FCC Test Report

Report No.: AGC08699200301FE06

FCC ID	:	2AFMDKM29KM29PROF38
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Bluetooth FM transmitter
BRAND NAME	:	Nulaxy, Tecboss, QPAU Pinci, TechRise, Technet LoHI, ZEEPORTE
MODEL NAME	:	FM38, KM29, KM29Pro, FM38P, FM39, FM39P, FM40, FM43LP, FM46P, FM36, FM41, FM45, FM46, FM47, FM50, FM51, FM52, FM53, FM44, KM28, KM34, KM35
APPLICANT	:	SHENZHEN SPRING TECHNOLOGY CO., LIMITED
DATE OF ISSUE	:	Mar. 27, 2020
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	/	Mar. 27, 2020	Valid	Initial Release

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1. VERIFICATION OF CONFORMITY

Applicant	SHENZHEN SPRING TECHNOLOGY CO., LIMITED
Address	5/F Ablock, NO.162 TongFuYu Industrial Park KuKeng GuanLan LongHua New District, Shenzhen, China
Manufacturer	SHENZHEN SPRING TECHNOLOGY CO., LIMITED
Address	5/F Ablock, NO.162 TongFuYu Industrial Park KuKeng GuanLan LongHua New District, Shenzhen, China
Factory	SHENZHEN SPRING TECHNOLOGY CO., LIMITED
Address	5/F Ablock, NO.162 TongFuYu Industrial Park KuKeng GuanLan LongHua New District, Shenzhen, China
Product Designation	Bluetooth FM transmitter
Brand Name	Nulaxy, Tecboss, QPAU Pinci, TechRise, Technet LoHI, ZEEPORTE
Test Model	FM38
Series Model	KM29, KM29Pro, FM38P, FM39, FM39P, FM40, FM43LP, FM46P, FM36, FM41, FM45, FM46, FM47, FM50, FM51, FM52, FM53, FM44, KM28, KM34, KM35
Difference description	All the same except for the model name
Date of test	Mar. 09, 2020 to Mar. 23, 2020
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 Dongguan Precise Testing Service 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	Daisy Qin Project Engineer	Mar. 23, 2020
Reviewed By	Max Zhang Reviewer	Mar. 27, 2020
Approved By	Forrest Lei Authorized Officer	Mar. 27, 2020

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)	44.87dBuV/m(average)@3m
Modulation	FM
Number of channels	199(Channel spacing 100kHz)
Hardware Version	V5
Software Version	V1
Antenna Designation	Internal Antenna (Met 15.203 Antenna requirement)
Antenna Gain	0.5dBi
Power Supply	DC 12~24V

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	Sim TX BT Low channel GFSK + FM Low channel
2	Sim TX BT Middle channel GFSK+ FM Low channel
3	Sim TX BT High channel GFSK+ FM Low channel
4	Sim TX BT Low channel π/4-DQPSK+ FM Low channel
5	Sim TX BT Middle channel π/4-DQPSK+ FM Low channel
6	Sim TX BT High channel π/4-DQPSK+ FM Low channel
7	Sim TX BT Low channel 8DPSK + FM Low channel
8	Sim TX BT Middle channel 8DPSK + FM Low channel
9	Sim TX BT High channel 8DPSK + FM Low channel
10	Sim TX BT Low channel GFSK + FM Middle channel
11	Sim TX BT Middle channel GFSK+ FM Middle channel
12	Sim TX BT High channel GFSK+ FM Middle channel
13	Sim TX BT Low channel π/4-DQPSK+ FM Middle channel

14	Sim TX BT Middle channel π/4-DQPSK+ FM Middle channel
15	Sim TX BT High channel π/4-DQPSK+ FM Middle channel
16	Sim TX BT Low channel 8DPSK + FM Middle channel
17	Sim TX BT Middle channel 8DPSK + FM Middle channel
18	Sim TX BT High channel 8DPSK + FM Middle channel
19	Sim TX BT Low channel GFSK + FM High channel
20	Sim TX BT Middle channel GFSK+ FM High channel
21	Sim TX BT High channel GFSK+ FM High channel
22	Sim TX BT Low channel π/4-DQPSK+ FM High channel
23	Sim TX BT Middle channel π/4-DQPSK+ FM High channel
24	Sim TX BT High channel π/4-DQPSK+ FM High channel
25	Sim TX BT Low channel 8DPSK + FM High channel
26	Sim TX BT Middle channel 8DPSK + FM High channel
27	Sim TX BT High channel 8DPSK + FM High channel
Note: 1. For Radiated Emission, 3axis were chosen for testing for each applicable mode. 2. All the requirements have beentested 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. 4.Tuning-Range confirmed 88.1 ~ 107.9 MHz	

5. SYSTEM TEST CONFIGURATION

5.1. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	Bluetooth FM transmitter	KM29KM29ProFM38	2AFMDKM29KM29PROF38	EUT
2	Control Box	N/A	USB-TTL	AE
3	Car battery	N/A	12V 60Ah	AE
4	Load	N/A	2Ω	AE
5	Load	N/A	4Ω	AE
6	Mobile phone	J326T	N/A	AE
7	U-Disk	DT 101G2	16GB	AE
8	TF Card Port	SDA10	16GB	AE
9	AUX in Cable	N/A	0.8m	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

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	Jun. 12, 2019	Jun. 11, 2020
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 12, 2019	Dec. 11, 2020
Attenuator	ZHINAN	E-002	N/A	Sep. 09, 2019	Sep. 08, 2020
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	Jun. 13, 2018	Jun. 12, 2020
ANTENNA	SCHWARZBECK	VULB9168	494	Sep. 20, 2019	Sep. 19, 2021
Test software	FARA	EZ_EMC(Ver. RA-03A)	N/A	N/A	N/A

