

FCC REPORT

Applicant: Hang Zhou DingYu Electronic Technology Co.,Ltd

Address of Applicant: Rm901, Unit One, Union Plaza A, No.2 zi Jin hua Road
Hangzhou 310012, China

Manufacturer: Hang Zhou DingYu Electronic Technology Co.,Ltd

Address of Manufacturer: Rm901, Unit One, Union Plaza A, No.2 zi Jin hua Road
Hangzhou 310012, China

Factory: DONGGUAN DUOLI ELECTRONIC TECHNOLOGY CO., LTD

Address of Factory: F2,ZHENG WEI HI-TECH ZONES,JUN DA COMMUNITY,
DONG KENG TOWN, Dong Guan City, Guang Dong Province,
China

Equipment Under Test (EUT)

Product Name: TRV LIGHTING REMOTE CONTROL

Model No.: 1292701

FCC ID: 2AO7P-1292701

Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.231

Date of sample receipt: March 06, 2018

Date of Test: March 07-14, 2018

Date of report issued: March 15, 2018

Test Result : PASS *

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

Authorized Signature:



Robinson Lo

Laboratory Manager

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

2 Version

Version No.	Date	Description
01	March 15, 2018	Original

Prepared By:

Bill. yuan

Date:

March 15, 2018

Project Engineer

Check By:

Andy. wu

Date:

March 15, 2018

Reviewer

3 Contents

	Page
1 COVER PAGE	1
2 VERSION	2
3 CONTENTS	3
4 TEST SUMMARY	4
4.1 MEASUREMENT UNCERTAINTY	4
5 GENERAL INFORMATION	5
5.1 GENERAL DESCRIPTION OF EUT	5
5.2 TEST MODE	6
5.3 DESCRIPTION OF SUPPORT UNITS	6
5.4 TEST FACILITY.....	6
5.5 TEST LOCATION	6
5.6 OTHER INFORMATION REQUESTED BY THE CUSTOMER	6
6 TEST INSTRUMENTS LIST	7
7 TEST RESULTS AND MEASUREMENT DATA.....	8
7.1 ANTENNA REQUIREMENT	8
7.2 RADIATED EMISSION METHOD	9
7.2.1 Field Strength of The Fundamental Signal	11
7.2.2 Spurious emissions.....	12
7.3 20dB OCCUPY BANDWIDTH	15
7.4 DWELL TIME	16
7.5 SILENT PERIOD	17
8 TEST SETUP PHOTO	18
9 EUT CONSTRUCTIONAL DETAILS	19

4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
Conduction Emission	15.207	N/A
Field strength of the fundamental signal	15.231 (e)	Pass
Spurious emissions	15.231 (e)/15.209	Pass
20dB Bandwidth	15.231 (c)	Pass
Dwell time	15.231 (e)	Pass
Silent period	15.231(e)	Pass

Pass: The EUT complies with the essential requirements in the standard.

N/A: Not applicable

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz ~ 30MHz	$\pm 4.34\text{dB}$	(1)
Radiated Emission	30MHz ~ 1000MHz	$\pm 4.24\text{dB}$	(1)
Radiated Emission	1GHz ~ 26.5GHz	$\pm 4.68\text{dB}$	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	$\pm 3.45\text{dB}$	(1)
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.			

5 General Information

5.1 General Description of EUT

Product Name:	TRV LIGHTING REMOTE CONTROL
Model No.:	1292701
Serial No.:	27026
Test sample(s) ID:	GTS201803000052-1
Sample(s) Status:	Engineer sample
Hardware:	1.0
Software:	1.0
Operation Frequency:	433.82MHz
Modulation technology:	ASK
Antenna Type:	PCB Antenna
Antenna gain:	0dBi (declare by applicant)
Power supply:	Remote control: DC 6V by Button battery Receiver: DC 12V by Lead-Acid battery

5.2 Test mode

Transmitting mode	Keep the EUT in transmitting mode.
-------------------	------------------------------------

Per-test mode.

We have verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which only the worst case was shown in this test report and defined as follows:

Axis	X	Y	Z
Field Strength(dBuV/m)	70.56	71.00	70.85

5.3 Description of Support Units

None.

5.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **FCC —Registration No.: 381383**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 381383, Jan. 08, 2018.

- **Industry Canada (IC) —Registration No.: 9079A-2**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, August 15, 2016

5.5 Test Location

All tests were performed at:
Global United Technology Services Co., Ltd. No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China Tel: 0755-27798480 Fax: 0755-27798960

5.6 Other Information Requested by the Customer

None.

