

FCC Test Report

Report No.: AGC07307190902FE06

FCC ID : 2ALU4DX203A03
APPLICATION PURPOSE : Original Equipment
PRODUCT DESIGNATION : Low-Profile Bluetooth FM Transmitter
BRAND NAME : AUTO DRIVE
MODEL NAME : VM-203
APPLICANT : Huizhou Artsun Industrial Company Limited
DATE OF ISSUE : Oct. 22, 2019
STANDARD(S) : FCC Part 15.239
REPORT VERSION : V1.0

Attestation of *Global Compliance*(Shenzhen) Co., Ltd

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Oct. 22, 2019	Valid	Original Report



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1. VERIFICATION OF CONFORMITY

Applicant	Huizhou Artsun Industrial Company Limited
Address	No.2, Floor 14th, Unit one, Ruihe Commercial Square, No.1 Yandayi Road, Henan'an District, Huizhou City 516007, Guangdong, China
Manufacturer	Huizhou Artsun Industrial Company Limited
Address	No.2, Floor 14th, Unit one, Ruihe Commercial Square, No.1 Yandayi Road, Henan'an District, Huizhou City 516007, Guangdong, China
Factory	VOLANT ROC ELECTRONICS TECH CO., LTD
Address	A Building, QianLi Industrial Park, Sandong Town, Huizhou City 516025, Guangdong, China
Product Designation	Low-Profile Bluetooth FM Transmitter
Brand Name	AUTO DRIVE
Test Model	VM-203
Date of test	Oct. 16, 2019 to Oct. 22, 2019
Deviation	None
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)

Oct. 22, 2019

Reviewed By



Max Zhang
(Reviewer)

Oct. 22, 2019

Approved By



Forrest Lei
(Authorized Officer)

Oct. 22, 2019

2. GENERAL INFORMATION

2.1.PRODUCT DESCRIPTION

A major technical description of EUT is described as following

Operation Frequency	88.1MHz-107.9MHz
Field Strength(3m)	37.2dBuV/m(PK)@3m
Modulation	FM
Number of channels	199(Channel spacing 100kHz)
Hardware Version	VM-2001B
Software Version	V5.0
Antenna Designation	Integrated Antenna (Met 15.203 Antenna requirement)
Power Supply	DC 12/24V by car battery

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

3. MEASUREMENT UNCERTAINTY

Conducted measurement: +/- 3.18dB

Radiated measurement: +/- 3.91dB

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.

5. SYSTEM TEST CONFIGURATION

5.1. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	Low-Profile Bluetooth FM Transmitter	VM-203	2ALU4DX203A03	EUT
2	Smart phone	P8	N/A	A.E
3	U-disk	DataTraveler SE9 16G	N/A	A.E
4	Battery	N300	N/A	A.E
5	USB line	2375	1m	A.E
6	Load	RX24-50W	50 Ω	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
15.209	Line Conducted Emission	N/A

Note: N/A means it's not applicable to this item.



6. TEST FACILITY

Test Site	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	Jun. 12, 2019	Jun. 26, 2020
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 20, 2018	Dec. 19, 2019
Attenuator	ZHINAN	E-002	N/A	Aug. 26, 2019	Aug. 25, 2020
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep. 09, 2019	Sep. 08, 2021
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	Jun. 14, 2018	Jun. 13, 2020
ANTENNA	SCHWARZBECK	VULB9168	494	Jan. 09, 2019	Jan. 08, 2021



7. RADIATED EMISSION

7.1. MEASUREMENT PROCEDURE

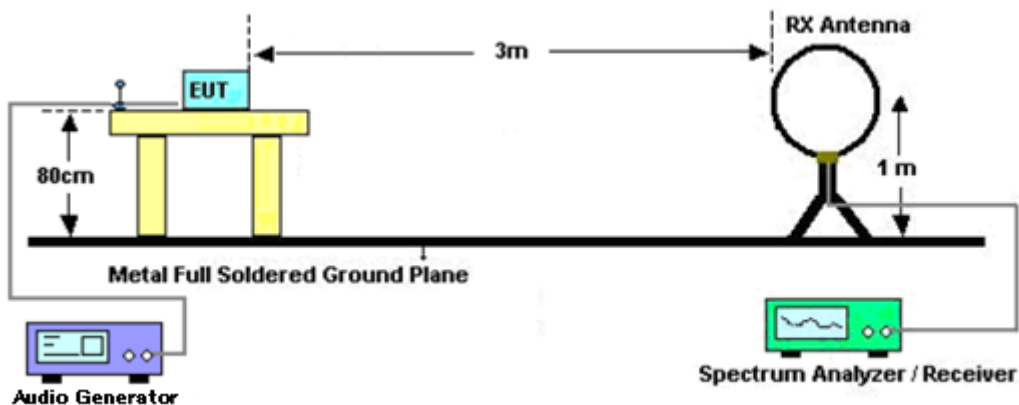
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground and opposite the horn antenna. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power 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 below 1GHz, use 120KHz RBW and VBW>=3RBW for QP reading.
7. 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.
8. Only the worst case is reported.

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

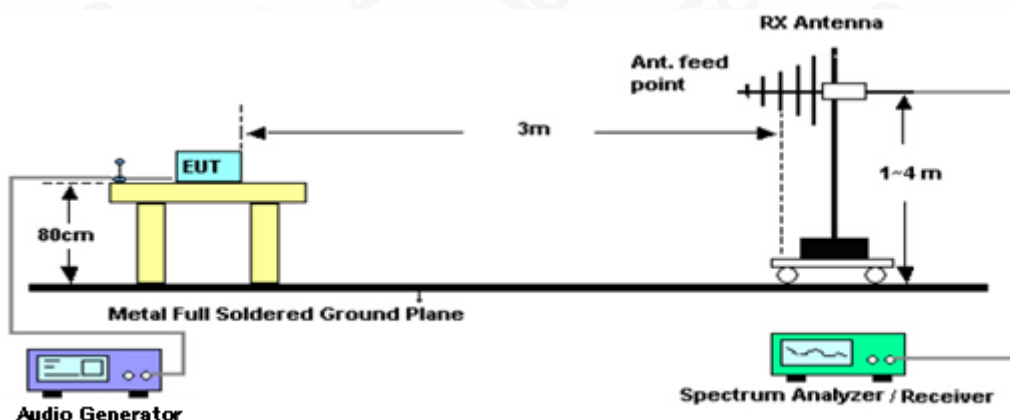
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RBW 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RBW 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RBW 120KHz for QP

