

SIMPLISAFE INC

TEST REPORT

SCOPE OF WORK

EMISSIONS TESTING – Smoke/CO Detector

REPORT NUMBER

104848821BOX-001.1

ISSUE DATE

01/24/2022

[REVISED DATE]

01/24/2023

DOCUMENT CONTROL NUMBER

Non-Specific Radio Report Shell Rev. August 2020
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EMISSIONS TEST REPORT
(FULL COMPLIANCE)

Report Number: 104848821BOX-001.1

Project Number: G104848821

Report Issue Date: 01/24/2022

Report Revision Date: 01/24/2023

Model(s) Tested: SSBat301

Model(s) Partially Tested: None

Model(s) Not Tested but declared equivalent by the client: None

Standards: FCC 47CFR Part 15 Subpart C Section 15.231 (2022)
FCC 47CFR Part 15 Subpart B (2022)
Industry Canada RSS-210 Issue 10 December 2019
ISED ICES-003 Issue 7 October, 2020
Industry Canada RSS-Gen Issue 5 April 2018

Tested by:
Intertek
70 Codman Hill Road
Boxborough, MA 01719
USA

Client:
SimpliSafe, Inc.
294 Washington St
Floor 9
Boston, MA 02108
USA

Report prepared by Vathana Ven



Vathana Ven / EMC Engineering Supervisor

Report reviewed by Kouma Sinn



Kouma Sinn / EMC Engineering Supervisor

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1 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 4.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested **complies** with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

2 Test Summary

Section	Test full name	Result
3	Client Information	--
4	Description of Equipment Under Test and Variant Models	--
5	System Setup and Method	--
6	Fundamental Field Strength (CFR47 Part 15 Subpart C Section 15.231(b) ISED RSS-210 Annex 1.1.2 and Table A)	Pass
7	Occupied Bandwidth (CFR47 Part 15 Subpart C Sections 15.215, 15.231(c) ISED RSS-Gen Section 4.6, IC RSS-Gen A1.1.3)	Pass
8	Radiated Spurious Emissions (CFR47 Part 15 Subpart C Sections 15.205, 15.209, and 15.231(b)(1-3), ISED RSS-Gen Section 7.2.2 Table 3 and Section 7.2.5 Table 5, ISED RSS-210 Annex 1.1.2 and Table A)	Pass
9	Duty Cycle (CFR47 Part 15 Section 15.35 and Subpart C Section 15.231(b)(2) ISED RSS-Gen Section 4.5)	N/A
10	5 Second Shut Off Time (CFR47 Part 15 Subpart C Section 15.231(a)(1) ISED RSS-210 Section A1.1.1(a))	Pass
--	AC Line-Conducted Emissions (CFR47 FCC Part 15 Subpart C 15.207; ISED RSS-Gen Section 7.2.4)	N/A Battery Powered
11	Revision History	

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3 Client Information

This EUT was tested at the request of:

Client: SimpliSafe, Inc.
294 Washington St
Floor 9
Boston, MA 02108
USA

Contact: Dean Goodale
Telephone: (603) 479-3909
Fax: None
Email: dean.goodale@simplisafe.com

4 Description of Equipment Under Test and Variant Models

Manufacturer: SimpliSafe, Inc.
294 Washington St
Floor 9
Boston, MA 02108
USA

Equipment Under Test			
Description	Manufacturer	Model Number	Serial Number
Smoke + CO Detector	SimpliSafe Inc.	SSBat301	Sample #1
Smoke + CO Detector	SimpliSafe Inc.	SSBat301	Sample #4
Smoke + CO Detector	SimpliSafe Inc.	SSBat301	Sample #3

Receive Date:	11/09/2021
Received Condition:	Good
Type:	Production

Description of Equipment Under Test (provided by client)
Smoke + Carbon monoxide detector

Equipment Under Test Power Configuration			
Rated Voltage	Rated Current	Rated Frequency	Number of Phases
3V Battery power	N/A	N/A	N/A

Operating modes of the EUT:

No.	Descriptions of EUT Exercising
1	Sample # 3 is configured as a normal operating device
2	Sample # 1 is configured to transmit at greater than 98 %

Software used by the EUT:

No.	Descriptions of EUT Exercising
1	None

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Radio/Receiver Characteristics	
Frequency Band(s)	433.92 MHz
Modulation Type(s)	FSK
Field strength	80.43 dB(μV/m)
Test Channels	433.92 MHz
Occupied Bandwidth	37.45 kHz
Frequency Hopper: Number of Hopping Channels	N/A
Frequency Hopper: Channel Dwell Time	N/A
Frequency Hopper: Max interval between two instances of use of the same channel	N/A
MIMO Information (# of Transmit and Receive antenna ports)	N/A
Equipment Type	Standalone
Antenna Type and Gain	Integral antenna, Gain 0 dBi

Variant Models:

The following variant models were not tested as part of this evaluation, but have been identified by the manufacturer as being electrically identical models, depopulated models, or with reasonable similarity to the model(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

None

5 System Setup and Method

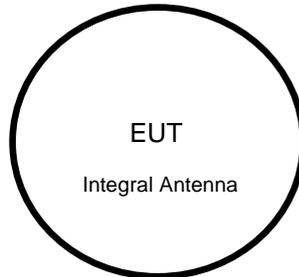
Cables					
ID	Description	Length (m)	Shielding	Ferrites	Termination
	None	N/A	N/A	N/A	N/A

Support Equipment			
Description	Manufacturer	Model Number	Serial Number
None	N/A	N/A	N/A

5.1 Method:

Configuration as required by ANSI C63.4:2014 and ANSI C63.10:2013.

