

## TEST REPORT

**Product** : Handheld UHF Reader  
**Trade mark** : CHAINWAY  
**Model/Type reference** : C76  
**Serial Number** : N/A  
**Report Number** : EED32K00243605  
**FCC ID** : 2AC6AC76  
**Date of Issue** : Mar. 28, 2019  
**Test Standards** : 47 CFR Part 15 Subpart E  
**Test result** : PASS

Prepared for:

**Shenzhen Chainway Information Technology Co., Ltd.**  
**9/F, Building 2, Daqian Industrial Park, Longchang Rd.,**  
**District 67, Bao'an, Shenzhen**

Prepared by:

**Centre Testing International Group Co., Ltd.**  
**Hongwei Industrial Zone, Bao'an 70 District,**  
**Shenzhen, Guangdong, China**  
**TEL: +86-755-3368 3668**  
**FAX: +86-755-3368 3385**

Tested By:

Jay Zheng

Jay Zheng

Compiled by:

Kevin Lan

Kevin Lan

Reviewed by:

Ware Xin

Ware Xin

Approved by:

Kevin Yang

Kevin yang

Date:

Mar. 28, 2019

Check No.:3096338075



## 2 Version

| Version No. | Date          | Description |
|-------------|---------------|-------------|
| 00          | Mar. 28, 2019 | Original    |
|             |               |             |
|             |               |             |

### 3 Test Summary

| Test Item                            | Test Requirement                                       | Test method    | Result |
|--------------------------------------|--|----------------|--------|
| Non-Occupancy Period                 | 47 CFR Part 15 Subpart E<br>Section 15.407 (h)(2)(iv)  | KDB 905462 D02 | PASS   |
| DFS Detection Threshold              | 47 CFR Part 15 Subpart E<br>Section 15.407 (h)(2)      | KDB 905462 D02 | N/A    |
| Channel Availability Check Time      | 47 CFR Part 15 Subpart E<br>Section 15.407 (h)(2)(ii)  | KDB 905462 D02 | N/A    |
| U-NII Detection Bandwidth            | 47 CFR Part 15 Subpart E<br>Section 15.407 (h)(2)      | KDB 905462 D02 | N/A    |
| Channel Closing Transmission<br>Time | 47 CFR Part 15 Subpart E<br>Section 15.407 (h)(2)(iii) | KDB 905462 D02 | PASS   |
| Channel Move Time                    | 47 CFR Part 15 Subpart E<br>Section 15.407 (h)(2)(iii) | KDB 905462 D02 | PASS   |

Remark:

The tested sample and the sample information are provided by the client.

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.

RF: In this whole report RF means Radiated Frequency.

CH: In this whole report CH means channel.

Volt: In this whole report Volt means Voltage.

Temp: In this whole report Temp means Temperature.

Humid: In this whole report Humid means humidity.

Press: In this whole report Press means Pressure.

N/A: In this whole report not application.

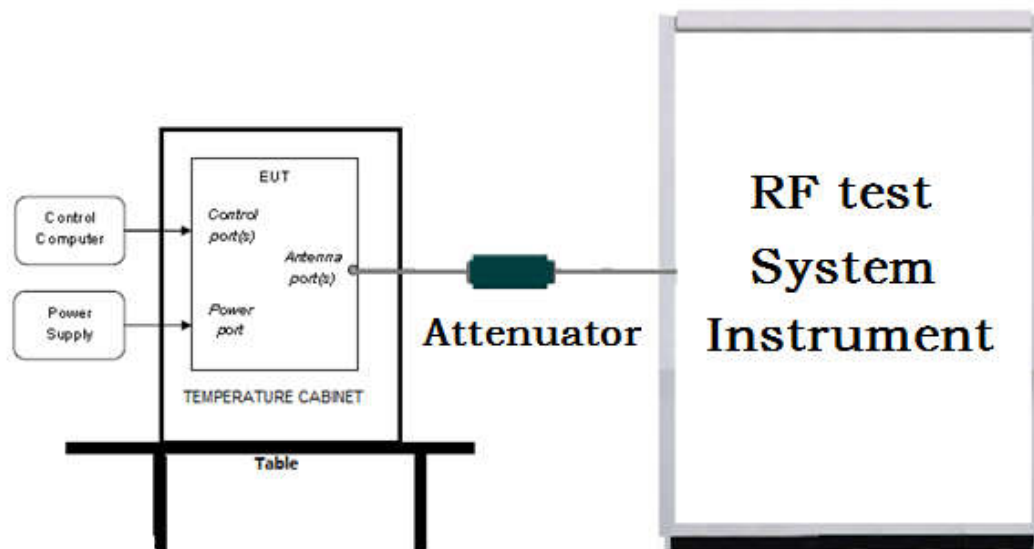
## 4 Content

|   |           |
|---|-----------|
| <b>1 COVER PAGE</b>   | <b>1</b>  |
| <b>2 VERSION</b>  | <b>2</b>  |
| <b>3 TEST SUMMARY</b>                                       | <b>3</b>  |
| <b>4 CONTENT</b>  | <b>4</b>  |
| <b>5 TEST REQUIREMENT</b>                                   | <b>5</b>  |
| 5.1 TEST SETUP  | 5         |
| 5.1.1 For Conducted test setup                              | 5         |
| 5.1.2 Setup for Master with injection at the Master         | 5         |
| 5.1.3 Setup for Client with injection at the Master         | 5         |
| 5.1.4 Setup for Client with injection at the Client         | 6         |
| 5.2 TEST ENVIRONMENT  | 6         |
| 5.3 TEST CONDITION  | 6         |
| 5.3.1 Radar test waveforms                                  | 6         |
| 5.3.2 Technical requirement                                 | 9         |
| <b>6 GENERAL INFORMATION</b>                                | <b>11</b> |
| 6.1 CLIENT INFORMATION                                      | 11        |
| 6.2 GENERAL DESCRIPTION OF EUT                              | 11        |
| 6.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD       | 11        |
| 6.4 DESCRIPTION OF SUPPORT UNITS                            | 13        |
| 6.5 TEST LOCATION   | 13        |
| 6.6 DEVIATION FROM STANDARDS                                | 13        |
| 6.7 ABNORMALITIES FROM STANDARD CONDITIONS                  | 13        |
| 6.8 OTHER INFORMATION REQUESTED BY THE CUSTOMER             | 13        |
| 6.9 MEASUREMENT UNCERTAINTY (95% CONFIDENCE LEVELS, $K=2$ ) | 13        |
| <b>7 EQUIPMENT LIST</b>                                     | <b>14</b> |
| <b>8 RADIO TECHNICAL REQUIREMENTS SPECIFICATION</b>         | <b>15</b> |
| 8.1. CONDUCTED TEST PROCEDURE                               | 19        |
| 8.2. TEST RESULTS   | 19        |
| <b>PHOTOGRAPHS OF EUT CONSTRUCTIONAL DETAILS</b>            | <b>22</b> |

