Shenzhen CTL Testing Technology Co., Ltd.
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TEST REPORT

FCC PART 15.236

Report Reference No.: **CTL1904301011-WF**

Compiled by: (position+printed name+signature)	Happy Guo (File administrators)	Happy Guo
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Approved by: (position+printed name+signature)	Ivan Xie (Manager)	Ivan Xie

Product Name.....:	Wireless Microphone
Model/Type reference .....:	W-8129D
Listed Models .....:	AUD-MC1, AUD-MC2, AUD-MC3, AUD-MC4, AUD-MC5, AUD-MC6
Trade Mark .....:	N/A
FCC ID .....:	**2ATWN-W8129D**
Applicant's name .....:	**AUDSTER INC.**
Address of applicant .....:	55 Concord St. Newark, NJ 07114
Test Firm .....:	**Shenzhen CTL Testing Technology Co., Ltd.**
Address of Test Firm .....:	Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055
Test specification.....:	
Standard.....:	**FCC 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
TRF Originator .....:	Shenzhen CTL Testing Technology Co., Ltd.
Master TRF .....:	Dated 2011-01
Date of receipt of test item.....:	May 05, 2019
Date of sampling.....:	May 05, 2019
Date of Test Date.....:	May 06, 2019–Jun. 24, 2019
Data of Issue.....:	Jun. 25, 2019
Result.....:	**Pass**

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TEST REPORT

Test Report No. :	CTL1904301011-WF	Jun. 25, 2019 Date of issue

Equipment under Test	:	Wireless Microphone
Model /Type	:	W-8129D
Listed Models	:	AUD-MC1, AUD-MC2, AUD-MC3, AUD-MC4, AUD-MC5, AUD-MC6
Applicant	:	**AUDSTER INC.**
Address	:	55 Concord St. Newark, NJ 07114
Manufacturer	:	**GUANGZHOU DIWEIQI SPEAKER MANUFACTORY**
Address	:	No.32 Zhushui 1st Road, Shenshan, Jianggao Town, Baiyun District, Guangzhou, China

Test result	Pass *

∗ In the configuration tested, the EUT complied with the standards specified page 5.

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.

** Modified History **

Revisions	Description	Issued Data	Report No.	Remark
Version 1.0	Initial Test Report Release	2019-06-25	CTL1904301011-WF	Tracy Qi

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1. SUMMARY

1.1. 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

1.2. Test Description

FCC PART 15.247		
FCC Part 15.207	AC Power Conducted Emission	N/A
FCC Part 15.236(d)	RF Power Output	PASS
FCC Part 15.236(f)	Occupied Bandwidth	PASS
FCC Part 15.236(g) ETSI EN 300 422-1 v1.4.2	Necessary Bandwidth Spurious emissions	PASS
FCC Part 15.209	Radiated Emissions	PASS
FCC Part 15.236(f)(3)	Frequency Stability	PASS
FCC Part 15.203	Antenna Requirement	PASS

1.3. Test Facility

1.3.1 Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.
Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen 518055 China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 32/EN 55032 requirements.

1.3.2 Laboratory accreditation

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

CNAS-Lab Code: L7497

Shenzhen CTL Testing Technology Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No. 4343.01

Shenzhen CTL Testing Technology Co., Ltd, EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

IC Registration No.: 9518B

CAB identifier: CN0041

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements with Registration No.: 9518B on Jan. 22, 2019.

FCC-Registration No.: 399832

Designation No.: CN1216

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 399832, December 08, 2017.

1.4. 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 CISPR 16 - 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen CTL 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 CTL laboratory is reported:

Test	Measurement Uncertainty	Notes
Transmitter power conducted	±0.57 dB	(1)
Transmitter power Radiated	±2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	±2.20 dB	(1)
Occupied Bandwidth	±0.01ppm	(1)
Radiated Emission 30~1000MHz	±4.10dB	(1)
Radiated Emission Above 1GHz	±4.32dB	(1)

Conducted Disturbance 0.15~30MHz	±3.20dB	(1)

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

2. GENERAL INFORMATION

2.1. Environmental conditions

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

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

2.2. General Description of EUT

Product Name:	Wireless Microphone
Model/Type reference:	W-8129D
Power supply:	DC 3V from battery
Modulation Type:	FM
Operation frequency:	210.3MHz
Channel number:	1
Nominal channel bandwidth	200KHz
Antenna type:	Internal antenna
Antenna gain:	0dBi

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

2.3. Description of Test Modes and Test Frequency

The Applicant provides software tools to control the EUT for staying in continuous transmitting (Duty Cycle more than 98%) and receiving mode for testing.

2.4. Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	R&S	ENV216	3560.6550.12	2019/05/24	2020/05/23
LISN	R&S	ESH2-Z5	860014/010	2019/05/24	2020/05/23
Bilog Antenna	Sunol Sciences Corp.	JB1	A061713	2019/05/24	2020/05/23
EMI Test Receiver	R&S	ESCI	1166.5950.03	2019/05/24	2020/05/23
Spectrum Analyzer	Agilent	E4407B	MY41440676	2019/05/24	2020/05/23
Spectrum Analyzer	Agilent	N9020	US46220290	2019/05/24	2020/05/23
Controller	EM Electronics	EM 1000	060859	2019/05/24	2020/05/23
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2019/05/24	2020/05/23
Active Loop Antenna	Da Ze	ZN30900A	/	2019/05/24	2020/05/23
Amplifier	Agilent	8449B	3008A02306	2019/05/24	2020/05/23
Amplifier	Agilent	8447D	2944A10176	2019/05/24	2020/05/23
Temperature/Humidity Meter	Gangxing	CTH-608	02	2019/05/24	2020/05/23
High-Pass Filter	micro-tranics	HPM50108	G174	2019/05/24	2020/05/23
High-Pass Filter	micro-tranics	HPM50111	G142	2019/05/24	2020/05/23
Coaxial Cables	HUBER+SUHNER	SUCOFLEX 104PEA-10M	10m	2019/05/24	2020/05/23
Coaxial Cables	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	2019/05/24	2020/05/23
Coaxial Cables	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	2019/05/24	2020/05/23
RF Cable	Megalon	RF-A303	N/A	2019/05/24	2020/05/23

The calibration interval was one year

2.5. Related Submittal(s) / Grant (s)

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

2.6. Modifications

No modifications were implemented to meet testing criteria.

