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Report No.: GZEM190701452702
Page: 1 of 22

TEST REPORT

Application No.: GZEM1907014527CR
Applicant: Simplisafe, Inc
Address of Applicant: 294 Washington Street, 9th Floor, Boston MA 02108, United States
Manufacturer: Simplisafe, Inc
Address of Manufacturer: 294 Washington Street, 9th Floor, Boston MA 02108, United States
Factory: Jetta (China) Industries Co., Ltd
Address of Factory: 333 Cai Xin Lu, Lan He Zhen, Nan Sha Qu, Guangzhou Shi, Guangdong Province, China

Equipment Under Test (EUT):

EUT Name: Pin pad
Model No.: SSPP1
Trade Mark: Simplisafe
Standard(s) : 47 CFR Part 15, Subpart C 15.231
Date of Receipt: 2019-07-23
Date of Test: 2019-07-29 to 2019-07-31
Date of Issue: 2019-08-16

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

Kobe Jian

Kobe Jian

EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.



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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2019-08-16		Original

Authorized for issue by:			
Tested By		2019-07-29 to 2019-07-31 Date	
Checked By		2019-08-02 Date	
	Kevin_Zhang /Project Engineer		
	Ricky_Liu /Reviewer		



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2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.231	N/A	47 CFR Part 15, Subpart C 15.203	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Occupied Bandwidth	47 CFR Part 15, Subpart C 15.231	ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.231(c)	Pass
Dwell Time	47 CFR Part 15, Subpart C 15.231	ANSI C63.10 (2013) Section 7.8.4	47 CFR Part 15, Subpart C 15.231(a)	Pass
Field Strength of the Fundamental Signal	47 CFR Part 15, Subpart C 15.231	ANSI C63.10 (2013) Section 6.5	47 CFR Part 15, Subpart C (15.231(b))	Pass
Radiated Emissions	47 CFR Part 15, Subpart C 15.231	ANSI C63.10 (2013) Section 6.4&6.5&6.6	47 CFR Part 15, Subpart C (15.231(b))	Pass



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3 Contents

	Page
1 Cover Page	1
2 Test Summary	3
3 Contents	4
4 General Information	5
4.1 Details of E.U.T.	5
4.2 Description of Support Units	5
4.3 Environment parameter	5
4.4 Measurement Uncertainty	6
4.5 Test Location	6
4.6 Test Facility	7
4.7 Deviation from Standards	8
4.8 Abnormalities from Standard Conditions	8
5 Equipment List	9
6 Radio Spectrum Technical Requirement	11
6.1 Antenna Requirement	11
6.1.1 Test Requirement:	11
6.1.2 Conclusion	11
7 Radio Spectrum Matter Test Results	12
7.1 Occupied Bandwidth	12
7.1.1 E.U.T. Operation	12
7.1.2 Test Setup Diagram	12
7.1.3 Measurement Procedure and Data	13
7.2 Dwell Time	14
7.2.1 E.U.T. Operation	14
7.2.2 Test Setup Diagram	14
7.2.3 Measurement Procedure and Data	15
7.3 Field Strength of the Fundamental Signal	16
7.3.1 E.U.T. Operation	17
7.3.2 Test Setup Diagram	17
7.3.3 Measurement Procedure and Data	18
7.4 Radiated Emissions	19
7.4.1 E.U.T. Operation	20
7.4.2 Test Setup Diagram	20
7.4.3 Measurement Procedure and Data	21



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4 General Information

4.1 Details of E.U.T.

Power Supply:	DC 6.0V = 2 x 3V Lithium cells
Test Voltage:	DC 6.0V
Cable:	N/A
Antenna Gain:	0dBi
Antenna Type:	Integrated Antenna
Modulation Type:	FSK
Operation Frequency:	433.42MHz

4.2 Description of Support Units

The EUT has been tested as an independent unit.

