MEASUREMENT REPORT

FCC PART 15.231(a)

FCC ID: 2ALBS-1SG65

APPLICANT: WHETRON ELECTRONICS(SUZHOU) CO.,LTD

Application Type: Certification

Product: Remote Keyless Entry

Model No.: 1SG65

FCC Classification: FCC Part 15 Security/Remote Control Transmitter (DSC)

FCC Rule Part(s): Part 15.231(a)

Test Procedure(s): ANSI C63.10-2013

Test Date: September 30 ~ December 28, 2018

Reviewed By: (Kevin Guo)

Approved By: (Robin Wu)

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

The test results relate only to the samples tested.
This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.
The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
1809WSU015-U1	Rev. 01	Initial report	12-28-2018	Valid

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§2.1033 General Information

Applicant:	WHETRON ELECTRONICS(SUZHOU) CO.,LTD
Applicant Address:	NO.457,XIANGJIANG ROAD, HIGH NEW DISTRICT,SUZHOU, P.R. CHINA
Manufacturer:	WHETRON ELECTRONICS(SUZHOU) CO.,LTD
Manufacturer Address:	NO.457,XIANGJIANG ROAD, HIGH NEW DISTRICT,SUZHOU, P.R. CHINA
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
FCC Registration No.:	893164
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- **MRT facility is a FCC registered (MRT Reg. No. 893164) test facility with the site description report on file and has met all the requirements specified in ANSI C63.4-2014.**
- **MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.**
- **MRT facility is a VCCI registered (R-20025, G-20034, C-20020, T-20020) test laboratory with the site description on file at VCCI Council.**
- **MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications, Radio and SAR testing.**

Accredited Laboratory

A2LA has accredited

MRT TECHNOLOGY (SUZHOU) CO., LTD.

Suzhou, Jiangsu, People's Republic of China

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

Presented this 24th day of July 2018.

President and CEO
for the Accreditation Council
Certificate Number 3628.01
Valid to August 31, 2020

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The measurement facility compliant with the test site requirements specified in ANSI C63.4-2014.

2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name:	Remote Keyless Entry
Model No.:	1SG65
Frequency Range:	433.92 MHz
Type of modulation:	ASK
Antenna Type:	PCB Antenna
Device Category:	Portable Device

2.2. Test Standards

The following report is prepared on behalf of the device in accordance with FCC Part 15, Subpart C, and section 15.231, 15.203, 15.205 and 15.209 of the Federal Communication Commission rules. The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.231, 15.203, 15.205 and 15.209 of the Federal Communication Commission rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which results in lowering the emission/immunity, should be checked to ensure compliance has been maintained.

2.3. Test Configuration

The **Remote Keyless Entry** was tested per the guidance of ANSI C63.10-2013. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

2.4. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

2.5. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

2.6. Test Mode

All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode	
Mode 1	Transmitting with modulation continuously (Note 1)
Mode 2	Transmitting with modulation normally

Note 1: The EUT was operated at continuous transmitting mode that was for the purpose of the measurements.

Note 2: Release Time and Duty Cycle use test mode 2, Radiated Emission and 20dB Bandwidth use test mode 1.

3. ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

- The antenna of the device is permanently attached.
- There are no provisions for connection to an external antenna.

Conclusion:

The device unit complies with the requirement of §15.203.

4. TEST EQUIPMENT CALIBRATION DATE

Radiated Disturbance – AC2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
MXE EMI Receiver	Agilent	N9038A	MRTSUE06125	1 year	2019/08/14
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2018/11/20
Bilog Period Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2018/10/20
Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06171	1 year	2018/11/09
Broadband Coaxial Preamplifi	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2018/11/16
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06178	1 year	2019/08/14
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2019/05/02

20dB Bandwidth – AC2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cal. Due Date
MXE EMI Receiver	Agilent	N9038A	MRTSUE06125	1 year	2019/08/14
Bilog Period Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2018/10/20
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06178	1 year	2019/08/14
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2019/05/02

Release Time – AC2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cal. Due Date
MXE EMI Receiver	Agilent	N9038A	MRTSUE06125	1 year	2019/08/14
Bilog Period Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2019/10/20
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06178	1 year	2019/08/14
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2019/05/02

Duty Cycle – AC2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cal. Due Date
MXE EMI Receiver	Agilent	N9038A	MRTSUE06125	1 year	2019/08/14
Bilog Period Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2018/10/20
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06178	1 year	2019/08/14
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2019/05/02

Software	Version	Function
e3	V8.3.5	EMI Test Software

5. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Radiated Emission Measurement – AC2
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 9kHz ~ 1GHz: 4.18dB 1GHz ~ 18GHz: 4.76dB
Release Time Measurement – AC2
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.09ms

6. TEST RESULT

6.1. Summary

Company Name: **WHETRON ELECTRONICS(SUZHOU) CO.,LTD**

FCC ID: **2ALBS-1SG65**

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.205 15.231(b)	Radiated Emissions	Refer to 6.2.1	Radiated	Pass	Section 6.2
15.231(c)	20dB Bandwidth	Refer to 6.3.1		Pass	Section 6.3
15.231(a)(1)	Release Time	Refer to 6.4.1		Pass	Section 6.4
15.231(b)	Duty Cycle	Refer to 6.5.1		Pass	Section 6.5

Note: The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

6.2. Radiated Emissions

6.2.1.Test Limit

According to §15.231(b), the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
40.66 - 40.70	2250	225
70 - 130	1250	125
130 - 174	[1] 1250 to 3750	[1] 125 to 375
174 - 260	3750	375
260 - 470	[1] 3750 to 12500	[1] 375 to 1250
Above 470	12500	1250

The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements start below or at the lowest crystal frequency.