5.2 EUT Block Diagram:



6 Fundamental Field Strength

6.1 Method

Tests are performed in accordance with FCC 47CFR Part 15 Subpart C Section 15.231 and ISED RSS-210.

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucisprr
Radiated Emissions, 10m	30-1000 MHz	5.0 dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	4.6 dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.9 dB	5.2 dB
Radiated Emissions, 3m	6-15 GHz	5.1 dB	5.5 dB
Radiated Emissions, 3m	15-18 GHz	4.7 dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	4.7 dB	5.5 dB

As shown in the table above our radiated emissions U_{lab} is less than the corresponding U_{CISPR} reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

Where

- FS = Field Strength in dB μ V/m
- RA = Receiver Amplitude (including preamplifier) in dB μ V
- CF = Cable Attenuation Factor in dB
- AF = Antenna Factor in dB
- AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dB μ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

RA = 52.0 dB μ V
 AF = 7.4 dB/m
 CF = 1.6 dB
 AG = 29.0 dB
 FS = 32 dB μ V/m

To convert from dB μ V to μ V or mV the following was used:

$$UF = 10^{(NF / 20)} \text{ where UF = Net Reading in } \mu\text{V}$$

$$NF = \text{Net Reading in dB}\mu\text{V}$$

Example:

$$FS = RA + AF + CF - AG = 52.0 + 7.4 + 1.6 - 29.0 = 32.0$$

$$UF = 10^{(32 \text{ dB}\mu\text{V} / 20)} = 39.8 \mu\text{V/m}$$

Alternately, when BAT-EMC Emission Software is used, the "Level" includes all losses and gains and is compared directly in the "Margin" column to the "Limit". The "Correction" includes Antenna Factor, Preamp, and Cable Loss. These are already accounted for in the "Level" column.

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6.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV007	Weather Station Vantage Vue	Davis	6250	MS191212003	03/20/2021	03/20/2022
145108	EMI Test Receiver (20Hz - 40GHz)	Rohde & Schwarz	ESIB40	100209	06/22/2021	06/22/2022
145145	Broadband Hybrid Antenna 30 MHz - 3 GHz	Sunol Sciences Corp.	JB3	A122313	06/09/2021	06/09/2022
HS003	10m under floor cable	Huber-Schuner	10m-1	HS003	02/17/2021	02/17/2022
145-420	Receiver to floor cable	Utiflex	UFB311A-2-0591-70070	145-420	02/17/2021	02/17/2022
145-422	10Amp Pre-amp to under floor	Utiflex	UFB311A-0-2756-70070	145-422	02/17/2021	02/17/2022

Software Utilized:

Name	Manufacturer	Version
EMI Boxborough.xls	Intertek	08/27/2010

6.3 Results:

The sample tested was found to Comply.

The Fundamental field strength must meet the following limits:

Fundamental Frequency (MHz), excluding restricted band frequencies of RSS-Gen	Field Strength of the Fundamental ^(Note 1) (microvolts/m at 3 metres)	Field Strength of Unwanted Emissions ^(Note 1) (microvolts/m at 3 metres)
40.66-40.70	See Section A2.7	
70-130	1,250	125
130-174	1,250 to 3,750*	125 to 375
174-260 ^(Note 2)	3,750	375
260-470 ^(Note 2)	3,750 to 12,500*	375 to 1,250
Above 470	12,500	1,250

Note 1: Limits on the field strength of emissions, as shown in this table, are based on the average value of the measured emissions. As an alternative, compliance with the limits in this table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector.

* Linear interpolation with frequency F in MHz:

For 130-174 MHz: FS (microvolts/m) = (56.82 x F)-6136

For 260-470 MHz: FS (microvolts/m) = (41.67 x F)-7083

For a fundamental frequency of 433.92 MHz, this corresponds to a limit of 100.82 dBuV/m peak and 80.82 dBuV/m average at a 3 meter test distance.

6.4 Setup Photographs:

Test setup photos not included in this report

6.5 Test Data:

Radiated Emissions

Company: Simplisafe	Antenna & Cables: N Bands: N, LF, HF, SHF
Model #: Smoke Detector	Antenna: 145-145_6-9-2022.txt 145-145_6-9-2022.txt
Serial #: None (Test Sample # 1)	Cable(s): <small>10m track A_M7006_H5002-145-145-145420_11-25-2021.txt</small> NONE.
Engineers: Kouma Sinn	Location: 10m Chamber Barometer: DAV007 Filter: NONE
Project #: G104848821	Date(s): 12/12/21
Standard: FCC 15.231	Temp/Humidity/Pressure: 24 C 19% 1008mbar
Receiver: 145-108	Limit Distance (m): 3
PreAmp: PRE-10 -40db gain factors.txt	Test Distance (m): 10
PreAmp Used? (Y or N): Y	Voltage/Frequency: Internal Battery Frequency Range: Fundamental Signal
Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)	
Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW	

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth
EUT on its top side. Note: the net reading includes average factor of 5 dB											
Max h Pk	V	433.909	75.92	22.70	3.21	40.67	-10.46	66.61	80.82	-14.21	120/300 kHz
Max h Pk	H	433.909	89.72	22.70	3.21	40.67	-10.46	80.41	80.82	-0.41	120/300 kHz
EUT on its back. Note: the net reading includes average factor of 5 dB											
Max h Pk	V	433.909	76.52	22.70	3.21	40.67	-10.46	67.21	80.82	-13.61	120/300 kHz
Max h Pk	H	433.909	89.74	22.70	3.21	40.67	-10.46	80.43	80.82	-0.39	120/300 kHz
EUT on its side. Note: the net reading includes average factor of 5 dB											
Max h Pk	V	433.909	86.93	22.70	3.21	40.67	-10.46	77.62	80.82	-3.20	120/300 kHz
Max h Pk	H	433.909	86.15	22.70	3.21	40.67	-10.46	76.84	80.82	-3.98	120/300 kHz

