



# **TEST REPORT**

Applicant: SHENZHEN HOMELEAD ELECTRONICS CO.,LTD.

Address: 11th Floor, Bldg 2, Phase 5, Fucheng Digital Innovation Shijing Road, Fucheng Street,Longhua Shenzhen China

Product Name: Wireless Soil Monitor

FCC ID: 2AAXF-HG9901

 
 Standard(s):
 47 CFR Part 15, Subpart C(15.231) ANSI C63.10-2013

 Report Number:
 SZ2231215-76007E-RF-00

Report Date: 2024/1/31

The above device has been tested and found compliant with the requirement of the relative standards by Bay Area Compliance Laboratories Corp. (Dongguan).

Gonin Xn

Reviewed By: Gavin Xu

Title: RF Engineer

fron Cas

Approved By: Ivan Cao Title: EMC Manager

**Bay Area Compliance Laboratories Corp. (Dongguan)** No.12, Pulong East 1<sup>st</sup> Road, Tangxia Town, Dongguan, Guangdong, China

> Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

Note: The information marked  $\blacktriangle$  is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested. This report cannot be reproduced except in full, without prior written approval of the Company. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0. This report may contain data that are not covered by the accreditation scope and shall be marked with  $\bigstar$ . This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

# CONTENTS

DOCUMENT REVISION HISTORY	4
1. GENERAL INFORMATION	5
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	5
1.2 Accessory Information	5
1.3 ANTENNA INFORMATION DETAIL	5
1.4 EQUIPMENT MODIFICATIONS	5
2. DESCRIPTION OF TEST CONFIGURATION	6
2.1 EUT OPERATION CONDITION	6
2.2 EUT EXERCISE SOFTWARE	6
2.3 SUPPORT EQUIPMENT LIST AND DETAILS	6
2.4 SUPPORT CABLE LIST AND DETAILS	6
2.5 BLOCK DIAGRAM OF TEST SETUP	6
2.6 TEST FACILITY	7
2.7 Measurement Uncertainty	7
3. SUMMARY OF TEST RESULTS	8
4. REQUIREMENTS AND TEST RESULT	9
A 1 A C L DUE CONDUCTED ENGLIQUES	0
4.1 AC LINE CONDUCTED EMISSIONS	9
4.1 AC LINE CONDUCTED EMISSIONS	9 10
4.1 AC LINE CONDUCTED EMISSIONS 4.2 RADIATION SPURIOUS EMISSIONS 4.2.1 Applicable Standard	
<ul> <li>4.1 AC LINE CONDUCTED EMISSIONS</li> <li>4.2 RADIATION SPURIOUS EMISSIONS</li> <li>4.2.1 Applicable Standard</li> <li>4.2.2 EUT Setup</li> <li>4.2.3 EMI Test Passiver &amp; Spectrum Analyzer Sotup</li> </ul>	
<ul> <li>4.1 AC LINE CONDUCTED EMISSIONS</li> <li>4.2 RADIATION SPURIOUS EMISSIONS</li> <li>4.2.1 Applicable Standard</li> <li>4.2.2 EUT Setup</li> <li>4.2.3 EMI Test Receiver &amp; Spectrum Analyzer Setup</li> <li>4.2.4 Test Procedure</li> </ul>	
<ul> <li>4.1 AC LINE CONDUCTED EMISSIONS</li> <li>4.2 RADIATION SPURIOUS EMISSIONS</li> <li>4.2.1 Applicable Standard</li> <li>4.2.2 EUT Setup</li> <li>4.2.3 EMI Test Receiver &amp; Spectrum Analyzer Setup</li> <li>4.2.4 Test Procedure</li> <li>4.2.5 Corrected Amplitude &amp; Margin Calculation</li> </ul>	
