

# 低功率射頻電機(LP0002)DFS測試報告

|       |                    |
|-------|--------------------|
| 案 號：  | 1906C174           |
| 報告編號： | BTL-NCC-5-1906C174 |
| 受理日期： | 108 年 06 月 28 日    |
| 完成日期： | 108 年 08 月 16 日    |
| 發行日期： | 108 年 08 月 21 日    |

|        |                              |
|--------|------------------------------|
| 產品名稱：  | 雷蛇靈刃潛行版遊戲筆記型電腦               |
| 主 型 號： | RZ09-031                     |
| 系列型號：  | RZ09-0310                    |
| 商標/廠牌： | RAZER                        |
| 申請廠商：  | (名稱) 台灣雷蛇有限公司                |
|        | (地址) 104臺北市中山區民生東路3段69、71號4樓 |

## 東研信超股份有限公司

台北市內湖區舊宗路二段171巷18號  
電話：(02) 2657-3299 傳真：(02) 2657-3331

TAF實驗室認可編號：0659



## 報告發行歷史紀錄

| 報告版本 | 內容    | 發行日期       |
|------|-------|------------|
| R00  | 初始報告。 | 108年08月21日 |

## 測試證明書

本實驗室特此證明：

本測試報告內所記載之測試數據，數據之觀測評估、分析及選取，測試程式以及待測試設備系統之組成，符合國家通訊傳播委員會低功率射頻電機技術規範：NCC LP0002(107-01-10)所規定之量測方法、量測程式之相關規定。

本測試報告內所記載之受測試件（或稱待測樣品），經本實驗室實施測試以後所得之射頻干擾特性，符合國家通訊傳播委員會低功率射頻電機技術規範：NCC LP0002(107-01-10)所規定設備傳導干擾電壓及輻射干擾場強之限制值。

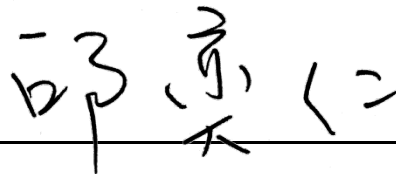
### 本實驗室聲明

除非本實驗室與客戶間有書面同意特定之量測不準確度，否則本實驗室依適用的測試標準、程式所完成之測試報告，係以一般商用範圍可接受之不準確度來表示測試結果之正確性。

本測試報告所記載之測試結果僅對客戶所指定之待測樣品，在本測試報告所述及之測試條件下所實施之量測有效。製造商有責任確保爾後製造之量產品，其所使用之電氣、機構的零件與本待測樣品所使用的相同。本實驗室沒有義務對客戶或其他者，以本實驗室所出具之測試報告做其它增加或減少之推斷。

本測試報告屬客戶之機密文件。居於客戶、本實驗室間之相互保護，未經本實驗室簽署之局部影印或複製均屬無效。

報告簽署人：



發行日期： 108 年 08 月 21 日

**東研信超股份有限公司**

台北市內湖區舊宗路二段171巷18號

電話：(02) 2657-3299 傳真：(02) 2657-3331

## 低功率射頻電機測試紀錄表

測試單位名稱：東研信超股份有限公司

測試單位電話：(02) 2641-8198

測試單位地址：新北市汐止區大同路二段 169 巷 68-1 號

器材名稱：雷蛇靈刃潛行版遊戲筆記型電腦

申請廠商：台灣雷蛇有限公司

製造廠商：Razer Inc.

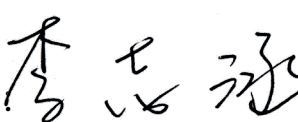
廠牌：RAZER

主型號：RZ09-031

系列型號：RZ09-0310

| 項次 | 測試項目                   | 適用規範                     | 測試結果    | 測試設備    | 結果判定 |
|----|------------------------|--------------------------|---------|---------|------|
| 1  | 射功率控制(TPC)及動態頻率選擇(DFS) | 低功率射頻電機技術規範<br>4.7.7.2 節 | Page 24 | Page 13 | 合格   |

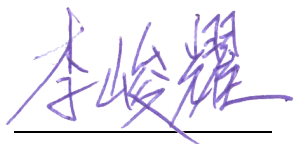
技術主管



直接主管



測試員



| <b>Table of Contents</b>                                            | <b>Page</b> |
|---------------------------------------------------------------------|-------------|
| <b>1 . APPLIED STANDARDS</b>                                        | <b>6</b>    |
| 1.1 OTHER RELEVANT STATEMENT                                        | 6           |
| <b>2 . EUT INFORMATION</b>                                          | <b>7</b>    |
| 2.1 EUT SPECIFICATION TABLE                                         | 7           |
| 2.3 CONDUCTED OUTPUT POWER AND EIRP                                 | 8           |
| <b>3 . U-NII DFS RULE REQUIREMENTS</b>                              | <b>10</b>   |
| 3.1 WORKING MODES AND REQUIRED TEST ITEMS                           | 10          |
| 3.2 TEST LIMITS AND RADAR SIGNAL PARAMETERS                         | 11          |
| <b>4 . TEST INSTRUMENTS</b>                                         | <b>13</b>   |
| <b>5 . DYNAMIC FREQUENCY SELECTION (DFS) TEST</b>                   | <b>14</b>   |
| 5.1 DFS MEASUREMENT SYSTEM                                          | 14          |
| 5.2 CALIBRATION OF DFS DETECTION THRESHOLD LEVEL                    | 22          |
| 5.3 DEVIATION FROM TEST STANDARD                                    | 22          |
| <b>6 . TEST RESULTS</b>                                             | <b>23</b>   |
| 6.1 SUMMARY OF TEST RESULT                                          | 23          |
| 6.2 TEST MODE: DEVICE OPERATING IN MASTER MODE                      | 24          |
| 6.3 DFS DETECTION THRESHOLD                                         | 25          |
| 6.4 CHANNEL CLOSING TRANSMISSION AND CHANNEL MOVE TIME WLAN TRAFFIC | 26          |
| 6.5 NON- OCCUPANCY PERIOD                                           | 38          |
| <b>7 . EUT TEST PHOTOS</b>                                          | <b>44</b>   |

## 1. APPLIED STANDARDS

國家通訊傳播委員會低功率射頻電機技術規範/低功率 0002 (LP0002) (107-01-10)  
 FCC Part 15, Subpart E (Section 15.407) / FCC 06-96  
 FCC KDB 789033 D02 General U-NII Test Procedures New Rules v02r01  
 FCC KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02  
 FCC KDB 905462 D03 UNII Clients Without Radar Detection New Rules v01r02

### 1.1 OTHER RELEVANT STATEMENT

1. 本測試報告屬新設計之機型，申請新的型式認證。
2. 本次申請的系列產品除了型號、外觀顏色及搭配的電源供應器與主型號不同外，其餘皆相同。
3. 此產品具有Bluetooth(EDR+LE), 2.4G WLAN, 5G WLAN及DFS Slave功能。

| 功能                                                                                                       | 報告編號               | 備註  |
|----------------------------------------------------------------------------------------------------------|--------------------|-----|
| Bluetooth EDR<br>2402 MHz ~ 2480 MHz                                                                     | BTL-NCC-1-1906C174 |     |
| Bluetooth LE<br>2402 MHz ~ 2480 MHz                                                                      | BTL-NCC-2-1906C174 |     |
| WLAN 2.4GHz<br>2412 MHz ~ 2462 MHz                                                                       | BTL-NCC-3-1906C174 |     |
| WLAN 5GHz<br>5150 MHz ~ 5250 MHz,<br>5250 MHz ~ 5350 MHz,<br>5470 MHz ~ 5725 MHz,<br>5725 MHz ~ 5850 MHz | BTL-NCC-4-1906C174 |     |
| DFS Slave                                                                                                | BTL-NCC-5-1906C174 | 本報告 |

## 2. EUT INFORMATION

### 2.1 EUT SPECIFICATION TABLE

Table 1: Specification of EUT

|                           |                                                   |
|---------------------------|---------------------------------------------------|
| Product Name              | 雷蛇靈刀潛行版遊戲筆記型電腦                                    |
| Brand Name                | RAZER                                             |
| Model Name                | RZ09-031                                          |
| Seires Model              | RZ09-0310                                         |
| Model Difference(s)       | Only differ in model name and available adapters. |
| Operational Mode          | Client                                            |
| Operating Frequency Range | 5250 MHz 至 5350 MHz<br>5470 MHz 至 5725MHz         |
| Modulation                | IEEE 802.11a/n/ac: OFDM<br>IEEE 802.11ax: OFDMA   |
| Max. Output Power         | 17.82dBm                                          |
| Max. e.i.r.p.             | 25.36dBm (343.558mW < 500mW)                      |

**Note:** This device was functioned as a

☐ Master    ☒ Client device without radar detection    ☐ Client device with radar detection

### 2.2 DESCRIPTION OF AVAILABLE ANTENNAS TO THE EUT

| Ant. | Brand                                                                               | P/N             | Antenna Type | Connector | Gain (dBi) |
|------|-------------------------------------------------------------------------------------|-----------------|--------------|-----------|------------|
| 1    |  | BY5780-16-002-C | PIFA         | N/A       | 4.57       |
| 2    |  | BY5780-16-001-C | PIFA         | N/A       | 4.49       |

Note:

- (1) This EUT supports MIMO 2X2, any transmit signals are correlated with each other, so Directional gain=  $10\log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N]$  dBi, that is Directional gain=  $10\log[(10^{4.57/20} + 10^{4.49/20})^2 / 2]$  dBi = 7.54. So, the UNII-2A, UNII-2C output power limit is 24-7.54+6=22.46. The UNII-2A, UNII-2C power spectral density limit is 11-7.54+6=9.46.
- (2) Ant. 1 refers to aux antenna, Ant. 2 refers to main antenna.

