



FCC RF Test Report

Applicant: Remote Tech LLC

Address of Applicant: 310 ALDER RD, DOVER DE 19904 USA

Equipment Under Test (EUT)

Product Name: Smart key

Model No.: RT-J54B3, RT-J54B4, RT-J54B5, RT-R54B5, RT-R54B3, RT-R54B4

FCC ID: 2AOKM-CYV13B

Applicable standards: FCC CFR Title 47 Part 15C (§15.231)

Date of sample receipt: 24 Dec., 2021

Date of Test: 25 Dec., 2021 to 28 Feb., 2022

Date of report issue: 01 Mar., 2022

Test Result: PASS

Tested by:

Mike Ou

Date:

01 Mar., 2022

Reviewed by:

Wenwen Zhang

Date:

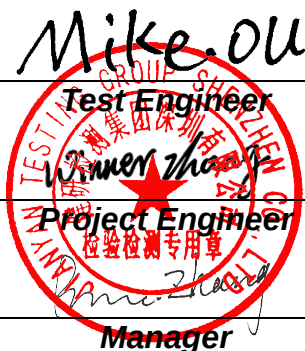
01 Mar., 2022

Approved by:

Wenwen Zhang

Date:

01 Mar., 2022



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 above the application standard version. Test results reported herein relate only to the item(s) tested.

This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

2 Version

Version No.	Date	Description
00	01 Mar., 2022	Original

3 Contents

	Page
1 COVER PAGE.....	1
2 VERSION	2
3 CONTENTS	3
4 GENERAL INFORMATION.....	4
4.1 CLIENT INFORMATION.....	4
4.2 GENERAL DESCRIPTION OF E.U.T.....	4
4.3 TEST MODE AND ENVIRONMENT	5
4.4 DESCRIPTION OF SUPPORT UNITS.....	5
4.5 MEASUREMENT UNCERTAINTY.....	5
4.6 ADDITIONS TO, DEVIATIONS, OR EXCLUSIONS FROM THE METHOD	5
4.7 LABORATORY FACILITY.....	5
4.8 LABORATORY LOCATION	6
4.9 TEST INSTRUMENTS LIST.....	6
5 MEASUREMENT SETUP AND PROCEDURE	7
5.1 TEST SETUP	7
5.2 TEST PROCEDURE	8
6 TEST RESULTS.....	9
6.1 SUMMARY	9
6.1.1 Clause and data summary	9
6.1.2 Test Limit	10
6.2 ANTENNA REQUIREMENT	11
6.3 20dB BANDWIDTH	12
6.4 FIELD STRENGTH EMISSIONS.....	13
6.5 DURATION TIME.....	21
7 TEST SETUP PHOTOS.....	22
8 EUT CONSTRUCTIONAL PHOTOS.....	23

4 General Information

4.1 Client Information

Applicant:	Remote Tech LLC
Address:	310 ALDER RD, DOVER DE 19904 USA
Manufacturer:	Remote Tech LLC
Address:	310 ALDER RD, DOVER DE 19904 USA

4.2 General Description of E.U.T.

Product Name:	Smart key
Model No.:	RT-J54B3, RT-J54B4, RT-J54B5, RT-R54B5, RT-R54B3, RT-R54B4
Operation Frequency:	433.9 MHz
Channel Numbers:	1
Modulation Type:	FSK
Antenna Type:	PCB Antenna
Antenna Gain:	0 dBi
Power Supply:	DC 3V (CR2032 battery)
Test Sample Condition:	The test samples were provided in good working order with no visible defects.
Remark:	Model No.: RT-J54B3, RT-J54B4, RT-J54B5, RT-R54B5, RT-R54B3, RT-R54B4 All models are identical inside, including the electrical circuit design, layout, components used and internal wiring. Models RT-J54B3, RT-J54B4, RT-J54B5, RT-R54B3, RT-R54B4, RT-R54B5 represent appearance of the key with 3 , 4 and 5 buttons on the shell. The PCB function is the same for all these models.

4.3 Test Mode and Environment

Test mode:			
Transmitting mode:		Keep the EUT in transmitting mode with modulation	
The EUT was placed on three different polar directions tested: i.e. X axis, Y axis, Z axis. which was shown in this test report and defined as follows:			
Axis	X	Y	Z
Field Strength(dBuV/m)	77.56	77.12	78.29
According to ANSI C63.10 standards, the test results are both the “worst case” and “worst setup”: Y axis (see the test setup photo).			
Operating Environment:			
Temperature:	15℃ ~ 35℃		
Humidity:	20 % ~ 75 % RH		
Atmospheric Pressure:	1010 mbar		

4.4 Description of Support Units

N/A

4.5 Measurement Uncertainty

Parameter	Expanded Uncertainty (Confidence of 95%(U = 2Uc(y)))
Radiated Emission (30MHz ~ 1GHz) (3m SAC)	±4.45 dB
Radiated Emission (1GHz ~ 18GHz) (3m SAC)	±5.34 dB
Radiated Emission (18GHz ~ 40GHz) (3m SAC)	±5.34 dB
Note: All the measurement uncertainty value were shown with a coverage k=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.	

