



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 Web: www.rheintech.com Herndon, VA 20170 E-Mail: ATCBINFO@rheintech.com		Applicant: Motorola, Inc Phone: 215-323-2117 Connected Home Solutions Fax: 215-323-0480 Contact: Michael Welty 101 Tournament Dr Horsham, PA 19044 E-Mail: MWELTY@MOTOROLA.COM	
FCC ID/ IC ID:	ACQWACA/3231A - WACA	Test Report Date:	February 27, 2006
Platform:	N/A	RTL Work Order Number:	2006021
Model Name/ Model Numbers:	RCKT Wireless Audio Car Adapter; Model: WACA-d	RTL Quote Number:	QRTL06-150
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:	DSS – Part 15 Spread Spectrum Transmitter (Bluetooth portion)		
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		
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
2402-2480	0.0022	N/A	N/A

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: February 27, 2006

Typed/Printed Name: Desmond A. Fraser

Position: President

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

360 Herndon Parkway, Suite 1400
Herndon, VA 20170
Tel: 703-689-0368 Fax: 703-689-2056

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1 General Information

1.1 Scope

This is a 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	RCKT Wireless Audio Car Adapter
Model	WACA-d
Power Supply	+12V DC
Modulation Type	FHSS - Bluetooth
Frequency Range	2402 – 2480 MHz
Antenna Connector Type	Antenna is PCB trace
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 certification for Motorola CHS Model: WACA-d, FCC ID ACQWACA, IC: 3231A - WACA.

1.5 Modifications

No modifications were required for compliance.

2 Test Information

2.1 Description of Test Modes

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

Table 2-1: Channels Tested for FHSS – 1 Mbps

Channel	Frequency
0	2402
38	2440
78	2480

2.2 Exercising the EUT

The EUT was tested in all three orthogonal planes in order to determine worst-case emissions. The EUT was provided with software to 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 February 22, 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 2-3: Equipment Under Test

Part	Manufacturer	Model	Serial Number	FCC ID	Cable Description	RTL Bar Code
RCKT Wireless Audio Car Adapter (EUT)	Motorola CHS	WACA-d	Prototype1	ACQWACA	Unshielded power and I/O	17056
RCKT Wireless Audio Car Adapter (EUT) for conducted measurements	Motorola CHS	WACA-d	7	ACQWACA	Unshielded power and I/O	17057
Communication adapter	Motorola CHS	66108	N/A	N/A	0.3m unshielded power; 0.1 and 1.75m unshielded I/O	17058
Mobile Radio/CD player	Alpine Electronics, Inc.	CDA-9851	N/A	N/A	0.75m I/O and power	17054

Table 2-4: Additional Equipment Required for Testing

Part	Manufacturer	Model	Serial Number	FCC ID	Cable Description	RTL Bar Code
Mouse	Microsoft	Intellimouse 1.2A	2881943-5	N/A	1.8m unshielded I/O	12221
PC	Dell	Dimension 4600 Series	GBG0X41	N/A	1.7m unshielded Power	901330
Flat Screen Monitor	MAG	700P	F6EQ5810281 8U	N/A	1.5m unshielded power/1.5m Shielded I/O	901427
Keyboard	Dell	SK8110	N/A	N/A	1.9m unshielded	N/A
DC Power Supply	GW	Instek PSS-3203	N/A	N/A	1.9m unshielded power	2679

2.5 Configuration of Tested System

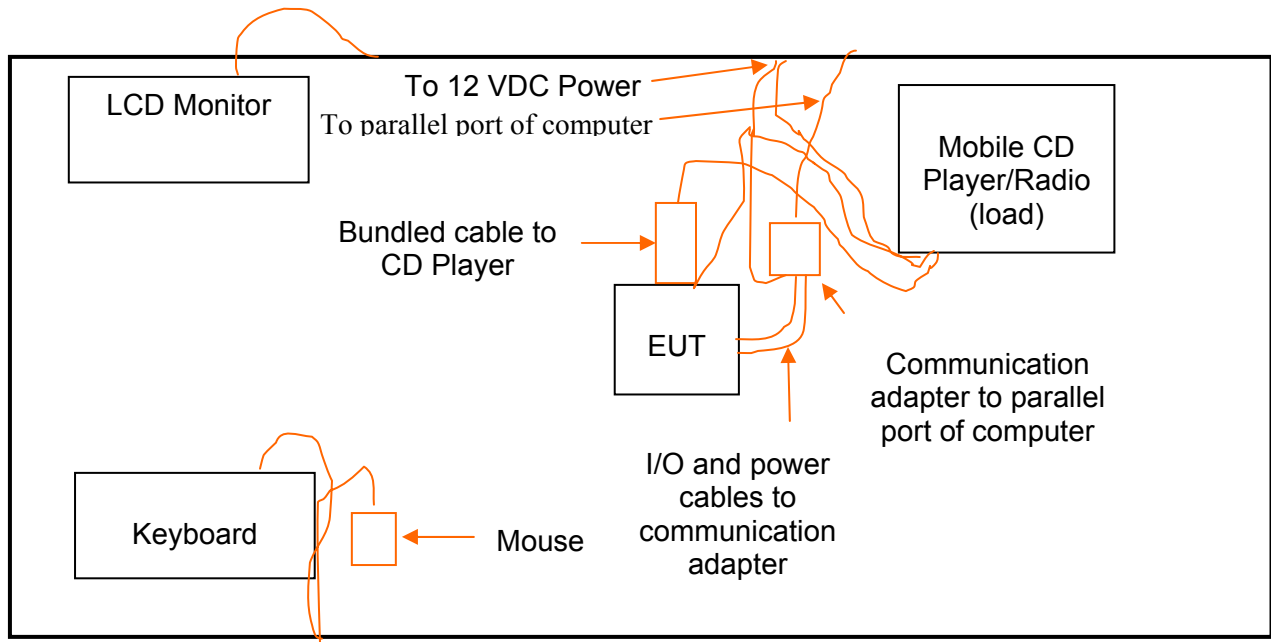


Figure 2-1: Configuration of System Under Test

3 Peak Output Power - §15.247(b)(1); RSS-210 §6.6.2(o)

3.1 Power Output Test Procedure

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

Table 3-1: Power Output Test Equipment

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

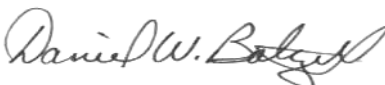
3.2 Power Output Test Data

Table 3-2: Power Output Test Data

Channel	Frequency (MHz)	Peak Power conducted output (dBm)
0	2402	3.47
38	2440	2.84
78	2480	2.11

Test Personnel:

Daniel W. Baltzell
Test Engineer



Signature

February 25, 2006
Dates Of Test

4 Compliance with the Band Edge – FCC §15.247(d); RSS-210 §6.6.2(o)

4.1 Band Edge Test Procedure

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

Table 4-1: Band Edge Test Equipment

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

4.2 Restricted Band Edge Test Results

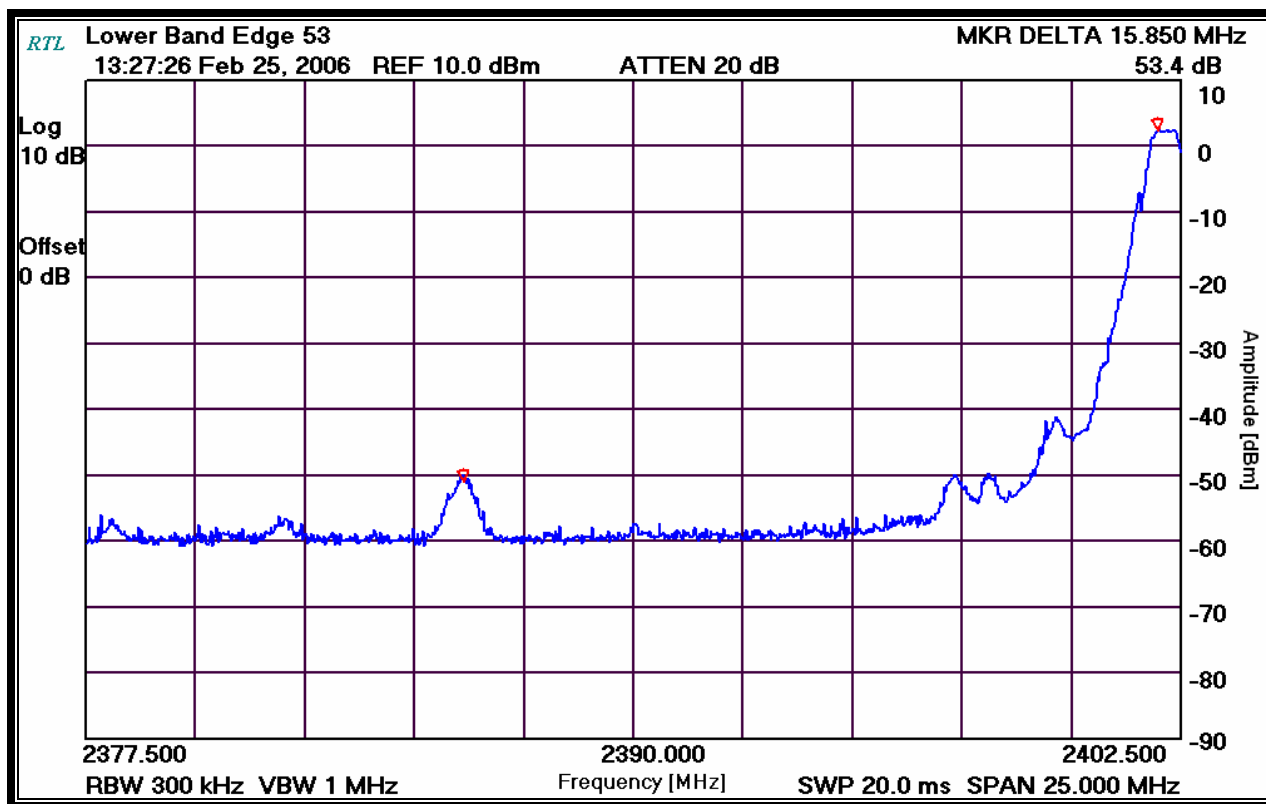
4.2.1 Calculation of Lower Band Edge

95.9 dBuV/m is the field strength measurement, from which the delta measurement of 53.4 dB is subtracted (reference plots), resulting in a level of 42.5 dB. This level has a margin of 11.5 dB below the limit of 54 dBuV/m.