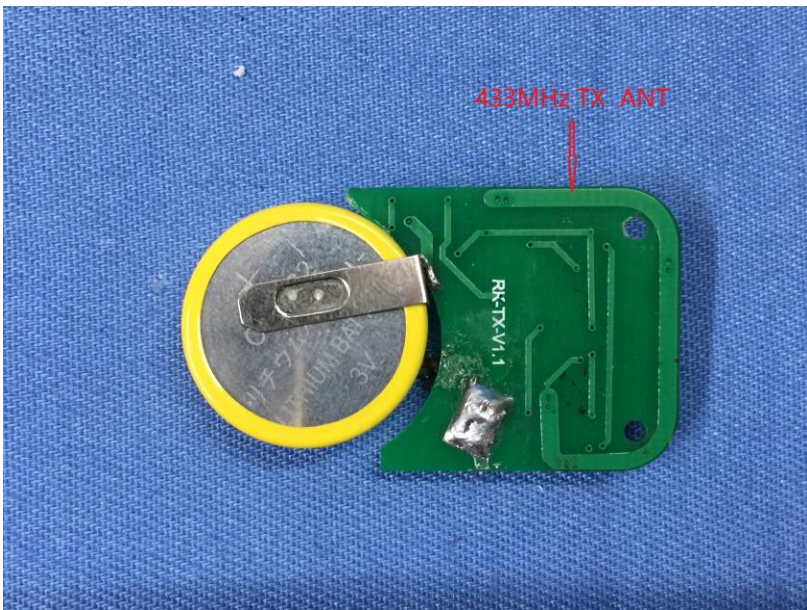
6 Test Instruments list

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.0(L)*6.0(W)* 6.0(H)	GTS250	July. 03 2015	July. 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June 28 2017	June 27 2018
4	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June 28 2017	June 27 2018
5	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June 28 2017	June 27 2018
6	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June 28 2017	June 27 2018
7	Horn Antenna	ETS-LINDGREN	3160	GTS217	June 28 2017	June 27 2018
8	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
9	Coaxial Cable	GTS	N/A	GTS213	June 28 2017	June 27 2018
10	Coaxial Cable	GTS	N/A	GTS211	June 28 2017	June 27 2018
11	Coaxial cable	GTS	N/A	GTS210	June 28 2017	June 27 2018
12	Coaxial Cable	GTS	N/A	GTS212	June 28 2017	June 27 2018
13	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June 28 2017	June 27 2018
14	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	June 28 2017	June 27 2018
15	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June 28 2017	June 27 2018
16	Band filter	Amindeon	82346	GTS219	June 28 2017	June 27 2018

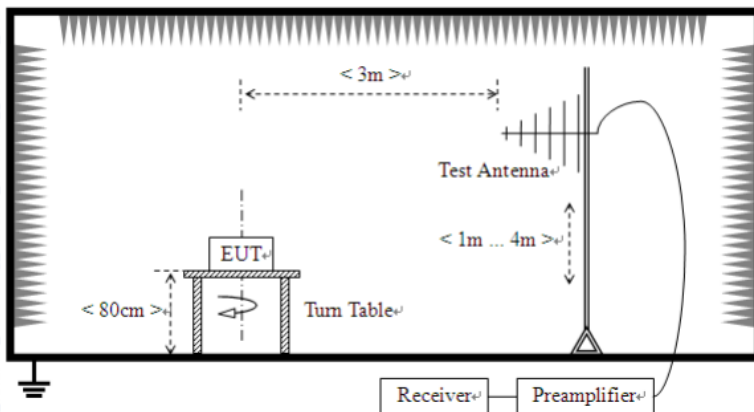
General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Barometer	ChangChun	DYM3	GTS257	June 29 2016	June 28 2017

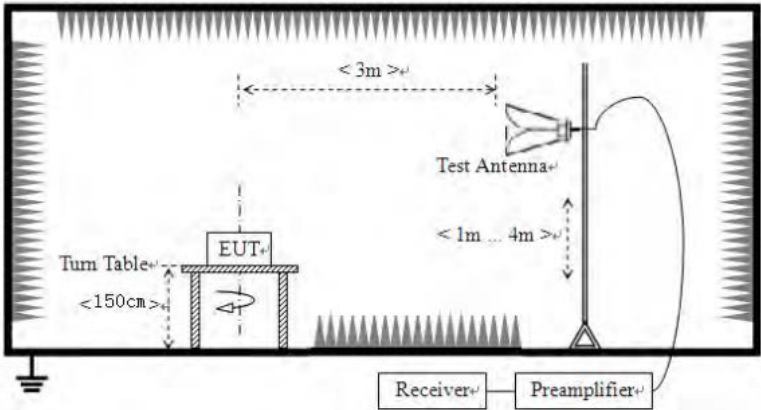
7 Test results and Measurement Data

7.1 Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203
15.203 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, 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.	
EUT Antenna:	
The antenna is PCB antenna, the best case gain of the antenna is 0dBi.	
	

