

TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: Vecima Networks AMG1020

FCC ID: OPP-AMG1020X

IC Certification Number: 2943A-AMG1020

To: FCC Parts 22.913 & 24.232, Industry Canada RSS-132 4.4 and
RSS-133 6.4

Test Report Serial No:
RFI-RPT-RP77944JD31A V4.0

Version 4.0 Supersedes All Previous Versions

**This Test Report Is Issued Under The Authority
Of Chris Guy, Head of Global Approvals:**



Checked By:	Ian Watch
Signature:	
Date of Issue:	16 December 2011

This report is issued in Adobe Acrobat portable document format (PDF). It is only a valid copy of the report if it is being viewed in PDF format with the following security options not allowed: Changing the document, Selecting text and graphics, Adding or changing notes and form fields.

This report may not be reproduced other than in full, except with the prior written approval of RFI Global Services Ltd. The results in this report apply only to the sample(s) tested.

This page has been left intentionally blank.

Table of Contents

1. Customer Information	4
2. Summary of Testing	5
2.1. General Information	5
2.2. Summary of Test Results	6
2.3. Methods and Procedures	6
2.4. Deviations from the Test Specification	6
3. Equipment Under Test (EUT)	7
3.1. Identification of Equipment Under Test (EUT)	7
3.2. Description of EUT	7
3.3. Modifications Incorporated in the EUT	7
3.4. Additional Information Related to Testing	8
3.5. Support Equipment	9
4. Operation and Monitoring of the EUT during Testing	10
4.1. Operating Modes	10
4.2. Configuration and Peripherals	10
5. Measurements, Examinations and Derived Results	11
5.1. General Comments	11
5.2. Test Results Part 22 & RSS-132	12
5.2.1. Transmitter Output Power (ERP)	12
5.3. Test Results Part 24 & RSS-133	14
5.3.1. Transmitter Output Power (EIRP)	14
6. Measurement Uncertainty	16
Appendix 1. Test Equipment Used.....	17

1. Customer Information

Company Name:	Connected Development LLC
Address:	5020 Weston Parkway Suite 215 Cary NC 27513 United States

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR22
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2011: Part 22 Subpart H (Public Mobile Services)
Specification Reference:	47CFR24
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2011: Part 24 Subpart E (Personal Communication Services)
Specification Reference:	RSS-132 Issue 2 Sep 2005
Specification Title:	Cellular Telephones Employing New Technologies Operating in the Bands 824-849 MHz and 869-894 MHz
Specification Reference:	SRSP-503 Issue 7 Sep 2008
Specification Title:	Technical Requirements for Cellular Radiotelephone Systems Operating in the Bands 824 – 849 MHz and 869 – 894 MHz
Specification Reference:	RSS-133 Issue 5 Feb 2009
Specification Title:	2 GHz Personal Communications Services
Specification Reference:	SRSP-510 Issue 5 Feb 2009
Specification Title:	Technical Requirements for Personal Communications Services (PCS) in the Bands 1850-1915 MHz and 1930-1995 MHz
Site Registration:	FCC: 209735; Industry Canada: 3245B-2
Location of Testing:	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH
Test Date:	09 November 2011

2.2. Summary of Test Results

FCC Reference (47CFR)	IC Reference	Measurement	Result
Part 22 & RSS-132			
Part 22.913(a)	RSS-132 4.4 SRSP-503 5.1.3	Transmitter Output Power (ERP)	
Part 24 & RSS-133			
Part 24.232	RSS-133 6.4 SRSP-510 5.1.2	Transmitter Output Power (EIRP)	
Key to Results			
 = Complied	 = Did not comply		

2.3. Methods and Procedures

Reference:	ANSI/TIA-603-C-2004
Title:	Land Mobile Communications Equipment, Measurements and performance Standards

2.4. Deviations from the Test Specification

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

Brand Name:	Vecima Networks
Model Name or Number:	AMG1020
IMEI:	35242104258426004
Hardware Version Number:	4.06
Software Version Number:	4_1_8
FCC ID:	OPP-AMG1020X
IC Certification Number:	2943A-AMG1020

3.2. Description of EUT

The equipment under test was a multi mode radio telematics unit for vehicular use. It contains GSM/CDMA, Wi-Fi 802.11b/g and GPS wireless technologies.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Type of Radio Device:	Transceiver		
Mode:	GSM/GPRS		
Modulation Type:	GMSK		
Channel Spacing:	200 kHz		
Power Supply Requirement(s):	Nominal	13.8 V	
Technology Tested:	GSM850		
Maximum Output Power (ERP):	GSM	30.05 dBm	
	GPRS	29.45 dBm	
Transmit Frequency Range:	824 to 849 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	128	824.2
	Middle	190	836.6
	Top	251	848.8
Technology Tested:	PCS1900		
Maximum Output Power (EIRP):	GSM	30.2 dBm	
	GPRS	29.7 dBm	
Transmit Frequency Range:	1850 to 1910 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	512	1850.2
	Middle	660	1879.8
	Top	810	1909.8

3.5. Support Equipment

The following support equipment was used to exercise the EUT during testing:

Description:	Laptop
Brand Name:	Dell
Model Name or Number:	D610
Serial Number:	RFI Asset Number PC479NT

Description:	External Antenna
Brand Name:	Vecima Networks
Model Name or Number:	AMG1021A
Stated Gain:	1.6 dBi (Peak, including cable losses - GSM850 band) 2.9 dBi (Peak, including cable losses - PCS1900 band)

Description:	Backpack Antenna
Brand Name:	Vecima Networks
Model Name or Number:	AMG1021B
Stated Gain:	-1.0 dBi (Peak, including cable losses - GSM850 band) -1.0 dBi (Peak, including cable losses - PCS1900 band)

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

The EUT was tested in the following operating mode(s):

- Constantly transmitting at full power on bottom, middle and top channels as required.

