



TEST REPORT

FCC ID: 2AI4T-S01

For

Shenzhen Xhorse Electronics Co., Ltd.

Universal Remote Key

Model No. : S01

Trade Name : **Xhorse**

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

Prepared by : Shenzhen Alpha Product Testing Co., Ltd.
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DECLARATION

Applicant : Shenzhen Xhorse Electronics Co., Ltd.
 Manufacturer : Shenzhen Xhorse Electronics Co., Ltd.
 Product : Universal Remote Key
 (A)Model No. : S01
 (B)Trade Name : **Xhorse**
 (C)Power supply : DC 3V from battery

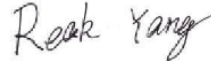
Measurement Standard Used:


FCC Rules and Regulations Part 15 Subpart C Section 15.231: 2016, 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 B Class B 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 
 Test Engineer

Approved by (name + signature).....: Simple Guan 
 Project Manager

Date of issue..... : July 02, 2016

1. General Information

1.1. Description of Device (EUT)

EUT	: Universal Remote Key
Model No.	: S01
DIFF.	: N/A
Trade Name	: 
Power supply	: DC 3V from battery
Operation frequency	: 315.0MHz, 433.92MHz
Modulation	: FSK
Data Rate	: 100kbps
Hardware Version	: V2
Software Version	: 5.2
Antenna Type	: Internal antenna, max gain -16.2dBi.
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, Guangdong, 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, Guangdong, China

1.2. Accessories of device (EUT)

Accessories	: N/A
Model	N/A
Input	N/A
Output	N/A
Accessories2	: N/A
Model	N/A

1.3. Test Lab information

Shenzhen Alpha Product Testing Co., Ltd.

Building B, East Area of Nanchang Second, Industrial Zone, Gushu 2nd
Road, Bao'an, Shenzhen, China

March 25, 2015 File on Federal Communication Commission
Registration Number: 203110

July 18, 2014 Certificated by IC
Registration Number: 12135A

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, The EUT has been tested as an independent unit. And Continual Transmitting in maximum power.		

2.2. Assistant equipment used for test

Description	:	N/A
Manufacturer	:	N/A
Model No.	:	N/A
Remark: N/A		

2.3. Block Diagram

1. EUT was placed on a turn table , which is 0.8 meter high above ground for below 1GHz, 1.5 meter high above ground for above 1GHz. All the X,Y,Z position of EUT were for test. EUT was set into test mode before test. New battery is used during all test.

TX Mode:



2.4. 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)
FSK	CH1	433.92
	CH2	315

Note: The EUT is tested by X,Y,Z position and for each of the buttons, this report only list the worst position Z and button 2 data.

2.5. Test Conditions

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

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

Item	MU	Remark
Uncertainty for Power point Conducted Emissions Test	2.42dB	
Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)	2.13 dB	Polarize: V
	2.57dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.54dB	Polarize: V
	4.1dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	2.08dB	Polarize: H
	2.56dB	Polarize: V
Uncertainty for radio frequency	1×10^{-9}	
Uncertainty for conducted RF Power	0.65dB	
Uncertainty for temperature	0.2°C	
Uncertainty for humidity	1%	
Uncertainty for DC and low frequency voltages	0.06%	

2.7. Test Equipment

Equipment	Manufacture	Model No.	Serial No.	Last cal. Due To	Cal Interval
3m Semi-Anechoic	ETS-LINDGREN	N/A	SEL0017	2017.01.16	1Year
Spectrum analyzer	Agilent	E4407B	MY49510055	2017.01.16	1Year
Receiver	R&S	ESCI	101165	2017.01.16	1Year
Bilog Antenna	SCHWARZBECK	VULB 9168	9168-438	2018.01.18	2Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D(1201)	2017.01.20	2Year
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA 9170 D(1432)	2017.01.20	2Year
Active Loop Antenna	Beijing Daze	ZN30900A	SEL0097	2017.01.16	1Year
Cable	Resenberger	SUCOFLEX 104	MY6562/4	2017.01.16	1Year
Cable	Resenberger	SUCOFLEX 104	309972/4	2017.01.16	1Year
Cable	Resenberger	SUCOFLEX 104	329112/4	2017.01.16	1Year
Pre-amplifier	Agilent	8449B	3008A02664	2017.01.18	1Year
Pre-amplifier	HP	HP8347A	2834A00455	2017.01.18	1Year

