

## 9. LIST OF TEST EQUIPMENT

| Type                                | Manufacturer           | Model                       | Cal.Date<br>(yy/mm/dd) | Next.Cal.Date<br>(yy/mm/dd) | S/N                |
|-------------------------------------|------------------------|-----------------------------|------------------------|-----------------------------|--------------------|
| Spectrum Analyzer                   | Agilent Technologies   | N9020A                      | 19/06/26               | 20/06/26                    | US47360812         |
| Spectrum Analyzer                   | Agilent Technologies   | N9020A                      | 18/12/19               | 19/12/19                    | MY48011700         |
| Spectrum Analyzer                   | Agilent Technologies   | N9030A                      | 19/03/15               | 20/03/15                    | MY53310140         |
| DC Power Supply                     | Agilent Technologies   | 66332A                      | 18/12/18               | 19/12/18                    | US37473833         |
| Multimeter                          | FLUKE                  | 17B                         | 18/12/18               | 19/12/18                    | 26030065WS         |
| Signal Generator                    | Rohde Schwarz          | SMBV100A                    | 18/12/19               | 19/12/19                    | 255571             |
| Signal Generator                    | ANRITSU                | MG3695C                     | 18/12/10               | 19/12/10                    | 173501             |
| Thermohygrometer                    | BODYCOM                | BJ5478                      | 18/12/27               | 19/12/27                    | 120612-1           |
| Thermohygrometer                    | SATO                   | PC-5000TRH-II               | 18/07/18               | 19/07/18                    | N/A                |
|                                     |                        |                             | 19/07/18               | 20/07/18                    |                    |
| Thermohygrometer                    | BODYCOM                | BJ5478                      | 19/07/03               | 20/07/03                    | N/A                |
| HYGROMETER                          | TESTO                  | 608-H1                      | 19/01/31               | 20/01/31                    | 34862883           |
| Loop Antenna                        | Schwarzbeck            | FMZB1513                    | 18/01/30               | 20/01/30                    | 1513-128           |
| BILOG ANTENNA                       | Schwarzbeck            | VULB 9160                   | 18/07/13               | 20/07/13                    | 3359               |
| Horn Antenna                        | ETS-Lindgren           | 3115                        | 18/01/30               | 20/01/30                    | 6419               |
| Horn Antenna                        | A.H.Systems Inc.       | SAS-574                     | 17/07/31               | 19/07/31                    | 155                |
| PreAmplifier                        | tsj                    | MLA-0118-J01-45             | 18/12/19               | 19/12/19                    | 17138              |
| PreAmplifier                        | tsj                    | MLA-1840-J02-45             | 19/06/27               | 20/06/27                    | 16966-10728        |
| PreAmplifier                        | tsj                    | MLA-10K01-B01-27            | 18/10/31               | 19/10/31                    | 2005354            |
| Attenuator                          | SMAJK                  | SMAJK-2-3                   | 19/06/25               | 20/06/25                    | 4                  |
| Attenuator                          | SMAJK                  | SMAJK-2-3                   | 18/07/02               | 19/07/02                    | 3                  |
|                                     |                        |                             | 19/06/27               | 20/06/27                    |                    |
| Attenuator                          | SRTechnology           | F01-B0606-01                | 18/07/02               | 19/07/02                    | 13092403           |
|                                     |                        |                             | 19/06/27               | 20/06/27                    |                    |
| Attenuator                          | Hefei Shunze           | SS5T2.92-10-40              | 18/07/03               | 19/07/03                    | 16012202           |
|                                     |                        |                             | 19/06/27               | 20/06/27                    |                    |
| High Pass Filter                    | Wainwright Instruments | WHNX8.0/26.5-6SS            | 18/07/03               | 19/07/03                    | 3                  |
|                                     |                        |                             | 19/06/27               | 20/06/27                    |                    |
| High Pass Filter                    | Wainwright Instruments | WHKX12-935-1000-15000-40SS  | 18/07/02               | 19/07/02                    | 8                  |
|                                     |                        |                             | 19/06/26               | 20/06/26                    |                    |
| High Pass Filter                    | Wainwright Instruments | WHKX10-2838-3300-18000-60SS | 18/07/02               | 19/07/02                    | 1                  |
|                                     |                        |                             | 19/06/26               | 20/06/26                    |                    |
| Power Meter & Wide Bandwidth Sensor | Anritsu                | ML2496A<br>MA2411B          | 18/12/19               | 19/12/19                    | 1338004<br>1306053 |
| Temp & Humi Test Chamber            | SJ Science             | SJ-TH-S50                   | 18/12/20               | 19/12/20                    | SJ-TH-S50-140205   |
| EMI Receiver                        | ROHDE&SCHWARZ          | ESW44                       | 18/08/06               | 19/08/06                    | 101645             |
| EMI Test Receiver                   | Rohde Schwarz          | ESCI7                       | 19/01/30               | 20/01/30                    | 100910             |
| PULSE LIMITER                       | Rohde Schwarz          | ESH3-Z2                     | 18/09/27               | 19/09/27                    | 101333             |
| LISN                                | SCHWARZBECK            | NNLK 8121                   | 19/03/19               | 20/03/19                    | 06183              |
| Cable                               | HUBER+SUHNER           | SUCOFLEX                    | 18/12/21               | 19/12/21                    | C-1                |
| Cable                               | HUBER+SUHNER           | SUCOFLEX                    | 18/12/21               | 19/12/21                    | C-2                |
| Cable                               | HUBER+SUHNER           | SUCOFLEX                    | 18/12/21               | 19/12/21                    | C-3                |
| Cable                               | HUBER+SUHNER           | SUCOFLEX                    | 18/12/21               | 19/12/21                    | C-4                |
| Cable                               | Junkosha               | MWX241                      | 19/01/14               | 20/01/14                    | G-04               |
| Cable                               | Junkosha               | MWX241                      | 19/01/14               | 20/01/14                    | G-07               |
| Cable                               | DT&C                   | Cable                       | 19/01/14               | 20/01/14                    | G-13               |
| Cable                               | DT&C                   | Cable                       | 19/01/14               | 20/01/14                    | G-14               |
| Cable                               | HUBER+SUHNER           | SUCOFLEX 104                | 19/01/14               | 20/01/14                    | G-15               |

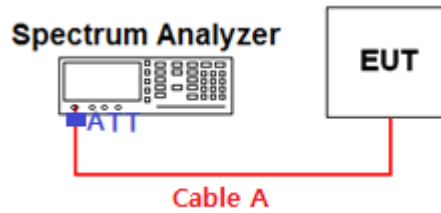
Note 1: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2017

Note 2: The cable is not a regular calibration item, so it has been calibrated by DT & C itself.

## APPENDIX I

### Conducted Test set up Diagram

#### ▪ Conducted Measurement



## APPENDIX II

### Duty Cycle Information

#### ■ Test Procedure

**Duty Cycle [X = On Time / ( On + Off time )]** is measured using Measurement Procedure of **KDB789033 D02v02r01**

1. Set the center frequency of the spectrum analyzer to the center frequency of the transmission.
2. Set RBW  $\geq$  EBW if possible; otherwise, set RBW to the largest available value.
3. Set VBW  $\geq$  RBW. Set detector = peak.
4. Note : The zero-span measurement method shall not be used unless both **RBW and VBW are  $> 50/T$** , where  $T$  is defined in section II.B.1.a), and **the number of sweep points across duration  $T$  exceeds 100**. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if  $T \leq 16.7$  microseconds.)

$T$  : The minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

( $T$  = On time of the above table since the EUT operates with above fixed Duty Cycle and it is the minimum On time)

#### ■ Test Results:

##### Duty cycle

| Mode             | Data Rate  | Tested Frequency [MHz] | Maximum Achievable Duty Cycle (x) = On / (On+Off) |                    |        | DCCF= $10 \log(1/x)$ [dB] | 50/T [kHz] |
|------------------|------------|------------------------|---------------------------------------------------|--------------------|--------|---------------------------|------------|
|                  |            |                        | T=On Time [ms]                                    | (On+Off) Time [ms] | x      |                           |            |
| 802.11a          | 24Mbps     | 5180                   | 0.532                                             | 0.617              | 0.8622 | 0.64                      | 93.98      |
| 802.11ac (VHT20) | MCS3 (1SS) | 5180                   | 0.515                                             | 0.599              | 0.8598 | 0.66                      | 97.09      |
| 802.11ac (VHT40) | MCS0       | 5190                   | 0.952                                             | 1.044              | 0.9119 | 0.40                      | 52.52      |
| 802.11ac (VHT80) | MCS8 (1SS) | 5210                   | 0.075                                             | 0.158              | 0.4747 | 3.24                      | 666.67     |

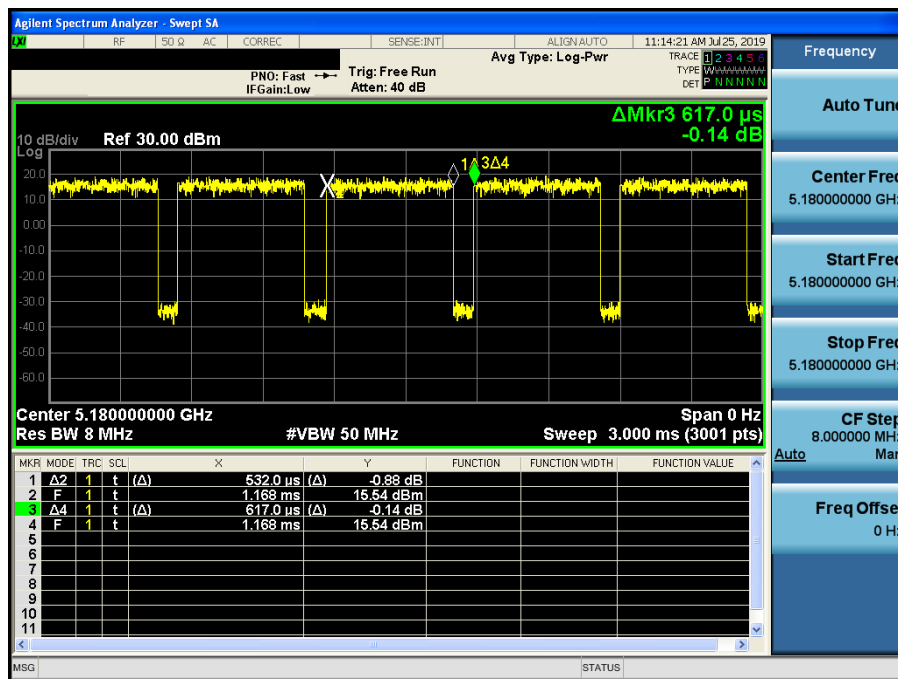
| Mode             | Data Rate  | Tested Frequency [MHz] | Maximum Achievable Duty Cycle (x) = On / (On+Off) |                    |        | DCCF= $10 \log(1/x)$ [dB] | 50/T [kHz] |
|------------------|------------|------------------------|---------------------------------------------------|--------------------|--------|---------------------------|------------|
|                  |            |                        | T=On Time [ms]                                    | (On+Off) Time [ms] | x      |                           |            |
| 802.11ac (VHT20) | MCS3 (2SS) | 5180                   | 0.284                                             | 0.369              | 0.7683 | 1.14                      | 176.37     |
| 802.11n (HT40)   | MCS8       | 5190                   | 0.496                                             | 0.579              | 0.8566 | 0.67                      | 100.81     |
| 802.11ac (VHT80) | MCS5 (2SS) | 5210                   | 0.072                                             | 0.154              | 0.4649 | 3.33                      | 698.32     |

