



Engineering and Testing for EMC and Safety Compliance



Accredited under A2LA Certificate # 2653.01

Certification Application Report FCC Part 15.249 & 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 Email: atcinfo@rheintech.com		Applicant: Ikusi – Angel Iglesias Phone: +34 943 448854 Contact: Francisco Lopez Fax: +34 943 448811 Paseo Miramon 170 Apartado 1320 20009 San Sebastian SPAIN E-Mail: lopez.f@ikusi.es	
FCC ID	PVT-R70MR06C1	Test Report Date	December 14, 2007
IC	4166A-R70MR06C1		
PlatForm	N/A	RTL Work Order Number	2007257
Model #	R70MR06C1	RTL Quote Number	QRTL07-293
FCC Classification	DXX – Part 15 Low Power Communication Device Transmitter		
FCC Rule Part	Part 15.249 (10-01-06): Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5850 MHz, and 24.0-24.25 GHz		
Industry Canada Standard	RSS-210 (Issue 7): Low Power License-Exempt Radio Communication Devices (All Frequency Bands)		
Digital Interface Information	Digital Interface was found to be compliant		
Receiver Information	Receiver was found to be compliant		
Frequency Range (MHz)	Output Power (W)	Frequency Tolerance	Emission Designator
902.5 - 927.45	N/A	N/A	9K12F1D

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. Modifications made to the equipment during testing, in order to achieve compliance with these standards, are listed in the report.

Furthermore, there was no deviation from, additions to, or exclusions from the FCC Part 2, FCC Part 15, Industry Canada RSS-210, and ANSI C63.4.

Signature: _____

Date: December 14, 2007

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. and IKUSI – Angel Iglesias. The test results relate only to the item tested.

Table of Contents

1	General Information	4
1.1	Scope	4
1.2	Modifications.....	4
1.3	Test Facility	4
1.4	Related Submittal(s)/Grant(s)	4
2	Test Information	5
2.1	Test Justification	5
2.2	Exercising the EUT	5
2.3	Test Result Summary	5
2.4	Test System Details.....	6
2.5	Configuration of Tested System	6
3	Conducted AC Emissions – FCC §15.207 & IC RSS-Gen.....	7
3.1	Site and Test Description.....	7
3.2	Test Limits	7
3.3	Conducted AC Emissions Test Data.....	8
4	Radiated Emission Limits Fundamental Emissions – FCC §15.249 & IC RSS-210 §A2.9	10
4.1	Radiated Emission Limits Test Procedure	10
4.2	Radiated Emission Limits Test Data	10
5	Radiated Emission Limits Radiated Harmonics – FCC §15.249 & IC RSS-210 §A2.9.....	11
5.1	Radiated Emission Limits Test Procedure	11
6	Conclusion.....	11

Table Index

Table 2-1:	Test Result Summary with FCC Rules and Regulations.....	5
Table 2-2:	Equipment under Test (EUT)	6
Table 3-1:	Conducted Emissions Test Equipment	7
Table 3-2:	Conducted AC Emissions; Neutral (Line 1); Receive Mode.....	8
Table 3-3:	Conducted AC Emissions; Hot (Line 2); Receive Mode.....	8
Table 3-4:	Conducted AC Emissions; Neutral (Line 1); Transmit Mode.....	8
Table 3-5:	Conducted AC Emissions; Hot (Line 2); Transmit Mode.....	9
Table 4-1:	Radiated Emissions Fundamental Emissions	10
Table 5-1:	Radiated Spurious Emissions Test Equipment	11
Table 6-1:	Industry Canada Modulated Bandwidth Test Equipment	33
Table 6-2:	Minimum 20 dB Modulated Bandwidths.....	33
Table 6-3:	Radiated Receiver/Digital Emissions Data.....	37
Table 6-4:	Radiated Receiver/Digital Emissions Test Equipment	37