<ul> <li>4.1 AC LINE CONDUCTED EMISSIONS</li> <li>4.2 RADIATION SPURIOUS EMISSIONS</li> <li>4.2.1 Applicable Standard</li> <li>4.2.2 EUT Setup</li> <li>4.2.3 EMI Test Receiver &amp; Spectrum Analyzer Setup</li> <li>4.2.4 Test Procedure</li> <li>4.2.5 Corrected Amplitude &amp; Margin Calculation</li> <li>4.2.6 Test Result</li> </ul>	
<ul> <li>4.1 AC LINE CONDUCTED EMISSIONS</li> <li>4.2 RADIATION SPURIOUS EMISSIONS</li> <li>4.2.1 Applicable Standard</li> <li>4.2.2 EUT Setup</li> <li>4.2.3 EMI Test Receiver &amp; Spectrum Analyzer Setup</li> <li>4.2.4 Test Procedure</li> <li>4.2.5 Corrected Amplitude &amp; Margin Calculation</li> <li>4.2.6 Test Result</li> <li>4.3 20 DB EMISSION BANDWIDTH:</li> </ul>	
<ul> <li>4.1 AC LINE CONDUCTED EMISSIONS</li> <li>4.2 RADIATION SPURIOUS EMISSIONS</li> <li>4.2.1 Applicable Standard</li> <li>4.2.2 EUT Setup</li> <li>4.2.3 EMI Test Receiver &amp; Spectrum Analyzer Setup</li> <li>4.2.4 Test Procedure</li> <li>4.2.5 Corrected Amplitude &amp; Margin Calculation</li> <li>4.2.6 Test Result</li> <li>4.3 20 DB EMISSION BANDWIDTH:</li> <li>4.3.1 Applicable Standard</li> <li>4.3.2 EUT Setup</li> </ul>	
<ul> <li>4.1 AC LINE CONDUCTED EMISSIONS</li> <li>4.2 RADIATION SPURIOUS EMISSIONS</li> <li>4.2.1 Applicable Standard</li> <li>4.2.2 EUT Setup.</li> <li>4.2.3 EMI Test Receiver &amp; Spectrum Analyzer Setup</li> <li>4.2.4 Test Procedure</li> <li>4.2.5 Corrected Amplitude &amp; Margin Calculation.</li> <li>4.2.6 Test Result</li> <li>4.3 20 DB EMISSION BANDWIDTH:</li> <li>4.3.1 Applicable Standard.</li> <li>4.3.2 EUT Setup.</li> <li>4.3.3 Test Procedure</li> </ul>	
<ul> <li>4.1 AC LINE CONDUCTED EMISSIONS</li> <li>4.2 RADIATION SPURIOUS EMISSIONS</li> <li>4.2.1 Applicable Standard.</li> <li>4.2.2 EUT Setup.</li> <li>4.2.3 EMI Test Receiver &amp; Spectrum Analyzer Setup</li> <li>4.2.4 Test Procedure</li> <li>4.2.5 Corrected Amplitude &amp; Margin Calculation.</li> <li>4.2.6 Test Result</li> </ul> 4.3 20 DB EMISSION BANDWIDTH: <ul> <li>4.3.1 Applicable Standard.</li> <li>4.3.2 EUT Setup.</li> <li>4.3.3 Test Procedure</li> <li>4.3.4 Test Result</li> </ul>	
<ul> <li>4.1 AC LINE CONDUCTED EMISSIONS</li> <li>4.2 RADIATION SPURIOUS EMISSIONS</li> <li>4.2.1 Applicable Standard</li> <li>4.2.2 EUT Setup.</li> <li>4.2.3 EMI Test Receiver &amp; Spectrum Analyzer Setup</li> <li>4.2.4 Test Procedure</li> <li>4.2.5 Corrected Amplitude &amp; Margin Calculation.</li> <li>4.2.6 Test Result</li> <li>4.3 20 DB EMISSION BANDWIDTH:</li> <li>4.3.1 Applicable Standard</li> <li>4.3.2 EUT Setup.</li> <li>4.3.3 Test Procedure</li> <li>4.3.4 Test Result</li> <li>4.4 DEACTIVATION TESTING.</li> </ul>	
