

EMC TEST REPORT

For

Shenzhen Sonoff Technologies Co., Ltd.

433MHz Remote Control

Test Model: RM433

List Model No.: /

Prepared for : Shenzhen Sonoff Technologies Co., Ltd.
Address : Building 8, Room 1001, Lianhua industrial park, Longyuan Road, Hualian community, Longhua St, Longhua dist, Shenzhen, Guangdong, China.

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample : December 12, 2018
Number of tested samples : 1
Serial number : Prototype
Date of Test : December 12, 2018~ December 27, 2018
Date of Report : January 14, 2019



EMC TEST REPORT
ETSI EN 301 489-1 V2.1.1 (2017-02)
Final draft ETSI EN 301 489-3 V2.1.1 (2017-03)

Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services

Report Reference No. : **LCS181207090AEA**

Date Of Issue : January 14, 2019

Testing Laboratory Name..... : **Shenzhen LCS Compliance Testing Laboratory Ltd.**

Address : 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China

Testing Location/ Procedure..... : Full application of Harmonised standards ☒
 Partial application of Harmonised standards ☐
 Other standard testing method ☐

Applicant's Name..... : **Shenzhen Sonoff Technologies Co., Ltd.**

Address : Building 8, Room 1001, Lianhua industrial park, Longyuan Road, Hualian community, Longhua St, Longhua dist, Shenzhen, Guangdong, China.

Test Specification

Standard : ETSI EN 301 489-1 V2.1.1 (2017-02)
 Final draft ETSI EN 301 489-3 V2.1.1 (2017-03)

Test Report Form No. : LCSEMC-1.0

TRF Originator : Shenzhen LCS Compliance Testing Laboratory Ltd.

Master TRF : Dated 2017-06

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Test Item Description. : **433MHz Remote Control**

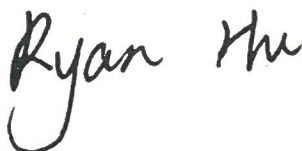
Trade Mark : 

Test Model : RM433

Ratings : DC 12V (supplied by type 27A non recharged battery)

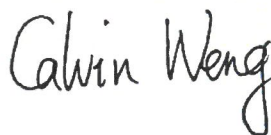
Result : **Positive**

Compiled by:



Ryan Hu/ Administrators

Supervised by:



Calvin Weng/ Technique principal

Approved by:



Gavin Liang/ Manager

EMC -- TEST REPORT**Test Report No. : LCS181207090AEA**January 14, 2019

Date of issue

Test Model..... : RM433

EUT..... : 433MHz Remote Control

Applicant..... : Shenzhen Sonoff Technologies Co., Ltd.

Address..... : Building 8, Room 1001, Lianhua industrial park, Longyuan Road, Hualian community, Longhua St, Longhua dist, Shenzhen, Guangdong, China.

Telephone..... : /

Fax..... : /

Manufacturer..... : Shenzhen Sonoff Technologies Co., Ltd.

Address..... : Building 8, Room 1001, Lianhua industrial park, Longyuan Road, Hualian community, Longhua St, Longhua dist, Shenzhen, Guangdong, China.

Telephone..... : /

Fax..... : /

Factory..... : /

Address..... : /

Telephone..... : /

Fax..... : /

Test Result**Positive**

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.

Revision History

Revision	Issue Date	Revisions	Revised By
000	January 14, 2019	Initial Issue	Gavin Liang

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1. GENERAL INFORMATION

1.1. Product Description for Equipment Under Test (EUT)

EUT	: 433MHz Remote Control
Model No.	: RM433
Model Declaration	: /
Test Model	: RM433
Power Supply	: DC 12V (supplied by type 27A non recharged battery)
Hardware Version	: V1.0
Software Version	: V01
Transmitter	
Frequency Range	: 433.92MHz
Channel Number	: 1
Modulation Type	: ASK
Antenna Description	: PCB Antenna, 0dBi (Max.)

1.2. Objective

ETSI EN 301 489-1	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU
ETSI EN 301 489-3	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU

The objective is to determine compliance with ETSI EN 301 489-1 V2.1.1 (2017-02) and ETSI EN 301 489-3 V2.1.1 (2017-03).

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

No Related Submittals.

1.4. Test Methodology

All measurements contained in this report were conducted with ETSI EN 301 489-1 V2.1.1 (2017-02) and ETSI EN 301 489-3 V2.1.1 (2017-03).

1.5. Description of Test Facility

FCC Registration Number. is 254912.
 Industry Canada Registration Number. is 9642A-1.
 ESMD Registration Number. is ARCB0108.
 UL Registration Number. is 100571-492.
 TUV SUD Registration Number. is SCN1081.
 TUV RH Registration Number. is UA 50296516-001.
 NVLAP Registration Code is 600167-0.

1.6. Support equipment List

Manufacturer	Description	Model	Serial Number	Certificate
--	--	--	--	--

1.7. External I/O

I/O Port Description	Quantity	Cable
--	--	--

1.8. Measurement Uncertainty

Item	MU	Remark
Uncertainty for Power point Conducted Emissions Test	$\pm 2.42\text{dB}$	
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	$\pm 3.54\text{dB}$	Polarize: V
	$\pm 4.1\text{dB}$	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	$\pm 2.08\text{dB}$	Polarize: H
	$\pm 2.56\text{dB}$	Polarize: V
Uncertainty for radio frequency	$\pm 3 \times 10^{-7}\text{MHz}$	
Uncertainty for conducted RF Power	$\pm 0.65\text{dB}$	
Uncertainty for temperature	$\pm 0.2^\circ\text{C}$	
Uncertainty for humidity	$\pm 1\%$	
Uncertainty for DC and low frequency voltages	$\pm 0.05\text{V}$	

1.9. Description Of Test Modes

There was 2 test Modes. TM1 to TM2 were shown below:

TM1: Operate in transmitting mode;
 TM2: Idle mode TM2: Idle mode.

***Note: All test modes were tested, but we only recorded the worst case in this report.

2. SUMMARY OF TEST RESULTS

Rule	Description of Test Items	Result
§7.1	Reference to clauses EN 301 489-1 §8.4 AC mains power input/output ports	N/A*
§7.1	Reference to clauses EN 301 489-1 §8.3 DC power input/output ports	N/A*
§7.1	Reference to clauses EN 301 489-1 §8.2 Enclosure of ancillary equipment measured on a stand alone basis	Compliant
§7.1	Reference to clauses EN 301 489-1 §8.5 Harmonic current emissions (AC mains input port)	N/A
§7.1	Reference to clauses EN 301 489-1 §8.6 Voltage fluctuations and flicker (AC mains input port)	N/A
§7.1	Reference to clauses EN 301 489-1 §8.7 Telecommunication ports	N/A*
§7.2	Reference to clauses EN 301 489-1 §9.3 Electrostatic discharge (EN 61000-4-2)	Compliant
§7.2	Reference to clauses EN 301 489-1 §9.2 Radio frequency electromagnetic field (80 MHz to 6 000 MHz)(EN 61000-4-3)	Compliant
§7.2	Reference to clauses EN 301 489-1 §9.4 Fast transients, common mode (EN 61000-4-4)	N/A
§7.2	Reference to clauses EN 301 489-1 §9.8 Surges (EN 61000-4-5)	N/A
§7.2	Reference to clauses EN 301 489-1 §9.5 Radio frequency, common mode (EN 61000-4-6)	N/A
§7.2	Reference to clauses EN 301 489-1 §9.6 Transients and surges in the vehicular environment (ISO 7637-2)	N/A*
§7.2	Reference to clauses EN 301 489-1 §9.7 Voltage dips and interruptions (EN 61000-4-11)	N/A

Note: N/A means not applicable.

3. LINE CONDUCTED EMISSION

3.1. Conducted Emission Limit

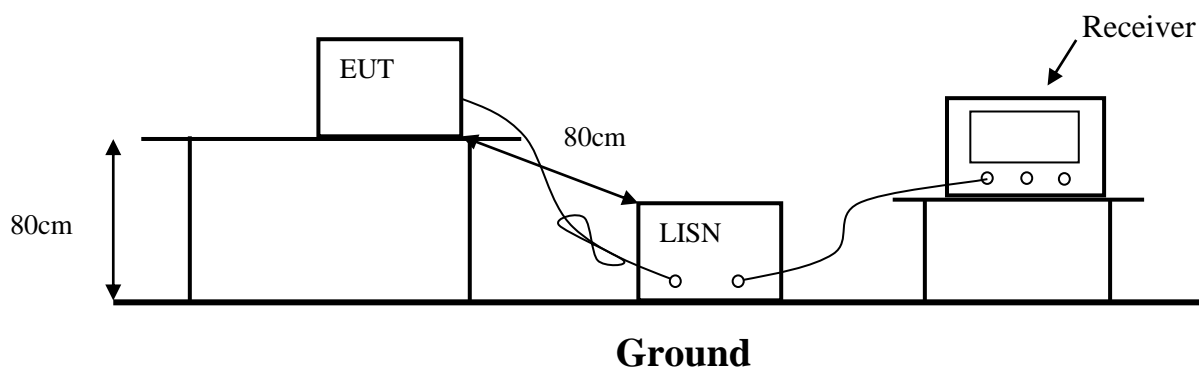
ETSI EN 301 489-1 V2.1.1 (2017-02) Clause 8.4.3

Limits for Line Conducted Emission

Frequency (MHz)	Limit (dB μ V)	
	Quasi-peak Level	Average Level
0.15~0.50	66.0 ~ 56.0 *	56.0 ~ 46.0 *
0.50~5.00	56.0	46.0
5.00~30.00	60.0	50.0

NOTE1-The lower limit shall apply at the transition frequencies.
NOTE2-The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

3.2. Test Configuration



The setup of EUT is according with per ETSI EN 301 489-1 measurement procedure. The specification used was with the ETSI EN 301 489-1 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle. The spacing between the peripherals was 10 cm.

The EUT received DC 3V charging power from the Adapter which received power through a LISN supplying power of AC 230V/50Hz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	30MHz~1000MHz
(IF)RB	9kHz

All data was recorded in the Quasi-peak and average detection mode.

Marked on both the 6 highest Quasi-Peak & 6 highest Average emissions points of the EUT.

3.3. Test Data

Not applicable to this device.