Note: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

Equipment	Manufacture	Model No.	Serial No.	Test Location	Frequency Rang
Cable	Resenberger	SUCOFLEX 104	309972/4	Radiation	9KHz-2GHz
Cable	Resenberger	SUCOFLEX 104	329112/4	Radiation	1GHz-26.5G Hz

Note: For the relevant Conducted Measurement, the temporary antenna connector is used during the measurement.
Antenna Connector Impedance: 50Ω , Cable Loss: 1.0 dB

3. Radiation Emission

3.1. Radiation Emission Limits(15.209&231)

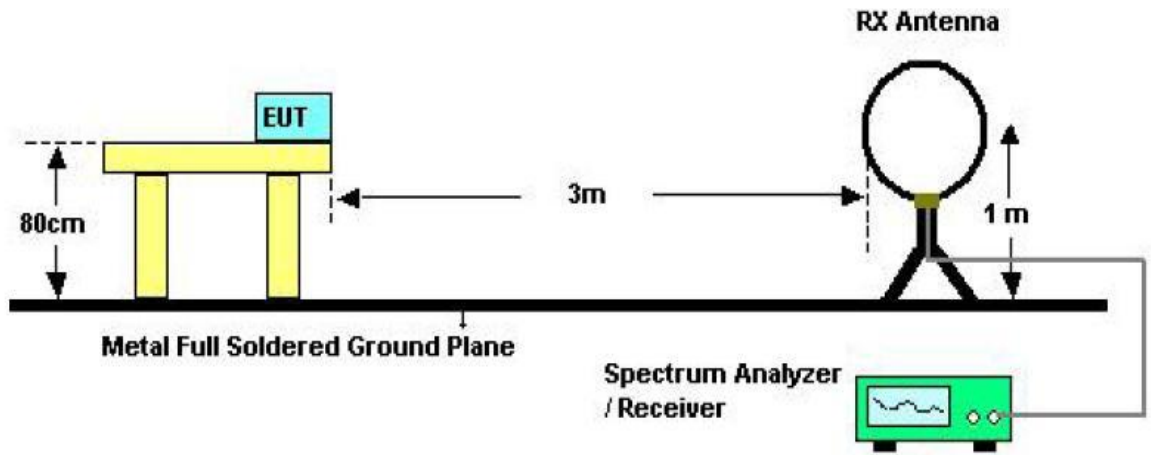
Frequency (MHz)	Field Strength Limits at 3 metres (watts, e.i.r.p.)		
	uV/m	dB uV/m	Measurement distance(m)
0.009-0.490	2400/F(kHz)	XX	300
0.490-1.705	24000/F(kHz)	XX	30
1.705-30	30	29.5	30
30~88	100(3nW)	40	3
88~216	150(6.8nW)	43.5	3
216~960	200(12nW)	46	3
Above960	500(75nW)	54	3
Carrier Frequency (433.92)		80.8(AV)	3
Carrier Frequency (315)		75.6(AV)	3

NOTE:

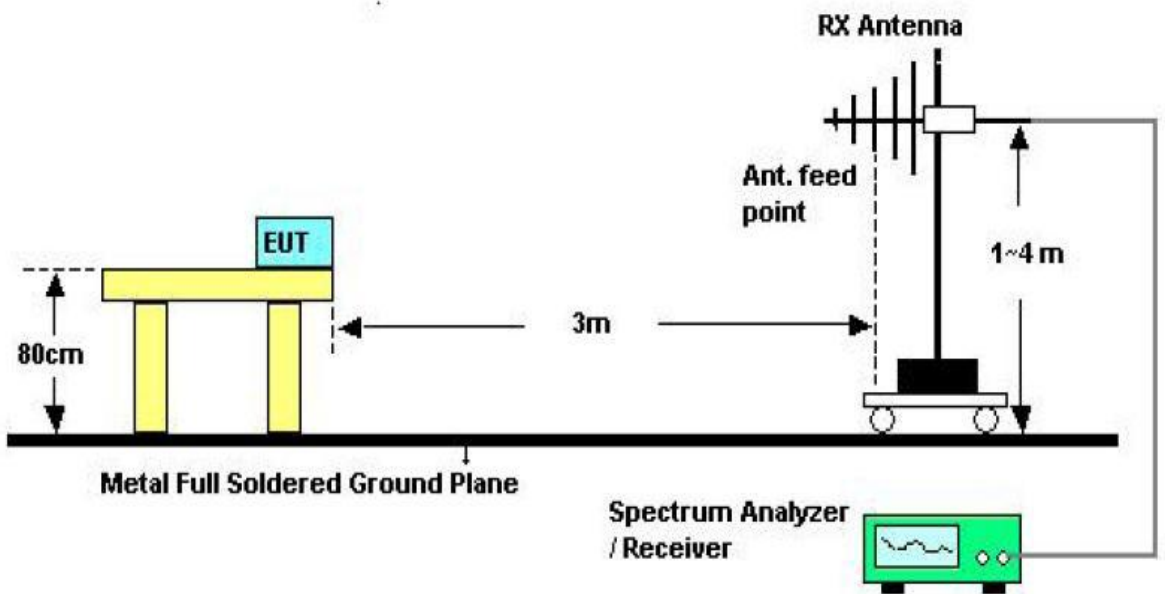
- a) The tighter limit applies at the band edges.
- b) Emission Level(dB uV/m)=20log Emission Level(Uv/m)

