



Shenzhen CTA Testing Technology Co., Ltd.

Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

FCC PART 15 SUBPART CTEST REPORT

FCC PART 15.236

Report Reference No.....: CTA23102300701

FCC ID.....: 2AINTU-51

Compiled by

(position+printedname+signature)....: File administrators Zoey Cao

Supervised by

(position+printedname+signature)....: Project Engineer Amy Wen

Approved by

(position+printedname+signature)....: RF Manager Eric Wang

Date of issue.....: Oct. 30, 2023

Testing Laboratory Name: Shenzhen CTA Testing Technology Co., Ltd.

Address.....: Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

Applicant's name: AIRWAVE TECHNOLOGIES, INC.

Address: 2901 Simms Street Ste F Hollywood, FL 33020

Test specification

Standard: FCC Part 15.236

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Test item description: Wireless Microphone(Handheld Transmitter)

Trade Mark: N/A

Manufacturer: Enping Pasgao Electronic Company Limited

Model/Type reference.....: U-51 A

Listed Models: U-51 B, AT-5210 A, AT-5210 B, AT-5220 A, AT-5220 B

Modulation Type: FM

Operation Frequency.....: 470.2-488.7MHz, 514-542MHz

Rating: DC 3.0V From Battery

Result.....: PASS

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Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China
Tel:+86-755 2322 5875 E-mail:cta@cta-test.cn Web:http://www.cta-test.cn

TEST REPORT

Equipment under Test : Wireless Microphone(Handheld Transmitter)

Model /Type : U-51 A

Series Model : U-51 B, AT-5210 A, AT-5210 B, AT-5220 A, AT-5220 B

Applicant : **AIRWAVE TECHNOLOGIES, INC.**

Address : 2901 Simms Street Ste F Hollywood, FL 33020

Manufacturer : **Enping Pasgao Electronic Company Limited**

Address : V1 2nd District Industrial Transfer Park, Enping, Jiangmen, Guangdong, China

Test Result:	PASS
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory

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1 TEST STANDARDS

The tests were performed according to following standards:

[FCC Rules Part 15.236](#): Operation of wireless microphones in the bands 54-72 MHz, 76-88 MHz, 174-216 MHz, 470-608 MHz and 614-698 MHz.

[ANSI C63.10-2013](#): American National Standard for Testing Unlicensed Wireless Devices

2 SUMMARY

2.1 General Remarks

Date of receipt of test sample	:	Oct. 20, 2023
Testing commenced on	:	Oct. 20, 2023
Testing concluded on	:	Oct. 30, 2023

2.2 Product Description

Product Name:	Wireless Microphone(Handheld Transmitter)
Model/Type reference:	U-51 A
Power supply:	DC 3V From Battery
Hardware version:	N/A
Software version:	N/A
Testing sample ID:	CTA231023007-1# (Engineer sample) CTA231023007-2#(Normal sample)
microphone	
Frequency:	470.2-488.7MHz, 514-542MHz
Nominal channel bandwidth	200KHz
Modulation Type:	FM
Antenna type:	Spring antenna
Antenna gain:	1.85 dBi

Note: For more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.3 Equipment Under Test

Power supply system utilised

Power supply voltage	:	☐ 230V/ 50 Hz	☐ 120V/60Hz
		☐ 12 V DC	☐ 24 V DC
		☒ Other (specified in blank below)	

DC 3.0V From Battery

2.4 Short description of the Equipment under Test (EUT)

This is a Wireless Microphone(Handheld Transmitter).

For more details, refer to the user's manual of the EUT.

2.5 EUT operation mode

The EUT has been tested under typical operating condition. The EUT will staying in continuous transmitting when switch to the specific test frequency.

Channel A

Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	470.200	51	478.100
02	470.400	52	478.200
03	470.500	53	478.500
04	470.600	54	478.600
05	470.700	55	478.700
06	470.900	56	479.000
07	471.000	57	479.100
08	471.100	58	479.200
09	471.200	59	479.500
10	471.300	60	479.600
11	471.400	61	479.700
12	471.500	62	480.000
13	471.600	63	480.100
14	471.700	64	480.200
15	471.800	65	482.000
16	471.900	66	482.100
17	472.000	67	482.200
18	472.100	68	482.500
19	472.200	69	482.600
20	472.300	70	482.700
21	472.400	71	483.000
22	472.500	72	483.100
23	472.600	73	483.200
24	472.700	74	483.900
25	472.800	75	484.000
26	472.900	76	484.100
27	473.000	77	484.400
28	473.200	78	484.500
29	473.300	79	484.600
30	473.400	80	487.600
31	473.500	81	487.700
32	473.800	82	487.800
33	473.900	83	487.900
34	474.000	84	488.000
35	474.300	85	488.100
36	474.400	86	488.200
37	474.500	87	488.300
38	474.800	88	488.400
39	474.900	89	488.500
40	475.000	90	488.600
41	475.300	91	488.700
42	475.400	92	488.800
43	475.500	93	
44	475.800	94	
45	475.900	95	
46	476.000	96	
47	477.500	97	
48	477.600	98	
49	477.700	99	
50	478.000	100	

Channel B:

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Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	514.000	71	525.900
02	514.400	72	526.150
03	514.650	73	526.300
04	514.800	74	526.550
05	515.050	75	526.700
06	515.200	76	527.100
07	515.450	77	527.150
08	515.500	78	527.500
09	515.600	79	527.550
10	516.000	80	527.900
11	516.250	81	527.950
12	516.300	82	528.300
13	516.400	83	528.350
14	516.600	84	528.550
15	516.650	85	528.750
16	516.800	86	528.950
17	517.200	87	529.550
18	517.400	88	529.600
19	517.450	89	530.000
20	517.500	90	530.150
21	517.550	91	530.400
22	517.600	92	530.550
23	517.850	93	530.800
24	518.200	94	531.200
25	518.250	95	531.250
26	518.350	96	531.650
27	518.400	97	532.050
28	518.600	98	532.450
29	518.650	99	533.000
30	518.750	100	533.050
31	518.800	101	533.100
32	519.050	102	533.450
33	519.150	103	533.950
34	519.200	104	534.150
35	519.450	105	534.550
36	519.550	106	535.450
37	519.850	107	535.750
38	519.950	108	535.850
39	520.350	109	535.900
40	520.450	110	536.400
41	520.650	111	536.550
42	520.750	112	536.800
43	520.850	113	536.950
44	521.050	114	537.050
45	521.150	115	537.650
46	521.250	116	537.700
47	521.450	117	538.100
48	521.550	118	538.200
49	521.650	119	538.600
50	521.850	120	538.800
51	521.950	121	539.200
52	522.050	122	539.500
53	522.250	123	539.650
54	522.450	124	540.500
55	522.650	125	540.550
56	522.850	126	540.750
57	523.050	127	540.950
58	523.250	128	541.100
59	523.350	129	541.150

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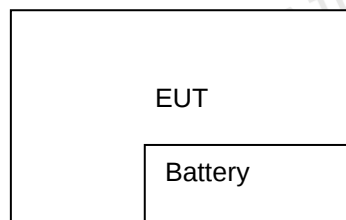
60	523.450	130	541.450
61	523.750	131	541.550
62	523.850	132	541.600
63	524.250	133	541.750
64	524.550	134	541.850
65	524.650	135	541.900
66	524.950	136	541.950
67	525.100	137	542.000
68	525.350	138	
69	525.500	139	
70	525.750	140	

Channel A:**Testing Frequency:**

Channel	Frequency(MHz)
Low	470.200 MHz
Mid	479.200 MHz
High	488.700 MHz

Channel B:**Testing Frequency:**

Channel	Frequency(MHz)
Low	514.000 MHz
Mid	528.300 MHz
High	542.000 MHz

2.6 Block Diagram of Test Setup**2.7 Related Submittal(s) / Grant (s)**

This submittal(s) (test report) is intended for the device filing to comply with Section 15.236 of the FCC Part 15, Subpart C Rules.

2.8 Modifications

No modifications were implemented to meet testing criteria.

3 TEST ENVIRONMENT

3.1 Address of the test laboratory

Shenzhen CTA Testing Technology Co., Ltd.

Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: 517856 Designation Number: CN1318

Shenzhen CTA Testing Technology Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

A2LA-Lab Cert. No.: 6534.01

Shenzhen CTA Testing Technology Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010.

