DEKRA Testing and Certification (Suzhou) Co., Ltd.
No.99 Hongye Rd., Suzhou Industrial Park, Suzhou, 215006, Jiangsu, China
TEL: +86-512-6251-5088 / FAX: +86-512-6251-5098

Test report No:
21B0620R-RF-US-P07V02

FCC TEST REPORT

Product Name	BCM-KEY
Model and /or type reference	RKE3.1
Trade Name	SGMW
FCC ID	2AVYXRKE31
Applicant´s name / address	SAIC GM WULING AUTOMOBILE COMPANY LIMITED Liuzhou City, Guangxi Zhuang Autonomous Region, 545007 China
Test method requested, standard	FCC CFR Title 47 Part 15 Subpart C Section 15.231 ANSI C63.10: 2013
Verdict Summary	IN COMPLIANCE
Testedby (name / position & signature)	Adma Lu/Project Engineer Adma Lu
Approved by (name / position & signature)	Jack Zhang/Supervisor Jack Zhang
Date of issue	2022-03-08
Report Version	V1.0
Report template No	Template_FCC 15.231-RF-V1.0

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COMPETENCES AND GUARANTEES

DEKRA is a testing laboratory competent to carry out the tests described in this report.
In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

IMPORTANT: No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of DEKRA.

GENERAL CONDITIONS

Test Location	No. 99, Hongye Road, Suzhou Industrial Park Suzhou, 215006, P.R. China
Date(receive sample)	Nov. 17, 2021
Date (start test)	Nov. 20, 2021
Date (finish test)	Dec. 25, 2021

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or Competent Authorities.
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4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA.

ENVIRONMENTAL CONDITIONS

The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. The climatic conditions during the tests were within the following limits:

Ambient temperature	15 °C – 35 °C
Relative Humidity air	30% - 60%

If explicitly required in the basic standard or applied product / product family standard the climatic values are recorded and documented separately in this test report.

POSSIBLE TEST CASE VERDICTS

Test case does not apply to test object	N/A
Test object does meet requirement	P (Pass) / PASS
Test object does not meet requirement	F (Fail) / FAIL
Not measured	N/M

ABBREVIATIONS

For the purposes of the present document, the following abbreviations apply:

EUT : Equipment Under Test
QP : Quasi-Peak
CAV : CISPR Average
AV : Average
CDN : Coupling Decoupling Network
SAC : Semi-Anechoic Chamber
OATS : Open Area Test Site
BW : Bandwidth
AM : Amplitude Modulation
PM : Pulse Modulation
HCP : Horizontal Coupling Plane
VCP : Vertical Coupling Plane
U_N : Nominal voltage
*T*x : Transmitter
*R*x : Receiver
N/A : Not Applicable
N/M : Not Measured

DOCUMENT HISTORY

Report No.	Version	Description	Issued Date
21B0620R-RF-US-P07V02	V1.0	Initial issue of report.	2022-03-08

REMARKS AND COMMENTS

1. The equipment under test (EUT) does meet the essential requirements of the stated standard(s)/test(s).
2. These test results on a sample of the device are for the purpose of demonstrating Compliance with Part 15 Subpart C Paragraph 15.231.
3. The measurement result is considered in conformance with the requirement if it is within the prescribed limit, It is not necessary to account the uncertainty associated with the measurement result.
4. The test results presented in this report relate only to the object tested.
5. The test report shall not be reproduced without the written approval of DEKRA Testing and Certification (Suzhou) Co., Ltd.
6. This report will not be used for social proof function in China market.
7. DEKRA declines any responsibility with the following test data provided by customer that may affect the validity of result:
   - Chapter 1.1 General Description of the Item(s);
   - Chapter 1.2 Channel List.

USED EQUIPMENT

AC Power Line Conducted Emission / TR1

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EMI Test Receiver	R&S	ESCI	100906	2021.04.16	2022.04.15
Two-Line V-Network	R&S	ENV216	101044	2021.04.16	2022.04.15
50ohm Termination	SHX	TF2	7081402	2021.09.21	2022.09.20
50ohm Termination	SHX	TF2	7081403	2021.09.21	2022.09.20
50ohm Coaxial Switch	Anritsu	MP59B	6200464462	N/A	N/A
Temperature/Humidity Meter	RTS	RTS-8S	TR1-TH	2021.08.21	2022.08.20
Dekra test software	Dekra	-	-	-	-

Radiated Emission(30MHz-1GHz) / AC2

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EMI Test Receiver	R&S	ESCI	100573	2021.10.30	2022.10.29
Bilog Antenna	Teseq GmbH	CBL6112D	27611	2021.09.20	2022.09.19
Coaxial Cable	Huber+Suhner	RG 214	AC2-C	2021.04.03	2022.04.02
Temperature/Humidity Meter	RTS	RTS-8S	AC2-TH	2021.08.11	2022.08.10
Dekra test software	Dekra	-	-	-	-