## 2.3 CONDUCTED OUTPUT POWER AND EIRP

Table 2: The Output Power and e.i.r.p. List

| Mode: TX IEEE 802.11a |                         |                  |                     |                    |
|-----------------------|-------------------------|------------------|---------------------|--------------------|
| Frequency Band (MHz)  | Max. Output Power (dBm) | Directional Gain | Max. e.i.r.p. (dBm) | Max. e.i.r.p. (mW) |
| 5250~5350             | 15.98                   | 7.54             | 23.52               | 224.905            |
| 5470~5725             | 17.67                   | 7.54             | 25.21               | 331.894            |

| Mode: TX IEEE 802.11n (HT40) |                         |                  |                     |                    |
|------------------------------|-------------------------|------------------|---------------------|--------------------|
| Frequency Band (MHz)         | Max. Output Power (dBm) | Directional Gain | Max. e.i.r.p. (dBm) | Max. e.i.r.p. (mW) |
| 5250~5350                    | 15.45                   | 7.54             | 22.99               | 199.067            |
| 5470~5725                    | 17.33                   | 7.54             | 24.87               | 306.902            |

| Mode: TX IEEE 802.11ac (VHT80) |                         |                  |                     |                    |
|--------------------------------|-------------------------|------------------|---------------------|--------------------|
| Frequency Band (MHz)           | Max. Output Power (dBm) | Directional Gain | Max. e.i.r.p. (dBm) | Max. e.i.r.p. (mW) |
| 5250~5350                      | 15.49                   | 7.54             | 23.03               | 200.909            |
| 5470~5725                      | 17.23                   | 7.54             | 24.77               | 299.916            |

| Mode: TX IEEE 802.11ac (VHT160) |                         |                  |                     |                    |
|---------------------------------|-------------------------|------------------|---------------------|--------------------|
| Frequency Band (MHz)            | Max. Output Power (dBm) | Directional Gain | Max. e.i.r.p. (dBm) | Max. e.i.r.p. (mW) |
| 5470~5725                       | 14.84                   | 7.54             | 22.38               | 172.982            |

| Mode: TX IEEE 802.11ax (HEW20) |                         |                  |                     |                    |
|--------------------------------|-------------------------|------------------|---------------------|--------------------|
| Frequency Band (MHz)           | Max. Output Power (dBm) | Directional Gain | Max. e.i.r.p. (dBm) | Max. e.i.r.p. (mW) |
| 5250~5350                      | 15.83                   | 7.54             | 23.37               | 217.270            |
| 5470~5725                      | 17.63                   | 7.54             | 25.17               | 328.852            |

| Mode: TX IEEE 802.11ax (HEW40) |                         |                  |                     |                    |
|--------------------------------|-------------------------|------------------|---------------------|--------------------|
| Frequency Band (MHz)           | Max. Output Power (dBm) | Directional Gain | Max. e.i.r.p. (dBm) | Max. e.i.r.p. (mW) |
| 5250~5350                      | 15.33                   | 7.54             | 22.87               | 193.642            |
| 5470~5725                      | 17.23                   | 7.54             | 24.77               | 299.916            |

| Mode: TX IEEE 802.11ax (HEW80) |                            |                     |                        |                       |
|--------------------------------|----------------------------|---------------------|------------------------|-----------------------|
| Frequency Band<br>(MHz)        | Max. Output Power<br>(dBm) | Directional<br>Gain | Max. e.i.r.p.<br>(dBm) | Max. e.i.r.p.<br>(mW) |
| 5250~5350                      | 15.24                      | 7.54                | 22.78                  | 189.671               |
| 5470~5725                      | 17.55                      | 7.54                | 25.09                  | 322.849               |

| Mode: TX IEEE 802.11ax (HEW160) |                            |                     |                        |                       |
|---------------------------------|----------------------------|---------------------|------------------------|-----------------------|
| Frequency Band<br>(MHz)         | Max. Output Power<br>(dBm) | Directional<br>Gain | Max. e.i.r.p.<br>(dBm) | Max. e.i.r.p.<br>(mW) |
| 5470~5725                       | 14.92                      | 7.54                | 22.46                  | 176.198               |

### 3. U-NII DFS RULE REQUIREMENTS

#### 3.1 WORKING MODES AND REQUIRED TEST ITEMS

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 5: Applicability of DFS requirements prior to use a channel

| Requirement                     | Operational Mode |                                |                             |
|---------------------------------|------------------|--------------------------------|-----------------------------|
|                                 | Master           | Client without radar detection | Client with radar detection |
| Non-Occupancy Period            | ✓                | ✓                              | ✓                           |
| 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 6: Applicability of DFS requirements during normal operation.

| Requirement                       | Operational Mode |                                |                             |
|-----------------------------------|------------------|--------------------------------|-----------------------------|
|                                   | Master           | Client without radar detection | Client with radar detection |
| DFS Detection Threshold           | ✓                | Not required                   | ✓                           |
| Channel Closing Transmission Time | ✓                | ✓                              | ✓                           |
| Channel Move Time                 | ✓                | ✓                              | ✓                           |
| U-NII Detection Bandwidth         | ✓                | Not required                   | ✓                           |

## 3.2 TEST LIMITS AND RADAR SIGNAL PARAMETERS

### DETECTION THRESHOLD VALUES

Table 7: DFS Detection Thresholds for Master Devices and Client Devices With Radar Detection.

| Max.imum Transmit Power                                                            | Value<br>(See Notes 1 and 2) |
|------------------------------------------------------------------------------------|------------------------------|
| e.i.r.p. $\geq$ 200 milliwatt                                                      | -64 dBm                      |
| e.i.r.p. < 200 milliwatt and<br>Power pectral density < 10 dBm/MHz                 | -62 dBm                      |
| e.i.r.p. < 200 milliwatt that do not meet the<br>power pectral 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.

**Note 3:** e.i.r.p. is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.

Table 8: 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<br>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 9: 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 $\left\{ \left( \frac{1}{360} \right) \cdot \left( \frac{19 \cdot 10^6}{PRI_{\mu sec}} \right) \right\}$ | 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.

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                       |

#### 4. TEST INSTRUMENTS

Table 10: Test instruments list.

| DESCRIPTION           | MANUFACTURER  | MODEL NO.     | Serial No     | Calibration Until |
|-----------------------|---------------|---------------|---------------|-------------------|
| EXA Spectrum Analyzer | Agilent       | N9010A        | MY50520044    | Mar. 10, 2020     |
| Signal Generator      | Agilent       | E4438C        | MY49071316    | Mar. 10, 2020     |
| POWER SPLITTER        | Mini-Circuits | ZFRSC-123-S+  | 331000910-1   | Mar. 10, 2020     |
| POWER SPLITTER        | Mini-Circuits | ZN4PD1-63-S+  | SF9335D1045-1 | Mar. 10, 2020     |
| Attenuator            | WOKEN         | 6SM3502       | VAS1214NL     | Feb. 12, 2020     |
| Wi-Fi Router          | tp-link       | Archer AX6000 | N/A           | N/A               |

Note:

- (1) Calibration interval of instruments listed above is one year.
- (2) Wi-Fi Router's FCC ID: TE7AX6000

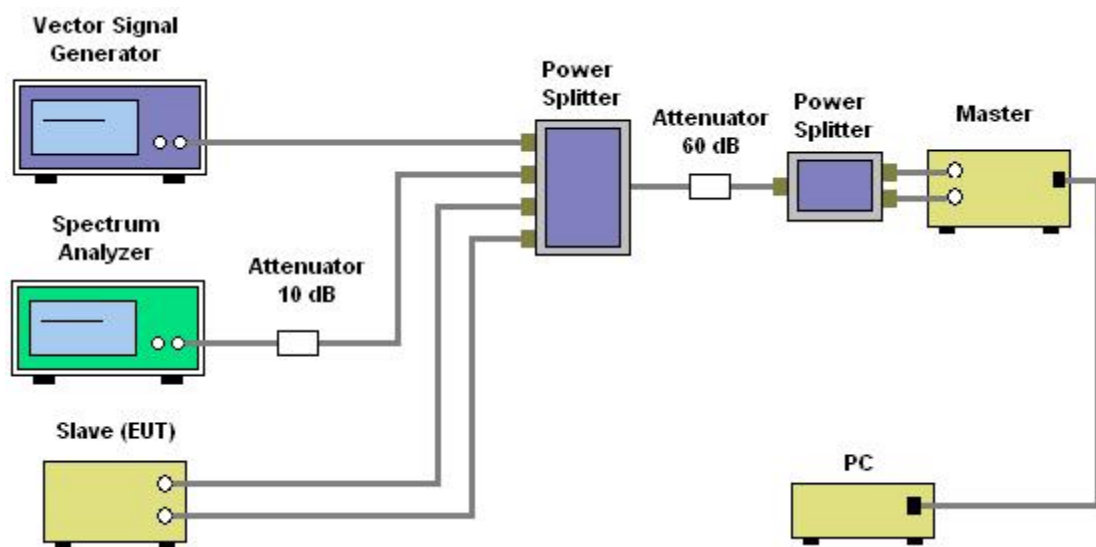
## 5. DYNAMIC FREQUENCY SELECTION (DFS) TEST

### 5.1 DFS MEASUREMENT SYSTEM

#### Test Procedure

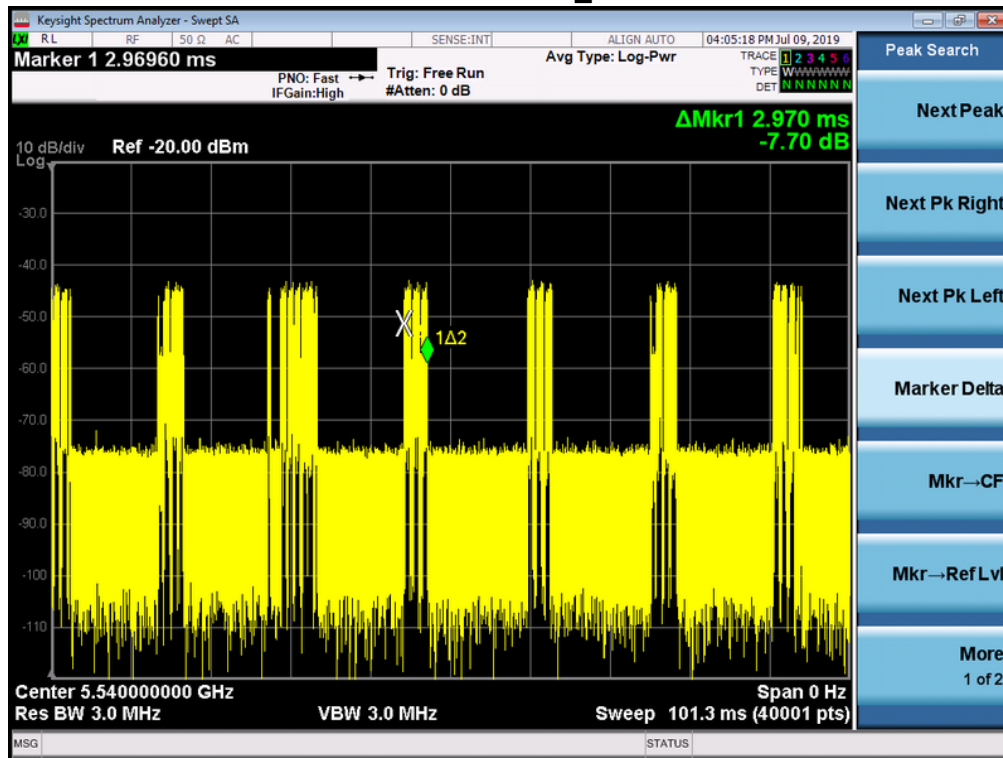
1. Master device and client device are set up by conduction method as the following configuration.
2. The client device is connected to notebook and to access a IP address on wireless connection with the master device.
3. Then the master device is connected to another notebook to access a IP address.
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

