



FCC CFR47 PART 15 SUBPART E

CERTIFICATION TEST REPORT  
CLASS II PERMISSIVE CHANGE

FOR

QUAD-BAND RADIO WITH WLAN AND BT RADIO

MODEL NUMBER: A1456, A1532

FCC ID: BCG-E2644A

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Revision History

| Rev. | Issue Date | Revisions  | Revised By |
|------|------------|--|------------|
| V1   | 11/16/2015 | Initial issue. Upgrade 13U14987-16 report to 5.2/5.3/5.6GHz band to new rule per KDB 789033 D02 v01. | T. Chu     |
| V2   | 11/23/2015 | Revised report to address TCB's questions  | T. Chu     |

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## 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** APPLE, INC.  
1 INFINITE LOOP  
CUPERTINO, CA 95014, U.S.A.

**EUT DESCRIPTION:** QUAD-BAND RADIO WITH WLAN AND BT RADIO

**MODEL:** A1456, A1532

**SERIAL NUMBER:** C39KD007FHYY (RF) and C7JKT0URFLTW (DFS)

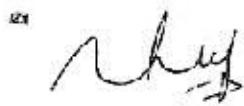
**DATE TESTED:** MAY 14 – JUNE 12 (RF) and July 16, 2013 (DFS)

| APPLICABLE STANDARDS     |              |
|--------------------------|--------------|
| STANDARD                 | TEST RESULTS |
| CFR 47 Part 15 Subpart E | Pass         |

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. 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 any government.

Approved & Released For  
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WiSE Operations Manager  
UL Verification Services Inc.

Tested By:



Francisco Guarnero  
WiSE Technician  
UL Verification Services Inc.

## 2. 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 v01r02/D03 v01r01/D06 v01, FCC KDB 789033 D02 v01, ANSI C63.10-2009.

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/standards/scopes/2000650.htm>.

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. 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.

### 4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

### 4.3. MEASUREMENT UNCERTAINTY

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

| PARAMETER                             | UNCERTAINTY |
|---------------------------------------|-------------|
| Conducted Disturbance, 0.15 to 30 MHz | 3.52 dB     |
| Radiated Disturbance, 30 to 1000 MHz  | 4.94 dB     |

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

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

Model A1456/A1532 is a mobile phone with multimedia functions (music, application support, and video), cellular GSM/GPRS/EGPRS/WCDMA/HSPA+/DC-HSDPA/CDMA/EVDO/LTE radio, IEEE 802.11a/b/g/n, Bluetooth and GPS radio. The rechargeable battery is not user accessible.

### 5.2. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

Upgrade 5.2/5.3/5.6GHz band to new rule per KDB 789033 D02 v01.

We have reviewed the original test report for UNII-1, UNII-2A and UNII-2C bands and are hereby attesting that all current technical requirements are still met and all applicable test procedures remain the same. Therefore, the original report is still applicable and no additional testing is done.

We updated the following on this report:

- Updated report to latest KDB 789033 D02 v01.
- 5.2G output power table limit/PPSD limit.
- Removed IC related information.
- Removed Peak Excursion.

### 5.3. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

| Frequency Range (MHz) | Mode         | Output Power (dBm) | Output Power (mW) |
|-----------------------|--------------|--------------------|-------------------|
| 5180 - 5240           | 802.11a      | 14.24              | 26.55             |
| 5180 - 5240           | 802.11n HT20 | 14.36              | 27.29             |
| 5190 - 5230           | 802.11n HT40 | 14.31              | 26.98             |
| 5260 - 5320           | 802.11a      | 14.28              | 26.76             |
| 5260 - 5320           | 802.11n HT20 | 14.58              | 28.67             |
| 5270 - 5310           | 802.11n HT40 | 14.74              | 29.79             |
| 5500 - 5700           | 802.11a      | 14.01              | 25.20             |
| 5500 - 5700           | 802.11n HT20 | 14.05              | 25.41             |
| 5510 - 5670           | 802.11n HT40 | 14.23              | 26.49             |

## 5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PiFA antenna, with a maximum gain as below table.

| FREQUENCY (MHZ) | ANTENNA GAIN ( dBi) |
|-----------------|---------------------|
| 5150 -- 5250    | -0.73               |
| 5250 -- 5350    | -0.37               |
| 5500 -- 5700    | 1.31                |
| 5725 -- 5850    | 1.59                |

## 5.5. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was WL Tool FW 6.10.56.166.

## 5.6. WORST-CASE CONFIGURATION AND MODE

The worst-case channel for RF radiated emissions below 1GHz tests is channel with highest RF output power.

Based on the investigation results, the highest peak power and enhanced data rate is the worst-case scenario for all measurements.

For the fundamental investigation, the EUT is investigated for vertical and horizontal antenna orientations and the worst case was determined to be at Y-position.

Based on the manufacturer's attestation that the nominal output power is reduced as the data rate increases, the data rates tested represent the highest power and worst-case with respect to EMC performance.

Worst-case data rates were used:

802.11b mode: 1 Mbps  
802.11g mode: 6 Mbps  
802.11a mode: 6 Mbps  
802.11n HT20mode: MCS0  
802.11n HT40mode: MCS0

## 6. 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            | Asset  | Cal Due  |
| Horn Antenna 1-18GHz                | ETS Lindgren   | 3117             | F00133 | 02/19/14 |
| Preamplifier, 1300 MHz              | Agilent / HP   | 8447D            | C00580 | 01/28/14 |
| Antenna, Horn, 26.5 GHz             | ARA            | SWH-28           | C01015 | 05/06/14 |
| Antenna, Biconolog, 30MHz-1 GHz     | Sunol Sciences | JB3              | F00215 | 03/07/14 |
| Peak / Average Power Sensor         | Agilent / HP   | E9323A           | F00026 | 07/27/13 |
| P-Series single channel Power Meter | Agilent / HP   | N1911A           | F00153 | 07/26/13 |
| Spectrum Analyzer, 3Hz-44GHz        | Agilent        | N9030A           | F00127 | 02/22/14 |
| PreApmplifier, 1-26.5GHz            | Agilent        | 8449B            | C01052 | 10/22/13 |
| LISN, 30 MHz                        | FCC            | LISN-50/250-25-2 | N02625 | 04/17/14 |
| Antenna, Horn, 40 GHz               | ARA            | MWH-2640/B       | C00981 | 06/14/14 |
| EMI Test Receiver, 30 MHz           | R & S          | ESHS 20          | N02396 | 08/08/13 |
| Preamplifier, 40 GHz                | Miteq          | NSP4000-SP2      | C00990 | 08/02/13 |

## 7. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

### LIMITS

None; for reporting purposes only.

### PROCEDURE

KDB 789033 Zero-Span Spectrum Analyzer Method.

#### 7.1.1. 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/T Minimum VBW (kHz) |
|----------------|------------------|---------------|-----------------------|----------------|-----------------------------------|-----------------------|
| 802.11a 20 MHz | 2.061            | 2.093         | 0.985                 | 98.5%          | 0.00                              | 0.010                 |
| 802.11n HT20   | 1.920            | 1.949         | 0.985                 | 98.5%          | 0.00                              | 0.010                 |
| 802.11n HT40   | 0.943            | 0.9921        | 0.951                 | 95.1%          | 0.22                              | 1.060                 |

#### 7.1.2. MEASUREMENT METHOD FOR POWER AND PPSD

The Duty Cycle is greater than or equal to 98% therefore KDB 789033 Method SA-1 is used.

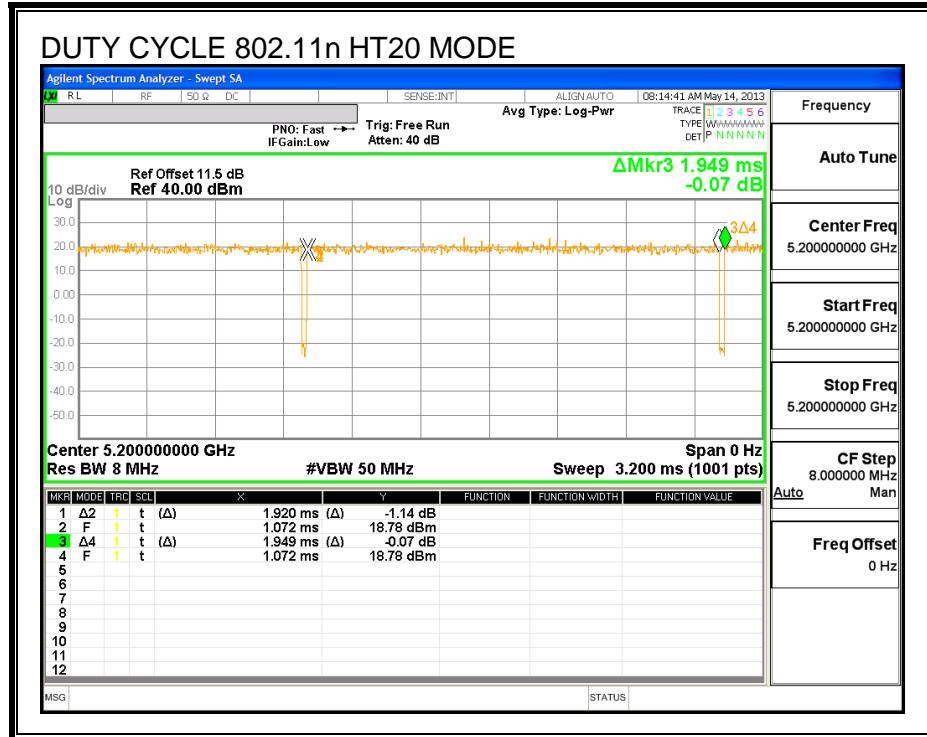
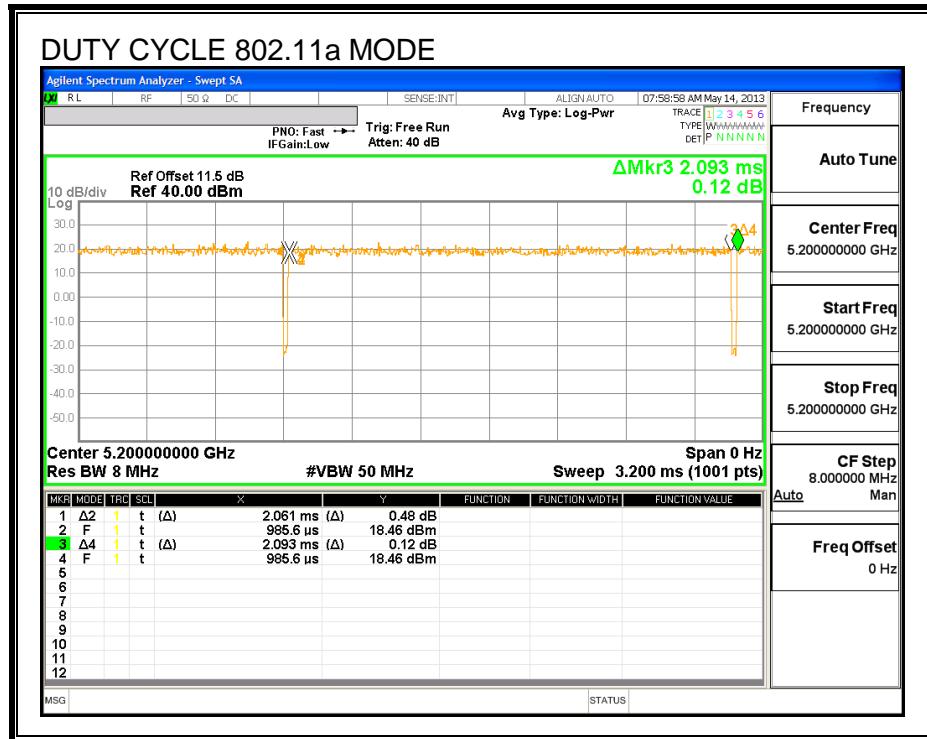
The Duty Cycle is less than 98% and consistent therefore KDB 789033 Method SA-2 is used.

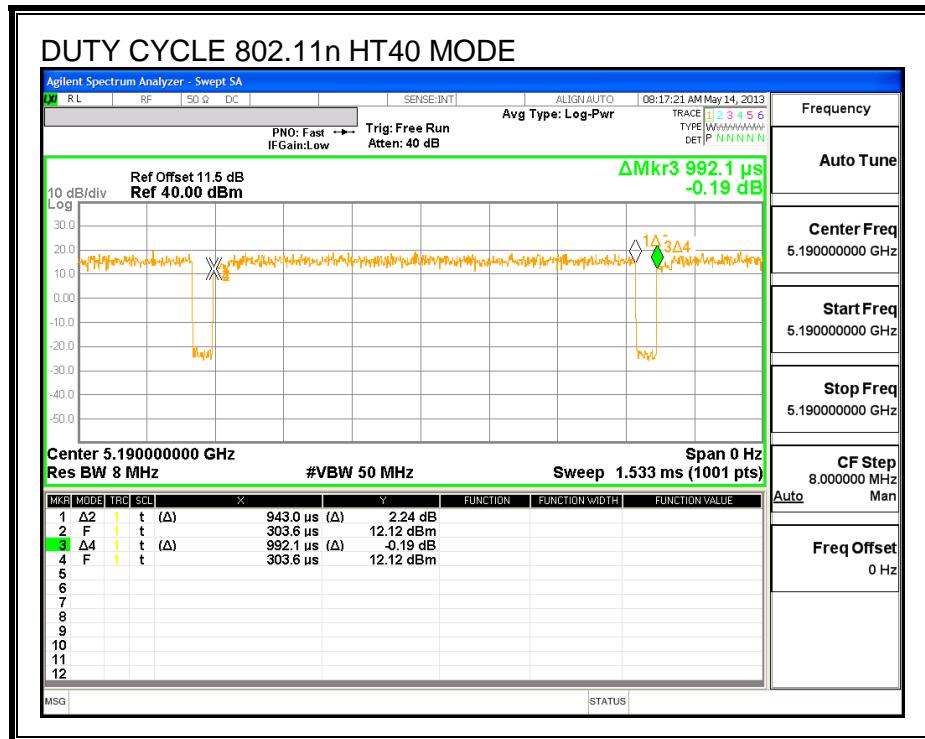
#### 7.1.3. MEASUREMENT METHOD FOR AVERAGE SPURIOUS EMISSIONS ABOVE 1 GHz

The Duty Cycle is greater than or equal to 98%, KDB 789033 Method AD with Power RMS Averaging is used.

The Duty Cycle is less than 98% and consistent, KDB 789033 Method AD with Power RMS Averaging and duty cycle correction is used.

#### 7.1.4. DUTY CYCLE PLOTS





## 8. ANTENNA PORT TEST RESULTS

### 8.1. 802.11a MODE IN THE 5.2 GHz BAND

#### 8.1.1. 26 dB BANDWIDTH

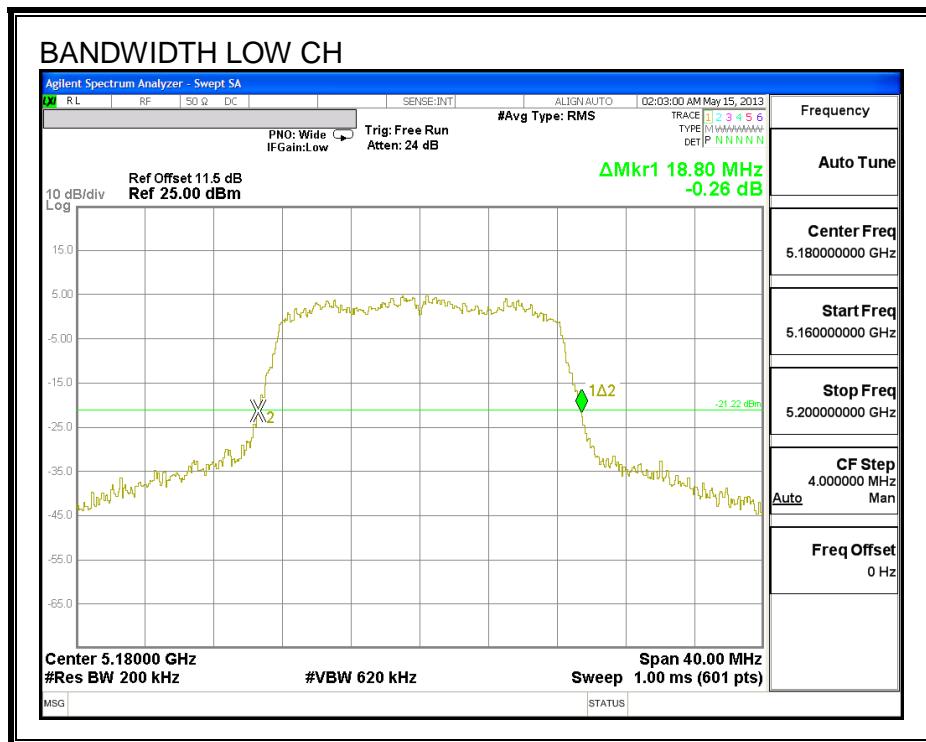
##### LIMITS

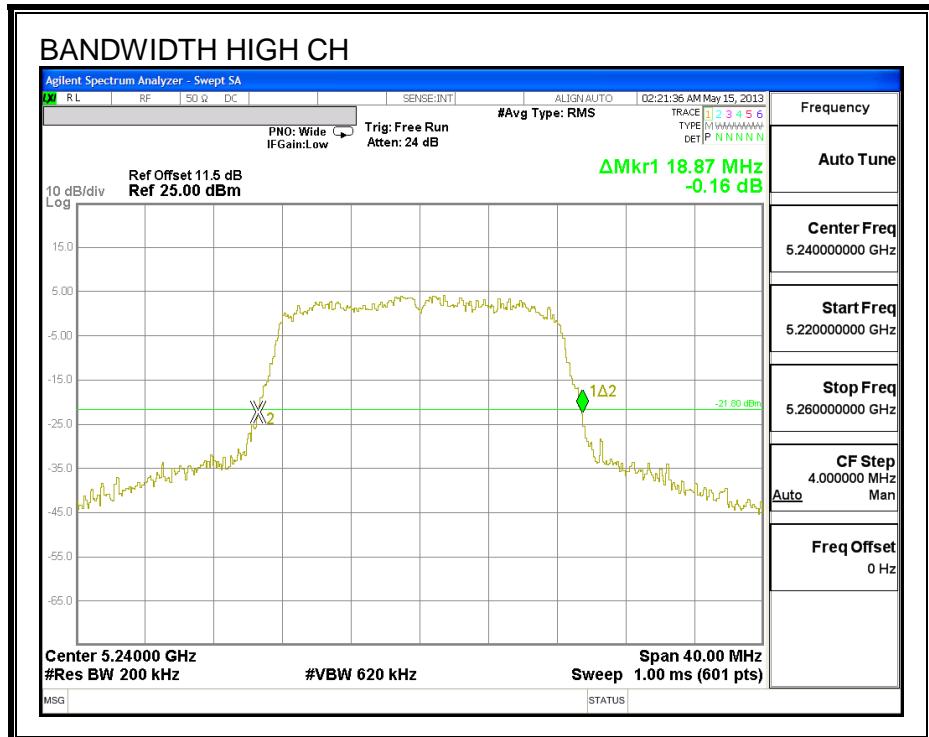
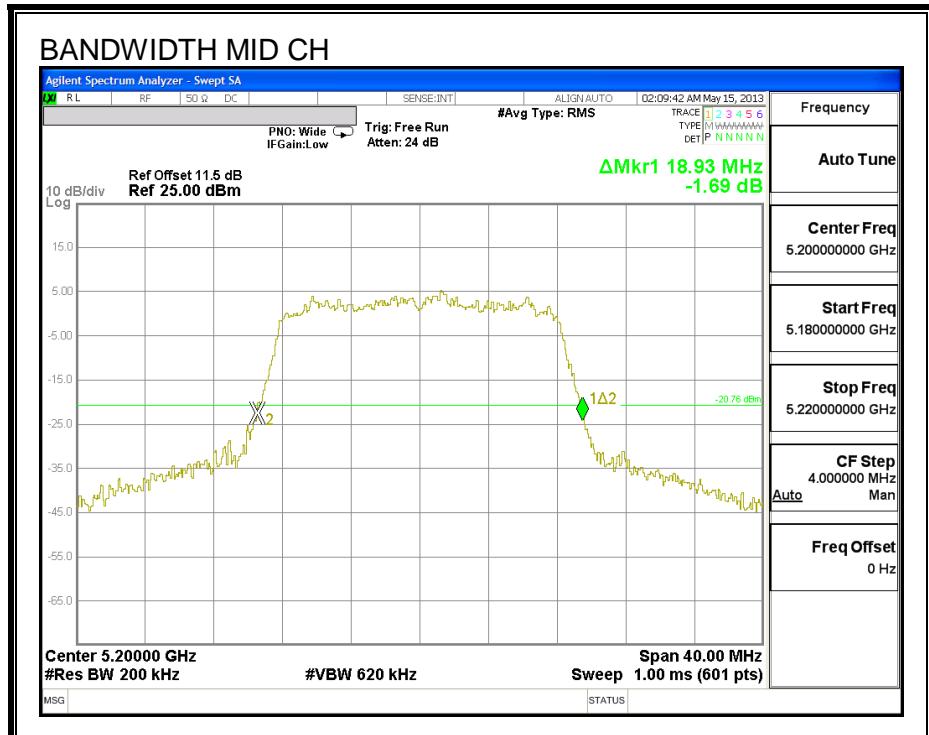
None; for reporting purposes only.

##### RESULTS

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) |
|---------|-----------------|-----------------------|
| Low     | 5180            | 18.80                 |
| Mid     | 5200            | 18.93                 |
| High    | 5240            | 18.87                 |

##### 26 dB BANDWIDTH





## 8.1.2. 99% BANDWIDTH

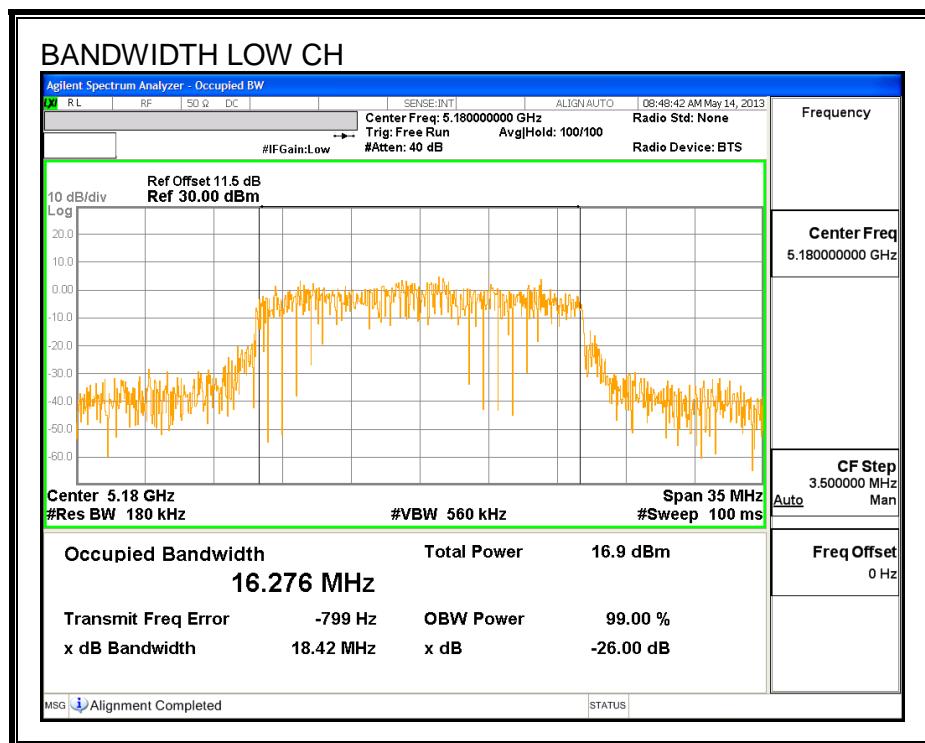
### LIMITS

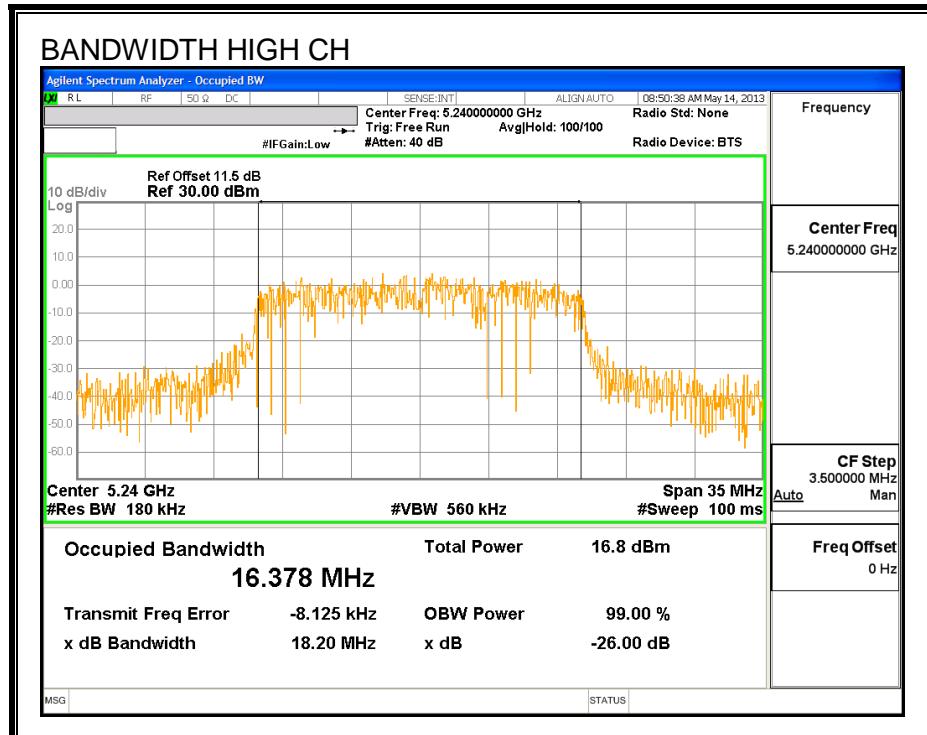
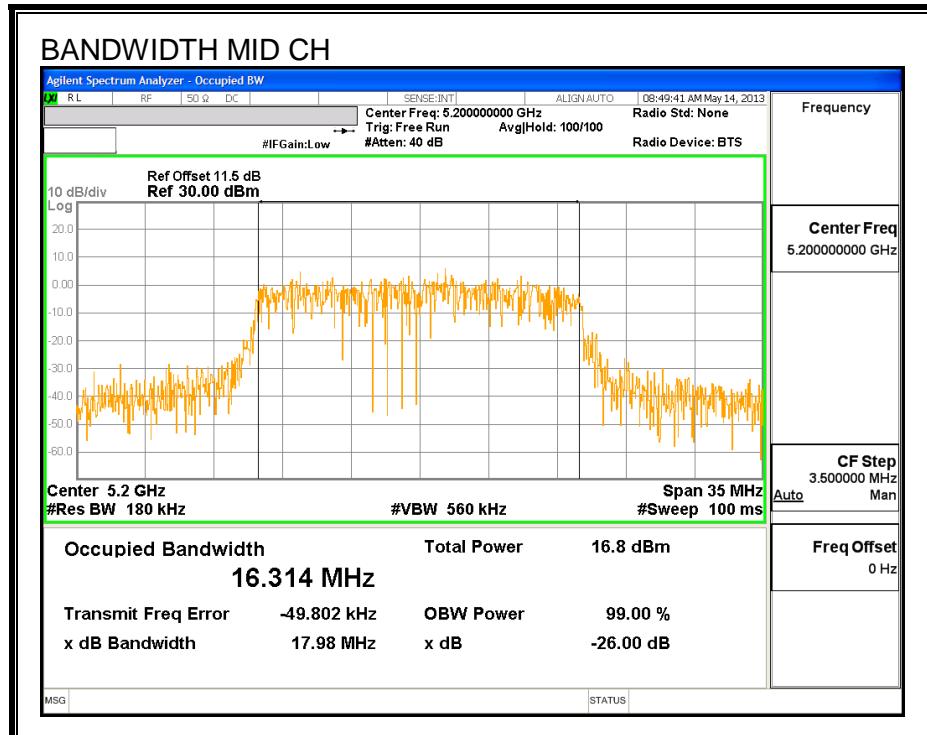
None; for reporting purposes only.

