

FCC PART 15E TEST REPORT FOR CERTIFICATION  
On Behalf of

CTOUCH Europe B.V.

WIFI MODULE

Model Number: WIM000AS

FCC ID: 2APQQ-WIM000AS

|               |                                                                     |
|---------------|---------------------------------------------------------------------|
| Prepared for: | CTOUCH Europe B.V.                                                  |
|               | Achtseweg Zuid 153R, 5651 GW Eindhoven, Nederlands                  |
|               |                                                                     |
| Prepared By:  | EST Technology Co., Ltd.                                            |
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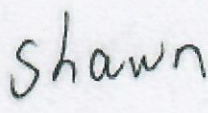
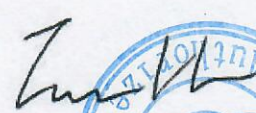
|                 |                             |
|-----------------|-----------------------------|
| Report Number:  | ESTE-R2003023               |
| Date of Test:   | Dec. 23, 2019~Mar. 04, 2020 |
| Date of Report: | Mar. 06, 2020               |

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## EST Technology Co., Ltd.

|                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                         |                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| <b>Applicant:</b>                                                                                                                                                                                        | CTOUCH Europe B.V.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                         |                             |
| <b>Address:</b>                                                                                                                                                                                          | Achtseweg Zuid 153R, 5651 GW Eindhoven, Nederlands                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                         |                             |
| <b>Manufacturer:</b>                                                                                                                                                                                     | CTOUCH Europe B.V.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                         |                             |
| <b>Address:</b>                                                                                                                                                                                          | Achtseweg Zuid 153R, 5651 GW Eindhoven, Nederlands                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                         |                             |
| <b>E.U.T:</b>                                                                                                                                                                                            | WIFI MODULE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                         |                             |
| <b>Model Number:</b>                                                                                                                                                                                     | WIM000AS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                         |                             |
| <b>Power Supply:</b>                                                                                                                                                                                     | DC 12V From Adapter Input AC 100-240V, 50/60Hz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                         |                             |
| <b>Trade Name:</b>                                                                                                                                                                                       | CTOUCH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>Serial No.:</b>                                                                                                                      | -----                       |
| <b>Date of Receipt:</b>                                                                                                                                                                                  | Dec. 23, 2019                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>Date of Test:</b>                                                                                                                    | Dec. 23, 2019~Mar. 04, 2020 |
| <b>Test Specification:</b>                                                                                                                                                                               | FCC Part 15 Subpart E 15.407<br>ANSI C63.10:2013<br>FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01<br>FCC KDB 662911 D01 Multiple Transmitter Output v02r01                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                         |                             |
| <b>Test Result:</b>                                                                                                                                                                                      | <p>The device described above is tested by EST Technology Co., Ltd. The measurement results were contained in this test report and EST Technology Co., Ltd. was assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliance with the FCC Rules and Regulations Part 15 Subpart E requirements.</p> <p>This report applies to above tested sample only and shall not be reproduced in part without written approval of EST Technology Co., Ltd.</p> <p style="text-align: right;"><b>Date:</b> Mar. 05, 2020</p> |                                                                                                                                         |                             |
| <b>Prepared by:</b>                                                                                                                                                                                      | <b>Reviewed by:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>Approved by:</b>                                                                                                                     |                             |
| <br><hr style="width: 100%;"/> Ring / Assistant                                                                       | <br><hr style="width: 100%;"/> Shawn / Engineer                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <br><hr style="width: 100%;"/> Iceman Hu / Manager |                             |
| <b>Other Aspects:</b>                                                                                                                                                                                    | None.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                         |                             |
| <i>Abbreviations: OK/P=passed    fail/F=failed    n.a/N=not applicable    E.U.T=equipment under tested</i>                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                         |                             |
| <i>This test report is based on a single evaluation of one sample of above mentioned products, It is not permitted to be duplicated in extracts without written approval of EST Technology Co., Ltd.</i> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                         |                             |

# 1. GENERAL INFORMATION

## 1.1. Description of Device (EUT)

|                     |   |                                                                                                                                                                                                                                                                                        |
|---------------------|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FCC ID              | : | 2APQQ-WIM000AS                                                                                                                                                                                                                                                                         |
| Product Name        | : | WIFI MODULE                                                                                                                                                                                                                                                                            |
| Model Number        | : | WIM000AS                                                                                                                                                                                                                                                                               |
| Software Version    | : | V01                                                                                                                                                                                                                                                                                    |
| Hardware Version    | : | V01                                                                                                                                                                                                                                                                                    |
| Operation frequency | : | U-NII-1: 5150 MHz~5250 MHz<br>U-NII-3: 5725 MHz~5850 MHz                                                                                                                                                                                                                               |
| Number of channel   | : | U-NII-1:<br>IEEE 802.11a / n HT20 / ac VHT20: 4 Channels;<br>IEEE 802.11n HT40 / ac VHT40: 2 Channels;<br>IEEE 802.11ac VHT80: 1 Channel.<br>U-NII-3:<br>IEEE 802.11a / n HT20 / ac VHT20: 5 Channels;<br>IEEE 802.11n HT40 / ac VHT40: 2 Channels;<br>IEEE 802.11ac VHT80: 1 Channel. |
| Modulation          | : | OFDM(QPSK, BPSK, 16-QAM, 64-QAM,256-QAM)                                                                                                                                                                                                                                               |
| Transmit Data Rate  | : | IEEE 802.11a: 54, 48, 36, 24, 18, 12, 9, 6Mbps;<br>IEEE 802.11n: up 150Mbps;<br>IEEE 802.11ac: up to 866.6Mbps;                                                                                                                                                                        |
| Channels Spacing    | : | IEEE 802.11a: 20MHz;<br>IEEE 802.11n HT20: 20MHz;<br>IEEE 802.11n HT40: 40MHz;<br>IEEE 802.11ac VHT20: 20MHz;<br>IEEE 802.11ac VHT40: 40MHz;<br>IEEE 802.11ac VHT80: 80MHz;                                                                                                            |

|                |   |                      |                                                                                                                                                                      |
|----------------|---|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Transmit Power | : | U-NII-1              | IEEE 802.11a: 15.05<br>IEEE 802.11n HT20: 16.01<br>IEEE 802.11n HT40: 15.80<br>IEEE 802.11ac VHT20: 15.67<br>IEEE 802.11ac VHT40: 15.73<br>IEEE 802.11ac VHT80: 8.79 |
|                |   | U-NII-3              | IEEE 802.11a: 7.00<br>IEEE 802.11n HT20: 8.73<br>IEEE 802.11n HT40: 9.53<br>IEEE 802.11ac VHT20: 9.08<br>IEEE 802.11ac VHT40: 9.43<br>IEEE 802.11ac VHT80: 9.01      |
| Sample Type    | : | Prototype production |                                                                                                                                                                      |

## Note:

For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

## 1.2. The antenna information for EUT

| Ant No. | Brand | Model Name | Antenna Type     | Connector | Gain (dBi) |
|---------|-------|------------|------------------|-----------|------------|
| 1       | N/A   | N/A        | External antenna | N/A       | 2          |
| 2       | N/A   | N/A        | External antenna | N/A       | 2          |

Remark:

- (1) The EUT can work as CDD mode in IEEE 802.11n and IEEE 802.11ac, and can operate with one spatial stream.

According to KDB 662911 F 2) f) (i):

$$\text{Directional gain} = 2\text{dBi} + 10 \times \log(2/1)\text{dB} = 5.01\text{dBi} < 6\text{dBi}$$

So, the output power limit and power spectral density do not need to be reduced.

- (2) After pre-test all antenna configurations, the worst case configuration is listed below.

| TX Mode \ ANT No.   | SISO Configuration | MIMO Configuration |
|---------------------|--------------------|--------------------|
| IEEE 802.11a        | ANT1+ANT2          | /                  |
| IEEE 802.11n HT20   | /                  | ANT1+ANT2          |
| IEEE 802.11n HT40   | /                  | ANT1+ANT2          |
| IEEE 802.11ac VHT20 | /                  | ANT1+ANT2          |
| IEEE 802.11ac VHT40 | /                  | ANT1+ANT2          |
| IEEE 802.11ac VHT80 | /                  | ANT1+ANT2          |

## 2. SUMMARY OF TEST

### 2.1. Summary of test result

| Report Section | Description of Test Item                                | FCC Standard Section          | Results |
|----------------|---------------------------------------------------------|-------------------------------|---------|
| 3              | 6dB Bandwidth & 26dB Bandwidth & 99% Occupied Bandwidth | 15.407(a)<br>15.407(e)        | PASS    |
| 4              | Maximum Conducted Output Power                          | 15.407(a)                     | PASS    |
| 5              | Peak Power Spectral Density                             | 15.407(a)                     | PASS    |
| 6              | Unwanted Emissions and Band Edge                        | 15.205<br>15.209<br>15.407(b) | PASS    |
| 7              | Frequency Stability                                     | 15.407(g)                     | PASS    |
| 8              | AC Power Line Conducted Emissions                       | 15.207<br>15.407(b)(6)        | PASS    |
| 9              | Antenna Requirement                                     | 15.203                        | PASS    |

Note:

(1) "N/A" denotes test is not applicable in this test report

## 2.2. Test Facilities

EMC Lab : Certificated by CNAS, CHINA  
Registration No.: L5288  
Date of registration: November 13, 2017

Certificated by FCC, USA  
Designation Number: CN1215  
Test Firm Registration Number: 722932  
Date of registration: November 21, 2017

Certificated by A2LA, USA  
Registration No.: 4366.01  
Date of registration: November 07, 2017

Certificated by Industry Canada  
CAB identifier No.: CN0035  
Date of registration: January 04, 2019

Certificated by VCCI, Japan  
Registration No.: R-13663; C-14103  
Date of registration: July 25, 2017  
This Certificate is valid until: July 24, 2020

Certificated by TUV Rheinland, Germany  
Registration No.: UA 50413872 0001  
Date of registration: July 31, 2018

Certificated by TUV/PS, Shenzhen  
Registration No.: SCN1017  
Date of registration: January 27, 2011

Certificated by Intertek ETL SEMKO  
Registration No.: 2011-RTL-L2-64  
Date of registration: April 28, 2011

Certificated by Nemko, Hong Kong  
Registration No.: 175193  
Date of registration: May 4, 2011

Name of Firm : EST Technology Co., Ltd.

Site Location : Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China

### 2.3. Measurement uncertainty for EST Technology Co., Ltd.

| Test Item                                                | Uncertainty               |
|----------------------------------------------------------|---------------------------|
| Uncertainty for Conduction emission test                 | 2.54dB                    |
| Uncertainty for Radiation Emission test (30MHz-1GHz)     | 3.62                      |
| Uncertainty for Radiation Emission test (1GHz to 18GHz)  | 4.86                      |
| Uncertainty for spurious emissions test (18GHz to 40GHz) | 4.67                      |
| Uncertainty for radio frequency                          | $7 \times 10^{-8}$        |
| Uncertainty for conducted RF Power                       | 0.20dB                    |
| Uncertainty for Power density test                       | 0.26dB                    |
| Temperature                                              | $\pm 0.6^{\circ}\text{C}$ |
| Humidity                                                 | $\pm 4.0\%$               |
| Volatage DC                                              | $\pm 1.0\%$               |
| Volatage (AC, <10KHz)                                    | $\pm 1.5\%$               |

Note:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

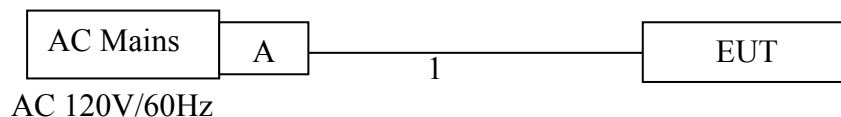
### 2.4. Assistant equipment used for test

| Item | Equipment | Brand          | Model Name/Type No. | FCC ID | Series No. |
|------|-----------|----------------|---------------------|--------|------------|
| A    | Adapter   | FSP GROUP INC. | FSP065-10AABA       | -      | -          |

| Item | Shielded Type | Ferrite Core | Length | Note     |
|------|---------------|--------------|--------|----------|
| 1    | NO            | NO           | 2.4m   | DC Cable |

### 2.5. Block Diagram

For radiated emissions test: EUT was placed on a turn table, which is 0.8 (or 1.5) meter high above ground.



(EUT: WIFI MODULE)

## 2.6. Test Mode

Pre-scan has been combined all possible modulations and data rates to determine the worst case test mode, the worst case test mode was selected for the final test as listed below.

| Test Item                      | Test Mode           | Channel              | Modulation | Data rate |
|--------------------------------|---------------------|----------------------|------------|-----------|
| 6dB Bandwidth                  | IEEE 802.11a        | 149/157/165          | OFDM       | 6Mbps     |
|                                | IEEE 802.11n HT20   | 149/157/165          | OFDM       | MCS0      |
|                                | IEEE 802.11n HT40   | 151/159              | OFDM       | MCS0      |
|                                | IEEE 802.11ac VHT20 | 149/157/165          | OFDM       | MCS0      |
|                                | IEEE 802.11ac VHT40 | 151/159              | OFDM       | MCS0      |
|                                | IEEE 802.11ac VHT80 | 155                  | OFDM       | MCS0      |
| 26dB Bandwidth                 | IEEE 802.11a        | 36/44/48/            | OFDM       | 6Mbps     |
|                                | IEEE 802.11n HT20   | 36//44/48            | OFDM       | MCS0      |
|                                | IEEE 802.11n HT40   | 38/46                | OFDM       | MCS0      |
|                                | IEEE 802.11ac VHT20 | 36/44/48             | OFDM       | MCS0      |
|                                | IEEE 802.11ac VHT40 | 38/46                | OFDM       | MCS0      |
|                                | IEEE 802.11ac VHT80 | 42                   | OFDM       | MCS0      |
| 99% Occupied Bandwidth         | IEEE 802.11a        | 36/40/48/149/157/165 | OFDM       | 6Mbps     |
|                                | IEEE 802.11n HT20   | 36/40/48/149/157/165 | OFDM       | MCS0      |
|                                | IEEE 802.11n HT40   | 38/46/151/159        | OFDM       | MCS0      |
|                                | IEEE 802.11ac VHT20 | 36/40/48/149/157/165 | OFDM       | MCS0      |
|                                | IEEE 802.11ac VHT40 | 38/46/151/159        | OFDM       | MCS0      |
|                                | IEEE 802.11ac VHT80 | 42/155               | OFDM       | MCS0      |
| Maximum Conducted Output Power | IEEE 802.11a        | 36/40/48/149/157/165 | OFDM       | 6Mbps     |
|                                | IEEE 802.11n HT20   | 36/40/48/149/157/165 | OFDM       | MCS0      |
|                                | IEEE 802.11n HT40   | 38/46/151/159        | OFDM       | MCS0      |
|                                | IEEE 802.11ac VHT20 | 36/40/48/149/157/165 | OFDM       | MCS0      |
|                                | IEEE 802.11ac VHT40 | 38/46/151/159        | OFDM       | MCS0      |
|                                | IEEE 802.11ac VHT80 | 42/155               | OFDM       | MCS0      |

|                                              |                     |                      |      |       |
|----------------------------------------------|---------------------|----------------------|------|-------|
| Peak Power Spectral Density                  | IEEE 802.11a        | 36/40/48/149/157/165 | OFDM | 6Mbps |
|                                              | IEEE 802.11n HT20   | 36/40/48/149/157/165 | OFDM | MCS0  |
|                                              | IEEE 802.11n HT40   | 38/46/151/159        | OFDM | MCS0  |
|                                              | IEEE 802.11ac VHT20 | 36/40/48/149/157/165 | OFDM | MCS0  |
|                                              | IEEE 802.11ac VHT40 | 38/46/151/159        | OFDM | MCS0  |
|                                              | IEEE 802.11ac VHT80 | 42/155               | OFDM | MCS0  |
| Unwanted Emissions and Band Edge(Above 1GHz) | IEEE 802.11a        | 36/40/48/149/157/165 | OFDM | 6Mbps |
|                                              | IEEE 802.11n HT20   | 36/40/48/149/157/165 | OFDM | MCS0  |
|                                              | IEEE 802.11n HT40   | 38/46/151/159        | OFDM | MCS0  |
|                                              | IEEE 802.11ac VHT20 | 36/40/48/149/157/165 | OFDM | MCS0  |
|                                              | IEEE 802.11ac VHT40 | 38/46/151/159        | OFDM | MCS0  |
|                                              | IEEE 802.11ac VHT80 | 42/155               | OFDM | MCS0  |
| Unwanted Emissions Below 1GHz                | IEEE 802.11a        | 36                   | OFDM | 6Mbps |
| Frequency Stability                          | Unmodulation        | 36/149               | N/A  | N/A   |
| AC Power Line Conducted Emissions            | IEEE 802.11a        | 36                   | OFDM | 6Mbps |

Note:

1. In radiated measurement, the EUT had been pre-scan on the positioned of each 3 axis(X,Y,Z), the worst case was found when positioned on **X-plane**.

## 2.7. Channel List

| Band    | Mode                             | Channel | Frequency (MHz) |
|---------|----------------------------------|---------|-----------------|
| U-NII-1 | IEEE 802.11a & n HT20 & ac VHT20 | 36      | 5180            |
|         |                                  | 40      | 5200            |
|         |                                  | 44      | 5220            |
|         |                                  | 48      | 5240            |
|         | IEEE 802.11n HT40 & ac VHT40     | 38      | 5190            |
|         |                                  | 46      | 5230            |
|         | IEEE 802.11ac VHT80              | 42      | 5210            |
| U-NII-3 | IEEE 802.11a & n HT20 & ac VHT20 | 149     | 5745            |
|         |                                  | 153     | 5765            |
|         |                                  | 157     | 5785            |
|         |                                  | 161     | 5805            |
|         |                                  | 165     | 5825            |
|         | IEEE 802.11n HT40 & ac VHT40     | 151     | 5755            |
|         |                                  | 159     | 5795            |
|         | IEEE 802.11ac VHT80              | 155     | 5775            |

## 2.8. Power Setting of Test Software

| Software Name               | MTool2.0.0.7 |       |       |
|-----------------------------|--------------|-------|-------|
| Frequency(MHz)              | 5745         | 5785  | 5825  |
| IEEE 802.11a Setting        | 40,40        | 40,40 | 40,40 |
| IEEE 802.11n HT20 Setting   | 40,40        | 40,40 | 40,40 |
| IEEE 802.11ac VHT20 Setting | 40,40        | 40,40 | 40,40 |
| Frequency(MHz)              | 5755         | 5795  |       |
| IEEE 802.11n HT40 Setting   | 40,40        | 40,40 |       |
| IEEE 802.11ac VHT40 Setting | 40,40        | 40,40 |       |
| Frequency(MHz)              | 5775         |       |       |
| IEEE 802.11ac VHT80 Setting | 40,40        |       |       |

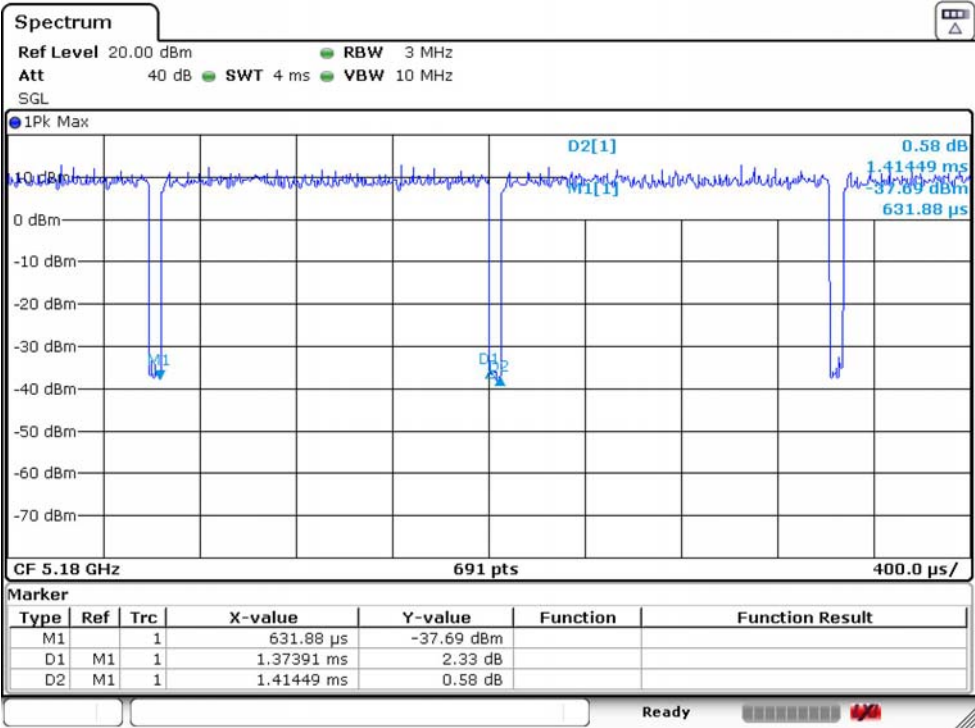
## 2.9. Duty Cycle of Test Signal

| Temperature         | 24.8℃           | Relative Humidity |                 | 56%            | Test Voltage     |          | 120V/60Hz        |
|---------------------|-----------------|-------------------|-----------------|----------------|------------------|----------|------------------|
| Mode                | Frequency (MHz) | On time (ms)      | Total Time (ms) | Duty Cycle (%) | Duty Factor (dB) | 1/T (Hz) | VBW Setting (dB) |
| IEEE 802.11a        | 5180            | 1.37391           | 1.41449         | 97.13          | 0.13             | 1952     | 1952             |
| IEEE 802.11n HT20   | 5180            | 1.28116           | 1.32754         | 96.51          | 0.15             | 1952     | 1952             |
| IEEE 802.11n HT40   | 5190            | 1.29275           | 1.33333         | 96.96          | 0.13             | 1952     | 1952             |
| IEEE 802.11ac VHT20 | 5180            | 0.64058           | 0.68696         | 93.25          | 0.30             | 1952     | 1952             |
| IEEE 802.11ac VHT40 | 5190            | 0.64348           | 0.68986         | 93.28          | 0.30             | 1952     | 1952             |
| IEEE 802.11ac VHT80 | 5210            | 0.32464           | 0.37101         | 87.50          | 0.58             | 1952     | 1952             |

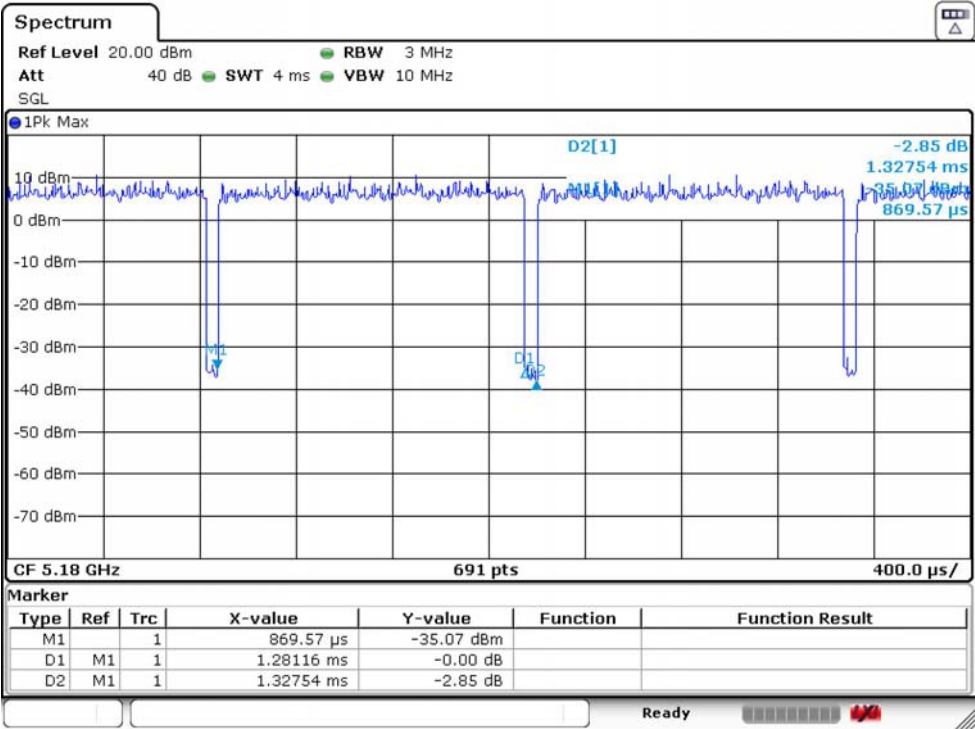
Note:

1. Duty Cycle=On Time/Total Time×100%.
2. Duty Factor=10×Log(1/Duty Cycle).
3. If duty cycle <98 %, the conducted average output power and average power spectral density should be add duty factor.
4. If duty cycle ≥98 %,the EUT is consider to be transmitting continuously,the conducted average output power and average power spectral density no need to add duty factor.
5. The on-time time is transmission duration(T).
6. The VBW Setting is use for RMS measurement in unwanted emissions and band edge(Above 1GHz ) test.

