



# **CERTIFICATION TEST REPORT**

**Report Number. :** 12563993-E5V2

**Applicant :** Samsung Electronics Co., Ltd.  
129 Samsung-Ro, Yeongtong-Gu,  
Suwon-Si, Gyeonggi-Do, 16677, Korea

**Model :** SM-G970N

**FCC ID :** A3LSMG970KOR

**EUT Description :** GSM/WCDMA/LTE phone with BT, DTS/UNII a/b/g/n/ac/11ax HE  
20/40/80, ANT+ and NFC

**Test Standard(s) :** FCC 47 CFR PART 15 SUBPART E (Excluding DFS)

**Date Of Issue:**  
January 29, 2019

**Prepared by:**  
UL Verification Services Inc.  
47173 Benicia Street  
Fremont, CA 94538 U.S.A.  
TEL: (510) 771-1000  
FAX: (510) 661-0888



NVLAP Lab code: 200065-0

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## REPORT REVISION HISTORY

| Rev. | Issue Date | Revisions                                      | Revised By |
|------|------------|--|------------|
| V1   | 1/24/2019  | Initial Issue                                  |            |
| V2   | 1/29/2019  | Updated Section 2.1, 2.2, 2.3, add section 2.4 | Dan Corona |

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** Samsung Electronics Co., Ltd.  
129 Samsung-Ro, Yeongtong-Gu,  
Suwon-Si, Gyeonggi-Do, 16677, Korea

**EUT DESCRIPTION:** GSM/WCDMA/LTE phone with BT, DTS/UNII a/b/g/n/ac/11ax HE  
20/40/80, ANT+ and NFC

**MODEL:** SM-G970N

**SERIAL NUMBER:** R38KA0H49TL (Conducted), R38KB05BJQB (Radiated) (Original)  
R39KB0AHYCP, R39KB0AHYMF (Radiated) (Spot Check)

**DATE TESTED:** NOVEMBER 2, 2018 – DECEMBER 27, 2018 (Original)  
DECEMBER 14 & 19, 2018 (Spot Check)

| APPLICABLE STANDARDS                     |              |
|--|--------------|
| STANDARD                                 | TEST RESULTS |
| CFR 47 Part 15 Subpart E (Excluding DFS) | Complies     |

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For  
UL Verification Services Inc. By:

Reviewed By:



Dan Corona  
Operations Leader  
Consumer Technology Division  
UL Verification Services Inc.

Steven Tran  
Project Engineer  
Consumer Technology Division  
UL Verification Services Inc.

## 2. INTRODUCTION OF TEST DATA REUSE

### 2.1. INTRODUCTION

According to the manufacturer, FCC ID: A3LSMG970F and FCC ID: A3LSMG970KOR non-licensed radios are electrically identical. The FCC ID: A3LSMG970F test data shall remain representative of FCC ID: A3LSMG970KOR.

The applicant takes full responsibility that the test data as referenced in this section represents compliance for this FCC ID.

### 2.2. DIFFERENCES

The FCC ID: A3LSMG970F, shares the same enclosure and circuit board as FCC ID: A3LSMG970KOR. The UNII WLAN antennas and surrounding circuitry and layout are identical between two models.

After confirming through preliminary radiated emissions that the performance of the FCC ID: A3LSMG970F remains representative of FCC ID: A3LSMG970KOR. The test data of FCC ID: A3LSMG970F being submitted for this application to cover UNII WLAN features.

### 2.3. SPOT CHECK VERIFICATION RESULTS SUMMARY

Spot check verification has been done on device A3LSMG970KOR for radiated harmonic spurious and radiated band-edge. The data from the application has been verified through appropriate spot checks to demonstrate compliance for this device as shown in the summary below.

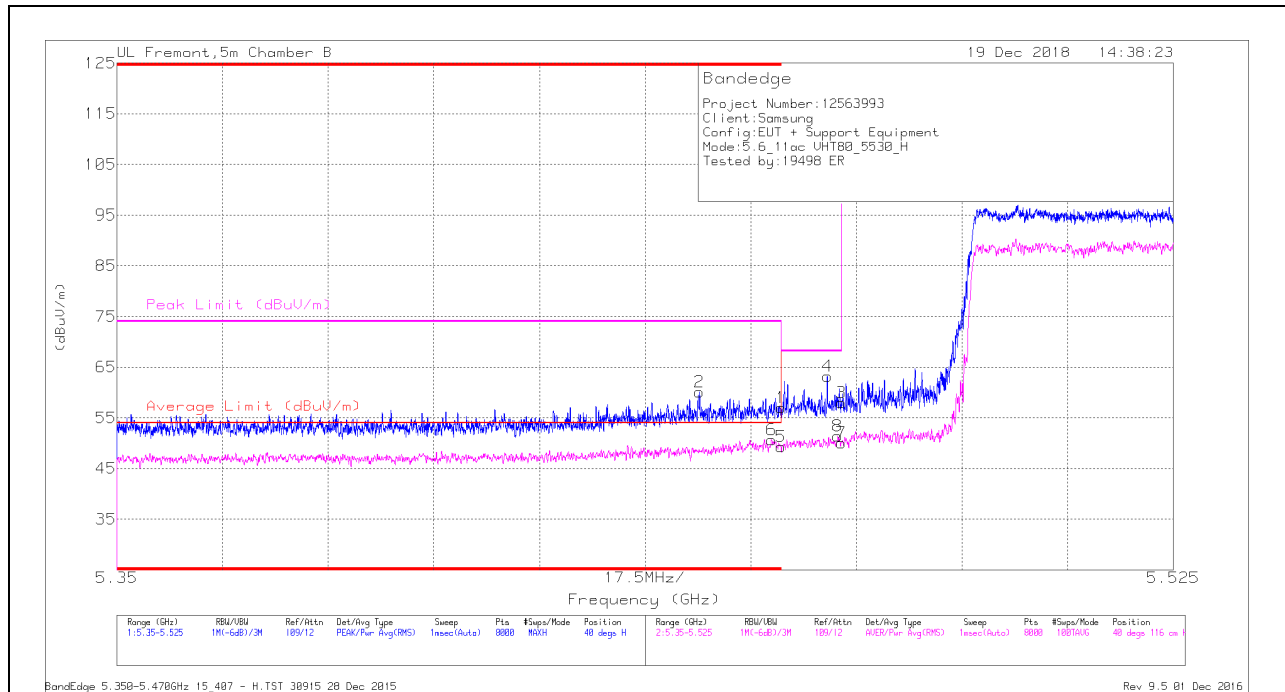
| A3LSMG970KOR SPOT CHECK RESULTS |                        |           |         |                    |                |       |                  |       |            |       |
|---------------------------------|------------------------|-----------|---------|--------------------|----------------|-------|------------------|-------|------------|-------|
| Technology                      | Mode                   | Test Item | Channel | Measured Frequency | Original model |       | Spot check model |       | Delta (dB) |       |
|                                 |                        |           |         |                    | SM-G970F       |       | SM-G970N         |       |            |       |
|                                 |                        |           |         |                    | Peak           | Ave   | Peak             | Ave   | Peak       | Ave   |
| DTS                             | 5.6_11ac VHT80         | RBE       | 106     | 5458MHz            | 62.22          | 52.07 | 59.84            | 50.41 | -2.38      | -1.66 |
|                                 | 5.8_11ax HE80_26T_RU36 | RSE       | 155     | 11626MHz           | 65.39          | 50.68 | 61.23            | 46.35 | -4.16      | -4.33 |

Comparison of the models, upper deviation is within 3dB range and all test are under FCC Technical Limits.



**2.3.1. SPOT CHECK DATA  
 BANDEDGE (HIGH CHANNEL)**

**HORIZONTAL RESULT**



**Trace Markers**

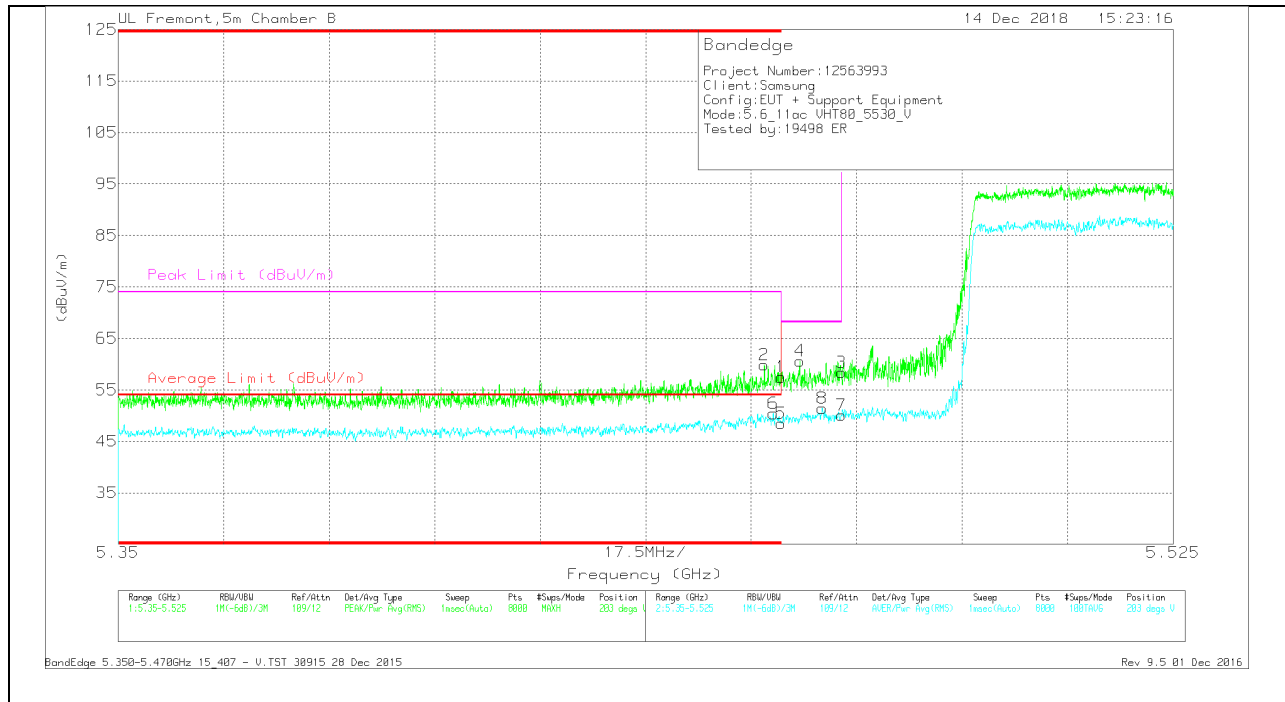
| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T863 (dB/m) | Amp/Cbl/Fitr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|----------------|-----------------------|--------------|----------------------------|------------------------|-------------|---------------------|----------------|----------------|-------------|----------|
| 2      | * 5.447         | 43.05                | Pk  | 35.2           | -18.2                 | 0            | 60.05                      | -                      | -           | 74                  | -13.95         | 40             | 116         | H        |
| 6      | * 5.458         | 31.66                | RMS | 35.3           | -18.2                 | 1.95         | 50.71                      | 54                     | -3.29       | -                   | -              | 40             | 116         | H        |
| 1      | * 5.46          | 39.78                | Pk  | 35.3           | -18.1                 | 0            | 56.98                      | -                      | -           | 74                  | -17.02         | 40             | 116         | H        |
| 5      | * 5.46          | 30.15                | RMS | 35.3           | -18.1                 | 1.95         | 49.3                       | 54                     | -4.7        | -                   | -              | 40             | 116         | H        |
| 4      | 5.468           | 46                   | Pk  | 35.3           | -18.1                 | 0            | 63.2                       | -                      | -           | 68.2                | -5             | 40             | 116         | H        |
| 8      | 5.469           | 32.33                | RMS | 35.3           | -18.2                 | 1.95         | 51.38                      | -                      | -           | -                   | -              | 40             | 116         | H        |
| 3      | 5.47            | 40.9                 | Pk  | 35.3           | -18.2                 | 0            | 58                         | -                      | -           | 68.2                | -10.2          | 40             | 116         | H        |
| 7      | 5.47            | 31.04                | RMS | 35.3           | -18.2                 | 1.95         | 50.09                      | -                      | -           | -                   | -              | 40             | 116         | H        |

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

### VERTICAL RESULT



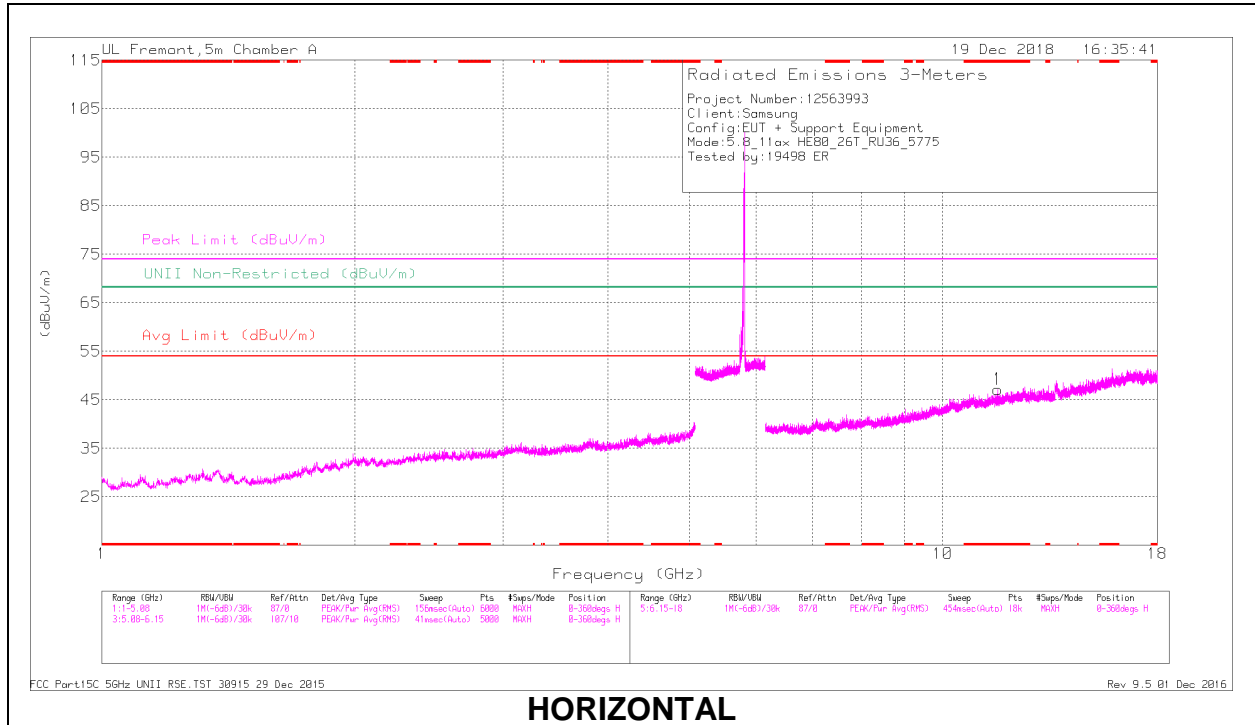
### Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T863 (dB/m) | Amp/Cbl/Ftr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|----------------|----------------------|--------------|----------------------------|------------------------|-------------|---------------------|----------------|----------------|-------------|----------|
| 1      | * 5.46          | 40.29                | Pk  | 35.3           | -18.1                | 0            | 57.49                      | -                      | -           | 74                  | -16.51         | 203            | 115         | V        |
| 2      | * 5.457         | 42.64                | Pk  | 35.3           | -18.1                | 0            | 59.84                      | -                      | -           | 74                  | -14.16         | 203            | 115         | V        |
| 5      | * 5.46          | 29.32                | RMS | 35.3           | -18.1                | 1.95         | 48.47                      | 54                     | -5.53       | -                   | -              | 203            | 115         | V        |
| 6      | * 5.459         | 31.36                | RMS | 35.3           | -18.2                | 1.95         | 50.41                      | 54                     | -3.59       | -                   | -              | 203            | 115         | V        |
| 4      | 5.463           | 43.52                | Pk  | 35.3           | -18.2                | 0            | 60.62                      | -                      | -           | 68.2                | -7.58          | 203            | 115         | V        |
| 8      | 5.467           | 32.35                | RMS | 35.3           | -18.2                | 1.95         | 51.4                       | -                      | -           | -                   | -              | 203            | 115         | V        |
| 3      | 5.47            | 41.28                | Pk  | 35.3           | -18.2                | 0            | 58.38                      | -                      | -           | 68.2                | -9.82          | 203            | 115         | V        |
| 7      | 5.47            | 31.03                | RMS | 35.3           | -18.2                | 1.95         | 50.08                      | -                      | -           | -                   | -              | 203            | 115         | V        |

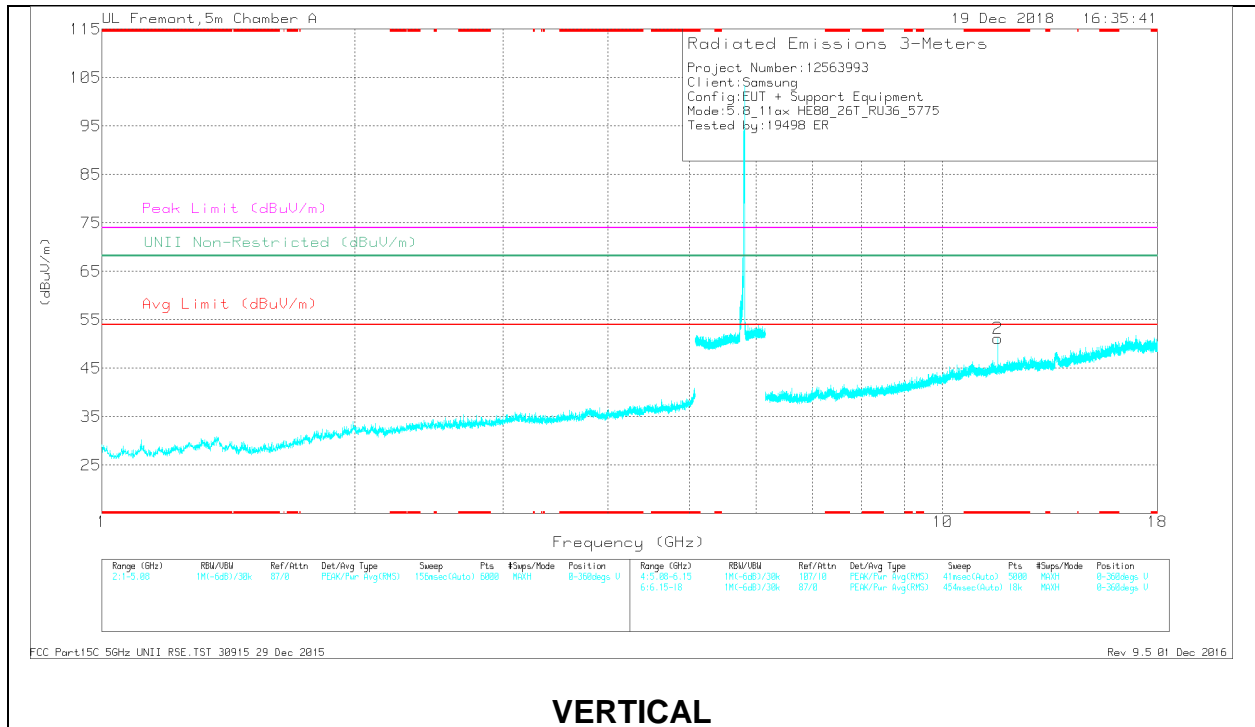
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 Pk - Peak detector  
 RMS - RMS detection

# HARMONICS AND SPURIOUS EMISSIONS

## LOW CHANNEL RESULTS



### HORIZONTAL



### VERTICAL

**RADIATED EMISSIONS**

| Frequency (GHz) | Meter Reading (dBuV) | Det  | AF T345 (dB/m) | Amp/Cbl/Filtr/ Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|-----------------|----------------------|------|----------------|-------------------------|--------------|----------------------------|--------------------|-------------|---------------------|----------------|------------------------------|----------------|----------------|-------------|----------|
| * 11.626        | 41.23                | PK-U | 38.3           | -18.3                   | 0            | 61.23                      | -                  | -           | 74                  | -12.77         | -                            | -              | 97             | 100         | V        |
| * 11.626        | 26.23                | ADR  | 38.3           | -18.3                   | .12          | 46.35                      | 54                 | -7.65       | -                   | -              | -                            | -              | 97             | 100         | V        |

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 PK-U - U-NII: Maximum Peak  
 ADR - U-NII AD primary method, RMS average

## 2.4. REFERENCE DETAIL

Reference application that contains the reused reference data.

| Equipment Class | Reference FCC ID  | Type Grant/ Permissive Change | Reference Application | Folder Test/RF Exposure | Report Title/Section                                  |
|-----------------|-------------------|-------------------------------|-----------------------|-------------------------|---|
| PCE             | A3LSMG970F        | Grant                         | 12563734-E1V6         | Test                    | FCC Report WWAN / All sections except Appendix A      |
| DSS             | A3LSMG970F        | Grant                         | 12563734-E2V2         | Test                    | FCC Report BT / All sections                          |
| DTS             | A3LSMG970F        | Grant                         | 12563734-E3V3         | Test                    | FCC Report BLE / All sections                         |
|                 |                   |                               | 12563734-E4V4         | Test                    | FCC Report DTS WLAN / All sections                    |
| <b>NII</b>      | <b>A3LSMG970F</b> | <b>Grant</b>                  | <b>12563734-E5V3</b>  | <b>Test</b>             | <b>FCC Report UNII WLAN / All sections except DFS</b> |
| DXX             | A3LSMG970F        | Grant                         | 12563734-E7V3         | Test                    | FCC Report ANT+ / All sections                        |
|                 |                   |                               | 12563734-E8V3         | Test                    | FCC Report NFC / All sections                         |
| DCD             | A3LSMG970F        | Grant                         | 12563734-E9V3         | Test                    | FCC Report Wireless Charging / All sections           |

### 3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC 14-30, FCC KDB 662911 D01 v02r01, FCC KDB 905462 D02 v02/D03 v01r02/D06 v02, FCC KDB 789033 D02 v02r01, FCC KDB 644545 D03 v01, ANSI C63.10-2013, FCC 06-96.

### 4. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, and 47658 Kato Road, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

| 47173 Benicia Street   | 47266 Benicia Street                              | 47658 Kato Rd                                     |
|--|---|---|
| <input checked="" type="checkbox"/> Chamber A (ISED:2324B-1) | <input type="checkbox"/> Chamber D (ISED:22541-1) | <input type="checkbox"/> Chamber I (ISED:2324A-5) |
| <input checked="" type="checkbox"/> Chamber B (ISED:2324B-2) | <input type="checkbox"/> Chamber E (ISED:22541-2) | <input type="checkbox"/> Chamber J (ISED:2324A-6) |
| <input type="checkbox"/> Chamber C (ISED:2324B-3)            | <input type="checkbox"/> Chamber F (ISED:22541-3) | <input type="checkbox"/> Chamber K (ISED:2324A-1) |
|  | <input type="checkbox"/> Chamber G (ISED:22541-4) | <input type="checkbox"/> Chamber L (ISED:2324A-3) |
|  | <input type="checkbox"/> Chamber H (ISED:22541-5) |   |

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers above are covered under Industry Canada company address and respective code

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0

## 5. CALIBRATION AND UNCERTAINTY

### 5.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

### 5.2. SAMPLE CALCULATION

#### RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

$$36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$$

#### MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.

$$36.5 \text{ dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dBuV}$$

### 5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| PARAMETER   | UNCERTAINTY |
|---|-------------|
| Worst Case Conducted Disturbance, 9KHz to 0.15 MHz  | 3.84 dB     |
| Worst Case Conducted Disturbance, 0.15 to 30 MHz    | 3.65 dB     |
| Worst Case Radiated Disturbance, 9KHz to 30 MHz     | 3.15 dB     |
| Worst Case Radiated Disturbance, 30 to 1000 MHz     | 5.36 dB     |
| Worst Case Radiated Disturbance, 1000 to 18000 MHz  | 4.32 dB     |
| Worst Case Radiated Disturbance, 18000 to 26000 MHz | 4.45 dB     |
| Worst Case Radiated Disturbance, 26000 to 40000 MHz | 5.24 dB     |

Uncertainty figures are valid to a confidence level of 95%.

## 6. EQUIPMENT UNDER TEST

### 6.1. EUT DESCRIPTION

The EUT is a GSM/WCDMA/LTE phone with BT, DTS/UNII a/b/g/n/ac/11ax HE 20/40/80, ANT+ and NFC. The test report addresses the UNII WLAN operational mode.

### 6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

#### 5.2 GHz BAND

| Frequency Range (MHz)    | Mode                           | Output Power (dBm) | Output Power (mW) |
|--------------------------|--------------------------------|--------------------|-------------------|
| <b>5.2 GHz band, 2TX</b> |                                |                    |                   |
| 5180-5240                | 802.11a CDD                    | 19.70              | 93.33             |
| 5180-5240                | 802.11n HT20 CDD               | 19.70              | 93.33             |
| 5190-5230                | 802.11n HT40 CDD               | 18.59              | 72.28             |
| 5210                     | 802.11ac VHT80 CDD             | 17.69              | 58.75             |
| 5180-5240                | 802.11ax HE20 OFDMA, 242-Tones | 19.56              | 90.36             |
| 5180-5240                | 802.11ax HE20 OFDMA, 106-Tones | 18.57              | 71.94             |
| 5180-5240                | 802.11ax HE20 OFDMA, 52-Tones  | 14.62              | 28.97             |
| 5180-5240                | 802.11ax HE20 OFDMA, 26-Tones  | 13.06              | 20.23             |
| 5190-5230                | 802.11ax HE40 OFDMA, 484-Tones | 18.66              | 73.45             |
| 5190-5230                | 802.11ax HE40 OFDMA, 242-Tones | 19.56              | 90.36             |
| 5190-5230                | 802.11ax HE40 OFDMA, 106-Tones | 18.69              | 73.96             |
| 5190-5230                | 802.11ax HE40 OFDMA, 52-Tones  | 15.25              | 33.50             |
| 5190-5230                | 802.11ax HE40 OFDMA, 26-Tones  | 12.74              | 18.79             |
| 5210                     | 802.11ax HE80 OFDMA, 996-Tones | 17.55              | 56.89             |
| 5210                     | 802.11ax HE80 OFDMA, 484-Tones | 18.72              | 74.47             |
| 5210                     | 802.11ax HE80 OFDMA, 242-Tones | 19.72              | 93.76             |
| 5210                     | 802.11ax HE80 OFDMA, 106-Tones | 18.72              | 74.47             |
| 5210                     | 802.11ax HE80 OFDMA, 52-Tones  | 15.23              | 33.34             |
| 5210                     | 802.11ax HE80 OFDMA, 26-Tones  | 13.66              | 23.23             |



**5.3 GHz BAND**

| Frequency Range (MHz)    | Mode                           | Output Power (dBm) | Output Power (mW) |
|--------------------------|--------------------------------|--------------------|-------------------|
| <b>5.3 GHz band, 2TX</b> |                                |                    |                   |
| 5260-5320                | 802.11a CDD                    | 19.58              | 90.78             |
| 5260-5320                | 802.11n HT20 CDD               | 19.60              | 91.20             |
| 5270-5310                | 802.11n HT40 CDD               | 18.62              | 72.78             |
| 5290                     | 802.11ac VHT80 CDD             | 17.41              | 55.08             |
| 5260-5320                | 802.11ax HE20 OFDMA, 242-Tones | 19.29              | 84.92             |
| 5260-5320                | 802.11ax HE20 OFDMA, 106-Tones | 18.33              | 68.08             |
| 5260-5320                | 802.11ax HE20 OFDMA, 52-Tones  | 14.90              | 30.90             |
| 5260-5320                | 802.11ax HE20 OFDMA, 26-Tones  | 13.41              | 21.93             |
| 5270-5310                | 802.11ax HE40 OFDMA, 484-Tones | 18.64              | 73.11             |
| 5270-5310                | 802.11ax HE40 OFDMA, 242-Tones | 19.52              | 89.54             |
| 5270-5310                | 802.11ax HE40 OFDMA, 106-Tones | 18.04              | 63.68             |
| 5270-5310                | 802.11ax HE40 OFDMA, 52-Tones  | 14.53              | 28.38             |
| 5270-5310                | 802.11ax HE40 OFDMA, 26-Tones  | 12.10              | 16.22             |
| 5290                     | 802.11ax HE80 OFDMA, 996-Tones | 17.49              | 56.10             |
| 5290                     | 802.11ax HE80 OFDMA, 484-Tones | 18.48              | 70.47             |
| 5290                     | 802.11ax HE80 OFDMA, 242-Tones | 19.45              | 88.10             |
| 5290                     | 802.11ax HE80 OFDMA, 106-Tones | 18.41              | 69.34             |
| 5290                     | 802.11ax HE80 OFDMA, 52-Tones  | 14.99              | 31.55             |
| 5290                     | 802.11ax HE80 OFDMA, 26-Tones  | 13.32              | 21.48             |

**5.6 GHz BAND**

| Frequency Range (MHz)    | Mode                           | Output Power (dBm) | Output Power (mW) |
|--------------------------|--------------------------------|--------------------|-------------------|
| <b>5.6 GHz band, 2TX</b> |                                |                    |                   |
| 5500-5720                | 802.11a CDD                    | 19.27              | 84.53             |
| 5500-5720                | 802.11n HT20 CDD               | 19.26              | 84.33             |
| 5510-5710                | 802.11n HT40 CDD               | 18.44              | 69.82             |
| 5530-5690                | 802.11ac VHT80 CDD             | 17.44              | 55.46             |
| 5500-5720                | 802.11ax HE20 OFDMA, 242-Tones | 19.50              | 89.13             |
| 5500-5720                | 802.11ax HE20 OFDMA, 106-Tones | 18.03              | 63.53             |
| 5500-5720                | 802.11ax HE20 OFDMA, 52-Tones  | 14.52              | 28.31             |
| 5500-5720                | 802.11ax HE20 OFDMA, 26-Tones  | 13.51              | 22.44             |
| 5510-5710                | 802.11ax HE40 OFDMA, 484-Tones | 19.56              | 90.36             |
| 5510-5710                | 802.11ax HE40 OFDMA, 242-Tones | 19.50              | 89.13             |
| 5510-5710                | 802.11ax HE40 OFDMA, 106-Tones | 18.47              | 70.31             |
| 5510-5710                | 802.11ax HE40 OFDMA, 52-Tones  | 15.02              | 31.77             |
| 5510-5710                | 802.11ax HE40 OFDMA, 26-Tones  | 13.48              | 22.28             |
| 5530-5690                | 802.11ax HE80 OFDMA, 996-Tones | 17.42              | 55.21             |
| 5530-5690                | 802.11ax HE80 OFDMA, 484-Tones | 18.49              | 70.63             |
| 5530-5690                | 802.11ax HE80 OFDMA, 242-Tones | 19.41              | 87.30             |
| 5530-5690                | 802.11ax HE80 OFDMA, 106-Tones | 18.47              | 70.31             |
| 5530-5690                | 802.11ax HE80 OFDMA, 52-Tones  | 15.40              | 34.67             |
| 5530-5690                | 802.11ax HE80 OFDMA, 26-Tones  | 14.49              | 28.12             |

**5.8 GHz BAND**

| Frequency Range (MHz)    | Mode                           | Output Power (dBm) | Output Power (mW) |
|--------------------------|--------------------------------|--------------------|-------------------|
| <b>5.8 GHz band, 2TX</b> |                                |                    |                   |
| 5745-5825                | 802.11a CDD                    | 19.74              | 94.19             |
| 5745-5825                | 802.11n HT20 CDD               | 19.72              | 93.76             |
| 5755-5795                | 802.11n HT40 CDD               | 18.22              | 66.37             |
| 5775                     | 802.11ac VHT80 CDD             | 17.35              | 54.33             |
| 5745-5825                | 802.11ax HE20 OFDMA, 242-Tones | 19.28              | 84.72             |
| 5745-5825                | 802.11ax HE20 OFDMA, 106-Tones | 18.41              | 69.34             |
| 5745-5825                | 802.11ax HE20 OFDMA, 52-Tones  | 15.46              | 35.16             |
| 5745-5825                | 802.11ax HE20 OFDMA, 26-Tones  | 14.33              | 27.10             |
| 5755-5795                | 802.11ax HE40 OFDMA, 484-Tones | 18.38              | 68.87             |
| 5755-5795                | 802.11ax HE40 OFDMA, 242-Tones | 19.38              | 86.70             |
| 5755-5795                | 802.11ax HE40 OFDMA, 106-Tones | 18.19              | 65.92             |
| 5755-5795                | 802.11ax HE40 OFDMA, 52-Tones  | 15.41              | 34.75             |
| 5755-5795                | 802.11ax HE40 OFDMA, 26-Tones  | 14.26              | 26.67             |
| 5775                     | 802.11ax HE80 OFDMA, 996-Tones | 17.16              | 52.00             |
| 5775                     | 802.11ax HE80 OFDMA, 484-Tones | 18.43              | 69.66             |
| 5775                     | 802.11ax HE80 OFDMA, 242-Tones | 19.38              | 86.70             |
| 5775                     | 802.11ax HE80 OFDMA, 106-Tones | 18.40              | 69.18             |
| 5775                     | 802.11ax HE80 OFDMA, 52-Tones  | 15.45              | 35.08             |
| 5775                     | 802.11ax HE80 OFDMA, 26-Tones  | 14.33              | 27.10             |

### 6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain as below table:

| Frequency Band (GHz) | Chain 0            | Chain 1            |
|----------------------|--------------------|--------------------|
|                      | Antenna Gain (dBi) | Antenna Gain (dBi) |
| 5.2                  | -2.27              | -1.75              |
| 5.3                  | -2.10              | -0.16              |
| 5.6                  | -2.10              | -2.50              |
| 5.8                  | -7.19              | -6.65              |

Note:

Antenna #1 = Chain 0

Antenna #2-2 = Chain 1

### 6.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was G970N.001.

### 6.5. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 1GHz, above 18GHz, and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Band edge and radiated emissions between 1GHz and 18GHz were performed with the EUT set to transmit at the highest power on low, middle and high channels.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

Worst-case data rates as provided by the client were:

802.11a mode: 6 Mbps  
802.11n HT20 mode: MCS0  
802.11n HT40 mode: MCS0  
802.11ac VHT80 mode: MCS0  
802.11ax HE20 mode: MCS0  
802.11ax HE40 mode: MCS0  
802.11ax HE80 mode: MCS0

All radios that can be transmitted simultaneously have been evaluated for radiated for all possible combinations of transmission and found to be in compliance.

## 6.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

| Support Equipment List |              |          |               |        |
|------------------------|--------------|----------|---------------|--------|
| Description            | Manufacturer | Model    | Serial Number | FCC ID |
| AC Adapter             | Samsung      | EP-TA300 | R3KB5B01S1SE3 | N/A    |
| USB Data Cabel         | Samsung      | N/A      | N/A           | N/A    |
| Earphone               | Samsung      | N/A      | N/A           | N/A    |

### I/O CABLES

| I/O Cable List |         |                      |                |             |                  |                      |
|----------------|---------|----------------------|----------------|-------------|------------------|----------------------|
| Cable No       | Port    | # of identical ports | Connector Type | Cable Type  | Cable Length (m) | Remarks              |
| 1              | Antenna | 1                    | RF             | Shielded    | 0.2              | To Spectrum Analyzer |
| 2              | USB     | 1                    | USB            | Un-shielded | 1                | EUT to AC Mains      |

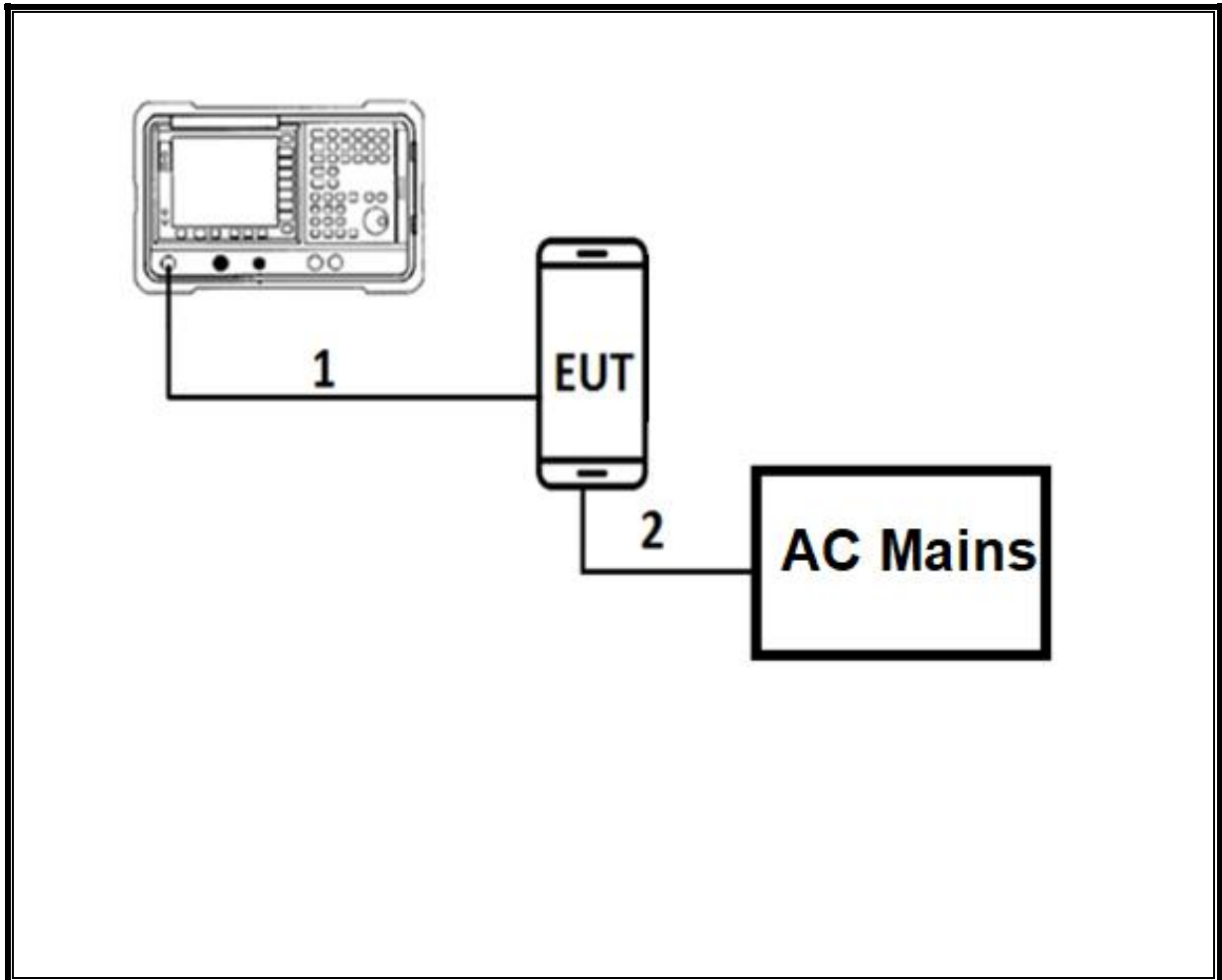
### I/O CABLES (RADIATED AND CONDUCTED EMISSIONS)

| I/O Cable List |          |                      |                |             |                  |         |
|----------------|----------|----------------------|----------------|-------------|------------------|---------|
| Cable No       | Port     | # of identical ports | Connector Type | Cable Type  | Cable Length (m) | Remarks |
| 1              | USB      | 1                    | Type C         | Shielded    | 1                | N/A     |
| 2              | Earphone | 1                    | 3.5mm          | Un-shielded | 1                | N/A     |

**TEST SETUP**

The EUT is a stand alone. Test software exercised the radio card.