4.6 Additions to, Deviations, or Exclusions From the Method

No

4.7 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations: ● FCC - Designation No.: CN1211 JianYan Testing Group Shenzhen Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 727551. ● ISED – CAB identifier.: CN0021 The 3m Semi-anechoic chamber and 10m Semi-anechoic chamber of JianYan Testing Group Shenzhen Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1. ● CNAS - Registration No.: CNAS L15527 JianYan Testing Group Shenzhen Co., Ltd. is accredited to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L15527. ● A2LA - Registration No.: 4346.01 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. The test scope can be found as below link: https://portal.a2la.org/scopepdf/4346-01.pdf
--

4.8 Laboratory Location

JianYan Testing Group Shenzhen Co., Ltd.

Address: No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, People's Republic of China.

Tel: +86-755-23118282, Fax: +86-755-23116366

Email: info-JYTee@lets.com, Website: <http://jyt.lets.com>

4.9 Test Instruments list

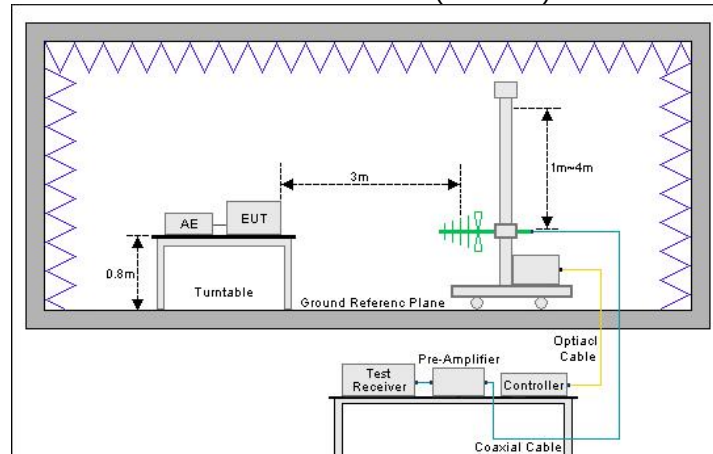
Radiated Emission(3m SAC):					
Test Equipment	Manufacturer	Model No.	Manage No.	Cal.Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
3m SAC	ETS	9m*6m*6m	WXJ001-1	01-19-2021	01-18-2024
BiConiLog Antenna	Schwarzbeck	VULB9163	WXJ002	03-03-2021	03-02-2022
Biconical Antenna	Schwarzbeck	VUBA9117	WXJ002-1	06-20-2021	06-19-2022
Horn Antenna	Schwarzbeck	BBHA9120D	WXJ002-2	03-03-2021	03-02-2022
Horn Antenna	Schwarzbeck	BBHA9120D	WXJ002-3	06-18-2021	06-17-2022
Loop Antenna	Schwarzbeck	FMZB 1519 B	WXJ002-4	03-07-2021	03-06-2022
Pre-amplifier (30MHz ~ 1GHz)	Schwarzbeck	BBV9743B	WXG001-7	03-07-2021	03-06-2022
Pre-amplifier (1GHz ~ 18GHz)	SKET	LNPA_0118G-50	WXG001-3	03-07-2021	03-06-2022
Pre-amplifier (18GHz ~ 40GHz)	RF System	TRLA-180400G45B	WXG001-9	03-07-2021	03-06-2022
EMI Test Receiver	Rohde & Schwarz	ESRP7	WXJ003-1	03-03-2021	03-02-2022
Spectrum Analyzer	KEYSIGHT	N9010B	WXJ004-2	11-27-2021	11-26-2022
Coaxial Cable (30MHz ~ 1GHz)	JYTSZ	JYT3M-1G-NN-8M	WXG001-4	03-07-2021	03-06-2022
Coaxial Cable (1GHz ~ 18GHz)	JYTSZ	JYT3M-18G-NN-8M	WXG001-5	03-07-2021	03-06-2022
Coaxial Cable (18GHz ~ 40GHz)	JYTSZ	JYT3M-40G-SS-8M	WXG001-7	03-07-2021	03-06-2022
Coaxial Cable (9kHz ~ 30MHz)	JYT	JYT3M-1G-BB-5M	WXG001-6	03-07-2021	03-06-2022
Band Reject Filter Group	Tonscend	JS0806-F	WXJ089	N/A	
Test Software	Tonscend	TS+	Version: 3.0.0.1		

5 Measurement setup and procedure

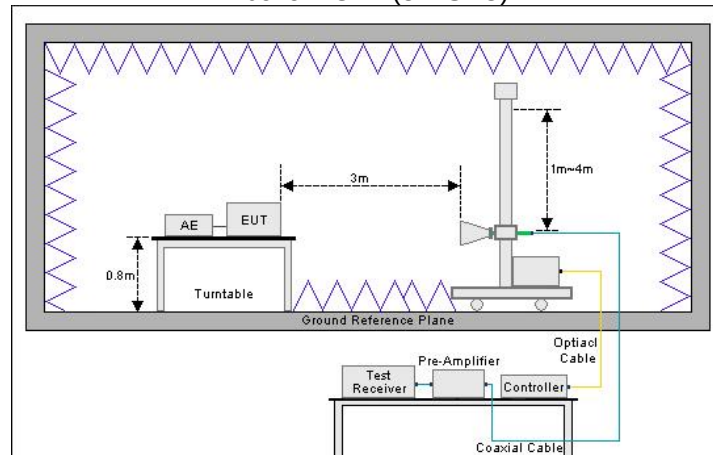
5.1 Test setup

Radiated emission measurement:

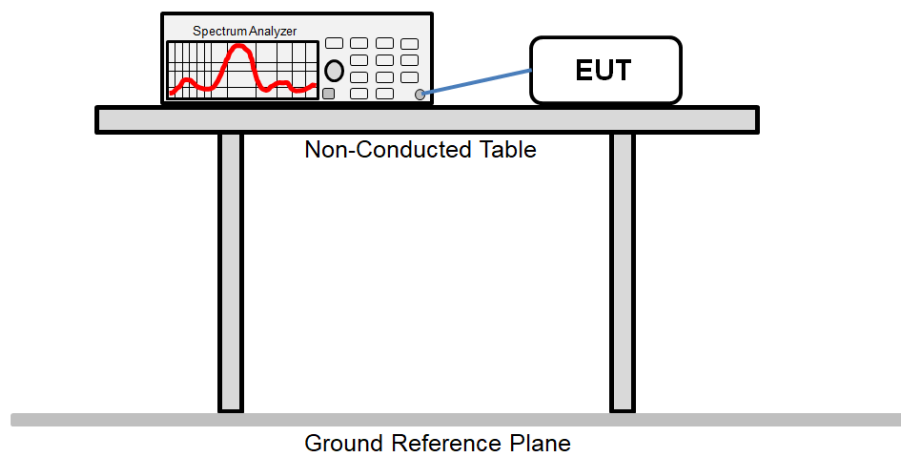
30 MHz – 1000 MHz (3m SAC)



Above 1 GHz (3m SAC)



Conducted test method:



5.2 Test procedure

Test method	Test step
Radiated emission	1. The EUT was placed on the tabletop of a rotating table 0.8 m the ground at a 3 m semi anechoic chamber. The measurement distance from the EUT to the receiving antenna is 3 m. 2. EUT works in each mode of operation that needs to be tested, and having the EUT continuously working, respectively on 3 axis (X, Y & Z) and considered typical configuration to obtain worst position. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations. 3. Open the test software to control the test antenna and test turntable. Perform the test, save the test results, and export the test data.
Conducted test method	1. The antenna port of EUT was connected to the RF port of the spectrum analyzer through an RF cable. 2. The EUT is keeping in continuous transmission mode and tested in all modulation modes. 3. The test data is saved by the screenshot function of the spectrum analyzer.

6 Test Results

6.1 Summary

6.1.1 Clause and data summary

Test Items	FCC Part Section(s)	Test Data	Result
Antenna Requirement	15.203	See Section 6.2	Pass
Conducted Emission	15.207	N/A	N/A
20dB Bandwidth	15.231 (c)	See Section 6.3	Pass
Field strength emissions	15.209 15.231 (b)	See Section 6.4	Pass
Duration Time	15.231 (a)(1)	See Section 6.5	Pass
Remark: 1. Pass: The EUT complies with the essential requirements in the standard. 2. N/A: Not Applicable, EUT Power Supply is DC 3V.			
Test Method:	ANSI C63.4-2014 ANSI C63.10-2013		

6.1.2 Test Limit

Items	Limit																					
20dB Bandwidth	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.																					
Field strength emissions	<table><tr><th>Fundamental Frequency (MHz)</th><th>Field strength of fundamental (microvolts/meter)</th><th>Field strength of spurious emissions (microvolts/meter)</th></tr><tr><td>40.66 – 40.70</td><td>2250</td><td>225</td></tr><tr><td>70.00 – 130.00</td><td>1250</td><td>125</td></tr><tr><td>130.00 – 174.00</td><td>¹1250 to 3750</td><td>¹125 to 375</td></tr><tr><td>174.00 – 260.00</td><td>3750</td><td>375</td></tr><tr><td>260.00 – 470.00</td><td>¹3750 to 12500</td><td>¹375 to 1250</td></tr><tr><td>Above 470.00</td><td>12500</td><td>1250</td></tr></table> ¹Linear interpolations. (1) The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges. (2) 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. (3) 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.	Fundamental Frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)	40.66 – 40.70	2250	225	70.00 – 130.00	1250	125	130.00 – 174.00	¹ 1250 to 3750	¹ 125 to 375	174.00 – 260.00	3750	375	260.00 – 470.00	¹ 3750 to 12500	¹ 375 to 1250	Above 470.00	12500	1250
Fundamental Frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)																				
40.66 – 40.70	2250	225																				
70.00 – 130.00	1250	125																				
130.00 – 174.00	¹ 1250 to 3750	¹ 125 to 375																				
174.00 – 260.00	3750	375																				
260.00 – 470.00	¹ 3750 to 12500	¹ 375 to 1250																				
Above 470.00	12500	1250																				
Duration Time	A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.																					

