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Report No.: 1503RSU02903
Report Version: V01
Issue Date: 06-17-2015

# DFS MEASUREMENT REPORT
## FCC PART 15.407

| | |
|---|---|
| **FCC ID:** | TK4WLE600VX |
| **APPLICANT:** | Compex Systems Pte Ltd |
| **Application Type:** | Certification |
| **Product:** | 802.11ac Dual Band Module |
| **Model No.:** | WLE600VX |
| **Brand Name:** | COMPEX |
| **FCC Classification:** | Unlicensed National Information Infrastructure (UNII) |
| **FCC Rule Part(s):** | Part 15.407(h)(2), KDB 905462 D02v01r02, KDB 905462 D03v01r01, KDB 905462 D04v01 |
| **Type of Device:** | ☐ Master Device<br>☒ Client Device without radar detection<br>☐ Client Device with radar detection |
| **Test Date:** | Mar. 16 ~ Jun. 17, 2015 |

Reviewed By : Robin Wu
( Robin Wu )

Approved By : Marlinchen
( Marlin Chen )

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

The test results relate only to the samples tested.
This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in KDB 905462 D02v01r02. Test results reported herein relate only to the item(s) tested.
The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

# Revision History

| Report No. | Version | Description | Issue Date |
|---|---|---|---|
| 1503RSU02903 | Rev. 01 | Initial report | 06-17-2015 |
| | | | |

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## §2.1033 General Information

| | |
|---|---|
| **Applicant:** | Compex Systems Pte Ltd |
| **Applicant Address:** | 135, Joo Seng Road, #08-01 Singapore 368363 |
| **Manufacturer:** | Compex Systems Pte Ltd |
| **Manufacturer Address:** | 135, Joo Seng Road, #08-01 Singapore 368363 |
| **Test Site:** | MRT Technology (Suzhou) Co., Ltd |
| **Test Site Address:** | D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China |
| **MRT FCC Registration No.:** | 809388 |
| **Model No.:** | WLE600VX |
| **FCC ID:** | TK4WLE600VX |
| **Test Device Serial No.:** | N/A ☐ Production ☒ Pre-Production ☐ Engineering |

### Test Facility / Accreditations

**Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.**

- **MRT facility is a FCC registered (MRT Reg. No. 809388) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules.**
- **MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.**
- **MRT facility is a VCCI registered (R-4179, G-814, C-4664, T-2206) test laboratory with the site description on file at VCCI Council.**
- **MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications and Radio testing for FCC, Industry Canada, EU and TELEC Rules.**

American Association for Laboratory Accreditation

Accredited Laboratory

A2LA has accredited

MRT TECHNOLOGY (SUZHOU) CO., LTD.

Suzhou, China

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).

Presented this 17th day of June 2014.

President & CEO
For the Accreditation Council
Certificate Number 3628.01
Valid to August 31, 2016

*For the term to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.*

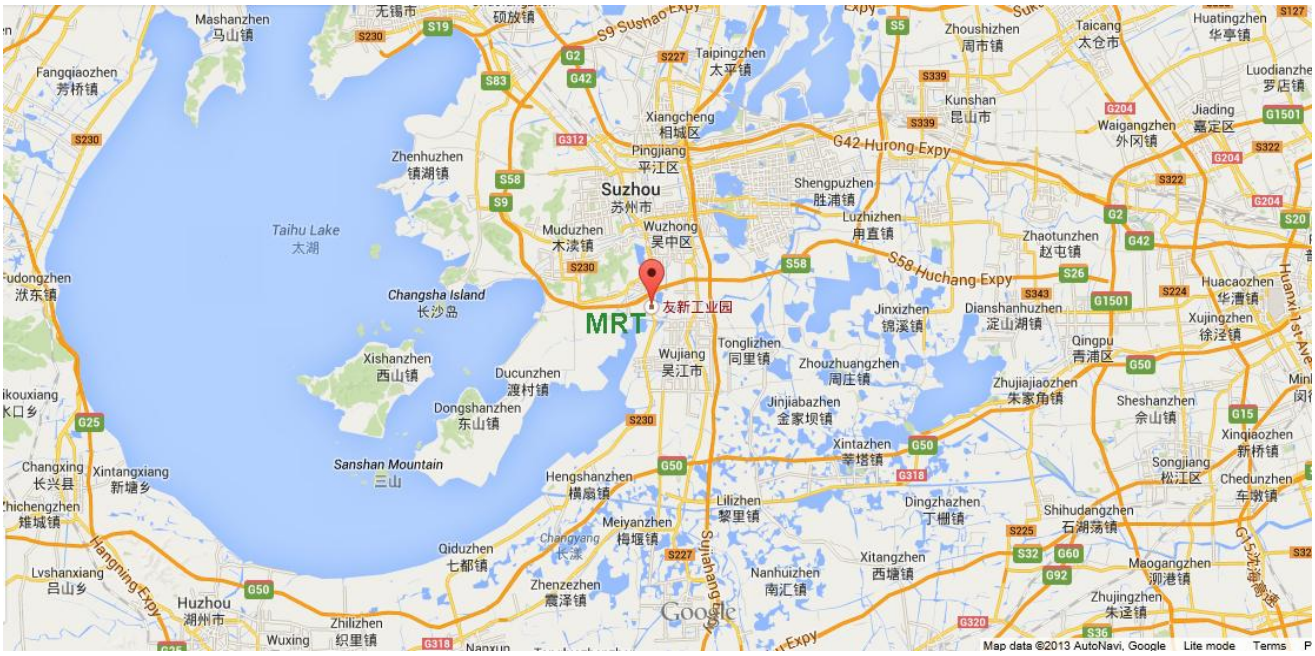
# 1. INTRODUCTION

## 1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

## 1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2009 on September 30, 2013.



# 2. PRODUCT INFORMATION

## 2.1. Equipment Description

| | |
|---|---|
| Product Name | 802.11ac Dual Band Module |
| Model No. | WLE600VX |
| Radio Type | Intentional Transceiver |
| Operation Mode | Client device without radar detection |
| Frequency Range | For 802.11a/n-HT20:<br>5260~5320MHz, 5500~5700MHz<br>For 802.11ac-VHT20:<br>5260~5320MHz, 5500~5720MHz<br>For 802.11n-HT40:<br>5270~5310MHz, 5510~5670MHz<br>For 802.11ac-VHT40:<br>5270~5310MHz, 5510~5710MHz<br>For 802.11ac-VHT80:<br>5290MHz, 5530MHz, 5610MHz, 5690MHz |
| Maximum EIRP | 23.90dBm |
| Minimum EIRP | 29.91dBm |
| Type of Modulation | 802.11a/n/ac: OFDM; |
| Uniform Spreading | For the 5250-5350MHz, 5470-5725MHz bands, the Master device provides, on aggregate, uniform loading of the spectrum across all devices by selecting an operating channel among the available channels using a random algorithm. |

