

FCC Test Report

Report No.: AGC02180201103FE06

FCC ID : 2AR6E-HK203
APPLICATION PURPOSE : Original Equipment
PRODUCT DESIGNATION : Bluetooth FM Transmitter
BRAND NAME : N/A
MODEL NAME : HK203(Series model name please see page 4)
APPLICANT : HAIKE PLASTIC AND ELECTRONIC CO LTD
DATE OF ISSUE : Dec. 10,2020
STANDARD(S) : FCC Part 15.239
REPORT VERSION : V1.0



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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Dec. 10,2020	Valid	Initial Release

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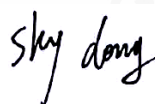


1. VERIFICATION OF CONFORMITY

Applicant	HAIKE PLASTIC AND ELECTRONIC CO LTD
Address	Block B. Shanghenglang Bai Fuli Industrial, Dalang Street, Long Hua, ShenZhen, China.
Manufacturer	HAIKE PLASTIC AND ELECTRONIC CO LTD
Address	Block B. Shanghenglang Bai Fuli Industrial, Dalang Street, Long Hua, ShenZhen, China.
Factory	HAIKE PLASTIC AND ELECTRONIC CO LTD
Address	Block B. Shanghenglang Bai Fuli Industrial, Dalang Street, Long Hua, ShenZhen, China.
Product Designation	Bluetooth FM Transmitter
Brand Name	N/A
Test Model	HK203
Series Model	HK201, HK202, HK205, HK206, HK207, HK208, HK105, HK106, HK109D, HK012D, CCC-8800-SL, DAB 010, DAB 011, DAB 012, DAB 013, DAB 014, DAB 005, DAB 105, DAB 006, DAB 106, DAB 007, DAB 107, DAB 008, DAB 108, DAB 009, DAB 109, BT010, HK010, HK006, HK007, HK008, HK009, HK100, HK011, HK012, BT008, BT009, BT001, BTT010, AF-001, AF-002, T20, T10, T20CS, T20C, T20J, T20S, T10J, TX60, TX70, TX80, TX90, Blufree-001, Blufree-002, Blufree-003, Blufree-004
Difference Description	All the same except for the model name.
Date of test	Nov. 24,2020 to Dec. 09,2020
Deviation	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Report Template	AGCRT-US-BR/RF (2013-03-01)

We hereby certify that: The above equipment was tested by Attestation of Global Compliance (Shenzhen) 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 radiated emission limits of FCC part 15.239.

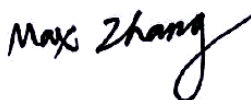
Prepared By



Sky Dong
(Project Engineer)

Dec. 10,2020

Reviewed By



Max Zhang
(Reviewer)

Dec. 10,2020

Approved By



Forrest Lei
(Authorized Officer)

Dec. 10,2020

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

A major technical description of EUT is described as following

Operation Frequency	88.1MHz-107.9MHz
Test Frequency	Low: 88.1 MHz; Middle:98.0 MHz; High: 107.9 MHz
Field Strength(3m)	46.98dBuV/m(PK)@3m
Modulation	FM
Number of channels	199(Channel spacing 100kHz)
Hardware Version	1.0
Software Version	1.0
Antenna Designation	Integral Antenna (Met 15.203 Antenna requirement)
Antenna Gain	-0.58dBi
Power Supply	DC 12/24V by car battery

NOTE: About the EUT, please refer to User's Manual.

2.2 TABLE OF CARRIER FREQUENCIES

Frequency Band	Channel Number	Frequency
88.1MHz-107.9MHz	1	88.10
	2	88.20
	--	--
	100	98.00
	101	98.10
	--	--
	198	107.80
	199	107.90

3. MEASUREMENT UNCERTAINTY

- Uncertainty of Radiated Emission below 1GHz, $U_c = \pm 4.0$ dB
- Uncertainty of Radiated Emission above 1GHz, $U_c = \pm 4.8$ dB

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4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Transmitting mode(Low channel)
2	Transmitting mode(Middle channel)
3	Transmitting mode(High channel)

Note: 1. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
2. All the requirements have been tested by modulating the transmitter with a 2.5 kHz tone at a fixed level which set to the manufacturer's maximum rated input to the modulator.
3. Only the result of the worst case was recorded in the report, if no other cases.

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5. SYSTEM TEST CONFIGURATION

5.1. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	Bluetooth FM Transmitter	HK203	2AR6E-HK203	EUT
2	Car battery	SCOSCHE	N/A	AE
3	SD card	N/A	N/A	AE
4	control board	EPS-35-3.3	DC 3.3V	AE
5	Load	N/A	N/A	AE

5.2. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
15.239	Field Strength of Fundamental and Spurious Emission	Compliant
15.215	Bandwidth	Compliant
15.207	Line Conducted Emission	N/A

Note: The EUT was supplied by car battery.

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6. TEST FACILITY

TestSite	Attestation of Global Compliance(Shenzhen) Co., Ltd
Location	1-2/F,Building19,JunfengIndustrialPark,ChongqingRoad,HepingCommunity,Fuhai Street,Bao'anDistrict,Shenzhen,Guangdong,China
Designation Number	CN1259
FCC Test Firm Registration Number	975832
A2LA Cert. No.	5054.02
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	May 15, 2020	May 14, 2021
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 12, 2019	Dec. 11, 2020
Attenuator	ZHINAN	E-002	N/A	N/A	N/A
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	May 22, 2020	May 21, 2022
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May 17, 2019	May 16, 2021
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Sep. 03,2020	Sep. 02,2022
ANTENNA	SCHWARZBECK	VULB9168	494	Jan. 09, 2019	Jan. 08, 2021
Test software	FARA	EZ-EMC (Ver RA-03A)	N/A	N/A	N/A
RF Communications Test Set	Agilent	8920B	US35010161	Sep. 03,2020	Sep. 02,2021

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7. RADIATED EMISSION

7.1. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

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The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/3MHz for Peak, 1MHz/3MHz for Average

Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

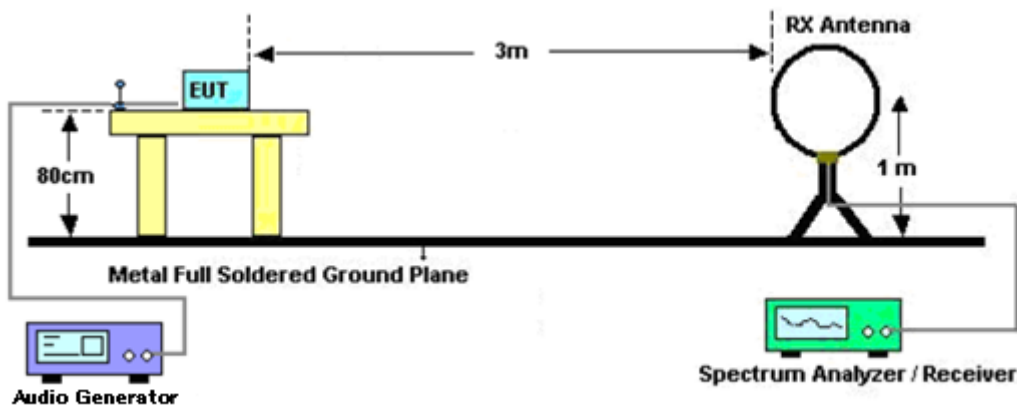
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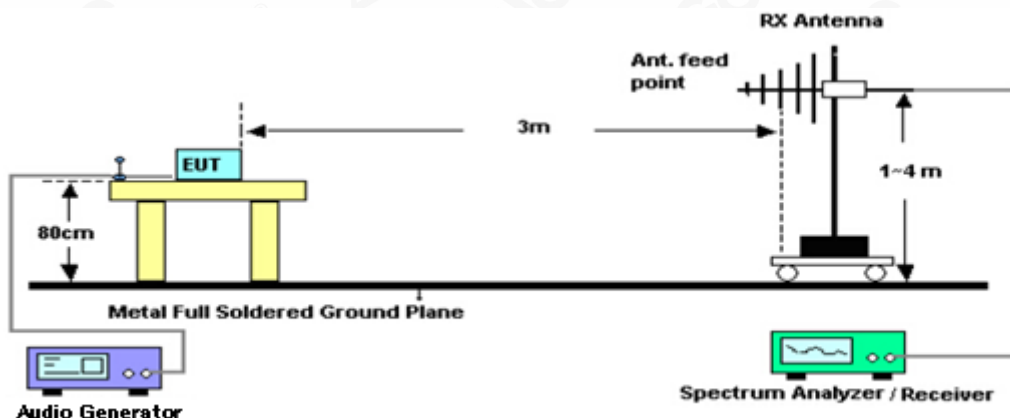


7.2.TEST SETUP

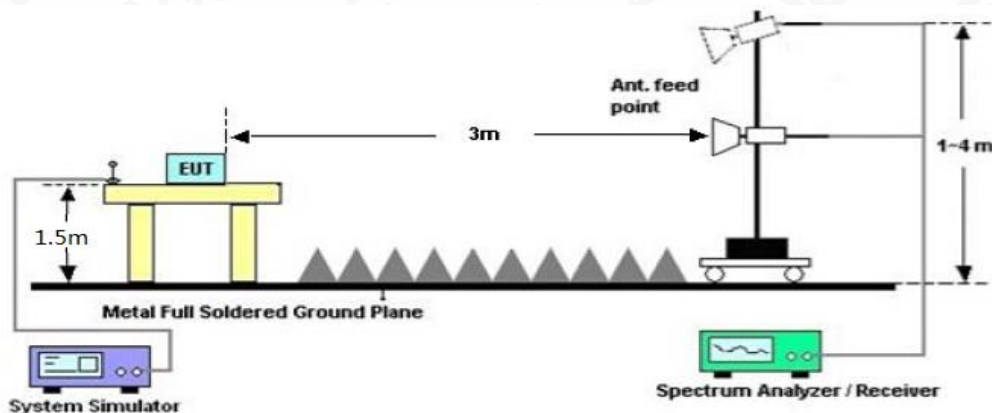
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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7.3. TEST RESULT FOR FIELD STRENGTH OF FUNDAMENTAL

Frequency MHz	Polarization	Level dB(uV/m) PK	Limit dB(uV/m) AV	Margin dB	Pass/Fail	Detector
88.100	H	46.73	47.96	1.23	Pass	PK
88.100	V	46.37	47.96	1.59	Pass	PK
98.000	H	46.84	47.96	1.12	Pass	PK
98.000	V	46.56	47.96	1.40	Pass	PK
107.900	H	46.98	47.96	0.98	Pass	PK
107.900	V	46.65	47.96	1.31	Pass	PK

7.4. TEST RESULT FOR FIELD STRENGTH OF BAND EDGE EMISSION

Frequency MHz	Polarization	Level dB(uV/m) QP	Limit dB(uV/m) QP	Margin dB	Pass/Fail	Detector
88.000	H	35.47	40	4.53	Pass	QP
88.000	V	33.36	40	6.64	Pass	QP
108.000	H	30.18	43.5	13.32	Pass	QP
108.000	V	29.30	43.5	14.20	Pass	QP

Note: The above two frequencies are the worst case for the band edge emission test.

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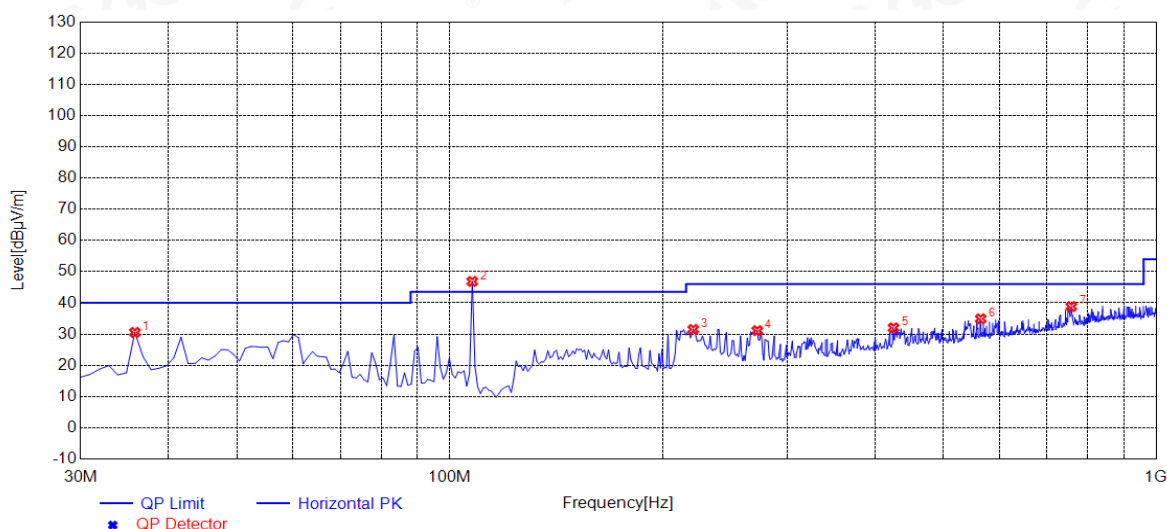


7.5. TEST RESULT FOR SPURIOUS EMISSION

RADIATED EMISSION BELOW 30MHz

No emission found between lowest internal used/generated frequencies to 30MHz.