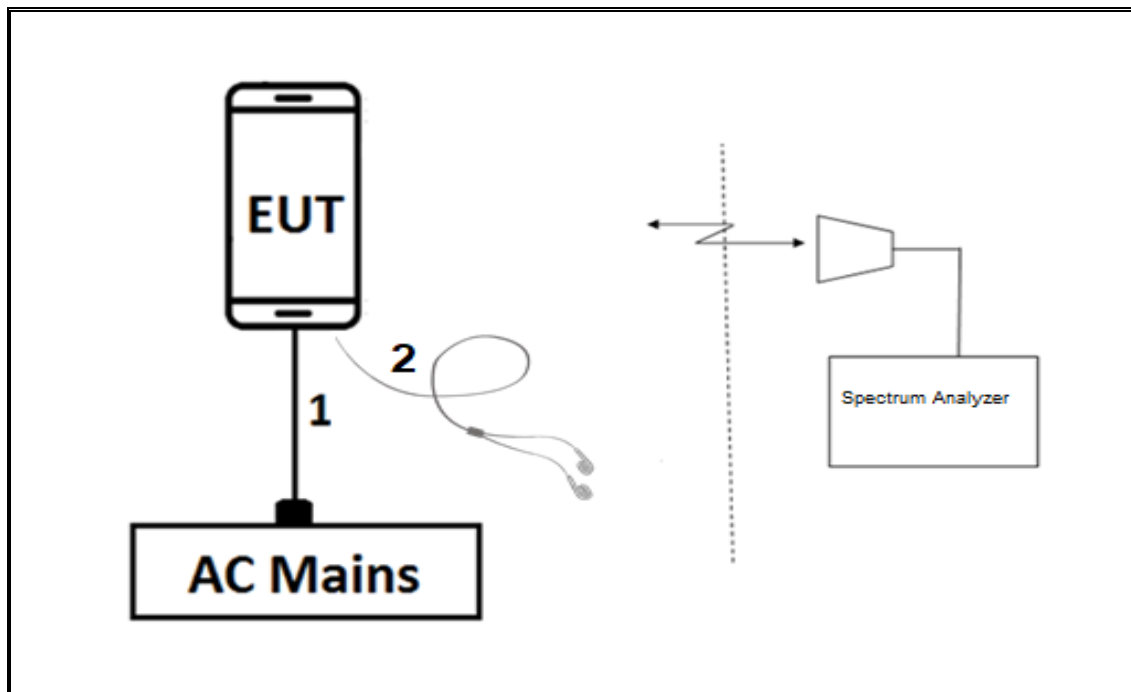
**CONDUCTED TEST SETUP DIAGRAM**



**TEST SETUP**

For conducted tests: the EUT was stand alone. The test software exercises the radio.

**RADIATED AND AC LINE CONDUCTED EMISSIONS SETUP DIAGRAM**



**TEST SETUP**

For radiated tests: EUT has support equipment. The test software exercises the radio.

## 7. MEASUREMENT METHOD

On Time and Duty Cycle: KDB 789033 D02 v02r01, Section II.B.

6 dB Emission BW: KDB 789033 D02 v02r01, Section II.C.2

26 dB Emission BW: KDB 789033 D02 v02r01, Section II.C.1

99% Occupied BW: KDB 789033 D02 v02r01, Section II.D.

Conducted Output Power: KDB 789033 D02 v02r01, Sections II.E.3.b & II.E.2.b.

Power Spectral Density: KDB 789033 D02 v02r01, Section II F.

Unwanted emissions: KDB 789033 D02 v02r01, Sections II.G.3 – II.G.6.

AC Power Line Conducted Emissions: ANSI C63.10-2013, Section 6.2.

## 8. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

| TEST EQUIPMENT LIST                              |                                 |                        |            |            |             |
|--|---------------------------------|------------------------|------------|------------|-------------|
| Description                                      | Manufacturer                    | Model                  | ID Num     | Cal Due    | Last Cal    |
| Amplifier, 100KHz to 1GHz,32dB                   | Agilent (Keysight) Technologies | 8447D                  | T15        | 10/20/2019 | 10/20/2018  |
| RF Amplifier                                     | MITEQ                           | AFS42-00101800-25-S-42 | T493       | 10/13/2019 | 10/13/2018  |
| RF Amplifier, 1-18GHz                            | MITEQ                           | AFS42-00101800-25-S-42 | T1165      | 10/20/2019 | 10/20/2018  |
| Pre-Amp 1-26.5 GHz                               | Agilent                         | 8449B                  | T404       | 03/09/2019 | 023/09/2018 |
| Antenna, Broadband Hybrid, 30MHz to 3000MHz      | Sunol Sciences Corp.            | JB3                    | PRE0181574 | 08/01/2019 | 08/01/2018  |
| Antenna, Horn 1-18GHz                            | ETS-Lindgren                    | 3117                   | T345       | 04/25/2019 | 04/25/2018  |
| Antenna, Horn 1-18GHz                            | ETS-Lindgren                    | 3117                   | T863       | 06/21/2019 | 06/21/2018  |
| Antenna, Horn 1-18GHz                            | ETS-Lindgren                    | 3117                   | T862       | 05/24/2019 | 05/24/2018  |
| Antenna, Active Loop 9kHz-30MHz                  | Com-Power Corp.                 | AL-130R                | PRE0165308 | 12/13/2018 | 12/13/2017  |
| 18 - 26.5 GHz Horn Antenna                       | ARA                             | MWH-1826/B             | T477       | 06/16/2019 | 06/16/2018  |
| 26.5 - 40 GHz Horn Antenna                       | ARA                             | MWH-2640/B             | T446       | 8/9/2019   | 8/9/2018    |
| Power Meter, P-series single channel             | Agilent (Keysight) Technologies | N1911A                 | T1271      | 07/26/2019 | 07/26/2018  |
| Power Sensor, P-series, 50MHz to 18GHz, Wideband | Agilent (Keysight) Technologies | N1921A                 | T1224      | 10/09/2019 | 10/09/2018  |
| EMI Reciever                                     | Rohde & Schwarz                 | ESR                    | T1436      | 02/21/2019 | 02/21/2018  |
| L.I.S.N.   | FCC INC.                        | FCC LISN 50/250        | T1310      | 06/15/2019 | 06/15/2018  |
| Spectrum Analyzer, PXA, 3Hz to 44GHz             | Agilent (Keysight) Technologies | N9030A                 | T1113      | 12/21/2018 | 12/21/2017  |
| Spectrum Analyzer                                | Agilent (Keysight) Technologies | E4446A                 | T146       | 08/13/2019 | 08/13/2018  |
| Spectrum Analyzer, PXA, 3Hz to 44GHz             | Agilent (Keysight) Technologies | N9030A                 | T1466      | 04/16/2019 | 04/16/2018  |
| Spectrum Analyzer, PXA, 3Hz to 44GHz             | Agilent (Keysight) Technologies | N9030A                 | T1454      | 01/08/2019 | 01/08/2018  |

| Test Software List    |              |        |                       |
|-----------------------|--------------|--------|-----------------------|
| Description           | Manufacturer | Model  | Version               |
| Radiated Software     | UL           | UL EMC | Ver 9.5, Dec 01, 2016 |
| Antenna Port Software | UL           | UL RF  | Ver 9.0, Oct 31, 2018 |



## **9. ANTENNA PORT TEST RESULTS**

### **9.1. ON TIME AND DUTY CYCLE**

#### **LIMITS**

None; for reporting purposes only.

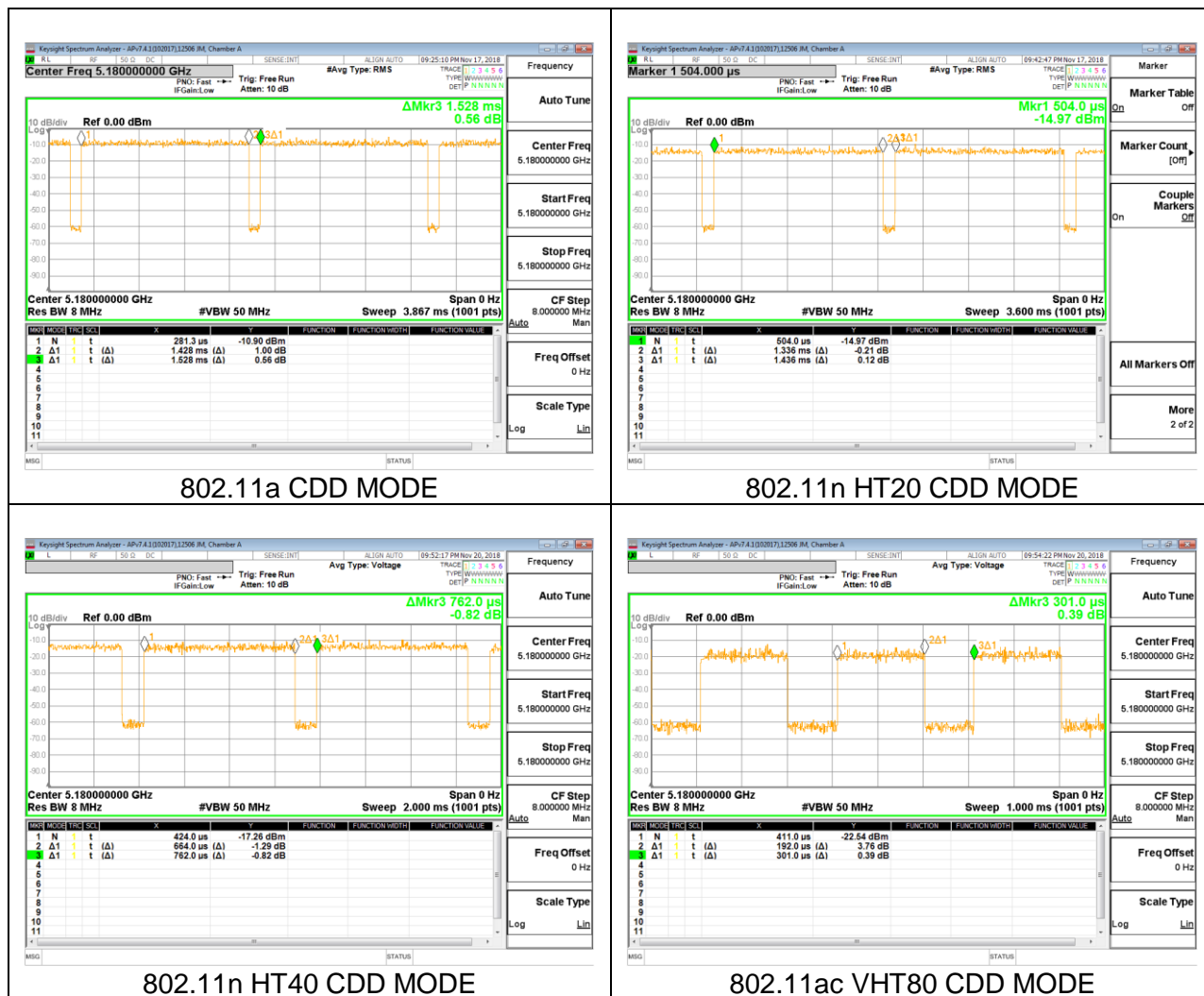
#### **PROCEDURE**

KDB 789033 Zero-Span Spectrum Analyzer Method.

**ON TIME AND DUTY CYCLE RESULTS**

| Mode                              | ON Time B (msec) | Period (msec) | Duty Cycle x (linear) | Duty Cycle (%) | Duty Cycle Correction Factor (dB) | 1/B Minimum VBW (kHz) |
|-----------------------------------|------------------|---------------|-----------------------|----------------|-----------------------------------|-----------------------|
| 802.11a CDD                       | 1.428            | 1.528         | 0.935                 | 93.46%         | 0.29                              | 0.700                 |
| 802.11n HT20 CDD                  | 1.336            | 1.436         | 0.930                 | 93.04%         | 0.31                              | 0.749                 |
| 802.11n HT40 CDD                  | 0.664            | 0.762         | 0.871                 | 87.14%         | 0.60                              | 1.506                 |
| 802.11ac VHT80 CDD                | 0.192            | 0.301         | 0.638                 | 63.79%         | 1.95                              | 5.208                 |
| 802.11ax HE20 OFDMA, RU size 242T | 0.602            | 0.702         | 0.858                 | 85.75%         | 0.67                              | 1.661                 |
| 802.11ax HE20 OFDMA, RU size 106T | 1.282            | 1.386         | 0.925                 | 92.50%         | 0.34                              | 0.780                 |
| 802.11ax HE20 OFDMA, RU size 52T  | 2.642            | 2.746         | 0.962                 | 96.21%         | 0.17                              | 0.379                 |
| 802.11ax HE20 OFDMA, RU size 26T  | 5.218            | 5.338         | 0.978                 | 97.75%         | 0.10                              | 0.192                 |
| 802.11ax HE40 OFDMA, RU size 484T | 0.337            | 0.437         | 0.771                 | 77.13%         | 1.13                              | 2.966                 |
| 802.11ax HE40 OFDMA, RU size 242T | 0.600            | 0.700         | 0.857                 | 85.71%         | 0.67                              | 1.667                 |
| 802.11ax HE40 OFDMA, RU size 106T | 1.282            | 1.394         | 0.920                 | 91.97%         | 0.36                              | 0.780                 |
| 802.11ax HE40 OFDMA, RU size 52T  | 2.654            | 2.760         | 0.962                 | 96.16%         | 0.17                              | 0.377                 |
| 802.11ax HE40 OFDMA, RU size 26T  | 5.194            | 5.330         | 0.974                 | 97.45%         | 0.11                              | 0.193                 |
| 802.11ax HE80 OFDMA, RU size 996T | 0.202            | 0.312         | 0.648                 | 64.77%         | 1.89                              | 4.946                 |
| 802.11ax HE80 OFDMA, RU size 484T | 0.337            | 0.446         | 0.756                 | 75.57%         | 1.22                              | 2.966                 |
| 802.11ax HE80 OFDMA, RU size 242T | 0.601            | 0.709         | 0.848                 | 84.77%         | 0.72                              | 1.663                 |
| 802.11ax HE80 OFDMA, RU size 106T | 1.281            | 1.393         | 0.920                 | 91.96%         | 0.36                              | 0.781                 |
| 802.11ax HE80 OFDMA, RU size 52T  | 2.653            | 2.753         | 0.964                 | 96.37%         | 0.16                              | 0.377                 |
| 802.11ax HE80 OFDMA, RU size 26T  | 5.185            | 5.333         | 0.972                 | 97.22%         | 0.12                              | 0.193                 |

### DUTY CYCLE PLOTS

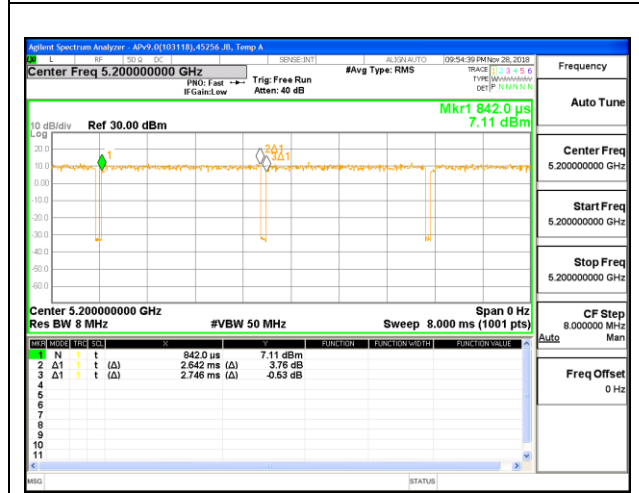




802.11ax HE20 OFDMA, RU SIZE 242T  
 MODE



802.11ax HE20 OFDMA, RU SIZE 106T  
 MODE



802.11ax HE20 OFDMA, RU SIZE 52T MODE



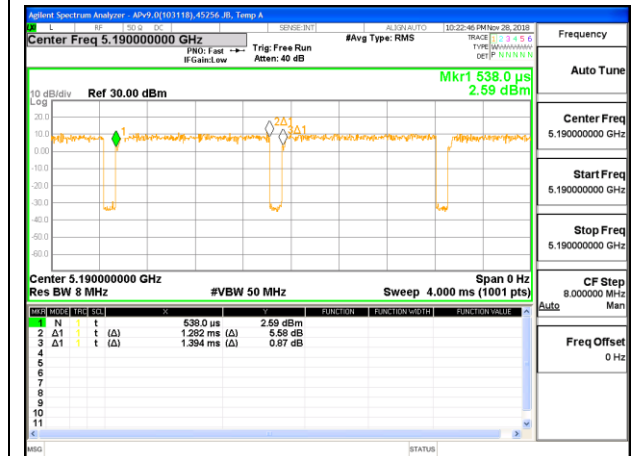
802.11ax HE20 OFDMA, RU SIZE 26T MODE



802.11ax HE40 OFDMA, RU SIZE 484T  
 MODE



802.11ax HE40 OFDMA, RU SIZE 242T  
 MODE

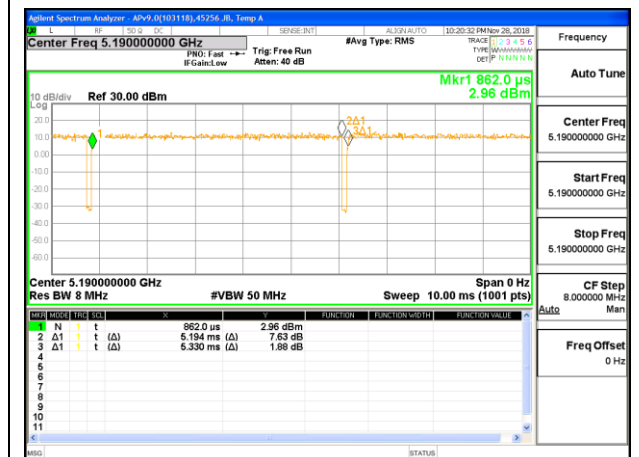


802.11ax HE40 OFDMA, RU SIZE 106T  
 MODE



802.11ax HE40 OFDMA, RU SIZE 52T MODE

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802.11ax HE40 OFDMA, RU SIZE 26T MODE



802.11ax HE80 OFDMA, RU SIZE 996T  
 MODE



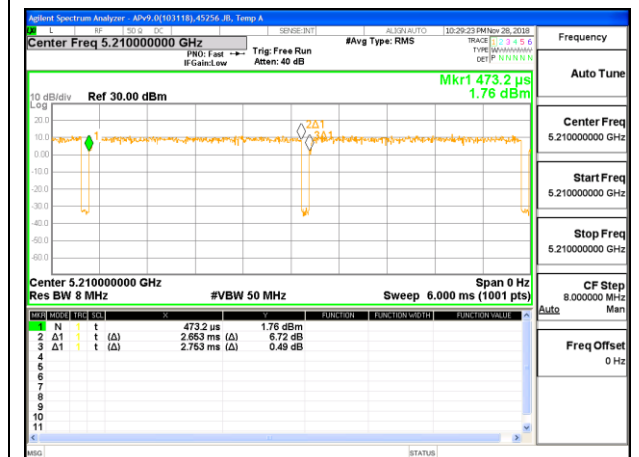
802.11ax HE80 OFDMA, RU SIZE 484T  
 MODE



802.11ax HE80 OFDMA, RU SIZE 242T  
 MODE



802.11ax HE80 OFDMA, RU SIZE 106T  
 MODE



802.11ax HE80 OFDMA, RU SIZE 52T MODE



802.11ax HE80 OFDMA, RU SIZE 26T MODE

## **9.2. 26 dB BANDWIDTH**

### **LIMITS**

None; for reporting purposes only.

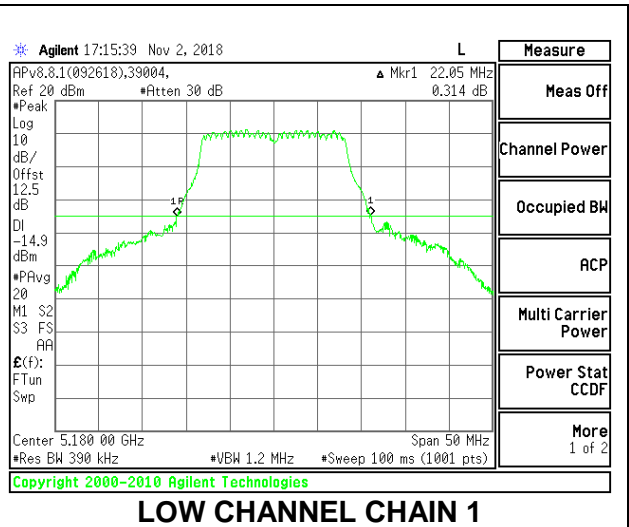
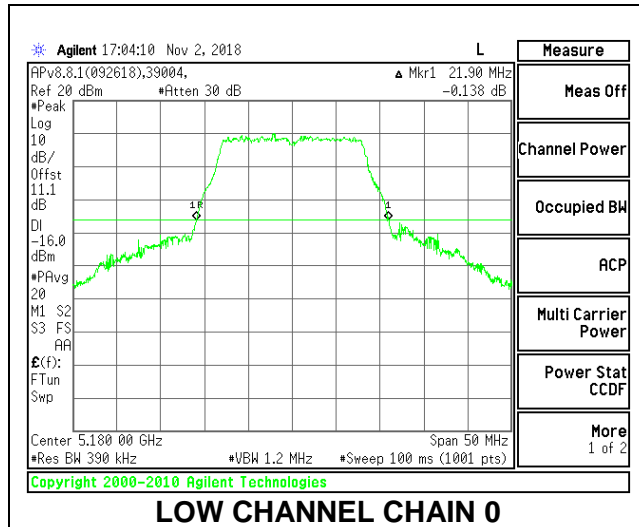
### **RESULTS**

### 9.2.1. 802.11a MODE IN THE 5.2 GHz BAND

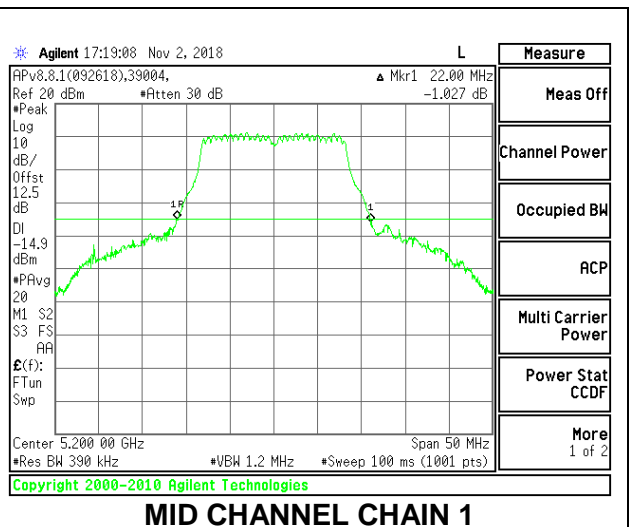
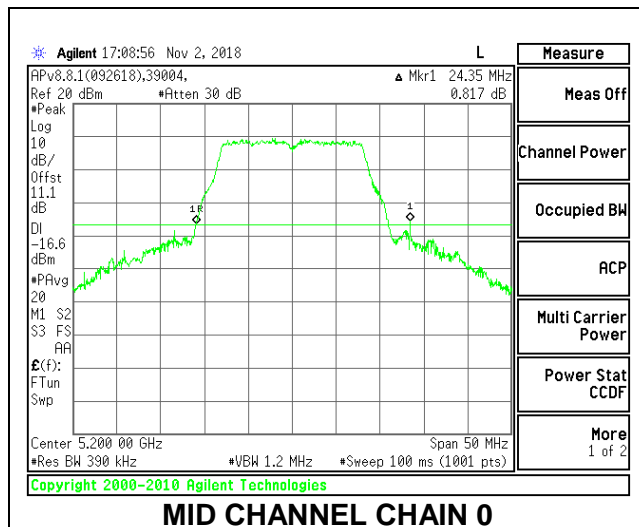
#### 2TX Antenna 1 + Antenna 2 CDD MODE

| Channel | Frequency (MHz) | 26 dB Bandwidth Chain 0 (MHz) | 26 dB Bandwidth Chain 1 (MHz) |
|---------|-----------------|-------------------------------|-------------------------------|
| Low     | 5180            | 21.90                         | 22.05                         |
| Mid     | 5200            | 24.35                         | 22.00                         |
| High    | 5240            | 21.85                         | 22.05                         |

#### LOW CHANNEL

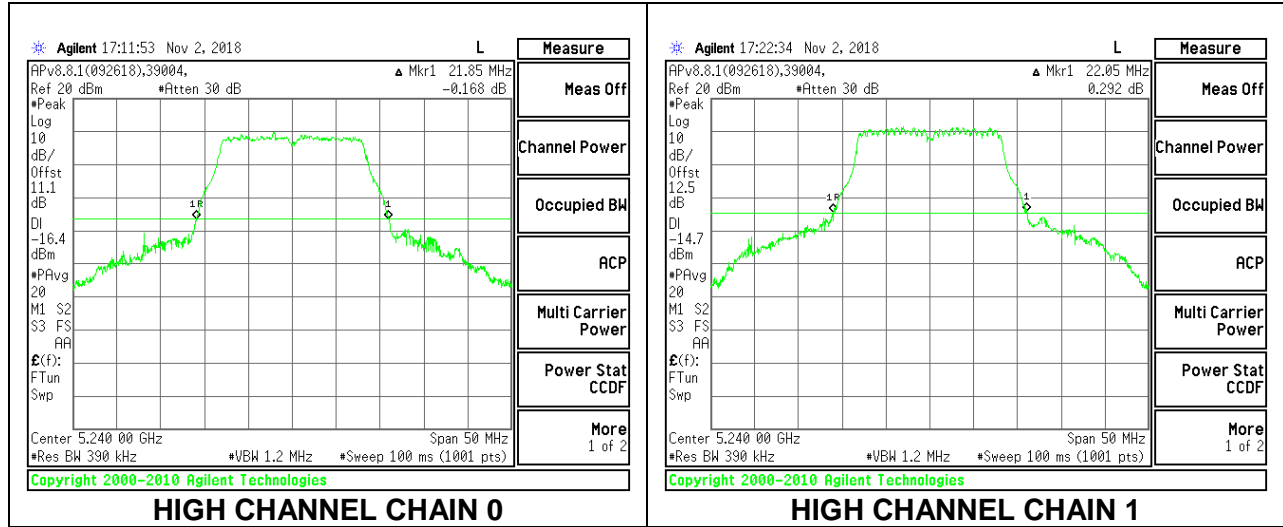


#### MID CHANNEL





**HIGH CHANNEL**

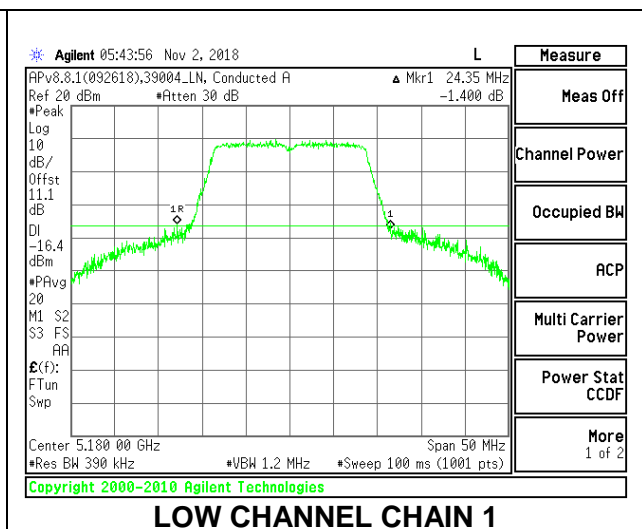
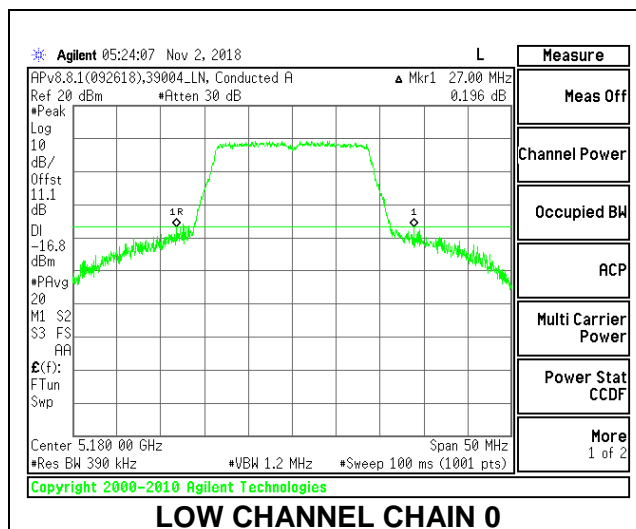


### 9.2.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND

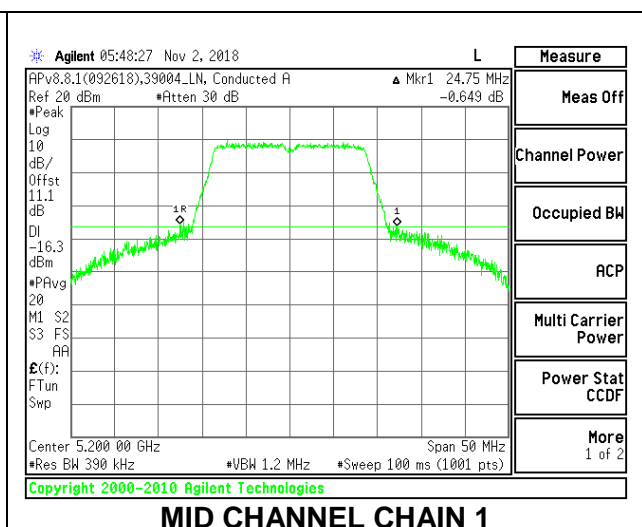
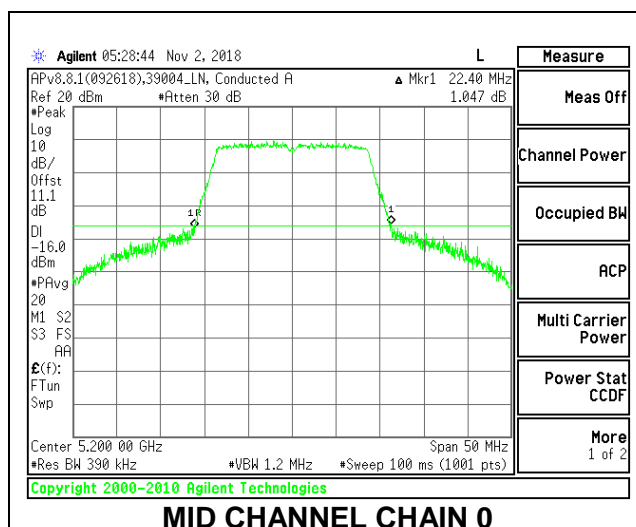
#### 2TX Antenna 1 + Antenna 2 CDD MODE

| Channel | Frequency (MHz) | 26 dB Bandwidth Chain 0 (MHz) | 26 dB Bandwidth Chain 1 (MHz) |
|---------|-----------------|-------------------------------|-------------------------------|
| Low     | 5180            | 27.00                         | 24.35                         |
| Mid     | 5200            | 22.40                         | 24.75                         |
| High    | 5240            | 22.60                         | 26.30                         |

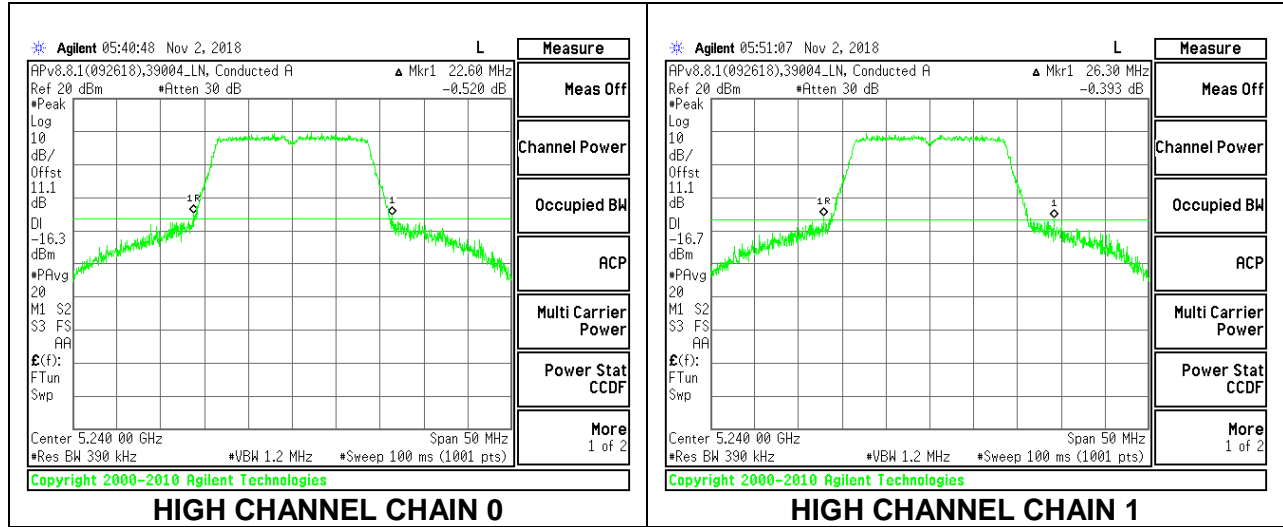
#### LOW CHANNEL



#### MID CHANNEL



**HIGH CHANNEL**

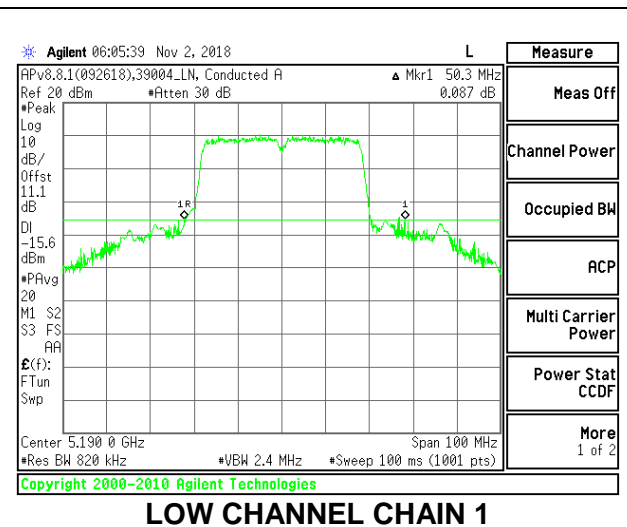
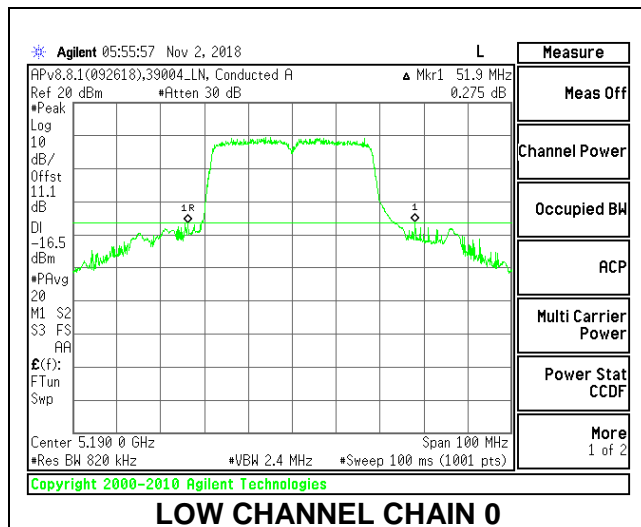