7. RADIATED EMISSION

7.1. MEASUREMENT PROCEDURE

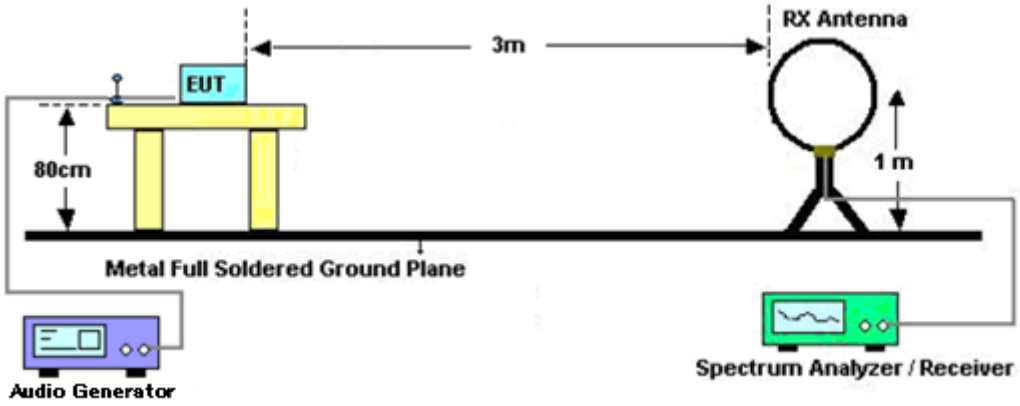
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground and opposite the horn antenna. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power 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.

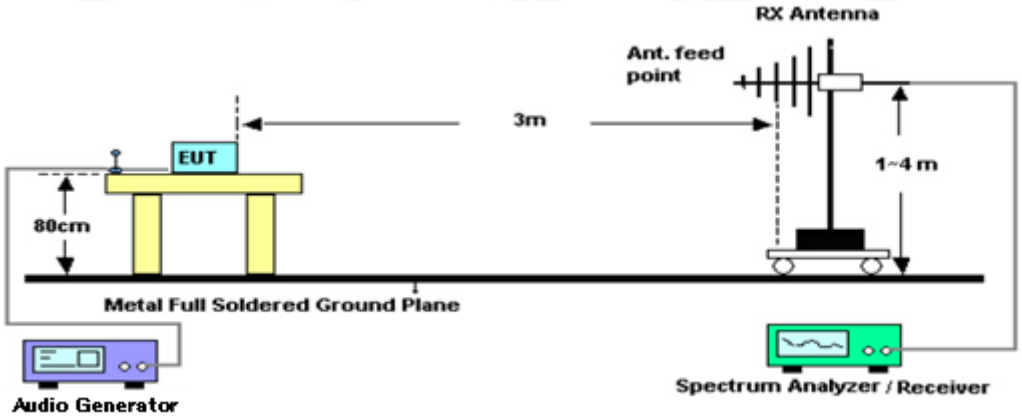
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RBW 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RBW 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RBW 120KHz for QP

7.2.TEST SETUP

Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



7.3. TEST RESULTFOR 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	45.97	67.96	21.99	Pass	PK
88.100	V	43.21	67.96	24.75	Pass	PK
98.000	H	44.78	67.96	23.18	Pass	PK
98.000	V	43.59	67.96	24.37	Pass	PK
107.900	H	46.87	67.96	21.09	Pass	PK
107.900	V	42.63	67.96	25.33	Pass	PK
Frequency MHz	Polarization	Level dB(uV/m) AV	Limit dB(uV/m) AV	Margin dB	Pass/Fail	Detector
88.100	H	43.21	47.96	4.75	Pass	AV
88.100	V	42.08	47.96	5.88	Pass	AV
98.000	H	45.61	47.96	2.35	Pass	AV
98.000	V	42.81	47.96	5.15	Pass	AV
107.900	H	44.34	47.96	3.62	Pass	AV
107.900	V	42.53	47.96	5.43	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	35.43	40	4.57	Pass	QP
88.000	V	31.58	40	8.42	Pass	QP
108.000	H	34.76	43.5	8.74	Pass	QP
108.000	V	31.70	43.5	11.8	Pass	QP