RADIATED EMISSION BELOW 1GHZ-Horizontal



NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	35.8200	30.54	10.93	40.00	9.46	100	21	Horizontal
2	107.9000	46.86	12.17	47.96	1.10	200	36	Horizontal
3	221.0900	31.49	13.37	46.00	14.51	200	303	Horizontal
4	272.5000	31.11	15.63	46.00	14.89	200	132	Horizontal
5	424.7900	32.02	20.40	46.00	13.98	200	354	Horizontal
6	564.4700	34.91	23.54	46.00	11.09	200	2	Horizontal
7	758.4700	38.82	27.39	46.00	7.18	100	165	Horizontal

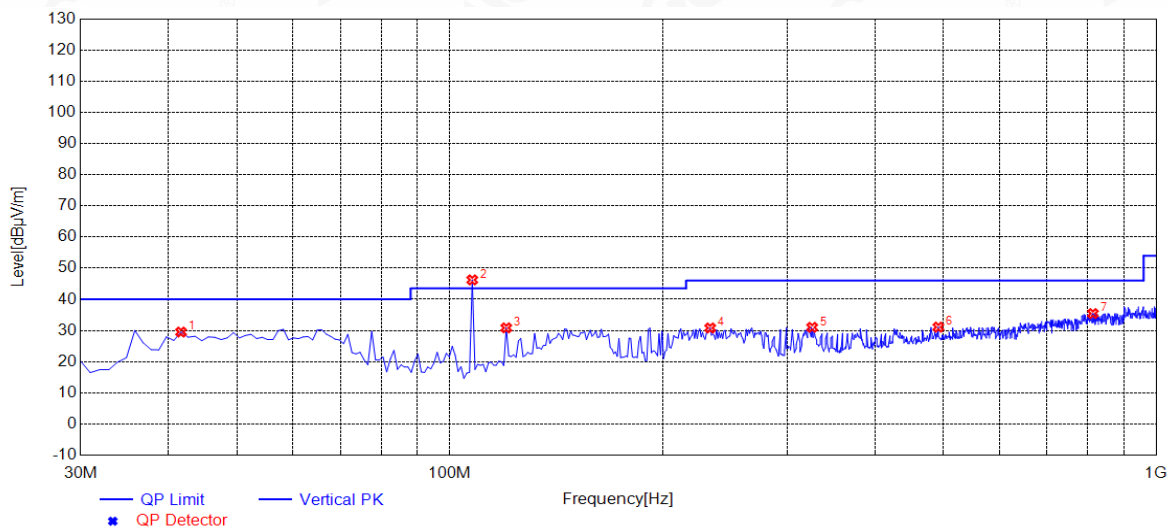
RESULT: PASS

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RADIATED EMISSION BELOW 1GHZ-Vertical



NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	41.6400	29.51	11.89	40.00	10.49	100	2	Vertical
2	107.9000	46.24	12.17	47.96	1.72	100	12	Vertical
3	120.2100	30.85	13.48	43.50	12.65	100	293	Vertical
4	233.7000	30.81	14.33	46.00	15.19	100	113	Vertical
5	325.8500	31.02	16.92	46.00	14.98	100	91	Vertical
6	491.7200	31.09	21.98	46.00	14.91	100	263	Vertical
7	813.7600	35.44	28.72	46.00	10.56	100	5	Vertical

RESULT: PASS

Note: 1. Factor=Antenna Factor+ Cable loss-Amplifier gain, Margin= Limit –Level.

- The “Factor” value can be calculated automatically by software of measurement system.
- All test modes had been pre-tested. The mode3 is the worst case and recorded in the report.
- Which above 1GHz are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

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8. BANDWIDTH

8.1. MEASUREMENT PROCEDURE

1. Set the parameters of SPA as below:

Centre frequency = Operation Frequency

RBW=3KHz

VBW=10KHz

Span: 300kHz

Sweep time: Auto

For the occupied bandwidth measurements, the input signal shall be a 2.5 kHz tone.

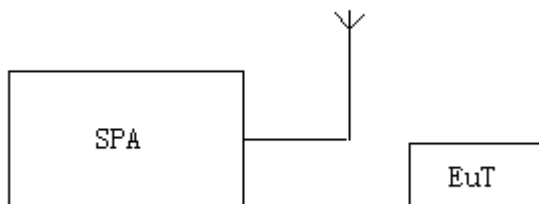
☐ The level of the tone shall be 16 dB higher than that required to produce a frequency deviation of 75 kHz, or 50% of the manufacturer's rated deviation, whichever is less.

☒ Alternatively, in the event that a 16 dB increase cannot be achieved, the level of the tone shall be set to the manufacturer's maximum rated input to the modulator.

2. Set the EUT to continue transmitting mode. Allow the trace to stabilize. Use the "N dB down" function of SPA to define the bandwidth.

3. Record the plots and Reported.

8.2. TEST SETUP



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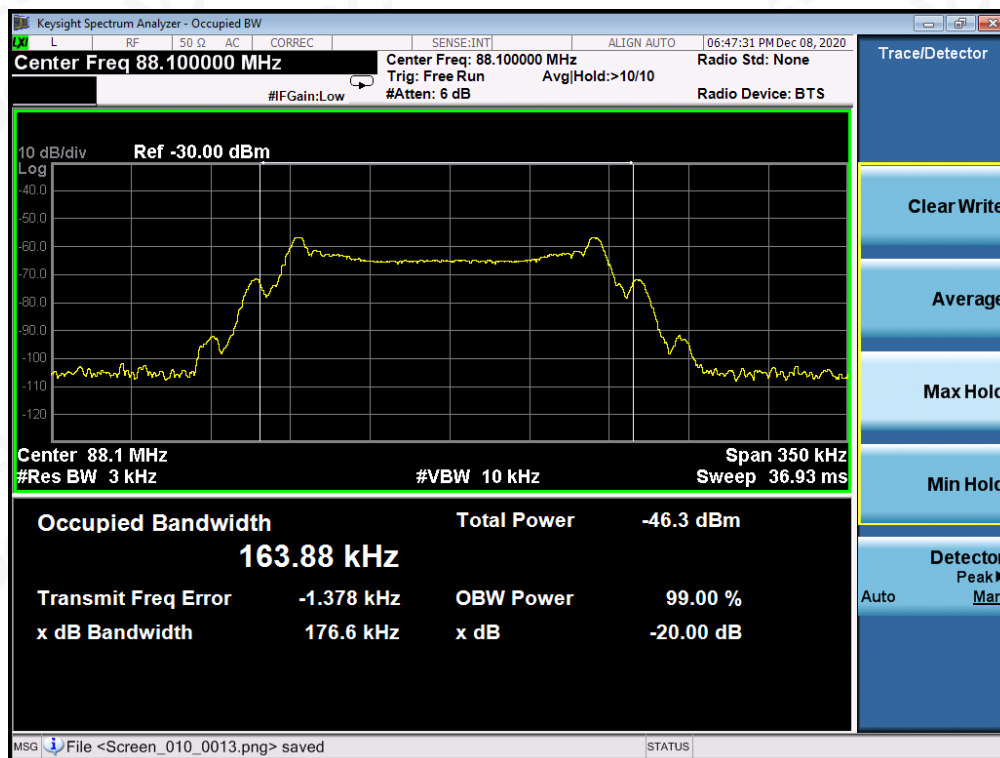
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8.3. TEST RESULT