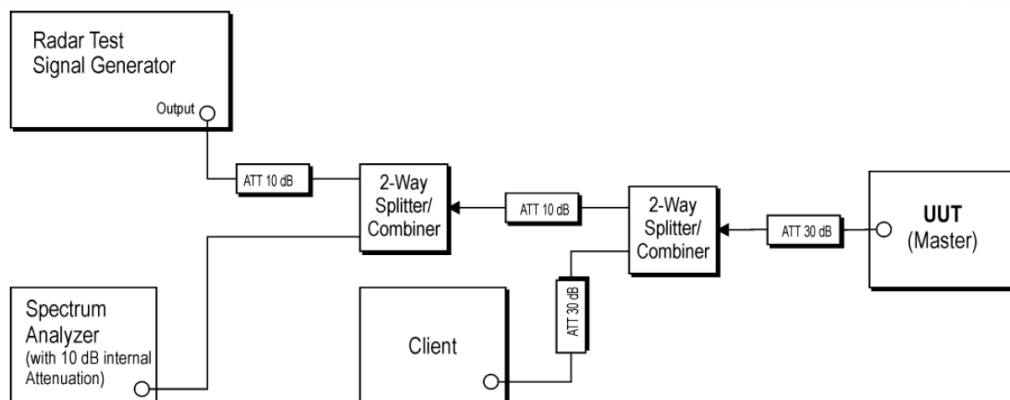
## 5 Test Requirement

### 5.1 Test setup

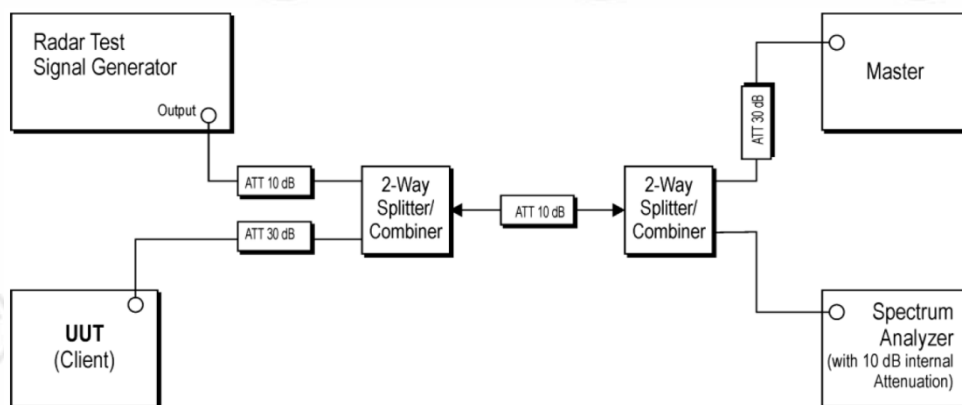
#### 5.1.1 For Conducted test setup



#### 5.1.2 Setup for Master with injection at the Master

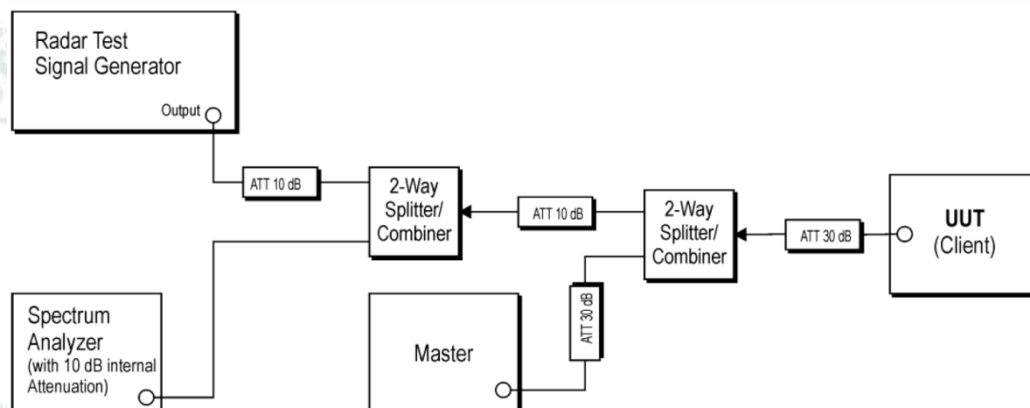


#### 5.1.3 Setup for Client with injection at the Master





### 5.1.4 Setup for Client with injection at the Client



## 5.2 Test Environment

| Operating Environment: |           |
|------------------------|-----------|
| Temperature:           | 24°C      |
| Humidity:              | 48% RH    |
| Atmospheric Pressure:  | 1010 mbar |

## 5.3 Test Condition

### 5.3.1 Radar test waveforms

This section provides the parameters for required test waveforms, minimum percentage of successful detections, and the minimum number of trials that must be used for determining DFS conformance. Step intervals of 0.1 microsecond for Pulse Width, 1 microsecond for PRI, 1 MHz for chirp width and 1 for the number of pulses will be utilized for the random determination of specific test waveforms.

#### a) 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 $\left\{ \left( \frac{1}{360} \right) \cdot \left( \frac{19 \cdot 10^6}{\text{PRI}_{\mu\text{sec}}} \right) \right\}$ | 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. |                    |   |   |  |                          |

A minimum of 30 unique waveforms are required for each of the Short Pulse Radar Types 2 through 4. If more than 30 waveforms are used for Short Pulse Radar Types 2 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms. If more than 30 waveforms are used for Short Pulse Radar Type 1, then each additional waveform is generated with Test B and must also be unique and not repeated from the previous waveforms in Tests A or B.

**b) 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                       |

The parameters for this waveform are randomly chosen. Thirty unique waveforms are required for the Long Pulse Radar Type waveforms. If more than 30 waveforms are used for the Long Pulse Radar Type waveforms, then each additional waveform must also be unique and not repeated from the previous waveforms.

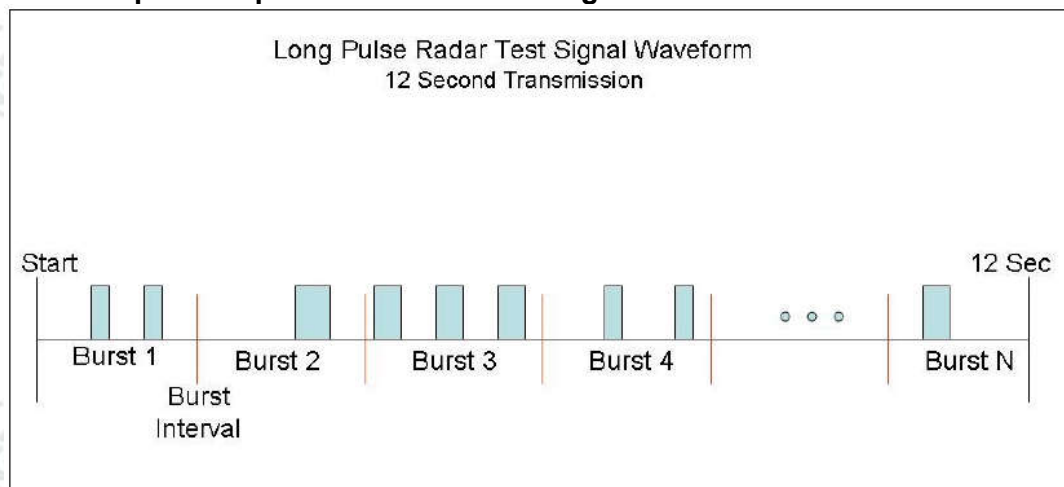
**Each waveform is defined as follows:**

