

Report No.: GZEM201201705501 Page: 1 of 26 FCC ID: U9K-ES3001

## **TEST REPORT**

Application No.:	GZEM2012017055CR
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 Company Limited
Address of Factory:	333 Cai Xin Lu, Lan He Zhen, Nan Sha Qu, Guangzhou City, Guangdong Province, China
Equipment Under Test (EUT	):
EUT Name:	Entry Sensor
Model No.:	SSES3
Trade mark:	Simplisafe
Standard(s) :	47 CFR Part 15, Subpart C 15.231
Date of Receipt:	2020-12-07
Date of Test:	2020-12-09 to 2020-12-31
Date of Issue:	2020-12-31
Test Result:	Pass*

\* In the configuration tested, the EUT complied with the standards specified above.

Foke. Jun

Kobe Jian EMC Laboratory Manager



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Revision Record					
Version	Chapter	Date	Modifier	Remark	
01		2020-12-31		Original	

Authorized for issue by:		
	Jim Li	
	Jim Li/Project Engineer	
	Riday Liu	
	Ricky Liu/Reviewer	



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#### **Test Summary** 2

Radio Spectrum Technical Requirement					
ltem	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	

N/A: Not applicable

Radio Spectrum Matter Part						
ltem	Standard	Method	Requirement	Result		
20dB 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		
Radiated Emissions	47 CFR Part 15, Subpart C 15.231	ANSI C63.10 (2013) Section 6.4&6.5&6.6	47 CFR Part 15C Section 15.231(b) and 15.209	Pass		
Dwell Time (15.231(a))	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 (15.231(b))	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		



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## 4 General Information

4.1 Details of E.U.T.

Power Supply:	DC 3.0V Lithium battery (size of "CR2032")
Test voltage:	DC 3V
Cable:	NA
Operation Frequency:	433.92MHz
EUT Function:	Sensor with 433.92MHz as carrier for data transmission
Antenna Type:	integrated antenna
Antenna Gain:	0dBi declared by applicant
Modulation	FSK declared by applicant
SN	E20004
Hardware	REV02
Software	REV0.0.3
Power setting	Default

### 4.2 Description of Support Units

The EUT has been tested as an independent unit.

### 4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty		
20dB Bandwidth	±3%		
	±5.06dB (3m); ±4.46dB (10m)		
Radiated Emissions	(Below 1GHz);		
	±5.08dB (1GHz-6GHz)		
Dwell Time (15.231(a))	± 0.37%		
Field Strength of the Fundamental Signal (15.231(b))	±5.06dB (3m); ±4.46dB (10m)		
	(Below 1GHz)		

#### 4.4 Test Location

All tests were performed at: SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory, 198 Kezhu Road, Scientech 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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### 4.5 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/New Zealand Regulatory Compliance Mark (RCM).

#### • 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 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.

#### ISED (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-20107 and T-11179) •

The 10m Semi-anechoic chamber, 966 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-20107 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 17025:2017, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.

#### 4.6 Deviation from Standards

None

## 4.7 Abnormalities from Standard Conditions

None



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#### **Equipment List** 5

#### 20dB Bandwidth Equipment Manufacturer Model No **Inventory No** Cal Date Cal Due Date Aailent **EXA Signal Analzer** N9010A EMC2138 2020-09-17 2021-09-16 Technologies 6dB Attenuator ΗP 8491A EMC2062 2020-04-15 2022-04-14 Test Software JS1120-3 HangTianXing V2.6 GZE100-69 N/A N/A SGS-EMC 2019-11-02 **MI CABLE** 0.8M EMC2136 2021-11-01

