



FCC TEST REPORT

FCC ID: 2AI4T-XNKF01

On Behalf of

Shenzhen Xhorse Electronics Co., Ltd.

Universal Smart Key

Model No.: XNKF01, XSKF01

Prepared for : Shenzhen Xhorse Electronics Co., Ltd.
2009-2011, Changhong Science and Technology Building, Science Park
Address : South Twelfth Road, High Tech Science Park, Nanshan District,
Shenzhen, China

Prepared By : Shenzhen Alpha Product Testing Co., Ltd.
Address : Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103,
Shenzhen, Guangdong, China

Report Number : T1881255 06
Date of Receipt : August 09, 2018
Date of Test : August 09, 2018-September 04, 2018
Date of Report : September 29, 2019
Version Number : REV0

Contents

1. General Information	5
1.1. Description of Device (EUT)	5
1.2. Accessories of Device (EUT)	6
1.3. Tested Supporting System Details	6
1.4. Test Facility	6
2. Summary of test	7
2.1. Summary of test result	7
2.2. Block Diagram	8
2.3. Test mode	8
2.4. Test Conditions	8
2.5. Measurement Uncertainty (95% confidence levels, k=2)	8
2.6. Test Equipment	9
3. Radiation Emission	10
3.1. Radiation Emission Limits(15.209&231)	10
3.2. Test Setup	10
3.3. Test Procedure	12
3.4. Test Equipment Setting For emission test.	12
3.5. Test Condition	12
3.6. Test Result	12
4. Power Line Conducted Emission	16
4.1. Conducted Emission Limits (15.209)	16
4.2. Test Setup	16
4.3. Test Procedure	17
4.4. Test Results	17
5. Occupied bandwidth	18
5.1. Test limit	18
5.2. Method of measurement	18
5.3. Test Setup	18
5.4. Test Results	18
6. Transmission time	20
6.1. Test limit	20
6.2. Method of measurement	20
6.3. Test Setup	20
6.4. Test Results	21
7. Antenna Requirement	23
7.1. Standard Requirement	23
7.2. Antenna Connected Construction	23
7.3. Result	23
8. Test setup photo	24
9. Photos of EUT	25

TEST REPORT DECLARATION

Applicant : Shenzhen Xhorse Electronics Co., Ltd.

Address : 2009-2011, Changhong Science and Technology Building, Science Park South
Twelfth Road, High Tech Science Park, Nanshan District, Shenzhen, China

Manufacturer : Shenzhen Xhorse Electronics Co., Ltd.

Address : 2009-2011, Changhong Science and Technology Building, Science Park South
Twelfth Road, High Tech Science Park, Nanshan District, Shenzhen, China

EUT Description : Universal Smart Key

(A) Model No. : XNKF01, XSKF01

(B) Trademark : 

Measurement Standard Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.231

ANSI C63.10-2013

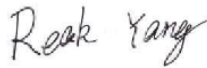
The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits both conducted and radiated emissions. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After the test, our opinion is that EUT compliance with the requirement of the above standards.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

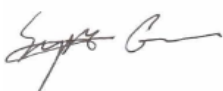
Tested by (name + signature).....:

Reak Yang
Project Engineer


.....

Approved by (name + signature).....:

Simple Guan
Project Manager


.....

Date of issue.....:

September 29, 2019

Revision History

Revision	Issue Date	Revisions	Revised By
REV0	September 29, 2019	Initial released Issue	Simple Guan

1. General Information

1.1. Description of Device (EUT)

EUT : Universal Smart Key

Model No. : XNKF01, XSKF01

DIFF. : All model's the function, software and electric circuit are the same,
: except the model number difference. This report performs the model
XNKF01.

Trade mark : 

Power supply : DC 3V from battery

Operation frequency : 433.92MHz, 315MHz

Modulation : ASK

Antenna Type : Internal antenna, max gain 0dBi.

Software version : V1.0.0

Hardware version : V6

1.2. Accessories of Device (EUT)

Accessories1 : /
Manufacturer : /
Model : /
Power supply : /

1.3. Tested Supporting System Details

No.	Description	Manufacturer	Model	Serial Number	Certification or DOC
/	/	/	/	/	/

1.4. Test Facility

Shenzhen Alpha Product Testing Co., Ltd
Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103,
Shenzhen, Guangdong, China

June 21, 2018 File on Federal Communication Commission
Registration Number: 293961
July 15, 2019 Certificated by IC
Registration Number: CN0085

2. Summary of test

2.1. Summary of test result

Description of Test Item	Standard	Results
Spurious Emission	Section 15.231&15.209	PASS
Conduction Emission	Section 15.207	N/A
Occupied bandwidth	Section 15.231	PASS
Transmission time	Section 15.231	PASS
Band Edge	Section 15.231	N/A
Antenna Requirement	Section 15.203	PASS
Note : Test according to ANSI C63.10-2013		

2.2. Block Diagram

1. For radiated emissions test: EUT was placed on a turn table, which is 0.8 meters high above ground for below 1 GHz test and 1.5 meters high above ground for below 1 GHz test . EUT was set into test mode before test. New battery is used during all test



2.3. Test mode

EUT work in Continuous TX mode, and select test channel, wireless mode

Tested mode, channel, and data rate information		
Mode	Channel	Frequency (MHz)
ASK	CH1	433.92
	CH2	315

