FCC TEST REPORT

Client Name	:	Autel Intelligent Tech. Corp., Ltd.
Address	:	7th-8th, 10th Floor, Bldg. B1, Zhiyuan, Xueyuan Rd. Xili, Nanshan, Shenzhen, China
Product Name	:	MX-SENSOR
Date	:	Apr. 13, 2021

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	:	MX-SENSOR
Model No.	:	1 SENSOR, 1 SENSOR PL
Trade Mark	:	AUTEL
Rating(s)	:	Input: DC 3V(with "CR2050", 320mAh battery inside)

Test Standard(s)	**:**	**FCC Part15 Subpart C, Section 15.231**
Test Method(s)	**:**	**ANSI C63.10: 2013**

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	Mar. 12, 2021
Date of Test	Mar. 12~24, 2021
Prepared by	Ella Liang (Engineer /Ella Liang)
Reviewer	Bibo Zhang (Supervisor / Bibo Zhang)
Approved & Authorized Signer	Kingkong Jin (Manager / 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, China
Manufacturer	:	Autel Intelligent Tech. Corp., Ltd.
Address	:	7th-8th, 10th Floor, Bldg. B1, Zhiyuan, Xueyuan Rd. Xili, Nanshan, Shenzhen, 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	:	MX-SENSOR	
Model No.	:	1 SENSOR, 1 SENSOR PL (Note: All samples are the same except the model name and only the shell silk screen, so we prepare "1 SENSOR" for test 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:	315 MHz, 433.92 MHz
		Number of Channel:	2 Channels
		Modulation Type:	FSK, ASK
		Antenna Type:	Spring antenna
		Antenna Gain(Peak):	-12 dBi
Remark: 1)For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.			

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	315 MHz
TX Mode	433.92 MHz

For Radiated Emission	
Final Test Mode	Frequency
TX Mode	315 MHz
TX Mode	433.92 MHz

Note:

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

1.5. List of Channels

Mode	Frequency
Mode 1	315 MHz
Mode 2	433.92 MHz

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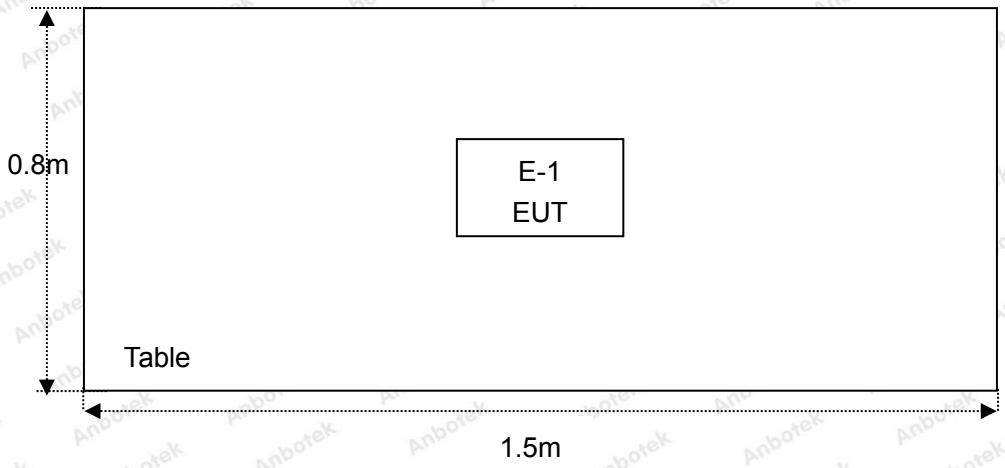
Hotline 400-003-0500
www.anbotek.com

1.6. Description of Test Setup

RE



1.7. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	100055	Oct. 26, 2020	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Oct. 26, 2020	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESR26	101481	Oct. 26, 2020	1 Year
4.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Oct. 26, 2020	1 Year
5.	MAX Spectrum Analysis	Agilent	N9020A	MY51170037	Oct. 26, 2020	1 Year
6.	Preamplifier	SKET Electronic	BK1G18G30D	KD17503	Oct. 26, 2020	1 Year
7.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Nov. 02, 2020	2 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Nov. 02, 2020	2 Year
9.	Loop Antenna	Schwarzbeck	FMZB1519B	00053	Nov. 02, 2020	2 Year
10.	Horn Antenna	A-INFO	LB-180400-KF	J211060628	Nov. 02, 2020	2 Year
11.	Pre-amplifier	SONOMA	310N	186860	Oct. 26, 2020	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. 26, 2020	1 Year
14.	Power Sensor	DAER	RPR3006W	15I00041SN045	Oct. 26, 2020	1 Year
15.	Power Sensor	DAER	RPR3006W	15I00041SN046	Oct. 26, 2020	1 Year
16.	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	Oct. 26, 2020	1 Year
17.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Oct. 26, 2020	1 Year
18.	Signal Generator	Agilent	E4421B	MY41000743	Oct. 26, 2020	1 Year
19.	DC Power Supply	IVYTECH	IV3605	1804D360510	Oct. 26, 2020	1 Year
20.	Constant Temperature Humidity Chamber	ZHONGJIAN	ZJ-KHWS80B	N/A	Oct. 26, 2020	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 registed 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, September 30, 2020.

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, September 30, 2020.

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.		

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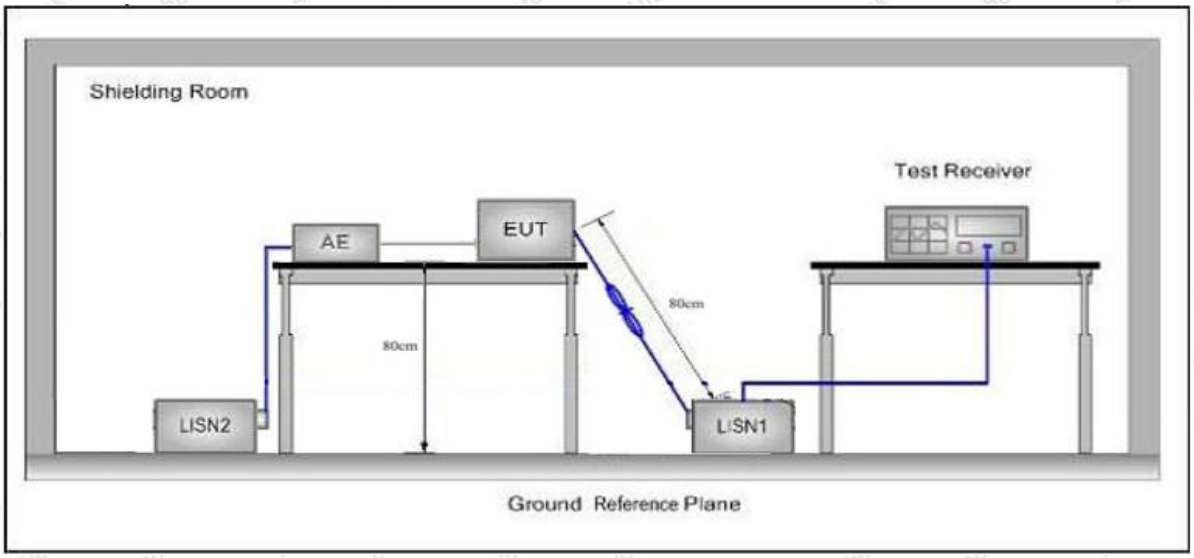
3. Conducted Emission Test

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 C63.10-2013 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.

The EUT is powered by battery, so there is no need for conducted emission test.

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)
433.92	80.82 (AVG)
433.92	100.82 (Peak)