4. RADIATED DISTURBANCE

4.1. Radiated Emission Limit

ETSI EN 301 489-1 V2.1.1 (2017-02)

Limits for radiated disturbance Below 1GHz

Frequency (MHz)	Distance (Meters)	Field Strengths Limit (dB μ V/m)
30 ~ 230	3	40
230 ~ 1000	3	47

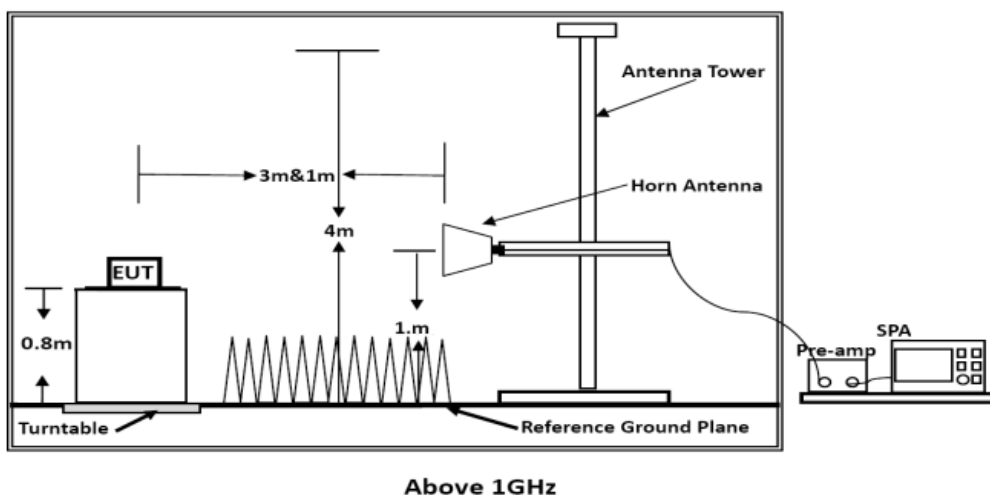
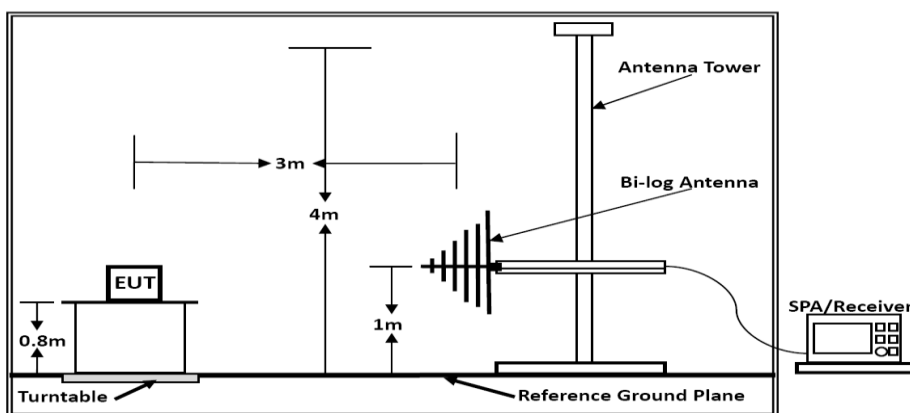
Note: (1) The smaller limit shall apply at the combination point between two frequency bands. (2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.

Limits for radiated disturbance Above 1GHz

Frequency (MHz)	Distance (Meters)	Average Limit (dB μ V/m)	Peak Limit (dB μ V/m)
1000-3000	3	50	70
3000-6000	3	54	74

Note: The lower limit applies at the transition frequency.

4.2. Test Configuration



4.3. Test Procedure

1) Sequence of testing 30 MHz to 1 GHz

Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

Premeasurement:

- The turntable rotates from 0 ° to 315 ° using 45 ° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1 to 4 meter.
- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement:

- The final measurement will be performed with minimum the six highest peaks.
- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position ($\pm 45^\circ$) and antenna movement between 1 and 4 meter.
- The final measurement will be done with QP detector with an EMI receiver.
- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

2) Sequence of testing 1 GHz to 6 GHz

Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

Premeasurement:

- The turntable rotates from 0 °to 315 °using 45 °steps.
- The antenna is polarized vertical and horizontal.
- The antenna height scan range is 1 meter to 4 meter.
- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

Final measurement:

- The final measurement will be performed with minimum the six highest peaks.
- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position ($\pm 45^\circ$) and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.
- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.
- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

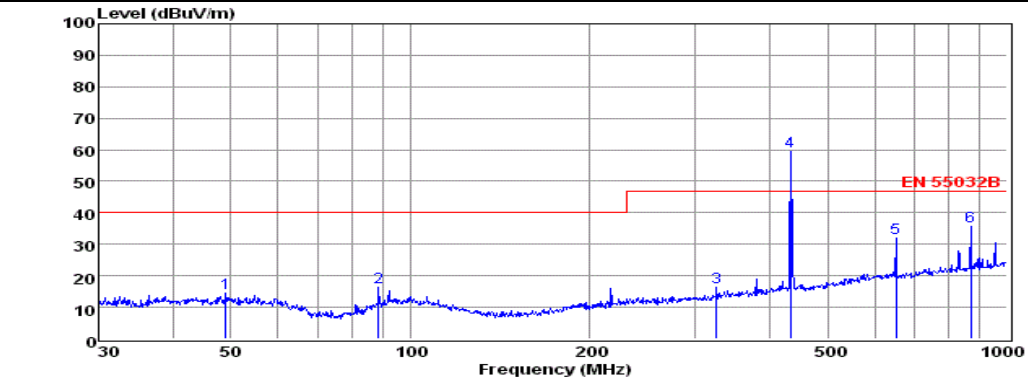
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	30MHz~1000MHz / RB 100kHz for QP

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	6000 MHz
RB / VB	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average

4.4. Test Data

The worst test mode of the EUT was TM1, and its test data was showed as the follow:

Model No.	RM433	Test Mode	TM 1
Environmental Conditions	23.3°C, 54.8% RH	Detector Function	Quasi-peak
Pol	Vertical	Distance	3m
Test Engineer	Mina Xu	Test date:	December 25, 2018

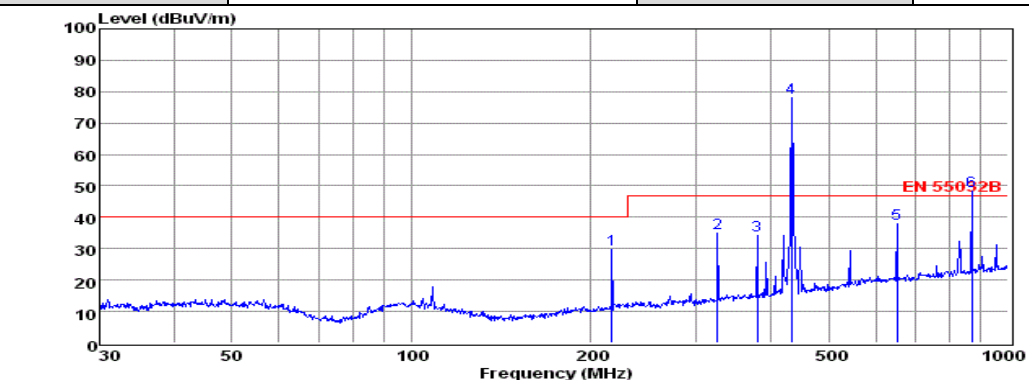


Env./Ins: 23.3°C/54.8%
pol: VERTICAL

	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	49.01	0.71	0.35	13.31	14.37	40.00	-25.63	QP
2	88.34	4.38	0.68	11.37	16.43	40.00	-23.57	QP
3	325.60	1.67	1.04	13.55	16.26	47.00	-30.74	QP
4	434.07	42.65	1.18	15.53	59.36	47.00	12.36	Peak
5	651.94	11.68	1.58	18.64	31.90	47.00	-15.10	QP
6	869.13	12.91	1.87	20.77	35.55	47.00	-11.45	Peak

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that are 20db below the official limit are not reported

Model No.	RM433	Test Mode	TM 1
Environmental Conditions	23.3°C, 54.8% RH	Detector Function	Quasi-peak
Pol	Horizontal	Distance	3m
Test Engineer	Mina Xu	Test date:	December 25, 2018



Env./Ins: 23.3°C/54.8%
pol: HORIZONTAL

	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	216.78	17.83	0.88	11.10	29.81	40.00	-10.19	QP
2	325.60	20.44	1.04	13.55	35.03	47.00	-11.97	QP
3	379.91	18.55	1.18	14.59	34.32	47.00	-12.68	QP
4	434.07	61.33	1.18	15.53	78.04	47.00	31.04	Peak
5	651.94	17.54	1.58	18.64	37.76	47.00	-9.24	QP
6	869.13	25.86	1.87	20.77	48.50	47.00	1.50	Peak

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that are 20db below the official limit are not reported

Note: The frequency 434.07 MHz is the wanted signal of the EUT.

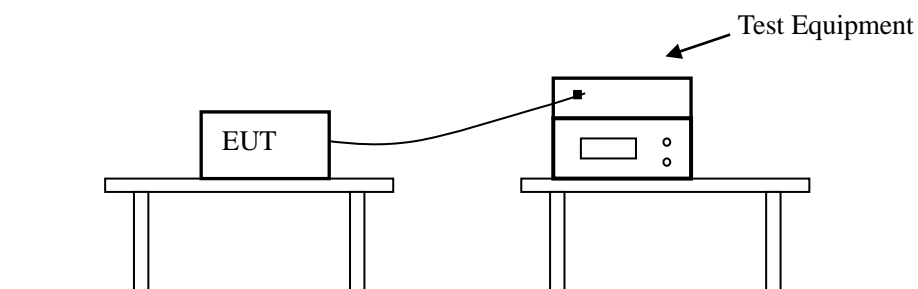
Test Mode: TM 1 (above 1GHz)	Tested by: Mina Xu
Test voltage: DC 12V	Test Distance: 3m
Detector Function: Peak+AV	Test Results: Passed

Pol.	Frequency MHz	Emission Level dB μ V/m		Limits dB μ V/m		Margin dB μ V/m	
H	1263.71	57.63	32.87	70.00	50.00	-12.37	-17.13
	1860.88	58.09	36.24	70.00	50.00	-11.91	-13.76
	2151.01	51.94	32.72	70.00	50.00	-18.06	-17.28
	3274.00	49.62	32.17	74.00	54.00	-24.38	-21.83
	4398.19	55.84	37.39	74.00	54.00	-18.16	-16.61
	5728.50	55.60	31.39	74.00	54.00	-18.40	-22.61
V	1263.01	56.88	33.01	70.00	50.00	-13.12	-16.99
	1857.87	58.32	37.05	70.00	50.00	-11.68	-12.95
	2155.46	52.23	33.19	70.00	50.00	-17.77	-16.81
	3276.22	49.35	30.39	74.00	54.00	-24.65	-23.61
	4395.35	55.13	35.67	74.00	54.00	-18.87	-18.33
	5731.26	56.22	31.41	74.00	54.00	-17.78	-22.59

1. Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
2. Measurements above show only up to 6 maximum emissions noted.
3. Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5. HARMONIC CURRENT EMISSIONS

5.1. Test Configuration



5.2. Test Standard

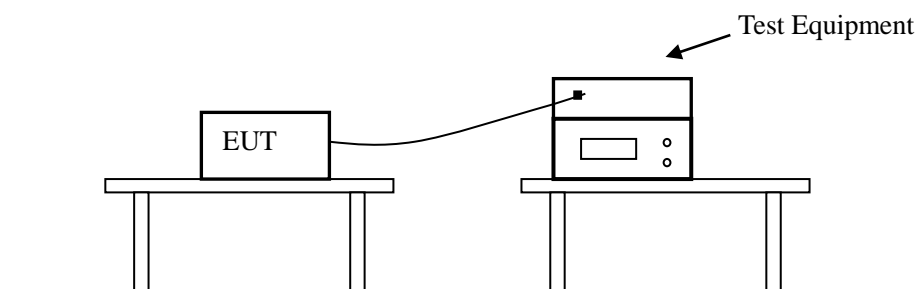
According to ETSI EN 301489-1 V2.2.0 (2017-03) & EN 61000-3-2: 2014

5.3. Test Data

Not applicable to this device.