Radiated Emission(1GHz-40GHz) / AC5

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EXA Spectrum Analyzer	Keysight	N9010A	MY55370495	2021.04.15	2022.04.14
Amplifier	Keleto	LNPA	SK20190225	2021.09.23	2022.09.22
Preamplifier	EMCI	EMC184045SE	980263	2021.05.22	2022.05.21
DRG Horn Antenna	ETS-Lindgren	3117	00167055	2021.08.04	2022.08.03
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	294	2021.03.21	2023.03.20
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2021.04.03	2022.04.02
Coaxial Cable	ROSENBERGER	LA1-C011-2000/3000	AC5-40G	2021.04.15	2022.04.14
Temperature/Humidity Meter	RTS	RTS-8S	AC5-TH	2021.08.11	2022.08.10
Dekra test software	Dekra	-	-	-	-

UNCERTAINTY

Uncertainties have been calculated according to the DEKRA internal document.The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%The Uncertainties is complice with standard required as below.

Test item	Uncertainty
AC Power Line Conducted Emission	9kHz~150kHz: 2.80dB 150kHz~30MHz: 2.40dB
Radiated Emission(30MHz~1GHz)	Horizontal: 30MHz~200MHz: 3.50 dB 300MHz~1GHz: 3.60 dB Vertical: 30MHz~200MHz: 3.60 dB 300MHz~1GHz: 3.50 dB
Radiated Emission(1GHz~26.5GHz)	Horizontal: 1GHz~18GHz: 5.00 dB Vertical: 1GHz~18GHz: 4.80 dB
Occupied Bandwidth	±1kHz
Time	

1 GENERAL INFORMATION

1.1 General Description of the Item(s)

Product Name ..... :	BCM-KEY
Model No. ..... :	RKE3.1
FCC ID ..... :	2AVYXRKE31
Manufacturter ..... :	United Automotive Electronic Systems Co., Ltd.
Manufacturer Address..... :	No. 8, cheyuanheng fifth road yufeng area,Liuzhou City, Guangxi Province,516006,P.R. China.

Wireless specifiction..... :	N/A
Operating frequency range(s) ..... :	433.92MHz
Type of Modulation..... :	FSK
Number of channel..... :	1

Rated power supply ..... :	Voltage and Frequency	
	☐	AC: 220 – 240 V, 50/60 Hz
	☐	AC: 110 – 130 Vac, 50/60 Hz
	☐	DC: 3 Vdc
	☒	Battery:3V
Mounting position ..... :	☐	Table top equipment
	☐	Wall/Ceiling mounted equipment
	☐	Floor standing equipment
	☐	Head-mounted equipment
	☒	Other:handheld equipment

1.2 Channel List

SRD Working Frequency							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
01	433 MHz						

Note: The general description of the Item(s) and channel list in clause 1 are provided and confirmed by the client.

2 DESCRIPTION OF TEST SETUP

2.1 Operating mode(s) used for tests

During the tests the following operating mode(s) has(have) been used.

