



DFS Test Report

FCC ID: 2A3EJ-AIR&IC: 28090-AIR

Report No. : TBR-C-202310-0075-32
Applicant : Deeper Network Inc.
Equipment Under Test (EUT)
EUT Name : Deeper Connect Air
Model No. : Air
Series Model No. : ----
Brand Name : ----
Sample ID : HC-C-202310-0075-03-01-1#&HC-C-202310-0075-03-01-2#
Receipt Date : 2023-12-08
Test Date : 2023-12-08 to 2024-01-12
Issue Date : 2024-01-12
Standards : FCC Part 15 Subpart E 15.407
RSS-247 Issue 3 August 2023
KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02
KDB 905462 D03 UNII Clients Without Radar Detection New Rules v01r02
Test Method : ANSI C63.10:2013
Conclusions : **PASS**

In the configuration tested, the EUT complied with the standards specified above

Test/Witness Engineer : Wade Lv

Wade Lv

Test/Witness Engineer : Ivan Su

Ivan Su

Approved& Authorized : Ray Lai

Ray Lai



This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

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Revision History

| Report No. | Version | Description | Issued Date |
|----------------------|---------|-------------------------|-------------|
| TBR-C-202310-0075-32 | Rev.01 | Initial issue of report | 2024-01-12 |
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1. General Information about EUT

1.1 Client Information

| | | |
|---------------------|---|---|
| Applicant | : | Deeper Network Inc. |
| Address | : | 5200 Great America pkwy, Santa Clara CA USA 95054 |
| Manufacturer | : | Deeper Network Inc. |
| Address | : | 5200 Great America pkwy, Santa Clara CA USA 95054 |

1.2 General Description of EUT (Equipment Under Test)

| | | |
|---------------------------------|---|--|
| EUT Name | : | Deeper Connect Air |
| HVIN/Models No. | : | Air |
| Model Different | : | ---- |
| Operating Frequency Band | : | <input checked="" type="checkbox"/> 5250-5350MHz |
| | : | <input checked="" type="checkbox"/> 5470-5725MHz |
| TPC | : | <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes |
| Power Rating | : | USB Input: 5V/2A |
| Software Version | : | ---- |
| Hardware Version | : | V1.3 |
| Note | : | This device was functioned as a <input type="checkbox"/> Master <input type="checkbox"/> Slave device with radar detection <input checked="" type="checkbox"/> Slave device without radar detection |

Note:

- (1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- (2) Antenna information provided by the manufacturer.

| Brand | Model Name | Antenna Type | Gain (dBi) | |
|----------|------------|--------------|------------|-------|
| | | | Ant.1 | Ant.2 |
| U-NII-2A | N/A | PCB | 2.24 | 2.24 |
| U-NII-2C | N/A | | 2.97 | 2.97 |



(3)Channel List:

| Frequency Band | Channel No. | Frequency | Channel No. | Frequency |
|---|-------------|-----------|-------------|-----------|
| 5260~5320 MHz (U-NII-2A) | 52 | 5260 MHz | 60 | 5300 MHz |
| | 54 | 5270 MHz | 62 | 5310MHz |
| | 56 | 5280MHz | 64 | 5320 MHz |
| | 58 | 5290MHz | | |
| For 20 MHz Bandwidth, use channel 52, 56, 60, 64. For 40 MHz Bandwidth, use channel 54, 62. For 80 MHz Bandwidth, use channel 58. | | | | |
| Frequency Band | Channel No. | Frequency | Channel No. | Frequency |
| 5500~5720 MHz (U-NII-2C) | 100 | 5500 MHz | 124 | 5620 MHz |
| | 102 | 5510 MHz | 126 | 5630 MHz |
| | 104 | 5520 MHz | 128 | 5640 MHz |
| | 106 | 5530 MHz | 132 | 5660 MHz |
| | 108 | 5540 MHz | 134 | 5670 MHz |
| | 110 | 5550 MHz | 136 | 5680 MHz |
| | 112 | 5560 MHz | 138 | 5690 MHz |
| | 116 | 5580 MHz | 140 | 5700 MHz |
| | 118 | 5590 MHz | 142 | 5710 MHz |
| | 120 | 5600 MHz | 144 | 5720 MHz |
| | 122 | 5610 MHz | | |
| For 20 MHz Bandwidth, use channel 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140, 144 For 40 MHz Bandwidth, use channel 102, 110, 118, 126, 134, 142 For 80 MHz Bandwidth, use channel 106, 122, 138 | | | | |
| Note: For the protection of Environment, the 5600-5650MHz band restricted in Canada. So the CH 188/120/122/124/126/128 was restricted use in Canada. | | | | |