3.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

3.4 Summary of measurement results

Test Specification clause	Test case	Test result
§15.236(d)	RF Power Output	Compliant
§15.236(f)(2)	Occupied Bandwidth	Compliant
§15.236(g)	Necessary Bandwidth	Compliant
§15.236(g)	Spurious emissions	Compliant
§15.236(f)(3)	Frequency Stability	Compliant
§15.207	Conducted Emissions	N/A

Remark:

1. The measurement uncertainty is not included in the test result.
2. We tested all test mode and recorded worst case in report

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Tel:+86-755 2322 5875 E-mail:cta@cta-test.cn Web:http://www.cta-test.cn

3.5 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2" and is documented in the Shenzhen CTA Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen CTA Testing Technology Co., Ltd. :

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10 dB	(1)
Radiated Emission	1~18GHz	4.32 dB	(1)
Radiated Emission	18-40GHz	5.54 dB	(1)
Conducted Disturbance	0.15~30MHz	3.12 dB	(1)

- (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

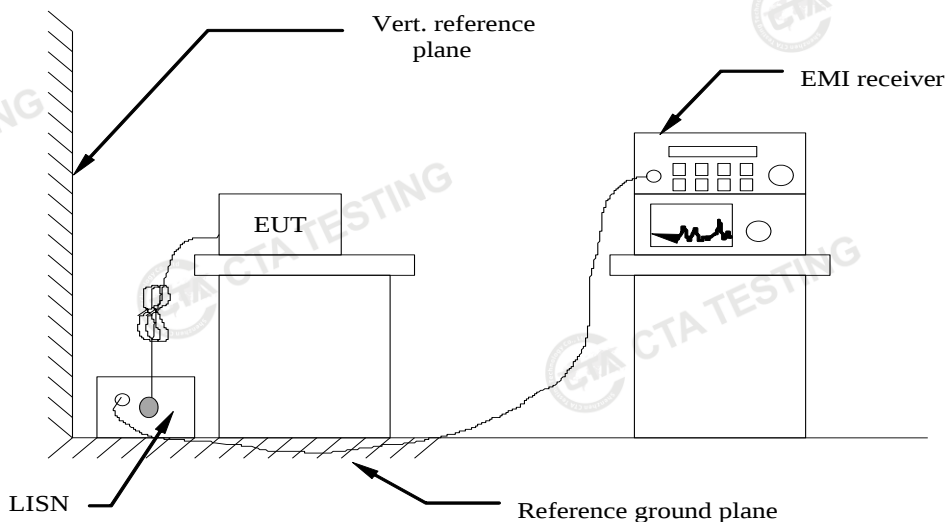
3.6 Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Equipment No.	Calibration Date	Calibration Due Date
LISN	R&S	ENV216	CTA-308	2023/08/02	2024/08/01
LISN	R&S	ENV216	CTA-314	2023/08/02	2024/08/01
EMI Test Receiver	R&S	ESPI	CTA-307	2023/08/02	2024/08/01
EMI Test Receiver	R&S	ESCI	CTA-306	2023/08/02	2024/08/01
Spectrum Analyzer	Agilent	N9020A	CTA-301	2023/08/02	2024/08/01
Spectrum Analyzer	R&S	FSP	CTA-337	2023/08/02	2024/08/01
Vector Signal generator	Agilent	N5182A	CTA-305	2023/08/02	2024/08/01
Analog Signal Generator	R&S	SML03	CTA-304	2023/08/02	2024/08/01
Universal Radio Communication	CMW500	R&S	CTA-302	2023/08/02	2024/08/01
Temperature and humidity meter	Chigo	ZG-7020	CTA-326	2023/08/02	2024/08/01
Ultra-Broadband Antenna	Schwarzbeck	VULB9163	CTA-310	2021/08/07	2024/08/06
Horn Antenna	Schwarzbeck	BBHA 9120D	CTA-309	2021/08/07	2024/08/06
Loop Antenna	Zhinan	ZN30900C	CTA-311	2021/08/07	2024/08/06
Horn Antenna	Beijing Hangwei Dayang	OBH100400	CTA-336	2021/08/07	2024/08/06
Amplifier	Schwarzbeck	BBV 9745	CTA-312	2023/08/02	2024/08/01
Amplifier	Taiwan chengyi	EMC051845B	CTA-313	2023/08/02	2024/08/01
Directional coupler	NARDA	4226-10	CTA-303	2023/08/02	2024/08/01
High-Pass Filter	XingBo	XBLBQ-GTA18	CTA-402	2023/08/02	2024/08/01
High-Pass Filter	XingBo	XBLBQ-GTA27	CTA-403	2023/08/02	2024/08/01
Automated filter bank	Tonscend	JS0806-F	CTA-404	2023/08/02	2024/08/01
Power Sensor	Agilent	U2021XA	CTA-405	2023/08/02	2024/08/01
Amplifier	Schwarzbeck	BBV9719	CTA-406	2023/08/02	2024/08/01

4 TEST CONDITIONS AND RESULTS

4.1 AC Power Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

- 1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013.
- 2 Support equipment, if needed, was placed as per ANSI C63.10-2013
- 3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013
- 4 The EUT received DC12V power from adapter, the adapter received AC120V/60Hz and AC 240V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5 All support equipments received AC power from a second LISN, if any.
- 6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
- 8 During the above scans, the emissions were maximized by cable manipulation.

AC Power Conducted Emission Limit

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following :

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST RESULTS

The EUT is powered by the Battery, So this test item is not applicable for the EUT.

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4.2 Maximum Output Power

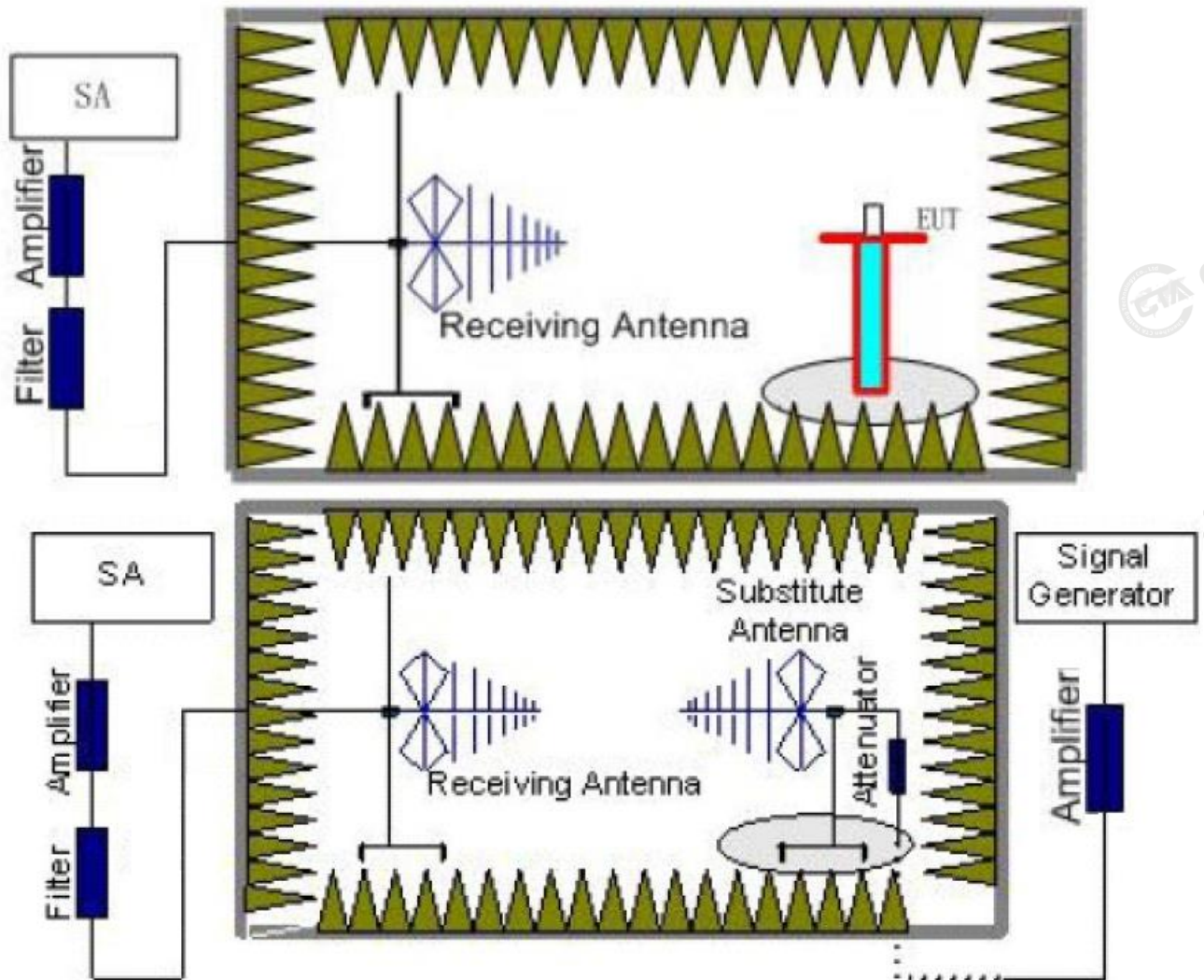
Limit

The maximum radiated power shall not exceed the following values:

- (1) In the bands allocated and assigned for broadcast television and in the 600 MHz service band: 50 mW EIRP
- (2) In the 600 MHz guard band and the 600 MHz duplex gap: 20 mW EIRP.