### 9.2.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND

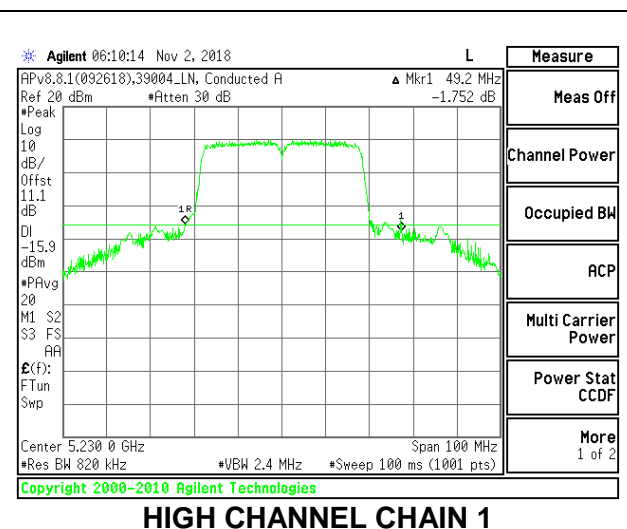
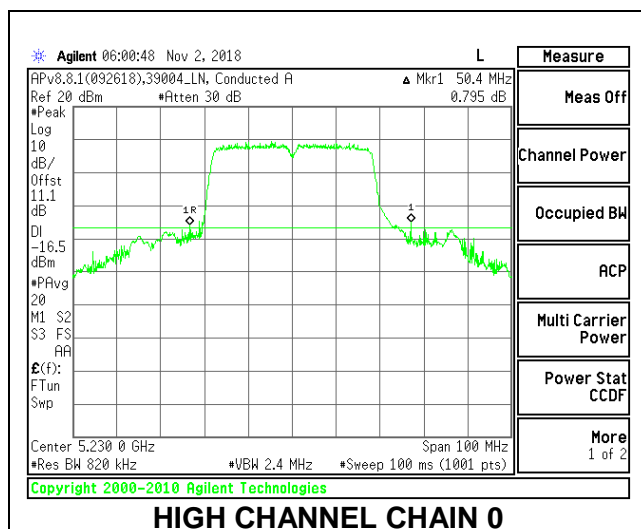
#### 2TX Antenna 1 + Antenna 2 CDD MODE

| Channel | Frequency<br>(MHz) | 26 dB Bandwidth  |                  |
|---------|--------------------|------------------|------------------|
|         |                    | Chain 0<br>(MHz) | Chain 1<br>(MHz) |
| Low     | 5190               | 51.90            | 50.30            |
| High    | 5230               | 50.40            | 49.20            |

#### LOW CHANNEL



#### HIGH CHANNEL

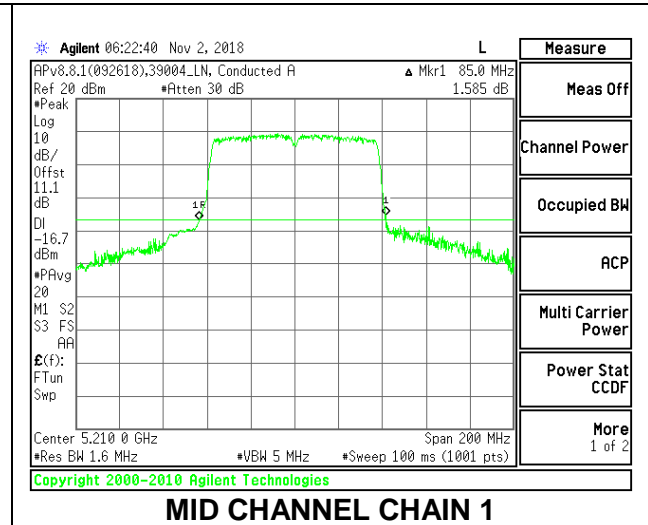
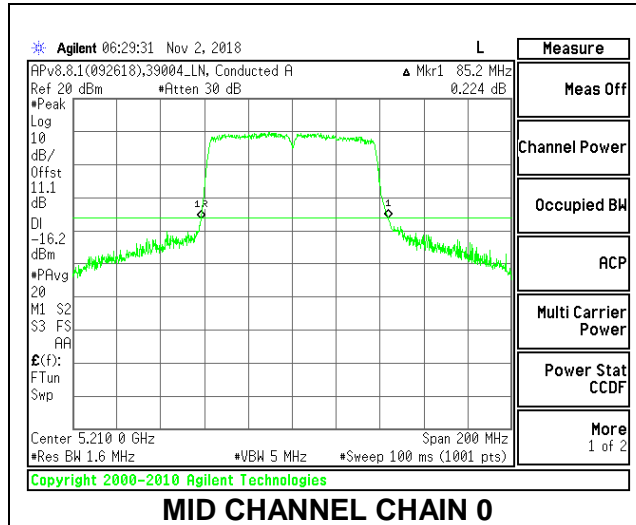


**9.2.4. 802.11ac VHT80 MODE IN THE 5.2 GHz BAND**

**2TX Antenna 1 + Antenna 2 CDD MODE**

| Channel | Frequency<br>(MHz) | 26 dB Bandwidth  |                  |
|---------|--------------------|------------------|------------------|
|         |                    | Chain 0<br>(MHz) | Chain 1<br>(MHz) |
| Mid     | 5210               | 85.20            | 85.00            |

**MID CHANNEL**

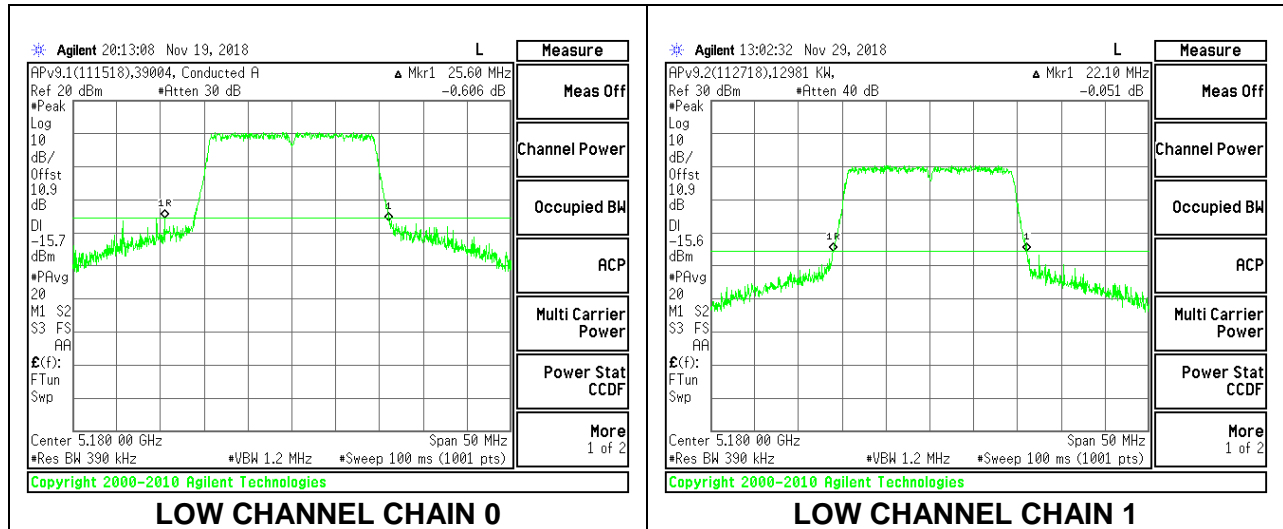


### 9.2.5. 802.11ax HE20 MODE IN THE 5.2 GHz BAND

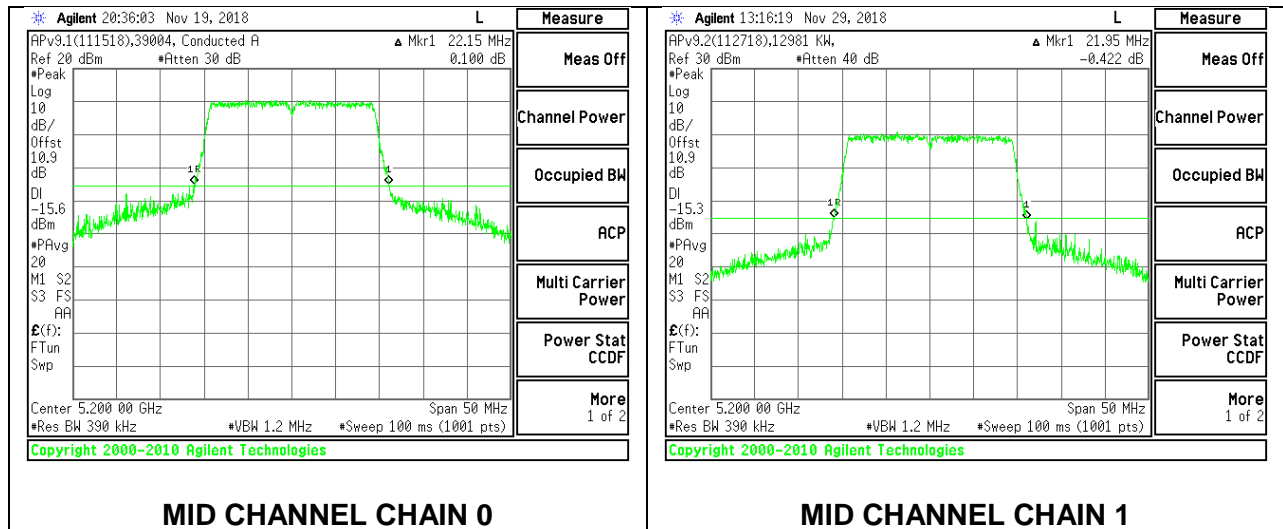
#### 2TX Antenna 1 + Antenna 2 OFDMA MODE – 242-Tones, RU Index 61

| Channel | Frequency (MHz) | 26 dB Bandwidth Chain 0 (MHz) | 26 dB Bandwidth Chain 1 (MHz) |
|---------|-----------------|-------------------------------|-------------------------------|
| Low     | 5180            | 25.60                         | 22.10                         |
| Mid     | 5200            | 22.15                         | 21.95                         |
| High    | 5240            | 22.20                         | 21.95                         |

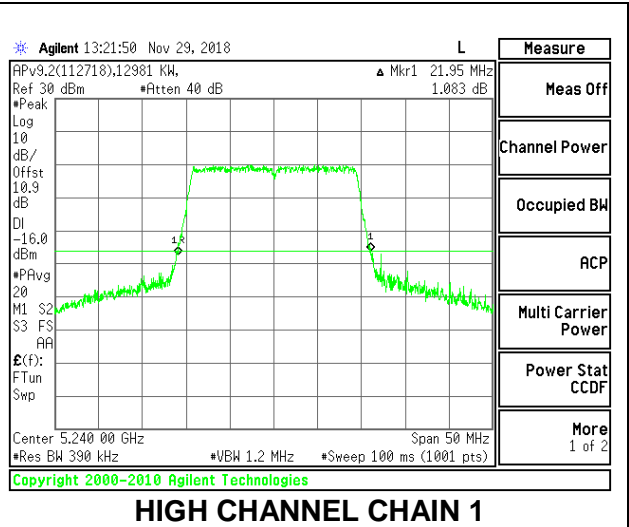
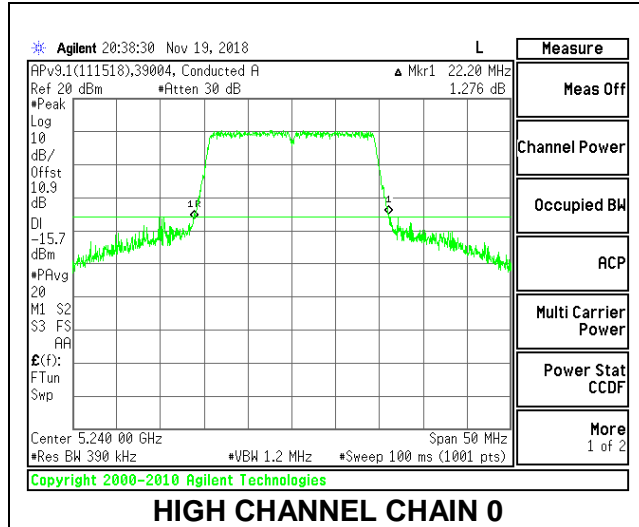
#### LOW CHANNEL



#### MID CHANNEL



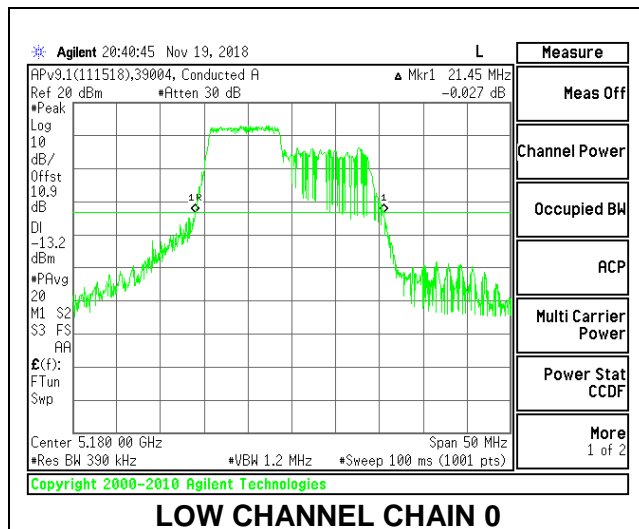
**HIGH CHANNEL**



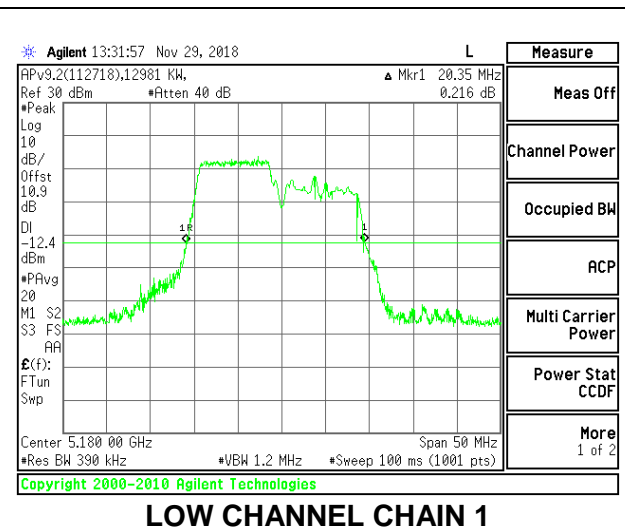
**2TX Antenna 1 + Antenna 2 OFDMA MODE – 106-Tones, RU Index 53**

| Channel | Frequency (MHz) | 26 dB Bandwidth Chain 0 (MHz) | 26 dB Bandwidth Chain 1 (MHz) |
|---------|-----------------|-------------------------------|-------------------------------|
| Low     | 5180            | 21.45                         | 20.35                         |
| Mid     | 5200            | 21.50                         | 20.55                         |
| High    | 5240            | 21.60                         | 20.60                         |

**LOW CHANNEL**

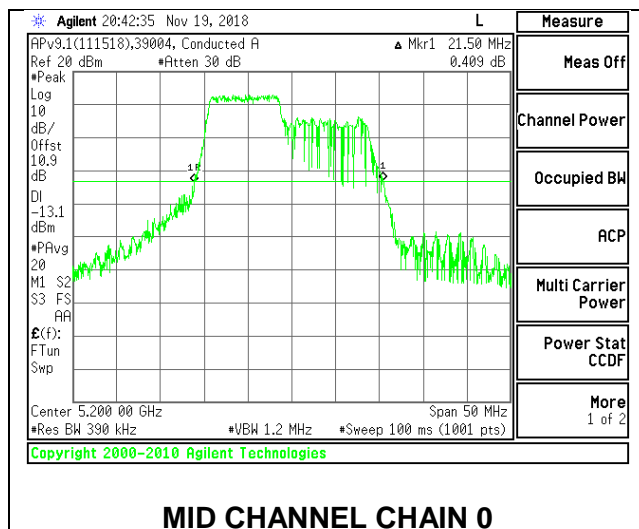


**LOW CHANNEL CHAIN 0**

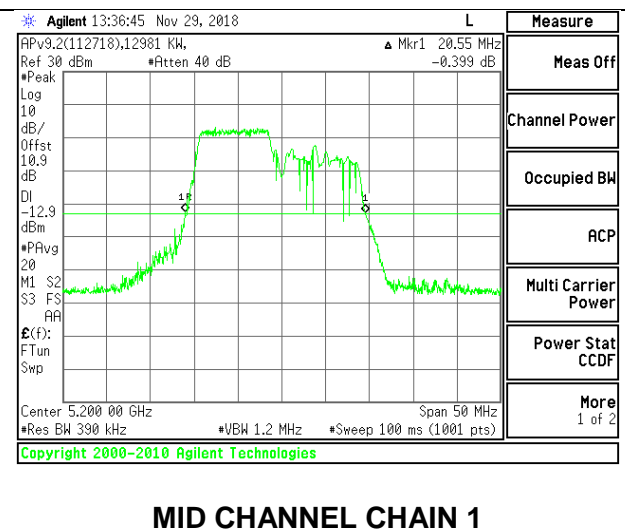


**LOW CHANNEL CHAIN 1**

**MID CHANNEL**



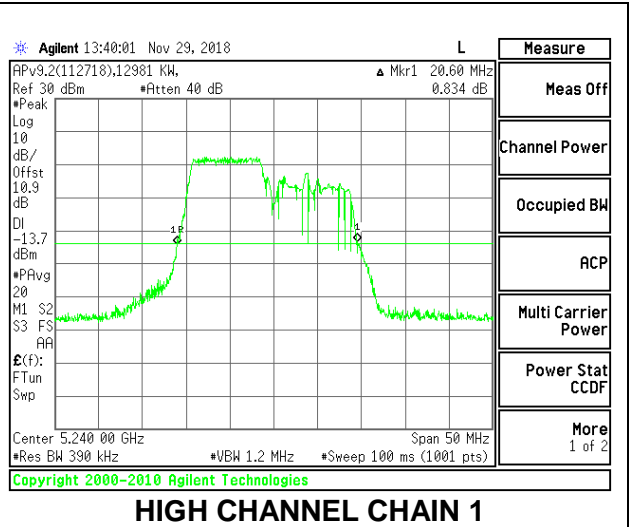
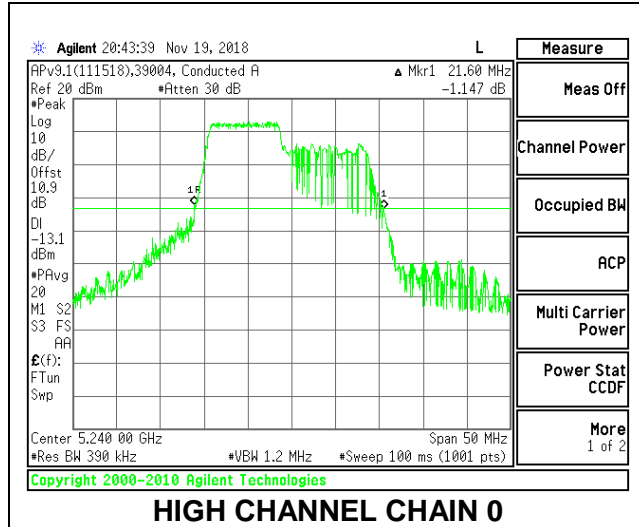
**MID CHANNEL CHAIN 0**



**MID CHANNEL CHAIN 1**



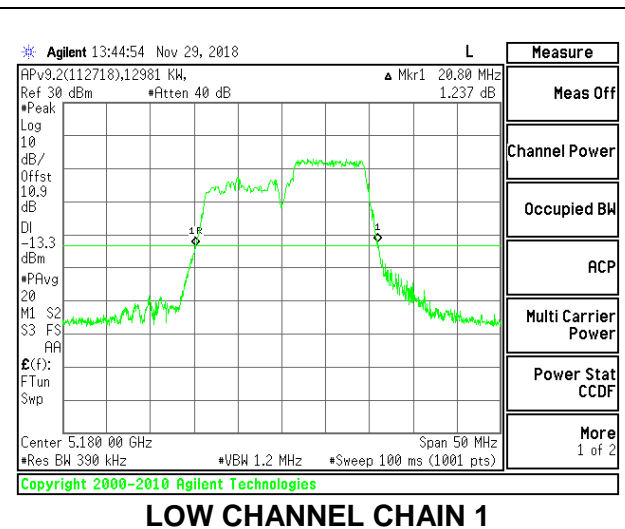
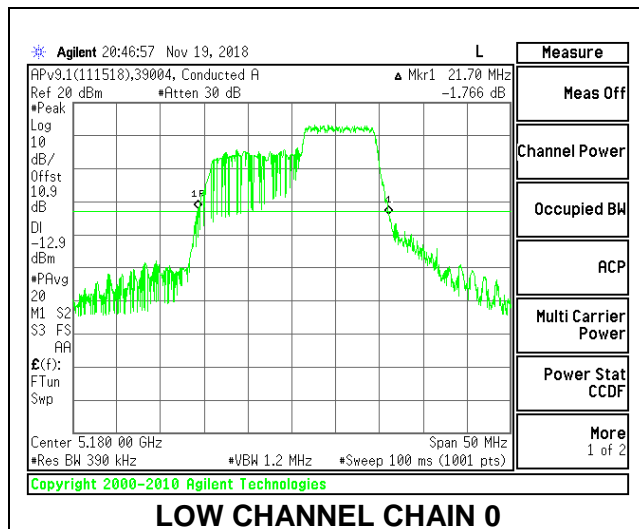
**HIGH CHANNEL**



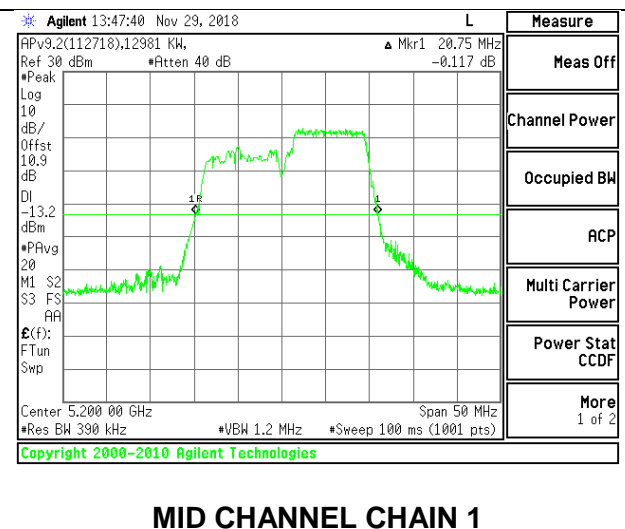
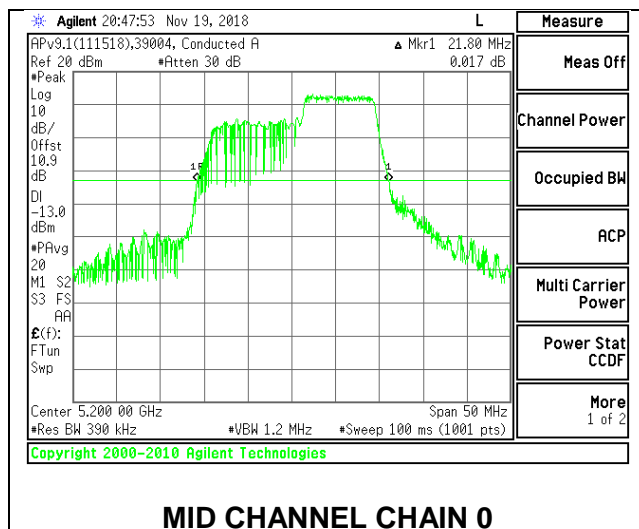
**2TX Antenna 1 + Antenna 2 OFDMA MODE – 106-Tones, RU Index 54**

| Channel | Frequency (MHz) | 26 dB Bandwidth Chain 0 (MHz) | 26 dB Bandwidth Chain 1 (MHz) |
|---------|-----------------|-------------------------------|-------------------------------|
| Low     | 5180            | 21.70                         | 20.80                         |
| Mid     | 5200            | 21.80                         | 20.75                         |
| High    | 5240            | 21.80                         | 20.65                         |

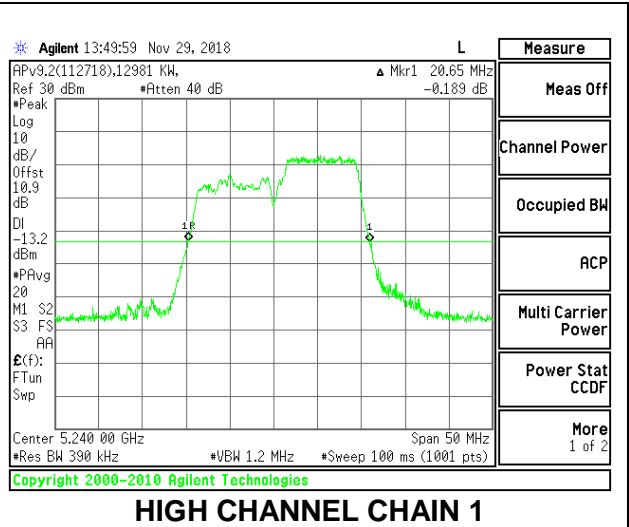
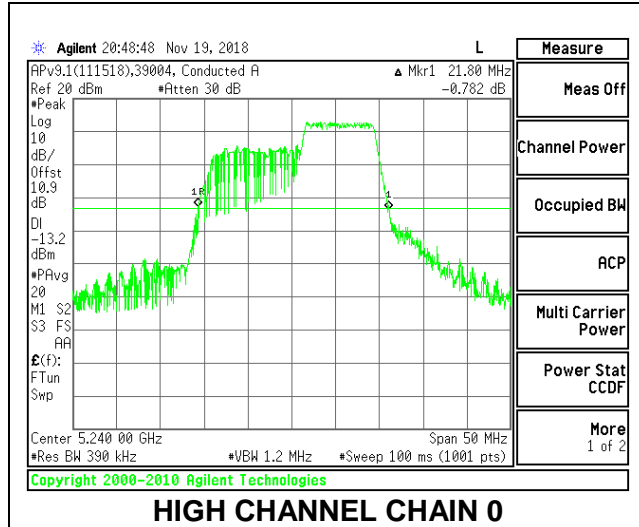
**LOW CHANNEL**



**MID CHANNEL**



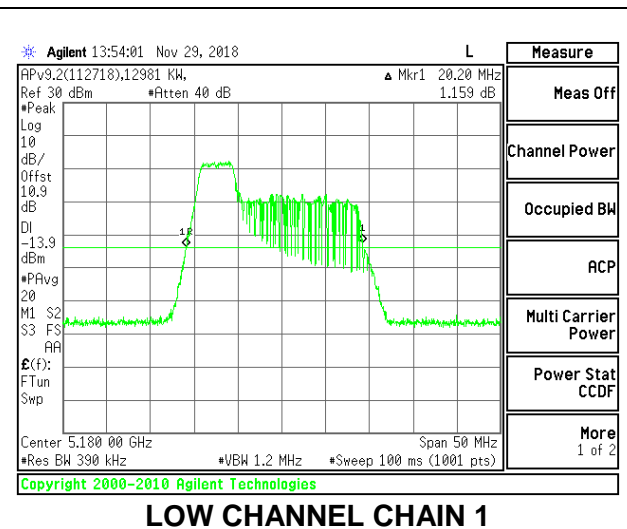
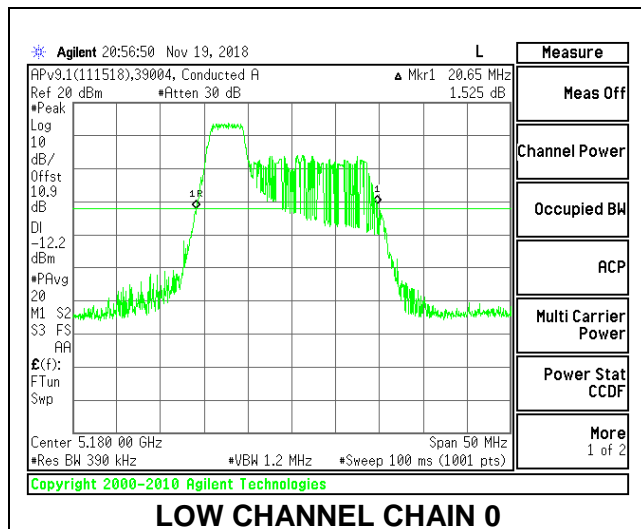
**HIGH CHANNEL**



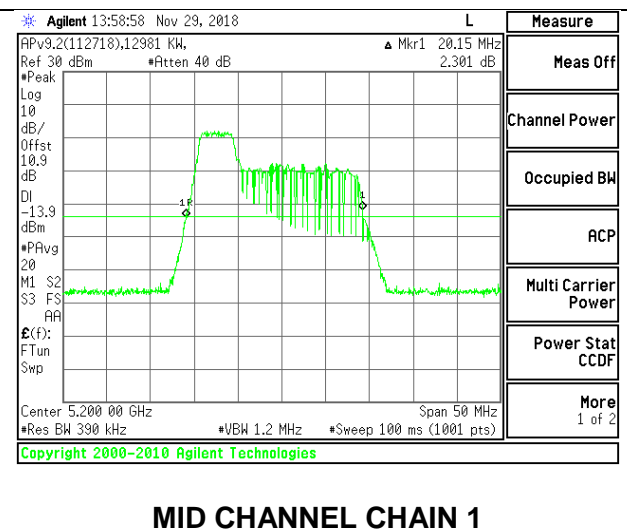
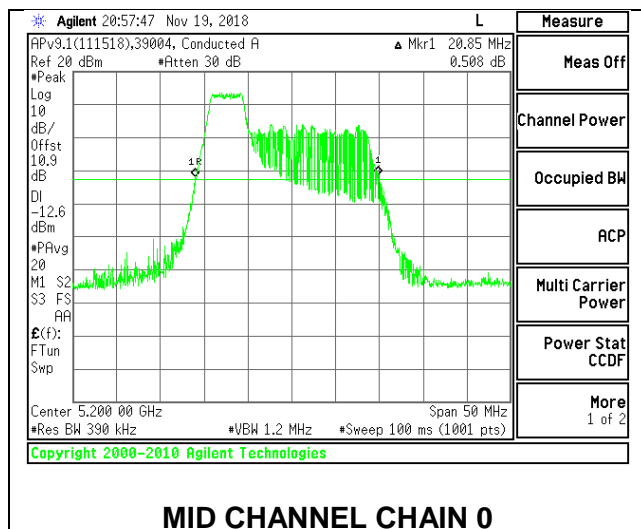
**2TX Antenna 1 + Antenna 2 OFDMA MODE – 52-Tones, RU Index 37**

| Channel | Frequency (MHz) | 26 dB Bandwidth Chain 0 (MHz) | 26 dB Bandwidth Chain 1 (MHz) |
|---------|-----------------|-------------------------------|-------------------------------|
| Low     | 5180            | 20.65                         | 20.20                         |
| Mid     | 5200            | 20.85                         | 20.15                         |
| High    | 5240            | 20.95                         | 20.25                         |

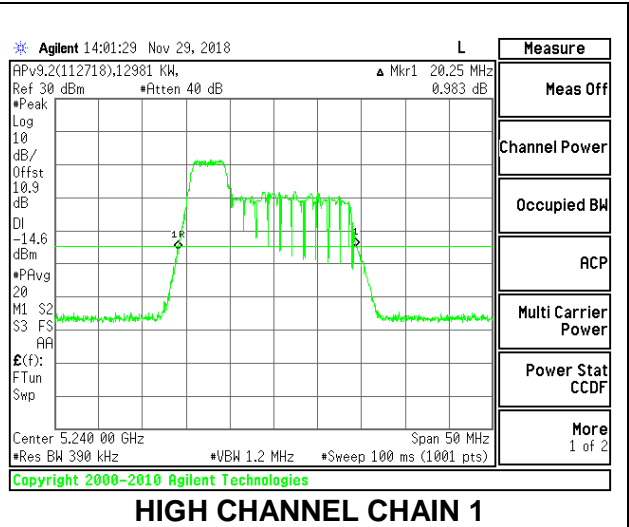
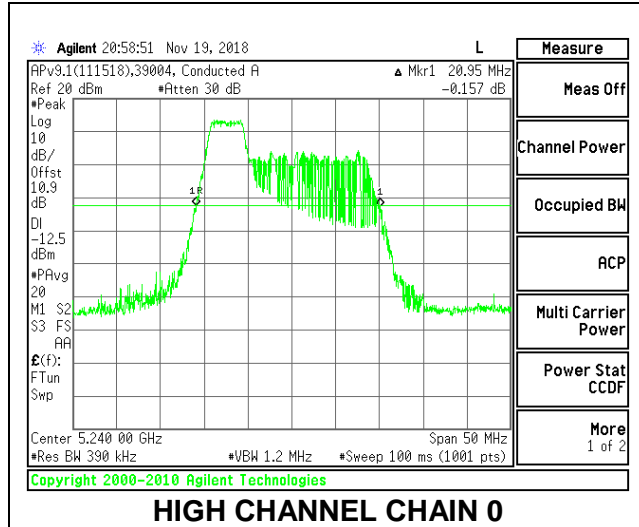
**LOW CHANNEL**



**MID CHANNEL**



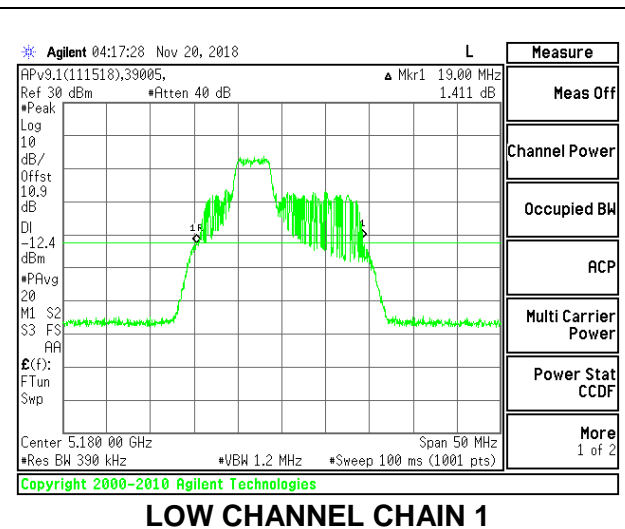
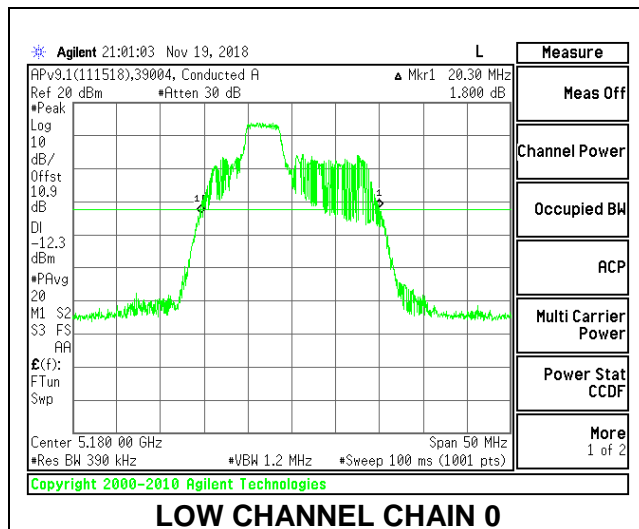
**HIGH CHANNEL**



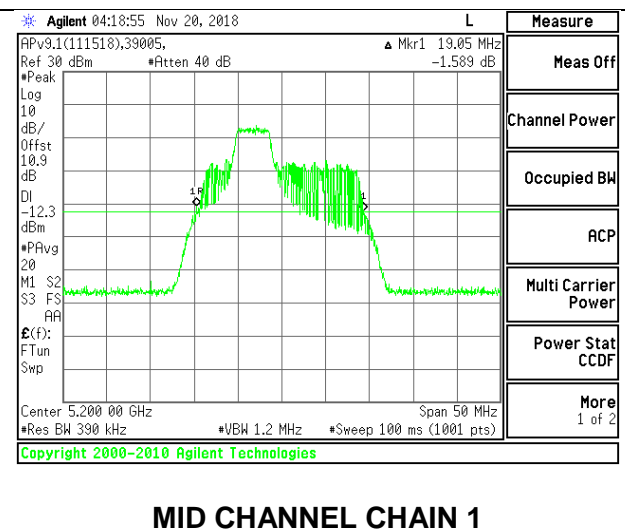
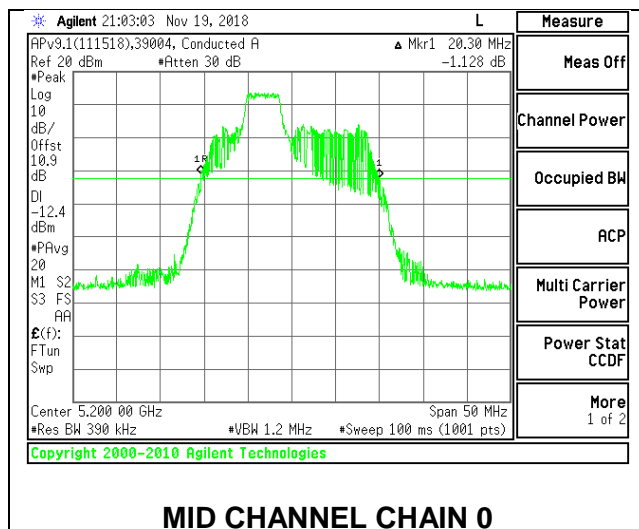
**2TX Antenna 1 + Antenna 2 OFDMA MODE – 52-Tones, RU Index 38**

| Channel | Frequency (MHz) | 26 dB Bandwidth Chain 0 (MHz) | 26 dB Bandwidth Chain 1 (MHz) |
|---------|-----------------|-------------------------------|-------------------------------|
| Low     | 5180            | 20.30                         | 19.00                         |
| Mid     | 5200            | 20.30                         | 19.05                         |
| High    | 5240            | 20.40                         | 19.10                         |