3.2. Test Setup

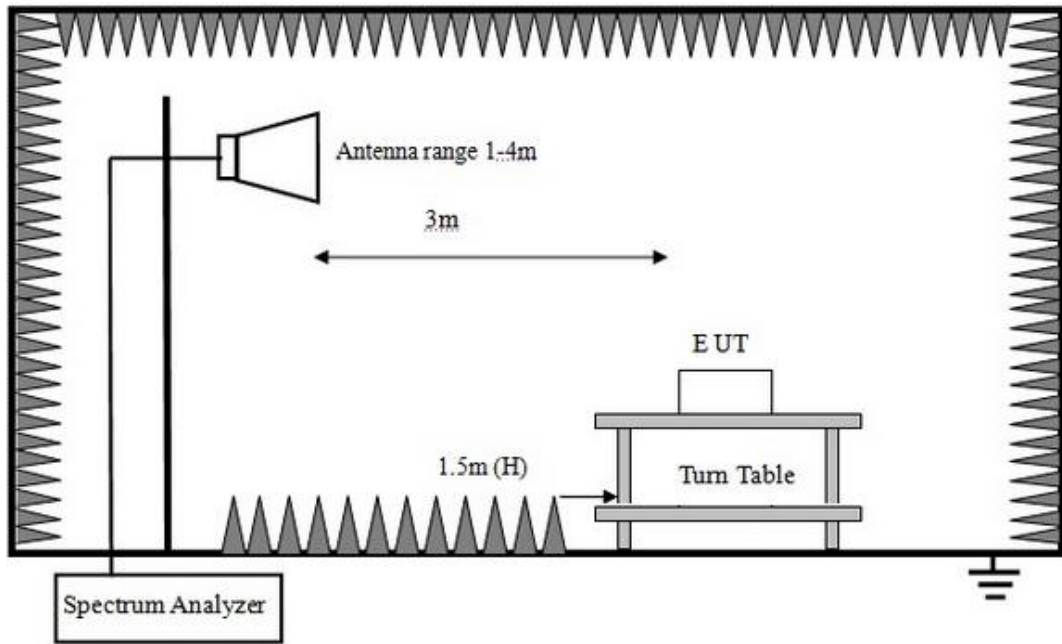
See the next page.



Below 30MHz Test Setup



Above 30MHz Test Setup



Above 1GHz Test Setup

3.3. Test Procedure

- a) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1GHz, The EUT was placed on a rotating 0.8 m high above ground for below 1GHz and 1.5m high above ground 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, For above 1GHz test, keeping the horn antenna aimed at the source of emissions at each frequency of significant emissions The horn antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane..
- 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	VBW1KHz
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 Remote Key		Model Name	S01						
Temperature	25°C		Relative Humidity	56%						
Pressure	960hPa		Test voltage	DC 3V from battery						
Test Mode	TX CH1		Test by	Reak						
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	Remark
433.92	H	79.17	15.58	0.67	27.22	-10.97	68.2	80.8	12.6	Peak
867.84	H	54.27	21.26	0.67	27.22	-5.29	48.98	60.8	11.82	Peak
433.92	V	74.29	15.58	0.67	27.22	-10.97	63.32	80.8	17.48	Peak
867.84	V	52.44	21.26	0.67	27.22	-5.29	47.15	60.8	13.65	Peak

EUT	Universal Remote Key		Model Name	S01				
Temperature	25°C		Relative Humidity	56%				
Pressure	960hPa		Test voltage	DC 3V from battery				
Test Mode	TX CH1		Test by	Reak				
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	56.45	---	-10.41	42.68	74.00	-30.35	Peak
--	V	--	---	--	--	--	--	--
1301.76	H	53.71	---	-10.41	43.65	74.00	-31.32	Peak
--	H	--	---	--	--	--	--	--