### RESULTS

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---------|-----------------|---------------------|
| Low     | 5180            | 16.276              |
| Mid     | 5200            | 16.314              |
| High    | 5240            | 16.378              |

### 99% BANDWIDTH





### 8.1.3. AVERAGE POWER

#### LIMITS

None; for reporting purposes only.

#### TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

#### RESULTS

| Channel | Frequency (MHz) | Power (dBm) |
|---------|-----------------|-------------|
| Low     | 5180            | 14.10       |
| Mid     | 5200            | 14.14       |
| High    | 5240            | 14.13       |

### 8.1.4. OUTPUT POWER AND PSD

#### LIMITS

##### FCC §15.407 (a) (1)

- (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
- (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
- (iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

## RESULTS

### Antenna Gain

| Channel | Frequency<br>(MHz) | Directional<br>Gain<br>(dBi) |
|---------|--------------------|------------------------------|
| Low     | 5180               | -6.00                        |
| Mid     | 5200               | -6.00                        |
| High    | 5240               | -6.00                        |

### Limits

| Channel | Frequency<br>(MHz) | FCC<br>Power<br>Limit<br>(dBm) | FCC<br>PSD<br>Limit<br>(dBm) |
|---------|--------------------|--------------------------------|------------------------------|
| Low     | 5180               | 24.00                          | 11.00                        |
| Mid     | 5200               | 24.00                          | 11.00                        |
| High    | 5240               | 24.00                          | 11.00                        |

|                    |      |  |
|--------------------|------|--|
| Duty Cycle CF (dB) | 0.00 | Included in Calculations of Corr'd Power & PSD |
|--------------------|------|--|

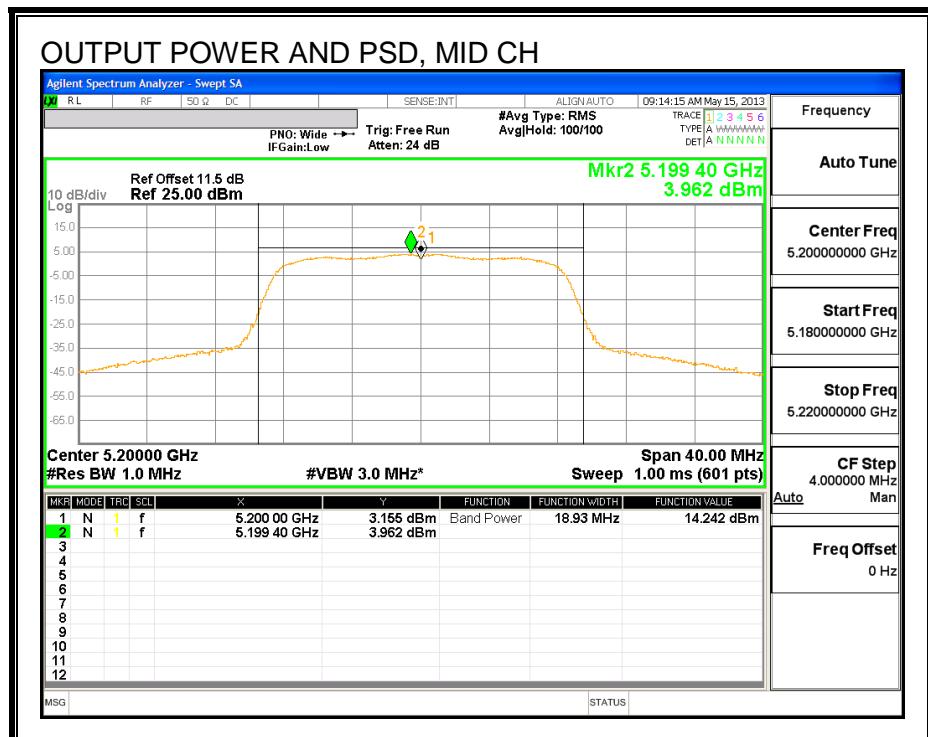
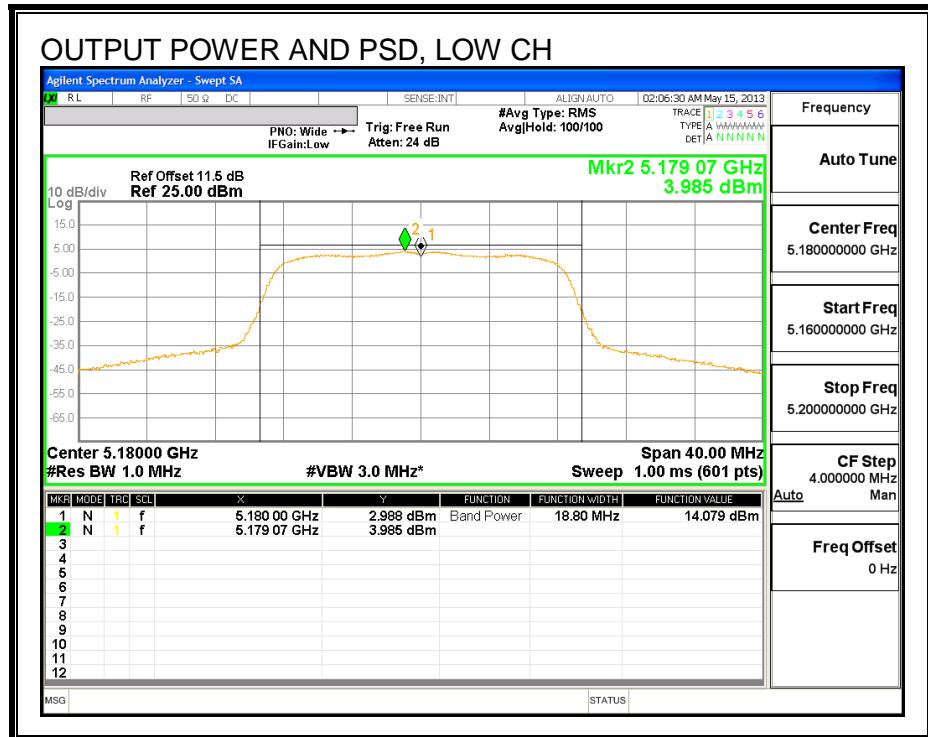
### Output Power Results

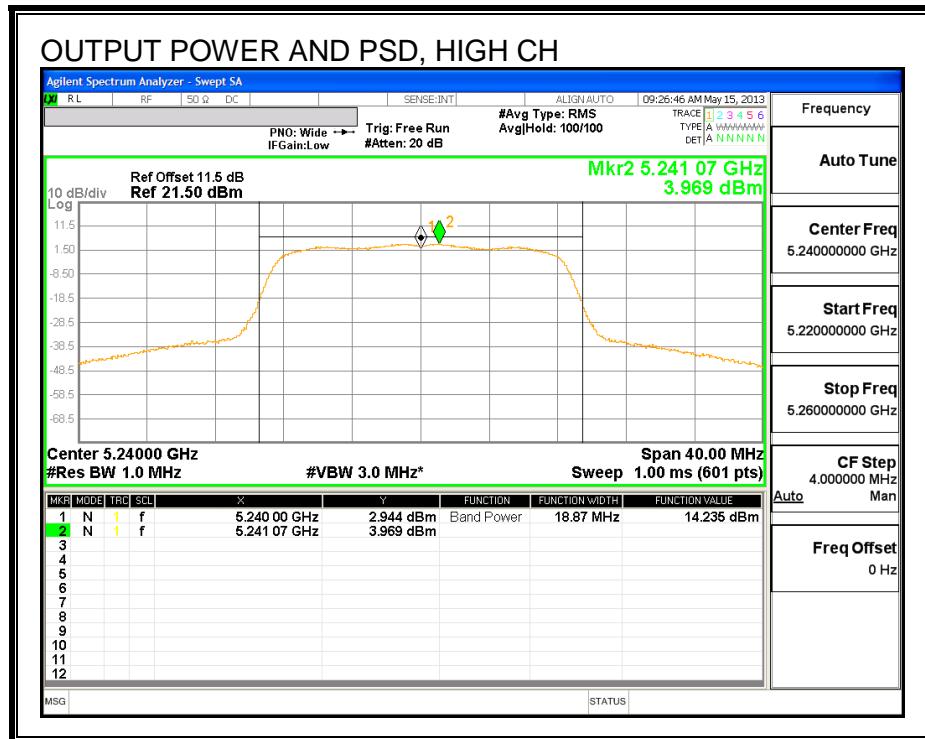
| Channel | Frequency<br>(MHz) | Chain 0<br>Meas<br>Power<br>(dBm) | Total<br>Corr'd<br>Power<br>(dBm) | Power<br>Limit<br>(dBm) | Power<br>Margin<br>(dB) |
|---------|--------------------|-----------------------------------|-----------------------------------|-------------------------|-------------------------|
| Low     | 5180               | 14.08                             | 14.08                             | 24.00                   | -9.92                   |
| Mid     | 5200               | 14.24                             | 14.24                             | 24.00                   | -9.76                   |
| High    | 5240               | 14.24                             | 14.24                             | 24.00                   | -9.77                   |

### PSD Results

| Channel | Frequency<br>(MHz) | Chain 0<br>Meas<br>PSD<br>(dBm) | Total<br>Corr'd<br>PSD<br>(dBm) | PSD<br>Limit<br>(dBm) | PSD<br>Margin<br>(dB) |
|---------|--------------------|---------------------------------|---------------------------------|-----------------------|-----------------------|
| Low     | 5180               | 3.985                           | 3.985                           | 11.00                 | -7.02                 |
| Mid     | 5200               | 3.962                           | 3.962                           | 11.00                 | -7.04                 |
| High    | 5240               | 3.969                           | 3.969                           | 11.00                 | -7.03                 |

**OUTPUT POWER AND PSD**





## 8.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND

### 8.2.1. 26 dB BANDWIDTH

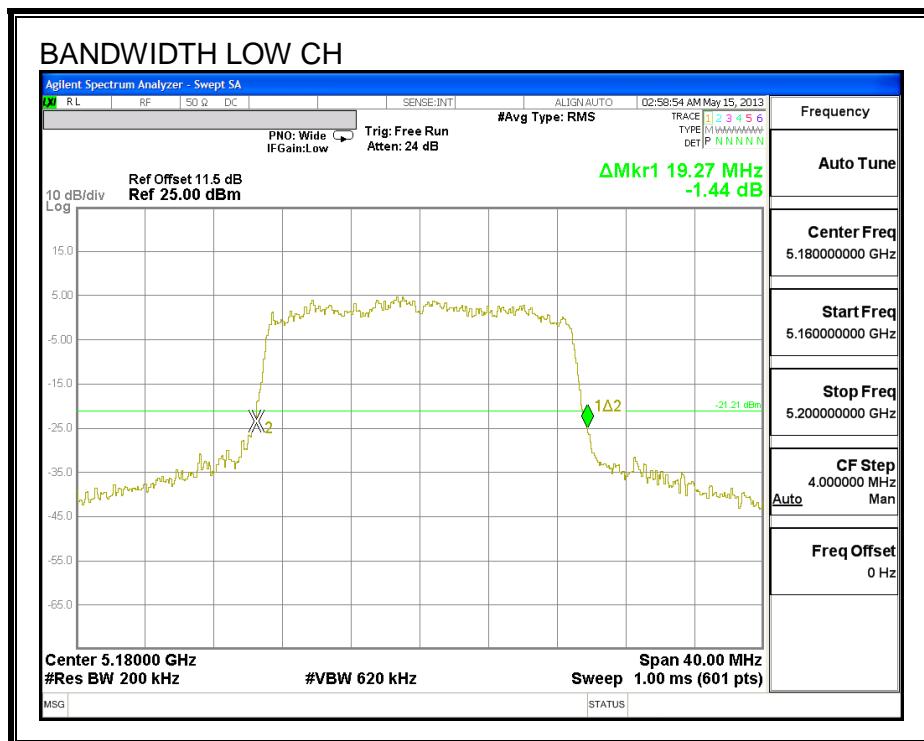
#### LIMITS

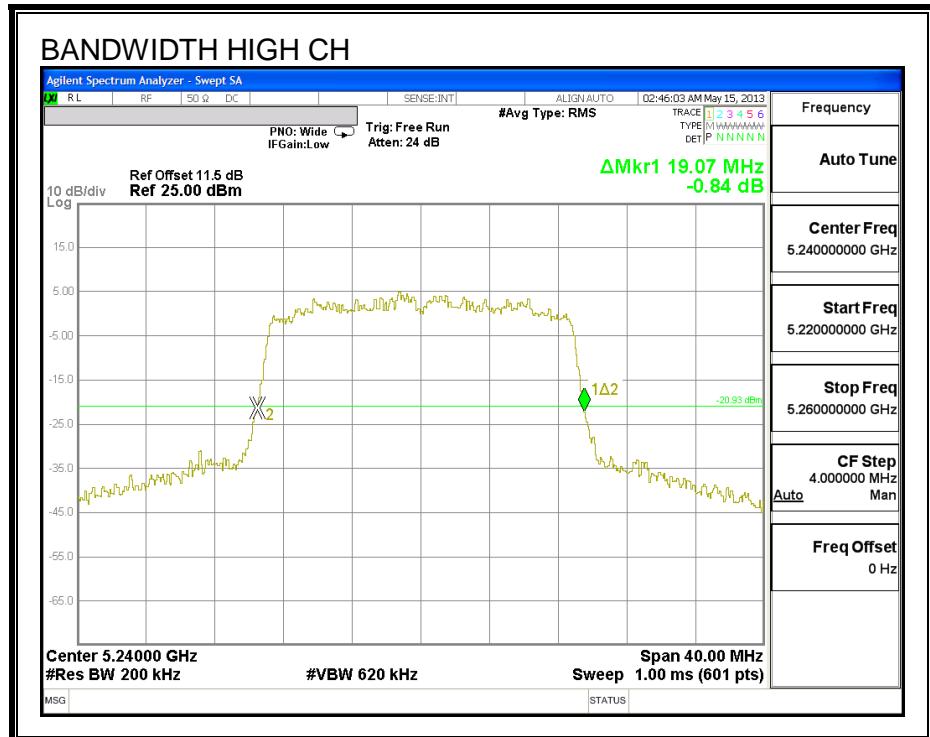
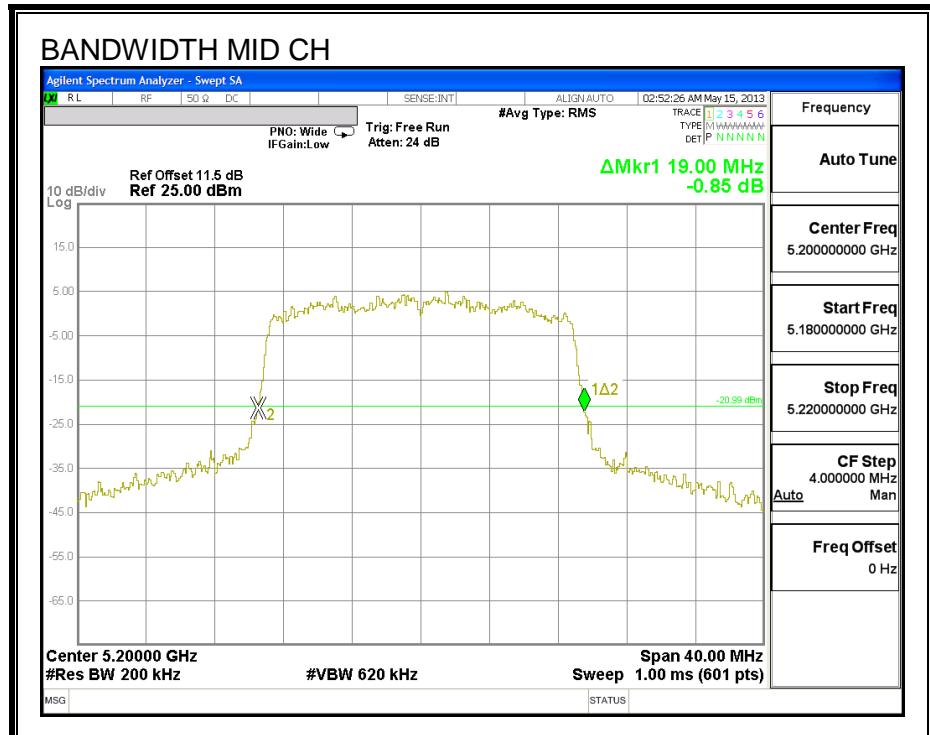
None; for reporting purposes only.

#### RESULTS

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) |
|---------|-----------------|-----------------------|
| Low     | 5180            | 19.27                 |
| Mid     | 5200            | 19.00                 |
| High    | 5240            | 19.07                 |

#### 26 dB BANDWIDTH





## 8.2.2. 99% BANDWIDTH

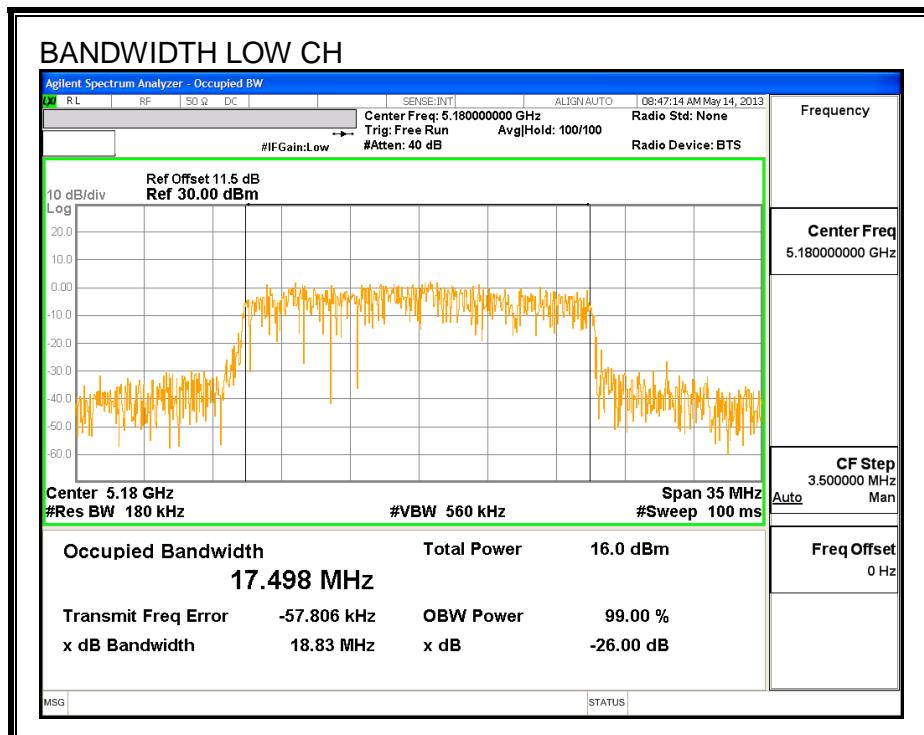
### LIMITS

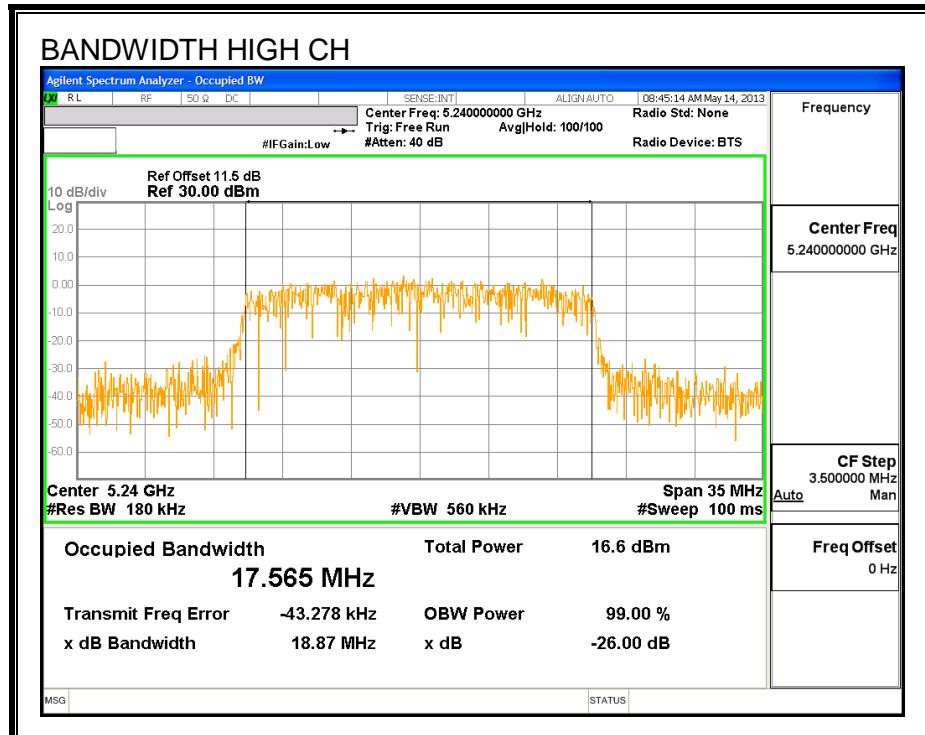
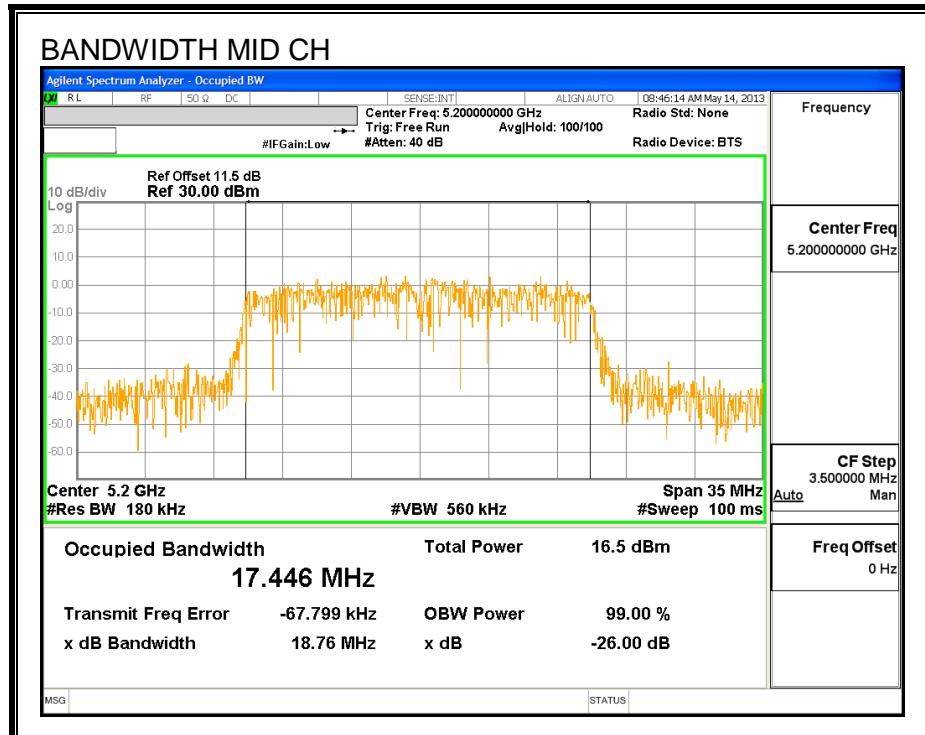
None; for reporting purposes only.

