

## COMPLIANCE WORLDWIDE INC. TEST REPORT 463-13

In Accordance with the Requirements of

Industry Canada RSS 210, Issue 8

Federal Communications Commission CFR Title 47 Part 15.231  
Low Power License-Exempt Radio Communication Devices  
Intentional Radiators

Issued to

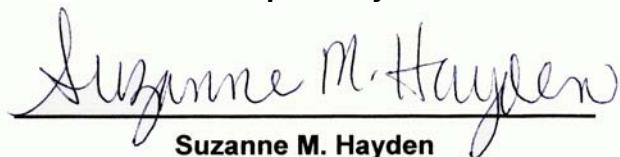
**Nel - Tech Labs, Inc.  
4 Ash Street Extension  
Derry, NH 03038**

for the  
**Customer Service Button**

**FCC ID: UOXNTLCSBUTTON**

**Report Issued on October 4, 2013**

Prepared by

  
Suzanne M. Hayden  
Suzanne M. Hayden

Reviewed By

  
Larry K. Stillings  
Larry K. Stillings

This test report shall not be reproduced, except in full, without written permission from Compliance Worldwide, Inc.

## Table of Contents

1. Scope.....	3
2. Product Details.....	3
2.1. Manufacturer .....	3
2.2. Model Number.....	3
2.3. Serial Number .....	3
2.4. Description .....	3
2.5. Power Source.....	3
2.6. EMC Modifications .....	3
3. Product Configuration .....	3
3.1. Operational Characteristics & Software .....	3
3.2. EUT Hardware .....	3
3.4. Support Equipment .....	3
3.3. Support Equipment Cables .....	3
3.5. Block Diagram.....	3
4. Measurements Parameters.....	4
4.1. Measurement Equipment Used to Perform Test.....	4
4.2. Measurement & Equipment Setup .....	4
4.3. Test Procedure.....	4
5. Measurement Summary.....	5
6. Measurement Data.....	6
6.1. Antenna Requirement .....	6
6.2. Operational Requirement .....	6
6.3. Radiated Field Strength of Fundamental .....	8
6.4. Radiated Field Strength of Harmonics .....	9
6.5. Spurious Radiated Emissions .....	10
6.6. Emission Bandwidth.....	14
6.7. Bandwidth of Momentary Signals .....	15
7. Test Setup Photographs .....	16
8. Test Site Description .....	21



Test Number: 463-13

Issue Date: 10/4/2013

## 1. Scope

This test report certifies that the Nel -Tech Labs Customer Service Button, as tested, meets the RSS 210 Annex II Rules and FCC Part 15.231, Subpart C requirements. The scope of this test report is limited to the test sample provided by the client, only in as much as that sample represents other production units. If any significant changes are made to the unit, the changes shall be evaluated and a retest may be required

## 2. Product Details

**2.1. Manufacturer:** Nel -Tech Labs, Inc.  
**2.2. Model Number:** 942143  
**2.3. Serial Number:** N/A  
**2.4. Description:** 434.0 MHz Customer Service Button  
**2.5. Power Source:** 4.5 VDC (3 AAA Batteries)  
**2.6. EMC Modifications:** None

## 3. Product Configuration

### 3.1. Operational Characteristics & Software

#### Operating Instructions for Test

The Nel-Tech Labs Customer Service Button is operated by simply pressing the button on the unit.

### 3.2. EUT Hardware

Manufacturer	Model/Part # / Options	Serial Number	Input Voltage	Frq (Hz)	Description/Function
Nel - Tech Labs	Customer Service Button	N/A	4.5	DC	Momentary Push Switch

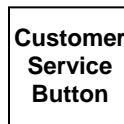
### 3.3. Support Equipment

Manufacturer	Model/Part # / Options	Serial Number	Input Voltage	Frq (Hz)	Description/Function
None					

