RHEIN TECH LABORATORIES, INC.

Engineering Solutions & Electromagnetic Compatibility Services

FCC Part 15.247 & IC RSS-210 Class 2 Permissive Change Report

Test Lab:	Applicant:
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FCC ID:/ IC:	SP8-FAP6210001/ 9568A-FAP6210001	**Test Report Date:**	June 14, 2012
Platform:	N/A	**RTL Work Order Number:**	2012174
Model #:	FAP6210-001	**RTL Quote Number:**	QRTL12-174A

American National Standard Institute:	ANSI C63.4-2003: Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
American National Standard Institute:	ANSI C63.10-2009: American National Standard for Testing Unlicensed Wireless Devices
FCC Classification:	DTS – Part 15 Digital Transmission System
FCC Rule Part(s):	FCC Rules Part 15.247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz Direct Sequence System (10-01-11)
IC Rule Part(s):	RSS-210 Issue 8: Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

Frequency Range (MHz)	Output Power (W)	Frequency Tolerance	Emission Designator
903 – 927	0.020	N/A	545KF1D

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, ANSI C63.4, and IC RSS-210.

Signature: 

Date: June 14, 2012

Typed/Printed Name: Desmond A. Fraser

Position: President

These tests are accredited and meet the requirements of ISO/IEC 17025 as verified by ANSI-ASQ National Accreditation Board/ACLASS. Refer to certificate and scope of accreditation AT-1445.

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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.

RSS-210 Issue 8: Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

1.2 Description of EUT

Equipment Under Test	Miner Mesh Handset (MMH)
Model #	FAP6210-001
Power Supply	6 AA Alkaline Batteries
Modulation Type	2-FSK
Frequency Range	903 – 927 MHz
Antenna Connector Type	Reverse Polarity SMA
Antenna Type	Reduced-height 1/4-wave omni < 6 dBi

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 a Class 2 permissive change application for Innovative Wireless Technologies, Inc. Model # FAP6210-001, Miner Mesh Handset (MMH), FCC ID: SP8-FAP6210001, IC: 9568A-FAP6210001, granted May 9, 2011.

1.5 Description of Change

Please refer to Appendix A of this test report.
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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: Frequencies Tested

Channel	Frequency
Low	903.0
Mid	915.0
High	927.0

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), IC RSS-210/RSS-Gen

FCC Reference	IC Reference	C63.10 Procedure	Test	Pass/Fail or N/A
FCC 15.207	RSS-Gen 7.2.4	6.2	AC Power Conducted Emissions	N/A
FCC 15.209	RSS-Gen 7.2.5	6.5, 6.6	Radiated Emissions	N/A
FCC 15.247(b)	RSS-210 A8.4	6.10	Maximum Peak Power Output	Pass
FCC 15.247(d)	RSS-210 A8.5	6.7	Antenna Conducted Spurious Emissions	Pass
FCC 15.247(d)	RSS-210 A8.5	6.9.2	Band Edge	Pass
FCC 15.247(a)(2)	RSS-210 A8.2	6.9.1	6 dB Bandwidth	N/A
FCC 15.247(e)	RSS-210 A8.2	6.11	Power Spectral Density	Pass