7.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	30MHz to 6000MHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
Limit: (Field strength of the fundamental signal)	Frequency	Limit (dBuV/m @3m)		Remark	
	433.82MHz	72.86		Average Value	
		92.86		Peak Value	
Limit: (Spurious Emissions)	Frequency	Limit (dBuV/m @3m)		Remark	
	30MHz-88MHz	40.00		Quasi-peak Value	
	88MHz-216MHz	43.50		Quasi-peak Value	
	216MHz-960MHz	46.00		Quasi-peak Value	
	960MHz-1GHz	54.00		Quasi-peak Value	
	Above 1GHz	54.00		Average Value	
		74.00		Peak Value	
	Or The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level whichever limit permits a higher field strength.				
Test setup:	Below 1GHz				
					
	Above 1GHz				

	
Test Procedure:	1. The EUT was placed on the top of a rotating table (0.8 meters for below 1GHz and 1.5 meters for above 1GHz) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement data:

7.2.1 Field Strength of The Fundamental Signal

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
433.82	89.47	16.03	3.02	37.52	71.00	92.86	-21.86	Horizontal
433.82	88.03	16.03	3.02	37.52	69.56	92.86	-23.30	Vertical

Average value:

Frequency (MHz)	Peak Value (dBuV/m)	Average factor	Average value (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
433.82	71.00	0.00	71.00	72.86	-1.86	Horizontal
433.82	69.56	0.00	69.56	72.86	-3.30	Vertical

Remark:

Average value=Peak value + Average factor

Calculate Formula:

Average factor =20 log(Duty cycle)

Duty cycle=on time/0.1 seconds or period, whichever is less

T on time =0.125(s)

T period =36.50(s)

Test data:

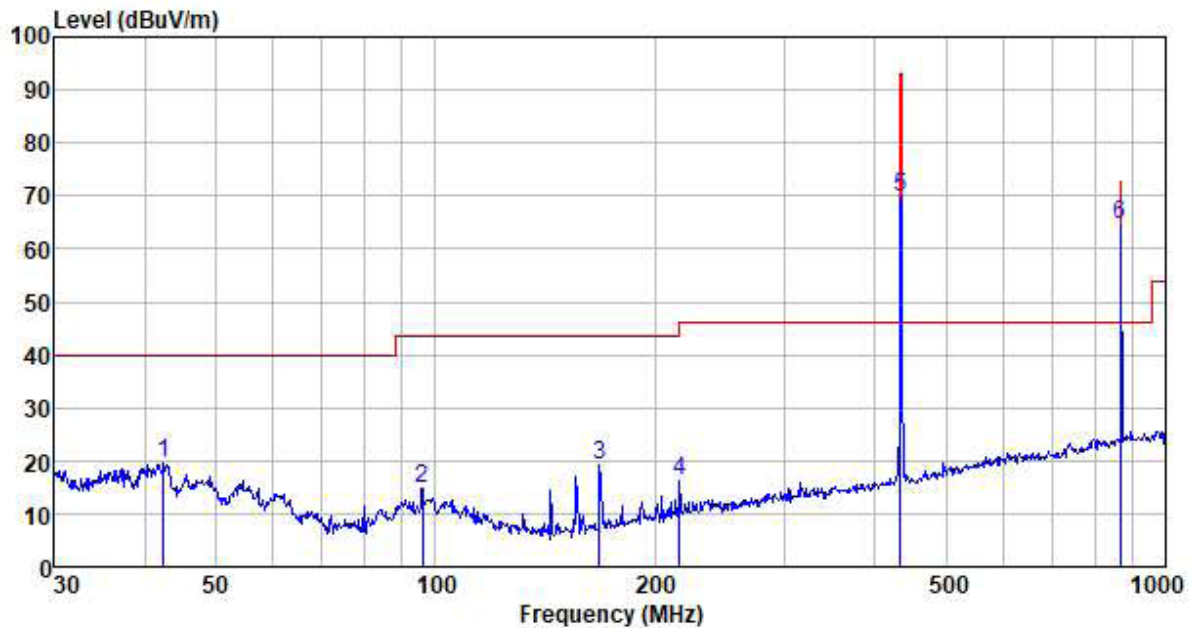
Duty cycle=0.125/0.1=1

So average factor =20 log(1)=0

7.2.2 Spurious emissions

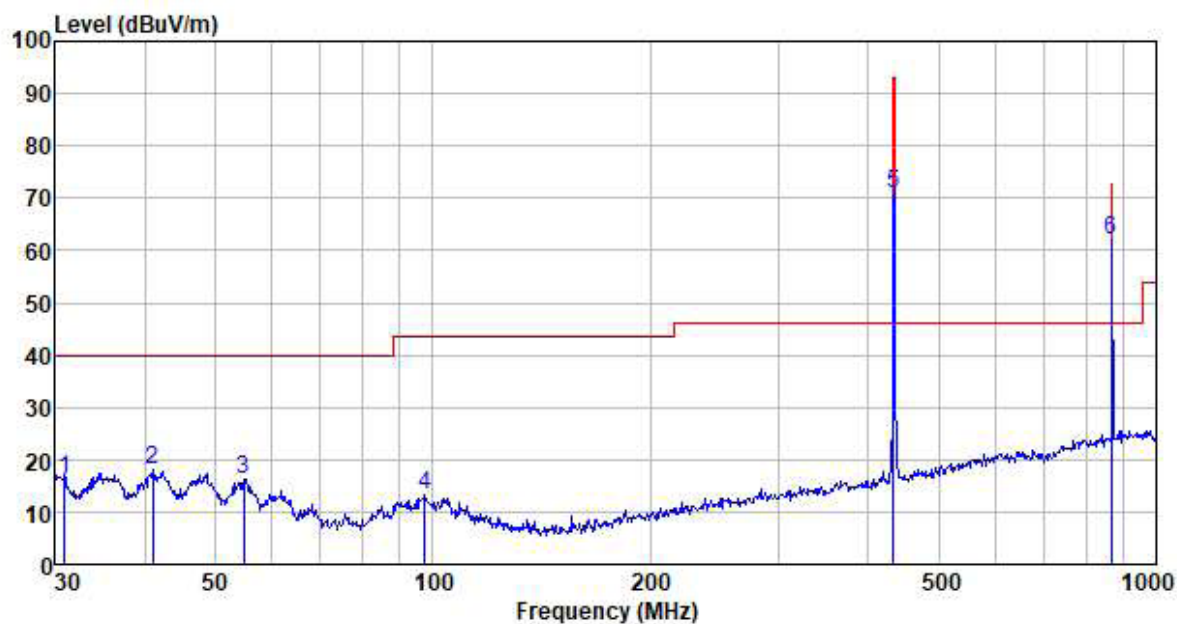
Below 1GHz:

Vertical:



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
42.451	42.29	12.23	0.69	35.80	19.41	40.00	-20.59	QP
96.099	38.76	11.65	1.16	36.69	14.88	43.50	-28.62	QP
167.824	46.17	8.46	1.67	37.18	19.12	43.50	-24.38	QP
216.024	40.48	11.02	1.93	37.35	16.08	46.00	-29.92	QP
433.820	88.03	16.03	3.02	37.52	69.56	92.86	-23.30	Peak
867.640	75.58	22.02	4.73	37.61	64.72	72.86	-8.14	QP

Horizontal:



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
30.962	39.51	11.22	0.56	35.07	16.22	40.00	-23.78	QP
40.988	41.06	12.21	0.67	35.72	18.22	40.00	-21.78	QP
54.835	39.88	11.80	0.82	36.25	16.25	40.00	-23.75	QP
97.456	36.92	11.86	1.17	36.70	13.25	43.50	-30.25	QP
433.820	89.47	16.03	3.02	37.52	71.00	92.86	-21.86	Peak
867.640	72.68	22.02	4.73	37.61	61.82	72.86	-11.04	QP

Above 1G:

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1301.46	45.16	24.98	4.54	36.00	38.68	74.00	-35.32	Vertical
1735.28	44.66	25.71	4.82	36.34	38.85	74.00	-35.15	Vertical
2169.10	38.43	26.68	5.15	36.66	33.60	74.00	-40.40	Vertical
2602.92	37.04	28.40	6.60	37.33	34.71	74.00	-39.29	Vertical
3036.74	31.10	30.18	8.07	37.49	31.86	74.00	-42.14	Vertical
3470.56	29.54	31.58	9.06	37.51	32.67	74.00	-41.33	Vertical
1301.46	46.45	24.98	4.54	36.00	39.97	74.00	-34.03	Horizontal
1735.28	48.70	25.71	4.82	36.34	42.89	74.00	-31.11	Horizontal
2169.10	40.61	26.68	5.15	36.66	35.78	74.00	-38.22	Horizontal
2602.92	48.75	27.62	5.46	36.92	44.91	74.00	-29.09	Horizontal
3036.74	37.55	28.40	6.68	37.34	35.29	74.00	-38.71	Horizontal
3470.56	32.60	30.09	8.02	37.47	33.24	74.00	-40.76	Horizontal

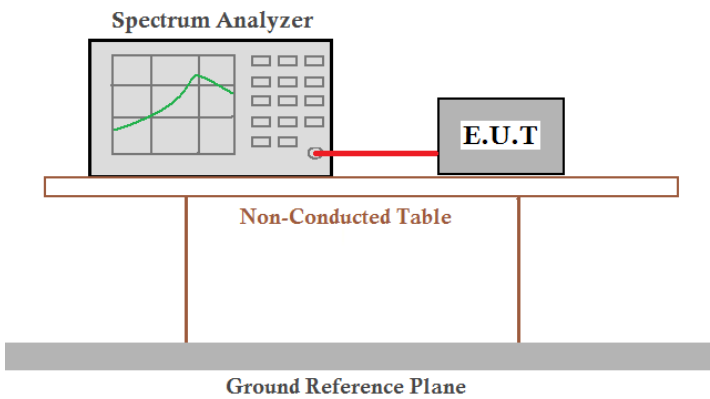
Average value:

Frequency (MHz)	Level (dBuV/m)	Average factor	Average value (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1301.46	38.68	0.00	38.68	54.00	-15.32	Vertical
1735.28	38.85	0.00	38.85	54.00	-15.15	Vertical
2169.10	33.60	0.00	33.60	54.00	-20.40	Vertical
2602.92	34.71	0.00	34.71	54.00	-19.29	Vertical
3036.74	31.86	0.00	31.86	54.00	-22.14	Vertical
3470.56	32.67	0.00	32.67	54.00	-21.33	Vertical
1301.46	39.97	0.00	39.97	54.00	-14.03	Horizontal
1735.28	42.89	0.00	42.89	54.00	-11.11	Horizontal
2169.10	35.78	0.00	35.78	54.00	-18.22	Horizontal
2602.92	44.91	0.00	44.91	54.00	-9.09	Horizontal
3036.74	35.29	0.00	35.29	54.00	-18.71	Horizontal
3470.56	33.24	0.00	33.24	54.00	-20.76	Horizontal

Remark:

1. Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. Average value=Peak value + Duty cycle factor

7.3 20dB Occupy Bandwidth

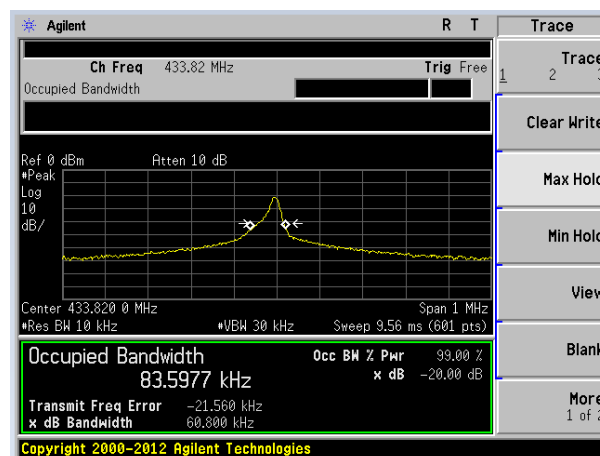
Test Requirement:	FCC Part15 C Section 15.231 (c)
Test Method:	ANSI C63.10:2013
Limit:	The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

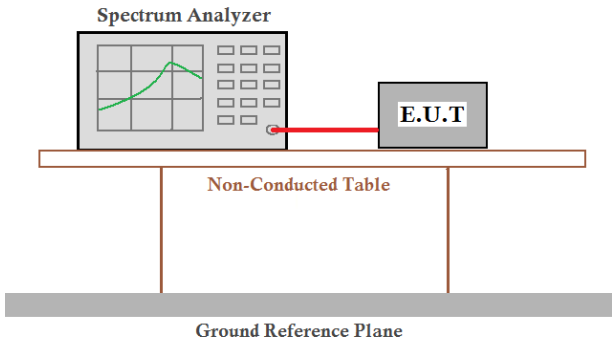
Test Frequency (MHz)	20dB bandwidth (MHz)	Limit (MHz)	Result
433.82	0.0608	1.0845	Pass

