



Engineering Solutions & Electromagnetic Compatibility Services

**Application Test Report
FCC Part 15.231 & Industry Canada RSS-210**

Test Lab: Rhein Tech Laboratories, Inc. Tel: 703-689-0368 360 Herndon Parkway Fax: 703-689-2056 Suite 1400 www.rheintech.com Herndon, VA 20170 E-Mail: atcbinfo@rheintech.com		Applicant: Strattec Security Corp. Tel: 414-247-3333 3333 West Good Hope Rd. Fax: 414-247-3329 Milwaukee, Wisconsin Contact: Brian Reetz breetz@strattec.com	
FCC ID/IC:	OHT4882056 5461A-4882056	Test Report Date:	July 19, 2017
Platform:	N/A	RTL Work Order #:	2017126
Model:	OHT4882056	RTL Quote #:	QRTL17-126A
American National Standard Institute:	ANSI C63.10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices		
FCC Classification:	DSC – Part 15 Security/Remote Control Transmitter		
FCC Rule Part(s)/Guidance:	FCC Rules Part 15.231: Periodic operation in the band 40.66–40.70 MHz and above 70 MHz (10-1-16)		
Industry Canada:	RSS-210 Issue 9: Low Power License-Exempt Communications Devices		
Frequency Range (MHz)	Output Power* (W)	Frequency Tolerance	Emission Designator
433.92	N/A	N/A	582KF1D

* power is calculated radiated peak limit

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, Industry Canada RSS-210, and ANSI C63.10.

Signature: 

Date: July 19, 2017

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 Strattec Security Corp. 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 ANAB. Refer to certificate and scope of accreditation AT-1445.

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1 General Information

1.1 Scope

This is a FCC/IC original application report.

Applicable Standards:

- FCC Rules Part 15.231: Periodic operation in the band 40.66–40.70 MHz and above 70 MHz (15.231(e) limits)
- Industry Canada RSS-210: Low Power License-Exempt Communications Devices

1.2 Description of EUT

Model	OHT4882056
Power Supply	Internal 3 VDC Cell (CR2450)
Frequency Range	433.92 MHz
Antenna Type	Internal PCB Trace

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.

1.4 Related Submittal(s)/Grant(s)

This is an original application of a transmitter for Strattec Security Corp., Model: OHT4882056, FCC ID: OHT4882056, IC: 5461A-4882056.

2 Test Information

2.1 Description of Test Modes

In accordance with FCC 15.31(m), and because the EUT utilizes an operating band of one frequency, the following frequency was tested.

Table 2-1: Channels Tested

Frequency
433.92

2.2 Exercising the EUT

The EUT was supplied with test firmware programmed to transmit continuously, as well as in an original configuration for bandwidth and timing tests. The EUT was tested in all three orthogonal planes in order to determine worst-case emissions. 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 15.231, IC RSS-210 Annex A

FCC Reference	IC RSS-210 Reference	Test	Pass/Fail or N/A
15.209	4.1	Radiated Emissions	Pass
15.231(e)	A.1.4	Maximum Peak Power Output	Pass
15.231(c)	A.1.3	Bandwidth	Pass
15.231(a)(1)	A.1.1	5 second release	Pass

2.4 Test System Details

The test samples were received on June 29, 2017. 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
Keyfob Silver Side, 3 button	Strattec Security Corp.	OHT4882056	N/A	OHT4882056	N/A	22544
Keyfob Black Side, 3 button	Strattec Security Corp.	OHT4882056	N/A	OHT4882056	N/A	22545
Keyfob Silver Side, 5 button	Strattec Security Corp.	OHT4882056	N/A	OHT4882056	N/A	22548
Keyfob Black Side, 5 button	Strattec Security Corp.	OHT4882056	N/A	OHT4882056	N/A	22547
Keyfob Black Side, 3 button, normal operation	Strattec Security Corp.	OHT4882056	N/A	OHT4882056	N/A	22546