3. TEST CONDITIONS AND RESULTS

3.1. Conducted Emissions Test

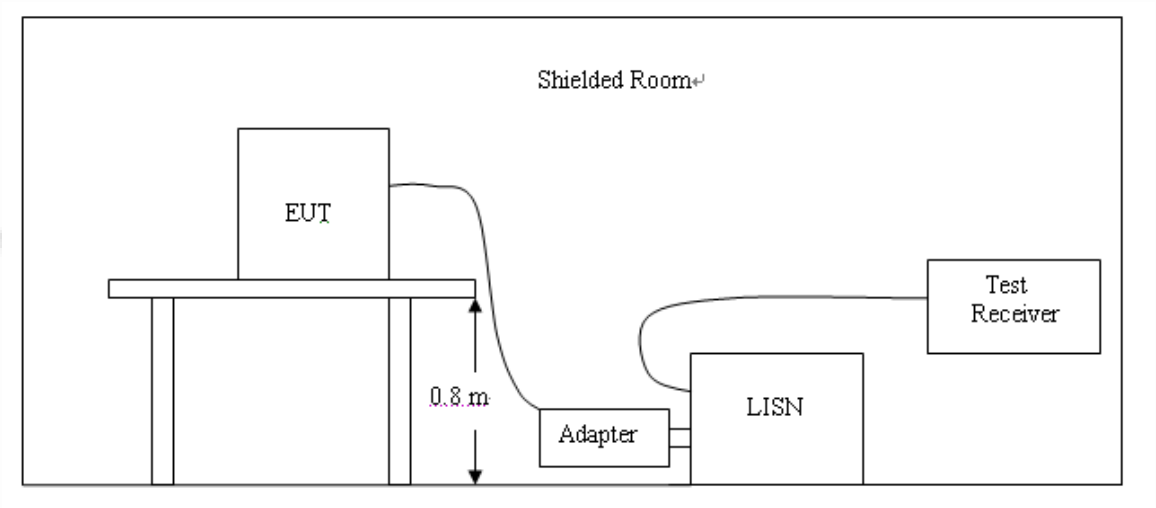
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207

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 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 adapter received AC120V/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.

TEST RESULTS

Not applicable to this device, which is powered by battery.

3.2. Radiated Emissions and Band Edge

Limit

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission out of authorized band shall not exceed the following table at a 3 meters measurement distance.

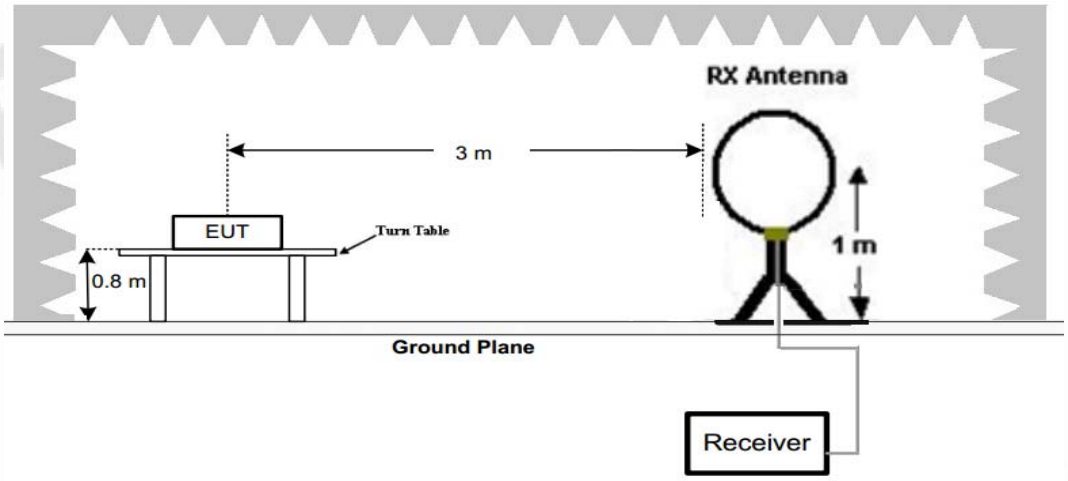
In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a)

Radiated emission limits

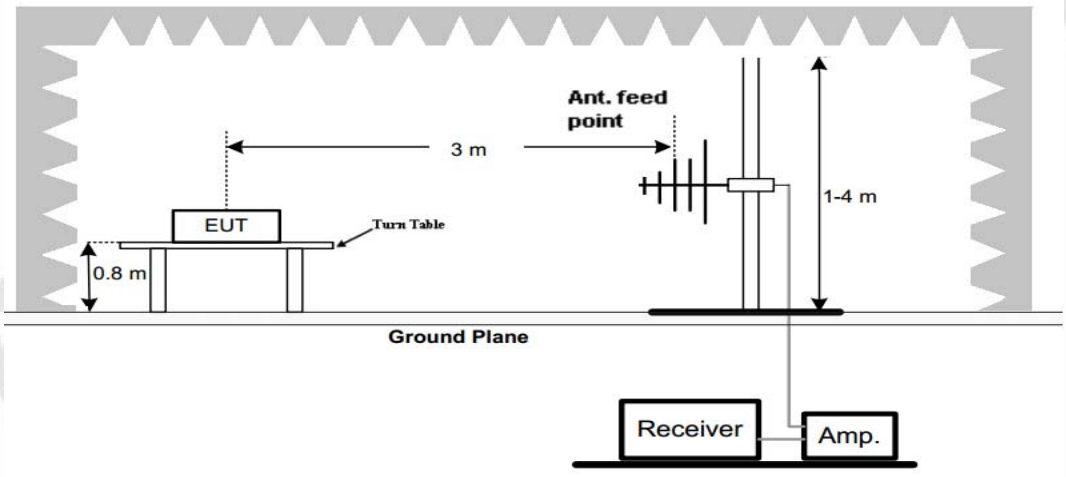
Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST CONFIGURATION