## ■ Test Plot:

## Single Transmit

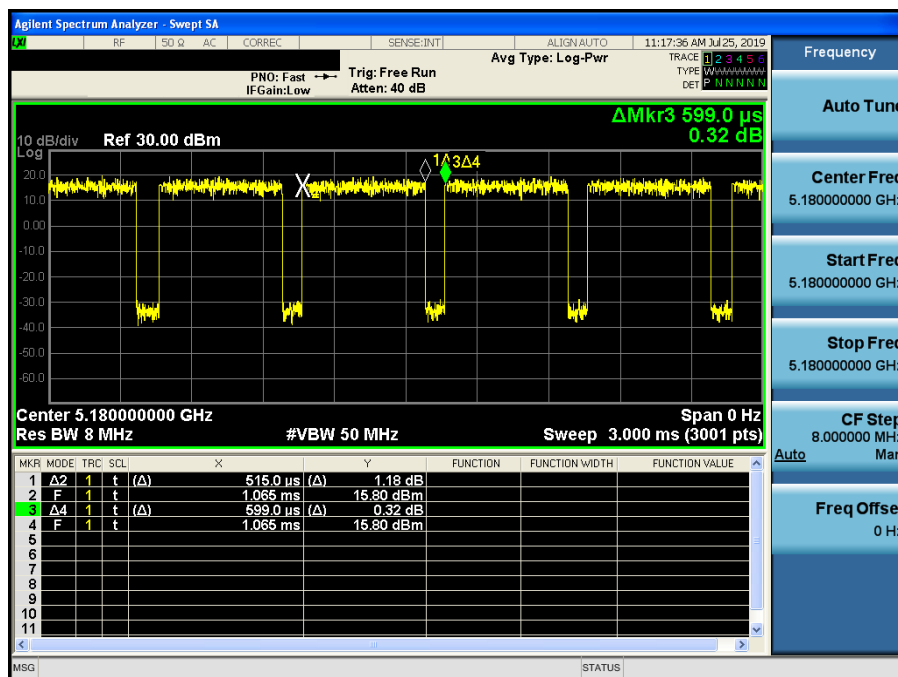
## Duty Cycle

Test Mode: 802.11a &amp; Ch.36



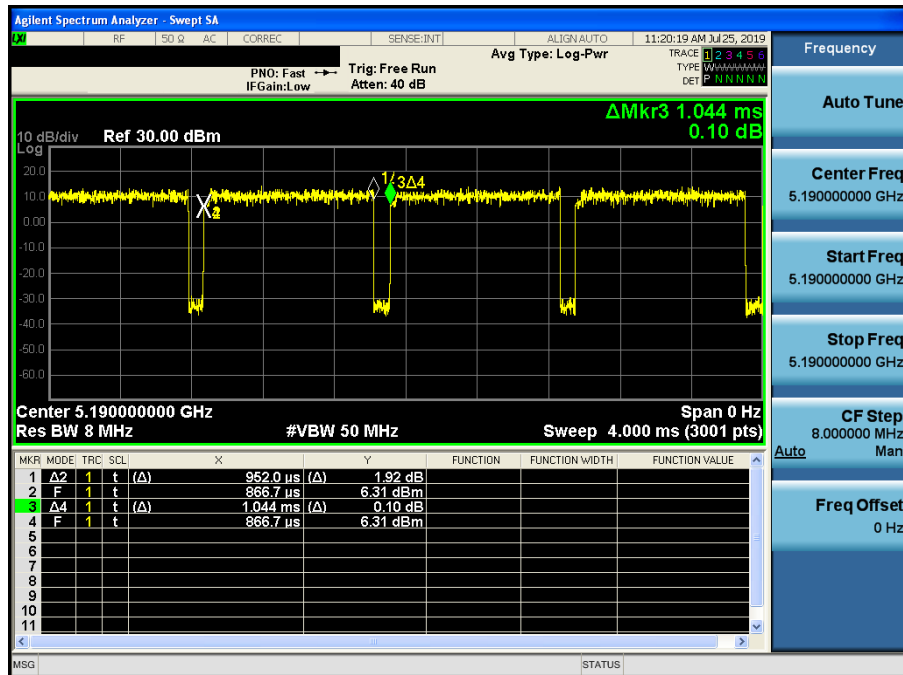
## Duty Cycle

Test Mode: 802.11ac VHT20 &amp; Ch.36



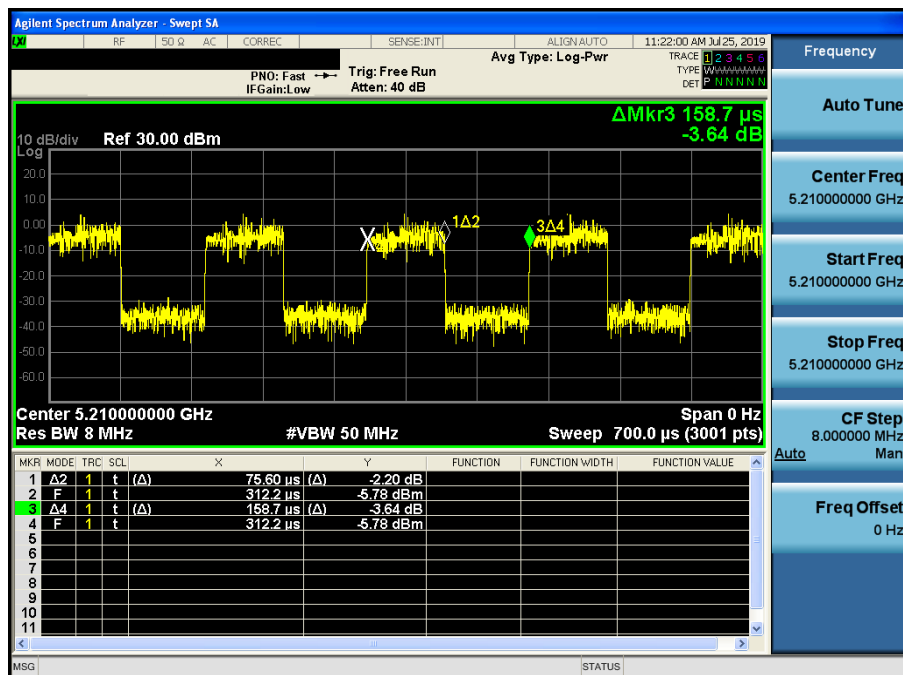
## Duty Cycle

Test Mode: 802.11ac VHT40 &amp; Ch.38



## Duty Cycle

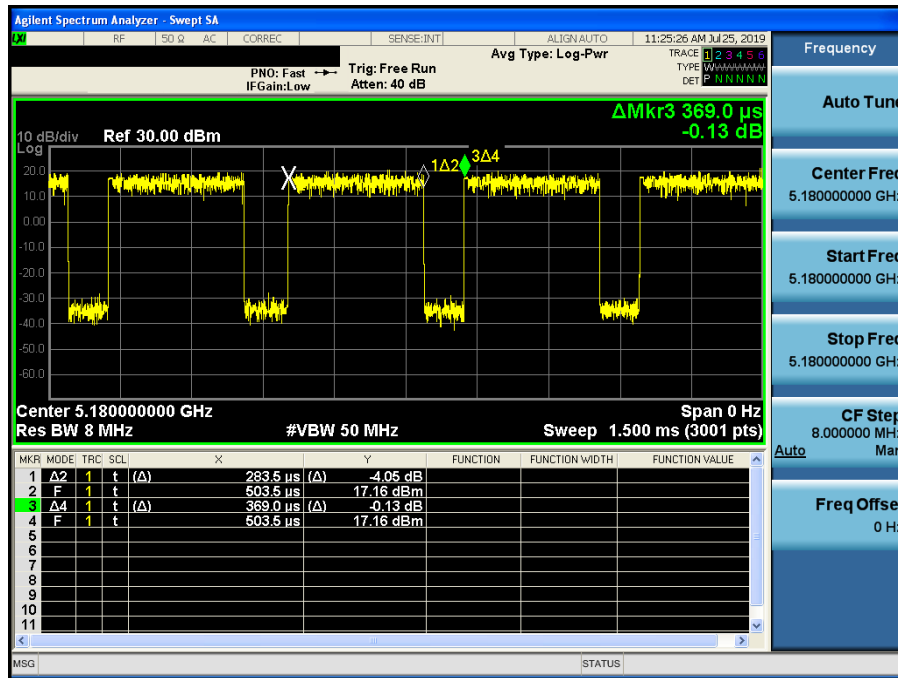
Test Mode: 802.11ac VHT80 &amp; Ch.42



## Multiple Transmit \_ SDM

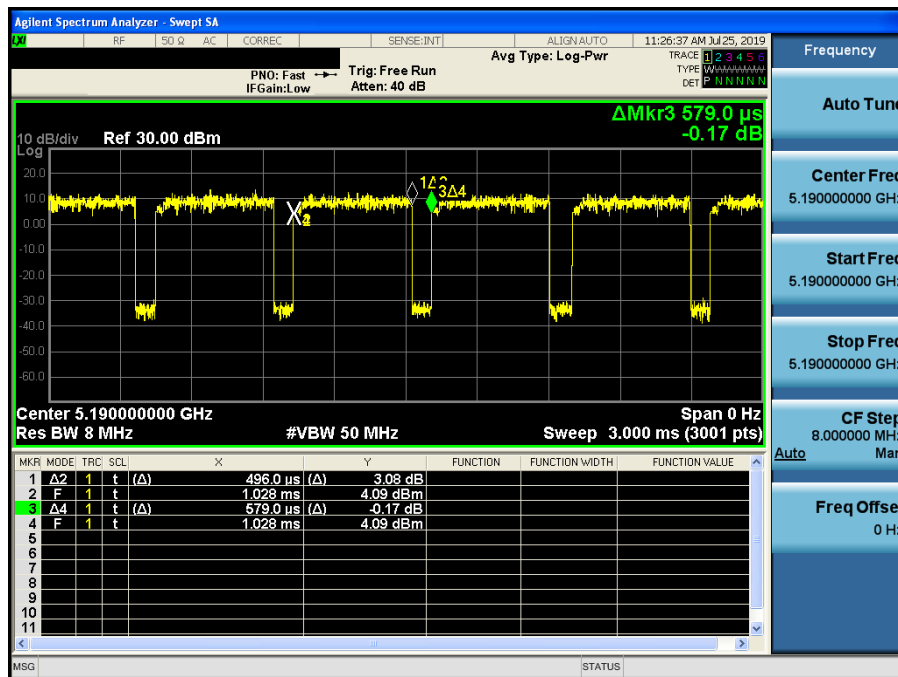
### Duty Cycle

Test Mode: 802.11ac VHT20 & Ch.36



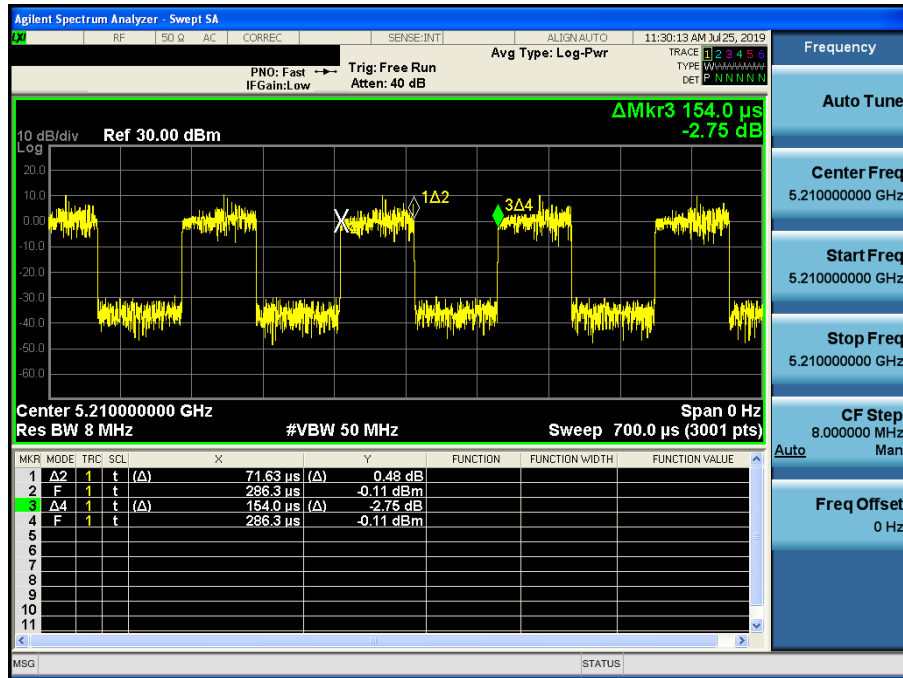
### Duty Cycle

Test Mode: 802.11n HT40 & Ch.38



# Duty Cycle

Test Mode: 802.11ac VHT80 & Ch.42

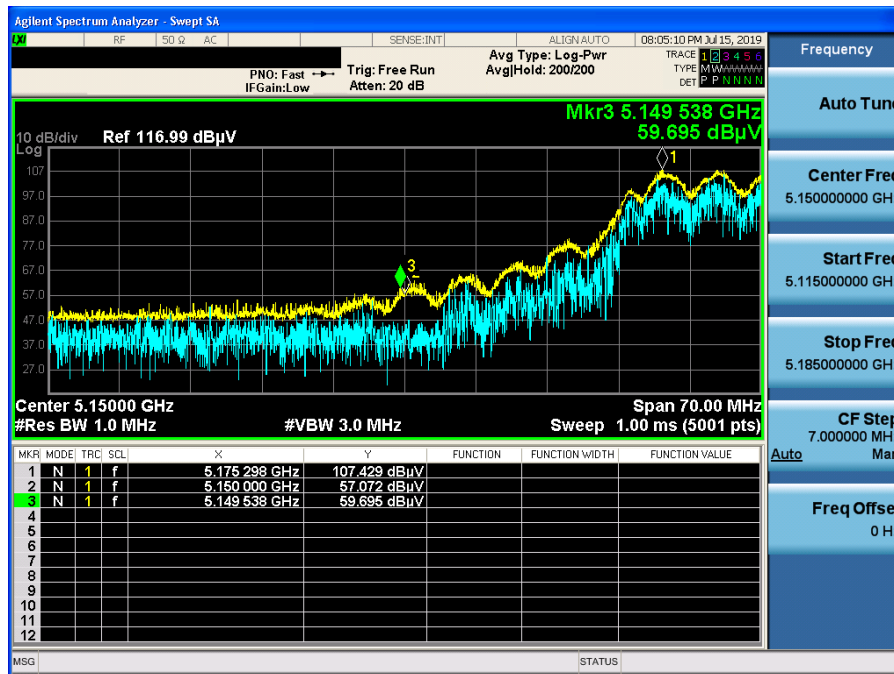


## APPENDIX III

## Unwanted Emissions (Radiated) Test Plot: MIMO(CDD)

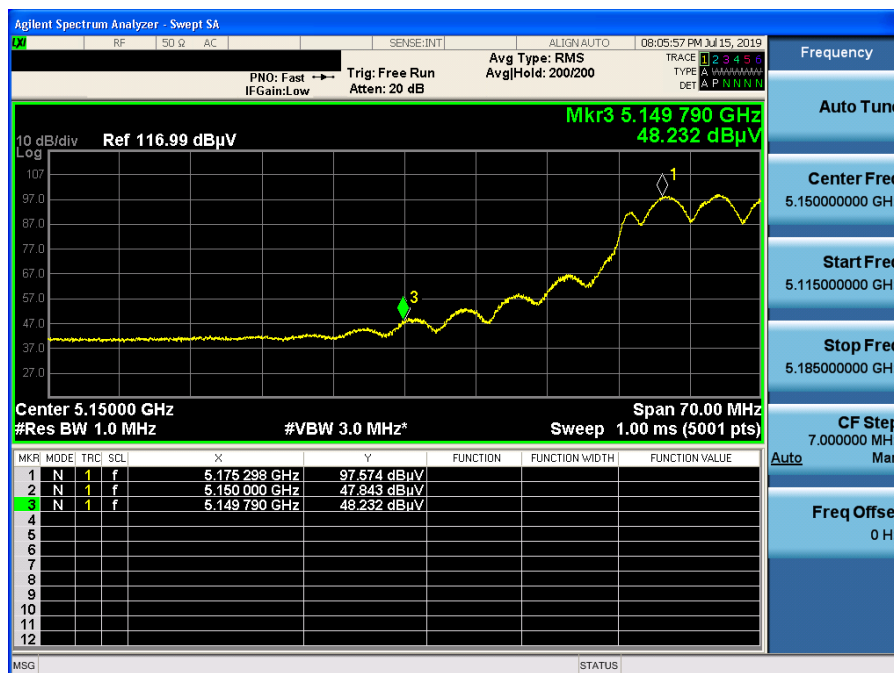
802.11a &amp; U-NII 1 &amp; Ch.36 &amp; Y axis &amp; Ver

Detector Mode : PK



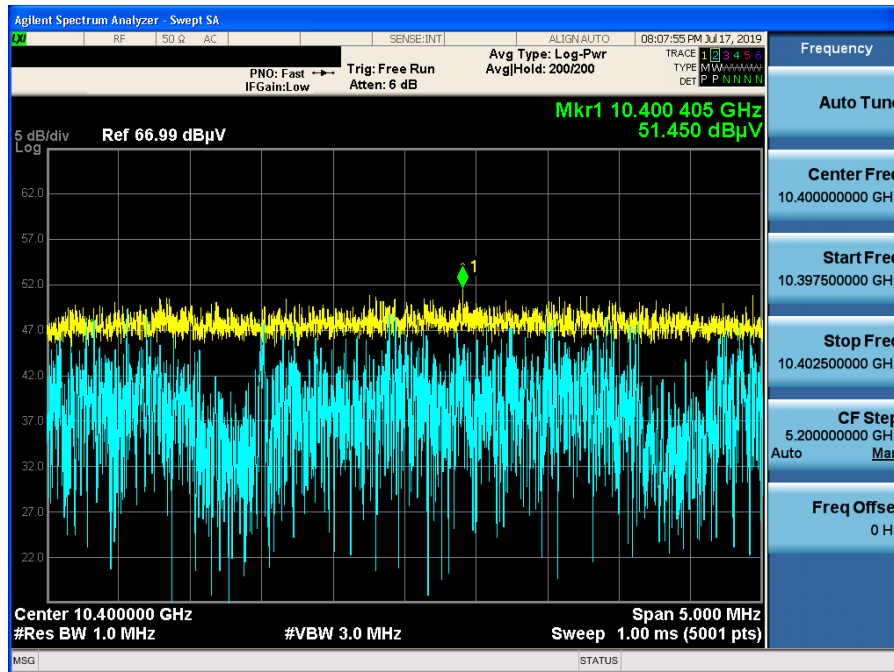
802.11a &amp; U-NII 1 &amp; Ch.36 &amp; Y axis &amp; Ver

Detector Mode : AV



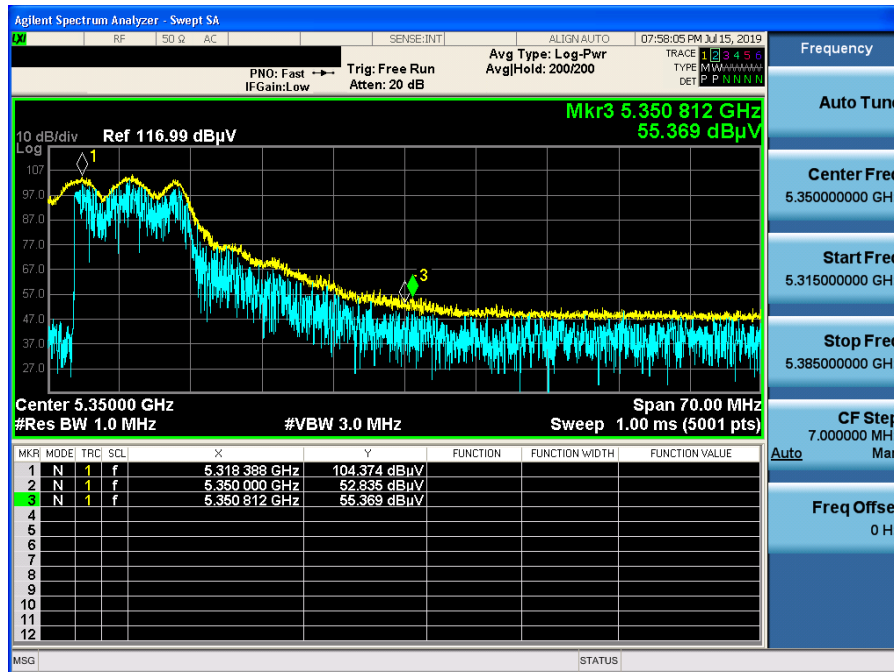
802.11a &amp; U-NII 1 &amp; Ch.40 &amp; Y axis &amp; Hor

Detector Mode : PK



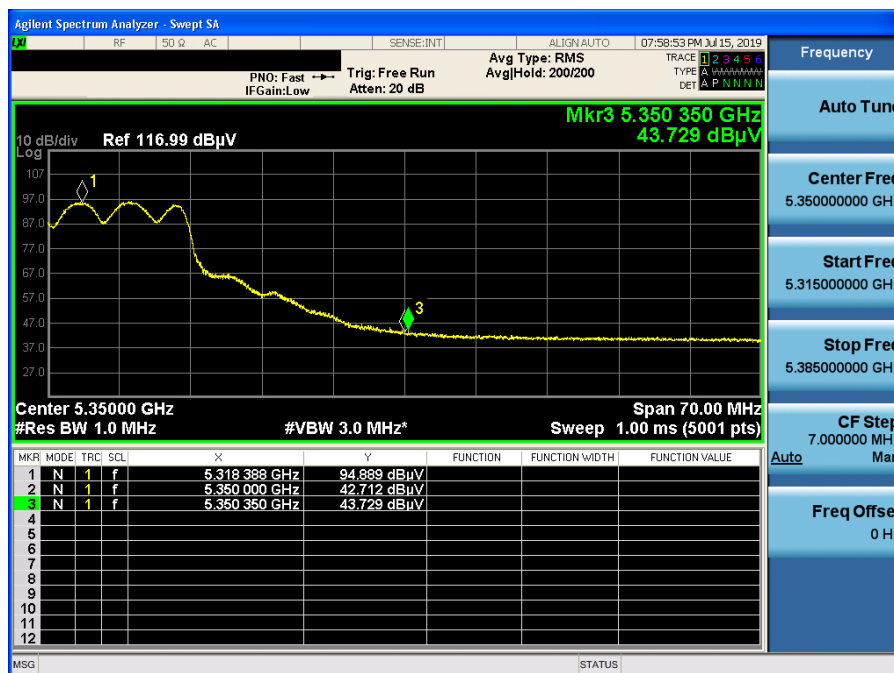
## 802.11a &amp; U-NII 2A &amp; Ch.64 &amp; Y axis &amp; Ver

Detector Mode : PK



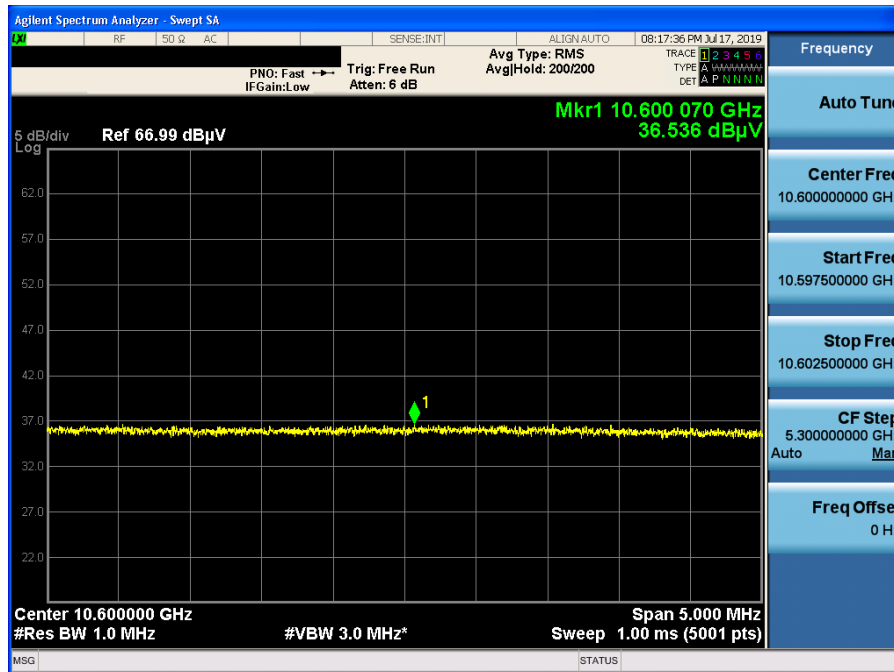
## 802.11a &amp; U-NII 2A &amp; Ch.64 &amp; Y axis &amp; Ver

Detector Mode : AV



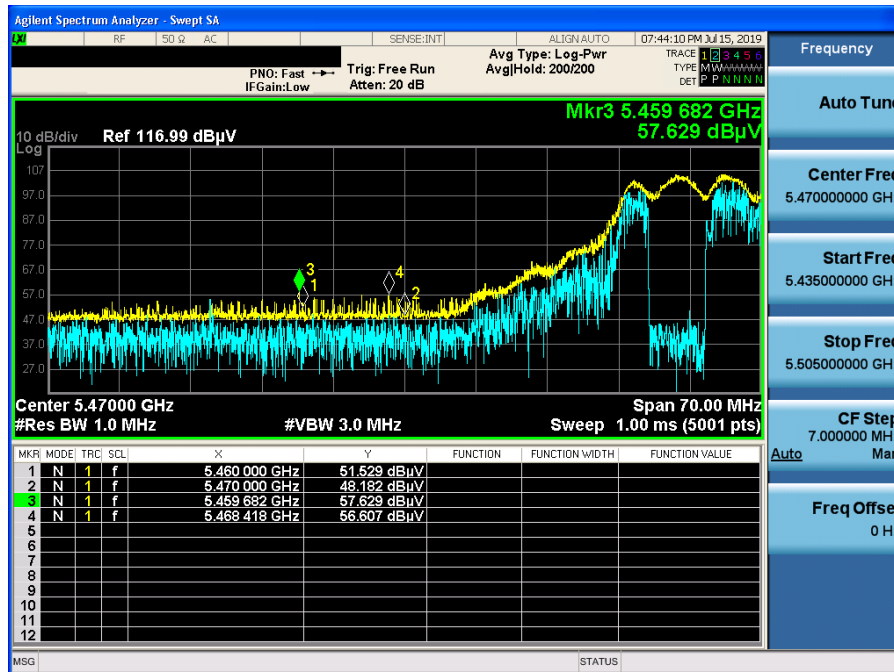
802.11a & U-NII 2A & Ch.60 & Y axis & Hor

Detector Mode : AV



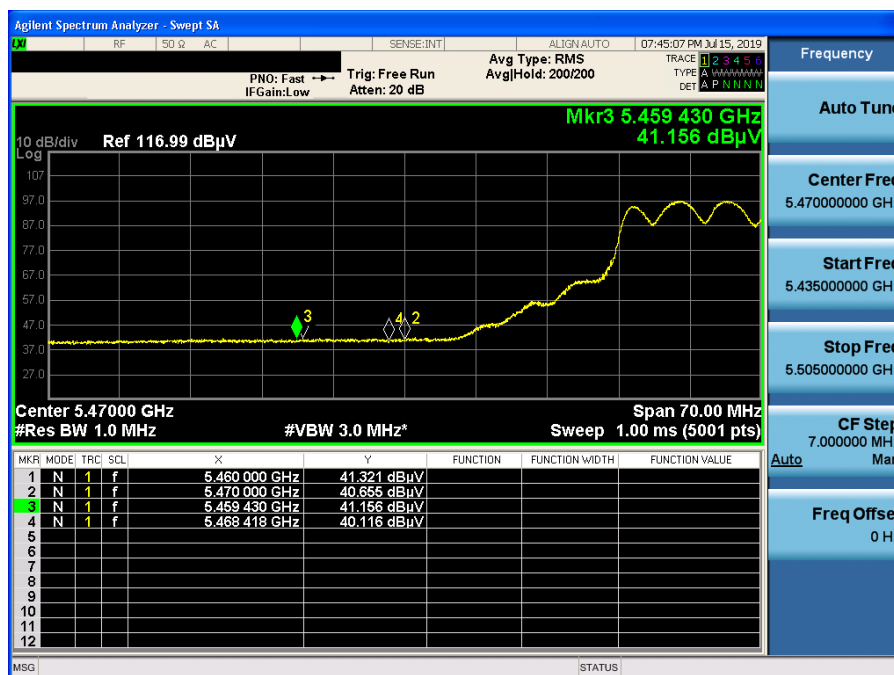
802.11a &amp; U-NII 2C &amp; Ch.100 &amp; Y axis &amp; Ver

Detector Mode : PK



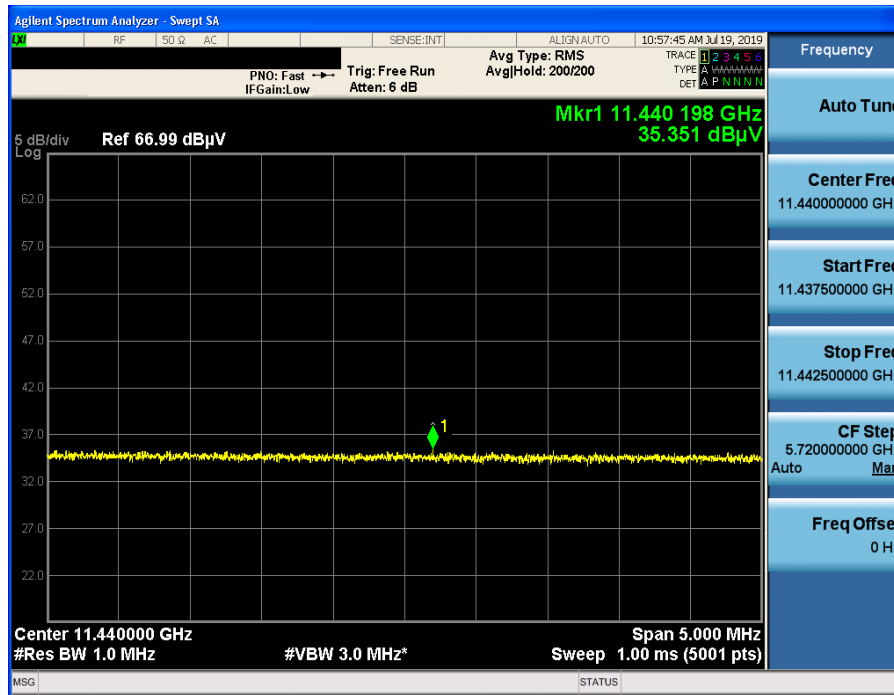
802.11a &amp; U-NII 2C &amp; Ch.100 &amp; Y axis &amp; Ver

Detector Mode : AV



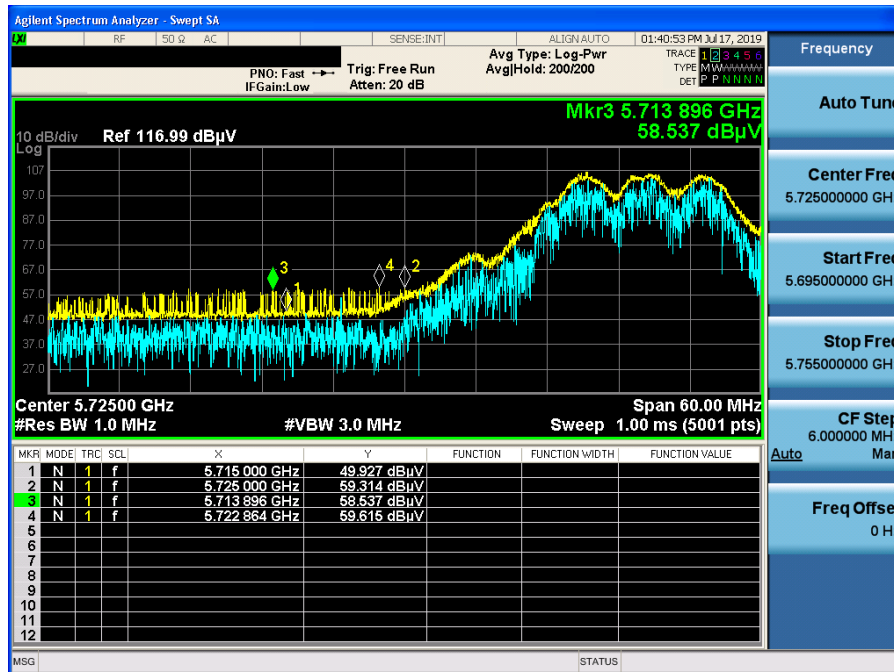
802.11a & U-NII 2C & Ch.144 & Y axis & Hor

Detector Mode : AV



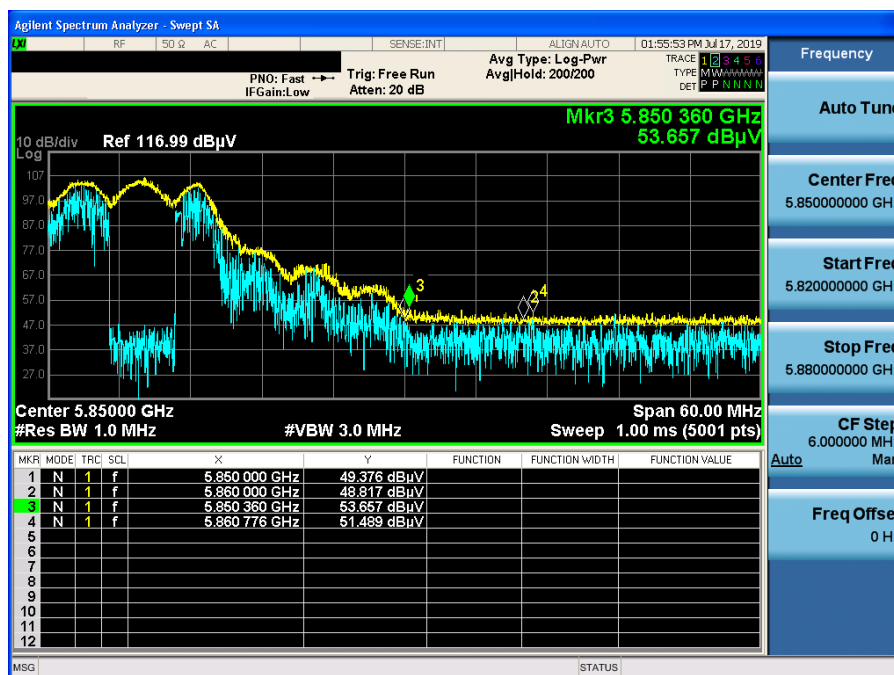
802.11a &amp; U-NII 3 &amp; Ch.149 &amp; Y axis &amp; Ver

Detector Mode : PK



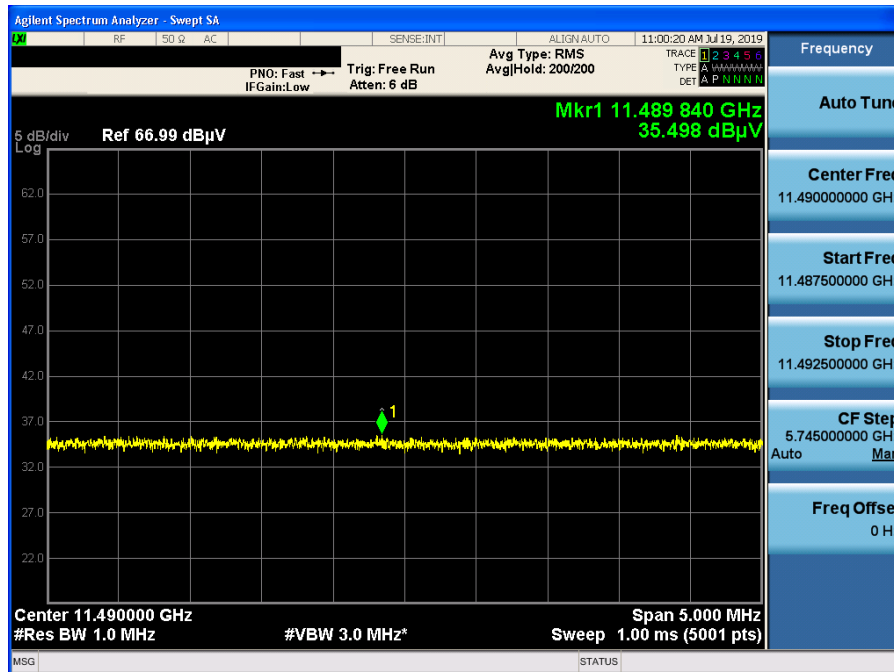
802.11a &amp; U-NII 3 &amp; Ch.165 &amp; Y axis &amp; Ver

