



# FCC Test Report

Test report  
On Behalf of  
Huizhou Yinhua Technology Co, LTD.  
For  
D-ONE  
Model No.: ONE  
FCC ID: 2BKNM-ONE

Prepared For : Huizhou Yinhua Technology Co, LTD.  
Yuanhui Road No. 8-4, Mobile Smart Industry Base, Huicheng District, Huizhou  
City, Guangdong Province, China

Prepared By : Shenzhen HUAKE Testing Technology Co., Ltd.  
1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping,  
Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

Date of Test: Jul. 09, 2024 ~ Aug. 13, 2024

Date of Report: Aug. 13, 2024

Report Number: HK2407093751-3E



## Test Result Certification

**Applicant's name** ..... : Huizhou Yinhua Technology Co, LTD.

**Address** ..... : Yuanhui Road No. 8-4, Mobile Smart Industry Base, Huicheng District, Huizhou City, Guangdong Province, China

**Manufacturer's Name** ..... : Huizhou Yinhua Technology Co, LTD.

**Address** ..... : Yuanhui Road No. 8-4, Mobile Smart Industry Base, Huicheng District, Huizhou City, Guangdong Province, China

### Product description

**Trade Mark:** XPECE

**Product name** ..... : D-ONE

**Model and/or type reference** : ONE

**Standards** ..... : FCC Rules and Regulations Part 15 Subpart E Section 15.407  
ANSI C63.10: 2013

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen HUAKE Testing Technology Co., Ltd. is acknowledged as copyright owner and source of the material. Shenzhen HUAKE Testing Technology Co., Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

**Date of Test** ..... :

**Date (s) of performance of tests** ..... : Jul. 09, 2024 ~ Aug. 13, 2024

**Date of Issue** ..... : Aug. 13, 2024

**Test Result** ..... : Pass

**Testing Engineer** :

(Len Liao)

**Technical Manager** :

(Sliver Wan)

**Authorized Signatory** :

(Jason Zhou)



## Table of Contents

<b>1. Test Result Summary .....</b>	<b>5</b>
1.1. Test Procedures and Results .....	5
1.2. Information of the Test Laboratory .....	5
1.3. Measurement Uncertainty .....	6
<b>2. EUT Description .....</b>	<b>7</b>
2.1. General Description of EUT .....	7
2.2. Operation Frequency Each of Channel .....	8
2.3. Operation of EUT During Testing .....	8
2.4. Description of Test Setup .....	9
2.5. Description of Support Units .....	10
<b>3. General Information .....</b>	<b>11</b>
3.1. Test Environment and Mode .....	11
<b>4. Test Results and Measurement Data .....</b>	<b>12</b>
4.1. Conducted Emission .....	12
4.2. Maximum Conducted Output Power .....	15
4.3. 6DB Emission Bandwidth .....	18
4.4. 26DB Bandwidth and 99% Occupied Bandwidth .....	21
4.5. Power Spectral Density .....	22
4.6. Band Edge .....	25
4.7. Spurious Emission .....	30
4.8. Frequency Stability Measurement .....	38
4.9. Antenna Requirement .....	40
<b>5. Photographs of Test Setup .....</b>	<b>41</b>
<b>6. Photos of the EUT .....</b>	<b>42</b>



**\*\* Modified History \*\***

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	Aug. 13, 2024	Jason Zhou





## 1. Test Result Summary

### 1.1. Test Procedures and Results

Requirement	CFR 47 Section	Result
Antenna requirement	§15.203	PASS
AC Power Line Conducted Emission	§15.207	N/A
Maximum Conducted Output Power	§15.407(a)	PASS
6dB Emission Bandwidth	§15.407(e)	PASS
26dB Emission Bandwidth & 99% Occupied Bandwidth	§15.407(a)	N/A
Power Spectral Density	§15.407(a)	PASS
Band edge	§15.407(b)/15.209/15.205	PASS
Radiated Emission	§15.407(b)/15.209/15.205	PASS
Frequency Stability	§15.407(g)	PASS

**Note:**

1. PASS: Test item meets the requirement.
2. Fail: Test item does not meet the requirement.
3. N/A: Test case does not apply to the test object.
4. The test result judgment is decided by the limit of test standard.

### 1.2. Information of the Test Laboratory

Shenzhen HUAKE Testing Technology Co., Ltd.

Add.: 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

Testing Laboratory Authorization:

A2LA Accreditation Code is 4781.01.

FCC Designation Number is CN1229.

Canada IC CAB identifier is CN0045.

CNAS Registration Number is L9589.



### 1.3. Measurement Uncertainty

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95 %.

No.	Item	MU
1	Conducted Emission	$\pm 0.37\text{dB}$
2	RF power, conducted	$\pm 3.35\text{dB}$
3	Spurious emissions, conducted	$\pm 2.20\text{dB}$
4	All emissions, radiated(<1G)	$\pm 3.90\text{dB}$
5	All emissions, radiated(>1G)	$\pm 4.28\text{dB}$
6	Temperature	$\pm 0.1^{\circ}\text{C}$
7	Humidity	$\pm 1.0\%$



## 2. EUT Description

### 2.1. General Description of EUT

Equipment:	D-ONE
Model Name:	ONE
Serial Model:	N/A
Model Difference:	N/A
Trade Mark:	XPECE
FCC ID:	2BKNM-ONE
Operation Frequency:	5745-5825MHz
Number of Channel:	11
Modulation Type:	GFSK
Antenna Type:	Internal Antenna
Antenna Gain:	1.76dBi
Power Source:	DC 22.2V From Battery
Power Supply:	DC 22.2V From Battery

**Note:**

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2. Antenna gain Refer to the antenna specifications.
3. The cable loss data is obtained from the supplier.
4. The test results in the report only apply to the tested sample.