4.2. Test Setup

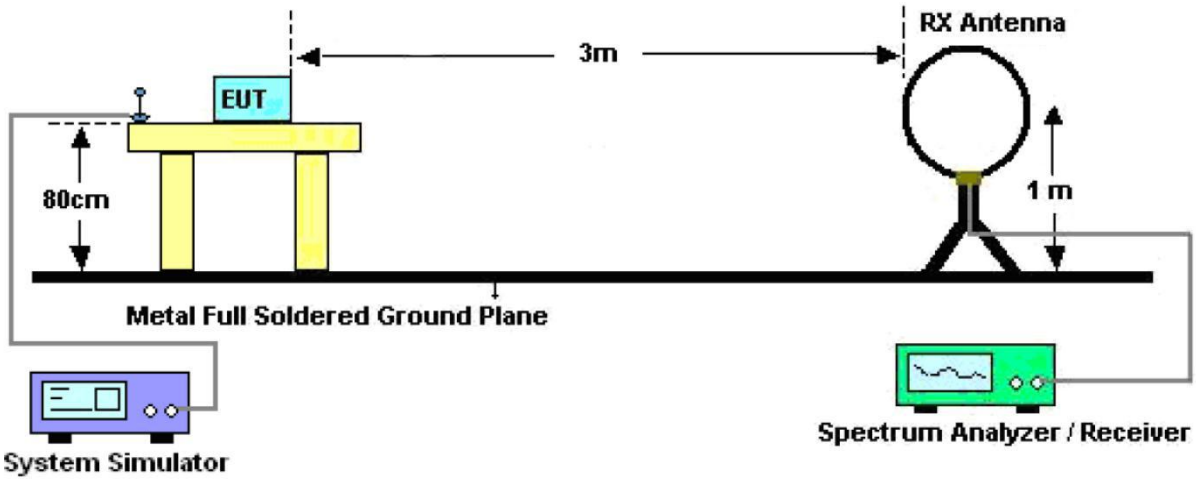


Figure 1. Below 30MHz

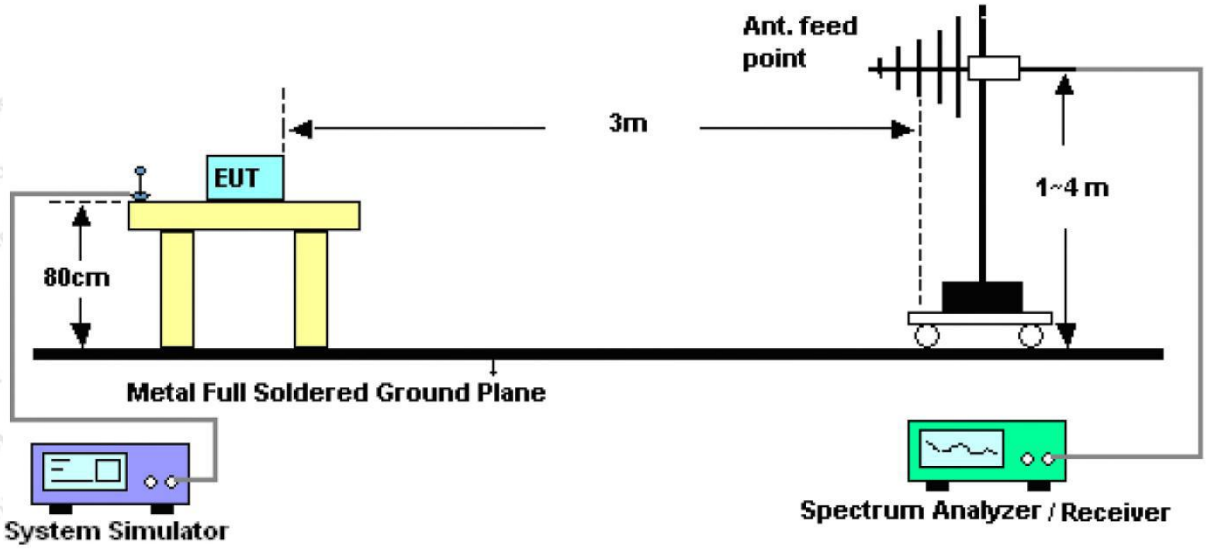


Figure 2. 30MHz to 1GHz

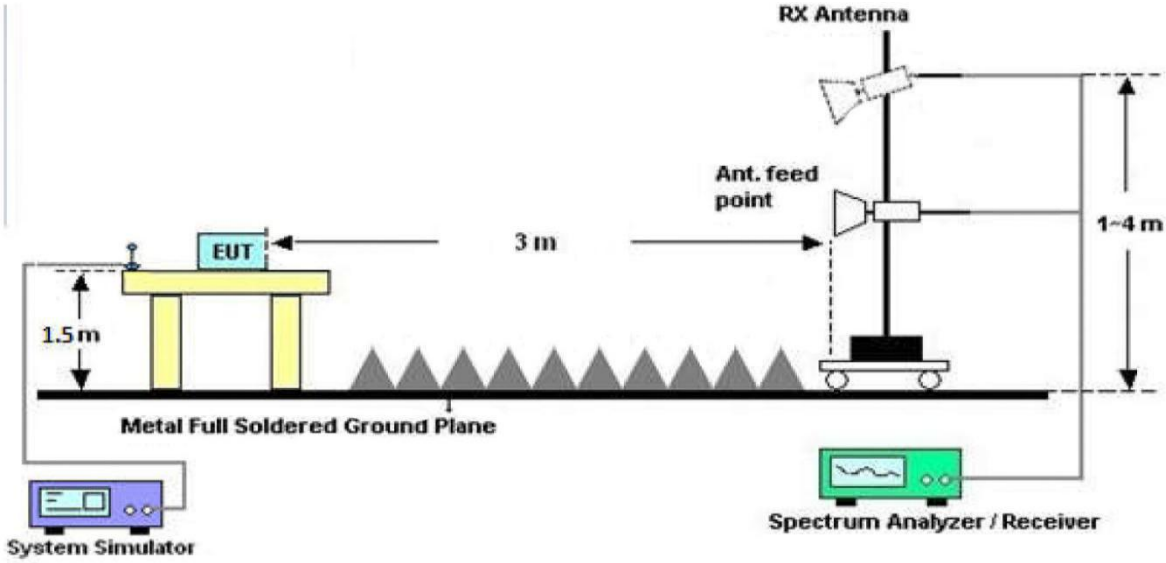


Figure 3. Above 1 GHz

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 modes, only the worst case is recorded in the report.

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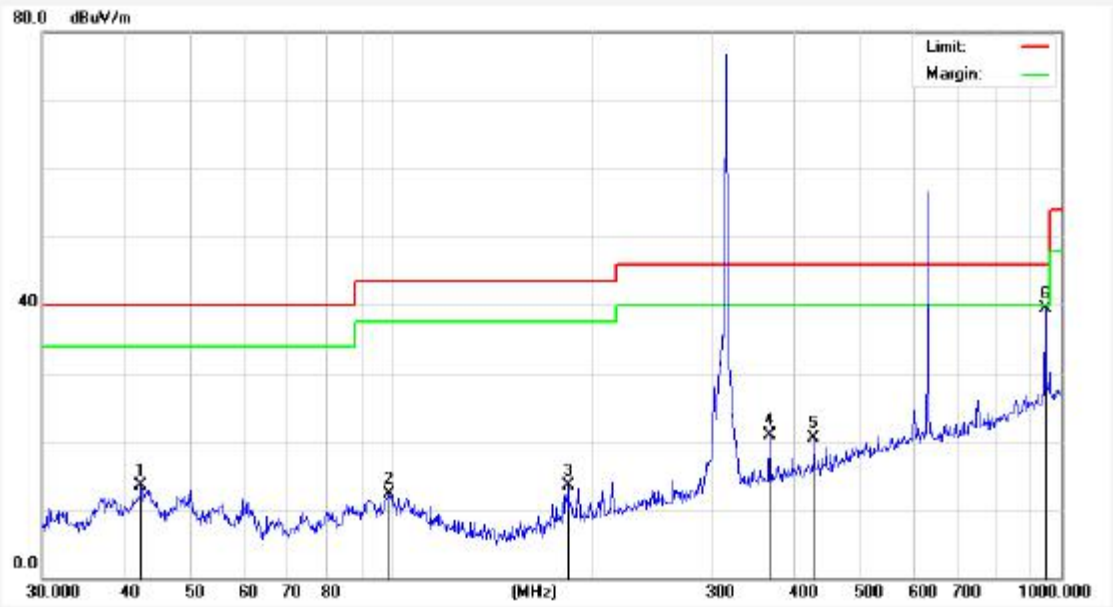
Test Results (30~1000MHz)

Test Mode:	315MHz(ASK)
Power Source:	DC 3V battery inside
Polarization:	Horizontal
Temp.(℃)/Hum.(%RH):	22.0℃/50%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	42.1542	28.24	-14.71	13.53	40.00	-26.47	QP	100	360	
2	98.8326	31.72	-19.48	12.24	43.50	-31.26	QP	100	0	
3	183.2005	34.10	-20.67	13.43	43.50	-30.07	QP	100	360	
4	366.8231	33.81	-12.98	20.83	46.00	-25.17	QP	100	0	
5	426.5210	32.91	-12.48	20.43	46.00	-25.57	QP	100	360	
6	945.4397	40.34	-0.92	39.42	46.00	-6.58	QP	100	0	

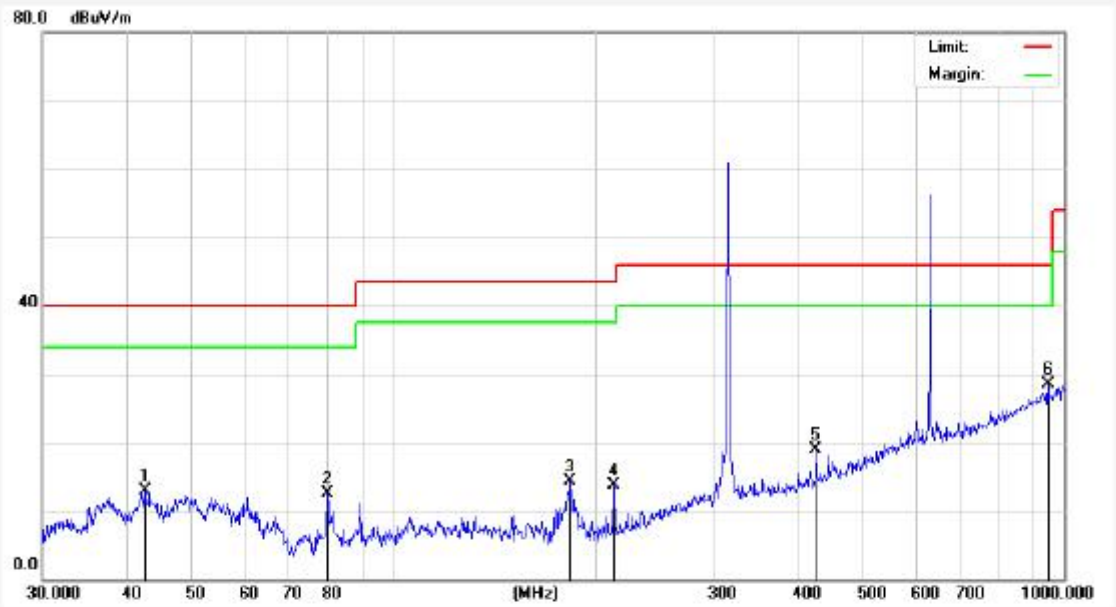
Test Results (30~1000MHz)