### RESULTS

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---------|-----------------|---------------------|
| Low     | 5180            | 17.498              |
| Mid     | 5200            | 17.446              |
| High    | 5240            | 17.565              |

### 99% BANDWIDTH





### 8.2.3. AVERAGE POWER

#### LIMITS

None; for reporting purposes only.

#### TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

#### RESULTS

| Channel | Frequency (MHz) | Power (dBm) |
|---------|-----------------|-------------|
| Low     | 5180            | 14.10       |
| Mid     | 5200            | 14.30       |
| High    | 5240            | 14.28       |

### 8.2.4. OUTPUT POWER AND PSD

#### LIMITS

FCC §15.407 (a) (1)

- (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
- (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
- (iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

## RESULTS

### Antenna Gain

| Channel | Frequency<br>(MHz) | Directional<br>Gain<br>(dBi) |
|---------|--------------------|------------------------------|
| Low     | 5180               | -6.00                        |
| Mid     | 5200               | -6.00                        |
| High    | 5240               | -6.00                        |

### Limits

| Channel | Frequency<br>(MHz) | FCC<br>Power<br>Limit<br>(dBm) | FCC<br>PSD<br>Limit<br>(dBm) |
|---------|--------------------|--------------------------------|------------------------------|
| Low     | 5180               | 24.00                          | 11.00                        |
| Mid     | 5200               | 24.00                          | 11.00                        |
| High    | 5240               | 24.00                          | 11.00                        |

| Duty Cycle CF (dB) | 0.00 | Included in Calculations of Corr'd Power & PSD |
|--------------------|------|--|
|--------------------|------|--|

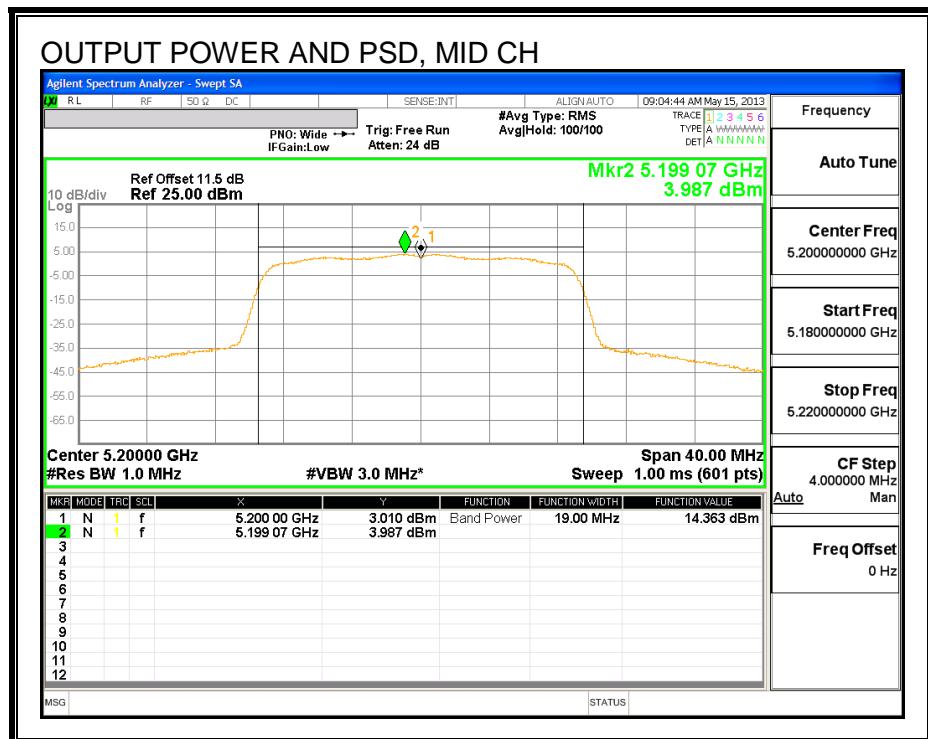
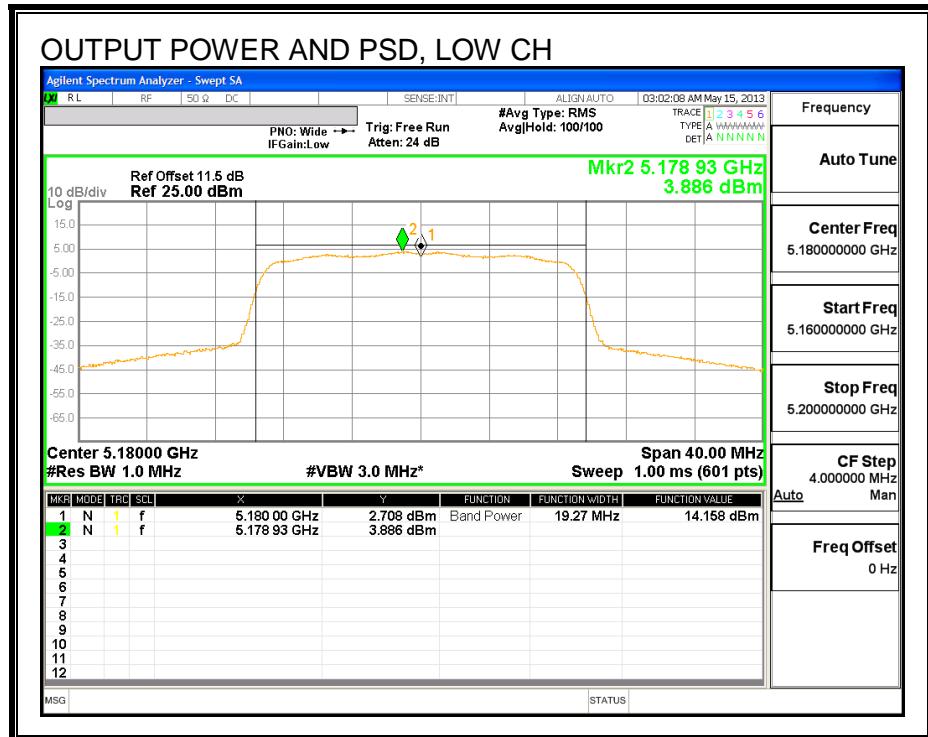
### Output Power Results

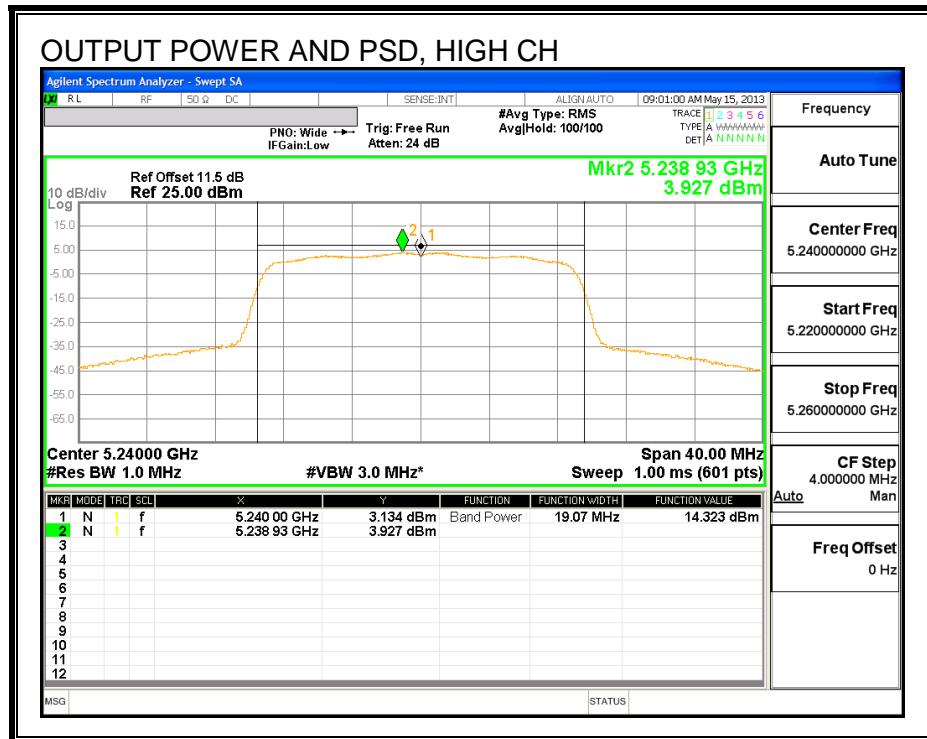
| Channel | Frequency<br>(MHz) | Meas<br>Power<br>(dBm) | Total<br>Corr'd<br>Power<br>(dBm) | Power<br>Limit<br>(dBm) | Power<br>Margin<br>(dB) |
|---------|--------------------|------------------------|-----------------------------------|-------------------------|-------------------------|
| Low     | 5180               | 14.16                  | 14.16                             | 24.00                   | -9.84                   |
| Mid     | 5200               | 14.36                  | 14.36                             | 24.00                   | -9.64                   |
| High    | 5240               | 14.32                  | 14.32                             | 24.00                   | -9.68                   |

### PSD Results

| Channel | Frequency<br>(MHz) | Meas<br>PSD<br>(dBm) | Total<br>Corr'd<br>PSD<br>(dBm) | PSD<br>Limit<br>(dBm) | PSD<br>Margin<br>(dB) |
|---------|--------------------|----------------------|---------------------------------|-----------------------|-----------------------|
| Low     | 5180               | 3.89                 | 3.89                            | 11.00                 | -7.11                 |
| Mid     | 5200               | 3.99                 | 3.99                            | 11.00                 | -7.01                 |
| High    | 5240               | 3.93                 | 3.93                            | 11.00                 | -7.07                 |

**OUTPUT POWER AND PSD**





## 8.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND

### 8.3.1. 26 dB BANDWIDTH

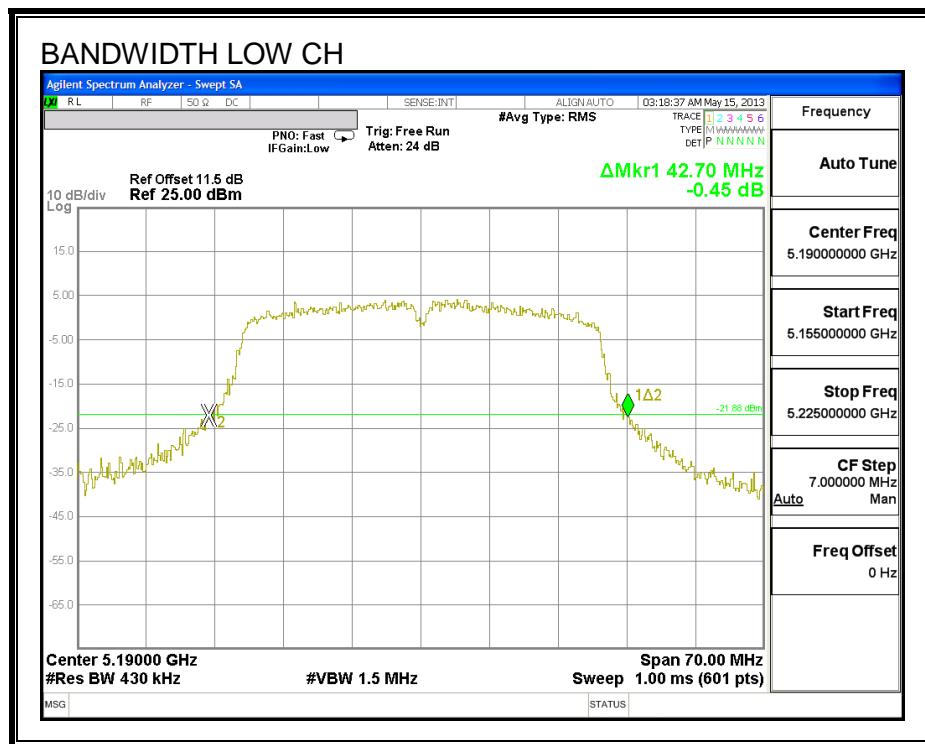
#### LIMITS

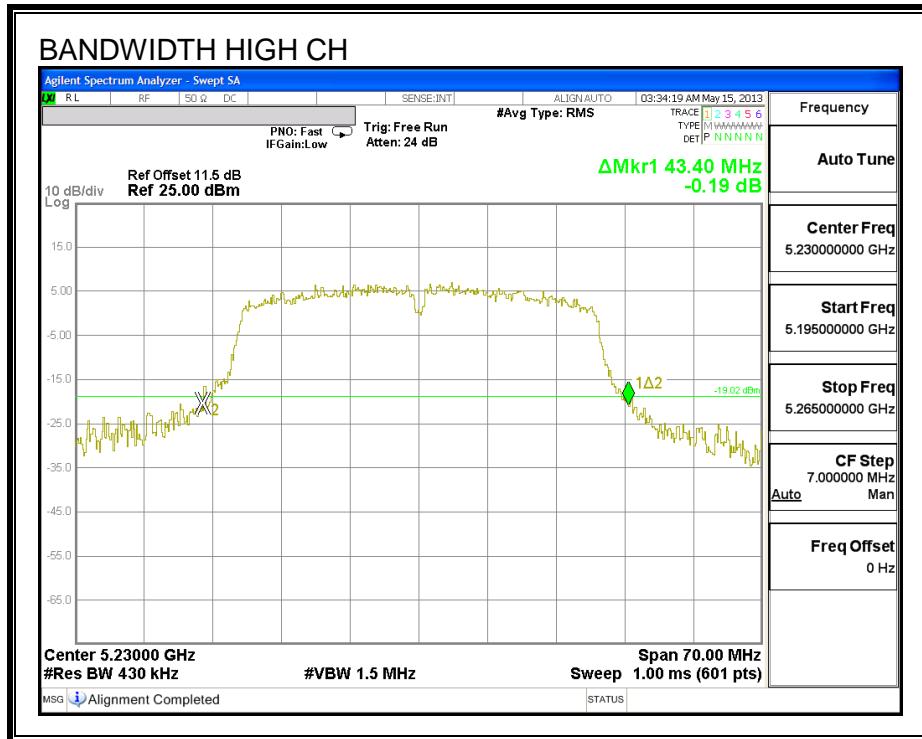
None; for reporting purposes only.

#### RESULTS

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) |
|---------|-----------------|-----------------------|
| Low     | 5190            | 42.70                 |
| High    | 5230            | 43.40                 |

#### 26 dB BANDWIDTH





### 8.3.2. 99% BANDWIDTH

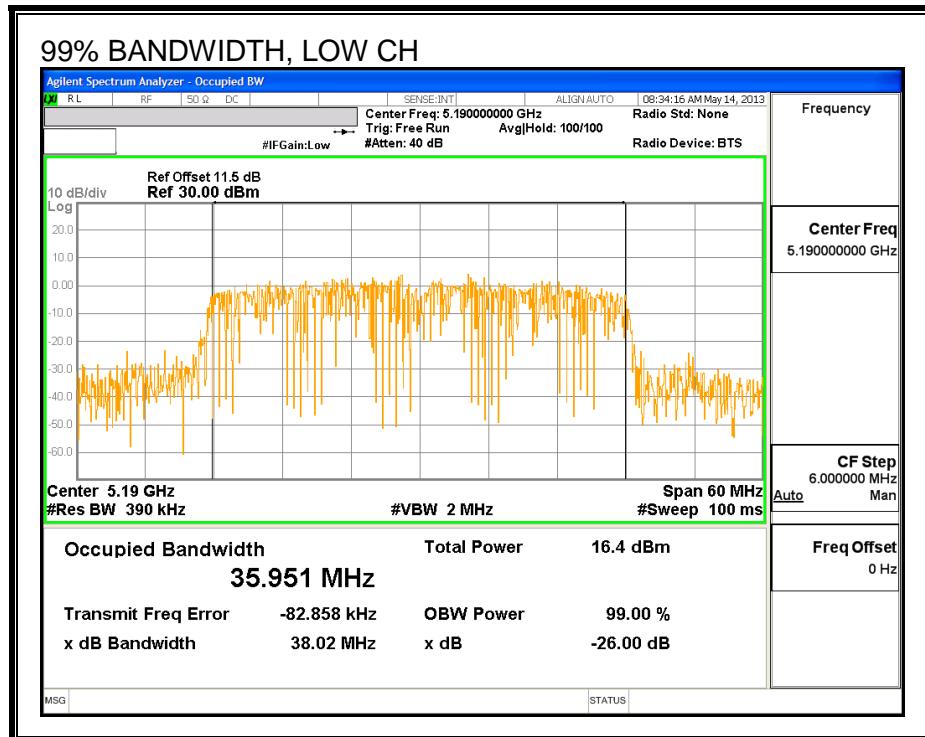
#### LIMITS

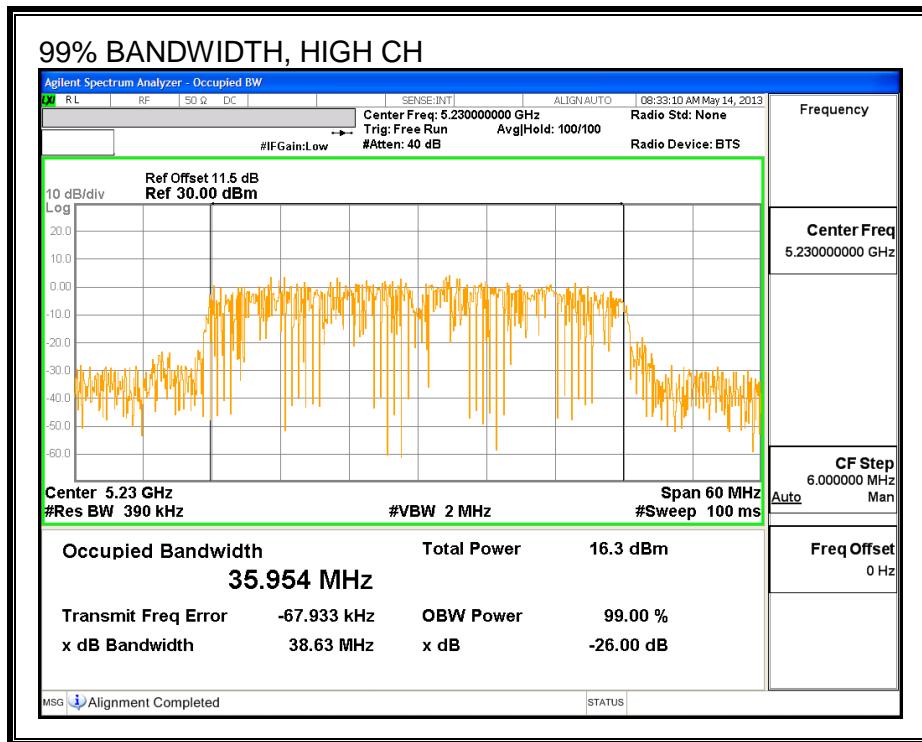
None; for reporting purposes only.

#### RESULTS

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---------|-----------------|---------------------|
| Low     | 5190            | 35.951              |
| High    | 5230            | 35.954              |

#### 99% BANDWIDTH





### 8.3.3. AVERAGE POWER

#### LIMITS

None; for reporting purposes only.

#### TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

#### RESULTS

| Channel | Frequency (MHz) | Power (dBm) |
|---------|-----------------|-------------|
| Low     | 5190            | 13.95       |
| High    | 5230            | 14.05       |

### 8.3.4. OUTPUT POWER AND PPSD

#### LIMITS

##### FCC §15.407 (a) (1)

- (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
- (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
- (iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

## RESULTS

### Antenna Gain

| Channel | Frequency<br>(MHz) | Directional<br>Gain<br>(dBi) |
|---------|--------------------|------------------------------|
| Low     | 5190               | -6.00                        |
| High    | 5230               | -6.00                        |

### Limits

| Channel | Frequency<br>(MHz) | FCC<br>Power<br>Limit<br>(dBm) | FCC<br>PPSD<br>Limit<br>(dBm) |
|---------|--------------------|--------------------------------|-------------------------------|
| Low     | 5190               | 24.00                          | 11.00                         |
| High    | 5230               | 24.00                          | 11.00                         |

|                    |      |   |
|--------------------|------|---|
| Duty Cycle CF (dB) | 0.22 | Included in Calculations of Corr'd Power & PPSD |
|--------------------|------|---|

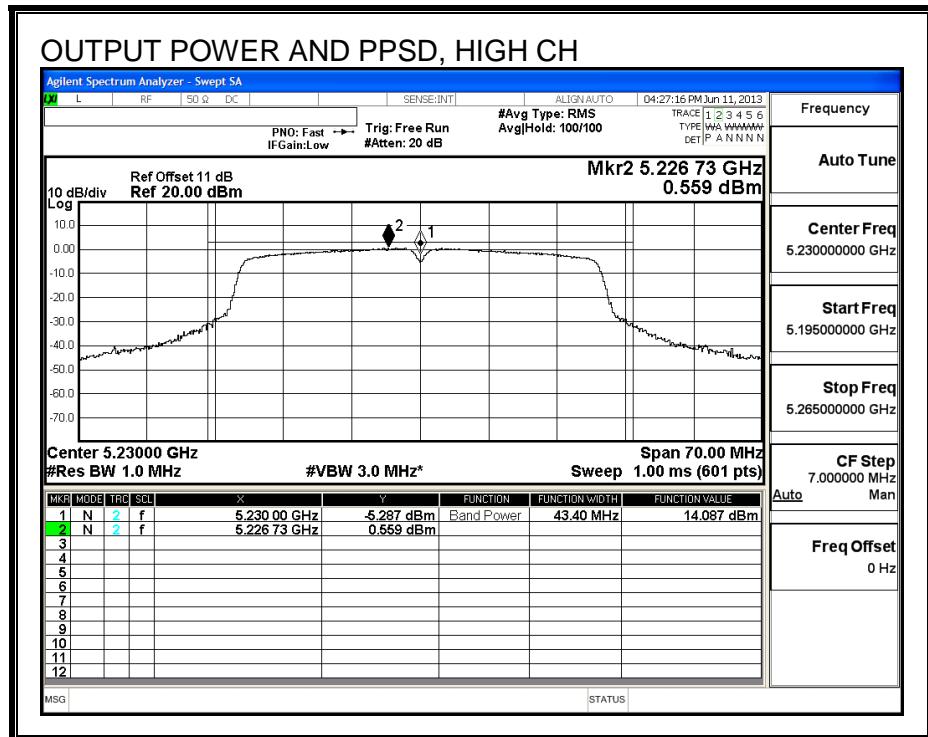
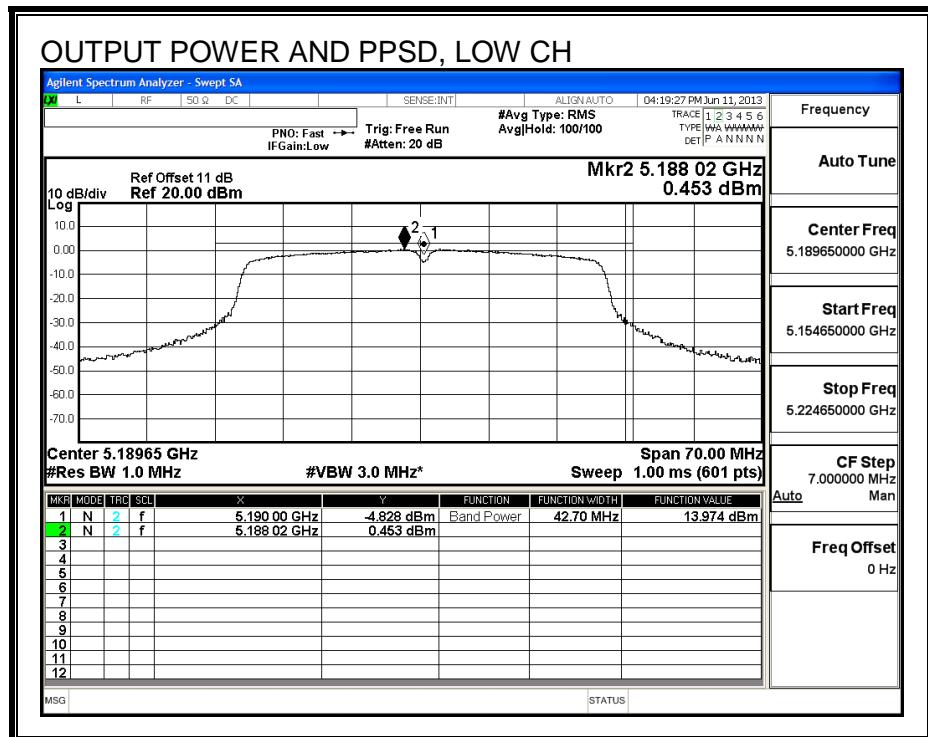
### Output Power Results

| Channel | Frequency<br>(MHz) | Meas<br>Power<br>(dBm) | Total<br>Corr'd<br>Power<br>(dBm) | Power<br>Limit<br>(dBm) | Power<br>Margin<br>(dB) |
|---------|--------------------|------------------------|-----------------------------------|-------------------------|-------------------------|
| Low     | 5190               | 13.974                 | 14.19                             | 24.00                   | -9.81                   |
| High    | 5230               | 14.087                 | 14.31                             | 24.00                   | -9.69                   |

### PPSD Results

| Channel | Frequency<br>(MHz) | Meas<br>PPSD<br>(dBm) | Total<br>Corr'd<br>PPSD<br>(dBm) | PPSD<br>Limit<br>(dBm) | PPSD<br>Margin<br>(dB) |
|---------|--------------------|-----------------------|----------------------------------|------------------------|------------------------|
| Low     | 5190               | 0.453                 | 0.67                             | 11.00                  | -10.33                 |
| High    | 5230               | 0.559                 | 0.78                             | 11.00                  | -10.22                 |