<ul> <li>4.1 AC LINE CONDUCTED EMISSIONS</li> <li>4.2 RADIATION SPURIOUS EMISSIONS</li> <li>4.2.1 Applicable Standard</li> <li>4.2.2 EUT Setup</li> <li>4.2.3 EMI Test Receiver &amp; Spectrum Analyzer Setup</li> <li>4.2.4 Test Procedure</li> <li>4.2.5 Corrected Amplitude &amp; Margin Calculation</li> <li>4.2.6 Test Result</li> <li>4.3 20 DB EMISSION BANDWIDTH:</li> <li>4.3.1 Applicable Standard</li> <li>4.3.2 EUT Setup</li> <li>4.3.3 Test Procedure</li> <li>4.3.4 Test Result</li> <li>4.4 DEACTIVATION TESTING</li> <li>4.4.1 Applicable Standard</li> </ul>	
<ul> <li>4.1 AC LINE CONDUCTED EMISSIONS</li> <li>4.2 RADIATION SPURIOUS EMISSIONS</li> <li>4.2.1 Applicable Standard</li> <li>4.2.2 EUT Setup.</li> <li>4.2.3 EMI Test Receiver &amp; Spectrum Analyzer Setup</li> <li>4.2.4 Test Procedure</li> <li>4.2.5 Corrected Amplitude &amp; Margin Calculation.</li> <li>4.2.6 Test Result</li> <li>4.3 20 DB EMISSION BANDWIDTH:</li> <li>4.3.1 Applicable Standard.</li> <li>4.3.2 EUT Setup.</li> <li>4.3.3 Test Procedure</li> <li>4.3.4 Test Result</li> <li>4.4 DEACTIVATION TESTING.</li> <li>4.4.1 Applicable Standard.</li> <li>4.2.5 EUT Setup.</li> </ul>	
<ul> <li>4.1 AC LINE CONDUCTED EMISSIONS</li> <li>4.2 RADIATION SPURIOUS EMISSIONS</li> <li>4.2.1 Applicable Standard.</li> <li>4.2.2 EUT Setup.</li> <li>4.2.3 EMI Test Receiver &amp; Spectrum Analyzer Setup</li> <li>4.2.4 Test Procedure</li> <li>4.2.5 Corrected Amplitude &amp; Margin Calculation.</li> <li>4.2.6 Test Result</li> <li>4.3 20 DB EMISSION BANDWIDTH:</li> <li>4.3.1 Applicable Standard.</li> <li>4.3.2 EUT Setup.</li> <li>4.3.3 Test Procedure</li> <li>4.3.4 Test Result</li> <li>4.4 DeaCTIVATION TESTING.</li> <li>4.4 Test Procedure</li> <li>4.3 Test Procedure</li> <li>4.4 Test Result</li> </ul>	
<ul> <li>4.1 AC LINE CONDUCTED EMISSIONS.</li> <li>4.2 RADIATION SPURIOUS EMISSIONS.</li> <li>4.2.1 Applicable Standard.</li> <li>4.2.2 EUT Setup.</li> <li>4.2.3 EMI Test Receiver &amp; Spectrum Analyzer Setup.</li> <li>4.2.4 Test Procedure</li></ul>	
<ul> <li>4.1 AC LINE CONDUCTED EMISSIONS</li></ul>	
<ul> <li>4.1 AC LINE CONDUCTED EMISSIONS.</li> <li>4.2 RADIATION SPURIOUS EMISSIONS.</li> <li>4.2.1 Applicable Standard.</li> <li>4.2.2 EUT Setup.</li> <li>4.2.3 EMI Test Receiver &amp; Spectrum Analyzer Setup</li></ul>	
<ul> <li>4.1 AC LINE CONDUCTED EMISSIONS.</li> <li>4.2 RADIATION SPURIOUS EMISSIONS.</li> <li>4.2.1 Applicable Standard.</li> <li>4.2.2 EUT Setup.</li> <li>4.2.3 EMI Test Receiver &amp; Spectrum Analyzer Setup</li></ul>	