## 2.2. Operation Frequency Each of Channel

Description of Channel:							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	5745	2	5760	3	5765	4	5769
5	5780	6	5785	7	5805	8	5806
9	5809	10	5820	11	5825	12	

## 2.3. Operation of EUT During Testing

Operating Mode

The mode is used: **Transmitting mode**

Low Channel: 5745MHz

Middle Channel: 5785MHz

High Channel: 5825MHz





## 2.4. Description of Test Setup

Operation of EUT during testing:



EUT

The sample was placed (0.8m below 1GHz, 1.5m above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages. The worst case is X position



## 2.5. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Trade Mark	Model/Type No.	Specification	Remark
1	D-ONE	XPECE	ONE	N/A	EUT

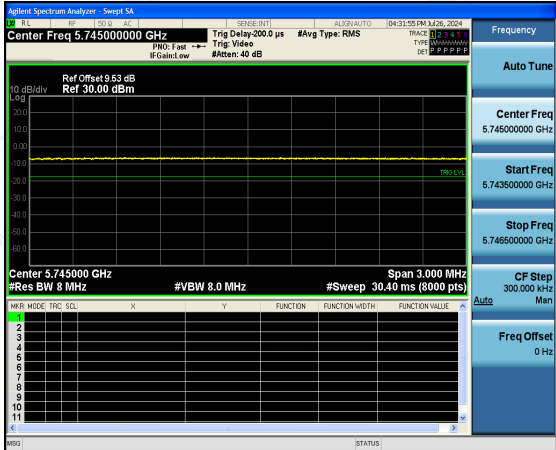
### Note:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.
3. For conducted measurements (Output Power, 20dB and 99% Bandwidth, Power Spectral Density, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.



### 3. General Information

#### 3.1. Test Environment and Mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	56 % RH
Atmospheric Pressure:	1010 mbar
Test Mode:	
Engineering mode:	Keep the EUT in continuous transmitting by select channel and modulations
<p>The sample was placed 0.8m/1.5m for blow/above 1GHz above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y &amp; Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.</p>	
<p>We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:</p> <p>The duty cycle is 100%:</p> 	



## 4. Test Results and Measurement Data

### 4.1. Conducted Emission

#### 4.1.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 C Section 15.207		
<b>Test Method:</b>	ANSI C63.10:2013		
<b>Frequency Range:</b>	150 kHz to 30 MHz		
<b>Receiver setup:</b>	RBW=9 kHz, VBW=30 kHz, Sweep time=auto		
<b>Limits:</b>	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
<b>Test Setup:</b>	<p>Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</p>		
<b>Test Mode:</b>	Tx Mode		
<b>Test Procedure:</b>	<ol style="list-style-type: none"><li>1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</li><li>2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</li><li>3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.</li></ol>		
<b>Test Result:</b>	N/A		





#### 4.1.2. Test Instruments

Conducted Emission Shielding Room Test Site (843)					
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Receiver	R&S	ESR	HKE-005	Feb. 20, 2024	Feb. 19, 2025
LISN	R&S	ENV216	HKE-002	Feb. 20, 2024	Feb. 19, 2025
LISN	R&S	ENV216	HKE-059	Feb. 20, 2024	Feb. 19, 2025
Coax cable (9KHz-30MHz)	Times	381806-00 2	N/A	Feb. 20, 2024	Feb. 19, 2025
EMI Test Software	Tonscend	JS32-CE 2.5.0.6	HKE-081	N/A	N/A
10dB Attenuator	Schwarzbeck	VTSD9561 F	HKE-153	Feb. 20, 2024	Feb. 19, 2025

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



#### 4.1.3. Test data


Not applicable.

Note: EUT power supply by DC Power, so this test item not applicable.



## 4.2. Maximum Conducted Output Power

### 4.2.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 E Section 15.407(a)	
<b>Test Method:</b>	KDB789033 D02 General UNII Test Procedures New Rules v02.r01 Section E	
<b>Limit:</b>	Frequency Band (MHz)	Limit
	5725-5850	1 W
<b>Test Setup:</b>	 <p style="text-align: center;"><b>Power meter</b>                      <b>EUT</b></p>	
<b>Test Mode:</b>	Transmitting mode with modulation	
<b>Test Procedure:</b>	<ol style="list-style-type: none"><li>1. The testing follows the Measurement Procedure of KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section E, 3, a.</li><li>2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.</li><li>3. Set to the maximum power setting and enable the EUT transmit continuously.</li><li>4. Measure the conducted output power and record the results in the test report.</li></ol>	
<b>Test Result:</b>	PASS	
<b>Remark:</b>	Conducted output power= measurement power +10log(1/x) X is duty cycle=1, so 10log(1/1)=0 Conducted output power= measurement power	