2.4. Test Conditions

Temperature range	21-25 °C
Humidity range	40-75%
Pressure range	86-106kPa

2.5. Measurement Uncertainty (95% confidence levels, k=2)

Item	MU	Remark
Uncertainty for Power point Conducted Emissions Test	2.71dB	
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.90 dB	Polarize: V
	3.92dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	4.26 dB	Polarize: H
	4.28 dB	Polarize: V
Uncertainty for conducted RF Power	0.16dB	

2.6. Test Equipment

Equipment	Manufacture	Model No.	Serial No.	Last Cal.	Cal Interval
3m Semi-Anechoic	ETS-LINDGREN	N/A	SEL0017	2018.09.29	1 Year
Spectrum analyzer	Agilent	E4407B	MY49510055	2018.09.29	1 Year
Receiver	R&S	ESCI	101165	2018.09.29	1 Year
Bilog Antenna	SCHWARZBECK	VULB 9168	9168-438	2018.09.30	2 Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D(1201)	2018.09.30	2 Year
Active Loop Antenna	Beijing Daze	ZN30900A	SEL0097	2018.09.29	1 Year
Cable	Resenberger	SUCOFLEX 104	MY6562/4	2018.09.29	1 Year
Cable	Resenberger	SUCOFLEX 104	309972/4	2018.09.29	1 Year
Cable	Resenberger	SUCOFLEX 104	329112/4	2018.09.29	1 Year
Pre-amplifier	SCHWARZBECK	BBV9743	9743-019	2018.09.29	1 Year
Pre-amplifier	Quietek	AP-180C	CHM-0602012	2018.09.29	1 Year

3. Radiation Emission

3.1. Radiation Emission Limits(15.209&231)

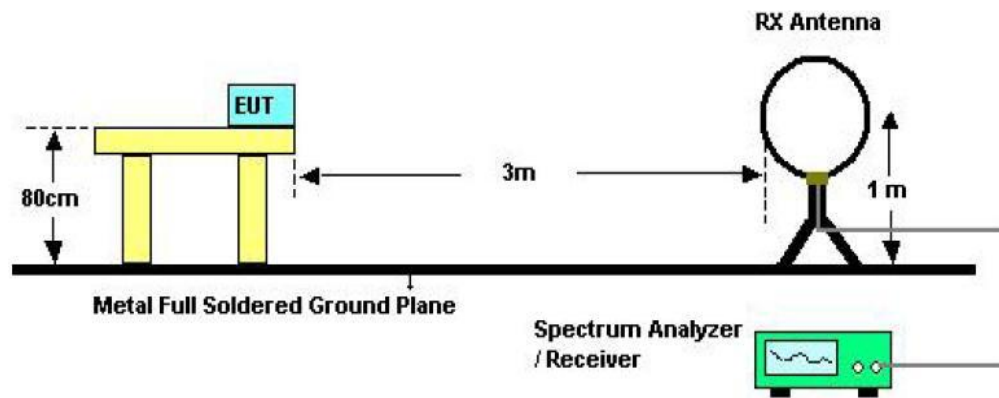
Frequency (MHz)	Field Strength Limits at 3 metres (watts, e.i.r.p.)		
	uV/m	dB uV/m	Measurement distance(m)
0.009-0.490	2400/F(kHz)	XX	300
0.490-1.705	24000/F(kHz)	XX	30
1.705-30	30	29.5	30
30~88	100(3nW)	40	3
88~216	150(6.8nW)	43.5	3
216~960	200(12nW)	46	3
Above960	500(75nW)	54	3
Carrier frequency		75.6(AV)	3
Carrier frequency		95.6(PK)	3

NOTE:

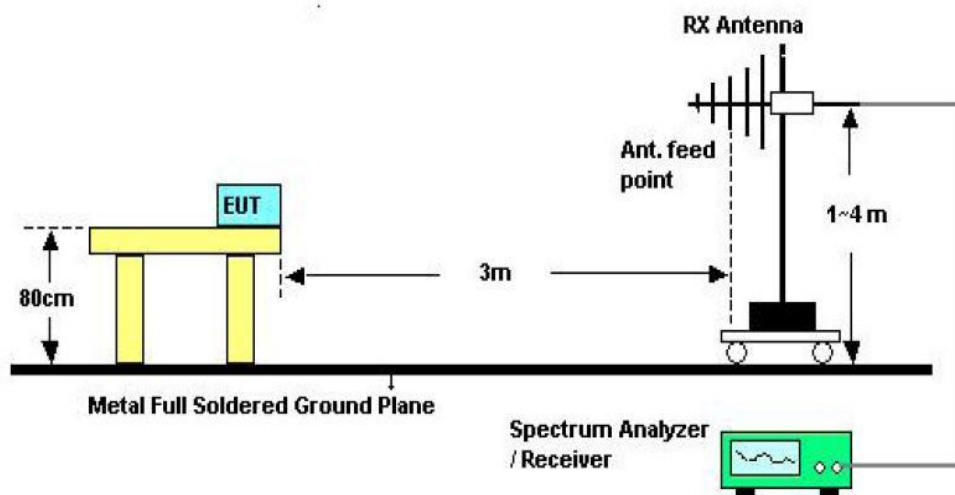
- a) The tighter limit applies at the band edges.
- b) Emission Level(dB uV/m)=20log Emission Level(Uv/m)