Channel	Channel Frequency(MHz)	-20dB bandwidth (kHz)	Limit(kHz)
Low	88.1	176.6	200
Middle	98.0	176.8	200
High	107.9	176.6	200

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

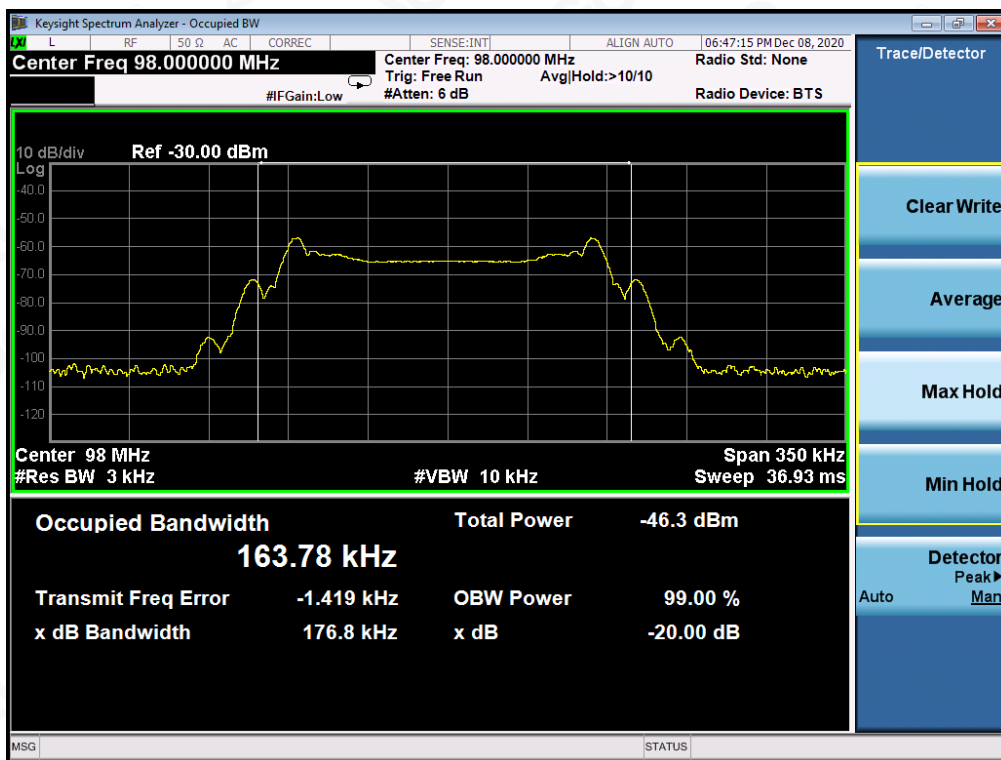


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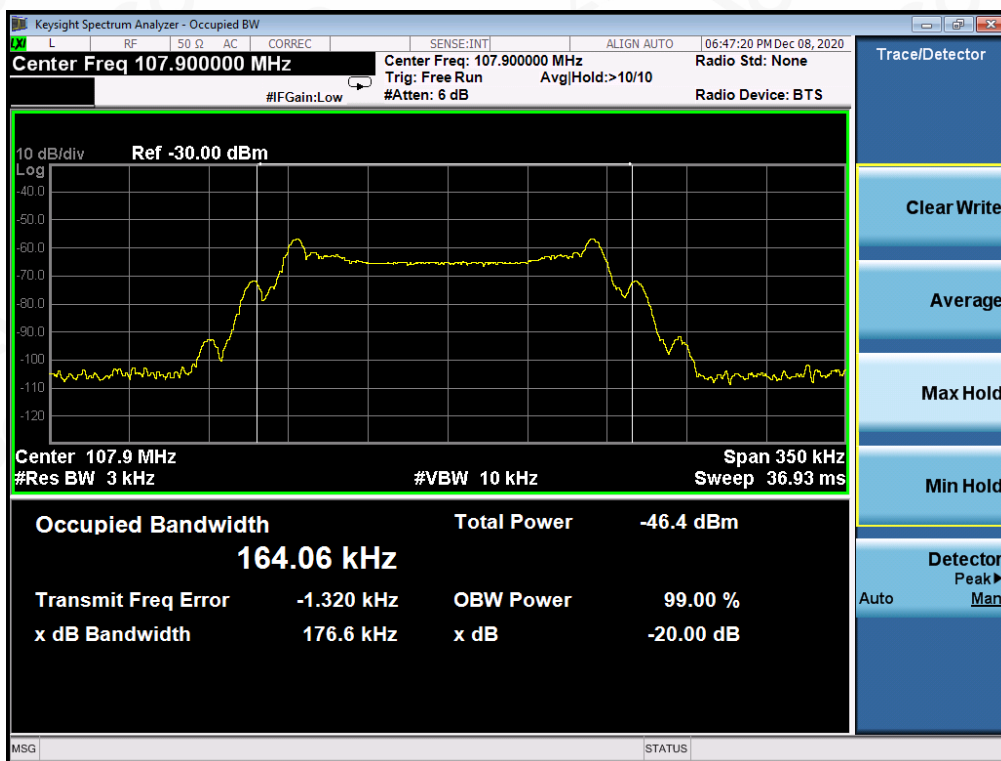
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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



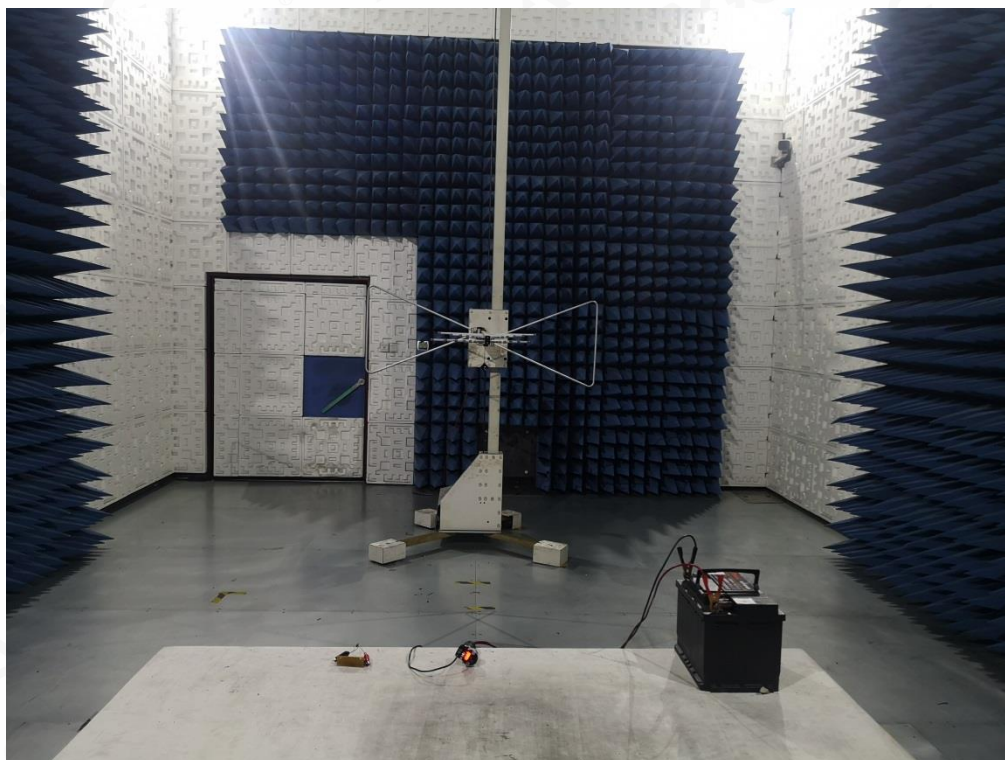
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APPENDIX A: PHOTOGRAPHS OF TEST SETUP