2.5 Configuration of Tested System

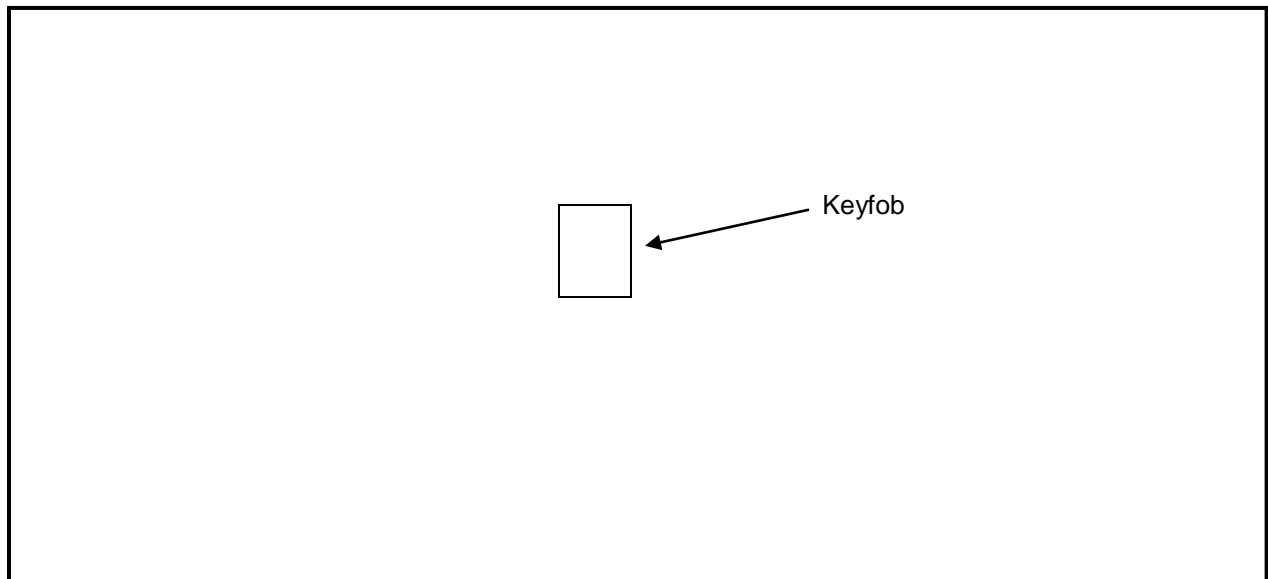


Figure 2-1: Configuration of System Under Test

3 Bandwidth – FCC 15.231(c); IC RSS-210 A1.3

3.1 Bandwidth Test Procedure

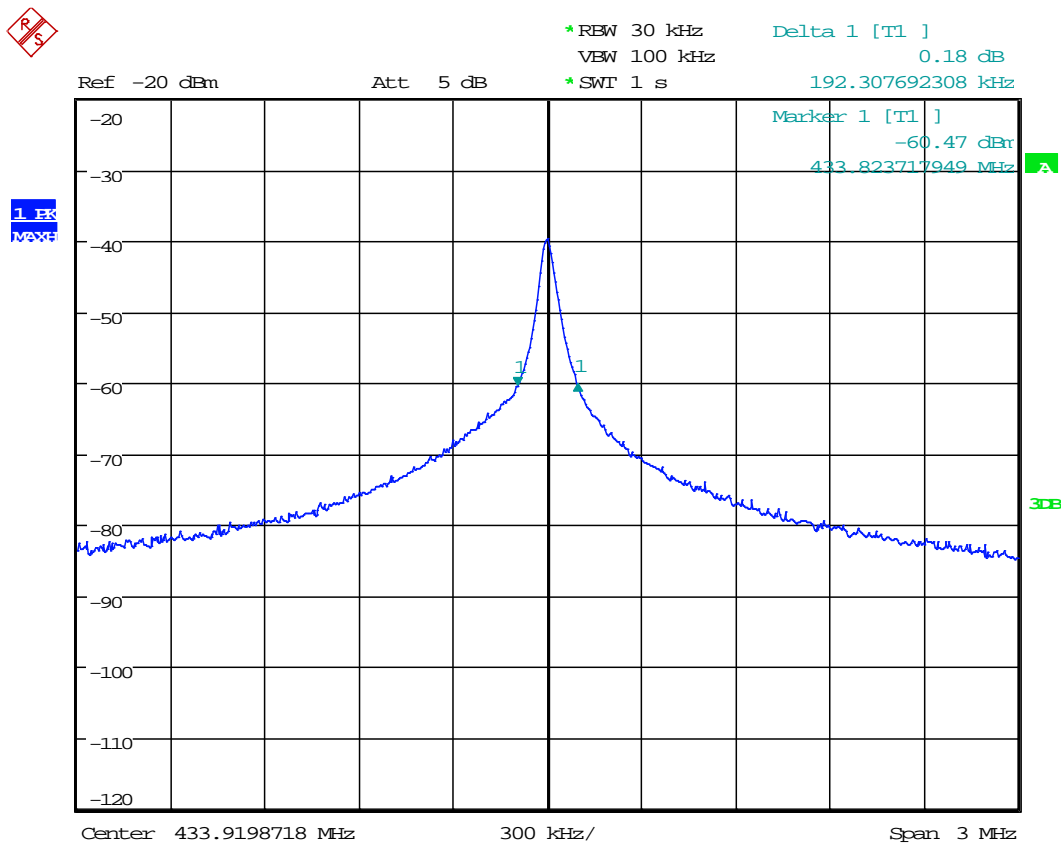
The minimum 20 dB bandwidth (99% for ISED) was measured using a 50 ohm spectrum analyzer. The carrier was adjusted on the analyzer so that it was displayed entirely on the spectrum analyzer. The analyzer went through several sweeps with the max hold function used in peak detector mode. The resolution bandwidth was set to 30 kHz, and the video bandwidth set > 3X RBW. The minimum bandwidth was measured using the spectrum analyzer marker delta function. The plots on the following pages contain the bandwidth measurement results.

Table 3-1: 20 dB Bandwidth Test Equipment

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

3.2 20 dB Bandwidth Test Data

Plot 3-1: 20 dB Bandwidth – 433.920 MHz



Date: 29.JUN.2017 14:04:01

Test Personnel:

Dan Baltzell
 EMC Test Engineer

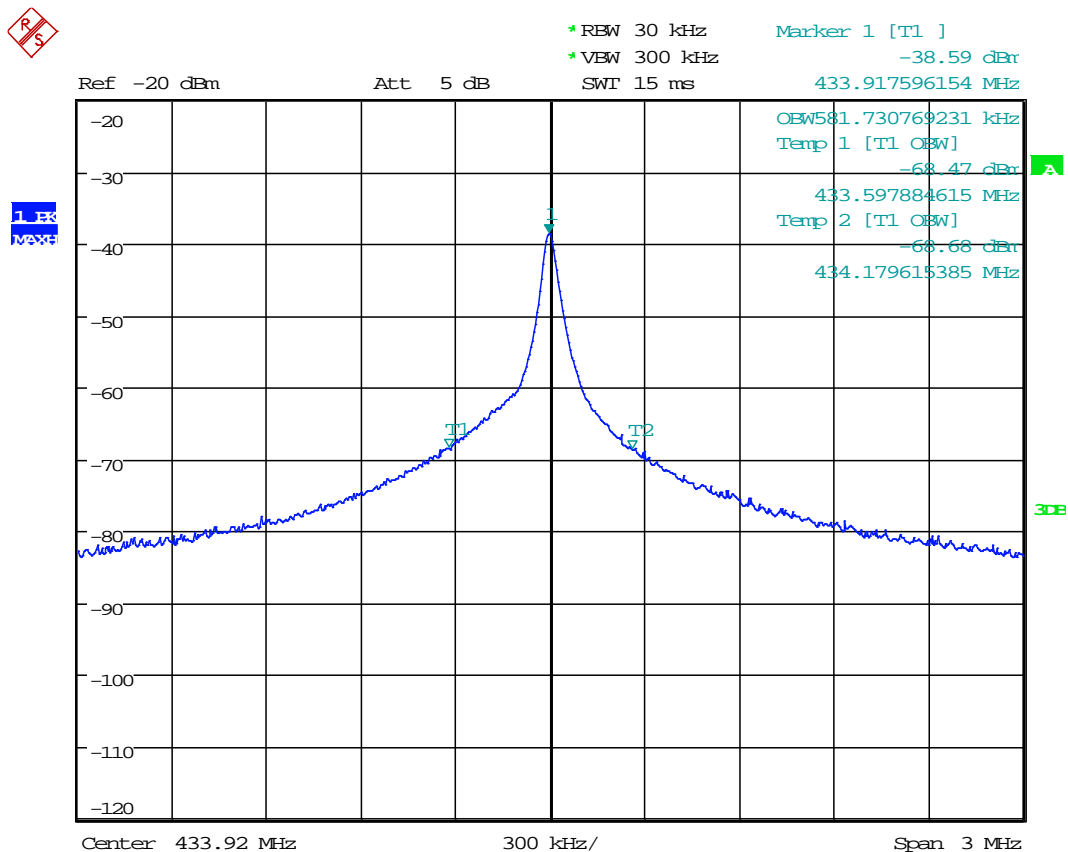
Daniel W. Baltzell

Signature

June 29, 2017
 Date of Test

3.3 99% Bandwidth Test Data

Plot 3-2: 99% Bandwidth – 433.920 MHz



Date: 6.JUL.2017 15:14:22

Test Personnel:

Dan Baltzell
 EMC Test Engineer

Daniel W. Baltzell

Signature

July 6, 2017
 Date of Test

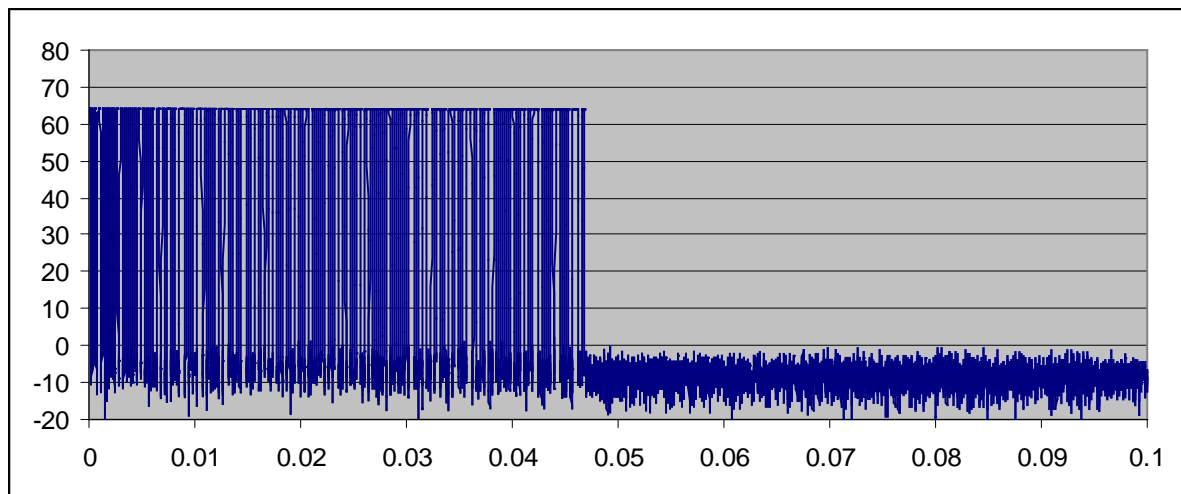
4 Duty Cycle Calculation

4.1 Duty Cycle Test Procedure

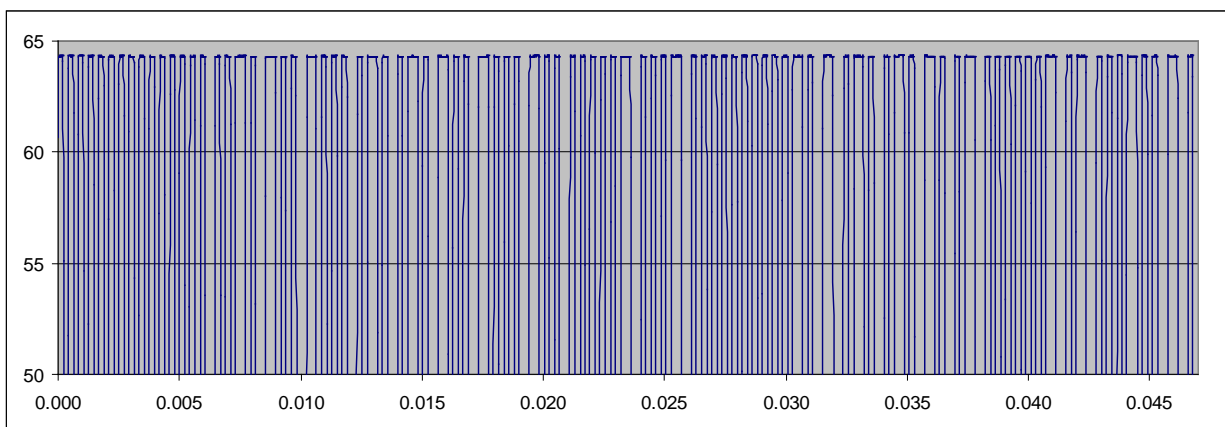
Using a zero span, the sweep time was set to 100 ms. Pulses were measured triggered with the IF power for 8000 points. The amplitudes were summed, less space between, from an ASCII output of the analyzer to a spreadsheet where the result was found to be 0.024938 seconds.

Table 4-1: Duty Cycle Test Equipment

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



Plot 4-1: Duty Cycle Plot (100 ms)



Plot 4-2: Detail of Pulses Measured

Duty cycle calculation for 0.025/0.1:

$$20 \cdot \log(0.025/0.1) = -12 \text{ dB}$$

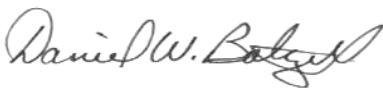
Table 4-2: Example of Spreadsheet used for Duty Cycle

Time (s)	Amplitude (dBuV)	Time difference (s)
Column A	Column B	Column C
0.00017500	64.32826	0.0000125
0.00018750	64.32763	0.0000125
0.00020000	64.08362	0.0000125
0.00021250	55.07623	0.0000125
0.00022500	-2.16612	0.0000000
0.00023750	-3.19086	0.0000000

Column C " =IF(B43>40,A44-A43,0)"

Column D " =SUM(C29:C8029)" resulted in 0.024938

Test Personnel:

Daniel W. Baltzell Test Engineer	 Signature	June 30, 2017 Date of Test
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5 Radiated Emissions Test Results - FCC Part 15.231(e); IC RSS-210 A.1.4

5.1 Limits of Radiated Emissions Measurement

Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emission (microvolts/meter)
40.66-40.70	1000	100
70-130	500	50
130-174	500 to 1500 ¹	50 to 150 ¹
174-260	1500	150
260-470	1500 to 5000 ¹	150 to 500 ¹
Above 470	5000	500

¹Linear interpolations

5.2 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 10th harmonic of the highest fundamental transmitter frequency (4.3 GHz).

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.

The fundamental field strength of each type with a key inserted and removed were measured and the worst case spurious emissions reported.

