



Engineering and Testing for EMC and Safety Compliance

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

Test Lab: Rhein Tech Laboratories, Inc. Phone: 703-689-0368 360 Herndon Parkway Fax: 703-689-2056 Suite 1400 http://www.rheintech.com Herndon, VA 20170 E-Mail: ATCBINFO@rheintech.com		Applicant: 3e Technologies International Phone: 301-670-6779 700 King Farm Blvd.; Ste. 600 Fax: 301-670-6989 Rockville, MD 20850 Email: jhorky@eti.com Contact: Joseph Horky	
FCC ID/ IC ID:	QVT-527A3/ 6780A-527A3	Date of Test Report:	September 21, 2006
Platform:	802.11 Application Platform	RTL Work Order Number:	2006146
Model#:	3e-527A3	RTL Quote Number:	QRTL06-325
American National Standard Institute: 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			
FCC Classification: DTS – Part 15 Digital Transmission System			
FCC Rule Part(s): FCC Rules 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			
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)	Frequency Tolerance	Emission Designator
2412-2462	0.067	N/A	17M7G7D
2412-2462	0.352	N/A	19M6G7D
5725-5825	0.309	N/A	43M3G7D

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: Desmond A. Fraser

Date: September 21, 2006

Typed/Printed Name: Desmond A. Fraser

Position: President

*This report may not be reproduced, except in full, without the written approval of Rhein Tech Laboratories, Inc.
The test results relate only to the item(s) tested.*

Table of Contents

1	General Information	6
1.1	Scope	6
1.2	Description of EUT	6
1.3	Test Facility	6
1.4	Related Submittal(s)/Grant(s)	6
1.5	Modifications	6
2	Test Information	7
2.1	Description of Test Modes	7
2.2	Exercising the EUT	7
2.3	Test Result Summary	8
2.4	Test System Details	8
2.5	Configuration of Tested System	9
3	Peak Output Power - §15.247(b)(1); RSS-210 §A8.4(4)	10
3.1	Power Output Test Procedure	10
3.2	Power Output Test Data	10
4	Compliance with the Band Edge – FCC §15.247(c); RSS-210 §A8.5	11
4.1	802.11b/g Band Edge Test Procedure	11
4.2	Band Edge Test Results for 802.11b/g Card	12
4.3	802.11a Limits of Band Edge Measurement	16
4.4	802.11a Band Edge Test Procedure	16
4.5	Band Edge Test Results 802.11a	17
4.5.1	Lower Band Edge 802.11a	17
4.5.2	Upper Band Edge 802.11a	19
5	Antenna Conducted Spurious Emissions - §15.247(c); RSS-210 §A8.5	21
5.1	Antenna Conducted Spurious Emissions Test Procedures	21
5.2	Antenna Conducted Spurious Emissions Test Results for 802.11b/g Card	22
5.3	Antenna Conducted Spurious Emissions Test Results for 802.11a Card	28
5.3.1	802.11a Test Results	28
6	6 dB Bandwidth - §15.247(a)(2); RSS-210 §A8.2(1)	33
6.1	6 db Bandwidth Test Procedure – Minimum 6 db Bandwidth	33
6.2	6 dB Bandwidth Test Results for 802.11b/g Card	33
6.3	6 dB Bandwidth Test Results for 802.11a	40
7	Power Spectral Density - §15.247(d); RSS-210 §A8.2(2)	45
7.1	Power Spectral Density Test Procedure	45
7.2	Power Spectral Density Test Results for 802.11b/g Card	45
7.2.1	Power Spectral Density Test Data	45
7.3	Power Spectral Density Plots - 802.11b	46
7.4	Power Spectral Density Plots - 802.11g	49
7.5	Power Spectral Density Plots - 802.11a	52
8	Conducted Emissions Measurement – FCC §15.207; RSS-GEN §7.2.2	57
8.1	Limits of Conducted Emissions Measurement	57
8.2	Conducted Emissions Measurement Test Procedure	57
8.3	Conducted Test Data	58
9	Radiated Emissions - §15.209; RSS-210 §A8.5, RSS-GEN §4.8, 6	62
9.1	Limits of Radiated Emissions Measurement	62
9.2	Radiated Emissions Measurement Test Procedure	62
9.3	Unintentional Radiated Emissions Test Results	64
9.4	Radiated Spurious Emissions	65
10	Antenna Requirement – FCC §15.203	70
10.1	Applicable Standard	70
10.2	Antenna Connector Construction	70
11	Conclusion	70
11.1	20 db Bandwidth Test Procedure – Minimum 20 db Bandwidth	103
11.2	20 dB Bandwidth Test Results for 802.11b/g Card	103

Figure Index

Figure 2-1:	Configuration of System Under Test	9
-------------	--	---

Table Index

Table 2-1:	Channels Tested for 802.11b – 11 Mbps	7
Table 2-2:	Channels Tested for 802.11g – 54 Mbps	7
Table 2-3:	Channels Tested for 802.11a – 54 Mbps and Turbo Mode	7
Table 2-4:	Test Result Summary for FCC Rules and Regulations – FCC Part 15, Subpart C (Section 15.247)...	8
Table 2-5:	Equipment Under Test (EUT).....	8
Table 2-6:	Support Equipment	8
Table 3-1:	Power Output Test Equipment.....	10
Table 3-2:	Power Output Test Data – 802.11b.....	10
Table 3-3:	Power Output Test Data - 802.11g	10
Table 3-4:	Power Output Test Data - 802.11a	10
Table 4-1:	Band Edge Test Equipment.....	11
Table 4-2:	Band Edge Test Equipment.....	16
Table 5-1:	Antenna Conducted Spurious Emissions Test Equipment.....	21
Table 6-1:	6 dB Bandwidth Test Equipment.....	33
Table 6-2:	6 db Bandwidth Test Data - 802.11b.....	33
Table 6-3:	6 db Bandwidth Test Data - 802.11g.....	33
Table 6-4:	6 db Bandwidth Test Data - 802.11a.....	40
Table 7-1:	Power Spectral Density Test Equipment.....	45
Table 7-2:	Power Spectral Density Test Data - 802.11b	45
Table 7-3:	Power Spectral Density Test Data - 802.11g	45
Table 7-4:	Power Spectral Density Test Data 802.11a	45
Table 8-1:	Conducted Emissions Test Equipment	57
Table 8-2:	Conducted Emissions Test Data; Transmit; Receive Mode; Neutral Side (Line 1)	58
Table 8-3:	Conducted Emissions Test Data; Transmit; Receive Mode; Hot Side (Line 2)	58
Table 8-4:	Conducted Emissions Test Data; Transmit; 802.11b TX 2437 MHz; Neutral Side (Line 1)	58
Table 8-5:	Conducted Emissions Test Data; Transmit; 802.11b TX 2437 MHz; Hot Side (Line 2)	59
Table 8-6:	Conducted Emissions Test Data; Transmit; 802.11g TX 2437 MHz; Neutral Side (Line 1)	59
Table 8-7:	Conducted Emissions Test Data; Transmit; 802.11g TX 2437 MHz; Hot Side (Line 2)	59
Table 8-8:	Conducted Emissions Test Data; Transmit; 802.11g TX 2437/802.11a TX turbo 5760; Neutral Side (Line 1).....	60
Table 8-9:	Conducted Emissions Test Data; Transmit; 802.11g TX 2437/802.11a TX turbo 5760 MHz; Hot Side (Line 2).....	60
Table 8-10:	Conducted Emissions Test Data; Transmit; 802.11a TX 5785 MHz; Neutral Side (Line 1)	60
Table 8-11:	Conducted Emissions Test Data; Transmit; 802.11a TX 5785 MHz; Hot Side (Line 2)	61
Table 9-1:	Radiated Emissions Test Equipment	63
Table 9-2:	Unintentional Radiated Emissions Test Results.....	64
Table 9-3:	Radiated Emissions Harmonics/Spurious Channel 1 (TX Frequency: 2412 MHz; 802.11b).....	65
Table 9-4:	Radiated Emissions Harmonics/Spurious Channel 6 (TX Frequency: 2437 MHz; 802.11b).....	65
Table 9-5:	Radiated Emissions Harmonics/Spurious Channel 11 (TX Frequency: 2462 MHz; 802.11b).....	66
Table 9-6:	Radiated Emissions Harmonics/Spurious Channel 1 (TX Frequency: 2412 MHz; 802.11g	66
Table 9-7:	Radiated Emissions Harmonics/Spurious Channel 6 (TX Frequency: 2437 MHz; 802.11g).....	67
Table 9-8:	Radiated Emissions Harmonics/Spurious Channel 11 (TX Frequency: 2462 MHz; 802.11g).....	67
Table 9-9:	Radiated Emissions Harmonics/Spurious Channel 149 (5745 MHz, 802.11a)	68
Table 9-10:	Radiated Emissions Harmonics/Spurious Channel 157 (5785 MHz, 802.11a)	68
Table 9-11:	Radiated Emissions Harmonics/Spurious Channel 165 (5825 MHz, 802.11a)	68
Table 9-12:	Collocated Radiated Emissions Intermodulation Products; 802.11a Channel 157 (5785 MHz) and 802.11b Channel 6 (2437 MHz)	69
Table 11-1:	20 dB Bandwidth Test Equipment.....	103
Table 11-2:	20 db Bandwidth Test Data - 802.11b.....	103
Table 11-3:	20 db Bandwidth Test Data - 802.11g.....	103
Table 11-4:	20 db Bandwidth Test Data - 802.11a.....	103

Plot Index

Plot 4-1:	Lower Band Edge: Average Measurement Channel 1 (TX Frequency: 2412 MHz – 11 Mbps).....	12
Plot 4-2:	Upper Band Edge: Average Measurement Channel 11 (TX Frequency: 2462 MHz – 11 Mbps).....	13
Plot 4-3:	Lower Band Edge: Delta Measurement Channel 1 (TX Frequency: 2412 MHz – 54 Mbps).....	14
Plot 4-4:	Upper Band Edge: Delta Measurement Channel 11 (TX Frequency: 2462 MHz – 54 Mbps).....	15
Plot 4-5:	Lower Band Edge: Channel 149 (TX Frequency: 5745 MHz – 54 Mbps).....	17
Plot 4-6:	Lower Band Edge: Channel 152 Turbo Mode (TX Frequency: 5760 MHz – 108 Mbps).....	18
Plot 4-7:	Upper Band Edge: Channel 165 (TX Frequency: 5825 MHz – 54 Mbps).....	19
Plot 4-8:	Upper Band Edge: Channel 160 Turbo Mode (TX Frequency: 5800 MHz – 108 Mbps).....	20
Plot 5-1:	Conducted Antenna Spurious Emissions; Channel 1; 802.11b	22
Plot 5-2:	Conducted Antenna Spurious Emissions; Channel 6; 802.11b	23
Plot 5-3:	Conducted Antenna Spurious Emissions; Channel 11; 802.11b	24
Plot 5-4:	Conducted Antenna Spurious Emissions; Channel 1; 802.11g	25
Plot 5-5:	Conducted Antenna Spurious Emissions; Channel 6; 802.11g	26
Plot 5-6:	Conducted Antenna Spurious Emissions; Channel 11; 802.11g	27
Plot 5-7:	Conducted Antenna Spurious Emissions; Channel 149; 5745 MHz; 54 Mbps	28
Plot 5-8:	Conducted Antenna Spurious Emissions; Channel 152; 5760 MHz Turbo Mode; 108 Mbps	29
Plot 5-9:	Conducted Antenna Spurious Emissions; Channel 157; 5785 MHz; 54 Mbps	30
Plot 5-10:	Conducted Antenna Spurious Emissions; Channel 160; 5800 MHz Turbo Mode; 108 Mbps	31
Plot 5-11:	Conducted Antenna Spurious Emissions; Channel 165; 5825 MHz; 54 Mbps	32
Plot 6-1:	6 dB Bandwidth Channel 1 (TX Frequency: 2412 MHz – 11 Mbps) 802.11b	34
Plot 6-2:	6 dB Bandwidth Channel 6 (TX Frequency: 2437 MHz – 11 Mbps) 802.11b	35
Plot 6-3:	6 dB Bandwidth Channel 11 (TX Frequency: 2462 MHz – 11 Mbps) 802.11b	36
Plot 6-4:	6 dB Bandwidth Channel 1 (TX Frequency: 2412 MHz – 54 Mbps) 802.11g	37
Plot 6-5:	6 dB Bandwidth Channel 6 (TX Frequency: 2437 MHz – 6 Mbps) 802.11g	38
Plot 6-6:	6 dB Bandwidth Channel 11 (TX Frequency: 2462 MHz - 54 Mbps) 802.11g	39
Plot 6-7:	6 dB Bandwidth Channel 149 (TX Frequency: 5745 MHz – 54 Mbps) 802.11a	40
Plot 6-8:	6 dB Bandwidth Channel 157 (TX Frequency: 5785 MHz – 54 Mbps) 802.11a	41
Plot 6-9:	6 dB Bandwidth Channel 165 (TX Frequency: 5825 MHz –54 Mbps) 802.11a	42
Plot 6-10:	6 dB Bandwidth Channel 152 (TX Frequency: 5760 MHz – Turbo 54 Mbps) 802.11a	43
Plot 6-11:	6 dB Bandwidth Channel 160 (TX Frequency: 5800 MHz – Turbo 54 Mbps) 802.11a	44
Plot 7-1:	Power Spectral Density: Channel 1 (2412 MHz – 11 Mbps)	46
Plot 7-2:	Power Spectral Density: Channel 6 (2437 MHz – 11 Mbps)	47
Plot 7-3:	Power Spectral Density: Channel 11 (2462 MHz – 11 Mbps)	48
Plot 7-4:	Power Spectral Density: Channel 1 (2412 MHz – 54 Mbps)	49
Plot 7-5:	Power Spectral Density: Channel 6 (2437 MHz – 54 Mbps)	50
Plot 7-6:	Power Spectral Density: Channel 11 (2462 MHz – 54 Mbps)	51
Plot 7-7:	Power Spectral Density: Channel 149 (5745 MHz – 54 Mbps)	52
Plot 7-8:	Power Spectral Density: Channel 157 (5785 MHz – 54 Mbps)	53
Plot 7-9:	Power Spectral Density: Channel 165 (5825 MHz – 54 Mbps)	54
Plot 7-10:	Power Spectral Density: Channel 152 Turbo (5760 MHz – 108 Mbps)	55
Plot 7-11:	Power Spectral Density: Channel 160 Turbo (5800 MHz – 108 Mbps)	56
Plot 11-1:	20 dB Bandwidth Channel 1 (TX Frequency: 2412 MHz – 11 Mbps) 802.11b	104
Plot 11-2:	20 dB Bandwidth Channel 6 (TX Frequency: 2437 MHz – 11 Mbps) 802.11b	105
Plot 11-3:	20 dB Bandwidth Channel 11 (TX Frequency: 2462 MHz – 11 Mbps) 802.11b	106
Plot 11-4:	20 dB Bandwidth Channel 1 (TX Frequency: 2412 MHz – 54 Mbps) 802.11g	107
Plot 11-5:	20 dB Bandwidth Channel 6 (TX Frequency: 2437 MHz – 6 Mbps) 802.11g	108
Plot 11-6:	20 dB Bandwidth Channel 11 (TX Frequency: 2462 MHz - 54 Mbps) 802.11g	109
Plot 11-7:	20 dB Bandwidth Channel 149 (TX Frequency: 5745 MHz – 54 Mbps) 802.11a	110
Plot 11-8:	20 dB Bandwidth Channel 157 (TX Frequency: 5785 MHz – 54 Mbps) 802.11a	111
Plot 11-9:	20 dB Bandwidth Channel 165 (TX Frequency: 5825 MHz –54 Mbps) 802.11a	112
Plot 11-10:	20 dB Bandwidth Channel 152 (TX Frequency: 5760 MHz – Turbo 54 Mbps) 802.11a	113
Plot 11-11:	20 dB Bandwidth Channel 160 (TX Frequency: 5800 MHz – Turbo 54 Mbps) 802.11a	114

Appendix Index

Appendix A:	RF Exposure Compliance	71
Appendix B:	Antenna Specifications Per FCC §15.204(c)	72
Appendix C:	FCC Agency Authorization Letter	73
Appendix D:	FCC Confidentiality Request Letter	74
Appendix E:	IC Authority to Act as Agent	75
Appendix F:	Acknowledgement of IC Listing Requirements	76
Appendix G:	Label and Label Location	77
Appendix H:	Technical Operational Description	78
Appendix I:	Schematics	79
Appendix J:	Block Diagram	80
Appendix K:	User Manual	81
Appendix L:	Test Photographs	82
Appendix M:	External Photographs	86
Appendix Q:	Internal Photographs	89
Appendix O:	20 dB Bandwidth; RSS-Gen	103

Photograph Index

Photograph 1:	FCC ID/IC ID Label Location	77
Photograph 2:	Radiated Testing Front View	82
Photograph 3:	Radiated Testing Back View	83
Photograph 4:	Conducted Testing Front View	84
Photograph 5:	Conducted Testing Back View	85
Photograph 6:	Top Front	86
Photograph 7:	Back and Side	87
Photograph 8:	Bottom	88
Photograph 9:	Inside Bottom Removed	89
Photograph 10:	Top of PCB	90
Photograph 11:	Bottom of PCB with Radios and Shields	91
Photograph 12:	Bottom of PCB with Radios and Shields Removed	92
Photograph 13:	Back of Power PCB	93
Photograph 14:	Front of Power PCB	94
Photograph 15:	Front of Ethernet PCB	95
Photograph 16:	Back of Ethernet PCB	96
Photograph 17:	5.7 GHz Radio Top	97
Photograph 18:	5.7 GHz Radio Bottom	98
Photograph 19:	2.4 GHz Radio Top	99
Photograph 20:	2.4 GHz Radio Bottom	100
Photograph 21:	2.4 GHz Antenna	101
Photograph 22:	5.7 GHz Antenna	102

1 General Information

1.1 Scope

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	Wireless Mesh Access Point/Bridge/Switch
Model	3e-527A3
Modulation Type	DBPSK, DQPSK, CCK, OFDM; BPSK; QPSK; 16QAM; 64QAM
Modulation Technology	DSSS, CCK
Transfer Rate	54, 48, 36, 24, 18, 12, 11, 9, 6, 5.5, 2, and 1 Mbps (option: Turbo Mode up to 108 Mbps)
Frequency Range	802.11b & g: 2412–2462 MHz; 802.11a: 5.725-5.825 GHz
Power Supply	110-230 VAC to power over Ethernet injector or 48VDC to Ethernet
Antenna Connector Type	U.FL connected to N female connector
Antenna Types	5 GHz 3 dBi Rubber Duck Omni Antenna with N Male Connector 2.4 GHz 2.1 dBi Omni Antenna with N Male Connector

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 certification application for 3e Technologies International, Inc., Model: 3e-527A3, FCC ID: QVT-527A3, IC: 6780A-527A3.

1.5 Modifications

No physical modifications were made to the EUT. A power setting of 5 was used in the firmware for all three modes during testing.

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 for 802.11b, 802.11g, and 802.11a:

Table 2-1: Channels Tested for 802.11b – 11 Mbps

Channel	Frequency
1	2412
6	2437
11	2462

Table 2-2: Channels Tested for 802.11g – 54 Mbps

Channel	Frequency
1	2412
6	2437
11	2462

Table 2-3: Channels Tested for 802.11a – 54 Mbps and Turbo Mode

Channel	Frequency
149	5745
152	5760 (turbo)
157	5785
160	5800 (turbo)
165	5825

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 2-4: Test Result Summary for FCC Rules and Regulations – FCC Part 15, Subpart C (Section 15.247)

Standard	Test	Pass/Fail or N/A
FCC 15.207	AC Power Conducted Emissions	Pass
FCC 15.247(a)(2)	Spectrum Bandwidth of DSSS System – Limit: 500 kHz Minimum	Pass
FCC 15.247(b)	Maximum Peak Power Output - Limit: 30 dBm max.	Pass
FCC 15.247(c)	Antenna Conducted Spurious Emissions – Limit: 15.209	Pass
FCC 15.247(d)	Power Spectral Density – Limit: 8 dBm max.	Pass
FCC 15.247(c)	Band Edge Measurement – Limit: 20 dB less than peak level of fundamental	Pass

2.4 Test System Details

The test sample was received on September 11, 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 2-5: Equipment Under Test (EUT)

Part	Manufacturer	Model	Serial #	FCC ID	Cable Description	RTL Bar Code
Wireless Mesh Access Point/Bridge/Switch	3e Technologies International	3e-527A3	P20060712-10	QVT-527A3	11 – 2 m shielded ethernet	17496
2.1 dBi Dual Band Omni Antenna	NetGate	ANT-DUALOMNI-NM	N/A	N/A	N/A	17498
3 dBi 5.7 GHz Omni Antenna	NetGate	ANT-5G-3-OMNI-NM	N/A	N/A	N/A	17499

Table 2-6: Support Equipment

Part	Manufacturer	Model	Serial #	FCC ID	Cable Description	RTL Bar Code
Laptop	Dell	Latitude D610	3e00668	N/A	N/A	17496
AC Adapter	Dell	NA	NA	NA	NA	NA
Power Over Ethernet Injector	3COM	PW130	N/A	N/A	N/A	17501
Hub	Netgear	DS524	N/A	N/A	N/A	17500

2.5 Configuration of Tested System

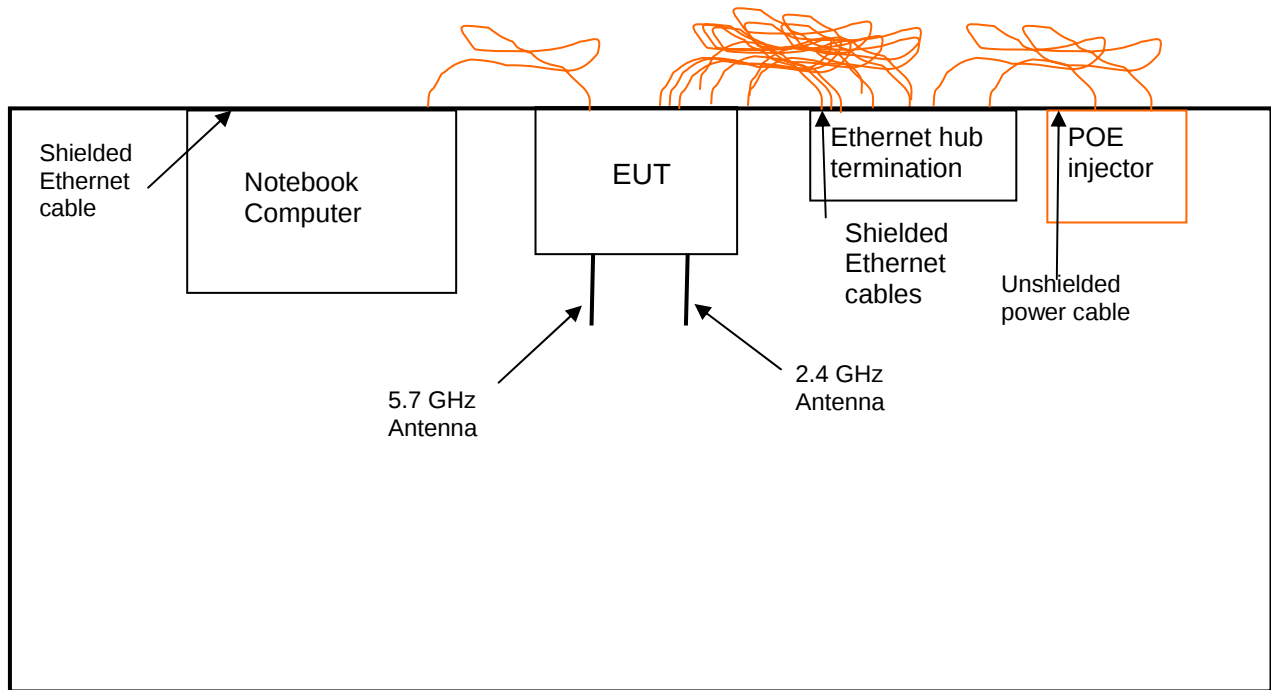


Figure 2-1: Configuration of System Under Test

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 #	Calibration Due Date
901184	Agilent Technologies	E4416A	EPM-P Power Meter,	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

Channel	Frequency (MHz)	Peak Power Conducted Output (dBm)
1	2412	17.56
6	2437	17.57
11	2462	18.26

Table 3-3: Power Output Test Data - 802.11g

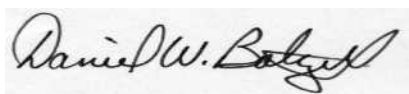
Channel	Frequency (MHz)	Peak Power Conducted Output (dBm)
1	2412	25.10
6	2437	25.47
11	2462	24.34

Table 3-4: Power Output Test Data - 802.11a

Channel	Frequency (MHz)	Peak Power Conducted Output (dBm)
149	5745	22.82
152 Turbo	5760	24.90
157	5785	22.78
160 Turbo	5800	23.70
165	5825	21.90

Test Personnel:

Daniel W. Baltzell
Test Engineer



Signature

September 11, 2006
Date Of Test

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

4.1 802.11b/g 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
901413	Agilent	E4448A	Spectrum Analyzer	US44020346	11/2/06
900878	Rhein Tech Labs	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	12/12/06
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	12/12/06
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

4.2 Band Edge Test Results for 802.11b/g Card

4.2.1.1 Calculation of Lower Band Edge 802.11b

102.3 dBuV/m is the field strength measurement, from which the delta measurement of 50.2 dB is subtracted (reference plots), resulting in a level of 52.1 dB. This level has a margin of 1.9 dB below the limit of 54 dBuV/m.

