



Engineering and Testing for EMC and Safety Compliance

CERTIFICATION APPLICATION REPORT  
FCC PART 15.247 CERTIFICATION

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<b>FCC ID:</b>	QVT-525A	<b>GRANTEE FRN NUMBER:</b>	0008305898
<b>PLAT FORM:</b>	N/A	<b>RTL WORK ORDER NUMBER:</b>	2004121
<b>MODEL(S):</b>	3e-525A	<b>RTL QUOTE NUMBER:</b>	QRTL04-194B
<b>DATE OF TEST REPORT:</b>	September 1, 2004		
<b>American National Standard Institute:</b>	ANSI C63.4: Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz		
<b>FCC Classification:</b>	DSS – Part 15 Spread Spectrum Transmitter		
<b>FCC Rule Part(s):</b>	Part 15.247: Operation within the bands 920-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz Direct Sequence System 97-114: Amendment of Parts 2 and 15 of the Commission's Rules Regarding Spread Spectrum Transmitters; ET Docket No. 96-8		
<b>Digital Interface Information</b>	Digital Interface was found to be compliant		
<b>Receiver Information</b>	Receiver was found to be compliant		
<b>Frequency Range (MHz)</b>	<b>Output Power* (W)</b>	<b>Frequency Tolerance</b>	<b>Emission Designator</b>
2412-2462	0.275	N/A	N/A

\* output power is maximum peak conducted

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 FCC Part 2, FCC Part 15, FCC 97-114, and ANSI C63.4.

Signature: Desmond A. Fraser

Date: September 1, 2004

Typed/Printed Name: Desmond A. Fraser

Position: President

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## **1 GENERAL INFORMATION**

### **1.1 SCOPE**

FCC Rules Part 15.247: 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.

A direct sequence (DS) system is a spread spectrum (SS) system in which the carrier has been modulated by a high speed spreading code and an information data stream. The high-speed code sequence dominates the “modulating function” and is the direct cause of the wide spreading of the transmitted signal.

### **1.2 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 2001).

### **1.3 RELATED SUBMITTAL(S)/GRANT(S)**

This is an original application for Certification for AEPTEC Microsystems, Inc. / 3e Technologies International, Inc., Model 3e-525A, Wireless Access Point, FCC ID: QVT-525A. The IF, LO and up to the 2<sup>nd</sup> LO were investigated and tested.

### **1.4 MODIFICATIONS**

No modifications were made to the EUT.

## 2 TEST INFORMATION

### 2.1 TEST JUSTIFICATION

The EUT was tested in all three orthogonal planes in order to determine worst-case emissions. Channel 1 at 2412 MHz, channel 6 at 2437 MHz and channel 11 at 2462 MHz were tested and investigated from 9 kHz to 24 GHz. Data for all three channels are presented in this report.

The EUT has three identical antennas (5 dBi). One antenna transmits and receives the 802.11b signals (this is the LAN side of the EUT). The second antenna transmits and receives the 802.11g signals (this is the bridge side of the EUT). The third antenna is used for receive diversity. The two transmit antenna are greater than 20 cm apart.

### 2.2 EXERCISING THE EUT

The EUT was provided with software to continuously transmit 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 2-1: TEST RESULT SUMMARY FOR FCC RULES AND REGULATIONS**

STANDARD	TEST	PASS/FAIL OR N/A
FCC 15.205	Compliance with the Restricted Band Edge	Pass
FCC 15.207	Conducted Emissions	Pass
FCC 15.209	Radiated Emissions	Pass
FCC 15.247(a)(2)	Modulated Bandwidth	Pass
FCC 15.247(b)	Power Output	Pass
FCC 15.247(c)	Antenna Conducted Spurious Emissions	Pass
FCC 15.247(d)	Power Spectral Density	Pass

## 2.4 TEST SYSTEM DETAILS

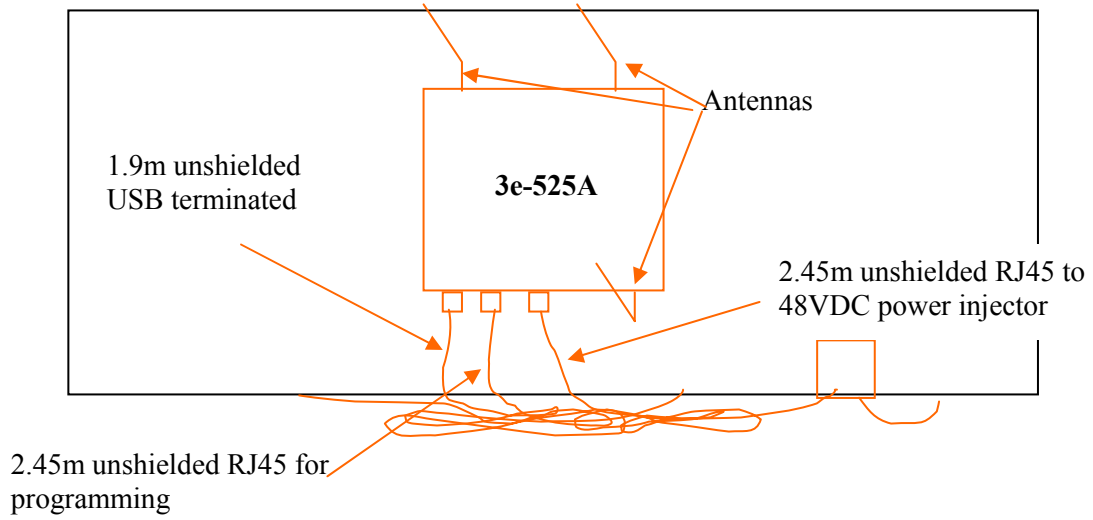
The test sample was received on August 6, 2004. The FCC identifiers for all applicable equipment, plus descriptions of all cables used in the tested system, are identified in Table 2-2.

**TABLE 2-2: EQUIPMENT UNDER TEST (EUT)**

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
3e-525A	3e Technologies International	3e525A	3e00957	QVT-525A	1.9m USB unshielded; 2-2.45m RJ45 shielded	016093
5 dBi Antenna	NA	NA	NA	NA	NA	016096
5 dBi Antenna	NA	NA	NA	NA	NA	016095
5 dBi Antenna	NA	NA	NA	NA	NA	016094
Lightning Protectors Reverse Polarity	NA	NA	NA	NA	NA	016113
Lightning Protectors Reverse Polarity	NA	NA	NA	NA	NA	016112
ITE AC Adapter; Power Injector 48 VDC	3Com	CTG#03044	757120030447	NA	1.8m Unshielded power	016098



## 2.5 CONFIGURATION OF TESTED SYSTEM



**FIGURE 1: WORST CASE CONFIGURATION OF SYSTEM UNDER TEST**

### **3 COMPLIANCE WITH FCC §15.31(M)**

In accordance with FCC 15.31(m), and because the EUT utilizes an operating band greater than 10 MHz, three frequencies were investigated. The following frequencies were tested: 2412 MHz, 2437 MHz and 2462 MHz. Both the 802.11b and 802.11g transmissions were investigated and found to be compliant.

### **4 COMPLIANCE WITH FCC §15.203**

The device uses unique antenna connectors not readily available to the public.

### **5 COMPLIANCE WITH FCC §15.204**

Please see Appendix B for antenna specifications.

## 6 CONDUCTED LIMITS – FCC §15.207

### 6.1 CONDUCTED TEST DATA

**TABLE 6-1: CONDUCTED TEST DATA; MODE TX, CHANNEL 1, NEUTRAL SIDE (LINE 1)**

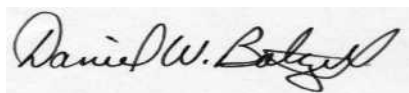
Temperature: 74°F Humidity: 43%										
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)	Pass/Fail	Comments
0.165	Pk	46.7	2.0	48.7	65.6	-16.9	55.6	-6.9	Pass	
0.264	Pk	40.0	1.8	41.8	62.7	-20.9	52.7	-10.9	Pass	
0.350	Pk	41.1	1.0	42.1	60.3	-18.2	50.3	-8.2	Pass	
0.702	Pk	42.1	0.9	43	56.0	-13.0	46.0	-3.0	Pass	
4.070	Pk	34.3	1.8	36.1	56.0	-19.9	46.0	-9.9	Pass	
39.350	Pk	43.1	4.5	47.6	60.0	-12.4	50.0	-2.4	Pass	

**TABLE 6-2: CONDUCTED TEST DATA; MODE TX, CHANNEL 1 HOT SIDE (LINE 2)**

Temperature: 74°F Humidity: 43%										
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)	Pass/Fail	Comments
0.174	Pk	44.40	1.9	46.3	65.3	-19.0	55.3	-9.0	Pass	
0.262	Pk	38.90	1.8	40.7	62.8	-22.1	52.8	-12.1	Pass	
0.346	Pk	41.00	1.0	42	60.4	-18.4	50.4	-8.4	Pass	
0.458	Pk	40.90	1.0	41.9	56.0	-14.1	46.0	-4.1	Pass	
4.220	Pk	35.00	1.8	36.8	56.0	-19.2	46.0	-9.2	Pass	
27.281	Pk	33.90	4.5	38.4	60.0	-21.6	50.0	-11.6	Pass	

**TEST PERSONNEL:**

Daniel W. Baltzell  
 EMC Test Engineer



Signature

August 6, 2004  
 Date Of Test

**TABLE 6-3: CONDUCTED TEST DATA; MODE TX, CHANNEL 6, NEUTRAL SIDE (LINE 1)**

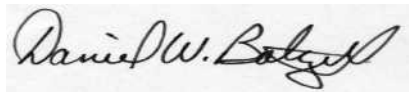
Temperature: 74°F Humidity: 43%										
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)	Pass/Fail	Comments
0.165	Pk	46.7	2.0	48.7	65.6	-16.9	55.6	-6.9	Pass	
0.264	Pk	40.0	1.8	41.8	62.7	-20.9	52.7	-10.9	Pass	
0.350	Pk	41.1	1.0	42.1	60.3	-18.2	50.3	-8.2	Pass	
0.702	Pk	42.1	0.9	43	56.0	-13.0	46.0	-3.0	Pass	
4.070	Pk	34.3	1.8	36.1	56.0	-19.9	46.0	-9.9	Pass	
29.350	Pk	43.1	4.5	47.6	60.0	-12.4	50.0	-2.4	Pass	

**TABLE 6-4: CONDUCTED TEST DATA; MODE TX, CHANNEL 6 HOT SIDE (LINE 2)**

Temperature: 74°F Humidity: 43%										
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)	Pass/Fail	Comments
0.174	Pk	44.40	1.9	46.3	65.3	-19.0	55.3	-9.0	Pass	
0.262	Pk	38.90	1.8	40.7	62.8	-22.1	52.8	-12.1	Pass	
0.346	Pk	41.00	1.0	42	60.4	-18.4	50.4	-8.4	Pass	
0.458	Pk	40.90	1.0	41.9	56.0	-14.1	46.0	-4.1	Pass	
4.220	Pk	35.00	1.8	36.8	56.0	-19.2	46.0	-9.2	Pass	
27.281	Pk	33.90	4.5	38.4	60.0	-21.6	50.0	-11.6	Pass	

**TEST PERSONNEL:**

Daniel W. Baltzell  
 EMC Test Engineer



Signature

August 6, 2004  
 Date Of Test

**TABLE 6-5: CONDUCTED TEST DATA; MODE TX, CHANNEL 11, NEUTRAL SIDE (LINE 1)**

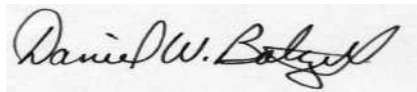
Temperature: 74°F Humidity: 43%										
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)	Pass/Fail	Comments
0.156	Pk	48.8	2.0	50.8	65.8	-15.0	55.8	-5.0	Pass	
0.266	Pk	41.6	1.8	43.4	62.7	-19.3	52.7	-9.3	Pass	
0.354	Pk	41.2	1.0	42.2	60.2	-18.0	50.2	-8.0	Pass	
0.881	Pk	38.3	0.9	39.2	56.0	-16.8	46.0	-6.8	Pass	
4.100	Pk	34.4	1.8	36.2	56.0	-19.8	46.0	-9.8	Pass	
29.320	Pk	42.3	4.5	46.8	60.0	-13.2	50.0	-3.2	Pass	

**TABLE 6-6: CONDUCTED TEST DATA; MODE TX, CHANNEL 11 HOT SIDE (LINE 2)**

Temperature: 74°F Humidity: 43%										
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)	Pass/Fail	Comments
0.175	Pk	49.1	1.9	51	65.3	-14.3	55.3	-4.3	Pass	
0.268	Pk	39.6	1.8	41.4	62.6	-21.2	52.6	-11.2	Pass	
0.356	Pk	40.9	1.0	41.9	60.1	-18.2	50.1	-8.2	Pass	
0.970	Pk	40.4	0.9	41.3	56.0	-14.7	46.0	-4.7	Pass	
4.160	Pk	36.4	1.8	38.2	56.0	-17.8	46.0	-7.8	Pass	
29.350	Pk	42.2	4.5	46.7	60.0	-13.3	50.0	-3.3	Pass	

**TEST PERSONNEL:**

Daniel W. Baltzell  
 EMC Test Engineer



Signature

August 6, 2004  
 Date Of Test

## 7 COMPLIANCE WITH THE BAND EDGE – FCC §15.247(C), §15.205

### 7.1 TEST PROCEDURE

Compliance with the band edges was performed using the FCC’s “Radiated Measurement at a Band Edge” guidance document. The data taken in this report represents the worst case operation.

### 7.2 BAND EDGE TEST EQUIPMENT

**TABLE 7-1: BAND EDGE TEST EQUIPMENT**

RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER	CALIBRATION DUE DATE
901215	Hewlett Packard	8596EM (9 kHz-12.8 GHz)	EMC Analyzer	3826A00144	8/27/04
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	5/20/07

### 7.3 RESTRICTED BAND EDGE PLOTS

#### 802.11b AP Outdoor Antenna Port

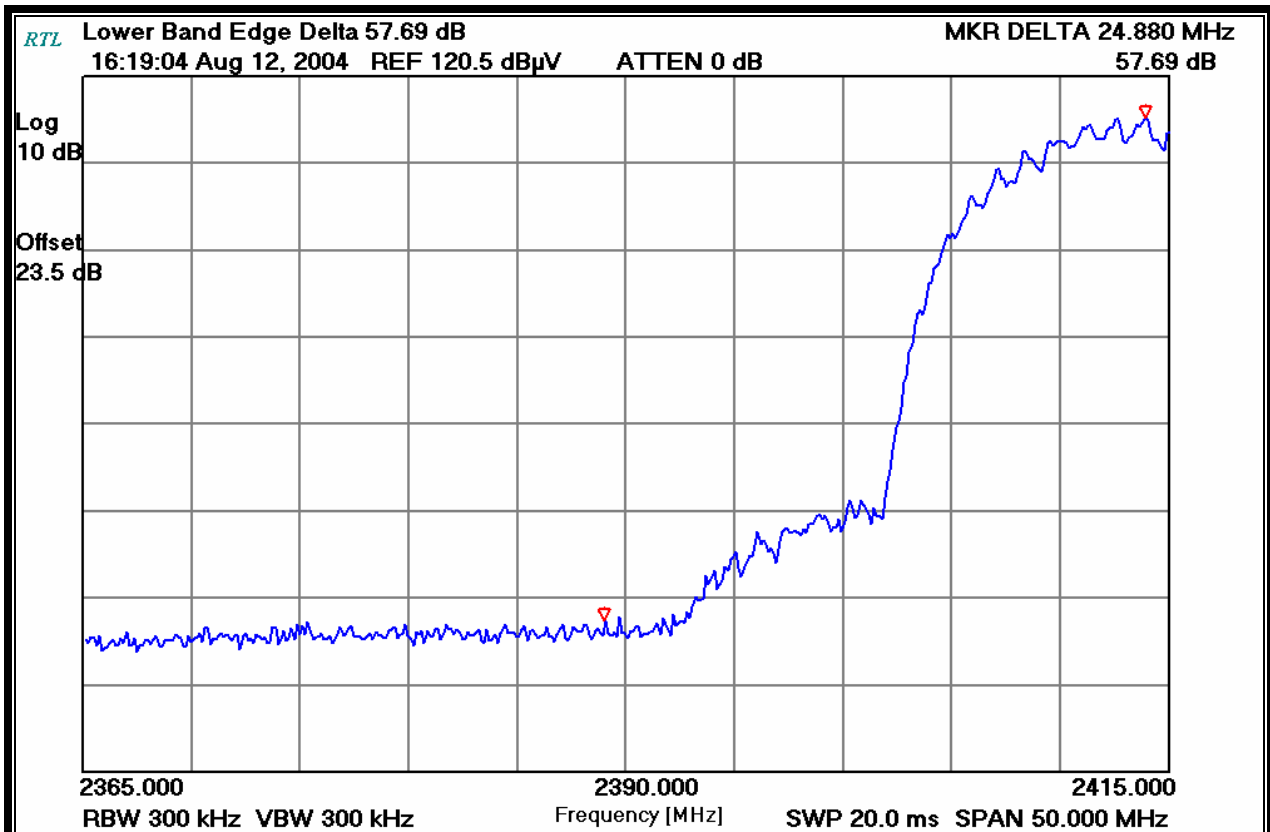
##### Calculation of Lower Band Edge

The level 109.4 dBuV/m is the field strength measurement, from which the delta measurement of 57.7 dB is subtracted (reference plots), which is equivalent to a level of 51.7 dB. This level has a margin of 2.3 dB below the limit of 54 dBuV/m.