1.5 Test Facility

The testing report were performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at 1/F., Building 6, Rundongsheng Industrial Zone, Longzhu, Xixiang, Bao'an District, Shenzhen, Guangdong, China. At the time of testing, the following bodies accredited the Laboratory:

CNAS (L5813)

The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

A2LA Certificate No.: 4750.01

The laboratory has been accredited by American Association for Laboratory Accreditation(A2LA) to ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories for the technical competence in the field of Electrical Testing. And the A2LA Certificate No.: 4750.01.FCC Accredited Test Site Number: 854351. Designation Number: CN1223.

IC Registration No.: (11950A)

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A. CAB identifier: CN0056.

2. Test Software

| Test Item | Test Software | Manufacturer | Version No. |
|--------------------------|---------------|--------------|-------------|
| RF Conducted Measurement | MTS-8310 | MWRFtest | V2.0.0.0 |
| RF Test System | JS1120 | Tonscend | V3.2.22 |



3. Test Equipment

| Antenna Conducted Emission | | | | | |
|---|--------------------|-------------------|---------------|---------------|---------------|
| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Due Date |
| Spectrum Analyzer | Agilent | E4407B | MY45106456 | Jun. 20, 2023 | Jun. 19, 2024 |
| Spectrum Analyzer | Rohde & Schwarz | FSV40-N | 102197 | Jun. 20, 2023 | Jun. 19, 2024 |
| MXA Signal Analyzer | KEYSIGHT | N9020B | MY60110172 | Aug. 30, 2023 | Aug. 29, 2024 |
| MXA Signal Analyzer | Agilent | N9020A | MY47380425 | Aug. 30, 2023 | Aug. 29, 2024 |
| Vector Signal Generator | Agilent | N5182A | MY50141294 | Aug. 30, 2023 | Aug. 29, 2024 |
| Analog Signal Generator | Agilent | N5181A | MY48180463 | Aug. 30, 2023 | Aug. 29, 2024 |
| Vector Signal Generator | KEYSIGHT | N5182B | MY59101429 | Aug. 30, 2023 | Aug. 29, 2024 |
| Analog Signal Generator | KEYSIGHT | N5173B | MY61252685 | Aug. 30, 2023 | Aug. 29, 2024 |
| RF Power Sensor | DARE!! Instruments | RadiPowerRPR3006W | 17I00015SNO26 | Aug. 30, 2023 | Aug. 29, 2024 |
| | DARE!! Instruments | RadiPowerRPR3006W | 17I00015SNO29 | Aug. 30, 2023 | Aug. 29, 2024 |
| | DARE!! Instruments | RadiPowerRPR3006W | 17I00015SNO31 | Aug. 30, 2023 | Aug. 29, 2024 |
| | DARE!! Instruments | RadiPowerRPR3006W | 17I00015SNO33 | Aug. 30, 2023 | Aug. 29, 2024 |
| RF Control Unit | Tonsced | JS0806-1 | 21C8060380 | N/A | N/A |
| RF Control Unit | Tonsced | JS0806-2 | 21F8060439 | Aug. 30, 2023 | Aug. 29, 2024 |
| Power Control Box | Tonsced | JS0806-4ADC | 21C8060387 | N/A | N/A |
| Wideband Radio Communication Tester | Rohde & Schwarz | CMW500 | 144382 | Aug. 30, 2023 | Aug. 29, 2024 |
| Universal Radio Communication Tester | Rohde&Schwarz | CMW500 | 168796 | Feb. 23, 2023 | Feb.22, 2024 |
| Temperature and Humidity Chamber | ZhengHang | ZH-QTH-1500 | ZH2107264 | Jun. 20, 2023 | Jun. 19, 2024 |



4. U-NII DFS Rule Requirements

4.1. Applicability of DFS requirements

The manufacturer shall state whether the UUT is capable of operating as a Master and/or a Client. If the UUT is capable of operating in more than one operating mode then each operating mode shall be tested separately. See tables 1 and 2 for the applicability of DFS requirements for each of the operational modes.