Radiated Emissions & F	Radiated Emissions & Field Strength of the Fundamental Signal (15.231(b))						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date		
EMI Test Receiver	Rohde & Schwarz	ESIB26	EMC0522	2020-01-10	2021-01-09		
Chamber cable	HangTianXing	N/A	EMC0542	2019-06-28	2021-06-27		
Trilog Broadband Antenna 30MHz-1GHz	SCHWARZBECKME SS-ELEKTRONIK	VULB 9168	SEM003-18	2019-02-22	2022-02-22		
Horn Antenna 1GHz- 18GHz	Rohde & Schwarz	HF906	EMC0518	2018-09-02	2021-09-01		
1GHz-26.5 GHz Pre- Amplifier	Agilent	8449B	EMC0521	2020-01-10	2021-01-09		
Pre-Amplifier MH648A	ANRITSU CORP	MH648A	EMC2086	2020-11-18	2021-11-17		
Active Loop Antenna	ETS-Lindgren	6502	EMC2190	2019-12-27	2021-12-26		
High Pass Filter	WAINWRIGHT INSTRUMENTS GMBH	WHKS650- 10SS	EMC2092	2020-01-10	2021-01-09		
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2019-10-20	2022-10-19		
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-19	2021-12-18		
MXE EMI Receiver	Keysight	N9038A	EMC2139	2020-11-18	2021-11-17		
EXA Signal Analyzer	Keysight	N9010A	EMC2138	2020-11-18	2021-11-17		
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A		



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Dwell Time (15.231(a))						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
EXA Signal Analzer	Agilent Technologies	N9010A	EMC2138	2020-09-17	2021-09-16	
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14	
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A	
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01	

General used equipment						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
DMM	Fluke	73	EMC0006	2020-07-09	2021-07-08	
DMM	Fluke	73	EMC0007	2020-07-09	2021-07-08	



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#### **Radio Spectrum Technical Requirement** 6

### 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 a 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 photo please refer to internal photo.

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 20dB Bandwidth

Test Requirement	47 CFR Part 15, Subpart C 15.231
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:	

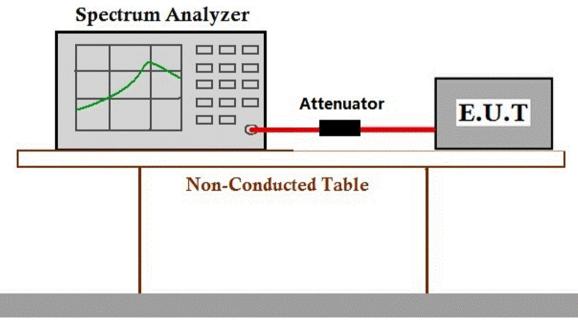
Temperature:	23.7 °C	Humidity:	56.8 % RH

Atmospheric Pressure: 1010 mbar

#### 7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in transmitting mode

#### 7.1.3 Test Setup Diagram



## **Ground Reference Plane**



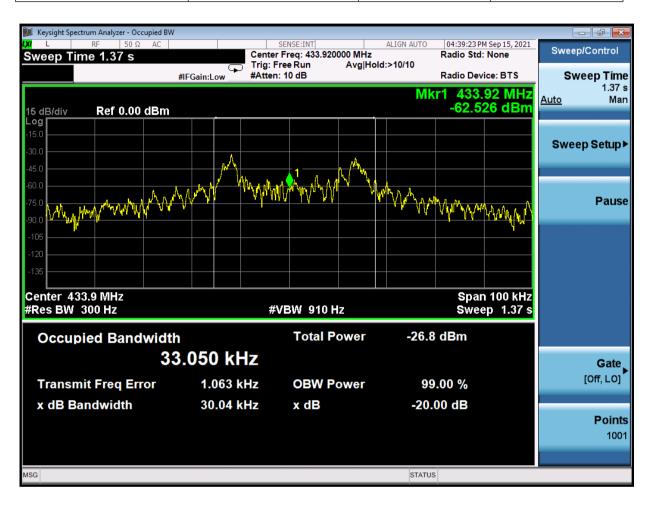


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#### 7.1.4 Measurement Procedure and Data

Test Result:

Test Channel	Test Channel Bandwidth		Verdict
433.92MHz	30.04 kHz	<=1.08MHz	PASS





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### 7.2 Dwell Time (15.231(a))

**Test Requirement** Test Method:

47 CFR Part 15, Subpart C 15.231 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 activated 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