### 3.4. Support Equipment Cables

Cable Type	Length	Shield	From	To
None				

### 3.5. Block Diagram



#### 4. Measurements Parameters

##### 4.1 Measurement Equipment Used to Perform Test

Device	Manufacturer	Model No.	Serial No.	Cal Due
EMI Test Receiver, 9kHz - 7GHz	Rohde & Schwarz	ESR7	101156	4/4/2015
Spectrum Analyzer	Rohde & Schwarz	FSV40	100899	6/6/2015
Spectrum Analyzer	Hewlett Packard	8546A	3650A00360	6/13/2014
Microwave Preamp	Hewlett Packard	8449B	3008A01323	6/5/2015
Loop Antenna, Passive, 9 kHz to 30 MHz	EMCO	6512	9309-1139	8/28/2014
Biconilog Antenna, 30 MHz to 2000 MHz	Sunol Sciences	JB1	A050913	5/15/2014
Double Ridged Antenna, 1 - 18 GHz	ETS-Lindgren	3117	00143292	1/14/2015
Band Pass Filter	Mini-Circuits	VHP-16	0341	2/27/2014

##### 4.2 Measurement & Equipment Setup

Test Date:	9/29/2013 to 10/4/2013
Test Engineers:	Brian Breault
Site Temperature (°C):	21.4
Relative Humidity (%RH):	44
Frequency Range:	150 kHz to 4.4 GHz
Measurement Distance:	3 Meters
EMI Receiver IF Bandwidth:	120 kHz (30 MHz – 1 GHz) 1 MHz (>1 GHz)
EMI Receiver Avg Bandwidth:	300 kHz (30 MHz – 1 GHz) 3 MHz (>1 GHz)
Detector Functions:	Peak, Quasi-Peak and Average
Antenna Height:	1 to 4 meters

#### 4. Measurements Parameters (continued)

##### 4.3 Test Procedure

Test measurements were made in accordance FCC Part 15.231: Periodic operation within the bands 40.66 – 40.70 MHz and above 70 MHz.

The test methods used to generate the data in this test report are in accordance with ANSI C63.10: 2009, American National Standard for Methods for Unlicensed Wireless Devices

In accordance with ANSI C63.4-2009, section 13.1.4.1 c, the device under test was rotated through three orthogonal axes to determine which attitude produced the highest emission relative to the limit. The attitude that produced the highest emission relative to the limit was used for all radiated emission measurements.

Test Number: 463-13

Issue Date: 10/4/2013

## 5. Measurement Summary

Test Requirement	FCC Requirement	Test Report Section	Result	Comment
Antenna Requirement	15.203	6.1	Compliant	The DUT utilizes an internal PCB etch antenna.
Operational Requirements	15.231 (a)(1)	6.2.1	Compliant	
	15.231 (a)(2)	6.2.2	N/A	This clause does not apply to the unit under test.
	15.231 (a)(3)	6.2.3	N/A	This clause does not apply to the unit under test.
	15.231 (a)(4)	6.2.4	N/A	This clause does not apply to the unit under test.
	15.231 (a)(5)	6.2.5	N/A	This clause does not apply to the unit under test.
Radiated Field Strength of Fundamental	15.231 (b)	6.3	Compliant	
Radiated Field Strength of Harmonics	15.231 (b)(3)	6.4	Compliant	
Spurious Radiated Emissions	15.231 (b)(3), 15.209	6.5	Compliant	
Emission Bandwidth	15.231 (c)	6.6	Compliant	
Bandwidth of Momentary Signals	IC RSS-210 A1.1.3	6.7	Compliant	
Conducted Emissions	15.207	6.8	N/A	Unit operates on 3 AAA batteries.
Determination of Average Factor (Duty Cycle)	15.35 (c)	---	Not Required	