Table 1: Applicability of DFS requirements prior to use a channel

| Requirement | Operational Mode | | |
|---------------------------------|---------------------------------|--|--|
| | <input type="checkbox"/> Master | <input checked="" type="checkbox"/> Client without radar detection | <input type="checkbox"/> Client with radar detection |
| Non-Occupancy Period | ✓ | Not required | ✓ |
| DFS Detection Threshold | ✓ | Not required | ✓ |
| Channel Availability Check Time | ✓ | Not required | Not required |
| Uniform Spreading | ✓ | Not required | Not required |
| U-NII Detection Bandwidth | ✓ | Not required | ✓ |

Table 2: Applicability of DFS requirements during normal operation

| Requirement | Operational Mode | | |
|-----------------------------------|---------------------------------|--|--|
| | <input type="checkbox"/> Master | <input checked="" type="checkbox"/> Client without radar detection | <input type="checkbox"/> Client with radar detection |
| DFS Detection Threshold | ✓ | Not required | ✓ |
| Channel Closing Transmission Time | ✓ | ✓ | ✓ |
| Channel Move Time | ✓ | ✓ | ✓ |
| U-NII Detection Bandwidth | ✓ | Not required | ✓ |



| Additional requirements for devices with multiple bandwidth modes | <input type="checkbox"/> Master Device or Client with Radar Detection | <input checked="" type="checkbox"/> Client without Detection |
|--|---|--|
| Detection Bandwidth and Statistical Performance Check | All BW modes must be tested | Not required |
| Channel Move Time and Channel Closing Transmission Time | Test using widest BW mode available | Test using widest BW mode available |
| All other tests | Any single BW mode | Not required |
| Note: Frequencies selected for statistical performance check (section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20MHz channels and the channel center frequency. | | |

4.2. Test Limits and Radar Signal Parameters

DETECTION THRESHOLD VALUES

Table 5: DFS Detection Thresholds for Master Devices and Client Devices with Radar Detection.

| Maximum Transmit Power | Value (See Notes 1 and 2) |
|--|------------------------------|
| EIRP \geq 200 milliwatt | -64 dBm |
| EIRP < 200 milliwatt and Power pectral 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.



Table 6: DFS Response Requirement Values

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



PARAMETERS OF DFS TEST SIGNALS

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.

Table 7: 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 |
| Note 1: 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.



Table 7a: Pulse Repetition Intervals Values for Test A.

| Pulse Repetition Frequency Number | Pulse Repetition Frequency (Pulses Per Second) | Pulse Repetition Interval (Microseconds) |
|--|---|---|
| 1 | 1930.5 | 518 |
| 2 | 1858.7 | 538 |
| 3 | 1792.1 | 558 |
| 4 | 1730.1 | 578 |
| 5 | 1672.2 | 598 |
| 6 | 1618.1 | 618 |
| 7 | 1567.4 | 638 |
| 8 | 1519.8 | 658 |
| 9 | 1474.9 | 678 |
| 10 | 1432.7 | 698 |
| 11 | 1392.8 | 718 |
| 12 | 1355 | 738 |
| 13 | 1319.3 | 758 |
| 14 | 1285.3 | 778 |
| 15 | 1253.1 | 798 |
| 16 | 1222.5 | 818 |
| 17 | 1193.3 | 838 |
| 18 | 1165.6 | 858 |
| 19 | 1139 | 878 |
| 20 | 1113.6 | 898 |
| 21 | 1089.3 | 918 |
| 22 | 1066.1 | 938 |
| 23 | 326.2 | 3066 |

Table 8: 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 (The center frequency for each of the 30 trials of the Bin 5 radar shall be randomly selected within 80% of the Occupied Bandwidth.) 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.