Test Procedure

1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all test transmit frequencies were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, And the maximum value of the receiver should be recorded as (P_r).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. An amplifier may be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (P_{cl}), the Substitution Antenna Gain (G_a) and the Amplifier Gain (P_{Ag}) should be recorded after test.
The measurement results are obtained as described below:
$$\text{Power(EIRP)} = P_{Mea} + P_{Ag} - P_{cl} + G_a$$
6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
7. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15\text{dBi}$.

Test Configuration**Test Results**

Remark;

The field strength of radiation emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The data show in this report only with the worst case setup. After exploratory measurement the worst case of H axis and receiver antenna at vertical polarization was reported.

Channel A:

Test Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dBi)	P_{Ag} (dB)	EIRP (dBm)	EIRP (mW)	FCC Limit (mW)	Polarization
470.200	-30.10	1.5	10.43	25.7	4.53	2.84	50	H
479.200	-28.34	1.5	10.43	25.7	6.29	4.25	50	H
488.700	-29.35	1.5	10.43	25.7	5.28	3.38	50	H

Channel B:

Test Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dBi)	P _{Ag} (dB)	EIRP (dBm)	EIRP (mW)	FCC Limit (mW)	Polarization
514.000	-29.26	1.5	10.43	25.7	5.37	3.44	50	H
528.300	-28.78	1.5	10.43	25.7	5.85	3.84	50	H
542.000	-28.75	1.5	10.43	25.7	5.88	3.87	50	H

Remark: $EIRP = P_{Mea}(dBm) + P_{Ag}(dB) - P_{cl}(dB) + G_a(dBi)$

4.3 Occupied Bandwidth

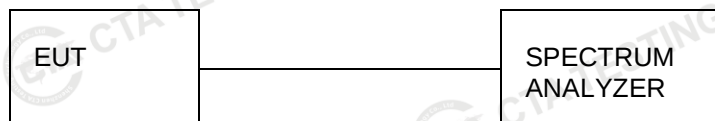
Limit

One or more adjacent 25 kHz segments within the assignable frequencies may be combined to form a channel whose maximum bandwidth shall not exceed 200 kHz. The operating bandwidth shall not exceed 200 kHz.

Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 3 KHz RBW and 10 KHz VBW.

Test Configuration



Test Results

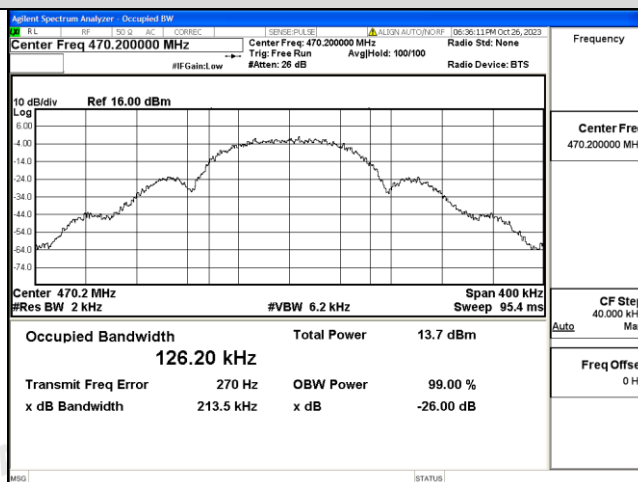
Channel A:

Modulation	Frequency (MHz)	99% OBW (KHz)	Limit (KHz)	Result
FM	470.200	126.20	200	Pass
FM	479.200	126.06	200	Pass
FM	488.700	126.23	200	Pass

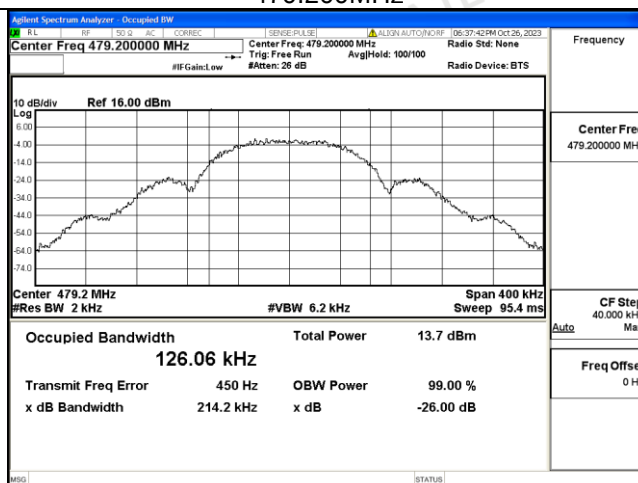
Channel B:

Modulation	Frequency (MHz)	99% OBW (KHz)	Limit (KHz)	Result
FM	514.000	126.65	200	Pass
FM	528.300	126.45	200	Pass
FM	542.000	127.66	200	Pass