Detector Mode : PK



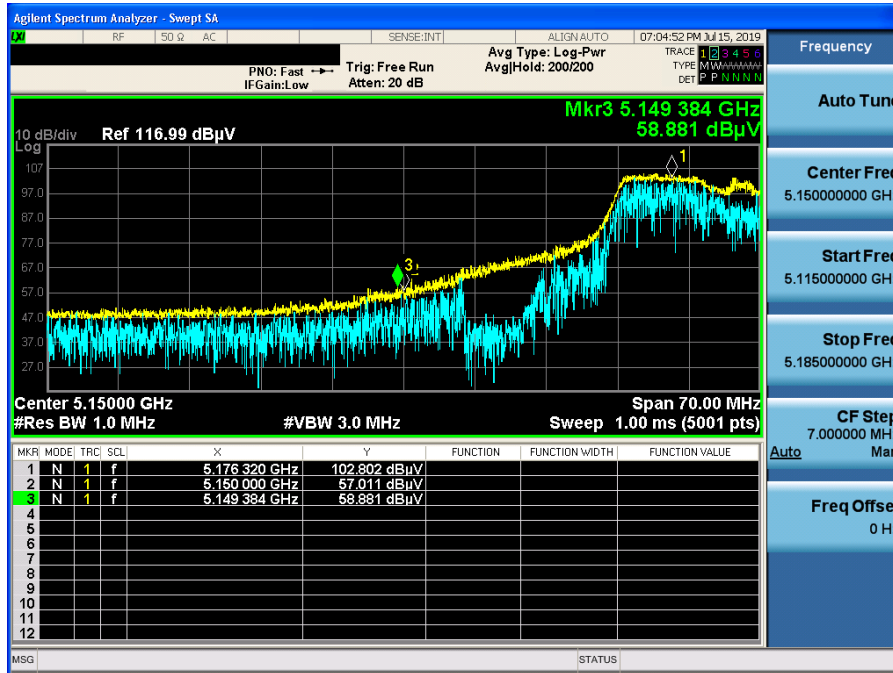
802.11a &amp; U-NII 3 &amp; Ch.149 &amp; Y axis &amp; Hor

Detector Mode : AV



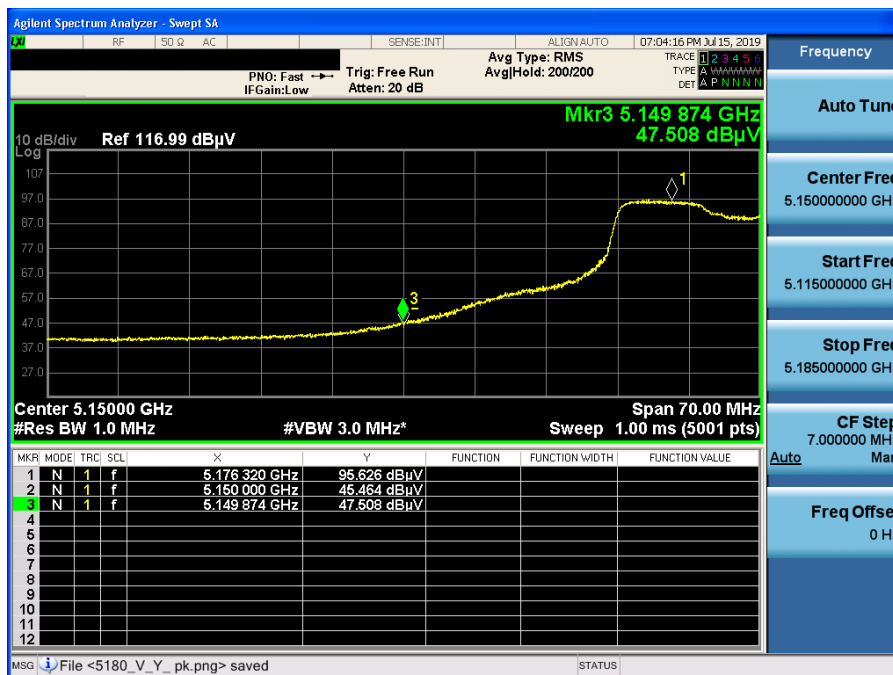
802.11ac(VHT20) &amp; U-NII 1 &amp; Ch.36 &amp; Y axis &amp; Ver

Detector Mode : PK

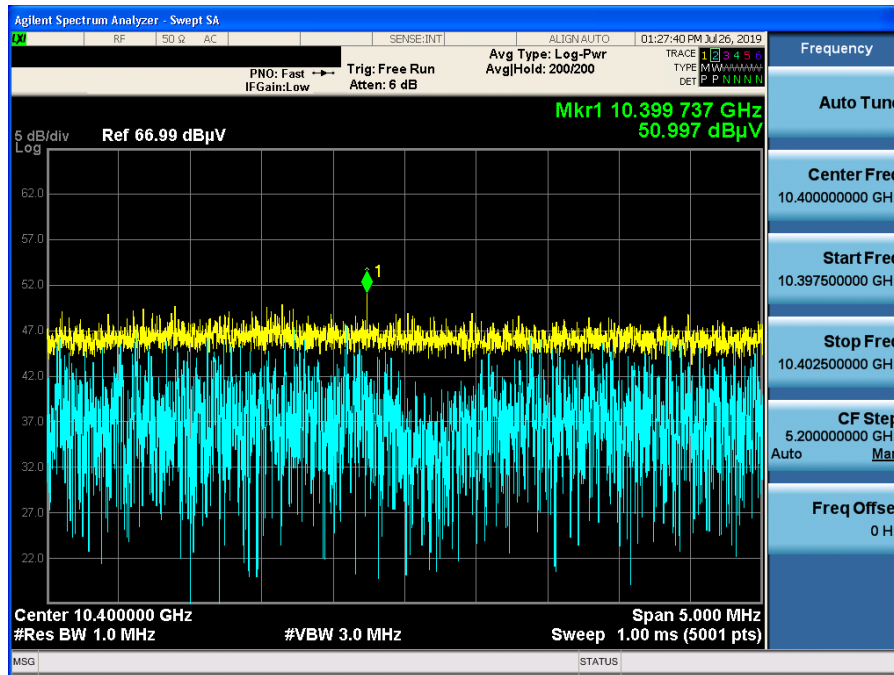


802.11ac(VHT20) &amp; U-NII 1 &amp; Ch.36 &amp; Y axis &amp; Ver

Detector Mode : AV

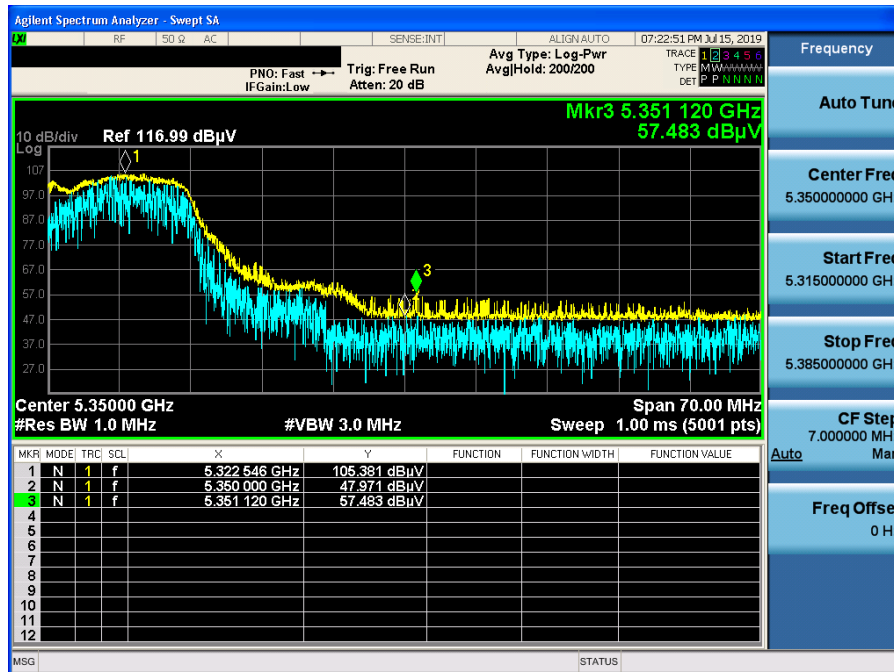


**Detector Mode : PK**



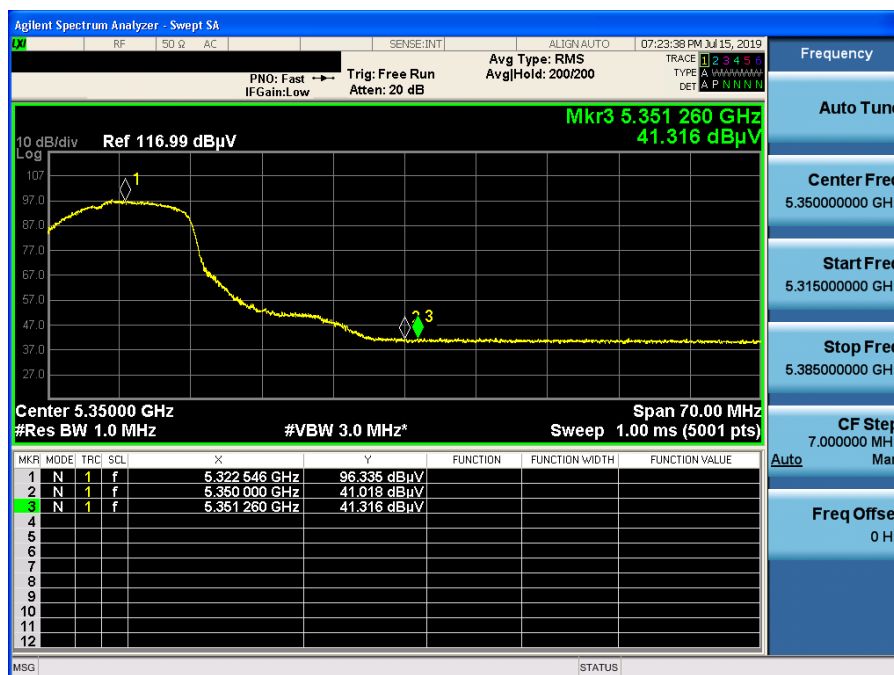
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Detector Mode : PK



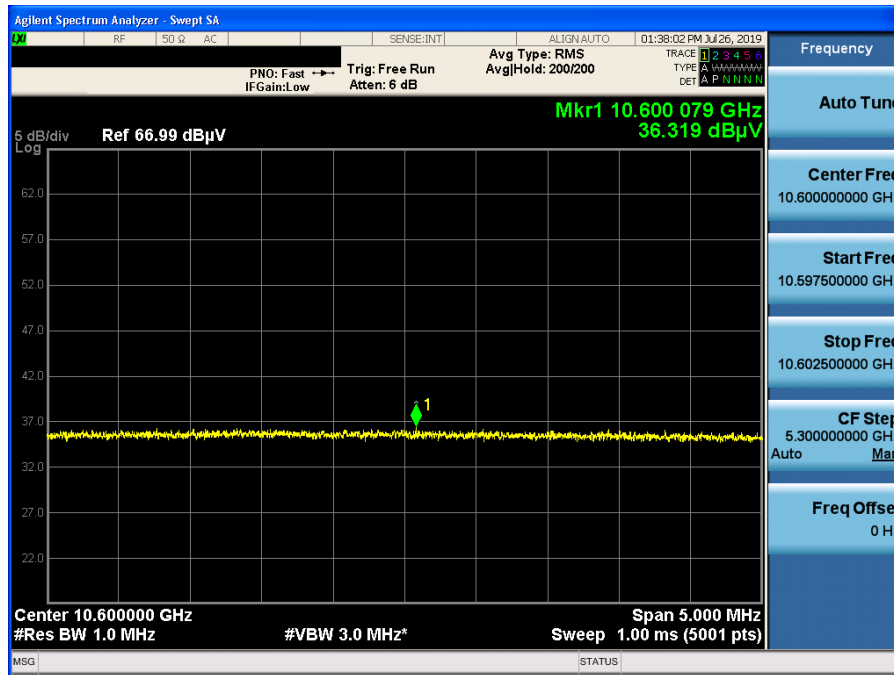
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Detector Mode : AV



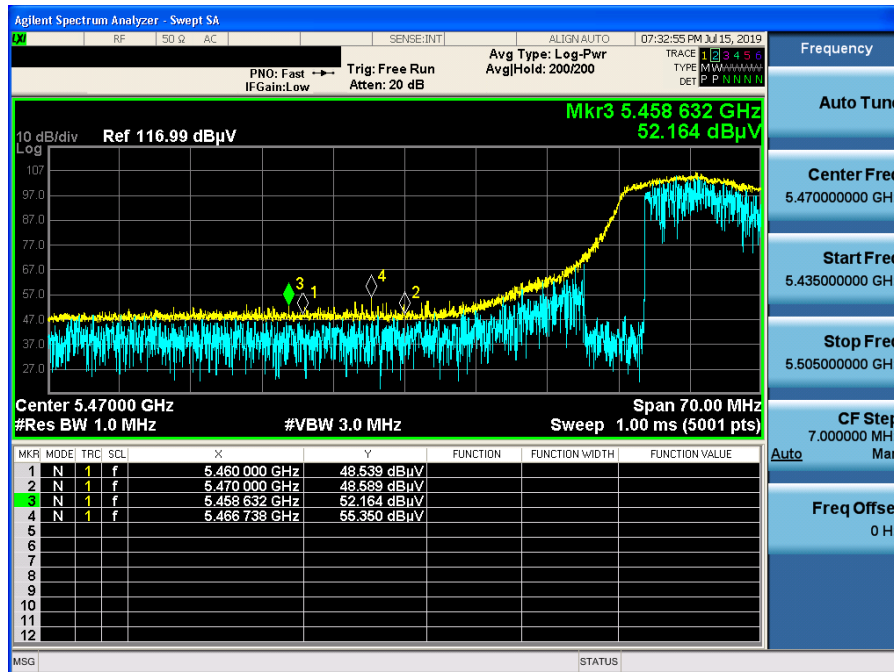
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Detector Mode : AV



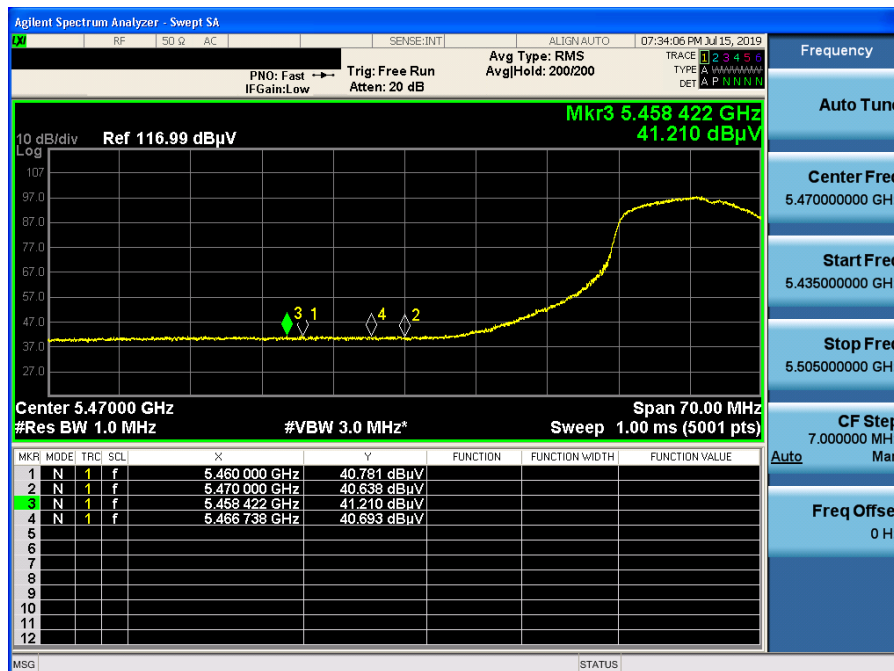
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Detector Mode : PK



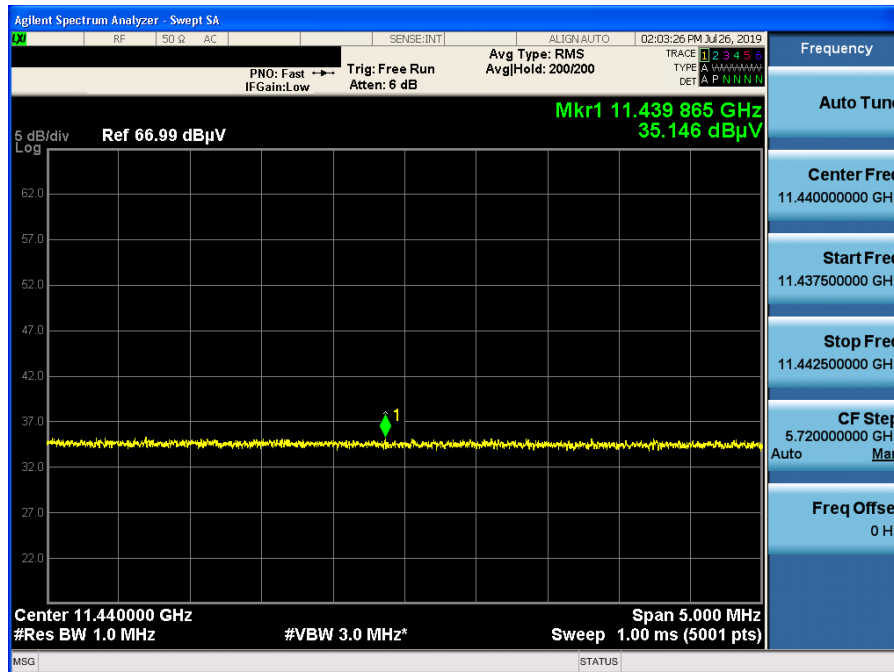
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Detector Mode : AV



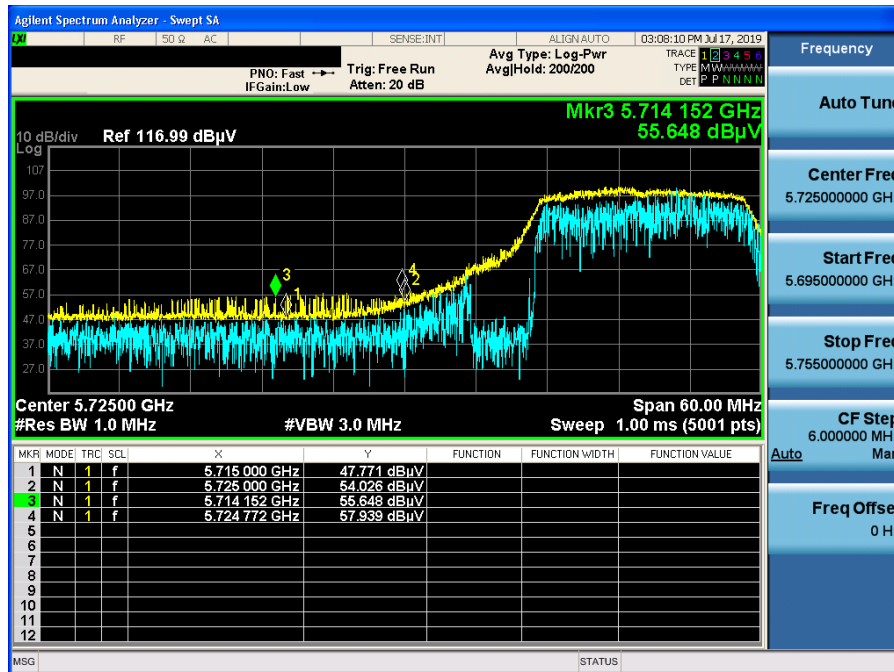
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Detector Mode : AV



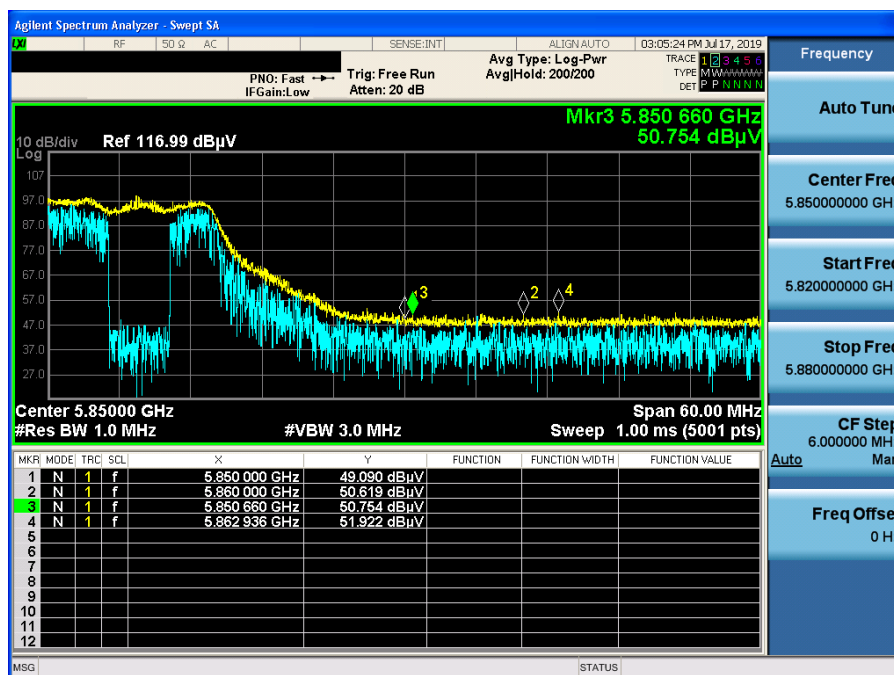
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Detector Mode : PK



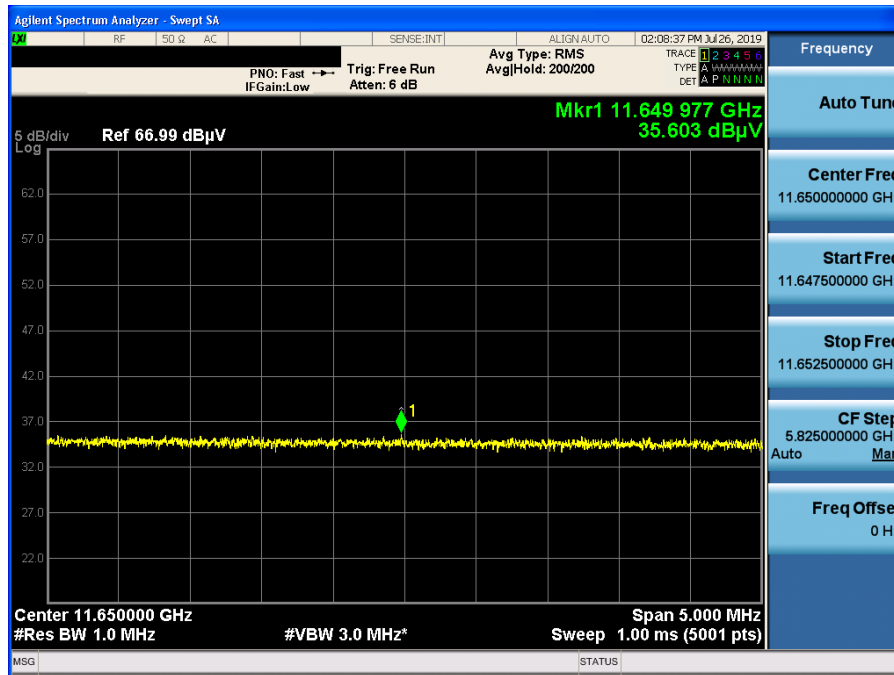
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Detector Mode : PK