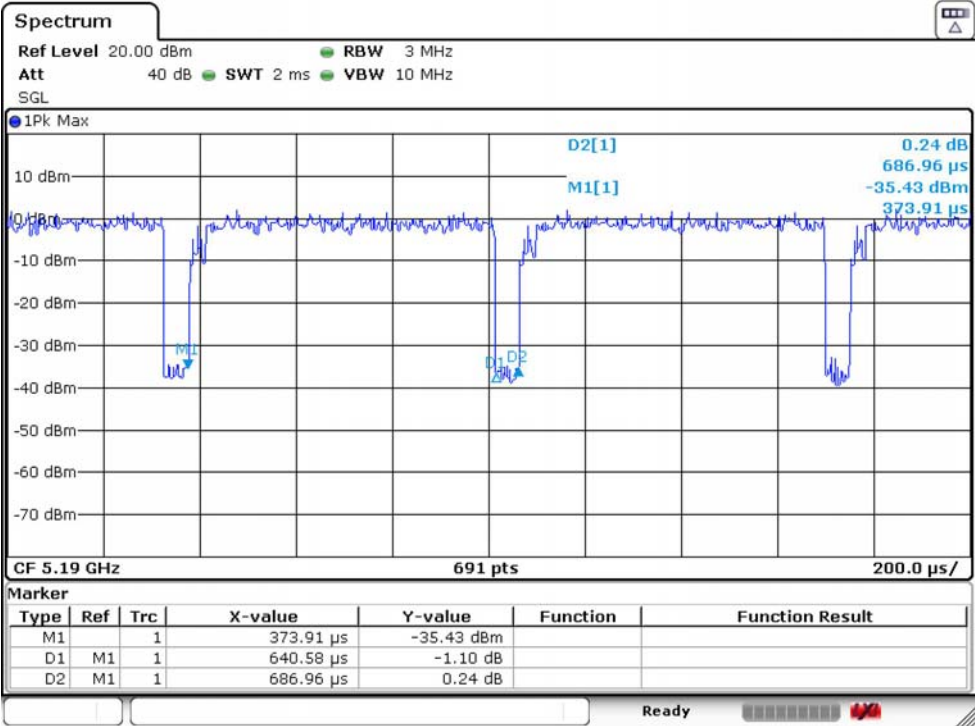
IEEE 802.11a 5180MHz



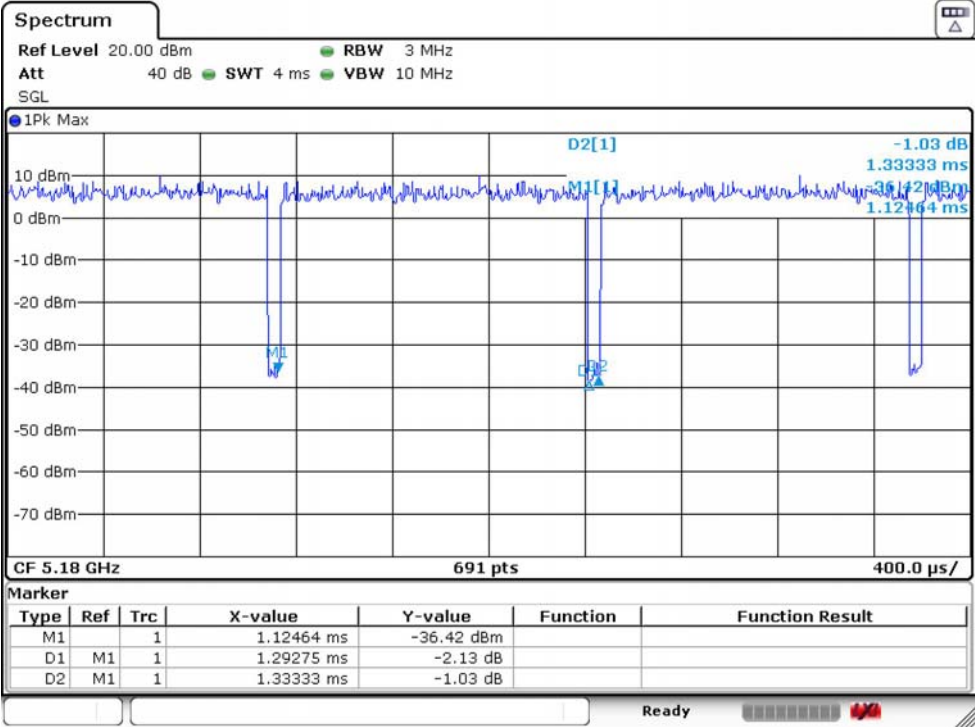
IEEE 802.11n HT20 5180MHz



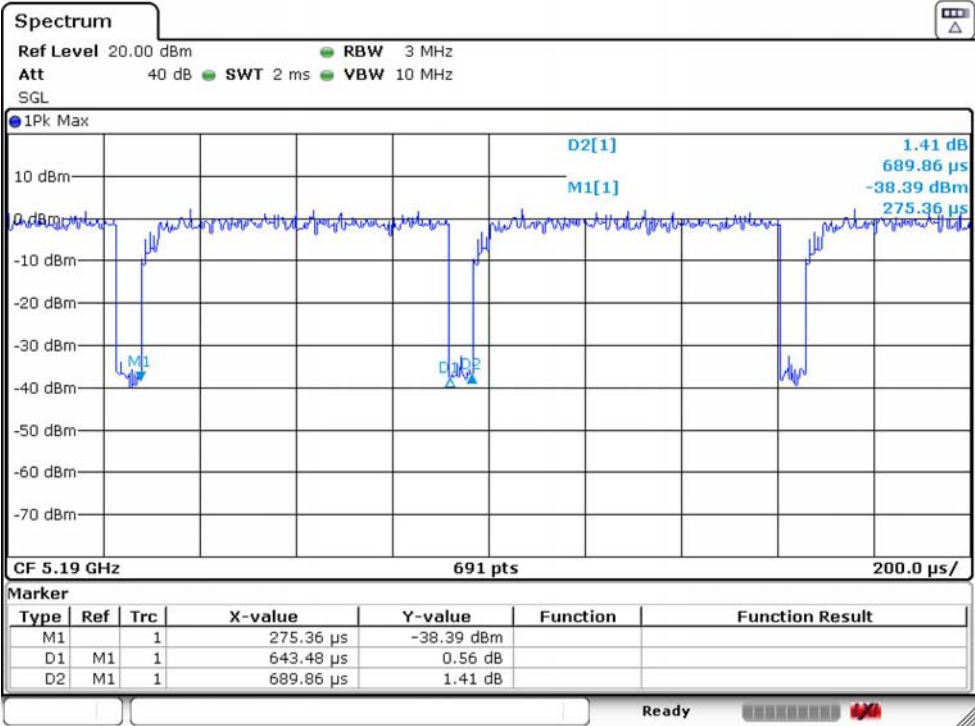
IEEE 802.11n HT40 5190MHz



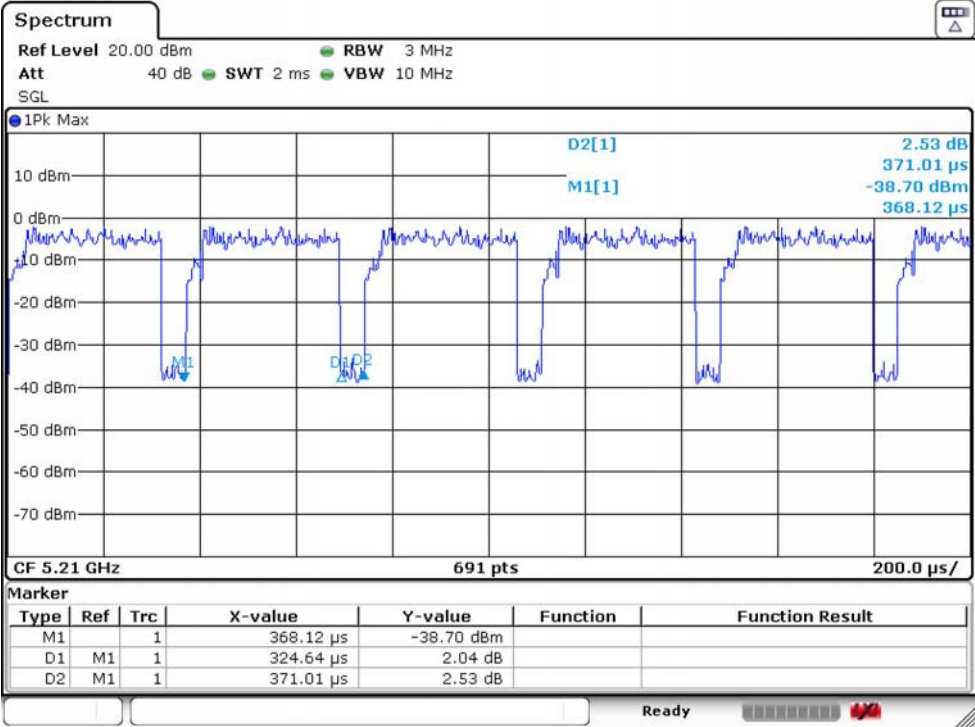
IEEE 802.11ac VHT20 5180MHz



IEEE 802.11ac VHT40 5190MHz



IEEE 802.11ac VHT80 5210MHz



## 2.10. Test Equipment List

| For AC power conducted emissions test |                 |              |            |                  |            |           |
|---------------------------------------|-----------------|--------------|------------|------------------|------------|-----------|
| Equipment                             | Manufacturer    | Model No.    | Serial No. | Calibration Body | Last Cal.  | Next Cal. |
| EMI Test Receiver                     | Rohde & Schwarz | ESHS30       | EST-E001   | LISAI            | June 14,19 | 1 Year    |
| Artificial Mains Network              | Rohde & Schwarz | ENV216       | EST-E002   | LISAI            | June 14,19 | 1 Year    |
| Pulse Limiter                         | Rohde & Schwarz | ESH3-Z2      | EST-E078   | LISAI            | June 14,19 | 1 Year    |
| Test Software                         | Audix           | e3-6.111221a | N/A        | N/A              | N/A        | N/A       |

| For radiated emissions test(9KHz-30MHz) |                 |              |            |                  |            |           |
|-----------------------------------------|-----------------|--------------|------------|------------------|------------|-----------|
| Equipment                               | Manufacturer    | Model No.    | Serial No. | Calibration Body | Last Cal.  | Next Cal. |
| EMI Test Receiver                       | Rohde & Schwarz | ESR7         | EST-E047   | LISAI            | June 14,19 | 1 Year    |
| Active Loop Antenna                     | SCHWARZB ECK    | FMZB 1519B   | EST-E054   | LISAI            | June 14,19 | 1 Year    |
| Test Software                           | Audix           | e3-6.111221a | N/A        | N/A              | N/A        | N/A       |
| 9kHz-30MHz Cable                        | N/A             | EST-001      | N/A        | N/A              | N/A        | N/A       |

| For radiated emissions test(30MHz-1000MHz) |                 |              |            |                  |            |           |
|--------------------------------------------|-----------------|--------------|------------|------------------|------------|-----------|
| Equipment                                  | Manufacturer    | Model No.    | Serial No. | Calibration Body | Last Cal.  | Next Cal. |
| EMI Test Receiver                          | Rohde & Schwarz | ESR7         | EST-E047   | LISAI            | June 14,19 | 1 Year    |
| Bilog Antenna                              | Teseq           | CBL 6111D    | EST-E034   | LISAI            | June 14,19 | 1 Year    |
| Test Software                              | Audix           | e3-6.111221a | N/A        | N/A              | N/A        | N/A       |
| 30-1000MHz Cable                           | N/A             | EST-002      | N/A        | N/A              | N/A        | N/A       |

| For radiated emissions test(Above 1000MHz) |                 |              |            |                  |            |           |
|--------------------------------------------|-----------------|--------------|------------|------------------|------------|-----------|
| Equipment                                  | Manufacturer    | Model No.    | Serial No. | Calibration Body | Last Cal.  | Next Cal. |
| Horn Antenna                               | SCHWARZB ECK    | BBHA 9120 D  | EST-E031   | LISAI            | June 14,19 | 1 Year    |
| Signal Amplifier                           | SCHWARZB ECK    | BBV9718      | EST-E032   | LISAI            | June 14,19 | 1 Year    |
| Spectrum Analyzer                          | Rohde & Schwarz | FSV40        | EST-E069   | LISAI            | June 14,19 | 1 Year    |
| Test Software                              | Audix           | e3-6.111221a | N/A        | N/A              | N/A        | N/A       |
| Above 1GHz Cable                           | N/A             | EST-003      | N/A        | N/A              | N/A        | N/A       |

| For connect EUT antenna terminal test |                 |            |            |                  |            |           |
|---------------------------------------|-----------------|------------|------------|------------------|------------|-----------|
| Equipment                             | Manufacturer    | Model No.  | Serial No. | Calibration Body | Last Cal.  | Next Cal. |
| TS 8997                               | Rohde & Schwarz | /          | /          | /                | /          | /         |
| Open Switch and Control Unit          | Rohde & Schwarz | OSP-B157WB | EST-E036   | LISAI            | June 14,19 | 1 Year    |
| Signal and Spectrum Analyzer          | Rohde & Schwarz | FSV        | EST-E037   | LISAI            | June 14,19 | 1 Year    |
| Signal Generator                      | Rohde & Schwarz | SMB100A    | EST-E038   | LISAI            | June 14,19 | 1 Year    |
| Vector Signal Generator               | Rohde & Schwarz | SMBV100A   | EST-E039   | LISAI            | June 14,19 | 1 Year    |
| Test Software                         | Rohde & Schwarz | WMS32      | V10.50.00  | N/A              | N/A        | N/A       |
| Temperature controller                | Terchy          | MHQ        | EST-E101   | LISAI            | June 14,19 | 1 Year    |

### 3. 6dB BANDWIDTH & 26dB BANDWIDTH & 99% OCCUPIED BANDWIDTH

#### 3.1. Limit

| Band     | Frequency (MHz) | Test Item                             | Limit                       |
|----------|-----------------|---------------------------------------|-----------------------------|
| U-NII-1  | 5150-5250       | 26dB Bandwidth&99% Occupied Bandwidth | N/A                         |
| U-NII-2A | 5250-5350       | 26dB Bandwidth&99% Occupied Bandwidth | N/A                         |
| U-NII-2C | 5470-5725       | 26dB Bandwidth&99% Occupied Bandwidth | N/A                         |
| U-NII-3  | 5725-5850       | 6dB Bandwidth&99% Occupied Bandwidth  | 6dB Bandwidth $\geq$ 500KHz |

#### 3.2. Test Setup



#### 3.3. Spectrum Analyzer Setting

| 6dB Bandwidth       |                                                                                            |
|---------------------|--------------------------------------------------------------------------------------------|
| Spectrum Parameters | Setting                                                                                    |
| RBW                 | 100KHz                                                                                     |
| VBW                 | 300KHz                                                                                     |
| Span                | 40MHz(20MHz Bandwidth mode)<br>60MHz(40MHz Bandwidth mode)<br>120MHz(80MHz Bandwidth mode) |
| Sweep Time          | Auto                                                                                       |
| Detector            | Peak                                                                                       |
| Trace Mode          | Max Hold                                                                                   |

| 26dB Bandwidth      |                                                                                            |
|---------------------|--------------------------------------------------------------------------------------------|
| Spectrum Parameters | Setting                                                                                    |
| RBW                 | approximately 1% of the emission bandwidth                                                 |
| VBW                 | >RBW                                                                                       |
| Span                | 40MHz(20MHz Bandwidth mode)<br>60MHz(40MHz Bandwidth mode)<br>120MHz(80MHz Bandwidth mode) |
| Sweep Time          | Auto                                                                                       |
| Detector            | Peak                                                                                       |
| Trace Mode          | Max Hold                                                                                   |

| 99% Occupied Bandwidth |                                         |
|------------------------|-----------------------------------------|
| Spectrum Parameters    | Setting                                 |
| RBW                    | 1% to 5% of the OBW                     |
| VBW                    | approximately three times the RBW       |
| Span                   | between 1.5 times and 5.0 times the OBW |
| Sweep Time             | Auto                                    |
| Detector               | Peak                                    |
| Trace Mode             | Max Hold                                |

### 3.4. Test Procedure

#### **For 26dB Bandwidth Measurement :**

- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with section 3.3.
- Set the EUT transmit continuously with maximum output power.
- Allow trace to stabilize, measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the instrument. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
- Repeat above procedures until all modes and channels were measured.
- Record the results in the test report.

#### **For 6dB Bandwidth Measurement :**

- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with section 3.3.
- Set the EUT transmit continuously with maximum output power.
- Allow trace to stabilize, measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.
- Repeat above procedures until all modes and channels were measured.
- Record the results in the test report.

#### **For 99% Occupied Bandwidth Measurement :**

- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with section 3.3.
- Set the EUT transmit continuously with maximum output power.
- Allow trace to stabilize, use the 99% power bandwidth function to measure bandwidth.
- Repeat above procedures until all modes and channels were measured.
- Record the results in the test report.