- 1) The transmission period for the Long Pulse Radar test signal is 12 seconds.
- 2) There are a total of 8 to 20 Bursts in the 12 second period, with the number of Bursts being randomly chosen. This number is Burst Count.
- 3) Each Burst consists of 1 to 3 pulses, with the number of pulses being randomly chosen. Each Burst within the 12 second sequence may have a different number of pulses.
- 4) The pulse width is between 50 and 100 microseconds, with the pulse width being randomly chosen. Each pulse within a Burst will have the same pulse width. Pulses in different Bursts may have different pulse widths.
- 5) Each pulse has a linear frequency modulated chirp between 5 and 20 MHz, with the chirp width being randomly chosen. Each pulse within a transmission period will have the same chirp width. The chirp is centered on the pulse. For example, with a radar frequency of 5300 MHz and a 20 MHz chirped signal, the chirp starts at 5290 MHz and ends at 5310 MHz.
- 6) If more than one pulse is present in a Burst, the time between the pulses will be between 1000 and 2000 microseconds, with the time being randomly chosen. If three pulses are present in a Burst, the random time interval between the first and second pulses is chosen independently of the random time interval between the second and third pulses.
- 7) The 12 second transmission period is divided into even intervals. The number of intervals is equal to Burst Count. Each interval is of length  $(12,000,000 / \text{Burst Count})$  microseconds. Each interval contains one Burst. The start time for the Burst, relative to the beginning of the interval, is between 1 and  $[(12,000,000 / \text{Burst Count}) - (\text{Total Burst Length}) + (\text{One Random PRI Interval})]$  microseconds, with the start time being randomly chosen. The step interval for the start time is 1 microsecond. The start time for each Burst is chosen randomly.

**A representative example of a Long Pulse Radar Type waveform:**

- 1) The total test waveform length is 12 seconds.
- 2) Eight (8) Bursts are randomly generated for the Burst Count.
- 3) Burst 1 has 2 randomly generated pulses.
- 4) The pulse width (for both pulses) is randomly selected to be 75 microseconds.
- 5) The PRI is randomly selected to be at 1213 microseconds.
- 6) Bursts 2 through 8 are generated using steps 3 – 5.
- 7) Each Burst is contained in even intervals of 1,500,000 microseconds. The starting location for Pulse 1, Burst 1 is randomly generated (1 to 1,500,000 minus the total Burst 1 length + 1 random PRI interval) at the 325,001 microsecond step. Bursts 2 through 8 randomly fall in successive 1,500,000 microsecond intervals (i.e. Burst 2 falls in the 1,500,001 – 3,000,000 microsecond range).

### Graphical representation of the Long Pulse Radar Test Waveform.



#### c) 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                       |

For the Frequency Hopping Radar Type, the same Burst parameters are used for each waveform. The hopping sequence is different for each waveform and a 100-length segment is selected from the hopping sequence defined by the following algorithm.

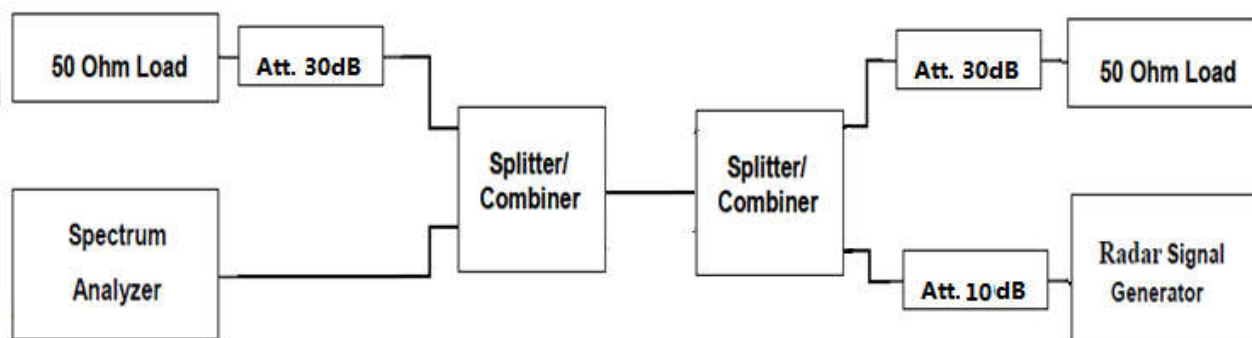
The first frequency in a hopping sequence is selected randomly from the group of 475 integer frequencies from 5250 – 5724 MHz. Next, the frequency that was just chosen is removed from the group and a frequency is randomly selected from the remaining 474 frequencies in the group. This process continues until all 475 frequencies are chosen for the set. For selection of a random frequency, the frequencies remaining within the group are always treated as equally likely.

#### d) Radar Waveform Calibration

The following equipment setup was used to calibrate the conducted radar waveform. A spectrum analyzer was used to establish the test signal level for each radar type. During this process there were replace 50ohm terminal from master and client device and no transmissions by either the master or client device. The spectrum analyzer was switched to the zero span (time domain) at the frequency of the radar waveform generator. Peak detection was utilized. The spectrum analyzer resolution bandwidth (RBW) and video bandwidth (VBW) were set to 3MHz and 3 MHz.

The signal generator amplitude was set so that the power level measured at the spectrum analyzer was - 61dBm due to the interference threshold level is not required.

### Conducted Calibration Setup





### 5.3.2 Technical requirement

#### a) Applicability of DFS Requirements

##### Applicability of DFS Requirements Prior to Use of a Channel

| Requirement                     | Operation Mode |                                |                             |
|---------------------------------|----------------|--------------------------------|-----------------------------|
|                                 | Master         | Client without Radar Detection | Client with Radar Detection |
| Non-Occupancy Period            | Yes            | Not require                    | Yes                         |
| DFS Detection Threshold         | Yes            | Not require                    | Yes                         |
| Channel Availability Check Time | Yes            | Not require                    | Not require                 |
| U-NII Detection Bandwidth       | Yes            | Not require                    | Yes                         |

##### Applicability of DFS requirements during normal operation

| Requirement                       | Operation Mode |                                |                             |
|-----------------------------------|----------------|--------------------------------|-----------------------------|
|                                   | Master         | Client without Radar Detection | Client with Radar Detection |
| DFS Detection Threshold           | Yes            | Not require                    | Yes                         |
| Channel Closing Transmission Time | Yes            | Yes                            | Yes                         |
| Channel Move Time                 | Yes            | Yes                            | Yes                         |
| U-NII Detection Bandwidth         | Yes            | Not require                    | Yes                         |

#### b) Requirements of Client Devices

- A Client Device will not transmit before having received appropriate control signals from a Master Device.
- A Client Device will stop all its transmissions whenever instructed by a Master Device to which it is associated and will meet the Channel Move Time and Channel Closing Transmission Time requirements. The Client Device will not resume any transmissions until it has again received control signals from a Master Device.
- If a Client Device is performing In-Service Monitoring and detects a Radar Waveform above the DFS Detection Threshold, it will inform the Master Device. This is equivalent to the Master Device detecting the Radar Waveform and d) through f) of section 5.1.1 apply.
- Irrespective of Client Device or Master Device detection the Channel Move Time and Channel Closing Transmission Time requirements remain the same.
- The client test frequency must be monitored to ensure no transmission of any type has occurred for 30 minutes. Note: If the client moves with the master, the device is considered compliant if nothing appears in the client non-occupancy period test. For devices that shut down (rather than moving channels), no beacons should appear.

