



Test report No. : 4788166493A-US-R2-V0  
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Issued date : 2017/10/31  
FCC ID : A43-WISP5

## RADIO TEST REPORT

**Applicant** : Portwell, Inc.  
**Model No.** : WiSP  
**FCC ID** : A43-WISP5  
**Test regulation** : FCC 47 CFR Part 15 Subpart E (Section 15.407)  
**Test Result** : Complied

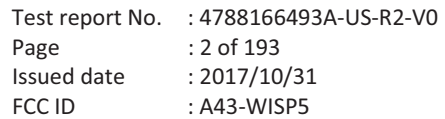
**Date of test:** 2017/10/2~2017/10/31  
**Sample received Date:** 2017/9/29  
**Representative test engineer:** *Wayne Chen*  
*Bull Chen*  
**Approved by:**



**EMC Lab.**

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**Original Test Report No.: 4788166493A-US-R2-V0**

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## 1. Attestation of Test Results

### Applicant

Company Name: Portwell, Inc.  
Address: No. 242, Bo-Ai St., Shu-Lin Dist., New Taipei City 238, Taiwan  
Model Name: WiSP

### Manufacturer

Company Name: Portwell, Inc.  
Address: No. 242, Bo-Ai St., Shu-Lin Dist., New Taipei City 238, Taiwan  
Model Name: WiSP

| APPLICABLE STANDARDS                          |              |
|-----------------------------------------------|--------------|
| STANDARD                                      | Test Results |
| FCC 47 CFR PART 15 Subpart E (Section 15.407) | PASS         |

1. This test report shall not be reproduced in full or partial, without the written approval of UL Taiwan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.

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## 2. Test Methodology

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15.407, KDB662911 D01 v02r01, KDB789033 D02 v01r04 and ANSI C63.10-2013.

## 3. Facilities and Accreditation

|                           |                                                                                                                                                                                                                                                                                    |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Location             | UL Verification Services Taiwan Co., Ltd                                                                                                                                                                                                                                           |
| Address                   | Building B & E, No.372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 310, Taiwan (R.O.C.)                                                                                                                                                                             |
| Accreditation Certificate | UL Verification Services Inc. is accredited by TAF, Laboratory Code 3398. The full scope of accreditation can be viewed at <a href="http://www.taftw.org.tw/wSite/sp?xdUrl=/wSite/taf/lalab.jsp&amp;mp=1">http://www.taftw.org.tw/wSite/sp?xdUrl=/wSite/taf/lalab.jsp&amp;mp=1</a> |

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#### 4. Measurement Uncertainty

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor k=2.

| Test Item                                      | Measurement Frequency Range | K | U(dB) |
|------------------------------------------------|-----------------------------|---|-------|
| Conducted disturbance at mains terminals ports | 0.15MHz ~ 30MHz             | 2 | 2.6   |
| RF Conducted                                   | 9 kHz - 40GHz               | 2 | 0.94  |
| Radiated disturbance below 30MHz               | 9 kHz - 30 MHz              | 2 | 2.4   |
| Radiated disturbance below 1 GHz               | 30MHz ~ 1GHz                | 2 | 5.5   |
| Radiated disturbance above 1GHz                | 1GHz ~ 40GHz                | 2 | 5.0   |

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## 5. Equipment under Test

### 5.1. Description of EUT

|                            |                                                                                       |               |
|----------------------------|---------------------------------------------------------------------------------------|---------------|
| <b>Product</b>             | <b>Wireless Service Platform</b>                                                      |               |
| <b>Model Name</b>          | <b>WiSP</b>                                                                           |               |
| <b>Power Supply</b>        | 1. EUT power Rating : 100-240V<br>2. Internal Battery<br>Rating:11.1V, 2500mAh / 28Wh |               |
| <b>Operating Frequency</b> | 802.11a/n HT20                                                                        | 5180~5240 MHz |
|                            |                                                                                       | 5745~5825 MHz |
|                            | 802.11n HT40                                                                          | 5190~5230 MHz |
|                            |                                                                                       | 5755~5795 MHz |
| <b>Number of channels</b>  | 802.11a / HT20 : 9 Channels<br>802.11n HT40: 4 Channels                               |               |

| <b>Modulaton</b> | <b>Chain 0</b> | <b>Chain 1</b> |
|------------------|----------------|----------------|
| 802.11a          | V              | X              |
| 802.11n HT20     | V              | V              |
| 802.11n HT40     | V              | V              |

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| Modulaton          | Channel | Frequency(MHz) | Power Setting |
|--------------------|---------|----------------|---------------|
| 802.11a<br>Chain 0 | 36      | 5180           | 07            |
|                    | 40      | 5200           | 07            |
|                    | 48      | 5240           | 07            |
|                    | 149     | 5745           | 0C            |
|                    | 157     | 5785           | 0D            |
|                    | 165     | 5825           | 0E            |

| Modulaton    | Channel | Frequency(MHz) | Power Setting |         |
|--------------|---------|----------------|---------------|---------|
|              |         |                | Chain 0       | Chain 1 |
| 802.11n HT20 | 36      | 5180           | 05            | 06      |
|              | 40      | 5200           | 05            | 06      |
|              | 48      | 5240           | 05            | 06      |
|              | 149     | 5745           | 0B            | 0B      |
|              | 157     | 5785           | 0B            | 0B      |
|              | 165     | 5825           | 0B            | 0B      |
| 802.11n HT40 | 38      | 5190           | 05            | 07      |
|              | 46      | 5230           | 05            | 07      |
|              | 151     | 5755           | 0B            | 0B      |
|              | 159     | 5795           | 0B            | 0B      |

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## 5.2. Test Condition

| Test Item                           | Test Site No. | Environmental Condition | Input Power   |
|-------------------------------------|---------------|-------------------------|---------------|
| Antenna Port Conducted Measuremaent | SR4           | 24°C / 60%RH            | 120Vac / 60Hz |
| Radiated Spurious Emission          | 966-2         | 22°C / 58%RH            | 120Vac / 60Hz |
| AC power Line Conducted Emission    | SR1           | 24°C / 60%RH            | 120Vac / 60Hz |

## 5.3. Description Of Available Antennas

| Frequecny Band (GHz) | Brand Name | Model Name  | Antenna Type   | Antenna Gain(dBi) |         |
|----------------------|------------|-------------|----------------|-------------------|---------|
|                      |            |             |                | Chain 0           | Chain 1 |
| 5                    | Aristotle  | RFA-25-L2M2 | Dipole Antenna | 2                 | 2       |

## 5.4. Software And Firmware

The software installed in the EUT during testing was “Ralink QA test program Version 17”.

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## 5.5. Operating Mode and Worst Case of EUT

For below 1G radiated emission and AC power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case.

The fundamental of the EUT was investigated in three orthogonal axes X/Y/Z, it was determined that X axis was worst-case . Therefore, all final radiated testing was performed with the EUT in X axis.

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

802.11a mode: 6 Mbps

802.11n HT20 mode: MCS0

802.11n HT40 mode: MCS0

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## 6. Test Equipment

| Test Equipment List                |              |                         |                  |               |               |
|------------------------------------|--------------|-------------------------|------------------|---------------|---------------|
| Equipment                          | Manufacturer | Model No.               | Serial No.       | Cal. Date     | Cal. Interval |
| Radiated Spurious Emission         |              |                         |                  |               |               |
| Spectrum Analyzer                  | Keysight     | N9010A                  | MY56070821       | Nov. 21, 2016 | 1 year        |
| Loop Antenna                       | ETS lindgren | 6502                    | 00213440         | Dec. 13, 2016 | 1 year        |
| Trilog-Broadband Antenna           | Schwarzbeck  | VULB9168                | VULB9168-733     | Jan. 17, 2017 | 1 year        |
| Horn Antenna (1G~18GHz)            | Schwarzbeck  | BBHA 9120D              | BBHA 9120D-01686 | Jan. 12, 2017 | 1 year        |
| Horn Antenna(18-40GHz)             | Schwarzbeck  | BBHA9170                | BBHA9170#759     | Jan.12, 2017  | 1 year        |
| Preamplifier (30-1000MHz)          | EMCI         | RMC330E                 | 980405           | Jan. 25, 2017 | 1 year        |
| Preamplifier (1-18GHz)             | EMCI         | EMC051835BE             | 908044           | Jan. 25, 2017 | 1 year        |
| Preamplifier (18-40GHz)            | EMCI         | EMC184045SE             | 980407           | Apr. 18, 2017 | 1 year        |
| RF Cable (9K~18G)                  | emci         | EMC106-NM-NM-7000       | 170102           | July 10, 2017 | 1 year        |
| RF Cable (9K~18G)                  | emci         | EMC106-NM-SM-2500       | 170219           | July 10, 2017 | 1 year        |
| RF Cable (9K~18G)                  | emci         | EMC106-NM-NM-4000       | 170221           | July 10, 2017 | 1 year        |
| RF Cable (18G~40G)                 | Rosnol       | K1K50-UP0264-K1K50-2500 | 170214-1         | July 10, 2017 | 1 year        |
| RF Cable (18G~40G)                 | Rosnol       | K1K50-UP0264-K1K50-3500 | 170214-2         | July 10, 2017 | 1 year        |
| RF Cable (18G~40G)                 | Rosnol       | K1K50-UP0264-K1K50-2500 | 170214-3         | July 10, 2017 | 1 year        |
| Antenna Port Conducted Measurement |              |                         |                  |               |               |
| Spectrum Analyzer                  | Keysight     | N9010A                  | MY56070834       | Nov. 21, 2016 | 1 year        |
| Power meter                        | Anrisu       | MA2411B                 | 1531202          | Dec. 13, 2016 | 1 year        |
| Power sensor                       | Anrisu       | ML2495A                 | 1645002          | Dec. 13, 2016 | 1 year        |
| Signal Generator                   | Keysight     | N5182B                  | MY56200244       | Dec. 19, 2016 | 1 year        |

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| AC power Line Conducted Emission |                 |         |                |               |        |
|----------------------------------|-----------------|---------|----------------|---------------|--------|
| EMI Test Receiver                | Rohde & Schwarz | ESR7    | 101753         | Nov. 4, 2016  | 1 year |
| Two-Line V-Network               | Rohde & Schwarz | ENV216  | 102136         | Nov. 16, 2016 | 1 year |
| Four-Line V-Network              | Rohde & Schwarz | ENV432  | 101298         | Dec. 7, 2016  | 1 year |
| RF Cable-CON                     | Huber+Suhner    | RG214/U | FCC-BCICF-4_RF | Mar. 23, 2017 | 1 year |

#### UL Software

| Software            | Test Item                        | Version |
|---------------------|----------------------------------|---------|
| EMC-RI              | Radiated measurement             | 1.0.0.0 |
| Keysight.TestSystem | Conducted measurement            | 1.0.0.0 |
| EZ_EMG              | AC power Line Conducted Emission | 1.1.4.2 |

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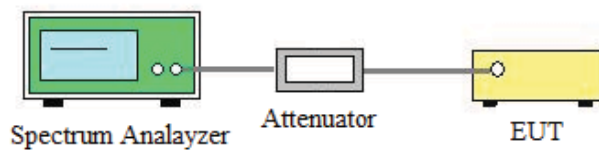
## 7. Test Result

### 7.1. Duty Cycle

#### Requirements

N/A

#### Test Setup



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### **Test Data**

| Mode                       | On time<br>(ms) | Period<br>(ms) | Duty cycle | Duty Cycle factor |
|----------------------------|-----------------|----------------|------------|-------------------|
| 802.11a<br>Chain 0         | 1               | 1              | 100%       | 0.000             |
| 802.11n<br>HT20<br>Chain 0 | 1               | 1              | 100%       | 0.000             |
| 802.11n<br>HT20<br>Chain 1 | 1               | 1              | 100%       | 0.000             |
| 802.11n<br>HT40<br>Chain 0 | 1               | 1              | 100%       | 0.000             |
| 802.11n<br>HT40<br>Chain 1 | 1               | 1              | 100%       | 0.000             |

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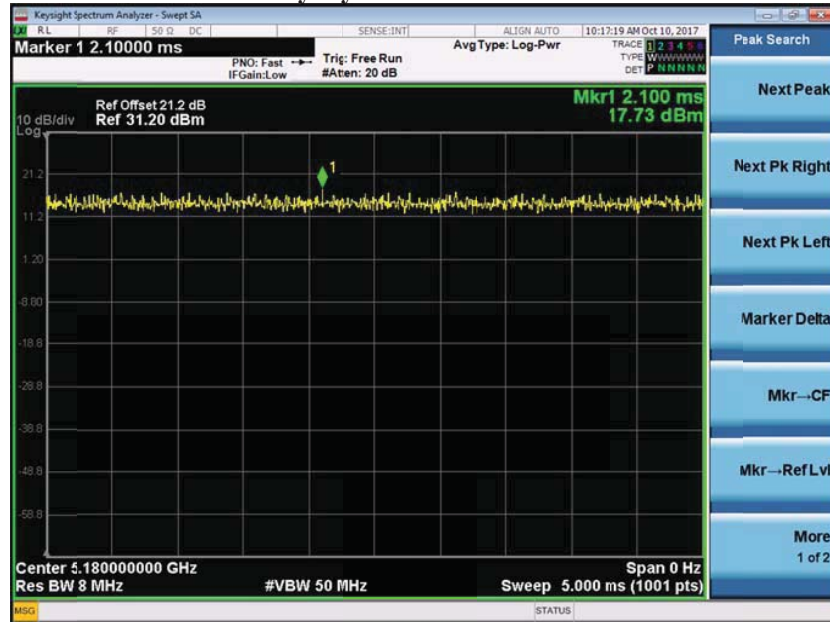
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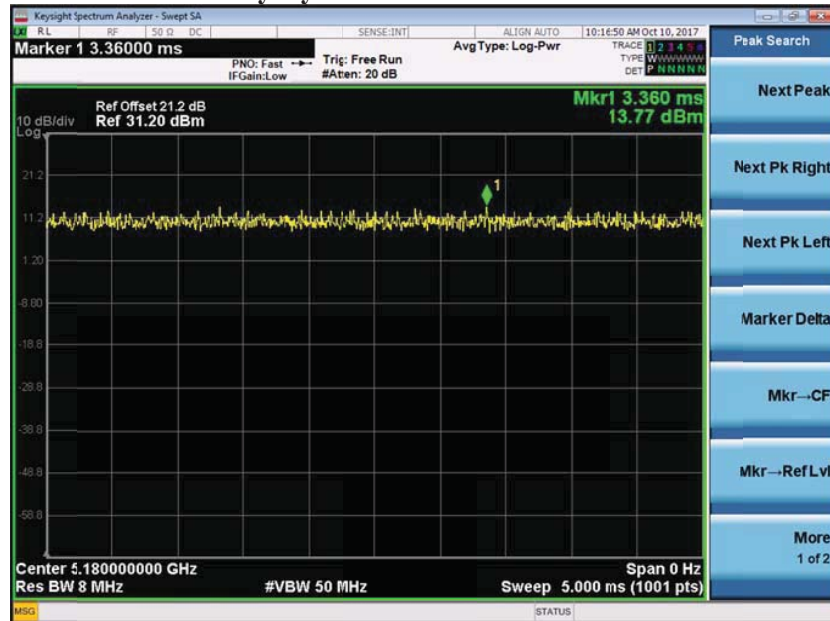


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### Duty Cycle 802.11a Chain 0



### Duty Cycle 802.11n HT20 Chain 0



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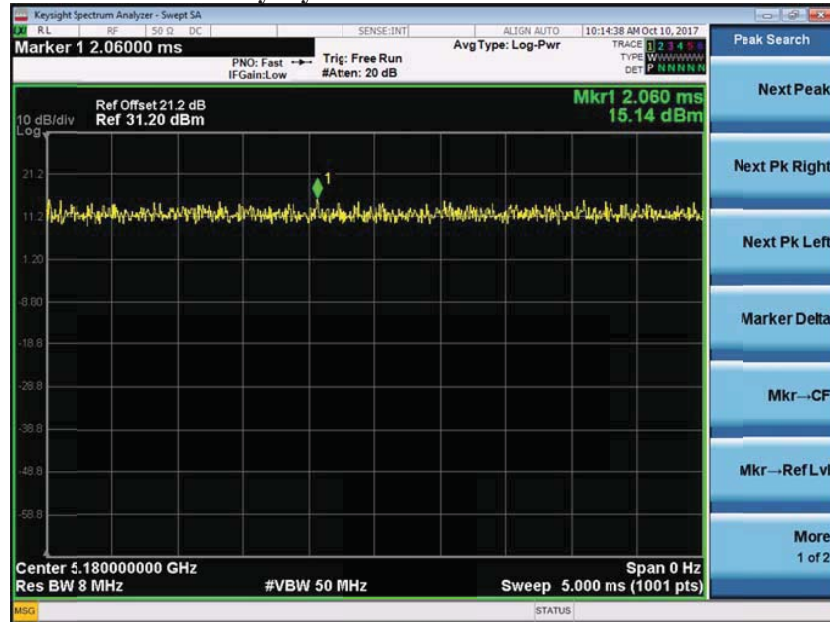
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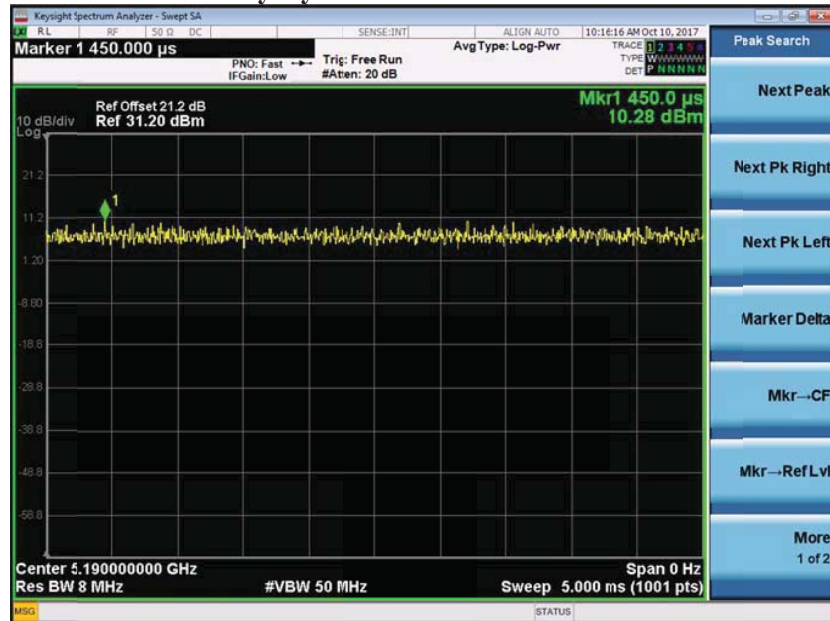


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### Duty Cycle 802.11n HT20 Chain 1



### Duty Cycle 802.11n HT40 Chain 0



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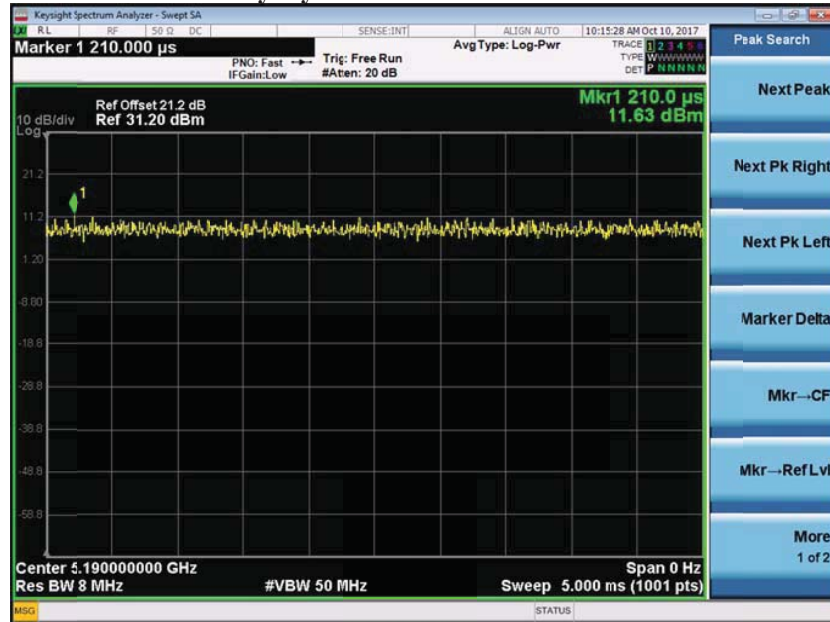
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### Duty Cycle 802.11n HT40 Chain 1



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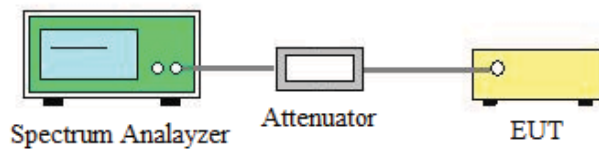
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## 7.2. 26 dB Bandwidth

### Requirements

For reporting purpose only.