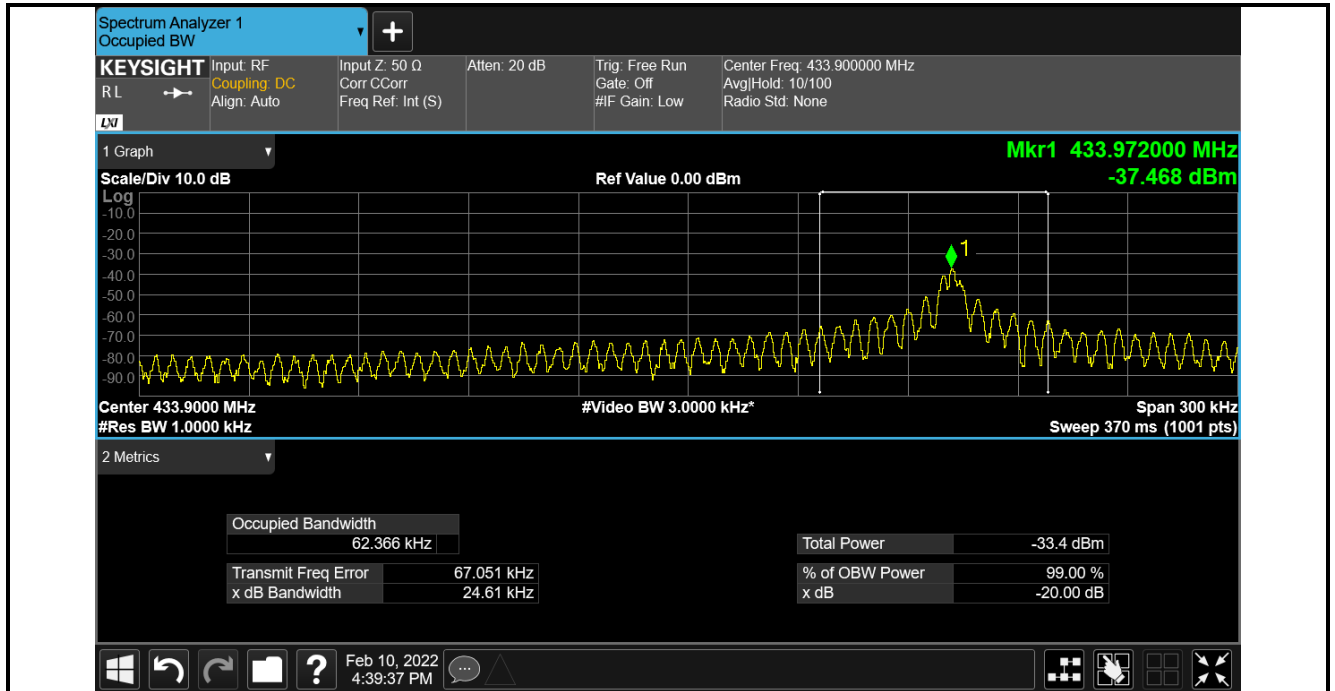
6.2 Antenna Requirement

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.
E.U.T Antenna:	The EUT make use of an PCB antenna.

6.3 20dB Bandwidth

20dB bandwidth (MHz)	Limit (MHz)	Results
0.02461	1.0848	Pass
Note: Limit = Fundamental frequency×0.25%=433.9×0.25%=1.0848MHz.		

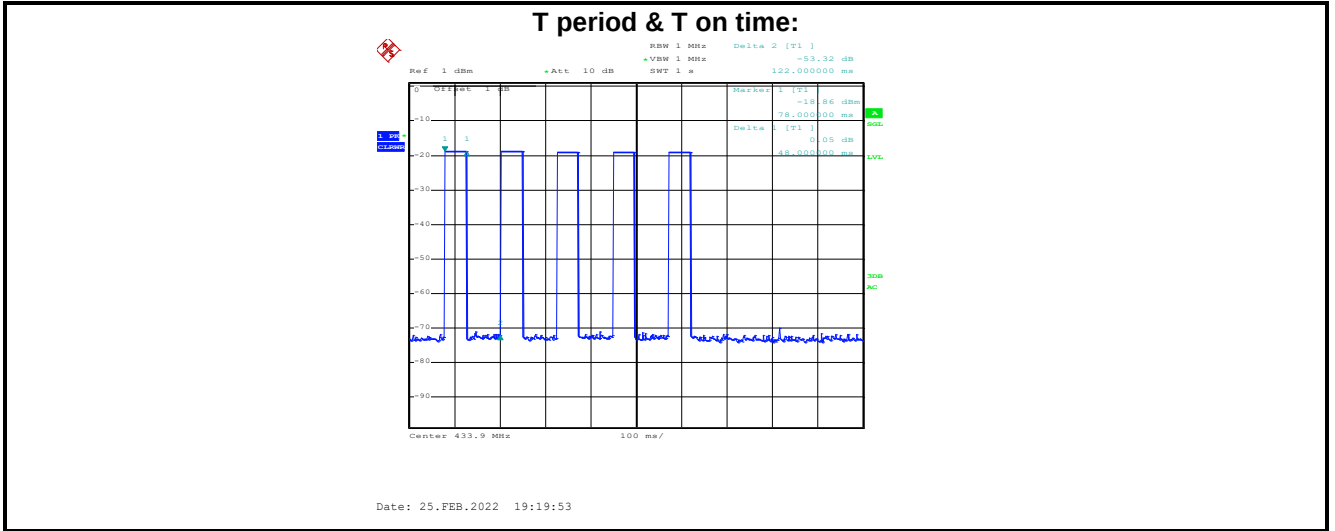
Test plot as follows:



6.4 Field Strength Emissions

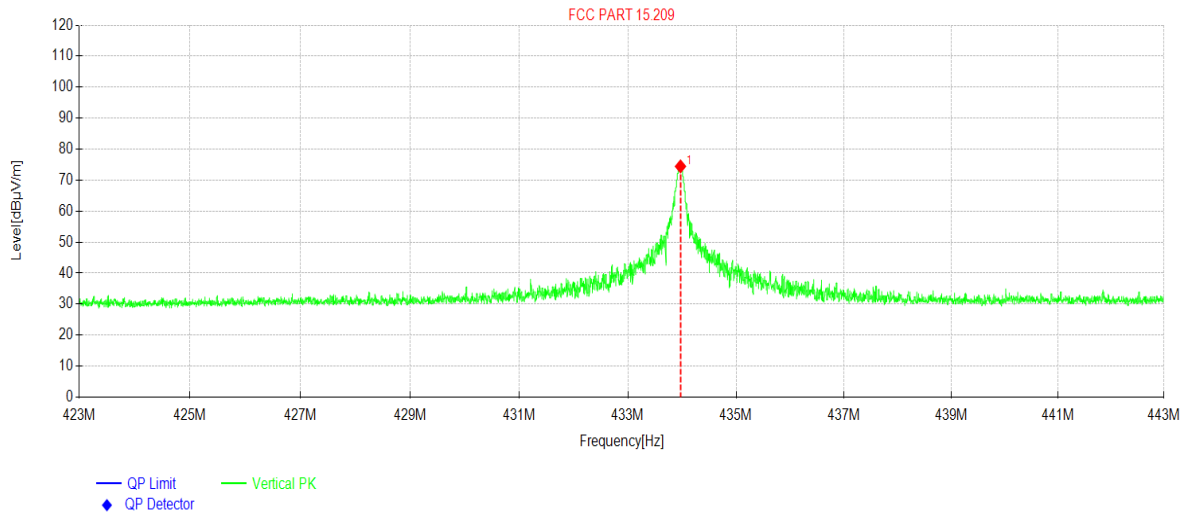
Field Strength of fundamental signal:

Peak value						
Frequency (MHz)	Read level (dBuV)	factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polarization
433.9	55.67	18.78	74.45	100.82	26.37	Vertical
433.9	59.51	18.77	78.29	100.82	22.54	Horizontal
Average value						
Frequency (MHz)	Level (dBuV/m)	Duty cycle factor	Average value (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Polarization
433.9	74.45	-6.38	68.07	80.82	12.75	Vertical
433.9	78.28	-6.38	71.90	80.82	8.92	Horizontal
Duty Cycle Factor Calculate Formula:	Average value = Peak value + Duty Cycle Factor					
	Duty cycle factor = $20\log(\text{Duty cycle})$					
	Duty cycle = on time/100 milliseconds or period, whichever is less					
	T on time = 48(ms)					
	T period = 122(ms) > 100(ms)					
	Duty cycle = 48%					
	Duty cycle factor = $20\log(\text{Duty cycle}) = -6.38$					



Test Plots:

Product Name:	Smart key	Product Model:	RT-J54B3
Test By:	Mike	Test mode:	Tx mode
Test Frequency:	433.9 MHz	Polarization:	Vertical
Test Voltage:	DC 3V		



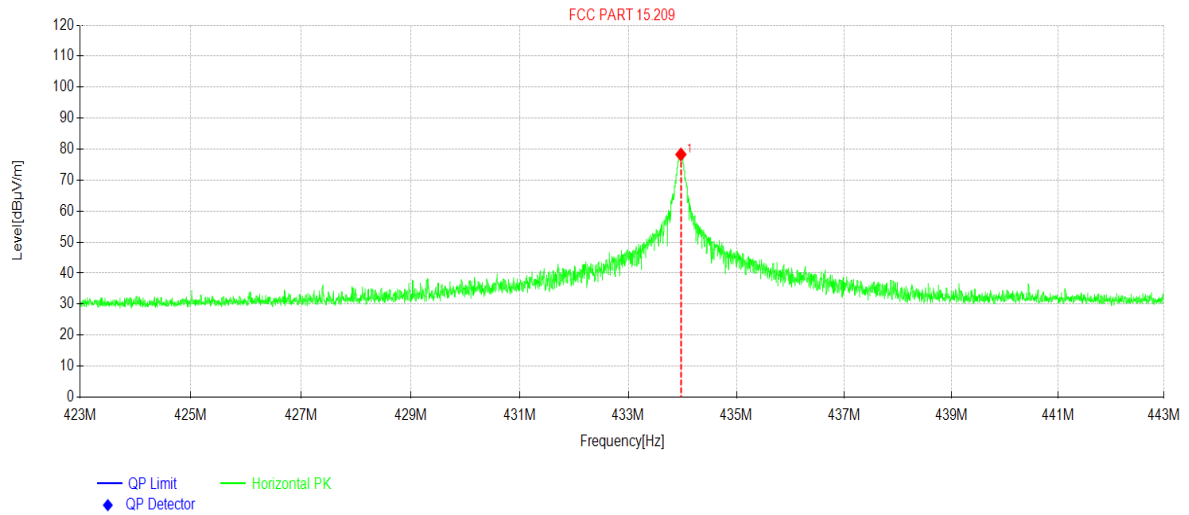
Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Trace	Polarity
1	433.971	55.67	74.45	18.78	100.82	26.37	PK	Vertical

