FCC PART 15 SUBPART C REQUIREMENT

OF

Bicycle speedometer

Model No.: 590C, 594C, 595C, 596C, 593C, 592C, 591C, 589C, 588C, 586C,585C, 583C, 582C, 581C,580C, 579C, 577C, 576C, 570C, 563C, 548C, 546C, 201C

FCC ID: 2BC5Z-590C

Report No.: E04A23080492F00101

Issue Date: October 16, 2023

Prepared for

Shenzhen Sandingfeilong Electronics Co., Ltd.

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Prepared by

Guangdong Global Testing Technology Co., Ltd.

Room 101-105, 203-210, Building 1, No.2, Keji 8 Road, Songshan Lake Park, Dongguan city, Guangdong, People’s Republic of China, 523808

VERIFICATION OF COMPLIANCE

Applicant:	Shenzhen Sandingfeilong Electronics Co., Ltd. Unit F,Floor 2,Building A2,Xiufeng Industrial City,Gankeng Village,Jihua Street,Longgang District,Shenzhen City,Guangdong Province, China
Manufacturer:	Dongguan Shundong Electronics Co., Ltd. 5B1 QingHu Road QingHuTou TangXia Town DongGuan, China
Product Description:	Bicycle speedometer
Trade Mark:	/
Model Number:	590C
Series Model:	594C, 595C, 596C, 593C, 592C, 591C, 589C, 588C, 586C,585C, 583C, 582C, 581C, 580C, 579C, 577C, 576C, 570C, 563C, 548C, 546C, 201C

We hereby certify that:

The above equipment was tested by Guangdong Global Testing Technology Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10-2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.209(2022).

Date of Test : October 8, 2023 to October 13, 2023

Prepared by : _____

Alan He/Editor

Reviewer &
Authorized Signer : _____

Shawn Wen/ Laboratory Manager

Modified Information

Version	Summary	Revision Date	Report No.
Ver.1.0	Original Report	/	E04A23080492F00101

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1 General Information

1.1 Product Description

Characteristics	Description
Product Name	Bicycle speedometer
Model number	590C
Series Model	594C, 595C, 596C, 593C, 592C, 591C, 589C, 588C, 586C, 585C, 583C, 582C, 581C, 580C, 579C, 577C, 576C, 570C, 563C, 548C, 546C, 201C
Battery Rating	CR2032 LITHIUM BATTERY 3V
Power Supply	DC 3V
Operating Frequency	125.2KHz
Modulation Technique	ASK
Antenna Type	Internal Antenna
Software version	V1.0
Hardware version	V1.0
Sample receipt date	October 7, 2023

1.2 Related Submittal(s) / Grant(s)

This submittal(s) (test report) is intended for FCC ID: 2BC5Z-590C filing to comply with the FCC Part 15, Subpart C Rules.

1.3 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013). Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4 Special Accessories

Not available for this EUT intended for grant.

1.5 Equipment Modifications

Not available for this EUT intended for grant.

1.6 Test Facility

Site Description

Name of Firm	:	Guangdong Global Testing Technology Co., Ltd.
Site Location	:	Room 101-105, 203-210, Building 1, No.2, Keji 8 Road, Songshan Lake Park, Dongguan city, Guangdong, People′ s Republic of China, 523808.

2 System Test Configuration

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the fixed in a particular direction according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013.

2.4 Configuration of Tested System

Fig. 2-1 Configuration of Tested System

Table 2-1 Equipment Used in Tested System

Item	Equipment	Trade Mark	Model No.	FCC ID	Note
1.	Bicycle speedometer	/	590C	2BC5Z-590C	***EUT***

Note:

(1) Unless otherwise denoted as EUT in『Remark』column, device(s) used in tested system is a support equipment.

3 Summary of Test Results

FCC Rules	Description Of Test	Result
§15.207	AC Power Conducted Emission	N/A
§15.209	Radiated Emission	Compliant
§2.1049	20dB Bandwidth	Compliant
§15.203	Antenna Requirement	Compliant

4 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty
20dB Bandwidth	±9.2 PPM
Conducted Emissions Test	±2.0dB
Radiated Emission Test	±2.0dB
Temperature	±0.5℃
Humidity	±3%

Remark: The coverage Factor (k=2), and measurement Uncertainty for a level of Confidence of 95%