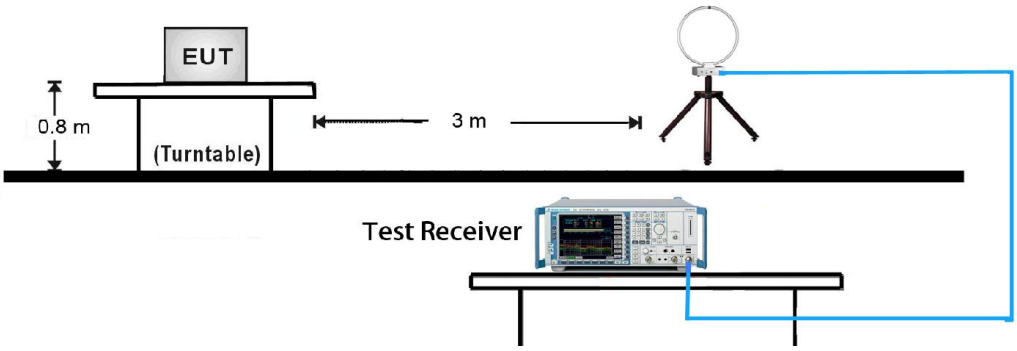
Compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.

6.2.2.Test Procedure Used

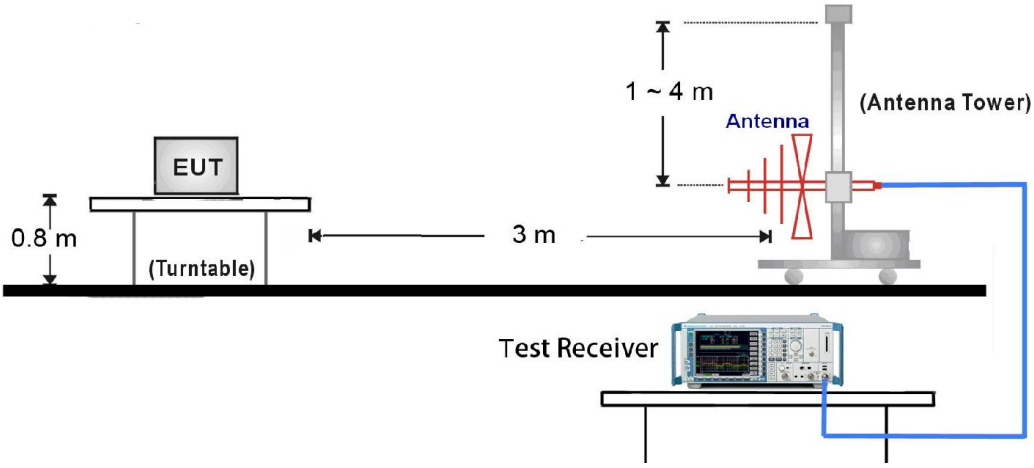
ANSI C63.10-2013 - Section 6.3 & 6.4 & 6.5 & 6.6 and Section 7.5

6.2.3.Test Setup

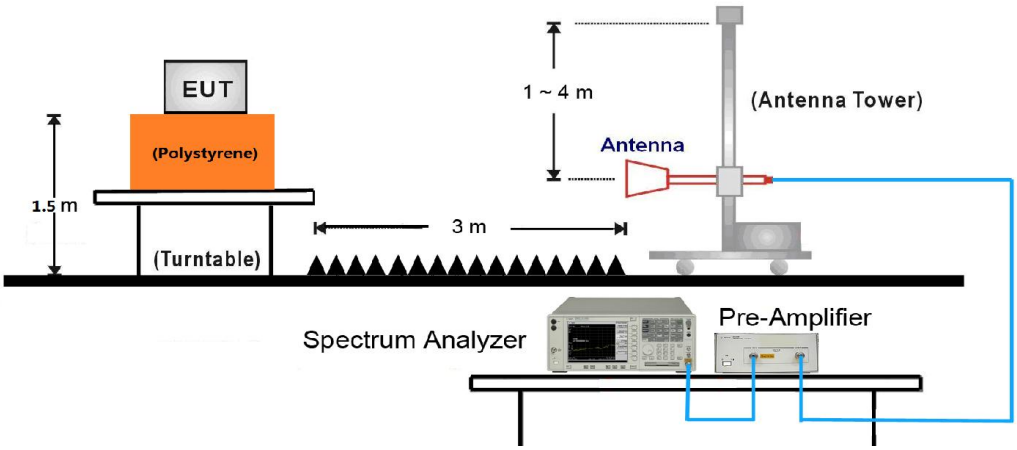
9kHz ~ 30MHz Test Setup:



30MHz ~ 1GHz Test Setup:

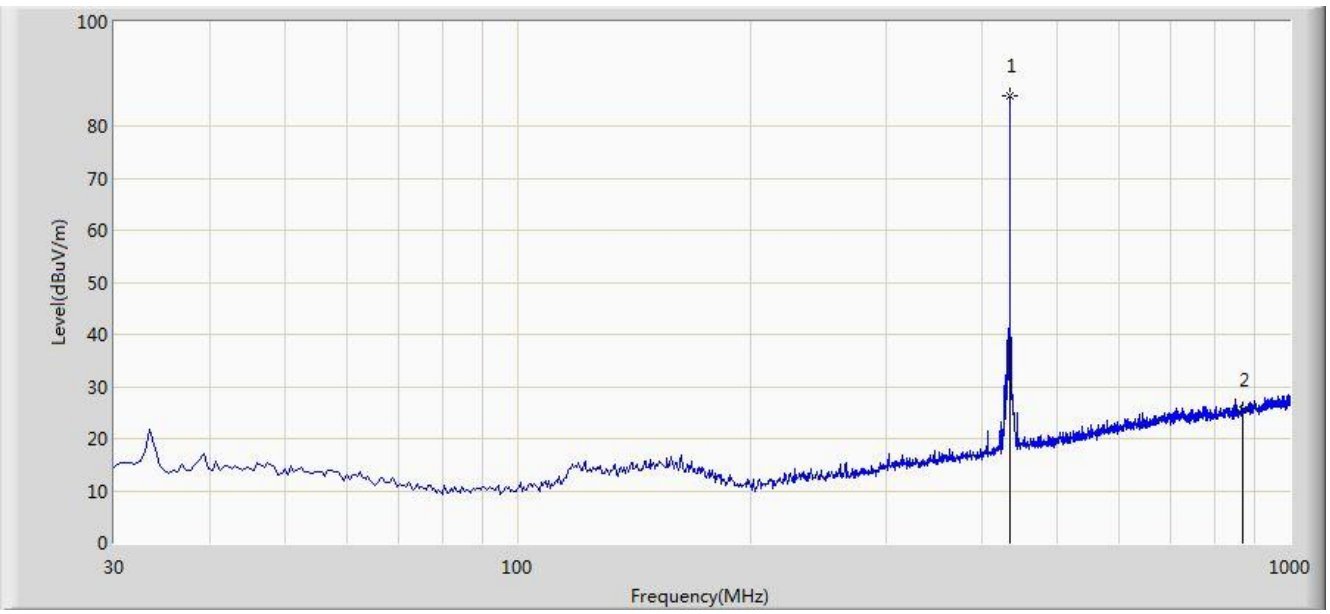


1GHz ~ 6GHz Test Setup:



6.2.4.Test Results

Site: AC2	Time: 2018/10/08 - 19:21
Limit: FCC 15.231(b)	Engineer: Jone Zhang
Probe: VULB9162_0.03-8GHz	Polarity: Horizontal
EUT: Remote Keyless Entry	Power: By Battery
Test Mode: Transmit at channel 433.92MHz	



No	Frequency (MHz)	Reading Level (dBuV)	Factor (dB)	Duty Cycle Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Type
1	434.005	68.214	17.508	N/A	85.722	100.825	-15.103	PK
	434.005	68.214	17.508	-16.480	69.242	80.825	-11.583	AV
2	867.840	1.396	23.969	N/A	25.365	80.825	-55.460	PK
	867.840	1.396	23.969	-16.480	8.885	60.825	-51.940	AV

Note 1: Testing is carried out with frequency rang 9 kHz to the tenth harmonics. There is the ambient noise within frequency range 9 kHz ~ 30 MHz, the permissible value is not show in the report.

