



Engineering and Testing for EMC and Safety Compliance



Accredited under NVLAP Lab Code 200061-0

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

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FCC ID/ IC:	FBRWRS970X/ 1859A-WRS970X	Test Report Date:	July 4, 2007
Platform:	N/A	RTL Work Order #:	2007202
Model Name/ Model Number:	WRS970X	RTL Quote #:	QRTL07-160
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:	DSS – Part 15 Spread Spectrum Transmitter		
FCC Rule Part(s)/Guidance:	FCC Rules Part 15.247: Operation within the bands 920-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz Direct Sequence System October 1, 2006, DA 00-705		
Industry Canada:	RSS-210 Issue 7: Low Power License-Exempt Communications Devices RSS-Gen Issue 2: General Requirements and Information for the Certification of Radiocommunication Equipment		
Digital Interface Information:	Digital Interface was found to be compliant		
Frequency Range (MHz)	Output Power (W)	Frequency Tolerance	Emission Designator
2401 – 2475	0.0043*	N/A	783KFXD

* power is 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 applicable parts of FCC Part 2, FCC Part 15 and ANSI C63.4 and Industry Canada RSS-210 and RSS-Gen.

Signature: 

Date: July 4, 2007

Typed/Printed Name: Desmond A. Fraser

Position: President

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The test results relate only to the item(s) tested.*

Table of Contents

1	General Information	5
1.1	Scope	5
1.2	Description of EUT	5
1.3	Test Facility	5
1.4	Related Submittal(s)/Grant(s)	5
1.5	Modifications	5
2	Test Information	6
2.1	Description of Test Modes	6
2.2	Exercising the EUT	6
2.3	Test Result Summary	6
2.4	Test System Details	7
2.5	Configuration of Tested System	8
3	Duty Cycle Calculation - FCC §15.35(c), RSS-Gen 4.3	8
4	Peak Output Power - §15.247(b)(1); RSS-GEN	9
4.1	Power Output Test Procedure	9
4.2	Power Output Test Data	9
5	Compliance with the Band Edge – FCC §15.247(d); RSS-GEN	10
5.1	Band Edge Test Procedure	10
5.2	Band Edge Test Results	10
5.2.1	Calculation of Lower Band Edge	10
5.2.2	Lower Band Edge Plots	11
5.2.3	Calculation of Upper Band Edge	13
5.2.4	Upper Band Edge Plots	13
6	Antenna Conducted Spurious Emissions - §15.247(d); RSS-Gen	15
6.1	Antenna Conducted Spurious Emissions Test Procedures	15
6.2	Antenna Conducted Spurious Emissions Test Results	15
7	20 dB Bandwidth – FCC §15.247(a)(1); IC RSS-Gen	17
7.1	20 dB Bandwidth Test Procedure	17
7.2	20 dB Modulated Bandwidth Test Data	17
7.3	20 dB Bandwidth Plots	18
8	Carrier Frequency Separation - §15.247(a)(1)	21
8.1	Carrier Frequency Separation Test Procedure	21
8.2	Carrier Frequency Separation Test Data	21
8.3	Hopping Characteristics Test Procedure	22
8.4	Number of Hopping Frequencies	22
8.5	Average Time of Occupancy	23
9	Radiated Emissions - §15.209; RSS-210 §6.2.1	25
9.1	Limits of Radiated Emissions Measurement	25
9.2	Radiated Emissions Measurement Test Procedure	25
9.3	Radiated Emissions Test Results	27
9.3.1	Radiated Emissions Digital/Receiver Test Data	27
9.3.2	Radiated Emissions Harmonics/Spurious Test Data	28
10	AC Conducted Emissions - FCC Rules and Regulations Part 15 §15.207: Conducted Limits	30
10.1	Site and Test Description	30
10.2	Test Limits	30
10.3	Conducted Emissions Test Data	31
11	Conclusion	36

Figure Index

Figure 2-1:	Configuration of System Under Test.....	8
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Table Index

Table 2-1:	Channels Tested.....	6
Table 2-2:	Test Result Summary – FCC Part 15, Subpart C (Section 15.247)	6
Table 2-3:	Equipment Under Test.....	7
Table 4-1:	Power Output Test Equipment.....	9
Table 4-2:	Power Output Test Data	9
Table 5-1:	Band Edge Test Equipment.....	10
Table 6-1:	Antenna Conducted Spurious Emissions Test Equipment.....	15
Table 6-2:	Antenna Conducted Spurious Emissions (2401 MHz = 6.2 dBm).....	15
Table 6-3:	Antenna Conducted Spurious Emissions (2437 MHz = 6.3 dBm).....	15
Table 6-4:	Antenna Conducted Spurious Emissions (2475 MHz = 6.0 dBm).....	16
Table 7-1:	20 dB Bandwidth Test Equipment.....	17
Table 7-2:	20 dB Modulated Bandwidth Test Data.....	17
Table 8-1:	Carrier Frequency Separation Test Equipment.....	21
Table 8-2:	Time of Occupancy Test Equipment	23
Table 9-1:	Radiated Emissions Test Equipment	26
Table 9-2:	Digital/Receiver Radiated Emissions Test Data Using AC Adapter	27
Table 9-3:	Digital/Receiver Radiated Emissions Test Data Using Power over Ethernet	27
Table 9-4:	Digital/Receiver Radiated Emissions Test Data Using USB to Laptop	28
Table 9-5:	Radiated Emissions Harmonics/Spurious 2401 MHz.....	28
Table 9-6:	Radiated Emissions Harmonics/Spurious 2437 MHz.....	28
Table 9-7:	Radiated Emissions Harmonics/Spurious 2475 MHz.....	29
Table 9-8:	Radiated Emissions Harmonics/Spurious Hopping Mode.....	29
Table 10-1:	Conducted Emissions Test Equipment	30
Table 10-2:	Conducted Emissions Test Data – Mode RX, Neutral Side Line 1, Power Over Ethernet TX.....	31
Table 10-3:	Conducted Emissions Test Data – Mode RX, Hot Side Line 2, Power Over Ethernet TX.....	31
Table 10-4:	Conducted Emissions Test Data – Mode RX, Neutral Side Line 1, Power Over Ethernet RX	32
Table 10-5:	Conducted Emissions Test Data – Mode RX, Hot Side Line 2, Power Over Ethernet RX	32
Table 10-6:	Conducted Emissions Test Data – Mode RX, Neutral Side Line 1, USB to Laptop in RX mode.....	33
Table 10-7:	Conducted Emissions Test Data – Mode RX, Hot Side Line 2, USB to Laptop in RX mode.....	33
Table 10-8:	Conducted Emissions Test Data – Mode RX, Neutral Side Line 1, USB to Laptop in TX Mode	34
Table 10-9:	Conducted Emissions Test Data – Mode RX, Hot Side Line 2, USB to Laptop in TX Mode	34
Table 10-10:	Conducted Emissions Test Data – Mode RX, Neutral Side Line 1, AC Adapter TX Mode	35
Table 10-11:	Conducted Emissions Test Data – Mode RX, Hot Side Line 2, AC Adapter TX Mode	35
Table 10-12:	Conducted Emissions Test Data – Mode RX, Neutral Side Line 1, AC Adapter RX Mode.....	35
Table 10-13:	Conducted Emissions Test Data – Mode RX, Hot Side Line 2, AC Adapter RX Mode.....	36

Plot Index

Plot 5-1:	Lower Band Edge – Fixed Low Channel Operation.....	11
Plot 5-2:	Lower Band Edge – Hopping	12
Plot 5-3:	Upper Band Edge – Fixed High Channel Operation.....	13
Plot 5-4:	Upper Band Edge – Hopping	14
Plot 7-1:	20 dB Bandwidth Channel 1.....	18
Plot 7-2:	20 dB Bandwidth Channel 37	19
Plot 7-3:	20 dB Bandwidth Channel 75.....	20
Plot 8-1:	Carrier Frequency Separation	21
Plot 8-2:	Number of Hopping Frequencies.....	22
Plot 8-3:	Time of Occupancy (Dwell Time)	23
Plot 8-4:	Time of Occupancy (Dwell Time 30 Second Sweep)	24

Appendix Index

Appendix A:	FCC Part 1.1307, 1.1310, 2.1091, 2.1093; IC RSS-Gen: RF Exposure	37
Appendix B:	Agency Authorization Letter.....	38
Appendix C:	Confidentiality Request Letter.....	39
Appendix D:	IC Letters.....	40
Appendix E:	Label and Label Location	41
Appendix F:	Technical Operational Description.....	43
Appendix G:	Schematics.....	44
Appendix H:	Block Diagram	45
Appendix I:	Manual	46
Appendix J:	Test Photographs	47
Appendix K:	External Photographs	59
Appendix L:	Internal Photographs	65

Photograph Index

Photograph 1:	FCC & IC ID Label Sample	41
Photograph 2:	ID Label Location	42
Photograph 3:	Conducted Testing – Front View AC Adapter.....	47
Photograph 4:	Conducted Testing – Back View AC Adapter	48
Photograph 5:	Conducted Testing – Front View USB.....	49
Photograph 6:	Conducted Testing – Back View USB	50
Photograph 7:	Conducted Testing – Front View POE	51
Photograph 8:	Conducted Testing – Back View POE.....	52
Photograph 9:	Radiated Testing – Front View POE	53
Photograph 10:	Radiated Testing – Back View POE.....	54
Photograph 11:	Radiated Testing – Front View USB	55
Photograph 12:	Radiated Testing – Back View USB.....	56
Photograph 13:	Radiated Testing – Front View AC Adapter	57
Photograph 14:	Radiated Testing – Back View AC Adapter.....	58
Photograph 15:	Base Front.....	59
Photograph 16:	Base Back.....	60
Photograph 17:	Base Top.....	61
Photograph 18:	Base Bottom.....	62
Photograph 19:	Base Left.....	63
Photograph 20:	Base Right.....	64
Photograph 21:	Internal View	65
Photograph 22:	PCB Top.....	66
Photograph 23:	PCB Back.....	67

1 General Information

1.1 Scope

This is an original certification application request.

