FCC Part 90 Rules
Test Report

Report No.: AGC01547190402FE10

FCC ID	:	TZ9SMM-107AV13
PRODUCT DESIGNATION		Wireless Microphone
BRAND NAME	:	Singing Machine
MODEL NAME	:	SMM107A
CLIENT	:	SEATUNE ELECTRONICS CO., LTD
DATE OF ISSUE	:	Apr. 30, 2019
STANDARD(S)	:	FCC Part 90 Rules
REPORT VERSION	:	V 1.0

***A**ttestation of **G**lobal **C**ompliance (Shenzhen) Co., Ltd*

Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Apr. 30, 2019	Valid	Initial Release

VERIFICATION OF COMPLIANCE

Applicant	SEATUNE ELECTRONICS CO., LTD
Address	1st Floor Building B, Linhai Industrial Area, Shuikou Road, Shuikou Town, Huizhou city, Guangdong, China
manufacturer	SEATUNE ELECTRONICS CO., LTD
Address	1st Floor Building B, Linhai Industrial Area, Shuikou Road, Shuikou Town, Huizhou city, Guangdong, China
Factory	SEATUNE ELECTRONICS CO., LTD
Address	1st Floor Building B, Linhai Industrial Area, Shuikou Road, Shuikou Town, Huizhou city, Guangdong, China
Product Designation	Wireless Microphone
Brand Name	Singing Machine
Test Model	SMM107A
Date of test	Apr. 22, 2019 to Apr. 29, 2019
Deviation	None
Condition of Test Sample	Normal
Test Result	Pass
Report Template	AGCRT-US-BR/RF

WE HEREBY CERTIFY THAT:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in TIA/EIA 603. The sample tested as described in this report is in compliance with the FCC Rules Part 90 requirements

The test results of this report relate only to the tested sample identified in this report.

Tested By Draven Li

Draven Li(Li Ming Liang) Apr. 29, 2019

Reviewed By Max Zhang

Max Zhang(Zhang Yi) Apr. 30, 2019

Approved By Forrest Lei

Forrest Lei(Lei Yonggang)
Authorized Officer Apr. 30, 2019

TABLE OF CONTENTS

1. GENERAL INFORMATION

1.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

Hardware Version	V1.3
Software Version	V1.1
Modulation	FM
Emission Bandwidth	45.48KHz
Maximum Transmitter Power	-5.15 dBm
Antenna Designation	PCB Antenna
Power Supply	DC 9V by battery
Operation Frequency	171.905 MHz

1.2 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID**: TZ9SMM-107AV13, filing to comply with the FCC Part 90 requirements.

1.3 TEST METHODOLOGY.

The radiated emission testing was performed according to the procedures of TIA/EIA 603.

1.4 TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, 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

1.5 SPECIAL ACCESSORIES

Not available for this EUT intended for grant.

1.6 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

2. SYSTEM TEST CONFIGURATION

2.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's 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. EUT operates only on one fixed frequency channel .

2.3 CONFIGURATION OF TESTED SYSTEM

Fig. 2-1 Configuration of Tested System

Table 2-1 Equipment Used in Tested System

Item	Equipment	Model No.	Identifier	Note
1	Wireless Microphone	SMM107A	**FCC ID**: TZ9SMM-107AV13	EUT

3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§90.265(b)	Frequency stability	Compliant
§90.265(b)	Occupied Bandwidth	Compliant
§90.265(b)	Output Power	Compliant
§90.217	Radiated Spurious Emission	Compliant
FCC PART 2 §2.1047	Modulation Characteristic	Compliant

LIST OF EQUIPMENTS USED

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	Jun. 12, 2018	Jun. 11, 2019
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 20, 2018	Dec. 19, 2019
Attenuator	Weinachel Corp	58-30-33	N/A	Jun. 12, 2018	Jun. 11, 2019
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	Jun. 14, 2018	Jun. 13, 2020
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May. 26, 2018	May. 25, 2020
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Oct. 25, 2018	Oct. 24, 2019
ANTENNA	SCHWARZBECK	VULB9168	D69250	Sep. 28, 2017	Sep. 27, 2019
Wideband Frequency Antenna	SCHWARZBECK	VULB9168	VULB9168-494	Mar. 13, 2018	Mar. 12, 2020
Horn Antenna	EM	EM-AH-10180	67	Mar. 01, 2018	Feb. 28, 2020
RF Communication Test Set	HP	8920B	US35010161	Jun. 12, 2018	Jun. 11, 2019
Signal Generator	AGILENT	N5182A	MY50140530	Sep. 20, 2018	Sep. 19, 2019
Power Supply	HAMEG	HMP2020	021610781	Sep. 20, 2018	Sep. 19, 2019
Small environmental tester	ESPEC	SH-242	--	Mar.02, 2018	Mar. 01, 2020

4. DESCRIPTION OF TEST MODES

RF TEST MODES

The EUT has been tested under normal operating condition.

Note: Only the result of the worst case was recorded in the report.

5. FREQUENCY TOLERANCE

5.1 PROVISIONS APPLICABLE

a). According to FCC Part 2 Section 2.1055(a)(1), the frequency stability shall be measured with variation of ambient temperature from –30℃ to +50℃ centigrade.

b). According to FCC Part 2 Section 2.1055(d)(2), for battery powered equipment, the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point, which is specified by the manufacturer.

c). According to §90.265, wireless microphone shall be within a frequency stability of ±32.5kHz.

5.2 MEASUREMENT PROCEDURE

5.2.1 Frequency stability versus environmental temperature

1. Setup the configuration per figure 1 for frequencies measurement inside an environment chamber, Install new battery in the EUT.
2. Turn on EUT and set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1KHz and Video Resolution Bandwidth to 1KHz and Frequency Span to 50KHz.Record this frequency as reference frequency.
3. Set the temperature of chamber to 50℃. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.
4. Repeat step 2 with a 10℃ decreased per stage until the lowest temperature -30℃ is measured, record all measured frequencies on each temperature step.

5.2.2 Frequency stability versus input voltage

1. Setup the configuration per figure 1 for frequencies measured at temperature if it is within 15℃ to 25℃. Otherwise, an environment chamber set for a temperature of 20℃ shall be used. The EUT shall be powered by DC 9.0V.
2. Set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1 KHz and Video Resolution Bandwidth to 1KHz. Record this frequency as reference frequency.
3. Supply the EUT primary voltage at the operating end point which is specified by manufacturer and record the frequency.