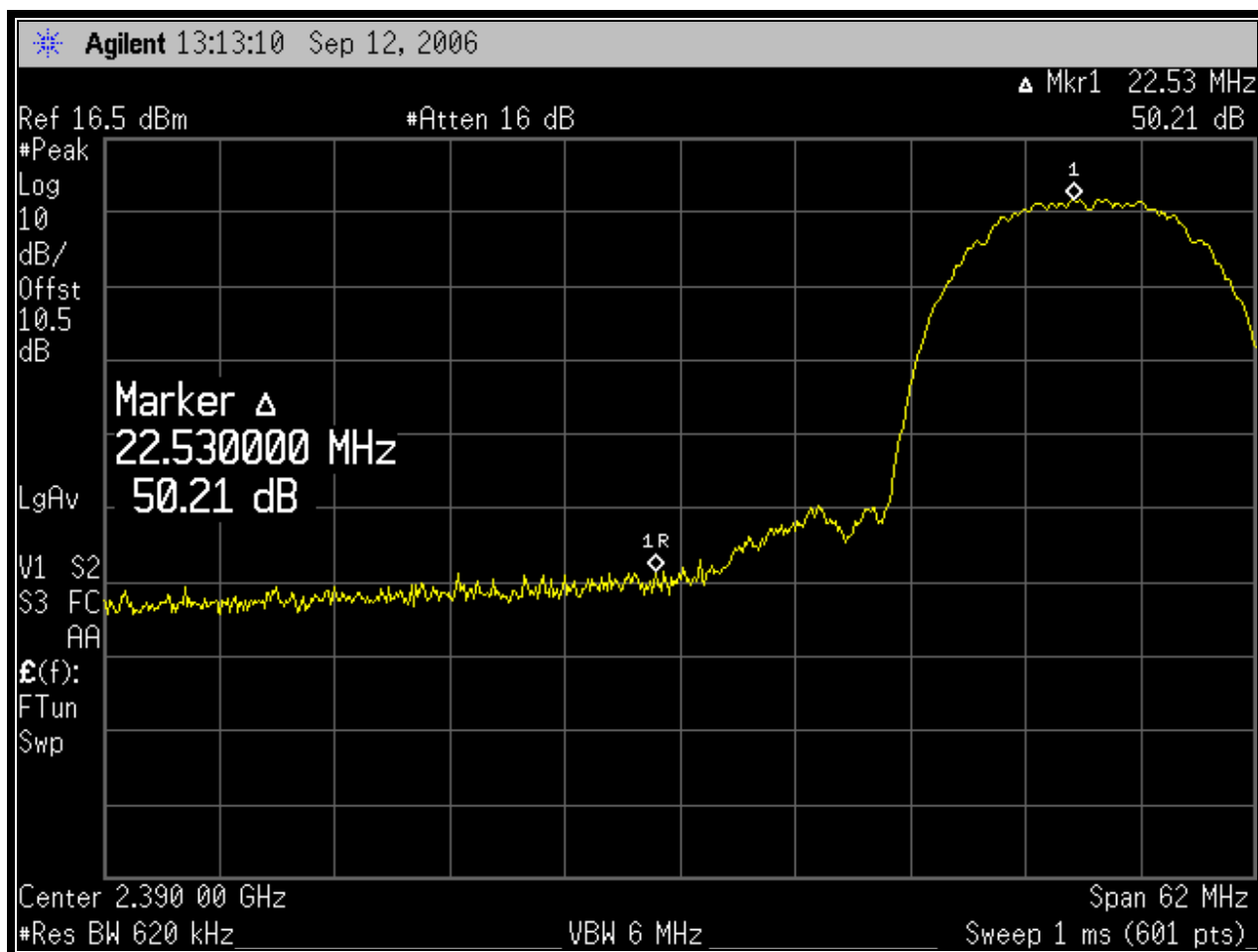
Calculation: $102.3 \text{ dBuV/m} - 50.2 \text{ dB} - 54 \text{ dBuV/m} = -1.9 \text{ dB}$

Peak Field Strength of Lower Band Edge (1 MHz RBW/1 MHz VBW) = 106.9 dBuV/m

Average Field Strength of Lower Band Edge (1 MHz RBW/10 Hz VBW) = 102.3 dBuV/m

Delta measurement = 52.1 dB

Plot 4-1: Lower Band Edge: Average Measurement Channel 1 (TX Frequency: 2412 MHz – 11 Mbps)



4.2.1.2 Calculation of Upper Band Edge 802.11b

103.6 dBuV/m is the field strength measurement, from which the delta measurement of 51.3 dB is subtracted (reference plots), resulting in a level of 52.3 dB. This level has a margin of 1.7 dB below the limit of 54 dBuV/m.

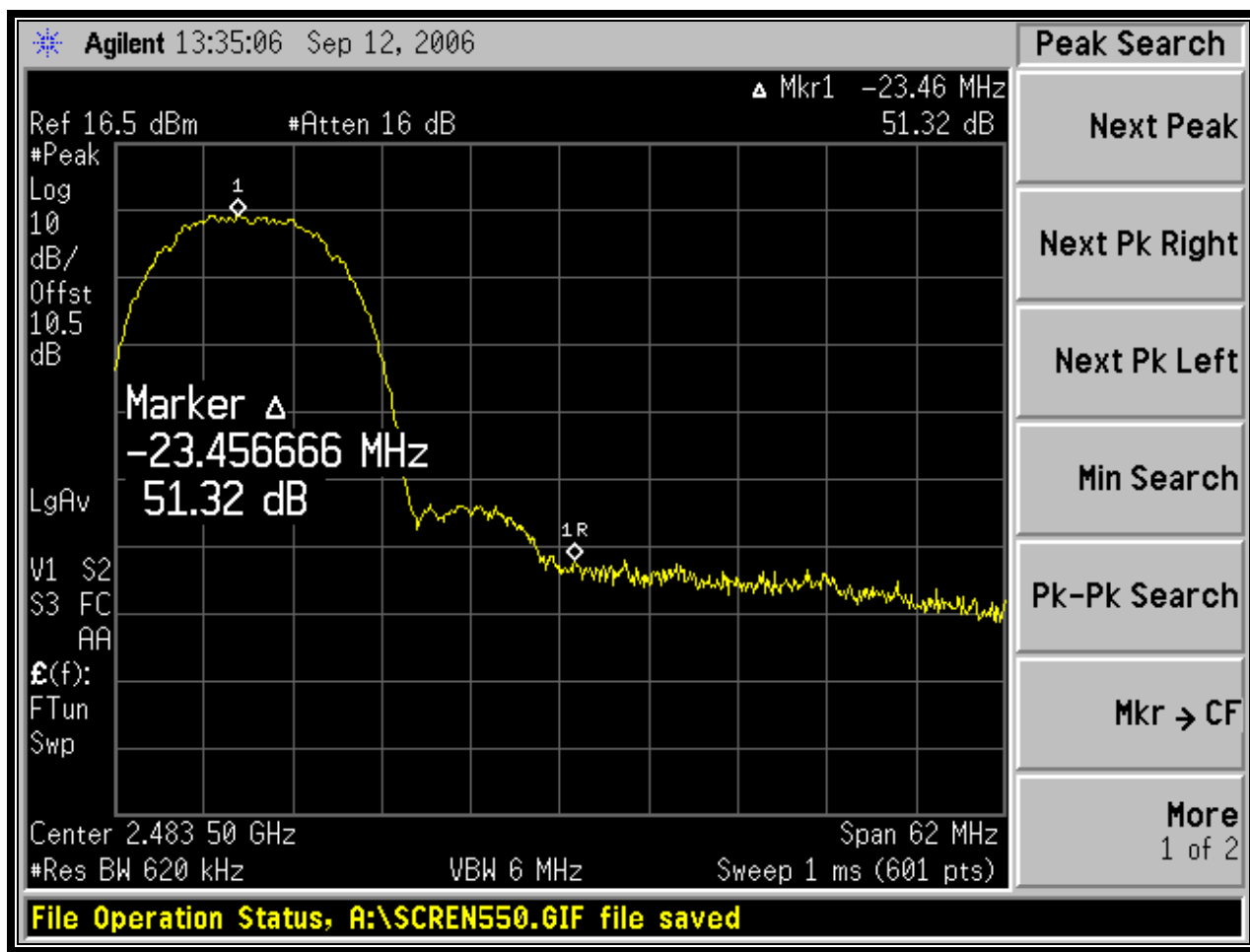
Calculation: $103.6 \text{ dBuV/m} - 51.3 \text{ dB} - 54 \text{ dBuV/m} = -1.7 \text{ dB}$

Peak Field Strength of Lower Band Edge (1 MHz RBW/1 MHz VBW) = 107.6 dBuV/m

Average Field Strength of Lower Band Edge (1 MHz RBW/10 Hz VBW) = 103.6 dBuV/m

Delta measurement = 51.3 dB

Plot 4-2: Upper Band Edge: Average Measurement Channel 11 (TX Frequency: 2462 MHz – 11 Mbps)



Test Personnel:

Daniel W. Baltzell
Test Engineer

Daniel W. Baltzell

Signature

September 12, 2006
Date Of Test

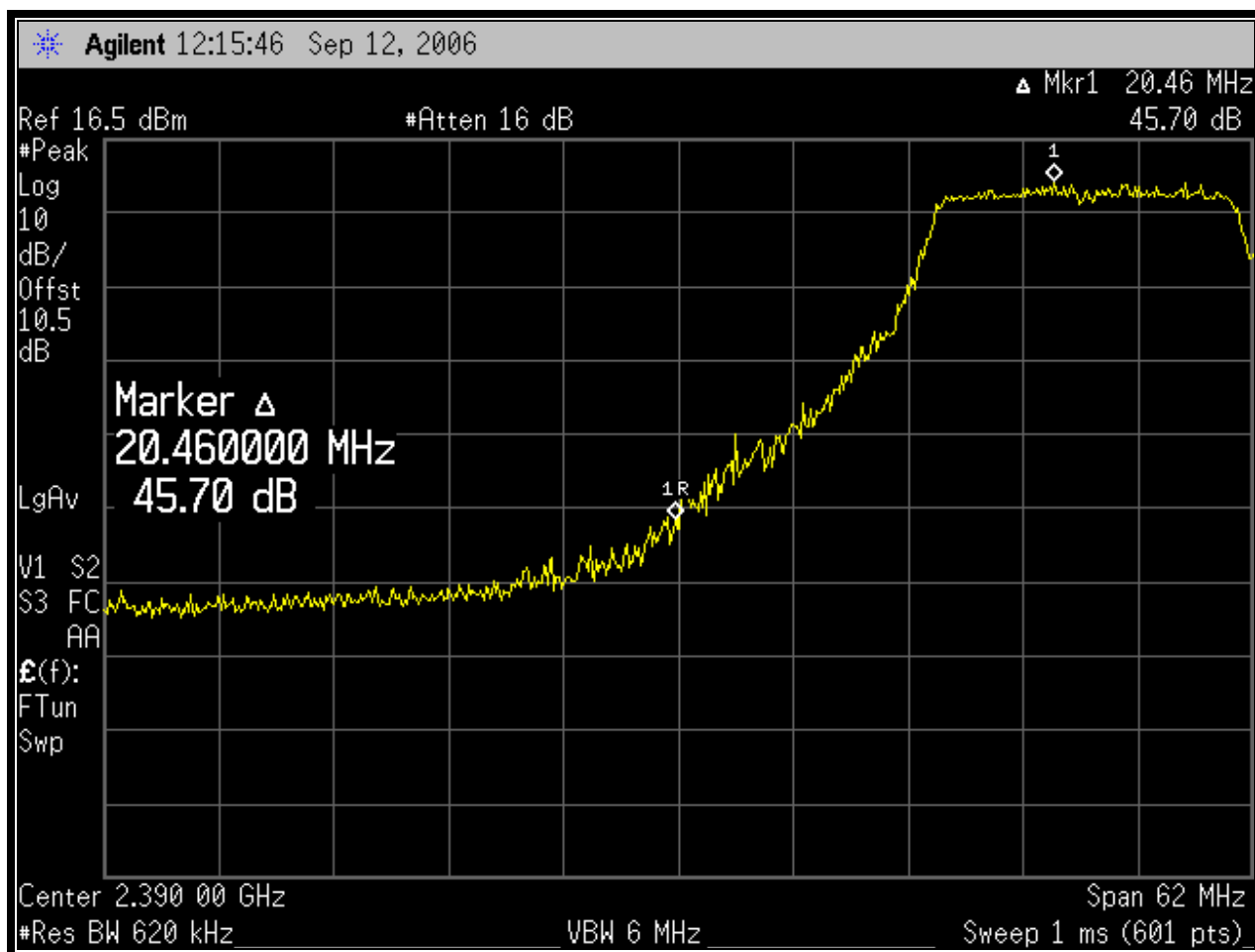
4.2.1.3 Calculation of Lower Band Edge 802.11g

98.9 dBuV/m is the field strength measurement, from which the delta measurement of 45.7 dB is subtracted (reference plots), resulting in a level of 53.2 dB. This level has a margin of 0.8 dB below the limit of 54 dBuV/m.

Calculation: $98.9 \text{ dBuV/m} - 45.7 \text{ dB} - 54 \text{ dBuV/m} = -0.8 \text{ dB}$

Peak Field Strength of Lower Band Edge (1 MHz RBW/1 MHz VBW) = 109.9 dBuV/m
 Average Field Strength of Lower Band Edge (1 MHz RBW/10 Hz VBW) = 98.9 dBuV/m
 Delta measurement = 45.7 dB

Plot 4-3: Lower Band Edge: Delta Measurement Channel 1 (TX Frequency: 2412 MHz – 54 Mbps)



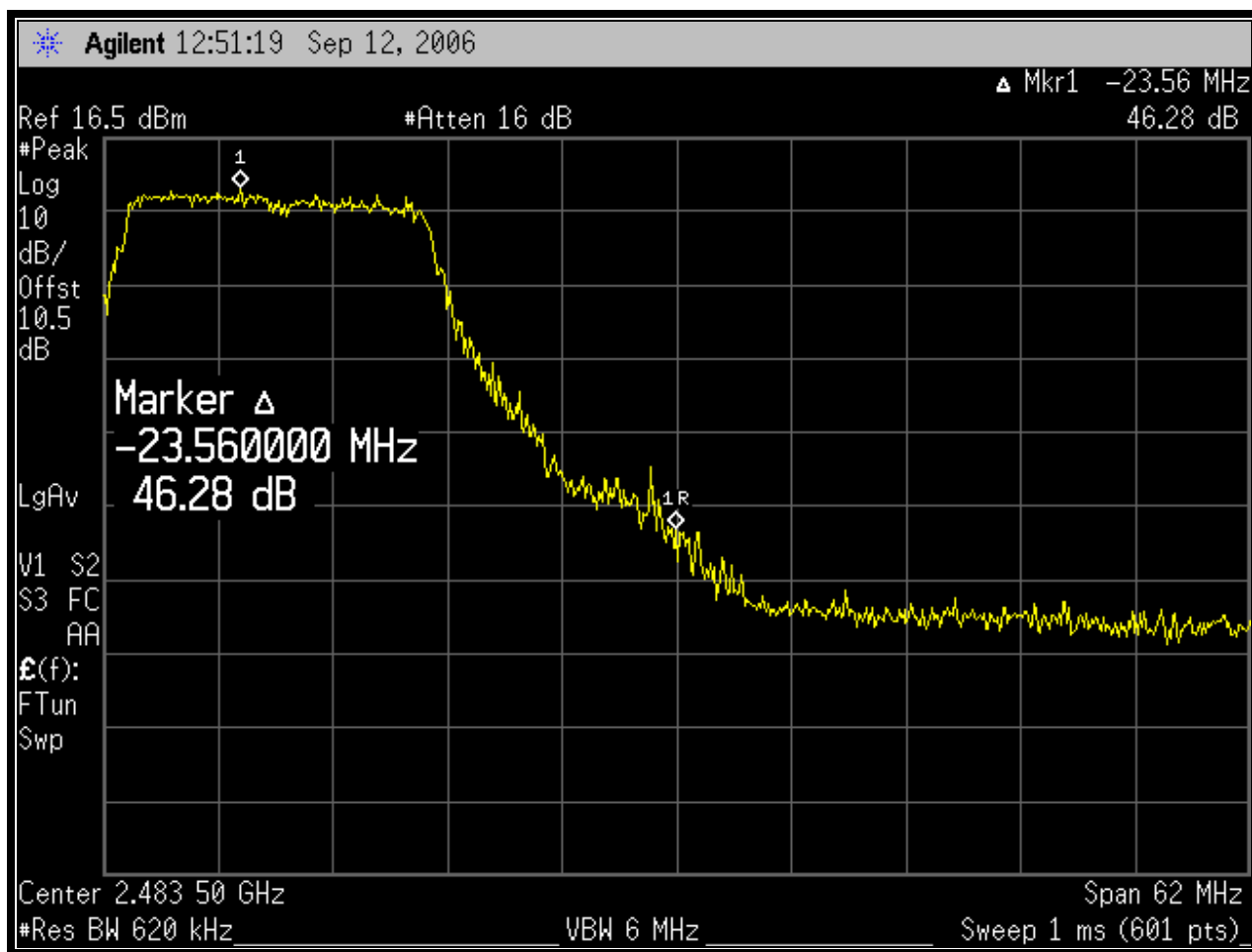
4.2.1.4 Calculation of Upper Band Edge 802.11g

99.3 dBuV/m is the field strength measurement, from which the delta measurement of 46.3 dB is subtracted (reference plots), resulting in a level of 53.0 dB. This level has a margin of 1 dB below the limit of 54 dBuV/m.

Calculation: $99.3 \text{ dBuV/m} - 46.3 \text{ dB} - 54 \text{ dBuV/m} = -1.0 \text{ dB}$

Peak Field Strength of Lower Band Edge (1 MHz RBW/1 MHz VBW) = 109.3 dBuV/m
Average Field Strength of Lower Band Edge (1 MHz RBW/10 Hz VBW) = 99.3 dBuV/m
Delta measurement = 46.3 dB

Plot 4-4: Upper Band Edge: Delta Measurement Channel 11 (TX Frequency: 2462 MHz – 54 Mbps)



Test Personnel:

Daniel W. Baltzell
Test Engineer

Daniel W. Baltzell

Signature

September 12, 2006
Date Of Test

4.3 802.11a Limits of Band Edge Measurement

Below -20 dB of the highest emission level of operating band (in 100 kHz resolution bandwidth).

4.4 802.11a Band Edge Test Procedure

The transmitter output was connected to a spectrum analyzer through a low loss cable. The RBW was set to 1 MHz and the VBW was set to 8 MHz with a suitable span including 100/150 MHz bandwidth from band edge.

Table 4-2: Band Edge Test Equipment

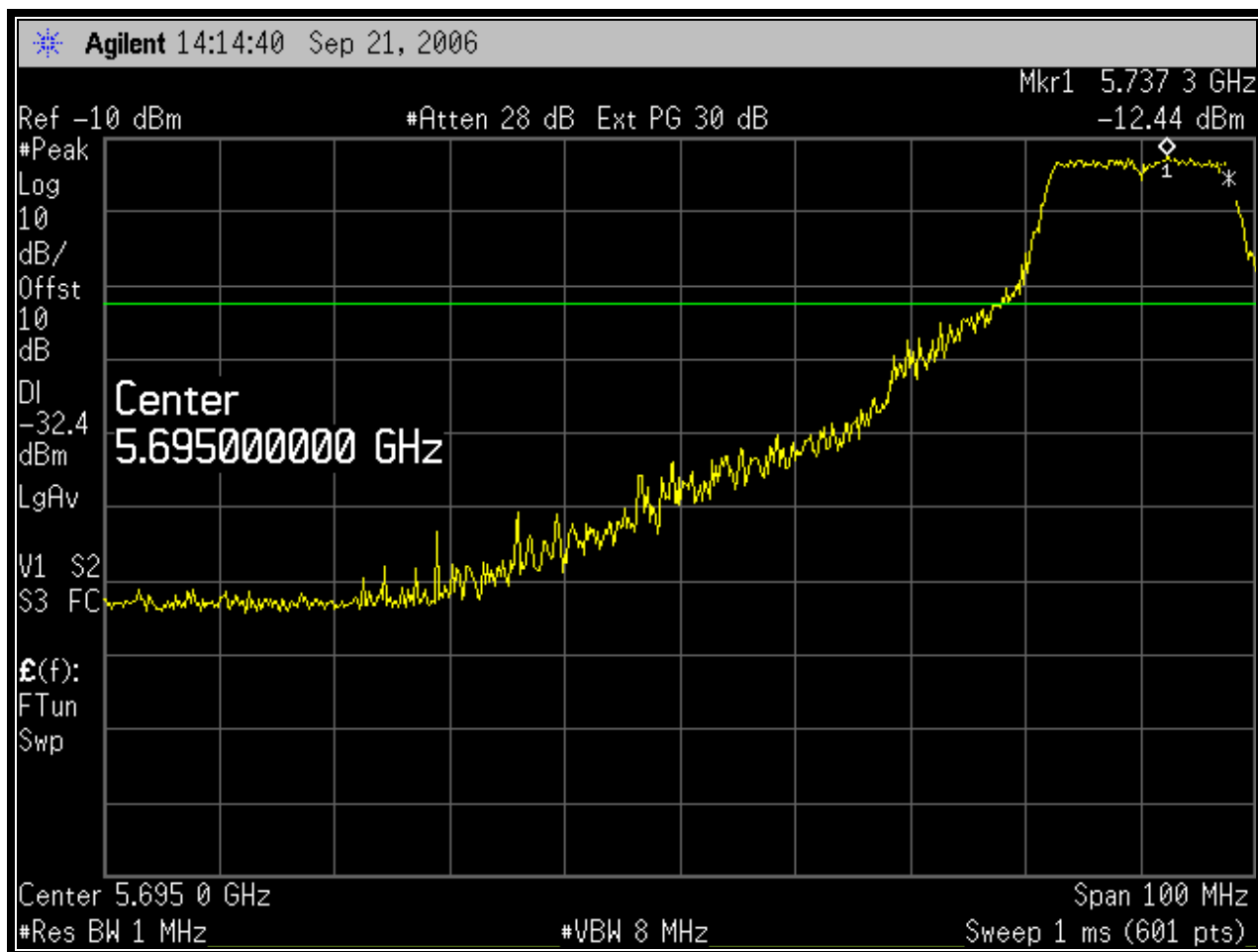
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901413	Agilent	E4448A	Spectrum Analyzer	US44020346	11/2/06

4.5 Band Edge Test Results 802.11a

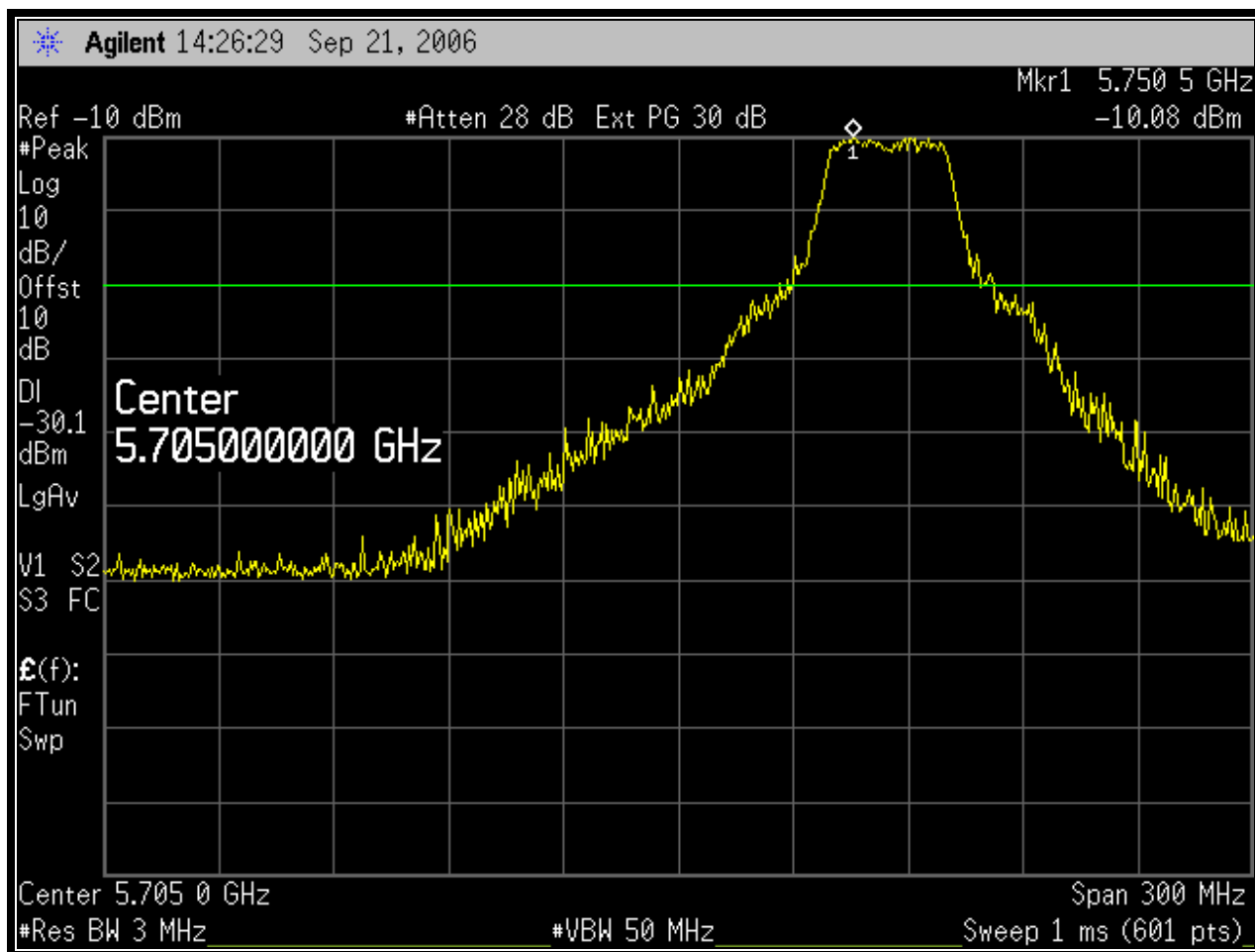
4.5.1 Lower Band Edge 802.11a

The spectrum plots show the display line 20 dBc, which shows compliance with Part 15.247 requirement.

