


# TEST REPORT

<b>DT&amp;C Co., Ltd.</b> 42, Yurim-ro, 154Beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea Tel : 031-321-2664, Fax : 031-321-1664	Report No : DRTFCC1603-0047 Pages:(1) / (109) page	 Dt&C			
<p>1. Customer</p> <ul style="list-style-type: none"><li>• Name : Honeywell International Inc</li><li>• Address : 9680 Old Bailes Rd, South Carolina United States 29707</li></ul> <p>2. Use of Report : FCC &amp; IC Original Grant</p> <p>3. Product Name (FCCID, IC) : Mobile Computer (HD5-6510GP, 1693B-6510GP)</p> <p>4. Date of Test : 2016-01-20 ~ 2016-01-26</p> <p>5. Test Method Used : FCC Part 15 Subpart C.407 RSS-247 Issue 1 (2015-05), RSS-GEN Issue 4 (2014-11)</p> <p>6. Testing Environment : See appended test report</p> <p>7. Test Result : <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail</p> <p>The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full.</p> <table border="1"><tr><td>Affirmation</td><td>Tested by Name : KwiCheol Yeom (Signature)</td><td>Technical Manager Name : GeunKi Son (Signature)</td></tr></table> <p style="text-align: center;"><b>2016 . 03 . 18 .</b> <b>DT&amp;C Co., Ltd.</b></p>			Affirmation	Tested by Name : KwiCheol Yeom (Signature)	Technical Manager Name : GeunKi Son (Signature)
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## Test Report Version

Test Report No.	Date	Description
DRTFCC1603-0047	Mar. 18, 2016	Initial issue

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## 1. EUT Description

<b>FCC Equipment Class</b>	Unlicensed National Information Infrastructure (UNII)
<b>Product</b>	Mobile Computer
<b>Model Name(FCC)</b>	Dolphin6510
<b>Model Name(IC)</b>	6510GP
<b>Hardware version</b>	4.0
<b>Software version</b>	1.0
<b>Power Supply</b>	DC 3.7 V
<b>Frequency Range</b>	<b>U-NII 1(5150 ~ 5250MHz)</b> ▪ 802.11a/n(HT20): 5180 ~ 5240 MHz <b>U-NII 2A(5250 ~ 5350 MHz)</b> ▪ 802.11a/n(HT20): 5260 ~ 5320 MHz <b>U-NII 2C(5470 ~ 5725 MHz)</b> ▪ 802.11a/n(HT20): 5500 ~ 5720 MHz <b>U-NII 3(5725 ~ 5850MHz)</b> ▪ 802.11a/n(HT20): 5745 ~ 5825 MHz
<b>Modulation type</b>	OFDM
<b>Antenna Specification</b>	<b>Antenna type</b> : Internal Antenna <b>Antenna gain</b> ▪ U-NII 1 : 2.821 dBi ▪ U-NII 2A : 2.077 dBi ▪ U-NII 2C : 3.886 dBi ▪ U-NII 3 : 2.866 dBi

## 2. Information about test items

### 2.1 Test mode

5GHz Band	Mode	Data Rate
U-NII 1	802.11a	6Mbps
	802.11n(HT20)	MCS 0
	802.11n(HT40)	-
	802.11ac(VHT80)	-
U-NII 2A	802.11a	6Mbps
	802.11n(HT20)	MCS 0
	802.11n(HT40)	-
	802.11ac(VHT80)	-
U-NII 2C	802.11a	6Mbps
	802.11n(HT20)	MCS 0
	802.11n(HT40)	-
	802.11ac(VHT80)	-
U-NII 3	802.11a	6Mbps
	802.11n(HT20)	MCS 0
	802.11n(HT40)	-
	802.11ac(VHT80)	-

Note 1: The worst case data rate is determined as above test mode according to the power measurements.  
And all test items were performed at the worst case data rate.

### 2.2 Tested Channel Information

5GHz Band	802.11a/n(HT20)		802.11n(HT40)		802.11ac(VHT80)	
	Channel	Frequency [MHz]	Channel	Frequency [MHz]	Channel	Frequency [MHz]
U-NII 1	36	5180	-	-	-	-
	40	5200	-	-	-	-
	48	5240	-	-	-	-
U-NII 2A	52	5260	-	-	-	-
	60	5300	-	-	-	-
	64	5320	-	-	-	-
U-NII 2C	100	5500	-	-	-	-
	116	5580	-	-	-	-
	140	5700	-	-	-	-
U-NII 3	149	5745	-	-	-	-
	157	5785	-	-	-	-
	165	5825	-	-	-	-

5GHz Band	802.11a/n(HT20)		802.11n(HT40)		802.11ac(VHT80)	
	Channel	Frequency [MHz]	Channel	Frequency [MHz]	Channel	Frequency [MHz]
U-NII 2C/ U-NII 3 (Band-crossing channels)	144	5720	-	-	-	-

Note1: Channel 144 is crosses the boundary between two adjacent U-NII bands. (UNII2C, 3)

## 2.3 Auxiliary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
-	-	-	-	-
-	-	-	-	-

## 2.4 Tested environment

Temperature	: 21 °C ~ 24 °C
Relative humidity content	: 40 % ~ 44 % R.H.
Details of power supply	: DC 3.7 V

## 2.5 EMI Suppression Device(s) / Modifications

EMI suppression device(s) added and/or modifications made during testing  
→ None

### 3. Summary of Tests

FCC Part Section(s)	RSS Std.	Parameter	Limit	Test Condition	Status Note 1
<b>I. Transmitter Mode (TX)</b>					
15.407(a)	-	Emission Bandwidth (26 dB Bandwidth)	N/A	Conducted	<b>C</b>
15.407(e)	RSS-247[6.2.4]	Minimum Emission Bandwidth (6 dB Bandwidth)	> 500 kHz in 5725 ~ 5850 MHz		<b>C</b>
-	RSS GEN[6.6]	Occupied Bandwidth (99%)	N/A		
15.407(a)	RSS-247[6.2]	Maximum Conducted Output Power	5150 ~ 5250 MHz : < 30 dBm or < 23.97 dBm (FCC) < 200 mW or 10 + 10log10(B) dBm whichever power is less. (IC) 5250 ~ 5350 & 5470 ~ 5725 MHz : < 250 mW or < 11 + 10 log10(B) dBm, whichever power is less. (FCC & IC) 5725 ~ 5850 MHz : < 30 dBm (FCC & IC) Note: B is the 99 % BW(IC) or 26dB BW(FCC).		<b>C</b> Note 3
15.407(a)	RSS-247[6.2]	Peak Power Spectral Density	5150 ~ 5250 MHz : 11 dBm/MHz or 17 dBm/MHz(FCC) 5150 ~ 5250 MHz: < 10 dBm/MHz 5250 ~ 5350 & 5470 ~ 5725 MHz: 11 dBm/MHz (FCC & IC) 5725 ~ 5850 MHz: 30 dBm/500kHz(FCC & IC)		<b>C</b> Note 4
15.407(g)	RSS GEN[6.11]	Frequency Stability	N/A		<b>C</b>
15.407(b)	RSS-247[6.2]	Undesirable Emissions	5150 ~ 5725 MHz: < -27 dBm/MHz EIRP 5725 ~ 5850 MHz: < -17 dBm/MHz EIRP or < -27 dBm/MHz EIRP	Radiated	<b>C</b> Note 5,6
15.205 15.209 15.407(b)	RSS-247[6.2] RSS-GEN[8.9] RSS-GEN[8.10]	General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		<b>C</b> Note 6
15.407(h)	RSS-247[6.3]	Dynamic Frequency Selection	FCC 15.407(h)	Conducted	<b>C</b> Note 7
15.207	RSS-GEN[8.8]	AC Conducted Emissions	FCC 15.207	AC Line Conducted	<b>C</b>
15.203	-	Antenna Requirements	FCC 15.203	-	<b>C</b>
<p>Note 1: <b>C</b> = Comply    <b>NC</b> = Not Comply    <b>NT</b> = Not Tested    <b>NA</b> = Not Applicable</p> <p>Note 2: The test items were performed according to the KDB789033 D02 V01, KDB644545 D03 and ANSI C63.10-2013</p> <p>Note 3: (i) For access point operating in the band 5.15 - 5.25 GHz: &lt; 30 dBm (ii) For mobile and portable client devices in the 5.15 - 5.25 GHz band: &lt; 23.97 dBm</p> <p>Note 4: (i) For access point operating in the band 5.15 - 5.25 GHz: &lt; 17 dBm/MHz (ii) For mobile and portable client devices in the 5.15 - 5.25 GHz band: &lt; 11 dBm/MHz</p> <p>Note 5: For transmitters operating in the 5.725 - 5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm/MHz</p> <p>Note 6: These test items were performed in each axis and the worst case data was reported.</p> <p>Note 7: Refer to the DFS test report.</p>					

## 4. Test Methodology

Generally the tests were performed according to the KDB789033 D02 v01. And ANSI C63.10-2013 was used to reference appropriate EUT setup and maximizing procedures of radiated spurious emission and AC line conducted emission testing

### 4.1 EUT configuration

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

### 4.2 EUT exercise

The EUT was operated in the test mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.407 under the FCC Rules Part 15 Subpart C.

### 4.3 General test procedures

#### Conducted Emissions

The power-line conducted emission test procedure is not described on the KDB789033 D02 v01. So this test was fulfilled with the requirements in Section 6.2 of ANSI C63.10-2013.

The EUT is placed on the wooden table, which is 0.8 m above ground plane and the conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-peak and Average detector.

#### Radiated Emissions

Basically the radiated tests were performed with KDB789033 D02 v01. But some requirements and procedures like test site requirements, EUT setup and maximizing procedure were fulfilled with the requirements in Section 5 and 6 of the ANSI C63.10-2013 as stated on KDB789033 D02 v01.

The EUT is placed on a non-conductive table. For emission measurements at or below 1 GHz, the table height is 80 cm.

For emission measurements above 1 GHz, the table height is 1.5 m. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 1 or 3 m away from the receiving antenna, which varied from 1 m to 4 m 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 highest emission, the relative positions of the EUT were rotated through three orthogonal axis.

### 4.4 Description of test modes

A test program is used to control the EUT for staying in continuous transmitting mode with maximum fixed duty cycle.



## 5. Instrument Calibration

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards.

## 6. Facilities and Accreditations

### 6.1 Facilities

The open area test site(OATS) or semi anechoic chamber and conducted measurement facility used to collect the radiated and conducted test data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 449-935. The site is constructed in conformance with the requirements..

- **Semi anechoic chamber registration Number : 165783(FCC) & 5740A-3(IC)**

### 6.2 Equipment

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, loop, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and peak, quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements. All receiving equipment conforms to CISPR Publication 16 - 1, "Radio Interference Measuring Apparatus and Measurement Methods."

## 7. Antenna Requirements

According to FCC 47 CFR §15.203:

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

**The antenna is permanently attached. (Refer to Internal photo file.)**

**Therefore this E.U.T Complies with the requirement of §15.203**

## 8. TEST RESULT

### 8.1 Emission Bandwidth (26 dB Bandwidth)

#### ■ Test Requirements

The bandwidth at 26 dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

The 26 dB bandwidth is used to determine the conducted output power limit.

#### ■ Test Configuration

Refer to the Appendix I.

#### ■ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer and used following test procedure of **KDB789033 D02 V01**.

1. Set resolution bandwidth (RBW) = approximately **1 %** of the EBW.
2. Set the video bandwidth (**VBW**) **> RBW**.
3. Detector = **Peak**.
4. Trace mode = **Max hold**.

Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW / EBW ratio is approximately 1 %.