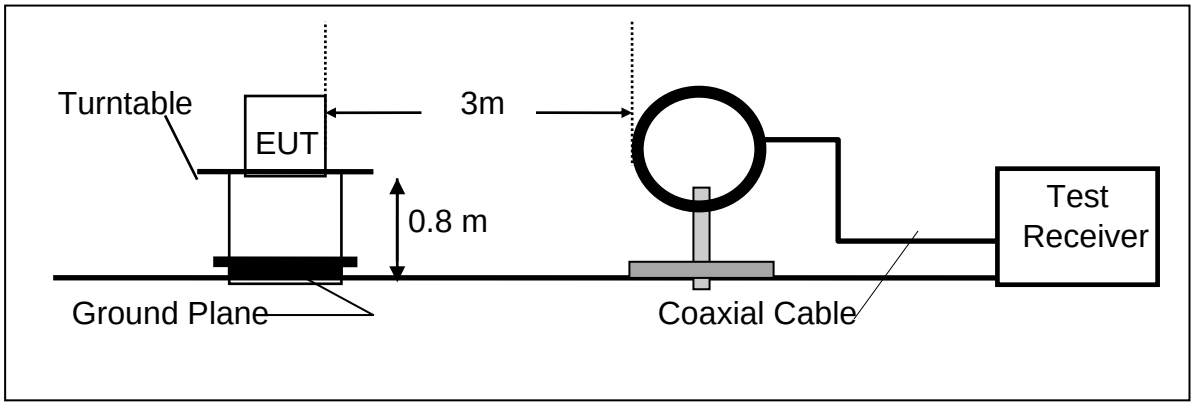
5 Radiated Emission Test

5.1 Measurement Procedure

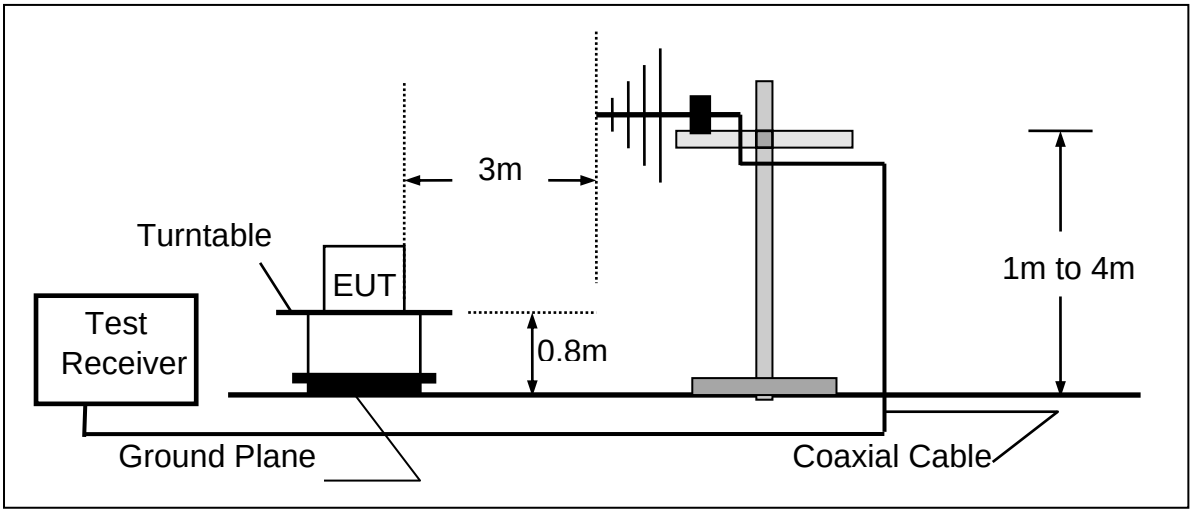
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured were complete.

5.2 Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



5.3 Measurement Equipment Used

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date
3m Semi-anechoic Chamber	ETS	9m*6m*6m	Q2146	2022/08/30	2025/08/29
EMI Test Receiver	Rohde & Schwarz	ESCI3	101409	2023/09/18	2024/09/17
Spectrum Analyzer	KEYSIGHT	N9020A	MY51283932	2023/09/18	2024/09/17
Pre-Amplifier	HzEMC	HPA-9K0130	HYPA21001	2022/10/29	2023/10/28
Biconilog Antenna	Schwarzbeck	VULB 9168	01315	2022/10/10	2025/10/09
Biconilog Antenna	ETS	3142E	00243646	2022/03/23	2025/03/22
Loop Antenna	ETS	6502	243668	2022/03/30	2025/03/29
Test Software	Farad	EZ-EMC Ver:ANCI-3A1	N/A	N/A	N/A

5.4 Radiated Emission Limit

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table 15.209(a):

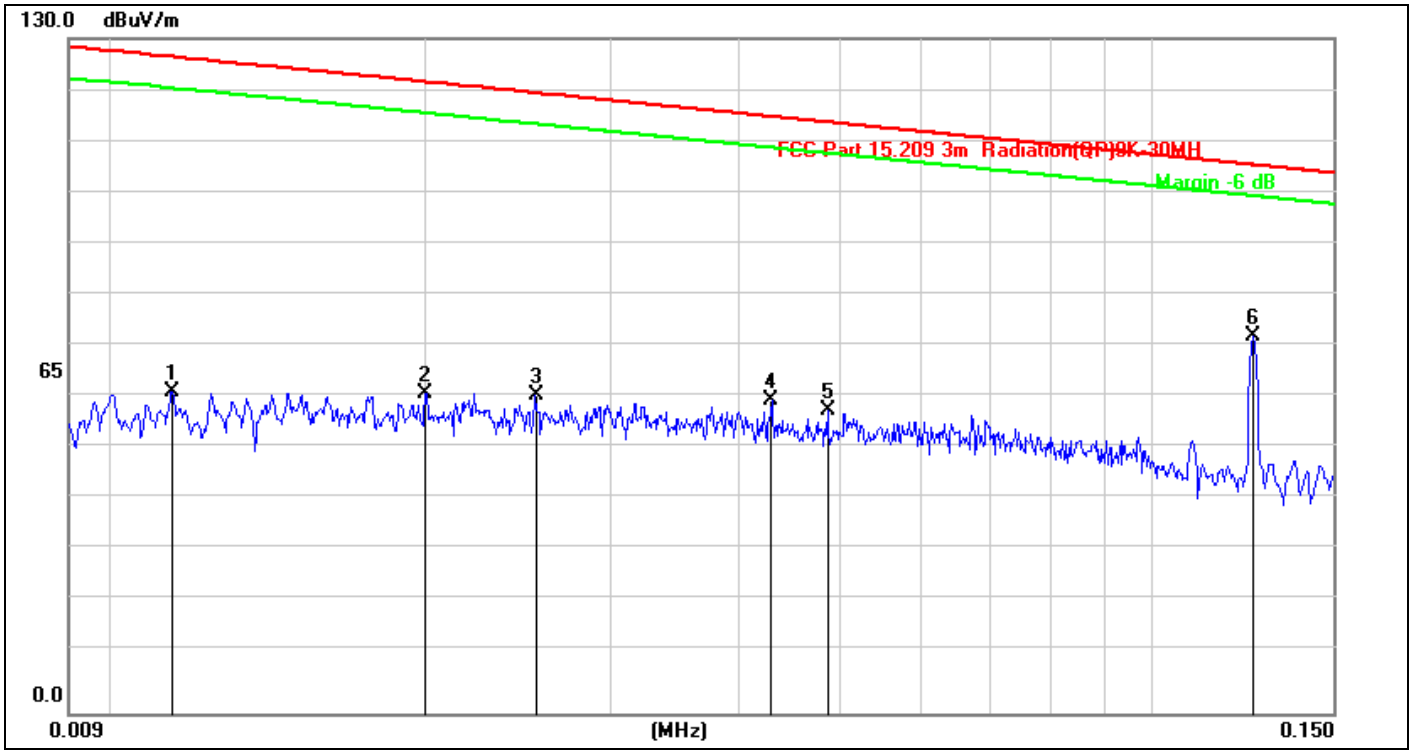
FCC Part 15.209				
Frequency (MHz)	Field Strength Limitation		Field Strength Limitation Frequency tion at 3m Measurement Dist	
	(uV/m)	Dist	(uV/m)	(dBuV/m)
0.009 – 0.490	2400 / F(KHz)	300m	10000 * 2400/F(KHz)	20log 2400/F(KHz) + 80
0.490 – 1.705	24000 / F(KHz)	30m	100 * 24000/F(KHz)	20log 24000/F(KHz) + 40
1.705 – 30.00	30	30m	100* 30	20log 30 + 40
30.0 – 88.0	100	3m	100	20log 100
88.0 – 216.0	150	3m	150	20log 150
216.0 – 960.0	200	3m	200	20log 200
Above 960.0	500	3m	500	20log 500