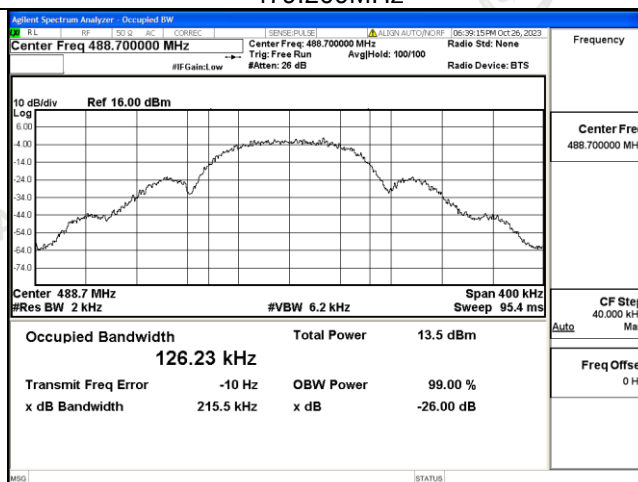
Plots of Occupied Bandwidth



470.200MHz

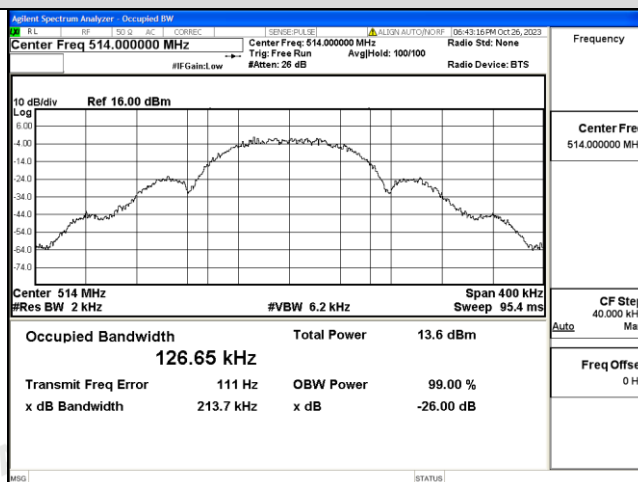


479.200MHz

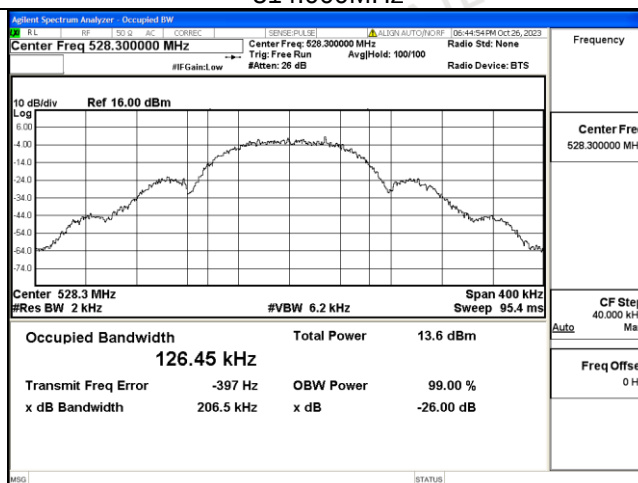


488.700MHz

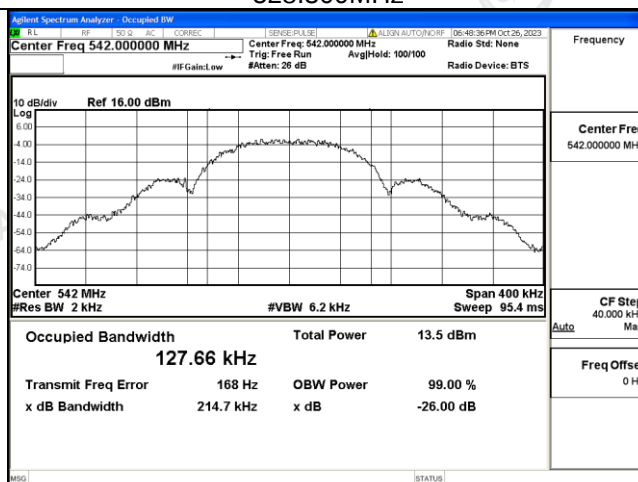
Plots of Occupied Bandwidth



514.000MHz



528.300MHz



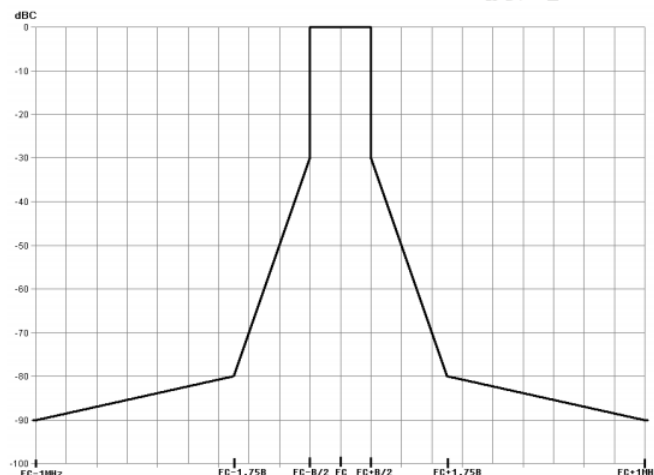
542.000MHz

4.4 Necessary Bandwidth

LIMIT

Emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in §8.3 of ETSI EN 300 422-1 V1.4.2 (2011-08) as below:

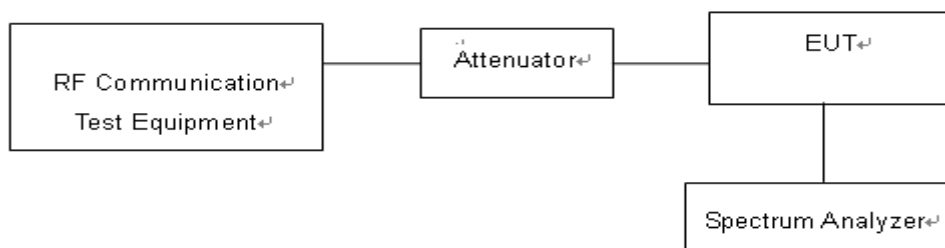
The transmitter output spectrum shall be within the mask defined in figure below where B is the declared channel bandwidth



TEST PROCEDURE

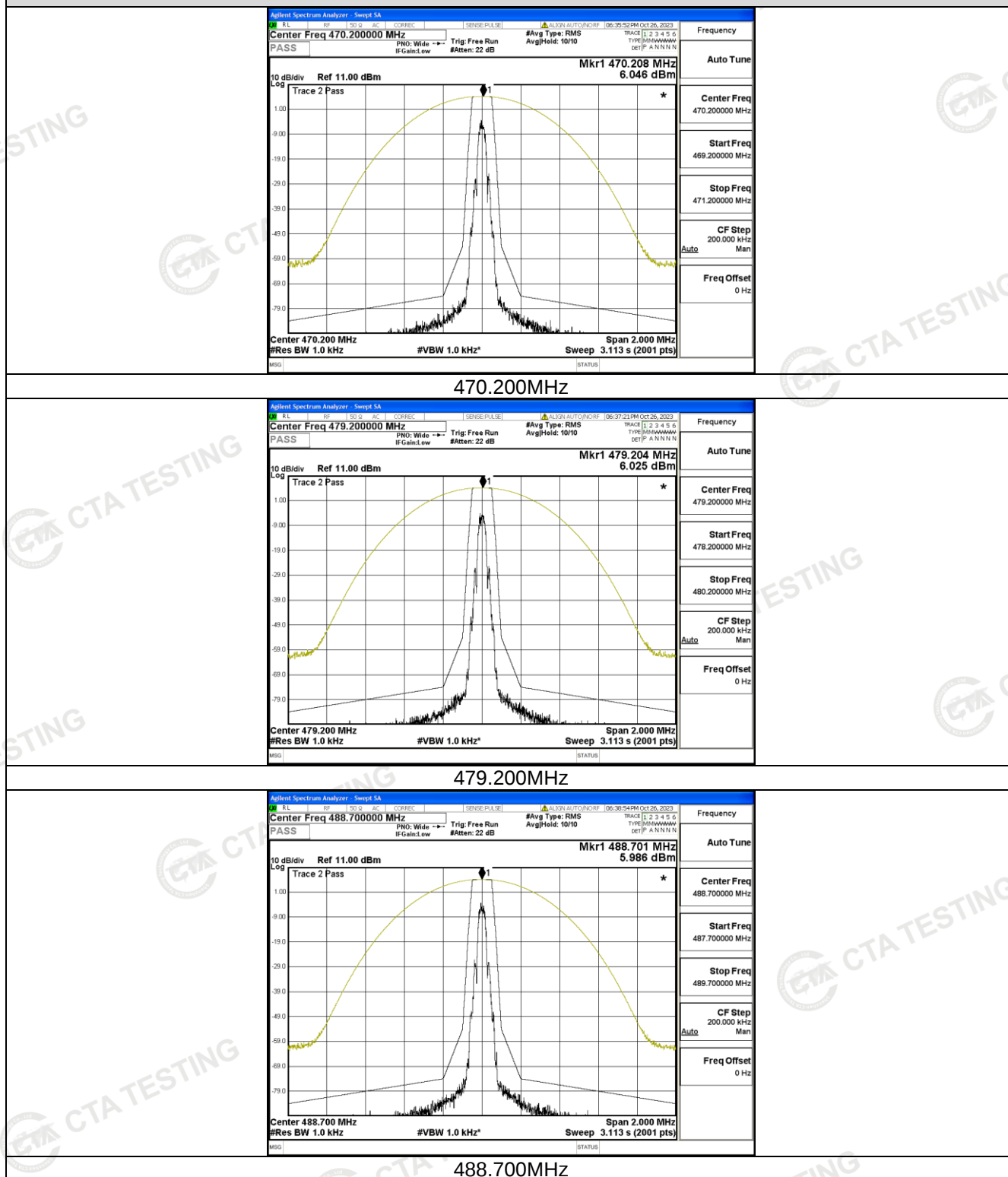
1. With the Low Frequency (LF) audio signal generator set to 500 Hz, the audio input level to the EUT shall be Adjusted to 8 dB below the limiting threshold (-8dB limit) as declared by the manufacturer.
2. The corresponding audio output level from the demodulator shall be measured and recorded.
3. The input impedance of the noise meter shall be sufficiently high to avoid more than 0.1 dB changes in input level when the meter is switched between input and output.
4. The audio input level shall be increased by 20 dB, i.e. to 12 dB (lim), and the corresponding change in output level shall be measured.
5. It shall be checked that the audio output level has increased by ≤ 10 dB.
6. If the step 5 is not met, the initial audio input level shall be increased from -8 dB (lim) in 1 dB steps until the above condition is fulfilled, and the input level recorded in the test report. This level replaces the value derived from the manufacturer's declaration and is defined as -8dB (lim).
7. Measure the input level at the transmitter required to give +12 dB (lim) and record the EUT output level test plots by the spectrum analyzer.
8. The transmitter RF output spectrum shall be measured, using a spectrum analyser with the following settings:
 - centre frequency: fc: Transmitter (Tx) nominal frequency;
 - dispersion (Span): fc - 1 MHz to fc + 1 MHz;
 - Resolution BandWidth (RBW): 1 kHz;
 - Video BandWidth (VBW): 1 kHz;
 - detector: Peak hold.