6. VOLTAGE FLUCTUATION AND FLICKER

6.1. Test Configuration



6.2. Test Standard

According to ETSI EN 301489-1 V2.2.0 (2017-03) & EN 61000-3-3: 2013

6.3. Test Data

Not applicable to this device.

7. GENERAL PERFORMANCE CRITERIA FOR IMMUNITY TEST

7.1. Performance criteria for Continuous phenomena applied to Transmitter (CT)

For equipment of type II or type III that requires a communication link that is maintained during the test, it shall be verified by appropriate means supplied by the manufacturer that the communication link is maintained during each individual exposure in the test sequence.

Where the EUT is a transmitter, tests shall be repeated with the EUT in standby mode to ensure that any unintentional transmission does not occur.

7.2. Performance criteria for Transient phenomena applied to Transmitter (TT)

For equipment of type II or type III that requires a communication link that is maintained during the test, this shall be verified by appropriate means supplied by the manufacturer during each individual exposure in the test sequence. Where the EUT is a transmitter, tests shall be repeated with the EUT in standby mode to ensure that any unintentional transmission does not occur.

7.3. Performance criteria for Continuous phenomena applied to Receiver (CR)

For equipment of type II or III that requires a communication link that is maintained during the test, it shall be verified by appropriate means supplied by the manufacturer that the communication link is maintained during each individual exposure in the test sequence. Where the EUT is a transceiver, under no circumstances shall the transmitter operate unintentionally during the test.

7.4. Performance criteria for Transient phenomena applied to Receiver (TR)

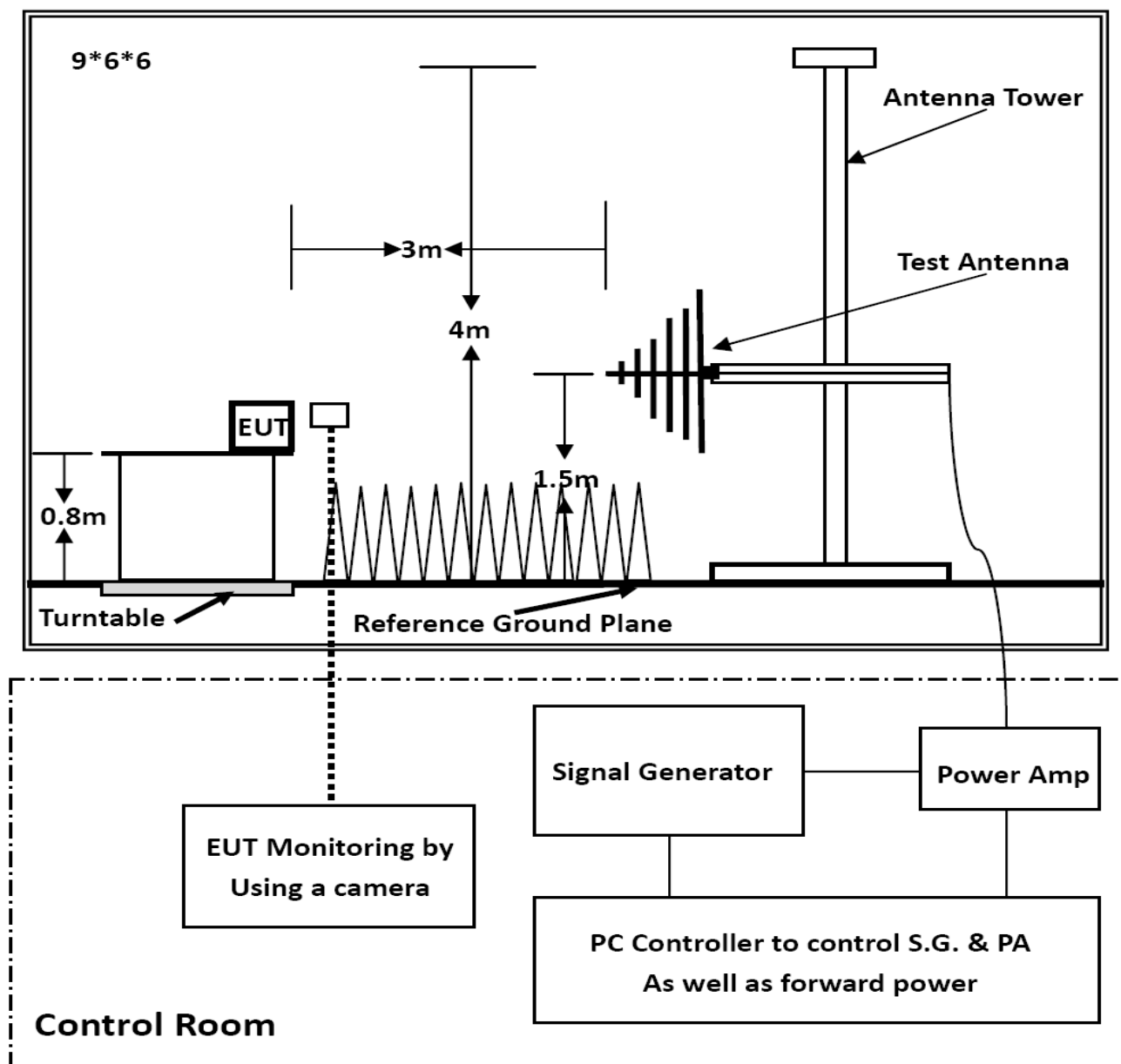
For equipment of type II or type III that requires a communication link that is maintained during the test, this shall be verified by appropriate means supplied by the manufacturer during each individual exposure in the test sequence. Where the EUT is a transceiver, under no circumstances shall the transmitter operate unintentionally during the test.

Performance criteria for ETSI EN 301 489-3 V2.1.1 (2017-03)

Criteria	During test	After test
A	Operate as intended No loss of function No unintentional responses	Operate as intended No loss of function No degradation of performance No loss of stored data or user programmable functions
B	May show loss of function No unintentional responses	Operate as intended Lost function(s) shall be self-recoverable No degradation of performance No loss of stored data or user programmable functions

8. RF ELECTROMAGNETIC FIELD (80 MHZ-6000 MHZ)

8.1. Test Configuration



8.2. Test Standard

ETSI EN 301 489-1, ETSI EN 301 489-3 /(EN 61000-4-3: 2006+A2: 2010)

Test level 2 at 3V / m.

8.3. Severity Level

Level	Field Strength V/m
1.	1
2.	3
3.	10
X	Special

Performance criterion: A

8.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. EUT is set 3 meter away from the transmitting antenna which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna are set on test. Each of the four sides of EUT must be faced this transmitting antenna and measured individually. In order to judge the EUT performance, a CCD camera is used to monitor EUT screen. All the scanning conditions are as follows:

Condition of Test	Remarks
1. Fielded Strength	3 V/m (Severity Level 2)
2. Radiated Signal	Unmodulated
3. Scanning Frequency	80-6000 MHz
4. Dwell time of radiated	0.0015 decade/s
5. Waiting Time	3 Sec.

8.5. Test Result

PASS.

Please refer to the following page.

RF ELECTROMAGNETIC FIELD

Standard	<input type="checkbox"/> IEC 61000-4-3 <input checked="" type="checkbox"/> EN 61000-4-3		
Applicant	Shenzhen Sonoff Technologies Co., Ltd.		
EUT	433MHz Remote Control	Temperature	23.3℃
M/N	RM433	Humidity	54.8%
Test Mode	TM1-TM2	Criterion	B
Test Engineer	Mina Xu	Test Date	December 25, 2018

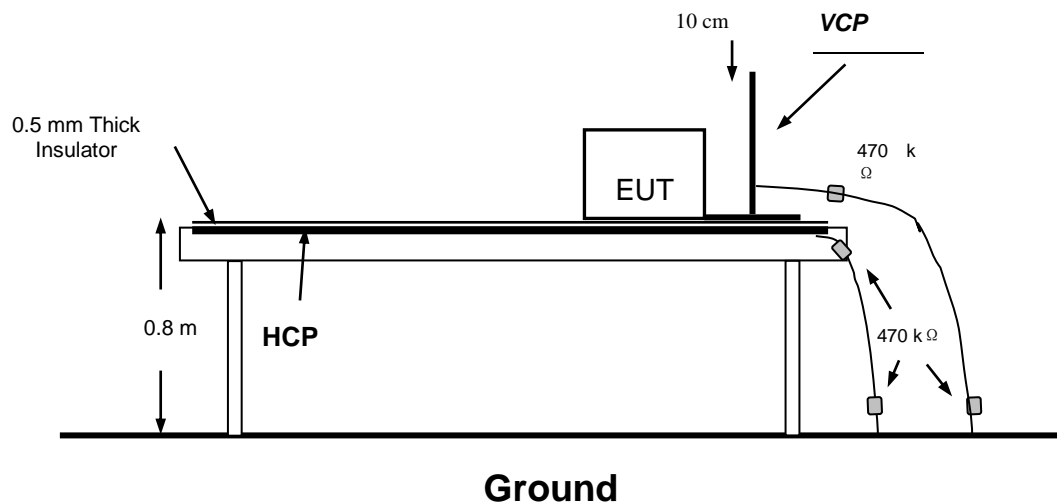
EUT Working Mode	Antenna Polarity	Frequency (MHz)	Field Strength (V/m)	Observation	Position	Conclusion
Operating Mode	Vertical	80-6000	3	TT,TR	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	TT,TR	Front, Right, Left, Back	Pass
Idle	Vertical	80-6000	3	See Note	Front, Right, Left, Back	Pass
	Horizontal	80--6000	3	See Note	Front, Right, Left, Back	Pass

***Note: Unintentional transmission is not founded from the EUT.

9. ELECTROSTATIC DISCHARGE

Please refer to ETSI EN 301 489-1 V2.1.1 (2017-02) and EN 61000-4-2.

