1601 North A.W. Grimes Blvd., Suite B
Round Rock, TX 78665
e-mail: info@ptitest.com
(512) 244-3371 Fax: (512) 244-1846

October 23, 2013

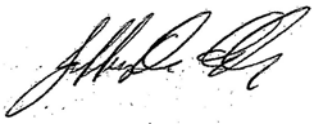
Ron Graczyk
RF Code, Inc.
9229 Waterford Centre Blvd., Suite 500
Austin, TX 78758
USA

Dear Ron:

Thank you for allowing Professional Testing (EMI), Inc. an opportunity to perform testing for RF Code. Enclosed is the Wireless Certification Report for the A761. This report can be used to demonstrate compliance with FCC requirements for wireless devices in the United States.

If you have any questions, please contact me.

Sincerely,



Jeffrey A. Lenk
President

Attachment

Project 14891-15

A761
433 MHz Radio Section

Wireless Certification Report

Prepared for:

RF Code, Inc.

By

Professional Testing (EMI), Inc.
1601 North A.W. Grimes Blvd., Suite B
Round Rock, Texas 78665

October 23, 2013

Reviewed by

Larry Finn
Product Development Engineer

Written by

Eric Lifsey
Test Engineer

Revision History

Revision Number	Description	Date
01	Revised per ACB comments	September 28, 2013
02	Revised per ACB comments	October 23, 2013

Table of Contents

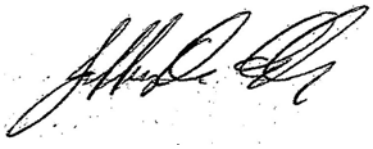
Certificate of Compliance

Applicant:	RF Code, Inc.
Applicant's Address:	RF Code, Inc. (Ron Graczyk) (Dale Parvey) 9229 Waterford Centre Blvd., Suite 500 Austin, TX 78758 USA
FCC ID:	P6F4TFX
Model:	A761 (433 MHz Radio Section)
Project Number:	14891-15

The **A761** by **RF Code, Inc.,** 433 MHz RFID radio, was tested utilizing the following documents and found to be in compliance with the required criteria on the indicated test date.

47 CFR (USA)		
Section Reference	Parameter	Date
15.231(a)	Fundamental Field Strength	2013-09-16
15.231(a)	Harmonic & Spurious Emissions	2013-07-22
15.203, 15.231	Antenna Requirements	2013-09-19
15.231	Bandwidth	2013-08-13

I, Jeffrey A. Lenk, for Professional Testing (EMI), Inc., being familiar with the FCC rules and test procedures, have reviewed the test setup, measured data, and this report. I believe them to be true and accurate.



Jeffrey A. Lenk
President

This report has been reviewed and accepted by RF Code, Inc.. The undersigned is responsible for ensuring that the A761 by RF Code, Inc., will continue to comply with the applicable rules.

_____

Representative of RF Code, Inc.

1.0 Introduction

1.1 Scope

This report describes the extent to which the equipment under test (EUT) conformed to the intentional radiator requirements of the United States. This report is part of a 2-radio composite application and relates to the 433 MHz RFID radio portion.

Professional Testing (EMI), Inc., (PTI) follows the guidelines of National Institute of Standards and Technology (NIST) for all uncertainty calculations, estimates, and expressions thereof for electromagnetic compatibility testing. The procedures of ANSI C63.4: 2009 were used for making all radiated enclosure and mains emission measurements.

1.2 EUT Description

This device is a wireless employee hand sanitation monitoring device. It is composed of a RF network data transceiver on 915 MHz and a RFID on 433.92 MHz. The EUT 433 MHz radio, as tested, consisted of the following:

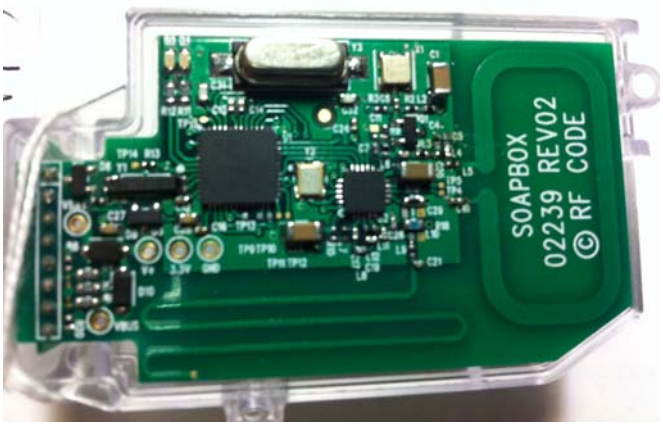
Table 1.2.1: Equipment Under Test

Manufacturer	Model	Serial #	Description
RF Code, Inc.	A761 433 MHz Section	99992	Wireless sanitation monitor.

The device is composed of an approximately rectangular circuit board in a plastic holder. The holder snaps into a reserved location inside a hand soap dispenser where the soap dispenser supplies battery power. The soap dispenser is designed to be wall mounted in one orientation.

In operation the device is triggered by the approach of a badged employee, or triggered by the soap dispensing directly, and then reports by wireless means the employee access to the soap dispenser to insure compliance to workplace sanitation rules.

The EUT main circuit board measures approximately 63 x 33 cm, it has a small power connector board with an edge connector that picks up power from the dispensers battery pack composed of 3 C-Size Alkaline batteries. A front view of the EUT is provided below.



Photograph 1.2.1: EUT

1.3 EUT Operation

The EUT was exercised in a manner consistent with normal operations and oriented in the same manner as the enclosure.

1.4 Modifications to Equipment

No modifications were made to the EUT during the performance of the test program.

1.5 Test Site

Measurements were made at the PTI semi-anechoic facility designated Site 45 (FCC 459644, IC 3036B-1) in Austin, Texas. The site is registered with the FCC under Section 2.948 and Industry Canada per RSS-GEN, and is subsequently confirmed by laboratory accreditation (NVLAP). The test site is located at 11400 Burnet Road, Austin, Texas 78758, while the main office is located at 1601 North A.W. Grimes Boulevard, Suite B, Round Rock, Texas, 78665.

2.0 Applicable Documents and Clauses

This device operates on the 433.92 MHz band as RFID. As such 47 CFR and relevant part(s) applies as shown below.

Table 2.0.1: Applicable Documents

Document #	Title/Description
47 CFR (USA)	Part 15 – Section 15.231
ANSI C63.4 2009	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment

Table 2.0.2: Applicable Clauses

Clause Subject	Section References	Required?	Result
Radiated Output Power	15.231(a)	Yes	Pass
Occupied Bandwidth, 20 dB	15.231, 2.1049	Yes	Pass
Field Strength of Radiated Spurious/Harmonic Emissions (30 MHz to 25 GHz)	15.231(a), 15.209	Yes	Pass
Antenna Construction	15.203	Yes	Pass

3.0 Fundamental Field Strength

Radiated peak output power measurements were made on the EUT.

3.1 Test Procedure

EUT is placed on a non-conductive surface 80 cm above a reference plane and measurements of emissions are made to find maximum emission level. This device is designed for vertical wall-mounting in one orientation. That orientation was selected for all measurements.

3.2 Test Criteria

Section Reference	Parameter	Date(s)
15.231(a) (433.92 MHz)	Radiated Output Power, 10,996.67 µV/m @ 3 m Restated as 80.83 dBµV/m @ 3 m Or extrapolated as 70.37 dBµV/m @ 10 m	2013-09-16

3.3 Test Results

The EUT was found to be in compliance with the applicable criteria. The maximum emission is presented below and compared to the limit.

433.92 MHz per FCC 15.231
Field Strength of Fundamental, **10** Meter Measurement Distance

Frequency MHz	Antenna Polarity	Corrected Level (Measured Peak Level) dBµV/m	Detector Mode
433.9444	V	73.34	Peak
433.8231	H	75.58	Peak

Resolution bandwidth 1 MHz. Video bandwidth 3 MHz. Detector mode is peak.