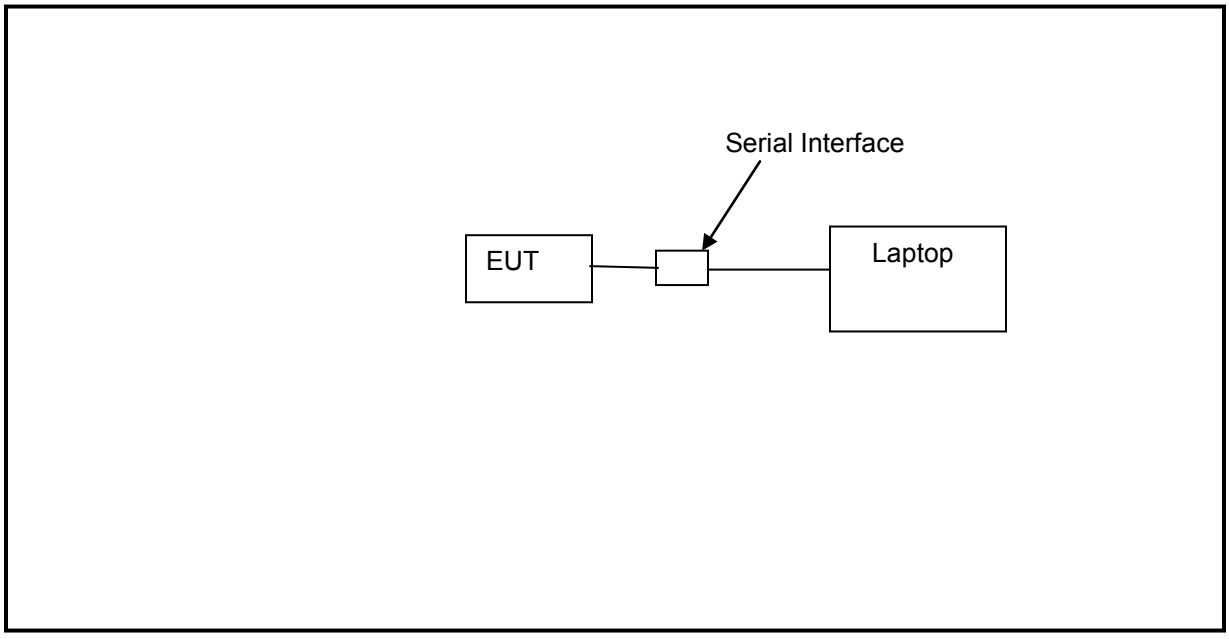
2.4 Test System Details

The test samples were received on June 8, 2012. 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	RTL Bar Code
Miner Mesh Handset (MMH)	Innovative Wireless Technologies, Inc.	FAP6210-001	HS11130044 (Bld Rev: P1A)	SP8-FAP6210001	20715
Serial Test Port	N/A	N/A	N/A	N/A	20019
Li-Ion Battery	Innovative Wireless Technologies, Inc.	FAA9100-400	1216	N/A	20716

2.5 Configuration of Tested System



3 Peak Output Power – FCC 15.247(b)(3)

3.1 Power Output Test Procedure

A conducted power measurement of the EUT was taken using a spectrum analyzer.

Procedure: C63.10-2009 6.10

Table 3-1: Power Output Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	6/03/13

3.2 Power Output Test Data

Table 3-2: Power Output Test Data

Frequency (MHz)	Peak Conducted Power (dBm)
903.0	12.9
915.0	13.0
927.0	13.1

*control software setting = 5

Test Personnel:

Daniel W. Baltzell		June 9, 2012
EMC Test Engineer	Signature	Date of Test

4 Band Edge Compliance of RF Conducted Emissions – FCC 15.247(d)

4.1 Band Edge Test Procedure

Procedure: C63.10-2009 6.9.2, 6.9.3

The EUT was connected to the spectrum analyzer through suitable attenuation. The span was set wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation. The spectrum analyzer was set to the following:

RBW > = 1% of the span
VBW > = RBW
Sweep >= auto
Detector function = peak
Trace = max hold