3.2. Test Setup

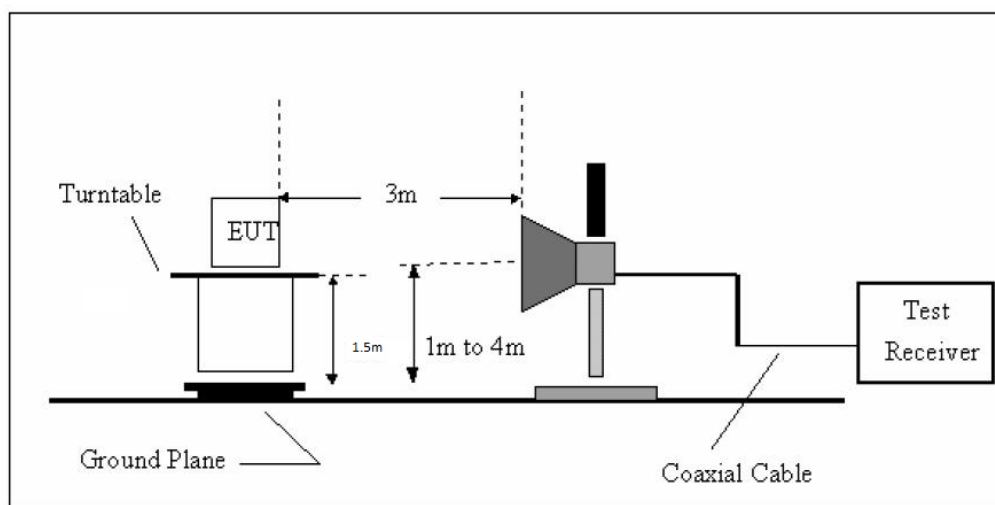
See the next page.



Below 30MHz Test Setup



Above 30MHz Test Setup



Above 1GHz Test Setup

3.3. Test Procedure

- a) The EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber for below 1GHz and 150 cm above the ground plane inside a semi-anechoic chamber for above 1GHz. The table was rotated 360 degrees to determine the position of the highest radiation.
- b) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- c) The initial step in collecting conducted emission data is a spectrum analyzer Peak detector mode pre-scanning the measurement frequency range. Significant Peaks are then marked. and then Quasi Peak Detector mode remeasured
- d) If Peak value comply with QP limit Below 1GHz. The EUT deemed to comply with QP limit. But the Peak value and average value both need to comply with applicable limit above 1GHz.
- e) For the actual test configuration, please see the test setup photo.

3.4. Test Equipment Setting For emission test.

9KHz~150KHz	RBW 200Hz	VBW 1KHz
150KHz~30MHz	RBW 9KHz	VBW 30KHz
30MHz~1GHz	RBW 120KHz	VBW 300KHz
Above 1GHz	RBW 1MHz	VBW 3MHz

3.5. Test Condition

Continual Transmitting in maximum power (The new battery be used during Test)

3.6. Test Result

We have scanned the 10th harmonic from 9KHz to the EUT.
Detailed information please see the following page.

From 9KHz to 30MHz: Conclusion: PASS

Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Notes: 1 --Means other frequency and mode comply with standard requirements and at least have 20dB margin.

Correct Factor=Cable Loss+Antenna Factor-Amplifier Gain

Measurement Result=Reading + Correct Factor

Margin=Measurement Result-Limit

2 –Spectrum setting:

a. Peak setting 30MHz-1GHz, RBW=100KHz, VBW=300KHz.

3- PK measure result values is less than the AVG limit values, so AV measure result values test not applicable.

Radiated Emissions Result of Inside band

EUT	Universal Smart Key	Model Name	XNKF01
Temperature	24°C	Relative Humidity	56%
Pressure	960hPa	Test voltage	DC 3V from battery
Test Mode	TX 433.92MHz	Test by	Ella Liang

Channel (433.92MHz Below 1GHz)										
Fre. MHz	Plority H/V	Reading dBuV	Antenna Factor dB	Cable Loss dB	Amplifier Gain dB	Correct Factor dB	Measure Result dBuV/m	Limit dBuV/m		Margin dB
433.92	H	85.55	15.58	0.67	27.22	-10.97	74.58	100.8	PK	-26.22
433.92	H	--	---	--	--	--	--	80.8	AV	--
867.84	H	47.56	21.26	0.67	27.22	-5.29	42.27	80.8	PK	-38.53
867.84	H	--	---	--	--	--	--	60.8	AV	--
157.01	H	30.27	22.1	0.67	27.22	-4.45	25.82	46	PK	-20.18
672.84	H	30.65	20.64	0.67	27.22	-5.91	24.74	46	AV	-21.26
433.92	V	86.85	15.58	0.67	27.22	-10.97	75.88	100.8	PK	-24.92
--	V	--	---	--	--	--	--	80.8	AV	--
867.84	V	48.24	21.26	0.67	27.22	-5.29	42.95	80.8	PK	-37.85
--	V	--	---	--	--	--	--	60.8	AV	--
301.43	V	31.16	22.1	0.67	27.22	-4.45	26.71	46	PK	-19.29
501.18	V	31.10	20.64	0.67	27.22	-5.91	25.19	46	AV	-20.81