Limit at **10** meters dBµV/m	Corrected Level (Measured Peak Level) dBµV/m	Duty Cycle Factor dB	Corrected Level dBµV/m	Margin dB
70.37	75.58	-20	55.58	-14.79

4.0 Transmitter Duty Cycle

Measurements of transmitter on time and intervals between transmissions were made to determine the duty cycle factor.

4.1 Test Procedure

EUT is placed into normal transmit operation to observe and record transmitter time domain performance.

4.2 Test Criteria

Measurement is based on intervals not to exceed 100 msec. Maximum transmitter on time is divided by the lesser of 100 msec or the actual measured minimum transmitter interval time. The result is converted to dB and applied as needed to peak measurements of transmitter artifacts to determine average power. This is not a pass/fail measurement.

4.3 Test Results

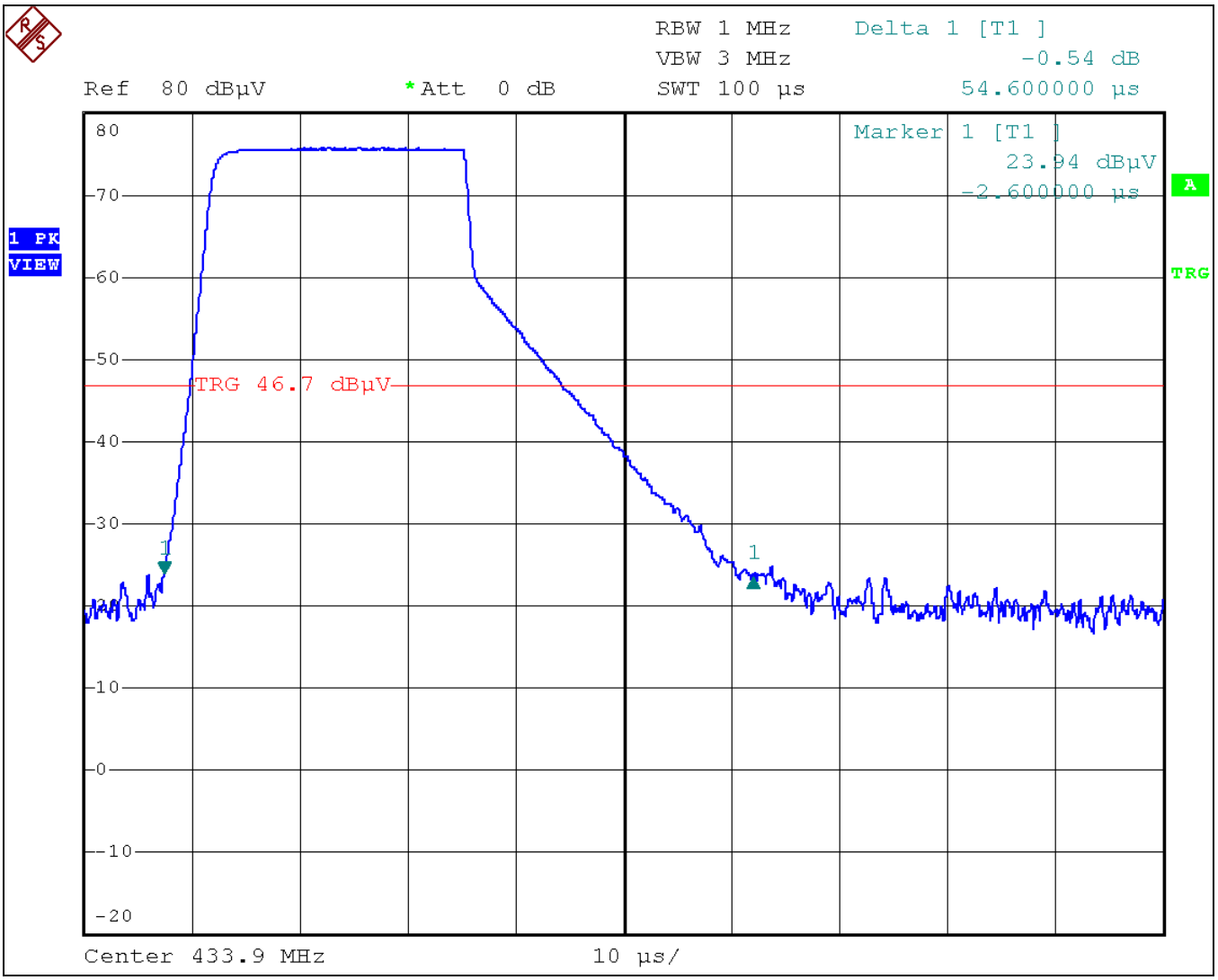
Measurements were performed on 2013-08-13 with the following results.

433 MHz Duty Cycle Factor				
Measured On Time (µs)	**Measured Time Interval (µs)**	**Duty Cycle Factor Calculation**	**Result (dB)**	**Duty Cycle Factor Allowed (dB)**
54.6	1,036 (Limit 100 ms.)	= 20 * Log_{10} (54.6 µs / 1,036 µs)	-25.56	-20

The allowed duty cycle factor is applied to fundamental and harmonic signals as needed to determine average levels.

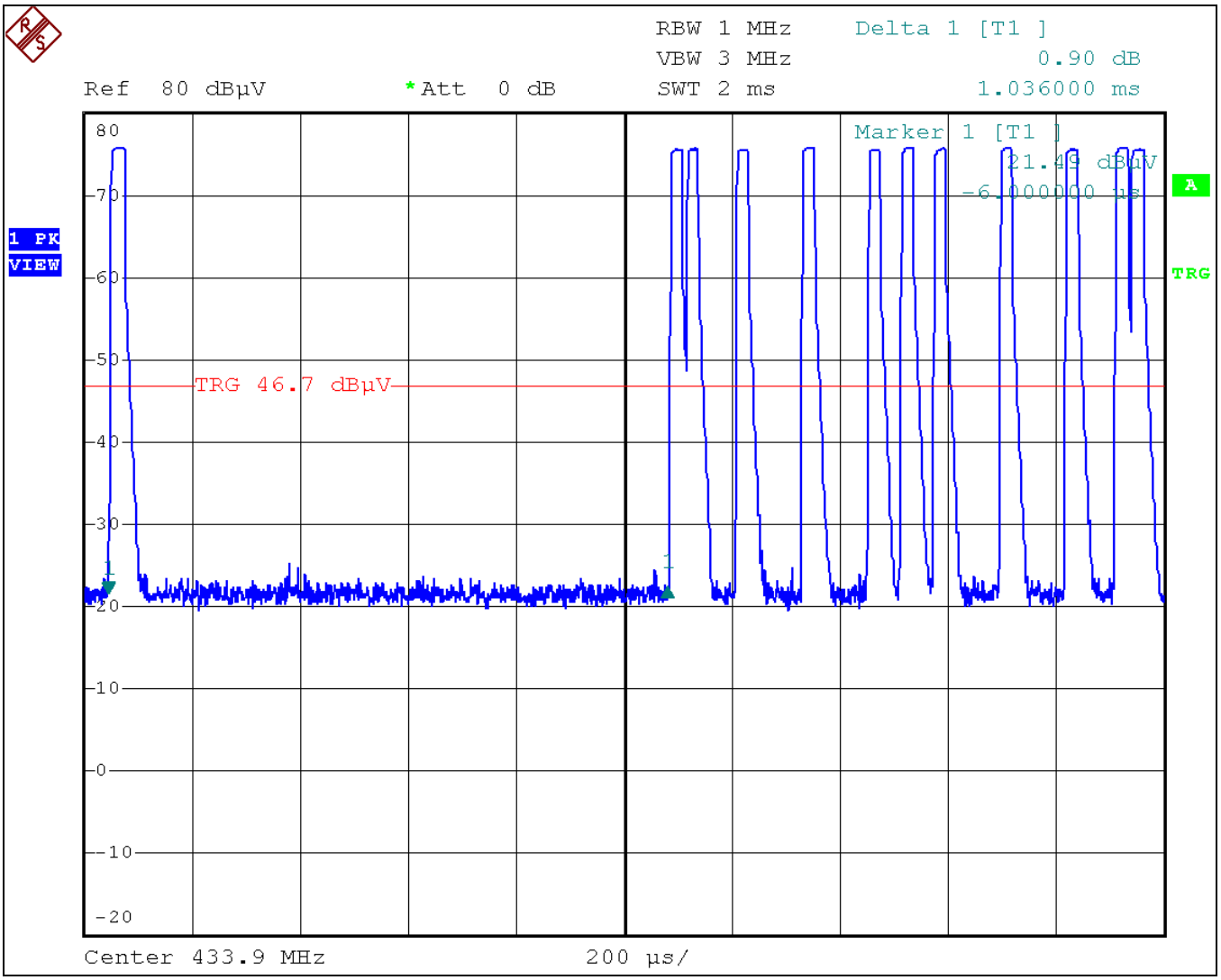
Factor for 433 MHz exposure calculation: 10 * Log_{10} (54.6 µs / 1,036 µs) = -12.78 dB