## 3.5. Test Result

| Temperature                           | 24.8℃                  | Relative Humidity |                         |        | 56%                                | Test Voltage |                                    | 120V/60Hz                         |
|---------------------------------------|------------------------|-------------------|-------------------------|--------|------------------------------------|--------------|------------------------------------|-----------------------------------|
| 26dB Bandwidth&99% Occupied Bandwidth |                        |                   |                         |        |                                    |              |                                    |                                   |
| BAND                                  | Test Mode              | Fre<br>(MHz)      | 26dB Bandwidth<br>(MHz) |        | 99% Occupied<br>Bandwidth<br>(MHz) |              | Calculate<br>Power<br>Limit<br>(W) | Calculate<br>Power Limit<br>(dBm) |
|                                       |                        |                   | Ant 1                   | Ant 2  | Ant 1                              | Ant 2        |                                    |                                   |
| U-NII-1                               | IEEE 802.11a           | 5180              | 22.402                  | 21.534 | 17.077                             | 16.845       | 0.2500                             | 23.98                             |
|                                       |                        | 5200              | 22.402                  | 21.592 | 17.077                             | 16.845       | 0.2500                             | 23.98                             |
|                                       |                        | 5240              | 22.460                  | 21.592 | 16.961                             | 16.903       | 0.2500                             | 23.98                             |
|                                       | IEEE 802.11n HT20      | 5180              | 22.055                  | 21.302 | 17.771                             | 17.713       | 0.2500                             | 23.98                             |
|                                       |                        | 5200              | 21.534                  | 21.418 | 17.771                             | 17.713       | 0.2500                             | 23.98                             |
|                                       |                        | 5240              | 21.418                  | 21.592 | 17.771                             | 17.713       | 0.2500                             | 23.98                             |
|                                       | IEEE 802.11ac<br>VHT20 | 5180              | 21.997                  | 21.36  | 17.829                             | 17.771       | 0.2500                             | 23.98                             |
|                                       |                        | 5200              | 21.823                  | 21.302 | 17.829                             | 17.713       | 0.2500                             | 23.98                             |
|                                       |                        | 5240              | 21.766                  | 21.418 | 17.771                             | 17.771       | 0.2500                             | 23.98                             |
|                                       | IEEE 802.11n HT40      | 5190              | 44.631                  | 44.457 | 37.511                             | 37.511       | 0.2500                             | 23.98                             |
|                                       |                        | 5230              | 44.284                  | 44.544 | 37.742                             | 37.511       | 0.2500                             | 23.98                             |
|                                       | IEEE 802.11ac<br>VHT40 | 5190              | 44.284                  | 44.284 | 37.395                             | 37.395       | 0.2500                             | 23.98                             |
|                                       |                        | 5230              | 44.023                  | 44.284 | 37.627                             | 37.511       | 0.2500                             | 23.98                             |
|                                       | IEEE 802.11ac<br>VHT80 | 5210              | 83.36                   | 83.18  | 75.716                             | 75.543       | 0.2500                             | 23.98                             |

| Temperature                          | 24.8℃                  | Relative Humidity |                        | 56%    | Test Voltage                         |        | 120V/60Hz                    |        |
|--------------------------------------|------------------------|-------------------|------------------------|--------|--------------------------------------|--------|------------------------------|--------|
| 6dB Bandwidth&99% Occupied Bandwidth |                        |                   |                        |        |                                      |        |                              |        |
| BAND                                 | Test Mode              | Fre<br>(MHz)      | 6dB Bandwidth<br>(MHz) |        | 99% Occupied<br>Bandwidth<br>( MHz ) |        | 6dB BW<br>Min Limit<br>(MHz) | Result |
|                                      |                        |                   | Ant 1                  | Ant 2  | Ant 1                                | Ant 2  |                              |        |
| U-NII-3                              | IEEE 802.11a           | 5745              | 16.314                 | 16.314 | 16.903                               | 16.845 | 0.5                          | PASS   |
|                                      |                        | 5785              | 16.314                 | 16.316 | 16.903                               | 16.845 | 0.5                          | PASS   |
|                                      |                        | 5825              | 16.317                 | 16.313 | 16.961                               | 16.903 | 0.5                          | PASS   |
|                                      | IEEE 802.11n HT20      | 5745              | 16.933                 | 16.686 | 17.771                               | 17.771 | 0.5                          | PASS   |
|                                      |                        | 5785              | 16.926                 | 16.686 | 17.829                               | 17.771 | 0.5                          | PASS   |
|                                      |                        | 5825              | 16.901                 | 16.685 | 17.771                               | 17.887 | 0.5                          | PASS   |
|                                      | IEEE 802.11ac<br>VHT20 | 5745              | 16.929                 | 16.554 | 17.771                               | 17.829 | 0.5                          | PASS   |
|                                      |                        | 5785              | 16.931                 | 16.558 | 17.829                               | 17.771 | 0.5                          | PASS   |
|                                      |                        | 5825              | 16.927                 | 16.555 | 17.887                               | 17.945 | 0.5                          | PASS   |
|                                      | IEEE 802.11n HT40      | 5755              | 35.821                 | 36.045 | 37.858                               | 37.742 | 0.5                          | PASS   |
|                                      |                        | 5795              | 35.827                 | 36.031 | 37.742                               | 37.742 | 0.5                          | PASS   |
|                                      | IEEE 802.11ac<br>VHT40 | 5755              | 36.043                 | 35.833 | 37.858                               | 37.627 | 0.5                          | PASS   |
|                                      |                        | 5795              | 36.029                 | 35.831 | 37.742                               | 37.627 | 0.5                          | PASS   |
|                                      | IEEE 802.11ac<br>VHT80 | 5775              | 75.138                 | 75.11  | 75.716                               | 75.543 | 0.5                          | PASS   |

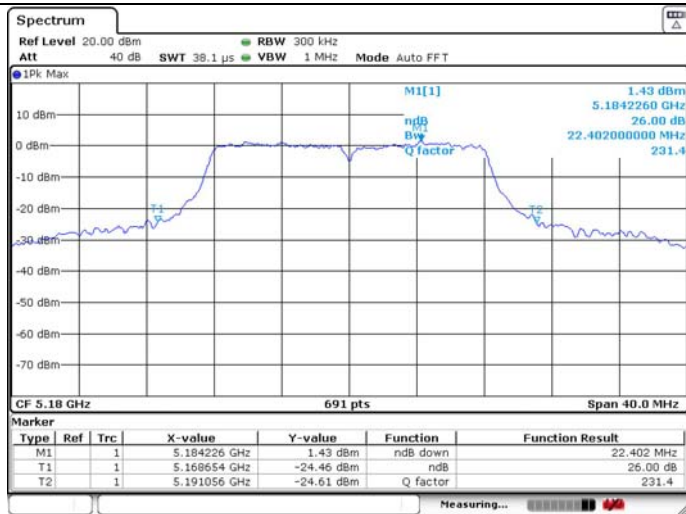
Note :

For Band U-NII-2A and U-NII-2C, the maximum conducted output power limit is 250mw or  $11+10 \times \log B$ , which is lesser, where B is the 26dB Bandwidth in MHz. So in this section, the maximum conducted output power limit can calculate with 26dB Bandwidth.