Calculation: $95.9 \text{ dBuV/m} - 53.4 \text{ dB} - 54 \text{ dBuV/m} = -11.5 \text{ dB}$

Field Strength of Lower Band Edge (1 MHz RBW/10 Hz VBW) = 95.9 dBuV/m
Delta measurement = 53.4 dB

Plot 4-1: Lower Band Edge: Average Measurement Channel 0 (TX Frequency: 2402 MHz)



4.2.2 Calculation of Upper Band Edge

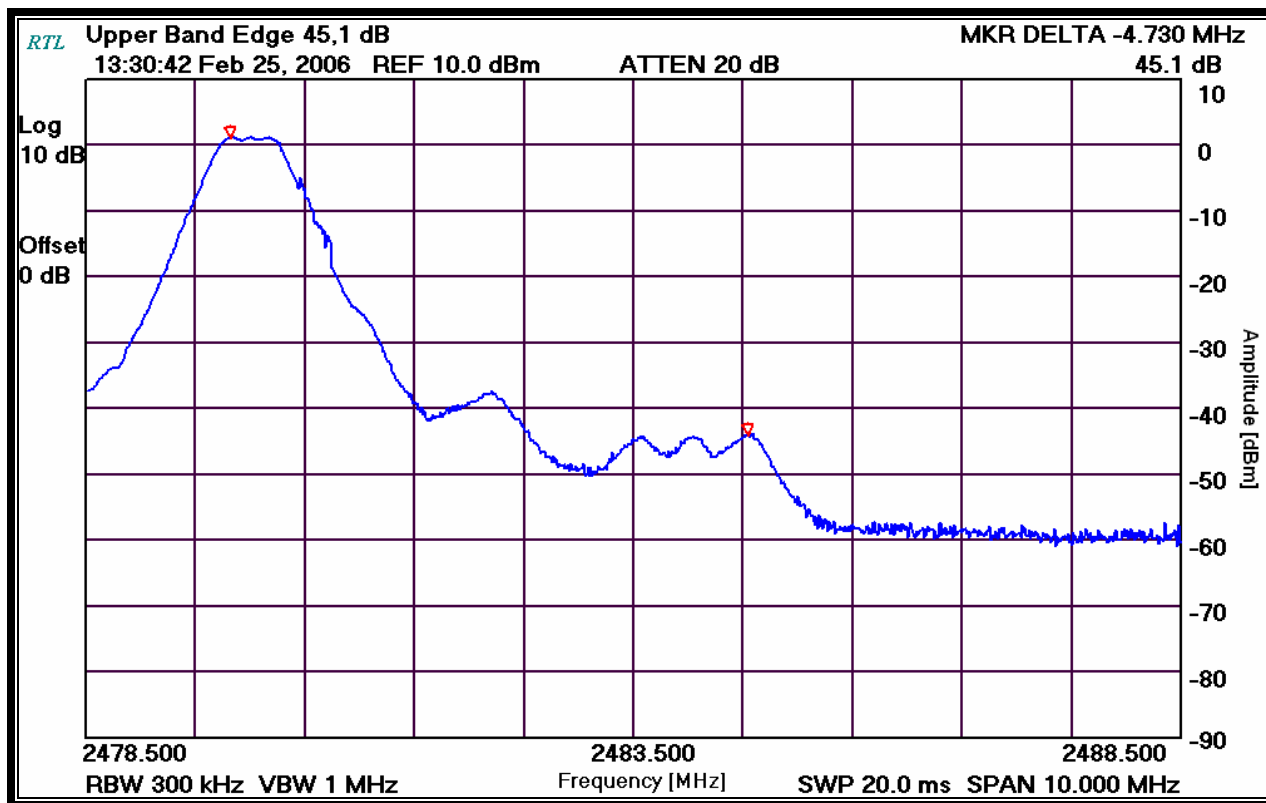
93.2 dBuV/m is the field strength measurement, from which the delta measurement of 45.1 dB is subtracted (reference plots), resulting in a level of 48.1 dB. This level has a margin of 5.9 dB below the limit of 54 dBuV/m.

Calculation: $93.2 \text{ dBuV/m} - 45.1 \text{ dB} - 54 \text{ dBuV/m} = -5.9 \text{ dB}$

Field Strength of Lower Band Edge (1 MHz RBW/10 Hz VBW) = 93.2 dBuV/m

Delta measurement = 45.1 dB

Plot 4-2: Upper Band Edge: Average Measurement Channel 78 (TX Frequency: 2480 MHz)



Test Personnel:

Daniel W. Baltzell
Test Engineer

Daniel W. Baltzell

Signature

February 25, 2006
Dates Of Test

5 Antenna Conducted Spurious Emissions - §15.247(d); RSS-210 §6.6.2(o)

5.1 Antenna Conducted Spurious Emissions Test Procedures

Antenna spurious emissions per FCC 15.247(c) 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 100 kHz. The modulated carrier was identified at the following frequencies: 2402 MHz, 2440 MHz and 2480 MHz.

5.2 Antenna Conducted Spurious Emissions Test Results

No harmonics or spurs were found within 20 dB (note that we are reporting power as peak) of the limit from the carrier to the 10th harmonic of the carrier frequency.

Table 5-1: Antenna Conducted Spurious Emissions; 2402 MHz

Frequency (MHz)	Spectrum Analyzer Level (dBm)	Limit (20 dBc)	Margin (dB)
4804.0	-49.8	-17.5	-32.3
7206.0	-60.3	-17.5	-42.8
9608.0	-67.4	-17.5	-49.9
12010.0	-86.4	-17.5	-68.9
14412.0	-64.0	-17.5	-46.5
16814.0	-75.7	-17.5	-58.2
19216.0	-71.4	-17.5	-53.9

Table 5-2: Antenna Conducted Spurious Emissions; 2440 MHz

Frequency (MHz)	Spectrum Analyzer Level (dBm)	Limit (20 dBc)	Margin (dB)
4880.0	-48.3	-18.2	-30.1
7320.0	-68.1	-18.2	-49.9
9760.0	-73.1	-18.2	-54.9
12200.0	-73.4	-18.2	-55.2
14640.0	-75.8	-18.2	-57.6
17080.0	-88.4	-18.2	-70.2

Table 5-3: Antenna Conducted Spurious Emissions; 2480 MHz

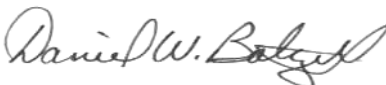
Frequency (MHz)	Spectrum Analyzer Level (dBm)	Limit (20 dBc)	Margin (dB)
4960.0	-47.0	-18.7	-28.3
7440.0	-70.1	-18.7	-51.4
9920.0	-75.0	-18.7	-56.3
12400.0	-74.7	-18.7	-56.0
14880.0	-85.6	-18.7	-66.9
17360.0	-88.6	-18.7	-69.9

Table 5-4: Antenna Conducted Spurious Emissions Test Equipment

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

Test Personnel:

Daniel W. Baltzell



February 25, 2006

EMC Test Engineer

Signature

Date Of Test

6 20 dB Bandwidth – FCC §15.247(a)(1)(ii); IC RSS-210 §5.9.1

6.1 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 100 kHz, and the video bandwidth set at 1 MHz. The minimum 20 dB bandwidths were measured using the spectrum analyzer delta marker set 20 dB down from the peak of the carrier. The table below contains the bandwidth measurement results.

