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Report No.: 1611RSU01002
Report Version: V01
Issue Date: 03-26-2017

# MEASUREMENT REPORT
## FCC PART 15.407 WLAN 802.11a/n/ac

| | |
|---|---|
| **FCC ID:** | 2AEY7-S8A002 |
| **APPLICANT:** | Bak USA Technologies Corp. |
| **Application Type:** | Certification |
| **Product:** | MID |
| **Model No.:** | Seal 8 pro |
| **FCC Classification:** | Unlicensed National Information Infrastructure (NII) |
| **FCC Rule Part(s):** | Part 15.407 |
| **Test Procedure(s):** | ANSI C63.10-2013, KDB 789033 D02v01r03, KDB 662911 D01v02r01 |
| **Test Date:** | November 08, 2016 ~ March 25, 2017 |

Reviewed By Manager : Robin Wu ( Robin Wu )

Approved By CEO : Marlin Chen ( Marlin Chen )

ACCREDITED TESTING LABORATORY CERTIFICATE #3628.01

# Revision History

| Report No. | Version | Description | Issue Date | Note |
|---|---|---|---|---|
| 1611RSU01002 | Rev. 01 | Initial report | 03-26-2017 | Valid |
| | | | | |

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Description Page

## §2.1033 General Information

| | |
|---|---|
| **Applicant:** | Bak USA Technologies Corp. |
| **Applicant Address:** | 425 Michigan Avenue, Buffalo, NY 14203, USA |
| **Manufacturer:** | Shenzhen Wisky Technology Co., LTD. |
| **Manufacturer Address:** | 5th Floor, W2-A Building, Hi-tech Park South 1st Road, Nanshan District, Shenzhen, China |
| **Test Site:** | MRT Technology (Suzhou) Co., Ltd |
| **Test Site Address:** | D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China |
| **MRT FCC Registration No.:** | 809388 |
| **FCC Rule Part(s):** | Part 15.407 |
| **Model No.:** | Seal 8 pro |
| **FCC ID:** | 2AEY7-S8A002 |
| **Test Device Serial No.:** | N/A ☐ Production ☒ Pre-Production ☐ Engineering |
| **FCC Classification:** | Unlicensed National Information Infrastructure (NII) |

### Test Facility / Accreditations

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

**MRT facility is a FCC registered (MRT Reg. No. 809388) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules.**

**MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.**

**MRT facility is a VCCI registered (R-4179, G-814, C-4664, T-2206) test laboratory with the site description on file at VCCI Council.**

**MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications and Radio testing for FCC, Industry Canada, EU and TELEC Rules.**

# INTRODUCTION

## *Scope*

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

## *MRT Test Location*

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

# PRODUCT INFORMATION

## *Equipment Description*

| | |
|---|---|
| Product Name | MID |
| FCC ID | 2AEY7-S8A002 |
| Model No. | Seal 8 pro |
| LTE Specification | LTE Band 2 / 4 / 5 / 13 / 17 |
| Wi-Fi Specification | 802.11a//b/g/n/ac |
| Bluetooth Version | v4.0 dual mode |
| NFC | 13.56MHz |
| RF ID | 920.25 ~ 924.75MHz |
| **Components** | |
| Adapter | M/N: BCT050500-C02U<br>INPUT: 100-240V ~ 50/60Hz, 0.6A Max<br>OUTPUT: 5Vdc, 5.0A |

## *Product Specification Subjective to this Report*

| | |
|---|---|
| Frequency Range | For 802.11a/n-HT20:<br>5180~5320MHz, 5500~5700MHz, 5745~5825MHz<br>For 802.11ac-VHT20:<br>5180~5320MHz, 5500~5720MHz, 5745~5825MHz<br>For 802.11n-HT40:<br>5190~5310MHz, 5510~5670MHz, 5755~5795MHz<br>For 802.11ac-VHT40:<br>5190~5310MHz, 5510~5710MHz, 5755~5795MHz<br>For 802.11ac-VHT80:<br>5210MHz, 5290MHz, 5530MHz, 5610MHz, 5690MHz, 5775MHz |
| Type of Modulation | 802.11a/n/ac: OFDM |
| Maximum Average Output Power | 802.11a: 18.64dBm<br>802.11n-HT20: 18.56dBm<br>802.11n-HT40: 18.17dBm<br>802.11ac-VHT20: 18.36dBm<br>802.11ac-VHT40: 18.08dBm<br>802.11ac-VHT80: 17.02dBm |
| Antenna Type | PIFA Antenna |
| Antenna Gain | 4.8dBi |

Note: For other features of this EUT, test report will be issued separately.

### *Operation Frequency / Channel list*

802.11a/n-HT20

| Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---|---|---|---|---|---|
| 36 | 5180 MHz | 40 | 5200 MHz | 44 | 5220 MHz |
| 48 | 5240 MHz | 52 | 5260 MHz | 56 | 5280 MHz |
| 60 | 5300 MHz | 64 | 5320 MHz | 100 | 5500 MHz |
| 104 | 5520 MHz | 108 | 5540 MHz | 112 | 5560 MHz |
| 116 | 5580 MHz | 120 | 5600 MHz | 124 | 5620 MHz |
| 128 | 5640 MHz | 132 | 5660 MHz | 136 | 5680 MHz |
| 140 | 5700 MHz | 149 | 5745 MHz | 153 | 5765 MHz |
| 157 | 5785 MHz | 161 | 5805 MHz | 165 | 5825 MHz |

802.11ac-VHT20

| Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---|---|---|---|---|---|
| 36 | 5180 MHz | 40 | 5200 MHz | 44 | 5220 MHz |
| 48 | 5240 MHz | 52 | 5260 MHz | 56 | 5280 MHz |
| 60 | 5300 MHz | 64 | 5320 MHz | 100 | 5500 MHz |
| 104 | 5520 MHz | 108 | 5540 MHz | 112 | 5560 MHz |
| 116 | 5580 MHz | 120 | 5600 MHz | 124 | 5620 MHz |
| 128 | 5640 MHz | 132 | 5660 MHz | 136 | 5680 MHz |
| 140 | 5700 MHz | 144 | 5720 MHz | 149 | 5745 MHz |
| 153 | 5765 MHz | 157 | 5785 MHz | 161 | 5805 MHz |
| 165 | 5825 MHz | -- | -- | -- | -- |

802.11n-HT40

| Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---|---|---|---|---|---|
| 38 | 5190 MHz | 46 | 5230 MHz | 54 | 5270 MHz |
| 62 | 5310 MHz | 102 | 5510 MHz | 110 | 5550 MHz |
| 118 | 5590 MHz | 126 | 5630 MHz | 134 | 5670 MHz |
| 151 | 5755 MHz | 159 | 5795 MHz | -- | -- |

802.11ac-VHT40

| Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---|---|---|---|---|---|
| 38 | 5190 MHz | 46 | 5230 MHz | 54 | 5270 MHz |
| 62 | 5310 MHz | 102 | 5510 MHz | 110 | 5550 MHz |
| 118 | 5590 MHz | 126 | 5630 MHz | 134 | 5670 MHz |
| 142 | 5710 MHz | 151 | 5755 MHz | 159 | 5795 MHz |

802.11ac-VHT80

| Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---|---|---|---|---|---|
| 42 | 5210 MHz | 58 | 5290 MHz | 106 | 5530 MHz |
| 122 | 5610 MHz | 138 | 5690 MHz | 155 | 5775 MHz |

***Description of Available Antennas***

| Antenna Type | Frequency Band (GHz) | Tx Paths | Max Peak Gain (dBi) | CDD Directional Gain (dBi) | |
|---|---|---|---|---|---|
| | | | | For Power | For PSD |
| PIFA Antenna | 2.4 | 2 | 3.21 | 3.21 | 6.22 |
| | 5 | 2 | 4.8 | 4.8 | 7.81 |

Note: The EUT supports Cyclic Delay Diversity (CDD) technology, and CDD signals are correlated.
For CDD transmissions, directional gain is calculated as follows, $N_{ANT}$ = 2, $N_{SS}$ = 1.
If all antennas have the same gain, $G_{ANT}$, Directional gain = $G_{ANT}$ + Array Gain, where Array Gain is as follows.

- For power spectral density (PSD) measurements on all devices,
  Array Gain = 10 log ($N_{ANT}$/ $N_{SS}$) dB = 3.01;
- For power measurements on IEEE 802.11 devices,
  Array Gain = 0 dB for $N_{ANT} \leq 4$;

### *Device Capabilities*

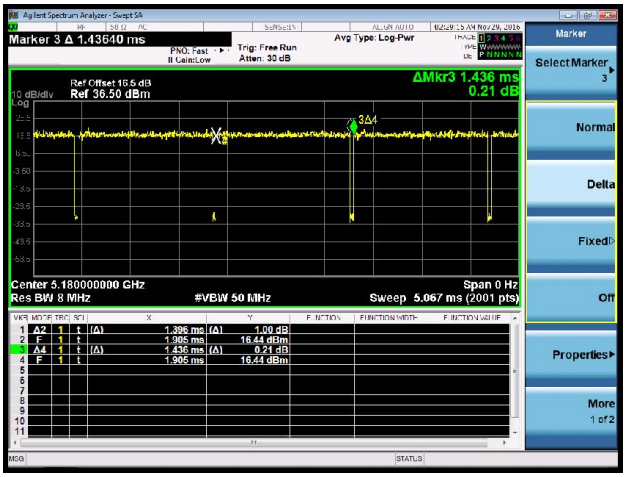
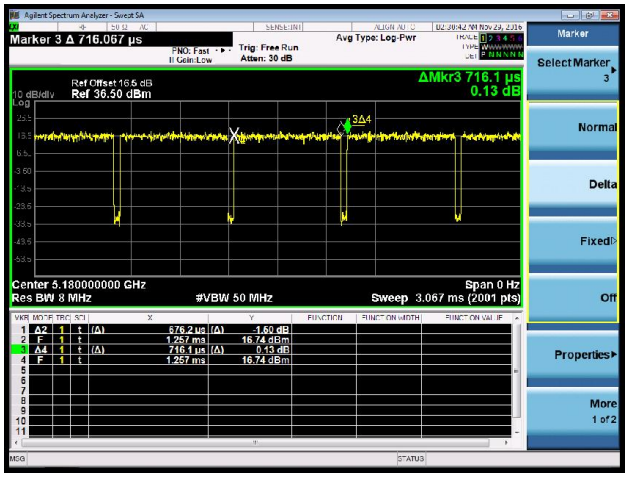
This device contains the following capabilities:

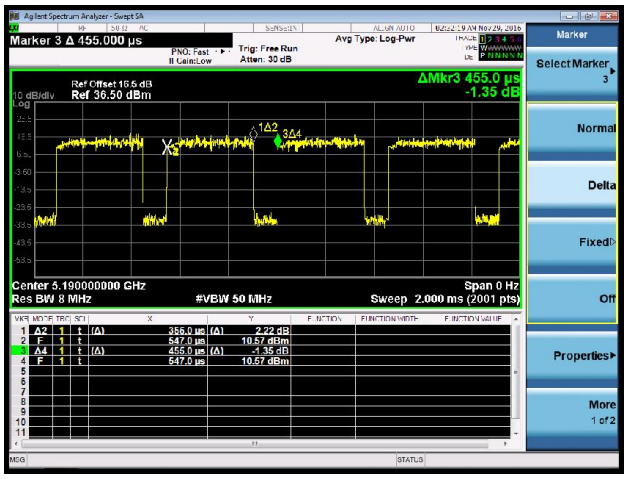
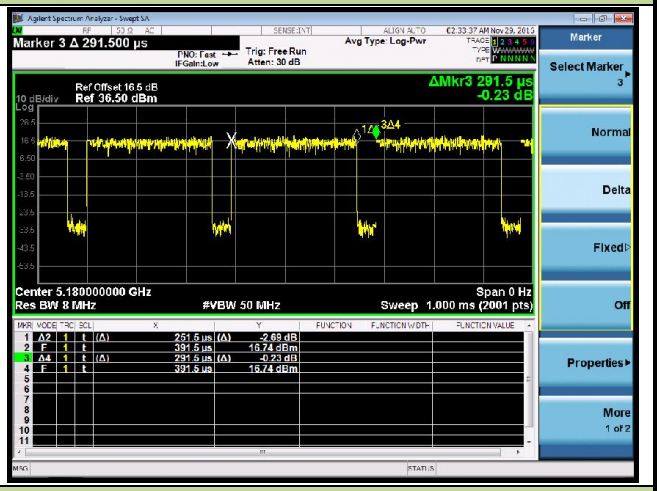
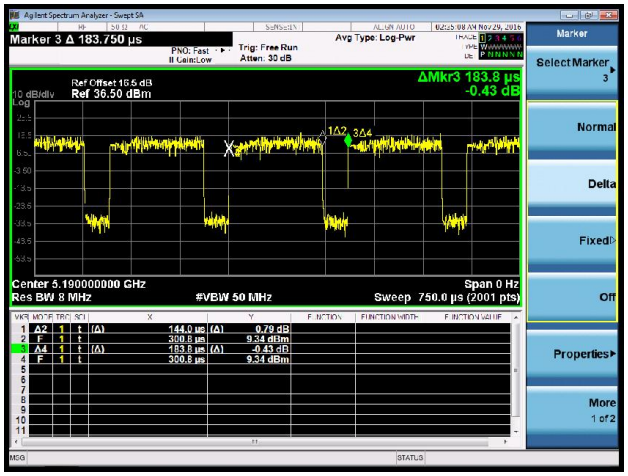
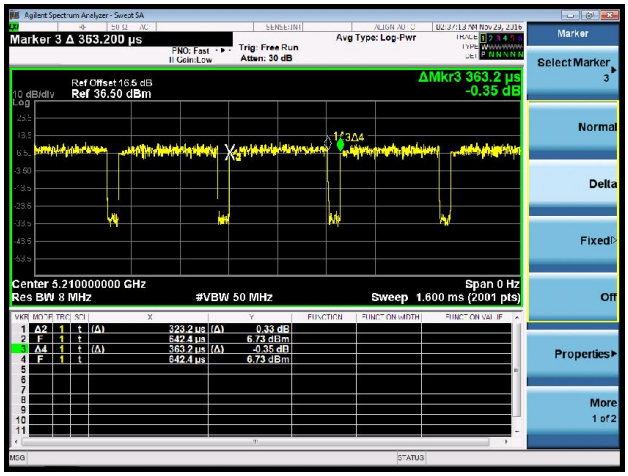
5GHz WLAN (UNII), 2.4GHz WLAN (DTS), Bluetooth (v4.0 Dual mode), Multi-Band LTE, RF ID, NFC

**Note:** 5GHz (NII) operation is possible in 20MHz and 40MHz channel bandwidths. The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz.

The duty cycles are as follows:

| Test Mode | Duty Cycle |
|---|---|
| 802.11a | 97.2% |
| 802.11n-HT20 | 94.4% |
| 802.11n-HT40 | 78.0% |
| 802.11ac-VHT20 | 86.3% |
| 802.11ac-VHT40 | 78.3% |
| 802.11ac-VHT80 | 89.0% |

| 802.11a – Duty Cycle | 802.11n-HT20 – Duty Cycle |
|---|---|
|  |  |

| 802.11n-HT40 – Duty Cycle | 802.11ac-VHT20 – Duty Cycle |
|---|---|
|  |  |
| **802.11ac-VHT40 – Duty Cycle** | **802.11ac-VHT80 – Duty Cycle** |
|  |  |

### *Test Configuration*

The **MID** was tested per the guidance of KDB 789033 D02v01r03. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

### *EMI Suppression Device(s)/Modifications*

No EMI suppression device(s) were added and/or no modifications were made during testing.

### *Labeling Requirements*

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

# DESCRIPTION OF TEST

### *Evaluation Procedure*

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013), and the guidance provided in KDB 789033 D02v01r03 were used in the measurement of the **MID.**

**Deviation from measurement procedure…….....None**

### *AC Line Conducted Emissions*

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions are used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2013.

Line conducted emissions test results are shown in Section 7.9.

### *Radiated Emissions*

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. A MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up for frequencies below 1GHz was placed on top of the 0.8 meter high, 1 x 1.5 meter table; and test set-up for frequencies 1-40GHz was placed on top of the 1.5 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions. According to 3dB Beam-Width of horn antenna, the horn antenna should be always directed to the EUT when rising height.

# ANTENNA REQUIREMENTS

**Excerpt from §15.203 of the FCC Rules/Regulations:**

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

The antenna of the **MID** is **permanently attached.**
There are no provisions for connection to an external antenna.

**Conclusion:**

The **MID** unit complies with the requirement of §15.203.

# TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions - SR2

| Instrument | Manufacturer | Type No. | Serial No. | Cali. Interval | Cali. Due Date |
|---|---|---|---|---|---|
| EMI Test Receiver | R&S | ESR7 | 102030 | 1 year | 2017/05/08 |
| Two-Line V-Network | R&S | ENV216 | 101683 | 1 year | 2017/06/21 |
| Two-Line V-Network | R&S | ENV216 | 101684 | 1 year | 2017/06/21 |
| Temperature/Humidity Meter | Yuhuaze | HTC-2 | N/A | 1 year | 2017/12/22 |
| Shielding Anechoic Chamber | Mikebang | Chamber-SR2 | N/A | 1 year | 2017/05/10 |

Radiated Emission - AC1

| Instrument | Manufacturer | Type No. | Serial No. | Cali. Interval | Cali. Due Date |
|---|---|---|---|---|---|
| Spectrum Analyzer | Agilent | N9020A | MY52090106 | 1 year | 2017/05/07 |
| Microwave System Amplifier | Agilent | 83017A | MY53270040 | 1 year | 2017/03/28 |
| Preamplifier | Schwarzbeck | BBV 9721 | 9721-008 | 1 year | 2017/04/16 |
| Loop Antenna | Schwarzbeck | FMZB1519 | 100982 | 1 year | 2017/12/21 |
| Bilog Period Antenna | Schwarzbeck | VULB 9168 | 662 | 1 year | 2017/11/19 |
| Horn Antenna | Schwarzbeck | BBHA9120D | 9120D-1167 | 1 year | 2017/10/22 |
| Broadband Horn Antenna | Schwarzbeck | BBHA9170 | BBHA9170549 | 1 year | 2018/01/04 |
| Temperature/Humidity Meter | Yuhuaze | HTC-2 | N/A | 1 year | 2017/12/22 |
| Anechoic Chamber | TDK | Chamber-AC1 | N/A | 1 year | 2017/05/10 |

Conducted Test Equipment - TR3

| Instrument | Manufacturer | Type No. | Serial No. | Cali. Interval | Cali. Due Date |
|---|---|---|---|---|---|
| Spectrum Analyzer | Agilent | N9020A | MY52090106 | 1 year | 2017/05/08 |
| USB wideband power sensor | Boonton | 55006 | 8911 | 1 year | 2017/05/08 |
| Temperature/Humidity Meter | Yuhuaze | HTC-2 | N/A | 1 year | 2017/12/22 |

| Software | Version | Function |
|---|---|---|
| e3 | V8.3.5 | EMI Test Software |

# MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

| AC Conducted Emission Measurement – SR2 |
|---|
| Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):<br>150kHz~30MHz: 3.46dB |
| **Radiated Emission Measurement – AC1** |
| Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):<br>9kHz ~ 1GHz: 4.18dB<br>1GHz ~ 40GHz: 4.76dB |

# TEST RESULT

## *Summary*

**Company Name:** **Bak USA Technologies Corp.**

**FCC ID:** **2AEY7-S8A002**

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

**Data Rate(s) Tested:** **6Mbps ~ 54Mbps (a);**
**13/14.4Mbps ~ 130/144.4Mbps (n-HT20MHz BW);**
**27/30Mbps ~ 270/300Mbps (n-HT40MHz BW);**
**13/14.4Mbps ~ 156/173.4Mbps (ac-VHT20MHz BW);**
**27/30Mbps ~ 360/400Mbps (ac-VHT40MHz BW);**
**58.6/65Mbps ~ 780/866.6Mbps (ac-VHT80MHz BW)**

| FCC Part Section(s) | Test Description | Test Limit | Test Condition | Test Result | Reference |
|---|---|---|---|---|---|
| 15.407(a) | 26dB Bandwidth | N/A | Conducted | Pass | Section 7.2 |
| 15.407(e) | 6dB Bandwidth | ≥ 500kHz | | Pass | Section 7.3 |
| 15.407(a)(1)(ii) (iv), (2), (3) | Maximum Conducted Output Power | ≤ 24 dBm U-NII-1, 2A, 2C<br>≤ 30 dBm U-NII-3 | | Pass | Section 7.4 |
| 15.407(a)(1)(iv) , (3), (5) | Peak Power Spectral Density | ≤ 11 dBm/MHz U-NII-1, 2A, 2C<br>≤ 30 dBm/500kHz U-NII-3 | | Pass | Section 7.5 |
| 15.407(g) | Frequency Stability | N/A | | Pass | Section 7.6 |
| 15.407(b)(1), (4)(i) | Undesirable Emissions | ≤ -27dBm/MHz EIRP<br>See section 7.7 | Radiated | Pass | Section 7.7 & 7.8 |
| 15.205, 15.209 15.407(b)(5), (6), (7) | General Field Strength Limits (Restricted Bands and Radiated Emission Limits) | Emissions in restricted bands must meet the radiated limits detailed in 15.209 | | Pass | |
| 15.207 | AC Conducted Emissions 150kHz - 30MHz | < FCC 15.207 limits | Line Conducted | Pass | Section 7.9 |

Notes:

1) All channels, modes, and modulations/data rates were investigated among all UNII bands. For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst case emissions.
2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.