#### .u.i. Operation

**Operating Environment:** 

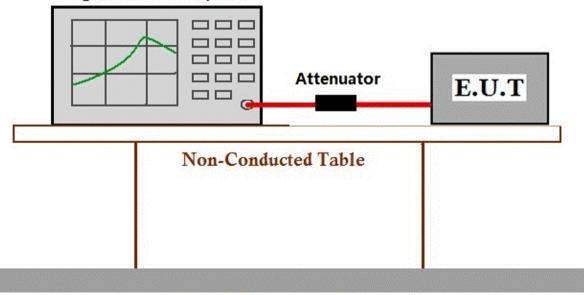
Temperature:	23.8 °C	Humidity:	56.7 % RH	Atmospheric Pressure:	1010	mbar

#### 7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in transmitting mode

7.2.3 Test Setup Diagram

### Spectrum Analyzer



## Ground Reference Plane



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#### 7.2.4 Measurement Procedure and Data

#### Test Result:

Test Channel	Shutdown Time	Limit	Verdict
433.92MHz	1.240s	≤5s	PASS

Keysight Spectrum Analyzer - Swept SA							
RF 50 Ω AC		SENSE:INT		ALIGN AUTO e: Log-Pwr	10:35:37 AM Fe	b 05, 2021	Properties
rker 2 Δ 1.24000 S	PNO: Wide ↔ IFGain:Low	Trig: Free Run Atten: 10 dB	Avg Hold		TYPE		Select Marker
dB/div Ref 0.00 dBm					ΔMkr2 1. -0.7	240 s 70 dB	2
	2∆1						Relative To
							X Axis Sca Tim Auto M
fpalecileural lynationadeurotharatharadh	Name and a state	under and the last of the frequency of the second	u-lalorate,rfta-uto	and the second of the second	n, add Andronada ya Adda	n, 1 400, 180 m	<b>Marker Trac</b> [Trace1, Auto Ini
nter 433.920000 MHz 8 BW 91 kHz	VBW 9	10 kHz		Sweep	Spa 5.000 s (10	ın 0 Hz 01 pts)	Lin On
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	400.0 ms 1.240 s (Δ)	Y FU -28.183 dBm -0.770 dB	NCTION FU	NCTION WIDTH	FUNCTION \	ALUE	
						-	



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### 7.3 Field Strength of the Fundamental Signal (15.231(b))

-	• •	,
Test Requirement	47 CFR Part 15, Subpart C 15.23	31
Test Method:	ANSI C63.10 (2013) Section 6.5	
Measurement Distance:	3m	
Limit:		

Fundamental Frequency MHz	Field Strength of Fundamental (dBµV/m @ 3 m)	Field Strength of Harmonics and Spurious Emissions (dBµV/m @ 3 m)				
40.66 to 40.70	67.04	47.04				
70 to 130	61.94	41.94				
130 to 174	61.94 to 71.48	41.94 to 51.48				
174 to 260	71.48	51.48				
260 to 470	71.48 to 81.94	51.48 to 61.94				
Above 470	81.94	61.94				
Detector:	Peak for pre-scan					
	QP for 30MHz to1000 MHz:120 kHz resolution bandwidth					
	Peak for Above 1 GHz: 1 MHz resolution bandwidth					

\*\* linear interpolations

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows:

for the band 130-174 MHz, uV/m at 3 meters = 56.81818(F) - 6136.3636;

for the band 260-470 MHz, uV/m at 3 meters = 41.6667(F) - 7083.3333.

The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

The fundamental frequency of the EUT is 433.92 MHz

The limit for average or QP field strength dBuv/m for the fundamental emission= 80.83 dBµV/m

No fundamental is allowed in the restricted bands.

The limit for average field strength dBuv/m for the spurious emission=60.83 dBuV/m. Spurious in the restricted bands must be less than 60.83 dBuV/m or 15.209, whichever limit permits a higher field strength.