### Test Setup



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### Test Data

| Mode                 | Channel | Frequency (MHz) | 26dB Bandwidth (MHz) |
|----------------------|---------|-----------------|----------------------|
| 802.11a Chain0       | 36      | 5180            | 19.02                |
|                      | 40      | 5200            | 19.09                |
|                      | 48      | 5240            | 19.61                |
|                      | 149     | 5745            | 19.8                 |
|                      | 157     | 5785            | 19.35                |
|                      | 165     | 5825            | 19.72                |
| 802.11n HT20 Chain 0 | 36      | 5180            | 19.23                |
|                      | 40      | 5200            | 19.25                |
|                      | 48      | 5240            | 19.6                 |
|                      | 149     | 5745            | 19.25                |
|                      | 157     | 5785            | 19.31                |
|                      | 165     | 5825            | 19.79                |
| 802.11n HT20 Chain 1 | 36      | 5180            | 19.74                |
|                      | 40      | 5200            | 19.74                |
|                      | 48      | 5240            | 19.73                |
|                      | 149     | 5745            | 20.75                |
|                      | 157     | 5785            | 19.73                |
|                      | 165     | 5825            | 20.47                |
| 802.11n HT40 Chain 0 | 38      | 5190            | 39.35                |
|                      | 46      | 5230            | 39.37                |
|                      | 151     | 5755            | 39.92                |
|                      | 159     | 5795            | 39.45                |
| 802.11n HT40 Chain 1 | 38      | 5190            | 39.43                |
|                      | 46      | 5230            | 39.66                |
|                      | 151     | 5755            | 39.64                |
|                      | 159     | 5795            | 39.85                |

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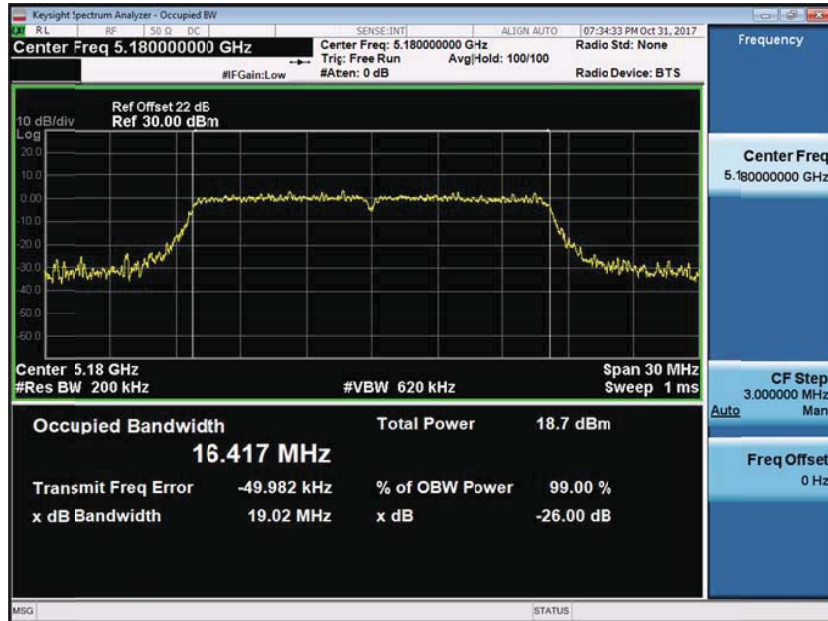
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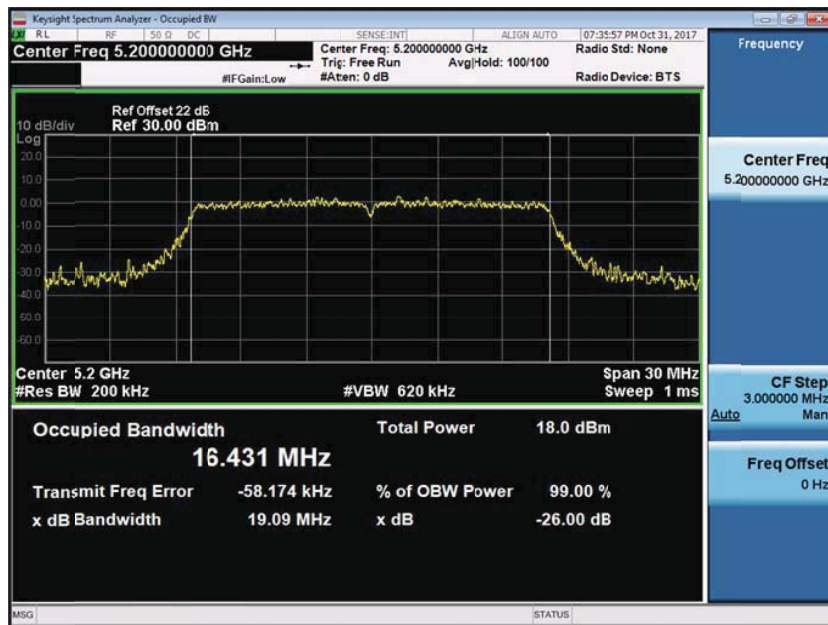


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Issued date : 2017/10/31  
FCC ID : A43-WISP5

### 26dB Bandwidth 802.11a Chain 0 Ch 36 5180MHz



### 26dB Bandwidth 802.11a Chain 0 Ch 40 5200MHz



EMC Lab.

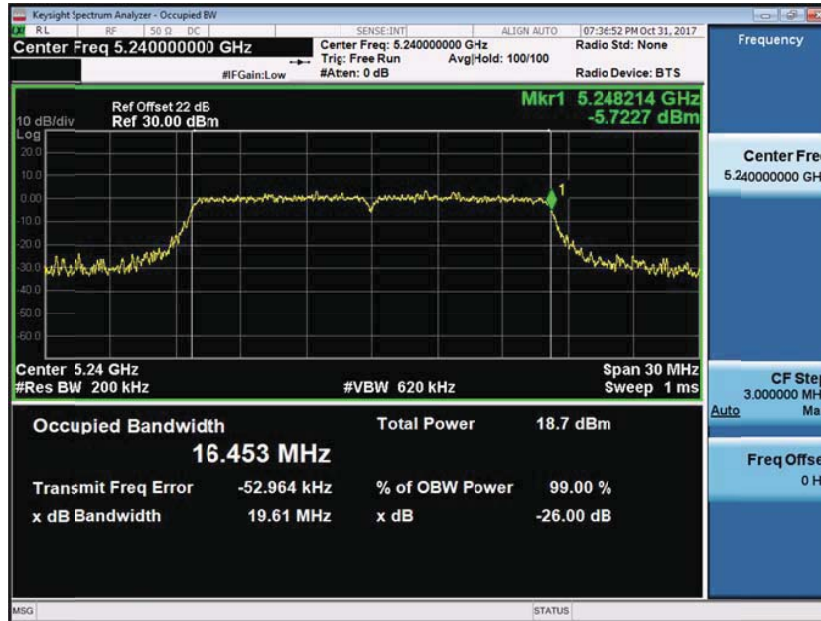
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Telephone :+886-2-7737-3000  
Facsimile (FAX) :+886-2-7737-3610

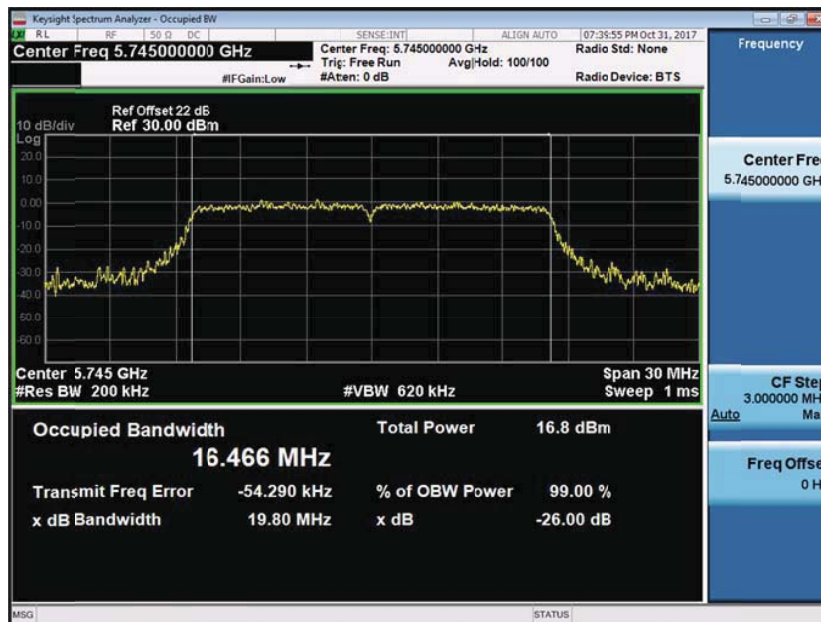


Test report No. : 4788166493A-US-R2-V0  
Page : 21 of 193  
Issued date : 2017/10/31  
FCC ID : A43-WISP5

### 26dB Bandwidth 802.11a Chain 0 Ch 48 5240MHz



### 26dB Bandwidth 802.11a Chain 0 Ch 149 5745MHz



EMC Lab.

Underwriters Laboratories Taiwan Co., Ltd.

Building B and Building E, No.372-7 Hsinchu County, Taiwan, Sec. 4, Zhongxing Rd., Zhudong Township,

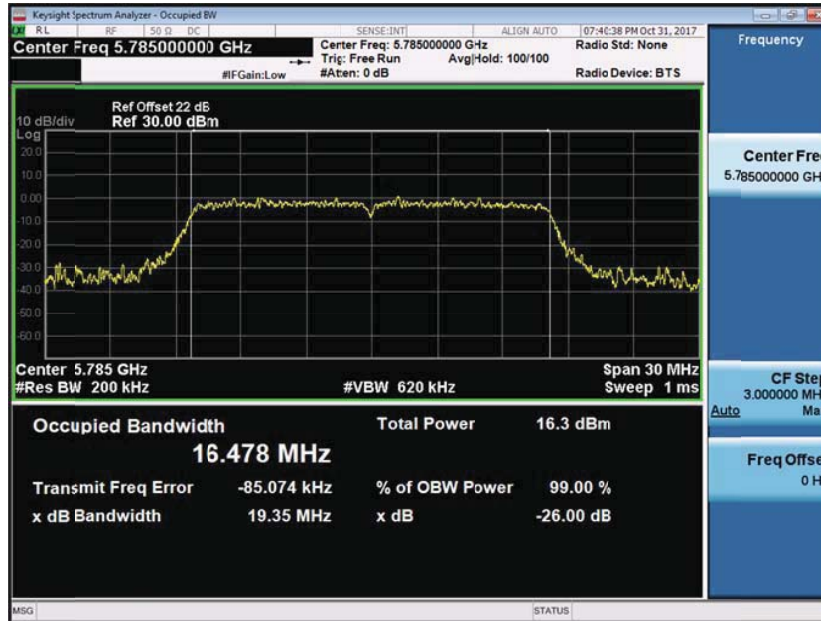
Telephone :+886-2-7737-3000

Facsimile (FAX) :+886-2-7737-3610

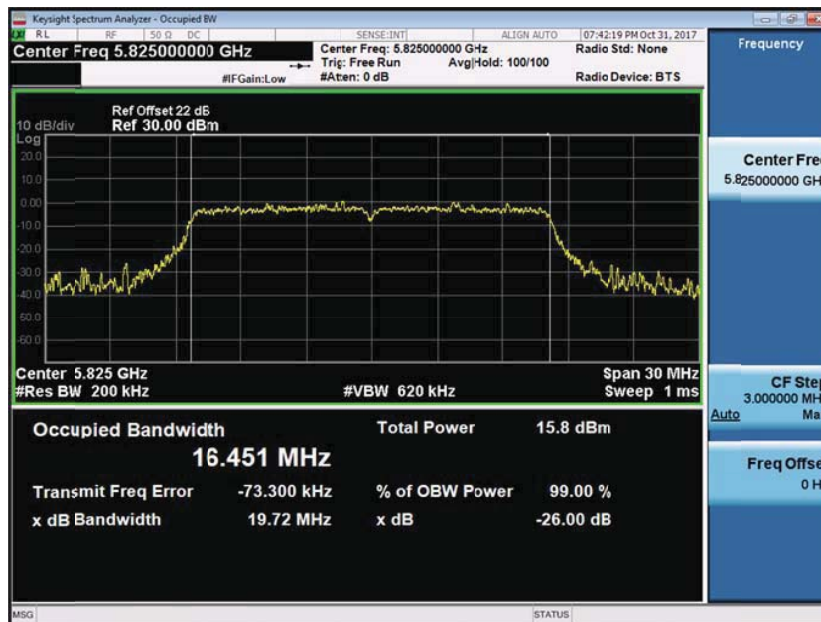


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Page : 22 of 193  
Issued date : 2017/10/31  
FCC ID : A43-WISP5

### 26dB Bandwidth 802.11a Chain 0 Ch 157 5785MHz



### 26dB Bandwidth 802.11a Chain 0 Ch 165 5825MHz



EMC Lab.

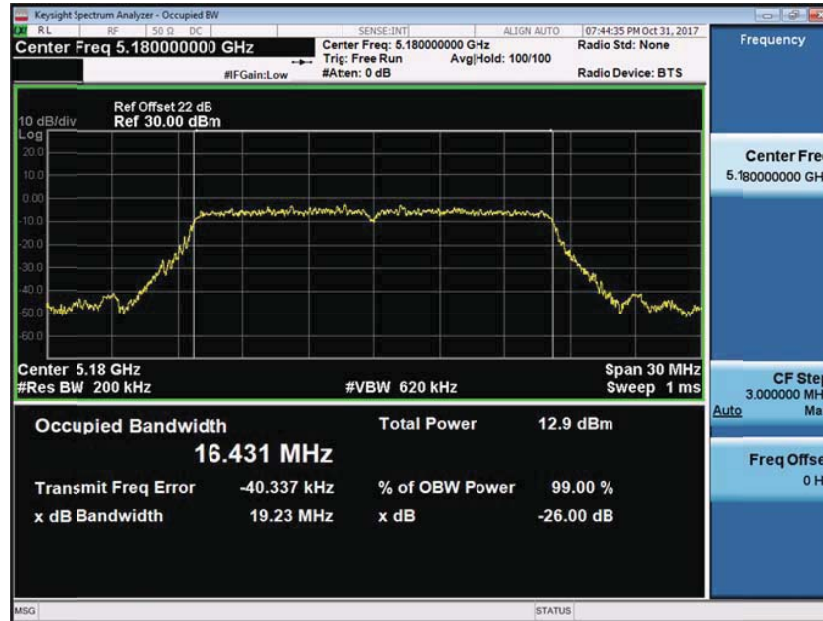
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Telephone : +886-2-7737-3000  
Facsimile (FAX) : +886-2-7737-3610

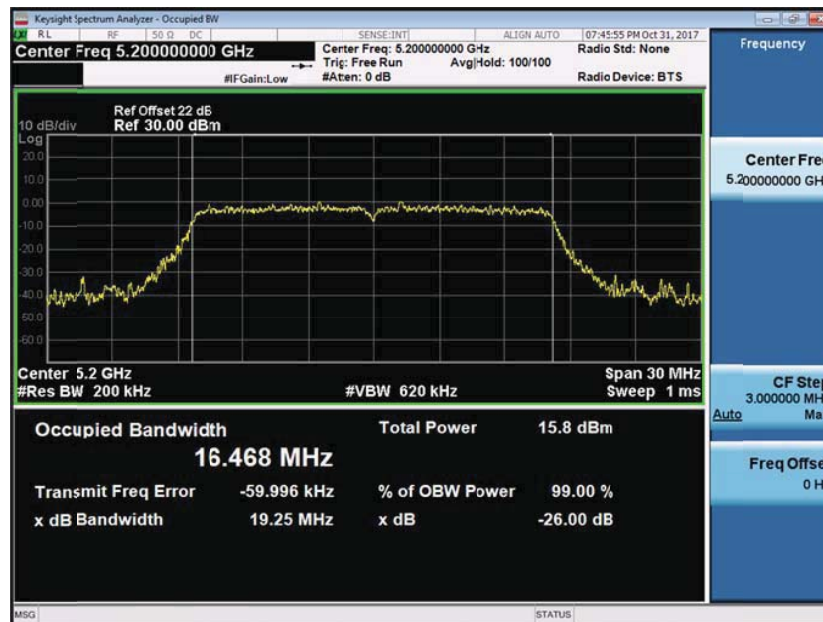


Test report No. : 4788166493A-US-R2-V0  
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Issued date : 2017/10/31  
FCC ID : A43-WISP5

### 26dB Bandwidth 802.11n HT20 Chain 0 Ch 36 5180MHz



### 26dB Bandwidth 802.11n HT20 Chain 0 Ch 40 5200MHz



EMC Lab.

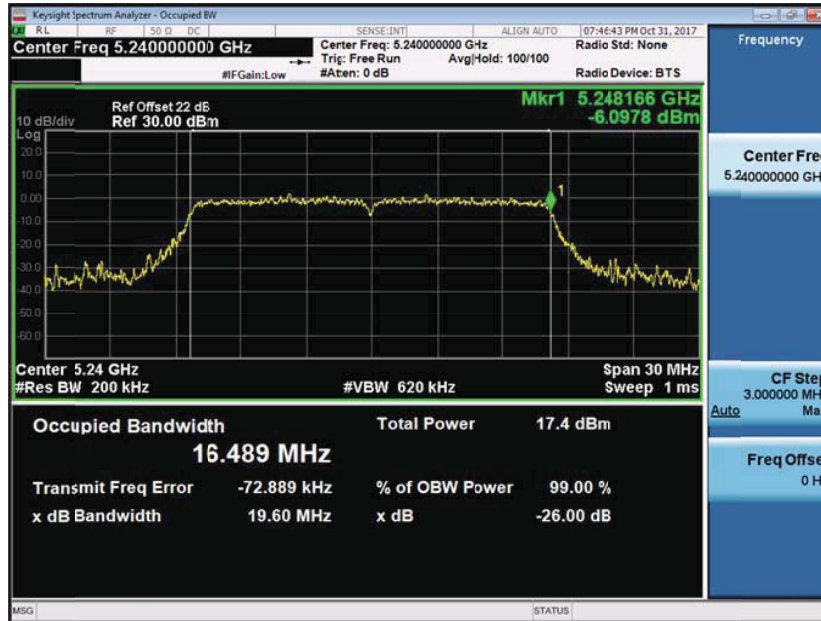
Underwriters Laboratories Taiwan Co., Ltd.

Building B and Building E, No.372-7 Hsinchu County, Taiwan, Sec. 4, Zhongxing Rd., Zhudong Township,  
Telephone :+886-2-7737-3000  
Facsimile (FAX) :+886-2-7737-3610

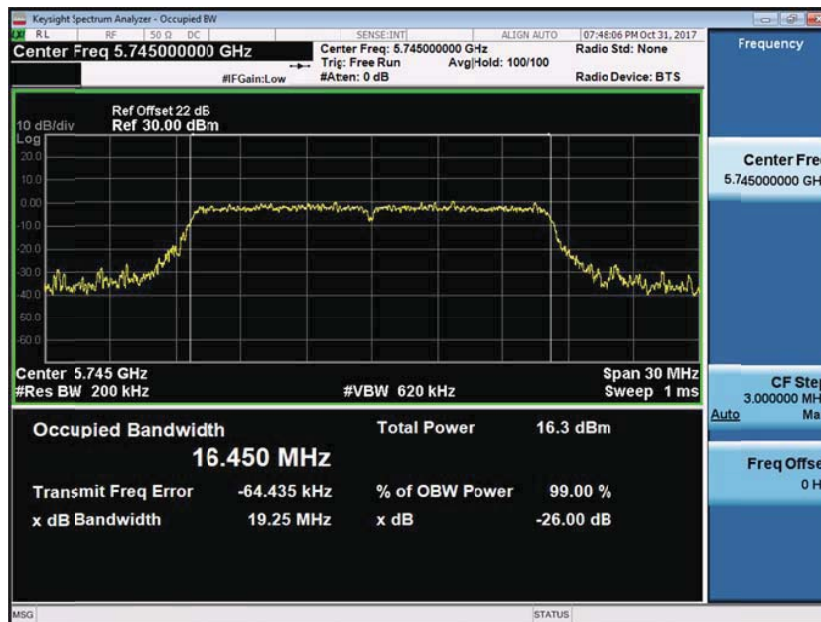


Test report No. : 4788166493A-US-R2-V0  
Page : 24 of 193  
Issued date : 2017/10/31  
FCC ID : A43-WISP5

### 26dB Bandwidth 802.11n HT20 Chain 0 Ch 48 5240MHz



### 26dB Bandwidth 802.11n HT20 Chain 0 Ch 149 5745MHz



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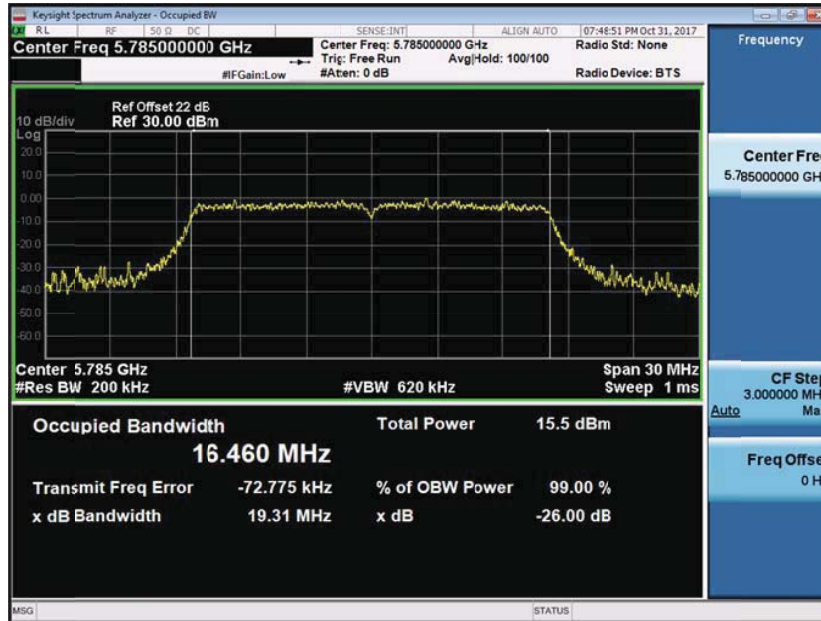
Telephone :+886-2-7737-3000

Facsimile (FAX) :+886-2-7737-3610

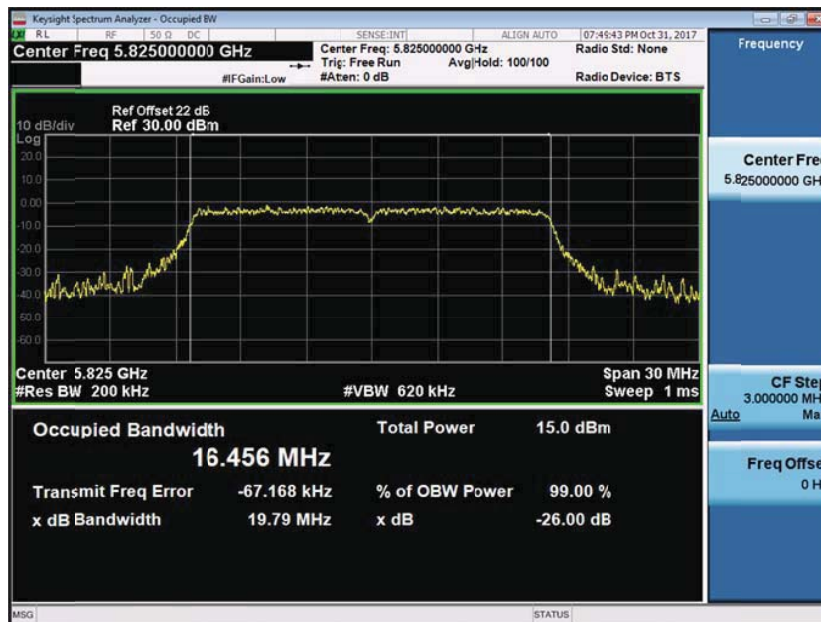


Test report No. : 4788166493A-US-R2-V0  
Page : 25 of 193  
Issued date : 2017/10/31  
FCC ID : A43-WISP5

### 26dB Bandwidth 802.11n HT20 Chain 0 Ch 157 5785MHz



### 26dB Bandwidth 802.11n HT20 Chain 0 Ch 165 5825MHz



EMC Lab.