■ TEST RESULTS: **Comply**

Mode	Band	Channel	Frequency [MHz]	Test Result [MHz]
802.11a	U-NII 1	36	5180	21.25
		40	5200	20.63
		48	5240	21.18
	U-NII 2A	52	5260	21.29
		60	5300	20.86
		64	5320	21.29
	U-NII 2C	100	5500	22.05
		116	5580	21.42
		140	5700	21.31
802.11n (HT20)	U-NII 1	36	5180	21.47
		40	5200	21.48
		48	5240	21.81
	U-NII 2A	52	5260	21.68
		60	5300	22.94
		64	5320	21.87
	U-NII 2C	100	5500	21.81
		116	5580	21.87
		140	5700	22.23
802.11a	U-NII 2C (Band-crossing channels)	144	5720	15.08
-		-	-	
802.11n (HT20)		144	5720	15.41
-		-	-	

## ■ Result Plots

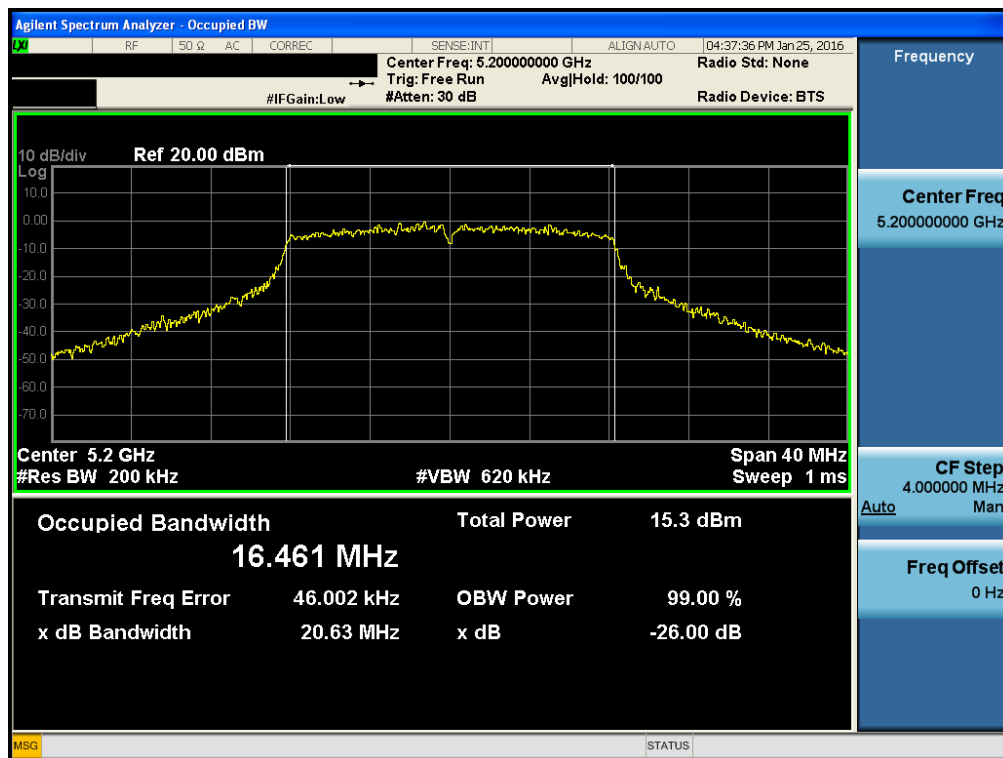
## 26 dB Bandwidth

Test Mode: 802.11a &amp; Ch.36



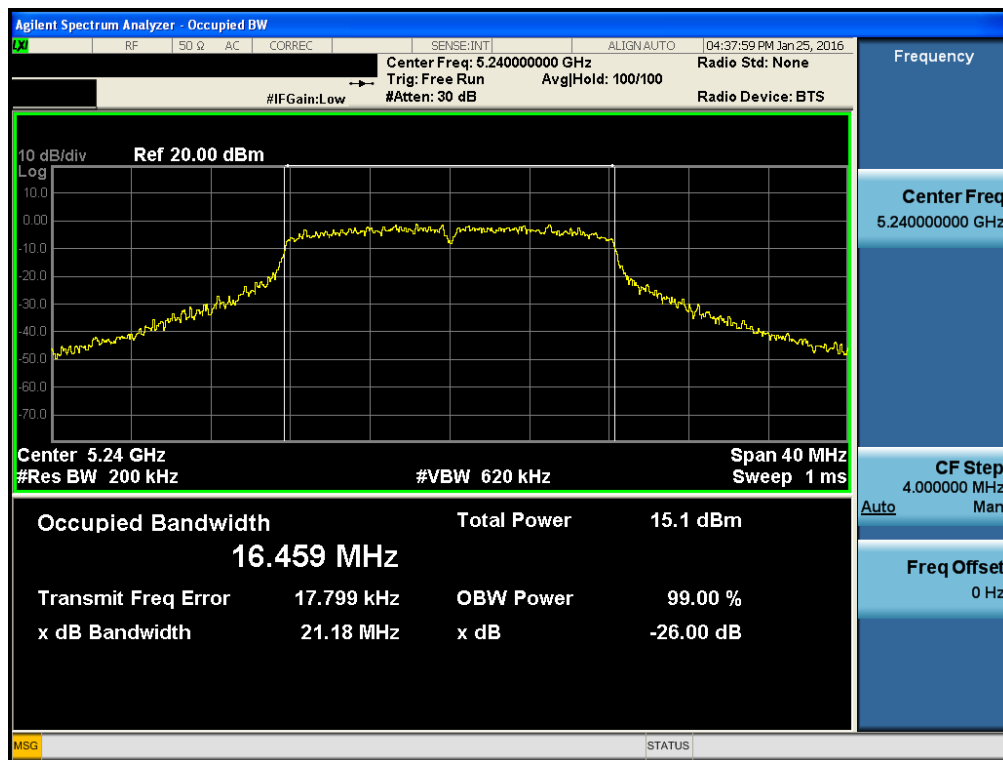
## 26 dB Bandwidth

Test Mode: 802.11a &amp; Ch.40



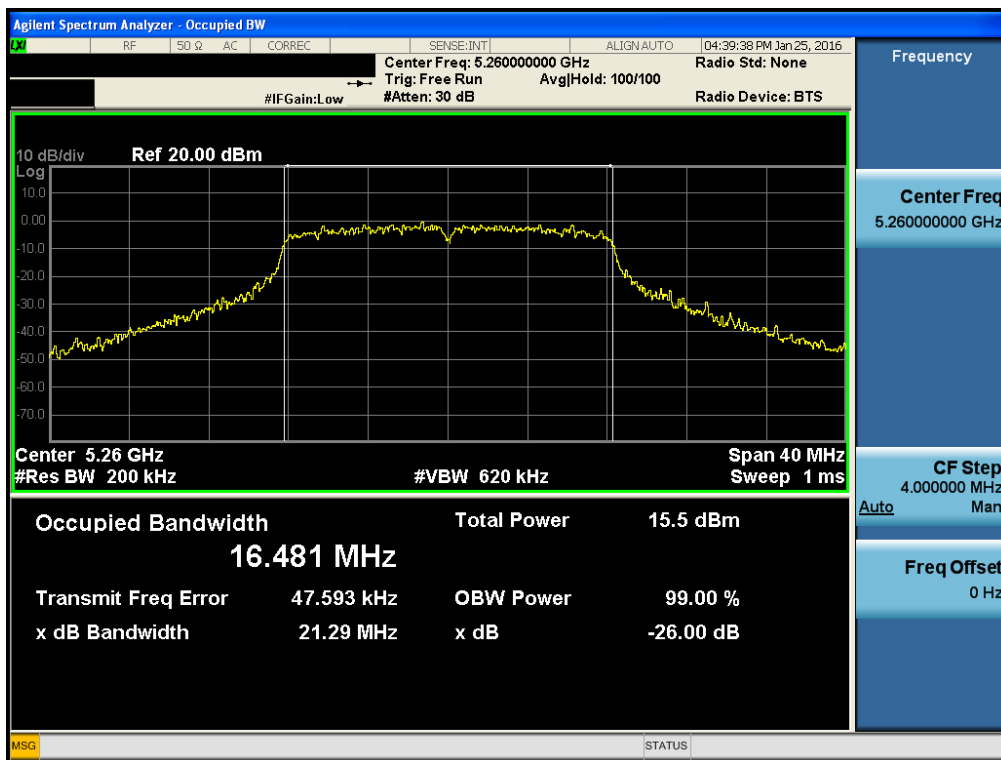
## 26 dB Bandwidth

Test Mode: 802.11a &amp; Ch.48



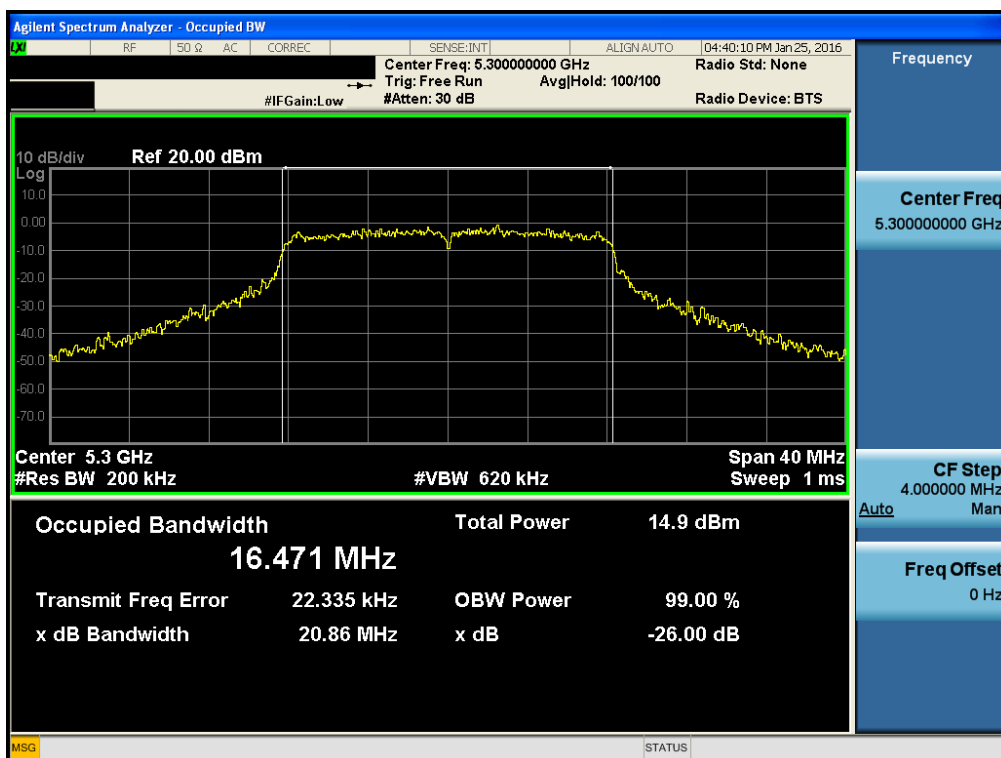
## 26 dB Bandwidth

Test Mode: 802.11a &amp; Ch.52



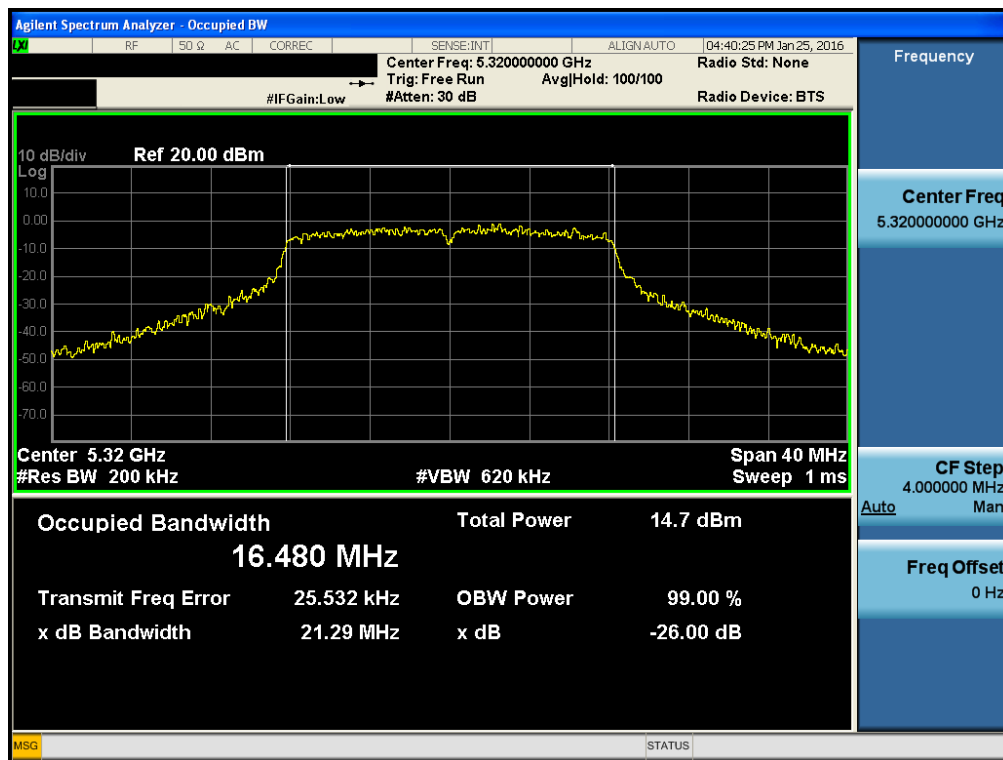
## 26 dB Bandwidth

Test Mode: 802.11a &amp; Ch.60