Plot 4.3.1 433 MHz - Transmit On Time



Max hold recording was continued until no further change was observed.
Measured maximum transmit time: 54.6 µs.

Plot 4.3.2 433 MHz - Transmit Interval Time



NOTE – The plot reveals many transmit events with **varying time intervals**. The spectrum analyzer was set to trigger on video then kept in max hold until a stable result was obtained. Then the shortest interval was revealed and measured. The additional transmit events on the right side of the plot are relative to the first event captured on the left, so the next closest transmit event, just past the mid-point of the plot, is the shortest interval recorded.

Measured minimum transmit interval time: 1,036 µs.

5.0 Occupied Bandwidth

Occupied bandwidth measurement was made on the EUT.

5.1 Test Procedure

The EUT is configured for best signal/power and the bandwidth then is measured. A recording of the results is included.

5.2 Test Criteria

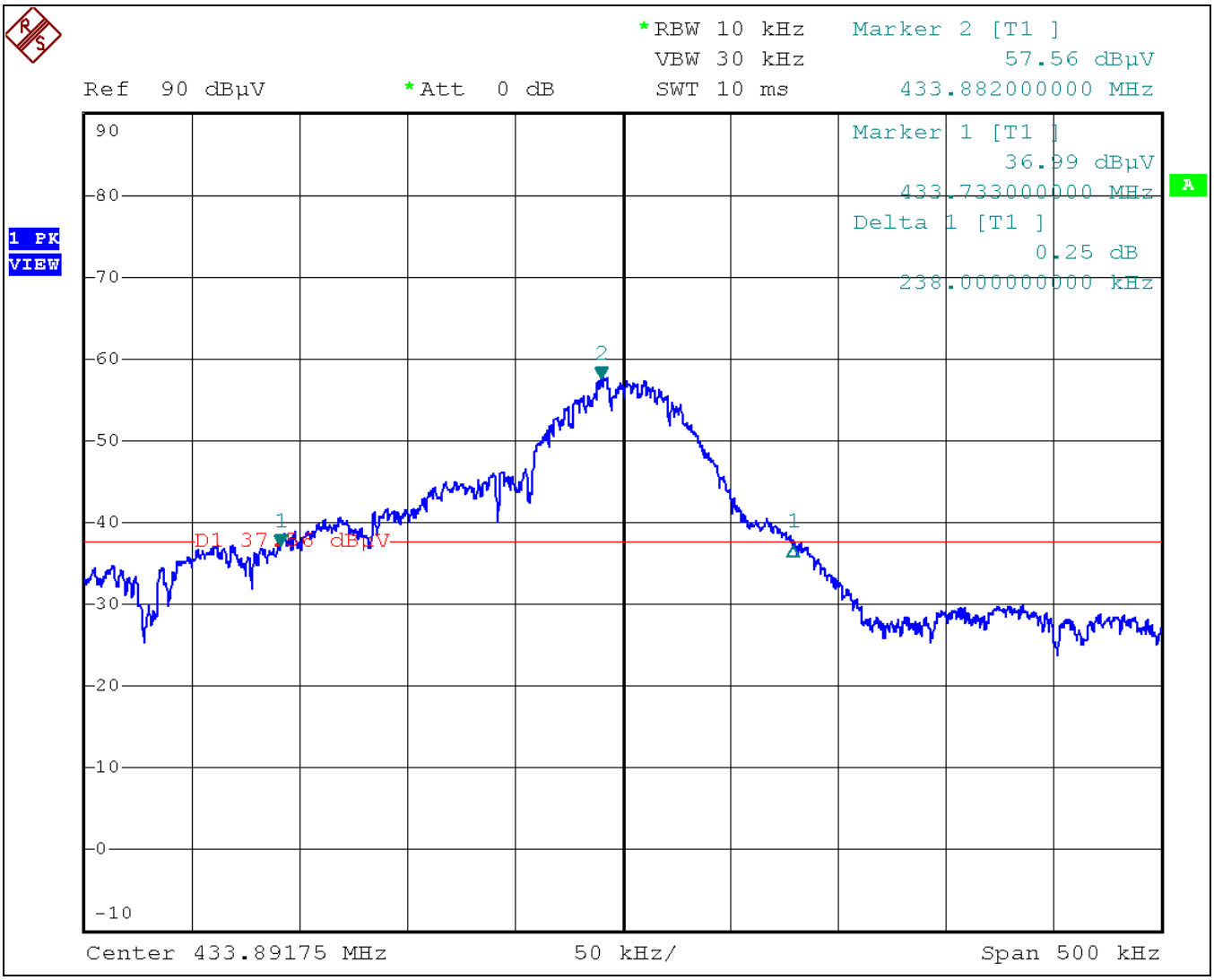
Section Reference	Parameter	Date(s)
15.231(c), 2.1049	Bandwidth, 20 dB	2013-09-12

5.3 Test Results

EUT was found to be in compliance with applicable requirements.

15.231(c) 20 dB BW Limit For Fundamental = 433.92 MHz 0.25% of Fundamental kHz	Measured BW 20 dB kHz
1084.8	238.0

5.3.1 Bandwidth Plot 433 MHz



6.0 Radiated Spurious Emissions Below 1 GHz

Out of band spurious/harmonic emissions measurements were performed on the EUT to determine compliance to 47 CFR, Part 15.

6.1 Test Procedure

The EUT was placed on a non-conductive table 0.8 meters above the ground plane. The table was centered on a rotating turntable at a distance of 10 meters from the measurement antenna.

Spurious emissions below 1 GHz were measured with quasi-peak detection with a resolution bandwidth of 120 kHz. Transmitter products were measured with peak detection and the duty cycle factor applied to determine average. A diagram showing the test setup is given as Figure 6.1.1.