Calculation:  $109.4 \text{ dBuV/m} - 57.7 \text{ dB} - 54 \text{ dBuV/m} = -2.3 \text{ dB}$

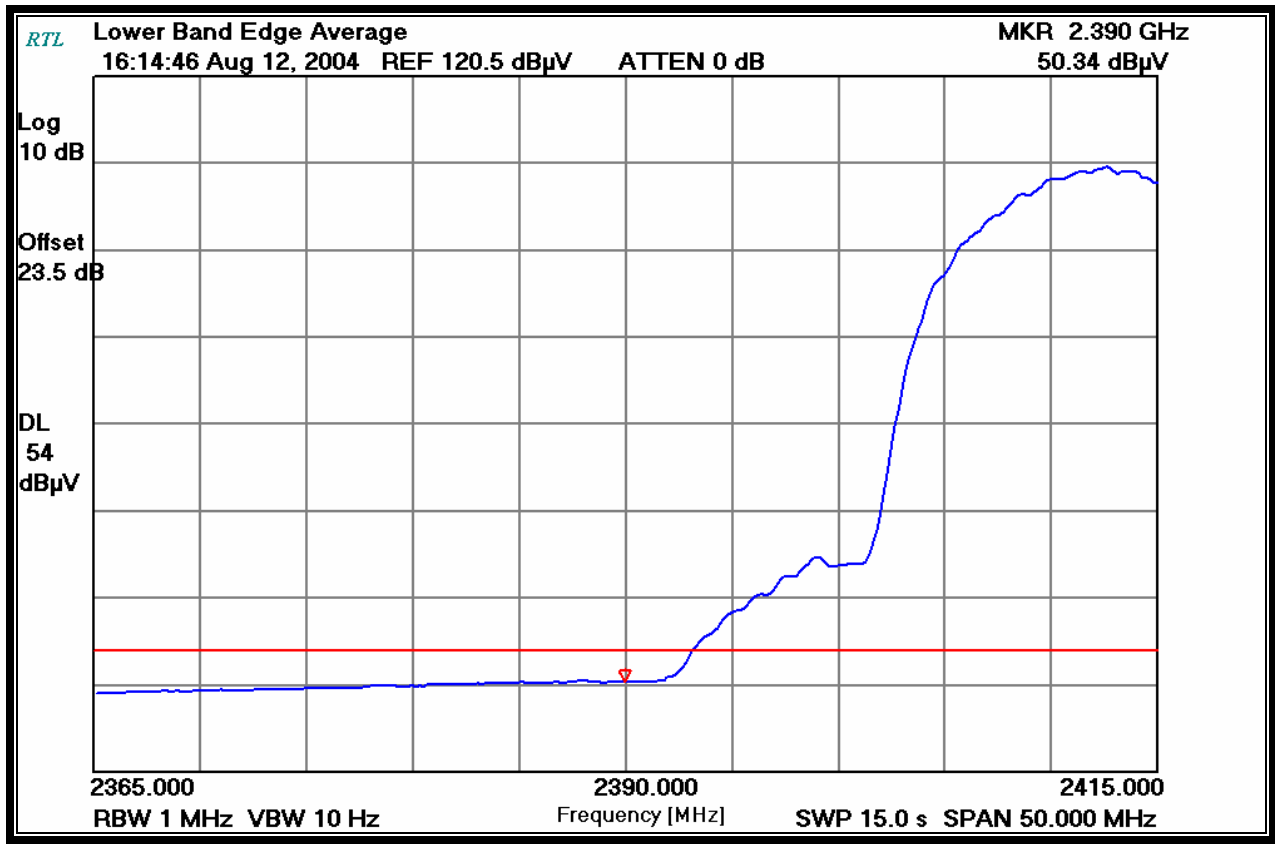
Field strength of Lower Band Edge (1 MHz RBW/10 Hz VBW) = 109.4 dBuV/m  
 Delta measurement = 55.8 dB

**PLOT 7-1: LOWER BAND EDGE: MARKER-DELTA METHOD (TX FREQUENCY: 2412 MHZ)**



**802.11b AP Outdoor Antenna Port**

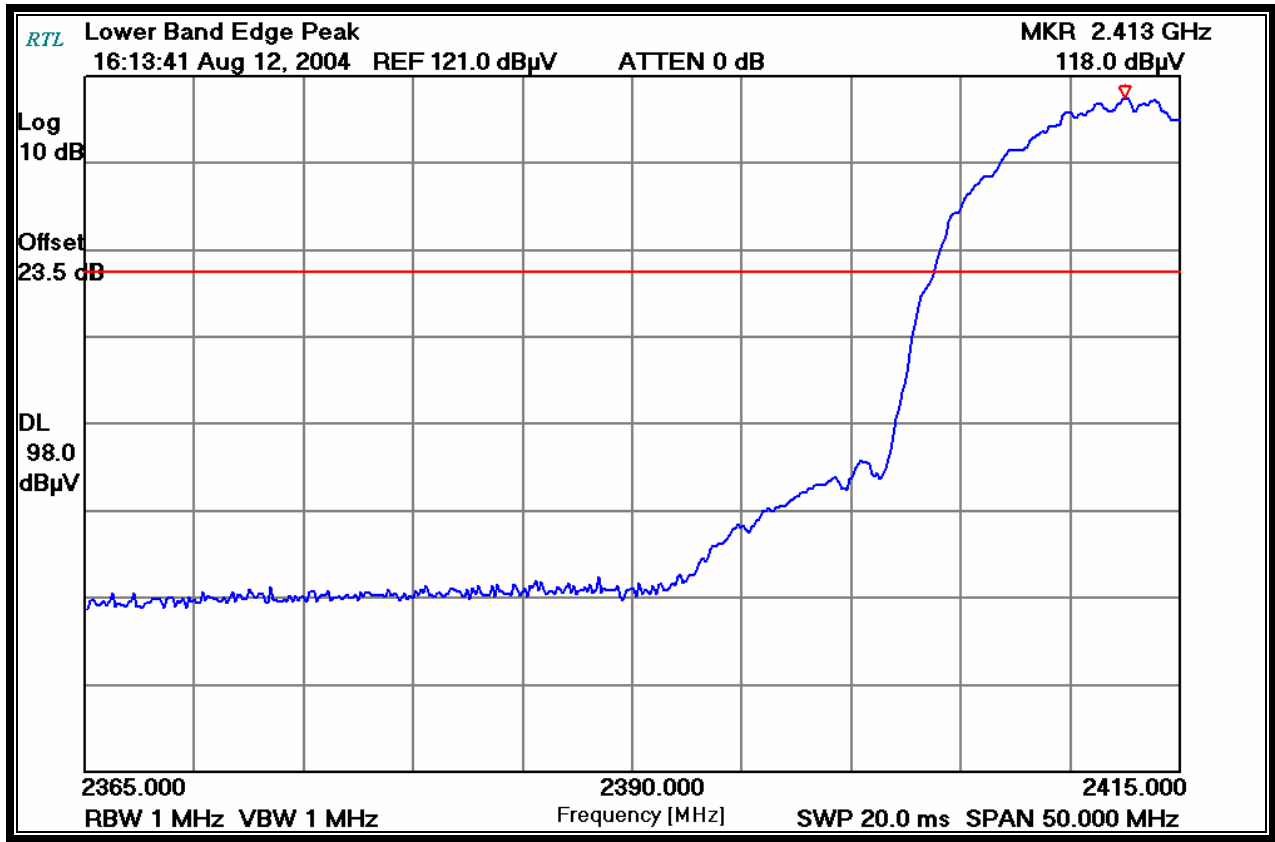
**PLOT 7-2: LOWER BAND EDGE: AVERAGE MEASUREMENT (TX FREQUENCY: 2412 MHZ)**





**802.11b AP Outdoor Antenna Port**

**PLOT 7-3: LOWER BAND EDGE: PEAK MEASUREMENT (TX FREQUENCY: 2412 MHZ)**



## 802.11b AP Outdoor Antenna Port

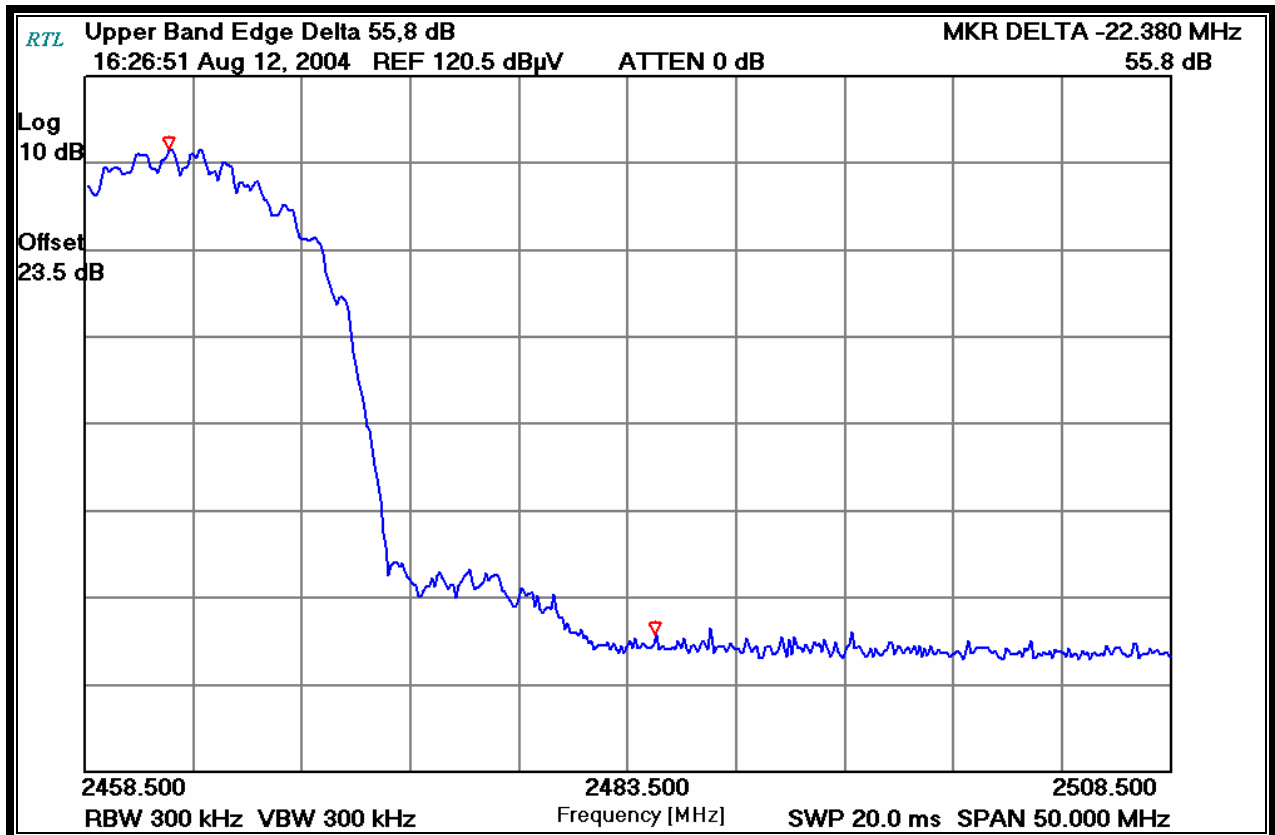
### Calculation of Upper Band Edge

The level 106.0 dBuV/m is the field strength measurement, from which the delta measurement of 55.8 dB is subtracted (reference plots), which is equivalent to a level of 50.2 dB. This level has a margin of 3.8 dB below the limit of 54 dBuV/m.

Calculation:  $106.0 \text{ dBuV/m} - 55.8 \text{ dB} - 54 \text{ dBuV/m} = -3.8 \text{ dB}$

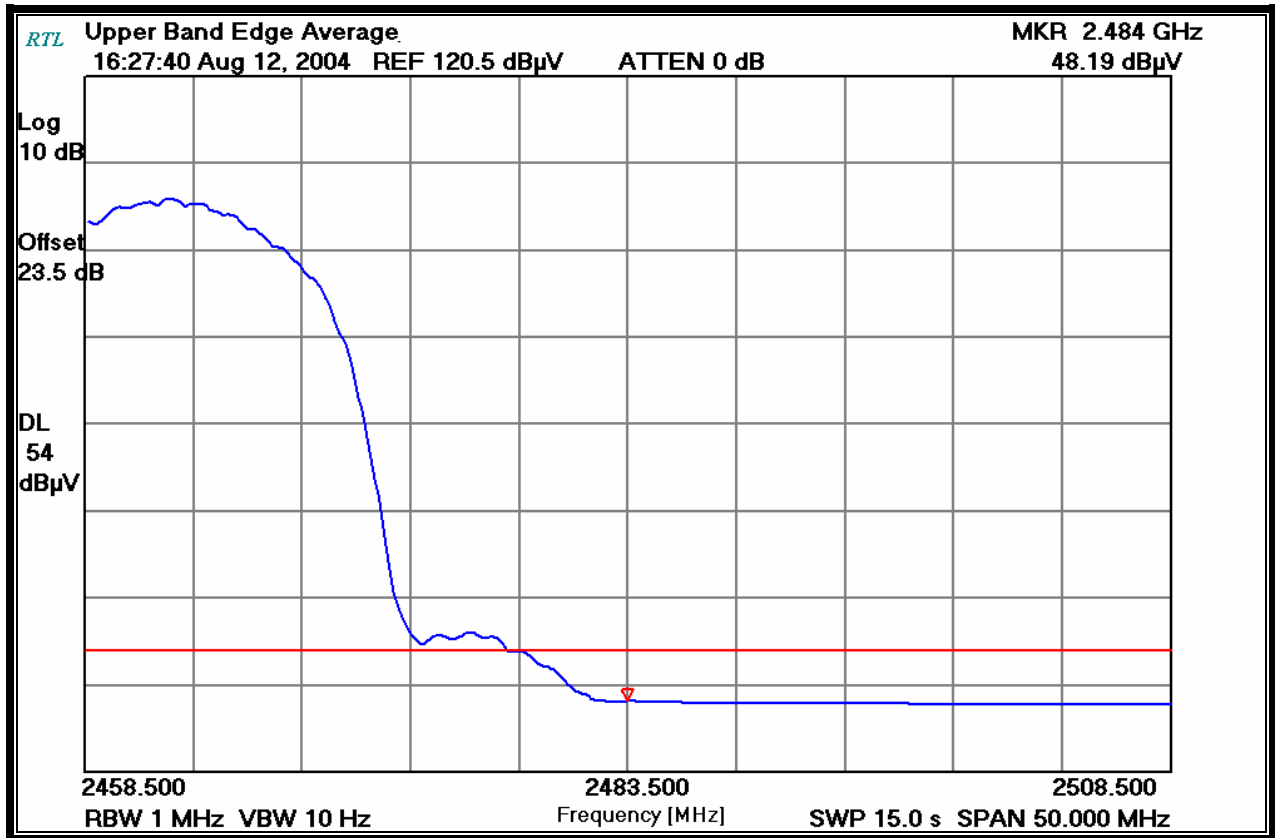
Field strength of Upper Band Edge (1 MHz RBW/10 Hz VBW) = 106.0 dBuV/m  
Delta measurement = 55.8 dB