**OUTPUT POWER AND PPSD**



## 8.4. 802.11a MODE IN THE 5.3 GHz BAND

### 8.4.1. 26 dB BANDWIDTH

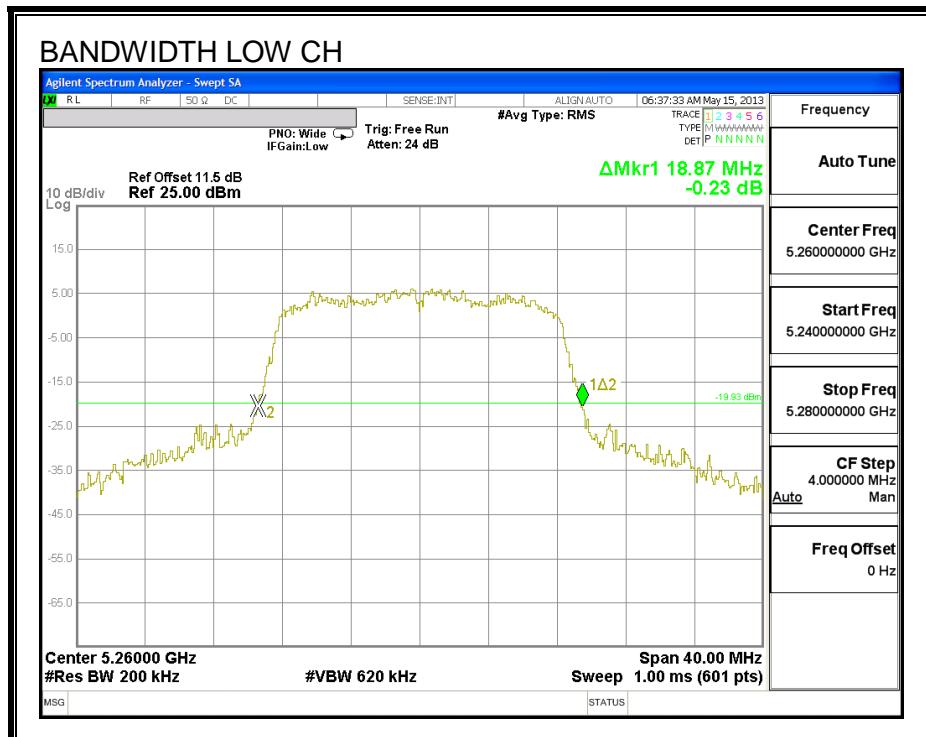
#### LIMITS

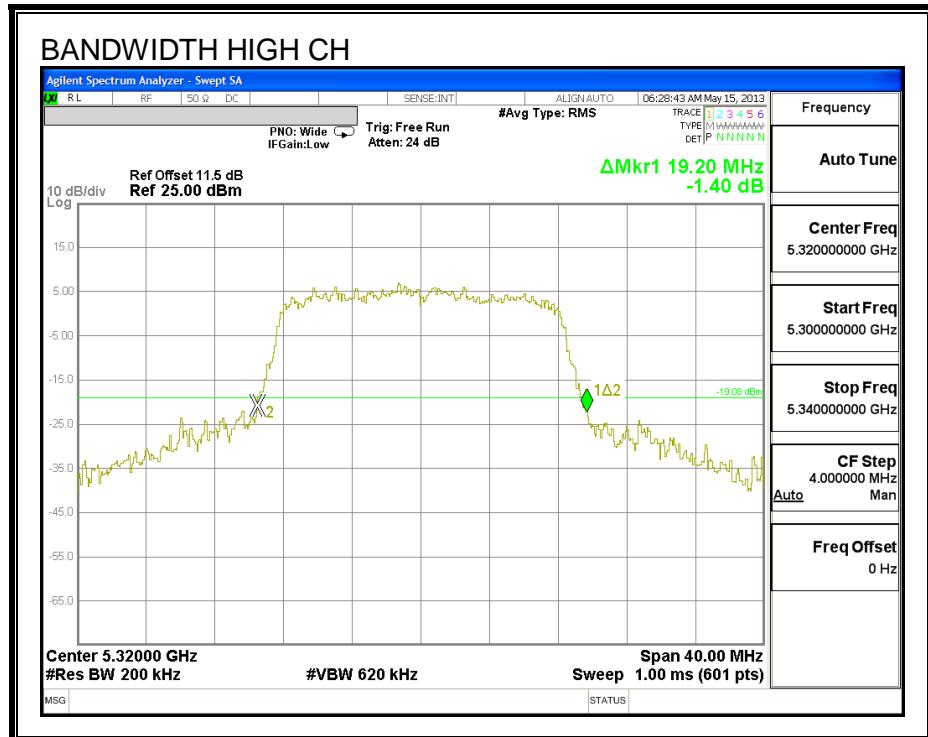
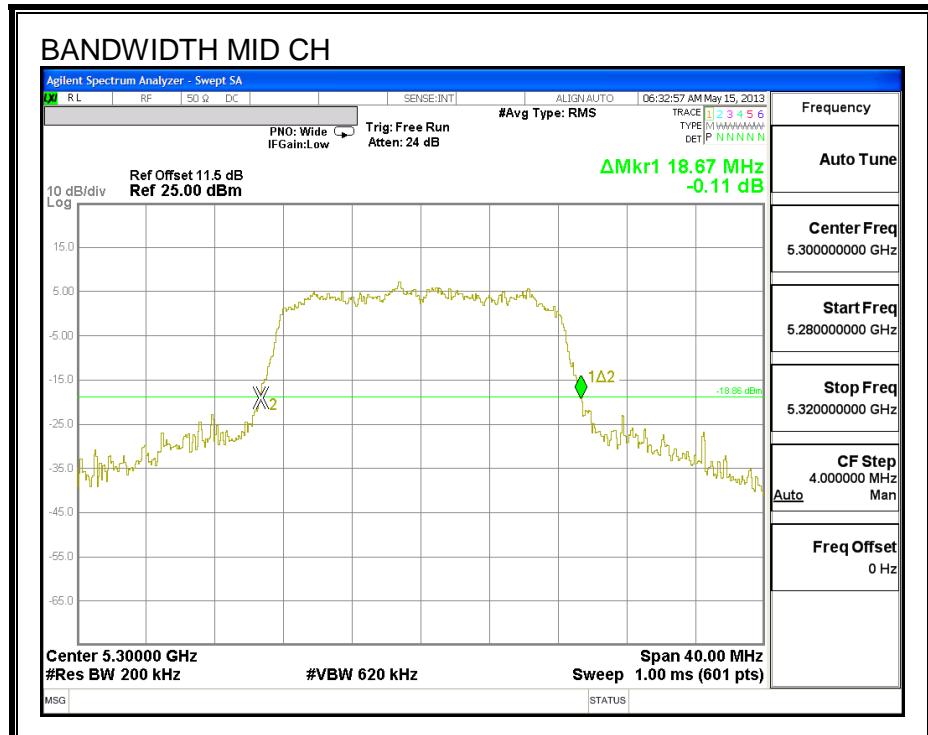
None; for reporting purposes only.

#### RESULTS

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) |
|---------|-----------------|-----------------------|
| Low     | 5260            | 18.87                 |
| Mid     | 5300            | 18.67                 |
| High    | 5320            | 19.20                 |

#### 26 dB BANDWIDTH





## 8.4.2. 99% BANDWIDTH

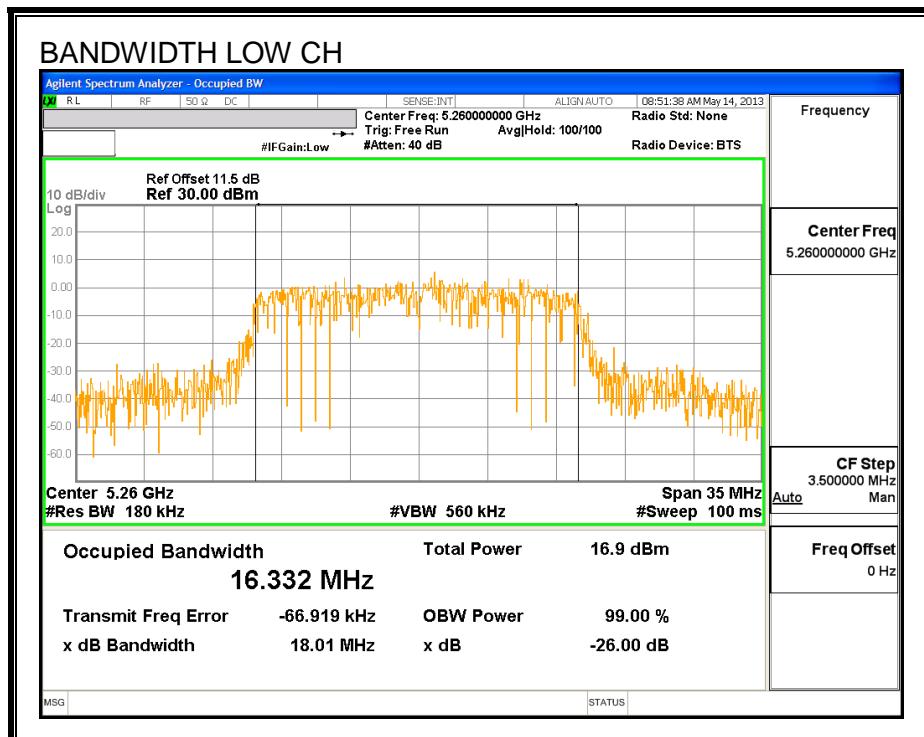
### LIMITS

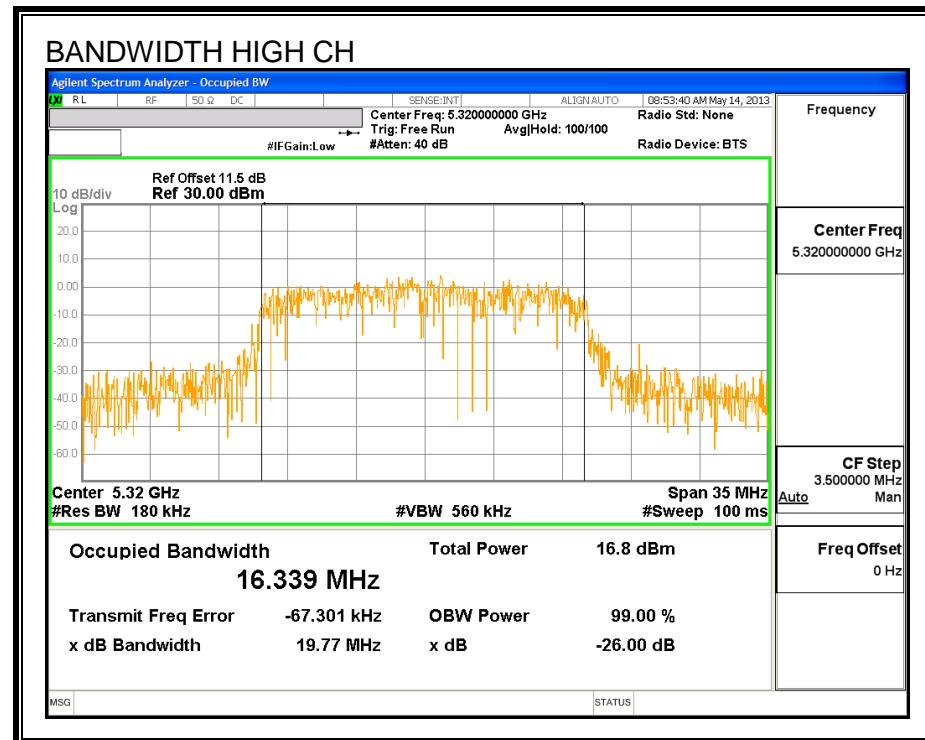
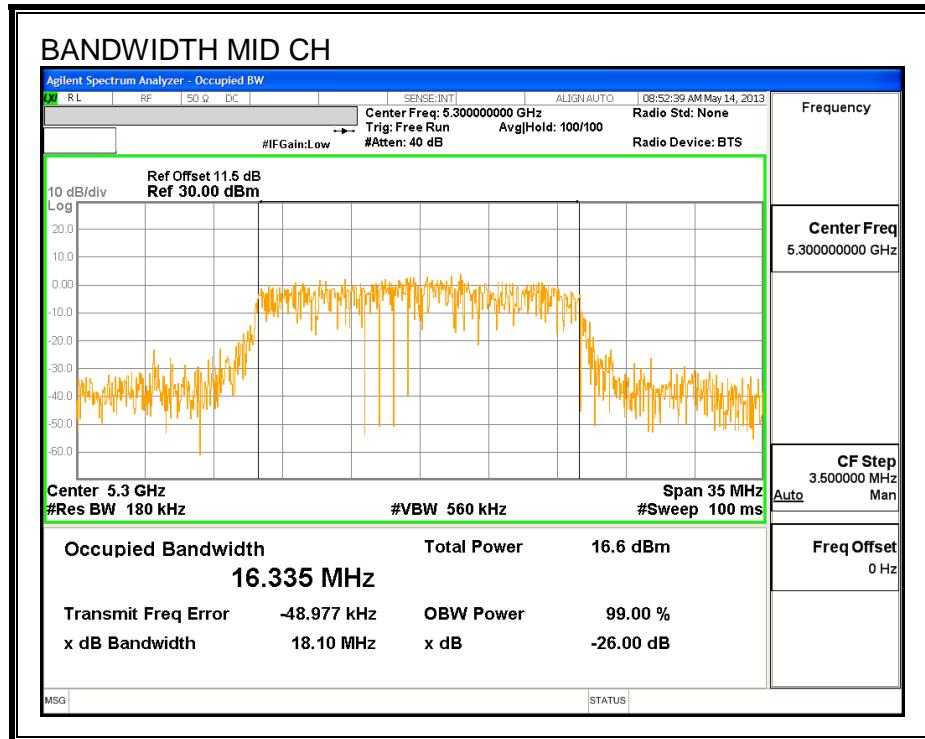
None; for reporting purposes only.

### RESULTS

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---------|-----------------|---------------------|
| Low     | 5260            | 16.332              |
| Mid     | 5300            | 16.335              |
| High    | 5320            | 16.339              |

### 99% BANDWIDTH





### 8.4.3. AVERAGE POWER

#### LIMITS

None; for reporting purposes only.

#### TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

#### RESULTS

| Channel | Frequency (MHz) | Power (dBm) |
|---------|-----------------|-------------|
| Low     | 5260            | 14.40       |
| Mid     | 5300            | 14.26       |
| High    | 5320            | 14.25       |

#### 8.4.4. OUTPUT POWER AND PPSD

##### LIMITS

FCC §15.407 (a) (2)

For the band 5.25–5.35 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or  $11 \text{ dBm} + 10 \log B$ , where B is the 26–dB emission bandwidth in MHz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

##### DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

## RESULTS

### Bandwidth and Antenna Gain

| Channel | Frequency<br>(MHz) | Min<br>26 dB<br>BW<br>(MHz) | Directional<br>Gain<br>(dBi) |
|---------|--------------------|-----------------------------|------------------------------|
| Low     | 5260               | 18.9                        | -6.00                        |
| Mid     | 5300               | 18.7                        | -6.00                        |
| High    | 5320               | 19.2                        | -6.00                        |

### Limits

| Channel | Frequency<br>(MHz) | FCC<br>Power<br>Limit<br>(dBm) | FCC<br>PPSD<br>Limit<br>(dBm) |
|---------|--------------------|--------------------------------|-------------------------------|
| Low     | 5260               | 23.76                          | 11.00                         |
| Mid     | 5300               | 23.71                          | 11.00                         |
| High    | 5320               | 23.83                          | 11.00                         |

|                    |      |   |
|--------------------|------|---|
| Duty Cycle CF (dB) | 0.00 | Included in Calculations of Corr'd Power & PPSD |
|--------------------|------|---|

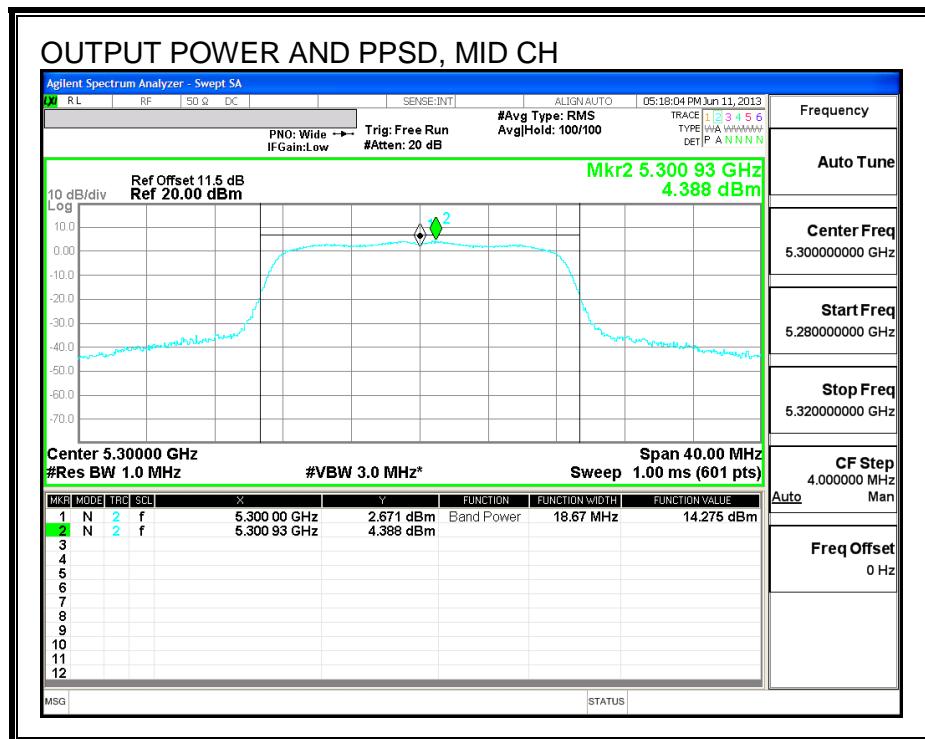
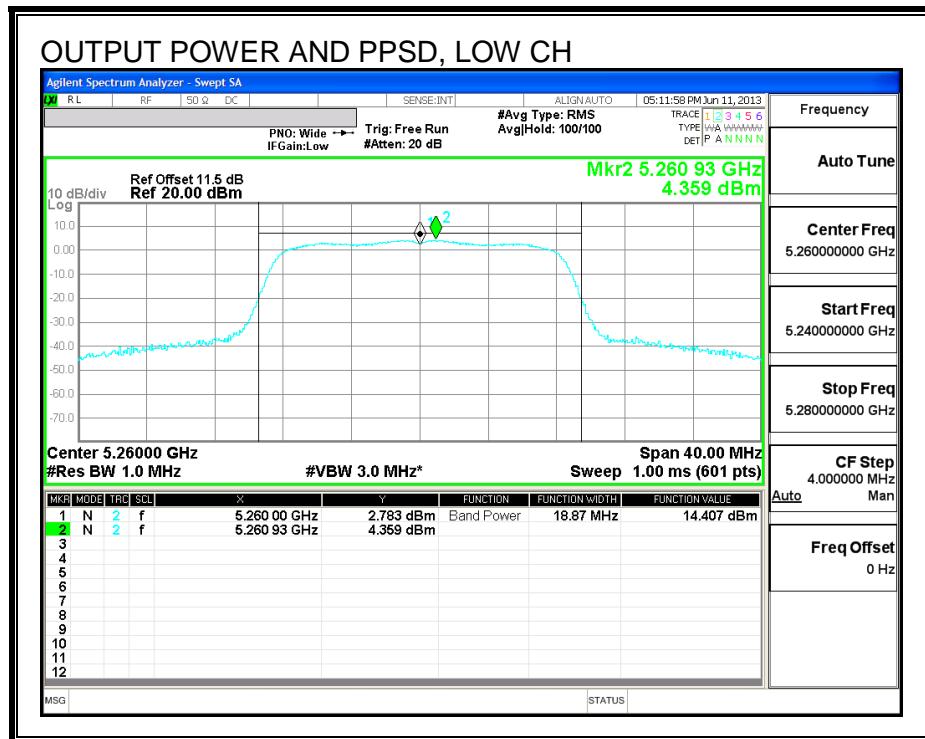
### Output Power Results

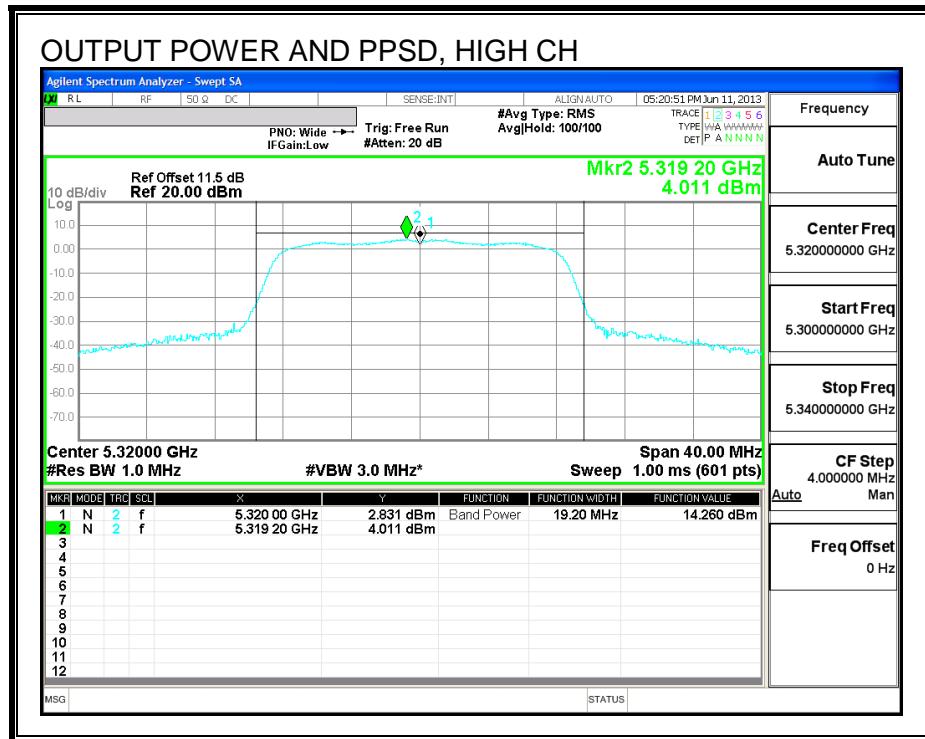
| Channel | Frequency<br>(MHz) | Meas<br>Power<br>(dBm) | Total<br>Corr'd<br>Power<br>(dBm) | Power<br>Limit<br>(dBm) | Power<br>Margin<br>(dB) |
|---------|--------------------|------------------------|-----------------------------------|-------------------------|-------------------------|
| Low     | 5260               | 14.407                 | 14.41                             | 23.76                   | -9.35                   |
| Mid     | 5300               | 14.275                 | 14.28                             | 23.71                   | -9.44                   |
| High    | 5320               | 14.260                 | 14.26                             | 23.83                   | -9.57                   |

### PPSD Results

| Channel | Frequency<br>(MHz) | Meas<br>PPSD<br>(dBm) | Total<br>Corr'd<br>PPSD<br>(dBm) | PPSD<br>Limit<br>(dBm) | PPSD<br>Margin<br>(dB) |
|---------|--------------------|-----------------------|----------------------------------|------------------------|------------------------|
| Low     | 5260               | 4.359                 | 4.36                             | 11.00                  | -6.64                  |
| Mid     | 5300               | 4.388                 | 4.39                             | 11.00                  | -6.61                  |
| High    | 5320               | 4.011                 | 4.01                             | 11.00                  | -6.99                  |

