FCC TEST REPORT

Client Name	:	Autel Intelligent Tech. Corp., Ltd.
Address	:	7th-8th, 10th Floor, Bldg. B1, Zhiyuan, Xueyuan Rd. Xili, Nanshan Shenzhen 518055 China
Product Name	:	UNIVERSAL SMART KEY
Date	:	Apr. 23, 2022

Shenzhen Anbotek Compliance Laboratory Limited

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TEST REPORT

Applicant	:	Autel Intelligent Tech. Corp., Ltd.
Manufacturer	:	Autel Intelligent Tech. Corp., Ltd.
Product Name	:	UNIVERSAL SMART KEY
Model No.	:	IKEYCL005AL, IKEYCL004AL
Trade Mark	:	AUTEL
Rating(s)	:	Input: DC 3V with "CR2032" battery inside

Test Standard(s)	**:**	**FCC Part15 Subpart C, Section 15.231**
Test Method(s)	**:**	**ANSI C63.10: 2020**

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Receipt Apr. 06, 2022

Date of Test Apr. 06~18, 2022

Prepared by

(TuTu Hong)

Approved & Authorized Signer

(Kingkong Jin)

1. General Information

1.1. Client Information

Applicant	:	Autel Intelligent Tech. Corp., Ltd.
Address	:	7th-8th, 10th Floor, Bldg. B1, Zhiyuan, Xueyuan Rd. Xili, Nanshan Shenzhen 518055 China
Manufacturer	:	Autel Intelligent Tech. Corp., Ltd.
Address	:	7th-8th, 10th Floor, Bldg. B1, Zhiyuan, Xueyuan Rd. Xili, Nanshan Shenzhen 518055 China
Factory 1	:	Autel Intelligent Technology Corp., Ltd. Guangming Branch
Address	:	7F&6F, East Wing, Building 2, and 6F of Electronical Building, Yanxiang Industrial Zone, Gaoxin Rd, Dongzhou Community of Guangming New District, Shenzhen
Factory 2	:	AUTEL VIETNAM COMPANY LIMITED
Address	:	4th Floor, Factory#6, Land#CN1, An Duong Industrial Zone, Hong Phong Township, An Duong County, Hai Phong, Viet Nam

1.2. Description of Device (EUT)

Product Name	:	UNIVERSAL SMART KEY	
Model No.	:	IKEYCL005AL, IKEYCL004AL (Note: All samples are the same except the model number and buttons' number and size, so we prepare both model for radiated emission test. Other items are test for "IKEYCL005AL" only.)	
Trade Mark	:	AUTEL	
Test Power Supply	:	DC 3V Battery inside	
Test Sample No.	:	1-2-1(Normal Sample), 1-2-2(Engineering Sample)	
Product Description	:	Operation Frequency:	315MHz, 434MHz
		Number of Channel:	2 Channels
		Modulation Type:	FSK, ASK
		Antenna Type:	PCB antenna
		Antenna Gain(Peak):	434MHz: -1dBi(Provided by customer) 315 MHz: -1dBi(Provided by customer)
		Adapter:	N/A
Remark: 1)For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual. 2) This report is for SRD module.			

1.3. Auxiliary Equipment Used During Test

N/A	:	

1.4. Description of Test Modes

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Frequency
TX Mode	434 MHZ(ASK)
TX Mode	434 MHZ(FSK)
TX Mode	315 MHZ(ASK)
TX Mode	315 MHZ(FSK)

For Radiated Emission	
Final Test Mode	Frequency
TX Mode	434 MHZ(ASK)
TX Mode	434 MHZ(FSK)
TX Mode	315 MHZ(ASK)
TX Mode	315 MHZ(FSK)

Note:

1. During the test, the EUT was keeping continuous transmission.

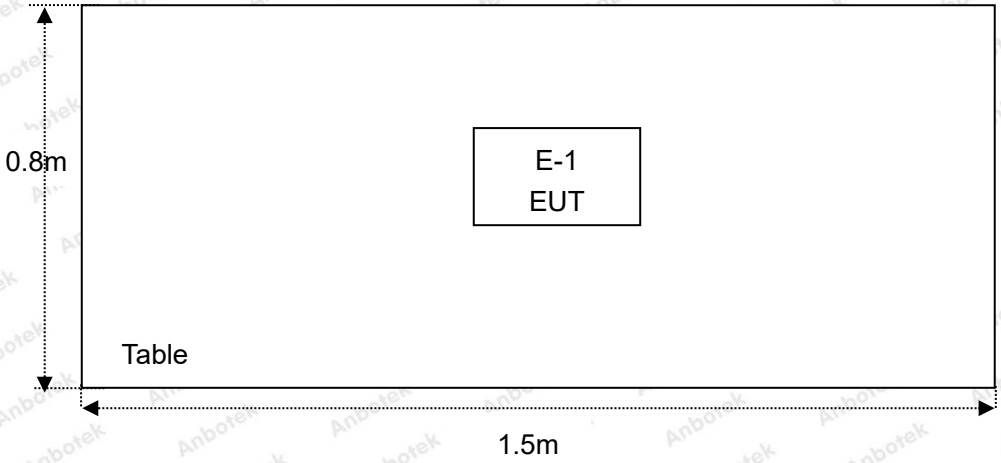
1.5. List of Channels

Mode	Frequency
01	315 MHz
02	434 MHz

Address: 1/F., Building D, Sogood Science and Technology Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.
Tel:(86) 755-26066440 Fax: (86) 755-26014772 Email: service@anbotek.com
Hotline 400-003-0500
www.anbotek.com

1.6. Description of Test Setup

RE



1.7. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Three Phase V-type Artificial Power Network	CYBERTEK	EM5040DT	E215040DT001	Jul 05, 2021	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Oct. 22, 2021	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESR26	101481	Oct. 22, 2021	1 Year
4.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Oct. 22, 2021	1 Year
5.	MAX Spectrum Analysis	Agilent	N9020A	MY51170037	Oct. 22, 2021	1 Year
6.	Preamplifier	SKET Electronic	BK1G18G30D	KD17503	Oct. 22, 2021	1 Year
7.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Oct. 22, 2021	2 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Oct. 22, 2021	2 Year
9.	Loop Antenna	Schwarzbeck	FMZB1519B	00053	Oct. 22, 2021	2 Year
10.	Horn Antenna	A-INFO	LB-180400-KF	J211060628	Oct. 22, 2021	2 Year
11.	Pre-amplifier	SONOMA	310N	186860	Oct. 22, 2021	1 Year
12.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
13.	RF Test Control System	YIHENG	YH3000	2017430	Oct. 22, 2021	1 Year
14.	Power Sensor	DAER	RPR3006W	15I00041SN045	Oct. 22, 2021	1 Year
15.	Power Sensor	DAER	RPR3006W	15I00041SN046	Oct. 22, 2021	1 Year
16.	MXA Spectrum Analysis	KEYSIGHT	N9020A	MY53280032	Oct. 22, 2021	1 Year
17.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Oct. 22, 2021	1 Year
18.	Signal Generator	Agilent	E4421B	MY41000743	Oct. 22, 2021	1 Year
19.	DC Power Supply	IVYTECH	IV3605	1804D360510	Oct. 22, 2021	1 Year
20.	Constant Temperature Humidity Chamber	ZHONGJIAN	ZJ-KHWS80B	N/A	Oct. 22, 2021	1 Year

1.8. Description of Test Facility

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

FCC-Registration No.: 184111

Shenzhen Anbotek Compliance Laboratory Limited, 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 our files. Registration No. 184111.

ISED-Registration No.: 8058A-1

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A.

Test Location

Shenzhen Anbotek Compliance Laboratory Limited.
1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518102

2. Summary of Test Results

Standard Section	Test Item	Result
15.203	Antenna Requirement	PASS
15.207	Conducted Emission	N/A
15.205/15.209/15.231(b)	Spurious Emission	PASS
15.231(c)	20dB Occupied Bandwidth	PASS
15.231(a)	Dwell time	PASS
Remark: “N/A” is an abbreviation for Not Applicable.		

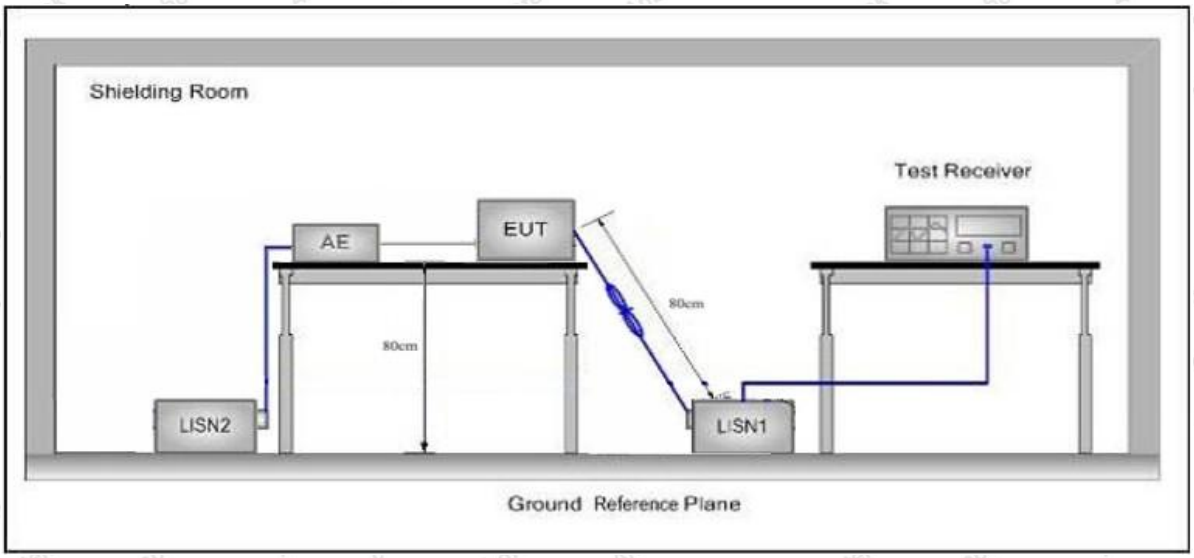
Address: 1/F., Building D, Sogood Science and Technology Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.
Tel:(86) 755-26066440 Fax: (86) 755-26014772 Email: service@anbotek.com
Hotline 400-003-0500
www.anbotek.com

3. Conducted Emission Test

3.1. Test Standard and Limit

Test Standard	FCC Part15 Section 15.207		
Test Limit	Frequency	Maximum RF Line Voltage (dBuV)	
		Quasi-peak Level	Average Level
	150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
	500kHz~5MHz	56	46
	5MHz~30MHz	60	50
Remark: (1) *Decreasing linearly with logarithm of the frequency. (2) The lower limit shall apply at the transition frequency.			

3.2. Test Setup



3.3. Test Procedure

The EUT system 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 line 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 FCC ANSI C63.10: 2020 on Conducted Emission Measurement.

The bandwidth of test CAR REMOTE (ESCI) set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

3.4. Test Data

Not applicable for equipment operated with DC power supply.

