



# RADIO TEST REPORT

For

**KHADAS TECHNOLOGY CO., LTD**

**VIM1S**

**Test Model: VIM1S**

Prepared for : KHADAS TECHNOLOGY CO., LTD  
Address : 2709 QIANCHENG CENTER, HAICHENG ROAD,  
XIXIANG STREET, BAO'AN DISTRICT, SHENZHEN,  
CHINA. 518101

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.  
Address : Room 101, 201, Building A and Room 301, Building C,  
Juji Industrial Park, Yabianxueziwei, Shajing Street,  
Bao'an District, Shenzhen, Guangdong, China

Tel : (+86)755-82591330  
Fax : (+86)755-82591332  
Web : www.LCS-cert.com  
Mail : webmaster@LCS-cert.com

Date of receipt of test sample : August 27, 2022  
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Sample No. : A082522150-1, A082522150-2  
Serial number : Prototype  
Date of Test : August 27, 2022 ~ September 19, 2022  
Date of Report : September 19, 2022





<b>RADIO TEST REPORT</b>	
<b>MIC Notice No.88 Appendix No.43</b>	
Second-Generation Low-Power Data Communication System/Wireless LAN System	
<b>Report Reference No.</b> .....	<b>LCSA082522150EC</b>
<b>Date of Issue</b> .....	September 19, 2022
<b>Testing Laboratory Name</b> .....	<b>Shenzhen LCS Compliance Testing Laboratory Ltd.</b>
<b>Address</b> .....	Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
<b>Testing Location/ Procedure</b> ...	Full application of Harmonised standards <input checked="" type="checkbox"/> Partial application of Harmonised standards <input type="checkbox"/> Other standard testing method <input type="checkbox"/>
<b>Applicant's Name</b> .....	<b>KHADAS TECHNOLOGY CO., LTD</b>
<b>Address</b> .....	2709 QIANCHENG CENTER, HAICHENG ROAD, XIXIANG STREET, BAO'AN DISTRICT, SHENZHEN, CHINA. 518101
<b>Test Specification</b>	
<b>Standard</b> .....	MIC Notice No.88 Appendix No.43
<b>Test Report Form No.</b> .....	LCSEMC-1.0
<b>TRF Originator</b> .....	Shenzhen LCS Compliance Testing Laboratory Ltd.
<b>Master TRF</b> .....	Dated 2011-03
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<b>Test Item Description.</b> .....	<b>VIM1S</b>
<b>Trade Mark</b> .....	Khadas
<b>Test Model</b> .....	VIM1S
<b>Ratings</b> .....	Type-C Power Input: DC 5V, 2A USB1 Output: DC 5V, 500mA/ USB2 Output: DC 5V, 750mA
<b>Result</b> .....	<b>Positive</b>

Compiled by:

Supervised by:

Approved by:

Vera Deng/ Administrator

Cary Luo/ Technique principal

Gavin Liang/ Manager



Shenzhen LCS Compliance Testing Laboratory Ltd.  
 Add: Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China  
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# RADIO -- TEST REPORT

<b>Test Report No. : LCSA082522150EC</b>	<u>September 19, 2022</u> Date of issue
--	--

Test Model .....	: VIM1S
EUT.....	: VIM1S
<b>Applicant.....</b>	<b>: KHADAS TECHNOLOGY CO., LTD</b>
Address.....	: 2709 QIANCHENG CENTER, HAICHENG ROAD, XIXIANG STREET, BAO'AN DISTRICT, SHENZHEN, CHINA. 518101
Telephone.....	: /
Fax.....	: /
<b>Manufacturer.....</b>	<b>: KHADAS TECHNOLOGY CO., LTD</b>
Address.....	: 2709 QIANCHENG CENTER, HAICHENG ROAD, XIXIANG STREET, BAO'AN DISTRICT, SHENZHEN, CHINA. 518101
Telephone.....	: /
Fax.....	: /
<b>Factory.....</b>	<b>: KHADAS TECHNOLOGY CO., LTD</b>
Address.....	: 2709 QIANCHENG CENTER, HAICHENG ROAD, XIXIANG STREET, BAO'AN DISTRICT, SHENZHEN, CHINA. 518101
Telephone.....	: /
Fax.....	: /

<b>Test Result</b>	<b>Positive</b>
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The test report merely corresponds to the test sample.  
 It is not permitted to copy extracts of these test result without the written permission of the test laboratory.



