



Engineering Solutions & Electromagnetic Compatibility Services

**FCC Part 15.225 & Industry Canada RSS-210  
Certification Application Report**

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<b>FCC/IC ID</b>	W9T-BTRLBEX/ 8174A-BTRLBEX	<b>Test Report Date</b>	August 19, 2016
<b>Platform</b>	N/A	<b>RTL Work Order #</b>	2016095
<b>Model</b>	Bluetooth® REALTOR® Lockbox-EX	<b>RTL Quote #</b>	QRTL16-095A
<b>American National Standard Institute</b>	ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices		
<b>FCC Classification</b>	DXX – Part 15 Low Power Communication Device Transmitter		
<b>FCC Rule Part(s)/Guidance</b>	FCC Rules Part 15.225: Operation within the band 13.110-14.010 MHz (10-01-15)		
<b>Industry Canada</b>	RSS-210 Issue 8: License-Exempt Radio Apparatus (All Frequency Bands): Category I Equipment RSS-Gen: Issue 4; 2014 General Requirements for the Compliance of Radio Apparatus		
<b>Digital Interface Information</b>	Digital Interface was found to be compliant		
<b>Frequency Range (MHz)</b>	<b>Output Power (W)</b>	<b>Frequency Tolerance</b>	<b>Emission Designator</b>
13.56	N/A	N/A	154KFXD

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, RSS-210, and ANSI C63.10.

Signature: 

Date: August 19, 2016

Typed/Printed Name: Desmond A. Fraser

Position: President

*This report may not be reproduced, except in full, without the written approval of Rhein Tech Laboratories, Inc. and SentriLock, LLC. The test results relate only to the item(s) tested.*

*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

This is an original certification application request for the Bluetooth® REALTOR® Lockbox-EX.

Applicable Standards:

- FCC Part 15.225: Operation within the band 13.110-14.010 MHz
- Industry Canada RSS-210: License-Exempt Radio Apparatus (All Frequency Bands): Category I Equipment

### 1.2 Description of EUT

<b>Equipment Under Test</b>	Transceiver
<b>Model</b>	Bluetooth® REALTOR® Lockbox-EX
<b>Power Supply</b>	3.6 VDC AA size cell Thionyl Chloride Lithium
<b>Modulation Type</b>	ASK
<b>Frequency Range</b>	13.56 MHz
<b>Antenna Connector Type</b>	Chip
<b>Antenna Type</b>	Internal

### 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.

### 1.4 Related Submittal(s)/Grant(s)

This is an original certification application for Sentrilock, LLC Model: Bluetooth® REALTOR® Lockbox-EX, FCC ID: W9T-BTRLBEX; IC: 8174A-BTRLBEX. The Industry Canada certification includes a Family Certification for two HVIN's, SL30671 and SL30704, the standard model and the wall-mount model respectively.

### 1.5 Modifications

No modifications were made to the equipment during testing in order to achieve compliance with these standards.

## 2 Test Information

### 2.1 Description of Test Modes

**Table 2-1: Channels Tested**

Frequency (MHz)
13.56

### 2.2 Exercising the EUT

The EUT was supplied with test firmware programmed with a continuous channel for testing. 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.

### 2.3 Test Result Summary

**Table 2-2: Test Result Summary**

Standard	Test	Pass/Fail or N/A
FCC 15.207	AC Power Conducted Emissions	N/A
FCC 15.209	Radiated Emissions	Pass
FCC 15.225(a) and (d)	Field Strength of Fundamental and Harmonics	Pass
RSS-Gen	20 dB Bandwidth	Pass