Channel (433.92MHz Above 1GHz)								
Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs	Peak Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)			
1301.76	V	56.40	---	-10.41	45.99	74	-28.01	Peak
--	V	--	---	--	--	54	--	--
1301.76	H	56.46	---	-10.41	46.05	74	-27.95	Peak
--	H	--	---	--	--	54.00	--	--

EUT	Universal Smart Key	Model Name	XNKF01
Temperature	24°C	Relative Humidity	56%
Pressure	960hPa	Test voltage	DC 3V from battery
Test Mode	TX 315MHz	Test by	Ella Liang

Channel (315MHz Below 1GHz)										
Fre. MHz	Plority H/V	Reading dBuV	Antenna Factor dB	Cable Loss dB	Amplifier Gain dB	Correct Factor dB	Measure Result dBuV/m	Limit dBuV/m	Margin dB	Remark
315	H	85.49	13.19	0.67	27.22	-13.36	72.13	75.6	-3.47	Peak
630	H	52.10	18.12	0.67	27.22	-8.43	43.67	55.6	-11.93	Peak
945	H	52.72	22.1	0.67	27.22	-4.45	48.27	55.6	-7.33	Peak
315	V	78.99	13.19	0.67	27.22	-13.36	65.63	75.6	-9.97	Peak
630	V	45.99	18.12	0.67	27.22	-8.43	37.56	55.6	-18.04	Peak
945	V	52.58	22.1	0.67	27.22	-4.45	48.13	55.6	-7.47	Peak

Channel (315MHz Above 1GHz)								
Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs	Peak Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)			
1250	V	52.88	---	-10.01	42.87	74	-31.13	Peak
--	V	--	---	--	--	--	--	--
1250	H	51.45	---	-10.0	41.45	74	-32.55	Peak
--	H	--	---	--	--	--	--	--

4. Power Line Conducted Emission

4.1. Conducted Emission Limits (15.209)

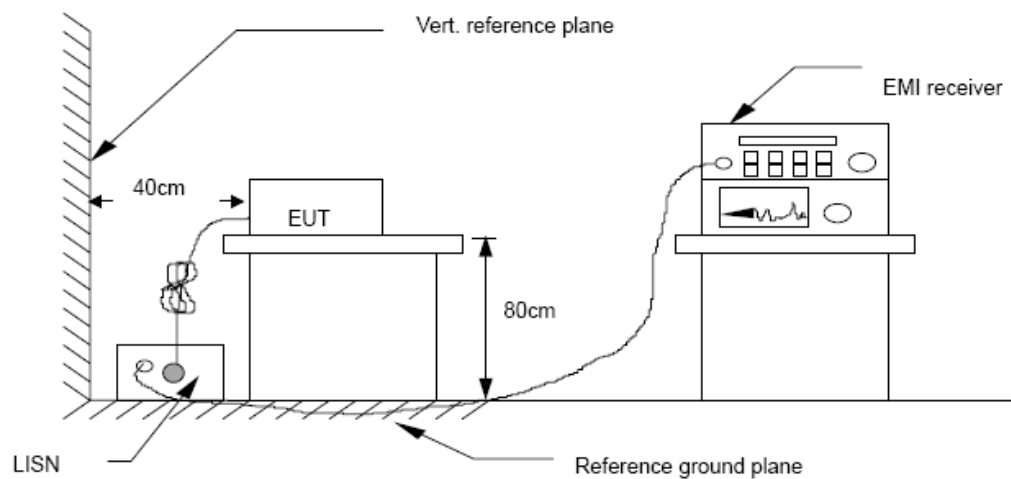
Frequency MHz	Limits dB(μ V)	
	Quasi-peak Level	Average Level
0.15 -0.50	66 -56*	56 - 46*
0.50 -5.00	56	46
5.00 -30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.

2. The lower limit shall apply at the transition frequencies.

3. The limit decreases in line with the logarithm of the frequency in the rang of 0.15 to 0.50 MHz.

4.2. Test Setup



4.3. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10-2013 on Conducted Emission Measurement.

The bandwidth of test receiver (R & S ESCI) is set at 9 kHz.

4.4. Test Results

EUT power supply by battery, so the test not applicable.

5. Occupied bandwidth

5.1. Test limit

Please refer section RSS-210 & 15.231

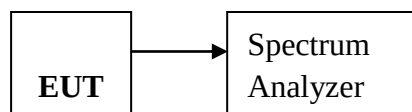
According to §15.231(C), The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz.

5.2. Method of measurement

a)The bandwidth is measured at an amplitude level reduced 20dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

b)The test receiver RBW set 30KHz,VBW set 30KHz,Sweep time set auto.