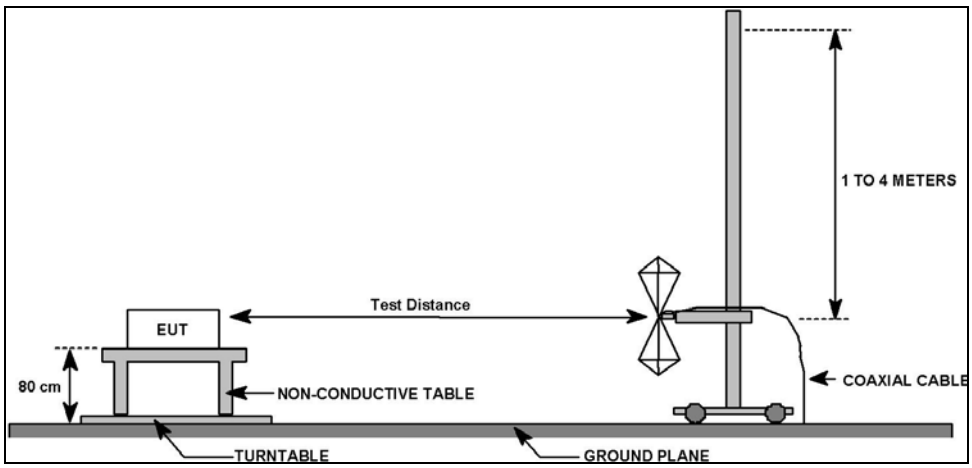


Figure 6.1.1: Field Strength of Spurious Emissions Test Setup

6.2 Test Criteria

Clause Subject	Section Number	Date
Field Strength of Radiated Spurious/Harmonic Emissions	15.231(a), 15.209	2013-07-22

6.3 Test Results

The EUT satisfied the criteria. Recorded data is presented below.

NOTE – These transmit mode scans were not used to measure fundamental power as the bandwidth for both transmitters exceeded 120 kHz.

6.4 Test Results – Receive Mode

Table 6.4.1: Receive Mode, Radiated Spurious Emissions, Below 1 GHz, Vertical Polarity

Professional Testing, EMI, Inc.			
Test Method:	ANSI C63.4–2009: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/22/2013	EUT Serial #:	9992
Customer:	RFCode, Inc.	EUT Part #:	None
Project Number:	14891-15	Test Technician:	Dave Kohutek / Eric Lifsey
Purchase Order #:	8945	Supervisor:	Rob McCollough
Equip. Under Test:	A761	Witness' Name:	Jesse Richardson

Radiated Emissions Test Results Data Sheet					Page: 1 of 1
EUT Line Voltage:	6	VDC	EUT Power Frequency:	N/A	N/A
Antenna Orientation:	Vertical		Frequency Range:	30MHz to 1GHz	
EUT Mode of Operation:			Receive Only		

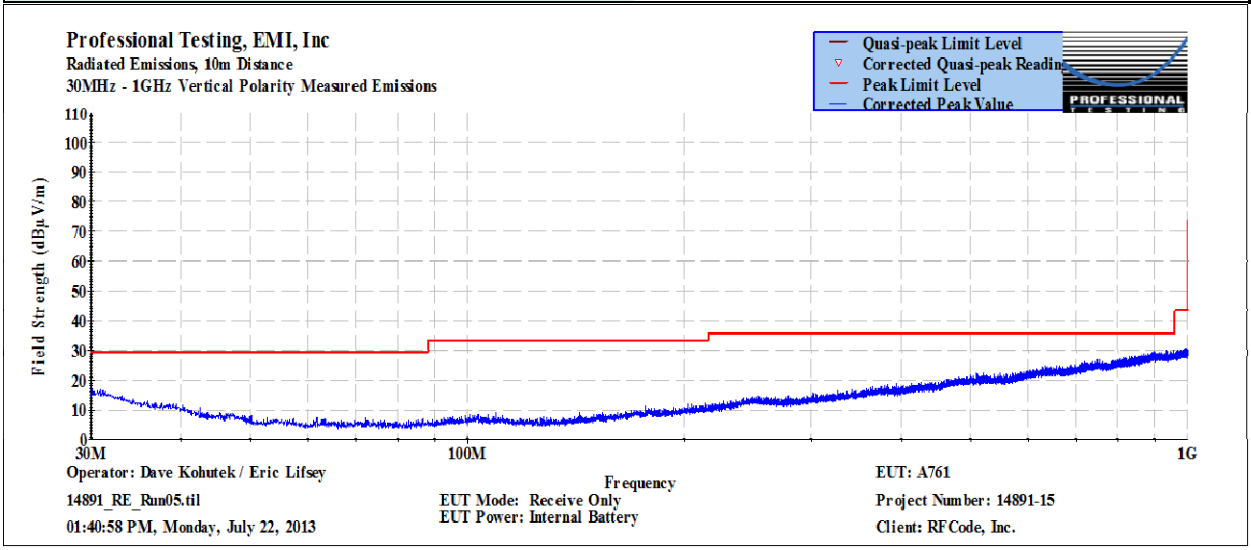
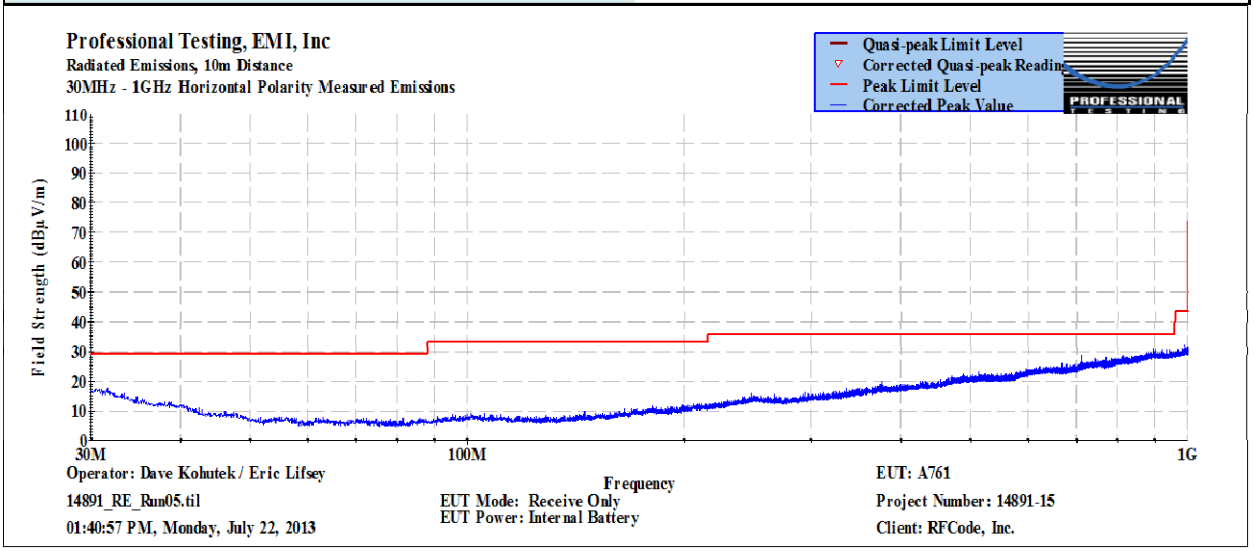


Table 6.4.2: Receive Mode, Radiated Spurious Emissions, Below 1 GHz, Vertical Polarity

Professional Testing, EMI, Inc.			
Test Method:	ANSI C63.4–2009: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/22/2013	EUT Serial #:	9992
Customer:	RFCode, Inc.	EUT Part #:	None
Project Number:	14891-15	Test Technician:	Dave Kohutek / Eric Lifsey
Purchase Order #:	8945	Supervisor:	Rob McCollough
Equip. Under Test:	A761	Witness' Name:	Jesse Richardson

Radiated Emissions Test Results Data Sheet			Page:	1	of	1
EUT Line Voltage:	6	VDC	EUT Power Frequency:	N/A	N/A	
Antenna Orientation:	Horizontal		Frequency Range:	30MHz to 1GHz		
EUT Mode of Operation:			Receive Only			