5.3 TEST SETUP BLOCK DIAGRAM

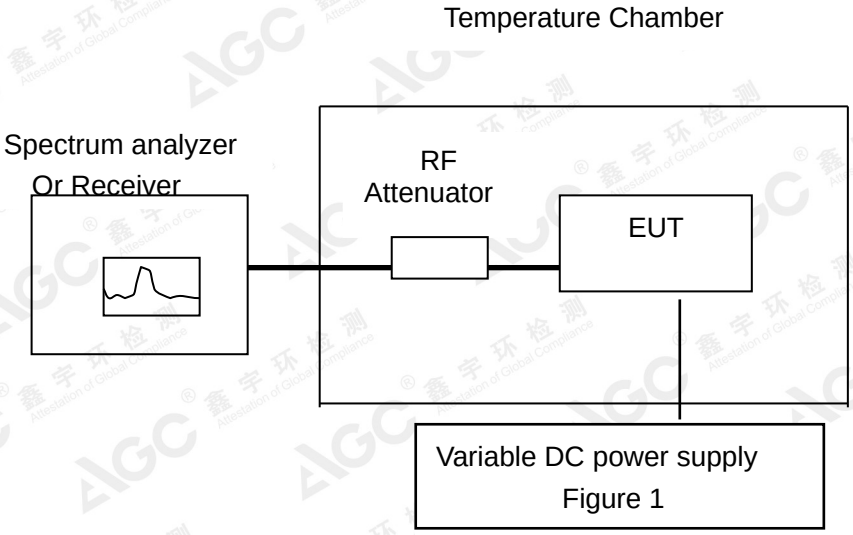


Figure 1

5.4 TEST RESULT

(1) Frequency stability versus input voltage (Supply nominal voltage is 9.0V)

Environment Temperature(℃)	Power Supply (V)	Reference Frequency(171.905MHz) kHz 462.7250MHz	Limit: kHz
50	DC 9.0 V	-2.3	±32.5
40	DC 9.0 V	-1.8	
30	DC 9.0 V	-1.2	
20	DC 9.0 V	-2.5	
10	DC 9.0 V	-4.0	
0	DC 9.0 V	3.2	
-10	DC 9.0 V	4.0	
-20	DC 9.0 V	4.1	
-30	DC 9.0 V	4.0	
Result	Pass		

Environment Temperature(℃)	Power Supply (V)	Reference Frequency(171.905MHz) kHz 462.7250MHz	Limit: kHz
20	DC 9.0 V	2.5	±32.5
20	DC 5.5 V	2.7	
Result	Pass		

Note: Battery end point is DC 5.4V.

6. EMISSION BANDWIDTH

6.1 PROVISIONS APPLICABLE

Occupied Bandwidth: The EUT was connected to the audio signal generator and the spectrum analyzer via the main RF connector, and through an appropriate attenuator. The EUT was controlled to transmit its maximum power. Then the bandwidth of 99% power can be measured by the spectrum analyzer.

6.2 MEASUREMENT PROCEDURE

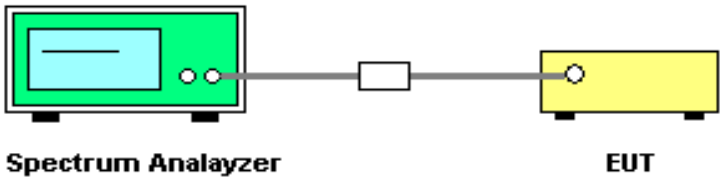
1). The EUT was placed on a turn table which is 0.8m above ground plane.

2). The EUT was modulated by 2.5 KHz Sine wave audio signal, The level of the audio signal employed is 16 dB greater than that necessary to produce 50% of rated system deviation. Rated system deviation is 2.5 kHz (12.5 kHz channel spacing).

3). Set SPA Center Frequency = fundamental frequency, RBW=100Hz.VBW= 300 Hz, Span =100 KHz.

4). Set SPA Max hold. Mark peak, -26 dB.

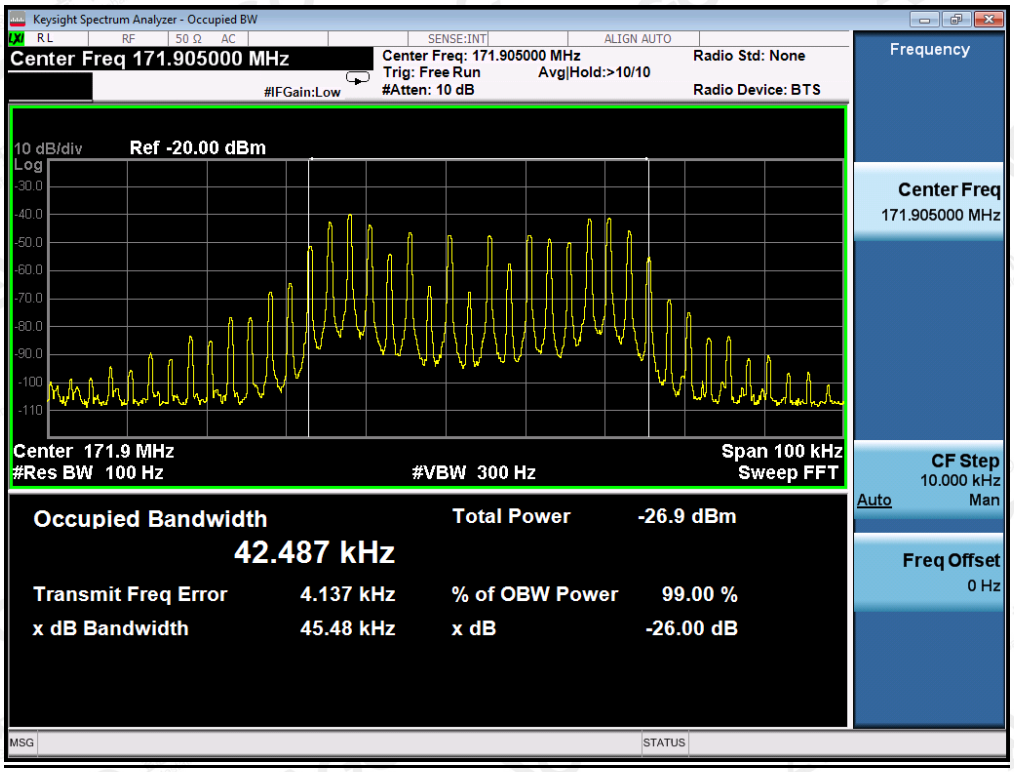
6.3 TEST SETUP BLOCK DIAGRAM



6.4 MEASUREMENT RESULT

26 dB Bandwidth Measurement Result			
Operating Frequency	Test Data	Limit	Result
171.905MHz	45.48KHz	54KHz	Pass