7.2.TEST SETUP

Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHZ-1000MHZ



7.3. TEST RESULT FOR FIELD STRENGTH OF FUNDAMENTAL

Frequency MHz	Polarization	Level dB(uV/m) PK	Limit dB(uV/m) PK	Margin dB	Pass/Fail	Detector
88.100	H	37.20	67.96	30.76	Pass	PK
88.100	V	28.77	67.96	39.19	Pass	PK
98.000	H	36.83	67.96	31.13	Pass	PK
98.000	V	28.67	67.96	39.29	Pass	PK
107.900	H	36.96	67.96	31.00	Pass	PK
107.900	V	28.66	67.96	39.30	Pass	PK
Frequency MHz	Polarization	Level dB(uV/m) AV	Limit dB(uV/m) AV	Margin dB	Pass/Fail	Detector
88.100	H	36.51	47.96	11.45	Pass	AV
88.100	V	28.15	47.96	19.81	Pass	AV
98.000	H	36.22	47.96	11.74	Pass	AV
98.000	V	28.07	47.96	19.89	Pass	AV
107.900	H	36.37	47.96	11.59	Pass	AV
107.900	V	28.11	47.96	19.85	Pass	AV

8.4. 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	28.15	40	5.84	Pass	QP
88.000	V	25.26	40	7.3	Pass	QP
108.000	H	23.91	43.5	9.69	Pass	QP
108.000	V	24.96	43.5	11.78	Pass	QP

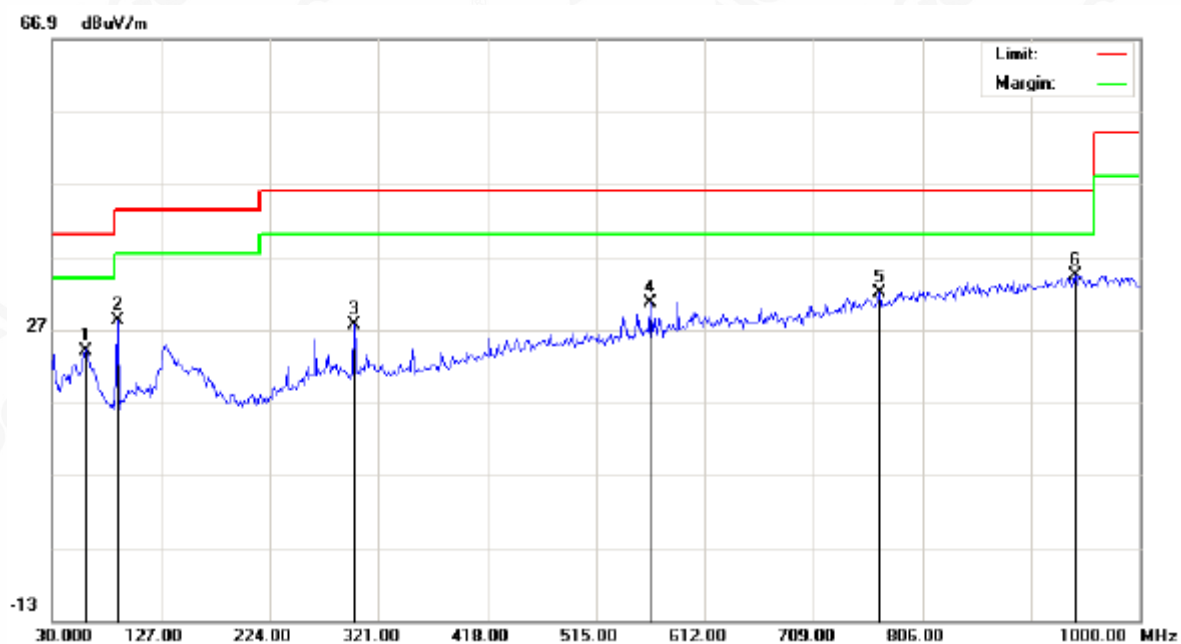
Note: The above two frequencies are the worst case for the band edge emission test.

7.5. TEST RESULT FOR SPURIOUS EMISSION

RADIATED EMISSION FM OW 30MHz

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

RADIATED EMISSION FM OW 1GHZ-Horizontal



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		60.7167	5.36	18.74	24.10	40.00	-15.90	peak			
2		88.1000	13.18	14.97	28.15	47.96	-19.81	peak			
3		299.9833	8.19	19.47	27.66	46.00	-18.34	peak			
4		563.5000	4.34	26.23	30.57	46.00	-15.43	peak			
5		767.2000	2.38	29.67	32.05	46.00	-13.95	peak			
6	*	941.8000	2.42	32.06	34.48	46.00	-11.52	peak			

RESULT: PASS

RADIATED EMISSION BELOW 1GHZ-Vertical



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	60.7167	17.81	18.74	36.55	40.00	-3.45	peak			
2		88.1000	21.54	14.97	36.51	47.96	-11.45	peak			
3		264.4166	10.43	18.67	29.10	46.00	-16.90	peak			
4		587.7500	3.94	26.71	30.65	46.00	-15.35	peak			
5		784.9833	1.60	30.07	31.67	46.00	-14.33	peak			
6		930.4833	2.36	31.96	34.32	46.00	-11.68	peak			

RESULT: PASS

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

2. The "Factor" value can be calculated automatically by software of measurement system.

3. All test modes had been tested. The Low channel is the worst case and recorded in the report.

Remark: which above 1GHz are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

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

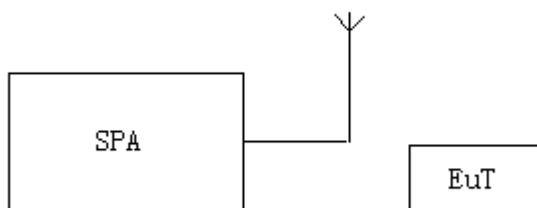
For the occupied bandwidth measurements, the input signal shall be a 2.5 kHz tone.