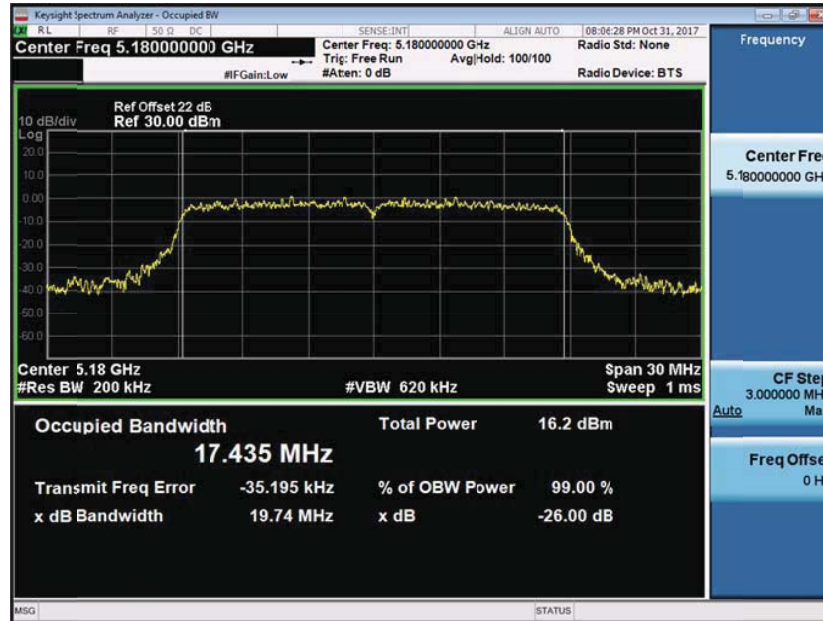
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Telephone : +886-2-7737-3000  
Facsimile (FAX) : +886-2-7737-3610

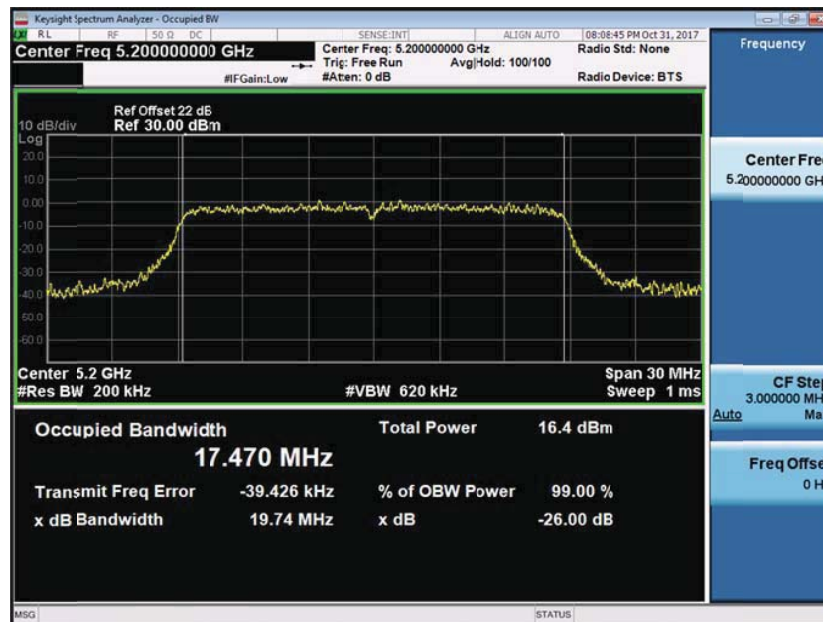


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Issued date : 2017/10/31  
FCC ID : A43-WISP5

### 26dB Bandwidth 802.11n HT20 Chain 1 Ch 36 5180MHz



### 26dB Bandwidth 802.11n HT20 Chain 1 Ch 40 5200MHz



EMC Lab.

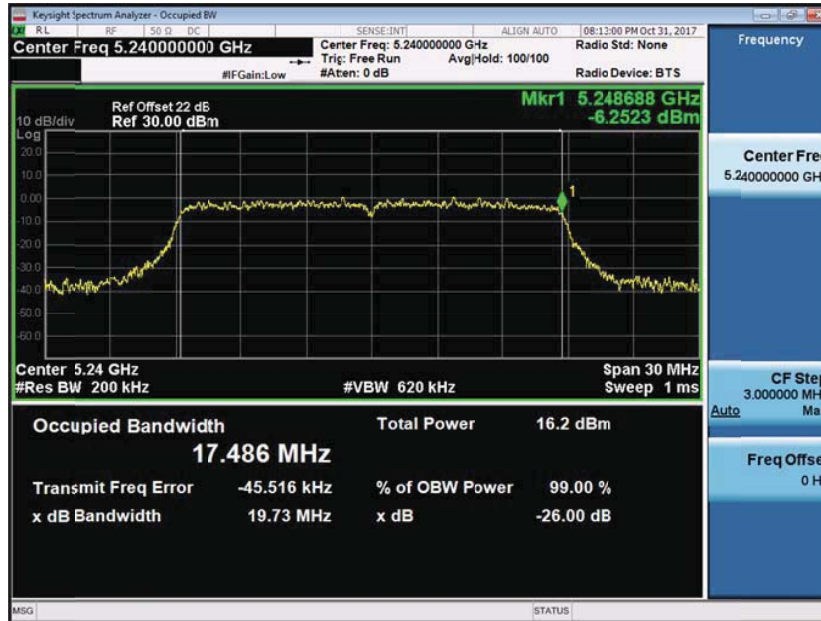
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Facsimile (FAX) : +886-2-7737-3610

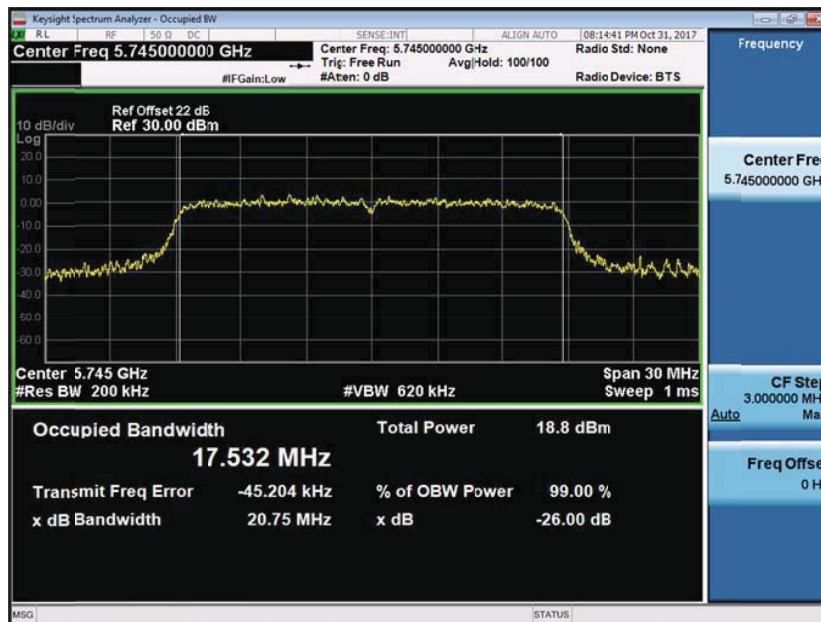


Test report No. : 4788166493A-US-R2-V0  
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Issued date : 2017/10/31  
FCC ID : A43-WISP5

### 26dB Bandwidth 802.11n HT20 Chain 1 Ch 48 5240MHz



### 26dB Bandwidth 802.11n HT20 Chain 1 Ch 149 5745MHz



EMC Lab.

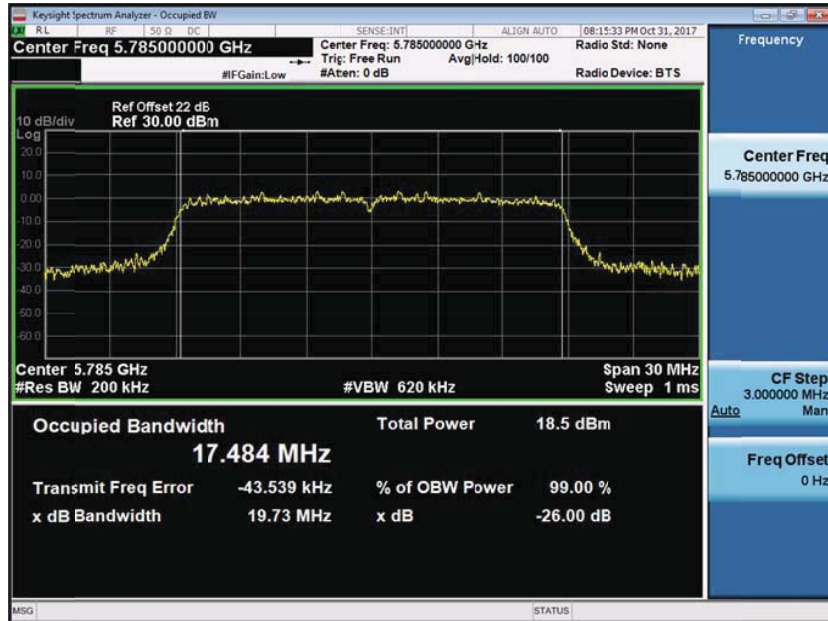
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Facsimile (FAX) : +886-2-7737-3610

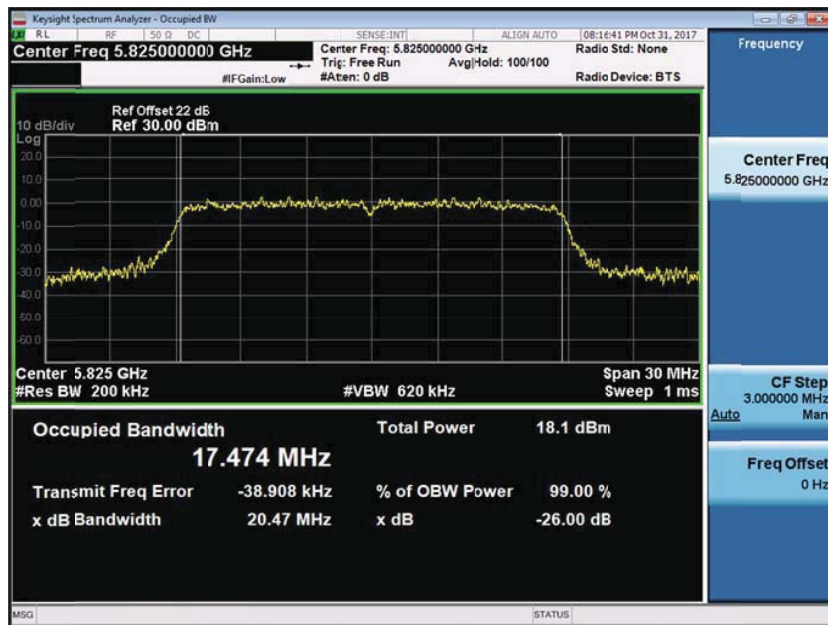


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Issued date : 2017/10/31  
FCC ID : A43-WISP5

### 26dB Bandwidth 802.11n HT20 Chain 1 Ch 157 5785MHz



### 26dB Bandwidth 802.11n HT20 Chain 1 Ch 165 5825MHz



EMC Lab.

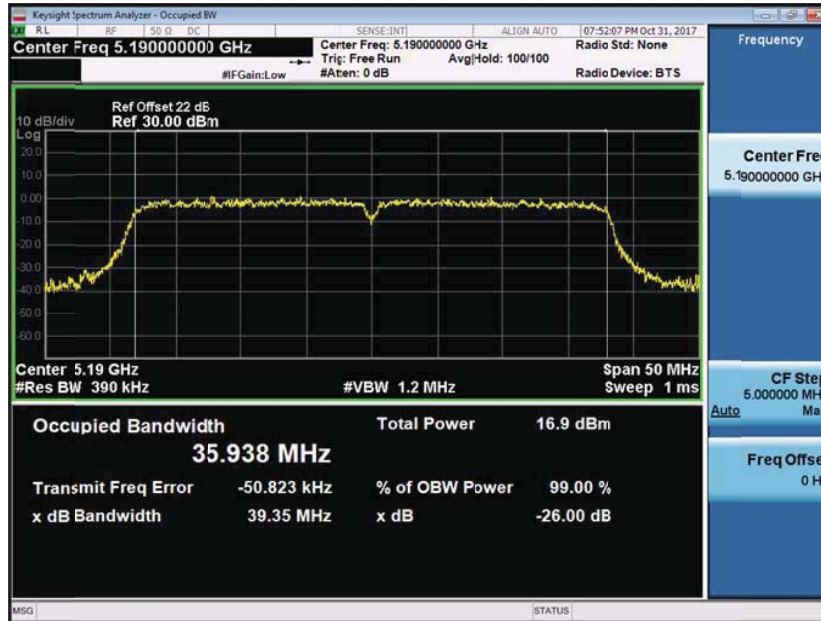
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Issued date : 2017/10/31  
FCC ID : A43-WISP5

### 26dB Bandwidth 802.11n HT40 Chain 0 Ch 38 5190MHz



### 26dB Bandwidth 802.11n HT40 Chain 0 Ch 46 5230MHz



EMC Lab.

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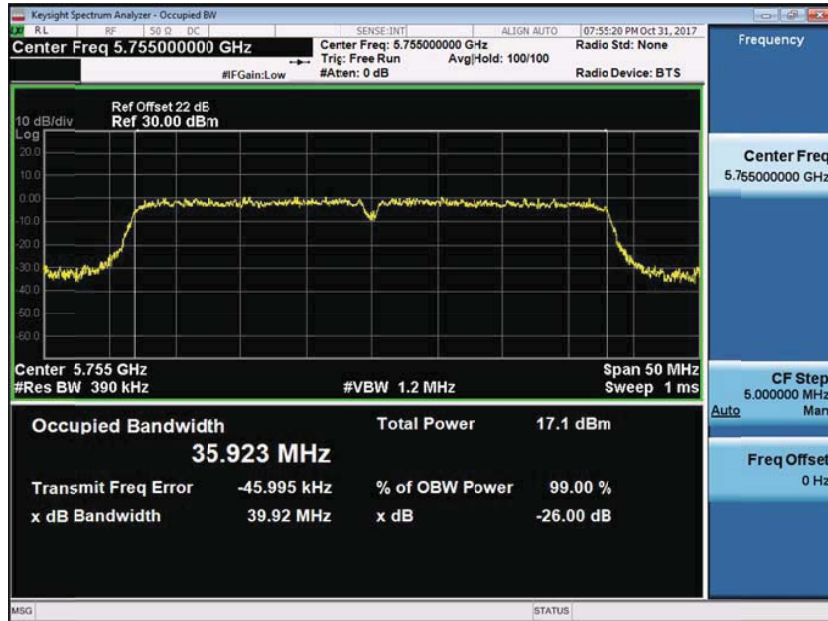
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Facsimile (FAX) : +886-2-7737-3610

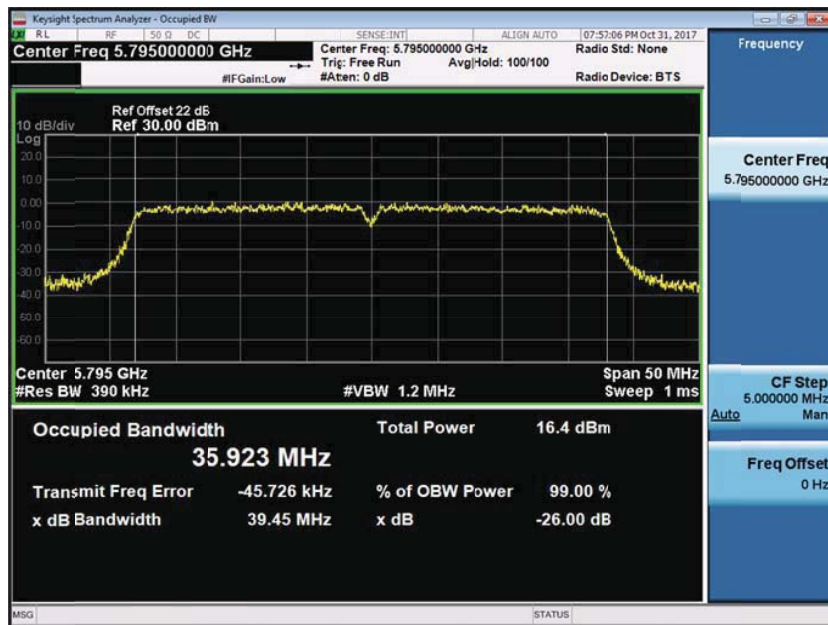


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Issued date : 2017/10/31  
FCC ID : A43-WISP5

### 26dB Bandwidth 802.11n HT40 Chain 0 Ch 151 5755MHz



### 26dB Bandwidth 802.11n HT40 Chain 0 Ch 159 5795MHz



EMC Lab.

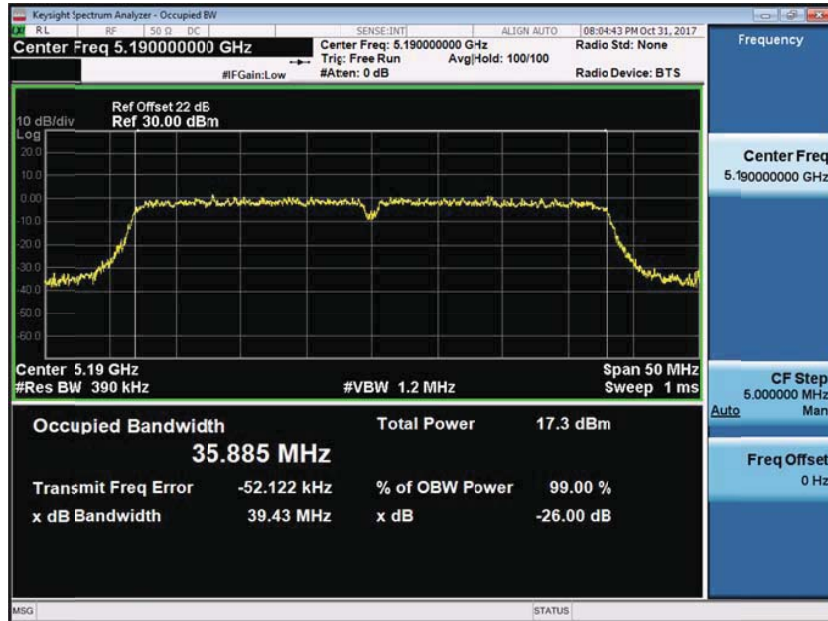
Underwriters Laboratories Taiwan Co., Ltd.