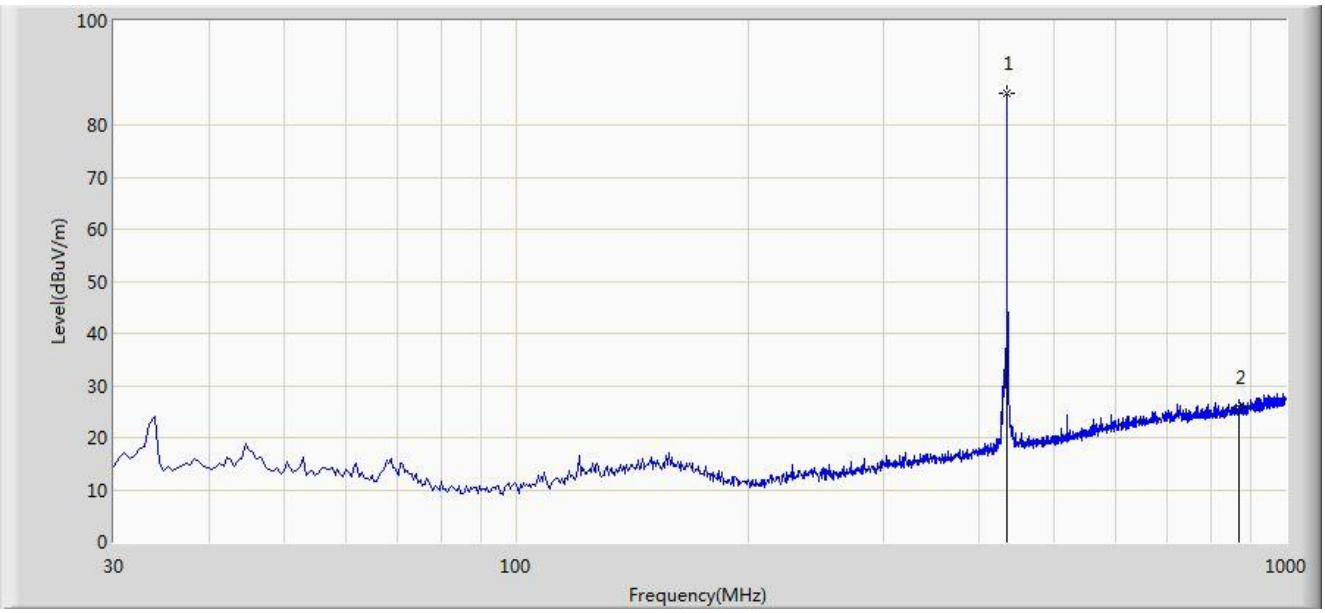
Note 2: The fundamental frequency is 433.92MHz, so the fundamental and spurious emissions radiated limit base on the operating frequency 433.92MHz.

Note 3: Peak Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB).

AV Measure Level = Peak Measure Level + Duty Cycle Factor.

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC2	Time: 2018/09/30 - 21:37
Limit: FCC 15.231(b)	Engineer: Jone Zhang
Probe: VULB9162_0.03-8GHz	Polarity: Vertical
EUT: Remote Keyless Entry	Power: By Battery
Test Mode: Transmit at channel 433.92MHz	



No	Frequency (MHz)	Reading Level (dBuV)	Factor (dB)	Duty Cycle Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Type
1	434.005	68.499	17.508	N/A	86.007	100.825	-14.818	PK
	434.005	68.499	17.508	-16.480	69.527	80.825	-11.298	AV
2	867.840	1.738	23.969	N/A	25.707	80.825	-55.118	PK
	867.840	1.738	23.969	-16.480	9.227	60.825	-51.598	AV

Note 1: Testing is carried out with frequency rang 9 kHz to the tenth harmonics. There is the ambient noise within frequency range 9 kHz ~ 30 MHz, the permissible value is not show in the report.

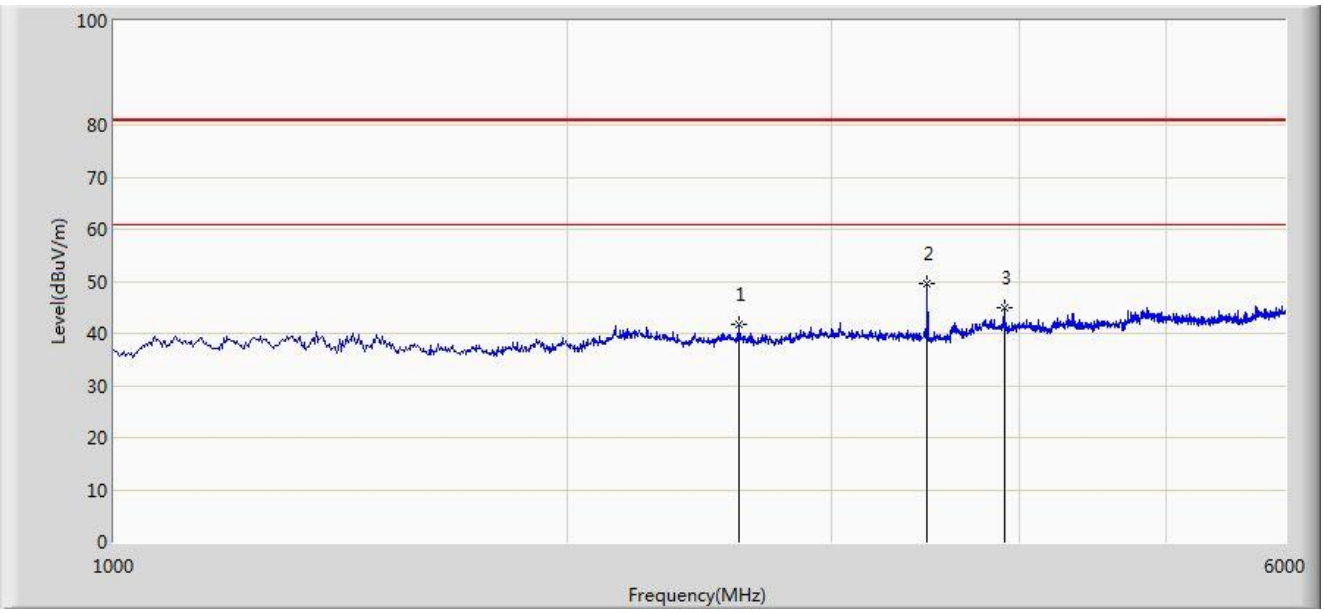
Note 2: The fundamental frequency is 433.92MHz, so the fundamental and spurious emissions radiated limit base on the operating frequency 433.92MHz.