Table 6-1: 20 dB Bandwidth Test Equipment

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

6.2 20 dB Modulated Bandwidth Test Data

Table 6-2: 20 dB Modulated Bandwidth Test Data

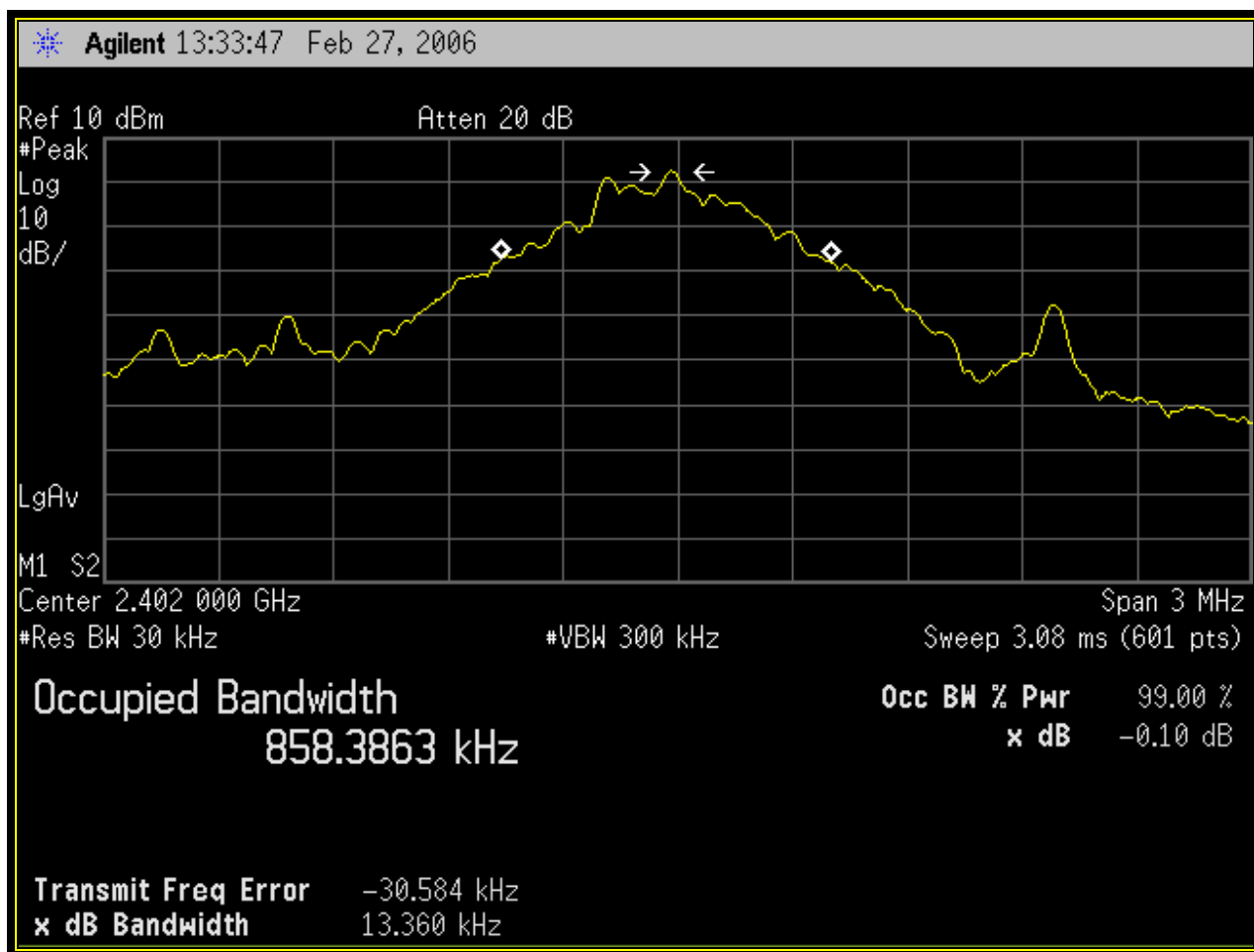
Minimum 20 dB Bandwidths

Channel	20 dB Bandwidth (MHz)
0	858.4
38	851.0
78	850.0

6.3 20 dB Bandwidth Plots

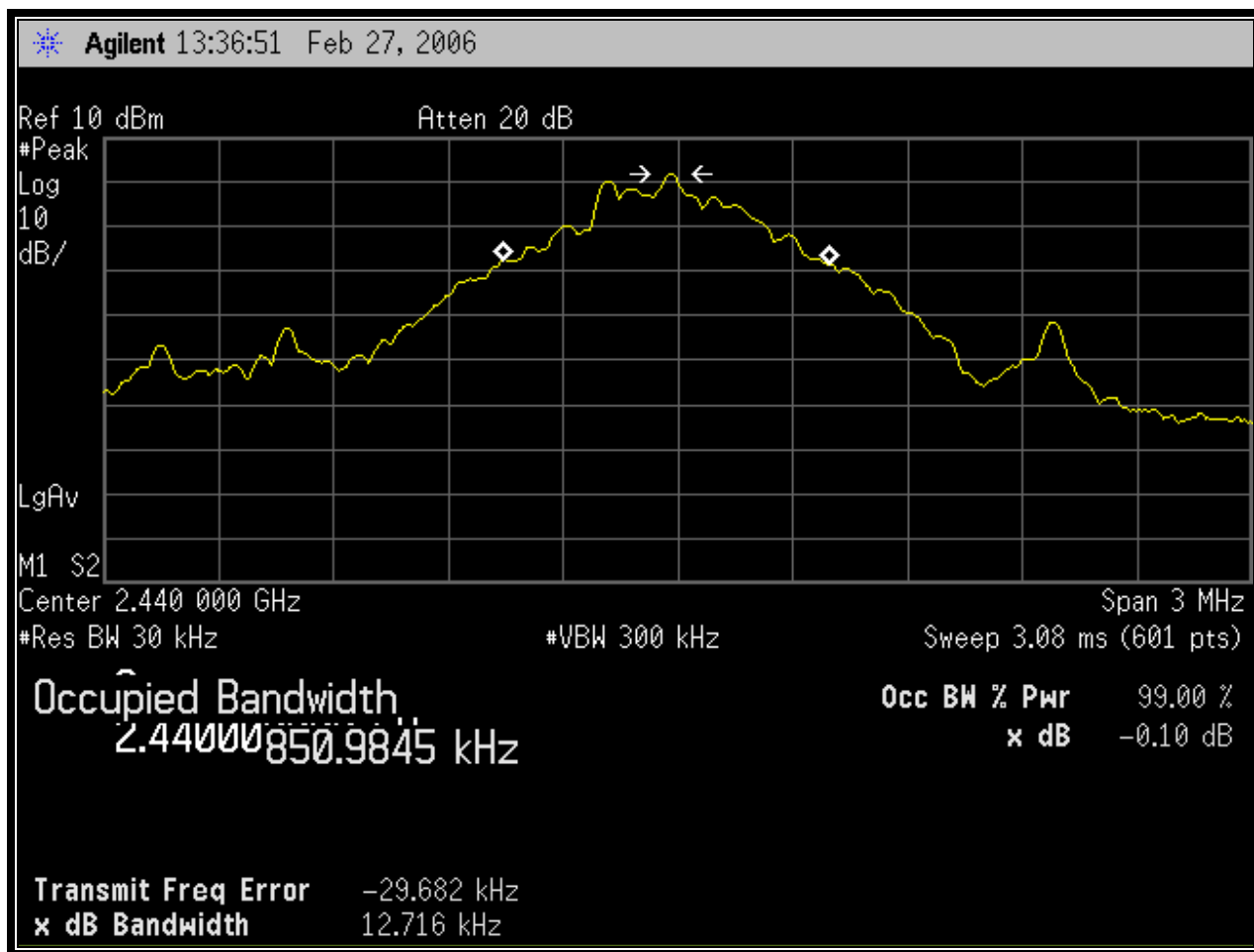
Channel: 0
 Channel Frequency (MHz): 2402
 Resolution Bandwidth (kHz): 30
 Video Bandwidth (kHz): 300
 Span (MHz): 3

Plot 6-1: 20 dB Bandwidth Channel 0



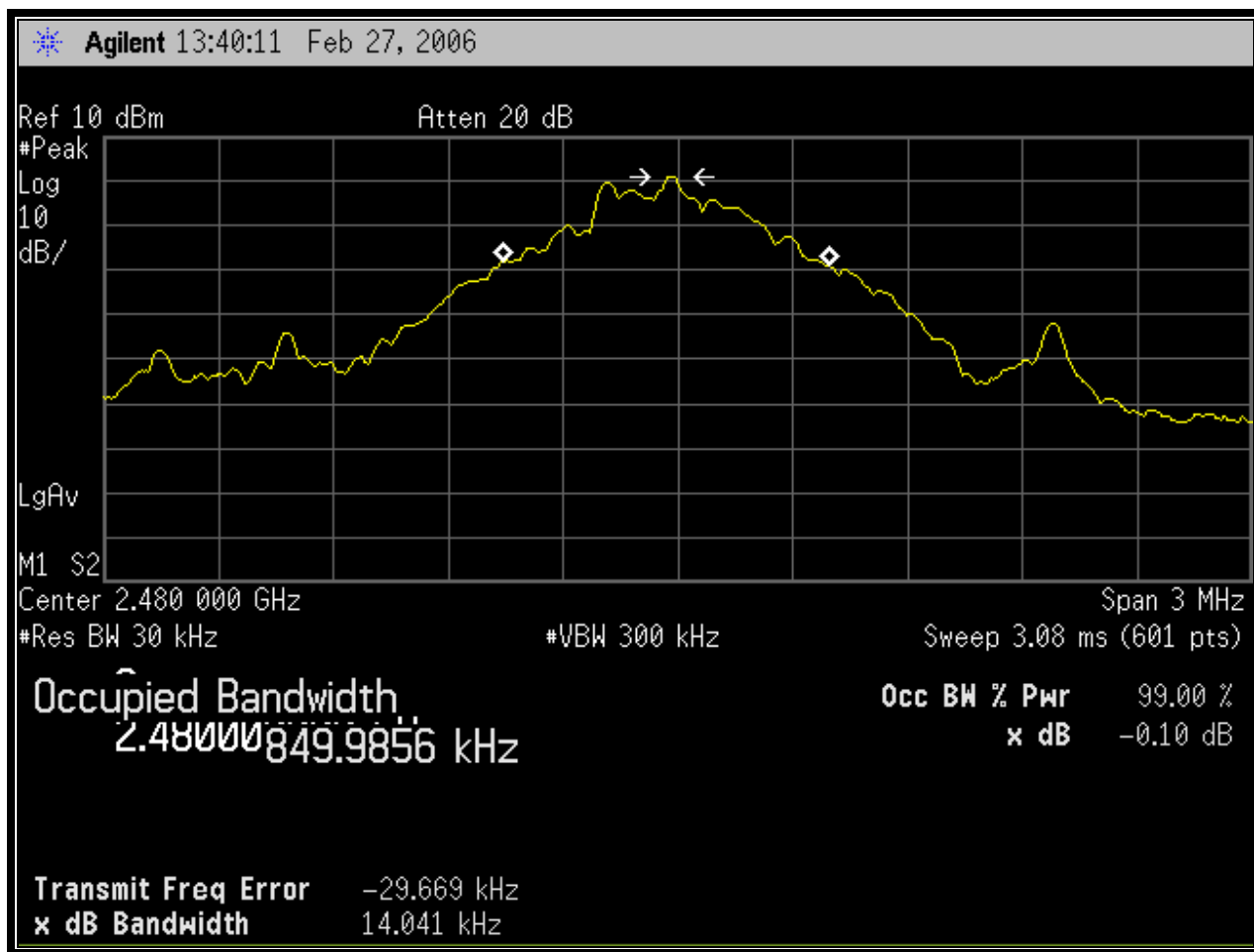
Channel: 38
 Channel Frequency (MHz): 2440
 Resolution Bandwidth (kHz): 30
 Video Bandwidth (kHz): 300
 Span (MHz): 3

Plot 6-2: 20 dB Bandwidth Channel 38



Channel: 78
 Channel Frequency (MHz): 2480
 Resolution Bandwidth (kHz): 30
 Video Bandwidth (kHz): 300
 Span (MHz): 3

Plot 6-3: 20 dB Bandwidth Channel 78



Test Personnel:

Daniel W. Baltzell

Daniel W. Baltzell

February 27, 2006

EMC Test Engineer

Signature

Date Of Test

7 Carrier Frequency Separation - §15.247(a)(1)

7.1 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.