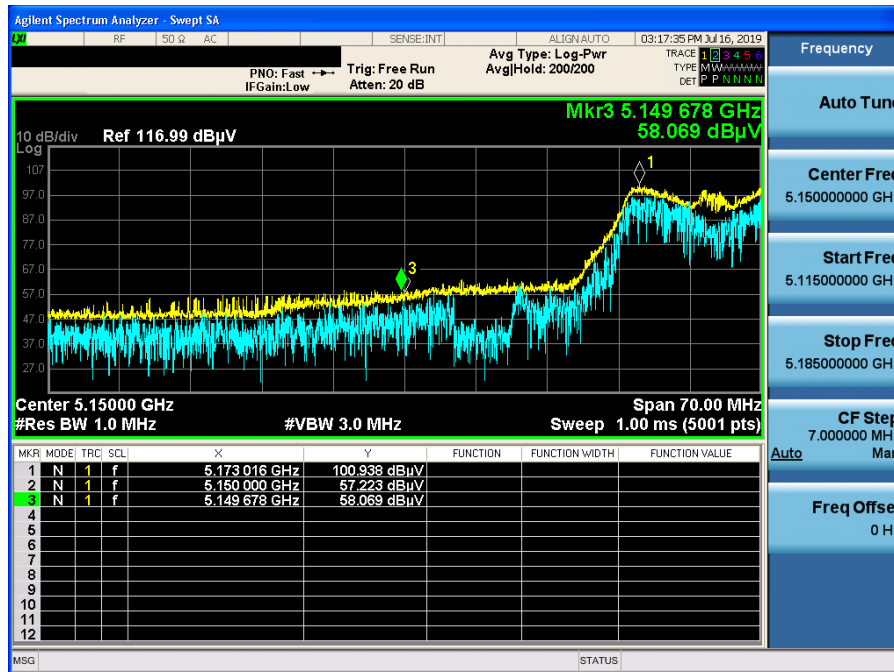
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Detector Mode : AV



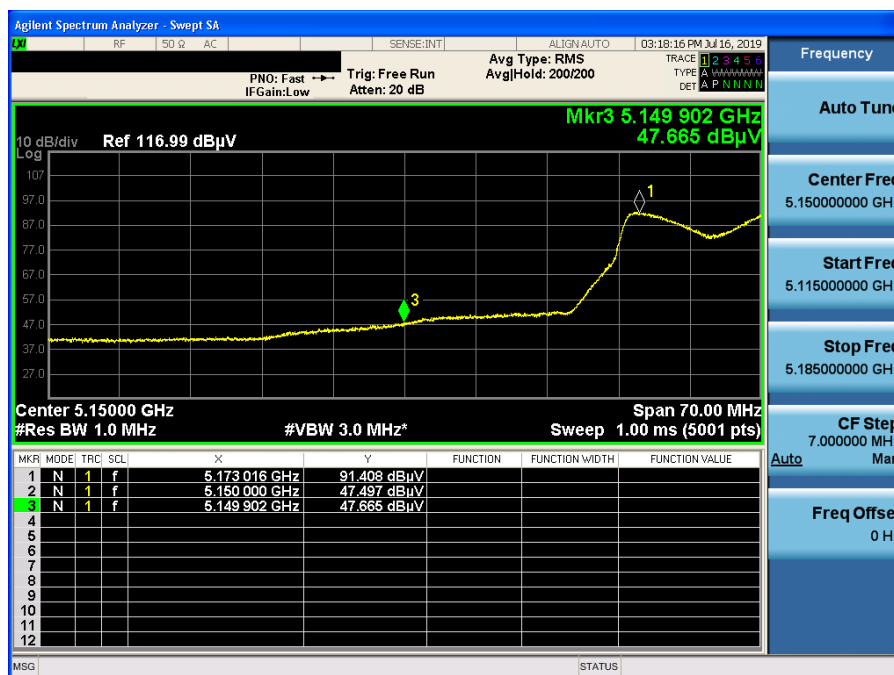
802.11ac(VHT40) &amp; U-NII 1 &amp; Ch.38 &amp; Y axis &amp; Ver

Detector Mode : PK



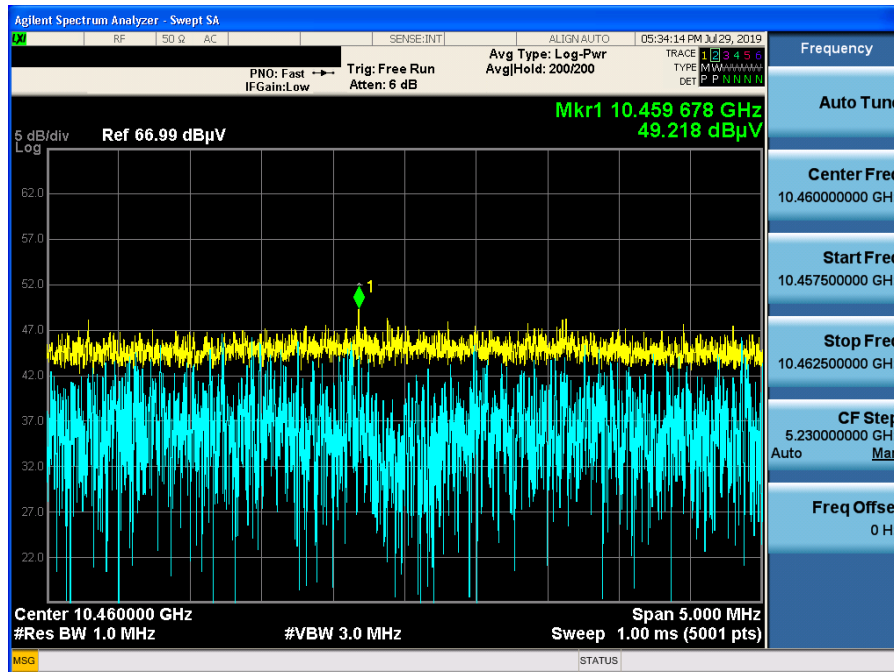
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Detector Mode : AV



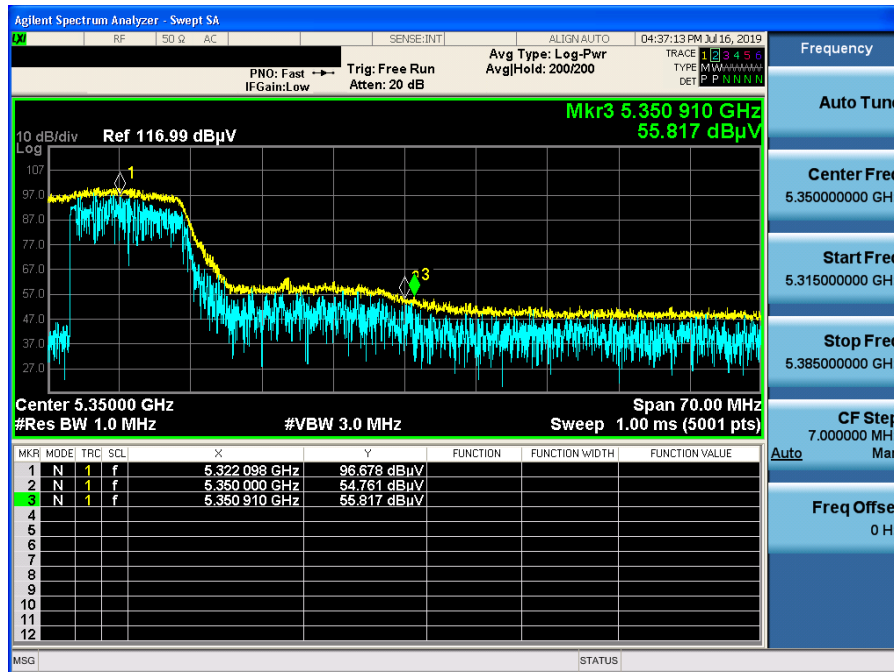
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Detector Mode : PK



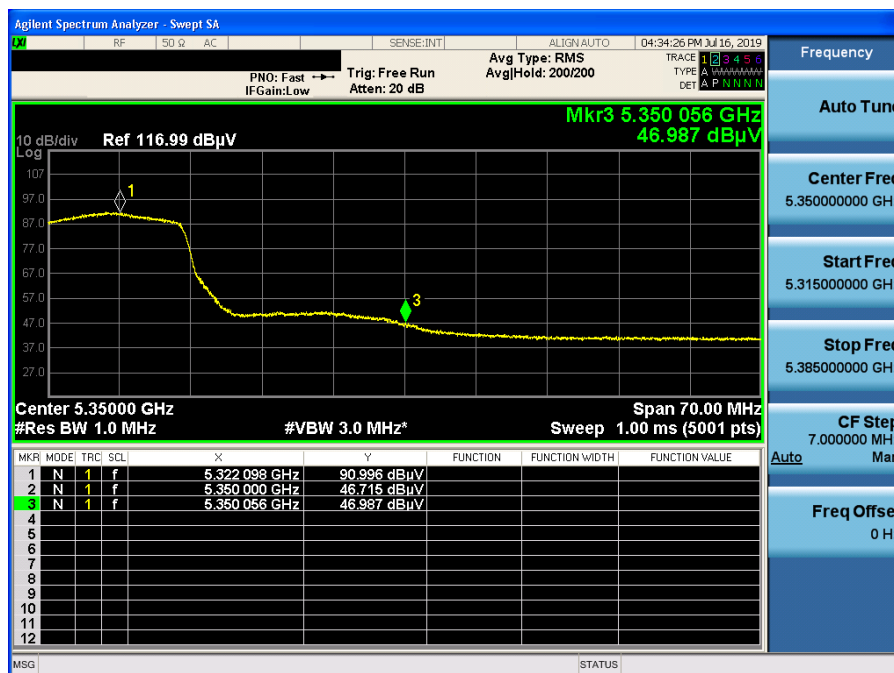
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Detector Mode : PK



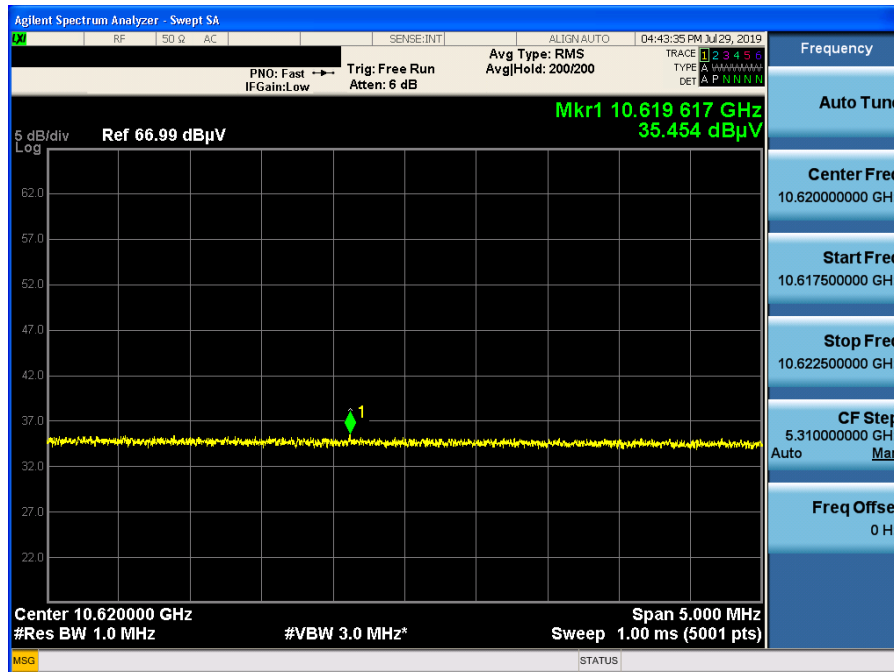
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Detector Mode : AV



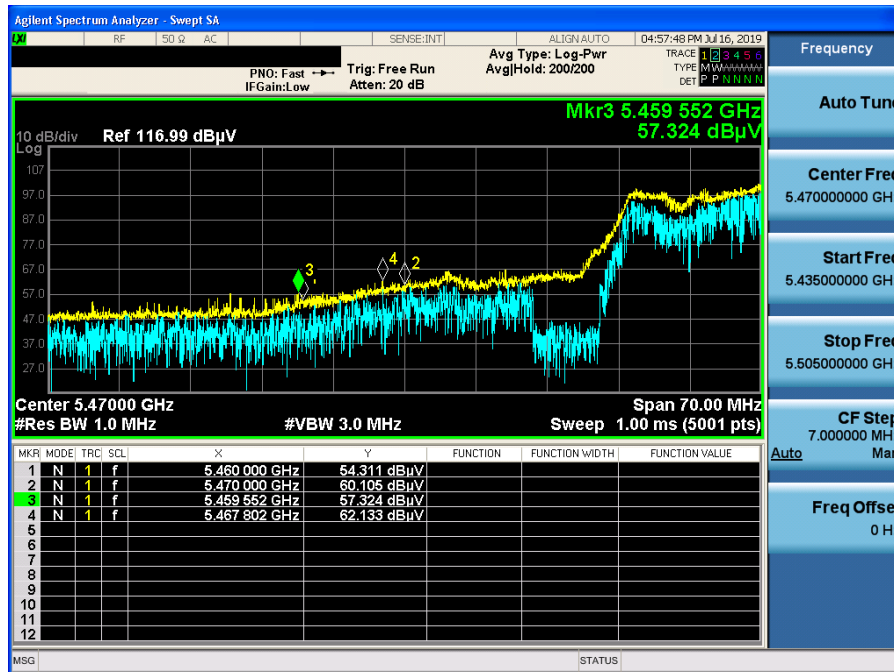
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Detector Mode : AV



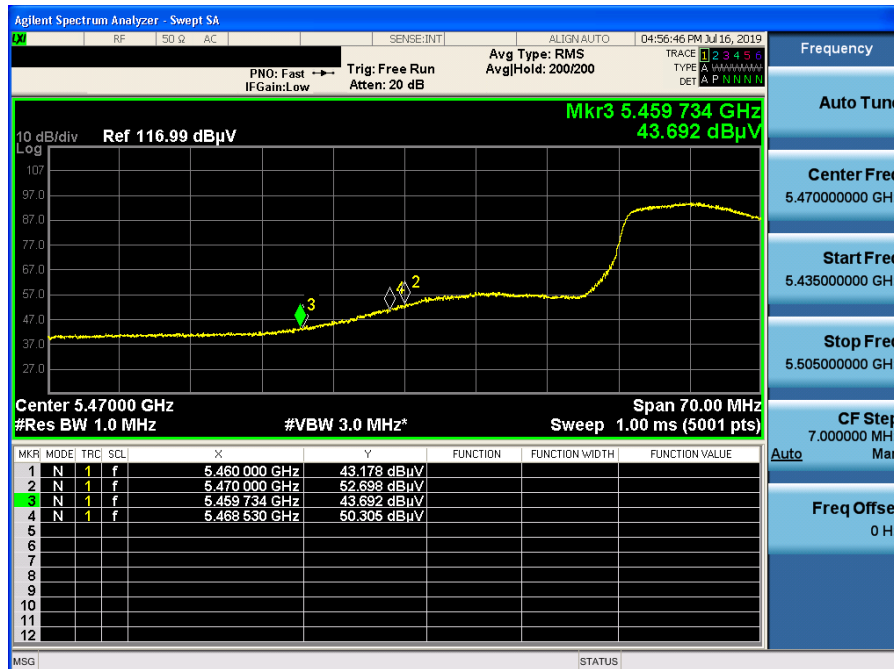
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Detector Mode : PK



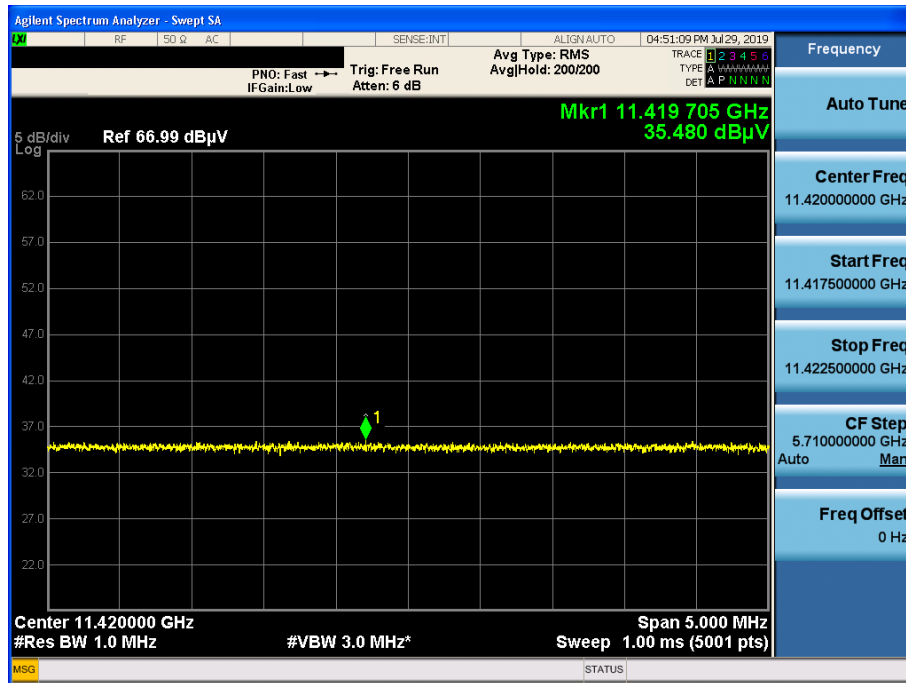
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Detector Mode : AV



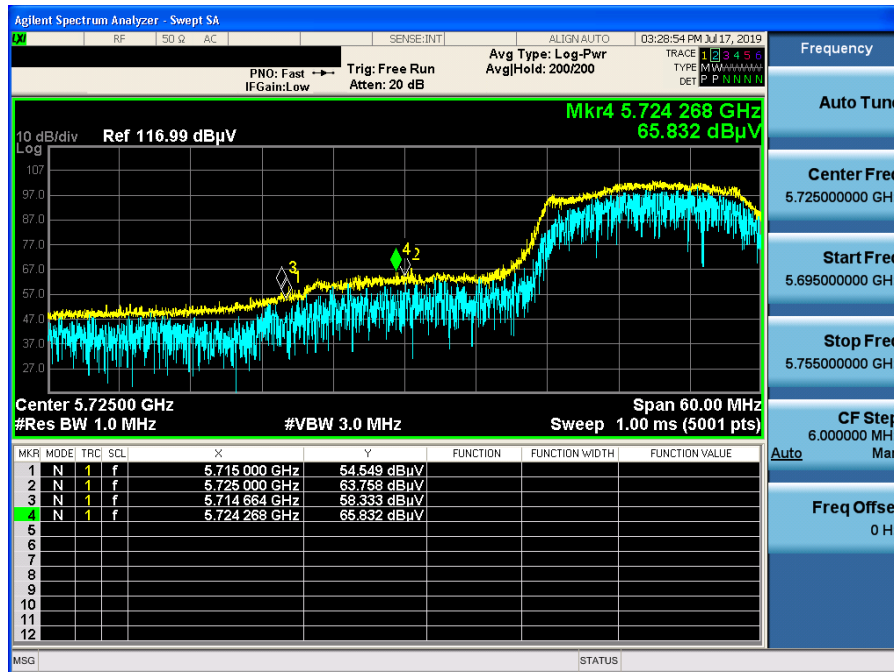
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Detector Mode : AV



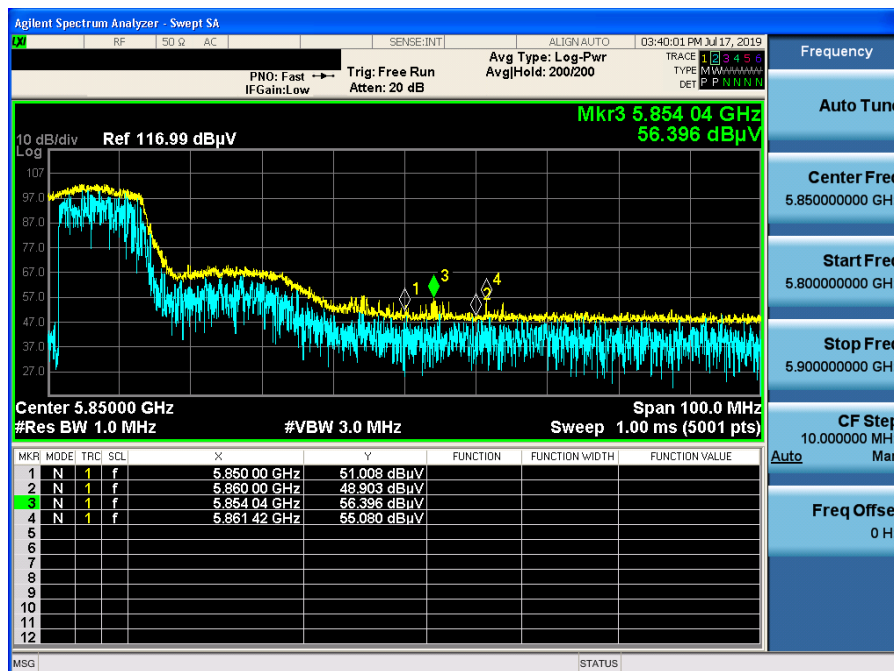
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Detector Mode : PK



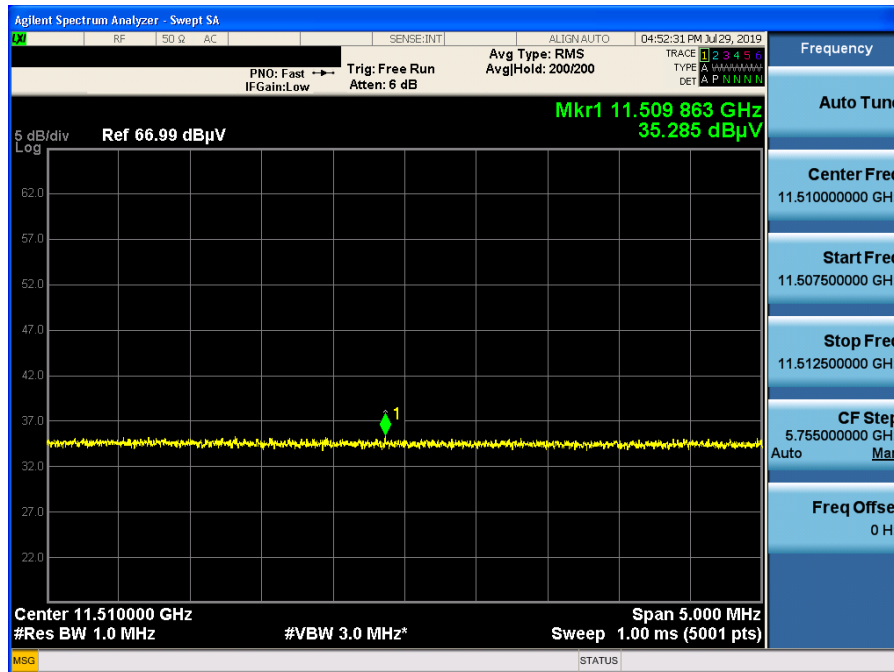
802.11ac(VHT40) &amp; U-NII 3 &amp; Ch.159 &amp; Y axis &amp; Ver