TEST CONFIGURATION

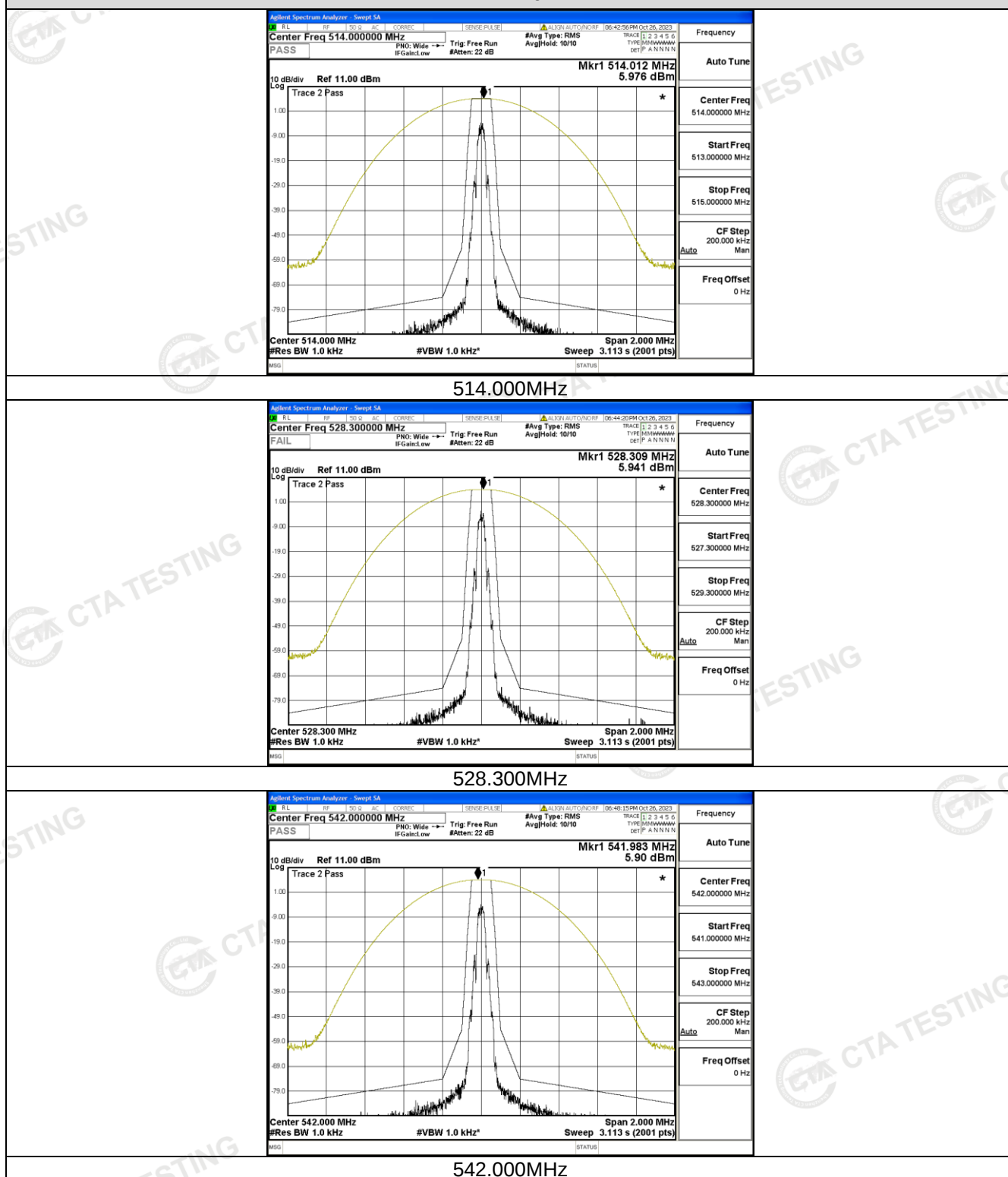


TEST RESULTS**Note:**

	Bandwidth(B)	B/2	0.35B
Manufacturer declare	200 KHz	100KHz	70KHz

Plots of Necessary Bandwidth**Shenzhen CTA Testing Technology Co., Ltd.**
 Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China
 Tel:+86-755 2322 5875 E-mail:cta@cta-test.cn Web:http://www.cta-test.cn

Plots of Necessary Bandwidth



4.5 Transmitter spurious emissions

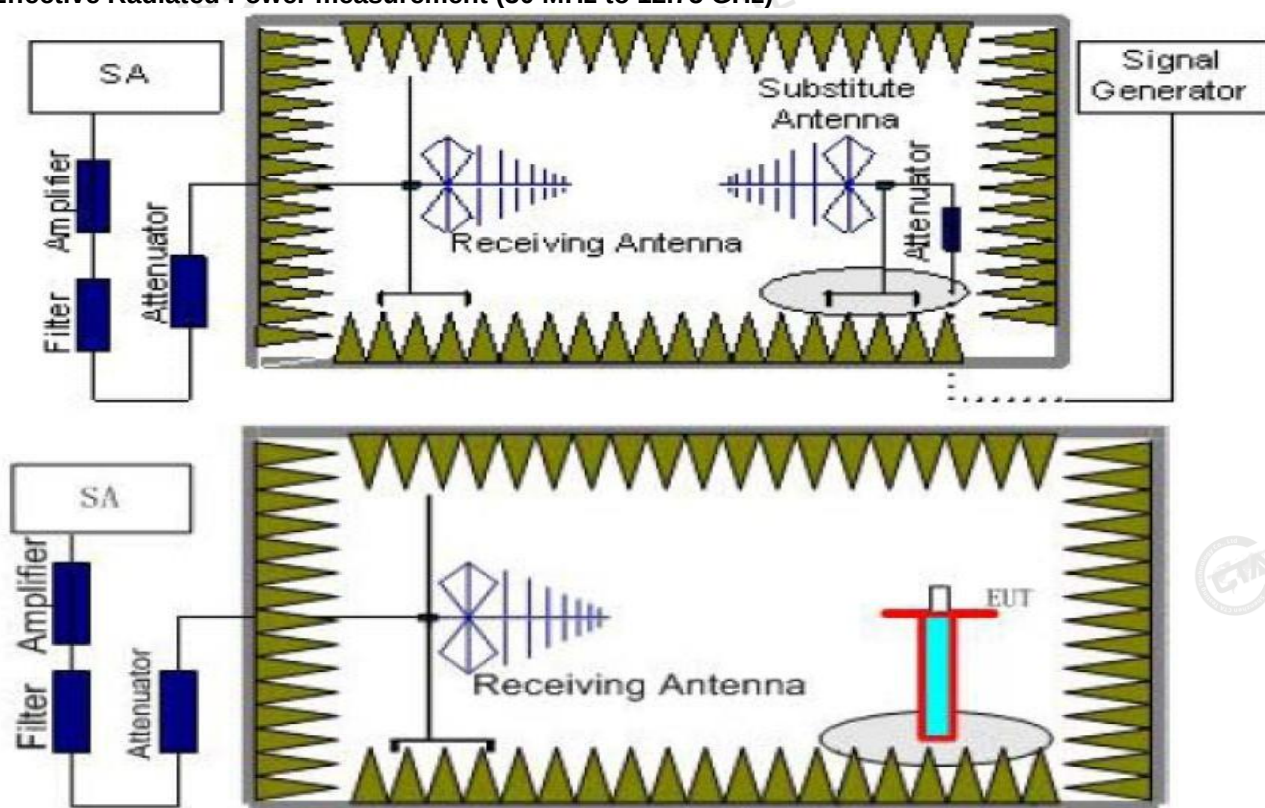
Limit

Spurious emissions are emissions outside the frequency range(s) of the equipment. The power of the spurious emissions shall not exceed the limits of table as below:

State	Frequency		
	47 MHz to 74 MHz 87,5 MHz to 137 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	Other Frequencies below 1 000 MHz	Frequencies above 1 000 MHz
Operation	4 nW	250 nW	1 μ W
Standby	2 nW	2 nW	20 nW

Test Configuration

Effective Radiated Power measurement (30 MHz to 12.75 GHz)



TEST PROCEDURE

1. The EUT was placed on a turntable with 1.5m height.
2. The test distance between the receiving antenna and the EUT is 3 meter, while the receiving (test) antenna is kept at 1.5 meter height.
3. Set EUT in continuous transmitting with maximum output power at test frequency.
4. The table was rotated from 0 to 360 degree to search the highest radiated emission.
5. Repeat step 3 to 4 for each polarization and test channel to find the worst emission level.
6. The results obtained are compared to the limits in order to prove compliance with the requirement.