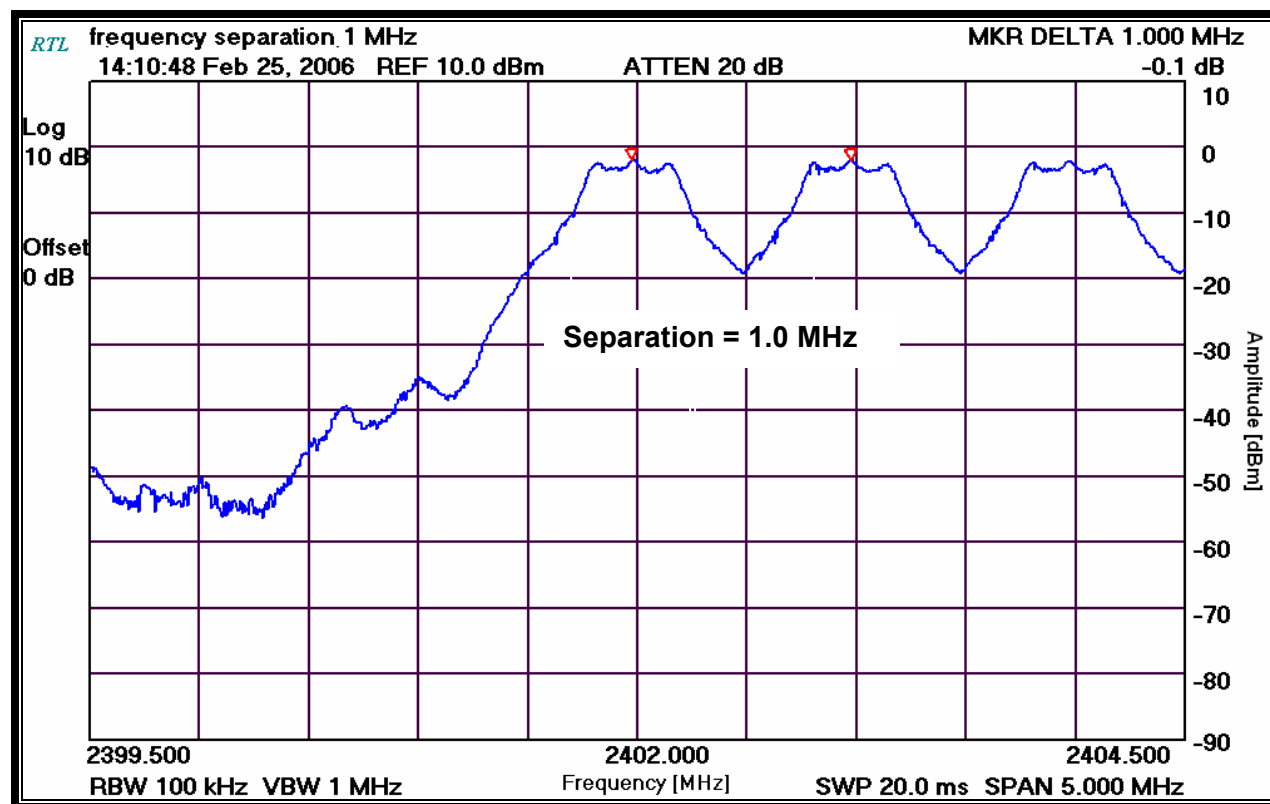
Measured frequency separation = 1.0 MHz

Table 7-1: Carrier Frequency Separation Test Equipment

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

7.2 Carrier Frequency Separation Test Data

Plot 7-1: Carrier Frequency Separation



Test Personnel:

Daniel W. Baltzell

Daniel W. Baltzell

February 25, 2006

EMC Test Engineer

Signature

Date Of Test

8 Hopping Characteristics – FCC §15.247(a)(1)(iii); IC RSS-210 §6.2.2(o)

8.1 Hopping Characteristics Test Procedure

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

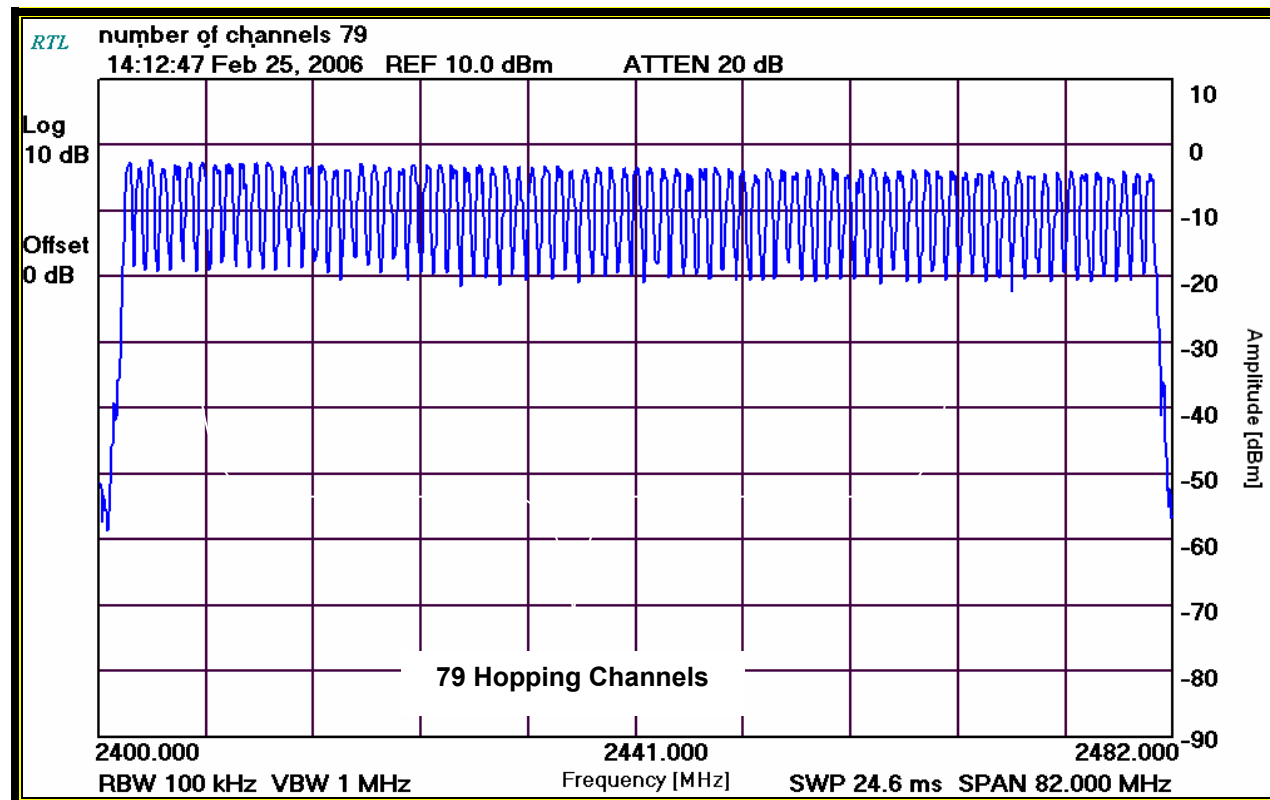
Table 8-1: Hopping Characteristics Test Equipment

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

8.2 Number of Hopping Frequencies

Measured number of hopping frequencies = 79

Plot 8-1: Number of Hopping Frequencies



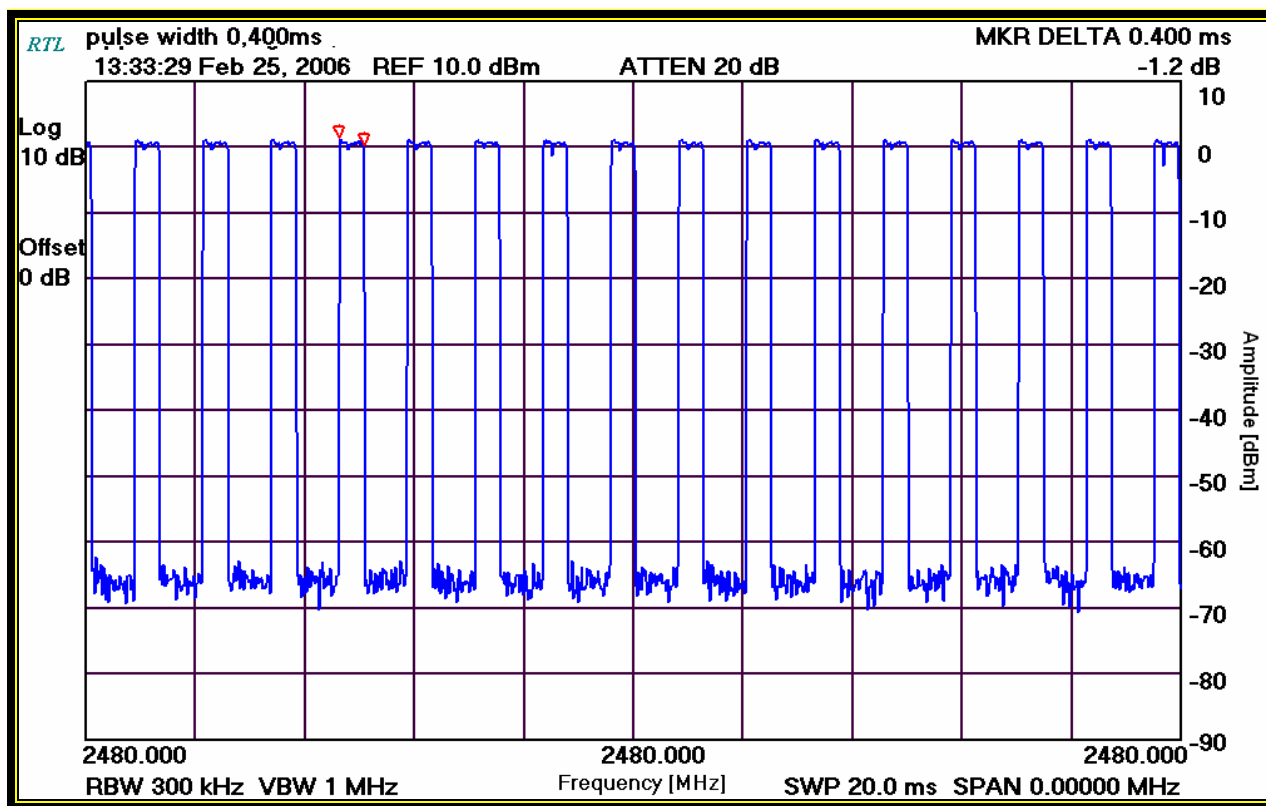
8.3 Average Time of Occupancy

The spectrum analyzer sweep was set to 20 ms, with a zero span and captured pulses from the device under test. A marker delta was used to measure the dwell time for this pulse. The sweep was then set to single sweep for 5 s (it was not possible to get a suitable display with a sweep time of 31.6 s).