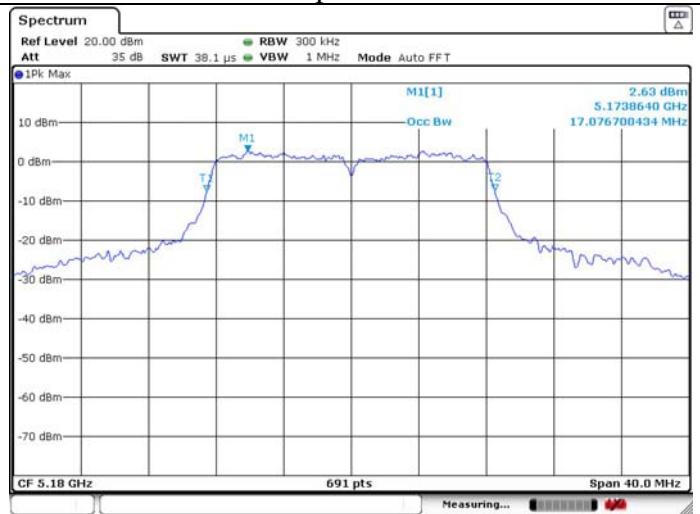
## 3.6. Test Result

## U-NII-1 IEEE 802.11a 5180MHz\_Ant 1

## 26dB Bandwidth

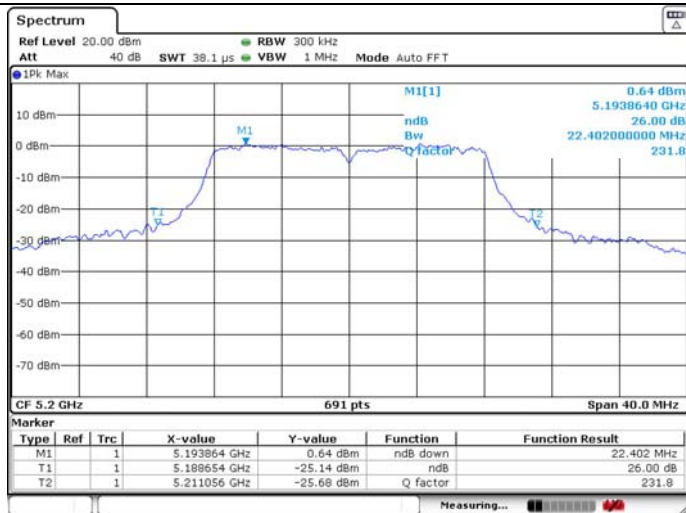


## 99% Occupied Bandwidth

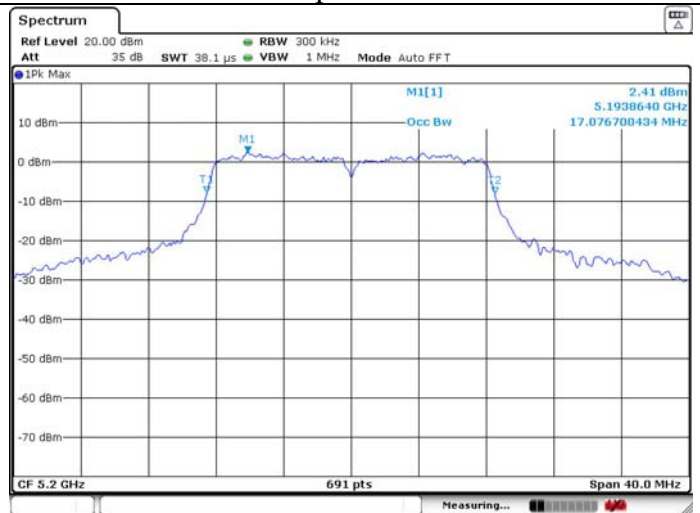


## U-NII-1 IEEE 802.11a 5200MHz\_Ant 1

## 26dB Bandwidth

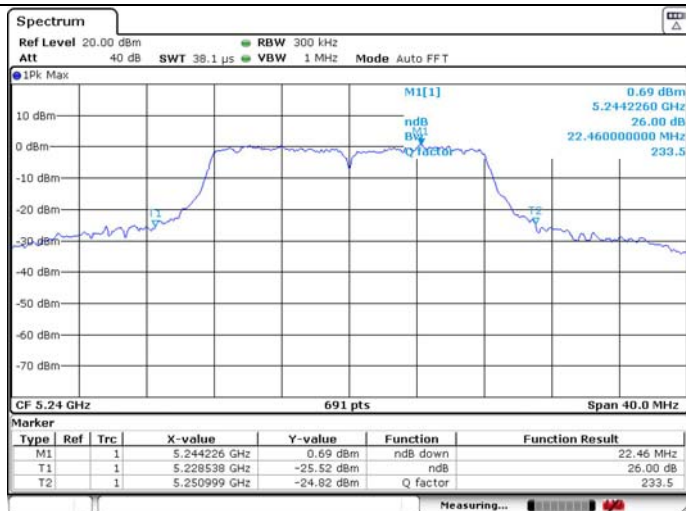


## 99% Occupied Bandwidth



## U-NII-1 IEEE 802.11a 5240MHz\_Ant 1

## 26dB Bandwidth

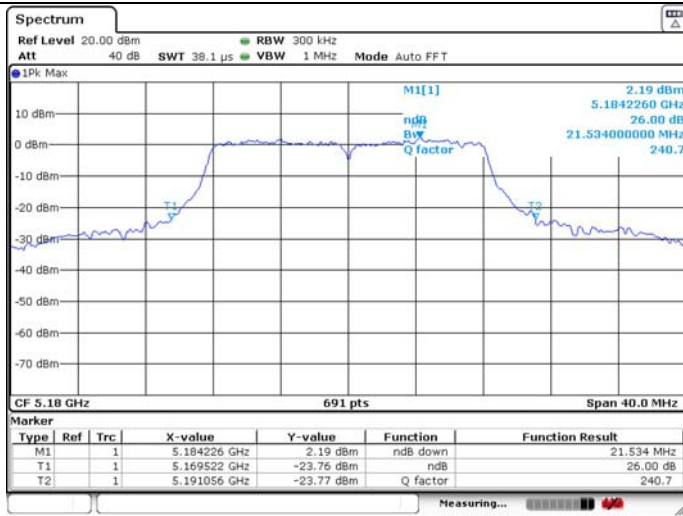


## 99% Occupied Bandwidth

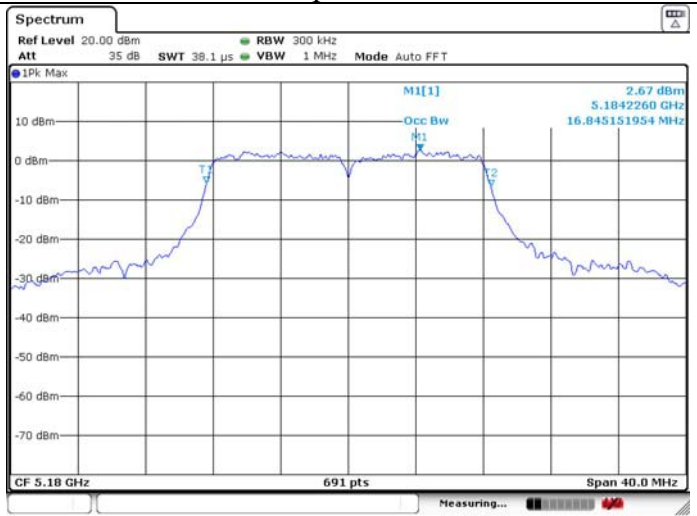


## U-NII-1 IEEE 802.11a 5180MHz\_Ant 2

## 26dB Bandwidth

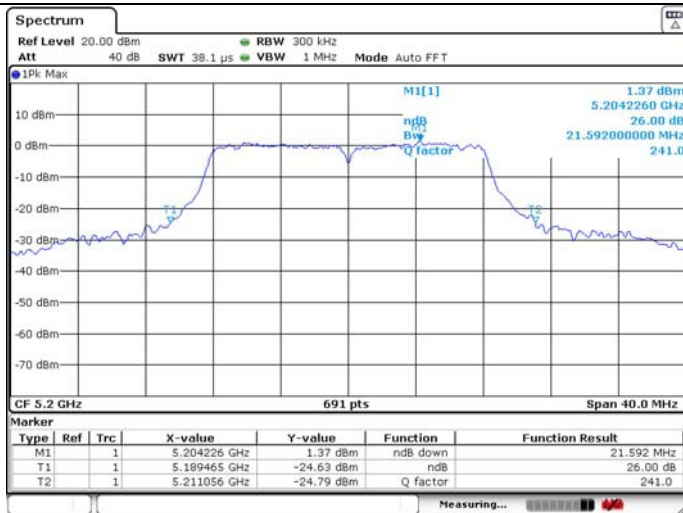


## 99% Occupied Bandwidth

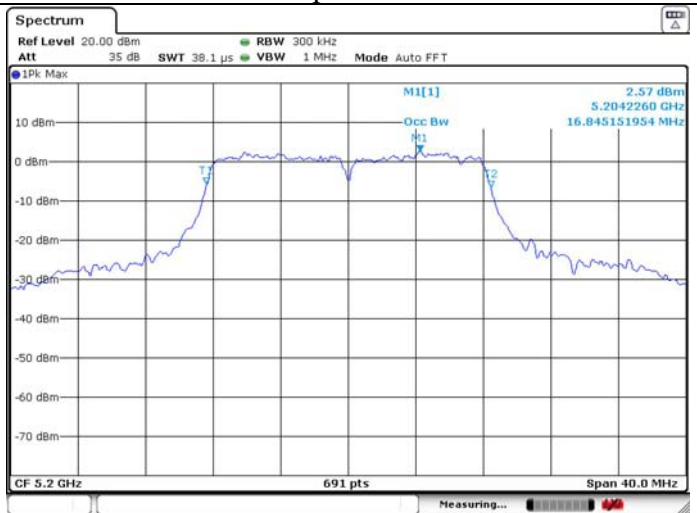


## U-NII-1 IEEE 802.11a 5200MHz\_Ant 2

## 26dB Bandwidth

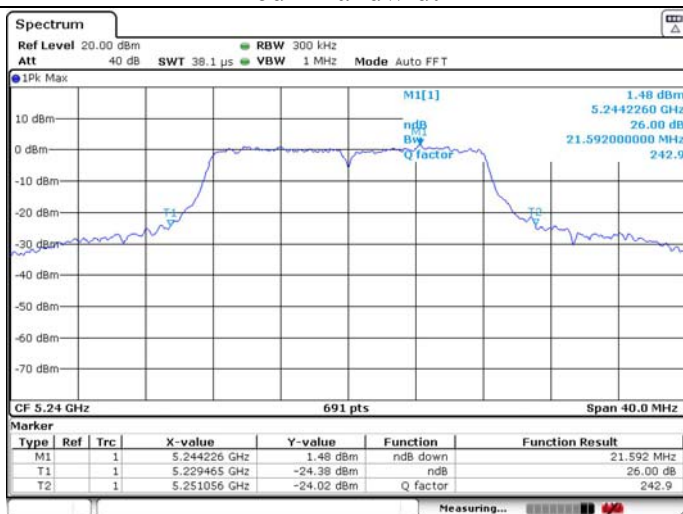


## 99% Occupied Bandwidth

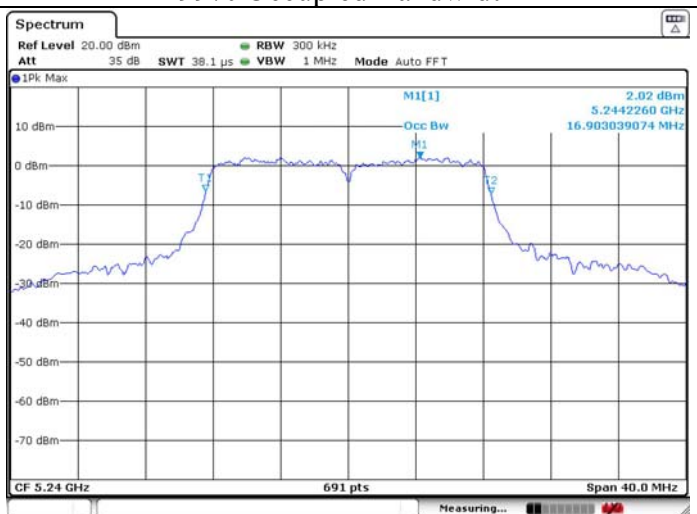


## U-NII-1 IEEE 802.11a 5240MHz\_Ant 2

## 26dB Bandwidth

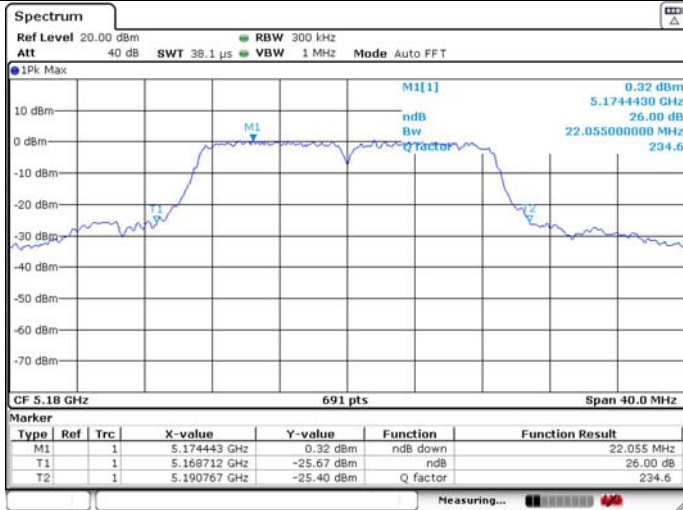


## 99% Occupied Bandwidth



## U-NII-1 IEEE 802.11n HT20 5180MHz\_Ant 1

## 26dB Bandwidth

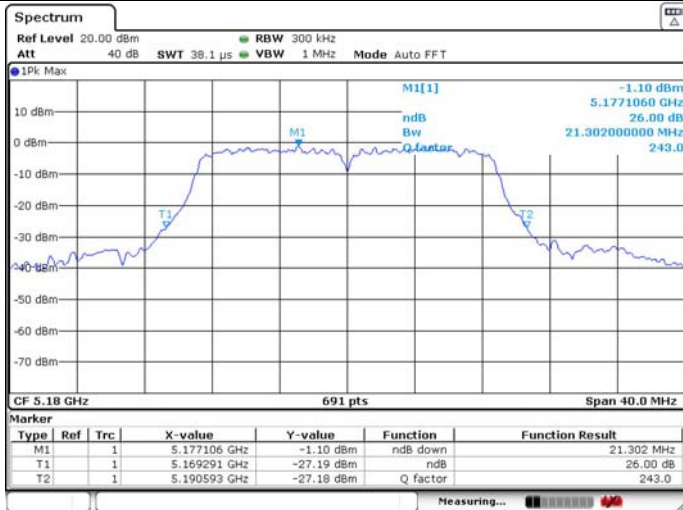


## 99% Occupied Bandwidth



## U-NII-1 IEEE 802.11n HT20 5180MHz\_Ant 2

## 26dB Bandwidth

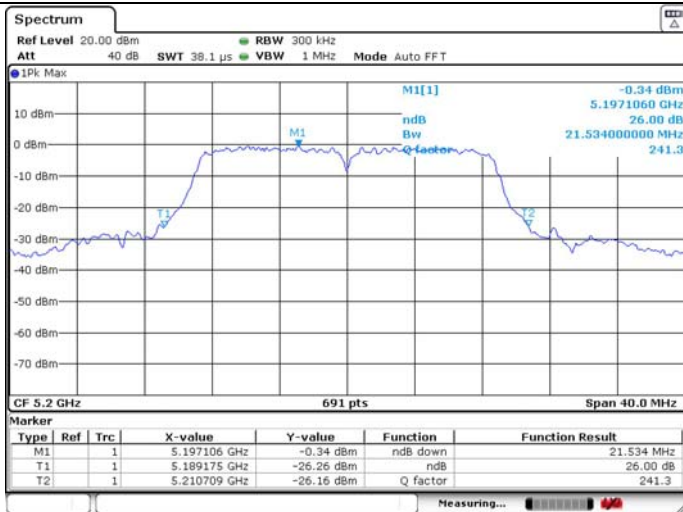


## 99% Occupied Bandwidth



## U-NII-1 IEEE 802.11n HT20 5200MHz\_Ant 1

## 26dB Bandwidth

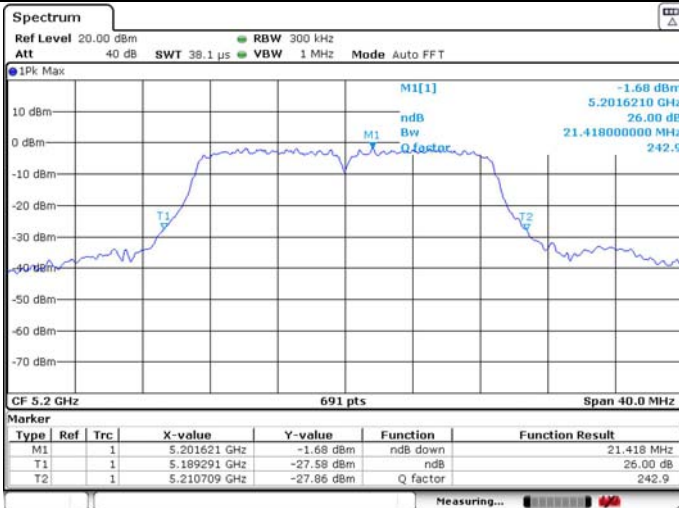


## 99% Occupied Bandwidth



## U-NII-1 IEEE 802.11n HT20 5200MHz\_Ant 2

## 26dB Bandwidth

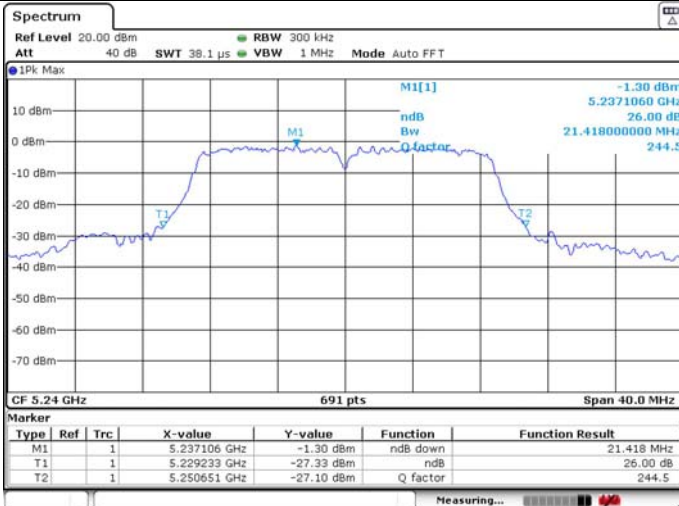


## 99% Occupied Bandwidth



## U-NII-1 IEEE 802.11n HT20 5240MHz\_Ant 1

## 26dB Bandwidth

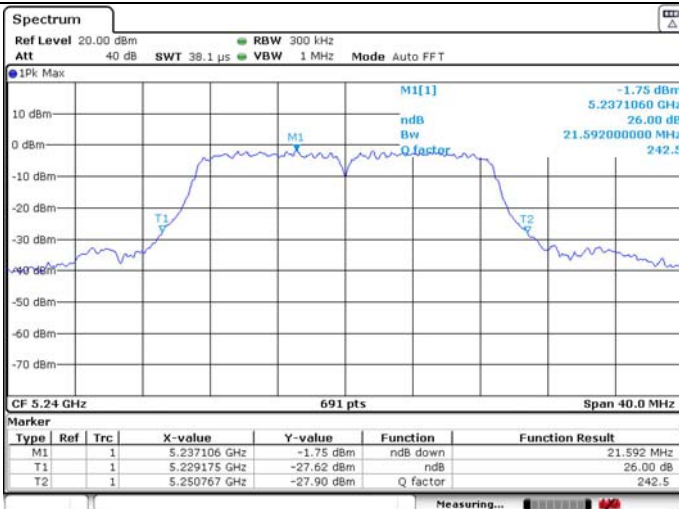


## 99% Occupied Bandwidth

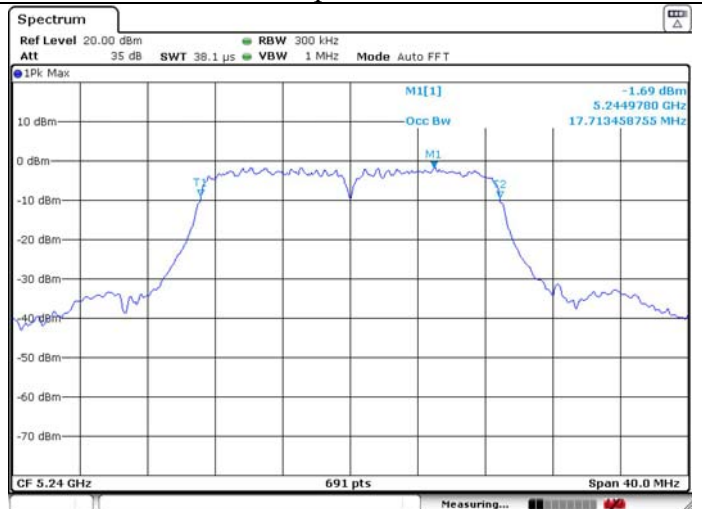


## U-NII-1 IEEE 802.11n HT20 5240MHz\_Ant 2

## 26dB Bandwidth

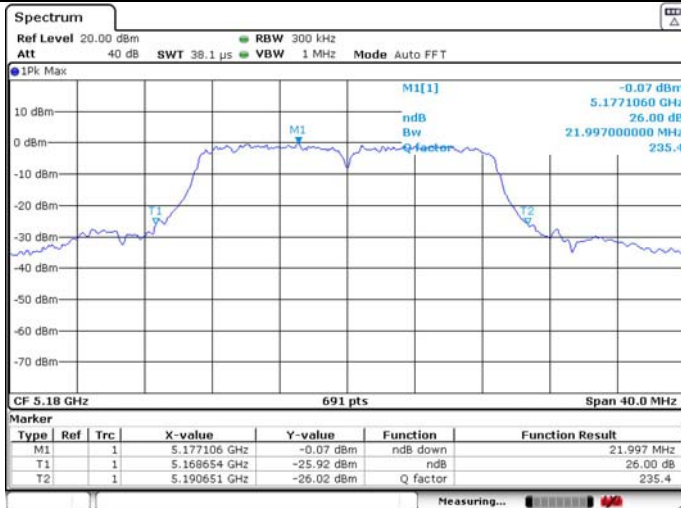


## 99% Occupied Bandwidth



## U-NII-1 IEEE 802.11ac VHT20 5180MHz\_Ant 1

## 26dB Bandwidth

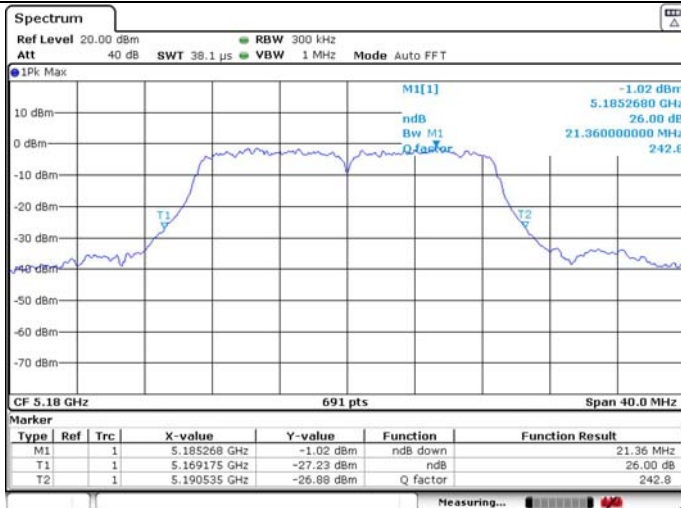


## 99% Occupied Bandwidth



## U-NII-1 IEEE 802.11ac VHT20 5180MHz\_Ant 2

## 26dB Bandwidth

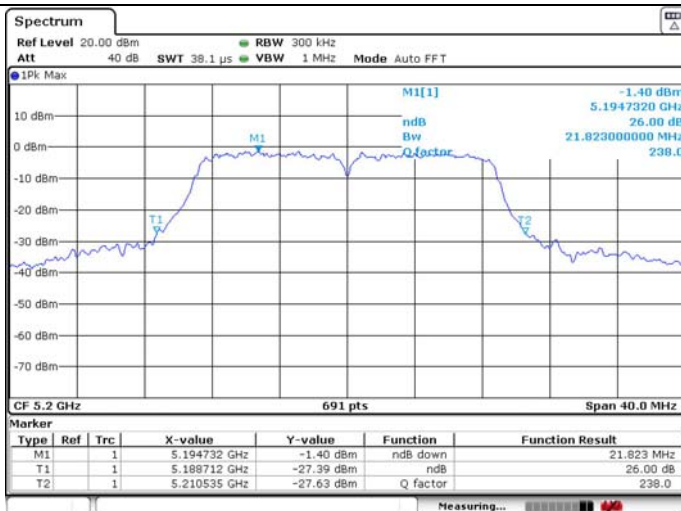