## 2.2. DFS Band Carrier Frequencies Operation

802.11a/n Center Working Frequency of Each Channel

| Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---|---|---|---|---|---|
| 52 | 5260 MHz | 56 | 5280 MHz | 60 | 5300 MHz |
| 64 | 5320 MHz | 100 | 5500 MHz | 104 | 5520 MHz |
| 108 | 5540 MHz | 112 | 5560 MHz | 116 | 5580 MHz |
| 120 | 5600 MHz | 124 | 5620 MHz | 128 | 5640 MHz |
| 132 | 5660 MHz | 136 | 5680 MHz | 140 | 5700 MHz |

802.11ac-VHT20 Center Working Frequency of Each Channel

| Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---|---|---|---|---|---|
| 52 | 5260 MHz | 56 | 5280 MHz | 60 | 5300 MHz |
| 64 | 5320 MHz | 100 | 5500 MHz | 104 | 5520 MHz |
| 108 | 5540 MHz | 112 | 5560 MHz | 116 | 5580 MHz |
| 120 | 5600 MHz | 124 | 5620 MHz | 128 | 5640 MHz |
| 132 | 5660 MHz | 136 | 5680 MHz | 140 | 5700 MHz |
| 144 | 5720 MHz | N/A | N/A | N/A | N/A |

802.11n-HT40 Center Working Frequency of Each Channel

| Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---|---|---|---|---|---|
| 54 | 5270 MHz | 62 | 5310 MHz | 102 | 5510 MHz |
| 110 | 5550 MHz | 118 | 5590 MHz | 126 | 5630 MHz |
| 134 | 5670 MHz | N/A | N/A | N/A | N/A |

802.11ac-VHT40 Center Working Frequency of Each Channel

| Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---|---|---|---|---|---|
| 54 | 5270 MHz | 62 | 5310 MHz | 102 | 5510 MHz |
| 110 | 5550 MHz | 118 | 5590 MHz | 126 | 5630 MHz |
| 134 | 5670 MHz | 142 | 5710MHz | N/A | N/A |

| 802.11ac-VHT80 Center Working Frequency of Each Channel | | | | | |
|---|---|---|---|---|---|
| Channel | Frequency | Channel | Frequency | Channel | Frequency |
| 58 | 5290 MHz | 106 | 5530 MHz | 122 | 5610 MHz |
| 138 | 5690 MHz | N/A | N/A | N/A | N/A |

## 2.3. Description of Available Antennas

| Antenna Type | Manufacturer | Tx Paths | Max Directional Gain (dBi) |
|---|---|---|---|
| Panel Antenna 1# | Compex Systems Pte Ltd | 3 | 2.4GHz: 11.0 |
| Panel Antenna 2# | Kenbotong Communication LTD | 3 | 2.4GHz: 10.0<br>5GHz: 10.0 |
| Panel Antenna 3# | Smart Ant Inc | 3 | 2.4GHz: 7.0<br>5GHz: 7.0 |
| Panel Antenna 4# | TAOGLAS Inc | 3 | 2.4GHz: 4.5<br>5GHz: 6.7 |
| Panel Antenna 5# | Compex Systems Pte Ltd | 3 | 2.4GHz: 5.0<br>5GHz: 5.0 |
| Panel Antenna 6# | Compex Systems Pte Ltd | 3 | 2.4GHz: 5.0<br>5GHz: 5.0 |
| Dipole Antenna 1# | Kunshan Wavelink Electronic Co., Ltd. | 3 | 2.4GHz: 2.0<br>5GHz: 2.0 |

Note 1: The device didn't support transmit beam-forming mode and Cyclic Delay Diversity (CDD) mode, and the transmit signals are uncorrected, so no add array gain to the band power and band PSD.

Note 2: 5.725~5.850GHz band use the max antenna gain 10dBi, 5.15~5.35GHz and 5.470~5.725GHz bands use the max antenna gain 7dBi which are declared by the applicant.

Note 3: In the conducted testing, the antenna ports (0/1) were used for the tests and -64dBm was used as DFS detection threshold values.

## 2.4. Test Mode

| Test Mode | Mode 1: Communication |
|---|---|

# 3. DFS DETECTION THRESHOLDS AND RADAR TEST WAVEFORMS

## 3.1. Applicability

The following table from FCC KDB 905462 D02 UNII DFS Compliance Procedures New Rules v01r02 lists the applicable requirements for the DFS testing.

| 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 |
| U-NII Detection Bandwidth | Yes | Not required | Yes |

**Table 3-1: Applicability of DFS Requirements Prior to Use of a Channel**

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

| Additional requirements for devices with multiple bandwidth modes | Master Device or Client with Radar Detection | Client Without Radar Detection |
|---|---|---|
| U-NII 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 the widest BW mode available for the link |
| All other tests | Any single BW mode | Not required |
| Note: Frequencies selected for statistical performance check 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 20 MHz channels and the channel center frequency. | | |

**Table 3-2: Applicability of DFS Requirements during normal operation**

## 3.2. DFS Devices Requirements

**Per FCC KDB 905462 D02 UNII DFS Compliance Procedures New Rules v01r02 the following are the requirements for Client Devices:**

a) A Client Device will not transmit before having received appropriate control signals from a Master Device.

b) 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.

c) 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.

d) Irrespective of Client Device or Master Device detection the Channel Move Time and Channel Closing Transmission Time requirements remain the same.

e) 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.

**Channel Move Time and Channel Closing Transmission Time requirements are listed in the following table.**

| 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 period.<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.<br>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.<br>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. |

**Table 3-3: DFS Response Requirements**

## 3.3. DFS Detection Threshold Values

The DFS detection thresholds are defined for Master devices and Client Devices with In-service monitoring. These detection thresholds are listed in the following table.

| **Maximum Transmit Power** | **Value**<br>**(See Notes 1, 2, and 3)** |
|---|---|
| EIRP ≥ 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 requirement | -64 dBm |
| **Note 1:** This is the level at the input of the receiver assuming a 0 dBi receive antenna.<br>**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.<br>**Note3:** EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01. | |

**Table 3-4: Detection Thresholds for Master Devices and Client Devices with Radar Detection**

## 3.4. Parameters of DFS Test Signals

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.