#### 4.2.2. Test Instruments

RF Test Room					
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum analyzer	Agilent	N9020A	HKE-025	Feb. 20, 2024	Feb. 19, 2025
Power meter	Agilent	E4419B	HKE-085	Feb. 20, 2024	Feb. 19, 2025
Power Sensor	Agilent	E9300A	HKE-086	Feb. 20, 2024	Feb. 19, 2025
RF cable	Times	1-40G	HKE-034	Feb. 20, 2024	Feb. 19, 2025
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 20, 2024	Feb. 19, 2025
RF Test Software	Tonscend	JS1120-3 Version 3.3.23	HKE-083	N/A	N/A

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



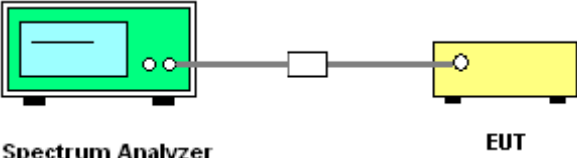
**Test Data**

Frequency (MHz)	Test Channel	Maximum Conducted Output Power (dBm)	FCC Limit (dBm)	Result
5745	CH1	-8.53	30	PASS
5785	CH6	-10.04	30	PASS
5825	CH11	-11.35	30	PASS
Note: 1.The test results including the cable lose.				



### 4.3. 6DB Emission Bandwidth

#### 4.3.1. Test Specification

Test Requirement:	FCC CFR47 Part 15 Section 15.407(e)
Test Method:	KDB789033 D02 General UNII Test Procedures New Rules v01r04 Section C
Limit:	>500kHz
Test Setup:	 <p>Spectrum Analyzer                      EUT</p>
Test Mode:	Transmitting mode with modulation
Test Procedure:	<ol style="list-style-type: none"><li>1. KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section C.</li><li>2. Set to the maximum power setting and enable the EUT transmit continuously.</li><li>3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6dB bandwidth must be greater than 500 kHz.</li><li>4. Measure and record the results in the test report.</li></ol>
Test Result:	PASS

#### 4.3.2. Test Instruments

RF Test Room					
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum analyzer	Agilent	N9020A	HKE-025	Feb. 20, 2024	Feb. 19, 2025
RF cable	Times	1-40G	HKE-034	Feb. 20, 2024	Feb. 19, 2025
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 20, 2024	Feb. 19, 2025
RF Test Software	Tonscend	JS1120-3 Version 3.3.23	HKE-083	N/A	N/A

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



#### 4.3.3. Test data

Frequency (MHz)	Test Channel	6 dB Bandwidth (MHz)	Limit (MHz)	Result
5745	CH1	1.677	0.5	PASS
5785	CH6	1.716	0.5	PASS
5825	CH11	1.809	0.5	PASS

Note: RBW setting for 99% bandwidth is 1%-5% OBW



Test plots as follows:



The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAKE, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com

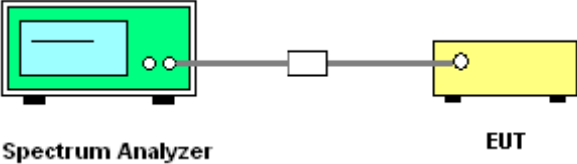
Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China





#### 4.4. 26DB Bandwidth and 99% Occupied Bandwidth

##### 4.4.1. Test Specification

Test Requirement:	47 CFR Part 15C Section 15.407 (a)
Test Method:	KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section C
Limit:	No restriction limits
Test Setup:	 Spectrum Analyzer                      EUT
Test Mode:	Transmitting mode with modulation
Test Procedure:	<ol style="list-style-type: none"><li>1. KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section C.</li><li>2. Set to the maximum power setting and enable the EUT transmit continuously.</li><li>3. Make the measurement with the spectrum analyzer's resolution bandwidth <math>RBW = 1\% \text{ EBW}</math>, <math>VBW \geq 3RBW</math>, In order to make an accurate measurement.</li><li>4. Measure and record the results in the test report.</li></ol>
Test Result:	N/A

##### 4.4.2. Test Instruments

RF Test Room					
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum analyzer	Agilent	N9020A	HKE-025	Feb. 20, 2024	Feb. 19, 2025
RF cable	Times	1-40G	HKE-034	Feb. 20, 2024	Feb. 19, 2025
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 20, 2024	Feb. 19, 2025
RF Test Software	Tonscend	JS1120-3 Version 3.3.23	HKE-083	N/A	N/A

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI). Test Result

##### 4.4.3. Test Result

N/A

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAKE, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

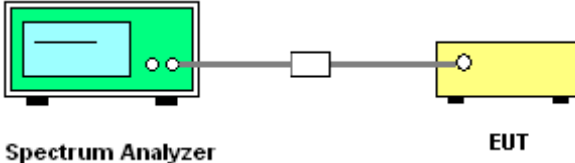
TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : [service@cer-mark.com](mailto:service@cer-mark.com)

Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



## 4.5. Power Spectral Density

### 4.5.1. Test Specification

Test Requirement:	FCC Part15 E Section 15.407 (a)
Test Method:	KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section F
Limit:	$\leq 30.00\text{dBm}/500\text{KHz}$ for Band IV 5725MHz-5850MHz
Test Setup:	 <p>Spectrum Analyzer                      EUT</p>
Test Mode:	Transmitting mode with modulation
Test Procedure:	<ol style="list-style-type: none"><li>1. Set the spectrum analyzer or EMI receiver span to view the entire emission bandwidth.</li><li>2. Set RBW = 510 kHz/1 MHz, VBW <math>\geq 3 \times</math> RBW, Sweep time = Auto, Detector = RMS.</li><li>3. Allow the sweeps to continue until the trace stabilizes.</li><li>4. Use the peak marker function to determine the maximum amplitude level.</li><li>5. The E.I.R.P spectral density used radiated test method. At a test site that has been validated using the procedures of ANSI C63.4 or the latest CISPR 16-1-4 for measurements above 1 GHz, so as to simulate a near free-space environment.</li></ol>
Test Result:	PASS