15.205 Restricted bands of operation

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])

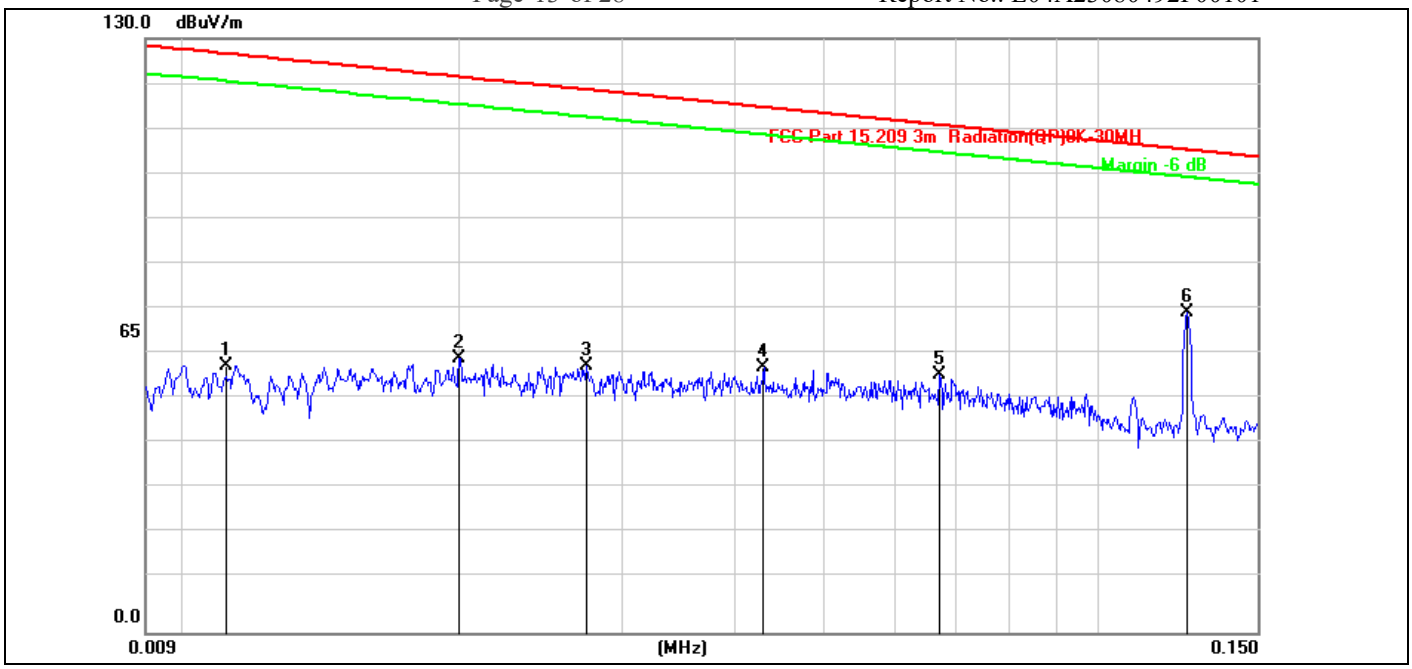
Remark: 1. Emission level in dBuV/m=20 log (uV/m)
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of ξ 15.205, and the emissions located in restricted bands also comply with 15.209 limit.

5.5 Measurement Result



Limit:	**FCC Part 15C 3m Radiation(QP)**	**Antenna:**	**coaxial**
EUT:	**Bicycle speedometer**	**Temperature:**	**24.3℃**
M/N.:	**590C**	**Humidity:**	**53.2%RH**
Mode:	**125.2kHz**	**Power Rating:**	**DC 3V**
Test Engineer:	**Berny**	**Test Time:**	**2023/10/13**