RADIATED EMISSION TEST SETUP BELOW 1G



RADIATED EMISSION TEST SETUP ABOVE 1G



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APPENDIX B: PHOTOGRAPHS OF EUT

TOP VIEW OF EUT



BOTTOM VIEW OF EUT



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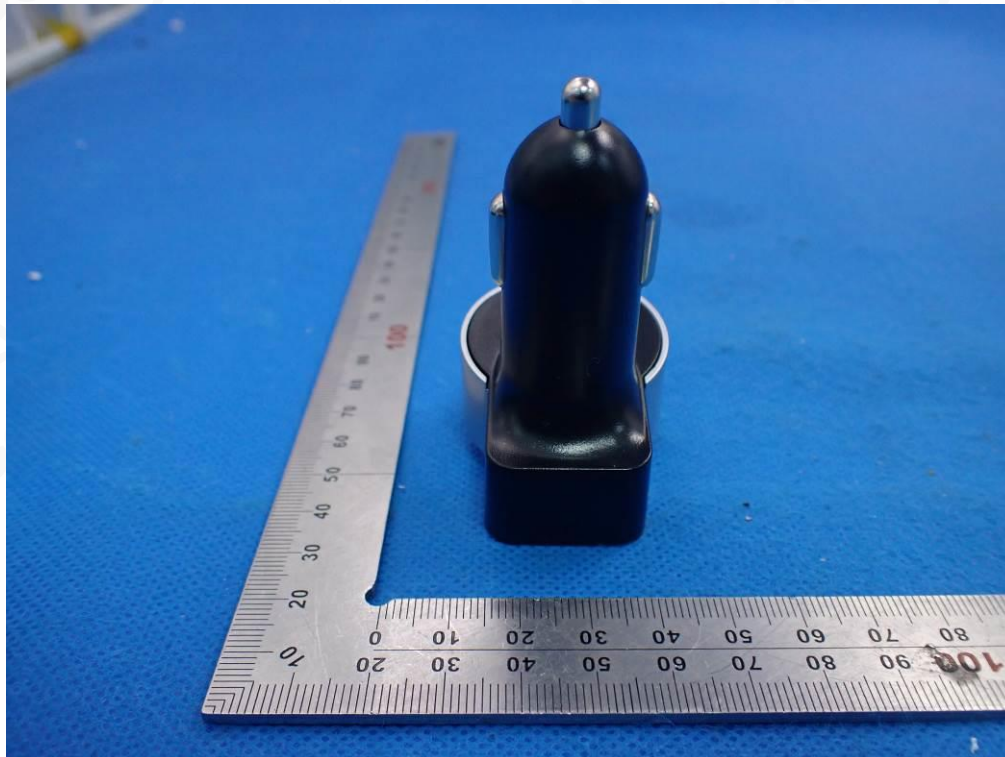
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FRONT VIEW OF EUT