4.3 Environment parameter

Environment Parameter	Selected Values During Tests	
Relative Humidity	Ambient	
Value	Temperature(°C)	Voltage(V)
TNVN	+20	6.0
TLVN	-20	6.0
THVN	+50	6.0
TNVL	+20	5.1
TNVH	+20	6.9

Note:

VN:	Normal Voltage
TN:	Normal Temperature
TL:	Low Temperature
TH:	High Temperature
VL:	Low Voltage
VH:	High Voltage



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4.4 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 5.5 \times 10^{-8}$
2	Duty cycle	$\pm 0.57\%$
3	Occupied Bandwidth	$\pm 3\%$
4	RF Conducted power	$\pm 0.68\text{dB}$
5	RF Power Density	$\pm 1.50\text{dB}$
6	Conducted Spurious Emissions	$\pm 1.04\text{dB}$
7	RF Radiated Power	$\pm 4.5\text{dB}$ (below 1GHz)
		$\pm 4.8\text{dB}$ (above 1GHz)
8	Radiated Spurious Emission Test	$\pm 4.5\text{dB}$ (30MHz-1GHz)
		$\pm 4.8\text{dB}$ (1GHz-18GHz)
9	Temperature	$\pm 0.4^\circ\text{C}$
10	Humidity	$\pm 1.3\%$
11	Supply Voltages	$\pm 1.5\%$
12	Time	$\pm 3\%$

4.5 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,
 198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District,
 Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.



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4.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **NVLAP (Lab Code: 200611-0)**

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

● **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our NVLAP accreditation.

● **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

● **CNAS (Lab Code: L0167)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2018 accreditation criteria for testing laboratories (identical to

ISO/IEC 17025:2017 General Requirements) for the Competence of Testing Laboratories.

● **FCC Recognized 2.948 Listed Test Firm(Registration No.: 282399)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 282399, May 31, 2002.

● **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818, Jul 13, 2017.

● **Industry Canada (Registration No.: 4620B, CAB identifier: CN0052)**

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

● **VCCI (Registration No.: R-12460, C-12584, G-10449 and T-11179)**

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-10449 and T-11179 respectively.

● **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2005, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.



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4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Conditions

None



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5 Equipment List

Occupied Bandwidth					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer	AgilentTechnologies	N9010A	EMC2138	2018-11-19	2019-11-18
6dB Attenuator	HP	8491A	EMC2062	2018-04-04	2020-04-03
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS	0.8M	EMC2136	2017-11-02	2019-11-01
MI CABLE	SGS	0.8M	EMC2137	2017-11-02	2019-11-01

Dwell Time					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer	AgilentTechnologies	N9010A	EMC2138	2018-11-19	2019-11-18
6dB Attenuator	HP	8491A	EMC2062	2018-04-04	2020-04-03
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS	0.8M	EMC2136	2017-11-02	2019-11-01
MI CABLE	SGS	0.8M	EMC2137	2017-11-02	2019-11-01

Radiated Emissions					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Temperature Chamber	GZ GongWen Co.Ltd.	GDJW-100	EMC0039	2019-07-01	2020-06-30
Compact Semi-Anechoic Chamber	ChangZhou ZhongYu	N/A	EMC0525	2016-12-04	2019-12-03
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2018-12-08	2019-12-07
Horn Antenna (Rx)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2019-09-08	2019-09-08
Bilog Type Antenna	Schaffner Chase	CBL6143	EMC0519	2020-05-03	2020-05-03
1-26.5GHz Pre Amplifier	Agilent	8449B	EMC0521	2020-01-06	2020-01-06
Amplifier 9kHz-1300MHz	HP	8447F	EMC2065	2019-05-29	2020-05-28
Antenna Mask (Tx)	HD-GmbH	AS620M	EMC0507	N/A	N/A
Antenna Mask (Rx)	HD-GmbH	MA240	EMC0508	N/A	N/A
966 Anechoic Chamber	C.R.T	9mX6mX6m	EMC2142	2017-12-19	2019-12-18
Signal Analyzer (20Hz ~ 26.5Ghz)	R&S	FSIQ26	EMC0069	2018-11-19	2019-11-18



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General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
DMM	Fluke	73	EMC0006	2019-07-16	2020-07-15
DMM	Fluke	73	EMC0007	2019-07-16	2020-07-15



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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

6.1.2 Conclusion

Standard 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 an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit permanently attached antenna or of an so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best-case gain of the antenna is 0dBi.