☐ 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.

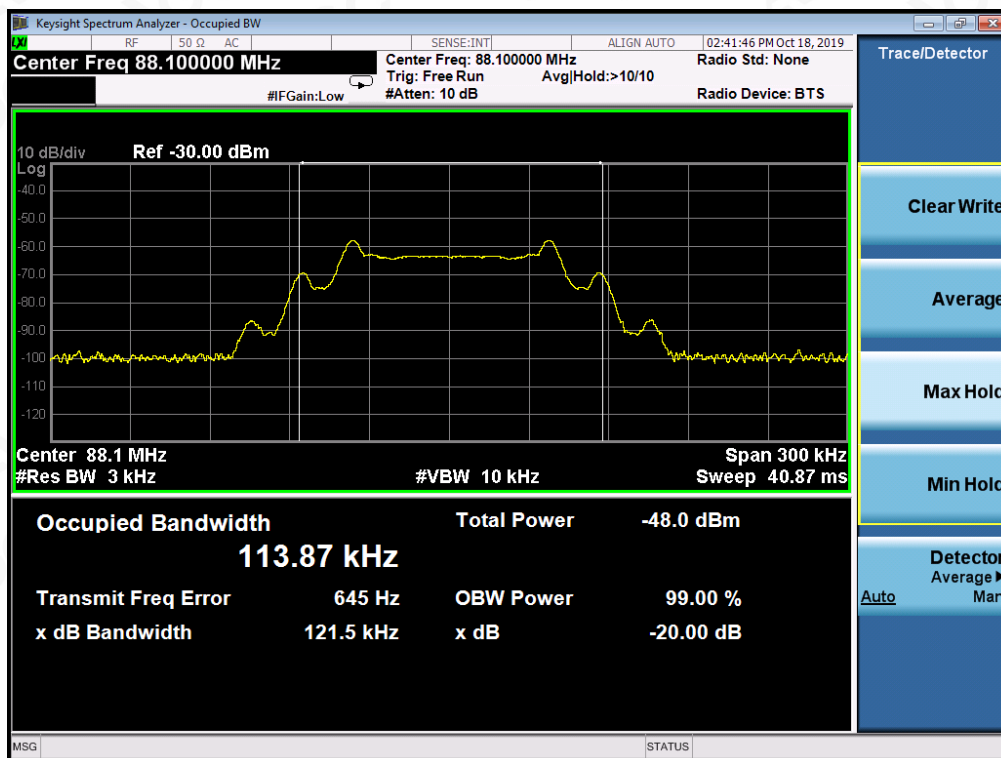
8.2. TEST SETUP



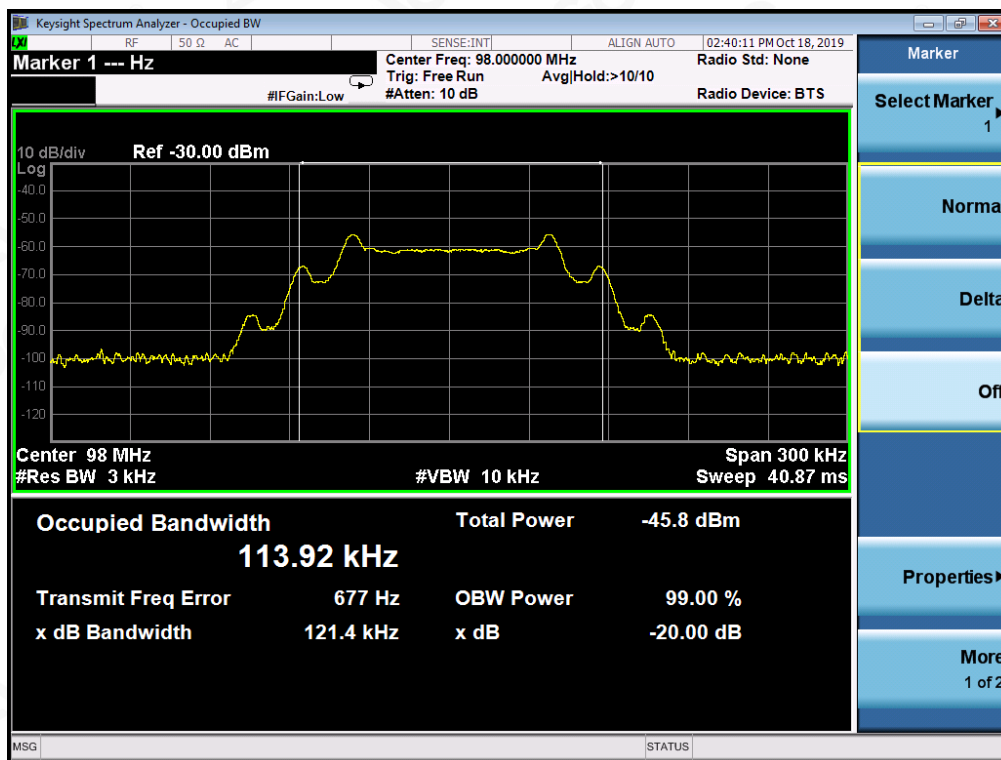
8.3. TEST RESULT

Channel	Channel Frequency(MHz)	-20dB bandwidth (kHz)	Limit(kHz)
Low	88.1	121.5	200
Middle	98.0	121.4	200
High	107.9	121.7	200