Test Number: 463-13

Issue Date: 10/4/2013

## 6. Measurement Data

### 6.1. Antenna Requirement (Section 15.203)

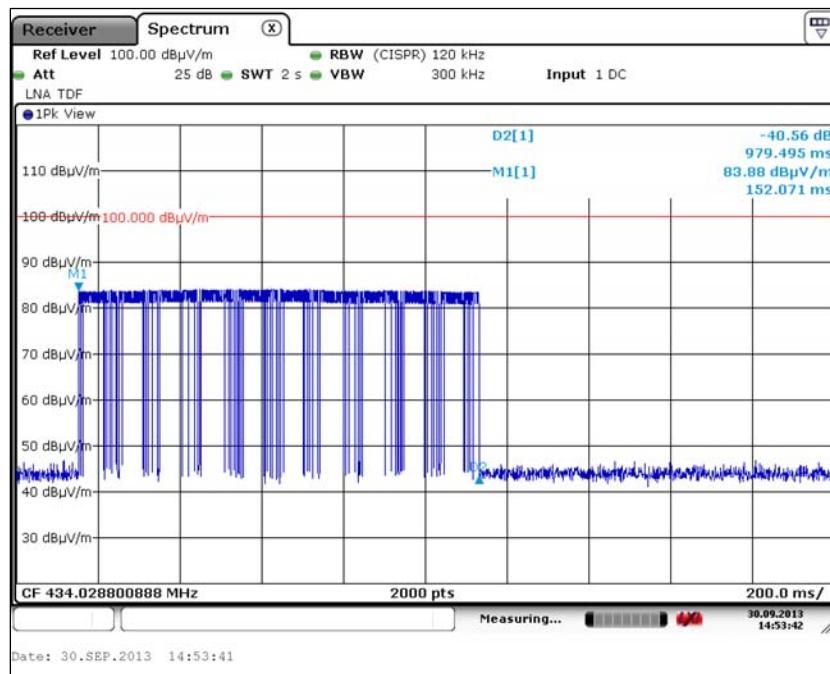
Requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section.

Status: The unit under test is configured with an internal, PC board etched antenna.

### 6.2. Operational Requirements (Section 15.231(a))

6.2.1. Requirement: A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released (Section 15.231(a)(1)).

Status: The transmitter switch deactivates after a 979.495 millisecond transmission.



**6.2. Operational Requirements (Section 15.231(a)) (continued)**

6.2.2. Requirement: A transmitter activated automatically shall cease transmission within 5 seconds after activation (Section 15.231(a)(2)).

Status: This clause does not apply to the device under test.

6.2.3. Requirement: Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour (Section 15.231(a)(3)).

Status: This clause does not apply to the unit under test.

6.2.4. Requirement: Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition. (Section 15.231(a)(4)).

Status: This clause does not apply to the unit under test.

6.2.5. Requirement: Transmission of set-up information for security systems may exceed the transmission duration limits in paragraphs (a)(1) and (a)(2) of this section, provided such transmission are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.

Status: This clause does not apply to the unit under test.

## 6. Measurement Data (continued)

### 6.3. Radiated Field Strength of Fundamental (15.231, Section (b))

Requirement: The 3 meter field strength of the fundamental emissions from intentional radiators operating within the 260-470 MHz frequency bands shall comply with the limits specified in FCC Part 15.231, Section (b). The limit is based on a linear interpolation of the following field strength:

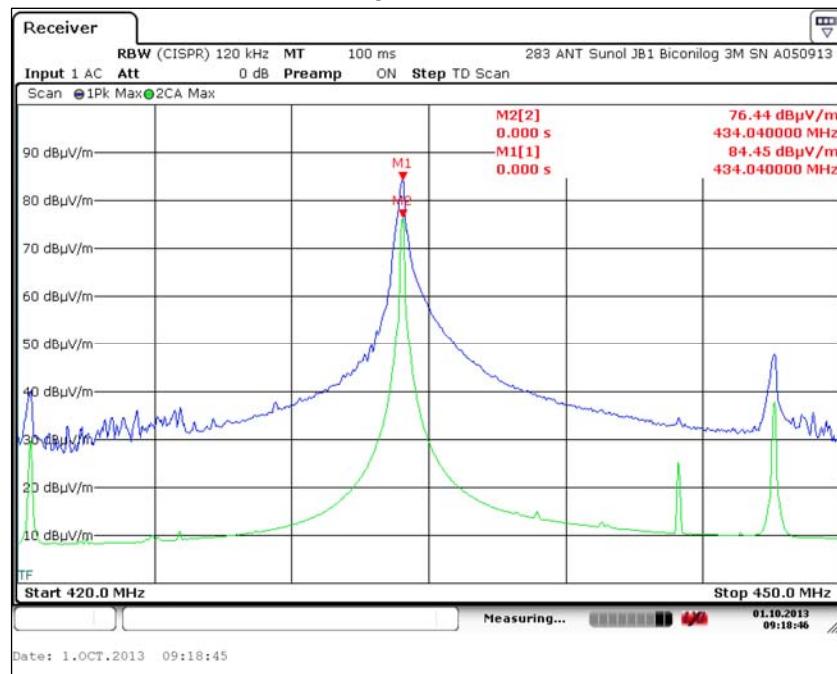
Fundamental Frequency (MHz)	Field Strength of Fundamental ( $\mu$ V/m)
260–470	3,750 to 12,500 $\mu$ V/m