6.5 Test Results – Transmit Mode

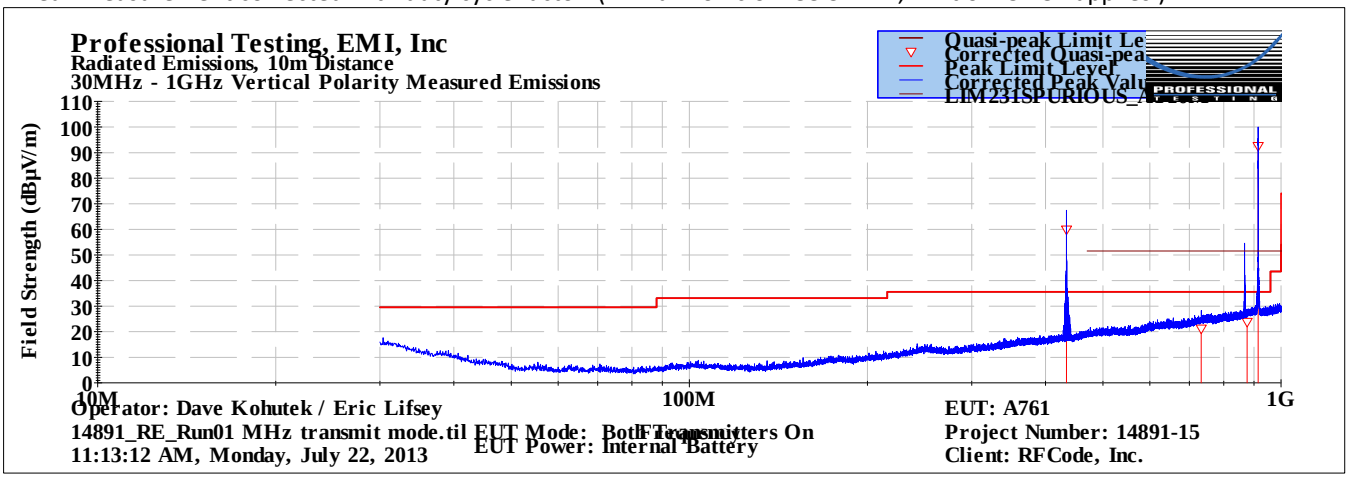
Table 6.5.1: Transmit Mode, Radiated Spurious Emissions, Below 1 GHz, Vertical Polarity

Professional Testing, EMI, Inc.			
Test Method:	ANSI C63.4–2009: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/22/2013	EUT Serial #:	9992
Customer:	RFCode, Inc.	EUT Part #:	None
Project Number:	14891-15	Test Technician:	Dave Kohutek / Eric Lifsey
Purchase Order #:	8945	Supervisor:	Rob McCollough
Equip. Under Test:	A761	Witness' Name:	Jesse Richardson

Radiated Emissions Test Results Data Sheet			Page: 1 of 1		
EUT Line Voltage:	6	VDC	EUT Power Frequency:	N/A	N/A
Antenna Orientation:	Vertical		Frequency Range:	30MHz to 1GHz	
EUT Mode of Operation:			Continuous Beacon Mode		

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
733.144	10	27	1.18	Quasi-peak	21.3	21.135	35.6	-14.5	Pass
876.504	10	117	4.03	Peak	54.51	34.51	51.5	-17.0	Pass*

* Peak measurement corrected with duty cycle factor. (2nd harmonic of 433.9 MHz, limit of 15.231 applies.)



Measurement resolution bandwidth 120 kHz, video bandwidth 120 kHz.

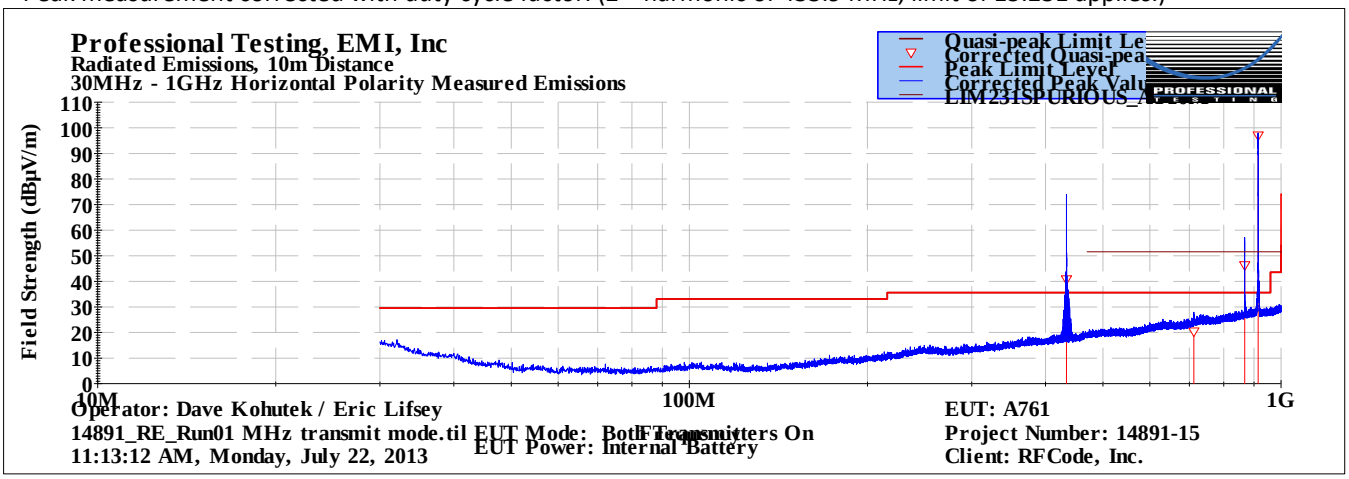
Table 6.5.2: Transmit Mode, Radiated Spurious Emissions, Below 1 GHz, Horizontal Polarity

Professional Testing, EMI, Inc.			
Test Method:	ANSI C63.4–2009: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/22/2013	EUT Serial #:	9992
Customer:	RFCode, Inc.	EUT Part #:	None
Project Number:	14891-15	Test Technician:	Dave Kohutek / Eric Lifsey
Purchase Order #:	8945	Supervisor:	Rob McCollough
Equip. Under Test:	A761	Witness' Name:	Jesse Richardson

Radiated Emissions Test Results Data Sheet			Page: 1 of 1
EUT Line Voltage:	6 VDC	EUT Power Frequency:	N/A N/A
Antenna Orientation:	Horizontal	Frequency Range:	30MHz to 1GHz
EUT Mode of Operation:		Continuous Beacon Mode	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
712.442	10	347	2.63	Quasi-peak	21.1	20.3	35.6	-15.3	Pass
867.967	10	341	3.01	Peak	57.13	37.1	51.5	-14.4	Pass*

* Peak measurement corrected with duty cycle factor. (2nd harmonic of 433.9 MHz, limit of 15.231 applies.)



Measurement resolution bandwidth 120 kHz, video bandwidth 120 kHz.
The dark red limit line starting at 470 MHz is the spurious limit per 15.231.

7.0 Radiated Spurious Emissions Above 1 GHz

Out of band spurious/harmonic emissions measurements were performed on the EUT to determine compliance to 47 CFR, Part 15.

7.1 Test Procedure

The EUT was placed on a non-conductive table 0.8 meters above the ground plane. The table was centered on a rotating turntable at a distance of 1 meter from the measurement antenna.

Harmonic emissions above 1 GHz peak were measured with peak detection, a resolution bandwidth of 3 MHz, and at a distance of 3 meters. If peak measurements exceeded average limits, the peak limit was applicable and duty cycle factor was then applied for average level calculation. Emissions were investigated up to the 10^{th} harmonic of the transmitter fundamental.

Non-harmonic spurious emissions must satisfy the average limit and the peak limit (20 dB above average). A diagram showing the test setup is given as Figure 5.1.1.