Test Mode: 315MHz(ASK)

Power Source: DC 3V battery inside

Polarization: Vertical

Temp.(℃)/Hum.(%RH): 22.0℃/50%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	42.6000	26.79	-13.85	12.94	40.00	-27.06	QP	100	360	
2	79.8003	30.15	-17.72	12.43	40.00	-27.57	QP	100	0	
3	183.8440	32.28	-18.05	14.23	43.50	-29.27	QP	100	360	
4	213.0151	30.36	-16.70	13.66	43.50	-29.84	QP	100	0	
5	426.5210	29.55	-10.73	18.82	46.00	-27.18	QP	100	360	
6	945.4399	29.51	-0.92	28.59	46.00	-17.41	QP	100	0	

Remark:

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

Test Results (Fundamental)

Mode	Freq.	Antenna	Reading	Cable Loss	Ant Factor	Amplifier	Duty cycle Factor	Results	Limits	Det.
	(MHz)	Pol.	(dBuV/m)	(dB)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	Mode
TX Mode(ASK)	315.00	H	94.12	1.52	12.64	31.45	-	76.83	95.62	PK
	315.00	H	94.12	1.52	12.64	31.45	-13.23	63.60	75.62	AV
	315.00	V	79.14	1.52	12.64	31.45	-	61.85	95.62	PK
	315.00	V	79.14	1.52	12.64	31.45	-13.23	48.62	75.62	AV
TX Mode(FSK)	315.00	H	94.80	1.52	12.64	31.45	-	77.51	95.62	PK
	315.00	H	94.80	1.52	12.64	31.45	-13.27	64.24	75.62	AV
	315.00	V	97.38	1.52	12.64	31.45	-	80.09	95.62	PK
	315.00	V	97.38	1.52	12.64	31.45	-13.27	66.82	75.62	AV
TX Mode(ASK)	433.92	H	94.11	1.52	12.64	31.45	-	76.82	100.82	PK
	433.92	H	94.11	1.52	12.64	31.45	-13.32	63.50	80.82	AV
	433.92	V	79.87	1.52	12.64	31.45	-	62.58	100.82	PK
	433.92	V	79.87	1.52	12.64	31.45	-13.32	49.26	100.82	AV
TX Mode(FSK)	433.92	H	94.74	1.52	12.64	31.45	-	77.45	100.82	PK
	433.92	H	94.74	1.52	12.64	31.45	-13.12	64.33	80.82	AV
	433.92	V	79.64	1.52	12.64	31.45	-	62.35	100.82	PK
	433.92	V	79.64	1.52	12.64	31.45	-13.12	49.23	80.82	AV

Remark:

1. Result = Reading + Cable Loss +Ant Factor –Amplifier + Duty cycle Factor
2. Pulse Desensitization Correction Factor

Mode	Freq. (MHz)	Pulse Width (ms)	2/Pulse Width（kHz）
TX Mode	315(ASK)	8.7	0.23
TX Mode	315(FSK)	8.7	0.23
TX Mode	433.92(ASK)	8.7	0.23
TX Mode	433.92(ASK)	8.9	0.22

RBW(1000kHz)＞ 2/Pulse Width

Therefore PDCF is not needed.

3. AV=PEAK +Duty Cycle Factor

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4. Duty Cycle Factor

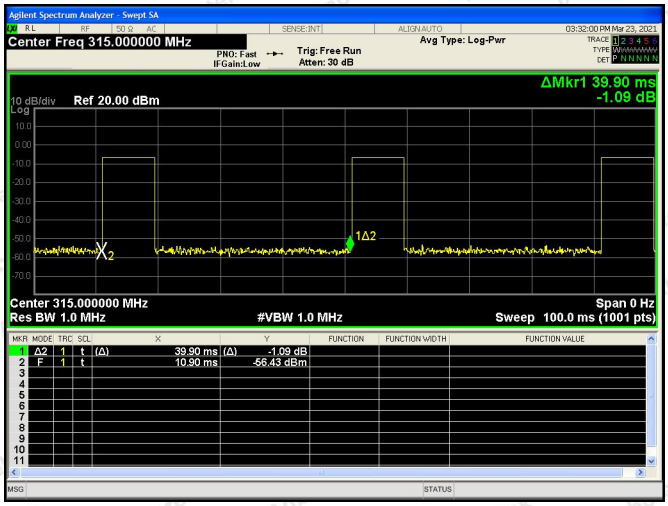
Mode	Freq. (MHz)	T on1 (ms)	N1	T period(ms)	Duty Cycle	Duty Cycle Factor
TX Mode	315(ASK)	8.7	1	39.9	21.80%	-13.23
TX Mode	315(FSK)	8.7	1	40.1	21.70%	-13.27
TX Mode	433.92(ASK)	8.7	1	40.3	21.59%	-13.32
TX Mode	433.92(FSK)	8.9	1	40.3	22.08%	-13.12

T on=T on1*N

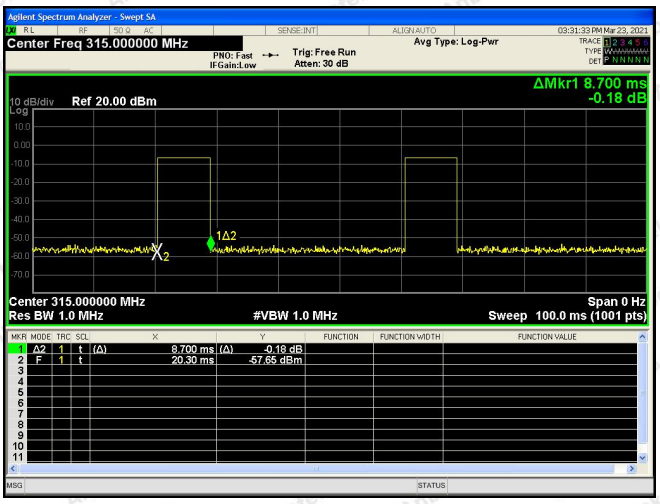
Duty Cycle=T on/T period

Duty Cycle Factor =20*lg(Duty Cycle)