***26dB Bandwidth Measurement***

## *1.1.1. Test Limit*

N/A

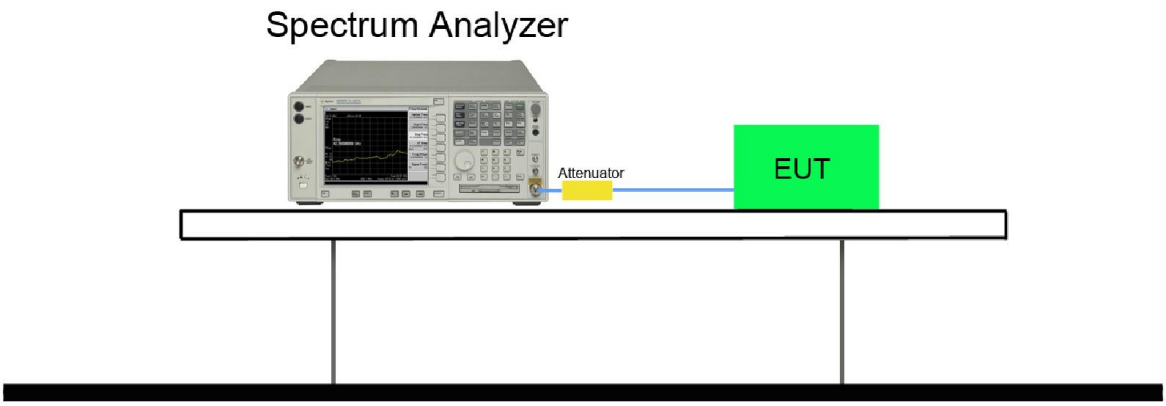
## *1.1.2. Test Procedure used*

KDB 789033 D02v01r03 – Section C.1

## *1.1.3. Test Setting*

1. The analyzers' automatic bandwidth measurement capability was used to perform the 26dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 26. The automatic bandwidth measurement function also has the capability of simultaneously measuring the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediated power nulls in the fundamental emission.
2. RBW = approximately 1% of the emission bandwidth.
3. VBW ≥ 3 × RBW.
4. Detector = Peak.
5. Trace mode = max hold.

## *1.1.4. Test Setup*



### *1.1.5. Test Result*

| Test Mode | Data Rate (Mbps) | Channel No. | Frequency (MHz) | 26dB Bandwidth (MHz) | 99% Bandwidth (MHz) | Result |
|---|---|---|---|---|---|---|
| Ant 0 / Ant 0 + 1 | | | | | | |
| 802.11a | 6 | 36 | 5180 | 21.66 | 16.94 | Pass |
| 802.11a | 6 | 44 | 5220 | 21.43 | 16.79 | Pass |
| 802.11a | 6 | 48 | 5240 | 21.52 | 16.87 | Pass |
| 802.11a | 6 | 52 | 5260 | 21.31 | 16.82 | Pass |
| 802.11a | 6 | 60 | 5300 | 21.26 | 16.85 | Pass |
| 802.11a | 6 | 64 | 5320 | 20.89 | 16.79 | Pass |
| 802.11a | 6 | 100 | 5500 | 21.20 | 17.03 | Pass |
| 802.11a | 6 | 120 | 5600 | 21.50 | 16.96 | Pass |
| 802.11a | 6 | 140 | 5700 | 22.61 | 16.83 | Pass |
| 802.11a | 6 | 149 | 5745 | 32.86 | 16.88 | Pass |
| 802.11a | 6 | 157 | 5785 | 25.58 | 17.17 | Pass |
| 802.11a | 6 | 165 | 5825 | 25.68 | 17.12 | Pass |
| 802.11n-HT20 | 13.0 | 36 | 5180 | 21.36 | 17.88 | Pass |
| 802.11n-HT20 | 13.0 | 44 | 5220 | 21.27 | 17.88 | Pass |
| 802.11n-HT20 | 13.0 | 48 | 5240 | 21.16 | 17.84 | Pass |
| 802.11n-HT20 | 13.0 | 52 | 5260 | 21.22 | 17.95 | Pass |
| 802.11n-HT20 | 13.0 | 60 | 5300 | 21.29 | 17.92 | Pass |
| 802.11n-HT20 | 13.0 | 64 | 5320 | 21.08 | 17.93 | Pass |
| 802.11n-HT20 | 13.0 | 100 | 5500 | 21.13 | 17.97 | Pass |
| 802.11n-HT20 | 13.0 | 120 | 5600 | 22.53 | 17.89 | Pass |
| 802.11n-HT20 | 13.0 | 140 | 5700 | 21.41 | 18.02 | Pass |
| 802.11n-HT20 | 13.0 | 149 | 5745 | 30.00 | 17.67 | Pass |
| 802.11n-HT20 | 13.0 | 157 | 5785 | 25.52 | 18.25 | Pass |
| 802.11n-HT20 | 13.0 | 165 | 5825 | 29.33 | 18.22 | Pass |
| 802.11n-HT40 | 27.0 | 38 | 5190 | 39.35 | 36.18 | Pass |
| 802.11n-HT40 | 27.0 | 46 | 5230 | 40.14 | 36.31 | Pass |
| 802.11n-HT40 | 27.0 | 54 | 5270 | 39.23 | 36.23 | Pass |
| 802.11n-HT40 | 27.0 | 62 | 5310 | 40.00 | 36.21 | Pass |
| 802.11n-HT40 | 27.0 | 102 | 5510 | 62.04 | 36.92 | Pass |
| 802.11n-HT40 | 27.0 | 118 | 5590 | 65.77 | 36.59 | Pass |
| 802.11n-HT40 | 27.0 | 134 | 5670 | 60.12 | 36.86 | Pass |

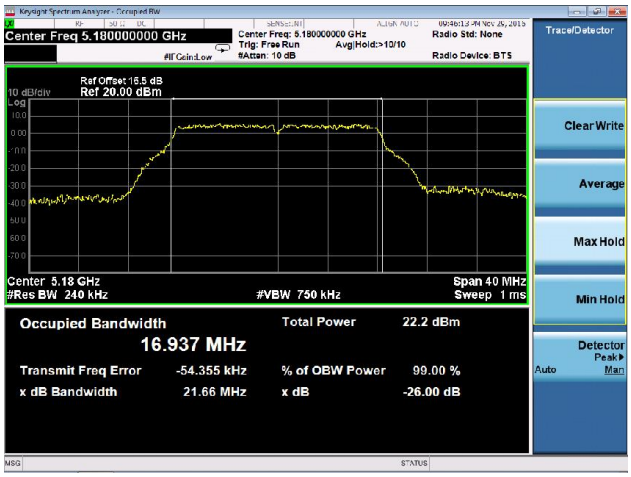
| | | | | | | |
|---|---|---|---|---|---|---|
| 802.11n-HT40 | 27.0 | 151 | 5755 | 72.79 | 36.79 | Pass |
| 802.11n-HT40 | 27.0 | 159 | 5795 | 70.19 | 36.72 | Pass |
| 802.11ac-VHT20 | 13.0 | 36 | 5180 | 21.12 | 17.81 | Pass |
| 802.11ac-VHT20 | 13.0 | 44 | 5220 | 20.99 | 17.88 | Pass |
| 802.11ac-VHT20 | 13.0 | 48 | 5240 | 21.10 | 17.81 | Pass |
| 802.11ac-VHT20 | 13.0 | 52 | 5260 | 21.07 | 17.76 | Pass |
| 802.11ac-VHT20 | 13.0 | 60 | 5300 | 21.59 | 17.80 | Pass |
| 802.11ac-VHT20 | 13.0 | 64 | 5320 | 21.20 | 17.82 | Pass |
| 802.11ac-VHT20 | 13.0 | 100 | 5500 | 21.49 | 17.98 | Pass |
| 802.11ac-VHT20 | 13.0 | 120 | 5600 | 21.66 | 17.84 | Pass |
| 802.11ac-VHT20 | 13.0 | 140 | 5700 | 21.76 | 17.95 | Pass |
| 802.11ac-VHT20 | 13.0 | 144 | 5720 | 21.29 | 17.93 | Pass |
| 802.11ac-VHT20 | 13.0 | 149 | 5745 | 30.09 | 17.68 | Pass |
| 802.11ac-VHT20 | 13.0 | 157 | 5785 | 26.38 | 18.41 | Pass |
| 802.11ac-VHT20 | 13.0 | 165 | 5825 | 27.98 | 18.19 | Pass |
| 802.11ac-VHT40 | 27.0 | 38 | 5190 | 39.11 | 36.35 | Pass |
| 802.11ac-VHT40 | 27.0 | 46 | 5230 | 39.79 | 36.35 | Pass |
| 802.11ac-VHT40 | 27.0 | 54 | 5270 | 42.88 | 36.44 | Pass |
| 802.11ac-VHT40 | 27.0 | 62 | 5310 | 39.22 | 36.32 | Pass |
| 802.11ac-VHT40 | 27.0 | 102 | 5510 | 59.58 | 36.75 | Pass |
| 802.11ac-VHT40 | 27.0 | 118 | 5590 | 73.24 | 36.71 | Pass |
| 802.11ac-VHT40 | 27.0 | 134 | 5670 | 70.11 | 36.70 | Pass |
| 802.11ac-VHT40 | 27.0 | 142 | 5710 | 69.63 | 36.82 | Pass |
| 802.11ac-VHT40 | 27.0 | 151 | 5755 | 72.01 | 36.74 | Pass |
| 802.11ac-VHT40 | 27.0 | 159 | 5795 | 73.51 | 36.61 | Pass |
| 802.11ac-VHT80 | 58.6 | 42 | 5210 | 81.62 | 75.73 | Pass |
| 802.11ac-VHT80 | 58.6 | 58 | 5290 | 80.64 | 75.70 | Pass |
| 802.11ac-VHT80 | 58.6 | 106 | 5530 | 80.65 | 75.76 | Pass |
| 802.11ac-VHT80 | 58.6 | 122 | 5610 | 80.81 | 75.55 | Pass |
| 802.11ac-VHT80 | 58.6 | 138 | 5690 | 80.94 | 75.97 | Pass |
| 802.11ac-VHT80 | 58.6 | 155 | 5775 | 79.93 | 75.80 | Pass |