Occupied bandwidth



7. MAXIMUMN TRANSMITTER POWER

7.1 PROVISIONS APPLICABLE

Per FCC §2.1046 and §90.265: Maximum power shall not exceed 50mW

7.2 TEST PROCEDURE

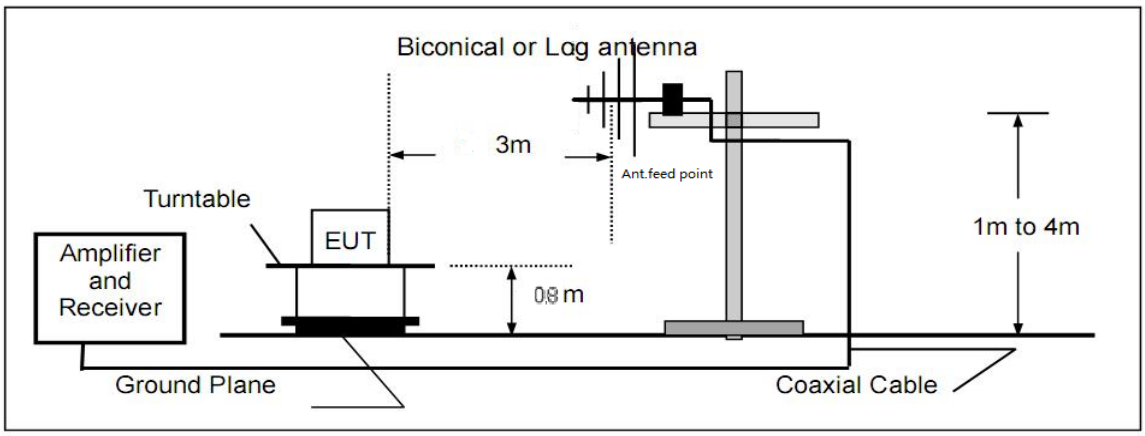
EUT was placed on a 1.5m outdoor wooden table. The search antenna is placed at 3m distances from the EUT and search antenna height is from 1-4m. With the transmitter operating at continuously mode, the turntable was slowly rotated to locate the direction of maximum emission. Once maximum direction is determined, the search antenna was raised and lowered in both vertical and horizontal polarizations.

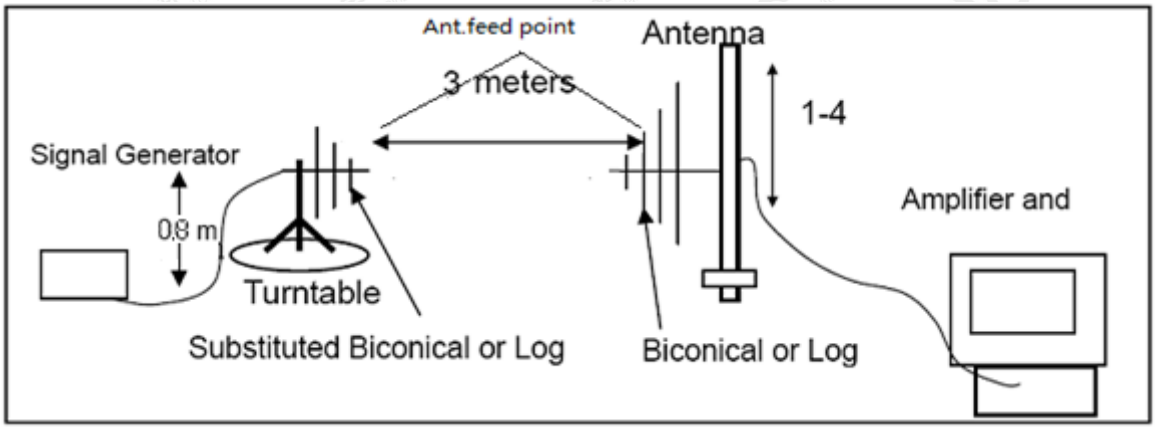
The EUT was removed from the turntable and replaced with a linearly polarized antenna connected to a calibrated RF signal generator. The RF generator was set to a measured emission frequency and the search antenna was raised and lowered to produced a maximum received reading. The generator output was increased to match the radiated emission reading measured previously, and the result expressed in dB E.I.R.P. or ERP.

7.3 TEST CONFIGURATION

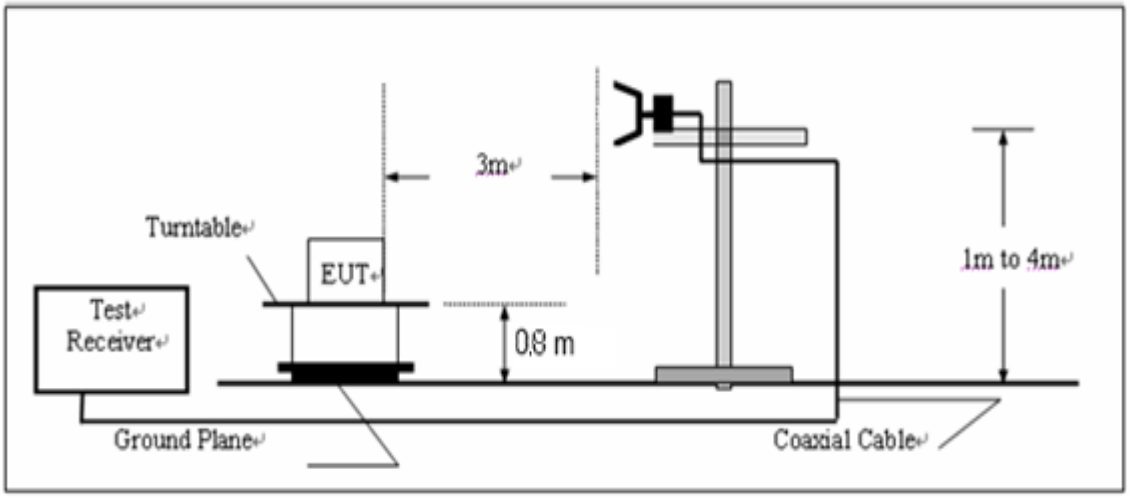
Effective Radiated Power

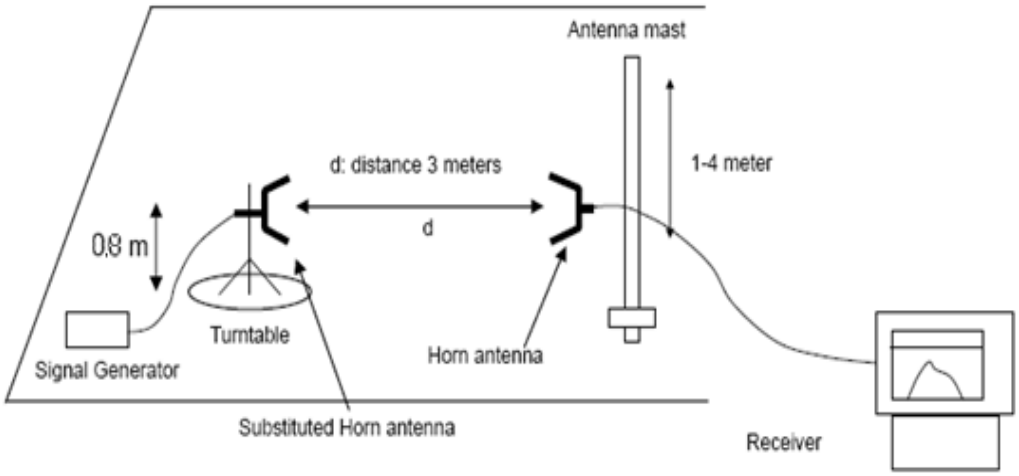
Radiated Below1GHz





Radiated Above 1 GHz





7.4 TEST RESULT

Carrier Frequency	E.R.P (dBm)	Test Result(mW)	Limit(mW)
171.905 MHz	-5.15	0.31	50

8. UNWANTED RADIATION

8.1 PROVISIONS APPLICABLE

Emission Mask B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.