#### 7.3.1 E.U.T. Operation

**Operating Environment:** 

Temperature: 22 °C Humidity: 52 % RH Atmospheric Pressure: 1010 mba	Temperature:	22 °C	Humidity: 52	% RH	Atmospheric Pressure:	1010	mbar
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#### 7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in transmitting mode



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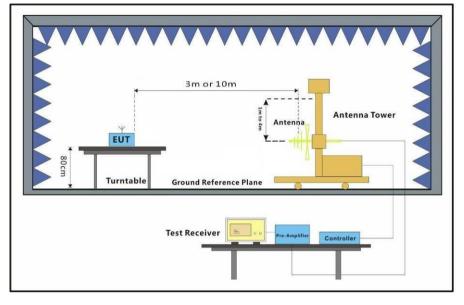
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#### 7.3.3 Test Setup Diagram



#### 7.3.4 Measurement Procedure and Data

And according 15.35(a)

15.35(a) On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths, unless otherwise specified. The specifications for the measuring instrument using the CISPR guasi-peak detector can be found in Publication 16 of the International Special Committee on Radio Interference (CISPR) of the International Electrotechnical Commission. As an alternative to CISPR guasipeak measurements, the responsible party, at its option, may demonstrate compliance with the emission limits using measuring equipment employing a peak detector function, properly adjusted for such factors as pulse desensitization, as long as the same bandwidths as indicated for CISPR guasi-peak measurements are employed.

Note: For pulse modulated devices with a pulse-repetition frequency of 20 Hz or less and for which CISPR guasi-peak measurements are specified, compliance with the regulations shall be demonstrated using measuring equipment employing a peak detector function, properly adjusted for such factors as pulse desensitization, using the same measurement bandwidths that are indicated for CISPR guasi-peak measurements.

According to 15.35 (b) Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz. When average radiated emission measurements are specified in this part, including average emission measurements below 1000 MHz, there also is a limit on the peak level of the radio frequency emissions. Unless otherwise specified, e.g., see §§ 15.250, 15.252, 15.255, and 15.509-15.519 of this part, the limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device, e.g., the total peak power level. Note that the use of a pulse desensitization correction factor may be needed to determine the total peak emission level. The instruction manual or application note for the measurement instrument should be consulted for determining pulse desensitization factors, as necessary.



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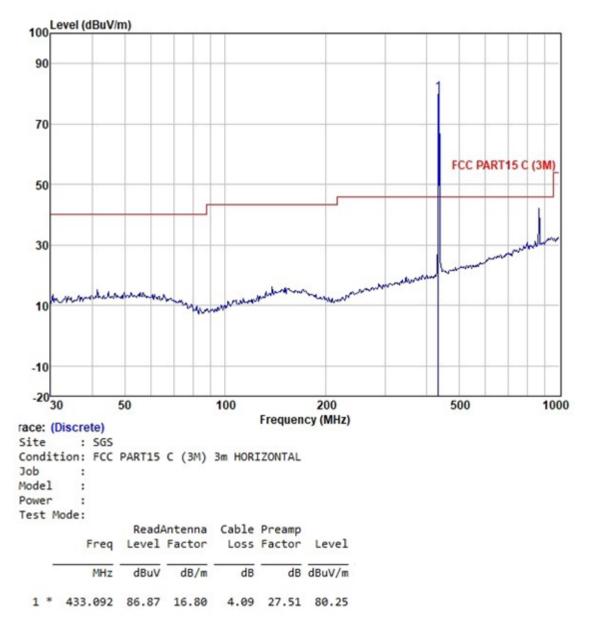
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Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
433.92	86.87	80.25	80.83	-0.58	QP



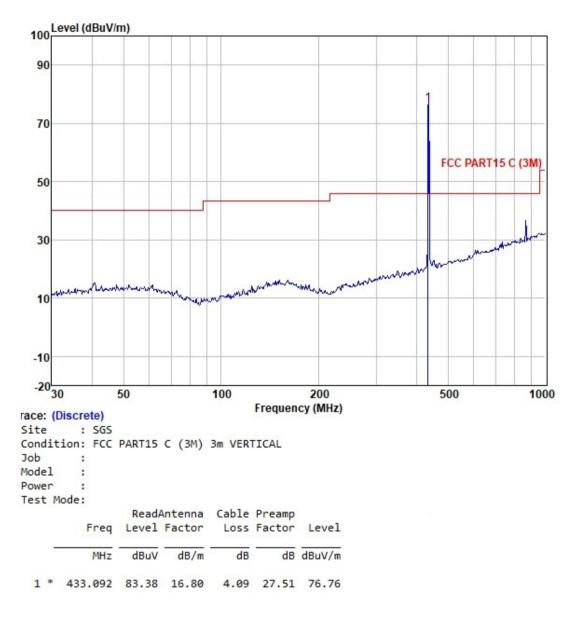
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Test Mode: 00; Polarity: Vertical



Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
433.92	83.38	76.76	80.83	-4.07	QP



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### 7.4 Radiated Emissions

Test Requirement	47 CFR Part 15, Subpart C 15.231 & 15.209
Test Method:	ANSI C63.10 (2013) Section 6.4&6.5&6.6
Measurement Distance:	3m
Limit:	
For Restricted bands	

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

For Other bands						
Fundamental Frequency MHz	Field Strength of Fundamental (dBµV/m @ 3 m)	Field Strength of Hasrmonics and Spurious Emissions (dBµV/m @ 3 m)				
40.66 to 40.70	67.04	47.04				
70 to 130	61.94	41.94				
130 to 174	61.94 to 71.48	41.94 to 51.48				
174 to 260	71.48	51.48				
260 to 470	71.48 to 81.94	51.48 to 61.94				
Above 470	81.94	61.94				
Detector:	Peak for pre-scan					
	QP for 30MHz to1000 MHz:120 kHz resolution bandwidth					
	Peak for Above 1 GHz: 1 MHz resolution bandwidth					

#### 7.4.1 E.U.T. Operation

Operating Environment:								
Tempe	erature:	22	°C	Humidity:	52	% RH	Atmospheric Pressure: 1010 mbar	
7.4.2 Test M	lode Des	scriptio	n					
Pre-scan / Final test	Mode Code	Descr	iption					
Final test	00	TX mo	de_Ke	ep the EUT in tra	nsmi	tting mod	e	
		-			-	<b>J</b>	-	



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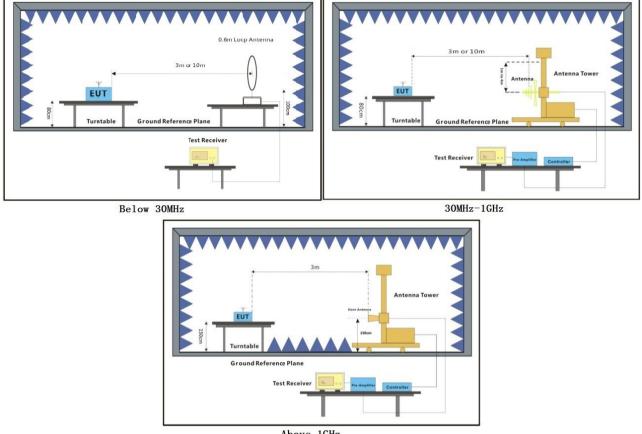
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#### 7.4.3 Test Setup Diagram



Above 1GHz



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#### 7.4.4 Measurement Procedure and Data

For testing performed with the loop antenna, the center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane. Only the worst position of vertical was shown in the report.

Measured Level I=Read Level + Antenna Factor + Cable Loss - Preamp Factor

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 factor is calculated from following formula:

20log (Duty cycle) =20log(0.74)= -2.615dB

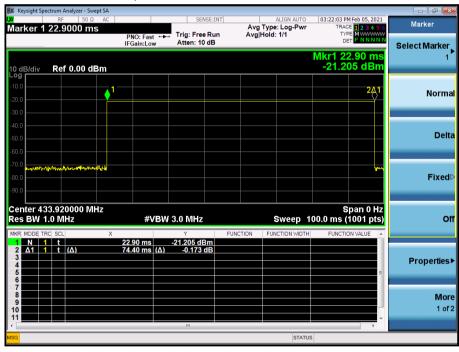
Here:

Duty cycle = Ton cum / Ton+off

Ton cum = 74 (ms)

Ton+off = 100 (ms)Duty cycle = 74 / 100 = 0.74

Please refer to below plot for more details.