**OUTPUT POWER AND PPSD**





## 8.5. 802.11n HT20 MODE IN THE 5.3 GHz BAND

### 8.5.1. 26 dB BANDWIDTH

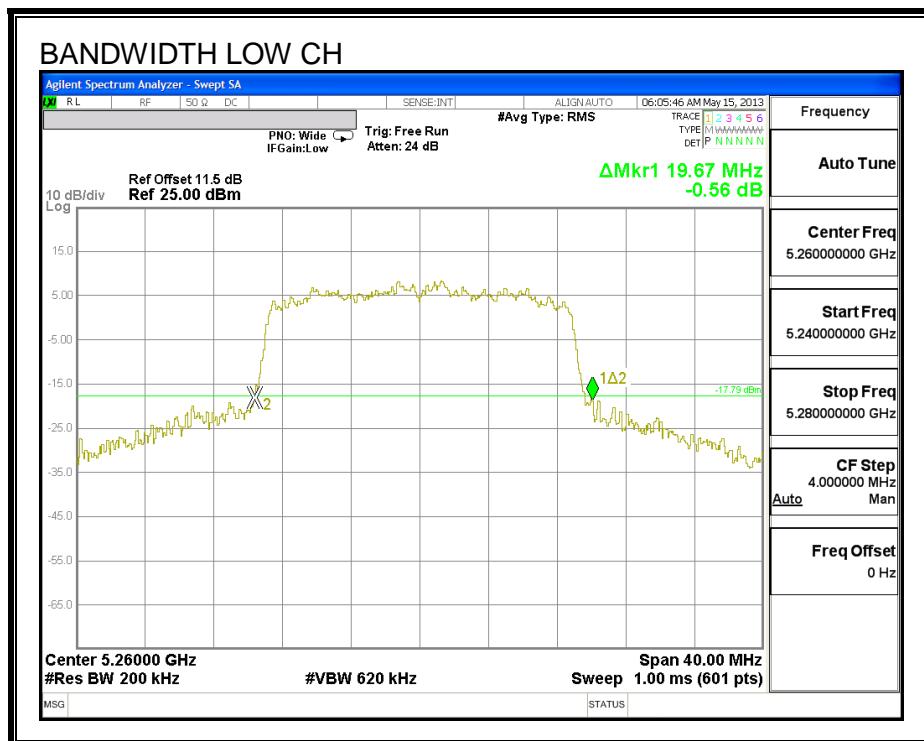
#### LIMITS

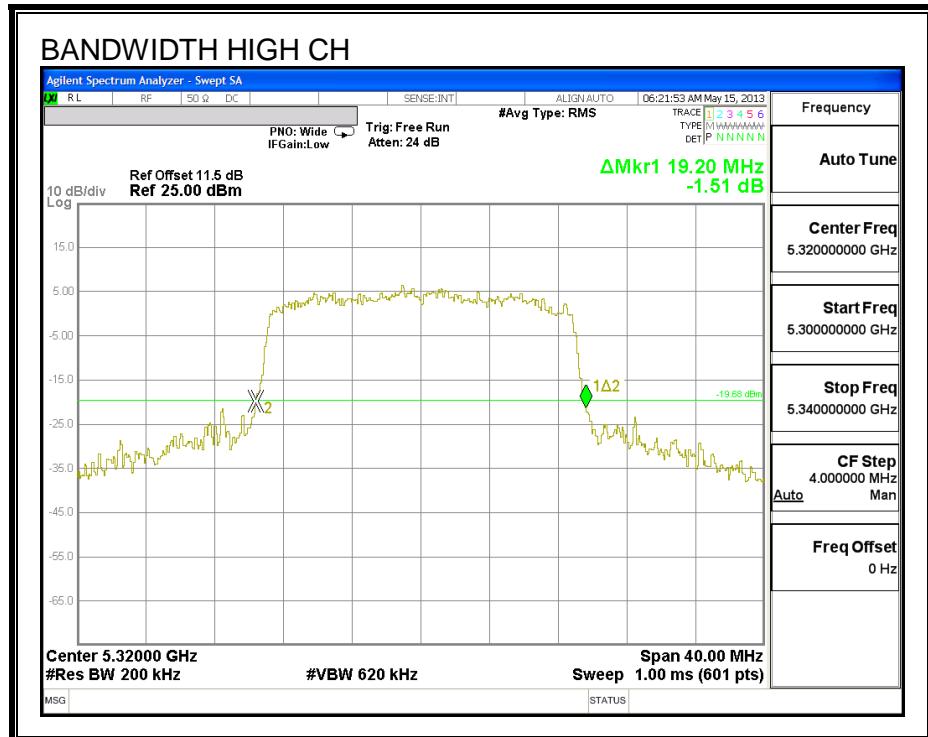
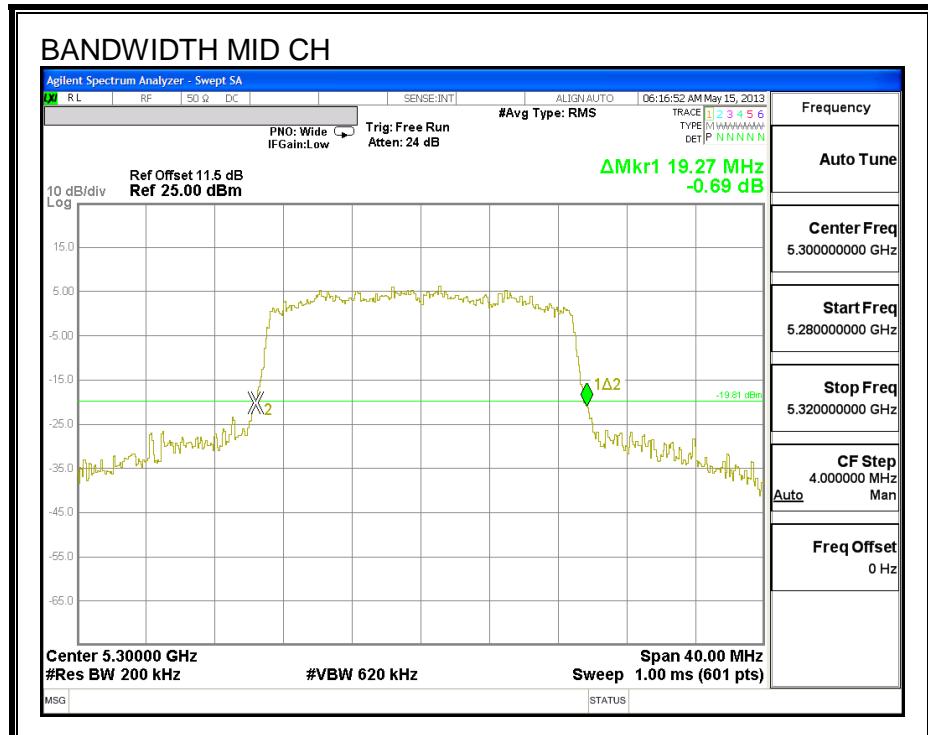
None; for reporting purposes only.

#### RESULTS

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) |
|---------|-----------------|-----------------------|
| Low     | 5260            | 19.67                 |
| Mid     | 5300            | 19.27                 |
| High    | 5320            | 19.20                 |

#### 26 dB BANDWIDTH





## 8.5.2. 99% BANDWIDTH

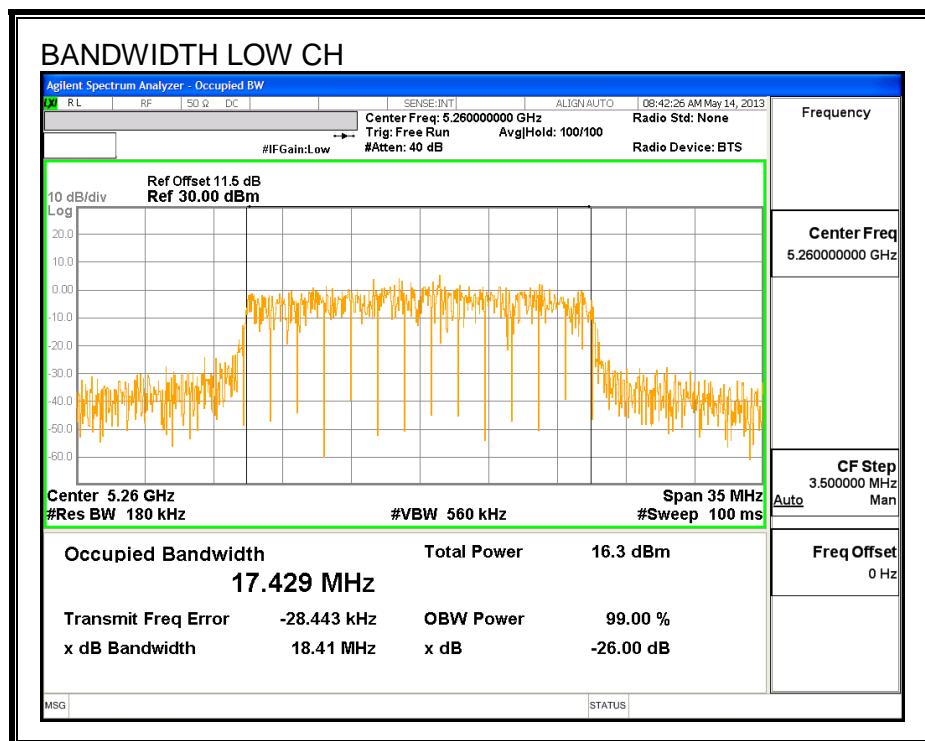
### LIMITS

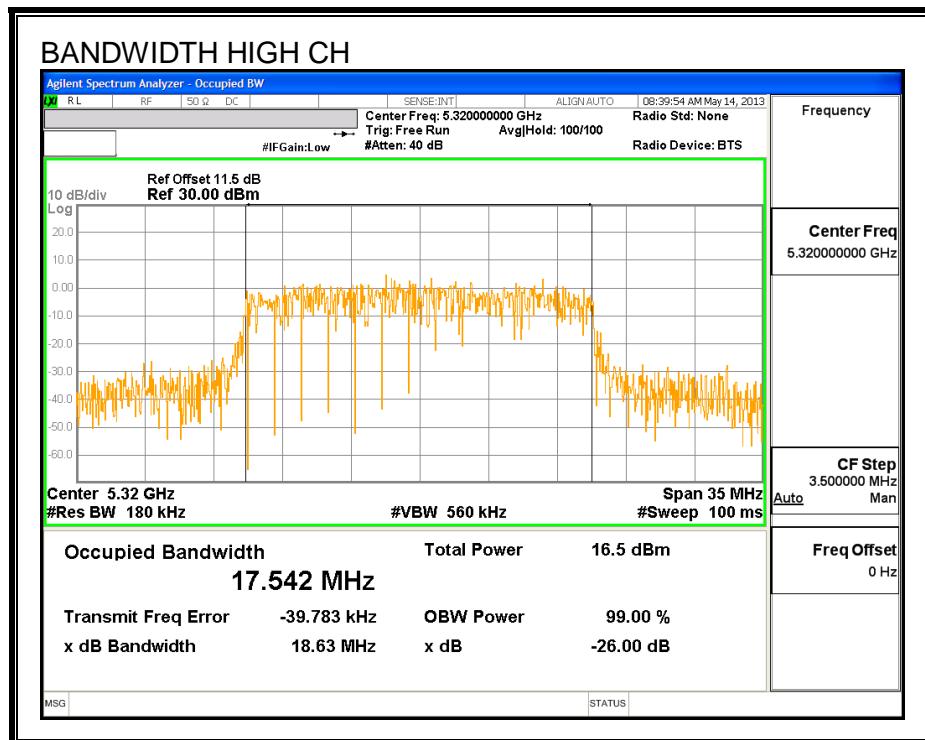
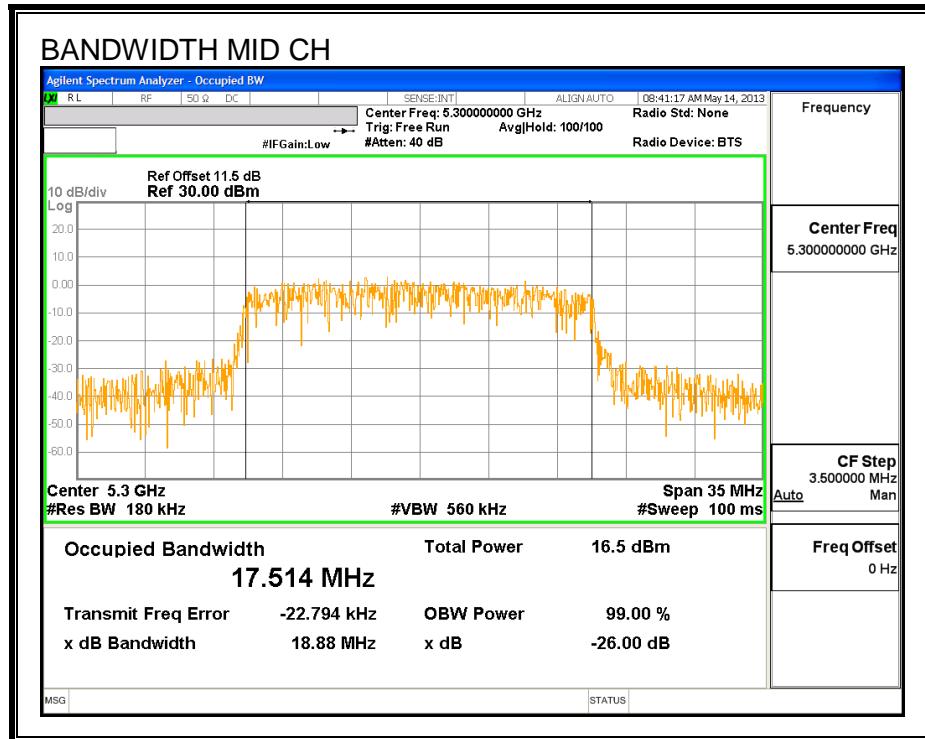
None; for reporting purposes only.

### RESULTS

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---------|-----------------|---------------------|
| Low     | 5260            | 17.429              |
| Mid     | 5300            | 17.514              |
| High    | 5320            | 17.542              |

### 99% BANDWIDTH





### 8.5.3. AVERAGE POWER

#### LIMITS

None; for reporting purposes only.

#### TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

#### RESULTS

| Channel | Frequency (MHz) | Power (dBm) |
|---------|-----------------|-------------|
| Low     | 5260            | 14.56       |
| Mid     | 5300            | 14.44       |
| High    | 5320            | 14.32       |

### 8.5.4. OUTPUT POWER AND PPSD

#### LIMITS

FCC §15.407 (a) (2)

For the band 5.25–5.35 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or  $11 \text{ dBm} + 10 \log B$ , where B is the 26–dB emission bandwidth in MHz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

## RESULTS

### Bandwidth and Antenna Gain

| Channel | Frequency<br>(MHz) | Min<br>26 dB<br>BW<br>(MHz) | Directional<br>Gain<br>(dBi) |
|---------|--------------------|-----------------------------|------------------------------|
| Low     | 5260               | 19.7                        | -6.00                        |
| Mid     | 5300               | 19.3                        | -6.00                        |
| High    | 5320               | 19.2                        | -6.00                        |

### Limits

| Channel | Frequency<br>(MHz) | FCC<br>Power<br>Limit<br>(dBm) | FCC<br>PPSD<br>Limit<br>(dBm) |
|---------|--------------------|--------------------------------|-------------------------------|
| Low     | 5260               | 23.94                          | 11.00                         |
| Mid     | 5300               | 23.85                          | 11.00                         |
| High    | 5320               | 23.83                          | 11.00                         |

|                    |      |   |
|--------------------|------|---|
| Duty Cycle CF (dB) | 0.00 | Included in Calculations of Corr'd Power & PPSD |
|--------------------|------|---|

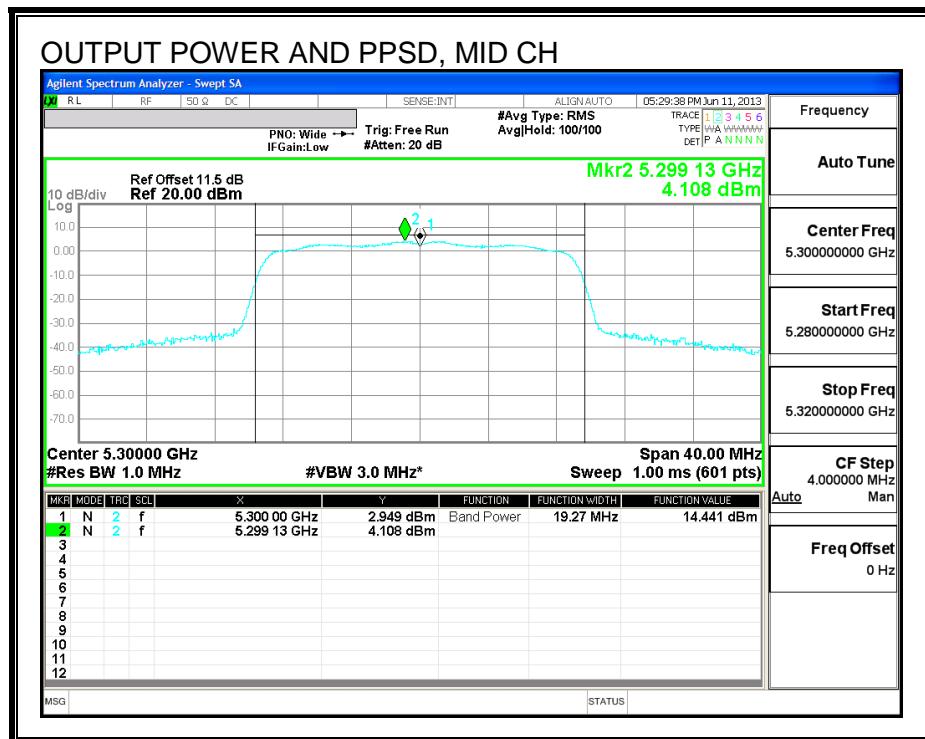
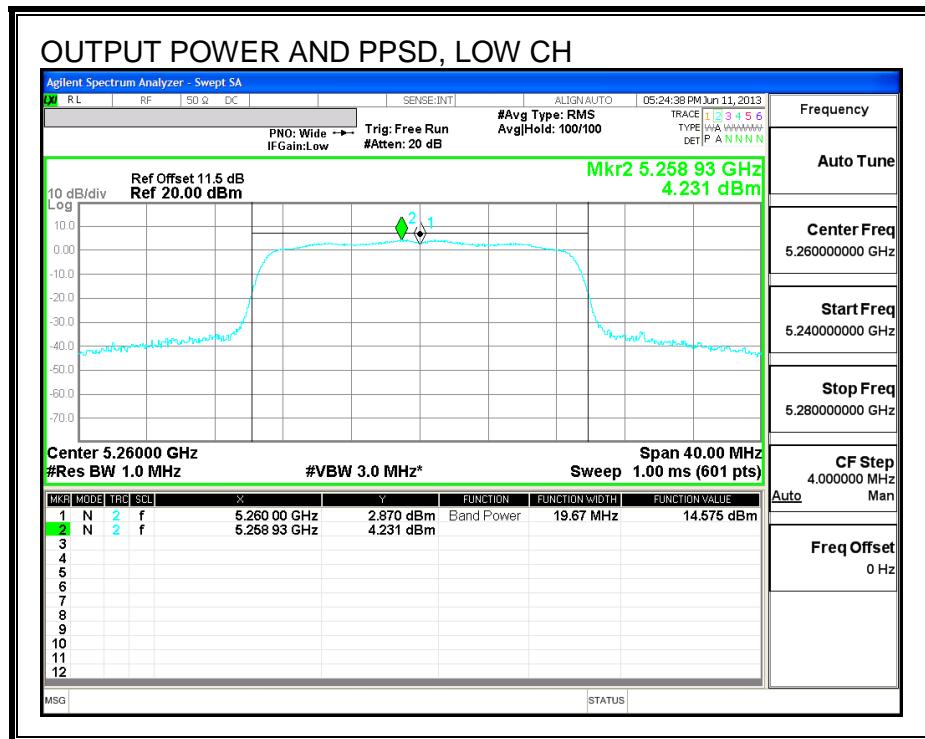
### Output Power Results

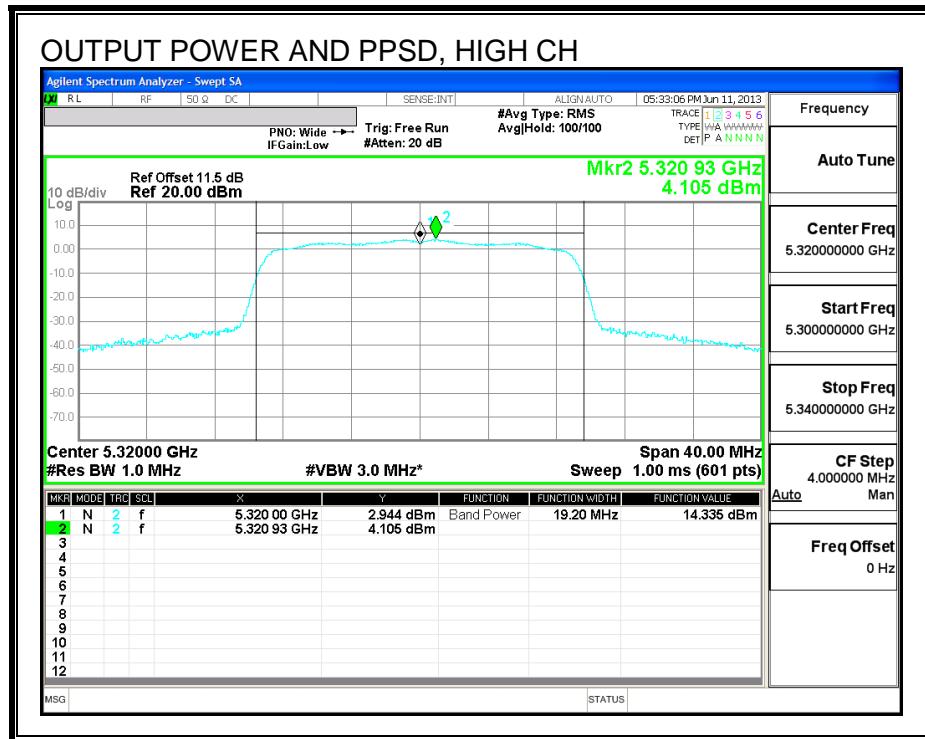
| Channel | Frequency<br>(MHz) | Meas<br>Power<br>(dBm) | Total<br>Corr'd<br>Power<br>(dBm) | Power<br>Limit<br>(dBm) | Power<br>Margin<br>(dB) |
|---------|--------------------|------------------------|-----------------------------------|-------------------------|-------------------------|
| Low     | 5260               | 14.575                 | 14.58                             | 23.94                   | -9.36                   |
| Mid     | 5300               | 14.441                 | 14.44                             | 23.85                   | -9.41                   |
| High    | 5320               | 14.335                 | 14.34                             | 23.83                   | -9.50                   |

### PPSD Results

| Channel | Frequency<br>(MHz) | Meas<br>PPSD<br>(dBm) | Total<br>Corr'd<br>PPSD<br>(dBm) | PPSD<br>Limit<br>(dBm) | PPSD<br>Margin<br>(dB) |
|---------|--------------------|-----------------------|----------------------------------|------------------------|------------------------|
| Low     | 5260               | 4.231                 | 4.23                             | 11.00                  | -6.77                  |
| Mid     | 5300               | 4.108                 | 4.11                             | 11.00                  | -6.89                  |
| High    | 5320               | 4.105                 | 4.11                             | 11.00                  | -6.90                  |

**OUTPUT POWER AND PPSD**





## 8.6. 802.11n HT40 MODE IN THE 5.3 GHz BAND

### 8.6.1. 26 dB BANDWIDTH

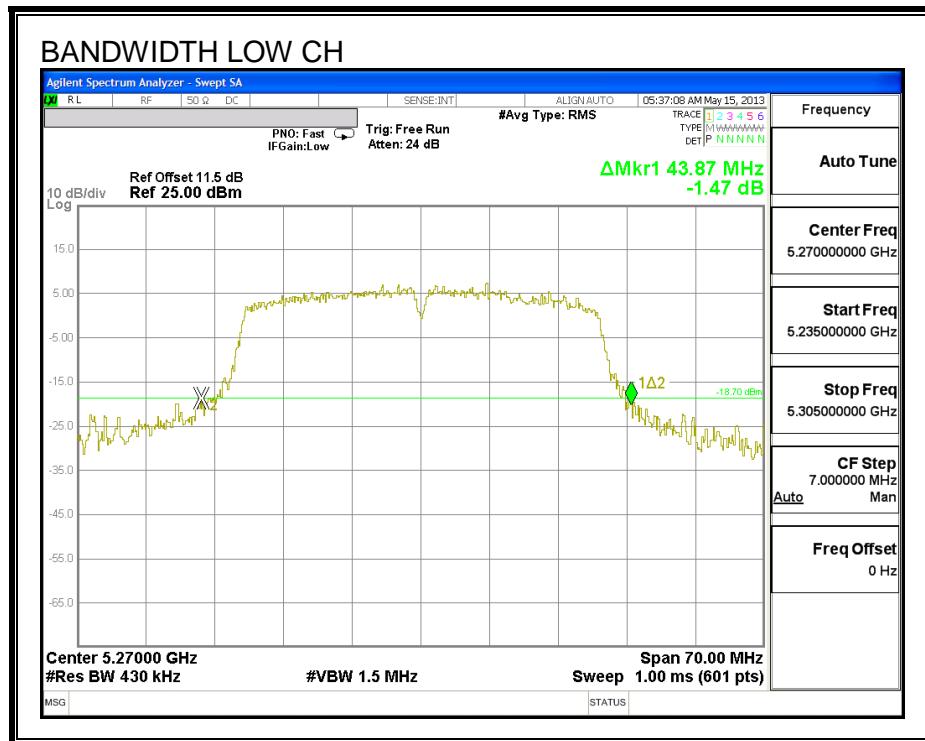
#### LIMITS

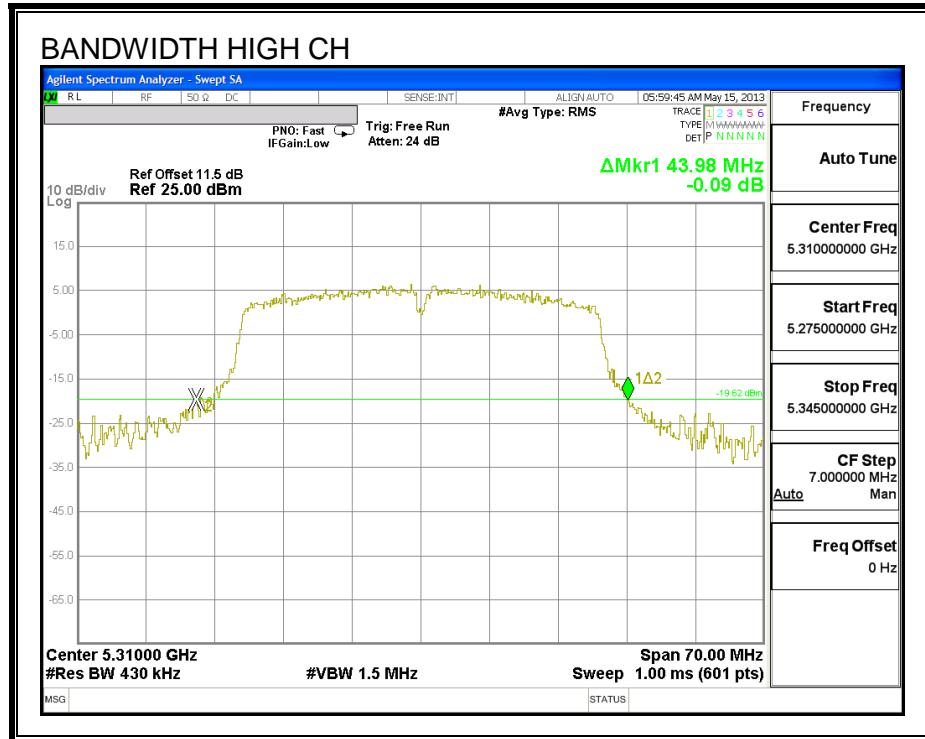
None; for reporting purposes only.