(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.

(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

8.2 MEASUREMENT PROCEDURE

(1)On a test site, the EUT shall be placed on a turntable, and in the position closest to the normal use as declared by the user.

(2)The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the transmitter.

(3)The output of the antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.

(4)The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.

(5)The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.

(6)The transmitter shall than be rotated through 360°in the horizontal plane, until the maximum signal level is detected by the measuring receiver.

(7)The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.

(8)The maximum signal level detected by the measuring receiver shall be noted.

(9)The measurement shall be repeated with the test antenna set to horizontal polarization.

(10) Replace the antenna with a proper Antenna (substitution antenna).

(11)The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting.

(12)The substitution antenna shall be connected to a calibrated signal generator.

(13)If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.

(14)The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.

(15)The input signal to substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.

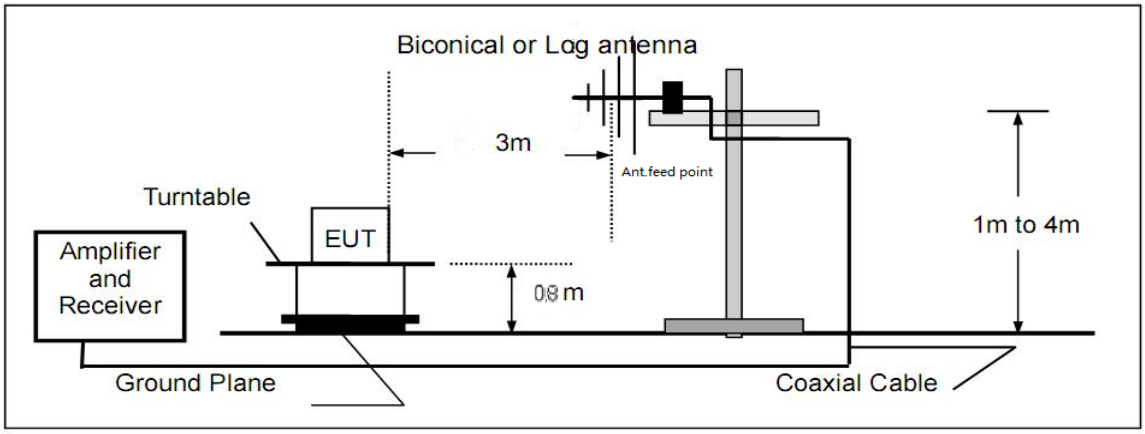
(16)The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.

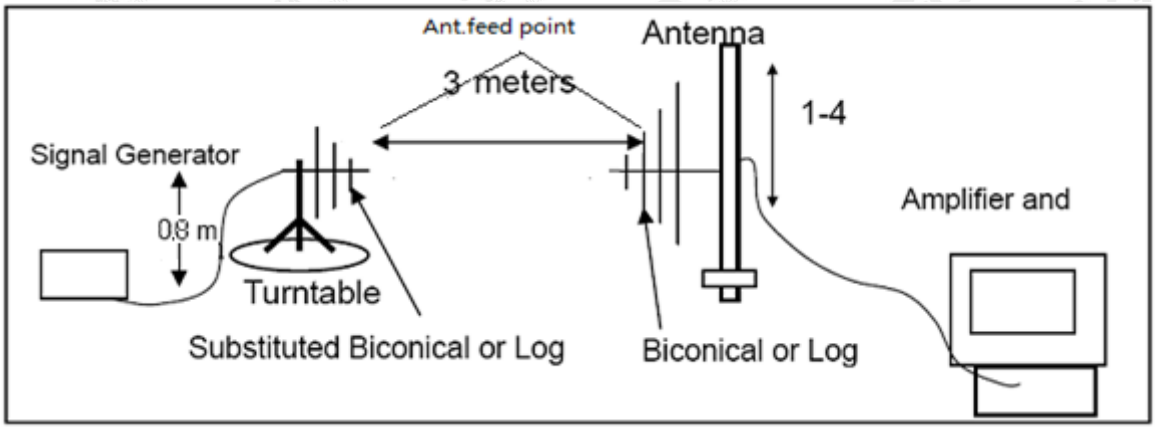
(17)The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

8.3 TEST SETUP BLOCK DIAGRAM

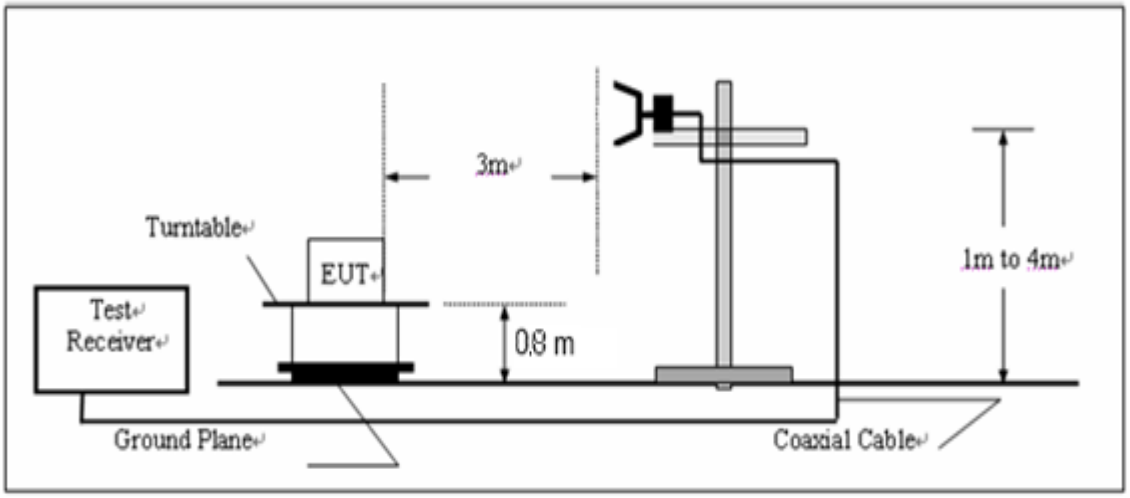
SUBSTITUTION METHOD: (Radiated Emissions)