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7 Radio Spectrum Matter Test Results

7.1 Occupied Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.231(c)

Test Method: ANSI C63.10 (2013) Section 6.9

Limit:

Frequency range(MHz)	Limit
70-900	No wider than 0.25% of the center frequency
Above 900	No wider than 0.5% of the center frequency

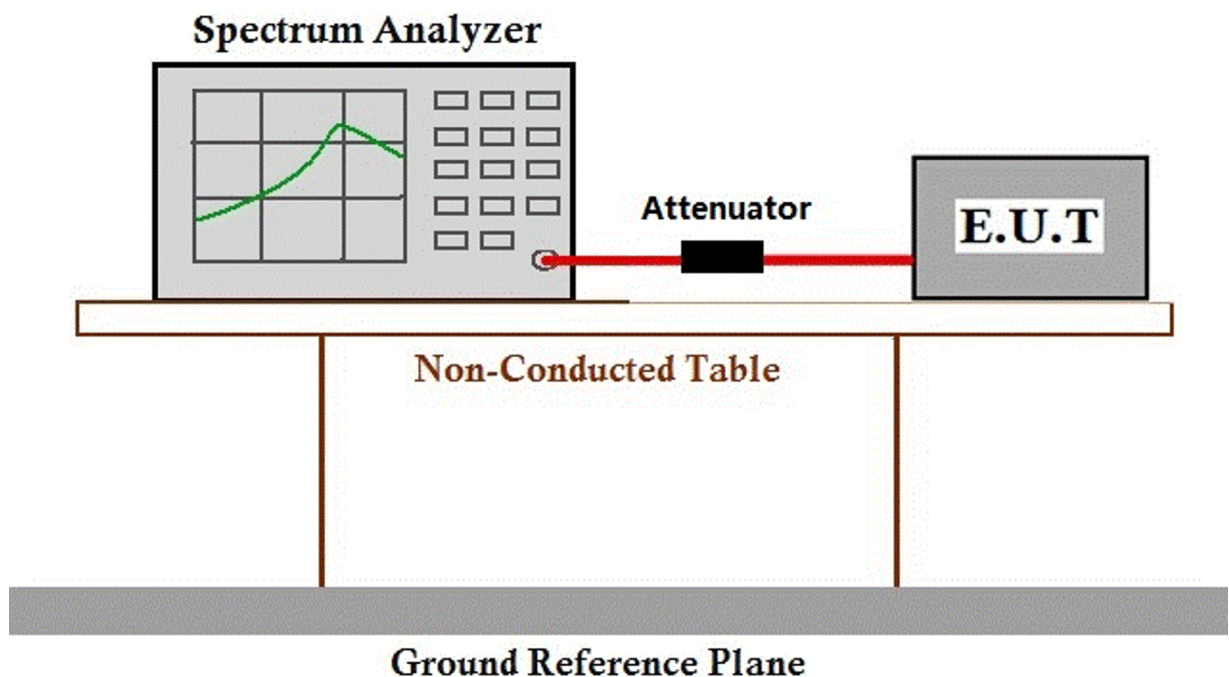
7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 25.3 °C Humidity: 55.5 % RH Atmospheric Pressure: 1020 mbar

Test mode c:TX mode_Keep the EUT in transmitting with modulation mode.