Note: Limit= Fundamental frequency×0.25%=433.82×0.25%=1.085MHz

Test plot as follows:

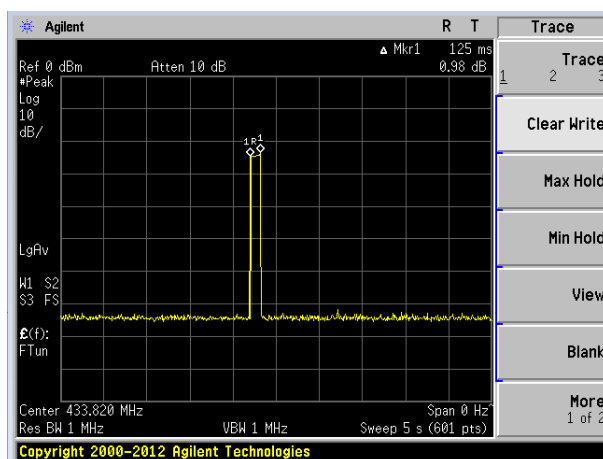


7.4 Dwell time

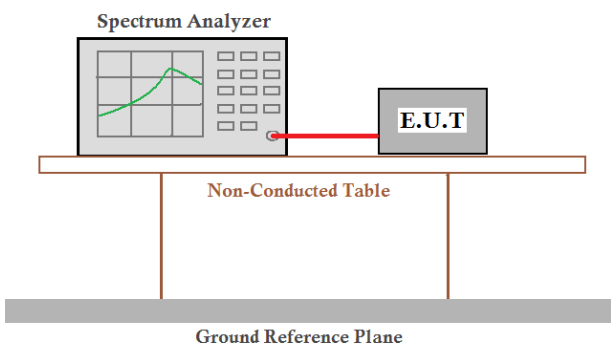
Test Requirement:	FCC Part15 C Section 15.231 (e)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=100KHz, VBW=300KHz, span=0Hz, detector: Peak
Limit:	Not more than 1seconds
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement data:

Test Frequency (MHz)	Duration of each TX(second):	Limit (second)	Result
433.82	0.125	<1.0	Pass

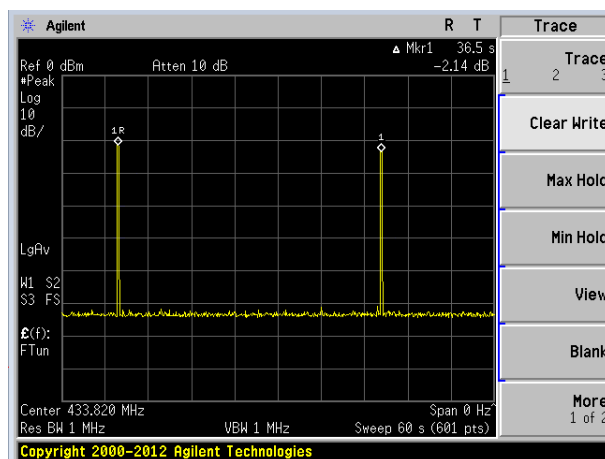


7.5 Silent period

Test Requirement:	FCC Part15 C Section 15.231 (e)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=100KHz, VBW=300KHz, span=0Hz, detector: Peak
Limit:	at least 30 times the duration of the transmission or more than 10 seconds
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 transmit, and read the transmission time.
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

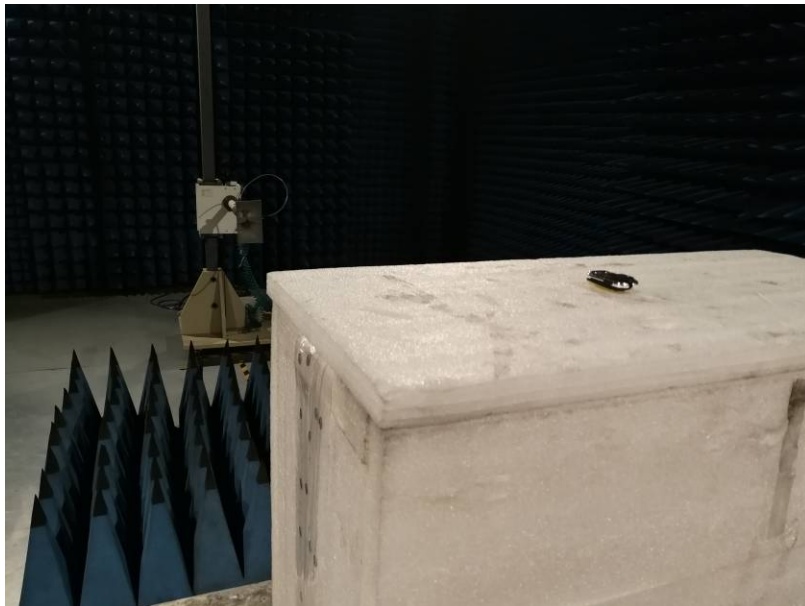
Measurement data:

Test Frequency (MHz)	Silent period (seconds)	Limit (seconds)	Result
433.82	36.50	>10	Pass



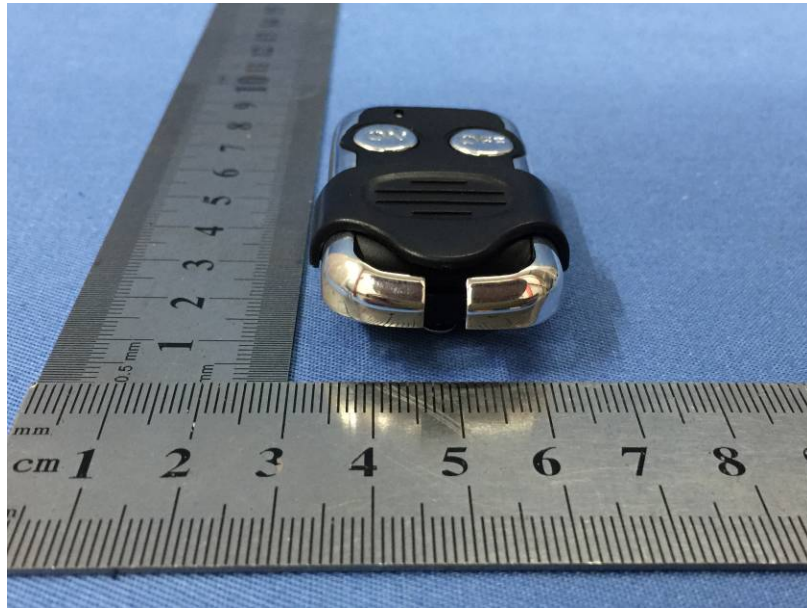
8 Test Setup Photo

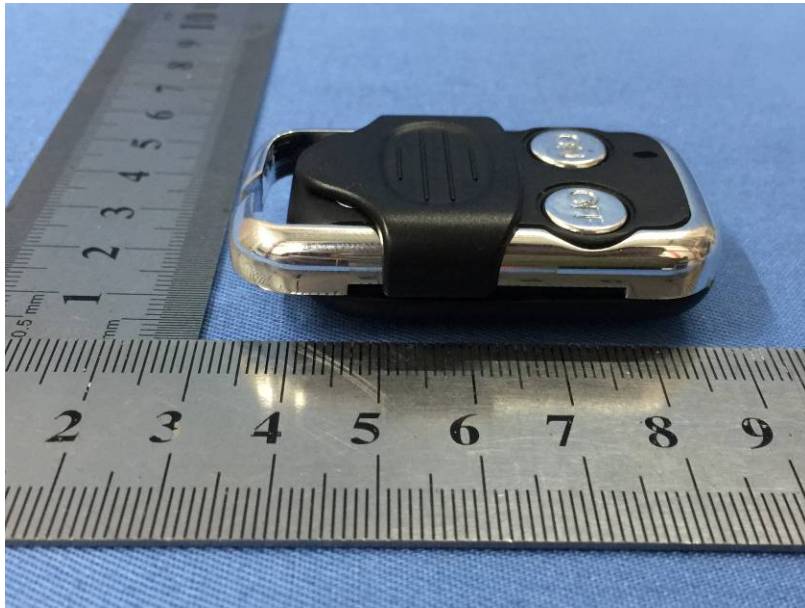