#### Setup

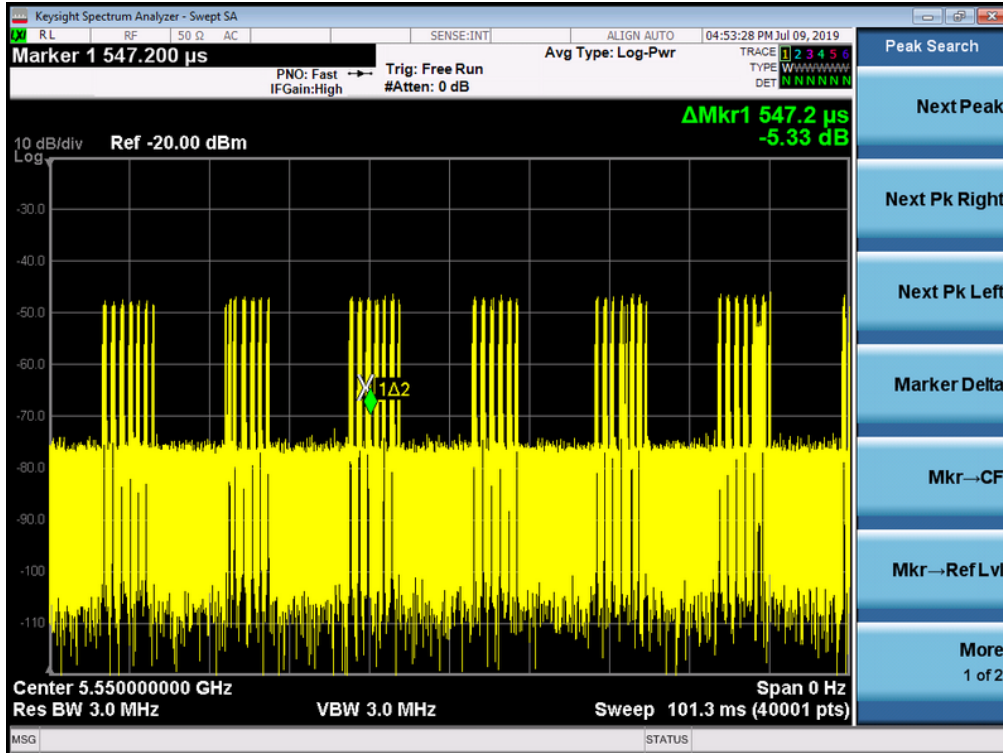


## Channel Loading

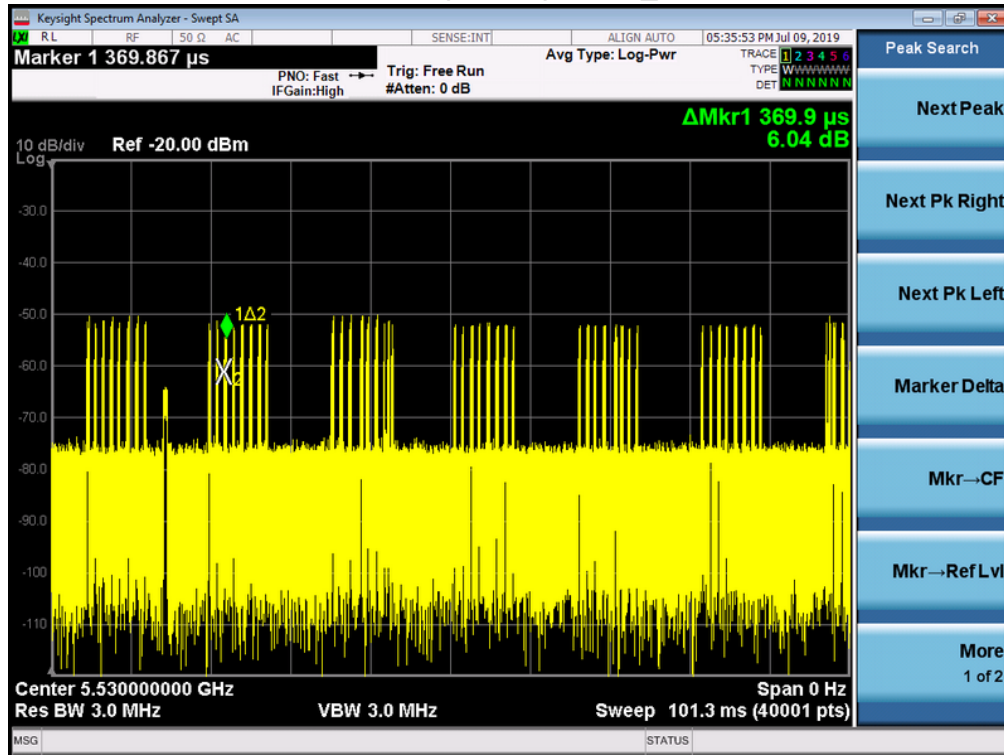
### IEEE 802.11A Mode\_5540MHz



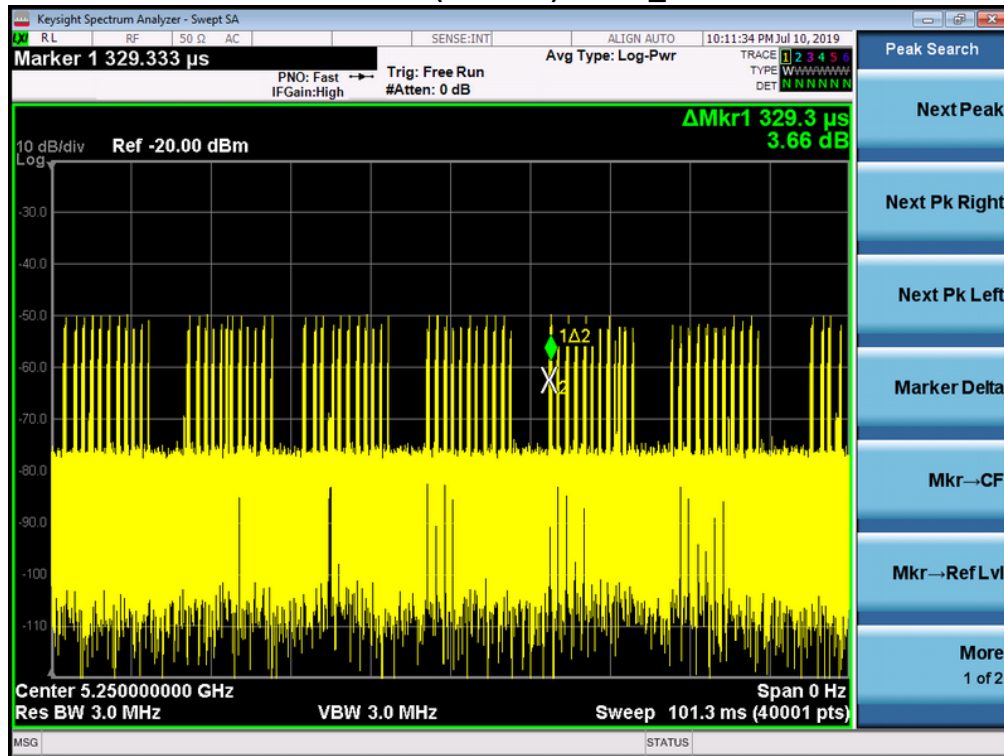
### IEEE 802.11n (HT40) Mode\_5550MHz



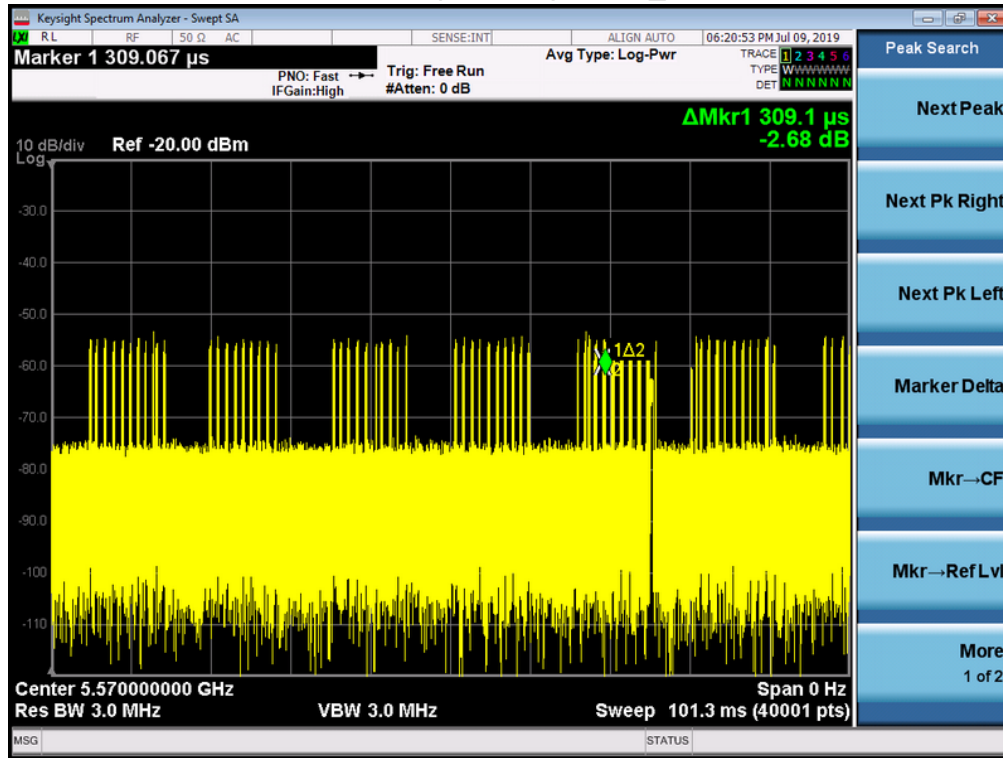
### IEEE 802.11ac (VHT80) Mode\_5530MHz



### IEEE 802.11ac (VHT160) Mode\_5250MHz

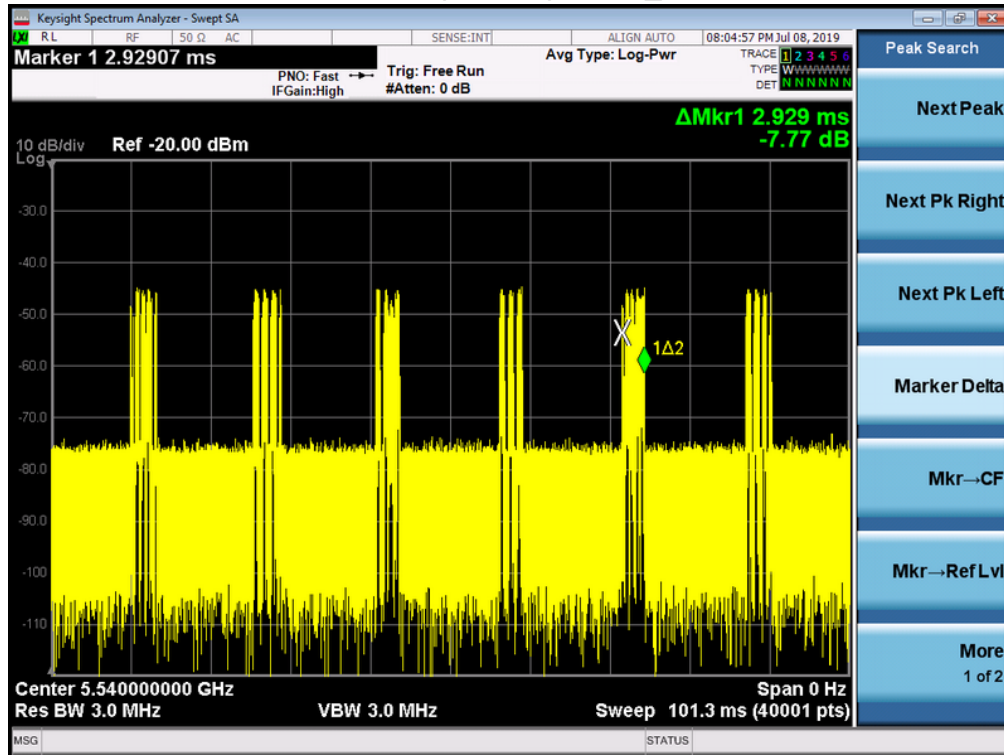


# IEEE 802.11ac (VHT160) Mode\_5570MHz

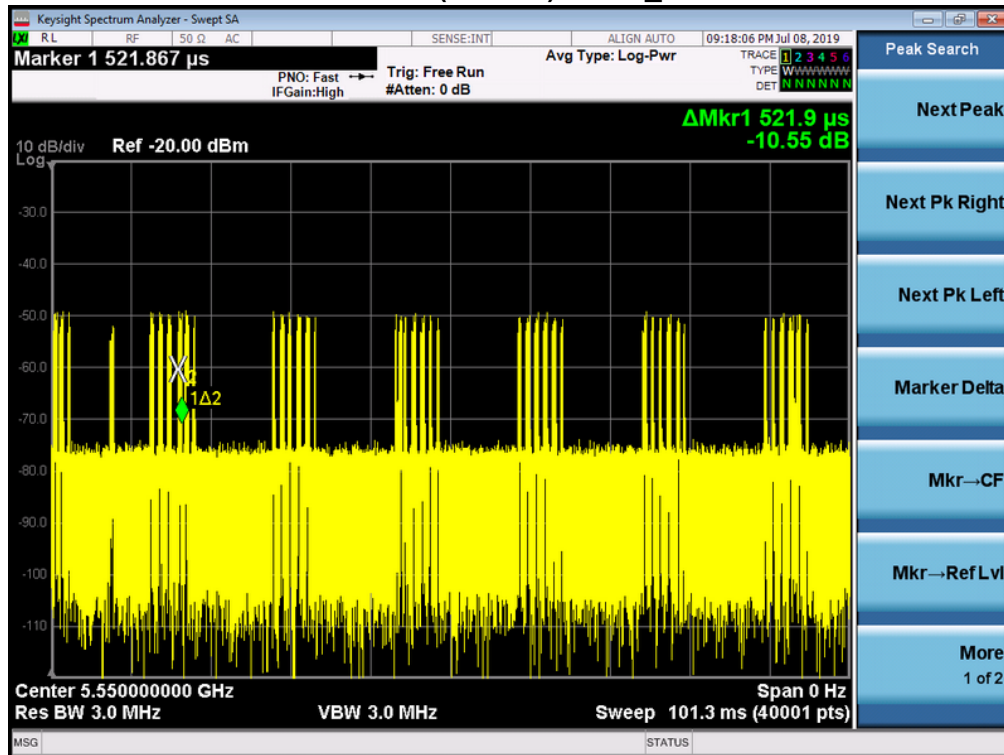


| Frequency (MHz) | Marker Delta (ms) | Number | On Time (ms) | Total Time (ms) | Dutycycle (%) | Limit (%) |
|-----------------|-------------------|--------|--------------|-----------------|---------------|-----------|
| 5540            | 2.97              | 6      | 17.82        | 101.3           | 17.59         | 17.00     |
| 5550            | 0.5472            | 40     | 21.888       | 101.3           | 21.61         | 17.00     |
| 5530            | 0.3699            | 50     | 18.495       | 101.3           | 18.26         | 17.00     |
| 5250            | 0.3293            | 60     | 19.758       | 101.3           | 19.50         | 17.00     |