Fundamental Limit at 434.0 MHz = 11,000  $\mu$ V/m = 80.83 dB $\mu$ V/m

Conclusion: The radiated field strength of the device under test complies with the requirements detailed in FCC Part 15.231, Section (b).

Freq (MHz)	Amplitude (dB $\mu$ V/m)		Limit (dB $\mu$ V/m)		Margin (dB)		Ant Pol.	Ant Ht.	Turntable Azimuth	Result
	Peak	Avg.	Peak	Avg.	Peak	Avg.				
434.00	82.78	74.92	100.83	80.83	-18.05	-5.91	H	100	0	Compliant
	84.45	76.44	100.83	80.83	-16.38	-4.39	V	100	0	Compliant

#### 6.3.1. Worst Case Radiated Field Strength of Fundamental



## 6. Measurement Data (continued)

### 6.4. Radiated Field Strength of Harmonics (15.231, Section (b))

Requirement: The 3 meter field strength of the harmonic emissions from intentional radiators operating within the 260-470 MHz frequency band shall comply with the limits specified in FCC Part 15.231, Section (b). The limit is based on a linear interpolation of the following field strength:

Fundamental Frequency (MHz)	Field Strength of Spurious Emissions ( $\mu$ V/m)
260–470	375 to 1250

$$\text{Spurious Emissions Limit} = 1,100 \mu\text{V/m} = 60.83 \text{ dB}\mu\text{V/m}$$

Test Notes: The peak field strength may not be greater than 20 dB above the average limit.

Conclusion: The device under test complies with the requirements detailed in FCC 15.231, Section B.

#### 6.4.1. Harmonics < 1 GHz

Freq.	Amplitude <sup>1</sup> (dB $\mu$ V/m)		Limit (dB $\mu$ V/m)		Margin (dB)		Ant Polarity	Ant Height	Turntable Azimuth	Result
	Peak	QP	Peak	QP	Peak	QP	H/V	cm	Deg	
868	44.63	42.99	80.83	60.83	-36.20	-17.84	H	100	0	Compliant
868	34.09	31.02	80.83	60.83	-46.74	-29.81	V	100	0	Compliant

#### 6.4.2. Harmonics > 1 GHz (Tabled data represents the worst case polarity)

Freq.	Amplitude <sup>1</sup> (dB $\mu$ V/m)		Limit (dB $\mu$ V/m)		Margin (dB)		Ant Polarity	Ant Height	Turntable Azimuth	Result
	Peak	Average	Peak	Average	Peak	Average	H/V	cm	Deg	
1302.00	44.18	30.22	74.00	54.00	-29.82	-23.78	V	100	0	Compliant
1736.00	50.73	39.84	80.83	60.83	-30.10	-20.99	V	100	0	Compliant
2170.00	53.85	42.59	80.83	60.83	-26.98	-18.24	V	100	0	Compliant
2604.00	60.29	46.43	80.83	60.83	-20.54	-14.40	V	100	0	Compliant
3038.00	53.78	41.01	80.83	60.83	-27.05	-19.82	V	100	0	Compliant
3472.00	52.97	40.84	80.83	60.83	-27.86	-19.99	V	100	0	Compliant
3906.00	56.12	45.03	74.00	54.00	-17.88	-8.97	V	100	0	Compliant
4340.00	65.54	53.26	74.00	54.00	-8.46	-0.74	V	100	0	Compliant

<sup>1</sup> Correction factors are included in measurement values

## 6. Measurement Data (continued)

### 6.5. Spurious Radiated Emissions, 12 MHz to 4.4 GHz (15.231, Section (b))

Requirement: Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

#### 6.5.1. Spurious Radiated Emissions Test Setup

Requirement: (15.209) The Emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency Range (MHz)	Distance (Meters)	Limit (dB $\mu$ V/m) <sup>1</sup>
0.009 to 0.490	3	128.5 to 93.8
0.490 to 1.705	3	73.8 to 63.0
1.705 to 30	3	69.5
30 to 88	3	40.0
88 to 216	3	43.5
216 to 960	3	46.0
>960	3	54.0 <sup>2</sup>

<sup>1</sup> Measurements in the 9 to 90 kHz, 110 to 490 kHz and above 1000 MHz ranges employ an average detector. Otherwise a quasi-peak detector is used.