5.3. Test Setup

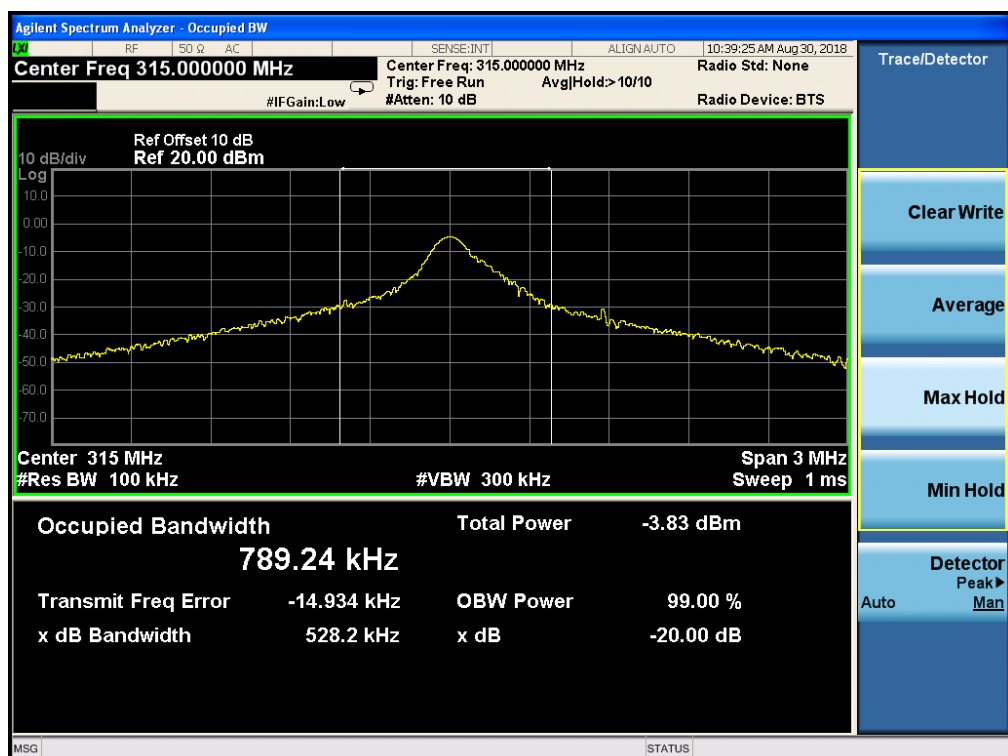
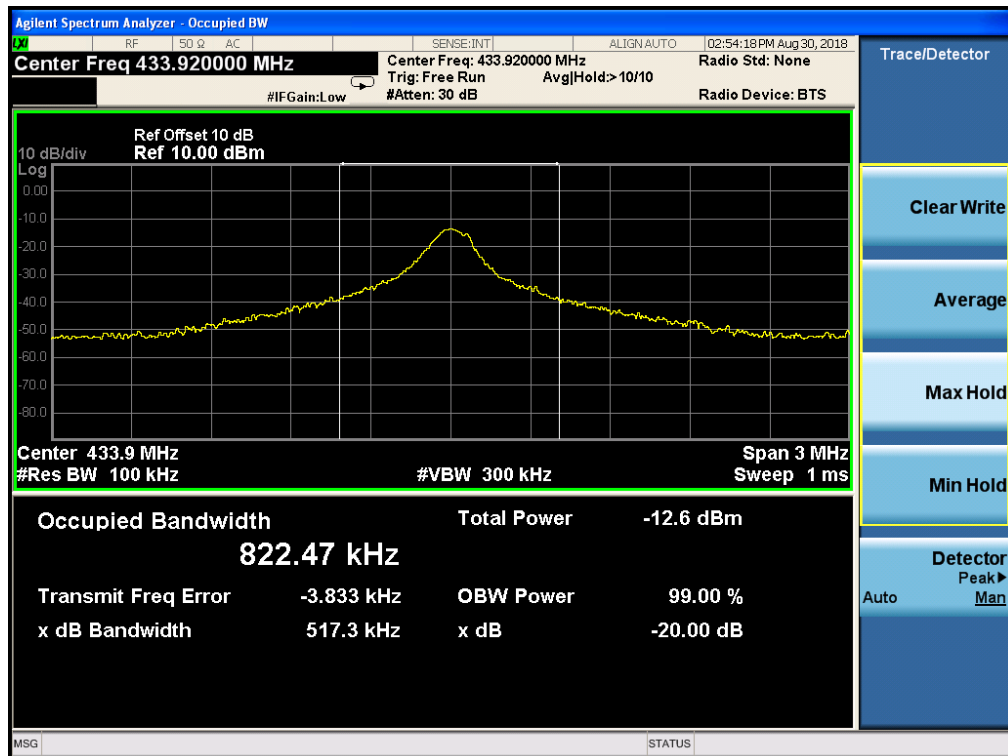


5.4. Test Results

Mode	Freq (MHz)	20dB Bandwidth (KHz)	99% Bandwidth	Limit (kHz)	Conclusion
ASK	433.92	517.3	/	1084.8	PASS
ASK	315.00	528.2	/	787.5	PASS

*Note: Limit = 433.92MHz *0.25% = 1084.8 kHz*

*Limit = 315MHz *0.25% = 787.5 kHz*



6. Transmission time

6.1. Test limit

Please refer section RSS-210 & 15.231

According to §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.