4. Radiated Emission and Band Edge

4.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.209, 15.205 and 15.231(b)				
Test Limit	Frequency (MHz)	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz~0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz~88MHz	100	40.0	Quasi-peak	3
	88MHz~216MHz	150	43.5	Quasi-peak	3
	216MHz~960MHz	200	46.0	Quasi-peak	3
	960MHz~1000MHz	500	54.0	Quasi-peak	3
	Above 1000MHz	500	54.0	Average	3
		-	74.0	Peak	3
Remark: (1)The lower limit shall apply at the transition frequency. (2) 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.					

the formulas for calculating the maximum permitted fundamental field strengths are as follows:
for the band 260-470 MHz, μV/m at 3 meters = 41.6667(F) - 7083.3333.
The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level

Emission Level (dBuV/m)=20log Emission Level(uV/m)

The field strength of emission limits have been calculated in below table:

Fundamental Frequency (MHz)	Field Strength of Fundamental (dBuV/m)@3m
315	75.62 (AVG)
315	95.62 (Peak)
434	80.83 (AVG)
434	100.83 (Peak)

4.2. Test Setup

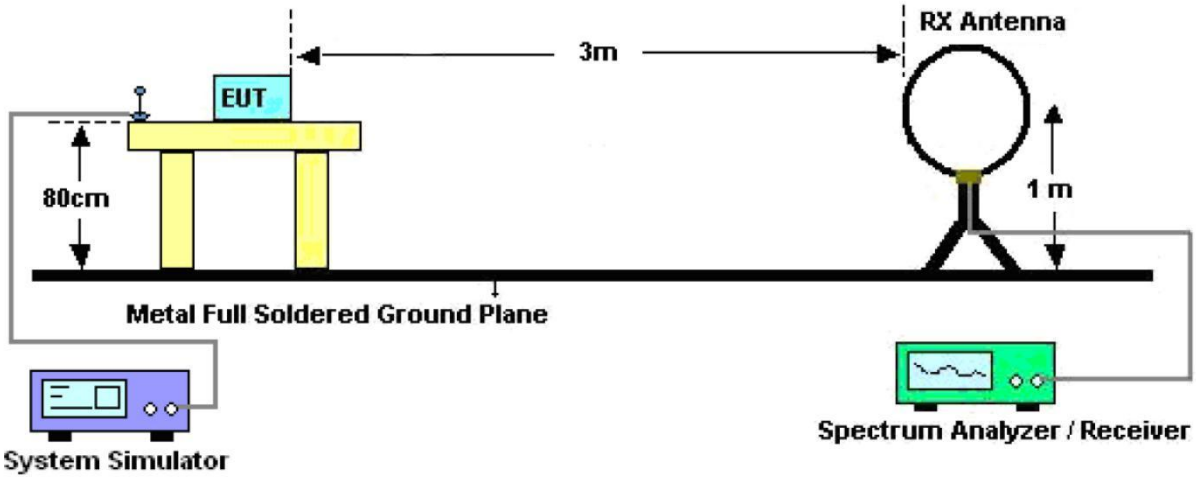


Figure 1. Below 30MHz

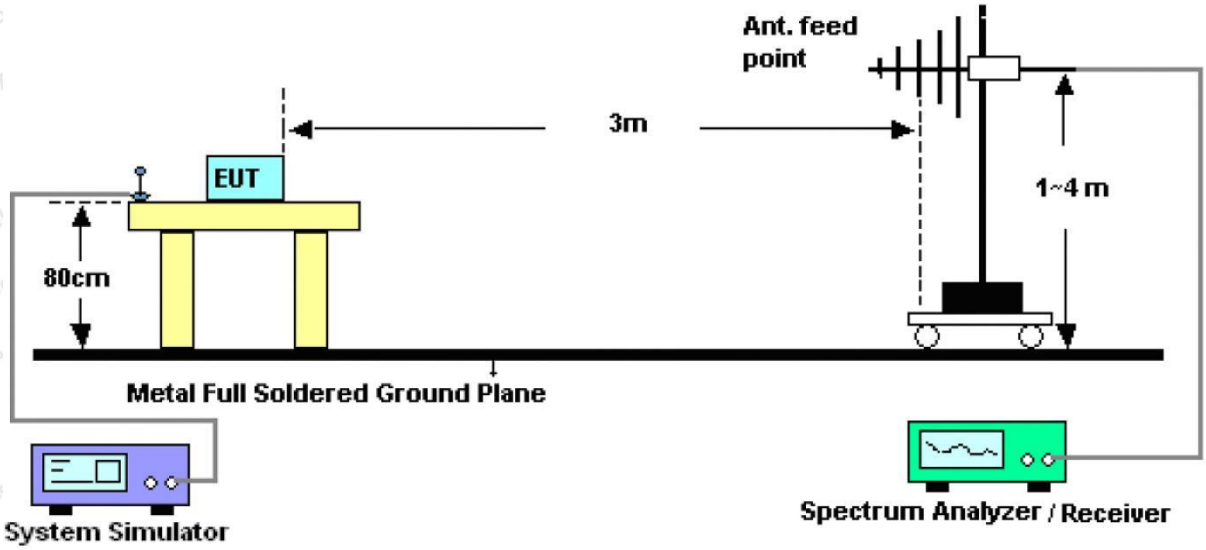


Figure 2. 30MHz to 1GHz

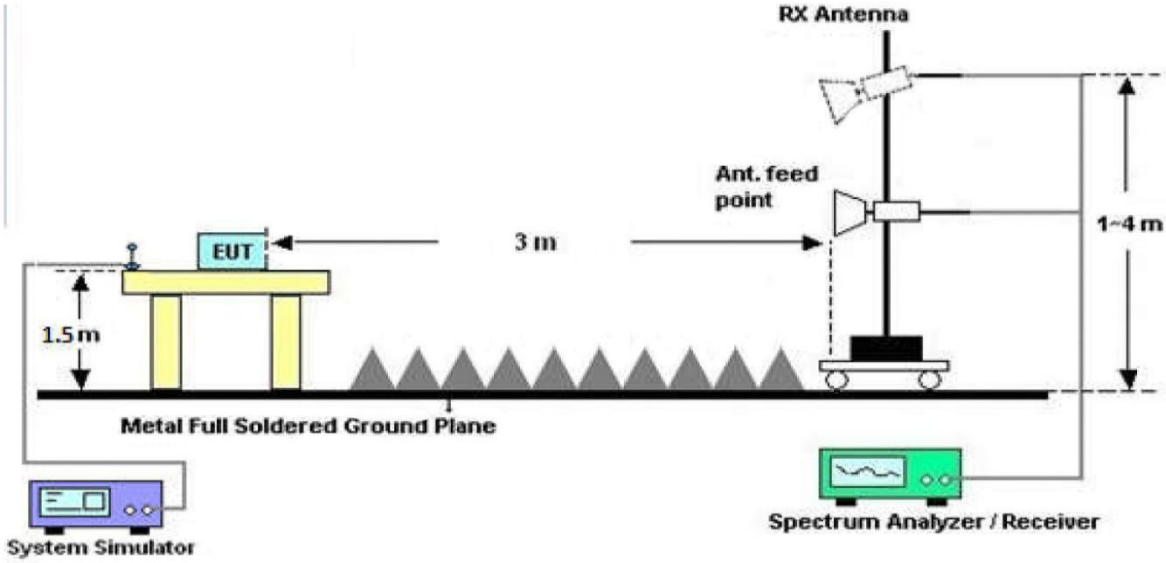


Figure 3. Above 1 GHz

4.3. Test Procedure

For below 1GHz: The EUT is placed on a turntable, which is 0.8m above the ground plane.
For above 1GHz: The EUT is placed on a turntable, which is 1.5m above the ground plane.
The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Rotated the EUT through three orthogonal axes to determine the maximum emissions, both horizontal and vertical polarization of the antenna are set on test. The EUT is tested in 9*6*6 Chamber. The device is evaluated in xyz orientation.

For 9kHz to 150kHz, Set the spectrum analyzer as:
RBW = 200Hz, VBW =1kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 150kHz to 30MHz, Set the spectrum analyzer as:
RBW = 9KHz, VBW =30kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 30MHz to 1000MHz, Set the spectrum analyzer as:
RBW = 100kHz, VBW =300kHz,Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For above 1GHz,Set the spectrum analyzer as:
RBW =1MHz, VBW =1MHz, Detector= Peak, Trace mode= Max hold, Sweep- auto couple.
RBW =1MHz, VBW =10Hz, Detector= Average, Trace mode= Max hold, Sweep- auto couple.

4.4. Test Data

PASS

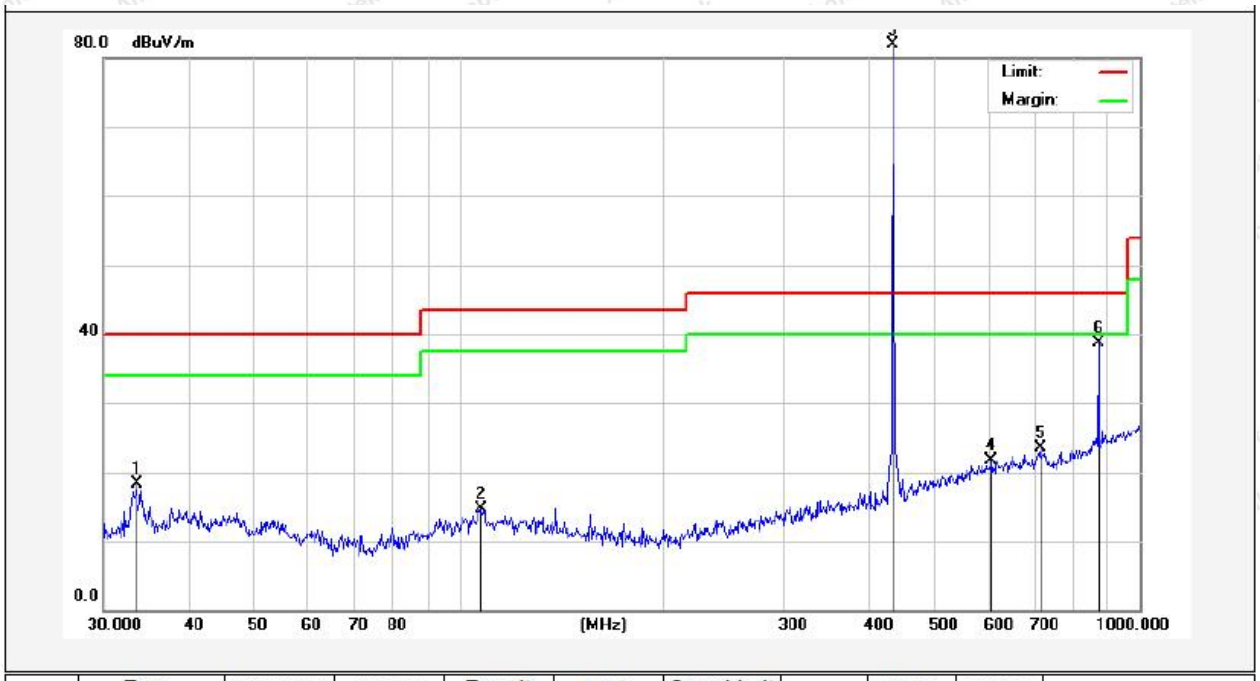
During the test, Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the X-axis is the worst case.

The test results of 9kHz-30MHz are attenuated more than 20dB below the permissible limits, so the results don't record in the report.

During the test, pre-scan all models, only the worst case (model: IKEYCL005AL) is recorded in the report.

Test Results (30~1000MHz)

Test Model:	IKEYCL005AL
Test Mode:	434MHz(ASK)
Power Source:	DC 3V Battery inside
Polarization:	Horizontal
Temp.(℃)/Hum.(%RH):	23.1℃/46%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	33.5624	37.18	-18.97	18.21	40.00	-21.79	QP			
2	107.8877	37.49	-22.79	14.70	43.50	-28.80	QP			
3	434.0651	97.62	-15.70	81.92	/	/	peak			
4	605.6592	32.14	-10.53	21.61	46.00	-24.39	QP			
5	714.1734	33.30	-9.72	23.58	46.00	-22.42	QP			
6	869.1302	45.79	-7.00	38.79	/	/	peak			

Test Results (30~1000MHz)

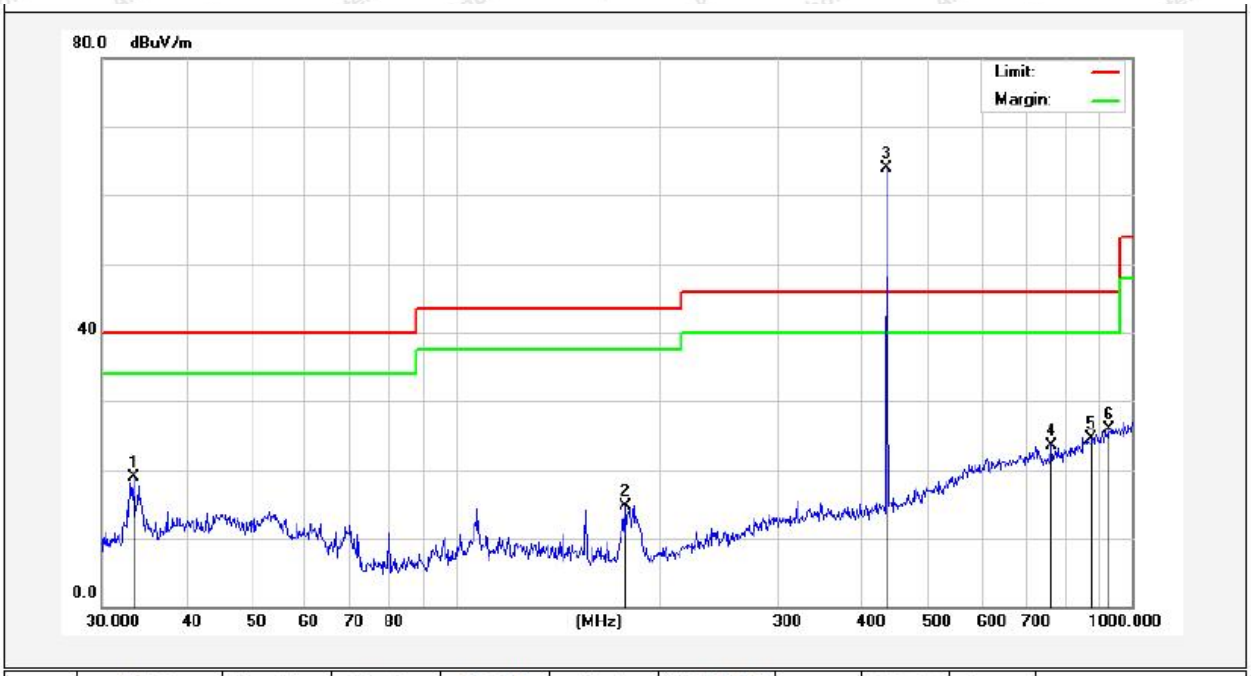
Test Model: IKEYCL005AL

Test Mode: 434MHz(ASK)