**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 3-6 | $\text{Roundup}\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot 10^6}{\text{PRI}_{\text{usec}}}\right)\right\}$ | 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. | | | | | |

**Table 3-5: Parameters for Short Pulse Radar Waveforms**

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.

| 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 3-6: Pulse Repetition Intervals Values for Test A**

**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 |

**Table 3-7: Parameters for Long Pulse Radar Waveforms**

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.

**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 |

**Table 3-8: Parameters for Frequency Hopping Radar Waveforms**

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 – 5724MHz. 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.

## 3.5. Conducted Test Setup

The FCC KDB 905462 D02 UNII DFS Compliance Procedures New Rules v01r02 describes a radiated test setup and a conducted test setup. The conducted test setup was used for this testing. Figure 3-1 shows the typical test setup.

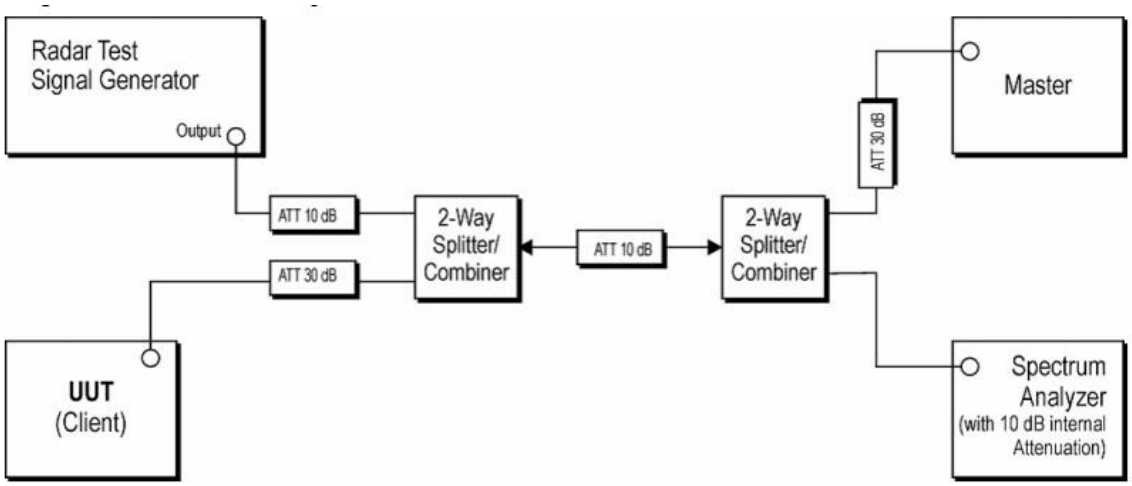
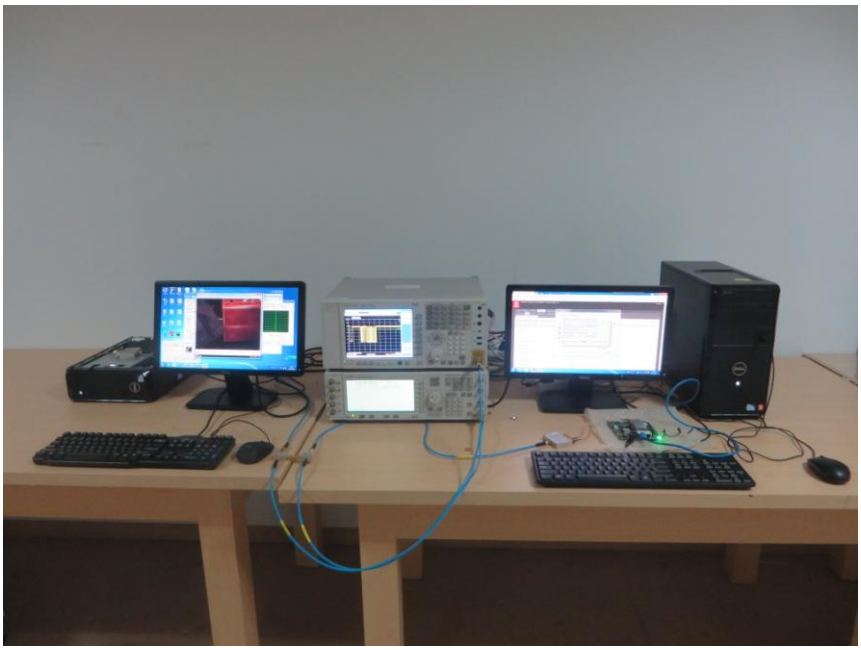



**Figure 3-1: Conducted Test Setup where UUT is a Client and Radar Test Waveforms are injected into the Masters**

**DFS Test Set-up Photo**



| Master Device | Manufacturer | Type No. | FCC ID |
|---|---|---|---|
| Wireless LAN Access Point | HP | JG993A | O9C-BJNGAFB0004 |

# 4. TEST EQUIPMENT CALIBRATION DATE

Dynamic Frequency Selection (DFS)

| Instrument | Manufacturer | Type No. | Serial No. | Cali. Due Date |
|---|---|---|---|---|
| Spectrum Analyzer | Agilent | N9020A | MRTSUE06106 | 2016/04/23 |
| ESG Vector Signal Generator | Agilent | E4438C | MRTSUE06026 | 2015/12/09 |
| Temperature/Humidity Meter | Ouleinuo | N/A | MRTSUE06112 | 1 year |

| Software | Version | Manufacturer | Function |
|---|---|---|---|
| Pulse Building | N/A | Agilent | Radar Signal Generation Software |
| DFS Tool | V 6.9.2 | Agilent | DFS Test Software |

# 5. TEST RESULT

## 5.1. Summary

**Product Name:** **802.11ac Dual Band Module**

**FCC ID:** **TK4WLE600VX**

**FCC Classification:** **Unlicensed National Information Infrastructure (UNII)**

| Parameter | Limit | Test Result | Reference |
|---|---|---|---|
| Channel Move Time, Channel Closing Transmission Time, Non-Occupancy Period | Refer Table 3-3 | Pass | Section 5.4 |

## 5.2. Radar Waveform Calibration

### 5.2.1. Calibration Setup

The conducted test setup was used for this calibration testing. Figure 3-2 shows the typical test setup.