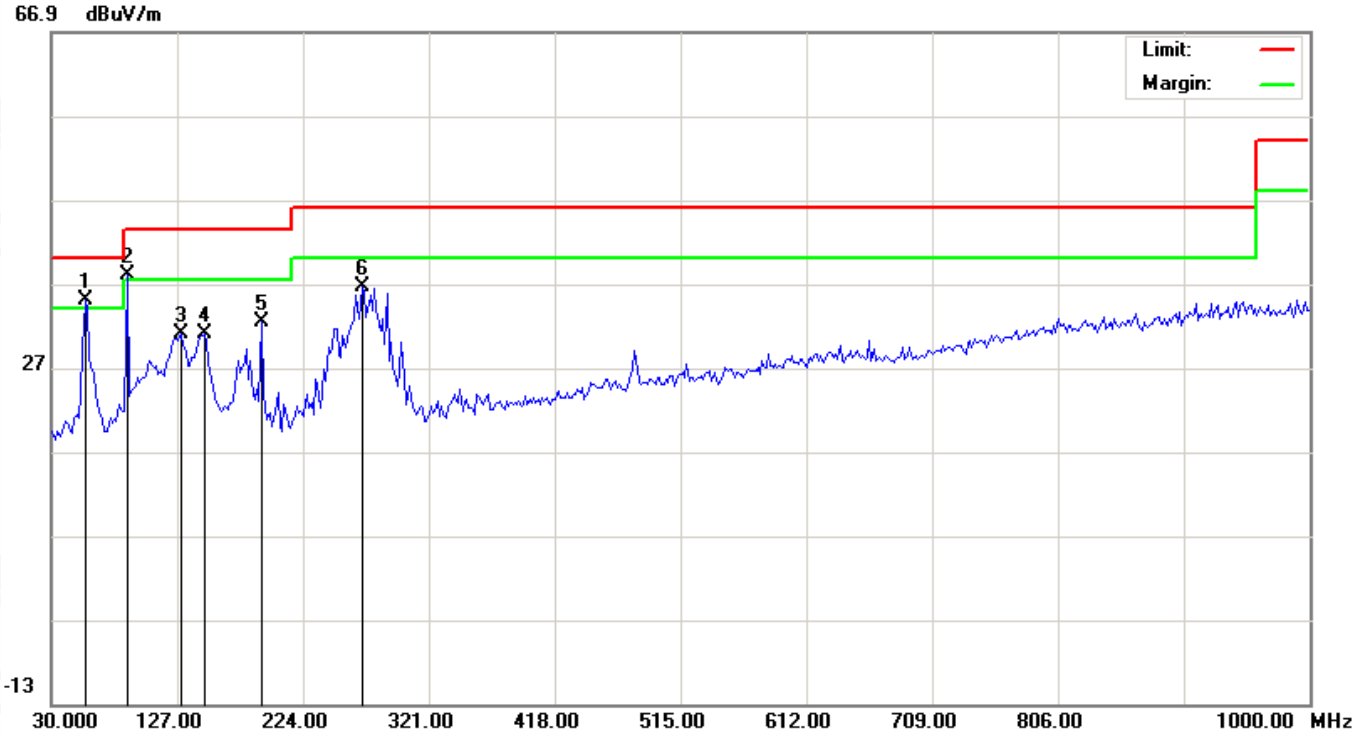
Note: The above two frequencies are the worst case for the band edge emission test.

7.5. TEST RESULT FOR SPURIOUS EMISSION

RADIATED EMISSION BELOW 30MHz

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

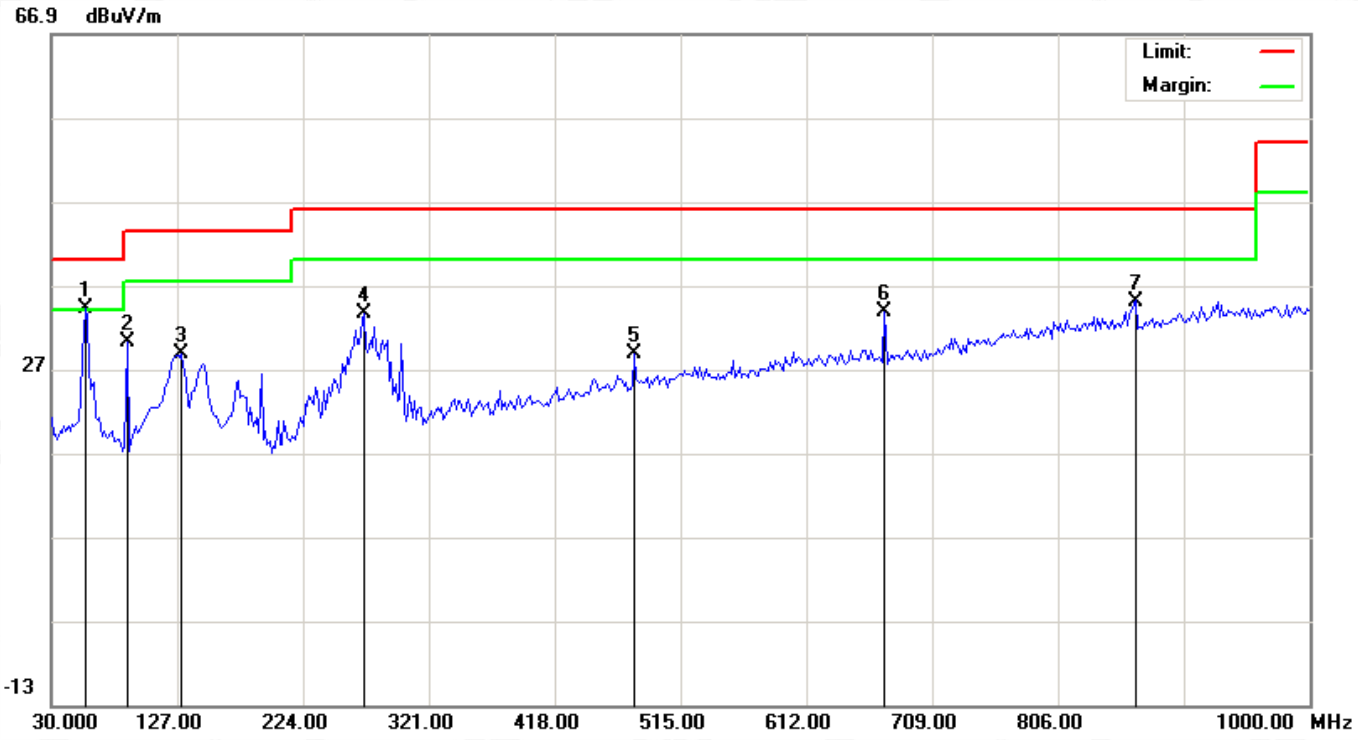
RADIATED EMISSION BELOW 1GHZ-Horizontal



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	*	55.8667	15.81	19.23	35.04	40.00	-4.96	peak			
2	!	88.2000	23.12	14.97	38.09	43.50	-5.41	peak			
3		130.2332	12.43	18.61	31.04	43.50	-12.46	peak			
4		148.0167	11.84	19.21	31.05	43.50	-12.45	peak			
5		191.6667	15.90	16.51	32.41	43.50	-11.09	peak			
6		269.2667	17.61	19.07	36.68	46.00	-9.32	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	*	55.8667	14.90	19.23	34.13	40.00	-5.87	peak			
2		88.2000	15.19	14.97	30.16	43.50	-13.34	peak			
3		130.2332	10.13	18.61	28.74	43.50	-14.76	peak			
4		270.8833	14.37	19.20	33.57	46.00	-12.43	peak			
5		479.4333	4.25	24.58	28.83	46.00	-17.17	peak			
6		671.8167	6.01	27.81	33.82	46.00	-12.18	peak			
7		865.8167	3.84	31.26	35.10	46.00	-10.90	peak			