Radiated Emission

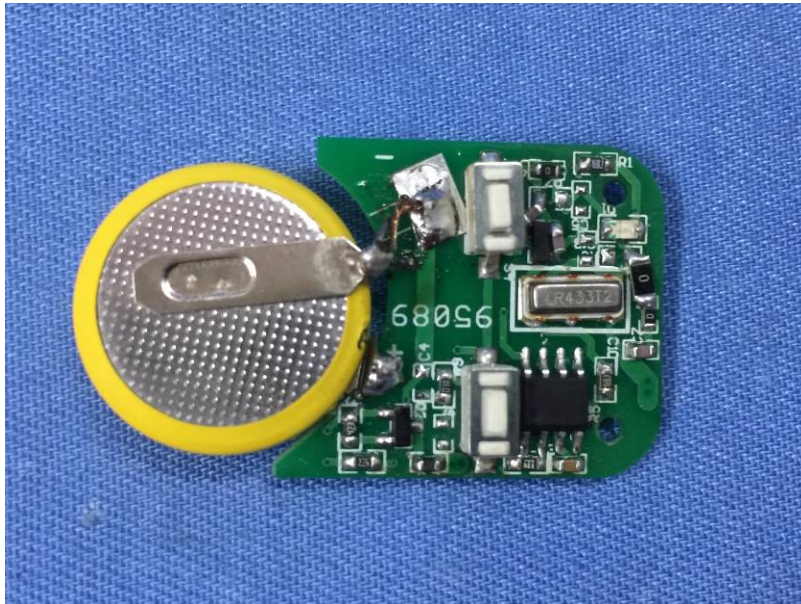
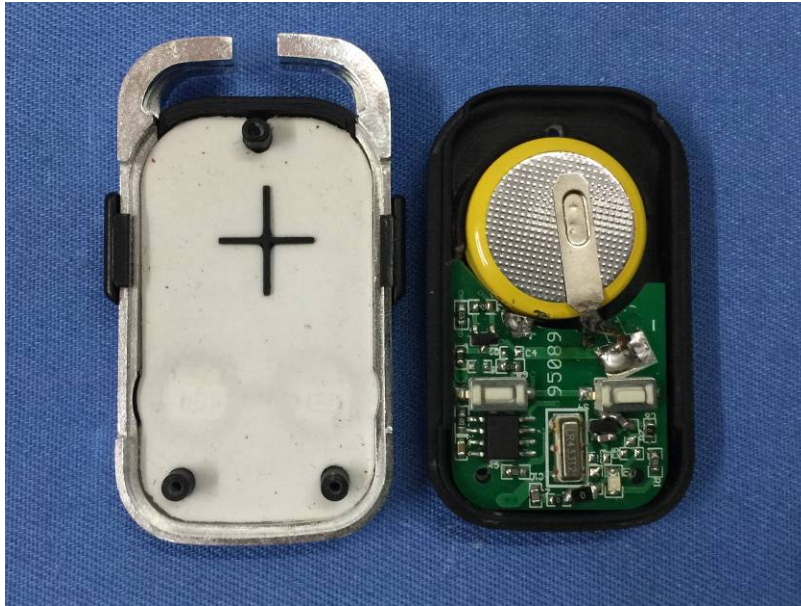


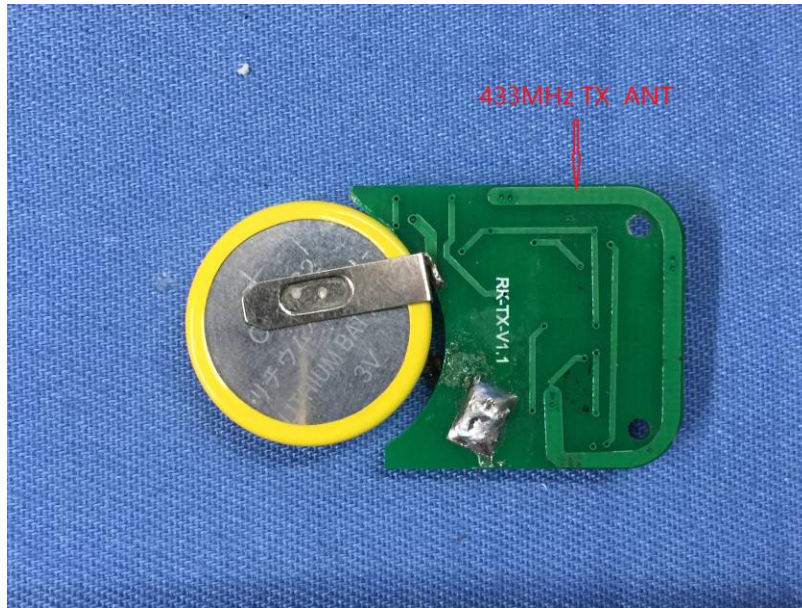
9 EUT Constructional Details











----- End -----