Power Source: DC 3V Battery inside

Polarization: Vertical

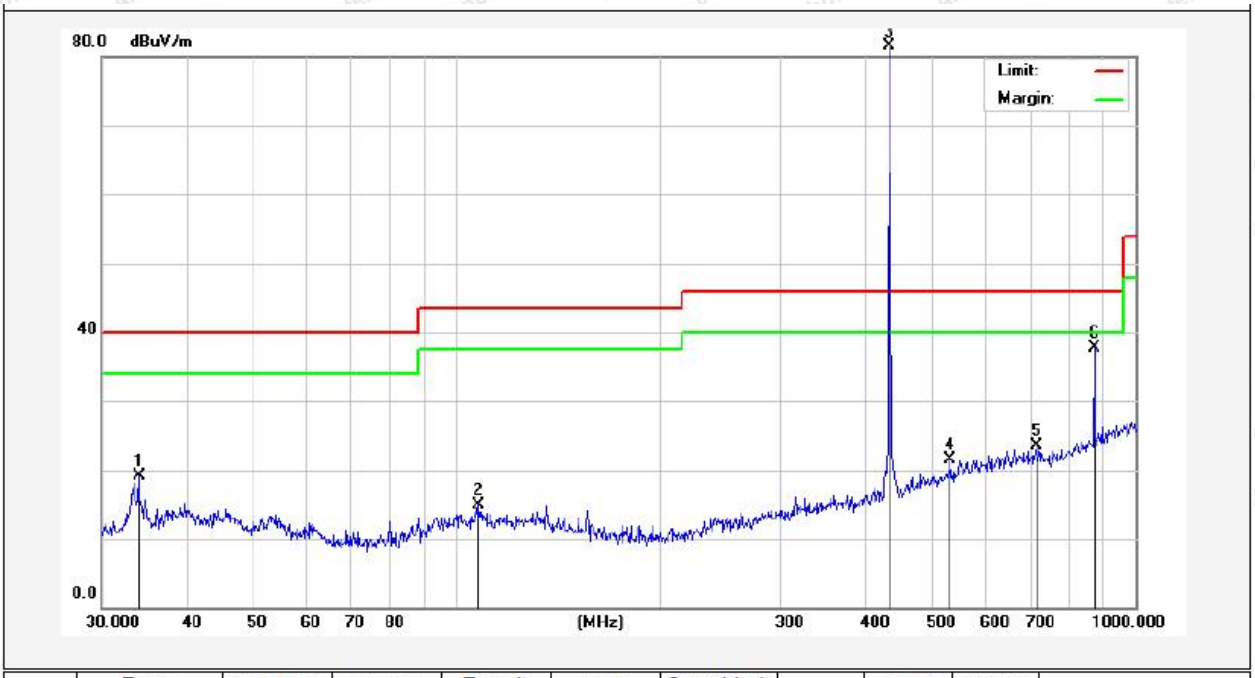
Temp.(℃)/Hum.(%RH): 23.1℃/46%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	33.4448	36.21	-17.40	18.81	40.00	-21.19	QP			
2	178.1326	35.35	-20.70	14.65	43.50	-28.85	QP			
3	434.0650	77.79	-13.93	63.86	/	/	peak			
4	760.7036	32.63	-9.03	23.60	46.00	-22.40	QP			
5	869.1302	31.56	-7.00	24.56	/	/	peak			
6	925.7563	31.89	-5.92	25.97	46.00	-20.03	QP			

Test Results (30~1000MHz)

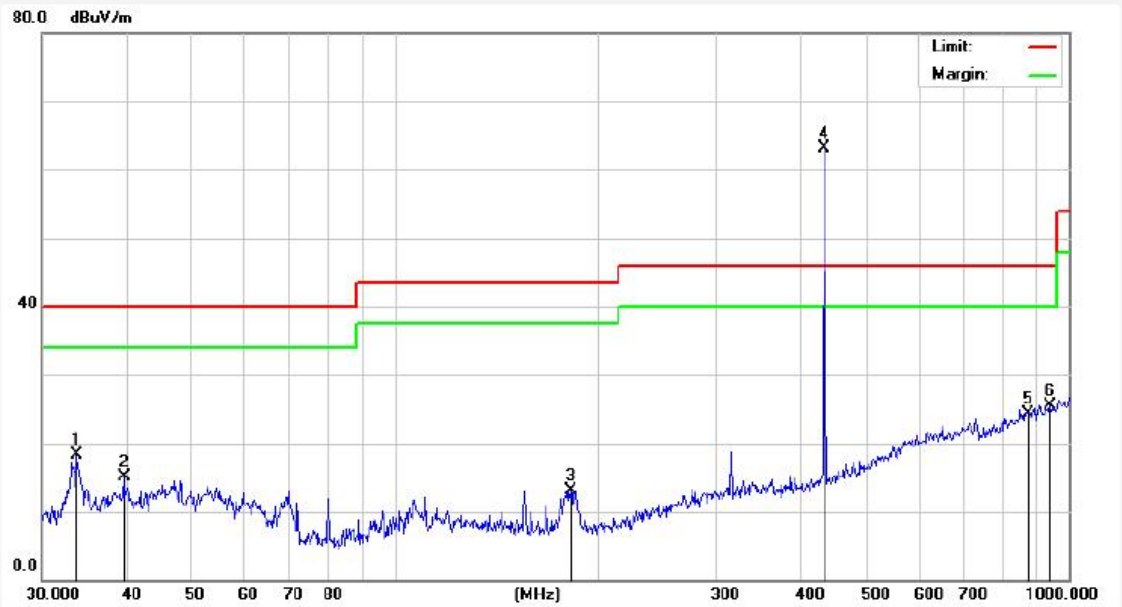
Test Model:	IKEYCL005AL
Test Mode:	434MHz(FSK)
Power Source:	DC 3V Battery inside
Polarization:	Horizontal
Temp.(℃)/Hum.(%RH):	23.1℃/46%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	34.0365	37.92	-18.80	19.12	40.00	-20.88	QP			
2	107.8877	37.67	-22.79	14.88	43.50	-28.62	QP			
3	434.0651	97.20	-15.70	81.50	/	/	peak			
4	533.8321	33.89	-12.42	21.47	46.00	-24.53	QP			
5	714.1734	33.16	-9.72	23.44	46.00	-22.56	QP			
6	869.1302	44.69	-7.00	37.69	/	/	peak			

Test Results (30~1000MHz)

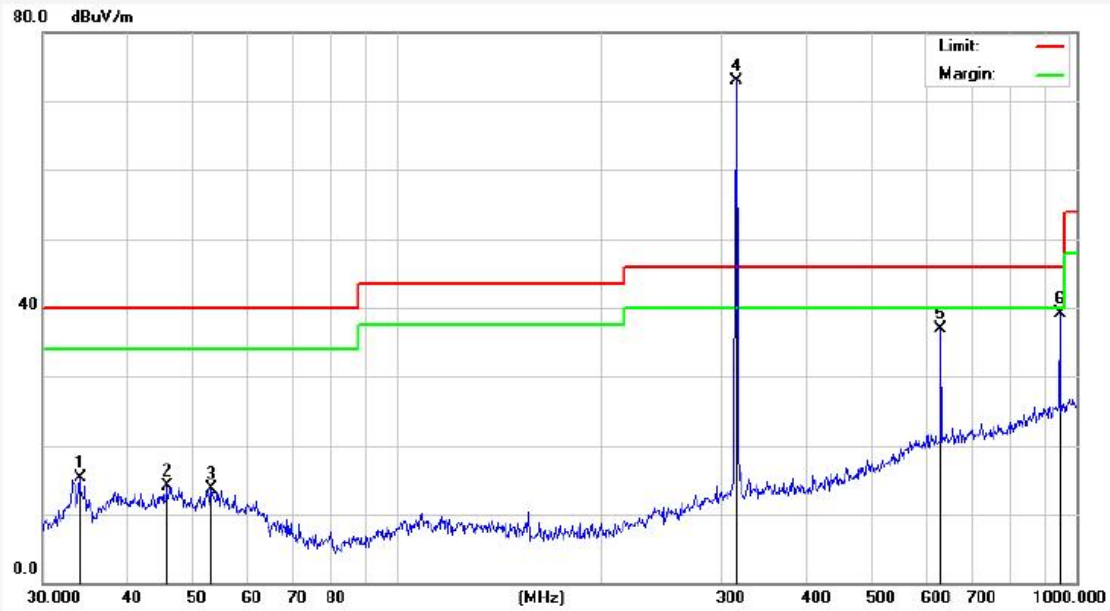
Test Model:	IKEYCL005AL
Test Mode:	434MHz(FSK)
Power Source:	DC 3V Battery inside
Polarization:	Vertical
Temp.(℃)/Hum.(%RH):	23.1℃/46%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	33.7986	35.62	-17.34	18.28	40.00	-21.72	QP			
2	39.7146	29.73	-14.71	15.02	40.00	-24.98	QP			
3	182.5592	33.65	-20.48	13.17	43.50	-30.33	QP			
4	434.0651	77.02	-13.93	63.09	/	/	peak			
5	869.1302	31.27	-7.00	24.27	/	/	peak			
6	938.8326	31.22	-5.77	25.45	46.00	-20.55	QP			

Test Results (30~1000MHz)

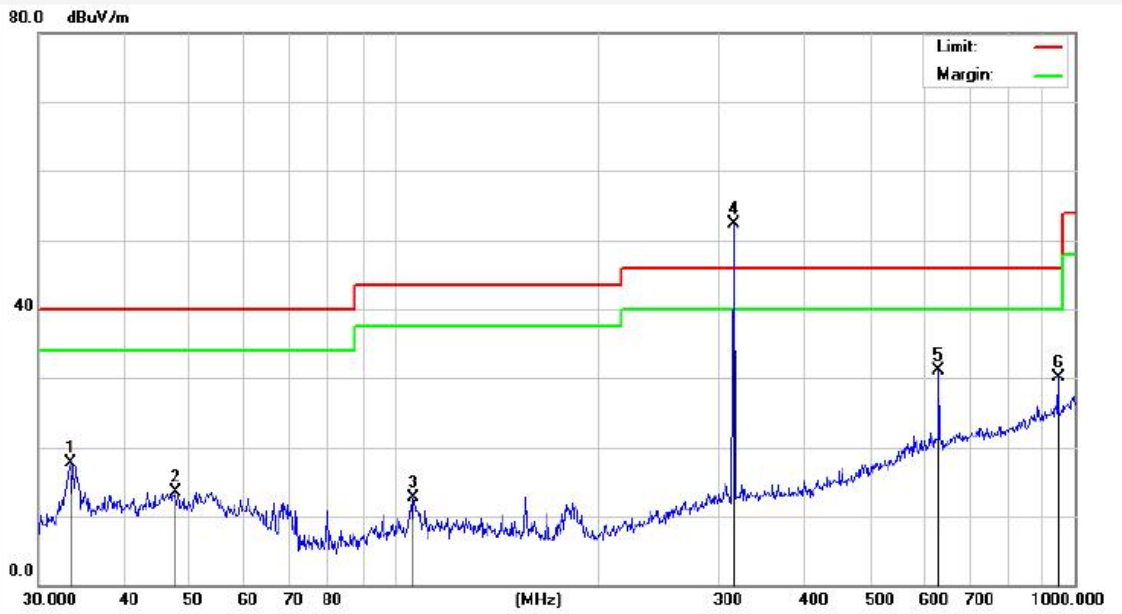
Test Model:	IKEYCL005AL
Test Mode:	315MHz(ASK)
Power Source:	DC 3V Battery inside
Polarization:	Horizontal
Temp.(℃)/Hum.(%RH):	23.1℃/46%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	34.0365	34.04	-18.80	15.24	40.00	-24.76	QP			
2	45.6948	29.30	-15.28	14.02	40.00	-25.98	QP			
3	53.1313	30.62	-16.93	13.69	40.00	-26.31	QP			
4	315.4808	89.72	-16.80	72.92	/	/	peak			
5	631.6884	47.48	-10.62	36.86	/	/	peak			
6	945.4399	44.79	-5.69	39.10	/	/	peak			

Test Results (30~1000MHz)