6.2. Method of measurement

6.2.1. Place the EUT on the table and set it in transmitting mode.

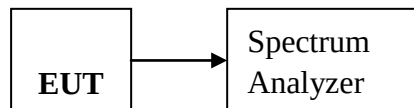
6.2.2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

6.2.3. Set spectrum analyzer Center= 433.92MHz, Span = 0MHz, Sweep = 10s.

6.2.4. Set the spectrum analyzer as RBW, VBW=100kHz,

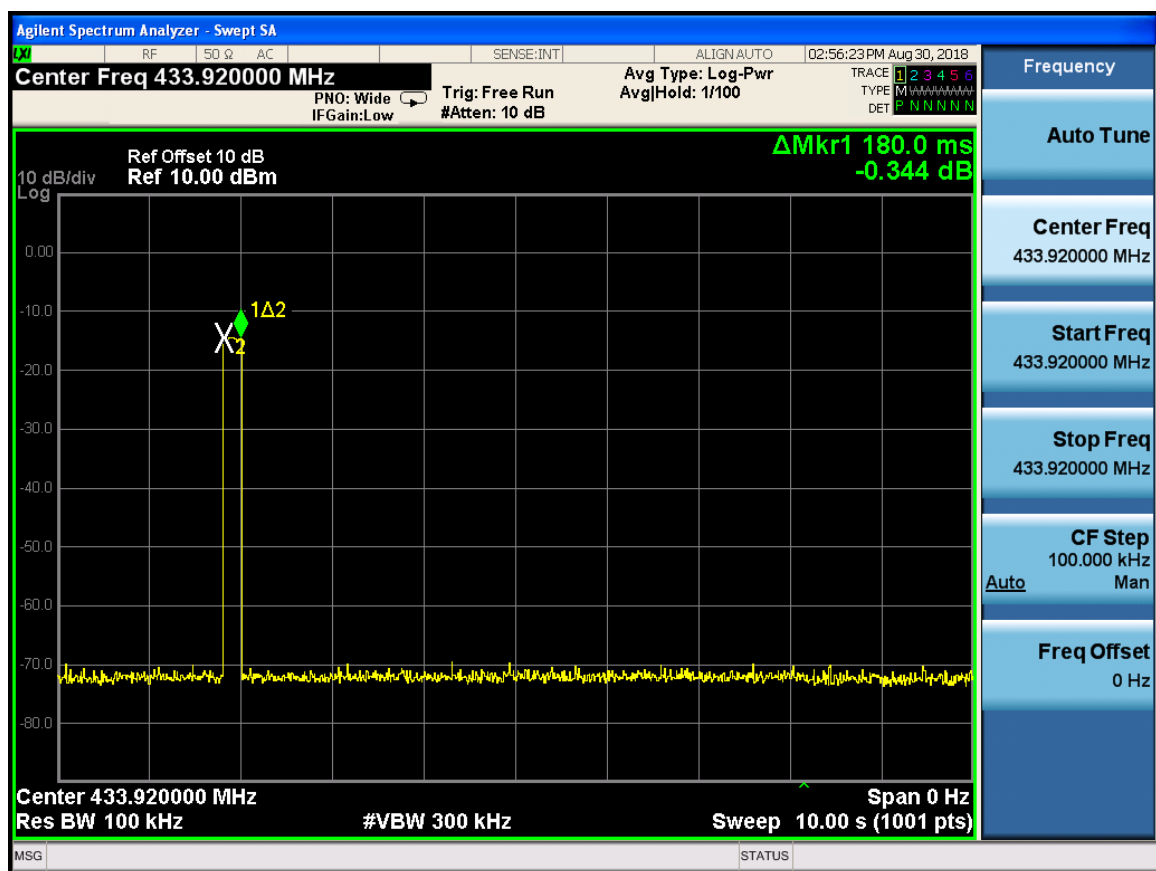
6.2.5. Max hold, view and count how many channel in the band.