Note 3: Peak Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB).

AV Measure Level = Peak Measure Level + Duty Cycle Factor.

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC2	Time: 2018/09/30 - 18:00
Limit: FCC 15.231(b)	Engineer: Jone Zhang
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: Remote Keyless Entry	Power: By Battery
Test Mode: Transmit at channel 433.92MHz	



No	Frequency (MHz)	Reading Level (dBuV)	Factor (dB)	Duty Cycle Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Type
1	2602.500	42.210	-0.397	N/A	41.813	80.825	-39.012	PK
	2602.500	42.210	-0.397	-16.480	25.333	60.825	-35.492	AV
2	3472.500	47.963	1.539	N/A	49.502	80.825	-31.323	PK
	3472.500	47.963	1.539	-16.480	33.022	60.825	-27.803	AV
3	3905.000	41.834	3.135	N/A	44.969	80.825	-35.856	PK
	3905.000	41.834	3.135	-16.480	28.489	60.825	-32.336	AV

Note 1: Testing is carried out with frequency rang 9 kHz to the tenth harmonics. There is the ambient noise within frequency range 9 kHz ~ 30 MHz, the permissible value is not show in the report.

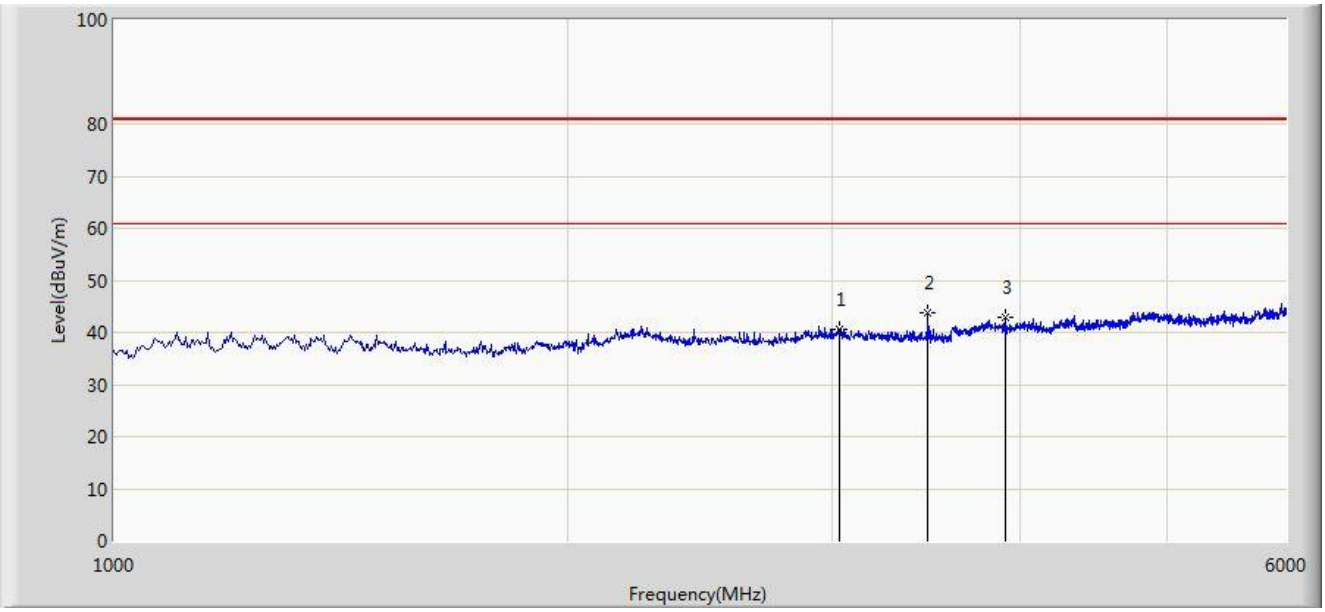
Note 2: The fundamental frequency is 433.92MHz, so the fundamental and spurious emissions radiated limit base on the operating frequency 433.92MHz.

Note 3: Peak Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB).

AV Measure Level = Peak Measure Level + Duty Cycle Factor.

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) – Pre_Amplifier Gain (dB).