Test Personnel: <u>Kouma Sinn <i>KPS</i></u>	Test Date: <u>12/12/2021</u>
Supervising/Reviewing Engineer: <u>N/A</u>	
(Where Applicable) <u>FCC Part 15.231</u>	
Product Standard: <u>ISED RSS-210</u>	Limit Applied: <u>See section 6.3</u>
Input Voltage: <u>Battery Powered</u>	
Pretest Verification w/ BB Source: <u>BB Source</u>	Ambient Temperature: <u>24 °C</u>
	Relative Humidity: <u>19 %</u>
	Atmospheric Pressure: <u>1008 mbars</u>

Deviations, Additions, or Exclusions: None

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7 Occupied Bandwidth

7.1 Method

Tests are performed in accordance with FCC 47CFR Part 15 Subpart C Section 15.231 and ISED RSS-210.

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

7.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV007	Weather Station Vantage Vue	Davis	6250	MS191212003	03/20/2021	03/20/2022
145108	EMI Test Receiver (20Hz - 40GHz)	Rohde & Schwarz	ESIB40	100209	06/22/2021	06/22/2022
145145	Broadband Hybrid Antenna 30 MHz - 3 GHz	Sunol Sciences Corp.	JB3	A122313	06/09/2021	06/09/2022
HS003	10m under floor cable	Huber-Schuner	10m-1	HS003	02/17/2021	02/17/2022
145-420	Receiver to floor cable	Utiflex	UFB311A-2-0591-70070	145-420	02/17/2021	02/17/2022
145-422	10Amp Pre-amp to under floor	Utiflex	UFB311A-0-2756-70070	145-422	02/17/2021	02/17/2022

Software Utilized:

Name	Manufacturer	Version
None		

7.3 Results:

The sample tested was found to Comply. 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. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier. Therefore, the bandwidth must not exceed 1090 kHz.

7.4 Setup Photographs:

Test setup photos not included in this report

7.5 Plots/Data:

Occupied Bandwidth, 37.45 kHz



Test Personnel: Kouma Sinn *KPS*
 Supervising/Reviewing
 Engineer: Vathana F. Ven *VSV*
 (Where Applicable) FCC Part 15.231
 Product Standard: ISED RSS-210
 Input Voltage: Battery Powered
 Pretest Verification w/
 BB Source: BB Source

Test Date: 12/12/2021

Limit Applied: See section 7.3

Ambient Temperature: 24 °C

Relative Humidity: 19 %

Atmospheric Pressure: 1008 mbars

Deviations, Additions, or Exclusions: None

8 Radiated and Spurious Emissions

8.1 Method

Tests are performed in accordance with FCC 47CFR Part 15 Subpart C Section 15.231 and ISED RSS-210.

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucisp
Radiated Emissions, 10m	30-1000 MHz	5.0 dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	4.6 dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.9 dB	5.2 dB
Radiated Emissions, 3m	6-15 GHz	5.1 dB	5.5 dB
Radiated Emissions, 3m	15-18 GHz	4.7 dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	4.7 dB	5.5 dB

As shown in the table above our radiated emissions U_{lab} is less than the corresponding U_{CISPR} reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

Where FS = Field Strength in dB μ V/m
 RA = Receiver Amplitude (including preamplifier) in dB μ V
 CF = Cable Attenuation Factor in dB
 AF = Antenna Factor in dB
 AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dB μ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

RA = 52.0 dB μ V
 AF = 7.4 dB/m
 CF = 1.6 dB
 AG = 29.0 dB
 FS = 32 dB μ V/m

To convert from dB μ V to μ V or mV the following was used:

$$UF = 10^{(NF / 20)} \text{ where } UF = \text{Net Reading in } \mu\text{V}$$

$$NF = \text{Net Reading in dB}\mu\text{V}$$

Example:

$$FS = RA + AF + CF - AG = 52.0 + 7.4 + 1.6 - 29.0 = 32.0$$

$$UF = 10^{(32 \text{ dB}\mu\text{V} / 20)} = 39.8 \mu\text{V/m}$$

Alternately, when BAT-EMC Emission Software is used, the “Level” includes all losses and gains and is compared directly in the “Margin” column to the “Limit”. The “Correction” includes Antenna Factor, Preamp, and Cable Loss. These are already accounted for in the “Level” column.

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8.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV007'	Weather Station Vantage Vue	Davis	6250	MS191212003	03/20/2021	03/20/2022
145108'	EMI Test Receiver (20Hz - 40GHz)	Rohde & Schwarz	ESIB40	100209	06/22/2021	06/22/2022
145145'	Broadband Hybrid Antenna 30 MHz - 3 GHz	Sunol Sciences Corp.	JB3	A122313	06/09/2021	06/09/2022
HS003'	10m under floor cable	Huber-Schuner	10m-1	HS003	02/17/2021	02/17/2022
145-420'	Receiver to floor cable	Utiflex	UFB311A-2-0591-70070	145-420	02/17/2021	02/17/2022
145-422'	10Amp Pre-amp to under floor	Utiflex	UFB311A-0-2756-70070	145-422	02/17/2021	02/17/2022
ETS002'	1-18GHz DRG Horn Antenna	ETS Lindgren	3117	00143260	08/24/2021	08/24/2022
PRE12'	Pre-amplifier	Com Power	PAM-118A	18040117	12/06/2021	12/06/2022
HS003'	10m under floor cable	Huber-Schuner	10m-1	HS003	02/17/2021	02/17/2022

Software Utilized:

Name	Manufacturer	Version
EMI Boxborough.xls	Intertek	08/27/2010

8.3 Results:

The sample tested was found to Comply.