Table 9: Frequency Hopping Radar Test Waveform

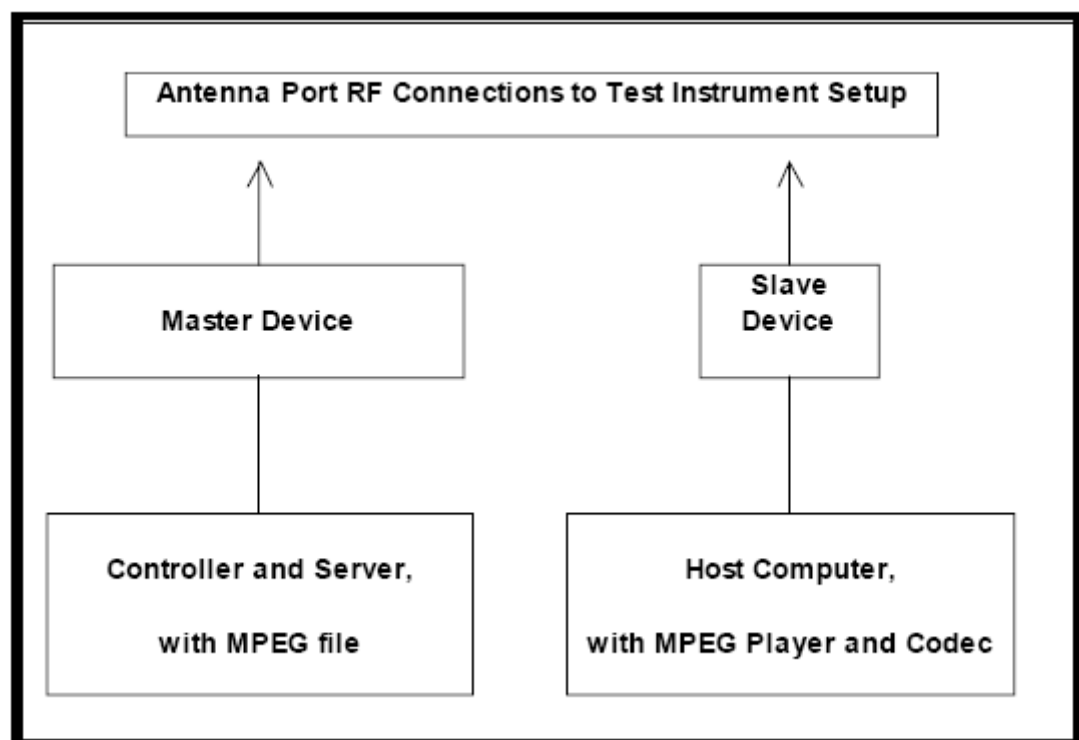
| Radar Type | Pulse Width (μsec) | Chirp Width (MHz) | PRI (μsec) | Number of Pulses per Burst | Number of Bursts | Minimum Percentage of Successful Detection | Minimum Number of Trials |
|------------|--------------------|-------------------|------------|----------------------------|------------------|--|--------------------------|
| 6 | 1 | 333 | 9 | 0.333 | 300 | 70% | 30 |



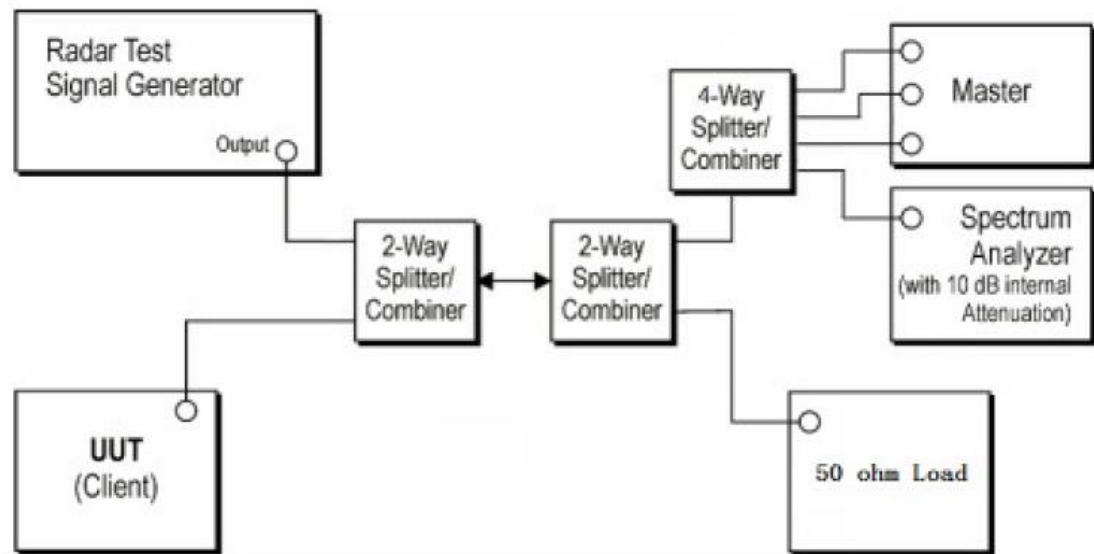
5. Calibration of Radar Waveform

5.1. Test Procedure

1. 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.
2. 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.
3. 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.
4. 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.