Plot 4-5: Lower Band Edge: Channel 149 (TX Frequency: 5745 MHz – 54 Mbs)



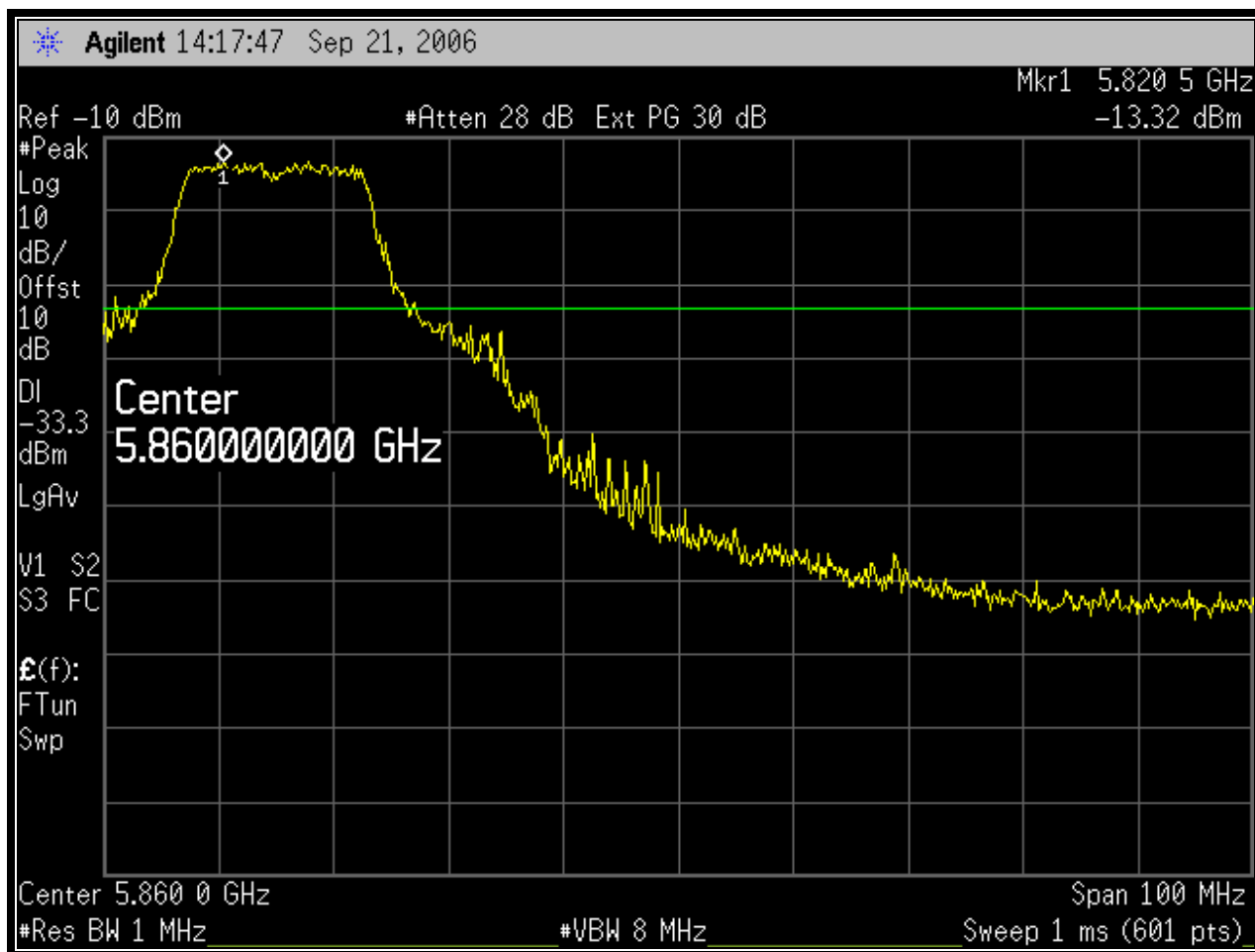
Plot 4-6: Lower Band Edge: Channel 152 Turbo Mode (TX Frequency: 5760 MHz – 108 Mbps)



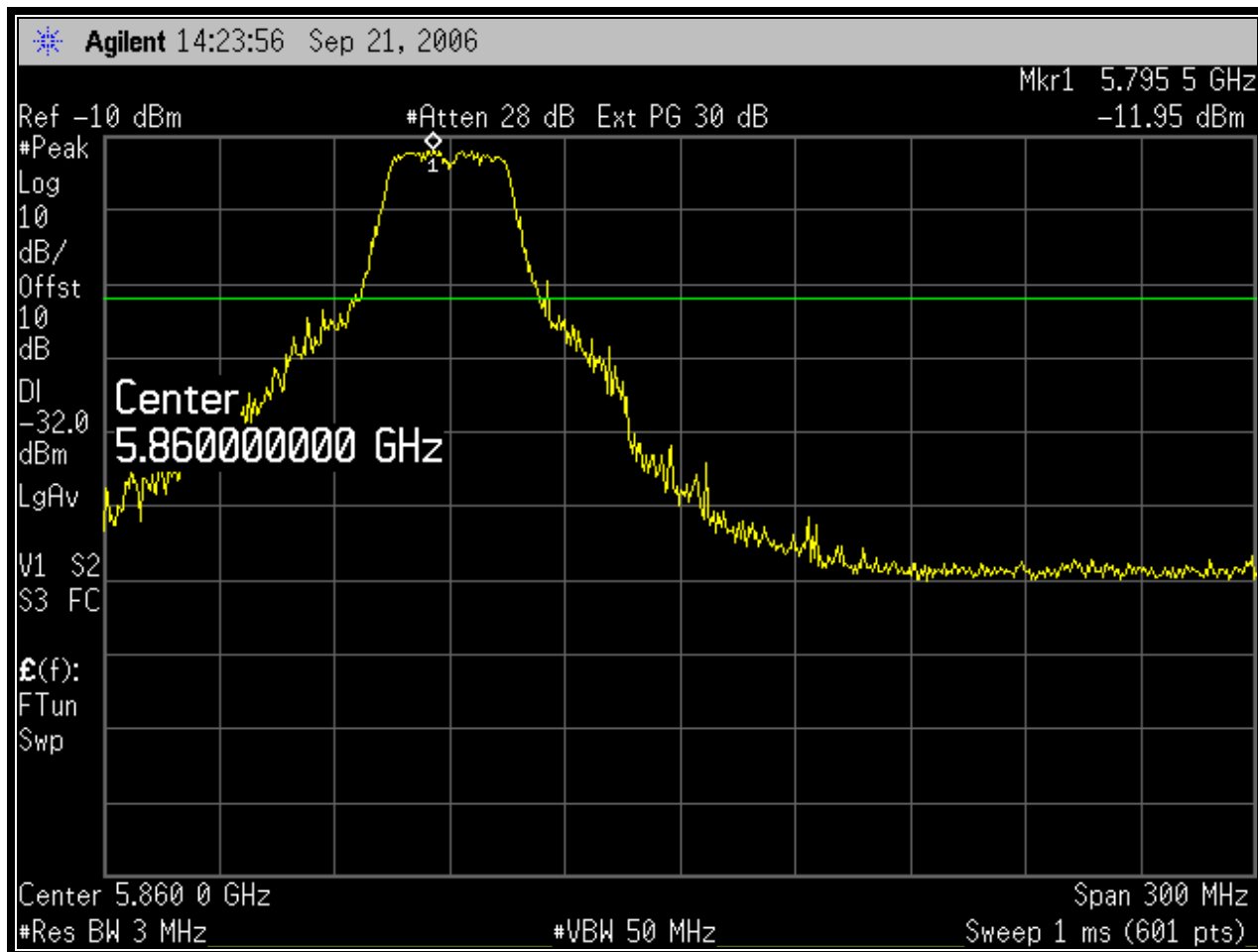
4.5.2 Upper Band Edge 802.11a

The spectrum plots show the display line 20 dBc, which shows compliance with Part 15.247 requirement.

Plot 4-7: Upper Band Edge: Channel 165 (TX Frequency: 5825 MHz – 54 Mbs)



Plot 4-8: Upper Band Edge: Channel 160 Turbo Mode (TX Frequency: 5800 MHz – 108 Mbps)



TEST PERSONNEL:

Daniel W. Baltzell
 Test Engineer

Signature

September 21, 2006
 Date Of Tests

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

5.1 Antenna Conducted Spurious Emissions Test Procedures

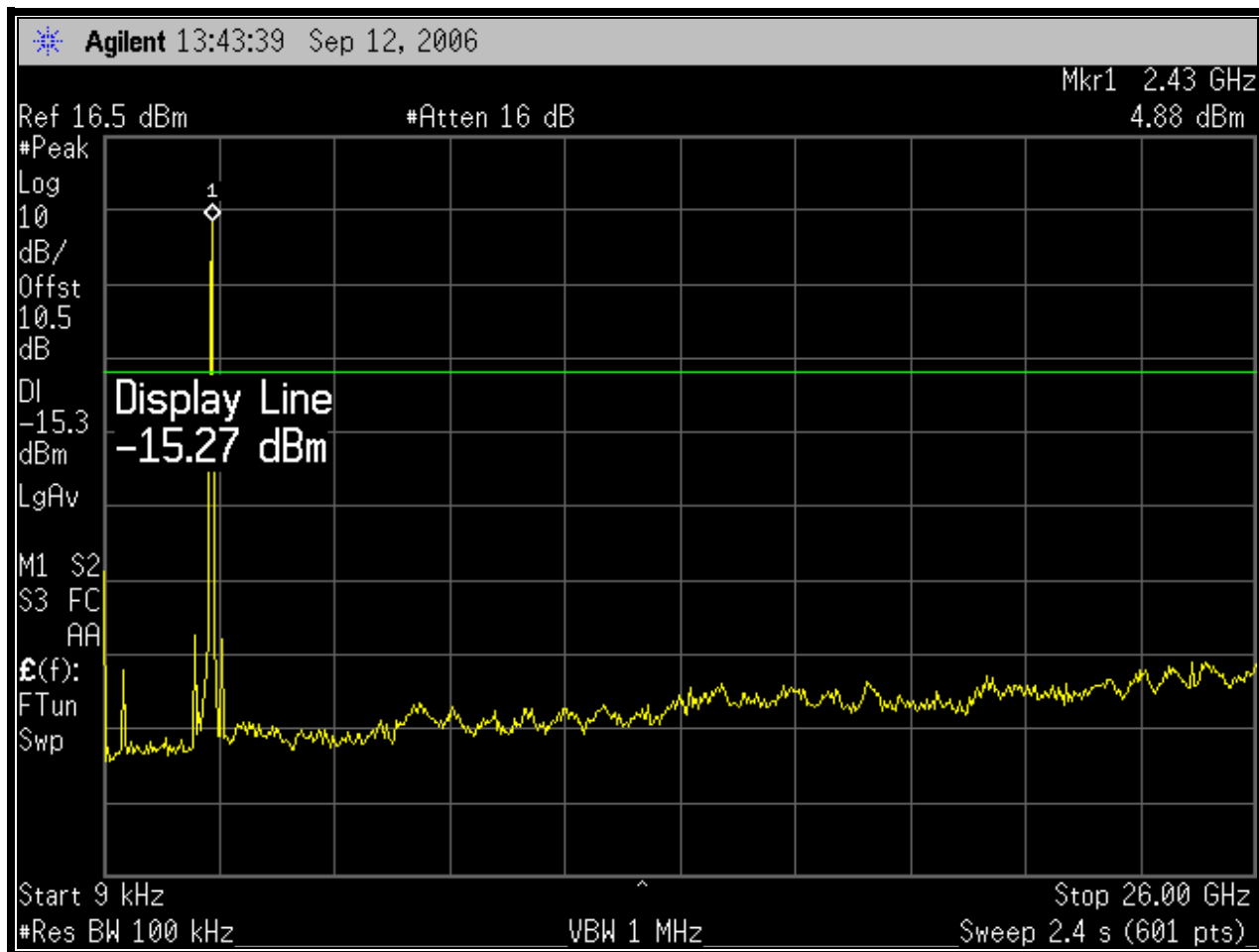
Antenna spurious emissions per FCC 15.247(c) was measured from the EUT antenna port using a 50 ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 1 MHz. The modulated carrier was identified at the following frequencies: 2412 MHz, 2437 MHz and 2462 MHz. No harmonics or spurs were found within 20 dB of the carrier level from 9 kHz to 25 GHz. See the Antenna Conducted Spurious Noise Plots below. The low, middle, and high frequencies were investigated and tested.

Table 5-1: Antenna Conducted Spurious Emissions Test Equipment

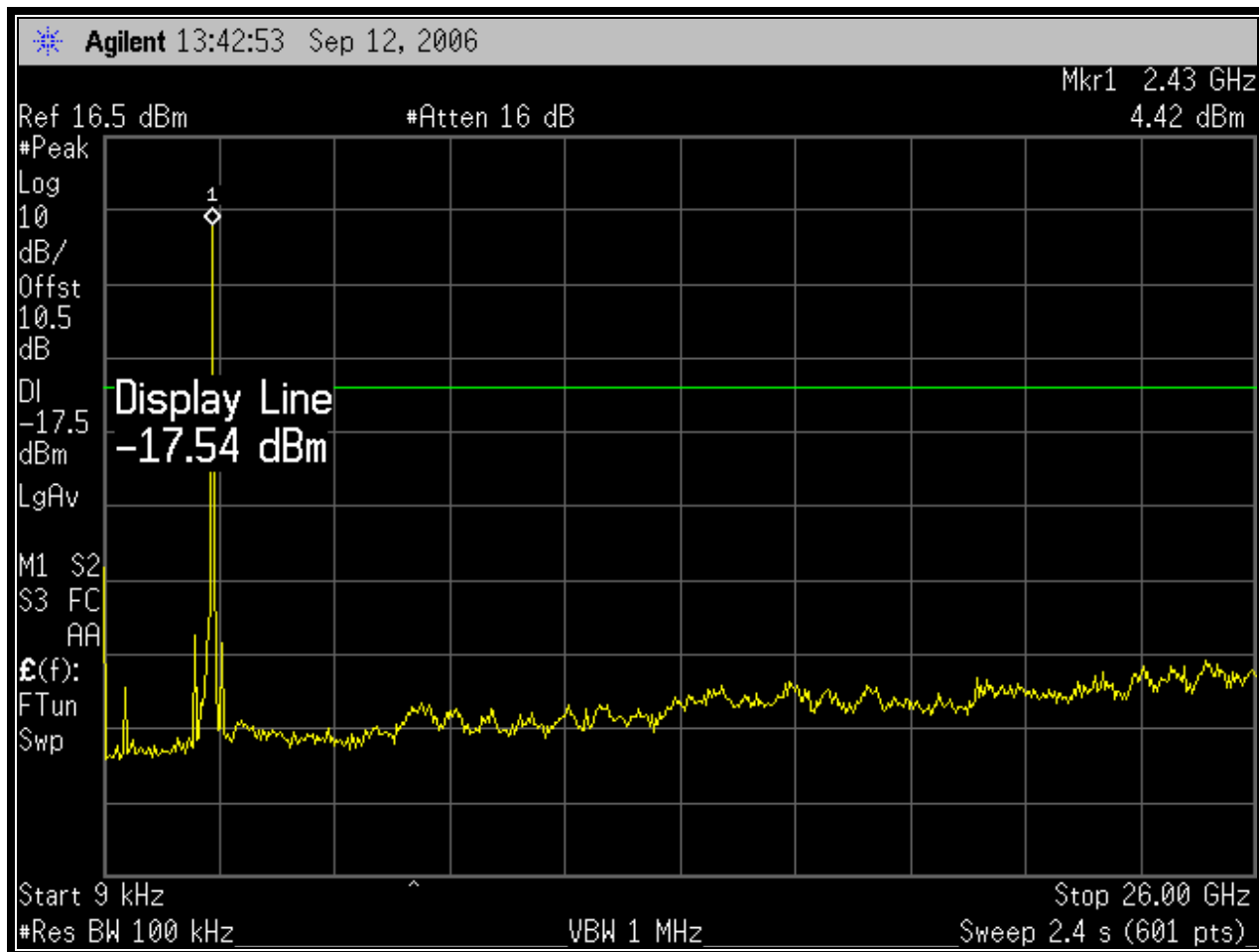
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901413	Agilent	E4448A	Spectrum Analyzer	US44020346	11/2/06

5.2 Antenna Conducted Spurious Emissions Test Results for 802.11b/g Card

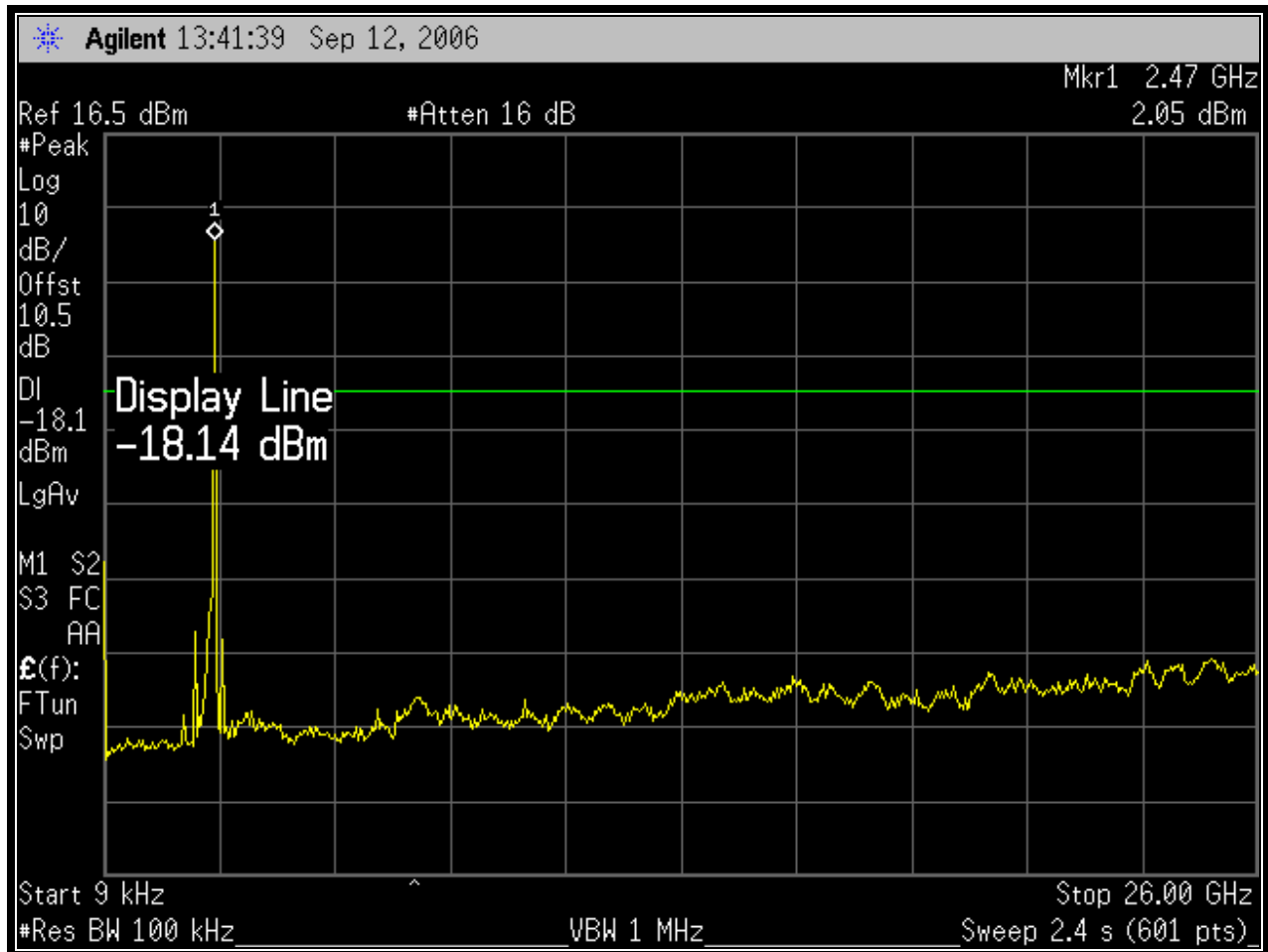
Plot 5-1: Conducted Antenna Spurious Emissions; Channel 1; 802.11b



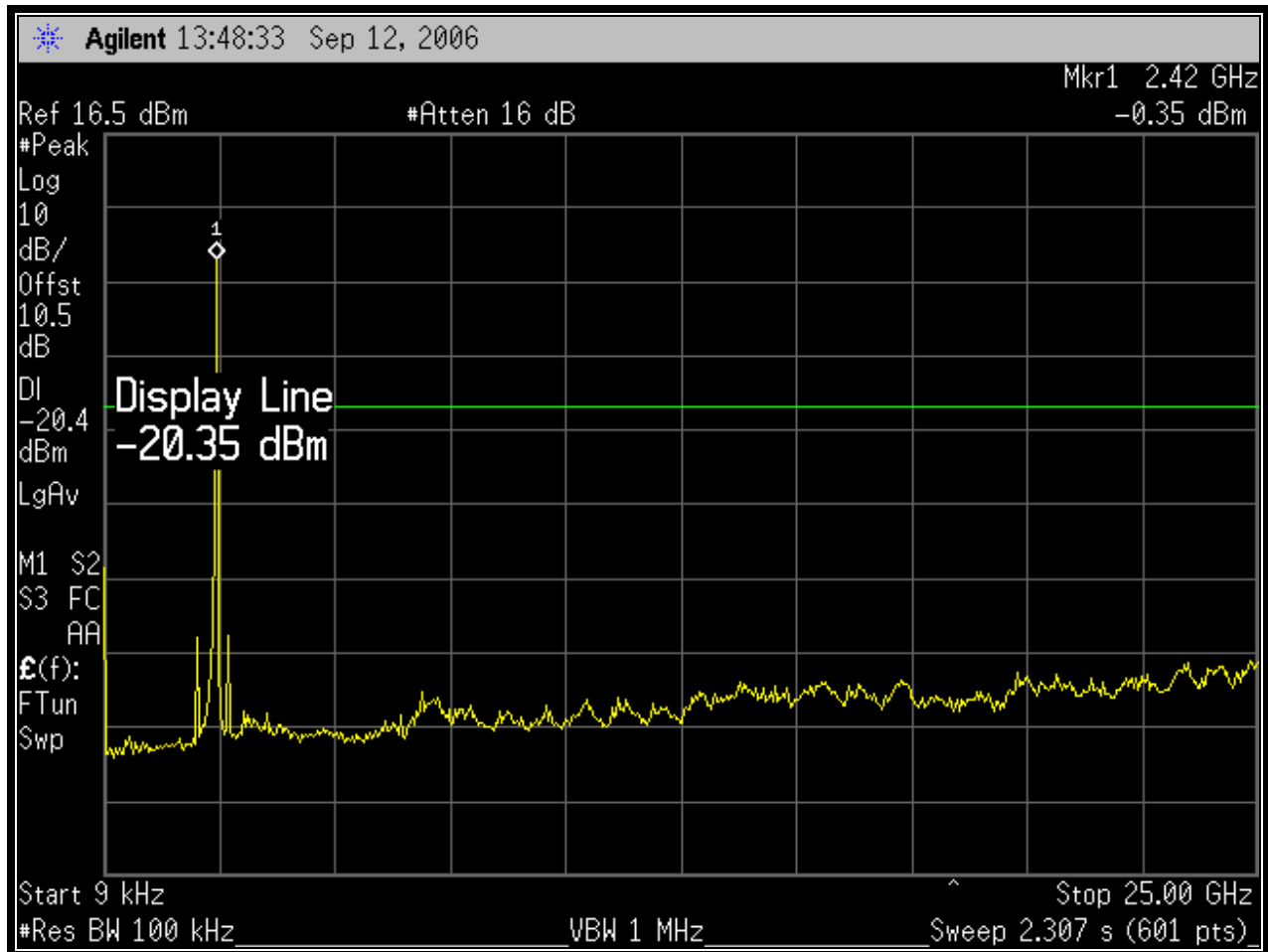
Plot 5-2: Conducted Antenna Spurious Emissions; Channel 6; 802.11b