7.1.2 Test Setup Diagram



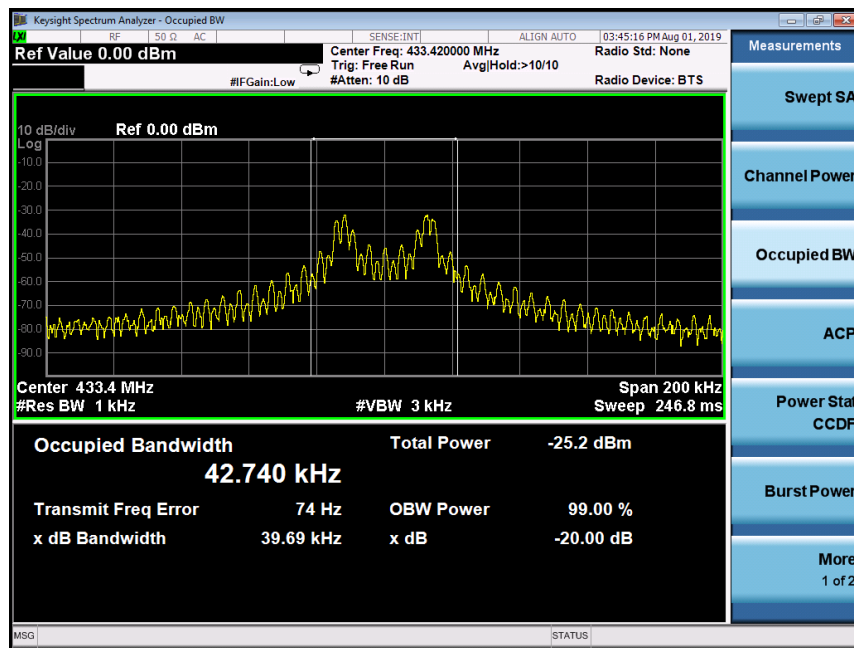
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7.1.3 Measurement Procedure and Data

Test Result:

Test Channel	Bandwidth	Limit	Verdict
433.42MHz	39.69kHz	1.08	PASS

Test Plot:



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7.2 Dwell Time

Test Requirement 47 CFR Part 15, Subpart C 15.231(a)

Test Method: ANSI C63.10 (2013) Section 7.8.4

Limit:

Device type	Limit
Manually operated transmitter	The switch automatically deactivate the transmitter within not more than 5 seconds of being released
Automatically actived transmitter	Cease transmission within 5 seconds after activation
Periodic transmissions to determine system integrity of transmitters used in security or safety applications	The total transmission time does not exceed 2 seconds per hour

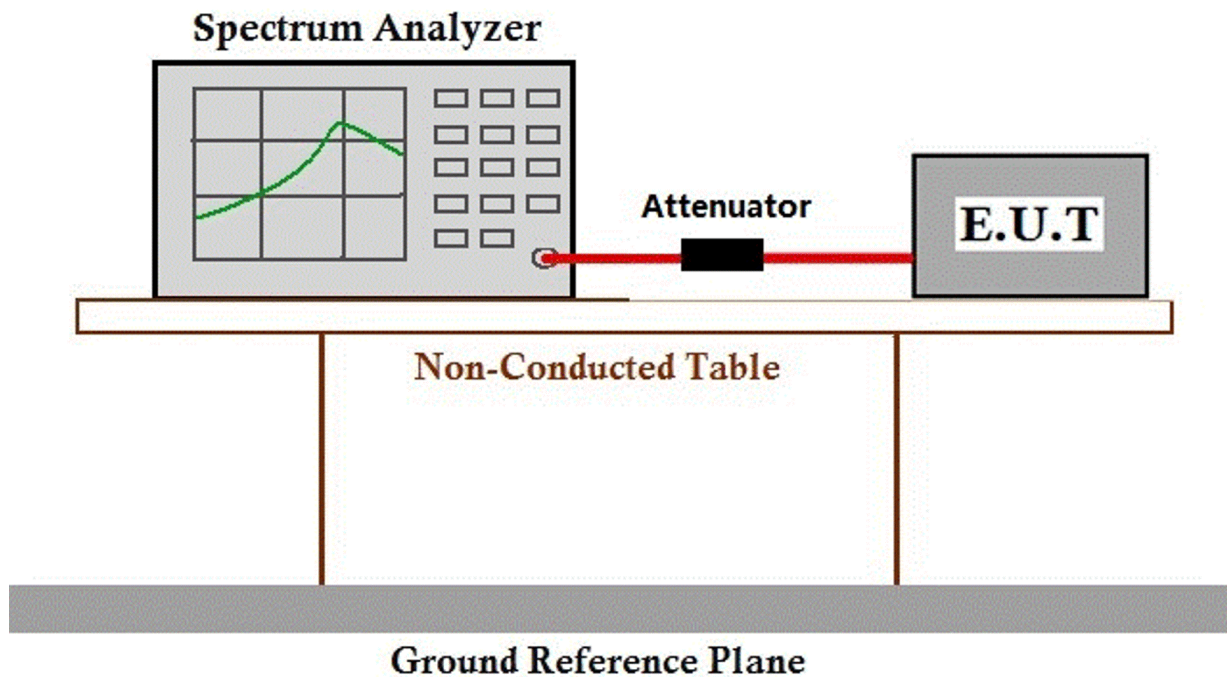
7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 25.3 °C Humidity: 55.5 % RH Atmospheric Pressure: 1020 mbar