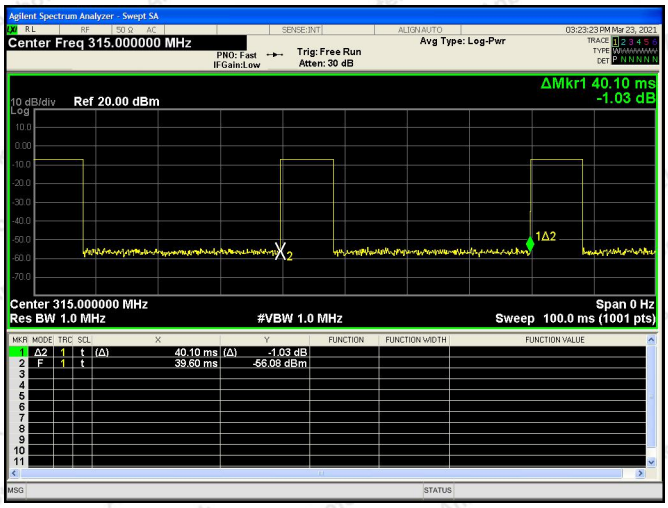
315MHz(ASK)-T period



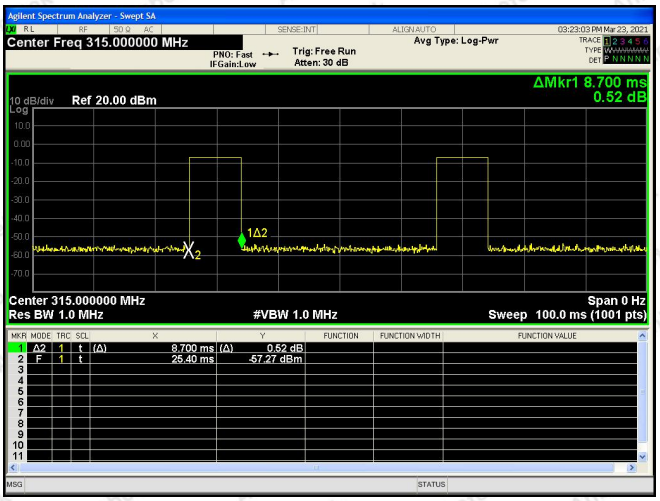
315MHz(ASK)-T on1



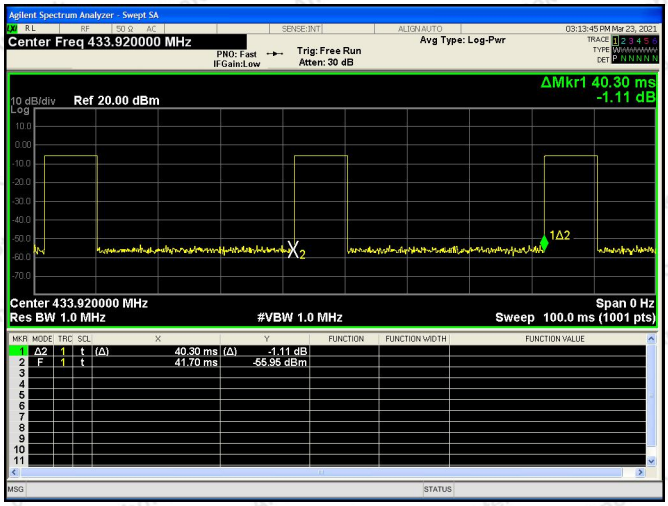
315MHz(FSK)-T period



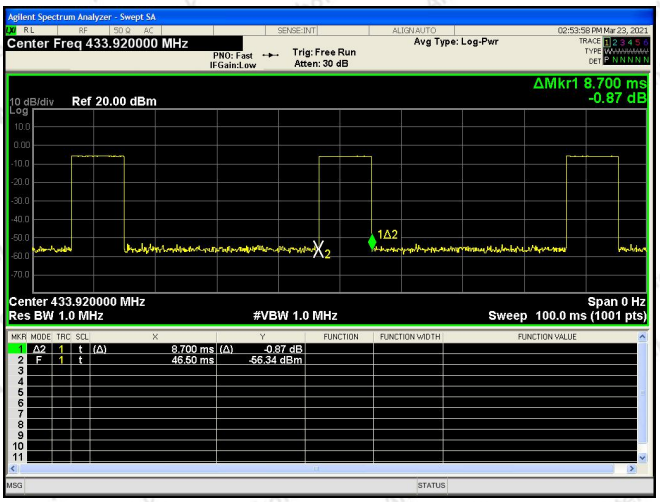
315MHz(FSK)-T on1



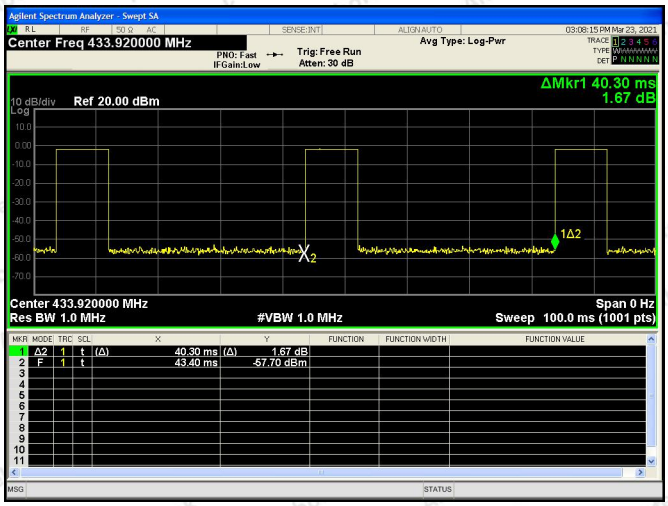
433.92MHz(ASK)-T period



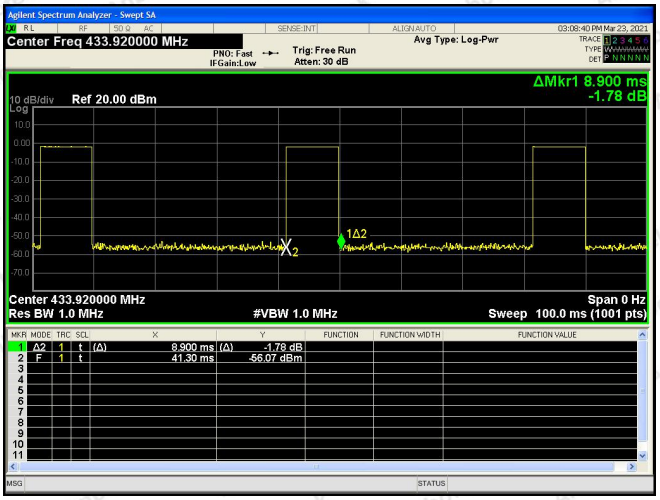
433.92MHz(ASK)-T on1



433.92MHz(FSK)-T period



433.92MHz(FSK)-T on1



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

315MHz(ASK)

Frequency	Antenna	Reading	Cable Loss	Ant Factor	Amplifier	Duty cycle Factor	Results	Limits	Det
(MHz)	Pol.	(dBuV/m)	(dB)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	Mode
630.00	H	74.38	1.92	12.71	31.72	-	57.29	75.62	PK
630.00	H	74.38	1.92	12.71	31.72	-13.23	44.06	55.62	AV
630.00	V	76.34	1.92	12.71	31.72	-	59.25	75.62	PK
630.00	V	76.34	1.92	12.71	31.72	-13.23	46.02	55.62	AV
945.00	H	53.60	2.38	21.43	32.45	-	44.96	74	PK
945.00	H	53.60	2.38	21.43	32.45	-13.23	31.73	54	AV
945.00	V	55.69	2.38	18.56	32.45	-	44.18	74	PK
945.00	V	55.69	2.38	18.56	32.45	-13.23	30.95	54	AV
1260.00	H	-	-	-	-	-	-	74	PK
1260.00	H	-	-	-	-	-	-	54	AV
1260.00	V	-	-	-	-	-	-	74	PK
1260.00	V	-	-	-	-	-	-	54	AV

315MHz(FSK)

Frequency	Antenna	Reading	Cable Loss	Ant Factor	Amplifier	Duty cycle Factor	Results	Limits	Det
(MHz)	Pol.	(dBuV/m)	(dB)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	Mode
630.00	H	74.21	1.92	12.71	31.72	-	57.12	75.62	PK
630.00	H	74.21	1.92	12.71	31.72	-13.27	43.85	55.62	AV
630.00	V	76.42	1.92	12.71	31.72	-	59.33	75.62	PK
630.00	V	76.42	1.92	12.71	31.72	-13.27	46.06	55.62	AV
945.00	H	53.09	2.38	21.43	32.45	-	44.45	74	PK
945.00	H	53.09	2.38	21.43	32.45	-13.27	31.18	54	AV
945.00	V	55.70	2.38	18.56	32.45	-	44.19	74	PK
945.00	V	55.70	2.38	18.56	32.45	-13.27	30.92	54	AV
1260.00	H	-	-	-	-	-	-	74	PK
1260.00	H	-	-	-	-	-	-	54	AV
1260.00	V	-	-	-	-	-	-	74	PK
1260.00	V	-	-	-	-	-	-	54	AV

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Hotline 400-003-0500
www.anbotek.com

433.92MHz(ASK)

Frequency	Antenna	Reading	Cable Loss	Ant Factor	Amplifier	Duty cycle Factor	Results	Limits	Det
(MHz)	Pol.	(dBuV/m)	(dB)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	Mode
780.00	H	64.07	1.92	12.71	31.72	-	46.98	80.82	PK
780.00	H	64.07	1.92	12.71	31.72	-13.32	33.66	60.82	AV
780.00	V	56.46	1.92	12.71	31.72	-	39.37	80.82	PK
780.00	V	56.46	1.92	12.71	31.72	-13.32	26.05	60.82	AV
1170.00	H	53.98	2.38	21.43	32.45	-	45.34	74	PK
1170.00	H	53.98	2.38	21.43	32.45	-13.32	32.02	54	AV
1170.00	V	55.86	2.38	18.56	32.45	-	44.35	74	PK
1170.00	V	55.86	2.38	18.56	32.45	-13.32	31.03	54	AV

433.92MHz(FSK)

Frequency	Antenna	Reading	Cable Loss	Ant Factor	Amplifier	Duty cycle Factor	Results	Limits	Det
(MHz)	Pol.	(dBuV/m)	(dB)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	Mode
780.00	H	74.11	1.92	12.71	31.72	-	57.02	80.82	PK
780.00	H	74.11	1.92	12.71	31.72	-13.12	43.90	60.82	AV
780.00	V	76.78	1.92	12.71	31.72	-	59.69	80.82	PK
780.00	V	76.78	1.92	12.71	31.72	-13.12	46.57	60.82	AV
1170.00	H	53.68	2.38	21.43	32.45	-	45.04	74	PK
1170.00	H	53.68	2.38	21.43	32.45	-13.12	31.92	54	AV
1170.00	V	55.35	2.38	18.56	32.45	-	43.84	74	PK
1170.00	V	55.35	2.38	18.56	32.45	-13.12	30.72	54	AV

Remark:

1. Result = Reading + Cable Loss +Ant Factor –Amplifier + Duty cycle Factor

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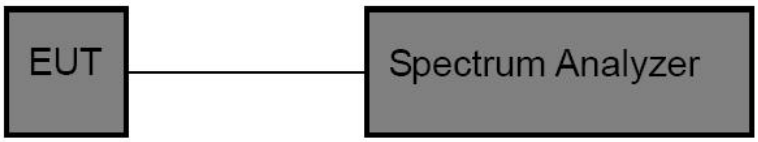
5. 20DB Occupy Bandwidth Test

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 = 30kHz, VBW≥3*RBW =100kHz,
   Span= 1MHz
   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	96.16	⩽787.5	PASS
TX Mode	315	FSK	196.6	⩽787.5	PASS
TX Mode	433.92	ASK	97.66	⩽1084.8	PASS
TX Mode	433.92	FSK	360.63	⩽1084.8	PASS

Note: Limit=0.0025*Freq.