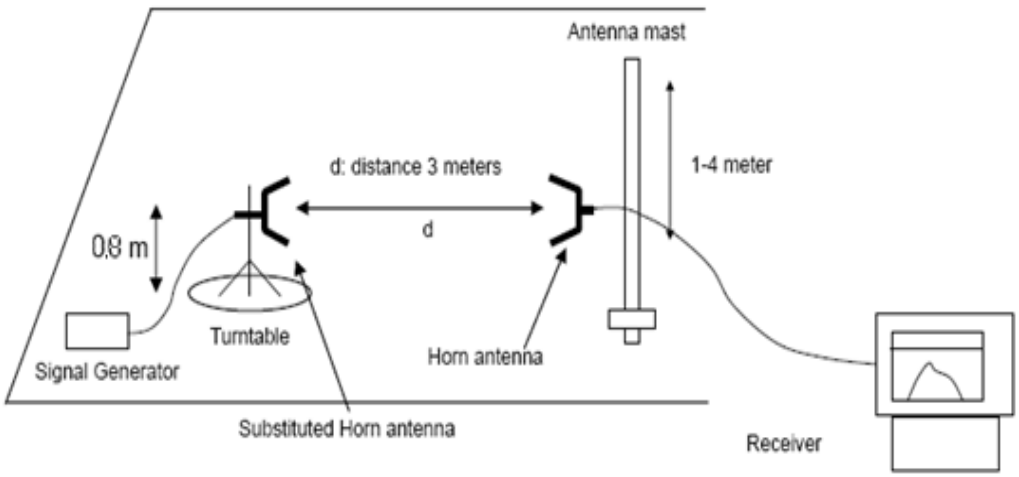
Radiated Below1GHz





Radiated Above 1 GHz





8.4 MEASUREMENT RESULTS:

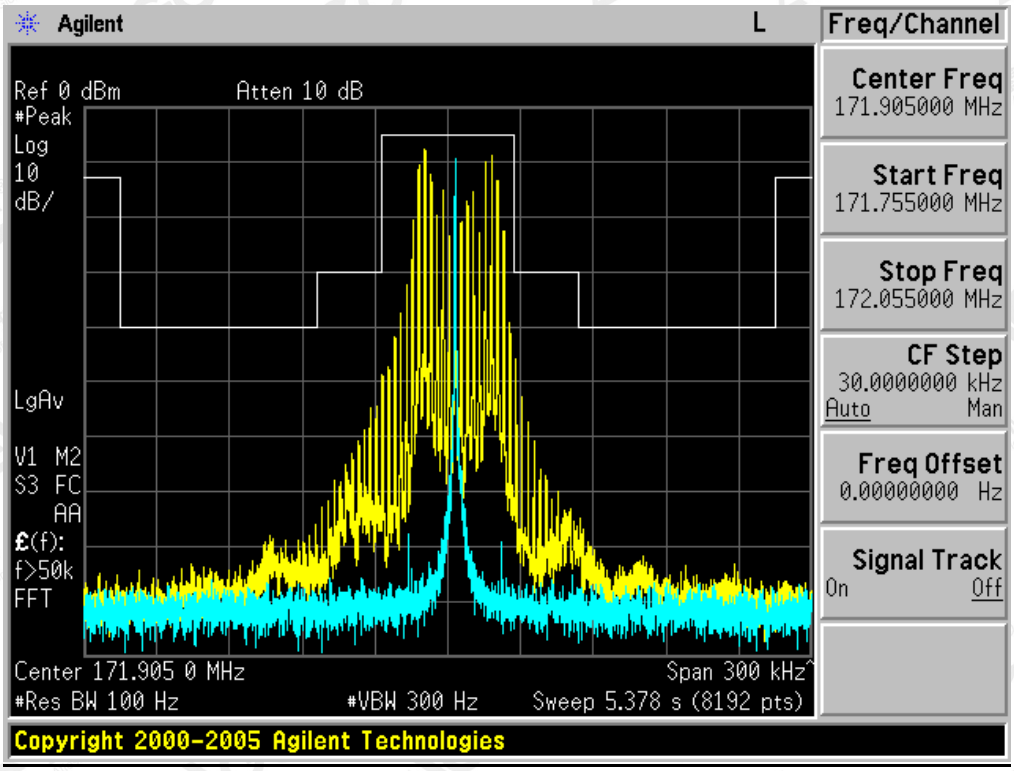
Frequency(TX)	polarity	Result(dBm)	Limit(dBm)	Margin(dB)
343.81	H	-62.35	-13	49.35
343.81	V	-63.45	-13	50.45
515.72	H	-65.02	-13	52.02
515.72	V	-66.79	-13	53.79

RESULT: PASS

8.5 EMISSION MASK PLOT

The detailed procedure employed for Emission Mask measurements are specified as following:

The Worst Emission Mask for 54 KHz channel Separation



9. MODULATION CHARACTERISTICS

9.1 PROVISIONS APPLICABLE

According to CFR 47 section 2.1047(a), for Voice Modulation Communication Equipment, the frequency response of the audio modulation circuit over a range of 100 to 5000Hz shall be measured.

9.2 MEASUREMENT METHOD

9.2.1 Modulation Limit

(1). Configure the EUT as shown in figure 1, adjust the audio input for 60% of rated system deviation at 1KHz using this level as a reference (0dB) and vary the input level from –20 to +20dB. Record the frequency deviation obtained as a function of the input level.

(2). Repeat step 1 with input frequency changing to 300, 1000, 3000 and 15000 kHz in sequence.

9.2.2 Audio Frequency Response

(1). Configure the EUT as shown in figure 1.

(2). Adjust the audio input for 20% of rated system deviation at 1 KHz using this level as a reference (0 dB).

(3). Vary the Audio frequency from 100 Hz to 10 KHz and record the frequency deviation.

(4). Audio Frequency Response = 20log10 (Deviation of test frequency/Deviation of 1 KHz reference).