Applicable Standards:

- 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.
- Industry Canada RSS-210: Low Power License-Exempt Communications Devices

1.2 Description of EUT

Equipment Under Test	Base Station
Model Name/Number	WRS970X
Power Supply	USB; AC Adapter 5VDC; or Power over Ethernet
Modulation Type	FHSS
Frequency Range	2401 – 2475 MHz
Antenna Connector Type	PCB F type
Antenna Types	Internal

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 Fleetwood Group, Inc., Model Name: WRS970X, FCC ID: FBRWRS970X, IC: 1859A-WRS970X.

1.5 Modifications

No modifications were made to the equipment during testing in order to achieve compliance with these standards.

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

Channel	Frequency
Low	2401
Middle	2437
High	2475

2.2 Exercising the EUT

The EUT was supplied with test firmware programmed with a high, mid, and low channel for testing as well as in an original configuration for hopping mode. The EUT was tested in all three orthogonal planes in order to determine worst-case emissions. 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 2-2: 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(b)	Maximum Peak Power Output	Pass
FCC 15.247(d)	Antenna Conducted Spurious Emissions	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 samples were received on June 26, 2007. The FCC identifiers for all applicable equipment, plus descriptions of all cables used in the tested system, are identified in the following table.

Table 2-3: Equipment Under Test

Part	Manufacturer	Model	Serial Number	FCC ID	Cable Description	RTL Bar Code
Base	Fleetwood Group, Inc.	WRS970X	FCC3	FBRWRS970X	N/A	17960
Base	Fleetwood Group, Inc.	WRS970X	FCC4	FBRWRS970X	N/A	17961
Base	Fleetwood Group, Inc.	WRS970X	FCC5	FBRWRS970X	N/A	17962
Base	Fleetwood Group, Inc.	WRS970X	FCC7	FBRWRS970X	N/A	17963
Laptop	WinBook	Green730	GAXT22000099	N/A	1 m shielded USB to mini USB	17954
Laptop AC Adapter	Lite-On	PA-1900-05	240281560C	N/A	1.7 m unshielded AC; 1.5 m DC with Ferrite	17955
Power over Ethernet	N/A	PW130	N/A	N/A	4.3 m unshielded Ethernet with Adapter; 3 m shielded Ethernet	17964
5V AC Adapter	ELPAC Power Systems	FW1805	054024	N/A	1.8 m shielded AC; 1.9 m unshielded DC with adapter	17966

2.5 Configuration of Tested System

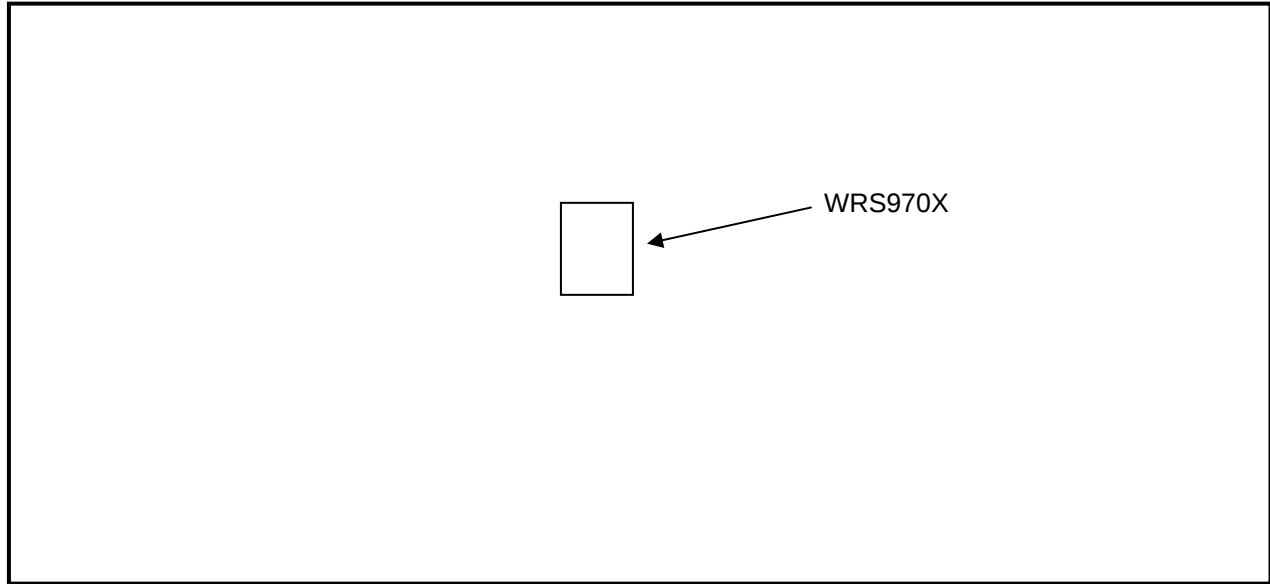


Figure 2-1: Configuration of System Under Test

3 Duty Cycle Calculation - FCC §15.35(c), RSS-Gen 4.5

A standard transmission consists of a 1.125 ms data packet, with a 473.3 ms transmission period. Therefore, the aggregate on time within a transmission period of 100 ms is 1.125 ms, or $20\log(1.125/100)=39$ dB or 20 dB which is the maximum allowed.

The duty cycle correction is 20 dB.

4 Peak Output Power - §15.247(b)(1); RSS-210 A8.4(2)

4.1 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 4-1: Power Output Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901356	Agilent Technologies	E9323A	Power Sensor	31764-264	10/03/07
901184	Agilent Technologies	E4416A	EPM-P Power Meter, single channel	GB41050573	10/03/07

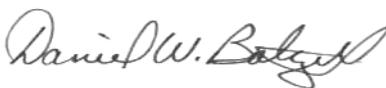
4.2 Power Output Test Data

Table 4-2: Power Output Test Data

Channel	Frequency (MHz)	Peak Power Conducted Output (dBm)
Low	2401	6.2
Middle	2437	6.3
High	2475	6.0

Test Personnel:

Daniel W. Baltzell
Test Engineer



Signature

June 29, 2007
Date Of Test

5 Compliance with the Band Edge – FCC §15.247(d); RSS-210 A8.5

5.1 Band Edge Test Procedure

The transmitter output was connected to its appropriate antenna. A conducted antenna port delta measurement was performed from the highest peak in the restricted band to the peak of the fundamental, and subtracted from the radiated field strength; the result was compared to the limit.

Table 5-1: Band Edge Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900878	Rhein Tech Laboratories	AM3-1197-0005	3 meter Antenna Mast, polarizing	Outdoor Range 1	Not Required
901425	Insulated Wire, Inc.	KPS-1503-2400-KPS	RF cable, 20'	NA	12/05/07
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	12/05/07
901242	Rhein Tech Laboratories	WRT-000-0003	Wood Rotating Table	N/A	Not Required
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	06/14/10
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	06/13/08
901215	Hewlett Packard	8596EM	Spectrum Analyzer (9 kHz - 12.8 GHz)	3826A00144	10/16/07

5.2 Band Edge Test Results

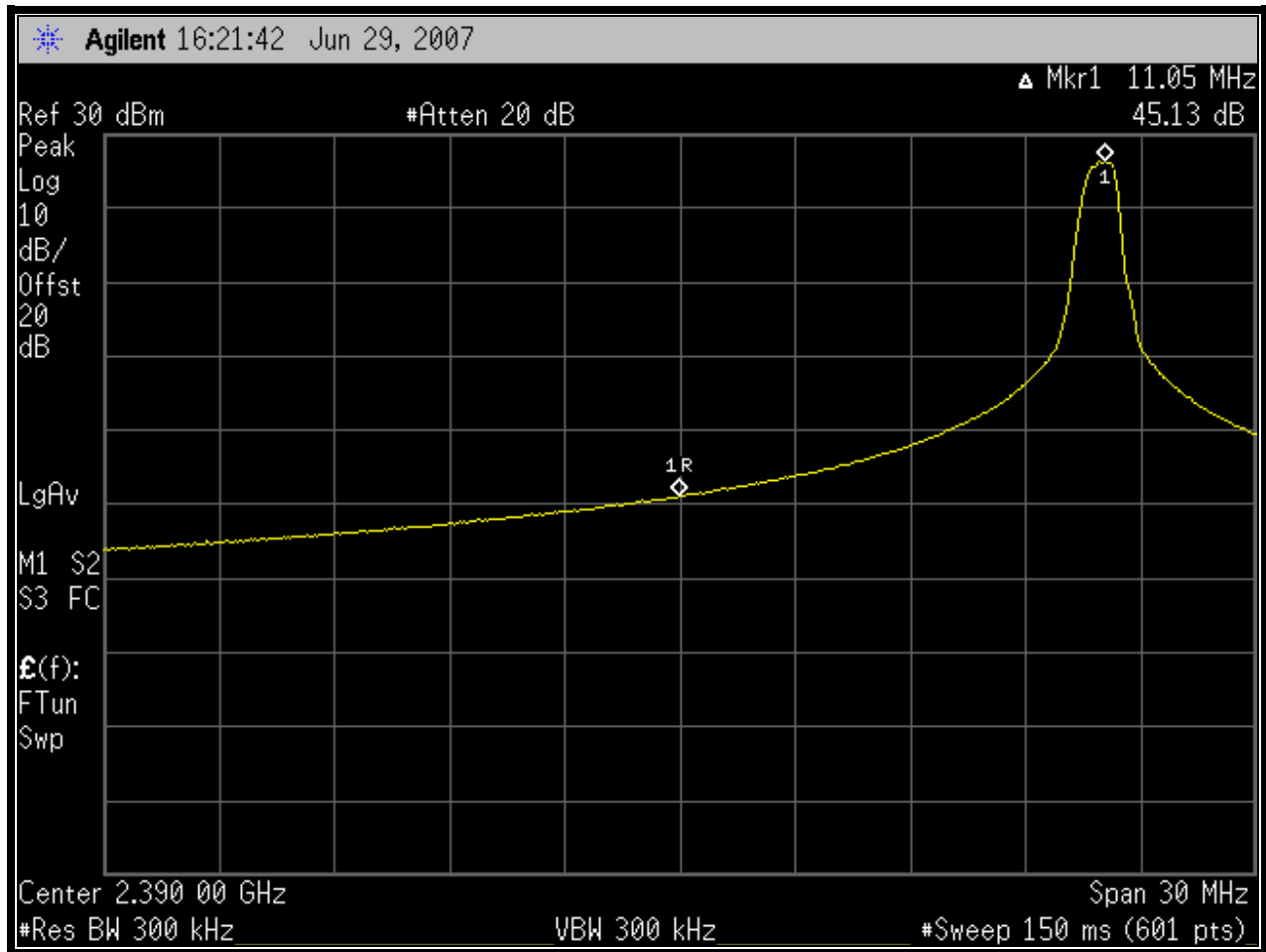
5.2.1 Calculation of Lower Band Edge

89.8 dBuV/m is the field strength measurement, from which the delta measurement of 41.5 dB is subtracted (reference hopping plot), resulting in a level of 48.3 dB. This level has a margin of 5.7 dB below the limit of 54 dBuV/m.