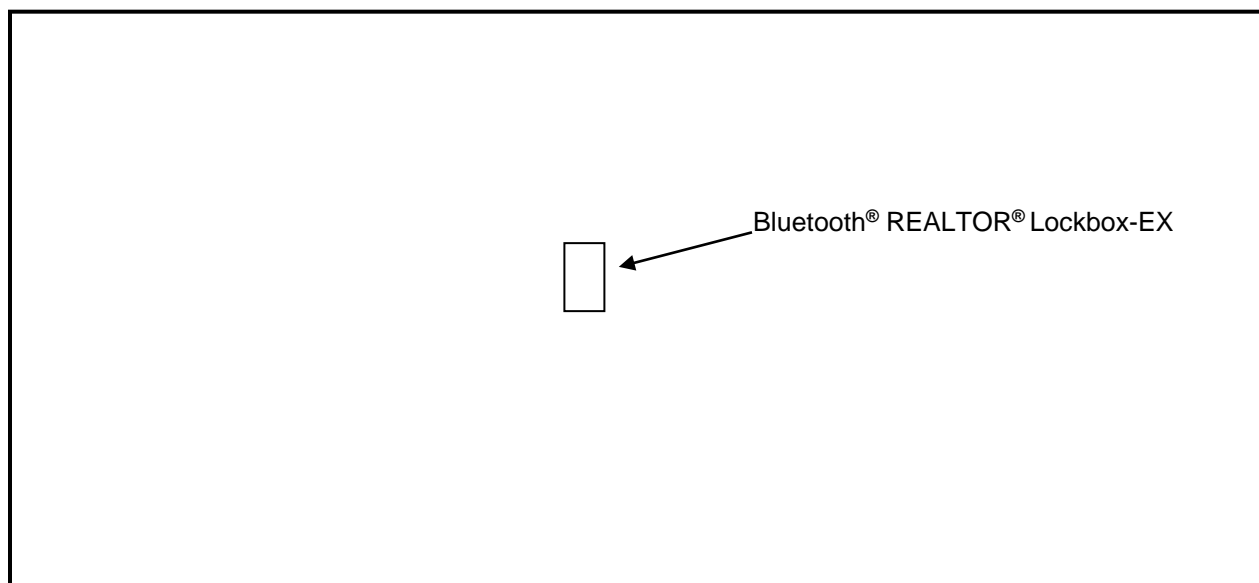
## 2.4 Test System Details

The test samples were received on August 6, 2016. The FCC identifiers for all applicable equipment, plus descriptions of all cables used in the tested system, are identified in the following table.

**Table 2-3: Equipment Under Test**

Part	Manufacturer	Model	Serial Number	FCC ID	Cable Description	RTL Bar Code
Wireless Lock (Standard)	Sentrilock, LLC	Bluetooth® REALTOR® Lockbox-EX	1063835	W9T-BTRLBEX	N/A	22117
Wireless Lock (External Connector)	Sentrilock, LLC	Bluetooth® REALTOR® Lockbox-EX	1063839	W9T-BTRLBEX	N/A	22118
Wireless Lock (Constant Transmit)	Sentrilock, LLC	Bluetooth® REALTOR® Lockbox-EX	1063841	W9T-BTRLBEX	N/A	22119

## 2.5 Configuration of Tested System



**Figure 2-1: Configuration of System Under Test**

### 3 Radiated Emissions – FCC §15.209, §15.225(a)&(d); IC RSS-210 §A2.6; RSS-Gen

#### 3.1 Limits of Radiated Emissions Measurement

Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009-0.490	2400/f (kHz)	300
0.490-1.705	2400/f (kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

As shown in 15.35(b), for frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any circumstances of modulation.

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

$20\log(15,848)=84$  dBuV/m at 30 m

Converting to 10 m  $20*\log(30/10)=9.5$ ,  $84+9.5=93.5$  dBuV/m at 10 m.

#### 3.2 Radiated Emissions Measurement Test Procedure

Before final measurements of radiated emissions were made on the open-field three/ten meter range, the EUT was scanned indoors at one and three meter distances. This was done in order to determine its emissions spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to ensure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the three/ten-meter, open-field test site. The EUT was placed on a nonconductive turntable 0.8 meters above the ground plane. The spectrum was examined from 9 kHz to the 10<sup>th</sup> harmonic of the highest fundamental transmitter frequency (135.6 MHz).

At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the emission's maximum level. Measurements were taken using both horizontal and vertical antenna polarizations. For frequencies between 30 and 1000 MHz, the spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode. For emissions above 1000 MHz, emissions are measured using the average detector function with a minimum resolution bandwidth of 1 MHz. No video filter less than 10 times the resolution bandwidth was used. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

**Table 3-1: Radiated Emissions Test Equipment**

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901663	Rohde and Schwarz	HFH2-Z2	Loop Antenna (9 kHz-30 MHz)	881056/062	5/21/17
900878	Rhein Tech Laboratories	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	Not Required
901242	Rhein Tech Laboratories	WRT-000-0003	Wood rotating table	N/A	Not Required
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	3/22/18
900791	Chase	CBL6111B	Bilog Antenna (30 MHz-2000 MHz)	N/A	6/11/17
901592	Insulated Wire Inc.	KPS-1503-3600-KPR	SMK RF Cables 20'	NA	8/3/17
901593	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36"	NA	8/1/17

### 3.3 Radiated Emissions Test Results

**Table 3-2: Radiated Emissions Test Data (Fundamental)**

Emission Frequency (MHz)	Quasi-Peak Analyzer Reading (dBuV/m)	Site Correction Factor (dB/m)	Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)
13.56	29.7	20.7	50.4	93.5	-43.1

\* testing performed at 10m.