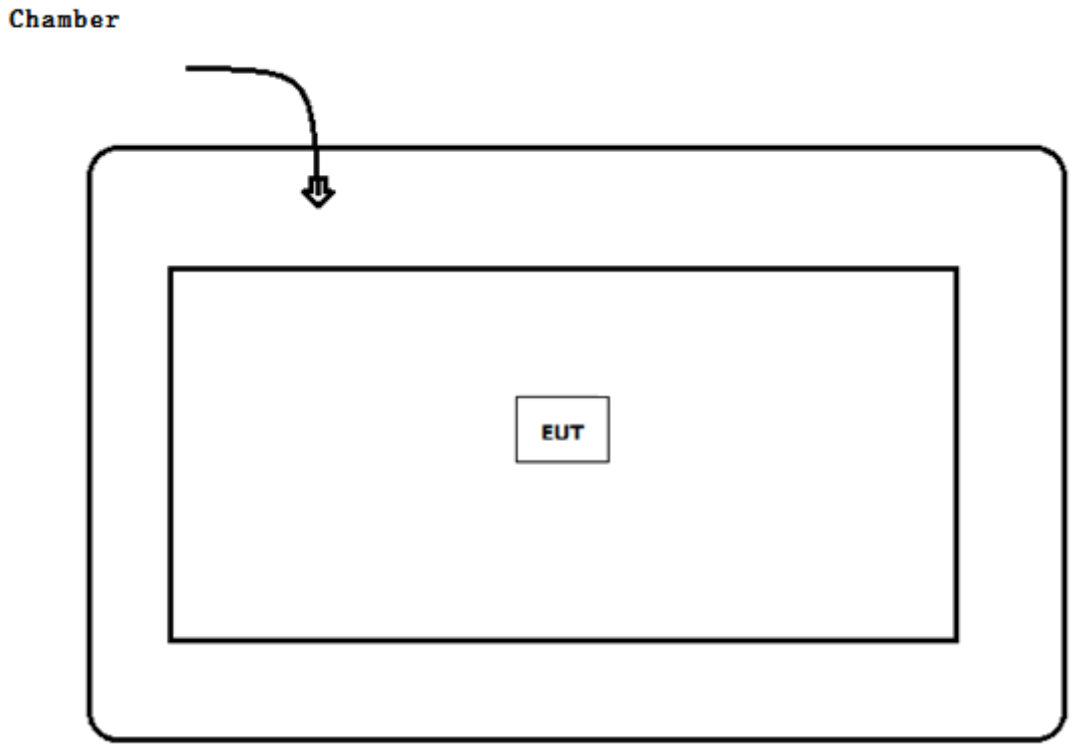
Test Mode For Bluetooth	Mode1: Transmit

2.2 Auxiliary equipment / Test software for the EUT

Auxiliary equipment	Type / Version	Manufacturer	Supplied by
N/A	N/A	N/A	N/A
Software	Type / Version	Manufacturer	Supplied by
N/A	N/A	N/A	N/A

2.3 Test Configuration / Block diagram used for tests

Test setup Diagram- Radiated Emission



2.4 Testing process

1	Setup the EUT as shown in Section 2.3.
2	Press the transmit button.
3	Configure the test mode, the test channel, and the data rate.
4	Verify that the EUT works properly.

3 VERDICT SUMMARY SECTION

This chapter presents an overview of standards and results. Refer to the next chapters for details of measured test results and applied test levels.

3.1 Standards

Standard	Year	Description
FCC CFR Title 47 Part 15 Subpart C Section 15.231	2021	Periodic operation in the band 40.66-40.70 MHz and above 70 MHz.
ANSI C63.10	2013	American National Standard ofProcedures for Compliance Testing ofUnlicensed Wireless Devices

3.2 Deviation(s) from the Standard(s) / Test Specification(s)

The following deviation(s) was / were made from the published requirements of the listed standards: N/A.

(Please define the deviations from the standard(s) if applicable)

3.3 Overview of results

Requirement – Test case	Basic standard(s)	Verdict	Remark
AC Power Line Conducted Emission	FCC 15.207	PASS	---
Field strength of fundamental	FCC 15.231(b)(1)	PASS	---
Field strength of spurious emissions	FCC 15.231(b)(1)(2),FCC 15.209	PASS	---
20dB Bandwidth	FCC 15.231(c)	PASS	---
Duration Time	FCC 15.231(a)(1)	PASS	---

3.4 Test Facility

USA	**:**	**FCC Designation Number: CN1199**
CA	**:**	**ISED CAB identifier: CN0040**

4 TEST RESULTS

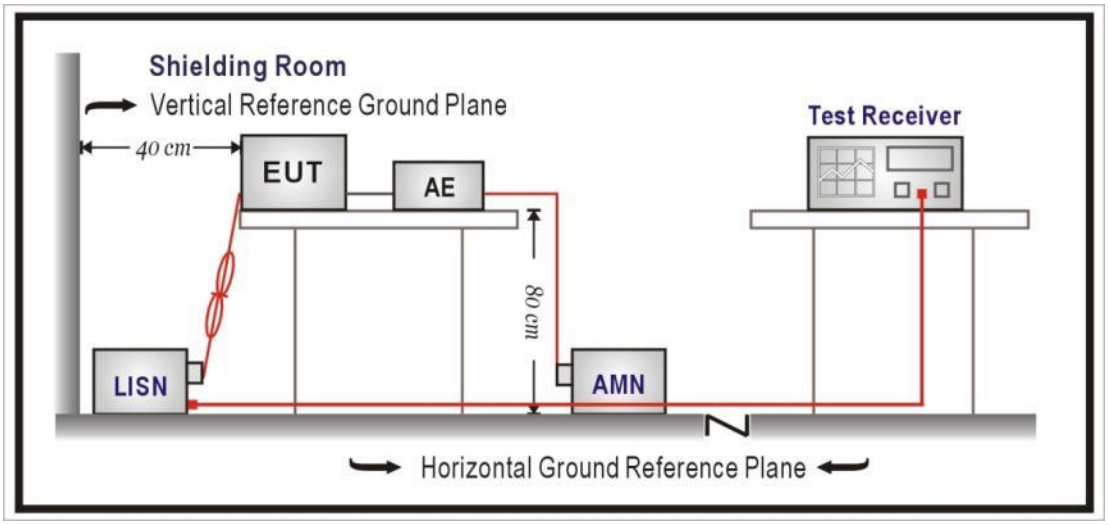
4.1 AC Power Line Conducted Emission	VERDICT: N/A

4.1.1 Limit

Standard	FCC Part 15 Subpart C Paragraph 15.207	
Frequency range [MHz]	Limit: QP [dB(μV)[1)]]	Limit: AV [dB(μV) [1)]]
0,15 - 0,50	66 – 56 [2)]	56 - 46 [2)]
0,50 - 5,0	56	46
5,0 - 30	60	50

[1)] At the transition frequency, the lower limit applies.
[2)] The limit decreases linearly with the logarithm of the frequency.
NOTE 1: The exclusion band for transmitters shall be considered for transmitters operating at frequencies below 30 MHz.
NOTE 2: Where the AC output port is directly connected (or via a circuit breaker) to the AC power input port of the EUT the AC power output port need not to be tested.