The Fundamental field strength must meet the following limits:

Fundamental Frequency (MHz), excluding restricted band frequencies of RSS-Gen	Field Strength of the Fundamental ^(Note 1) (microvolts/m at 3 metres)	Field Strength of Unwanted Emissions ^(Note 1) (microvolts/m at 3 metres)
40.66-40.70	See Section A2.7	
70-130	1,250	125
130-174	1,250 to 3,750*	125 to 375
174-260 ^(Note 2)	3,750	375
260-470 ^(Note 2)	3,750 to 12,500*	375 to 1,250
Above 470	12,500	1,250

Note 1: Limits on the field strength of emissions, as shown in this table, are based on the average value of the measured emissions. As an alternative, compliance with the limits in this table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector.

* Linear interpolation with frequency F in MHz:

For 130-174 MHz: FS (microvolts/m) = (56.82 x F)-6136

For 260-470 MHz: FS (microvolts/m) = (41.67 x F)-7083

For a fundamental frequency of 433.92 MHz, this corresponds to a limit of 100.82 dBuV/m peak and 80.82 dBuV/m average at a 3 meter test distance.

8.4 Setup Photographs:

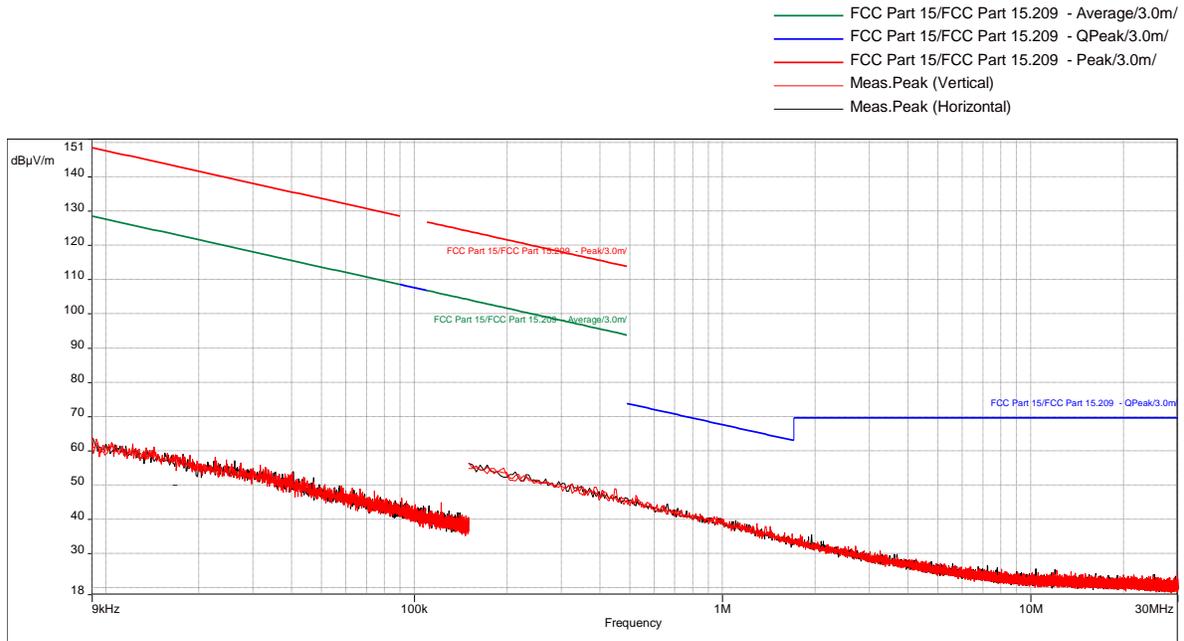
Test setup photos not included in this report

8.5 Plots/Data:

Test Information:

Date and Time	1/3/2022 2:06:39 PM
Client and Project Number	SimpliSafe
Engineer	Kouma Sinn
Temperature	21 C
Humidity	21 %
Atmospheric Pressure	1012 mbar
Comments	Scan 6: Transmit, EUT on its back, RE 9kHz-30MHz Loop antenna, Electric Field, 3M Location (FCC 15.209)

Graph:



Results: No emissions were detected.