Table 5-1: Radiated Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900878	Rhein Tech Laboratories, Inc.	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	Not Required
901592	Insulated Wire Inc.	KPS-1503-3600-KPR	SMK RF Cables 20'	NA	8/03/17
901242	Rhein Tech Laboratories, Inc.	WRT-000-0003	Wood rotating table	N/A	Not Required
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	1166.1660.50	3/22/18
900791	Chase	CBL6112	Antenna (30 MHz – 2 GHz)	2099	6/11/18
900321	EMCO	3161-03	Horn Antenna (4.0 - 8.2 GHz)	9508-1020	4/9/18
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	4/9/18

5.2.1 Radiated Emissions Harmonics/Spurious Test Data

Table 5-2: Fundamental Peak Radiated Emissions Harmonics

Emission Frequency (MHz)	Antenna Polarity (H/V)	Peak Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Peak Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Peak Margin (dB)	Test Configuration
433.920	V	65.6	18.2	83.8	100.8	-17.0	3 Button Silver Side, Key Inserted
433.920	V	65.9	18.2	84.1	100.8	-16.7	3 Button Black Side, Key Inserted
433.920	V	63.6	18.2	81.8	100.8	-19.0	5 Button Silver Side, Key Inserted
433.920	V	63.8	18.2	82.0	100.8	-18.8	5 Button Black Side, Key Inserted
433.920	V	65.7	18.2	83.9	100.8	-16.9	3 Button Silver Side, Key Removed
433.920	V	65.6	18.2	83.8	100.8	-17.0	3 Button Black Side, Key Removed
433.920	V	63.7	18.2	81.9	100.8	-18.9	5 Button Silver Side, Key Removed
433.920	V	63.6	18.2	81.8	100.8	-19.0	5 Button Black Side, Key Removed

Table 5-3: Fundamental Average Radiated Emissions Harmonics

Emission Frequency (MHz)	Antenna Polarity (H/V)	Peak Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Average Emission Level (-12 dB d.c.) (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dB)	Test Configuration
433.920	V	65.6	18.2	71.8	80.8	-9.0	3 Button Silver Side, Key Inserted
433.920	V	65.9	18.2	72.1	80.8	-8.7	3 Button Black Side, Key Inserted
433.920	V	63.6	18.2	69.8	80.8	-11.0	5 Button Silver Side, Key Inserted
433.920	V	63.8	18.2	70.0	80.8	-10.8	5 Button Black Side, Key Inserted
433.920	V	65.7	18.2	71.9	80.8	-8.9	3 Button Silver Side, Key Removed
433.920	V	65.6	18.2	71.8	80.8	-9.0	3 Button Black Side, Key Removed
433.920	V	63.7	18.2	69.9	80.8	-10.9	5 Button Silver Side, Key Removed
433.920	V	63.6	18.2	69.8	80.8	-11.0	5 Button Black Side, Key Removed

Note: Average emissions are calculated by subtracting the duty cycle from the peak emissions

Table 5-4: Peak Radiated Emissions Harmonics (3 Button Black Side, Key Inserted)

Emission Frequency (MHz)	Antenna Polarity (H/V)	Peak Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Peak Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Peak Margin (dB)
867.840	V	20.8	22.8	43.6	80.8	-37.2
1301.760	H	24.1	26.4	50.5	74.0	-23.5
1735.680	H	25.8	30.5	56.3	80.8	-24.5
2169.600	V	16.2	25.1	41.3	80.8	-39.5
2603.520	V	19.7	25.9	45.6	80.8	-35.2
3037.440	H	16.1	26.5	42.6	80.8	-38.2
3471.360	V	17.3	27.4	44.7	80.8	-36.1
3905.280	V	15.3	28.1	43.4	74.0	-30.6
4339.200	V	19.9	33.4	53.3	74.0	-20.7

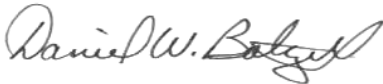
Table 5-5: Average Radiated Emissions Harmonics (3 Button Black Side, Key Inserted)

Emission Frequency (MHz)	Antenna Polarity (H/V)	Peak Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Average Emission Level (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dB)
867.840	V	20.8	22.8	31.6	60.8	-29.2
1301.760	H	24.1	26.4	38.5	54.0	-15.5
1735.680	H	25.8	30.5	44.3	60.8	-16.5
2169.600	V	16.2	25.1	29.3	60.8	-31.5
2603.520	V	19.7	25.9	33.6	60.8	-27.2
3037.440	H	16.1	26.5	30.6	60.8	-30.2
3471.360	V	17.3	27.4	32.7	60.8	-28.1
3905.280	V	15.3	28.1	31.4	54.0	-22.6
4339.200	V	19.9	33.4	41.3	54.0	-12.7

Note: Average emissions are calculated by subtracting the duty cycle from the peak emissions.