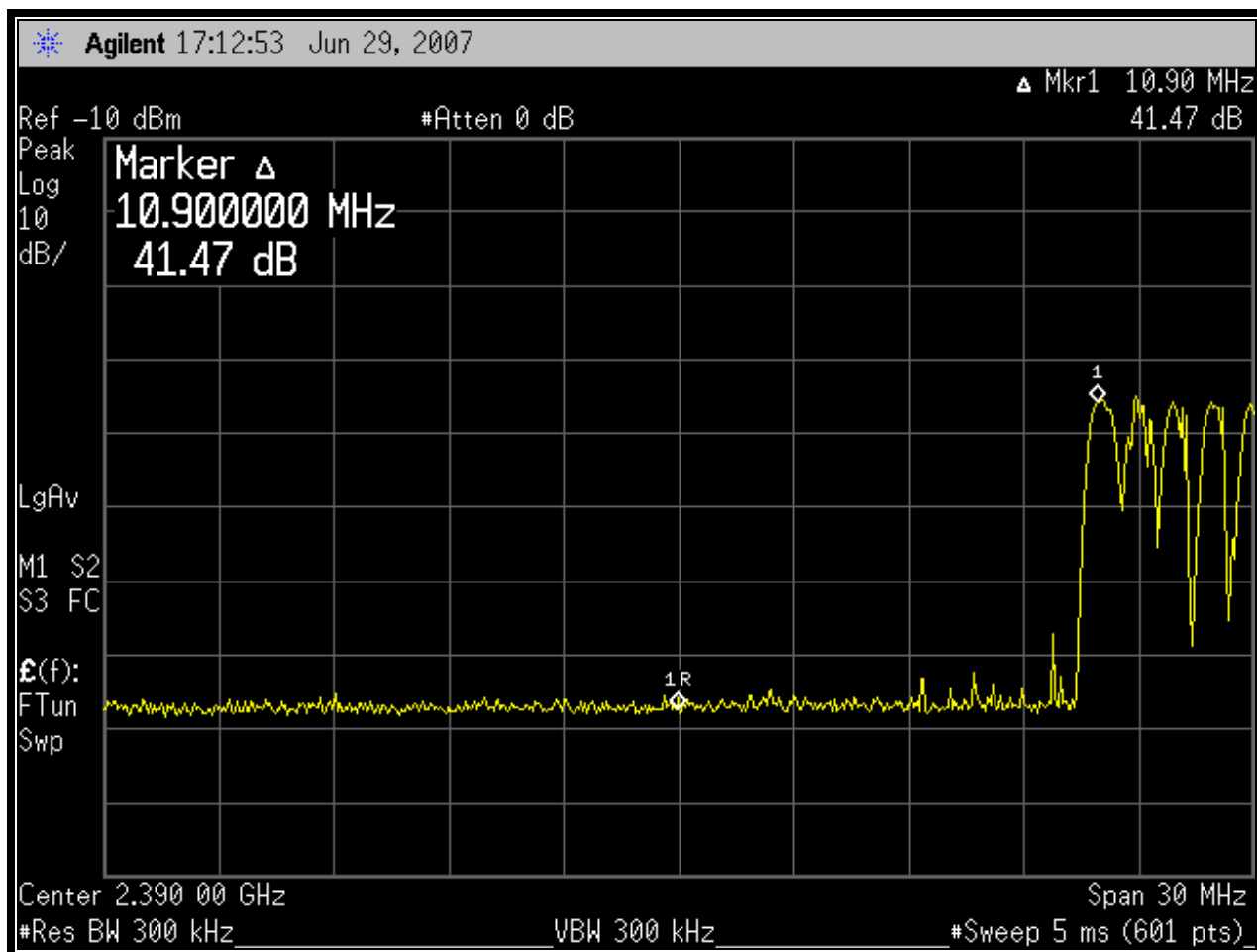
Calculation: $89.8 \text{ dBuV/m} - 41.5 \text{ dB} - 54 \text{ dBuV/m} = -5.7 \text{ dB}$

Peak Field Strength of Lower Band Edge (1 MHz RBW/8 MHz VBW) = 109.8 dBuV/m
Average Field Strength of Lower Band Edge (1 MHz RBW/10 Hz VBW) = 89.8 dBuV/m
Delta measurement = 41.5 dB

5.2.2 Lower Band Edge Plots



Plot 5-1: Lower Band Edge – Fixed Low Channel Operation



Plot 5-2: Lower Band Edge – Hopping

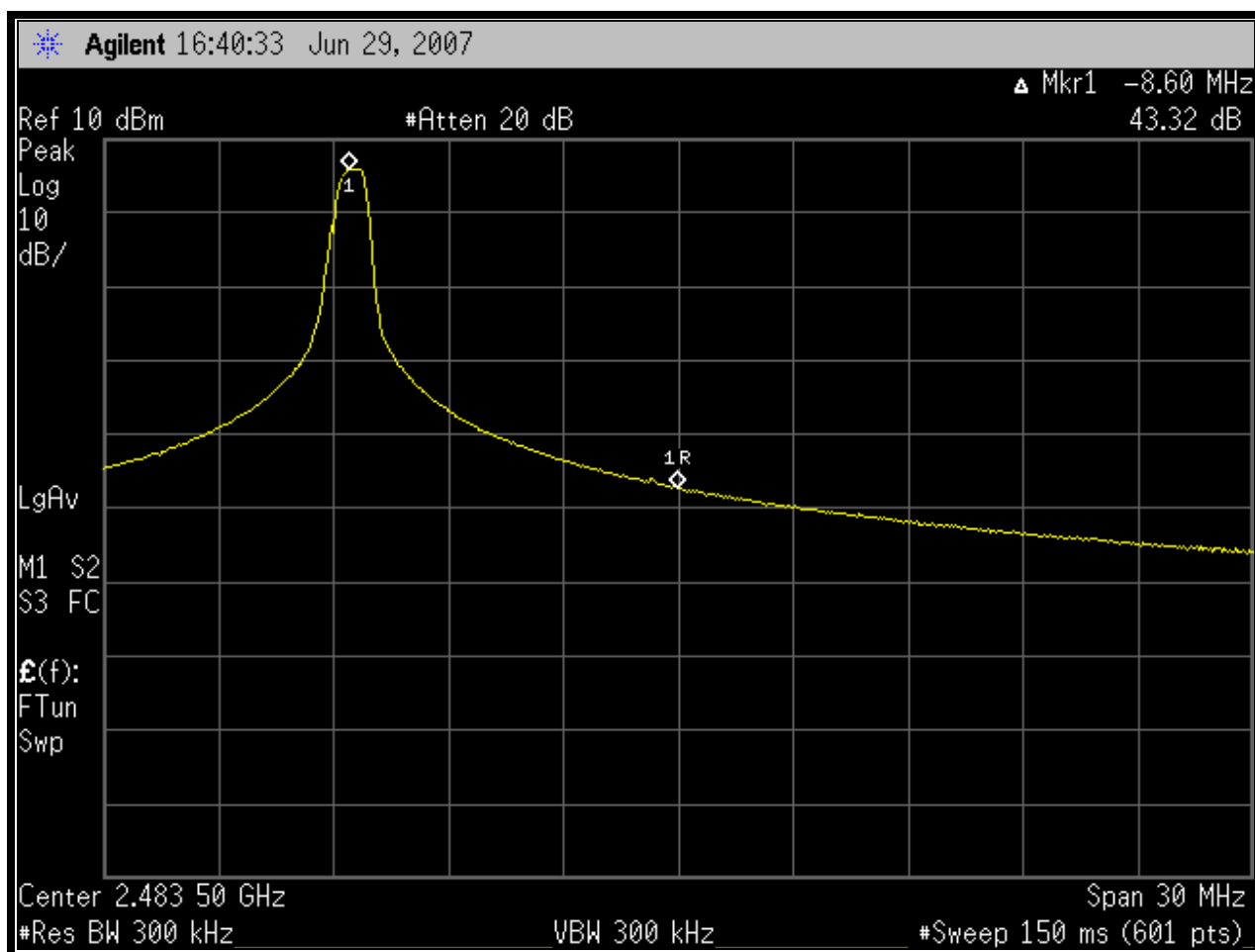
5.2.3 Calculation of Upper Band Edge

90.5 dBuV/m is the field strength measurement, from which the delta measurement of 38 dB is subtracted (reference hopping plot), resulting in a level of 52.5 dB. This level has a margin of 1.5 dB below the limit of 54 dBuV/m.