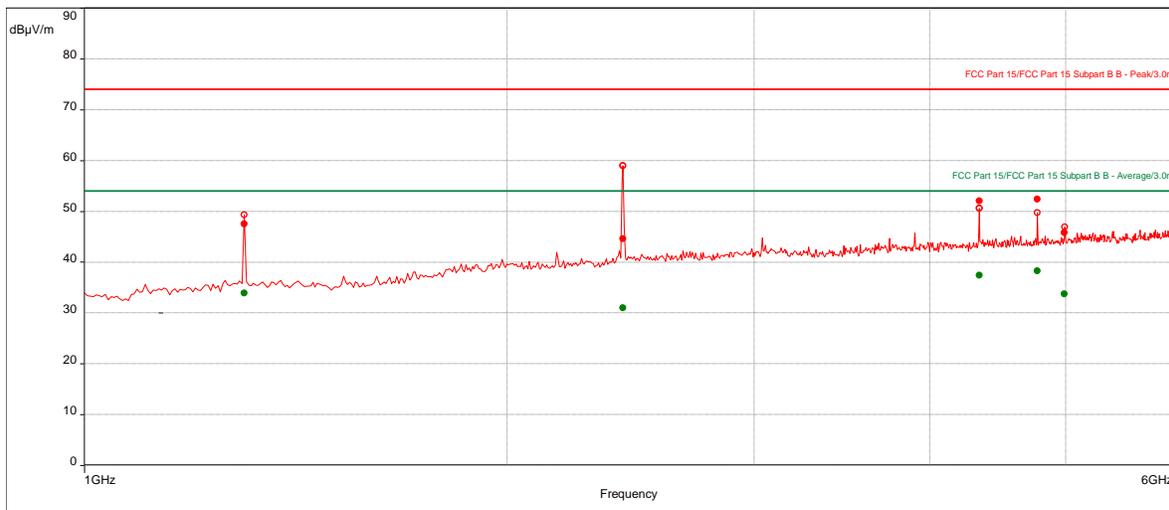
EUT on its back, RE 1 to 6 GHz

Test Information:

Date and Time	1/3/2022 9:21:31 AM
Client and Project Number	SimpliSafe
Engineer	Kouma Sinn
Temperature	21 C
Humidity	21 %
Atmospheric Pressure	1012 mbar
Comments	Scan 1: Transmit, EUT on its back, 1.5m high, RE 1 to 6 GHz SA mode

Graph:

- FCC Part 15/FCC Part 15 Subpart B B - Average/3.0m/
- FCC Part 15/FCC Part 15 Subpart B B - QPeak/3.0m/
- FCC Part 15/FCC Part 15 Subpart B B - Peak/3.0m/
- Level (Manual finals)
- Meas.Peak
- Peak (Peak /Lim. Average)
- Level (Average (PASS))
- Level (Peak (PASS))


Results:
Peak (PASS) (6)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
1301.842105	47.51	74.00	-26.49	155.00	2.95	Horizontal	1000000.00	-6.76
2420.263158	44.54	74.00	-29.46	349.00	1.01	Vertical	1000000.00	-2.45
4339.473684	52.01	74.00	-21.99	159.00	1.16	Vertical	1000000.00	1.11
4772.894737	52.36	74.00	-21.64	206.00	1.20	Vertical	1000000.00	2.29
4990.526316	45.75	74.00	-28.25	43.00	3.20	Vertical	1000000.00	3.10
5997.105263	47.12	74.00	-26.88	127.00	1.20	Vertical	1000000.00	5.44

Average (PASS) (6)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
1301.842105	33.90	54.00	-16.10	155.00	2.95	Horizontal	1000000.00	-6.76
2420.263158	30.96	54.00	-19.04	349.00	1.01	Vertical	1000000.00	-2.45
4339.473684	37.41	54.00	-16.59	159.00	1.16	Vertical	1000000.00	1.11
4772.894737	38.28	54.00	-15.72	206.00	1.20	Vertical	1000000.00	2.29
4990.526316	33.73	54.00	-20.27	43.00	3.20	Vertical	1000000.00	3.10
5997.105263	34.58	54.00	-19.42	127.00	1.20	Vertical	1000000.00	5.44

Notes: The unfilled red dot are the pre-scan peak readings. They are not listed in the table above. The emission at 2420.263 MHz is a random transient signal.

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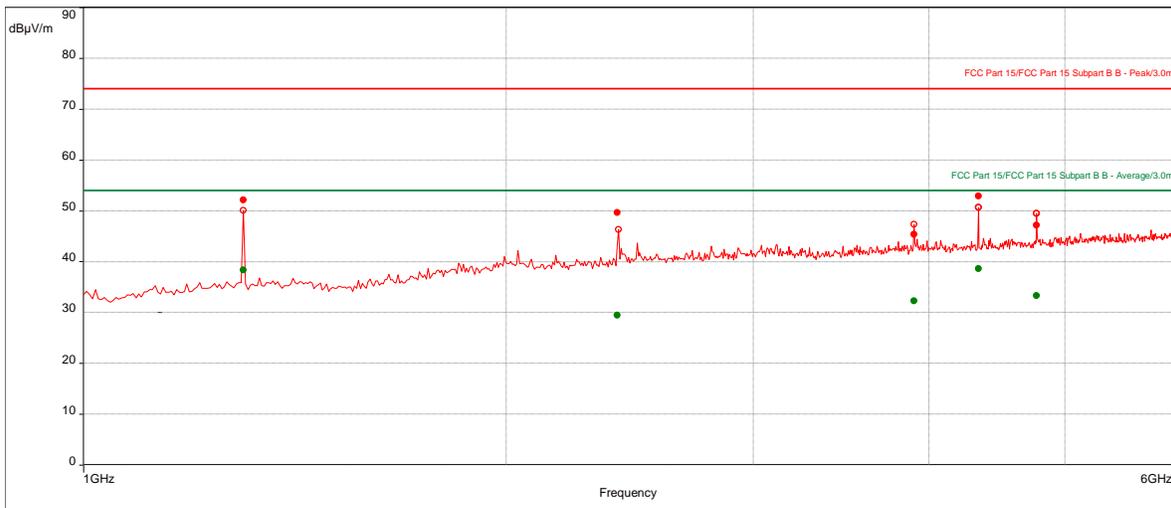
EUT on its top side, RE 1 to 6 GHz