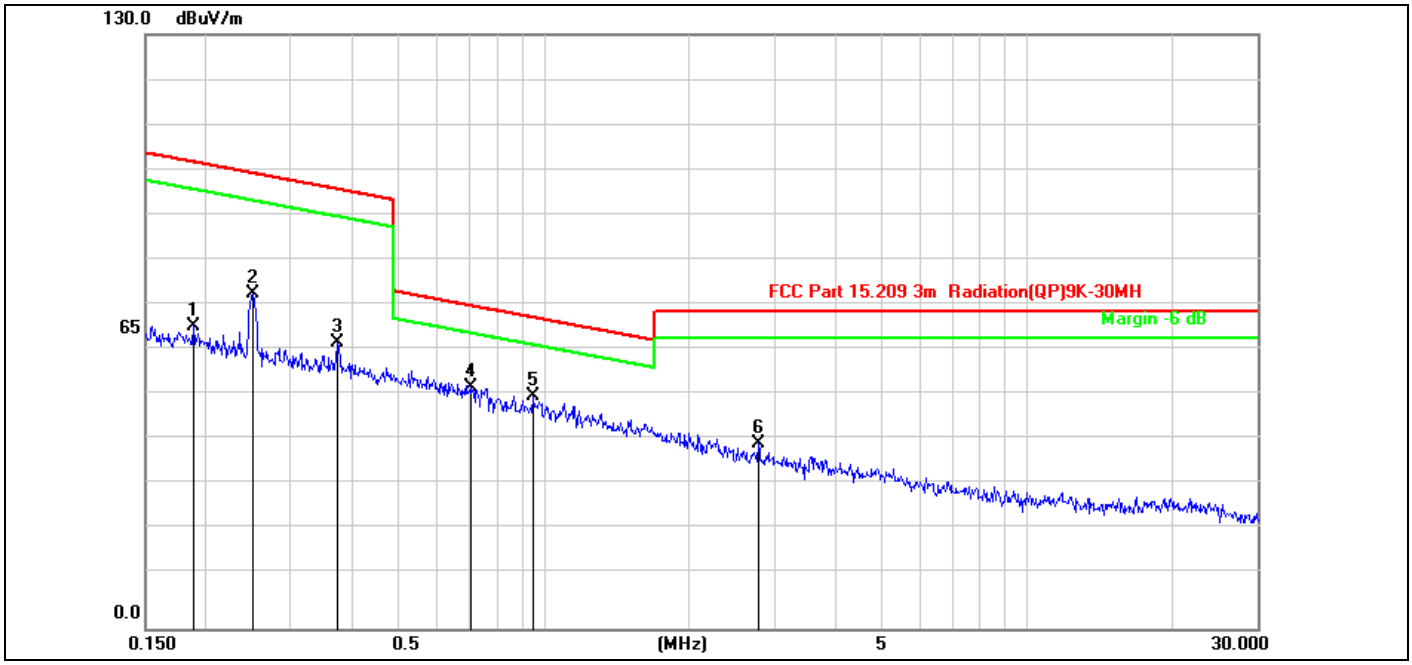
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)	Remark
1	0.0112	41.48	20.42	61.90	126.60	-64.70	QP	100	0	
2	0.0200	41.20	20.29	61.49	121.57	-60.08	QP	100	0	
3	0.0253	40.94	20.21	61.15	119.53	-58.38	QP	100	0	
4	0.0429	40.12	20.01	60.13	114.94	-54.81	QP	100	0	
5	0.0487	38.28	19.95	58.23	113.84	-55.61	QP	100	0	
6 *	0.1255	52.88	19.62	72.50	105.62	-33.12	QP	100	0	



Limit:	**FCC Part 15C 3m Radiation(QP)**	**Antenna:**	**coplanar**
EUT:	**Bicycle speedometer**	**Temperature:**	**24.3℃**
M/N.:	**590C**	**Humidity:**	**53.2%RH**
Mode:	**125.2kHz**	**Power Rating:**	**DC 3V**
Test Engineer:	**Berny**	**Test Time:**	**2023/10/13**

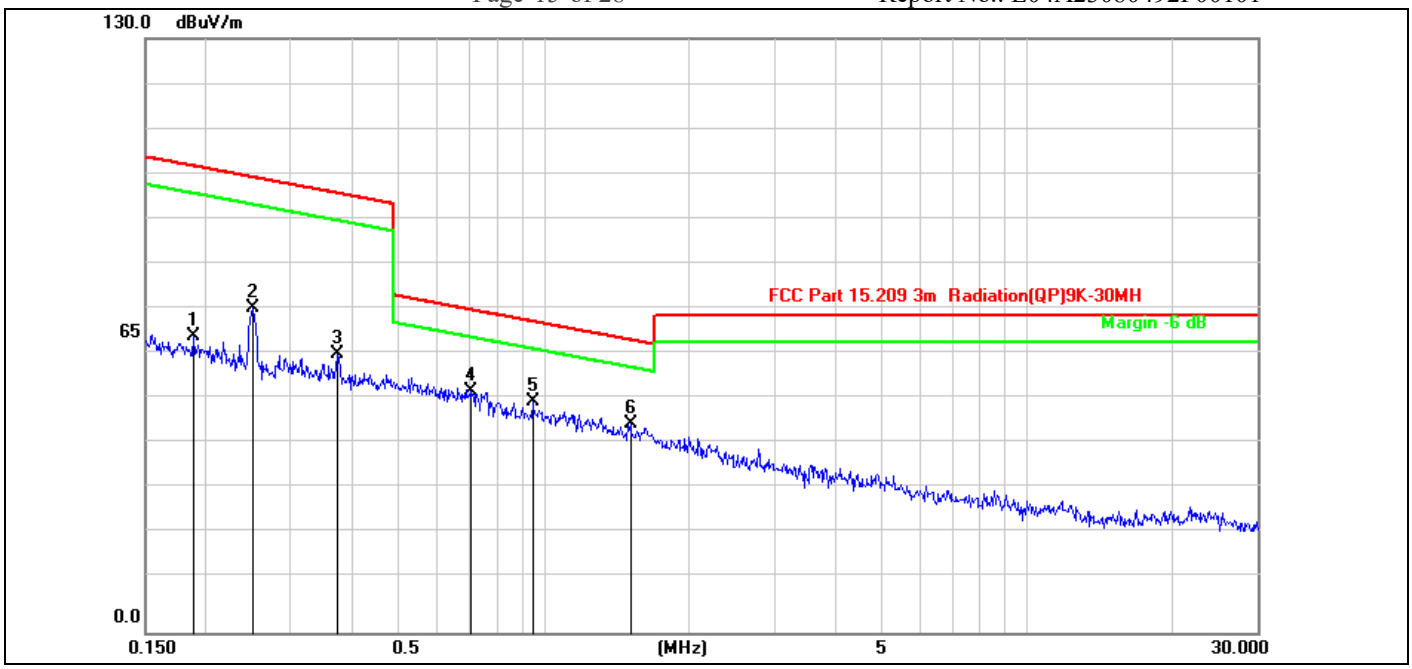
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)	Remark
1	0.0111	37.98	20.42	58.40	126.68	-68.28	QP	100	0	
2	0.0200	39.70	20.29	59.99	121.57	-61.58	QP	100	0	
3	0.0274	38.00	20.18	58.18	118.84	-60.66	QP	100	0	
4	0.0429	38.12	20.01	58.13	114.94	-56.81	QP	100	0	
5	0.0670	36.65	19.68	56.33	111.07	-54.74	QP	100	0	
6 *	0.1255	50.38	19.62	70.00	105.62	-35.62	QP	100	0	