#### 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.



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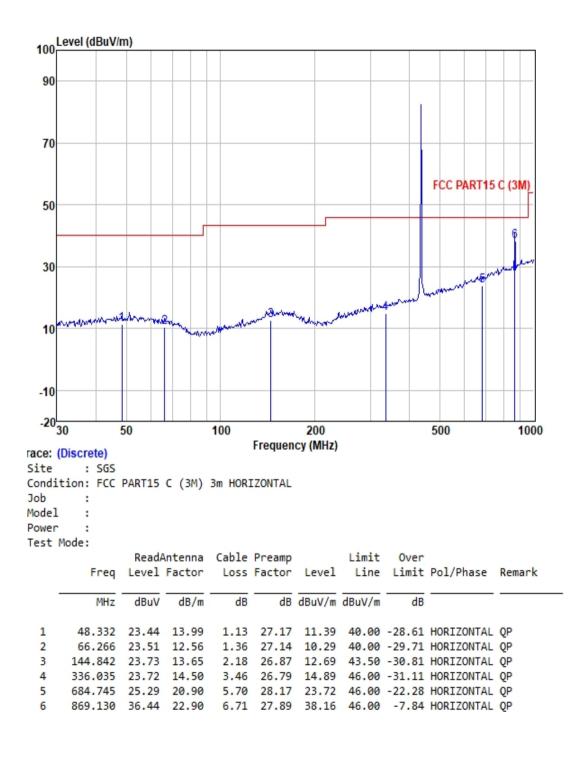
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**30MHz- 1G:** Field Strength of Unwanted Emissions. Quasi-Peak Measurement Test Mode: 00; Polarity: Horizontal





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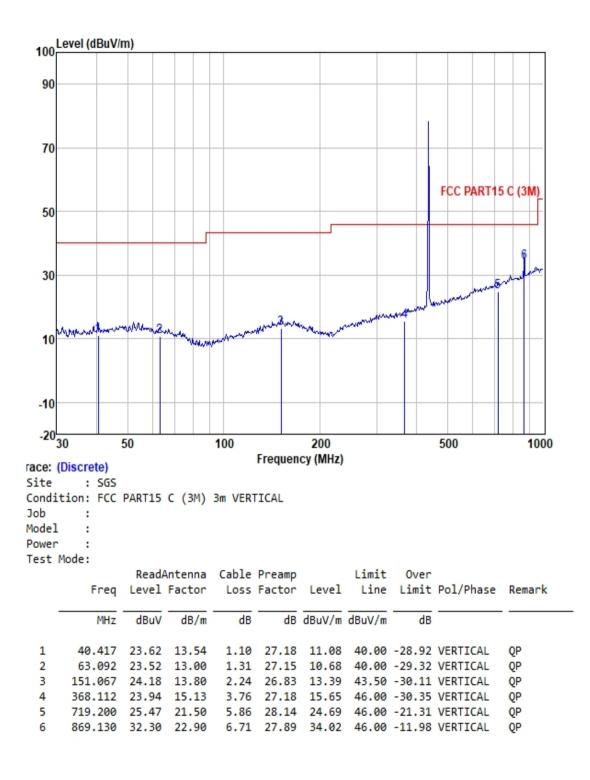
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Test Mode: 00; Polarity: Vertical





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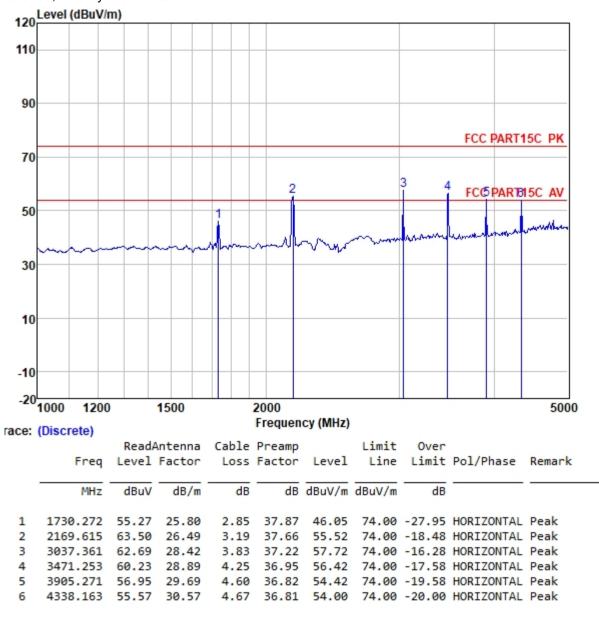
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1GHz~5 GHz Field Strength of Unwanted Emissions Measurement Test Mode: 00; Polarity: Horizontal