### 4.5.2. Test Instruments

RF Test Room					
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum analyzer	Agilent	N9020A	HKE-025	Feb. 20, 2024	Feb. 19, 2025
RF cable	Times	1-40G	HKE-034	Feb. 20, 2024	Feb. 19, 2025
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 20, 2024	Feb. 19, 2025
RF Test Software	Tonscend	JS1120-3 Version 3.3.23	HKE-083	N/A	N/A

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



#### 4.5.3. Test data

Frequency (MHz)	Test Channel	Level [dBm/510kHz]	$10\log(500/510)$	Power Spectral Density	Limit (dBm/500kHz)	Result
5745	CH1	-7.62	-0.086	-7.706	30	PASS
5785	CH6	-9.11	-0.086	-9.196	30	PASS
5825	CH11	-10.36	-0.086	-10.446	30	PASS

Note: 1. Power Spectral Density= Level [dBm/510kHz]+ ( $10\log(\text{Limit RBW/Test RBW})$ )  
2. Instrument attenuation and cable loss See test diagram

Test plots as follows:



The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAKE, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com

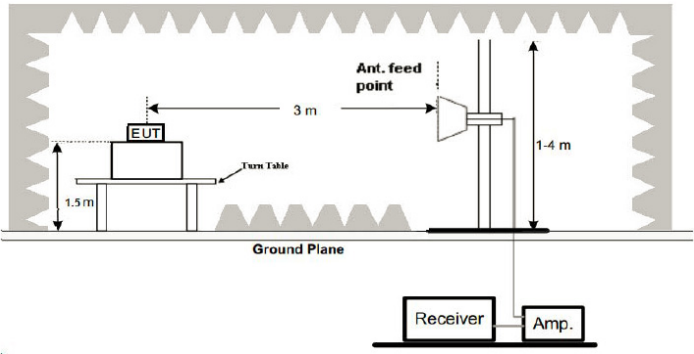
Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China





## 4.6. Band Edge

### 4.6.1. Test Specification

<b>Test Requirement:</b>	FCC CFR47 Part 15E Section 15.407
<b>Test Method:</b>	ANSI C63.10 2013
<b>Limit:</b>	(1)For transmitters operating in the 5.725-5.85 GHz band: (i) All emissions shall be limited to a level of $-27$ dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge. The limit of frequency below 1GHz and which fall in restricted bands should complies 15.209.
<b>Test Setup:</b>	 <p>The diagram illustrates the test setup. An EUT (Equipment Under Test) is placed on a turn table at a height of 1.5 m. The turn table is 3 m away from an antenna feed point. The antenna is mounted on a variable-height antenna tower, with the height ranging from 1 m to 4 m. The antenna is connected to a receiver and an amplifier. The entire setup is on a ground plane.</p>
<b>Test Mode:</b>	Transmitting mode with modulation
<b>Test Procedure:</b>	<ol style="list-style-type: none"><li>1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</li><li>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li><li>3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li><li>4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</li><li>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li></ol>



	6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi peak or average method as specified and then reported in a data sheet.
Test Result:	PASS



## 4.6.2. Test Instruments

## Radiated Emission Test Site (966)

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum analyzer	Agilent	N9020A	HKE-025	Feb. 20, 2024	Feb. 19, 2025
Spectrum analyzer	R&S	FSV3044	HKE-126	Feb. 20, 2024	Feb. 19, 2025
Preamplifier	EMCI	EMC051845S	HKE-006	Feb. 20, 2024	Feb. 19, 2025
Preamplifier	Schwarzbeck	BBV 9743	HKE-016	Feb. 20, 2024	Feb. 19, 2025
Preamplifier	A.H. Systems	SAS-574	HKE-182	Feb. 20, 2024	Feb. 19, 2025
6dB Attenuator	Pasternack	6db	HKE-184	Feb. 20, 2024	Feb. 19, 2025
EMI Test Receiver	Rohde & Schwarz	ESR-7	HKE-010	Feb. 20, 2024	Feb. 19, 2025
Broadband Antenna	Schwarzbeck	VULB9168	HKE-167	Feb. 21, 2024	Feb. 20, 2026
Loop Antenna	COM-POWER	AL-130R	HKE-014	Feb. 21, 2024	Feb. 20, 2026
Horn Antenna	Schwarzbeck	9120D	HKE-013	Feb. 21, 2024	Feb. 20, 2026
EMI Test Software	Tonscend	JS32-RE 5.0.0	HKE-082	N/A	N/A
RSE Test Software	Tonscend	JS36-RSE 5.0.0	HKE-184	N/A	N/A

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

**4.6.3. Test Data**

Operation Mode: TX CH Low (5745MHz)

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
5650	43.29	-2.06	41.23	68.2	-26.97	peak
5700	84.37	-1.96	82.41	105.2	-22.79	peak
5720	85.92	-2.87	83.05	110.8	-27.75	peak
5725	96.71	-2.14	94.57	122.2	-27.63	peak
Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Level - Limit						