Note: (1) All Readings are Peak Value.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss.
(3) The average measurement was not performed when the peak measured data under the limit of average detection.
(4) EUT lying on the table position is the worst case result in the report.



Limit:	**FCC Part 15C 3m Radiation(QP)**	**Antenna:**	**coaxial**
EUT:	**Bicycle speedometer**	**Temperature:**	**24.3℃**
M/N.:	**590C**	**Humidity:**	**53.2%RH**
Mode:	**125.2kHz**	**Power Rating:**	**DC 3V**
Test Engineer:	**Berny**	**Test Time:**	**2023/10/13**

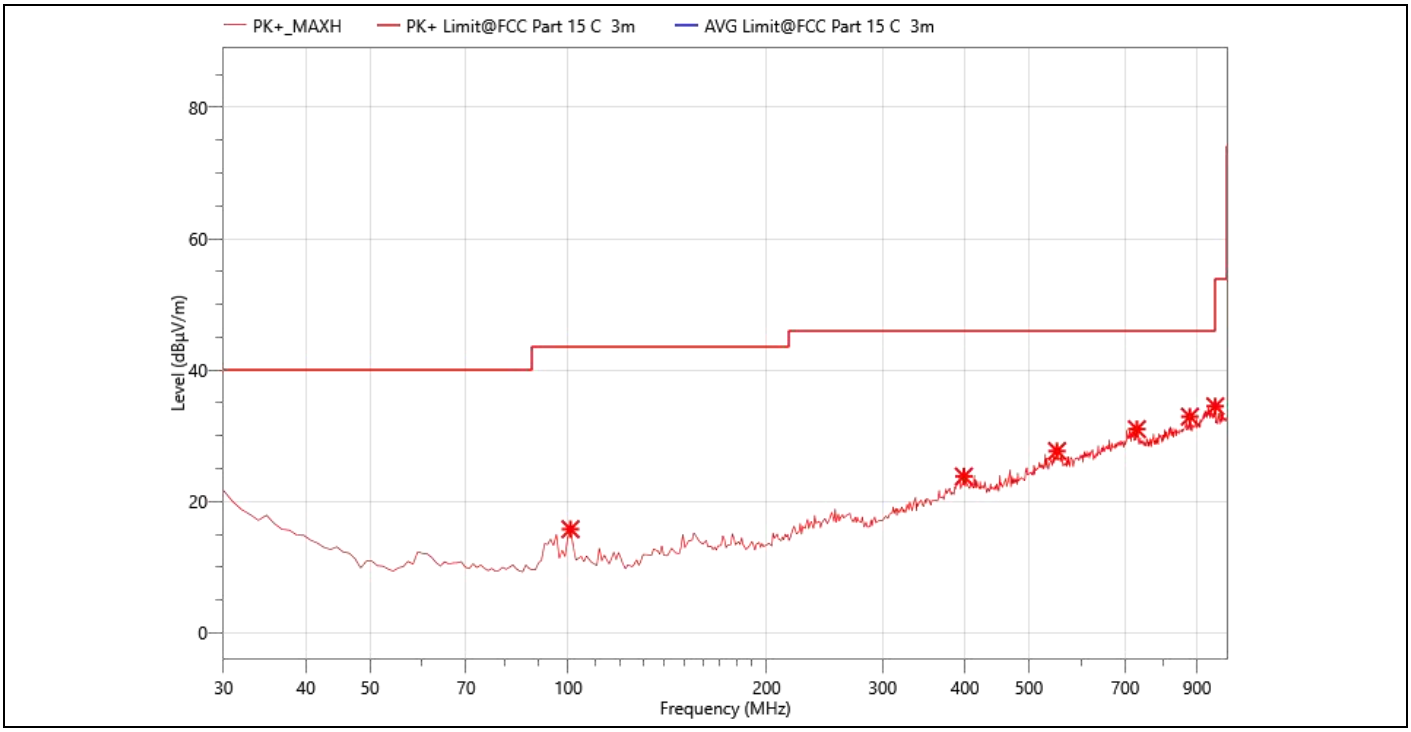
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)	Remark
1	0.1884	46.66	19.64	66.30	102.10	-35.80	QP	100	0	
2	0.2495	53.73	19.63	73.36	99.66	-26.30	QP	100	0	
3	0.3751	42.86	19.61	62.47	96.12	-33.65	QP	100	0	
4	0.7084	33.25	19.53	52.78	70.61	-17.83	QP	100	0	
5 *	0.9481	31.56	19.45	51.01	68.08	-17.07	QP	100	0	
6	2.7794	20.87	19.61	40.48	69.50	-29.02	QP	100	0	



Limit:	**FCC Part 15C 3m Radiation(QP)**	**Antenna:**	**coplanar**
EUT:	**Bicycle speedometer**	**Temperature:**	**24.3℃**
M/N.:	**590C**	**Humidity:**	**53.2%RH**
Mode:	**125.2kHz**	**Power Rating:**	**DC 3V**
Test Engineer:	**Berny**	**Test Time:**	**2023/10/13**