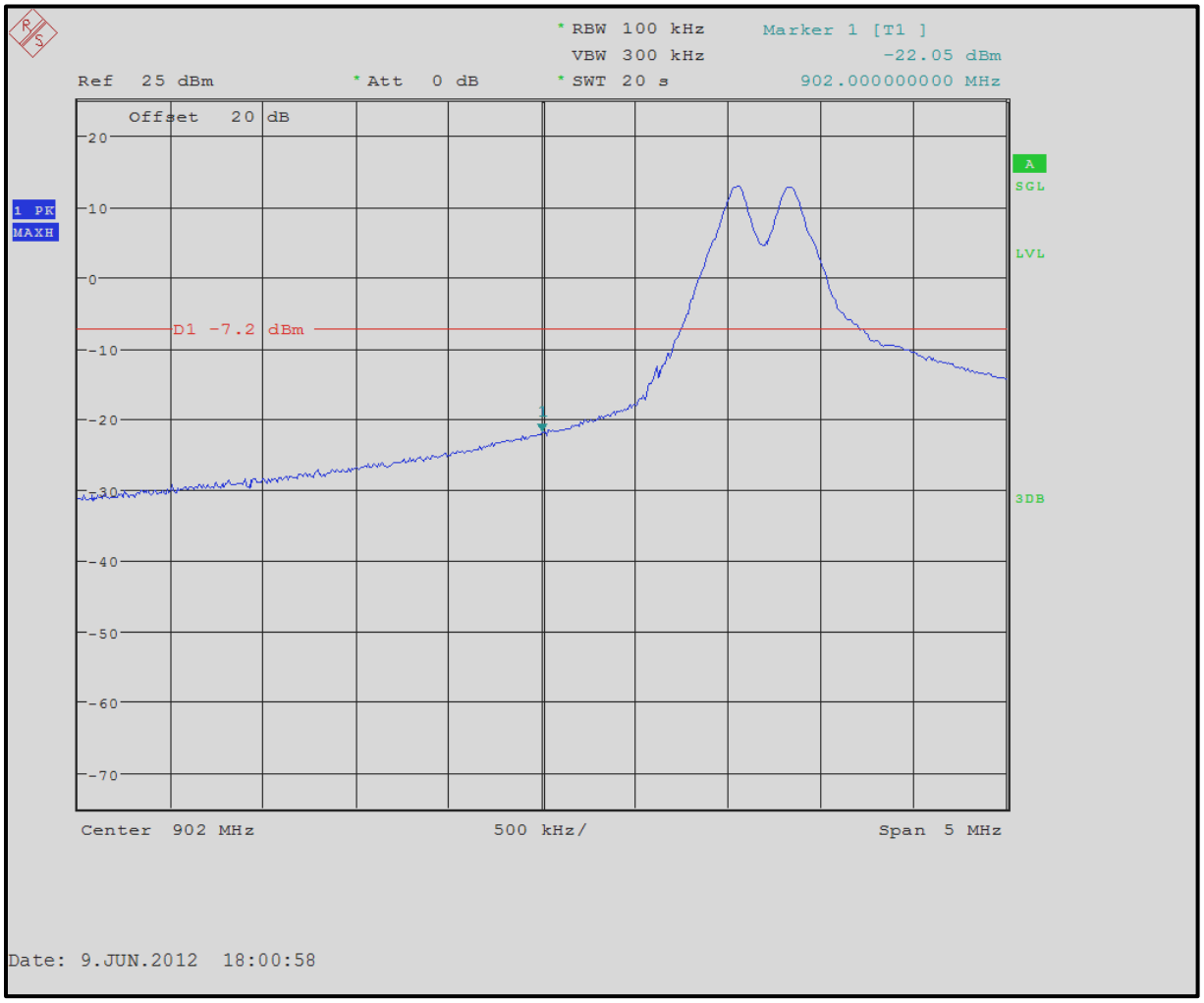
The trace was allowed to stabilize. The marker was set on the emission at the band edge. The marker-delta was used to show the delta between the maximum in-band emission and the emission at the band edge, and was compared to the 20 dBc requirement of 15.247(d) (when using peak emissions).