Detector Mode : PK



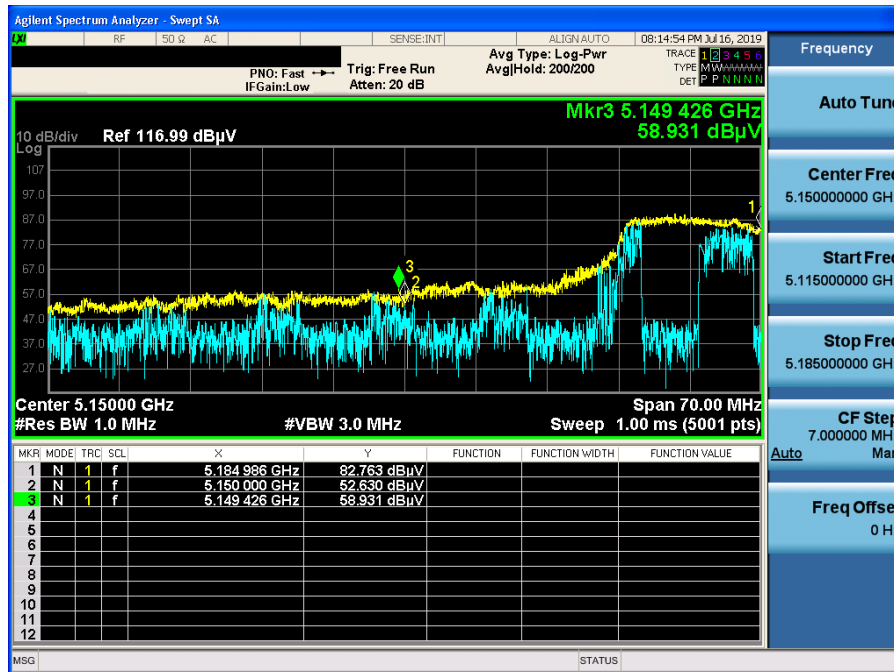
802.11ac(VHT40) &amp; U-NII 3 &amp; Ch.151 &amp; Y axis &amp; Hor

Detector Mode : AV



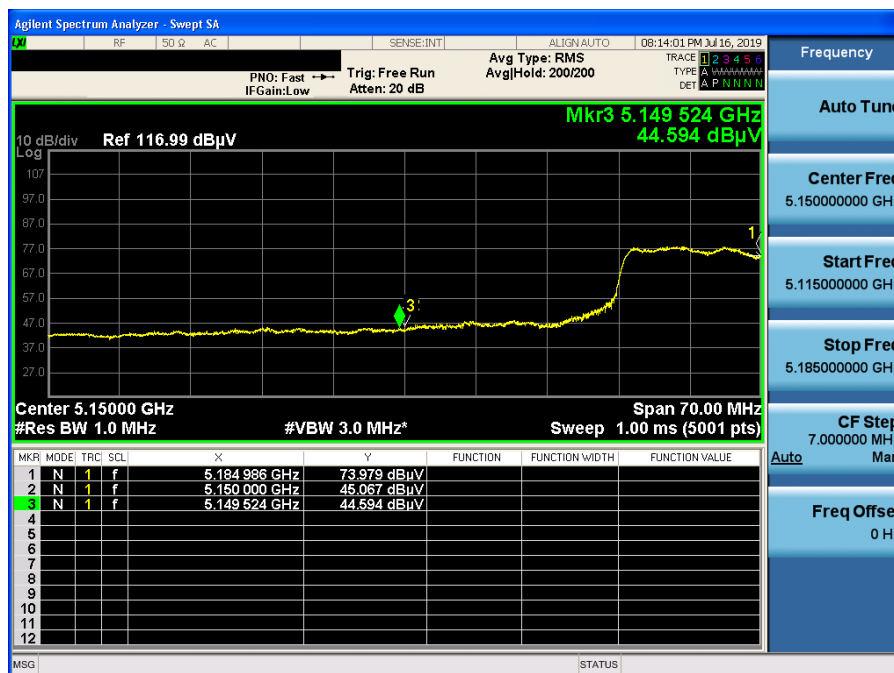
802.11ac(VHT80) &amp; U-NII 1 &amp; Ch.42 &amp; Z axis &amp; Hor

Detector Mode : PK

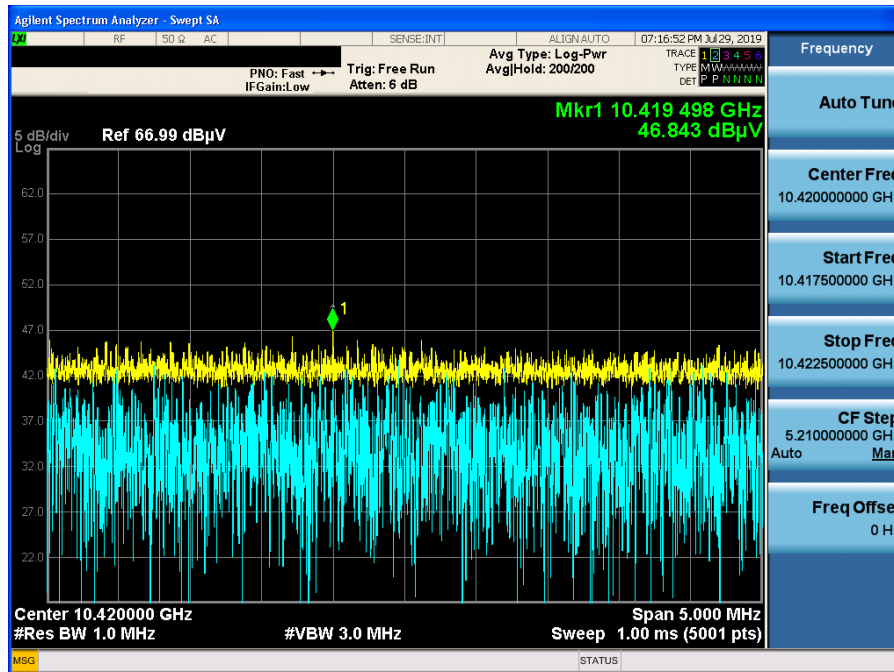


802.11ac(VHT80) &amp; U-NII 1 &amp; Ch.42 &amp; Z axis &amp; Hor

Detector Mode : AV

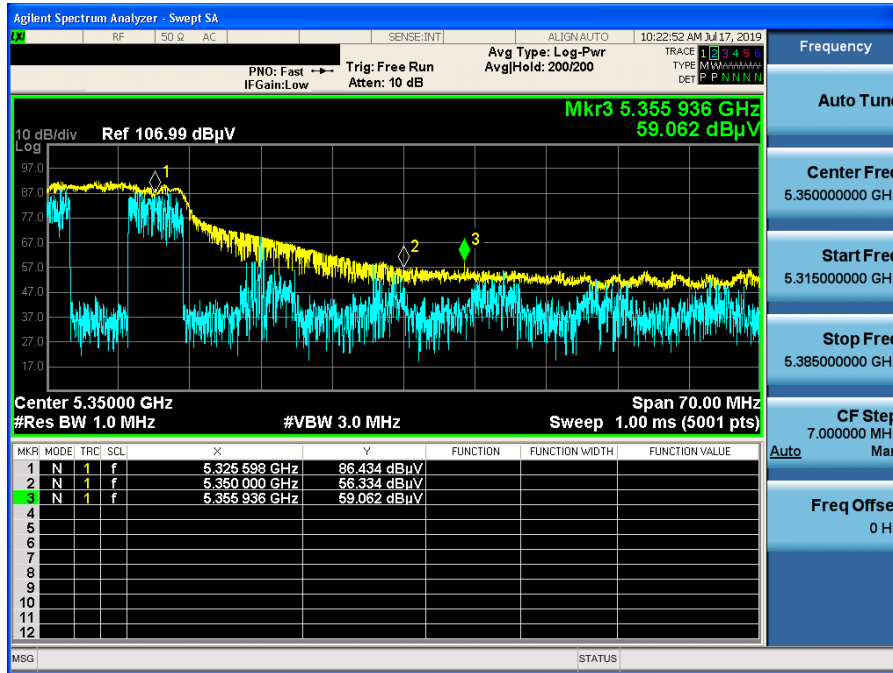


**Detector Mode : PK**



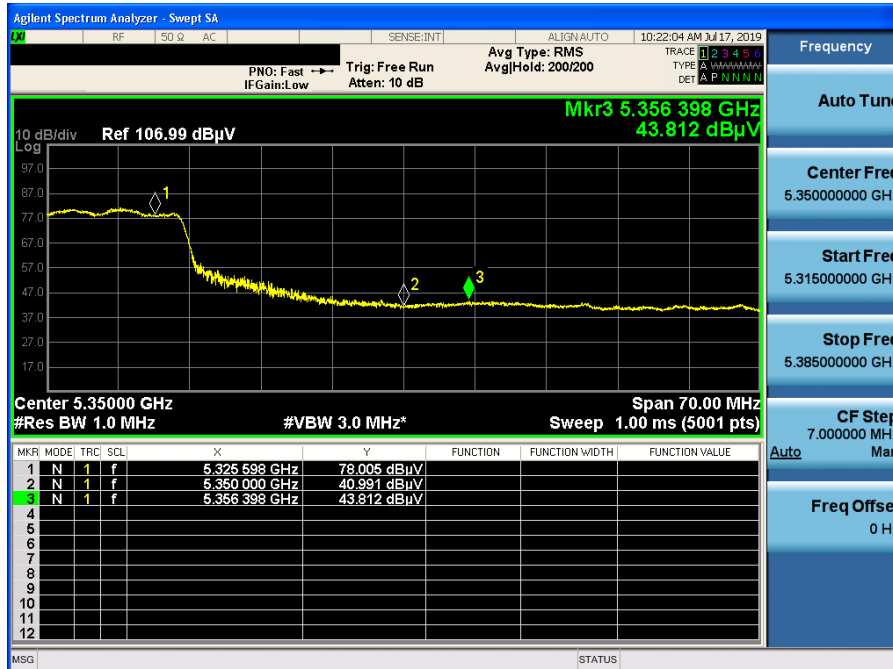
802.11ac(VHT80) & U-NII 3 & Ch.58 & Z axis & Hor

Detector Mode : PK



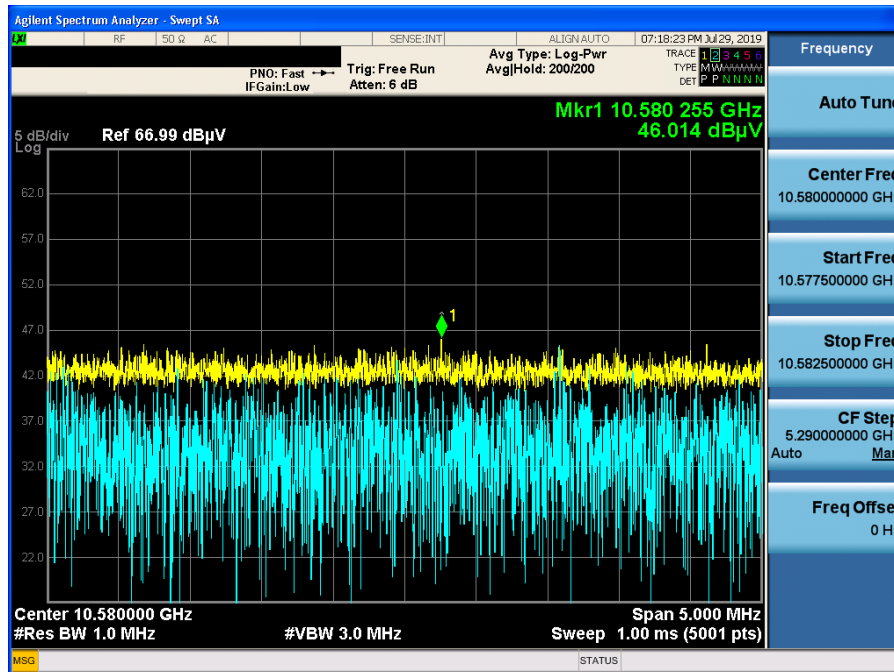
802.11ac(VHT80) & U-NII 3 & Ch.58 & Z axis & Hor

Detector Mode : PK



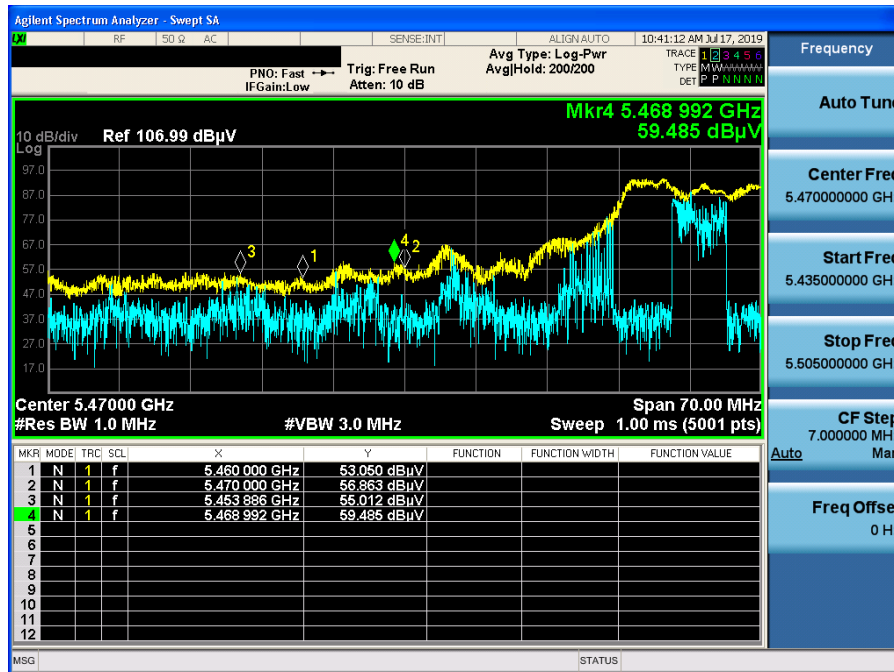
802.11ac(VHT80) & U-NII 3 & Ch.58 & Y axis & Hor

Detector Mode : PK



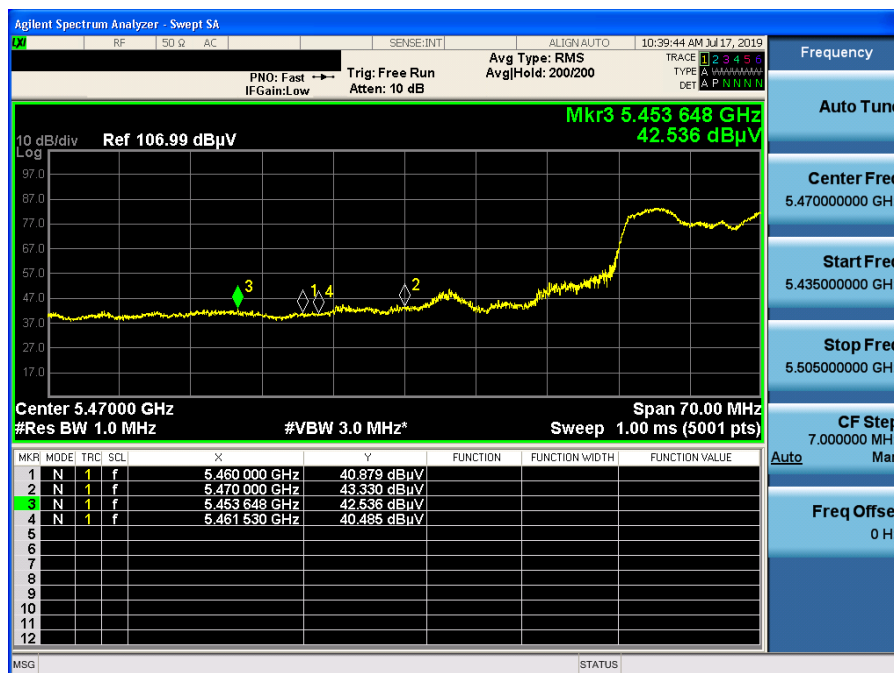
802.11ac(VHT80) &amp; U-NII 2A &amp; Ch.106 &amp; Z axis &amp; Hor

Detector Mode : PK



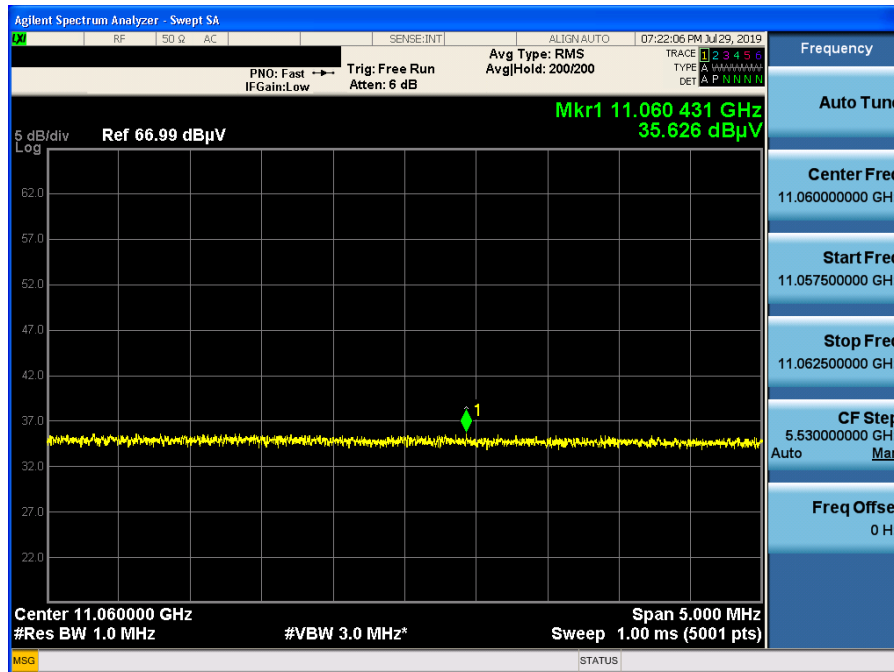
802.11ac(VHT80) &amp; U-NII 2A &amp; Ch.106 &amp; Z axis &amp; Hor

Detector Mode : AV



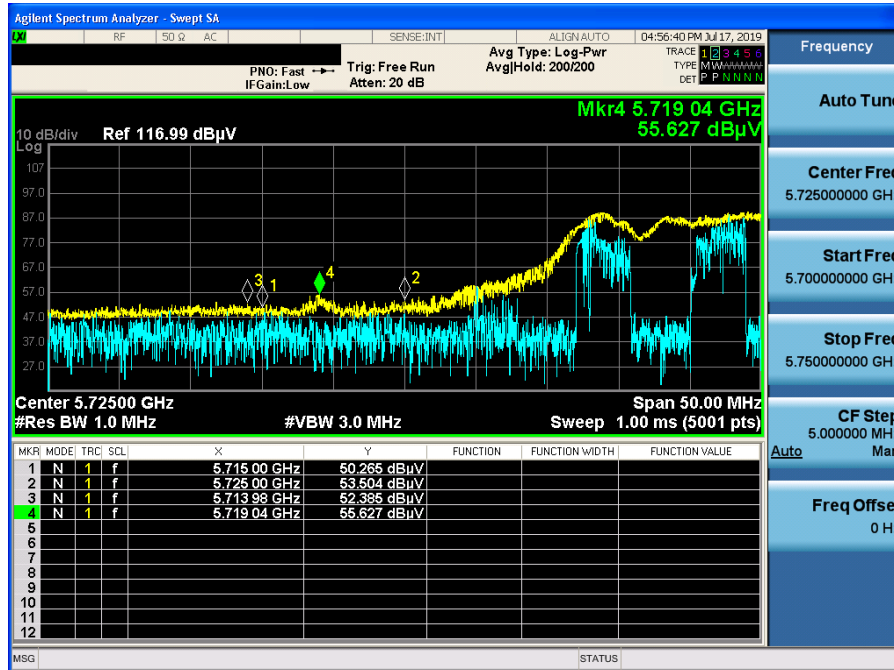
802.11ac(VHT80) & U-NII 2A & Ch.106 & Y axis & Hor

Detector Mode : AV



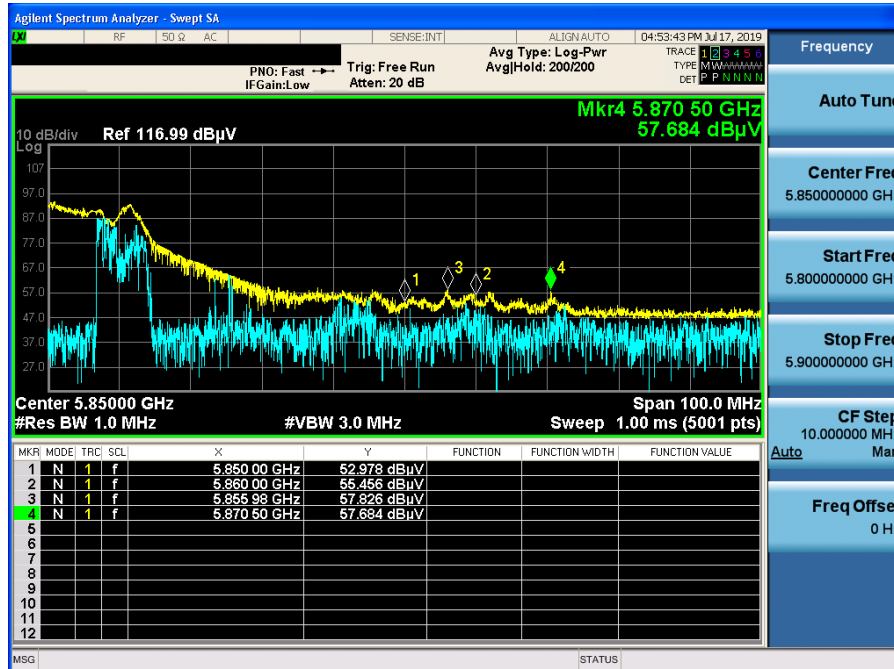
802.11ac(VHT80) & U-NII 2C & Ch.155 & Z axis & Hor

Detector Mode : PK



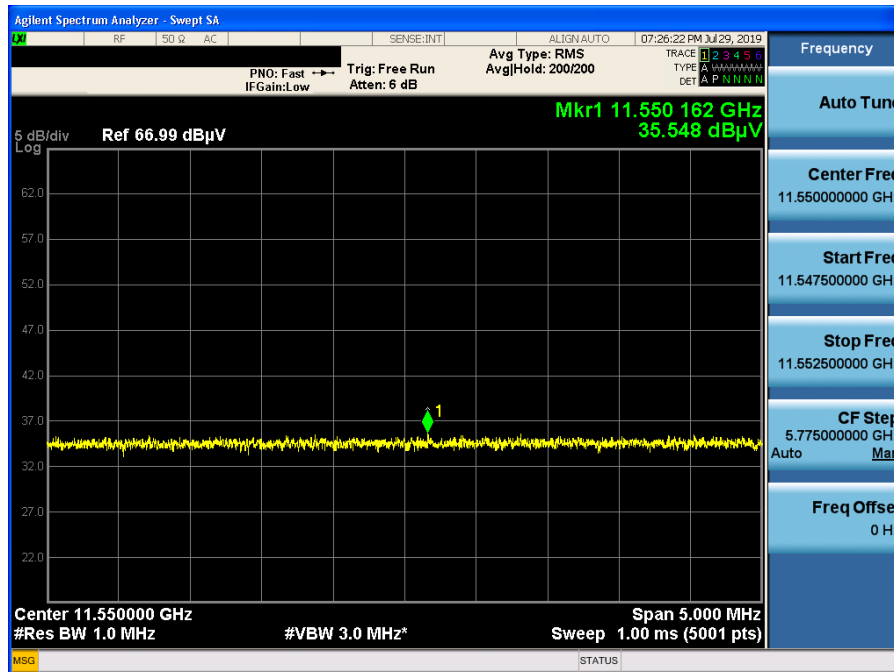
802.11ac(VHT80) & U-NII 2C & Ch.155 & Z axis & Hor