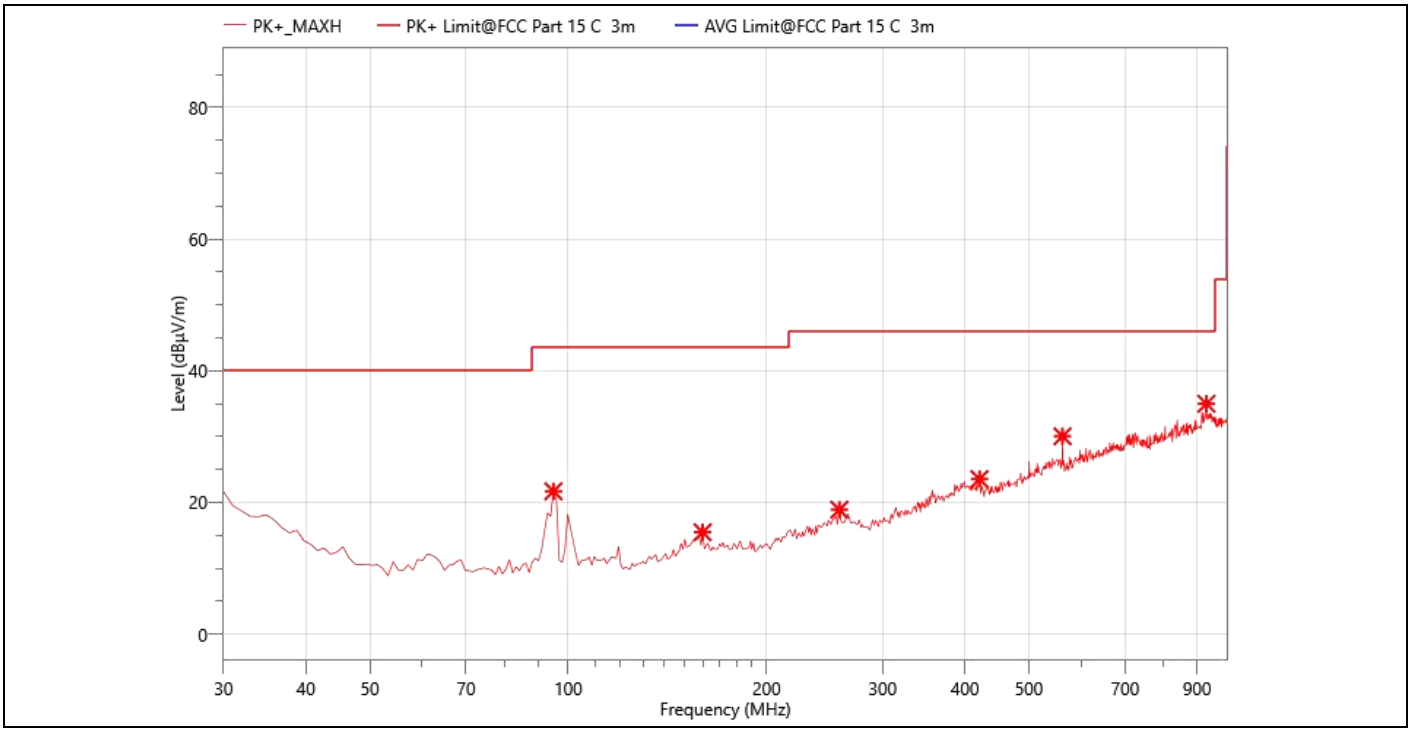
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)	Remark
1	0.1884	45.16	19.64	64.80	102.10	-37.30	QP	100	236	
2	0.2494	51.23	19.63	70.86	99.66	-28.80	QP	100	254	
3	0.3750	41.36	19.61	60.97	96.12	-35.15	QP	100	120	
4	0.7084	33.25	19.53	52.78	70.61	-17.83	QP	100	103	
5 *	0.9481	31.06	19.45	50.51	68.08	-17.57	QP	100	271	
6	1.5113	26.29	19.49	45.78	64.04	-18.26	QP	100	152	

Note: (1) All Readings are Peak Value.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss.
(3) The average measurement was not performed when the peak measured data under the limit of average detection.
(4) EUT lying on the table position is the worst case result in the report.



Limit:	**FCC Part 15C 3m Radiation**	**Antenna:**	**Horizontal**
EUT:	**Bicycle speedometer**	**Temperature:**	**24.5℃**
M/N.:	**590C**	**Humidity:**	**54%RH**
Mode:	**125.2kHz**	**Power Rating:**	**DC 3V**
Test Engineer:	**Vier**	**Test Time:**	**2023/10/12**

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)	Remark
1	100.810	33.65	-17.86	15.79	43.50	27.71	QP	150.0	360.0	
2	398.600	31.37	-7.55	23.82	46.00	22.18	QP	150.0	360.0	
3	551.860	31.08	-3.4	27.68	46.00	18.32	QP	150.0	360.0	
4	729.370	31.36	-0.34	31.02	46.00	14.98	QP	150.0	360.0	
5	877.780	31.25	1.67	32.92	46.00	13.08	QP	150.0	360.0	
6 *	959.260	31.09	3.42	34.51	46.00	11.49	QP	150.0	360.0	