4.2. Configuration and Peripherals

The EUT was tested in the following configuration(s):

- Connected to a GSM/GPRS system simulator, operating in transceiver mode.

5. Measurements, Examinations and Derived Results

5.1. General Comments

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to Section 6 for details.

5.2. Test Results Part 22 & RSS-132**5.2.1. Transmitter Output Power (ERP)****Test Summary:**

Test Engineer:	Nick Steele	Test Date:	09 November 2011
Test Sample IMEI:	35242104258426004		

FCC Part:	22.913(a)
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.17.2

Environmental Conditions:

Temperature (°C):	28
Relative Humidity (%):	24

Results: GSM Circuit Switched / AMG1021A Antenna

Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
Bottom	30.6	-0.55	30.05	38.45	8.4	Complied
Middle	30.4	-0.55	29.85	38.45	8.6	Complied
Top	30.2	-0.55	29.65	38.45	8.8	Complied

Results: GSM Circuit Switched / AMG1021B Antenna

Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
Bottom	30.6	-3.15	27.45	38.45	11.0	Complied
Middle	30.4	-3.15	27.25	38.45	11.2	Complied
Top	30.2	-3.15	27.05	38.45	11.4	Complied

Transmitter Output Power (continued)**Results: GPRS / AMG1021A Antenna**

Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
Bottom	30.0	-0.55	29.45	38.45	9.0	Complied
Middle	29.9	-0.55	29.35	38.45	9.1	Complied
Top	29.7	-0.55	29.15	38.45	9.3	Complied

Results: GPRS / AMG1021B Antenna

Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
Bottom	30.0	-3.15	26.85	38.45	11.6	Complied
Middle	29.9	-3.15	26.75	38.45	11.7	Complied
Top	29.7	-3.15	26.55	38.45	11.9	Complied

Note(s):

1. Industry Canada SRSP-503 states the limit as an EIRP value of 11.5 Watts (40.6 dBm) which equates to an ERP limit of 7 Watts (38.45 dBm).
2. The declared antenna gain for the AMG1021A antenna when operating in the GSM850 band was added to the measured conducted power to obtain the ERP.

$$ERP = Conducted\ power + Antenna\ Gain\ in\ dBd$$

3. The AMG1021A antenna gain was stated as 1.6 dBi, this was converted to a dBd value as ERP was required.

$$Gain\ in\ dBd = Gain\ in\ dBi - 2.15$$

$$Gain\ in\ dBd = 1.6 - 2.15 = -0.55$$

4. The AMG1021B antenna gain was stated as -1.0 dBi, this was converted to a dBd value as ERP was required.

$$Gain\ in\ dBd = Gain\ in\ dBi - 2.15$$

$$Gain\ in\ dBd = -1.0 - 2.15 = -3.15$$

5.3. Test Results Part 24 & RSS-133

5.3.1. Transmitter Output Power (EIRP)

Test Summary:

Test Engineer:	Nick Steele	Test Date:	09 November 2011
Test Sample IMEI:	35242104258426004		

FCC Part:	24.232
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.17.2

Environmental Conditions:

Temperature (°C):	28
Relative Humidity (%):	25

Results: GSM Circuit Switched / AMG1021A Antenna

Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
Bottom	27.3	2.9	30.2	33.0	2.8	Complied
Middle	27.2	2.9	30.1	33.0	2.9	Complied
Top	27.2	2.9	30.1	33.0	2.9	Complied

Results: GSM Circuit Switched / AMG1021B Antenna

Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
Bottom	27.3	-1.0	26.3	33.0	6.7	Complied
Middle	27.2	-1.0	26.2	33.0	6.8	Complied
Top	27.2	-1.0	26.2	33.0	6.8	Complied

Transmitter Output Power (continued)**Results: GPRS / AMG1021A Antenna**

Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
Bottom	26.8	2.9	29.7	33.0	3.3	Complied
Middle	26.7	2.9	29.6	33.0	3.4	Complied
Top	26.6	2.9	29.5	33.0	3.5	Complied

Results: GPRS / AMG1021B Antenna

Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
Bottom	26.8	-1.0	25.8	33.0	25.8	Complied
Middle	26.7	-1.0	25.7	33.0	25.7	Complied
Top	26.6	-1.0	25.6	33.0	25.6	Complied

Note(s):

1. The declared antenna gain for the AMG1021A antenna when operating in the PCS1900 band was added to the measured conducted power to obtain the EIRP.

$$EIRP = \text{Conducted power} + \text{Antenna Gain in dBi}$$

2. The AMG1021A antenna gain was stated as 2.9 dBi.
3. The AMG1021B antenna gain was stated as -1.0 dBi.

6. Measurement Uncertainty

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document "approximately" is interpreted as meaning "effectively" or "for most practical purposes".

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
Effective Radiated Power (ERP)	824 to 849 MHz	95%	±2.94 dB
Effective Isotropic Radiated Power (EIRP)	1850 to 1910 MHz	95%	±2.94 dB

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
L1021	Comms Test Set	Rohde & Schwarz	CMU 200	111379	11 Jan 2012	12

NB In accordance with UKAS requirements all the measurement equipment is on a calibration schedule.