

# TEST REPORT

**Product Name** : **WIFI Module**  
**Model Number** : **AL-7651B-WG-A, WF-M651-UWD1, WF-M651-UWD2**  
**FCC ID** : **2AOKI-AL7651B**

Prepared for : Sichuan AI-Link Technology Co., Ltd.  
Address : Anzhou, Industrial park, Mianyang, Sichuan, China

Prepared by : EMTEK (SHENZHEN) CO., LTD.  
Address : Building 69, Majialong Industry Zone, Nanshan District,  
Shenzhen, Guangdong, China

Tel: (0755) 26954280  
Fax: (0755) 26954282

Report Number : ENS2205050036W00103R  
Date(s) of Tests : May 6, 2022 to May 31, 2022  
Date of issue : June 6, 2022

## TABLE OF CONTENTS

|   |           |
|---|-----------|
| <b>1. TEST RESULT CERTIFICATION.....</b>                | <b>3</b>  |
| <b>2. EUT DESCRIPTION.....</b>                          | <b>5</b>  |
| <b>3. SUMMARY OF TEST RESULT.....</b>                   | <b>7</b>  |
| <b>4. TEST METHODOLOGY.....</b>                         | <b>8</b>  |
| 4.1 GENERAL DESCRIPTION OF APPLIED STANDARDS.....       | 8         |
| 4.2 MEASUREMENT EQUIPMENT USED.....                     | 8         |
| 4.3 DESCRIPTION OF TEST MODES.....                      | 9         |
| 4.4 TEST SOFTWARE.....                                  | 13        |
| <b>5. FACILITIES AND ACCREDITATIONS.....</b>            | <b>14</b> |
| 5.1 FACILITIES.....                                     | 14        |
| 5.2 EQUIPMENT.....                                      | 14        |
| 5.3 LABORATORY ACCREDITATIONS AND LISTINGS.....         | 14        |
| <b>6. SETUP OF EQUIPMENT UNDER TEST.....</b>            | <b>15</b> |
| 6.1 SETUP CONFIGURATION OF EUT.....                     | 15        |
| 6.2 CALIBRATION OF DFS DETECTION THRESHOLD LEVEL:.....  | 15        |
| 6.3 SUPPORT EQUIPMENT.....                              | 16        |
| <b>7. DYNAMIC FREQUENCY SELECTION REQUIREMENTS.....</b> | <b>17</b> |
| 7.1 APPLICABLE STANDARD.....                            | 17        |
| 7.2 CONFORMANCE LIMIT.....                              | 17        |
| 7.3 TEST CONFIGURATION.....                             | 17        |
| 7.4 TEST PARAMETERS OF DFS TEST SIGNAL.....             | 18        |
| 7.5 OPERATION MODES AND REQUIREMENT TEST ITEMS.....     | 19        |
| 7.6 TEST PROCEDURE.....                                 | 19        |
| <b>8. TEST RESULT.....</b>                              | <b>20</b> |
| 8.1 DETAILED TEST RESULTS.....                          | 20        |
| 8.2 RADAR WAVEFORM.....                                 | 21        |
| 8.3 IN-SERVICE MONITORING.....                          | 23        |
| 8.4 NON-OCCUPANCY PERIOD.....                           | 26        |

### 1. TEST RESULT CERTIFICATION

Applicant : Sichuan AI-Link Technology Co., Ltd.  
 Address : Anzhou, Industrial park, Mianyang, Sichuan, China  
 Manufacturer : Sichuan AI-Link Technology Co., Ltd.  
 Address : Anzhou, Industrial park, Mianyang, Sichuan, China  
 EUT : WIFI Module  
 Model Name : AL-7651B-WG-A, WF-M651-UWD1, WF-M651-UWD2  
 (Note: All models are different for connectors and radium carving, the others are the same.)  
 Trademark : AI-LINK


**Measurement Procedure Used:**


| APPLICABLE STANDARDS          |             |
|-------------------------------|-------------|
| STANDARD                      | TEST RESULT |
| FCC 47 CFR Part 15, Subpart E | PASS        |


The above equipment was tested by EMTEK (SHENZHEN) CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with the above table standards requirement.

The test results of this report relate only to the tested sample identified in this report.

Date of Test : May 6, 2022 to May 31, 2022

Prepared by :   
 Una Yu/Editor

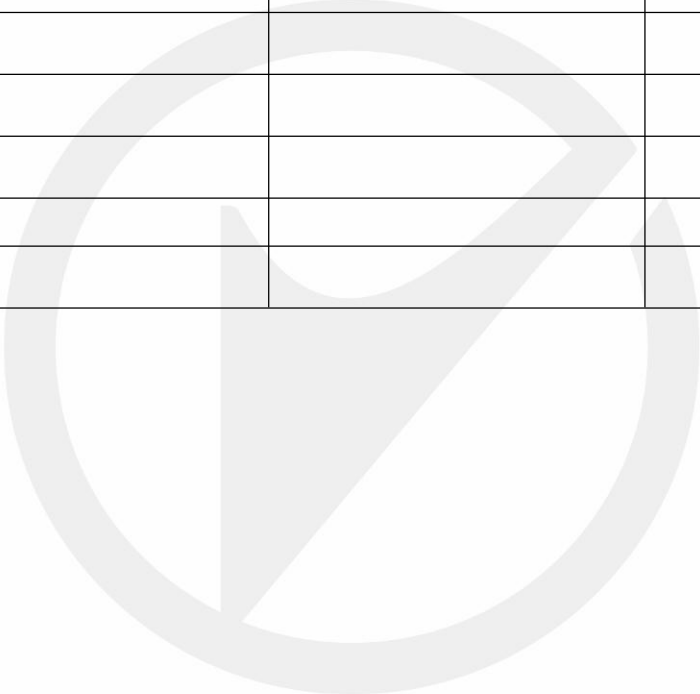
Reviewer :   
 Joe Xia/Supervisor

Approved & Authorized Signer :   
 Lisa Wang/Manager



## Modified Information

| Version | Report No.           | Revision Date | Summary         |
|---------|----------------------|---------------|-----------------|
| Ver.1.0 | ENS2205050036W00103R | /             | Original Report |
|         |                      |               |                 |
|         |                      |               |                 |
|         |                      |               |                 |
|         |                      |               |                 |
|         |                      |               |                 |
|         |                      |               |                 |
|         |                      |               |                 |
|         |                      |               |                 |
|         |                      |               |                 |
|         |                      |               |                 |