Radiated Emissions Result of Inside band

EUT	Universal Remote Key		Model Name	S01						
Temperature	25°C		Relative Humidity	56%						
Pressure	960hPa		Test voltage	DC 3V from battery						
Test Mode	TX CH2		Test by	Reak						
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
315.0	H	74.52	13.19	0.67	27.22	-13.36	61.16	75.6	-14.44	Peak
630.0	H	51.61	18.12	0.67	27.22	-8.43	43.18	55.6	-12.42	Peak
945.0	H	53.7	22.1	0.67	27.22	-4.45	49.25	55.6	-6.35	Peak
315.0	V	67.67	13.19	0.67	27.22	-13.36	54.31	75.6	-21.29	Peak
630.0	V	47.46	18.12	0.67	27.22	-8.43	39.03	55.6	-16.57	Peak
945.0	V	53.12	22.1	0.67	27.22	-4.45	48.67	55.6	-6.93	Peak

EUT	Universal Remote Key		Model Name	S01						
Temperature	25°C		Relative Humidity	56%						
Pressure	960hPa		Test voltage	DC 3V from battery						
Test Mode	TX CH2		Test by	Reak						
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	52.87	---	-10.01	42.86	74	-31.14	Peak		
--	V	--	---	--	--	--	--	--		
1250	H	51.44	---	-10.0	41.43	74	-32.57	Peak		
--	H	--	---	--	--	--	--	--		

4. POWER LINE CONDUCTED EMISSION

4.1. Conducted Emission Limits (15.209)

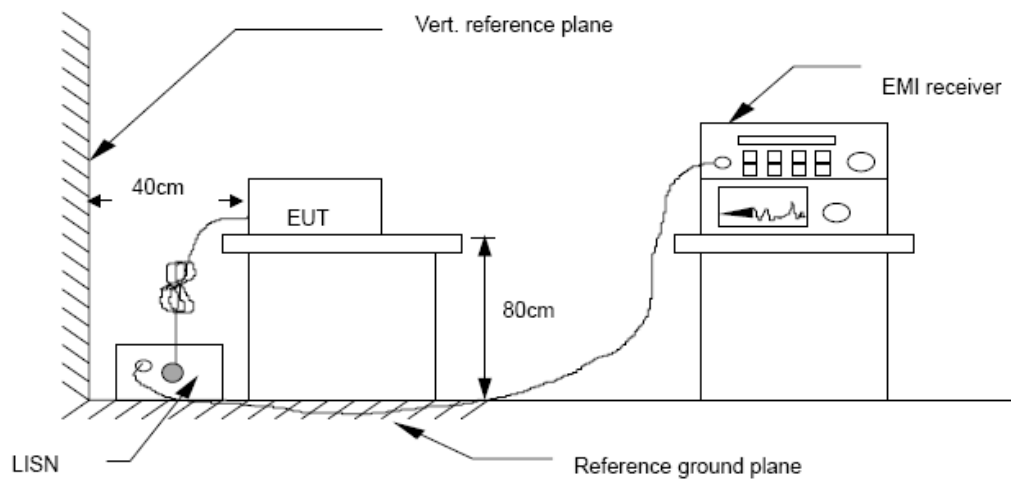
Frequency MHz	Limits dB(μ V)	
	Quasi-peak Level	Average Level
0.15 -0.50	66 -56*	56 - 46*
0.50 -5.00	56	46
5.00 -30.00	60	50

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 ESCS30) 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.