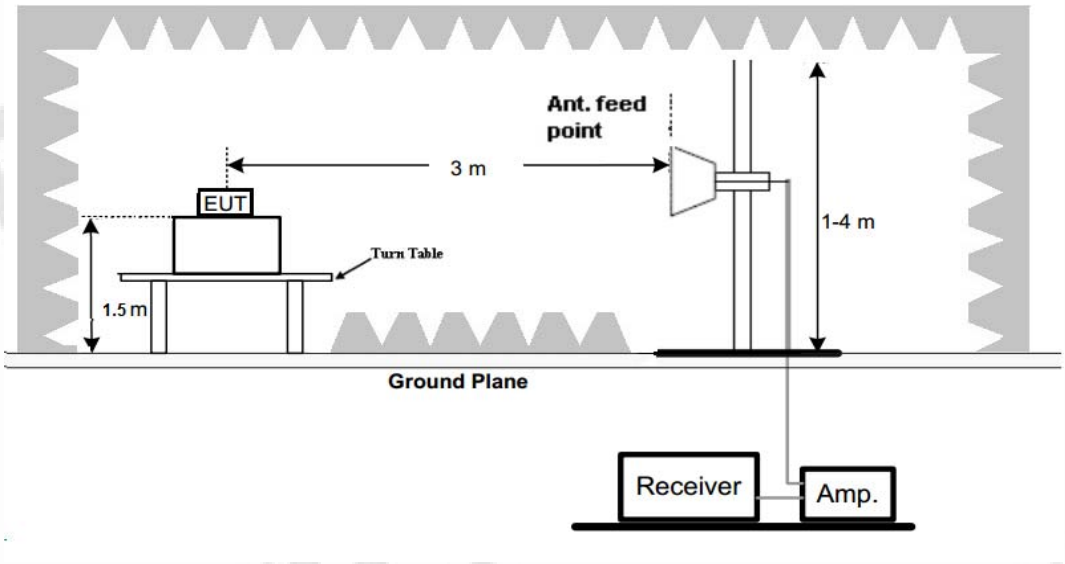
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



Test Procedure

1. Below 1GHz measurement the EUT is placed on a turntable which is 0.8m above ground plane, and above 1GHz measurement EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0℃ to 360℃ to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.

TEST RESULTS

Remark:

Radiated emission test from 9 KHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9 KHz to 30MHz and not recorded in this report.

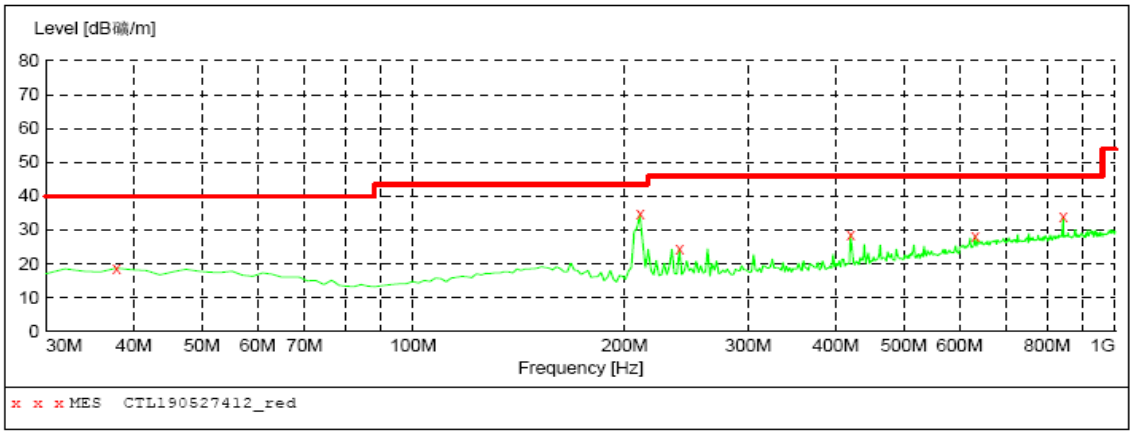
For 30MHz-1GHz

Horizontal

SWEEP TABLE: "test (30M-1G)"

Short Description: Field Strength

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	300.0 ms	120 kHz	VULB9168



MEASUREMENT RESULT: "CTL190527412_red"