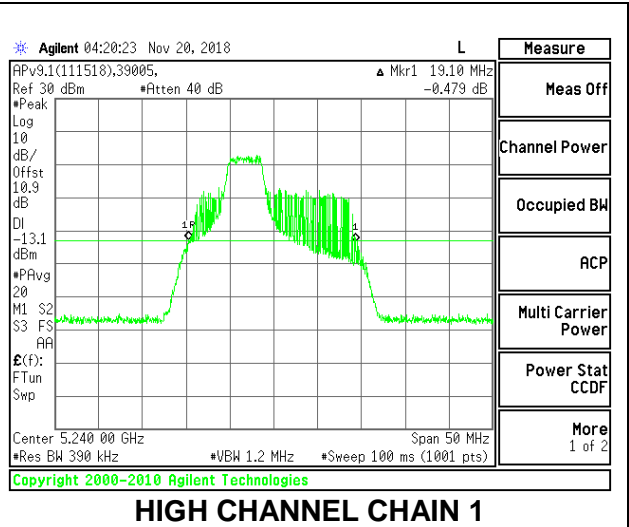
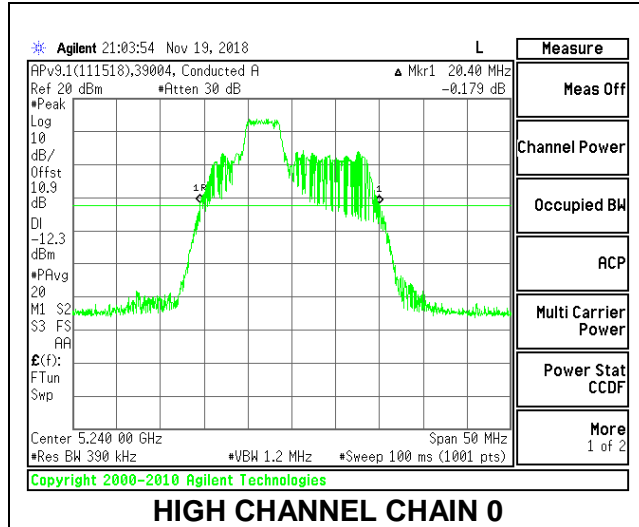
**LOW CHANNEL**



**MID CHANNEL**



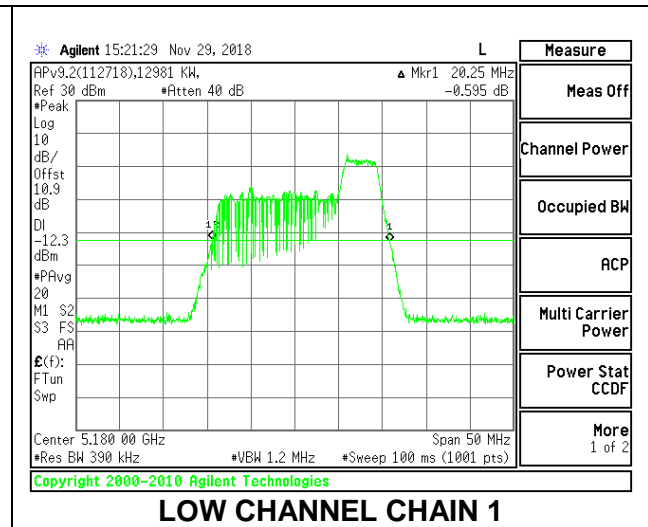
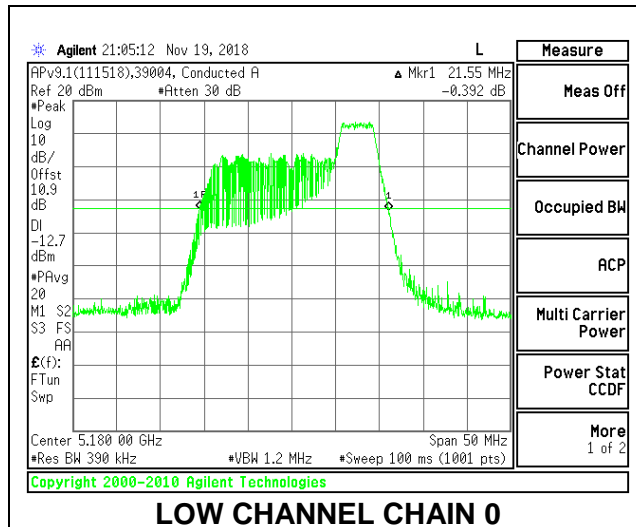
**HIGH CHANNEL**



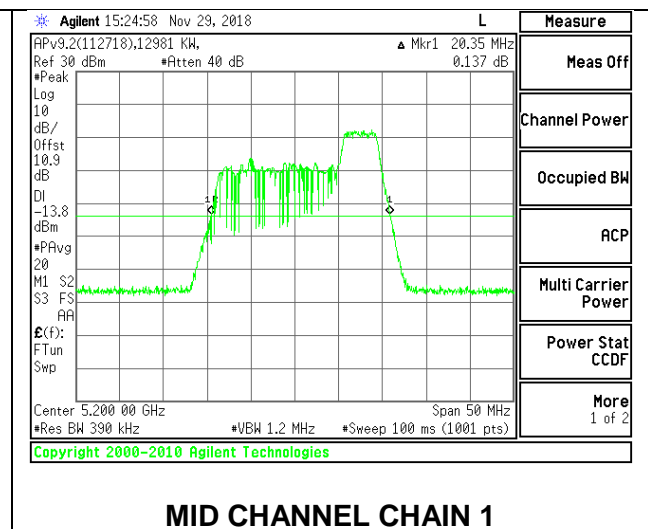
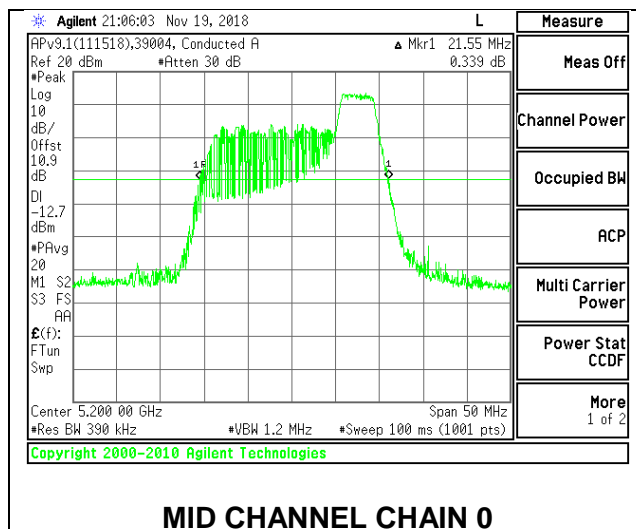
**2TX Antenna 1 + Antenna 2 OFDMA MODE – 52-Tones, RU Index 40**

| Channel | Frequency (MHz) | 26 dB Bandwidth Chain 0 (MHz) | 26 dB Bandwidth Chain 1 (MHz) |
|---------|-----------------|-------------------------------|-------------------------------|
| Low     | 5180            | 21.55                         | 20.25                         |
| Mid     | 5200            | 21.55                         | 20.35                         |
| High    | 5240            | 21.50                         | 20.45                         |

**LOW CHANNEL**

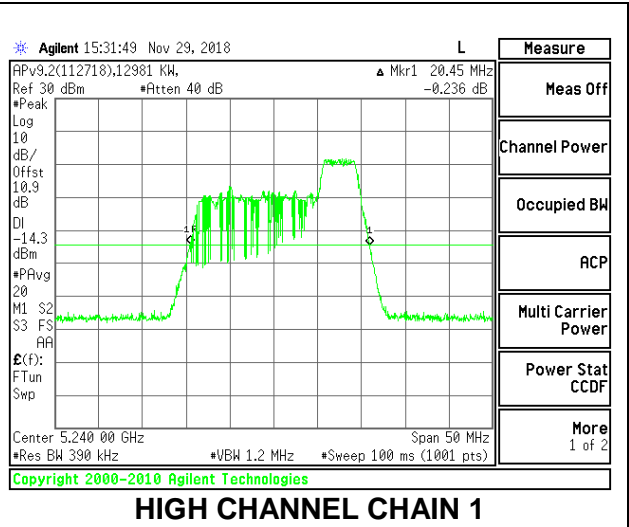
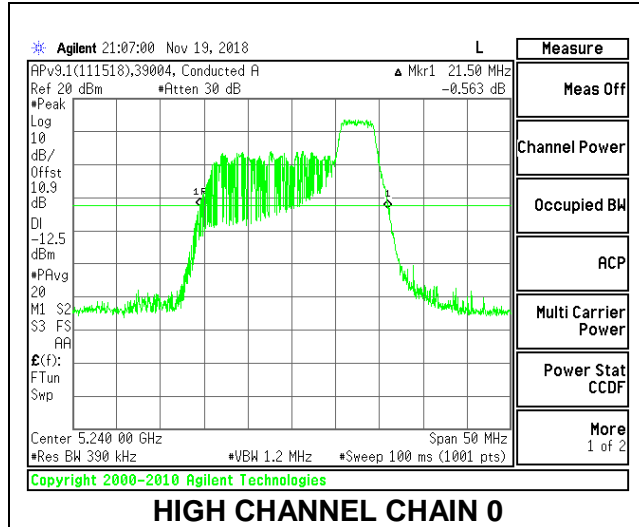


**MID CHANNEL**





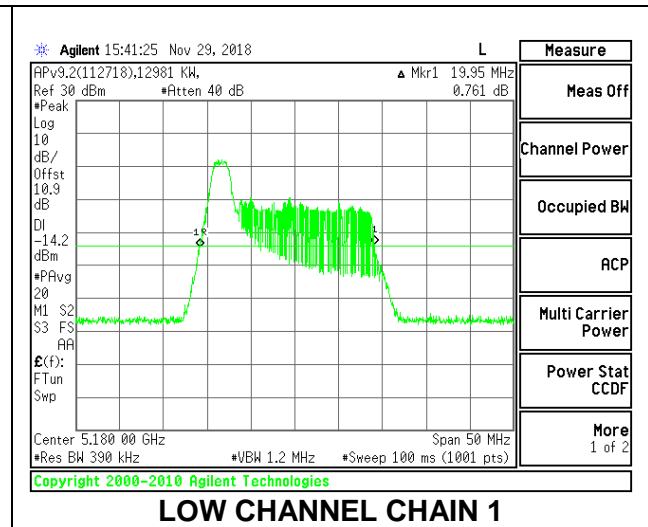
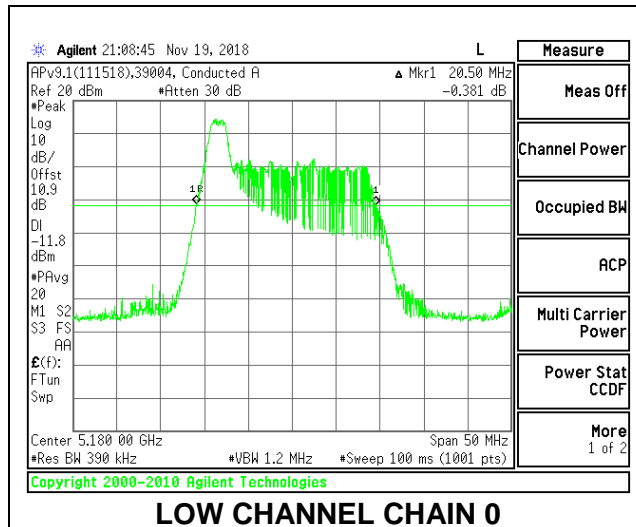
### HIGH CHANNEL



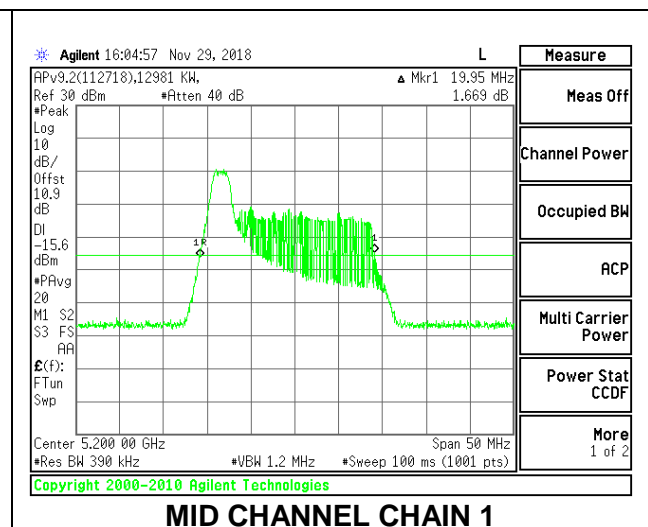
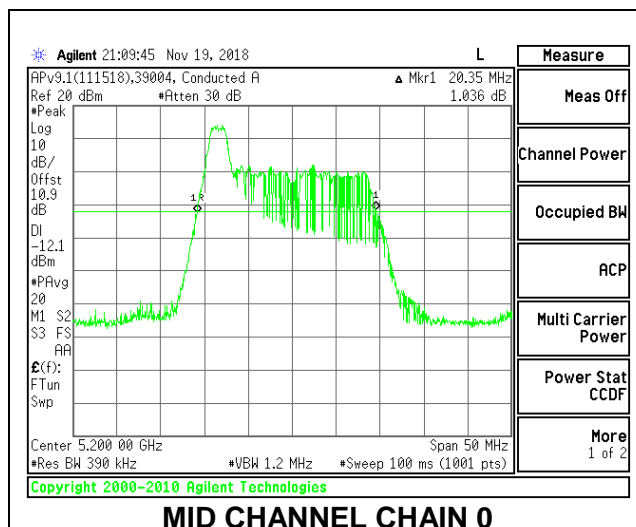
**2TX Antenna 1 + Antenna 2 OFDMA MODE – 26-Tones, RU Index 0**

| Channel | Frequency (MHz) | 26 dB Bandwidth Chain 0 (MHz) | 26 dB Bandwidth Chain 1 (MHz) |
|---------|-----------------|-------------------------------|-------------------------------|
| Low     | 5180            | 20.50                         | 19.95                         |
| Mid     | 5200            | 20.35                         | 19.95                         |
| High    | 5240            | 20.50                         | 19.95                         |

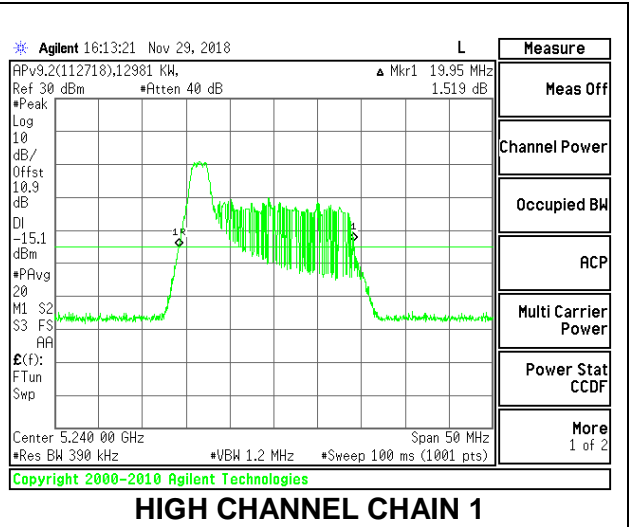
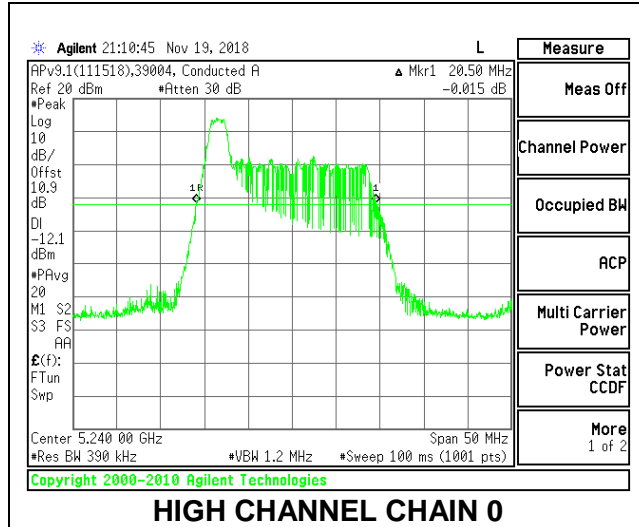
**LOW CHANNEL**



**MID CHANNEL**



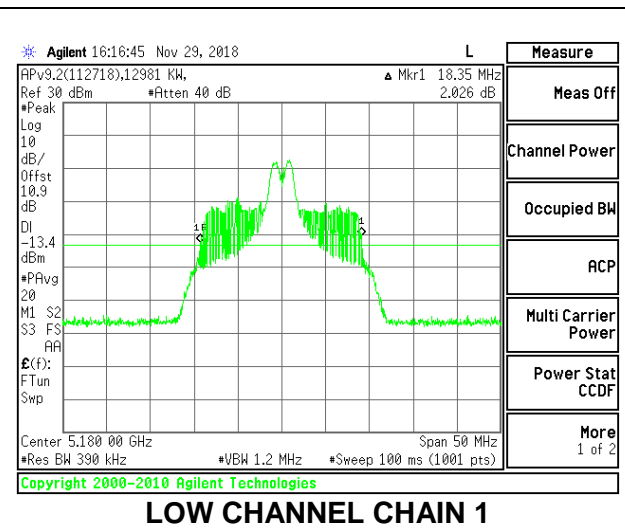
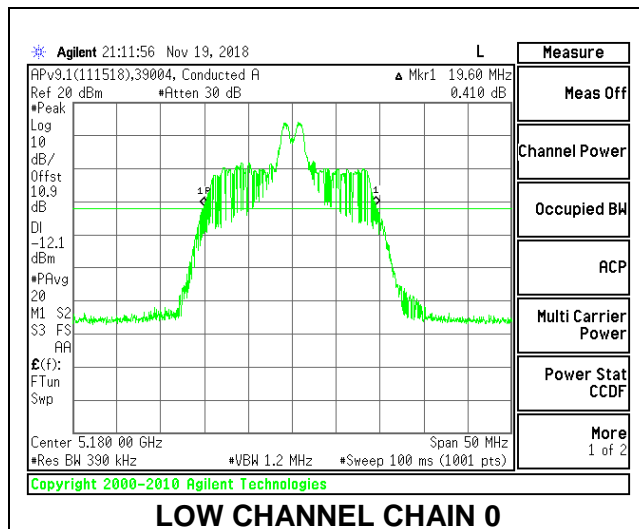
**HIGH CHANNEL**



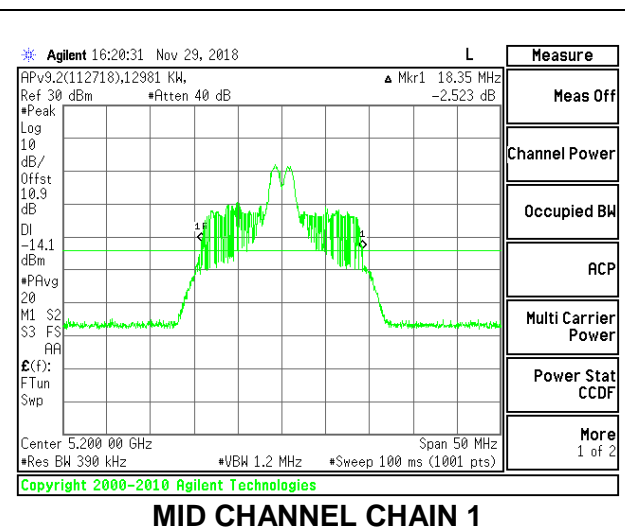
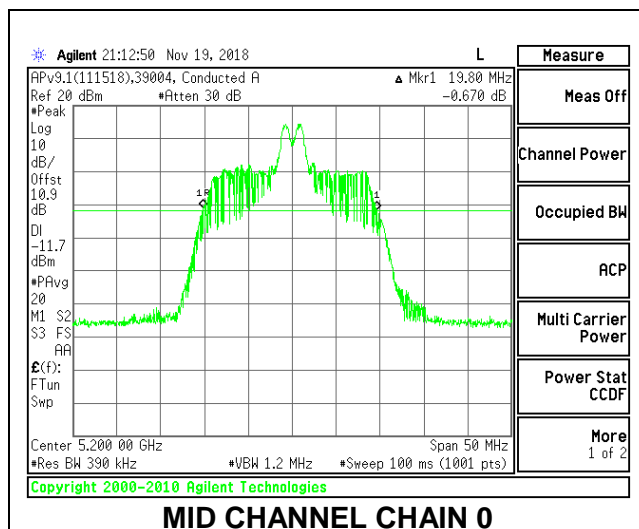
**2TX Antenna 1 + Antenna 2 OFDMA MODE – 26-Tones, RU Index 4**

| Channel | Frequency (MHz) | 26 dB Bandwidth Chain 0 (MHz) | 26 dB Bandwidth Chain 1 (MHz) |
|---------|-----------------|-------------------------------|-------------------------------|
| Low     | 5180            | 19.60                         | 18.35                         |
| Mid     | 5200            | 19.80                         | 18.35                         |
| High    | 5240            | 19.70                         | 18.50                         |

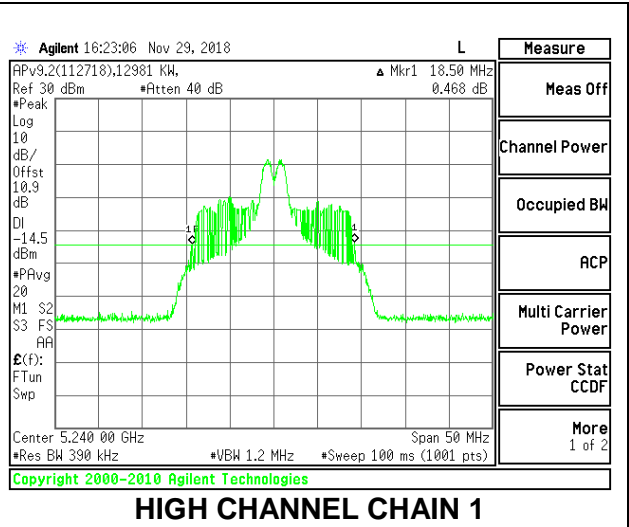
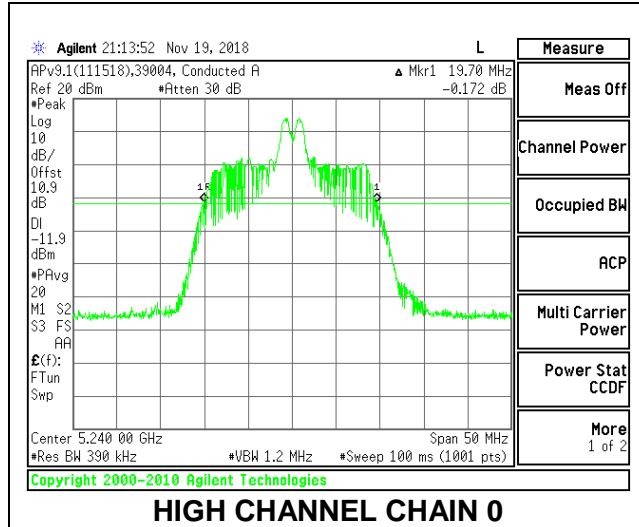
**LOW CHANNEL**



**MID CHANNEL**



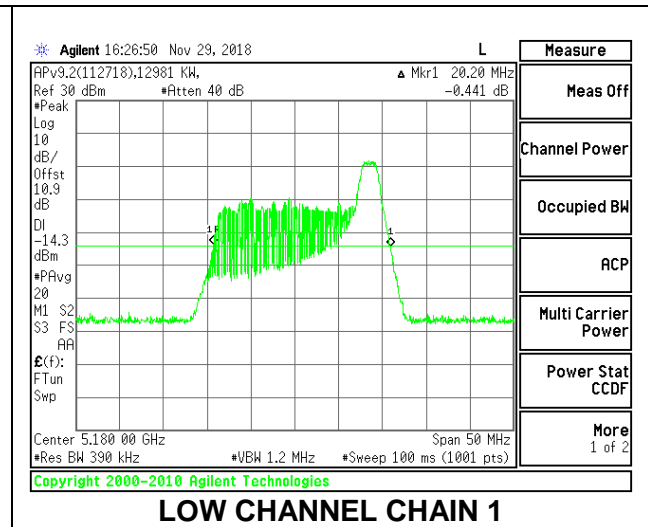
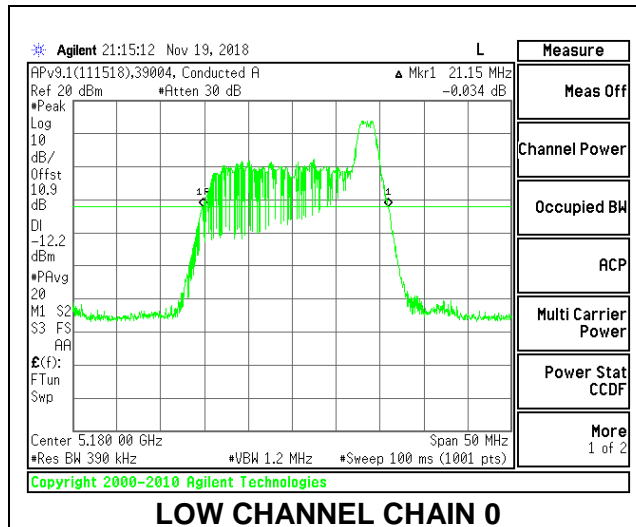
**HIGH CHANNEL**



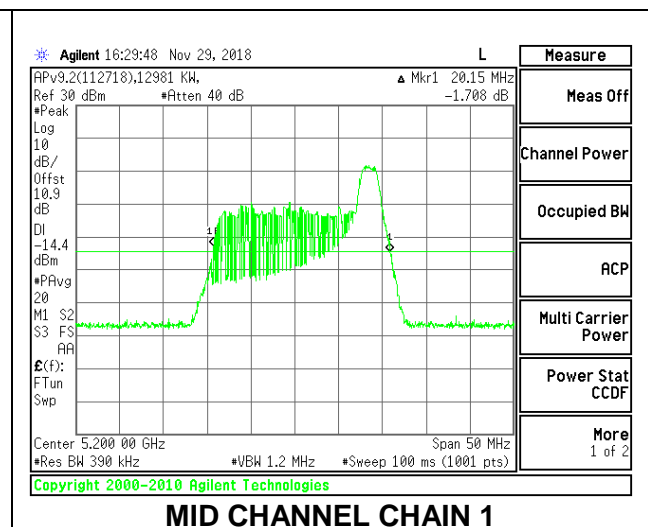
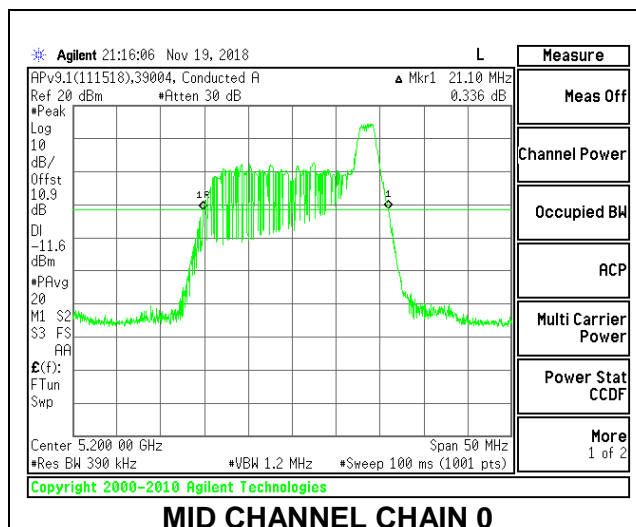
**2TX Antenna 1 + Antenna 2 OFDMA MODE – 26-Tones, RU Index 8**

| Channel | Frequency (MHz) | 26 dB Bandwidth Chain 0 (MHz) | 26 dB Bandwidth Chain 1 (MHz) |
|---------|-----------------|-------------------------------|-------------------------------|
| Low     | 5180            | 21.15                         | 20.20                         |
| Mid     | 5200            | 21.10                         | 20.15                         |
| High    | 5240            | 21.05                         | 20.20                         |

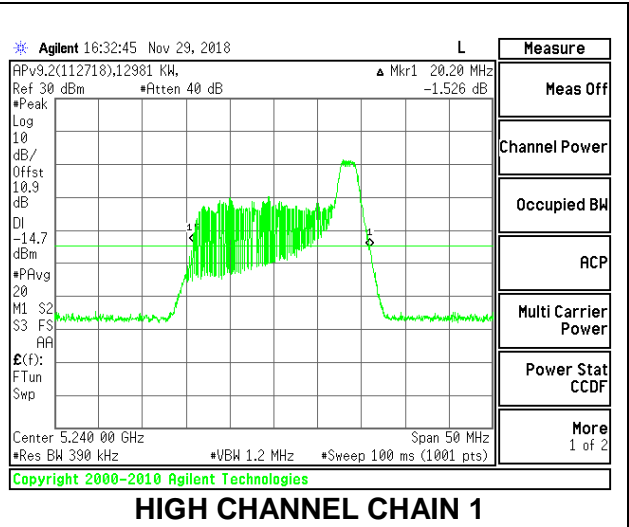
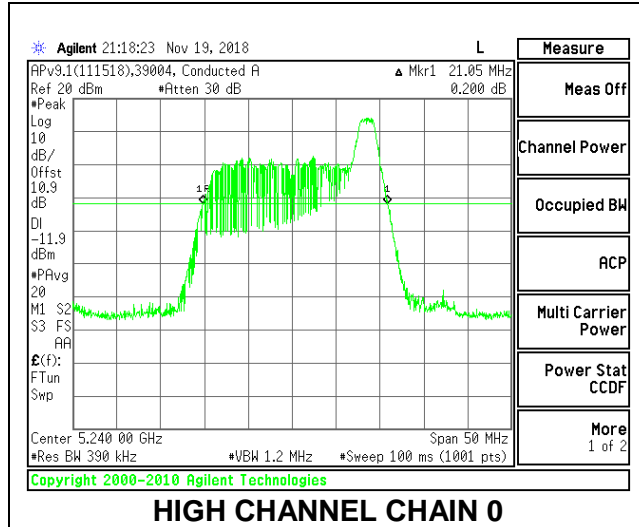
**LOW CHANNEL**



**MID CHANNEL**



### HIGH CHANNEL

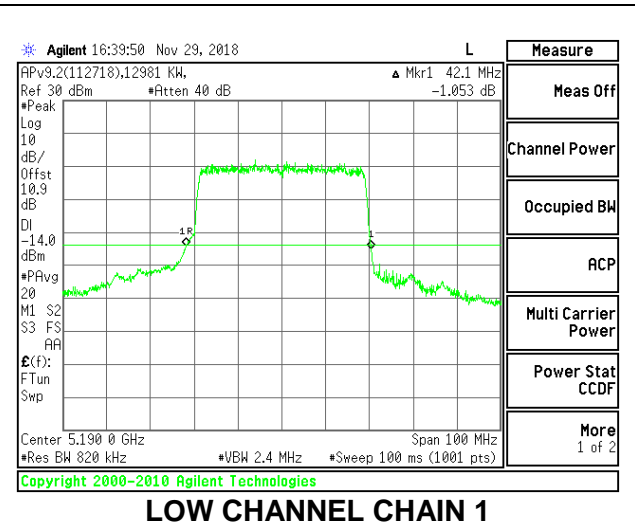
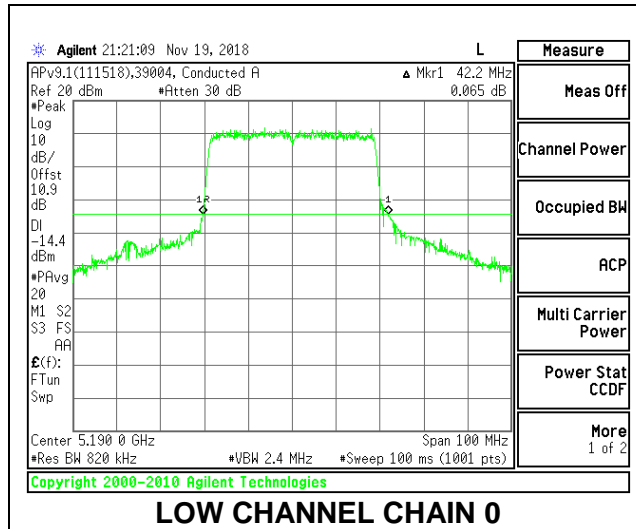


### 9.2.6. 802.11ax HE40 MODE IN THE 5.2 GHz BAND

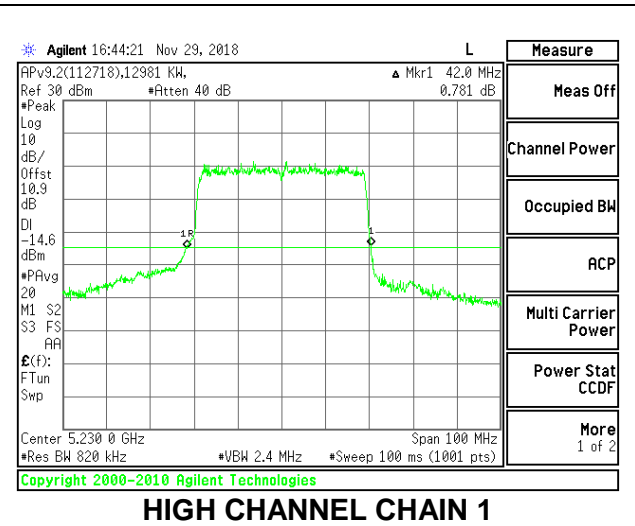
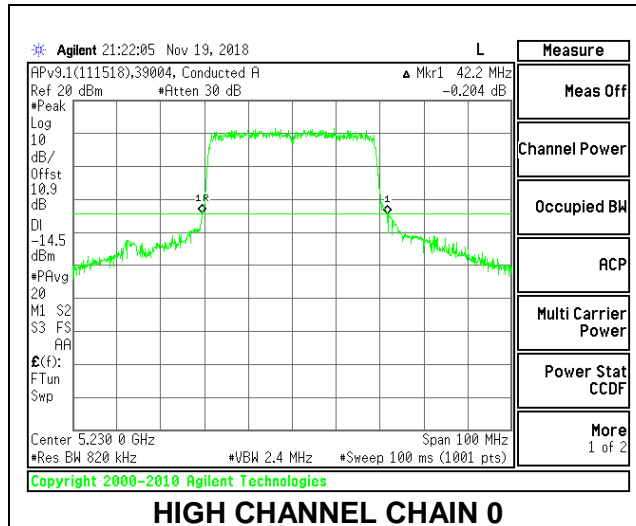
#### 2TX Antenna 1 + Antenna 2 OFDMA MODE – 484-Tones, RU Index 65

| Channel | Frequency<br>(MHz) | 26 dB Bandwidth<br>Chain 0<br>(MHz) | 26 dB Bandwidth<br>Chain 1<br>(MHz) |
|---------|--------------------|-------------------------------------|-------------------------------------|
| Low     | 5190               | 42.20                               | 42.10                               |
| High    | 5230               | 42.20                               | 42.00                               |

#### LOW CHANNEL



#### HIGH CHANNEL

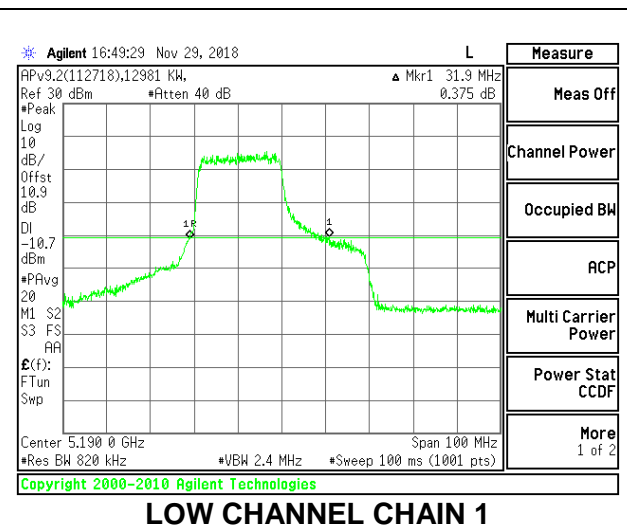
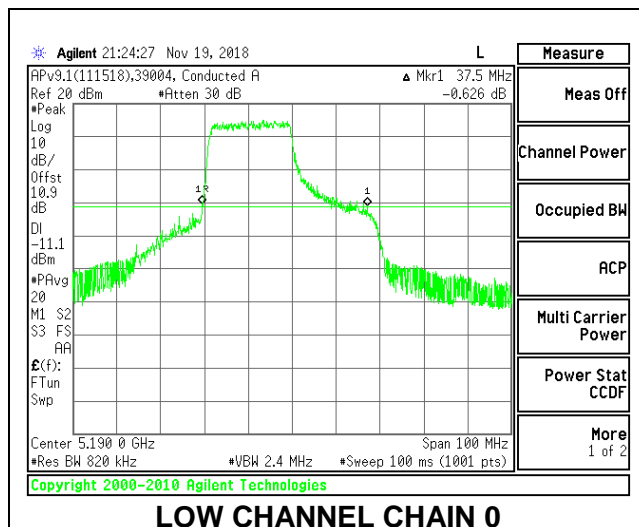