#### C) DFS Detection Thresholds and Response Requirement

##### DFS Detection Thresholds for Master Devices and Client Devices With Radar Detection

| Maximum Transmit Power  | Value<br>(See Notes 1, 2, and 3) |
|---|----------------------------------|
| EIRP $\geq$ 200 milliwatt   | -64 dBm                          |
| EIRP < 200 milliwatt and<br>power spectral density < 10 dBm/MHz   | -62 dBm                          |
| EIRP < 200 milliwatt that do not meet the power spectral density<br>requirement   | -64 dBm                          |
| <p><b>Note 1:</b> This is the level at the input of the receiver assuming a 0 dBi receive antenna.</p> <p><b>Note 2:</b> 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.</p> <p><b>Note3:</b> EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.</p> |                                  |

### DFS Response Requirement Values

| Parameter  | Value   |
|--|---|
| <i>Non-occupancy period</i>  | Minimum 30 minutes  |
| <i>Channel Availability Check Time</i>   | 60 seconds  |
| <i>Channel Move Time</i>   | 10 seconds<br>See Note 1.   |
| <i>Channel Closing Transmission Time</i>   | 200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period.<br>See Notes 1 and 2. |
| <i>U-NII Detection Bandwidth</i>   | Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3.                                   |
| <p><b>Note 1:</b> <i>Channel Move Time</i> and the <i>Channel Closing Transmission Time</i> should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst.</p> <p><b>Note 2:</b> The <i>Channel Closing Transmission Time</i> is comprised of 200 milliseconds starting at the beginning of the <i>Channel Move Time</i> plus any additional intermittent control signals required to facilitate a <i>Channel</i> 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.</p> <p><b>Note 3:</b> During the <i>U-NII Detection Bandwidth</i> 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.</p> |   |

## 6 General Information

### 6.1 Client Information

|                          |   |
|--------------------------|---|
| Applicant:               | Shenzhen Chainway Information Technology Co., Ltd.                                    |
| Address of Applicant:    | 9/F, Building 2, Daqian Industrial Park, Longchang Rd., District 67, Bao'an, Shenzhen |
| Manufacturer:            | Shenzhen Chainway Information Technology Co., Ltd.                                    |
| Address of Manufacturer: | 9/F, Building 2, Daqian Industrial Park, Longchang Rd., District 67, Bao'an, Shenzhen |
| Factory:                 | Shenzhen Chainway Information Technology Co., Ltd.                                    |
| Address of Factory:      | 9/F, Building 2, Daqian Industrial Park, Longchang Rd., District 67, Bao'an, Shenzhen |

### 6.2 General Description of EUT

|                                  |   |
|----------------------------------|---|
| Product Name:                    | Handheld UHF Reader   |
| Model No.:                       | C76   |
| Trade Mark:                      | CHAINWAY  |
| Location for use:                | indoor  |
| EUT Supports Radios application: | BT 4.0 Single mode: 2402MHz to 2480MHz;<br>2.4GHz Wi-Fi: 802.11b/g/n(HT20)(HT40): 2412MHz ~2462 MHz;<br>5GHz Wi-Fi: U-NII-1: 5.15-5.25GHz; U-NII-2A: 5.25-5.35GHz;<br>U-NII-2C: 5.470-5.725GHz; U-NII-3: 5.725-5.850GHz;<br>802.11a; 802.11n(20MHz/40MHz);<br>RFID: 902MHz to 928MHz; NFC: 13.56MHz;<br>GPS: 1559MHz to 1610MHz |
| Power Supply:                    | Adapter: Model: GME10D-050200FUu<br>Input: 100-240V~ 50/60Hz, 0.28A<br>Output: 5V---2A  |
| USB cable:                       | 100cm(Unshielded)   |
| Sample Received Date:            | Sep. 05, 2018   |
| Sample tested Date:              | Sep. 12, 2018 to Feb. 20, 2019  |

### 6.3 Product Specification subjective to this standard

|                      |  |
|----------------------|--|
| Operation Frequency: | IEEE 802.11a/n(20M): 5150MHz ~5250 MHz<br>IEEE802.11n(40M): 5150MHz ~5250 MHz<br>IEEE 802.11a/n(20M): 5250MHz ~5350 MHz<br>IEEE802.11n(40M): 5250MHz ~5350 MHz<br>IEEE 802.11a/n(20M): 5470MHz ~5725 MHz<br>IEEE802.11n(40M): 5470MHz ~5725 MHz<br>IEEE 802.11a/n(20M): 5725MHz ~5850 MHz<br>IEEE802.11n(40M): 5725MHz ~5850 MHz   |
| Channel Numbers:     | IEEE 802.11a/n(20M): 5150MHz ~5250MHz/ 4 channel<br>IEEE 802.11n(40M): 5150MHz ~5250MHz/ 2 channel<br>IEEE 802.11a/n(20M): 5250MHz ~5350 MHz/ 4 channel<br>IEEE802.11n(40M): 5250MHz ~5350 MHz/ 2 channel<br>IEEE 802.11a/n(20M): 5470MHz ~5725 MHz/ 8 channel<br>IEEE802.11n(40M): 5470MHz ~5725 MHz/ 3 channel<br>IEEE 802.11a/n(20M): 5725MHz ~5850MHz/ 5 channel<br>IEEE 802.11n(40M): 5725MHz ~5850MHz/ 2 channel |
| Operation Mode:      | Client Without Radar Detection function  |
| Type of Modulation:  | 802.11a; 802.11n(20MHz/40MHz);<br>OFDM(64QAM, 16QAM, QPSK, BPSK)   |
| Sample Type:         | Portable device  |
| Firmware version:    | C76E_LWG_M0_V0.4.6_S171219   |



|                        |  |
|------------------------|--|
| Hardware version:      | C70SEA_MB_V11                                  |
| Test Power Grade:      | N/A  |
| Test Software of EUT:  | N/A  |
| Antenna Type and Gain: | WiFi: Antenna type: PFC, Antenna gain: 0.43dBi |
| Test Voltage:          | AC 120V, 60Hz                                  |

## Operation Frequency each of channel

| For 802.11a/n( 20M) Operation in the 5150MHz ~5250 MHz band |           |         |           |
|---|-----------|---------|-----------|
| Channel   | Frequency | Channel | Frequency |
| 36  | 5180MHz   | 44      | 5220MHz   |
| 40  | 5200MHz   | 48      | 5240MHz   |
| For 802.11a/n( 20M) Operation in the 5250MHz ~5350 MHz band |           |         |           |
| Channel   | Frequency | Channel | Frequency |
| 52  | 5260MHz   | 60      | 5300MHz   |
| 56  | 5280MHz   | 64      | 5320MHz   |
| For 802.11a/n( 20M) Operation in the 5470MHz ~5725 MHz band |           |         |           |
| Channel   | Frequency | Channel | Frequency |
| 100   | 5500MHz   | 116     | 5580MHz   |
| 104   | 5520MHz   | 132     | 5660MHz   |
| 108   | 5540MHz   | 136     | 5680MHz   |
| 112   | 5560MHz   | 140     | 5700MHz   |
| For 802.11a/n( 20M) Operation in the 5725MHz ~5850 MHz band |           |         |           |
| Channel   | Frequency | Channel | Frequency |
| 149   | 5745MHz   | 162     | 5805MHz   |
| 153   | 5765MHz   | 165     | 5825MHz   |
| 157   | 5785MHz   | NA      | NA        |

| For 802.11n(40M) Operation in the 5150MHz ~5250 MHz band |           |         |           |
|--|-----------|---------|-----------|
| Channel  | Frequency | Channel | Frequency |
| 38   | 5190MHz   | 46      | 5230MHz   |
| For 802.11n(40M) Operation in the 5250MHz ~5350 MHz band |           |         |           |
| Channel  | Frequency | Channel | Frequency |
| 54   | 5270MHz   | 62      | 5310MHz   |
| For 802.11n(40M) Operation in the 5470MHz ~5725 MHz band |           |         |           |
| Channel  | Frequency | Channel | Frequency |
| 102  | 5510MHz   | 134     | 5670MHz   |
| 110  | 5550MHz   | NA      | NA        |
| For 802.11n(40M) Operation in the 5725MHz ~5850 MHz band |           |         |           |
| Channel  | Frequency | Channel | Frequency |
| 151  | 5755MHz   | 159     | 5795MHz   |