## 2. EUT DESCRIPTION

| Characteristics | Description  |  |
|-----------------|--|--|
| Product         | WIFI Module  |  |
| Model Number    | AL-7651B-WG-A, WF-M651-UWD1, WF-M651-UWD2<br>(Note: All models are different for connectors and radium carving, the others are the same.)  |  |
| Wifi Type       | <input checked="" type="checkbox"/> UNII-1: 5150MHz-5250MHz Band<br><input checked="" type="checkbox"/> UNII-2A: with 5250MHz-5350MHz Band<br><input checked="" type="checkbox"/> UNII-2C: with 5470MHz-5725MHz Band<br><input checked="" type="checkbox"/> UNII-3 with 5725MHz-5850MHz Band   |  |
| WLAN Supported  | <input checked="" type="checkbox"/> 802.11a<br><input checked="" type="checkbox"/> 802.11n(20MHz channel bandwidth)<br><input checked="" type="checkbox"/> 802.11n(40MHz channel bandwidth)<br><input checked="" type="checkbox"/> 802.11ac(20MHz channel bandwidth)<br><input checked="" type="checkbox"/> 802.11ac(40MHz channel bandwidth)<br><input checked="" type="checkbox"/> 802.11ac(80MHz channel bandwidth) |  |
| Data Rate       | 802.11a:54/48/36/24/18/12/9/6Mbps<br>802.11n:up to 600 Mbps<br>802.11ac:up to 1.733Gbps  |  |
| Modulation      | <input checked="" type="checkbox"/> OFDM with BPSK/QPSK/16QAM/64QAM for 802.11a/n<br><input checked="" type="checkbox"/> OFDM with BPSK/QPSK/16QAM/64QAM/256QAM for 802.11ac   |  |
| Frequency Range | <input checked="" type="checkbox"/> UNII-1: 5150MHz-5250MHz Band   |  |
|                 | <input checked="" type="checkbox"/> 5180-5240MHz for 802.11a   | <input checked="" type="checkbox"/> 5190-5230MHz for 802.11n(HT40)                             |
|                 | <input checked="" type="checkbox"/> 5180-5240MHz for 802.11n(HT20)   | <input checked="" type="checkbox"/> 5190-5230MHz for 802.11ac(HT40)                            |
|                 | <input checked="" type="checkbox"/> 5180-5240MHz for 802.11ac(HT20)  | <input checked="" type="checkbox"/> 5210MHz for 802.11ac(HT80)                                 |
|                 | <input checked="" type="checkbox"/> UNII-2A: with 5250MHz-5350MHz Band   |  |
|                 | <input checked="" type="checkbox"/> 5260-5320MHz for 802.11a   | <input checked="" type="checkbox"/> 5270-5310MHz for 802.11n(HT40)                             |
|                 | <input checked="" type="checkbox"/> 5260-5320MHz for 802.11n(HT20)   | <input checked="" type="checkbox"/> 5270-5310MHz for 802.11ac(HT40)                            |
|                 | <input checked="" type="checkbox"/> 5260-5320MHz for 802.11ac(HT20)  | <input checked="" type="checkbox"/> 5290MHz for 802.11ac(HT80)                                 |
| Frequency Range | <input checked="" type="checkbox"/> UNII-2C: with 5470MHz-5725MHz Band   |  |
|                 | <input checked="" type="checkbox"/> 5500-5700MHz for 802.11a   | <input checked="" type="checkbox"/> 5510-5670MHz for 802.11n(HT40)                             |
|                 | <input checked="" type="checkbox"/> 5500-5700MHz for 802.11n(HT20)   | <input checked="" type="checkbox"/> 5510-5670MHz for 802.11ac(HT40)                            |
|                 | <input checked="" type="checkbox"/> 5500-5700MHz for 802.11ac(HT20)  | <input checked="" type="checkbox"/> 5530-5610MHz for 802.11ac(HT80)                            |
|                 | <input checked="" type="checkbox"/> UNII-3 with 5725MHz-5850MHz Band   |  |
|                 | <input checked="" type="checkbox"/> 5745-5825MHz for 802.11a   | <input checked="" type="checkbox"/> 5755-5795MHz for 802.11n(HT40)                             |
|                 | <input checked="" type="checkbox"/> 5745-5825MHz for 802.11n(HT20)   | <input checked="" type="checkbox"/> 5755-5795MHz for 802.11ac(HT40)                            |
|                 | <input checked="" type="checkbox"/> 5745-5825MHz for 802.11ac(HT20)  | <input checked="" type="checkbox"/> 5775MHz for 802.11ac(HT80)                                 |
| TPC Function    | <input type="checkbox"/> Applicable  | <input checked="" type="checkbox"/> Not Applicable   |
| Antenna Type    | Integrated Antenna   |  |
| Antenna Gain    | ANT1: 3.68dBi<br>ANT2: 4.13dBi<br>ANT3: 5.19dBi (ANT3 is another antenna of antenna2 port using by the clients.)   |  |
| Transmit Power  | Output Power (Max.)<br>for UNII-1<br>(1TX)   | 802.11a: 19.64dBm  |
|                 |  | 802.11n(HT 20 MHz): 19.42dBm<br>802.11n(HT 40 MHz): 18.66dBm<br>802.11ac (HT 20 MHz): 19.14dBm |

