COMMUNICATION CERTIFICATION LABORATORY
1940 West Alexander Street
Salt Lake City, UT 84119
801-972-6146

Test Report

Certification

Test Of:

T1985AA, T1986AA,
T1981AA, and T1982AA

FCC ID#:

CNTFAT1981AA

Test Specification:

FCC PART 15, Subpart C, §15.225

Test Report Serial No: 1523

Applicant:

Hewlett Packard Company
11311 Chinden Blvd.
Boise, ID 83714

Date of Test: June 18, 2008

Issue Date: July 1, 2008

Accredited Testing Laboratory By:

NVLAP

NVLAP Lab Code 100272-0

CERTIFICATION OF ENGINEERING REPORT

This report has been prepared by Communication Certification Laboratory to document compliance of the device described below with the requirements of Federal Communications Commission (FCC) Part 15, Subpart C, §15.225. This report may be reproduced in full. Partial reproduction may only be made with the written consent of the laboratory. The results in this report apply only to the sample tested.

- Applicant: Hewlett Packard Company
- Manufacturer: RF IDeas, Inc.
- Brand Name: Hewlett Packard
- Model Numbers: T1985AA, T1986AA, T1981AA, and T1982AA
- FCC ID Number: CNTFAT1981AA

On this 1st day of July 2008, I, individually, and for Communication Certification Laboratory, certify that the statements made in this engineering report are true, complete, and correct to the best of my knowledge, and are made in good faith.

Although NVLAP has accredited the Communication Certification Laboratory EMC testing facilities, this report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

COMMUNICATION CERTIFICATION LABORATORY

Tested by: Norman P. Hansen
EMC Technician

TABLE OF CONTENTS

PAGE

SECTION 1.0 CLIENT INFORMATION

1.1 Applicant:

Company Name: Hewlett Packard Company
11311 Chinden Blvd.
Boise, ID 83714

Contact Name: Eric Hoffman
Title: Product Regulations Manager

1.2 Manufacturer:

Company Name: RF IDeas, Inc.
1250 South Grove Avenue, Suite 302
Barrington, IL 60010

Contact Name: Shiung Lo
Title: Engineering

SECTION 2.0 EQUIPMENT UNDER TEST (EUT)

2.1 Identification of EUT:

Brand Name:	Hewlett Packard
Model Numbers:	T1985AA, T1986AA, T1981AA, and T1982AA
Serial Number:	80503080500660
Country of Manufacture:	U.S.A.

2.2 Description of EUT:

The EUT is a series of RFID readers operating at 13.56 MHz for use in entry control systems. Data interface and power is provided using a USB port of the host system. All models are identical in hardware with changes in the software for the different applications.

This report covers the transmitter requirements of FCC §15.225 only. The other circuitry, subject to other paragraphs and standards, is to be tested and covered in a separate report.

2.3 EUT and Support Equipment:

The FCC ID numbers for all the EUT and support equipment used during the test are listed below:

Brand Name Model Number Serial No.	FCC ID Number	Description	Name of Interface Ports / Interface Cables
BN: Hewlett Packard MN: T1983AA (Note 1)	CNTFAT1981AA	RFID Reader	See Section 2.4
BN: Toshiba Satellite MN: PSAFGU-02L002 SN:97087751Q	DoC	Computer	USB/USB cable (Note 2) Network/Cat 5 cable

Brand Name Model Number Serial No.	FCC ID Number	Description	Name of Interface Ports / Interface Cables
BN: TRENDnet MN: TEG-S50TXE	DoC	5 port LAN switch	Ethernet/Cat 5 cable w/RJ45 connectors

Note: (1) EUT.
(2) Interface port connected to EUT (See Section 2.4)

The support equipment listed above was not modified in order to achieve compliance with this standard.

2.4 Interface Ports on EUT:

Name of Port	No. of Ports Fitted to EUT	Cable Descriptions/Length
USB	1	USB cable/2 meters

2.5 Modification Incorporated/Special Accessories on EUT:

There were no modifications or special accessories required to comply with the specification.