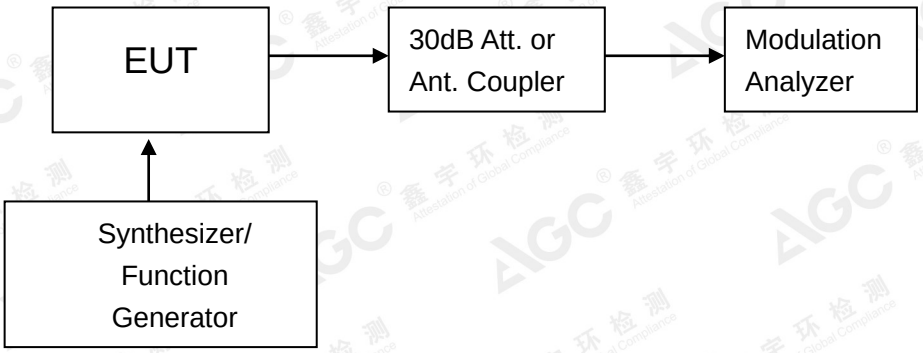


Figure 1: Modulation characteristic measurement configuration

9.3 MEASUREMENT RESULT

(A). MODULATION LIMIT

Modulation Level (dB)	Peak Freq. Deviation At 300 Hz	Peak Freq. Deviation At 1000 Hz	Peak Freq. Deviation At 3000 Hz	Peak Freq. Deviation At 15000 Hz
-20	1.3	1.5	2.3	0.8
-15	3.1	4.8	5.3	0.6
-10	4.2	5.2	25.6	1.3
-5	5.2	8.3	15.3	2.3
0	10.3	11.2	20.6	9.2
+5	16.3	23.6	16.2	4.3
+10	32.5	31.6	13.6	2.1
+15	41.5	33.6	9.6	1.9
+20	52.6	38.2	11.3	3.1

(B). AUDIO FREQUENCY RESPONSE:

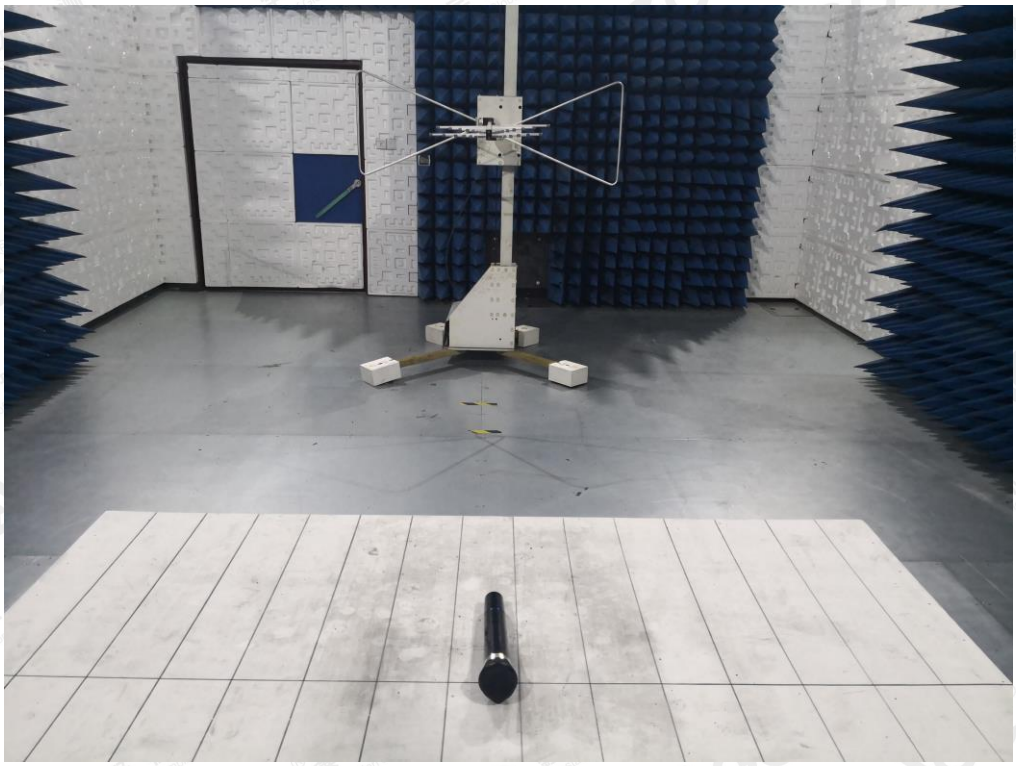
Frequency (Hz)	Audio Frequency Response(dB)
100	-2.01
200	-0.79
300	-0.68
400	-0.66
500	-0.61
600	-0.52
700	-0.50
800	-0.45
900	-0.23
1000	0.15
1600	1.25
2000	3.71
2500	4.75
4000	6.02
4500	4.50
5000	8.20
6000	6.11
7000	1.02
9000	0.36
10000	-1.72
14000	-11.04
15000	-16.47

(B). AUDIO LOW-PASS FILTER RESPONSE:

Frequency (Hz)	Audio Low-pass(dB)
1000	0
2000	-0.40
3000	-4.54
5000	-6.75
8000	-9.04
10000	-8.55
12000	-17.04
15000	-25.04