Figure Index

Figure 2-1:	Worst Case Configuration of System under Test.....	6
-------------	--	---

Plot Index

Plot 6-1:	Modulated Bandwidth Low Channel	34
Plot 6-2:	Modulated Bandwidth Mid Channel.....	35
Plot 6-3:	Modulated Bandwidth High Channel	36

Appendix Index

Appendix A:	FCC Part 1.1307, 1.1310, 2.1091, 2.1093; IC RSS-Gen: RF Exposure	12
Appendix B:	FCC/TCB Agency Authorization Letter	13
Appendix C:	FCC Confidentiality Request Letter	14
Appendix D:	IC Agent Authority and Listing Requirements Letters	15
Appendix E:	IC Confidentiality Request	16
Appendix F:	Label and Label Location	17
Appendix G:	Operational Description	19
Appendix H:	Schematics	20
Appendix I:	Block Diagram	21
Appendix J:	Manual	22
Appendix K:	Test Photographs	23
Appendix L:	External Photographs	27
Appendix M:	Internal Photographs	28
Appendix N:	Additional Information for Canadian Certification.....	33

Photograph Index

Photograph 1:	ID Label Location on EUT Side	17
Photograph 2:	ID Label Sample.....	18
Photograph 3:	Radiated Emissions - Front View	23
Photograph 4:	Radiated Emissions - Rear View	24
Photograph 5:	Conducted AC Emissions - Front View	25
Photograph 6:	Conducted AC Emissions - Rear View	26
Photograph 7:	Front.....	27
Photograph 8:	Inside Front Cover.....	28
Photograph 9:	PCB Mounted in Case.....	29
Photograph 10:	PCB Top with Shield	30
Photograph 11:	PCB Top without Shield	31
Photograph 12:	PCB Bottom	32

1 General Information

1.1 Scope

FCC Rules Part 15.249: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5850 MHz, and 24.0-24.25 GHz.

IC RSS-210 Section A2.9: 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz.

1.2 Modifications

R30 was changed to 470K ohm and C43 was changed to 120 ohm to reduce the field strength.

1.3 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located at Rhein Tech Laboratories (RTL), 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 IKUSI Model R70MR06C1, FCC ID: PVT-R70MR06C1, IC: 4166A-R70MR06C1.

2 Test Information

2.1 Test Justification

The EUT was tested in all three orthogonal planes in order to determine worst-case emissions. The low channel at 902.5 MHz, mid channel at 915.7 MHz, and high channel at 927.45 MHz, were tested and investigated from 9 kHz to 10 GHz. Data for all three channels is presented in this report. The test results relate only to the item(s) that was tested. The PCB trace antenna transmits and receives.

2.2 Exercising the EUT

The EUT was provided with software to continuously transmit during testing. The carrier was also checked to verify that the information was being transmitted. There were no deviations from the test standard(s) and/or methods. The IF, LO, and up to the 2nd LO, were investigated and tested, and found to be compliant.

2.3 Test Result Summary

Table 2-1: Test Result Summary with FCC Rules and Regulations

Standard	Test	Pass/Fail or N/A
FCC 15.249(a)	Radiated Emissions	Pass
FCC 15.207	AC Line Conducted Emissions	Pass
RSS-Gen	20 dB Bandwidth	N/A

2.4 Test System Details

The test sample was received on September 24, 2007. The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system, are in the table below.