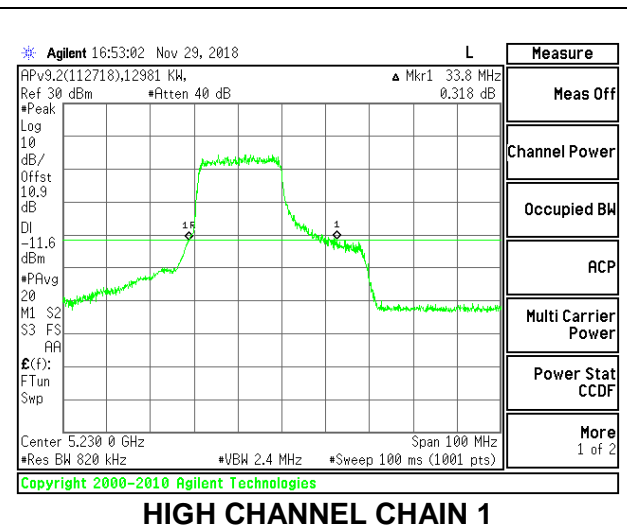
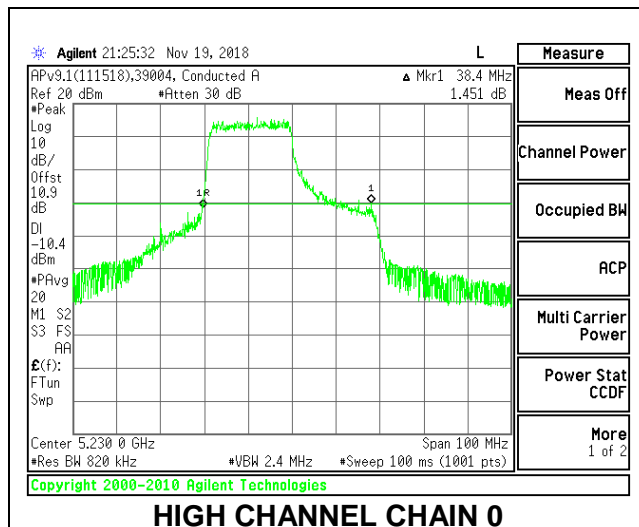
**2TX Antenna 1 + Antenna 2 OFDMA MODE – 242-Tones, RU Index 61**

| Channel | Frequency (MHz) | 26 dB Bandwidth Chain 0 (MHz) | 26 dB Bandwidth Chain 1 (MHz) |
|---------|-----------------|-------------------------------|-------------------------------|
| Low     | 5190            | 37.50                         | 31.90                         |
| High    | 5230            | 38.40                         | 33.80                         |

**LOW CHANNEL**



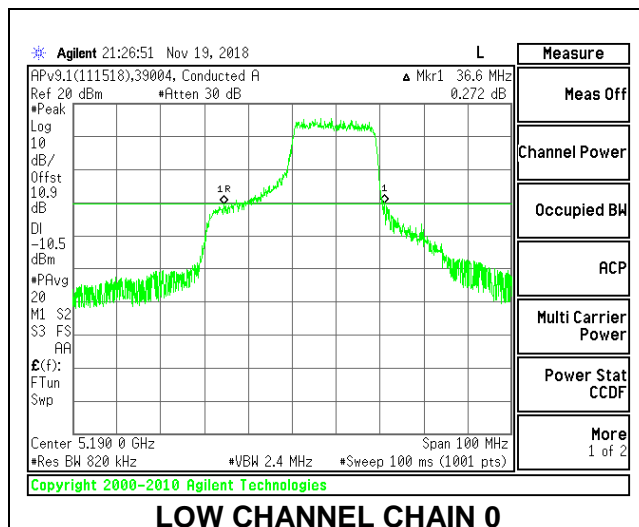
**HIGH CHANNEL**



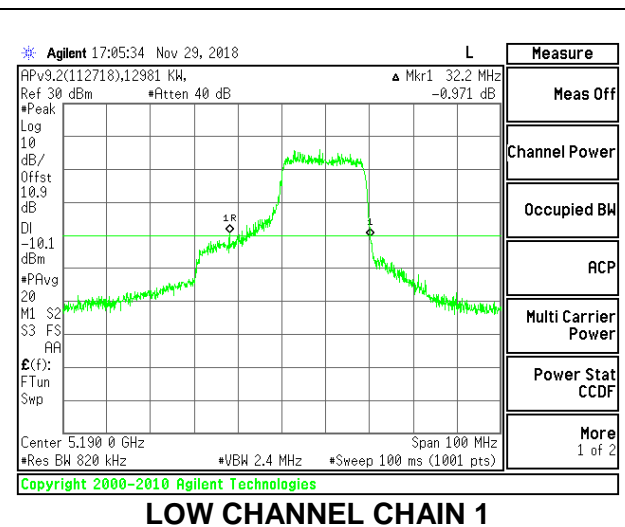
**2TX Antenna 1 + Antenna 2 OFDMA MODE – 242-Tones, RU Index 62**

| Channel | Frequency<br>(MHz) | 26 dB Bandwidth<br>Chain 0<br>(MHz) | 26 dB Bandwidth<br>Chain 1<br>(MHz) |
|---------|--------------------|-------------------------------------|-------------------------------------|
| Low     | 5190               | 36.60                               | 32.20                               |
| High    | 5230               | 38.10                               | 33.20                               |

**LOW CHANNEL**

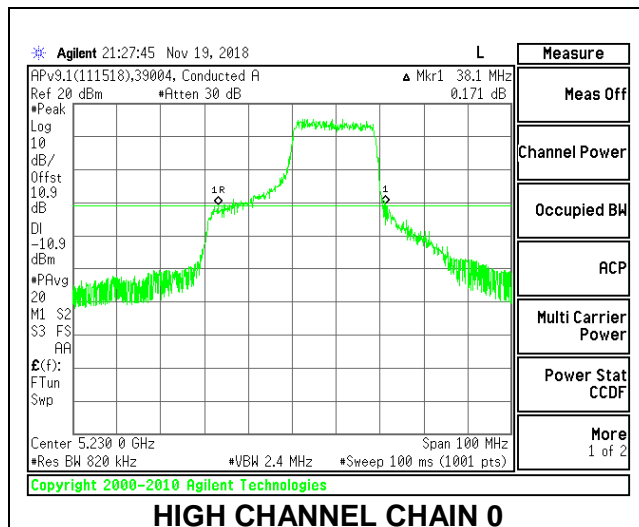


**LOW CHANNEL CHAIN 0**

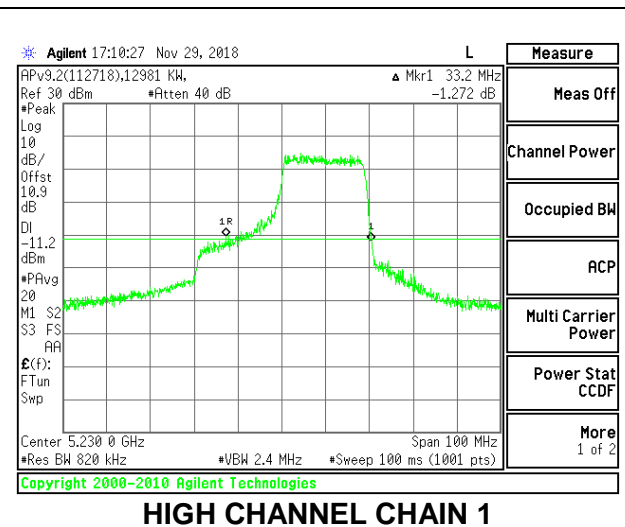


**LOW CHANNEL CHAIN 1**

**HIGH CHANNEL**



**HIGH CHANNEL CHAIN 0**

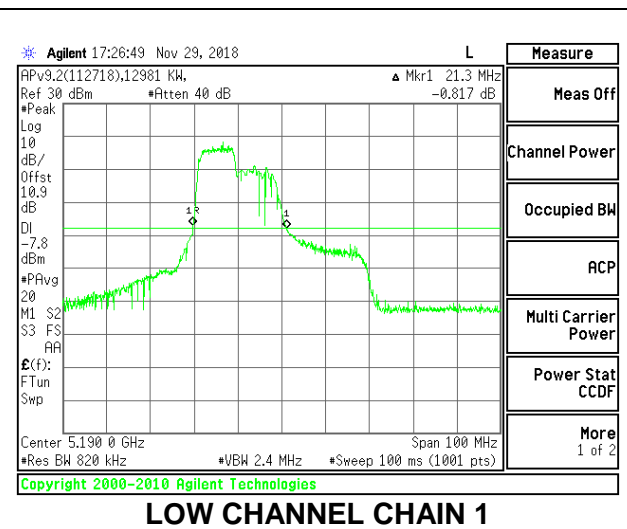
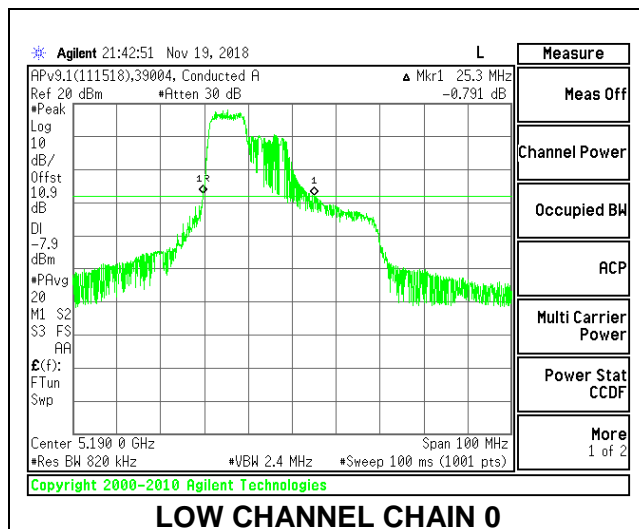


**HIGH CHANNEL CHAIN 1**

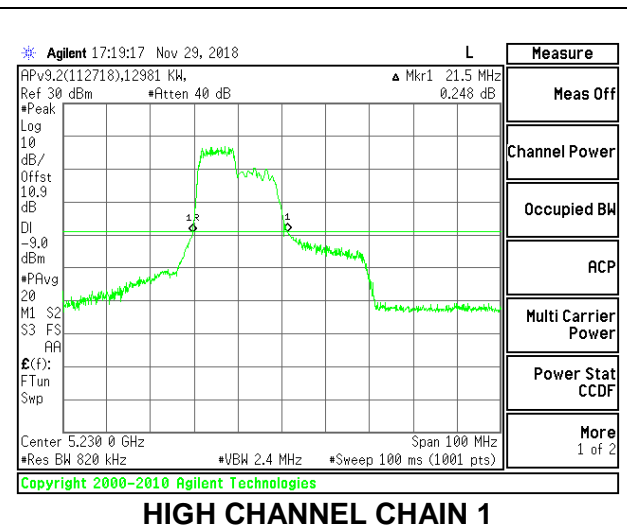
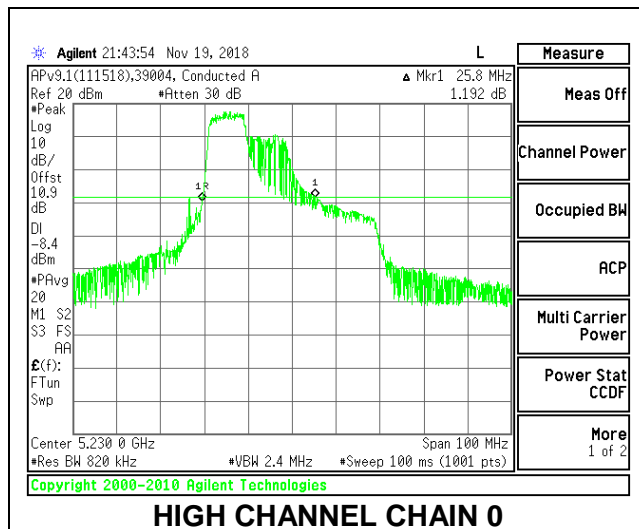
**2TX Antenna 1 + Antenna 2 OFDMA MODE – 106-Tones, RU Index 53**

| Channel | Frequency (MHz) | 26 dB Bandwidth Chain 0 (MHz) | 26 dB Bandwidth Chain 1 (MHz) |
|---------|-----------------|-------------------------------|-------------------------------|
| Low     | 5190            | 25.30                         | 21.30                         |
| High    | 5230            | 25.80                         | 21.50                         |

**LOW CHANNEL**



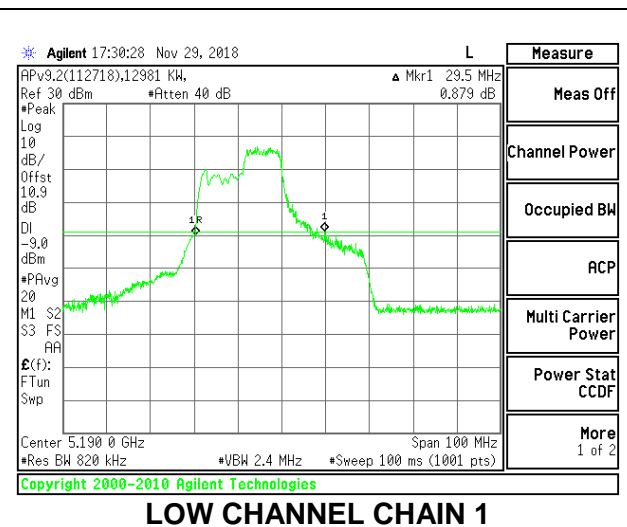
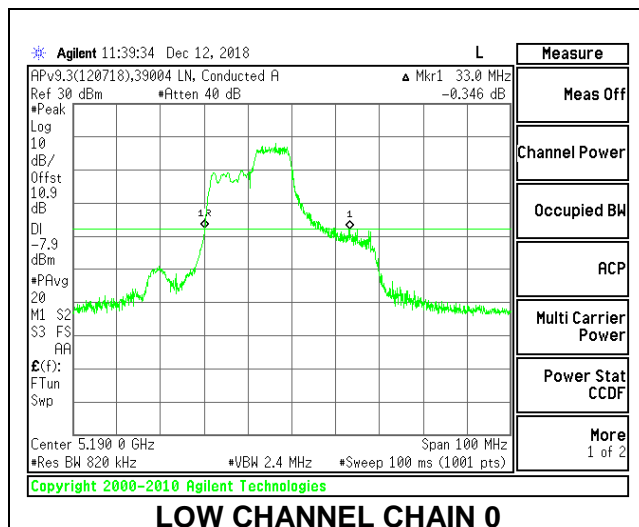
**HIGH CHANNEL**



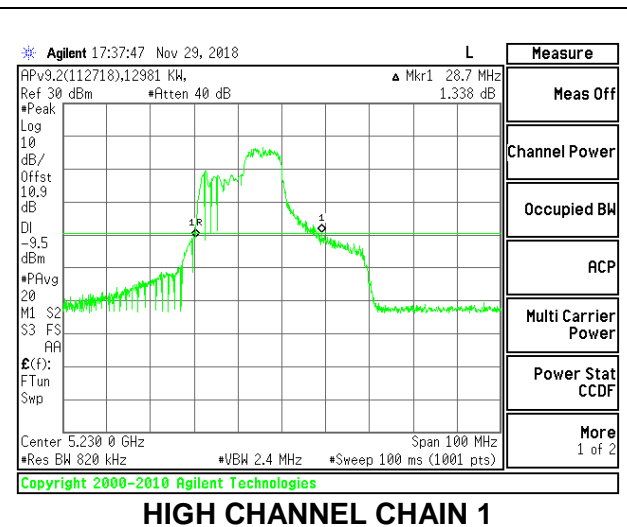
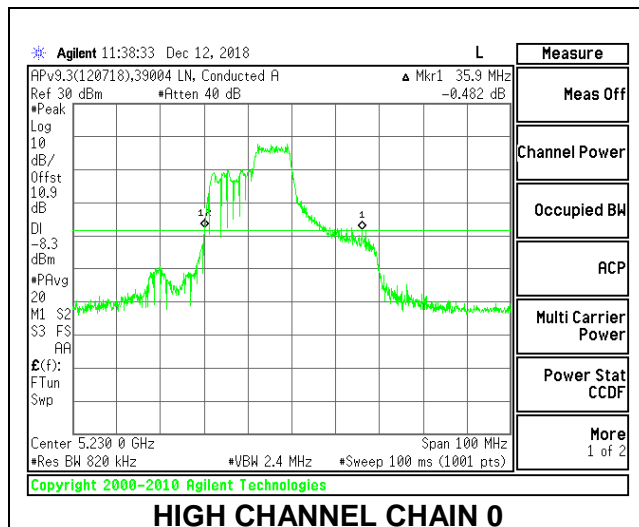
**2TX Antenna 1 + Antenna 2 OFDMA MODE – 106-Tones, RU Index 54**

| Channel | Frequency (MHz) | 26 dB Bandwidth Chain 0 (MHz) | 26 dB Bandwidth Chain 1 (MHz) |
|---------|-----------------|-------------------------------|-------------------------------|
| Low     | 5190            | 33.00                         | 29.50                         |
| High    | 5230            | 35.90                         | 28.70                         |

**LOW CHANNEL**



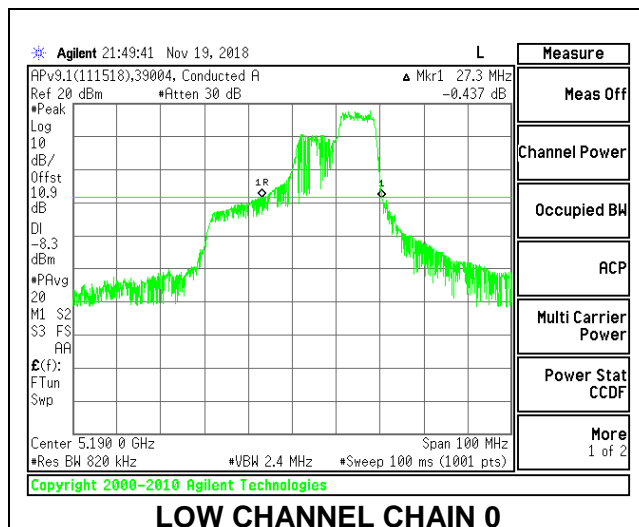
**HIGH CHANNEL**



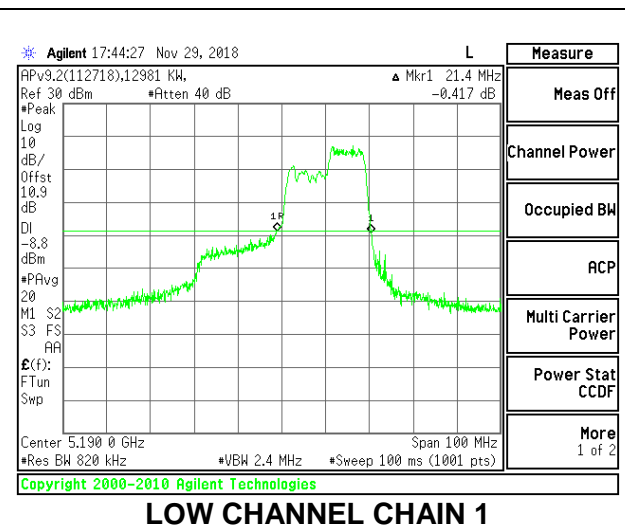
**2TX Antenna 1 + Antenna 2 OFDMA MODE – 106-Tones, RU Index 56**

| Channel | Frequency<br>(MHz) | 26 dB Bandwidth<br>Chain 0<br>(MHz) | 26 dB Bandwidth<br>Chain 1<br>(MHz) |
|---------|--------------------|-------------------------------------|-------------------------------------|
| Low     | 5190               | 21.50                               | 21.50                               |
| High    | 5230               | 21.60                               | 21.40                               |

**LOW CHANNEL**

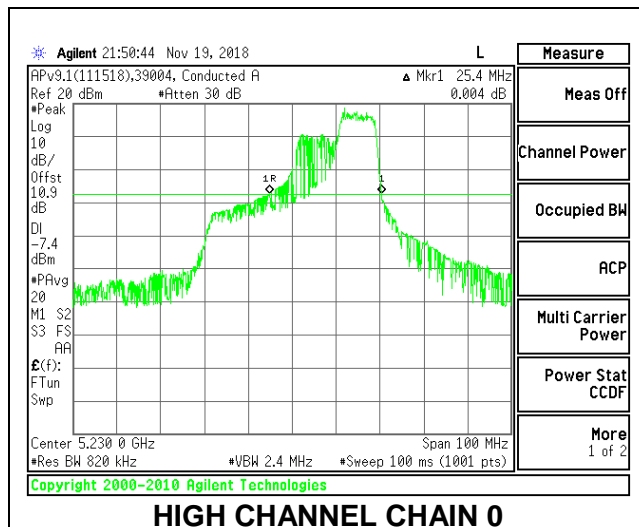


**LOW CHANNEL CHAIN 0**

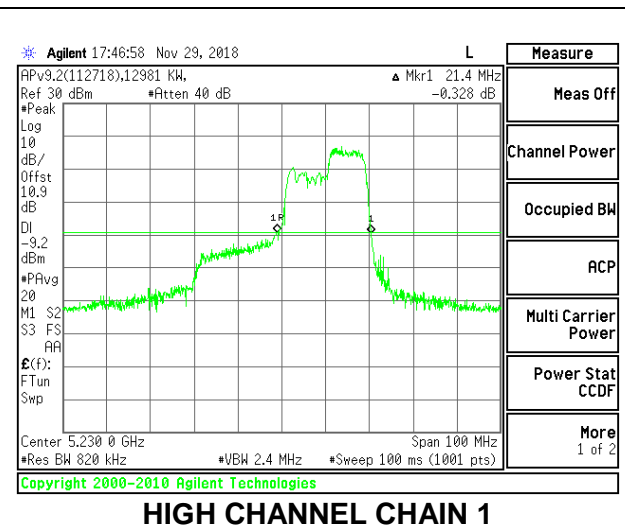


**LOW CHANNEL CHAIN 1**

**HIGH CHANNEL**



**HIGH CHANNEL CHAIN 0**

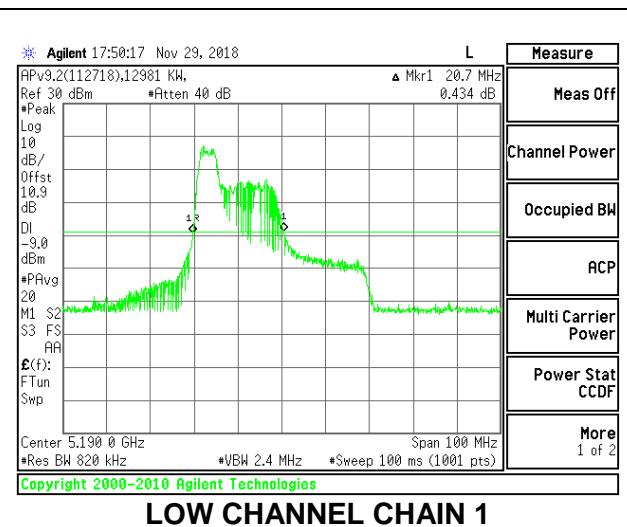
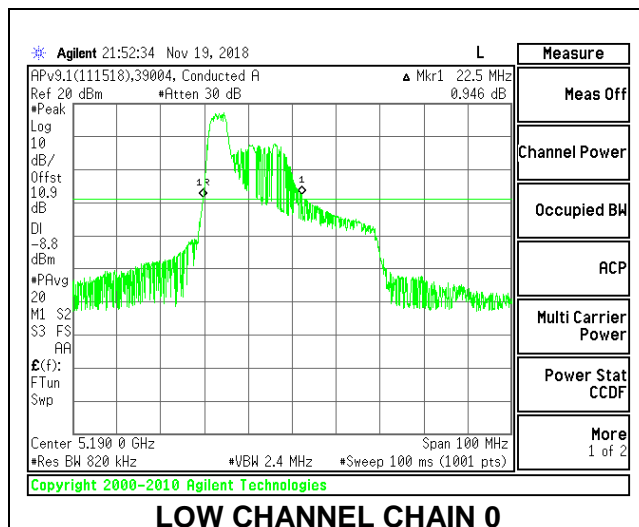


**HIGH CHANNEL CHAIN 1**

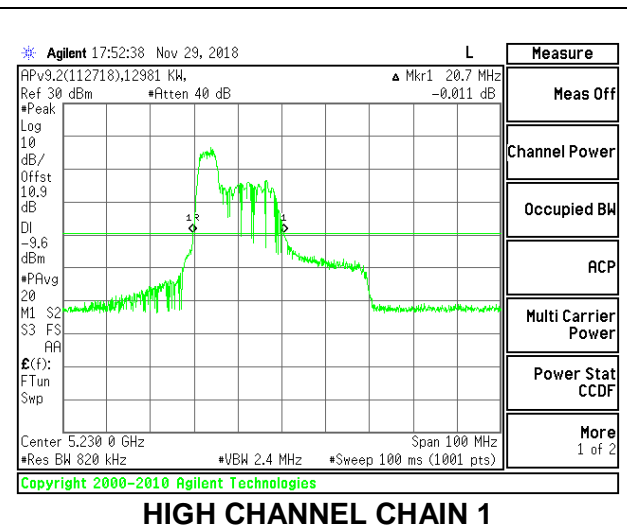
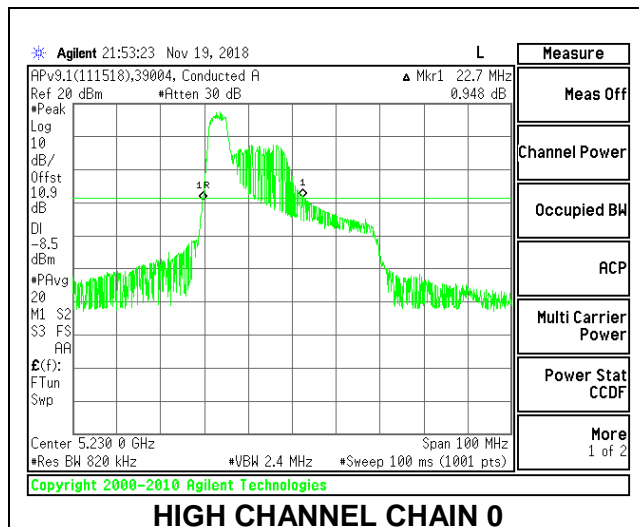
**2TX Antenna 1 + Antenna 2 OFDMA MODE – 52-Tones, RU Index 37**

| Channel | Frequency<br>(MHz) | 26 dB Bandwidth<br>Chain 0<br>(MHz) | 26 dB Bandwidth<br>Chain 1<br>(MHz) |
|---------|--------------------|-------------------------------------|-------------------------------------|
| Low     | 5190               | 22.50                               | 20.70                               |
| High    | 5230               | 22.70                               | 20.70                               |

**LOW CHANNEL**



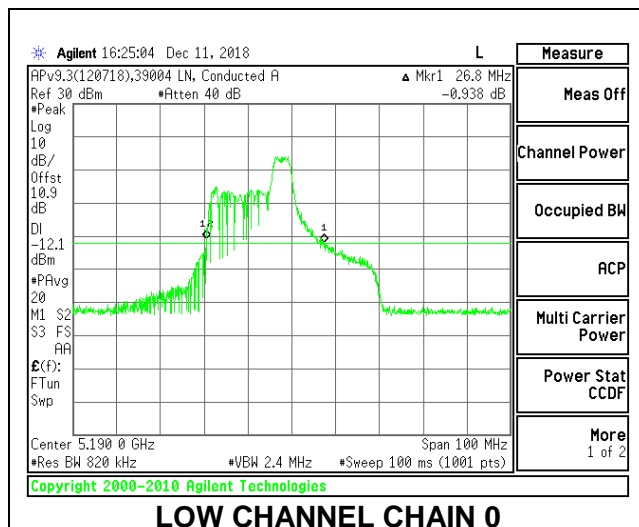
**HIGH CHANNEL**



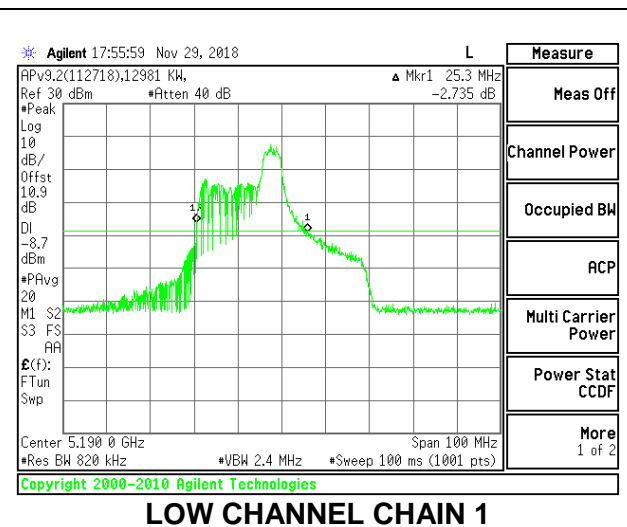
**2TX Antenna 1 + Antenna 2 OFDMA MODE – 52-Tones, RU Index 40**

| Channel | Frequency<br>(MHz) | 26 dB Bandwidth<br>Chain 0<br>(MHz) | 26 dB Bandwidth<br>Chain 1<br>(MHz) |
|---------|--------------------|-------------------------------------|-------------------------------------|
| Low     | 5190               | 26.80                               | 25.30                               |
| High    | 5230               | 25.20                               | 26.90                               |

**LOW CHANNEL**

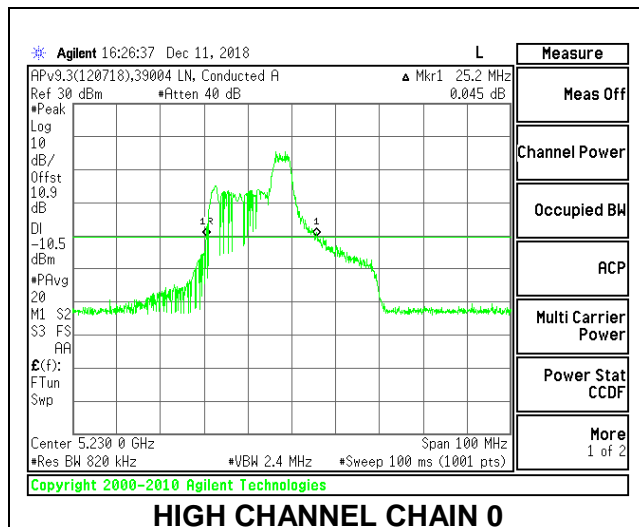


**LOW CHANNEL CHAIN 0**

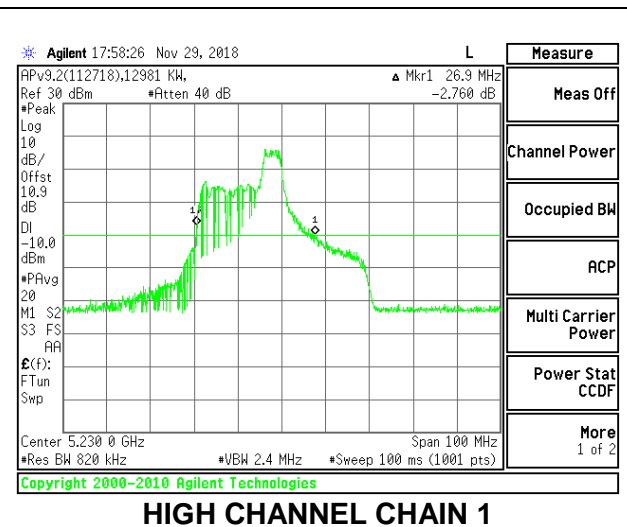


**LOW CHANNEL CHAIN 1**

**HIGH CHANNEL**



**HIGH CHANNEL CHAIN 0**

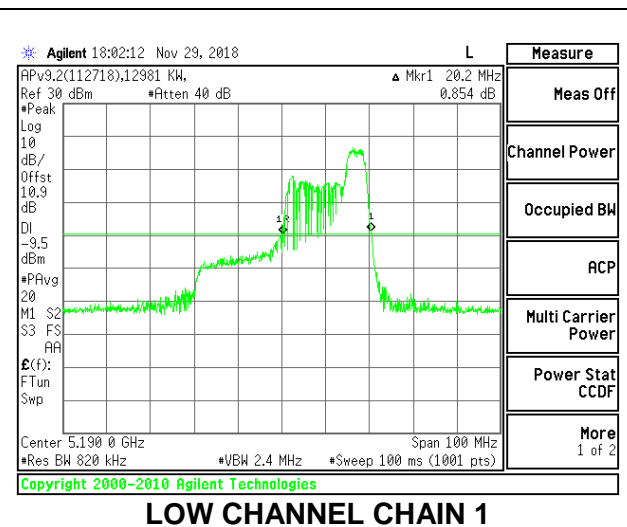
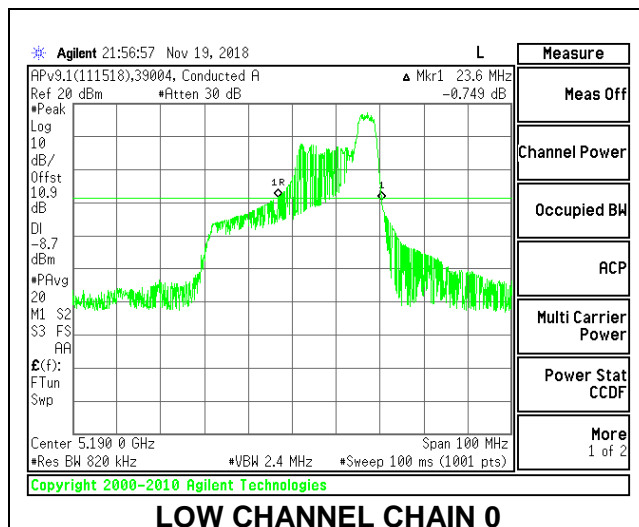


**HIGH CHANNEL CHAIN 1**

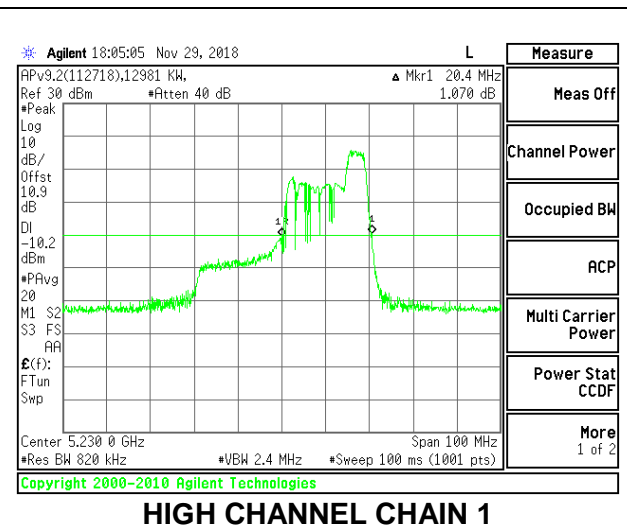
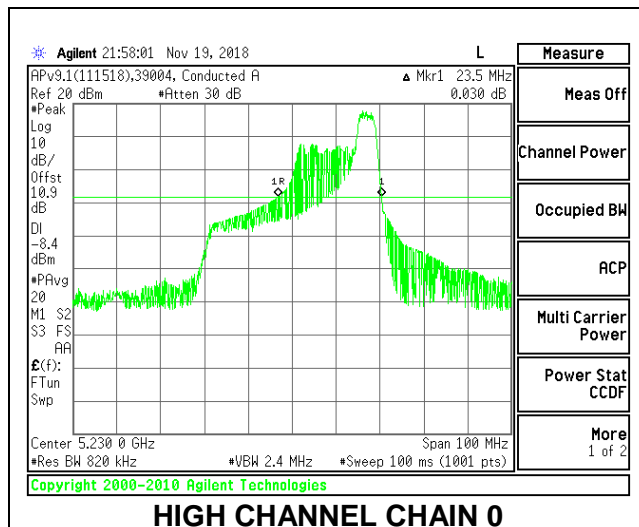
**2TX Antenna 1 + Antenna 2 OFDMA MODE – 52-Tones, RU Index 44**

| Channel | Frequency<br>(MHz) | 26 dB Bandwidth<br>Chain 0<br>(MHz) | 26 dB Bandwidth<br>Chain 1<br>(MHz) |
|---------|--------------------|-------------------------------------|-------------------------------------|
| Low     | 5190               | 23.60                               | 20.20                               |
| High    | 5230               | 23.50                               | 20.40                               |