|                     |   |   |
|---------------------|---|---|
|                     |   | 802.11ac (HT 40 MHz): 18.52dBm<br>802.11ac (HT 80 MHz): 17.67dBm  |
|                     | Output Power (Max.)<br>for UNII-2A<br>(1TX) | 802.11a: 20.31dBm<br>802.11n(HT 20 MHz): 19.30dBm<br>802.11n(HT 40 MHz): 19.23dBm<br>802.11ac (HT 20 MHz): 19.19dBm<br>802.11ac (HT 40 MHz): 19.03dBm<br>802.11ac (HT 80 MHz): 18.69dBm |
|                     | Output Power (Max.)<br>for UNII-2C<br>(1TX) | 802.11a: 21.23dBm<br>802.11n(HT 20 MHz): 19.66dBm<br>802.11n(HT 40 MHz): 19.97dBm<br>802.11ac (HT 20 MHz): 19.42dBm<br>802.11ac (HT 40 MHz): 19.96dBm<br>802.11ac (HT 80 MHz): 20.17dBm |
|                     | Output Power (Max.)<br>for UNII-3<br>(1TX)  | 802.11a: 20.72dBm<br>802.11n(HT 20 MHz): 18.87dBm<br>802.11n(HT 40 MHz): 19.96dBm<br>802.11ac (HT 20 MHz): 18.66dBm<br>802.11ac (HT 40 MHz): 19.08dBm<br>802.11ac (HT 80 MHz): 18.44dBm |
|                     | Output Power (Max.)<br>for UNII-1<br>(2TX)  | 802.11n(HT 20 MHz): 21.80dBm<br>802.11n(HT 40 MHz): 21.59dBm<br>802.11ac (HT 20 MHz): 21.77dBm<br>802.11ac (HT 40 MHz): 20.94dBm<br>802.11ac (HT 80 MHz): 20.65dBm                      |
|                     | Output Power (Max.)<br>for UNII-2A<br>(2TX) | 802.11n(HT 20 MHz): 21.96dBm<br>802.11n(HT 40 MHz): 22.11dBm<br>802.11ac (HT 20 MHz): 21.82dBm<br>802.11ac (HT 40 MHz): 21.98dBm<br>802.11ac (HT 80 MHz): 21.32dBm                      |
|                     | Output Power (Max.)<br>for UNII-2C<br>(2TX) | 802.11n(HT 20 MHz): 22.33dBm<br>802.11n(HT 40 MHz): 21.98dBm<br>802.11ac (HT 20 MHz): 22.22dBm<br>802.11ac (HT 40 MHz): 22.75dBm<br>802.11ac (HT 80 MHz): 22.98dBm                      |
|                     | Output Power (Max.)<br>for UNII-3<br>(2TX)  | 802.11n(HT 20 MHz): 21.36dBm<br>802.11n(HT 40 MHz): 22.60dBm<br>802.11ac (HT 20 MHz): 21.26dBm<br>802.11ac (HT 40 MHz): 21.48dBm<br>802.11ac (HT 80 MHz): 20.86dBm                      |
| <b>Power Supply</b> | DC 3.3V                                     |   |

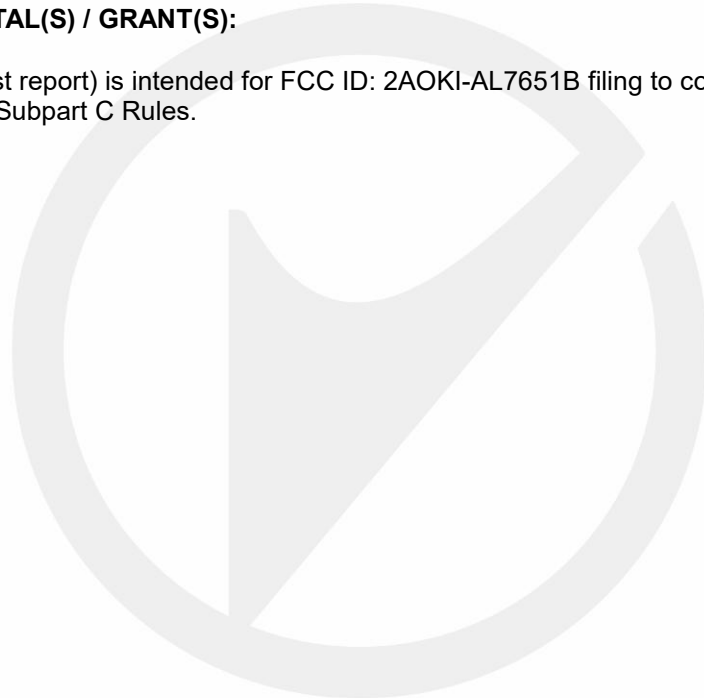
**Note:** for more details, please refer to the user's manual of the EUT.

### 3. SUMMARY OF TEST RESULT

| FCC Part Clause | IC Part Clause | Test Parameter                    | Remarks    | Pass/Fail |
|-----------------|----------------|-----------------------------------|------------|-----------|
| 15.407(h)       | RSS-247 6.3    | DFS Detection Threshold           | N/A        | N/A       |
|                 |                | Channel Availability Check Time   | N/A        | N/A       |
|                 |                | Channel Move Time                 | Applicable | Pass      |
|                 |                | Channel Closing Transmission Time | Applicable | Pass      |
|                 |                | Non- Occupancy Period             | N/A        | N/A       |
|                 |                | Uniform Spreading                 | N/A        | N/A       |
|                 |                | U-NII Detection Bandwidth         | N/A        | N/A       |

#### RELATED SUBMITTAL(S) / GRANT(S):

This submittal(s) (test report) is intended for FCC ID: 2AOKI-AL7651B filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.



#### 4. TEST METHODOLOGY

##### 4.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:

FCC 06-96

FCC 47 CFR Parts 15, Subpart E

FCC KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02

IC RSS-247 Issue 2(02-2017)

##### 4.2 MEASUREMENT EQUIPMENT USED

| Equipment                    | Manufacturer | Model No. | Serial No. | Last Cal.     | Cal. Interval |
|------------------------------|--------------|-----------|------------|---------------|---------------|
| Wireless Connectivity Tester | R&S          | CMW270    | 102543     | Aug. 27, 2021 | 1Year         |
| UP/DOWN-Converter            | R&S          | CMW-Z800A | 100274     | Sep. 14, 2021 | 1Year         |
| Signal Analyzer              | KEYSIGHT     | N9010B    | MY60242456 | Jan. 21, 2022 | 1Year         |
| Analog Signal Generator      | KEYSIGHT     | N5173B    | MY61252625 | Oct. 29, 2021 | 1Year         |
| Vector Signal Generator      | KEYSIGHT     | N5182B    | MY61252674 | Oct. 28, 2021 | 1Year         |
| Frequency Extender           | KEYSIGHT     | N5182BX07 | MY59362541 | Nov. 23, 2021 | 1Year         |
| RF Control Unit              | Tonscend     | JS0806-2  | 218060480  | N/A           | N/A           |
| Temperature&Humidity Chamber | ESPEC        | EL-02KA   | 12107166   | Jul. 03, 2021 | 1 Year        |



### 4.3 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

#### Wifi 5G with U-NII - 1

Frequency and Channel list for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|---------|-----------------|
| 36      | 5180            | 44      | 5220            |         |                 |
| 40      | 5200            | 48      | 5240            |         |                 |