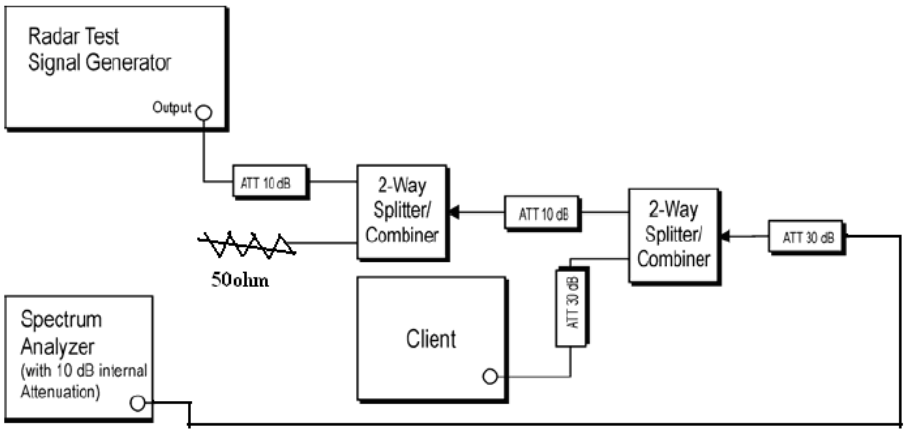


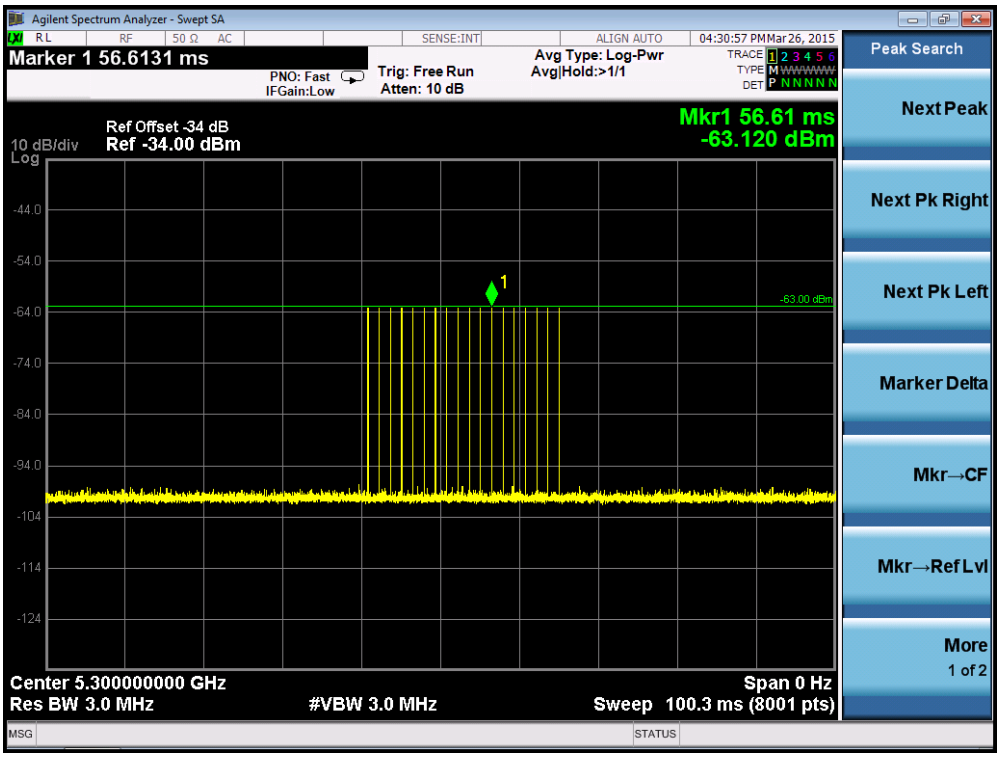

**Figure 3-2: Conducted Test Setup**

### 5.2.2. Calibration Procedure

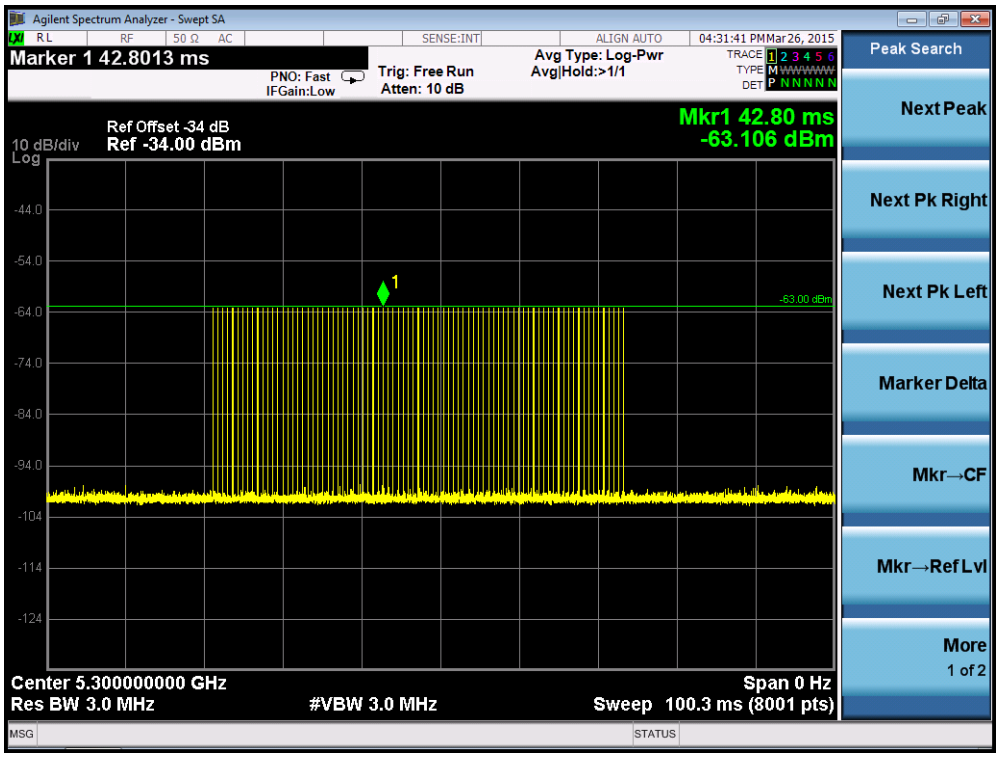
The Interference Radar Detection Threshold Level is (-64dBm) + (0) [dBi] + 1 dB= -63 dBm that had been taken into account the output power range and antenna gain. The above equipment setup was used to calibrate the conducted Radar Waveform. A vector signal generator was utilized to establish the test signal level for each radar type. During this process there were replace 50ohm terminal form 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 used. The spectrum analyzer resolution bandwidth (RBW) and video bandwidth (VBW) were set to at least 3MHz. The vector signal generator amplitude was set so that the power level measured at the spectrum analyzer was (-64dBm) + (0) [dBi] + 1 dB= -63dBm. Capture the spectrum analyzer plots on short pulse radar types, long pulse radar type and hopping radar waveform.