**LOW CHANNEL**



**HIGH CHANNEL**

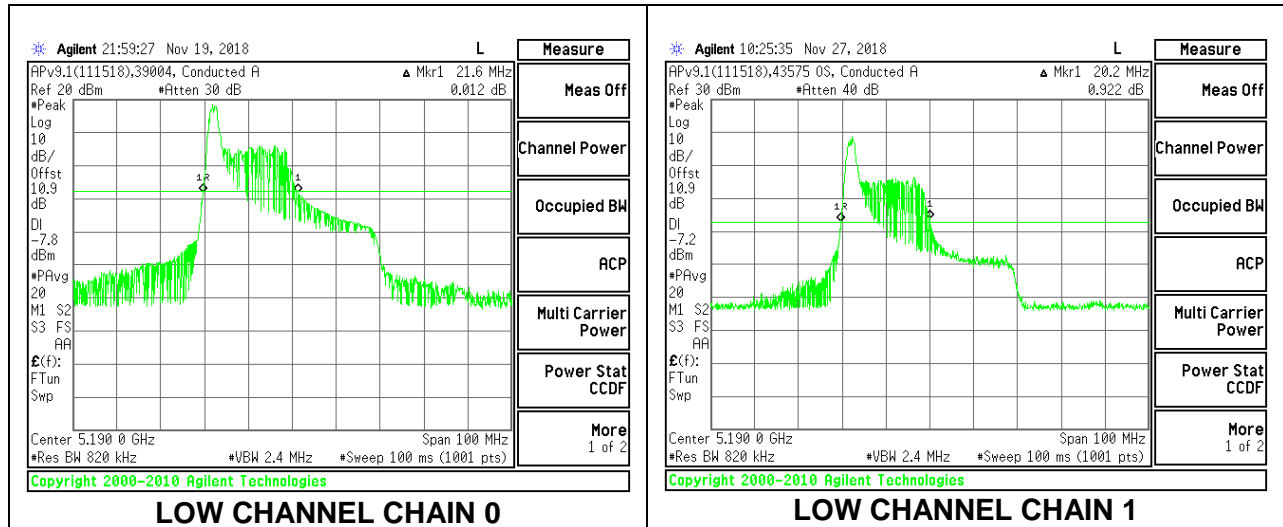




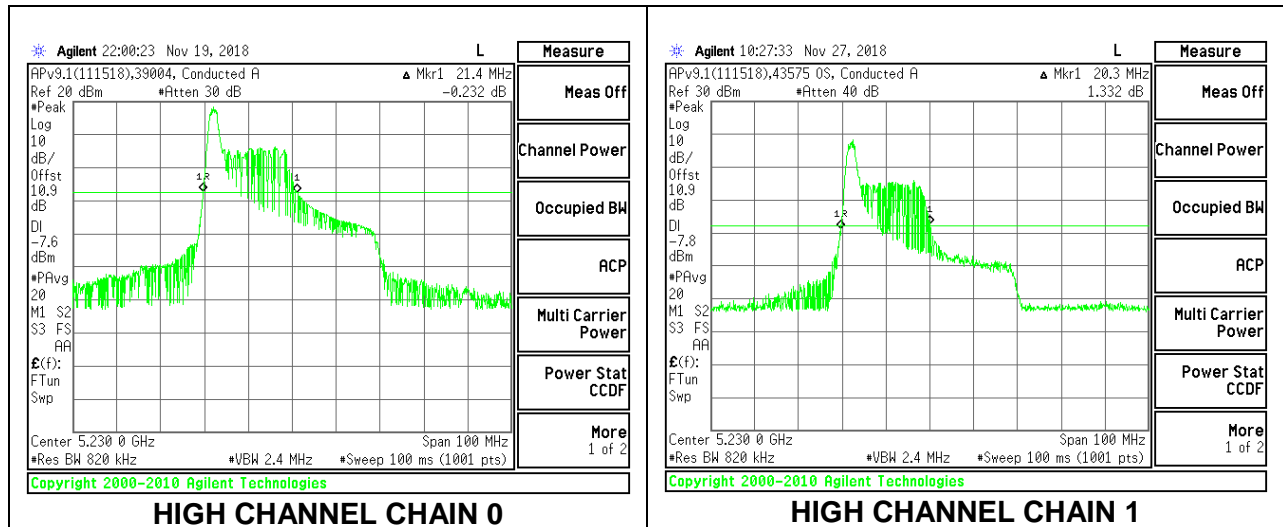
**2TX Antenna 1 + Antenna 2 OFDMA MODE – 26-Tones, RU Index 0**

| Channel | Frequency<br>(MHz) | 26 dB Bandwidth<br>Chain 0<br>(MHz) | 26 dB Bandwidth<br>Chain 1<br>(MHz) |
|---------|--------------------|-------------------------------------|-------------------------------------|
| Low     | 5190               | 21.60                               | 20.20                               |
| High    | 5230               | 21.40                               | 20.30                               |

**LOW CHANNEL**



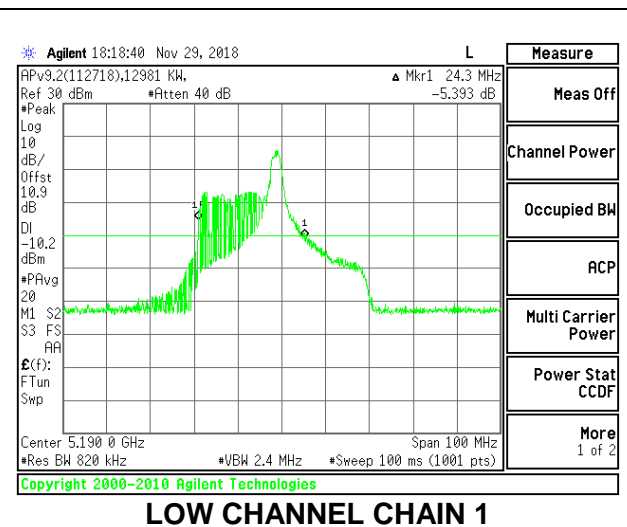
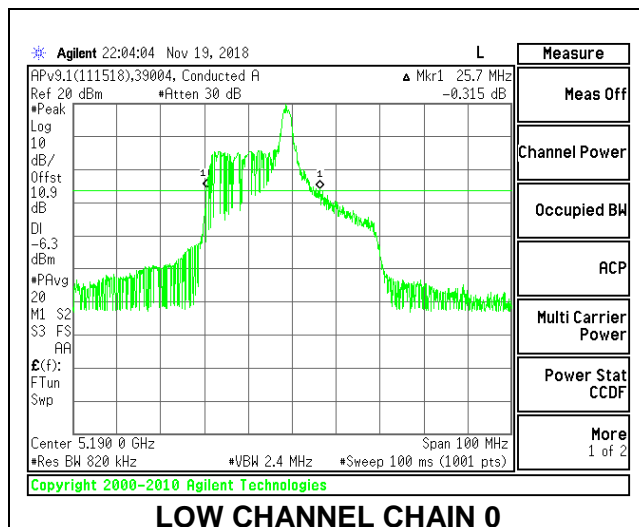
**HIGH CHANNEL**



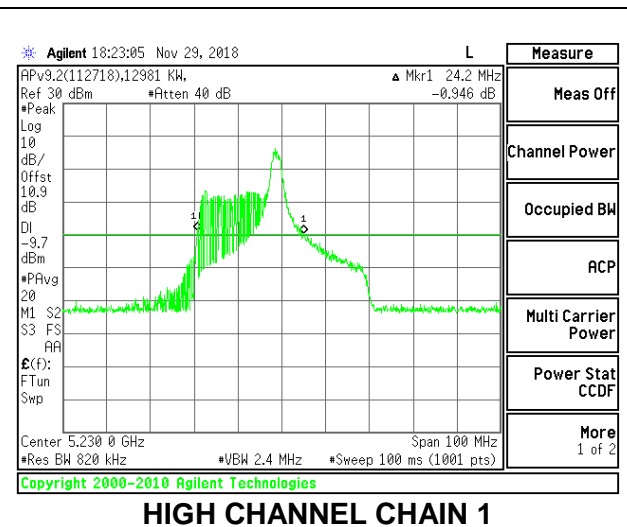
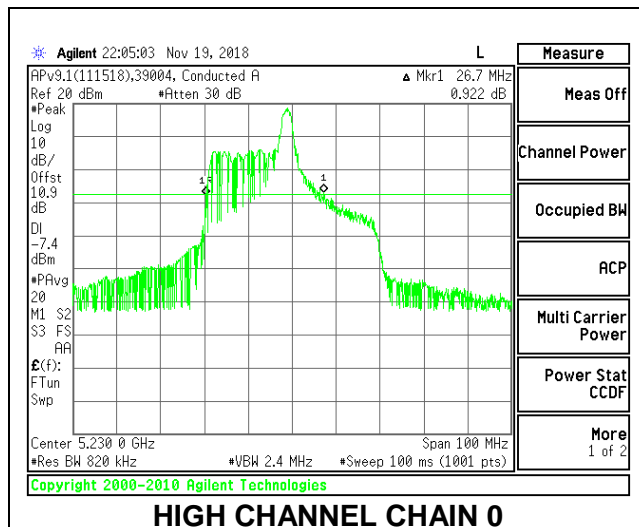
**2TX Antenna 1 + Antenna 2 OFDMA MODE – 26-Tones, RU Index 8**

| Channel | Frequency<br>(MHz) | 26 dB Bandwidth<br>Chain 0<br>(MHz) | 26 dB Bandwidth<br>Chain 1<br>(MHz) |
|---------|--------------------|-------------------------------------|-------------------------------------|
| Low     | 5190               | 25.70                               | 24.30                               |
| High    | 5230               | 26.70                               | 24.20                               |

**LOW CHANNEL**



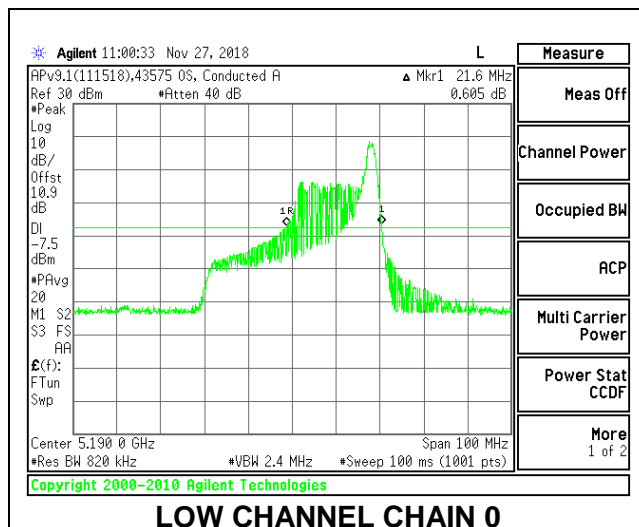
**HIGH CHANNEL**



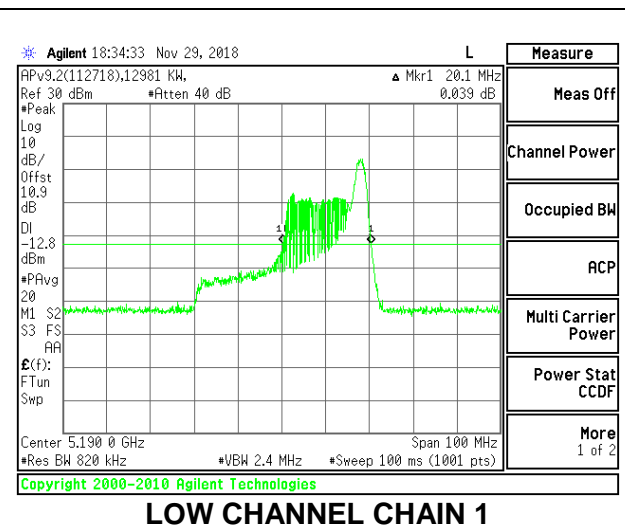
**2TX Antenna 1 + Antenna 2 OFDMA MODE – 26-Tones, RU Index 17**

| Channel | Frequency (MHz) | 26 dB Bandwidth Chain 0 (MHz) | 26 dB Bandwidth Chain 1 (MHz) |
|---------|-----------------|-------------------------------|-------------------------------|
| Low     | 5190            | 21.60                         | 20.10                         |
| High    | 5230            | 22.20                         | 19.80                         |

**LOW CHANNEL**

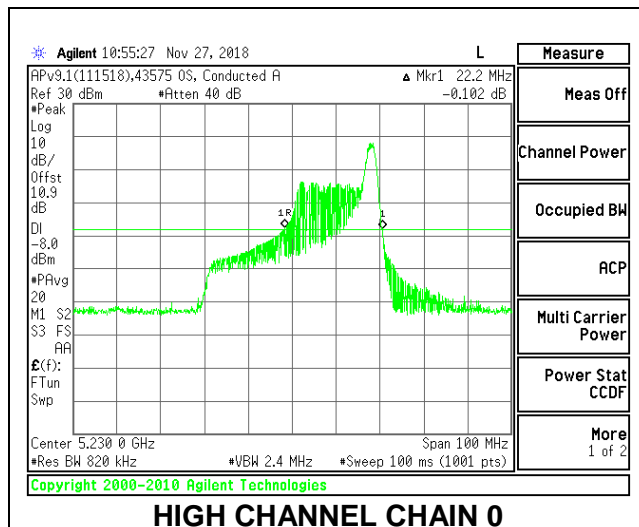


**LOW CHANNEL CHAIN 0**

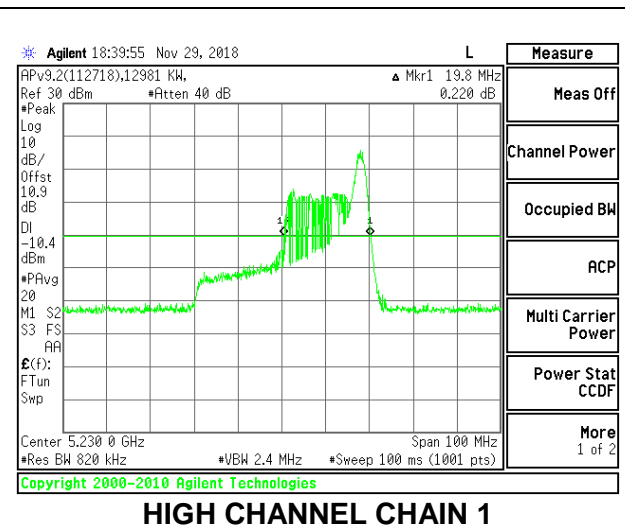


**LOW CHANNEL CHAIN 1**

**HIGH CHANNEL**



**HIGH CHANNEL CHAIN 0**



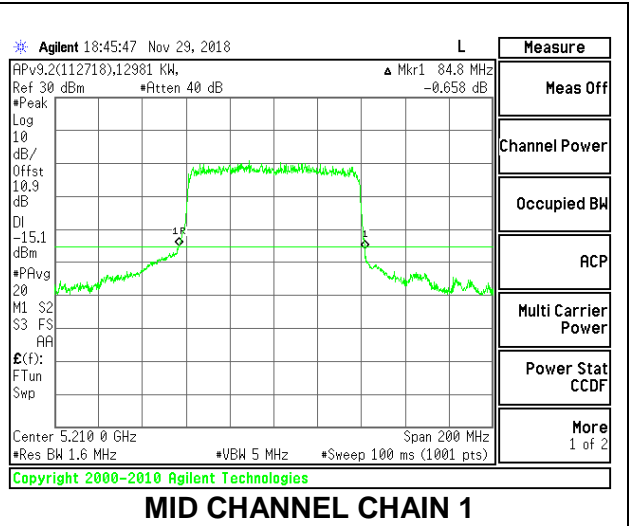
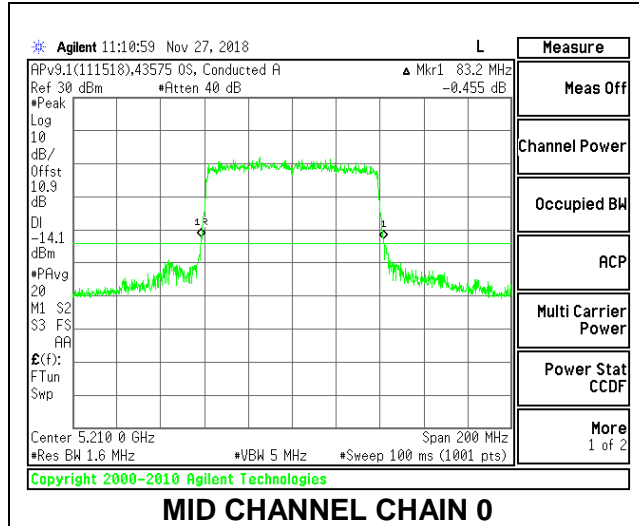
**HIGH CHANNEL CHAIN 1**

**9.2.7. 802.11ax HE80 MODE IN THE 5.2 GHz BAND**

**2TX Antenna 1 + Antenna 2 OFDMA MODE – 996-Tones, RU Index 67**

| Channel | Frequency<br>(MHz) | 26 dB Bandwidth  |                  |
|---------|--------------------|------------------|------------------|
|         |                    | Chain 0<br>(MHz) | Chain 1<br>(MHz) |
| Mid     | 5210               | 83.20            | 84.80            |

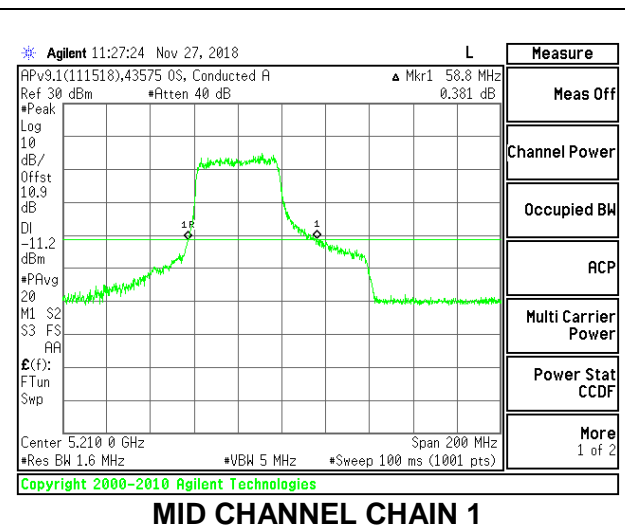
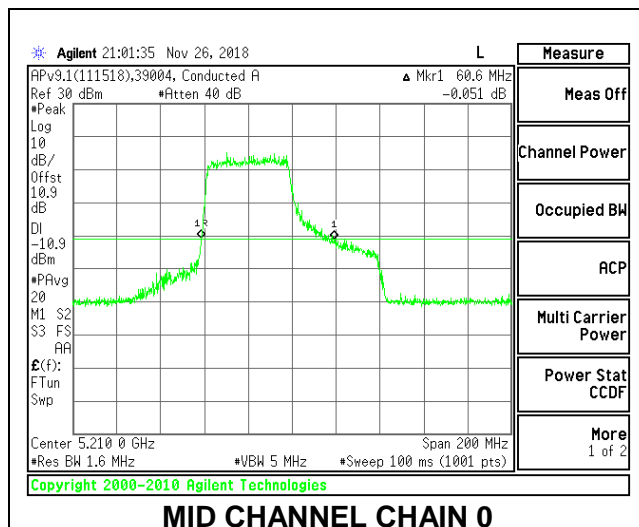
**MID CHANNEL**



**2TX Antenna 1 + Antenna 2 OFDMA MODE – 484-Tones, RU Index 65**

| Channel | Frequency<br>(MHz) | 26 dB Bandwidth<br>Chain 0<br>(MHz) | 26 dB Bandwidth<br>Chain 1<br>(MHz) |
|---------|--------------------|-------------------------------------|-------------------------------------|
| Mid     | 5210               | 60.60                               | 58.80                               |

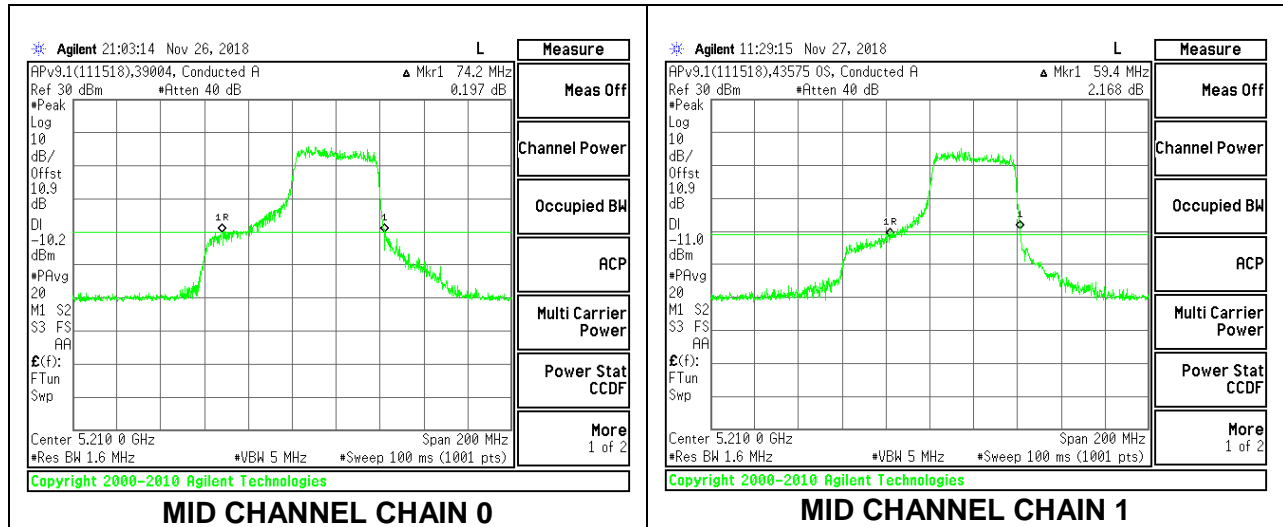
**MID CHANNEL**



**2TX Antenna 1 + Antenna 2 OFDMA MODE – 484-Tones, RU Index 66**

| Channel | Frequency<br>(MHz) | 26 dB Bandwidth<br>Chain 0<br>(MHz) | 26 dB Bandwidth<br>Chain 1<br>(MHz) |
|---------|--------------------|-------------------------------------|-------------------------------------|
| Mid     | 5210               | 74.20                               | 59.40                               |

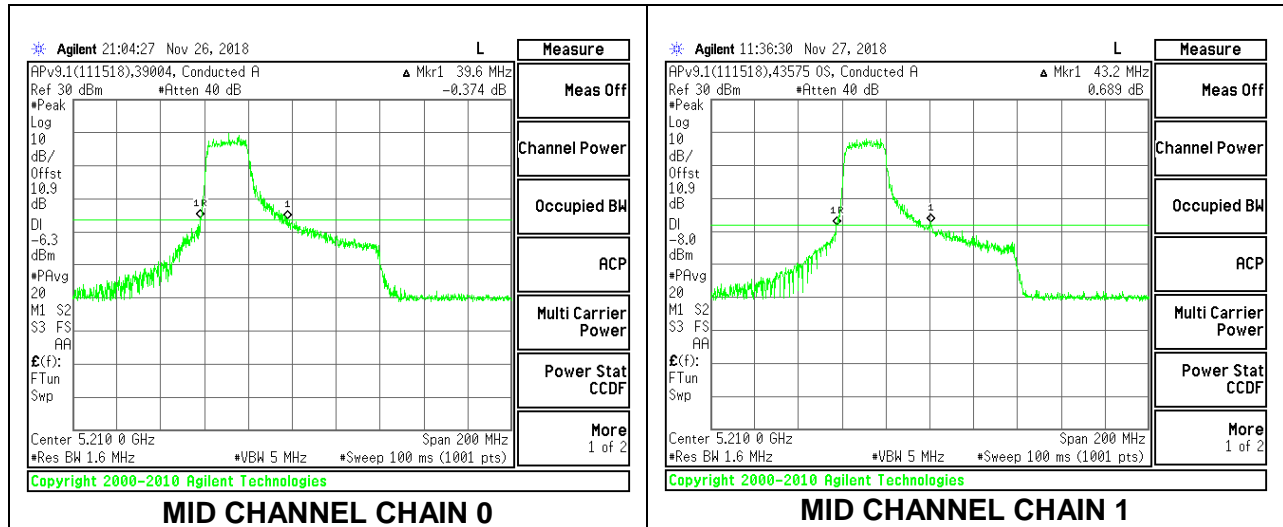
**MID CHANNEL**



**2TX Antenna 1 + Antenna 2 OFDMA MODE – 242-Tones, RU Index 61**

| Channel | Frequency<br>(MHz) | 26 dB Bandwidth<br>Chain 0<br>(MHz) | 26 dB Bandwidth<br>Chain 1<br>(MHz) |
|---------|--------------------|-------------------------------------|-------------------------------------|
| Mid     | 5210               | 39.60                               | 43.20                               |

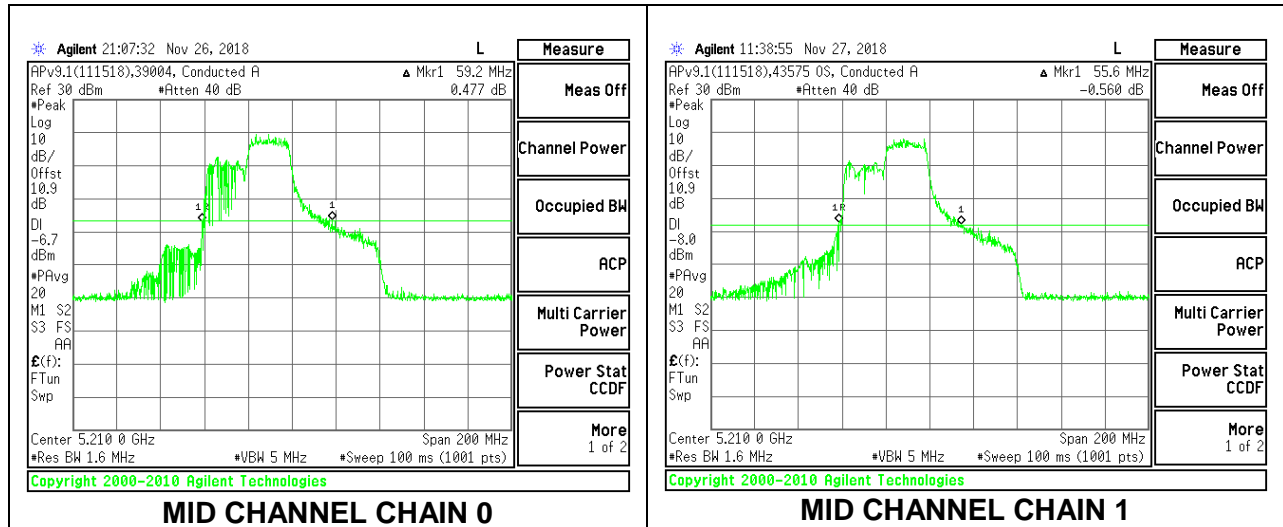
**MID CHANNEL**



**2TX Antenna 1 + Antenna 2 OFDMA MODE – 242-Tones, RU Index 62**

| Channel | Frequency<br>(MHz) | 26 dB Bandwidth<br>Chain 0<br>(MHz) | 26 dB Bandwidth<br>Chain 1<br>(MHz) |
|---------|--------------------|-------------------------------------|-------------------------------------|
| Mid     | 5210               | 59.20                               | 55.60                               |

**MID CHANNEL**

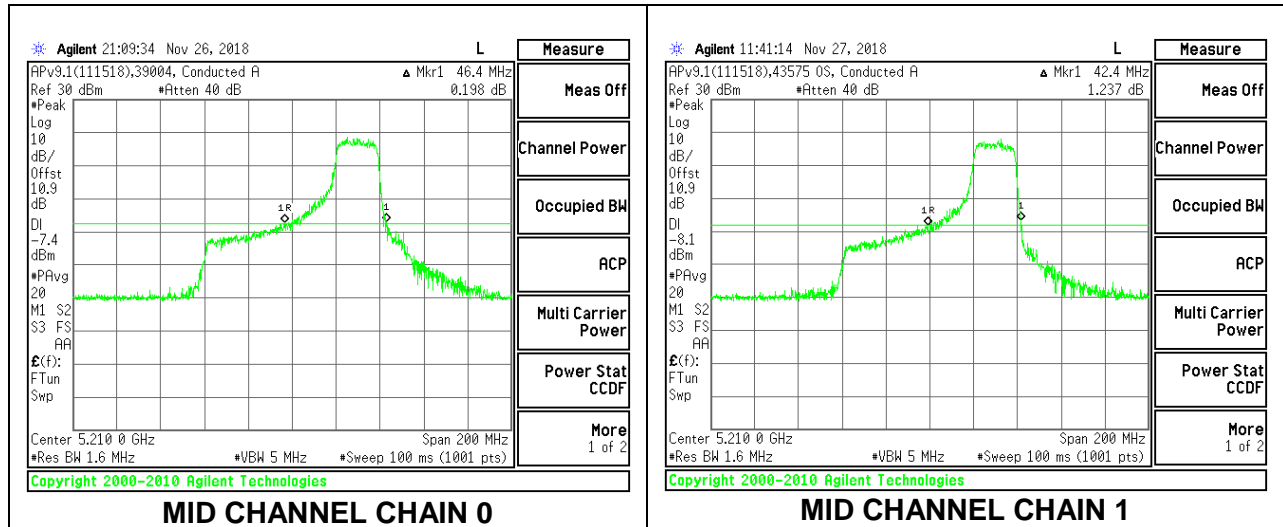




**2TX Antenna 1 + Antenna 2 OFDMA MODE – 242-Tones, RU Index 64**

| Channel | Frequency<br>(MHz) | 26 dB Bandwidth<br>Chain 0<br>(MHz) | 26 dB Bandwidth<br>Chain 1<br>(MHz) |
|---------|--------------------|-------------------------------------|-------------------------------------|
| Mid     | 5210               | 46.40                               | 42.40                               |

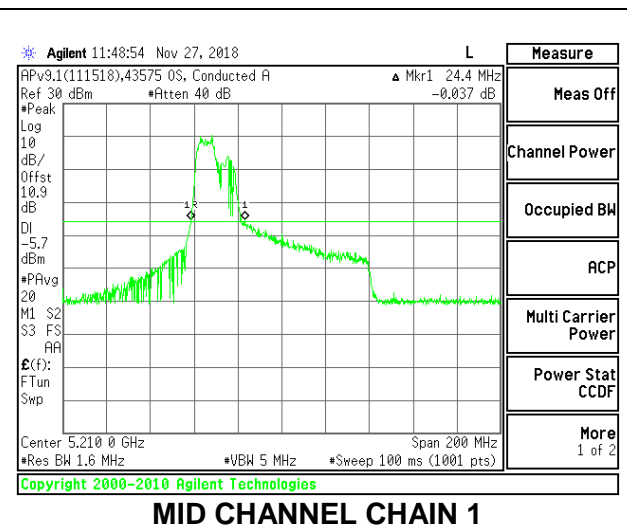
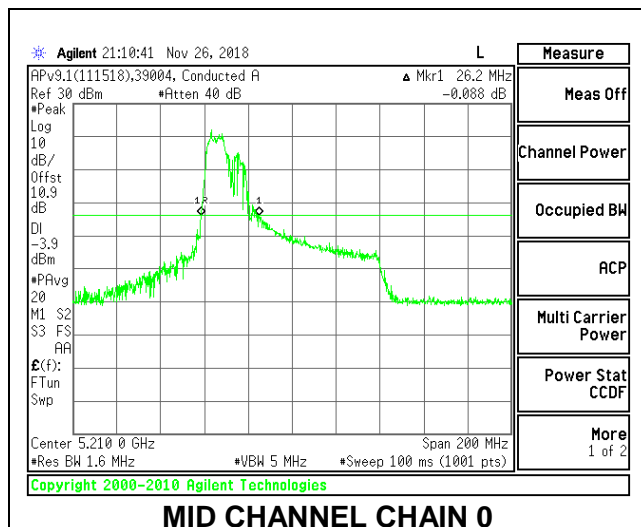
**MID CHANNEL**



**2TX Antenna 1 + Antenna 2 OFDMA MODE – 106-Tones, RU Index 53**

| Channel | Frequency<br>(MHz) | 26 dB Bandwidth<br>Chain 0<br>(MHz) | 26 dB Bandwidth<br>Chain 1<br>(MHz) |
|---------|--------------------|-------------------------------------|-------------------------------------|
| Mid     | 5210               | 26.20                               | 24.40                               |

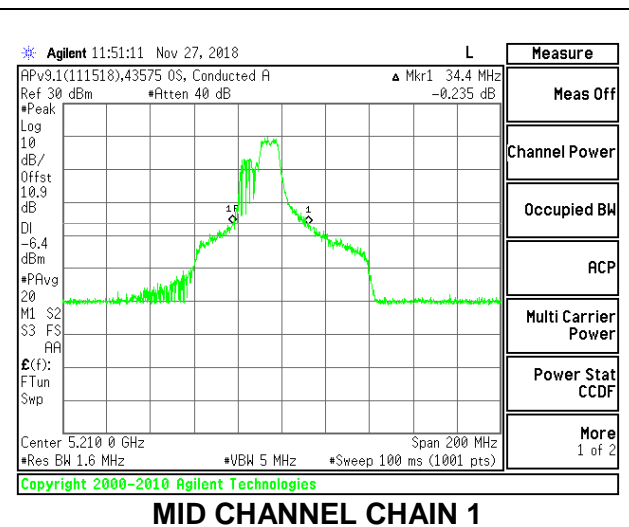
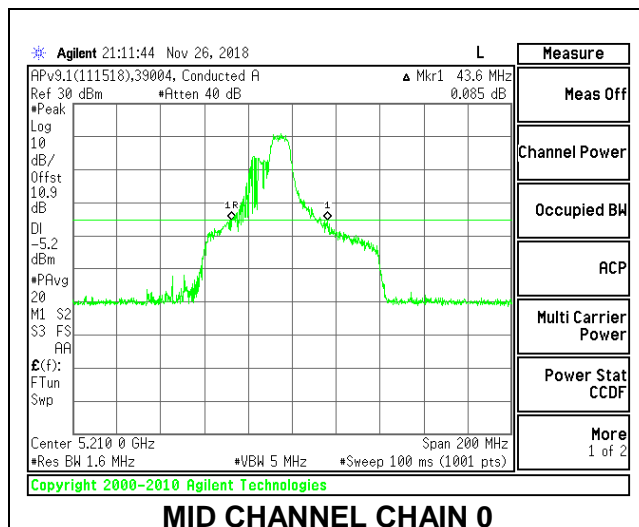
**MID CHANNEL**



**2TX Antenna 1 + Antenna 2 OFDMA MODE – 106-Tones, RU Index 56**

| Channel | Frequency<br>(MHz) | 26 dB Bandwidth<br>Chain 0<br>(MHz) | 26 dB Bandwidth<br>Chain 1<br>(MHz) |
|---------|--------------------|-------------------------------------|-------------------------------------|
| Mid     | 5210               | 43.60                               | 34.40                               |

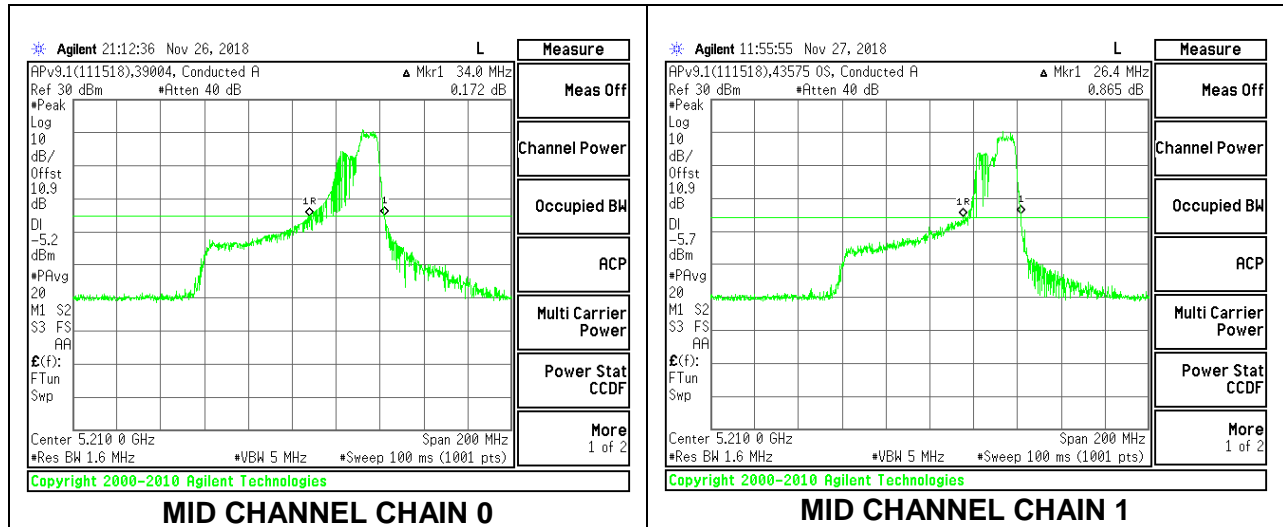
**MID CHANNEL**



**2TX Antenna 1 + Antenna 2 OFDMA MODE – 106-Tones, RU Index 60**

| Channel | Frequency<br>(MHz) | 26 dB Bandwidth<br>Chain 0<br>(MHz) | 26 dB Bandwidth<br>Chain 1<br>(MHz) |
|---------|--------------------|-------------------------------------|-------------------------------------|
| Mid     | 5210               | 34.00                               | 26.40                               |