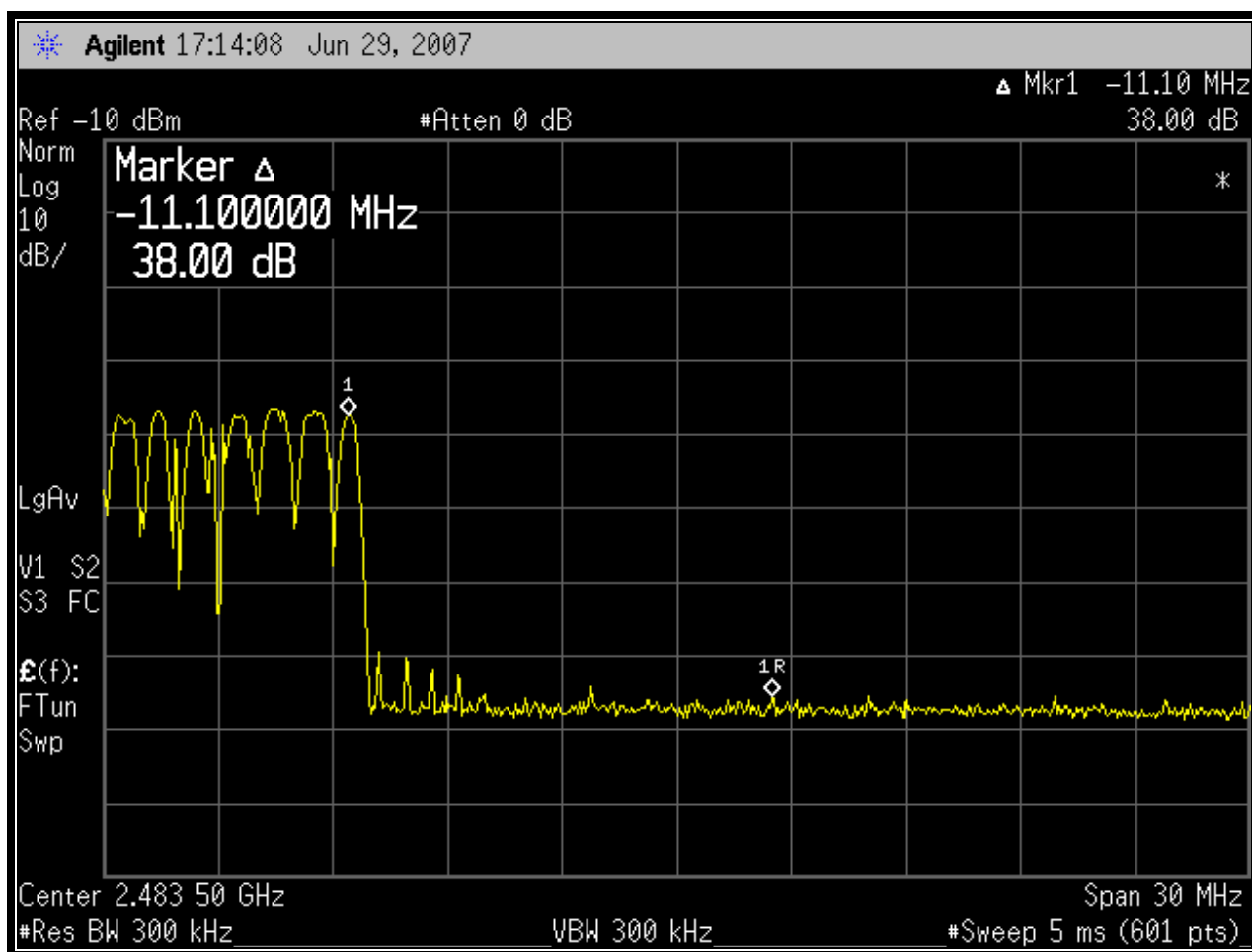
Calculation: $90.5 \text{ dBuV/m} - 38 \text{ dB} - 54 \text{ dBuV/m} = -1.5 \text{ dB}$

Peak Field Strength of Lower Band Edge (1 MHz RBW/8 MHz VBW) = 110.5 dBuV/m
 Average Field Strength of Lower Band Edge (1 MHz RBW/10 Hz VBW) = 90.5 dBuV/m
 Delta measurement = 38 dB

5.2.4 Upper Band Edge Plots



Plot 5-3: Upper Band Edge – Fixed High Channel Operation



Plot 5-4: Upper Band Edge – Hopping

Test Personnel:

Daniel W. Baltzell
 Test Engineer

Daniel W. Baltzell

Signature

June 29 and July 3, 2007
 Date Of Test

6 Antenna Conducted Spurious Emissions - §15.247(d); RSS-210 A8.5

6.1 Antenna Conducted Spurious Emissions Test Procedures

Antenna spurious emissions per FCC 15.247(d) were 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 1 MHz. The modulated carriers measured were at 2401 MHz, 2437 MHz and 2475 MHz.

Table 6-1: Antenna Conducted Spurious Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	6/13/08

6.2 Antenna Conducted Spurious Emissions Test Results

Table 6-2: Antenna Conducted Spurious Emissions (2401 MHz = 6.2 dBm)

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Result
300.000	-55.2	-13.8	-41.4	Pass
900.000	-61.7	-13.8	-47.9	Pass
1200.458	-24.8	-13.8	-11.0	Pass
1363.000	-46.2	-13.8	-32.4	Pass
1501.100	-52.8	-13.8	-39.0	Pass
2345.000	-37.5	-13.8	-23.7	Pass
2462.000	-45.5	-13.8	-31.7	Pass
2724.000	-35.5	-13.8	-21.7	Pass
3302.000	-47.7	-13.8	-33.9	Pass
3602.000	-32.2	-13.8	-18.4	Pass
4802.000	-63.5	-13.8	-49.7	Pass

Table 6-3: Antenna Conducted Spurious Emissions (2437 MHz = 6.3 dBm)

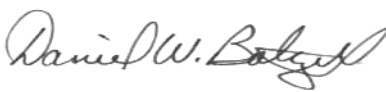
Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Result
305.000	-64.9	-13.7	-51.2	Pass
913.300	-62.0	-13.7	-48.3	Pass
1218.000	-23.8	-13.7	-10.1	Pass
1363.000	-53.5	-13.7	-39.8	Pass
1523.000	-55.4	-13.7	-41.7	Pass
1612.000	-67.2	-13.7	-53.5	Pass
2132.000	-51.6	-13.7	-37.9	Pass
2345.000	-45.2	-13.7	-31.5	Pass
2725.000	-35.7	-13.7	-22.0	Pass
3350.000	-48.7	-13.7	-35.0	Pass
3655.000	-32.6	-13.7	-18.9	Pass
4873.790	-37.7	-13.7	-24.0	Pass
7310.000	-58.2	-13.7	-44.5	Pass

Table 6-4: Antenna Conducted Spurious Emissions (2475 MHz = 6.0 dBm)

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Result
928.300	-58.4	-14.0	-44.4	Pass
1237.000	-22.9	-14.0	-8.9	Pass
1362.000	-39.5	-14.0	-25.5	Pass
2165.000	-52.8	-14.0	-38.8	Pass
2520.000	-46.7	-14.0	-32.7	Pass
2580.000	-32.8	-14.0	-18.8	Pass
2525.000	-34.7	-14.0	-20.7	Pass
2785.000	-49.8	-14.0	-35.8	Pass
3712.000	-32.8	-14.0	-18.8	Pass
4950.000	-38.9	-14.0	-24.9	Pass

Test Personnel:

Daniel W. Baltzell
Test Engineer



Signature

June 29, 2007
Date Of Test

7 20 dB Bandwidth – FCC §15.247(a)(1); RSS-Gen 4.6

7.1 20 dB Bandwidth Test Procedure

The minimum 20 dB bandwidths per RSS-210 were measured using a 50 ohm spectrum analyzer. The modulated carrier was adjusted on the analyzer so that it was displayed entirely on the spectrum analyzer. The sweep time was auto and allowed through several sweeps with the max hold function used in peak detector mode. The resolution bandwidth was set to 30 kHz, and the video bandwidth set at 300 kHz. The spectrum analyzer auto-measurement was set to -20 dB for x dB. The table below contains the bandwidth measurement results.

Table 7-1: 20 dB Bandwidth Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	06/13/08

7.2 20 dB Modulated Bandwidth Test Data

Table 7-2: 20 dB Modulated Bandwidth Test Data

Minimum 20 dB bandwidths

Channel	20 dB Bandwidth (kHz)
1	783.1
37	695.5
75	706.9

7.3 20 dB Bandwidth Plots

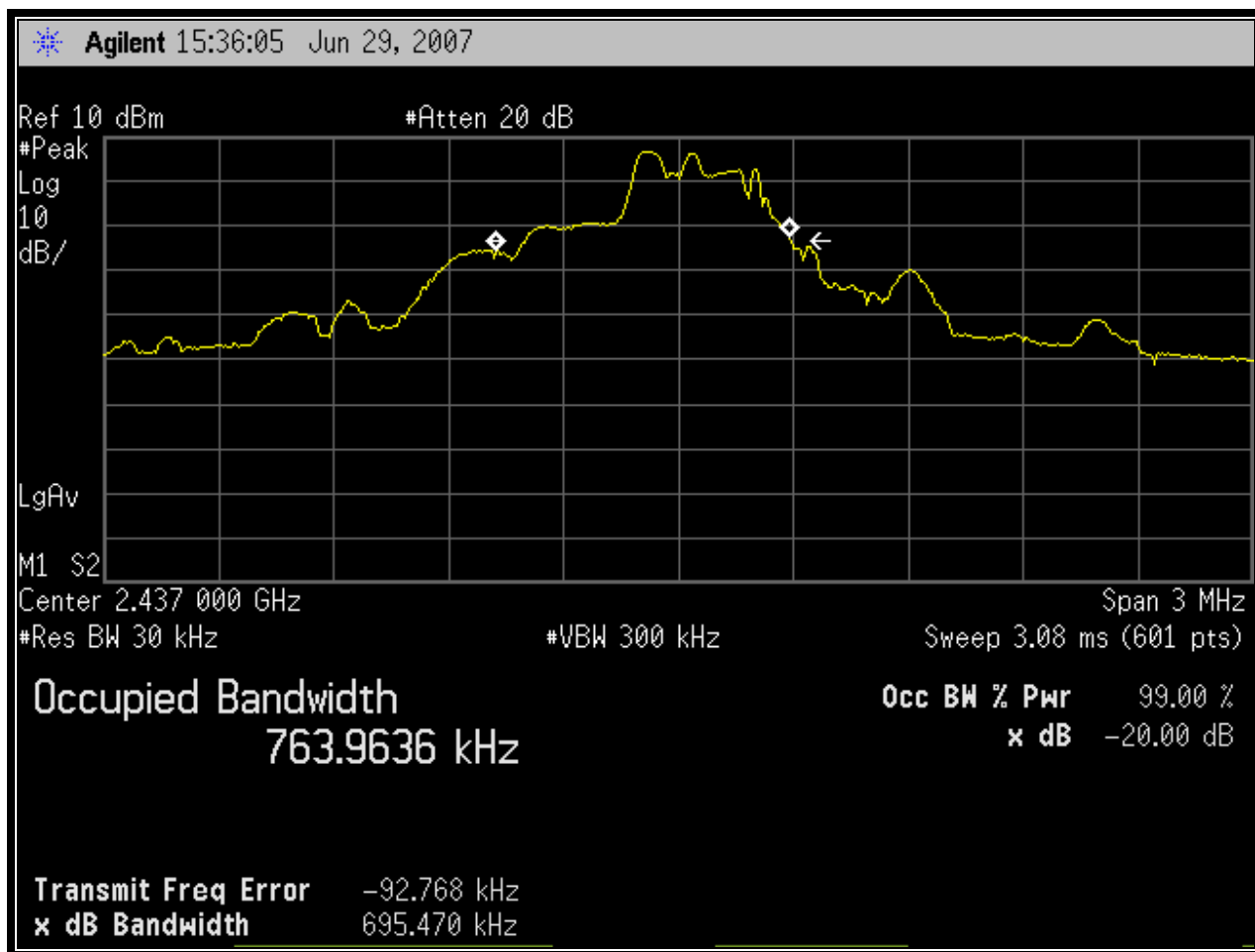
Channel: 1
 Channel Frequency (MHz): 2401
 Resolution Bandwidth (kHz): 30
 Video Bandwidth (kHz): 300
 Span (MHz): 3

Plot 7-1: 20 dB Bandwidth Channel 1



Channel: 37
 Channel Frequency (MHz): 2437
 Resolution Bandwidth (kHz): 30
 Video Bandwidth (kHz): 300
 Span (MHz): 3

Plot 7-2: 20 dB Bandwidth Channel 37



Channel: 75
Channel Frequency (MHz): 2475
Resolution Bandwidth (kHz): 30
Video Bandwidth (kHz): 300
Span (MHz): 3

Plot 7-3: 20 dB Bandwidth Channel 75



Test Personnel:

Daniel W. Baltzell
Test Engineer

Signature

June 29, 2007
Date Of Test

8 Carrier Frequency Separation - §15.247(a)(1); RSS-210 A8.1

8.1 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.

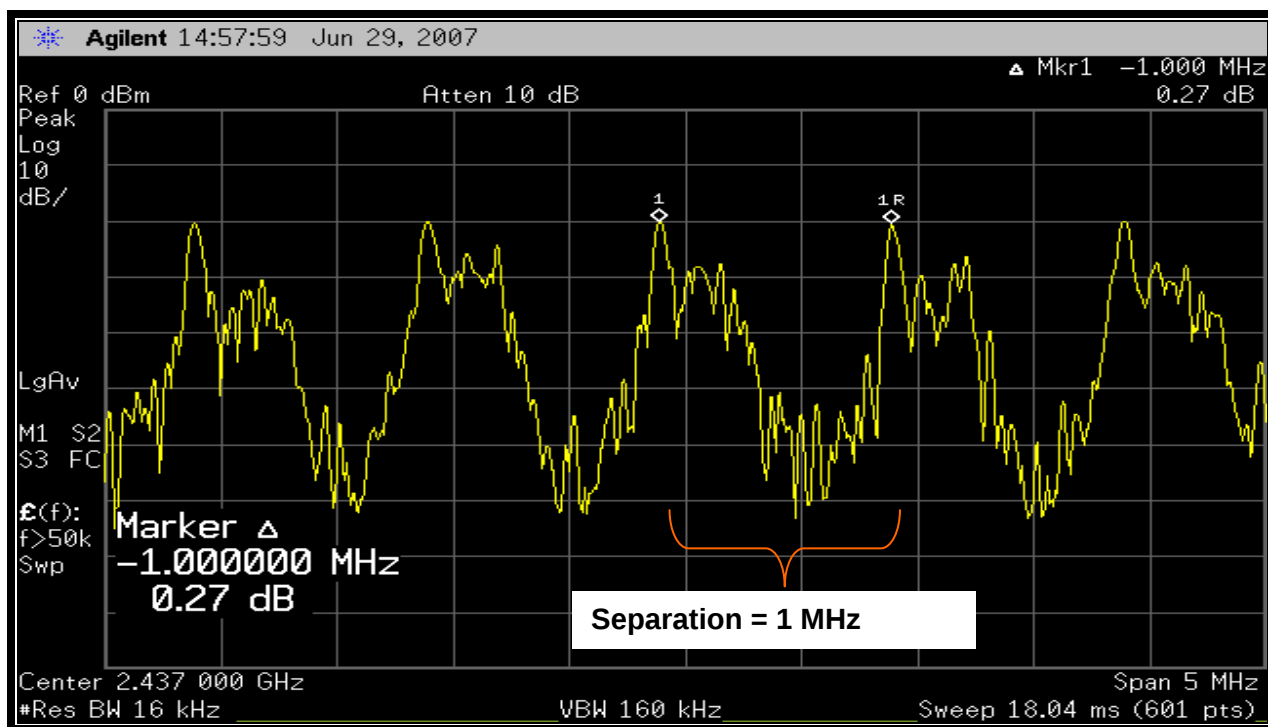
Measured frequency separation = 1 MHz

Table 8-1: Carrier Frequency Separation Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	6/13/08

8.2 Carrier Frequency Separation Test Data

Plot 8-1: Carrier Frequency Separation



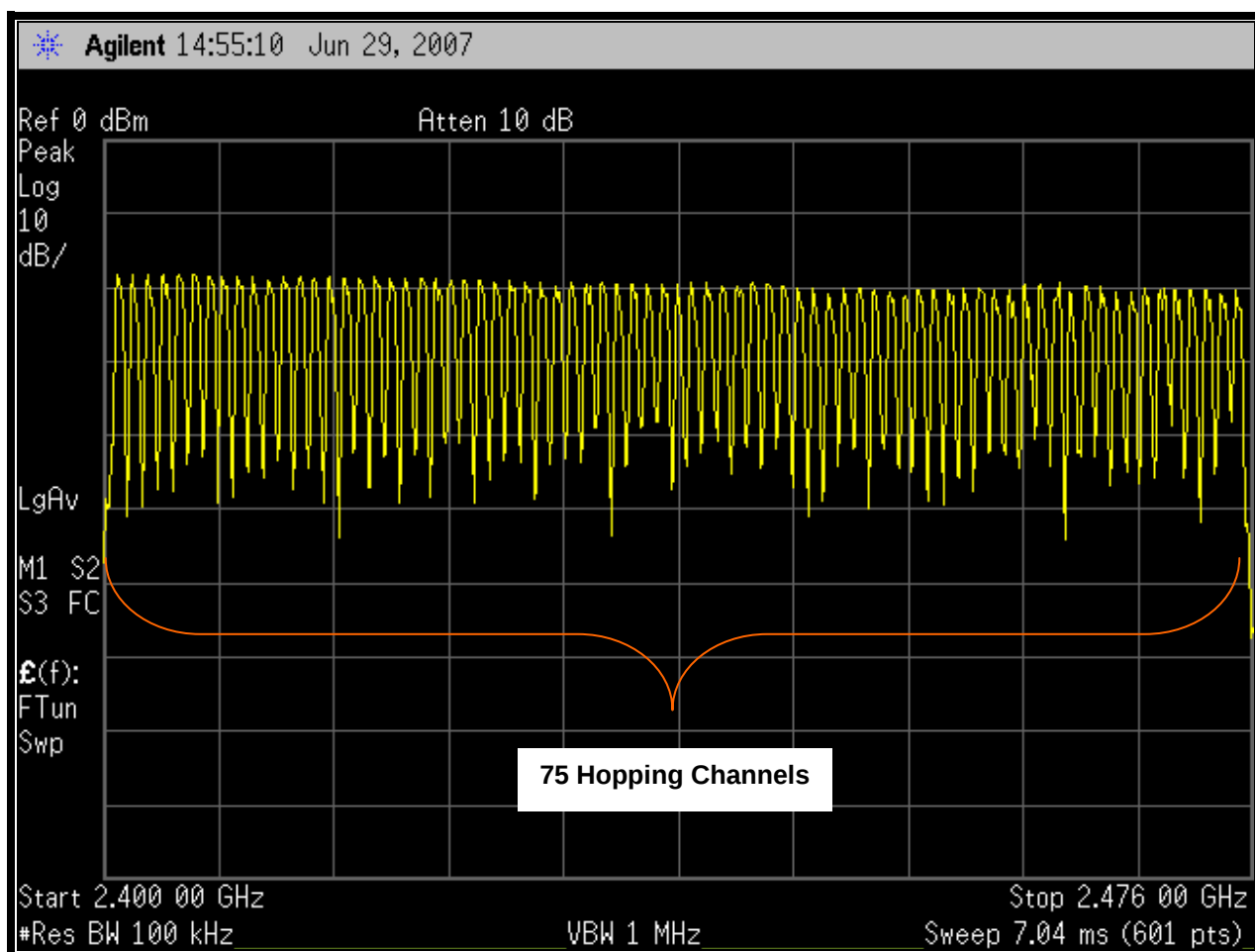
8.3 Hopping Characteristics Test Procedure

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.

8.4 Number of Hopping Frequencies

Measured number of hopping frequencies = 75

Plot 8-2: Number of Hopping Frequencies



8.5 Average Time of Occupancy

The spectrum analyzer sweep was set to 15 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 30 and the number of pulses counted.

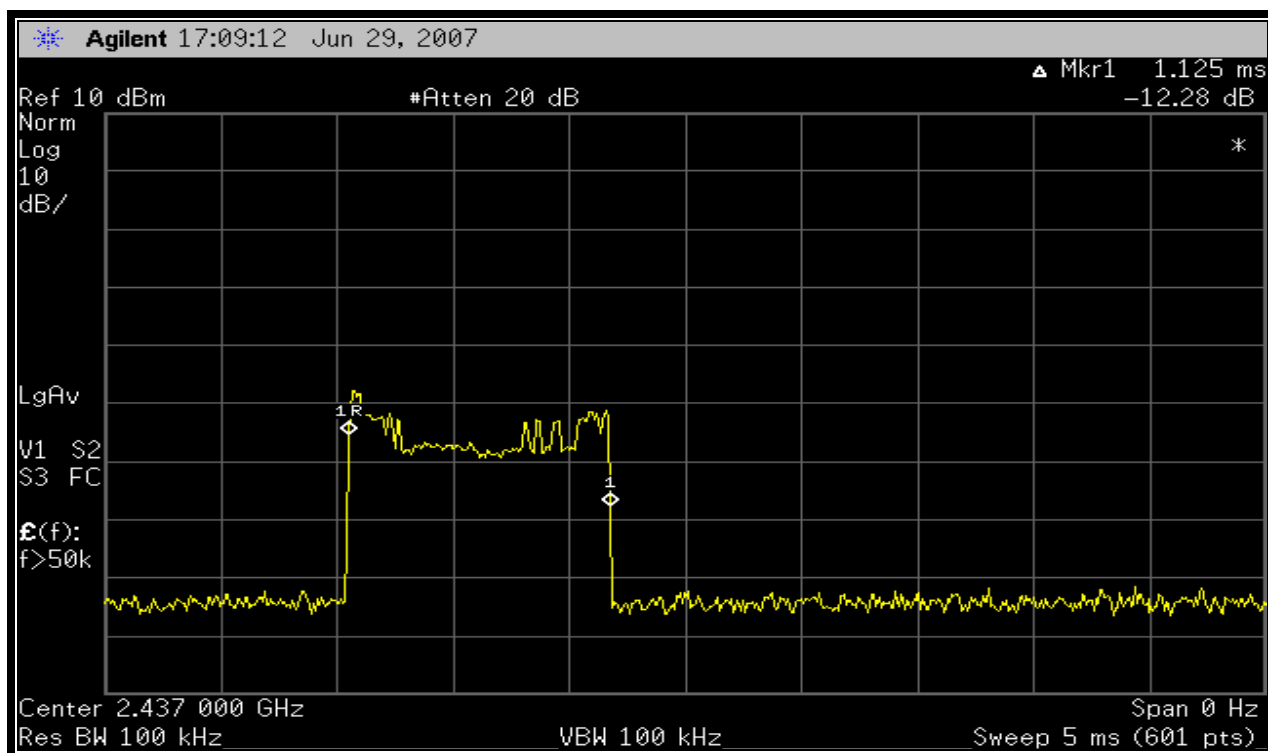
The number of pulses in a period of 0.4 seconds X 75 hopping channels (30 s) was 65.

The average time of occupancy in the above period (30 s) is equal to 65 pulses X 1.125 ms = 73.1 ms, which meets the limit as defined by 15.247(a)(1)(iii) of 0.4 seconds.

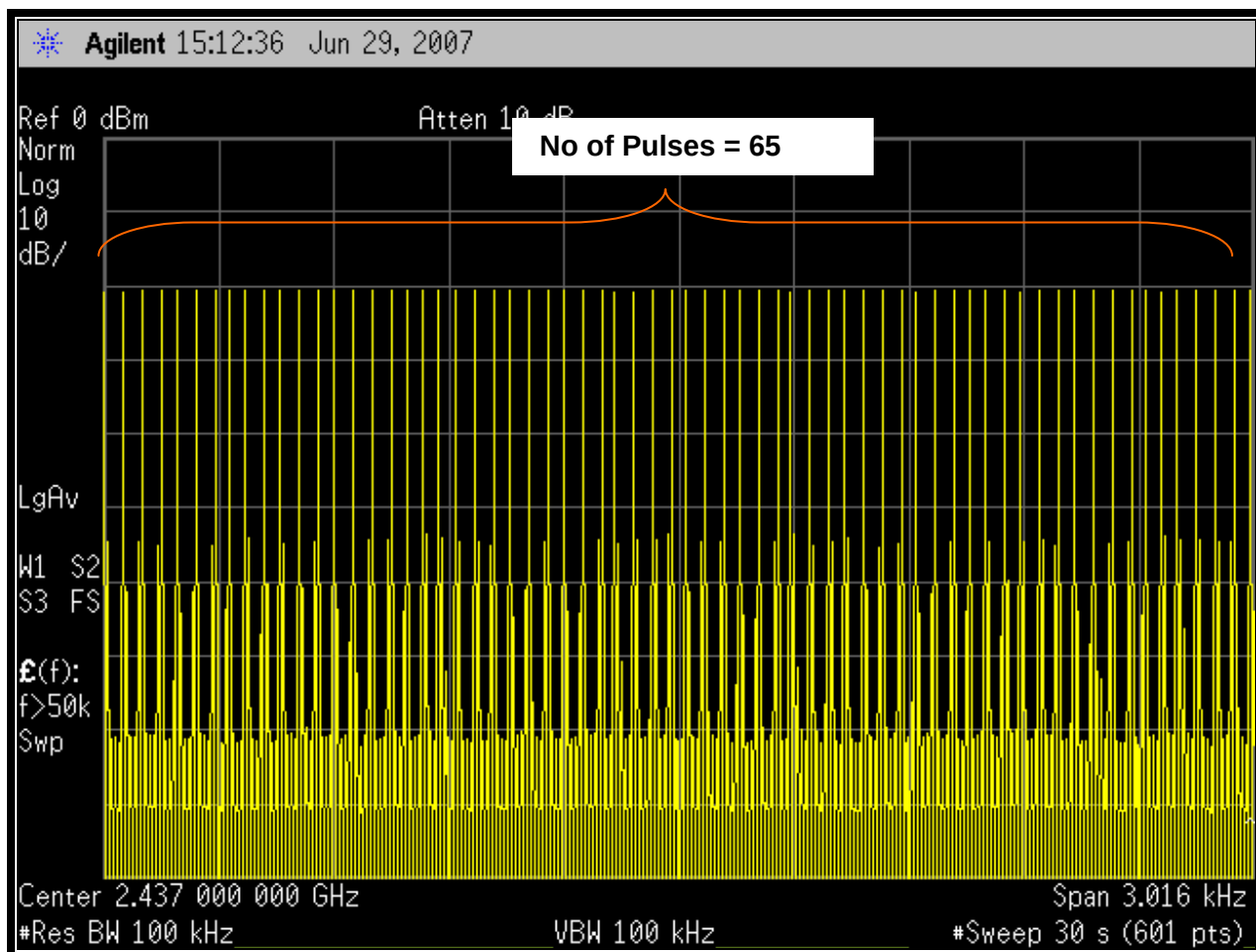
Table 8-2: Time of Occupancy Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	6/13/08

Plot 8-3: Time of Occupancy (Dwell Time)



Plot 8-4: Time of Occupancy (Dwell Time 30 Second Sweep)



Number of pulses in 30 seconds: 65

Test Personnel:

Daniel W. Baltzell
Test Engineer

Signature

June 29, 2007
Date Of Test

9 Radiated Emissions - §15.209; RSS-210 2.6

9.1 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.

9.2 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 10th 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 9-1: Radiated Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900151	Rohde and Schwarz	HFH2-Z2	Loop Antenna (9 kHz - 30 MHz)	827525/019	09/15/09
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1 - 26.5 GHz)	3008A00505	09/13/07
901281	Rhein Tech Laboratories	PR-1040	Amplifier (10 MHz - 2 GHz)	1004	01/19/08
900878	Rhein Tech Laboratories	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	Not Required
901425	Insulated Wire, Inc.	KPS-1503-2400-KPS	RF cable, 20'	NA	12/05/07
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	12/05/07
901242	Rhein Tech Laboratories	WRT-000-0003	Wood rotating table	N/A	Not Required
900913	Hewlett Packard	85462A	EMI Receiver RF Section (9 KHz – 6.5 GHz)	3325A00159	03/21/08
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	06/13/08
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	06/14/10
900321	EMCO	3161-03	Horn Antenna (4.0 - 8.2 GHz)	9508-1020	06/14/10
900323	EMCO	3160-07	Horn Antenna (8.2 - 12.4 GHz)	9605-1054	06/14/10
900356	EMCO	3160-08	Horn Antenna (12.4 - 18 GHz)	9607-1044	06/14/10
900325	EMCO	3160-9	Horn Antennas (18 - 26.5 GHz)	9605-1051	06/14/10

9.3 Radiated Emissions Test Results

9.3.1 Radiated Emissions Digital/Receiver Test Data

Table 9-2: Digital/Receiver Radiated Emissions Test Data Using AC Adapter

Temperature: 69°F Humidity: 39%										
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
154.590	Qp	V	170	1.3	37.8	-18.2	19.6	43.5	-23.9	Pass
258.420	Qp	V	270	1.0	32.0	-13.9	18.1	46.0	-27.9	Pass
340.815	Qp	H	270	1.0	38.1	-12.2	25.9	46.0	-20.1	Pass
376.935	Qp	H	180	1.0	35.3	-11.1	24.2	46.0	-21.8	Pass
387.080	Qp	H	180	1.0	45.3	-10.7	34.6	46.0	-11.4	Pass
387.080	Qp	V	270	1.5	41.4	-10.7	30.7	46.0	-15.3	Pass
442.375	Qp	H	265	1.0	34.6	-9.1	25.5	46.0	-20.5	Pass
523.635	Qp	H	225	1.5	30.3	-7.6	22.7	46.0	-23.3	Pass
718.860	Qp	H	185	1.0	35.1	-4.8	30.3	46.0	-15.7	Pass
718.860	Qp	V	120	1.2	33.2	-4.8	28.4	46.0	-17.6	Pass
829.455	Qp	H	120	1.0	28.6	-2.7	25.9	46.0	-20.1	Pass

Table 9-3: Digital/Receiver Radiated Emissions Test Data Using Power over Ethernet

Temperature: 69°F Humidity: 39%										
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
326.135	Qp	H	270	1.0	35.5	-12.7	22.8	46.0	-23.2	Pass
364.521	Qp	H	220	1.0	40.0	-11.3	28.7	46.0	-17.3	Pass
370.146	Qp	H	220	1.0	37.9	-11.4	26.5	46.0	-19.5	Pass
384.831	Qp	H	190	1.0	38.4	-10.9	27.5	46.0	-18.5	Pass
387.081	Qp	H	220	1.0	44.6	-10.7	33.9	46.0	-12.1	Pass
442.375	Qp	V	270	1.0	39.5	-9.1	30.4	46.0	-15.6	Pass
468.333	Qp	H	280	1.0	38.8	-8.6	30.2	46.0	-15.8	Pass
473.962	Qp	H	270	1.0	42.3	-8.4	33.9	46.0	-12.1	Pass
523.758	Qp	V	180	1.5	38.9	-7.6	31.3	46.0	-14.7	Pass
718.860	Qp	V	180	1.4	37.3	-4.8	32.5	46.0	-13.5	Pass
829.458	Qp	V	170	1.0	34.1	-2.7	31.4	46.0	-14.6	Pass

Table 9-4: Digital/Receiver Radiated Emissions Test Data Using USB to Laptop

Temperature: 69°F Humidity: 39%										
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
41.030	Qp	V	180	1.0	40.4	-16.3	24.1	40.0	-15.9	Pass
120.800	Qp	V	120	1.0	36.6	-16.9	19.7	43.5	-23.8	Pass
293.360	Qp	H	240	1.0	36.7	-13.6	23.1	46.0	-22.9	Pass
299.900	Qp	H	180	1.0	40.6	-13.5	27.1	46.0	-18.9	Pass
442.375	Qp	V	180	1.0	33.7	-9.1	24.6	46.0	-21.4	Pass
528.063	Qp	H	265	1.0	34.7	-7.6	27.1	46.0	-18.9	Pass

9.3.2 Radiated Emissions Harmonics/Spurious Test Data

Table 9-5: Radiated Emissions Harmonics/Spurious 2401 MHz

Fundamental amplitude = 109.8 dBuV/m

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)
1200.431	77.9	57.9	-13.6	44.3	54.0	-9.7
2339.590	50.5	30.5	12.2	42.7	54.0	-11.3
2384.700	56.0	36.0	12.1	48.1	54.0	-5.9
3601.330	42.4	22.4	11.0	33.4	54.0	-20.6
4802.078	47.2	27.2	16.3	43.5	54.0	-10.5
7203.078	41.9	21.9	19.6	41.5	89.8	-48.3

Table 9-6: Radiated Emissions Harmonics/Spurious 2437 MHz

Fundamental amplitude = 109.0 dBuV/m

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)
1218.403	77.5	57.5	-13.5	44.0	54.0	-10.0
2337.460	51.9	31.9	12.2	44.1	54.0	-9.9
3655.350	35.7	15.7	11.2	26.9	54.0	-27.1
4874.084	46.8	26.8	16.2	43.0	54.0	-11.0
7311.126	40.8	20.8	14.7	35.5	54.0	-18.5
9748.168	42.4	22.4	18.1	40.5	89.0	-48.5

Table 9-7: Radiated Emissions Harmonics/Spurious 2475 MHz

Fundamental amplitude = 110.5 dBuV/m

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)
1237.460	77.0	57.0	-12.8	44.2	54.0	-9.8
4950.083	48.0	28.0	16.3	44.3	54.0	-9.7
7425.125	41.5	21.5	15.1	36.6	54.0	-17.4
9900.166	44.4	24.4	18.1	42.5	90.5	-48.0
12375.208	36.2	16.2	18.9	35.1	54.0	-18.9
14850.249	41.0	21.0	25.1	46.1	90.5	-44.4

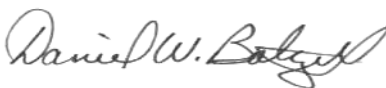
Table 9-8: Radiated Emissions Harmonics/Spurious Hopping Mode

Fundamental amplitude =109.0 dBuV/m

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)
2340.160	51.4	31.4	12.3	43.7	54.0	-10.3
4947.000	44.3	24.3	16.3	40.6	54.0	-13.4
7400.200	40.3	20.3	15.3	35.6	54.0	-18.4
9883.200	43.3	23.3	18.4	41.7	89.0	-47.3
12016.000	36.6	16.6	19.2	35.8	54.0	-18.2
14818.900	40.9	20.9	24.7	45.6	89.0	-43.4
16900.200	39.6	19.6	24.6	44.2	89.0	-44.8

Test Personnel:

Daniel W. Baltzell
Test Engineer



Signature

July 2 and 4, 2007
Dates Of Tests

10 AC Conducted Emissions - FCC Rules and Regulations Part 15 §15.207; RSS-Gen 7.2.2: Conducted Limits

10.1 Site and Test Description

The power line conducted emissions 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 microhenry Line Impedance Stabilization Network (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 100 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 100 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. Video filter less than 10 times the resolution bandwidth is not 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 kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limits were measured and have been recorded.

10.2 Test Limits

Class A Line-Conducted Emissions		
Limit (dBµV)		
Frequency (MHz)	Quasi-Peak	Average
0.15 to 0.50	79	66
0.50 to 30.0	73	60

Class B Line-Conducted Emissions		
Limit (dBµV)		
Frequency (MHz)	Quasi-Peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5.00	56	46
5.00 to 30.00	60	50

Table 10-1: Conducted Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901215	Hewlett Packard	8596EM	Spectrum Analyzer (9 kHz-12.8 GHz)	3826A00144	10/16/07
901084	AFJ International	LS16	16A LISN	16010020082	3/28/08

10.3 Conducted Emissions Test Data

Table 10-2: Conducted Emissions Test Data – Mode RX, Neutral Side Line 1, Power Over Ethernet TX

Temperature: 74°F Humidity: 32%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC 15.207 QP Limit (dBuV)	FCC 15.207 QP Margin (dBuV)	FCC 15.207 AV Limit (dBuV)	FCC 15.207 AV Margin (dBuV)	Pass/Fail
0.158	Pk	30.8	0.2	31.0	65.6	-34.6	55.6	-24.6	Pass
0.203	Pk	31.2	0.2	31.4	63.5	-32.1	53.5	-22.1	Pass
0.340	Pk	29.9	0.2	30.1	59.2	-29.1	49.2	-19.1	Pass
0.405	Pk	28.3	0.3	28.6	57.8	-29.2	47.8	-19.2	Pass
5.370	Pk	33.9	1.3	35.2	60.0	-24.8	50.0	-14.8	Pass
15.910	Pk	32.3	2.2	34.5	60.0	-25.5	50.0	-15.5	Pass

Table 10-3: Conducted Emissions Test Data – Mode RX, Hot Side Line 2, Power Over Ethernet TX

Temperature: 74°F Humidity: 32%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC 15.207 QP Limit (dBuV)	FCC 15.207 QP Margin (dBuV)	FCC 15.207 AV Limit (dBuV)	FCC 15.207 AV Margin (dBuV)	Pass/Fail
0.155	Pk	32.8	0.2	33.0	65.7	-32.7	55.7	-22.7	Pass
0.339	Pk	30.5	0.2	30.7	59.2	-28.5	49.2	-18.5	Pass
0.407	Pk	29.2	0.3	29.5	57.7	-28.2	47.7	-18.2	Pass
0.475	Pk	30.3	0.2	30.5	56.4	-25.9	46.4	-15.9	Pass
6.470	Pk	34.1	1.5	35.6	60.0	-24.4	50.0	-14.4	Pass
16.060	Pk	32.2	2.2	34.4	60.0	-25.6	50.0	-15.6	Pass

Table 10-4: Conducted Emissions Test Data – Mode RX, Neutral Side Line 1, Power Over Ethernet RX

Temperature: 74°F Humidity: 32%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC 15.207 QP Limit (dBuV)	FCC 15.207 QP Margin (dBuV)	FCC 15.207 AV Limit (dBuV)	FCC 15.207 AV Margin (dBuV)	Pass/Fail
0.151	Pk	32.4	0.2	32.6	65.9	-33.3	55.9	-23.3	Pass
0.339	Pk	28.6	0.2	28.8	59.2	-30.4	49.2	-20.4	Pass
0.406	Pk	32.9	0.3	33.2	57.7	-24.5	47.7	-14.5	Pass
2.050	Pk	33.8	0.7	34.5	56.0	-21.5	46.0	-11.5	Pass
7.290	Pk	34.8	1.5	36.3	60.0	-23.7	50.0	-13.7	Pass
15.910	Pk	30.4	2.2	32.6	60.0	-27.4	50.0	-17.4	Pass

Table 10-5: Conducted Emissions Test Data – Mode RX, Hot Side Line 2, Power Over Ethernet RX

Temperature: 74°F Humidity: 32%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC 15.207 QP Limit (dBuV)	FCC 15.207 QP Margin (dBuV)	FCC 15.207 AV Limit (dBuV)	FCC 15.207 AV Margin (dBuV)	Pass/Fail
0.203	Pk	32.2	0.2	32.4	63.5	-31.1	53.5	-21.1	Pass
0.405	Pk	33.4	0.3	33.7	57.8	-24.1	47.8	-14.1	Pass
0.474	Pk	28.5	0.2	28.7	56.4	-27.7	46.4	-17.7	Pass
2.270	Pk	32.1	0.8	32.9	56.0	-23.1	46.0	-13.1	Pass
7.650	Pk	32.9	1.5	34.4	60.0	-25.6	50.0	-15.6	Pass
15.990	Pk	31.2	2.2	33.4	60.0	-26.6	50.0	-16.6	Pass

Table 10-6: Conducted Emissions Test Data – Mode RX, Neutral Side Line 1, USB to Laptop in RX Mode

Temperature: 74°F Humidity: 32%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC 15.207 QP Limit (dBuV)	FCC 15.207 QP Margin (dBuV)	FCC 15.207 AV Limit (dBuV)	FCC 15.207 AV Margin (dBuV)	Pass/Fail
0.225	Pk	51.2	0.2	51.4	62.6	-11.2	52.6	-1.2	Pass
0.340	Pk	44.2	0.2	44.4	59.2	-14.8	49.2	-4.8	Pass
0.452	Av	44.2	0.2	44.4	56.8	-12.4	46.8	-2.4	Pass
0.452	Qp	48.8	0.2	49.0	56.8	-7.8			Pass
0.790	Av	42.4	0.3	42.7	56.0	-13.3	46.0	-3.3	Pass
0.790	Qp	37.6	0.3	37.9	56.0	-18.1			Pass
13.260	Pk	27.6	2.0	29.6	60.0	-30.4	50.0	-20.4	Pass
22.550	Pk	28.6	2.5	31.1	60.0	-28.9	50.0	-18.9	Pass

Table 10-7: Conducted Emissions Test Data – Mode RX, Hot Side Line 2, USB to Laptop in RX Mode

Temperature: 74°F Humidity: 32%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC 15.207 QP Limit (dBuV)	FCC 15.207 QP Margin (dBuV)	FCC 15.207 AV Limit (dBuV)	FCC 15.207 AV Margin (dBuV)	Pass/Fail
0.226	Pk	50.0	0.2	50.2	62.6	-12.4	52.6	-2.4	Pass
0.337	Pk	44.0	0.2	44.2	59.3	-15.1	49.3	-5.1	Pass
0.452	Av	44.6	0.2	44.8	56.8	-12.0	46.8	-2.0	Pass
0.452	Qp	48.5	0.2	48.7	56.8	-8.1			Pass
0.791	Av	42.5	0.3	42.8	56.0	-13.2	46.0	-3.2	Pass
0.791	Qp	47.0	0.3	47.3	56.0	-8.7			Pass
13.630	Pk	27.4	2.0	29.4	60.0	-30.6	50.0	-20.6	Pass
24.250	Pk	29.6	2.5	32.1	60.0	-27.9	50.0	-17.9	Pass

Table 10-8: Conducted Emissions Test Data – Mode RX, Neutral Side Line 1, USB to Laptop in TX Mode

Temperature: 74°F Humidity: 32%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC 15.207 QP Limit (dBuV)	FCC 15.207 QP Margin (dBuV)	FCC 15.207 AV Limit (dBuV)	FCC 15.207 AV Margin (dBuV)	Pass/Fail
0.224	Pk	50.3	0.2	50.5	62.7	-12.2	52.7	-2.2	Pass
0.339	Pk	41.2	0.2	41.4	59.2	-17.8	49.2	-7.8	Pass
0.449	Av	44.0	0.2	44.2	56.9	-12.7	46.9	-2.7	Pass
0.449	Qp	48.0	0.2	48.2	56.9	-8.7			Pass
0.785	Av	42.8	0.3	43.1	56.0	-12.9	46.0	-2.9	Pass
0.785	Qp	46.7	0.3	47.0	56.0	-9.0			Pass
13.480	Pk	27.0	2.0	29.0	60.0	-31.0	50.0	-21.0	Pass
24.750	Pk	27.8	2.6	30.4	60.0	-29.6	50.0	-19.6	Pass
0.224	Pk	50.3	0.2	50.5	62.7	-12.2	52.7	-2.2	Pass
0.339	Pk	41.2	0.2	41.4	59.2	-17.8	49.2	-7.8	Pass

Table 10-9: Conducted Emissions Test Data – Mode RX, Hot Side Line 2, USB to Laptop in TX Mode

Temperature: 74°F Humidity: 32%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC 15.207 QP Limit (dBuV)	FCC 15.207 QP Margin (dBuV)	FCC 15.207 AV Limit (dBuV)	FCC 15.207 AV Margin (dBuV)	Pass/Fail
0.225	Pk	49.6	0.2	49.8	62.6	-12.8	52.6	-2.8	Pass
0.336	Pk	44.0	0.2	44.2	59.3	-15.1	49.3	-5.1	Pass
0.449	Av	44.1	0.2	44.3	56.9	-12.6	46.9	-2.6	Pass
0.449	Qp	48.7	0.2	48.9	56.9	-8.0			Pass
0.786	Av	42.0	0.3	42.3	56.0	-13.7	46.0	-3.7	Pass
0.786	Qp	47.4	0.3	47.7	56.0	-8.3			Pass
10.820	Pk	28.9	1.7	30.6	60.0	-29.4	50.0	-19.4	Pass
19.990	Pk	27.4	2.4	29.8	60.0	-30.2	50.0	-20.2	Pass
0.225	PK	49.6	0.2	49.8	62.6	-12.8	52.6	-2.8	Pass

Table 10-10: Conducted Emissions Test Data – Mode RX, Neutral Side Line 1, AC Adapter TX Mode

Temperature: 74°F Humidity: 32%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC 15.207 QP Limit (dBuV)	FCC 15.207 QP Margin (dBuV)	FCC 15.207 AV Limit (dBuV)	FCC 15.207 AV Margin (dBuV)	Pass/Fail
0.212	Pk	43.0	0.2	43.2	63.1	-19.9	53.1	-9.9	Pass
0.284	Pk	37.5	0.2	37.7	60.7	-23.0	50.7	-13.0	Pass
0.356	Pk	38.3	0.2	38.5	58.8	-20.3	48.8	-10.3	Pass
0.650	Pk	27.3	0.2	27.5	56.0	-28.5	46.0	-18.5	Pass
3.080	Pk	27.9	1.0	28.9	56.0	-27.1	46.0	-17.1	Pass
22.330	Pk	30.9	2.5	33.4	60.0	-26.6	50.0	-16.6	Pass

Table 10-11: Conducted Emissions Test Data – Mode RX, Hot Side Line 2, AC Adapter TX Mode

Temperature: 74°F Humidity: 32%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC 15.207 QP Limit (dBuV)	FCC 15.207 QP Margin (dBuV)	FCC 15.207 AV Limit (dBuV)	FCC 15.207 AV Margin (dBuV)	Pass/Fail
0.213	Pk	44.8	0.2	45.0	63.1	-18.1	53.1	-8.1	Pass
0.286	Pk	36.9	0.2	37.1	60.6	-23.5	50.6	-13.5	Pass
0.356	Pk	37.0	0.2	37.2	58.8	-21.6	48.8	-11.6	Pass
0.650	Pk	29.2	0.2	29.4	56.0	-26.6	46.0	-16.6	Pass
1.390	Pk	27.2	0.5	27.7	56.0	-28.3	46.0	-18.3	Pass
22.400	Pk	34.3	2.5	36.8	60.0	-23.2	50.0	-13.2	Pass

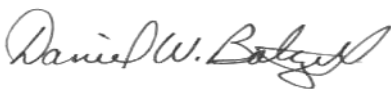
Table 10-12: Conducted Emissions Test Data – Mode RX, Neutral Side Line 1, AC Adapter RX Mode

Temperature: 74°F Humidity: 32%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC 15.207 QP Limit (dBuV)	FCC 15.207 QP Margin (dBuV)	FCC 15.207 AV Limit (dBuV)	FCC 15.207 AV Margin (dBuV)	Pass/Fail
0.213	Pk	41.9	0.2	42.1	63.1	-21.0	53.1	-11.0	Pass
0.285	Pk	35.8	0.2	36.0	60.7	-24.7	50.7	-14.7	Pass
0.356	Pk	36.0	0.2	36.2	58.8	-22.6	48.8	-12.6	Pass
0.650	Pk	28.1	0.2	28.3	56.0	-27.7	46.0	-17.7	Pass
1.750	Pk	26.3	0.6	26.9	56.0	-29.1	46.0	-19.1	Pass
24.840	Pk	35.2	2.6	37.8	60.0	-22.2	50.0	-12.2	Pass

Table 10-13: Conducted Emissions Test Data – Mode RX, Hot Side Line 2, AC Adapter RX Mode

Temperature: 74°F Humidity: 32%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC 15.207 QP Limit (dBuV)	FCC 15.207 QP Margin (dBuV)	FCC 15.207 AV Limit (dBuV)	FCC 15.207 AV Margin (dBuV)	Pass/Fail
0.215	Pk	42.1	0.2	42.3	63.0	-20.7	53.0	-10.7	Pass
0.285	Pk	37.3	0.2	37.5	60.7	-23.2	50.7	-13.2	Pass
0.356	Pk	33.3	0.2	33.5	58.8	-25.3	48.8	-15.3	Pass
0.500	Pk	29.7	0.2	29.9	56.0	-26.1	46.0	-16.1	Pass
1.610	Pk	25.9	0.6	26.5	56.0	-29.5	46.0	-19.5	Pass
22.990	Pk	35.7	2.4	38.1	60.0	-21.9	50.0	-11.9	Pass

Test Personnel:

Daniel W. Baltzell		July 2, 2007
Test Engineer	Signature	Date Of Test

11 Conclusion

The data in this measurement report shows that the EUT as tested, Fleetwood Group, Inc., Model Name: WRS970X, FCC ID: FBRWRS970X, IC: 1859A-WRS970X, complies with all the applicable requirements of Parts 2 and 15 of the FCC Rules and Regulations and IC RSS-210 and RSS-Gen.