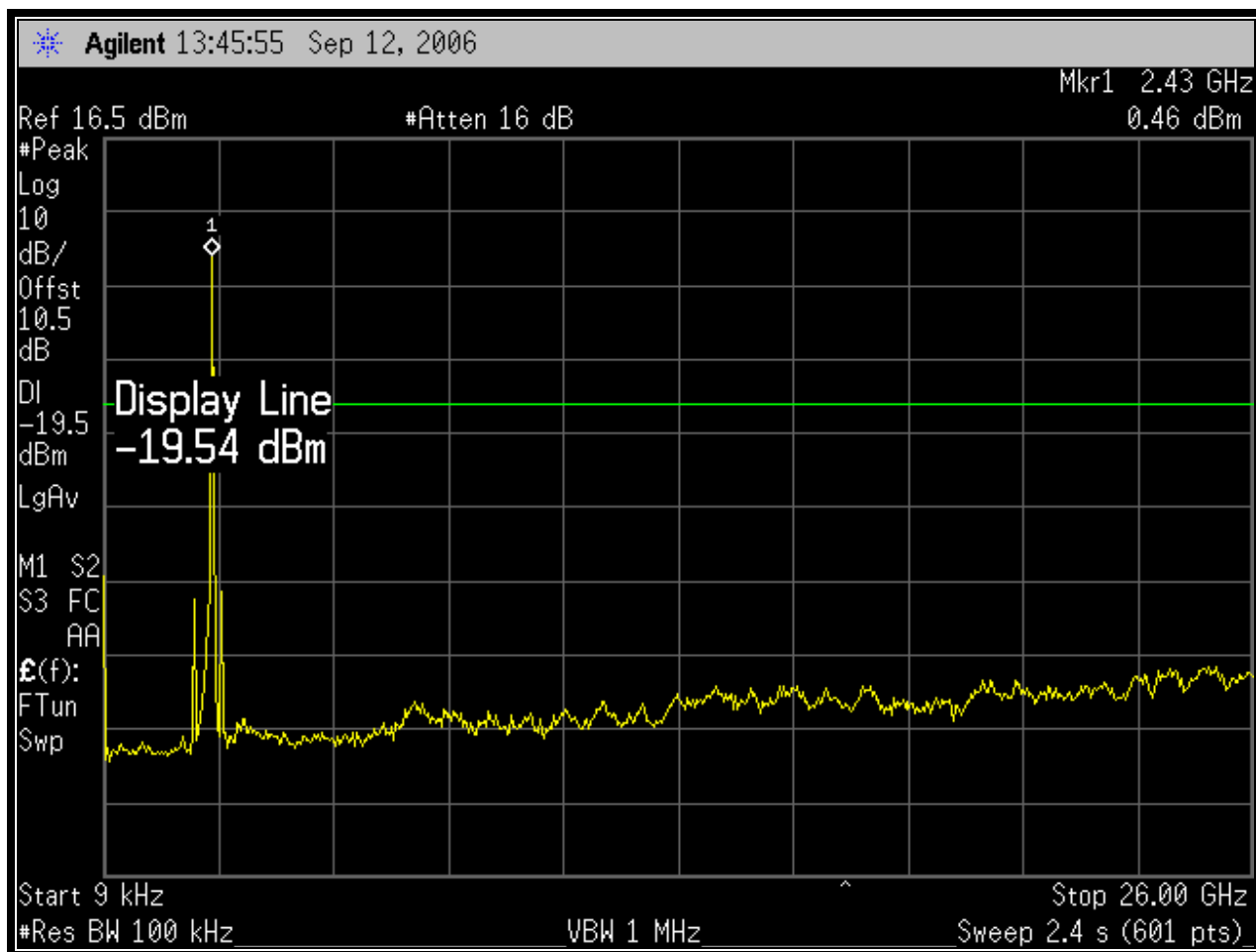
Plot 5-3: Conducted Antenna Spurious Emissions; Channel 11; 802.11b



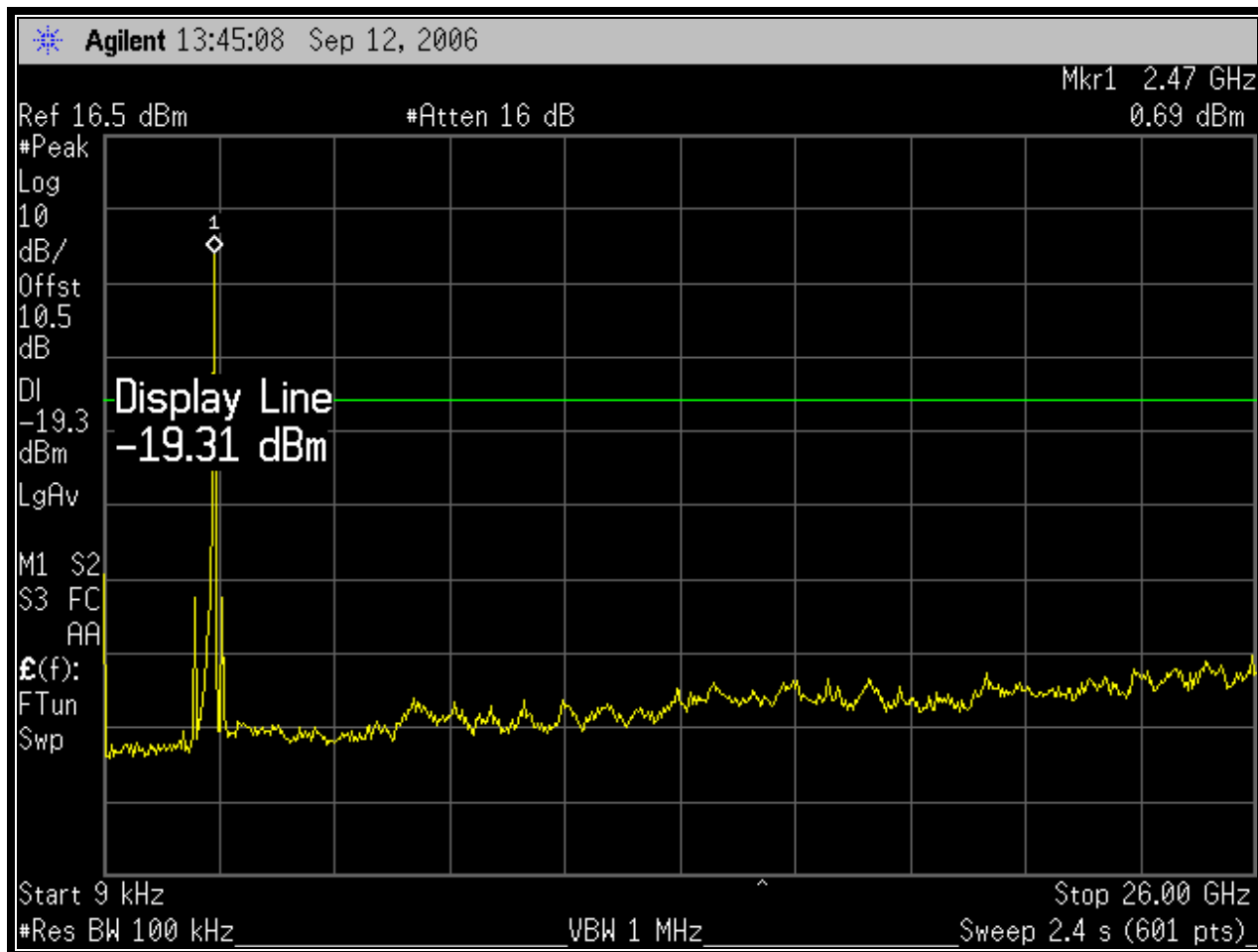
Plot 5-4: Conducted Antenna Spurious Emissions; Channel 1; 802.11g



Plot 5-5: Conducted Antenna Spurious Emissions; Channel 6; 802.11g



Plot 5-6: Conducted Antenna Spurious Emissions; Channel 11; 802.11g



Test Personnel:

Daniel W. Baltzell
Test Engineer

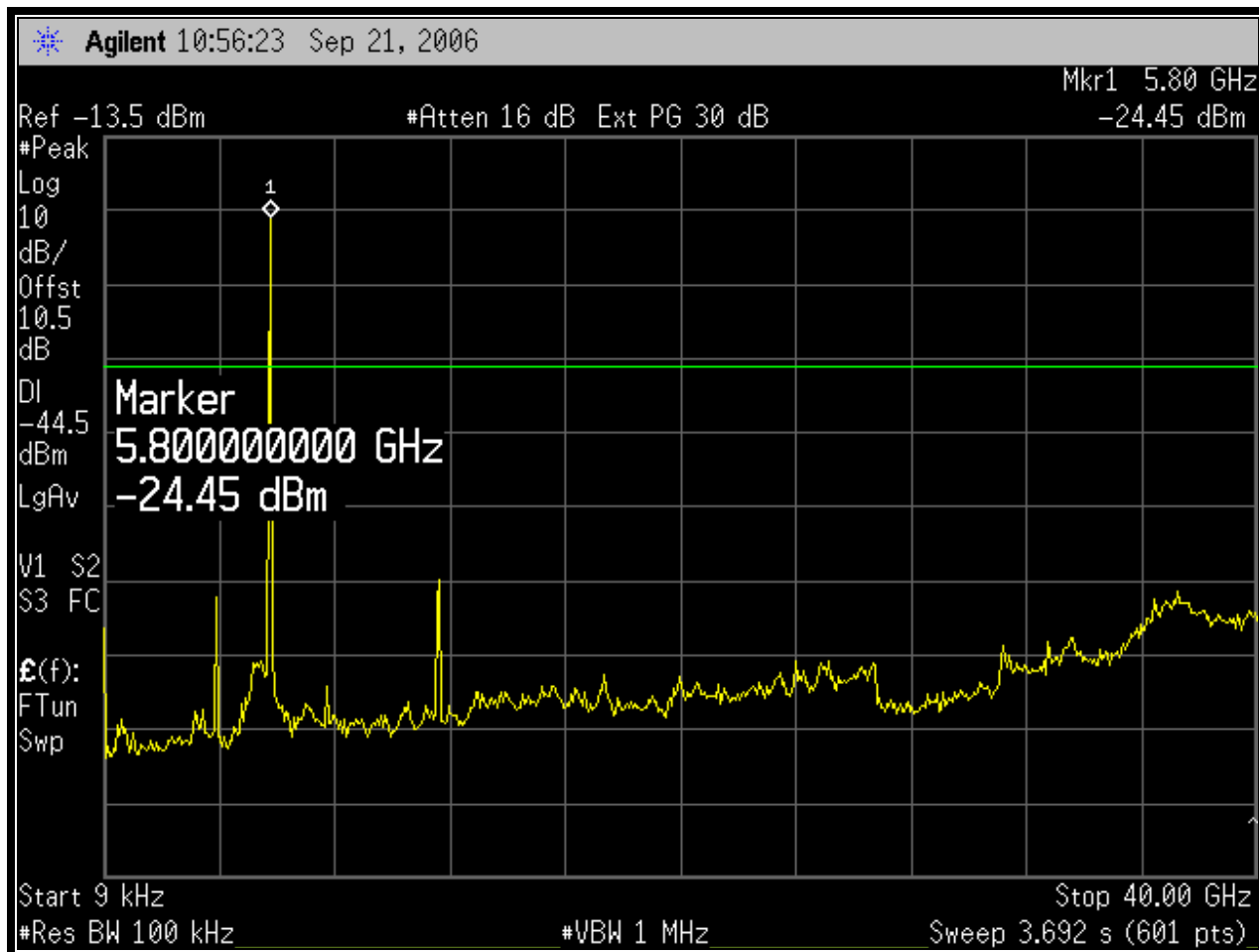
Signature

September 12, 2006
Date Of Test

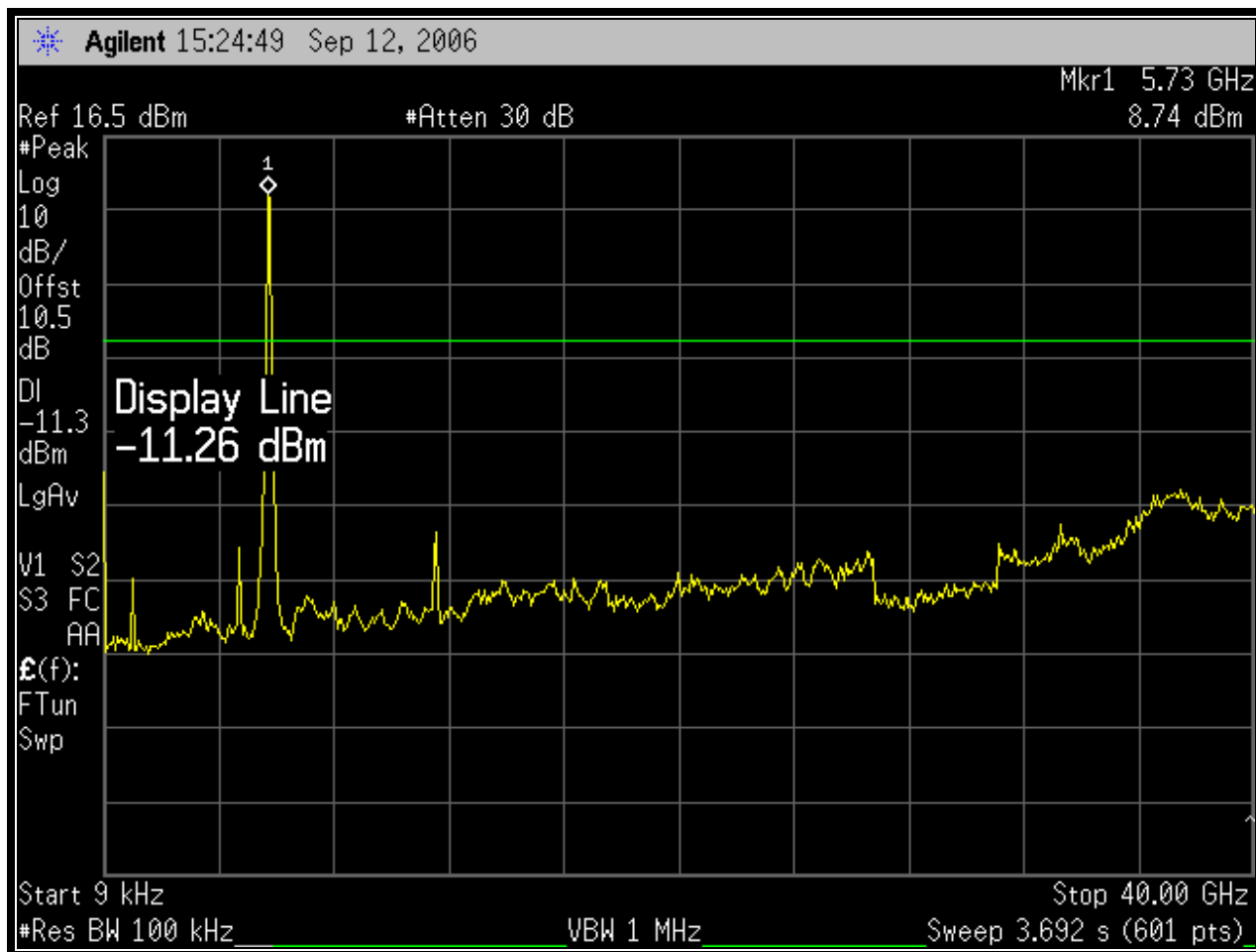
5.3 Antenna Conducted Spurious Emissions Test Results for 802.11a Card

5.3.1 802.11a Test Results

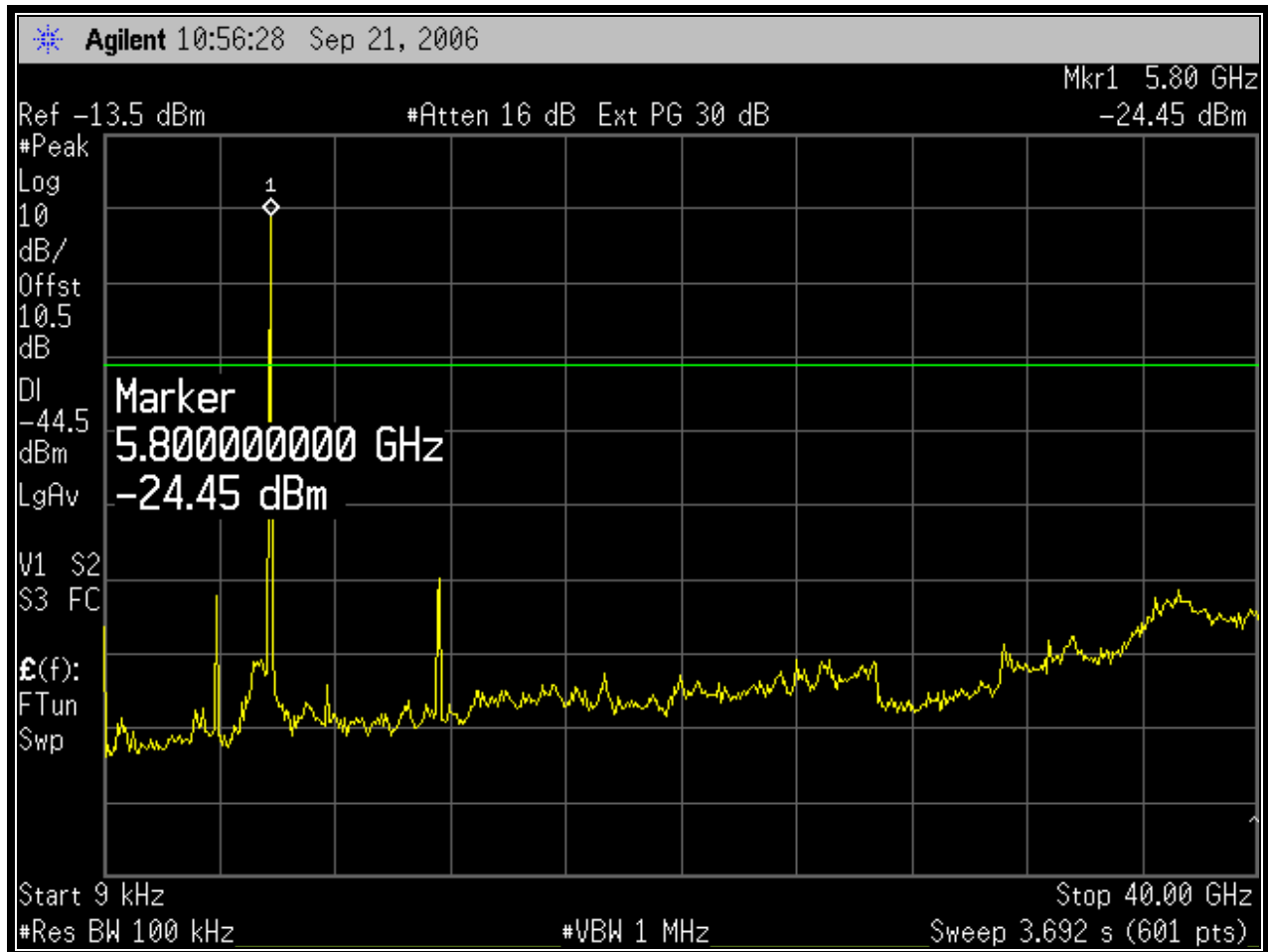
Plot 5-7: Conducted Antenna Spurious Emissions; Channel 149; 5745 MHz; 54 Mbps



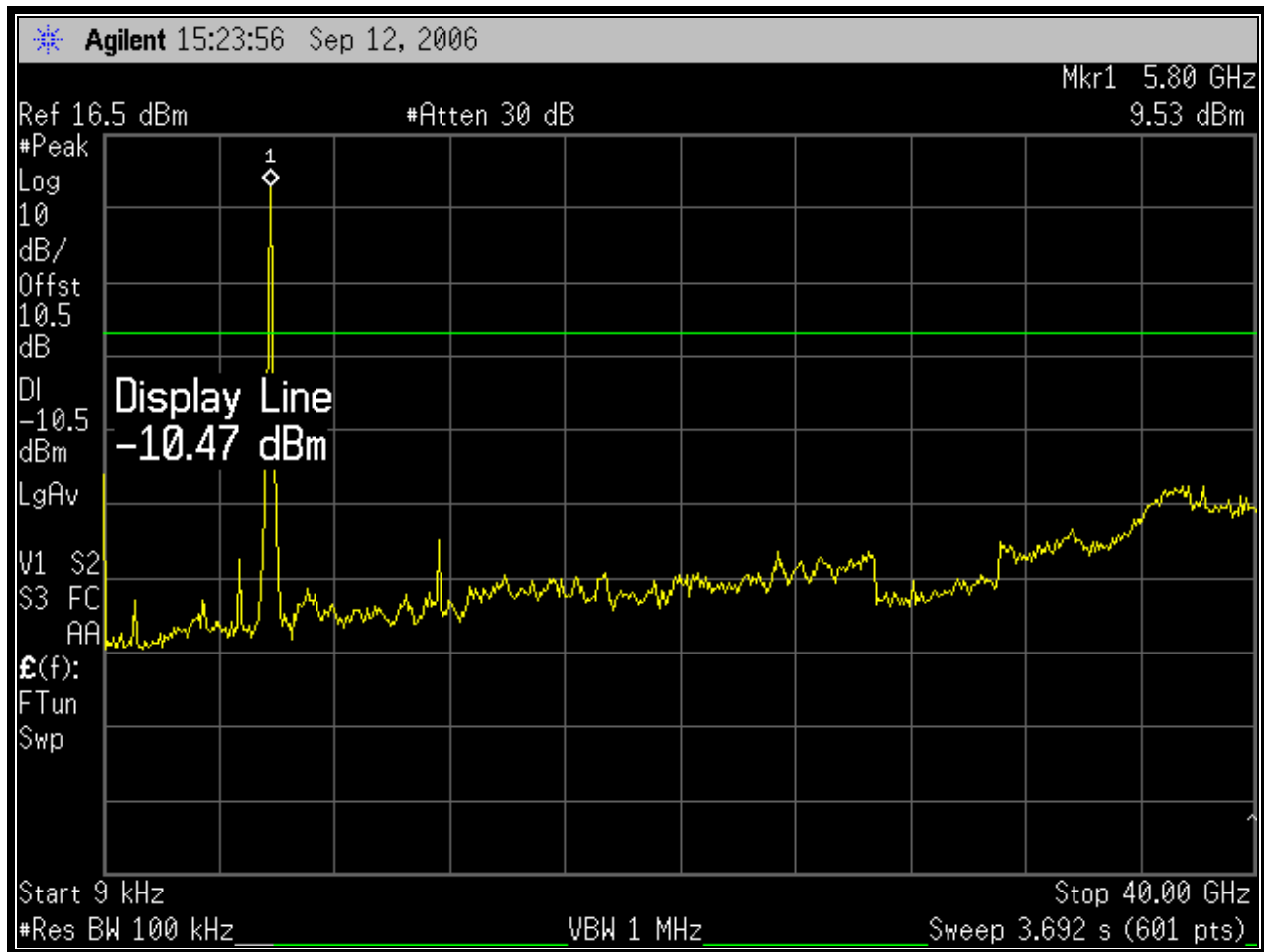
Plot 5-8: Conducted Antenna Spurious Emissions; Channel 152; 5760 MHz Turbo Mode; 108 Mbps



Plot 5-9: Conducted Antenna Spurious Emissions; Channel 157; 5785 MHz; 54 Mbps



Plot 5-10: Conducted Antenna Spurious Emissions; Channel 160; 5800 MHz Turbo Mode; 108 Mbps



Plot 5-11: Conducted Antenna Spurious Emissions; Channel 165; 5825 MHz; 54 Mbps



Test Personnel:

Daniel W. Baltzell
EMC Test Engineer

Signature

September 12/21, 2006
Dates Of Test

6 6 dB Bandwidth - §15.247(a)(2); RSS-210 §A8.2(1)

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 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
901413	Agilent	E4448A	Spectrum Analyzer	US44020346	11/2/06

6.2 6 dB Bandwidth Test Results for 802.11b/g Card

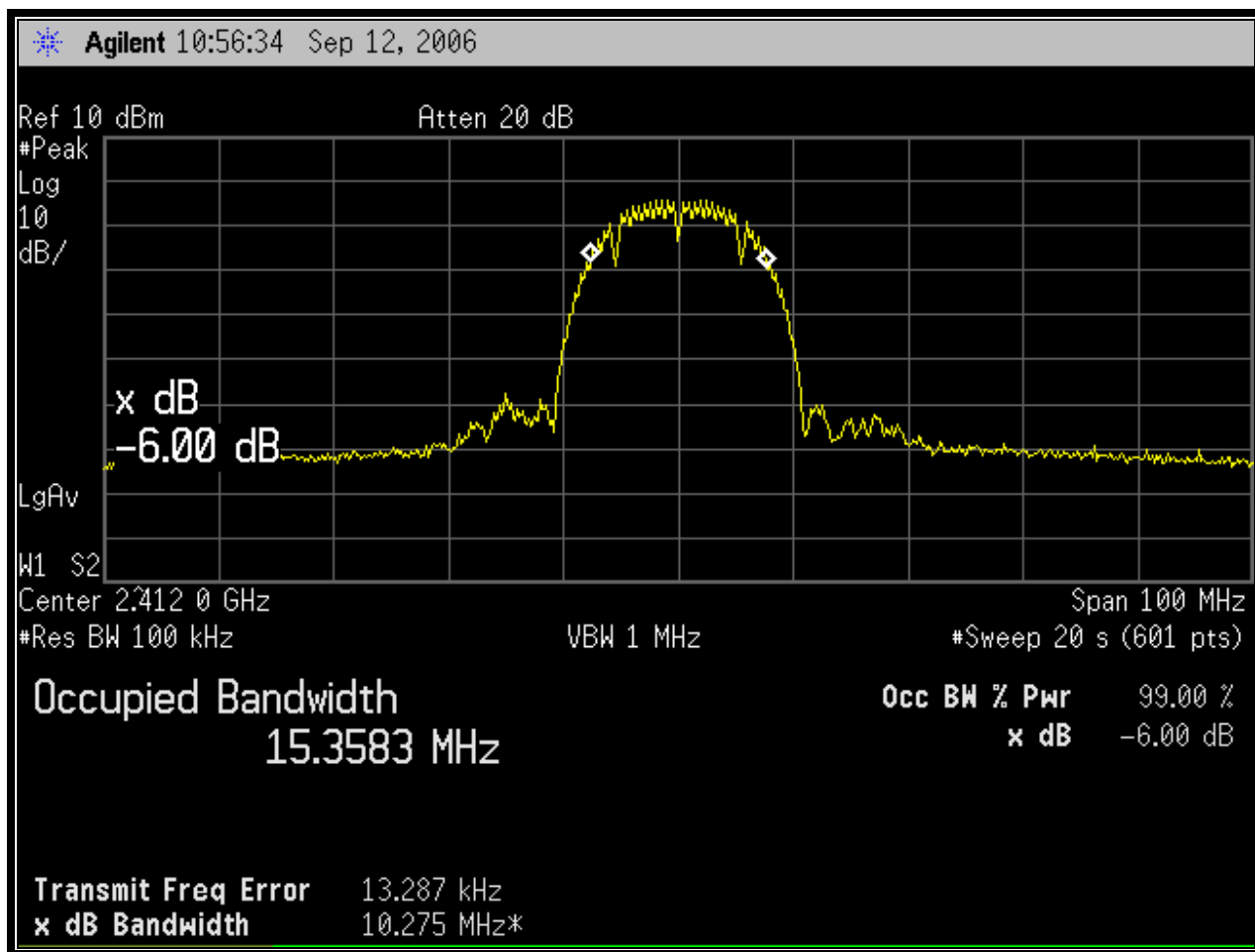
Table 6-2: 6 db Bandwidth Test Data - 802.11b