Test Information:

Date and Time	1/3/2022 9:56:59 AM
Client and Project Number	SimpliSafe
Engineer	Kouma Sinn
Temperature	21 C
Humidity	21 %
Atmospheric Pressure	1012 mbar
Comments	Scan 2: Transmit, EUT on its top, 1.5m high, RE 1 to 6 GHz SA mode

Graph:

- FCC Part 15/FCC Part 15 Subpart B B - Average/3.0m/
- FCC Part 15/FCC Part 15 Subpart B B - QPeak/3.0m/
- FCC Part 15/FCC Part 15 Subpart B B - Peak/3.0m/
- Level (Manual finals)
- Meas.Peak
- Peak (Peak /Lim. Average)
- Level (Average (PASS))
- Level (Peak (PASS))



Results:

Peak (PASS) (5)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
1301.842105	52.14	74.00	-21.86	126.00	1.15	Horizontal	1000000.00	-6.76
2401.842105	49.64	74.00	-24.36	198.00	1.00	Vertical	1000000.00	-2.60
3905	45.31	74.00	-28.69	146.00	2.45	Vertical	1000000.00	0.34
4338.947368	52.89	74.00	-21.11	248.00	1.01	Vertical	1000000.00	1.11
4772.894737	47.12	74.00	-26.88	82.00	2.55	Vertical	1000000.00	2.29

Average (PASS) (5)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
1301.842105	38.34	54.00	-11.66	126.00	1.15	Horizontal	1000000.00	-6.76
2401.842105	29.44	54.00	-20.56	198.00	1.00	Vertical	1000000.00	-2.60
3905	32.23	54.00	-21.77	146.00	2.45	Vertical	1000000.00	0.34
4338.947368	38.59	54.00	-15.41	248.00	1.01	Vertical	1000000.00	1.11
4772.894737	33.29	54.00	-20.71	82.00	2.55	Vertical	1000000.00	2.29

Notes: The unfilled red dot are the pre-scan peak readings. They are not listed in the table above.

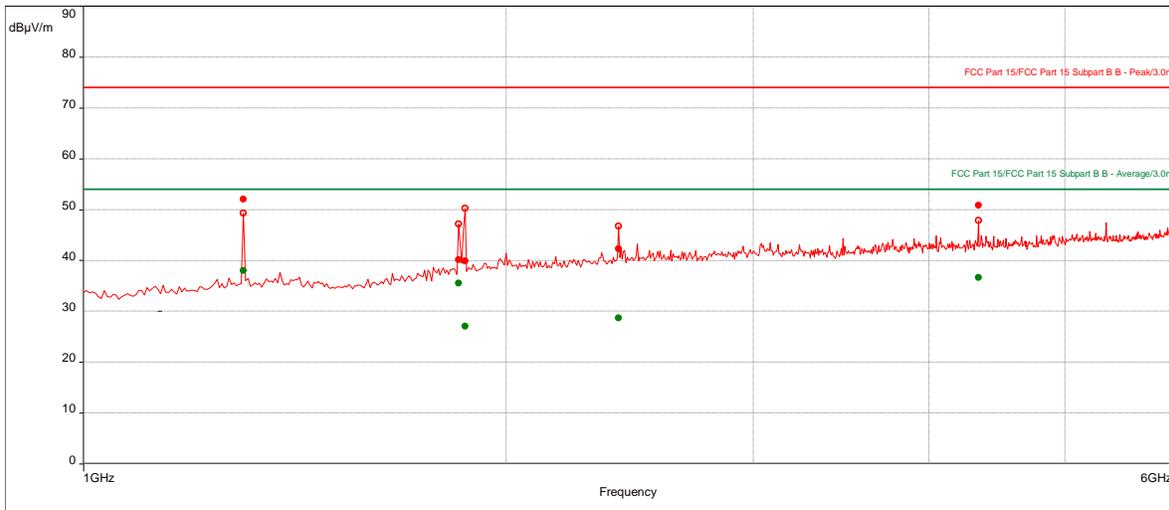
EUT on its side, RE 1 to 6 GHz

Test Information:

Date and Time	1/3/2022 10:26:53 AM
Client and Project Number	SimpliSafe
Engineer	Kouma Sinn
Temperature	21 C
Humidity	21 %
Atmospheric Pressure	1012 mbar
Comments	Scan 3: Transmit, EUT on its side, 1.5m high, RE 1 to 6 GHz SA mode

Graph:

- FCC Part 15/FCC Part 15 Subpart B B - Average/3.0m/
- FCC Part 15/FCC Part 15 Subpart B B - QPeak/3.0m/
- FCC Part 15/FCC Part 15 Subpart B B - Peak/3.0m/
- Level (Manual finals)
- Meas.Peak
- Peak (Peak /Lim. Average)
- Level (Average (PASS))
- Level (Peak (PASS))



Results:

Peak (PASS) (5)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
1301.842105	52.02	74.00	-21.98	205.00	1.15	Horizontal	1000000.00	-6.76
1850.526316	40.13	74.00	-33.87	183.00	3.74	Horizontal	1000000.00	-4.15
1869.210526	39.90	74.00	-34.10	305.00	3.10	Vertical	1000000.00	-3.96
2403.684211	42.25	74.00	-31.75	214.00	1.55	Vertical	1000000.00	-2.58
4338.947368	50.80	74.00	-23.20	243.00	2.95	Horizontal	1000000.00	1.11

Average (PASS) (5)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
1301.842105	37.99	54.00	-12.01	205.00	1.15	Horizontal	1000000.00	-6.76
1850.526316	35.51	54.00	-14.49	183.00	3.74	Horizontal	1000000.00	-4.15
1869.210526	27.04	54.00	-22.96	305.00	3.10	Vertical	1000000.00	-3.96
2403.684211	28.62	54.00	-21.38	214.00	1.55	Vertical	1000000.00	-2.58
4338.947368	36.59	54.00	-17.41	243.00	2.95	Horizontal	1000000.00	1.11

Notes: The unfilled red dot are the pre-scan peak readings. They are not listed in the table above. The emission at 1850.526 MHz and 1869.211 are random transient signals.