BACK VIEW OF EUT

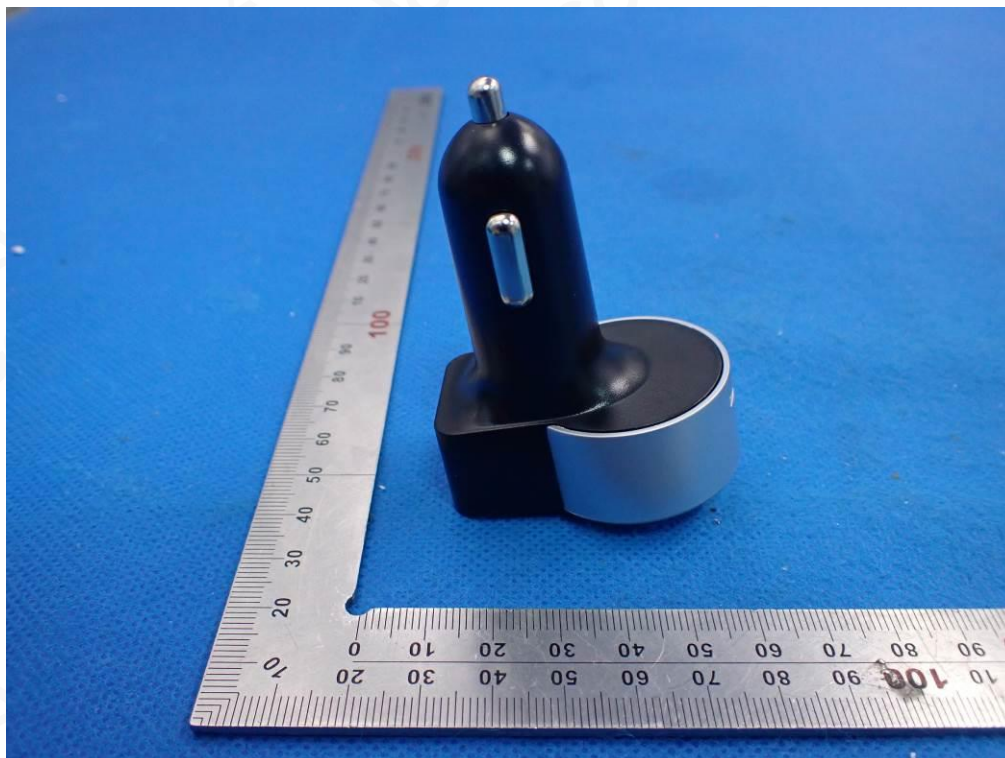


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LEFT VIEW OF EUT



RIGHT VIEW OF EUT



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VIEW OF EUT(PORT)-1



VIEW OF EUT(PORT)-2

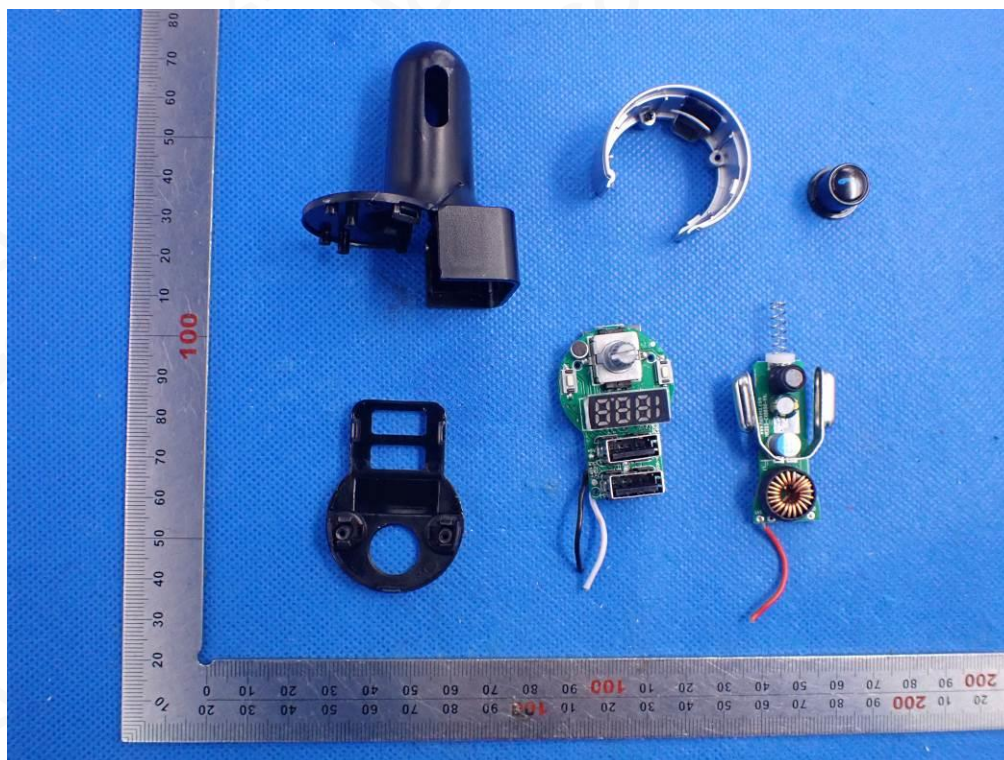


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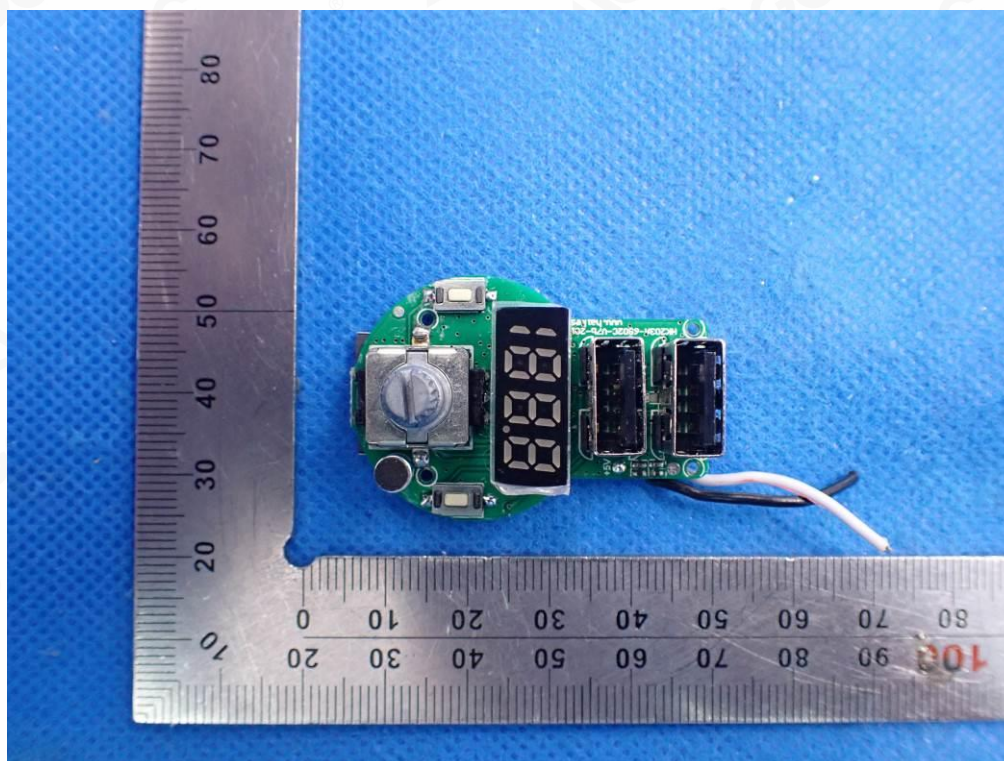
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OPEN VIEW OF EUT