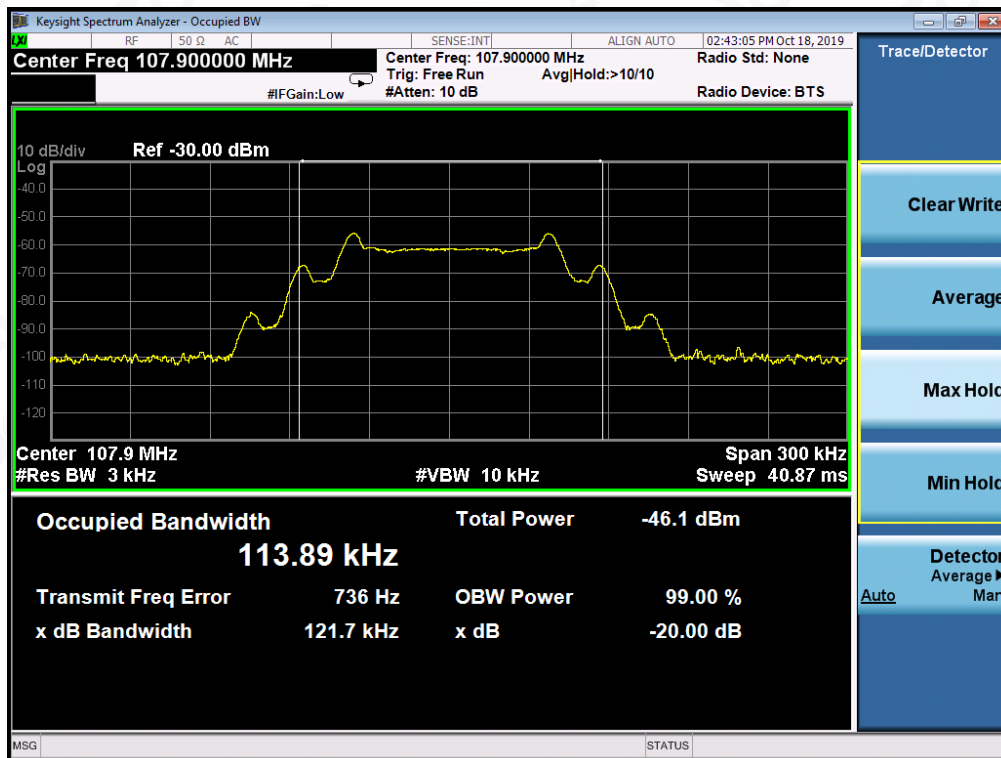
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



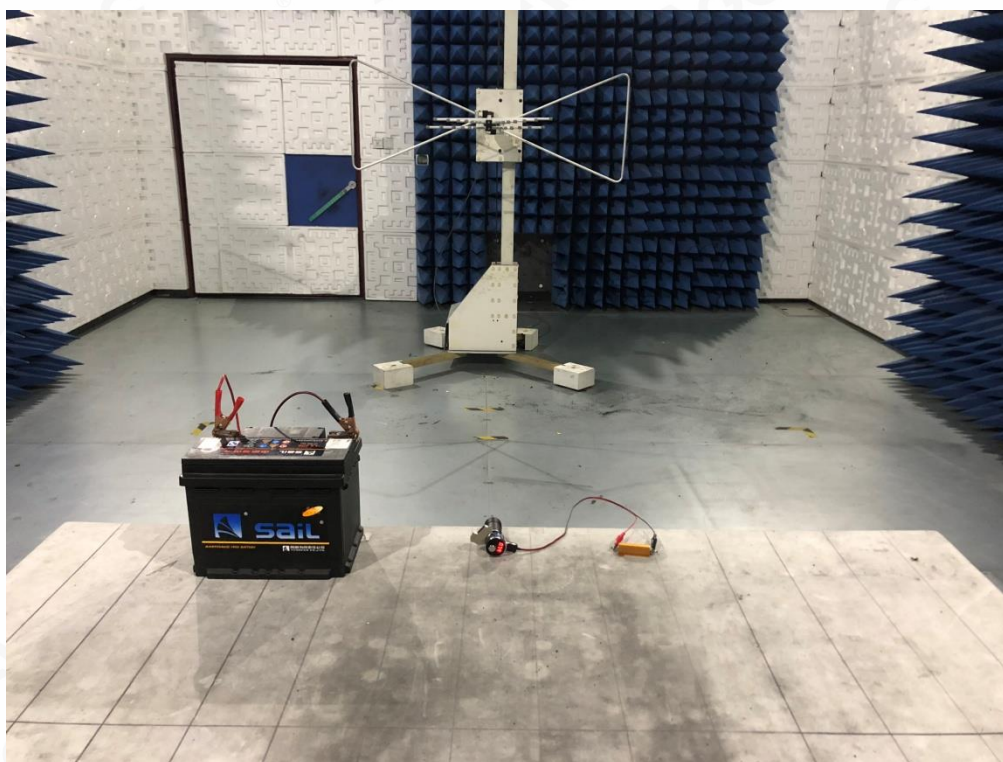
TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



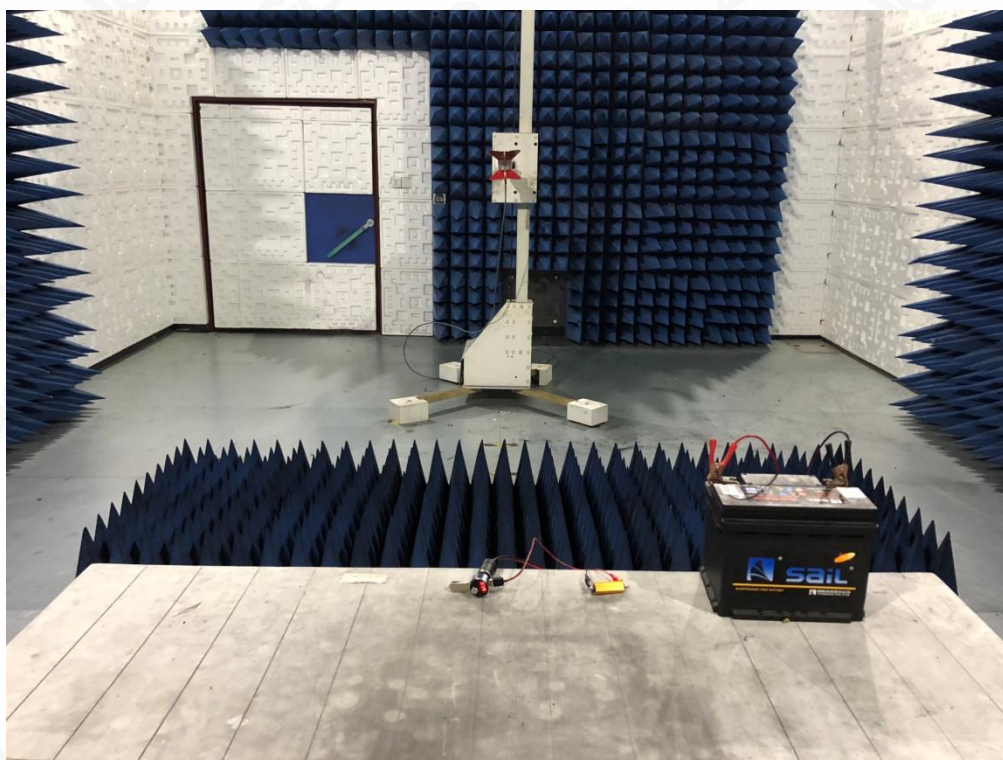
TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