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass/Fail
1	2412	10.275	0.5	Pass
6	2437	12.115	0.5	Pass
11	2462	11.622	0.5	Pass

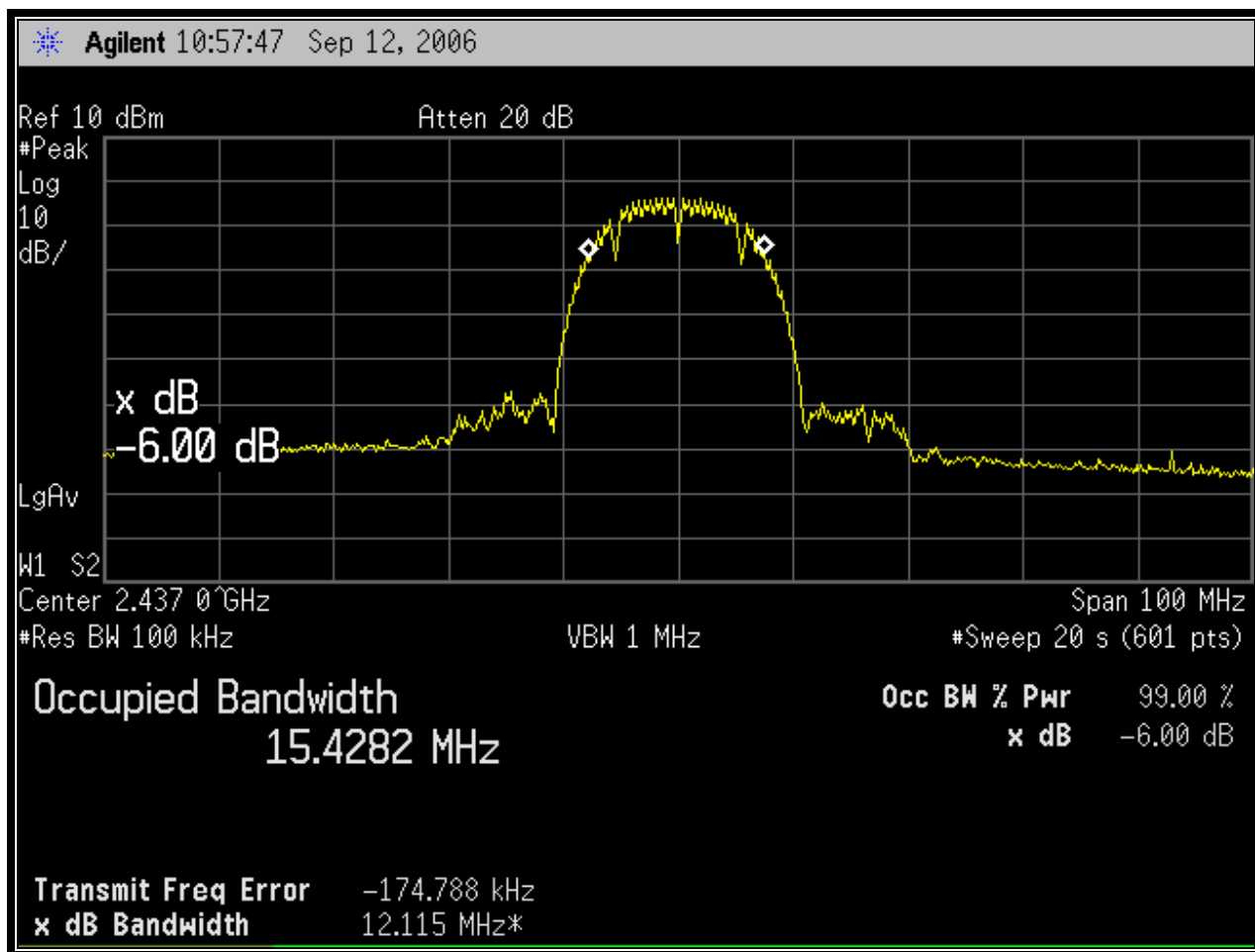
Table 6-3: 6 db Bandwidth Test Data - 802.11g

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass/Fail
1	2412	16.747	0.5	Pass
6	2437	16.729	0.5	Pass
11	2462	14.400	0.5	Pass

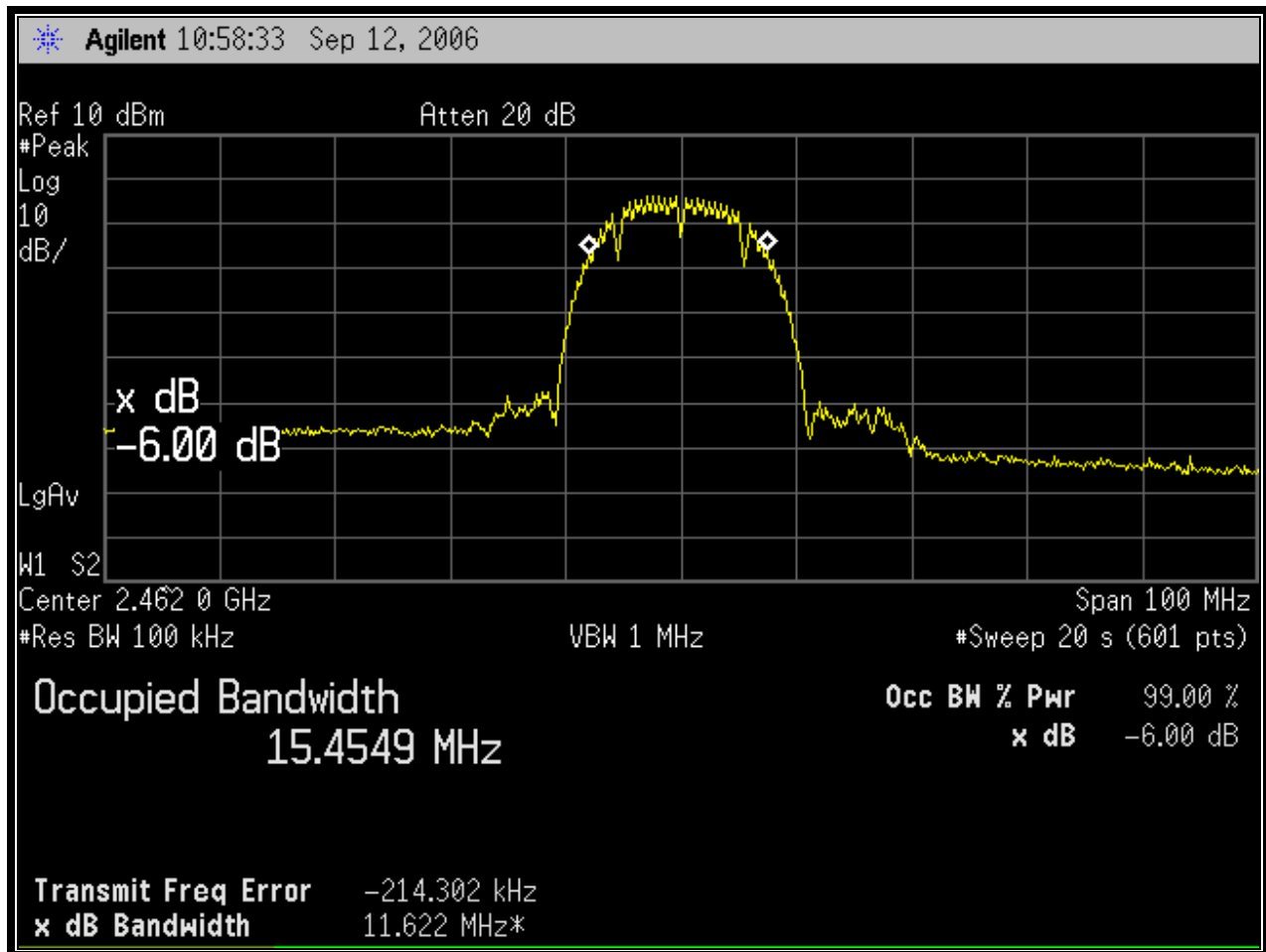
Plot 6-1: 6 dB Bandwidth Channel 1 (TX Frequency: 2412 MHz – 11 Mbps) 802.11b



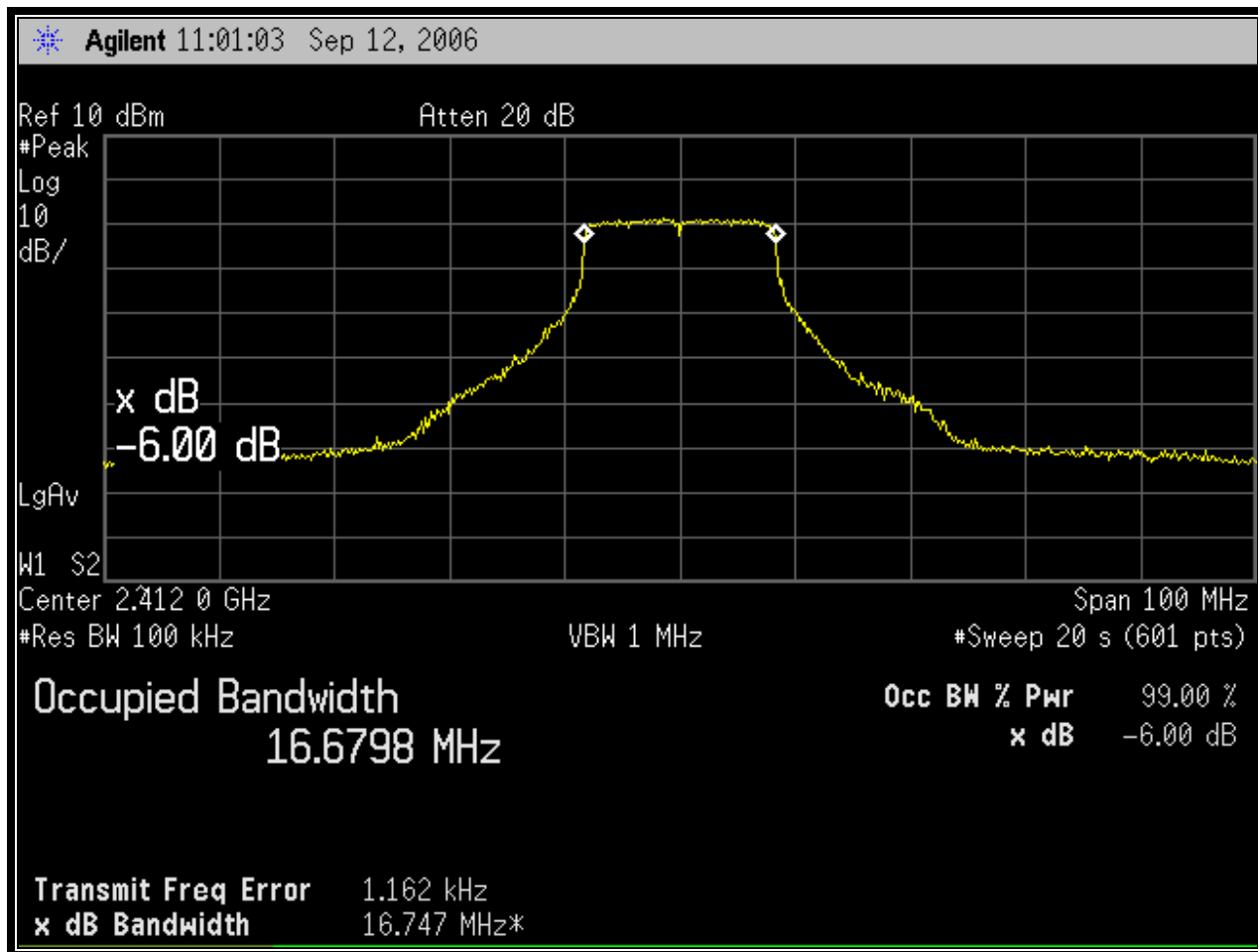
Plot 6-2: 6 dB Bandwidth Channel 6 (TX Frequency: 2437 MHz – 11 Mbps) 802.11b



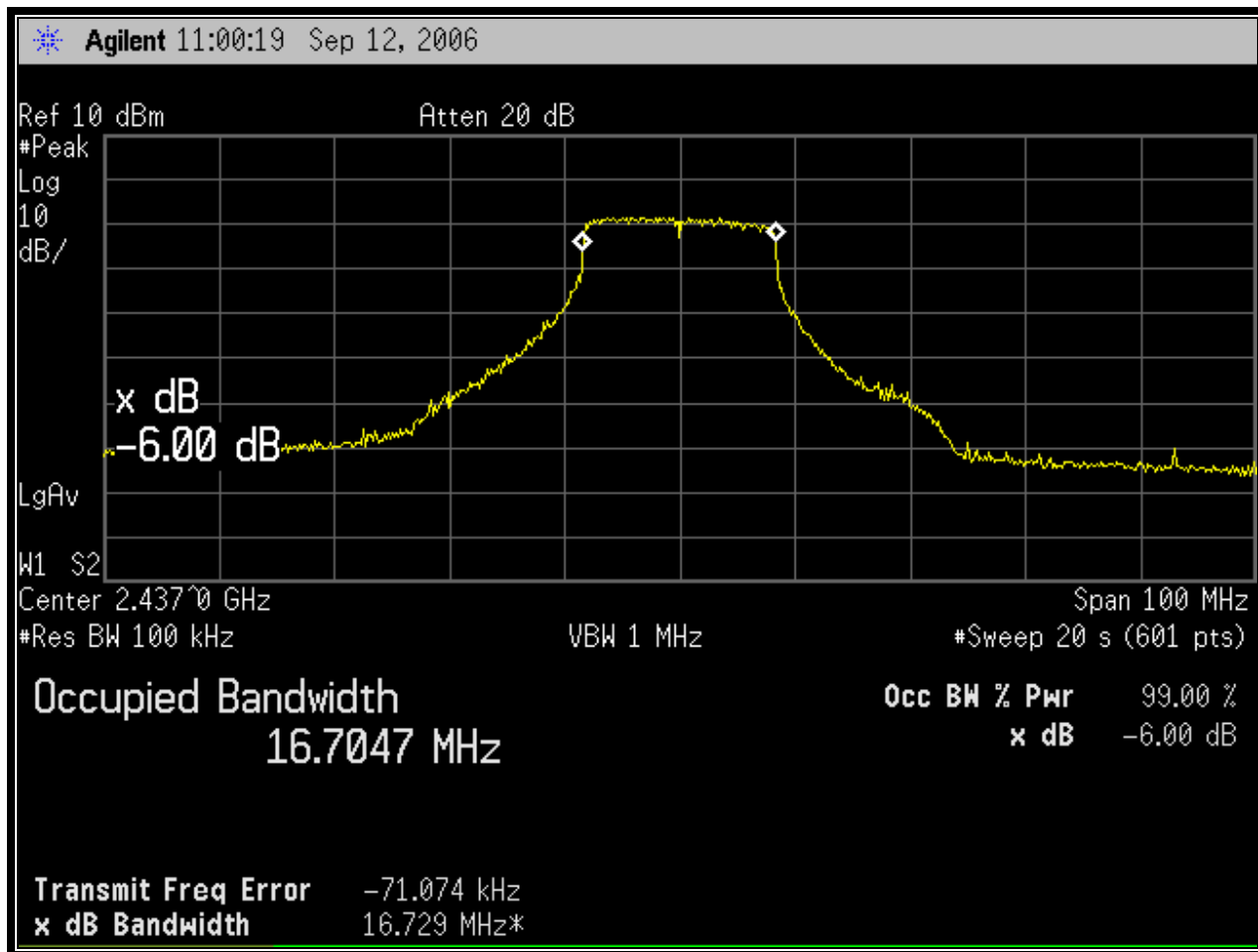
Plot 6-3: 6 dB Bandwidth Channel 11 (TX Frequency: 2462 MHz – 11 Mbps) 802.11b



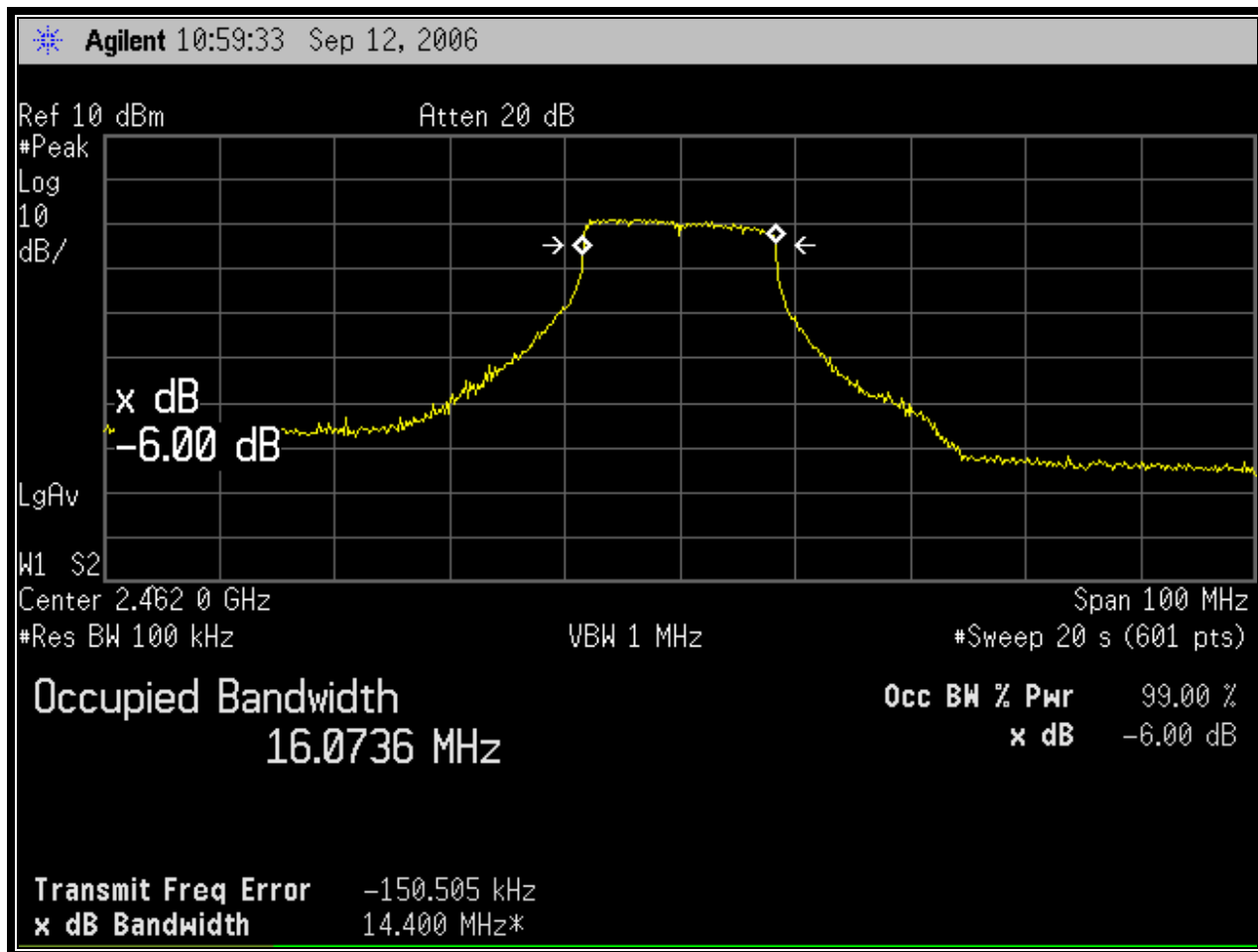
Plot 6-4: 6 dB Bandwidth Channel 1 (TX Frequency: 2412 MHz – 54 Mbps) 802.11g



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



Plot 6-6: 6 dB Bandwidth Channel 11 (TX Frequency: 2462 MHz - 54 Mbps) 802.11g



Test Personnel:

Daniel W. Baltzell
 Test Engineer

Signature

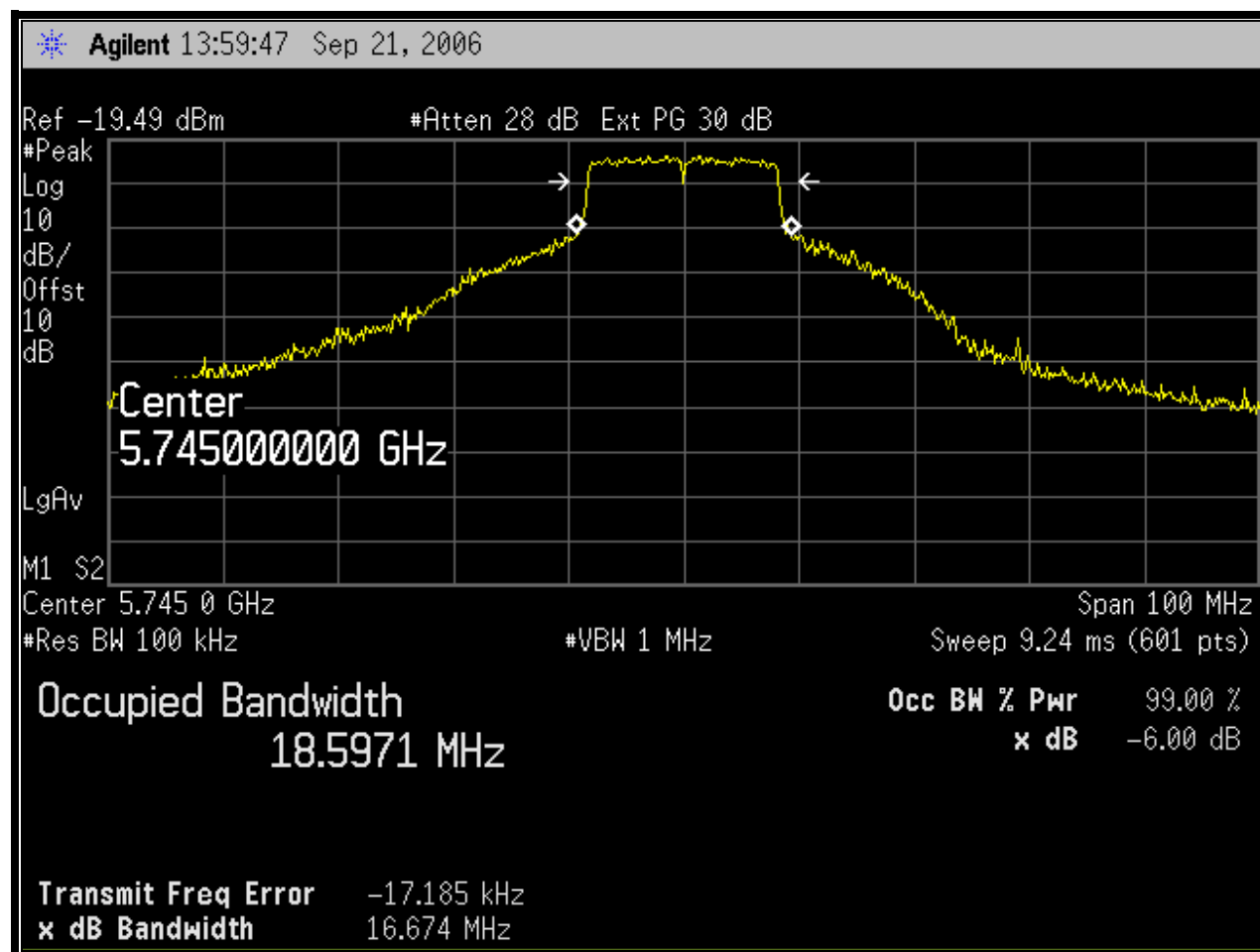
September 12, 2006
 Date Of Test

6.3 6 dB Bandwidth Test Results for 802.11a

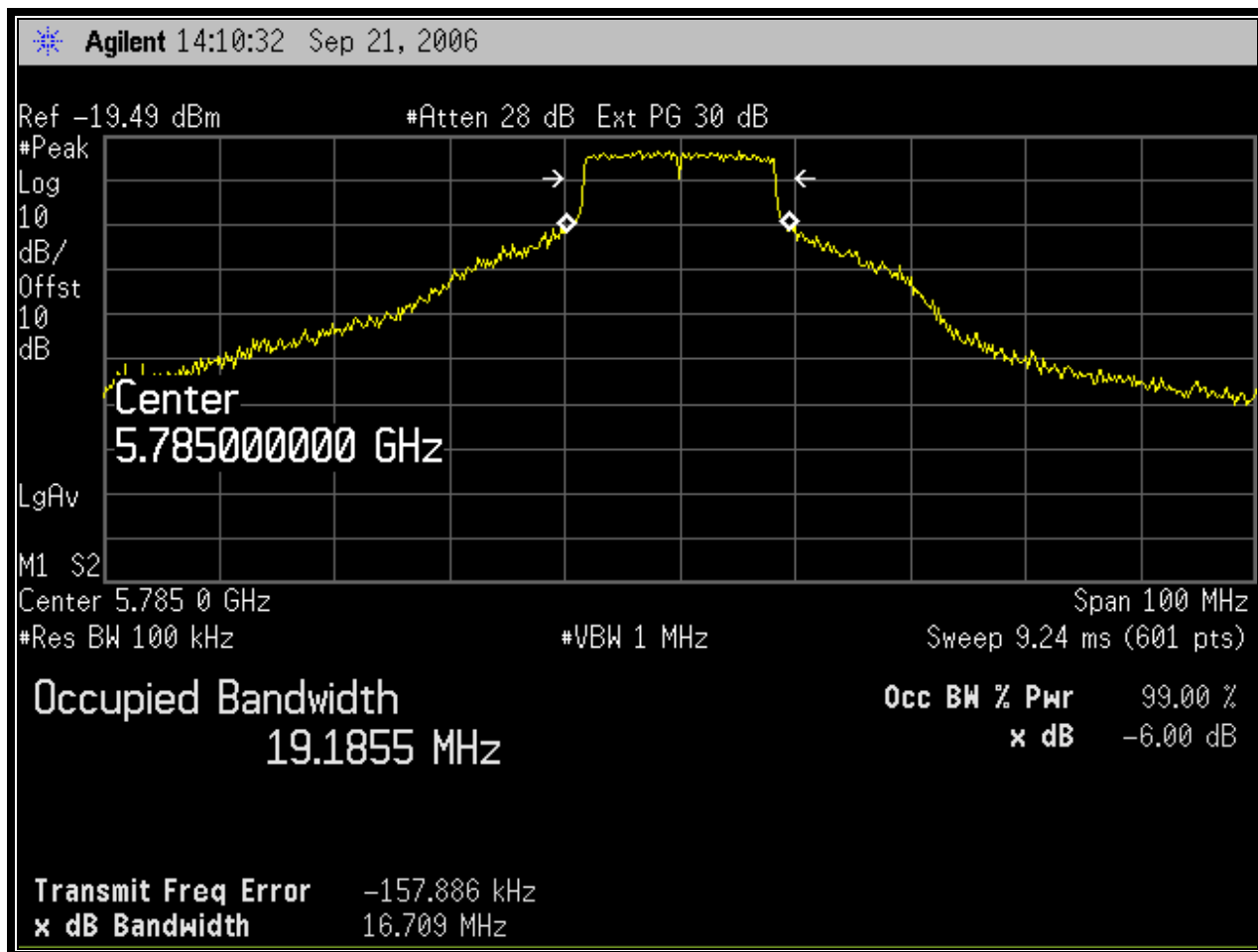
Table 6-4: 6 db Bandwidth Test Data - 802.11a