| 5570            | 0.3091            | 60     | 18.546       | 101.3           | 18.31         | 17.00     |

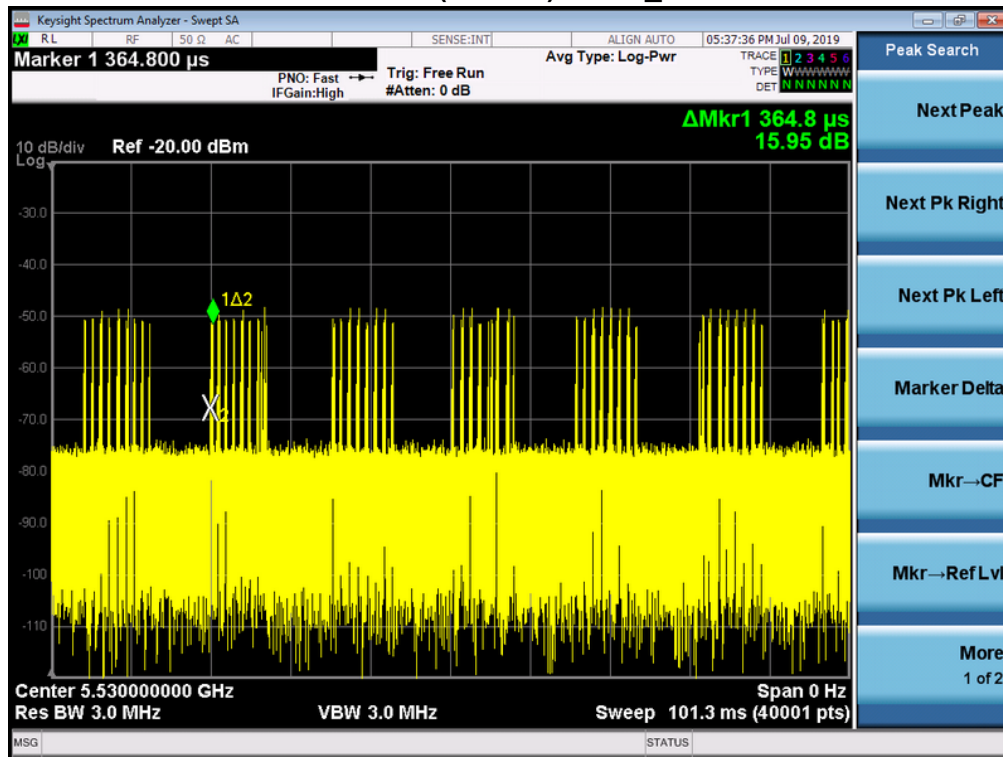
### IEEE 802.11ax (HEW20) Mode\_5540MHz



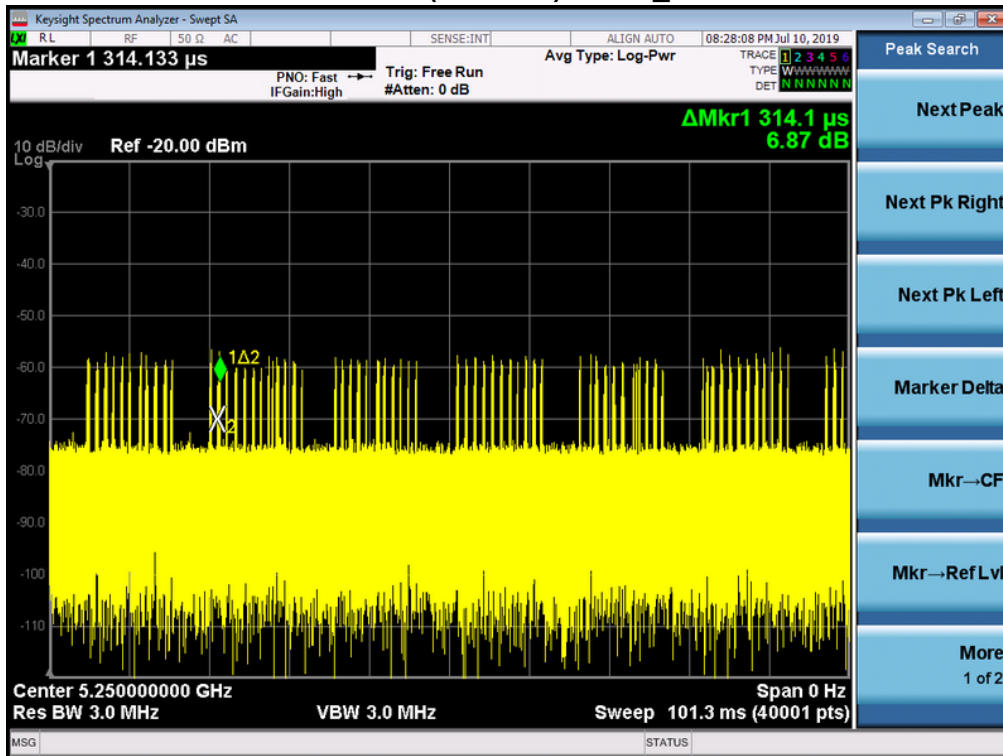
### IEEE 802.11ax (HEW40) Mode\_5550MHz



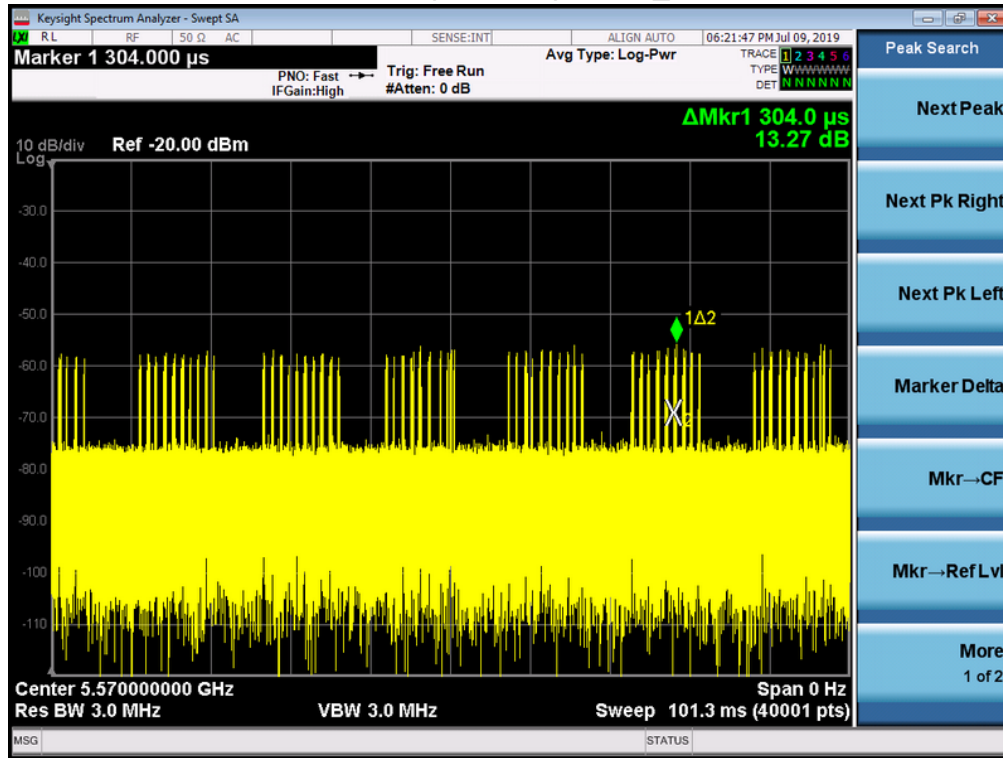
### IEEE 802.11ax (HEW80) Mode\_5530MHz



### IEEE 802.11ax (HEW160) Mode\_5250MHz



### IEEE 802.11ax (HEW160) Mode\_5570MHz



| Frequency (MHz) | Marker Delta (ms) | Number | On Time (ms) | Total Time (ms) | Dutycycle (%) | Limit (%) |
|-----------------|-------------------|--------|--------------|-----------------|---------------|-----------|
| 5540            | 2.929             | 6      | 17.574       | 101.3           | 17.35         | 17.00     |
| 5550            | 0.5219            | 40     | 20.876       | 101.3           | 20.61         | 17.00     |
| 5530            | 0.3648            | 50     | 18.24        | 101.3           | 18.01         | 17.00     |
| 5250            | 0.3141            | 60     | 18.846       | 101.3           | 18.60         | 17.00     |
| 5570            | 0.304             | 60     | 18.24        | 101.3           | 18.01         | 17.00     |