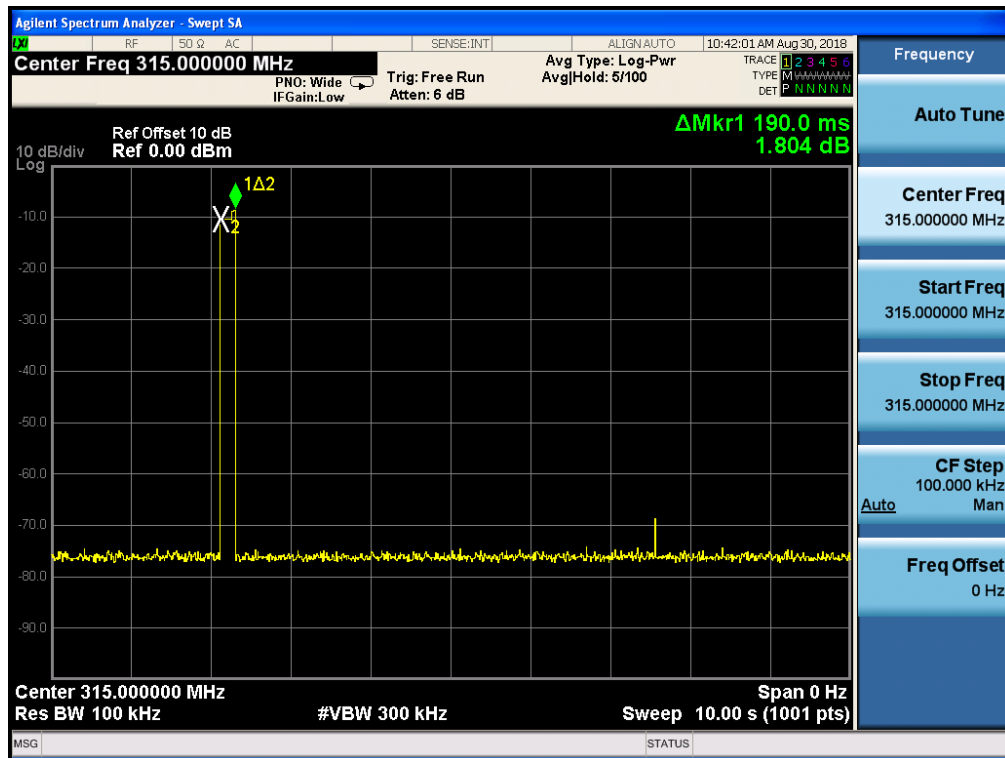
6.3. Test Setup



6.4. Test Results

Freq (MHz)	Test Result(s)	Limit (s)	Conclusion
433.92	0.18	< 5s	PASS
315.00	0.19	< 5s	PASS





7. Antenna Requirement

7.1. 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 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 manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

7.2. Antenna Connected Construction

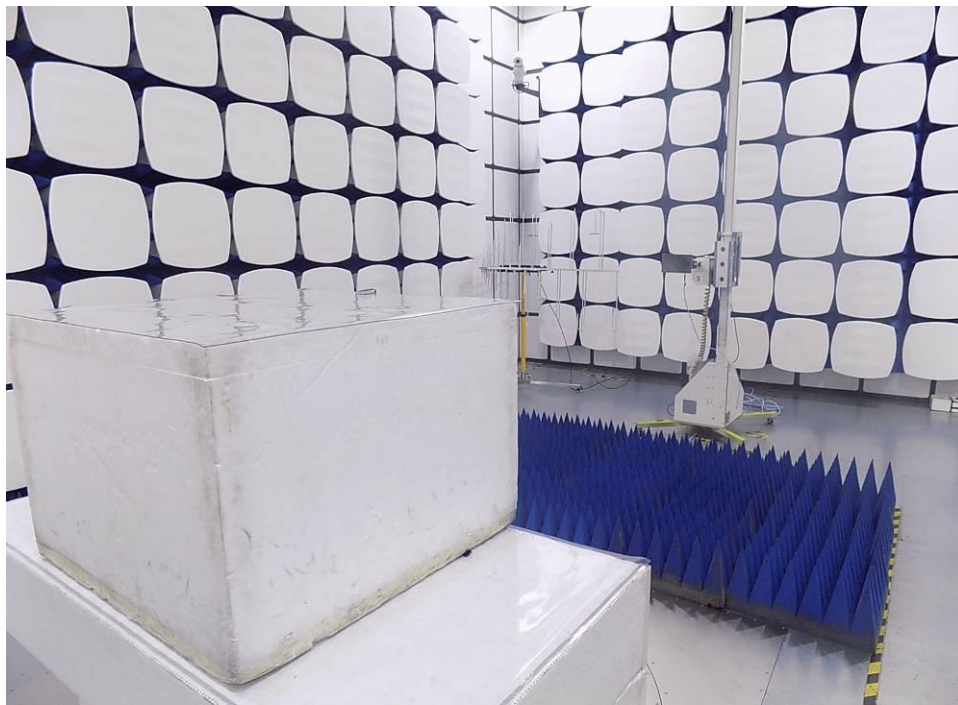
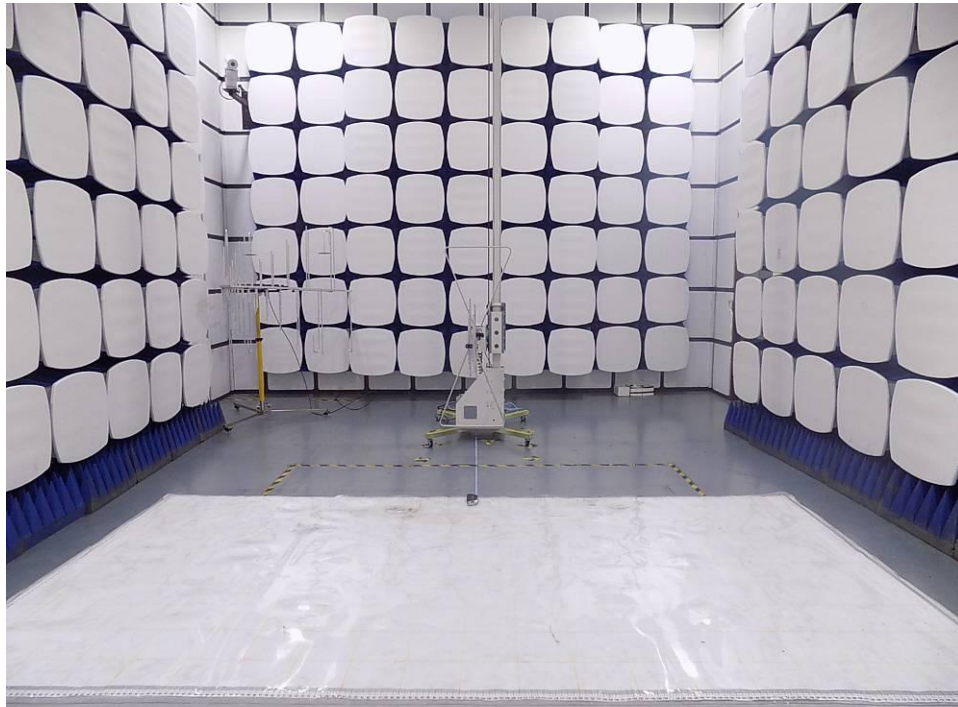
The directional gains of antenna used for transmitting is 0 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

7.3. Result

The EUT antenna is Internal antenna. It comply with the standard requirement.