### **PLOT 7-4: UPPER BAND EDGE: MARKER-DELTA METHOD (TX FREQUENCY: 2462 MHz)**



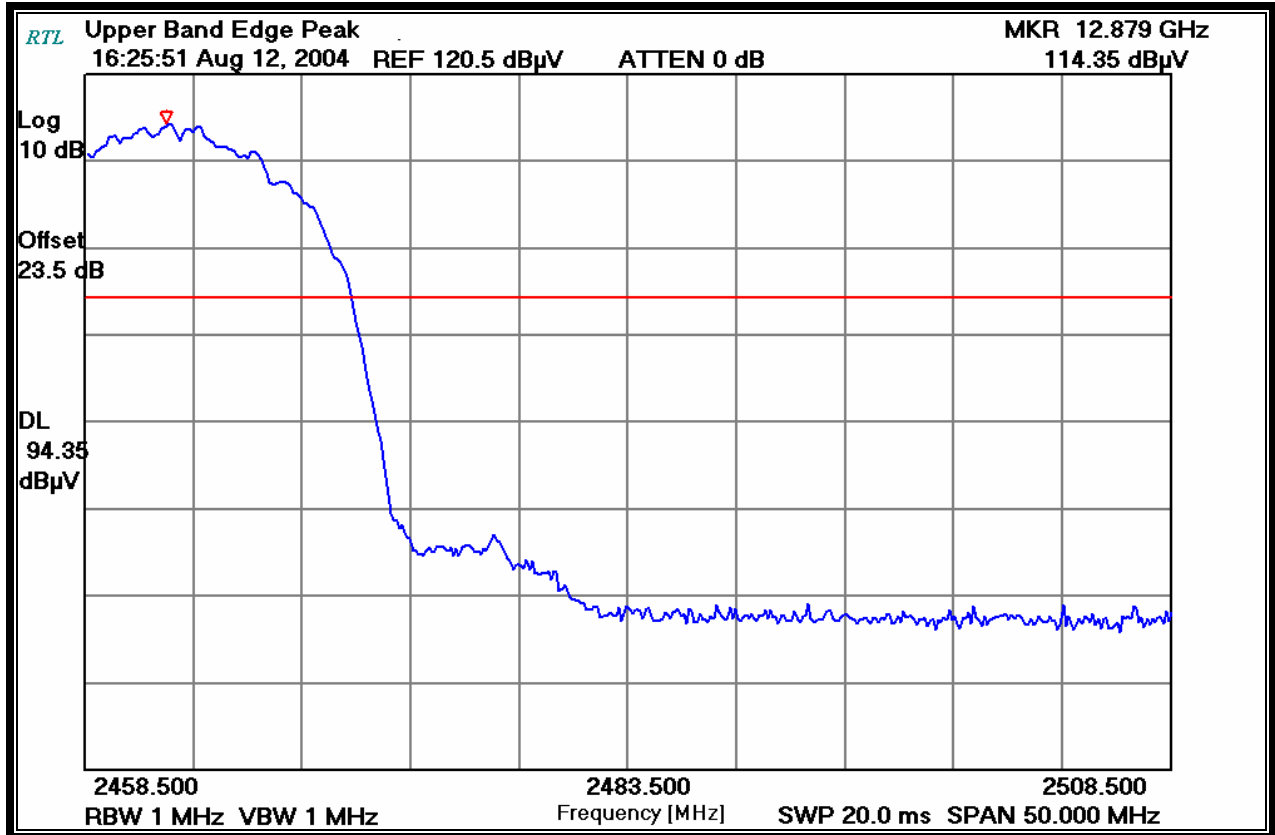
**802.11b AP Outdoor Antenna Port**

**PLOT 7-5: UPPER BAND EDGE: AVERAGE MEASUREMENT (TX FREQUENCY: 2462 MHZ)**



**802.11b AP Outdoor Antenna Port**

**PLOT 7-6: UPPER BAND EDGE: PEAK MEASUREMENT (TX FREQUENCY: 2462 MHz)**



**TEST PERSONNEL:**

Daniel W. Baltzell  
Test Engineer

Signature

August 12, 2004  
Dates Of Test

### 802.11g Bridge Antenna Port

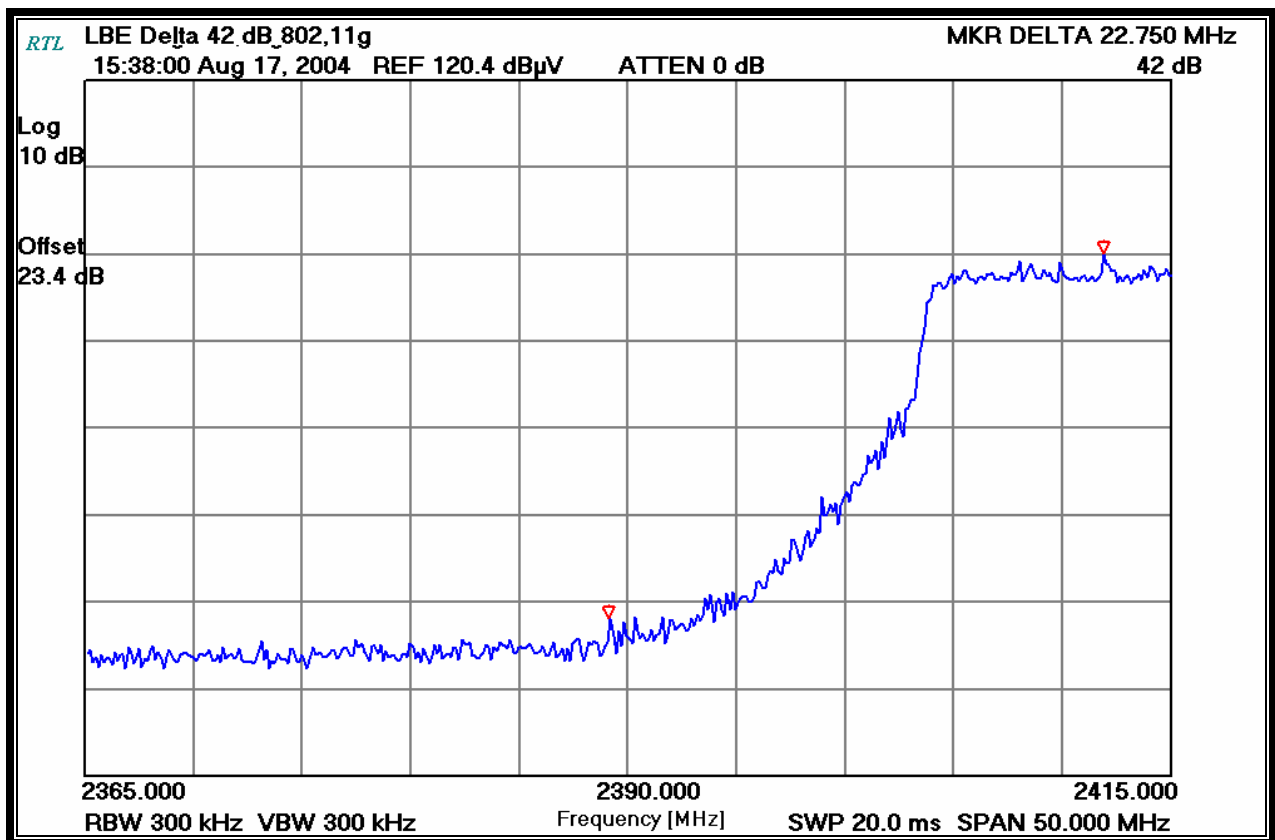
#### Calculation of Lower Band Edge

The level 93.9 dBuV/m is the field strength measurement, from which the delta measurement of 42 dB is subtracted (reference plots), which is equivalent to a level of 51.9 dB. This level has a margin of 2.1 dB below the limit of 54 dBuV/m.

Calculation:  $93.9 \text{ dBuV/m} - 42.0 \text{ dB} - 54 \text{ dBuV/m} = -2.1 \text{ dB}$

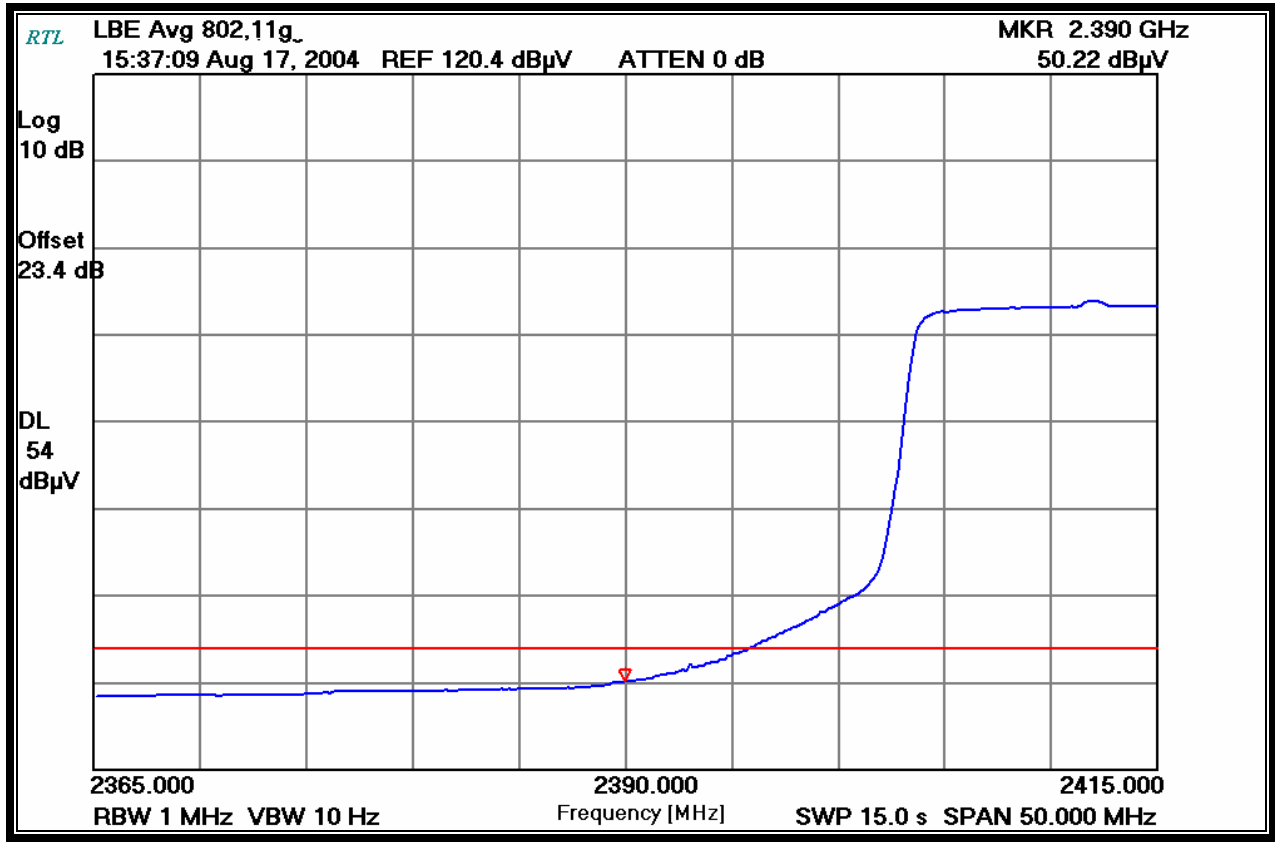
Field strength of Lower Band Edge (1 MHz RBW/10 Hz VBW) = 93.9 dBuV/m  
Delta measurement = 42.0 dB