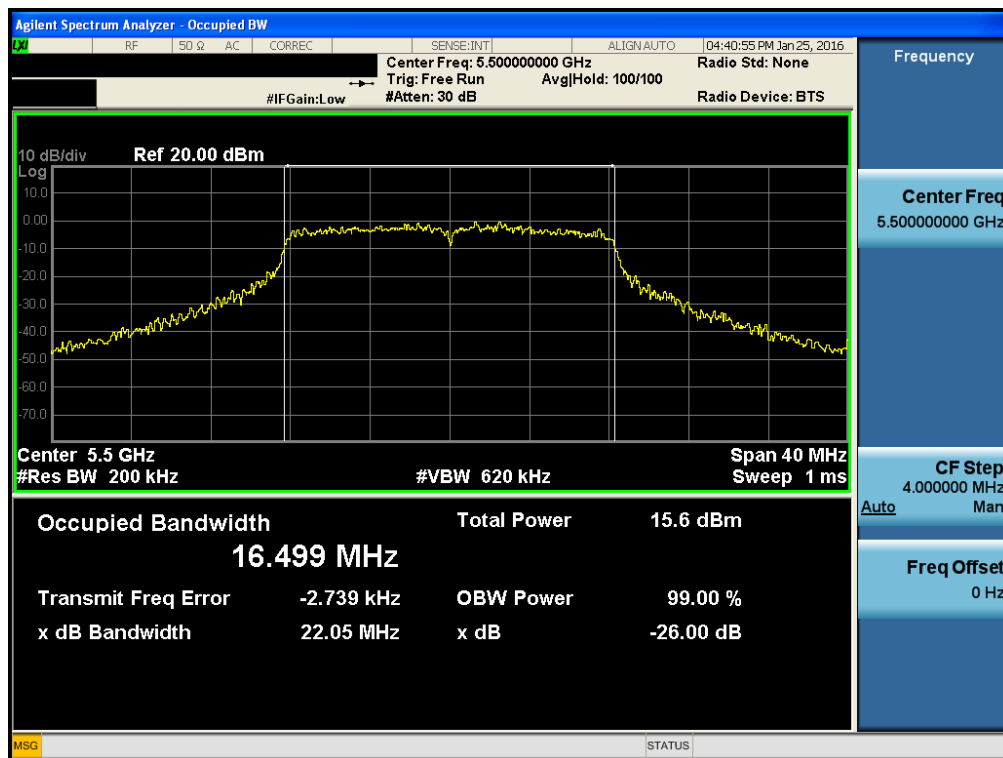
## 26 dB Bandwidth

Test Mode: 802.11a &amp; Ch.64



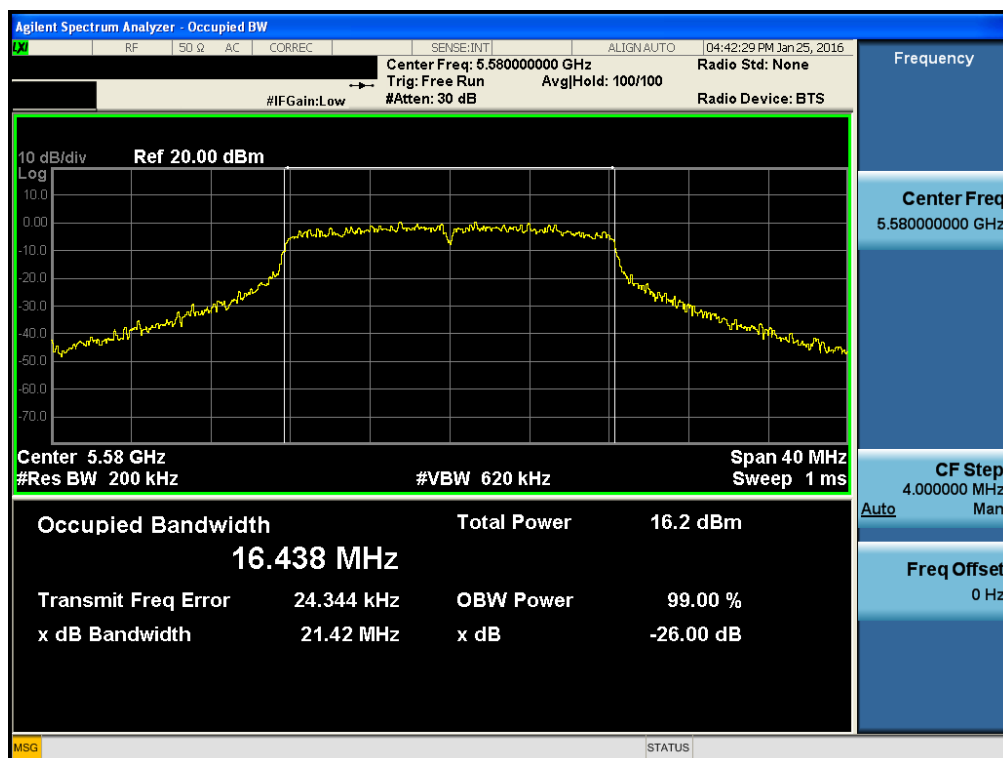
## 26 dB Bandwidth

Test Mode: 802.11a &amp; Ch.100



## 26 dB Bandwidth

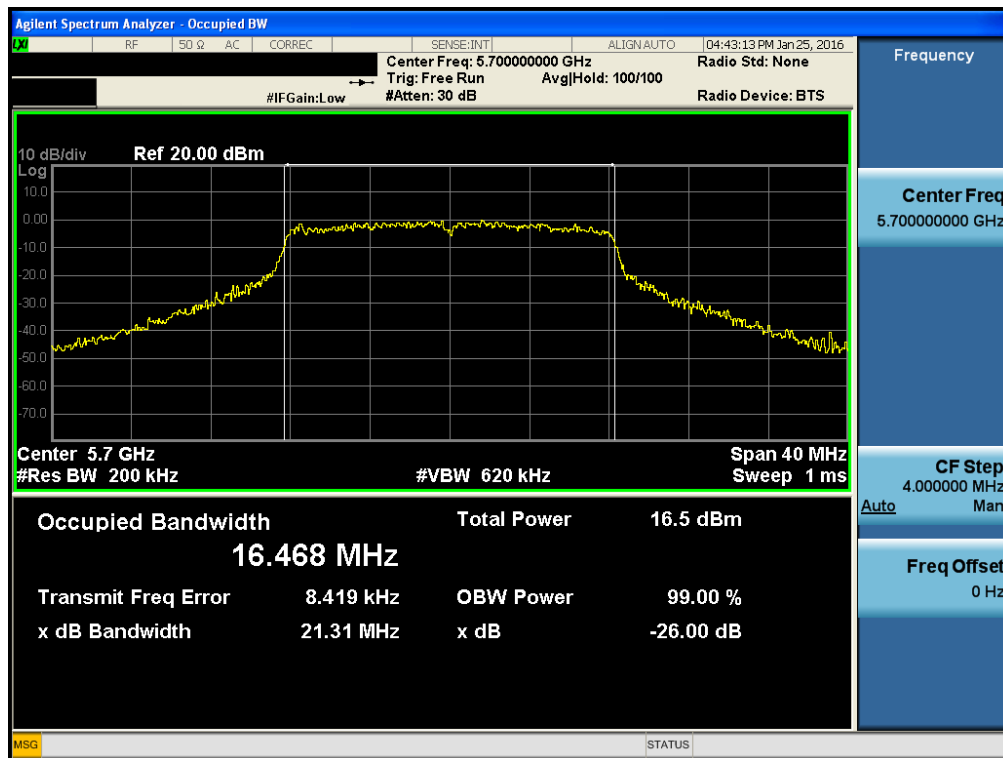
Test Mode: 802.11a &amp; Ch.116





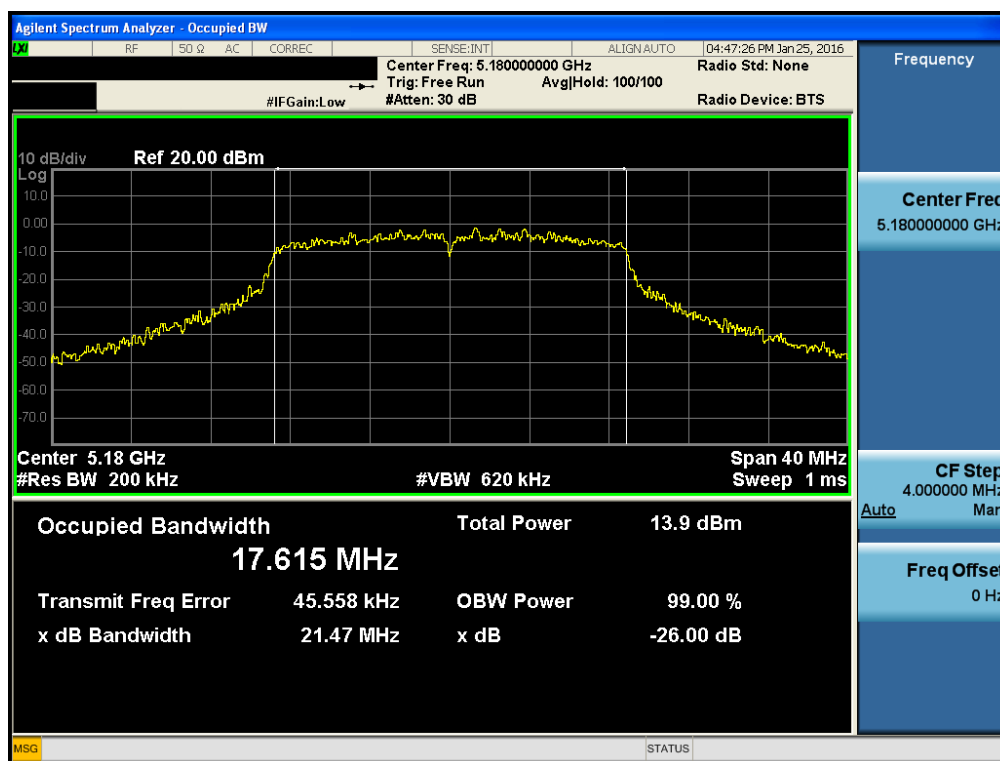
## 26 dB Bandwidth

Test Mode: 802.11a &amp; Ch.140



## 26 dB Bandwidth

Test Mode: 802.11n(HT20) &amp; Ch.36



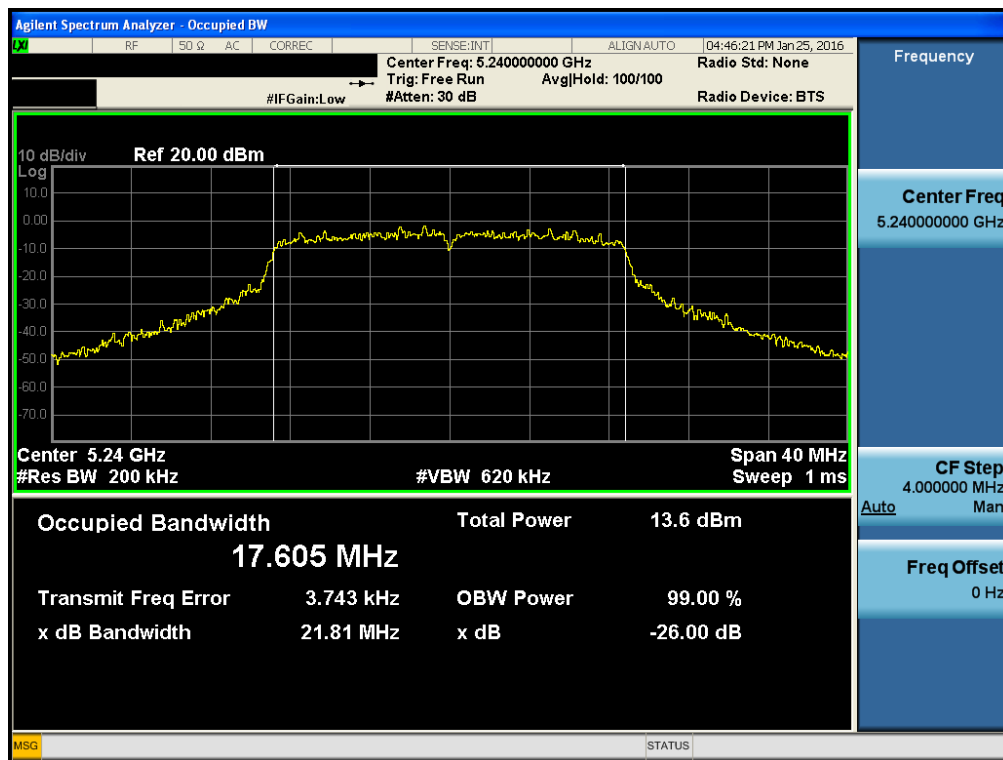
## 26 dB Bandwidth

Test Mode: 802.11n(HT20) &amp; Ch.40



## 26 dB Bandwidth

Test Mode: 802.11n(HT20) &amp; Ch.48



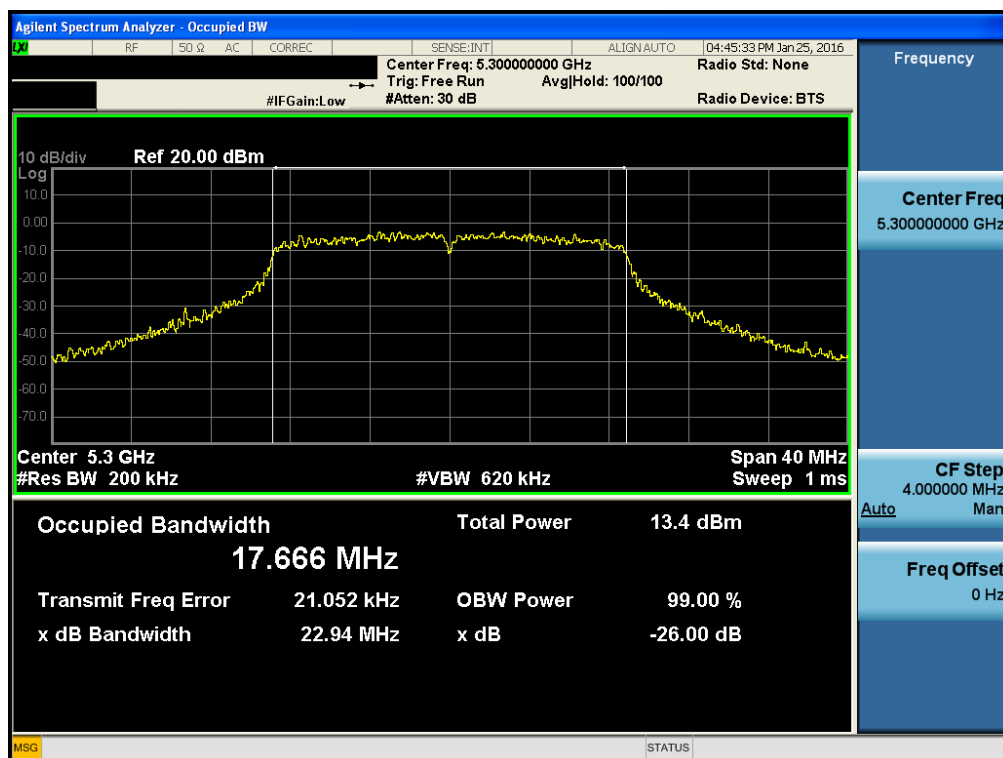
## 26 dB Bandwidth

Test Mode: 802.11n HT20 &amp; Ch.52



## 26 dB Bandwidth

Test Mode: 802.11n HT20 &amp; Ch.60



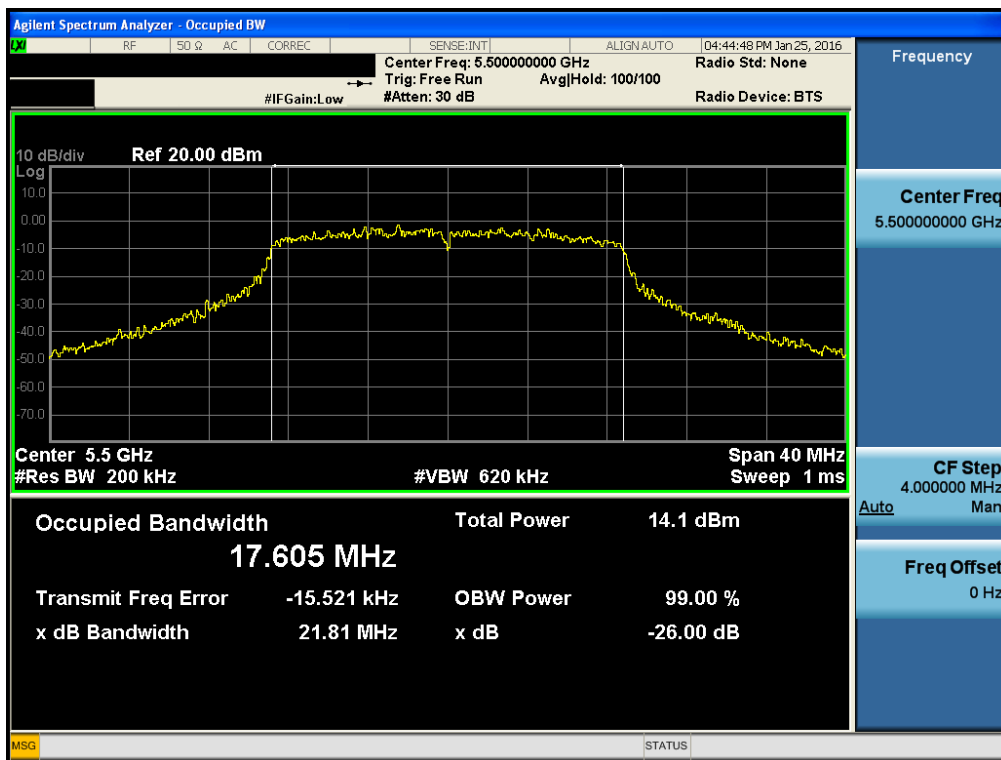
## 26 dB Bandwidth

Test Mode: 802.11n HT20 &amp; Ch.64



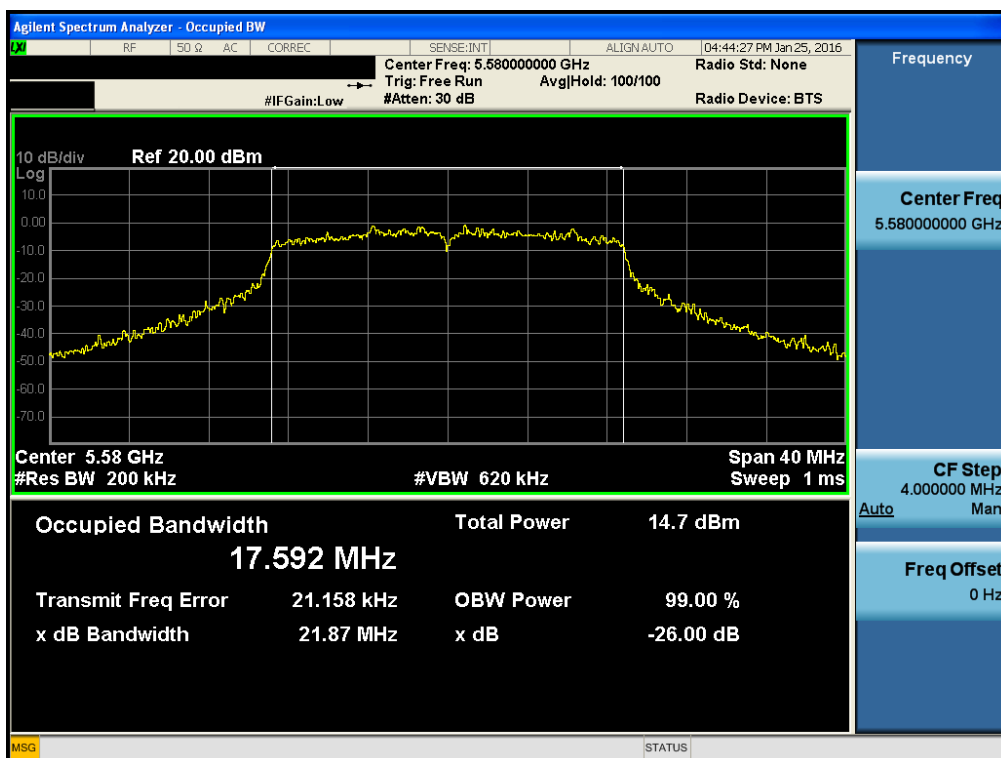
## 26 dB Bandwidth

Test Mode: 802.11n HT20 &amp; Ch.100



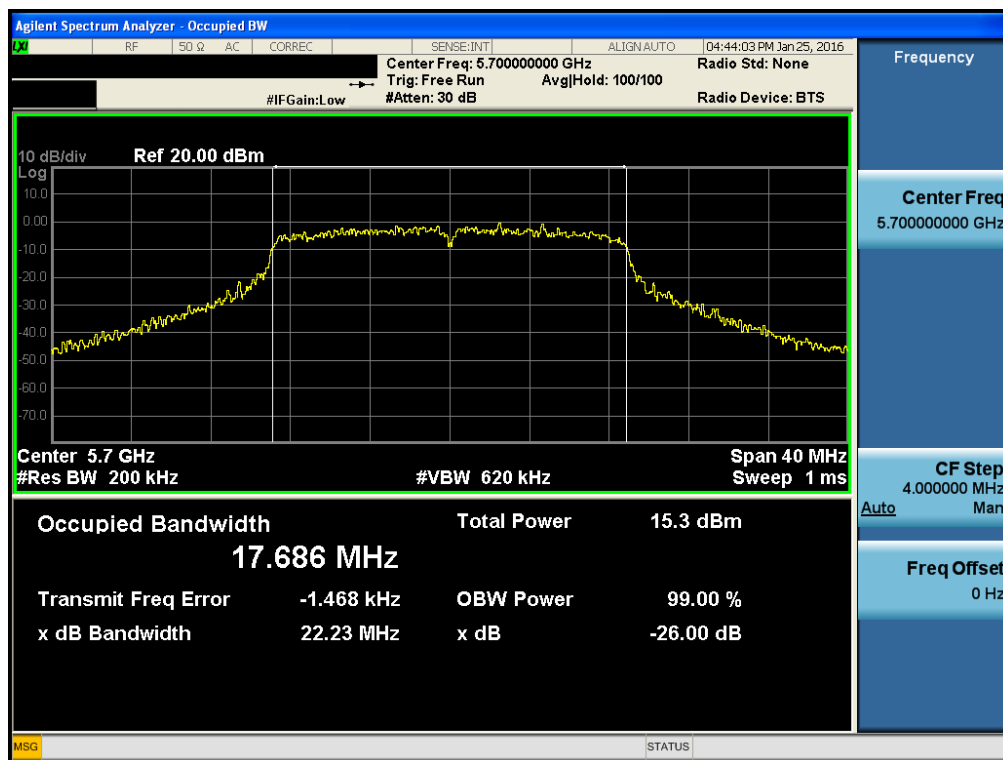
## 26 dB Bandwidth

Test Mode: 802.11n HT20 &amp; Ch.116