## 6.4 Description of Support Units

The EUT has been tested with associated equipment below.

| Associated equipment name |        | Manufacture | model         | serial number        | Supplied by | Certification |
|---------------------------|--------|-------------|---------------|----------------------|-------------|---------------|
| AE1                       | Phone  | Apple       | A1367         | TTF20120027          | CTI         | FCC           |
| AE2                       | Router | HuaWei      | WS550         | K8E8W1531400<br>2784 | CTI         | FCC           |
| AE3                       | PC     | Apple       | MMGF2<br>ZP/A | ODN20170212          | CTI         | FCC           |

## 6.5 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd.

Hongwei Industrial Zone, Bao'an 70 District, Shenzhen, Guangdong, China 518101

Telephone: +86 (0) 755 33683668 Fax: +86 (0) 755 33683385

No tests were sub-contracted.

## 6.6 Deviation from Standards

None.

## 6.7 Abnormalities from Standard Conditions

None.

## 6.8 Other Information Requested by the Customer

None.

## 6.9 Measurement Uncertainty (95% confidence levels, k=2)

| No. | Item                            | Measurement Uncertainty |
|-----|---------------------------------|-------------------------|
| 1   | Radio Frequency                 | $7.9 \times 10^{-8}$    |
| 2   | RF power, conducted             | 0.46dB (30MHz-1GHz)     |
|     |                                 | 0.55dB (1GHz-18GHz)     |
| 3   | Radiated Spurious emission test | 4.3dB (30MHz-1GHz)      |
|     |                                 | 4.5dB (1GHz-12.75GHz)   |
| 4   | Conduction emission             | 3.5dB (9kHz to 150kHz)  |
|     |                                 | 3.1dB (150kHz to 30MHz) |
| 5   | Temperature test                | 0.64°C                  |
| 6   | Humidity test                   | 3.8%                    |
| 7   | DC power voltages               | 0.026%                  |

## 7 Equipment List

| RF test system                   |               |                              |               |                          |                            |
|----------------------------------|---------------|------------------------------|---------------|--------------------------|----------------------------|
| Equipment                        | Manufacturer  | Model No.                    | Serial Number | Cal. Date (mm-dd-yyyy)   | Cal. Due date (mm-dd-yyyy) |
| Signal Generator                 | Keysight      | E8257D                       | MY53401106    | 03-13-2018               | 03-12-2019                 |
| Spectrum Analyzer                | Keysight      | N9010A                       | MY54510339    | 03-13-2018               | 03-12-2019                 |
| Signal Generator                 | Keysight      | N5182B                       | MY53051549    | 03-13-2018               | 03-12-2019                 |
| High-pass filter                 | Sinoscite     | FL3CX03WG1<br>8NM12-0398-002 | ---           | 01-10-2018<br>01-08-2019 | 01-09-2019<br>01-07-2020   |
| High-pass filter                 | MICRO-TRONICS | SPA-F-63029-4                | ---           | 01-10-2018<br>01-08-2019 | 01-09-2019<br>01-07-2020   |
| DC Power                         | Keysight      | E3642A                       | MY54426035    | 03-13-2018               | 03-12-2019                 |
| PC-1                             | Lenovo        | R4960d                       | ---           | 03-13-2018               | 03-12-2019                 |
| BT&WI-FI Automatic control       | R&S           | OSP120                       | 101374        | 03-13-2018               | 03-12-2019                 |
| RF control unit                  | JS Tonscend   | JS0806-2                     | 15860006      | 03-13-2018               | 03-12-2019                 |
| RF control unit                  | JS Tonscend   | JS0806-1                     | 15860004      | 03-13-2018               | 03-12-2019                 |
| RF control unit                  | JS Tonscend   | JS0806-4                     | 158060007     | 03-13-2018               | 03-12-2019                 |
| BT&WI-FI Automatic test software | JS Tonscend   | JS1120-2                     | ---           | 03-13-2018               | 03-12-2019                 |
| Temperature/Humidity Indicator   | biaozhi       | HM10                         | 1804186       | 10-13-2017<br>10-12-2018 | 10-12-2018<br>10-11-2019   |

## 8 Radio Technical Requirements Specification

### Reference documents for testing:

| No. | Identity   | Document Title  |
|-----|--|---|
| 1   | FCC Part15E  | Subpart E—Unlicensed National Information Infrastructure Devices  |
| 2   | FCC KDB 905462 D02<br>UNII DFS Compliance<br>Procedures New Rules<br>v02 | Compliance Measurement Procedures For Unlicensed-National<br>Information Infrastructure Devices Operating In The 5250-5350 Mhz And<br>5470-5725 Mhz Bands Incorporating Dynamic Frequency Selection |
| 3   | FCC KDB 905462 D04<br>Test Mode New Rules<br>v01                         | OPERATIONAL MODES SUGGESTED FOR DFS TESTING   |
| 4   | FCC KDB 905462 D06<br>802.11 Channel Plans<br>New Rules v02              | OPERATION IN U-NII BANDS –802.11 CHANNEL PLAN (§15.407)   |

### Test Results List:

| FCC Part15E   | Test<br>method | Test item                               | Operation Mode verdict |                                   |                                |
|---|----------------|---|------------------------|-----------------------------------|--------------------------------|
|   |                |   | Master                 | Client without<br>Radar Detection | Client with<br>Radar Detection |
| 47 CFR Part 15<br>Subpart E Section<br>15.407 (h)(2)(iv)  | 905462 D02     | Non-Occupancy<br>Period                 | --                     | PASS                              | --                             |
| 47 CFR Part 15<br>Subpart E Section<br>15.407 (h)(2)      | 905462 D02     | DFS Detection<br>Threshold              | --                     | Not require                       | --                             |
| 47 CFR Part 15<br>Subpart E Section<br>15.407 (h)(2)(ii)  | 905462 D02     | Channel<br>Availability Check<br>Time   | --                     | Not require                       | --                             |
| 47 CFR Part 15<br>Subpart E Section<br>15.407 (h)(2)      | 905462 D02     | U-NII Detection<br>Bandwidth            | --                     | Not require                       | --                             |
| 47 CFR Part 15<br>Subpart E Section<br>15.407 (h)(2)(iii) | 905462 D02     | Channel Closing<br>Transmission<br>Time | --                     | PASS                              | --                             |
| 47 CFR Part 15<br>Subpart E Section<br>15.407 (h)(2)(iii) | 905462 D02     | Channel Move<br>Time                    | --                     | PASS                              | --                             |

### Channel Loading/Data Streaming

Timing plots are required with calculations demonstrating a minimum channel loading of approximately 17% or greater.