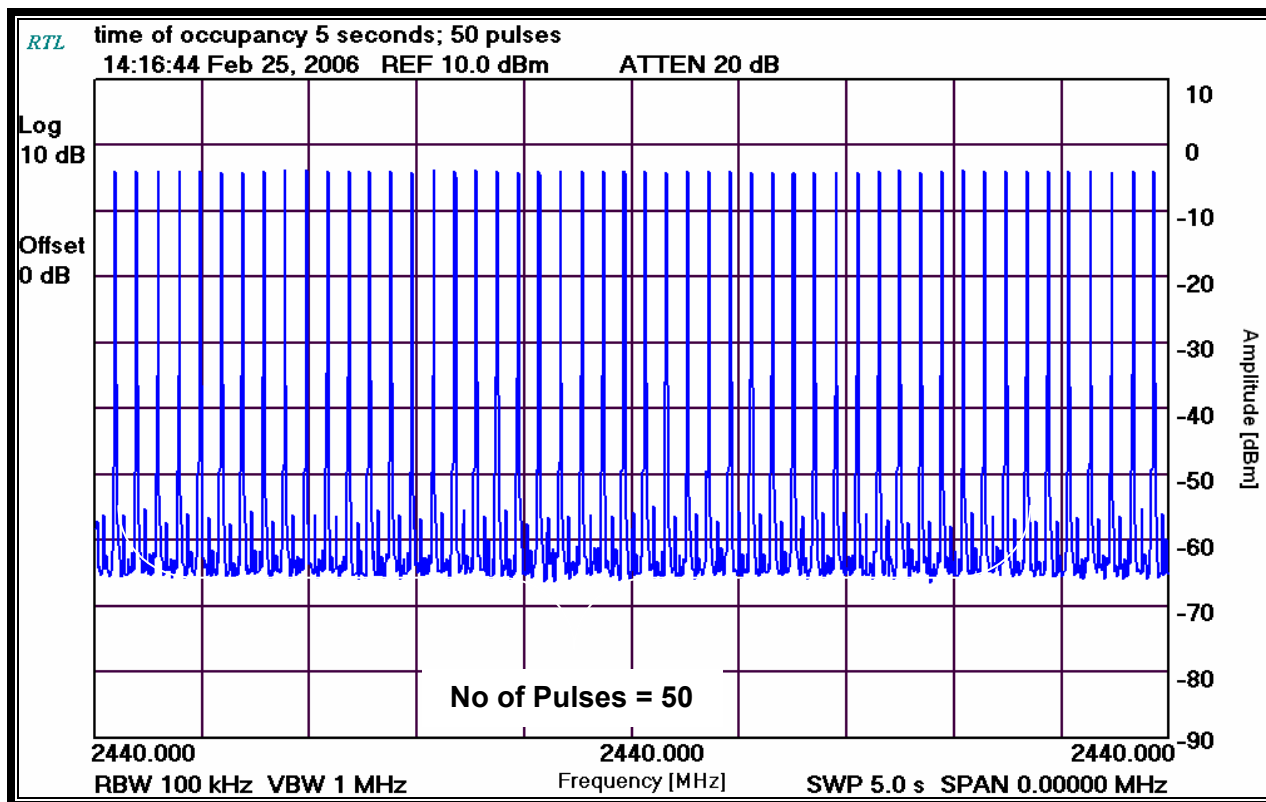
The number of pulses in 5 s was 50. Therefore, the number of pulses in a period of 0.4 seconds X 79 hopping channels (31.6 s) would be 316 pulses.

The average time of occupancy in the above period (31.6 s) is equal to 316 pulses X 400 us = 126.4 ms, which meets the limit as defined by 15.247(a)(1)(iii) of 0.4 seconds.

Plot 8-2: Time of Occupancy (Dwell Time)



Plot 8-3: Time of Occupancy (Dwell Time 5 Second Sweep)



Number of pulses in 5 seconds: 50. Therefore, the number of pulses in the period of 0.4 s X 79 channels would be 316 pulses.

Test Personnel:

Daniel W. Baltzell

February 25, 2006

EMC Test Engineer

Signature

Date Of Test

9 Conducted Emissions Measurement Limits – FCC §15.207; RSS-210 §9

9.1 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

9.2 Conducted Emissions Measurement Test Procedure

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

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

9.3 Conducted Emissions Line Test Equipment

Table 9-1: Conducted Emissions Line Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771	8/3/06
901083	AFJ International	LS16	16A LISN	16010020080	3/24/06

9.4 Conducted Line Emission Test Data

Table 9-2: Conducted Emissions (Neutral Side); Transmitting (2440 MHz)

Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)	Pass/Fail
0.155	Pk	52.2	0.2	52.4	65.7	-13.3	55.7	-3.3	Pass
0.207	Pk	43.0	0.2	43.2	63.3	-20.1	53.3	-10.1	Pass
0.426	Pk	34.5	0.3	34.8	57.3	-22.5	47.3	-12.5	Pass
0.617	Pk	27.2	0.3	27.5	56.0	-28.5	46.0	-18.5	Pass
16.420	Pk	34.5	2.2	36.7	60.0	-23.3	50.0	-13.3	Pass
24.120	Pk	37.4	2.5	39.9	60.0	-20.1	50.0	-10.1	Pass

Table 9-3: Conducted Emissions (Phase Side); Transmitting (2440 MHz)

Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)	Pass/Fail
0.151	Qp	46.0	0.2	46.2	65.9	-19.7	55.9	-9.7	Pass
0.151	Av	5.3	0.2	5.5	65.9	-60.4	55.9	-50.4	Pass
0.216	Pk	43.1	0.2	43.3	63.0	-19.7	53.0	-9.7	Pass
0.430	Pk	37.8	0.2	38.0	57.3	-19.3	47.3	-9.3	Pass
0.581	Pk	29.9	0.3	30.2	56.0	-25.8	46.0	-15.8	Pass
17.040	Pk	36.3	2.2	38.5	60.0	-21.5	50.0	-11.5	Pass
24.060	Pk	37.1	2.5	39.6	60.0	-20.4	50.0	-10.4	Pass

Table 9-4: Conducted Emissions (Neutral Side); Receive Mode

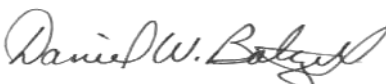
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)	Pass/Fail
0.152	Pk	51.0	0.2	51.2	65.9	-14.7	55.9	-4.7	Pass
0.209	Pk	42.6	0.2	42.8	63.2	-20.4	53.2	-10.4	Pass
0.447	Pk	37.1	0.2	37.3	56.9	-19.6	46.9	-9.6	Pass
0.508	Pk	33.2	0.2	33.4	56.0	-22.6	46.0	-12.6	Pass
16.870	Pk	35.8	2.2	38.0	60.0	-22.0	50.0	-12.0	Pass
24.060	Pk	36.0	2.5	38.5	60.0	-21.5	50.0	-11.5	Pass

Table 9-5: Conducted Emissions (Phase Side); Receive Mode

Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)	Pass/Fail
0.156	Pk	48.4	0.2	48.6	65.7	-17.1	55.7	-7.1	Pass
0.203	Pk	43.8	0.2	44.0	63.5	-19.5	53.5	-9.5	Pass
0.433	Pk	34.8	0.2	35.0	57.2	-22.2	47.2	-12.2	Pass
0.649	Pk	27.7	0.2	27.9	56.0	-28.1	46.0	-18.1	Pass
16.620	Pk	35.8	2.2	38.0	60.0	-22.0	50.0	-12.0	Pass
23.870	Pk	36.0	2.5	38.5	60.0	-21.5	50.0	-11.5	Pass

Test Personnel:

Daniel W. Baltzell



February 25, 2006

EMC Test Engineer

Signature

Date Of Test

10 Radiated Emissions - §15.209; RSS-210 §6.2.1

10.1 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.

10.2 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 10-1: Radiated Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1 - 26.5 GHz)	3008A00505	5/20/06
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	9/14/06
900811	Rhein Tech Labs	PR-1040	Amplifier	1003	3/8/06
900878	Rhein Tech Labs	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	Not Required
901231	IW Microwave Products	KPS-1503-2400-KPS	High frequency RF cables	240"	9/1/06
901232	IW Microwave Products	KPS-1503-2400-KPS	High frequency RF cables	240"	9/1/06
901235	IW Microwave Products	KPS-1503-360-KPS	High frequency RF cables	36"	9/1/06
901242	Rhein Tech Labs	WRT-000-0003	Wood rotating table	N/A	Not Required
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	5/20/07
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
900392	Hewlett Packard	1197OK	Harmonic Mixer (18 – 26.5 GHz)	3525A00159	11/27/07
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771	8/3/06
900930	Hewlett Packard	85662A	Spectrum Analyzer Display Section	3144A20839	8/3/06
900889	Hewlett Packard	85685A	RF Preselector (20 Hz - 2 GHz)	3146A01309	4/5/06
901020	Hewlett Packard	8564E	Spectrum Analyzer (30 Hz – 40 GHz)	3943A01719	9/14/06