4.1.2 Test Setup



4.1.3 Test Procedure

	References Rule	Chapter	Item
☒	ANSI C63.10-2013	6.2	Standard test method for ac power-line conducted emissions from unlicensedwireless devices

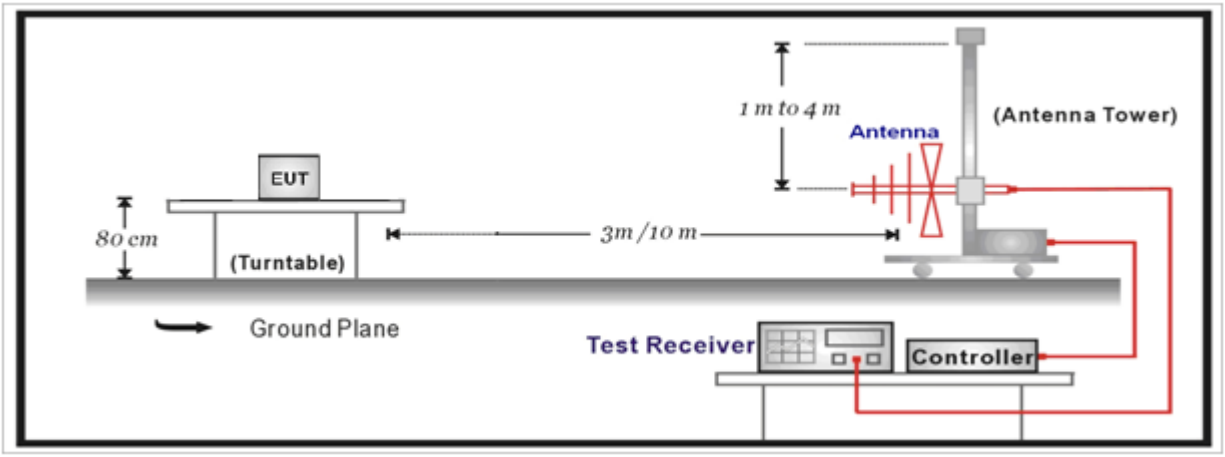
4.1.4 Test Data
This test item is not application. Beacause the EUT is a key, and powerd by battery and without charging port.

4.2 Field strength of fundamental	VERDICT: PASS

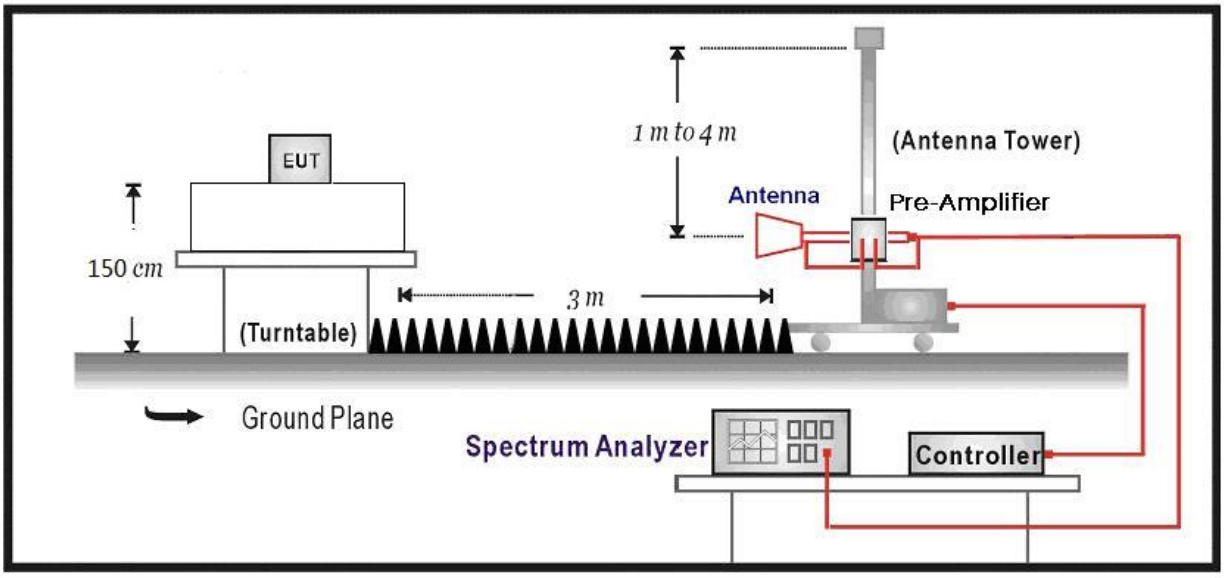
4.2.1 Limit		
Standard	FCC Part 15 Subpart C Paragraph 15.231	
Restricted Bands of operation for FCC		
Fundamental frequency (MHz)	Field strength of fundamental (μV/m)	Field strength of fundamental (dBμV/m)
40.66-40.70	2250	67.04
70-130	1250	61.93
130-174	1250-3750	61.93-71.48 1)
174-260	3750	71.48
260-470	3750-12500	71.48-81.93 1)
Above 470	12500	81.93
Note 1)： Linear interpolations		