<sup>2</sup> Value represents the limit in the restricted bands of operation. Otherwise the limit is 60.83 dB $\mu$ V/m as specified by Part 15.231.

Procedure: This test was performed in accordance with the procedure detailed in FCC OET publication number 558074, Section 5.4: Maximum Unwanted Emissions Levels and FCC 47CFRPart 15.209: Radiated Emission Limits; General Requirements.

Test measurements were made in accordance with ANSI C63.4-2009, Standard Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronics Equipment in the Range of 9 kHz to 40 GHz.

Conclusion: The Emissions from the DUT did not exceed the field strength levels specified in the above table.

Test Number: 463-13

Issue Date: 10/4/2013

## 6. Measurement Data (continued)

### 6.5. Spurious Radiated Emissions, 30 MHz to 4.4 GHz (15.231, Section (b)) (continued)

#### 6.5.1. Spurious Radiated Emissions, 12 MHz to 30 MHz Test Results

##### 6.5.1.1. 150 kHz to 30 MHz, Parallel Antenna



##### 6.5.1.2. 150 kHz to 30 MHz, Perpendicular Antenna



Test Number: 463-13

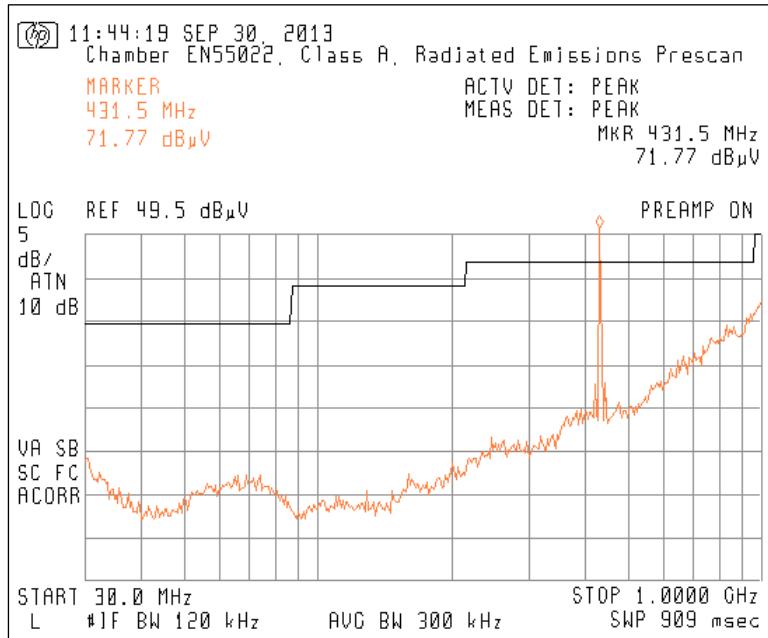
Issue Date: 10/4/2013

## 6. Measurement Data (continued)

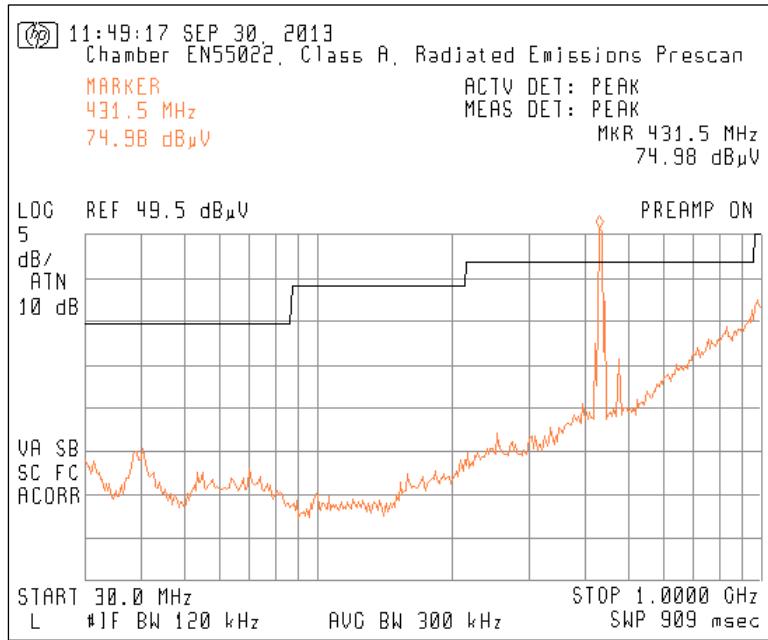