Table 4-1: Band Edge Test Equipment

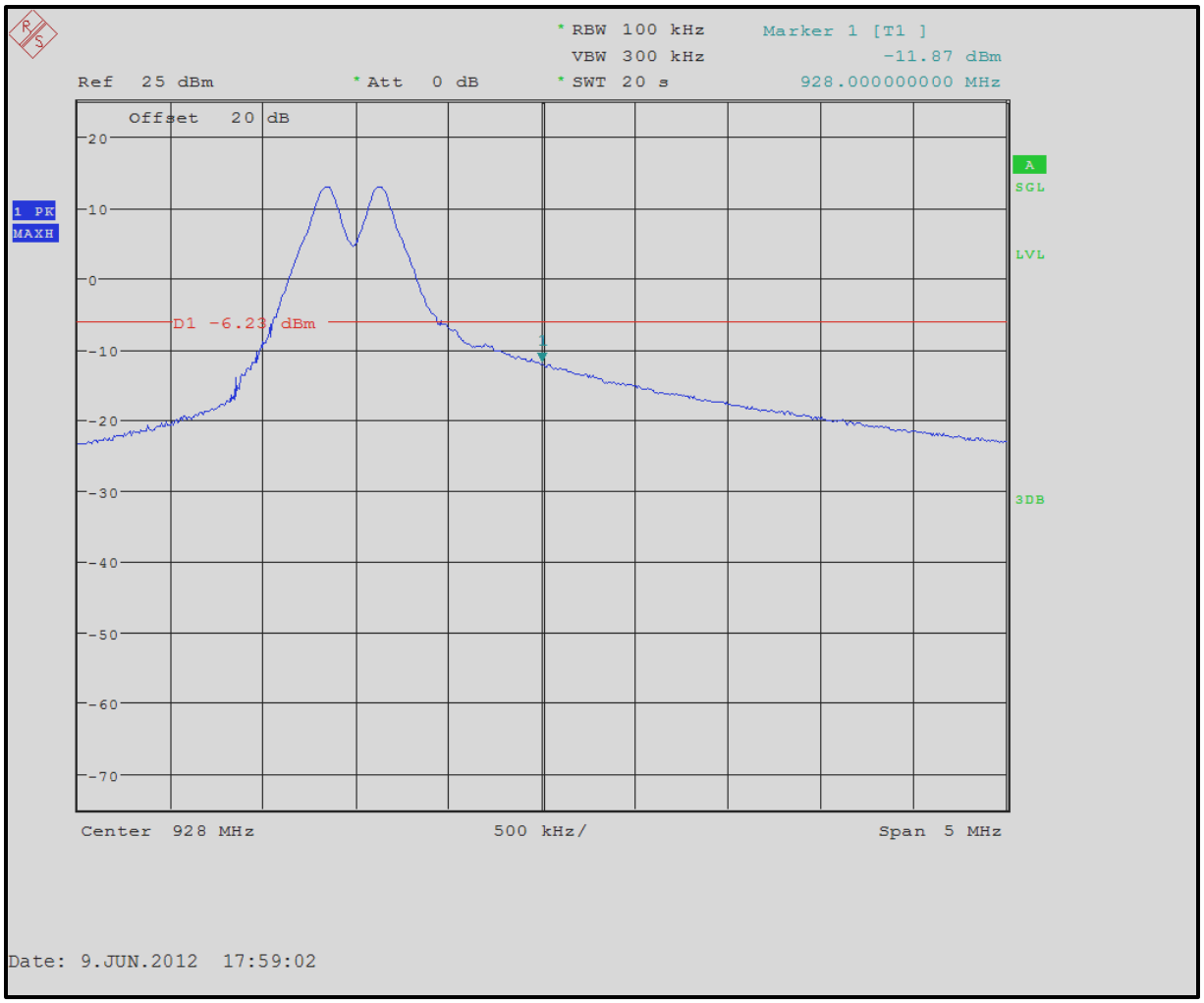
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	6/03/13

4.2 Test Results

Plot 4-1: Lower Band Edge (902 MHz Band Edge, 903.0 MHz Carrier)



Plot 4-2: Upper Band Edge (928 MHz Band Edge, 927.0 MHz Carrier)



Test Personnel:

Daniel W. Baltzell	Daniel W. Baltzell	June 9, 2012
EMC Test Engineer	Signature	Date of Test

5 Antenna Conducted Spurious Emissions – FCC 15.247(d)

5.1 Antenna Conducted Spurious Emissions Test Procedures

Procedure: C63.10-2009 6.7

Antenna spurious emissions per FCC 15.247(d) were measured from the EUT antenna port using a 50-ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 100 kHz. The modulated carrier was identified at the following frequencies: 903.0 MHz, 915.0 MHz and 927.0 MHz. The carrier to the 10th harmonic of the carrier frequency was investigated.

5.2 Antenna Conducted Spurious Emissions Test Results

All spurious emissions were greater than 20 dB below the limit (note that we are reporting power as peak). Per FCC 15.31(o), no data is being reported.

Table 5-1: Antenna Conducted Spurious Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	6/03/13

Test Personnel:

Daniel W. Baltzell		June 9, 2012
EMC Test Engineer	Signature	Date of Test

6 Power Spectral Density – FCC 15.247(e)

6.1 Power Spectral Density Test Procedure

Procedure: C63.10-2009 6.11.2

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 10 kHz, and the sweep time set at 100 seconds. The spectral lines were resolved for the modulated carriers at 903.0, 915.0 and 927.0 MHz. These levels are below the +8 dBm limit. See the power spectral density table and plots that follow.