4.2.2 Test Setup

30MHz-1GHz Test Setup:



Above 1GHz Test Setup:



4.2.3 Test Procedure

	References Rule			Chapter	Description
☒	ANSI C63.10			11.12	Emissions in restricted frequency bands
	☒	ANSI C63.10		11.12.1	Radiated emission measurements
	☒	ANSI C63.10		11.12.2.7	Radiated spurious emission test
		☒	ANSI C63.10	6.4	Radiated emissions from unlicensed wireless devices below 30 MHz
		☒	ANSI C63.10	6.5	Radiated emissions from unlicensed wireless devices in the frequency range of 30 MHz to 1000 MHz
		☒	ANSI C63.10	6.6	Radiated emissions from unlicensed wireless devices above 1 GHz

4.2.4 Test Data

Frequency (MHz)	Measure Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Type
433.920(X Axis)	74.021	100.83	-26.809	Horizontal	PK
433.920(X Axis)	60.707	100.83	-40.123	Vertical	PK

Frequency (MHz)	Measure Level (dBuV/m)	Duty cycle Factor	Average value (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
433.920(X Axis)	74.021	-0.48	73.541	80.83	-7.289	Horizontal
433.920(X Axis)	60.707	-0.48	60.227	80.83	-20.603	Vertical

Note 1:
Average value=Peak value + Duty Cycle Factor
Duty cycle factor = 20log(Duty cycle)
Duty cycle = on time/100 milliseconds or period, whichever is less
T on time =70.246(ms)
T on time+T off time=74.268ms
Duty cycle =94.58%
Duty cycle factor = 20log(Duty cycle) = -0.48
Note 2:
We have evluaed three orthogonal positions (X , Y , Z) and the position with the highest emission level(X Axis) was recorded and shown in the report.

4.3 Field strength of spurious emissions — VERDICT: PASS

4.3.1 Limit

Standard	FCC 15.231(b)(1)(2),FCC 15.209

FCC 15.231

Fundamental frequency (MHz)	Field strength of spurious emission (μV/m)	Field strength of spurious emission (dBμV/m)
40.66-40.70	225	47.04
70-130	125	41.93
130-174	125-375	41.93-51.48(Note 1)
174-260	375	51.48
260-470	375-1250	51.48-61.93(Note 1)
Above 470	1250	61.93

Note 1: Linear interpolations

The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.

Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in §15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.

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.

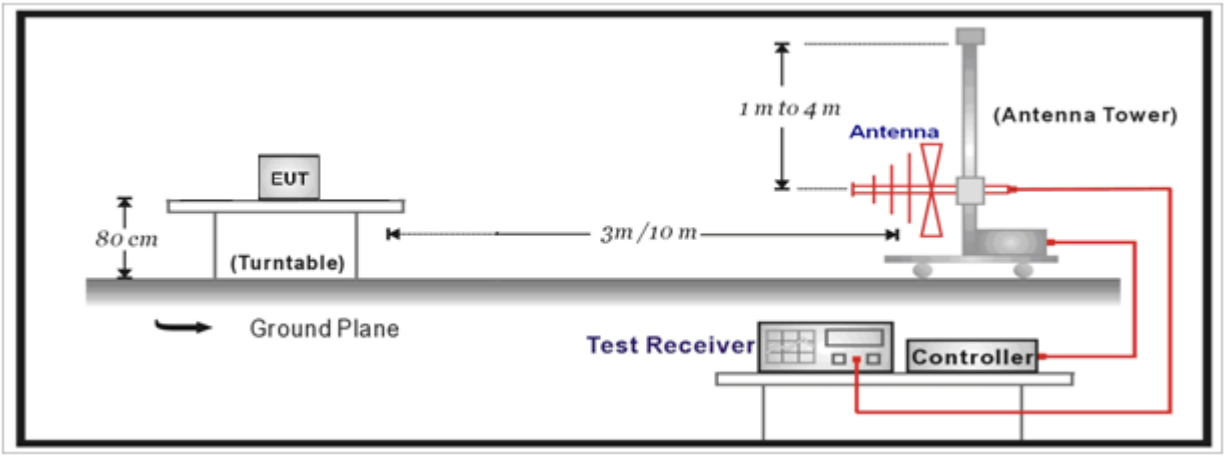
FCC 15.209			
Frequency (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance (m)
0.009 - 0.49	2400/F(kHz)	48.5 – 13.8	300(Note 1)
0.49 - 1.705	24000/F(kHz)	33.8 - 23	30(Note 1)
1.705 - 30	30	29.5	30(Note 1)
30 -88	100	40	3(Note 2)
88-216	150	43.5	3(Note 2)
216 - 960	200	46	3(Note 2)
Above 960	500	54	3(Note 2)