### 6.5. Spurious Radiated Emissions, 30 MHz to 4.4 GHz (15.231, Section (b)) (continued)

#### 6.5.2. Spurious Radiated Emissions, 30 MHz to 1 GHz Test Results

##### 6.5.2.1. Horizontal Polarity (Marked emission is the transmitter)



##### 6.5.2.2. Vertical Polarity (Marked emission is the transmitter)





Test Number: 463-13

Issue Date: 10/4/2013

## 6. Measurement Data (continued)

### 6.5. Spurious Radiated Emissions, 30 MHz to 4.4 GHz (15.231, Section (b)) (continued)

#### 6.5.3. Spurious Radiated Emissions, >1 GHz Test Results

There were no measurable spurious emissions other than the harmonic emissions detailed in section 6.4.2.

**Test Number: 463-13**
**Issue Date: 10/4/2013**

## 6. Measurement Data (continued)

### 6.6. Emission Bandwidth

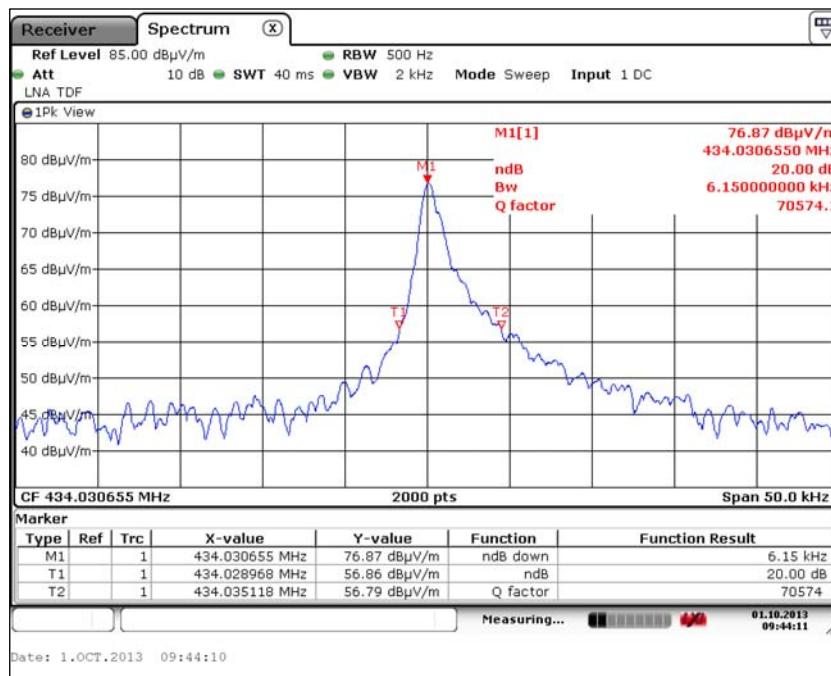
Requirement: The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test Note: In order to measure the modulated signal properly, a resolution bandwidth that is small compared with the bandwidth required by the procuring or regulatory agency shall be used on the measuring instrument. However, the resolution bandwidth of the measuring instrument shall be set to a value within 1% to 5% of the signal bandwidth requirements.

Conclusion: The Emissions from the DUT meets the above requirement.