Building B and Building E, No.372-7 Hsinchu County, Taiwan, Sec. 4, Zhongxing Rd., Zhudong Township,  
Telephone :+886-2-7737-3000  
Facsimile (FAX) :+886-2-7737-3610

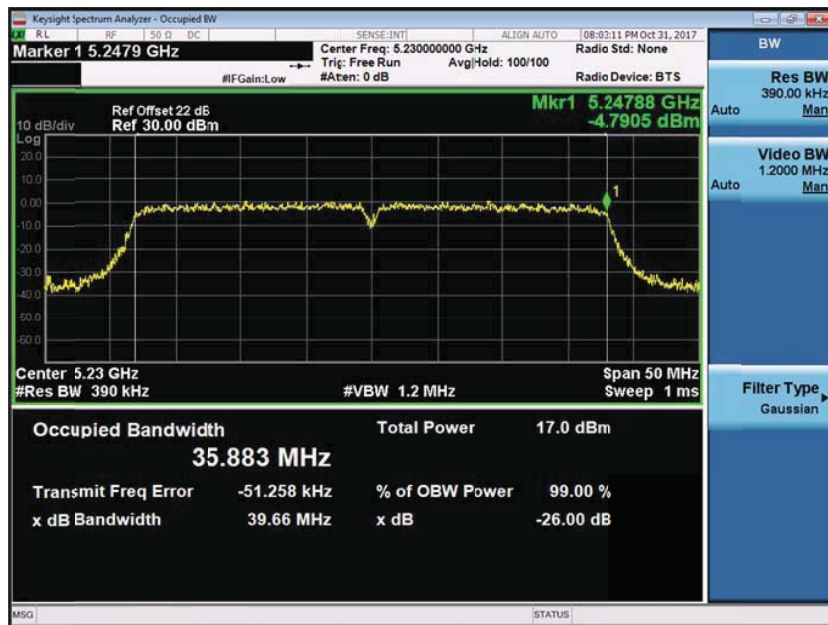


Test report No. : 4788166493A-US-R2-V0  
Page : 31 of 193  
Issued date : 2017/10/31  
FCC ID : A43-WISP5

### 26dB Bandwidth 802.11n HT40 Chain 1 Ch 38 5190MHz



### 26dB Bandwidth 802.11n HT40 Chain 1 Ch 46 5230MHz



EMC Lab.

Underwriters Laboratories Taiwan Co., Ltd.

Building B and Building E, No.372-7 Hsinchu County, Taiwan, Sec. 4, Zhongxing Rd., Zhudong Township,

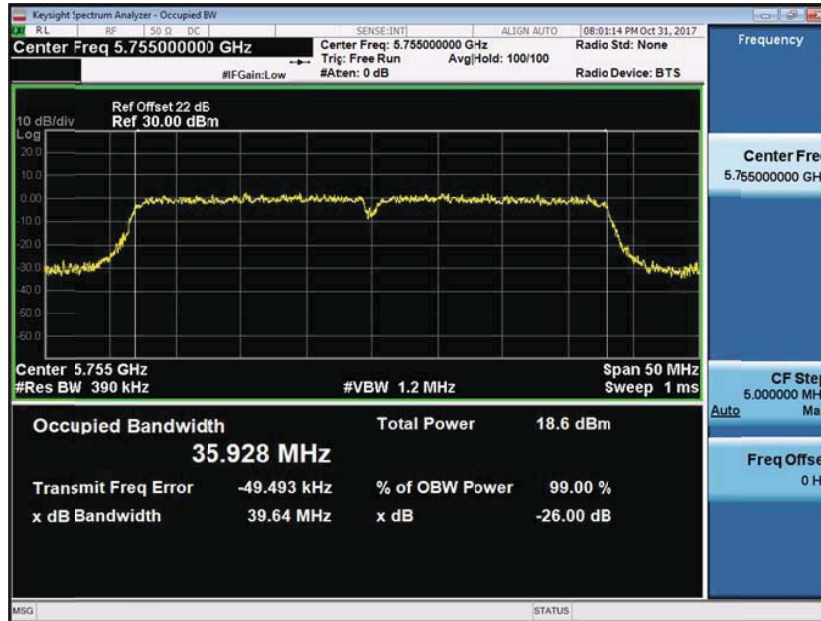
Telephone :+886-2-7737-3000

Facsimile (FAX) :+886-2-7737-3610

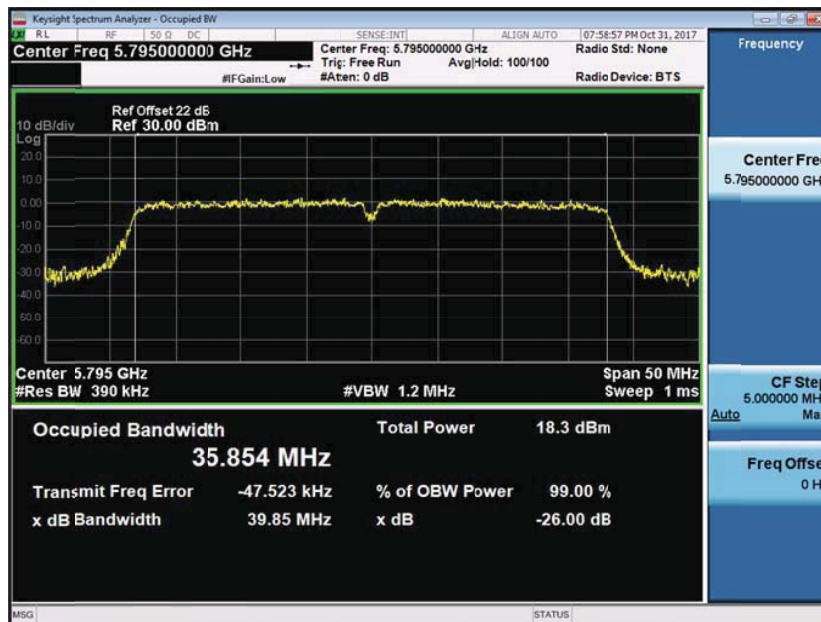


Test report No. : 4788166493A-US-R2-V0  
Page : 32 of 193  
Issued date : 2017/10/31  
FCC ID : A43-WISP5

### 26dB Bandwidth 802.11n HT40 Chain 1 Ch 151 5755MHz



### 26dB Bandwidth 802.11n HT40 Chain 1 Ch 159 5795MHz



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Test report No. : 4788166493A-US-R2-V0  
Page : 33 of 193  
Issued date : 2017/10/31  
FCC ID : A43-WISP5

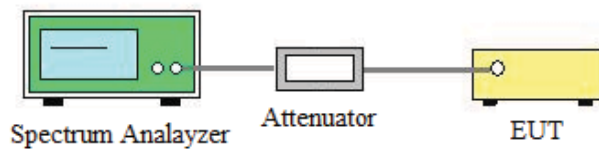
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### 7.3. 99% Bandwidth

#### Requirements

For reporting purpose only.

#### Test Setup



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Test report No. : 4788166493A-US-R2-V0  
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FCC ID : A43-WISP5

### Test Data

| Mode                 | Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|----------------------|---------|-----------------|---------------------|
| 802.11a Chain0       | 36      | 5180            | 16.417              |
|                      | 40      | 5200            | 16.431              |
|                      | 48      | 5240            | 16.453              |
|                      | 149     | 5745            | 16.466              |
|                      | 157     | 5785            | 16.478              |
|                      | 165     | 5825            | 16.451              |
| 802.11n HT20 Chain 0 | 36      | 5180            | 16.431              |
|                      | 40      | 5200            | 16.468              |
|                      | 48      | 5240            | 16.489              |
|                      | 149     | 5745            | 16.45               |
|                      | 157     | 5785            | 16.46               |
|                      | 165     | 5825            | 16.456              |
| 802.11n HT20 Chain 1 | 36      | 5180            | 17.435              |
|                      | 40      | 5200            | 17.47               |
|                      | 48      | 5240            | 17.486              |
|                      | 149     | 5745            | 17.532              |
|                      | 157     | 5785            | 17.484              |
|                      | 165     | 5825            | 17.474              |
| 802.11n HT40 Chain 0 | 38      | 5190            | 35.938              |
|                      | 46      | 5230            | 35.89               |
|                      | 151     | 5755            | 35.923              |
|                      | 159     | 5795            | 35.923              |
| 802.11n HT40 Chain 1 | 38      | 5190            | 35.885              |
|                      | 46      | 5230            | 35.883              |
|                      | 151     | 5755            | 35.928              |
|                      | 159     | 5795            | 35.854              |

### **EMC Lab.**

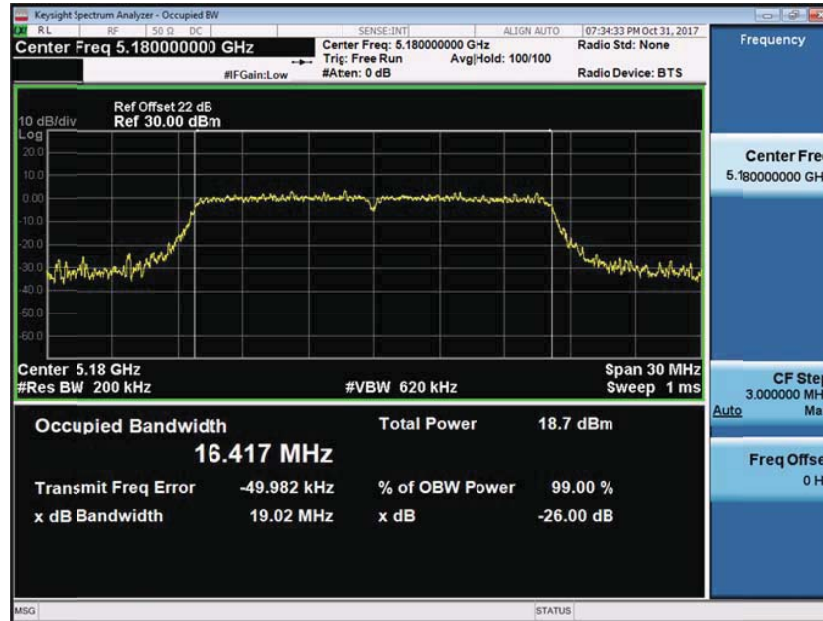
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Facsimile (FAX) :+886-2-7737-3610

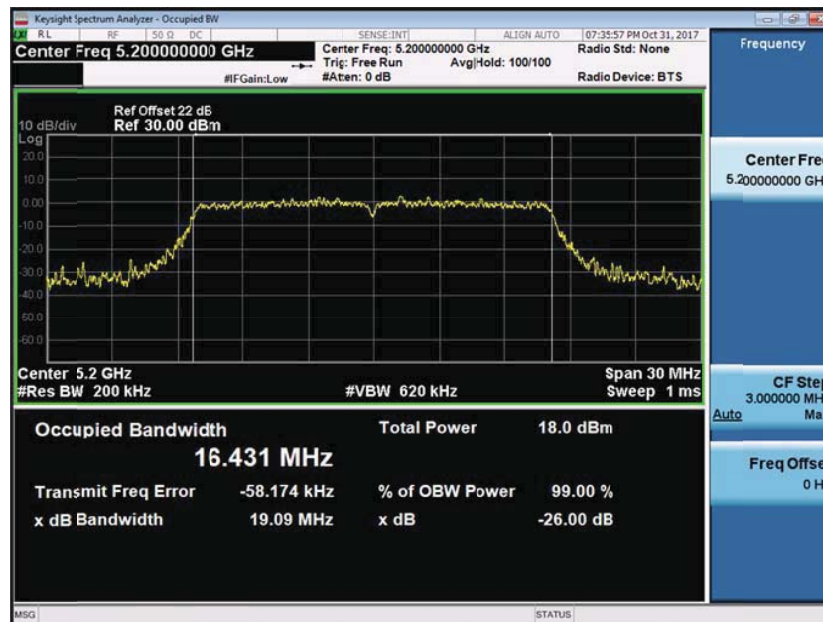


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Issued date : 2017/10/31  
FCC ID : A43-WISP5

### 99% Bandwidth 802.11a Chain 0 Ch 36 5180MHz



### 99% Bandwidth 802.11a Chain 0 Ch 40 5200MHz



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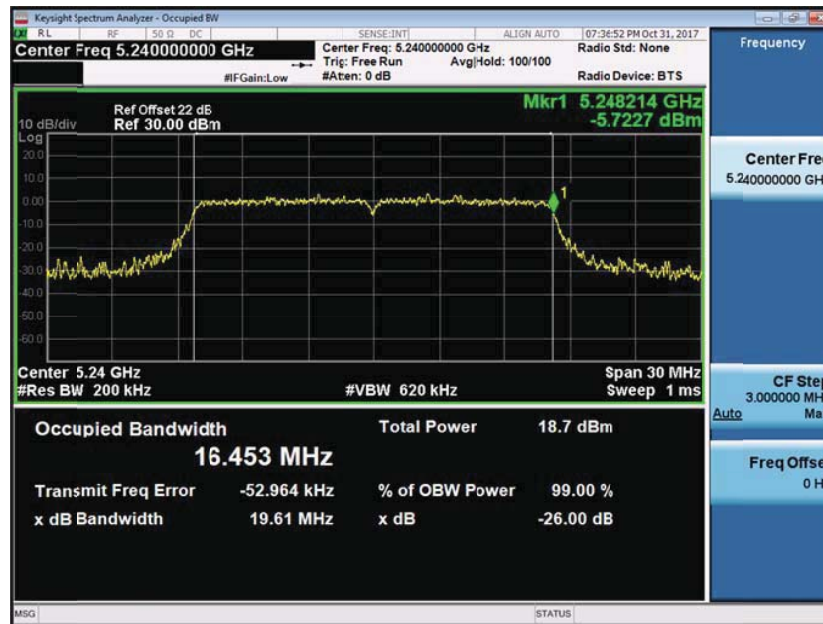
Telephone :+886-2-7737-3000

Facsimile (FAX) :+886-2-7737-3610

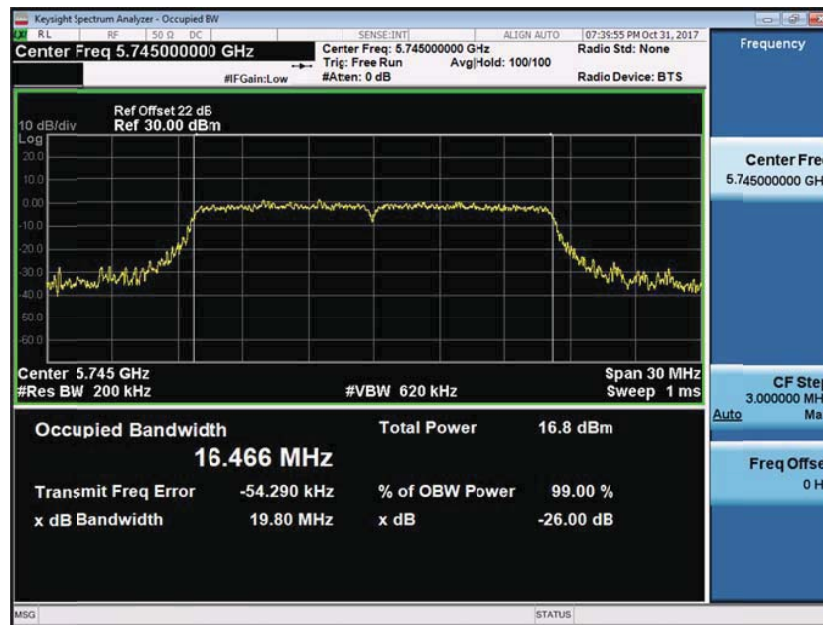


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Page : 36 of 193  
Issued date : 2017/10/31  
FCC ID : A43-WISP5

### 99% Bandwidth 802.11a Chain 0 Ch 48 5240MHz



### 99% Bandwidth 802.11a Chain 0 Ch 149 5745MHz



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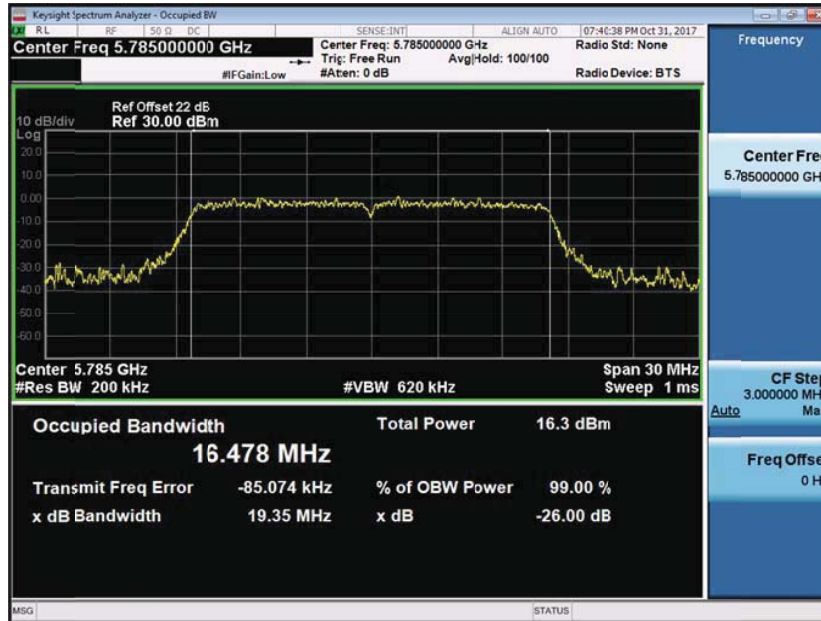
Telephone :+886-2-7737-3000

Facsimile (FAX) :+886-2-7737-3610

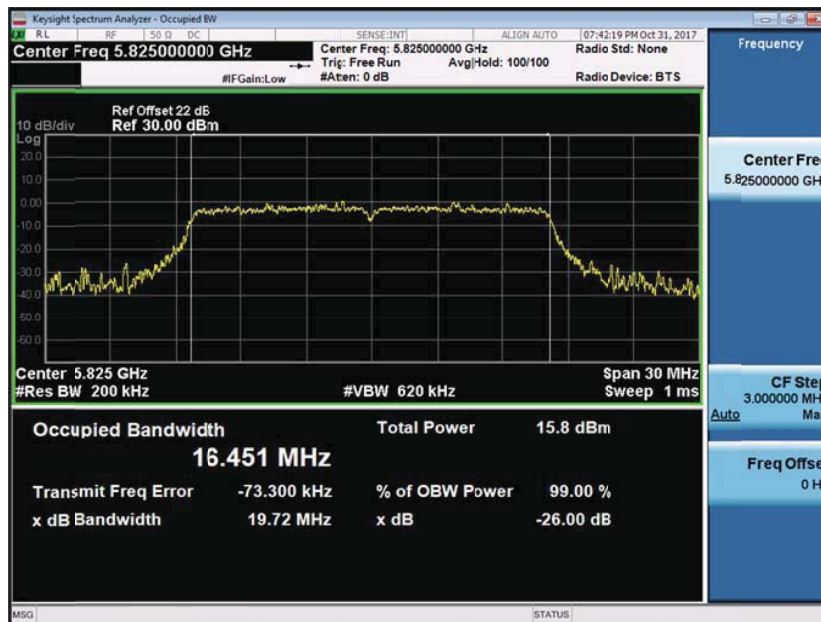


Test report No. : 4788166493A-US-R2-V0  
Page : 37 of 193  
Issued date : 2017/10/31  
FCC ID : A43-WISP5

### 99% Bandwidth 802.11a Chain 0 Ch 157 5785MHz



### 99% Bandwidth 802.11a Chain 0 Ch 165 5825MHz



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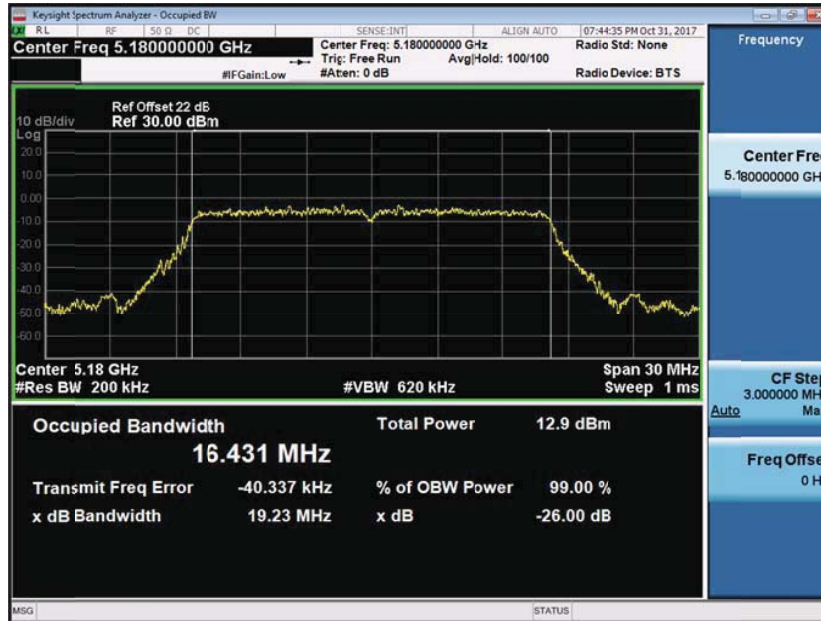
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Facsimile (FAX) :+886-2-7737-3610

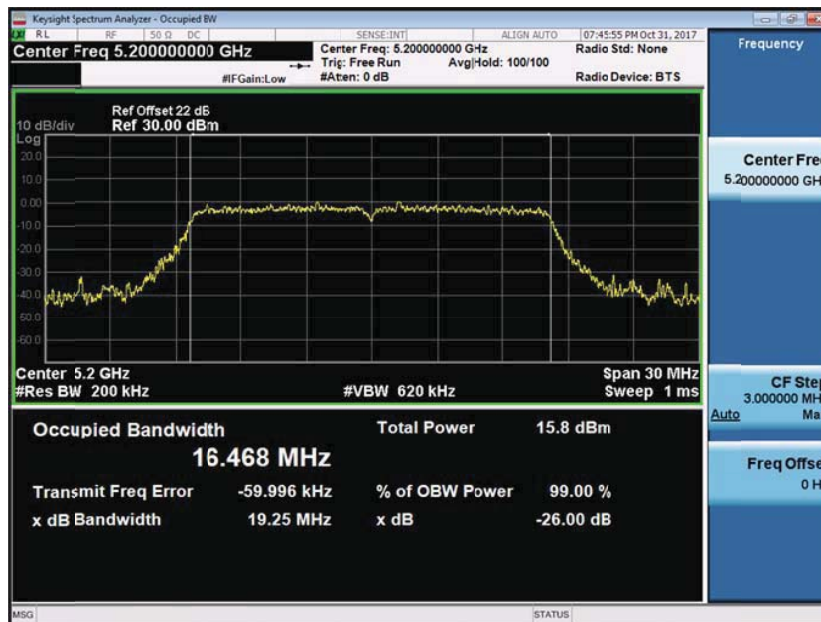


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Issued date : 2017/10/31  
FCC ID : A43-WISP5

### 99% Bandwidth 802.11n HT20 Chain 0 Ch 36 5180MHz



### 99% Bandwidth 802.11n HT20 Chain 0 Ch 40 5200MHz



EMC Lab.