Note 2: At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

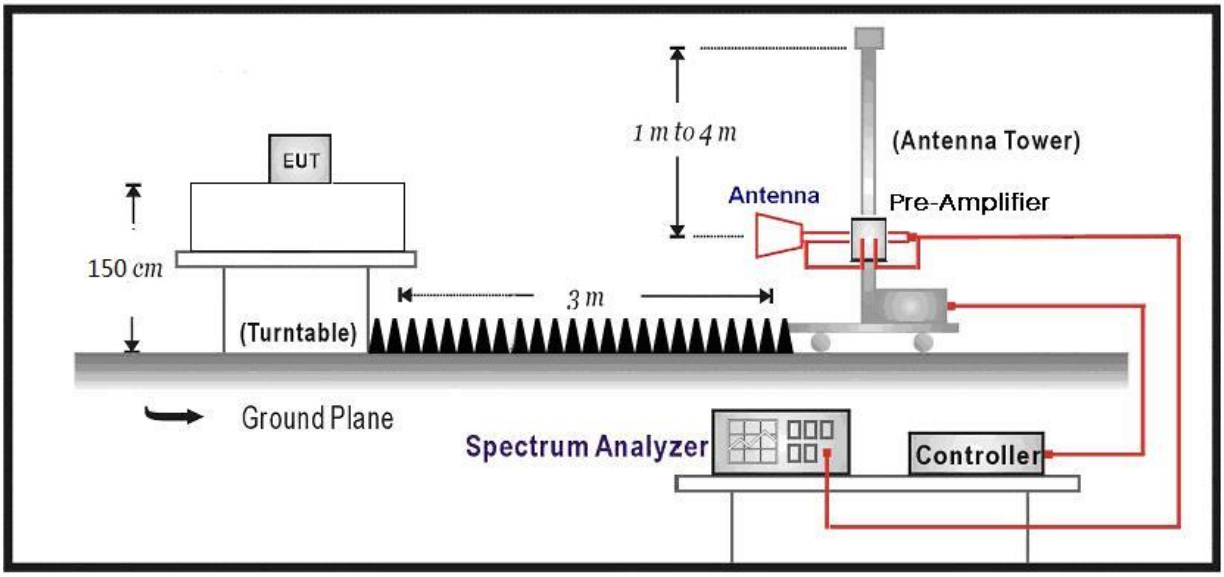
Note 3: At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

4.3.2 Test Setup

30MHz-1GHz Test Setup:



Above 1GHz Test Setup:



4.3.3 Test Procedure

	References Rule			Chapter	Description
☒	ANSI C63.10			11.12	Emissions in restricted frequency bands
	☒	ANSI C63.10		11.12.1	Radiated emission measurements
	☒	ANSI C63.10		11.12.2.7	Radiated spurious emission test
		☒	ANSI C63.10	6.4	Radiated emissions from unlicensed wireless devices below 30 MHz
		☒	ANSI C63.10	6.5	Radiated emissions from unlicensed wireless devices in the frequency range of 30 MHz to 1000 MHz
		☒	ANSI C63.10	6.6	Radiated emissions from unlicensed wireless devices above 1 GHz

4.3.4 Test Data

Frequency (MHz)	Measure Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Type
867.959	57.949	61.93	-3.981	Horizontal	QP
867.959	48.348	61.93	-13.582	Vertical	QP
1297.500	31.742	74.000	-42.258	Horizontal	PK
1739.500	42.213	74.000	-31.787	Horizontal	PK
2173.000	51.733	74.000	-22.267	Horizontal	PK
2606.500	49.001	74.000	-24.999	Horizontal	PK
3040.000	35.253	74.000	-38.747	Horizontal	PK
3473.500	35.918	74.000	-38.082	Horizontal	PK
3907.000	32.478	74.000	-41.522	Horizontal	PK
4340.500	33.134	74.000	-40.866	Horizontal	PK
4774.000	34.073	74.000	-39.927	Horizontal	PK
1297.500	31.277	74.000	-42.723	Vertical	PK
1739.500	37.559	74.000	-36.441	Vertical	PK
2173.000	47.912	74.000	-26.088	Vertical	PK
2606.500	39.191	74.000	-34.809	Vertical	PK
3040.000	32.785	74.000	-41.215	Vertical	PK
3473.500	37.404	74.000	-36.596	Vertical	PK
3907.000	33.490	74.000	-40.51	Vertical	PK
4340.500	33.838	74.000	-40.162	Vertical	PK
4774.000	33.791	74.000	-40.209	Vertical	PK

Note:
1. Measured Level = Reading Level + Factor.
2. The test frequency range, 9kHz~30MHz, the worst case are at least 20dB below the limits, therefore no data appear in the report.
3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.
4. As the radiated emission was performed, so conducted emission was not tested.
5. We have evluaed three orthogonal positions (X , Y , Z) and the position with the highest emission level(X Axis) was recorded and shown in the report.