Signature: _____

Typed Name: Eric Hoffman

Title: Product Regulations Manager

SECTION 3.0 TEST SPECIFICATION, METHODS & PROCEDURES

3.1 Test Specification:

Title: FCC PART 15, Subpart C (47 CFR 15)
§15.225

Operation within the Band 13.110 – 14.010 MHz

Purpose of Test: The tests were performed to demonstrate initial compliance.

3.2 Methods & Procedures:

3.2.1 §15.225 Operation within the Band 13.110 – 14.010 MHz

(a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

(b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

(e) The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of –20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

(f) In the case of radio frequency powered tags designed to operate with a device authorized under this section, the tag may be approved with the device or be considered as a separate device subject to its own authorization. Powered tags approved with a device under a single application shall be labeled with the same identification number as the device.

3.2.2 Test Procedure

The line conducted and radiated emissions testing was performed according to the procedures in ANSI C63.4 (2003). Testing was performed at CCL's Wanship open area test site #2, located at 550 West Wanship Road, Wanship, UT. This site has been fully described in a report submitted to the FCC, and was accepted in a letter dated June 6, 2006 (90504).

CCL participates in the National Voluntary Laboratory Accreditation Program (NVLAP) and has been accredited under NVLAP Lab Code:100272-0, which is effective until September 30, 2008.

For radiated emissions testing at 30 MHz or above that is performed at distances closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

SECTION 4.0 OPERATION OF EUT DURING TESTING

4.1 Operating Environment:

Power Supply: 120 VAC
AC Mains Frequency: 60 Hz

4.2 Operating Modes:

The EUT was tested when placed on three orthogonal axes. The worst-case emissions were seen when the EUT was placed flat on the table and constantly transmitting.

4.3 EUT Exercise Software:

No software was required to exercise the EUT.

SECTION 5.0 SUMMARY OF TEST RESULTS

5.1 FCC Part 15, Subpart C, §15.225

5.1.1 Summary of Tests:

Paragraph	Requirement	Frequency Range (MHz)	Result
15.225(a)	Field Strength	13.553 – 13.567	Complied
15.225(b)	Field Strength	13.410 -13.553 13.567 – 13.710	Complied
15.225(c)	Field Strength	13.110 – 13.410 13.710 – 14.010	Complied
15.225(d)	Field Strength	4.0 – 13.110 14.010 - 1000	Complied
15.225(e)	Frequency Stability	13.110 – 14.010	Complied
15.225(f)	RFID Tag	13.110 – 14.010	Complied

5.2 Result

In the configuration tested, the EUT complied with the requirements of the specification.