| Test Mode | Data Rate (Mbps) | Channel No. | Frequency (MHz) | 26dB Bandwidth (MHz) | 99% Bandwidth (MHz) | Result |
|---|---|---|---|---|---|---|
| Ant 1 / Ant 0 + 1 | | | | | | |
| 802.11a | 6 | 36 | 5180 | 21.46 | 16.89 | Pass |
| 802.11a | 6 | 44 | 5220 | 21.45 | 16.85 | Pass |
| 802.11a | 6 | 48 | 5240 | 21.37 | 16.76 | Pass |
| 802.11a | 6 | 52 | 5260 | 21.24 | 16.77 | Pass |
| 802.11a | 6 | 60 | 5300 | 21.06 | 16.79 | Pass |
| 802.11a | 6 | 64 | 5320 | 21.43 | 16.79 | Pass |
| 802.11a | 6 | 100 | 5500 | 21.19 | 16.86 | Pass |
| 802.11a | 6 | 120 | 5600 | 21.38 | 16.80 | Pass |
| 802.11a | 6 | 140 | 5700 | 21.19 | 16.82 | Pass |
| 802.11a | 6 | 149 | 5745 | 18.51 | 16.57 | Pass |
| 802.11a | 6 | 157 | 5785 | 21.08 | 16.85 | Pass |
| 802.11a | 6 | 165 | 5825 | 21.42 | 16.77 | Pass |
| 802.11n-HT20 | 13.0 | 36 | 5180 | 21.62 | 17.85 | Pass |
| 802.11n-HT20 | 13.0 | 44 | 5220 | 21.53 | 17.86 | Pass |
| 802.11n-HT20 | 13.0 | 48 | 5240 | 21.45 | 17.85 | Pass |
| 802.11n-HT20 | 13.0 | 52 | 5260 | 21.52 | 17.86 | Pass |
| 802.11n-HT20 | 13.0 | 60 | 5300 | 21.36 | 17.83 | Pass |
| 802.11n-HT20 | 13.0 | 64 | 5320 | 21.68 | 17.88 | Pass |
| 802.11n-HT20 | 13.0 | 100 | 5500 | 21.48 | 17.96 | Pass |
| 802.11n-HT20 | 13.0 | 120 | 5600 | 21.61 | 17.89 | Pass |
| 802.11n-HT20 | 13.0 | 140 | 5700 | 21.36 | 17.91 | Pass |
| 802.11n-HT20 | 13.0 | 149 | 5745 | 18.75 | 17.43 | Pass |
| 802.11n-HT20 | 13.0 | 157 | 5785 | 21.26 | 17.86 | Pass |
| 802.11n-HT20 | 13.0 | 165 | 5825 | 21.52 | 17.88 | Pass |
| 802.11n-HT40 | 27.0 | 38 | 5190 | 39.32 | 36.30 | Pass |
| 802.11n-HT40 | 27.0 | 46 | 5230 | 39.16 | 36.28 | Pass |
| 802.11n-HT40 | 27.0 | 54 | 5270 | 39.16 | 36.27 | Pass |
| 802.11n-HT40 | 27.0 | 62 | 5310 | 39.24 | 36.23 | Pass |
| 802.11n-HT40 | 27.0 | 102 | 5510 | 45.24 | 36.62 | Pass |
| 802.11n-HT40 | 27.0 | 118 | 5590 | 39.47 | 36.26 | Pass |
| 802.11n-HT40 | 27.0 | 134 | 5670 | 40.41 | 36.38 | Pass |
| 802.11n-HT40 | 27.0 | 151 | 5755 | 42.49 | 36.51 | Pass |
| 802.11n-HT40 | 27.0 | 159 | 5795 | 40.63 | 36.40 | Pass |

| | | | | | | |
|---|---|---|---|---|---|---|
| 802.11ac-VHT20 | 13.0 | 36 | 5180 | 21.40 | 17.87 | Pass |
| 802.11ac-VHT20 | 13.0 | 44 | 5220 | 20.98 | 17.85 | Pass |
| 802.11ac-VHT20 | 13.0 | 48 | 5240 | 21.34 | 17.81 | Pass |
| 802.11ac-VHT20 | 13.0 | 52 | 5260 | 21.40 | 17.85 | Pass |
| 802.11ac-VHT20 | 13.0 | 60 | 5300 | 21.54 | 17.85 | Pass |
| 802.11ac-VHT20 | 13.0 | 64 | 5320 | 21.46 | 17.83 | Pass |
| 802.11ac-VHT20 | 13.0 | 100 | 5500 | 21.44 | 17.82 | Pass |
| 802.11ac-VHT20 | 13.0 | 120 | 5600 | 21.31 | 17.82 | Pass |
| 802.11ac-VHT20 | 13.0 | 140 | 5700 | 21.20 | 17.86 | Pass |
| 802.11ac-VHT20 | 13.0 | 144 | 5720 | 21.53 | 17.86 | Pass |
| 802.11ac-VHT20 | 13.0 | 149 | 5745 | 19.12 | 17.46 | Pass |
| 802.11ac-VHT20 | 13.0 | 157 | 5785 | 21.34 | 17.90 | Pass |
| 802.11ac-VHT20 | 13.0 | 165 | 5825 | 21.37 | 17.81 | Pass |
| 802.11ac-VHT40 | 27.0 | 38 | 5190 | 39.35 | 36.24 | Pass |
| 802.11ac-VHT40 | 27.0 | 46 | 5230 | 39.29 | 36.27 | Pass |
| 802.11ac-VHT40 | 27.0 | 54 | 5270 | 40.04 | 36.39 | Pass |
| 802.11ac-VHT40 | 27.0 | 62 | 5310 | 39.43 | 36.32 | Pass |
| 802.11ac-VHT40 | 27.0 | 102 | 5510 | 39.67 | 36.45 | Pass |
| 802.11ac-VHT40 | 27.0 | 118 | 5590 | 40.06 | 36.42 | Pass |
| 802.11ac-VHT40 | 27.0 | 134 | 5670 | 39.60 | 36.38 | Pass |
| 802.11ac-VHT40 | 27.0 | 142 | 5710 | 39.67 | 36.43 | Pass |
| 802.11ac-VHT40 | 27.0 | 151 | 5755 | 39.93 | 36.48 | Pass |
| 802.11ac-VHT40 | 27.0 | 159 | 5795 | 39.51 | 36.46 | Pass |
| 802.11ac-VHT80 | 58.6 | 42 | 5210 | 80.05 | 75.77 | Pass |
| 802.11ac-VHT80 | 58.6 | 58 | 5290 | 81.08 | 75.74 | Pass |
| 802.11ac-VHT80 | 58.6 | 106 | 5530 | 81.26 | 75.81 | Pass |
| 802.11ac-VHT80 | 58.6 | 122 | 5610 | 80.79 | 75.65 | Pass |
| 802.11ac-VHT80 | 58.6 | 138 | 5690 | 80.54 | 75.72 | Pass |
| 802.11ac-VHT80 | 58.6 | 155 | 5775 | 80.84 | 75.74 | Pass |