RESULT: PASS

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

2. The “Factor” valuecan be calculated automatically by software of measurement system.

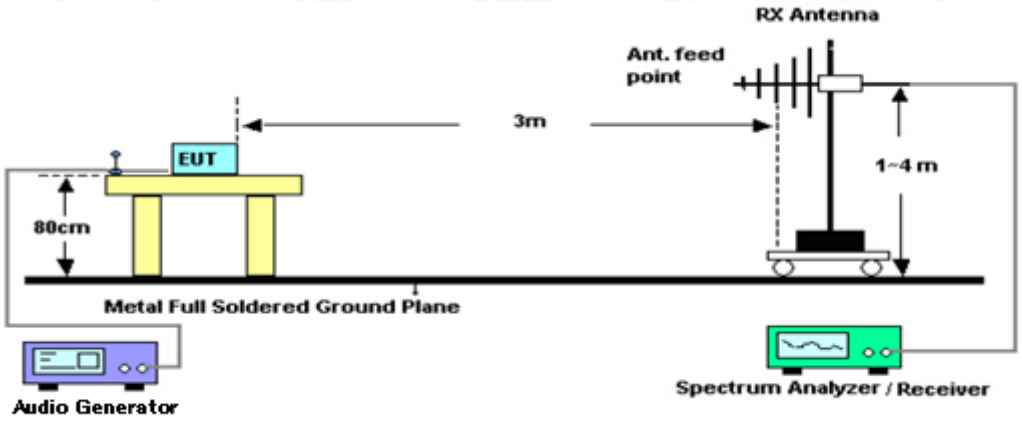
3. All test modes had been tested. The mode 9 is the worst case and recorded in the report.

8. BANDWIDTH

8.1. MEASUREMENT PROCEDURE

1. Set the parameters of SPA as below:
   Centrefrequency = 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 theEUT 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.

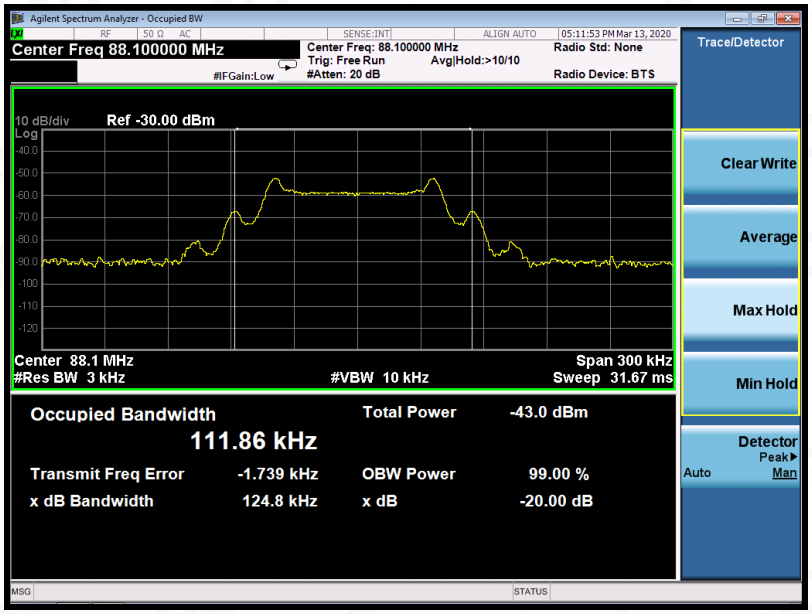
8.2. TEST SETUP



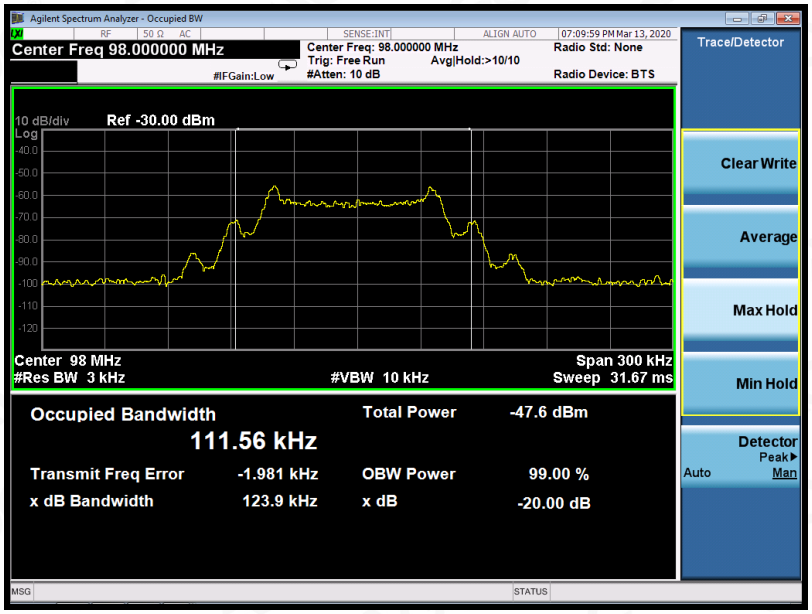
8.3. TEST RESULT

Channel	Channel Frequency(MHz)	-20dB bandwidth (kHz)	Limit(kHz)
Low	88.1	124.8	200
Middle	98.0	123.9	200
High	107.9	124.7	200