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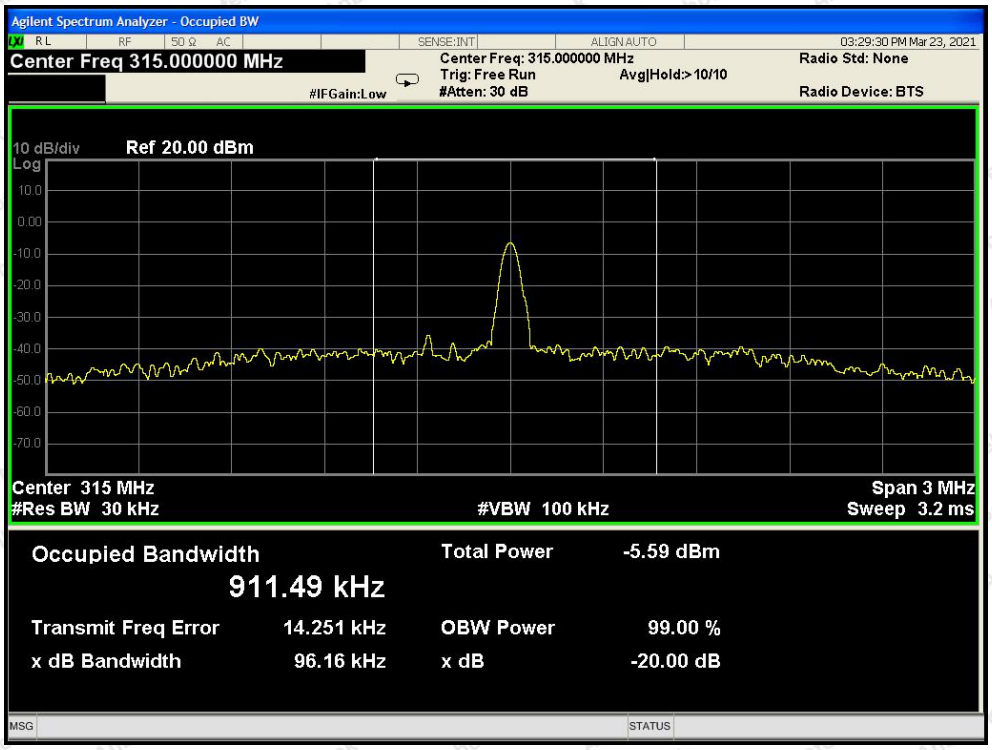
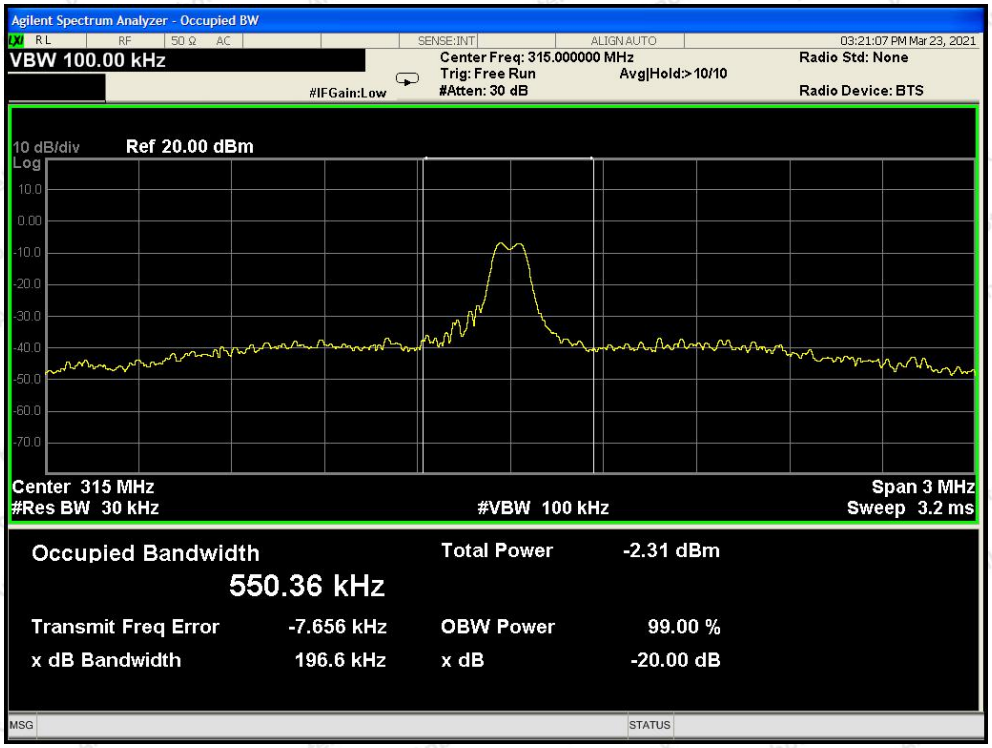
315 MHz(ASK)

Plot of 20DB Bandwidth



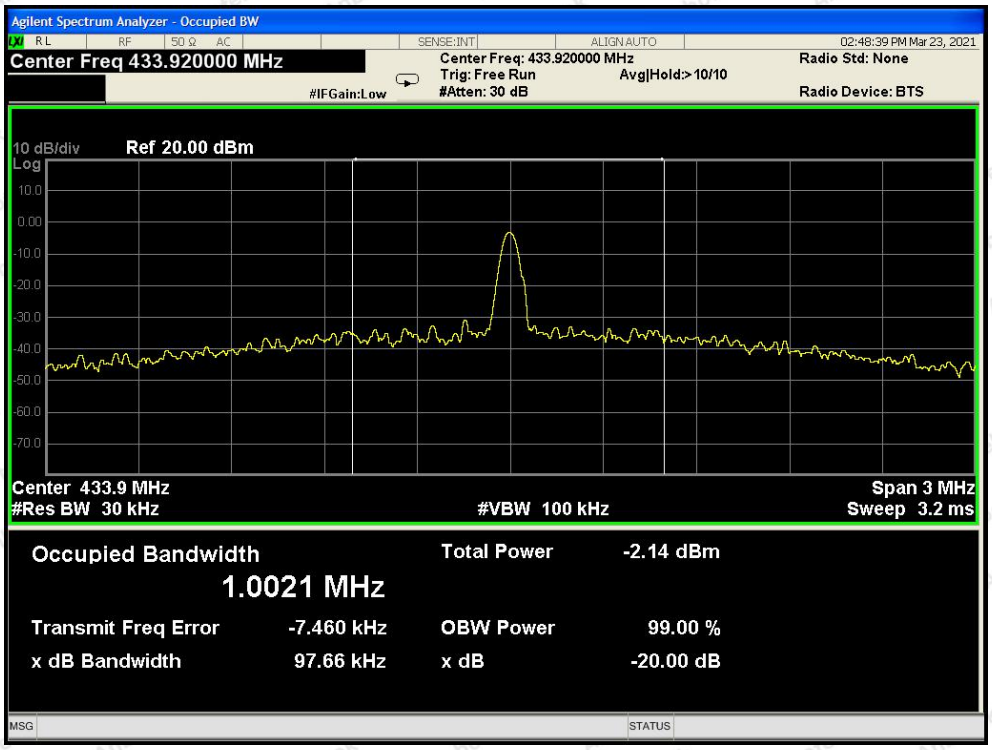
315 MHz(FSK)

Plot of 20DB Bandwidth



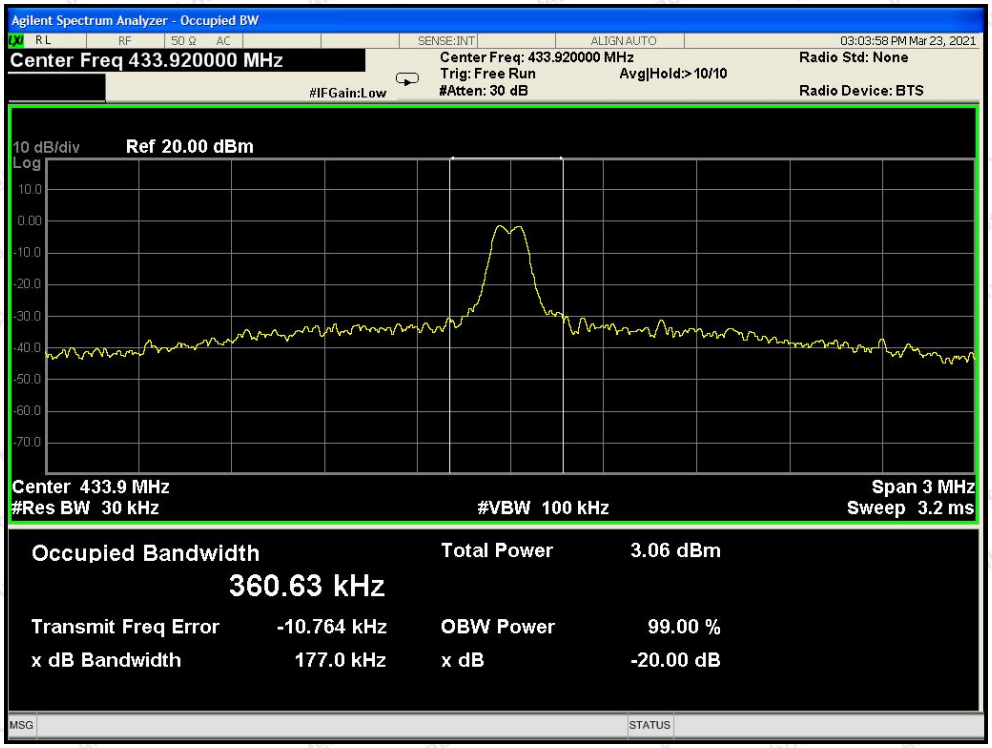
433.92 MHz(ASK)

Plot of 20DB Bandwidth



433.92 MHz(FSK)

Plot of 20DB Bandwidth

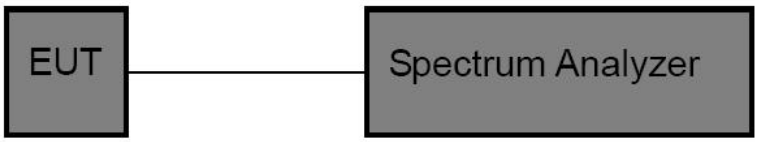


6. Dwell Time Test

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.