## 802.11a 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1

### Channel 36 (5180MHz)

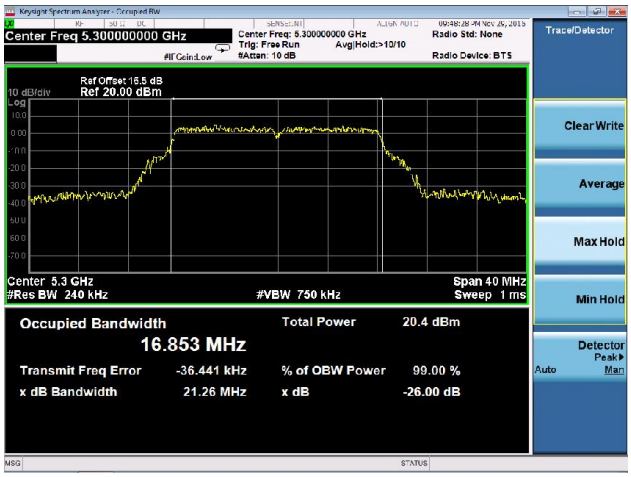



### Channel 44 (5220MHz)

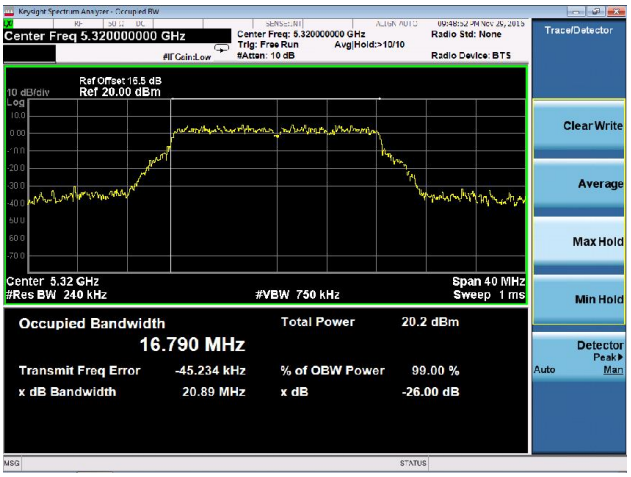

### Channel 48 (5240MHz)

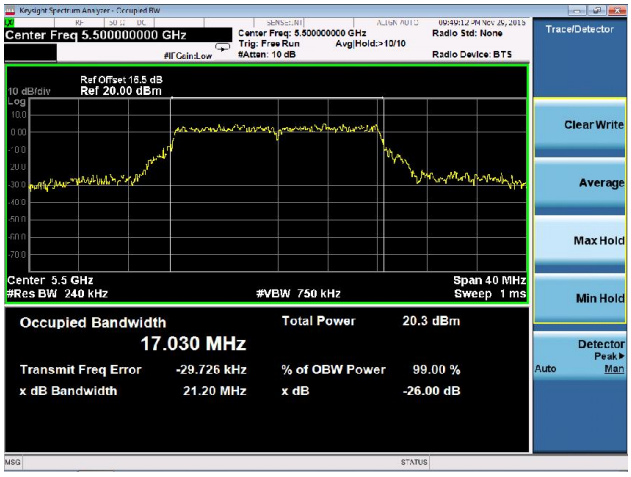
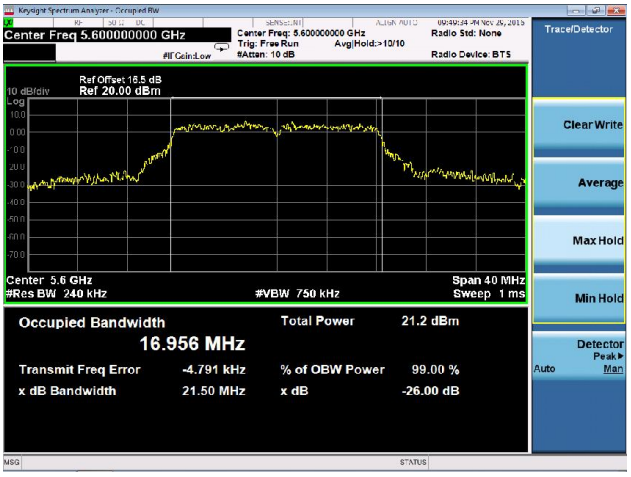
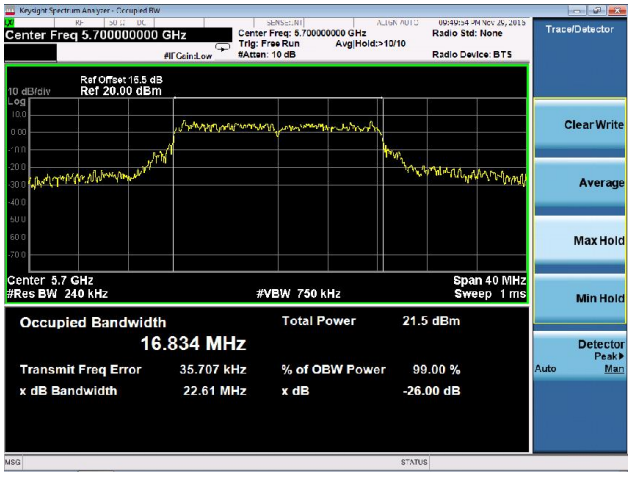
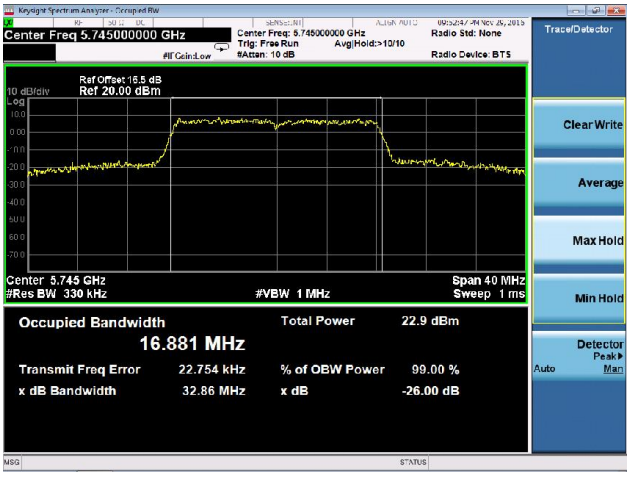
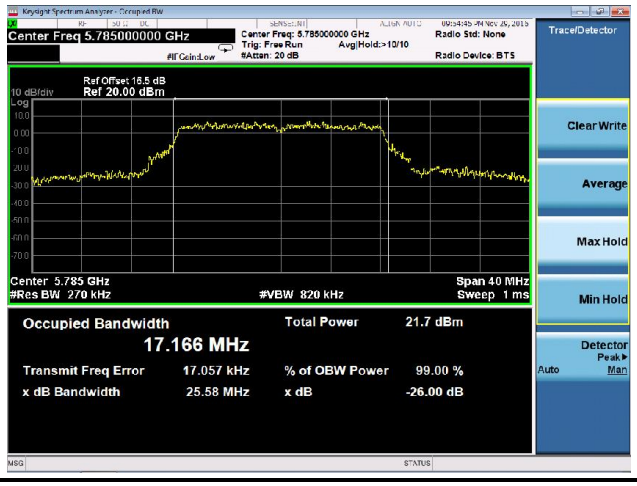

### Channel 52 (5260MHz)


### Channel 60 (5300MHz)




### Channel 64 (5320MHz)

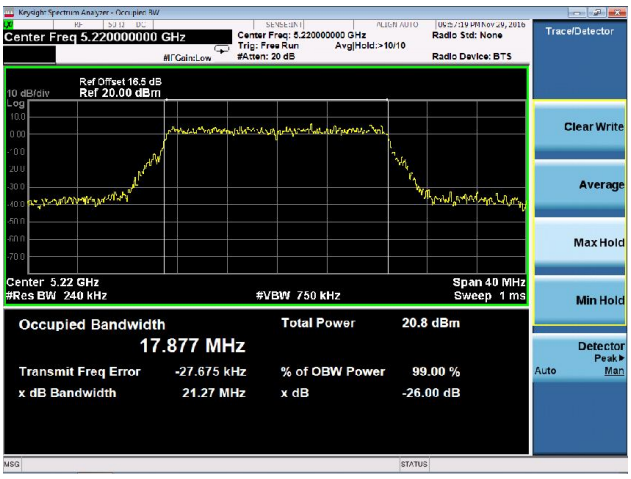


| Channel 100 (5500MHz) | Channel 120 (5600MHz) |
|---|---|
|  |  |
| **Channel 140 (5700MHz)** | **Channel 149 (5745MHz)** |
|  |  |
| **Channel 157 (5785MHz)** | **Channel 165 (5825MHz)** |
|  |  |

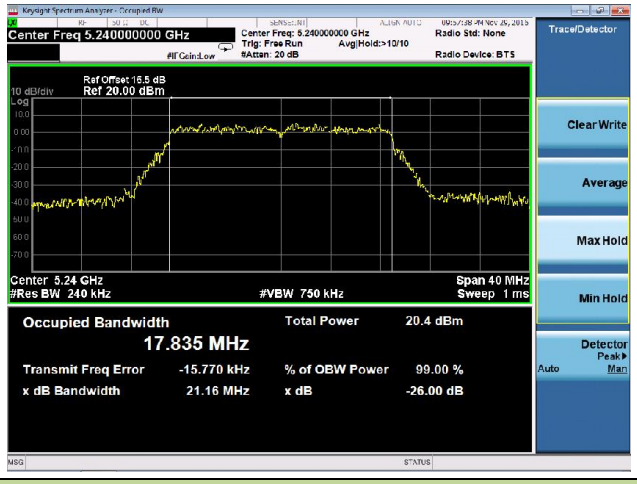
## 802.11n-HT20 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1