SECTION 6.0 MEASUREMENTS, EXAMINATIONS AND DERIVED RESULTS

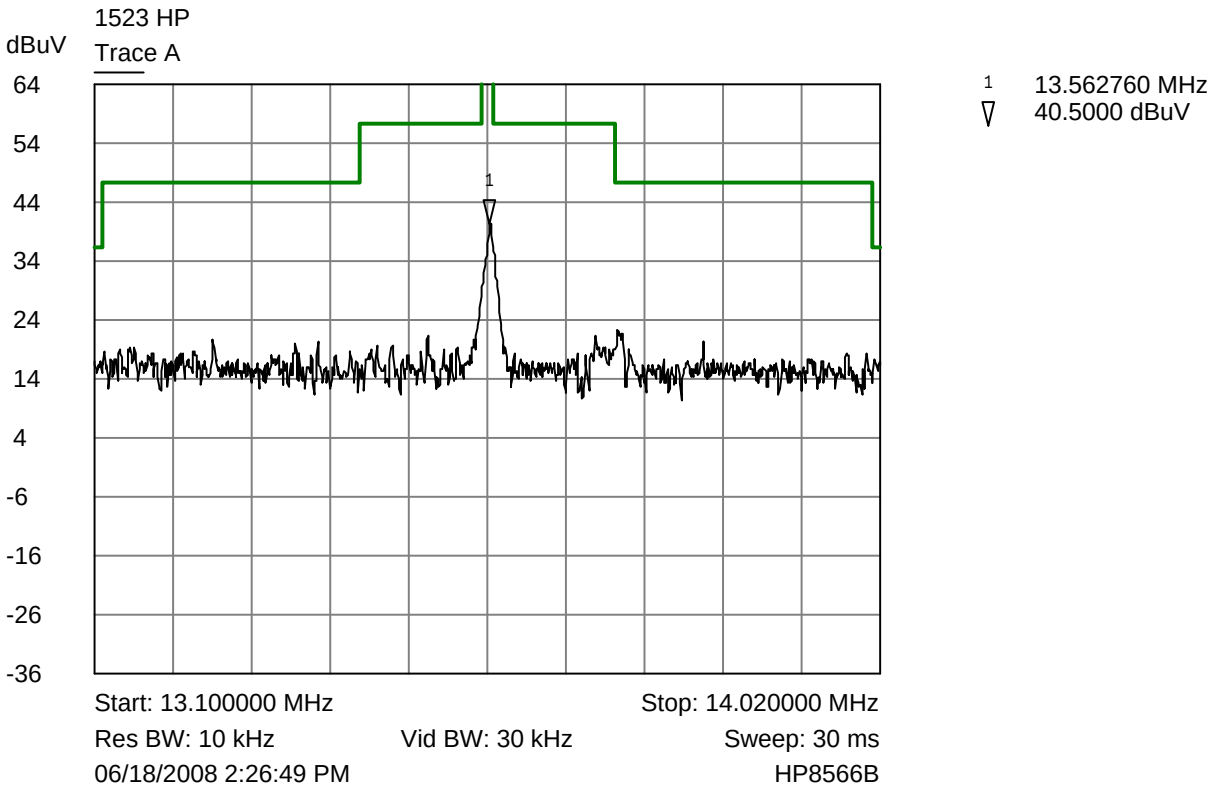
6.1 General Comments:

This section contains the test results only. Details of the test methods used and a list of the test equipment used during the measurements can be found in Appendix 1 of this report.

6.2 Test Results:

6.2.1 Radiated Disturbance Data (13.110 – 14.010 MHz)

The plot below shows the fundamental frequency compared to the limits of FCC §15.225 (a) – (c).



20 meter measurement distance

Trace A Peak Detection Band of Operation - Corrected Trace - Antenna and Cable CF of 10.8 dB

RESULT

The EUT complied with the specification for emissions in the band 13.110 to 14.010 MHz.

6.2.2 Radiated Disturbance Data

The table below shows the emissions of the EUT outside the frequency band of 13.110 – 14.010 MHz compared to the emission limits found in FCC §15.225(d).

Frequency (MHz)	Detector	Receiver Reading (dBμV)	Correction Factor (dB/m)	Field Strength (dBμV/m)	Limit (dBμV/m) (Note 2)	Margin (dB)
27.12	Peak (Note 1)	13.1	10.7	23.8	36.5	-12.7
40.68	Peak (Note 1)	22.0	12.3	34.3	40.0	-5.7
54.24	Peak (Note 1)	16.9	8.4	25.3	40.0	-14.7
67.80	Peak (Note 1)	13.4	7.5	20.9	40.0	-19.1
81.36	Peak (Note 1)	14.2	7.1	21.3	40.0	-18.7
94.92	Peak (Note 1)	19.7	8.6	28.3	43.5	-15.2
108.48	Peak (Note 1)	18.4	8.7	27.1	43.5	-16.4
122.04	Peak (Note 1)	26.8	7.7	34.5	43.5	-9.0
135.60	Peak (Note 1)	21.3	7.1	28.4	43.5	-15.1

Note 1: The reference detector used for the measurements was peak or quasi-peak and the data was compared to the quasi-peak limit.

Note 2: The measurement distance for frequencies below 30 MHz was 20 meters. For frequencies at or above 30 MHz a 3 meter measurement distance was used.