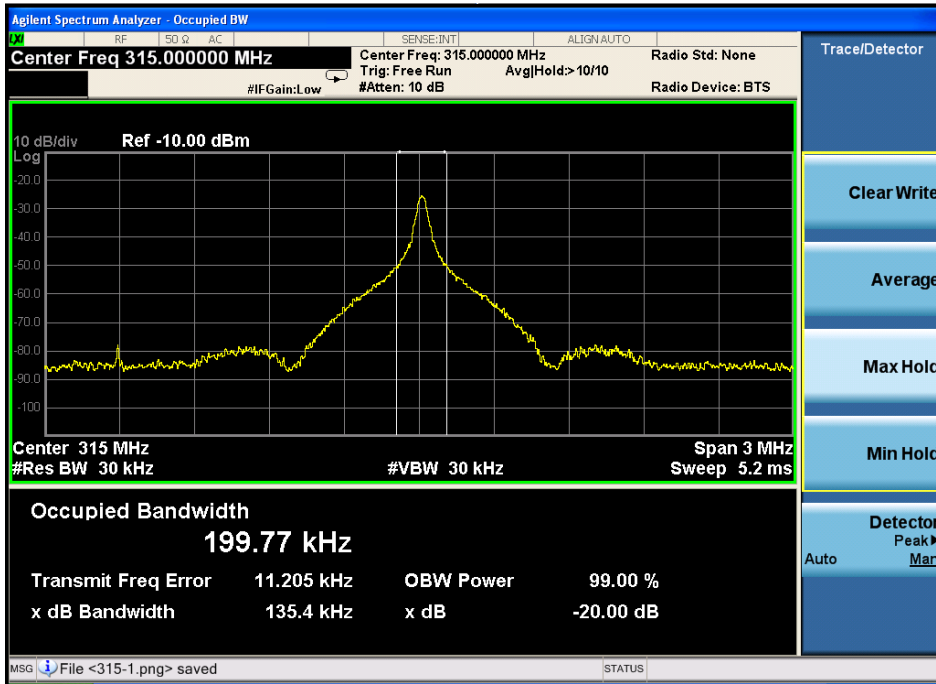
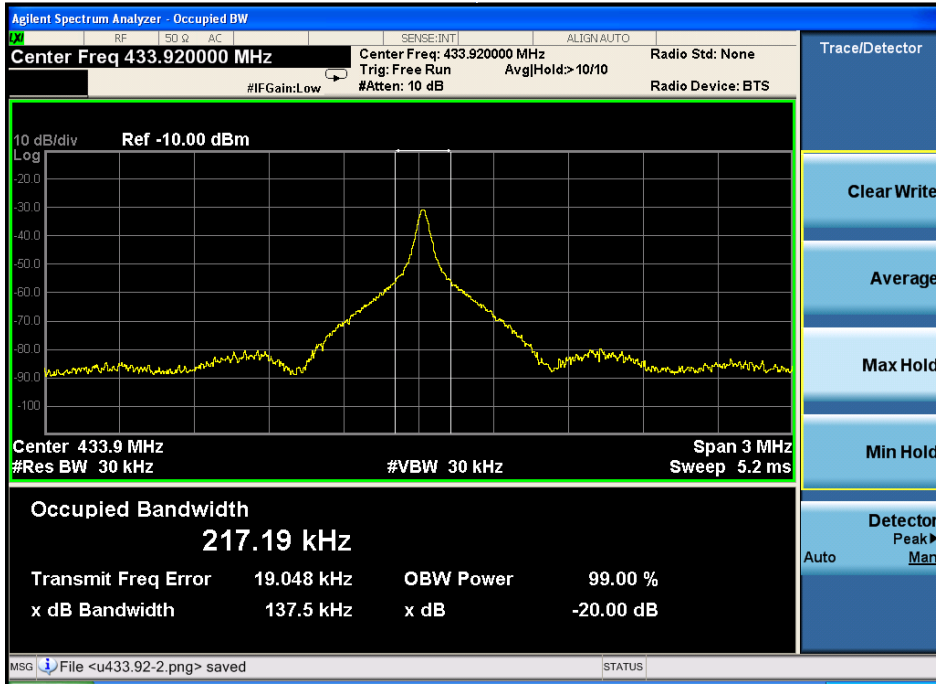
b) The test receiver RBW set 30KHz, VBW set 30KHz, Sweep time set auto.

5.3. Test Setup



5.4. Test Results

EUT: Universal Remote Key					
M/N: S01					
Test Mode: Keeping TX mode					
Test date: 2016-06-28		Test site: RF site		Tested by: Reak	
Mode	Freq (MHz)	20dB Bandwidth (KHz)	99% Bandwidth	Limit (kHz)	Conclusion
FSK	433.92	137.5	/	1084.8	PASS
	315	135.4	/	787.5	PASS



6. Transmission time

6.1. Test limit

Please refer section 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.