### Revision History

Report Version	Issue Date	Revision Content	Revised By
000	September 19, 2022	Initial Issue	---



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Bao'an District, Shenzhen, Guangdong, China  
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## 1. GENERAL INFORMATION

### 1.1. Description of Device (EUT)

EUT	: VIM1S
Test Model	: VIM1S
Power Supply	: Type-C Power Input: DC 5V, 2A USB1 Output: DC 5V, 500mA/ USB2 Output: DC 5V, 750mA
Hardware Version	: V11
Software Version	: OOWOW V1.0

#### Bluetooth

Frequency Range	: 2402-2480MHz for Bluetooth (79 channels for Bluetooth V5.0(BDR/EDR) Channel Frequency=2402+(K-1), K=1, 2, 3 .....79 40 channels for Bluetooth V5.0(BT LE/BT 2LE) Channel Frequency=2402+2(K-1), K=1, 2, 3 .....40
Declared Antenna Power	: Bluetooth V5.0(BDR/EDR): 0.02mW/MHz Bluetooth V5.0(BT LE/BT 2LE): 1.0mW
Modulation Technology	: Bluetooth V5.0(BDR/EDR): GFSK, $\pi/4$ -DQPSK, 8-DPSK Bluetooth V5.0(BT LE/BT 2LE): GFSK
Data Rate	: Bluetooth V5.0(BDR/EDR): 1/2/3Mbps Bluetooth V5.0(BT LE/BT 2LE): 1/2Mbps
Antenna Description	: FPC Antenna, 2.47dBi(Max.)

#### WIFI (2.4G Band)

Frequency Range	: 2412-2472MHz for 802.11b/g/n(HT20)
Channel Spacing	: 5MHz
Channel Number	: 13 Channel for 802.11b/g/n(HT20)(2412~2472MHz)
Modulation Type	: 802.11b: DSSS; 802.11g/n: OFDM
Declared Antenna Power	: 802.11b: 1.0mW/MHz 802.11g: 1.0mW/MHz 802.11n(HT20): 0.5mW/MHz
Antenna Description	: FPC Antenna, 2.47dBi (max.)

#### WIFI (5.2G Band)

Frequency Range	: 5180-5240MHz
Channel Number	: 4 Channel for 20MHz bandwidth(5180-5240MHz) 2 Channel for 40MHz bandwidth(5190-5230MHz) 1 Channel for 80MHz bandwidth(5210MHz)
Modulation Type	: 802.11a/n/ac: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)



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Declared Antenna Power : 802.11a: 0.5mW/MHz  
802.11n(HT20): 0.5mW/MHz  
802.11n(HT40): 0.05mW/MHz  
802.11ac(VHT20): 0.5mW/MHz  
802.11ac(VHT40): 0.05mW/MHz  
802.11ac(VHT80): 0.01mW/MHz  
Antenna Description : FPC Antenna, 1.71dBi(Max.)





## 1.2. Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	Certificate
---	ADAPTER	RCL-PD30WL U50K	---	---

Note: Auxiliary equipment is provided by the laboratory.

## 1.3. External I/O Cable

I/O Port Description	Quantity	Cable
Type-C Port	1	N/A
USB Port	2	N/A
HDMI Port	1	N/A
LAN Port	1	N/A

## 1.4. Description of Test Facility

FCC Registration Number is 254912.

NVLAP Accreditation Code is 600167-0.

FCC Designation Number is CN5024.

CAB identifier is CN0071.

CNAS Registration Number is L4595.

Industry Canada Registration Number is 9642A.