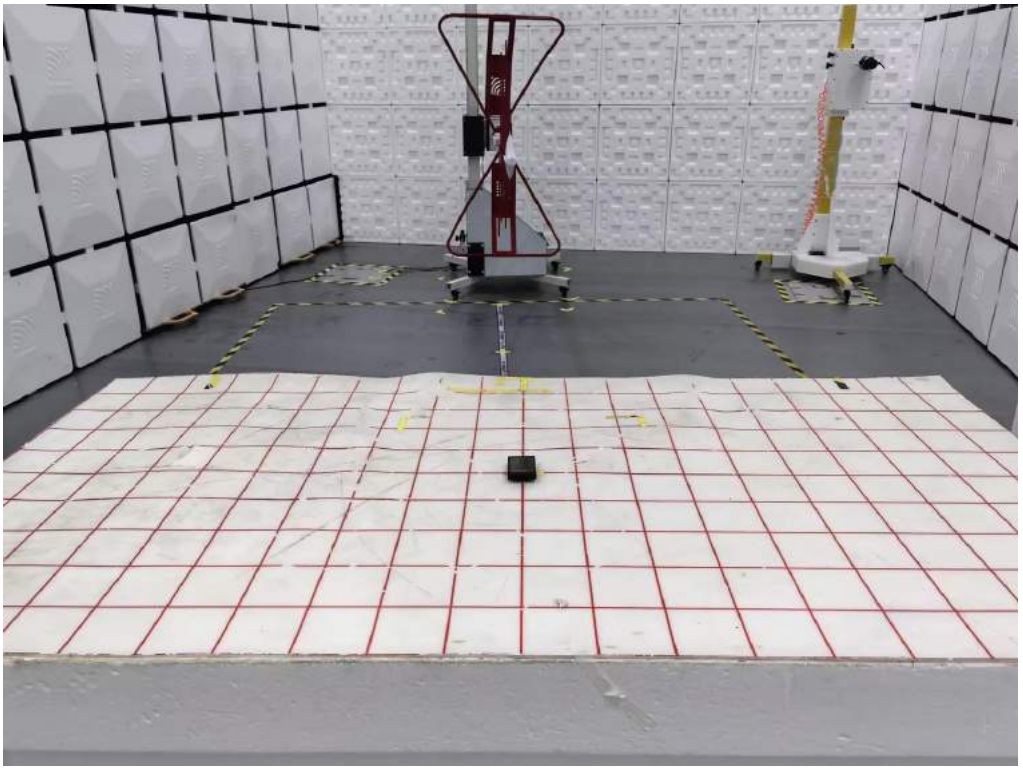
Limit:	**FCC Part 15C 3m Radiation**	**Antenna:**	**Vertical**
EUT:	**Bicycle speedometer**	**Temperature:**	**24.5℃**
M/N.:	**590C**	**Humidity:**	**54%RH**
Mode:	**125.2kHz**	**Power Rating:**	**DC 3V**
Test Engineer:	**Vier**	**Test Time:**	**2023/10/12**

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)	Remark
1 *	94.990	40.29	-18.59	21.70	43.50	21.80	QP	150.0	360.0	
2	159.980	30.77	-15.3	15.47	43.50	28.03	QP	150.0	360.0	
3	257.950	31.21	-12.31	18.90	46.00	27.10	QP	150.0	360.0	
4	420.910	31.14	-7.58	23.56	46.00	22.44	QP	150.0	360.0	
5	562.530	33.98	-3.93	30.05	46.00	15.95	QP	150.0	360.0	
6	930.160	30.89	4.1	34.99	46.00	11.01	QP	150.0	360.0	

5.6 Radiated Measurement Photos

9kHz-30MHz

30MHz-1GHz



6 20db Bandwidth

6.1 20dB Bandwidth Limit

None: for reporting purposed only.

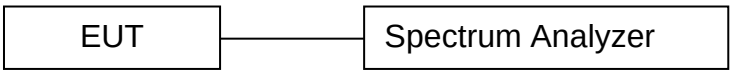
6.2 Test Instruments

Refer a test equipment and calibration data table in this test report.

6.3 Test Procedure

The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100Hz RBW and 300Hz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

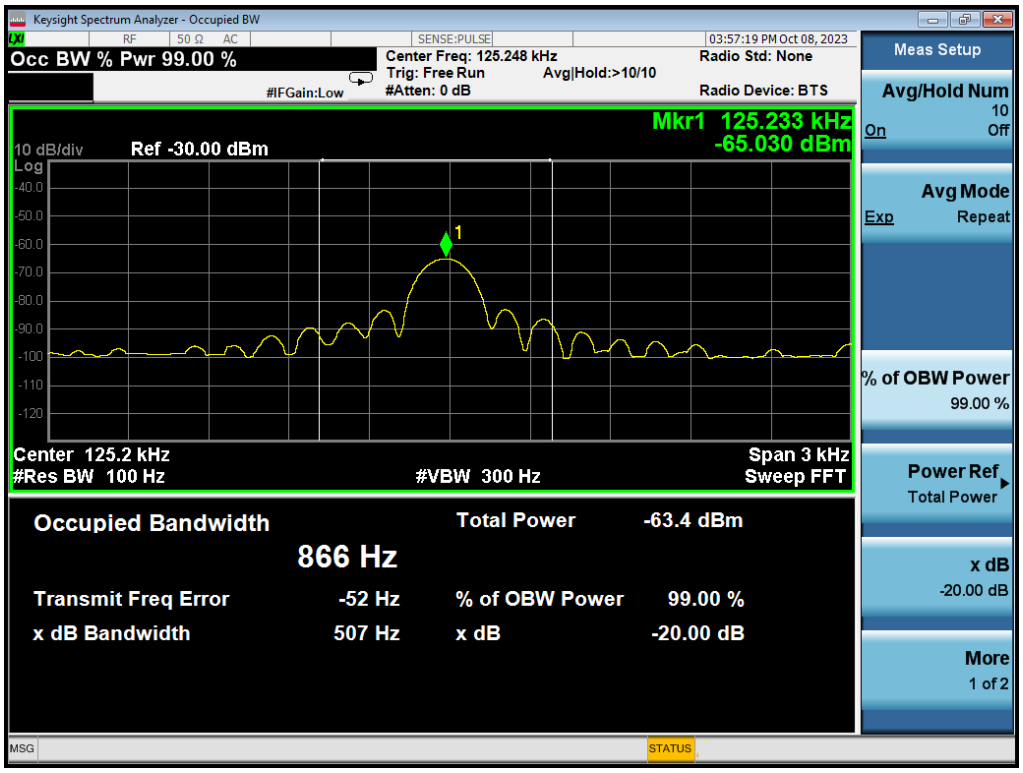
6.4 Test Setup



6.5 Test Result

Frequency (KHz)	20dB Bandwidth (KHz)	Results
125.2	0.507	PASS

20 dB Bandwidth Test plot



7 Antenna Application

7.1 Antenna requirement

For intentional device, according to FCC 47 CFR Section 15.203, 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.