RESULT

The EUT complied with the specification limit by a margin of 5.7 dB.

6.2.3 Frequency Stability

The EUT was tested for frequency stability as specified in §15.225(e). The table below shows the stability of the fundamental frequency when subject to temperature extremes. The EUT is powered by a USB compliant host system. Varying the AC mains voltage by 15% will not change the +5.0 VDC supplied to the EUT.

Time	+20°C	+50°C	Delta (Hz)	-20°C	Delta (Hz)
Start	13560748.5	13560721.0	-27.5	13560821.5	73.0
2 minutes	13560748.5	13560721.5	-27.0	13560819.0	70.5
5 minutes	13560748.5	13560721.0	-27.5	13560817.0	68.5
10 Minutes	13560748.5	13560721.0	-27.5	13560817.5	69.0

RESULT

The EUT complied with the specification as the frequency drift was less than 0.01% (1356 Hz) of the fundamental frequency.

6.2.4 RFID Tags

The RFID tag used with this system is passive and is included with this filing. See §15.225(f).

6.3 Sample Field Strength Calculation:

The field strength is calculated by adding the Correction Factor (Antenna Factor + Cable Factor), to the measured level from the receiver. The receiver amplitude reading is compensated for any amplifier gain. The basic equation with a sample calculation is shown below:

FS = RA + CF Where

FS = Field Strength
RA = Receiver Amplitude Reading (Receiver Reading - Amplifier Gain)
CF = Correction Factor (Antenna Factor + Cable Factor)

Assume a receiver reading of 42.5 dBμV is obtained from the receiver, an amplifier gain of 26.5 dB and a correction factor of 8.5 dB/m. The field strength is calculated by subtracting the amplifier gain and adding the correction factor, giving a field strength of 24.5 dBμV/m, FS = (42.5 - 26.5) + 8.5 = 24.5 dBμV/m.

APPENDIX 1 TEST PROCEDURES AND TEST EQUIPMENT

A1.1 Radiated Disturbance:

The radiated disturbance from the EUT was measured using a spectrum analyzer with a quasi-peak adapter for peak and quasi-peak readings. A preamplifier with a fixed gain of 26 dB and a power amplifier with a fixed gain of 22 dB were used to increase the sensitivity of the measuring instrumentation. The quasi-peak adapter uses a bandwidth of 120 kHz, with the spectrum analyzer's resolution bandwidth set at 1 MHz, for readings in the 30 to 1000 MHz frequency ranges. A 10 kHz resolution bandwidth was used for measuring frequencies below 30 MHz.

A biconilog antenna was used to measure the frequency range of 30 to 1000 MHz, at a distance of 3 or 10 meters from the EUT. The readings obtained by these antennas are correlated to the levels obtained with a tuned dipole antenna by adding antenna factors. An active loop antenna was used to measure frequencies below 30 MHz.

The configuration of the EUT was varied to find the maximum radiated emission. The EUT was connected to the peripherals listed in Section 2.3 via the interconnecting cables listed in Section 2.4. A technician manually manipulated these interconnecting cables to obtain worst-case radiated disturbance. The EUT was rotated 360 degrees, and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission. Where there was multiple interface ports all of the same type, cables are either placed on all of the ports or cables added to these ports until the emissions do not increase by more than 2 dB.