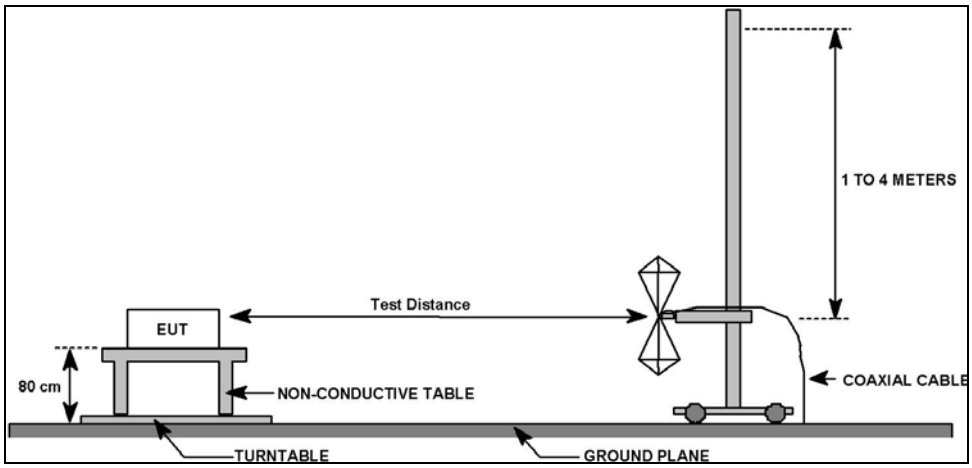


Figure 7.1.1: Field Strength of Spurious Emissions Test Setup

7.2 Test Criteria

Clause Subject	Section Number	Date
Field Strength of Radiated Spurious/Harmonic Emissions	15.231(a), 15.209	2013-07-22

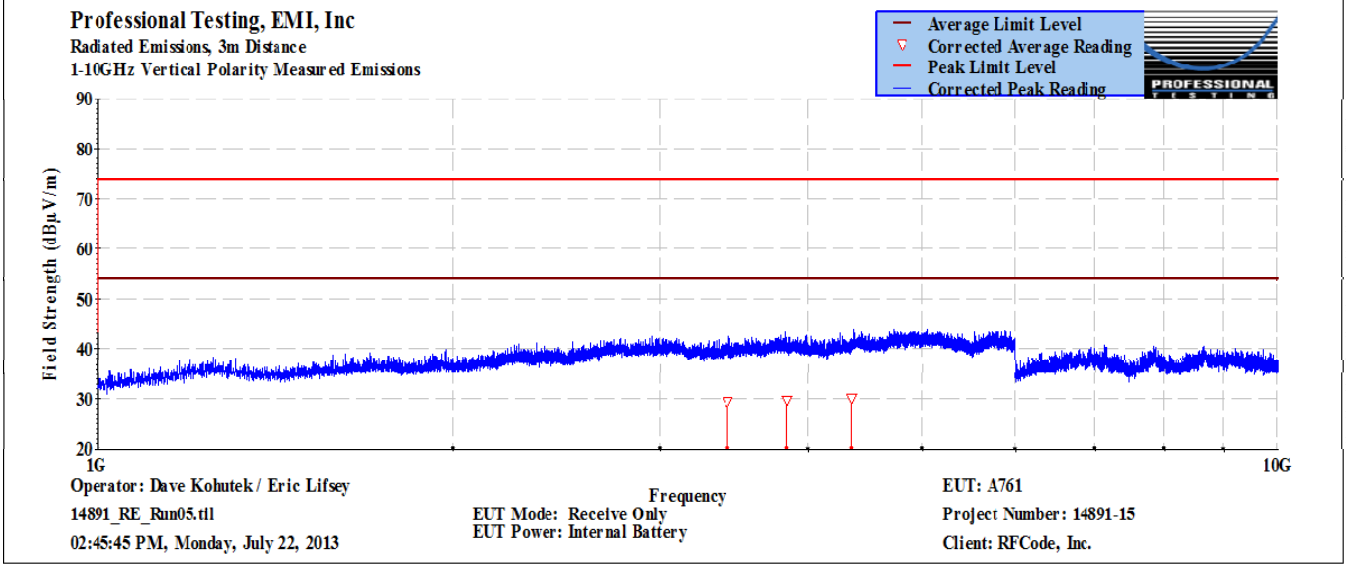
From timing measurements reported elsewhere in this report, the average level is -20 below the measured peak values. Therefore meeting the peak limit levels also complies with the average levels.

7.3 Test Results – Receive Mode

Professional Testing, EMI, Inc.			
Test Method:	ANSI C63.4–2009: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/22/2013	EUT Serial #:	9992
Customer:	RFCode, Inc.	EUT Part #:	None
Project Number:	14891-15	Test Technician:	Dave Kohutek / Eric Lifsey
Purchase Order #:	8945	Supervisor:	Rob McCollough
Equip. Under Test:	A761	Witness' Name:	Jesse Richardson

Radiated Emissions Test Results Data Sheet			Page: 1 of 1		
EUT Line Voltage:	6	VDC	EUT Power Frequency:	N/A	N/A
Antenna Orientation:	Vertical		Frequency Range:	Above 1GHz	
EUT Mode of Operation:			Receive Only		

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
3418.48	3	146	1	Average	76.3	29.35	54.0	-24.6	Pass
3839.09	3	27	1	Average	75.3	29.7	54.0	-24.3	Pass
4359.23	3	285	1	Average	74.8	30.134	54.0	-23.8	Pass



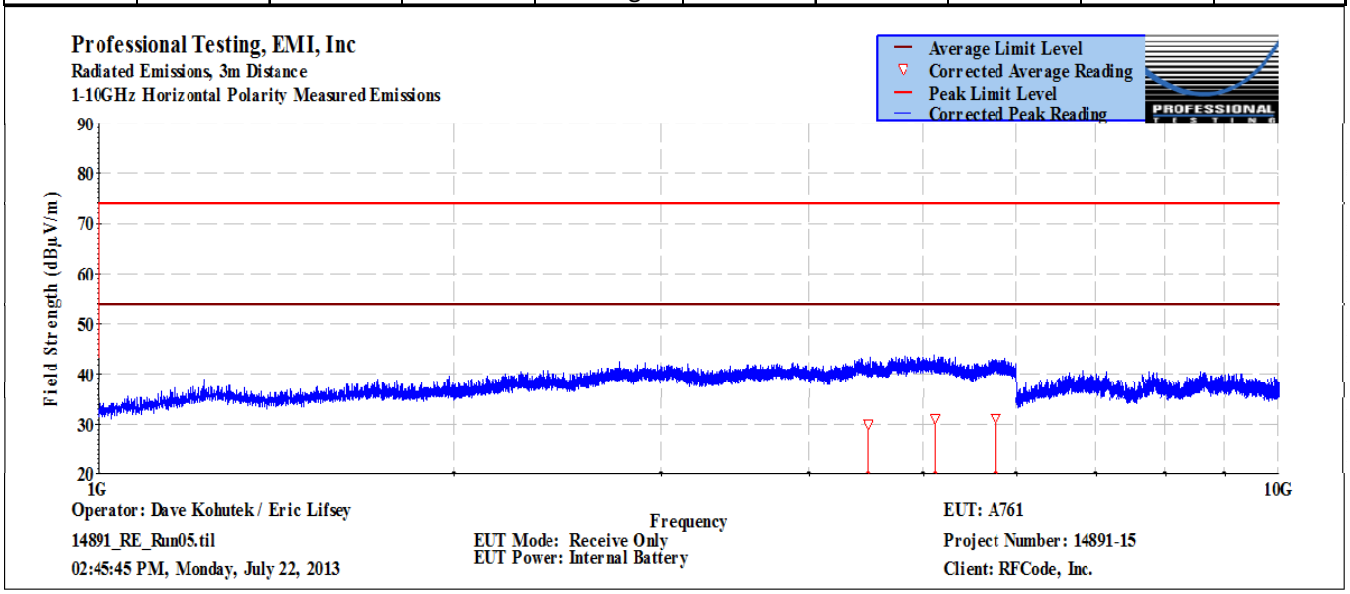
Detector mode peak. Resolution bandwidth 1 MHz. Video bandwidth 3 MHz.