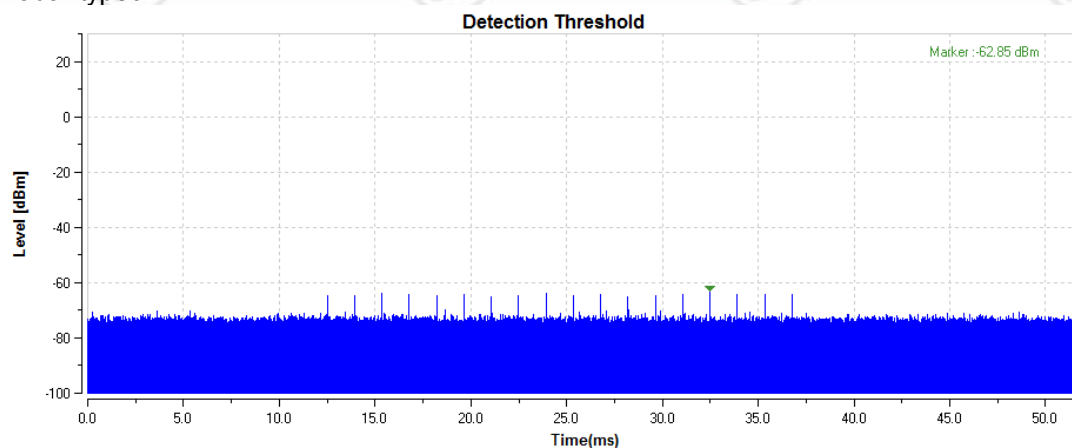
### Master DFS Threshold Level

DFS Threshold level: -63 dBm

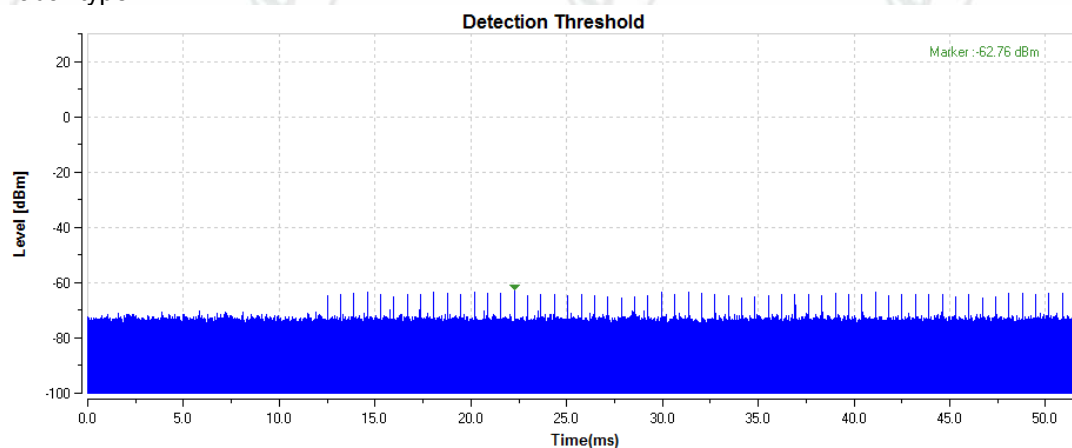
The Interference Radar Detection Threshold Level is  $(-64\text{dBm}) + 1\text{ dB} = -63\text{ dBm}$ . That has been taken into account the master output power range and antenna gain.