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass/Fail
149	5745	16.674	0.5	Pass
157	5785	16.709	0.5	Pass
165	5825	16.703	0.5	Pass
152 turbo	5760	33.131	0.5	Pass
160 turbo	5800	33.132	0.5	Pass

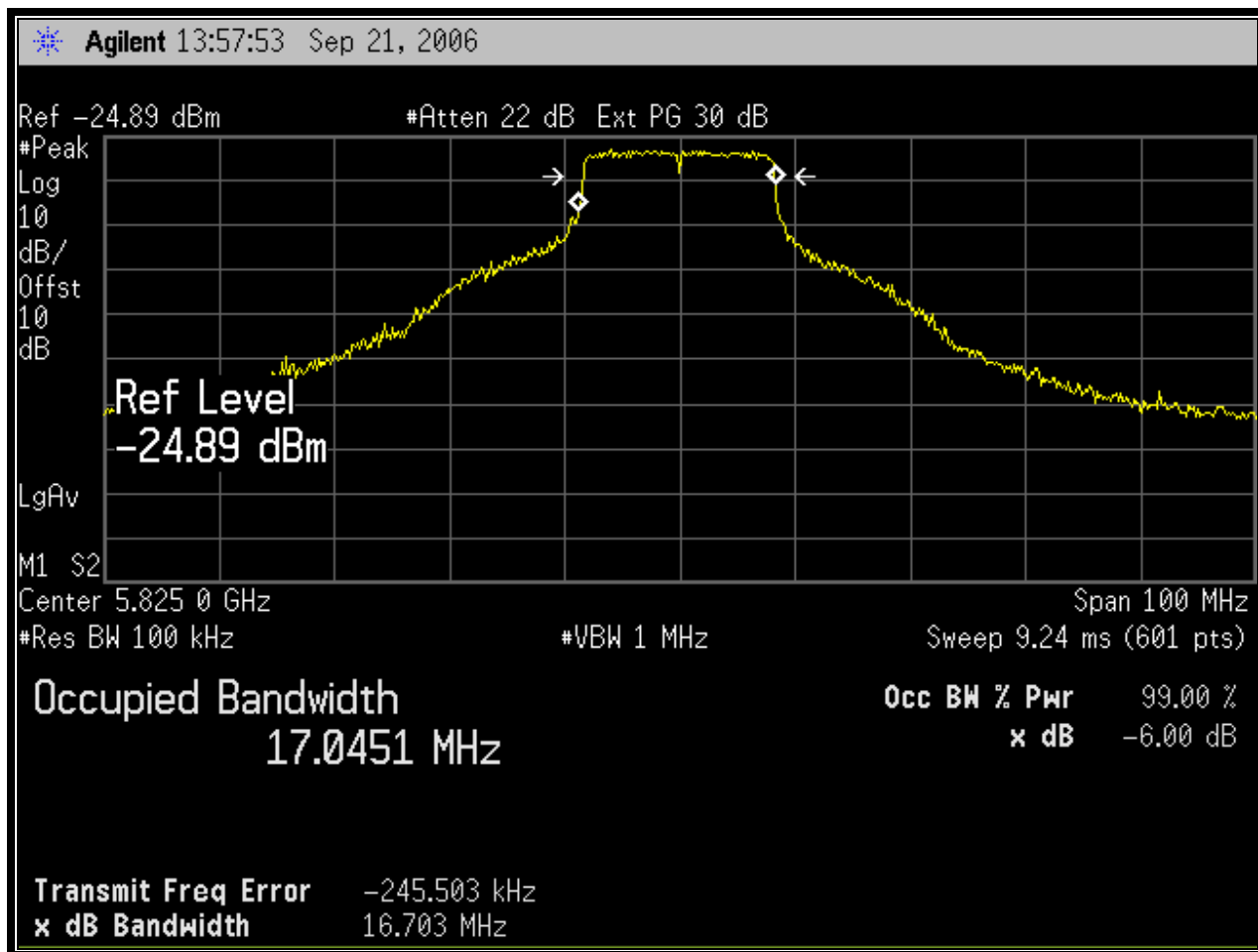
Plot 6-7: 6 dB Bandwidth Channel 149 (TX Frequency: 5745 MHz – 54 Mbps) 802.11a



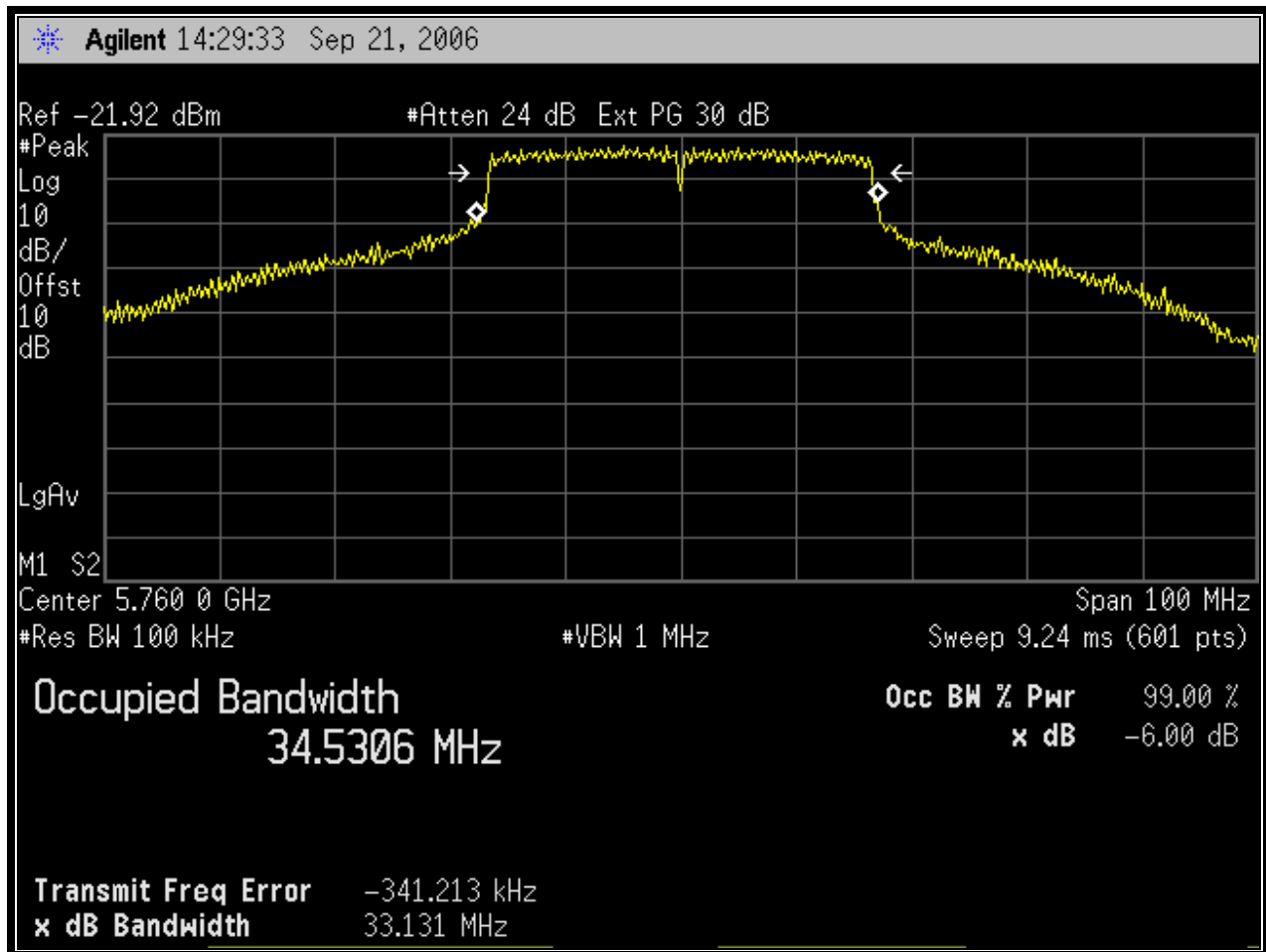
Plot 6-8: 6 dB Bandwidth Channel 157 (TX Frequency: 5785 MHz – 54 Mbps) 802.11a



Plot 6-9: 6 dB Bandwidth Channel 165 (TX Frequency: 5825 MHz -54 Mbps) 802.11a



Plot 6-10: 6 dB Bandwidth Channel 152 (TX Frequency: 5760 MHz – Turbo 54 Mbps) 802.11a



Plot 6-11: 6 dB Bandwidth Channel 160 (TX Frequency: 5800 MHz – Turbo 54 Mbps) 802.11a



Test Personnel:

Daniel W. Baltzell
 Test Engineer

Signature

September 21, 2006
 Date Of Test

7 Power Spectral Density - §15.247(d); RSS-210 §A8.2(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, 2.462 GHz, 5.745 GHz, 5.760 GHz, 5.785 GHz, 5800 GHz, and 5.825, 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
901413	Agilent	E4448A	Spectrum Analyzer	US44020346	11/2/06

7.2 Power Spectral Density Test Results for 802.11b/g Card

7.2.1 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	-6.07	8	Pass
6	2437	-5.24	8	Pass
11	2462	-5.36	8	Pass

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

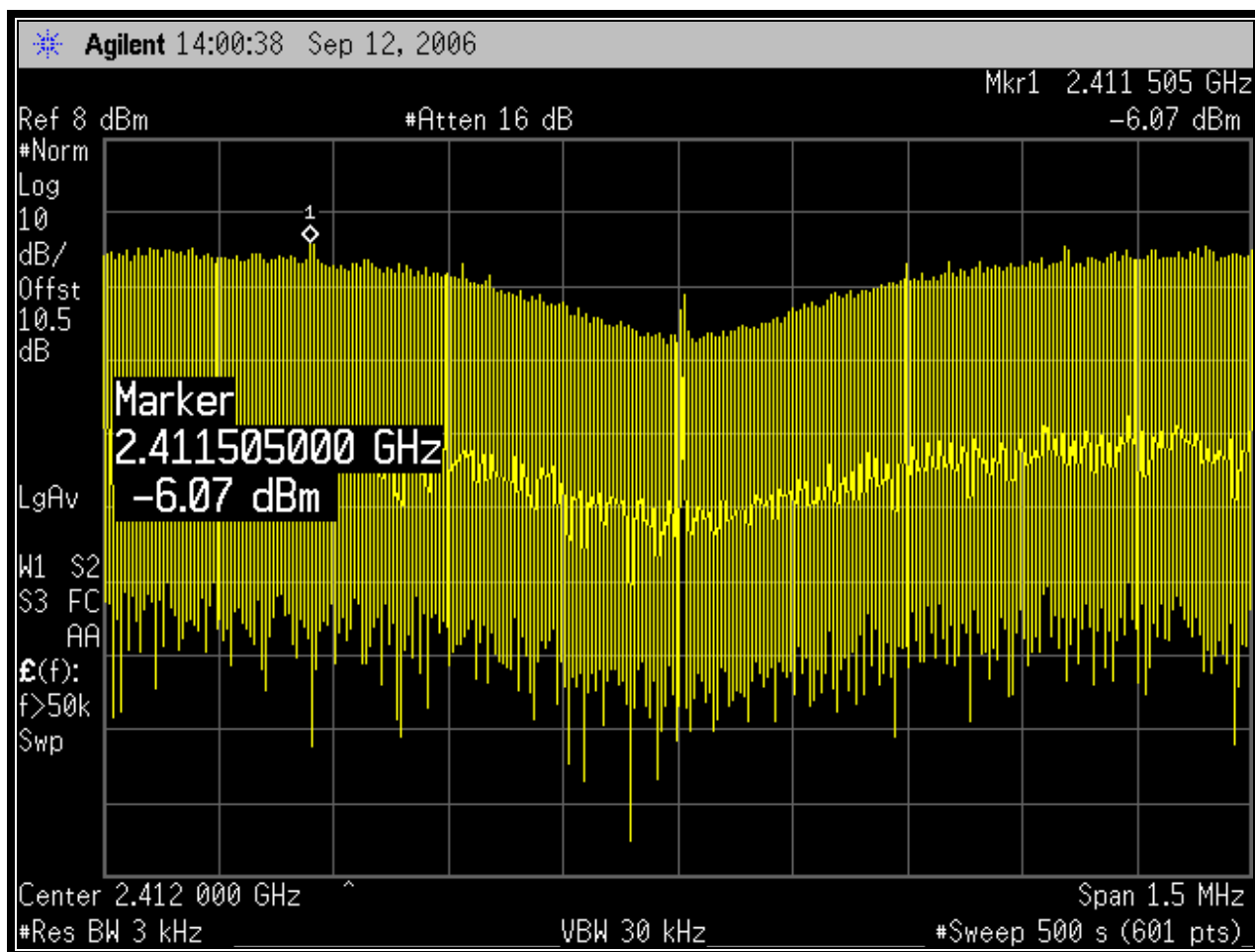
Channel	Frequency (MHz)	RF Power Level (dBm)	Maximum Limit +8dBm	Pass/Fail
1	2412	-6.90	8	Pass
6	2437	-7.66	8	Pass
11	2462	-8.42	8	Pass

Table 7-4: Power Spectral Density Test Data 802.11a

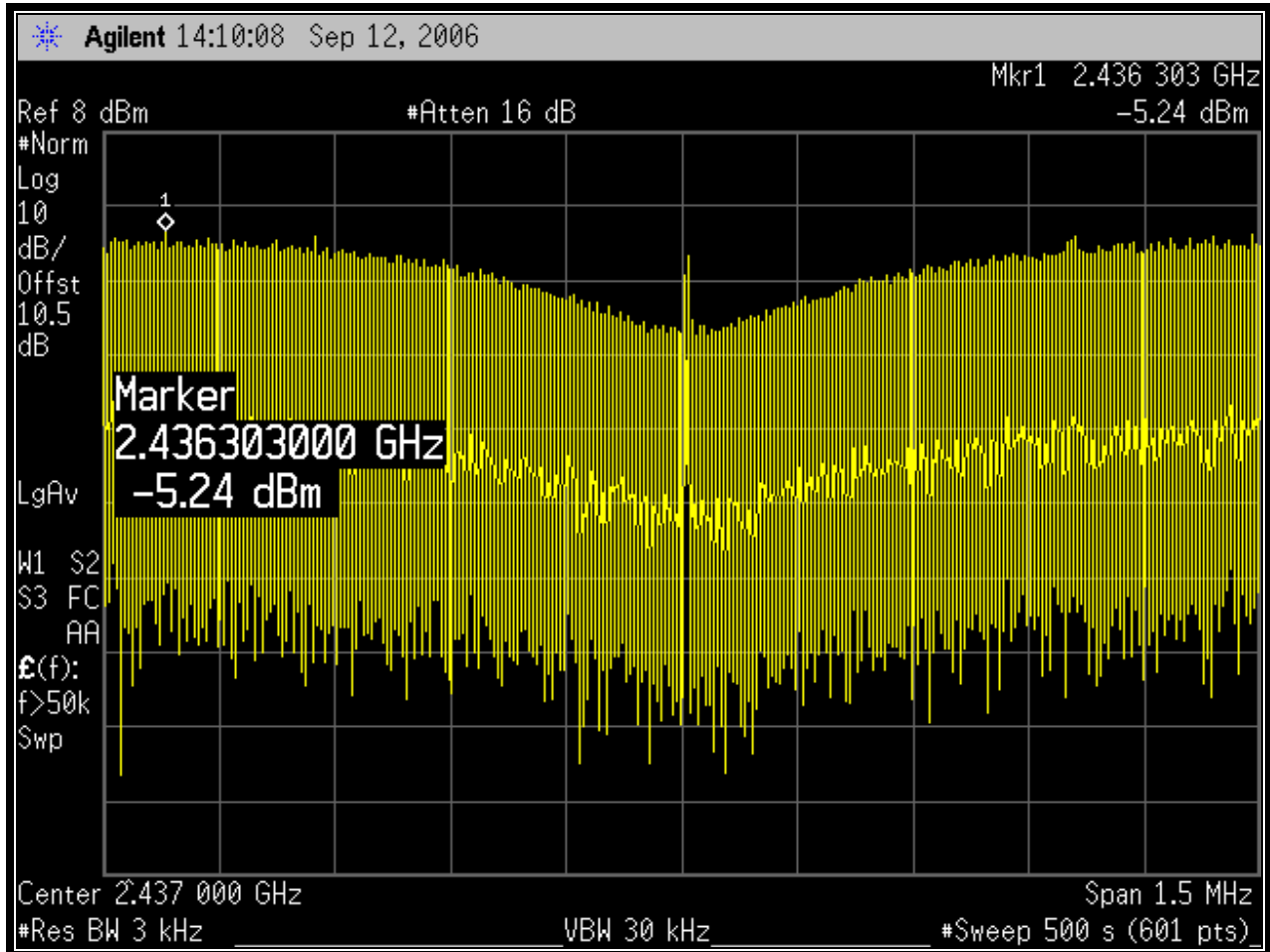
Channel	Frequency (MHz)	RF Power Level (dBm)	Maximum Limit +8dBm	Pass/Fail
149	5745	-13.83	8	Pass
157	5785	-9.30	8	Pass
165	5825	-10.30	8	Pass
152 turbo	5760	-6.68	8	Pass
160 turbo	5800	-9.50	8	Pass

7.3 Power Spectral Density Plots - 802.11b

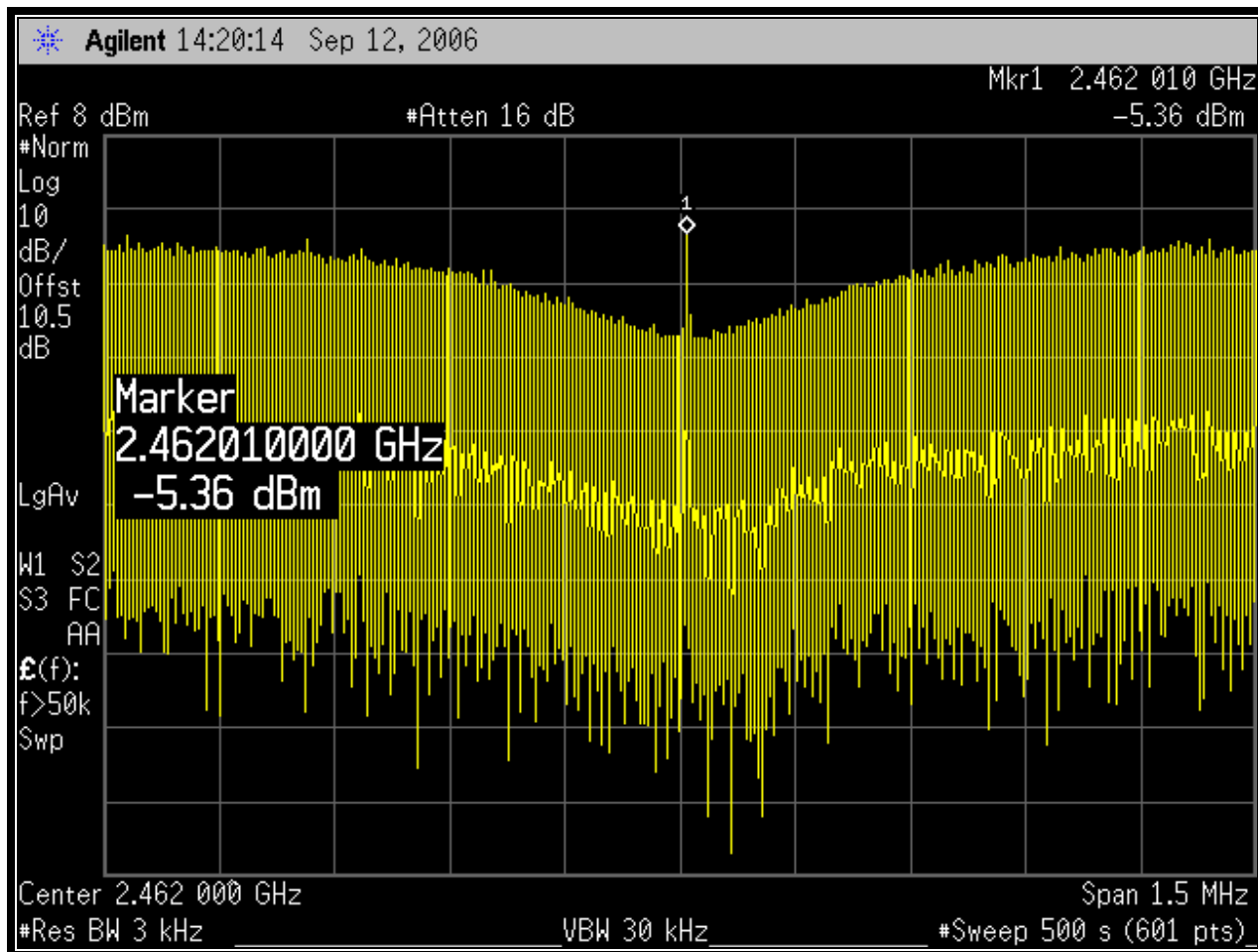
Plot 7-1: Power Spectral Density: Channel 1 (2412 MHz – 11 Mbps)



Plot 7-2: Power Spectral Density: Channel 6 (2437 MHz – 11 Mbps)