### 5.2.3. Cablibration Result

Radar #0 DFS detection threshold level and the burst of pulses on the Channel frequency

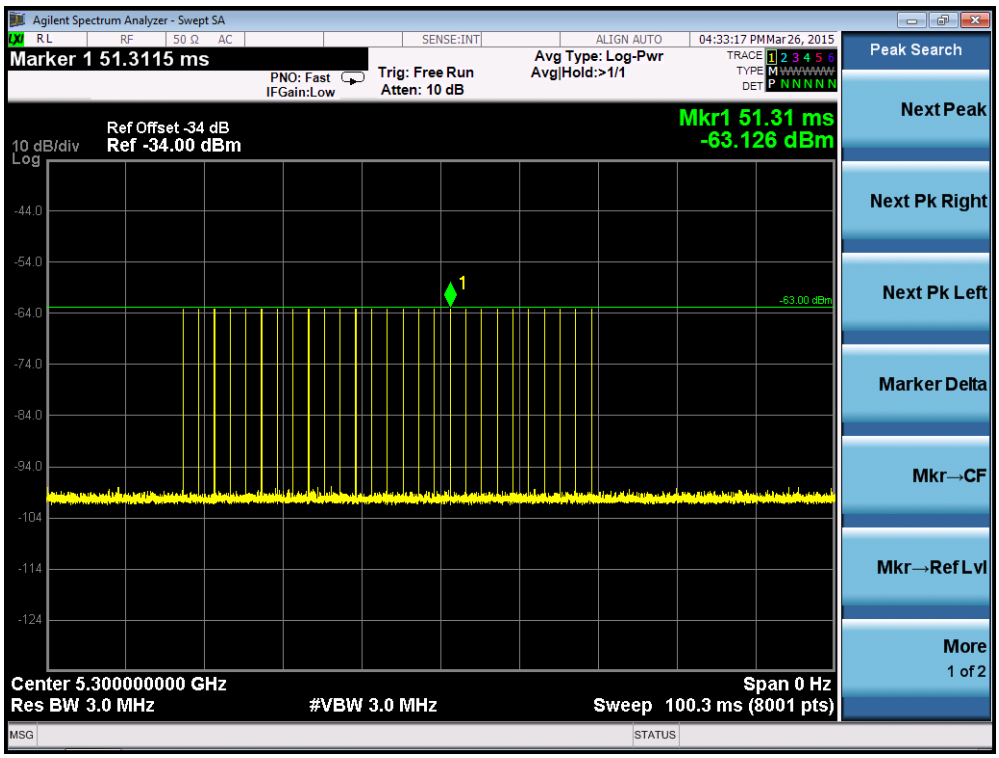



Radar #1(Test A) DFS detection threshold level and the burst of pulses on the Channel frequency



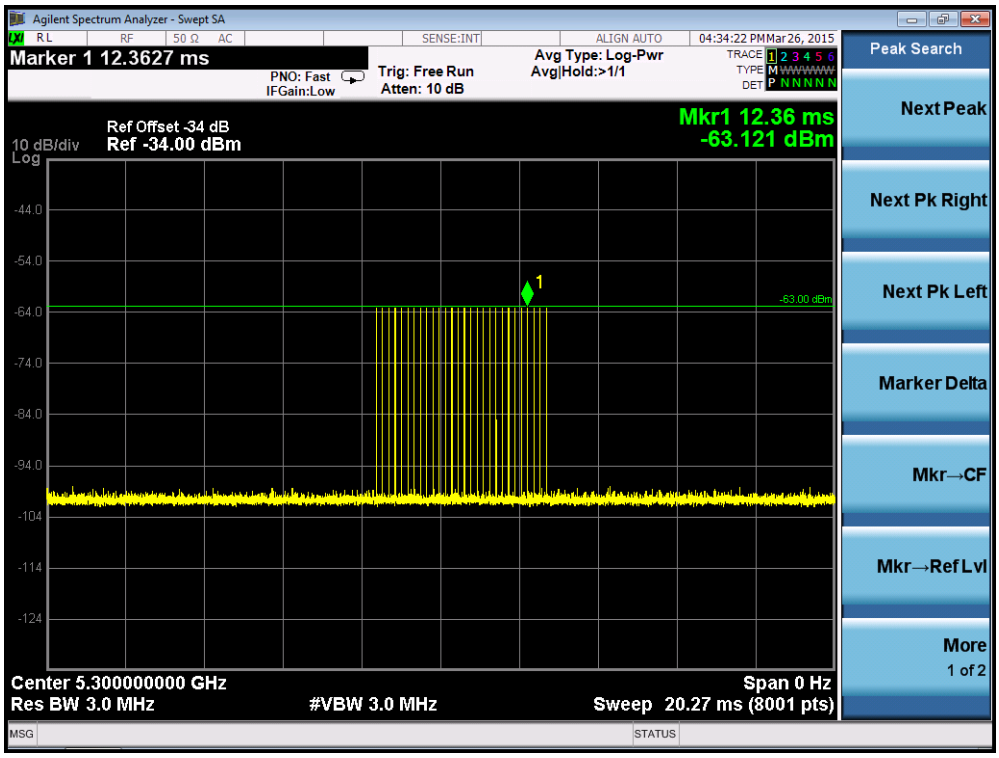

PRI = 738us and the number of pulses = 72

Radar #1(Test B) DFS detection threshold level and the burst of pulses on the Channel frequency