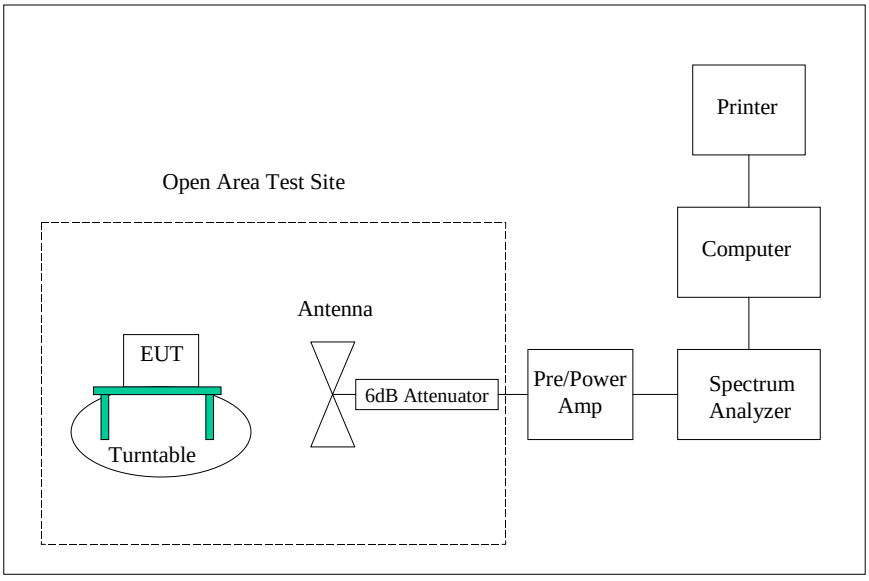
Desktop EUT are measured on a non-conducting table 0.8 meters above the ground plane. The table is placed on a turntable, which is level with the ground plane. For equipment normally placed on floors, the equipment shall be placed directly on the turntable.

Type of Equipment	Manufacturer	Model Number	Serial Number	Date of Last Calibration
Wanship Open Area Test Site #2	CCL	N/A	N/A	10/24/2007
Test Software	CCL	Radiated Emissions	Revision 1.3	N/A
Spectrum Analyzer	Hewlett Packard	8566B	2332A02726	04/29/2008

Type of Equipment	Manufacturer	Model Number	Serial Number	Date of Last Calibration
Quasi-Peak Detector	Hewlett Packard	85650A	2043A00287	04/02/2008
Biconilog Antenna	EMCO	3142	9601-1008	9/27/2007
3 Meter Radiated Emissions Cable Wanship Site #2	CCL	Cable K	N/A	12/31/2007
100’ Coaxial “N” connector cable	CCL	Coax	BC1162	12/31/2007
Pre/Power-Amplifier	Hewlett Packard	8447F	3113A05161	09/04/2007
Active Loop Antenna	EMCO	6502	2011	04/10/2007
6 dB Attenuator	Hewlett Packard	8491A	32835	12/31/2007

An independent calibration laboratory or CCL personnel calibrates all the equipment listed above at intervals defined in ANSI C63.4:2003 Section 4.4 following outlined calibration procedures. All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Supporting documentation relative to tractability is on file and is available for examination upon request.