Frequency and Channel list for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|---------|-----------------|
| 38      | 5190            | 46      | 5230            |         |                 |

Frequency and Channel list for 802.11ac (VHT80), 802.11ax (HE80):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|---------|-----------------|
| 42      | 5210            |         |                 |         |                 |

Test Frequency and Channel for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20):

| Lowest Frequency |                 | Middle Frequency |                 | Highest Frequency |                 |
|------------------|-----------------|------------------|-----------------|-------------------|-----------------|
| Channel          | Frequency (MHz) | Channel          | Frequency (MHz) | Channel           | Frequency (MHz) |
| 36               | 5180            | 40               | 5200            | 48                | 5240            |

Test Frequency and channel for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40):

| Lowest Frequency |                 | Middle Frequency |                 | Highest Frequency |                 |
|------------------|-----------------|------------------|-----------------|-------------------|-----------------|
| Channel          | Frequency (MHz) | Channel          | Frequency (MHz) | Channel           | Frequency (MHz) |
| 38               | 5190            | N/A              | N/A             | 46                | 5230            |

Test Frequency and channel for 802.11ac (VHT80), 802.11ax (HE80):

| Lowest Frequency |                 | Middle Frequency |                 | Highest Frequency |                 |
|------------------|-----------------|------------------|-----------------|-------------------|-----------------|
| Channel          | Frequency (MHz) | Channel          | Frequency (MHz) | Channel           | Frequency (MHz) |
| 42               | 5210            | N/A              | N/A             | N/A               | N/A             |

**Wifi 5G with U-NII -2A**

Frequency and Channel list 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|---------|-----------------|
| 52      | 5260            | 60      | 5300            |         |                 |
| 56      | 5280            | 64      | 5320            |         |                 |

Frequency and Channel list for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|---------|-----------------|
| 54      | 5270            |         |                 |         |                 |
| 62      | 5310            |         |                 |         |                 |

Frequency and Channel list for 802.11ac (VHT80), 802.11ax (HE80):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|---------|-----------------|
| 58      | 5290            |         |                 |         |                 |

Test Frequency and Channel for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20):

| Lowest Frequency |                 | Middle Frequency |                 | Highest Frequency |                 |
|------------------|-----------------|------------------|-----------------|-------------------|-----------------|
| Channel          | Frequency (MHz) | Channel          | Frequency (MHz) | Channel           | Frequency (MHz) |
| 52               | 5260            | 56               | 5280            | 64                | 5320            |

Test Frequency and channel for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40):

| Lowest Frequency |                 | Middle Frequency |                 | Highest Frequency |                 |
|------------------|-----------------|------------------|-----------------|-------------------|-----------------|
| Channel          | Frequency (MHz) | Channel          | Frequency (MHz) | Channel           | Frequency (MHz) |
| 54               | 5270            | N/A              | N/A             | 62                | 5310            |

Test Frequency and channel for 802.11ac (VHT80), 802.11ax (HE80):

| Lowest Frequency |                 | Middle Frequency |                 | Highest Frequency |                 |
|------------------|-----------------|------------------|-----------------|-------------------|-----------------|
| Channel          | Frequency (MHz) | Channel          | Frequency (MHz) | Channel           | Frequency (MHz) |
| 58               | 5290            |                  |                 |                   |                 |

**Wifi 5G with U-NII -2C**

Frequency and Channel list for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|---------|-----------------|
| 100     | 5500            | 116     | 5580            | 132     | 5660            |
| 104     | 5520            | 120     | 5600            | 136     | 5680            |
| 108     | 5540            | 124     | 5620            | 140     | 5700            |
| 112     | 5560            | 128     | 5640            |         |                 |

Frequency and Channel list for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|---------|-----------------|
| 102     | 5510            | 118     | 5590            | 134     | 5670            |
| 110     | 5550            | 126     | 5630            |         |                 |

Frequency and Channel list for 802.11ac (VHT80), 802.11ax (HE80):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|---------|-----------------|
| 106     | 5530            | 122     | 5610            |         |                 |
|         |                 |         |                 |         |                 |

Test Frequency and Channel for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20):

| Lowest Frequency |                 | Middle Frequency |                 | Highest Frequency |                 |
|------------------|-----------------|------------------|-----------------|-------------------|-----------------|
| Channel          | Frequency (MHz) | Channel          | Frequency (MHz) | Channel           | Frequency (MHz) |
| 100              | 5500            | 120              | 5600            | 140               | 5700            |

Test Frequency and channel for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40):

| Lowest Frequency |                 | Middle Frequency |                 | Highest Frequency |                 |
|------------------|-----------------|------------------|-----------------|-------------------|-----------------|
| Channel          | Frequency (MHz) | Channel          | Frequency (MHz) | Channel           | Frequency (MHz) |
| 102              | 5510            |                  |                 | 134               | 5670            |

Test Frequency and channel for 802.11ac (VHT80), 802.11ax (HE80):

| Lowest Frequency |                 | Middle Frequency |                 | Highest Frequency |                 |
|------------------|-----------------|------------------|-----------------|-------------------|-----------------|
| Channel          | Frequency (MHz) | Channel          | Frequency (MHz) | Channel           | Frequency (MHz) |
| 106              | 5530            |                  |                 |                   |                 |

**Wifi 5G with U-NII -3**

Frequency and Channel list for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|---------|-----------------|
| 149     | 5745            | 157     | 5785            | 165     | 5825            |
| 153     | 5765            | 161     | 5805            |         |                 |

Frequency and Channel list for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|---------|-----------------|
| 151     | 5755            | 159     | 5795            |         |                 |

Frequency and Channel list for 802.11ac (VHT80), 802.11ax (HE80):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|---------|-----------------|
| 155     | 5775            |         |                 |         |                 |

**Test** Frequency and Channel for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20):

| Lowest Frequency |                 | Middle Frequency |                 | Highest Frequency |                 |
|------------------|-----------------|------------------|-----------------|-------------------|-----------------|
| Channel          | Frequency (MHz) | Channel          | Frequency (MHz) | Channel           | Frequency (MHz) |
| 149              | 5745            | 157              | 5785            | 165               | 5825            |