9.1. Test Configuration



EN 61000-4-2 specifies that a tabletop EUT shall be placed on a non-conducting table which is 80 centimeters above a ground reference plane and that floor mounted equipment shall be placed on a insulating support approximately 10 centimeters above a ground plane. During the tests, the EUT is positioned over a ground reference plane in conformance with this requirement.

For tabletop equipment, a 1.5 by 1.0-meter metal sheet (HCP) is placed on the table and connected to the ground plane via a metal strap with two 470 k Ohms resistors in series. The EUT and attached cables are isolated from this metal sheet by 0.5-millimeter thick insulating material. A Vertical Coupling Plane (VCP) grounded on the ground plane through the same configuration as in the HCP is used.

9.2. Test Procedure

ETSI EN 301 489-1 V2.1.1 (2017-02)/ EN 61000-4-2: 2009

Test level 3 for Air Discharge at ± 8 kV

Test level 2 for Contact Discharge at ± 4 kV

9.2.1. Air Discharge

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

9.2.2. Contact Discharge

All the procedure shall be same as Section 9.2.1. except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

9.2.3. Indirect Discharge For Horizontal Coupling Plane

At least 10 single discharges (in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit (if applicable) of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

9.2.4. Indirect Discharge For Vertical Coupling Plane

At least 10 single discharges (in the most sensitive polarity) shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

9.3. Test Data

PASS.

Please refer to the following page.

Electrostatic Discharge Test Results

Standard	<input type="checkbox"/> IEC 61000-4-2 <input checked="" type="checkbox"/> EN 61000-4-2		
Applicant	Shenzhen Sonoff Technologies Co., Ltd.		
EUT	433MHz Remote Control	Temperature	23.6℃
M/N	RM433	Humidity	53.4%
Criterion	B	Pressure	1021mbar
Test Mode	TM1-TM2	Test Date	December 25, 2018
Test Engineer	Mina Xu		

TEST RESULT OF TM1-TM2

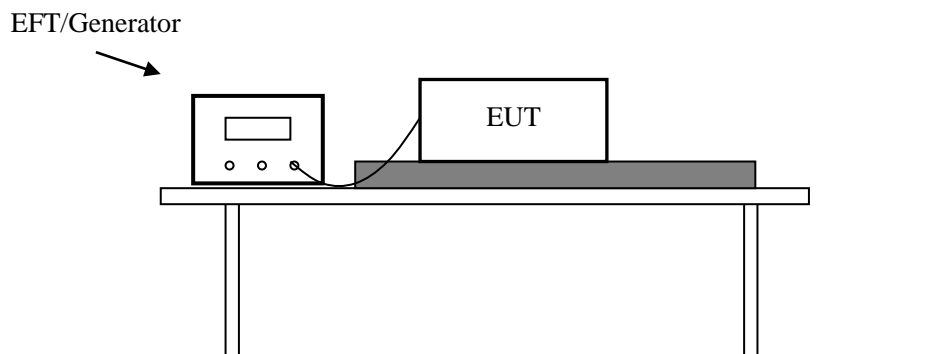
Test Voltage	Coupling	Observation	Result (Pass/Fail)
±2KV, ±4kV	Contact Discharge	TT, TR	Pass
±2KV, ±4kV, ±8kV	Air Discharge	TT, TR	Pass
±2KV, ±4kV	Indirect Discharge HCP	TT, TR	Pass
±2KV, ±4kV	Indirect Discharge VCP	TT, TR	Pass

Note:

The EUT performance complied with performance criteria for CT&CR to MS Function and there is no any degradation of performance and function.

10. ELECTRICAL FAST TRANSIENT IMMUNITY

10.1. Test Configuration



10.2. Test Standard

ETSI EN 301 489-1 V2.1.1 (2017-02)/ EN61000-4-4: 2012

Test level 2 at 1 kV

Test level

Level	Open Circuit Output Test Voltage $\pm 10\%$	
	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1	0.5 kV	0.25 kV
2	1 kV	0.5 kV
3	2 kV	1 kV
4	4 kV	2 kV
X	Special	Special

Performance criterion: B

10.3. Test Procedure

The EUT is put on the table, which is 0.8 meter high above the ground. This reference ground plane shall project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

10.4.1. For input and output AC power ports:

The EUT is connected to the power mains by using a coupling device, which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 minutes.

10.4.2. For signal lines and control lines ports: No I/O ports. It's unnecessary to test.

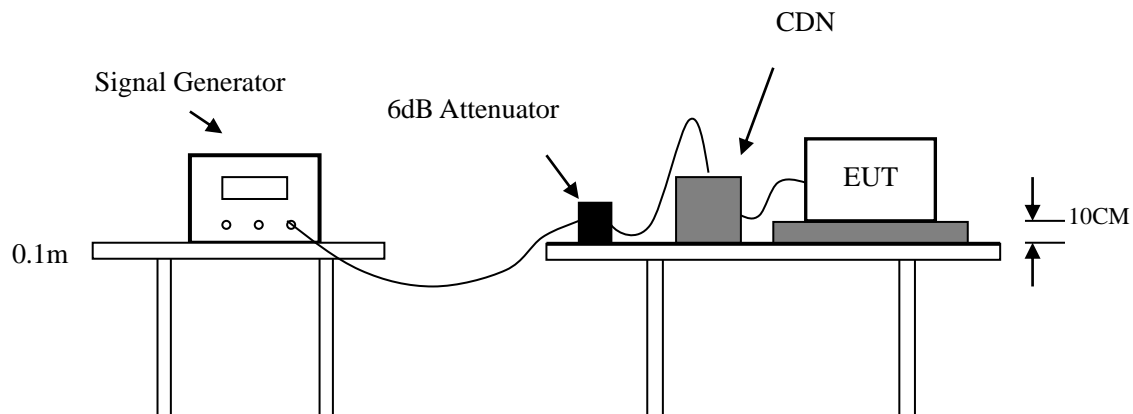
10.4.3. For DC output line ports: It's unnecessary to test.

10.4. Test Data

Not applicable to this device.

11. RF COMMON MODE

11.1. Test Configuration



11.2. Test Standard

ETSI EN 301 489-1 V2.1.1 (2017-02)/ EN 61000-4-6: 2014

Test level 2 at 3 V (r.m.s.), 0.15 MHz ~ 80 MHz,

Modulation type: AM

Modulation depth: 80%

Modulation signal: 1 kHz

Test level

Level	Voltage Level (r.m.s.) (V)
1	1
2	3
3	10
X	Special

Performance criterion: A

11.3. Test Procedure

11.3.1. Let the EUT work in test mode and test it.

11.3.2. The EUT are placed on an insulating support 0.1 m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3 m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).

11.3.3. The disturbance signal described below is injected to EUT through CDN.

11.3.4. The EUT operates within its operational mode(s) under intended climatic conditions after power on.

11.3.5. The frequency range is swept from 150 kHz to 80 MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave.

11.3.6. The rate of sweep shall not exceed 1.5×10^{-3} decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.

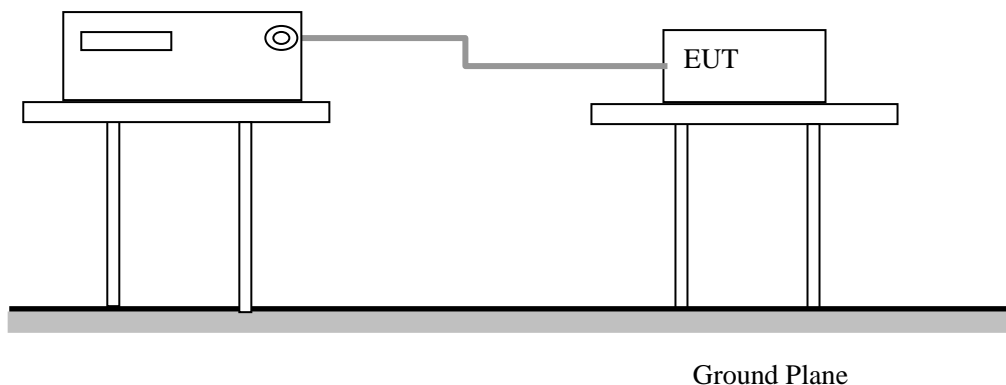
11.3.7. Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

11.4. Test Data

Not applicable to this device.

12. SURGES, LINE TO LINE AND LINE TO GROUND

12.1. Test Configuration



12.2. Test Standard

ETSI EN 301 489-1 V2.1.1 (2017-02) / EN 61000-4-5: 2014+A1: 2017

L-N: Test level 2 at 1 kV

L-PE, N-PE Test Level 3 at 2kV

Test Level

Open Circuit Output Test Voltage $\pm 10\%$		
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1	0.5 kV	0.25 kV
2	1 kV	0.5 kV
3	2 kV	1 kV
4	4 kV	2 kV
X	Special	Special

Performance criterion: B

12.3. Test Procedure

12.3.1. For line to line coupling mode, provide a 0.5 kV 1.2/50us voltage surge (at open-circuit condition).

12.3.2. At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.

12.3.3. Different phase angles are done individually.

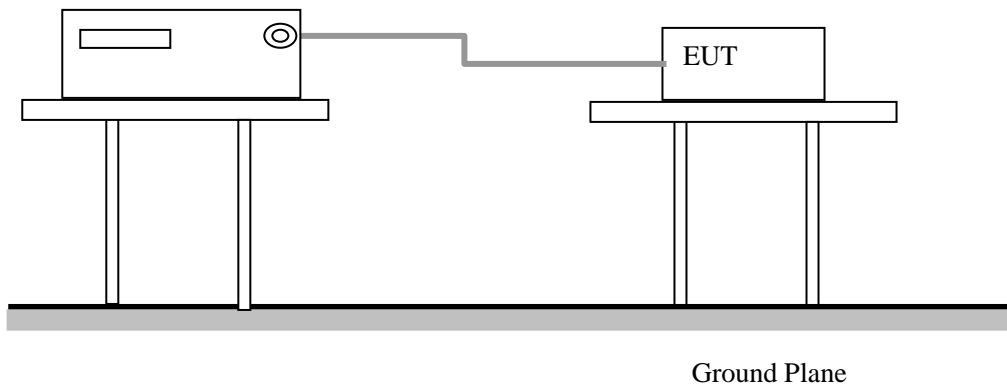
12.3.4. Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

12.4. Test Data

Not applicable to this device.