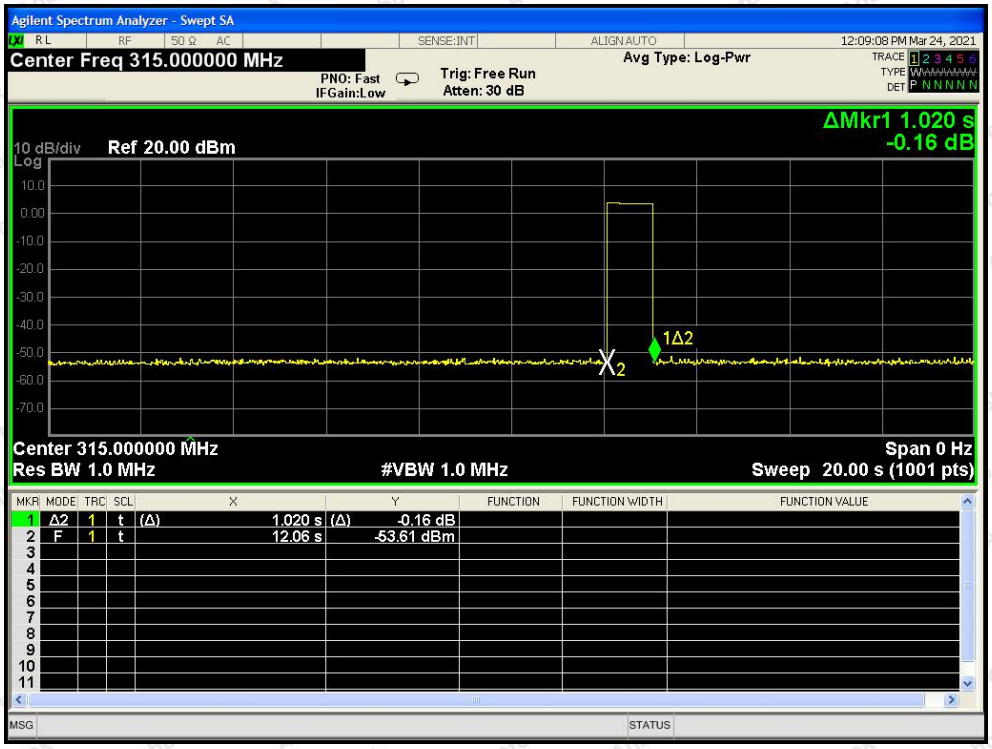
6.4. Test Data

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

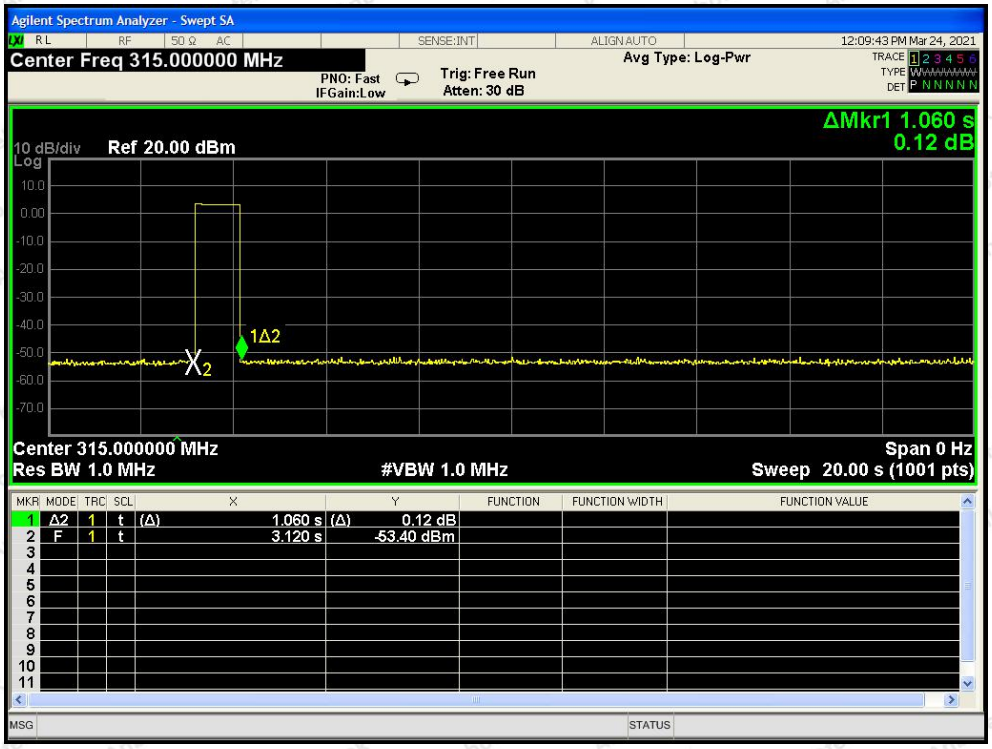
Mode	Freq. (MHz)	Modulation Type	Transmitting time(s)	Limit(s)	Results
TX Mode	315	ASK	1.02	≤5	PASS
TX Mode	315	FSK	1.06	≤5	PASS
TX Mode	433.92	ASK	1.10	≤5	PASS
TX Mode	433.92	FSK	1.00	≤5	PASS

Please refer the following plot.

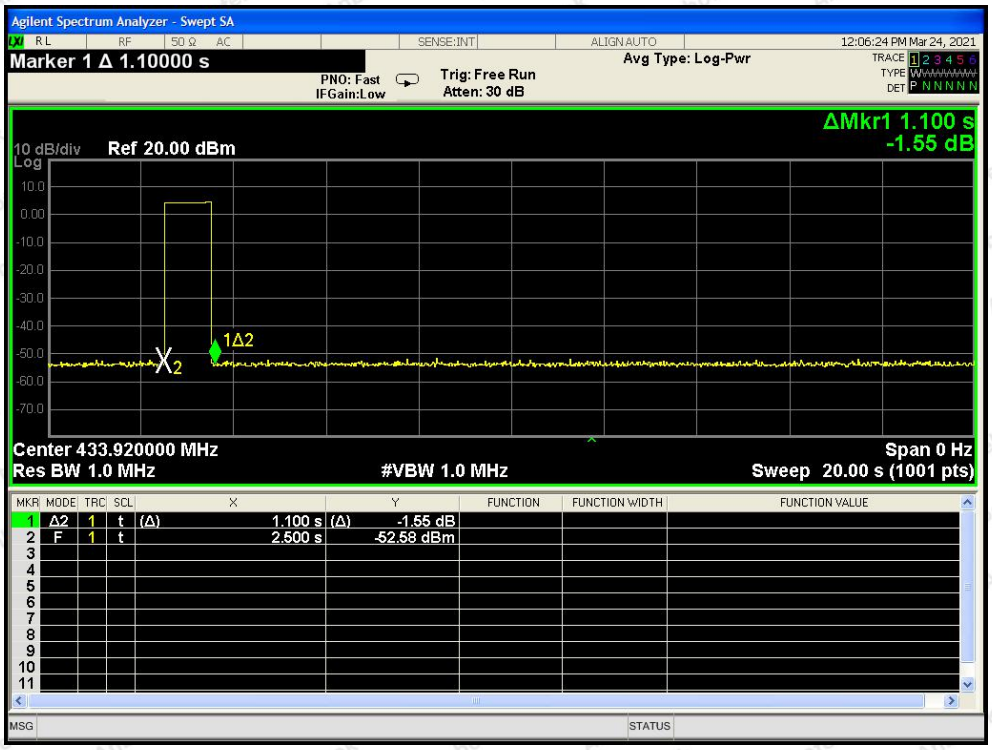
315 MHz(ASK)