10.3 Radiated Emissions Test Results

10.3.1 Radiated Emissions Digital/Receiver

Table 10-2: Digital/Receiver Radiated Emissions Test Results

Temperature: 31°F Humidity: 22%										
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
32.000	Qp	V	225	1.0	48.9	-13.2	35.7	40.0	-4.3	32.000
48.000	Qp	V	270	1.0	59.8	-20.8	39.0	40.0	-1.0	48.000
56.000	Qp	V	270	1.0	57.5	-22.7	34.8	40.0	-5.2	56.000
64.000	Qp	V	270	1.0	59.1	-23.7	35.4	40.0	-4.6	64.000
88.016	Qp	V	120	1.0	40.6	-19.1	21.5	43.5	-22.0	88.016
92.017	Qp	H	80	2.0	46.2	-19.2	27.0	43.5	-16.5	92.017
112.000	Qp	V	270	1.0	50.2	-15.7	34.5	43.5	-9.0	112.000
176.000	Qp	H	270	2.0	47.1	-18.3	28.8	43.5	-14.7	176.000
192.035	Qp	H	260	1.8	53.4	-18.2	35.2	43.5	-8.3	192.035

10.3.2 Radiated Emissions Harmonics/Spurious

Table 10-3: Radiated Emissions Harmonics/Spurious Channel 0 (TX Frequency: 2402 MHz)

Emission Frequency (MHz)	Peak Analyzer Reading (dBuV) (1 MHz RBW/VBW)	Average Analyzer Reading (dBuV) (1 MHz RBW/10 Hz VBW)	Site Correction Factor (dB/m)	Average Emission Level (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dB)
4804.0	43.3	33.5	10.1	43.6	54.0	-10.4
7206.0	30.2	20.5	10.4	30.9	75.9	-45.0
9608.0	26.8	17.2	13.3	30.5	75.9	-45.4
12010.0	27.7	19.7	15.8	35.5	54.0	-18.5
14412.0	25.7	15.8	19.0	34.8	54.0	-19.2
16814.0	29.8	20.3	19.2	39.5	75.9	-36.4

Table 10-4: Radiated Emissions Harmonics/Spurious Channel 38 (TX Frequency: 2440 MHz)

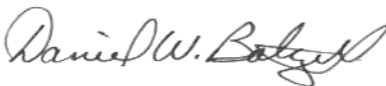
Emission Frequency (MHz)	Peak Analyzer Reading (dBuV) (1 MHz RBW/VBW)	Average Analyzer Reading (dBuV) (1 MHz RBW/10 Hz VBW)	Site Correction Factor (dB/m)	Average Emission Level (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dB)
4880.0	45.0	35.8	9.9	45.7	54.0	-8.3
7320.0	31.8	21.3	10.1	31.4	54.0	-22.6
9760.0	27.1	18.3	12.4	30.7	75.2	-44.5
12200.0	36.0	22.8	14.5	37.3	54.0	-16.7
14640.0	25.8	12.7	20.1	32.8	75.2	-42.4
17080.0	31.2	20.5	19.8	40.3	75.2	-34.9
19520.0	30.8	21.7	21.3	43.0	54.0	-11.0

Table 10-5: Radiated Emissions Harmonics/Spurious Channel 78 (TX Frequency: 2480 MHz)

Emission Frequency (MHz)	Peak Analyzer Reading (dBuV) (1 MHz RBW/VBW)	Average Analyzer Reading (dBuV) (1 MHz RBW/10 Hz VBW)	Site Correction Factor (dB/m)	Average Emission Level (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dB)
4960.0	45.3	36.7	10.6	47.3	54.0	-6.7
7440.0	31.0	21.2	10.8	32.0	54.0	-22.0
9920.0	25.8	18.5	13.3	31.8	73.2	-41.4
12400.0	26.8	22.2	17.8	40.0	54.0	-14.0
14880.0	23.2	11.2	20.6	31.8	73.2	-41.4
17360.0	20.7	11.8	17.8	29.6	73.2	-43.6
19840.0	23.5	12.8	23.1	35.9	54.0	-18.1

Test Personnel:

Daniel W. Baltzell



February 26, 2006

EMC Test Engineer

Signature

Date Of Test

11 Conclusion

The data in this measurement report shows that the EUT as tested, Motorola, Inc. RCKT Wireless Audio Car Adapter; Model Number: WACA-d, FCC ID: ACQWACA, IC: 3231A - WACA, complies with all the applicable requirements of Parts 2 and 15 of the FCC Rules and Regulations, and Industry Canada RSS-210.

Appendix A: RF Exposure Compliance

No RF Exposure Evaluation Required if power is below the following threshold:

Tunable Range		Center of Tunable Band (GHz)	60/f SAR Limitation (mW)
f(GHz) Low	f(GHz) High		
2.402	2.480	2.441	24.58

Maximum measured transmitter power:

Pout Conducted (mW)	Maximum Antenna Gain (numeric)	Pout EIRP (mW)
2.2	0.55	1.2

Threshold for no RF exposure evaluation is 24.58 mW

Maximum TX Power is 2.2 mW Conducted and 1.2 mW EIRP

Conclusion: No RF exposure evaluation required since maximum Transmitter Pout (both conducted and EIRP) is below FCC threshold.

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

Client: Motorola CHS
Model #: WACA-d
Standards: FCC 15.247 & RSS-210
FCC ID/IC: ACQWACA/3231A - WACA
Report #: 2006150

Appendix B: FCC Agency Authorization Letter

Please refer to the following page.

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

Client: Motorola CHS
Model #: WACA-d
Standards: FCC 15.247 & RSS-210
FCC ID/IC: ACQWACA/3231A - WACA
Report #: 2006150

Appendix C: FCC Confidentiality Request Letter

Please refer to the following page.

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

Client: Motorola CHS
Model #: WACA-d
Standards: FCC 15.247 & RSS-210
FCC ID/IC: ACQWACA/3231A - WACA
Report #: 2006150

Appendix D: Acknowledgement of IC Listing Requirements Letter

Please refer to the following page.

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

Client: Motorola CHS
Model #: WACA-d
Standards: FCC 15.247 & RSS-210
FCC ID/IC: ACQWACA/3231A - WACA
Report #: 2006150

Appendix E: IC Authority to Act as Agent

Please refer to the following page.

Appendix F: Label and Label Location

Please refer to the following pages for a sample of the ID label and location on the Bluetooth module, as well as a sample of the ID label that will be visible on the host.



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

Client: Motorola CHS
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FCC ID/IC: ACQWACA/3231A - WACA
Report #: 2006150

Appendix G: Technical Operational Description

Please refer to the following pages.

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

Client: Motorola CHS
Model #: WACA-d
Standards: FCC 15.247 & RSS-210
FCC ID/IC: ACQWACA/3231A - WACA
Report #: 2006150

Appendix H: Schematics

Please refer to the following pages.

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

Client: Motorola CHS
Model #: WACA-d
Standards: FCC 15.247 & RSS-210
FCC ID/IC: ACQWACA/3231A - WACA
Report #: 2006150

Appendix I: Block Diagram

Please refer to the following pages.

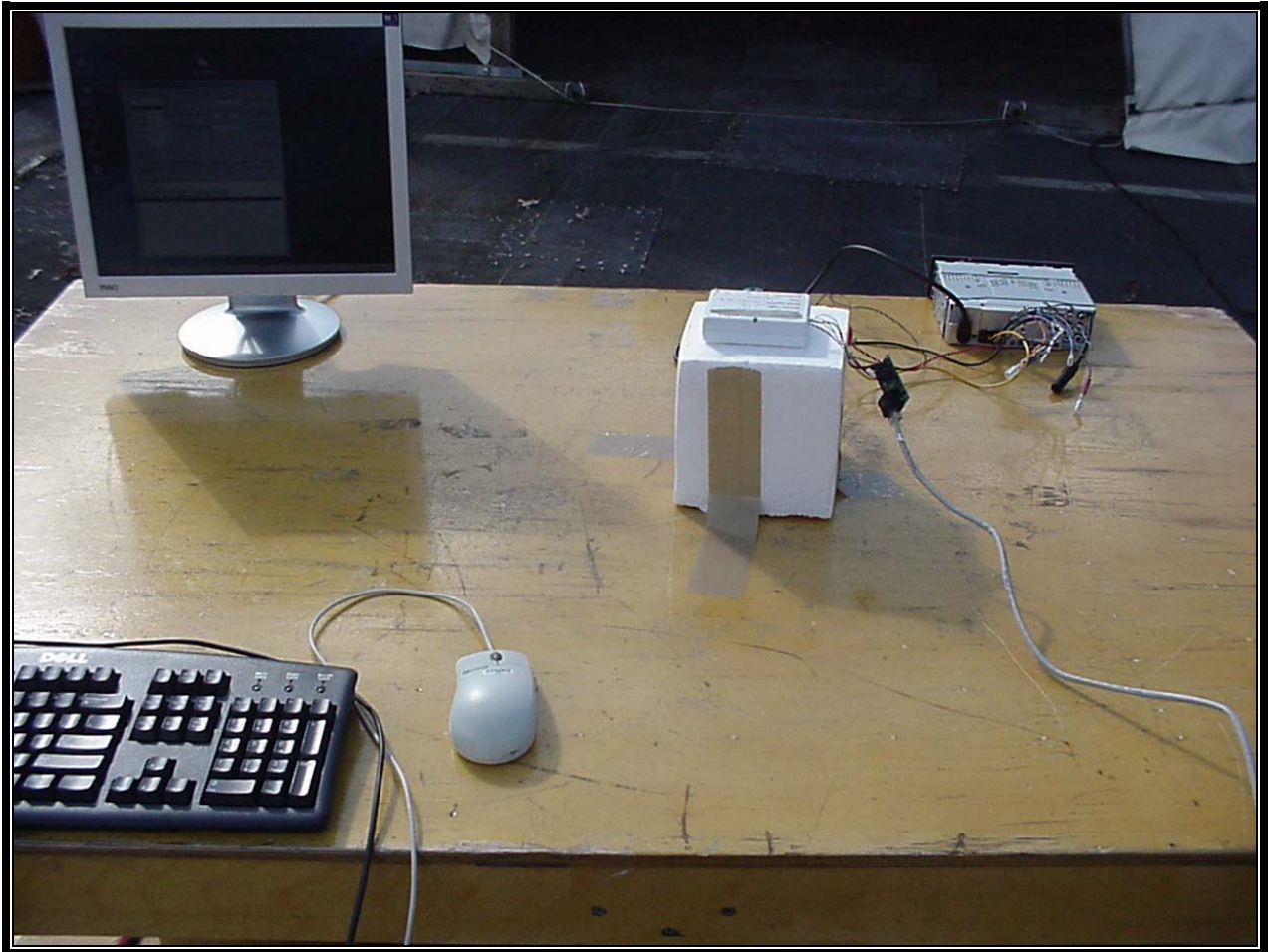
Rhein Tech Laboratories, Inc.
360 Herndon Parkway
Suite 1400
Herndon, VA 20170
<http://www.rheintech.com>