### Calibration plots for each of the required radar waveforms

Radar type0

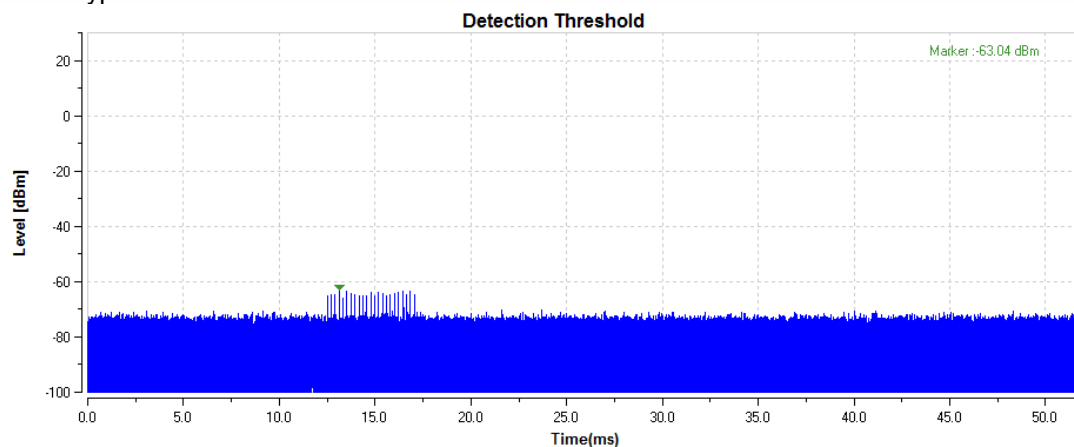


Radar type1

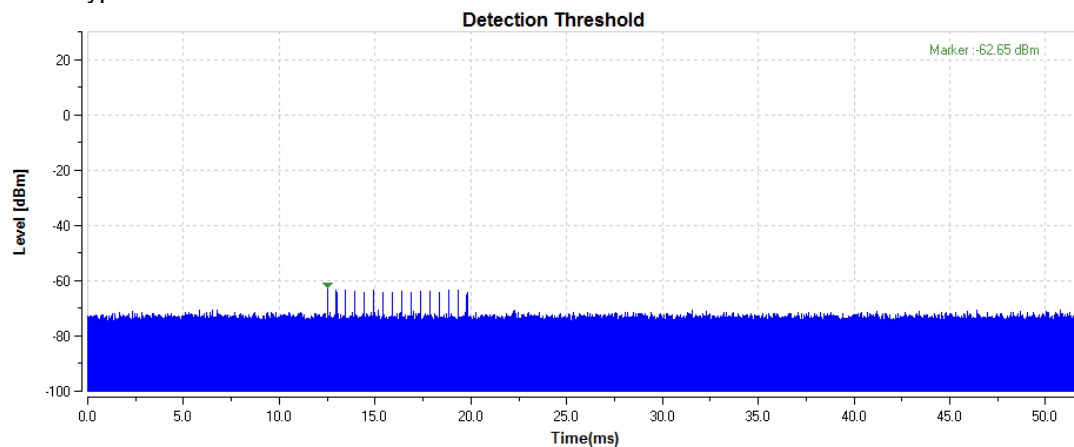




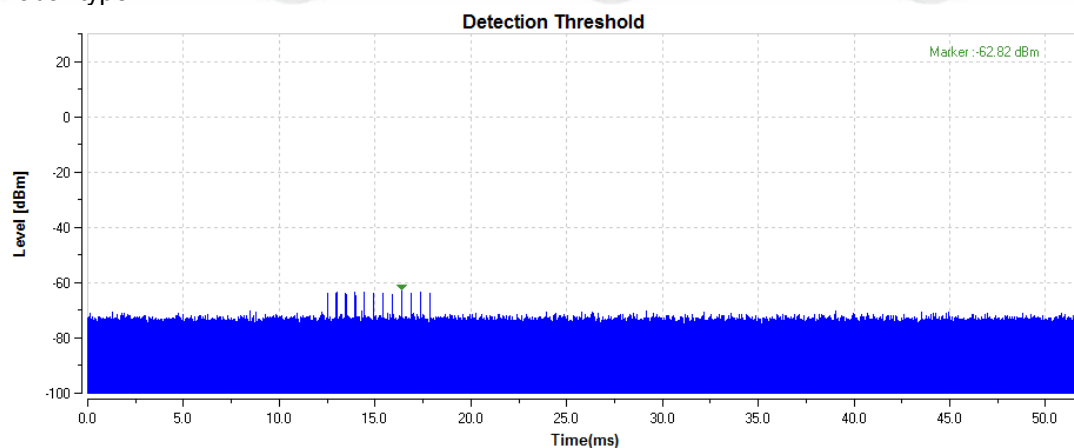
Radar type2



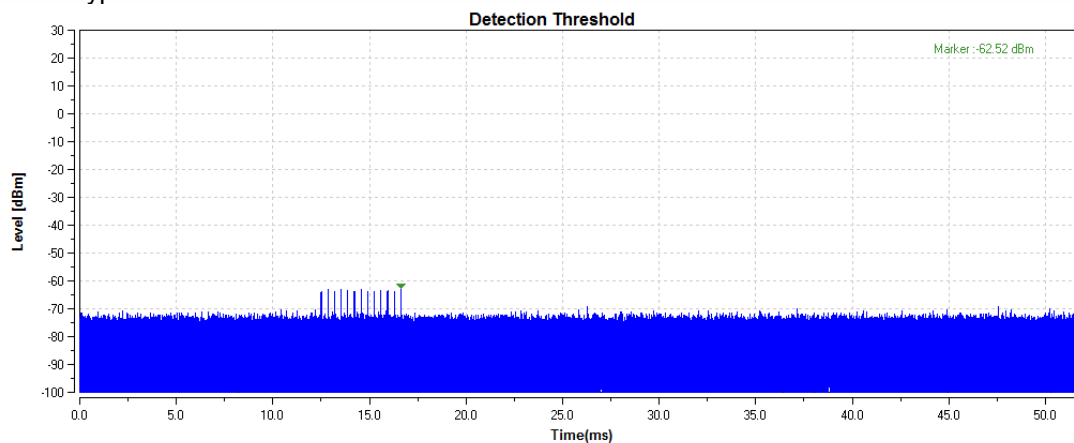
Radar type3



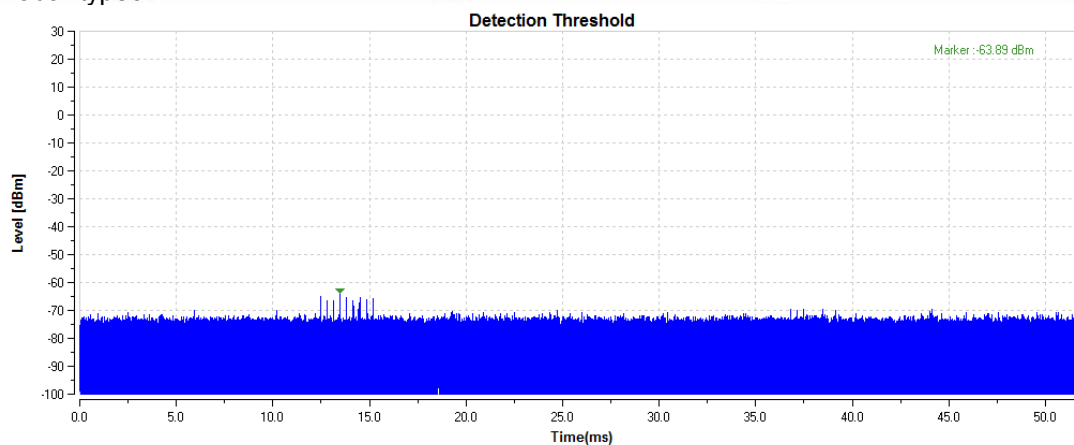
Radar type4



Radar type5



Radar type6

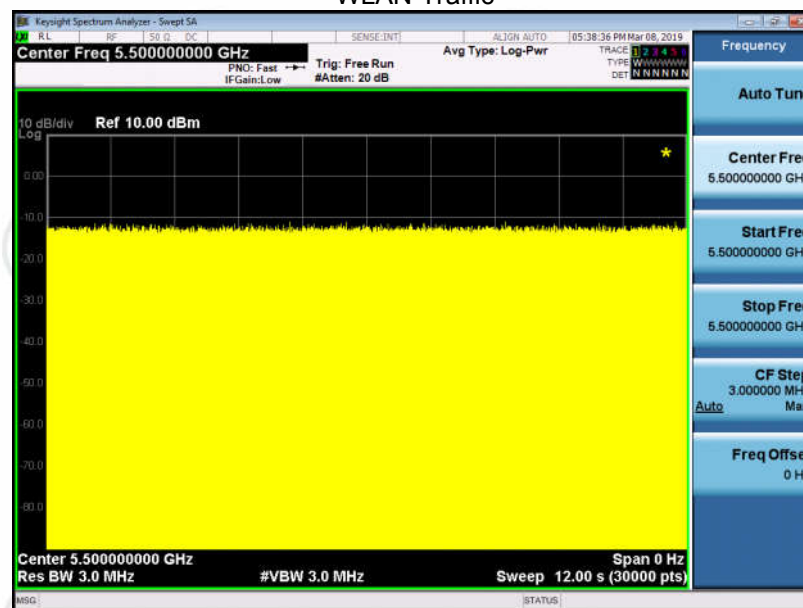


## 8.1. Conducted test procedure

- 1) One frequency will be chosen from the Operating Channels of the UUT within the 5250-5350 MHz or 5470-5725MHz bands.
- 2) The Client Device (EUT) is set up the above diagram and communications between the Master device and the Client is established.
- 3) Stream the channel loading test file from the Master Device to the Client Device on the test Channel for the entire period of the test.
- 4) An additional 1 dB is added to the radar test signal to ensure it is at or above the DFS Detection Threshold, accounting for equipment variations/errors.
- 5) Observe the transmissions of the UUT at the end of the Burst on the Operating Channel for duration greater than 12 seconds for Radar Type 0 to ensure detection occurs.
- 6) After the initial radar burst the channel is monitored for 30 minutes to ensure no transmissions or beacons occur. A second monitoring setup is used to verify that the Master and Client have both moved to different channels.