Test mode c:TX mode_Keep the EUT in transmitting with modulation mode.

7.2.2 Test Setup Diagram



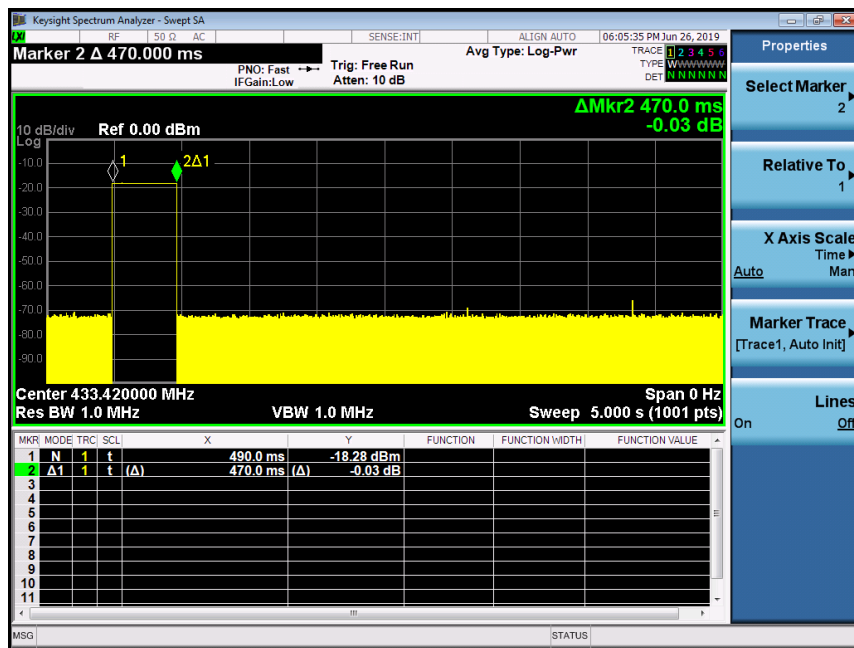
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7.2.3 Measurement Procedure and Data

Test Result:

Test Channel	Shutdown Time	Limit	Verdict
433.42MHz	0.47s	≤5s	PASS

Test Plot:



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7.3 Field Strength of the Fundamental Signal

Test Requirement 47 CFR Part 15, Subpart C 15.231(b)

Test Method: ANSI C63.10 (2013) Section 6.5

Measurement Distance: 3m

Limit:

Fundamental frequency(MHz)	Field strength of fundamental(microvolts/meter)	Field strength of fundamental(dBμV/meter)
40.66-40.70	2250	67.04
70-130	1250	61.94
130-174	1250 to 3750	61.94 to 71.48*
174-260	3750	71.48
260-470	3750 to 12500	71.48 to 81.94*
Above 470	12500	81.94

*Linear interpolation with frequency, f, in MHz:

For 130-174 MHz: Field Strength (μV/m) = (56.82 × f)–6136

For 260-470 MHz: Field Strength (μV/m) = (41.67 × f)–7083

Remark:

1. The emission limit is based on measurement instrumentation employing an average detector at a distance of 3 meters. The frequencies above 1000MHz are based on average limits. 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 condition of modulation.