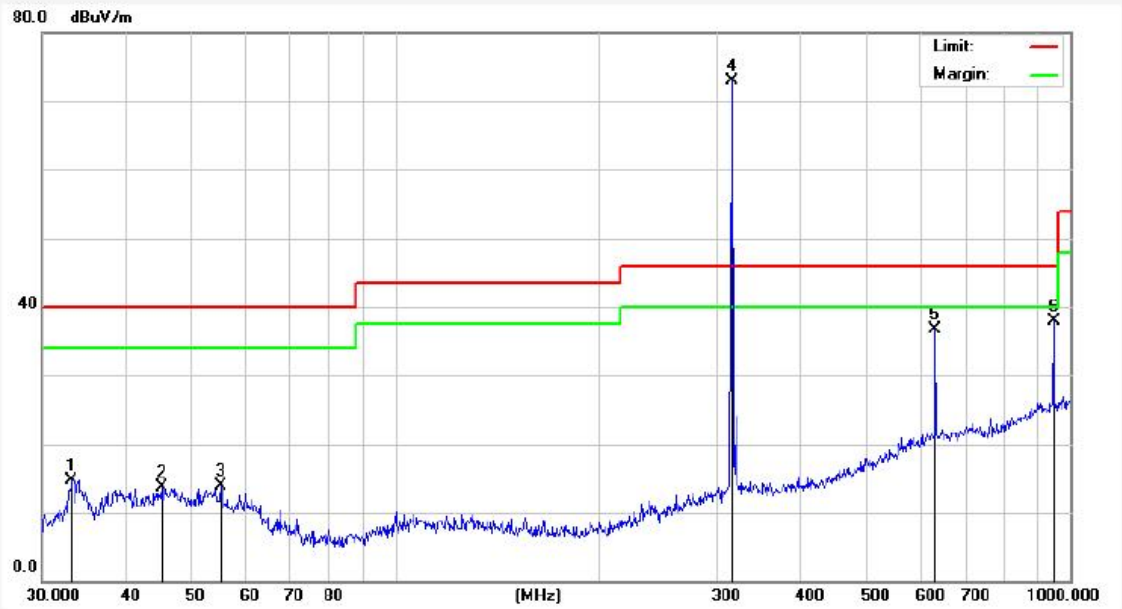
Test Model:	IKEYCL005AL
Test Mode:	315MHz(ASK)
Power Source:	DC 3V Battery inside
Polarization:	Vertical
Temp.(℃)/Hum.(%RH):	23.1℃/46%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	33.4449	35.03	-17.40	17.63	40.00	-22.37	QP			
2	47.6586	28.96	-15.43	13.53	40.00	-26.47	QP			
3	106.7587	30.43	-17.67	12.76	43.50	-30.74	QP			
4	315.4808	68.18	-15.87	52.31	/	/	peak			
5	631.6884	41.78	-10.62	31.16	/	/	peak			
6	945.4399	35.85	-5.69	30.16	/	/	peak			

Test Results (30~1000MHz)

Test Model:	IKEYCL005AL
Test Mode:	315MHz(FSK)
Power Source:	DC 3V Battery inside
Polarization:	Horizontal
Temp.(℃)/Hum.(%RH):	23.1℃/46%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	33.2112	33.88	-19.10	14.78	40.00	-25.22	QP			
2	45.0583	28.98	-15.21	13.77	40.00	-26.23	QP			
3	55.2207	31.44	-17.62	13.82	40.00	-26.18	QP			
4	315.4808	89.69	-16.80	72.89	/	/	peak			
5	631.6884	47.39	-10.62	36.77	/	/	peak			
6	945.4399	43.65	-5.69	37.96	/	/	peak			

Test Results (30~1000MHz)

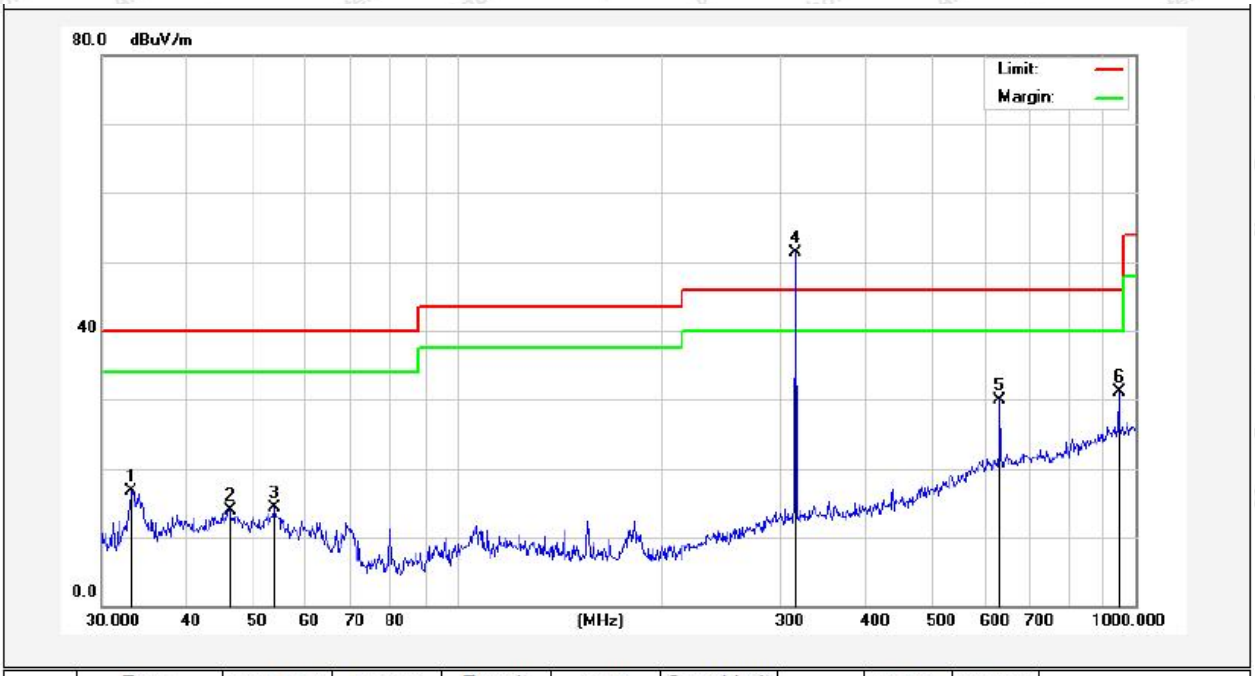
Test Model: IKEYCL005AL

Test Mode: 315MHz(FSK)

Power Source: DC 3V Battery inside

Polarization: Vertical

Temp.(℃)/Hum.(%RH): 23.1℃/46%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	33.2112	34.20	-17.44	16.76	40.00	-23.24	QP			
2	46.3402	29.17	-15.24	13.93	40.00	-26.07	QP			
3	53.8818	31.50	-17.21	14.29	40.00	-25.71	QP			
4	315.4808	67.16	-15.87	51.29	/	/	peak			
5	631.6884	40.56	-10.62	29.94	/	/	peak			
6	945.4399	36.75	-5.69	31.06	/	/	peak			

Remark:

1. Results = Reading + Cable Loss +Ant Factor –Amplifier

Test Results (Fundamental)

315MHz

Mode	Freq. (MHz)	Antenna Pol.	Reading (dBuV/m)	Factor (dB)	Duty cycle Factor (dB)	Results (dBuV/m)	Limits (dBuV/m)	Det. Mode
TX Mode (ASK)	315.4808	H	89.72	-16.8	-	72.92	95.62	PK
	315.4808	H	89.72	-16.8	-6.02	66.90	75.62	AV
	315.4808	V	68.18	-15.87	-	52.31	95.62	PK
	315.4808	V	68.18	-15.87	-6.02	46.29	75.62	AV

Remark:

1. Result = Reading + Factor+ Duty cycle Factor
2. Pulse Desensitization Correction Factor
3. AV=Peak +Duty Cycle Factor

Mode	Freq. (MHz)	Pulse Width (ms)	2/Pulse Width(kHz)
TX Mode	315(ASK)	0.42	4.762

RBW(1000kHz)＞ 2/Pulse Width

Therefore PDCF is not needed.

4. Duty Cycle Factor

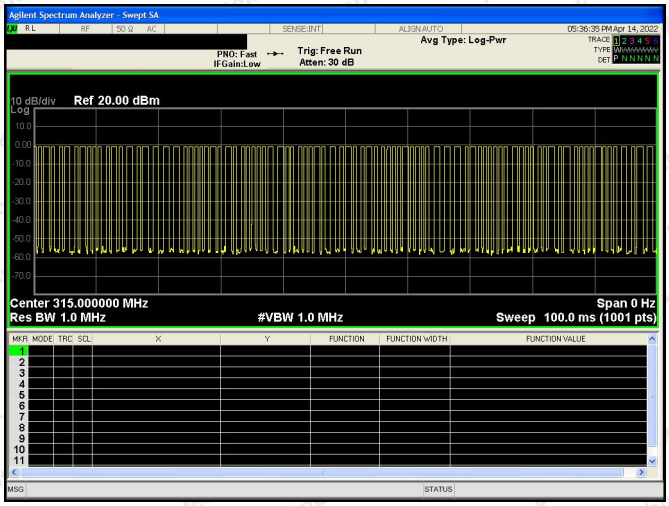
Mode	Freq. (MHz)	T on1 (ms)	N1	T on2 (ms)	N2	T on(ms)	T period (ms)	Duty Cycle	Duty Cycle Factor
TX Mode	315(ASK)	0.42	61	0.84	29	49.980	100	49.98%	-6.02

T on=T on1*N1 + T on2*N2

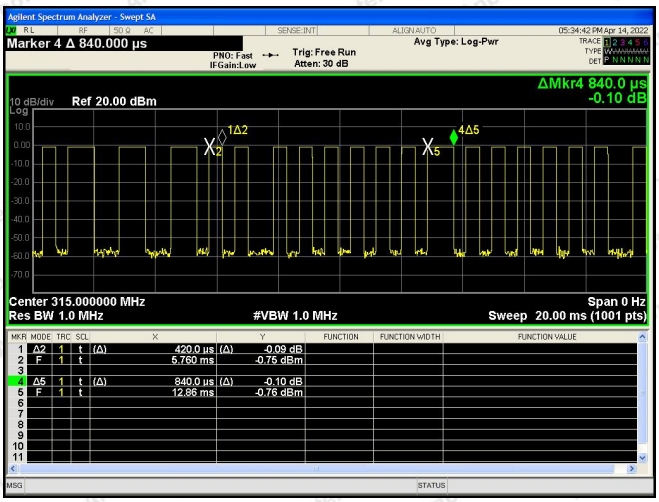
Duty Cycle=T on/T period

Duty Cycle Factor =20*lg(Duty Cycle)

315MHz(ASK)-T period



315MHz(ASK)-T on1&T on2



Test Results (Harmonics Emissions+Radiated Emissions from 1G-4G)

315MHz(ASK)

Frequency (MHz)	Antenna Pol.	Reading (dBuV/m)	Factor (dB)	Duty cycle Factor (dB)	Results (dBuV/m)	Limits (dBuV/m)	Det Mode
631.6884	H	47.48	-10.62	-	36.86	75.62	PK
631.6884	H	47.48	-10.62	-6.02	30.84	55.62	AV
631.6884	V	41.78	-10.62	-	31.16	75.62	PK
631.6884	V	41.78	-10.62	-6.02	25.14	55.62	AV
945.4399	H	44.79	-5.69	-	39.1	74	PK
945.4399	H	44.79	-5.69	-6.02	33.08	54	AV
945.4399	V	35.85	-5.69	-	30.16	74	PK
945.4399	V	35.85	-5.69	-6.02	24.14	54	AV

Remark:

1. Result = Reading + Factor + Duty cycle Factor

2.Pre-scan all models(IKEYCL005AL, IKEYCL004AL) and recorded the worst case(IKEYCL005A) results in this report.

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Test Results (Fundamental)

315MHz

Mode	Freq. (MHz)	Antenna Pol.	Reading (dBuV/m)	Factor (dB)	Results (dBuV/m)	Limits (dBuV/m)	Det. Mode
TX Mode (FSK)	315.4808	H	89.69	-16.8	72.89	95.62	PK
	315.4808	H	88.16	-16.8	71.36	75.62	AV
	315.4808	V	67.16	-15.87	51.29	95.62	PK
	315.4808	V	64.37	-15.87	48.5	75.62	AV

Remark:

1. Result = Reading + Factor
2. Pulse Desensitization Correction Factor
3. AV=PEAK +Duty Cycle Factor

Mode	Freq. (MHz)	Pulse Width (ms)	2/Pulse Width(kHz)
TX Mode	315(FSK)	100	0.020

RBW(1000kHz)＞ 2/Pulse Width

Therefore PDCF is not needed.