## 1.5. Test Conditions

<b>Temperature Range</b>	:	21-25°C
<b>Humidity Range</b>	:	45-85%
<b>Pressure Range</b>	:	86-106kPa

## 1.6. Frequency of Channels

### 802.11b/g/n (HT20)

Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432	12	2467
6	2437	13	2472
7	2442	--	--



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## 2. TEST METHODOLOGY

### 2.1. EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of ARIB STD-T66 Version 3.7/2014.

### 2.2. Measurement Uncertainty

Test Item	MU	Remark
Bandwidth	+/- 0.2 E-6	/
Antenna Power	+/-0.33dB	/
Frequency Tolerance	+/- 0.3 E-6	/
Conducted spurious emission	+/-0.13dB	/
DC Power	+/-1%	/

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

### 2.3. Table for Parameters of Test Software Setting

During testing, Channel & Power Controlling commands provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Power Parameters:

Test Method	FCC Test Tool		
	2412MHz	2442MHz	2472MHz
Frequency	2412MHz	2442MHz	2472MHz
802.11b (20MHz)	Default	Default	Default
802.11g (20MHz)	Default	Default	Default
802.11n (20MHz)	Default	Default	Default

\*\*\*Note: The output power level of the software was chosen as default only.



## 2.4. Description of Test Modes

Tested mode, channel, and data rate information				
Mode	Preliminary Test Data Rate (Mbps)	Final Test Data Rate (Mbps) (see Note)	Channel	Frequency (MHz)
802.11b	11/1	11	Low :CH1	2412
	11/1	11	Middle: CH7	2442
	11/1	11	High: CH13	2472
802.11g	54/6	6	Low :CH1	2412
	54/6	6	Middle: CH7	2442
	54/6	6	High: CH13	2472
802.11n HT20	65.0/6.5	6.5	Low :CH1	2412
	65.0/6.5	6.5	Middle: CH7	2442
	65.0/6.5	6.5	High: CH13	2472

Note: According exploratory test, EUT will have maximum output power in those data rate, so those data rate were used for all test.

## 2.5. Test Voltage

### POWER SUPPLY VOLTAGE FLUCTUATION TEST

Voltage Fluctuation Test	Normal Voltage	High Voltage +10% of Normal Voltage	Low Voltage -10% of Normal Voltage
Input To EUT	DC 5V	DC 5.5V	DC 4.5V
Output To RF Module	DC 3.3V	DC 3.3V	DC 3.3V
Voltage Variation (%)	--	--	--

Note: As the EUT was powered by DC 5V, and with the voltage stabilizing circuit used, the chip voltage received floating not exceed  $\pm 1\%$  of nominal condition when working on extreme voltage, so all test performed at nominal voltage only.





### 3. SYSTEM TEST CONFIGURATION

#### 3.1. Justification

The system was configured for testing in engineering mode.

#### 3.2. EUT Exercise Software

N/A.

#### 3.3. Special Accessories

N/A.

#### 3.4. Block Diagram/Schematics

Please refer to the related document.

#### 3.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.





## 4. SUMMARY OF TEST RESULTS

MIC Notice No.88 Appendix No.43 Article 2 Paragraph 1 Item 19		
Clause	Description of Test (Transmitter Parameters)	Result
3	Frequency Tolerance	PASS
6	Antenna Power	PASS
6	Tolerances for Antenna Power	PASS
4	Transmission Rate	PASS
4	Occupied Frequency Bandwidth	PASS
4	Spread Bandwidth	PASS
5	Spurious Emissions	PASS
10	Transmission Antenna Gain (EIRP Antenna Power)	PASS
11	Transmission Radiated Angle Width (3dB Beam width)	N/A
12	Interference prevention function	PASS
8	Carrier Sensing function	N/A
8	Number of carrier	PASS
Receiver Parameters		
7	Secondary Radiated Emissions	PASS
<p><i>Note: (1) N/A is an abbreviation for Not Applicable.</i>  <i>(2) N/T means this test item is not tested.</i>  <i>(3) This is a 2.4G WIFI RF test report for VIM1S .</i></p>		



## 5. TEST RESULT

### 5.1. Frequency Tolerance

#### 5.1.1. Standard Applicable

Tolerance of frequency shall be  $\pm 50 \times 10^{-6}$ .

#### 5.1.2. Measuring Instruments

Please refer to section 6 of equipments list in this report.