2. The fundamental frequency of the EUT is 433.92 MHz, so the limit for average or QP field strength dBuV/m for the fundamental emission= 80.8 dBuV/m.

3. The average correction factor is computed by analyzing the on time in 100ms over one complete pulse train. Analysis of the remote transmitter on time in one complete pulse train, therefore the average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle), where the Duty cycle is calculated from formula:

$$\text{Duty cycle} = \text{Ton_cum} / \text{Ton+off}$$

Here,

$$\text{Ton_cum} = 0.23 \text{ (ms)}$$

$$\text{Ton+off} = 0.415 \text{ (ms)}$$

$$\text{Duty cycle} = 0.23 / 0.415 = 0.55$$

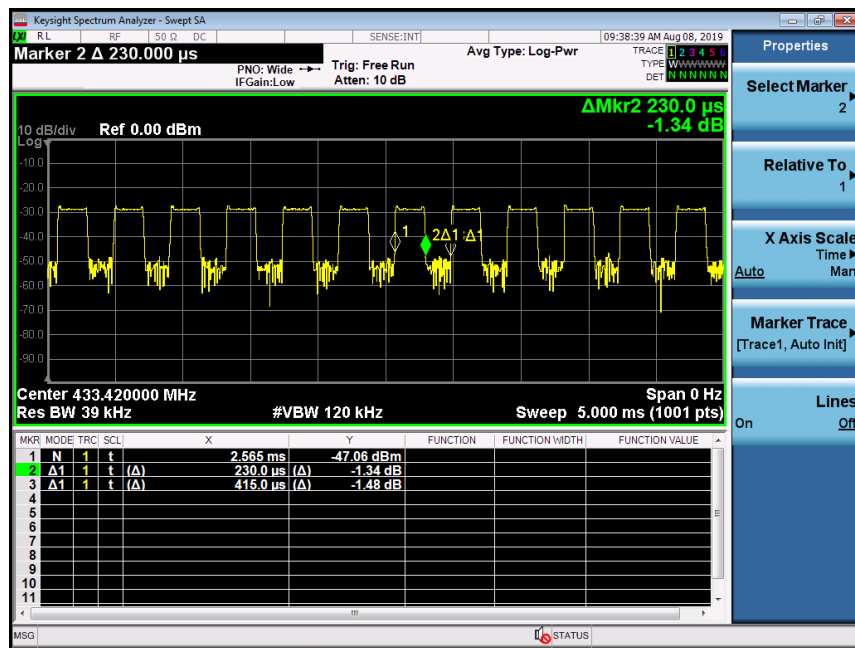
$$20\log (\text{Duty cycle}) = 20\log(0.55) = -5.19$$

Please refer to below test plots for more details.