Client: Motorola CHS
Model #: WACA-d
Standards: FCC 15.247 & RSS-210
FCC ID/IC: ACQWACA/3231A - WACA
Report #: 2006150

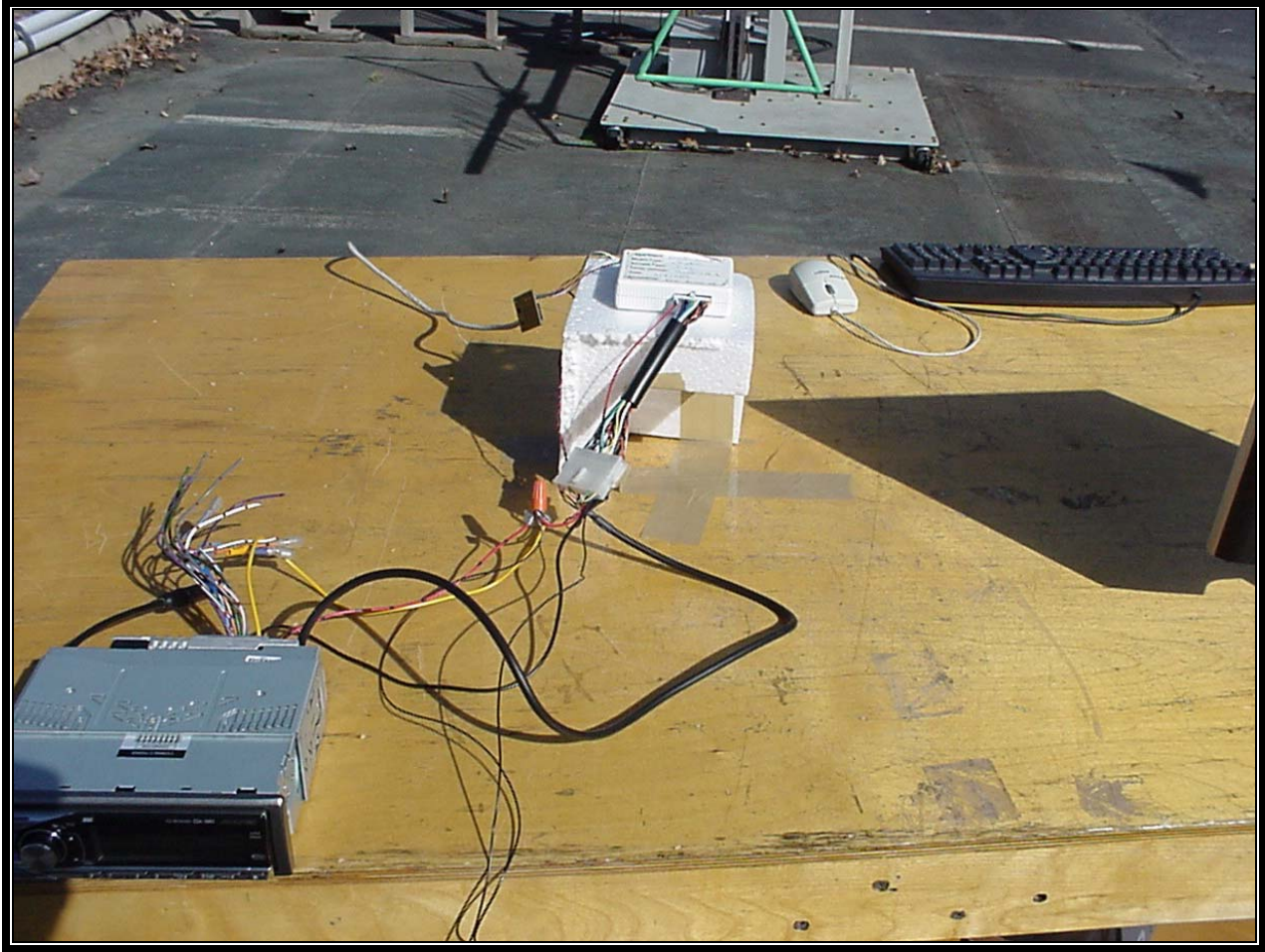
Appendix J: Manual

Please refer to the following page.

Appendix K: Test Photographs



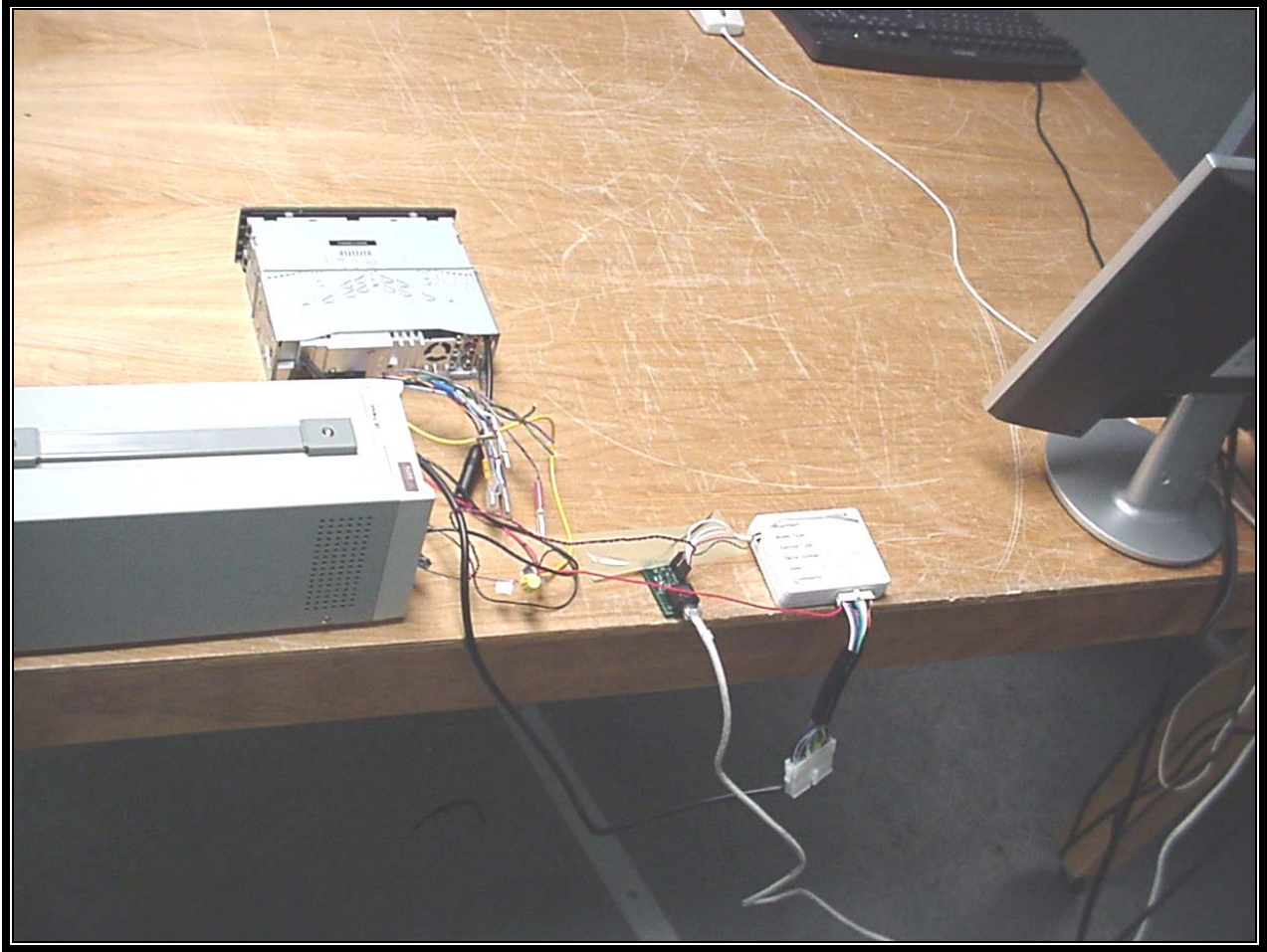
Photograph 1: Radiated Testing – Front View