**Test** Frequency and channel for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40):

| Lowest Frequency |                 | Middle Frequency |                 | Highest Frequency |                 |
|------------------|-----------------|------------------|-----------------|-------------------|-----------------|
| Channel          | Frequency (MHz) | Channel          | Frequency (MHz) | Channel           | Frequency (MHz) |
| 151              | 5755            | N/A              | N/A             | 159               | 5795            |

**Test** Frequency and channel for 802.11ac (VHT80), 802.11ax (HE80):

| Lowest Frequency |                 | Middle Frequency |                 | Highest Frequency |                 |
|------------------|-----------------|------------------|-----------------|-------------------|-----------------|
| Channel          | Frequency (MHz) | Channel          | Frequency (MHz) | Channel           | Frequency (MHz) |
| 155              | 5775            |                  |                 |                   |                 |

**4.4 TEST SOFTWARE**

| Item          | Software  |
|---------------|---|
| RF conducted: | ETSI Certification of Regulations Test Solution(V1.04.01) |
|               | N7607B Signal Studio for DFS Radar Profiles               |



## 5. FACILITIES AND ACCREDITATIONS

### 5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

Building 69, Majialong Industry Zone District, Nanshan District, Shenzhen, China

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

### 5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with preselectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### 5.3 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

EMC Lab.

: **Accredited by CNAS**

The Certificate Registration Number is L2291

The Laboratory has been assessed and proved to be in compliance with CNAS-CL01 (identical to ISO/IEC 17025:2017)

**Accredited by FCC**

Designation Number: CN1204

Test Firm Registration Number: 882943

**Accredited by A2LA**

The Certificate Number is 4321.01

**Accredited by Industry Canada**

The Conformity Assessment Body Identifier is CN0008

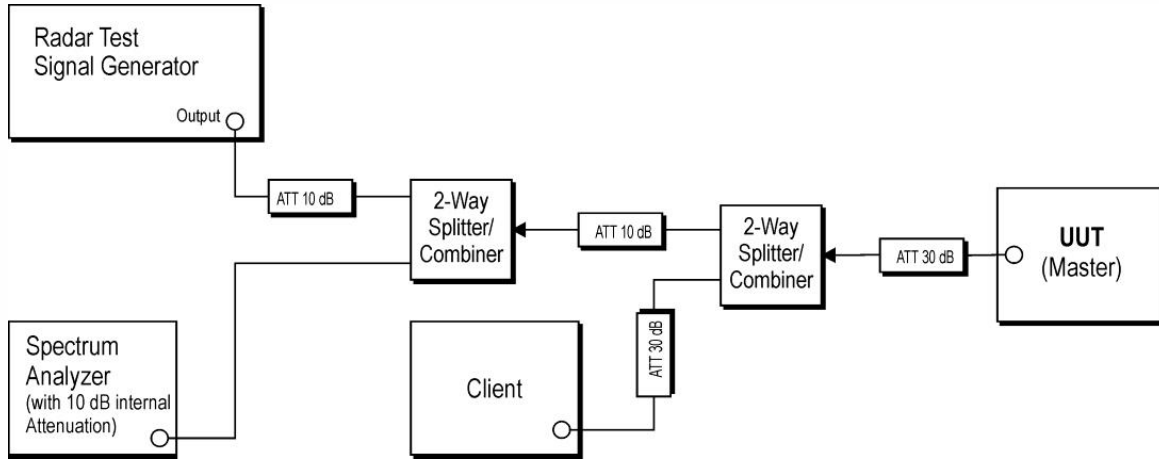
Name of Firm : EMTEK (SHENZHEN) CO., LTD.

Site Location : Building 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China

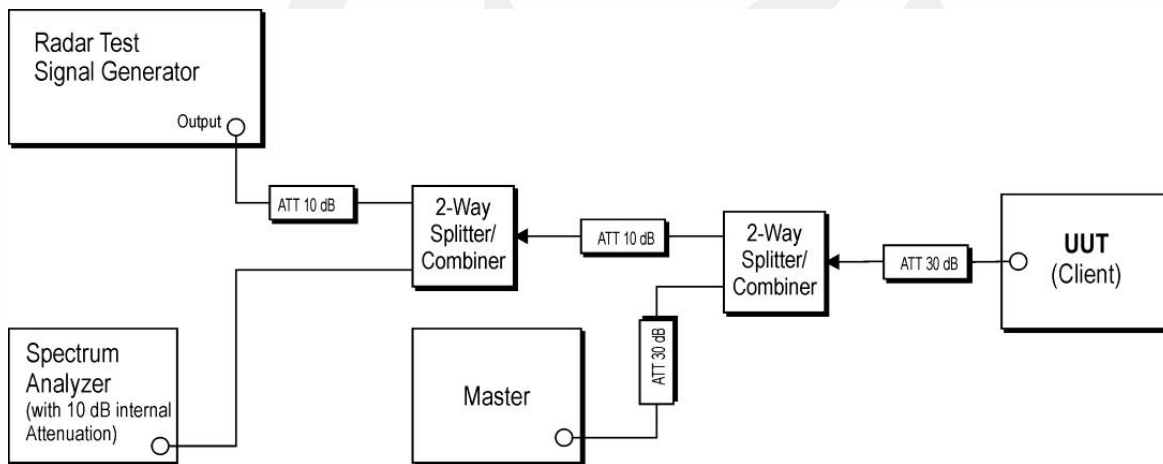
## 6. SETUP OF EQUIPMENT UNDER TEST

### 6.1 SETUP CONFIGURATION OF EUT

#### Master Modes



#### Slave Mode



### 6.2 CALIBRATION OF DFS DETECTION THRESHOLD LEVEL:

A 50 ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected in place of the master device and the signal generator is set to CW mode. The amplitude of the signal generator is adjusted to yield a level of  $-62$  dBm as measured on the spectrum analyzer. Without changing any of the instrument settings, the spectrum analyzer is reconnected to the Common port of the Spectrum Analyzer Combiner/Divider. Measure the amplitude and calculate the difference from  $-62$  dBm. Adjust the Reference Level Offset of the spectrum analyzer to this difference. The spectrum analyzer displays the level of the signal generator as received at the antenna ports of the Master Device. The interference detection threshold may be varied from the calibrated value of  $-62$  dBm and the spectrum analyzer will still indicate the level as received by the Master Device. Set the signal generator to produce a radar waveform, trigger a burst manually and measure the level on the spectrum analyzer. Readjust the amplitude of the signal generator as required so that the peak level of the waveform is at a displayed level equal to the required or desired interference detection threshold. Separate signal generator amplitude settings are determined as required for each radar type.