TEST RESULTS

The test frequency range from 25MHz to 4GHz and recorded worst at below:

Channel A:

Test mode: Tx (470.200MHz)					
Frequency (MHz)	Pol./Ant	Measurement EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
89.420	V	-64.61	-36.00	28.61	PASS
940.400	V	-64.67	-36.00	28.67	
1410.600	V	-69.60	-30.00	39.60	
--	V	--	--	--	
89.420	H	-64.61	-36.00	28.61	
940.400	H	-66.34	-36.00	30.34	
1410.600	H	-72.85	-30.00	42.85	
--	H	--	--	--	

Test mode: Tx (479.200MHz)					
Frequency (MHz)	Pol./Ant	Measurement EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
89.420	V	-65.90	-36.00	29.90	PASS
958.400	V	-64.74	-36.00	28.74	
1437.600	V	-68.13	-30.00	38.13	
--	V	--	--	--	
89.420	H	-64.75	-36.00	28.75	
958.400	H	-66.15	-36.00	30.15	
1437.600	H	-71.33	-30.00	41.33	
--	H	--	--	--	

Test mode: Tx (488.700MHz)					
Frequency (MHz)	Pol./Ant	Measurement EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
90.321	V	-64.56	-36.00	28.56	PASS
977.400	V	-63.93	-36.00	27.93	
1466.100	V	-68.81	-30.00	38.81	
--	V	--	--	--	
90.321	H	-65.12	-36.00	29.12	
977.400	H	-66.31	-36.00	27.31	
1466.100	H	-71.44	-30.00	41.44	
--	H	--	--	--	

Channel B:

Test mode: Tx (514.000MHz)					
Frequency (MHz)	Pol./Ant	Measurement EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
89.420	V	-65.43	-36.00	29.43	PASS
1028.000	V	-63.40	-30.00	33.40	
1542.000	V	-69.23	-30.00	39.23	
--	V	--	--	--	
89.420	H	-64.39	-36.00	28.39	
1028.000	H	-66.27	-30.00	36.27	
1542.000	H	-71.47	-30.00	41.47	
--	H	--	--	--	

Test mode: Tx (528.300MHz)					
Frequency (MHz)	Pol./Ant	Measurement EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
89.420	V	-64.65	-36.00	28.65	PASS
1056.600	V	-63.83	-30.00	33.83	
1584.900	V	-69.57	-30.00	39.57	
--	V	--	--	--	
89.420	H	-65.57	-36.00	29.57	
1056.600	H	-65.55	-30.00	35.55	
1584.900	H	-72.54	-30.00	42.54	
--	H	--	--	--	

Test mode: Tx (542.000MHz)					
Frequency (MHz)	Pol./Ant	Measurement EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
90.321	V	-65.37	-36.00	29.37	PASS
1084.000	V	-63.76	-30.00	33.76	
1626.000	V	-68.98	-30.00	38.98	
--	V	--	--	--	
90.321	H	-64.62	-36.00	28.62	
1084.000	H	-65.45	-30.00	35.45	
1626.000	H	-72.35	-30.00	42.35	
--	H	--	--	--	

Remark:

1. The test frequency range from 25MHz to 4GHz, RBW/VBW: 100 KHz/300KHz below 1GHz, RBW/VBW: 1000 KHz/3000KHz above 1GHz.
2. "--"Other emission levels were very low against the limit and not reported.

4.6 Frequency Stability

Limit

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.005\%$ of the operating frequency over a temperature variation of -20 degrees to $+50$ degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. Battery operated equipment shall be tested using a new battery.

Test Procedure

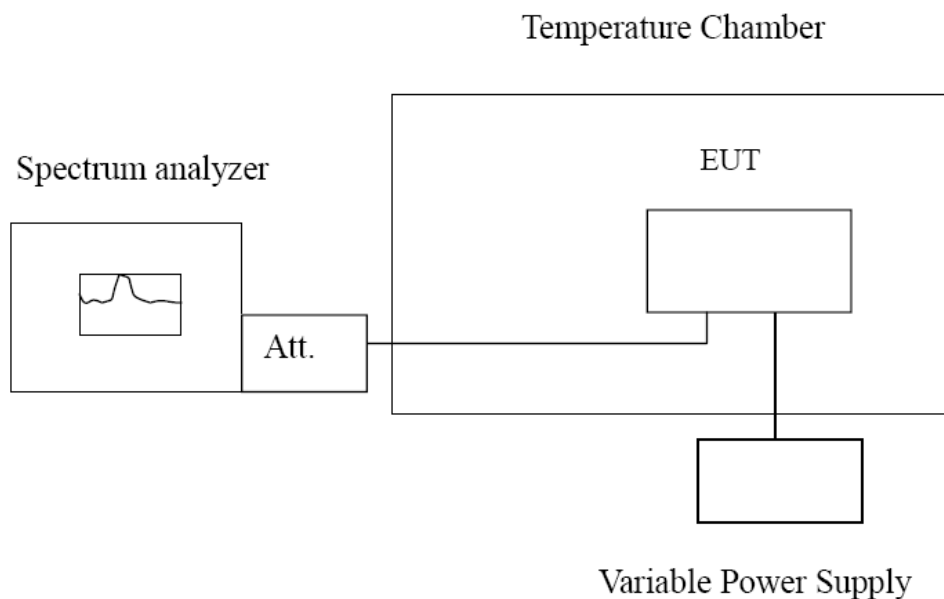
a) Frequency stability versus environmental temperature

1. Setup as Test Configuration for frequencies measured at ambient temperature if it is within 15°C to 25°C . Otherwise, an environmental chamber set for a temperature of 20°C shall be used.
2. Turn on EUT and set SA center frequency to the right frequency needs to be measured. Then set SA RBW to 3 kHz, VBW to 10kHz and frequency span to 500 kHz. Record this frequency to be a reference.
3. Set the temperature of chamber to 50°C . 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°C decreased per stage until the lowest temperature -20°C is measured, record all measurement frequencies.

b) Frequency stability versus input voltage

1. Setup as Test Configuration for frequencies measured at ambient temperature if it is within 15°C to 25°C . Otherwise, an environmental chamber set for a temperature of 20°C shall be used. Install new batteries in the EUT.
2. Set SA center frequency to the right frequency needs to be measured. Then set SA RBW to 3kHz, VBW to 10kHz and frequency span to 500 kHz. Record this frequency to be a reference.
3. For non hand carried, battery operated device, supply the EUT primary voltage with 85 and 115 percent of the nominal value and record the frequency.

Test Configuration



Test Results**Channel A:**

Reference Frequency: 470.200MHz					
Voltage (V)	Temperature (°C)	Frequency error (MHz)	Frequency Tolerance (%)	Limit (%)	Result
3.00	-20	0.00368	0.000783%	±0.005	PASS
	-10	0.00291	0.000620%		
	0	0.00553	0.001176%		
	10	0.00303	0.000644%		
	20	0.00158	0.000337%		
	30	0.00235	0.000501%		
	40	0.00035	0.000075%		
	50	-0.00018	-0.000038%		
3.45	20	-0.00064	-0.000135%		
2.55	20	-0.00210	-0.000447%		

Reference Frequency: 479.200MHz					
Voltage (V)	Temperature (°C)	Frequency error (MHz)	Frequency Tolerance (%)	Limit (%)	Result
3.00	-20	0.00236	0.000492%	±0.005	PASS
	-10	0.00309	0.000646%		
	0	0.00461	0.000963%		
	10	0.00303	0.000632%		
	20	0.00059	0.000123%		
	30	0.00317	0.000662%		
	40	0.00021	0.000044%		
	50	0.00027	0.000056%		
3.45	20	0.00046	0.000096%		
2.55	20	-0.00040	-0.000084%		

Reference Frequency: 488.700MHz					
Voltage (V)	Temperature (°C)	Frequency error (MHz)	Frequency Tolerance (%)	Limit (%)	Result
3.00	-20	0.00266	0.000544%	±0.005	PASS
	-10	0.00248	0.000508%		
	0	0.00233	0.000477%		
	10	0.00083	0.000169%		
	20	0.00105	0.000215%		
	30	0.00142	0.000291%		
	40	0.00117	0.000239%		
	50	0.00024	0.000049%		
3.45	20	0.00031	0.000063%		
2.55	20	-0.00301	-0.000616%		