Photograph 2: Radiated Testing – Back View

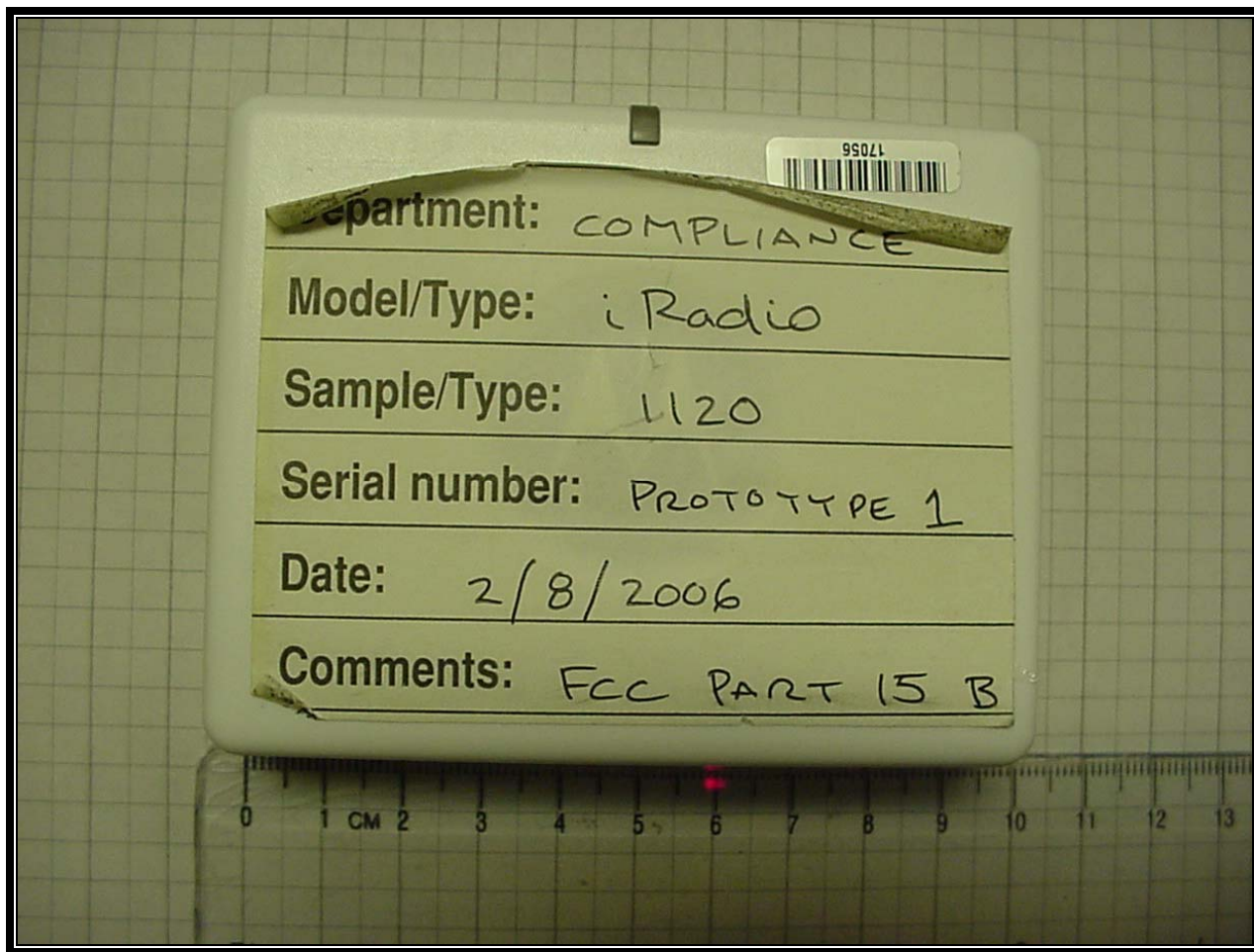


Photograph 3: Conducted AC Testing – Front View



Photograph 4: Conducted AC Testing – Back View

Appendix L: External Photographs

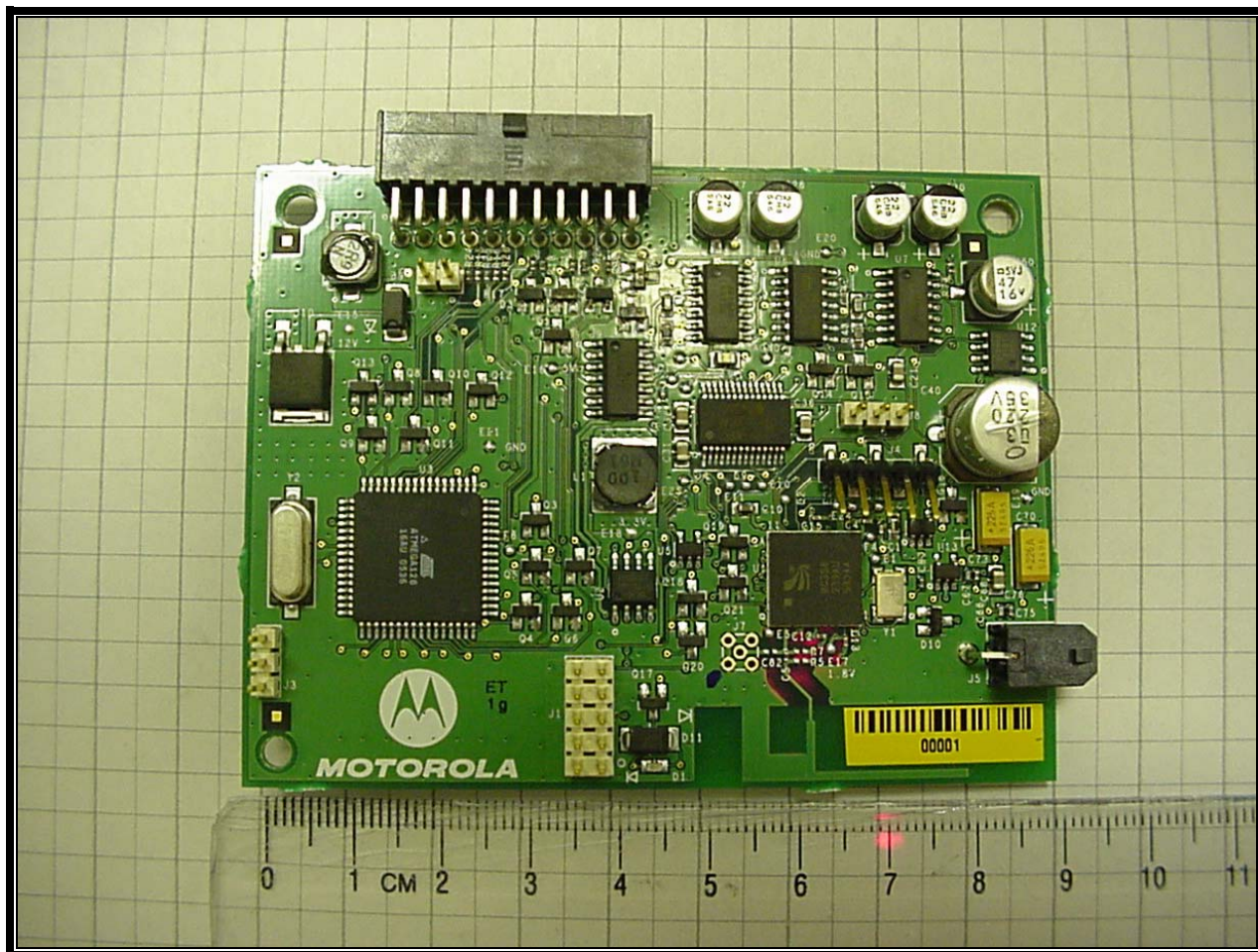


Photograph 5: Top

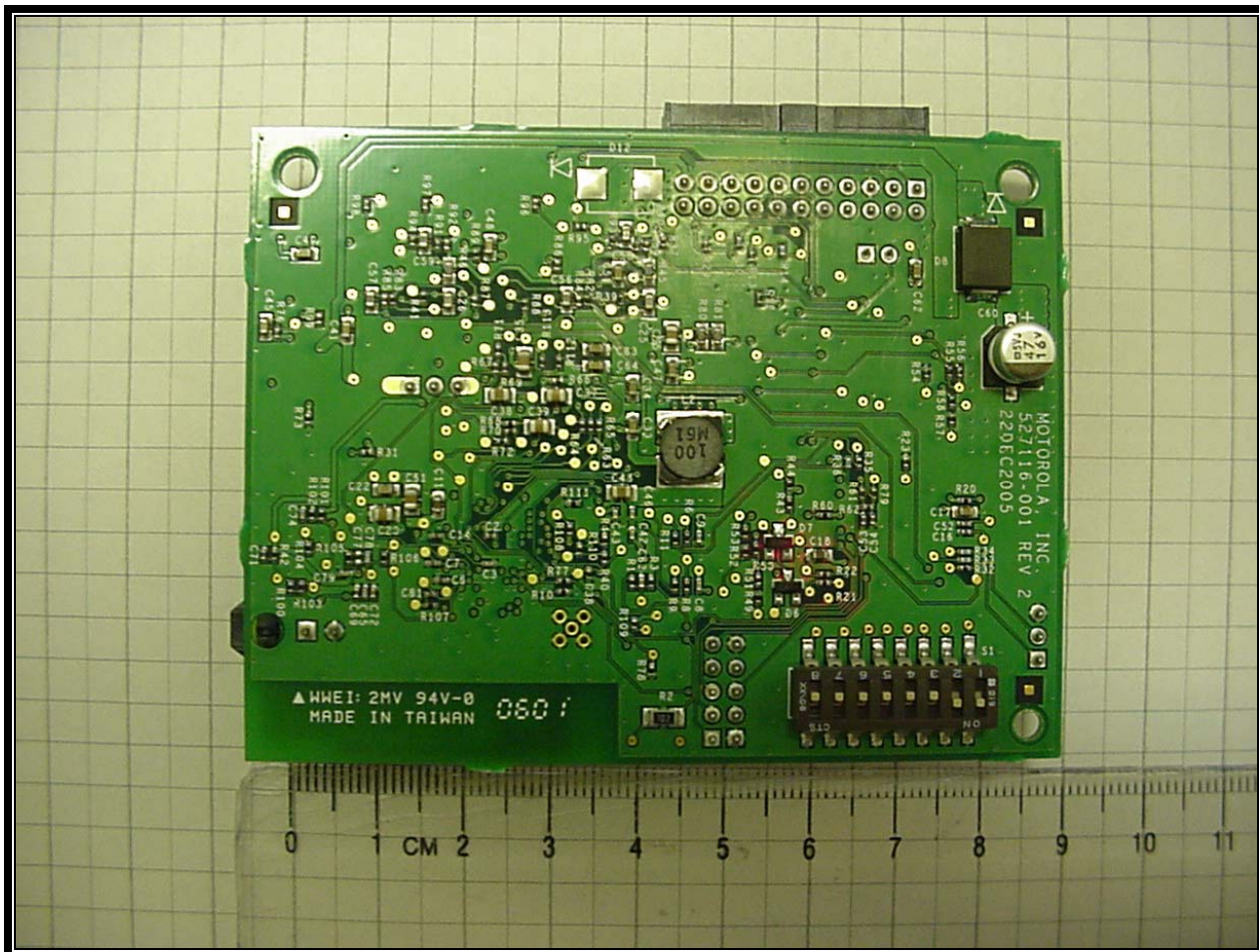


Photograph 6: Bottom

Appendix M: Internal Photographs



Photograph 7: Top of PCB



Photograph 8: Bottom of PCB