APPENDIX A: PHOTOGRAPHS OF TEST SETUP
RADIATED EMISSION TEST SETUP BELOW 1G



RADIATED EMISSION TEST SETUP ABOVE 1G



APPENDIX B: PHOTOGRAPHS OF EUT

TOP VIEW OF EUT



BOTTOM VIEW OF EUT



FRONT VIEW OF EUT



BACK VIEW OF EUT



LEFT VIEW OF EUT



RIGHT VIEW OF EUT



VIEW OF EUT(PORT)-1



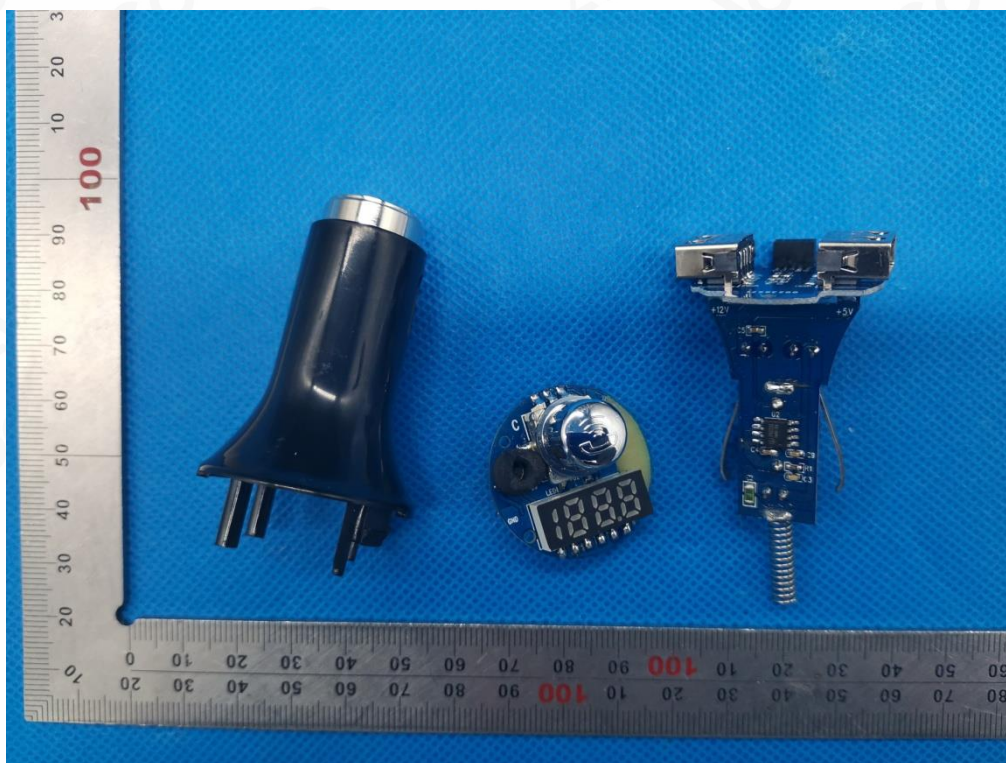
VIEW OF EUT(PORT)-2



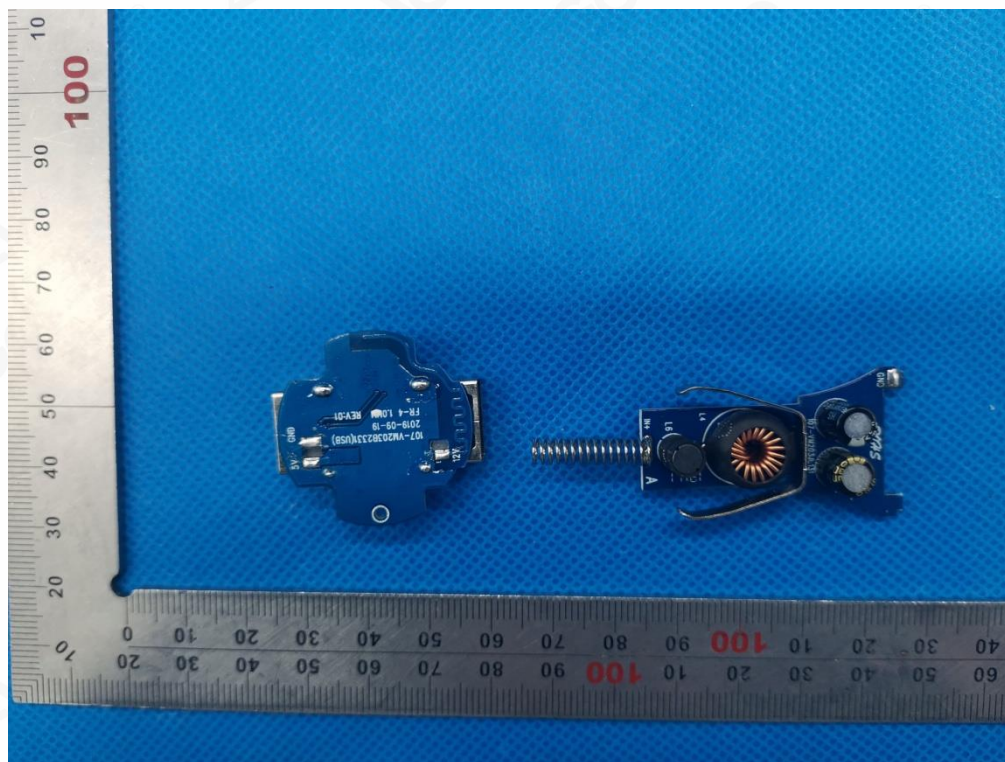
OPEN VIEW OF EUT-1



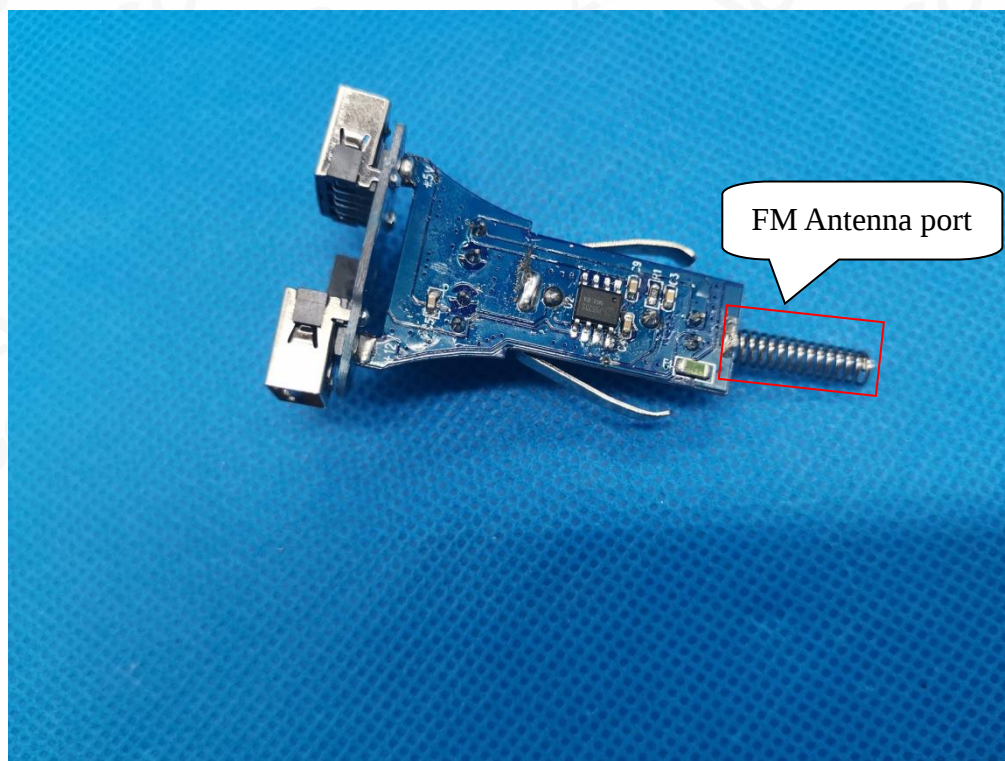
OPEN VIEW OF EUT-2