Table 2-2: Equipment under Test (EUT)

Part	Manufacturer	Model	Serial Number	FCC ID	Cable Description	RTL Bar Code
Transceiver	IKUSI	R70MR06C1	N/A	PVT-R70MR06C1	N/A	18149
Transceiver	IKUSI	R70MR06C1	N/A	PVT-R70MR06C1	N/A	18151

2.5 Configuration of Tested System

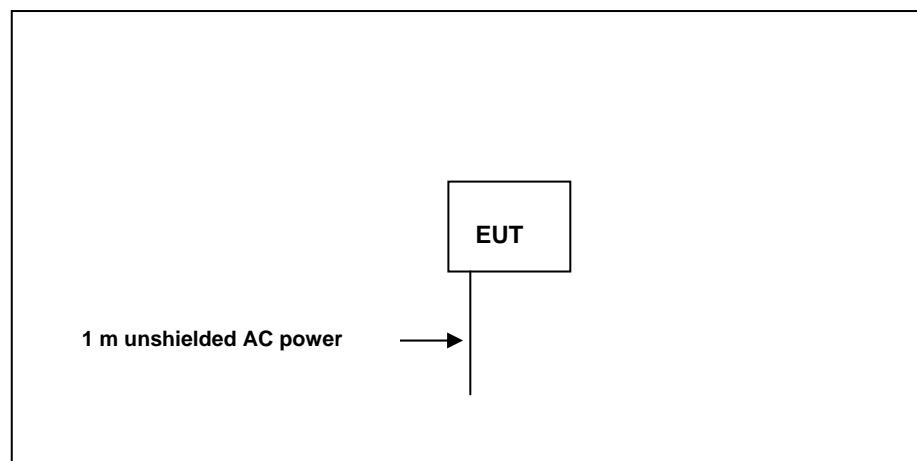


Figure 2-1: Worst Case Configuration of System under Test

3 Conducted AC Emissions – FCC §15.207 & IC RSS-Gen

3.1 Site and Test Description

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

The spectrum analyzer was connected to the AC line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Solar 100 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 100 kHz. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode, if applicable).

The analyzer's 6 dB bandwidth was set to 9 kHz. Video filter less than 10 times the resolution bandwidth is not used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, and by increasing the sweep time in order to obtain a calibrated measurement. The emission spectrum was scanned from 150 kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limits were measured and have been recorded.

3.2 Test Limits

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

Table 3-1: Conducted Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
900913	Hewlett Packard	85462A	EMI Receiver RF Section (9 KHz – 6.5 GHz)	3325A00159	3/21/08
901084	AFJ International	LS16	16A LISN	16010020082	3/28/08

3.3 Conducted AC Emissions Test Data

Table 3-2: Conducted AC Emissions; Neutral (Line 1); Receive Mode

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
0.192	Pk	31.4	0.2	31.6	79.0	-47.4	66.0	-34.4	Pass
0.283	Pk	30.5	0.2	30.7	79.0	-48.3	66.0	-35.3	Pass
0.412	Pk	25.1	0.3	25.4	79.0	-53.6	66.0	-40.6	Pass
1.090	Pk	23.8	0.4	24.2	73.0	-48.8	60.0	-35.8	Pass
3.520	Pk	13.9	1.0	14.9	73.0	-58.1	60.0	-45.1	Pass
5.880	Pk	19.7	1.4	21.1	73.0	-51.9	60.0	-38.9	Pass

Table 3-3: Conducted AC Emissions; Hot (Line 2); Receive Mode

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
0.222	Pk	26.5	0.2	26.7	79.0	-52.3	66.0	-39.3	Pass
0.283	Pk	24.3	0.2	24.5	79.0	-54.5	66.0	-41.5	Pass
0.335	Pk	26.1	0.2	26.3	79.0	-52.7	66.0	-39.7	Pass
0.720	Pk	27.0	0.4	27.4	73.0	-45.6	60.0	-32.6	Pass
1.750	Pk	20.7	0.6	21.3	73.0	-51.7	60.0	-38.7	Pass
5.740	Pk	22.5	1.4	23.9	73.0	-49.1	60.0	-36.1	Pass