## 99% Occupied Bandwidth



## U-NII-1 IEEE 802.11ac VHT20 5200MHz\_Ant 1

## 26dB Bandwidth

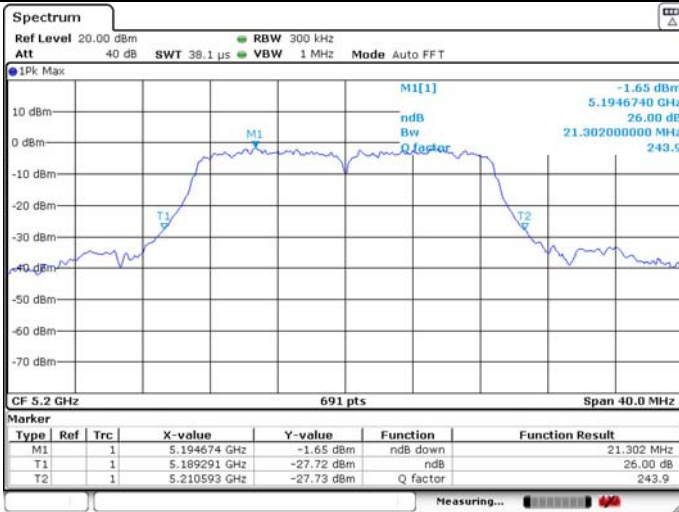


## 99% Occupied Bandwidth



## U-NII-1 IEEE 802.11ac VHT20 5200MHz\_Ant 2

## 26dB Bandwidth

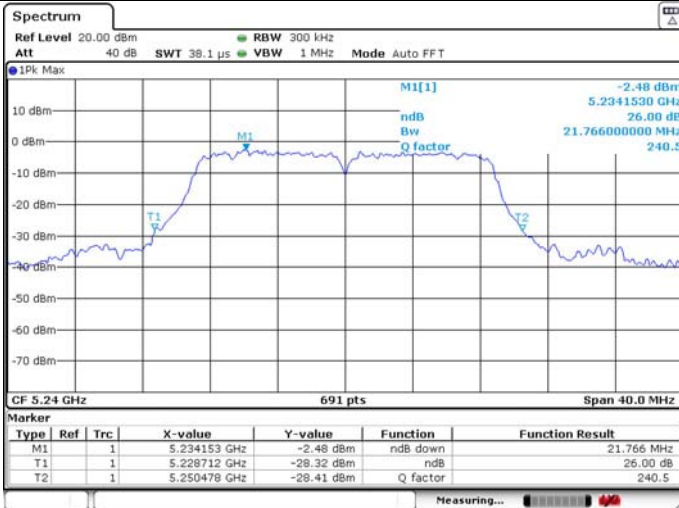


## 99% Occupied Bandwidth



## U-NII-1 IEEE 802.11ac VHT20 5240MHz\_Ant 1

## 26dB Bandwidth

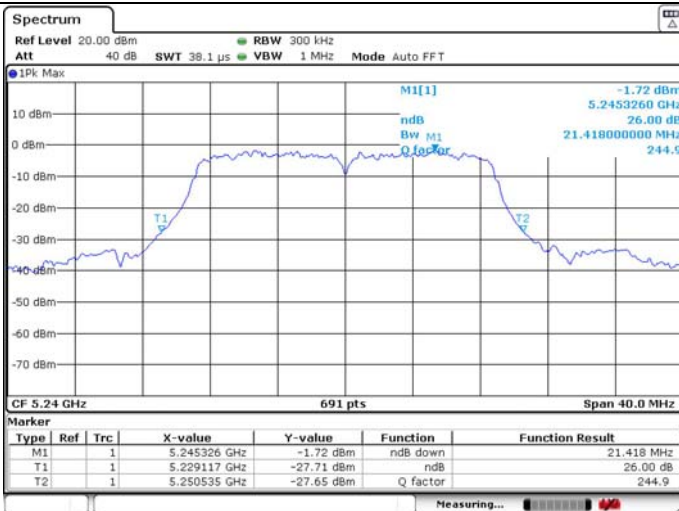


## 99% Occupied Bandwidth



## U-NII-1 IEEE 802.11ac VHT20 5240MHz\_Ant 2

## 26dB Bandwidth

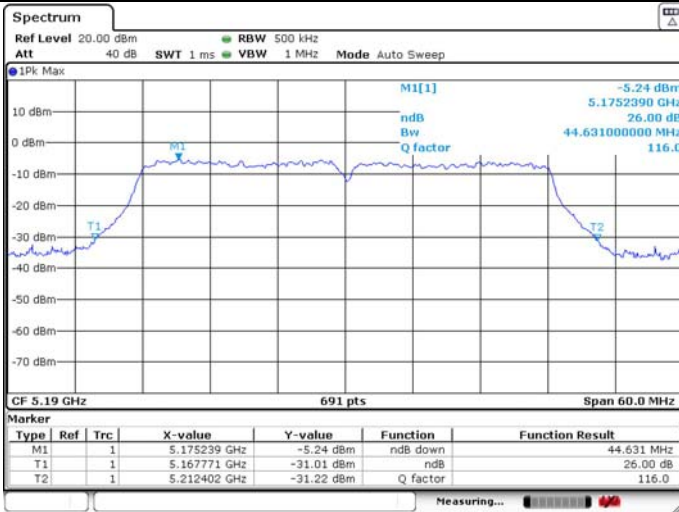


## 99% Occupied Bandwidth



## U-NII-1 IEEE 802.11n HT40 5190MHz\_Ant 1

## 26dB Bandwidth

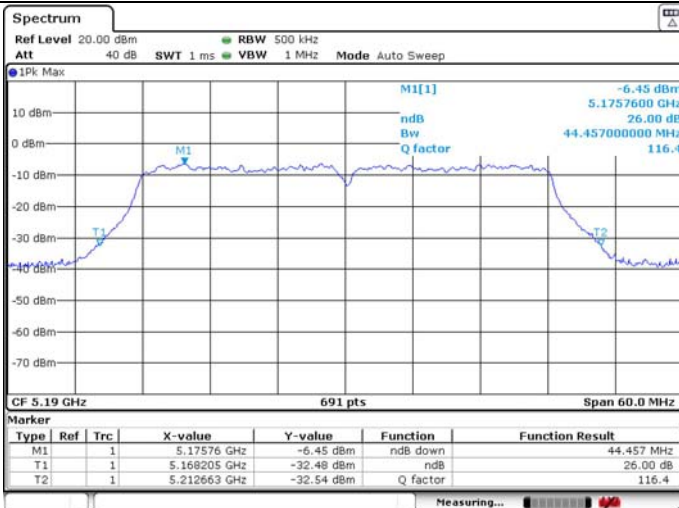


## 99% Occupied Bandwidth



## U-NII-1 IEEE 802.11n HT40 5190MHz\_Ant 2

## 26dB Bandwidth

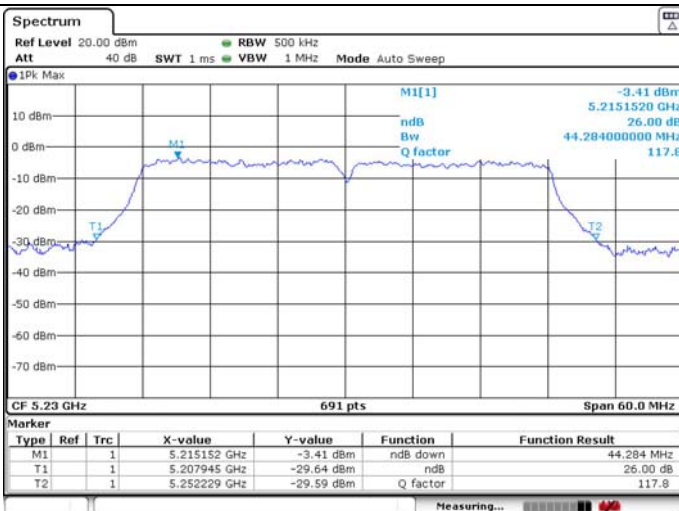


## 99% Occupied Bandwidth

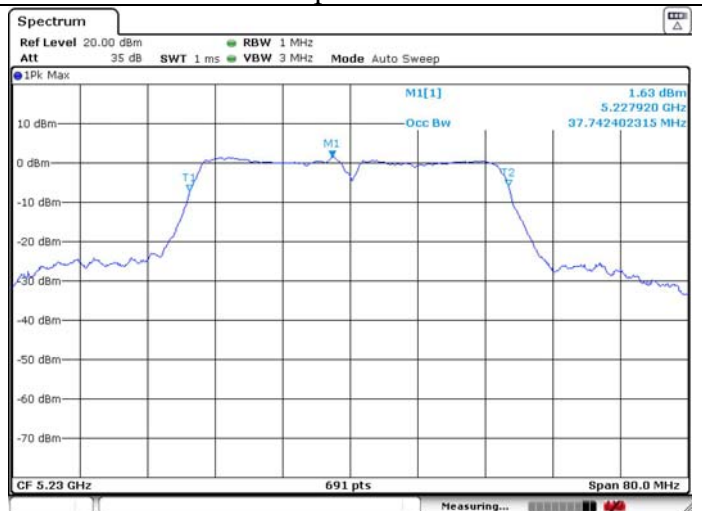


## U-NII-1 IEEE 802.11n HT40 5230MHz\_Ant 1

## 26dB Bandwidth

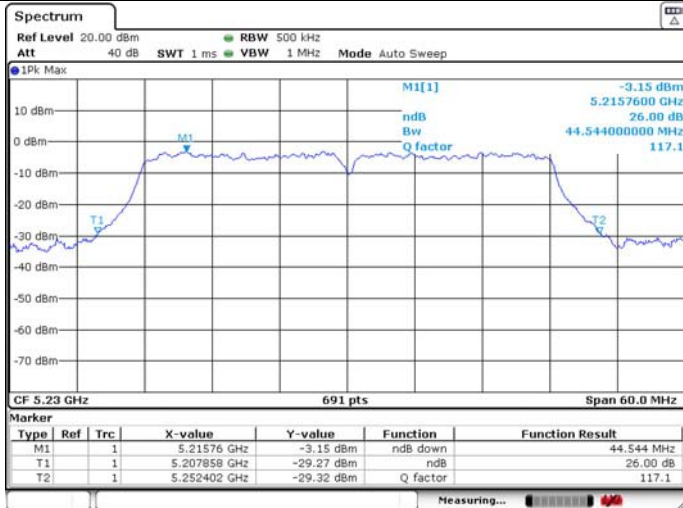


## 99% Occupied Bandwidth

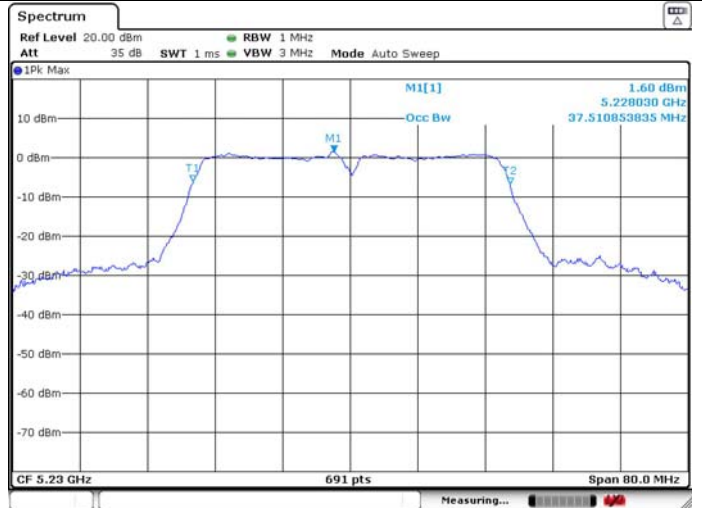


## U-NII-1 IEEE 802.11n HT40 5230MHz\_Ant 2

26dB Bandwidth

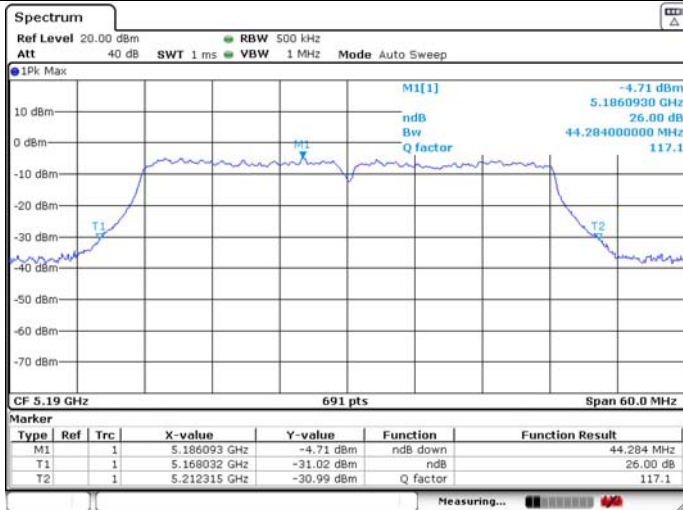


99% Occupied Bandwidth

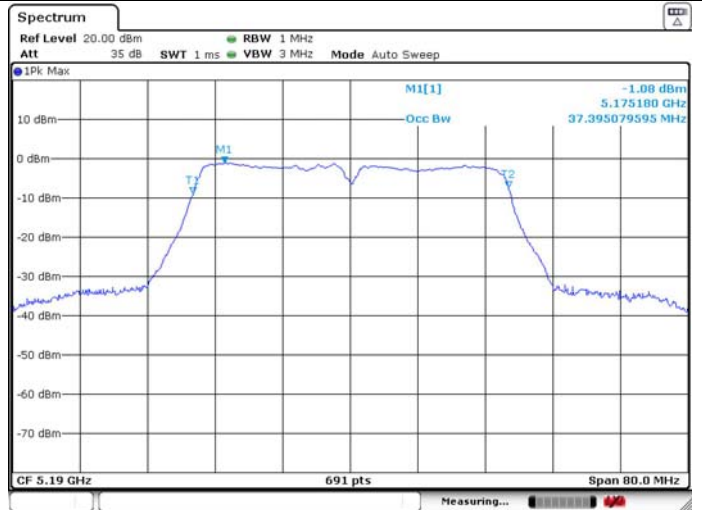


## U-NII-1 IEEE 802.11ac VHT40 5190MHz\_Ant 1

26dB Bandwidth

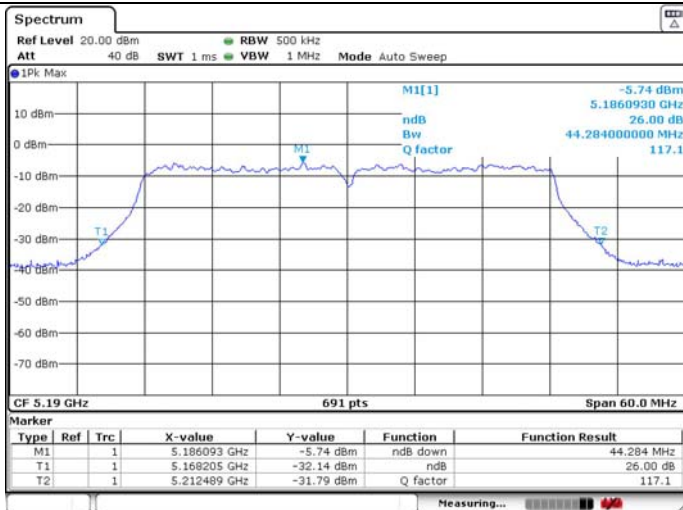


99% Occupied Bandwidth

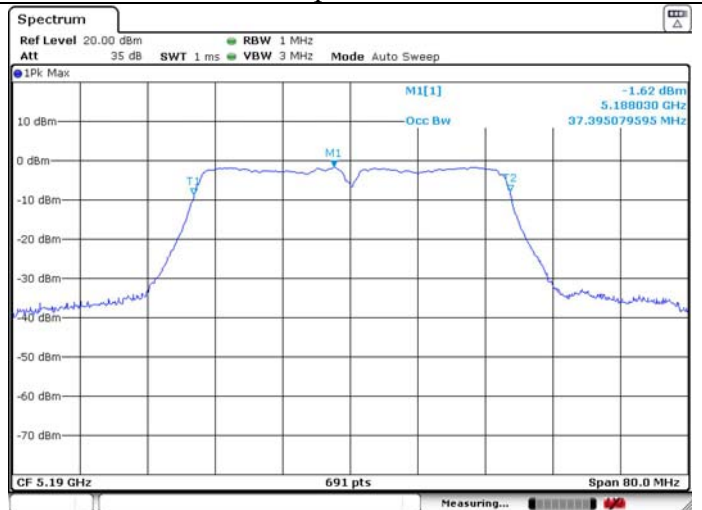


## U-NII-1 IEEE 802.11ac VHT40 5190MHz\_Ant 2

26dB Bandwidth

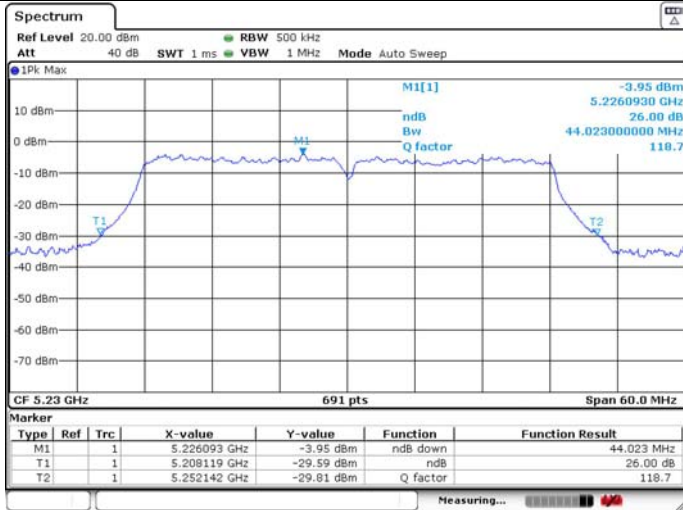


99% Occupied Bandwidth

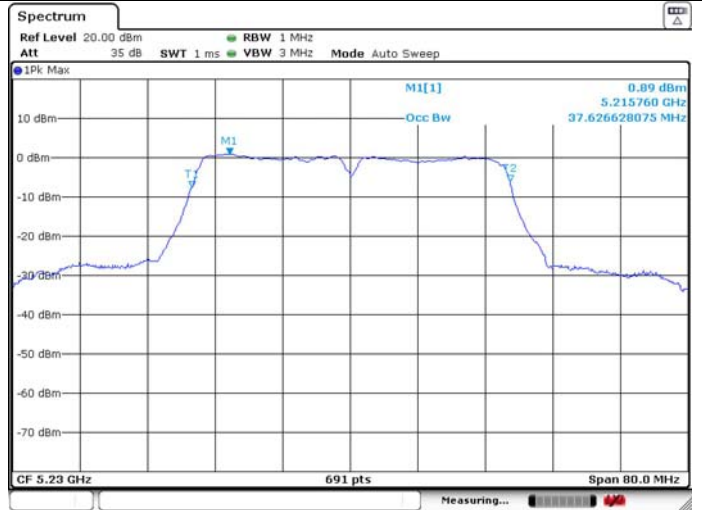


## U-NII-1 IEEE 802.11ac VHT40 5230MHz\_Ant 1

26dB Bandwidth

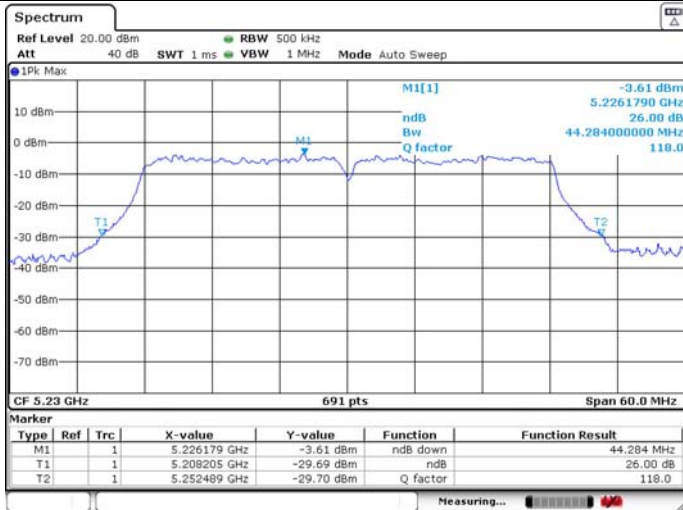


99% Occupied Bandwidth

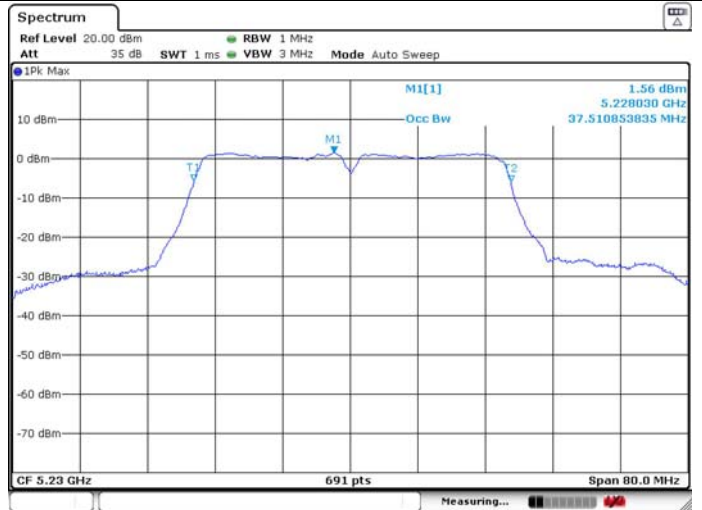


## U-NII-1 IEEE 802.11ac VHT40 5230MHz\_Ant 2

26dB Bandwidth

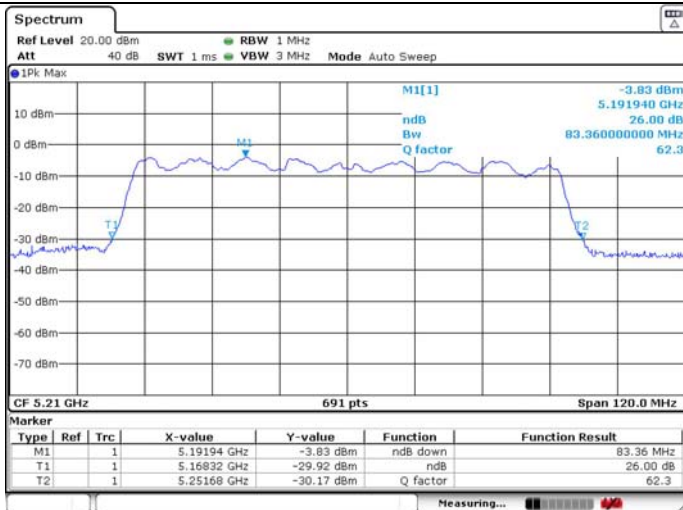


99% Occupied Bandwidth

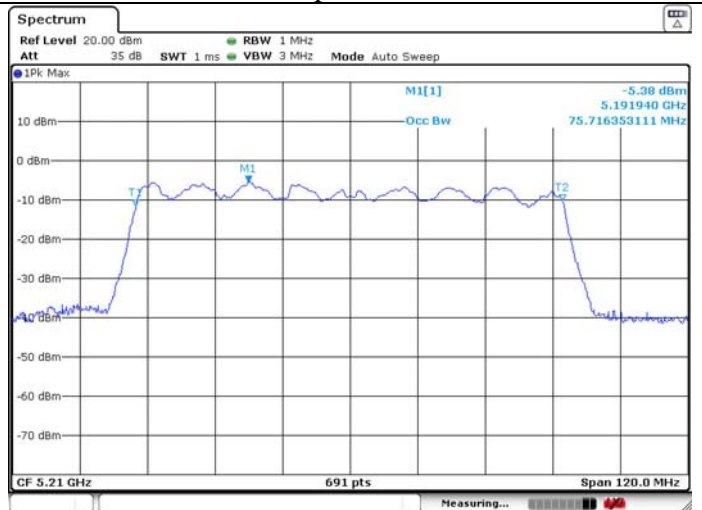


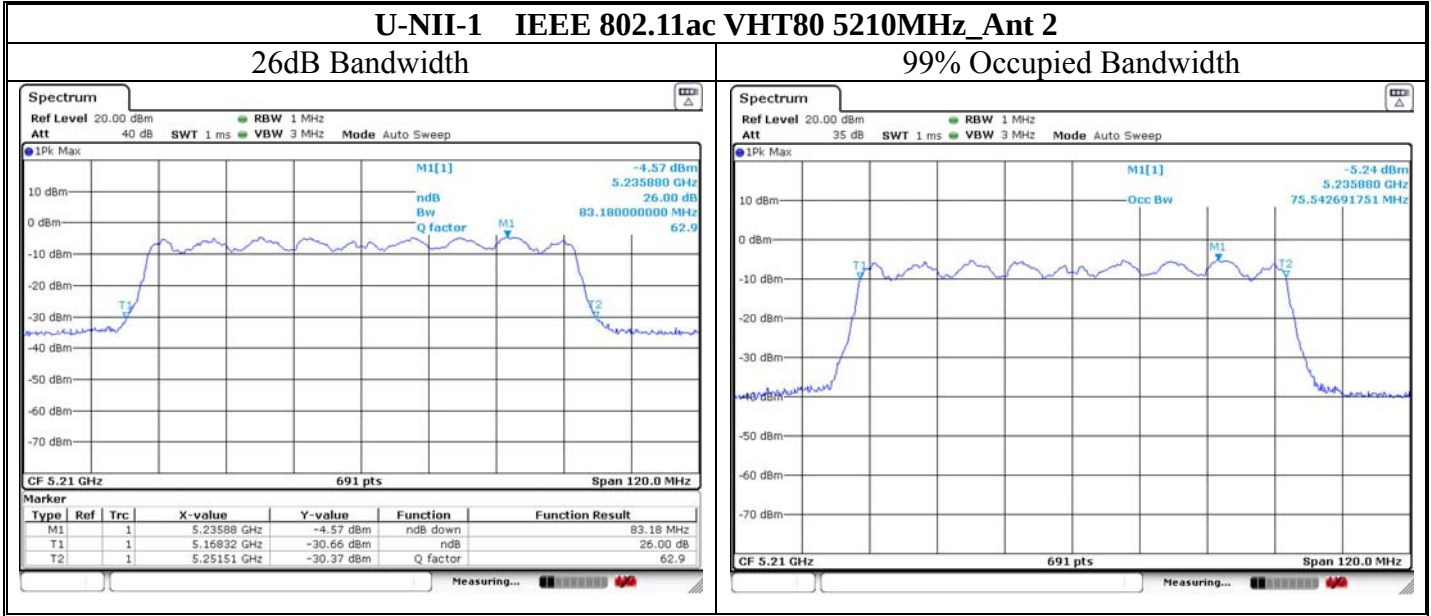
## U-NII-1 IEEE 802.11ac VHT80 5210MHz\_Ant 1