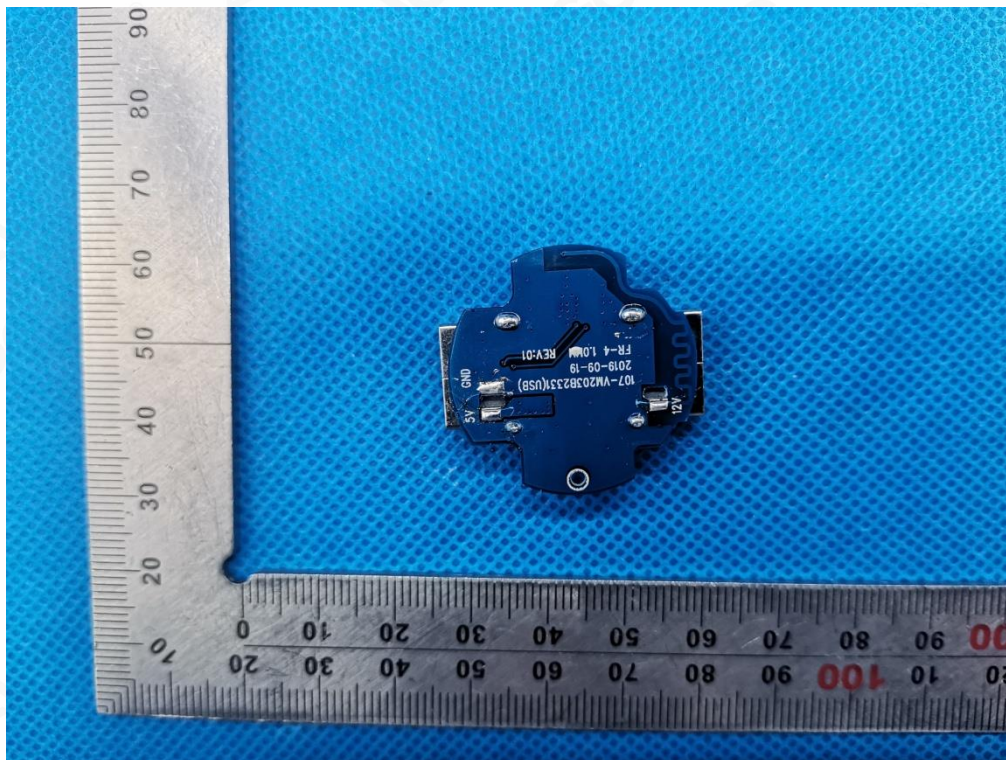
OPEN VIEW OF EUT-3



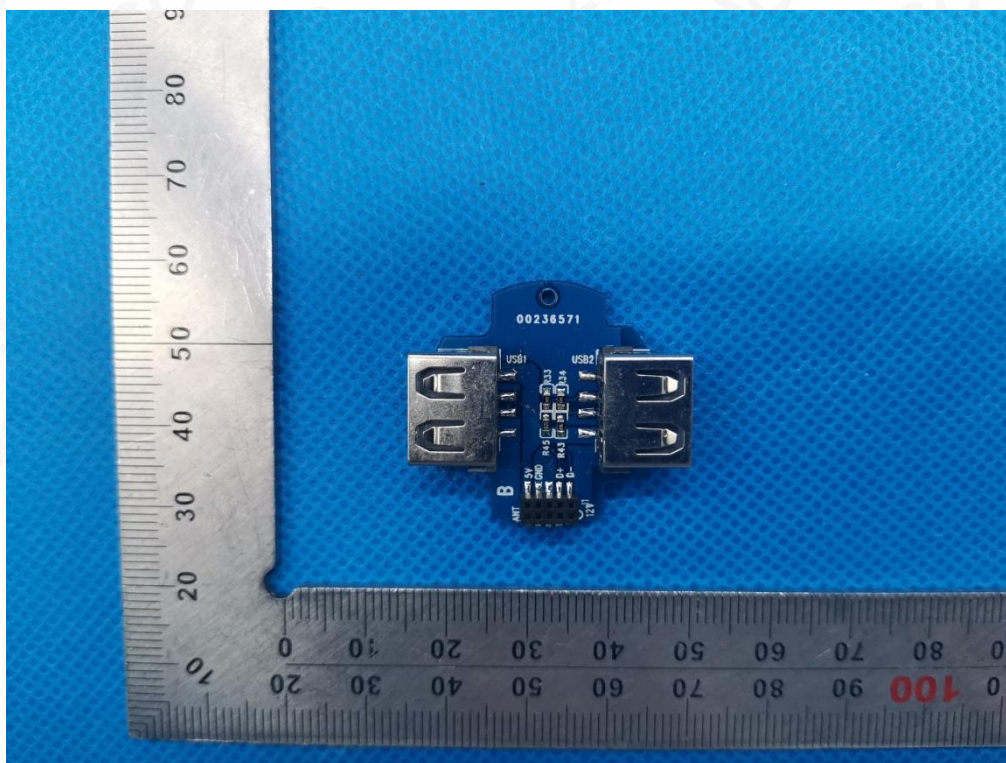
INTERNAL VIEW OF EUT-1



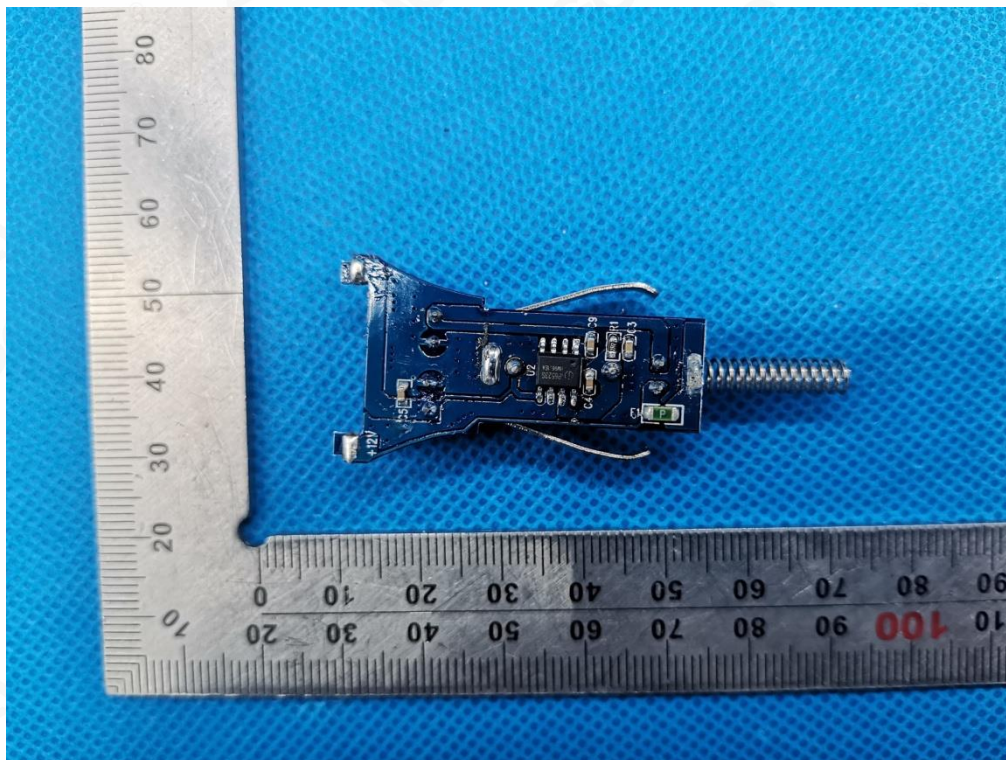
INTERNAL VIEW OF EUT-2



INTERNAL VIEW OF EUT-3



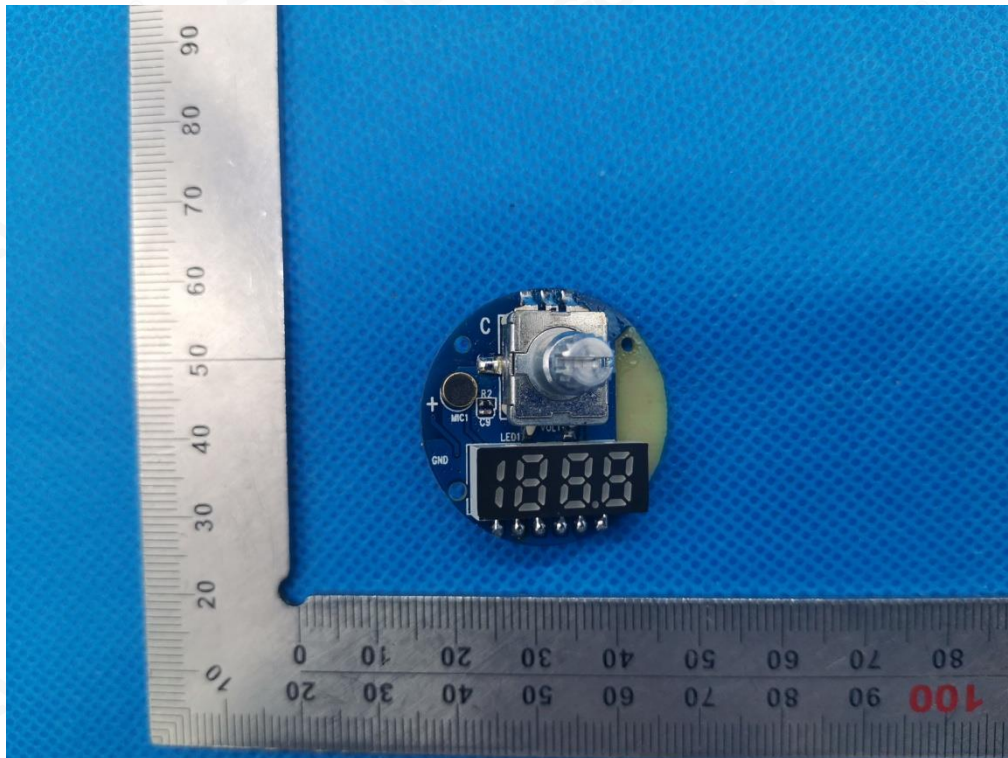