4. Duty Cycle Factor

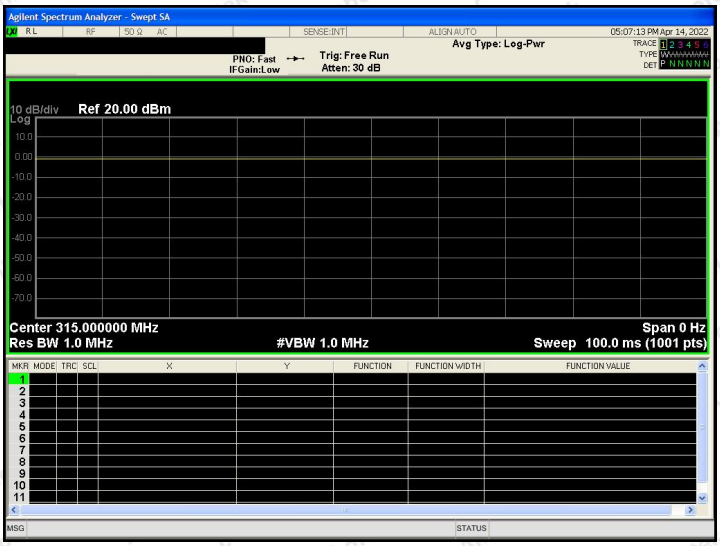
Mode	Freq. (MHz)	T on1 (ms)	N1	T on(ms)	T period (ms)	Duty Cycle
TX Mode	315(FSK)	100	1	100.000	100	100.00%

T on=T on1*N

Duty Cycle=T on/T period

Duty Cycle Factor =20*lg(Duty Cycle)

315MHz(FSK)-T on



Test Results (Harmonics Emissions+Radiated Emissions from 1G-4G)

315MHz(FSK)

Frequency (MHz)	Antenna Pol.	Reading (dBuV/m)	Factor (dB)	Results (dBuV/m)	Limits (dBuV/m)	Det Mode
631.6884	H	47.39	-10.62	36.77	75.62	PK
631.6884	H	44.96	-10.62	34.34	55.62	AV
631.6884	V	40.56	-10.62	29.94	75.62	PK
631.6884	V	37.98	-10.62	27.36	55.62	AV
945.4399	H	43.65	-5.69	37.96	74	PK
945.4399	H	42.07	-5.69	36.38	54	AV
945.4399	V	36.75	-5.69	31.06	74	PK
945.4399	V	35.99	-5.69	30.3	54	AV

Remark:

1. Result = Reading + Factor
2. Pre-scan all models(IKEYCL005AL, IKEYCL004AL) and recorded the worst case(IKEYCL005A) results in this report.

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www.anbotek.com

Test Results (Fundamental)

434MHz

Mode	Freq. (MHz)	Antenna Pol.	Reading (dBuV/m)	Factor (dB)	Duty cycle Factor (dB)	Results (dBuV/m)	Limits (dBuV/m)	Det. Mode
TX Mode (ASK)	434.0651	H	97.62	-15.7	-	81.92	100.83	PK
	434.0651	H	97.62	-15.7	-6.19	75.73	80.83	AV
	434.065	V	77.79	-13.93	-	63.86	100.83	PK
	434.065	V	77.79	-13.93	-6.19	57.67	80.83	AV

Remark:

1. Result = Reading + Factor+ Duty cycle Factor
2. Pulse Desensitization Correction Factor
3. AV=PEAK +Duty Cycle Factor

Mode	Freq. (MHz)	Pulse Width (ms)	2/Pulse Width(kHz)
TX Mode	434(ASK)	0.4	5.000

RBW(1000kHz)＞ 2/Pulse Width

Therefore PDCF is not needed.

4. Duty Cycle Factor

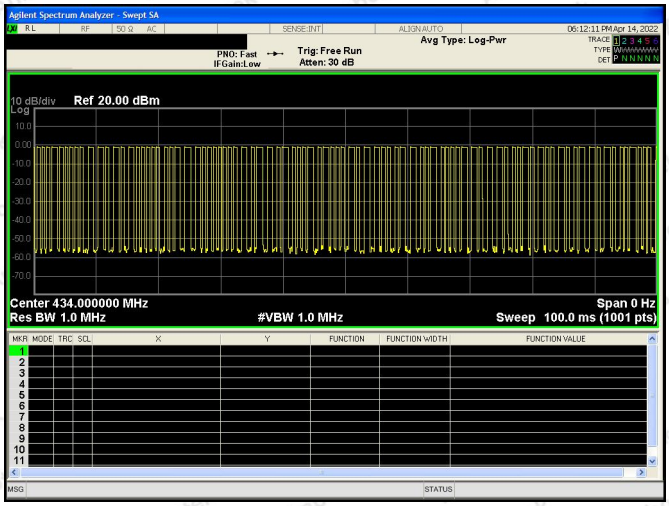
Mode	Freq. (MHz)	T on1 (ms)	N1	T on2 (ms)	N2	T on(ms)	T period (ms)	Duty Cycle	Duty Cycle Factor
TX Mode	434(ASK)	0.4	59	0.82	31	49.20	100	49.20%	-6.19

T on=T on1*1 + T on2*N2

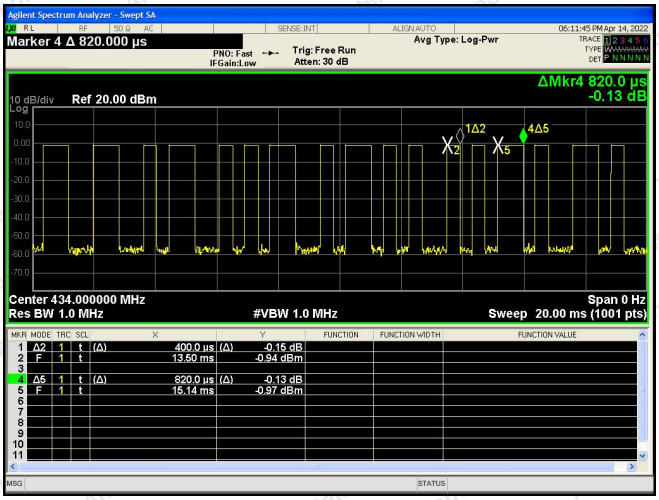
Duty Cycle=T on/T period

Duty Cycle Factor =20*lg(Duty Cycle)

434MHz(ASK)-T period



434MHz(ASK)-T on1&T on2



Test Results (Harmonics Emissions+Radiated Emissions from 1G-4G)

434MHz(ASK)

Frequency (MHz)	Antenna Pol.	Reading (dBuV/m)	Factor (dB)	Duty cycle Factor (dB)	Results (dBuV/m)	Limits (dBuV/m)	Det Mode
869.1302	H	45.79	-7.00	-	38.79	80.83	PK
869.1302	H	45.79	-7.00	-6.19	32.60	60.83	AV
869.1302	V	31.56	-7.00	-	24.56	80.83	PK
869.1302	V	31.56	-7.00	-6.19	18.37	60.83	AV
1302.1953	H	35.62	1.36	-	36.98	74	PK
1302.1953	H	35.62	1.36	-6.19	30.79	54	AV
1302.1953	V	34.77	1.36	-	36.13	74	PK
1302.1953	V	34.77	1.36	-6.19	29.94	54	AV

Remark:

1. Result = Reading + Factor + Duty cycle Factor
2. Pre-scan all models(IKEYCL005AL, IKEYCL004AL) and recorded the worst case(IKEYCL005A) results in this report.

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Test Results (Fundamental)

434MHz

Mode	Freq. (MHz)	Antenna Pol.	Reading (dBuV/m)	Factor (dB)	Results (dBuV/m)	Limits (dBuV/m)	Det. Mode
TX Mode (FSK)	434.0651	H	97.2	-15.7	81.5	100.83	PK
	434.0651	H	95.16	-15.7	79.46	80.83	AV
	434.065	V	77.02	-13.93	63.09	100.83	PK
	434.065	V	74.39	-13.93	60.46	80.83	AV

Remark:

1. Result = Reading + Factor
2. Pulse Desensitization Correction Factor
3. AV=PEAK +Duty Cycle Factor

Mode	Freq. (MHz)	Pulse Width (ms)	2/Pulse Width(kHz)
TX Mode	434(FSK)	100	0.020

RBW(1000kHz)＞ 2/Pulse Width

Therefore PDCF is not needed.

4. Duty Cycle Factor

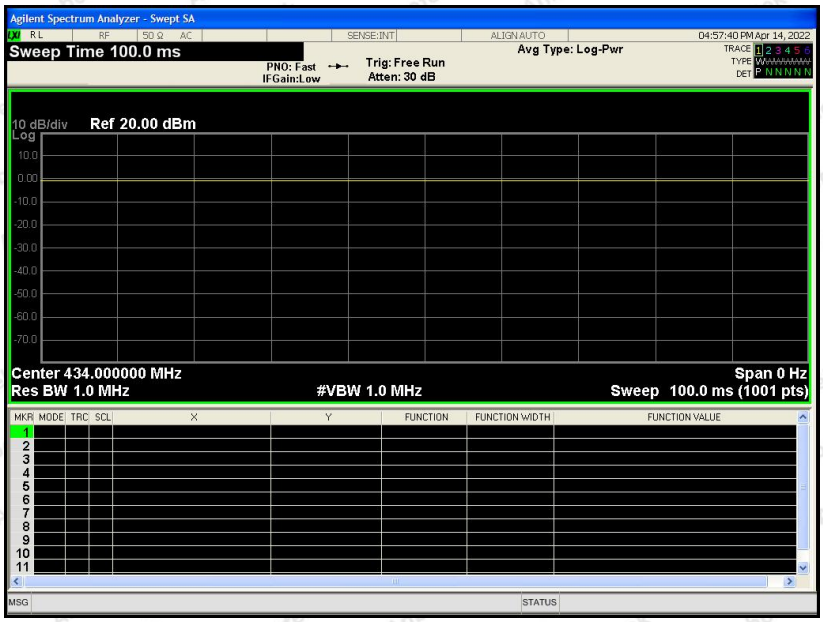
Mode	Freq. (MHz)	T on1 (ms)	N1	T on(ms)	T period (ms)	Duty Cycle
TX Mode	434(FSK)	100	1	100.000	100	100.00%

T on=T on1*N

Duty Cycle=T on/T period

Duty Cycle Factor =20*lg(Duty Cycle)

434MHz(FSK)-T on



Test Results (Harmonics Emissions+Radiated Emissions from 1G-4G)

434MHz(FSK)

Frequency (MHz)	Antenna Pol.	Reading (dBuV/m)	Factor (dB)	Results (dBuV/m)	Limits (dBuV/m)	Det Mode
869.1302	H	44.69	-7.00	37.69	80.83	PK
869.1302	H	42.33	-7.00	35.33	60.83	AV
869.1302	V	31.27	-7.00	24.27	80.83	PK
869.1302	V	30.26	-7.00	23.26	60.83	AV
1301.76	H	35.69	1.36	37.05	74	PK
1301.76	H	34.07	1.36	35.43	54	AV
1301.76	V	36.85	1.36	38.21	74	PK
1301.76	V	35.11	1.36	36.47	54	AV

Remark:

1. Result = Reading + Factor
2. Pre-scan all models(IKEYCL005AL, IKEYCL004AL) and recorded the worst case(IKEYCL005A) results in this report.

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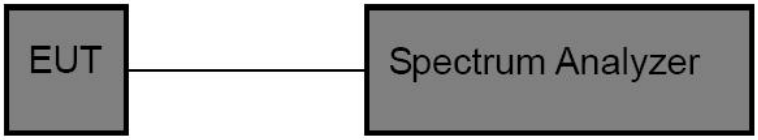
5. 20DB Occupy Bandwidth Test

5.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.231 (c)
Test Limit	According to FCC Part 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. For devices operating above 900MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20dB down from the modulated carrier.