Radiated Emissions Test Setup



APPENDIX 2 PHOTOGRAPHS

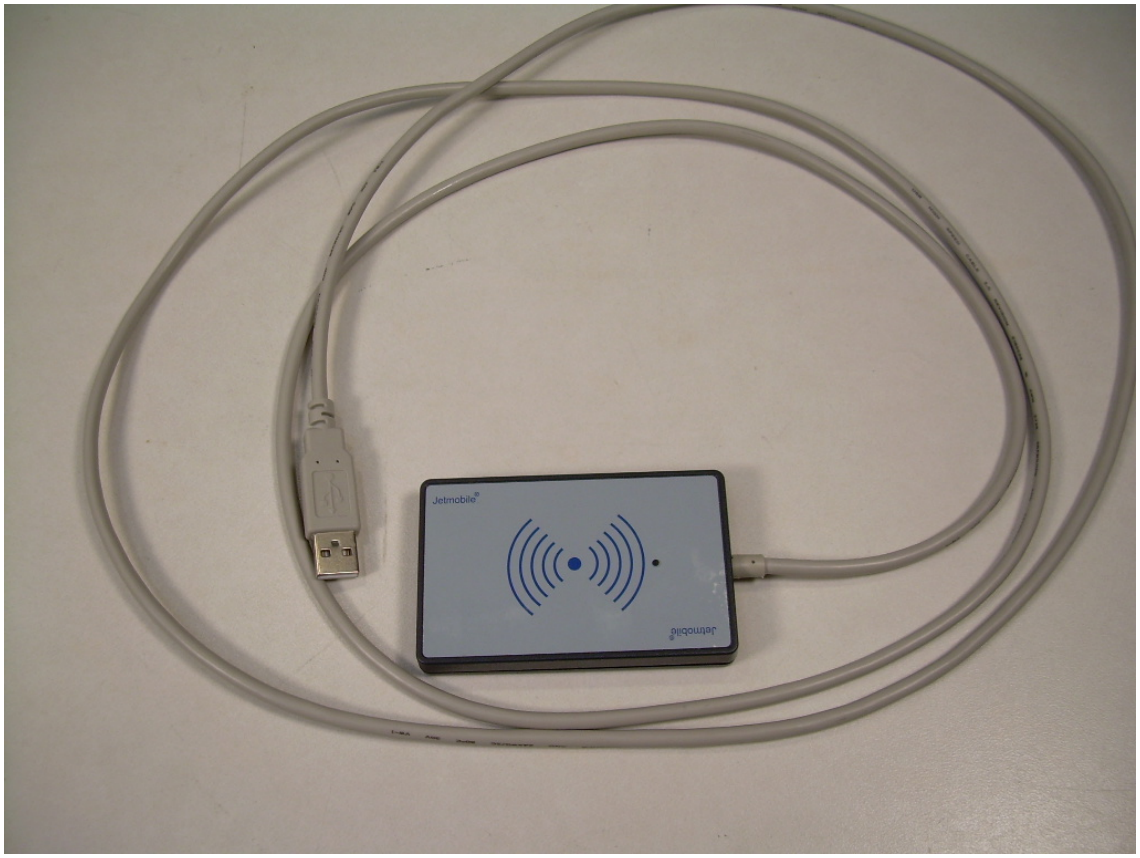
Photograph 1 – Front View Radiated Test Setup - Horizontal EUT Placement