2019-5-27 11:08

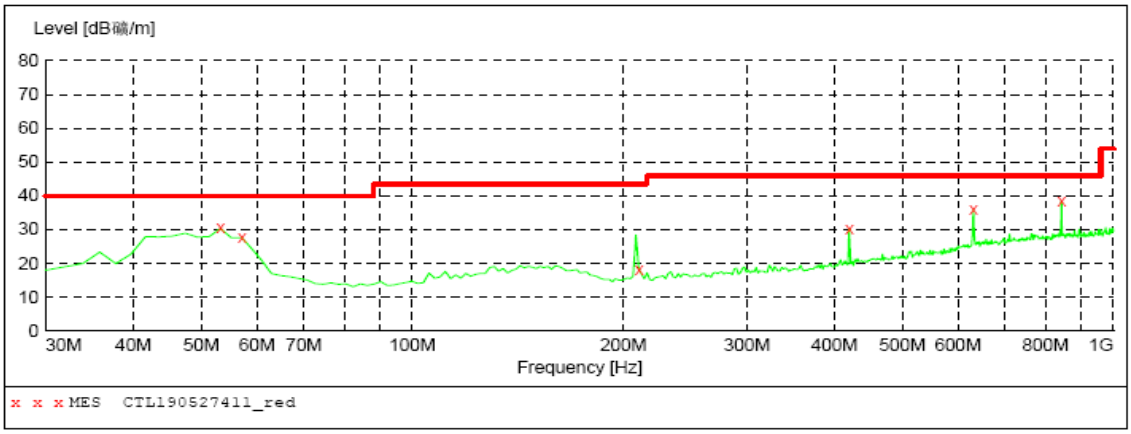
Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
37.760000	18.80	14.5	40.0	21.2	---	0.0	0.00	HORIZONTAL
210.420000	34.60	11.3	43.5	8.9	---	0.0	0.00	HORIZONTAL
239.520000	24.50	12.7	46.0	21.5	---	0.0	0.00	HORIZONTAL
419.940000	28.60	16.8	46.0	17.4	---	0.0	0.00	HORIZONTAL
631.400000	28.30	20.7	46.0	17.7	---	0.0	0.00	HORIZONTAL
842.860000	33.80	23.0	46.0	12.2	---	0.0	0.00	HORIZONTAL

Vertical

SWEEP TABLE: "test (30M-1G)"

Short Description: Field Strength

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	300.0 ms	120 kHz	VULB9168



MEASUREMENT RESULT: "CTL190527411_red"

2019-5-27 10:54

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
53.280000	30.40	13.9	40.0	9.6	---	0.0	0.00	VERTICAL
57.160000	27.60	13.6	40.0	12.4	---	0.0	0.00	VERTICAL
210.420000	18.30	11.3	43.5	25.2	---	0.0	0.00	VERTICAL
419.940000	30.10	16.8	46.0	15.9	---	0.0	0.00	VERTICAL
631.400000	36.00	20.7	46.0	10.0	---	0.0	0.00	VERTICAL
842.860000	38.50	23.0	46.0	7.5	---	0.0	0.00	VERTICAL

Note: Above 1-6GHz have been tested and found no emission except floor noise.

3.3. Maximum Output Power

Limit

The maximum radiated power shall not exceed the following values:

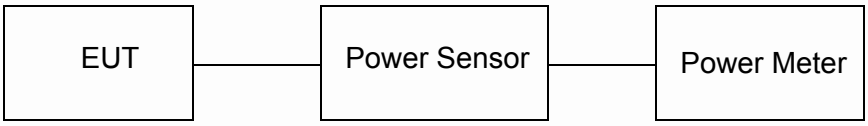
(1) In the bands allocated and assigned for broadcast television and in the 600 MHz service band: 50 mW EIRP

(2) In the 600 MHz guard band and the 600 MHz duplex gap: 20 mW EIRP.

Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power sensor.

Test Configuration



Test Results

Type	Frequency (MHz)	Output power (dBm)	Ant. Gain (dBi)	EIRP (dBm)	Limit (dBm)	Result
FM	210.3	6.182	0	6.182	17	Pass

Note: 1.The test results including the cable lose.

3.4. 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

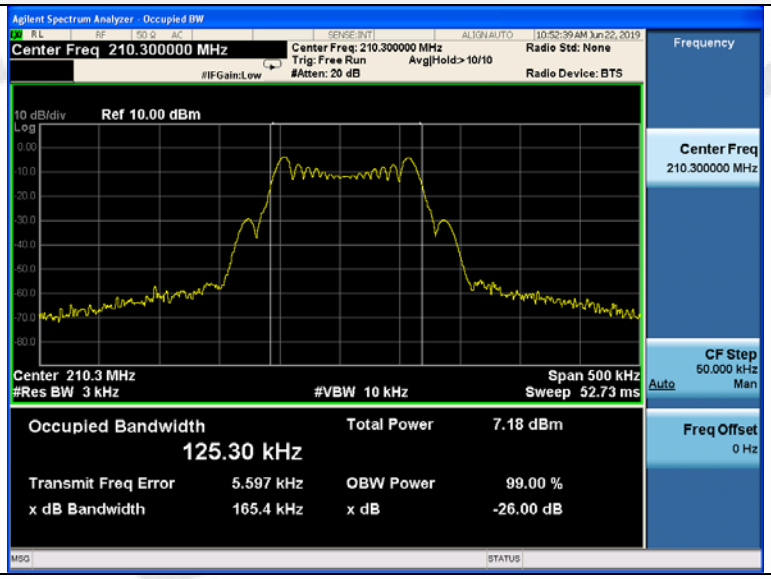
The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 3 KHz RBW and 10 KHz VBW.