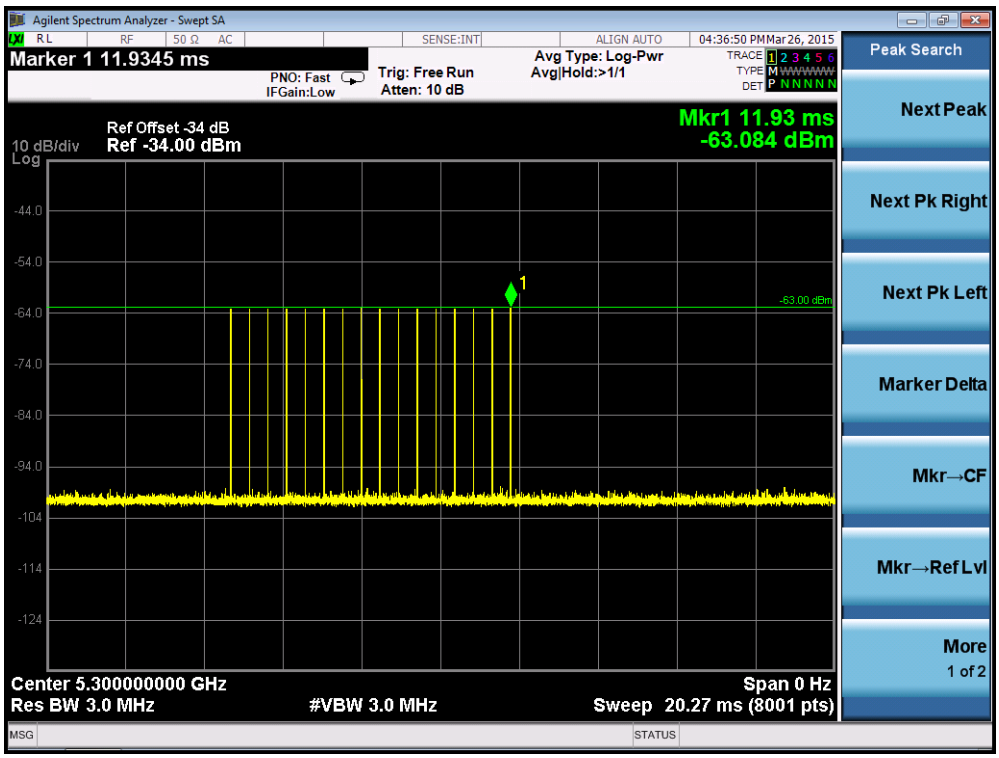



PRI = 1.787ms and the number of pulses = 30

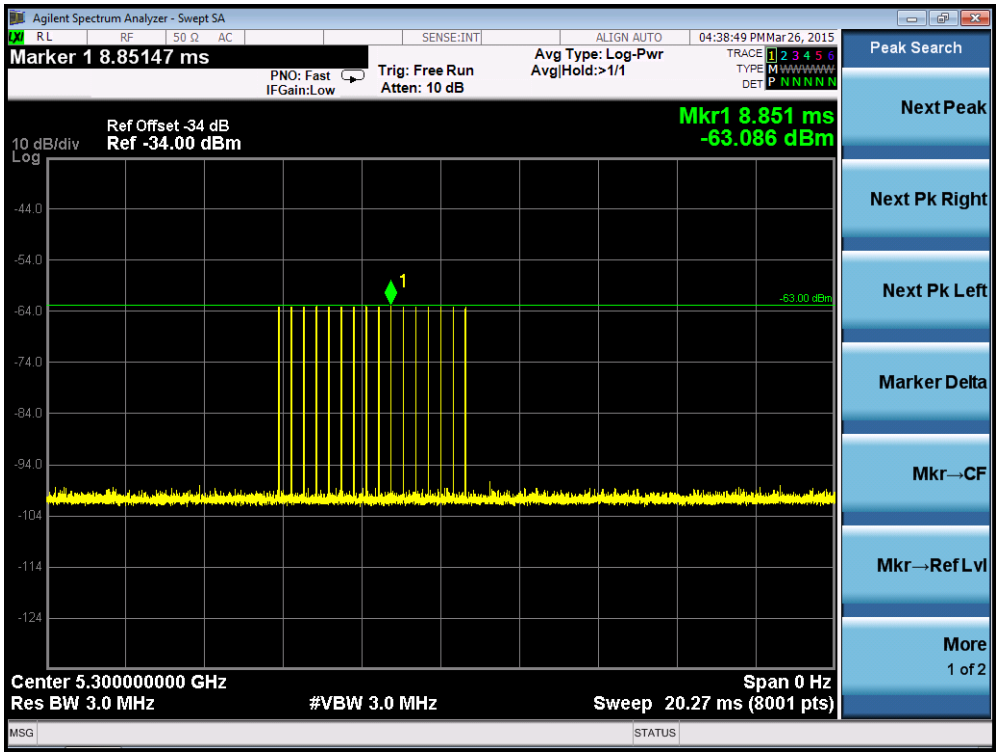
Radar #2 DFS detection threshold level and the burst of pulses on the Channel frequency



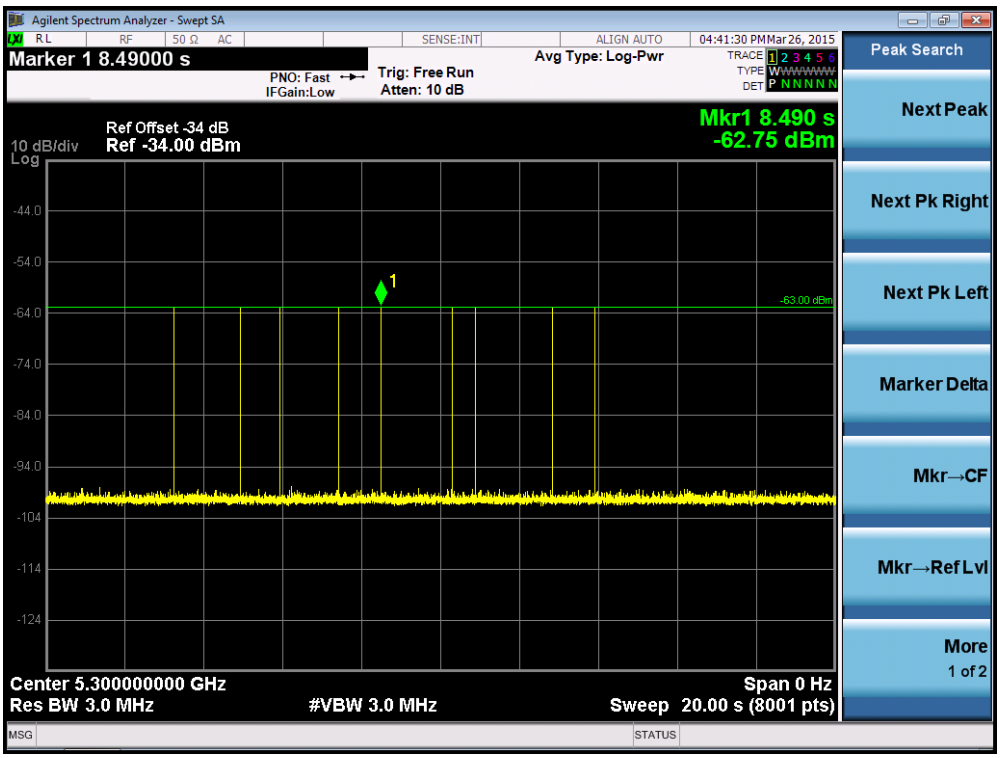
Radar #3 DFS detection threshold level and the burst of pulses on the Channel frequency