APPENDIX I: PHOTOGRAPHS OF SETUP

RADIATED EMISSION TEST SETUP BELOW 1GHZ



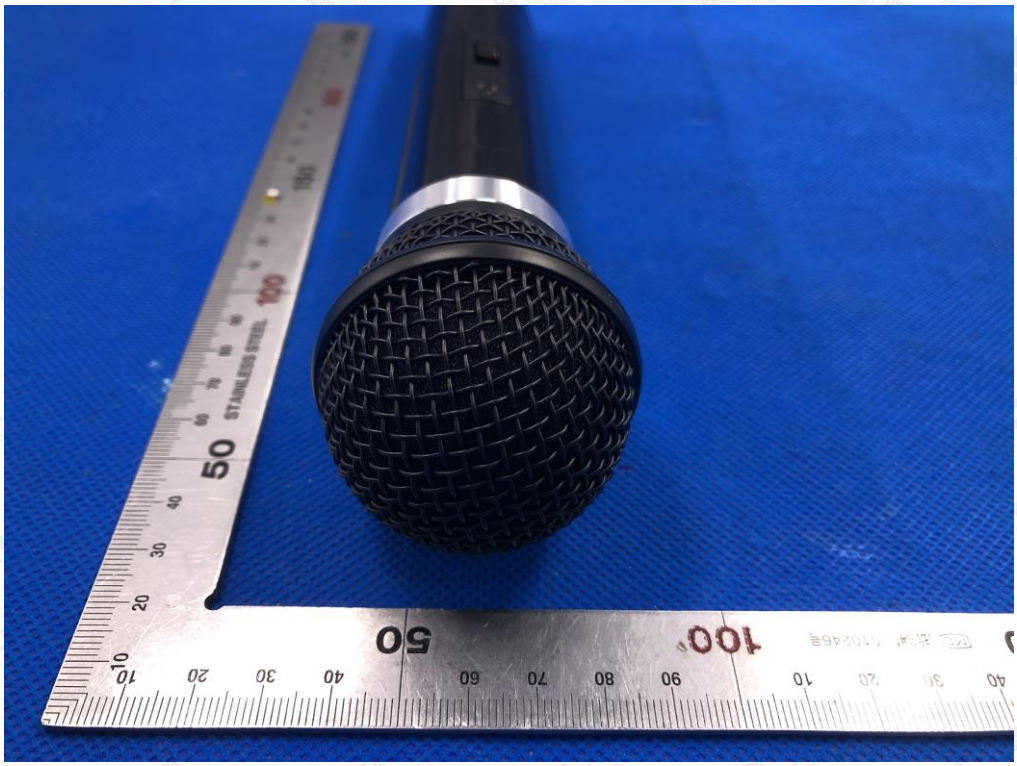
RADIATED EMISSION TEST SETUP ABOVE 1GHZ

APPENDIX II: EXTERNAL VIEW OF EUT

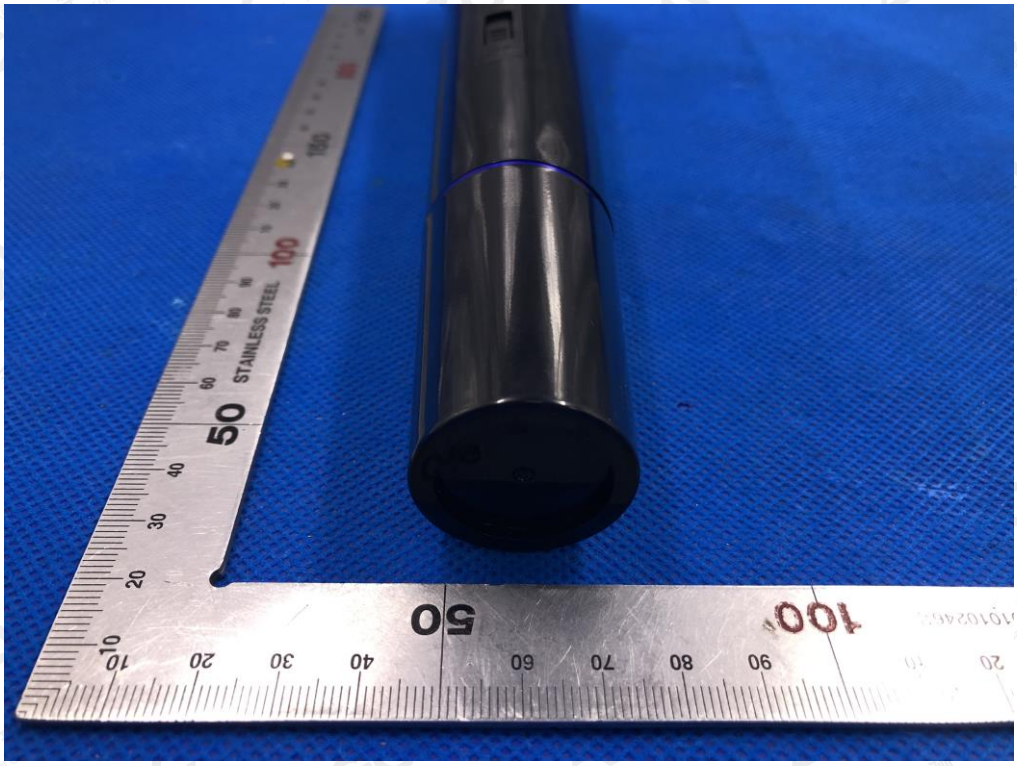
TOP VIEW OF EUT

BOTTOM VIEW OF EUT

FRONT VIEW OF EUT



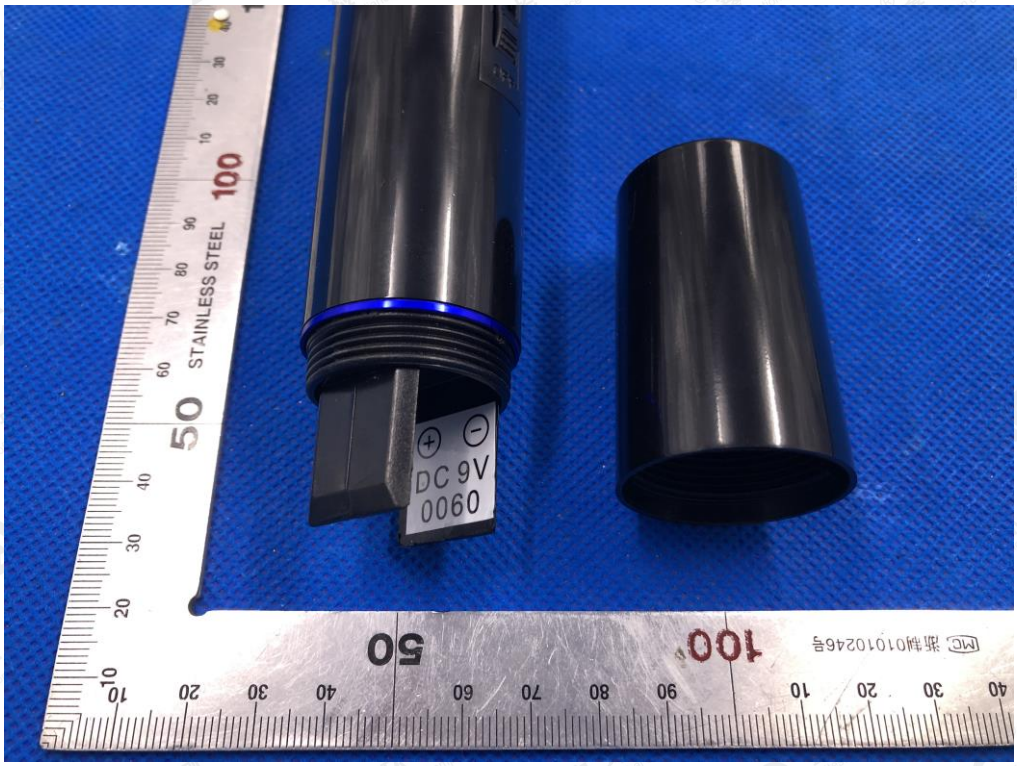