ALUATION	<b>APPENDIX C - RF EXPOSURE</b>
	APPLICABLE STANDARD
	Measurement Result

## **DOCUMENT REVISION HISTORY**

Revision Number	Report Number	Description of Revision	Date of Revision
1.0	SZ2231215-76007E-RF-00	Original Report	2024/1/31

## **1. GENERAL INFORMATION**

### **1.1 Product Description for Equipment under Test (EUT)**

EUT Name:	Wireless Soil Monitor	
EUT Model:	HG01	
Multiple Models:         HG02, HG03, HG04, HG05, HG06, HG07, HG08, HG09, HG           Multiple Models:         HG11, HG12, HG13, HG14, HG15, HG16, HG17, HG18, HG           HG20, GT01, GT02, GT03, GT04, GT05, GT06, GT07, GT08		
<b>Operation Frequency:</b>	433.92 MHz	
Modulation Type:	ASK	
Rated Input Voltage:	DC 1.5V from battery	
Serial Number:	2FBH-3	
EUT Received Date:	2023.12.20	
EUT Received Status:	Good	
Note:		

The multiple models are electrically identical with the test model. Please refer to the declaration letter for more detail, which was provided by manufacturer.

## **1.2 Accessory Information**

Accessory Description	Manufacturer	Model	Parameters
/	/	/	/

## **1.3 Antenna Information Detail**

Antenna Manufacturer	Antenna Type	Antenna Connector	Frequency Range	Antenna Gain
Shenzhen HomeLead Electronics Co.,LTD	Spring	Integrated	433.92 MHz	Unknown
The design of compliance with §15.203:				
Unit uses a permanently attached antenna.				
Unit uses a unique coupling to the intentional radiator.				
Unit was professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.				

## **1.4 Equipment Modifications**

No modifications are made to the EUT during all test items.

## 2. DESCRIPTION OF TEST CONFIGURATION

## **2.1 EUT Operation Condition**

The system was configured for testing in Engineering Mode, which was provided by the manufacturer. The following summary table is showing all test modes to demonstrate in compliance with the standard:

Test Items	Test Modes	
<b>RF</b> Conducted	Test Mode 1: Transmitting	
<b>Radiated Spurious Emission</b>	Test Mode 1: Transmitting	
AC Line Conducted Emission	Not Applicable, the device was powered by battery only.	
Note: New batteries were used in testing.		

## 2.2 EUT Exercise Software

Engineering Mode was provided by manufacturer  $\blacktriangle$ . The maximum power was configured default setting.

## 2.3 Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	/	/	/

## **2.4 Support Cable List and Details**

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	То
/	/	/	/	/	/

## 2.5 Block Diagram of Test Setup

Radiated Emissions:



## 2.6 Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 829273, the FCC Designation No. : CN5044.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0022.

#### 2.7 Measurement Uncertainty

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	$\pm 5\%$
	9kHz~30MHz: 3.3dB, 30MHz~200MHz: 4.55 dB, 200MHz~1GHz:
Unwanted Emissions, radiated	5.92 dB, 1GHz~6GHz: 4.98 dB, 6GHz~18GHz: 5.89 dB,
	18GHz~26.5GHz:5.47 dB, 26.5GHz~40GHz:5.63 dB
Unwanted Emissions, conducted	±2.47 dB
Temperature	$\pm 1$ °C
Humidity	$\pm 5\%$
DC and low frequency voltages	$\pm 0.4\%$
Duty Cycle	1%
AC Power Lines Conducted Emission	3.11 dB (150 kHz to 30 MHz)

## **3. SUMMARY OF TEST RESULTS**

Standard(s) Section	Test Items	Result
§15.207 (a)	Conducted Emissions	Not Applicable
§15.205, §15.209, §15.231 (e)	Radiated Emissions	Compliant
§15.231 (c)	20dB Bandwidth	Compliant
§15.231 (e)	Deactivation Testing	Compliant
§15.203	Antenna Requirement	Compliant

## 4. REQUIREMENTS AND TEST RESULT

## 4.1 AC Line Conducted Emissions

Not Applicable, the device was powered by battery only.