5.2. Conducted Calibration Test Setup



5.3. Deviation from Test Standard

No Deviation

5.4. Radar Waveform Calibration Result

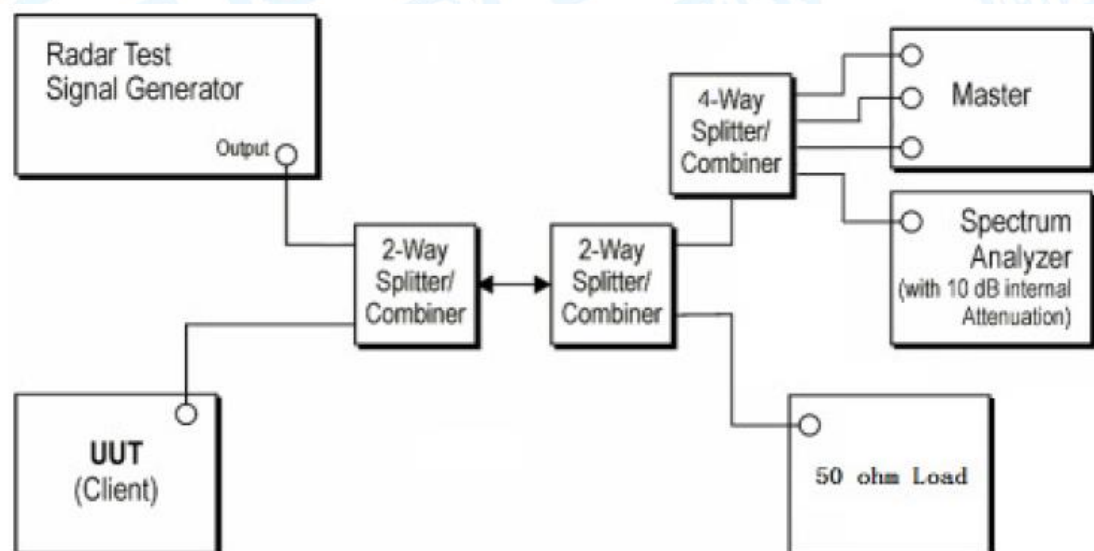


6. U-NII DFS Testing

6.1. Test Procedure

1. Master device and client device are set up by conduction method as the following configuration.
2. The client device is connected to notebook and to access a IP address on wireless connection with the master device.
3. Then the master device is connected to another notebook to access a IP address.
4. Finally, let the two IP addresses run traffic with each other through the Run flow software “Lan test” to reach 17% channel loading as below:

6.2. Test Setup



7. Testing Results

7.1. Summary of Test Results

| Clause | Test Parameter | Remarks | Pass/Fail |
|---|-----------------------------------|-------------------|-------------|
| 15.407 | DFS Detection Threshold | No Applicable | N/A |
| 15.407 | Channel Availability Check Time | Not Applicable | N/A |
| 15.407 | Channel Move Time | Applicable | Pass |
| 15.407 | Channel Closing Transmission Time | Applicable | Pass |
| 15.407 | Non- Occupancy Period | Applicable | Pass |
| 15.407 | Uniform Spreading | Not Applicable | N/A |
| 15.407 | U-NII Detection Bandwidth | Not Applicable | N/A |
| Test Mode | | | |
| The EUT is slave equipment, it need a master device when testing. Master with injection at the Master. (Radar Test Waveforms are injected into the Master) | | | |

7.2. DFS Detection Threshold

Calibration:

The EUT is slave equipment and it with a max gain is **2.97**dBi.

For a detection threshold level of -62dBm and the master (**Brand: ZTE, Model: ZXHN H389A, FCC ID: Q78-ZXHNH389A**) antenna gain is 3dBi, required detection threshold is

-59.00dBm= $(-62+3.0)$ dBm.

Note: Maximum Transmit Power is less than 200milliwatt in this report, so detection threshold level is -62dBm.