**PLOT 7-7: LOWER BAND EDGE: MARKER-DELTA METHOD (TX FREQUENCY: 2412 MHZ)**



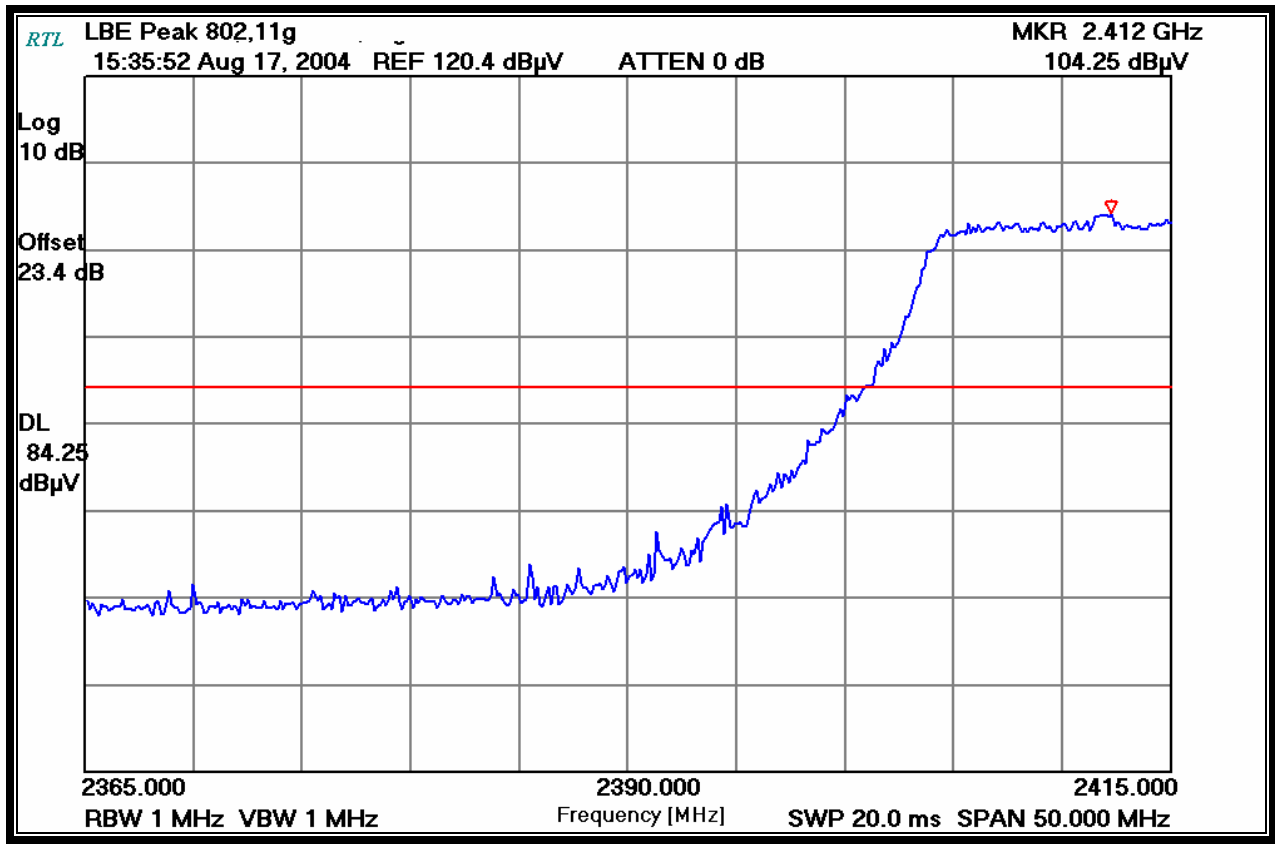
**802.11g Bridge Antenna Port**

**PLOT 7-8: LOWER BAND EDGE: AVERAGE MEASUREMENT (TX FREQUENCY: 2412 MHZ)**



**802.11g Bridge Antenna Port**

**PLOT 7-9: LOWER BAND EDGE: PEAK MEASUREMENT (TX FREQUENCY: 2412 MHZ)**



**802.11g Bridge Antenna Port**

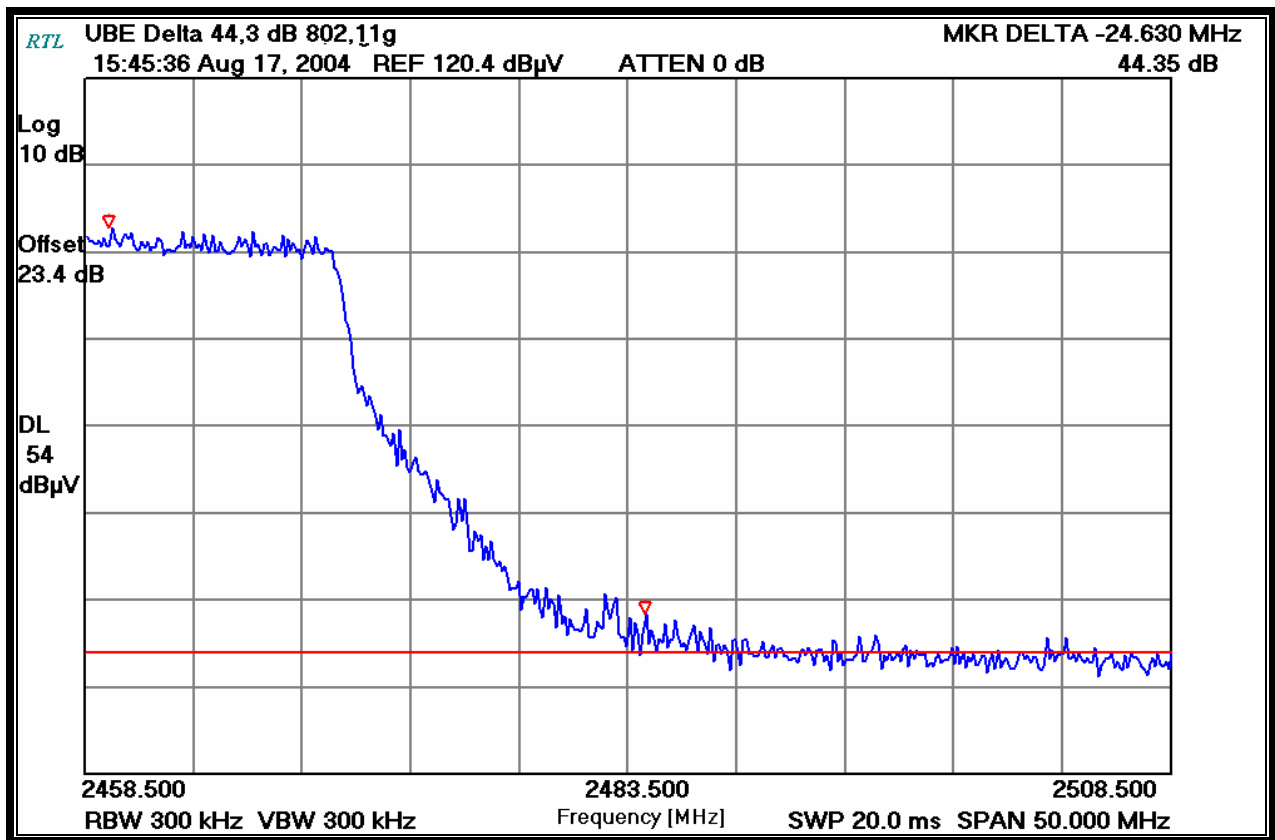
**Calculation of Upper Band Edge**

The level 96.4 dBuV/m is the field strength measurement, from which the delta measurement of 44.4 dB is subtracted (reference plots), which is equivalent to a level of 52.0 dB. This level has a margin of 2.0 dB below the limit of 54 dBuV/m.

Calculation:  $96.4 \text{ dBuV/m} - 44.4 \text{ dB} - 54 \text{ dBuV/m} = -2.0 \text{ dB}$

Field strength of Upper Band Edge (1 MHz RBW/10 Hz VBW) = 96.4 dBuV/m  
 Delta measurement = 44.4 dB

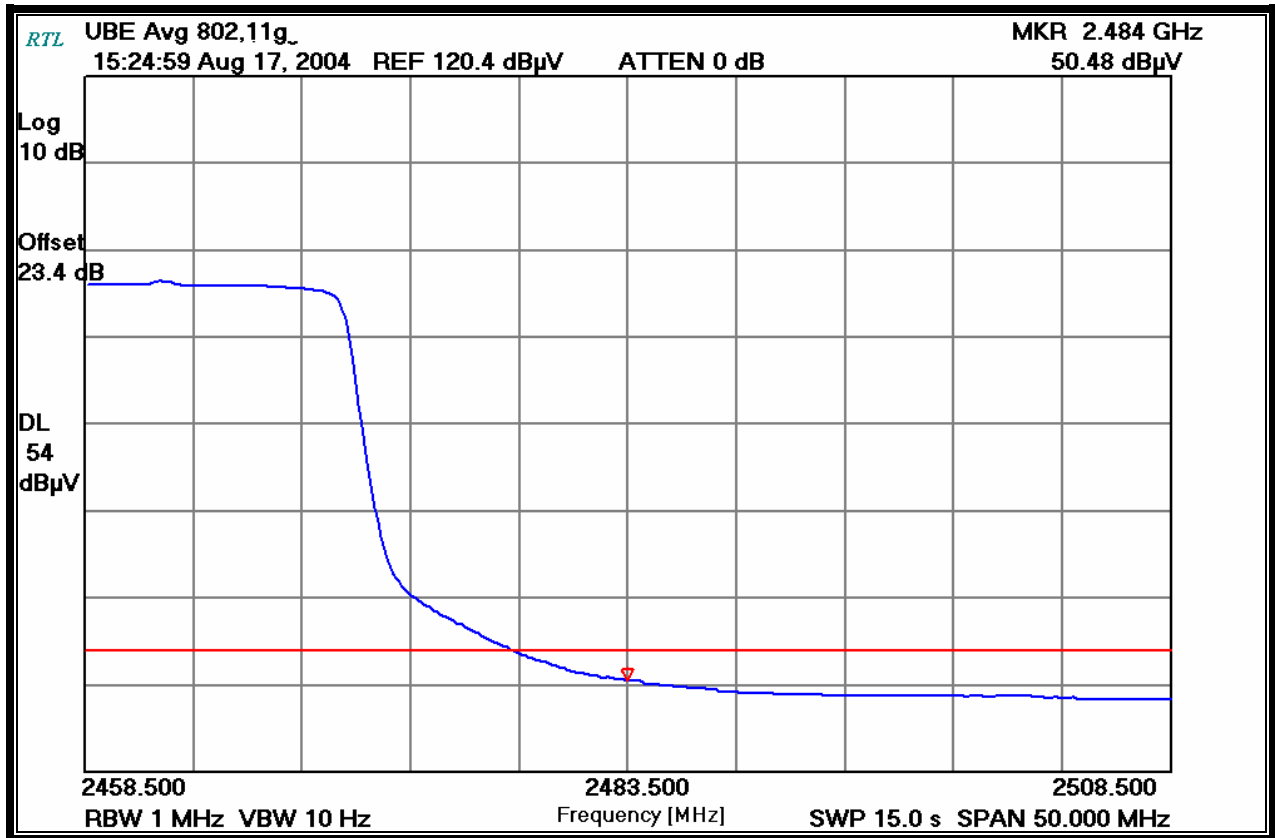
**PLOT 7-10: UPPER BAND EDGE: MARKER-DELTA METHOD (TX FREQUENCY: 2462 MHz)**





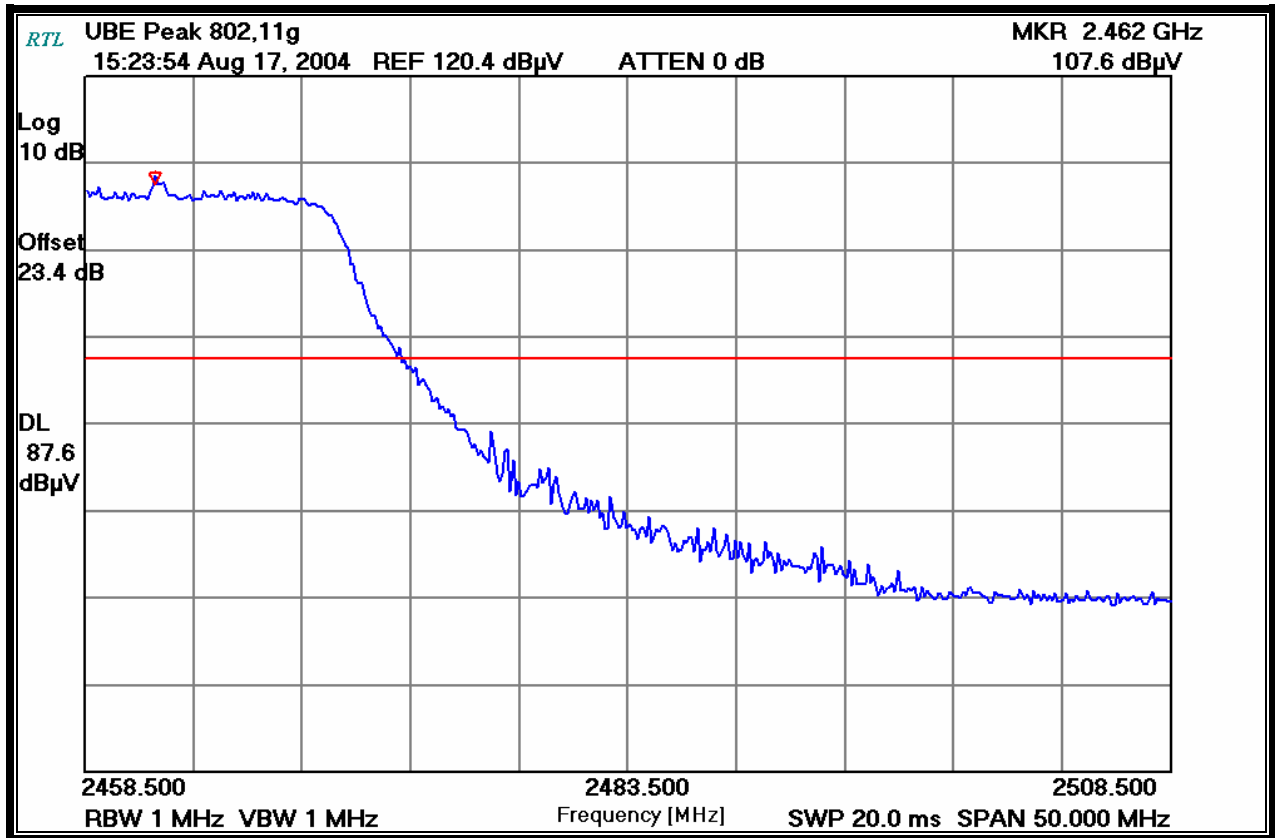
**802.11g Bridge Antenna Port**

**PLOT 7-11: UPPER BAND EDGE: AVERAGE MEASUREMENT (TX FREQUENCY: 2462 MHZ)**



**802.11g Bridge Antenna Port**

**PLOT 7-12: UPPER BAND EDGE: PEAK MEASUREMENT (TX FREQUENCY: 2462 MHZ)**



**TEST PERSONNEL:**

Daniel W. Baltzell  
Test Engineer

Signature

August 17, 2004  
Dates Of Test

## 8 RADIATED EMISSION; SPURIOUS AND HARMONICS – FCC §15.247(C)

### 8.1 RADIATED SPURIOUS EMISSION LIMITS TEST PROCEDURE

Radiated Spurious Emissions applies to harmonics and spurious emissions that fall in the restricted and non-restricted bands. The restricted bands are listed in Part 15.205. The maximum permitted average field strength for the restricted band is listed in Part 15.209. The EUT was tested in the 3 orthogonal planes.

### 8.2 RADIATED SPURIOUS TEST EQUIPMENT

**TABLE 8-1: RADIATED SPURIOUS EMISSIONS TEST EQUIPMENT**

RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER	CALIBRATION DUE DATE
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	5/20/07
900323	EMCO	3160-7	Horn Antennas (8.2 - 12.4 GHz)	9605-1054	5/20/07
900356	EMCO	3160-08	Horn Antennas (12.4 – 18 GHz)	9607-1044	5/20/07
900321	EMCO	3161-03	Horn Antenna (4.0 - 8.2 GHz)	9508-1020	5/20/07
901053	Schaffner & Chase	CBL6112B	Bilog Antenna (20 MHz - 2 GHz)	2648	9/3/04
900932	Hewlett Packard	8449B	Microwave Preamplifier (1 - 26.5 GHz)	3008A00505	5/5/05
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	8/11/05
901232	IW Microwave Products	KPW-1503-2400-KPS	High Frequency RF Cables	240"	9/5/04
901235	IW Microwave Products	KPS-1503-360-KPS	High Frequency RF Cables	36"	9/5/04

### 8.3 RADIATED EMISSIONS HARMONICS/SPURIOUS TEST DATA

#### 802.11b AP Outdoor Antenna Port

Field Strength =  $74.4 - 20 = 67.4$  limit for non-restricted band spurious emissions.

**TABLE 8-2: RADIATED EMISSIONS HARMONICS/SPURIOUS (TX FREQUENCY: 2412 MHZ)**

Emission Frequency (MHz)	Analyzer Reading (dBuV) Peak	Analyzer Reading (dBuV) Average	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4824.000	32.3	19.3	13.9	33.2	54.0	-20.8
7236.000	39.2	26.3	13.3	39.6	54.4	-14.8
9648.000	26.8	13.8	15.5	29.3	54.4	-25.1
12060.000	27.6	14.6	19.9	34.5	54.0	-19.5
14472.000	24.3	13.4	24.6	38.0	54.0	-16.0
16884.000	23.4	12.2	22.7	34.9	54.4	-19.5
19296.000	25.7	12.7	23.5	36.2	54.0	-17.8
21708.000	25.6	12.6	27.6	40.2	54.4	-14.2
24120.000	26.0	13.0	28.4	41.4	54.4	-13.0

PEAK: RES.=1 MHz, VID= 1MHz; AVERAGE: RES.=1 MHz, VID= 10Hz

**802.11b AP Outdoor Antenna Port**

Field Strength = 69.1 – 20 = 49.1 limit for non-restricted band spurious emissions.