The hopping type 6 pulse parameters are fixed while the hopping sequence is based on the August 2005 NTIA Hopping Frequency List. The initial starting point randomized at run-time and each subsequent starting point is incremented by 475. Each frequency in the 100-length segment is compared to the boundaries of the EUT Detection Bandwidth and the software creates a hopping burst pattern in accordance with Section 7.4.1.3 Method #2 Simulated Frequency Hopping Radar Waveform Generating Subsystem of FCC 06-96. The frequency of the signal generator is incremented in 1 MHz steps from FL to FH for each successive trial. This incremental sequence is repeated as required to generate a minimum of 30 total trials and to maintain a uniform frequency distribution over the entire Detection Bandwidth.

The signal monitoring equipment consists of a spectrum analyzer set to display 8001 bins on the horizontal axis. The time-domain resolution is 2 msec / bin with a 16 second sweep time, meeting the 10 second short pulse reporting criteria. The aggregate ON time is calculated by multiplying the number of bins above a threshold during a particular observation period by the dwell time per bin, with the analyzer set to peak detection and max hold.

Should multiple RF ports be utilized for the Master and/or Slave devices (for example, for diversity or MIMO implementations), additional combiner/dividers are inserted between the Master Combiner/Divider and the pad connected to the Master Device (and/or between the Slave Combiner/Divider and the pad connected to the Slave Device). Additional pads are utilized such that there is one pad at each RF port on each EUT.

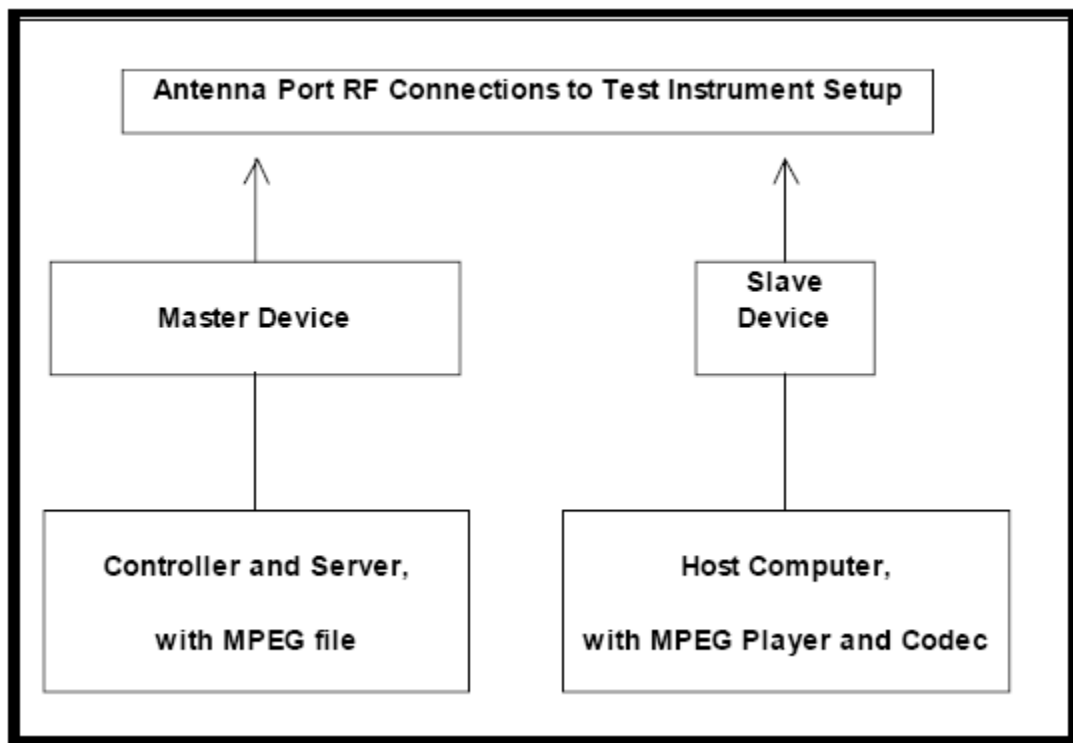
## 5.2 CALIBRATION OF DFS DETECTION THRESHOLD LEVEL

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.



## 5.3 DEVIATION FROM TEST STANDARD

No deviation.

## 6. TEST RESULTS

### 6.1 SUMMARY OF TEST RESULT

| Clause | Test Parameter                    | Test Mode and Channel               | Remarks        | Result |
|--------|-----------------------------------|-------------------------------------|----------------|--------|
| 15.407 | DFS Detection Threshold           | -                                   | No Applicable  | N/A    |
| 15.407 | Channel Availability Check Time   | -                                   | Not Applicable | N/A    |
| 15.407 | Channel Move Time                 | IEEE 802.11a<br>_5540 MHz           | Applicable     | Pass   |
|        |                                   | IEEE 802.11n (HT40)<br>_5550 MHz    |                |        |
|        |                                   | IEEE 802.11ac (VHT80)<br>_5530 MHz  |                |        |
|        |                                   | IEEE 802.11ac (VHT160)<br>_5250 MHz |                |        |
|        |                                   | IEEE 802.11ax (HEW20)<br>_5540 MHz  |                |        |
|        |                                   | IEEE 802.11ax (HEW40)<br>_5550 MHz  |                |        |
|        |                                   | IEEE 802.11ax (HEW80)<br>_5530 MHz  |                |        |
|        |                                   | IEEE 802.11ax (HEW160)<br>_5250 MHz |                |        |
|        |                                   | IEEE 802.11ax (HEW160)<br>_5570 MHz |                |        |
|        |                                   | IEEE 802.11a<br>_5540 MHz           |                |        |
| 15.407 | Channel Closing Transmission Time | IEEE 802.11n (HT40)<br>_5550 MHz    | Applicable     | Pass   |
|        |                                   | IEEE 802.11ac (VHT80)<br>_5530 MHz  |                |        |
|        |                                   | IEEE 802.11ac (VHT160)<br>_5250 MHz |                |        |
|        |                                   | IEEE 802.11ax (HEW20)<br>_5540 MHz  |                |        |
|        |                                   | IEEE 802.11ax (HEW40)<br>_5550 MHz  |                |        |
|        |                                   | IEEE 802.11ax (HEW80)<br>_5530 MHz  |                |        |
|        |                                   | IEEE 802.11ax (HEW160)<br>_5250 MHz |                |        |
|        |                                   | IEEE 802.11ax (HEW160)<br>_5570 MHz |                |        |
|        |                                   | IEEE 802.11a<br>_5540 MHz           |                |        |
|        |                                   | IEEE 802.11n (HT40)<br>_5550 MHz    |                |        |

| Clause | Test Parameter            | Test Mode and Channel               | Remarks        | Result |
|--------|---------------------------|-------------------------------------|----------------|--------|
| 15.407 | Non-Occupancy Period      | IEEE 802.11a<br>_5540 MHz           | Applicable     | Pass   |
|        |                           | IEEE 802.11n (HT40)<br>_5550 MHz    |                |        |
|        |                           | IEEE 802.11ac (VHT80)<br>_5530 MHz  |                |        |
|        |                           | IEEE 802.11ac (VHT160)<br>_5250 MHz |                |        |
|        |                           | IEEE 802.11ax (HEW20)<br>_5540 MHz  |                |        |
|        |                           | IEEE 802.11ax (HEW40)<br>_5550 MHz  |                |        |
|        |                           | IEEE 802.11ax (HEW80)<br>_5530 MHz  |                |        |
|        |                           | IEEE 802.11ax (HEW160)<br>_5250 MHz |                |        |
|        |                           | IEEE 802.11ax (HEW160)<br>_5570 MHz |                |        |
| 15.407 | Uniform Spreading         | -                                   | Not Applicable | N/A    |
| 15.407 | U-NII Detection Bandwidth | -                                   | Not Applicable | N/A    |

## 6.2 TEST MODE: DEVICE OPERATING IN MASTER 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)

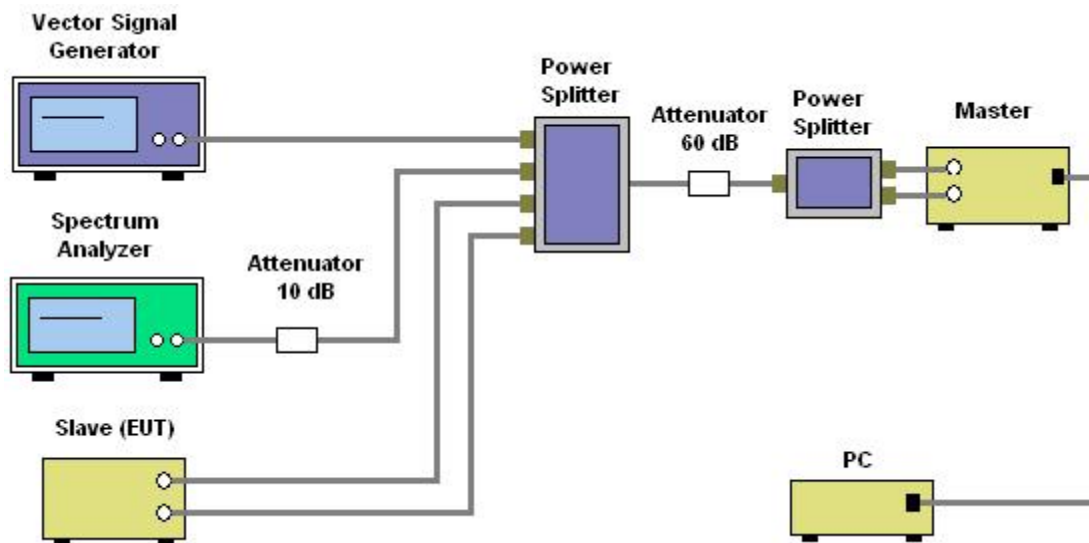
### 6.3 DFS DETECTION THRESHOLD

Calibration:

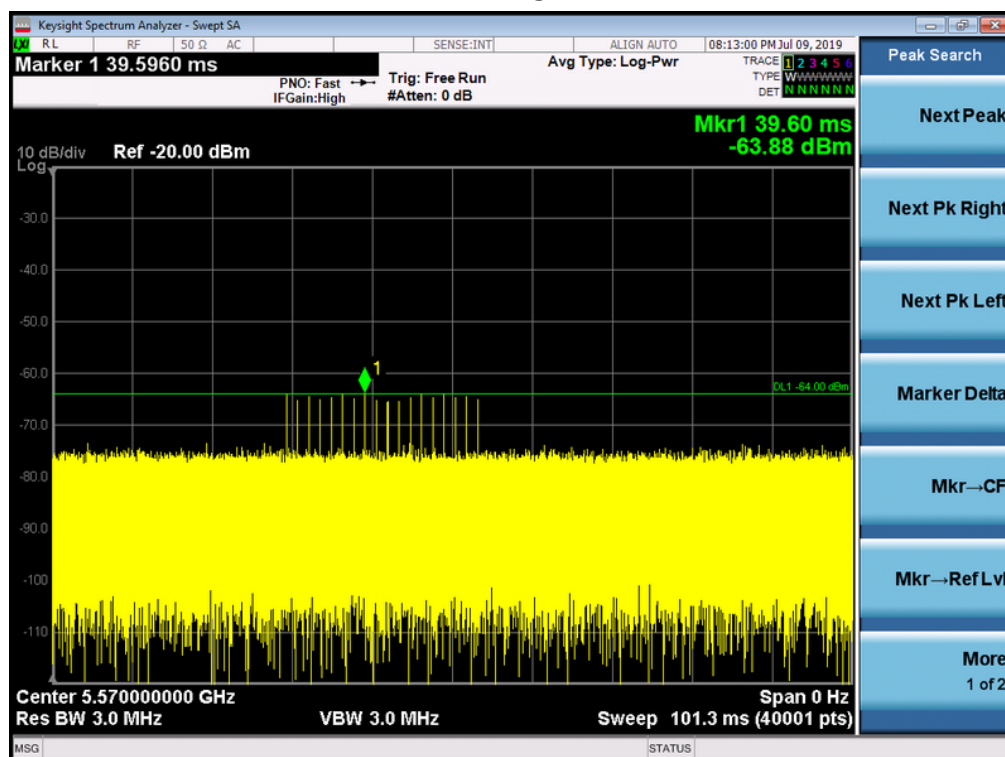
The EUT is slave equipment and it with a max gain is 4.57 dBi.  
For a detection threshold level of -62dBm and the master antenna gain is 2.28 dBi, required detection threshold is -61.72 dBm (= -64+2.28).

Note: Maximum Transmit Power is more than 200 milliwatt in this report, so detection threshold level is -64dBm.

#### Setup



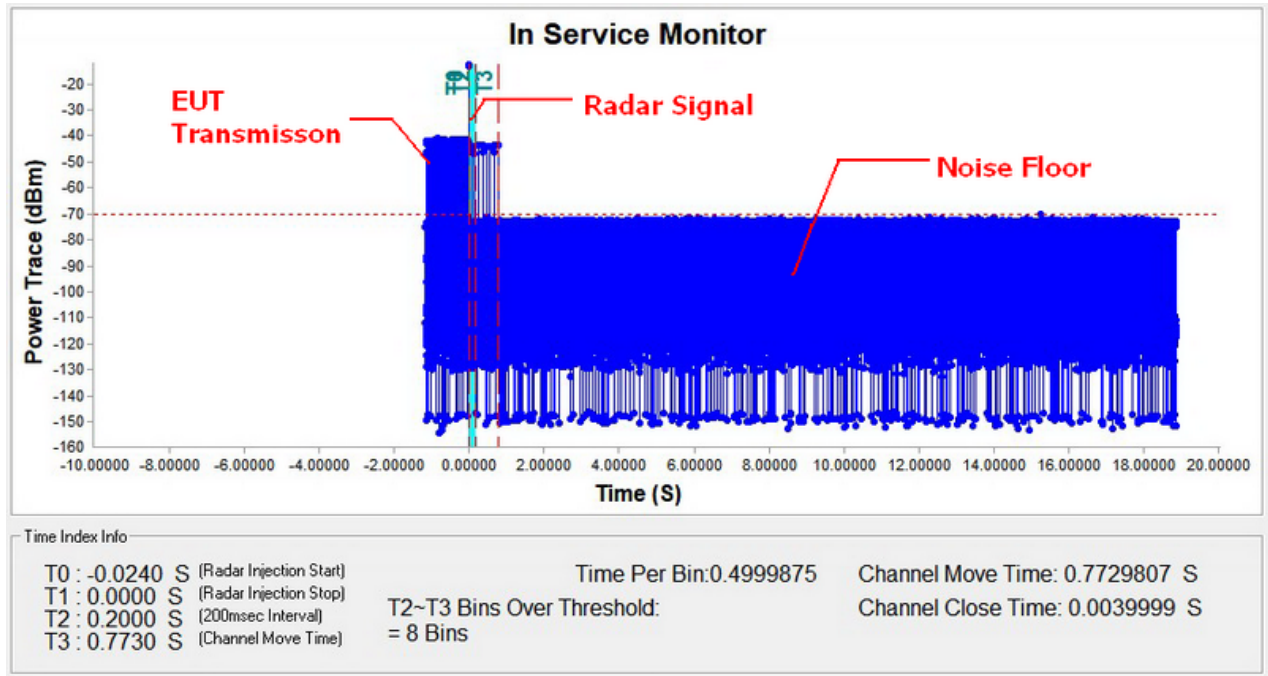
#### Radar Signal 0



## 6.4 CHANNEL CLOSING TRANSMISSION AND CHANNEL MOVE TIME WLAN TRAFFIC

TX (IEEE 802.11a Mode) \_5540MHz

Radar signal 0

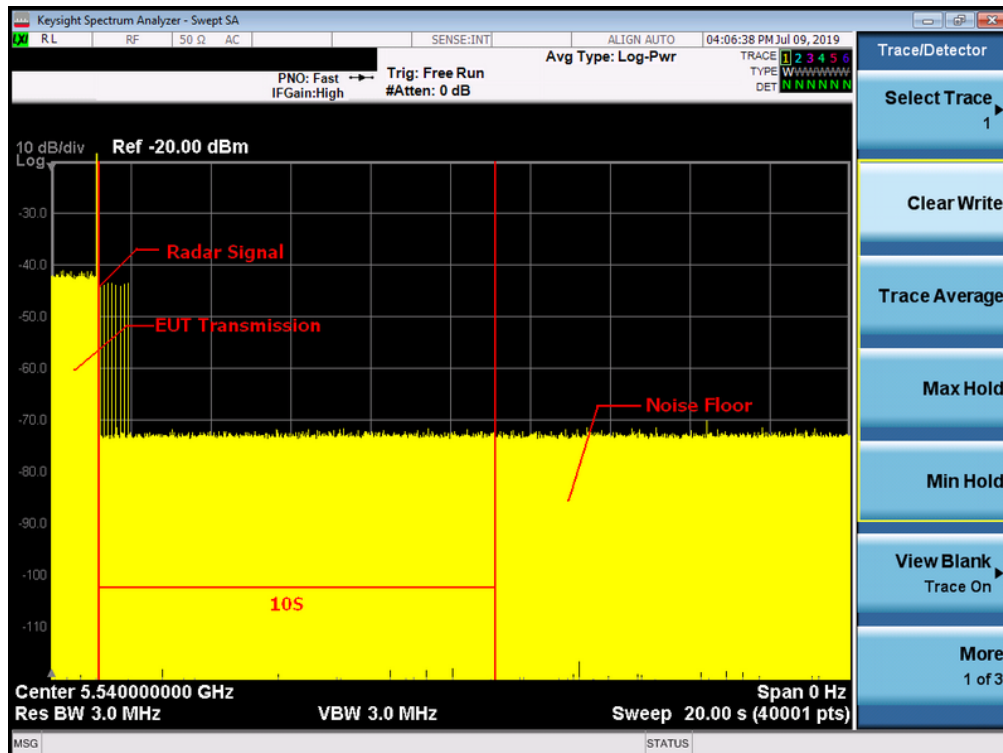


**Note:** T0 denotes the Radar Injection Start.

T1 denotes the start of Channel Move Time upon the end of the last Radar burst.

T2 denotes the data transmission time of 200ms from T1.

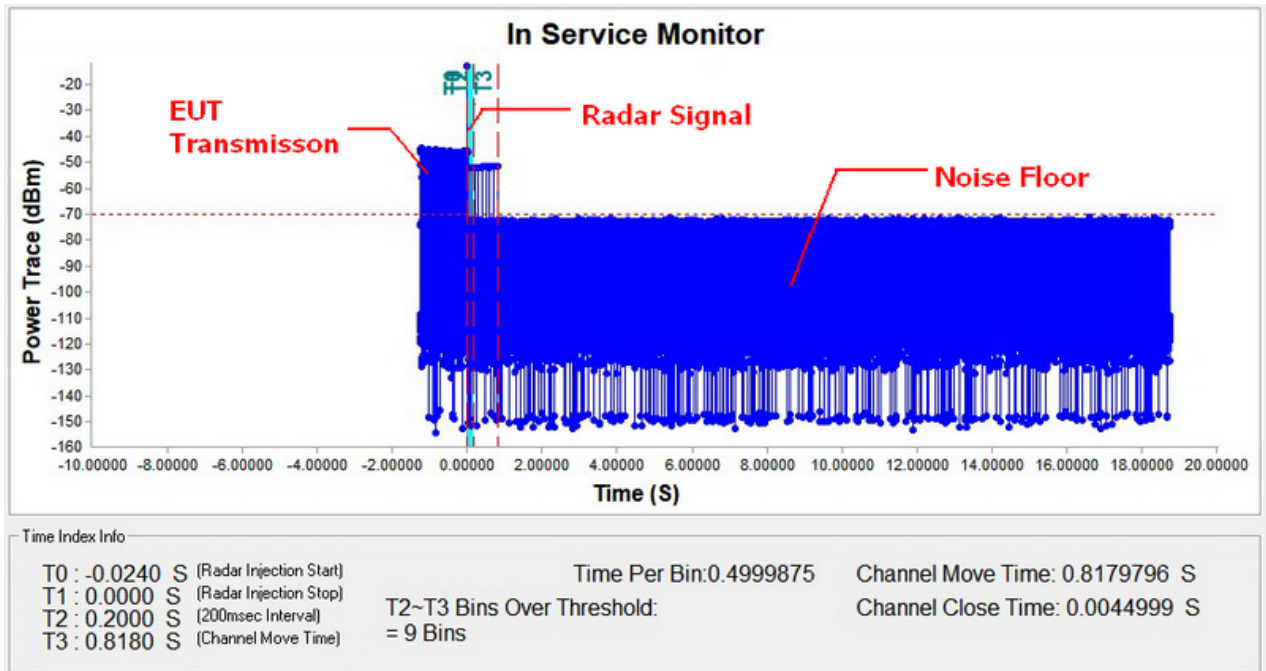
T3 denotes the end of Channel Move Time.