### Channel 36 (5180MHz)

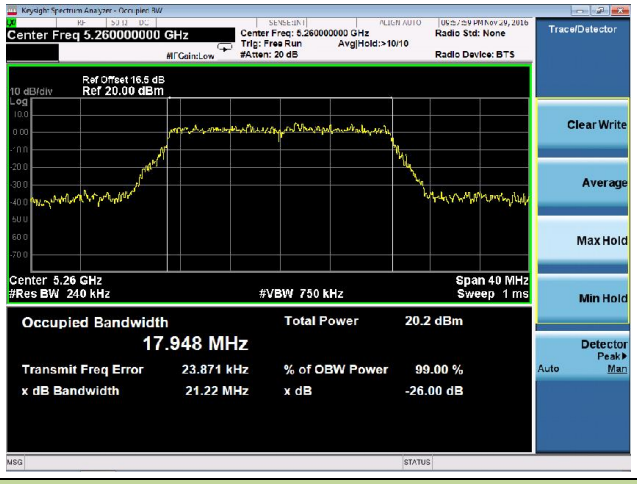

### Channel 44 (5220MHz)



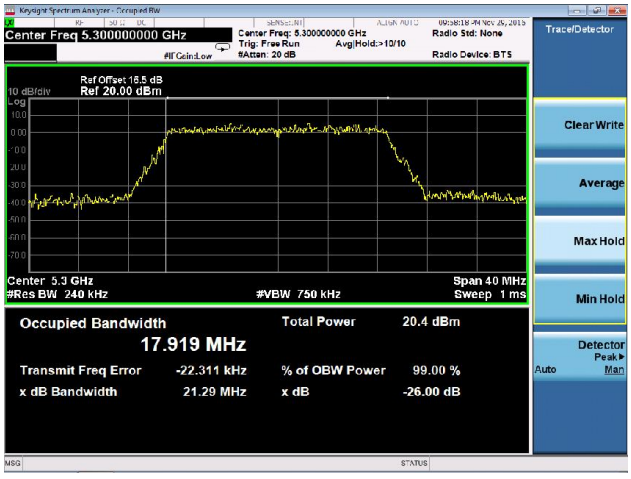

### Channel 48 (5240MHz)



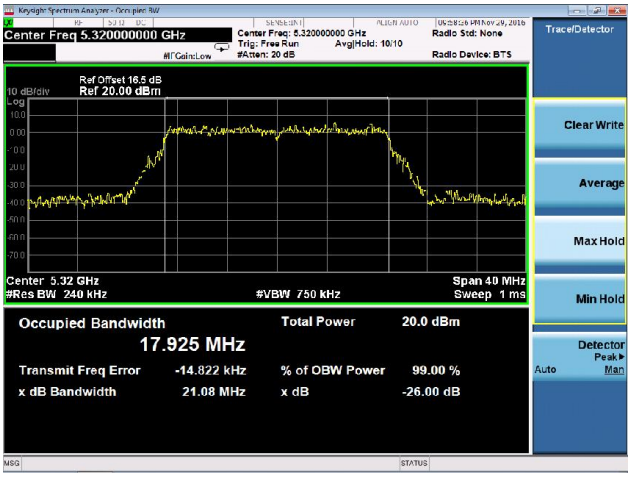

### Channel 52 (5260MHz)

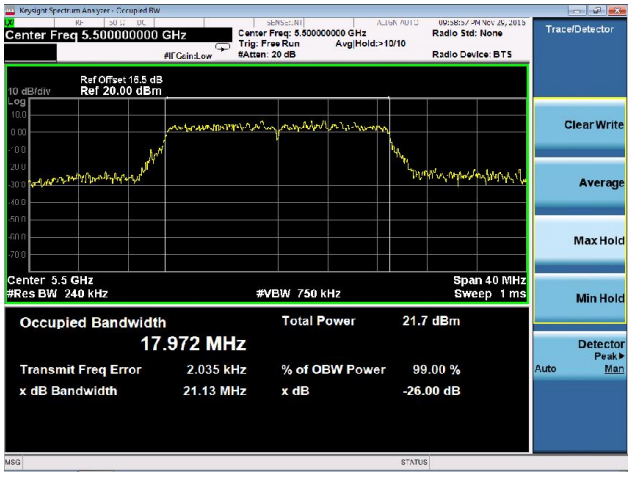
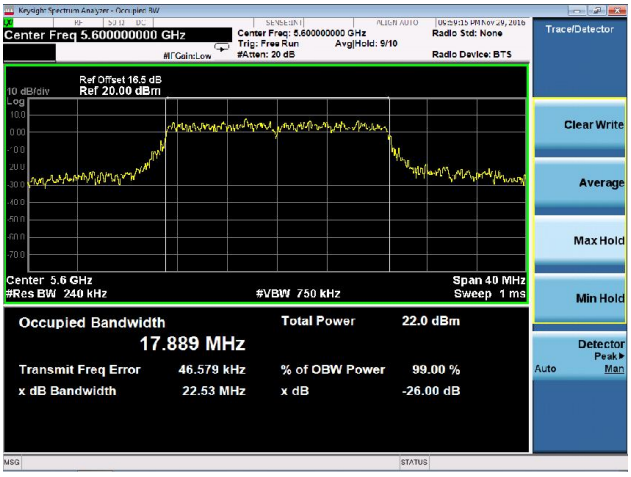
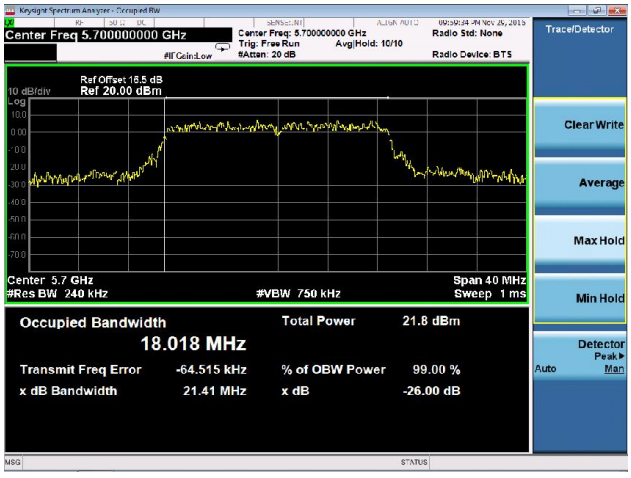
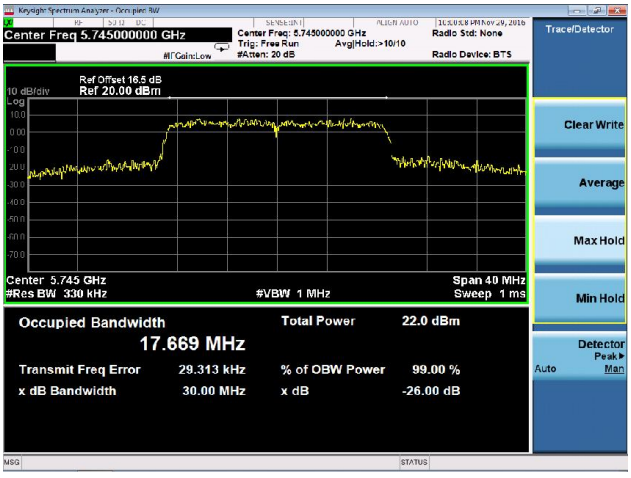
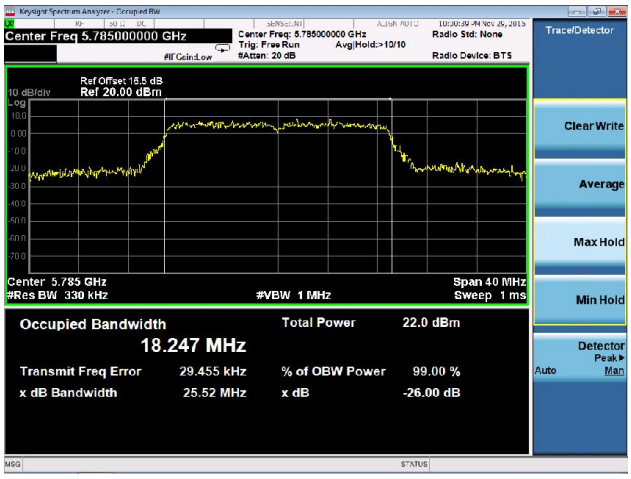
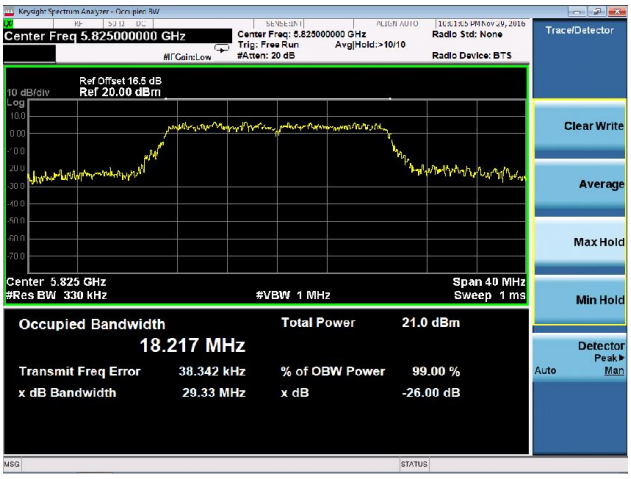



### Channel 60 (5300MHz)




### Channel 64 (5320MHz)

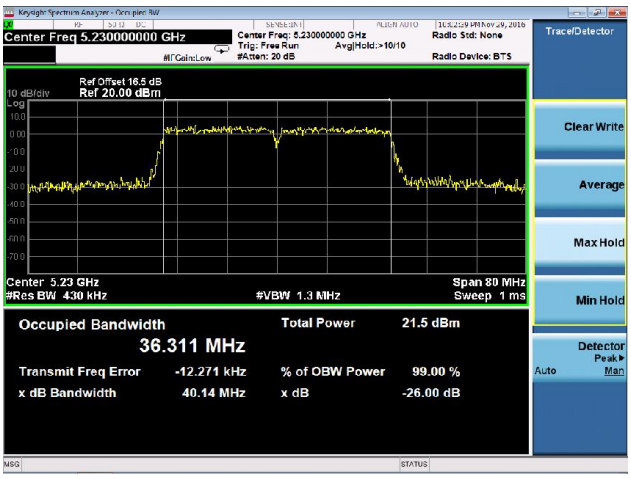


| Channel 100 (5500MHz) | Channel 120 (5600MHz) |
|---|---|
|  |  |
| **Channel 140 (5700MHz)** | **Channel 149 (5745MHz)** |
|  |  |
| **Channel 157 (5785MHz)** | **Channel 165 (5825MHz)** |
|  |  |

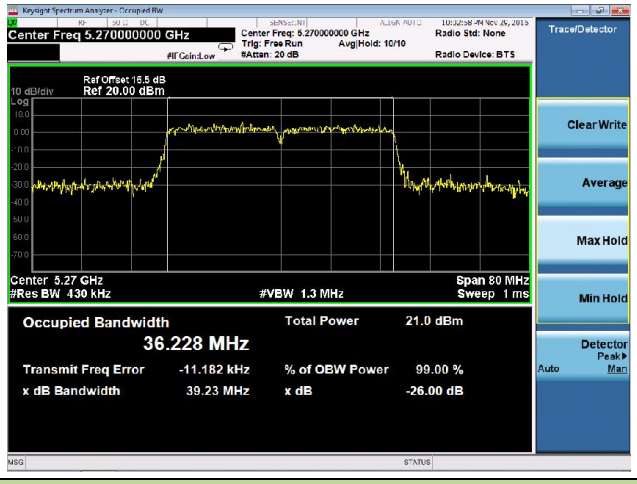
## 802.11n-HT40 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1