13. VOLTAGE DIPS/INTERRUPTIONS IMMUNITY TEST

13.1. Test Configuration



13.2. Test Standard

ETSI EN 301 489-1 V2.1.1 (2017-02)/ EN 61000-4-11: 2004+A1: 2017
Test levels and Performance Criterion

Test Level

Voltage Reduction %UT	Voltage dips %UT	Duration (in period)
100	0	0.5
100	0	1
30	70	5
Voltage Reduction %UT	Voltage Interruptions %UT	Duration (in period)
100	0	250

Performance criterion: B&C

13.3. Test Procedure

13.3.1. The interruption is introduced at selected phase angles with specified duration.

13.3.2. Record any degradation of performance.

13.4. Test Data

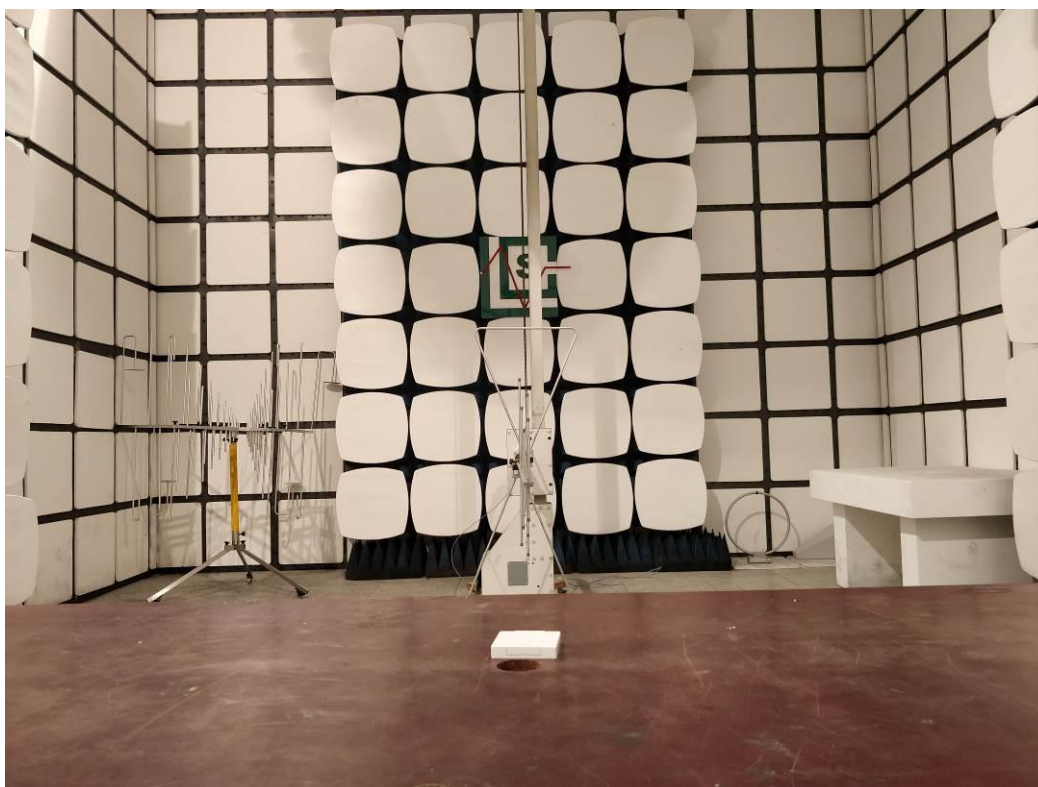
Not applicable to this device.

14. LIST OF MEASURING EQUIPMENT

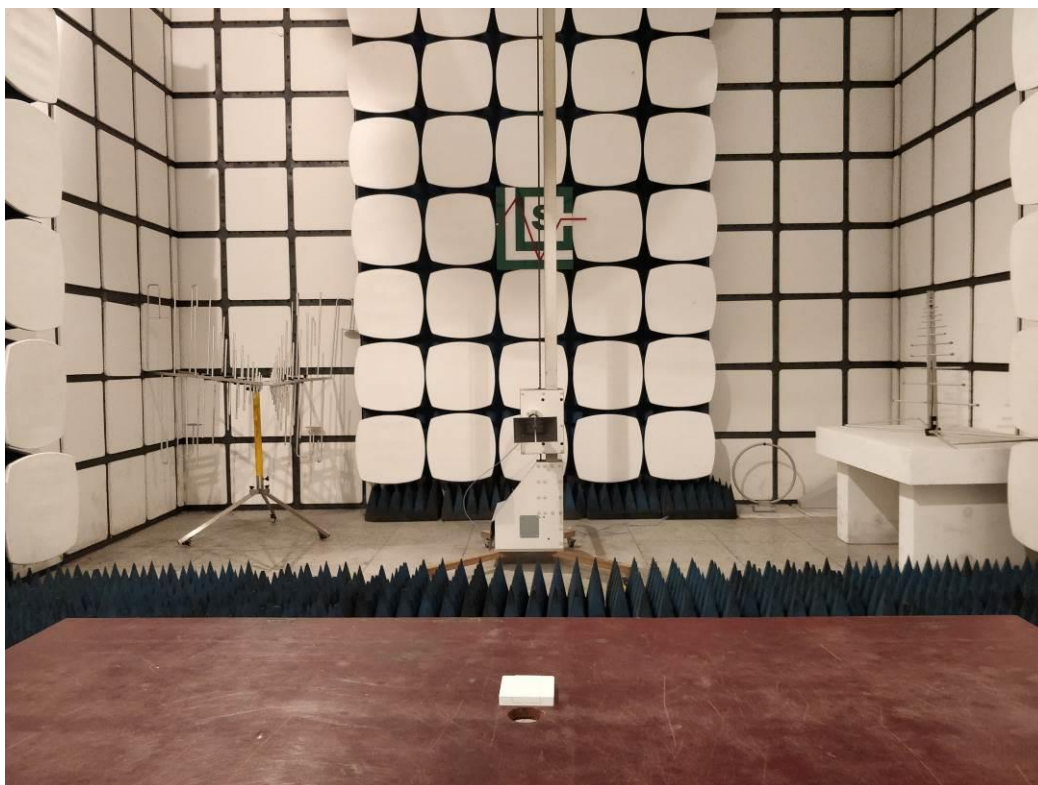
Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	EMI Test Software	AUDIX	E3	/	2018/6/16	2019/6/15
2	EMI Test Receiver	R&S	ESPI	101840	2018/6/16	2019/6/15
3	Artificial Mains	R&S	ENV216	101288	2018/6/16	2019/6/15
4	10dB Attenuator	SCHWARZBECK	MTS-IMP-136	261115-001-0032	2018/6/16	2019/6/15
5	Positioning Controller	MF	MF-7082	/	2018/6/16	2019/6/15
6	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2018/7/26	2019/7/25
7	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2018/7/2	2019/7/1
8	EMI Test Receiver	R&S	ESR 7	101181	2018/6/16	2019/6/15
9	RS SPECTRUM ANALYZER	R&S	FSP40	100503	2018/11/15	2019/11/14
10	AMPLIFIER	QuieTek	QTK	CHM/0809065	2018/11/15	2019/11/14
11	RF Cable-R03m	Jye Bao	RG142	CB021	2018/6/16	2019/6/15
12	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2018/6/16	2019/6/15
13	Power Analyzer Test System	Voltech	PM6000	2.00007E+11	2018/6/16	2019/6/15
14	RS Test Software	Tonscend	/	/	2018/6/16	2019/6/15
15	ESG Vector Signal Generator	Agilent	E4438C	MY42081396	2018/11/15	2019/11/14
16	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2018/6/16	2019/6/15
17	RF POWER AMPLIFIER	OPHIR	5225R	1052	NCR	NCR
18	RF POWER AMPLIFIER	OPHIR	5273F	1019	NCR	NCR
19	Stacked Broadband Log Periodic Antenna	SCHWARZBECK	STLP 9128	9128ES-145	NCR	NCR
20	Stacked Mikrowellen Log.-Per Antenna	SCHWARZBECK	STLP 9149	9149-484	NCR	NCR
21	Electric field probe	Narda S.TS./PMM	EP601	611WX80208	2018/3/26	2019/3/25
22	Sound Level meter	BK Precision	735	7.35009E+15	2018/6/16	2019/6/15
23	Audio Analyzer	R&S	UPV	1146.2003K02-101 721-UW	2018/6/16	2019/6/15
24	Mouse Simulation	Brueel & Kjaer	4227	A0304216	2018/6/16	2019/6/15
25	Ear Simulation and supply	Brueel & Kjaer	2669.4182.5935	A0305284	2018/6/16	2019/6/15
26	Acoustical Calibrators	Brueel & Kjaer	4231	A0304215	2018/6/16	2019/6/15
27	ESD Simulator	SCHLODER	SESD 230	604035	2018/7/2	2019/7/1
28	CaliforniaPACITANCE COUPLING CLAMP	3CTEST	EFTC	EC0441098	2018/6/16	2019/6/15
29	Simulator	FRANKONIA	CIT-10/75	A126A1195	2018/6/16	2019/6/15
30	CDN	FRANKONIA	CDN-M2+M3	A2210177	2018/6/16	2019/6/15
31	6dB Attenuator	FRANKONIA	DAM25W	1172040	2018/6/16	2019/6/15
32	Immunity Simulative Generator	EM TEST	UCS500 M4	0101-34	2018/11/15	2019/11/14
33	Voltage dips and up generator	3CTEST	VDG-1105G	EC0171014	2018/6/16	2019/6/15
34	Power frequency mag-field generator System	EVERFINE	EMS61000-8K	906003	2018/6/16	2019/6/15
35	Impedance Stabilization Network	TESEQ	ISN T800	45130	2018-11-15	2019-11-14

Note: All equipment is calibrated through GUANGZHOU LISAI Calibration and Test Co., Ltd.