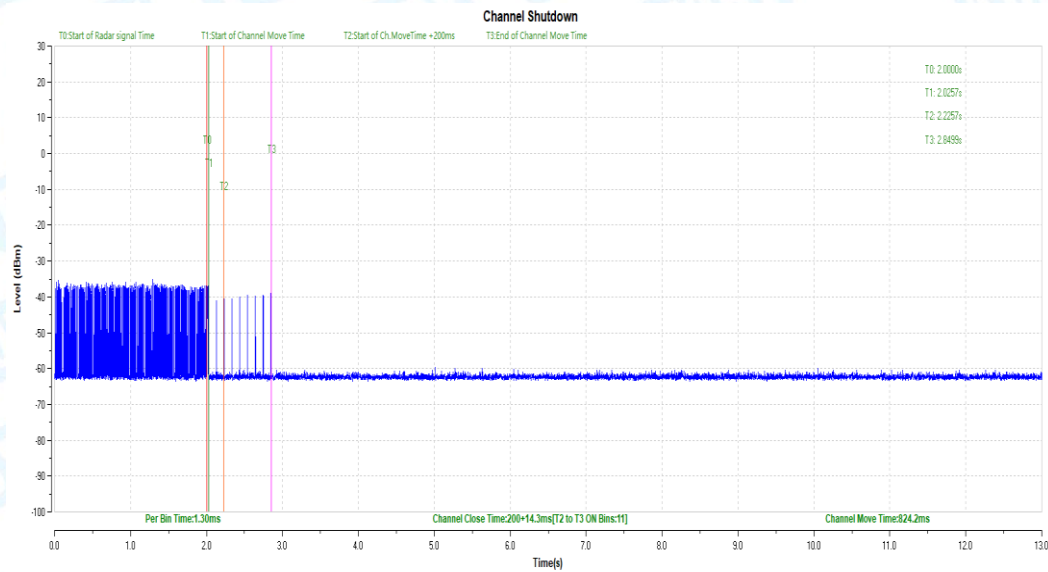


7.3. Channel Closing Transmission Time

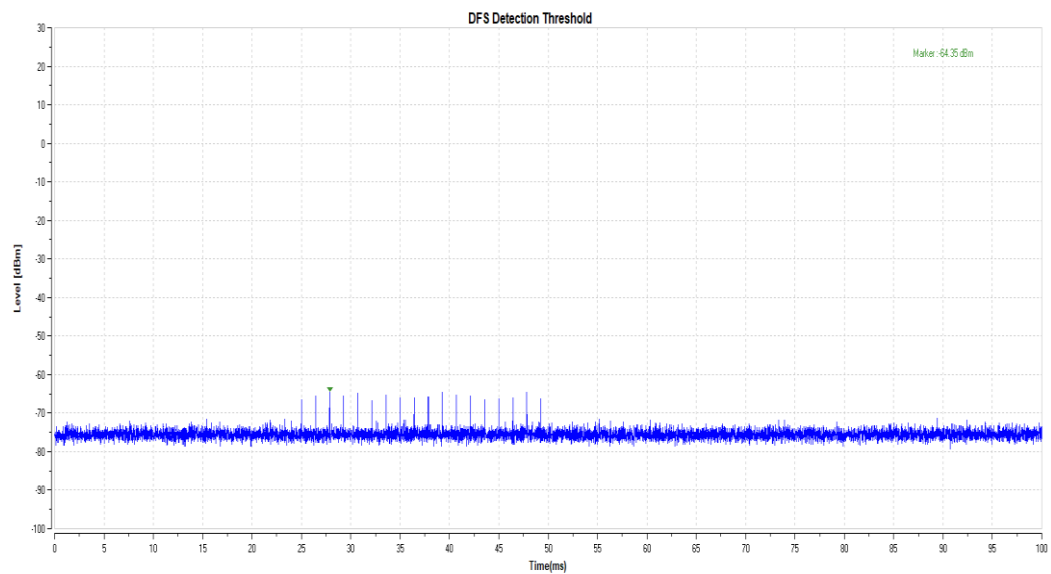
| Channel Closing Transmission Time and Channel Move Time Result | | | | | | |
|--|----------------|----------|-----------|---------|-----------|---------|
| Test Mode | Frequency[MHz] | CCTT[ms] | Limit[ms] | CMT[ms] | Limit[ms] | Verdict |
| 11AC80 | 5290 | 200+14.3 | 200+60 | 824.2 | 10000 | PASS |
| | 5530 | 200+11.7 | 200+60 | 774.8 | 10000 | PASS |