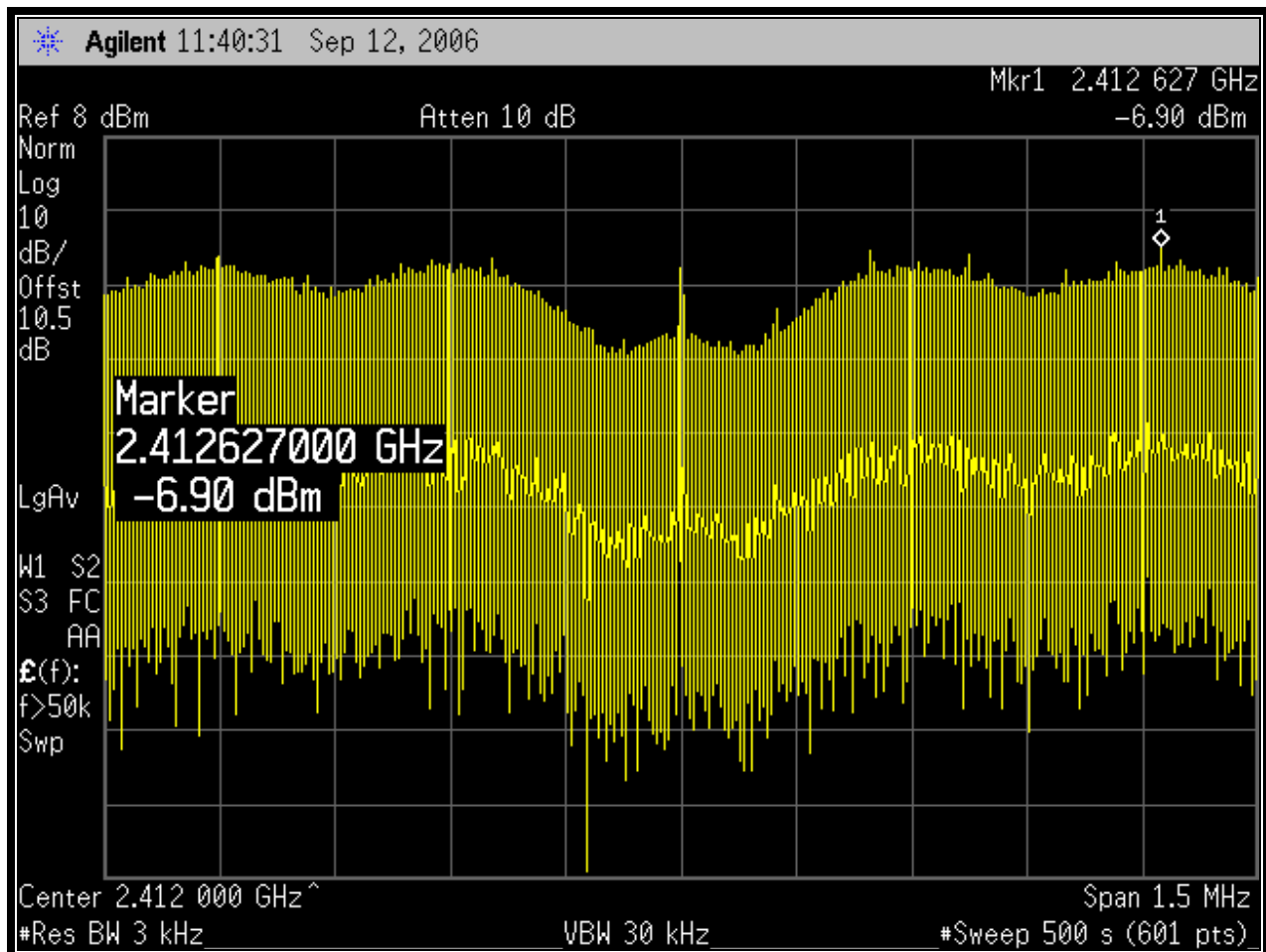


Plot 7-3: Power Spectral Density: Channel 11 (2462 MHz – 11 Mbps)

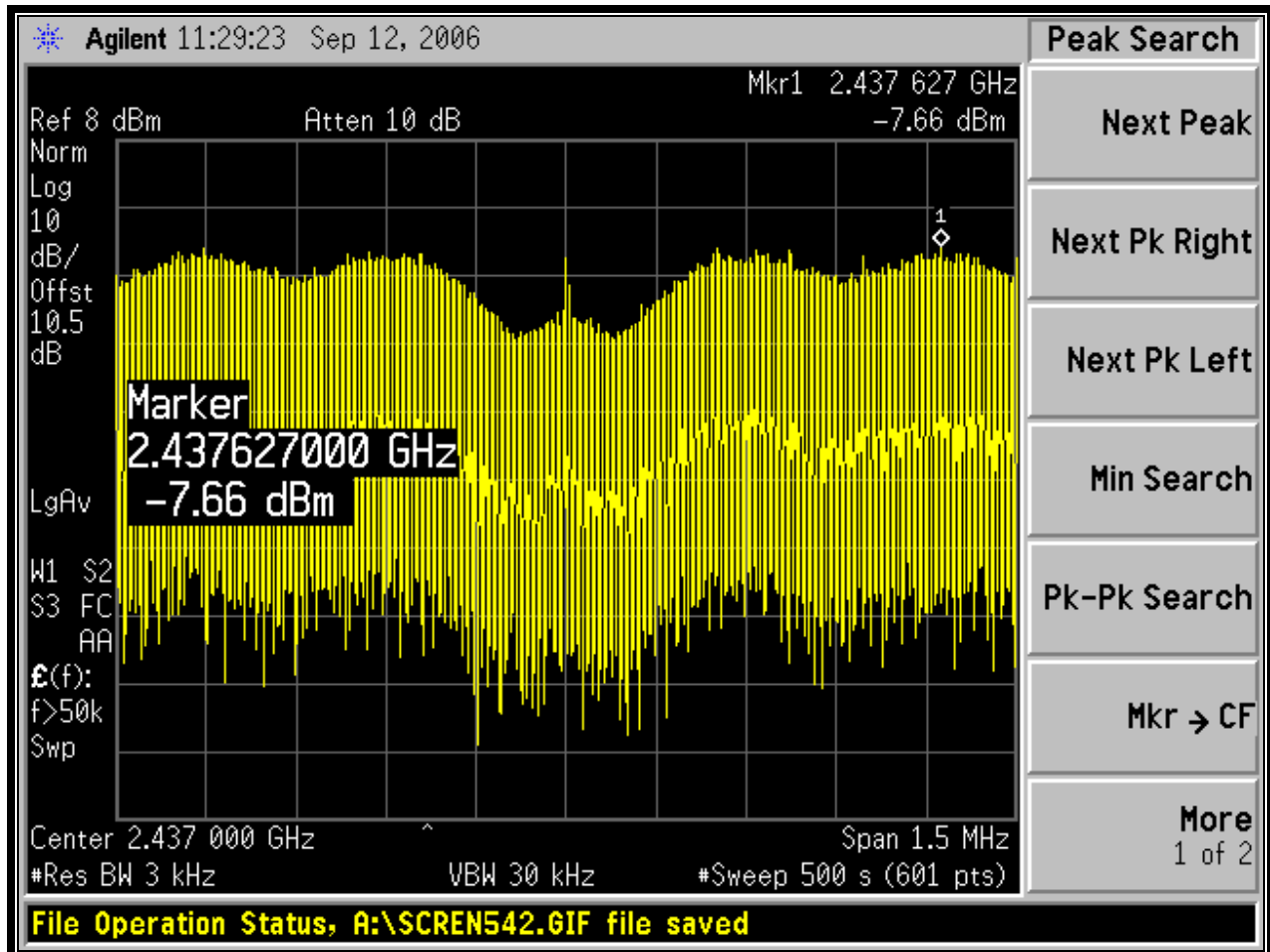


7.4 Power Spectral Density Plots - 802.11g

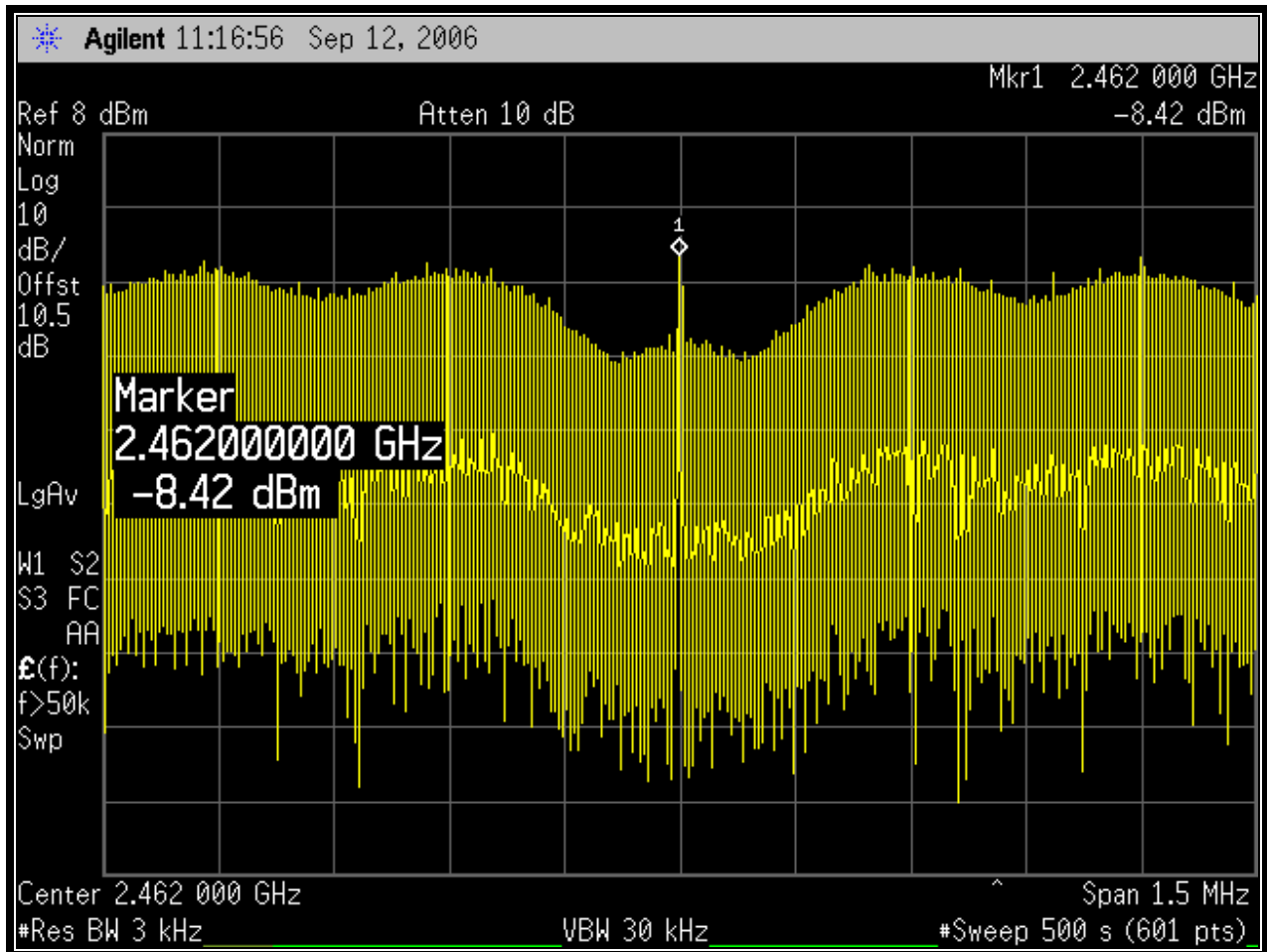
Plot 7-4: Power Spectral Density: Channel 1 (2412 MHz – 54 Mbps)



Plot 7-5: Power Spectral Density: Channel 6 (2437 MHz – 54 Mbps)

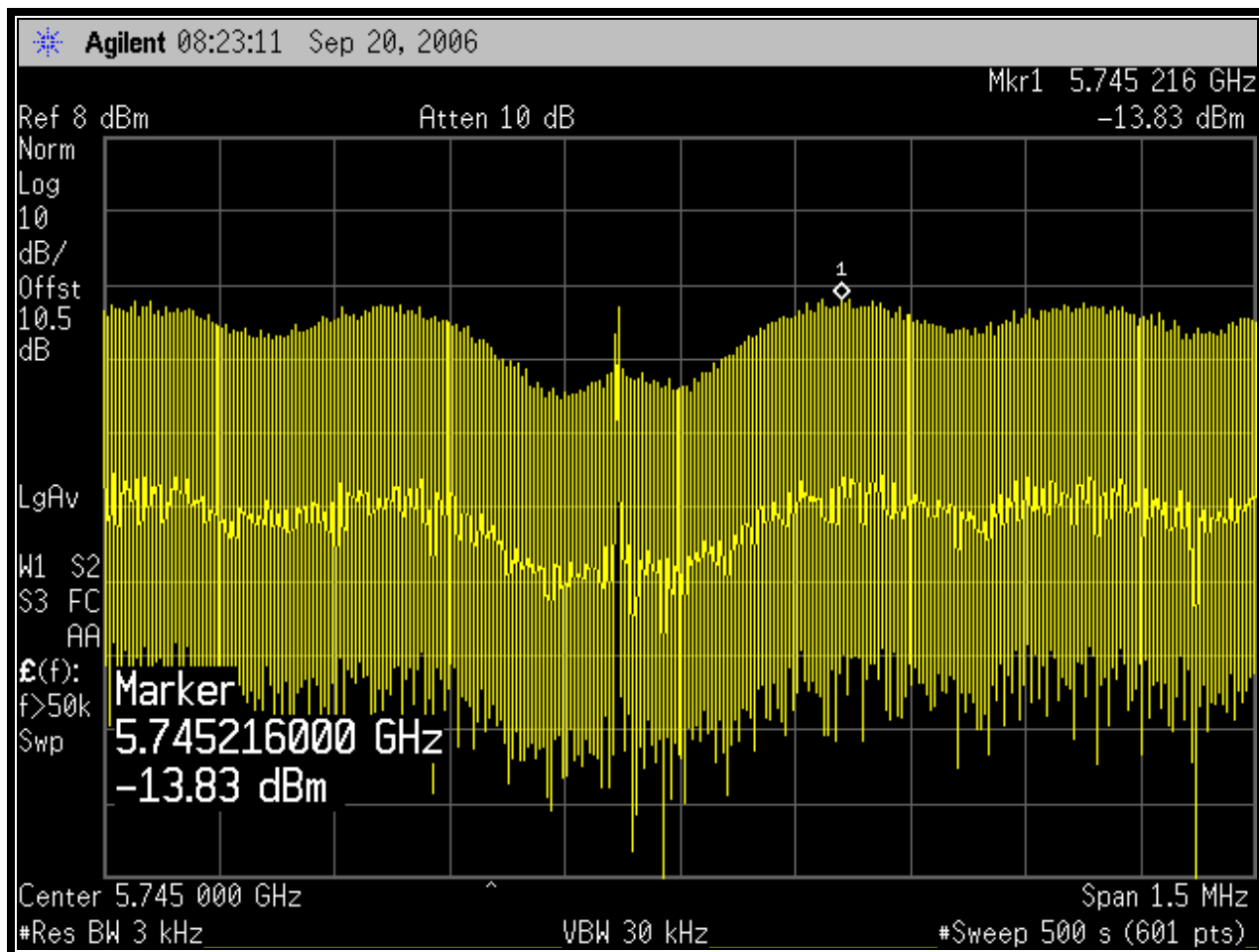


Plot 7-6: Power Spectral Density: Channel 11 (2462 MHz – 54 Mbps)

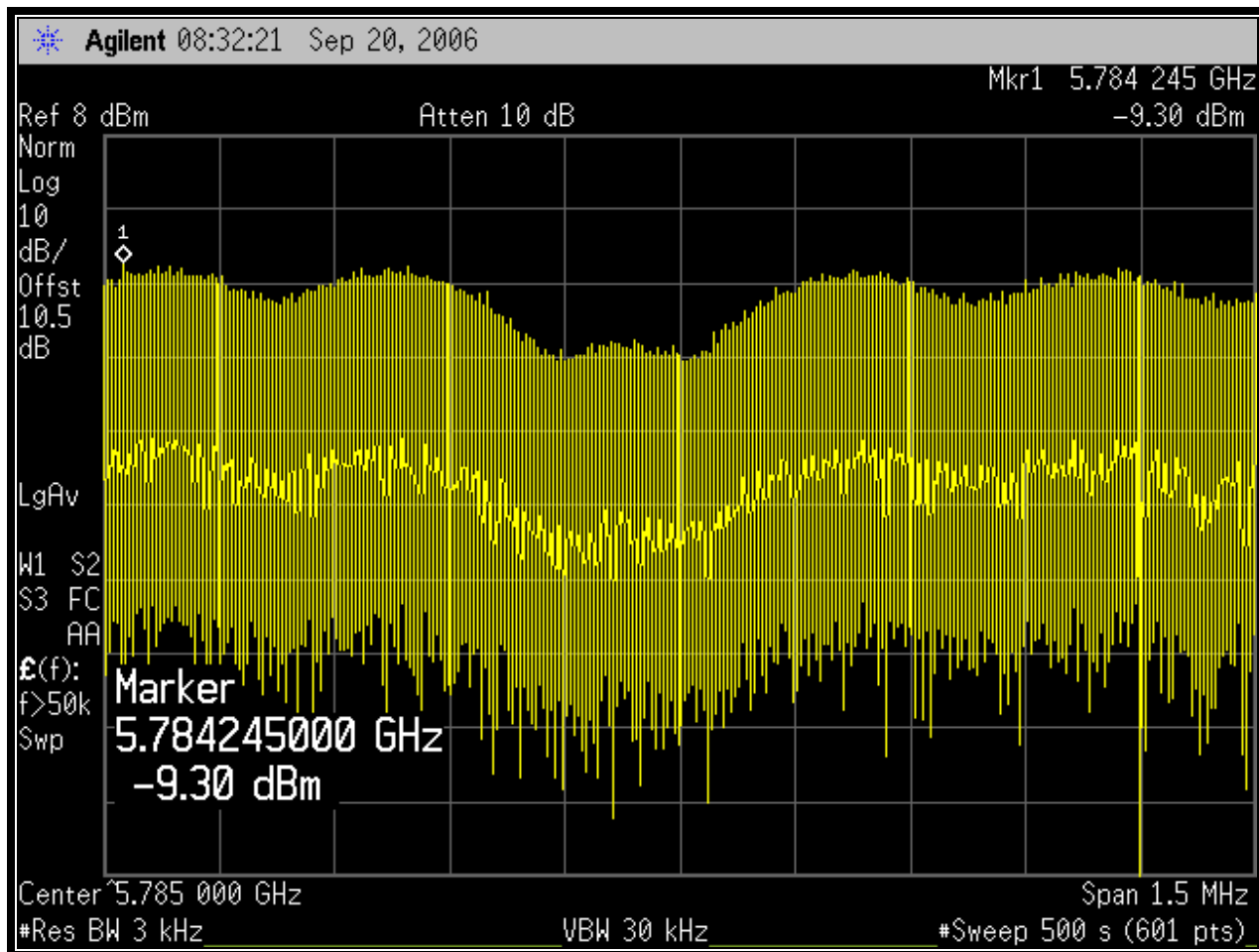


7.5 Power Spectral Density Plots - 802.11a

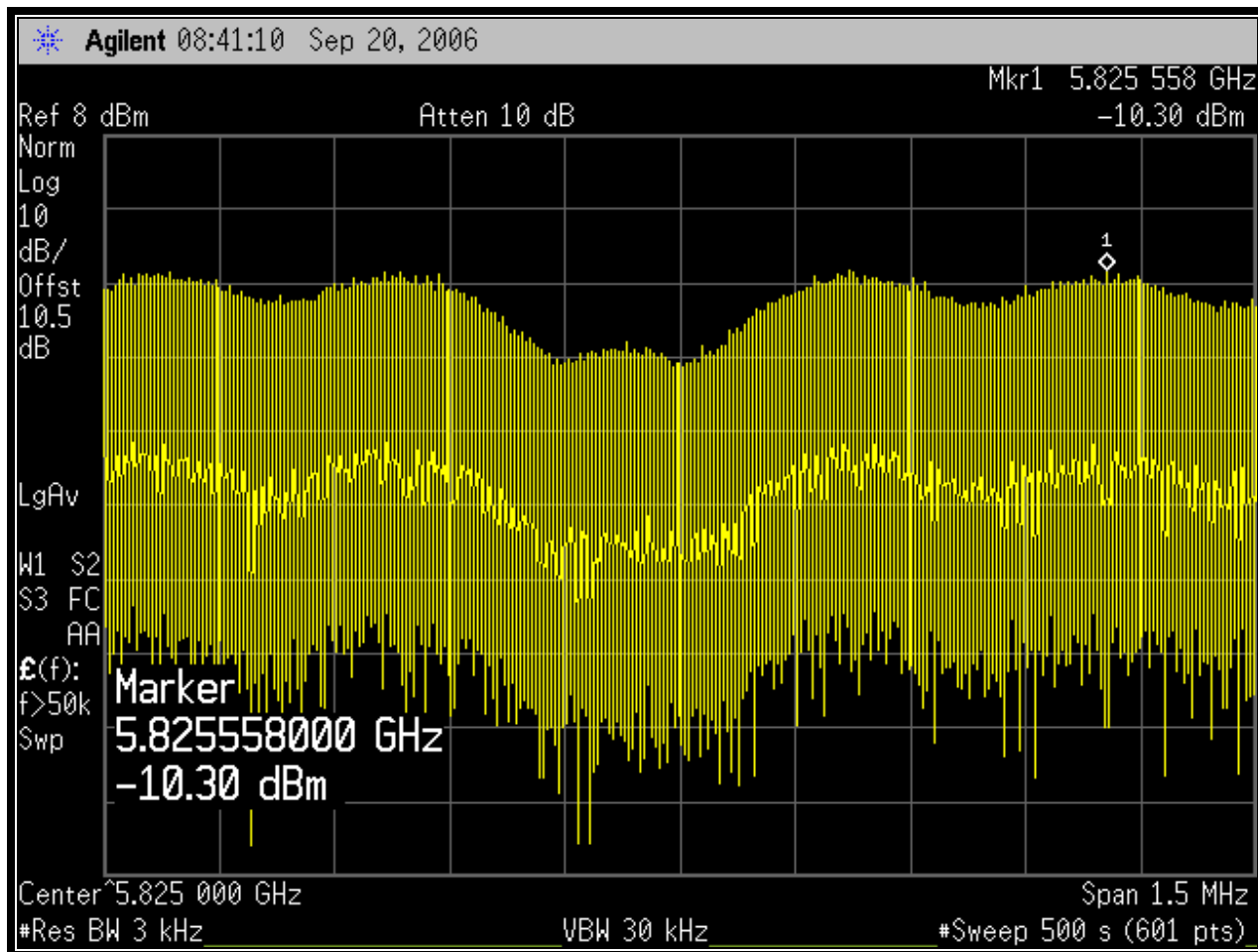
Plot 7-7: Power Spectral Density: Channel 149 (5745 MHz – 54 Mbps)



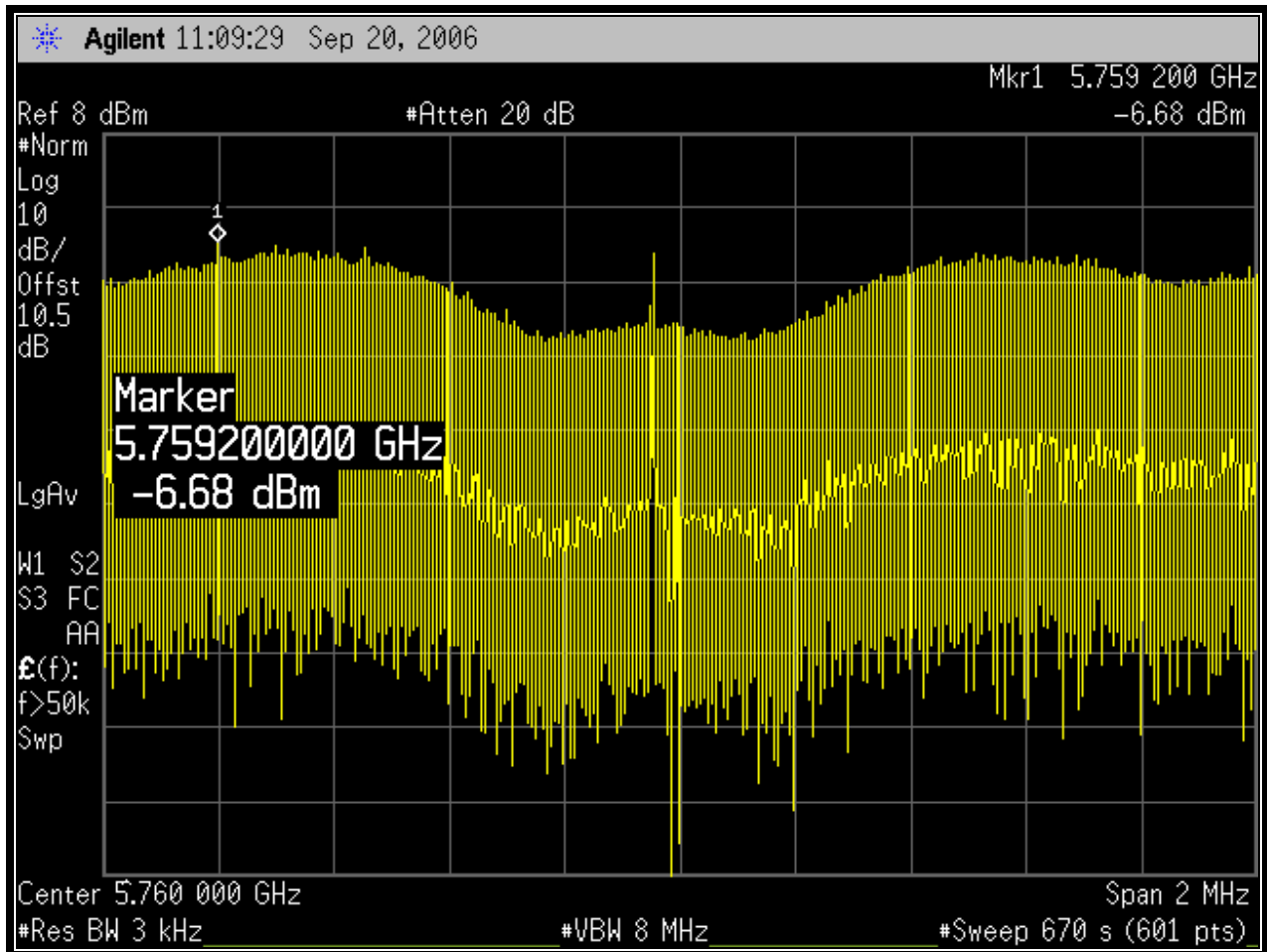
Plot 7-8: Power Spectral Density: Channel 157 (5785 MHz – 54 Mbps)