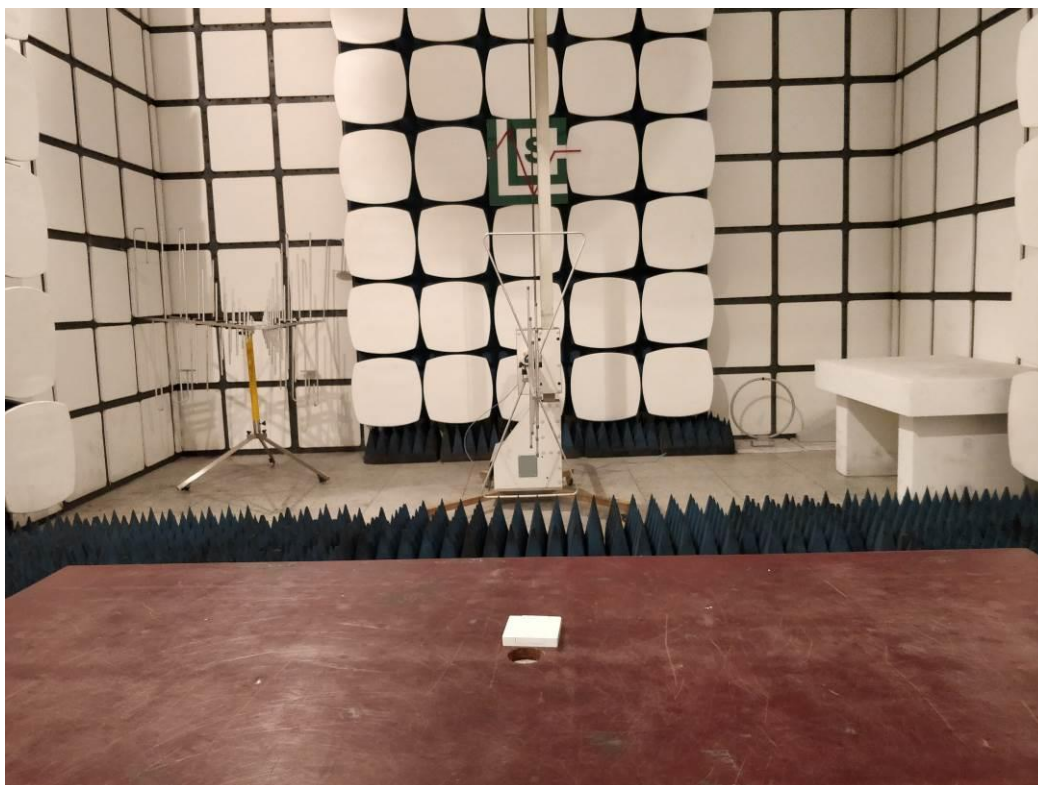
15. TEST SETUP PHOTOGRAPHS



Radiated Emission below 1GHz



Radiated Emission Above 1GHz



RS



ESD

16. EUT EXTERIOR AND INTERIOR PHOTOGRAPHS



Fig.1

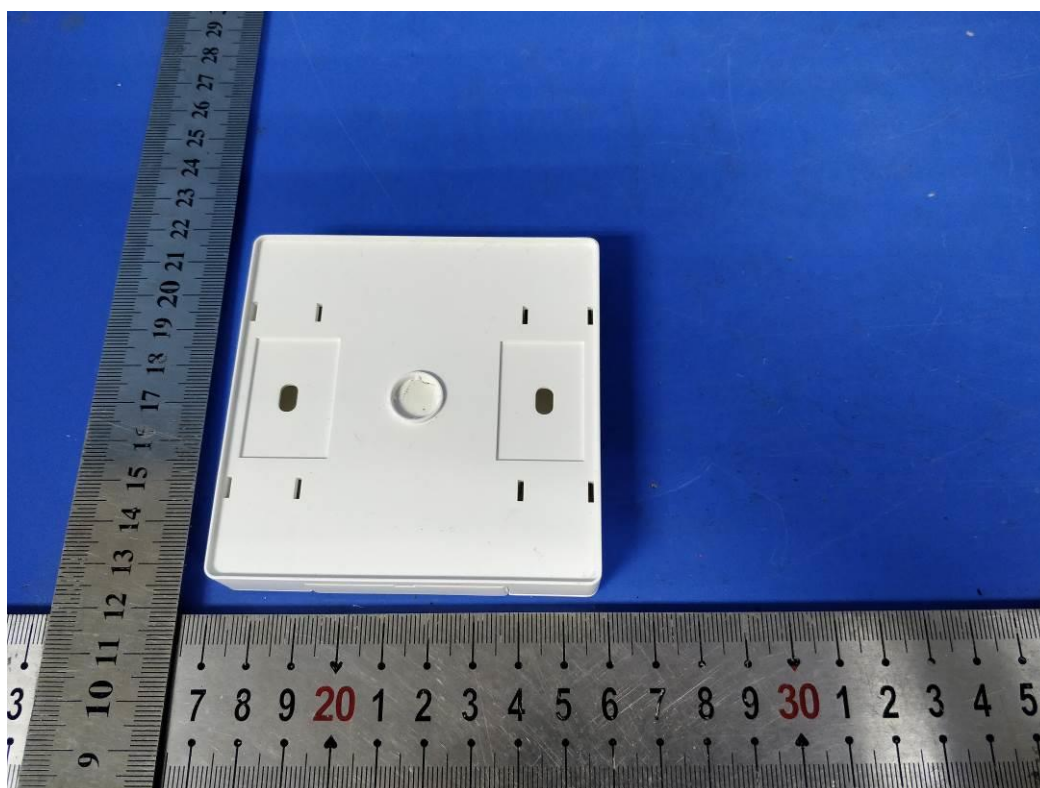


Fig.2



Fig.3



Fig.4

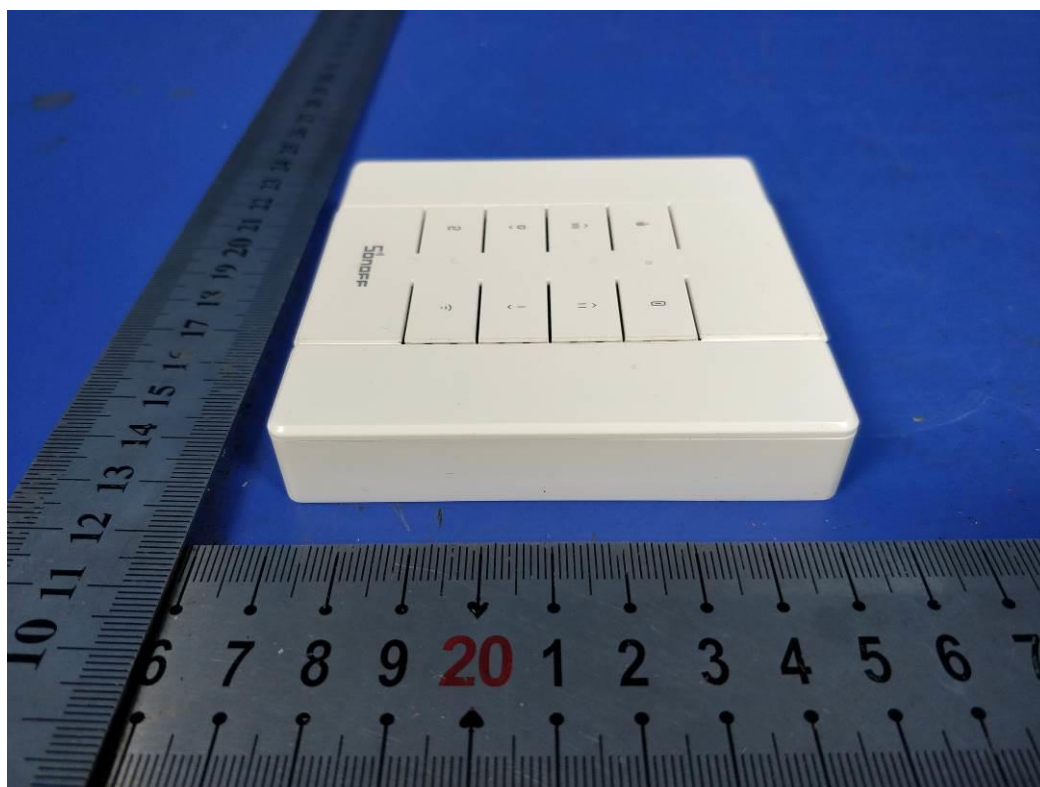