Detector Mode : PK



802.11ac(VHT80) & U-NII 2C & Ch.155 & Y axis & Hor

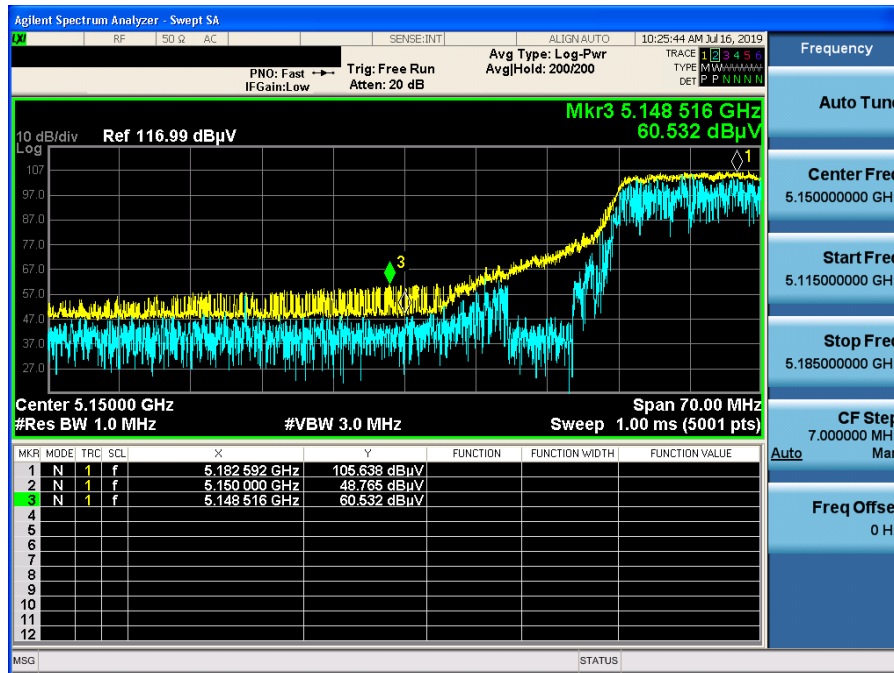
Detector Mode : AV



## Unwanted Emissions (Radiated) Test Plot : SDM

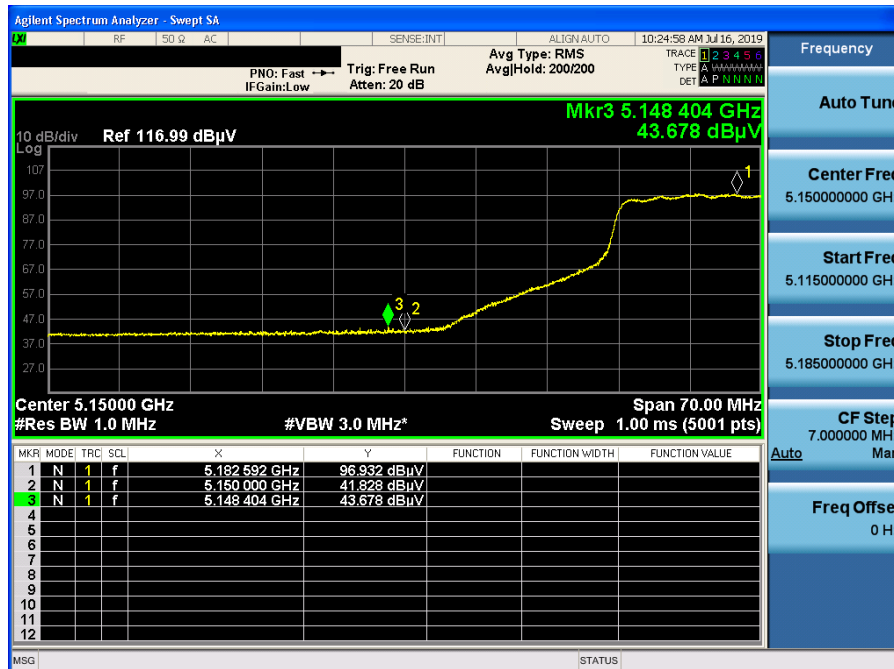
802.11ac(VHT20) & U-NII 1 & Ch.36 & Z axis & Ver

Detector Mode : PK



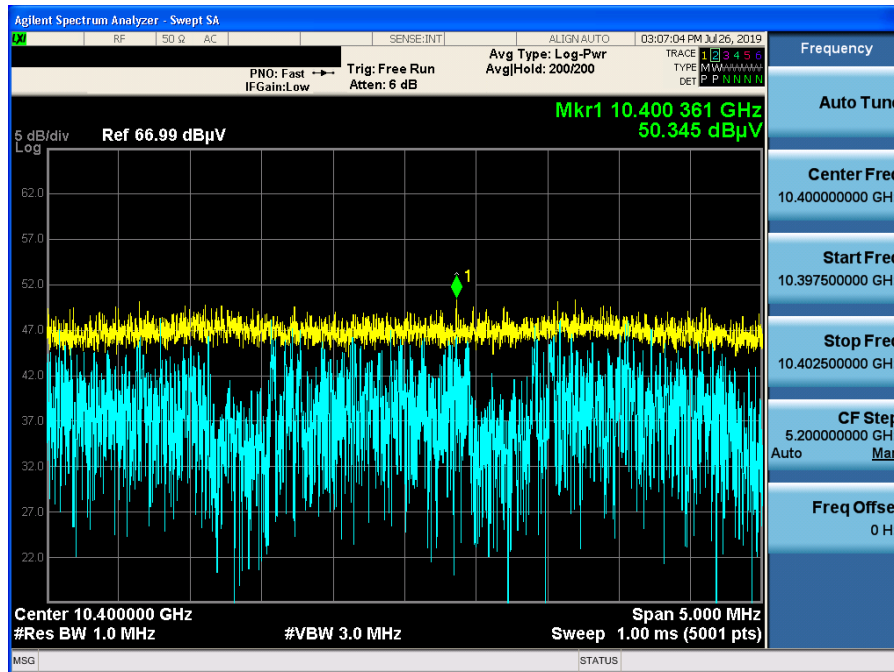
802.11ac(VHT20) & U-NII 1 & Ch.36 & Z axis & Ver

Detector Mode : AV



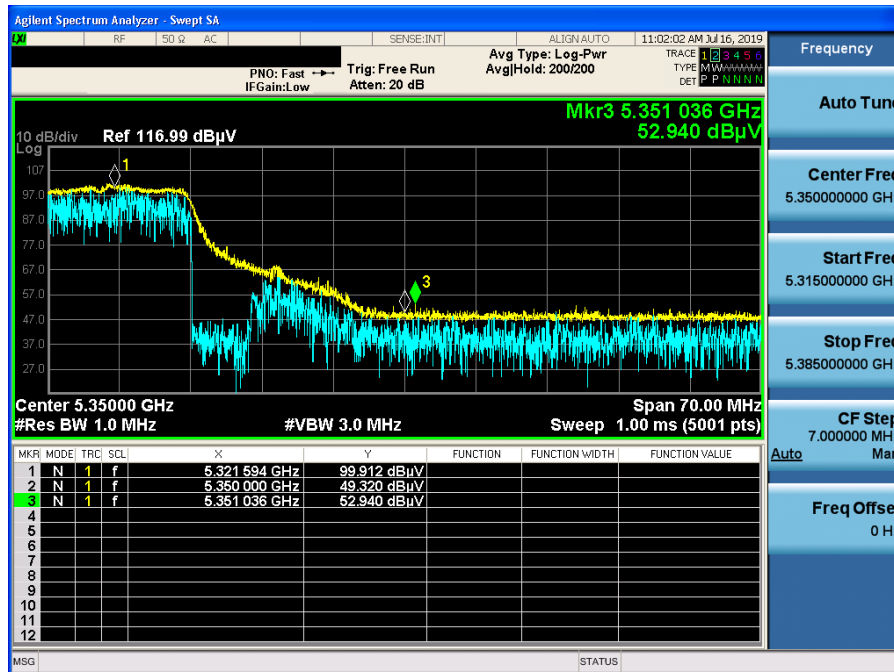
802.11ac(VHT20) &amp; U-NII 1 &amp; Ch.40 &amp; Y axis &amp; Hor

Detector Mode : PK



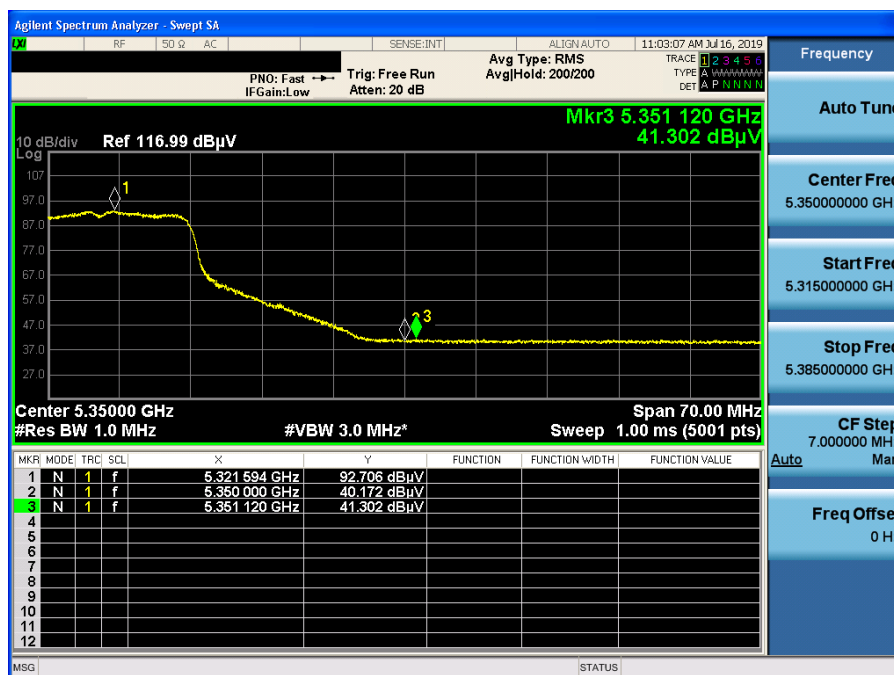
802.11ac(VHT20) &amp; U-NII 2A &amp; Ch.64 &amp; Z axis &amp; Ver

Detector Mode : PK



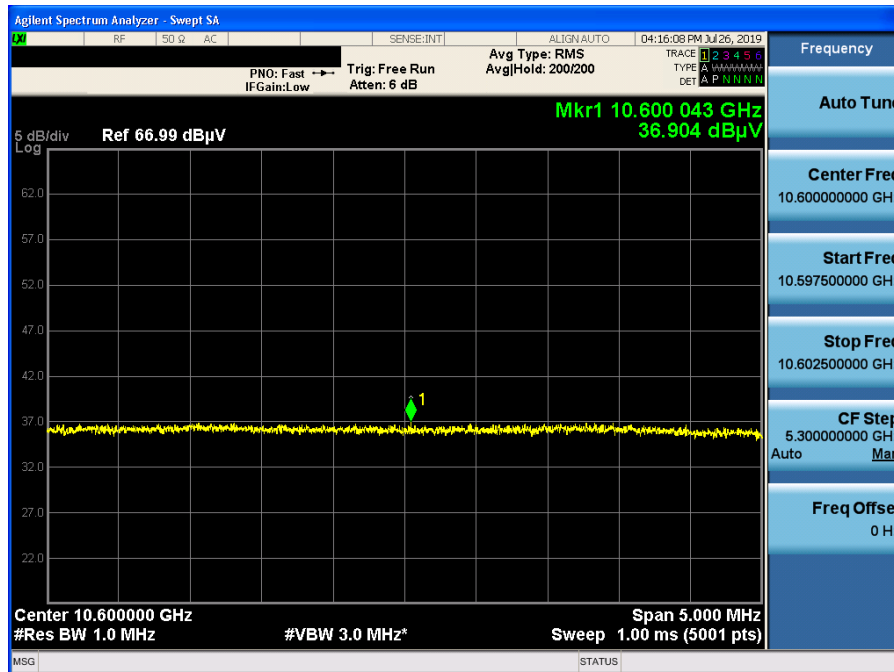
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Detector Mode : AV



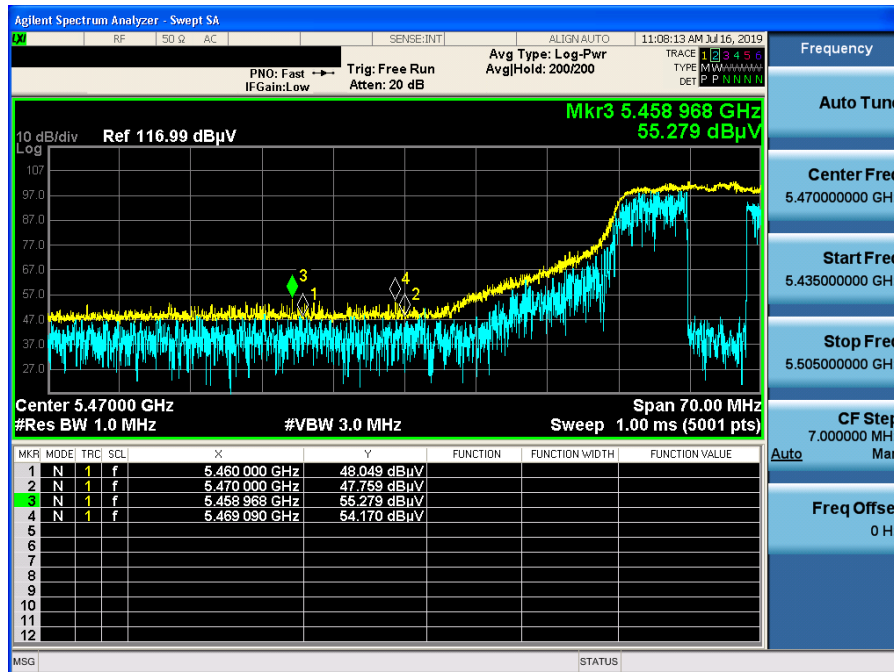
802.11ac(VHT20) & U-NII 2A & Ch.60 & Y axis & Hor

Detector Mode : AV



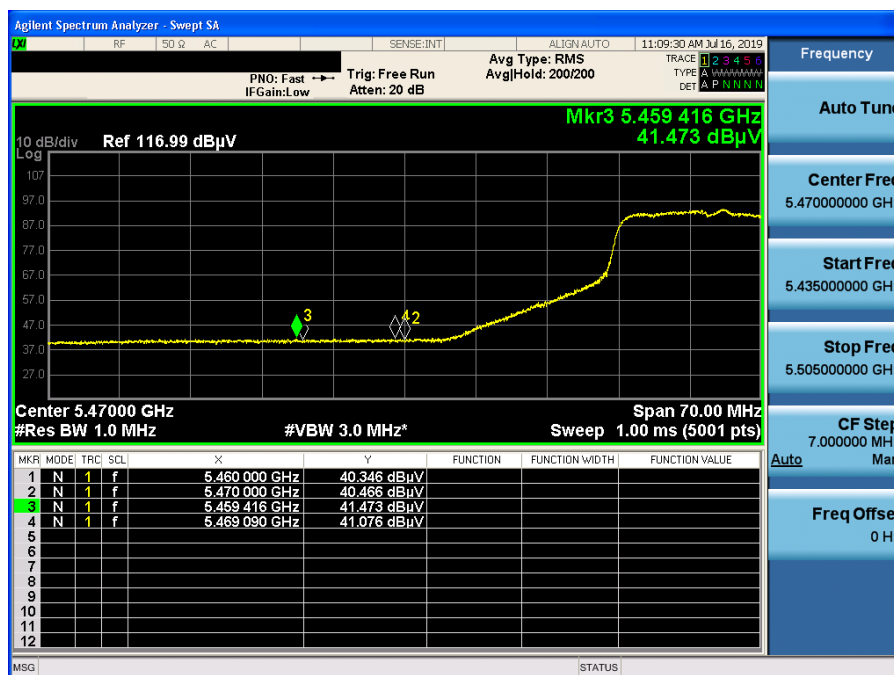
802.11ac(VHT20) &amp; U-NII 2C &amp; Ch.100 &amp; Z axis &amp; Ver

Detector Mode : PK



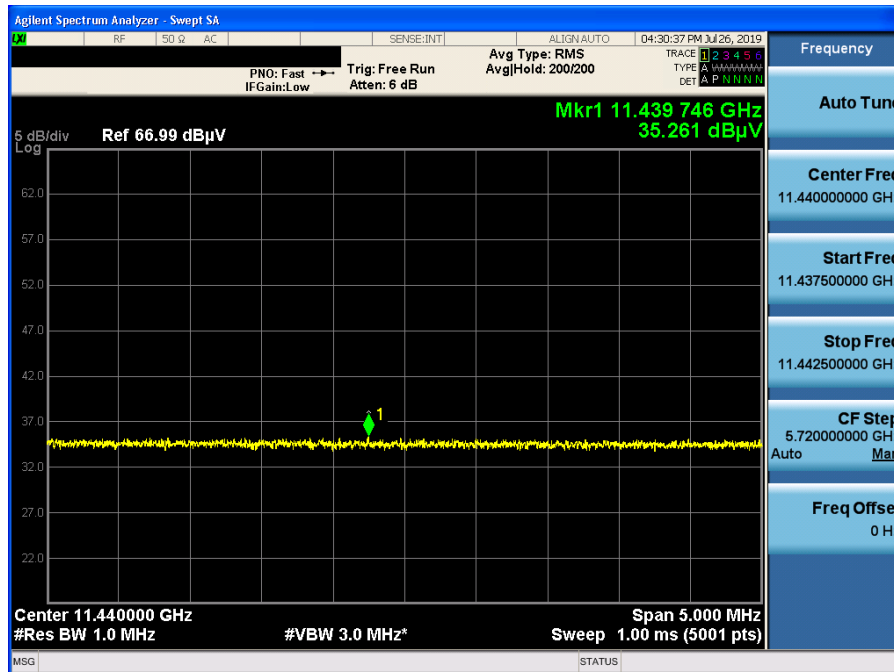
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Detector Mode : AV



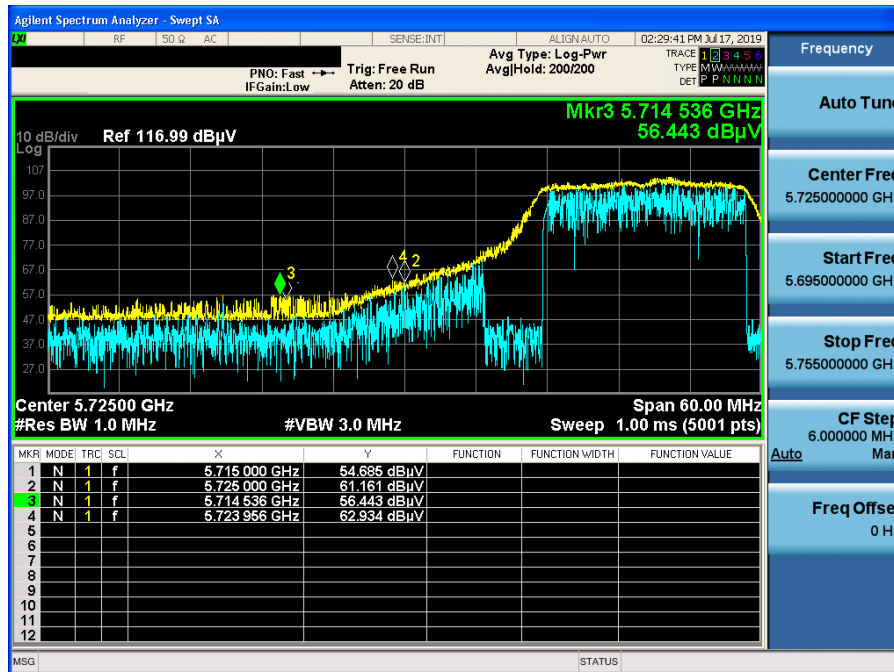
802.11ac(VHT20) & U-NII 2C & Ch.144 & Y axis & Hor

Detector Mode : AV



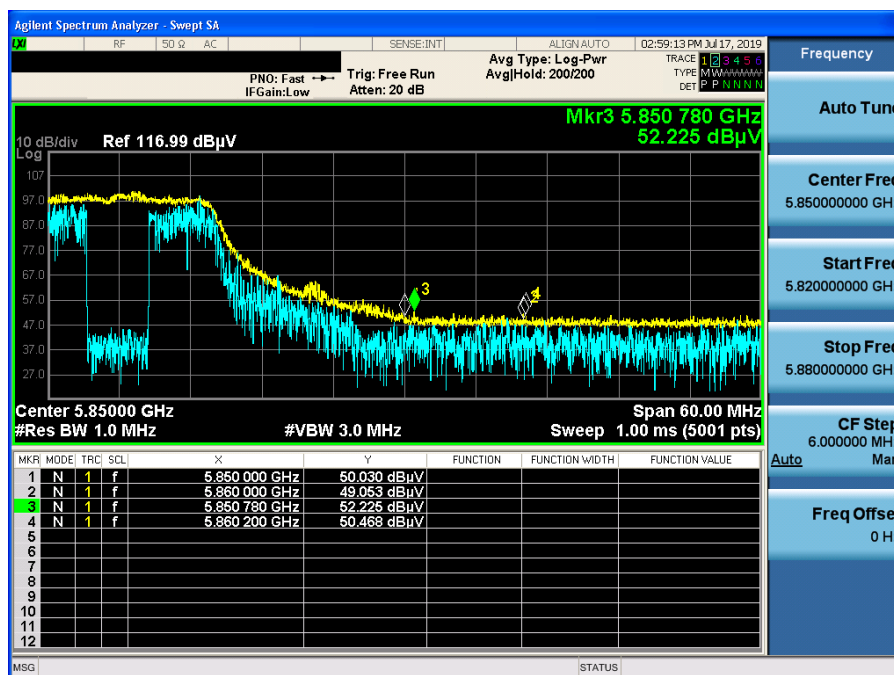
802.11ac(VHT20) &amp; U-NII 3 &amp; Ch.149 &amp; Y axis &amp; Ver