Table 6-1: Power Spectral Density Test Equipment

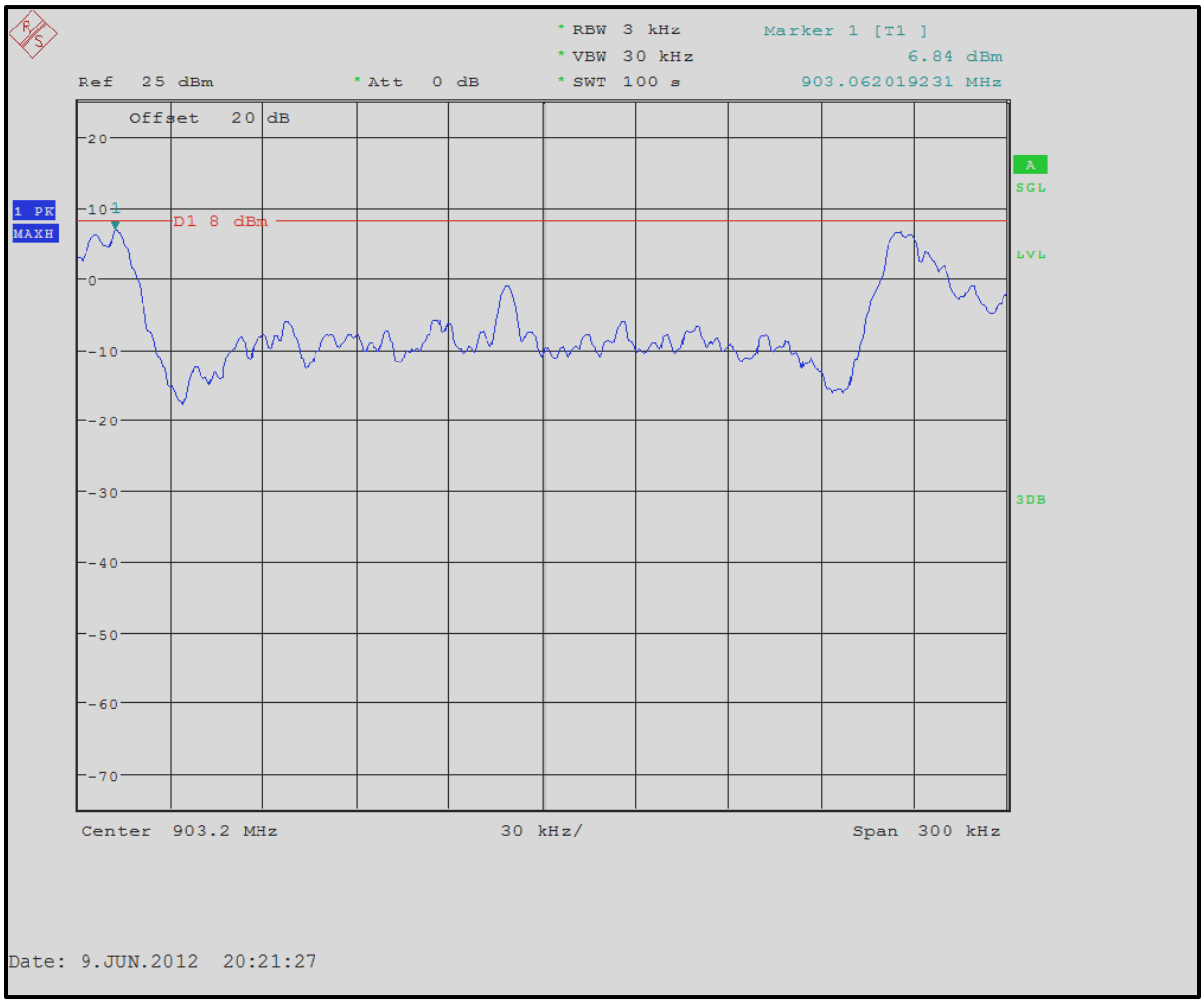
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	6/03/13