#### 5.1.3. Test Procedures

- a. Set EUT work in test mode as described in clause 2.4.
- b. Connected the EUT's antenna port to the Spectrum Analyzer by suitable attenuator, set the Spectrum Analyzer as below:

Centre Frequency: The centre frequency of the channel under test.

Resolution BW: 10 KHz.

Video BW: 10 KHz.

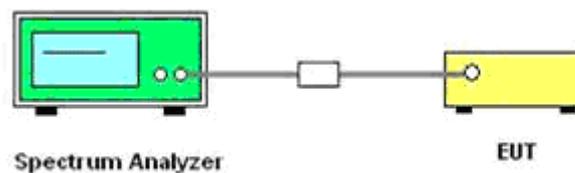
Span: 1MHz.

Detector: Peak.

Trace Mode: Max Hold.

- c. When the trace is complete, find the peak value of the power envelope and record.

#### 5.1.4. Test Setup Layout



#### 5.1.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

#### 5.1.6. Test Result

**Please refer to the Appendix C.1 for 2.4G WIFI RF Test Data.**





## 5.2. Antenna Power

### 5.2.1. Standard Applicable

Type	Limit
DTS	10mW
OFDM OBW<26MHz, DS	10mW/MHz
OFDM OBW 26-40MHz	5mW/MHz
Tolerance	+20%,-80%

### Upper Limit of EIRP for Modulation Systems

Modulation system	Frequency band used	Antenna power (max.)	EIRP (max.)	
			Omnidirectional case	Directional case
DS, OFDM	2,400 - 2,483.5 MHz	10 mW/MHz	12.14 dBm/MHz	22.14 dBm/MHz
FH, DS-FH FH-OFDM	2,400 - 2,483.5 MHz	3 mW/MHz	6.91 dBm/MHz	16.91 dBm/MHz
	Excluding 2,427 - 2,470.75 MHz	10 mW/MHz	12.14 dBm/MHz	22.14 dBm/MHz
Other than the above	2,400 - 2,483.5 MHz	10 mW	12.14 dBm	22.14 dBm

### 5.2.2. Measuring Instruments

Please refer to section 6 of equipments list in this report.

### 5.2.3. Test Procedures

- a. Set EUT work in test mode as described in clause 2.4.
- b. Connected the EUT's antenna port to the Spectrum Analyzer by suitable attenuator, set the Spectrum Analyzer as below:

Centre Frequency: The centre frequency of the channel under test.

Resolution BW: 1MHz.

Video BW: 1MHz.

Span: Wide enough to cover the complete power envelope of the signal of the EUT.

Trigger condition: Free run.

Sweep mode: Continuous sweeping.

Detector: Peak.

Trace Mode: Max Hold.

- c. When the trace is complete, find the peak value of the power envelope and record.



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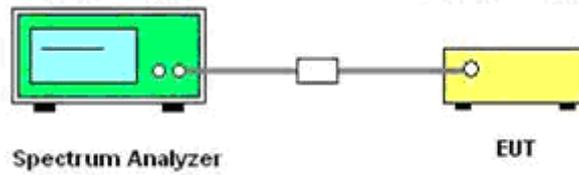
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#### 5.2.4. Test Setup



#### 5.2.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

#### 5.2.6. Test Result

**Please refer to the Appendix C.2 for 2.4G WIFI RF Test Data.**



### 5.3. Occupied Frequency Bandwidth

#### 5.3.1. Standard Applicable

Permissible value for occupied bandwidth using the FH system, a hybrid system combining DS and FH systems, or a hybrid system combining FH and OFDM systems shall be 83.5 MHz or less, while necessary bandwidth (minimum occupied bandwidth sufficient to ensure information transmission of required quality at a required transmission rate for the system used under specified conditions for a given emission type) using a system other than any of the above shall be 26 MHz or less.

#### 5.3.2. Measuring Instruments

Please refer to section 6 of equipments list in this report.

#### 5.3.3. Test Procedures

- a. Set EUT work in test mode as described in clause 2.4.
- b. Connected the EUT's antenna port to the Spectrum Analyzer by suitable attenuator, set the Spectrum Analyzer as below:

Centre Frequency: The centre frequency of the channel under test.