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Test Personnel: Kouma Sinn *KPS*
Supervising/Reviewing
Engineer:
(Where Applicable) Vathana F. Ven *VFV*
FCC Part 15.231
Product Standard: ISED RSS-210
Input Voltage: Battery Powered
Pretest Verification w/
BB Source: BB Source

Test Date: 12/12/2021

Limit Applied: See section 8.3

Ambient Temperature: 24 °C
Relative Humidity: 19 %
Atmospheric Pressure: 1008 mbars

Deviations, Additions, or Exclusions: None

Intertek

Report Number: 104848821BOX-001

Issued: 01/24/2022
Revised: 01/24/2023

9 Duty Cycle

9.1 Method

Tests are performed in accordance with FCC 47CFR Part 15 Subpart C Section 15.231 and ISED RSS-210.

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

9.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV007	Weather Station Vantage Vue	Davis	6250	MS191212003	03/20/2021	03/20/2022
145108	EMI Test Receiver (20Hz - 40GHz)	Rohde & Schwarz	ESIB40	100209	06/22/2021	06/22/2022
145145	Broadband Hybrid Antenna 30 MHz - 3 GHz	Sunol Sciences Corp.	JB3	A122313	06/09/2021	06/09/2022
HS003	10m under floor cable	Huber-Schuner	10m-1	HS003	02/17/2021	02/17/2022
145-420	Receiver to floor cable	Utiflex	UFB311A-2-0591-70070	145-420	02/17/2021	02/17/2022
145-422	10Amp Pre-amp to under floor	Utiflex	UFB311A-0-2756-70070	145-422	02/17/2021	02/17/2022

Software Utilized:

Name	Manufacturer	Version
None		

9.3 Results:

There is no limit on duty cycle, it is used to obtain the average value of emissions.

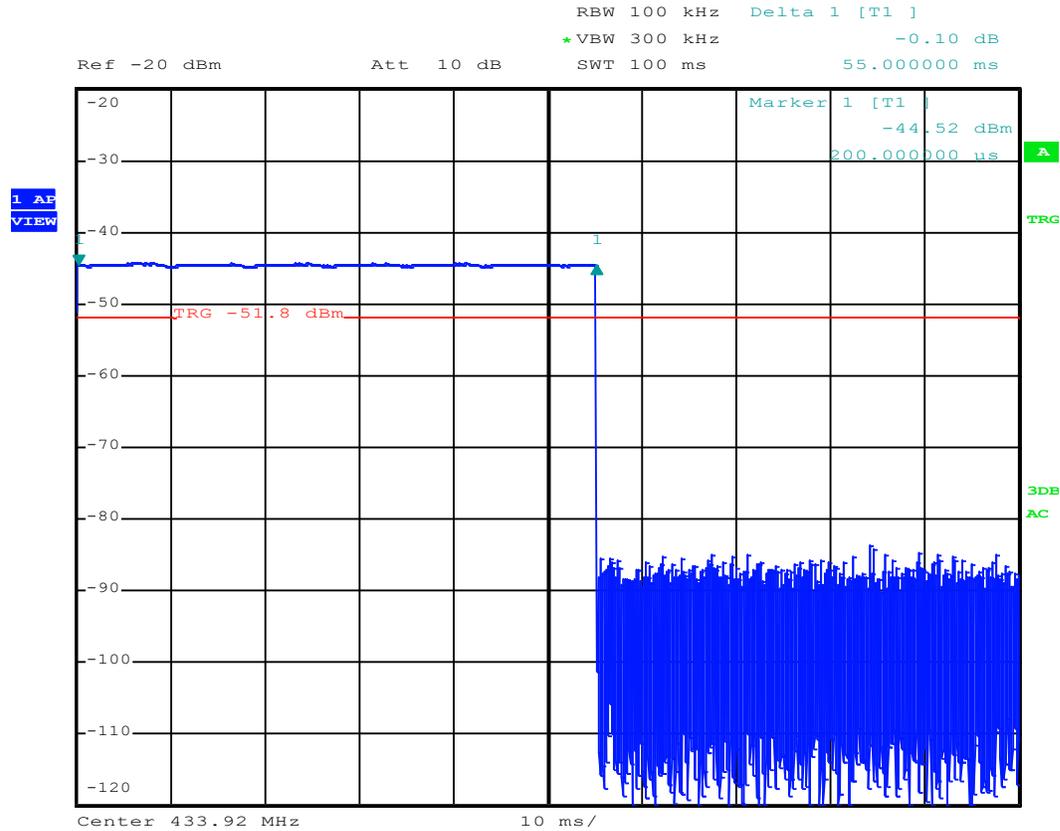
Duty cycle: $55/100 = 0.55$

Average factor = $20 * \text{LOG}(0.55) = 5 \text{ dB}$

9.4 Setup Photographs:

Test setup photos not included in this report

9.5 Plots/Data:



Date: 24.JAN.2022 18:49:57

Numbers of transmission in 100ms period, Marker 1 and Marker Delta 1 represented On-Time packet transmission.