Fig.5



Fig.6

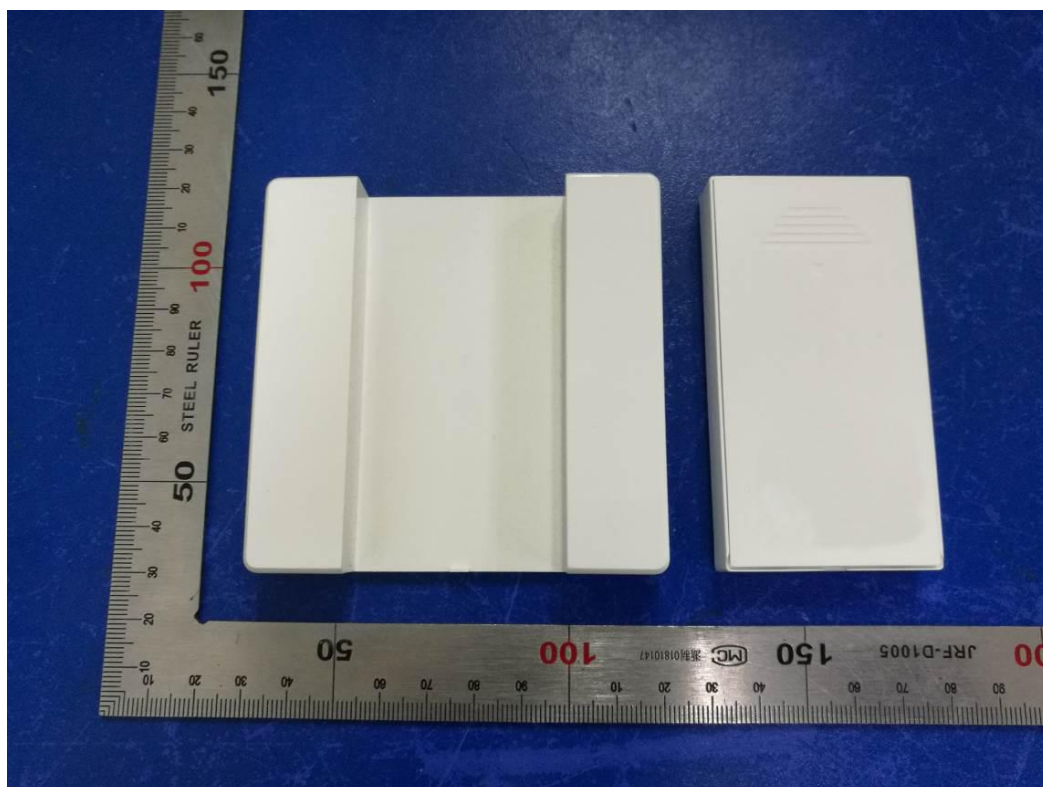


Fig.7

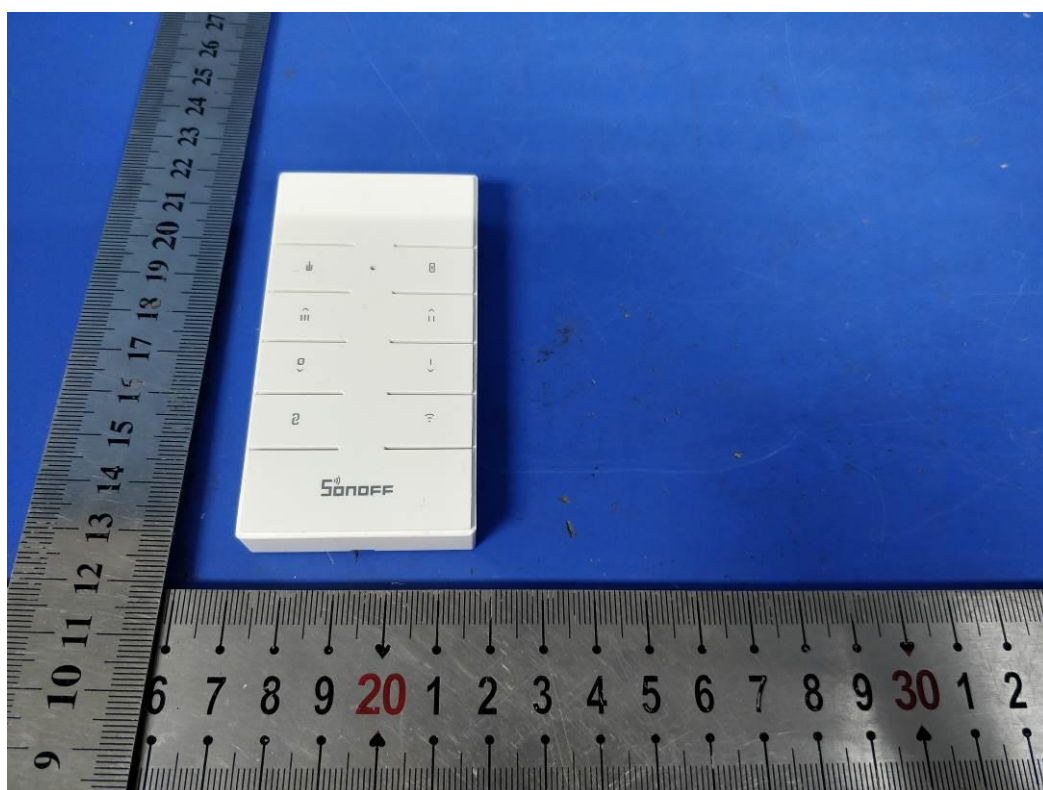


Fig.8



Fig.9



Fig.10

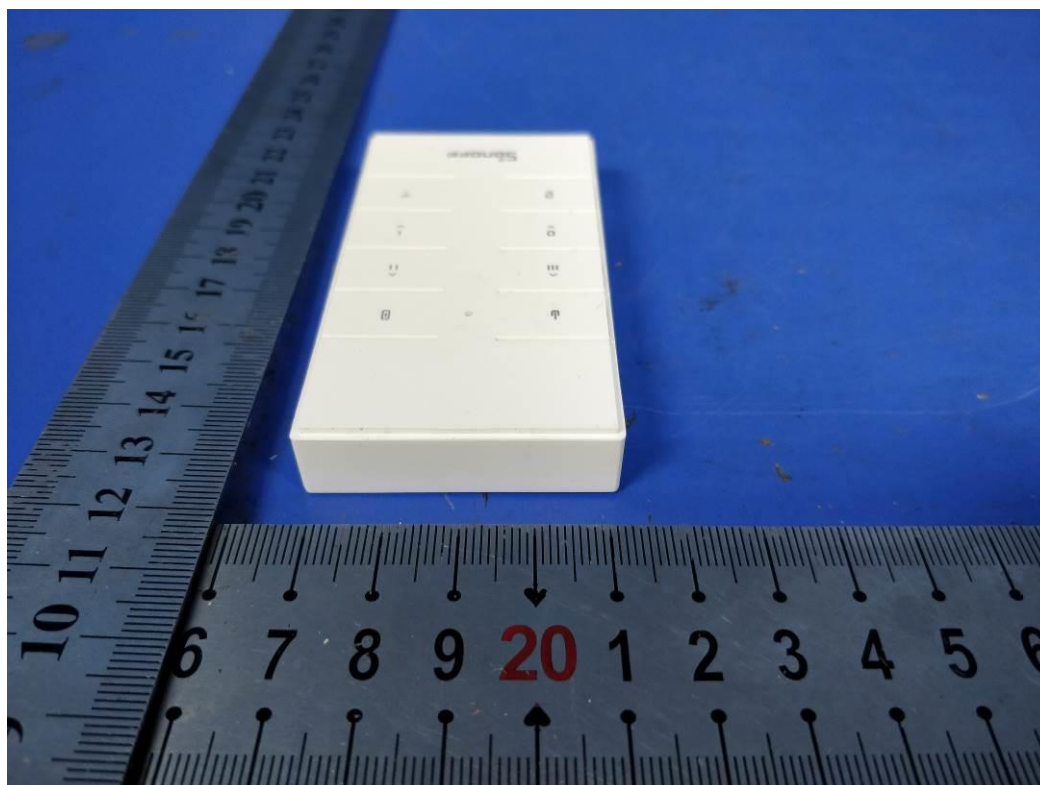


Fig.11



Fig.12



Fig.13



Fig.14

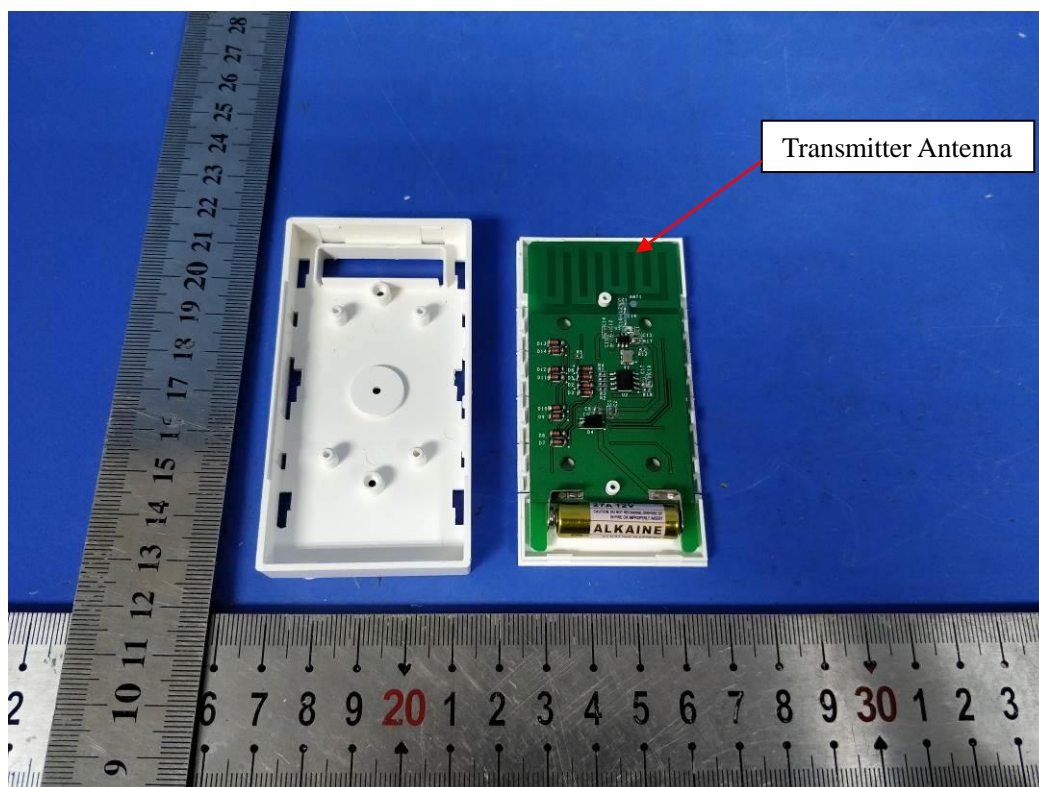


Fig.15