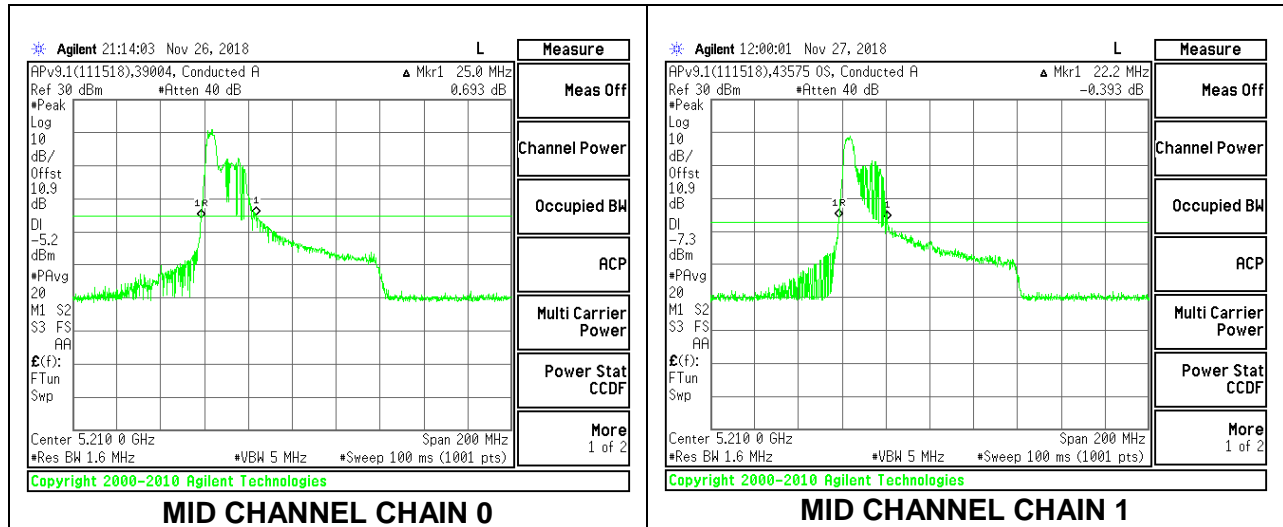
**MID CHANNEL**



**2TX Antenna 1 + Antenna 2 OFDMA MODE – 52-Tones, RU Index 37**

| Channel | Frequency<br>(MHz) | 26 dB Bandwidth<br>Chain 0<br>(MHz) | 26 dB Bandwidth<br>Chain 1<br>(MHz) |
|---------|--------------------|-------------------------------------|-------------------------------------|
| Mid     | 5210               | 25.00                               | 22.20                               |

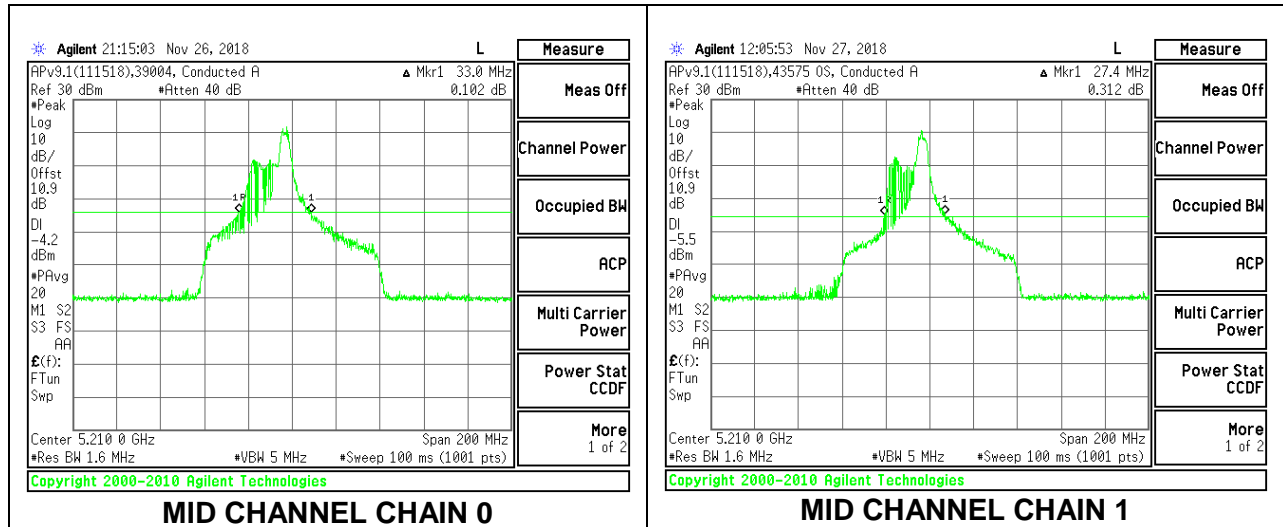
**MID CHANNEL**



**2TX Antenna 1 + Antenna 2 OFDMA MODE – 52-Tones, RU Index 44**

| Channel | Frequency<br>(MHz) | 26 dB Bandwidth<br>Chain 0<br>(MHz) | 26 dB Bandwidth<br>Chain 1<br>(MHz) |
|---------|--------------------|-------------------------------------|-------------------------------------|
| Mid     | 5210               | 33.00                               | 27.40                               |

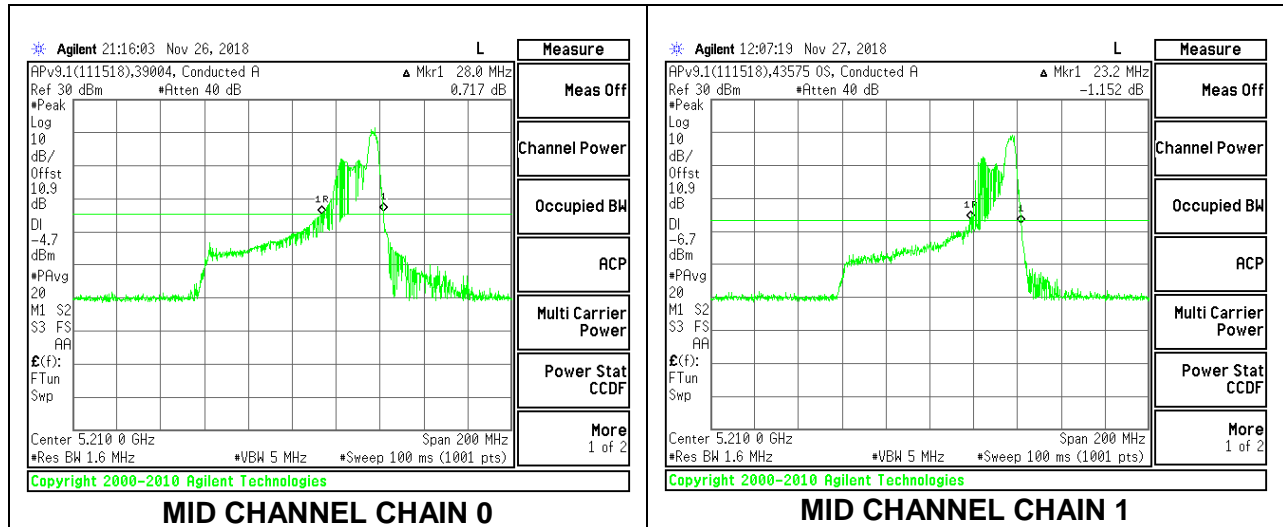
**MID CHANNEL**



**2TX Antenna 1 + Antenna 2 OFDMA MODE – 52-Tones, RU Index 52**

| Channel | Frequency<br>(MHz) | 26 dB Bandwidth<br>Chain 0<br>(MHz) | 26 dB Bandwidth<br>Chain 1<br>(MHz) |
|---------|--------------------|-------------------------------------|-------------------------------------|
| Mid     | 5210               | 28.00                               | 23.20                               |

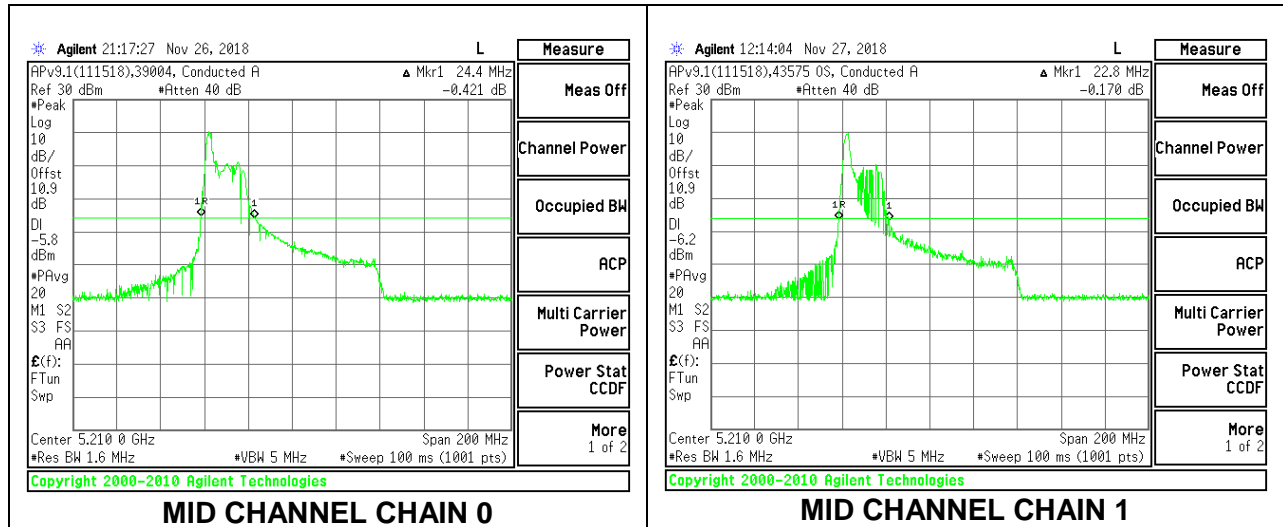
**MID CHANNEL**



**2TX Antenna 1 + Antenna 2 OFDMA MODE – 26-Tones, RU Index 0**

| Channel | Frequency<br>(MHz) | 26 dB Bandwidth<br>Chain 0<br>(MHz) | 26 dB Bandwidth<br>Chain 1<br>(MHz) |
|---------|--------------------|-------------------------------------|-------------------------------------|
| Mid     | 5210               | 24.40                               | 22.80                               |

**MID CHANNEL**

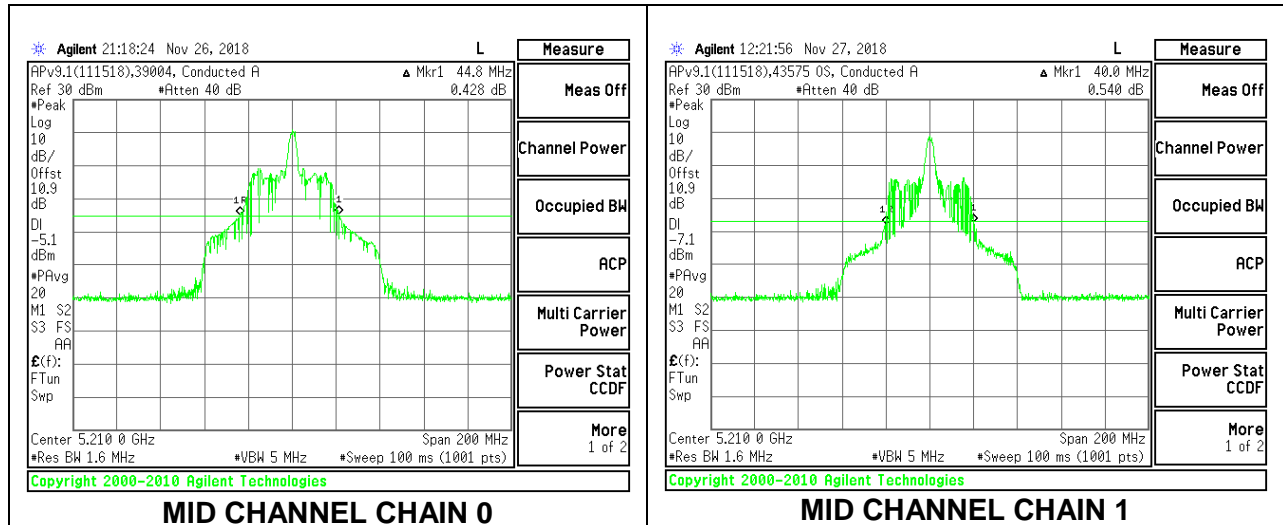




**2TX Antenna 1 + Antenna 2 OFDMA MODE – 26-Tones, RU Index 18**

| Channel | Frequency<br>(MHz) | 26 dB Bandwidth<br>Chain 0<br>(MHz) | 26 dB Bandwidth<br>Chain 1<br>(MHz) |
|---------|--------------------|-------------------------------------|-------------------------------------|
| Mid     | 5210               | 44.80                               | 40.00                               |

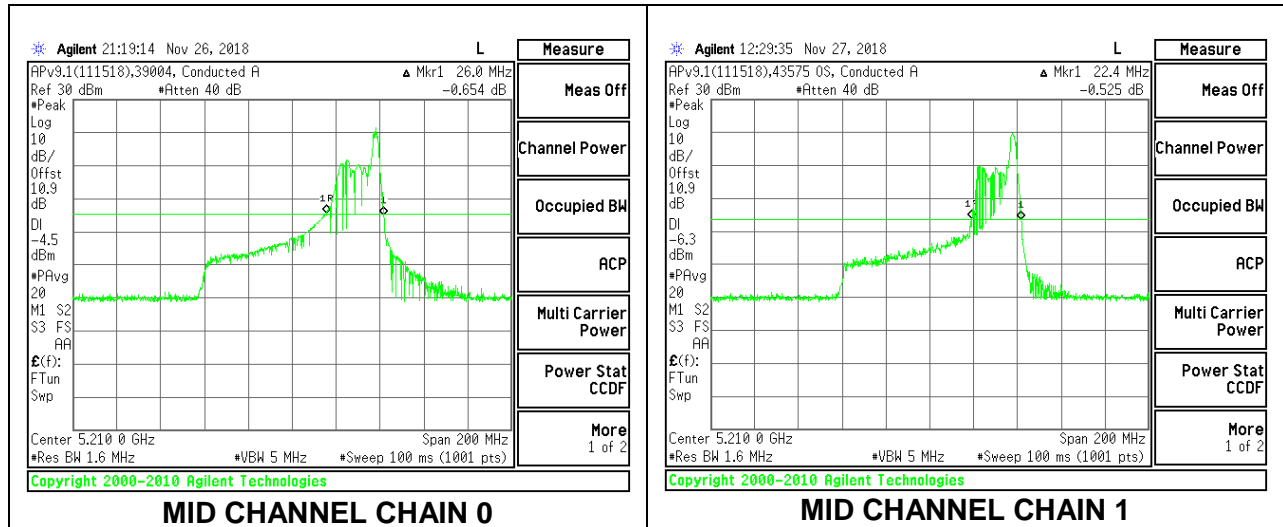
**MID CHANNEL**



**2TX Antenna 1 + Antenna 2 OFDMA MODE – 26-Tones, RU Index 36**

| Channel | Frequency<br>(MHz) | 26 dB Bandwidth<br>Chain 0<br>(MHz) | 26 dB Bandwidth<br>Chain 1<br>(MHz) |
|---------|--------------------|-------------------------------------|-------------------------------------|
| Mid     | 5210               | 26.00                               | 22.40                               |

**MID CHANNEL**

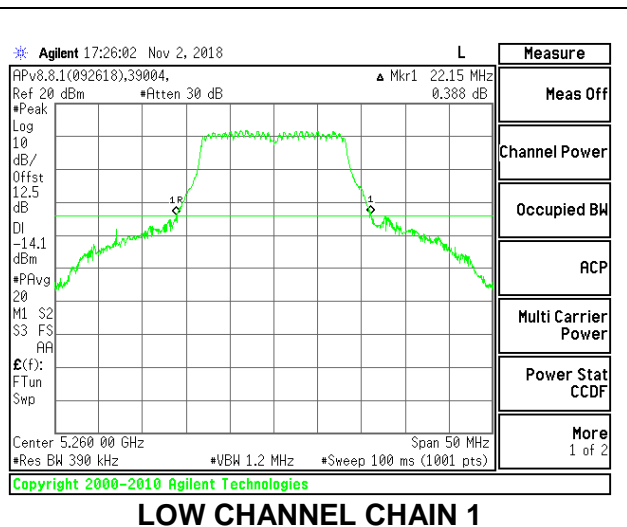
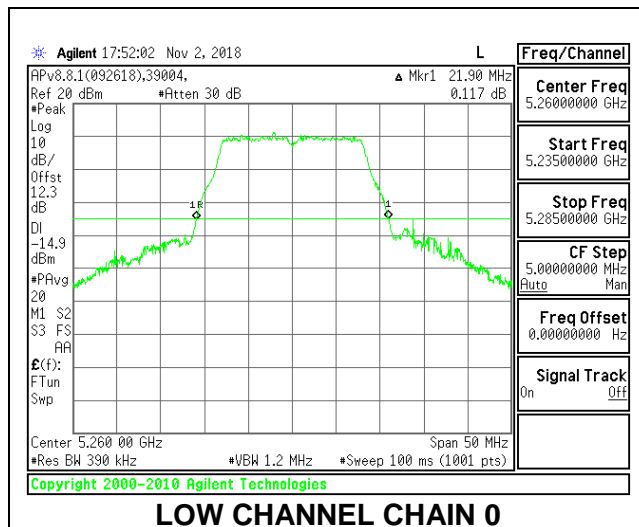


### 9.2.8. 802.11a MODE IN THE 5.3 GHz BAND

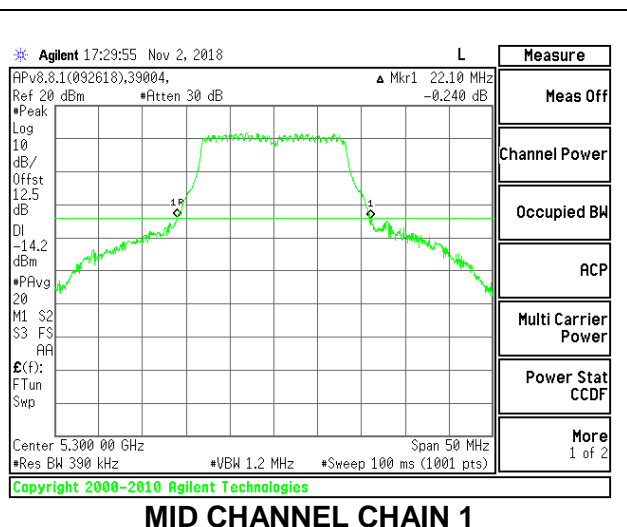
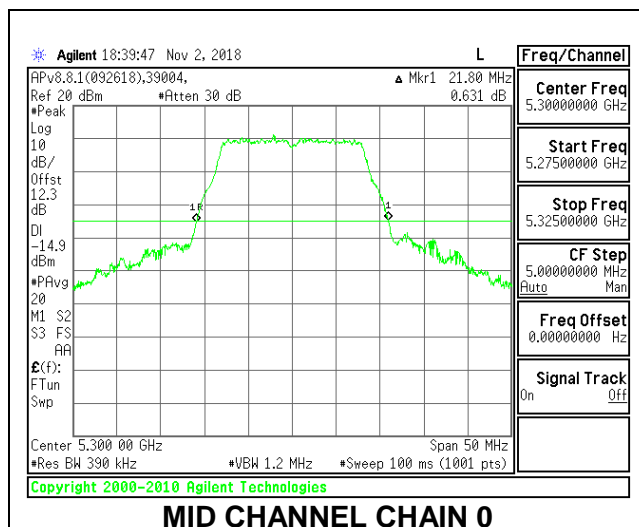
#### 2TX Antenna 1 + Antenna 2 CDD MODE

| Channel | Frequency (MHz) | 26 dB Bandwidth Chain 0 (MHz) | 26 dB Bandwidth Chain 1 (MHz) |
|---------|-----------------|-------------------------------|-------------------------------|
| Low     | 5260            | 21.90                         | 22.15                         |
| Mid     | 5300            | 21.80                         | 22.10                         |
| High    | 5320            | 21.85                         | 22.65                         |

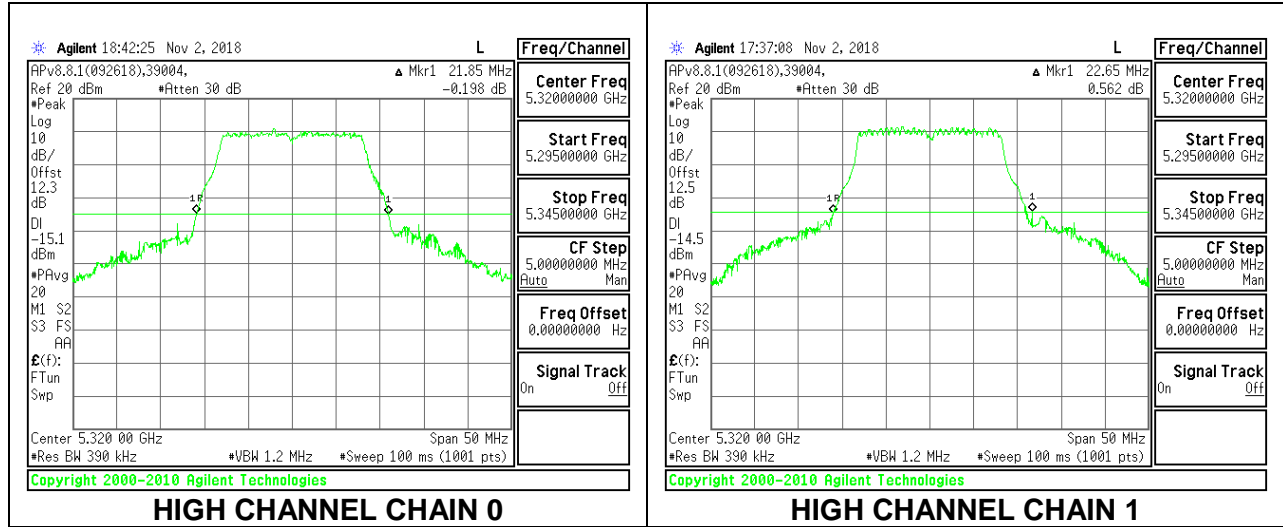
#### LOW CHANNEL



#### MID CHANNEL



**HIGH CHANNEL**

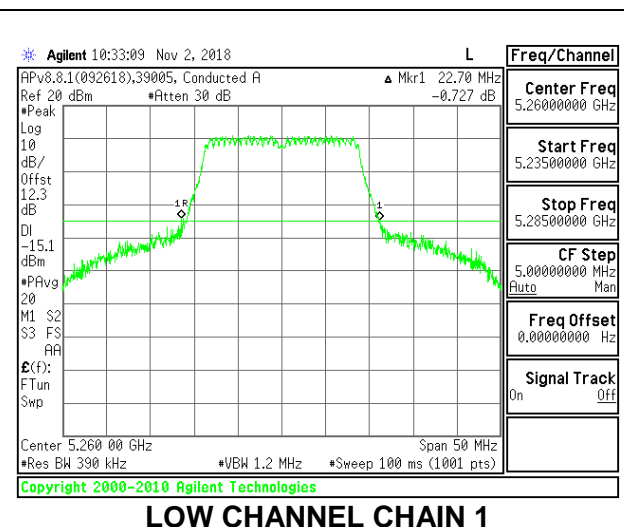
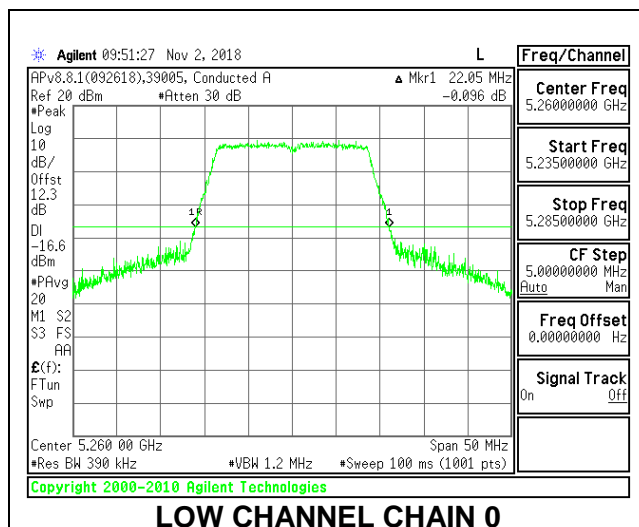


### 9.2.9. 802.11n HT20 MODE IN THE 5.3 GHz BAND

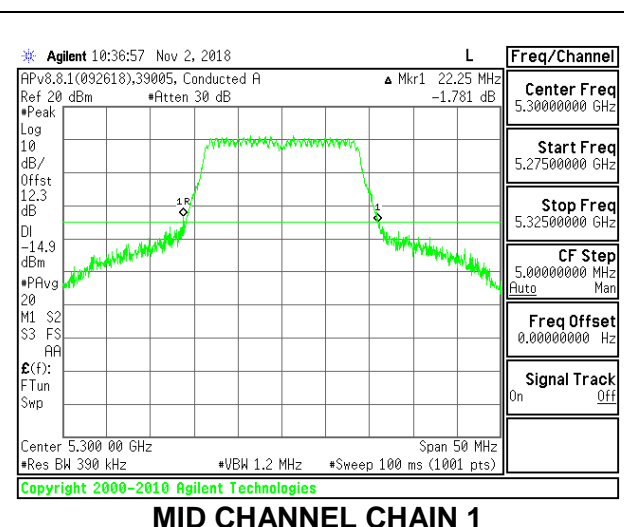
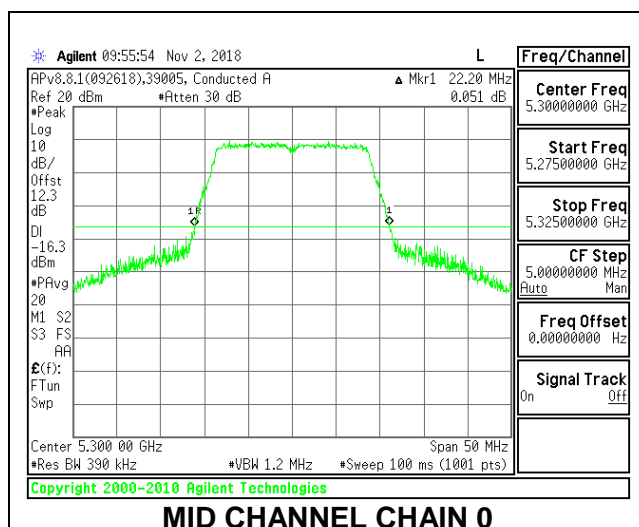
#### 2TX Antenna 1 + Antenna 2 CDD MODE

| Channel | Frequency (MHz) | 26 dB Bandwidth Chain 0 (MHz) | 26 dB Bandwidth Chain 1 (MHz) |
|---------|-----------------|-------------------------------|-------------------------------|
| Low     | 5260            | 22.05                         | 22.70                         |
| Mid     | 5300            | 22.20                         | 22.25                         |
| High    | 5320            | 22.05                         | 22.30                         |

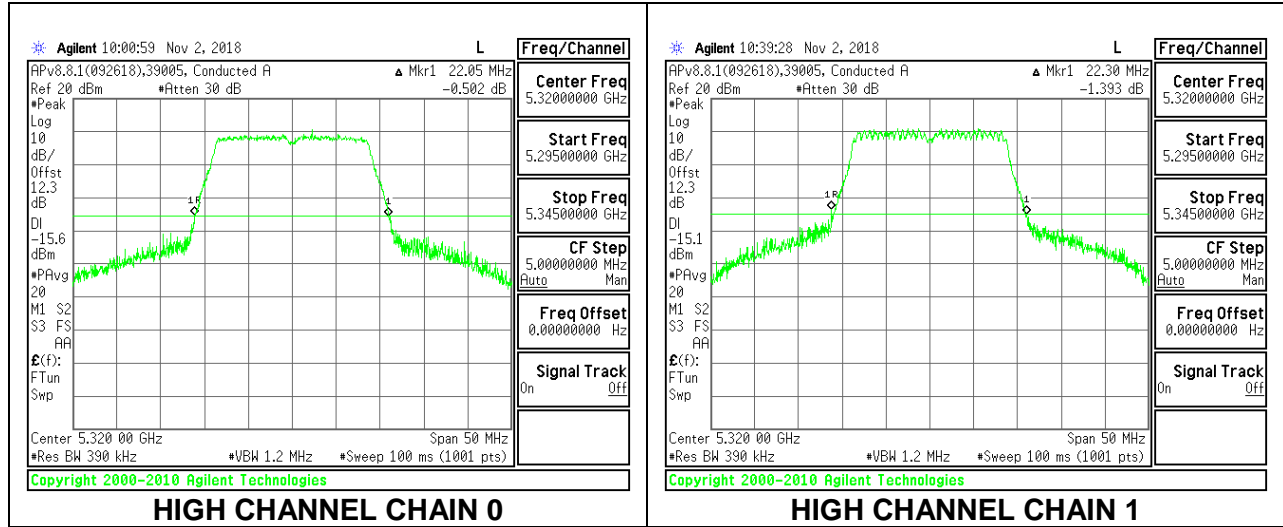
#### LOW CHANNEL



#### MID CHANNEL



**HIGH CHANNEL**

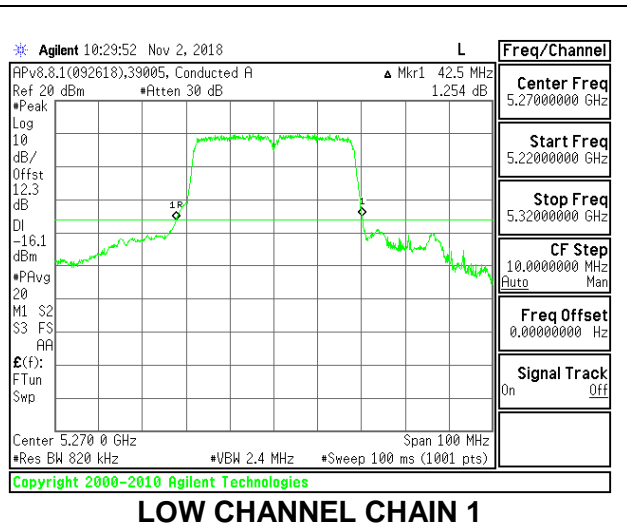
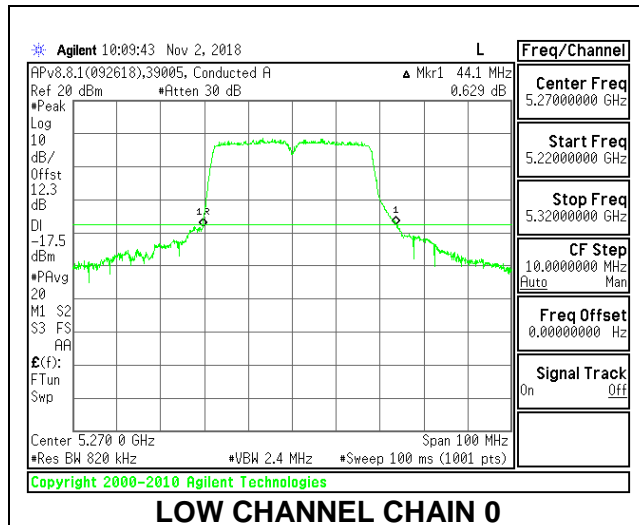


### 9.2.10. 802.11n HT40 MODE IN THE 5.3 GHz BAND

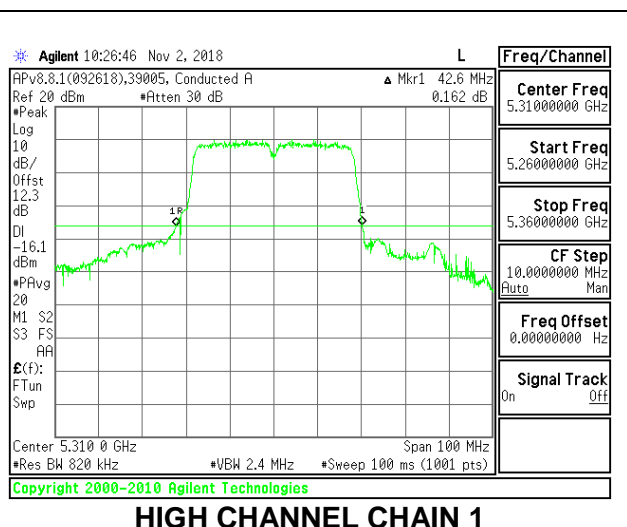
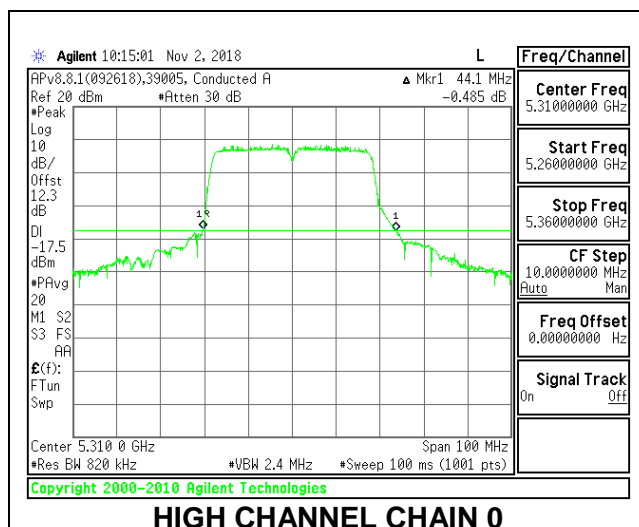
#### 2TX Antenna 1 + Antenna 2 CDD MODE

| Channel | Frequency (MHz) | 26 dB Bandwidth |               |
|---------|-----------------|-----------------|---------------|
|         |                 | Chain 0 (MHz)   | Chain 1 (MHz) |
| Low     | 5270            | 44.10           | 42.50         |
| High    | 5310            | 44.10           | 42.60         |

#### LOW CHANNEL



#### HIGH CHANNEL

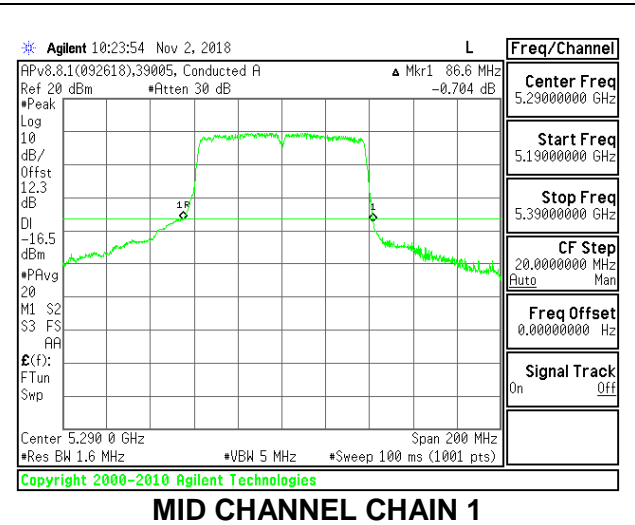
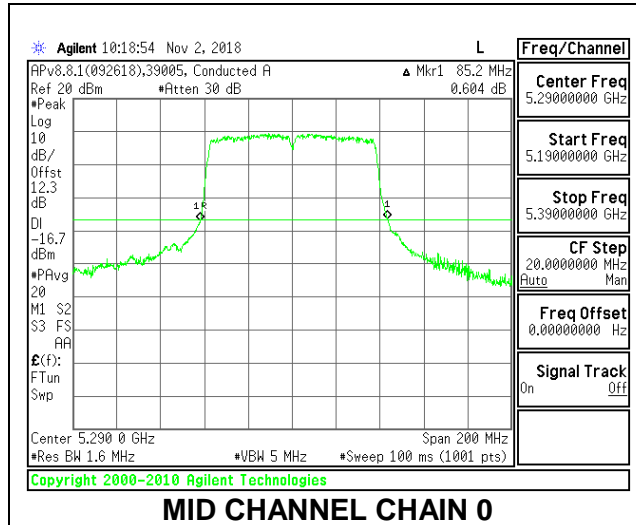


**9.2.11. 802.11ac VHT80 MODE IN THE 5.3 GHz BAND**

**2TX Antenna 1 + Antenna 2 CDD MODE**

| Channel | Frequency<br>(MHz) | 26 dB Bandwidth  |                  |
|---------|--------------------|------------------|------------------|
|         |                    | Chain 0<br>(MHz) | Chain 1<br>(MHz) |
| Mid     | 5290               | 85.20            | 86.60            |

**MID CHANNEL**



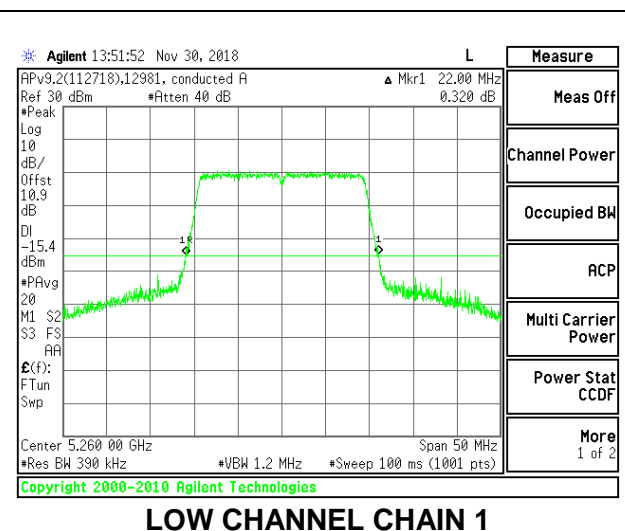
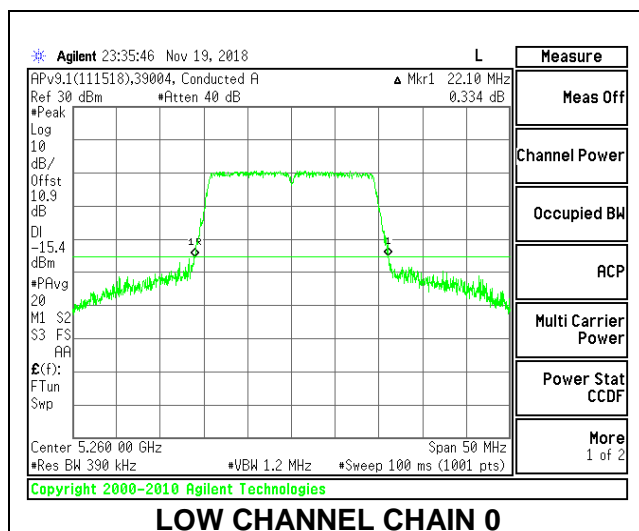