Photograph 2 – Front View Radiated Test Setup – On-Edge EUT Placement

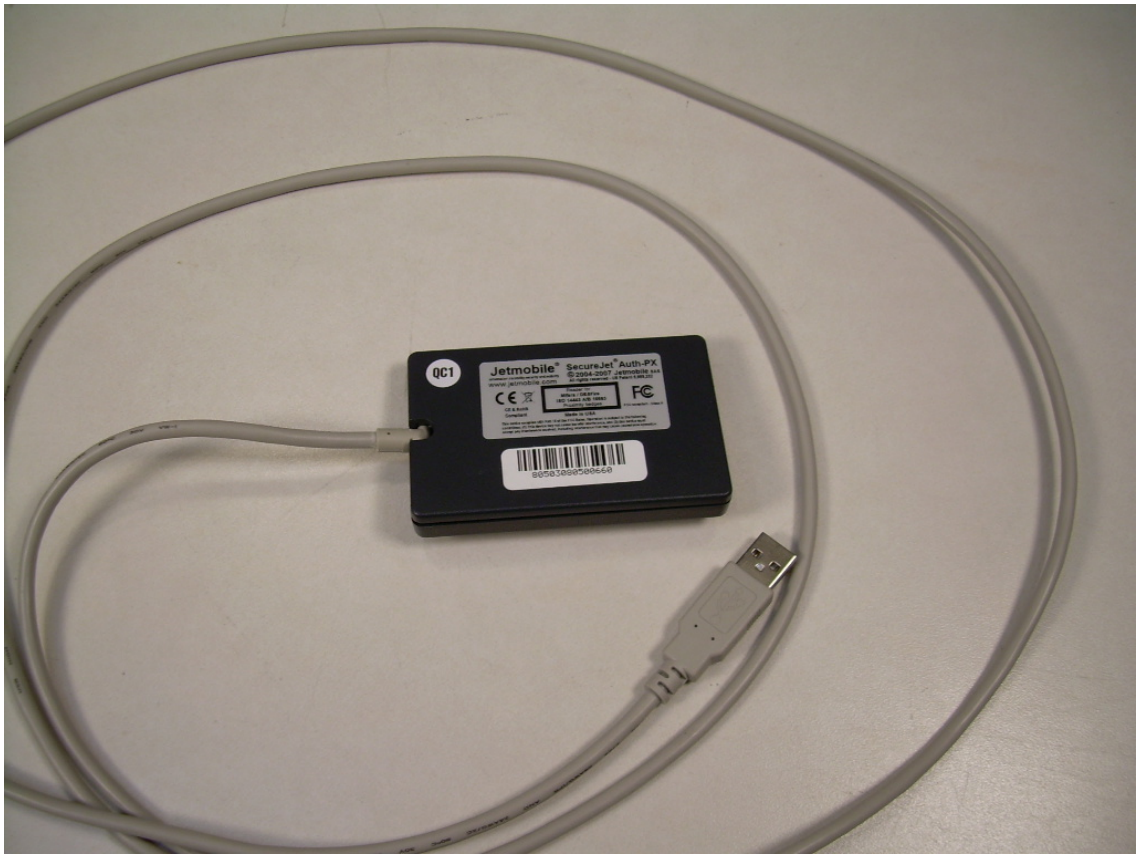
Photograph 3 – Front View Radiated Test Setup - Vertical EUT Placement