6.2 Power Spectral Density Test Data

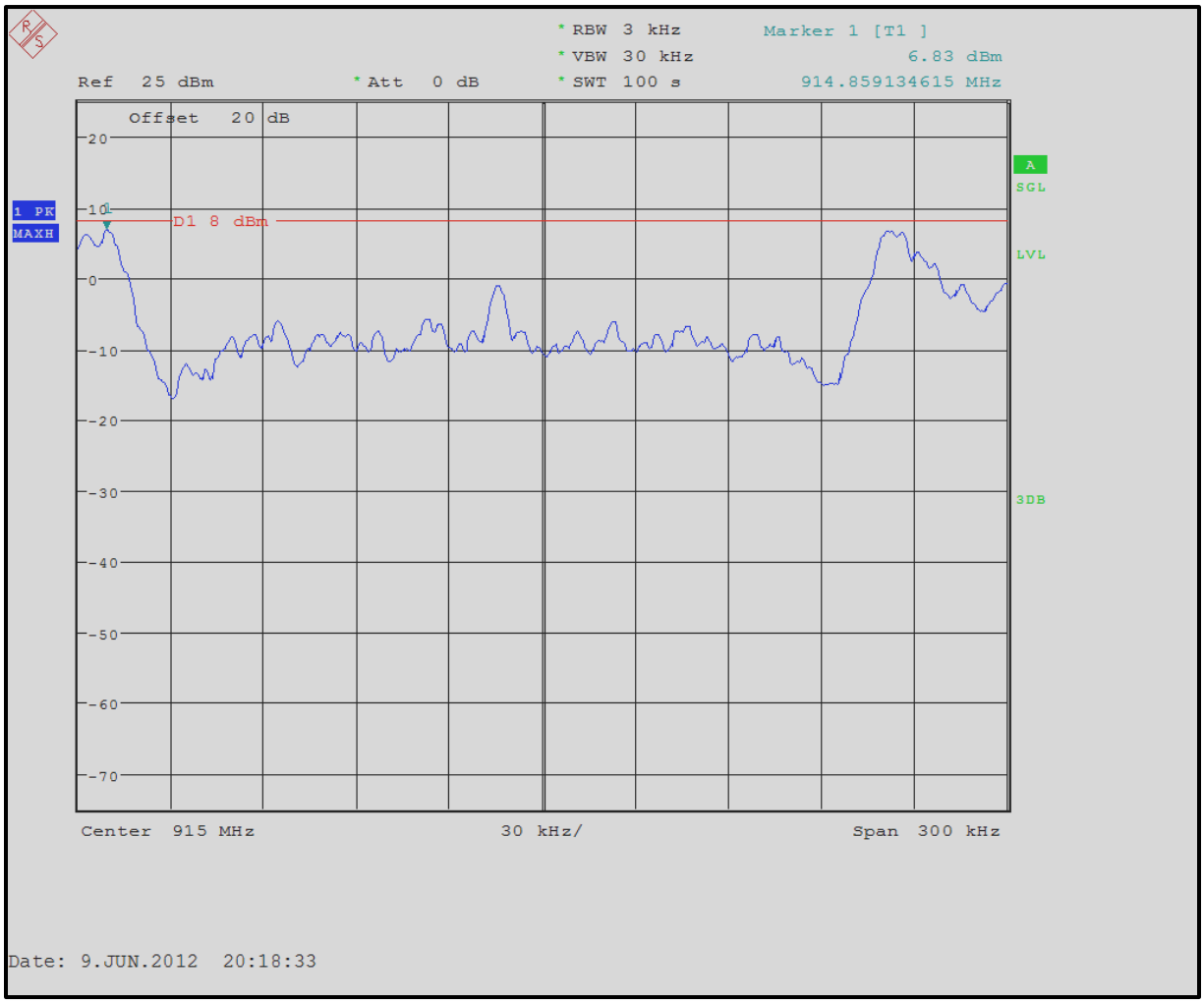
Table 6-2: Power Spectral Density Test Data

Frequency (MHz)	RF Power Level (dBm)	Maximum Limit +8 dBm	Pass/Fail
903.0	6.8	8	Pass
915.0	6.8	8	Pass
927.0	7.0	8	Pass