5.2. Test Setup



5.3. Test Procedure

1. Place the EUT on the table and set it in the continuously transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as:
   RBW = 1% to 5% of the OBW, VBW≥3*RBW,
   Span= 2*OBW~5*OBW
   Detector= Peak
   Trace mode= Max hold.
   Sweep- auto couple.
4. Mark the peak frequency and –20dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

5.4. Test Data

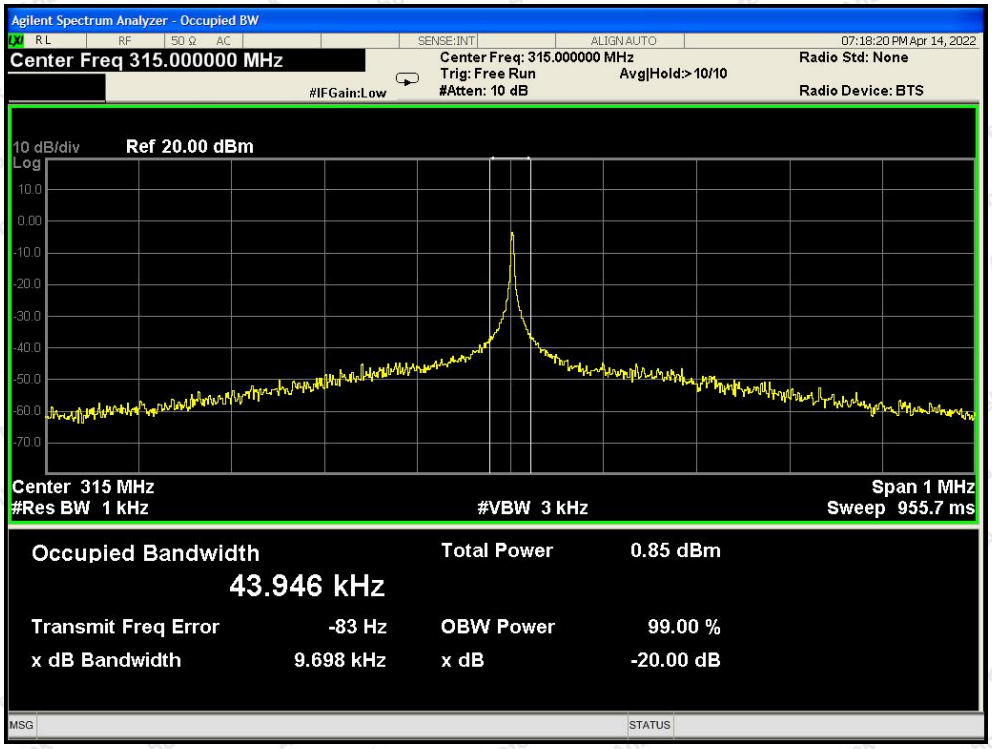
Test Item	:	20dB Bandwidth	Test Mode	:	Continuously transmitting
Test Voltage	:	DC 3V Battery inside	Temperature	:	22.7℃
Test Result	:	PASS	Humidity	:	55%RH

Mode	Freq. (MHz)	Modulation Type	20DB Bandwidth (kHz)	Limit (kHz)	Results
TX Mode	315	ASK	9.698	⩽787.5	PASS
TX Mode	315	FSK	68.50	⩽787.5	PASS
TX Mode	434	ASK	9.725	⩽1085	PASS
TX Mode	434	FSK	68.20	⩽1085	PASS

Note: Limit=0.0025*Freq.

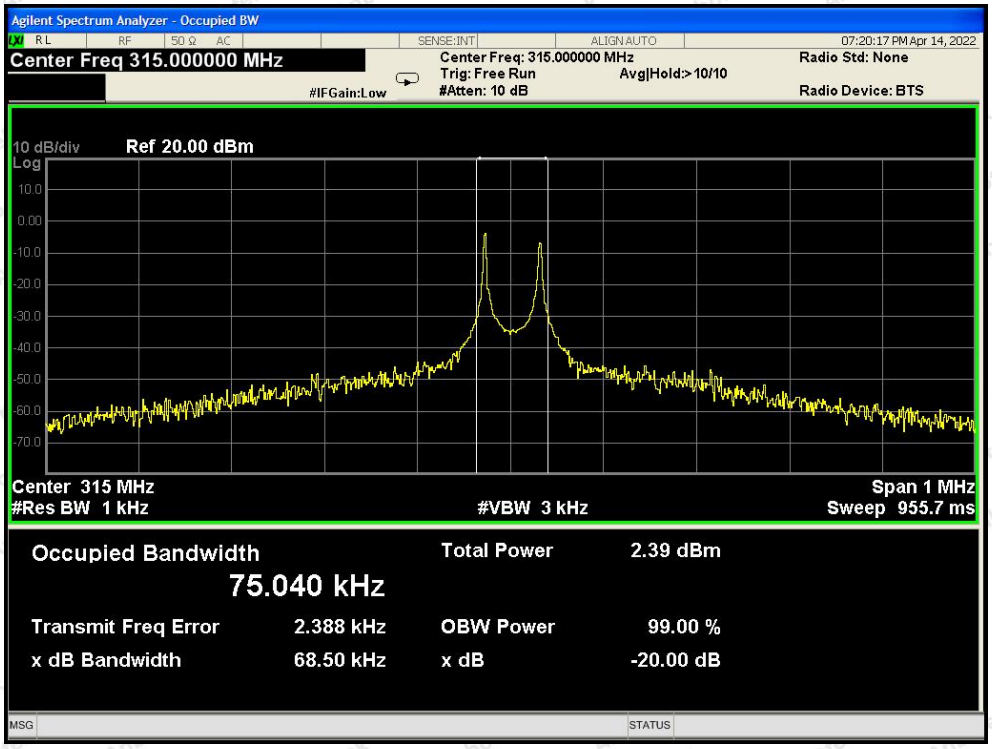
315 MHz(ASK)

Plot of 20DB Bandwidth



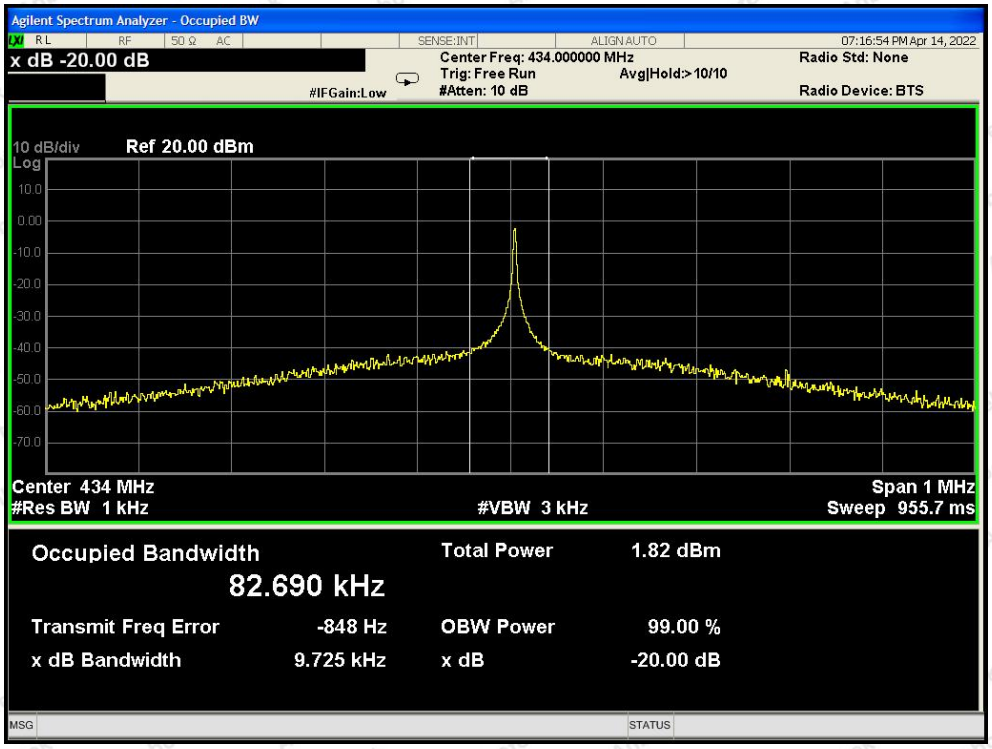
315 MHz(FSK)

Plot of 20DB Bandwidth



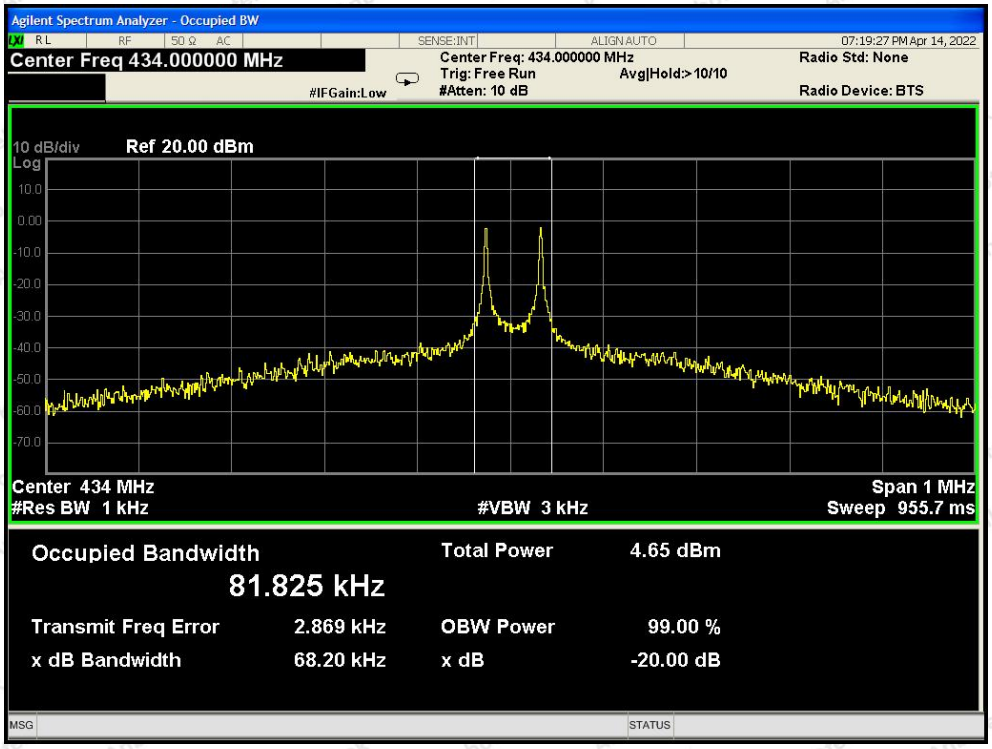
434 MHz(ASK)

Plot of 20DB Bandwidth



434 MHz(FSK)

Plot of 20DB Bandwidth

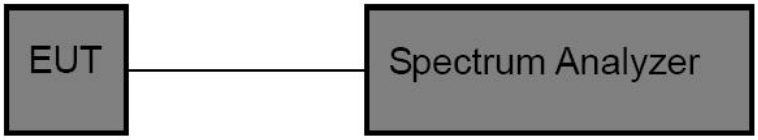


6. Dwell Time Test

6.1. Test Standard and Limit

Test Standard	FCC Part 15.231(a)(1)
Test Limit	According to FCC Part 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. Test Setup



6.3. Test Procedure

1. Place the EUT on the table and set it in continuously transmitting mode. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as
   RBW=1000kHz, VBW= 1000 kHz, Span= 0Hz, Sweep Time= 20 Seconds.
3. Record the Delta mark time.

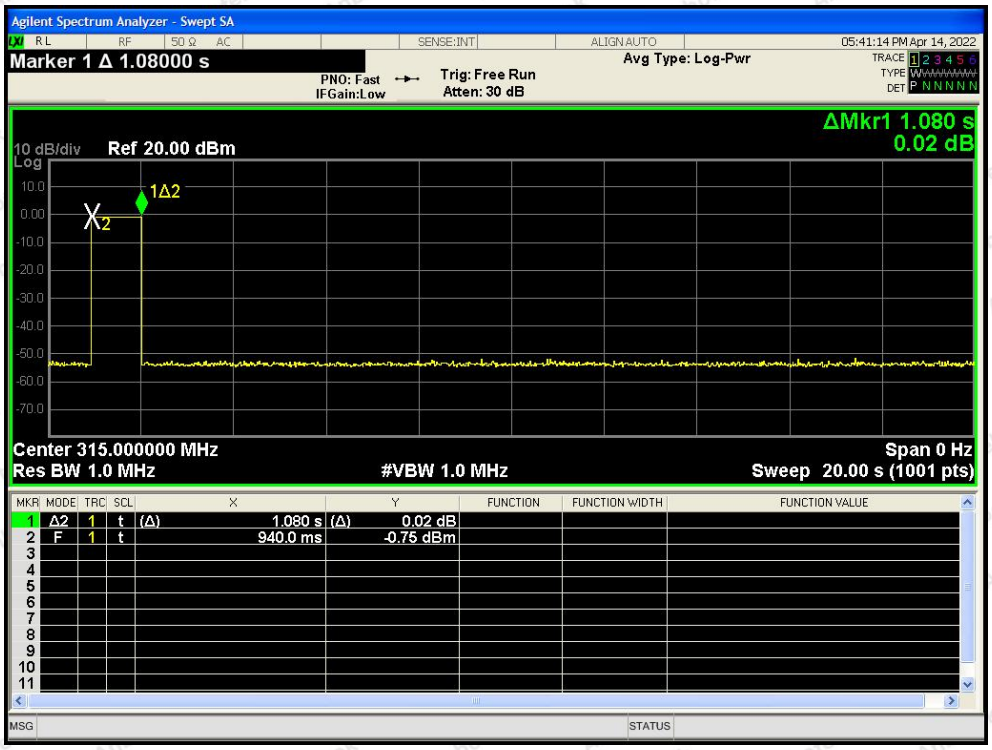
6.4. Test Data

Test Item	:	Dwell Time	Test Mode	:	Continuously transmitting
Test Voltage	:	DC 3V Battery inside	Temperature	:	22.7℃
Test Result	:	PASS	Humidity	:	55%RH