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.

Product Name:	Smart key	Product Model:	RT-J54B3
Test By:	Mike	Test mode:	Tx mode
Test Frequency:	433.9 MHz	Polarization:	Horizontal
Test Voltage:	DC 3V		



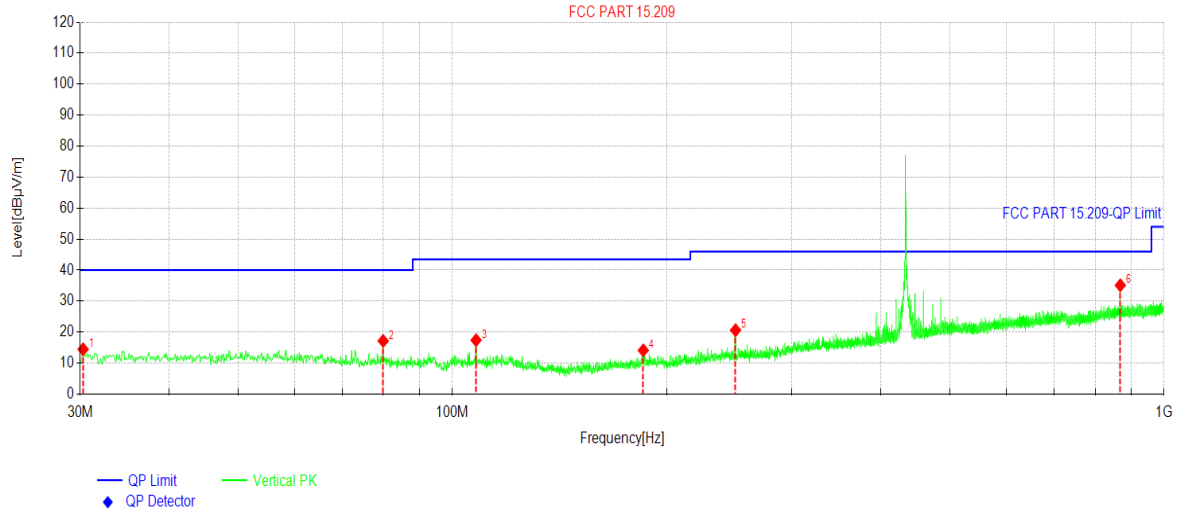
Suspected Data List								
NO.	Freq. [MHz]	Reading [dBuV/m]	Level [dBuV/m]	Factor [dB]	Limit [dBuV/m]	Margin [dB]	Trace	Polarity
1	433.971	59.51	78.29	18.78	100.82	22.54	PK	Horizontal

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.

Spurious Emissions:

Product Name:	Smart key	Product Model:	RT-J54B3
Test By:	Mike	Test mode:	Tx mode
Test Frequency:	30 MHz – 1000 MHz	Polarization:	Vertical
Test Voltage:	DC 3V		