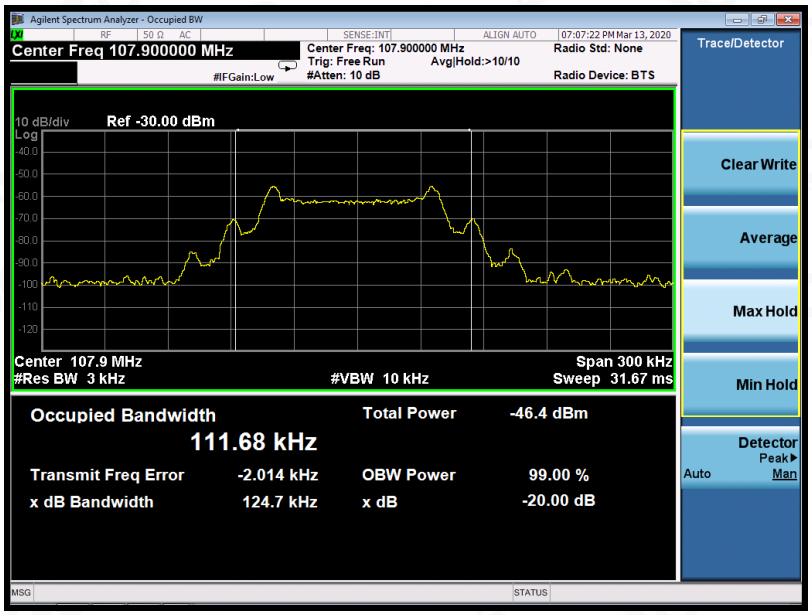
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