**Note:** An expanded plot for the device vacates the channel in the required 500ms

TX (IEEE 802.11n (HT40) Mode) \_5550MHz

Radar signal 0

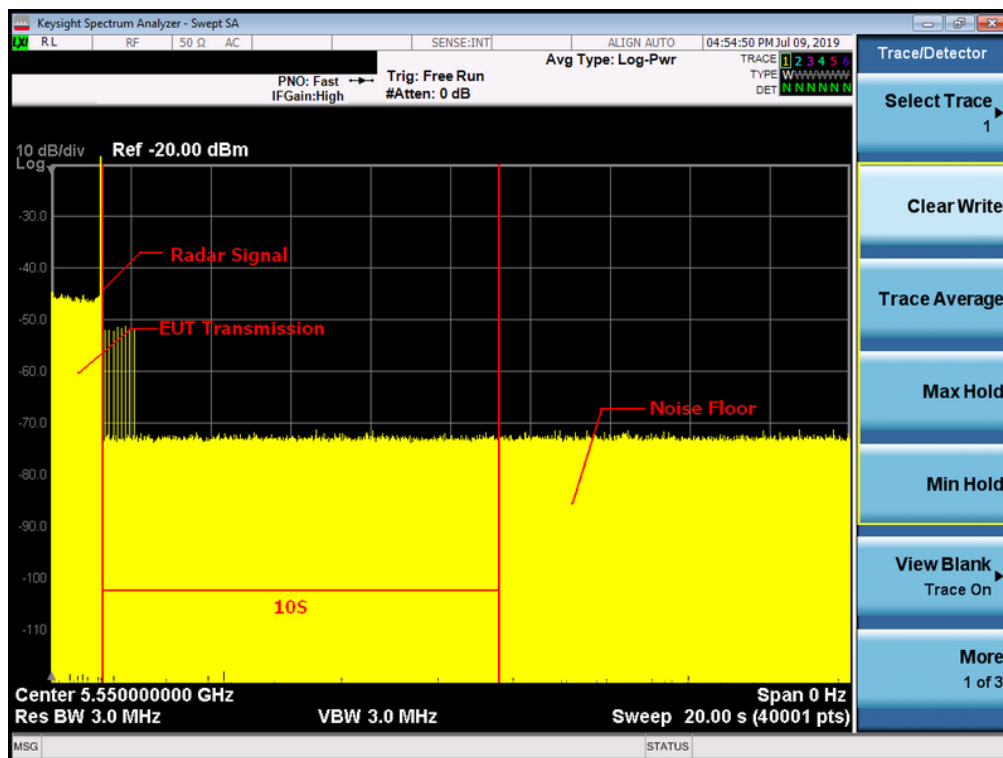


**Note:** T0 denotes the Radar Injection Start.

T1 denotes the start of Channel Move Time upon the end of the last Radar burst.

T2 denotes the data transmission time of 200ms from T1.

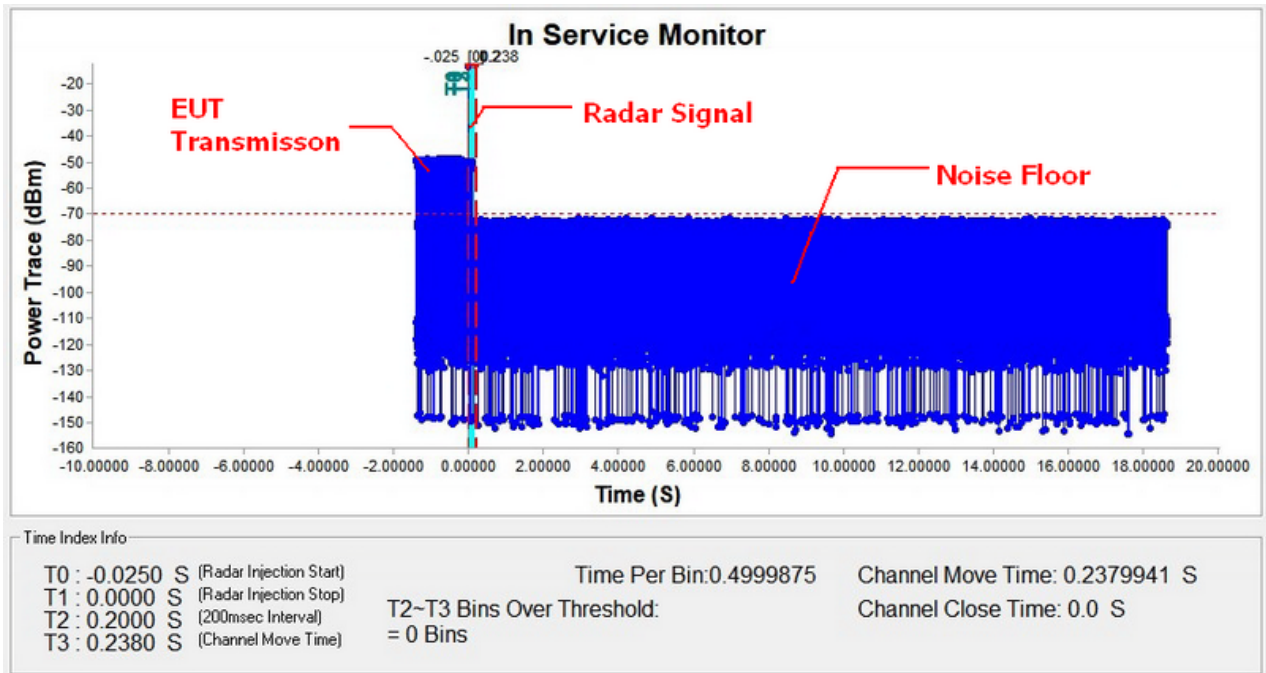
T3 denotes the end of Channel Move Time.



**Note:** An expanded plot for the device vacates the channel in the required 500ms

TX (IEEE 802.11ac (VHT80) Mode) \_5530MHz

Radar signal 0

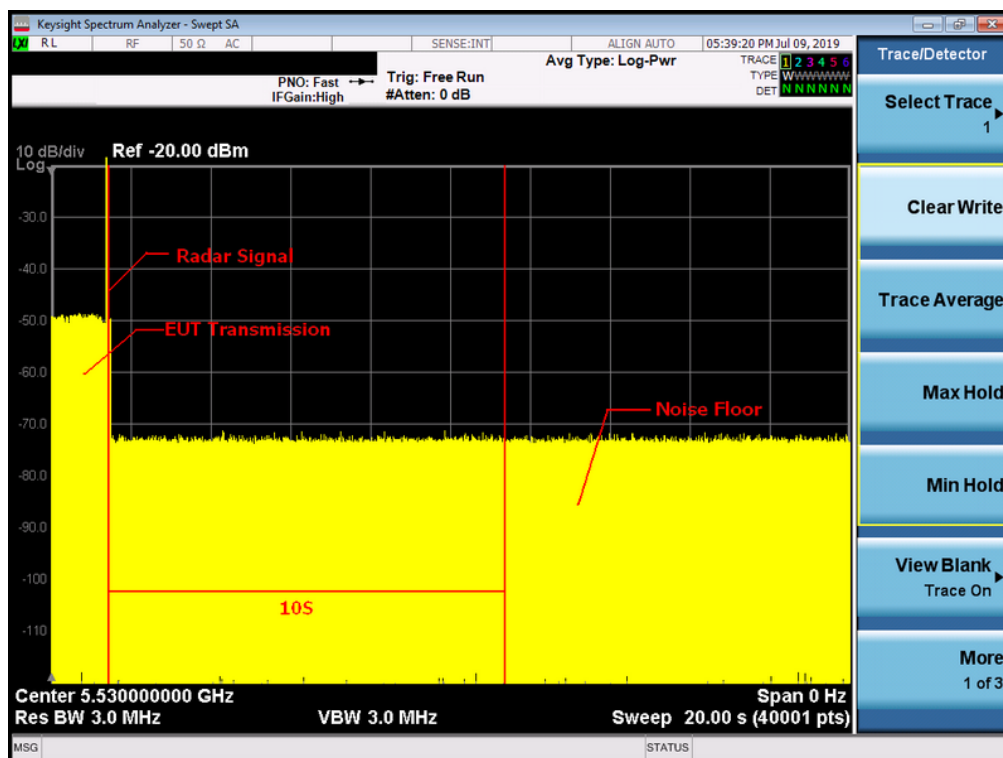


**Note:** T0 denotes the Radar Injection Start.

T1 denotes the start of Channel Move Time upon the end of the last Radar burst.

T2 denotes the data transmission time of 200ms from T1.

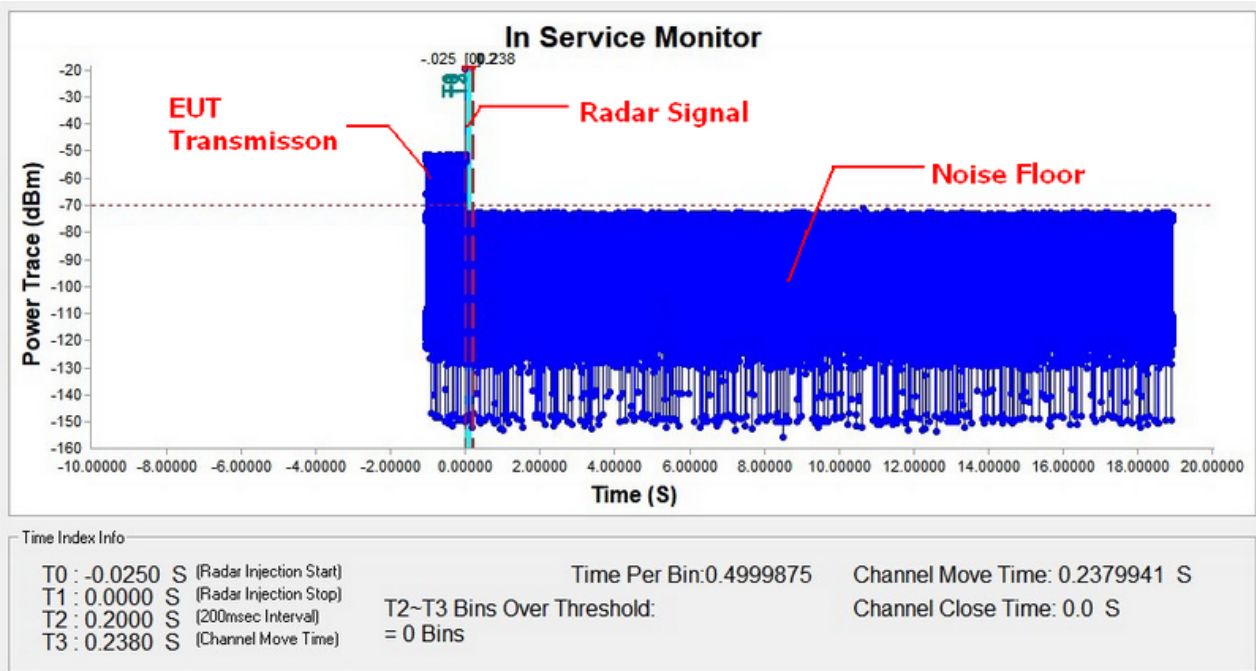
T3 denotes the end of Channel Move Time.