### 6.3 SUPPORT EQUIPMENT

| Item | Equipment             | Mfr/Brand | Model/Type No.    | Series No.  | FCC ID/IC                            |
|------|-----------------------|-----------|-------------------|-------------|--------------------------------------|
| 1.   | Wireless Access Point | Cisco     | AIR-CAP3702E-A-K9 | FTX182276QD | FCC ID: LDK102087<br>IC:2461B-102087 |

Note: Software for transferring data between master and slave devices is TFGEN-1.00 (transmission rate >80%)

**Notes:**

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.





## 7. DYNAMIC FREQUENCY SELECTION REQUIREMENTS

### 7.1 APPLICABLE STANDARD

According to 15.407(h) and RSS-247 6.3

### 7.2 CONFORMANCE LIMIT

The dynamic frequency selection requirement

| Parameter                         | Value  |
|-----------------------------------|--|
| Non-occupancy period              | Minimum 30 minutes   |
| Channel Availability Check Time   | 60 seconds   |
| Channel Move Time                 | 10 seconds<br>See Note 1.  |
| Channel Closing Transmission Time | 200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second periods.<br>See Notes 1 and 2. |
| U-NII Detection Bandwidth         | Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3.                                    |

**Note 1:** *Channel Move Time* and the *Channel Closing Transmission Time* should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst.

**Note 2:** The *Channel Closing Transmission Time* is comprised of 200 milliseconds starting at the beginning of the *Channel Move Time* plus any additional intermittent control signals required to facilitate a *Channel* move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

**Note 3:** During the *U-NII Detection Bandwidth* detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

The following table lists the DFS The detection threshold values

| Maximum Transmit Power   | Value<br>(See Notes 1, 2, and 3) |
|--|----------------------------------|
| EIRP ≥ 200 milliwatt   | -64 dBm                          |
| EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz                 | -62 dBm                          |
| EIRP < 200 milliwatt that do not meet the power spectral density requirement | -64 dBm                          |

**Note 1:** This is the level at the input of the receiver assuming a 0 dBi receive antenna.

**Note 2:** Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.

**Note3:** EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.

### 7.3 TEST CONFIGURATION

Conducted measurements shall be used for DFS test

### 7.4 TEST PARAMETERS OF DFS TEST SIGNAL

The following table lists the parameters of radar test signals

#### Short Pulse Radar Test Waveforms

| Radar Type  | Pulse Width (μsec) | PRI (μsec)  | Number of Pulses  | Minimum Percentage of Successful Detection | Minimum Number of Trials |
|---|--------------------|---|---|--|--------------------------|
| 0   | 1                  | 1428  | 18  | See Note 1                                 | See Note 1               |
| 1   | 1                  | Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a   | Roundup $\left\{ \begin{matrix} \left( \frac{1}{360} \right) \cdot \\ \left( \frac{19 \cdot 10^6}{PRI_{\mu sec}} \right) \end{matrix} \right\}$ | 60%  | 30                       |
|   |                    | Test B: 15 unique PRI values randomly selected within the range of 518-3066 μsec, with a minimum increment of 1 μsec, excluding PRI values selected in Test A |   |  |                          |
| 2   | 1-5                | 150-230   | 23-29   | 60%  | 30                       |
| 3   | 6-10               | 200-500   | 16-18   | 60%  | 30                       |
| 4   | 11-20              | 200-500   | 12-16   | 60%  | 30                       |
| Aggregate (Radar Types 1-4)   |                    |   |   | 80%  | 120                      |
| <b>Note 1:</b> Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests. |                    |   |   |  |                          |

#### Long Pulse Radar Test Waveform

| Radar Type | Pulse Width (μsec) | Chirp Width (MHz) | PRI (μsec) | Number of Pulses per Burst | Number of Bursts | Minimum Percentage of Successful Detection | Minimum Number of Trials |
|------------|--------------------|-------------------|------------|----------------------------|------------------|--|--------------------------|
| 5          | 50-100             | 5-20              | 1000-2000  | 1-3                        | 8-20             | 80%  | 30                       |

#### Frequency Hopping Radar Test Waveform

| Radar Type | Pulse Width (μsec) | PRI (μsec) | Pulses per Hop | Hopping Rate (kHz) | Hopping Sequence Length (msec) | Minimum Percentage of Successful Detection | Minimum Number of Trials |
|------------|--------------------|------------|----------------|--------------------|--------------------------------|--|--------------------------|
| 6          | 1                  | 333        | 9              | 0.333              | 300                            | 70%  | 30                       |

### 7.5 OPERATION MODES AND REQUIREMENT TEST ITEMS

The manufacture shall state whether the EUT is capable of operating as a Master or a Slave modes,if the EUT is capable of operating in more than one operational mode then every operating mode shall be assessed separately.

Applicability of DFS Requirements Prior to Use of a Channel

| Requirement                     | Operational Mode |                                |                             |
|---------------------------------|------------------|--------------------------------|-----------------------------|
|                                 | Master           | Client Without Radar Detection | Client With Radar Detection |
| Non-Occupancy Period            | Yes              | Not required                   | Yes                         |
| DFS Detection Threshold         | Yes              | Not required                   | Yes                         |
| Channel Availability Check Time | Yes              | Not required                   | Not required                |
| Uniform Spreading               | Yes              | Not required                   | Not required                |
| U-NII Detection Bandwidth       | Yes              | Not required                   | Yes                         |

Applicability of DFS requirements during normal operation

| Requirement                       | Operational Mode |                                |                             |
|-----------------------------------|------------------|--------------------------------|-----------------------------|
|                                   | Master           | Client Without Radar Detection | Client With Radar Detection |
| DFS Detection Threshold           | Yes              | Not required                   | Yes                         |
| Channel Closing Transmission Time | Yes              | Yes                            | Yes                         |
| Channel Move Time                 | Yes              | Yes                            | Yes                         |
| U-NII Detection Bandwidth         | Yes              | Not required                   | Yes                         |

### 7.6 TEST PROCEDURE

According to KDB 905462 D02v02 Section 7.