**TABLE 8-3: RADIATED EMISSIONS HARMONICS/SPURIOUS (TX FREQUENCY: 2437 MHZ)**

Emission Frequency (MHz)	Analyzer Reading (dBuV) Peak	Analyzer Reading (dBuV) Average	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4874.000	34.1	19.6	13.2	32.8	54.0	-21.2
7311.000	36.5	23.5	12.4	35.9	54.0	-18.1
9748.000	27.1	14.2	15.5	29.7	49.1	-19.4
12185.000	27.0	14.0	19.1	33.1	54.0	-20.9
14622.000	22.6	10.3	25.5	35.8	49.1	-13.3
17059.000	23.5	11.4	22.5	33.9	49.1	-15.2
19496.000	25.3	12.3	23.6	35.9	54.0	-18.1
21933.000	25.7	12.8	27.7	40.5	49.1	-8.6
24370.000	25.9	12.8	28.5	41.3	49.1	-7.8

PEAK: RES. =1 MHz, VID= 1MHZ; AVERAGE: RES. =1 MHz, VID= 10HZ

**802.11b AP Outdoor Antenna Port**

Field Strength = 71.7 – 20 = 51.7 limit for non-restricted band spurious emissions.

**TABLE 8-4: RADIATED EMISSIONS HARMONICS/SPURIOUS (TX FREQUENCY: 2462 MHZ)**

Emission Frequency (MHz)	Analyzer Reading (dBuV) Peak	Analyzer Reading (dBuV) Average	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4924.000	24.4	11.4	13.3	24.7	54.0	-29.3
7386.000	26.2	14.0	14.0	28.0	54.0	-26.0
9848.000	26.7	14.5	16.1	30.6	51.7	-21.2
12310.000	26.0	13.3	19.1	32.4	54.0	-21.6
14772.000	24.3	12.2	26.5	38.7	51.7	-13.0
17234.000	23.4	13.2	22.3	35.5	51.7	-16.2
19696.000	26.2	13.3	23.4	36.7	54.0	-17.3
22158.000	25.9	12.8	27.8	40.6	54.0	-13.4
24620.000	26.9	13.8	28.6	42.4	51.7	-9.3

PEAK: RES. =1 MHz, VID= 1MHZ; AVERAGE: RES. =1 MHz, VID= 10HZ

**802.11g Bridge Antenna Port**

Field Strength = 75.2 – 20 = 55.2 limit for non-restricted band spurious emissions.

**TABLE 8-5: RADIATED EMISSIONS HARMONICS/SPURIOUS (TX FREQUENCY: 2412 MHZ)**

Emission Frequency (MHz)	Analyzer Reading (dBuV) Peak	Analyzer Reading (dBuV) Average	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4824.000	24.0	11.0	13.9	24.9	54.0	-29.1
7236.000	24.8	11.8	13.3	25.1	55.2	-30.2
9648.000	26.4	13.4	15.5	28.9	55.2	-26.3
12060.000	27.0	14.0	19.9	33.9	54.0	-20.2
14472.000	20.5	7.5	24.6	32.1	54.0	-21.9
16884.000	20.5	8.2	22.7	30.9	55.2	-24.3
19296.000	26.8	13.8	23.5	37.3	54.0	-16.7
21708.000	25.9	12.9	27.6	40.5	55.2	-14.7
24120.000	25.8	12.8	28.4	41.2	55.2	-14.0

PEAK: RES. =1 MHz, VID= 1MHz; AVERAGE: RES. =1 MHz, VID= 10Hz

**802.11g Bridge Antenna Port**

Field Strength = 76.8 – 20 = 56.8 limit for non-restricted band spurious emissions.

**TABLE 8-6: RADIATED EMISSIONS HARMONICS/SPURIOUS (TX FREQUENCY: 2437 MHZ)**

Emission Frequency (MHz)	Analyzer Reading (dBuV) Peak	Analyzer Reading (dBuV) Average	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4874.000	39.2	26.3	13.2	39.5	54.0	-14.5
7311.000	34.9	21.9	12.4	34.2	54.0	-19.8
9748.000	36.0	23.1	15.5	38.6	56.8	-18.2
12185.000	26.9	13.9	19.1	33.0	54.0	-21.0
14622.000	21.7	8.8	25.5	34.3	56.8	-22.5
17059.000	20.3	9.2	22.5	31.7	56.8	-25.1
19496.000	26.5	13.5	23.6	37.1	54.0	-16.9
21933.000	25.5	12.5	27.7	40.2	56.8	-16.6
24370.000	25.1	12.0	28.5	40.5	56.8	-16.3

PEAK: RES. =1 MHz, VID= 1MHz; AVERAGE: RES. =1 MHz, VID= 10Hz

**802.11g Bridge Antenna Port**

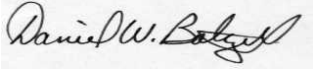
Field Strength = 75.8 – 20 = 55.8 limit for non-restricted band spurious emissions.

**TABLE 8-7: RADIATED EMISSIONS HARMONICS/SPURIOUS (TX FREQUENCY: 2462 MHZ)**

Emission Frequency (MHz)	Analyzer Reading (dBuV) Peak	Analyzer Reading (dBuV) Average	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4924.000	35.3	22.3	13.3	35.6	54.0	-18.4
7386.000	37.3	24.3	14.0	38.3	54.0	-15.7
9848.000	36.8	23.8	16.1	39.9	55.8	-15.9
12310.000	27.0	14.0	19.1	33.1	54.0	-20.9
14772.000	21.6	8.6	26.5	35.1	55.8	-20.7
17234.000	19.3	6.3	22.3	28.6	55.8	-27.2
19696.000	25.2	12.2	23.4	35.6	54.0	-18.4
22158.000	25.8	12.8	27.8	40.6	54.0	-13.4
24620.000	25.8	12.8	28.6	41.4	55.8	-14.4

PEAK: RES. =1 MHz, VID= 1MHz; AVERAGE: RES. =1 MHz, VID= 10Hz

**TEST PERSONNEL:**

Daniel W. Baltzell EMC Test Engineer	 Signature	August 9, 2004 Date Of Test
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## 9 MODULATED BANDWIDTH - §15.247(A)(2)

### 9.1 MODULATED 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 using the maximum 11 Mbps data rate. The minimum 6 dB bandwidths are presented in Table 10-2.

**TABLE 9-1: 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	6/23/05

**TABLE 9-2: MODULATED BANDWIDTH TEST DATA 802.11 B OUTDOOR ANTENNA PORT**

**Minimum 6 dB bandwidths**

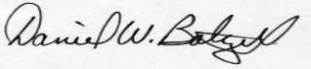
FREQUENCY (MHz)	6 dB BANDWIDTH (MHz)
2412	18.92
2437	19.46
2462	18.66

**TABLE 9-3: MODULATED BANDWIDTH TEST DATA 802.11G BRIDGE ANTENNA PORT**

**Minimum 6 dB bandwidths**

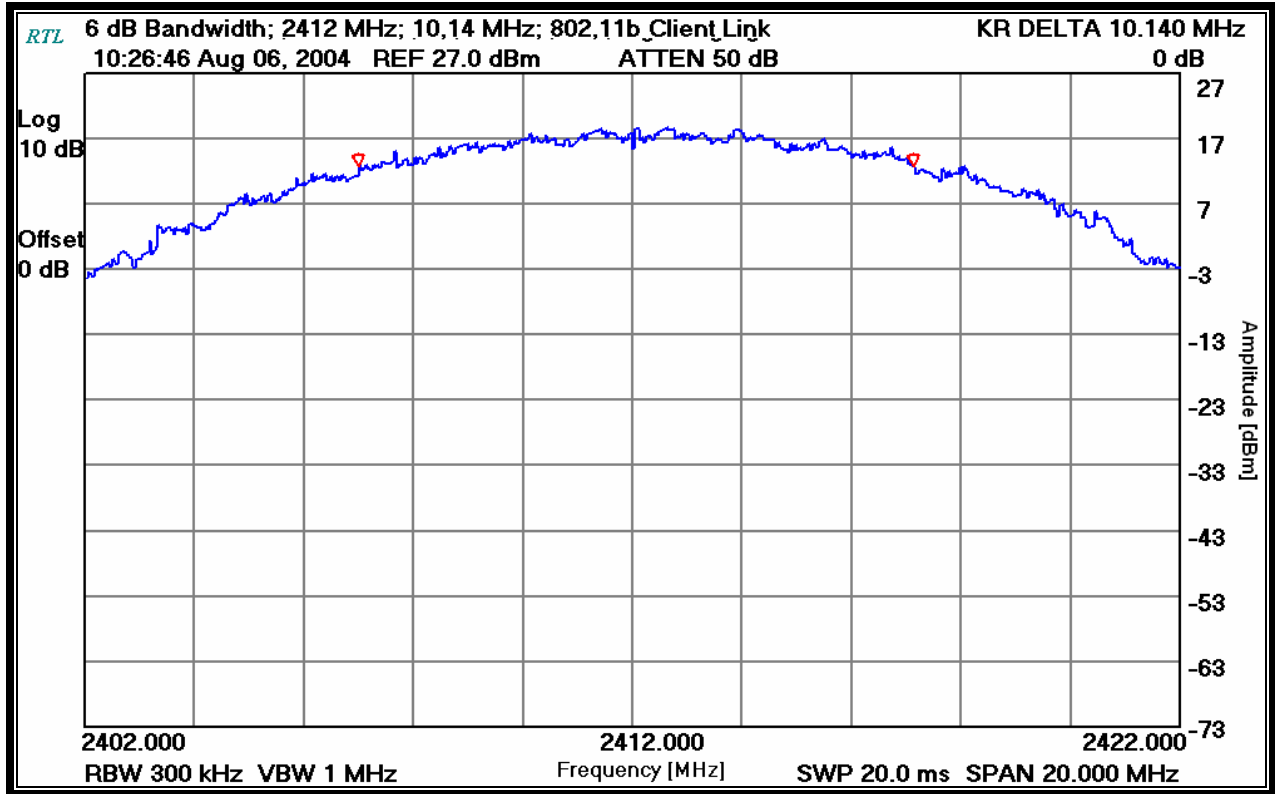
FREQUENCY (MHz)	6 dB BANDWIDTH (MHz)
2412	16.48
2437	16.24
2462	16.52

**TEST PERSONNEL:**

Daniel W. Baltzell EMC Test Engineer	 Signature	August 6, 2004 Date Of Test
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PLOT 9-1: 6 DB BANDWIDTH (TX FREQUENCY: 2412 MHZ) 802.11B ANTENNA PORT



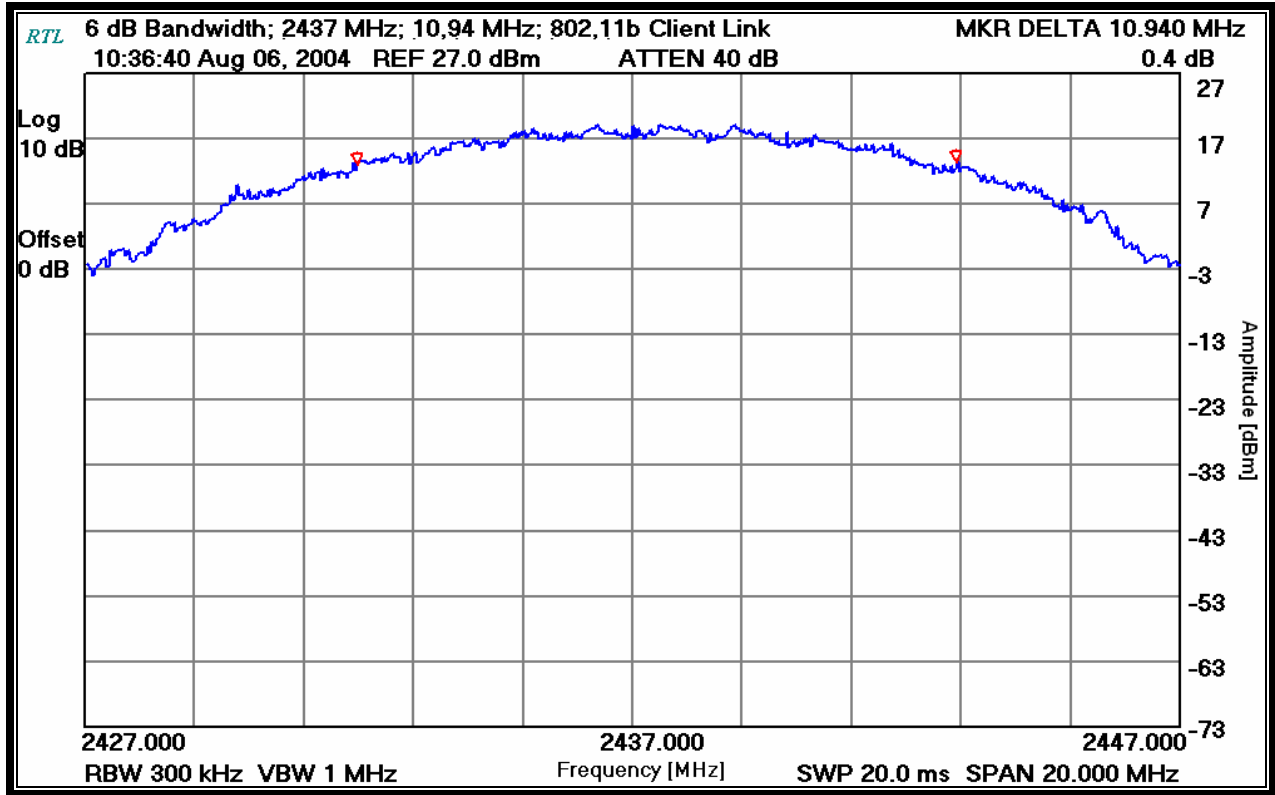
TEST PERSONNEL:

Daniel W. Baltzell  
EMC Test Engineer

Signature

August 6, 2004  
Date Of Test

PLOT 9-2: 6 DB BANDWIDTH (TX FREQUENCY: 2437 MHZ) 802.11B ANTENNA PORT



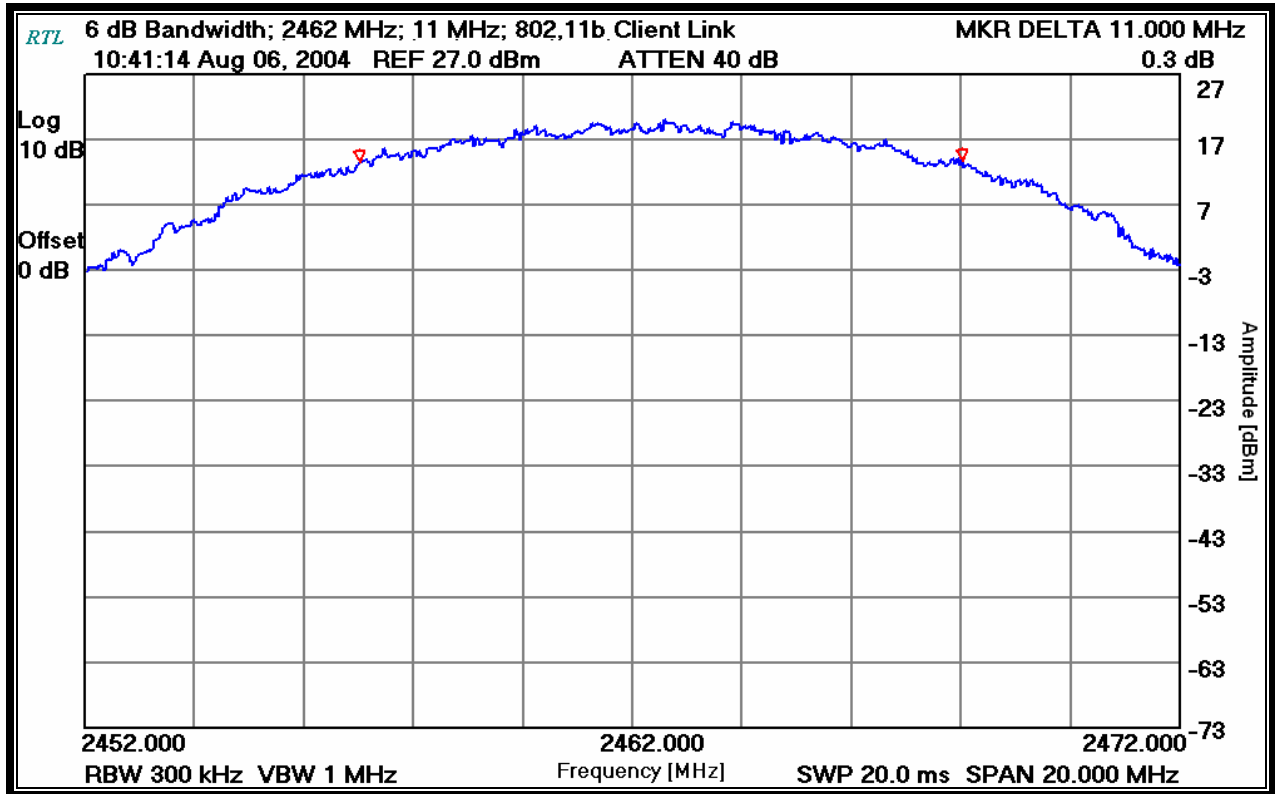
TEST PERSONNEL:

Daniel W. Baltzell  
EMC Test Engineer

Signature

August 6, 2004  
Date Of Test

PLOT 9-3: 6 DB BANDWIDTH (TX FREQUENCY: 2462 MHZ) 802.11B ANTENNA PORT



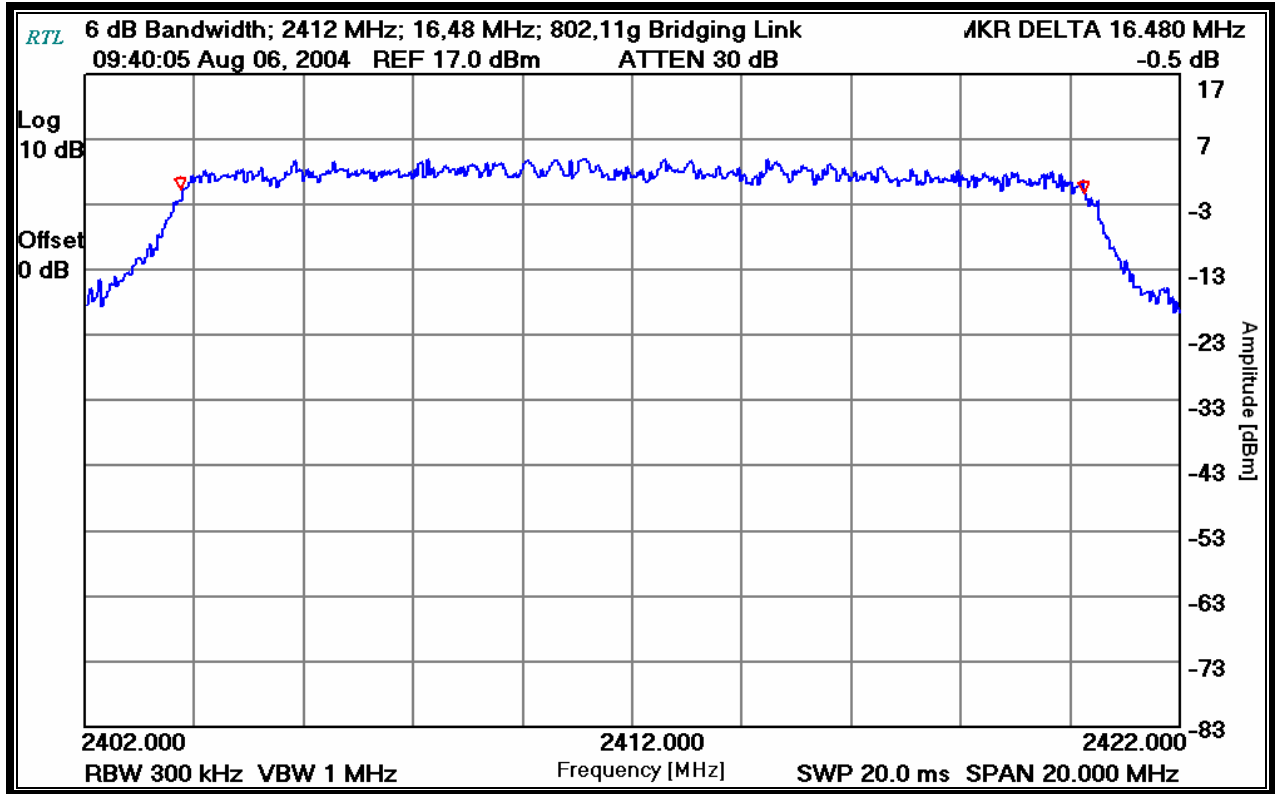
TEST PERSONNEL:

Daniel W. Baltzell  
EMC Test Engineer

Signature

August 6, 2004  
Date Of Test

PLOT 9-4: 6 DB BANDWIDTH (TX FREQUENCY: 2412 MHZ) 802.11G ANTENNA PORT



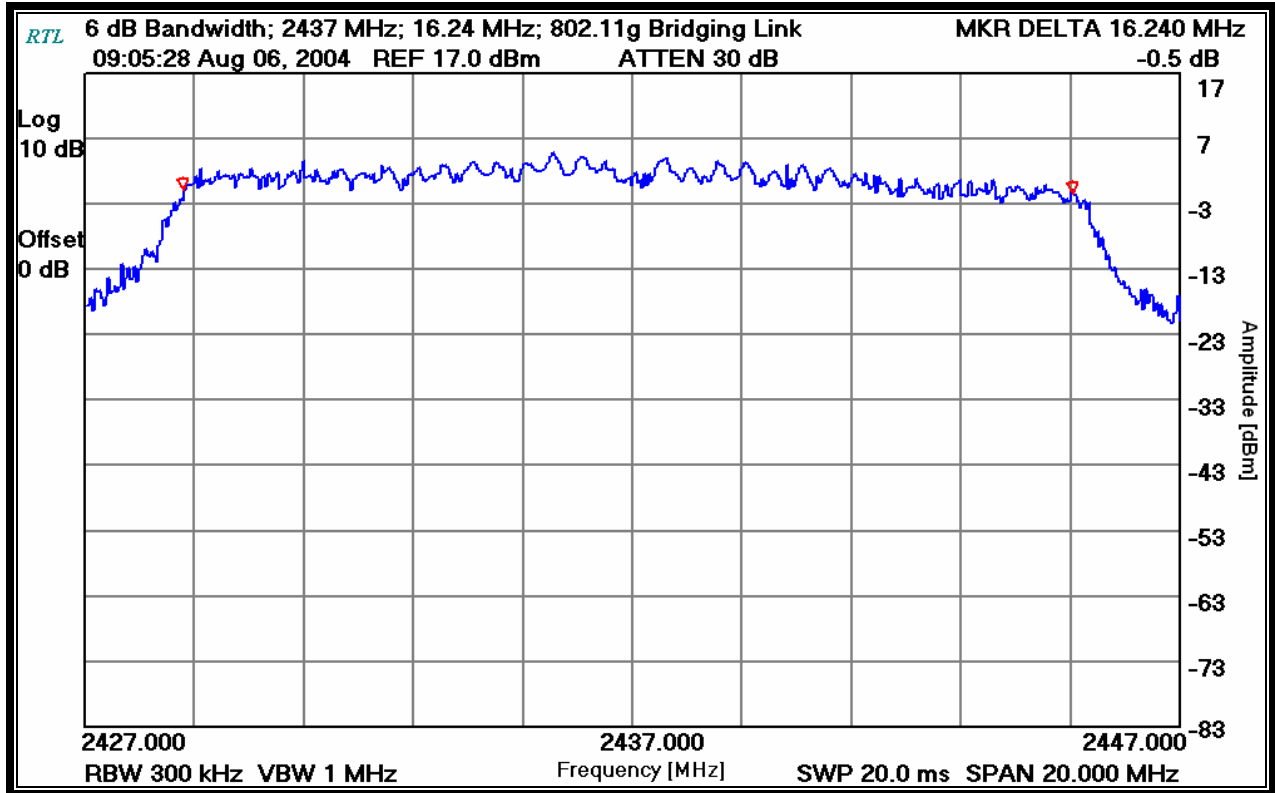
TEST PERSONNEL:

Daniel W. Baltzell  
EMC Test Engineer

*Daniel W. Baltzell*  
Signature

August 6, 2004  
Date Of Test

PLOT 9-5: 6 DB BANDWIDTH (TX FREQUENCY: 2437 MHZ) 802.11G ANTENNA PORT



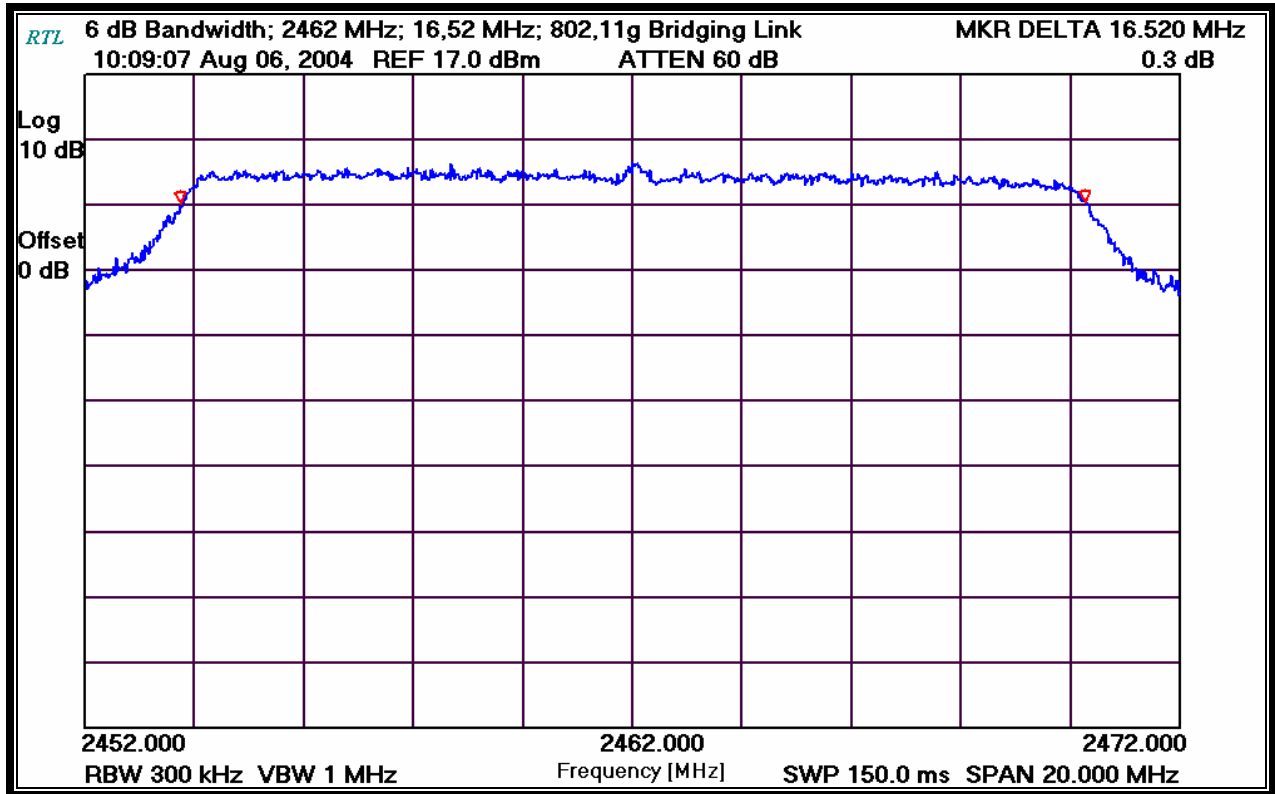
TEST PERSONNEL:

Daniel W. Baltzell  
EMC Test Engineer

Signature

August 6, 2004  
Date Of Test

**PLOT 9-6: 6 DB BANDWIDTH (TX FREQUENCY: 2462 MHZ) 802.11G ANTENNA PORT**



**TEST PERSONNEL:**

Daniel W. Baltzell  
EMC Test Engineer

Signature

August 6, 2004  
Date Of Test

## 10 PEAK OUTPUT POWER - §15.247(B)(1)

### 10.1 POWER OUTPUT TEST PROCEDURE

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

### 10.2 POWER OUTPUT TEST EQUIPMENT

TABLE 10-1: POWER OUTPUT TEST EQUIPMENT

RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER	CALIBRATION DUE DATE
901186	Agilent Technologies	E9323A	Peak & Avg. Power Sensor (50 MHz - 6 GHz)	US40410380	8/2/05
901184	Agilent Technologies	E4416A	EPM-P Power Meter, Single Channel	GB41050573	8/2/05
901140	Weinschel Corp.	47-10-34 DC-18GHz	Attenuator, 50W 10dB	BK6203	5/13/05

### 10.3 POWER OUTPUT TEST DATA

TABLE 10-2: POWER OUTPUT TEST DATA – 802.11B OUTDOOR ANTENNA PORT

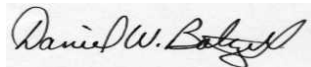
FREQUENCY (MHZ)	CHANNEL	PEAK POWER CONDUCTED OUTPUT (dBm)
2412	1	24.4
2437	6	23.5
2462	11	22.1

TABLE 10-3: POWER OUTPUT TEST DATA - 802.11G BRIDGE ANTENNA PORT

FREQUENCY (MHZ)	CHANNEL	PEAK POWER CONDUCTED OUTPUT (dBm)
2412	1	18.1
2437	6	18.9
2462	11	18.1

#### TEST PERSONNEL:

Daniel W. Baltzell  
 EMC Test Engineer



Signature

August 6, 2004  
 Date Of Test

## 11 ANTENNA CONDUCTED SPURIOUS EMISSIONS - §15.247(C)

### 11.1 ANTENNA CONDUCTED SPURIOUS EMISSIONS TEST PROCEDURES

Antenna spurious emission 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 300 kHz. The modulated carrier was identified at the following frequencies: 2412 MHz, 2437 MHz and 2462 MHz. No other harmonics or spurs were found within 20 dB of the carrier level from 9 kHz to the carrier 10<sup>th</sup> harmonic. See the Antenna Conducted Spurious Noise Table. The low, middle, and high frequencies were investigated and tested.