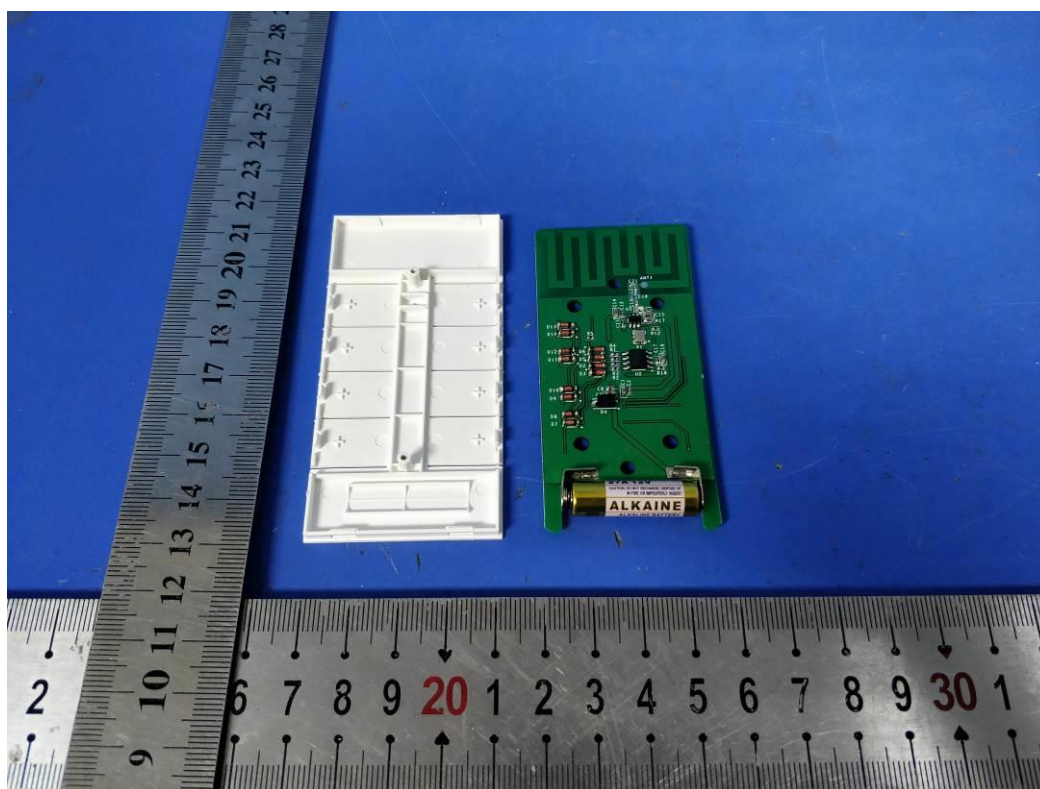


Fig.16

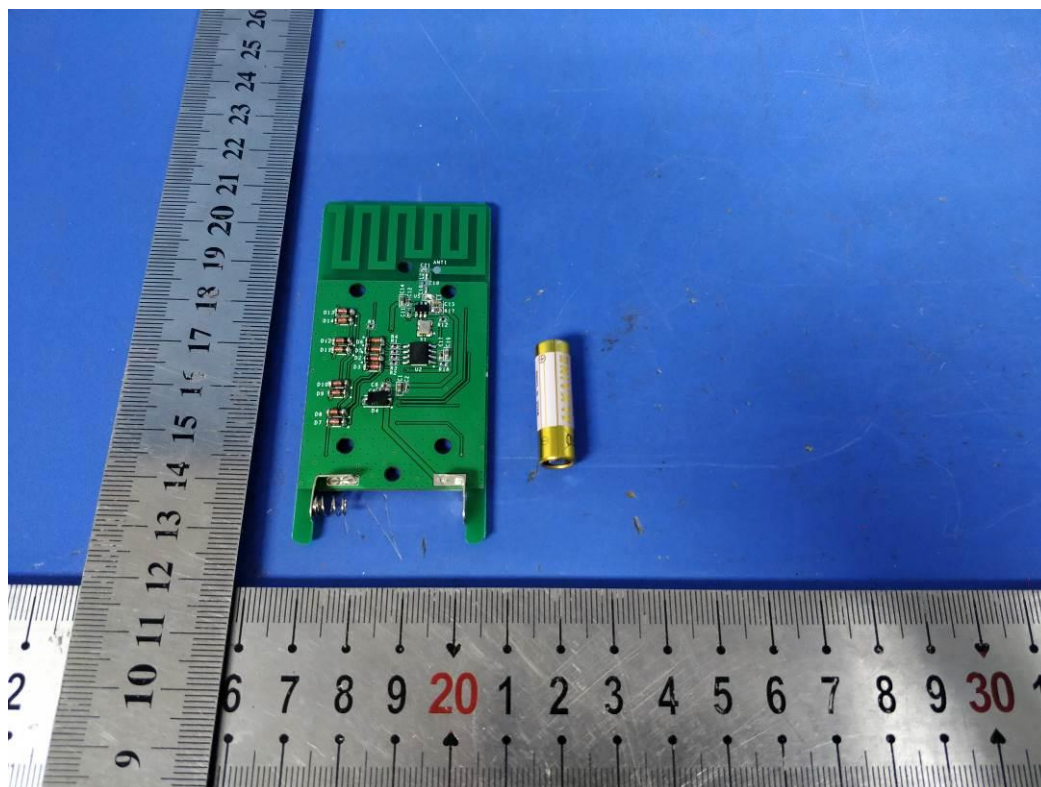


Fig.17

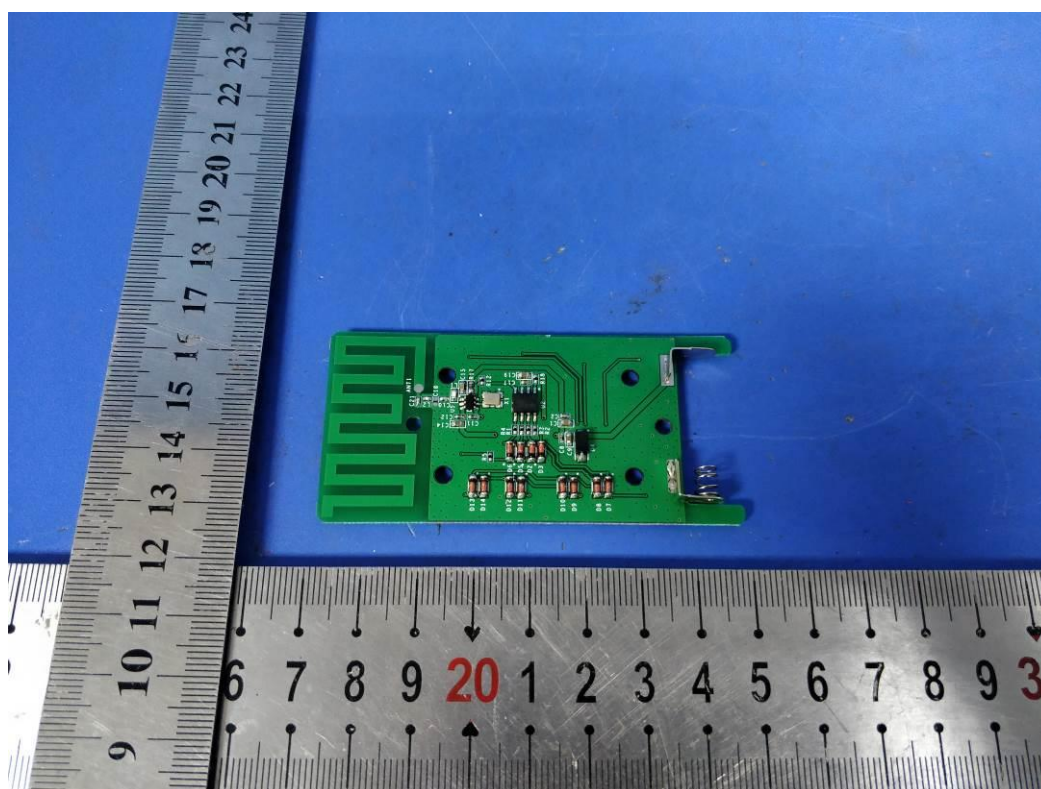


Fig.18

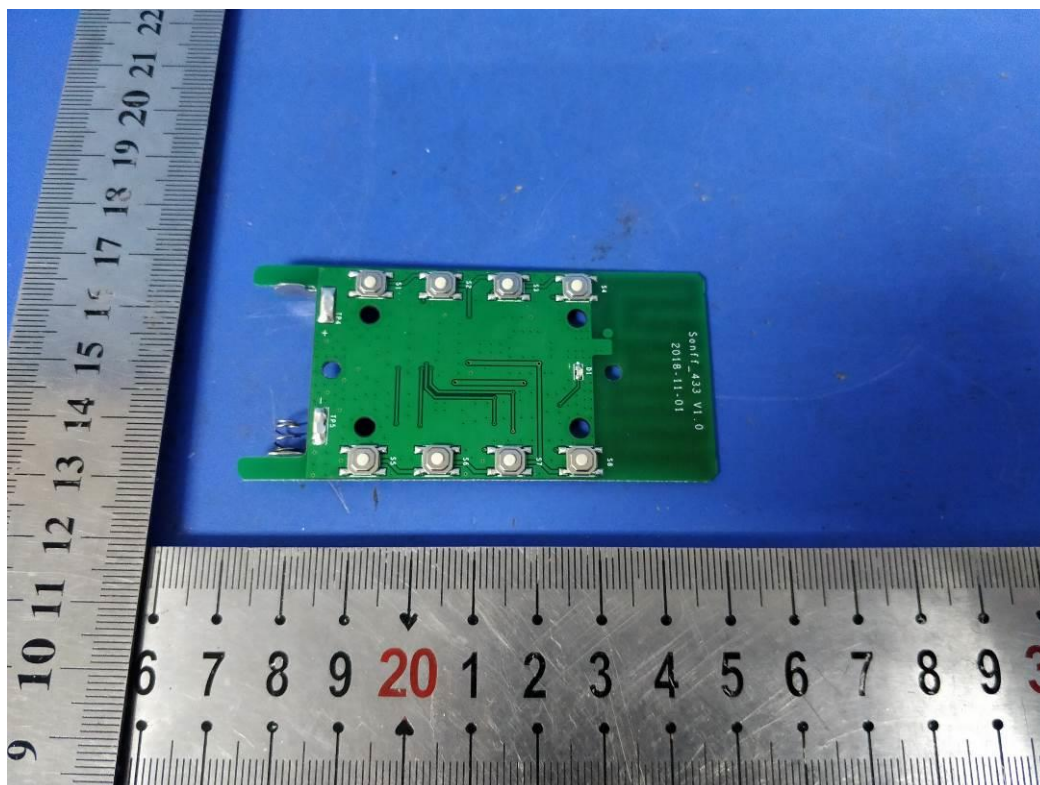


Fig.19

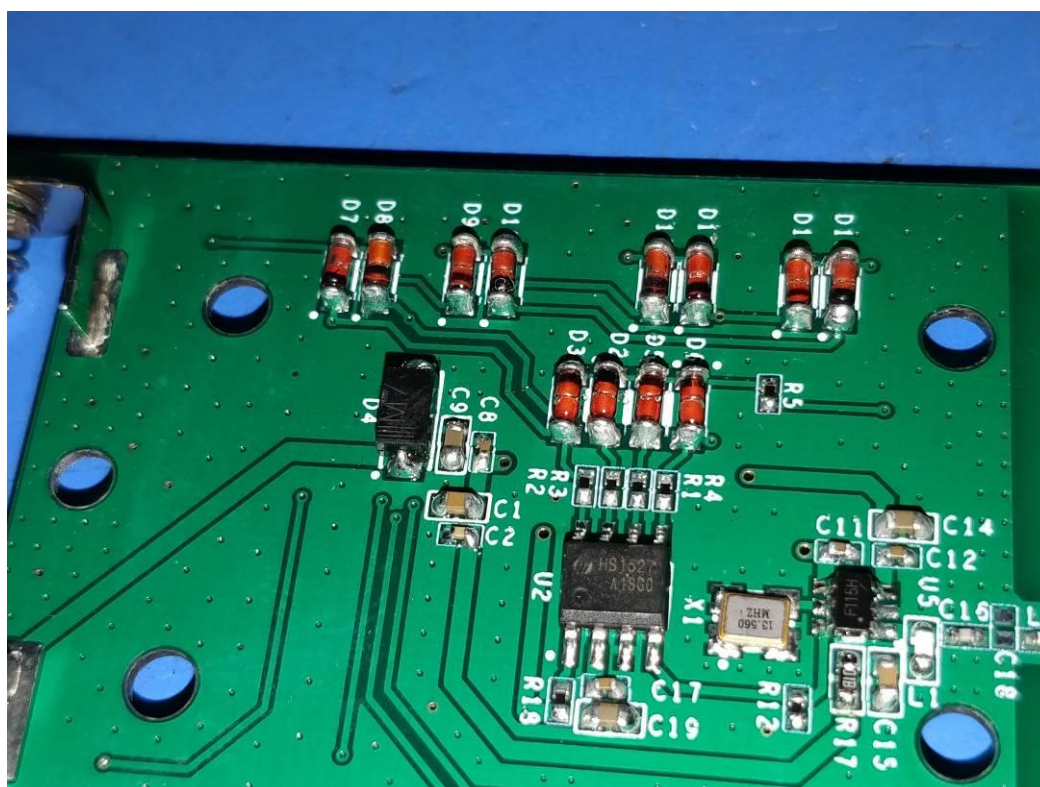


Fig.20



Fig.21

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