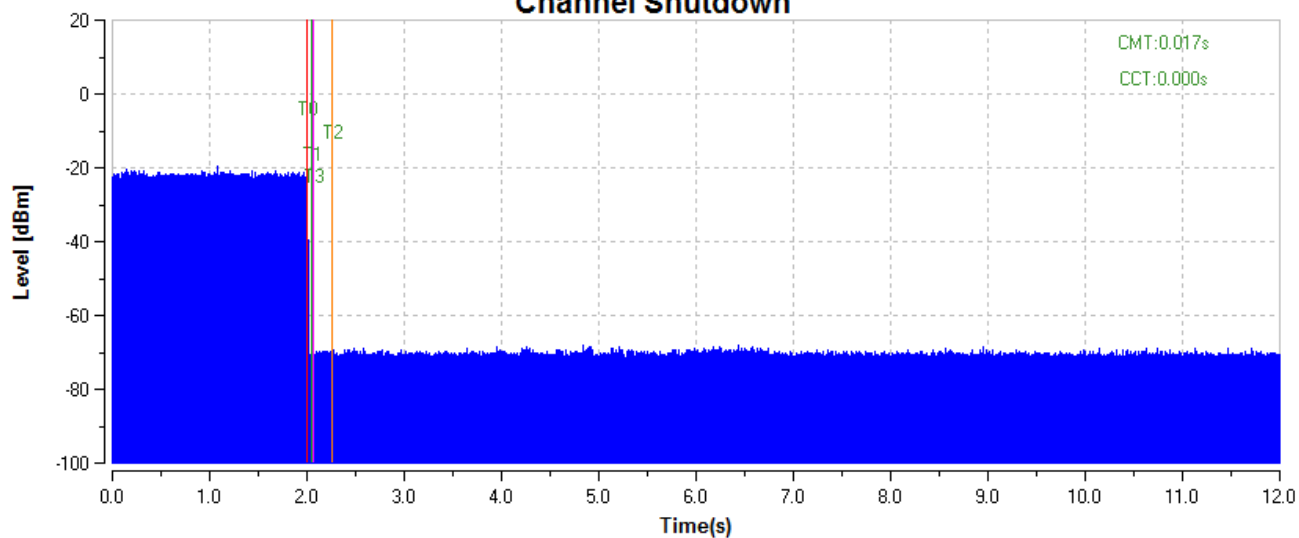
## 8.2. Test Results

WLAN Traffic



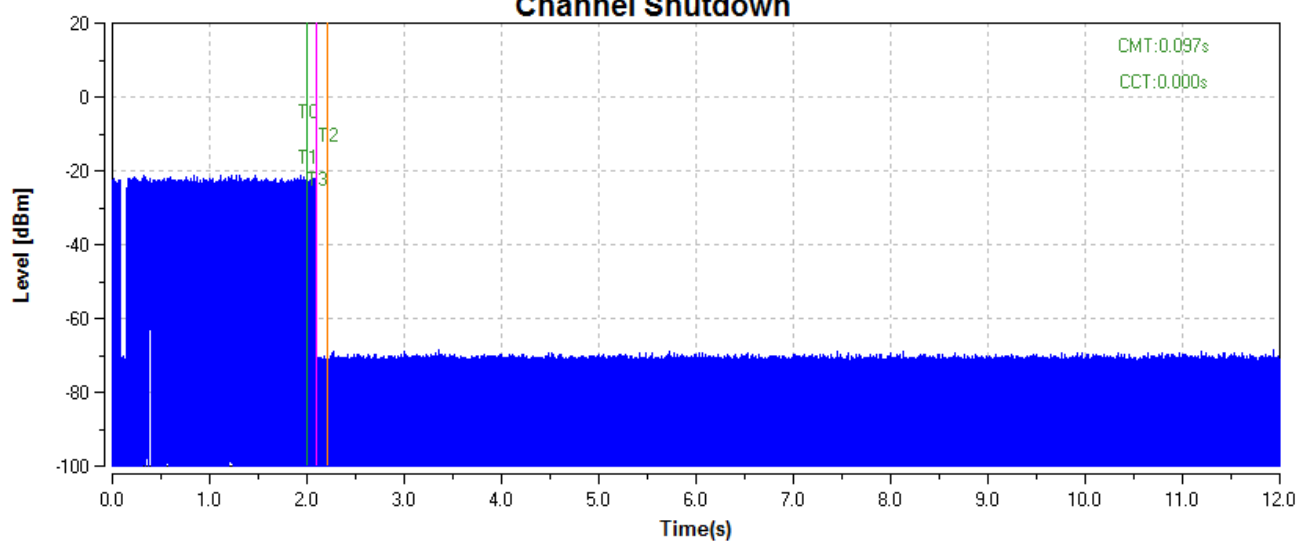
### Radar Type 0 Channel Move Time

#### Channel Shutdown

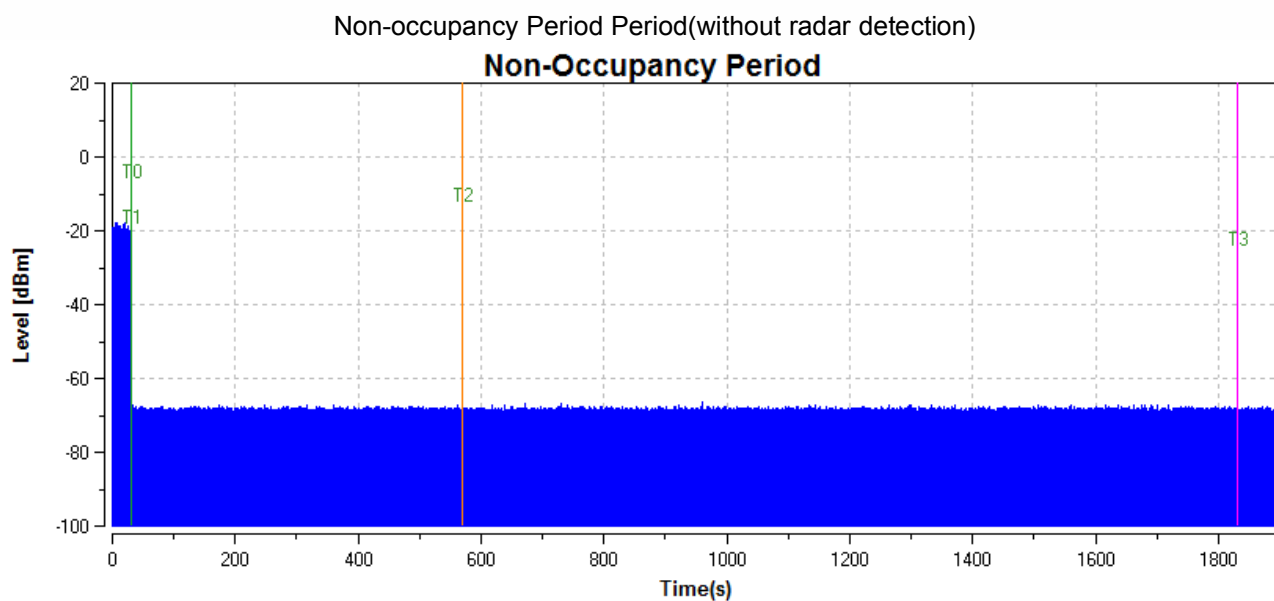


### Radar Type 0 Channel Closing Transmission

#### Channel Shutdown







**Verdict:**

To verify whether channel is unavailable to be operated in 30 minutes.

$1.8\text{ks} = 1800\text{s} = 1800\text{ s/min} / 60 = 30\text{minute}$

## PHOTOGRAPHS OF EUT Constructional Details

Refer to Report No.EED32K00243601 for EUT external and internal photos.

\*\*\* End of Report \*\*\*

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CTI, this report can't be reproduced except in full.