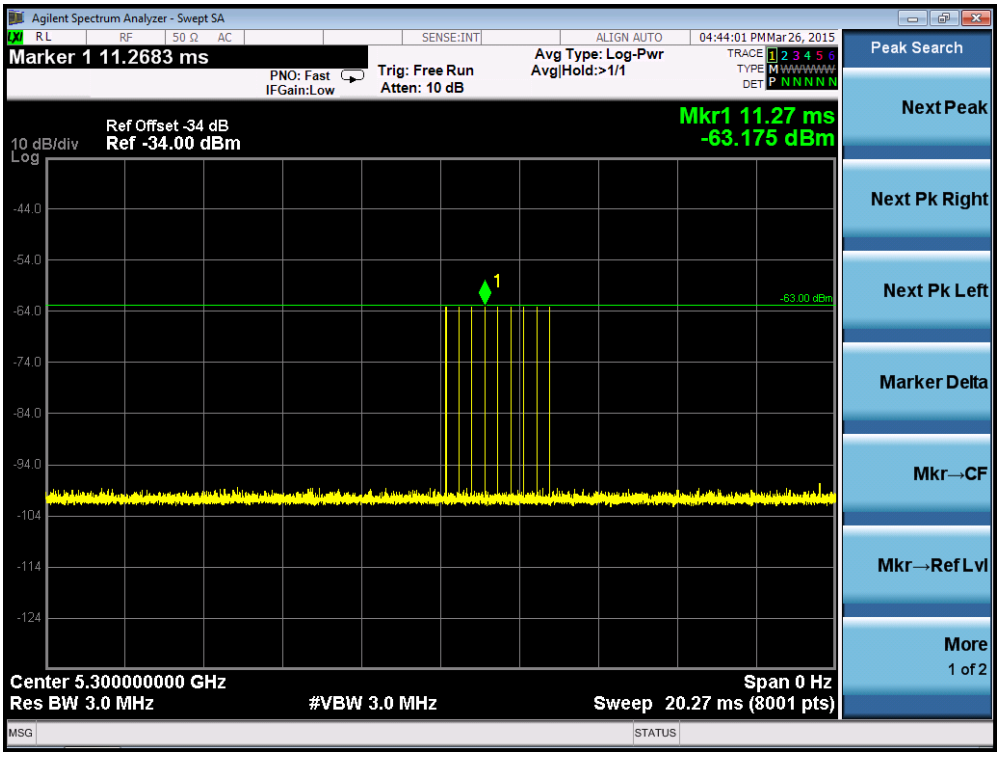

Radar #4 DFS detection threshold level and the burst of pulses on the Channel frequency



Radar #5 DFS detection threshold level and 12sec long burst on the Channel frequency



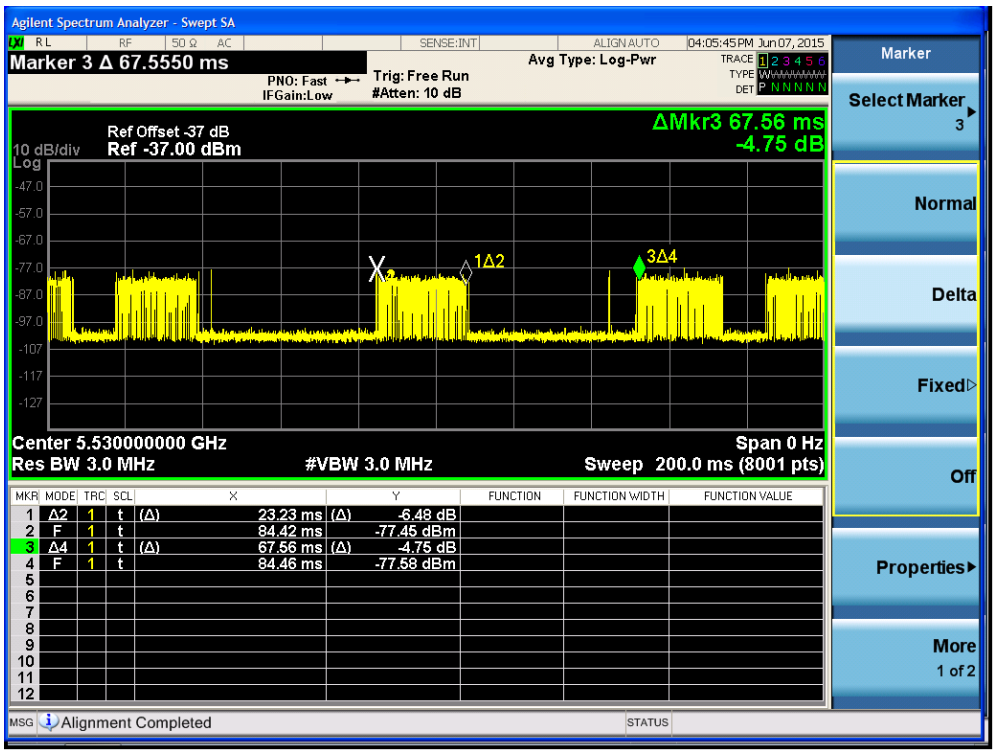

Radar #6 DFS detection threshold level and a single hop (13 pulses) on the Channel frequency within UNII detection bandwidth



## 5.3. Channel Loading Test Result

System testing was performed with the designated MPEG test file that streams full motion video from the Tablet PC to the Client in full motion video mode using the media player with the V2.61 Codec package. This file is used by IP and Frame based systems for loading the test channel during the In-service compliance testing of the U-NII device. Packet ratio = Time On/ (Time On + Off Time).

Channel Loading Plot - 802.11ac-VHT80 - 5530MHz




| Test Mode | Packet ratio | Requirement ratio | Test Result |
|---|---|---|---|
| 802.11ac-VHT80 | 34.38% | >17% | Pass |