Site: AC2	Time: 2018/09/30 - 18:10
Limit: FCC 15.231(b)	Engineer: Jone Zhang
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: Remote Keyless Entry	Power: By Battery
Test Mode: Transmit at channel 433.92MHz	



No	Frequency (MHz)	Reading Level (dBuV)	Factor (dB)	Duty Cycle Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Type
1	3030.000	39.690	0.843	N/A	40.533	80.825	-40.292	PK
	3030.000	39.690	0.843	-16.480	24.053	60.825	-36.772	AV
2	3472.500	42.294	1.539	N/A	43.833	80.825	-36.992	PK
	3472.500	42.294	1.539	-16.480	27.353	60.825	-33.472	AV
3	3905.000	39.895	3.135	N/A	43.030	80.825	-37.795	PK
	3905.000	39.895	3.135	-16.480	26.550	60.825	-34.275	AV

Note 1: Testing is carried out with frequency rang 9 kHz to the tenth harmonics. There is the ambient noise within frequency range 9 kHz ~ 30 MHz, the permissible value is not show in the report.

Note 2: The fundamental frequency is 433.92MHz, so the fundamental and spurious emissions radiated limit base on the operating frequency 433.92MHz.

Note 3: Peak Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB).

AV Measure Level = Peak Measure Level + Duty Cycle Factor.

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) – Pre_Amplifier Gain (dB).

6.3. 20dB Bandwidth

6.3.1.Test Limit

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.

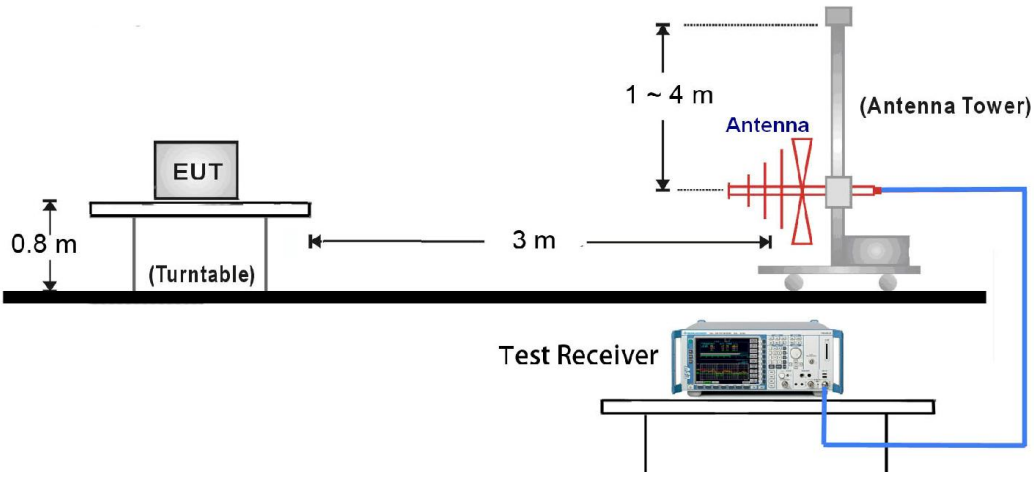
6.3.2.Test Procedure Used

ANSI C63.10-2013 - Section 6.9.2

6.3.3.Test Setting

With the EUT's antenna attached, the EUT's 20dB Bandwidth power was received by the test antenna, which was connected to the spectrum analyzer with the START, and STOP frequencies set to the EUT's operation band.

6.3.4.Test Setup



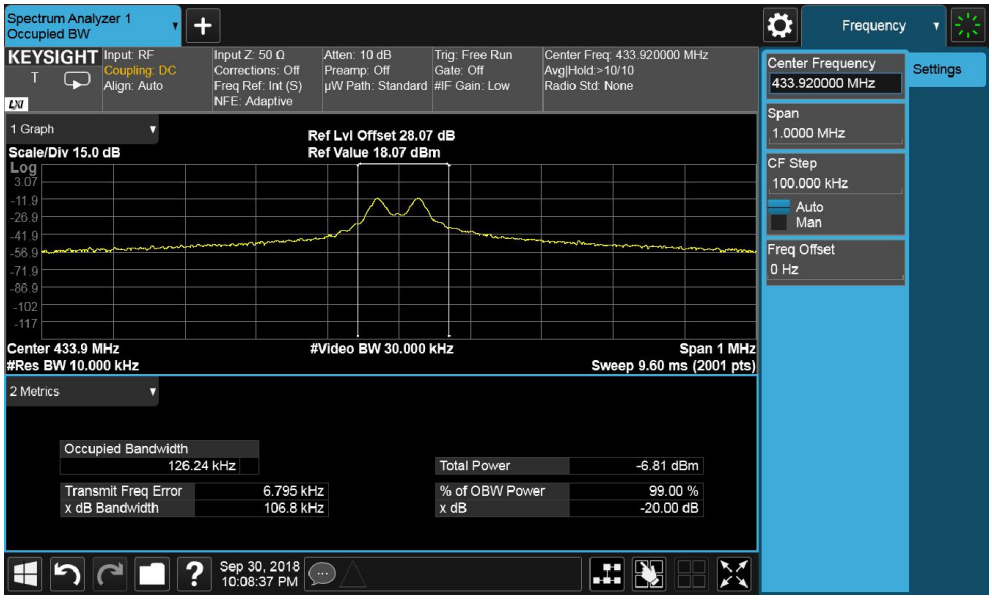
6.3.5.Test Result

Product	Remote Keyless Entry	Temperature	23°C
Test Engineer	Jone Zhang	Relative Humidity	54%
Test Site	AC2	Test Date	2018/09/30
Test Item	Occupied Bandwidth		

Test Frequency (MHz)	20dB Bandwidth (KHz)	99% Bandwidth (KHz)	Limit (KHz)	Result
433.92	106.8	126.24	≤ 1084.8	Pass

Limit = Fundamental Frequency * 0.25% = 433.92MHz * 0.25% = 1084.8 kHz

20dB Bandwidth Test Plot



6.4. Release Time

6.4.1.Test Limit

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.