## 26 dB Bandwidth

Test Mode: 802.11n HT20 &amp; Ch.140



## 26 dB Bandwidth

Test Mode: 802.11a &amp; Ch.144



## 26 dB Bandwidth

Test Mode: 802.11n HT20 &amp; Ch.144





## 8.2 Minimum Emission Bandwidth (6 dB Bandwidth)

### ■ Test Requirements

Within the 5.725 - 5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

### ■ TEST CONFIGURATION

Refer to the APPENDIX I.

### ■ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer and used following test procedure of **KDB789033 D02 V01**.

1. Set resolution bandwidth (RBW) = 100 kHz
2. Set the video bandwidth  $\geq 3 \times \text{RBW}$ .
3. Detector = **Peak**.
4. Trace mode = **Max hold**.

Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

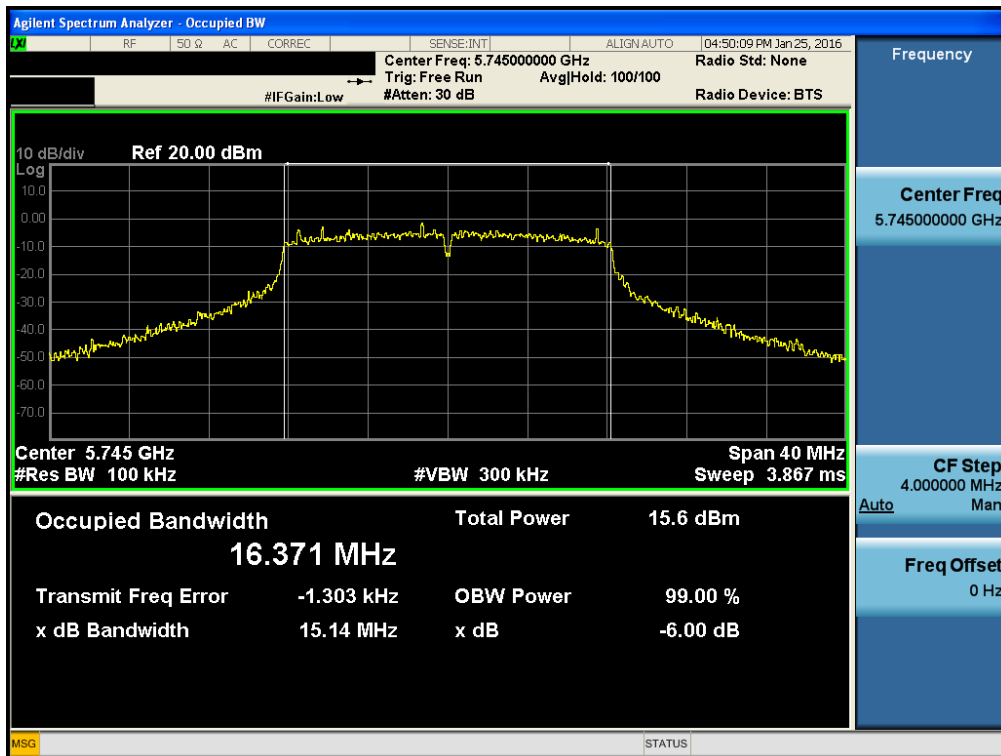
### ■ TEST RESULTS: **Comply**

Mode	Band	Channel	Frequency [MHz]	Test Result [MHz]
802.11a	U-NII 3	149	5745	15.14
		157	5785	14.45
		165	5825	15.53
802.11n (HT20)		149	5745	16.03
		157	5785	16.42
		165	5825	15.79
802.11a	U-NII 3 (Band-crossing channels)	144	5720	2.57
802.11n (HT20)		144	5720	2.57