§15.231(a) (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

6.2. Method of measurement

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

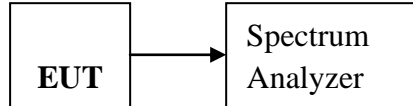
6.2.2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

6.2.3. Set spectrum analyzer Center=315MHz, 433.92MHz, Span = 0MHz, Sweep = 10s.

6.2.4. Set the spectrum analyzer as RBW, VBW=1MHz,

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

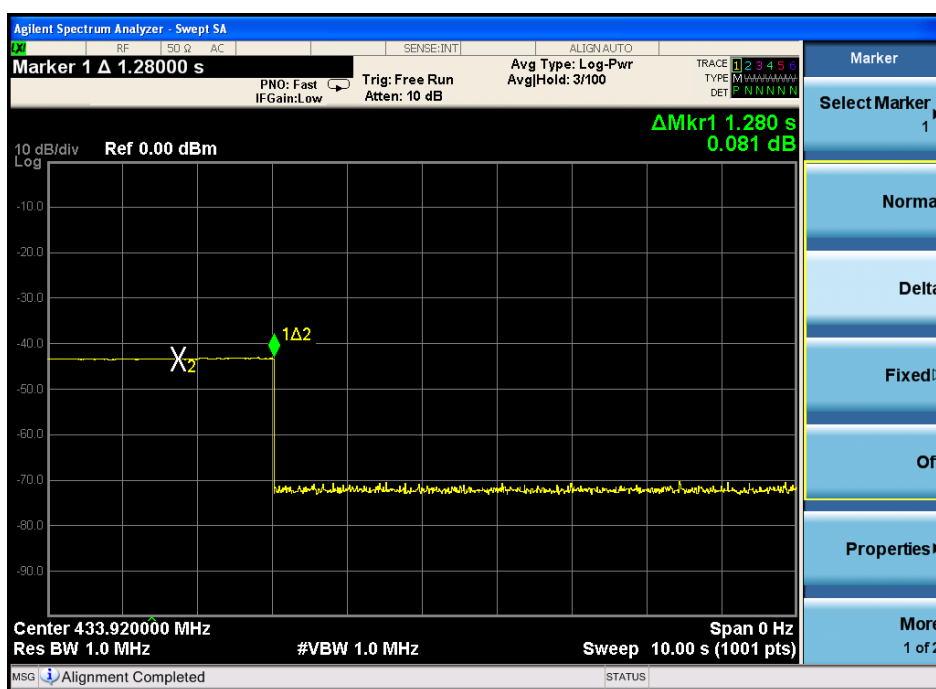
6.3. Test Setup



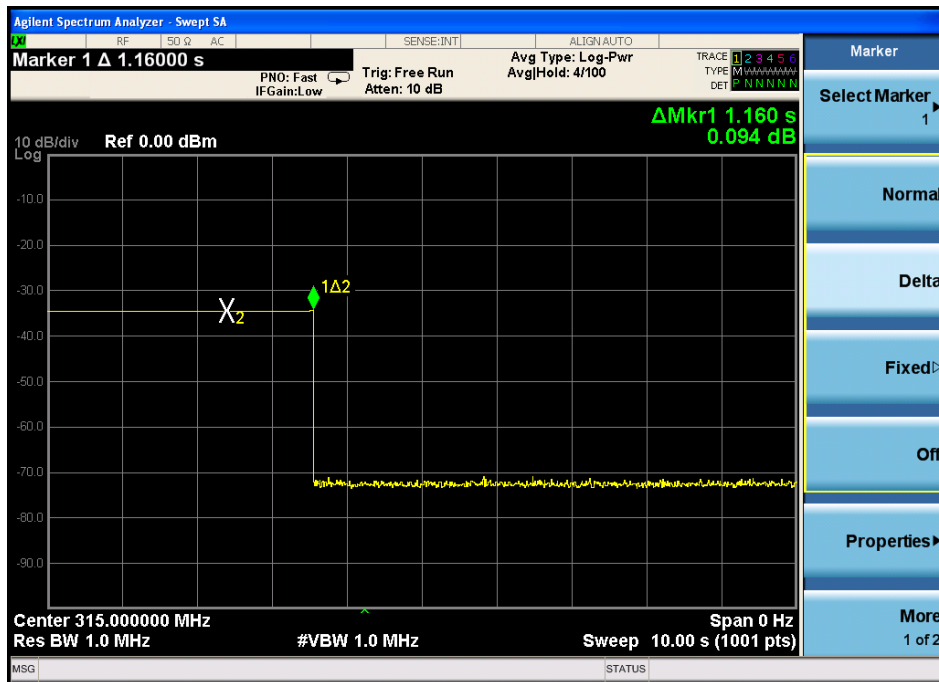
6.4. Test Results

EUT: Universal Remote Key			
M/N: S01			
Test Mode: Keeping TX mode			
Test date: 2016-06-28	Test site: RF site	Tested by: Reak	
Freq (MHz)	Test Result(s)	Limit (s)	Conclusion
433.92	1.28	< 5s	PASS
315	1.16	< 5s	PASS

EUT After Release the button, EUT emission Continue 1.28 seconds, Compliance with 15.231 a(1) section.