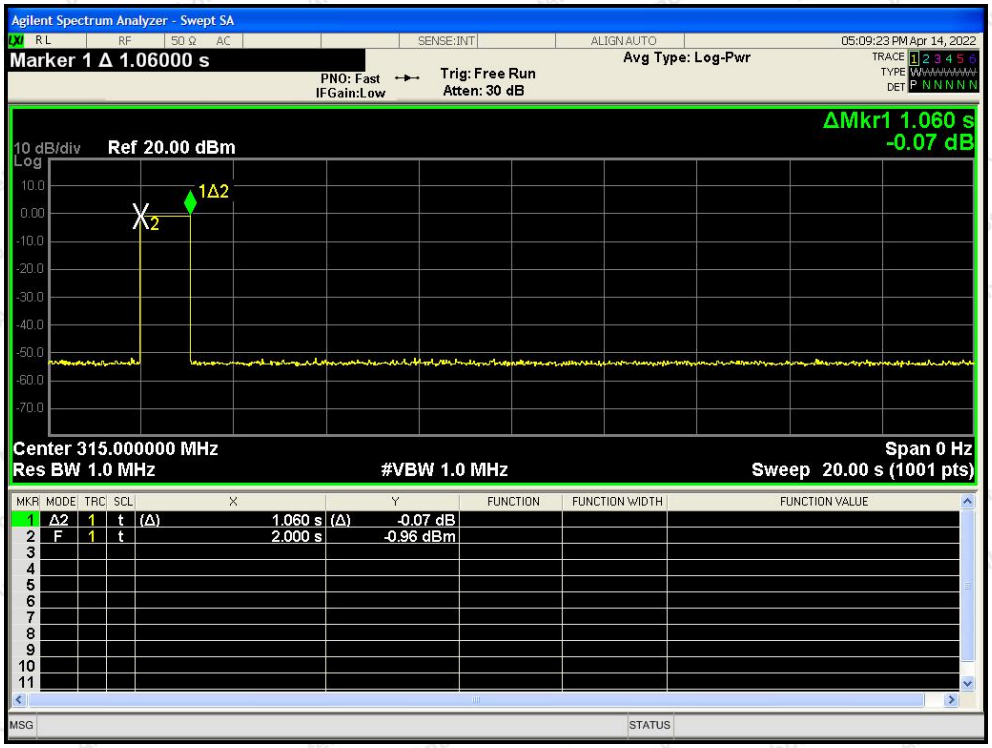
Mode	Freq. (MHz)	Modulation Type	Transmitting time(s)	Limit(s)	Results
TX Mode	315	ASK	1.080	≤5	PASS
TX Mode	315	FSK	1.060	≤5	PASS
TX Mode	434	ASK	1.040	≤5	PASS
TX Mode	434	FSK	1.080	≤5	PASS

Please refer the following plot.

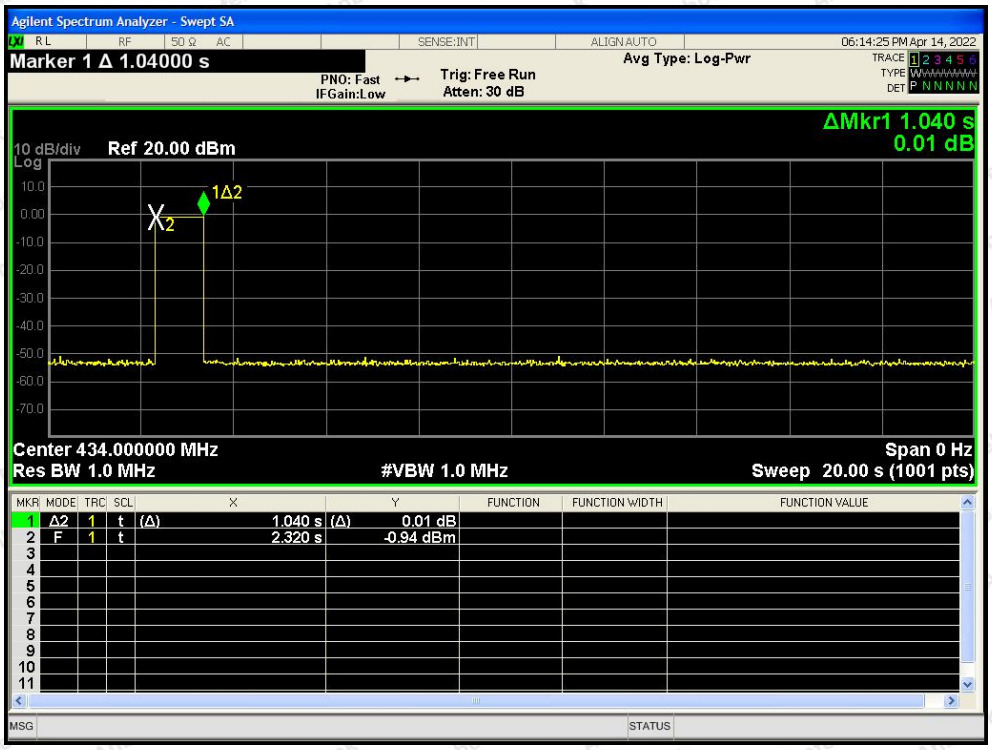
315 MHz(ASK)



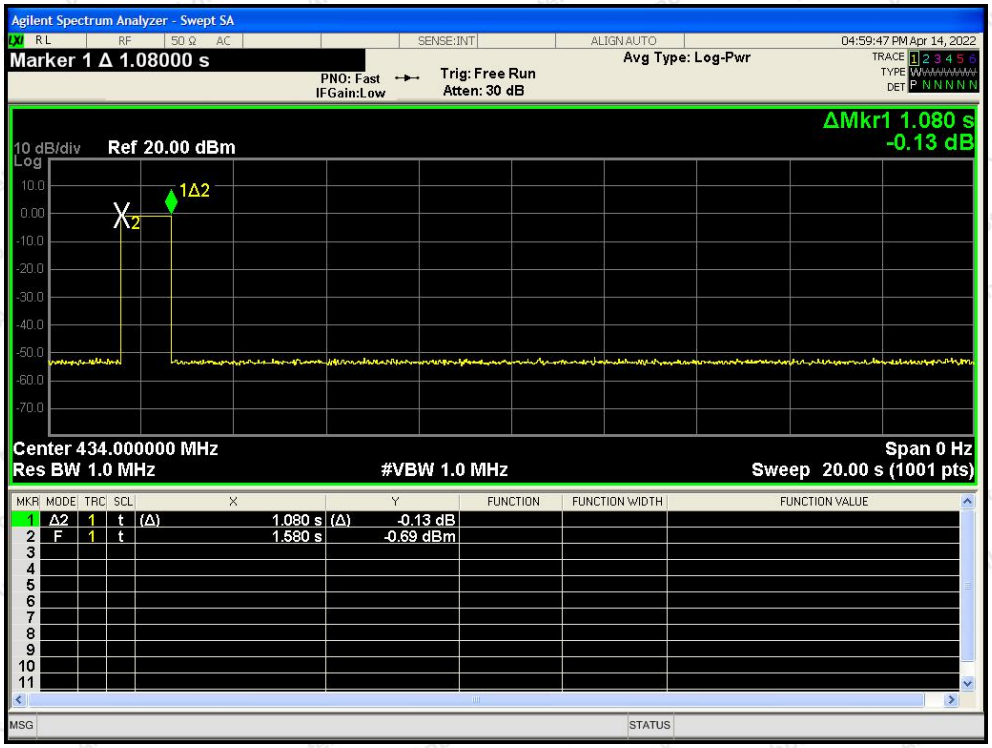
315 MHz(FSK)



434 MHz(ASK)



434 MHz(FSK)



7. Antenna Requirement

7.1. Test Standard and Requirement

Test Standard	FCC Part15 Section 15.203
Requirement	1) 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. Antenna requirement must meet at least one of the following: 1) Antenna must be permanently attached to device. 2) The antenna must use a unique type of connector to attach to the device. 3) Device must be professionally installed. The installer shall be responsible for ensuring that the correct antenna is employed by the device.

7.2. Antenna Connected Construction

The antenna is a PCB antenna which permanently attached, and the best case gain of the antenna is -1dBi. It complies with the standard requirement.

APPENDIX I -- TEST SETUP PHOTOGRAPH

Photo of Radiation Emission Test

APPENDIX II -- EXTERNAL PHOTOGRAPH

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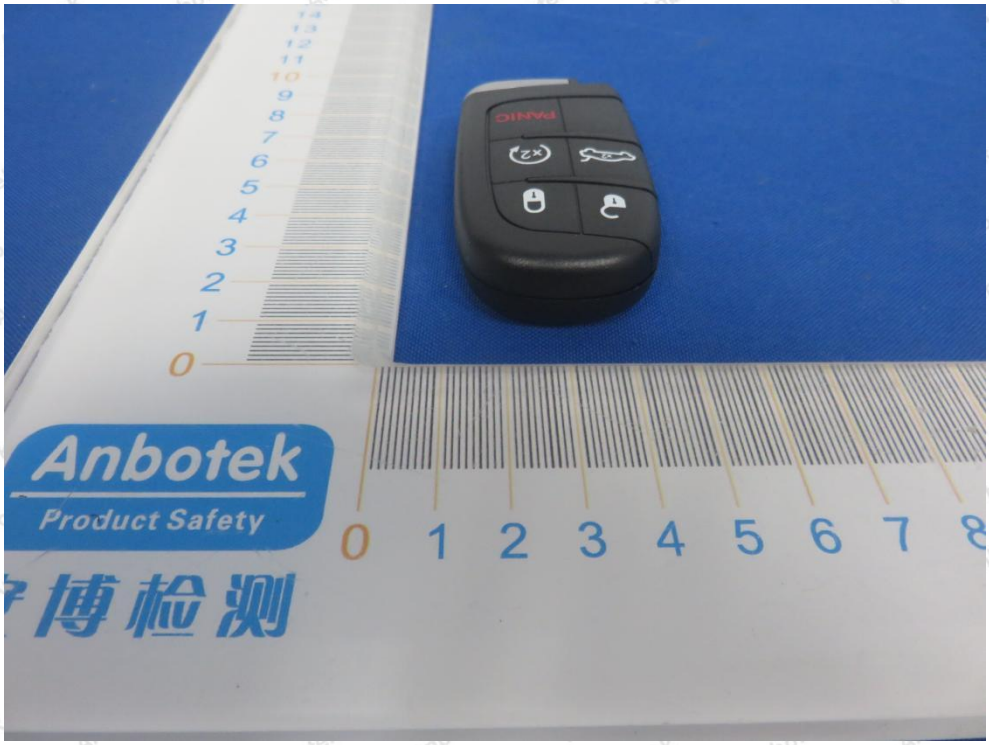
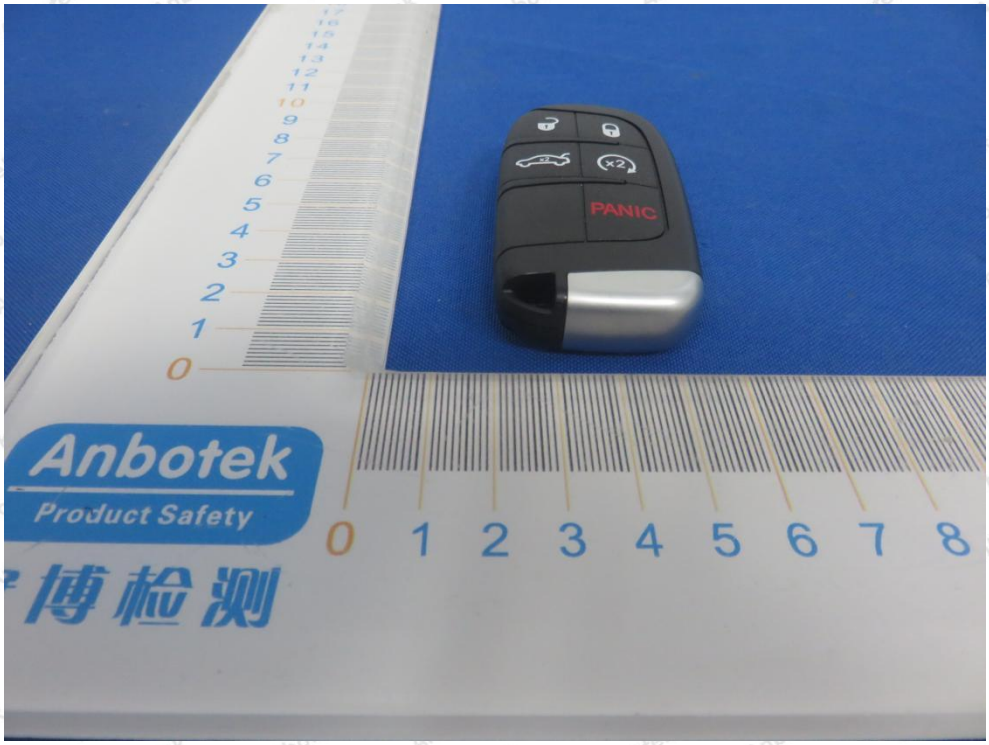
Product Safety
安博检测