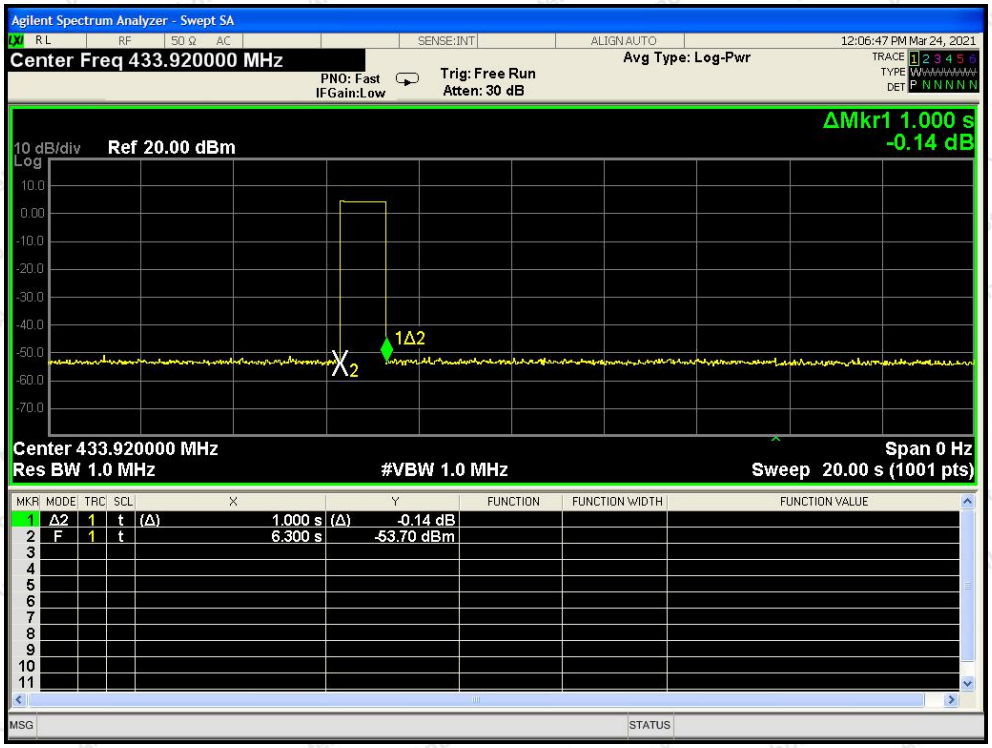
315 MHz(FSK)



433.92 MHz(ASK)



433.92 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.

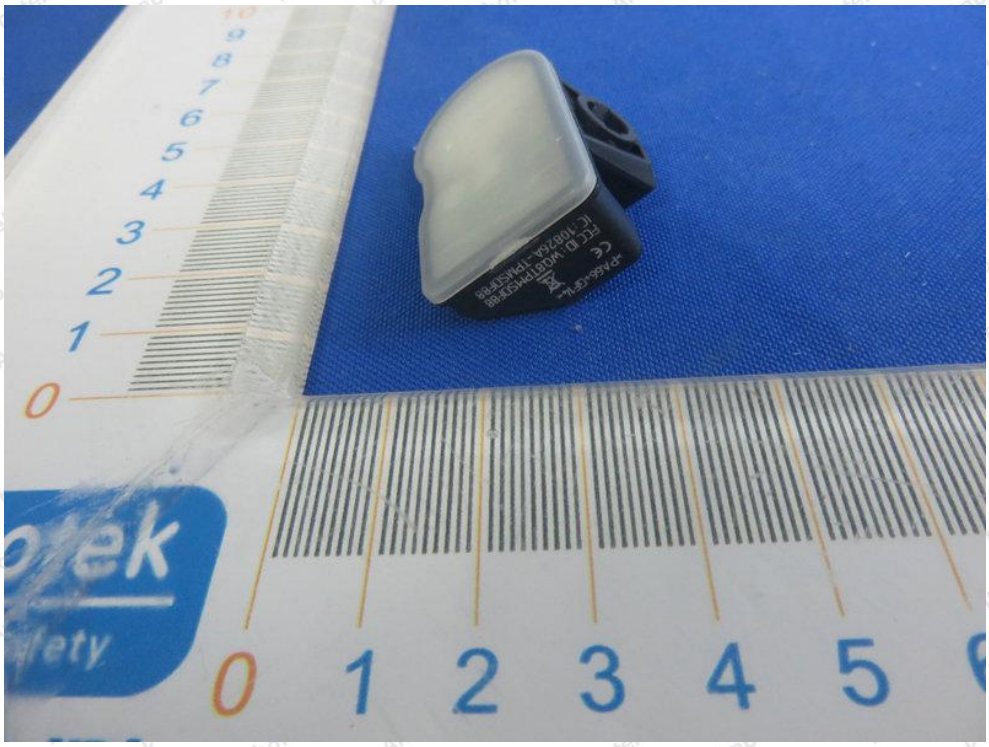
7.2. Antenna Connected Construction

The antenna is a Spring Antenna which permanently attached, and the best case gain of the antenna is -12 dBi. It complies with the standard requirement.