Professional Testing, EMI, Inc.			
Test Method:	ANSI C63.4–2009: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/22/2013	**EUT Serial #:**	9992
Customer:	RFCode, Inc.	**EUT Part #:**	None
Project Number:	14891-15	**Test Technician:**	Dave Kohutek / Eric Lifsey
Purchase Order #:	8945	**Supervisor:**	Rob McCollough
Equip. Under Test:	A761	**Witness' Name:**	Jesse Richardson

Radiated Emissions Test Results Data Sheet — **Page: 1 of 1**

EUT Line Voltage:	6 VDC	**EUT Power Frequency:**	N/A N/A
Antenna Orientation:	Horizontal	**Frequency Range:**	Above 1GHz
EUT Mode of Operation:		Receive Only	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
4491.55	3	246	1	Average	74.8	30.1	54.0	-23.8	Pass
5119.43	3	147	1	Average	74.5	31.2	54.0	-22.8	Pass
5760.63	3	32	1	Average	73.8	31.2	54.0	-22.8	Pass



Detector mode peak. Resolution bandwidth 1 MHz. Video bandwidth 3 MHz.

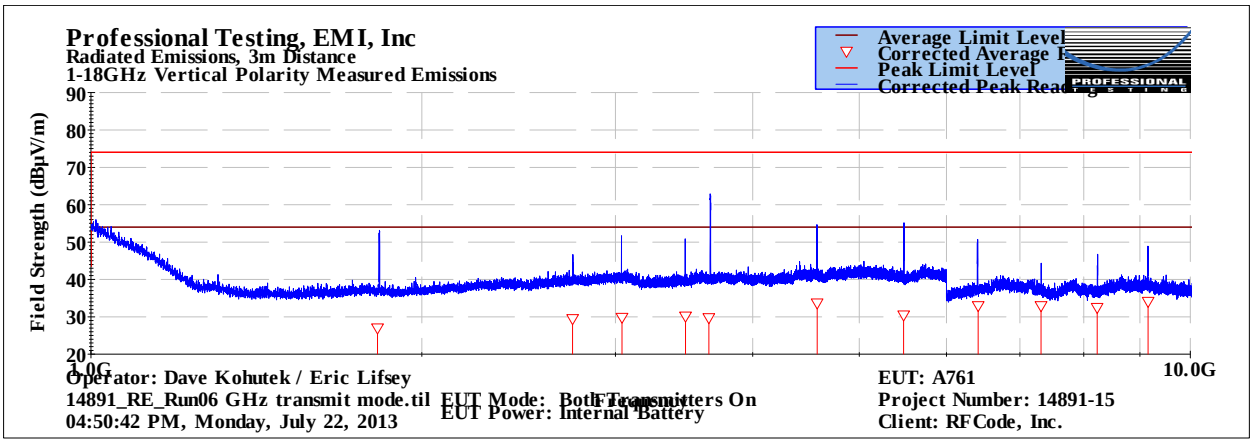
7.4 Test Results – Transmit Mode

Professional Testing, EMI, Inc.			
Test Method:	ANSI C63.4–2009: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/22/2013	EUT Serial #:	9992
Customer:	RFCode, Inc.	EUT Part #:	None
Project Number:	14891-15	Test Technician:	Dave Kohutek / Eric Lifsey
Purchase Order #:	8945	Supervisor:	Rob McCollough
Equip. Under Test:	A761	Witness' Name:	Jesse Richardson

Radiated Emissions Test Results Data Sheet			Page: 1 of 1
EUT Line Voltage:	6 VDC	EUT Power Frequency:	N/A N/A
Antenna Orientation:	Vertical	Frequency Range:	Above 1GHz
EUT Mode of Operation:		Continuous Beacon Mode	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Peak Amplitude (dBµV)	Corrected Peak Level (dBµV/m) with Duty Cycle Factor Applied	Limit Level (dBµV/m)	Margin (dB)	Test Results
3041.66	3	300	1	Peak	51.65	31.65	54.0	-22.4	Pass
3474.13	3	47	1	Peak	50.80	30.80	54.0	-23.2	Pass

Signals listed above are from the EUT in this report. Other signals are from the 915 MHz transmitter.



Detector mode peak. Resolution bandwidth 1 MHz. Video bandwidth 3 MHz.
Note the average is calculated in the table above. Please disregard the red markers in the above graph.

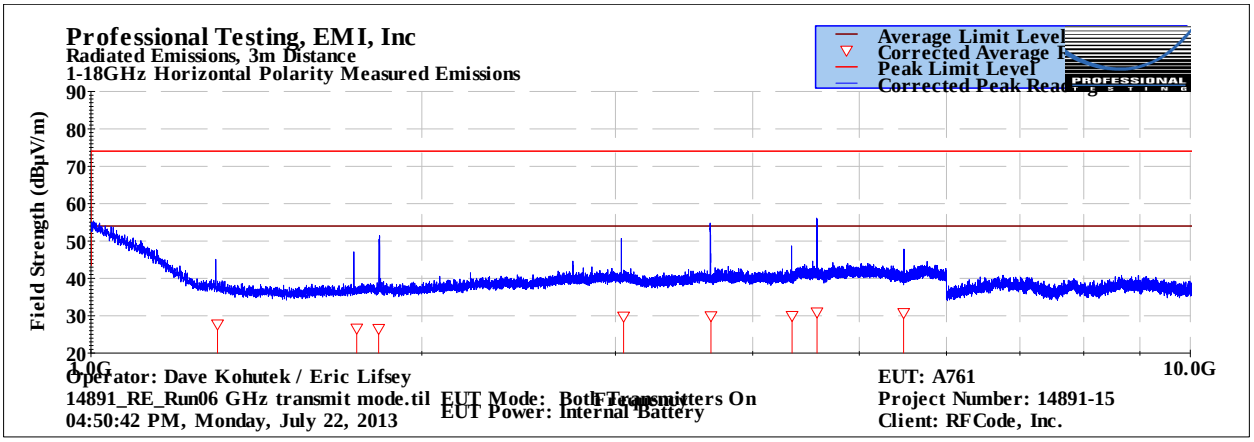
Professional Testing, EMI, Inc.			
Test Method:	ANSI C63.4–2009: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/22/2013	EUT Serial #:	9992
Customer:	RFCode, Inc.	EUT Part #:	None
Project Number:	14891-15	Test Technician:	Dave Kohutek / Eric Lifsey
Purchase Order #:	8945	Supervisor:	Rob McCollough
Equip. Under Test:	A761	Witness' Name:	Jesse Richardson

Radiated Emissions Test Results Data Sheet — Page: 1 of 1

EUT Line Voltage:	6 VDC	EUT Power Frequency:	N/A N/A
Antenna Orientation:	Horizontal	Frequency Range:	Above 1GHz
EUT Mode of Operation:		Continuous Beacon Mode	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Peak Amplitude (dBµV)	Corrected Peak Level (dBµV/m) with Duty Cycle Factor Applied	Limit Level (dBµV/m)	Margin (dB)	Test Results
1303.63	3	193	1	Peak	45.06	25.1	54.0	-28.9	Pass
1744.95	3	182	1	Peak	47.10	15.8	54.0	-38.2	Pass
3051.76	3	324	1	Peak	50.64	20.0	54.0	-34.0	Pass
4342.83	3	80	1	Peak	48.61	17.8	54.0	-36.2	Pass

Signals listed above are from the EUT in this report. Other signals are from the 915 MHz transmitter.



8.0 Antenna Construction Requirements

The design was investigated for meeting the antenna construction requirements of the applicable rules.