EUT After Release the button, EUT emission Continue 1.16 seconds, Compliance with 15.231 a(1) section.



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

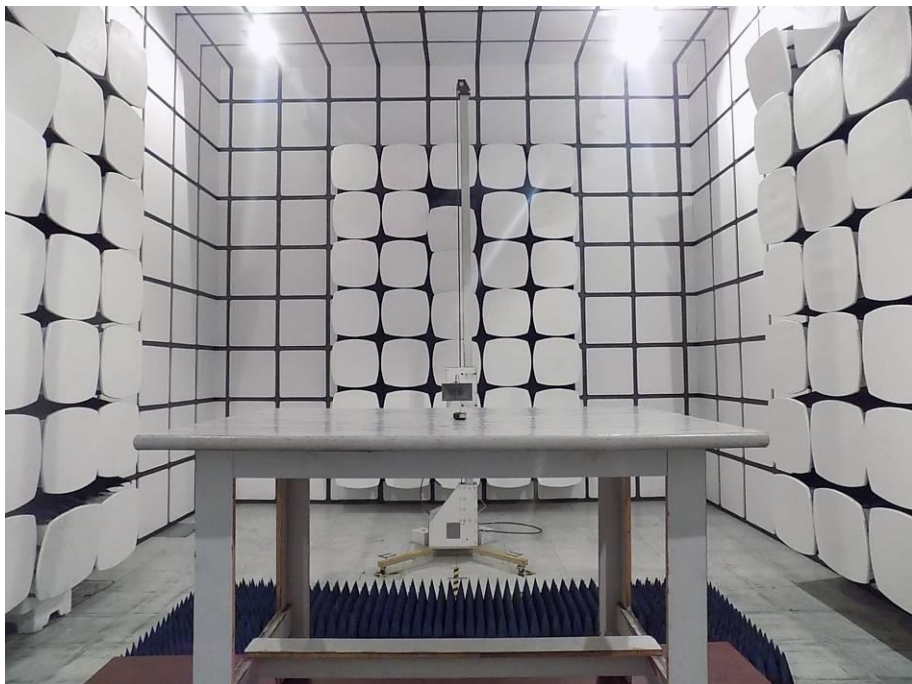
The directional gain of antenna used for transmitting is -16.2dBi, and no consideration of replacement. Please see EUT photo for details.