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
5650	43.32	-2.06	41.26	68.2	-26.94	peak
5700	82.36	-1.96	80.4	105.2	-24.8	peak
5720	89.75	-2.87	86.88	110.8	-23.92	peak
5725	94.91	-2.14	92.77	122.2	-29.43	peak
Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Level - Limit						





Operation Mode: TX CH High (5825MHz)

Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5850	93.04	-1.97	91.07	122.2	-31.13	
5855	86.56	-2.13	84.43	110.8	-26.37	peak
5875	84.01	-2.65	81.36	105.2	-23.84	peak
5925	48.38	-2.28	46.1	68.2	-22.1	peak
Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Level - Limit						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5850	100.22	-1.97	98.25	122.2	-23.95	
5855	84.06	-2.13	81.93	110.8	-28.87	peak
5875	81.64	-2.65	78.99	105.2	-26.21	peak
5925	51.24	-2.28	48.96	68.2	-19.24	peak
Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Level - Limit						

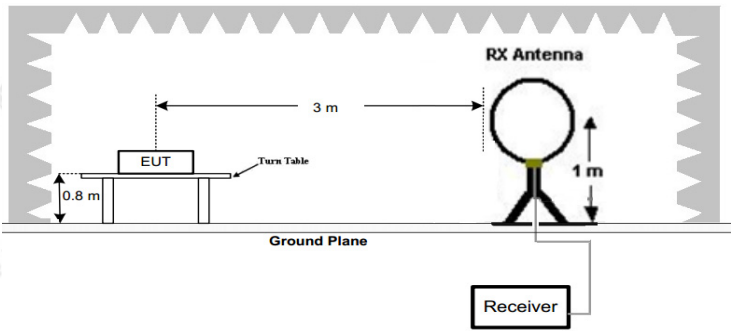
Remark:

1. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.
2. In restricted bands of operation, the spurious emissions below the permissible value more than 20dB.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



## 4.7. Spurious Emission

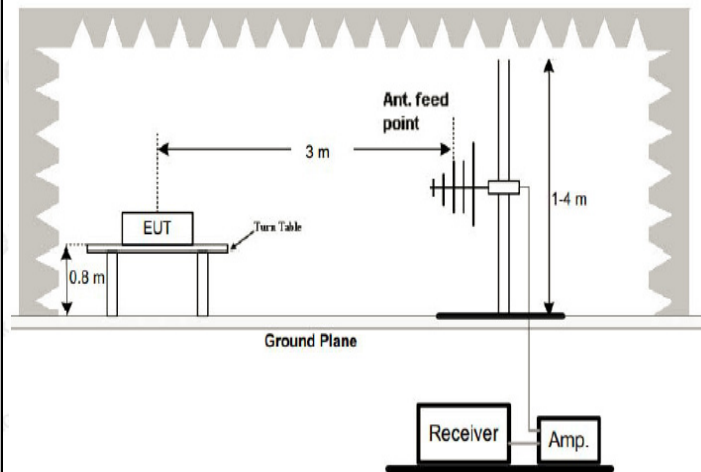
### 4.7.1.1. Test Specification

<b>Test Requirement:</b>	FCC CFR47 Part 15 Section 15.407 & 15.209 & 15.205				
<b>Test Method:</b>	KDB 789033 D02 v02r01				
<b>Frequency Range:</b>	9kHz to 40GHz				
<b>Measurement Distance:</b>	3 m				
<b>Antenna Polarization:</b>	Horizontal & Vertical				
<b>Operation mode:</b>	Transmitting mode with modulation				
<b>Receiver Setup:</b>	Frequency	Detector	RBW	VBW	Remark
	9kHz- 150kHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value
	150kHz- 30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		Peak	1MHz	10Hz	Average Value
<b>Limit:</b>	<p>(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.</p> <p>(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.</p> <p>(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.</p> <p>(4) For transmitters operating in the 5.725-5.85 GHz band:</p> <p>(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.</p> <p>The limit of frequency below 1GHz and which fall in restricted bands should comply 15.209.</p>				
<b>Test setup:</b>	<p>For radiated emissions below 30MHz</p>  <p>30MHz to 1GHz</p>				

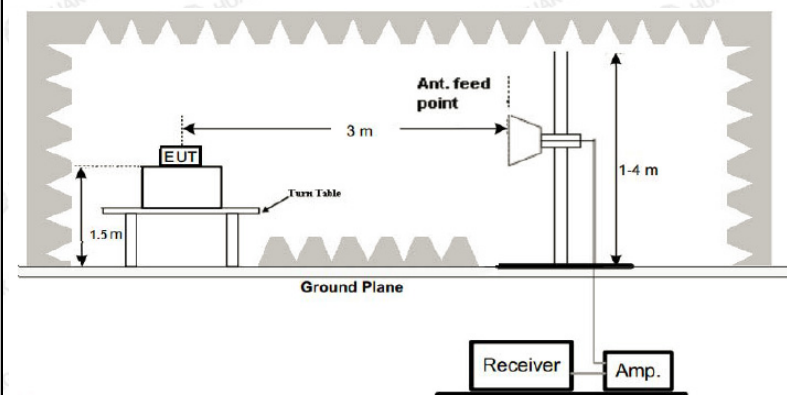
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAKE, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : [service@cer-mark.com](mailto:service@cer-mark.com)

Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



Above 1GHz



### Test Procedure:

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.