### 3.4 Radiated Emissions Harmonics/Spurious Test Data

**Table 3-3: Radiated Emissions Harmonics/Spurious**

Emission Frequency (MHz)	Quasi-Peak Analyzer Reading (dBuV/m)	Site Correction Factor (dB/m)	Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)
27.12	1.6	23.1	24.7	49.5	-24.8
40.68	-4.0	14.3	10.3	40.0	-29.7
54.24	-5.5	8.2	2.7	40.0	-37.3
67.80	2.3	7.2	9.5	40.0	-30.5
81.36	5.7	8.9	14.6	40.0	-25.4
94.92	-0.9	11.4	10.5	43.5	-33.0
108.48	0.9	12.7	13.6	43.5	-29.9
122.04	7.8	13.0	20.8	43.5	-22.7
135.60	-0.3	12.3	12.0	43.5	-31.5


\* testing performed at 1m, interpolated to 3m.

### 3.5 Radiated Emissions Digital Test Data

**Table 3-4: Digital Radiated Emissions Test Data**

Temperature: 70°F Humidity: 94%										
Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pass/Fail
32.0	Qp	V	0	1.0	4.0	18.2	22.2	40.0	-17.8	Pass
64.0	Qp	V	0	1.0	13.7	6.8	20.5	40.0	-19.5	Pass
96.0	Qp	V	0	1.0	10.9	11.6	22.5	43.5	-21.0	Pass
128.0	Qp	V	0	1.0	1.5	12.8	14.3	43.5	-29.2	Pass
160.0	Qp	V	0	1.0	2.8	11.5	14.3	43.5	-29.2	Pass
192.0	Qp	V	0	1.0	4.0	10.5	14.5	43.5	-29.0	Pass
320.0	Qp	V	0	1.0	-8.6	15.0	6.4	46.0	-39.6	Pass
544.0	Qp	H	0	1.0	-6.1	21.6	15.5	46.0	-30.5	Pass

**Test Personnel:**

Daniel W. Baltzell Test Engineer	 Signature	August 15, 2016 Date of Test
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#### 4 AC Conducted Emissions - FCC §15.207; IC RSS-Gen §7.2.4: Conducted Limits

No AC conducted tests are required since the device is powered solely by a 3 VDC AA size cell.

#### 5 20 dB Bandwidth – IC RSS-Gen

##### 5.1 20 dB Bandwidth Test Procedure

The minimum 20 dB bandwidths per RSS-Gen were measured using a 50-ohm spectrum analyzer. The modulated carrier was adjusted on the analyzer so that it was displayed entirely on the spectrum analyzer. The sweep time was auto and allowed through several sweeps with the max hold function used in peak detector mode. The resolution bandwidth was set to 1% of the span, and the video bandwidth set to 10 times the RBW. The table below contains the bandwidth measurement results.

**Table 5-1: 20 dB Bandwidth Test Equipment**

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	3/22/18

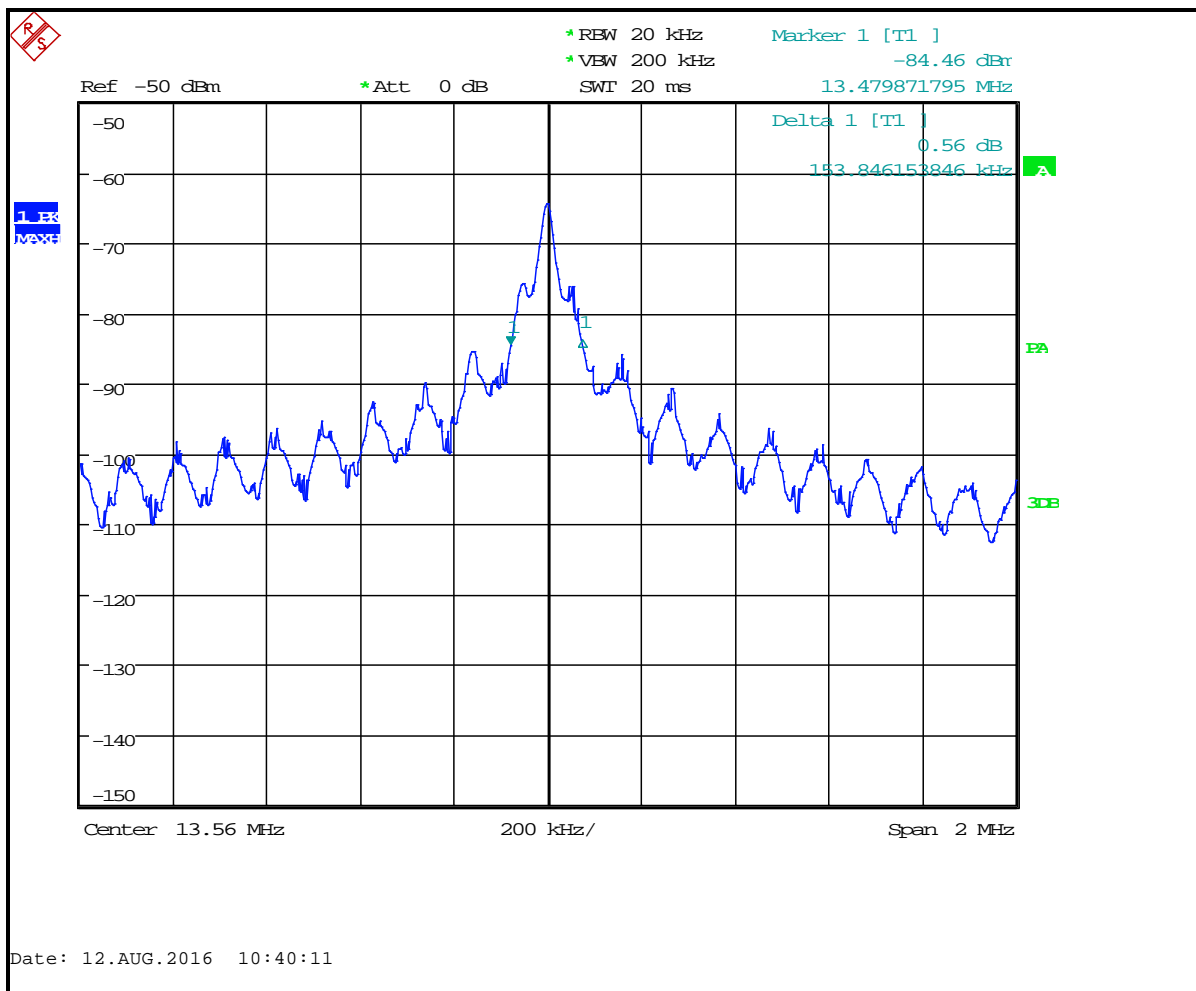
##### 5.2 20 dB Modulated Bandwidth Test Data