Table 3-4: Conducted AC Emissions; Neutral (Line 1); Transmit Mode

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
0.184	Pk	30.9	0.2	31.1	79.0	-47.9	66.0	-34.9	Pass
0.287	Pk	30.8	0.3	31.1	79.0	-47.9	66.0	-34.9	Pass
0.329	Pk	28.4	0.2	28.6	79.0	-50.4	66.0	-37.4	Pass
1.020	Pk	24.9	0.4	25.3	73.0	-47.7	60.0	-34.7	Pass
3.450	Pk	14.4	1.0	15.4	73.0	-57.6	60.0	-44.6	Pass
6.110	Pk	18.7	1.4	20.1	73.0	-52.9	60.0	-39.9	Pass

Table 3-5: Conducted AC Emissions; Hot (Line 2); Transmit Mode

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
0.209	Pk	25.9	0.2	26.1	79.0	-52.9	66.0	-39.9	Pass
0.285	Pk	24.8	0.2	25.0	79.0	-54.0	66.0	-41.0	Pass
0.329	Pk	26.1	0.2	26.3	79.0	-52.7	66.0	-39.7	Pass
0.840	Pk	27.8	0.3	28.1	73.0	-44.9	60.0	-31.9	Pass
1.680	Pk	22.2	0.6	22.8	73.0	-50.2	60.0	-37.2	Pass
5.930	Pk	22.0	1.4	23.4	73.0	-49.6	60.0	-36.6	Pass

Test Personnel:

Daniel Baltzell Test Engineer	 Signature	October 9, 2007 Date Of Test
----------------------------------	--	---------------------------------

4 Radiated Emission Limits Fundamental Emissions – FCC §15.249 & IC RSS-210 §A2.9

4.1 Radiated Emission Limits Test Procedure

Radiated Emissions of the Fundamentals were tested at three meters, and meet the quasi-peak limit of 50 mV/m. The EUT was tested in all three orthogonal planes for the low, mid, and high channels; the worst case emissions are shown. Peak measurements were taken and are compared to the quasi-peak limit.

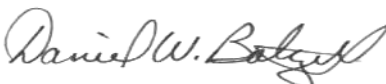
4.2 Radiated Emission Limits Test Data

Table 4-1: Radiated Emissions Fundamental Emissions

Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
902.500	Pk	62.7	29.2	91.9	94.0	-2.1
915.700	Pk	61.3	29.2	90.5	94.0	-3.5
927.450	Pk	60.1	29.3	89.4	94.0	-4.6

Test Personnel:

Daniel Baltzell
Test Engineer



Signature

December 7, 2007
Date Of Test

5 Radiated Emission Limits Radiated Harmonics – FCC §15.249 & IC RSS-210 §A2.9

5.1 Radiated Emission Limits Test Procedure

Radiated emissions of the harmonics were tested at three meters, and meet the requirements of 500 microvolts/meter in average mode, and 20 dB higher in peak mode, per 15.249(e). The EUT was tested in the X-Y, X-Z, and Y-Z orthogonal planes.

All spurious emissions were greater than 20 dB below the limit; no data is being reported per 15.31(o).

Table 5-1: Radiated Spurious Emissions Test Equipment

RTL Asset	Manufacturer	Model	Part Type	Serial Number	Calibration Date
900791	Chase	CBL6111B	Bilog antenna (30 MHz – 2000 MHz)	N/A	9/21/08
900932	Miteq	JS4-01002600-36-5P	Preamplifier (30 MHz – 26 GHz)	849863	2/15/08
901132	Par Electronics	N/A	Notch Filter	N/A	2/1/09
900905	Rhein Tech Laboratories, Inc.	PR-1040	Pre Amplifier 40dB (10 MHz – 2 GHz)	1006	5/16/08
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	6/14/10
900323	EMCO	3160-07	Horn Antenna (8.2 - 12.4 GHz)	9605-1054	6/14/10
900321	EMCO	3161-03	Horn Antenna (4.0 - 8.2 GHz)	9508-1020	6/14/10
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	6/13/08
901425	Insulated Wire, Inc.	KPS-1503-2400-KPS	RF cable, 20'	NA	10/08/08
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	10/08/08
900878	Rhein Tech Laboratories	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	Not Required
901242	Rhein Tech Laboratories	WRT-000-0003	Wood rotating table	N/A	Not Required

6 Conclusion

The data in this measurement report shows that Model: R70MR06C1; FCC ID: PVT-R70MR06C1, and IC: 4166A-R70MR06C1, complies with all the applicable requirements of Parts 2 and 15 of the FCC Rules, and Industry Canada RSS-210.