Test Configuration

Test Results

Modulation	Frequency (MHz)	99% OBW (KHz)	Limit (KHz)	Result
FM	210.3	125.30	200	Pass

Test plot as follows:


Agilent Spectrum Analyzer - Occupied BW
Center Freq 210.300000 MHz
Center Freq: 210.300000 MHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 20 dB
Radio Std: None
Radio Device: BTS
10 dB/div
Ref 10.00 dBm
Center 210.3 MHz
#Res BW 3 kHz
#VBW 10 kHz
Span 500 kHz
Sweep 52.73 ms
Occupied Bandwidth
125.30 kHz
Total Power 7.18 dBm
Transmit Freq Error 5.597 kHz
OBW Power 99.00 %
x dB Bandwidth 165.4 kHz
x dB -26.00 dB
Frequency
Center Freq
210.300000 MHz
CF Step
50.000 kHz
Auto Man
Freq Offset
0 Hz

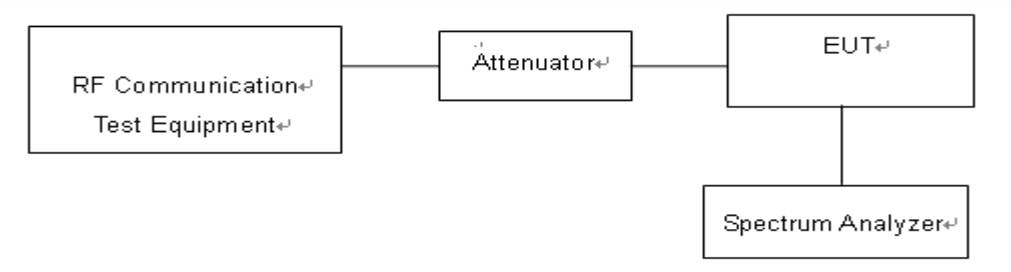
210.3MHz

3.5. Necessary Bandwidth

LIMIT

Analog emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in Section 8.3.1.2 of the European Telecommunications Institute Standard ETSI EN 300 422-1 v1.4.2 (2011-08).

TEST CONFIGURATION



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:

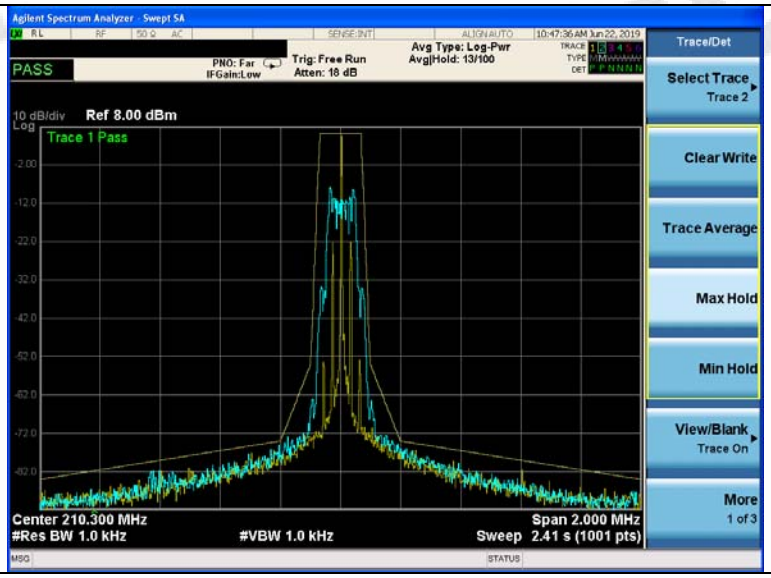
Centre frequency	Transmitter (Tx) nominal frequency
Span	fc - 1 MHz to fc + 1 MHz
Resolution BandWidth (RBW)	1 kHz
Video BandWidth(VBW)	1 kHz
Detector	Peak hold

TEST RESULTS

Note:

	Bandwidth(B)	B/2	0.35B
Manufacturer declare	200 KHz	100 KHz	0.70 KHz

TEST RESULTS



210.3MHz

3.6. Transmitter spurious emissions

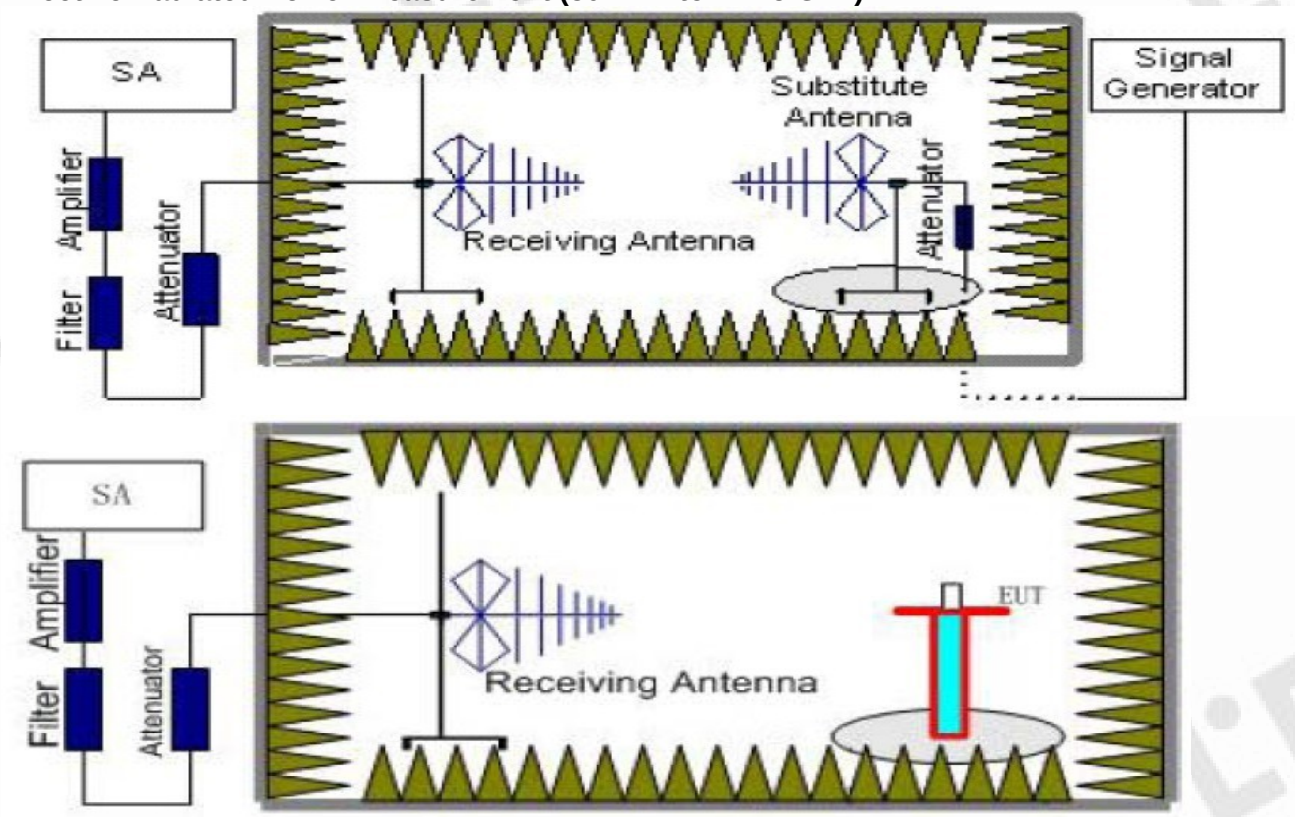
Limit

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 µW
Standby	2 nW	2 nW	20 nW

Test Configuration

Effective Radiated Power measurement (30 MHz to 12.75 GHz)

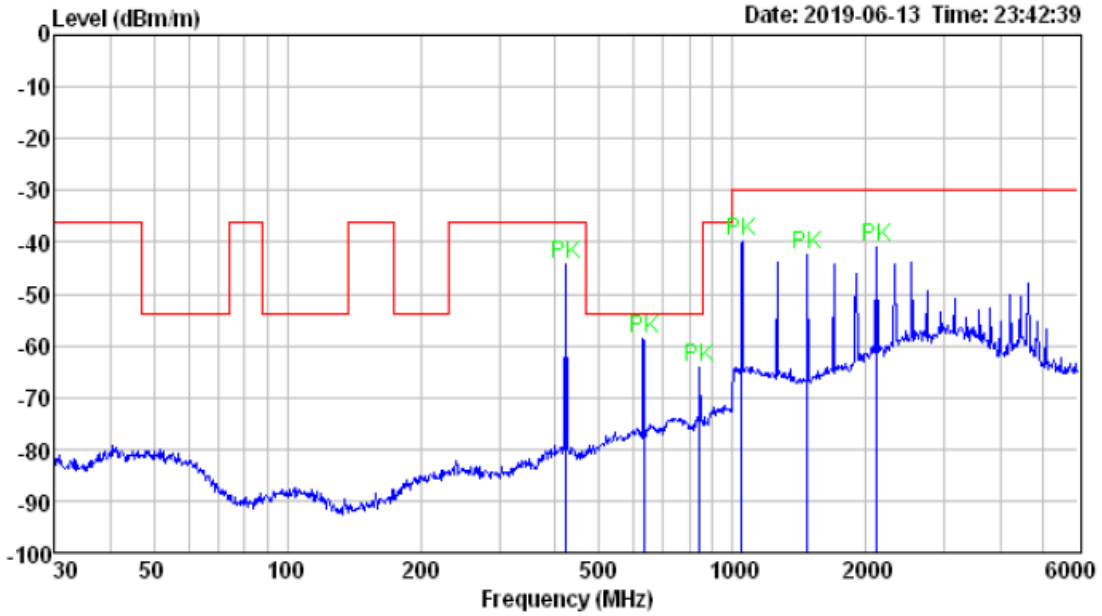


TEST PROCEDURE

1. Please refer to ETSI EN 300 422-1 V1.4.2 (2011-08) clause 6.1 for the test conditions.
2. Please refer to ETSI EN 300 422-1 V1.4.2 (2011-08) clause 8.4.2 for the measurement method.