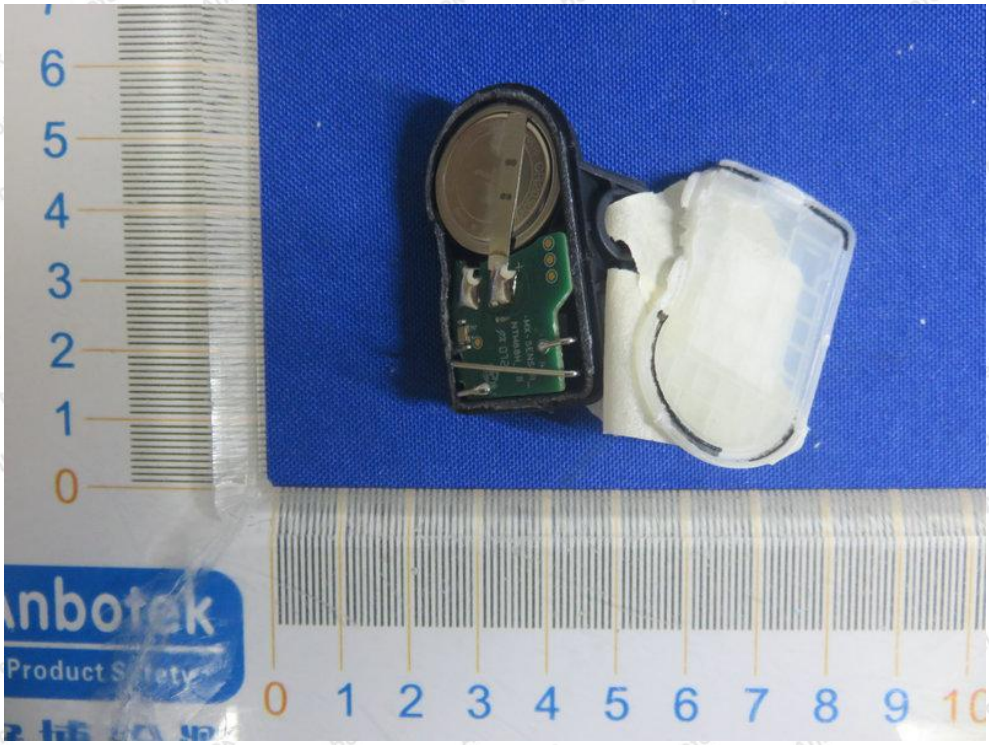
APPENDIX I -- TEST SETUP PHOTOGRAPH

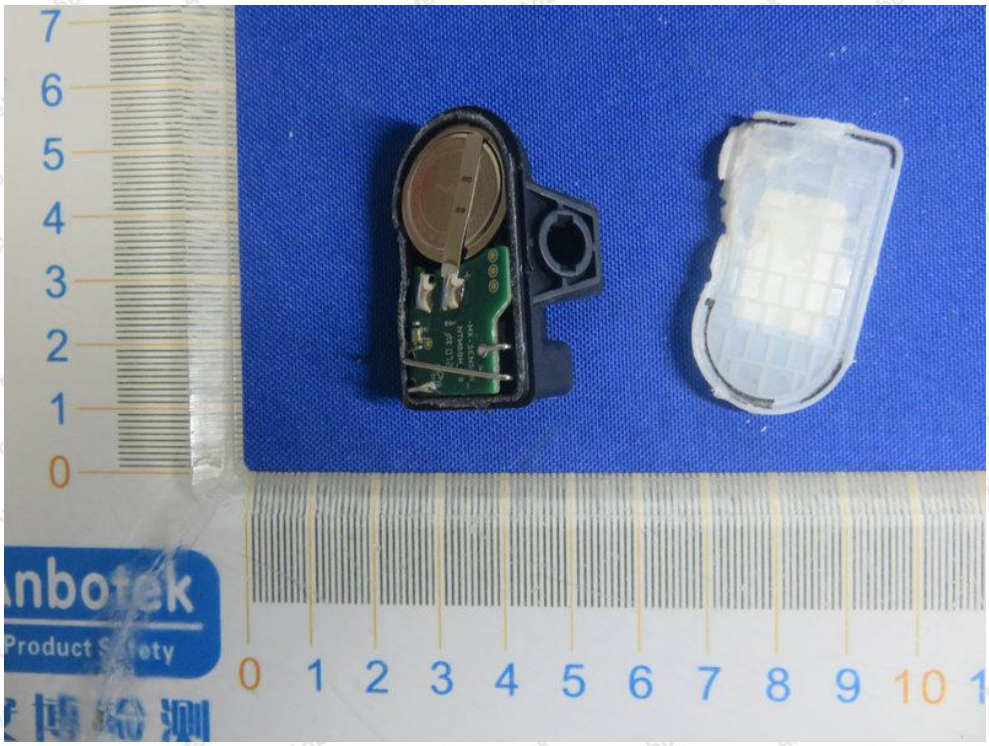
Photo of Radiation Emission Test

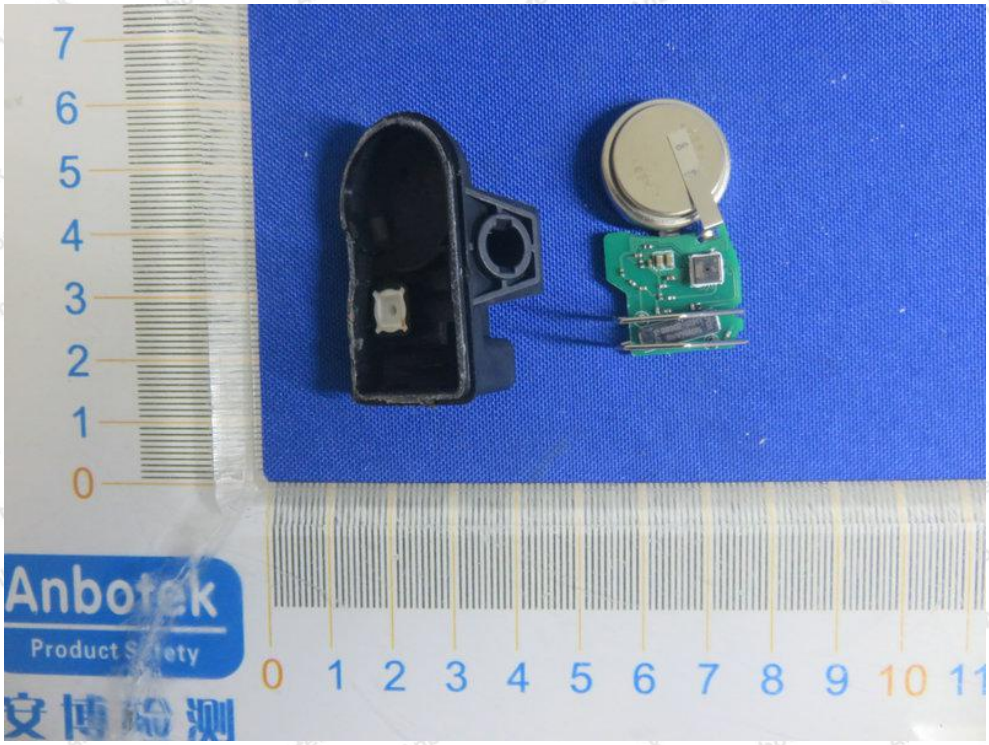
APPENDIX II -- EXTERNAL PHOTOGRAPH



APPENDIX III -- INTERNAL PHOTOGRAPH



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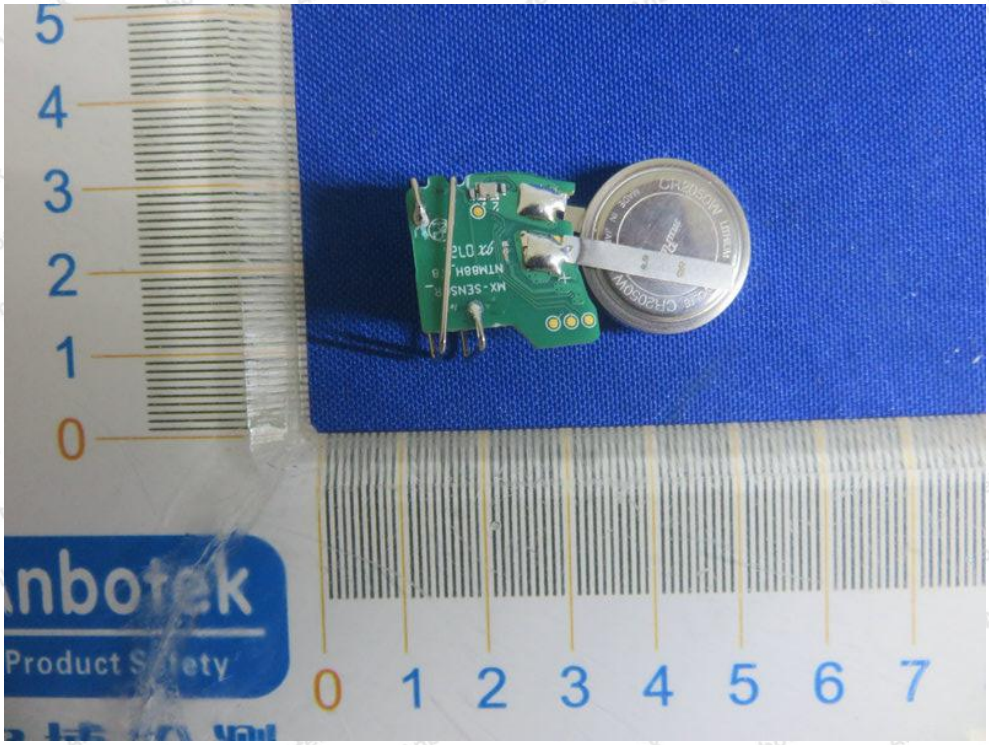

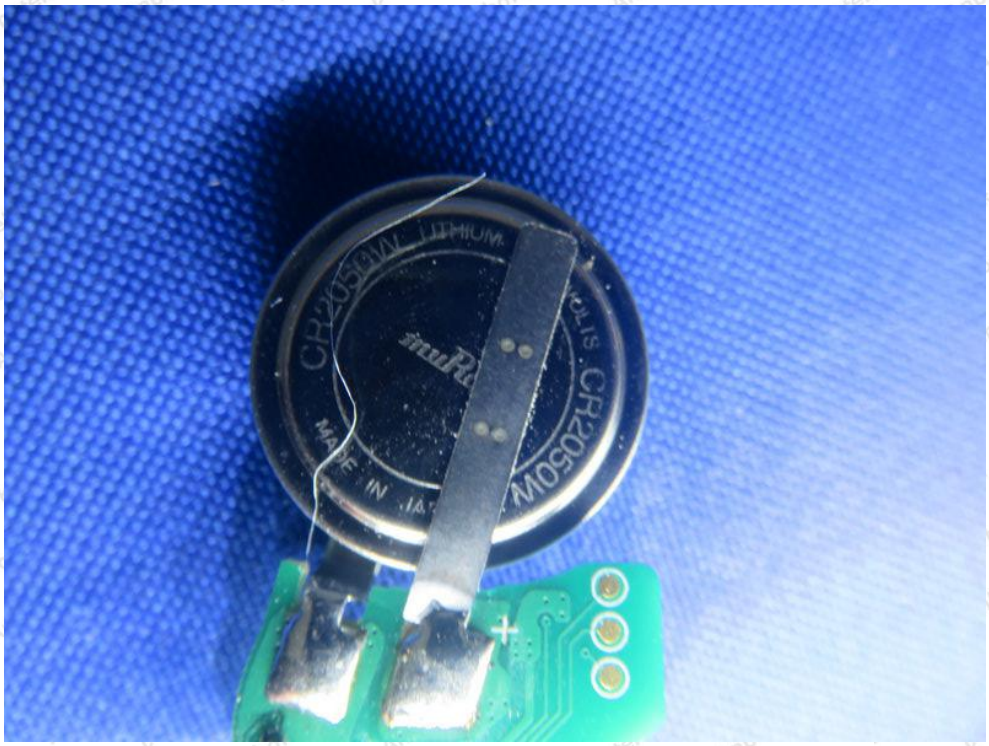

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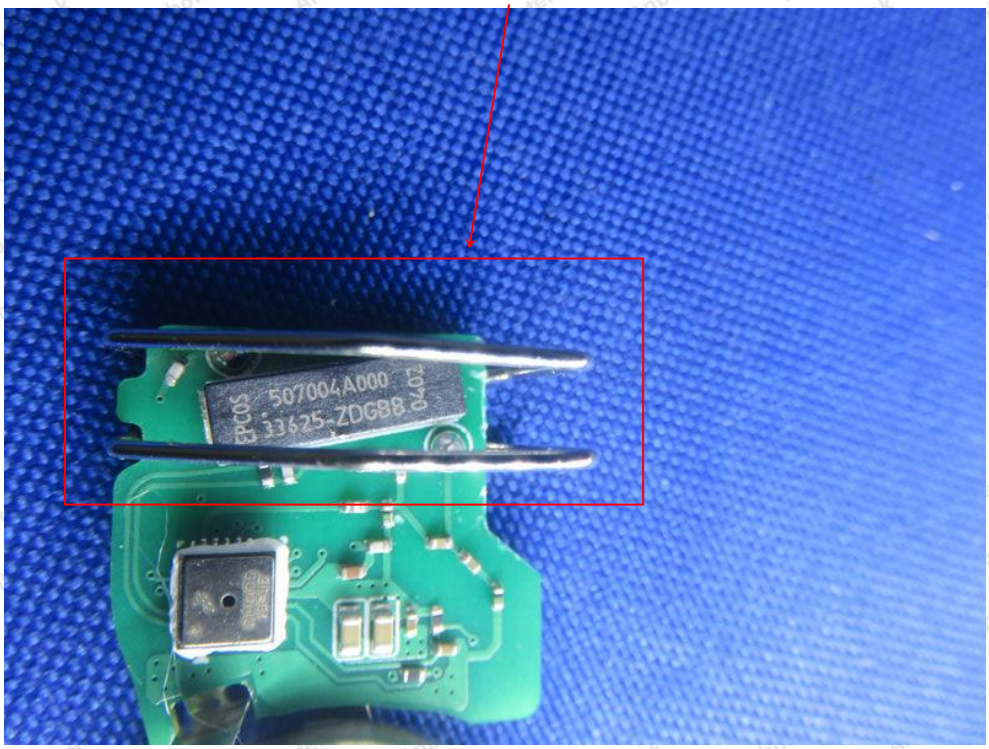

---------- End of Report ----------