#### RESULTS

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) |
|---------|-----------------|-----------------------|
| Low     | 5270            | 43.87                 |
| High    | 5310            | 43.98                 |

#### 26 dB BANDWIDTH





## 8.6.2. 99% BANDWIDTH

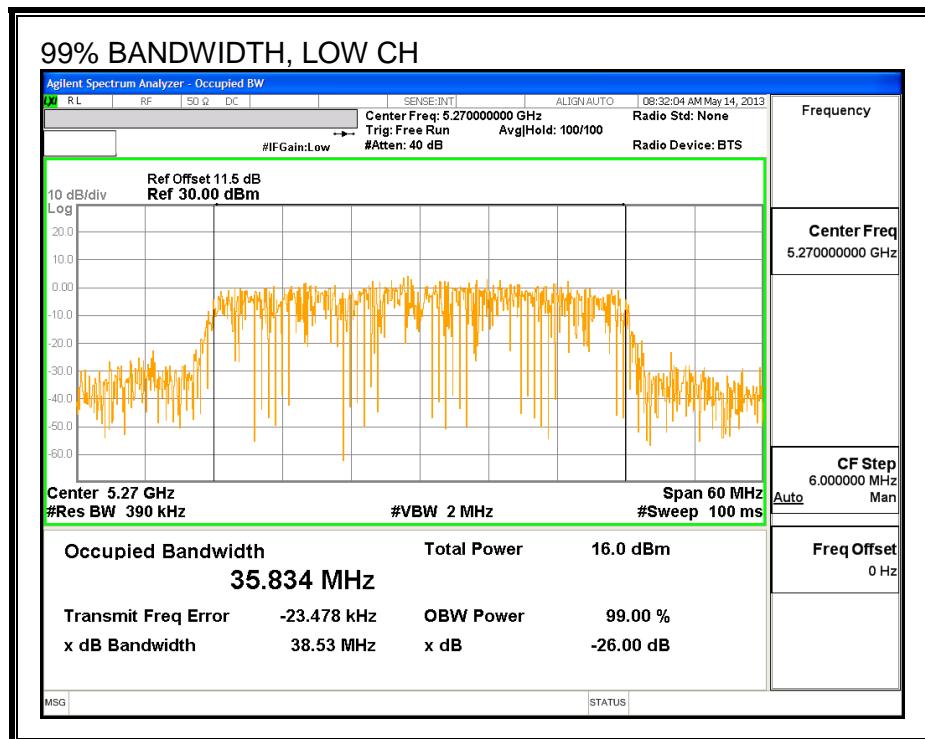
### LIMITS

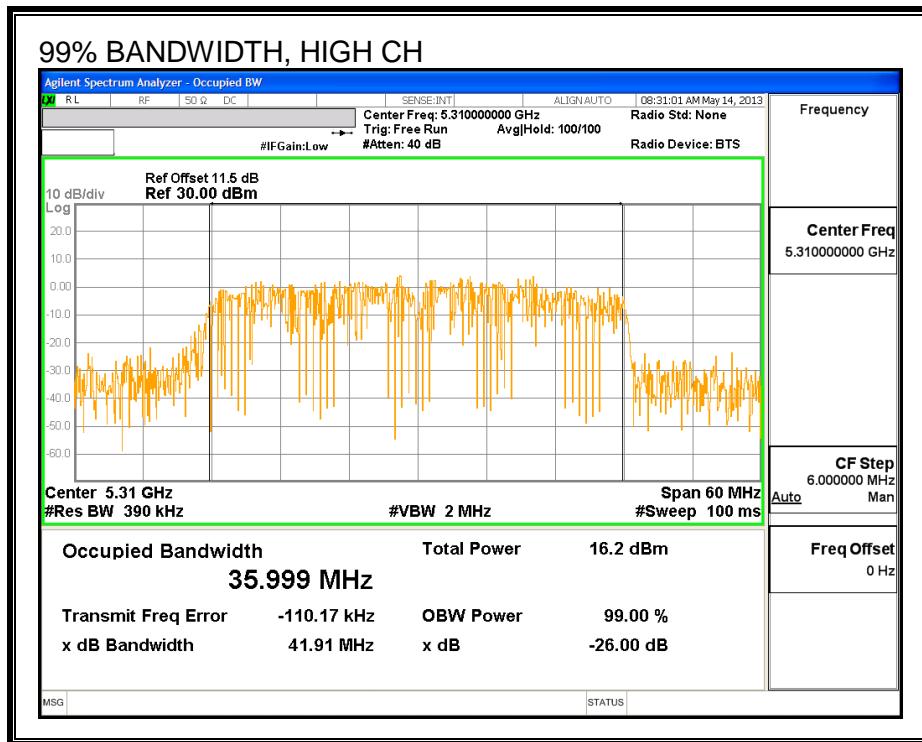
None; for reporting purposes only.

### RESULTS

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---------|-----------------|---------------------|
| Low     | 5270            | 35.834              |
| High    | 5310            | 35.999              |

### 99% BANDWIDTH





### 8.6.3. AVERAGE POWER

#### LIMITS

None; for reporting purposes only.

#### TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

#### RESULTS

| Channel | Frequency (MHz) | Power (dBm) |
|---------|-----------------|-------------|
| Low     | 5270            | 14.50       |
| High    | 5310            | 14.40       |

#### 8.6.4. OUTPUT POWER AND PPSD

##### LIMITS

FCC §15.407 (a) (2)

For the band 5.25–5.35 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or  $11 \text{ dBm} + 10 \log B$ , where B is the 26–dB emission bandwidth in MHz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

##### DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

## RESULTS

### Bandwidth and Antenna Gain

| Channel | Frequency<br>(MHz) | Min<br>26 dB<br>BW<br>(MHz) | Directional<br>Gain<br>(dBi) |
|---------|--------------------|-----------------------------|------------------------------|
| Low     | 5270               | 43.9                        | -6.00                        |
| High    | 5310               | 44.0                        | -6.00                        |

### Limits

| Channel | Frequency<br>(MHz) | FCC<br>Power<br>Limit<br>(dBm) | FCC<br>PPSD<br>Limit<br>(dBm) |
|---------|--------------------|--------------------------------|-------------------------------|
| Low     | 5270               | 24.00                          | 11.00                         |
| High    | 5310               | 24.00                          | 11.00                         |

|                    |      |   |
|--------------------|------|---|
| Duty Cycle CF (dB) | 0.22 | Included in Calculations of Corr'd Power & PPSD |
|--------------------|------|---|

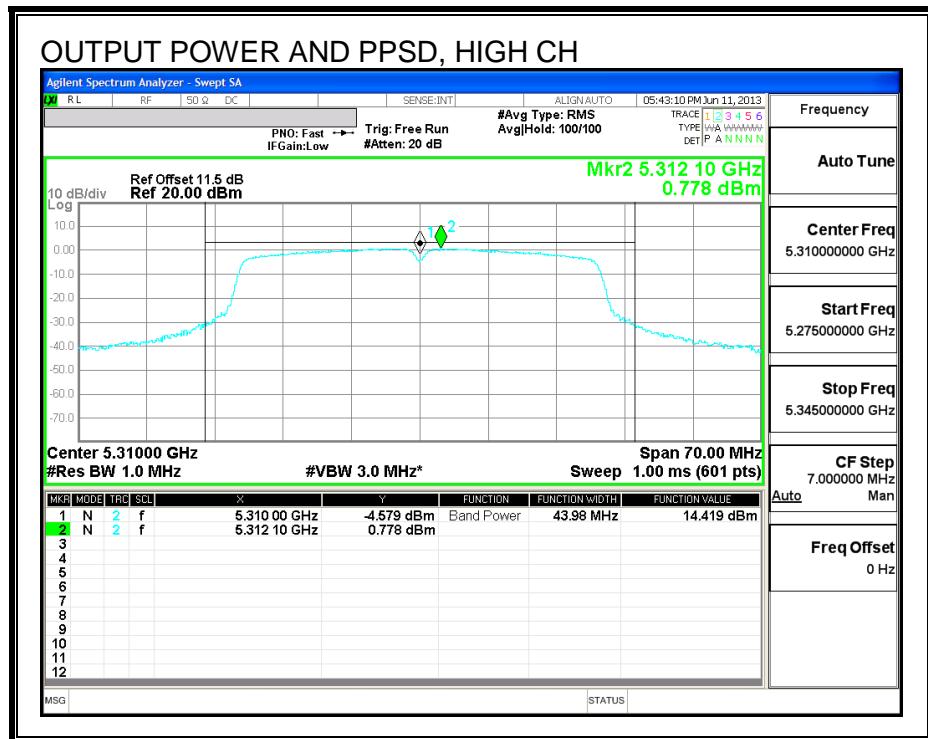
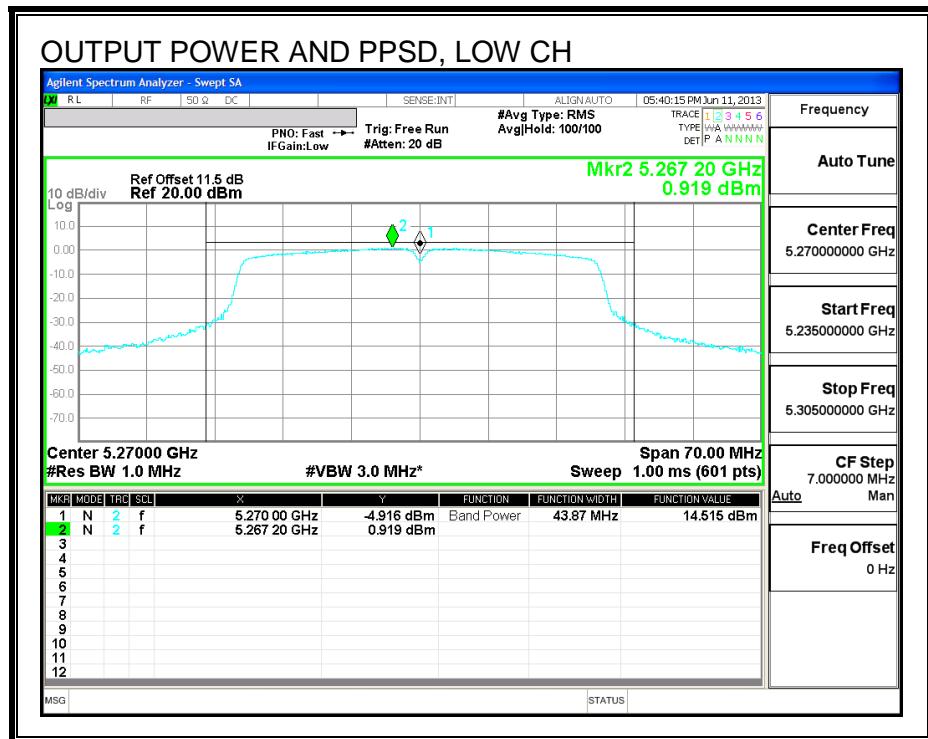
### Output Power Results

| Channel | Frequency<br>(MHz) | Meas<br>Power<br>(dBm) | Total<br>Corr'd<br>Power<br>(dBm) | Power<br>Limit<br>(dBm) | Power<br>Margin<br>(dB) |
|---------|--------------------|------------------------|-----------------------------------|-------------------------|-------------------------|
| Low     | 5270               | 14.515                 | 14.74                             | 24.00                   | -9.27                   |
| High    | 5310               | 14.419                 | 14.64                             | 24.00                   | -9.36                   |

### PPSD Results

| Channel | Frequency<br>(MHz) | Meas<br>PPSD<br>(dBm) | Total<br>Corr'd<br>PPSD<br>(dBm) | PPSD<br>Limit<br>(dBm) | PPSD<br>Margin<br>(dB) |
|---------|--------------------|-----------------------|----------------------------------|------------------------|------------------------|
| Low     | 5270               | 0.919                 | 1.14                             | 11.00                  | -9.86                  |
| High    | 5310               | 0.778                 | 1.00                             | 11.00                  | -10.00                 |

**OUTPUT POWER AND PPSD,**



## 8.7. 802.11a MODE IN THE 5.6 GHz BAND

### 8.7.1. 26 dB BANDWIDTH

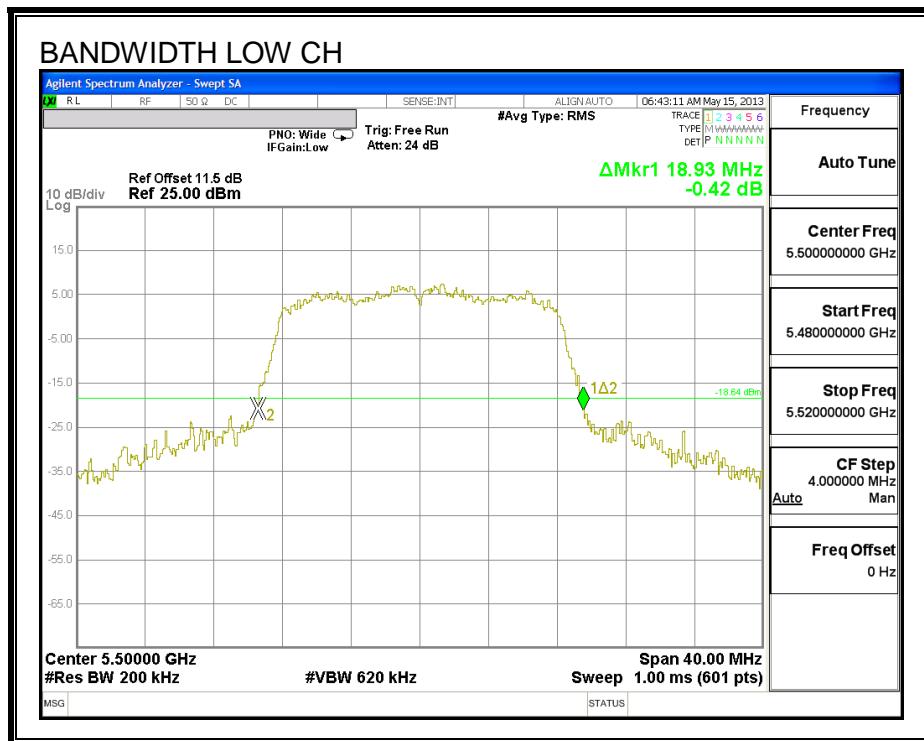
#### LIMITS

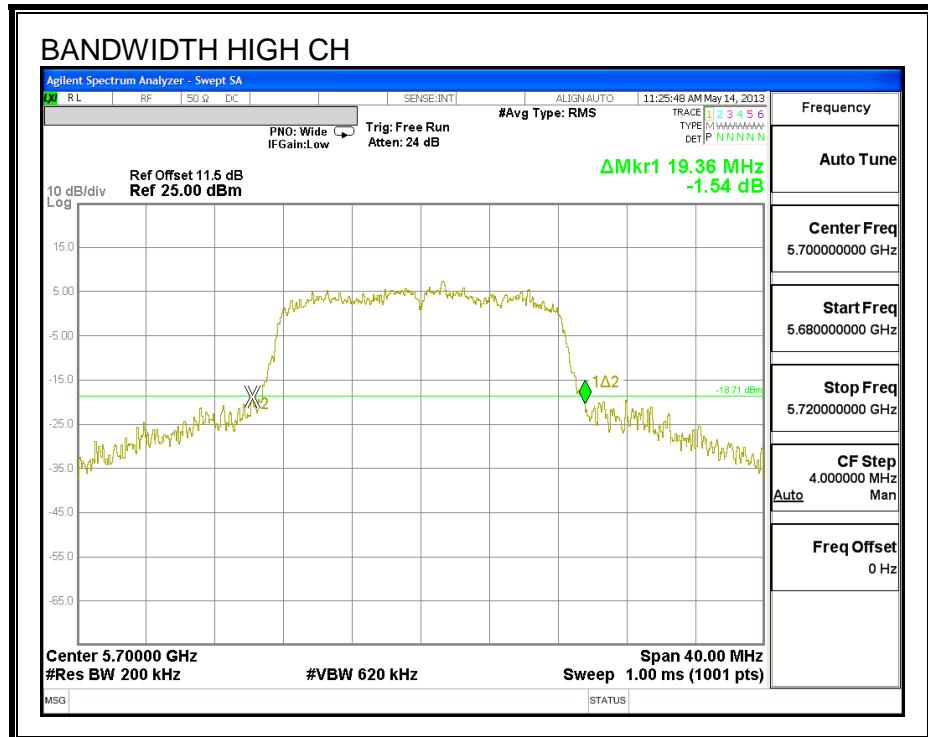
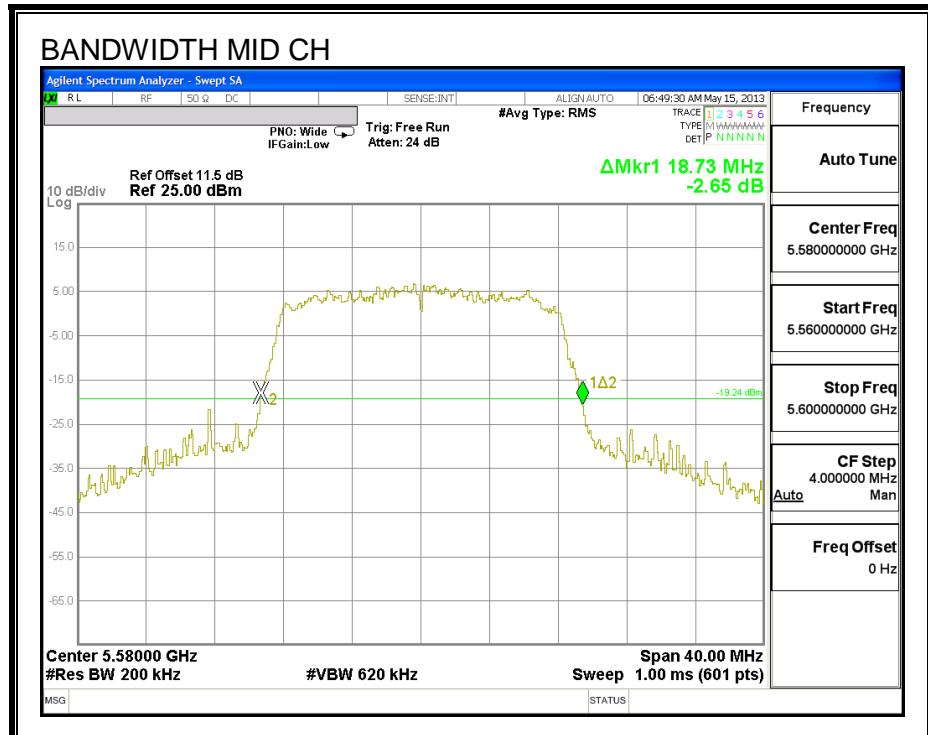
None; for reporting purposes only.

#### RESULTS

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) |
|---------|-----------------|-----------------------|
| Low     | 5500            | 18.93                 |
| Mid     | 5580            | 18.73                 |
| High    | 5700            | 19.36                 |

#### 26 dB BANDWIDTH





## 8.7.2. 99% BANDWIDTH

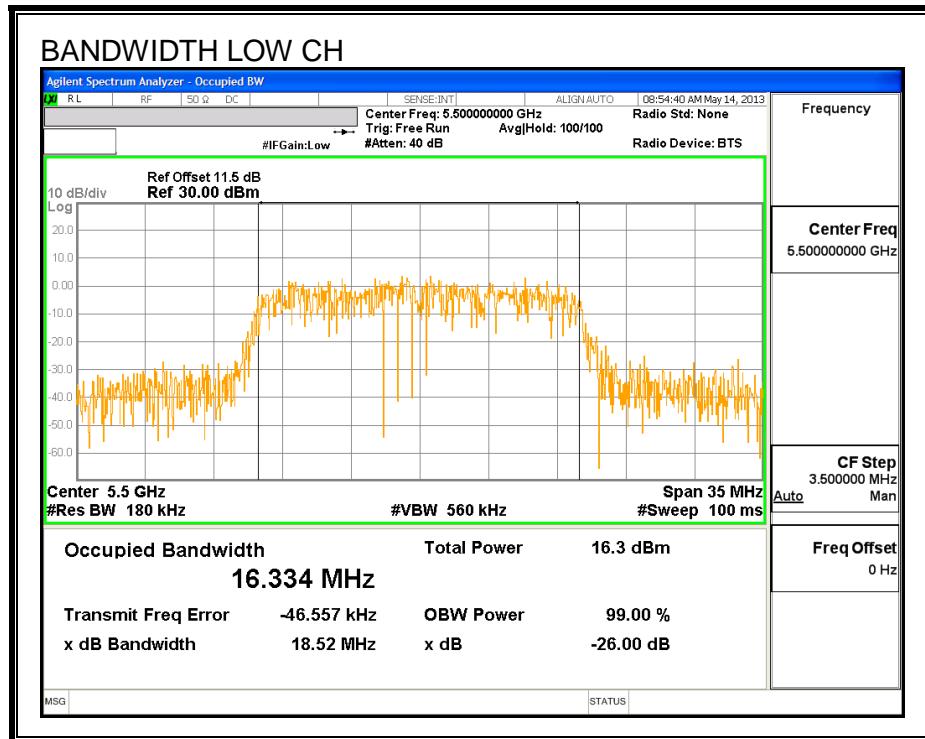
### LIMITS

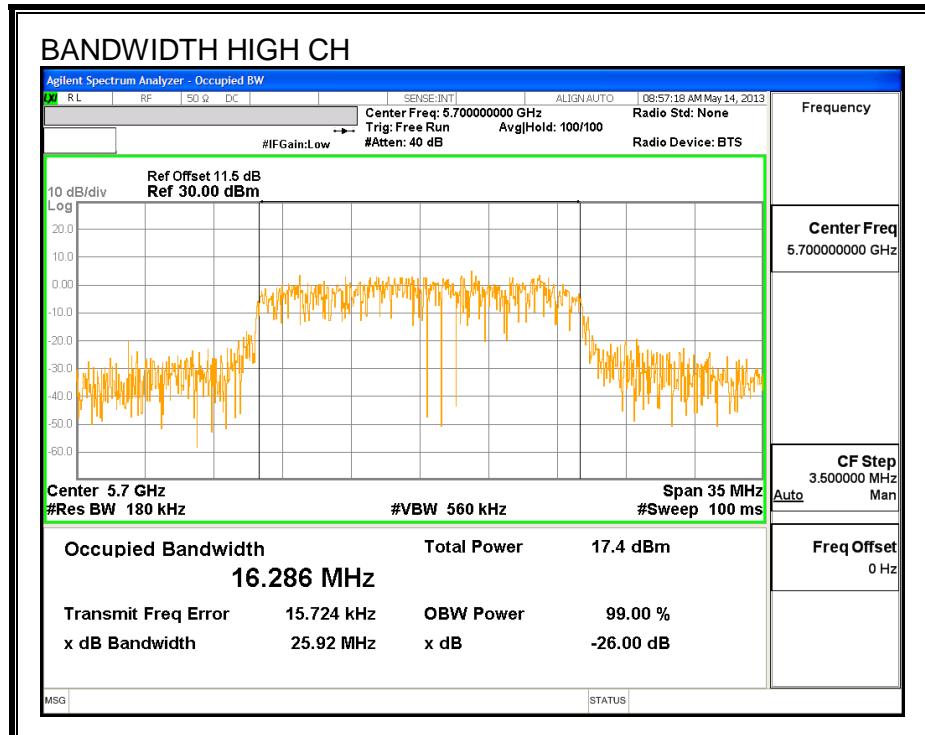
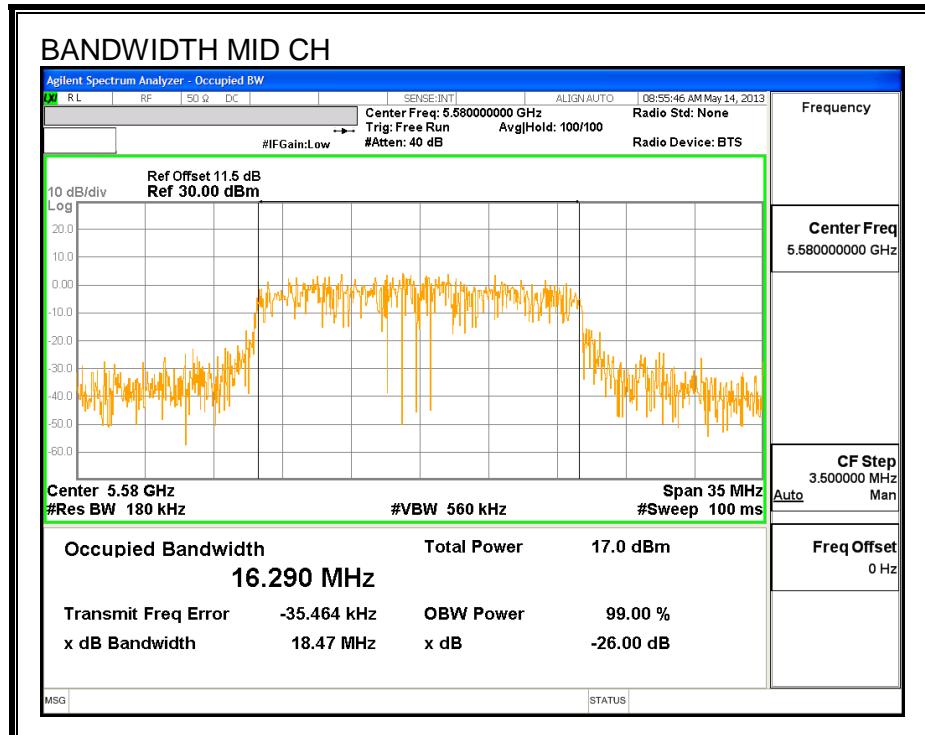
None; for reporting purposes only.