INTERNAL VIEW OF EUT-1

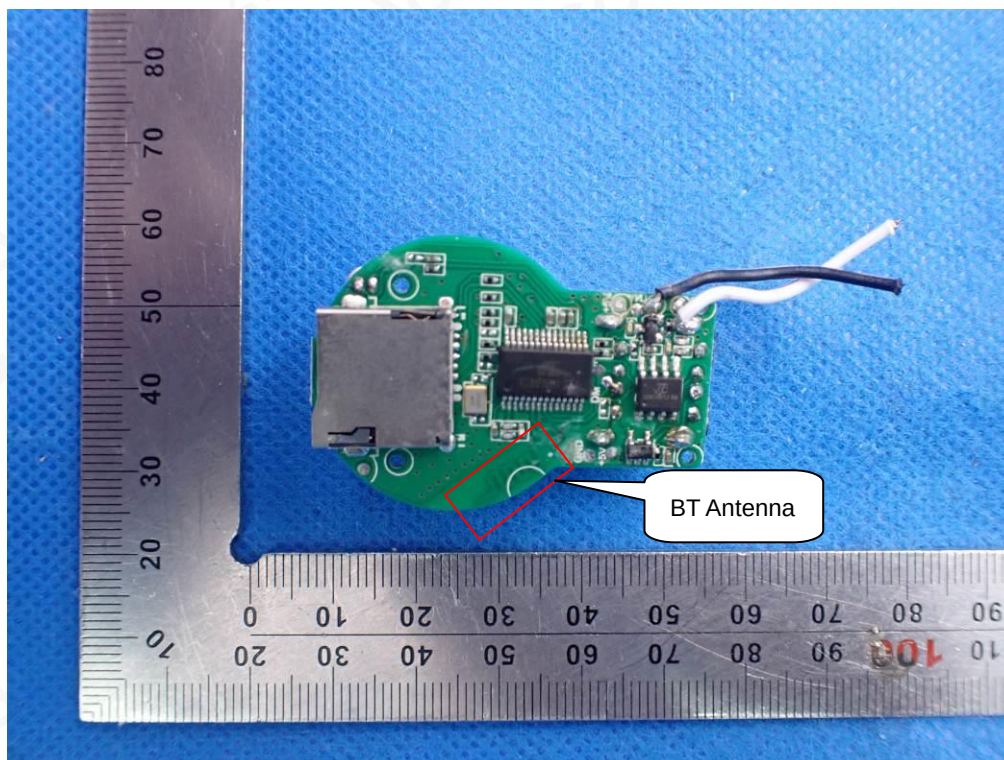


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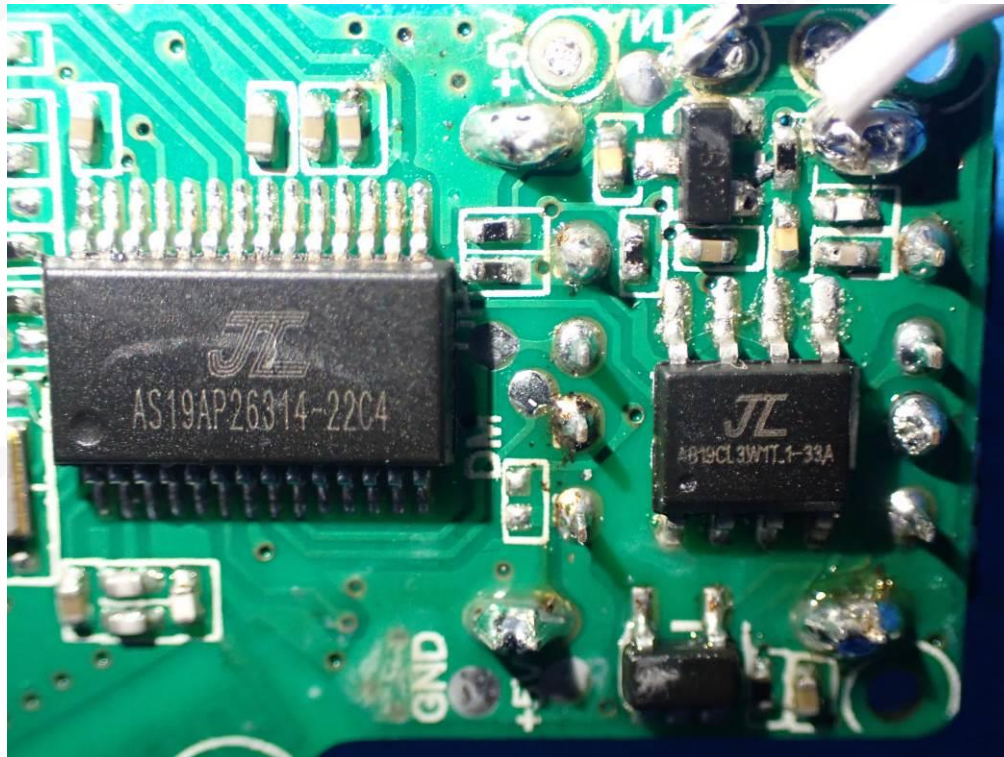
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INTERNAL VIEW OF EUT-2



INTERNAL VIEW OF EUT-3

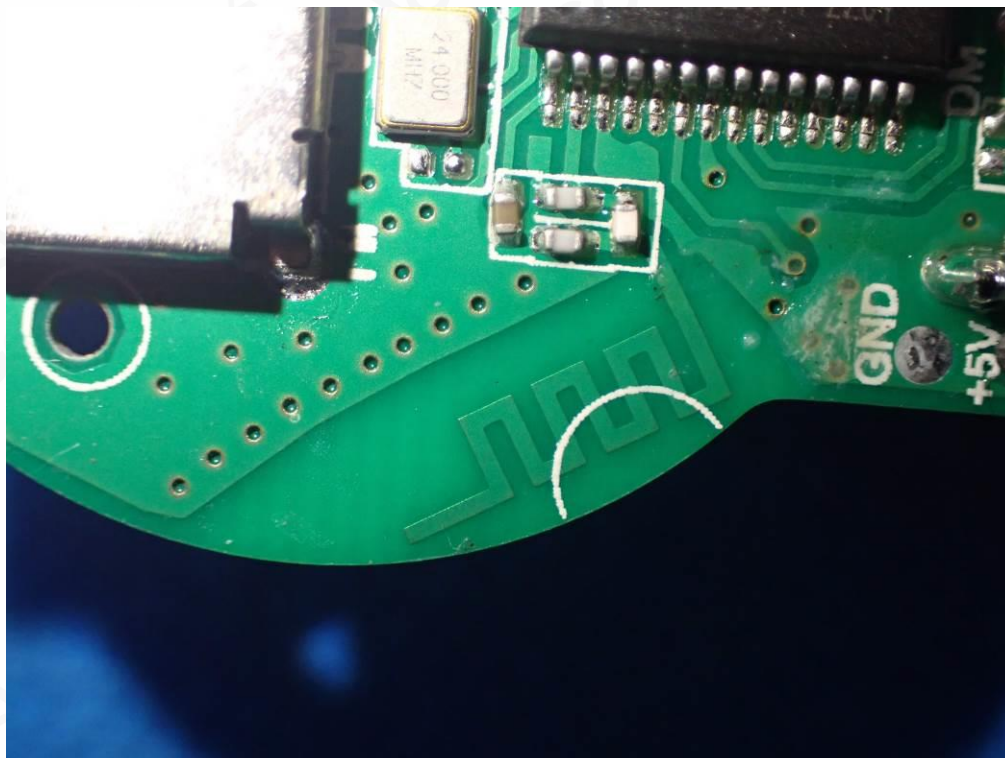


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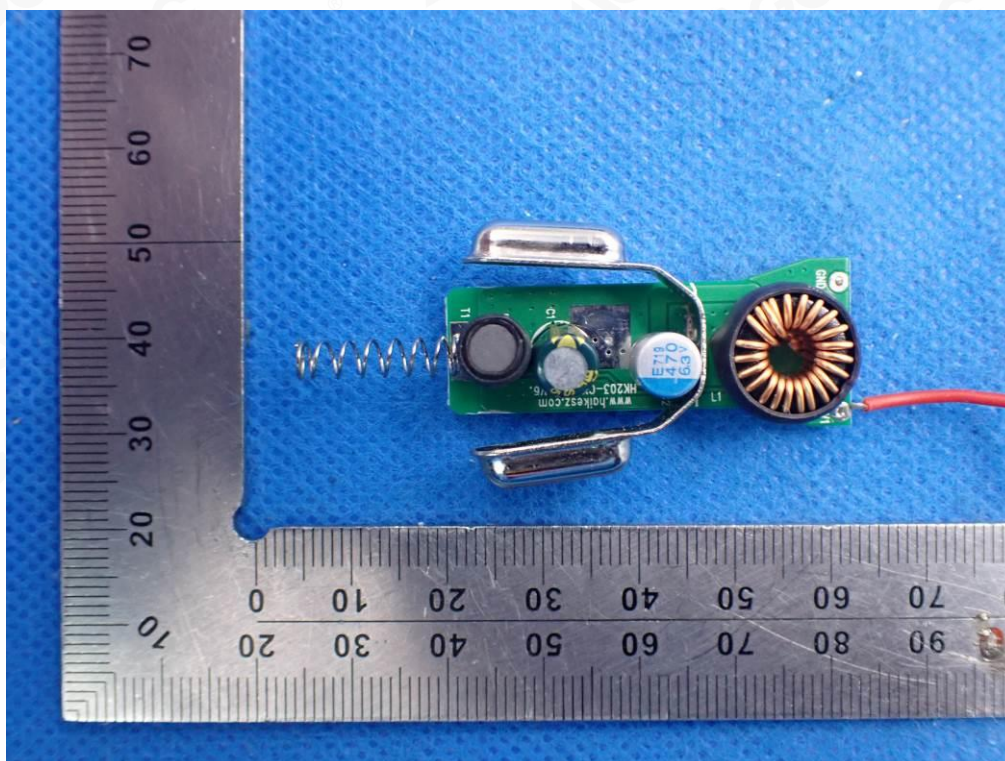
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INTERNAL VIEW OF EUT-4