	6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would bere-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
Test results:	PASS

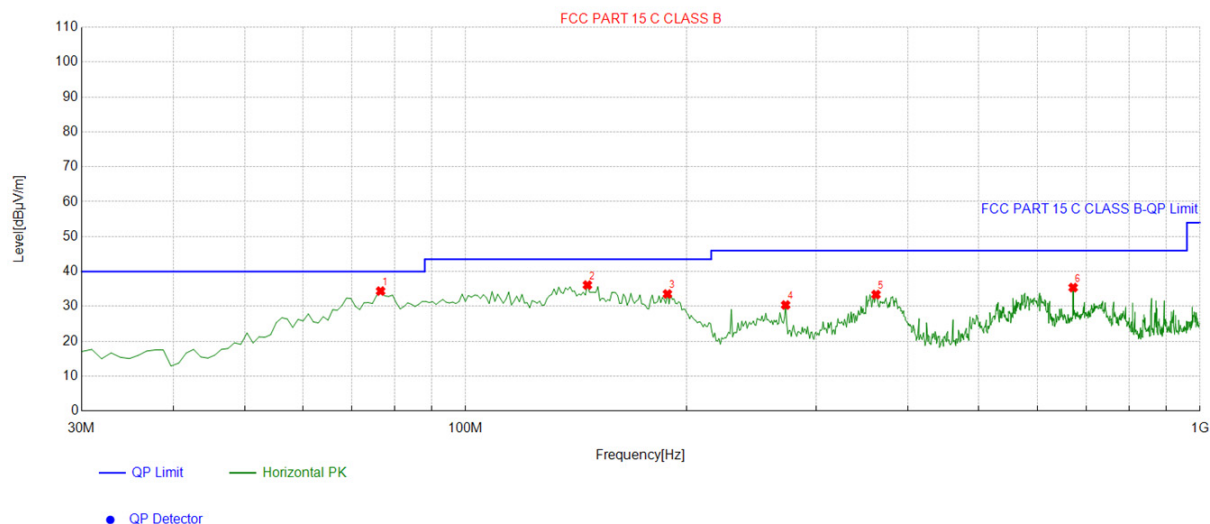




## 4.7.2. Test Data

### Below 1GHz Test Results:

#### Horizontal

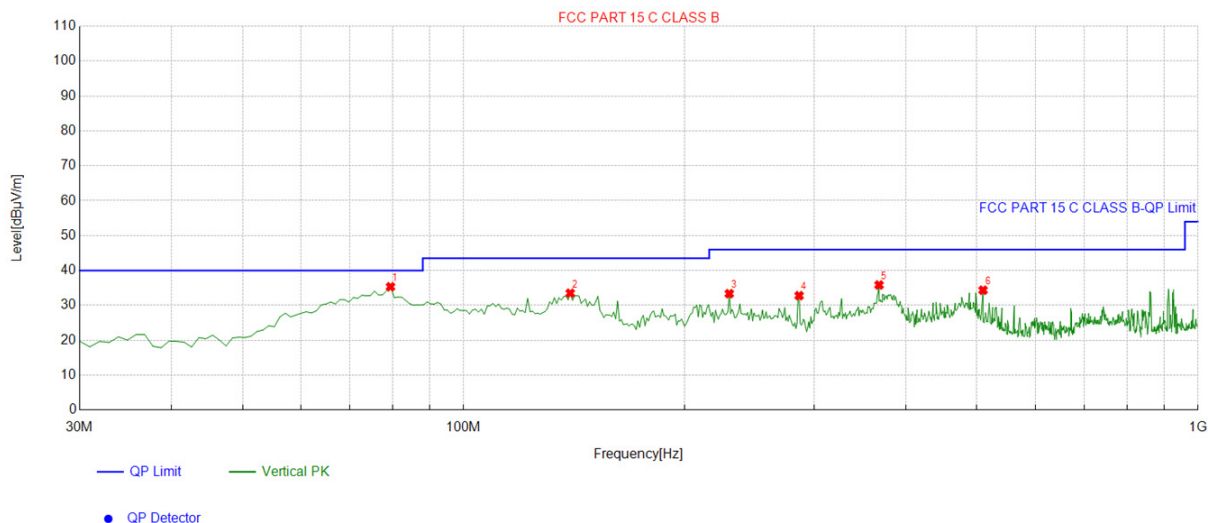


Suspected List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	76.606607	-17.96	52.34	34.38	40.00	5.62	100	172	Horizontal
2	146.51651	-18.23	54.34	36.11	43.50	7.39	100	141	Horizontal
3	188.26826	-15.99	49.54	33.55	43.50	9.95	100	249	Horizontal
4	272.74274	-12.61	43.00	30.39	46.00	15.61	100	122	Horizontal
5	362.07207	-9.74	43.13	33.39	46.00	12.61	100	344	Horizontal
6	671.81181	-4.50	39.89	35.39	46.00	10.61	100	86	Horizontal

Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Limit – Level



## Vertical



Suspected List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	79.51952	-18.01	53.35	35.34	40.00	4.66	100	277	Vertical
2	139.71972	-18.07	51.56	33.49	43.50	10.01	100	299	Vertical
3	230.02002	-13.93	47.29	33.36	46.00	12.64	100	83	Vertical
4	286.33633	-12.36	45.15	32.79	46.00	13.21	100	114	Vertical
5	367.89789	-9.77	45.61	35.84	46.00	10.16	100	184	Vertical
6	509.65966	-8.34	42.69	34.35	46.00	11.65	100	118	Vertical

Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Limit – Level

## Harmonics and Spurious Emissions

## Frequency Range (9 kHz-30MHz)

Frequency (MHz)	Level@3m (dBμV/m)	Limit@3m (dBμV/m)
--	--	--
--	--	--
--	--	--
--	--	--

**Note:** 1. Emission Level=Reading+ Cable loss-Antenna factor-Amp factor

2. The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement



## Above 1GHz

## RADIATED EMISSION TEST

LOW CH 1 /5745 MHz

Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
3368	53.24	-4.59	48.65	68.2	-19.55	peak
11096	52.63	4.21	56.84	74	-17.16	peak
11096	40.21	4.21	44.42	54	-9.58	AVG
Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Level - Limit						

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
3368	53.18	-4.59	48.59	68.2	-19.61	peak
11096	51.13	4.21	55.34	74	-18.66	peak
11096	35.78	4.21	39.99	54	-14.01	AVG
Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Level - Limit						



MID CH6 /5785 MHz

Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
3172	53.83	-4.59	49.24	68.2	-18.96	peak
10523	51.28	4.21	55.49	68.2	-12.71	peak
Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Level - Limit						

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
3172	55.65	-4.59	51.06	68.2	-17.14	peak
10523	51.47	4.21	55.68	68.2	-12.52	peak
Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Level - Limit						





HIGH CH 11 /5825 MHz

Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2705	55.48	-4.59	50.89	74	-23.11	
2705	44.62	-4.59	40.03	54	-13.97	AVG
11717	53.23	4.84	58.07	74	-15.93	peak
11717	41.71	4.84	46.55	54	-7.45	AVG
Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Level - Limit						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2705	54.53	-4.59	49.94	74	-24.06	
2705	42.91	-4.59	38.32	54	-15.68	AVG
11717	51.76	4.84	56.6	74	-17.4	peak
11717	41.81	4.84	46.65	54	-7.35	AVG
Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Level - Limit						

Remark:

- (1) Measuring frequencies from 1 GHz to the 40 GHz.
- (2) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (3) \* denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (4) The emissions are attenuated more than 20dB below the permissible limits are not record in the report.
- (5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.
- (6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54 dBuV/m(AV Limit), the Average Detected not need to completed.



## 4.8. Frequency Stability Measurement

### 4.8.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 Section 15.407(g)
<b>Test Method:</b>	ANSI C63.10: 2013
<b>Limit:</b>	The frequency tolerance shall be maintained within the band of operation frequency over a temperature variation of 0 degrees to 35 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.
<b>Test Setup:</b>	<pre>graph LR; SA[Spectrum Analyzer] --- EUT[EUT]; EUT --- TCh[Temperature Chamber]; TCh --- P[AC/DC Power supply];</pre>
<b>Test Procedure:</b>	The EUT was placed inside the environmental test chamber and powered by nominal AC/DC voltage. b. Turn the EUT on and couple its output to a spectrum analyzer. c. Turn the EUT off and set the chamber to the highest temperature specified. d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature. f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.
<b>Test Result:</b>	PASS
<b>Remark:</b>	N/A

**Test Result as follows:**

Mode	Voltage (V)	FHL (5745MHz)	Deviation (KHz)	FHH (5825MHz)	Deviation (KHz)
5.8G	18.87V	5744.996	-4	5824.981	-19
	22.20V	5744.974	-26	5825.022	22
	25.53V	5744.985	-15	5824.967	-33

Mode	Temperature (°C)	FHL (5745MHz)	Deviation (KHz)	FHH (5825MHz)	Deviation (KHz)
5.8G	-30	5745.016	16	5825.017	17
	-20	5745.004	4	5825.026	26
	-10	5744.988	-12	5824.988	-12
	0	5744.991	-9	5824.969	-31
	10	5744.969	-31	5825.012	12
	20	5744.979	-21	5824.979	-21
	30	5745.006	6	5825.015	15
	40	5744.981	-19	5824.984	-16
	50	5744.977	-23	5825.011	11





## 4.9. 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. And according to FCC 47 CFR Section 15.249, if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

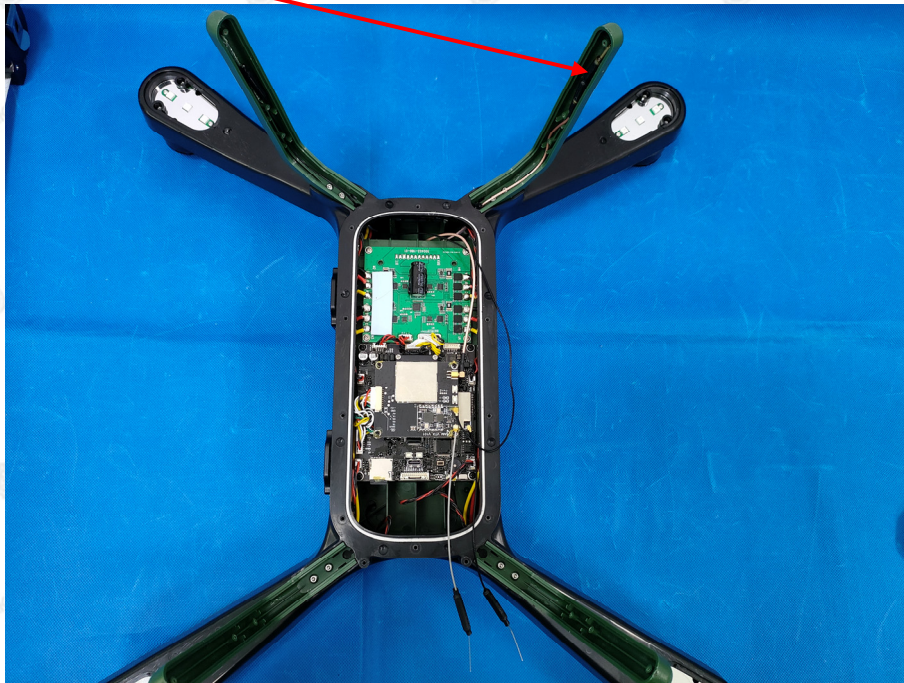
### Refer to statement below for compliance.