### Channel 38 (5190MHz)

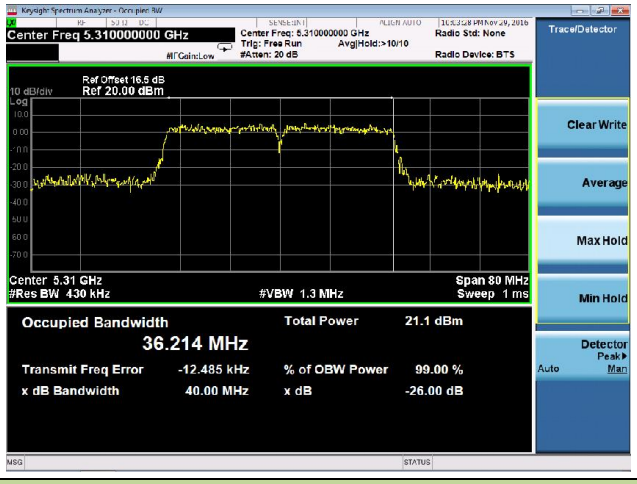

### Channel 46 (5230MHz)



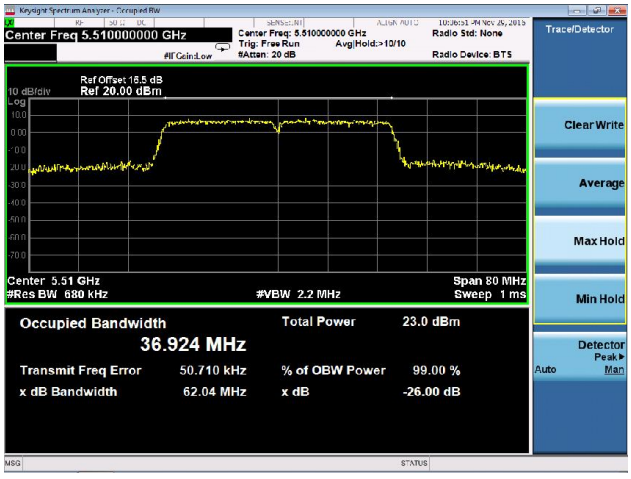

### Channel 54 (5270MHz)



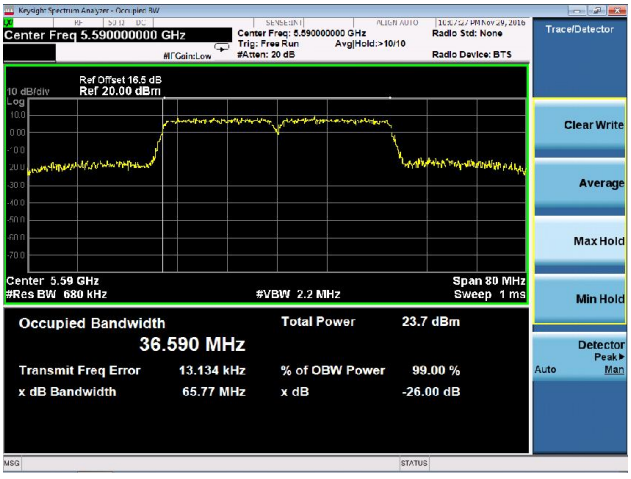

### Channel 62 (5310MHz)

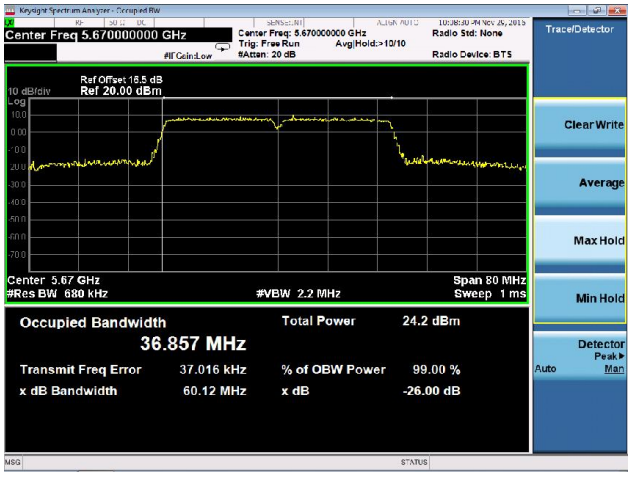
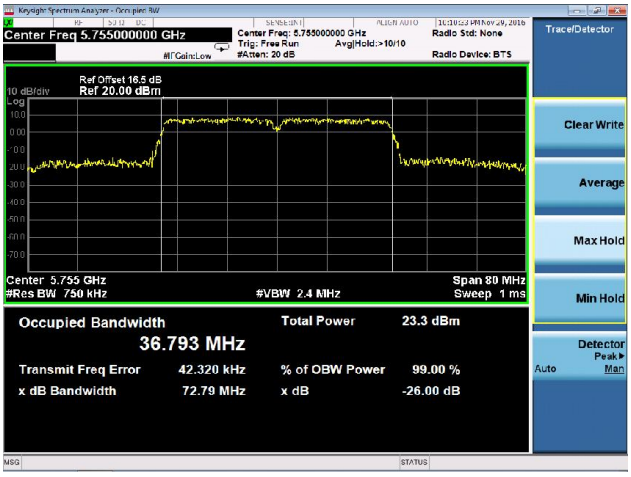
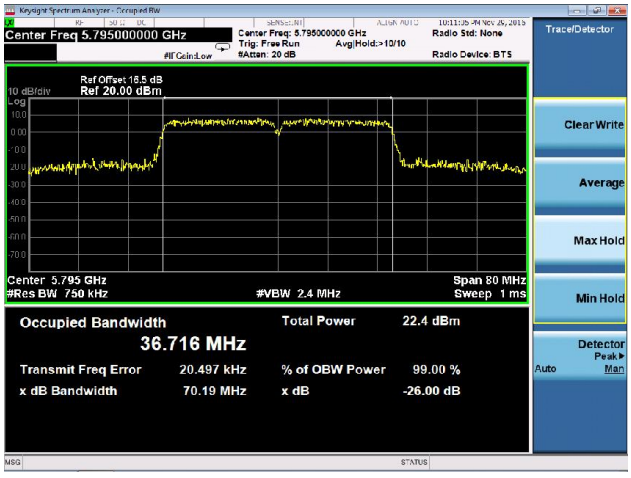



### Channel 102 (5510MHz)




### Channel 118 (5590MHz)

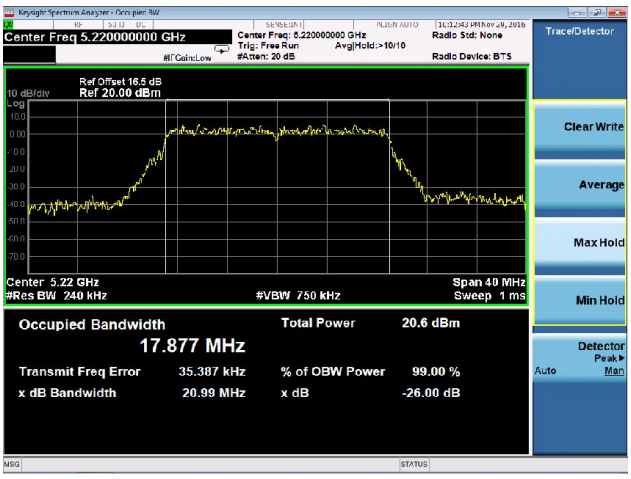


| Channel 134 (5670MHz) | Channel 151 (5755MHz) |
|---|---|
|  |  |
| **Channel 159 (5795MHz)** | |
|  | |

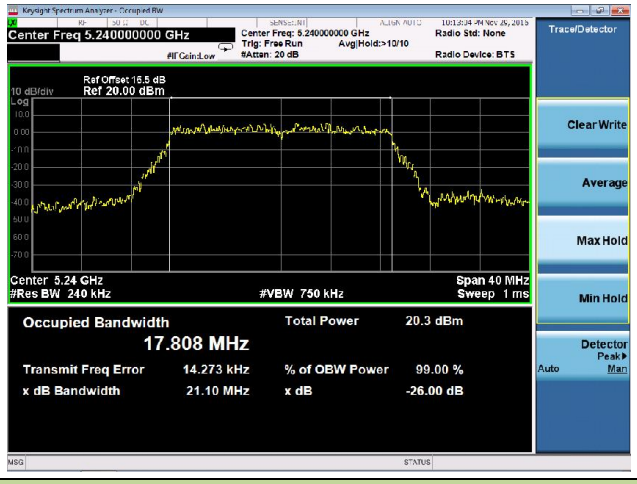
## 802.11ac-VHT20 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1

### Channel 36 (5180MHz)

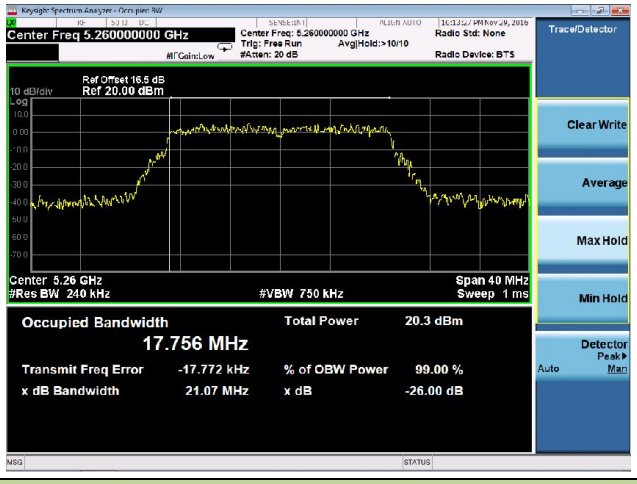

### Channel 44 (5220MHz)




### Channel 48 (5240MHz)

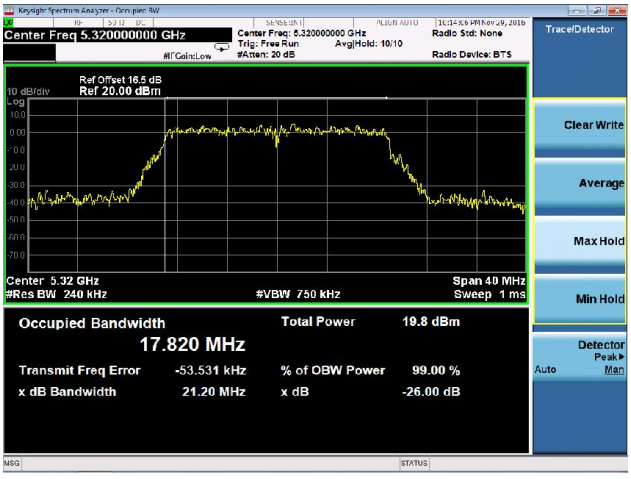


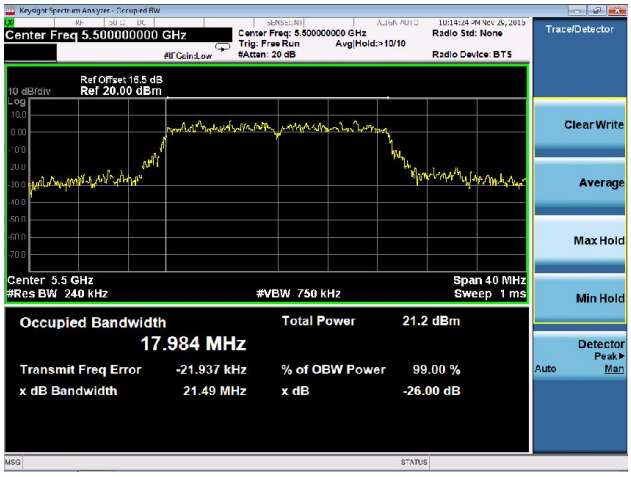
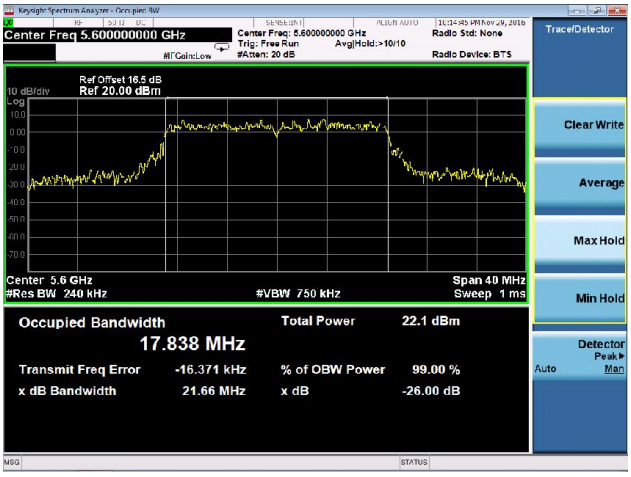