26dB Bandwidth



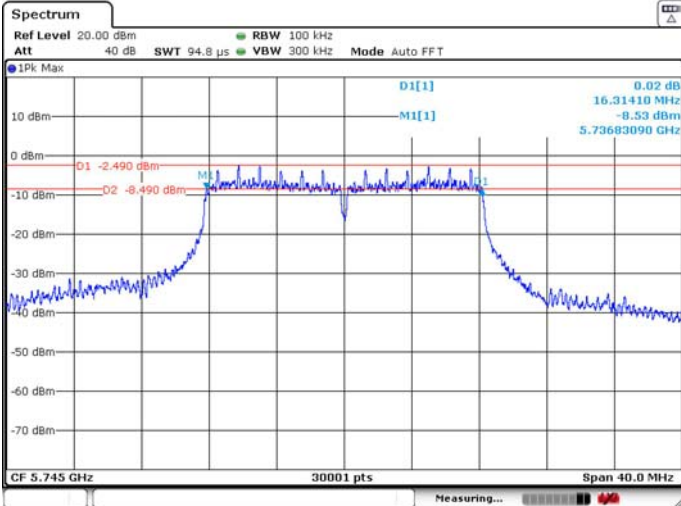
99% Occupied Bandwidth



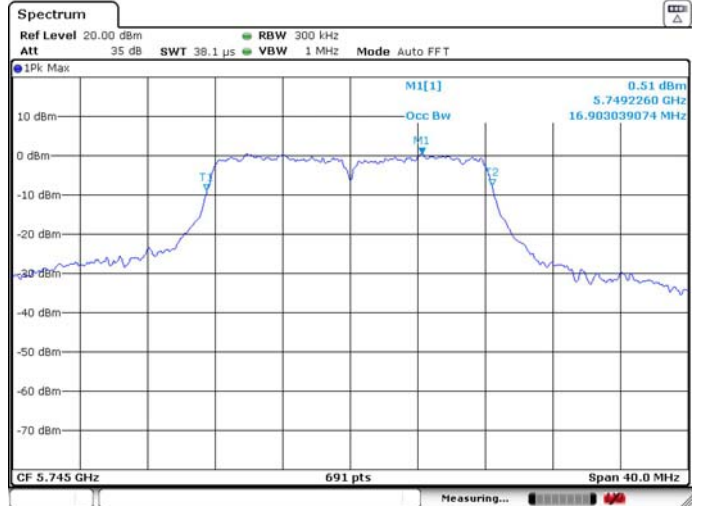


### U-NII-3 IEEE 802.11a 5745MHz\_Ant 1

#### 6dB Bandwidth

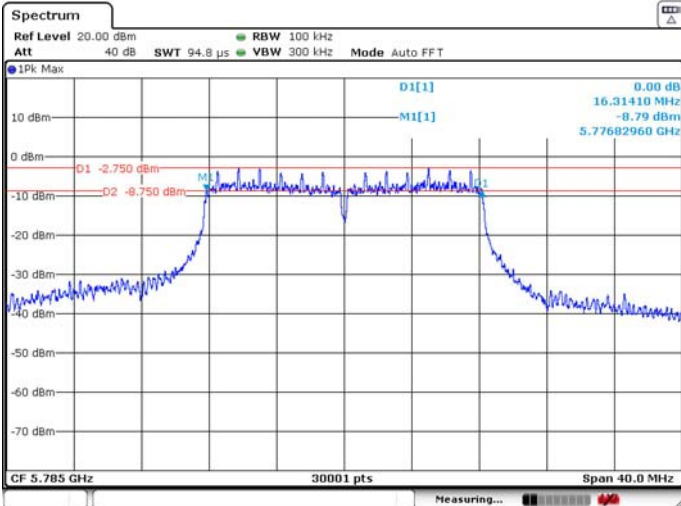


#### 99% Occupied Bandwidth



### U-NII-3 IEEE 802.11a 5785MHz\_Ant 1

#### 6dB Bandwidth

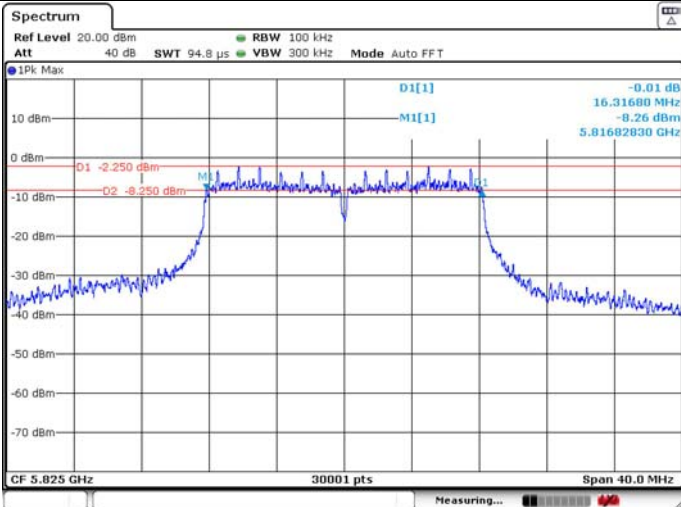


#### 99% Occupied Bandwidth

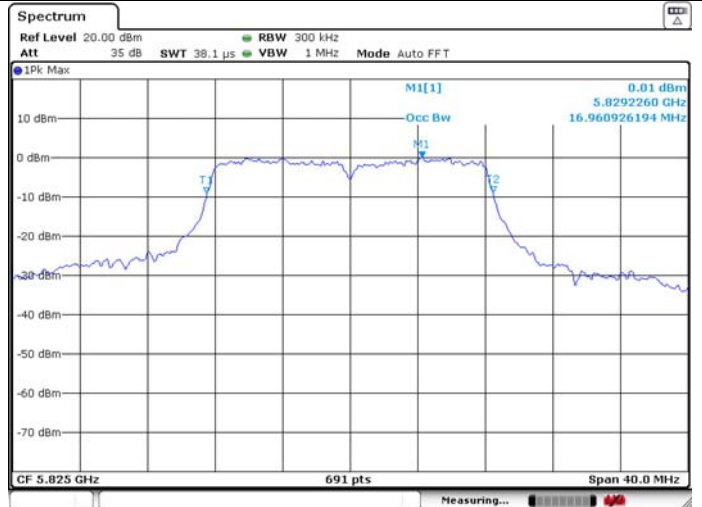


### U-NII-3 IEEE 802.11a 5825MHz\_Ant 1

#### 6dB Bandwidth

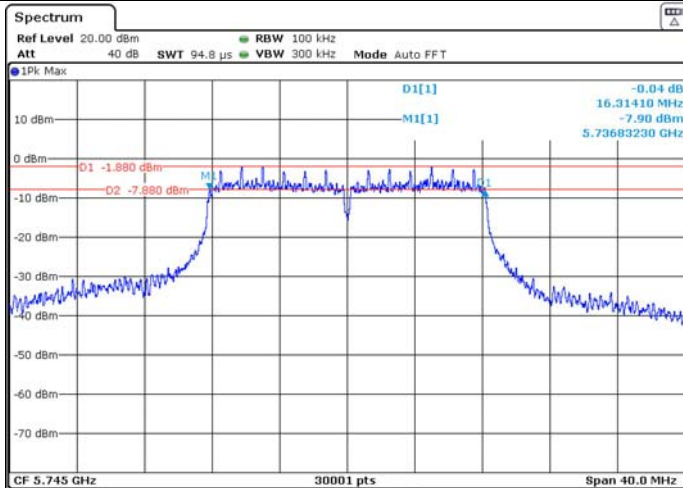


#### 99% Occupied Bandwidth



## U-NII-3 IEEE 802.11a 5745MHz\_Ant 2

## 6dB Bandwidth

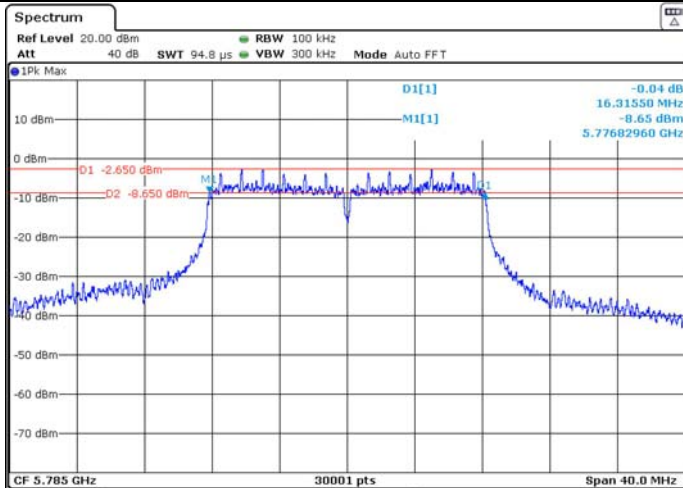


## 99% Occupied Bandwidth



## U-NII-3 IEEE 802.11a 5785MHz\_Ant 2

## 6dB Bandwidth

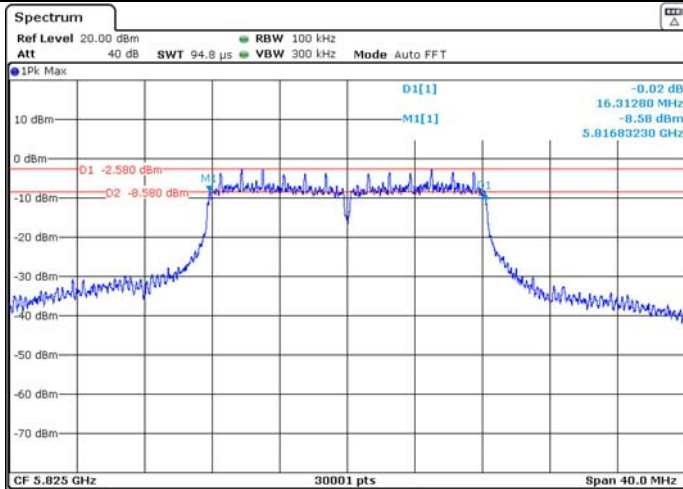


## 99% Occupied Bandwidth



## U-NII-3 IEEE 802.11a 5825MHz\_Ant 2

## 6dB Bandwidth

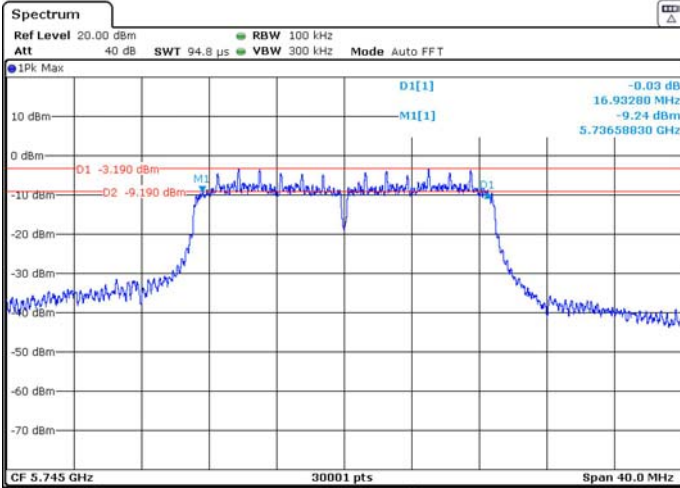


## 99% Occupied Bandwidth



### U-NII-3 IEEE 802.11n HT20 5745MHz\_Ant 1

#### 6dB Bandwidth

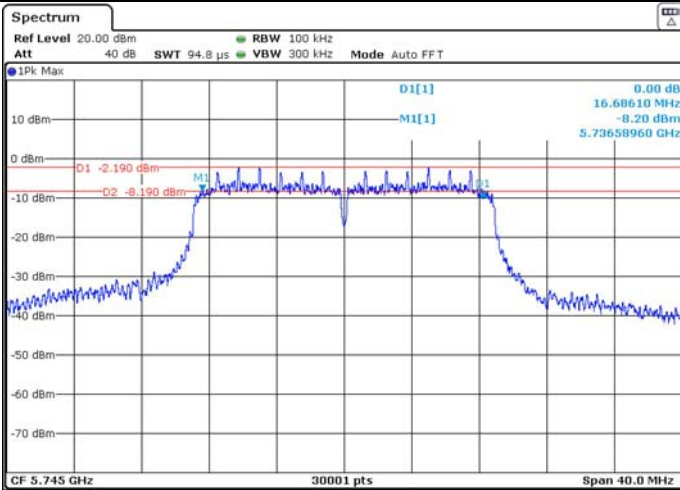


#### 99% Occupied Bandwidth



### U-NII-3 IEEE 802.11n HT20 5745MHz\_Ant 2

#### 6dB Bandwidth

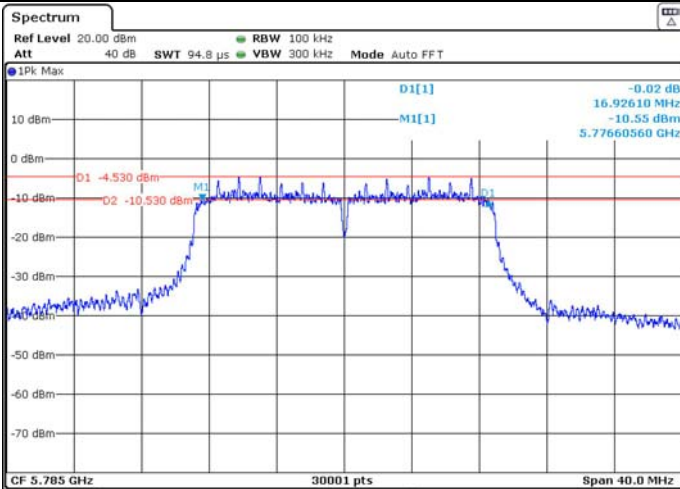


#### 99% Occupied Bandwidth



### U-NII-3 IEEE 802.11n HT20 5785MHz\_Ant 1

#### 6dB Bandwidth

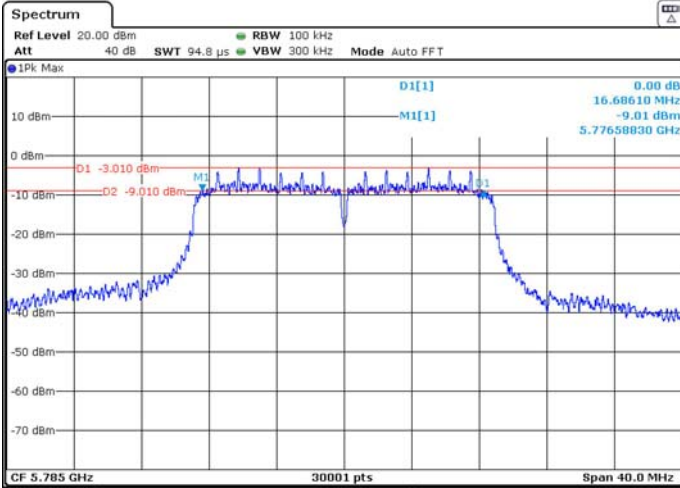


#### 99% Occupied Bandwidth



### U-NII-3 IEEE 802.11n HT20 5785MHz\_Ant 2

#### 6dB Bandwidth

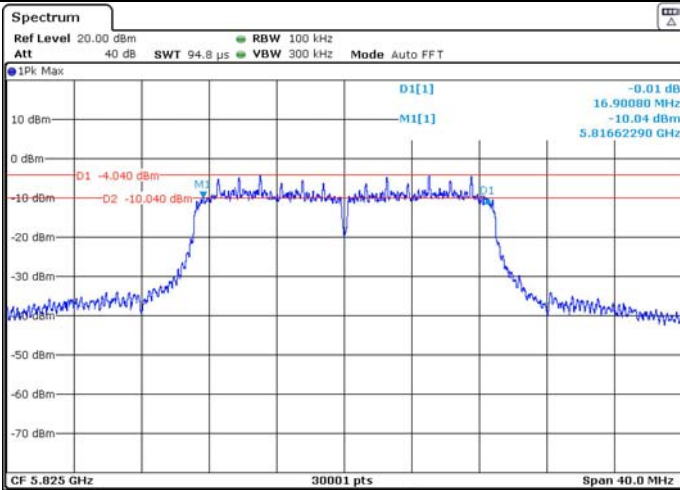


#### 99% Occupied Bandwidth



### U-NII-3 IEEE 802.11n HT20 5825MHz\_Ant 1

#### 6dB Bandwidth

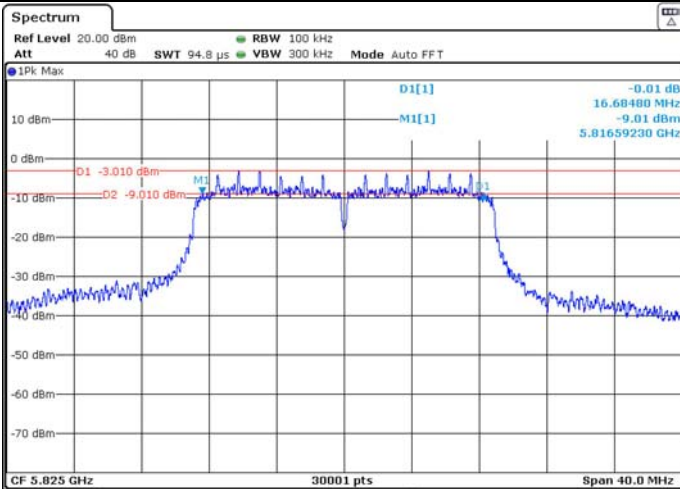


#### 99% Occupied Bandwidth



### U-NII-3 IEEE 802.11n HT20 5825MHz\_Ant 2

#### 6dB Bandwidth

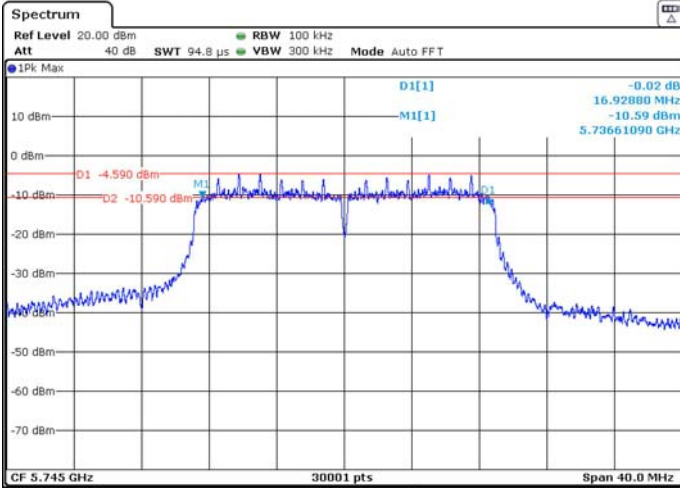


#### 99% Occupied Bandwidth



### U-NII-3 IEEE 802.11ac VHT20 5745MHz\_Ant 1

6dB Bandwidth

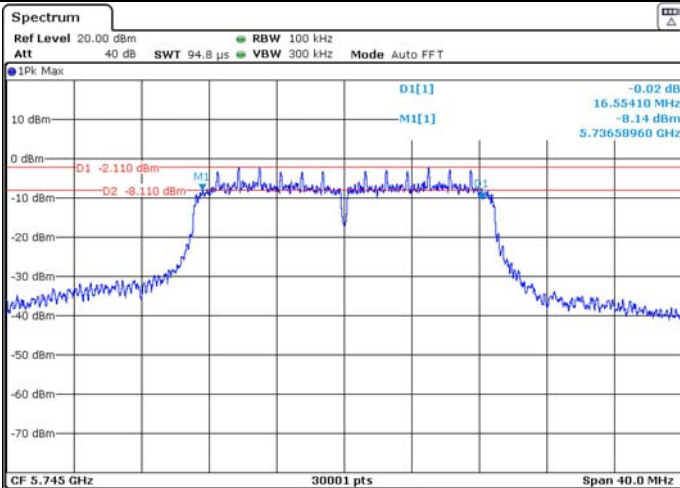


99% Occupied Bandwidth



### U-NII-3 IEEE 802.11ac VHT20 5745MHz\_Ant 2

6dB Bandwidth

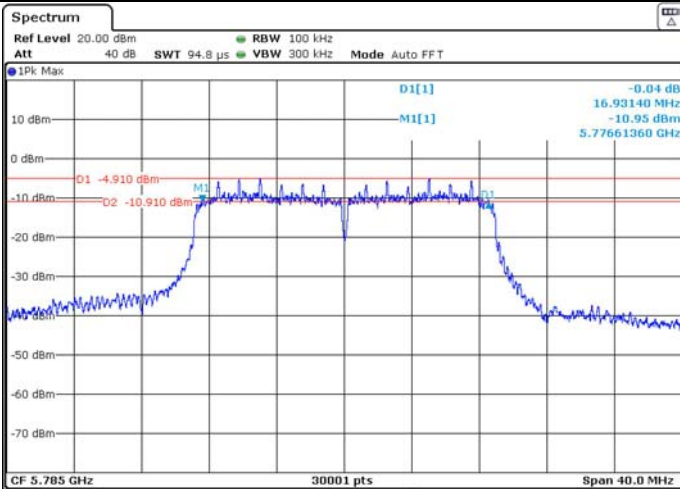


99% Occupied Bandwidth



### U-NII-3 IEEE 802.11ac VHT20 5785MHz\_Ant 1

6dB Bandwidth

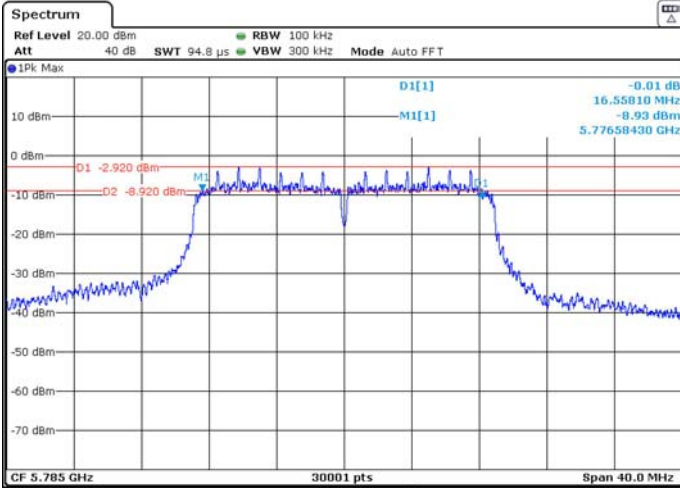


99% Occupied Bandwidth



### U-NII-3 IEEE 802.11ac VHT20 5785MHz\_Ant 2

#### 6dB Bandwidth

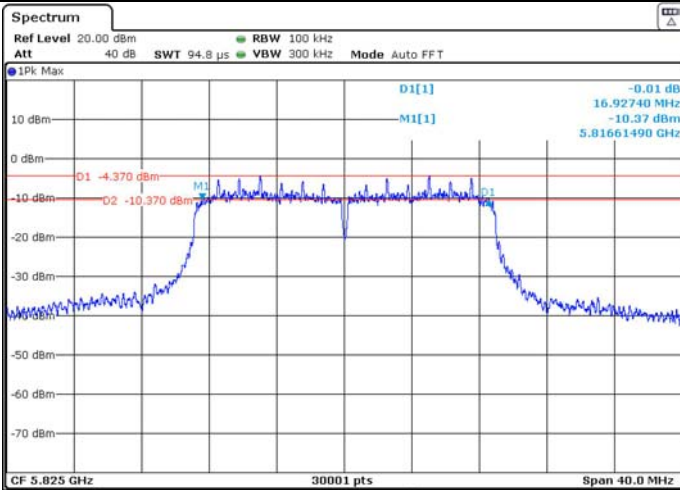


#### 99% Occupied Bandwidth



### U-NII-3 IEEE 802.11ac VHT20 5825MHz\_Ant 1

#### 6dB Bandwidth

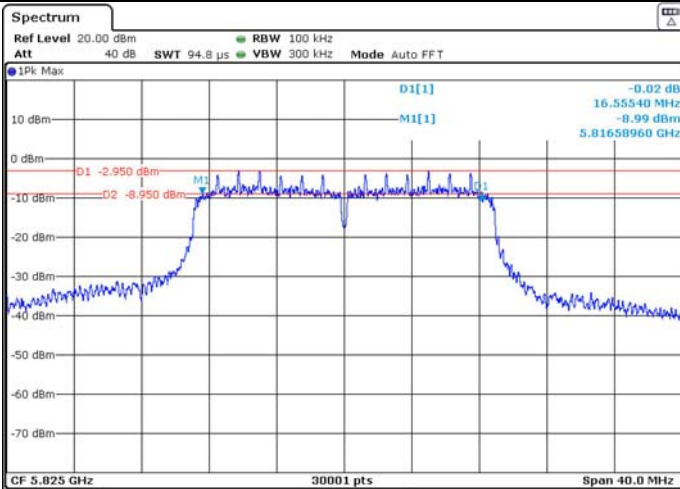


#### 99% Occupied Bandwidth



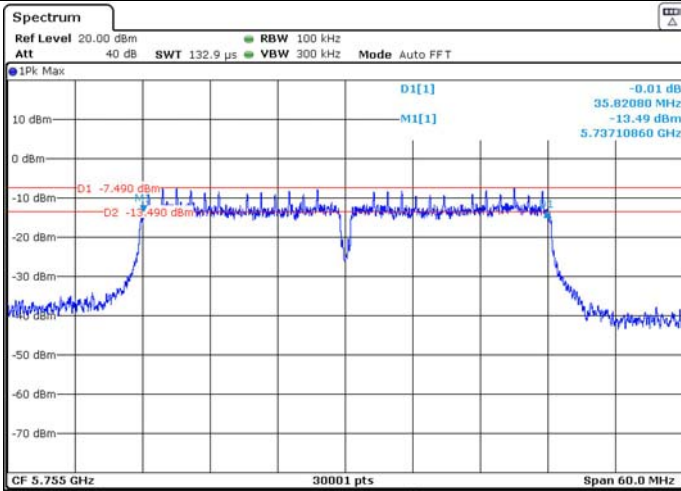
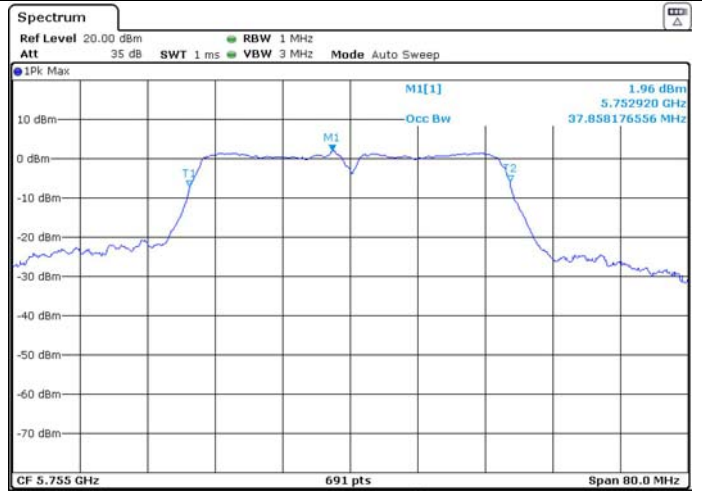
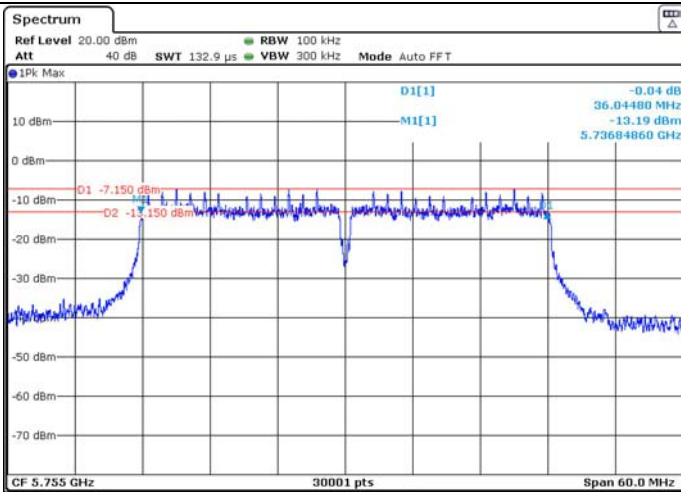
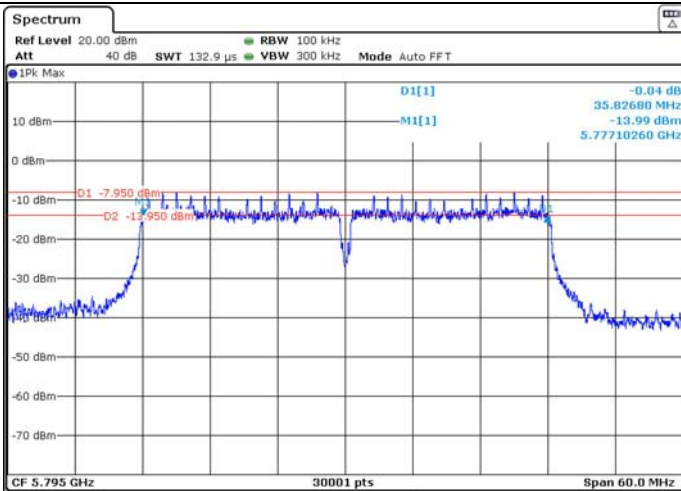
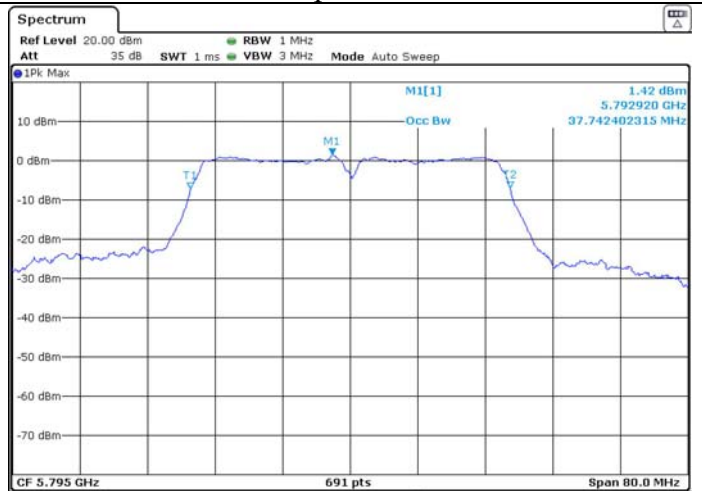
### U-NII-3 IEEE 802.11ac VHT20 5825MHz\_Ant 2