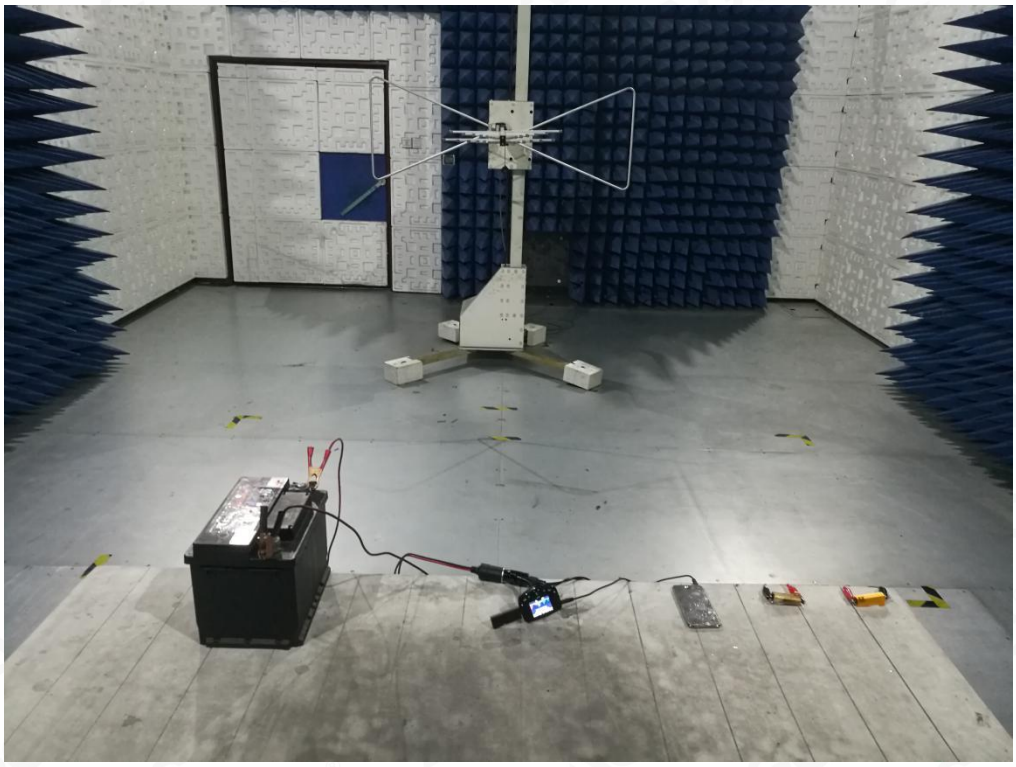


TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



APPENDIX A: PHOTOGRAPHS OF TEST SETUP

RADIATED EMISSION TEST SETUP BELOW 1G



RADIATED EMISSION TEST SETUP Above 1G

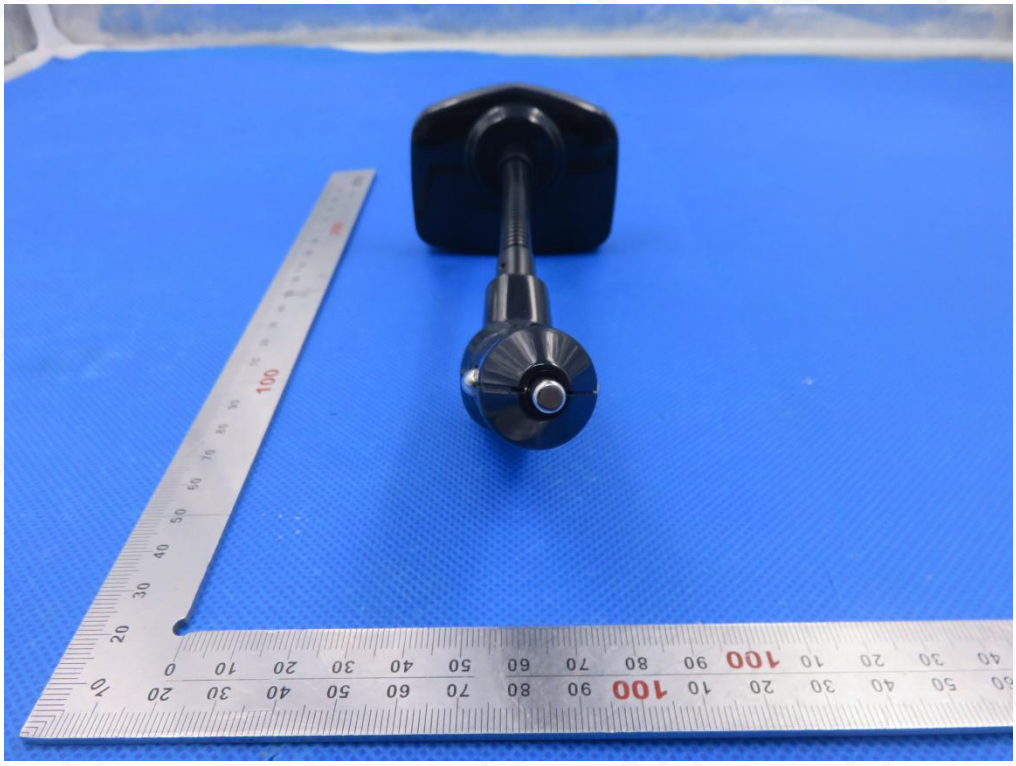
APPENDIX B:PHOTOGRAPHS OF EUT

TOP VIEW OF EUT