## 5.4. In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period Measurement

### 5.4.1. Test Limit

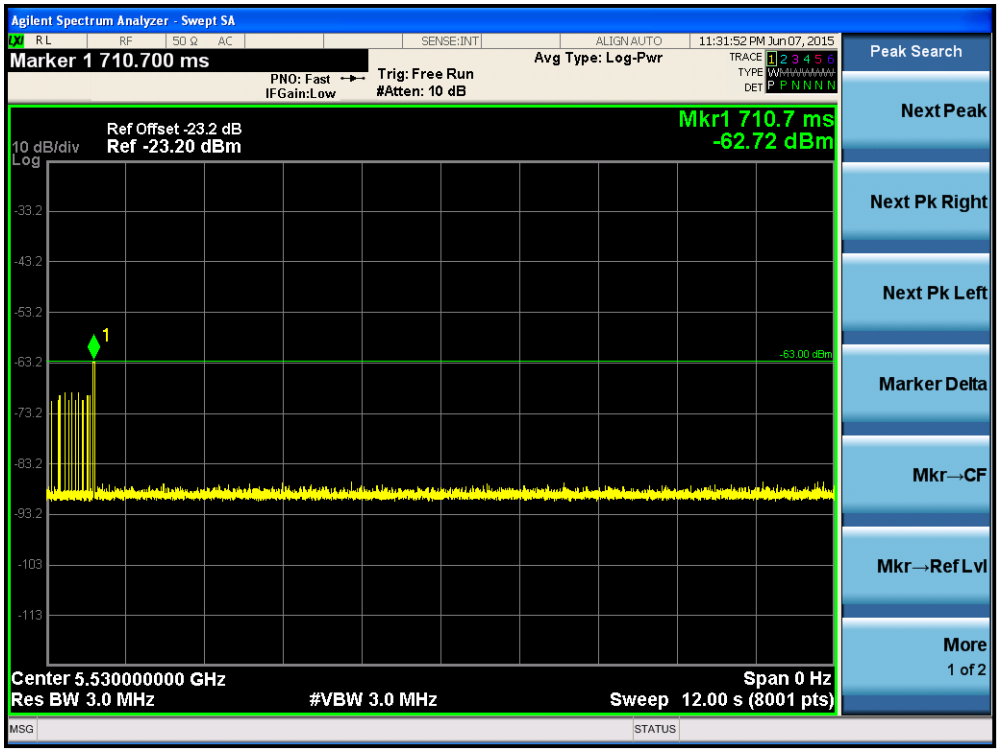
The EUT has In-Service Monitoring function to continuously monitor the radar signals. If the radar is detected, must leave the channel (Shutdown). The Channel Move Time to cease all transmissions on the current channel upon detection of a Radar Waveform above the DFS Detection Threshold within 10 sec. The total duration of Channel Closing Transmission Time is 260ms, consisting of data signals and the aggregate of control signals, by a U-NII device during the Channel Move Time. The Non-Occupancy Period time is 30 minute during which a Channel will not be utilized after a Radar Waveform is detected on that Channel.

### 5.4.2. Test Procedure Used

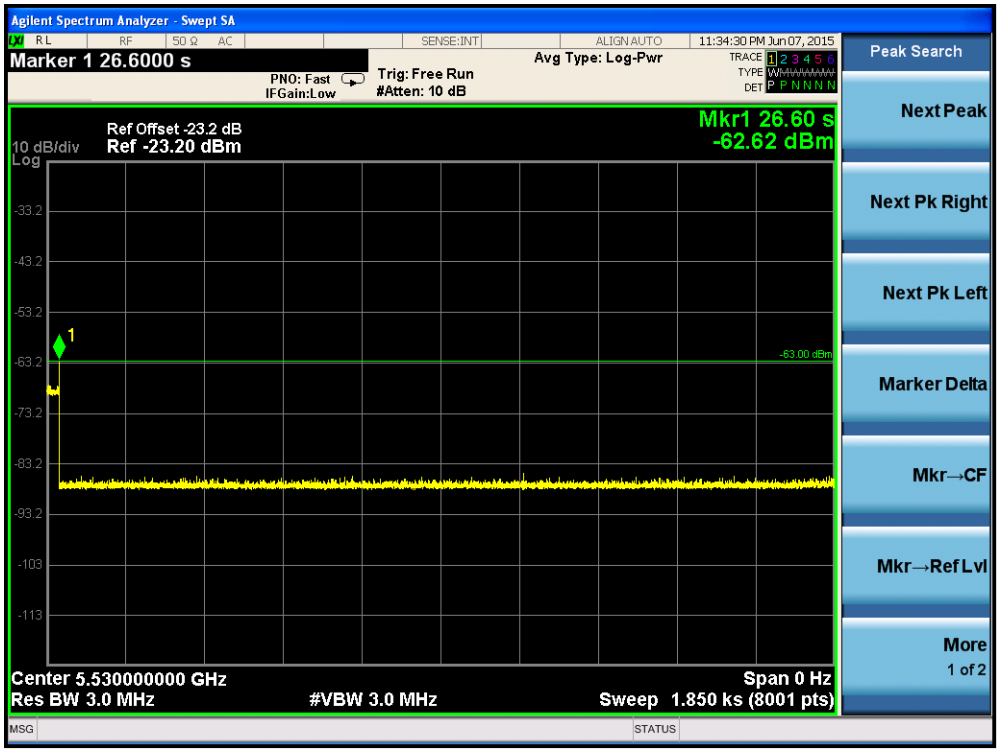
1. The test should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0.
2. When the radar burst with a level equal to the DFS Detection Threshold + 1dB is generated on the Operating Channel of the U-NII device. A U-NII device operating as a Master Device will associate with the Client Device at Channel. Stream the MPEG test file from the Master Device to the Client Device on the selected Channel for the entire period of the test. At time T0 the Radar Waveform generator sends a Burst of pulses for each of the radar types at Detection Threshold + 1dB.
2. Observe the transmissions of the EUT at the end of the radar Burst on the Operating Channel. Measure and record the transmissions from the EUT during the observation time (Channel Move Time).
3. Measurement of the aggregate duration of the Channel Closing Transmission Time method. With the spectrum analyzer set to zero span tuned to the center frequency of the EUT operating channel at the radar simulated frequency, peak detection, and max hold, the dwell time per bin is given by: Dwell (1.5ms) = S (12 sec) / B (8000); where Dwell is the dwell time per spectrum analyzer sampling bin, S is the sweep time and B is the number of spectrum analyzer sampling bins. An upper bound of the aggregate duration of the intermittent control signals of Channel Closing Transmission Time is calculated by: 20MHz: C (19.5 ms) = N (13) X Dwell (1.5 ms); where C is the Closing Time, N is the number of spectrum analyzer sampling bins showing a U-NII transmission and Dwell is the dwell time per bin.
4. Measure the EUT for more than 30 minutes following the channel close/move time to verify that the EUT does not resume any transmissions on this Channel.

### 5.4.3. Test Result

Channel Move Time and Channel Closing Transmission Time for 802.11ac-VHT80



Non-Occupancy Period for 802.11ac-VHT80




| Parameter | Test Result | Limit |
|---|---|---|
| | Type 0 | |
| Channel Move Time (s) | 0 s | <10s |
| Channel Closing Transmission Time (ms) (Note) | 0 ms | < 60ms |
| Non-Occupancy Period (min) | ≥ 30min | ≥ 30 min |

Note: 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 seconds period. The aggregate duration of control signals will not count quiet periods in between transmissions.

# 6. CONCLUSION

The data collected relate only the item(s) tested and show that the **802.11ac Dual Band Module**

**FCC ID: TK4WLE600VX** is in compliance with Part 15E of the FCC Rules.

The End