## ■ RESULT PLOTS

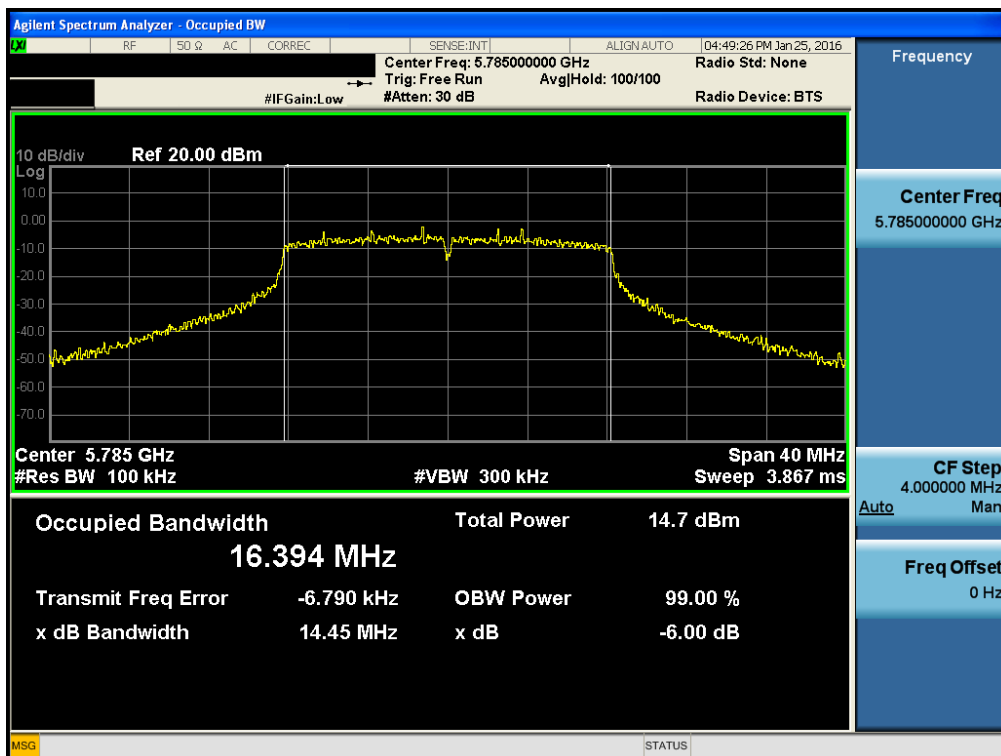
## 6 dB Bandwidth

Test Mode: 802.11a &amp; Ch.149



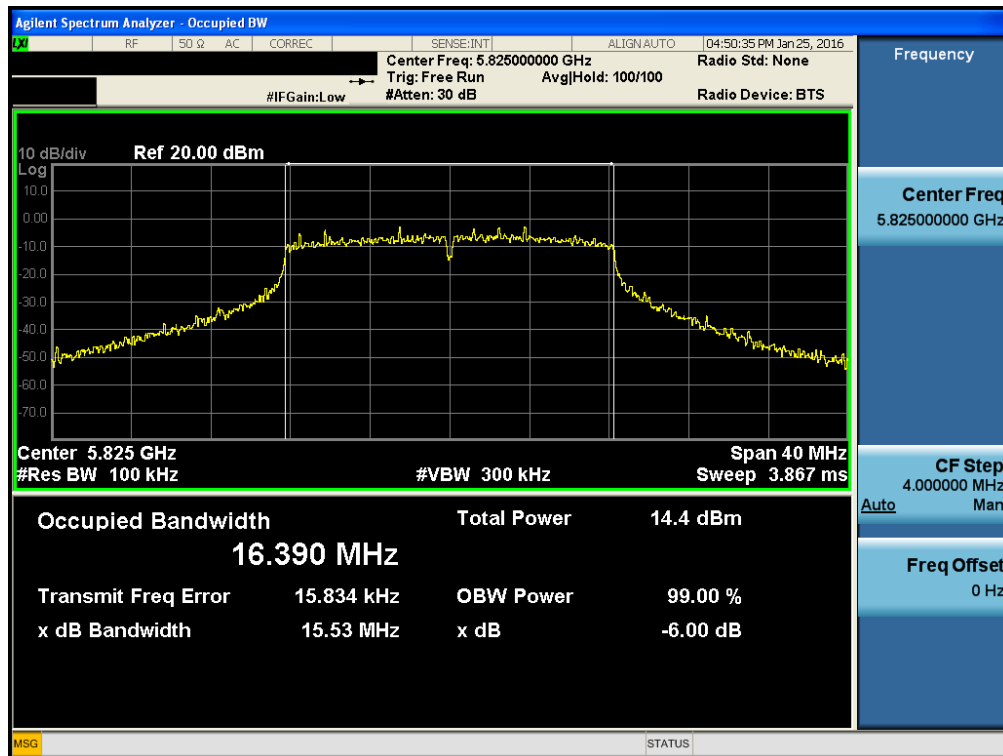
## 6 dB Bandwidth

Test Mode: 802.11a &amp; Ch.157



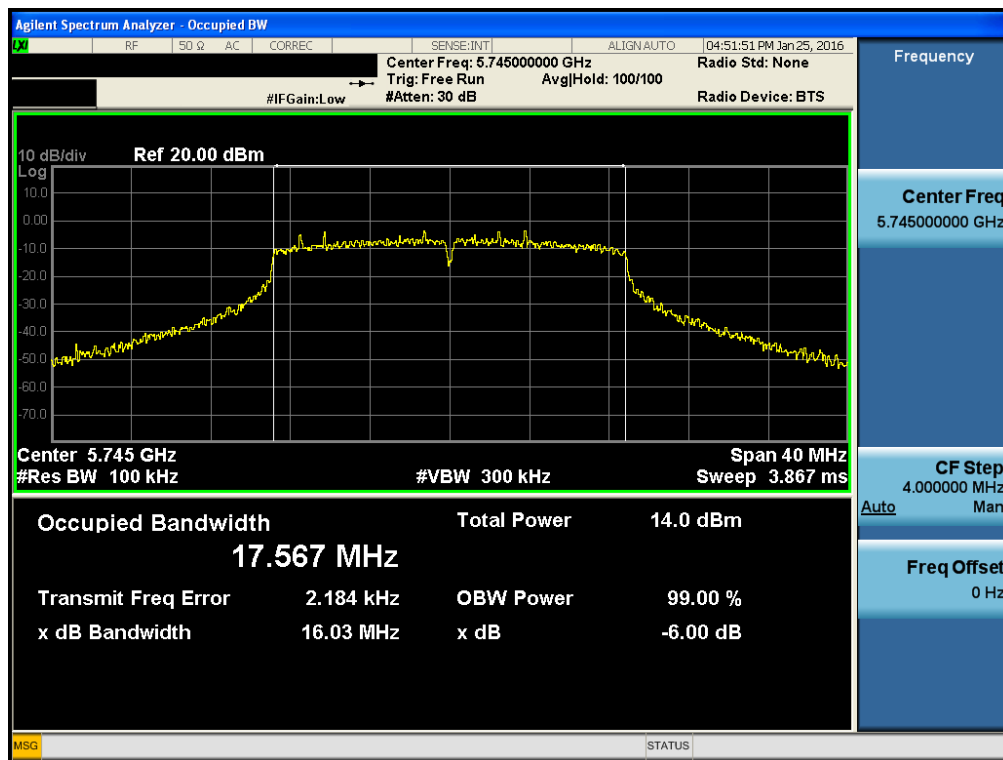
## 6 dB Bandwidth

Test Mode: 802.11a &amp; Ch.165



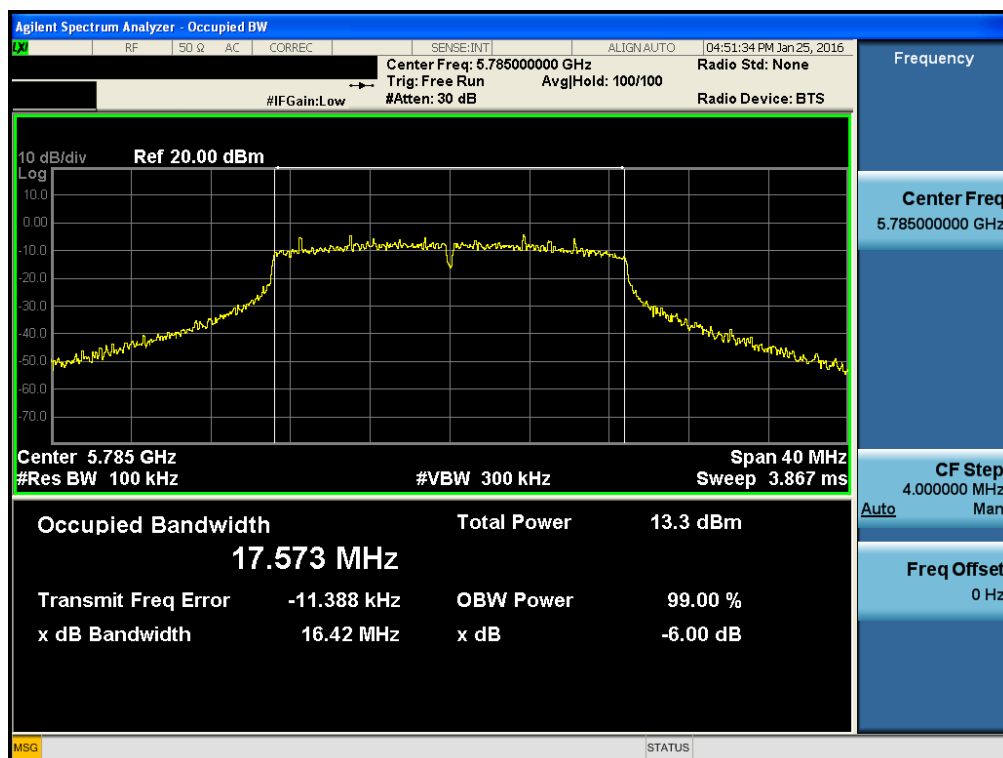
## 6 dB Bandwidth

Test Mode: 802.11n(HT20) &amp; Ch.149



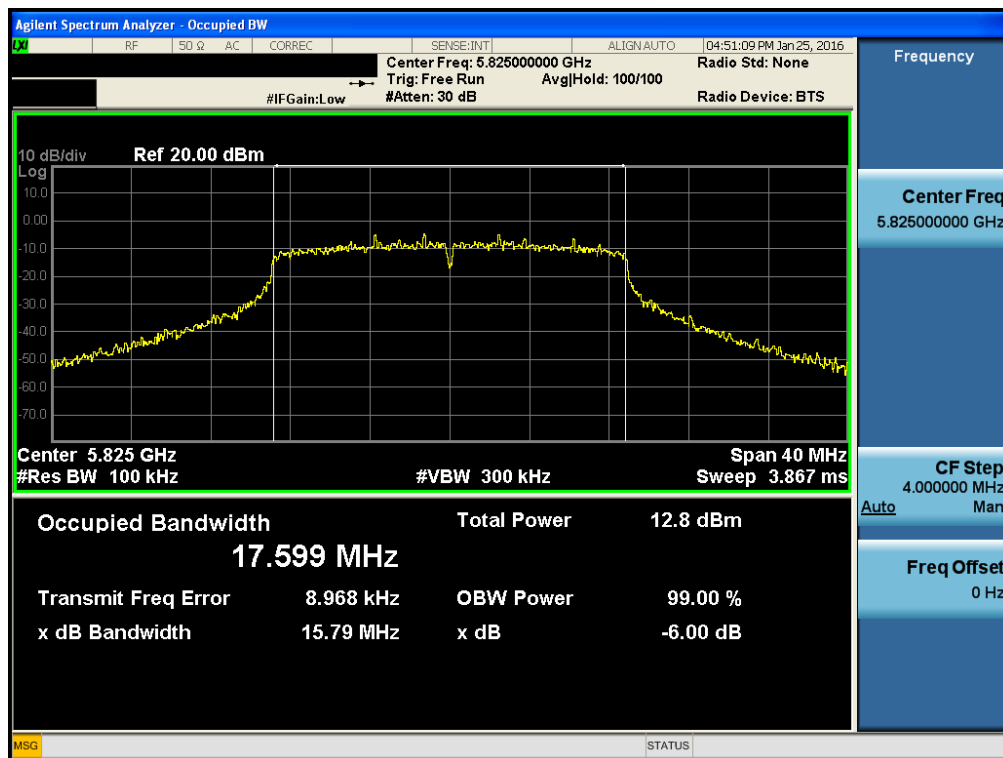
## 6 dB Bandwidth

Test Mode: 802.11n(HT20) &amp; Ch.157



## 6 dB Bandwidth

Test Mode: 802.11n(HT20) &amp; Ch.165



## 6 dB Bandwidth

Test Mode: 802.11a &amp; Ch.144



## 6 dB Bandwidth

Test Mode: 802.11n(HT20) &amp; Ch.144



## 8.3 Maximum Conducted Output Power

### ■ Test Requirements

#### Part. 15.407(a)

##### (1) For the band 5.15 - 5.25 GHz.

(i) For an outdoor access point operating in the band 5.15 - 5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15 - 5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15 - 5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15 - 5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25 - 5.35 GHz and 5.47 - 5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or  $11 \text{ dBm} + 10 \log B$ , where B is the 26 dB emission bandwidth in megahertz. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725 - 5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