Site Temperature: 22.4°C      Site Humidity: 31% RH

Fundamental Frequency (MHz)	-20 dB Bandwidth (MHz)	Limit (MHz)	Result	
			Result	Comments
434.000	0.00615	1.0850	Compliant	



Test Number: 463-13

Issue Date: 10/4/2013

## 6. Measurement Data (continued)

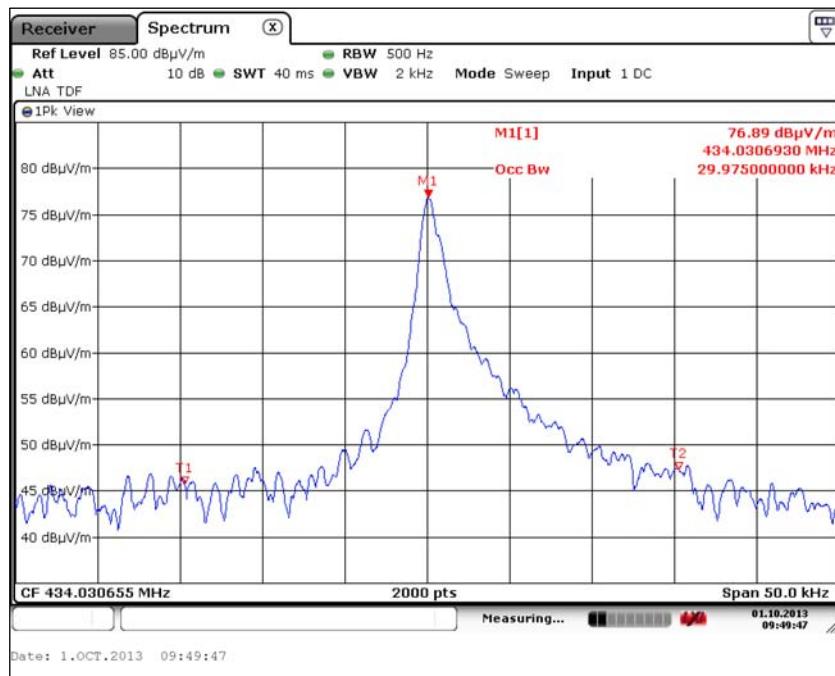
### 6.7. Bandwidth of Momentary Signals (IC RSS-210 A1.1.3)

Requirement: The 99% bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating between 70 MHz - 900 MHz.

The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual.

Conclusion: The Emissions from the DUT meets the above requirement.

Fundamental Frequency (MHz)	99% Bandwidth (MHz)	Limit (MHz)	Result
434.000	0.029975	1.0850	Compliant



Test Number: 463-13

Issue Date: 10/4/2013

## 7. Test Setup Photographs

### 7.1. Radiated Emissions Front View



Test Number: 463-13

Issue Date: 10/4/2013

**7. Test Setup Photographs**

**7.2. Radiated Emissions Rear View < 30 MHz**



Test Number: 463-13

Issue Date: 10/4/2013

## 7. Test Setup Photographs

### 7.3. Radiated Emissions Rear View 30 MHz – 1 GHz



Test Number: 463-13

Issue Date: 10/4/2013

## 7. Test Setup Photographs

### 7.5. Radiated Emissions Front View > 1 GHz



**7. Test Setup Photographs**

**7.5. Radiated Emissions Rear View > 1 GHz**





Test Number: 463-13



Issue Date: 10/4/2013

## 8. Test Site Description

Compliance Worldwide is located at 357 Main Street in Sandown, New Hampshire. The test sites at Compliance Worldwide are used for conducted and radiated emissions testing in accordance with Federal Communications Commission (FCC) and Industry Canada standards. A description of the test sites is on file with the FCC (registration number **96392**) and Industry Canada (file number **IC 3023A-1**).

The radiated emissions test site is a 3 and 10 meter enclosed open area test site (OATS). Personnel, support equipment and test equipment are located in the basement beneath the OATS ground plane.

The conducted emissions site is part of a 16' x 20' x 12' ferrite tile chamber and uses one of the walls for the vertical ground plane required by EN 55022.

Both sites are designed to test products or systems 1.5 meter W x 1.5 meter L x 2.0 meter H, floor standing or table top.