BOTTOM VIEW OF EUT

FRONT VIEW OF EUT

BACK VIEW OF EUT



LEFT VIEW OF EUT

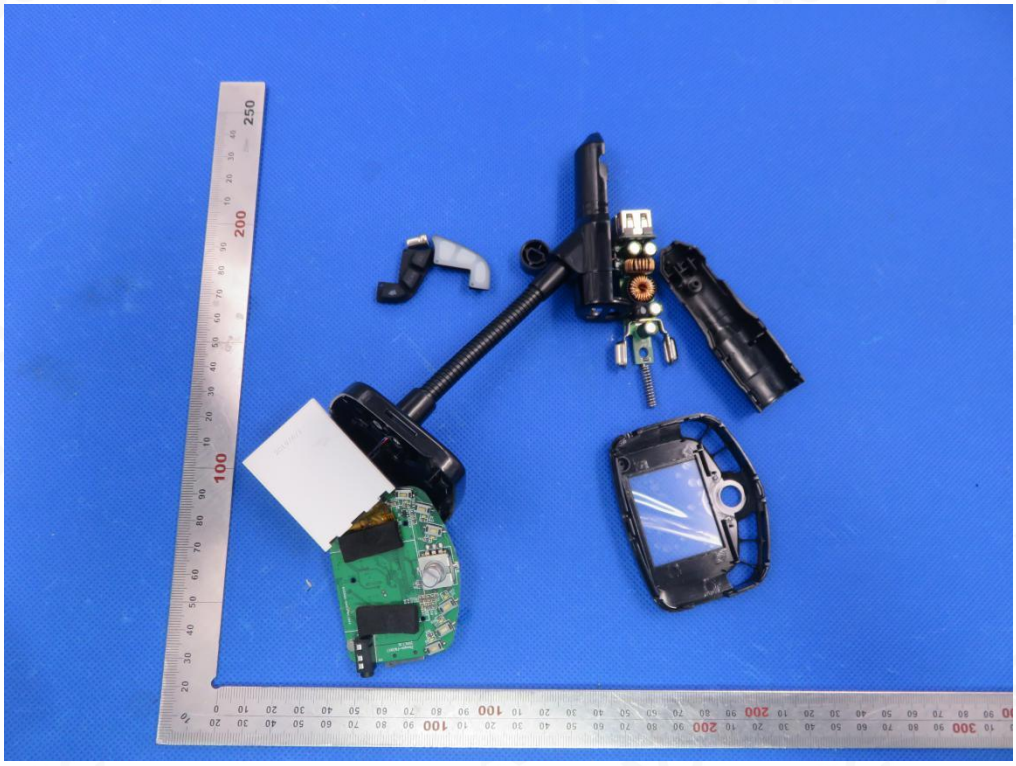
RIGHT VIEW OF EUT

VIEW OF EUT(PORT)-1

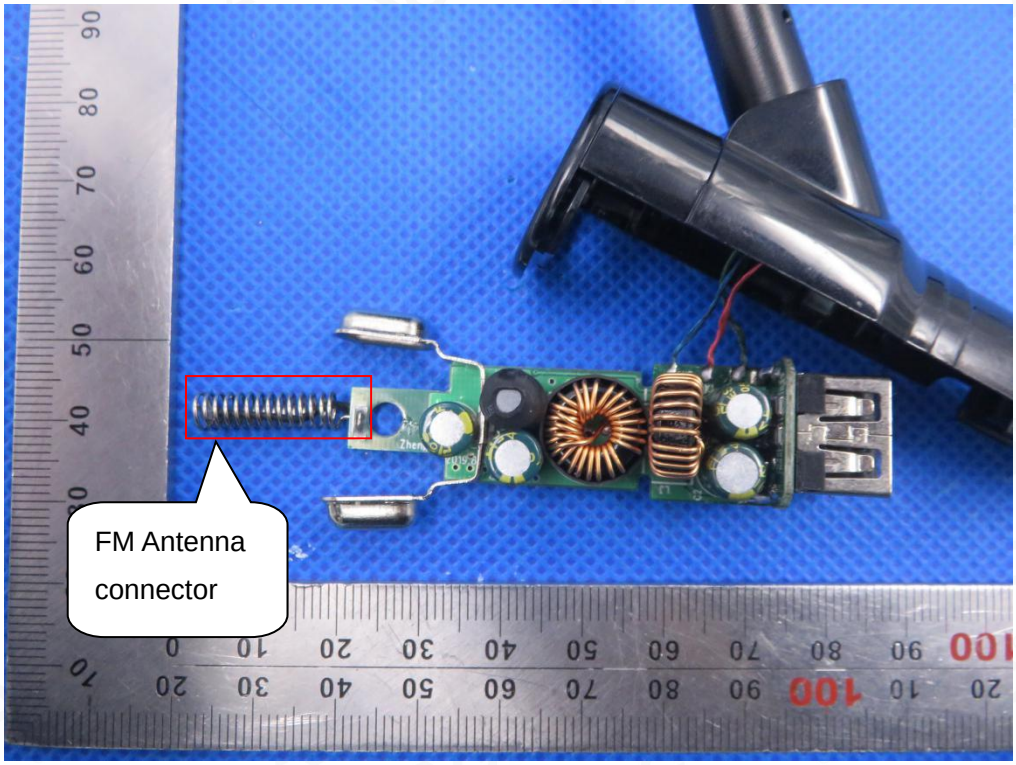
VIEW OF EUT(PORT)-2

VIEW OF EUT(PORT)-3

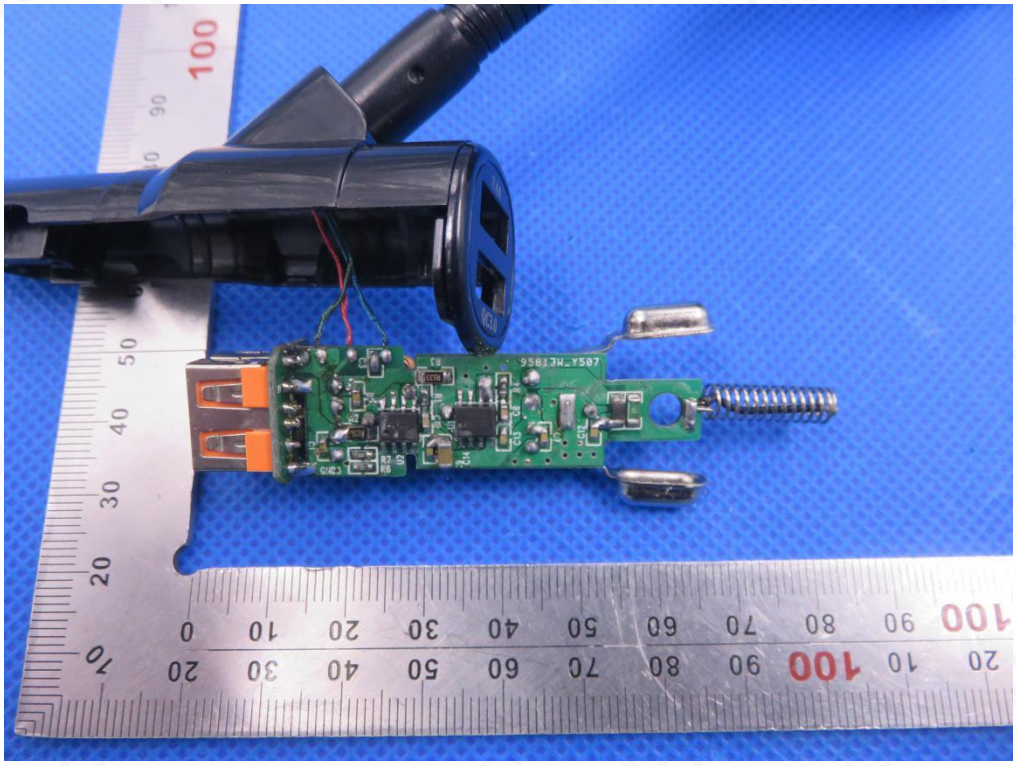
OPEN VIEW OF EUT