**Note:** An expanded plot for the device vacates the channel in the required 500ms

TX (IEEE 802.11ac (VHT160) Mode) \_5250MHz

Radar signal 0

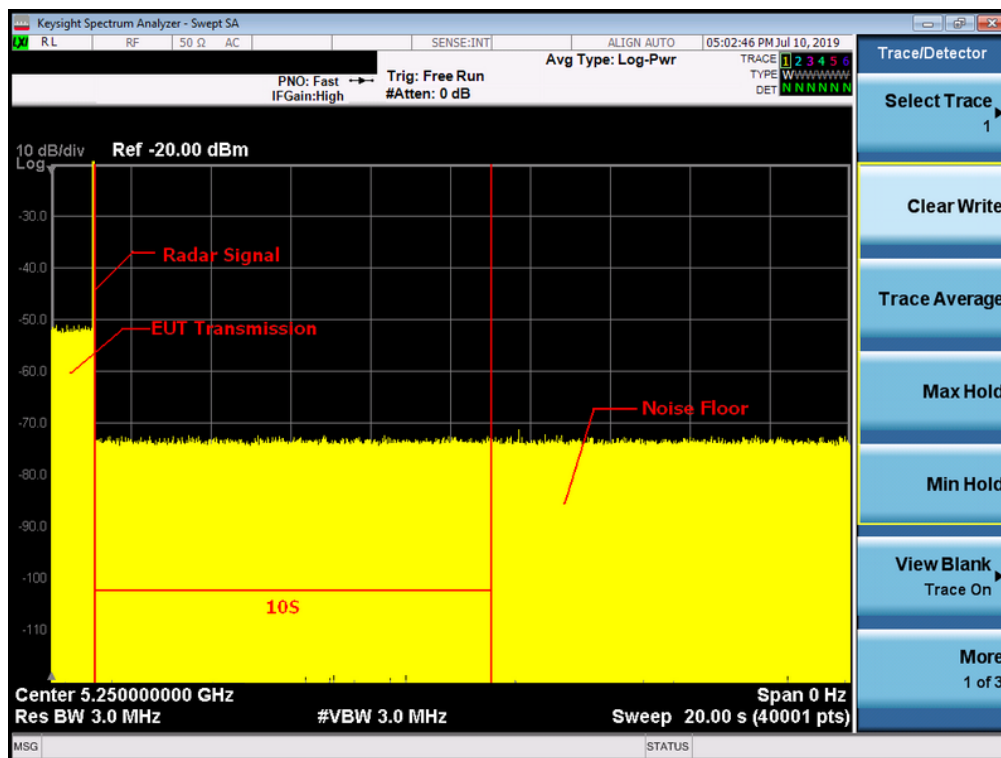


**Note:** T0 denotes the Radar Injection Start.

T1 denotes the start of Channel Move Time upon the end of the last Radar burst.

T2 denotes the data transmission time of 200ms from T1.

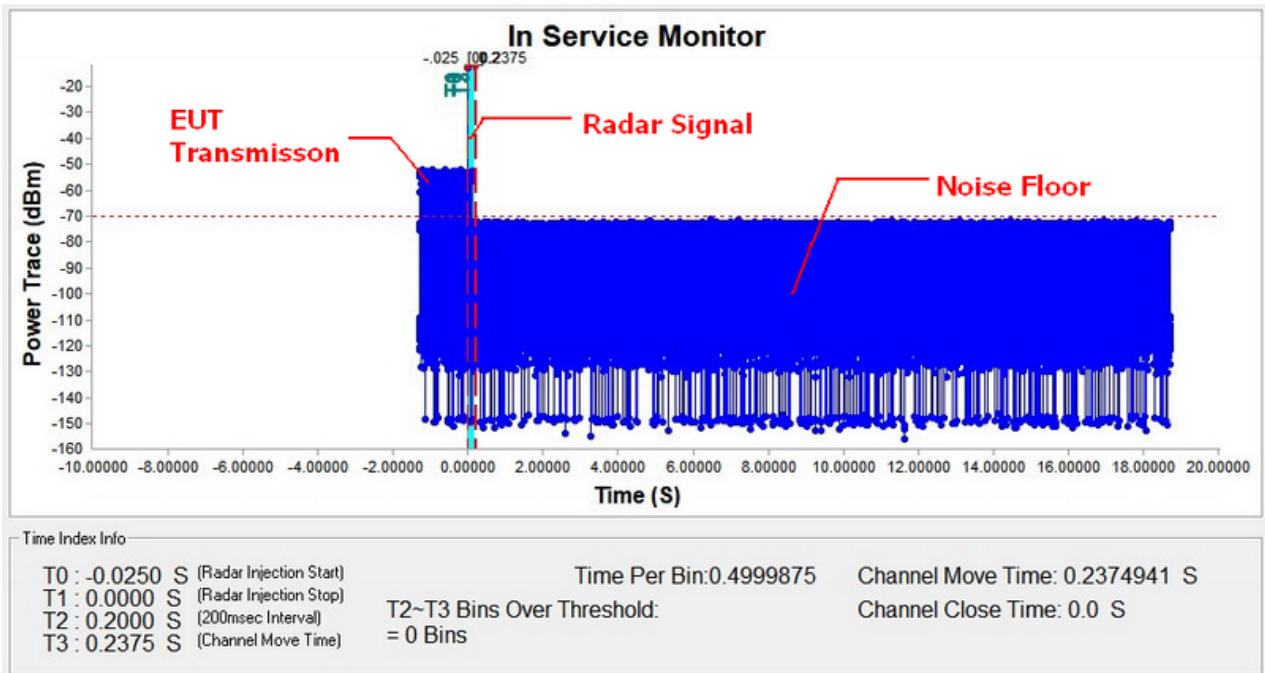
T3 denotes the end of Channel Move Time.



**Note:** An expanded plot for the device vacates the channel in the required 500ms

TX (IEEE 802.11ac (VHT160) Mode) \_5570MHz

Radar signal 0

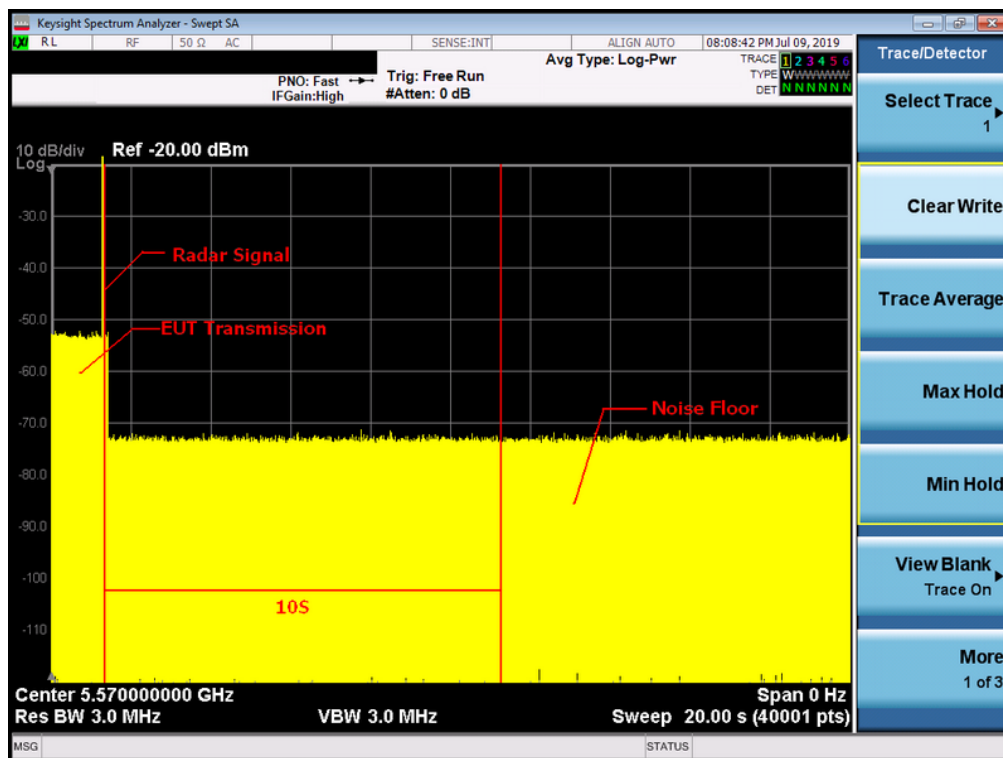


**Note:** T0 denotes the Radar Injection Start.

T1 denotes the start of Channel Move Time upon the end of the last Radar burst.

T2 denotes the data transmission time of 200ms from T1.

T3 denotes the end of Channel Move Time.



**Note:** An expanded plot for the device vacates the channel in the required 500ms

| IEEE 802.11a Mode_5540MHz |                   |                                                                                    |
|---------------------------|-------------------|------------------------------------------------------------------------------------|
| Item                      | Measured Value(s) | Limit(s)                                                                           |
| Channel Move Time         | 0.7729807         | 10                                                                                 |
| Channel Close Time        | 0.0039999         | 200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period |

| IEEE 802.11n (HT40) Mode_5550MHz |                   |                                                                                    |
|----------------------------------|-------------------|------------------------------------------------------------------------------------|
| Item                             | Measured Value(s) | Limit(s)                                                                           |
| Channel Move Time                | 0.8179796         | 10                                                                                 |
| Channel Close Time               | 0.0044999         | 200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period |

| IEEE 802.11ac (VHT80) Mode_5530MHz |                   |                                                                                    |
|------------------------------------|-------------------|------------------------------------------------------------------------------------|
| Item                               | Measured Value(s) | Limit(s)                                                                           |
| Channel Move Time                  | 0.2379941         | 10                                                                                 |
| Channel Close Time                 | 0.0               | 200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period |

| IEEE 802.11ac (VHT160) Mode_5250MHz |                   |                                                                                    |
|-------------------------------------|-------------------|------------------------------------------------------------------------------------|
| Item                                | Measured Value(s) | Limit(s)                                                                           |
| Channel Move Time                   | 0.2379941         | 10                                                                                 |
| Channel Close Time                  | 0.0               | 200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period |

| IEEE 802.11ac (VHT160) Mode_5570MHz |                   |                                                                                    |
|-------------------------------------|-------------------|------------------------------------------------------------------------------------|
| Item                                | Measured Value(s) | Limit(s)                                                                           |
| Channel Move Time                   | 0.2374941         | 10                                                                                 |
| Channel Close Time                  | 0.0               | 200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period |