## - Output power Limit Calculation (FCC)

Bands	Mode	Power Limit [mW]	Calculated Limit [dBm]	Antenna Gain [dBi]	Determined Limit [dBm]
U-NII 1	802.11a	250	23.97	2.821	23.97
	802.11n(HT20)				

Bands	Mode	Power Limit [mW]	Calculated Limit [dBm]	Antenna Gain [dBi]	Determined Limit [dBm]
		Least 26 dBc BW [MHz]			
U-NII 2A	802.11a	250	23.97	2.077	23.97
		20.86	24.19		
	802.11n(HT20)	250	23.97		23.97
		21.68	24.36		
U-NII 2C	802.11a	250	23.97	3.886	23.97
		21.31	24.28		
	802.11n(HT20)	250	23.97		23.97
		21.81	24.38		
U-NII 2C (band-crossing channels)	802.11a	250	23.97	3.886	22.78
		15.08	22.78		
	802.11n(HT20)	250	23.97		22.87
		15.41	22.87		

Bands	Mode	Power Limit [mW]	Calculated Limit [dBm]	Antenna Gain [dBi]	Determined Limit [dBm]
U-NII 3	802.11a	1000	30.00	2.866	30.00
	802.11n(HT20)				



**RSS-247[6.11]****(1) For band 5150 - 5250 MHz**

The maximum e.i.r.p. shall not exceed 200 mW or  $10 + 10 \log_{10} B$ , dBm, whichever power is less. B is the 99 % emission bandwidth in MHz.

**(2) For band 5250 - 5350 MHz**

The maximum conducted output power shall not exceed 250 mW or  $11 + 10 \log_{10} B$ , dBm, whichever power is less. The maximum e.i.r.p. shall not exceed 1.0 W or  $17 + 10 \log_{10} B$ , dBm, whichever power is less. B is the 99 % emission bandwidth in MHz.

**(3) For band 5470 - 5600 MHz and 5650 - 5725 MHz**

The maximum conducted output power shall not exceed 250 mW or  $11 + 10 \log_{10} B$ , dBm, whichever power is less. The maximum e.i.r.p. shall not exceed 1.0 W or  $17 + 10 \log_{10} B$ , dBm, whichever power is less. B is the 99 % emission bandwidth in MHz.

**(4) For band 5725 - 5850 MHz**

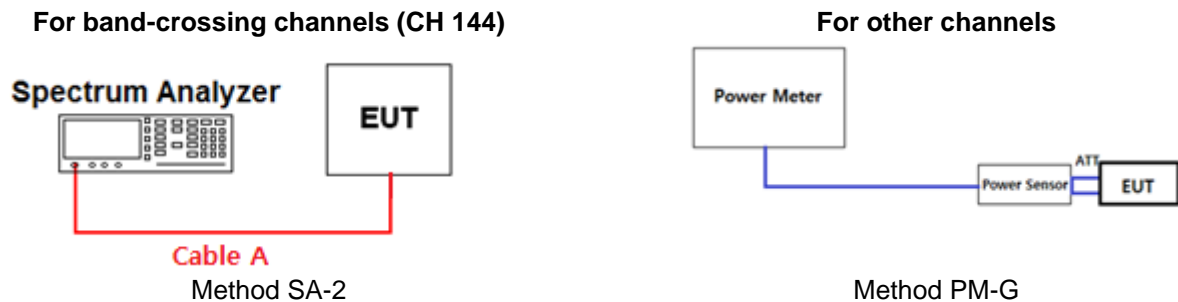
The maximum conducted output power shall not exceed 1 W.

**- Output power Limit Calculation (IC)**

Bands	Mode	Power Limit [mW]	Calculated Limit [dBm]	Antenna Gain [dBi]	Determined Limit [dBm]
		Least 99% BW [MHz]			
1	802.11a	250	23.97	2.821	22.20
		16.620	22.20		
	802.11n(HT20)	250	23.97		22.48
		17.711	22.48		
2	802.11a	250	23.97	2.077	23.19
		16.588	23.19		
	802.11n(HT20)	250	23.97		23.48
		17.734	23.48		
3	802.11a	250	23.97	3.886	23.19
		16.591	23.19		
	802.11n(HT20)	250	23.97		23.47
		17.697	23.47		

Bands	Mode	Power Limit [mW]	Calculated Limit [dBm]	Antenna Gain [dBi]	Determined Limit [dBm]
4	802.11a	1000	30.00	2.866	30.00
	802.11n(HT20)				

## Test Configuration



## Test Procedure

### Method PM-G of KDB789033 D02 V01

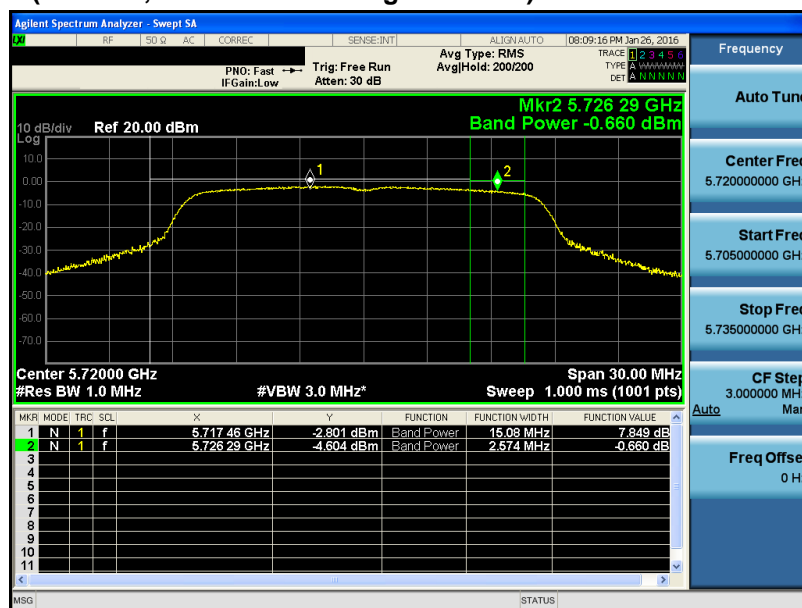
Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

### Method SA-2 of KDB789033 D02 V01

1. Set span to encompass the emission bandwidth (EBW) of the signal.
2. Set RBW = 1 MHz.
3. Set the VBW  $\geq 3 \times$  RBW.
4. Number of points in sweep  $\geq 2 \times$  Span / RBW.
5. Sweep time = auto.
6. Detector = RMS.
7. Trace average at least 100 traces in power averaging mode
8. Compute power by integrating the spectrum across the EBW of the signal.
9. Duty factor need added to measured value (duty cycle < 98 percent).

Note: The measure-and-sum technique is used for test mode with multiple transmitting.

## Description of test plot (U-NII 2C, 3 & Band-Crossing Channels)



**Maker 2 Function Width (U-NII 2C Band):** 26 dB BW (15.08 MHz)

**Maker 2 Function Value (U-NII 2C Band):** Output power (-0.66 dBm)

**Maker 1 Function Width (U-NII 3 Band):** 6 dB BW (2.57 MHz)

**Maker 1 Function Value (U-NII 3 Band):** Output power (7.85 dBm)

■ Test Results: **Comply**

Mode	Bands	Channel	Frequency [MHz]	Test Result [dBm]
802.11a	U-NII 1	36	5180	10.88
		40	5200	11.35
		48	5240	11.02
	U-NII 2A	52	5260	11.33
		60	5300	10.91
		64	5320	10.81
	U-NII 2C	100	5500	10.94
		116	5580	11.39
		140	5700	11.11
	U-NII 3	149	5745	11.11
		157	5785	10.98
		165	5825	10.78
802.11n (HT20)	U-NII 1	36	5180	10.10
		40	5200	10.12
		48	5240	9.84
	U-NII 2A	52	5260	10.28
		60	5300	9.87
		64	5320	9.66
	U-NII 2C	100	5500	9.90
		116	5580	10.38
		140	5700	9.70
	U-NII 3	149	5745	10.02
		157	5785	9.87
		165	5825	9.94

**Band-Crossing Channels**

Mode		Channel	Frequency [MHz]	Reading [dBm]	D.C.F [dB] Note 1	Test Result [dBm]
802.11a	U-NII 2C	144	5720	7.85	2.37	10.22
	U-NII 3	144	5720	-0.66		1.71
802.11n (HT20)	U-NII 2C	144	5720	6.28	2.52	8.80
	U-NII 3	144	5720	-1.95		0.57

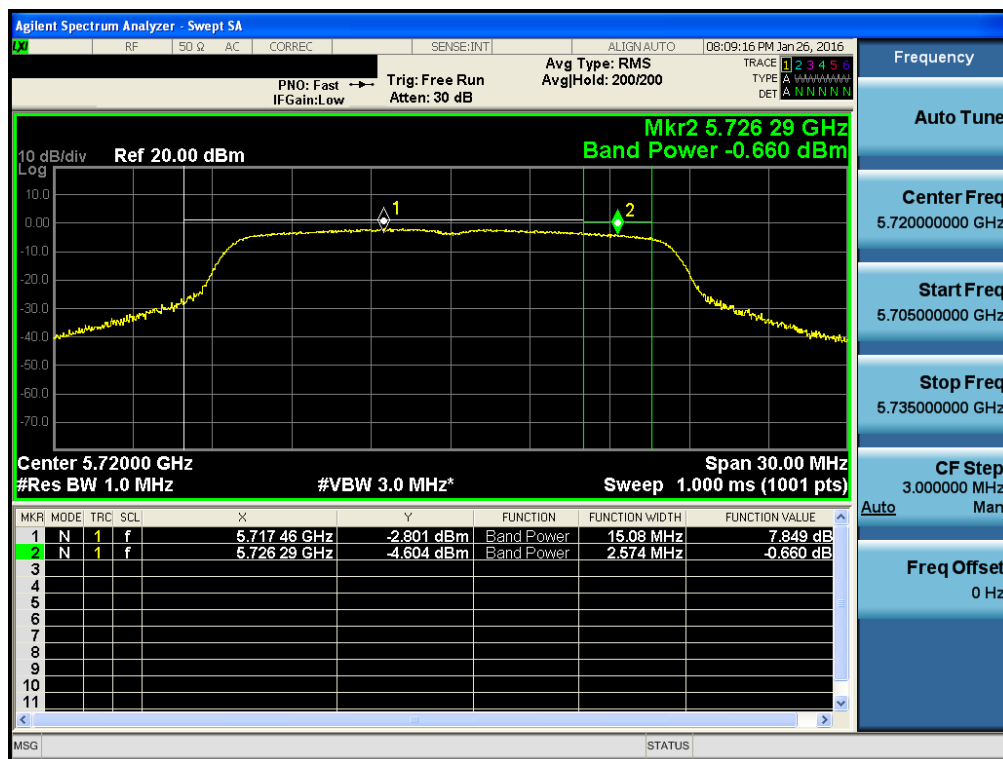
Note 1: D.C.F =  $10 \log(1/x)$  where x is the duty cycle.

Note 2: Test Result = Reading + D.C.F

## ■ RESULT PLOTS(Band-Crossing Channels)

## Maximum Output Power

Test Mode: 802.11a &amp; Ch.144



## Maximum Output Power

Test Mode: 802.11n HT20 &amp; Ch.144



## 8.4 Maximum Power Spectral Density

### ■ Test requirements

#### Part. 15.407(a)

##### (1) For the band 5.15 - 5.25 GHz.

(i) For an outdoor access point operating in the band 5.15 - 5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 MHz band. <sup>note1</sup>

(ii) For an indoor access point operating in the band 5.15 - 5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 MHz band. <sup>note1</sup>

(iii) For fixed point-to-point access points operating in the band 5.15 - 5.25 GHz, transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi.