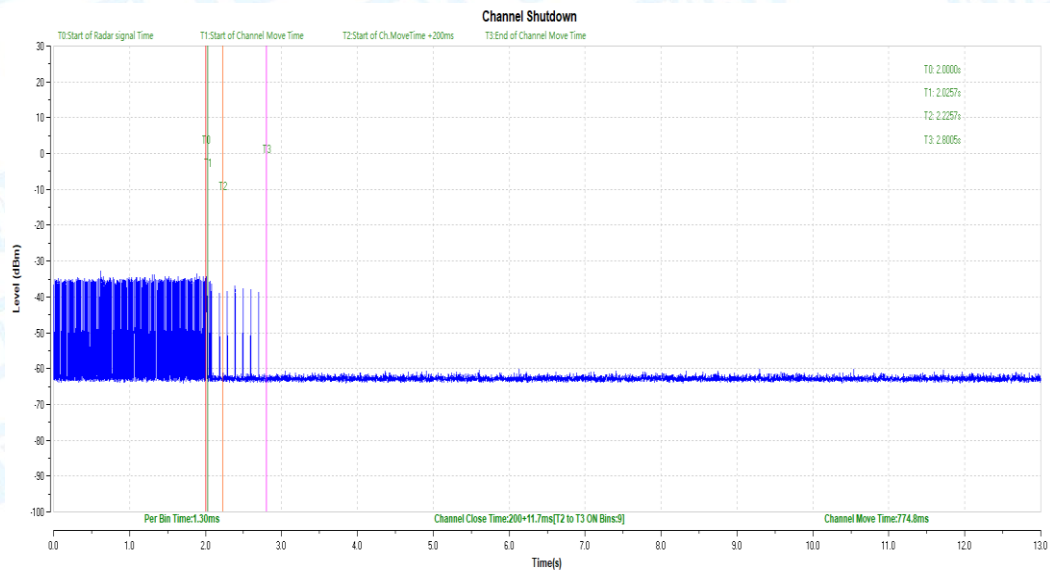
TX (11ac 80MHz Mode)_5290MHz Radar Signal 0