7.3. Result

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

8. Test setup photo

Photos of Radiated emission

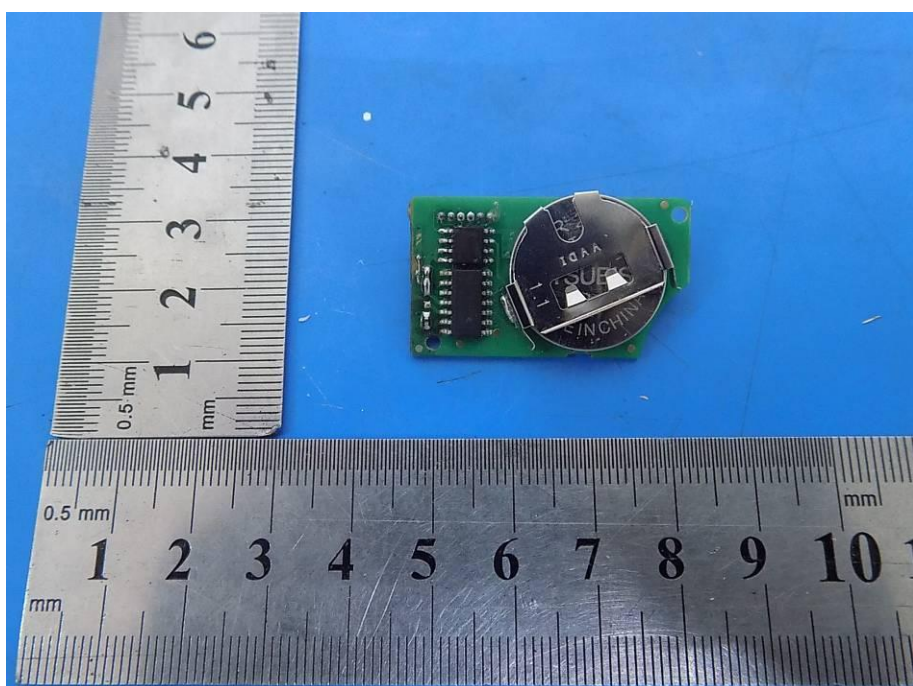


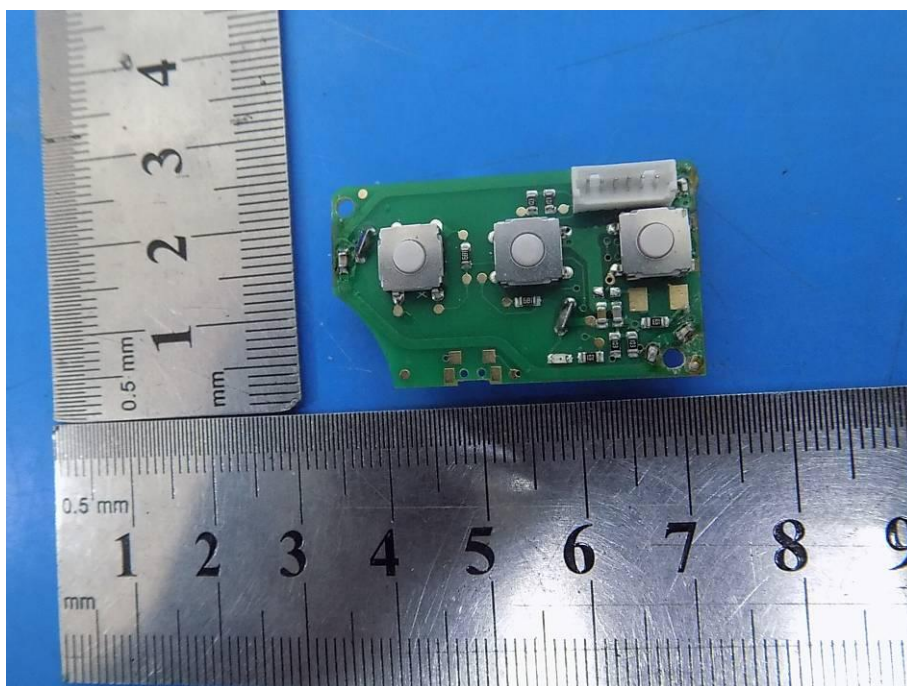
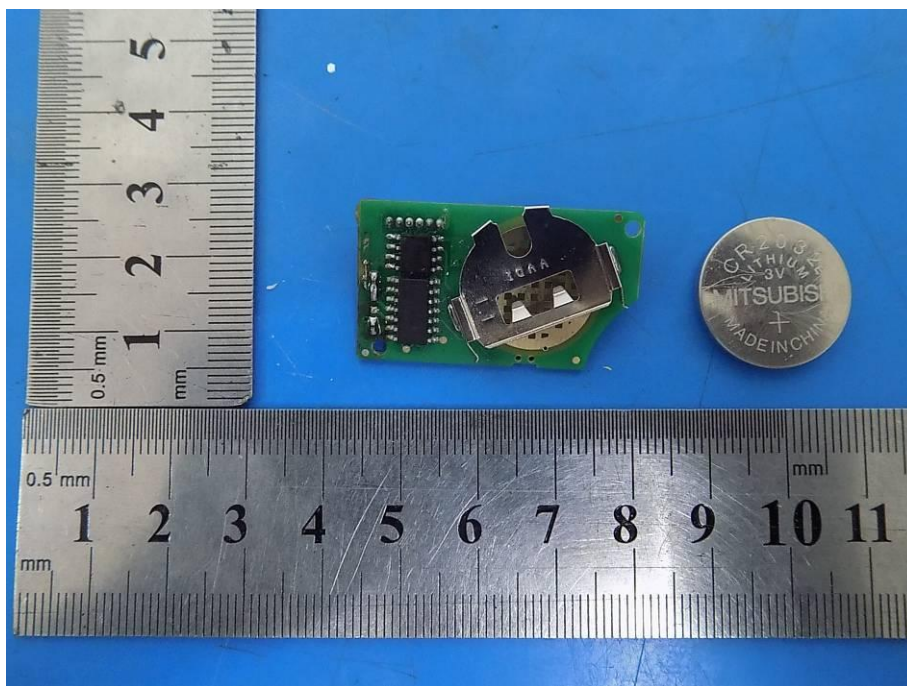
9. Photos of EUT











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