Anbotek
Product Safety
博检测

PANIC
nbotek
duct Safety
0 1 2 3 4 5 6 7 8 9


PANIC
Anbotek
Product Safety
0 1 2 3 4 5 6 7 8

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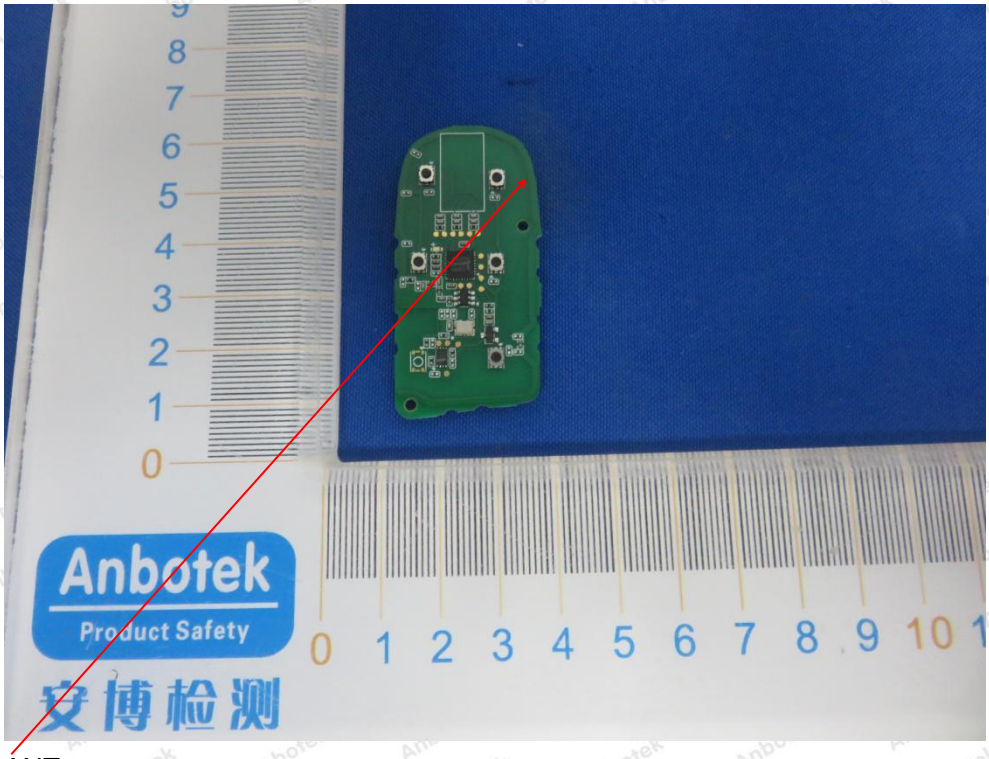
Product Safety
博检测

APPENDIX III -- INTERNAL PHOTOGRAPH



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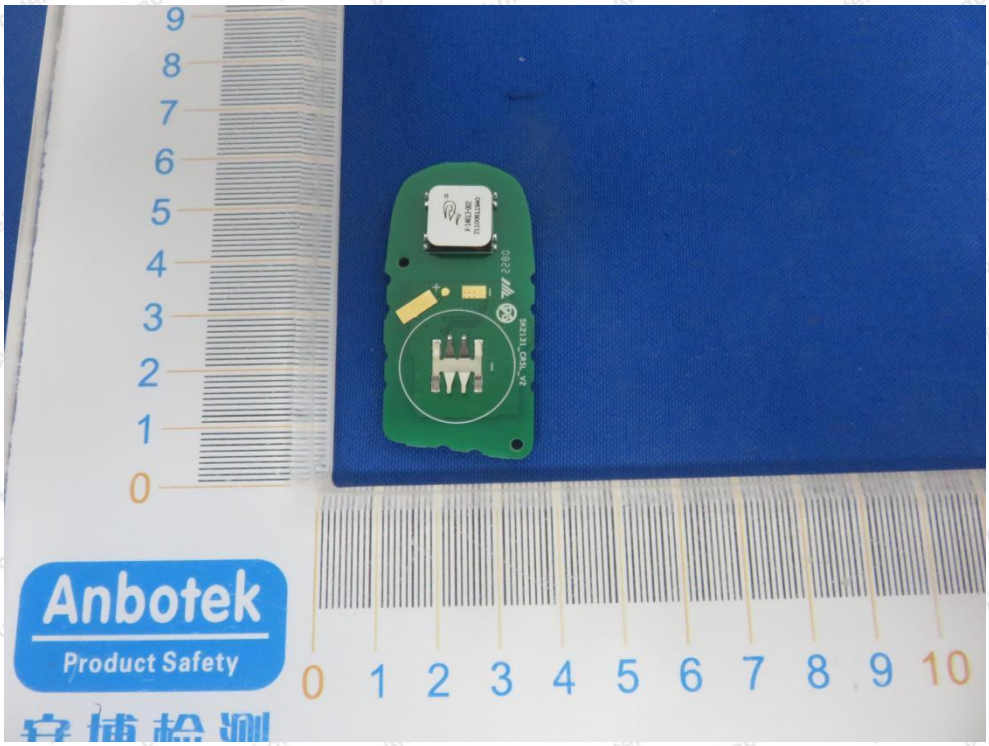

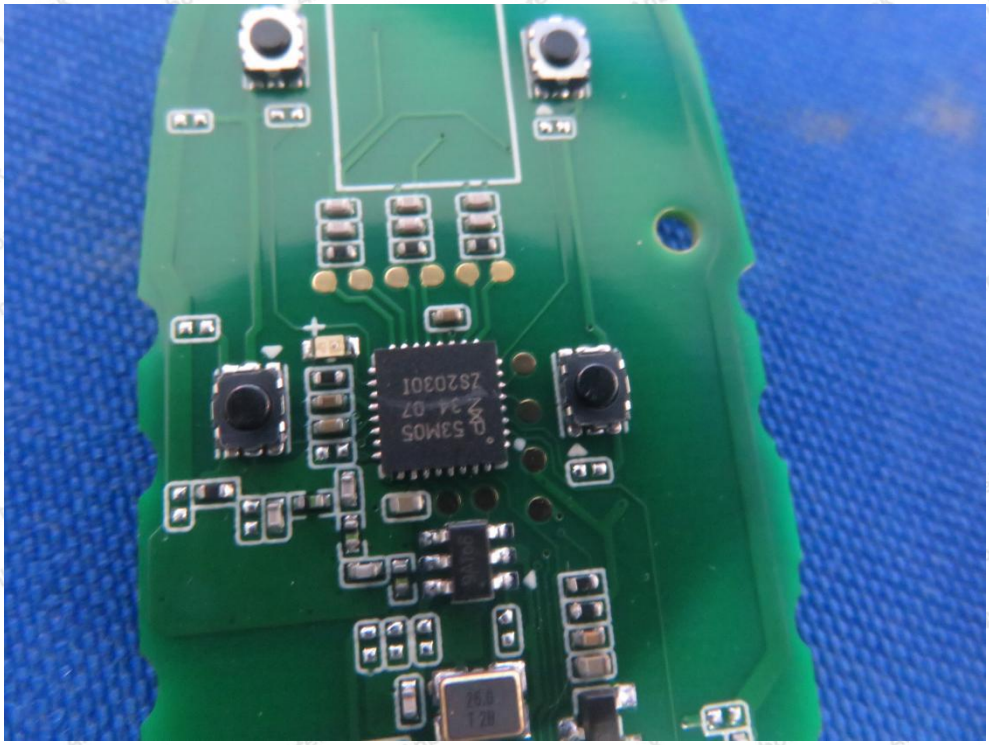

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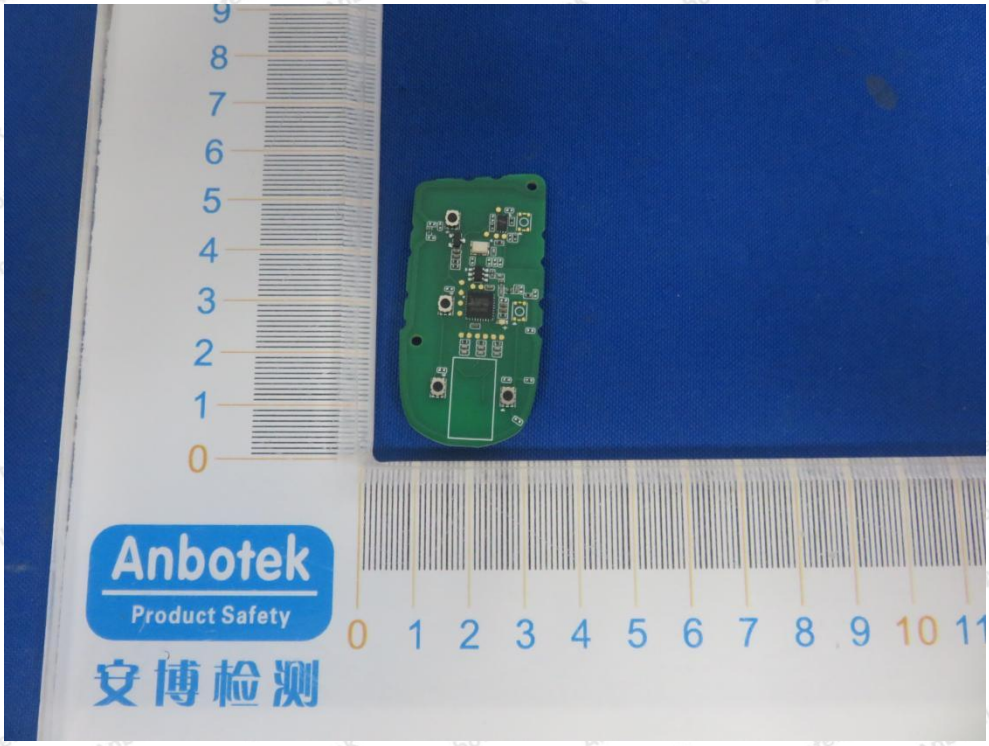
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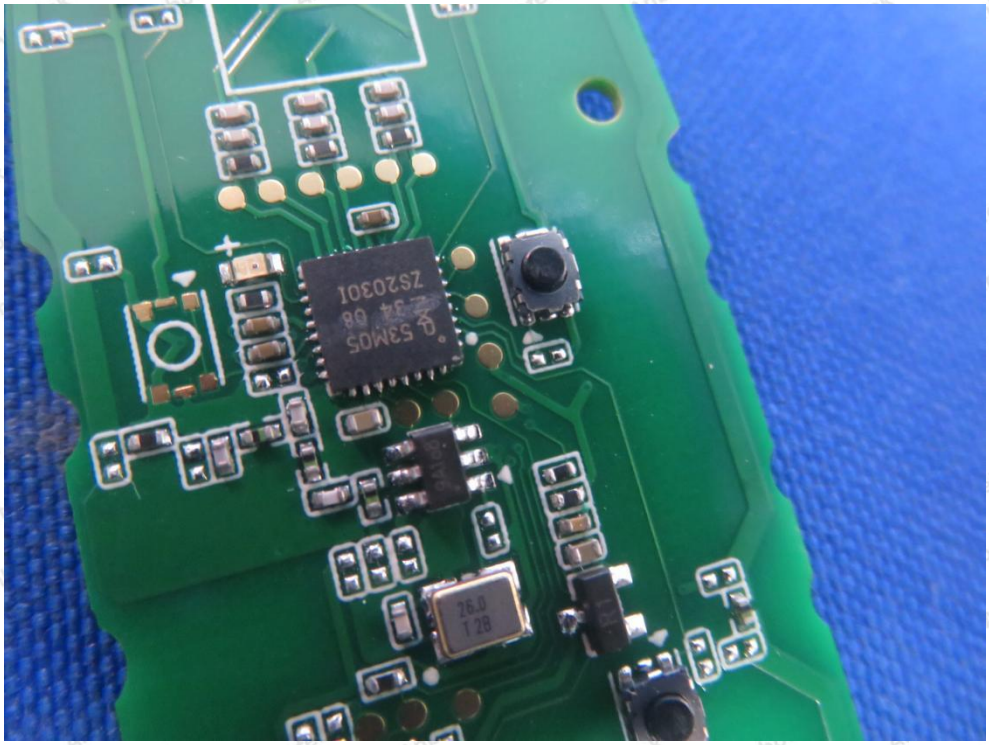

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