Frequency	Polarization	Emission Level	Limit Line	Over Limit	Remark	Verdict
(MHz)		(dBµv/m)	(dBµv/m)	(dB)		
2169.398	Horizontal	55.52	80.83	-25.31	Peak	PASS
3037.361	Horizontal	57.72	80.83	-23.11	Peak	PASS
3471.347	Horizontal	56.42	80.83	-24.41	Peak	PASS
3905.271	Horizontal	54.42	74	-19.58	Peak	PASS
3905.271	Horizontal	51.80	54	-2.2	Average	PASS



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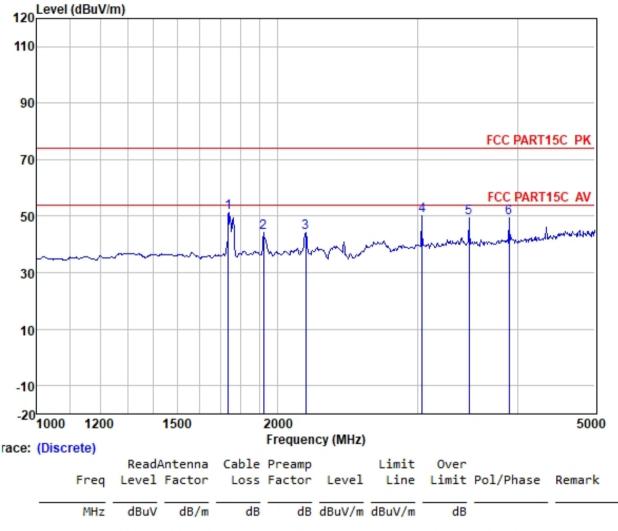
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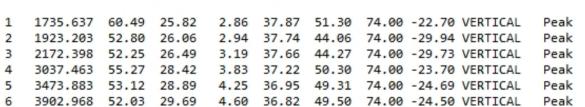
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Test Mode: 00; Polarity: Vertical







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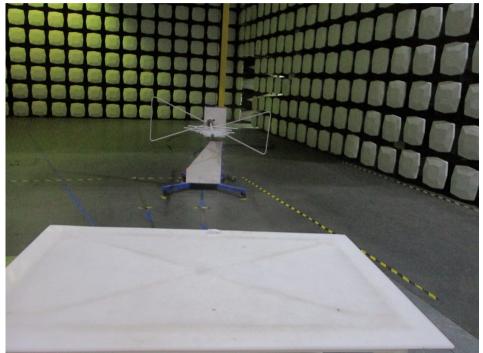
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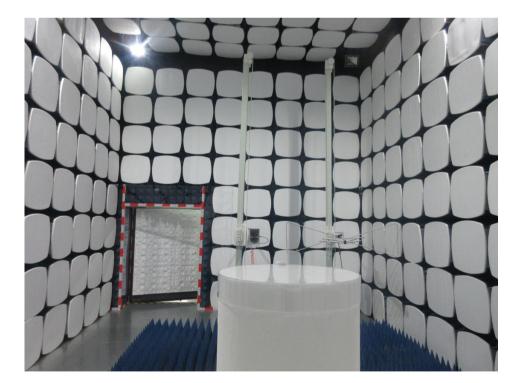


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#### **Test Setup Photo** 8

Radiated Emissions & Field Strength of the Fundamental Signal (15.231(b))







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#### **EUT Constructional Details (EUT Photos)** 9

Please refer to Appendix A - Photographs of EUT Constructional Details for GZEM2012017055CR.

- End of the Report -



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