(iv) For mobile and portable client devices in the 5.15 - 5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 MHz band. <sup>note1</sup>

(2) For the 5.25 - 5.35 GHz and 5.47 - 5.725 GHz bands, the peak power spectral density shall not exceed 11 dBm in any 1 MHz band. <sup>note1</sup>

(3) For the band 5.725 - 5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500 kHz band. <sup>note1,note2</sup>

**Note1:** If transmitting antennas of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

**Note2:** Fixed point - to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information.

#### - Peak Power Spectral Density Limit Calculation(FCC)

Band	Limit [dBm]	Antenna Gain [dBi]	Determined Limit [dBm]
U-NII 1	11	2.821	11
U-NII 2A	11	2.077	11
U-NII 2C	11	3.886	11
U-NII 3	30	2.866	30

**RSS-247[6.11]**

- (1) For band 5150 - 5250 MHz  
The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.
- (2) For band 5250 - 5350 MHz  
The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.
- (3) For band 5470 - 5600 MHz and 5650 - 5725 MHz  
The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.
- (4) For band 5725 - 5850 MHz  
The power spectral density shall not exceed 30 dBm in any 500 kHz band.

**- Peak Power Spectral Density Limit Calculation(IC)**

Band	Limit [dBm]	ANT Gain [dBi]	Determined Limit [dBm]
1	10	2.821	10
2	11	2.077	11
3	11	3.886	11
4	30	2.866	30

■ **Test configuration**

Refer to the APPENDIX I.

■ **Test procedure**

Maximum Power Spectral Density is measured using Measurement Procedure of KDB789033 D02 V01

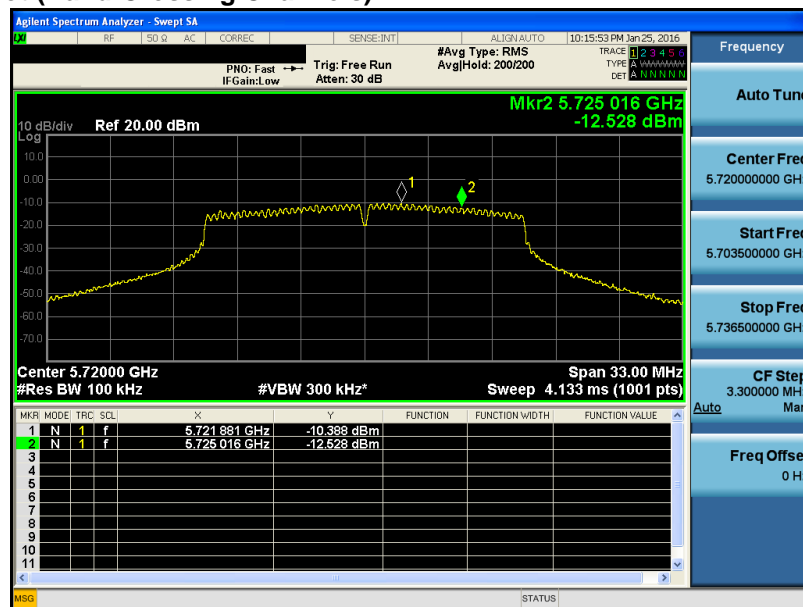
- 1) Create an average power spectrum for the EUT operating mode being tested by following the instructions in section II.E.2. for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA - 1, SA - 2, SA - 3, or alternatives to each) and apply it up to, but not including, the step labeled, "Compute power...". (This procedure is required even if the maximum conducted output power measurement was performed using a power meter, method PM.)
- 2) Use the peak search function on the instrument to find the peak of the spectrum and record its value.
- 3) Make the following adjustments to the peak value of the spectrum, if applicable:
  - a) If Method SA - 2 or SA - 2 Alternative was used, add  $10 \log(1 / x)$ , where x is the duty cycle, to the peak of the spectrum.
  - b) If Method SA - 3 Alternative was used and the linear mode was used in step II.E.2.g (viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.
- 4) The result is the Maximum PSD over 1 MHz reference bandwidth.
- 5) For devices operating in the bands 5.15 - 5.25 GHz, 5.25 - 5.35 GHz, and 5.47 - 5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in §15.407(a)(5). For devices operating in the band 5.725 - 5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, "provided that the measured power is integrated over the full reference bandwidth" to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 kHz

bandwidth, the following adjustments to the procedures apply:

- Set  $RBW \geq 1/T$ , where T is defined in section II.B.1.a). (Refer to Appendix II)
- Set  $VBW \geq 3 RBW$ .
- If measurement bandwidth of Maximum PSD is specified in 500 kHz, add  $10 \log(500 \text{ kHz} / RBW)$  to the measured result, whereas  $RBW (< 500 \text{ kHz})$  is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
- If measurement bandwidth of Maximum PSD is specified in 1 MHz, add  $10 \log(1 \text{ MHz} / RBW)$  to the measured result, whereas  $RBW (< 1 \text{ MHz})$  is the reduced resolution bandwidth of spectrum analyzer set during measurement.
- Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

**Note: As a practical matter, it is recommended to use reduced RBW of 100 kHz for the sections 5.c) and 5.d) above, since RBW = 100 kHz is available on nearly all spectrum analyzers.**

#### ■ Description of test plot (Band-Crossing Channels)



Maker 1 Value (U-NII 2C Band): Reading (-10.39 dBm)

Maker 2 Value (U-NII 3 Band): Reading (-12.53 dBm)

■ Test result: **Comply**

Mode	Channel	Frequency [MHz]	Reading [dBm]	T.F [dB] Note 1	Test Result [dBm]
802.11a	36	5180	-3.732	2.37	-1.362
	40	5200	-2.805		-0.435
	48	5240	-3.521		-1.151
	52	5260	-2.773		-0.403
	60	5300	-3.441		-1.071
	64	5320	-4.029		-1.659
	100	5500	-3.142		-0.772
	116	5580	-2.115		0.255
	140	5700	-1.273		1.097
	149	5745	-2.689	9.36	6.671
	157	5785	-3.266		6.094
	165	5825	-3.892		5.468
802.11n (HT20)	36	5180	-4.758	2.52	-2.238
	40	5200	-5.138		-2.618
	48	5240	-5.079		-2.559
	52	5260	-4.507		-1.987
	60	5300	-5.477		-2.957
	64	5320	-5.763		-3.243
	100	5500	-4.510		-1.990
	116	5580	-3.965		-1.445
	140	5700	-3.453		-0.933
	149	5745	-4.929	9.51	4.581
	157	5785	-5.830		3.680
	165	5825	-6.301		3.209

Note 1: "U-NII 1, 2A, 2C [T.F] = 10\*LOG(1MHz/1MHz) + D.C.F"

"U-NII 3 [T.F] = 10\*LOG(500kHz/100kHz) + D.C.F"

For D.C.F., please refer to appendix II.

Note 2: Test Result = Reading + T.F



**Band-Crossing Channels**

Mode		Channel	Frequency [MHz]	Reading [dBm]	T.F [dB] Note 1	Test Result [dBm]
802.11a	U-NII 2C	144	5720	-10.388	12.37	1.982
	U-NII 3	144	5720	-12.528	9.36	-3.168
802.11n (HT20)	U-NII 2C	144	5690	-12.563	12.52	-0.043
	U-NII 3	144	5690	-14.669	9.51	-5.159

Note 1: "U-NII 1, 2A, 2C [T.F] =  $10 \cdot \log(1\text{MHz}/100\text{kHz}) + \text{D.C.F}$ "

"U-NII 3 [T.F] =  $10 \cdot \log(500\text{kHz}/100\text{kHz}) + \text{D.C.F}$ "

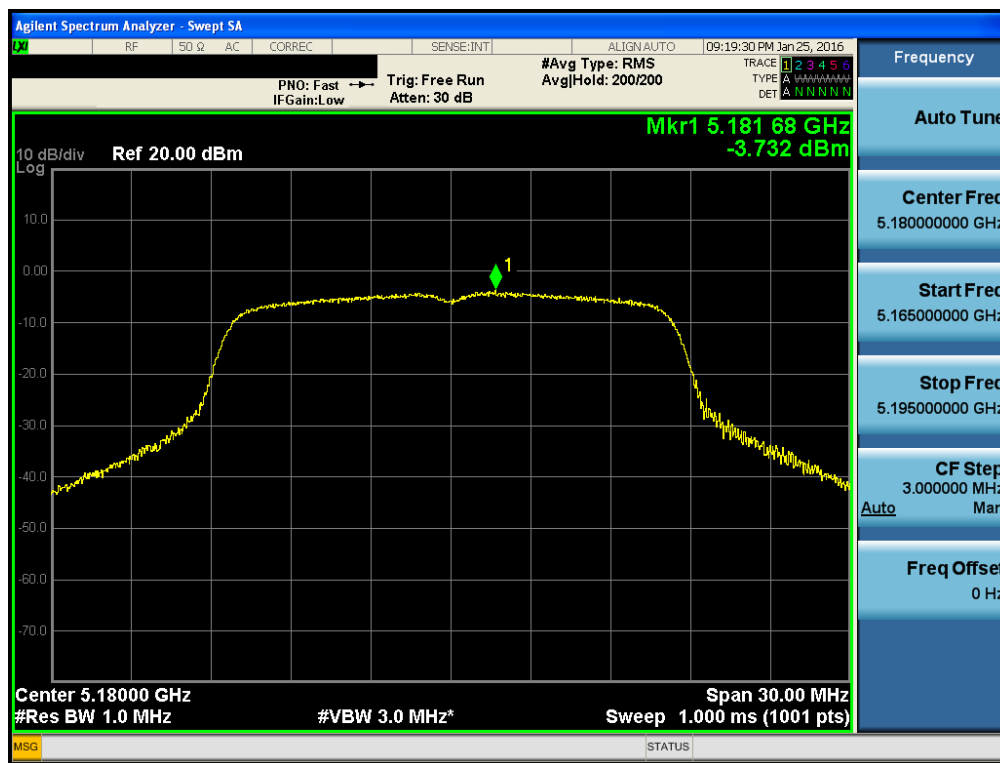
For D.C.F., please refer to appendix II.