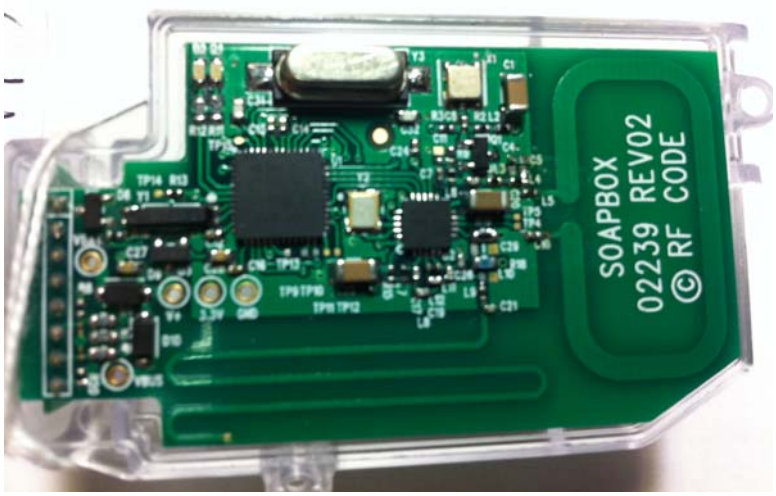
8.1 Procedure

A direct examination of the antenna construction is performed and compared to rule criteria that prevents wireless device antennas from being modified by end users in ways that would void their authorization to use the device.

8.2 Criteria

Clause Subject	Section Number	Date
Antenna Construction	15.203	2013-09-19

8.3 Results



Photograph 8.3.1 – Top View Showing Printed Circuit Antennas

Antenna for 15.231, 433 MHz Antenna Manufacturer, Details	
RF Code Printed circuit trace antenna. No external connector.	Antenna gain is estimated as 1.7 dBi (small loop).

The antenna designs meet the requirements of the rules.

9.0 Supplemental Compliance Statements

The following information addresses other requirements not otherwise included in test activities.

9.1 15.231(a) (2) – Transmission Cessation

The 433 MHz transmitter ceases transmission within 5 seconds after activation per 15.231(a)(2).

9.2 15.231(a) (3) – Periodic Transmissions

For the purpose of determining system integrity, specifically for security and safety applications, the 433 MHz transmitter emits supervisory and polling transmissions, including data. However, the total duration of these transmissions are limited such that they do not exceed more than 2 seconds per hour.

10.0 Equipment Lists

10.1 Equipment for Spurious Radiated Emissions

Professional Testing, EMI, Inc.			
Test Method:	ANSI C63.4–2009: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/22/2013	**EUT Serial #:**	9992
Customer:	RFCode, Inc.	**EUT Part #:**	None
Project Number:	14891-15	**Test Technician:**	Dave Kohutek / Eric Lifsey
Purchase Order #:	8945	**Supervisor:**	Rob McCollough
Equip. Under Test:	A761	**Witness' Name:**	Jesse Richardson

Radiated Emissions Test Equipment List	
Tile! Software Version:	4.2.A, May 23, 2010, 08:38:52 AM
Test Profile:	Radiated Emissions_Profile Version October 12, 2011

Asset #	Manufacturer	Model	Equipment Nomenclature	Serial Number	Calibration Due Date
1509A	Braden	N/A	TDK 10M Chamber, NSA < 1 GHz	DAC-012915-005	7/29/2014
1890	HP	8447F	Preamp/Amp, 9kHz-1300MHz, 28/25dB	3313A05298	1/8/2014
1930	Agilent	E4440A-239	Spectrum Analyzer, 3 Hz - 26.5 GHz	MY45304903	7/11/2014
1926	ETS-Lindgren	3142D	Antenna, Biconilog, 26 MHz - 6 GHz	00135454	7/29/2014
C027	N/A	RG214	Cable Coax, N-N, 25m	none	9/7/2013
1327	EMCO	1050	Controller, Antenna Mast	none	N/A
0942	EMCO	11968D	Turntable, 4ft.	9510-1835	N/A
1969	HP	11713A	Attenuator/Switch Driver	3748A04113	N/A
1509B	Braden	N/A	TDK 10M Chamber, VSWR > 1 GHz	DAC-012915-005	7/16/2014
1594	Miteq	AFS44-00102650	Amplifier, 1-26.5GHz, 42dB	none	10/15/2013
2004	Miteq	AFS44-00101800-2S-10P-44	Amplifier, 40dB, .1-18GHz	0	11/26/2013
C030	N/A	0	Cable Coax, N-N, 30m	none	9/7/2013
1780	ETS-Lindgren	3117	Antenna, Double Ridged Guide Horn, 1 - 18 GHz	00110313	1/30/2014
1325	EMCO	1050	Controller, Antenna Mast	9003-1461	N/A

10.2 Equipment for Timings and Bandwidth

The following equipment was used to measure transmitter timings and bandwidth.

Asset #	Manufacturer	Model #	Description	Calibration Due
0582	EMCO	3115	Ridge Guide Antenna	2014-02-14
1486	EMCO	3147	Log Periodic Antenna	2013-11-12
1594	Agilent	83017A	Microwave Preamplifier (preamp 1)	2014-09-24
1342	Rohde & Schwarz	FSP-30	Spectrum Analyzer	2015-01-29
C059	Pasternack		Cable	2014-02-06
C249	Pasternack		Cable	2014-02-06
C250	Pasternack		Cable	2014-02-06
1542	AH Systems	SAS-572	Horn Antenna, Standard Gain, 20 dB	Not Required

Appendix: Policy, Rationale, and Evaluation of EMC Measurement Uncertainty

All uncertainty calculations, estimates and expressions thereof shall be in accordance with NIST policy. Since PTI operates in accordance with NIST (NVLAP) Handbook 150-11: 2007, all instrumentation having an effect on the accuracy or validity of tests shall be periodically calibrated or verified traceable to national standards by a competent calibration laboratory. The certificates of calibration or verification on this instrumentation shall include estimates of uncertainty as required by NIST Handbook 150-11.

1. Rationale and Summary of Expanded Uncertainty.

Each piece of instrumentation at PTI that is used in making measurements for determining conformance to a standard (or limit), shall be assessed to evaluate its contribution to the overall uncertainty of the measurement in which it is used. The assessment of each item will be based on either a type A evaluation or a type B evaluation. Most of the evaluations will be type B, since they will be based on the manufacturer's statements or specifications of the calibration tolerances, or uncertainty will be stated along with a brief rationale for the type of evaluation and the resulting stated uncertainties.

The individual uncertainties included in the combined standard uncertainty for a specific test result will depend on the configuration in which the item of instrumentation is used. The combination will always be based on the law of propagation of uncertainty. Any systematic effects will be accommodated by including their uncertainties, in the calculation of the combined standard uncertainty; except that if the direction and amount of the systematic effect cannot be determined and separated from its uncertainty, the whole effect will be treated as uncertainty and combined along with the other elements of the test setup.

Type A evaluations of standard uncertainty will usually be based on calculating the standard deviation of the mean of a series of independent observations, but may be based on a least-squares curve fit or the analysis of variance for unusual situations. Type B evaluations of standard uncertainty will usually be based on manufacturer's specifications, data provided in calibration reports, and experience. The type of probability distribution used (normal, rectangular, a priori, or u-shaped) will be stated for each Type B evaluation.

In the evaluation of the uncertainty of each type of measurement, the uncertainty caused by the operator will be estimated. One notable operator contribution to measurement uncertainty is the manipulation of cables to maximize the measured values of radiated emissions. The operator contribution to measurement uncertainty is evaluated by having several operators independently repeat the same test. This results in a Type A evaluation of operator-contributed measurement uncertainty.

A summary of the expanded uncertainties of PTI measurements is shown as Table 1. These are the worst-case uncertainties considering all operative influence factors.

Table 1: Summary of Measurement Uncertainties for Site 45

Type of Measurement	Frequency Range	Meas. Dist.	Expanded Uncertainty U, dB (k=2)
Mains Conducted Emissions	150 kHz to 30 MHz	N/A	2.9
Telecom Conducted Emissions	150 kHz to 30 MHz	N/A	2.8
Radiated Emissions	30 to 1,000 MHz	10 m	4.8
	1 to 18 GHz	3 m	5.7

End of Report

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