## 4.2 Radiation Spurious Emissions

## 4.2.1 Applicable Standard

#### FCC §15.231 (e);

Intentional radiators may operate at a periodic rate exceeding that specified in paragraph (a) of this section and may be employed for any type of operation, including operation prohibited in paragraph (a) of this section, provided the intentional radiator complies with the provisions of paragraphs (b) through (d) of this section, except the field strength table in paragraph (b) of this section is replaced by the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	1,000	100
70-130	500 50	
130-174	500 to $1,500^1$	50 to $150^{1}$
174-260	1,500	150
260-470	<sup>1</sup> 1,500 to 5,000	150 to 500 <sup>1</sup>
Above 470	5,000	500

1Linear interpolations.

In addition, devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

### 4.2.2 EUT Setup

#### 9kHz - 30MHz:



### 30MHz - 1GHz:



Above 1GHz:



The radiated emissions were performed in the 3 meters distance, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.205, 15.209, and FCC 15.231 limits.

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

Report Template Version: FCC-15.231e-V1.0

The spacing between the peripherals was 10 cm.

For 9kHz-30MHz test, the lowest height of the magnetic antenna shall be 1 m above the ground and three antenna orientations (parallel, perpendicular, and ground-parallel) shall be measured.

#### 4.2.3 EMI Test Receiver & Spectrum Analyzer Setup

During the radiated emission test, the test receiver was set with the following configurations other than pulsed emissions for average test:

9kHz-1000MHz:

Frequency Range	Measurement	RBW	Video B/W	IF B/W
9 kHz – 150 kHz	QP/AV	200 Hz	1 kHz	200 Hz
150 kHz – 30 MHz	QP/AV	9 kHz	30 kHz	9 kHz
20 MILa 1000 MILa	PK	100 kHz	300 kHz	/
30 MHz – 1000 MHz	QP	/	/	120 kHz

Above 1GHz:

Measurement	RBW	Video B/W
РК	1MHz	3 MHz

#### 4.2.4 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

According to §15.231, Intentional radiators operating under the provisions of this Section shall demonstrate compliance with the limits on the field strength of emissions, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector

For pulsed emissions, according to C63.10 clause 7.5, Procedure for determining the average value of pulsed emissions

Unless otherwise specified, when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 s (100 ms). In cases where the pulse train exceeds 0.1 s, the measured field strength shall be determined during a 0.1 s interval.64 The following procedure is an example of how the average value may be determined. The average field strength may be found by measuring the peak pulse amplitude (in log equivalent units) and determining the duty cycle correction factor (in dB) associated with the pulse modulation as shown in Equation

$$\delta(dB) = 20\log(\Delta)$$

where

 $\delta~$  is the duty cycle correction factor (dB)

 $\Delta$  is the duty cycle (dimensionless)

#### 4.2.5 Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result = Reading + Factor Factor = Antenna Factor + Cable Loss- Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. The equation for margin calculation is as follows:

Margin = Limit – Result

### 4.2.6 Test Result

Serial Number:	2FBH-3	Test Date:	2024/1/29~2024/1/31
Test Site:	Chamber 10m, Chamber B	Test Mode:	Transmitting
Tester:	Leesin Xiang, Bill Yang	Test Result:	Pass

#### **Environmental Conditions:**

Temperature: (℃)	22.5~22.8	Relative Humidity: (%)	46~48	ATM Pressure: (kPa)	101.2~101.9
---------------------	-----------	------------------------------	-------	------------------------	-------------