Results: Pass

Test Personnel:

Daniel W. Baltzell Test Engineer	 Signature	June 30, 2017 Date of Test
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6 Five second Timing Test – FCC 15.231(a)(1); IC RSS-210 A1.1(a)

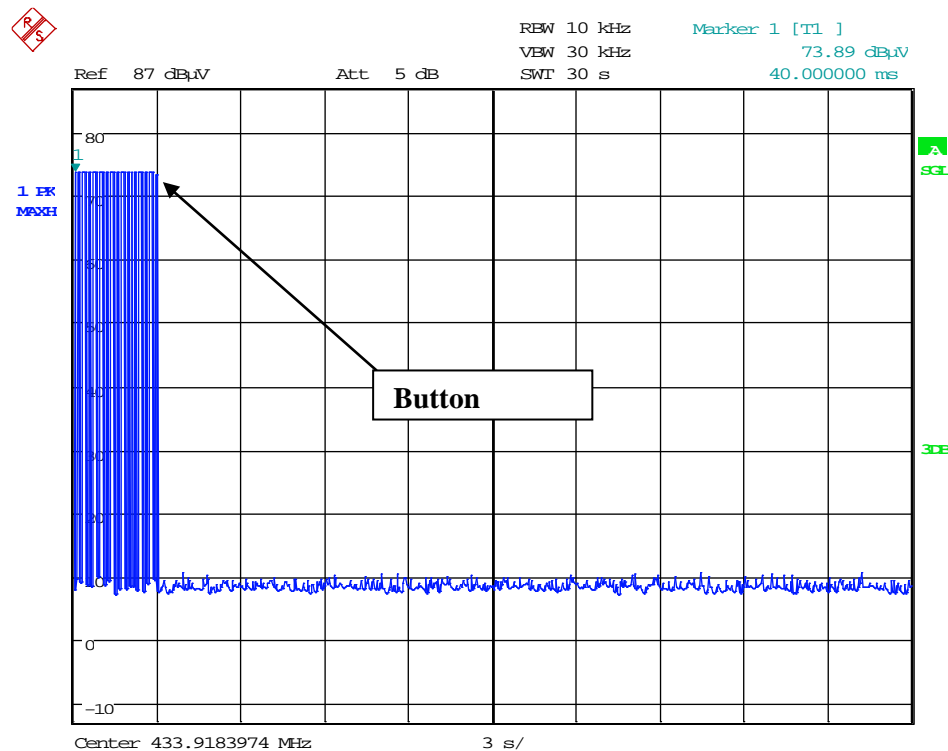
FCC 15.231(a)(1); A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

IC RSS-210 A1.1(a); A manually operated transmitter shall be equipped with a push-to-operate switch and be (a) under manual control at all times during transmission. When released, the transmitter shall cease transmission within no more than 5 seconds of being released.

Table 6-1: 5 Second Timing Test Equipment

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

Plot 6-1: Five second Timing Test




Date: 19.JUL.2017 08:15:13

Results: Pass

Rhein Tech Laboratories, Inc.
360 Herndon Parkway
Suite 1400
Herndon, VA 20170
<http://www.rheintech.com>

Client: Strattec Security Corp.
Model: OHT4882056
Standards: FCC 15.231/IC RSS-210
ID's: OHT4882056/5461A-4882056
Report #: 2017126

Test Personnel:

Daniel W. Baltzell		July 19, 2017
Test Engineer	Signature	Date of Test

7 Conclusion

The data in this measurement report shows that the EUT as tested, Strattec Security Corp., Model: OHT4882056, FCC ID: OHT4882056, IC: 5461A-4882056, complies with the applicable requirements of Parts 2 and 15 of the FCC Rules and Regulations, and Industry Canada RSS-210 and RSS-Gen.