8. Test setup photo

Photos of Radiated emission

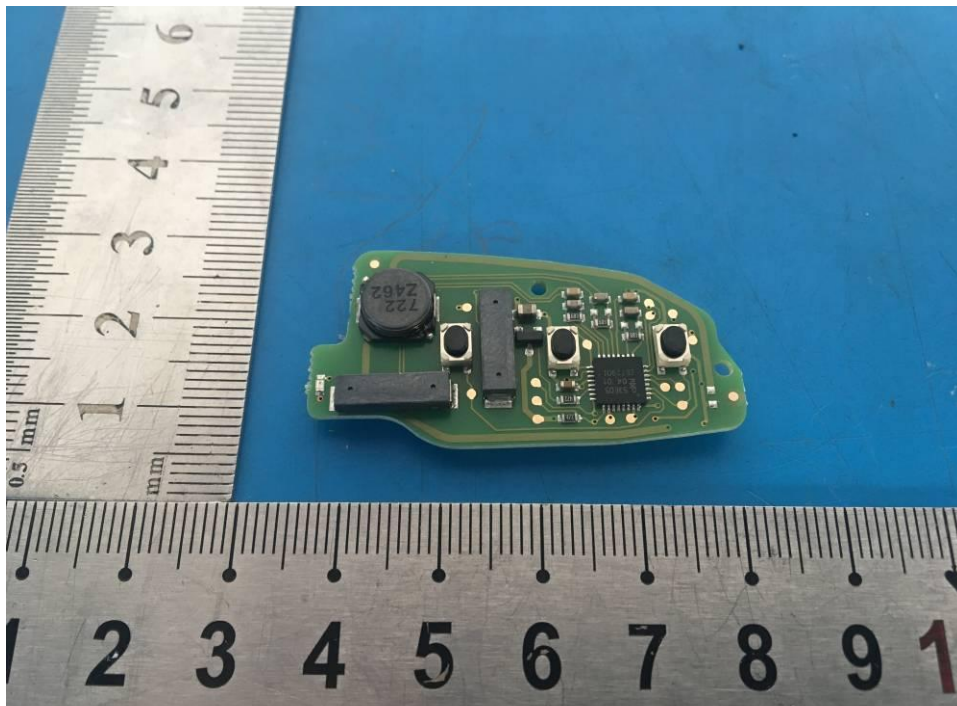


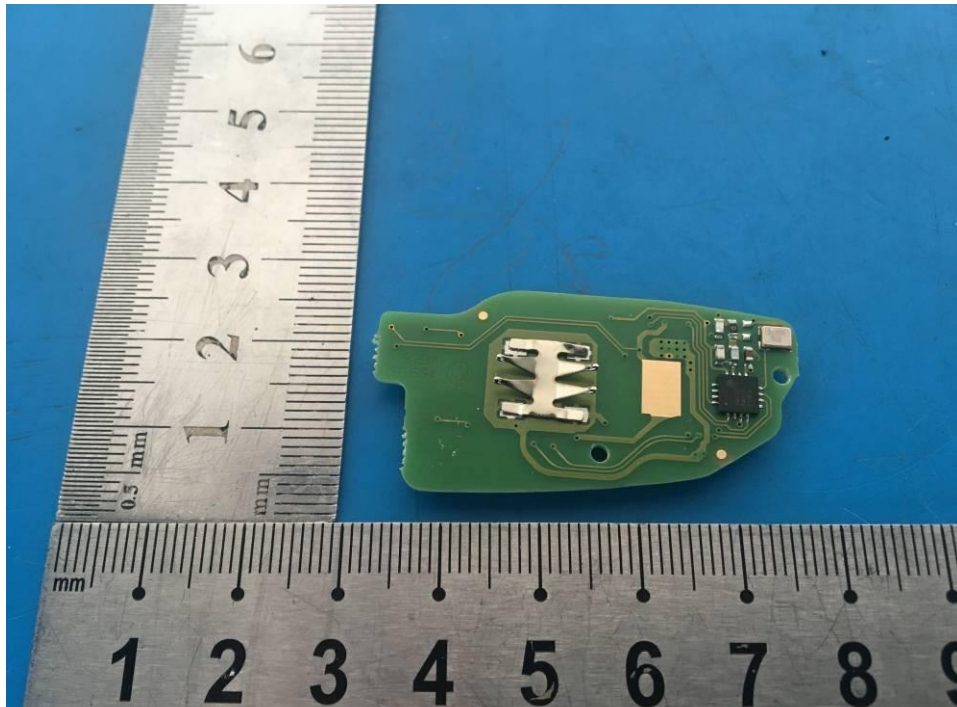
9. Photos of EUT











-----END OF THE REPORT-----