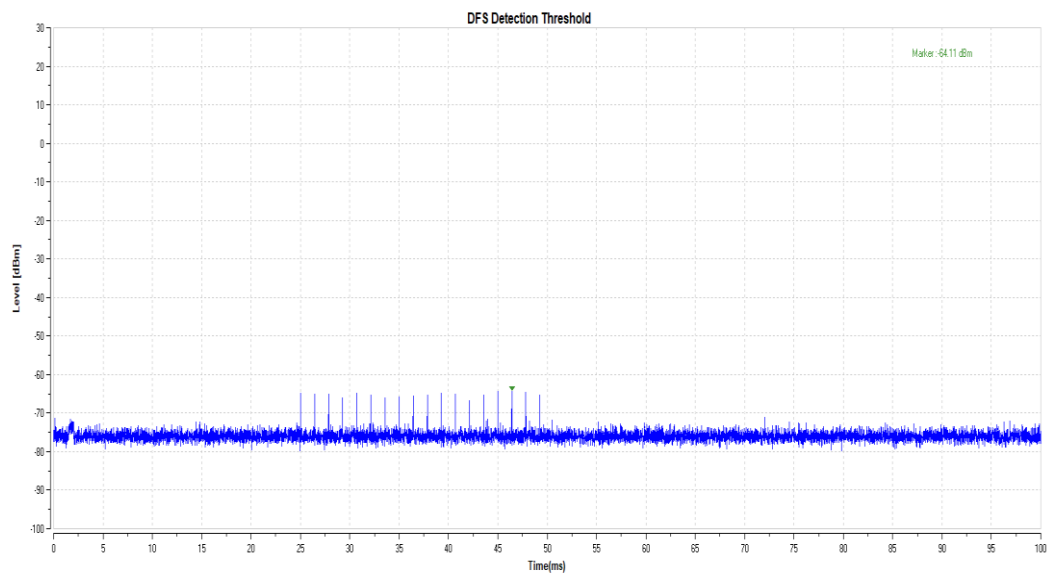
Cablibration Plots



TX (11ac 80MHz Mode)_5530MHz Radar Signal 0

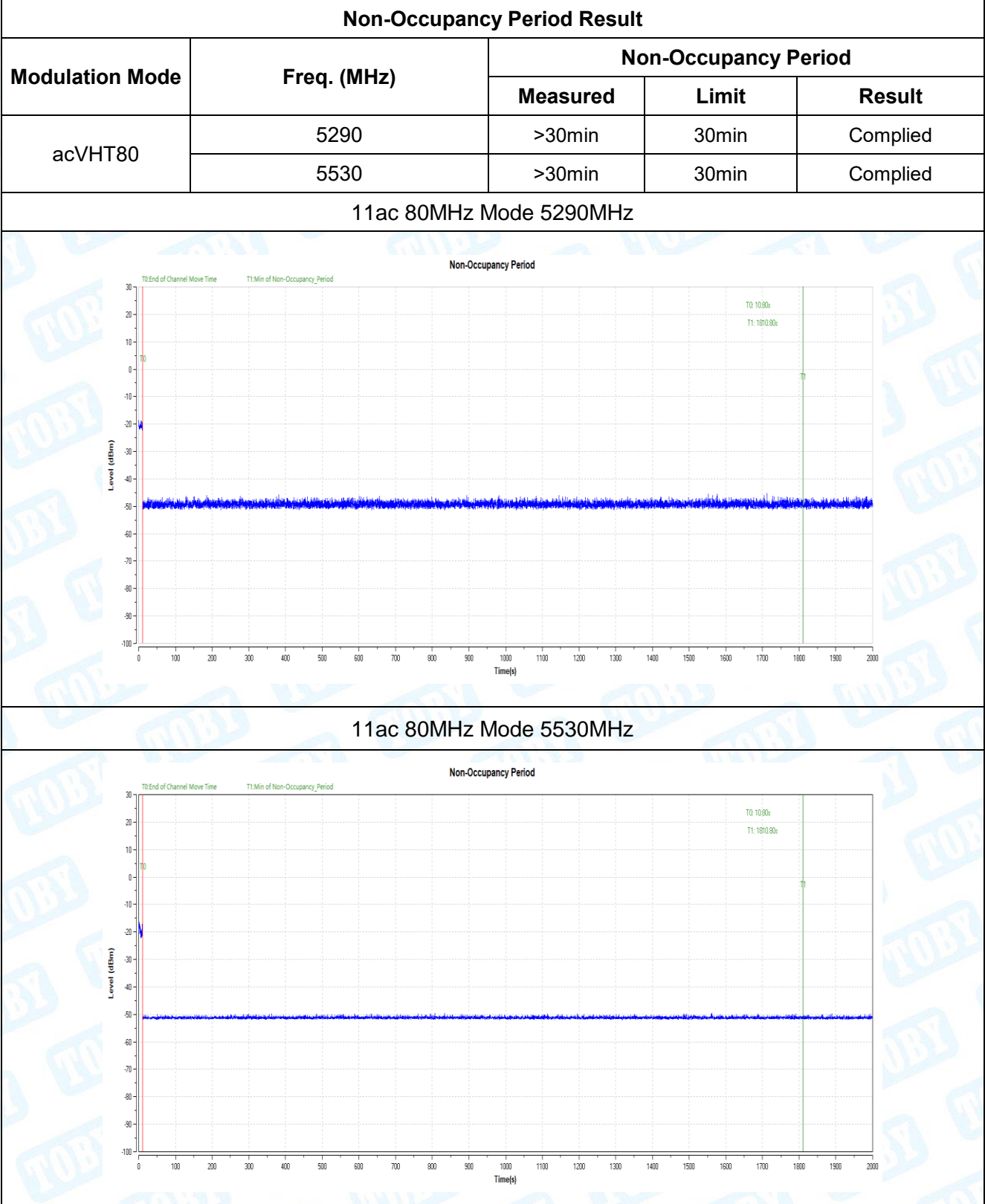


Cablibration Plots



7.4. Non-occupancy Period

During the 30 minutes observation time, UUT did not make any transmissions on a channel after a radar signal was detected on that channel by either the Channel Availability Check or the In-Service Monitoring.



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