Appendix N: Additional Information for Canadian Certification

Industry Canada - Modulated Bandwidth - RSS-Gen

Modulated Bandwidth Test Procedure

The minimum 20 dB bandwidth was measured using a 50 ohm spectrum analyzer with the resolution bandwidth set at 300 Hz, and the video bandwidth set at 3 kHz.

Table 7-1: Industry Canada Modulated Bandwidth Test Equipment

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


Modulated Bandwidth Test Data

Table 7-2: Minimum 20 dB Modulated Bandwidths

Frequency (MHz)	20 dB Bandwidth (kHz)
902.5	9.040
915.7	9.109
927.45	9.118

Test Personnel:

Daniel Baltzell
Test Engineer



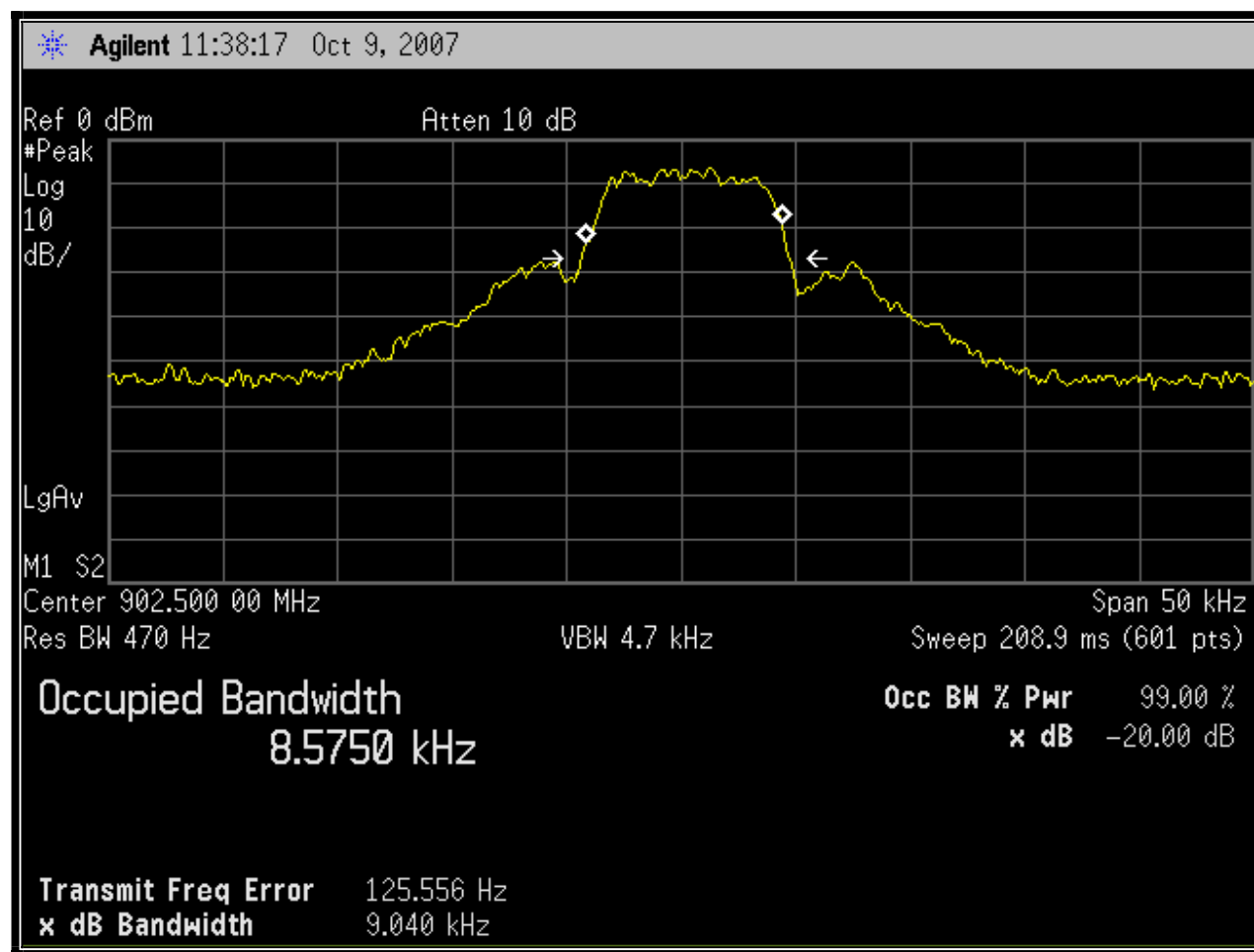
Signature

October 9, 2007
Date Of Test

Modulated Bandwidth Plots

Frequency (MHz): 902.5
 Resolution Bandwidth (Hz): 470
 Video Bandwidth (kHz): 4.7
 Sweep Time (s): 0.2089

Plot 7-1: Modulated Bandwidth Low Channel



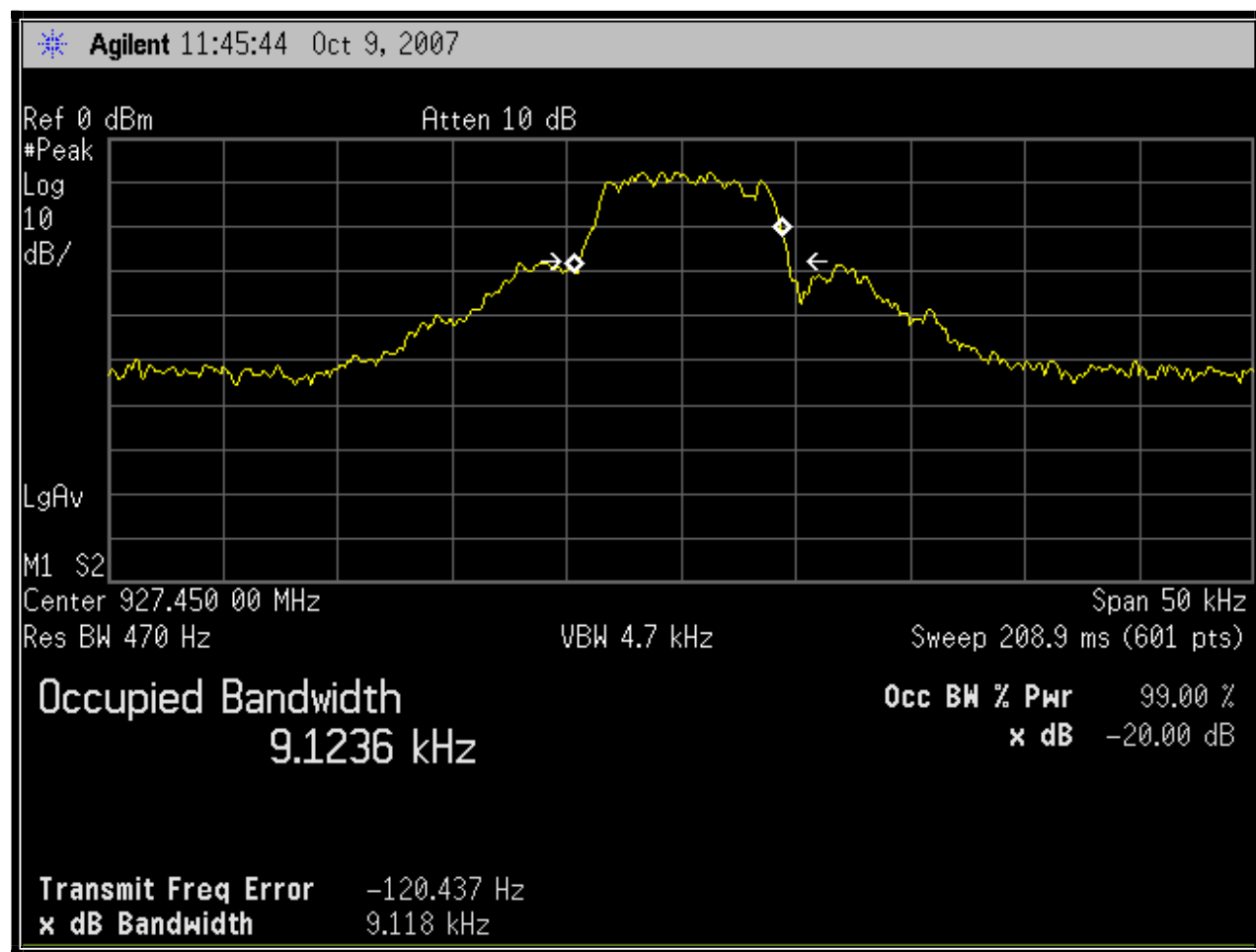
Frequency (MHz): 915.7
 Resolution Bandwidth (Hz): 470
 Video Bandwidth (kHz): 3.7
 Sweep Time (s): 0.2089