## 8. TEST RESULT

### 8.1 DETAILED TEST RESULTS

| MODES                                     | Test Parameter                    | Remark     | Verdict |
|---|-----------------------------------|------------|---------|
| <input type="checkbox"/> Master           | DFS Detection Threshold           | N/A        | N/A     |
|   | Channel Availability Check Time   | N/A        | N/A     |
|   | Channel Move Time                 | N/A        | N/A     |
|   | Channel Closing Transmission Time | N/A        | N/A     |
|   | Non-Occupancy Period              | N/A        | N/A     |
|   | Uniform Spreading                 | N/A        | N/A     |
|   | U-NII Detection Bandwidth         | N/A        | N/A     |
| <input checked="" type="checkbox"/> Slave | Radar Detection Threshold         | N/A        | N/A     |
|   | Channel Move Time                 | Applicable | PASS    |
|   | Channel Closing Transmission Time | Applicable | PASS    |
|   | Non-Occupancy Period              | N/A        | N/A     |
|   | U-NII Detection Bandwidth         | N/A        | N/A     |

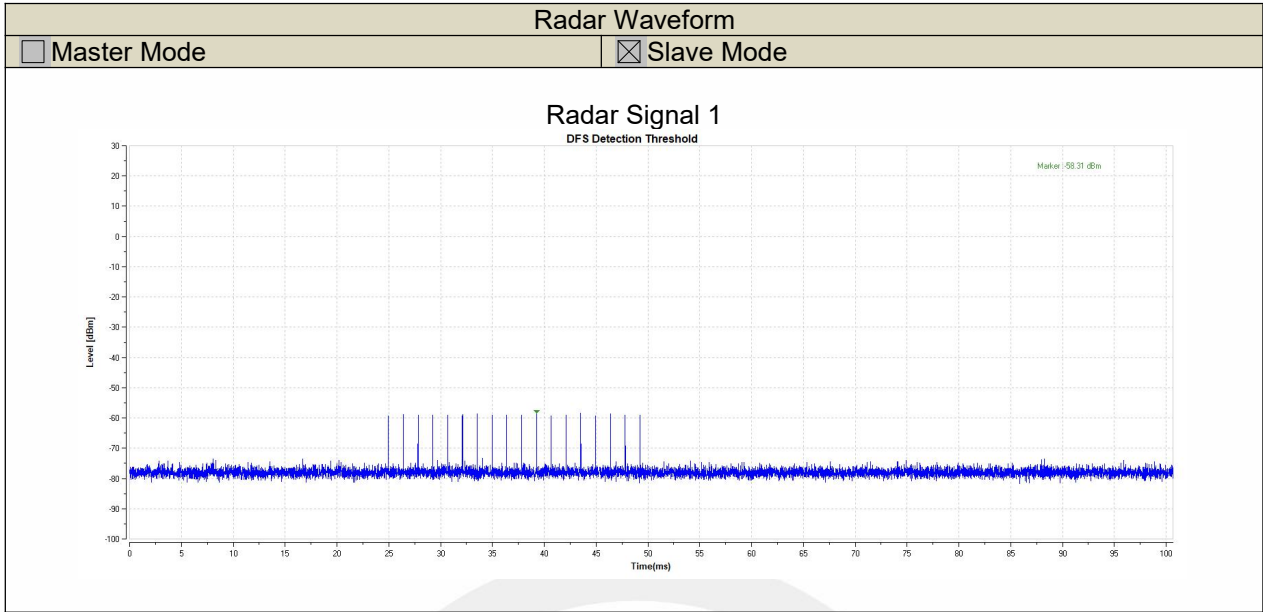
## 8.2 RADAR WAVEFORM

Calibration:

Maximum Transmit Power is be greater than 200 milliwatt and power spectral density <10 dBm/MHz in this report, so detection threshold level is -64dBm.

All the antenna(Antenna 1&2) and modes(802.11a/n/ac/ax) has been tested and the worst result have been recorded in the below page.