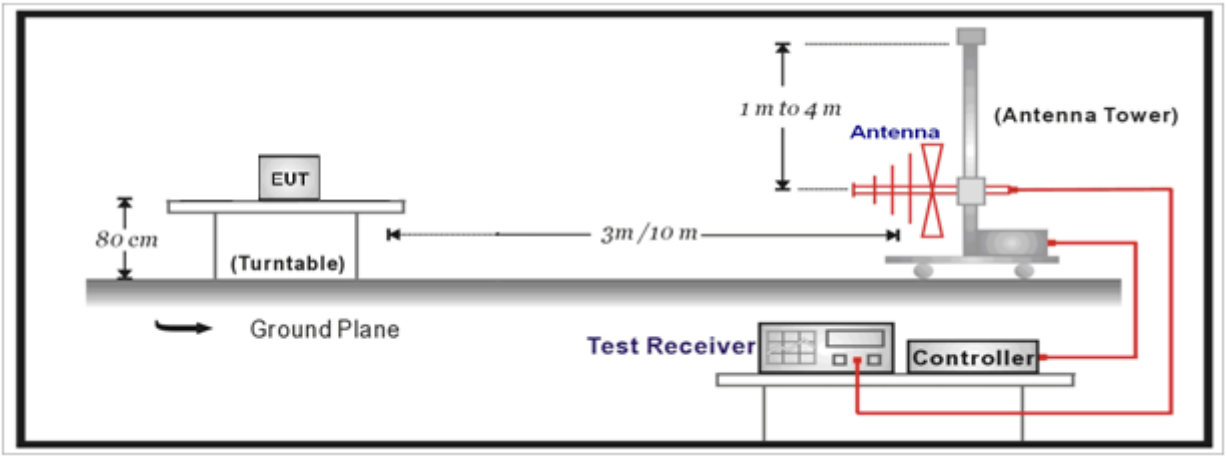
4.4 DTS Bandwidth	VERDICT: PASS

4.4.1 Limit

Standard	FCC 15.231(c)

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.

4.4.2 Test Setup



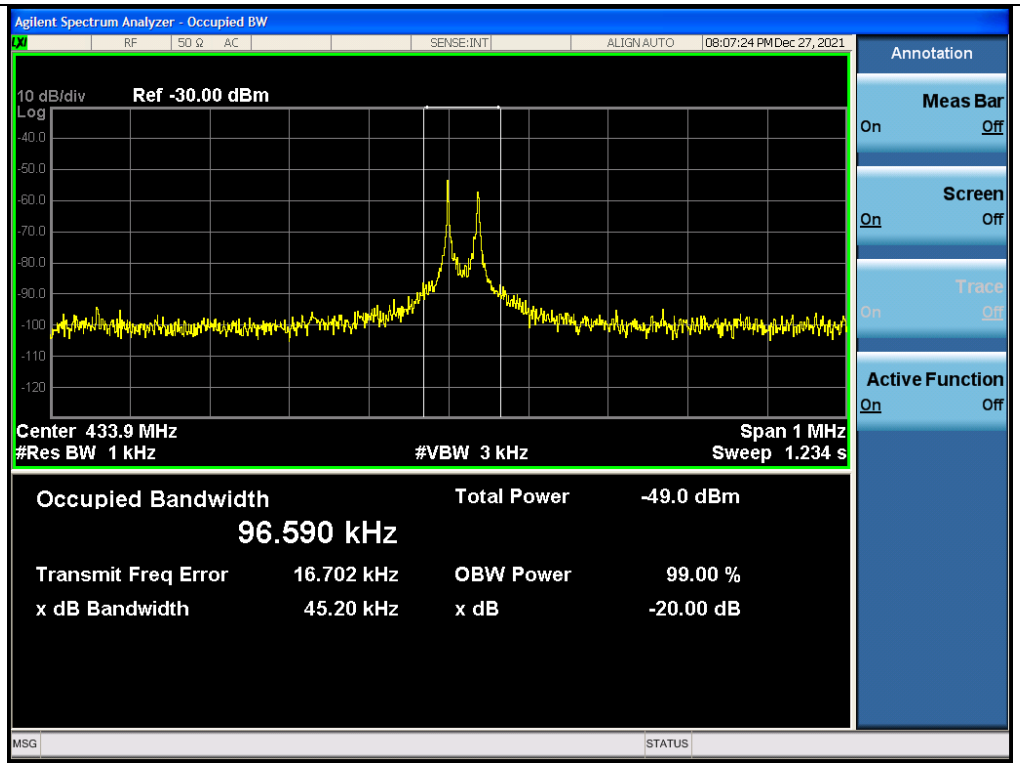
4.4.3 Test Procedure

	Reference Rule		Chapter	Description
☒	ANSI C63.10		6.9	Occupied bandwidth tests
	☒	ANSI C63.10	6.9.2	Occupied bandwidth—relative measurement procedure
	☐	ANSI C63.10	6.9.3	Occupied bandwidth—power bandwidth (99%) measurement procedure