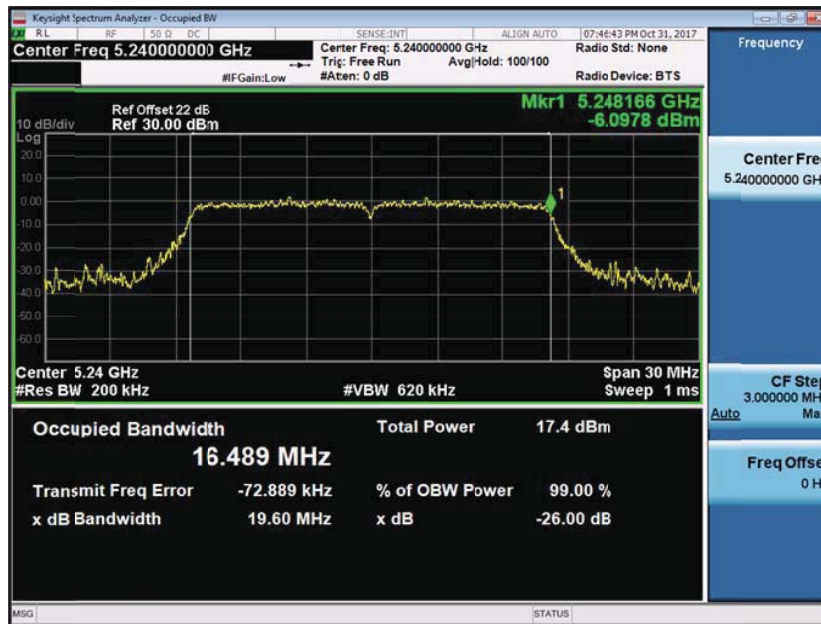
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Telephone :+886-2-7737-3000  
Facsimile (FAX) :+886-2-7737-3610

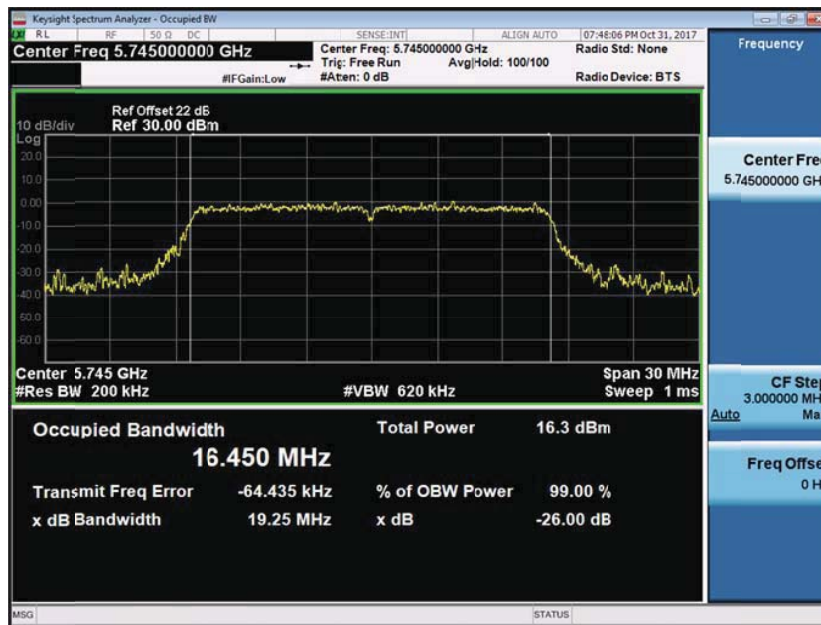


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Issued date : 2017/10/31  
FCC ID : A43-WISP5

### 99% Bandwidth 802.11n HT20 Chain 0 Ch 48 5240MHz



### 99% Bandwidth 802.11n HT20 Chain 0 Ch 149 5745MHz



EMC Lab.

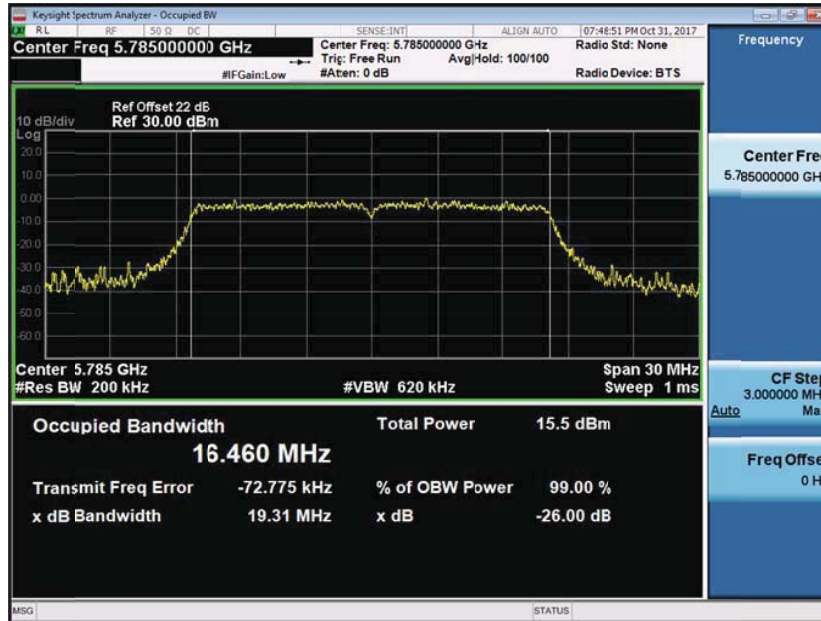
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Facsimile (FAX) :+886-2-7737-3610

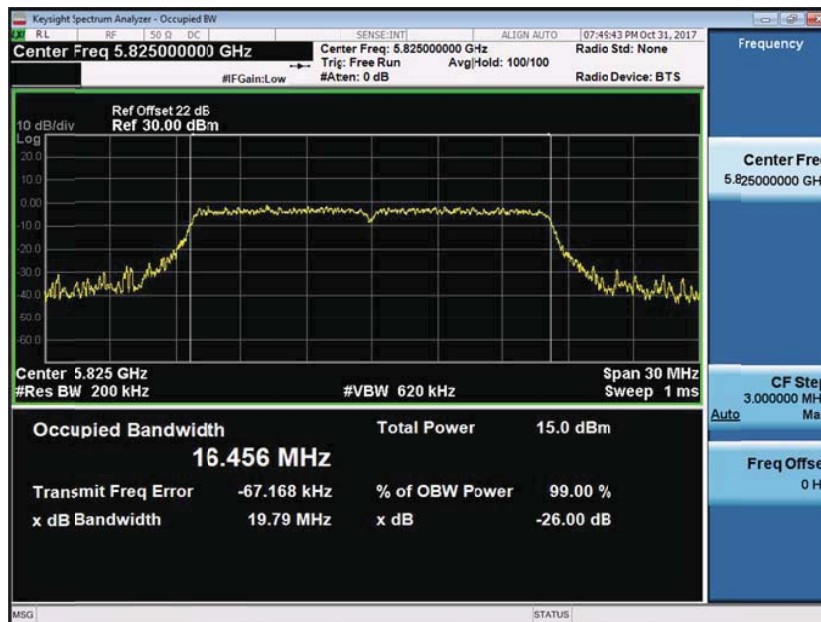


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Page : 40 of 193  
Issued date : 2017/10/31  
FCC ID : A43-WISP5

### 99% Bandwidth 802.11n HT20 Chain 0 Ch 157 5785MHz



### 99% Bandwidth 802.11n HT20 Chain 0 Ch 165 5825MHz



EMC Lab.

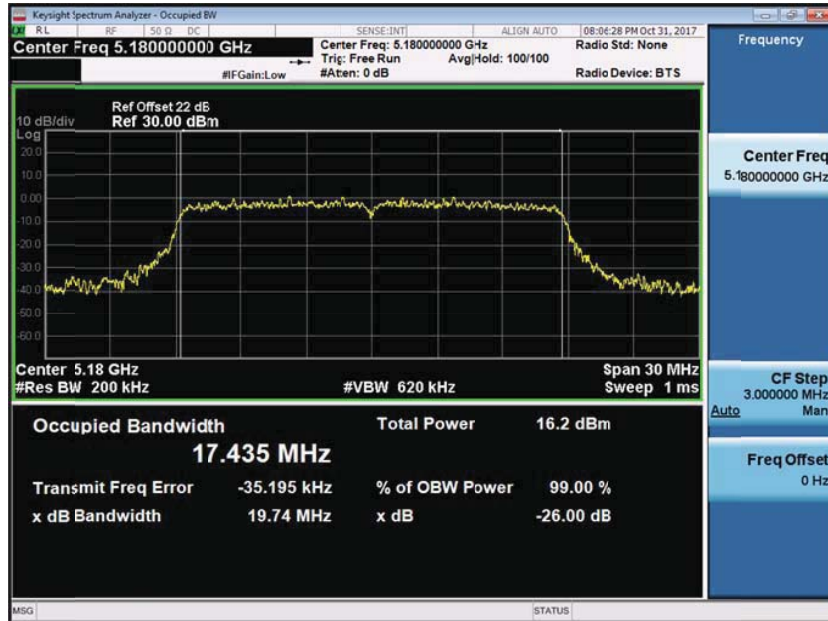
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Telephone : +886-2-7737-3000  
Facsimile (FAX) : +886-2-7737-3610

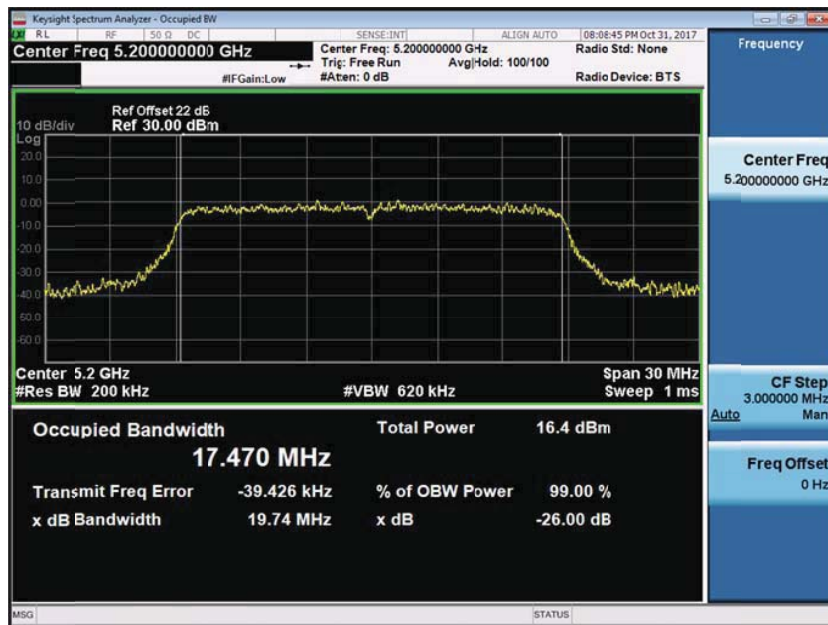


Test report No. : 4788166493A-US-R2-V0  
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Issued date : 2017/10/31  
FCC ID : A43-WISP5

### 99% Bandwidth 802.11n HT20 Chain 1 Ch 36 5180MHz



### 99% Bandwidth 802.11n HT20 Chain 1 Ch 40 5200MHz



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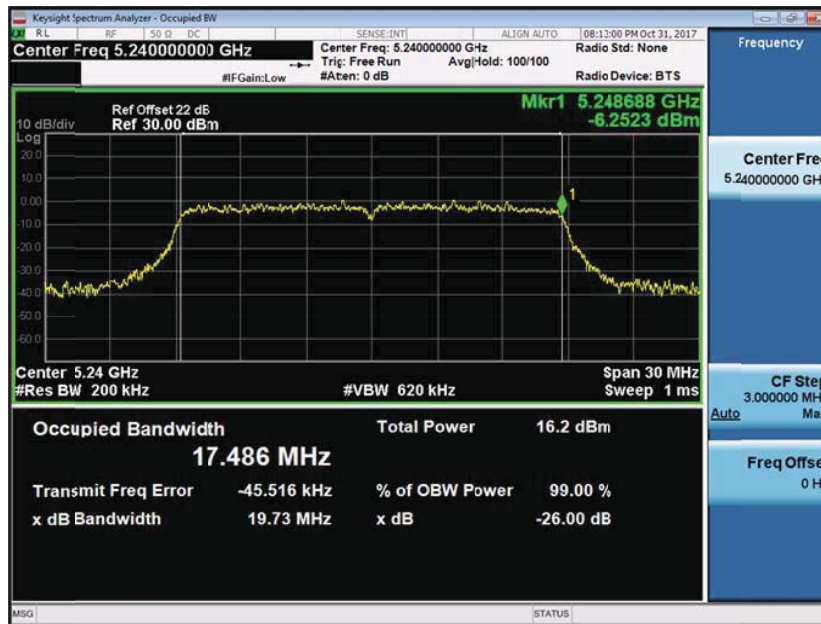
Telephone : +886-2-7737-3000

Facsimile (FAX) : +886-2-7737-3610

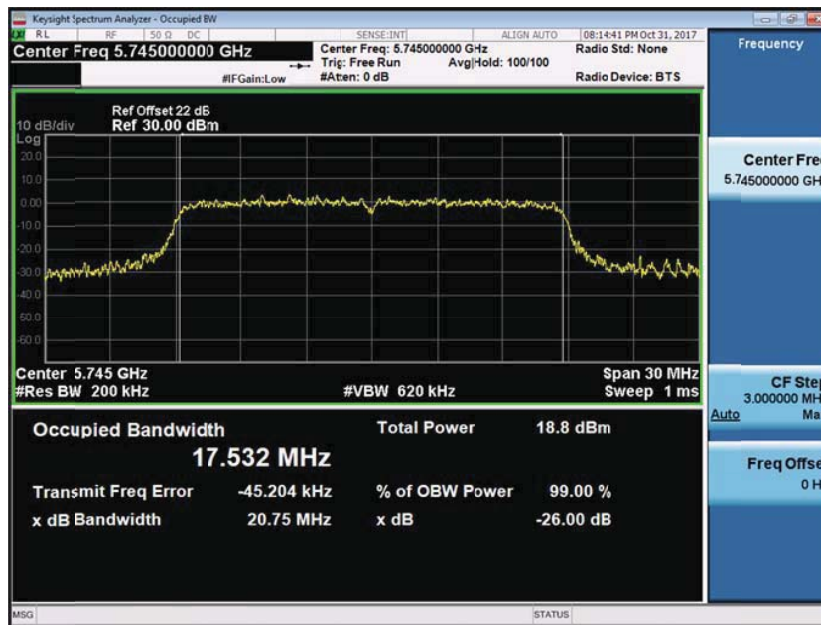


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Issued date : 2017/10/31  
FCC ID : A43-WISP5

### 99% Bandwidth 802.11n HT20 Chain 1 Ch 48 5240MHz



### 99% Bandwidth 802.11n HT20 Chain 1 Ch 149 5745MHz



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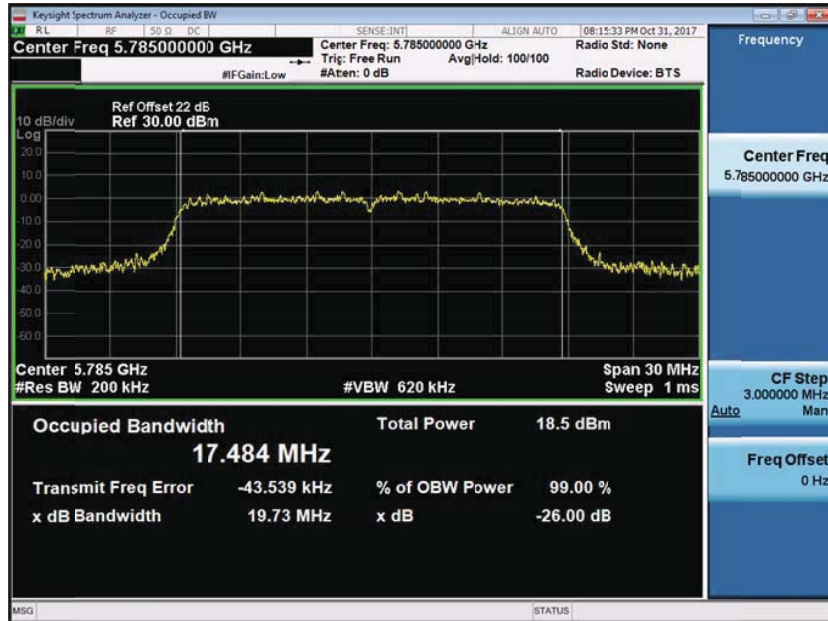
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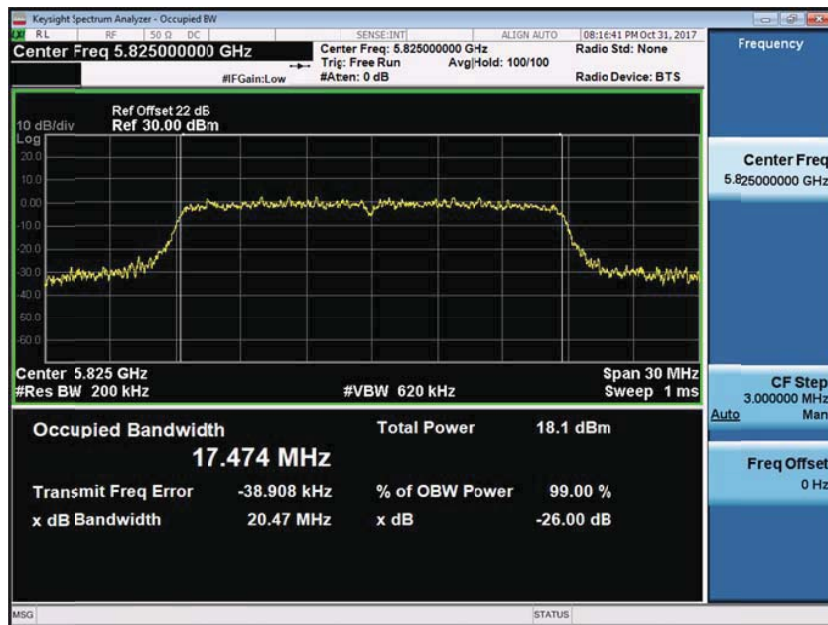


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### 99% Bandwidth 802.11n HT20 Chain 1 Ch 157 5785MHz



### 99% Bandwidth 802.11n HT20 Chain 1 Ch 165 5825MHz



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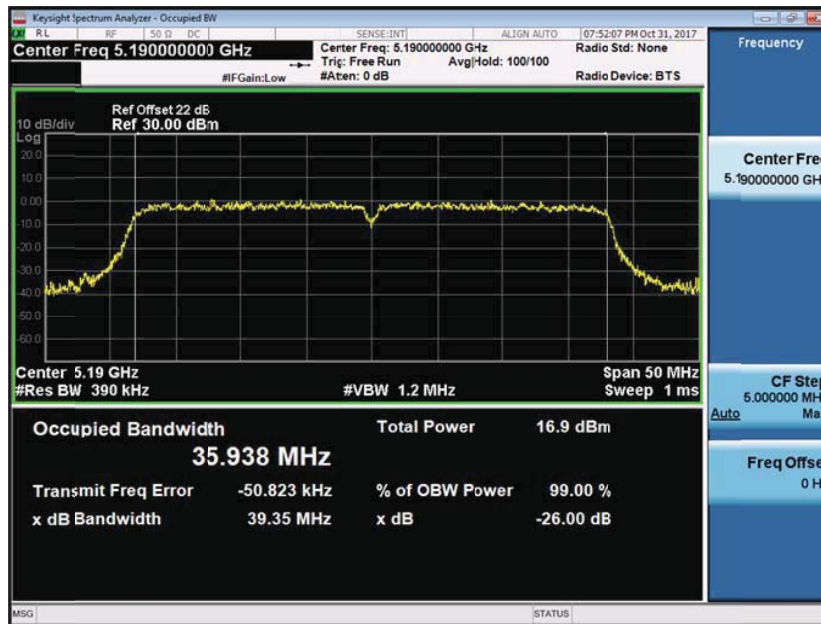
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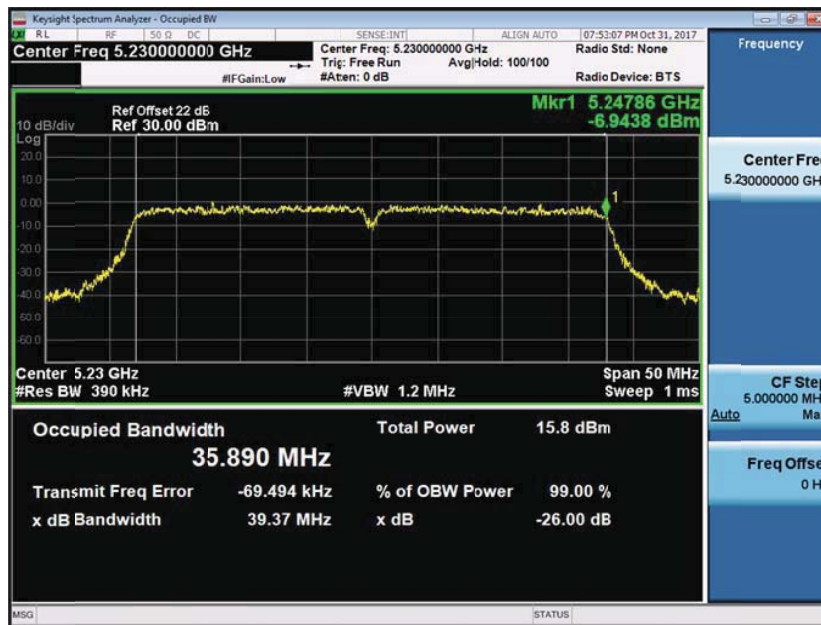


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### 99% Bandwidth 802.11n HT40 Chain 0 Ch 38 5190MHz



### 99% Bandwidth 802.11n HT40 Chain 0 Ch 46 5230MHz



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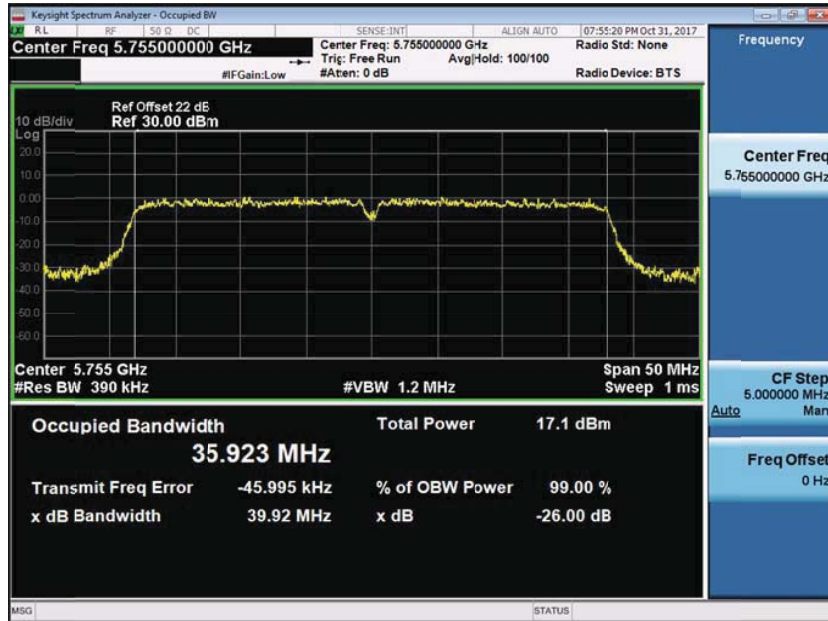
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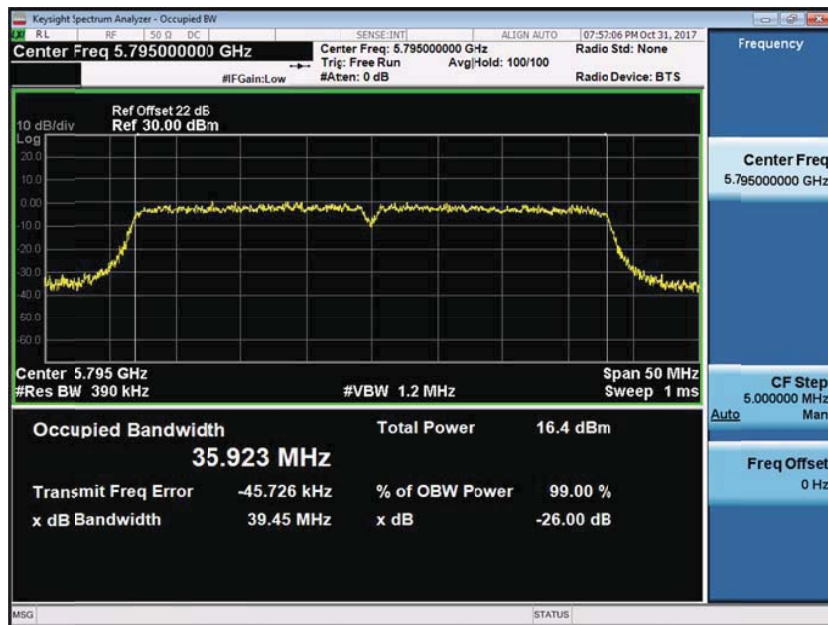


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### 99% Bandwidth 802.11n HT40 Chain 0 Ch 151 5755MHz



### 99% Bandwidth 802.11n HT40 Chain 0 Ch 159 5795MHz



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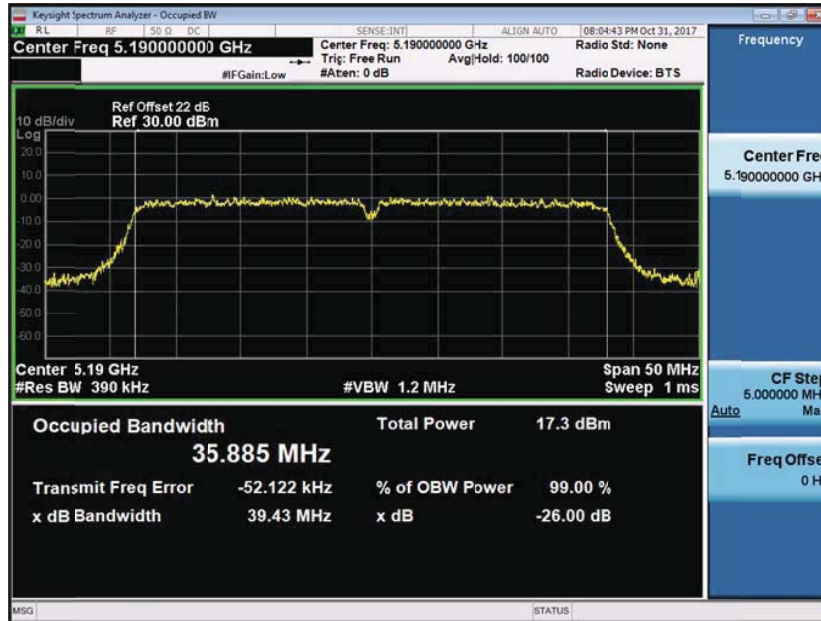
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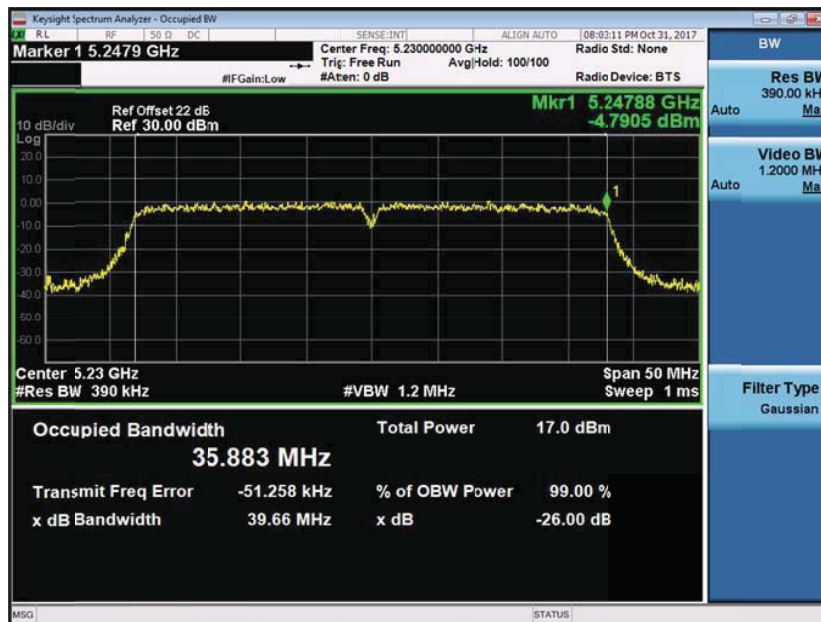


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### 99% Bandwidth 802.11n HT40 Chain 1 Ch 38 5190MHz



### 99% Bandwidth 802.11n HT40 Chain 1 Ch 46 5230MHz



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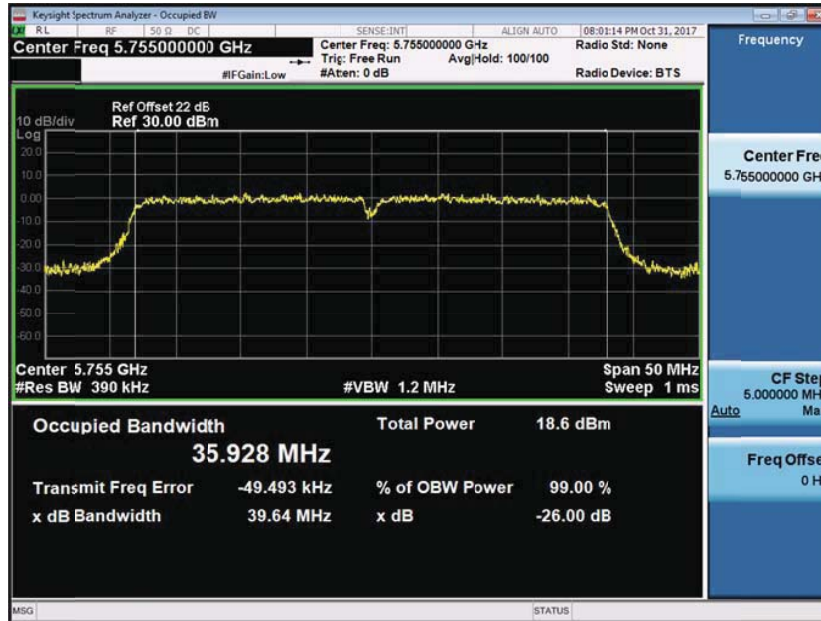
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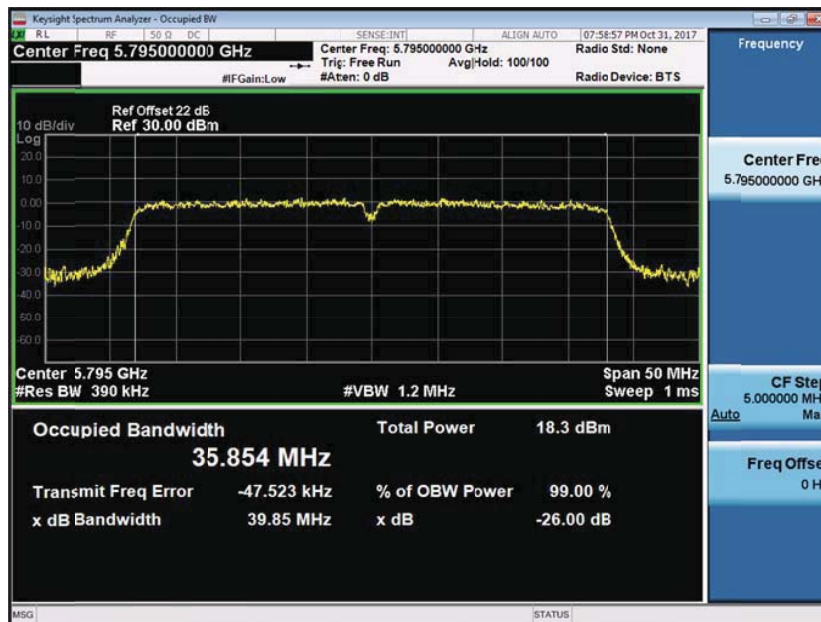


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### 99% Bandwidth 802.11n HT40 Chain 1 Ch 151 5755MHz



### 99% Bandwidth 802.11n HT40 Chain 1 Ch 159 5795MHz



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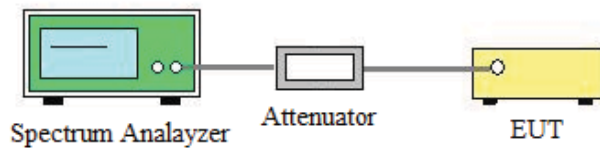
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## 7.4. 6 dB Bandwidth

### Requirements

The minimum 6 dB bandwidth shall be at least 500 kHz.

### Test Setup



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### Test Data

| Mode                 | Channel | Frequency (MHz) | 6dB Bandwidth (MHz) | Limit (MHz) | Result |
|----------------------|---------|-----------------|---------------------|-------------|--------|
| 802.11a Chain0       | 149     | 5745            | 16.36               | $\geq 0.5$  | Pass   |
|                      | 157     | 5785            | 16.32               | $\geq 0.5$  | Pass   |
|                      | 165     | 5825            | 16.3                | $\geq 0.5$  | Pass   |
| 802.11n HT20 Chain 0 | 149     | 5745            | 16.68               | $\geq 0.5$  | Pass   |
|                      | 157     | 5785            | 16.05               | $\geq 0.5$  | Pass   |
|                      | 165     | 5825            | 16.64               | $\geq 0.5$  | Pass   |
| 802.11n HT20 Chain 1 | 149     | 5745            | 16.9                | $\geq 0.5$  | Pass   |
|                      | 157     | 5785            | 16.68               | $\geq 0.5$  | Pass   |
|                      | 165     | 5825            | 16.83               | $\geq 0.5$  | Pass   |
| 802.11n HT40 Chain 0 | 151     | 5755            | 35.16               | $\geq 0.5$  | Pass   |
|                      | 159     | 5795            | 35.11               | $\geq 0.5$  | Pass   |
| 802.11n HT40 Chain 1 | 151     | 5755            | 35.1                | $\geq 0.5$  | Pass   |
|                      | 159     | 5795            | 35.1                | $\geq 0.5$  | Pass   |

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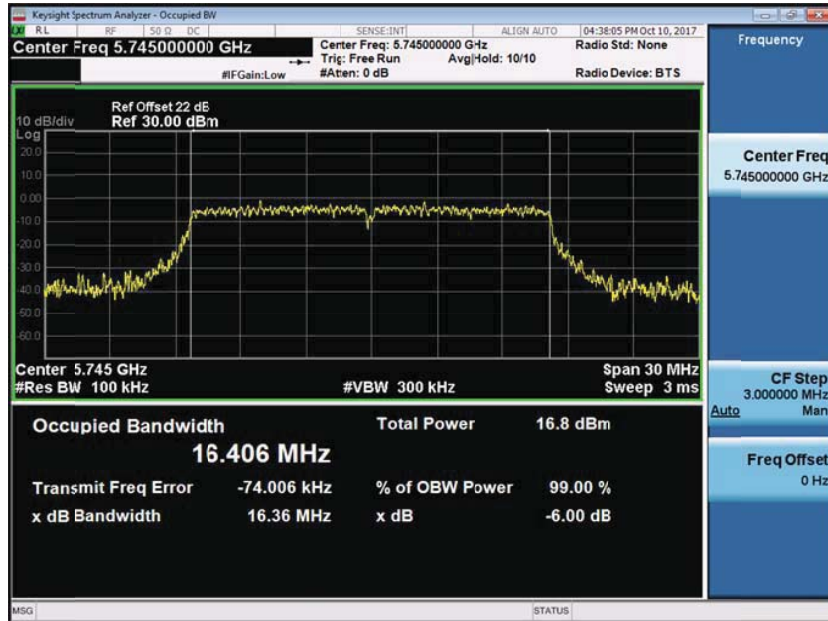
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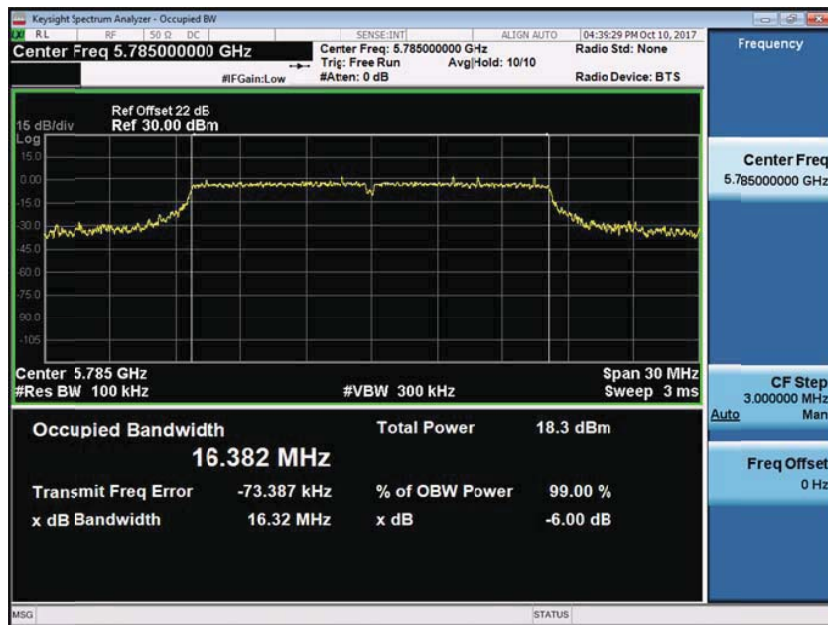


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### 6dB Bandwidth 802.11a Chain 0 Ch 149 5745MHz



### 6dB Bandwidth 802.11a Chain 0 Ch 157 5785MHz



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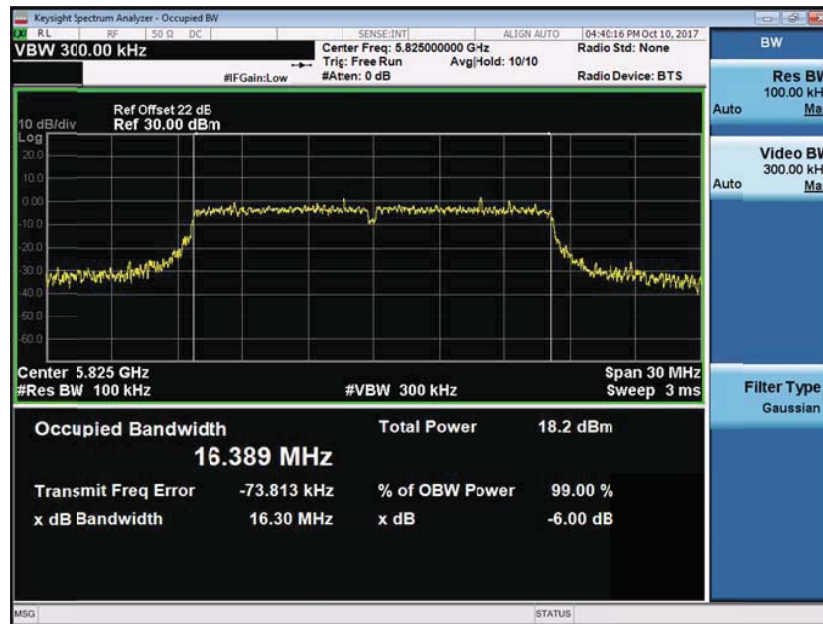
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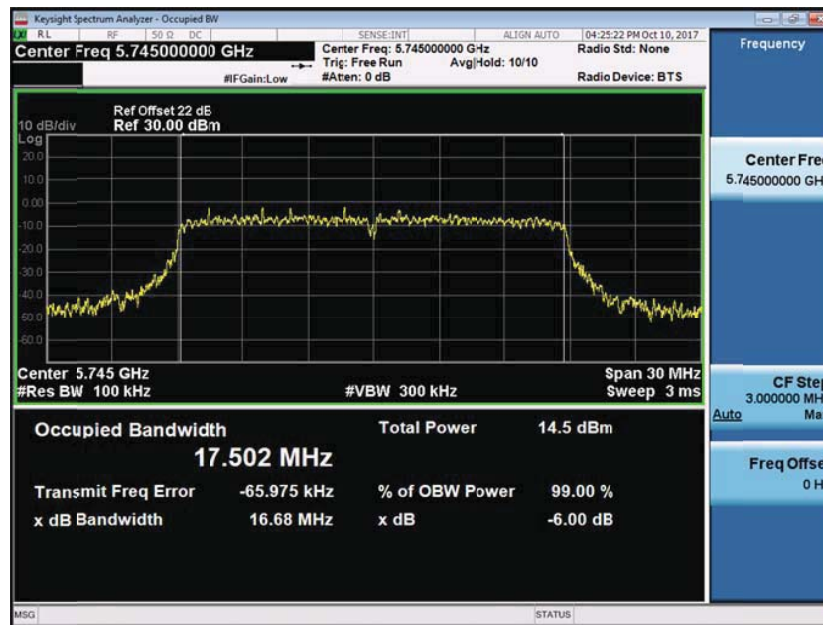


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### 6dB Bandwidth 802.11a Chain 0 Ch 165 5825MHz



### 6dB Bandwidth 802.11n HT20 Chain 0 Ch 149 5745MHz



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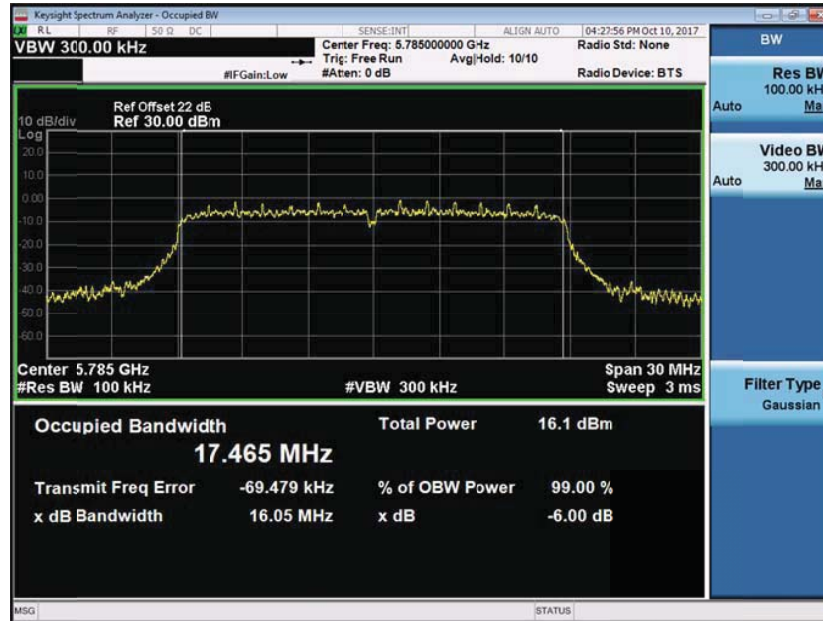
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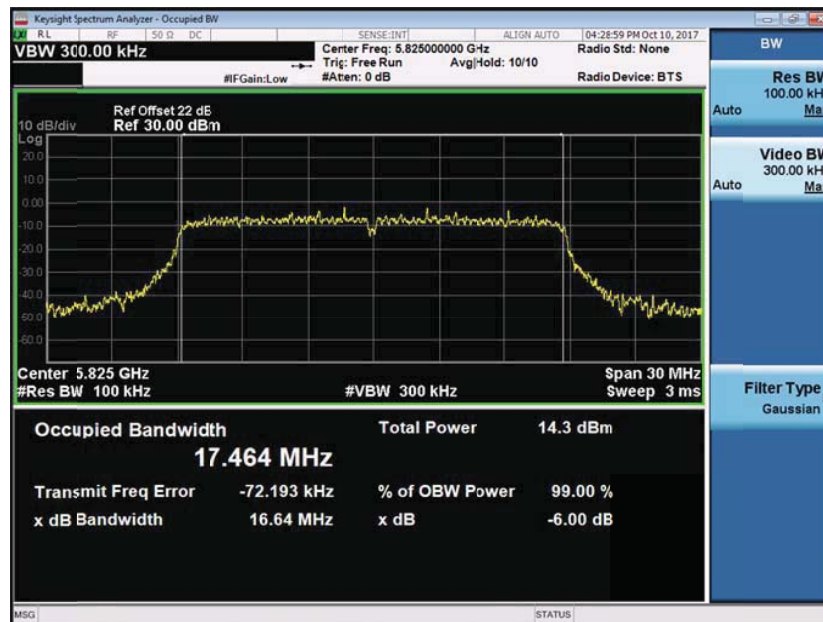


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### 6dB Bandwidth 802.11n HT20 Chain 0 Ch 157 5785MHz



### 6dB Bandwidth 802.11n HT20 Chain 0 Ch 165 5825MHz



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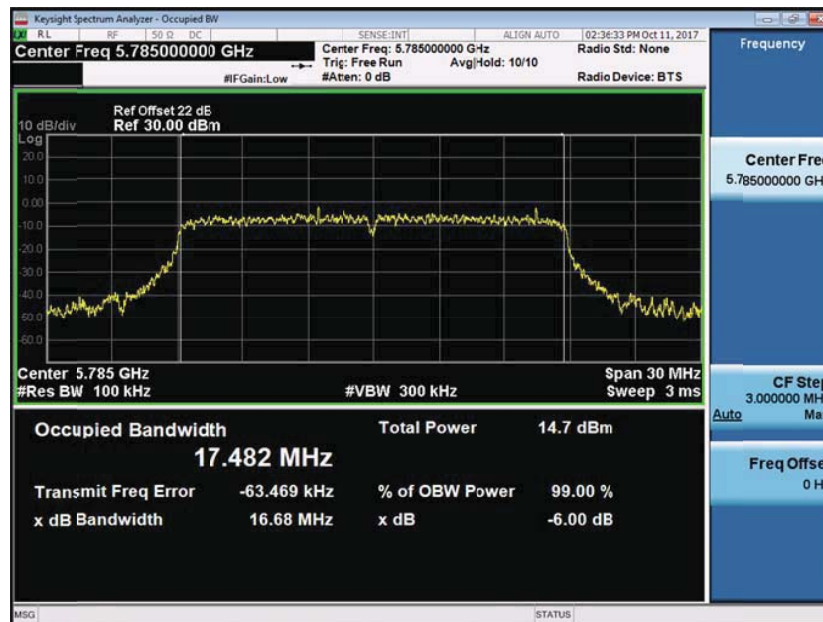


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### 6dB Bandwidth 802.11n HT20 Chain 1 Ch 149 5745MHz



### 6dB Bandwidth 802.11n HT20 Chain 1 Ch 157 5785MHz



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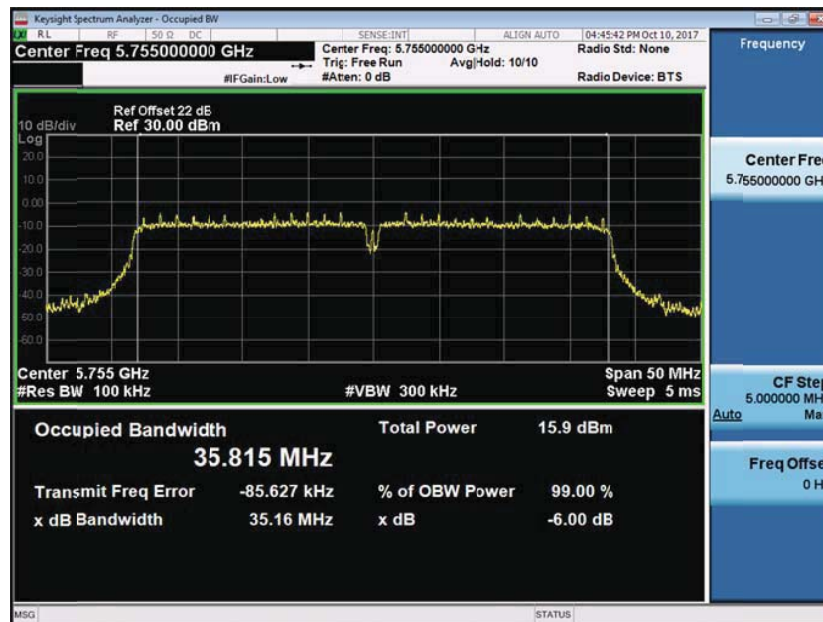


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### 6dB Bandwidth 802.11n HT20 Chain 1 Ch 165 5825MHz



### 6dB Bandwidth 802.11n HT40 Chain 0 Ch 151 5755MHz



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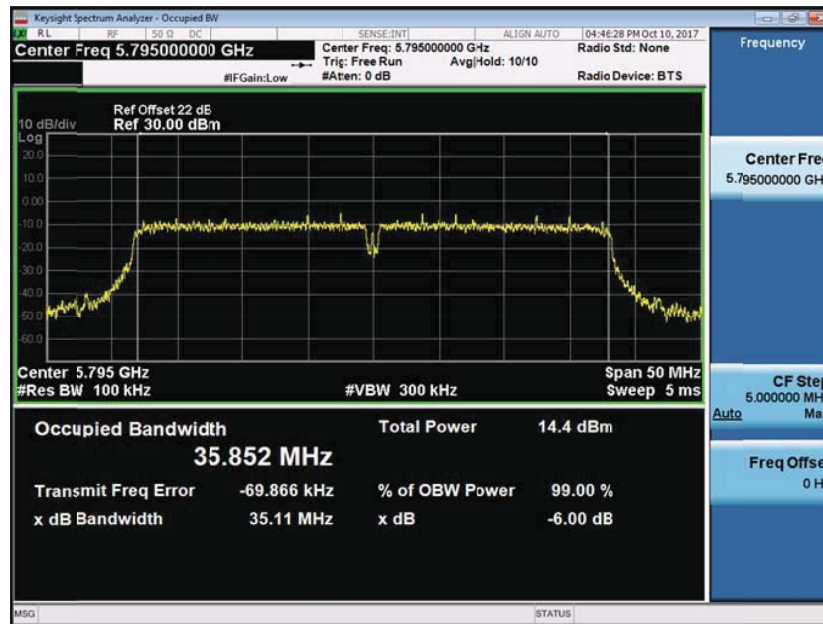
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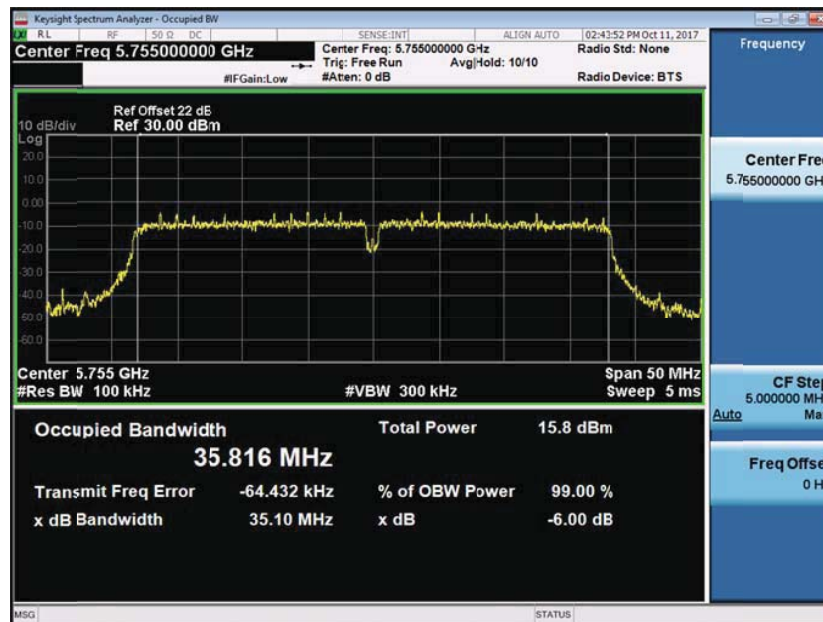


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### 6dB Bandwidth 802.11n HT40 Chain 0 Ch 159 5795MHz



### 6dB Bandwidth 802.11n HT40 Chain 1 Ch 151 5755MHz



EMC Lab.

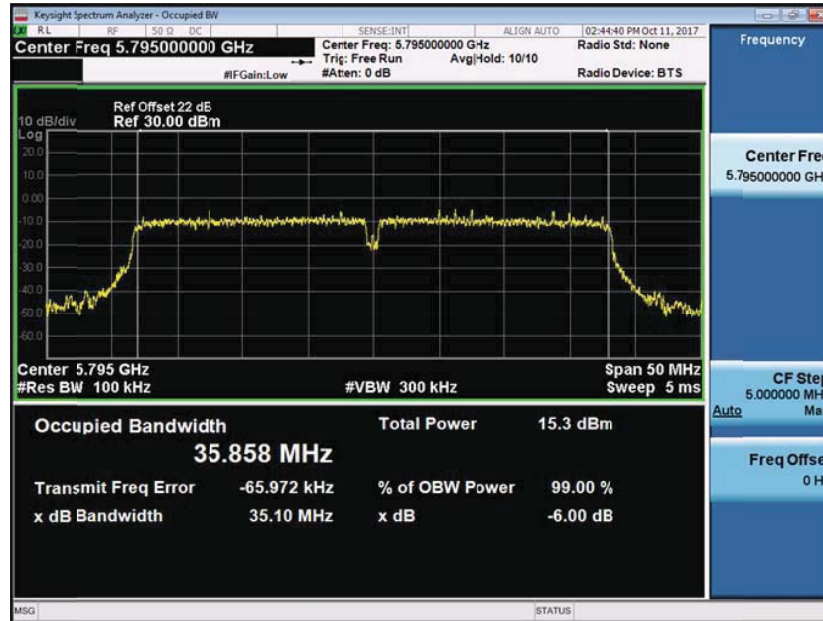
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### 6dB Bandwidth 802.11n HT40 Chain 1 Ch 159 5795MHz



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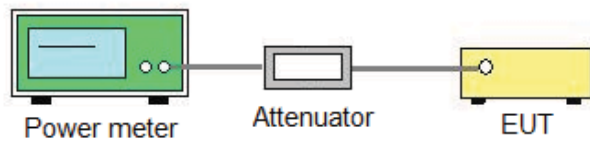
## 7.5. Maximum Conducted Output Power

### Requirements

For 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.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

### Test Setup



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### Test Data

| Mode            | Channel | Frequency (MHz) | Output Power (dBm) | Duty Cycle Factor (dB) | Total Power (dBm) | Output Power Limit (dBm) | Margin (dB) |
|-----------------|---------|-----------------|--------------------|------------------------|-------------------|--------------------------|-------------|
| 802.11a Chain 0 | 36      | 5180            | 11.15              | 0                      | 11.15             | 24                       | -12.85      |
|                 | 40      | 5200            | 11.32              | 0                      | 11.32             | 24                       | -12.68      |
|                 | 48      | 5240            | 11.39              | 0                      | 11.39             | 24                       | -12.61      |
|                 | 149     | 5745            | 11.24              | 0                      | 11.24             | 30                       | -18.76      |
|                 | 157     | 5785            | 11.73              | 0                      | 11.73             | 30                       | -18.27      |
|                 | 165     | 5825            | 11.81              | 0                      | 11.81             | 30                       | -18.19      |

| Mode         | Channel | Frequency (MHz) | Output Power (dBm) |         | Output Power (mW) |         | Duty Cycle Factor (dB) | Total Power (dBm) | Output Power Limit (dBm) | Margin (dB) |
|--------------|---------|-----------------|--------------------|---------|-------------------|---------|------------------------|-------------------|--------------------------|-------------|
|              |         |                 | Chain 0            | Chain 1 | Chain 0           | Chain 1 |                        |                   |                          |             |
| 802.11n HT20 | 36      | 5180            | 8.27               | 8.36    | 6.71              | 6.85    | 0                      | 11.33             | 24                       | -12.67      |
|              | 40      | 5200            | 8.35               | 8.24    | 6.84              | 6.67    | 0                      | 11.31             | 24                       | -12.69      |
|              | 48      | 5240            | 8.57               | 8.13    | 7.19              | 6.50    | 0                      | 11.37             | 24                       | -12.63      |
|              | 149     | 5745            | 8.32               | 9.21    | 6.79              | 8.34    | 0                      | 11.80             | 30                       | -18.20      |
|              | 157     | 5785            | 8.16               | 8.77    | 6.55              | 7.53    | 0                      | 11.49             | 30                       | -18.51      |
|              | 165     | 5825            | 8.02               | 8.45    | 6.34              | 7.00    | 0                      | 11.25             | 30                       | -18.75      |

| Mode         | Channel | Frequency (MHz) | Output Power (dBm) |         | Output Power (mW) |         | Duty Cycle Factor (dB) | Total Power (dBm) | Output Power Limit (dBm) | Margin (dB) |
|--------------|---------|-----------------|--------------------|---------|-------------------|---------|------------------------|-------------------|--------------------------|-------------|
|              |         |                 | Chain 0            | Chain 1 | Chain 0           | Chain 1 |                        |                   |                          |             |
| 802.11n HT40 | 38      | 5190            | 8.21               | 8.34    | 6.62              | 6.82    | 0                      | 11.29             | 24                       | -12.71      |
|              | 46      | 5230            | 8.23               | 8.22    | 6.65              | 6.64    | 0                      | 11.24             | 24                       | -12.76      |
|              | 151     | 5755            | 8.34               | 8.92    | 6.82              | 7.80    | 0                      | 11.65             | 30                       | -18.35      |
|              | 159     | 5795            | 8.01               | 8.62    | 6.32              | 7.28    | 0                      | 11.34             | 30                       | -18.66      |

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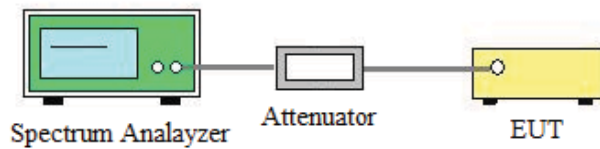
## 7.6. Power Spectral Density

### Requirements

For client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

### Test Setup



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### Test Data

| Mode               | Channel | Frequency (MHz) | PSD (dBm) | Duty Cycle Factor (dB) | Total PSD (dBm) | Limit (dBm) | Margin (dB) |
|--------------------|---------|-----------------|-----------|------------------------|-----------------|-------------|-------------|
| 802.11a<br>Chain 0 | 36      | 5180            | 0.340     | 0.00                   | 0.340           | 11          | -10.66      |
|                    | 40      | 5200            | 0.700     | 0.00                   | 0.700           | 11          | -10.30      |
|                    | 48      | 5240            | 0.810     | 0.00                   | 0.810           | 11          | -10.19      |
|                    | 149     | 5745            | -2.600    | 0.00                   | -2.600          | 30          | -32.60      |
|                    | 157     | 5785            | -1.880    | 0.00                   | -1.880          | 30          | -31.88      |
|                    | 165     | 5825            | -1.660    | 0.00                   | -1.660          | 30          | -31.66      |

| Mode            | Channel | Frequency (MHz) | PSD (dBm) |         | PSD (mW) |         | Duty Cycle Factor (dB) | Total PSD (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|---------|-----------------|-----------|---------|----------|---------|------------------------|-----------------|-------------|-------------|
|                 |         |                 | Chain 0   | Chain 1 | Chain 0  | Chain 1 |                        |                 |             |             |
| 802.11n<br>HT20 | 36      | 5180            | -2.39     | -2      | 0.58     | 0.63    | 0.00                   | 0.82            | 11          | -10.18      |
|                 | 40      | 5200            | -2.34     | -2.85   | 0.58     | 0.52    | 0.00                   | 0.42            | 11          | -10.58      |
|                 | 48      | 5240            | -2.54     | -2.73   | 0.56     | 0.53    | 0.00                   | 0.38            | 11          | -10.62      |
|                 | 149     | 5745            | -4.42     | -4.34   | 0.36     | 0.37    | 0.00                   | -1.37           | 30          | -31.37      |
|                 | 157     | 5785            | -5.13     | -4.81   | 0.31     | 0.33    | 0.00                   | -1.96           | 30          | -31.96      |
|                 | 165     | 5825            | -5.86     | -5.26   | 0.26     | 0.30    | 0.00                   | -2.54           | 30          | -32.54      |

| Mode            | Channel | Frequency (MHz) | PSD (dBm) |         | PSD (mW) |         | Duty Cycle Factor (dB) | Total PSD (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|---------|-----------------|-----------|---------|----------|---------|------------------------|-----------------|-------------|-------------|
|                 |         |                 | Chain 0   | Chain 1 | Chain 0  | Chain 1 |                        |                 |             |             |
| 802.11n<br>HT40 | 38      | 5190            | -6.11     | -5.15   | 0.24     | 0.31    | 0.00                   | -2.59           | 11          | -13.59      |
|                 | 46      | 5230            | -5.63     | -6.26   | 0.27     | 0.24    | 0.00                   | -2.92           | 11          | -13.92      |
|                 | 151     | 5755            | -8.46     | -7.98   | 0.14     | 0.16    | 0.00                   | -5.20           | 30          | -35.20      |
|                 | 159     | 5795            | -8.18     | -7.91   | 0.15     | 0.16    | 0.00                   | -5.03           | 30          | -35.03      |

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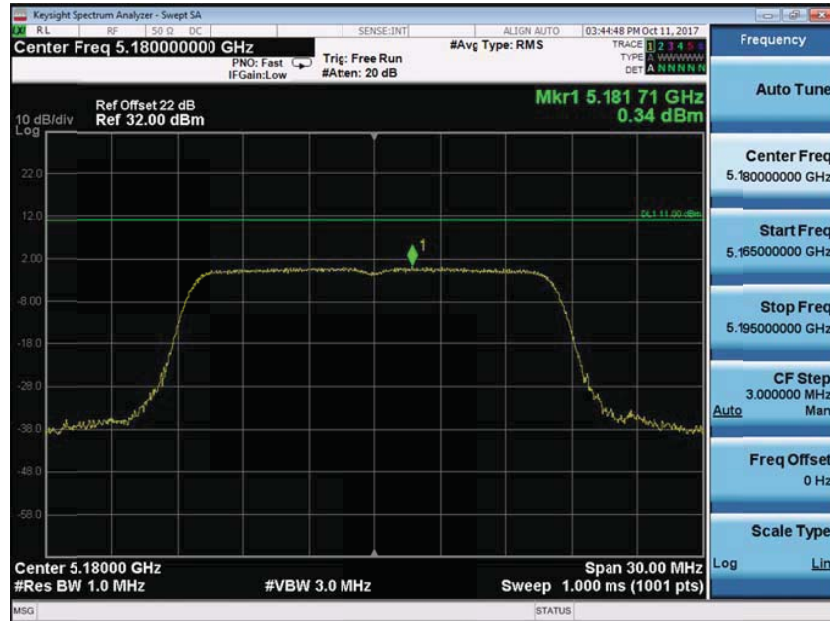
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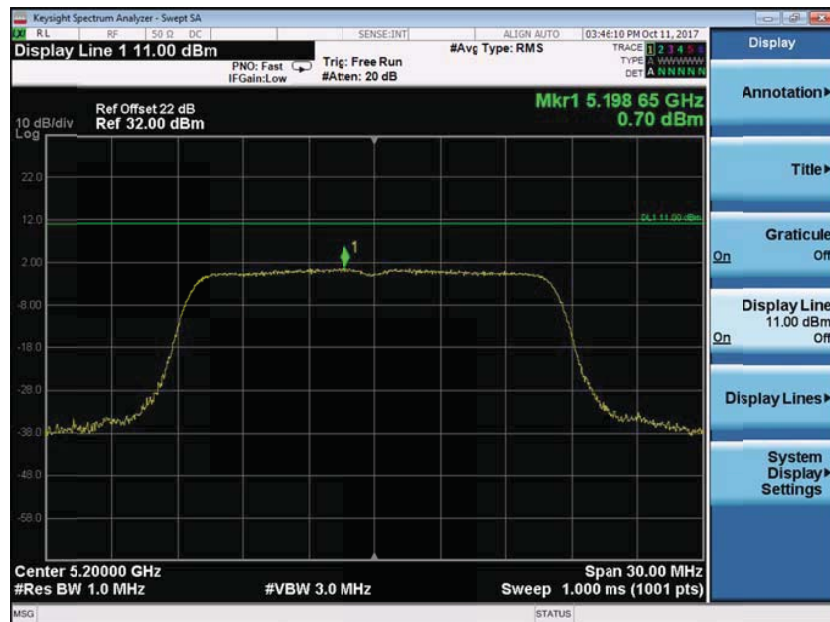


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### Power Spectral Density 802.11a Chain 0 Ch 36 5180MHz



### Power Spectral Density 802.11a Chain 0 Ch 40 5200MHz



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### Power Spectral Density 802.11a Chain 0 Ch 48 5240MHz



### Power Spectral Density 802.11a Chain 0 Ch 149 5745MHz



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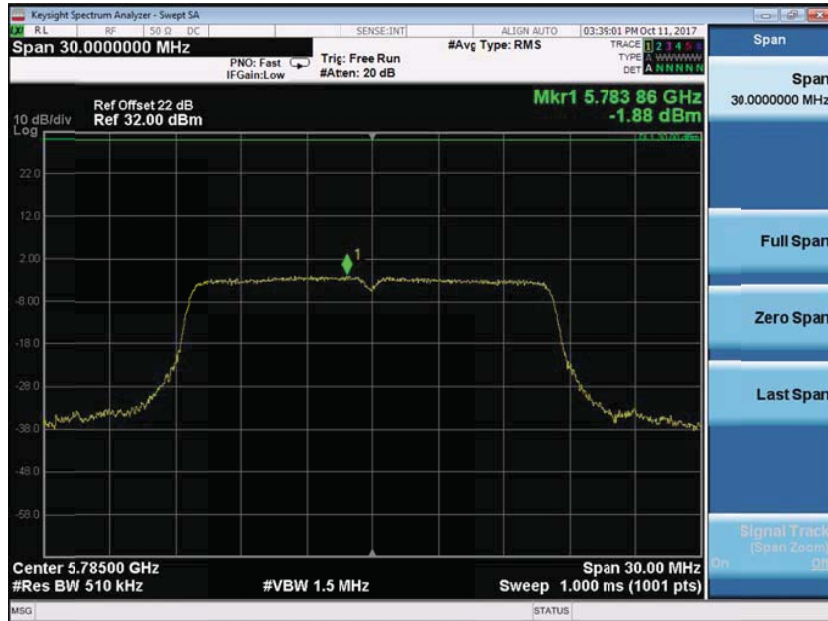
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### Power Spectral Density 802.11a Chain 0 Ch 157 5785MHz



### Power Spectral Density 802.11a Chain 0 Ch 165 5825MHz



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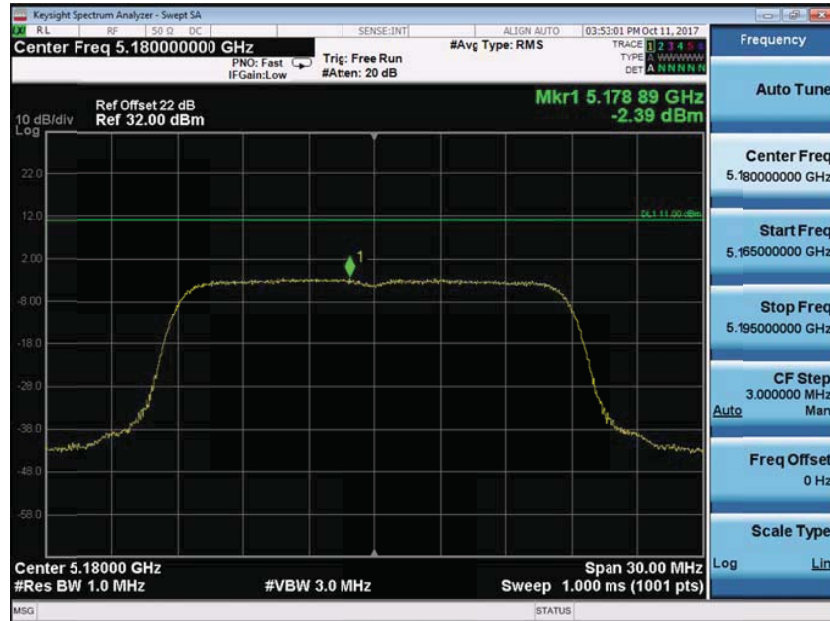
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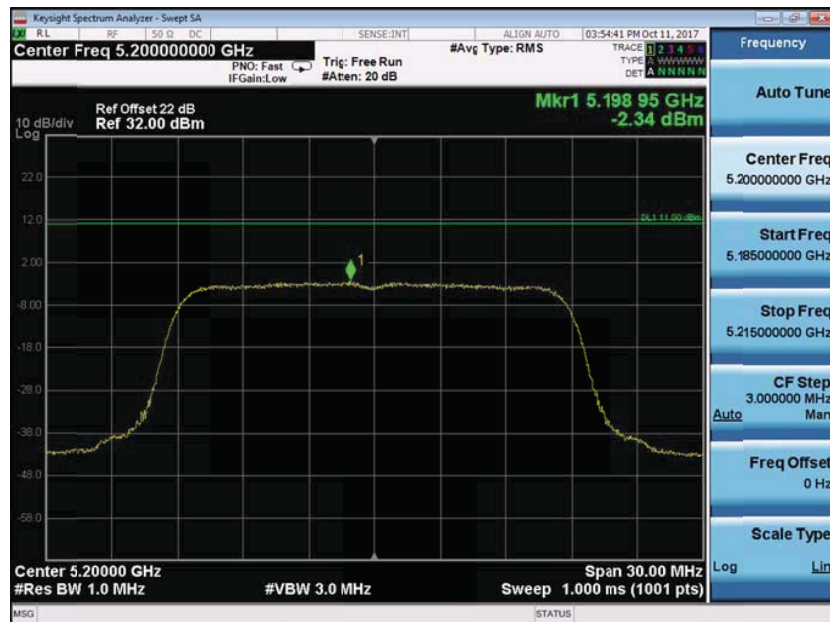


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### Power Spectral Density 802.11n HT20 Chain 0 Ch 36 5180MHz



### Power Spectral Density 802.11n HT20 Chain 0 Ch 40 5200MHz



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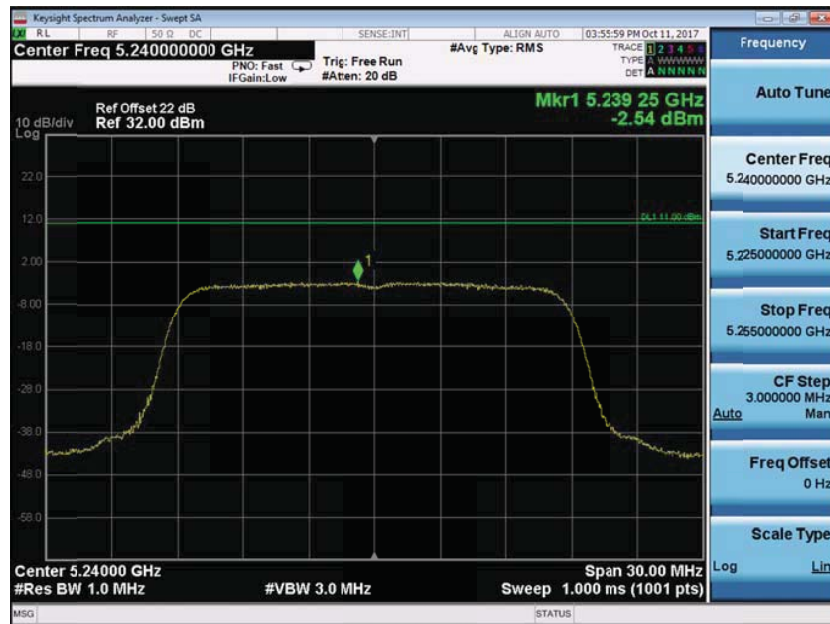
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### Power Spectral Density 802.11n HT20 Chain 0 Ch 48 5240MHz



### Power Spectral Density 802.11n HT20 Chain 0 Ch 149 5745MHz



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### Power Spectral Density 802.11n HT20 Chain 0 Ch 157 5785MHz



### Power Spectral Density 802.11n HT20 Chain 0 Ch 165 5825MHz



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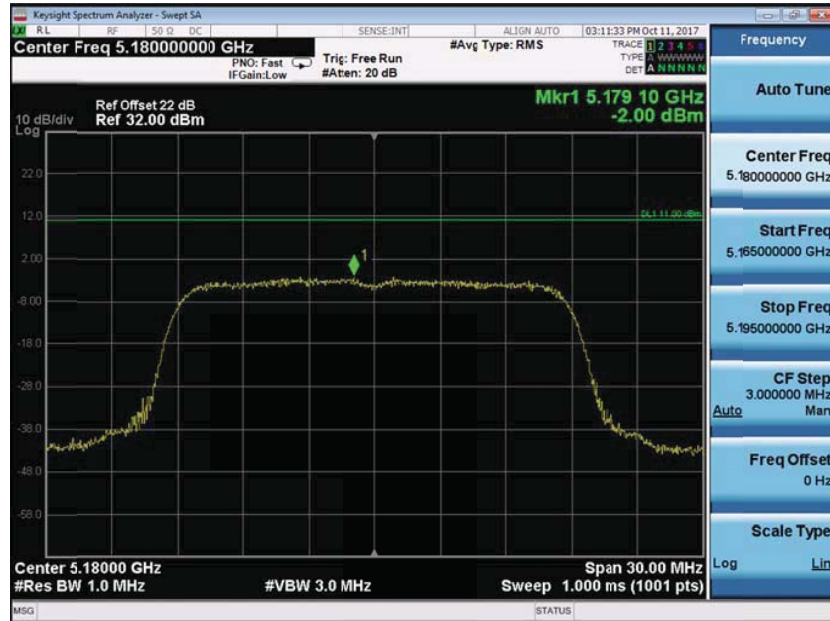
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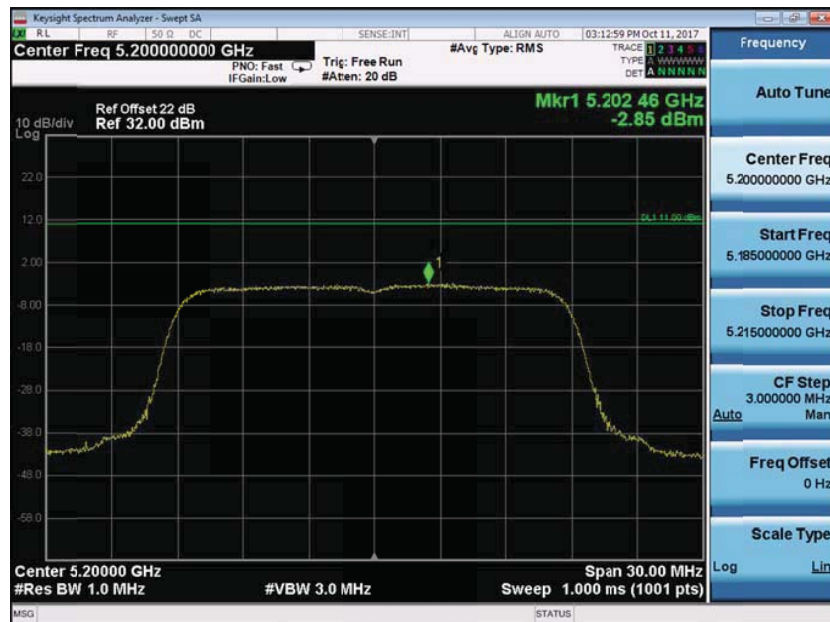


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### Power Spectral Density 802.11n HT20 Chain 1 Ch 36 5180MHz



### Power Spectral Density 802.11n HT20 Chain 1 Ch 40 5200MHz



EMC Lab.

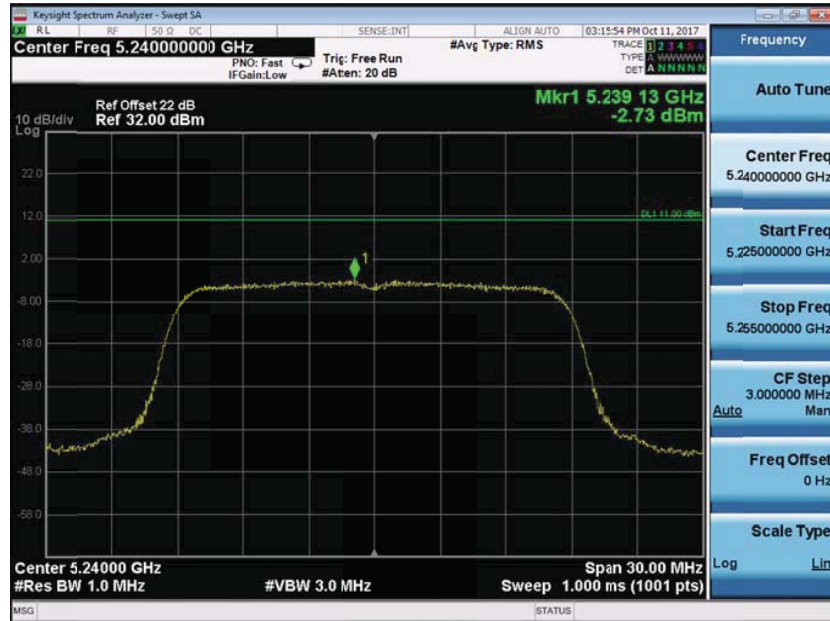
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### Power Spectral Density 802.11n HT20 Chain 1 Ch 157 5785MHz



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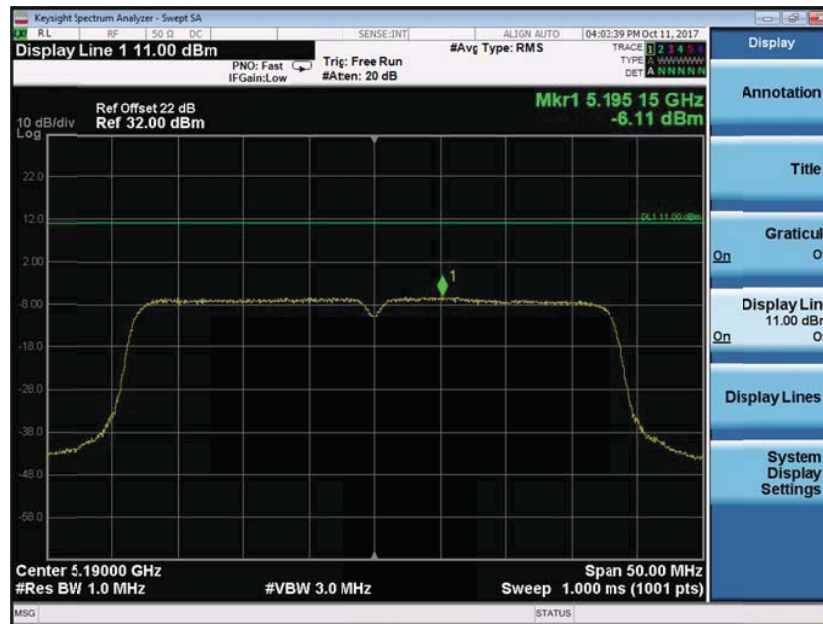
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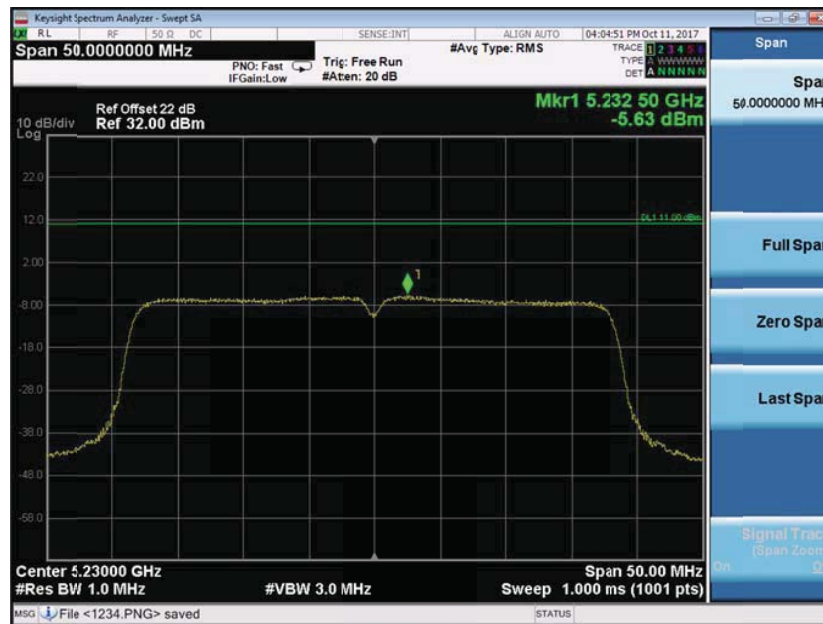


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### Power Spectral Density 802.11n HT40 Chain 0 Ch 38 5190MHz



### Power Spectral Density 802.11n HT40 Chain 0 Ch 46 5230MHz



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### Power Spectral Density 802.11n HT40 Chain 0 Ch 151 5755MHz



### Power Spectral Density 802.11n HT40 Chain 0 Ch 159 5795MHz



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### Power Spectral Density 802.11n HT40 Chain 1 Ch 38 5190MHz



### Power Spectral Density 802.11n HT40 Chain 1 Ch 46 5230MHz



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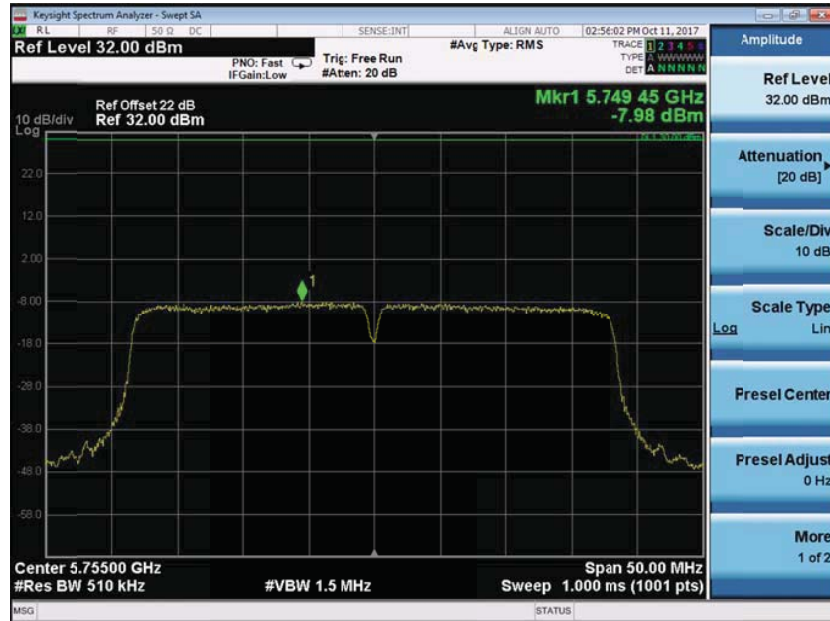
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### Power Spectral Density 802.11n HT40 Chain 1 Ch 151 5755MHz



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