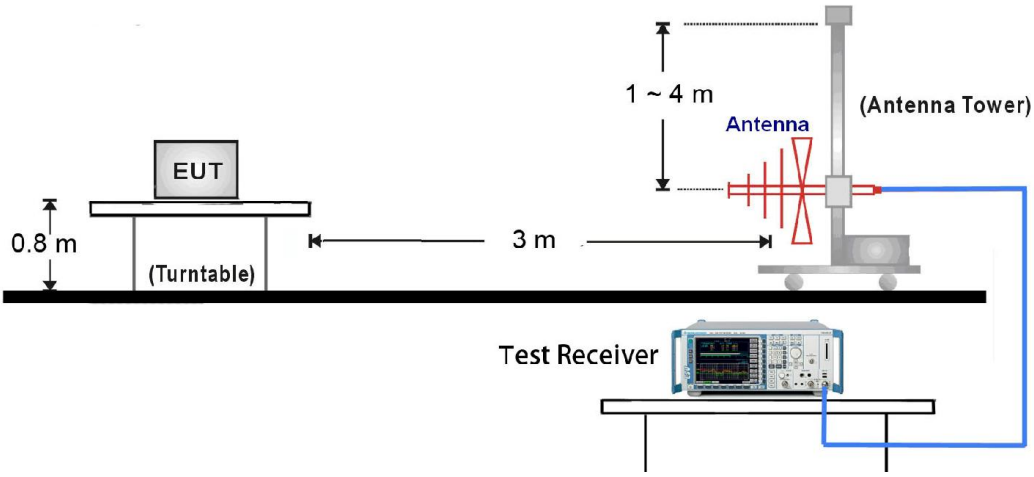
6.4.2.Test Procedure Used

ANSI C63.10-2013 – Section 7.4

6.4.3.Test Procedure

With the EUT's antenna attached, the EUT's output signal was received by the test antenna, which was connected to the spectrum analyzer. Set the center frequency to 433.92MHz, than set the spectrum analyzer to Zero Span for the release time reading. During the testing, the switch was released then the EUT automatically deactivated.

6.4.4.Test Setup



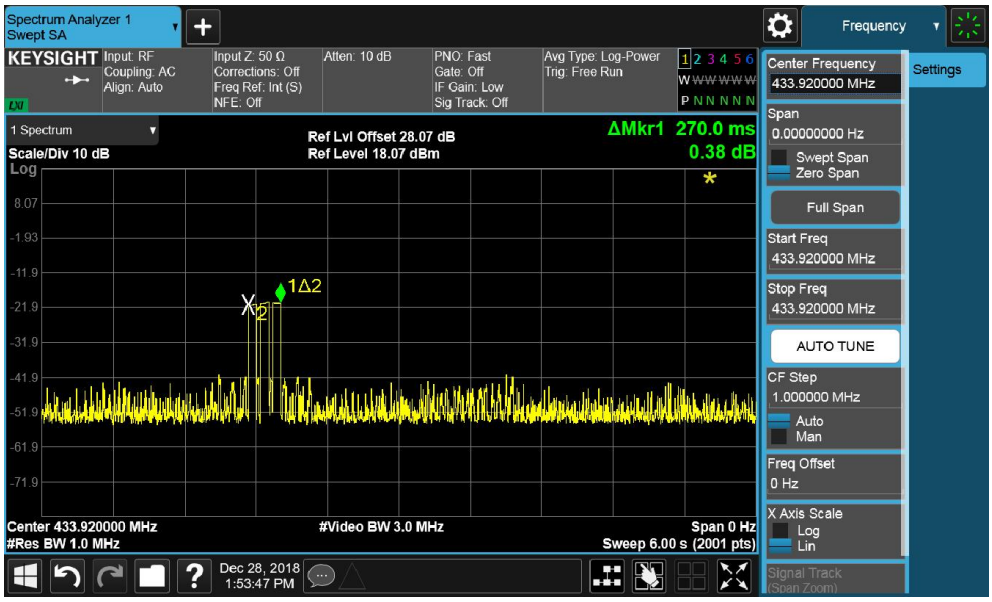
6.4.5.Test Result

Product	Remote Keyless Entry	Temperature	23°C
Test Engineer	Jone Zhang	Relative Humidity	54%
Test Site	AC2	Test Date	2018/09/30
Test Item	Release Time		