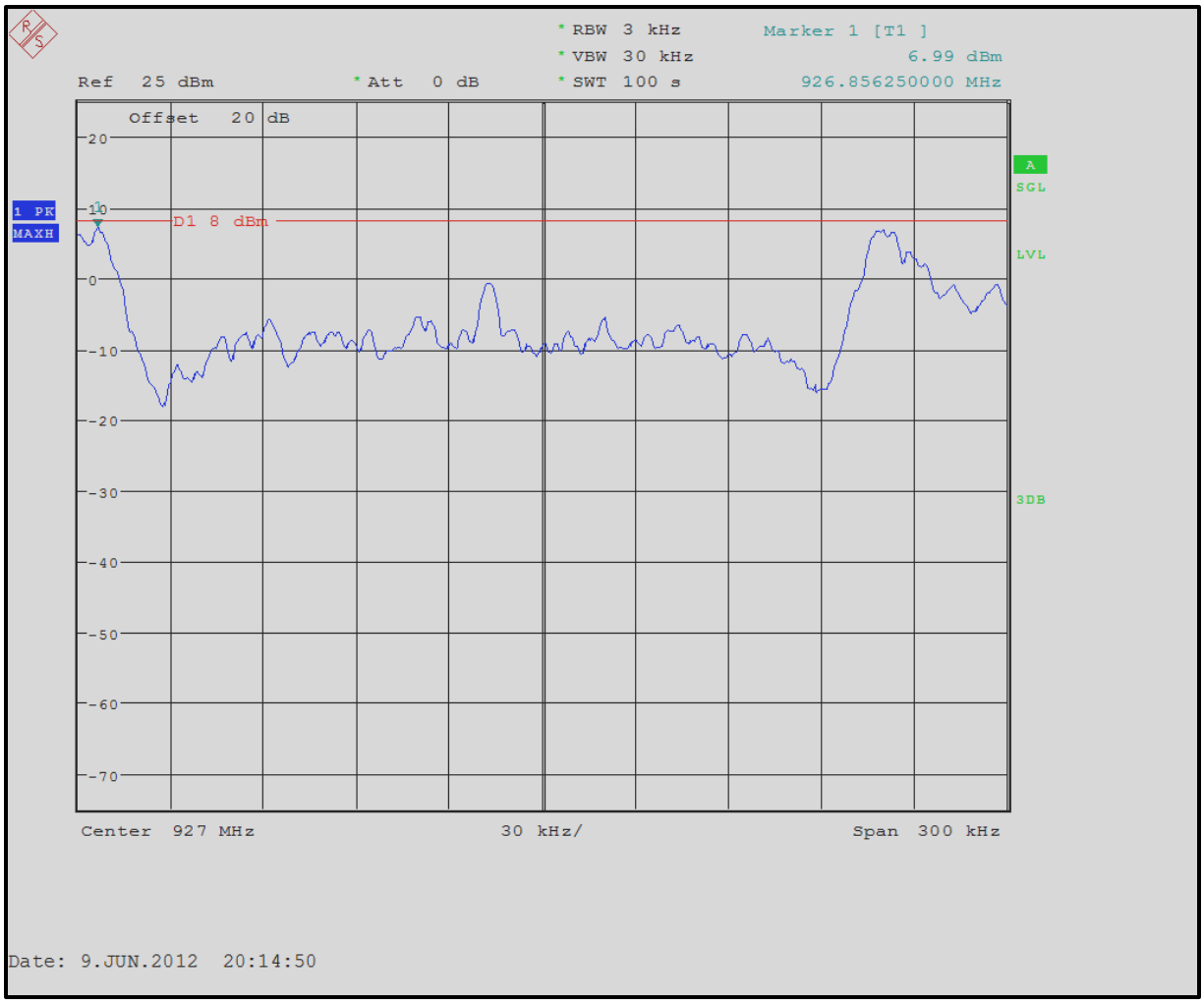
Plot 6-1: Power Spectral Density – 903.0 MHz



Plot 6-2: Power Spectral Density – 915.0 MHz



Plot 6-3: Power Spectral Density – 927.0 MHz



Test Personnel:

Daniel W. Baltzell	Daniel W. Baltzell	June 9, 2012
EMC Test Engineer	Signature	Date of Test

7 Conducted Emissions Measurement Limits – FCC 15.207

7.1 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

7.2 Conducted Emissions Measurement Test Procedure

Procedure: C63.10-2009 6.2

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.

7.3 Conducted Line Emissions Test Data

N/A – EUT is battery operated.

8 Conclusion

The data in this measurement report shows that the Innovative Wireless Technologies, Inc. Model # FAP6210-001, Miner Mesh Handset (MMH), FCC ID: SP8-FAP6210001, IC: 9568A-FAP6210001, complies with all the applicable requirements of Parts 2 and 15 of the FCC rules and regulations, and RSS-210 and RSS-Gen of the Industry Canada rules and regulations, and qualifies for a Class 2 permissive change.