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 antenna used in this product is a Internal Antenna, need professional installation. It conforms to the standard requirements. The directional gains of antenna used for transmitting is 1.76dBi.

### Antenna

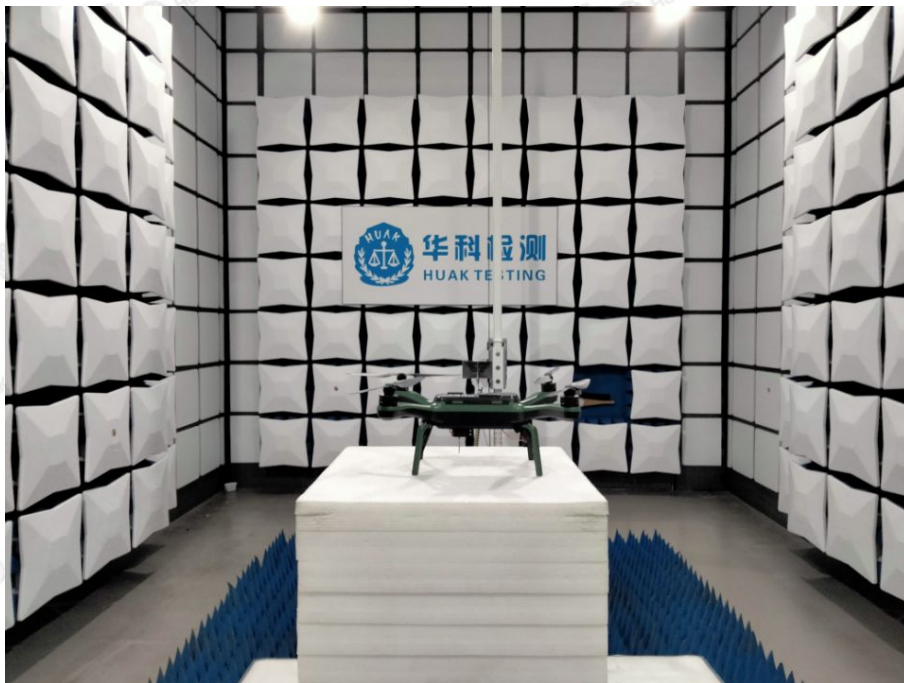
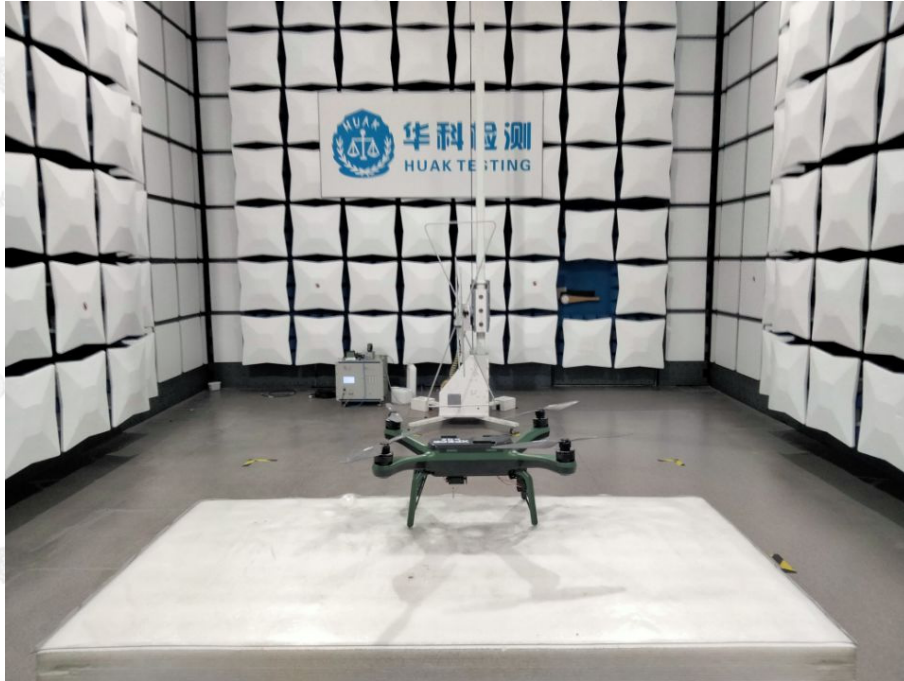






## 5. Photographs of Test Setup

### Radiated Emission





## 6. Photos of the EUT

Reference to the report: ANNEX A of external photos and ANNEX B of internal photos

-----End of test report-----