Item	Measured Value	Limit	Result
Release Time	0.270 s	≤ 5 s	Pass

Measure Value = Release$_{(on\ time)}$ = 270.0ms

Release Time



6.5. Duty Cycle

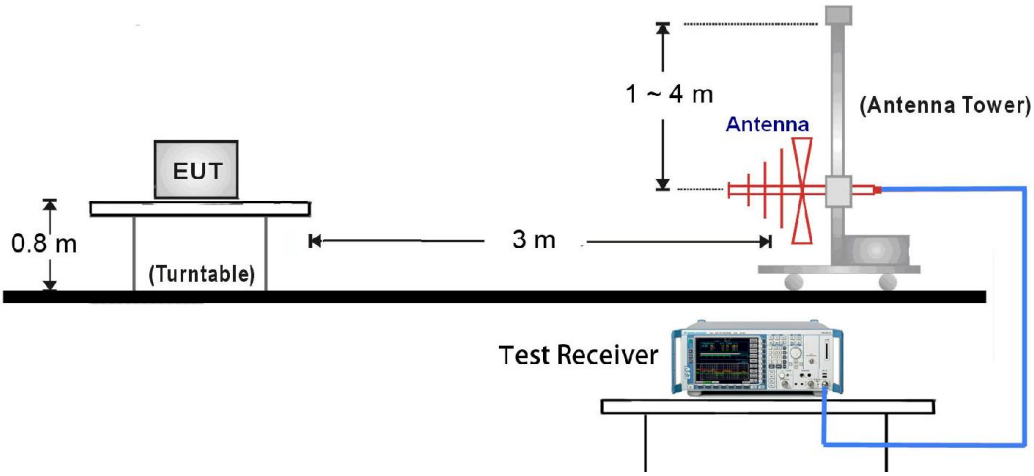
6.5.1.Test Limit

According to FCC Part 15.231(b) and 15.35(e), for pulse operation transmitter, the averaging pulsed emissions are calculated by peak value of measured emission plus duty cycle factor.

6.5.2.Test Procedure

With the EUT's antenna attached, the EUT's output signal was received by the test antenna, which was connected to the spectrum analyzer. Set the center frequency to 433.92MHz, than set the spectrum analyzer to Zero Span for the release time reading. During the testing, the switch was released then the EUT automatically deactivated.

6.5.3.Test Setup



6.5.4. Test Result

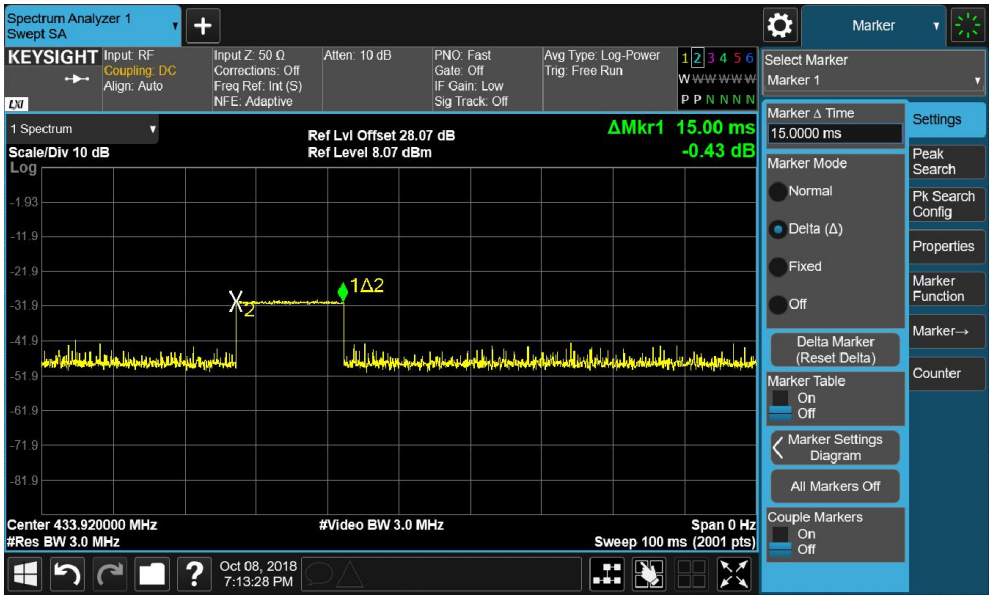
Product	Remote Keyless Entry	Temperature	23°C
Test Engineer	Jone Zhang	Relative Humidity	54%
Test Site	AC2	Test Date	2018/09/30
Test Item	Duty Cycle		

Test Frequency (MHz)	Total Time (Ton) (ms)	The duration of one cycle(ms)	Duty Cycle (%)	Duty Cycle Factor (dB)
433.92	15.00	100	15.00	-16.48

Note: Duty Cycle Factor = 20*Log(Duty Cycle).

Total Time (T_{on})(ms)= 15.00(ms)

Width of Pulse



7. CONCLUSION

The data collected relate only the item(s) tested and show that the device is in compliance with FCC Part 15.231(a) of the FCC Rules.

The End

Appendix A – Test Setup Photograph

Refer to “1809WSU015-UT” file.