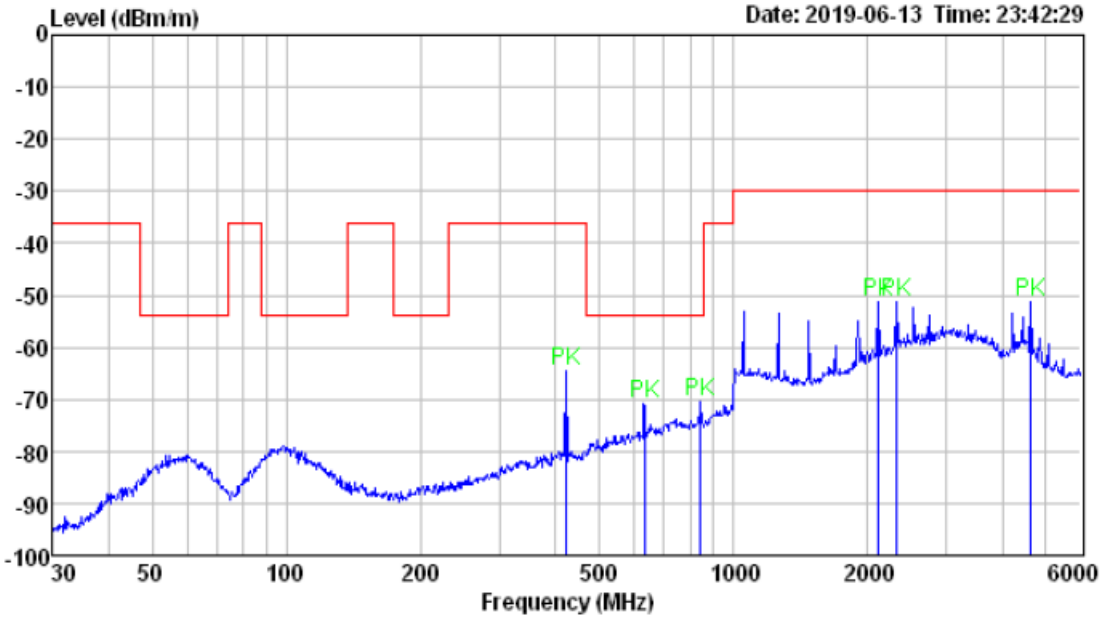
Test Results

Channel:	210.3MHz	Polarity:	Horizontal



Mark	Freq MHz	RD dbm	C.F dB	Result dBm	Limit dBm	Margin dB	Det.	Polarity
1	420.58	-44.10	-0.26	-44.36	-36.00	8.36	Peak	HORIZONTAL
2	631.69	-61.62	3.07	-58.55	-54.00	4.55	Peak	HORIZONTAL
3	842.13	-69.72	5.43	-64.29	-54.00	10.29	Peak	HORIZONTAL
4	1051.99	-33.93	-5.86	-39.79	-30.00	9.79	Peak	HORIZONTAL
5	1472.09	-34.40	-8.20	-42.60	-30.00	12.60	Peak	HORIZONTAL
6	2101.07	-37.31	-3.64	-40.95	-30.00	10.95	Peak	HORIZONTAL

Channel:	210.3MHz	Polarity:	Vertical



Mark	Freq MHz	RD dbm	C.F dB	Result dBm	Limit dBm	Margin dB	Det.	Polarity
1	420.58	-63.87	-0.55	-64.42	-36.00	28.42	Peak	VERTICAL
2	631.69	-73.92	3.19	-70.73	-54.00	16.73	Peak	VERTICAL
3	842.13	-76.22	5.87	-70.35	-54.00	16.35	Peak	VERTICAL
4	2101.07	-47.64	-3.64	-51.28	-30.00	21.28	Peak	VERTICAL
5	2315.14	-48.80	-2.38	-51.18	-30.00	21.18	Peak	VERTICAL
6	4632.17	-50.12	-1.01	-51.13	-30.00	21.13	Peak	VERTICAL

3.7. Frequency Stability

Limit

The frequency tolerance of the carrier signal shall be maintained within ±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

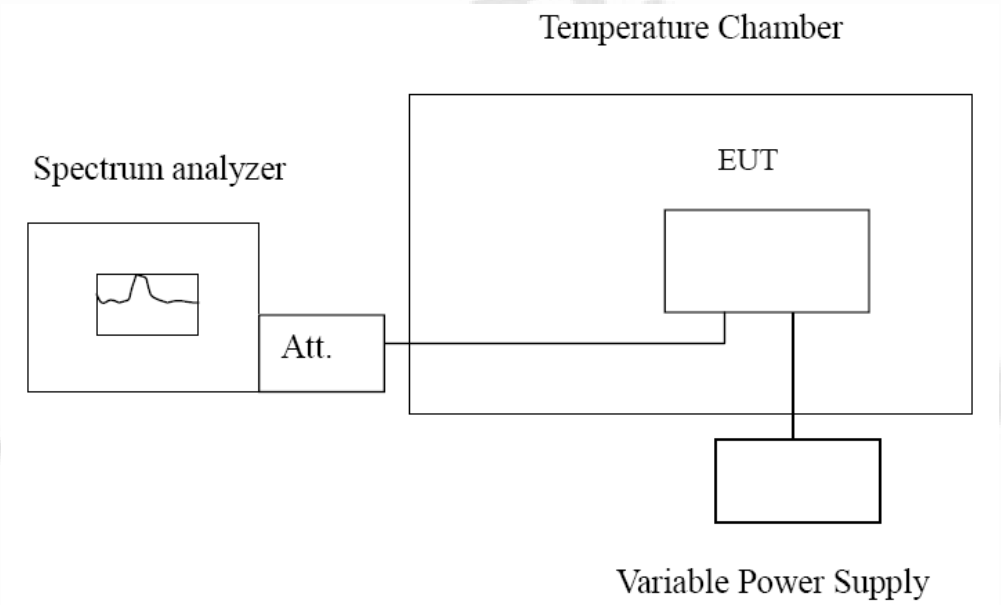
a) Frequency stability versus environmental temperature

1. Setup asTest Configuration for frequencies measured at ambient temperature if it is within 15℃to 25℃. Otherwise, an environmental chamber set for a temperature of 20℃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℃. 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 -20℃ 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℃to 25℃. Otherwise, an environmental chamber set for a temperature of 20℃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

Reference Frequency: 210.3MHz					
Voltage (V)	Temperature (℃)	Frequency error (MHz)	Frequency Tolerance (%)	Limit (%)	Result
3.0	-20	0.00385	0.00183	±0.005	PASS
	-10	0.00344	0.00164		
	0	0.00389	0.00185		
	10	0.00350	0.00166		
	20	0.00310	0.00147		
	30	0.00379	0.00180		
	40	0.00350	0.00166		
	50	0.00369	0.00176		
3.45	25	0.00317	0.00151		
2.55	25	0.00432	0.00205		