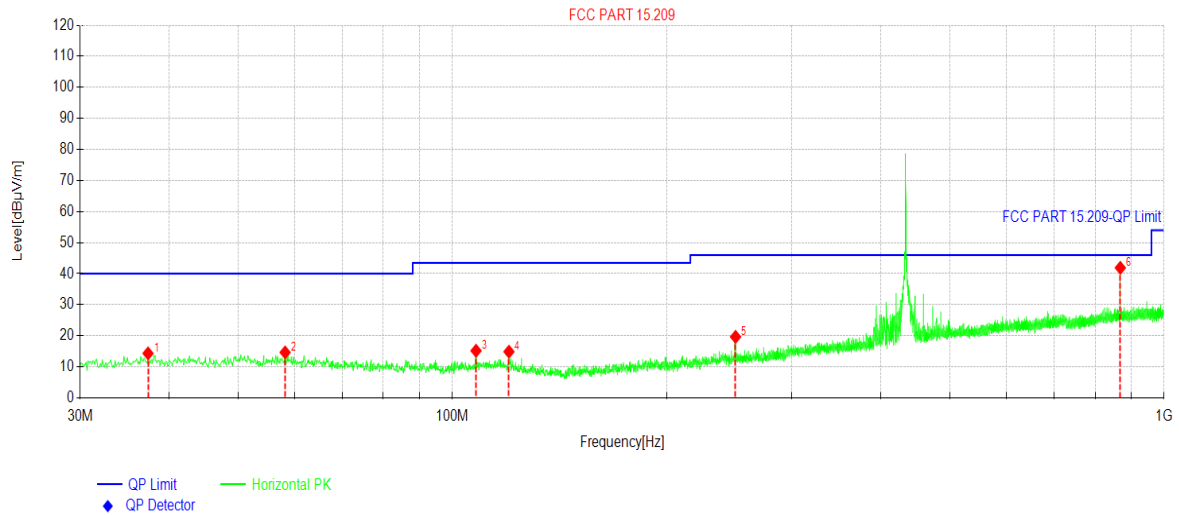


NO.	Freq. [MHz]	Reading[dBuV/m]	Level [dBuV/m]	Factor [dB]	Limit [dBuV/m]	Margin [dB]	Trace	Polarity
1	30.2910	30.56	14.47	-16.09	40.00	25.53	PK	Vertical
2	79.9600	34.52	17.17	-17.35	40.00	22.83	PK	Vertical
3	107.995	33.35	17.41	-15.94	43.50	26.09	PK	Vertical
4	185.506	30.46	14.13	-16.33	43.50	29.37	PK	Vertical
5	250.018	34.43	20.64	-13.79	46.00	25.36	PK	Vertical
6	868.066	36.52	35.12	-1.40	46.00	10.88	PK	Vertical

Remark:

- Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
- The emission levels of other frequencies are very lower than the limit and not show in test report.

Product Name:	Smart key	Product Model:	RT-J54B3
Test By:	Mike	Test mode:	Tx mode
Test Frequency:	30 MHz – 1000 MHz	Polarization:	Horizontal
Test Voltage:	DC 3V		

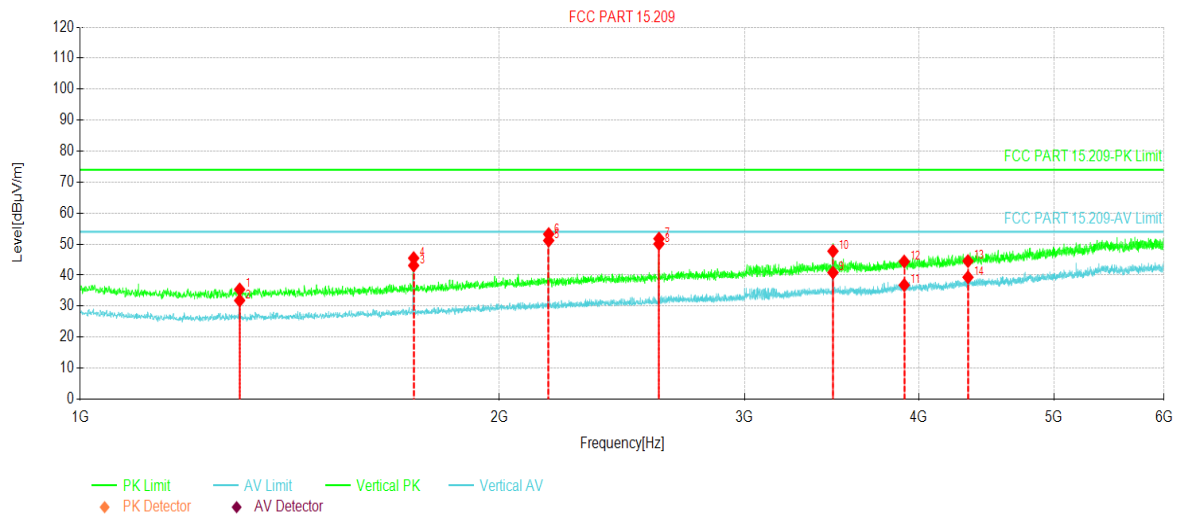


NO.	Freq. [MHz]	Reading[dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Trace	Polarity
1	37.3727	29.07	14.32	-14.75	40.00	25.68	PK	Horizontal
2	58.2298	29.52	14.64	-14.88	40.00	25.36	PK	Horizontal
3	107.995	31.12	15.18	-15.94	43.50	28.32	PK	Horizontal
4	120.122	30.92	14.88	-16.04	43.50	28.62	PK	Horizontal
5	250.018	33.45	19.66	-13.79	46.00	26.34	PK	Horizontal
6	868.066	43.29	41.89	-1.40	46.00	4.11	PK	Horizontal

Remark:

1. Final Level = Receiver Read level + Factor (Antenna Factor + Cable Loss – Preamplifier Factor).
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product Name:	Smart key	Product Model:	RT-J54B3
Test By:	Mike	Test mode:	NCF Tx mode
Test Frequency:	1000 MHz – 6000 MHz	Polarization:	Vertical
Test Voltage:	DC 3V		