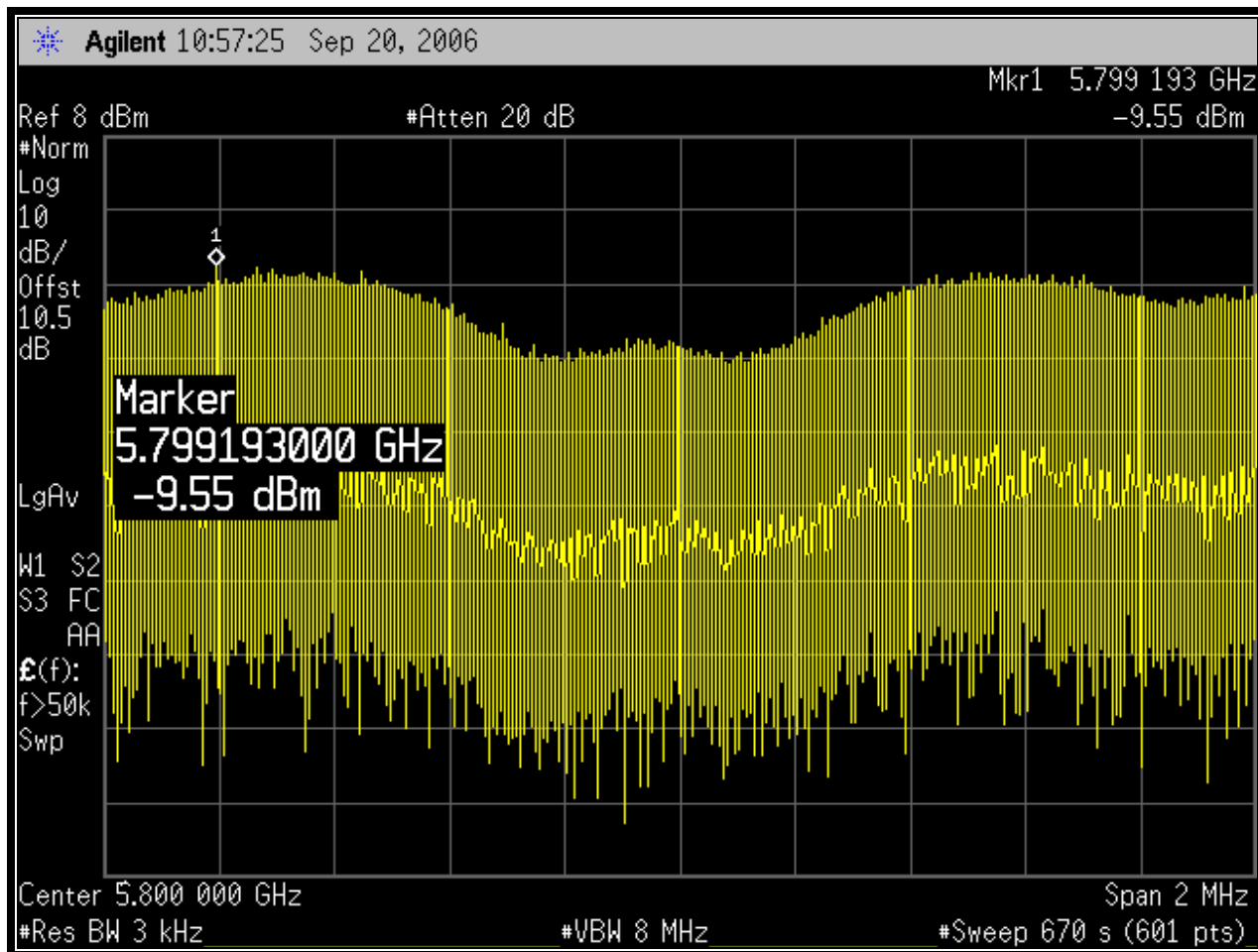
Plot 7-9: Power Spectral Density: Channel 165 (5825 MHz – 54 Mbps)



Plot 7-10: Power Spectral Density: Channel 152 Turbo (5760 MHz – 108 Mbps)



Plot 7-11: Power Spectral Density: Channel 160 Turbo (5800 MHz – 108 Mbps)



TEST PERSONNEL:

Daniel W. Baltzell
 EMC Test Engineer

Signature

September 12 & 20, 2006
 Dates Of Test

8 Conducted Emissions Measurement – FCC §15.207; RSS-GEN §7.2.2

8.1 Limits of Conducted Emissions Measurement

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

8.2 Conducted Emissions Measurement Test Procedure

The EUT was placed 0.4 meters from the conducting bulkhead of the shielded room. The EUT was connected to mains through a line impedance stabilization network (LISN). The LISN provides 50 ohm/50 uH coupling impedance to the measuring receiver.

The test frequency range was from 150 kHz to 30 MHz.

Table 8-1: Conducted Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900897	Hewlett Packard	8567A	HP Spectrum Analyzer (10 kHz - 1.5 GHz)	2727A00535	3/3/07
900729	Solar	8130	Filter	947306	N/A
901082	AFJ International	LS16	16A LISN	16010020081	11/29/05

8.3 Conducted Test Data

Table 8-2: Conducted Emissions Test Data; Transmit; Receive Mode; Neutral Side (Line 1)

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
0.153	Pk	43.8	0.2	44.0	65.8	-21.8	55.8	-11.8	Pass
0.194	Pk	40.2	0.2	40.4	63.9	-23.5	53.9	-13.5	Pass
0.262	Pk	33.3	0.2	33.5	61.4	-27.9	51.4	-17.9	Pass
0.394	Pk	36.2	0.2	36.4	58.0	-21.6	48.0	-11.6	Pass
0.458	Pk	36.3	0.2	36.5	56.7	-20.2	46.7	-10.2	Pass
4.660	Pk	32.6	1.4	34.0	56.0	-22.0	46.0	-12.0	Pass

Table 8-3: Conducted Emissions Test Data; Transmit; Receive Mode; Hot Side (Line 2)

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
0.156	Pk	44.0	0.2	44.2	65.7	-21.5	55.7	-11.5	Pass
0.198	Pk	43.7	0.2	43.9	63.7	-19.8	53.7	-9.8	Pass
0.331	Pk	30.5	0.3	30.8	59.4	-28.6	49.4	-18.6	Pass
0.396	Pk	35.6	0.2	35.8	57.9	-22.1	47.9	-12.1	Pass
0.460	Pk	36.7	0.2	36.9	56.7	-19.8	46.7	-9.8	Pass
1.150	Pk	31.0	0.5	31.5	56.0	-24.5	46.0	-14.5	Pass
10.770	Pk	24.4	2.0	26.4	60.0	-33.6	50.0	-23.6	Pass

Table 8-4: Conducted Emissions Test Data; Transmit; 802.11b TX 2437 MHz; Neutral Side (Line 1)

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	43.8	0.2	44.0	65.4	-21.4	55.4	-11.4	Pass
0.397	Pk	35.8	0.2	36.0	57.9	-21.9	47.9	-11.9	Pass
0.460	Pk	36.4	0.2	36.6	56.7	-20.1	46.7	-10.1	Pass
1.330	Pk	33.4	0.6	34.0	56.0	-22.0	46.0	-12.0	Pass
5.040	Pk	32.7	1.6	34.3	60.0	-25.7	50.0	-15.7	Pass
23.600	Pk	26.1	2.8	28.9	60.0	-31.1	50.0	-21.1	Pass

Table 8-5: Conducted Emissions Test Data; Transmit; 802.11b TX 2437 MHz; Hot Side (Line 2)

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
0.155	Pk	43.7	0.2	43.9	65.7	-21.8	55.7	-11.8	Pass
0.396	Pk	35.9	0.2	36.1	57.9	-21.8	47.9	-11.8	Pass
0.461	Pk	36.9	0.2	37.1	56.7	-19.6	46.7	-9.6	Pass
0.740	Pk	30.5	0.3	30.8	56.0	-25.2	46.0	-15.2	Pass
10.650	Pk	22.7	2.0	24.7	60.0	-35.3	50.0	-25.3	Pass
23.750	Pk	23.3	2.8	26.1	60.0	-33.9	50.0	-23.9	Pass

Table 8-6: Conducted Emissions Test Data; Transmit; 802.11g TX 2437 MHz; Neutral Side (Line 1)

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
0.153	Pk	46.6	0.2	46.8	65.8	-19.0	55.8	-9.0	Pass
0.199	Pk	40.5	0.2	40.7	63.7	-23.0	53.7	-13.0	Pass
0.265	Pk	36.4	0.2	36.6	61.3	-24.7	51.3	-14.7	Pass
0.396	Pk	38.2	0.2	38.4	57.9	-19.5	47.9	-9.5	Pass
0.460	Pk	38.4	0.2	38.6	56.7	-18.1	46.7	-8.1	Pass
2.510	Pk	32.7	1.0	33.7	56.0	-22.3	46.0	-12.3	Pass
11.420	Pk	22.2	2.0	24.2	60.0	-35.8	50.0	-25.8	Pass
23.160	Pk	25.8	2.9	28.7	60.0	-31.3	50.0	-21.3	Pass

Table 8-7: Conducted Emissions Test Data; Transmit; 802.11g TX 2437 MHz; Hot Side (Line 2)

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
0.160	Pk	41.7	0.2	41.9	65.5	-23.6	55.5	-13.6	Pass
0.199	Pk	36.3	0.2	36.5	63.7	-27.2	53.7	-17.2	Pass
0.397	Pk	35.4	0.2	35.6	57.9	-22.3	47.9	-12.3	Pass
0.462	Pk	38.0	0.2	38.2	56.7	-18.5	46.7	-8.5	Pass
1.030	Pk	31.6	0.4	32.0	56.0	-24.0	46.0	-14.0	Pass
10.680	Pk	23.5	2.0	25.5	60.0	-34.5	50.0	-24.5	Pass
23.390	Pk	23.8	2.9	26.7	60.0	-33.3	50.0	-23.3	Pass

Table 8-8: Conducted Emissions Test Data; Transmit; 802.11g TX 2437/802.11a TX turbo 5760; Neutral Side (Line 1)

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
0.176	Pk	44.5	0.2	44.7	64.7	-20.0	54.7	-10.0	Pass
0.395	Pk	35.7	0.2	35.9	58.0	-22.1	48.0	-12.1	Pass
0.462	Pk	37.5	0.2	37.7	56.7	-19.0	46.7	-9.0	Pass
3.330	Pk	32.7	1.1	33.8	56.0	-22.2	46.0	-12.2	Pass
11.120	Pk	22.7	2.0	24.7	60.0	-35.3	50.0	-25.3	Pass
23.630	Pk	23.7	2.8	26.5	60.0	-33.5	50.0	-23.5	Pass

Table 8-9: Conducted Emissions Test Data; Transmit; 802.11g TX 2437/802.11a TX turbo 5760 MHz; Hot Side (Line 2)

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
0.179	Pk	43.5	0.2	43.7	64.5	-20.8	54.5	-10.8	Pass
0.396	Pk	34.6	0.2	34.8	57.9	-23.1	47.9	-13.1	Pass
0.461	Pk	37.3	0.2	37.5	56.7	-19.2	46.7	-9.2	Pass
1.950	Pk	32.1	0.9	33.0	56.0	-23.0	46.0	-13.0	Pass
10.830	Pk	23.1	2.0	25.1	60.0	-34.9	50.0	-24.9	Pass
23.570	Pk	24.2	2.8	27.0	60.0	-33.0	50.0	-23.0	Pass

Table 8-10: Conducted Emissions Test Data; Transmit; 802.11a TX 5785 MHz; Neutral Side (Line 1)

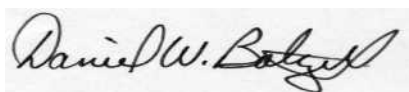
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	QP Limit (dBuV)	QP Margin (dBuV)	AV Limit (dBuV)	AV Margin (dBuV)	Pass/Fail
0.162	Pk	45.0	0.2	45.2	65.4	-20.2	55.4	-10.2	Pass
0.331	Pk	34.0	0.3	34.3	59.4	-25.1	49.4	-15.1	Pass
0.397	Pk	37.4	0.2	37.6	57.9	-20.3	47.9	-10.3	Pass
2.890	Pk	34.6	1.1	35.7	56.0	-20.3	46.0	-10.3	Pass
11.470	Pk	26.0	2.0	28.0	60.0	-32.0	50.0	-22.0	Pass
26.760	Pk	27.3	2.9	30.2	60.0	-29.8	50.0	-19.8	Pass

Table 8-11: Conducted Emissions Test Data; Transmit; 802.11a TX 5785 MHz; Hot Side (Line 2)

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
0.152	Pk	44.2	0.2	44.4	65.9	-21.5	55.9	-11.5	Pass
0.396	Pk	37.4	0.2	37.6	57.9	-20.3	47.9	-10.3	Pass
0.464	Pk	31.1	0.2	31.3	56.6	-25.3	46.6	-15.3	Pass
0.800	Pk	33.5	0.4	33.9	56.0	-22.1	46.0	-12.1	Pass
10.830	Pk	26.7	2.0	28.7	60.0	-31.3	50.0	-21.3	Pass
26.080	Pk	20.7	2.8	23.5	60.0	-36.5	50.0	-26.5	Pass

TEST PERSONNEL:

Daniel W. Baltzell
 EMC Test Engineer



Signature

September 14, 2006
 Date Of Test

9 Radiated Emissions - §15.209; RSS-210 §A8.5, RSS-GEN §4.8, 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 (24.62 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
901053	Schaffner Chase	CBL6112B	Bi-Log Antenna (20 MHz - 2 GHz)	2648	11/1/06
901365	MITEQ	JS4-00102600-41-5P	Amplifier, 15 V, 0.1-26 GHz, 28dB gain, power 5dB	1094152	3/24/07
901215	Hewlett Packard	8596EM	Spectrum Analyzer (9kHz - 12.8GHz)	3826A00144	9/22/06
901413	Agilent	E4448A	Spectrum Analyzer	US44020346	11/2/06
900811	Rhein Tech Labs	PR-1040	Amplifier	1003	3/15/07
900878	Rhein Tech Labs	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	Not Required
901426	Insulated Wire Inc.	KPS-1503-3600-KPS	RF cable, 30'	NA	12/12/06
901425	Insulated Wire, Inc.	KPS-1503-2400-KPS	RF cable, 20'	NA	12/12/06
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	12/12/06
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 GHz)	3525A00159	11/27/07

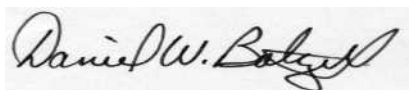
9.3 Unintentional Radiated Emissions Test Results

Table 9-2: Unintentional Radiated Emissions Test Results

Temperature: 71°F Humidity: 75%										
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
86.440	Qp	H	270	3.0	49.5	-20.3	29.2	40.0	-10.8	Pass
87.297	Qp	V	180	1.0	51.2	-19.3	31.9	40.0	-8.1	Pass
131.993	Qp	V	180	1.0	39.5	-16.0	23.5	43.5	-20.0	Pass
285.964	Qp	V	180	1.0	46.2	-14.1	32.1	46.0	-13.9	Pass
527.973	Qp	V	0	1.0	46.8	-7.4	39.4	46.0	-6.6	Pass
549.969	Qp	H	270	3.0	37.3	-6.4	30.9	46.0	-15.1	Pass
769.993	Qp	V	180	1.0	45.7	-3.8	41.9	46.0	-4.1	Pass
901.986	Qp	V	180	1.0	44.5	-2.4	42.1	46.0	-3.9	Pass
923.956	Qp	V	180	1.0	45.5	-2.1	43.4	46.0	-2.6	Pass

Test Personnel:

Daniel W. Baltzell
EMC Test Engineer



Signature

September 16, 2006
Date Of Test

9.4 Radiated Spurious Emissions

Table 9-3: Radiated Emissions Harmonics/Spurious Channel 1 (TX Frequency: 2412 MHz; 802.11b)

Emission Frequency (MHz)	Peak Analyzer Reading 1 MHz RBW/3 MHz VBW (dBuV)	Average Analyzer Reading 1 MHz RBW/10 Hz VBW (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2016.041	53.5	48.7	-3.8	44.9	82.3	-37.4
2136.170	47.3	36.5	-5.2	31.3	82.3	-51.0
2412.000	81.3	76.7	25.6	102.3	Fundamental	
2687.908	54.0	48.5	-5.1	43.4	54.0	-10.6
2807.959	36.3	34.5	-4.8	29.7	54.0	-24.3
4824.000	45.5	40.7	0.5	41.2	54.0	-12.8
7236.000	42.8	30.5	3.3	33.8	82.3	-48.5
9648.000	41.7	27.7	8.4	36.1	82.3	-46.2
12060.000	40.8	26.5	11.3	37.8	54.0	-16.2
14472.000	40.3	28.3	15.3	43.6	54.0	-10.4
16884.000	41.5	28.8	16.3	45.1	82.3	-37.2

Table 9-4: Radiated Emissions Harmonics/Spurious Channel 6 (TX Frequency: 2437 MHz; 802.11b)

Emission Frequency (MHz)	Peak Analyzer Reading 1 MHz RBW/3 MHz VBW (dBuV)	Average Analyzer Reading 1 MHz RBW/10 Hz VBW (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2016.133	57.5	54.0	-3.8	50.2	83.3	-33.1
2186.092	52.5	43.5	-5.2	38.3	83.3	-45.0
2437.000	81.5	77.7	25.6	103.3	Fundamental	
2687.908	53.8	49.8	-5.1	44.7	54.0	-9.3
2858.017	42.0	35.2	-4.9	30.3	54.0	-23.7
4874.000	47.0	42.5	0.1	42.6	54.0	-11.4
7311.000	42.5	29.8	2.9	32.7	54.0	-21.3
9748.000	39.7	27.2	8.6	35.8	83.3	-47.5
12185.000	37.8	27.0	10.5	37.5	54.0	-16.5
14622.000	40.2	28.0	15.6	43.6	83.3	-39.7
17059.000	41.0	27.8	16.0	43.8	83.3	-39.5

Table 9-5: Radiated Emissions Harmonics/Spurious Channel 11 (TX Frequency: 2462 MHz; 802.11b)

Emission Frequency (MHz)	Peak Analyzer Reading 1 MHz RBW/3 MHz VBW (dBuV)	Average Analyzer Reading 1 MHz RBW/10 Hz VBW (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2235.933	52.8	42.0	-5.2	36.8	54.0	-17.2
2360.013	59.7	47.3	-5.0	42.3	54.0	-11.7
2462.000	82.0	78.0	25.6	103.6	Fundamental	
2584.480	54.5	42.8	-4.8	38.0	83.6	-45.6
2688.067	52.3	49.7	-5.1	44.6	54.0	-9.4
4924.000	55.8	36.5	0.4	36.9	54.0	-17.1
7386.000	46.0	28.8	4.0	32.8	54.0	-21.2
9848.000	40.0	27.3	9.3	36.6	83.6	-47.0
12310.000	40.0	27.2	10.2	37.4	54.0	-16.6
14772.000	39.7	27.0	14.7	41.7	83.6	-41.9
17234.000	40.8	28.5	16.2	44.7	83.6	-38.9

Table 9-6: Radiated Emissions Harmonics/Spurious Channel 1 (TX Frequency: 2412 MHz; 802.11g)

Emission Frequency (MHz)	Peak Analyzer Reading 1 MHz RBW/3 MHz VBW (dBuV)	Average Analyzer Reading 1 MHz RBW/10 Hz VBW (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2412.000	84.3	73.3	25.6	98.9	Fundamental	
2687.908	51.8	48.3	-5.1	43.2	54.0	-10.8
2855.030	51.2	37.8	-4.9	32.9	54.0	-21.1
4824.000	48.2	30.5	0.5	31.0	54.0	-23.0
7236.000	50.5	30.2	3.3	33.5	78.9	-45.4
9648.000	42.2	27.7	8.4	36.1	78.9	-42.8
12060.000	39.0	26.5	11.3	37.8	54.0	-16.2
14472.000	40.5	28.2	15.3	43.5	54.0	-10.5
16884.000	41.2	28.8	16.3	45.1	78.9	-33.8

Table 9-7: Radiated Emissions Harmonics/Spurious Channel 6 (TX Frequency: 2437 MHz; 802.11g)

Emission Frequency (MHz)	Peak Analyzer Reading 1 MHz RBW/3 MHz VBW (dBuV)	Average Analyzer Reading 1 MHz RBW/10 Hz VBW (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2437.000	84.8	74.3	25.6	99.9	Fundamental	
2687.908	53.3	49.8	-5.1	44.7	54.0	-9.3
2905.310	57.5	41.5	-4.9	36.6	79.9	-43.3
4874.000	53.7	34.5	0.1	34.6	54.0	-19.4
7311.000	52.8	30.7	2.9	33.6	54.0	-20.4
9748.000	39.7	27.2	8.6	35.8	79.9	-44.1
12185.000	42.2	27.2	10.5	37.7	54.0	-16.3
14622.000	41.5	27.8	15.6	43.4	79.9	-36.5
17059.000	41.2	28.8	16.0	44.8	79.9	-35.1

Table 9-8: Radiated Emissions Harmonics/Spurious Channel 11 (TX Frequency: 2462 MHz; 802.11g)

Emission Frequency (MHz)	Peak Analyzer Reading 1 MHz RBW/3 MHz VBW (dBuV)	Average Analyzer Reading 1 MHz RBW/10 Hz VBW (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2235.933	53.3	42.2	-5.2	37.0	54.0	-17.0
2360.013	59.2	49.7	-5.0	44.7	54.0	-9.3
2462.000	83.7	73.7	25.6	99.3	Fundamental	
2688.033	57.8	54.8	-5.1	49.7	54.0	-4.3
4924.000	54.8	36.7	0.4	37.1	54.0	-16.9
7386.000	48.0	28.8	4.0	32.8	54.0	-21.2
9848.000	39.3	27.7	9.3	37.0	79.3	-42.3
12310.000	39.7	27.3	10.2	37.5	54.0	-16.5
14772.000	40.3	27.0	14.7	41.7	79.3	-37.6
17234.000	40.7	28.5	16.2	44.7	79.3	-34.6

Table 9-9: Radiated Emissions Harmonics/Spurious Channel 149 (5745 MHz, 802.11a)

Emission Frequency (MHz)	Peak Analyzer Reading 1 MHz RBW/3 MHz VBW (dBuV)	Average Analyzer Reading 1 MHz RBW/10 Hz VBW (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
3829.959	45.8	42.7	-3.6	39.1	54.0	-14.9
5745.000	83.7	73.0	33.7	106.7		
11490.000	47.3	34.7	15.4	50.1	54.0	-3.9
17235.000	42.7	29.8	16.2	46.0	86.7	-40.7
22980.000	39.2	26.8	21.7	48.5	54.0	-5.5

Table 9-10: Radiated Emissions Harmonics/Spurious Channel 157 (5785 MHz, 802.11a)

Emission Frequency (MHz)	Peak Analyzer Reading 1 MHz RBW/3 MHz VBW (dBuV)	Average Analyzer Reading 1 MHz RBW/10 Hz VBW (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
3856.627	45.3	40.5	-3.7	36.8	54.0	-17.2
5785.000	84.0	73.2	33.7	106.9		
11570.000	46.0	34.2	15.3	49.5	54.0	-4.5
17355.000	42.8	30.7	16.1	46.8	86.9	-40.1

Table 9-11: Radiated Emissions Harmonics/Spurious Channel 165 (5825 MHz, 802.11a)

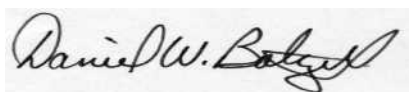
Emission Frequency (MHz)	Peak Analyzer Reading 1 MHz RBW/3 MHz VBW (dBuV)	Average Analyzer Reading 1 MHz RBW/10 Hz VBW (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
3883.298	45.7	40.0	-3.8	36.2	54.0	-17.8
5825.000	84.8	73.8	33.6	107.4		
11650.000	46.2	32.8	15.4	48.2	54.0	-5.8
17475.000	42.5	29.8	16.0	45.8	87.4	-41.6

Table 9-12: Collocated Radiated Emissions Intermodulation Products; 802.11a Channel 157 (5785 MHz) and 802.11b Channel 6 (2437 MHz)

Emission Frequency (MHz)	Peak Analyzer Reading 1 MHz RBW/3 MHz VBW (dBuV)	Average Analyzer Reading 1 MHz RBW/10 Hz VBW (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
910.000	42.3	32.0	-1.2	30.8	83.3	-52.5
2892.700	65.7	48.7	-4.9	43.8	54.0	-10.2
3348.000	66.5	55.0	-4.5	50.5	54.0	-3.5
8221.300	46.5	35.3	9.4	44.7	54.0	-9.3
9130.700	38.5	28.0	10.0	38.0	54.0	-16.0
10658.700	41.8	27.8	9.7	37.5	54.0	-16.5

TEST PERSONNEL:

Daniel W. Baltzell
EMC Test Engineer



Signature

September 17 & 21, 2006
Dates Of Tests

10 Antenna Requirement – FCC §15.203

10.1 Applicable Standard

According to Part 15.203, an intentional radiating device shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with this device. According to Part 15.247(b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

10.2 Antenna Connector Construction

The EUT's antenna connector is an N type connector and the antennas with the applicable gains are listed below.

Gain (dBi)	Manufacturer	Model Number	Antenna Type
2.1	NetGate	ANT-DUALOMNI-NM	Omni Antenna with N Male Connector
3	NetGate	ANT-5G-3-OMNI-NM	5 GHz Rubber Duck Omni Antenna with N Male Connector

11 Conclusion

The data in this measurement report shows that the EUT as tested, 3e Technologies International Model: 3e-527A3, FCC ID: QVT-527A3, IC: 6780A-527A3, complies with all the applicable requirements of Parts 2 and 15 of the FCC Rules and Regulations, and Industry Canada RSS-210.