**9.2.12. 802.11ax HE20 MODE IN THE 5.3 GHz BAND**

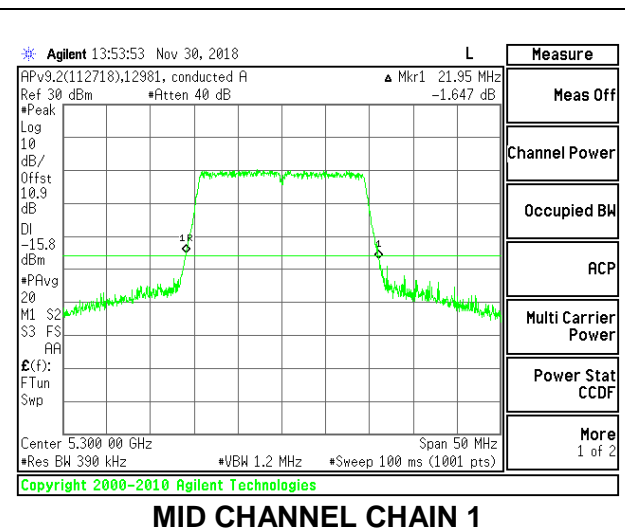
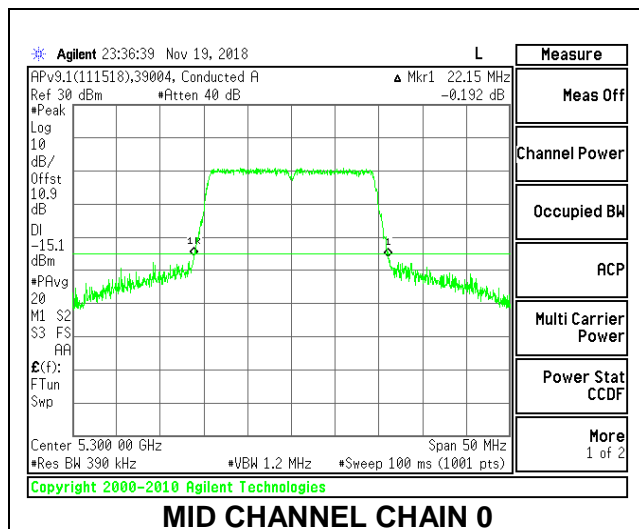
**2TX Antenna 1 + Antenna 2 OFDMA MODE – 242-Tones, RU Index 61**

| Channel | Frequency (MHz) | 26 dB Bandwidth Chain 0 (MHz) | 26 dB Bandwidth Chain 1 (MHz) |
|---------|-----------------|-------------------------------|-------------------------------|
| Low     | 5260            | 22.10                         | 22.00                         |
| Mid     | 5300            | 22.15                         | 21.95                         |
| High    | 5320            | 22.10                         | 21.95                         |

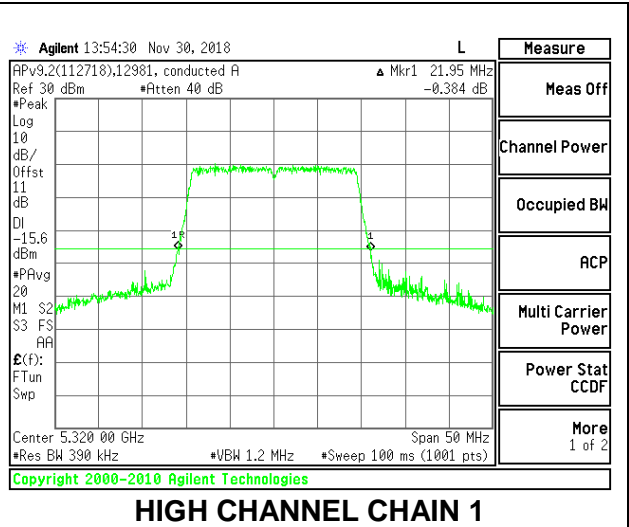
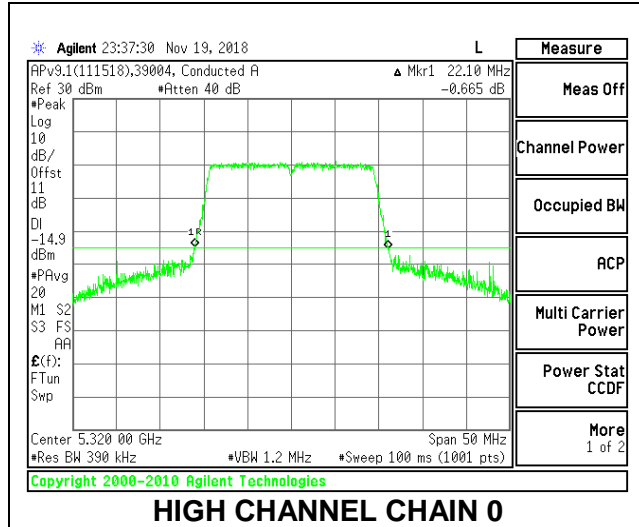
**LOW CHANNEL**



**MID CHANNEL**



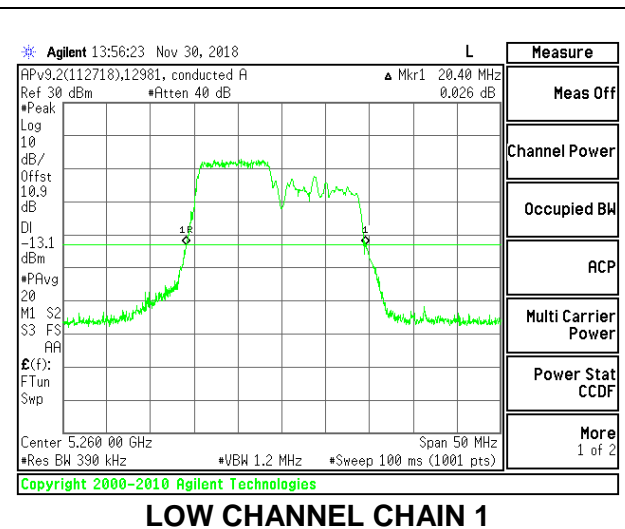
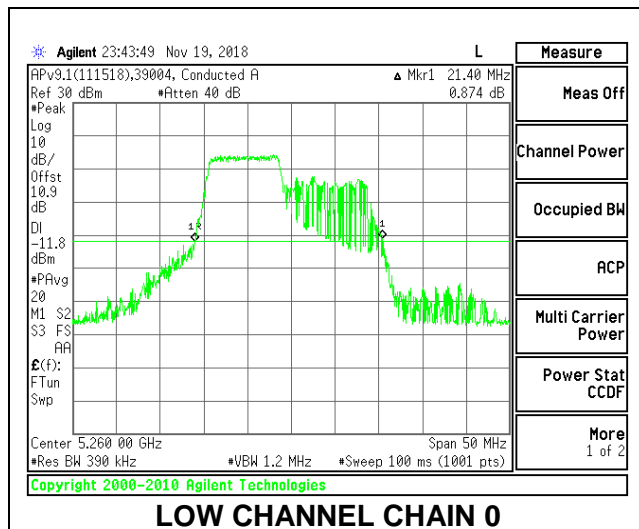
**HIGH CHANNEL**



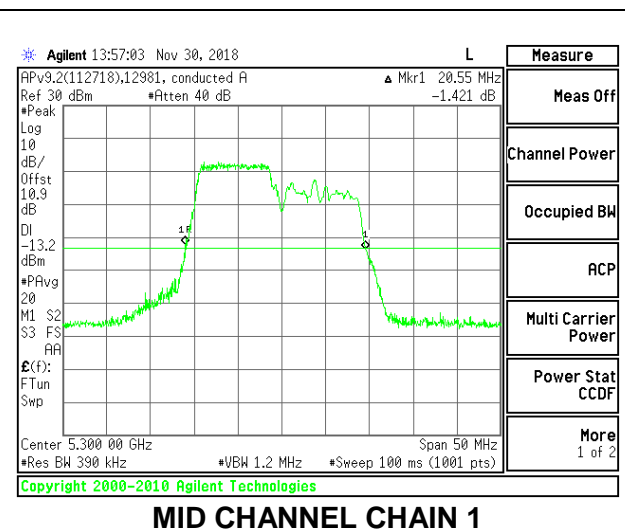
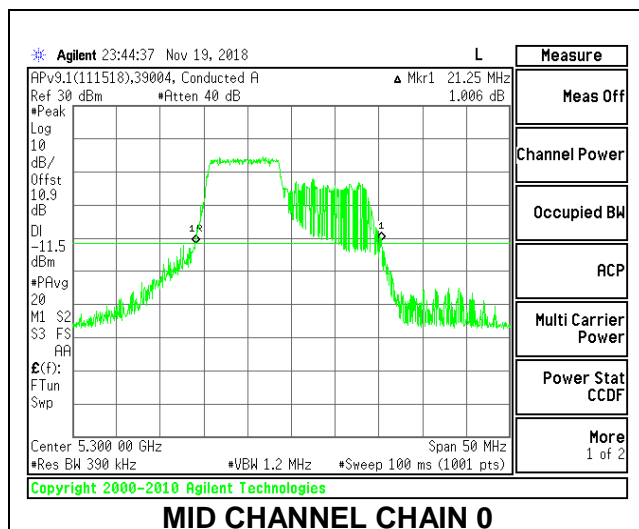
**2TX Antenna 1 + Antenna 2 OFDMA MODE – 106-Tones, RU Index 53**

| Channel | Frequency (MHz) | 26 dB Bandwidth Chain 0 (MHz) | 26 dB Bandwidth Chain 1 (MHz) |
|---------|-----------------|-------------------------------|-------------------------------|
| Low     | 5260            | 21.40                         | 20.40                         |
| Mid     | 5300            | 21.25                         | 20.55                         |
| High    | 5320            | 21.60                         | 20.55                         |

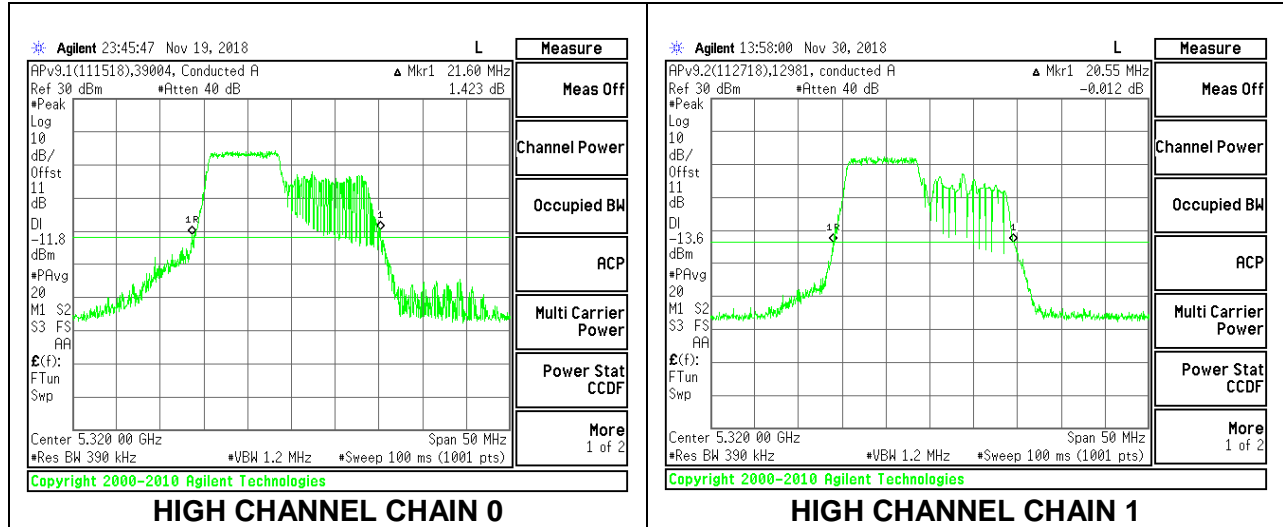
**LOW CHANNEL**



**MID CHANNEL**



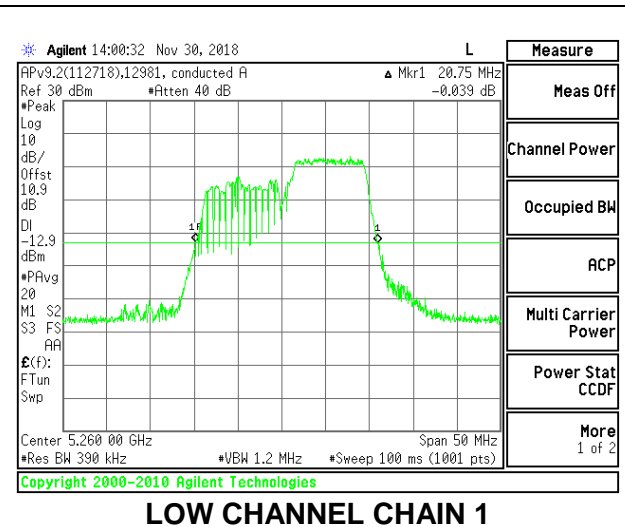
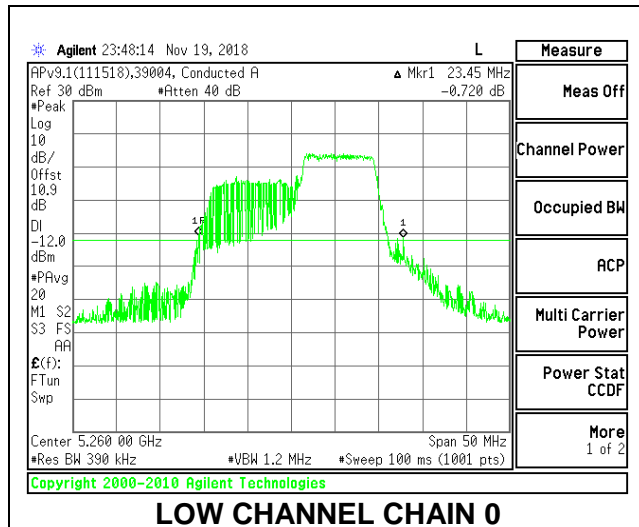
### HIGH CHANNEL



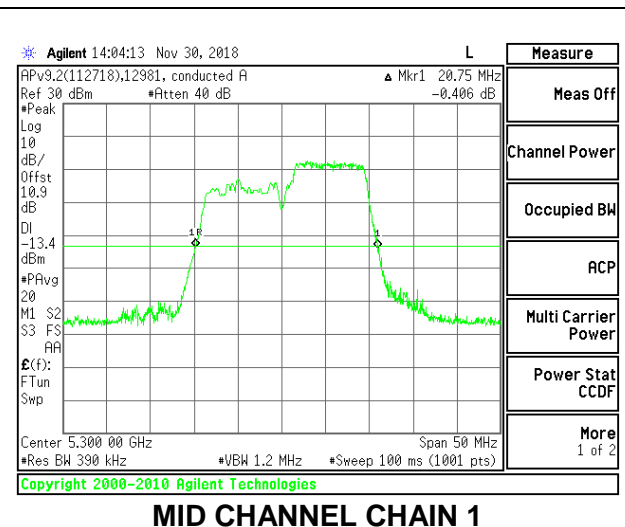
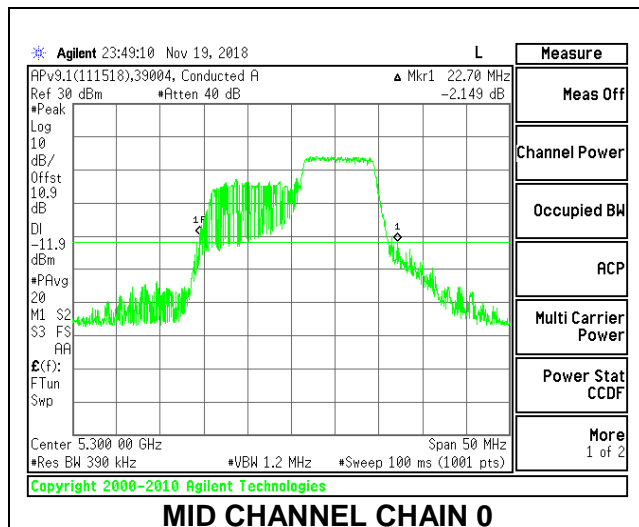
**2TX Antenna 1 + Antenna 2 OFDMA MODE – 106-Tones, RU Index 54**

| Channel | Frequency (MHz) | 26 dB Bandwidth Chain 0 (MHz) | 26 dB Bandwidth Chain 1 (MHz) |
|---------|-----------------|-------------------------------|-------------------------------|
| Low     | 5260            | 23.45                         | 20.75                         |
| Mid     | 5300            | 22.70                         | 20.75                         |
| High    | 5320            | 22.00                         | 20.70                         |

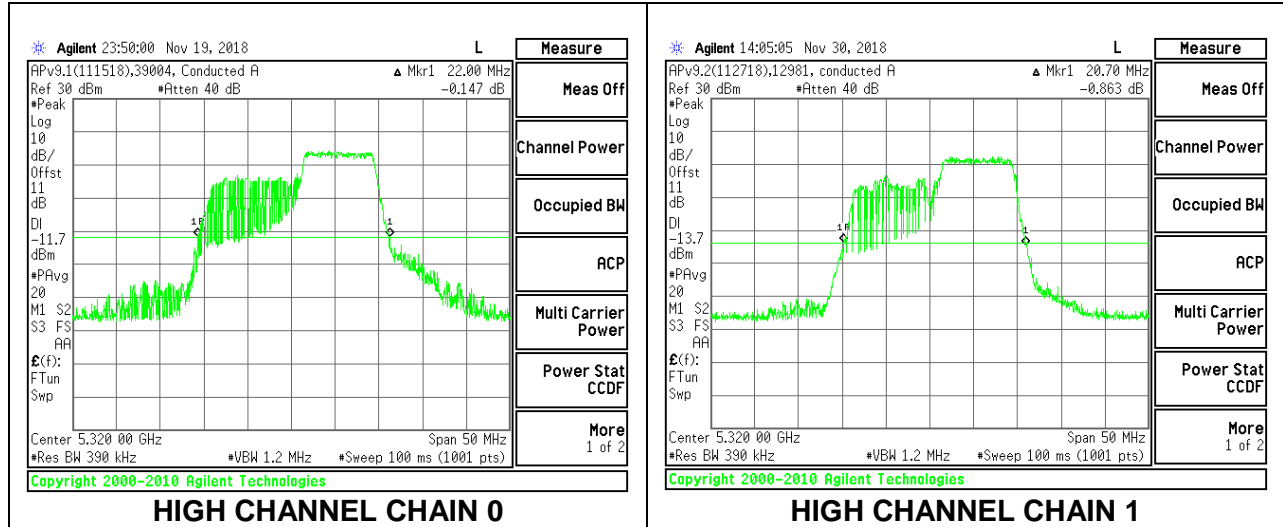
**LOW CHANNEL**



**MID CHANNEL**



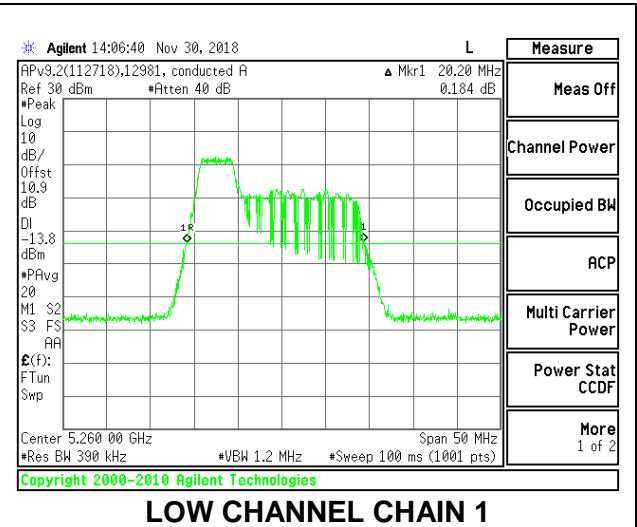
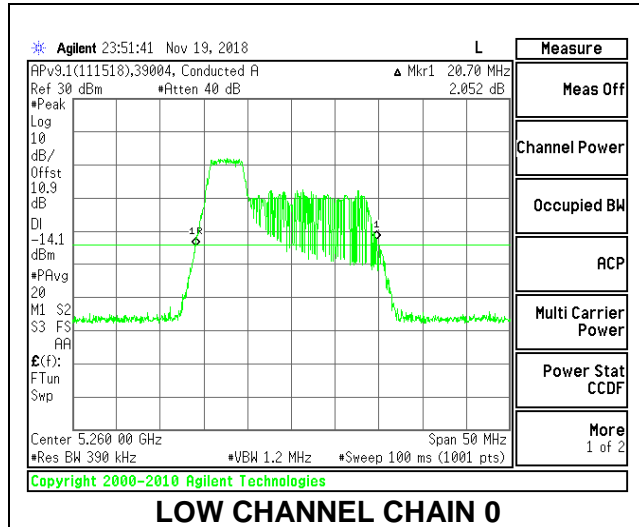
**HIGH CHANNEL**



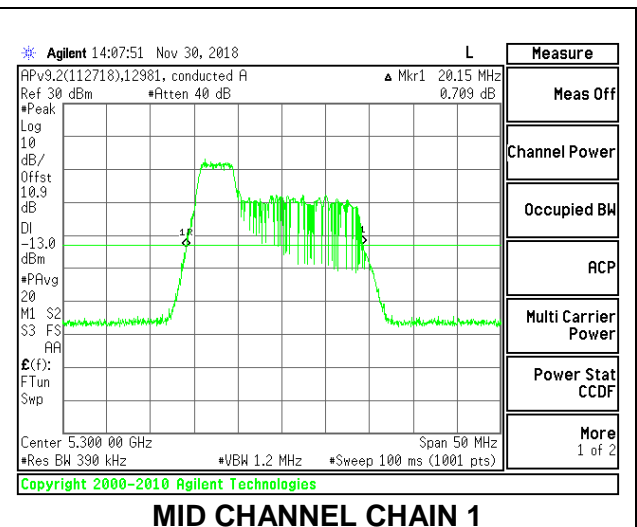
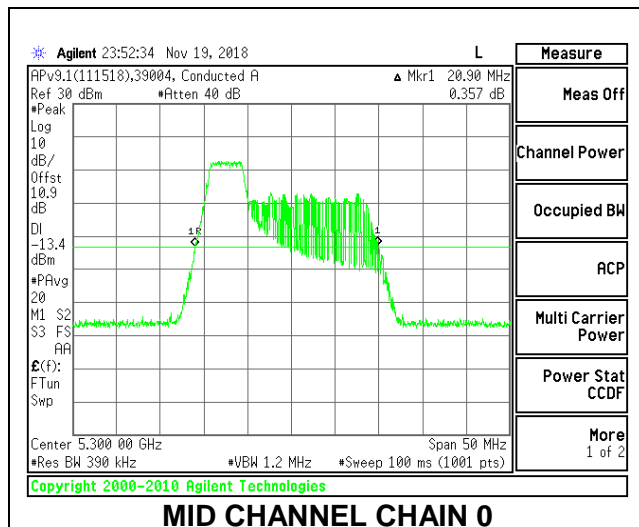
**2TX Antenna 1 + Antenna 2 OFDMA MODE – 52-Tones, RU Index 37**

| Channel | Frequency (MHz) | 26 dB Bandwidth Chain 0 (MHz) | 26 dB Bandwidth Chain 1 (MHz) |
|---------|-----------------|-------------------------------|-------------------------------|
| Low     | 5260            | 20.70                         | 20.20                         |
| Mid     | 5300            | 20.90                         | 20.15                         |
| High    | 5320            | 20.95                         | 20.10                         |

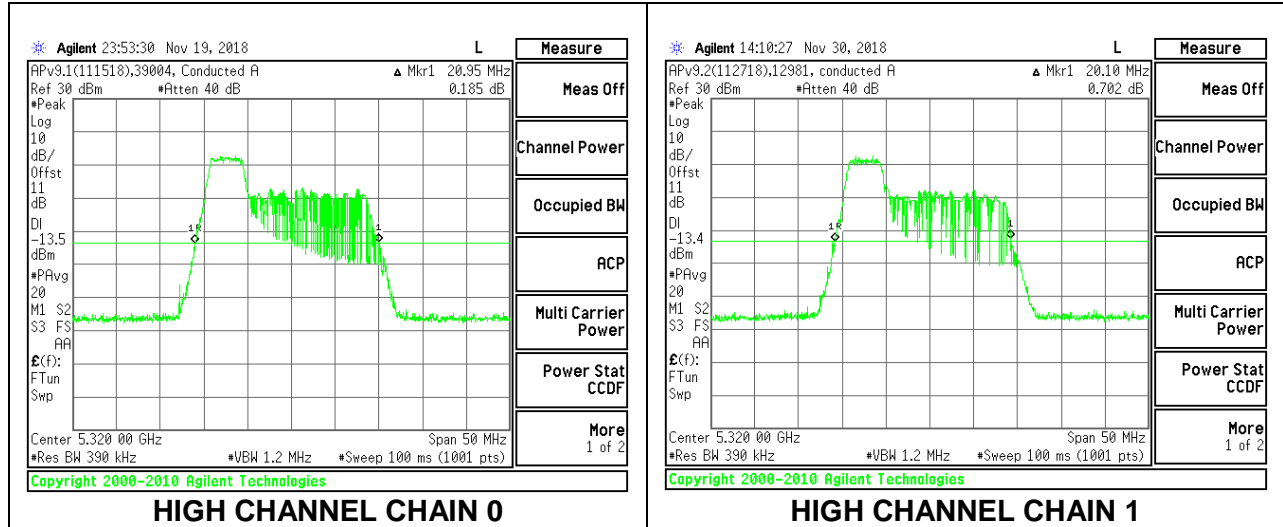
**LOW CHANNEL**



**MID CHANNEL**



**HIGH CHANNEL**

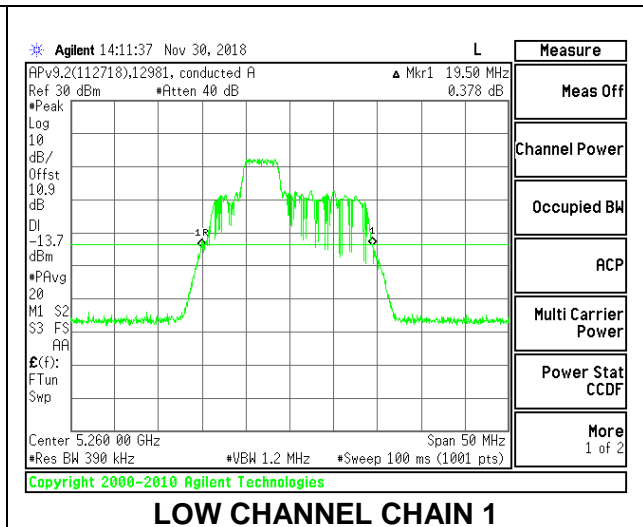
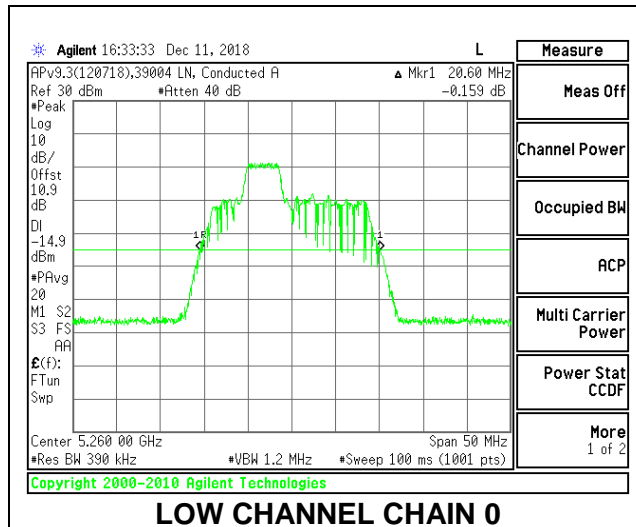




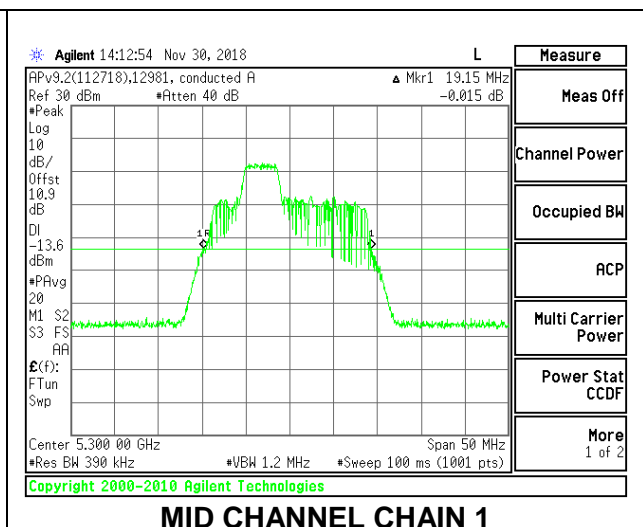
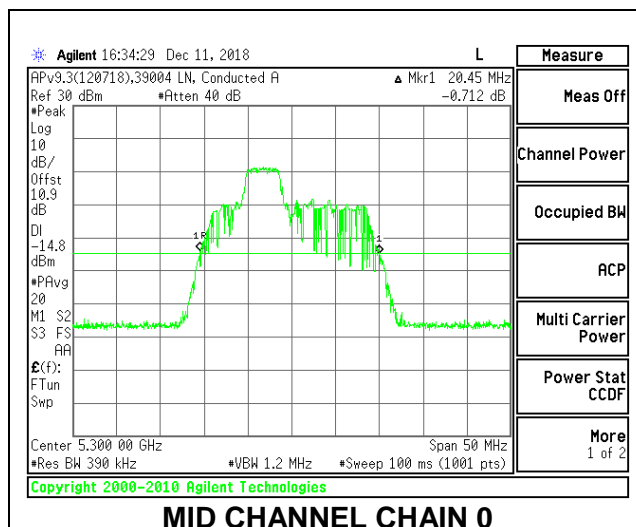
**2TX Antenna 1 + Antenna 2 OFDMA MODE – 52-Tones, RU Index 38**

| Channel | Frequency (MHz) | 26 dB Bandwidth Chain 0 (MHz) | 26 dB Bandwidth Chain 1 (MHz) |
|---------|-----------------|-------------------------------|-------------------------------|
| Low     | 5260            | 20.60                         | 19.50                         |
| Mid     | 5300            | 20.45                         | 19.15                         |
| High    | 5320            | 20.50                         | 19.15                         |

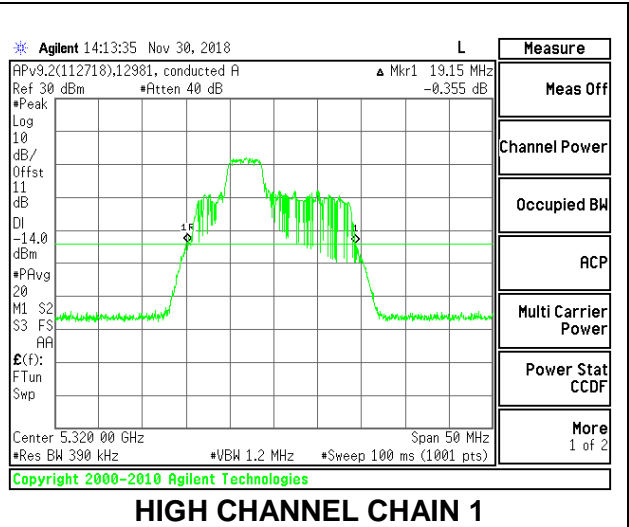
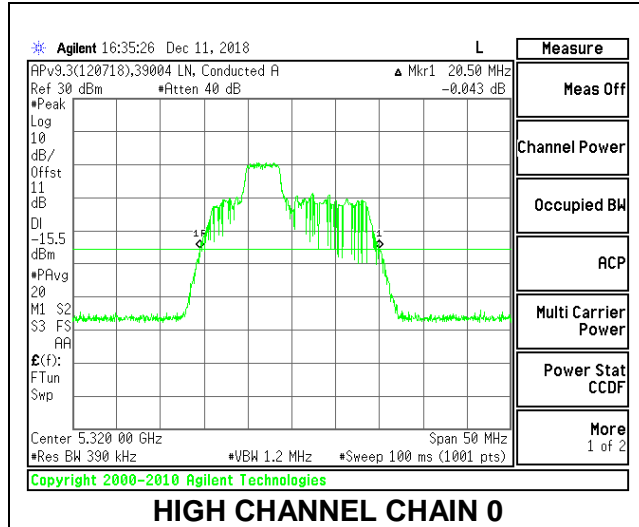
**LOW CHANNEL**



**MID CHANNEL**



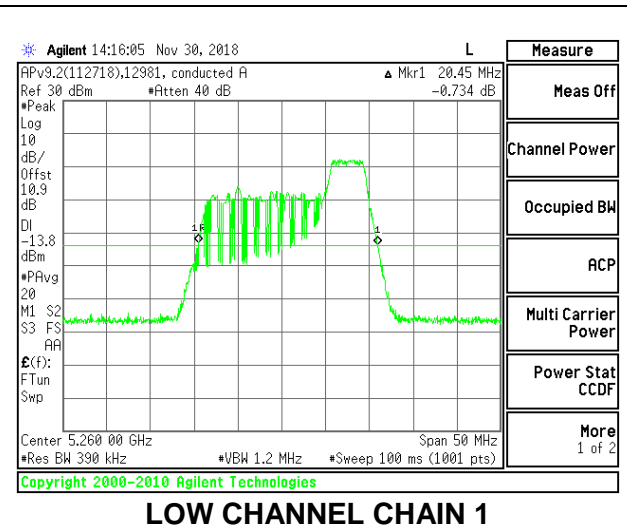
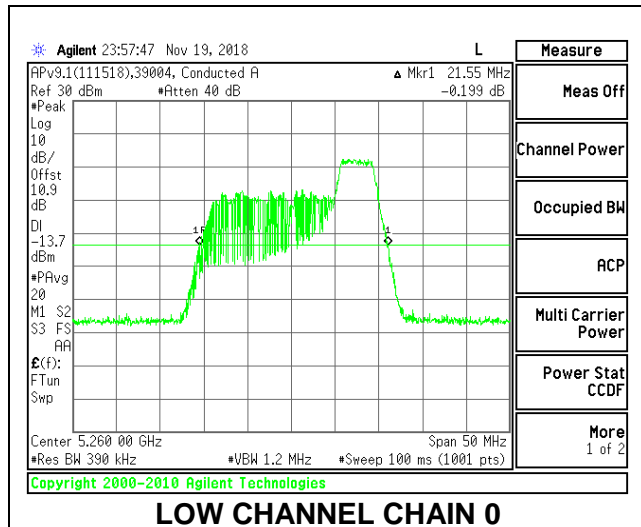
**HIGH CHANNEL**



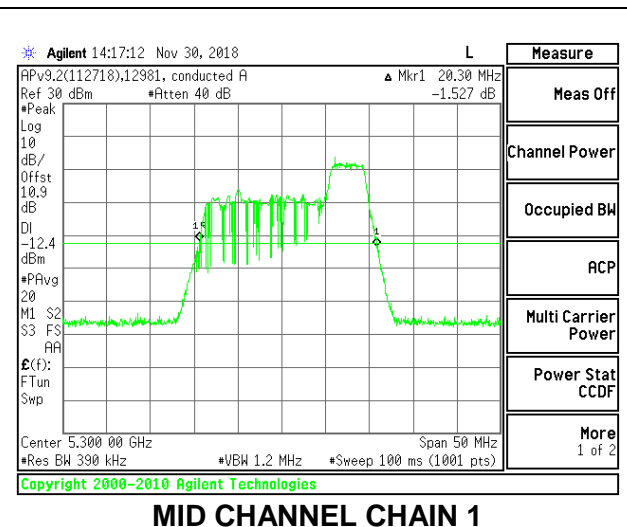
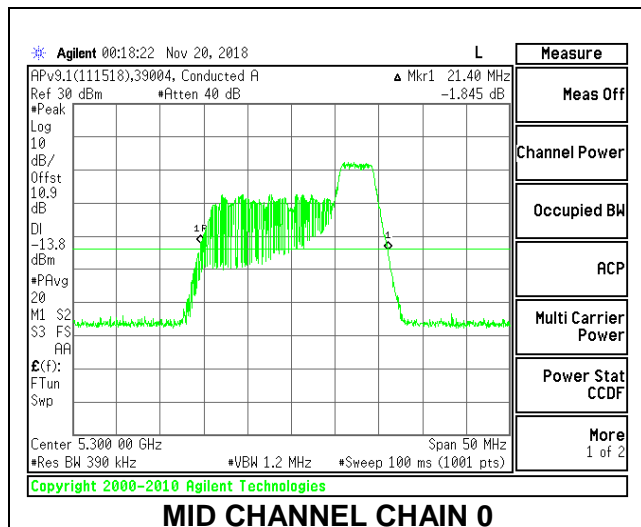
**2TX Antenna 1 + Antenna 2 OFDMA MODE – 52-Tones, RU Index 40**

| Channel | Frequency (MHz) | 26 dB Bandwidth Chain 0 (MHz) | 26 dB Bandwidth Chain 1 (MHz) |
|---------|-----------------|-------------------------------|-------------------------------|
| Low     | 5260            | 21.55                         | 20.45                         |
| Mid     | 5300            | 21.40                         | 20.30                         |
| High    | 5320            | 21.55                         | 20.50                         |

**LOW CHANNEL**



**MID CHANNEL**



**HIGH CHANNEL**