**Table 5-2: 20 dB Modulated Bandwidth Test Data**

Minimum 20 dB bandwidths	
Frequency (MHz)	20 dB Bandwidth (kHz)
13.56	153.9

### 5.3 20 dB Bandwidth Plots

Plot 5-1: 20 dB Bandwidth - 13.56 MHz



### Test Personnel:

Daniel W. Baltzell  
 Test Engineer

*Daniel W. Baltzell*

Signature

August 12, 2016  
 Date of Test

## 6 Frequency Stability – FCC §2.1055, §15.225(e)

### 6.1 Test Procedure

ANSI C63.10-2013, section 6.8

The carrier frequency stability is the ability of the transmitter to maintain an assigned carrier frequency.

15.255(e): The frequency tolerance of the carrier signal shall be maintained within  $\pm .01\%$  of the operating frequency over a temperature variation of  $-20^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  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  $20^{\circ}\text{C}$ . For battery operated equipment, the equipment tests shall be performed using a new battery.

The EUT was evaluated over the temperature range  $-20^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$ .

The temperature was initially set to  $-20^{\circ}\text{C}$  and a 1-hour period was observed for stabilization of the EUT. The frequency stability was measured within one minute after application of primary power to the transmitter. The temperature was raised at intervals of 10 degrees centigrade through the range. A ½-hour period was observed to stabilize the EUT at each measurement step and the frequency stability was measured within one minute after application of primary power to the transmitter. Additionally, the power supply voltage of the EUT was varied  $\pm 15\%$  nominal input voltage.

The worst-case deviation was found to be 0.006% of operating frequency.

**Table 6-1: Frequency Stability Test Equipment**

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900946	Tenney Engineering, Inc.	TH65	Temperature Chamber with Humidity	11380	3/26/18
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	3/22/18
901350	Meterman	33XR	Multimeter	040402802	4/14/17
901635	Hewlett Packard	6024A	DC Power Supply	1912A00331	N/A

### 6.2 Test Data

**Table 6-2: Temperature Frequency Stability**


Temperature ( $^{\circ}\text{C}$ )	Measured Frequency (MHz)	Percent of Operating Frequency
-20	13.559199	0.006
-10	13.559199	0.006
0	13.559199	0.006
10	13.559199	0.006
20 (reference)	13.559199	0.006
30	13.559199	0.006
40	13.559199	0.006
50	13.559199	0.006

**Table 6-3: Voltage Frequency Stability at 20°C**

Voltage (DC)	Measured Frequency (MHz)	Percent of Operating Frequency
3.06	13.559199	0.006
3.6	13.559199	0.006
4.14	13.559199	0.006

Results: The EUT is compliant.

**Test Personnel:**

Daniel Baltzell		August 12-15, 2016
Test Engineer	Signature	Dates of Tests

**7 Conclusion**

The data in this measurement report shows that the EUT as tested, Bluetooth® REALTOR® Lockbox-EX, FCC ID: W9T-BTRLBEX, IC: 8174A-BTRLBEX, complies with all the applicable requirements of Parts 2 and 15 of the FCC Rules and Regulations, and IC RSS-210 and RSS-Gen.