### Channel 52 (5260MHz)

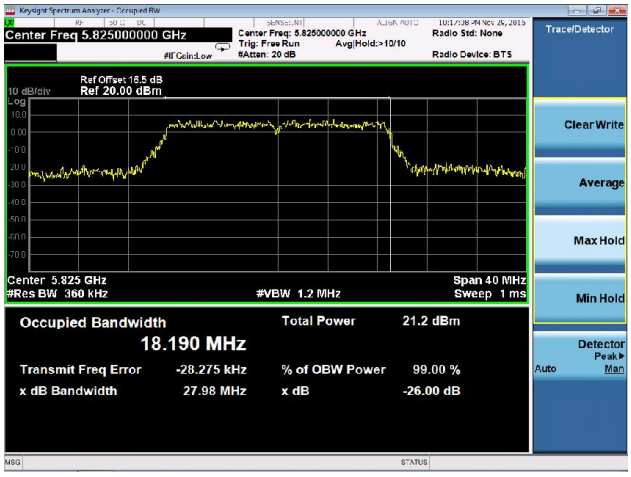



### Channel 60 (5300MHz)


### Channel 64 (5320MHz)



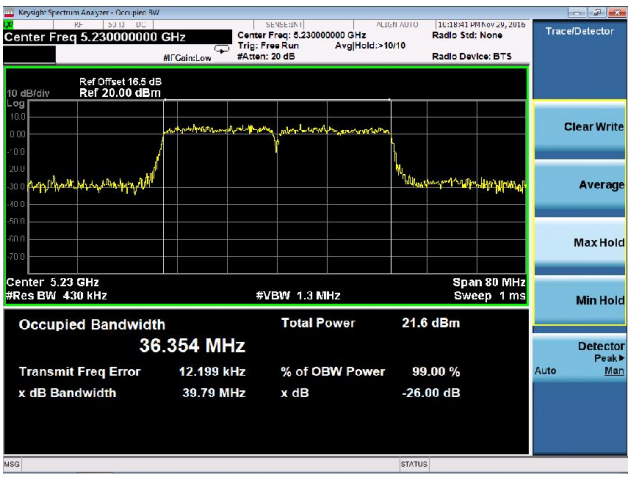
| Channel 100 (5500MHz) | Channel 120 (5600MHz) |
|---|---|
|  |  |
| **Channel 140 (5700MHz)** | **Channel 144 (5720MHz)** |
|  |  |
| **Channel 149 (5745MHz)** | **Channel 157 (5785MHz)** |
|  |  |

| Channel 165 (5825MHz) | |
|---|---|
|  | |

## 802.11ac-VHT40 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1

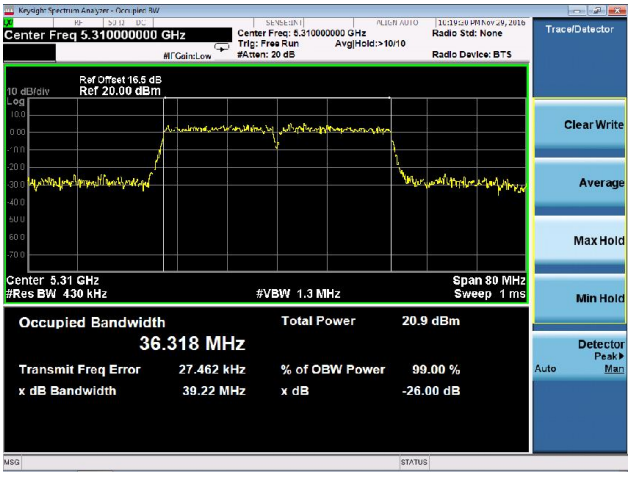
### Channel 38 (5190MHz)


### Channel 46 (5230MHz)

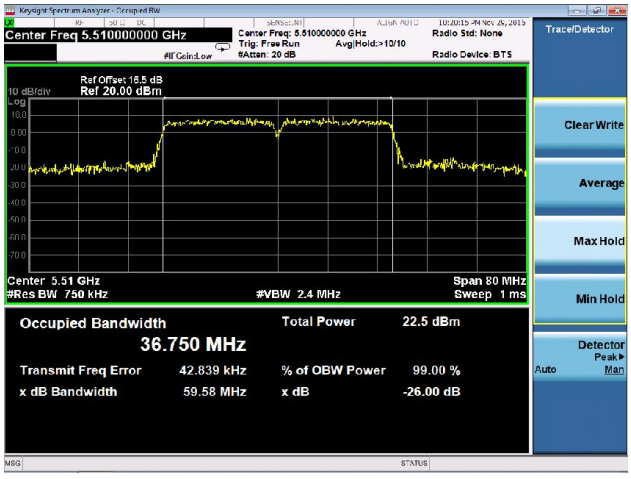



### Channel 54 (5270MHz)

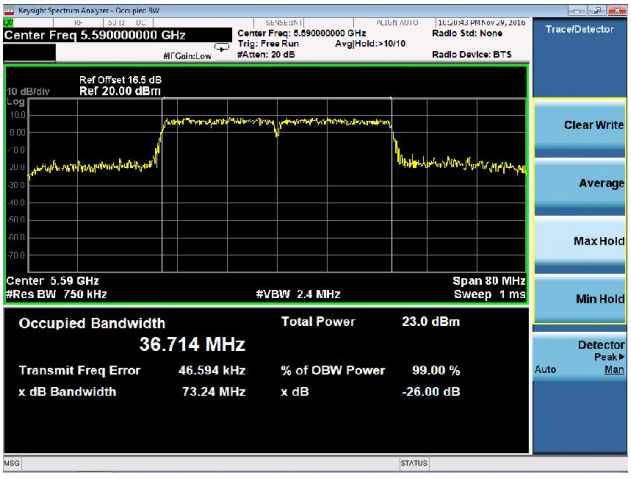

### Channel 62 (5310MHz)

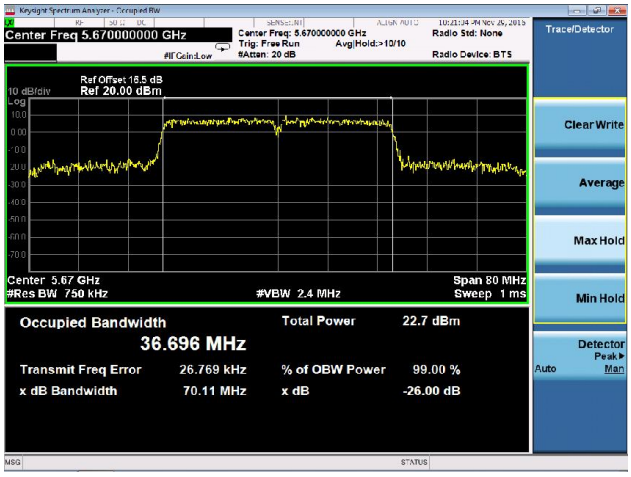
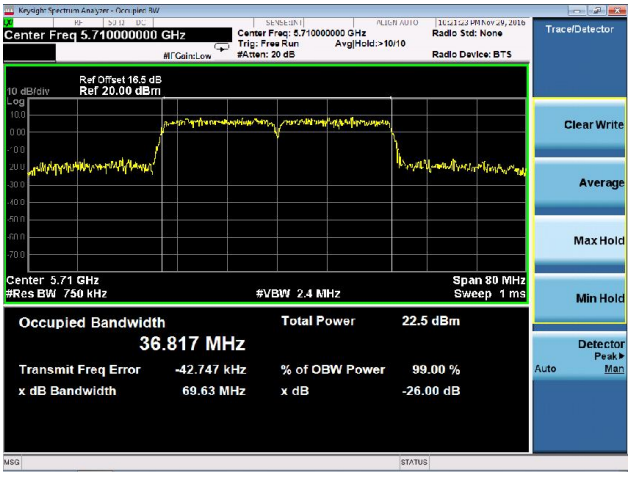
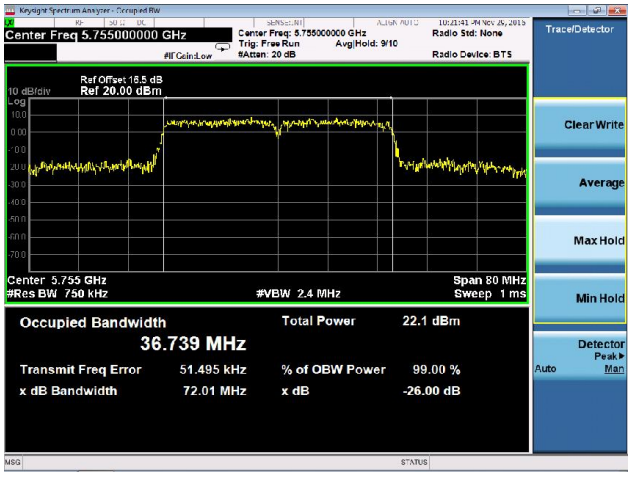
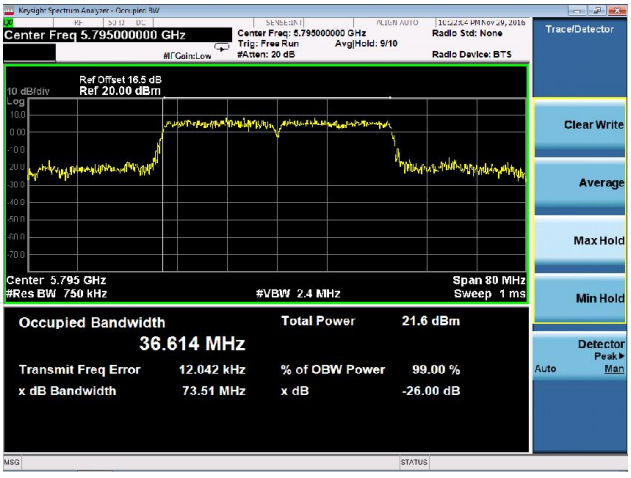



### Channel 102 (5510MHz)




### Channel 118 (5590MHz)



| Channel 134 (5670MHz) | Channel 142 (5710MHz) |
|---|---|
|  |  |
| **Channel 151 (5755MHz)** | **Channel 159 (5795MHz)** |
|  |  |