Detector Mode : PK



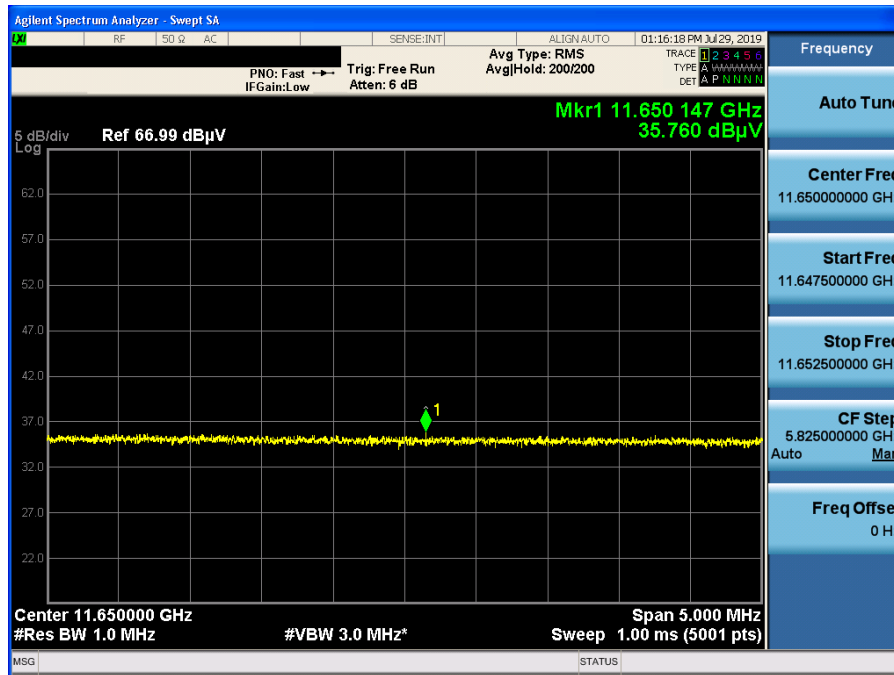
802.11ac(VHT20) &amp; U-NII 3 &amp; Ch.165 &amp; Z axis &amp; Ver

Detector Mode : PK



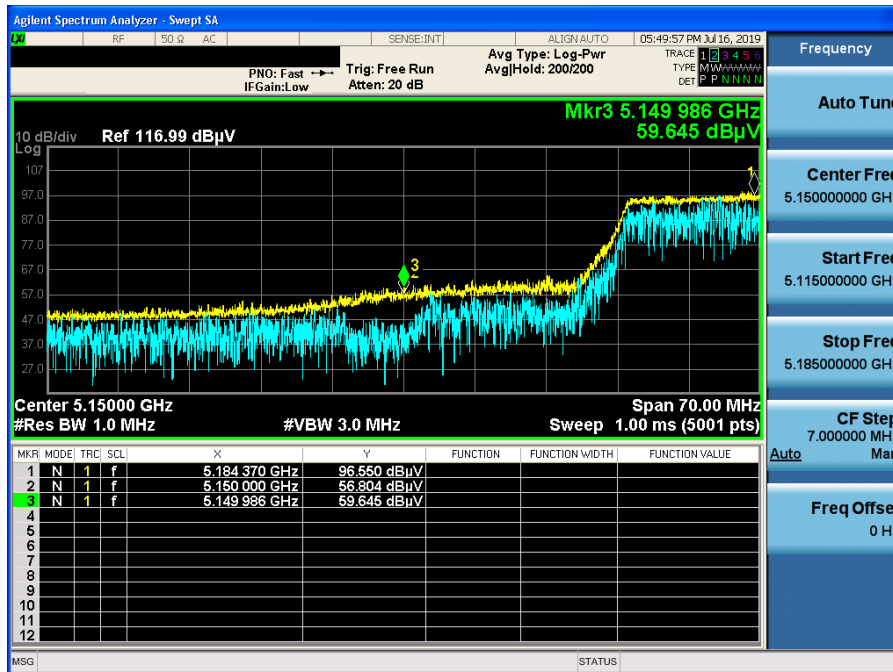
802.11ac(VHT20) & U-NII 3 & Ch.165 & Y axis & Hor

Detector Mode : AV



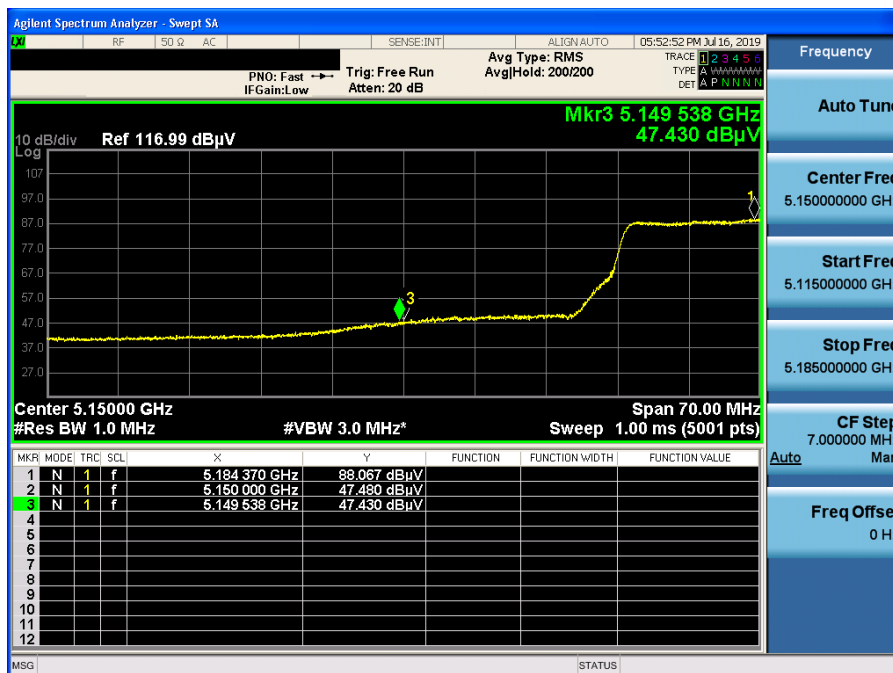
802.11n(HT40) &amp; U-NII 1 &amp; Ch.38 &amp; Z axis &amp; Hor

Detector Mode : PK



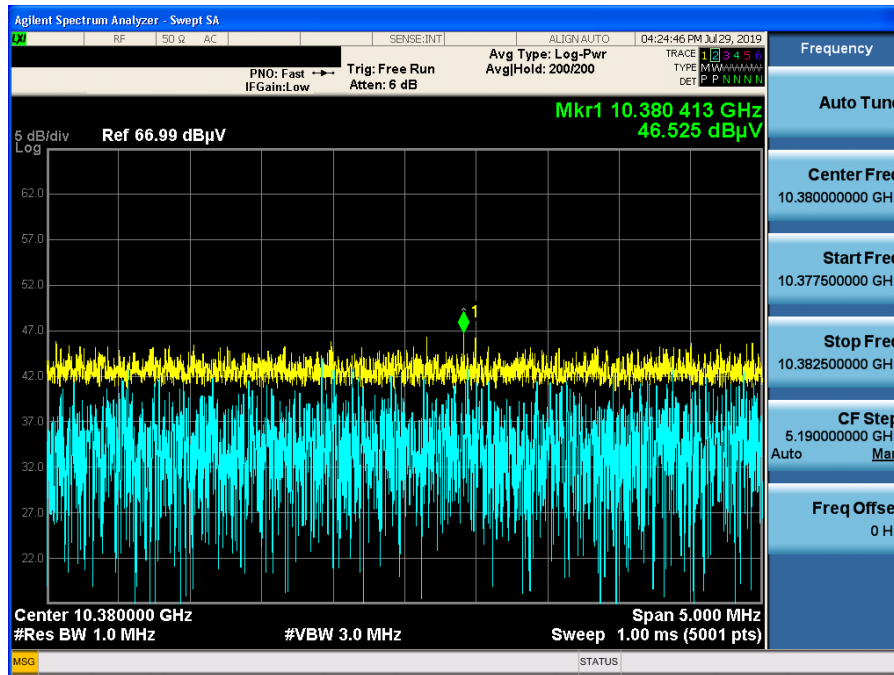
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Detector Mode : AV



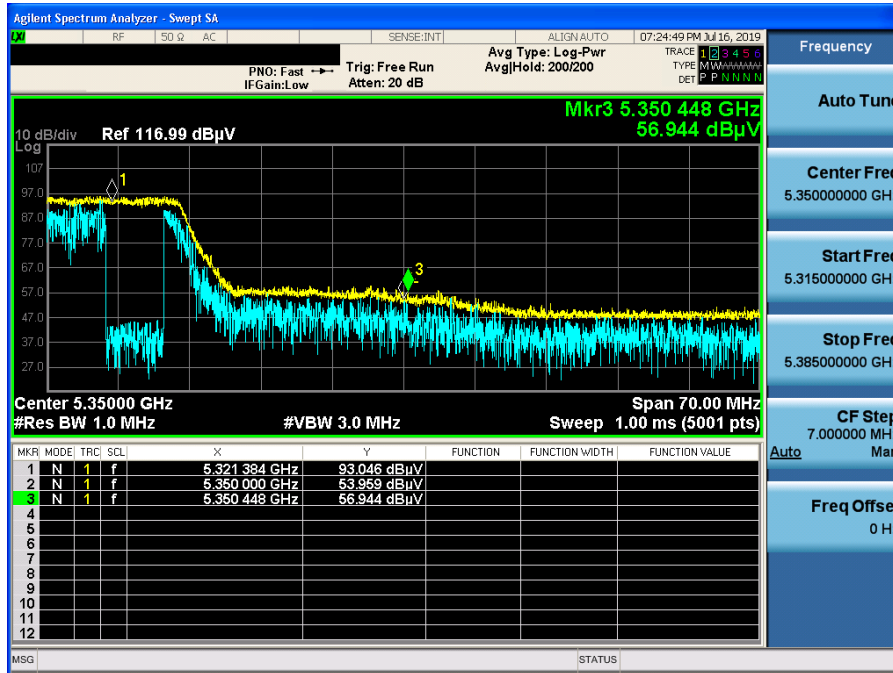
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Detector Mode : PK



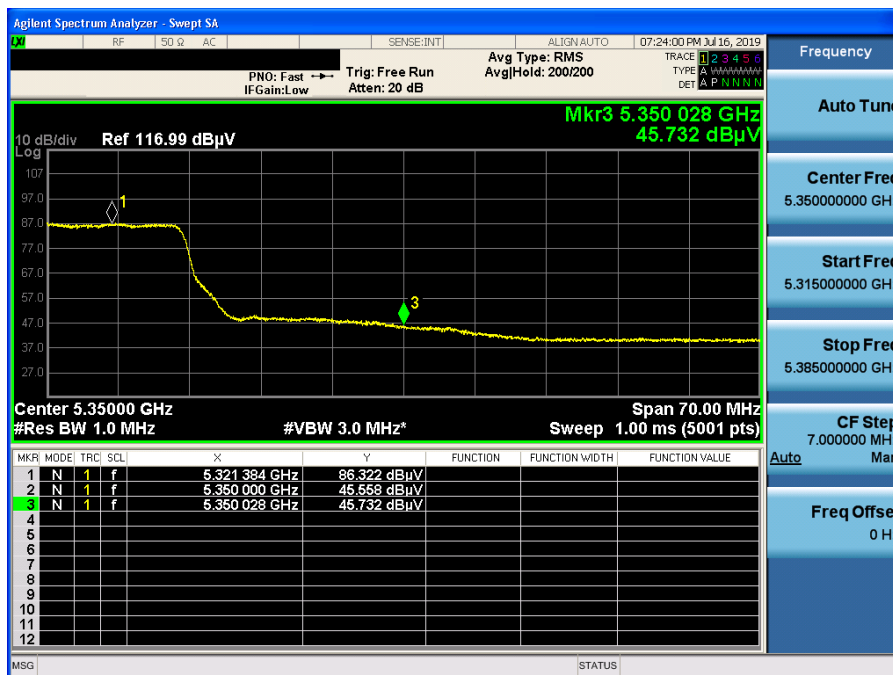
802.11n(HT40) &amp; U-NII 2A &amp; Ch.62 &amp; Z axis &amp; Hor

Detector Mode : PK



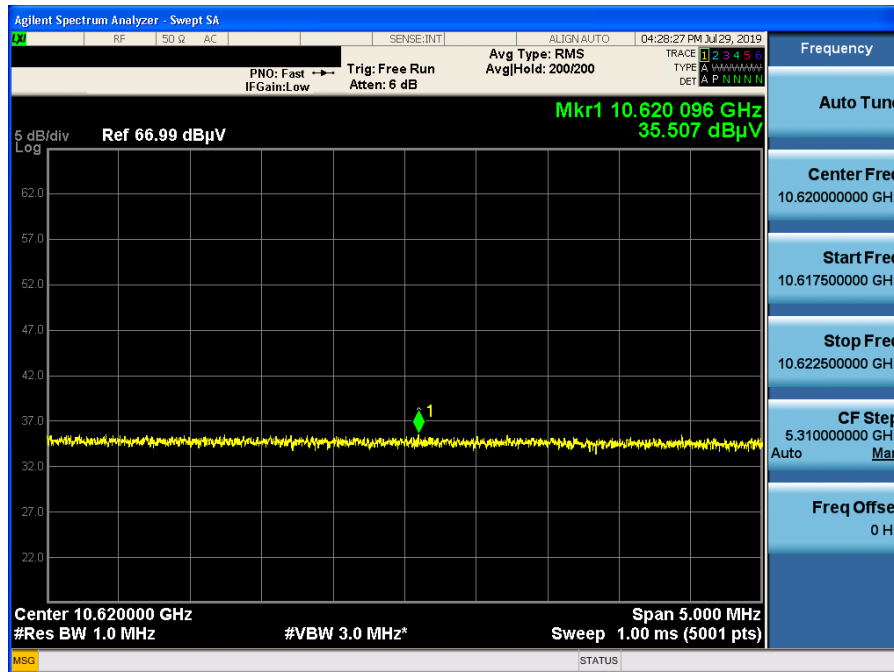
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Detector Mode : AV



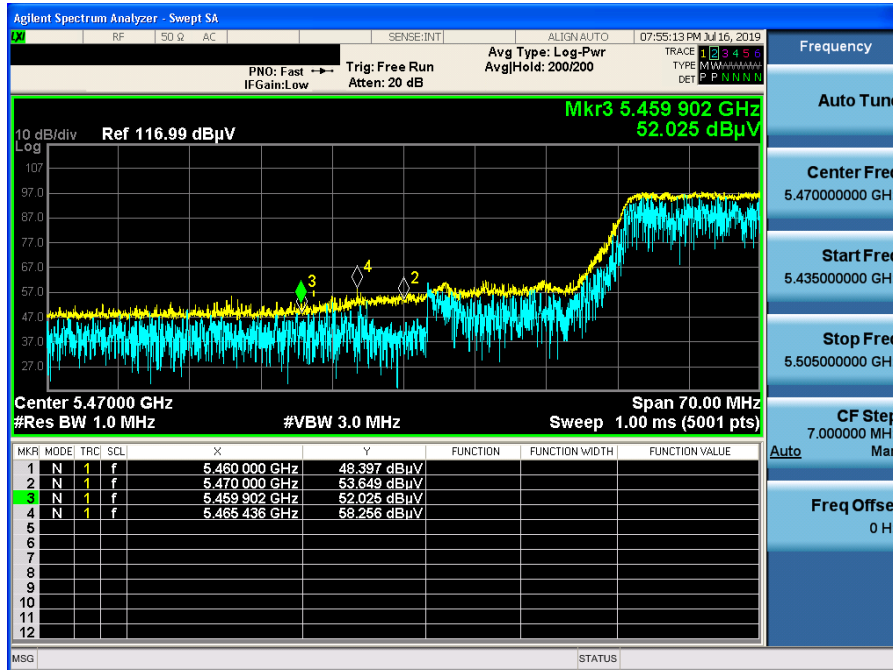
802.11n(HT40) & U-NII 2A & Ch.62 & Y axis & Hor

Detector Mode : AV



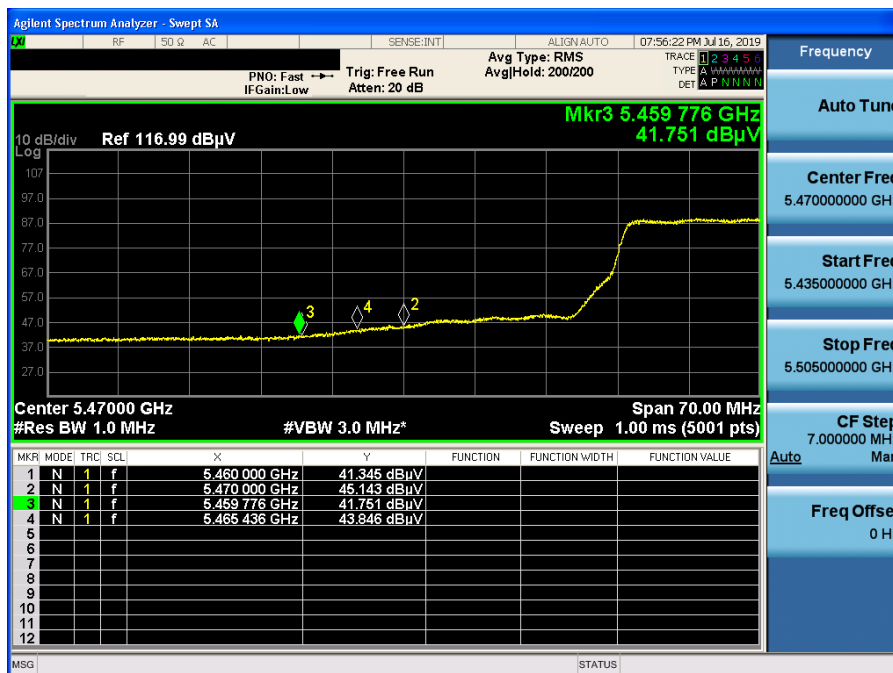
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Detector Mode : PK



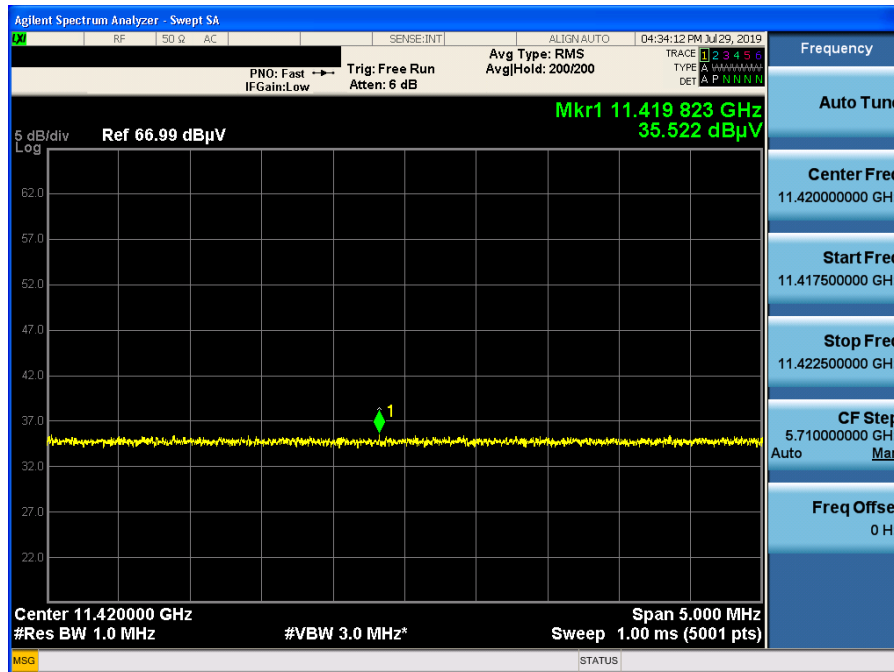
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Detector Mode : AV



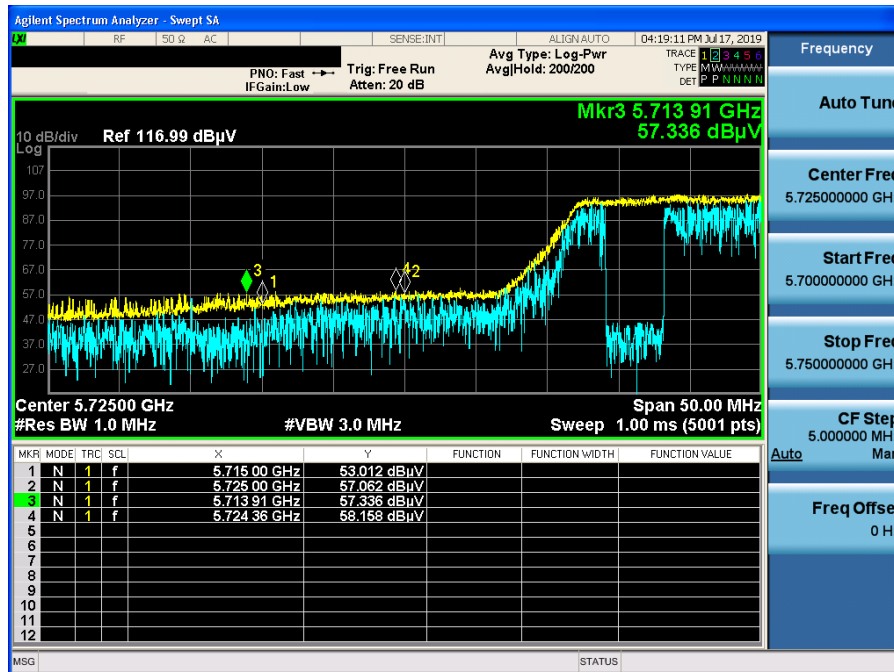
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Detector Mode : AV



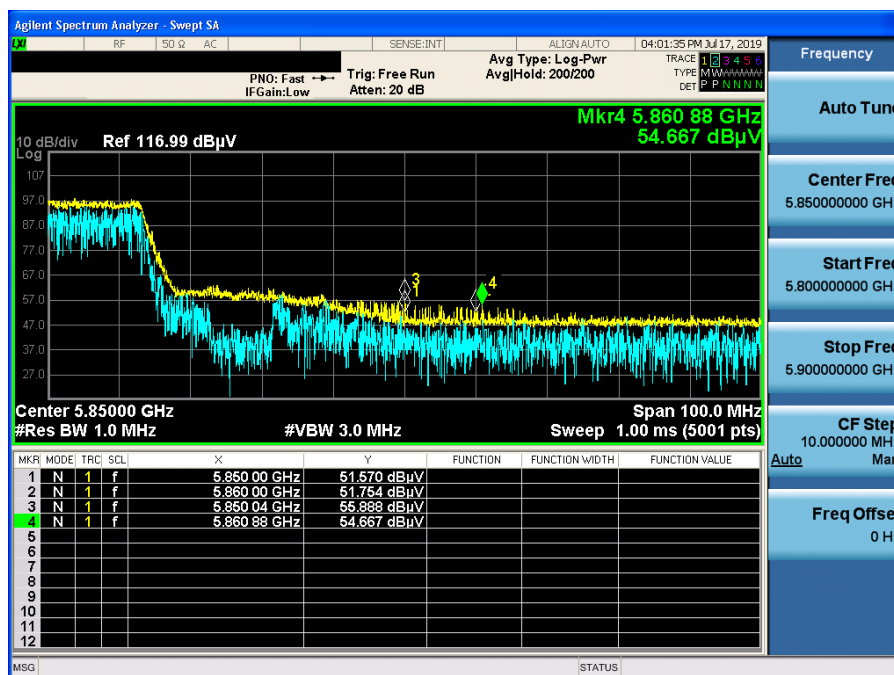
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Detector Mode : PK