RBW/VBW= 300 KHz/300KHz for WIFI.

Span: Wide enough to cover the complete power envelope of the signal of the EUT.

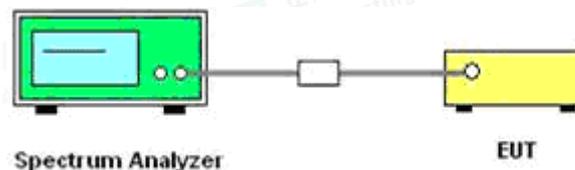
Sweep mode: Continuous sweeping.

Detector: Peak.

Trace Mode: Max Hold.

- c. When the trace is complete, measure the occupied bandwidth (99% bandwidth) with spectrum analyzer's bandwidth measure function.

#### 5.3.4. Test Setup Layout



#### 5.3.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

#### 5.3.6. Test Result of 99% Spectrum Bandwidth

**Please refer to the Appendix C.3 for 2.4G WIFI RF Test Data.**



## 5.4. Spread Bandwidth

### 5.4.1. Standard Applicable

In spread spectrum systems, spread bandwidth (which refers to a frequency bandwidth with an upper limit and lower limit such that each of the mean powers radiated above the upper frequency limit and below the lower frequency limit is equal to 5 % of the total mean power radiated; this also applies hereafter) shall be 500 kHz or more.

### 5.4.2. Measuring Instruments

Please refer to section 6 of equipments list in this report.

### 5.4.3. Test Procedures

- a. Set EUT work in test mode as described in clause 2.4.
- b. Connected the EUT's antenna port to the Spectrum Analyzer by suitable attenuator, set the Spectrum Analyzer as below:

Centre Frequency: The centre frequency of the channel under test.

RBW/VBW= 300 KHz/300KHz for WIFI.

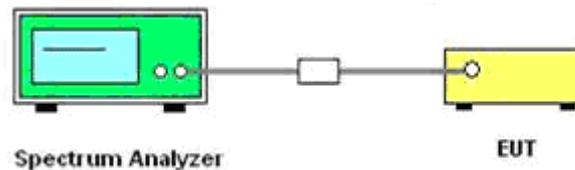
Span: Wide enough to cover the complete power envelope of the signal of the EUT.

Detector: Peak.

Trace Mode: Max Hold.

- c. When the trace is complete, measure the occupied bandwidth (90% bandwidth) with spectrum analyzer's bandwidth measure function.

### 5.4.4. Test Setup Layout



### 5.4.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

### 5.4.6. Test Result of 90% Occupied Bandwidth.

**Please refer to the Appendix C.4 for 2.4G WIFI RF Test Data.**



## 5.5. Transmitter Spurious Emissions (conducted)

### 5.5.1. Standard Applicable

Permissible mean power of spurious emission of each frequency supplied to a feeder, that is, mean power of spurious emission in the 1 MHz bandwidth at frequency  $f$  other than frequency band used shall be as follows:

#### STD-T66

- |  |                      |
|--|----------------------|
| a. 30MHz - 1,000MHz                                | 0.25 $\mu$ W or less |
| b. 1,000MHz - 2,387MHz                             | 2.5 $\mu$ W or less  |
| c. 2,387MHz - 2,400MHz and 2,483.5MHz - 2,496.5MHz | 25 $\mu$ W or less   |
| d. 2,496.5MHz - 13GHz                              | 2.5 $\mu$ W or less  |

#### STD-T33

- |   |                     |
|---|---------------------|
| a. $2,458\text{MHz} \leq f \leq 2,471\text{MHz}$ and $2,497\text{MHz} < f \leq 2,510\text{MHz}$<br>less | 25 $\mu$ W or less  |
| b. $2,458\text{MHz} > f$ and $2,510\text{MHz} < f$  | 2.5 $\mu$ W or less |

### 5.5.2. Measuring Instruments

Please refer to section 6 of equipments list in this report.