Plot 7-2: Modulated Bandwidth Mid Channel



Frequency (MHz): 927.45
Resolution Bandwidth (Hz): 470
Video Bandwidth (kHz): 3.7
Sweep Time (s): 0.2089

Plot 7-3: Modulated Bandwidth High Channel



Test Personnel:

Daniel Baltzell
Test Engineer

Daniel W. Baltzell

Signature

October 9, 2007
Date Of Test

Radiated Receiver/Digital Emissions Data – IC RSS-Gen

Table 7-3: Radiated Receiver/Digital Emissions Data

Temperature: 69°F					Humidity: 63%				
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)
115.585	Qp	H	220	2.4	53.2	-17.2	36.0	54.0	-18.0
143.585	Qp	V	180	1.0	65.0	-17.6	47.4	54.0	-6.6
160.960	Qp	H	180	1.6	64.0	-18.3	45.7	54.0	-8.3
169.850	Qp	V	180	1.0	65.7	-18.3	47.4	54.0	-6.6
226.634	Qp	H	200	1.0	58.5	-17.1	41.4	56.9	-15.5
227.085	Qp	H	180	1.8	60.2	-17.0	43.2	56.9	-13.7
228.585	Qp	V	270	1.0	59.2	-16.9	42.3	56.9	-14.6
310.634	Qp	H	190	2.0	54.1	-13.1	41.0	56.9	-15.9

Test Personnel:

Daniel Baltzell
Test Engineer



Signature

October 11, 2007
Date Of Test

Table 7-4: Radiated Receiver/Digital Emissions Test Equipment

RTL Asset	Manufacturer	Model	Part Type	Serial Number	Calibration Date
900913	Hewlett Packard	8546A	Spectrum Analyzer (9 kHz – 6.5 GHz)	3325A00159	3/21/08
901053	Schaffner & Chase	CBL6112B	Bilog antenna (20 MHz - 2 GHz)	2648	11/22/07
900905	Rhein Tech Laboratories, Inc.	PR-1040	Pre Amplifier 40dB (10 MHz – 2 GHz)	1006	5/16/08
900878	Rhein Tech Laboratories, Inc.	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	Not Required
901242	Rhein Tech Laboratories, Inc.	WRT-000-0003	Wood rotating table	N/A	Not Required