BACK VIEW OF EUT



LEFT VIEW OF EUT

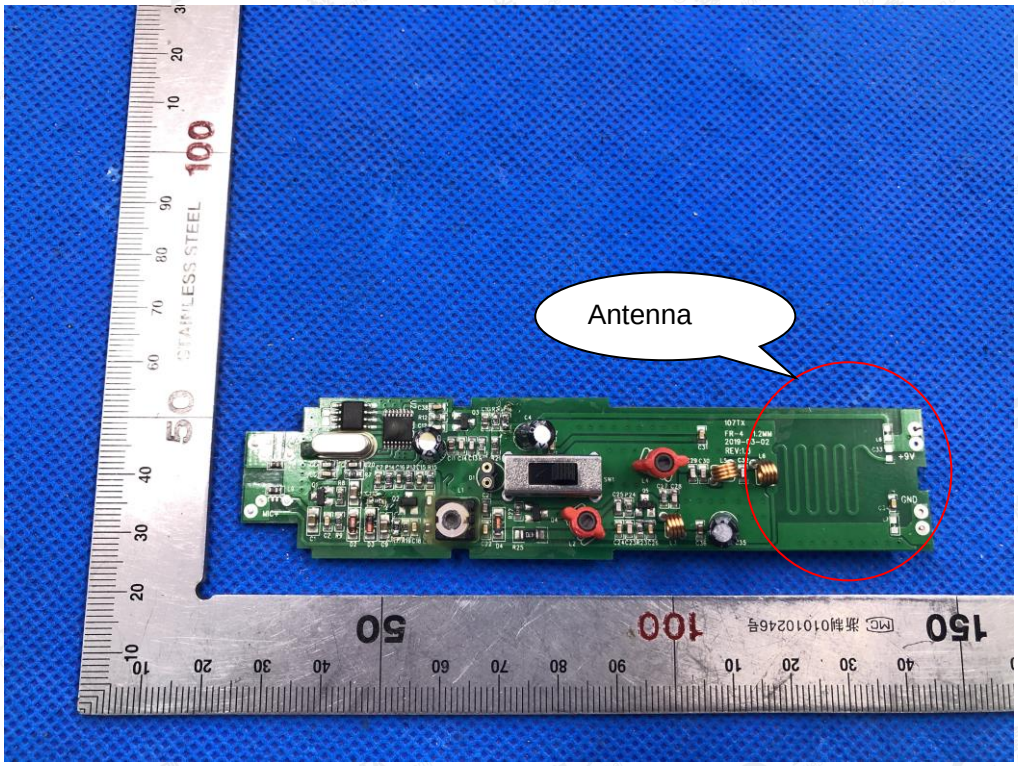
RIGHT VIEW OF EUT

OPEN VIEW-1 OF EUT

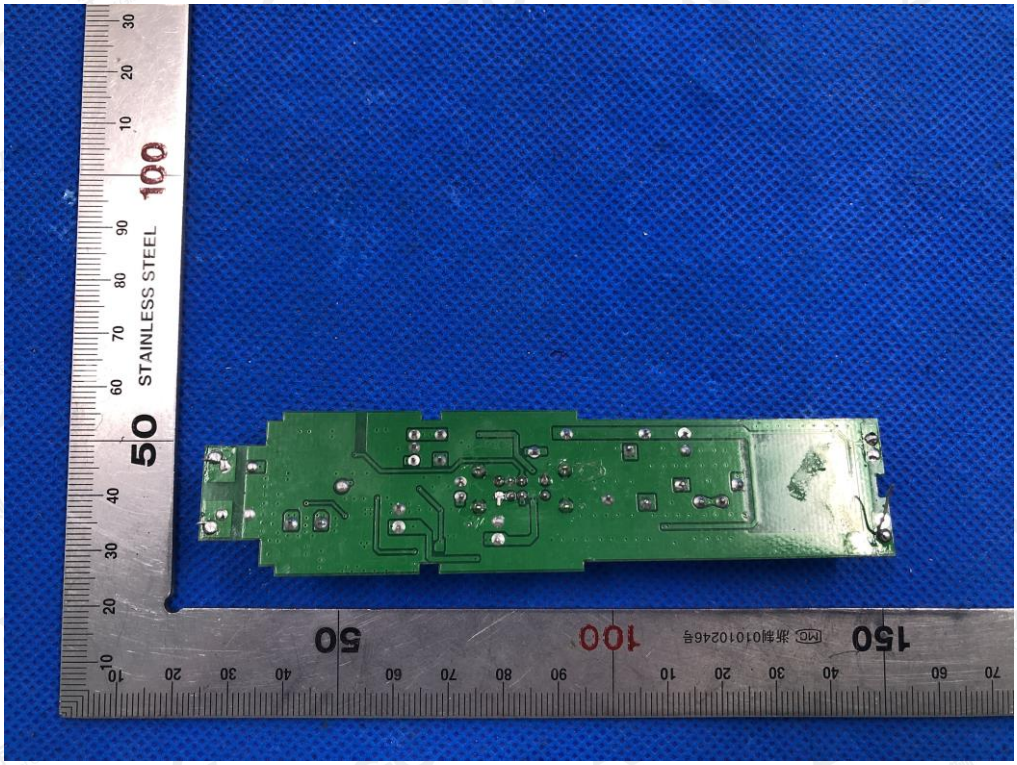


OPEN VIEW-2 OF EUT

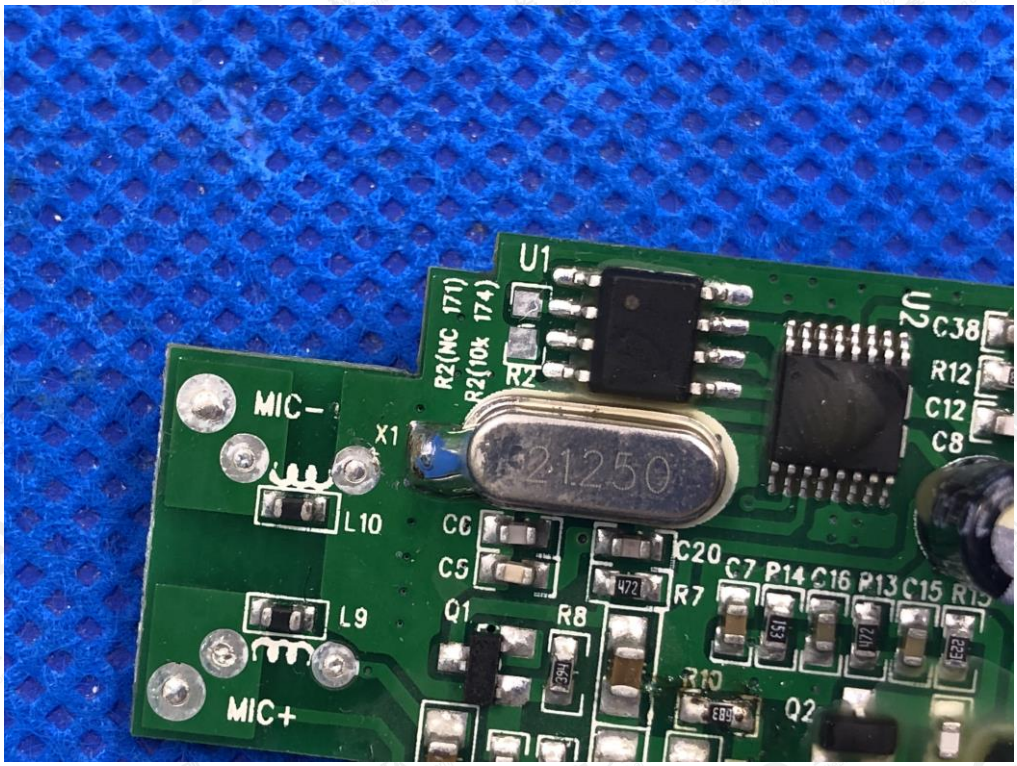
INTERNAL VIEW-1 OF EUT



INTERNAL VIEW-2 OF EUT



INTERNAL VIEW-3 OF EUT



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