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Test Plots



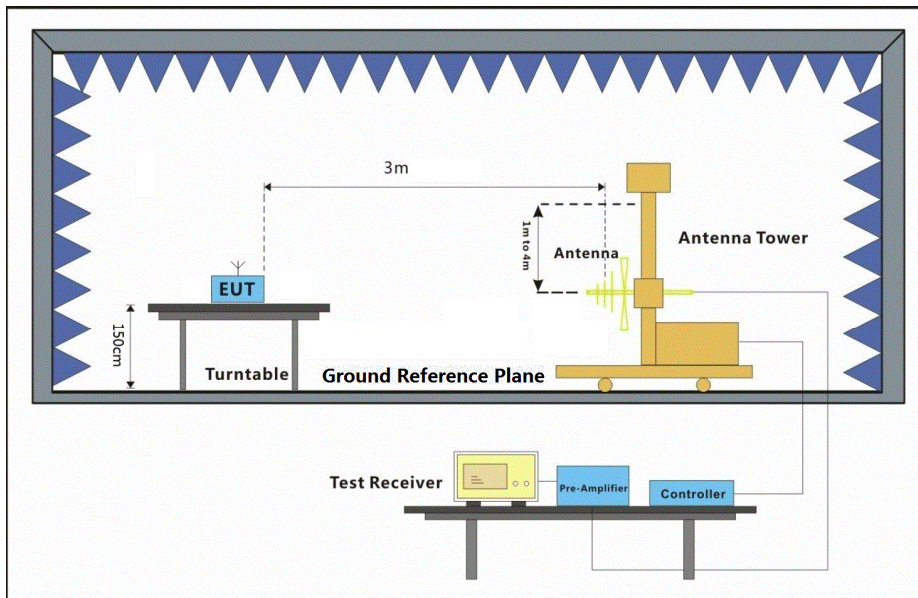
7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 23 °C Humidity: 51 % RH Atmospheric Pressure: 1020 mbar

Test mode c:TX mode_Keep the EUT in transmitting with modulation mode.

7.3.2 Test Setup Diagram



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7.3.3 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Frequency (MHz)	Polarization	Emission Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Remark	Verdict
433.42	Horizontal	82.57	108.8	-26.23	Peak	PASS
433.42	Horizontal	77.38	80.8	-3.42	Average	PASS
433.42	Vertical	75.46	108.8	-33.34	Peak	PASS
433.42	Vertical	70.27	80.8	-10.53	Average	PASS



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7.4 Radiated Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.231(b)
Test Method: ANSI C63.10 (2013) Section 6.4&6.5&6.6
Measurement Distance: 3m
Limit:

Frequency(MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/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

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.



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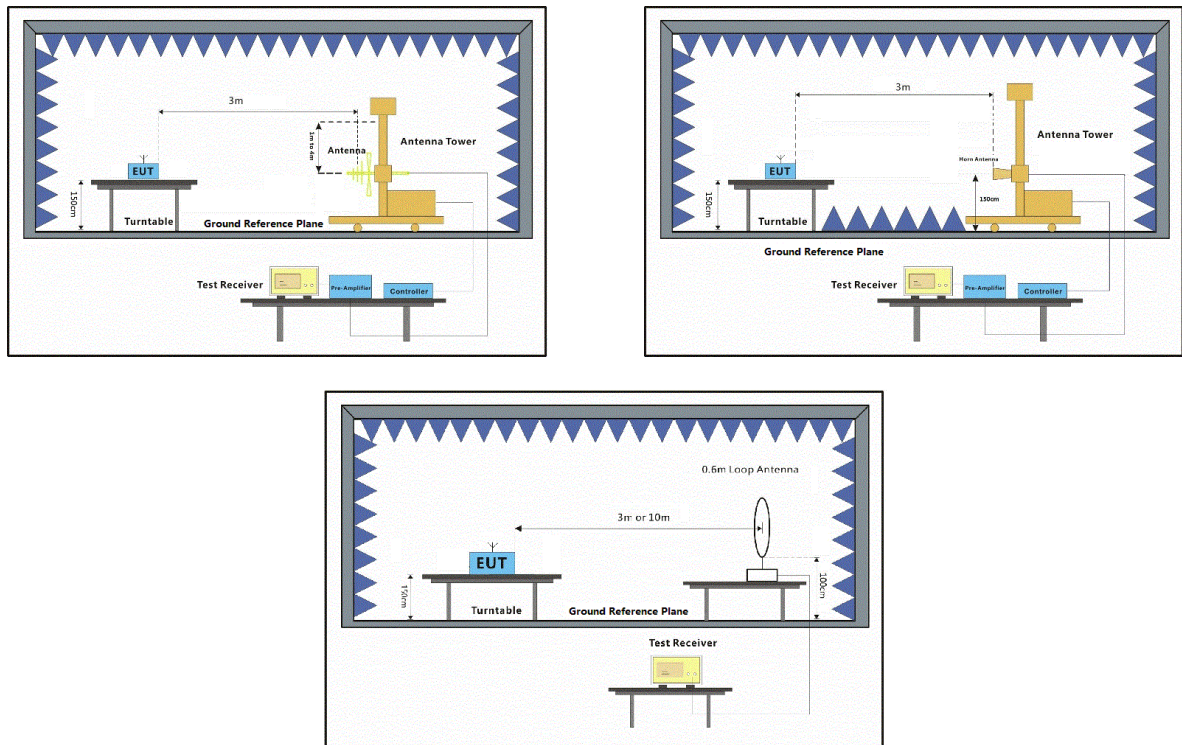
7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 24.2 °C Humidity: 50.3 % RH Atmospheric Pressure: 1020 mbar