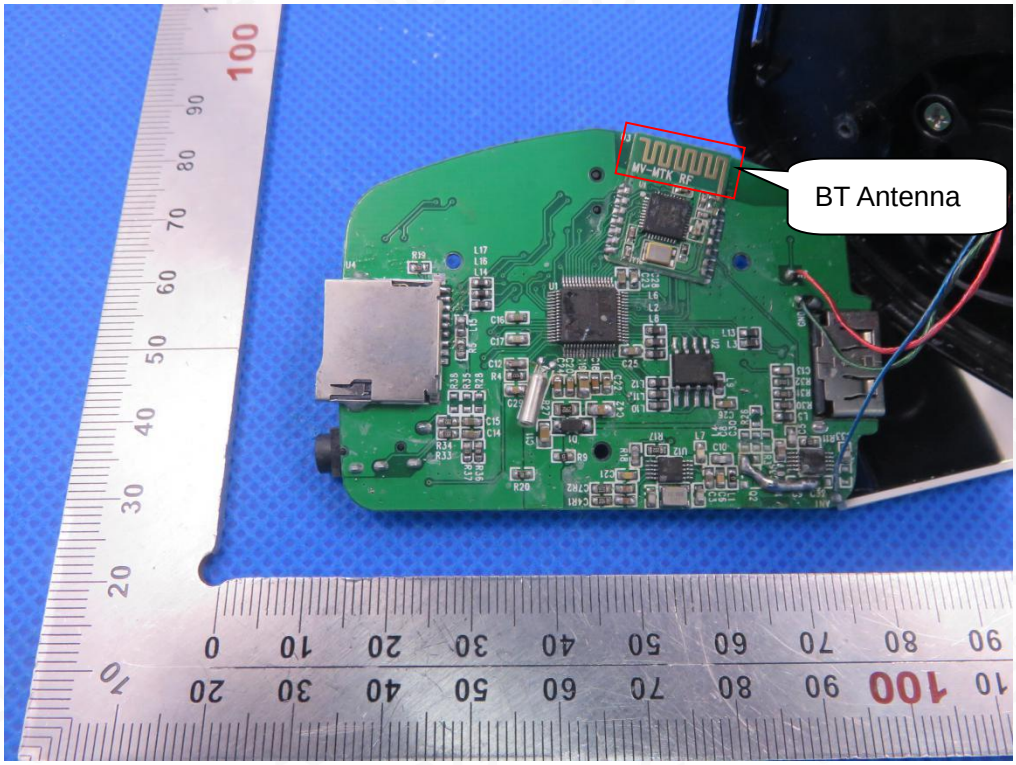
INTERNAL VIEW OF EUT-1



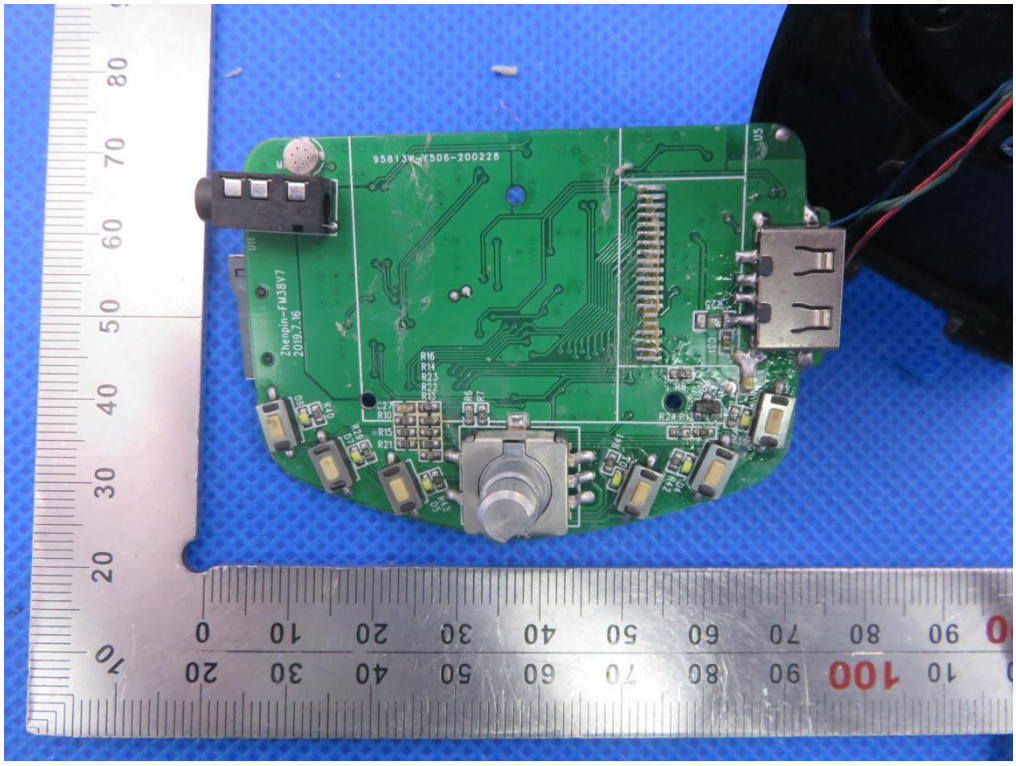
INTERNAL VIEW OF EUT-2



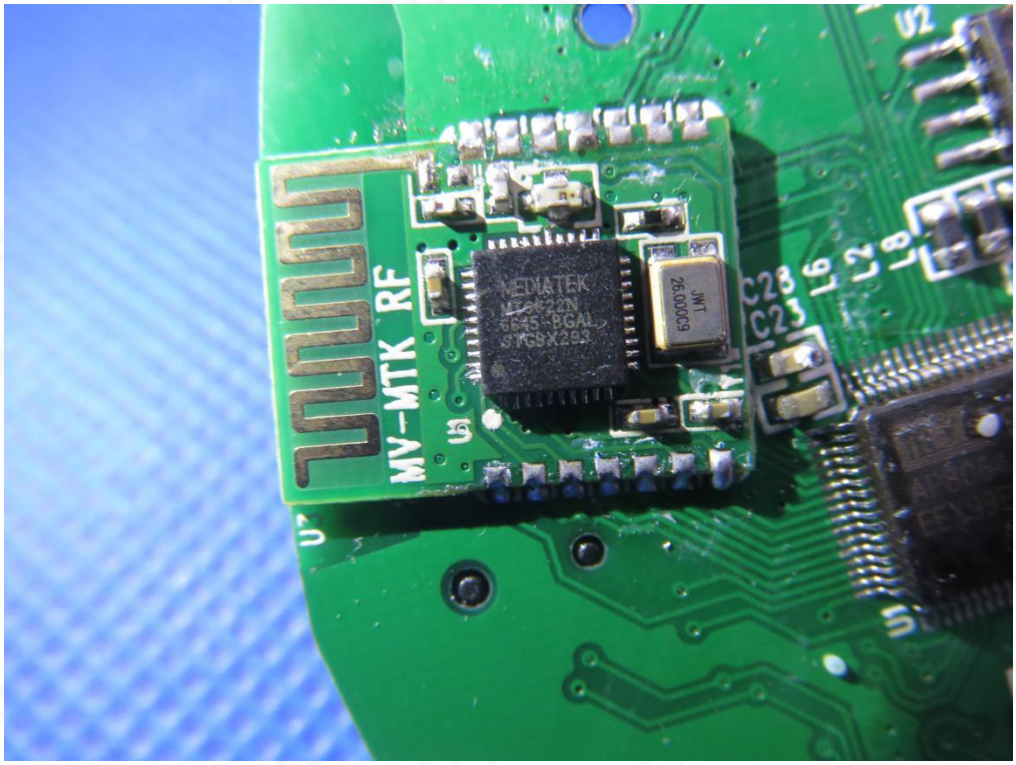
INTERNAL VIEW OF EUT-3



INTERNAL VIEW OF EUT-4



INTERNAL VIEW OF EUT-5



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