INTERNAL VIEW OF EUT-5

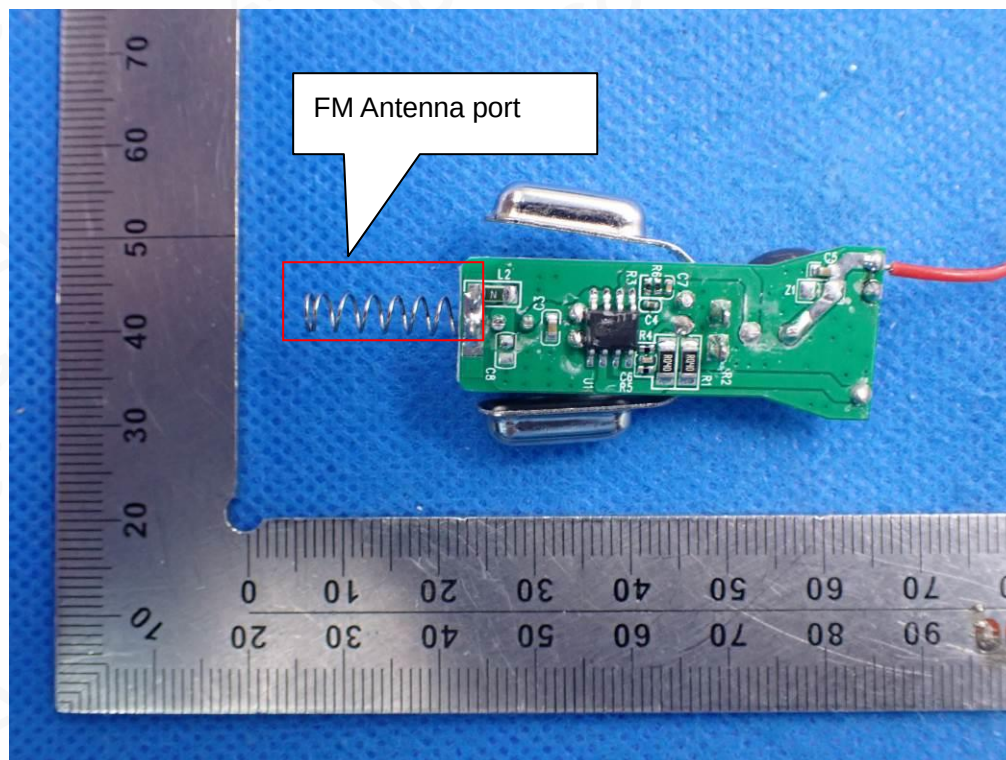


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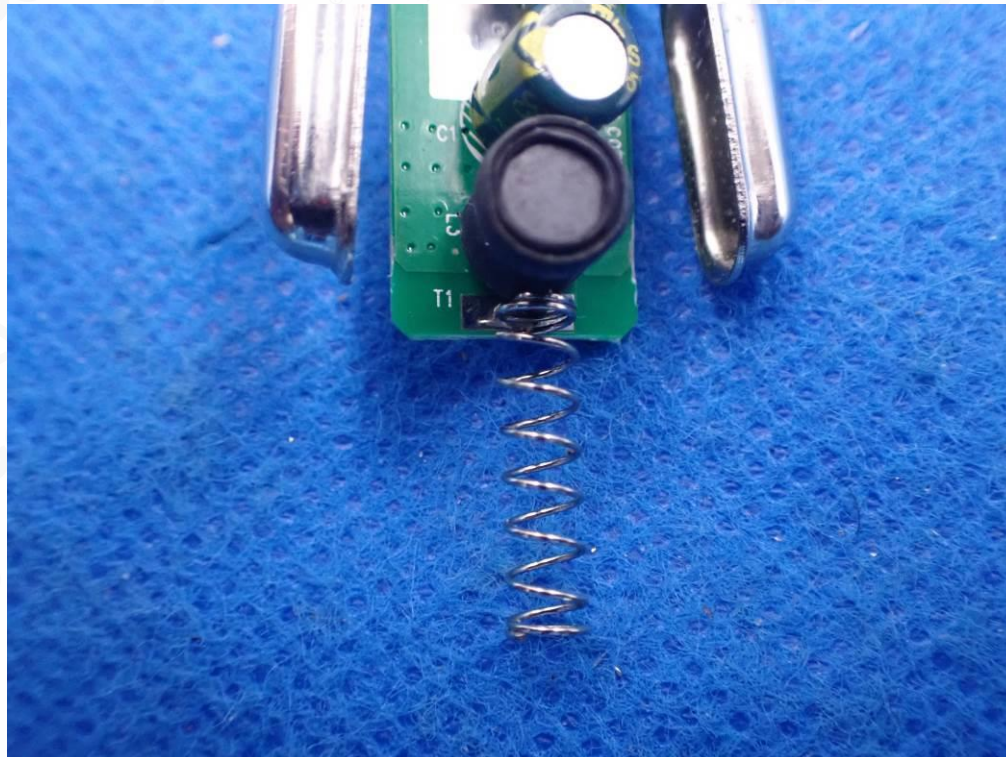
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INTERNAL VIEW OF EUT-6



INTERNAL VIEW OF EUT-7



----END OF REPORT----

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Conditions of Issuance of Test Reports

1. All samples and goods are accepted by the Attestation of Global Compliance (Shenzhen) Co., Ltd (the “Company”) solely for testing and reporting in accordance with the following terms and conditions. The company provides its services on the basis that such terms and conditions constitute express agreement between the company and any person, firm or company requesting its services (the “Clients”).
2. Any report issued by Company as a result of this application for testing services (the “Report”) shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.
3. The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.
4. The non-CMA report issued by AGC is only permitted to be used by the client as internal reference use and shall not be used for public demonstration purpose.
5. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.
6. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.
7. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.
8. Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.
9. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.
10. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

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