Photograph 4 – Back View Radiated Test Setup

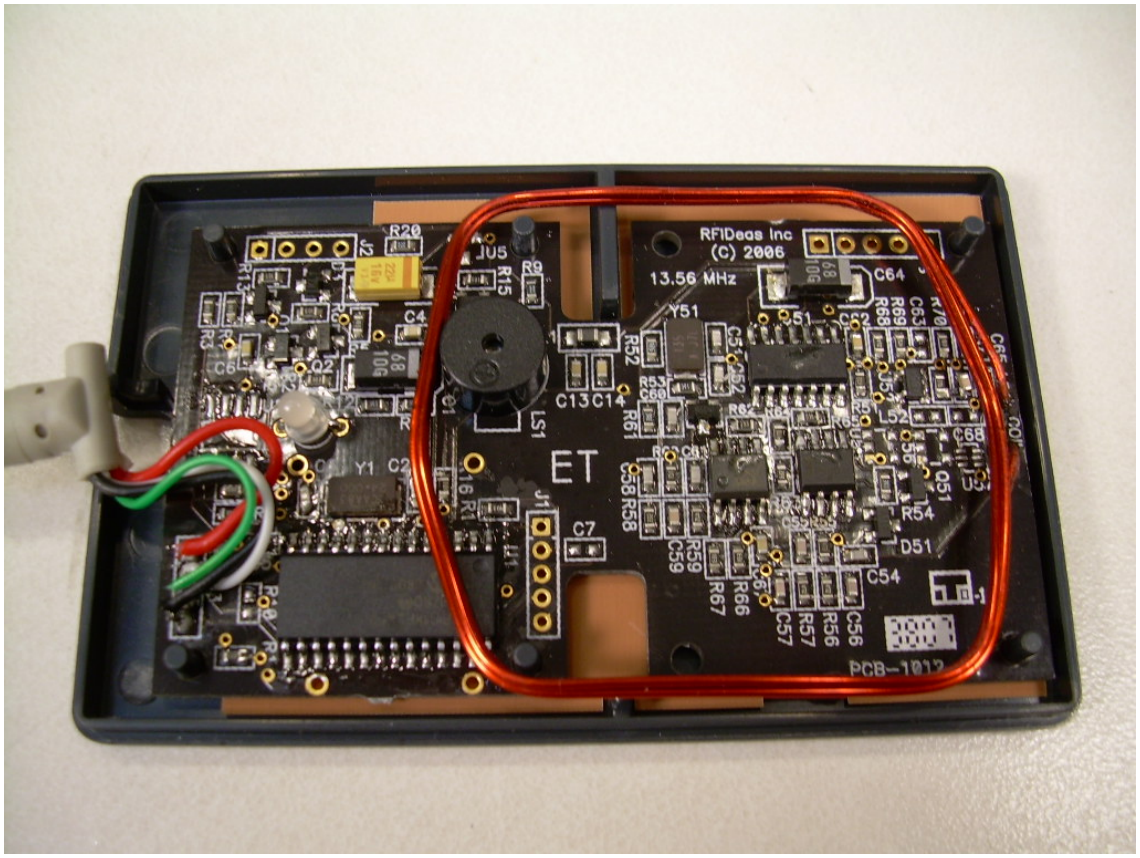
Photograph 5 – Front View of the EUT



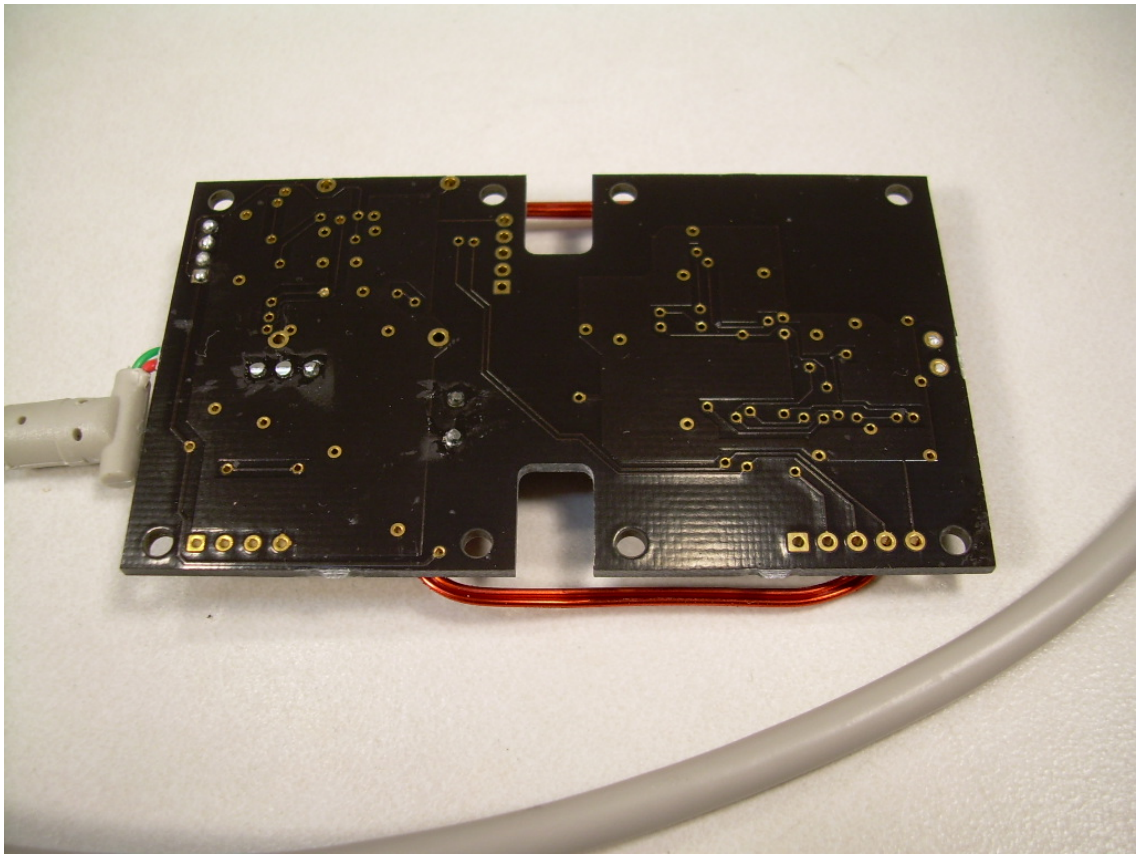
Photograph 6 – Back View of the EUT



Photograph 7 – Component Side of the PCB



Photograph 8 – Trace Side of the PCB



Photograph 9 – View of the EUT Housing