INTERNAL VIEW OF EUT-4



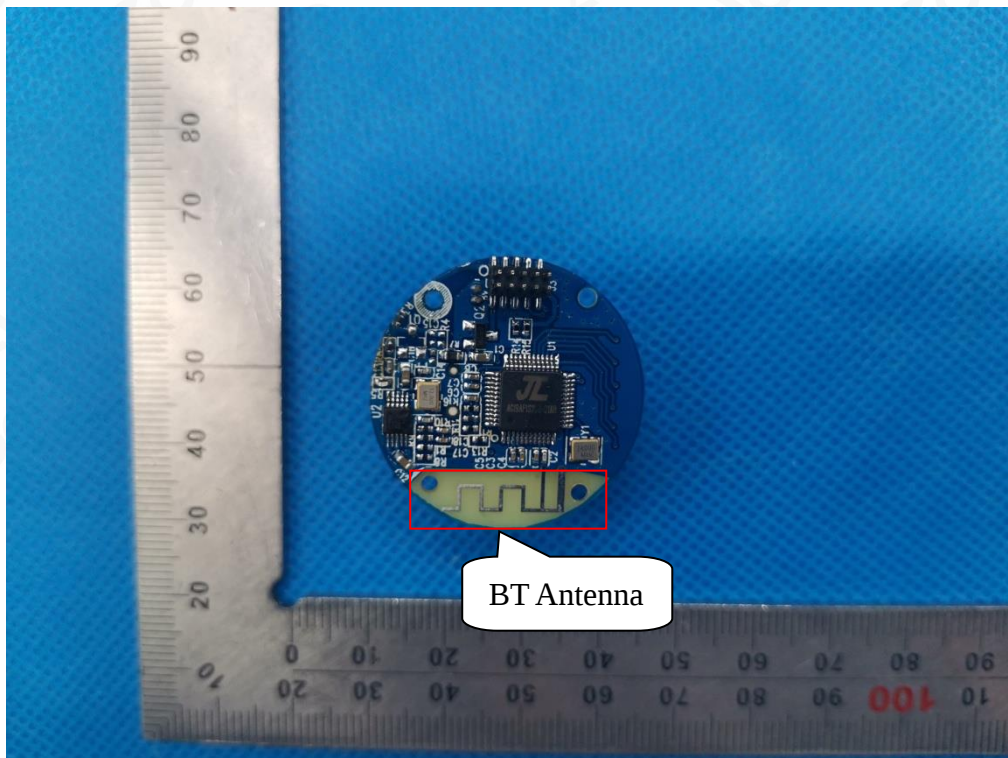
INTERNAL VIEW OF EUT-5



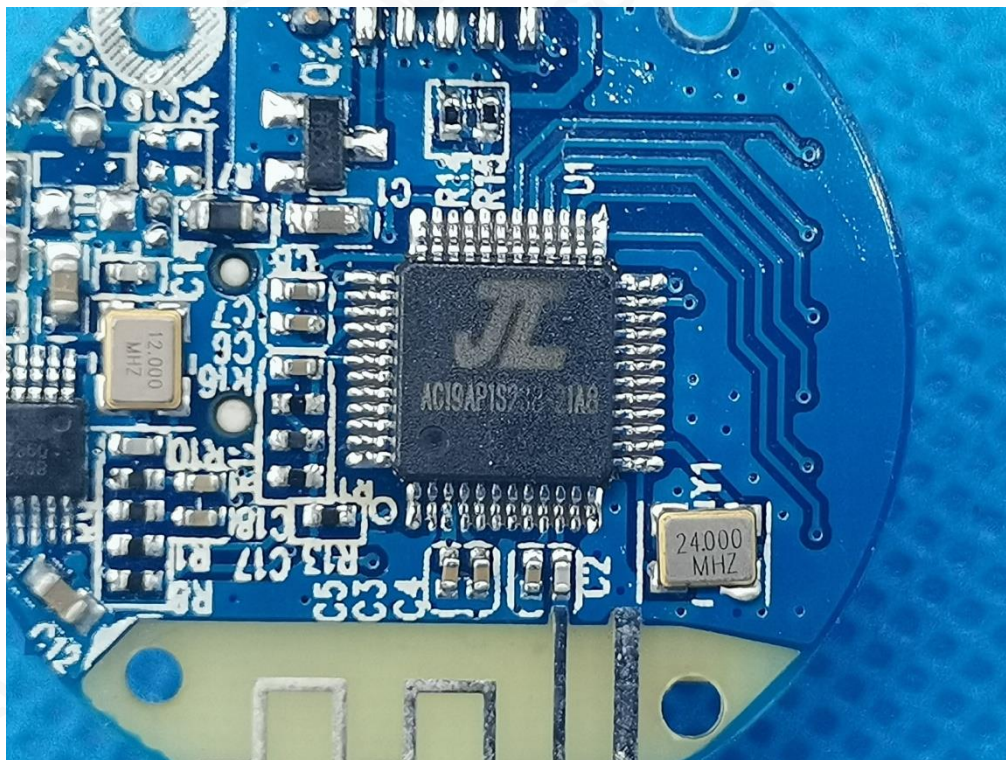
INTERNAL VIEW OF EUT-6



INTERNAL VIEW OF EUT-7



INTERNAL VIEW OF EUT-8



INTERNAL VIEW OF EUT-9



----END OF REPORT----