### RESULTS

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---------|-----------------|---------------------|
| Low     | 5500            | 16.334              |
| Mid     | 5580            | 16.290              |
| High    | 5700            | 16.286              |

### 99% BANDWIDTH





### 8.7.3. AVERAGE POWER

#### LIMITS

None; for reporting purposes only.

#### TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

#### RESULTS

| Channel | Frequency (MHz) | Power (dBm) |
|---------|-----------------|-------------|
| Low     | 5500            | 13.90       |
| Mid     | 5580            | 13.90       |
| High    | 5700            | 14.00       |

#### 8.7.4. OUTPUT POWER AND PPSD

##### LIMITS

FCC §15.407 (a) (2)

For the band 5.47–5.725 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or  $11 \text{ dBm} + 10 \log B$ , where B is the 26–dB emission bandwidth in MHz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

##### DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

## RESULTS

### Bandwidth and Antenna Gain

| Channel | Frequency<br>(MHz) | Min<br>26 dB<br>BW<br>(MHz) | Directional<br>Gain<br>(dBi) |
|---------|--------------------|-----------------------------|------------------------------|
| Low     | 5500               | 18.9                        | -5.50                        |
| Mid     | 5580               | 18.7                        | -5.50                        |
| High    | 5700               | 19.4                        | -5.50                        |

### Limits

| Channel | Frequency<br>(MHz) | FCC<br>Power<br>Limit<br>(dBm) | FCC<br>PPSD<br>Limit<br>(dBm) |
|---------|--------------------|--------------------------------|-------------------------------|
| Low     | 5500               | 23.77                          | 11.00                         |
| Mid     | 5580               | 23.73                          | 11.00                         |
| High    | 5700               | 23.87                          | 11.00                         |

|                    |      |   |
|--------------------|------|---|
| Duty Cycle CF (dB) | 0.00 | Included in Calculations of Corr'd Power & PPSD |
|--------------------|------|---|

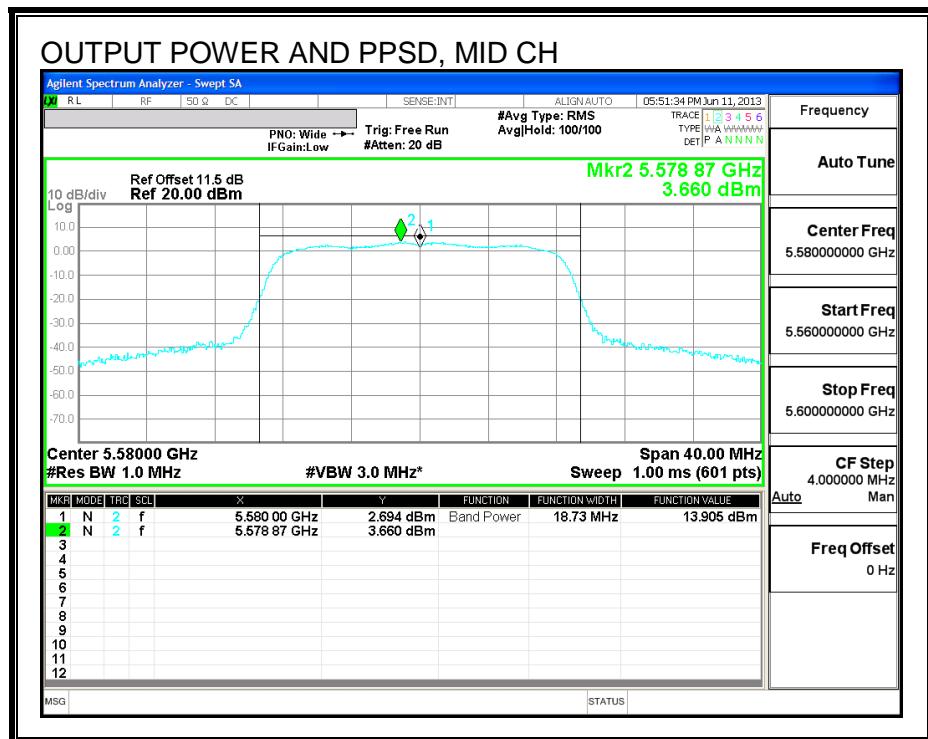
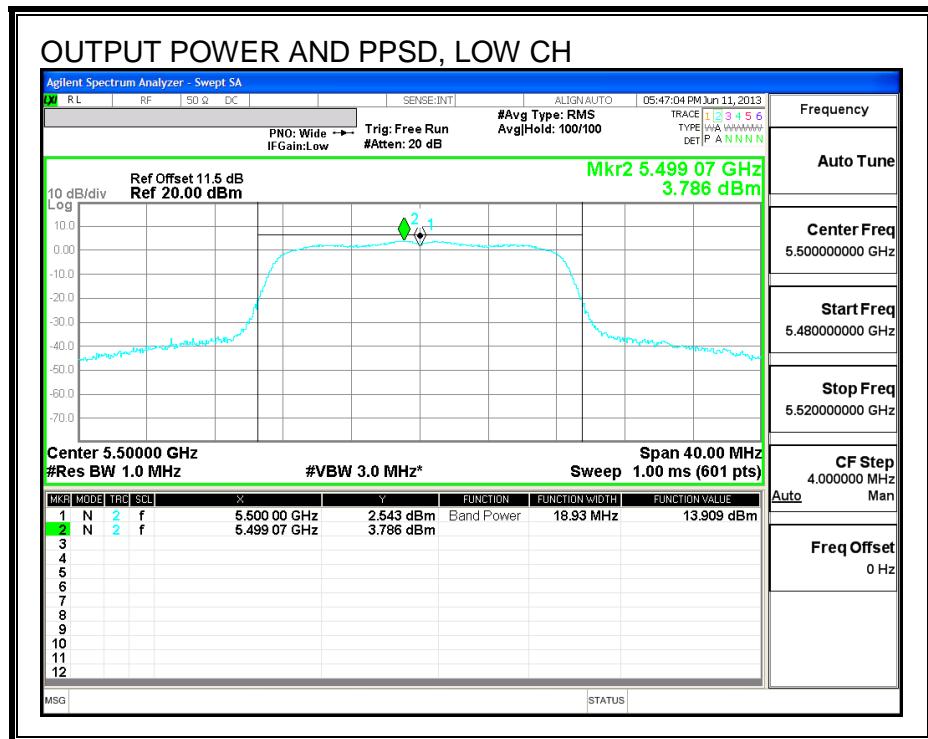
### Output Power Results

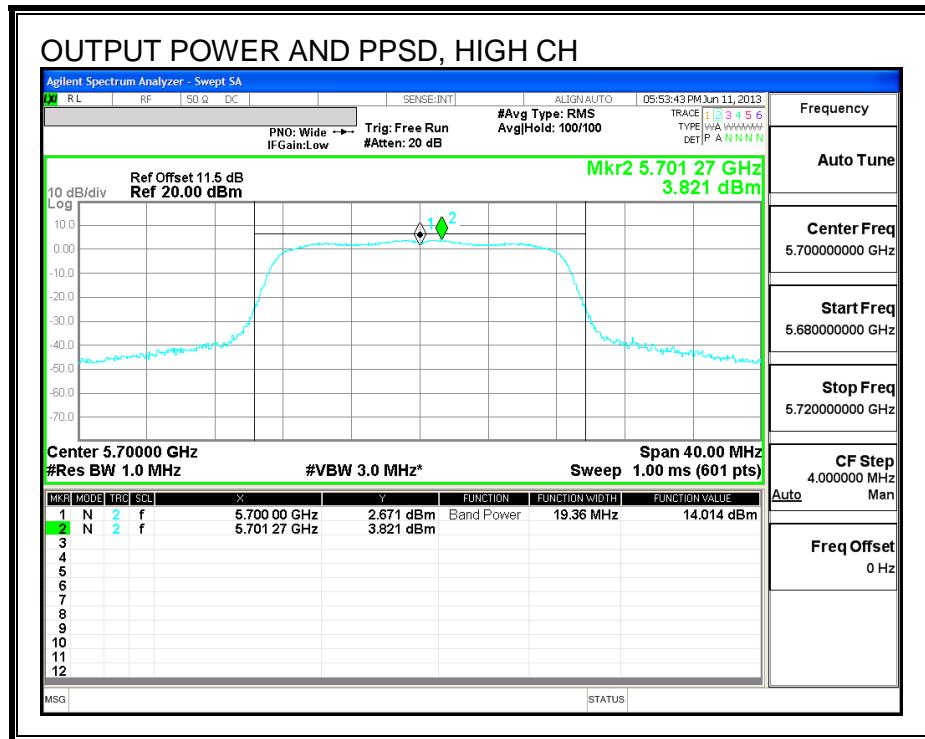
| Channel | Frequency<br>(MHz) | Meas<br>Power<br>(dBm) | Total<br>Corr'd<br>Power<br>(dBm) | Power<br>Limit<br>(dBm) | Power<br>Margin<br>(dB) |
|---------|--------------------|------------------------|-----------------------------------|-------------------------|-------------------------|
| Low     | 5500               | 13.909                 | 13.91                             | 23.77                   | -9.86                   |
| Mid     | 5580               | 13.905                 | 13.91                             | 23.73                   | -9.82                   |
| High    | 5700               | 14.014                 | 14.01                             | 23.87                   | -9.86                   |

### PPSD Results

| Channel | Frequency<br>(MHz) | Meas<br>PPSD<br>(dBm) | Total<br>Corr'd<br>PPSD<br>(dBm) | PPSD<br>Limit<br>(dBm) | PPSD<br>Margin<br>(dB) |
|---------|--------------------|-----------------------|----------------------------------|------------------------|------------------------|
| Low     | 5500               | 3.786                 | 3.79                             | 11.00                  | -7.21                  |
| Mid     | 5580               | 3.660                 | 3.66                             | 11.00                  | -7.34                  |
| High    | 5700               | 3.821                 | 3.82                             | 11.00                  | -7.18                  |

**OUTPUT POWER AND PPSD**





## 8.8. 802.11n HT20 MODE IN THE 5.6 GHz BAND

### 8.8.1. 26 dB BANDWIDTH

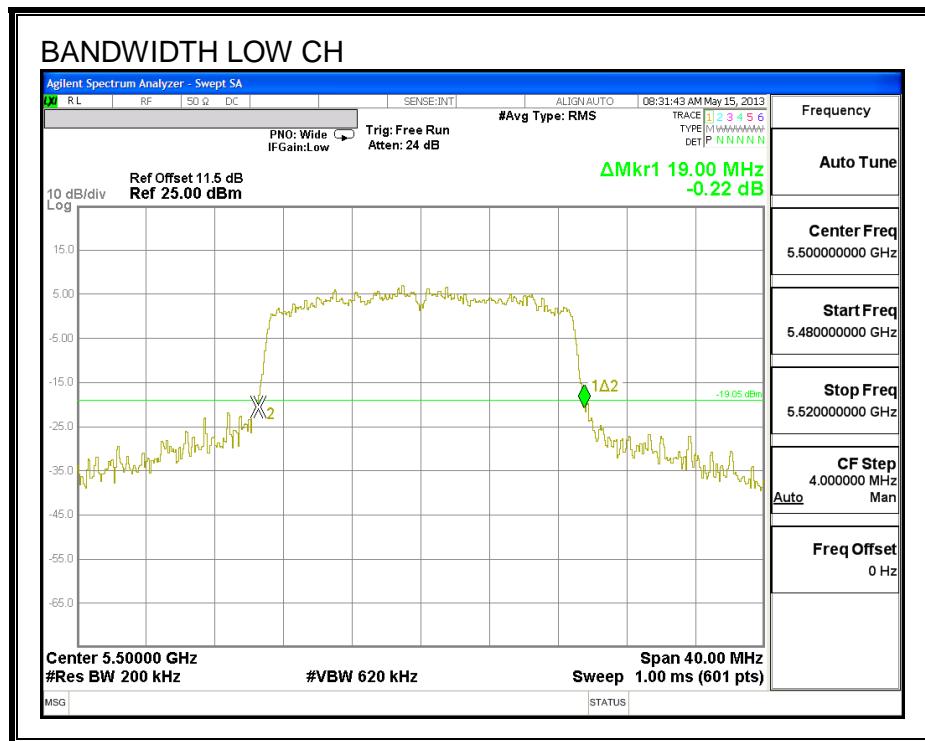
#### LIMITS

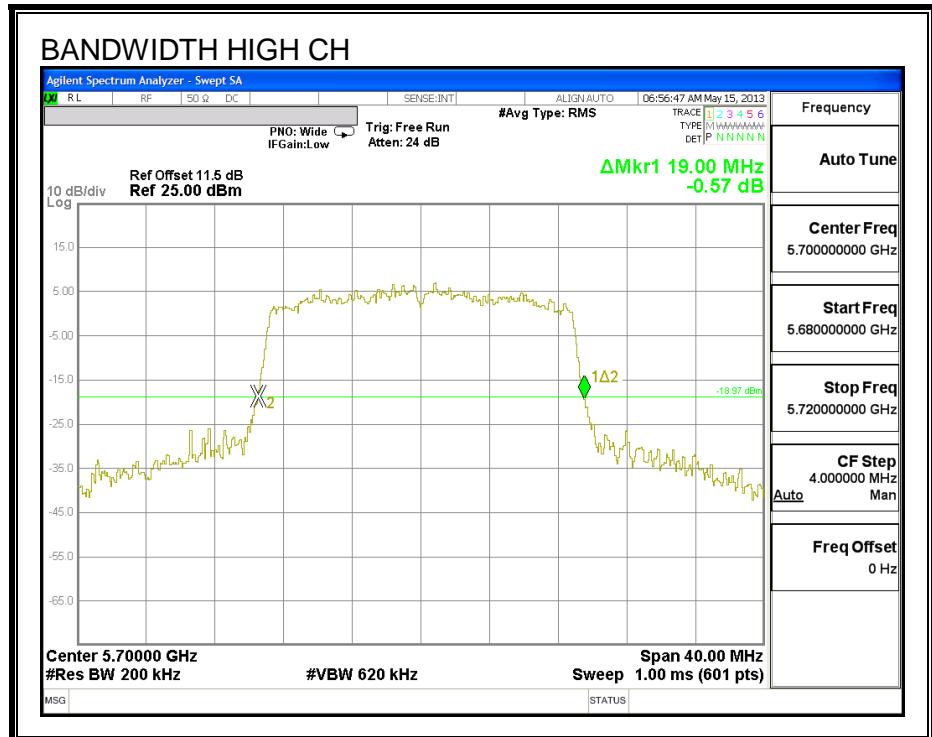
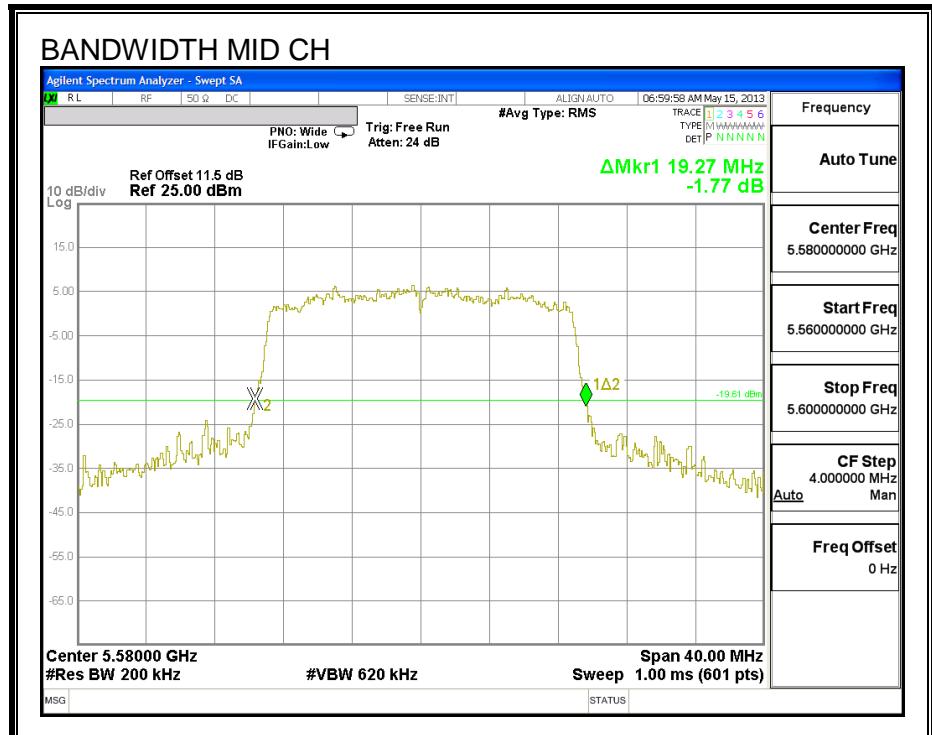
None; for reporting purposes only.

#### RESULTS

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) |
|---------|-----------------|-----------------------|
| Low     | 5500            | 19.00                 |
| Mid     | 5580            | 19.27                 |
| High    | 5700            | 19.00                 |

#### 26 dB BANDWIDTH





## 8.8.2. 99% BANDWIDTH

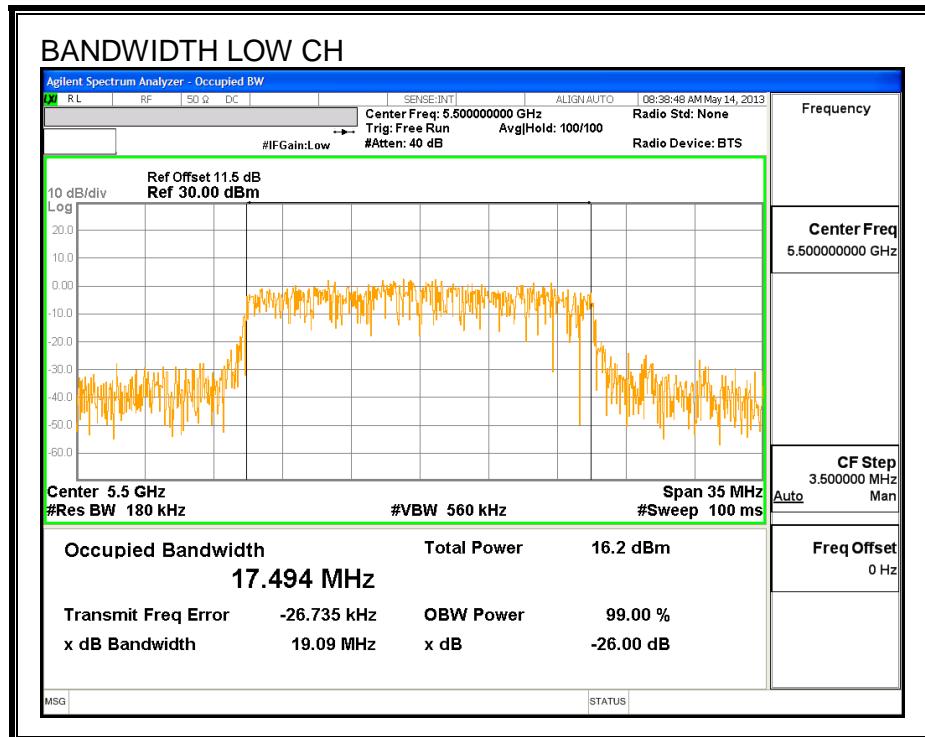
### LIMITS

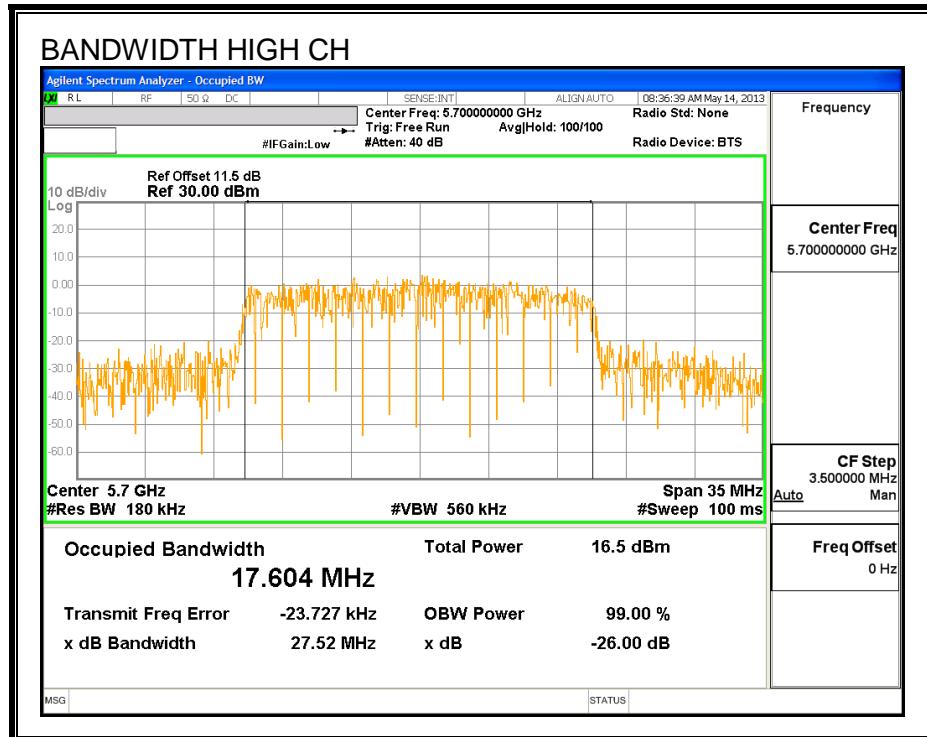
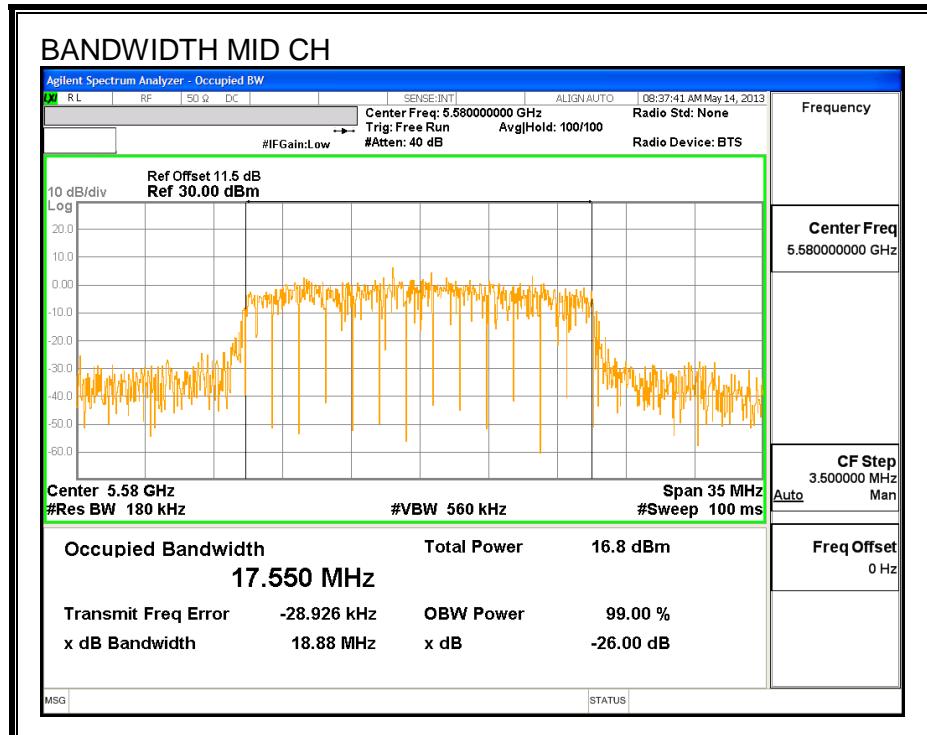
None; for reporting purposes only.

### RESULTS

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---------|-----------------|---------------------|
| Low     | 5500            | 17.494              |
| Mid     | 5580            | 17.550              |
| High    | 5700            | 17.604              |

### 99% BANDWIDTH





### 8.8.3. AVERAGE POWER

#### LIMITS

None; for reporting purposes only.

#### TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

#### RESULTS

| Channel | Frequency (MHz) | Power (dBm) |
|---------|-----------------|-------------|
| Low     | 5500            | 13.98       |
| Mid     | 5580            | 14.03       |
| High    | 5700            | 13.81       |

### 8.8.4. OUTPUT POWER AND PPSD

#### LIMITS

FCC §15.407 (a) (2)

For the band 5.47–5.725 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or  $11 \text{ dBm} + 10 \log B$ , where B is the 26–dB emission bandwidth in MHz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

## RESULTS

### Bandwidth and Antenna Gain

| Channel | Frequency<br>(MHz) | Min<br>26 dB<br>BW<br>(MHz) | Directional<br>Gain<br>(dBi) |
|---------|--------------------|-----------------------------|------------------------------|
| Low     | 5500               | 19.0                        | -5.50                        |
| Mid     | 5580               | 19.3                        | -5.50                        |
| High    | 5700               | 19.0                        | -5.50                        |

### Limits

| Channel | Frequency<br>(MHz) | FCC<br>Power<br>Limit<br>(dBm) | FCC<br>PPSD<br>Limit<br>(dBm) |
|---------|--------------------|--------------------------------|-------------------------------|
| Low     | 5500               | 23.79                          | 11.00                         |
| Mid     | 5580               | 23.85                          | 11.00                         |
| High    | 5700               | 23.79                          | 11.00                         |

|                    |      |   |
|--------------------|------|---|
| Duty Cycle CF (dB) | 0.00 | Included in Calculations of Corr'd Power & PPSD |
|--------------------|------|---|

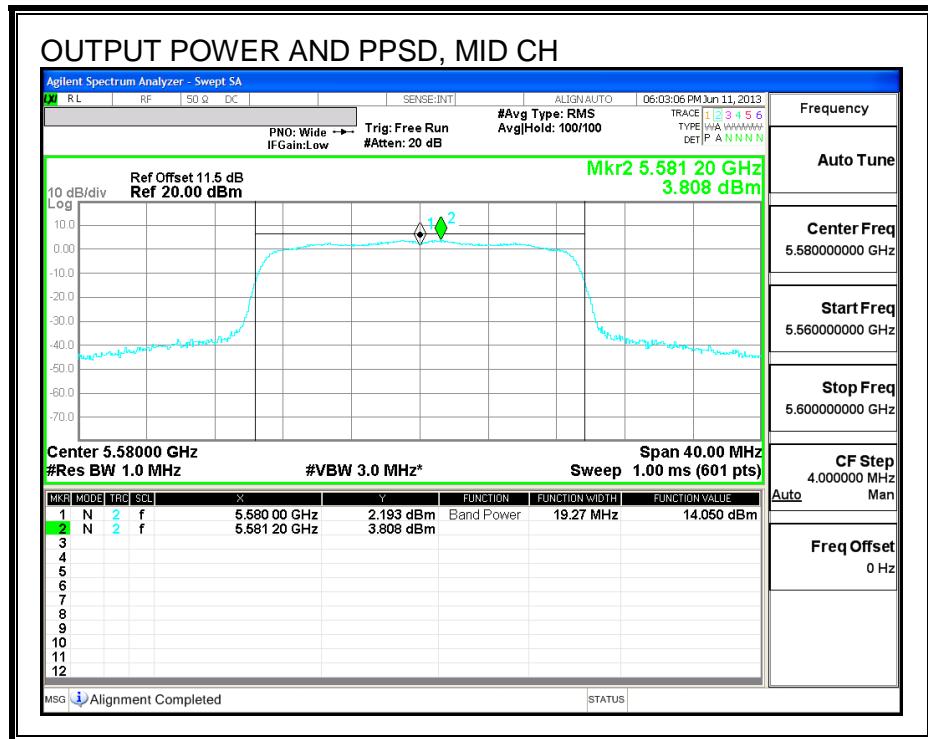
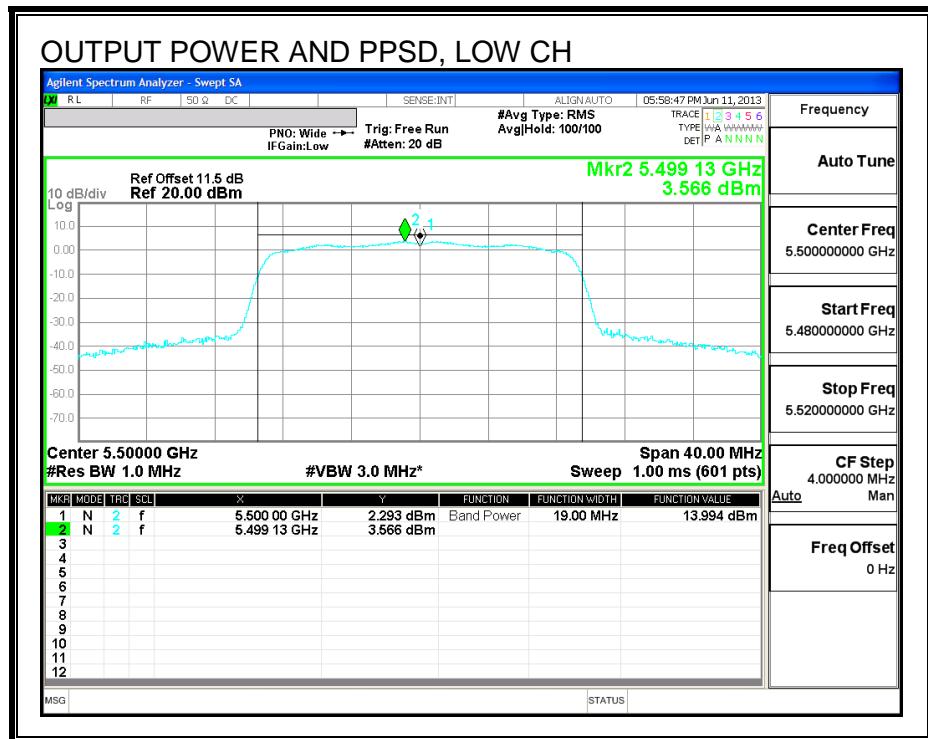
### Output Power Results

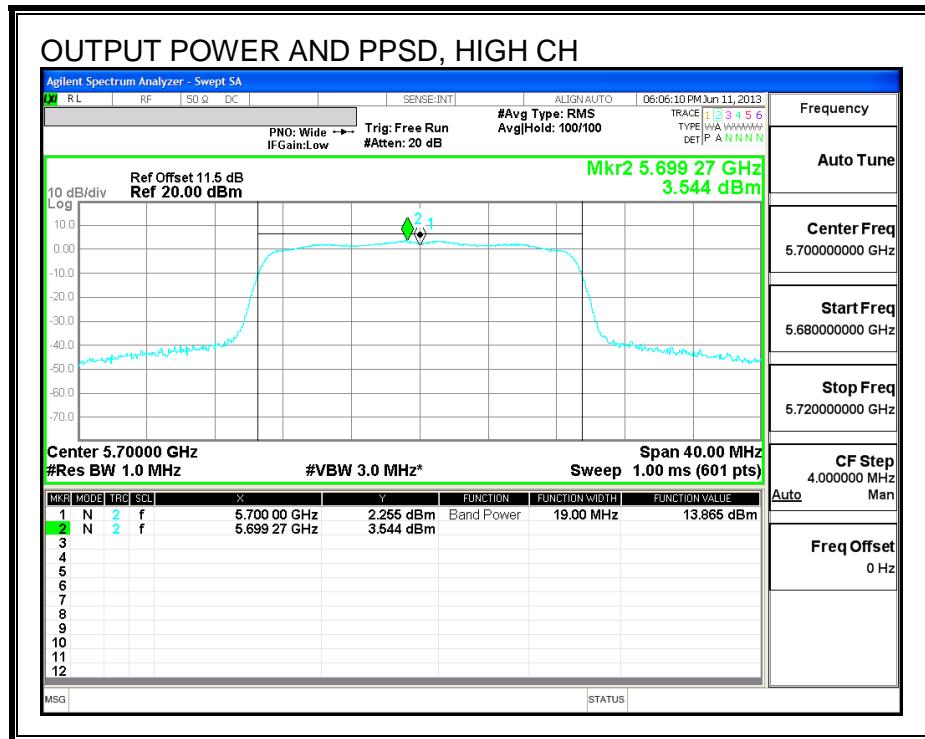
| Channel | Frequency<br>(MHz) | Meas<br>Power<br>(dBm) | Total<br>Corr'd<br>Power<br>(dBm) | Power<br>Limit<br>(dBm) | Power<br>Margin<br>(dB) |
|---------|--------------------|------------------------|-----------------------------------|-------------------------|-------------------------|
| Low     | 5500               | 13.994                 | 13.99                             | 23.79                   | -9.79                   |
| Mid     | 5580               | 14.050                 | 14.05                             | 23.85                   | -9.80                   |
| High    | 5700               | 13.865                 | 13.87                             | 23.79                   | -9.92                   |

### PPSD Results

| Channel | Frequency<br>(MHz) | Meas<br>PPSD<br>(dBm) | Total<br>Corr'd<br>PPSD<br>(dBm) | PPSD<br>Limit<br>(dBm) | PPSD<br>Margin<br>(dB) |
|---------|--------------------|-----------------------|----------------------------------|------------------------|------------------------|
| Low     | 5500               | 3.566                 | 3.57                             | 11.00                  | -7.43                  |
| Mid     | 5580               | 3.808                 | 3.81                             | 11.00                  | -7.19                  |
| High    | 5700               | 3.544                 | 3.54                             | 11.00                  | -7.46                  |

**OUTPUT POWER AND PPSD**





## 8.9. 802.11n HT40 MODE IN THE 5.6 GHz BAND

### 8.9.1. 26 dB BANDWIDTH

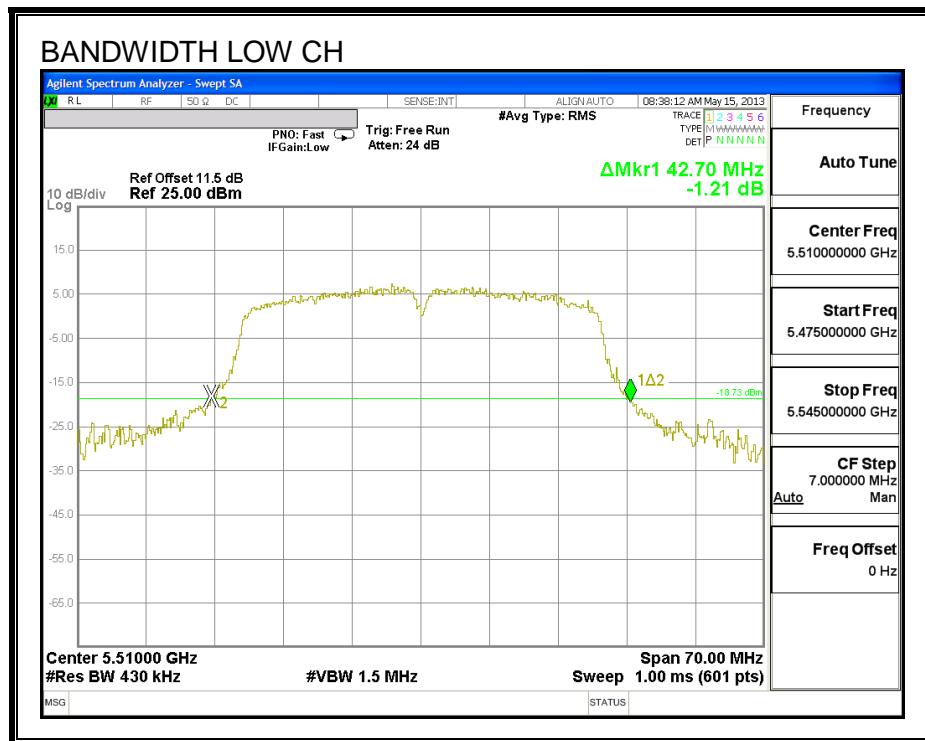
#### LIMITS

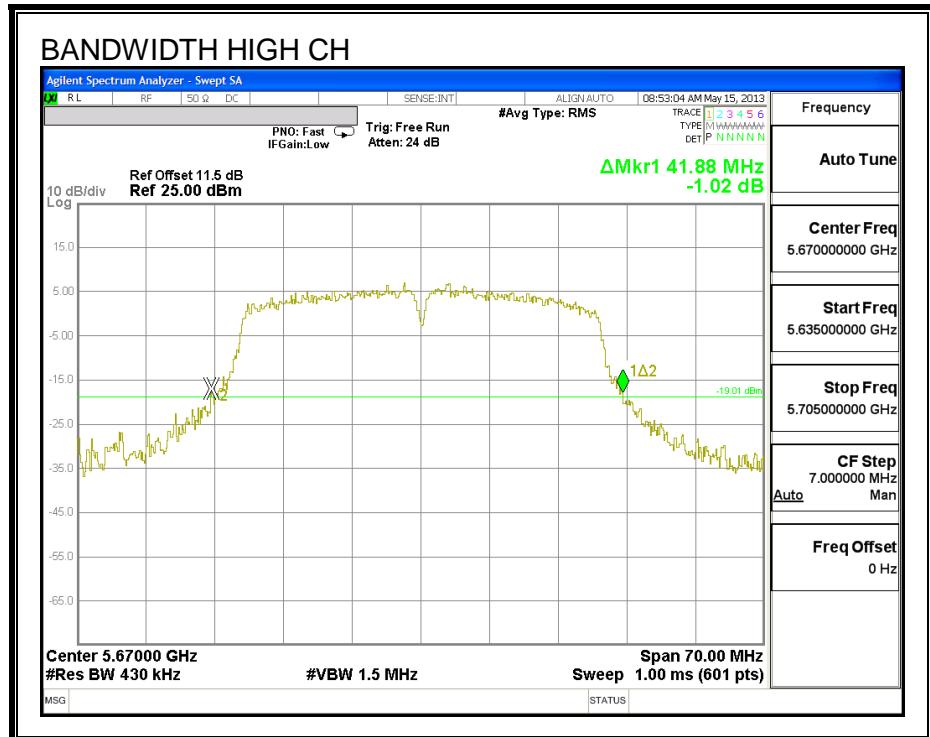
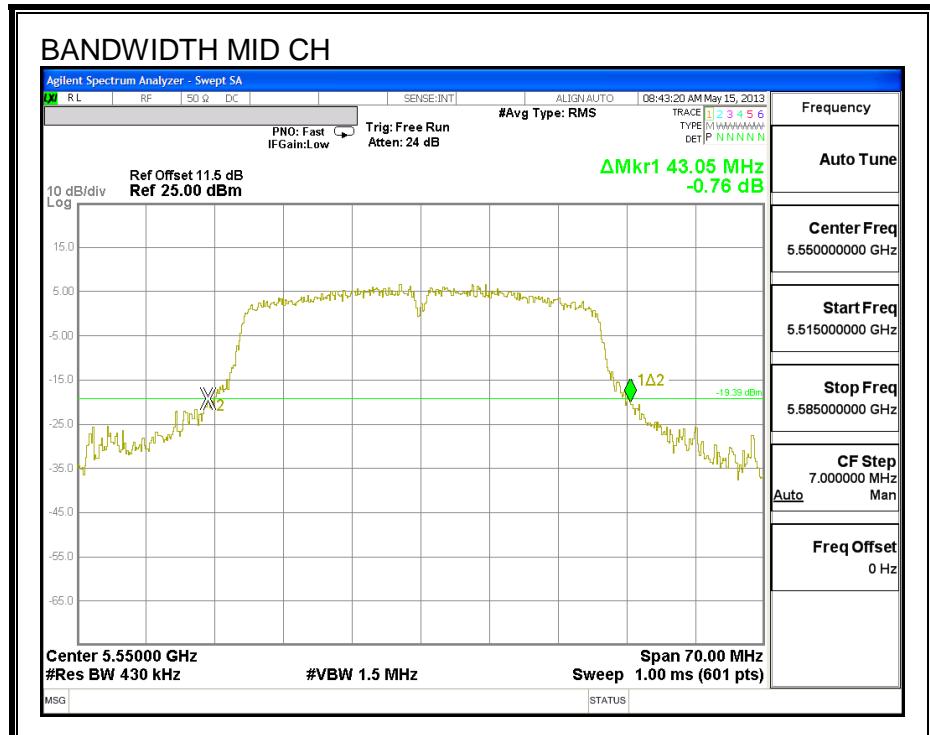
None; for reporting purposes only.

#### RESULTS

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) |
|---------|-----------------|-----------------------|
| Low     | 5510            | 42.70                 |
| Mid     | 5550            | 43.05                 |
| High    | 5670            | 41.88                 |

#### 26 dB BANDWIDTH





## 8.9.2. 99% BANDWIDTH

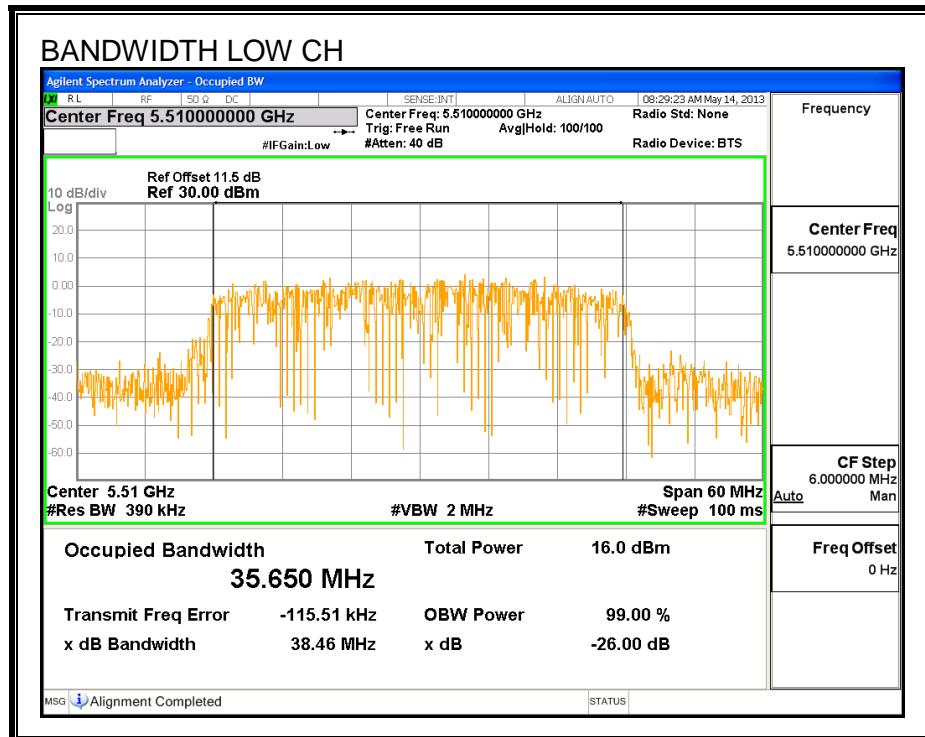
### LIMITS

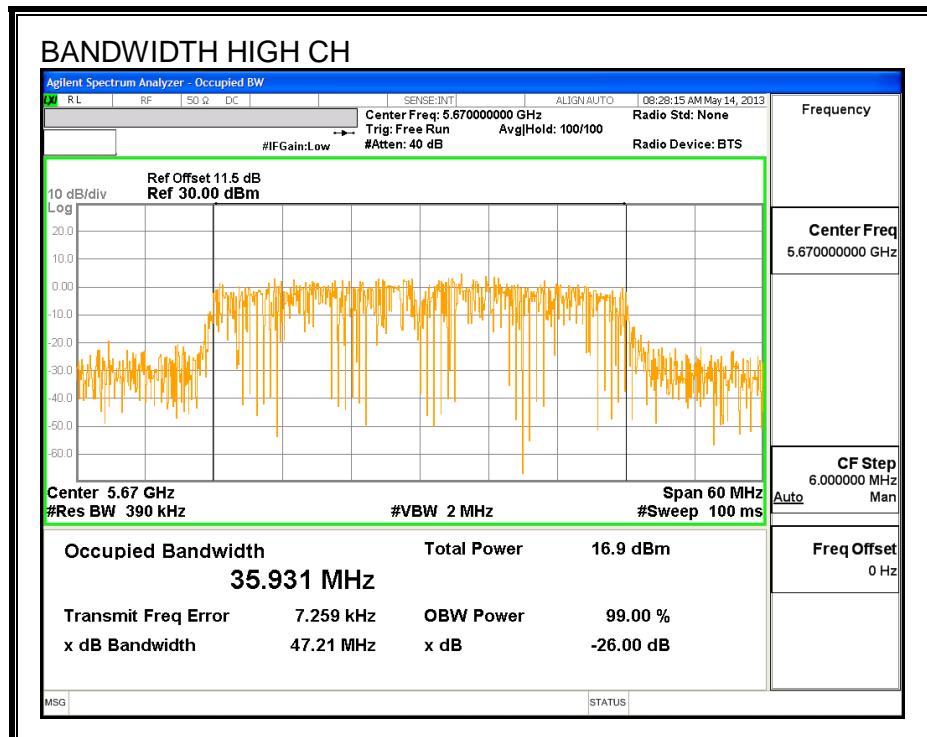
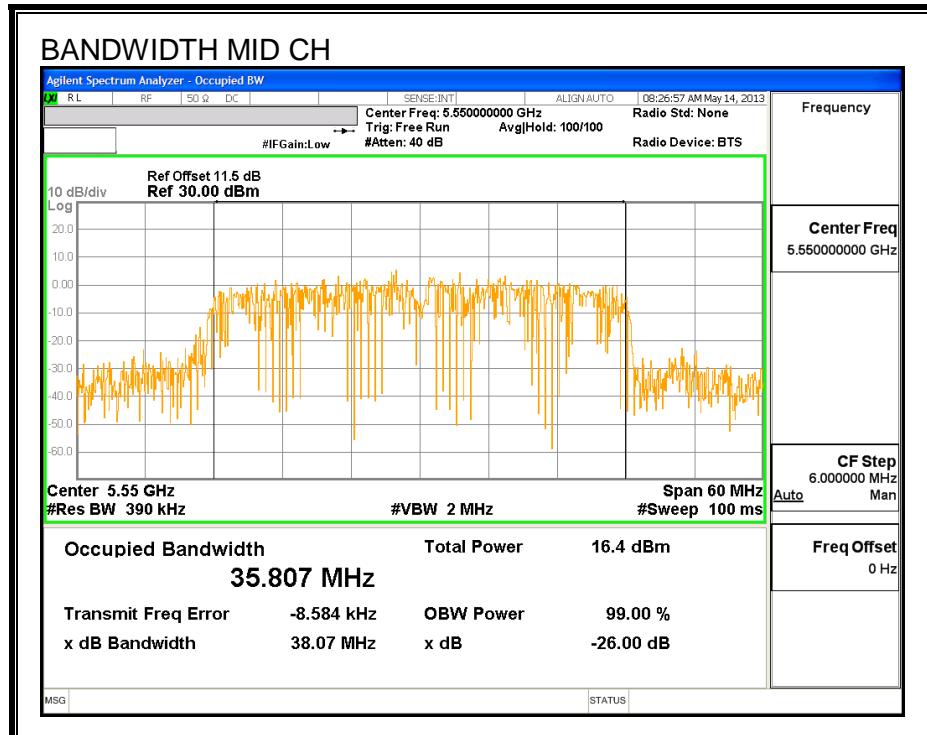
None; for reporting purposes only.

### RESULTS

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---------|-----------------|---------------------|
| Low     | 5510            | 35.650              |
| Mid     | 5550            | 35.807              |
| High    | 5670            | 35.931              |

### 99% BANDWIDTH





### 8.9.3. AVERAGE POWER

#### LIMITS

None; for reporting purposes only.

#### TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 11.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

#### RESULTS

| Channel | Frequency (MHz) | Power (dBm) |
|---------|-----------------|-------------|
| Low     | 5510            | 13.97       |
| Mid     | 5550            | 14.00       |
| High    | 5670            | 13.82       |

#### 8.9.4. OUTPUT POWER AND PPSD

##### LIMITS

FCC §15.407 (a) (2)

For the band 5.47–5.725 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or  $11 \text{ dBm} + 10 \log B$ , where B is the 26–dB emission bandwidth in MHz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

##### DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

## RESULTS

### Bandwidth and Antenna Gain

| Channel | Frequency<br>(MHz) | Min<br>26 dB<br>BW<br>(MHz) | Directional<br>Gain<br>(dBi) |
|---------|--------------------|-----------------------------|------------------------------|
| Low     | 5510               | 42.7                        | -5.50                        |
| Mid     | 5550               | 43.1                        | -5.50                        |
| High    | 5670               | 41.9                        | -5.50                        |

### Limits

| Channel | Frequency<br>(MHz) | FCC<br>Power<br>Limit<br>(dBm) | FCC<br>PPSD<br>Limit<br>(dBm) |
|---------|--------------------|--------------------------------|-------------------------------|
| Low     | 5510               | 24.00                          | 11.00                         |
| Mid     | 5550               | 24.00                          | 11.00                         |
| High    | 5670               | 24.00                          | 11.00                         |

|                    |      |   |
|--------------------|------|---|
| Duty Cycle CF (dB) | 0.22 | Included in Calculations of Corr'd Power & PPSD |
|--------------------|------|---|

### Output Power Results

| Channel | Frequency<br>(MHz) | Meas<br>Power<br>(dBm) | Total<br>Corr'd<br>Power<br>(dBm) | Power<br>Limit<br>(dBm) | Power<br>Margin<br>(dB) |
|---------|--------------------|------------------------|-----------------------------------|-------------------------|-------------------------|
| Low     | 5510               | 13.978                 | 14.20                             | 24.00                   | -9.80                   |
| Mid     | 5550               | 14.011                 | 14.23                             | 24.00                   | -9.77                   |
| High    | 5670               | 13.868                 | 14.09                             | 24.00                   | -9.91                   |

### PPSD Results

| Channel | Frequency<br>(MHz) | Meas<br>PPSD<br>(dBm) | Total<br>Corr'd<br>PPSD<br>(dBm) | PPSD<br>Limit<br>(dBm) | PPSD<br>Margin<br>(dB) |
|---------|--------------------|-----------------------|----------------------------------|------------------------|------------------------|
| Low     | 5510               | 0.211                 | 0.43                             | 11.00                  | -10.57                 |
| Mid     | 5550               | 0.388                 | 0.61                             | 11.00                  | -10.39                 |
| High    | 5670               | 0.117                 | 0.34                             | 11.00                  | -10.66                 |

**OUTPUT POWER AND PPSD**