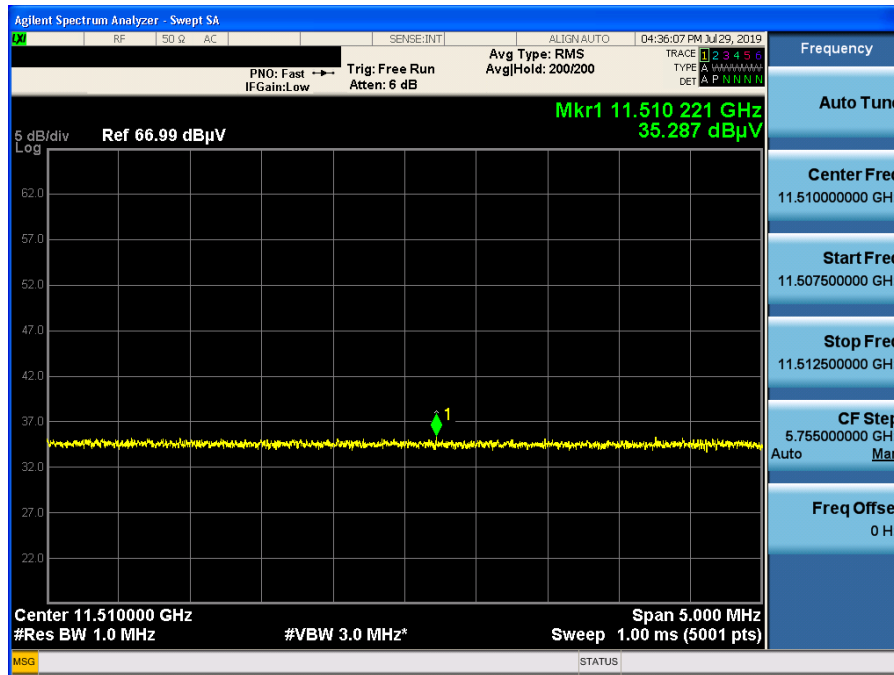
802.11n(HT40) &amp; U-NII 3 &amp; Ch.159 &amp; Z axis &amp; Hor

Detector Mode : PK



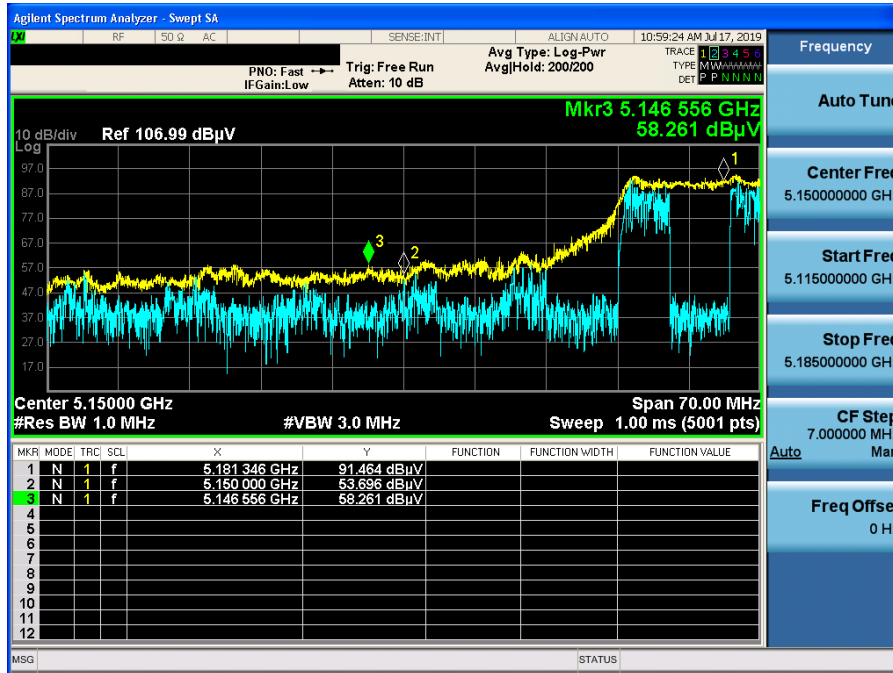
802.11n(HT40) & U-NII 3 & Ch.151 & Y axis & Hor

Detector Mode : AV



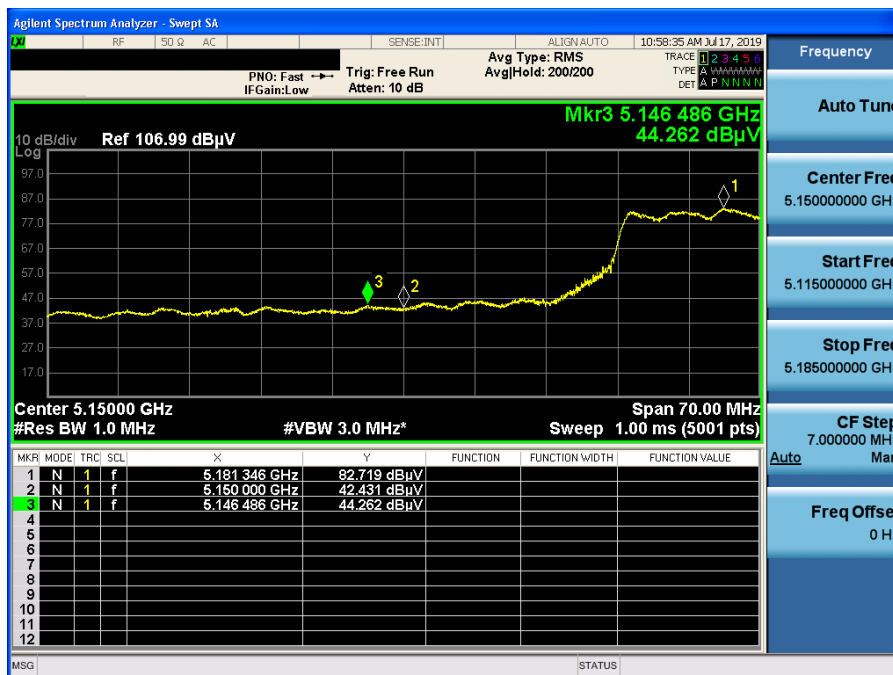
802.11ac(VHT80) &amp; U-NII 1 &amp; Ch.42 &amp; Z axis &amp; Hor

Detector Mode : PK



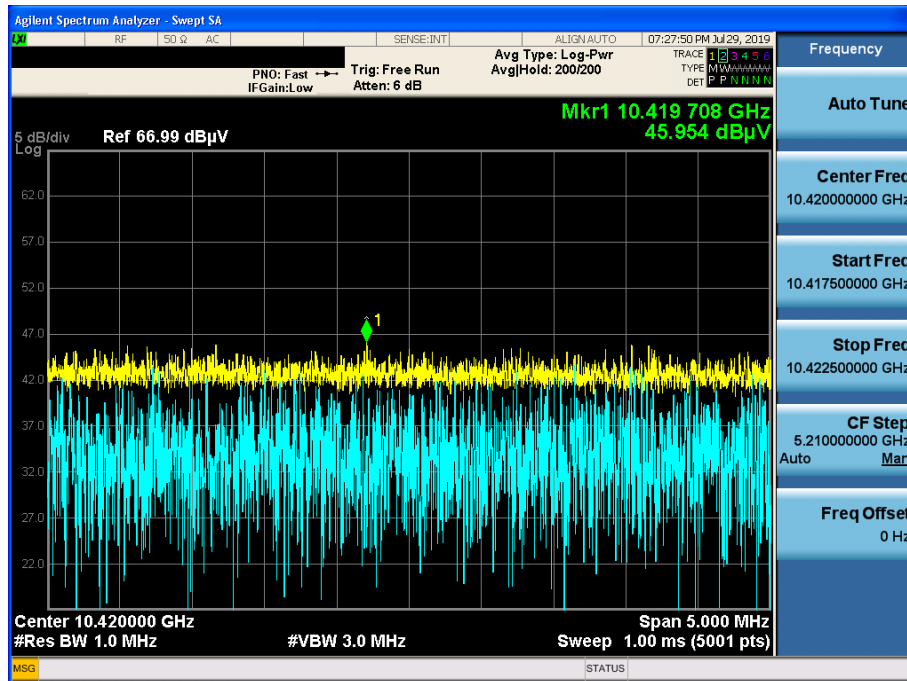
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Detector Mode : AV



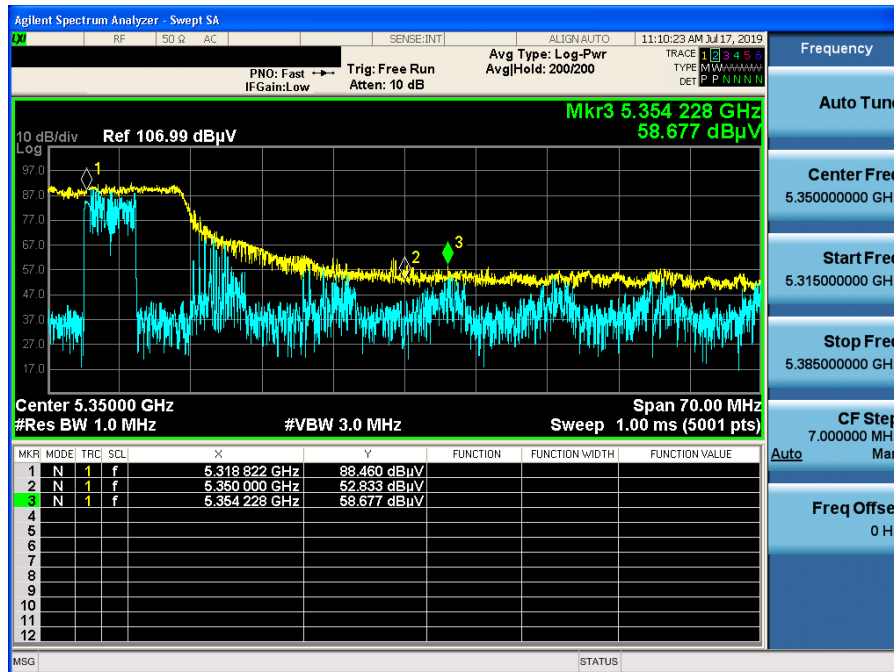
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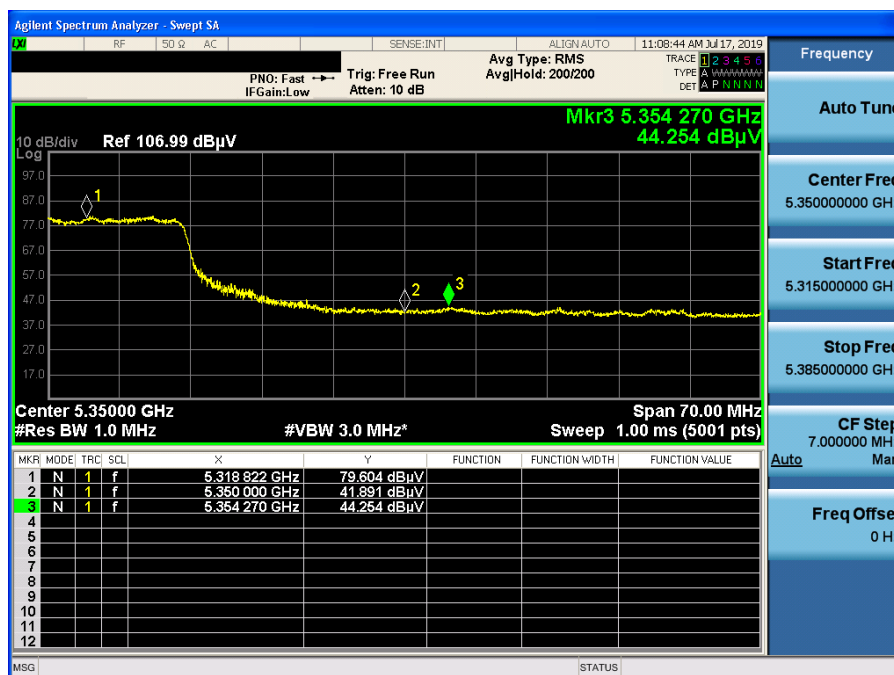
802.11ac(VHT80) &amp; U-NII 2A &amp; Ch.58 &amp; Z axis &amp; Hor

Detector Mode : PK

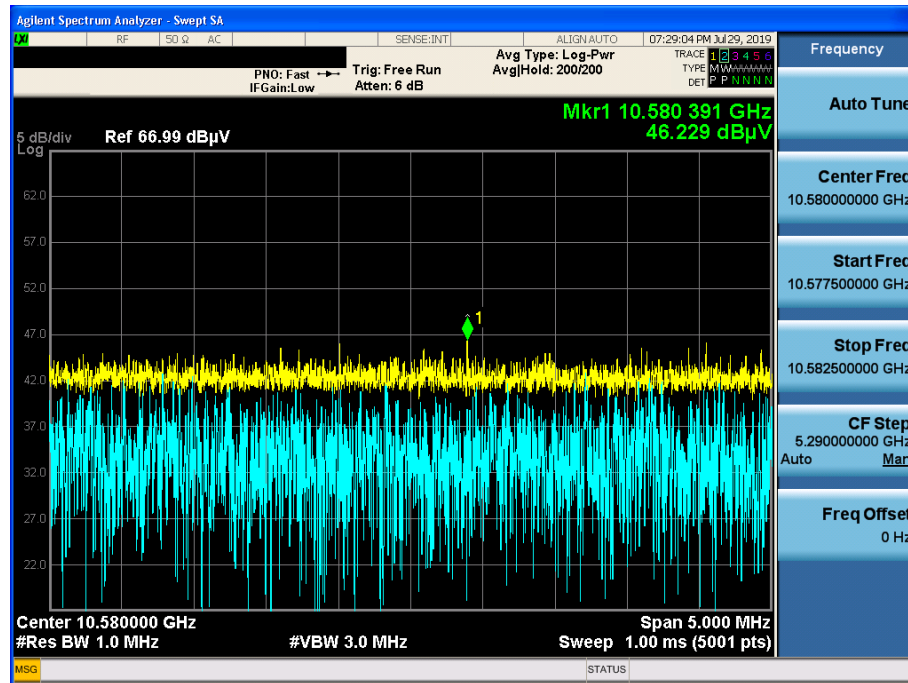


802.11ac(VHT80) &amp; U-NII 2A &amp; Ch.58 &amp; Z axis &amp; Hor

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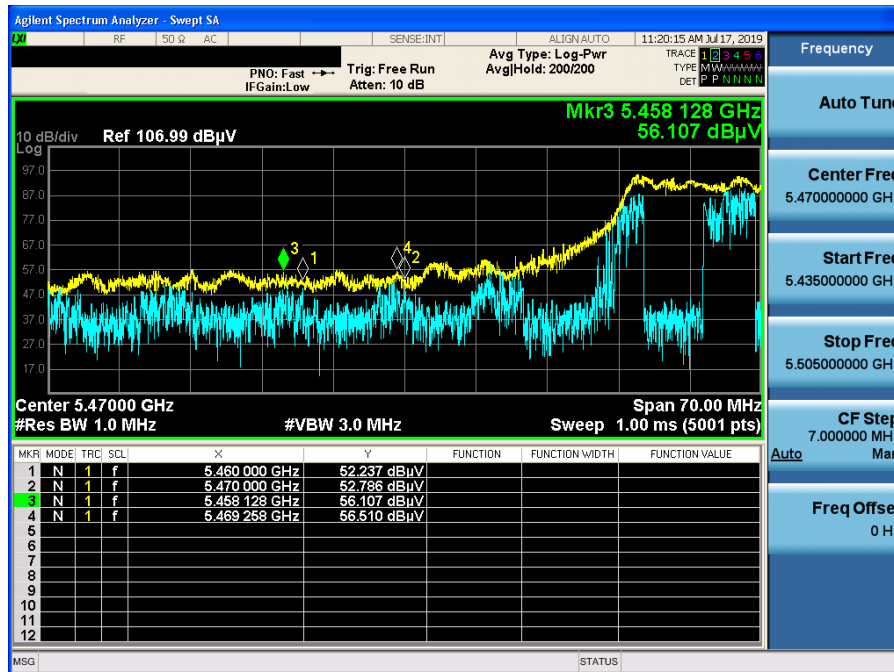


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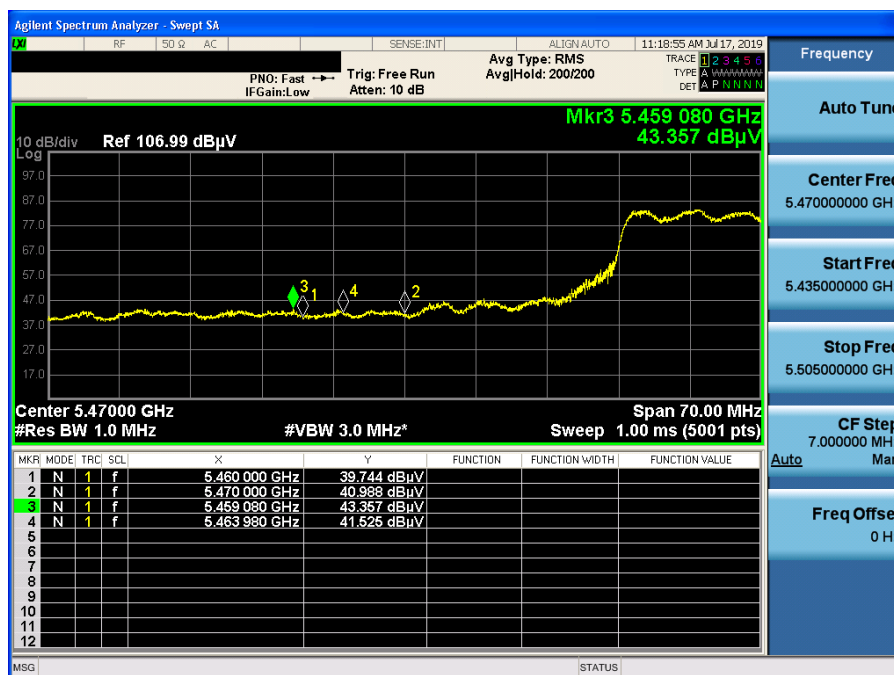
802.11ac(VHT80) &amp; U-NII 2C &amp; Ch.106 &amp; Z axis &amp; Hor

Detector Mode : PK



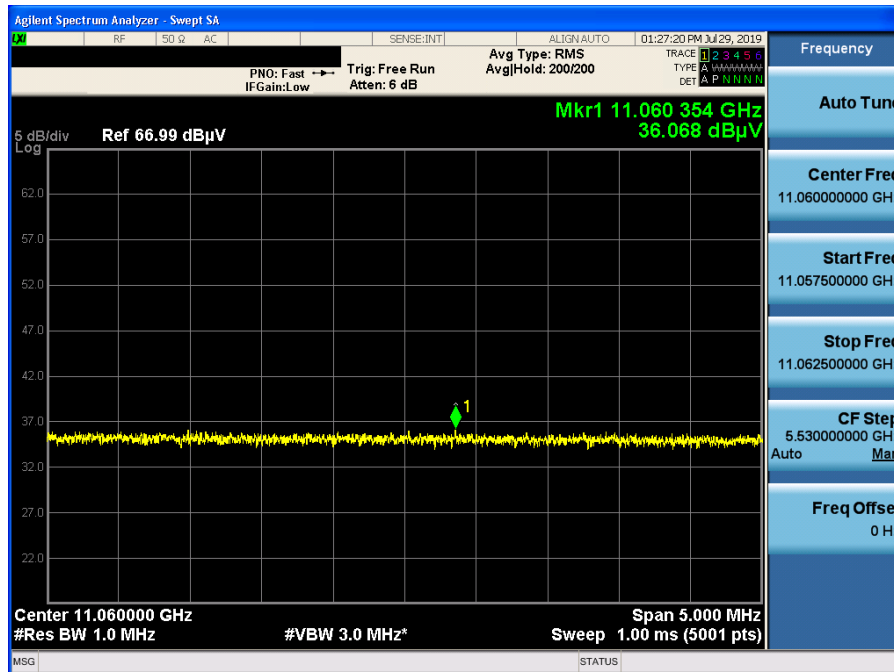
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Detector Mode : AV



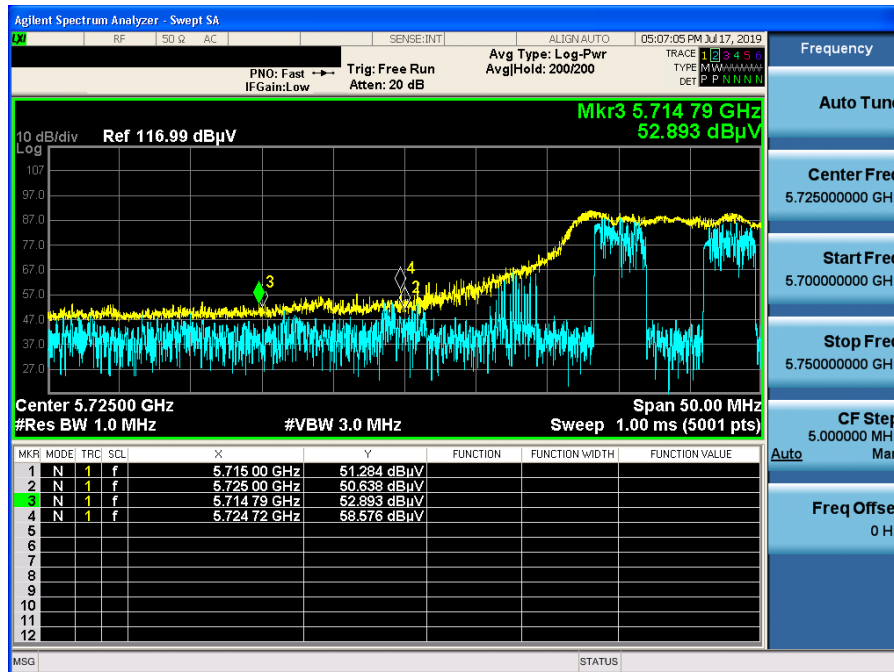
802.11ac(VHT80) & U-NII 2C & Ch.106 & Y axis & Hor

Detector Mode : AV



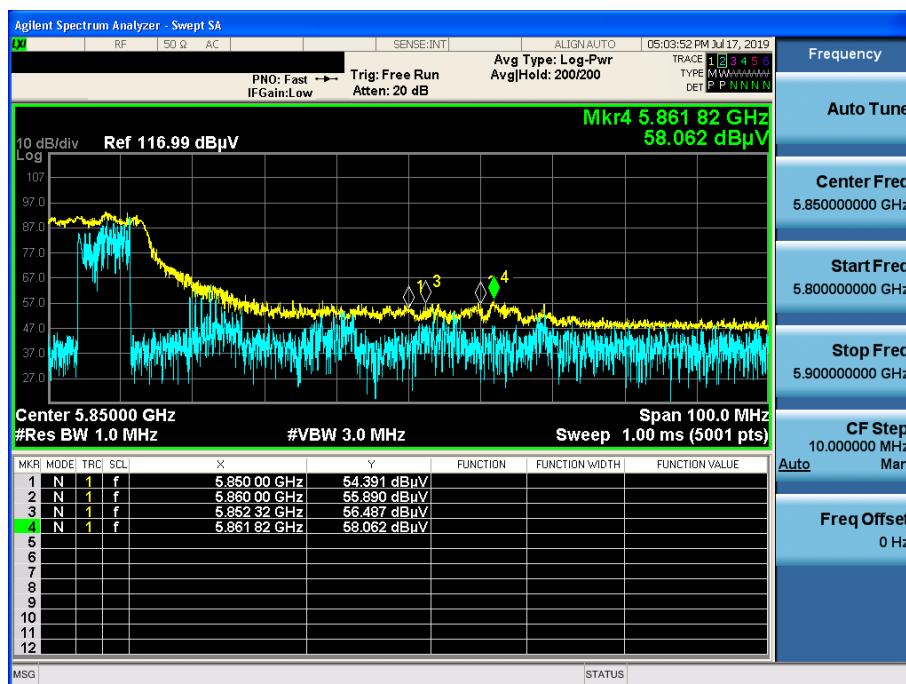
802.11ac(VHT80) &amp; U-NII 3 &amp; Ch.155 &amp; Z axis &amp; Hor

Detector Mode : PK



802.11ac(VHT80) &amp; U-NII 3 &amp; Ch.155 &amp; Z axis &amp; Hor

Detector Mode : PK



802.11ac(VHT80) & U-NII 3 & Ch.155 & Y axis & Hor

Detector Mode : AV