Test mode c:TX mode_Keep the EUT in transmitting with modulation mode.

7.4.2 Test Setup Diagram



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7.4.3 Measurement Procedure and Data

- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Radiated emission below 30MHz

The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

Frequency (MHz)	Polarization	Emission Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Remark	Verdict
35.251	Horizontal	24.62	60.8	-36.18	QP	PASS
60.492	Horizontal	15.81	60.8	-44.99	QP	PASS
159.784	Horizontal	15.8	60.8	-45	QP	PASS
365.539	Horizontal	18.78	60.8	-42.02	QP	PASS
590.974	Horizontal	23.64	60.8	-37.16	QP	PASS
760.704	Horizontal	27.35	60.8	-33.45	QP	PASS
49.707	Vertical	16.95	60.8	-43.85	QP	PASS
150.011	Vertical	15.7	60.8	-45.1	QP	PASS
281.995	Vertical	17.18	54	-36.82	QP	PASS
394.855	Vertical	21.06	60.8	-39.74	QP	PASS
638.369	Vertical	25.06	60.8	-35.74	QP	PASS
821.71	Vertical	28.51	60.8	-32.29	QP	PASS



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Radiated emission above 1GHz

Frequency (MHz)	Polarization	Emission Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Remark	Verdict
2165.753	Horizontal	46.06	80.8	-34.74	Peak	PASS
2165.753	Horizontal	40.87	60.8	-19.93	Average	PASS
2598.351	Horizontal	49.58	80.8	-31.22	Peak	PASS
2598.351	Horizontal	44.39	60.8	-16.41	Average	PASS
3031.626	Horizontal	54.19	80.8	-26.61	Peak	PASS
3031.626	Horizontal	49	60.8	-11.8	Average	PASS
3897.968	Horizontal	50.69	74	-23.31	Peak	PASS
3897.968	Horizontal	45.5	54	-8.5	Average	PASS
4330.163	Horizontal	50.95	80.8	-29.85	Peak	PASS
4330.163	Horizontal	45.76	60.8	-15.04	Average	PASS
5196.368	Horizontal	52.61	80.8	-28.19	Peak	PASS
5196.368	Horizontal	47.42	60.8	-13.38	Average	PASS
2165.753	Vertical	50.67	80.8	-30.13	Peak	PASS
2165.753	Vertical	45.48	60.8	-15.32	Average	PASS
2598.351	Vertical	54.79	80.8	-26.01	Peak	PASS
2598.351	Vertical	49.6	60.8	-11.2	Average	PASS
3031.626	Vertical	62.68	80.8	-18.12	Peak	PASS
3031.626	Vertical	57.49	60.8	-3.31	Average	PASS
3897.968	Vertical	55.84	74	-18.16	Peak	PASS
3897.968	Vertical	50.65	54	-3.35	Average	PASS
4330.163	Vertical	56.7	74	-17.3	Peak	PASS
4330.163	Vertical	51.51	54	-2.49	Average	PASS
5629.286	Vertical	55.32	80.8	-25.48	Peak	PASS
5629.286	Vertical	50.13	60.8	-10.67	Average	PASS

--End of Report--



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