### 11.2 ANTENNA CONDUCTED SPURIOUS TEST EQUIPMENT

TABLE 11-1: ANTENNA CONDUCTED SPURIOUS TEST EQUIPMENT

RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER	CALIBRATION DUE DATE
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz – 22 GHz)	3138A07771	6/23/05
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	8/11/05



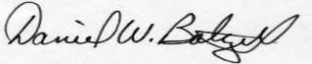
**11.3 ANTENNA CONDUCTED SPURIOUS EMISSIONS (TX FREQUENCY: 2412 MHZ); 802.11B OUTDOOR ANTENNA PORT**

Operating Frequency (MHz): 2412  
 Measured Level with 100 kHz RBW (dBm): 16.9  
 Limit (dBm): -3.1

**TABLE 11-2: CONDUCTED SPURIOUS EMISSIONS (TX FREQUENCY: 2412 MHZ)**

Frequency (MHz)	Measured Level (dBm)	Measured Level (dBc)	Limit (dBc)	Margin (dB)
4824.000	-25.1	42.0	20.0	-22.0
7236.000	-18.9	35.8	20.0	-15.8
9648.000	-43.9	60.8	20.0	-40.8
12060.000	-34.6	51.5	20.0	-31.5
14472.000	-41.4	58.3	20.0	-38.3
16884.000	-46.9	63.8	20.0	-43.8
19296.000	-68.4	85.3	20.0	-65.3
21708.000	-63.5	80.4	20.0	-60.4

**TEST PERSONNEL:**

Daniel W. Baltzell EMC Test Engineer	 Signature	August 6, 2004 Date Of Test
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**11.4 ANTENNA CONDUCTED SPURIOUS EMISSIONS (TX FREQUENCY: 2437 MHZ); 802.11B OUTDOOR ANTENNA PORT**

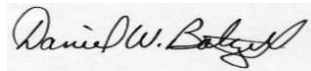
Operating Frequency (MHz): 2437  
 Measured Level at 100 kHz RBW(dBm): 15.7  
 Limit (dBm): -4.3

**TABLE 11-3: CONDUCTED SPURIOUS EMISSIONS (TX FREQUENCY: 2437 MHZ)**

Frequency (MHz)	Measured Level (dBm)	Measured Level (dBc)	Limit (dBc)	Margin (dB)
4874.000	-24.5	40.2	20.0	-20.2
7311.000	-15.1	30.8	20.0	-10.8
9748.000	-40.4	56.1	20.0	-36.1
12185.222	-29.2	44.9	20.0	-24.9
14622.222	-43.0	58.7	20.0	-38.7
17059.222	-48.7	64.4	20.0	-44.4
19496.222	-57.6	73.3	20.0	-53.3
21933.222	-54.3	70.0	20.0	-50.0

**TEST PERSONNEL:**

Daniel W. Baltzell  
 EMC Test Engineer



Signature

August 6, 2004  
 Date Of Test

**11.5 ANTENNA CONDUCTED SPURIOUS EMISSIONS (TX FREQUENCY: 2462 MHZ); 802.11B OUTDOOR ANTENNA PORT**

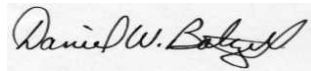
**Operating Frequency (MHz):** 2462  
**Measured Level at 100 kHz RBW (dBm):** 17.8  
**Limit (dBm):** -2.2

**TABLE 11-4: CONDUCTED SPURIOUS EMISSIONS (TX FREQUENCY: 927.7695 MHZ)**

Frequency (MHz)	Measured Level (dBm)	Measured Level (dBc)	Limit (dBc)	Margin (dB)
4924.000	-23.3	41.1	20.0	-21.1
7386.000	-14.1	31.9	20.0	-11.9
9848.000	-35.4	53.2	20.0	-33.2
12310.000	-31.2	49.0	20.0	-29.0
14772.000	-38.6	56.4	20.0	-36.4
17234.000	-48.3	66.1	20.0	-46.1
19696.000	-67.8	85.6	20.0	-65.6
22158.000	-52.0	69.8	20.0	-49.8

**TEST PERSONNEL:**

Daniel W. Baltzell  
 EMC Test Engineer



Signature

August 6, 2004  
 Date Of Test

**11.6 ANTENNA CONDUCTED SPURIOUS EMISSIONS (TX FREQUENCY: 2412 MHZ); 802.11G BRIDGE ANTENNA PORT**

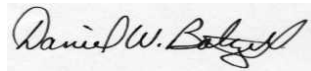
Operating Frequency (MHz): 2412  
 Measured Level with 100 kHz RBW (dBm): 1.0  
 Limit (dBm): -19.0

**TABLE 11-5: CONDUCTED SPURIOUS EMISSIONS (TX FREQUENCY: 2412 MHZ)**

Frequency (MHz)	Measured Level (dBm)	Measured Level (dBc)	Limit (dBc)	Margin (dB)
4824.000	-68.2	-53.1	54.1	20.0
7236.000	-65.9	-58.3	59.3	20.0
9648.000	-70.2	-51.9	52.9	20.0
12060.000	-78.2	-76.3	77.3	20.0
14472.000	-78.4	-72.3	73.3	20.0
16884.000	-75.8	-73.0	74.0	20.0
19296.000	-76.1	-68.4	69.4	20.0
21708.000	-68.6	-65.7	66.7	20.0

**TEST PERSONNEL:**

Daniel W. Baltzell  
 EMC Test Engineer

  
 Signature

August 6, 2004  
 Date Of Test

**11.7 ANTENNA CONDUCTED SPURIOUS EMISSIONS (TX FREQUENCY: 2437 MHZ); 802.11G BRIDGE ANTENNA PORT**

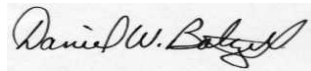
**Operating Frequency (MHz):** 2437  
**Measured Level at 100 kHz RBW(dBm):** 0.8  
**Limit (dBm):** -19.2

**TABLE 11-6: CONDUCTED SPURIOUS EMISSIONS (TX FREQUENCY: 2437 MHZ)**

Frequency (MHz)	Measured Level (dBm)	Measured Level (dBc)	Limit (dBc)	Margin (dB)
4874.000	-62.8	-62.8	63.6	20.0
7311.000	-75.5	-75.5	76.3	20.0
9748.000	-70.1	-70.1	70.9	20.0
12185.000	-77.3	-77.3	78.1	20.0
14622.000	-72.3	-72.3	73.1	20.0
17059.000	-74.8	-74.8	75.6	20.0
19496.000	-67.5	-67.5	68.3	20.0
21933.000	-67.2	-67.2	68.0	20.0

**TEST PERSONNEL:**

Daniel W. Baltzell  
 EMC Test Engineer



Signature

August 6, 2004  
 Date Of Test

**11.8 ANTENNA CONDUCTED SPURIOUS EMISSIONS (TX FREQUENCY: 2462 MHZ); 802.11G BRIDGE ANTENNA PORT**

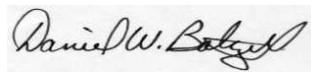
**Operating Frequency (MHz):** 2462  
**Measured Level at 100 kHz RBW (dBm):** -0.7  
**Limit (dBm):** -20.7

**TABLE 11-7: CONDUCTED SPURIOUS EMISSIONS (TX FREQUENCY: 927.7695 MHZ)**

Frequency (MHz)	Measured Level (dBm)	Measured Level (dBc)	Limit (dBc)	Margin (dB)
2359.999	-47.5	46.8	20.0	-26.8
2688.010	-45.0	44.3	20.0	-24.3
4924.000	-70.5	69.8	20.0	-49.8
7386.000	-61.5	60.8	20.0	-40.8
9848.000	-69.5	68.8	20.0	-48.8
12310.000	-78.9	78.2	20.0	-58.2
14772.000	-71.4	70.7	20.0	-50.7
17234.000	-73.9	73.2	20.0	-53.2
19696.000	-68.3	67.6	20.0	-47.6
22158.000	-67.1	66.4	20.0	-46.4

**TEST PERSONNEL:**

Daniel W. Baltzell  
 EMC Test Engineer



Signature

August 6, 2004  
 Date Of Test

## 12 POWER SPECTRAL DENSITY - §15.247(D)

### 12.1 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 10 kHz, and the sweep time set at 1000 seconds. The spectral lines were resolved for the modulated carriers at 2.412GHz, 2.437GHz, and 2.462GHz respectively. These levels are below the +8 dBm limit. See power spectral density table and plots.

### 12.2 POWER SPECTRAL DENSITY TEST EQUIPMENT

TABLE 12-1: POWER SPECTRAL DENSITY TEST EQUIPMENT

RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER	CALIBRATION DUE DATE
900931	Hewlett Packard	8566B	Spectrum Analyzer (100Hz – 22 GHz)	3138A07771	6/23/05

### 12.3 POWER SPECTRAL DENSITY TEST DATA

TABLE 12-2: POWER SPECTRAL DENSITY TEST DATA 802.11B OUTDOOR ANTENNA PORT

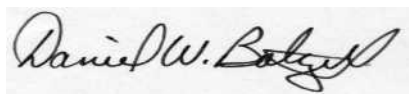
CHANNEL	FREQUENCY (MHZ)	POWER SPECTRAL DENSITY LIMIT = +8dBm
1	2412	-0.7
6	2437	-0.3
11	2462	-1.2

TABLE 12-3: POWER SPECTRAL DENSITY TEST DATA 802.11G BRIDGE ANTENNA PORT

CHANNEL	FREQUENCY (MHZ)	POWER SPECTRAL DENSITY LIMIT = +8dBm
1	2412	-12.2
6	2437	-8.8
11	2462	-11.0

#### TEST PERSONNEL:

Daniel W. Baltzell  
 EMC Test Engineer



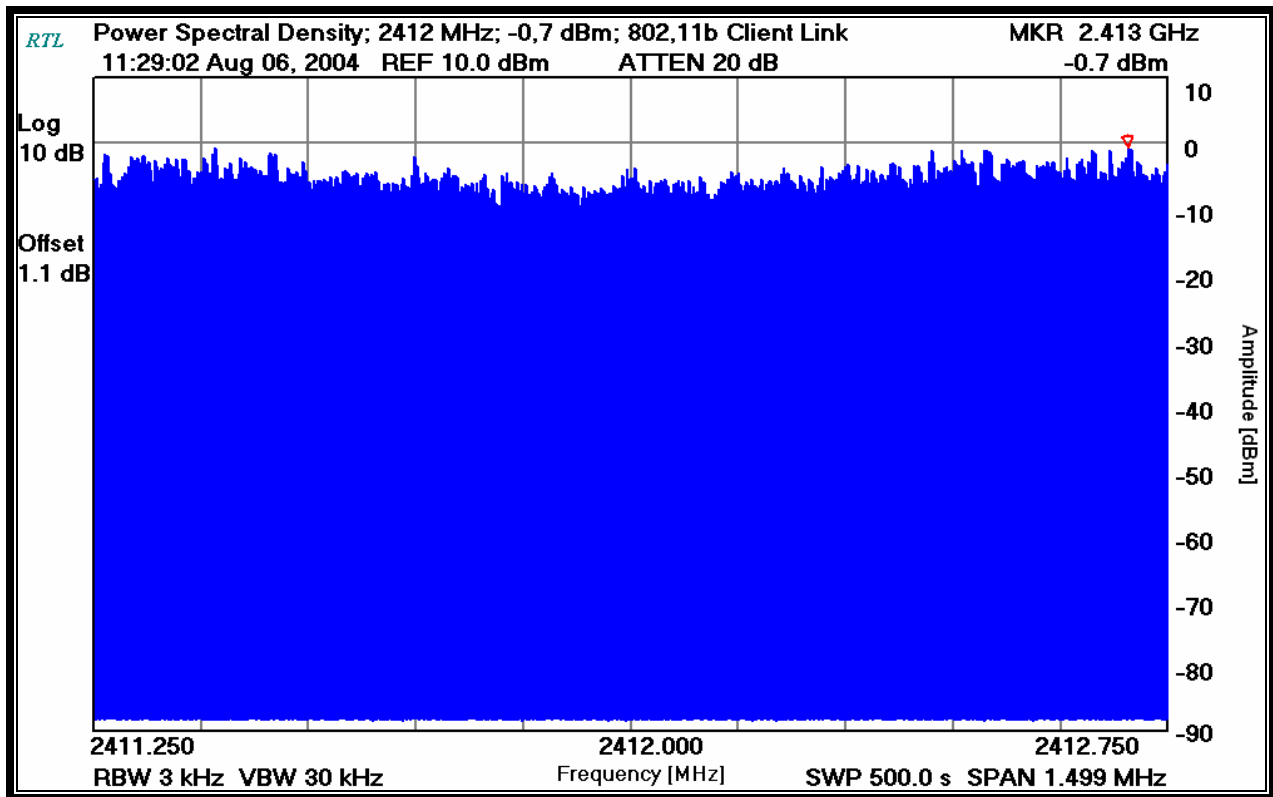
Signature

August 5-6, 2004  
 Date Of Test

## 12.4 POWER SPECTRAL DENSITY PLOTS 802.11B OUTDOOR ANTENNA PORT

### PLOT 12-1: POWER SPECTRAL DENSITY: CHANNEL 1

Operating Frequency (MHz): 2412  
Channel: 1  
Measured Cond. Pwr. (dBm): 26.9  
Bandwidth Resolution (kHz): 3  
Bandwidth Video (kHz): 30  
Sweep Time (sec.): 500



### TEST PERSONNEL:

Daniel W. Baltzell  
EMC Test Engineer

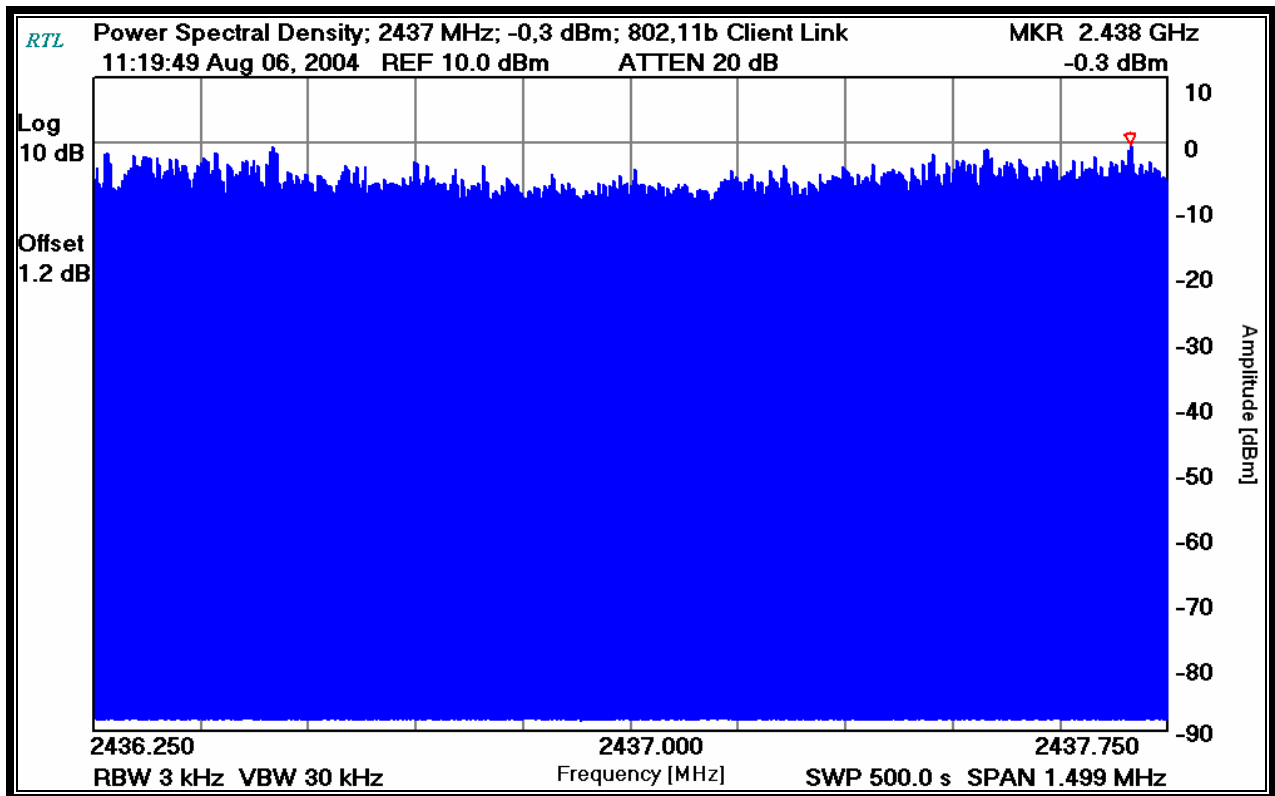
Signature

August 6, 2004  
Date Of Test



**PLOT 12-2: POWER SPECTRAL DENSITY: CHANNEL 6**

Operating Frequency (MHz): 2437  
Channel: 6  
Measured Cond. Pwr. (dBm): 26.8  
Bandwidth Resolution (kHz): 3  
Bandwidth Video (kHz): 30  
Sweep Time (sec.): 500.0