### 5.5.3. Test Procedures

- Set EUT work in test mode as described in clause 2.4.
- Connected the EUT's antenna port to the Spectrum Analyzer by suitable attenuator, set the Spectrum Analyzer as below:

Below 1GHz: RBW/VBW= 100KHz/ 100KHz

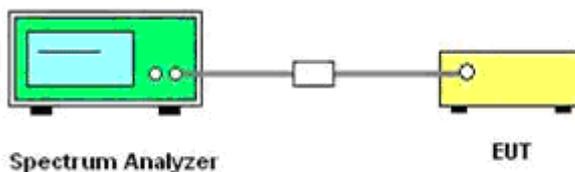
Above 1GHz: RBW/VBW= 1MHz / 1MHz.

Detector: Peak.

Trace Mode: Max Hold.

- All the emissions from 30MHz to 13GHz were measured and record.

### 5.5.4. Test Setup Layout





### 5.5.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

### 5.5.6. Test Results

**Please refer to the Appendix C.5 for 2.4G WIFI RF Test Data.**

-Note:SA set to from 2.4965GHz to 13GHz, plot shows from 2.497GHz to 13GHz as of SA's default format.



## 5.6. Carrier sensing function

### 5.6.1. Standard Applicable

Item	Limits
Carrier Sense	Good – EUT stop RF transmission signal after carrier inject to EUT. (On $22.79+Gr-20*\log(f)$ [dBm] (Gr: dBi; f: MHz) or 100mV/m)

### 5.6.2. Measuring Instruments

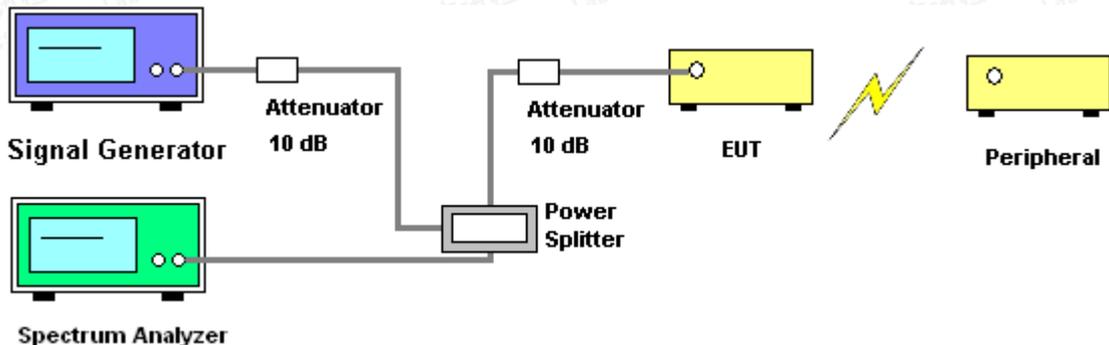
Please refer to section 6 of equipments list in this report. The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
RB / VB	1 MHz
Span	0 MHz
Sweep	Continuous
Detector	Peak
Trigger mode	Video

### 5.6.3. Test Procedures

- SSG adjusted the frequency as same as the EUT transmitted signal and emitted the absence of modulation from SSG and power level is (On  $22.79+Gr-20*\log(f)$ [dBm] (Gr: dBi; f: MHz). Then turn off the RF signal of SSG.
- EUT have transmitted the maximum modulation signal and fixed channelize.
- Setting of SA is following as: RB:1MHz / VB:1MHz / SPAN: 50MHz / AT: 10dB / Ref: 0dBm / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak.
- SSG RF Signal On.
- EUT shall be stop the transmitted any signal and SSG RF Signal Off. Then EUT will be continuous transmitted signal.

### 5.6.4. Test Setup Layout





### 5.6.5. EUT Operation during Test

The EUT was programmed to be in normal transmitting mode.

### 5.6.6. Test Result

Not Applicable

Note: 1.this test item only applies to those mode with bandwidth greater than 20MHz.