#### 6dB Bandwidth



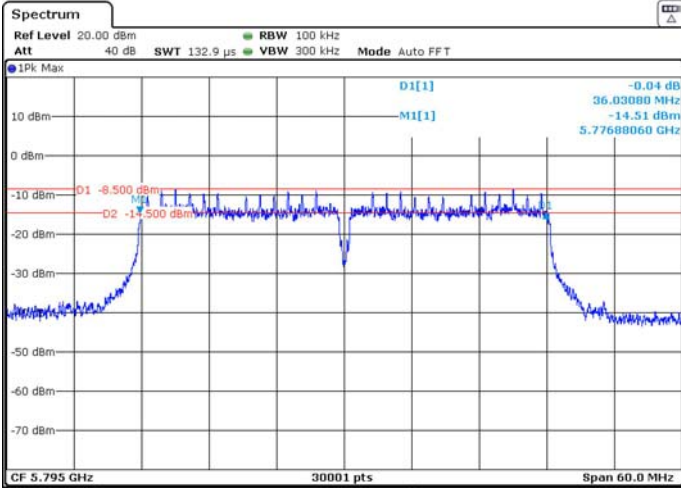
#### 99% Occupied Bandwidth



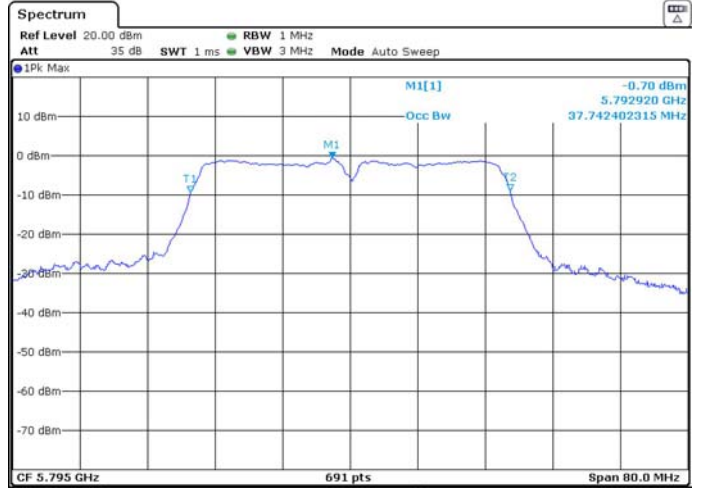
**U-NII-3 IEEE 802.11n HT40 5755MHz\_Ant 1****6dB Bandwidth****99% Occupied Bandwidth****U-NII-3 IEEE 802.11n HT40 5755MHz\_Ant 2****6dB Bandwidth****99% Occupied Bandwidth****U-NII-3 IEEE 802.11n HT40 5795MHz\_Ant 1****6dB Bandwidth****99% Occupied Bandwidth**

## U-NII-3 IEEE 802.11n HT40 5795MHz\_Ant 2

6dB Bandwidth

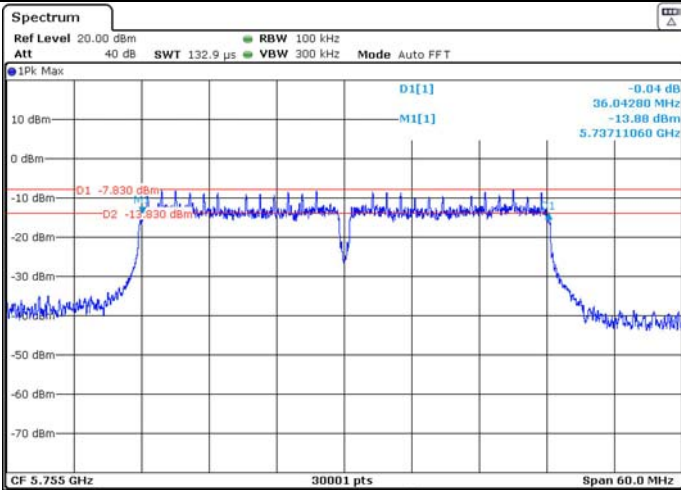


99% Occupied Bandwidth



## U-NII-3 IEEE 802.11ac VHT40 5755MHz\_Ant 1

6dB Bandwidth

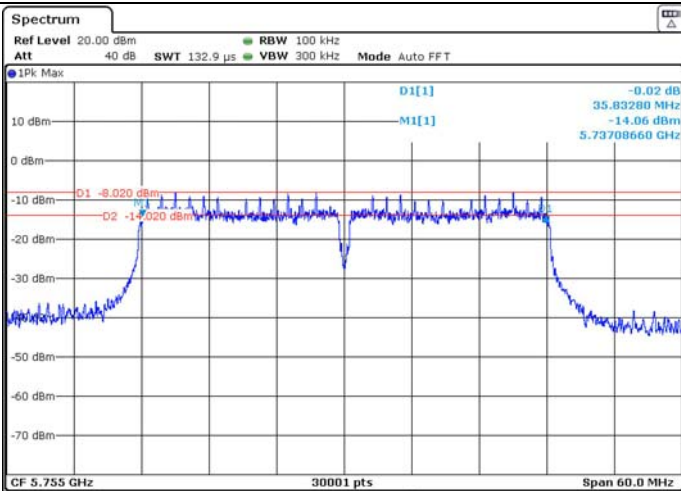


99% Occupied Bandwidth



## U-NII-3 IEEE 802.11ac VHT40 5755MHz\_Ant 2

6dB Bandwidth

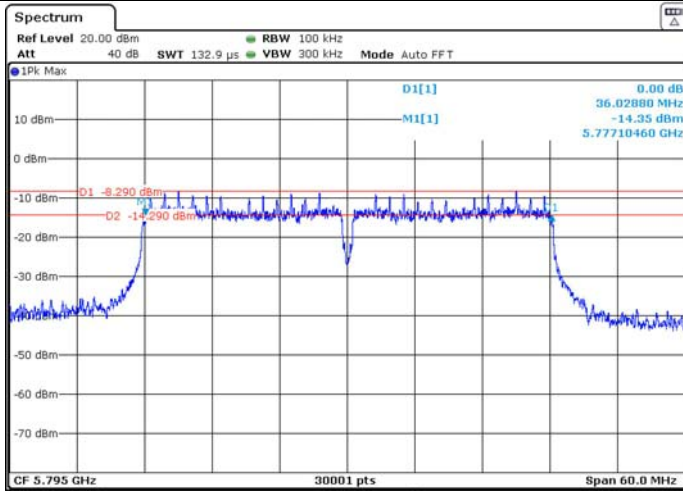


99% Occupied Bandwidth

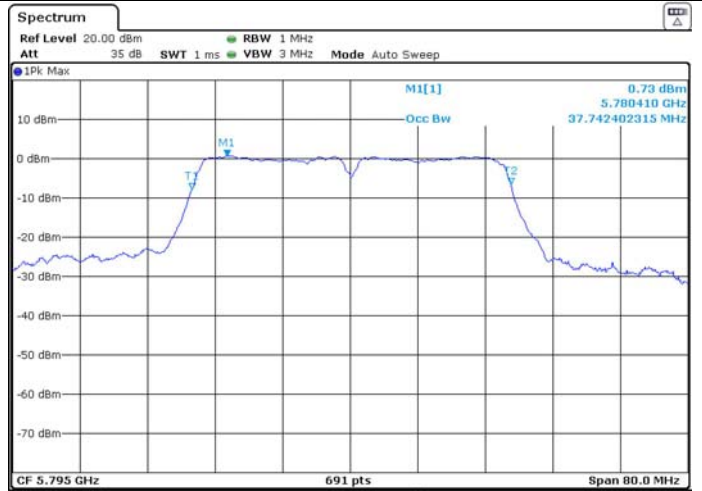


## U-NII-3 IEEE 802.11ac VHT40 5795MHz\_Ant 1

6dB Bandwidth

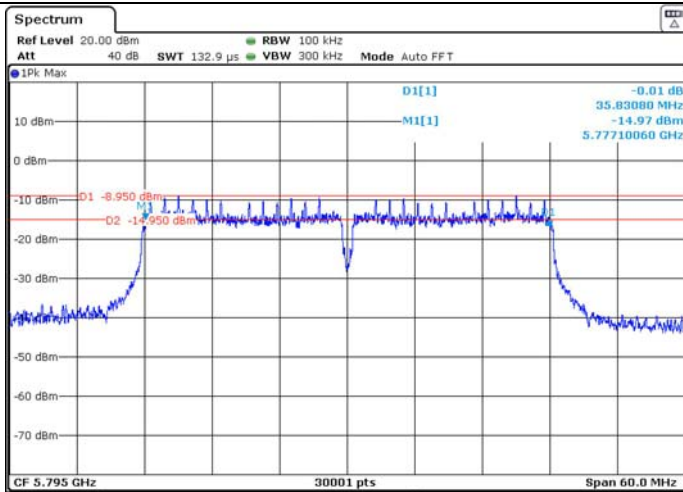


99% Occupied Bandwidth



## U-NII-3 IEEE 802.11ac VHT40 5795MHz\_Ant 2

6dB Bandwidth

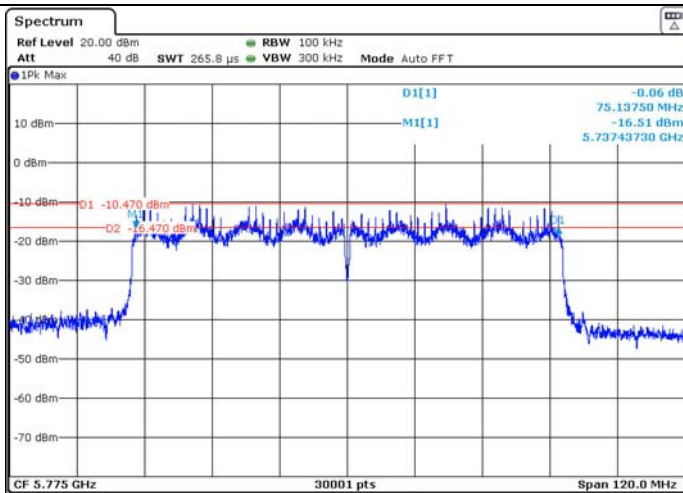


99% Occupied Bandwidth

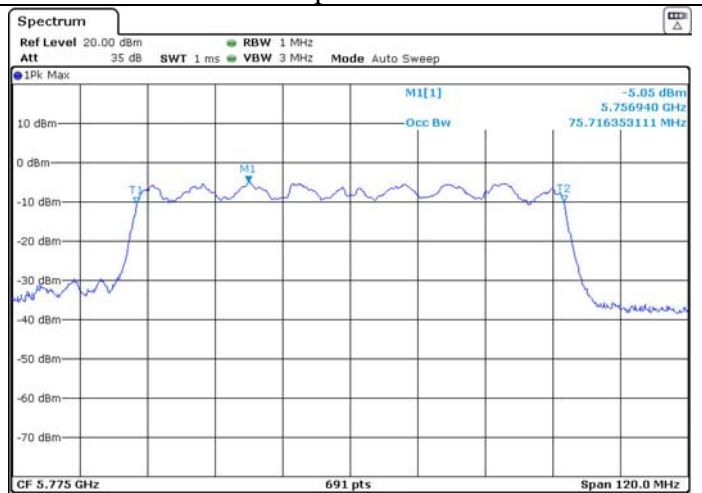


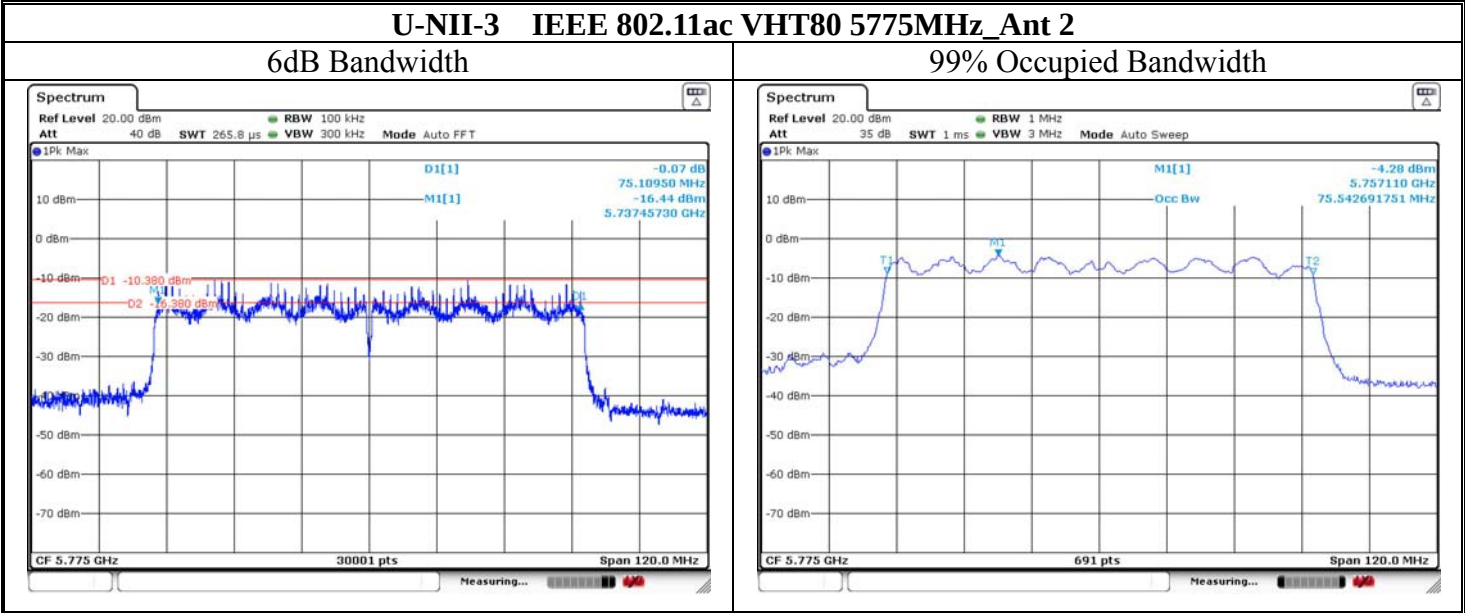
## U-NII-3 IEEE 802.11ac VHT80 5775MHz\_Ant 1

6dB Bandwidth



99% Occupied Bandwidth





## 4. MAXIMUM CONDUCTED OUTPUT POWER

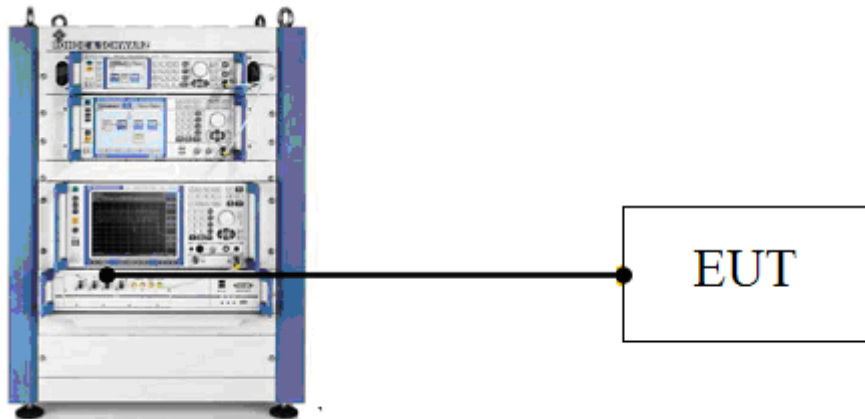
### 4.1. Limit

| Band     | EUT Type                          | Limit                                                                                                         |
|----------|-----------------------------------|---------------------------------------------------------------------------------------------------------------|
| U-NII-1  | Outdoor Access Point              | 1W(30dBm)<br>(Max. e.i.r.p $\leq$ 125mW at any elevation angle above 30 degrees as measured from the horizon) |
|          | Indoor Access Point               | 1W(30dBm)                                                                                                     |
|          | Fixed point-to-point Access Point | 1W(30dBm)                                                                                                     |
|          | Mobile and Portable Client Device | 250mW(23.98dBm)                                                                                               |
| U-NII-2A | All Device                        | 250mW(23.98dBm) or 11dBm+10 log B, Which is lesser.<br>(B is 26dB Bandwidth in MHz)                           |
| U-NII-2C | All Device                        | 250mW(23.98dBm) or 11dBm+10 log B, Which is lesser.<br>(B is 26dB Bandwidth in MHz)                           |
| U-NII-3  | All Device                        | 1W(30dBm)                                                                                                     |

Note:

For the Band U-NII-2A and U-NII-2C, the maximum conducted output power limit calculate result refer to section 3.5.

### 4.2. Test Setup



### 4.3. Test Procedure

- Connect EUT antenna terminal to the OSP-B157WB with RF cable.
- Set the EUT transmit continuously with maximum output power.
- Through the test software in TS8897 to control a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Because the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.
- Repeat above procedures until all modes and channels were measured.
- Record the results in the test report.

## 4.4. Test Result

| Temperature | 24.8℃                  | Relative Humidity |                                        |       | 56%                                          | Test Voltage                                   | 120V/60Hz      |        |
|-------------|------------------------|-------------------|----------------------------------------|-------|----------------------------------------------|------------------------------------------------|----------------|--------|
| BAND        | Test Mode              | Fre<br>(MHz)      | Conducted AVG<br>Output Power<br>(dBm) |       | Total<br>Conducted<br>Output<br>Power<br>(W) | Total<br>Conducted<br>Output<br>Power<br>(dBm) | Limit<br>(dBm) | Result |
|             |                        |                   | Ant 1                                  | Ant 2 |                                              |                                                |                |        |
| U-NII-1     | IEEE 802.11a           | 5180              | 13.99                                  | 15.05 | 0.0320                                       | 15.05                                          | 23.98          | PASS   |
|             |                        | 5200              | 14.25                                  | 14.99 | 0.0316                                       | 14.99                                          | 23.98          | PASS   |
|             |                        | 5240              | 12.56                                  | 14.40 | 0.0276                                       | 14.40                                          | 23.98          | PASS   |
|             | IEEE 802.11n HT20      | 5180              | 12.98                                  | 13.03 | 0.03994                                      | 16.01                                          | 23.98          | PASS   |
|             |                        | 5200              | 12.31                                  | 12.89 | 0.03646                                      | 15.62                                          | 23.98          | PASS   |
|             |                        | 5240              | 10.82                                  | 12.63 | 0.03038                                      | 14.83                                          | 23.98          | PASS   |
|             | IEEE 802.11ac<br>VHT20 | 5180              | 12.34                                  | 12.96 | 0.03689                                      | 15.67                                          | 23.98          | PASS   |
|             |                        | 5200              | 12.35                                  | 12.95 | 0.03690                                      | 15.67                                          | 23.98          | PASS   |
|             |                        | 5240              | 10.78                                  | 12.52 | 0.02984                                      | 14.75                                          | 23.98          | PASS   |
|             | IEEE 802.11n HT40      | 5190              | 9.56                                   | 9.74  | 0.01845                                      | 12.66                                          | 23.98          | PASS   |
|             |                        | 5230              | 12.00                                  | 13.46 | 0.03801                                      | 15.80                                          | 23.98          | PASS   |
|             | IEEE 802.11ac<br>VHT40 | 5190              | 9.40                                   | 9.82  | 0.01831                                      | 12.63                                          | 23.98          | PASS   |
|             |                        | 5230              | 11.96                                  | 13.37 | 0.03743                                      | 15.73                                          | 23.98          | PASS   |
|             | IEEE 802.11ac<br>VHT80 | 5210              | 5.39                                   | 6.13  | 0.00756                                      | 8.79                                           | 23.98          | PASS   |

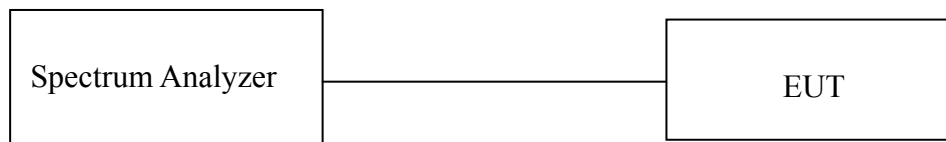
| BAND    | Test Mode              | Fre<br>(MHz) | Conducted AVG<br>Output Power<br>(dBm) |       | Total<br>Conducted<br>Output<br>Power<br>(W) | Total<br>Conducted<br>Output<br>Power<br>(dBm) | Limit<br>(dBm) | Result |
|---------|------------------------|--------------|----------------------------------------|-------|----------------------------------------------|------------------------------------------------|----------------|--------|
|         |                        |              | Ant 1                                  | Ant 2 |                                              |                                                |                |        |
| U-NII-3 | IEEE 802.11a           | 5745         | 6.64                                   | 4.51  | 0.00461                                      | 6.64                                           | 30.00          | PASS   |
|         |                        | 5785         | 7.00                                   | 4.60  | 0.00501                                      | 7.00                                           | 30.00          | PASS   |
|         |                        | 5825         | 5.86                                   | 3.40  | 0.00385                                      | 5.86                                           | 30.00          | PASS   |
|         | IEEE 802.11n HT20      | 5745         | 6.72                                   | 4.43  | 0.00746                                      | 8.73                                           | 30.00          | PASS   |
|         |                        | 5785         | 6.83                                   | 4.18  | 0.00743                                      | 8.71                                           | 30.00          | PASS   |
|         |                        | 5825         | 5.71                                   | 3.28  | 0.00585                                      | 7.67                                           | 30.00          | PASS   |
|         | IEEE 802.11ac<br>VHT20 | 5745         | 6.74                                   | 4.80  | 0.00774                                      | 8.89                                           | 30.00          | PASS   |
|         |                        | 5785         | 7.08                                   | 4.74  | 0.00809                                      | 9.08                                           | 30.00          | PASS   |
|         |                        | 5825         | 5.85                                   | 3.38  | 0.00602                                      | 7.79                                           | 30.00          | PASS   |
|         | IEEE 802.11n HT40      | 5755         | 7.53                                   | 5.19  | 0.00897                                      | 9.53                                           | 30.00          | PASS   |
|         |                        | 5795         | 7.20                                   | 4.51  | 0.00807                                      | 9.07                                           | 30.00          | PASS   |
|         | IEEE 802.11ac<br>VHT40 | 5755         | 7.37                                   | 5.20  | 0.00876                                      | 9.43                                           | 30.00          | PASS   |
|         |                        | 5795         | 7.20                                   | 4.48  | 0.00805                                      | 9.06                                           | 30.00          | PASS   |
|         | IEEE 802.11acVHT80     | 5775         | 7.19                                   | 4.35  | 0.00796                                      | 9.01                                           | 30.00          | PASS   |