3.8. Antenna Requirement

Standard Applicable

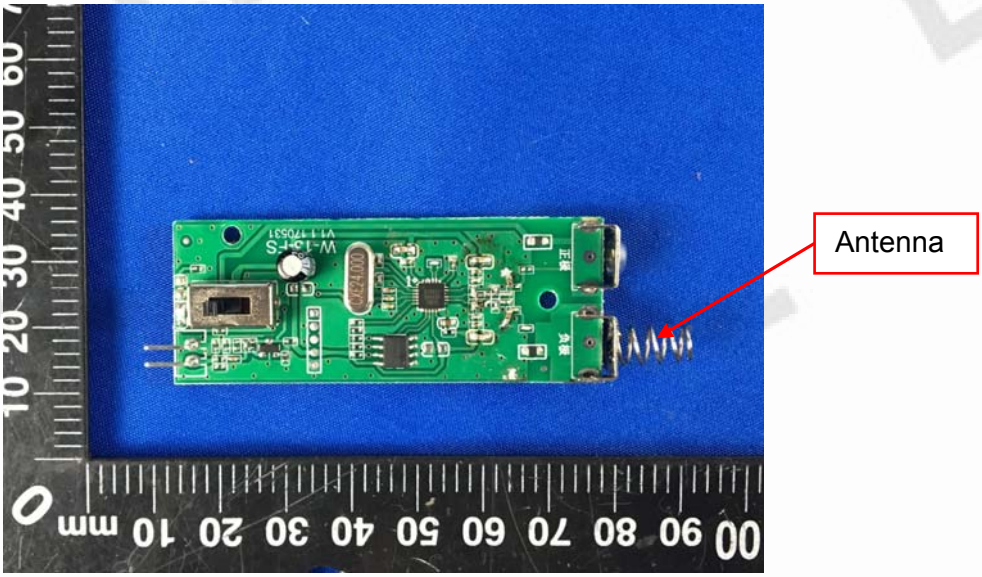
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Refer to statement below for compliance

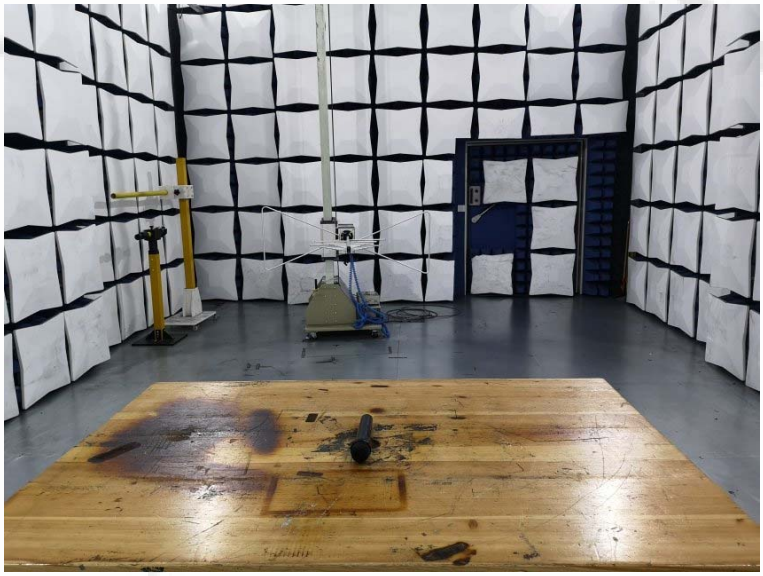
The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

Antenna Connected Construction

The maximum gain of antenna was 0dBi.



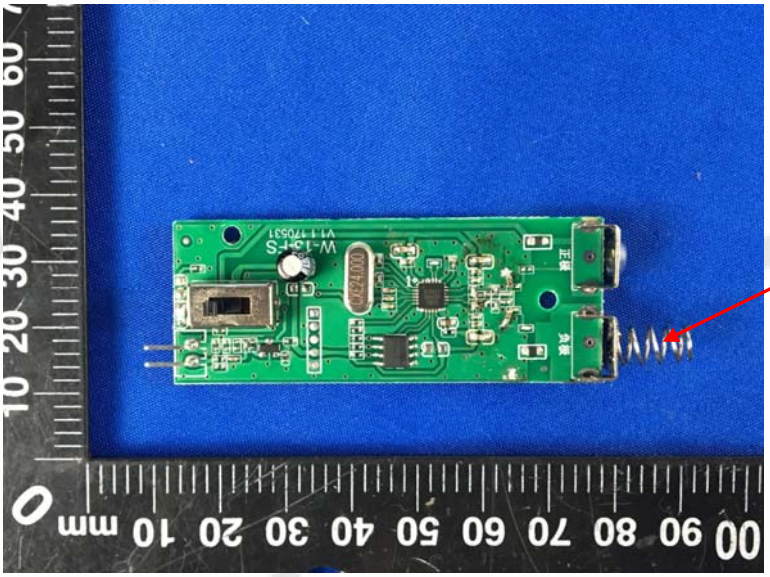
4. Test Setup Photos of the EUT

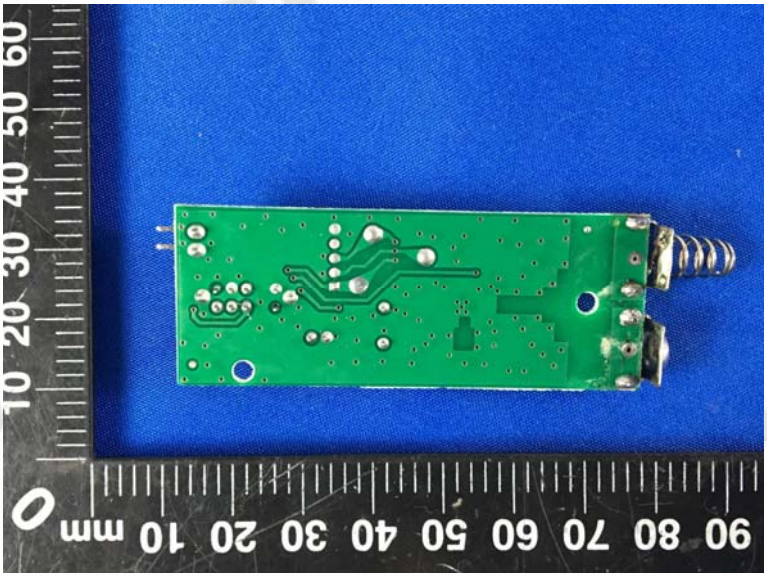


5. Photos of the EUT

External Photos

Internal Photos





********** End of Report **********