## 5.7. Interference prevention function

### 5.7.1. Standard Applicable

Item	Limits
Identification code	≧ 48 bits

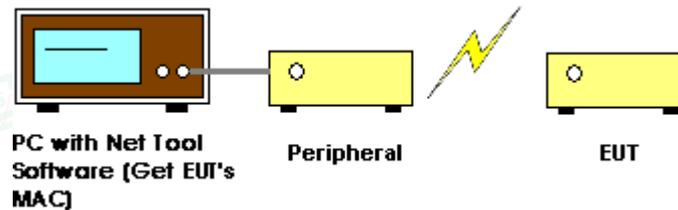
### 5.7.2. Measuring ID Code Software

PC with NetTool	Setting
MAC IP List	MAC Scan

### 5.7.3. Test Procedures

- In the case that the EUT has the function of automatically transmitting the identification code: a. Transmit the predetermined identification codes from EUT. b. Check the transmitted identification codes with the demodulator.
- In the case of receiving the identification code: a. Transmit the predetermined identification codes from the counterpart. b. Check if communication is normal. c. Transmit the other signals than predetermined ID codes from the counterpart. d. check if the EUT stops the transmission, or if it displays that identification codes are different from the predetermined ones.

### 5.7.4. Test Setup Layout



### 5.7.5. EUT Operation during Test

The EUT was programmed to be in normal transmitting mode.

### 5.7.6. Test Result

MAC Address: 60:A7:E1:DB:11B:2B

Complies.



## 5.8. Secondary Radiated Emissions

### 5.8.1. Standard Applicable

The limit on secondary emissions radiated from the receiving equipment within which the function of other radio equipment will not be impaired shall be, in terms of the power of a dummy antenna circuit that has the same electrical constant as the receiving antenna, 4nW or less at a frequency below 1 GHz and 20 nW or less at a frequency of 1 GHz or higher as measured using the circuit

### 5.8.2. Measuring Instruments

Please refer to section 6 of equipments list in this report.

### 5.8.3. Test Procedures

- a. Set EUT work in test mode as described in clause 2.4.
- b. Connected the EUT's antenna port to the Spectrum Analyzer by suitable attenuator, set the Spectrum Analyzer as below:

Resolution BW: 100 KHz for frequency below 1GHz and

1MHz for frequency above 1GHz

Video BW: 100 KHz for frequency below 1GHz and

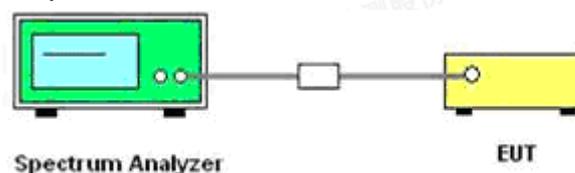
1MHz for frequency above 1GHz

Detector: Peak.

Trace Mode: Max Hold.

- c. All the emissions from 30MHz to 13GHz were measured and record.

### 5.8.4. Test Setup



### 5.8.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

### 5.8.6. Test Results

**Please refer to the Appendix C.6 for 2.4G WIFI RF Test Data.**





## 6. PHOTOGRAPHS OF TEST SETUP

Please refer to separated files Appendix E for Test Setup Photographs

## 7. EXTERNAL PHOTOGRAPHS OF THE EUT

Please refer to separated files Appendix F for External Photos of EUT

## 8. INTERNAL PHOTOGRAPHS OF THE EUT

Please refer to separated files Appendix G for Internal Photos of EUT

## 9. LIST OF MEASURING EQUIPMENTS

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Power Meter	Rohde & Schwarz China	NRVS	100444	2022-06-16	2023-06-15
2	Power Sensor	Rohde & Schwarz China	NRV-Z81	100458	2022-06-16	2023-06-15
3	Power Sensor	Rohde & Schwarz China	NRV-Z32	10057	2022-06-16	2023-06-15
4	MXA Signal Analyzer	Agilent Technologies Inc.	N9020A	MY49100060	2021-11-15	2022-11-14
5	DC Power Supply	Agilent Technologies Inc.	E3642A	N/A	2021-11-15	2022-11-14
6	Oscilloscope	Tektronix	46084A/4609A	140920	2022-08-16	2023-08-15
7	Signal Generator	Agilent	N5182A	MY47071151	2022-06-16	2023-06-15

-----THE END OF REPORT-----