Intertek

Report Number: 104848821BOX-001

Issued: 01/24/2022
Revised: 01/24/2023

10 5 Second Shut off

10.1 Method

Tests are performed in accordance with FCC 47CFR Part 15 Subpart C Section 15.231 and ISED RSS-210.

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

10.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV007	Weather Station Vantage Vue	Davis	6250	MS191212003	03/20/2021	03/20/2022
145108	EMI Test Receiver (20Hz - 40GHz)	Rohde & Schwarz	ESIB40	100209	06/22/2021	06/22/2022
145145	Broadband Hybrid Antenna 30 MHz - 3 GHz	Sunol Sciences Corp.	JB3	A122313	06/09/2021	06/09/2022
HS003	10m under floor cable	Huber-Schuner	10m-1	HS003	02/17/2021	02/17/2022
145-420	Receiver to floor cable	Utiflex	UFB311A-2-0591-70070	145-420	02/17/2021	02/17/2022
145-422	10Amp Pre-amp to under floor	Utiflex	UFB311A-0-2756-70070	145-422	02/17/2021	02/17/2022

Software Utilized:

Name	Manufacturer	Version
None	N/A	N/A

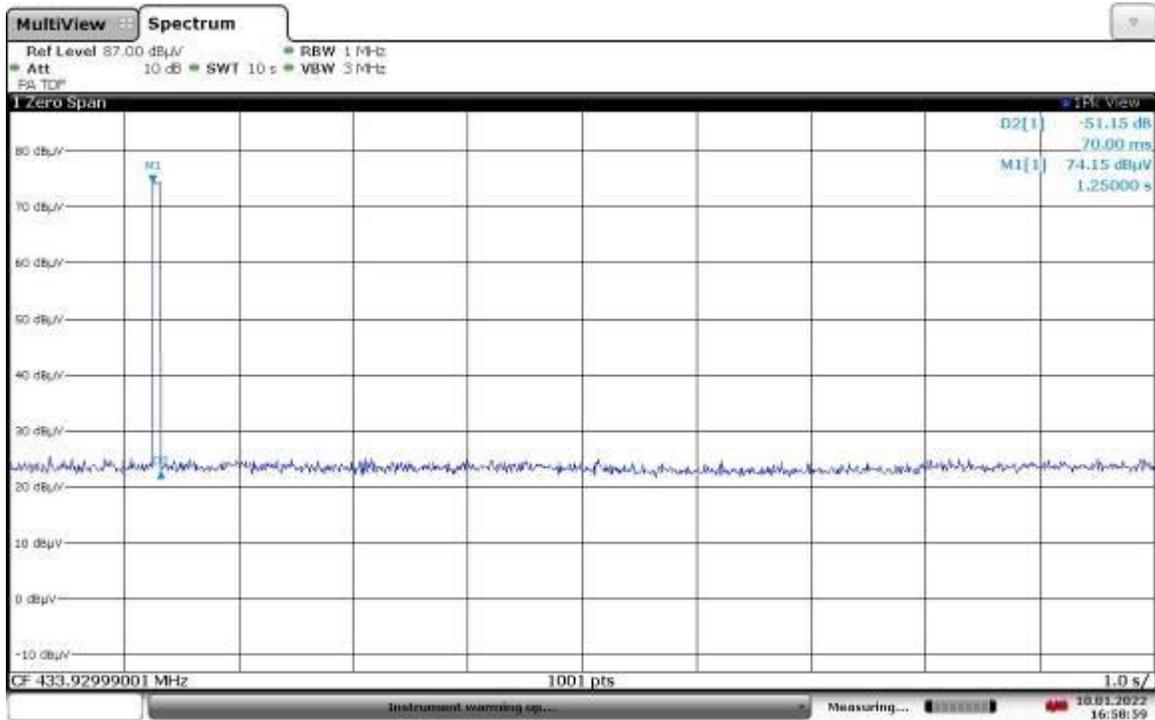
10.3 Results:

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

10.4 Setup Photographs:

Test setup photos not included in this report

10.5 Plots/Data:



16:59:00 10.01.2022

M1 corresponds to key on
M2 corresponds to key off

Test Personnel: Vathana Ven *VSV*
Supervising/Reviewing Engineer: _____
(Where Applicable) Kouma Sinn *KPS*
FCC Part 15.231
Product Standard: ISED RSS-210
Input Voltage: Battery Powered
Pretest Verification w/
BB Source: BB Source

Test Date: 01/10/2022

Limit Applied: See section 10.3

Ambient Temperature: 24 °C
Relative Humidity: 19 %
Atmospheric Pressure: 1008 mbars

Deviations, Additions, or Exclusions: None

Intertek

Report Number: 104848821BOX-001

Issued: 01/24/2022
Revised: 01/24/2023

11 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	01/24/2022	104848821BOX-001	VFV <i>VFV</i>	KPS <i>KPS</i>	Original Issue
1	01/24/2023	104848821BOX-001.1	VFV <i>VFV</i>	KPS <i>KPS</i>	See Note # 1 below

Note # 1:

- a. Pg 6 (reference to original report) – modulation correction from ASK to FSK.
- b. Pg 10 and Pg 18 (reference to original report) – Typo correction from 10m to 3m.
- c. Included notes for data tables in Section 8.5
- d. Revised transmitter operating mode # 2 in Section 4.0 to greater than 98 %
- e. Removed photos from report