## 5. PEAK POWER SPECTRAL DENSITY

### 5.1. Limit

| Band     | EUT Type                          | Limit        |
|----------|-----------------------------------|--------------|
| U-NII-1  | Outdoor Access Point              | 17dBm/MHz    |
|          | Indoor Access Point               | 17dBm/MHz    |
|          | Fixed point-to-point Access Point | 17dBm/MHz    |
|          | Mobile and Portable Client Device | 11dBm/MHz    |
| U-NII-2A | All Device                        | 11dBm/MHz    |
| U-NII-2C | All Device                        | 11dBm/MHz    |
| U-NII-3  | All Device                        | 30dBm/500KHz |

### 5.2. Test Setup



### 5.3. Spectrum Analyzer Setting

| Spectrum Parameters   | Setting                                                    |
|-----------------------|------------------------------------------------------------|
| RBW                   | 1MHz(For U-NII-1&U-NII-2A&U-NII-2C)<br>500KHz(For U-NII-3) |
| VBW                   | 3MHz(For U-NII-1&U-NII-2A&U-NII-2C)<br>2MHz(For U-NII-3)   |
| Span                  | encompass the entire 26 dB EBW or 99% OBW of the signal    |
| Sweep Time            | Auto                                                       |
| Number of Sweep Point | $\geq 2 \times \text{SPAN/RBW}$                            |
| Detector              | RMS(power averaging)                                       |
| Trace Average         | $\geq 100$ traces                                          |

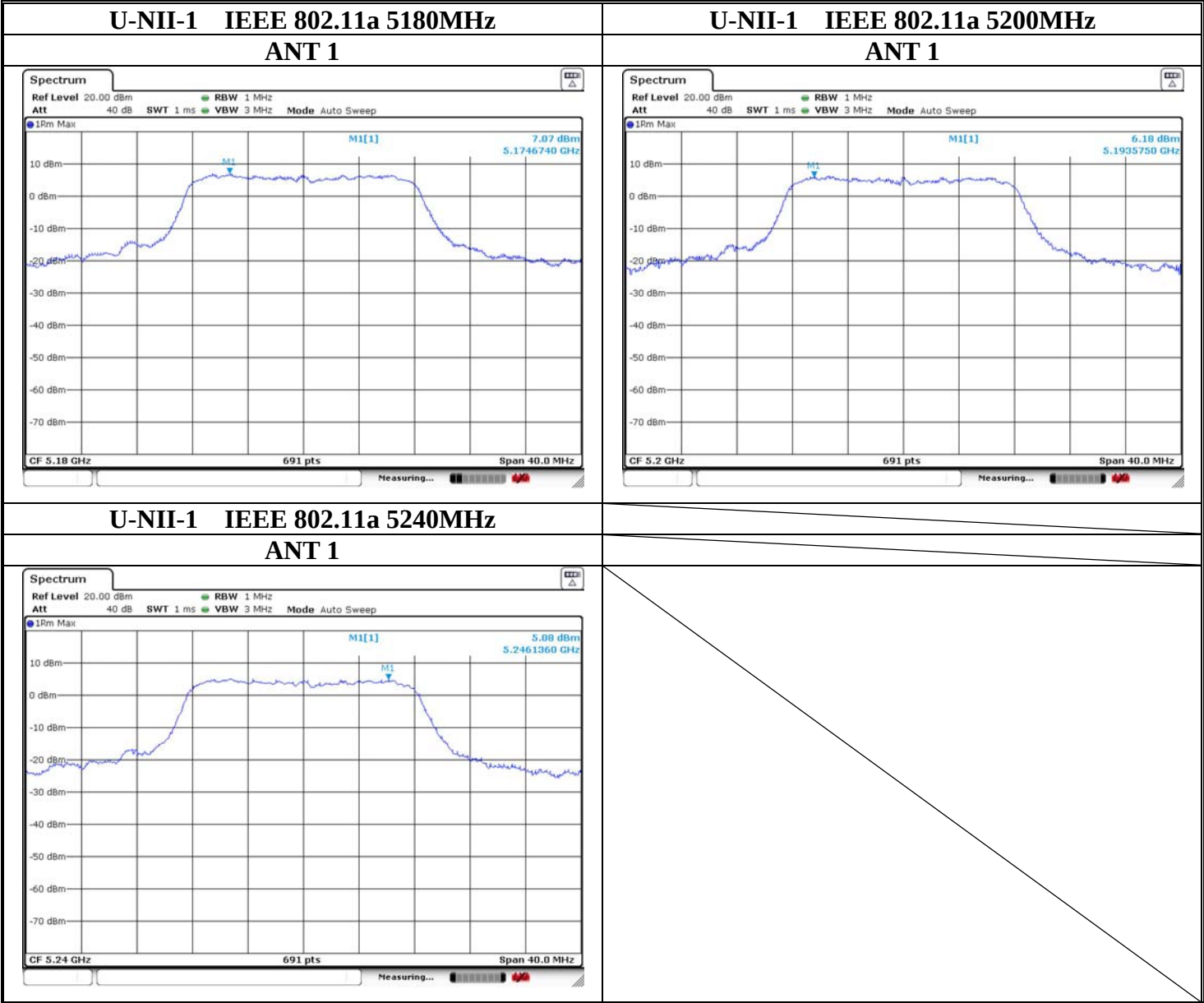
### 5.4. Test Procedure

- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with section 5.3.
- Set the EUT transmit continuously with maximum output power.
- Allow trace to stabilize, use the marker-to-peak function to set the marker to the average of the emission.
- If the duty cycle of test signal  $< 98\%$ , the result = max measured value +  $10 \times \log(1/\text{duty cycle})$ ;  
If the duty cycle of test signal  $\geq 98\%$ , the result = max measured value.
- Repeat above procedures until all modes and channels were measured.
- Record the results in the test report.

## 5.5. Test Result

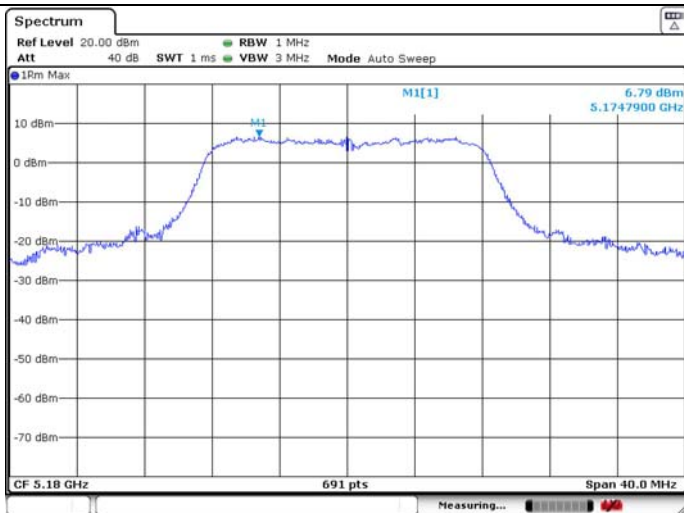
| Temperature |                     | 24.8℃     | Relative Humidity       |       | 56%              | Test Voltage                  | 120V/60Hz       |        |
|-------------|---------------------|-----------|-------------------------|-------|------------------|-------------------------------|-----------------|--------|
| BAND        | Test Mode           | Fre (MHz) | Power Density (dBm/MHz) |       | Duty Factor (dB) | Total Power Density (dBm/MHz) | Limit (dBm/MHz) | Result |
|             |                     |           | Ant 1                   | Ant 2 |                  |                               |                 |        |
| U-NII-1     | IEEE 802.11a        | 5180      | 7.07                    | 6.79  | 0.13             | 7.20                          | 11.00           | PASS   |
|             |                     | 5200      | 6.18                    | 6.27  | 0.13             | 6.31                          | 11.00           | PASS   |
|             |                     | 5240      | 5.08                    | 6.15  | 0.13             | 5.21                          | 11.00           | PASS   |
|             | IEEE 802.11n HT20   | 5180      | 4.56                    | 4.00  | 0.15             | 7.45                          | 11.00           | PASS   |
|             |                     | 5200      | 4.12                    | 3.91  | 0.15             | 7.18                          | 11.00           | PASS   |
|             |                     | 5240      | 2.79                    | 3.87  | 0.15             | 6.53                          | 11.00           | PASS   |
|             | IEEE 802.11ac VHT20 | 5180      | 4.42                    | 3.83  | 0.13             | 7.28                          | 11.00           | PASS   |
|             |                     | 5200      | 3.73                    | 3.65  | 0.13             | 6.83                          | 11.00           | PASS   |
|             |                     | 5240      | 2.67                    | 3.79  | 0.13             | 6.41                          | 11.00           | PASS   |
|             | IEEE 802.11n HT40   | 5190      | -1.37                   | -2.15 | 0.30             | 1.57                          | 11.00           | PASS   |
|             |                     | 5230      | 0.84                    | 1.36  | 0.30             | 4.42                          | 11.00           | PASS   |
|             | IEEE 802.11ac VHT40 | 5190      | -1.42                   | -1.86 | 0.30             | 1.68                          | 11.00           | PASS   |
|             |                     | 5230      | 0.81                    | 1.52  | 0.30             | 4.49                          | 11.00           | PASS   |
|             | IEEE 802.11ac VHT80 | 5210      | -8.36                   | -8.39 | 0.58             | -4.78                         | 11.00           | PASS   |

| BAND    | Test Mode           | Fre (MHz) | Power Density (dBm/500KHz) |       | Duty Factor (dB) | Total Power Density (dBm/500KHz) | Limit (dBm/500KHz) | Result |
|---------|---------------------|-----------|----------------------------|-------|------------------|----------------------------------|--------------------|--------|
|         |                     |           | Ant 1                      | Ant 2 |                  |                                  |                    |        |
| U-NII-3 | IEEE 802.11a        | 5745      | 3.13                       | 3.56  | 0.13             | 3.26                             | 30.00              | PASS   |
|         |                     | 5785      | 2.68                       | 2.58  | 0.13             | 2.81                             | 30.00              | PASS   |
|         |                     | 5825      | 3.07                       | 2.56  | 0.13             | 3.20                             | 30.00              | PASS   |
|         | IEEE 802.11n HT20   | 5745      | 1.97                       | 2.36  | 0.15             | 5.33                             | 30.00              | PASS   |
|         |                     | 5785      | 2.00                       | 1.72  | 0.15             | 5.03                             | 30.00              | PASS   |
|         |                     | 5825      | 2.44                       | 1.96  | 0.15             | 5.37                             | 30.00              | PASS   |
|         | IEEE 802.11ac VHT20 | 5745      | 1.61                       | 2.29  | 0.13             | 5.11                             | 30.00              | PASS   |
|         |                     | 5785      | 1.54                       | 1.46  | 0.13             | 4.64                             | 30.00              | PASS   |
|         |                     | 5825      | 1.99                       | 1.60  | 0.13             | 4.94                             | 30.00              | PASS   |
|         | IEEE 802.11n HT40   | 5755      | -2.66                      | -2.15 | 0.30             | 0.92                             | 30.00              | PASS   |
|         |                     | 5795      | -2.41                      | -2.71 | 0.30             | 0.76                             | 30.00              | PASS   |
|         | IEEE 802.11ac VHT40 | 5755      | -2.45                      | -2.18 | 0.30             | 1.00                             | 30.00              | PASS   |
|         |                     | 5795      | -2.56                      | -2.73 | 0.30             | 0.67                             | 30.00              | PASS   |
|         | IEEE 802.11ac VHT80 | 5775      | -7.64                      | -6.87 | 0.58             | -3.65                            | 30.00              | PASS   |



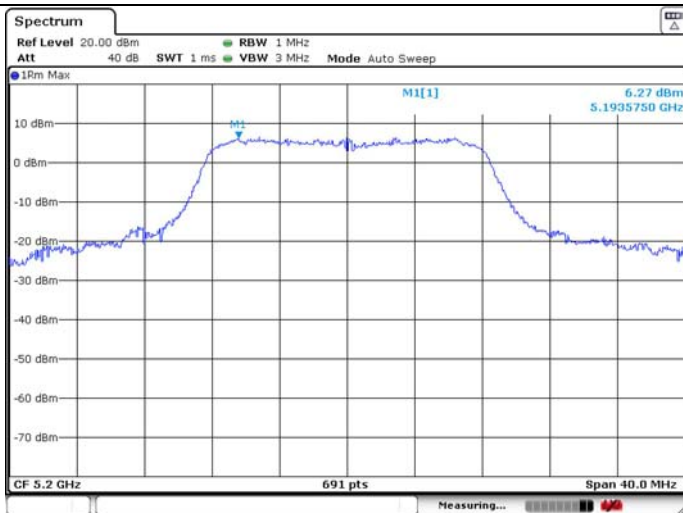
## U-NII-1 IEEE 802.11a 5180MHz

## ANT 2



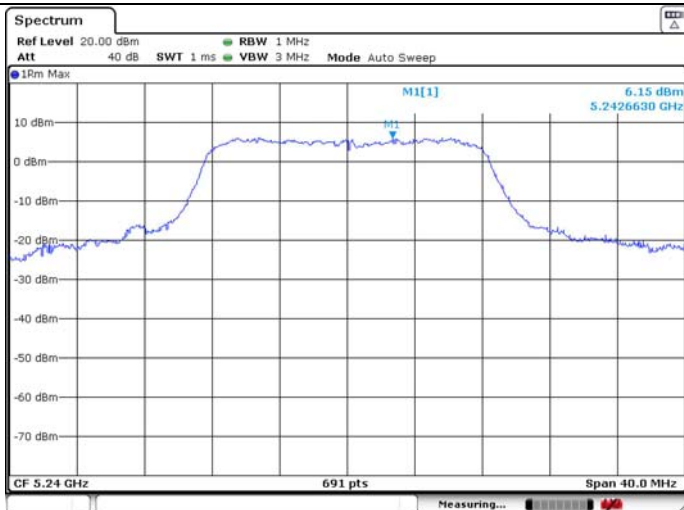
## U-NII-1 IEEE 802.11a 5200MHz

## ANT 2



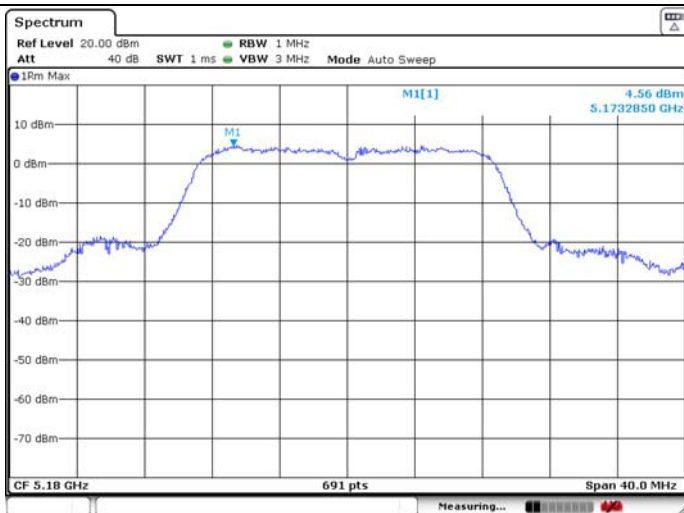
## U-NII-1 IEEE 802.11a 5240MHz

## ANT 2

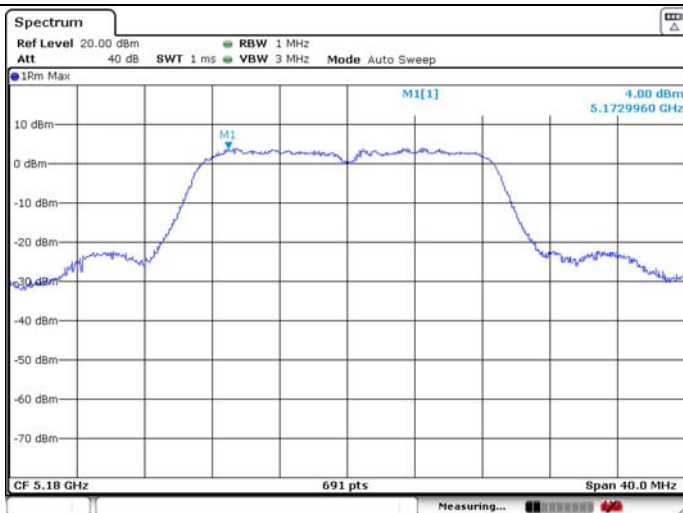


## U-NII-1 IEEE 802.11n HT20 5180MHz

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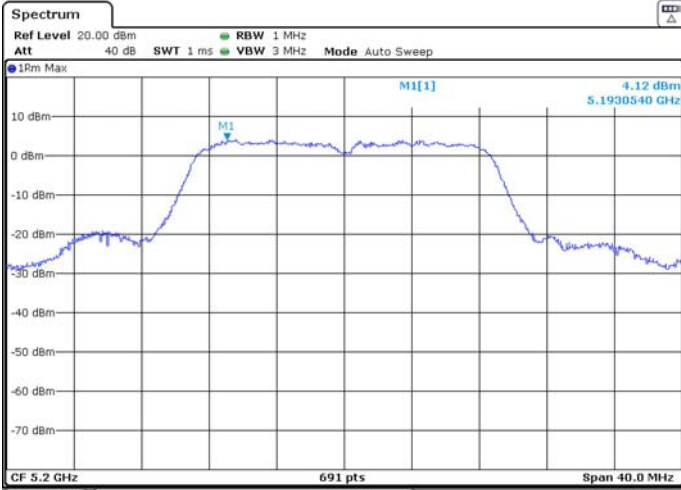


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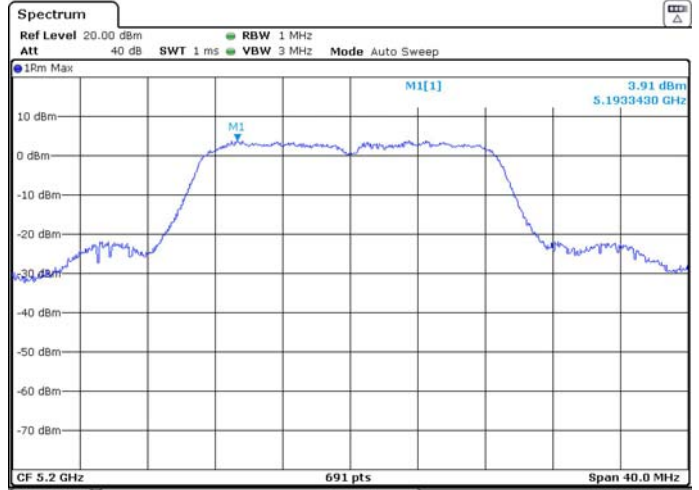


### U-NII-1 IEEE 802.11n HT20 5200MHz

ANT 1

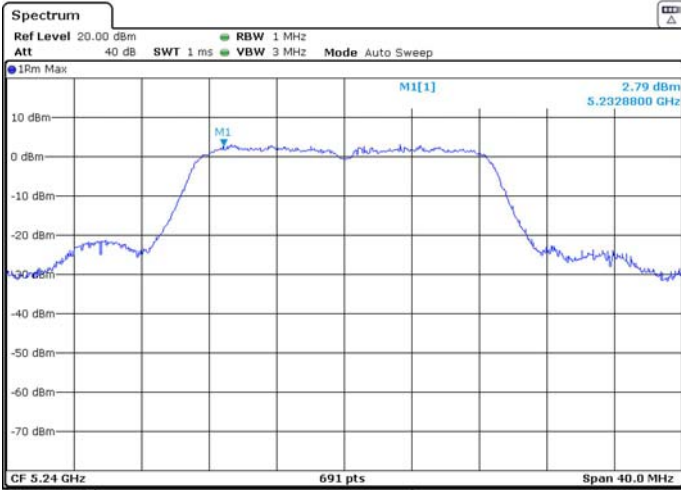


ANT 2

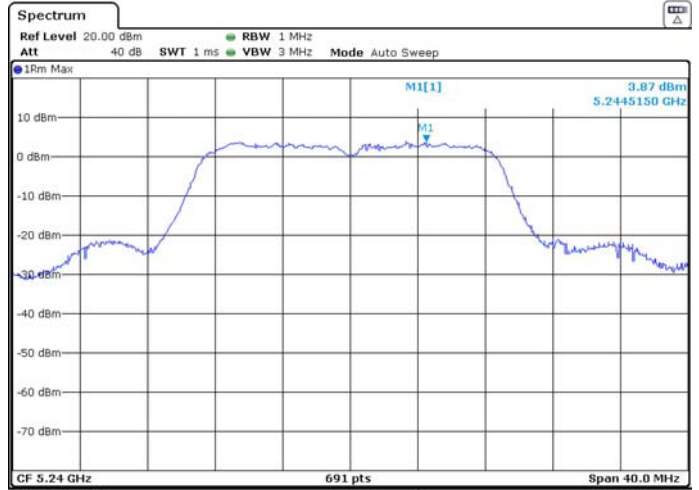


### U-NII-1 IEEE 802.11n HT20 5240MHz

ANT 1

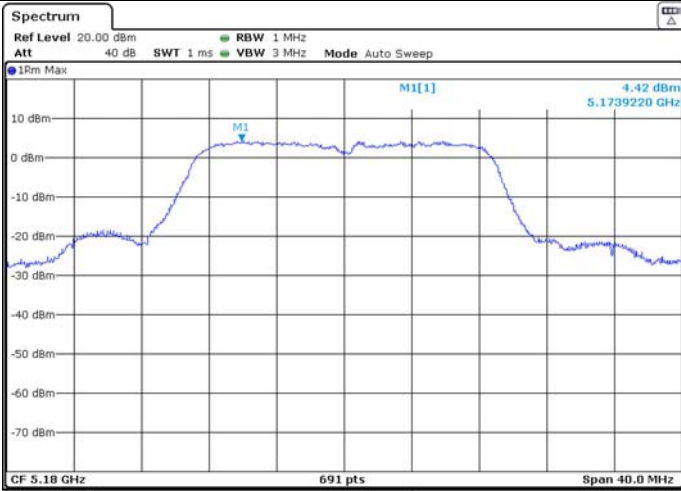


ANT 2



### U-NII-1 IEEE 802.11ac VHT20 5180MHz

ANT 1



ANT 2