### 8.3 IN-SERVICE MONITORING

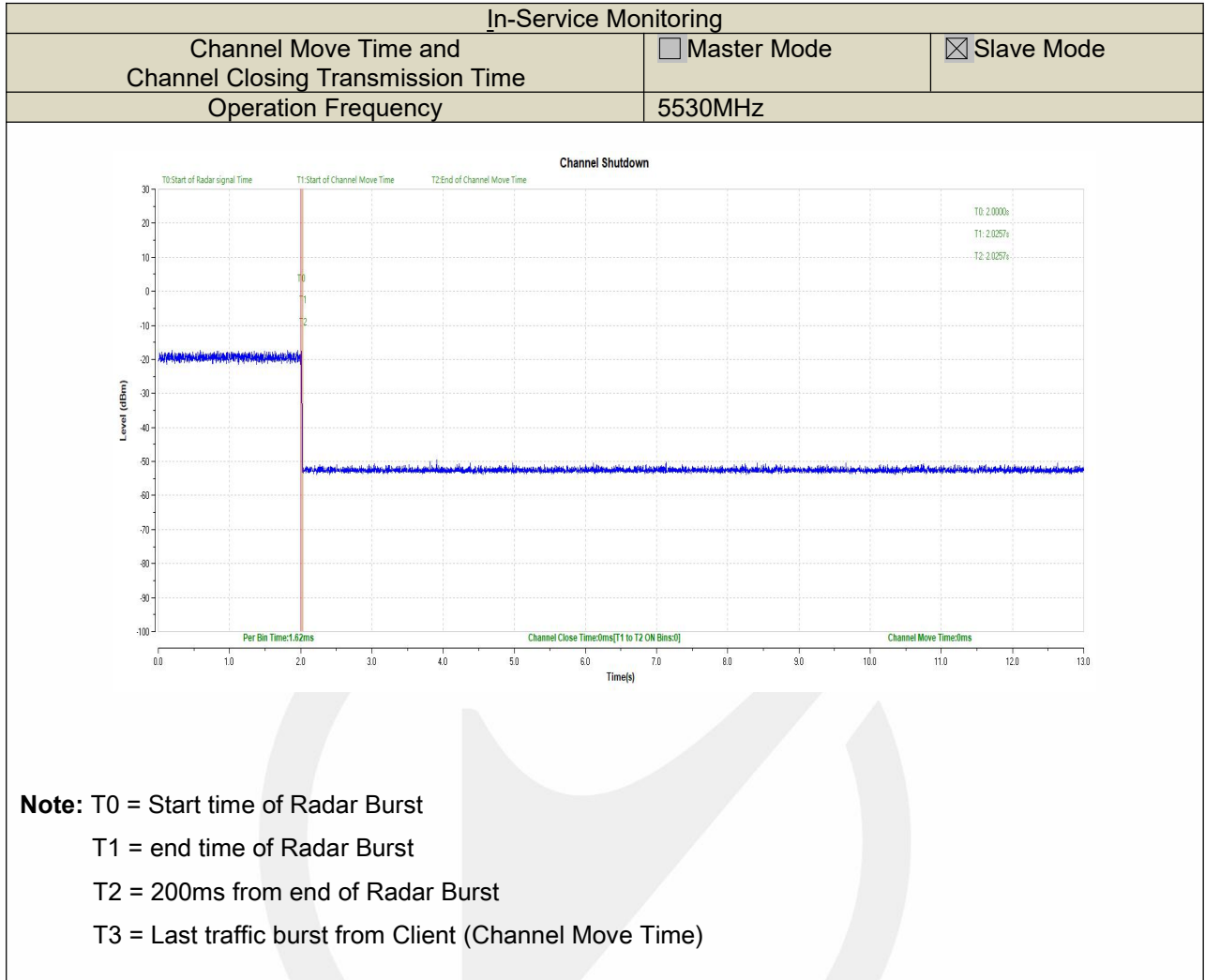
U-NII-Band II-A

| Radar test signal type 0 |                 |         |                  |                     | Detection(Y/N) |
|--------------------------|-----------------|---------|------------------|---------------------|----------------|
| Trial ID                 | Pulse Width(us) | PRI(us) | Number of Pulses | Waveform Length(us) |                |
| 0                        | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 1                        | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 2                        | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 3                        | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 4                        | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 5                        | 1.0             | 1428.0  | 18               | 25704.0             | N              |
| 6                        | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 7                        | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 8                        | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 9                        | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 10                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 11                       | 1.0             | 1428.0  | 18               | 25704.0             | N              |
| 12                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 13                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 14                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 15                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 16                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 17                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 18                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 19                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 20                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 21                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 22                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 23                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 24                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 25                       | 1.0             | 1428.0  | 18               | 25704.0             | N              |
| 26                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 27                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 28                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 29                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| <b>Detection Rate</b>    |                 |         |                  |                     | <b>90%</b>     |

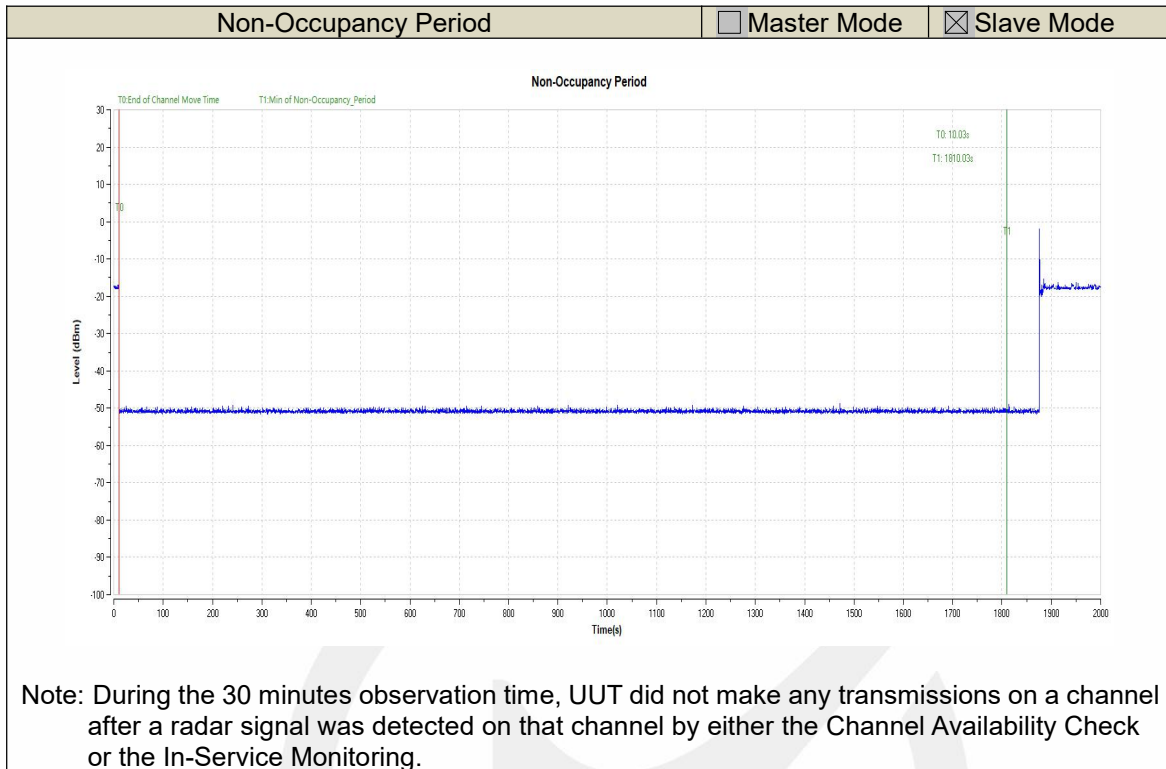
U-NII-Band II-C

| Radar test singal type 0 |                 |         |                  |                     | Detection(Y/N) |
|--------------------------|-----------------|---------|------------------|---------------------|----------------|
| Trial ID                 | Pulse Width(us) | PRI(us) | Number of Pulses | Waveform Length(us) |                |
| 0                        | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 1                        | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 2                        | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 3                        | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 4                        | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 5                        | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 6                        | 1.0             | 1428.0  | 18               | 25704.0             | N              |
| 7                        | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 8                        | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 9                        | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 10                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 11                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 12                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 13                       | 1.0             | 1428.0  | 18               | 25704.0             | N              |
| 14                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 15                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 16                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 17                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 18                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 19                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 20                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 21                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 22                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 23                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 24                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 25                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 26                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 27                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| 28                       | 1.0             | 1428.0  | 18               | 25704.0             | N              |
| 29                       | 1.0             | 1428.0  | 18               | 25704.0             | Y              |
| <b>Detection Rate</b>    |                 |         |                  |                     | <b>90%</b>     |





**8.4 NON-OCCUPANCY PERIOD**



--- End of Report ---