7.2 Result

The EUT's antenna, permanent attached antenna, used an Induction coil and integrated on PCB, The antenna's gain meets the requirement.

APPENDIX
(Photos of EUT)

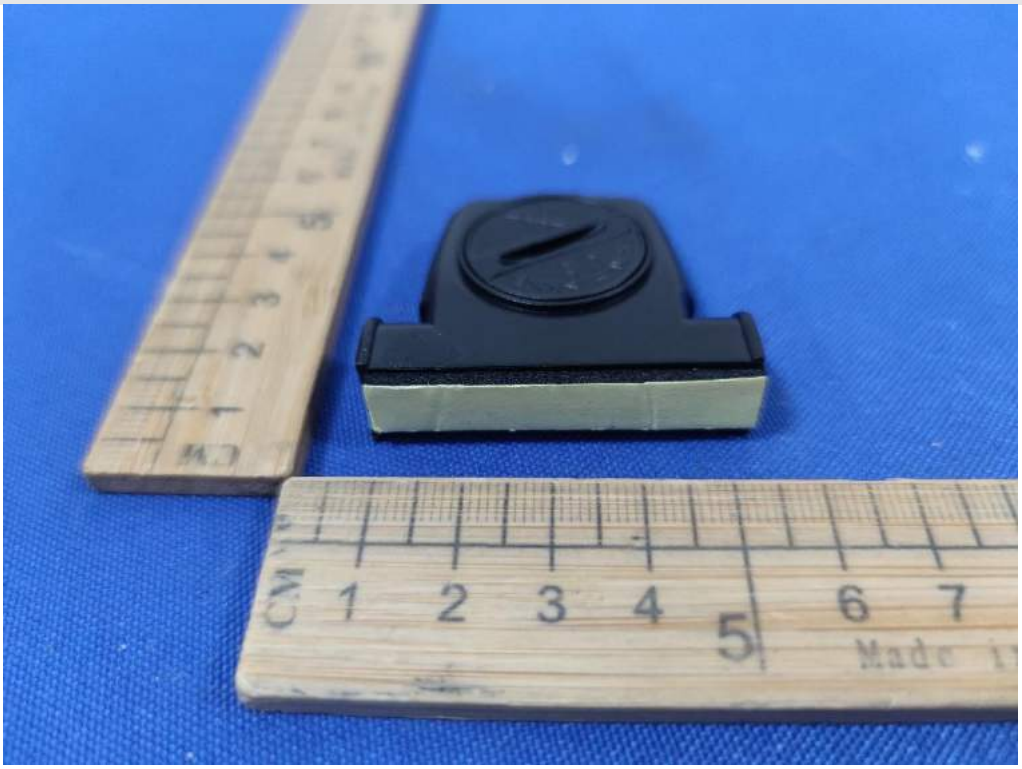
External-1

External-2

External-3

External-4

External-5

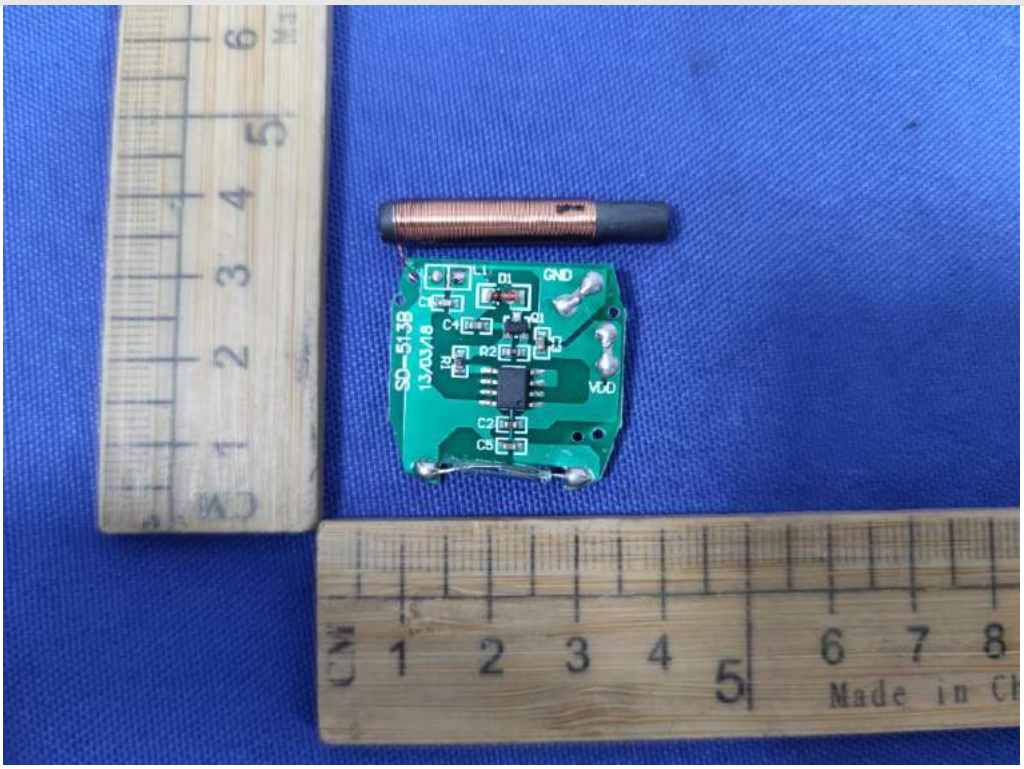


External-6

Internal-1

Internal-2

Internal-3



Internal-4

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