### **Test Equipment List and Details:**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date	
9 kHz~30 MHz						
ЕМСО	Passive Loop Antenna	6512	9706-1206	2023/10/21	2024/10/20	
Sunol Sciences	Hybrid Antenna	JB3	A060611-1	2023/9/6	2024/9/5	
Narda	Attenuator	779-6dB	04269	2023/9/6	2024/9/5	
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2023/8/1	2024/7/31	
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-04	2023/8/1	2024/7/31	
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2023/8/1	2024/7/31	
Sonoma	Amplifier	310N	185914	2023/8/1	2024/7/31	
R&S	EMI Test Receiver	ESCI	100224	2023/8/18	2024/8/17	
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A	
		Above	e 1GHz			
ETS-Lindgren	Horn Antenna	3115	000 527 35	2023/9/7	2024/9/6	
Xinhang Macrowave	Coaxial Cable	XH750A-N/J- SMA/J-10M	20231117004 #0001	2023/11/17	2024/11/16	
AH	Preamplifier	PAM-0118P	469	2023/8/19	2024/8/18	
R&S	Spectrum Analyzer	FSV40	101944	2023/10/18	2024/10/17	
Audix	Test Software	E3	191218 (V9)	N/A	N/A	

\* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

### Test Data:

Please refer to the below table and plots.

Note: The device can be mounted in multiple orientations, test was performed with X,Y, Z Axis according to C63.10 figure 8, the worst orientation was photographed and it's data was recorded.

## 1) 9kHz~30MHz

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

### 2) 30MHz-1GHz

Project No:	SZ2231215-76007E-RF
Test Engineer:	Leesin Xiang
Test Date:	2024-01-31
Polarization:	Horizontal
Test Mode:	Transmitting
Power Source:	DC 1.5V



-5.97

71.53

72.87

Note:

7\*

\*Fundamental

433.9200

All the emissions under the QP/Average limit, average test is not required.

peak

77.50

1.34

Report No.: SZ2231215-76007E-RF-00



1	30.0000	27.52	peak	-3.80	23.72	40.00	16.28
2	71.7100	32.40	peak	-16.26	16.14	40.00	23.86
3	135.7300	28.53	peak	-10.10	18.43	43.50	25.07
4	163.8600	30.00	peak	-11.35	18.65	43.50	24.85
5	202.6600	30.15	peak	-11.78	18.37	43.50	25.13
6	423.8200	34.01	peak	-6.23	27.78	46.00	18.22
7*	433.9200	58.81	peak	-5.97	52.84	72.87	20.03

Note:

\*Fundamental

All the emissions under the QP/Average limit, average test is not required.

### 3) 1GHz-6GHz



## 4.3 20 dB Emission Bandwidth:

#### 4.3.1 Applicable Standard

#### FCC §15.231(c)

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

### 4.3.2 EUT Setup



### 4.3.3 Test Procedure

According to ANSI C63.10-2013 Section 6.9.2

a) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, unless otherwise specified by the applicable requirement.

- b) Set the video bandwidth (VBW)  $\ge 3 \times RBW$ .
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

#### 4.3.4 Test Result

Serial Number:	2FBH-3	Test Date:	2024/2/1
Test Site:	Chamber 10m	Test Mode:	Transmitting
Tester:	Leesin Xiang	Test Result:	Pass

Environmenta	l Conditions:				
Temperature: (℃)	23.2	Relative Humidity: (%)	49	ATM Pressure: (kPa)	101.1

## Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sunol Sciences	Hybrid Antenna	JB3	A060611-1	2023/9/6	2024/9/5
Narda	Attenuator	779-6dB	04269	2023/9/6	2024/9/5
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2023/8/1	2024/7/31
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-04	2023/8/1	2024/7/31
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2023/8/1	2024/7/31
Sonoma	Amplifier	310N	185914	2023/8/1	2024/7/31
R&S	EMI Test Receiver	ESCI	100224	2023/8/18	2024/8/17

\* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

#### **Test Data:**

Test Frequency (MHz)	20dB Bandwidth (kHz)	Limit (kHz)
433.92	56	1084.8



#### **20dB Emission Bandwidth**

Project: SZ2231215-76007E-RF Tester: Leesin Xiang
Date: 1.FEB.2024 14:39:56

### **4.4 DEACTIVATION TESTING**

#### 4.4.1 Applicable Standard

#### FCC §15.231 (e)

In addition, devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

#### 4.4.2 EUT Setup



#### 4.4.3 Test Procedure

The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the ON and OFF times of the transmitted signal:

1) Set the center frequency of the instrument to the center frequency of the transmission.

- 2) Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value.
  3) Set VBW ≥ RBW. Set detector = peak or average.

### 4.4.4 Test Result

Serial Number:	2FBH-3	Test Date:	2024/2/1
Test Site:	Chamber 10m	Test Mode:	Transmitting
Tester:	Leesin Xiang	Test Result:	Pass

Environmental Conditions:						
Temperature: (℃)	16.7	Relative Humidity: (%)	44	ATM Pressure: (kPa)	101.9	

## Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sunol Sciences	Hybrid Antenna	JB3	A060611-1	2023/9/6	2024/9/5
Narda	Attenuator	779-6dB	04269	2023/9/6	2024/9/5
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2023/8/1	2024/7/31
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-04	2023/8/1	2024/7/31
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2023/8/1	2024/7/31
Sonoma	Amplifier	310N	185914	2023/8/1	2024/7/31
R&S	EMI Test Receiver	ESCI	100224	2023/8/18	2024/8/17

\* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

#### **Test Data:**

Test Frequency (MHz)	Transmission duration Time (s)	Transmission duration Time Limit (s)	Silent Time (s)	Silent Time Limit (s)
433.92	0.108	<1	22.86	>10
Note: Transmission duration Time*30=3.24s<10s				



#### Transmission duration Time=0.108s

Project: SZ2231215-76007E-RF Tester: Leesin Xiang Date: 1.FEB.2024 17:59:56

Silent Time=22.86s



Project: SZ2231215-76007E-RF Tester: Leesin Xiang Date: 1.FEB.2024 17:55:16

## 4.5 Antenna Requirement

#### 4.5.1 Applicable Standard

#### FCC §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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§15.211, 15.213, 15.217, 15.219, 15.221, or §15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

#### 4.5.2 Judgment

**Compliant.** Please refer to the Antenna Information detail in Section 1.3.

## **APPENDIX A - EUT PHOTOGRAPHS**

Please refer to the attachment SZ2231215-76007E-RF-EXP EUT external photographs and SZ2231215-76007E-RF-INP EUT internal photographs.

## **APPENDIX B - TEST SETUP PHOTOGRAPHS**

Please refer to the attachment SZ2231215-76007E-RF-00-TSP test setup photographs.

## **APPENDIX C - RF EXPOSURE EVALUATION**

#### **Applicable Standard**

(1.1307(b)(3)(i)) For single RF sources (*i.e.*, any single fixed RF source, mobile device, or portable device, as defined in paragraph (b)(2) of this section): A single RF source is exempt if:

(A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);

#### **Measurement Result**

Frequency	Maximum EIRP	Maximum ERP		1-mW	
(MHz)	(dBm)	dBm	mW	Test Exemption	
433.92	-23.67	-25.82	0.003	Compliant	

Note:

1. This device maximum E-Field level is 71.53 dB $\mu$ V/m at 3m, so the EIRP power is -23.67 dBm.

2. Pout EIRP(dBm)=Field Strength of Fundamental(dBuV/m)-95.2

Result: Compliant. RF Exposure is exemption.

==== END OF REPORT =====