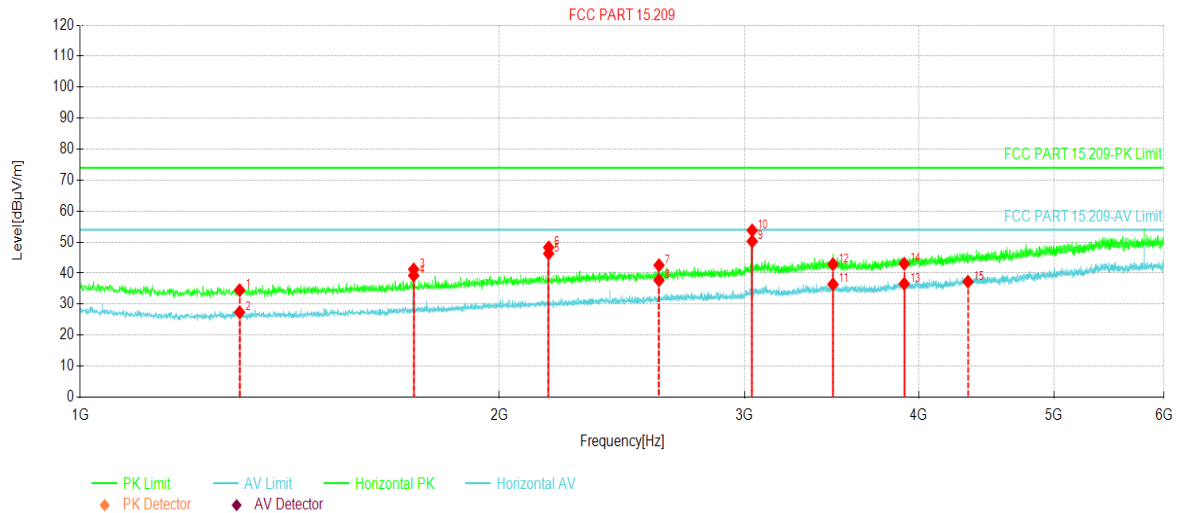


NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Trace	Polarity
1	1301.70	58.55	35.39	-23.16	74.00	38.61	PK	Vertical
2	1301.70	54.98	31.82	-23.16	54.00	22.18	AV	Vertical
3	1735.60	64.77	43.11	-21.66	54.00	10.89	AV	Vertical
4	1735.60	67.14	45.48	-21.66	74.00	28.52	PK	Vertical
5	2169.50	70.79	51.16	-19.63	54.00	2.84	AV	Vertical
6	2169.50	72.86	53.23	-19.63	74.00	20.77	PK	Vertical
7	2603.40	69.80	51.76	-18.04	74.00	22.24	PK	Vertical
8	2603.40	68.13	50.09	-18.04	54.00	3.91	AV	Vertical
9	3471.20	55.80	40.83	-14.97	54.00	13.17	AV	Vertical
10	3471.20	62.70	47.73	-14.97	74.00	26.27	PK	Vertical
11	3905.10	50.28	36.79	-13.49	54.00	17.21	AV	Vertical
12	3905.10	57.88	44.39	-13.49	74.00	29.61	PK	Vertical
13	4339.00	55.99	44.53	-11.46	74.00	29.47	PK	Vertical
14	4339.00	50.77	39.31	-11.46	54.00	14.69	AV	Vertical

Remark:

1. Final Level = Receiver Read level + Factor (Antenna Factor + Cable Loss – Preamplifier Factor).
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product Name:	Smart key	Product Model:	RT-J54B3
Test By:	Mike	Test mode:	NCF Tx mode
Test Frequency:	1000 MHz – 6000 MHz	Polarization:	Horizontal
Test Voltage:	DC 3V		



NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Trace	Polarity
1	1301.70	57.66	34.50	-23.16	74.00	39.50	PK	Horizontal
2	1301.70	50.53	27.37	-23.16	54.00	26.63	AV	Horizontal
3	1735.60	62.89	41.23	-21.66	74.00	32.77	PK	Horizontal
4	1735.60	60.89	39.23	-21.66	54.00	14.77	AV	Horizontal
5	2169.50	65.93	46.30	-19.63	54.00	7.70	AV	Horizontal
6	2169.50	67.94	48.31	-19.63	74.00	25.69	PK	Horizontal
7	2603.40	60.58	42.54	-18.04	74.00	31.46	PK	Horizontal
8	2603.40	55.74	37.70	-18.04	54.00	16.30	AV	Horizontal
9	3037.30	66.80	50.27	-16.53	54.00	3.73	AV	Horizontal
10	3037.30	70.32	53.79	-16.53	74.00	20.21	PK	Horizontal
11	3471.20	51.38	36.41	-14.97	54.00	17.59	AV	Horizontal
12	3471.20	57.85	42.88	-14.97	74.00	31.12	PK	Horizontal
13	3905.10	50.04	36.55	-13.49	54.00	17.45	AV	Horizontal
14	3905.10	56.52	43.03	-13.49	74.00	30.97	PK	Horizontal
15	4339.00	48.69	37.23	-11.46	54.00	16.77	AV	Horizontal

Remark:

1. Final Level = Receiver Read level + Factor (Antenna Factor + Cable Loss – Preamplifier Factor).
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

6.5 Duration Time

Duration time (second)	Limit (second)	Result
0.500	<5.0	Pass

Test plot as follows:

