

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

## INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART E AND INDUSTRY CANADA RSS 247 REQUIREMENT

OF

**Product Name:** HiMirror  
**Brand Name:** HiMirror  
**Model No.:** BM618  
**Model Difference:** N/A  
**FCC ID:** 2AJTF-BM618  
**IC:** 21978-BM618  
**Report No.:** E2/2016/A0021  
**Issue Date:** Nov. 01, 2016  
**FCC Rule Part:** §15.407  
**IC Rule Part:** RSS-247 issue 1 May 2015  
**Prepared for:** Cal-Comp Big Data, Inc.  
No. 147, Sec. 3, Beishen Rd., Shenkeng  
Dist., New Taipei City 222, Taiwan (R.O.C.)  
**Prepared by:** SGS Taiwan Ltd.  
Electronics & Communication Laboratory  
No.2, Keji 1st Rd., Guishan District,  
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## VERIFICATION OF COMPLIANCE

**Applicant:** Cal-Comp Big Data, Inc.  
No. 147, Sec. 3, Beishen Rd., Shenkeng Dist., New Taipei City 222,  
Taiwan (R.O.C.)

**Product Name:** HiMirror

**Brand Name:** HiMirror

**Model No.:** BM618

**Model Difference:** N/A

**FCC ID:** 2AJTF-BM618

**IC:** 21978-BM618

**File Number:** E2/2016/A0021

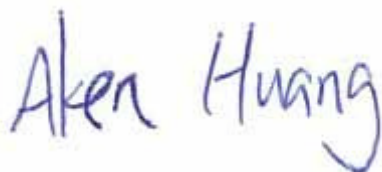
**Date of Test:** Oct. 04, 2016 ~ Oct. 27, 2016

**Date of EUT Received:** Oct. 04, 2016

**We hereby certify that:**

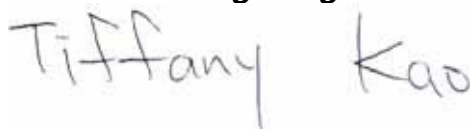
The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10: 2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits.

The test results of this report relate only to the tested sample identified in this report.

**Test By:****Date:**

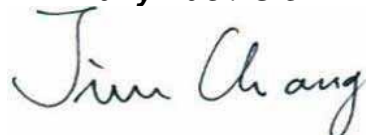
Nov. 01, 2016

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**Aken Huang / Engineer****Prepared By:****Date:**

Nov. 01, 2016

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**Tiffany Kao / Clerk****Approved By:****Date:**

Nov. 01, 2016

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**Jim Chang / Asst. Manager**

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## Revision History

| Report Number | Revision | Description                  | Issue Date    |
|---------------|----------|------------------------------|---------------|
| E2/2016/A0021 | Rev.00   | Initial creation of document | Nov. 01, 2016 |
|               |          |                              |               |
|               |          |                              |               |
|               |          |                              |               |

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## 1. GENERAL INFORMATION

### 1.1 Product Description

General:

|                              |                          |                                                                                                                                                                                                                                                                                                                                                |
|------------------------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Name:                | HiMirror                 |                                                                                                                                                                                                                                                                                                                                                |
| Brand Name:                  | HiMirror                 |                                                                                                                                                                                                                                                                                                                                                |
| Model No.:                   | BM618                    |                                                                                                                                                                                                                                                                                                                                                |
| Model Difference:            | N/A                      |                                                                                                                                                                                                                                                                                                                                                |
| Product SW/HW version:       | N/A / N/A                |                                                                                                                                                                                                                                                                                                                                                |
| Radio SW/HW version:         | N/A / N/A                |                                                                                                                                                                                                                                                                                                                                                |
| Test SW Version:             | N/A                      |                                                                                                                                                                                                                                                                                                                                                |
| RF power setting in TEST SW: | N/A                      |                                                                                                                                                                                                                                                                                                                                                |
| Power Supply:                | 12Vdc from AC/DC adapter |                                                                                                                                                                                                                                                                                                                                                |
|                              | Adapter:                 | <ol style="list-style-type: none"> <li>1. Model No.: 2ABN036F,<br/>Supplier: Channel Well Technology</li> <li>2. Model No.: KSAS0361200300HU<br/>Supplier: Kuantech (Shenzhen) Co., Ltd.</li> <li>3. Model No.: WA-36A12FU,<br/>Supplier: Asian Power Devices Inc.</li> <li>4. Model No.: WAG007,<br/>Supplier: Acbel Polytech Inc.</li> </ol> |

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## WLAN 5GHz:

| Wi-Fi               | Frequency Range   | Channels | Rated Power (Avg.) / (EIRP)                                                                                          | Modulation Technology | Type of Emission |
|---------------------|-------------------|----------|----------------------------------------------------------------------------------------------------------------------|-----------------------|------------------|
| 11a                 | 5150~5250         | 4        | 13.95 dBm (Avg.) /<br>18.45 dBm (EIRP)                                                                               | OFDM                  | 16M5D1D          |
| 11n_20M             | HT20<br>5150~5250 | 4        | HT: 14.20 dBm (Avg.) /<br>21.71 dBm (EIRP)<br>(Worst Case)                                                           | OFDM                  | 17M6D1D          |
| 11n_40M             | HT40<br>5150~5250 | 2        | HT: 14.93dBm (Avg.) /<br>22.44 dBm (EIRP)<br>(Worst Case)                                                            | OFDM                  | 36M3D1D          |
| Antenna Designation |                   |          | PCB Antenna,<br>1. Main<br>5GHz Gain: 4.13dBi (5150MHz-5250MHz)<br><br>2. Aux<br>5GHz Gain: 4.5dBi (5150MHz-5250MHz) |                       |                  |
| Modulation type     |                   |          | 64QAM, 16QAM, QPSK, BPSK for OFDM                                                                                    |                       |                  |
| Transition Rate:    |                   |          | 802.11 a: 6/9/12/18/24/36/48/54 Mbps<br>802.11 n_20MHz: 6.5 – 144.4Mbps<br>802.11 n_40MHz: 13.5 – 300Mbps            |                       |                  |

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## 1.2 Product Feature of Equipment Under Test

The equipment under Test (Hereafter Called: EUT) is supporting Wi-Fi 802.11a/b/g/n, Bluetooth features, and below is details of information.

| Product Feature      |                  |
|----------------------|------------------|
| Product Name:        | HiMirror         |
| Brand Name:          | HiMirror         |
| Model No.:           | BM618            |
| Model Difference:    | N/A              |
| FCC ID:              | 2AJTF-BM618      |
| IC :                 | 21978-BM618      |
| Bluetooth Version    | V4.1 single mode |
| Wi-Fi- Specification | 802.11a/b/g/n    |

**Note:** The above EUT information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

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### 1.3 Test Methodology of Applied Standards

FCC Part 15, Subpart E §15.407

FCC KDB 789033 D02 General UNII Test Procedures New Rules

FCC KDB 662911 D01 Multiple Transmitter Output

FCC KDB 644545 D03 Guidance for IEEE 802.11ac v01

RSS-247 issue 1 May 2015

RSS-Gen issue 4 Nov. 2014

ANSI C63.10:2013

Note:

1. All test items have been performed and record as per the above standards.
2. The composite system is compliance with FCC Subpart B is authorized under the certification procedure.

### 1.4 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd.,  
Guishan District, Taoyuan City, Taiwan 333 (TAF code 0513)

FCC Registration Numbers are: 735305

Canada Registration Number: 4620A-5.

### 1.5 Special Accessories

There are no special accessories used while test was conducted.

### 1.6 Equipment Modifications

There was no modification incorporated into the EUT.

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## 2. SYSTEM TEST CONFIGURATION

### 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz. The CISPR Quasi-Peak and Average detector mode is employed according to §15.207. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

#### 2.3.2 Radiated Emissions

The EUT is placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plan. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

### 2.4 Measurement Results Explanation Example

#### For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

#### Note:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Following shows an offset computation example with cable loss 1.4dB, and 10dB attenuator (SISO) and cable loss 4.4dB, and 10dB attenuator (MIMO).

SISO mode offset = RF cable loss (dB)+ attenuation factor(dB) =11.4(dB)

MIMO mode offset = RF cable loss (dB)+ attenuation factor(dB)+ 10 log(N<sub>ANT</sub>) dB =14.4(dB)

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## 2.5 Configuration of Tested System

Fig. 2-1 Radiated Emission & AC Power Line Conducted Emission

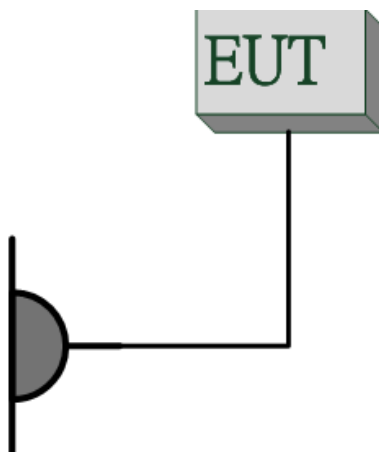


Fig. 2-2 Conducted (Antenna Port) Emission



Table 2-1 Equipment Used in Tested System

| Item | Equipment          | Mfr/Brand | Model/Type No. | Series No. | Data Cable | Power Cord  |
|------|--------------------|-----------|----------------|------------|------------|-------------|
| 1.   | WLAN Test Software | N/A       | N/A            | N/A        | N/A        | N/A         |
| 2.   | Notebook           | Lenovo    | L430           | R9-YYG88   | Shielded   | Un-shielded |
| 3.   | DC Power Supply    | Agilent   | E3640A         | MY52410006 | N/A        | Un-Shielded |

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### 3. SUMMARY OF TEST RESULT

| FCC Rules                | IC Rules                              | Description Of Test                            | Result    |
|--------------------------|---------------------------------------|------------------------------------------------|-----------|
| §15.207                  | RSS-Gen §8.8                          | AC Power Line Conducted Emission               | Compliant |
| §15.403(i)<br>§15.407(e) | RSS-247 §6.2.1~ 4 (1)<br>RSS-Gen §6.6 | 26 dB & 6dB & 99% Emission Bandwidth           | Compliant |
| §15.407(a)               | RSS-247 §6.2.1~ 4 (1)                 | Maximum Conducted Output Power                 | Compliant |
| §15.407(a)               | RSS-247 §6.2.1~ 4 (1)                 | Power Spectral Density                         | Compliant |
| §15.407(b)               | RSS-247 §6.2.1~ 4 (2)                 | Undesirable Radiated Emissions                 | Compliant |
| §15.407(c)               | RSS-247 §6.4                          | Transmission in case of Absence of Information | Compliant |
| §15.407(g)               | RSS-Gen §6.11                         | Frequency Stability                            | Compliant |
| §15.203<br>§15.407(a)    | RSS- Gen §6.7<br>RSS- Gen §8.3        | Antenna Requirement                            | Compliant |

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## 4. DESCRIPTION OF TEST MODES

### 4.1 Operated in U-NII Bands

Operated band in 5150 MHz ~5250 MHz:

4 channels are provided for 802.11a, 802.11n\_HT20

| CHANNEL | FREQUENCY | CHANNEL | FREQUENCY |
|---------|-----------|---------|-----------|
| 36      | 5180 MHz  | 44      | 5220 MHz  |
| 40      | 5200 MHz  | 48      | 5240 MHz  |

2 channels are provided for 802.11n\_HT40

| CHANNEL | FREQUENCY | CHANNEL | FREQUENCY |
|---------|-----------|---------|-----------|
| 38      | 5190 MHz  | 46      | 5230 MHz  |

### 4.2 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Test program used to control the EUT for staying in continuous transmitting mode is programmed.
3. Investigation has been done on all the possible configurations for searching the worst case.

**Note:** Pre-scanned was done on Antenna Main and Antenna Aux, and Antenna Aux results higher emission at 5GHz. Therefore, the completed set of measurement was done on Antenna Main (5GHz) to be presented on this test report.

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# RADIATED EMISSION TEST:

| RADIATED EMISSION TEST (BELOW 1 GHz) |                      |                   |                |            |                  |              |
|--------------------------------------|----------------------|-------------------|----------------|------------|------------------|--------------|
| MODE                                 | FREQUENCY BAND (MHz) | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION | DATA RATE (Mbps) | ANTENNA PORT |
| 802.11a                              | 5180~5240            | 36 to 48          | 36,44,48       | OFDM       | 1                | MAIN         |
| RADIATED EMISSION TEST (ABOVE 1 GHz) |                      |                   |                |            |                  |              |
| MODE                                 | FREQUENCY BAND (MHz) | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION | DATA RATE (Mbps) | ANTENNA PORT |
| 802.11a                              | 5180~5240            | 36 to 48          | 36,44,48       | OFDM       | 1                | MAIN         |
| 802.11n_HT20                         |                      |                   |                | OFDM       | MCS8             | MIMO         |
| 802.11n_HT40                         | 5190~5230            | 38 to 46          | 38,46          | OFDM       | MCS8             | MIMO         |

## Note:

The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for 802.11a/n WLAN Transmitter for channel Low, Mid and High, the worst case E2 position was reported.

# ANTENNA PORT CONDUCTED MEASUREMENT:

| CONDUCTED TEST |                      |                   |                |            |                  |              |
|----------------|----------------------|-------------------|----------------|------------|------------------|--------------|
| MODE           | FREQUENCY BAND (MHz) | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION | DATA RATE (Mbps) | ANTENNA PORT |
| 802.11a        | 5180~5240            | 36 to 48          | 36,44,48       | OFDM       | 1                | MAIN         |
| 802.11n_HT20   |                      |                   |                | OFDM       | MCS8             | MIMO         |
| 802.11n_HT40   | 5190~5230            | 38 to 46          | 38,46          | OFDM       | MCS8             | MIMO         |

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## 5. MEASUREMENT UNCERTAINTY

| Test Items                              | Uncertainty                |
|-----------------------------------------|----------------------------|
| AC Power Line Conducted Emission        | +/- 2.586 dB               |
| 26dB & 6dB Emission Bandwidth           | +/- 123.36 Hz              |
| The Maximum Output Power Measurement    | +/- 0.96 dB                |
| Peak Power Spectral Density Measurement | +/- 1.67 dB                |
| Frequency Stability                     | +/- 123.36 Hz              |
| Temperature                             | +/- 0.65 °C                |
| Humidity                                | +/- 4.6 %                  |
| DC / AC Power Source                    | DC= +/- 0.13%, AC=+/- 0.2% |

### Radiated Spurious Emission:

|                                                              |                            |
|--------------------------------------------------------------|----------------------------|
| Measurement uncertainty<br>(Polarization : <b>Vertical</b> ) | 9kHz-30MHz: +/-2.87dB      |
|                                                              | 30MHz - 180MHz: +/- 3.37dB |
|                                                              | 180MHz -417MHz: +/- 3.19dB |
|                                                              | 0.417GHz-1GHz: +/- 3.19dB  |
|                                                              | 1GHz - 18GHz: +/- 4.04dB   |
|                                                              | 18GHz - 40GHz: +/- 4.04dB  |

|                                                                |                            |
|----------------------------------------------------------------|----------------------------|
| Measurement uncertainty<br>(Polarization : <b>Horizontal</b> ) | 9kHz-30MHz: +/-2.87dB      |
|                                                                | 30MHz - 167MHz: +/- 4.22dB |
|                                                                | 167MHz -500MHz: +/- 3.44dB |
|                                                                | 0.5GHz-1GHz: +/- 3.39dB    |
|                                                                | 1GHz - 18GHz: +/- 4.08dB   |
|                                                                | 18GHz - 40GHz: +/- 4.08dB  |

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

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## 6. CONDUCTED EMISSION TEST

### 6.1. Standard Applicable

Frequency range within 150 kHz to 30 MHz shall not exceed the Limit table as below.

| Frequency range<br>MHz                                                                                                                                                              | Limits<br>dB(uV) |          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|----------|
|                                                                                                                                                                                     | Quasi-peak       | Average  |
| 0.15 to 0.50                                                                                                                                                                        | 66 to 56         | 56 to 46 |
| 0.50 to 5                                                                                                                                                                           | 56               | 46       |
| 5 to 30                                                                                                                                                                             | 60               | 50       |
| <b>Note</b><br>1.The lower limit shall apply at the transition frequencies<br>2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz. |                  |          |

### 6.2. Measurement Equipment Used

| Conducted Emission Test Site |             |                       |                  |              |            |
|------------------------------|-------------|-----------------------|------------------|--------------|------------|
| EQUIPMENT<br>TYPE            | MFR         | MODEL<br>NUMBER       | SERIAL<br>NUMBER | LAST<br>CAL. | CAL DUE.   |
| EMI Test Receiver            | R&S         | ESCI 7                | 100950           | 12/12/2015   | 12/11/2016 |
| Coaxial Cables               | N/A         | N30N30-1042-150<br>cm | N/A              | 02/07/2016   | 02/06/2017 |
| LISN                         | Schwarzbeck | NSLK 8127             | 8127-648         | 03/11/2016   | 03/10/2017 |
| Test Software                | Farad       | EZ-EMC                | Ver.<br>SGS-03A2 | N.C.R.       | N.C.R.     |

### 6.3. EUT Setup

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The LISN was connected with 120Vac/60Hz power source.

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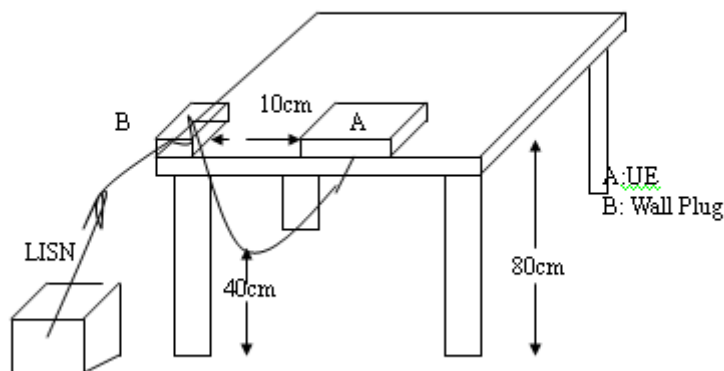
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## 6.4. Test SET-UP



## 6.5. Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all phases of power being supplied by given UE are completed.

## 6.6. Measurement Result

Note: Refer to next page for measurement data and plots.

Note2: The \* reveals the worst-case results that closet to the limit

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## AC POWER LINE CONDUCTED EMISSION TEST DATA

|                 |                |            |               |
|-----------------|----------------|------------|---------------|
| Operation Mode: | Operation mode | Test Date: | Oct. 07, 2016 |
| Temperature:    | 20             |            |               |

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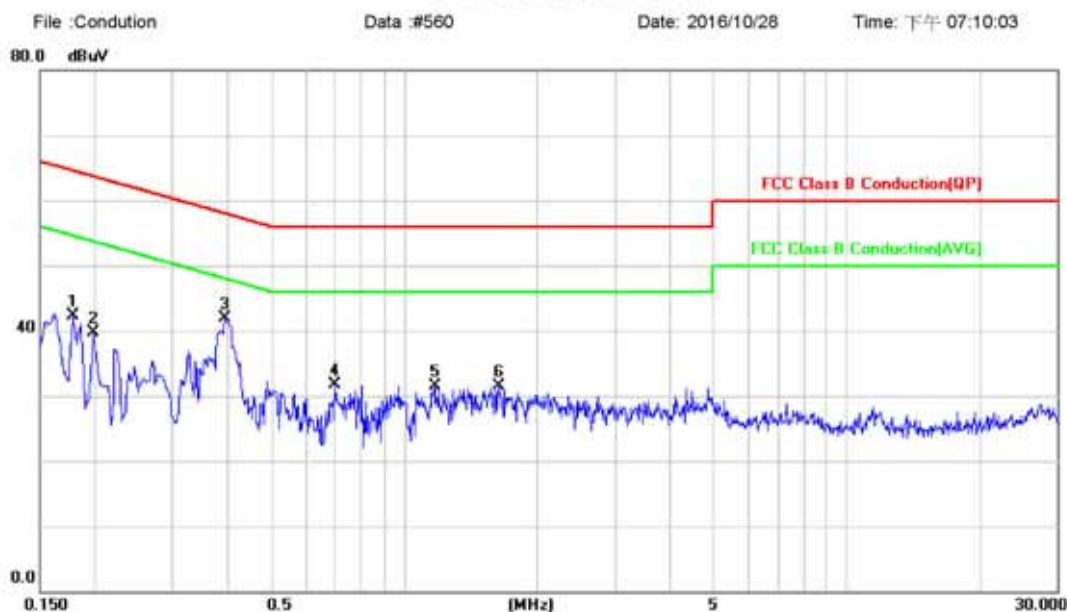
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Site : Conduction Room Phase: **N** Temperature: 25 °C  
Limit: FCC Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 56 %  
Mode: 2ABN036F  
Note:

## Conducted Emission



| No. | Mk. | Freq.  | Reading Level | Correct Factor | Measurement | Limit | Over   |          |         |
|-----|-----|--------|---------------|----------------|-------------|-------|--------|----------|---------|
|     |     | MHz    | dBuV          | dB             | dBuV        | dBuV  | dB     | Detector | Comment |
| 1   |     | 0.1780 | 22.60         | 19.72          | 42.32       | 64.58 | -22.26 | peak     |         |
| 2   |     | 0.1980 | 20.07         | 19.72          | 39.79       | 63.69 | -23.90 | peak     |         |
| 3   | *   | 0.3940 | 22.12         | 19.84          | 41.96       | 57.98 | -16.02 | peak     |         |
| 4   |     | 0.6980 | 11.74         | 19.91          | 31.65       | 56.00 | -24.35 | peak     |         |
| 5   |     | 1.1740 | 11.58         | 19.92          | 31.50       | 56.00 | -24.50 | peak     |         |
| 6   |     | 1.6420 | 11.53         | 19.93          | 31.46       | 56.00 | -24.54 | peak     |         |

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|                 |                |            |               |
|-----------------|----------------|------------|---------------|
| Operation Mode: | Operation mode | Test Date: | Oct. 07, 2016 |
| Temperature:    | 20             |            |               |

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Site : Conduction Room Phase: **N** Temperature: 25 °C  
 Limit: FCC Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 56 %  
 Mode: KSAS0361200300HU  
 Note:

## Conducted Emission



| No. | Mk. | Freq.  | Reading Level | Correct Factor | Measurement | Limit | Over   | Detector | Comment |
|-----|-----|--------|---------------|----------------|-------------|-------|--------|----------|---------|
|     |     | MHz    | dBuV          | dB             | dBuV        | dBuV  | dB     |          |         |
| 1   |     | 0.1500 | 29.01         | 19.73          | 48.74       | 66.00 | -17.26 | peak     |         |
| 2   |     | 0.1660 | 26.49         | 19.73          | 46.22       | 65.16 | -18.94 | peak     |         |
| 3 * |     | 0.1740 | 31.27         | 19.73          | 51.00       | 64.77 | -13.77 | peak     |         |
| 4   |     | 0.1980 | 28.00         | 19.72          | 47.72       | 63.69 | -15.97 | peak     |         |
| 5   |     | 0.2300 | 24.28         | 19.74          | 44.02       | 62.45 | -18.43 | peak     |         |
| 6   |     | 0.5980 | 18.42         | 19.91          | 38.33       | 56.00 | -17.67 | peak     |         |

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|                 |                |            |               |
|-----------------|----------------|------------|---------------|
| Operation Mode: | Operation mode | Test Date: | Oct. 07, 2016 |
| Temperature:    | 20             |            |               |

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Site : Conduction Room

Phase: **N**

Temperature: 25 ℃

Limit: FCC Class B Conduction(QP)

Power: AC 120V/60Hz

Humidity: 56 %

Mode: WA-36A12FU

Note:

## Conducted Emission



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|------------|----------|---------|
| 1   |     | 0.1580       | 21.45                    | 19.73                   | 41.18                    | 65.57         | -24.39     | peak     |         |
| 2   |     | 0.4780       | 13.58                    | 19.90                   | 33.48                    | 56.37         | -22.89     | peak     |         |
| 3   | *   | 0.7260       | 15.00                    | 19.92                   | 34.92                    | 56.00         | -21.08     | peak     |         |
| 4   |     | 0.8300       | 13.41                    | 19.92                   | 33.33                    | 56.00         | -22.67     | peak     |         |
| 5   |     | 1.2740       | 9.93                     | 19.93                   | 29.86                    | 56.00         | -26.14     | peak     |         |
| 6   |     | 3.9740       | 7.97                     | 19.97                   | 27.94                    | 56.00         | -28.06     | peak     |         |

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|-----------------|----------------|------------|---------------|
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Site : Conduction Room Phase: **N** Temperature: 25 °C  
Limit: FCC Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 56 %  
Mode: WAG007  
Note:

## Conducted Emission



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|------------|----------|---------|
| 1   | *   | 0.1540       | 34.70                    | 19.73                   | 54.43                    | 65.78         | -11.35     | QP       |         |
| 2   |     | 0.1540       | 16.30                    | 19.73                   | 36.03                    | 55.78         | -19.75     | AVG      |         |
| 3   |     | 0.1900       | 28.05                    | 19.72                   | 47.77                    | 64.04         | -16.27     | peak     |         |
| 4   |     | 0.1980       | 28.23                    | 19.72                   | 47.95                    | 63.69         | -15.74     | peak     |         |
| 5   |     | 0.2380       | 22.44                    | 19.75                   | 42.19                    | 62.17         | -19.98     | peak     |         |
| 6   |     | 0.2780       | 21.14                    | 19.77                   | 40.91                    | 60.88         | -19.97     | peak     |         |
| 7   |     | 0.3220       | 18.26                    | 19.79                   | 38.05                    | 59.66         | -21.61     | peak     |         |

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## 7. DUTY CYCLE TEST SIGNAL

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle.

All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

### Formula:

$$\text{Duty Cycle} = \text{Ton} / (\text{Ton} + \text{Toff})$$

### Measurement Procedure:

1. Set span = Zero
2. RBW = 8MHz
3. VBW = 8MHz,
4. Detector = Peak

Duty Cycle:

| Mode       | Duty Cycle (%) | Duty Factor (dB)<br>=10*log ( 1/Duty |
|------------|----------------|--------------------------------------|
| 802.11a    | 97.46          | 0.11                                 |
| 802.11n_20 | 94.53          | 0.24                                 |
| 802.11n_40 | 90.00          | 0.46                                 |

Duty Cycle Factor:  $10 * \log(1/0.9746) = 0.11$

Duty Cycle Factor:  $10 * \log(1/0.9453) = 0.24$

Duty Cycle Factor:  $10 * \log(1/0.9) = 0.46$

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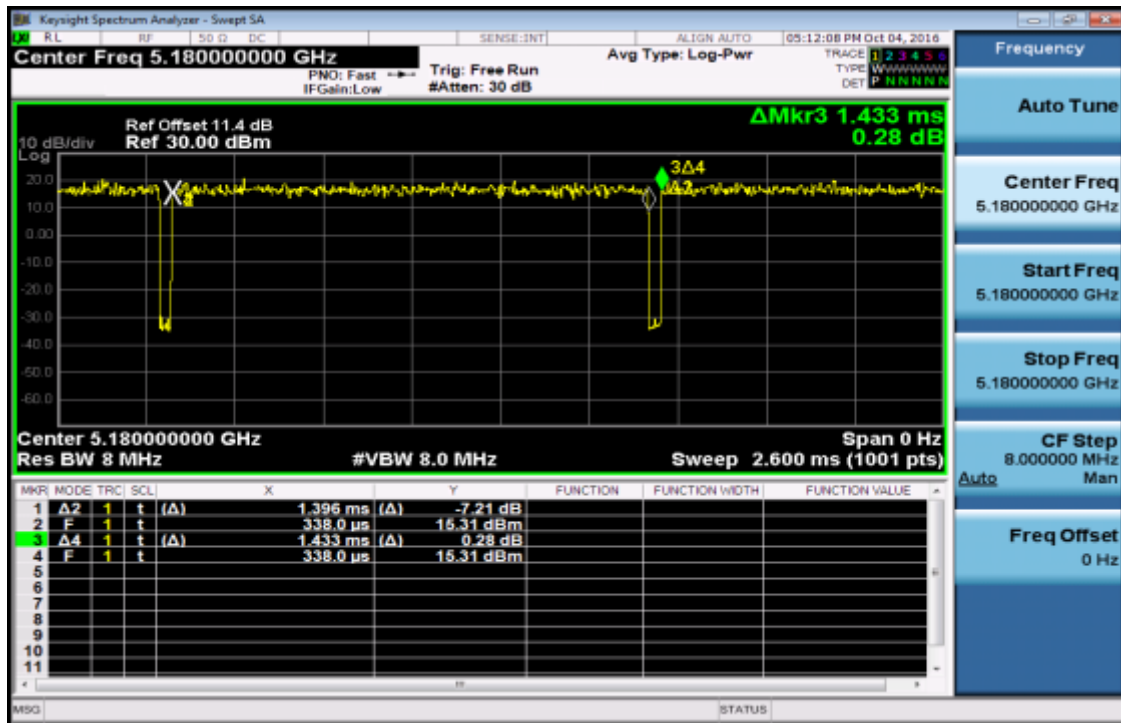
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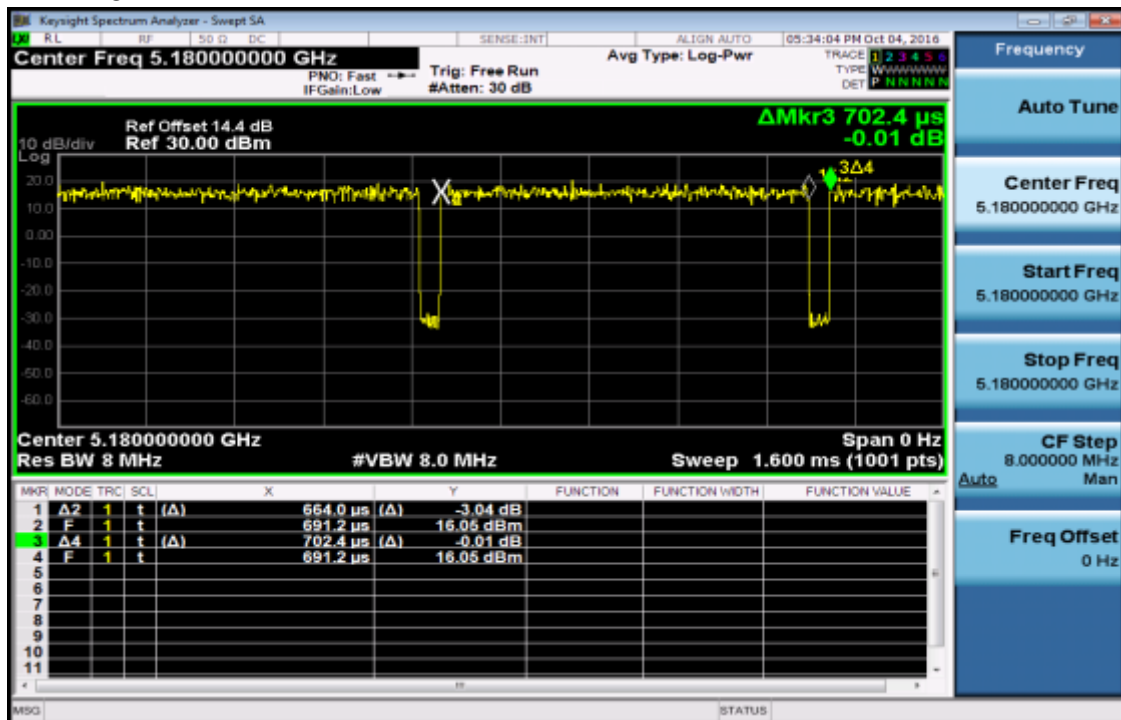
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## DUTY CYCLE TEST SIGNAL Measurement Result

### 802.11a



### 802.11n HT20



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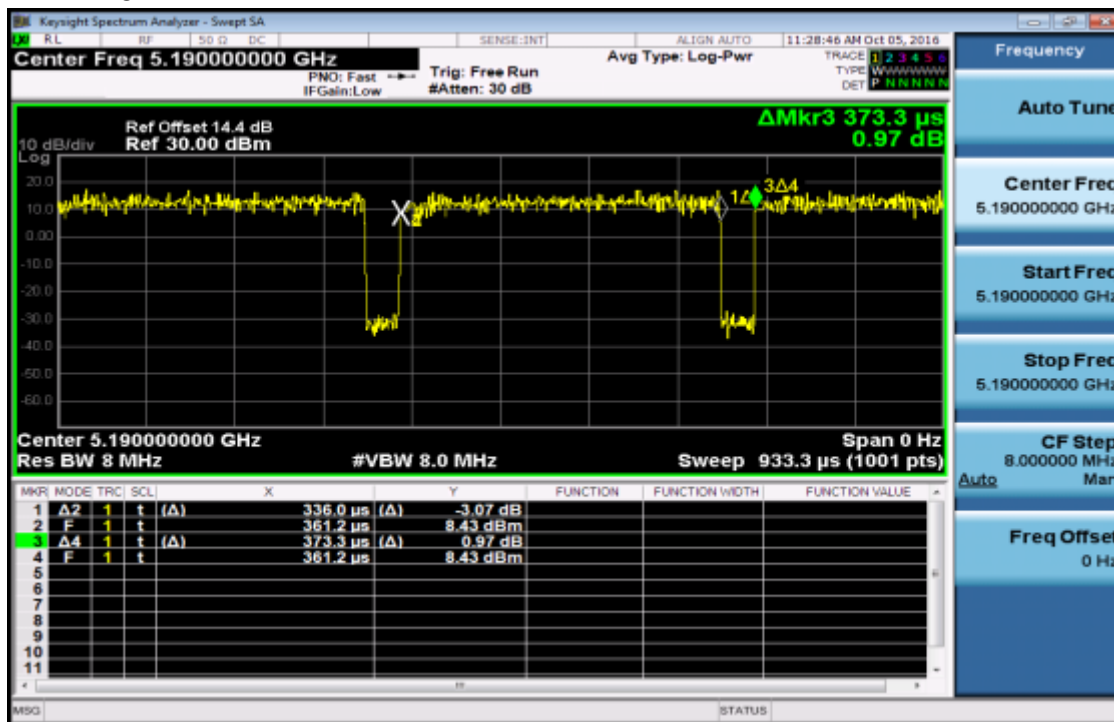
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## 802.11n HT 40



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## 8. 26dB & 99% EMISSION BANDWIDTH MEASUREMENT

### 8.1 Standard Applicable

There is no limit bandwidth for U-NII-1, U-NII-2-A and U-NII-2-C.

The minimum of 6dB Bandwidth measurement is 0.5 MHz for U-NII-3

### 8.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the Antenna port to the spectrum analyzer.
  - a. 26dB Band width Measurement: Set the spectrum analyzer as 1% of emission BW Sweep=auto, Detector = Peak, Trace Mode = Max Hold, Manually readjust RBW until the RBW/EBW ratio is 1% based on EBW as observed on the result of pre-sequence measurement.
  - b. Mark the peak frequency and -26dB (upper and lower) frequency.
4. Repeat the procedures as list above until all test default channels (low, middle, and high) are completed.
5. Minimum Emission Bandwidth for the band 5.725-5.850GHz.
  - a. Set the spectrum analyzer as RBW = 100 kHz, VBW = 3\*RBW, Span = 30M/50MHz, Detector=Peak, Sweep=auto
  - b. Mark the peak frequency and -6dB (upper and lower) frequency.
6. Repeat above procedures until all test default channel measured were complete.

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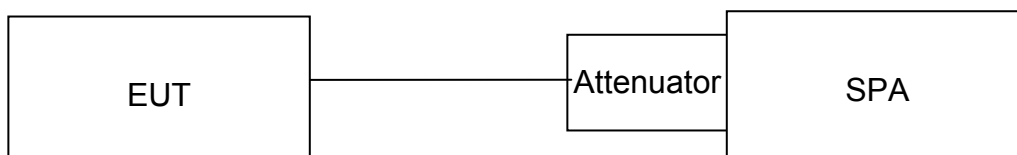
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### 8.3 Measurement Equipment Used

| SGS Conducted Room    |              |                |               |                  |                 |
|-----------------------|--------------|----------------|---------------|------------------|-----------------|
| Name of Equipment     | Manufacturer | Model          | Serial Number | Calibration Date | Calibration Due |
| Spectrum Analyzer     | KEYSIGHT     | N9010A         | MY54510568    | 04/14/2016       | 04/13/2017      |
| Power Meter           | Anritsu      | ML2496A        | 1326001       | 06/23/2016       | 06/22/2017      |
| Power Sensor          | Anritsu      | MA2411B        | 1315048       | 06/23/2016       | 06/22/2017      |
| Power Sensor          | Anritsu      | MA2411B        | 1315049       | 06/23/2016       | 06/22/2017      |
| Coaxial Cable<br>30cm | WOKEN        | 00100A1F1A195C | RF01          | 12/12/2015       | 12/11/2016      |
| DC Block              | PASTERNAK    | PE8210         | RF29          | 12/12/2015       | 12/11/2016      |
| Splitter              | RF-LAMBDA    | RFLT2W1G18G    | RF35          | 12/12/2015       | 12/11/2016      |
| Attenuator            | WOKEN        | 218FS-10       | RF23          | 12/12/2015       | 12/11/2016      |
| DC Power Supply       | Agilent      | E3640A         | MY53140006    | 05/04/2016       | 05/03/2017      |

### 8.4 Test Set-up



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## 8.5 Measurement Result

### 26dB Bandwidth

802.11a\_Main

| Frequency (MHz) | 26dB BW (MHz) | 10 Log (B) (dB) |
|-----------------|---------------|-----------------|
| 5180            | 19.95         | 12.998          |
| 5220            | 18.57         | 12.689          |
| 5240            | 19.76         | 12.957          |

802.11a\_Aux1

| Frequency (MHz) | 26dB BW (MHz) | 10 Log (B) (dB) |
|-----------------|---------------|-----------------|
| 5180            | 18.77         | 12.735          |
| 5220            | 27.28         | 14.359          |
| 5240            | 18.53         | 12.679          |

802.11n\_HT20\_Main

| Frequency (MHz) | 26dB BW (MHz) | 10 Log (B) (dB) |
|-----------------|---------------|-----------------|
| 5180            | 22.49         | 13.519          |
| 5220            | 20.67         | 13.154          |
| 5240            | 22.54         | 13.530          |

802.11n\_HT20\_Aux1

| Frequency (MHz) | 26dB BW (MHz) | 10 Log (B) (dB) |
|-----------------|---------------|-----------------|
| 5180            | 19.05         | 12.798          |
| 5220            | 18.93         | 12.772          |
| 5240            | 18.84         | 12.752          |

802.11n\_HT40\_Main

| Frequency (MHz) | 26dB BW (MHz) | 10 Log (B) (dB) |
|-----------------|---------------|-----------------|
| 5190            | 46.63         | 16.686          |
| 5230            | 46.59         | 16.683          |

802.11n\_HT40\_Aux1

| Frequency (MHz) | 26dB BW (MHz) | 10 Log (B) (dB) |
|-----------------|---------------|-----------------|
| 5190            | 45.62         | 16.592          |
| 5230            | 49.81         | 16.973          |

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**99% Emission Bandwidth****(5150~5250 MHz)**

802.11a

Main

| Frequency (MHz) | Measured Frequency (MHz) | Limit (MHz) |
|-----------------|--------------------------|-------------|
| 5240            | 5248.07                  | < 5250      |

Aux

| Frequency (MHz) | Measured Frequency (MHz) | Limit (MHz) |
|-----------------|--------------------------|-------------|
| 5240            | 5248.07                  | < 5250      |

802.11n HT20

Main

| Frequency (MHz) | Measured Frequency (MHz) | Limit (MHz) |
|-----------------|--------------------------|-------------|
| 5240            | 5248.64                  | < 5250      |

Aux

| Frequency (MHz) | Measured Frequency (MHz) | Limit (MHz) |
|-----------------|--------------------------|-------------|
| 5240            | 5248.64                  | < 5250      |

802.11n HT40

Main

| Frequency (MHz) | Measured Frequency (MHz) | Limit (MHz) |
|-----------------|--------------------------|-------------|
| 5230            | 5248.05                  | < 5250      |

Aux

| Frequency (MHz) | Measured Frequency (MHz) | Limit (MHz) |
|-----------------|--------------------------|-------------|
| 5230            | 5248.05                  | < 5250      |

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## 99% Bandwidth

802.11a\_Main

| Frequency (MHz) | 99% BW (MHz) | 10 Log (B) (dB) |
|-----------------|--------------|-----------------|
| 5180            | 16.415       | 12.152          |
| 5220            | 16.367       | 12.140          |
| 5240            | 16.456       | 12.163          |

802.11a\_Aux1

| Frequency (MHz) | 99% BW (MHz) | 10 Log (B) (dB) |
|-----------------|--------------|-----------------|
| 5180            | 16.209       | 12.098          |
| 5220            | 16.413       | 12.152          |
| 5240            | 16.324       | 12.128          |

802.11n\_HT20\_Main

| Frequency (MHz) | 99% BW (MHz) | 10 Log (B) (dB) |
|-----------------|--------------|-----------------|
| 5180            | 17.557       | 12.445          |
| 5220            | 17.513       | 12.434          |
| 5240            | 17.559       | 12.445          |

802.11n\_HT20\_Aux1

| Frequency (MHz) | 99% BW (MHz) | 10 Log (B) (dB) |
|-----------------|--------------|-----------------|
| 5180            | 17.543       | 12.441          |
| 5220            | 17.378       | 12.400          |
| 5240            | 17.491       | 12.428          |

802.11n\_HT40\_Main

| Frequency (MHz) | 99% BW (MHz) | 10 Log (B) (dB) |
|-----------------|--------------|-----------------|
| 5190            | 36.261       | 15.594          |
| 5230            | 36.312       | 15.601          |

802.11n\_HT40\_Aux1

| Frequency (MHz) | 99% BW (MHz) | 10 Log (B) (dB) |
|-----------------|--------------|-----------------|
| 5190            | 36.168       | 15.583          |
| 5230            | 36.299       | 15.599          |

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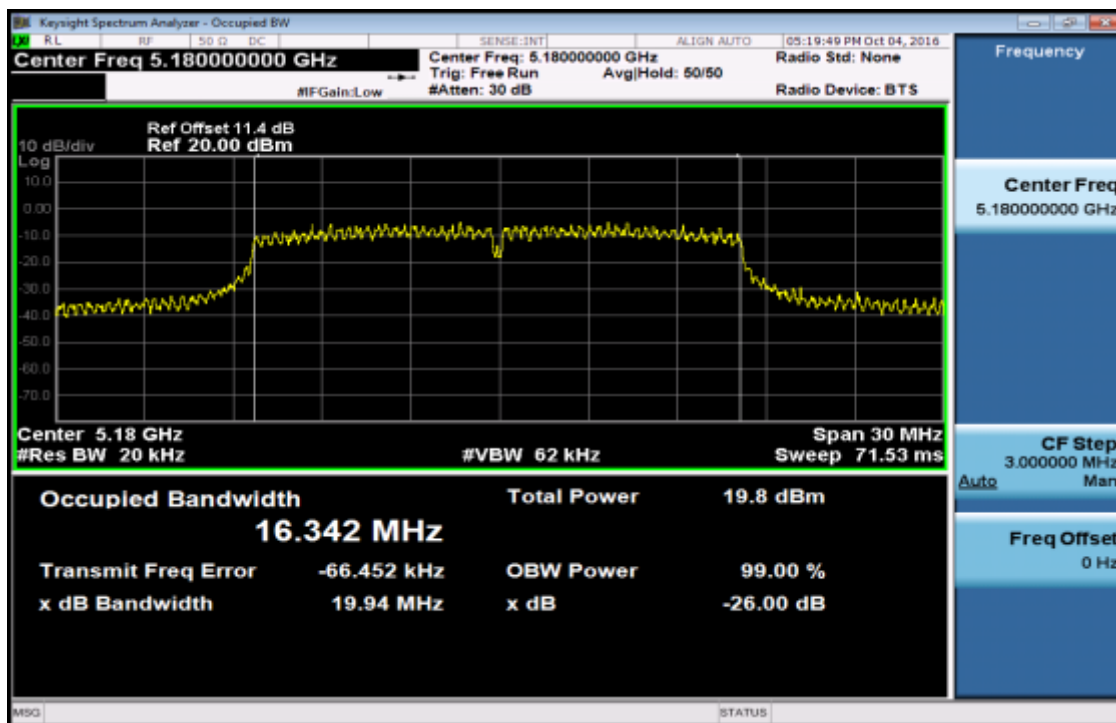
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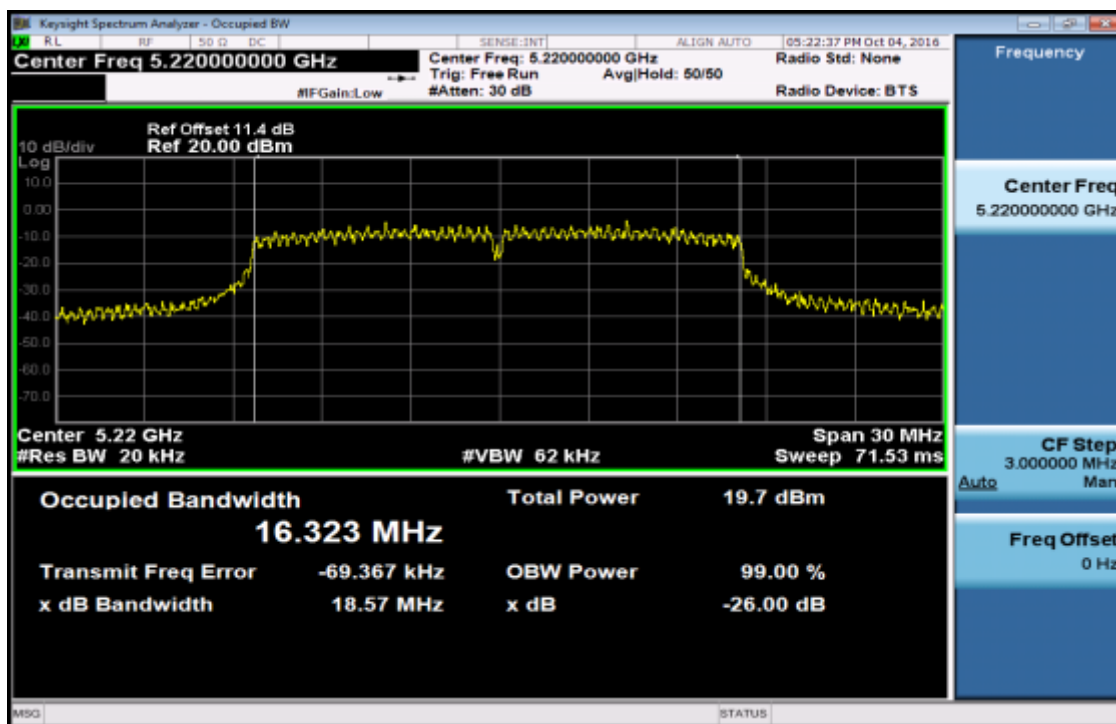
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## 802.11a, 5150~5250 MHz (Main)

### 26dB Band Width Test Data CH-Low (5180MHz)



### 26dB Band Width Test Data CH-Mid (5220MHz)



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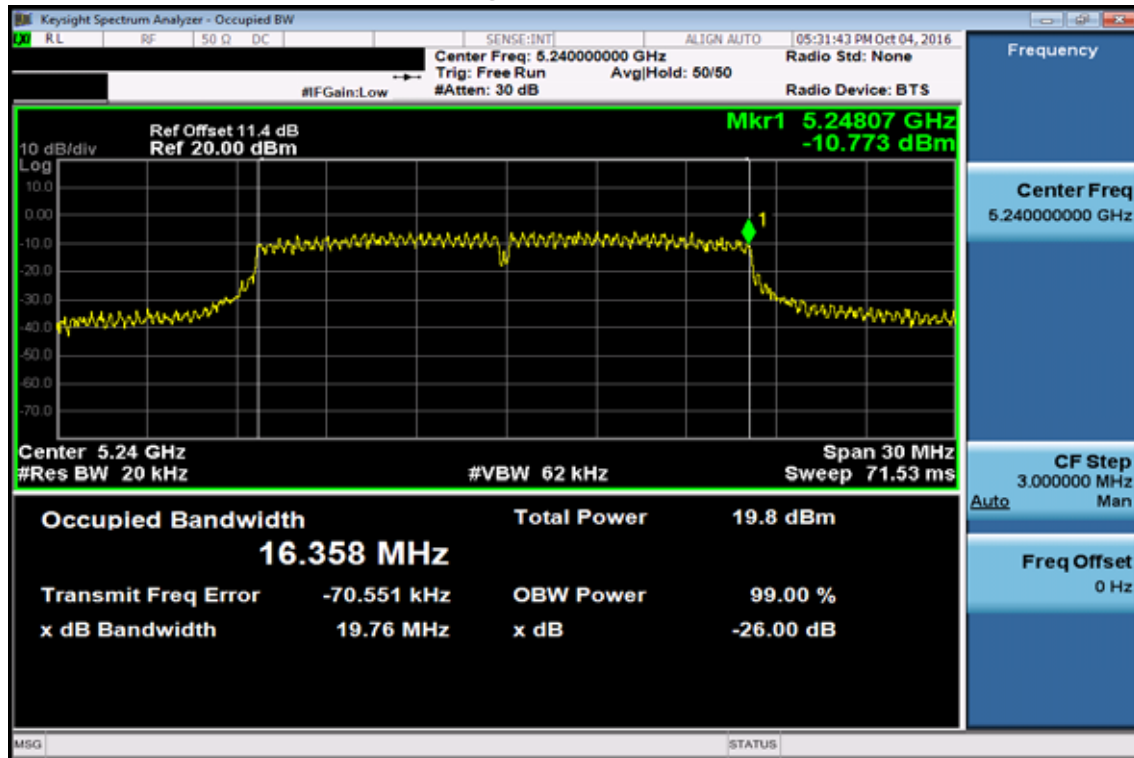
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## 26dB Band Width Test Data CH-High (5240MHz)



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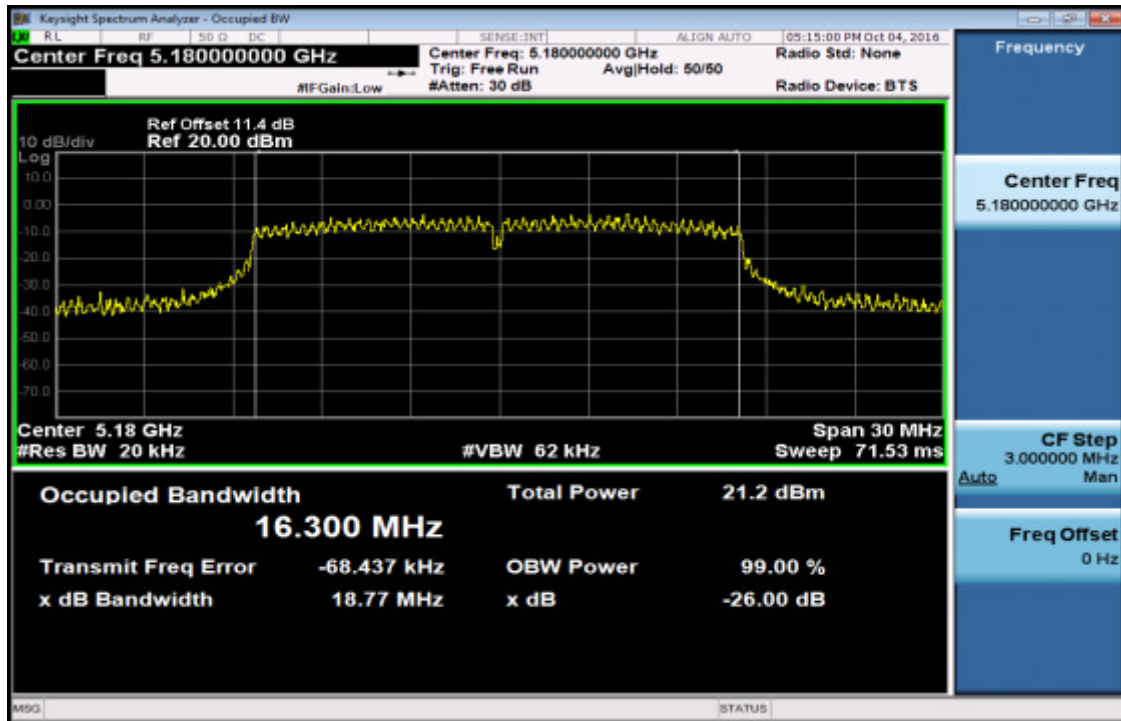
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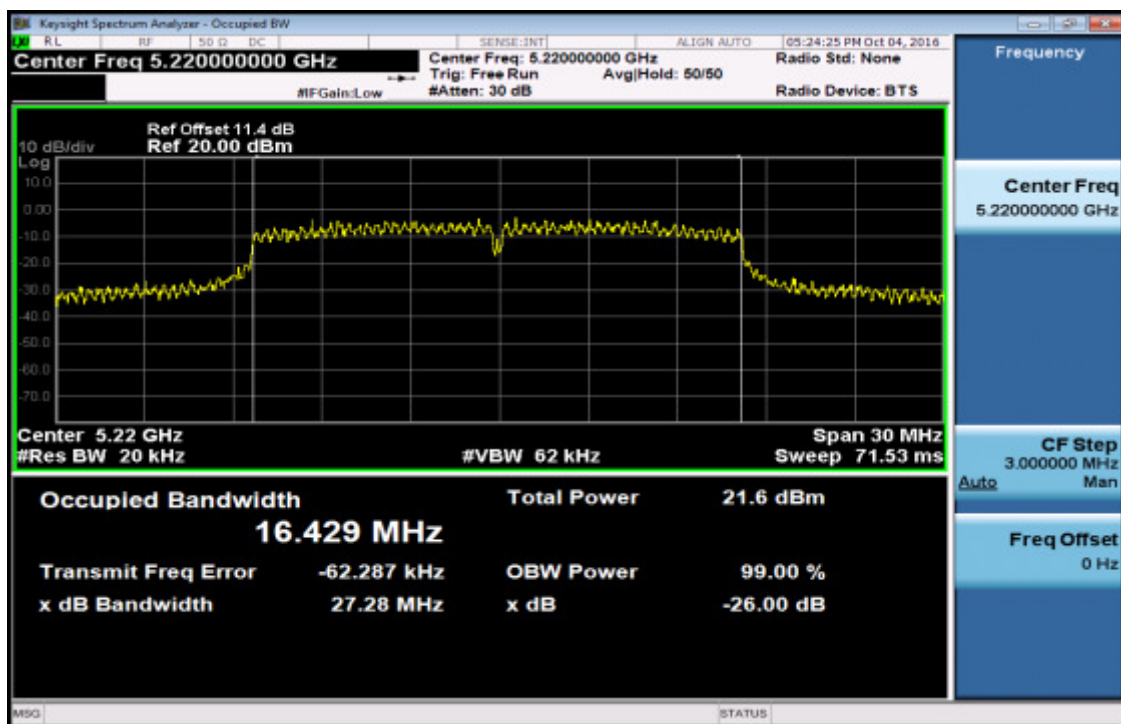
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## 802.11a, 5150~5250 MHz (Aux) 26dB Band Width Test Data CH-Low (5180MHz)



## 26dB Band Width Test Data CH-Mid (5220MHz)



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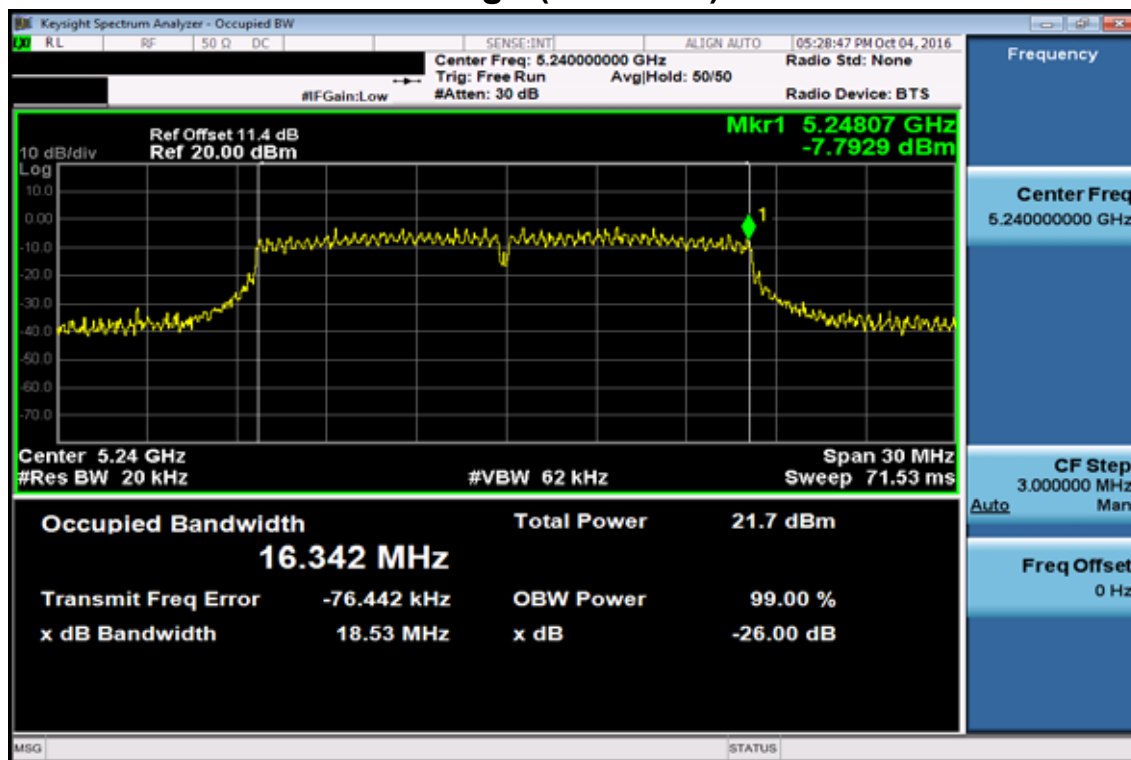
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## 26dB Band Width Test Data CH-High (5240MHz)



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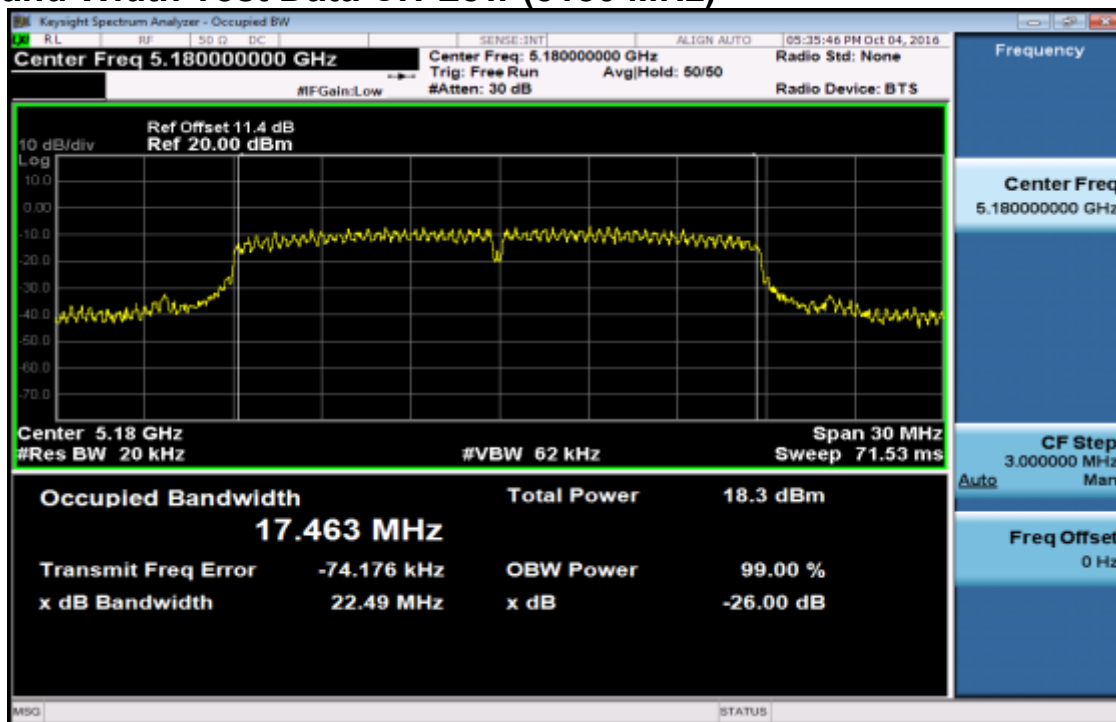
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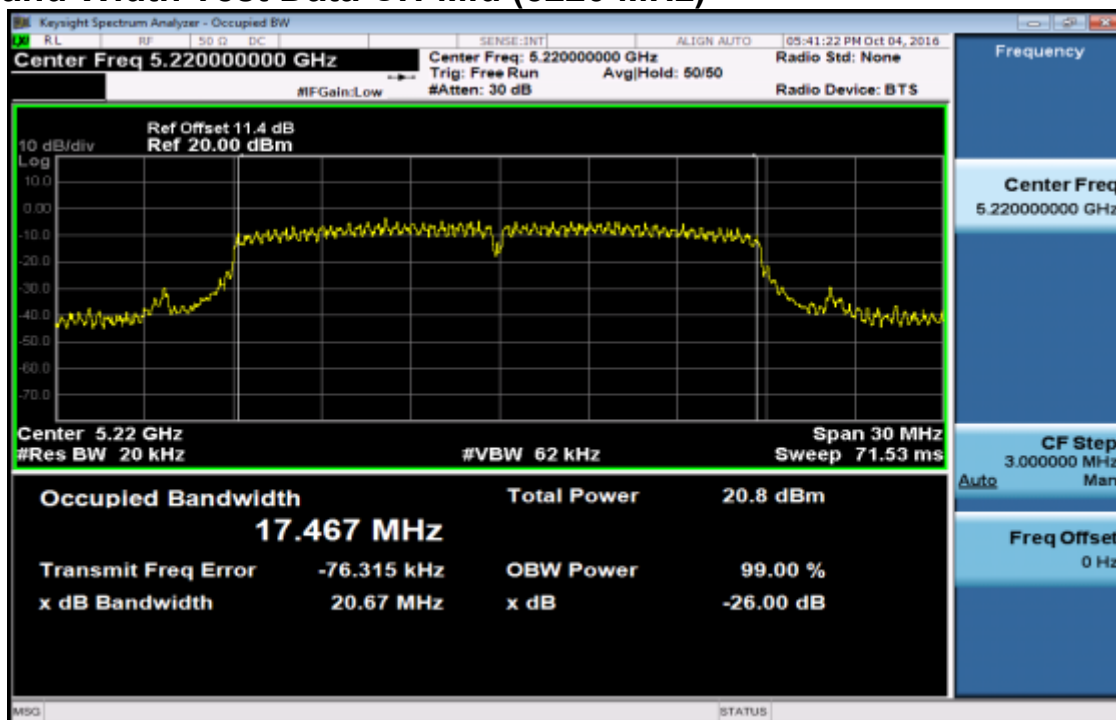
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## 802.11n HT20, 5150~5250 MHz (Main) 26dB Band Width Test Data CH-Low (5180 MHz)



## 26dB Band Width Test Data CH-Mid (5220 MHz)



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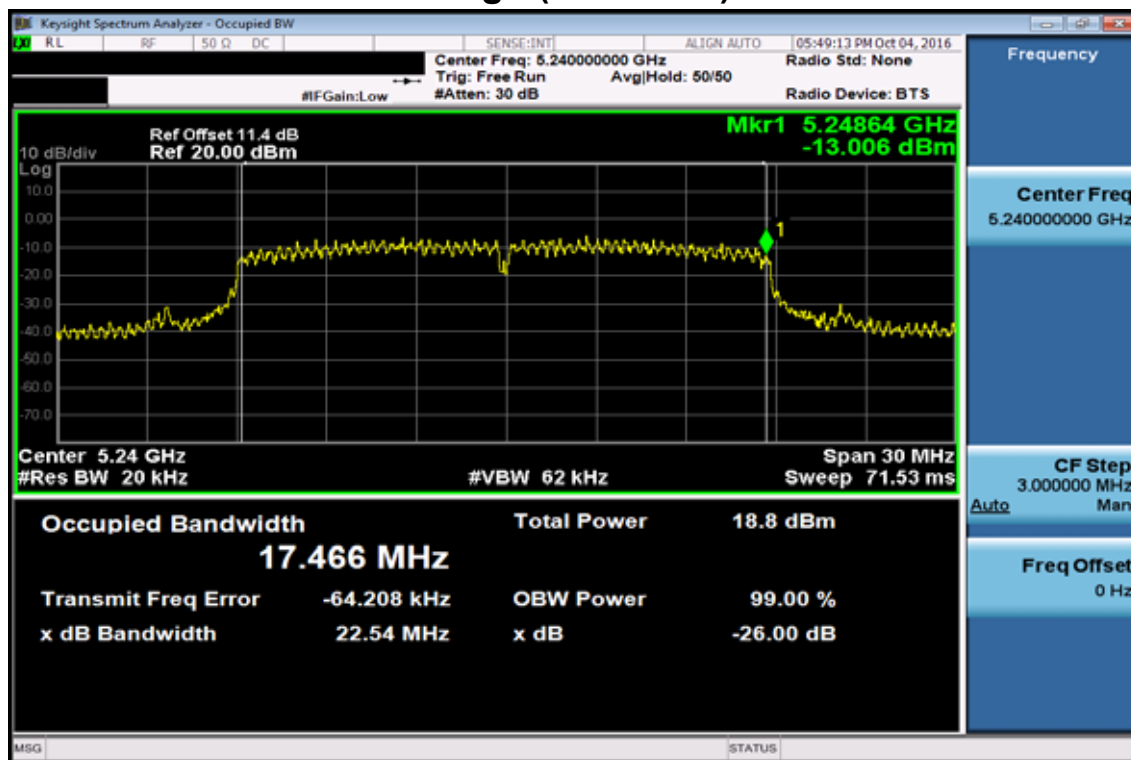
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## 26dB Band Width Test Data CH-High (5240 MHz)



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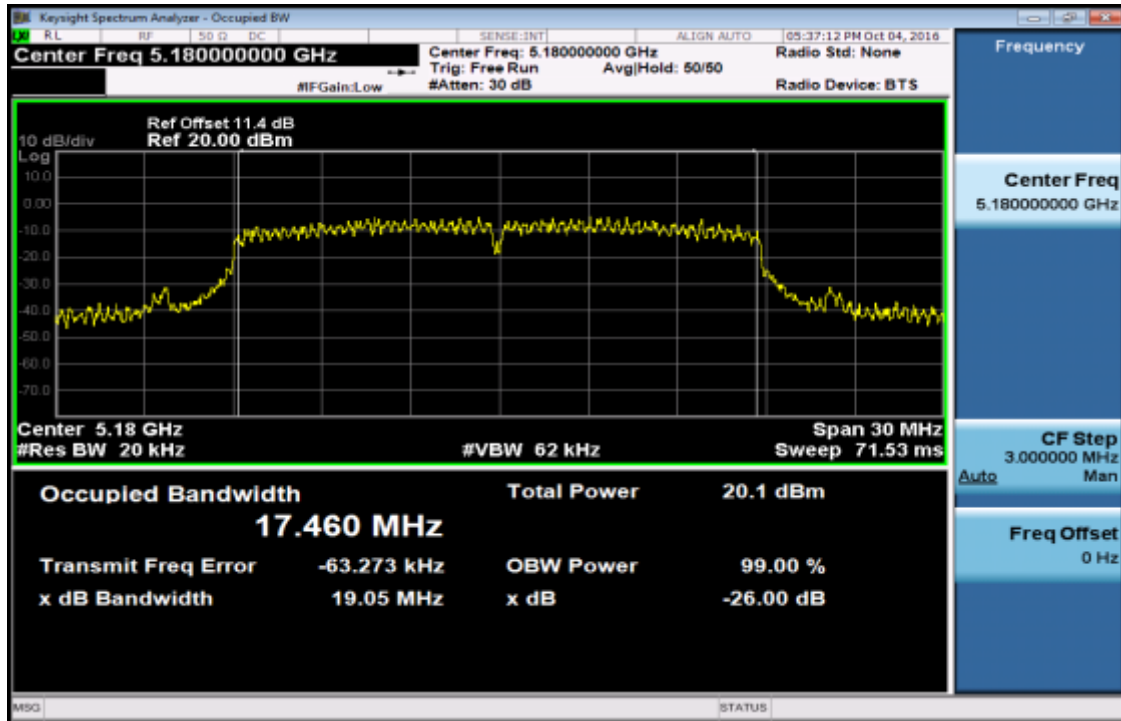
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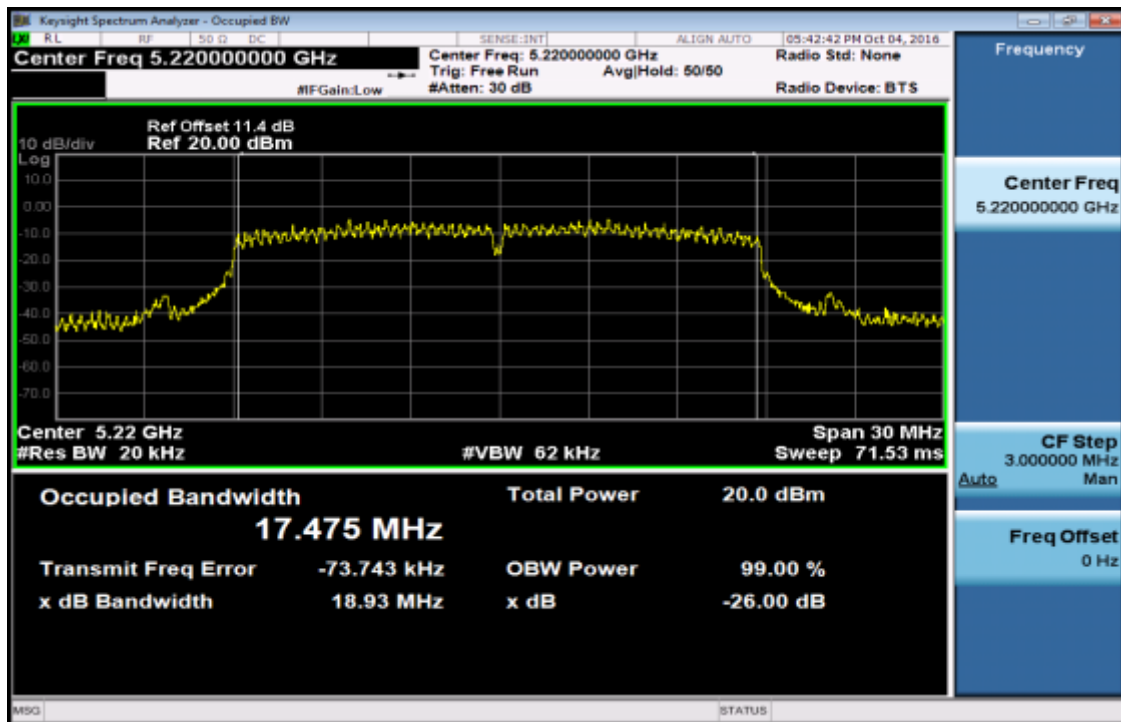
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## 802.11n HT20, 5150~5250 MHz (Aux1) 26dB Band Width Test Data CH-Low (5180 MHz)



## 26dB Band Width Test Data CH-Mid (5220 MHz)



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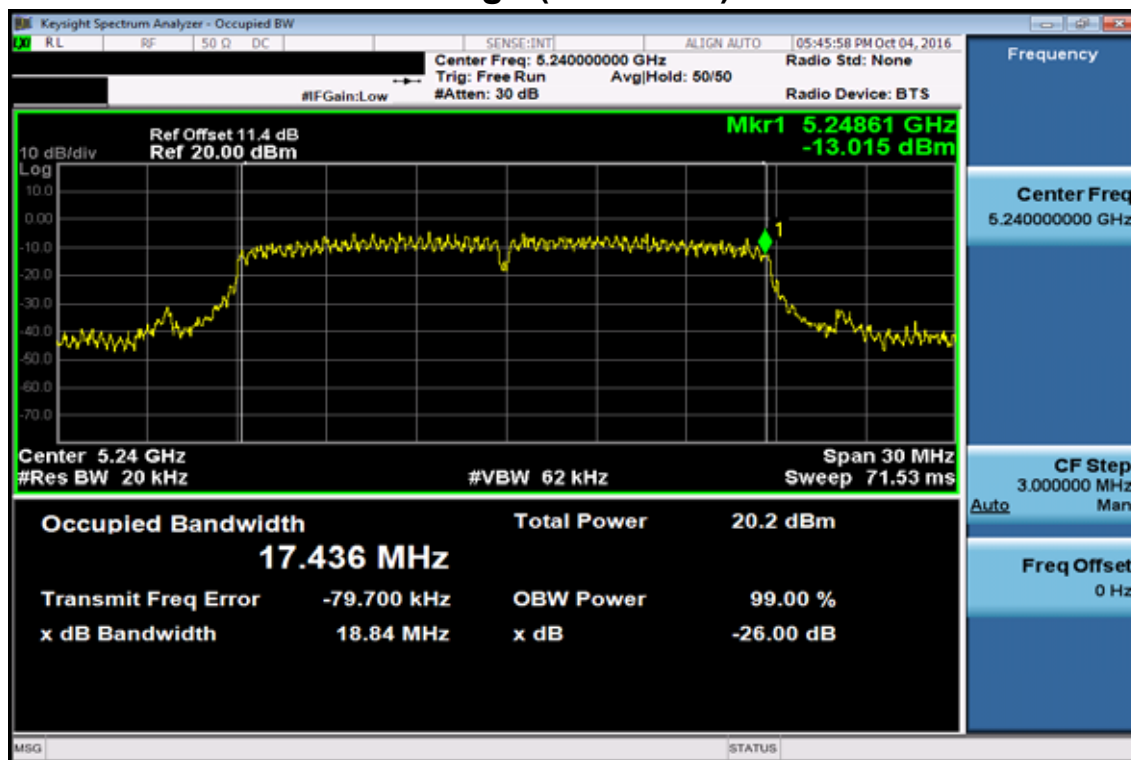
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## 26dB Band Width Test Data CH-High (5240 MHz)



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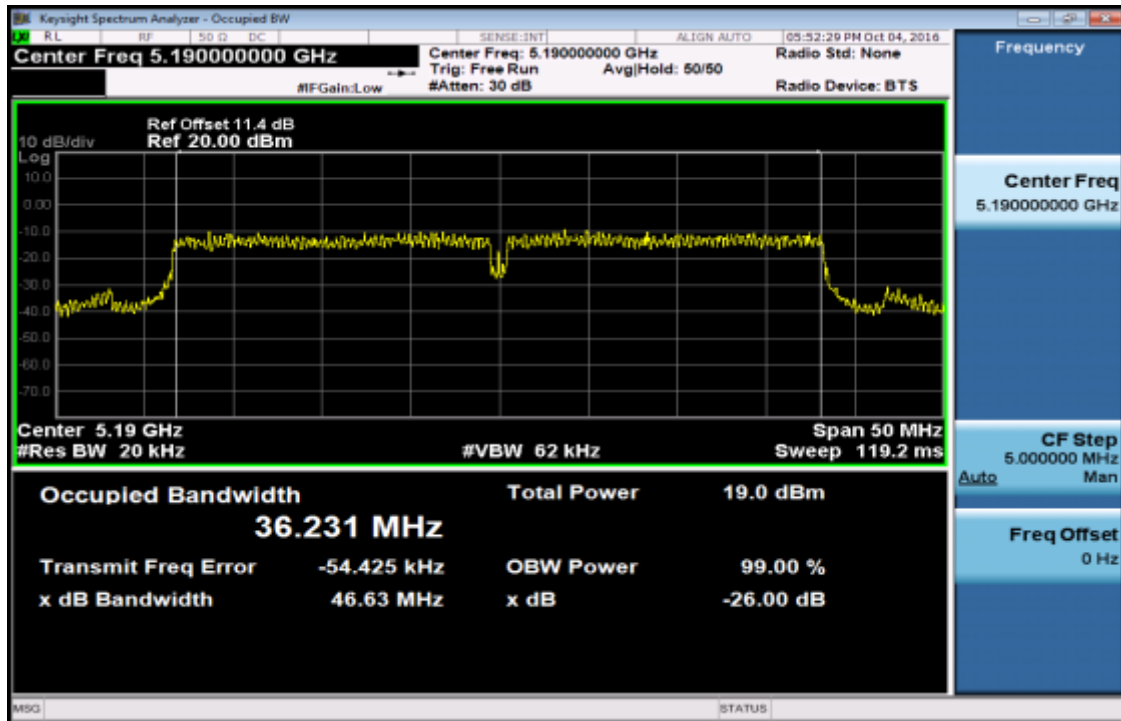
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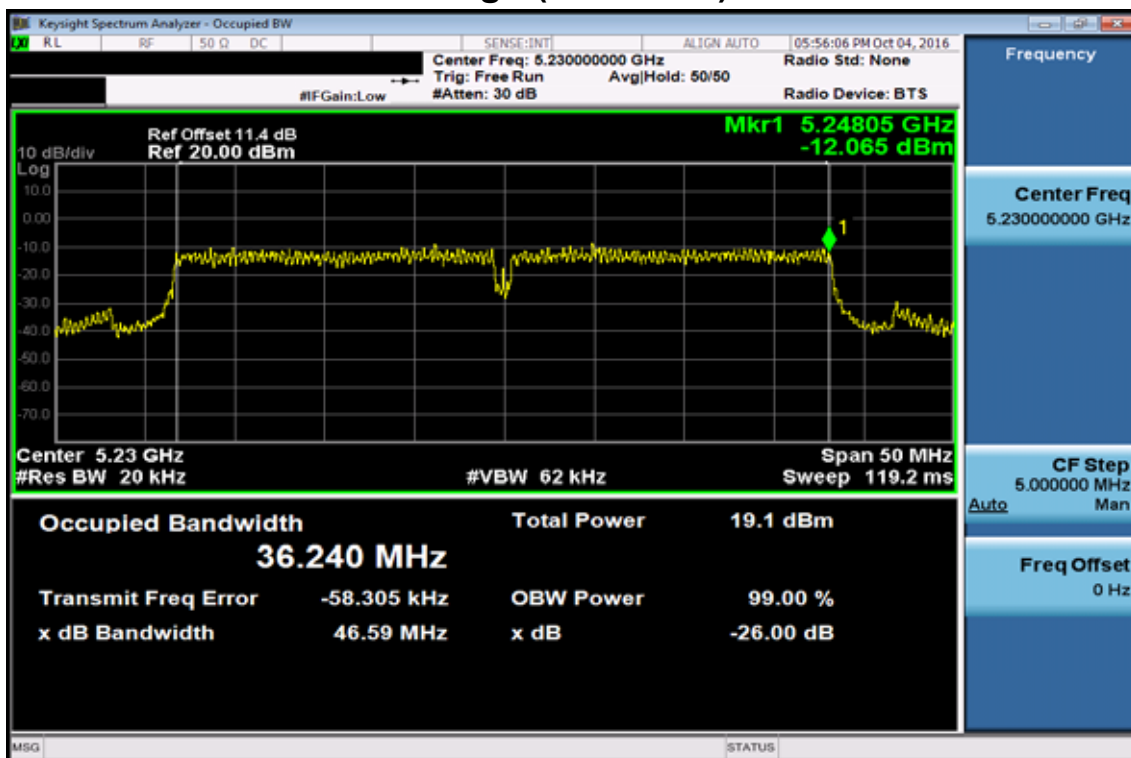
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## 802.11n HT40, 5150~5250 MHz (Main) 26dB Band Width Test Data CH-Low (5190 MHz)



## 26dB Band Width Test Data CH-High (5230 MHz)



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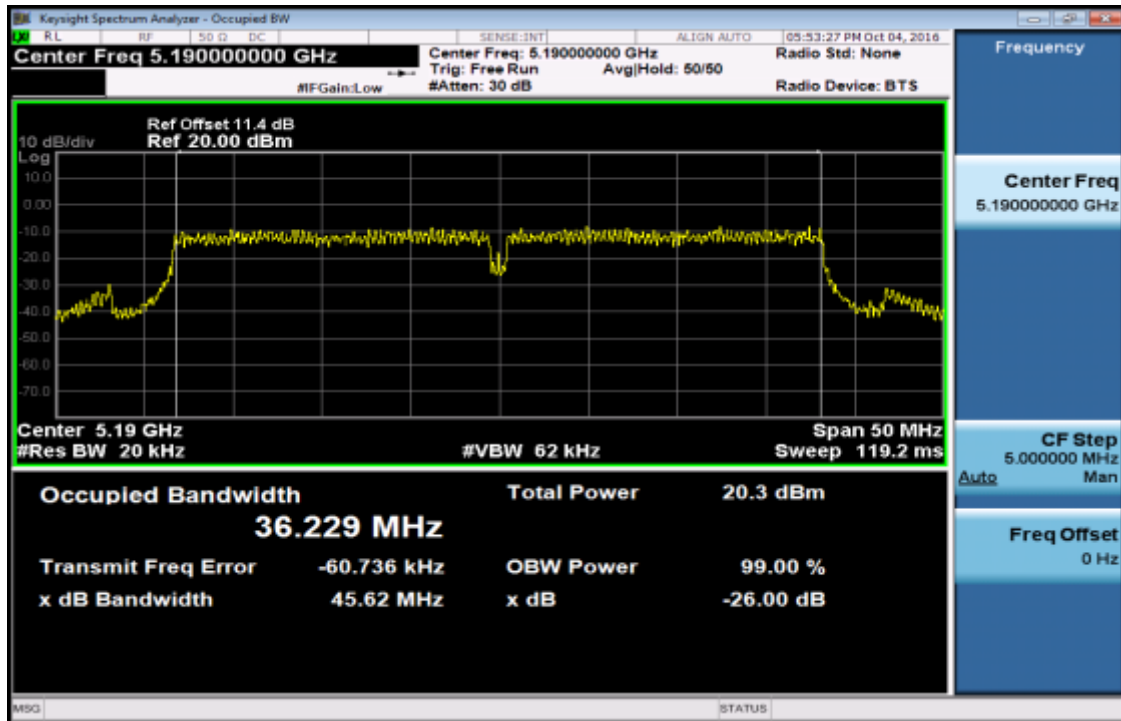
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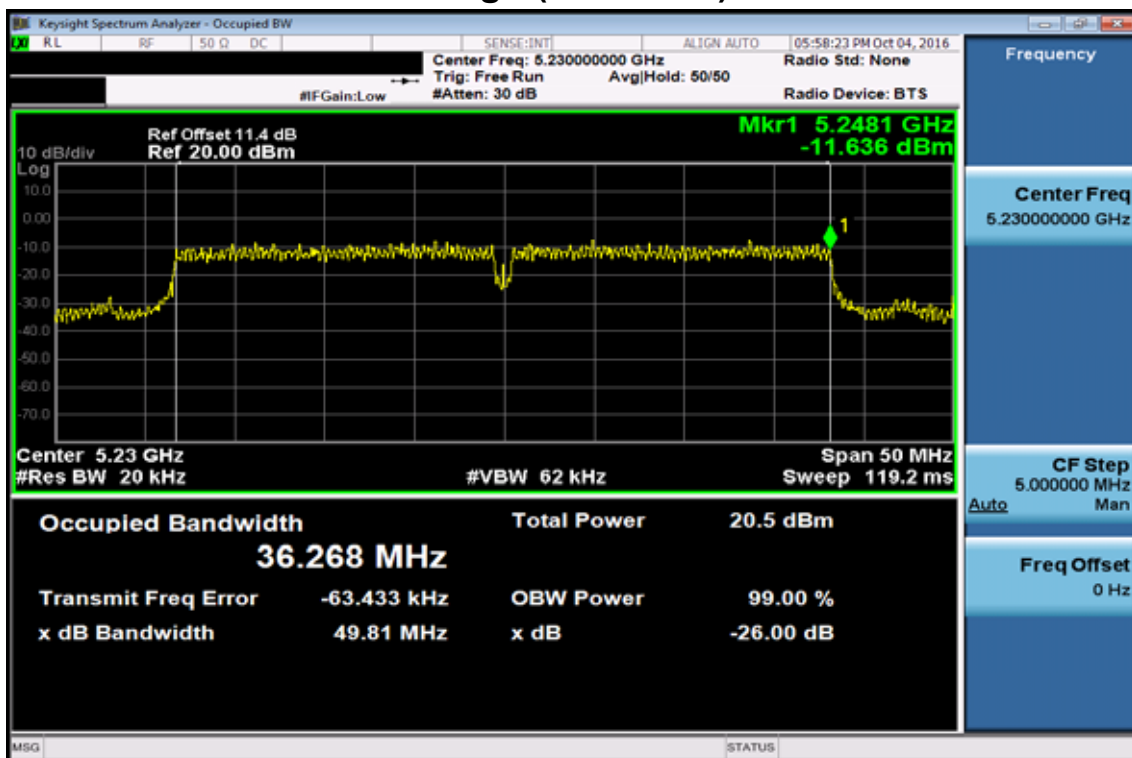
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## 802.11n HT40, 5150~5250 MHz (Aux1) 26dB Band Width Test Data CH-Low (5190 MHz)



## 26dB Band Width Test Data CH-High (5230 MHz)



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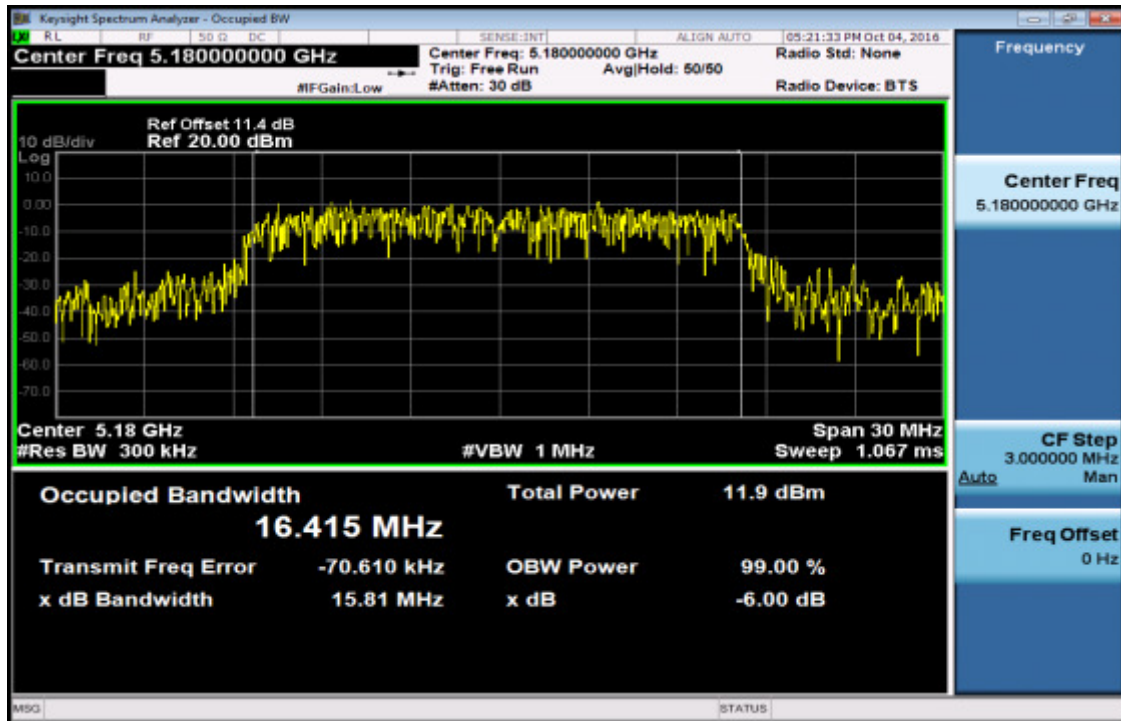
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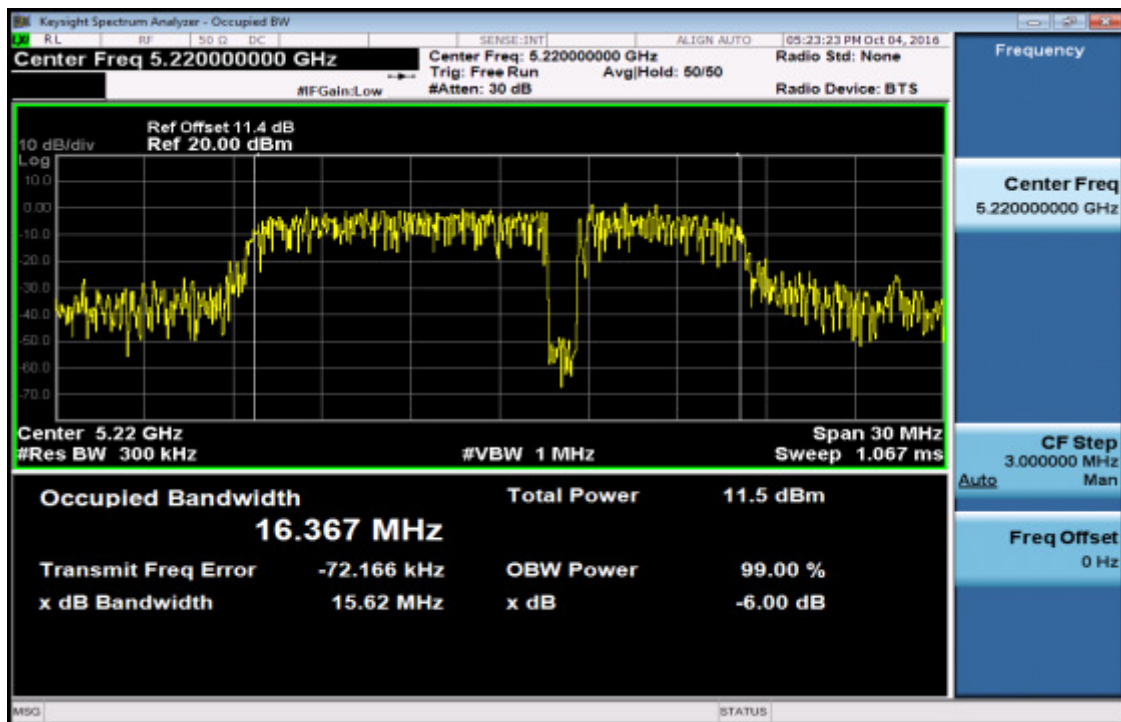
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## 802.11a, 5150~5250 MHz (Main)

### 99% Band Width Test Data CH-Low (5180MHz)



### 99% Band Width Test Data CH-Mid (5220MHz)



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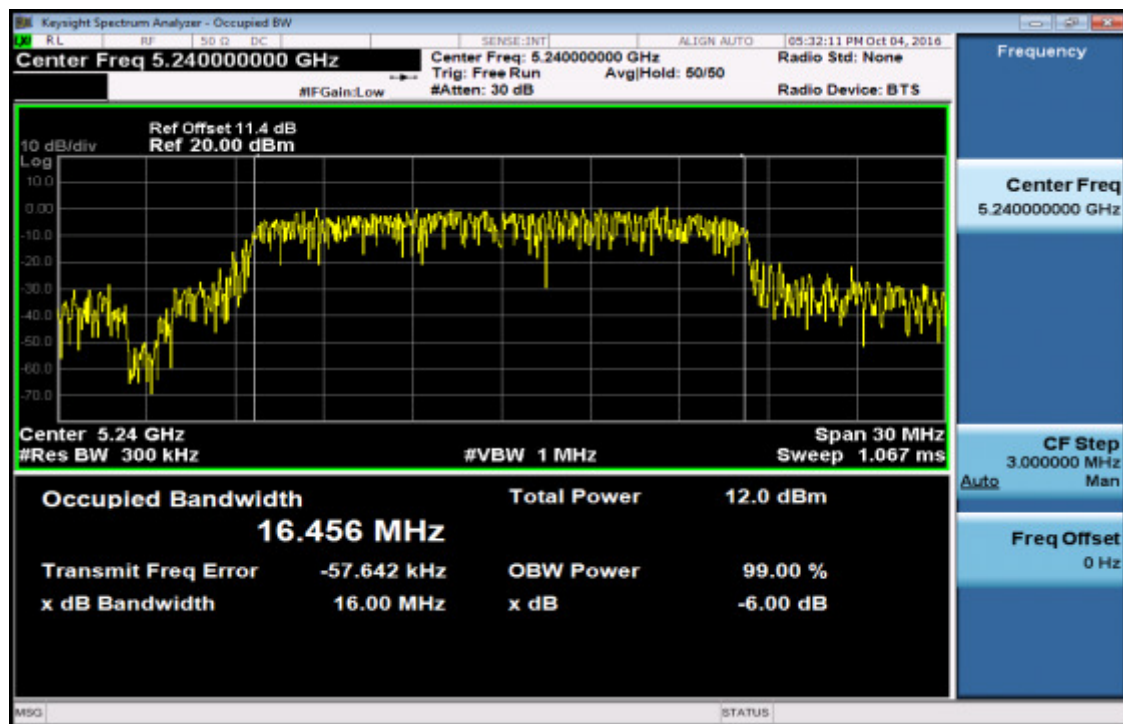
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## 99% Band Width Test Data CH-High (5240MHz)



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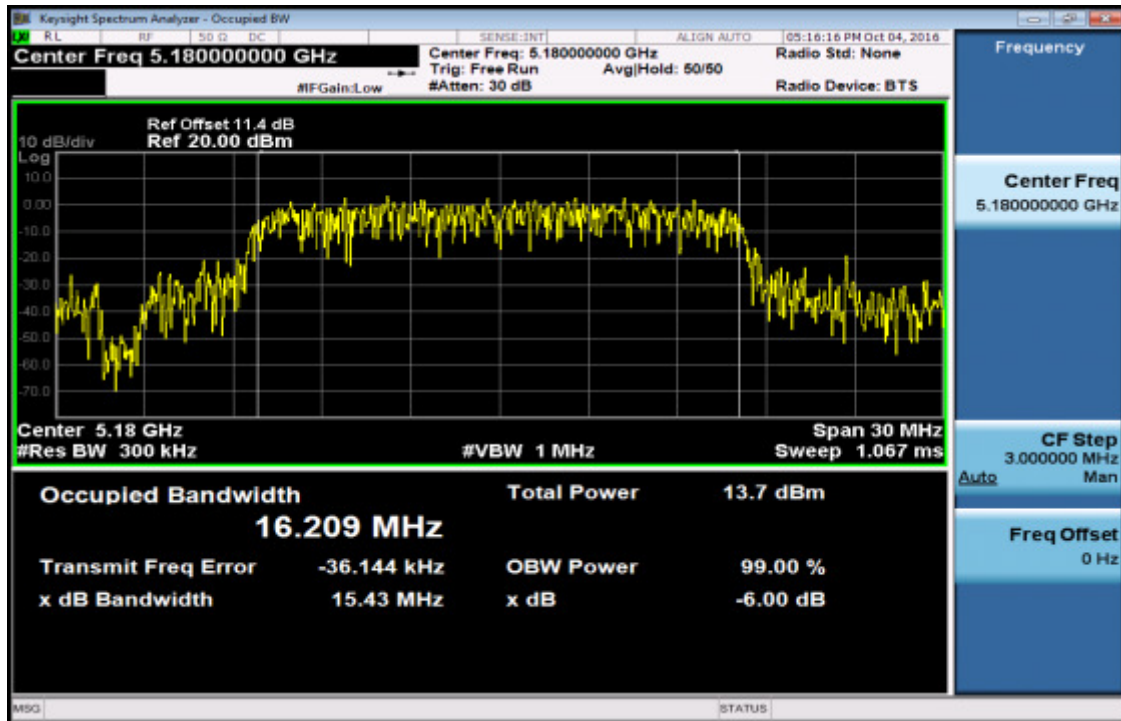
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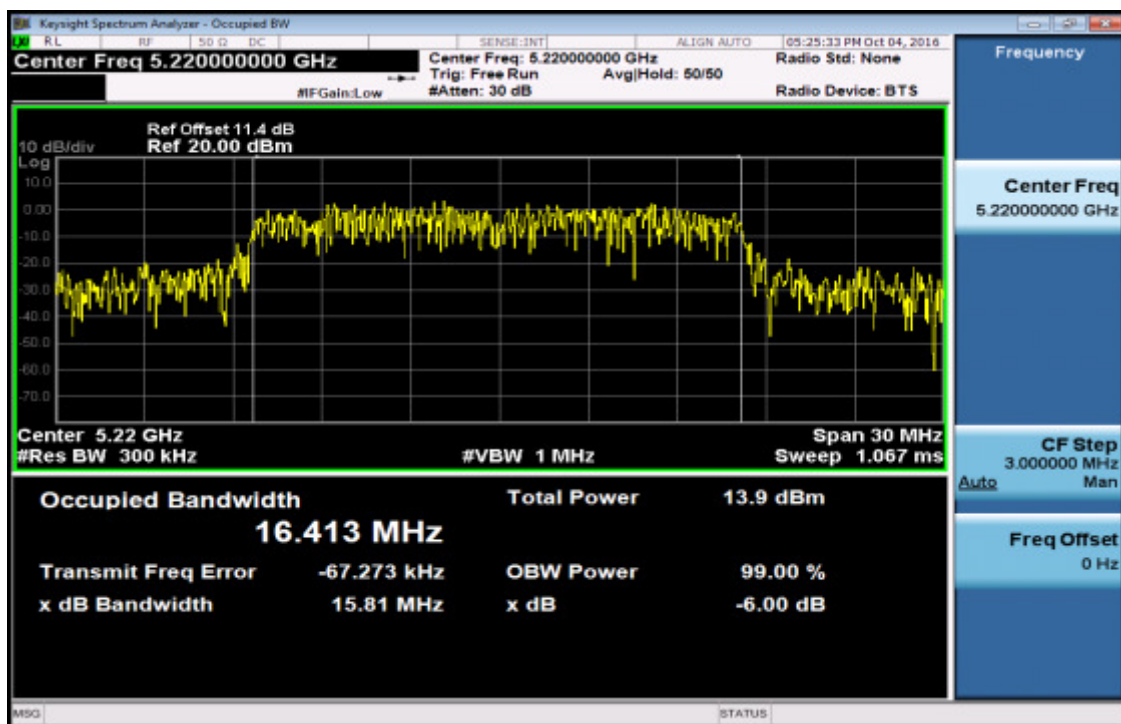
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## 802.11a, 5150~5250 MHz (Aux) 99% Band Width Test Data CH-Low (5180MHz)



## 99% Band Width Test Data CH-Mid (5220MHz)



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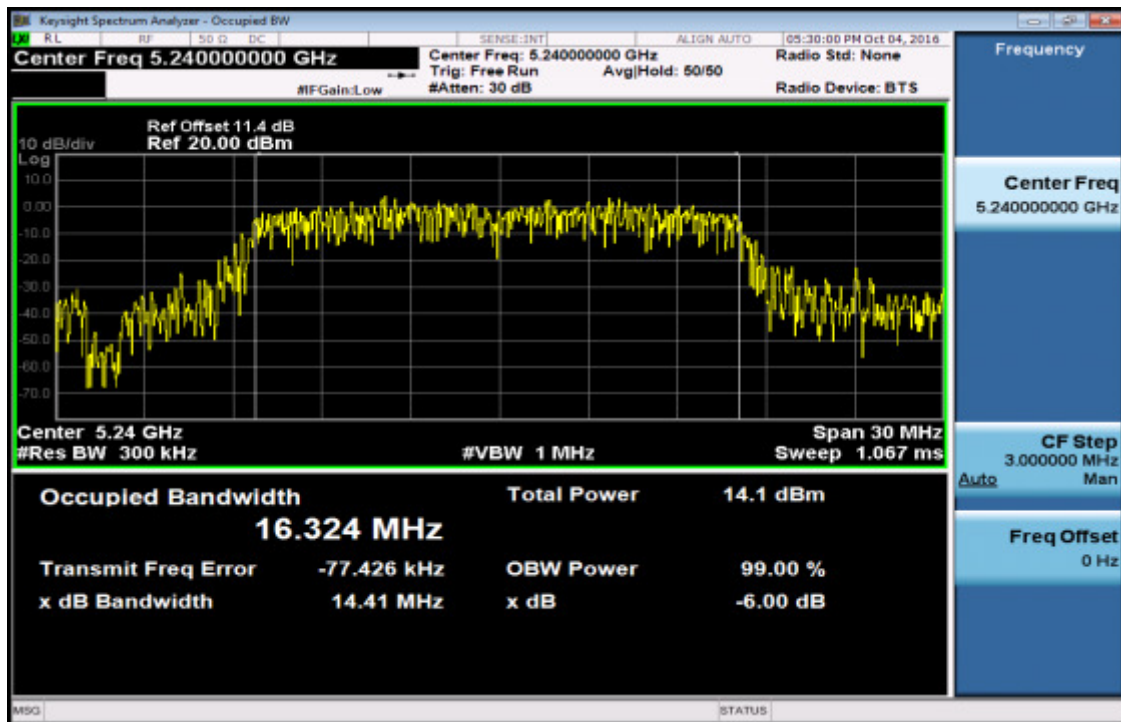
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## 99% Band Width Test Data CH-High (5240MHz)



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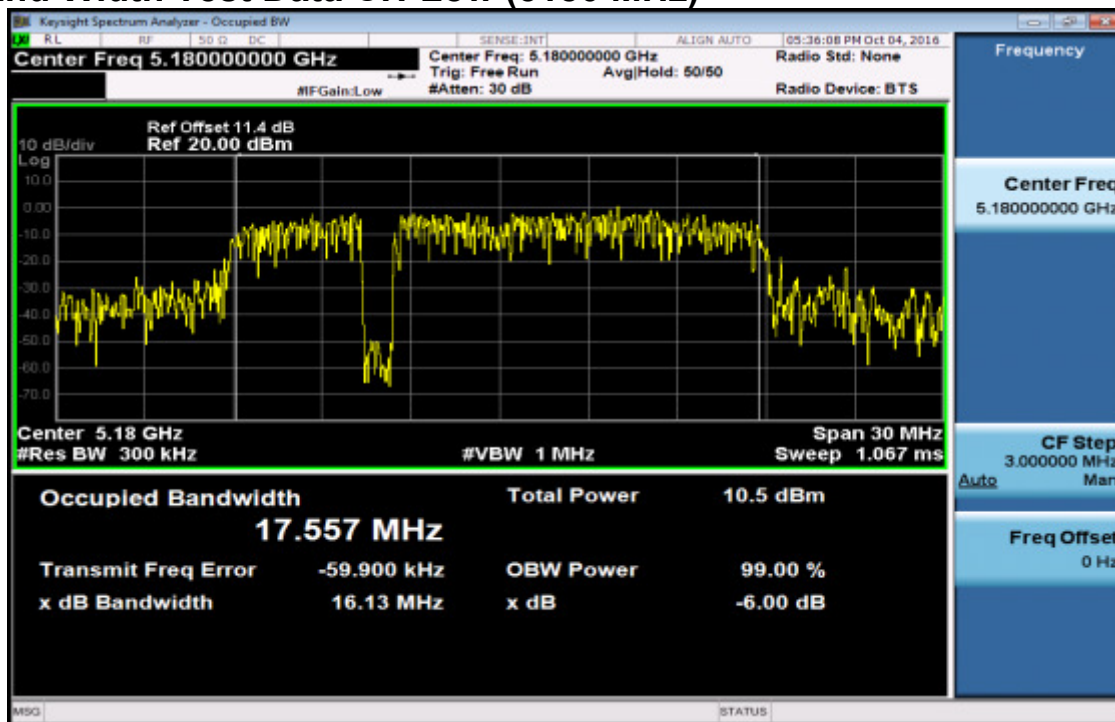
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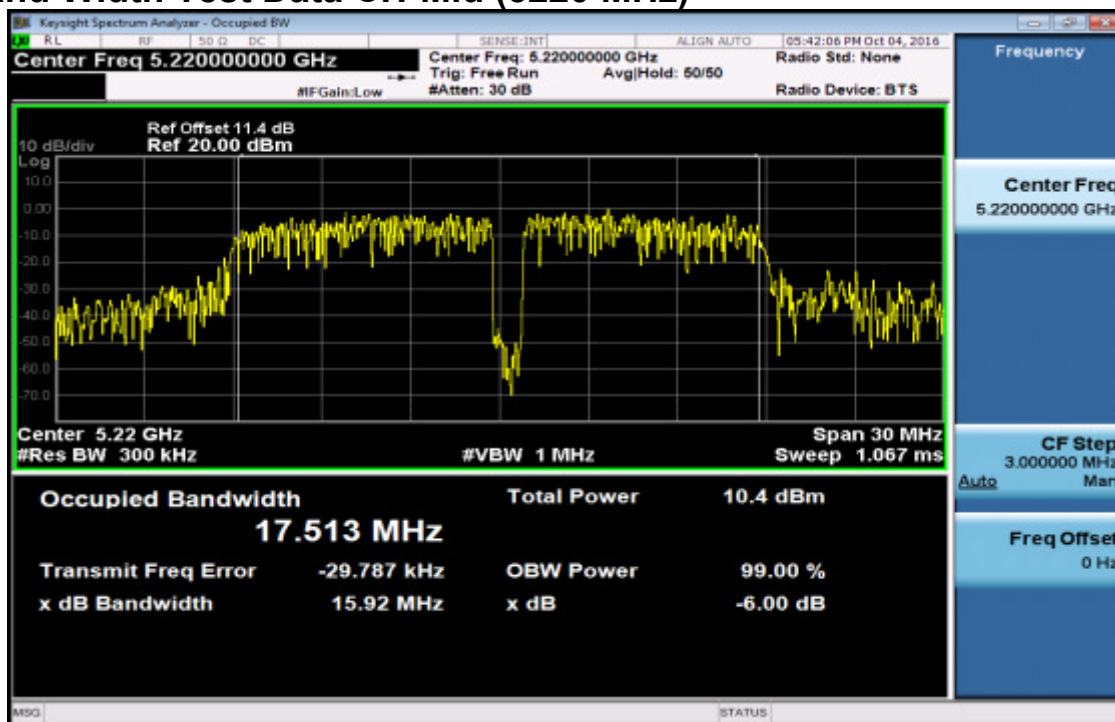
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## 802.11n HT20, 5150~5250 MHz (Main) 99% Band Width Test Data CH-Low (5180 MHz)



## 99% Band Width Test Data CH-Mid (5220 MHz)



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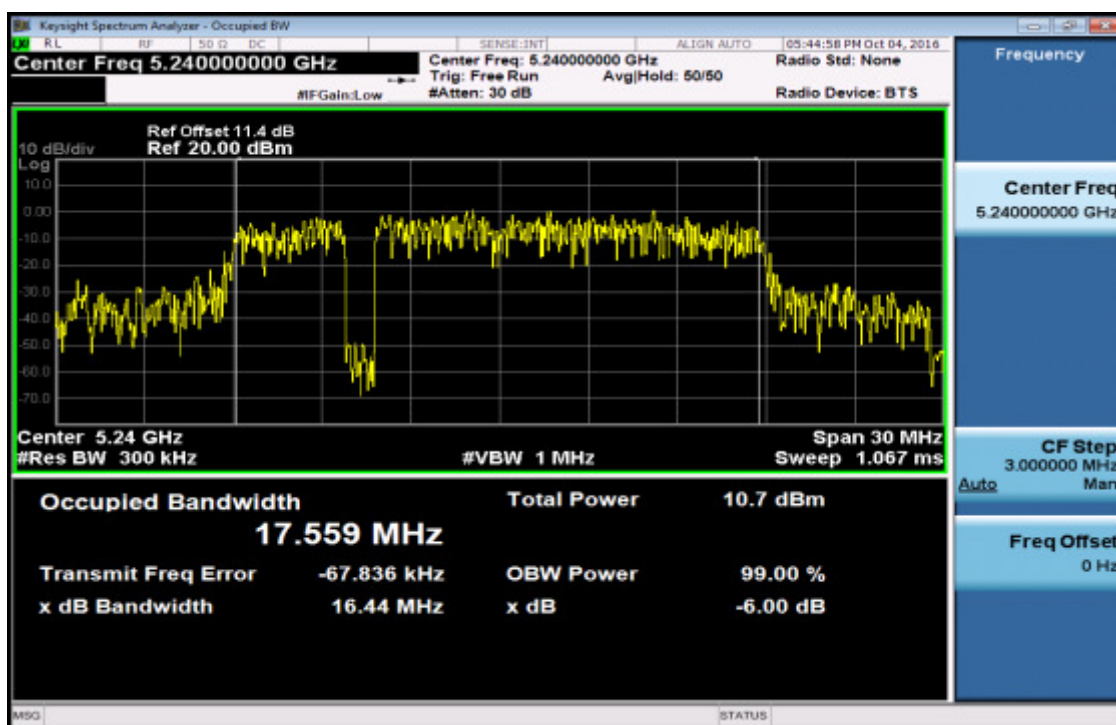
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## 99% Band Width Test Data CH-High (5240 MHz)



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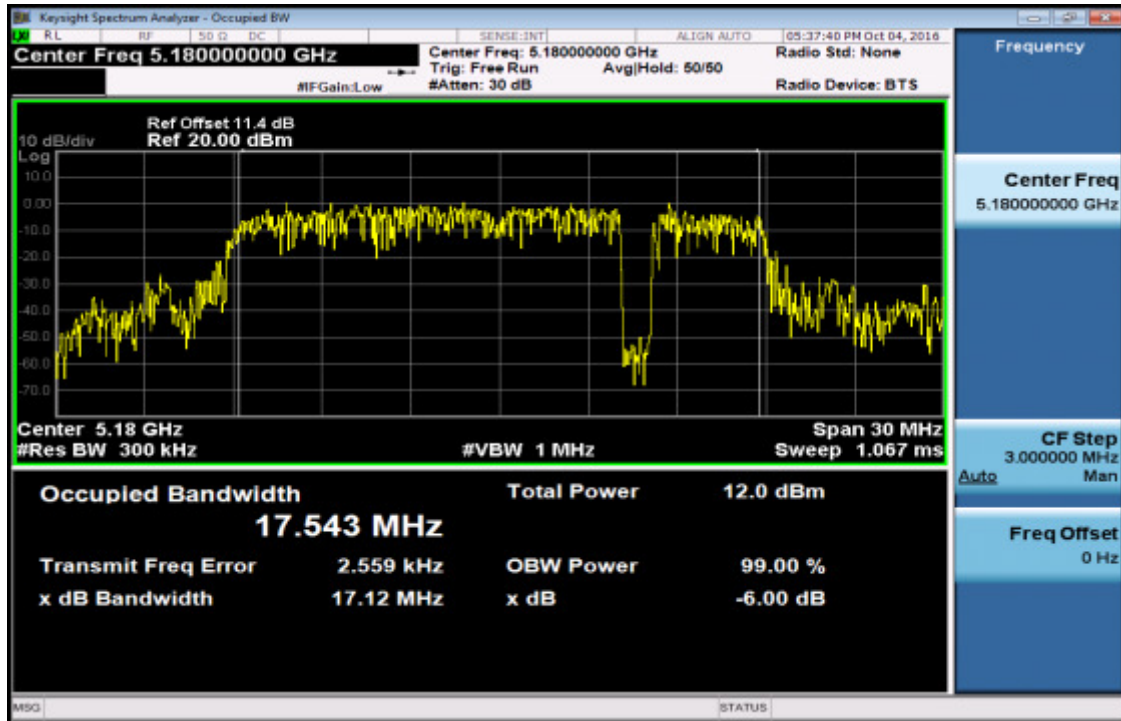
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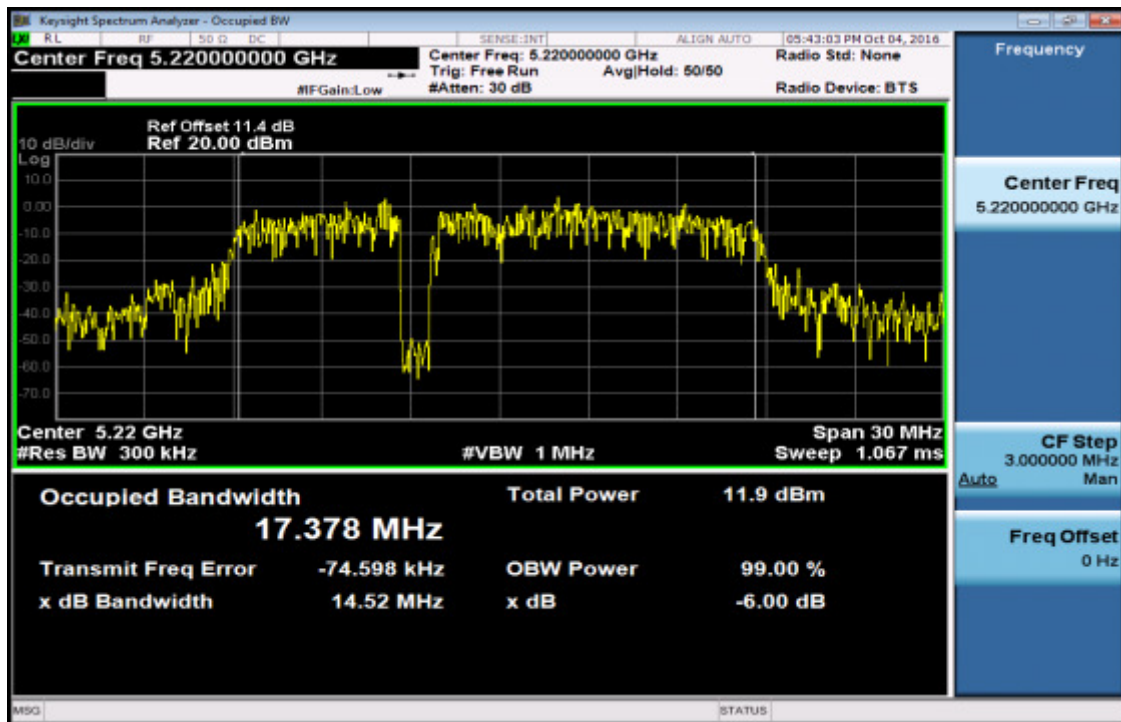
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## 802.11n HT20, 5150~5250 MHz (Aux1) 99% Band Width Test Data CH-Low (5180 MHz)



## 99% Band Width Test Data CH-Mid (5220 MHz)



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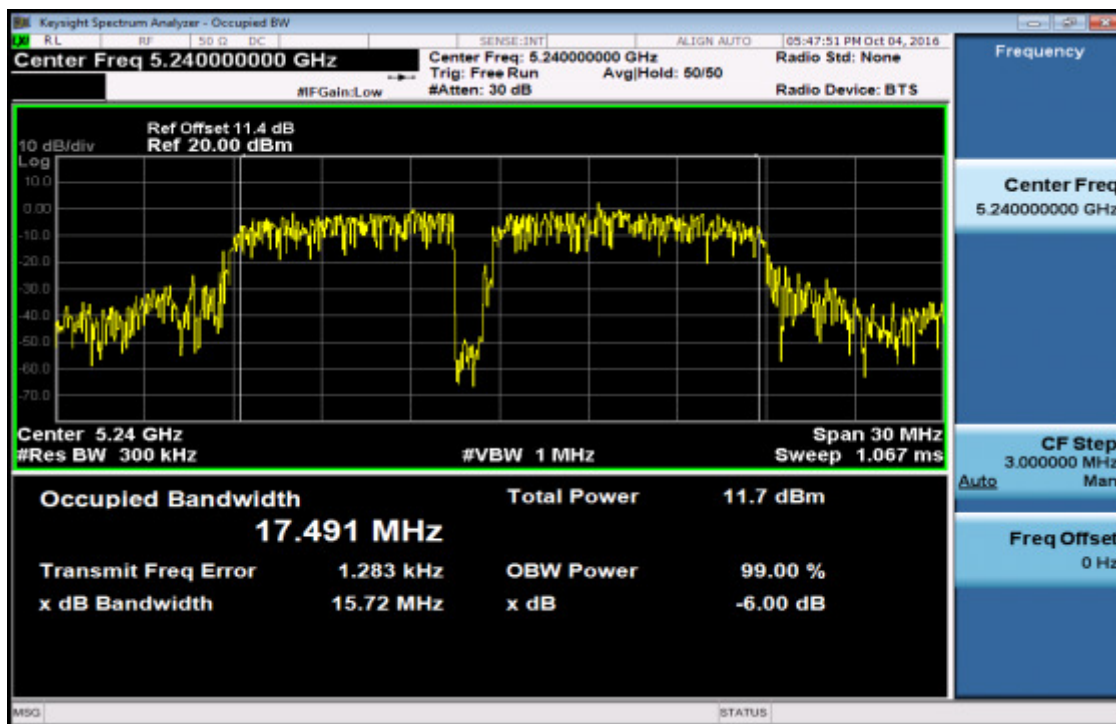
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## 99% Band Width Test Data CH-High (5240 MHz)



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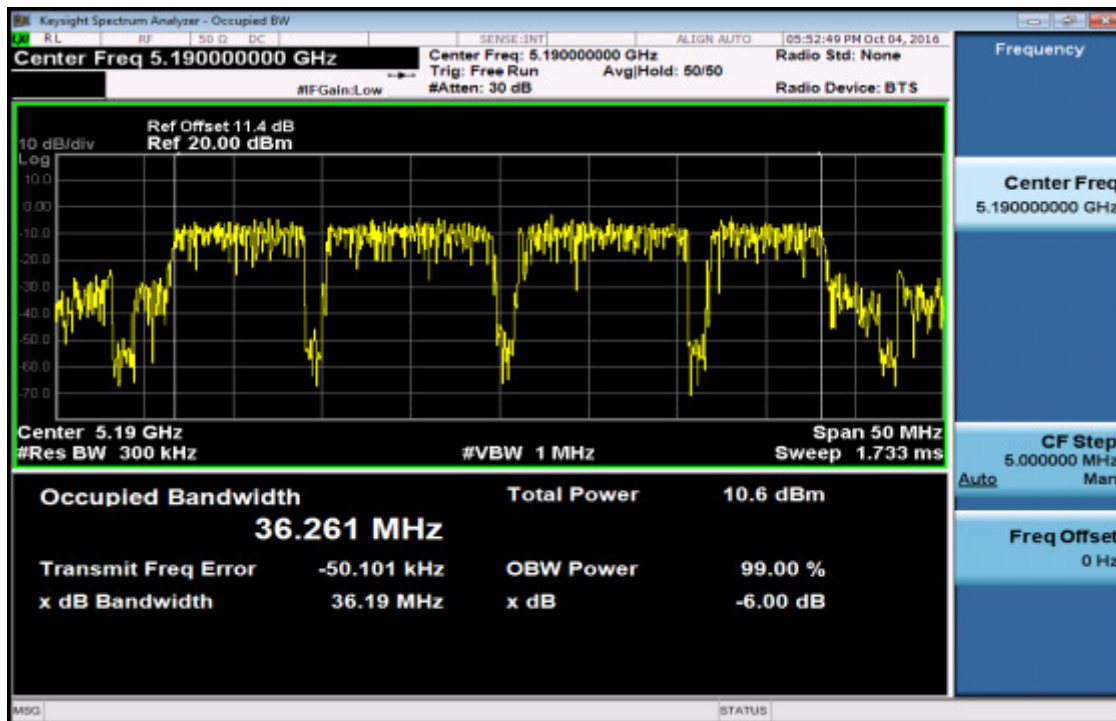
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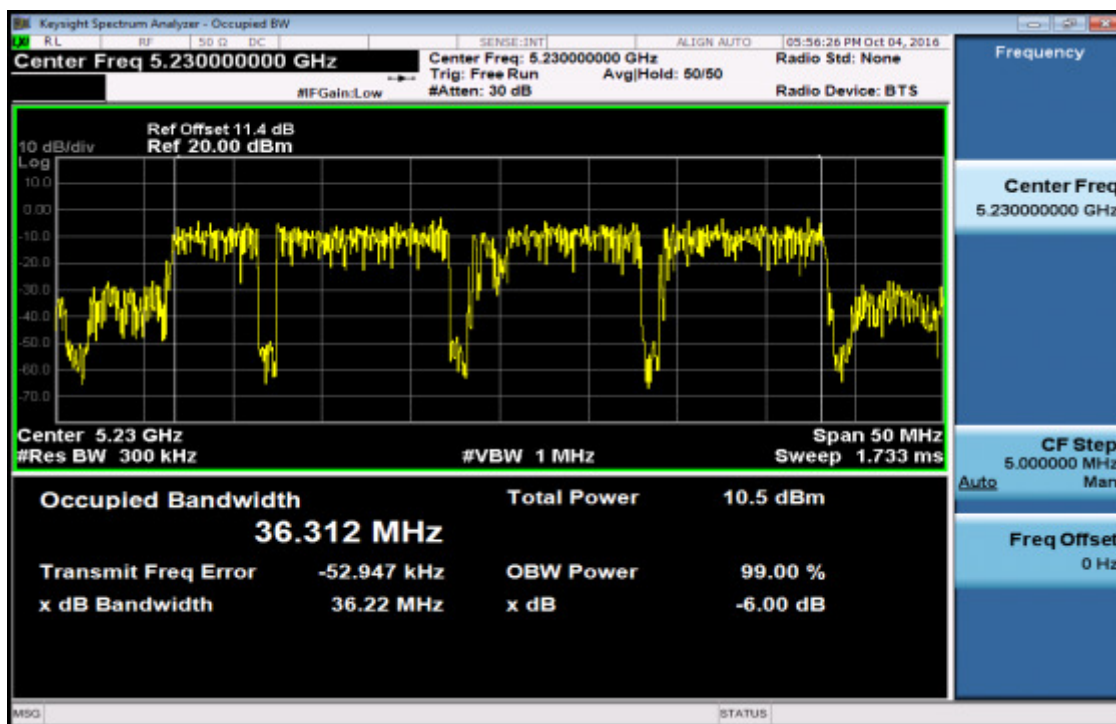
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## 802.11n HT40, 5150~5250 MHz (Main)

### 99% Band Width Test Data CH-Low (5190 MHz)



### 99% Band Width Test Data CH-High (5230 MHz)



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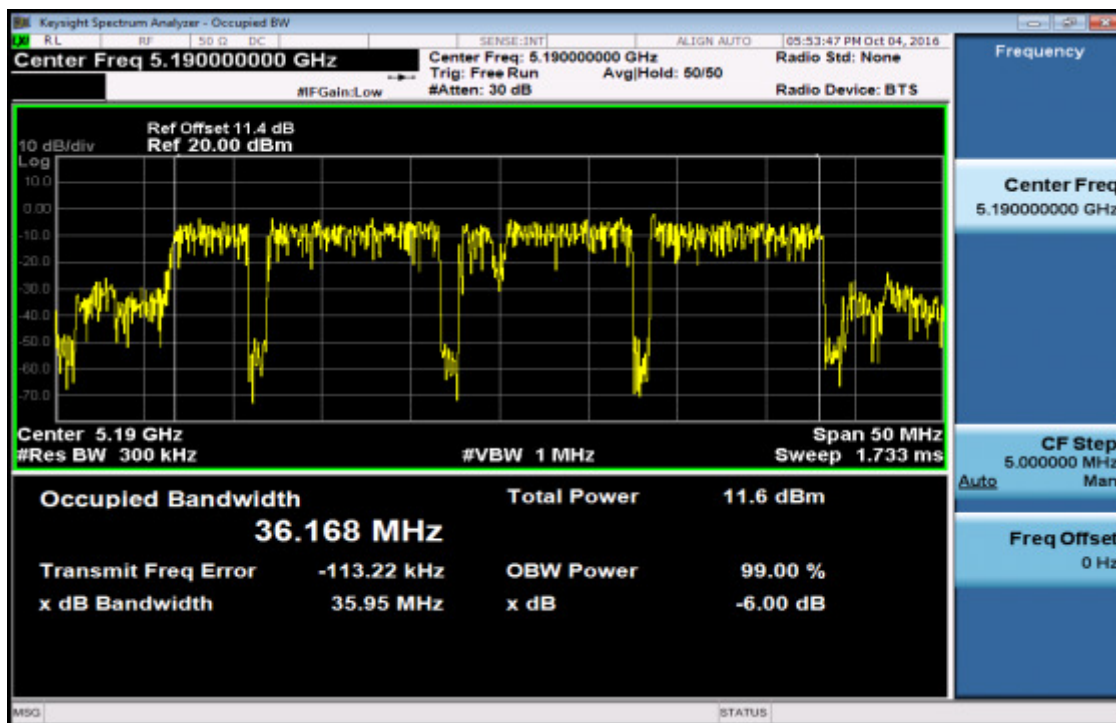
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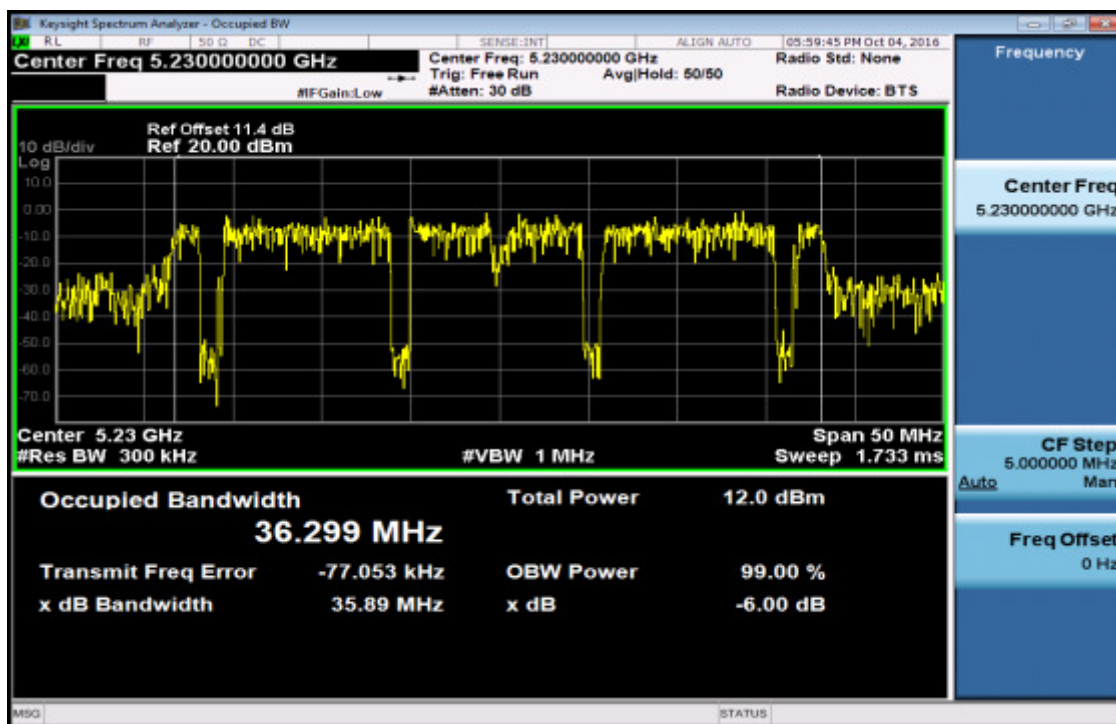
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## 802.11n HT40, 5150~5250 MHz (Aux)

### 99% Band Width Test Data CH-Low (5190 MHz)



### 99% Band Width Test Data CH-High (5230 MHz)



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## 9. MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

### 9.1 Standard Applicable

#### FCC

| OPERZTION<br>Band | EUT CATEGORY | LIMIT |
|-------------------|--------------|-------|
|-------------------|--------------|-------|

U-NII-1

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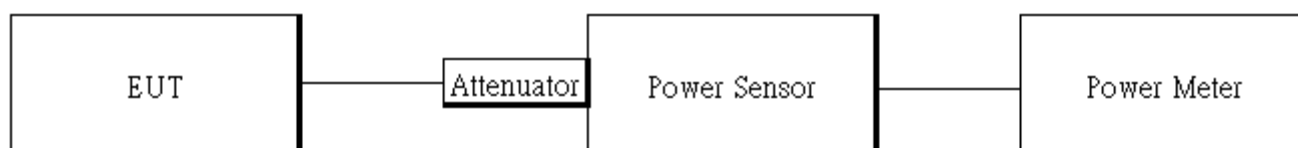
## 9.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter
4. Power Meter is used as the auxiliary test equipment to conduct the output power measurement.
5. Record the max. reading and add  $10 \log(1/\text{duty cycle})$ .
6. Repeat above procedures until all frequency (low, middle, and high channel) measured were complete.

## 9.3 Measurement Equipment Used

| SGS Conducted Room    |              |                |               |                  |                 |
|-----------------------|--------------|----------------|---------------|------------------|-----------------|
| Name of Equipment     | Manufacturer | Model          | Serial Number | Calibration Date | Calibration Due |
| Spectrum Analyzer     | KEYSIGHT     | N9010A         | MY54510568    | 04/14/2016       | 04/13/2017      |
| Power Meter           | Anritsu      | ML2496A        | 1326001       | 06/23/2016       | 06/22/2017      |
| Power Sensor          | Anritsu      | MA2411B        | 1315048       | 06/23/2016       | 06/22/2017      |
| Power Sensor          | Anritsu      | MA2411B        | 1315049       | 06/23/2016       | 06/22/2017      |
| Coaxial Cable<br>30cm | WOKEN        | 00100A1F1A195C | RF01          | 12/12/2015       | 12/11/2016      |
| DC Block              | PASTERNAK    | PE8210         | RF29          | 12/12/2015       | 12/11/2016      |
| Splitter              | RF-LAMBAD    | RFLT2W1G18G    | RF35          | 12/12/2015       | 12/11/2016      |
| Attenuator            | WOKEN        | 218FS-10       | RF23          | 12/12/2015       | 12/11/2016      |
| DC Power Supply       | Agilent      | E3640A         | MY53140006    | 05/04/2016       | 05/03/2017      |

## 9.4 Test Set-up



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## 9.5 Measurement Result

### Conducted output power (FCC)

#### 802.11a\_Aux1

| CH | Frequency (MHz) | Data Rate | TOTAL POWER (dBm) | TOTAL POWER (mW) | REQUIRED LIMIT (dBm) | RESULT |
|----|-----------------|-----------|-------------------|------------------|----------------------|--------|
| 36 | 5180            | MCS0      | 13.95             | 24.831           | 23.98                | PASS   |
| 44 | 5220            | MCS0      | 13.93             | 24.717           | 23.98                | PASS   |
| 48 | 5240            | MCS0      | 13.69             | 23.388           | 23.98                | PASS   |

#### 802.11n\_HT20\_MIMO

| CH | Frequency (MHz) | Data Rate | AVERAGE POWER (dBm) |       | TOTAL POWER (dBm) | TOTAL POWER (mW) | REQUIRED LIMIT (dBm) | RESULT |
|----|-----------------|-----------|---------------------|-------|-------------------|------------------|----------------------|--------|
|    |                 |           | CH 0                | CH 1  |                   |                  |                      |        |
| 36 | 5180            | MCS8      | 11.04               | 11.33 | 14.20             | 26.289           | 22.47                | PASS   |
| 44 | 5220            | MCS8      | 10.56               | 11.52 | 14.08             | 25.567           | 22.47                | PASS   |
| 48 | 5240            | MCS8      | 10.86               | 11.4  | 14.15             | 25.994           | 22.47                | PASS   |

#### 802.11n\_HT40\_MIMO

| CH | Frequency (MHz) | Data Rate | AVERAGE POWER (dBm) |       | TOTAL POWER (dBm) | TOTAL POWER (mW) | REQUIRED LIMIT (dBm) | RESULT |
|----|-----------------|-----------|---------------------|-------|-------------------|------------------|----------------------|--------|
|    |                 |           | CH 0                | CH 1  |                   |                  |                      |        |
| 38 | 5190            | MCS8      | 11.91               | 11.48 | 14.71             | 29.584           | 22.47                | PASS   |
| 46 | 5230            | MCS8      | 11.51               | 12.29 | 14.93             | 31.101           | 22.47                | PASS   |

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## EIRP

### 802.11a\_Aux1

| CH | Frequency (MHz) | TOTAL POWER (dBm) | Antenna Gain (dBi) | EIRP (dBm)   | EIRP (mW)     | REQUIRED LIMIT (dBm)          | RESULT |
|----|-----------------|-------------------|--------------------|--------------|---------------|-------------------------------|--------|
| 36 | 5180            | <b>13.95</b>      | 4.500              | <b>18.45</b> | <b>69.984</b> | 23.01 or $10+10\log(B)=22.10$ | PASS   |
| 44 | 5220            | 13.93             | 4.500              | 18.43        | 69.663        | 23.01 or $10+10\log(B)=22.15$ | PASS   |
| 48 | 5240            | 13.69             | 4.500              | 18.19        | 65.917        | 23.01 or $10+10\log(B)=22.13$ | PASS   |

### 802.11n\_HT20\_MIMO

| CH | Frequency (MHz) | TOTAL POWER (dBm) | Antenna Gain (dBi) | EIRP (dBm)   | EIRP (mW)      | REQUIRED LIMIT (dBm)          | RESULT |
|----|-----------------|-------------------|--------------------|--------------|----------------|-------------------------------|--------|
| 36 | 5180            | <b>14.20</b>      | 7.510              | <b>21.71</b> | <b>148.174</b> | 23.01 or $10+10\log(B)=22.44$ | PASS   |
| 44 | 5220            | 14.08             | 7.510              | 21.59        | 144.104        | 23.01 or $10+10\log(B)=22.40$ | PASS   |
| 48 | 5240            | 14.15             | 7.510              | 21.66        | 146.510        | 23.01 or $10+10\log(B)=22.43$ | PASS   |

### 802.11n\_HT40\_MIMO

| CH | Frequency (MHz) | TOTAL POWER (dBm) | Antenna Gain (dBi) | EIRP (dBm)   | EIRP (mW)      | REQUIRED LIMIT (dBm)          | RESULT |
|----|-----------------|-------------------|--------------------|--------------|----------------|-------------------------------|--------|
| 38 | 5190            | 14.71             | 7.510              | 22.22        | 166.749        | 23.01 or $10+10\log(B)=25.58$ | PASS   |
| 46 | 5230            | <b>14.93</b>      | 7.510              | <b>22.44</b> | <b>175.299</b> | 23.01 or $10+10\log(B)=25.60$ | PASS   |

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## 10. PEAK POWER SPECTRAL DENSITY

### 10.1 Standard Applicable

#### FCC

| OPERZTION<br>Band | EUT CATEGORY | LIMIT |
|-------------------|--------------|-------|
|-------------------|--------------|-------|

U-NII-1

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## 10.2 Measurement Procedure

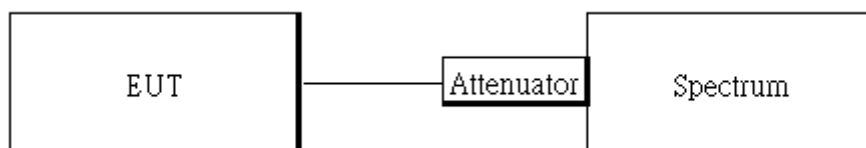
1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.
4. **For U-NII1, U-NII-2A, U-NII-2C Band:**  
Set RBW=1MHz, VBW=3MHz, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)  
**For U-NII-3 Band:**  
Set RBW=500 kHz, VBW $\geq$  3RBW, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)
5. Use the cursor on spectrum to peak search the highest level of trace
6. Record the max. reading and add 10 log(1/duty cycle).
7. Repeat above procedures until all default test channel (low, middle, and high) was complete.

Note: For the test of PSD at MIMO mode, the highest emission of worst case employing Measure and add 10 log (N) technical is reported on this report after the comparison between Main Antenna at single transmitting mode and Aux that yields the higher value. The MIMO transmitting mode produces higher value of outcome

## 10.3 Measurement Equipment Used

| SGS Conducted Room |              |          |               |                  |                 |
|--------------------|--------------|----------|---------------|------------------|-----------------|
| Name of Equipment  | Manufacturer | Model    | Serial Number | Calibration Date | Calibration Due |
| Spectrum Analyzer  | KEYSIGHT     | N9010A   | MY54510568    | 04/14/2016       | 04/13/2017      |
| DC Block           | PASTERNAK    | PE8210   | RF29          | 12/12/2015       | 12/11/2016      |
| Attenuator         | WOKEN        | 218FS-10 | RF23          | 12/12/2015       | 12/11/2016      |

## 10.4 Test Set-up



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## 10.5 Measurement Result

| POWER DENSITY 802.11a MODE |            |             |             |
|----------------------------|------------|-------------|-------------|
| Frequency (MHz)            | PPSD (dBm) | Limit (dBm) | Margin (dB) |
| 5180                       | 0.57       | 11          | -10.43      |
| 5220                       | 0.04       | 11          | -10.96      |
| 5240                       | -3.58      | 11          | -14.58      |

| POWER DENSITY 802.11n HT20 MODE |            |             |             |
|---------------------------------|------------|-------------|-------------|
| Frequency (MHz)                 | PPSD (dBm) | Limit (dBm) | Margin (dB) |
| 5180                            | -0.38      | 9.49        | -9.87       |
| 5220                            | 0.51       | 9.49        | -8.98       |
| 5240                            | -1.21      | 9.49        | -10.70      |

| POWER DENSITY 802.11n HT40 MODE |            |             |             |
|---------------------------------|------------|-------------|-------------|
| Frequency (MHz)                 | PPSD (dBm) | Limit (dBm) | Margin (dB) |
| 5190                            | -5.9       | 9.49        | -15.39      |
| 5230                            | -10.36     | 9.49        | -19.85      |

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## EIRP Power Density

| EIRP spectral density 802.11a MODE |            |                 |               |             |             |
|------------------------------------|------------|-----------------|---------------|-------------|-------------|
| Freq. (MHz)                        | PPSD (dBm) | Ant. Gain (dBi) | EIRP SD (dBm) | Limit (dBm) | Margin (dB) |
| 5180                               | 0.57       | 4.50            | 5.07          | 10          | -9.43       |
| 5220                               | 0.04       | 4.50            | 4.54          | 10          | -9.96       |
| 5240                               | -3.58      | 4.50            | 0.92          | 10          | -13.58      |

| EIRP spectral density 802.11n HT20 MODE |            |                 |               |             |             |
|-----------------------------------------|------------|-----------------|---------------|-------------|-------------|
| Freq. (MHz)                             | PPSD (dBm) | Ant. Gain (dBi) | EIRP SD (dBm) | Limit (dBm) | Margin (dB) |
| 5180                                    | -0.38      | 7.51            | 7.13          | 10          | -10.38      |
| 5220                                    | 0.51       | 7.51            | 8.02          | 10          | -9.49       |
| 5240                                    | -1.21      | 7.51            | 6.30          | 10          | -11.21      |

| EIRP spectral density 802.11n HT40 MODE |            |                 |               |             |             |
|-----------------------------------------|------------|-----------------|---------------|-------------|-------------|
| Freq. (MHz)                             | PPSD (dBm) | Ant. Gain (dBi) | EIRP SD (dBm) | Limit (dBm) | Margin (dB) |
| 5180                                    | -5.90      | 7.51            | 1.61          | 10          | -15.90      |
| 5220                                    | -10.36     | 7.51            | -2.85         | 10          | -20.36      |

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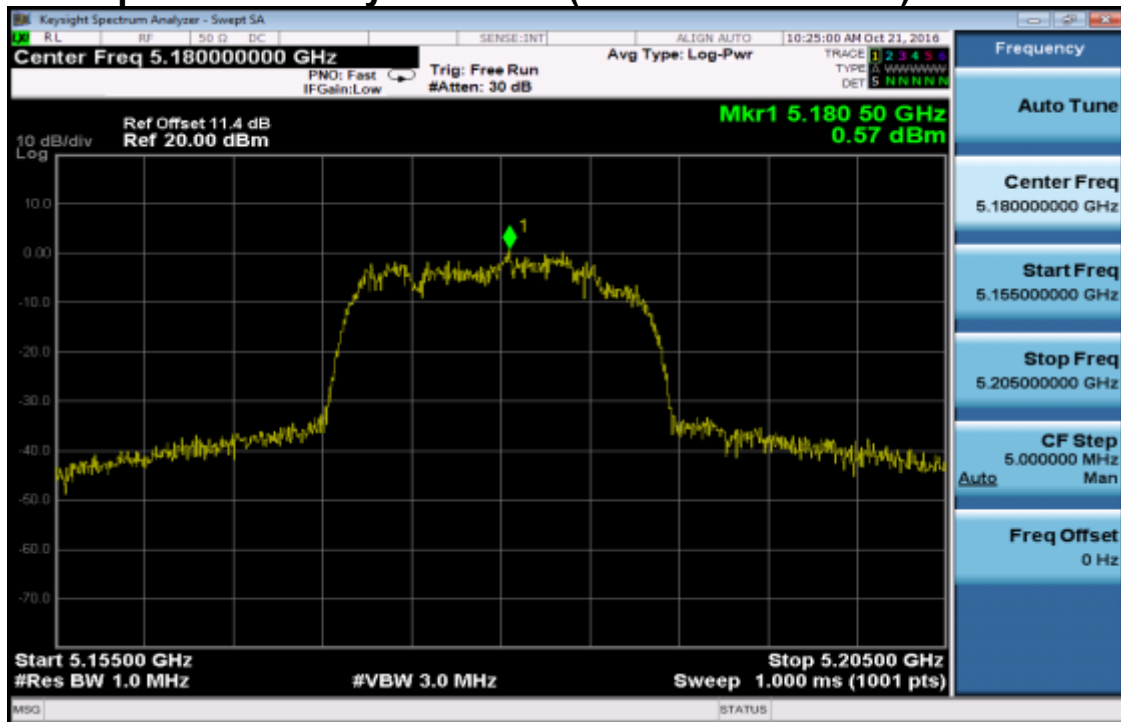
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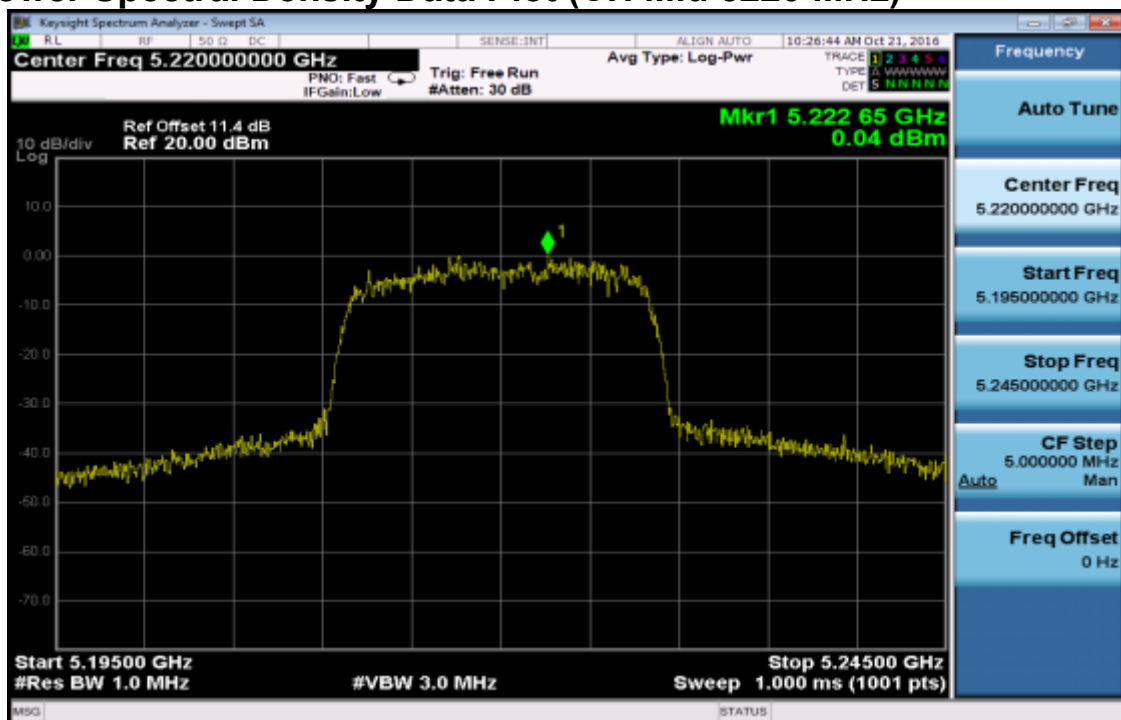
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## 802.11a 5150~5250 MHz

### Peak Power Spectral Density Data Plot (CH Low 5180 MHz)



### Peak Power Spectral Density Data Plot (CH Mid 5220 MHz)



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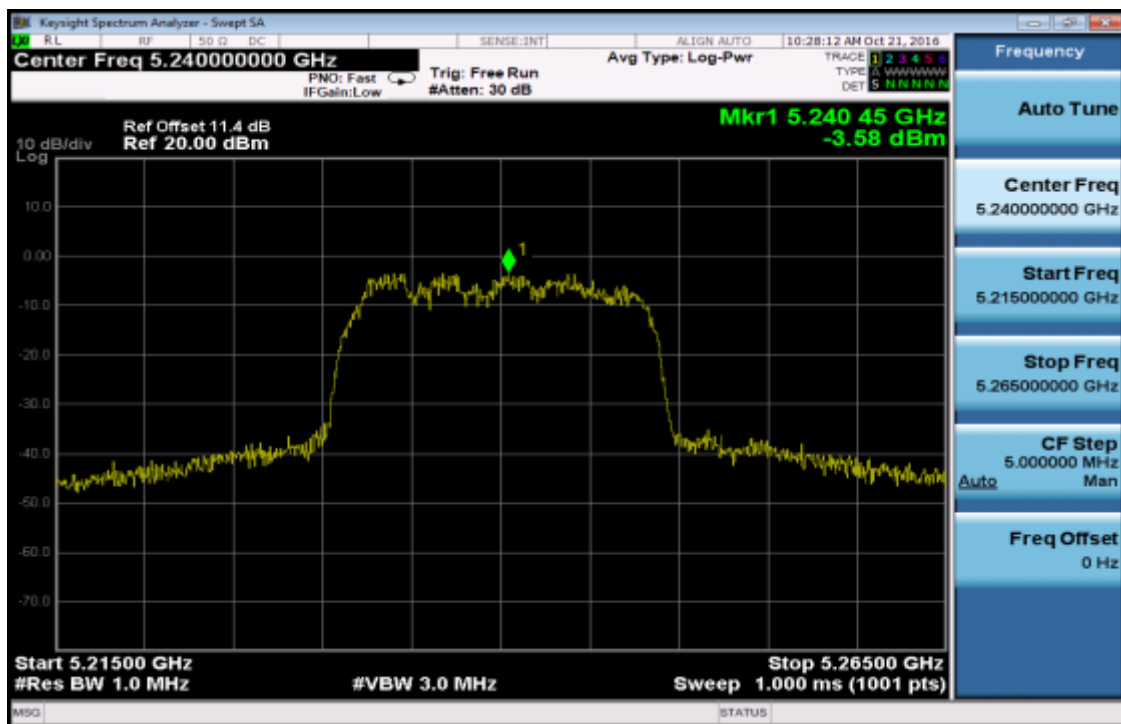
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## Peak Power Spectral Density Data Plot (CH High 5240 MHz)



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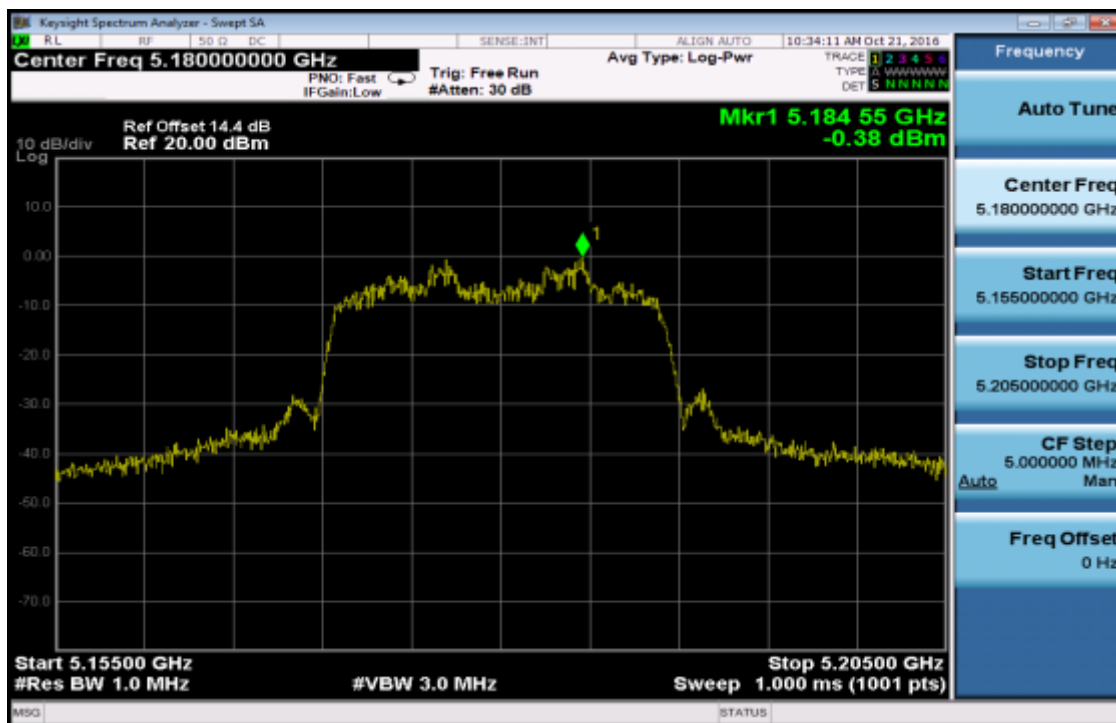
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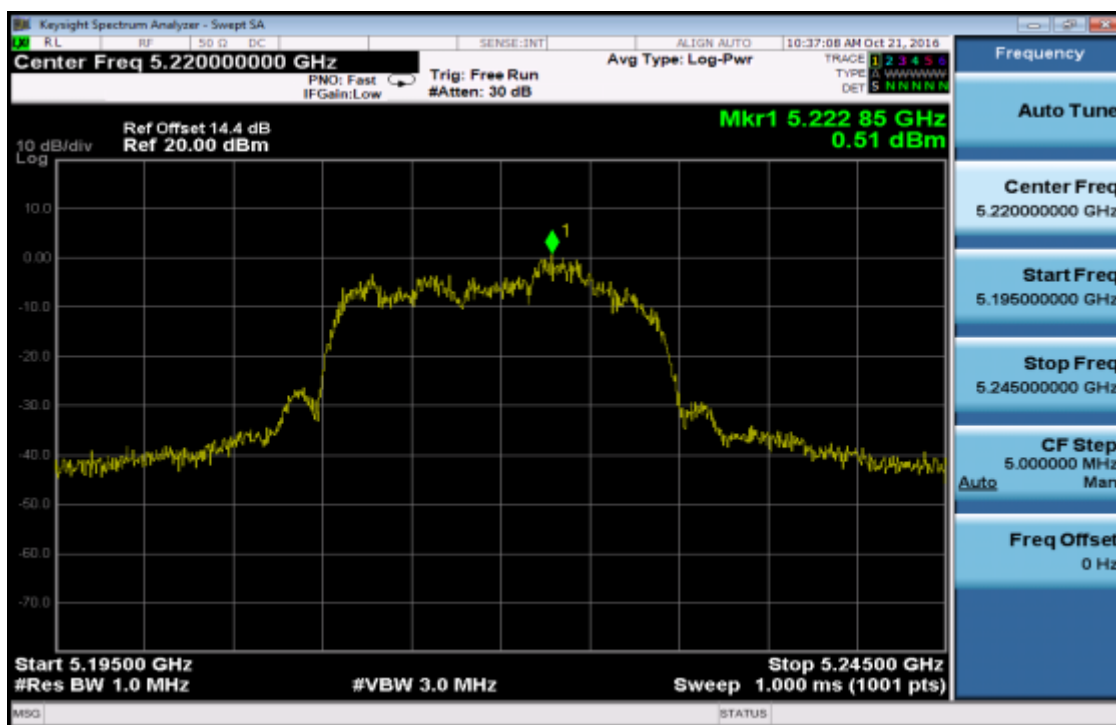
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## 802.11n HT20, 5150~5250 MHz

### Peak Power Spectral Density Data Plot (CH Low 5180 MHz)



### Peak Power Spectral Density Data Plot (CH Mid 5220 MHz)



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## Peak Power Spectral Density Data Plot (CH High 5240 MHz)



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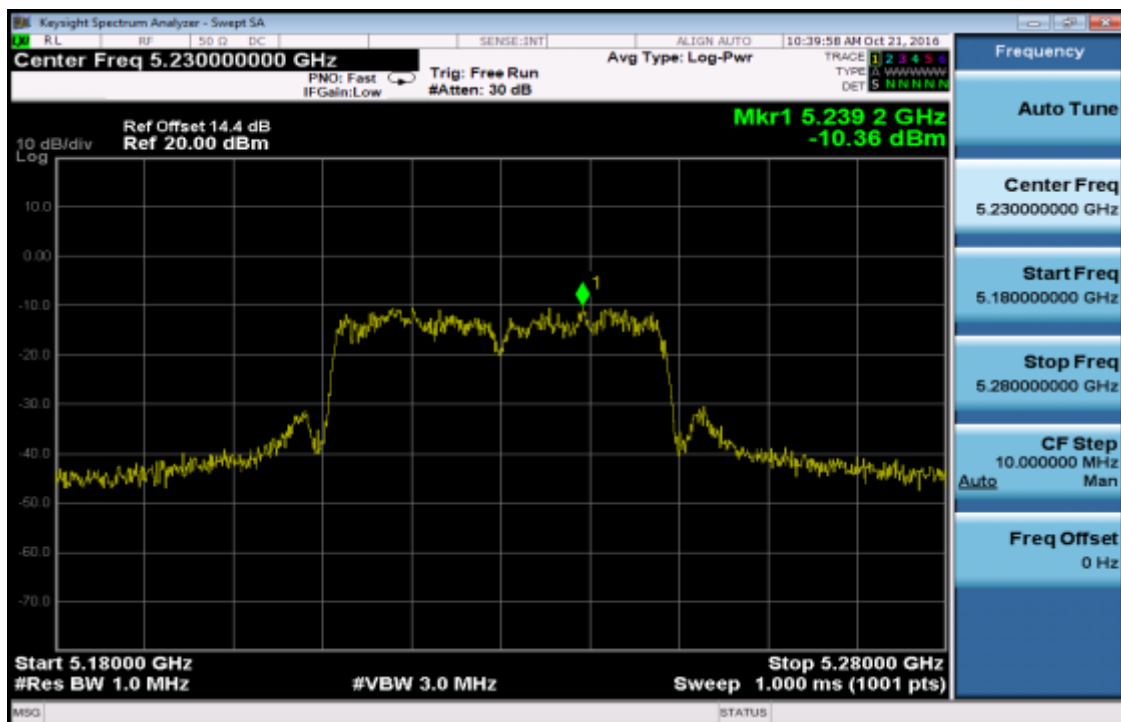
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## 802.11n HT40, 5150~5250 MHz Peak Power Spectral Density Data Plot (CH Low 5190 MHz)



## Peak Power Spectral Density Data Plot (CH High 5230 MHz)



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## 11. UNDESIRABLE RADIATED EMISSION MEASUREMENT1

### 11.1 Standard Applicable

The maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

1. For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
2. For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

| APPLICABLE TO                                                                                                                                                                                                                                                                                                                      | LIMIT                                                                                   |                                                                                             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| FCC KDB 789033 D02 General<br>UNII Test Procedures New Rules                                                                                                                                                                                                                                                                       | FIELD STRENGTH AT 3m                                                                    |                                                                                             |
|                                                                                                                                                                                                                                                                                                                                    | PK: 74 (dBμV/m)                                                                         | AV 54 (dBμV/m)                                                                              |
| APPLICABLE TO                                                                                                                                                                                                                                                                                                                      | EIRP LIMIT                                                                              | FIELD STRENGTH AT 3m                                                                        |
| 15.407(b)(1)                                                                                                                                                                                                                                                                                                                       | PK: -27 (dBm/MHz)                                                                       | PK: 68.3 (dBμV/m)                                                                           |
| 15.407(b)(2)                                                                                                                                                                                                                                                                                                                       |                                                                                         |                                                                                             |
| 15.407(b)(3)                                                                                                                                                                                                                                                                                                                       |                                                                                         |                                                                                             |
| 15.407(b)(4)(i)                                                                                                                                                                                                                                                                                                                    | PK:-27 (dBm/MHz) *1<br>PK:10 (dBm/MHz) *2<br>PK:15.6 (dBm/MHz) *3<br>PK:27 (dBm/MHz) *4 | PK: 68.2(dBμV/m) *1<br>PK:105.2 (dBμV/m) *2<br>PK: 110.8(dBμV/m) *3<br>PK:122.2 (dBμV/m) *4 |
| RSS-247 6.2.4 (2)                                                                                                                                                                                                                                                                                                                  | PK: -27 (dBm/MHz)                                                                       | PK: 68.3 (dBμV/m)                                                                           |
|                                                                                                                                                                                                                                                                                                                                    | PK: -17 (dBm/MHz)                                                                       | PK: 78.2 (dBμV/m)                                                                           |
| *1 beyond 75 MHz or more above of the bandedge.<br>*2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.<br>*3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.<br>*4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge. |                                                                                         |                                                                                             |

$EIRP = (E \cdot d)^2 / 30$ , where E is the field in V/m, d is the measurement distance (3m), EIRP is the equivalent isotropically radiated power in Watts..

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Unwanted spurious emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table:

| Frequency (MHz) | Field strength (microvolts/meter) | Distance (meters) |
|-----------------|-----------------------------------|-------------------|
| 0.009-0.490     | 2400/F(KHz)                       | 300               |
| 0.490-1.705     | 24000/F(KHz)                      | 30                |
| 1.705-30        | 30                                | 30                |
| 30-88           | 100                               | 3                 |
| 88-216          | 150                               | 3                 |
| 216-960         | 200                               | 3                 |
| Above 960       | 500                               | 3                 |

**Note:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBμV/m) = 20 log Emission level (dBμV/m)

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## 11.2 Measurement Equipment Used

| SGS SAC-III       |                 |                                |                  |                  |                 |
|-------------------|-----------------|--------------------------------|------------------|------------------|-----------------|
| Name of Equipment | Manufacturer    | Model                          | Serial Number    | Calibration Date | Calibration Due |
| EMI Test Receiver | R&S             | ESU 40                         | 100363           | 04/12/2016       | 04/11/2017      |
| Loop Antenna      | ETS-Lindgren    | 6502                           | 00143303         | 12/23/2015       | 12/22/2016      |
| Broadband Antenna | TESEQ           | CBL 6112D                      | 35240            | 10/28/2015       | 10/27/2016      |
| Horn Antenna      | ETS-Lindgren    | 3117                           | 00143272         | 12/16/2015       | 12/15/2016      |
| Horn Antenna      | Schwarzbeck     | BBHA9170                       | 185              | 07/18/2016       | 07/17/2017      |
| Pre Amplifier     | EMC Instruments | EMC330                         | 980096           | 12/12/2015       | 12/11/2016      |
| Pre Amplifier     | EMC Instruments | EMC0011830                     | 980199           | 12/12/2015       | 12/11/2016      |
| Pre Amplifier     | R&S             | SCU-18                         | 10204            | 12/12/2015       | 12/11/2016      |
| Pre Amplifier     | EMC Instruments | EMC184045B                     | 980135           | 12/12/2015       | 12/11/2016      |
| Coaxial Cable     | Huber+Suhner    | RG 214/U                       | 966Rx 9K-30M     | 12/12/2015       | 12/11/2016      |
| Coaxial Cable     | Huber+Suhner    | RG 214/U<br>SUCOFLEX<br>104    | 966Rx<br>30M-3G  | 12/12/2015       | 12/11/2016      |
| Coaxial Cable     | Huber+Suhner    | SUCOFLEX<br>104                | 966Rx<br>1G-18G  | 12/12/2015       | 12/11/2016      |
| Coaxial Cable     | Huber+Suhner    | mini 141-12<br>SUCOFLEX<br>104 | 966Rx<br>18G-40G | 12/12/2015       | 12/11/2016      |
| Coaxial Cable     | Huber+Suhner    | SUCOFLEX<br>104                | 966Tx<br>30M-18G | 12/12/2015       | 12/11/2016      |
| Coaxial Cable     | Huber+Suhner    | SUCOFLEX<br>102                | 966Tx<br>18G-40G | 12/12/2015       | 12/11/2016      |
| Attenuator        | WOKEN           | 218FS-10                       | RF27             | 12/12/2015       | 12/11/2016      |
| Site NSA          | SGS             | 966 Chamber<br>C               | SAC-C            | 03/04/2016       | 03/03/2017      |
| Site VSWR         | SGS             | 966 Chamber<br>C               | SAC-C            | 03/04/2016       | 03/03/2017      |
| DC Power Supply   | HOLA            | DP-3003                        | D7070035         | 05/04/2016       | 05/03/2017      |
| Controller        | MF              | MF-7802                        | N/A              | N.C.R.           | N.C.R.          |
| Antenna Master    | MF              | N/A                            | N/A              | N.C.R.           | N.C.R.          |
| Turn Table        | MF              | N/A                            | N/A              | N.C.R.           | N.C.R.          |
| Test Software     | World-Pallas    | Dr. E                          | V 3.0 Lite       | N.C.R.           | N.C.R.          |

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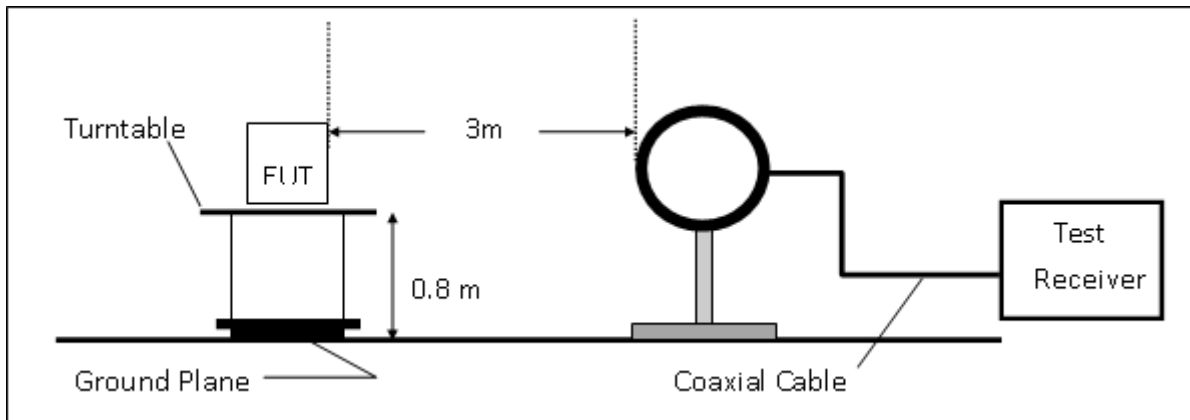
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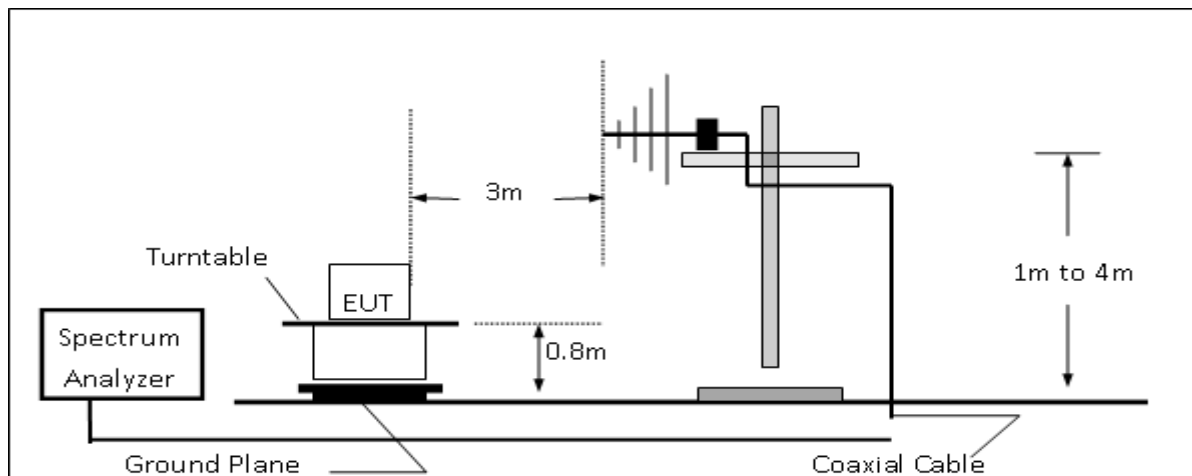
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## 11.3 Test SET-UP

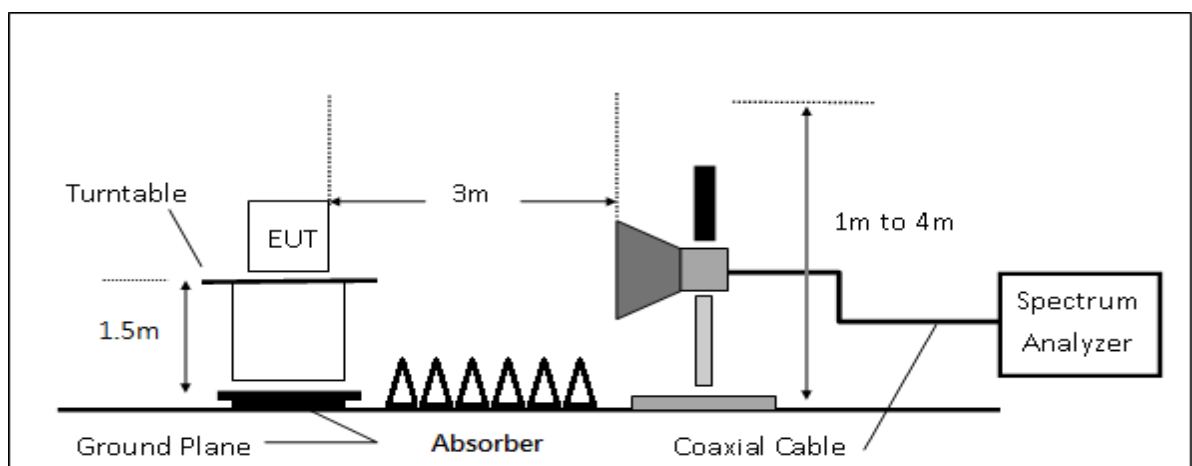
### (A) Radiated Emission Test Set-UP Frequency Below 30MHz.



### (B) Radiated Emission Test Set-UP, Frequency form 30MHz to 1000MHz



### (C) Radiated Emission Test Set-UP Frequency Over 1 GHz



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## 11.4 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules.
3. The EUT was placed on a turn table with 0.8m for frequency < 1GHz and 1.5m for frequency > 1GHz above ground plane.
4. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
5. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
6. Set the spectrum analyzer as RBW=120 kHz and VBW=300 kHz for Peak Detector (PK) and Quasi-peak (QP) at frequency below 1 GHz.
7. Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Peak Detector at frequency above 1 GHz.
8. Set the spectrum analyzer as RBW=1 MHz, VBW=10 Hz (Duty cycle > 98%) or VBW ≥ 1/T (Duty cycle < 98%) for Average Detector at frequency above 1 GHz.
9. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
10. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
11. Repeat above procedures until all frequency measured were complete.

## 11.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

|       |                        |                                            |
|-------|------------------------|--------------------------------------------|
| Where | FS = Field Strength    | CL = Cable Attenuation Factor (Cable Loss) |
|       | RA = Reading Amplitude | AG = Amplifier Gain                        |
|       | AF = Antenna Factor    |                                            |

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

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**Note :**

“F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

**11.6 Test Results of Radiated Spurious Emissions form 9 KHz to 30 MHz**

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit per 15.31(o) was not reported.

**11.7 Measurement Result**

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

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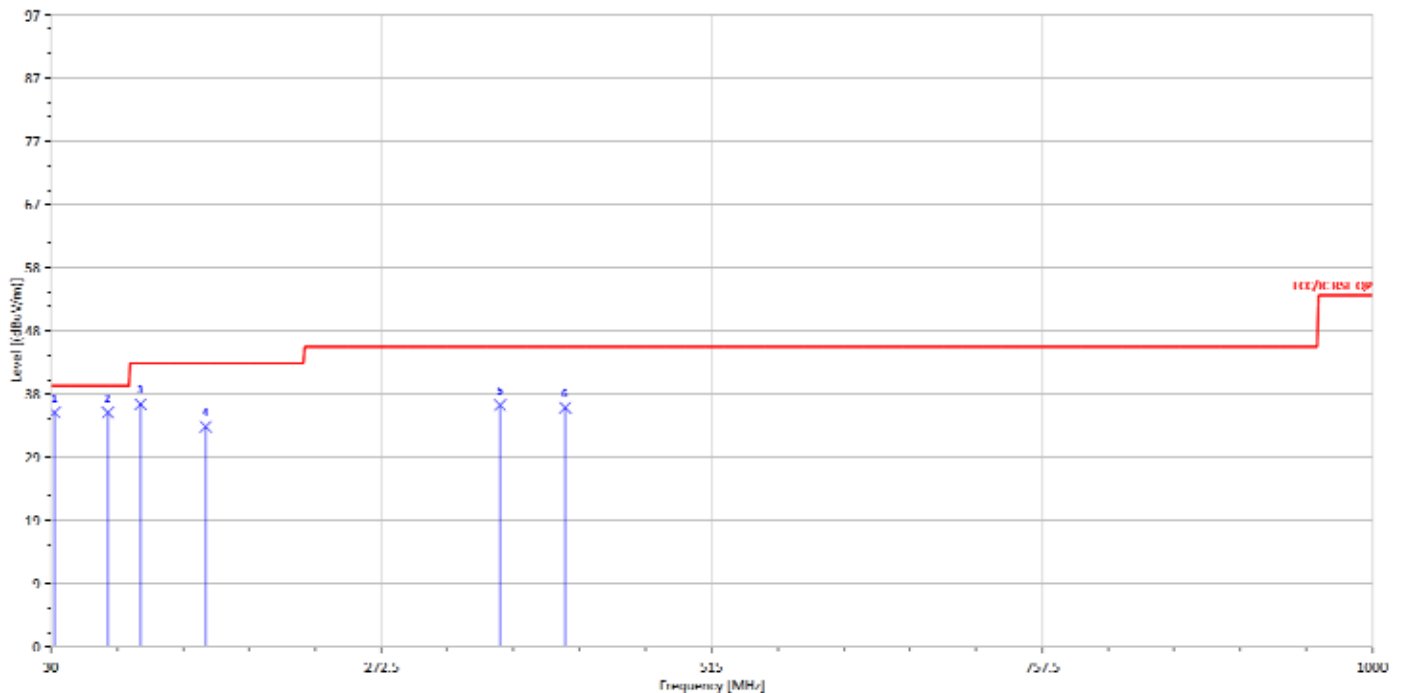
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## Radiated Spurious Emission Measurement Result

### Below 1GHz Worst-Case Data:

#### 802.11a 5150~5250 MHz

|                         |           |                            |                |
|-------------------------|-----------|----------------------------|----------------|
| Operation Mode :        | 802.11a   | Test Date :                | 2016/10/21     |
| Fundamental Frequency : | 5220 MHz  | Temp. / Humi. :            | 22.7deg_C/57RH |
| Operation Band :        | Tx CH Mid | Test Engineer :            | Pony           |
| EUT Pol. :              | E2        | Measurement Antenna Pol. : | Vertical       |



| Freq.  | Note    | Detector | Spectrum      | Factor | Actual | Limit  | Margin |
|--------|---------|----------|---------------|--------|--------|--------|--------|
| MHz    | F/H/E/S | Mode     | Reading Level |        | FS     | @3m    |        |
|        |         | PK/QP/AV | dBμV          | dB     | dBμV/m | dBμV/m | dB     |
| 32.91  | S       | QP       | 44.70         | -8.75  | 35.95  | 40     | -4.05  |
| 71.71  | S       | QP       | 57.60         | -21.65 | 35.95  | 40     | -4.05  |
| 95.96  | S       | Peak     | 55.68         | -18.44 | 37.24  | 43.5   | -6.26  |
| 143.49 | S       | Peak     | 50.08         | -16.32 | 33.76  | 43.5   | -9.74  |
| 359.80 | S       | Peak     | 48.32         | -11.20 | 37.12  | 46     | -8.88  |
| 407.33 | S       | Peak     | 45.88         | -9.16  | 36.71  | 46     | -9.29  |

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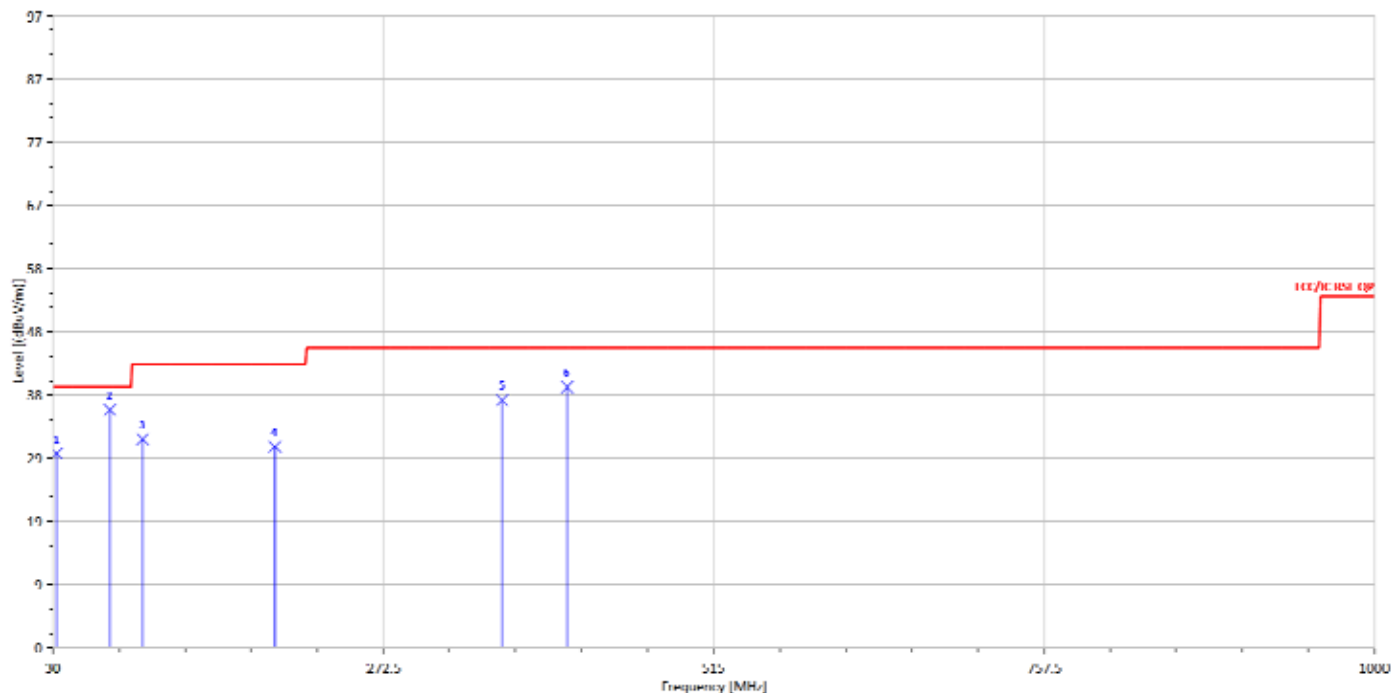
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Operation Mode : 802.11a      Test Date : 2016/10/21  
 Fundamental Frequency : 5220 MHz      Temp. / Humi. : 22.7deg\_C/57RH  
 Operation Band : Tx CH Mid      Test Engineer : Pony  
 EUT Pol. : E2      Measurement Antenna Pol. : Horizontal



| Freq.<br>MHz | Note<br>F/H/E/S | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dBμV | Factor<br>dB | Actual<br>FS<br>dBμV/m | Limit<br>@3m<br>dBμV/m | Margin<br>dB |
|--------------|-----------------|------------------------------|-----------------------------------|--------------|------------------------|------------------------|--------------|
| 32.91        | S               | Peak                         | 38.51                             | -8.75        | 29.76                  | 40                     | -10.24       |
| 71.71        | S               | Peak                         | 58.18                             | -21.65       | 36.53                  | 40                     | -3.47        |
| 95.96        | S               | Peak                         | 50.41                             | -18.44       | 31.97                  | 43.5                   | -11.53       |
| 192.96       | S               | Peak                         | 48.86                             | -18.05       | 30.81                  | 43.5                   | -12.69       |
| 359.80       | S               | Peak                         | 49.22                             | -11.20       | 38.02                  | 46                     | -7.98        |
| 407.33       | S               | Peak                         | 49.16                             | -9.16        | 39.99                  | 46                     | -6.01        |

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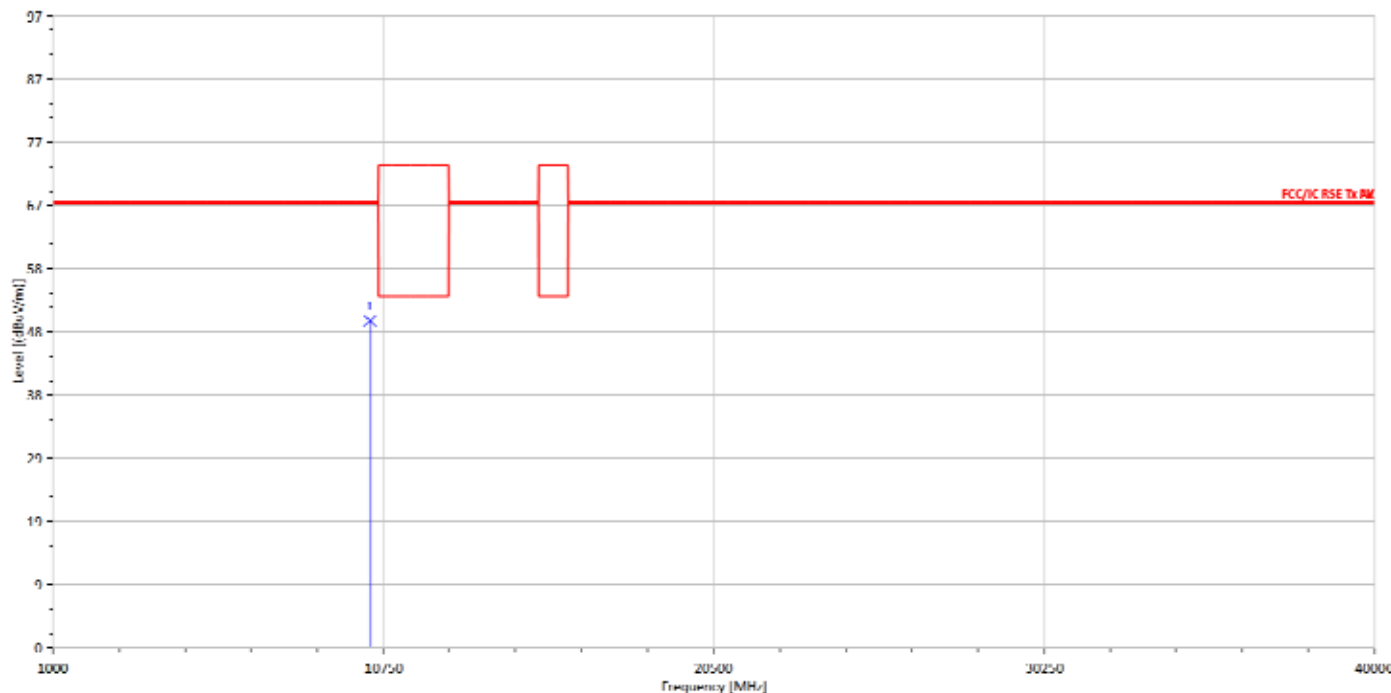
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## Above 1GHz Worst-Case Data:

### Radiated Spurious Emission Measurement Result 802.11a, 5150~5250 MHz

|                         |           |                            |                |
|-------------------------|-----------|----------------------------|----------------|
| Operation Mode :        | 802.11a   | Test Date :                | 2016/10/21     |
| Fundamental Frequency : | 5180 MHz  | Temp. / Humi. :            | 22.7deg_C/57RH |
| Operation Band :        | Tx CH Low | Test Engineer :            | Ashton         |
| EUT Pol. :              | E2        | Measurement Antenna Pol. : | Vertical       |



| Freq.    | Note    | Detector | Spectrum      | Factor | Actual | Limit  | Margin |
|----------|---------|----------|---------------|--------|--------|--------|--------|
| MHz      | F/H/E/S | Mode     | Reading Level |        | FS     | @3m    |        |
|          |         | PK/QP/AV | dBμV          | dB     | dBμV/m | dBμV/m | dB     |
| 10360.00 | H       | Peak     | 30.03         | 20.18  | 50.21  | 68.3   | -18.09 |

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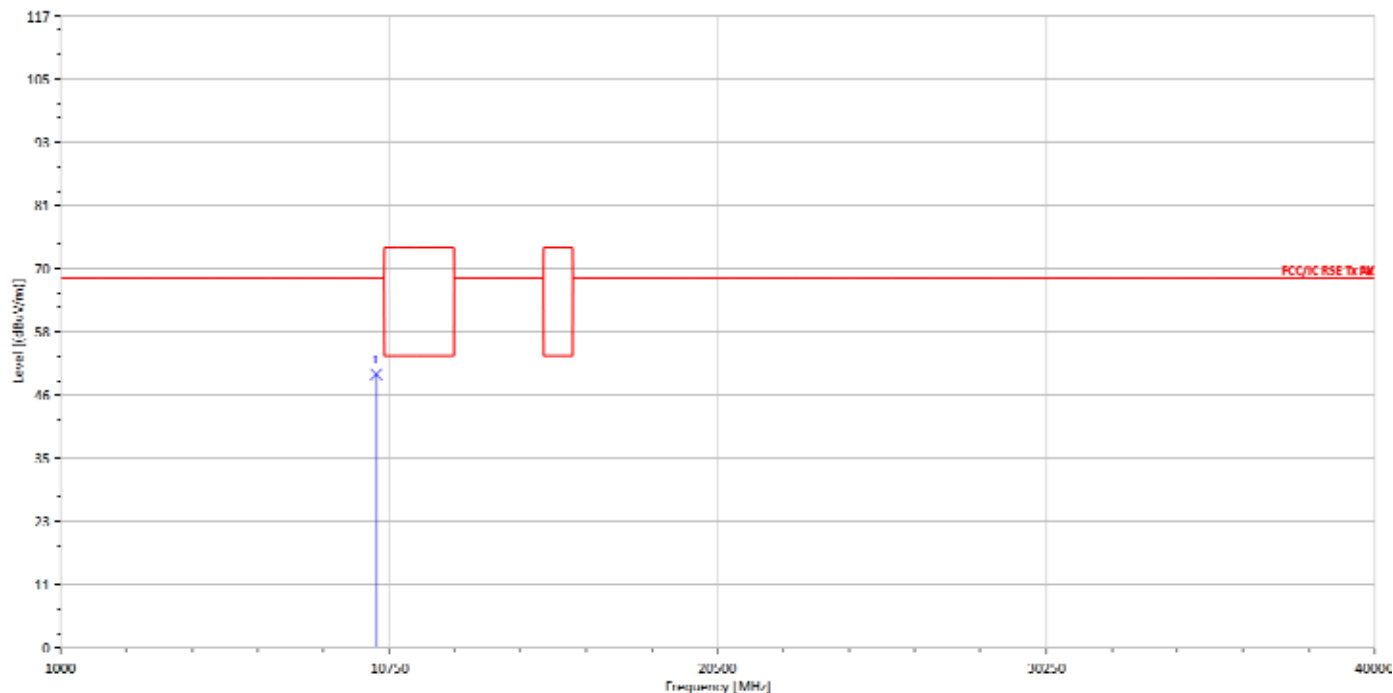
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Operation Mode : 802.11a      Test Date : 2016/10/21  
 Fundamental Frequency : 5180 MHz      Temp. / Humi. : 22.7deg\_C/57RH  
 Operation Band : Tx CH Low      Test Engineer : Ashton  
 EUT Pol. : E2      Measurement Antenna Pol. : Horizontal



| Freq.<br>MHz | Note<br>F/H/E/S | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dBμV | Factor<br>dB | Actual<br>FS<br>dBμV/m | Limit<br>@3m<br>dBμV/m | Margin<br>dB |
|--------------|-----------------|------------------------------|-----------------------------------|--------------|------------------------|------------------------|--------------|
| 10360.00     | H               | Peak                         | 30.37                             | 20.18        | 50.54                  | 68.3                   | -17.76       |

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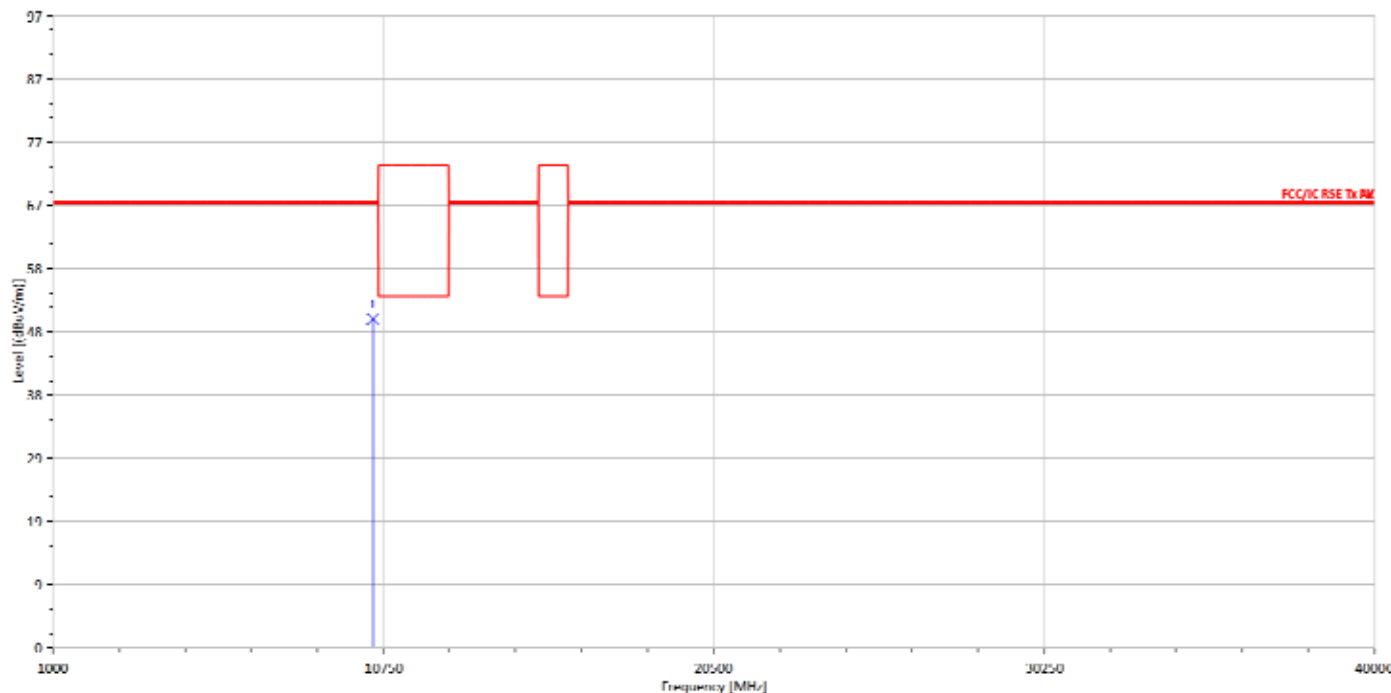
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Operation Mode : 802.11a      Test Date : 2016/10/21  
 Fundamental Frequency : 5220 MHz      Temp. / Humi. : 22.7deg\_C/57RH  
 Operation Band : Tx CH Mid      Test Engineer : Ashton  
 EUT Pol. : E2      Measurement Antenna Pol. : Vertical



| Freq.    | Note    | Detector | Spectrum      | Factor | Actual | Limit  | Margin |
|----------|---------|----------|---------------|--------|--------|--------|--------|
| MHz      | F/H/E/S | Mode     | Reading Level |        | FS     | @3m    |        |
|          |         | PK/QP/AV | dBμV          | dB     | dBμV/m | dBμV/m | dB     |
| 10440.00 | H       | Peak     | 30.20         | 20.29  | 50.49  | 68.3   | -17.81 |

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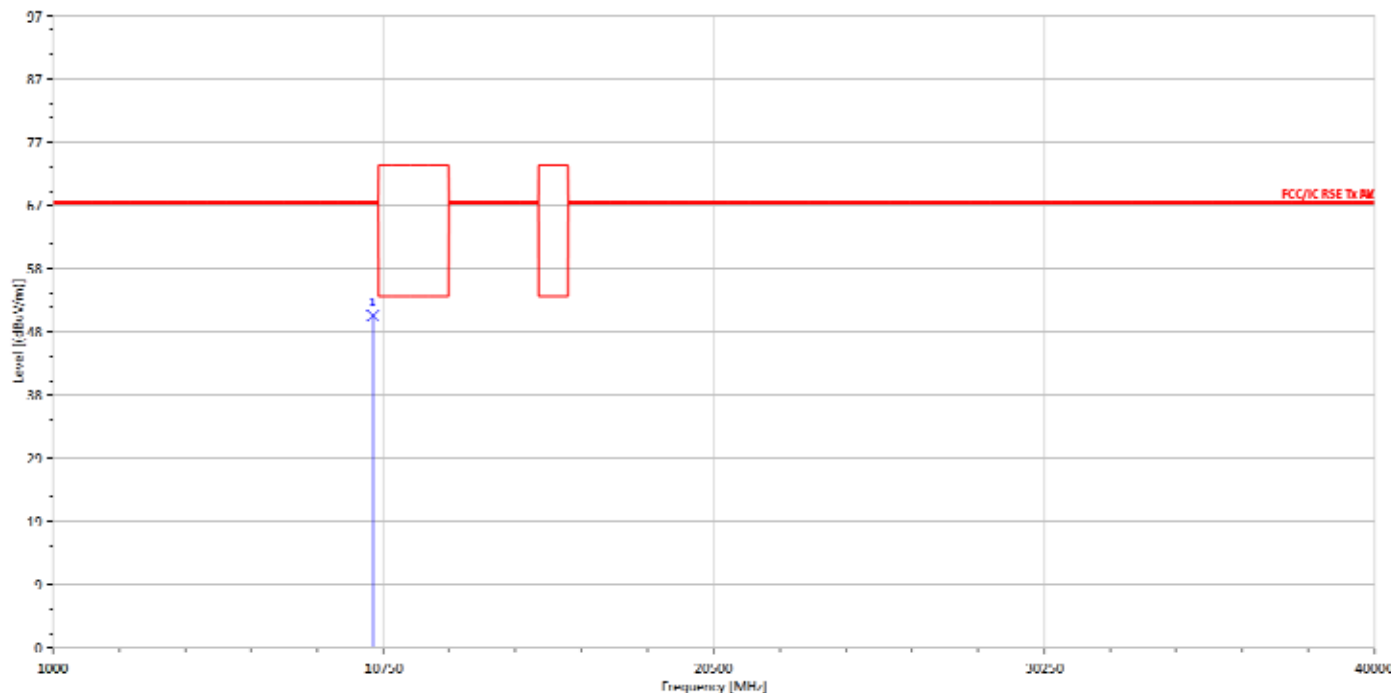
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Operation Mode : 802.11a      Test Date : 2016/10/21  
 Fundamental Frequency : 5220 MHz      Temp. / Humi. : 22.7deg\_C/57RH  
 Operation Band : Tx CH Mid      Test Engineer : Ashton  
 EUT Pol. : E2      Measurement Antenna Pol. : Horizontal



| Freq.    | Note    | Detector | Spectrum      | Factor | Actual | Limit  | Margin |
|----------|---------|----------|---------------|--------|--------|--------|--------|
| MHz      | F/H/E/S | Mode     | Reading Level | dB     | FS     | @3m    |        |
|          |         | PK/QP/AV | dBμV          |        | dBμV/m | dBμV/m | dB     |
| 10440.00 | H       | Peak     | 30.71         | 20.29  | 51.00  | 68.3   | -17.30 |

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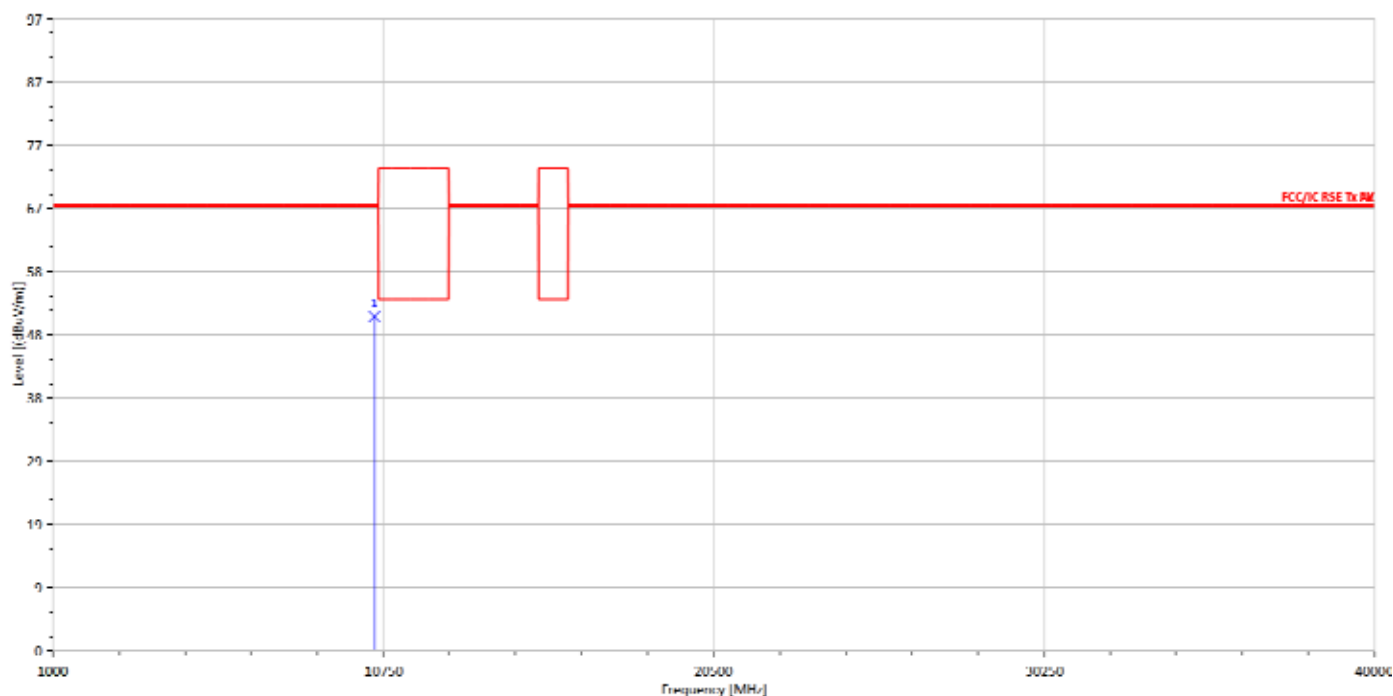
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|                         |            |                            |                |
|-------------------------|------------|----------------------------|----------------|
| Operation Mode :        | 802.11a    | Test Date :                | 2016/10/21     |
| Fundamental Frequency : | 5240 MHz   | Temp. / Humi. :            | 22.7deg_C/57RH |
| Operation Band :        | Tx CH High | Test Engineer :            | Ashton         |
| EUT Pol. :              | E2         | Measurement Antenna Pol. : | Vertical       |



| Freq.    | Note    | Detector | Spectrum      | Factor | Actual | Limit  | Margin |
|----------|---------|----------|---------------|--------|--------|--------|--------|
| MHz      | F/H/E/S | Mode     | Reading Level | dB     | FS     | @3m    |        |
|          |         | PK/QP/AV | dBμV          |        | dBμV/m | dBμV/m | dB     |
| 10480.00 | H       | Peak     | 30.64         | 20.68  | 51.32  | 68.3   | -16.98 |

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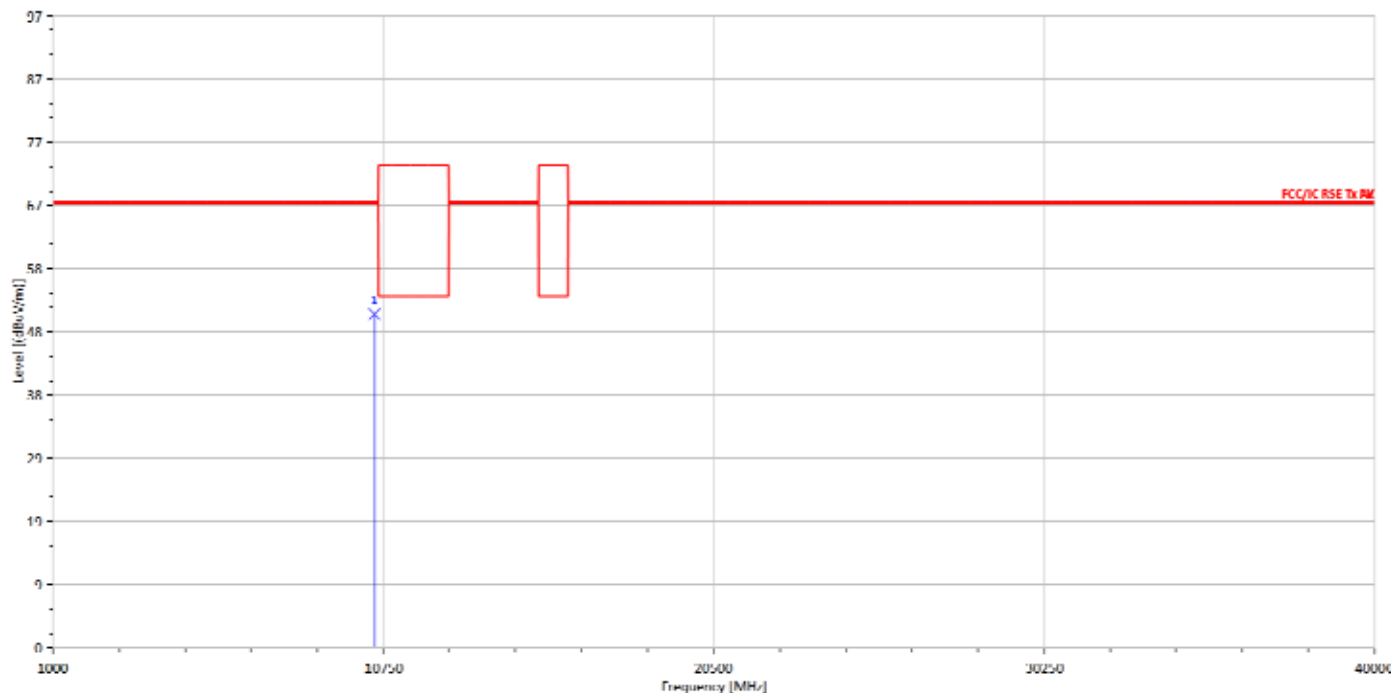
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|                         |            |                            |                |
|-------------------------|------------|----------------------------|----------------|
| Operation Mode :        | 802.11a    | Test Date :                | 2016/10/21     |
| Fundamental Frequency : | 5240 MHz   | Temp. / Humi. :            | 22.7deg_C/57RH |
| Operation Band :        | Tx CH High | Test Engineer :            | Ashton         |
| EUT Pol. :              | E2         | Measurement Antenna Pol. : | Horizontal     |



| Freq.    | Note    | Detector | Spectrum      | Factor | Actual | Limit  | Margin |
|----------|---------|----------|---------------|--------|--------|--------|--------|
| MHz      | F/H/E/S | Mode     | Reading Level | dB     | FS     | @3m    |        |
|          |         | PK/QP/AV | dBμV          |        | dBμV/m | dBμV/m | dB     |
| 10480.00 | H       | Peak     | 30.55         | 20.68  | 51.23  | 68.3   | -17.07 |

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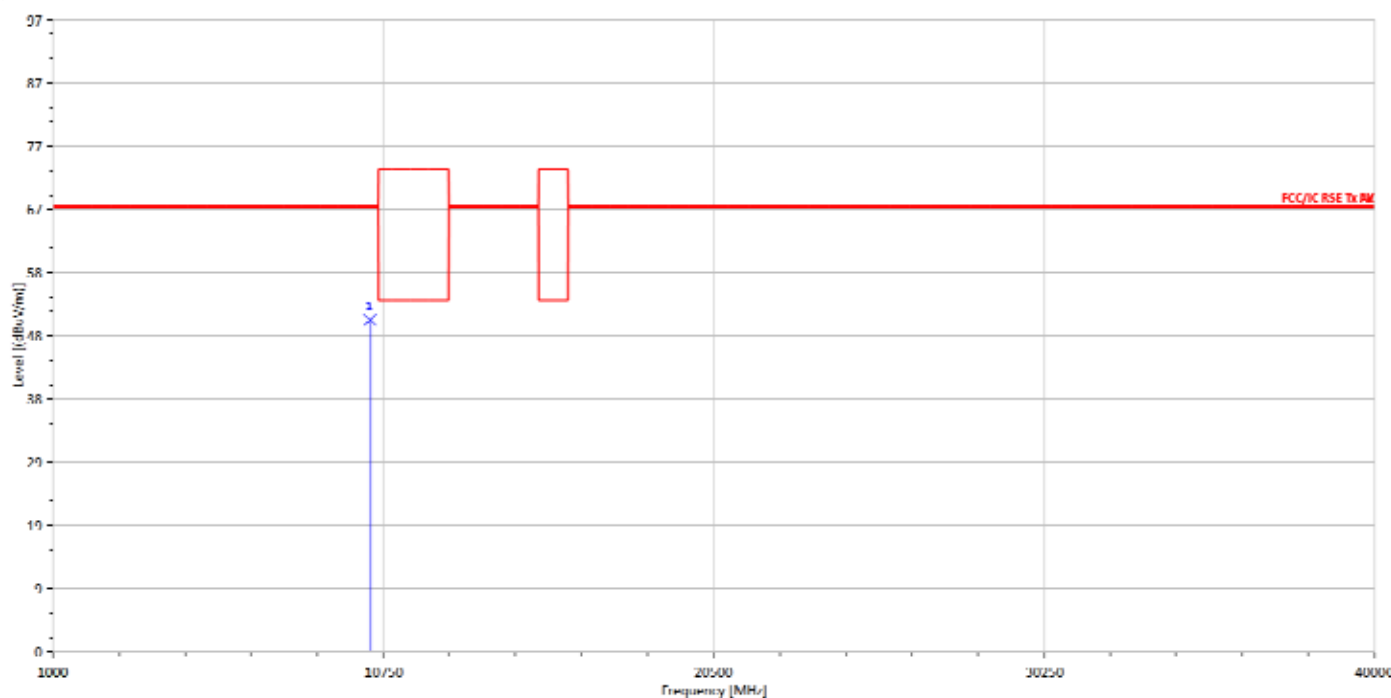
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## Radiated Spurious Emission Measurement Result 802.11n HT20, 5150~5250 MHz

|                         |           |                            |                 |
|-------------------------|-----------|----------------------------|-----------------|
| Operation Mode :        | 802.11n20 | Test Date :                | 2016/10/21      |
| Fundamental Frequency : | 5180 MHz  | Temp. / Humi. :            | 22.7 deg_C/57RH |
| Operation Band :        | Tx CH Low | Test Engineer :            | Ashton          |
| EUT Pol. :              | E2        | Measurement Antenna Pol. : | Vertical        |



| Freq.    | Note    | Detector | Spectrum      | Factor | Actual | Limit  | Margin |
|----------|---------|----------|---------------|--------|--------|--------|--------|
| MHz      | F/H/E/S | Mode     | Reading Level | dB     | FS     | @3m    | dB     |
|          |         | PK/QP/AV | dBμV          |        | dBμV/m | dBμV/m |        |
| 10360.00 | H       | Peak     | 30.78         | 20.18  | 50.95  | 68.3   | -17.35 |

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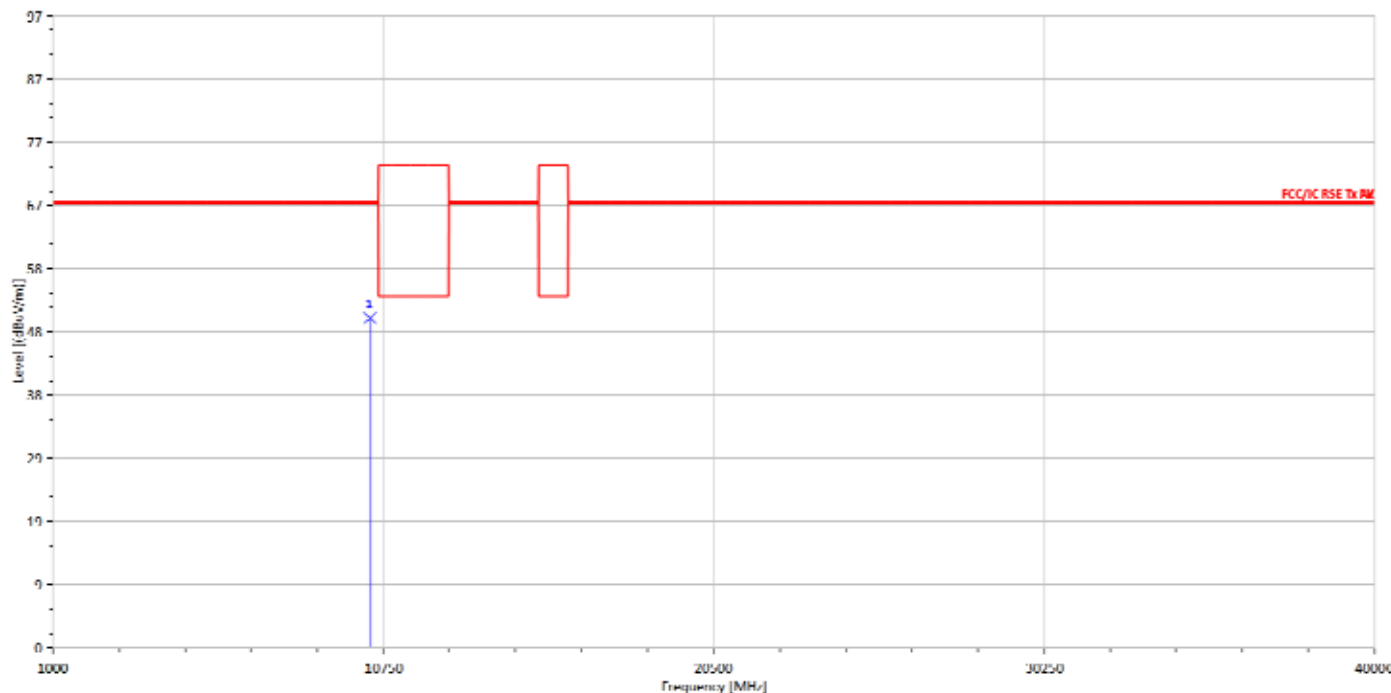
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Operation Mode : 802.11n20 Test Date : 2016/10/21  
 Fundamental Frequency : 5180 MHz Temp. / Humi. : 22.7 deg\_C/57RH  
 Operation Band : Tx CH Low Test Engineer : Ashton  
 EUT Pol. : E2 Measurement Antenna Pol. : Horizontal



| Freq.    | Note    | Detector | Spectrum      | Factor | Actual | Limit  | Margin |
|----------|---------|----------|---------------|--------|--------|--------|--------|
| MHz      | F/H/E/S | Mode     | Reading Level |        | FS     | @3m    |        |
|          |         | PK/QP/AV | dBμV          | dB     | dBμV/m | dBμV/m | dB     |
| 10360.00 | H       | Peak     | 30.46         | 20.18  | 50.63  | 68.3   | -17.67 |

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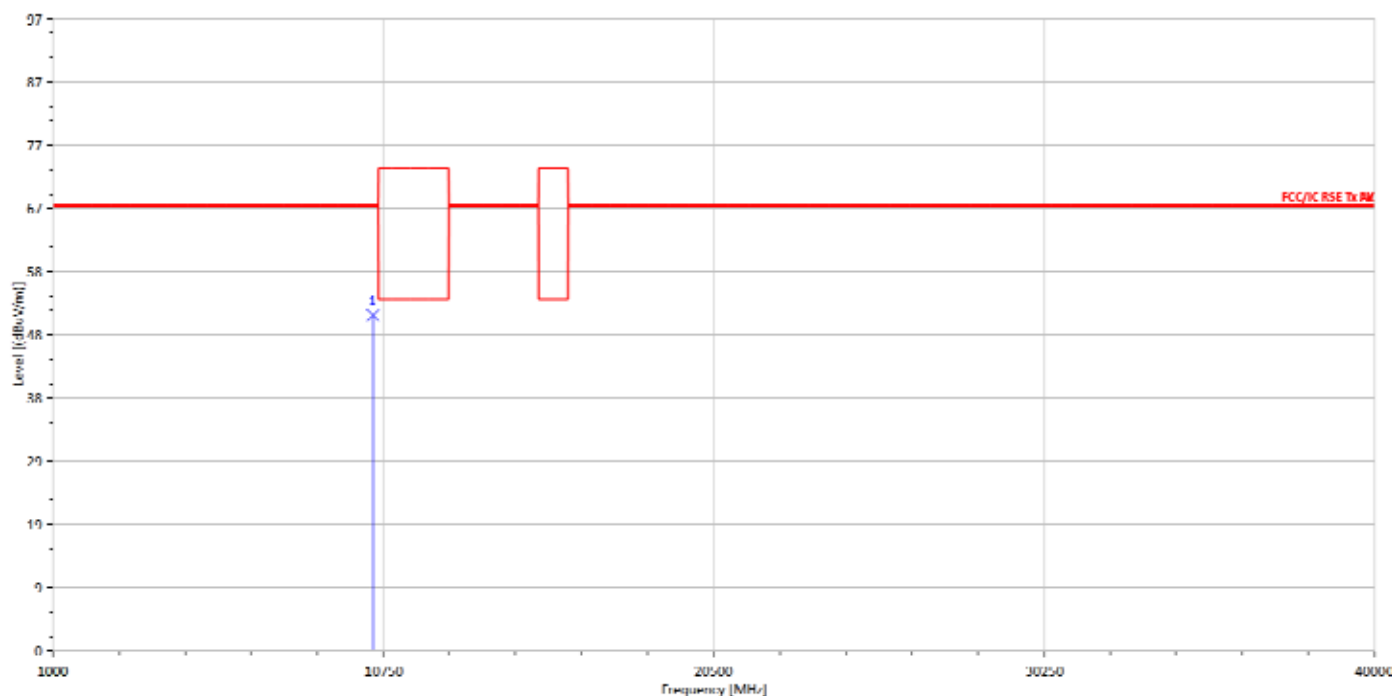
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|                         |           |                            |                 |
|-------------------------|-----------|----------------------------|-----------------|
| Operation Mode :        | 802.11n20 | Test Date :                | 2016/10/21      |
| Fundamental Frequency : | 5220 MHz  | Temp. / Humi. :            | 22.7 deg_C/57RH |
| Operation Band :        | Tx CH Mid | Test Engineer :            | Ashton          |
| EUT Pol. :              | E2        | Measurement Antenna Pol. : | Vertical        |



| Freq.    | Note    | Detector | Spectrum      | Factor | Actual | Limit  | Margin |
|----------|---------|----------|---------------|--------|--------|--------|--------|
| MHz      | F/H/E/S | Mode     | Reading Level |        | FS     | @3m    |        |
|          |         | PK/QP/AV | dBμV          | dB     | dBμV/m | dBμV/m | dB     |
| 10440.00 | H       | Peak     | 31.23         | 20.29  | 51.52  | 68.3   | -16.78 |

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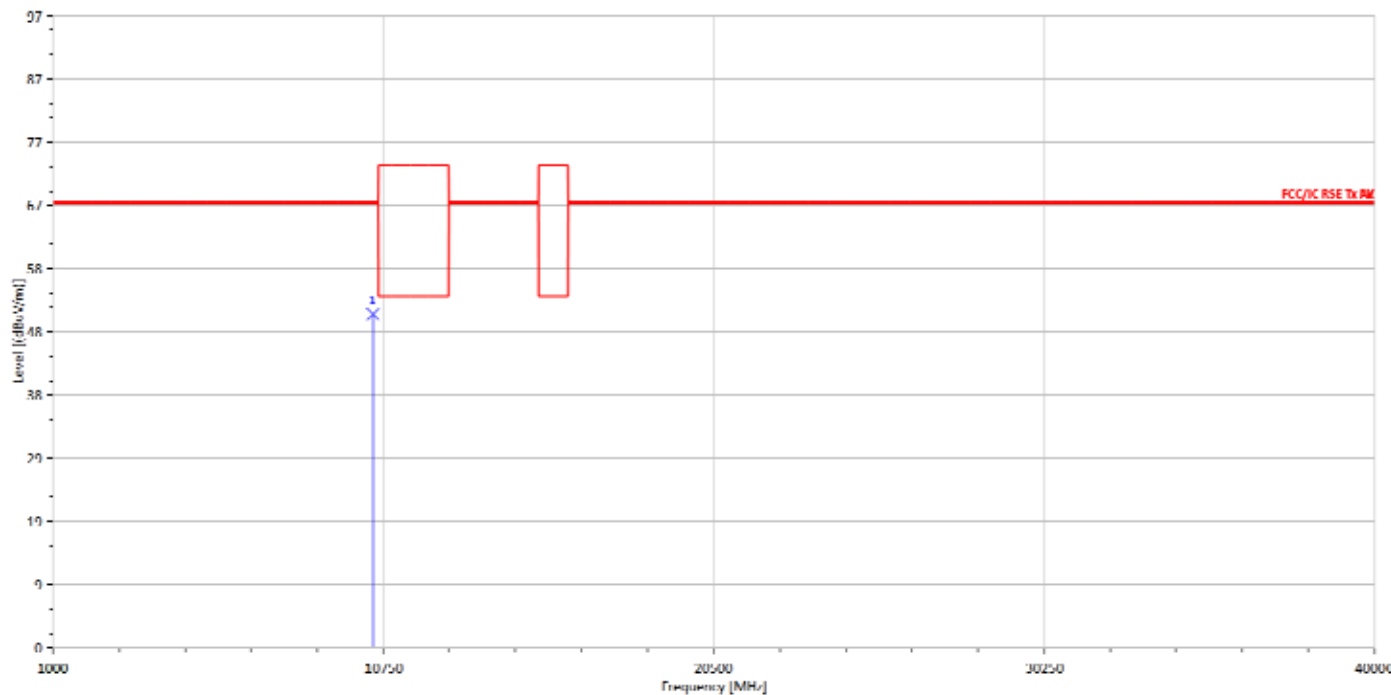
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Operation Mode : 802.11n20      Test Date : 2016/10/21  
 Fundamental Frequency : 5220 MHz      Temp. / Humi. : 22.7 deg\_C/57RH  
 Operation Band : Tx CH Mid      Test Engineer : Ashton  
 EUT Pol. : E2      Measurement Antenna Pol. : Horizontal



| Freq.    | Note    | Detector | Spectrum      | Factor | Actual | Limit  | Margin |
|----------|---------|----------|---------------|--------|--------|--------|--------|
| MHz      | F/H/E/S | Mode     | Reading Level |        | FS     | @3m    |        |
|          |         | PK/QP/AV | dBμV          | dB     | dBμV/m | dBμV/m | dB     |
| 10440.00 | H       | Peak     | 30.93         | 20.29  | 51.22  | 68.3   | -17.08 |

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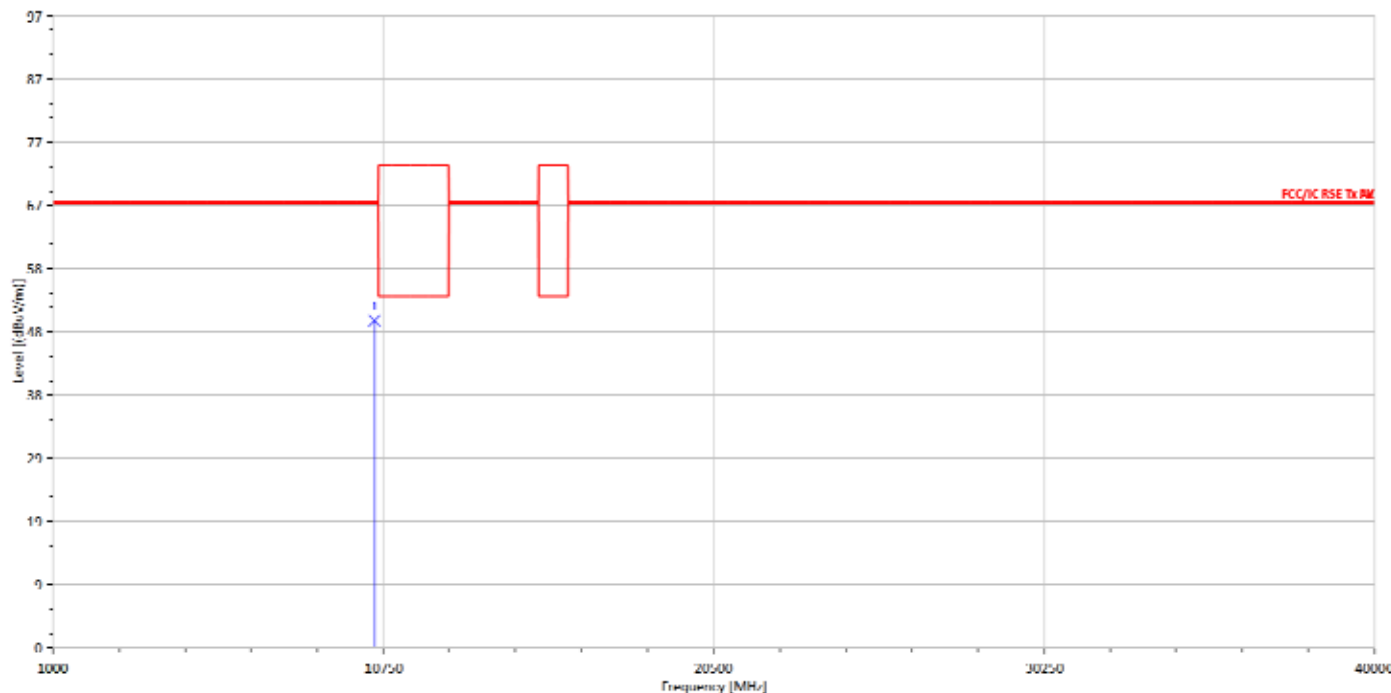
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Operation Mode : 802.11n20 Test Date : 2016/10/21  
Fundamental Frequency : 5240 MHz Temp. / Humi. : 22.7 deg\_C/57RH  
Operation Band : Tx CH High Test Engineer : Ashton  
EUT Pol. : E2 Measurement Antenna Pol. : Vertical



| Freq.    | Note    | Detector | Spectrum      | Factor | Actual | Limit  | Margin |
|----------|---------|----------|---------------|--------|--------|--------|--------|
| MHz      | F/H/E/S | Mode     | Reading Level |        | FS     | @3m    |        |
|          |         | PK/QP/AV | dBμV          | dB     | dBμV/m | dBμV/m | dB     |
| 10480.00 | H       | Peak     | 29.56         | 20.68  | 50.24  | 68.3   | -18.06 |

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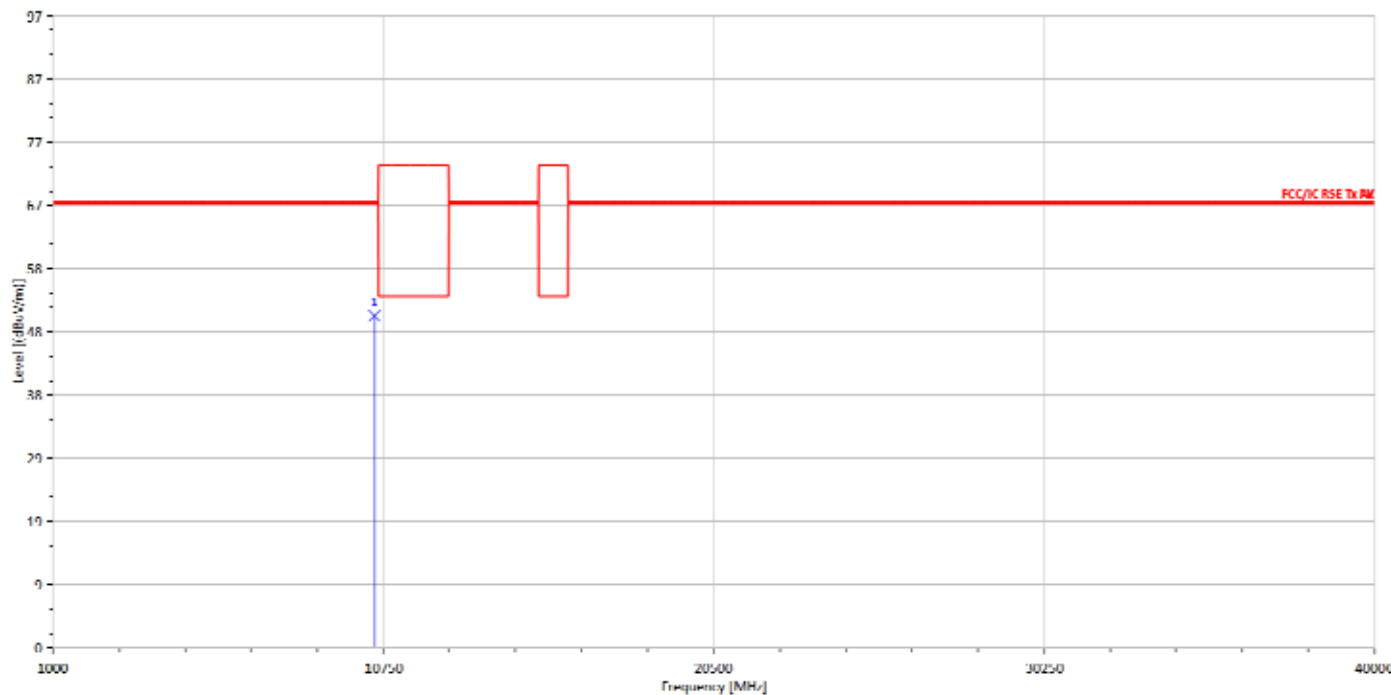
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Operation Mode : 802.11n20 Test Date : 2016/10/21  
 Fundamental Frequency : 5240 MHz Temp. / Humi. : 22.7 deg\_C/57RH  
 Operation Band : Tx CH High Test Engineer : Ashton  
 EUT Pol. : E2 Measurement Antenna Pol. : Horizontal



| Freq.    | Note    | Detector | Spectrum      | Factor | Actual | Limit  | Margin |
|----------|---------|----------|---------------|--------|--------|--------|--------|
| MHz      | F/H/E/S | Mode     | Reading Level |        | FS     | @3m    |        |
|          |         | PK/QP/AV | dBμV          | dB     | dBμV/m | dBμV/m | dB     |
| 10480.00 | H       | Peak     | 30.29         | 20.68  | 50.96  | 68.3   | -17.34 |

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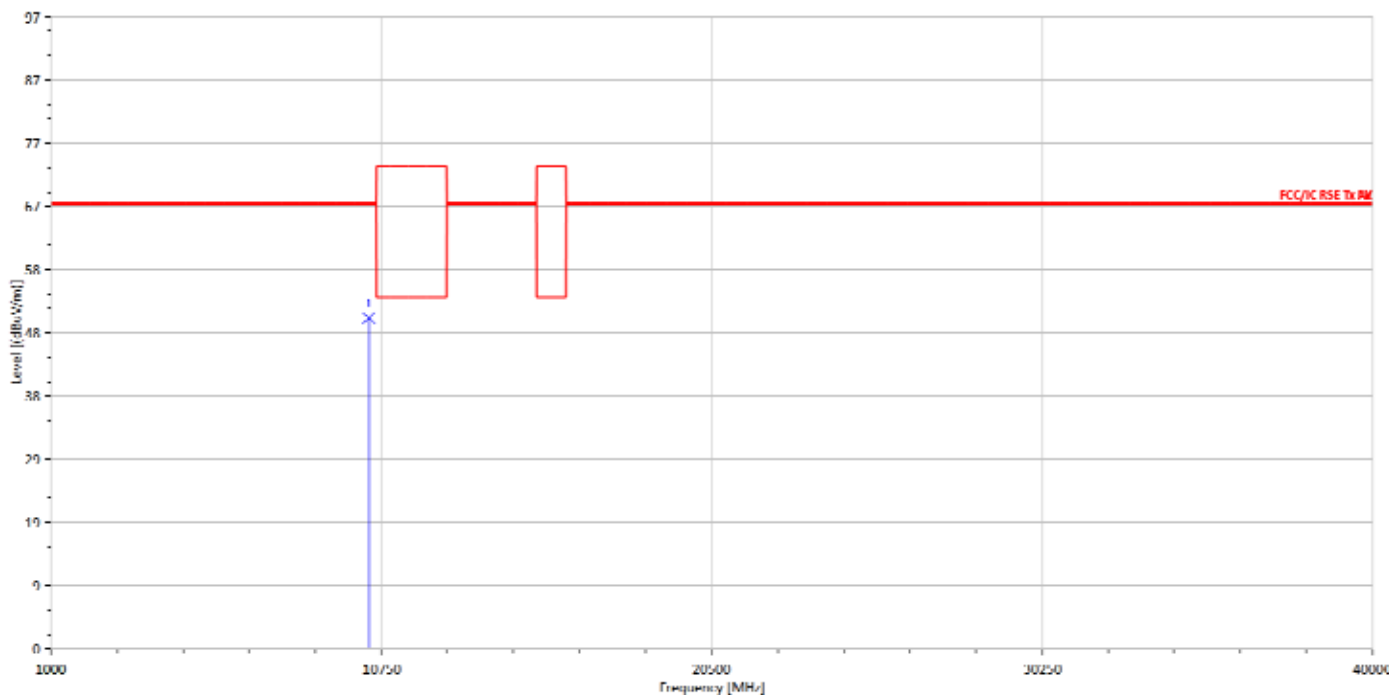
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## Radiated Spurious Emission Measurement Result 802.11n HT40, 5150~5250 MHz

|                         |           |                            |                 |
|-------------------------|-----------|----------------------------|-----------------|
| Operation Mode :        | 802.11n40 | Test Date :                | 2016/10/21      |
| Fundamental Frequency : | 5190 MHz  | Temp. / Humi. :            | 22.7 deg_C/57RH |
| Operation Band :        | Tx CH Low | Test Engineer :            | Ashton          |
| EUT Pol. :              | E2        | Measurement Antenna Pol. : | Vertical        |



| Freq.<br>MHz | Note<br>F/H/E/S | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dBμV | Factor<br>dB | Actual<br>FS<br>dBμV/m | Limit<br>@3m<br>dBμV/m | Margin<br>dB |
|--------------|-----------------|------------------------------|-----------------------------------|--------------|------------------------|------------------------|--------------|
| 10380.00     | H               | Peak                         | 29.84                             | 20.95        | 50.79                  | 68.3                   | -17.51       |

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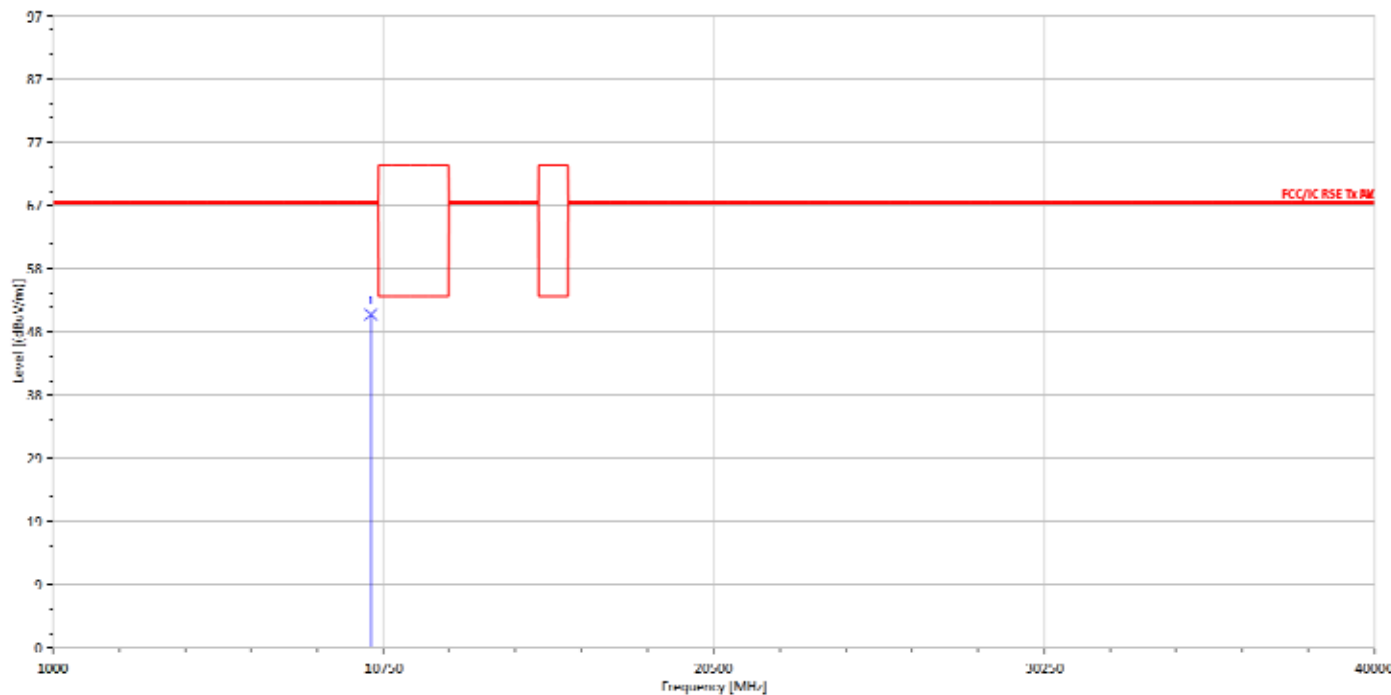
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Operation Mode : 802.11n40      Test Date : 2016/10/21  
 Fundamental Frequency : 5190 MHz      Temp. / Humi. : 22.7deg\_C/57RH  
 Operation Band : Tx CH Low      Test Engineer : Ashton  
 EUT Pol. : E2      Measurement Antenna Pol. : Horizontal



| Freq.    | Note    | Detector | Spectrum      | Factor | Actual | Limit  | Margin |
|----------|---------|----------|---------------|--------|--------|--------|--------|
| MHz      | F/H/E/S | Mode     | Reading Level | dB     | FS     | @3m    |        |
|          |         | PK/QP/AV | dBμV          |        | dBμV/m | dBμV/m | dB     |
| 10380.00 | H       | Peak     | 30.22         | 20.95  | 51.17  | 68.3   | -17.13 |

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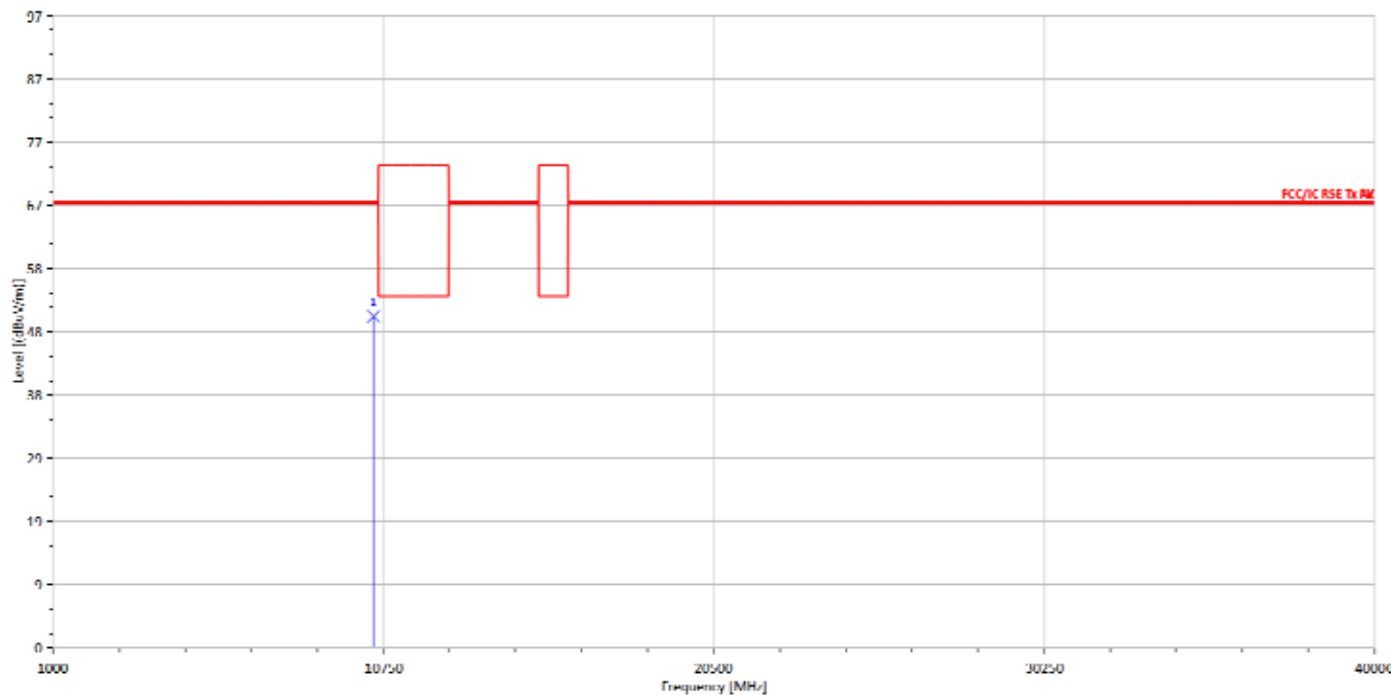
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Operation Mode : 802.11n40 Test Date : 2016/10/21  
 Fundamental Frequency : 5230 MHz Temp. / Humi. : 22.7 deg\_C/57RH  
 Operation Band : Tx CH High Test Engineer : Ashton  
 EUT Pol. : E2 Measurement Antenna Pol. : Vertical



| Freq.    | Note    | Detector | Spectrum      | Factor | Actual | Limit  | Margin |
|----------|---------|----------|---------------|--------|--------|--------|--------|
| MHz      | F/H/E/S | Mode     | Reading Level |        | FS     | @3m    |        |
|          |         | PK/QP/AV | dBμV          | dB     | dBμV/m | dBμV/m | dB     |
| 10460.00 | H       | Peak     | 29.93         | 20.95  | 50.88  | 68.3   | -17.42 |

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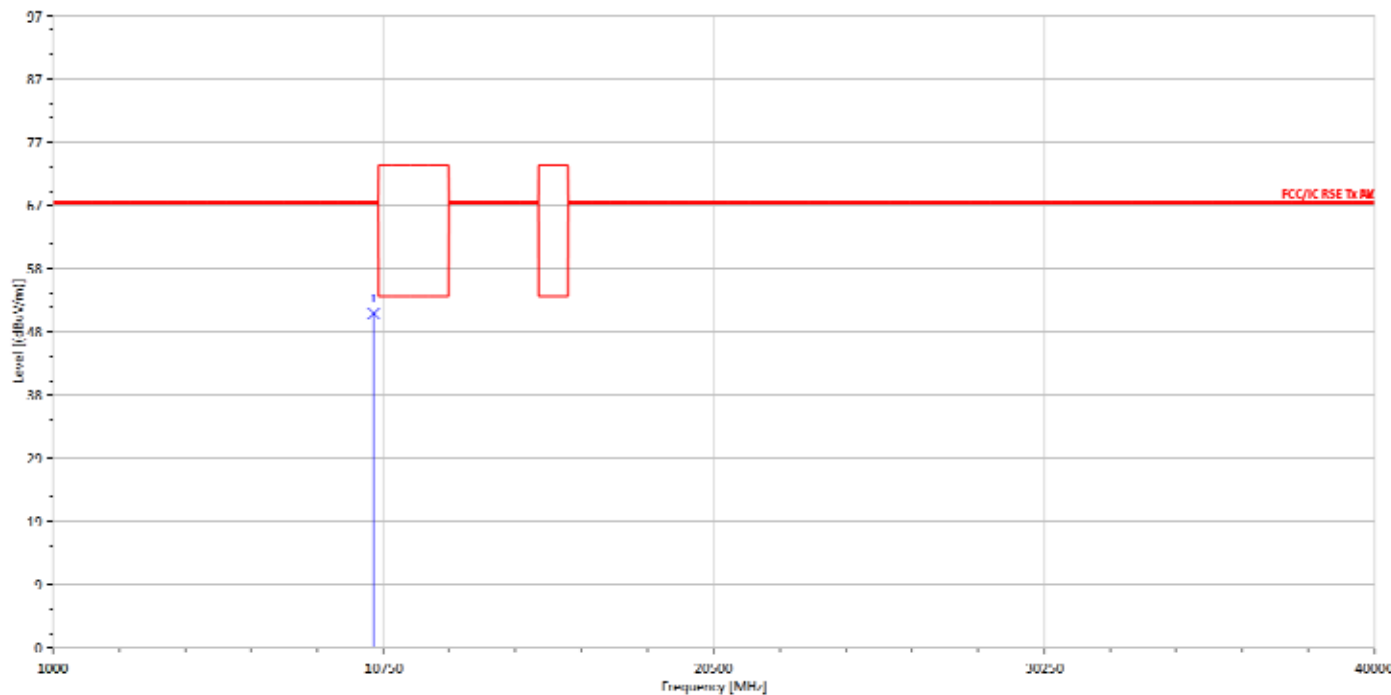
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Operation Mode : 802.11n40 Test Date : 2016/10/21  
 Fundamental Frequency : 5230 MHz Temp. / Humi. : 22.7 deg\_C/57RH  
 Operation Band : Tx CH High Test Engineer : Ashton  
 EUT Pol. : E2 Measurement Antenna Pol. : Horizontal



| Freq.    | Note    | Detector | Spectrum      | Factor | Actual | Limit  | Margin |
|----------|---------|----------|---------------|--------|--------|--------|--------|
| MHz      | F/H/E/S | Mode     | Reading Level |        | FS     | @3m    |        |
|          |         | PK/QP/AV | dBμV          | dB     | dBμV/m | dBμV/m | dB     |
| 10460.00 | H       | Peak     | 30.37         | 20.95  | 51.33  | 68.3   | -16.97 |

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## Band edge falling to restricted band

### 802.11a mode

Operation Mode : 802.11a      Test Date : 2016/10/21  
 Fundamental Frequency : 5180 MHz      Temp. / Humi. : 22.7deg\_C/57RH  
 Operation Band : BE CH Low      Test Engineer : Ashton  
 EUT Pol. : E2      Measurement Antenna Pol. : Vertical

| Freq.   | Note    | Detector Mode | Spectrum Reading Level | Factor | Actual FS | Limit @3m | Margin |
|---------|---------|---------------|------------------------|--------|-----------|-----------|--------|
| MHz     | F/H/E/S | PK/QP/AV      | dBμV                   | dB     | dBμV/m    | dBμV/m    | dB     |
| 5149.36 | S       | Peak          | 53.48                  | 8.19   | 61.67     | 74        | -12.33 |
| 5149.36 | S       | Average       | 32.53                  | 8.19   | 40.72     | 54        | -13.28 |
| 5150.00 | E       | Peak          | 52.92                  | 8.19   | 61.11     | 74        | -12.89 |
| 5150.00 | E       | Average       | 32.58                  | 8.19   | 40.77     | 54        | -13.23 |

Operation Mode : 802.11a      Test Date : 2016/10/21  
 Fundamental Frequency : 5180 MHz      Temp. / Humi. : 22.7deg\_C/57RH  
 Operation Band : BE CH Low      Test Engineer : Ashton  
 EUT Pol. : E2      Measurement Antenna Pol. : Horizontal

| Freq.   | Note    | Detector Mode | Spectrum Reading Level | Factor | Actual FS | Limit @3m | Margin |
|---------|---------|---------------|------------------------|--------|-----------|-----------|--------|
| MHz     | F/H/E/S | PK/QP/AV      | dBμV                   | dB     | dBμV/m    | dBμV/m    | dB     |
| 5150.00 | E       | Peak          | 64.93                  | 8.19   | 73.12     | 74        | -0.88  |
| 5150.00 | E       | Average       | 37.19                  | 8.19   | 45.38     | 54        | -8.62  |

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## 802.11n HT20 mode

Operation Mode : 802.11n20      Test Date : 2016/10/21  
 Fundamental Frequency : 5180 MHz      Temp. / Humi. : 22.7deg\_C/57RH  
 Operation Band : BE CH Low      Test Engineer : Ashton  
 EUT Pol. : E2      Measurement Antenna Pol. : Vertical

| Freq.   | Note    | Detector Mode | Spectrum Reading Level | Factor | Actual FS | Limit @3m | Margin |
|---------|---------|---------------|------------------------|--------|-----------|-----------|--------|
| MHz     | F/H/E/S | PK/QP/AV      | dBμV                   | dB     | dBμV/m    | dBμV/m    | dB     |
| 5150.00 | E       | Peak          | 53.39                  | 8.19   | 61.58     | 74        | -12.42 |
| 5150.00 | E       | Average       | 31.76                  | 8.19   | 39.95     | 54        | -14.05 |

Operation Mode : 802.11n20      Test Date : 2016/10/21  
 Fundamental Frequency : 5180 MHz      Temp. / Humi. : 22.7deg\_C/57RH  
 Operation Band : BE CH Low      Test Engineer : Ashton  
 EUT Pol. : E2      Measurement Antenna Pol. : Horizontal

| Freq.   | Note    | Detector Mode | Spectrum Reading Level | Factor | Actual FS | Limit @3m | Margin |
|---------|---------|---------------|------------------------|--------|-----------|-----------|--------|
| MHz     | F/H/E/S | PK/QP/AV      | dBμV                   | dB     | dBμV/m    | dBμV/m    | dB     |
| 5150.00 | E       | Peak          | 62.48                  | 8.19   | 70.67     | 74        | -3.33  |
| 5150.00 | E       | Average       | 34.95                  | 8.19   | 43.14     | 54        | -10.86 |

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## 802.11n HT40 mode

|                         |           |                            |                |
|-------------------------|-----------|----------------------------|----------------|
| Operation Mode :        | 802.11n40 | Test Date :                | 2016/10/21     |
| Fundamental Frequency : | 5190 MHz  | Temp. / Humi. :            | 22.7deg_C/57RH |
| Operation Band :        | BE CH Low | Test Engineer :            | Ashton         |
| EUT Pol. :              | E2        | Measurement Antenna Pol. : | Vertical       |

| Freq.   | Note    | Detector Mode | Spectrum Reading Level | Factor | Actual FS | Limit @3m | Margin |
|---------|---------|---------------|------------------------|--------|-----------|-----------|--------|
| MHz     | F/H/E/S | PK/QP/AV      | dBμV                   | dB     | dBμV/m    | dBμV/m    | dB     |
| 5148.64 | S       | Peak          | 55.89                  | 8.18   | 64.07     | 74        | -9.93  |
| 5148.64 | S       | Average       | 34.92                  | 8.18   | 43.10     | 54        | -10.90 |
| 5150.00 | E       | Peak          | 54.93                  | 8.19   | 63.13     | 74        | -10.87 |
| 5150.00 | E       | Average       | 35.22                  | 8.19   | 43.41     | 54        | -10.59 |

|                         |           |                            |                |
|-------------------------|-----------|----------------------------|----------------|
| Operation Mode :        | 802.11n40 | Test Date :                | 2016/10/21     |
| Fundamental Frequency : | 5190 MHz  | Temp. / Humi. :            | 22.7deg_C/57RH |
| Operation Band :        | BE CH Low | Test Engineer :            | Ashton         |
| EUT Pol. :              | E2        | Measurement Antenna Pol. : | Horizontal     |

| Freq.   | Note    | Detector Mode | Spectrum Reading Level | Factor | Actual FS | Limit @3m | Margin |
|---------|---------|---------------|------------------------|--------|-----------|-----------|--------|
| MHz     | F/H/E/S | PK/QP/AV      | dBμV                   | dB     | dBμV/m    | dBμV/m    | dB     |
| 5146.24 | S       | Peak          | 62.78                  | 8.17   | 70.95     | 74        | -3.05  |
| 5146.24 | S       | Average       | 39.55                  | 8.17   | 47.72     | 54        | -6.28  |
| 5150.00 | E       | Peak          | 61.76                  | 8.19   | 69.95     | 74        | -4.05  |
| 5150.00 | E       | Average       | 40.66                  | 8.19   | 48.85     | 54        | -5.15  |

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## 12. TRANSMISSION IN THE ABSENCE OF DATA

### 12.1 Standard Applicable

According to §15.407(c)

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

### 12.2 Result

No non-compliance noted:

Refer to the theory of operation.

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## 13. FREQUENCY STABILITY

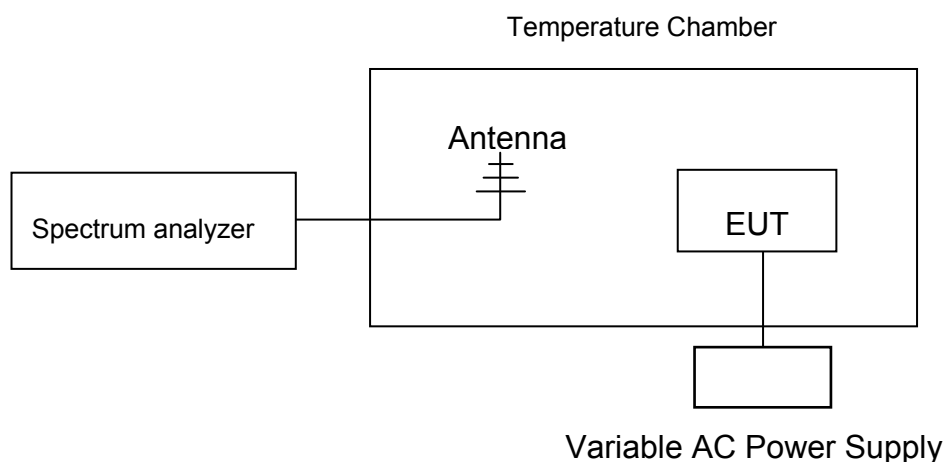
### 13.1 Standard Applicable

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

### 13.2 Measurement Procedure

1. The EUT was placed inside temperature chamber and powered and powered by nominal DC voltage.
2. Set EUT as normal operation.
3. Turn the EUT on and couple its output to spectrum.
4. Turn the EUT off and set the chamber to the highest temperature specified.
5. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT and measure the operating frequency.
6. Repeat step with the temperature chamber set to the lowest temperature.

### 13.3 Test SET-UP



### 13.4 Measurement Equipment Used:

| SGS Conducted Room  |              |           |               |                  |                 |
|---------------------|--------------|-----------|---------------|------------------|-----------------|
| Name of Equipment   | Manufacturer | Model     | Serial Number | Calibration Date | Calibration Due |
| Spectrum Analyzer   | KEYSIGHT     | N9010A    | MY54510568    | 04/14/2016       | 04/13/2017      |
| DC Power Supply     | Agilent      | E3640A    | MY53140006    | 05/04/2016       | 05/03/2017      |
| Temperature Chamber | TERCHY       | MHK-120LK | 1020582       | 06/16/2016       | 06/15/2017      |

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## 13.5 Measurement Result

Test Date 2016.10.21

Test By Henry

|   |       |    |      |             |            |
|---|-------|----|------|-------------|------------|
| 0 | 13.8V | 36 | 5180 | 5,179.92321 | 0.00001482 |
|   |       | 44 | 5220 | 5,219.92249 | 0.00001485 |
|   |       | 48 | 5240 | 5,239.92232 | 0.00001482 |
|   | 10.8V | 36 | 5180 | 5,179.92389 | 0.00001469 |
|   |       | 44 | 5220 | 5,219.92327 | 0.00001470 |
|   |       | 48 | 5240 | 5,239.92296 | 0.00001470 |

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Operation Mode 802.11 n\_HT40  
Temperature :24

Test Date 2016.10.21  
Test By Henry

**Spectrum  
Frequency  
(MHz)**

|    |      |             |            |
|----|------|-------------|------------|
| 38 | 5190 | 5,189.92304 | 0.00001483 |
| 46 | 5230 | 5,229.92276 | 0.00001477 |
| 38 | 5190 | 5,189.92304 | 0.00001483 |
| 46 | 5230 | 5,229.92276 | 0.00001477 |

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## 14. ANTENNA REQUIREMENT

### 14.1 Standard Applicable

According to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

According to §15.407, 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.

### 14.2 Antenna Connected Construction

PIFA antenna designs are used.

The antenna is designed with permanent attached and no consideration of replacement. Please see EUT photo and antenna spec. for details.

The antenna gain is less than 6dBi. Therefore, it is not necessary to reduce maximum output power limit.

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## 15. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

### 15.1 Standard Applicable

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a Mobile device, the MPE is required.

According to §1.1310 and §2.1093 RF exposure is calculated.

Limits for Maximum Permissive Exposure (MPE)

| Frequency Range (MHz)                               | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density (mW/cm <sup>2</sup> ) | Averaging Time (minute) |
|-----------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|-------------------------|
| Limits for General Population/Uncontrolled Exposure |                               |                               |                                     |                         |
| 0.3-1.34                                            | 614                           | 1.63                          | *(100)                              | 30                      |
| 1.34-30                                             | 824/f                         | 2.19/f                        | *(180/f <sup>2</sup> )              | 30                      |
| 30-300                                              | 27.5                          | 0.073                         | 0.2                                 | 30                      |
| 300-1500                                            | /                             | /                             | F/1500                              | 30                      |
| 1500-15000                                          | /                             | /                             | 1.0                                 | 30                      |

F = frequency in MHz

\* = Plane-wave equipment power density

### Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

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**802.11a Max. output power****802.11a\_Aux1**

| CH | Frequency (MHz) | Data Rate | TOTAL POWER (dBm) | TOTAL POWER (mW) | REQUIRED LIMIT (dBm) | RESULT |
|----|-----------------|-----------|-------------------|------------------|----------------------|--------|
| 36 | 5180            | MCS0      | <b>13.95</b>      | <b>24.831</b>    | 23.98                | PASS   |
| 44 | 5220            | MCS0      | 13.93             | 24.717           | 23.98                | PASS   |
| 48 | 5240            | MCS0      | 13.69             | 23.388           | 23.98                | PASS   |

**MPE Prediction (802.11a 5150~5250)**

|                                                                                   |              |                       |
|-----------------------------------------------------------------------------------|--------------|-----------------------|
| Average output power at antenna input terminal:                                   | <b>13.95</b> | (dBm)                 |
| Average output power at antenna input terminal:                                   | 24.831331    | (mW)                  |
| Duty cycle:                                                                       | <b>97.46</b> | (%)                   |
| Maximum Pav :                                                                     | 24.200615    | (mW)                  |
| Peak Antenna gain (Maximum):                                                      | <b>4.5</b>   | (dBi)                 |
| Peak Antenna gain (linear):                                                       | 2.8183829    | (numeric)             |
| Prediction distance:                                                              | 20           | (cm)                  |
| Prediction frequency:                                                             | <b>5180</b>  | (MHz)                 |
| MPE limit for uncontrolled exposure at prediction                                 | 1            | (mW/cm <sup>2</sup> ) |
| Power density at predication frequency at 20 (cm)                                 | 0.014        | (mW/cm <sup>2</sup> ) |
| <b>Measurement Result</b>                                                         |              |                       |
| The predicted power density level at 20 cm is 0.014 mW/cm <sup>2</sup> .          |              |                       |
| This is below the uncontrolled exposure limit of 1 mW/cm <sup>2</sup> at 5180MHz. |              |                       |

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## 802.11n\_HT20M Max. output power

### 802.11n\_HT20\_MIMO

| CH | Frequency (MHz) | Data Rate | AVERAGE POWER (dBm) |       | TOTAL POWER (dBm) | TOTAL POWER (mW) | REQUIRED LIMIT (dBm) | RESULT |
|----|-----------------|-----------|---------------------|-------|-------------------|------------------|----------------------|--------|
|    |                 |           | CH 0                | CH 1  |                   |                  |                      |        |
| 36 | 5180            | MCS8      | 11.04               | 11.33 | 14.20             | 26.289           | 22.47                | PASS   |
| 44 | 5220            | MCS8      | 10.56               | 11.52 | 14.08             | 25.567           | 22.47                | PASS   |
| 48 | 5240            | MCS8      | 10.86               | 11.4  | 14.15             | 25.994           | 22.47                | PASS   |

## MPE Prediction (802.11n\_HT20 5150~5250)

MIMO gain=  $G+(10 \log N)=4.5+3.01=7.51\text{dBm}$

|                                                   |           |                       |
|---------------------------------------------------|-----------|-----------------------|
| Average output power at antenna input terminal:   | 14.20     | (dBm)                 |
| Average output power at antenna input terminal:   | 26.30268  | (mW)                  |
| Duty cycle:                                       | 94.53     | (%)                   |
| Maximum Pav :                                     | 24.863923 | (mW)                  |
| Peak Antenna gain (Maximum):                      | 7.51      | (dBi)                 |
| Peak Antenna gain (linear):                       | 5.6363766 | (numeric)             |
| Prediction distance:                              | 20        | (cm)                  |
| Prediction frequency:                             | 5180      | (MHz)                 |
| MPE limit for uncontrolled exposure at prediction | 1         | (mW/cm <sup>2</sup> ) |
| Power density at predication frequency at 20 (cm) | 0.028     | (mW/cm <sup>2</sup> ) |

### Measurement Result

The predicted power density level at 20 cm is 0.028 mW/cm<sup>2</sup>.

This is below the uncontrolled exposure limit of 1 mW/cm<sup>2</sup> at 5180MHz.

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## 802.11n\_HT40M Max. output power

### 802.11n\_HT40\_MIMO

| CH | Frequency (MHz) | Data Rate | AVERAGE POWER (dBm) |       | TOTAL POWER (dBm) | TOTAL POWER (mW) | REQUIRED LIMIT (dBm) | RESULT |
|----|-----------------|-----------|---------------------|-------|-------------------|------------------|----------------------|--------|
|    |                 |           | CH 0                | CH 1  |                   |                  |                      |        |
| 38 | 5190            | MCS8      | 11.91               | 11.48 | 14.71             | 29.584           | 22.47                | PASS   |
| 46 | 5230            | MCS8      | 11.51               | 12.29 | <b>14.93</b>      | <b>31.101</b>    | 22.47                | PASS   |

## MPE Prediction (802.11n\_HT40 5150~5250)

MIMO gain=  $G+(10 \log N)=4.5+3.01=7.51\text{dBm}$

|                                                                                   |              |                       |
|-----------------------------------------------------------------------------------|--------------|-----------------------|
| Average output power at antenna input terminal:                                   | <b>14.93</b> | (dBm)                 |
| Average output power at antenna input terminal:                                   | 31.117163    | (mW)                  |
| Duty cycle:                                                                       | <b>90</b>    | (%)                   |
| Maximum Pav :                                                                     | 28.005447    | (mW)                  |
| Peak Antenna gain (Maximum):                                                      | <b>7.51</b>  | (dBi)                 |
| Peak Antenna gain (linear):                                                       | 5.6363766    | (numeric)             |
| Prediction distance:                                                              | 20           | (cm)                  |
| Prediction frequency:                                                             | <b>5230</b>  | (MHz)                 |
| MPE limit for uncontrolled exposure at prediction                                 | 1            | (mW/cm <sup>2</sup> ) |
| Power density at predication frequency at 20 (cm)                                 | 0.031        | (mW/cm <sup>2</sup> ) |
| <b>Measurement Result</b>                                                         |              |                       |
| The predicted power density level at 20 cm is 0.031 mW/cm <sup>2</sup> .          |              |                       |
| This is below the uncontrolled exposure limit of 1 mW/cm <sup>2</sup> at 5230MHz. |              |                       |

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## 16. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

### 16.1 Standard Applicable

According to RSS 102 March 19,2015 issue 5 §2.5.2 RF Exposure Evaluation

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);

at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than  $22.48/f^{0.5}W$  (adjusted for tune-up tolerance), where  $f$  is in MHz;

at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);

at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than  $1.31 \times 10^{-2} f^{0.6834} W$  (adjusted for tune-up tolerance), where  $f$  is in MHz;

This is a Mobile device, at which separation distance between the user and the device's antenna is 20cm. Therefore, section 2.5.2 shall be complied with

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**Maximum Permissible Exposure (MPE) Evaluation****802.11a 5150~5250:**

|                                               |           |           |
|-----------------------------------------------|-----------|-----------|
| Maximum average output power at antenna input | 13.95     | (dBm)     |
| Maximum average output power at antenna input | 24.831331 | (mW)      |
| Antenna gain (Peak):                          | 4.5       | (dBi)     |
| Maximum antenna gain:                         | 2.8183829 | (numeric) |
| Frequency                                     | 5180      | MHz       |
| Limit                                         | 4.5253    | W         |

**Evaluation Result**

The radiated power is  $13.95 + 4.5 = 18.45$  dBm(EIRP) = 69.984mW = 0.069984W that is less than or equal to 4.525W. Hence, following section 2.5.2 of RSS102 issue RF exposure evaluation is no longer required.

**802.11 n\_HT20 MIMO 5150~5250:**

|                                               |          |           |
|-----------------------------------------------|----------|-----------|
| Maximum average output power at antenna input | 14.2     | (dBm)     |
| Maximum average output power at antenna input | 26.30268 | (mW)      |
| Antenna gain (Peak):                          | 0.51     | (dBi)     |
| Maximum antenna gain:                         | 1.124605 | (numeric) |
| Frequency                                     | 5180     | MHz       |
| Limit                                         | 4.5253   | W         |

**Evaluation Result**

The radiated power is  $14.2 + 0.51 = 14.71$  dBm(EIRP) = 29.58mW = 0.02958W that is less than or equal to 4.525W. Hence, following section 2.5.2 of RSS102 issue RF exposure evaluation is no longer required.

**802.11 n\_HT40 MIMO 5150~5250:**

|                                               |           |           |
|-----------------------------------------------|-----------|-----------|
| Maximum average output power at antenna input | 14.93     | (dBm)     |
| Maximum average output power at antenna input | 31.117163 | (mW)      |
| Antenna gain (Peak):                          | 7.51      | (dBi)     |
| Maximum antenna gain:                         | 5.6363766 | (numeric) |
| Frequency                                     | 5230      | MHz       |
| Limit                                         | 4.5551    | W         |

**Evaluation Result**

The radiated power is  $14.93 + 7.51 = 22.44$  dBm(EIRP) = 175.388mW = 0.175388W that is less than or equal to 4.555W. Hence, following section 2.5.2 of RSS102 issue RF exposure evaluation is no longer required.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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