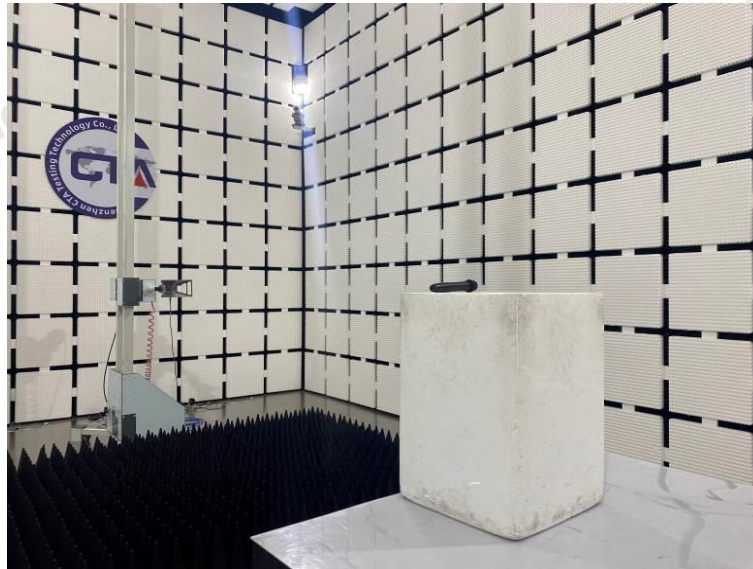
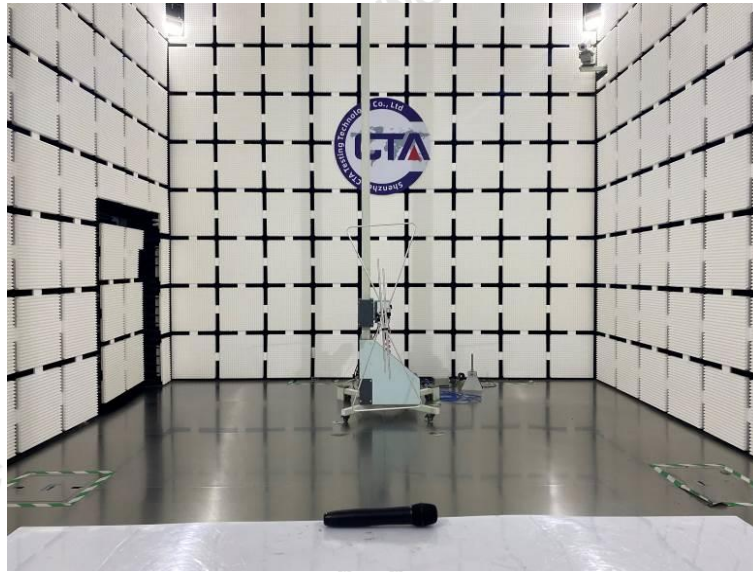
Channel B:

Reference Frequency: 514.000MHz					
Voltage (V)	Temperature (°C)	Frequency error (MHz)	Frequency Tolerance (%)	Limit (%)	Result
3.00	-20	0.00308	0.000599%	±0.005	PASS
	-10	0.00369	0.000719%		
	0	0.00422	0.000821%		
	10	0.00165	0.000321%		
	20	0.00179	0.000349%		
	30	0.00126	0.000246%		
	40	0.00029	0.000057%		
	50	0.00043	0.000083%		
3.45	20	0.00116	0.000225%	±0.005	PASS
2.55	20	-0.00218	-0.000423%		

Reference Frequency: 528.300MHz					
Voltage (V)	Temperature (°C)	Frequency error (MHz)	Frequency Tolerance (%)	Limit (%)	Result
3.00	-20	0.00292	0.000553%	±0.005	PASS
	-10	0.00345	0.000653%		
	0	0.00410	0.000776%		
	10	0.00206	0.000391%		
	20	0.00065	0.000123%		
	30	0.00201	0.000381%		
	40	0.00125	0.000236%		
	50	0.00067	0.000127%		
3.45	20	0.00096	0.000182%	±0.005	PASS
2.55	20	0.00000	-0.000001%		

Reference Frequency: 542.000MHz					
Voltage (V)	Temperature (°C)	Frequency error (MHz)	Frequency Tolerance (%)	Limit (%)	Result
3.00	-20	0.00342	0.000631%	±0.005	PASS
	-10	0.00345	0.000636%		
	0	0.00265	0.000489%		
	10	0.00166	0.000307%		
	20	0.00184	0.000339%		
	30	0.00211	0.000389%		
	40	0.00212	0.000392%		
	50	0.00022	0.000041%		
3.45	20	0.00023	0.000042%	±0.005	PASS
2.55	20	-0.00245	-0.000452%		

5 Test Setup Photos of the EUT



6 Photos of the EUT



Shenzhen CTA Testing Technology Co., Ltd.

Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

Tel: +86-755 2322 5875 E-mail: cta@cta-test.cn Web: <http://www.cta-test.cn>



Shenzhen CTA Testing Technology Co., Ltd.

Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

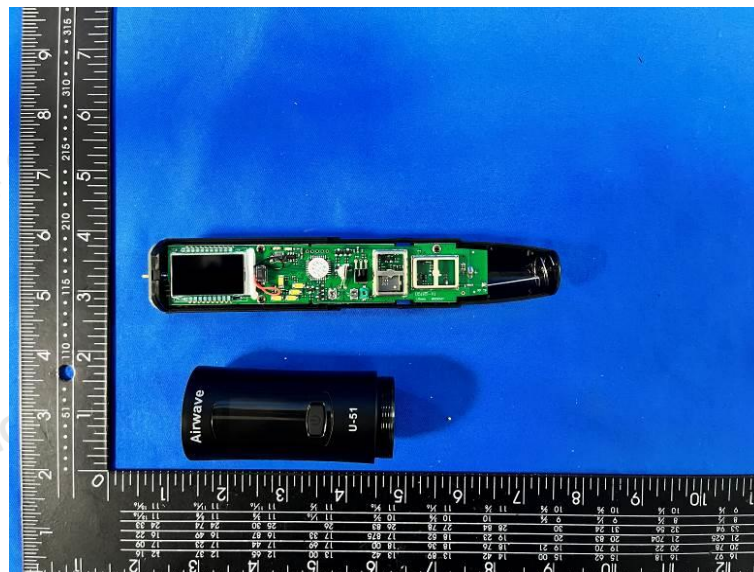
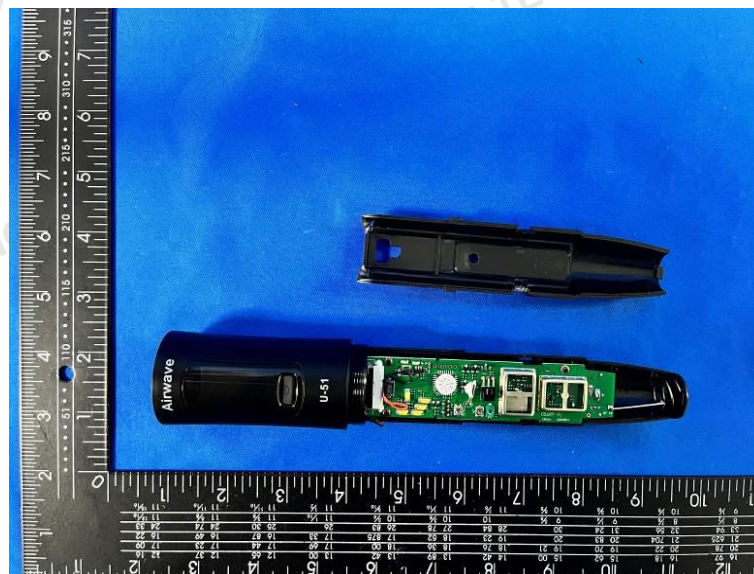
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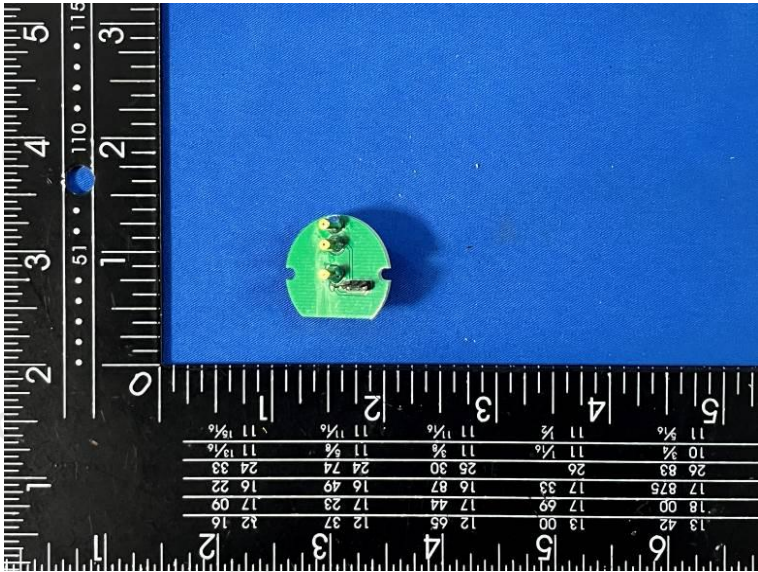
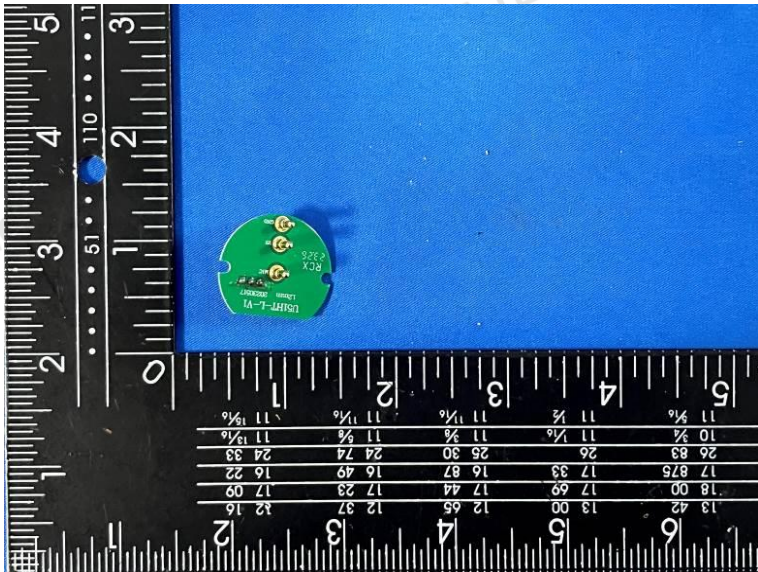
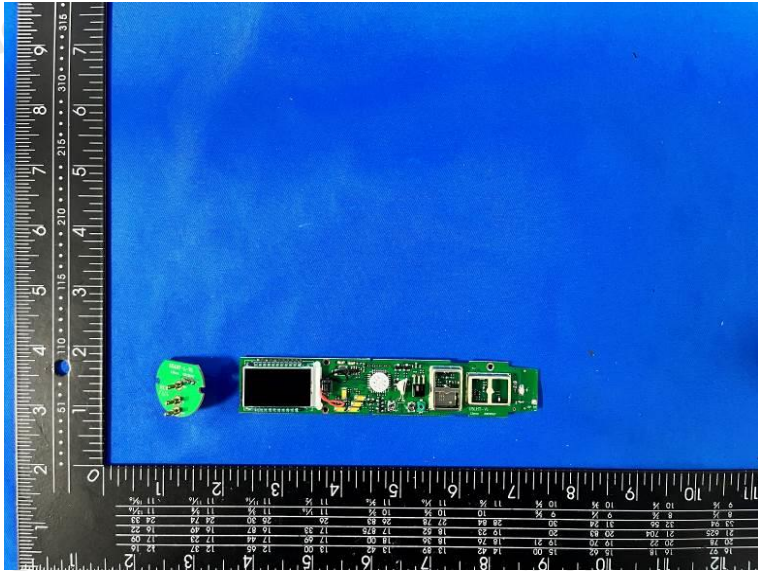
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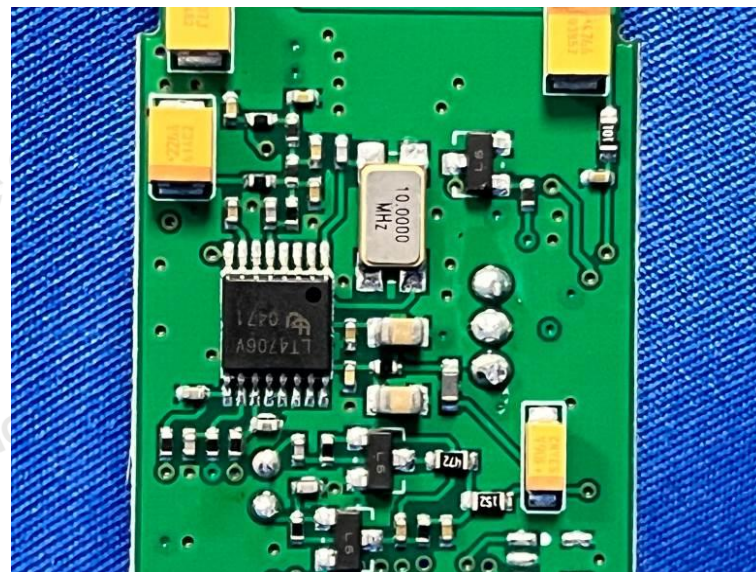
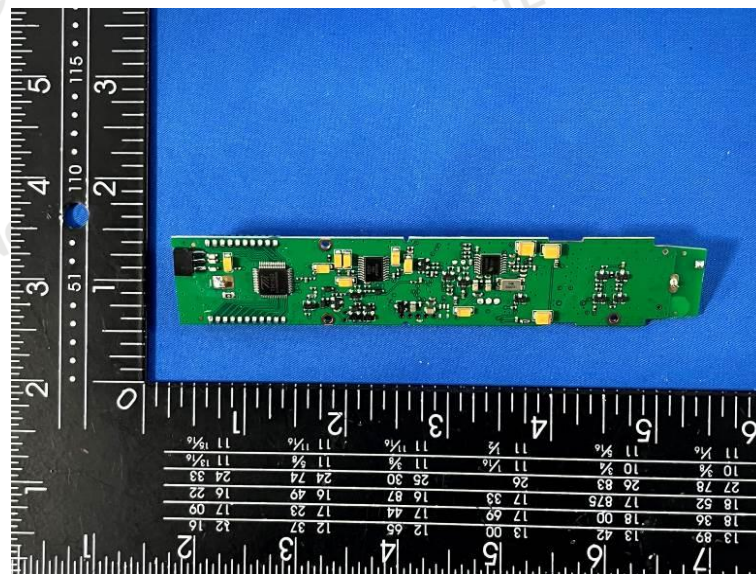
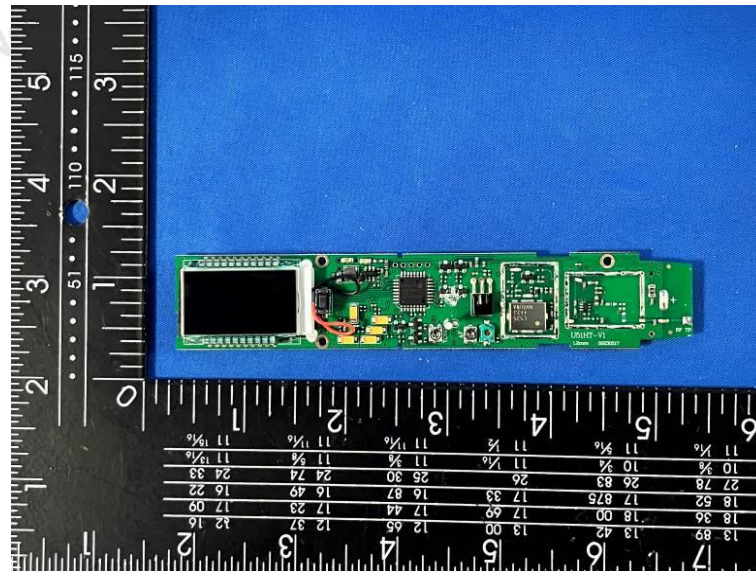


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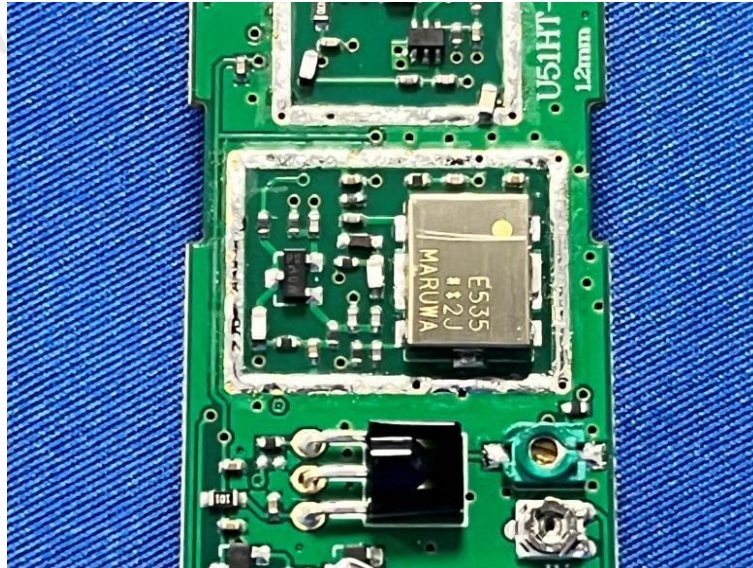
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Shenzhen CTA Testing Technology Co., Ltd.

Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China
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***** End of Report *****