**TEST PERSONNEL:**

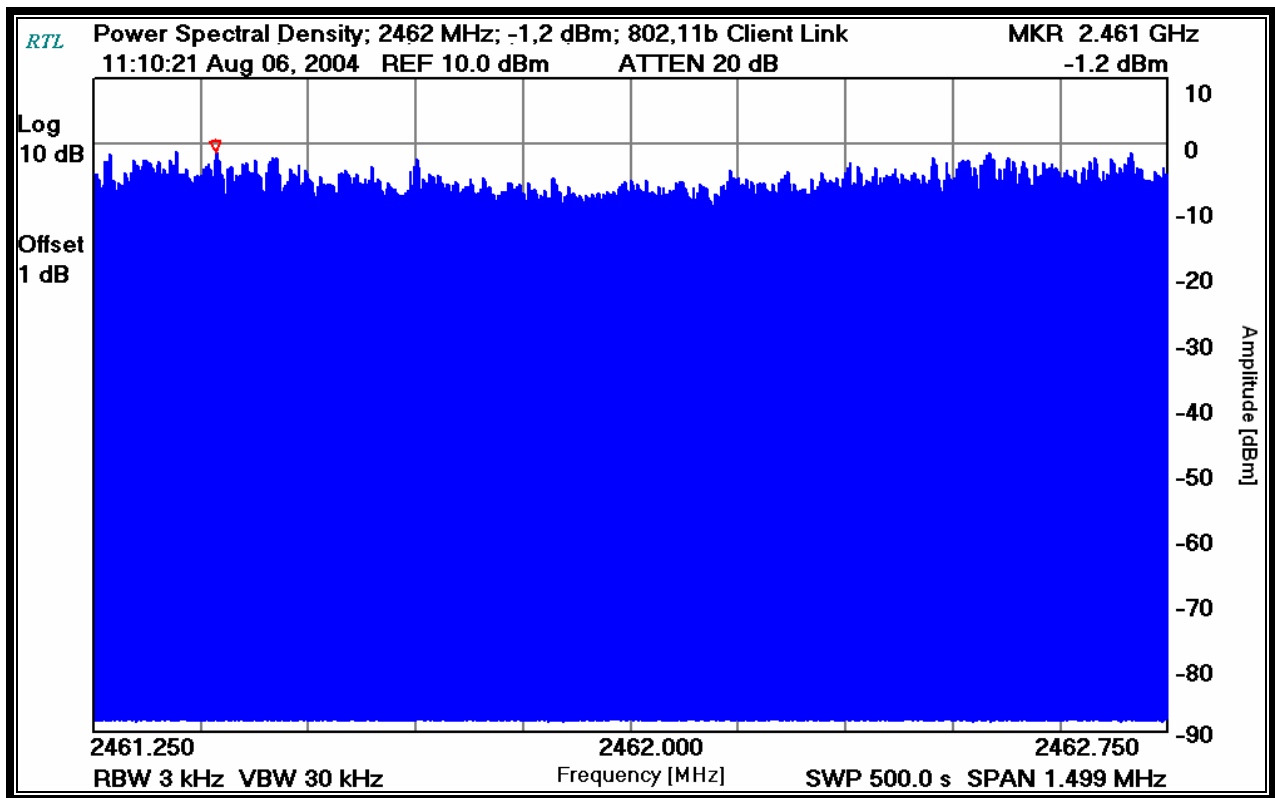
Daniel W. Baltzell  
EMC Test Engineer

Signature

August 6, 2004  
Date Of Test

**PLOT 12-3: POWER SPECTRAL DENSITY: CHANNEL 11**

Operating Frequency (MHz): 2462  
Channel: 11  
Measured Cond. Pwr. (dBm): 26.7  
Bandwidth Resolution (kHz): 3  
Bandwidth Video (kHz): 30  
Sweep Time (sec.): 500.0



**TEST PERSONNEL:**

Daniel W. Baltzell  
EMC Test Engineer

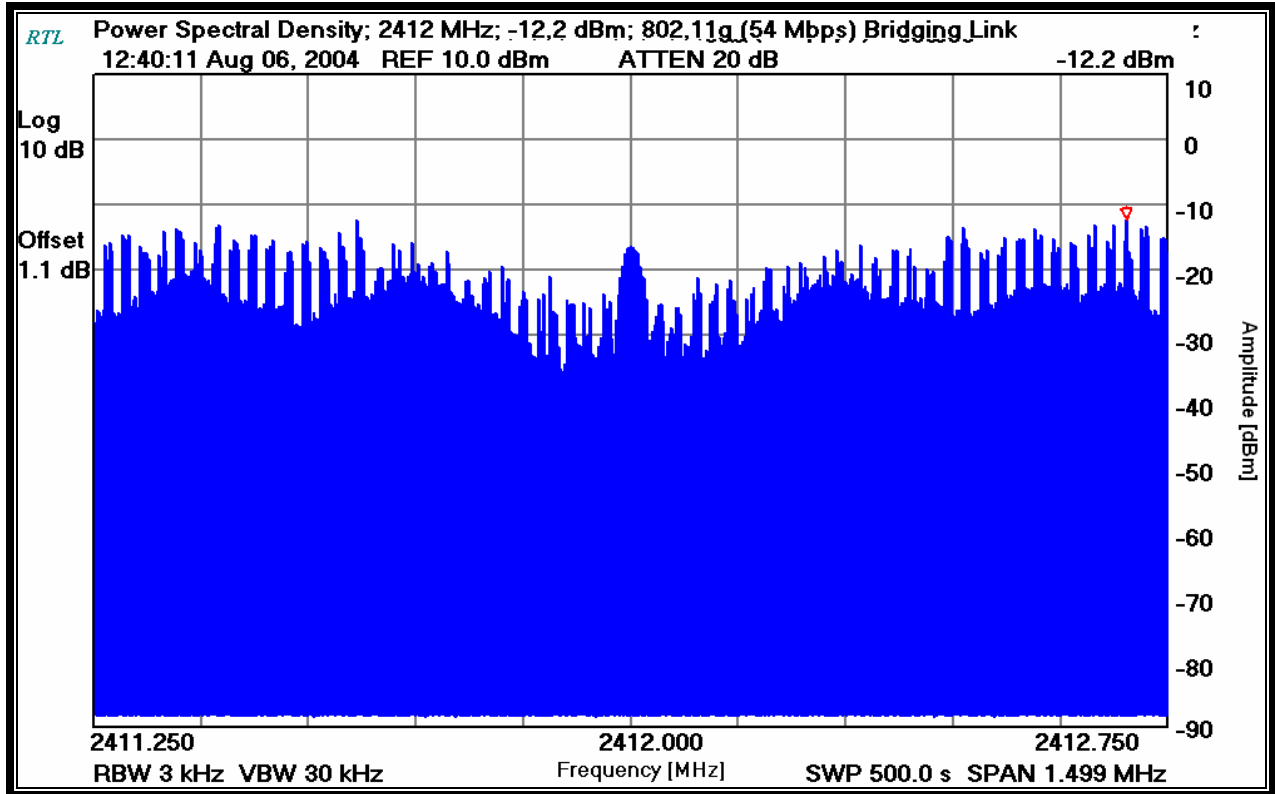
Signature

August 6, 2004  
Date Of Test

## 12.5 POWER SPECTRAL DENSITY PLOTS 802.11G BRIDGE ANTENNA PORT

PLOT 12-4: POWER SPECTRAL DENSITY: CHANNEL 1

Operating Frequency (MHz): 2412  
Channel: 1  
Measured Cond. Pwr. (dBm): 16.9  
Bandwidth Resolution (kHz): 3  
Bandwidth Video (kHz): 30  
Sweep Time (sec.): 500



### TEST PERSONNEL:

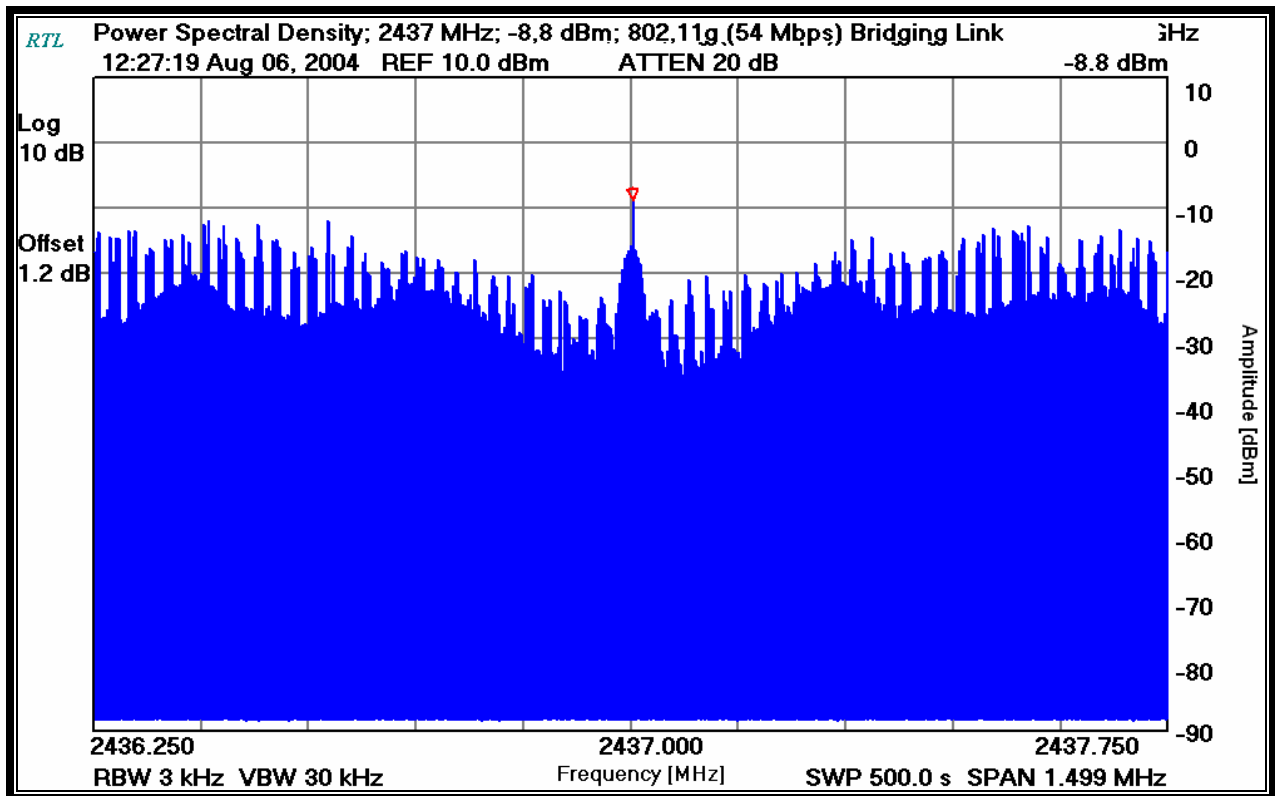
Daniel W. Baltzell  
EMC Test Engineer

Signature

August 6, 2004  
Date Of Test

**PLOT 12-5: POWER SPECTRAL DENSITY: CHANNEL 6**

Operating Frequency (MHz): 2437  
Channel: 6  
Measured Cond. Pwr. (dBm): 16.5  
Bandwidth Resolution (kHz): 3  
Bandwidth Video (kHz): 30  
Sweep Time (sec.): 500.0



**TEST PERSONNEL:**

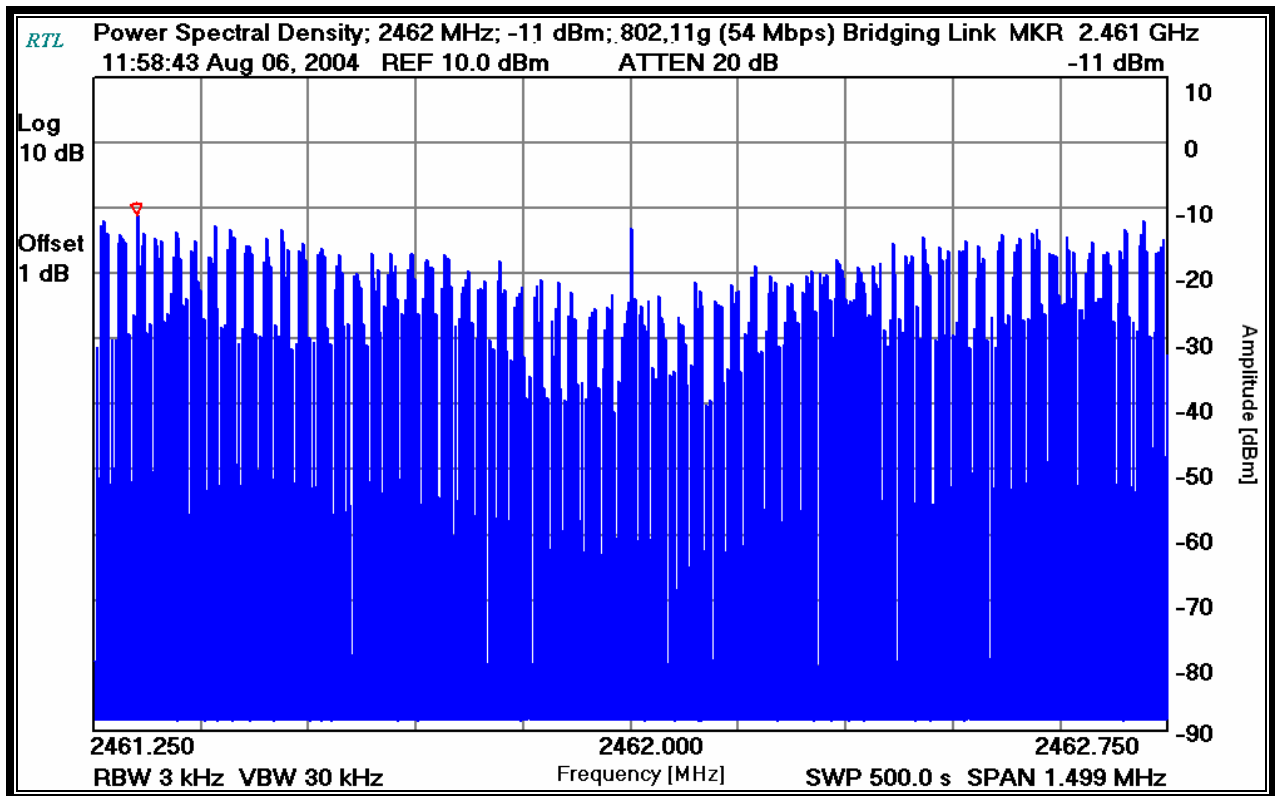
Daniel W. Baltzell  
EMC Test Engineer

Signature

August 6, 2004  
Date Of Test

**PLOT 12-6: POWER SPECTRAL DENSITY: CHANNEL 11**

Operating Frequency (MHz): 2462  
Channel: 11  
Measured Cond. Pwr. (dBm): 15.8  
Bandwidth Resolution (kHz): 3  
Bandwidth Video (kHz): 30  
Sweep Time (sec.): 500.0



**TEST PERSONNEL:**

Daniel W. Baltzell  
EMC Test Engineer

Signature

August 6, 2004  
Date Of Test

Rhein Tech Laboratories, Inc.  
360 Herndon Parkway  
Suite 1400  
Herndon, VA 20170  
<http://www.rheintech.com>

Client: 3e Technologies International Inc.  
Model: 3e-525A  
Standards FCC 15.247  
FCC ID: QVT-525A  
Report #: 2004121

### **13 CONCLUSION**

The data in this measurement report shows that the EUT as tested, Model: 3e-525A, FCC ID: QVT-525A, complies with all the applicable requirements of Parts 2 and 15 of the FCC Rules and Regulations.