4.4.4 Test Data

Mode	CH.	Test Freq. (MHz)	20dB Occupied Bandwidth (kHz)	Limit (kHz)	Result
1	00	433.92	45.20	Within band	Pass

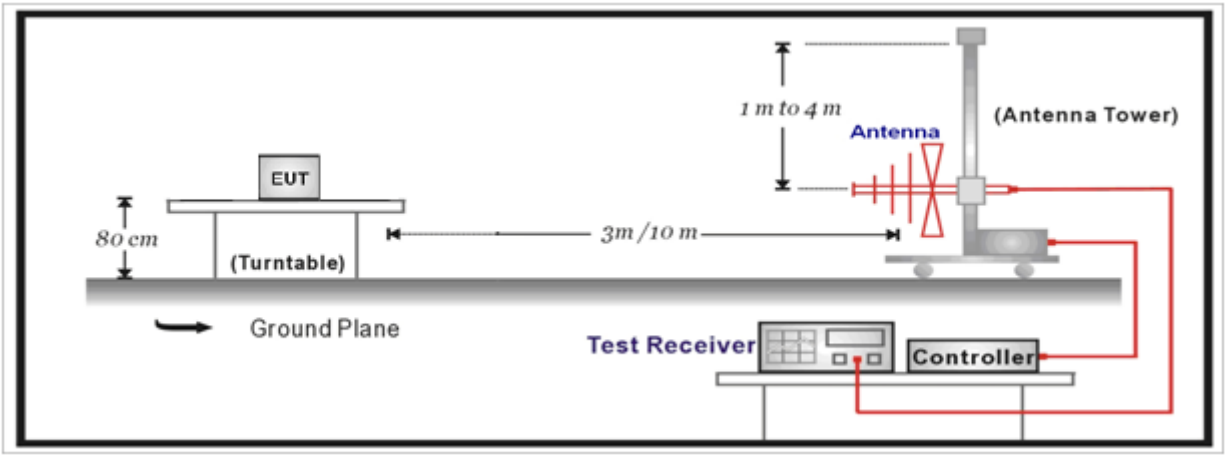
Note : The worst case of Occupied Bandwidth as below:



4.5 Duration Time	VERDICT: PASS

4.5.1 Limit	
Standard	FCC Part 15 Subpart C Paragraph 15.247 (b)(3)
(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.	

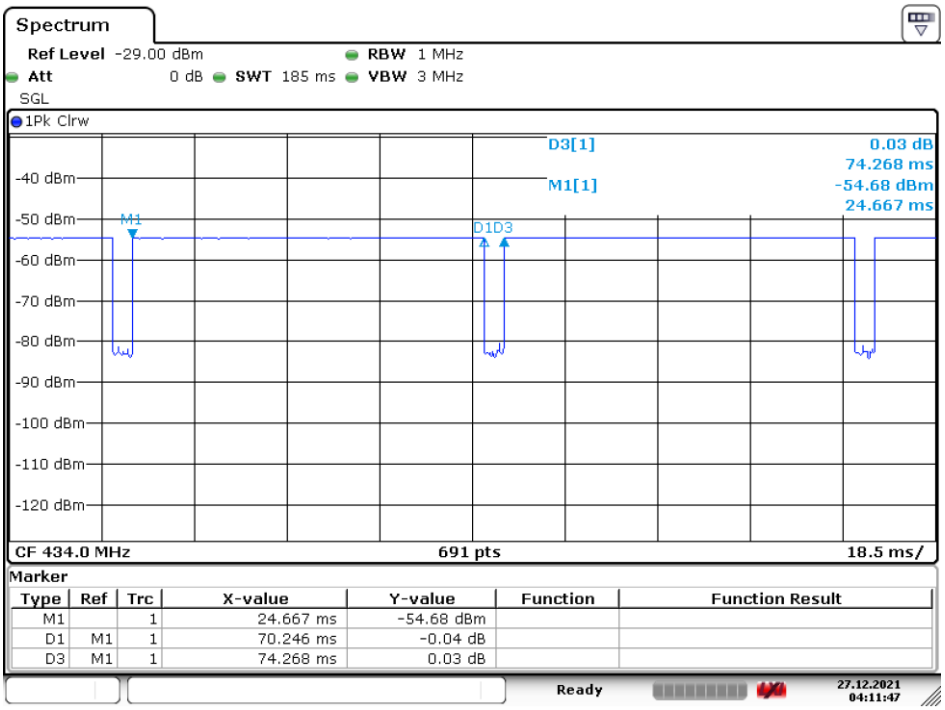
4.5.2 Test Setup



4.5.3 Test Procedure
1.According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT. 2. Set the EUT to proper test channel. 3. Single scan the transmission, and read the transmission time.

4.5.4 Test Data

Frequency (MHz)	Duration Time (S)	Limit (S)	Result
433.92	0.07025	＜5.0	Pass



5 TEST SETUP PHOTO AND EUT PHOTO

Remark: The test setup photo and EUT Photo please see appendix.

The End