Note 2: Test Result = Reading + T.F

## ■ RESULT PLOTS

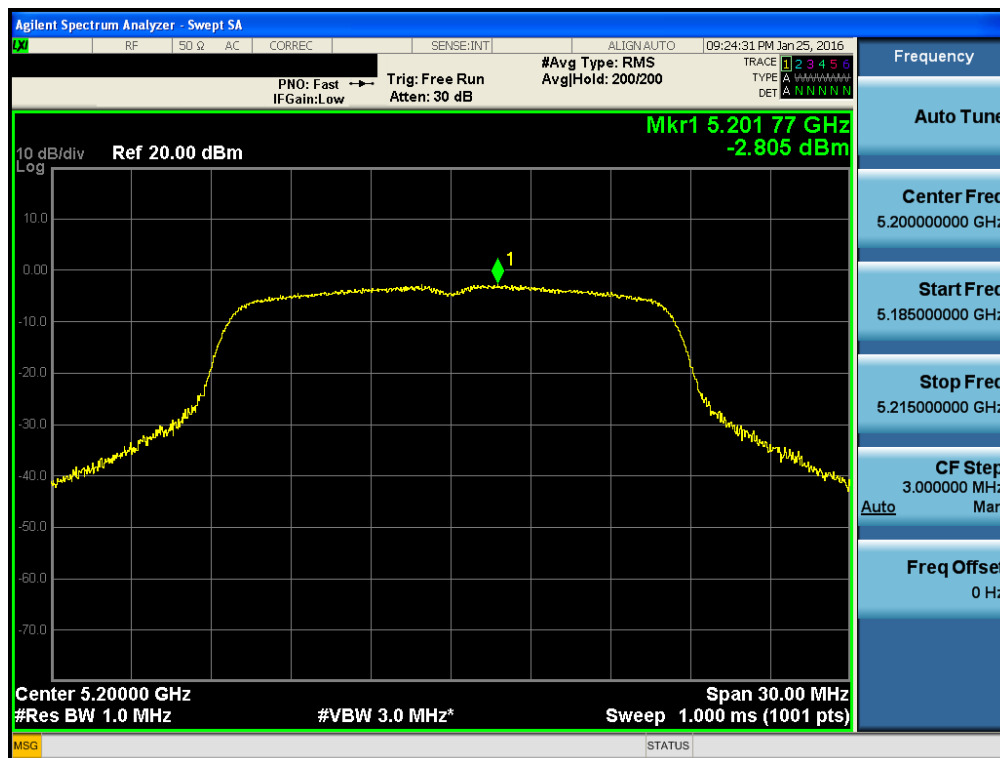
## Maximum Power Spectral Density

Test Mode: 802.11a &amp; Ch.36



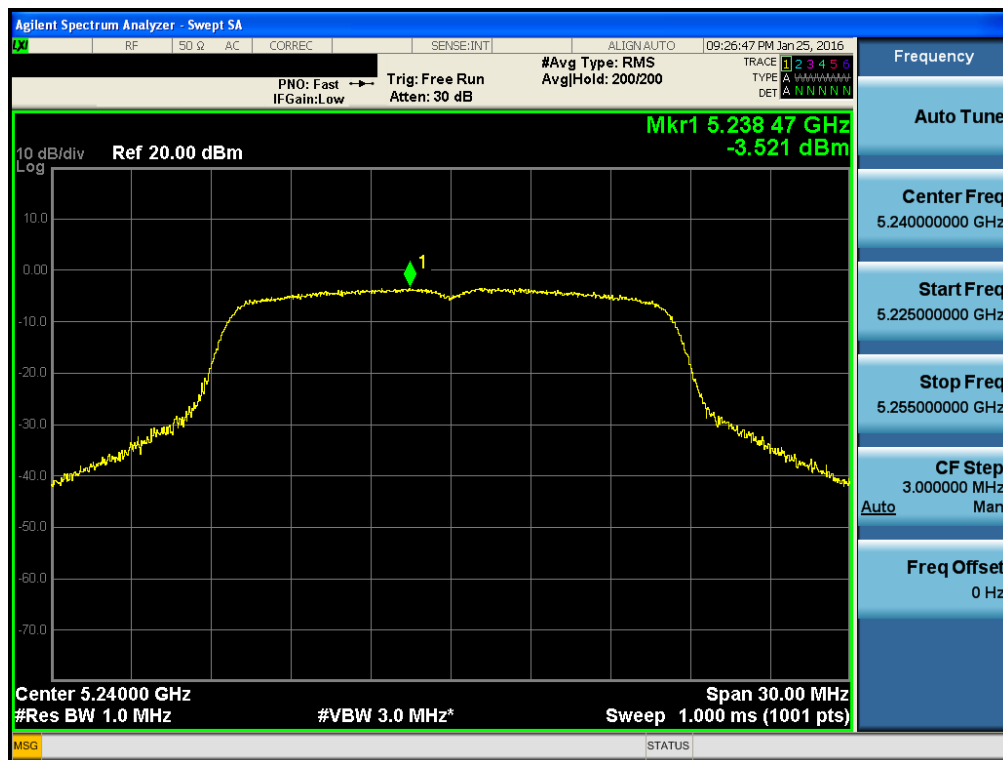
## Maximum Power Spectral Density

Test Mode: 802.11a &amp; Ch.40



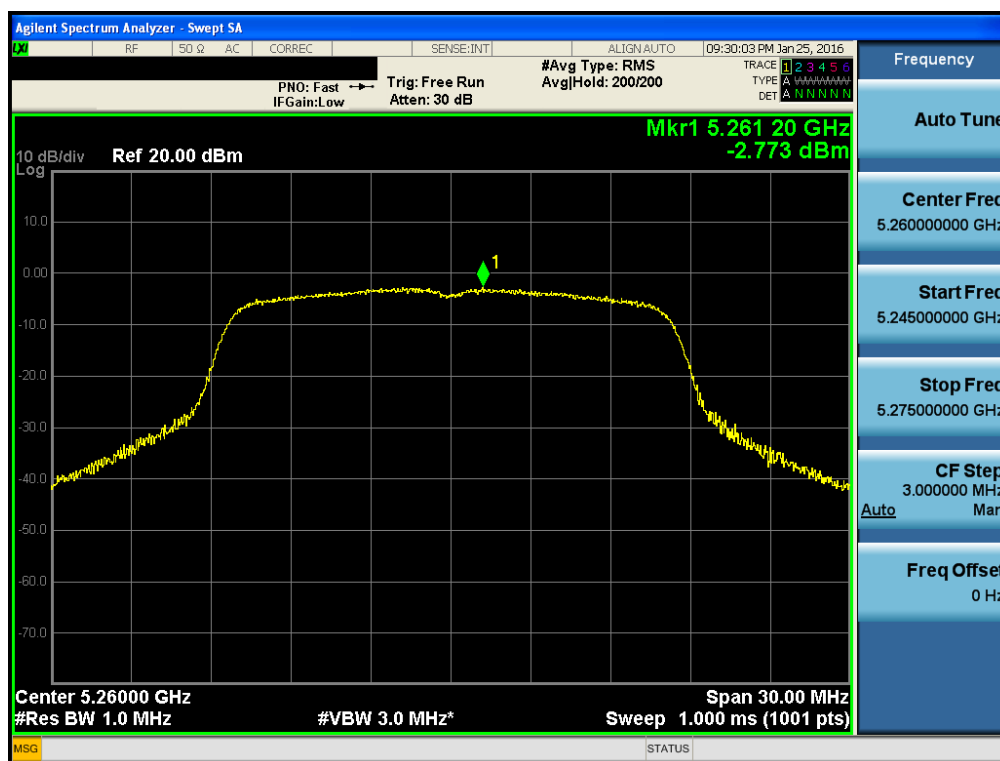
## Maximum Power Spectral Density

Test Mode: 802.11a &amp; Ch.48



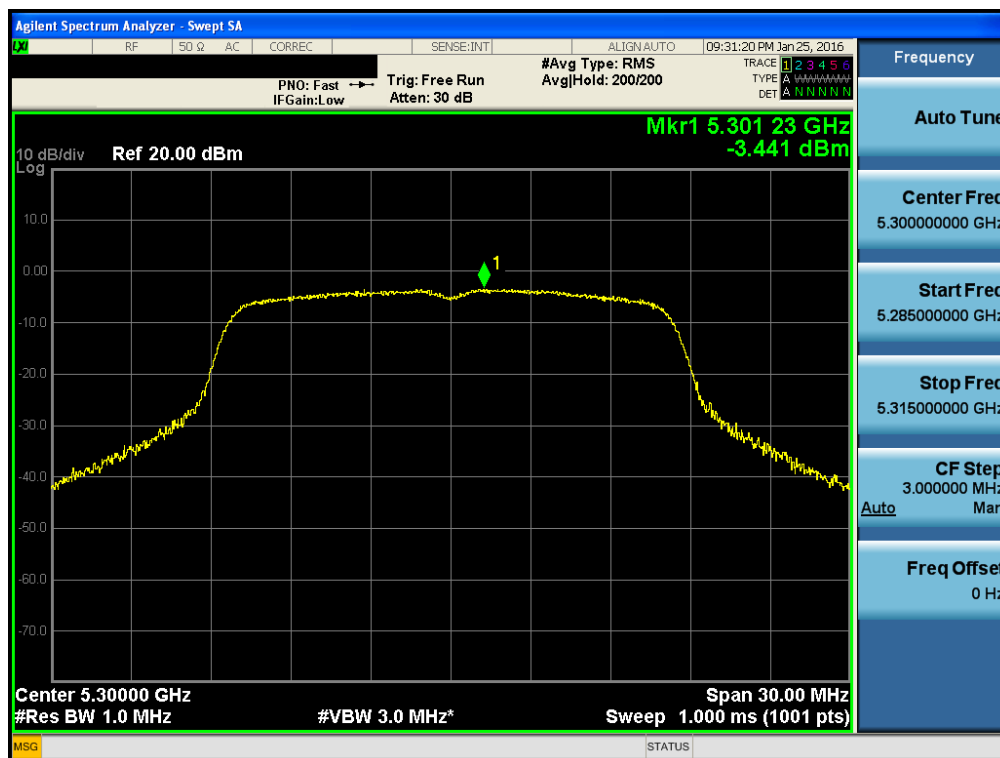
## Maximum Power Spectral Density

Test Mode: 802.11a &amp; Ch.52



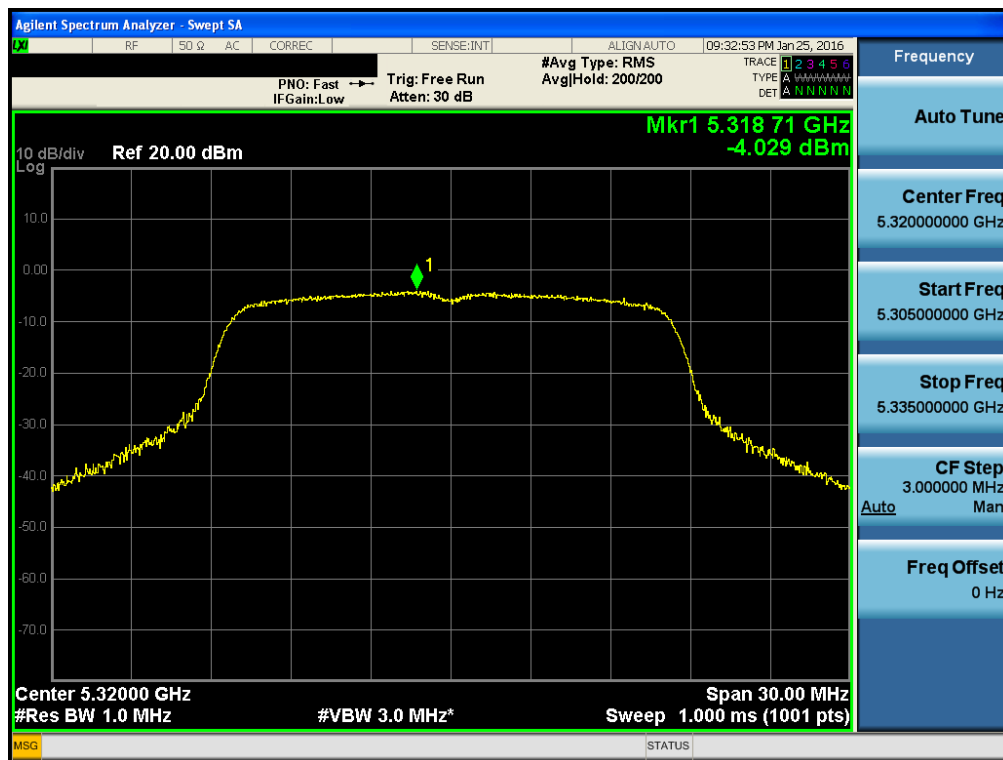
## Maximum Power Spectral Density

Test Mode: 802.11a &amp; Ch.60



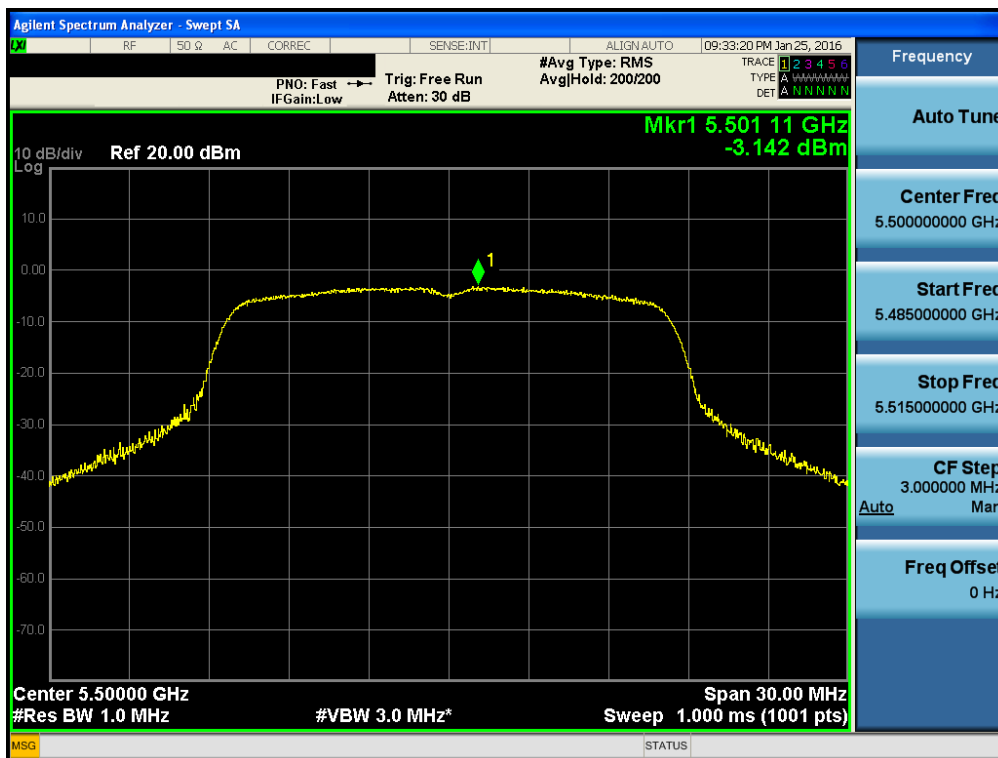
## Maximum Power Spectral Density

Test Mode: 802.11a &amp; Ch.64



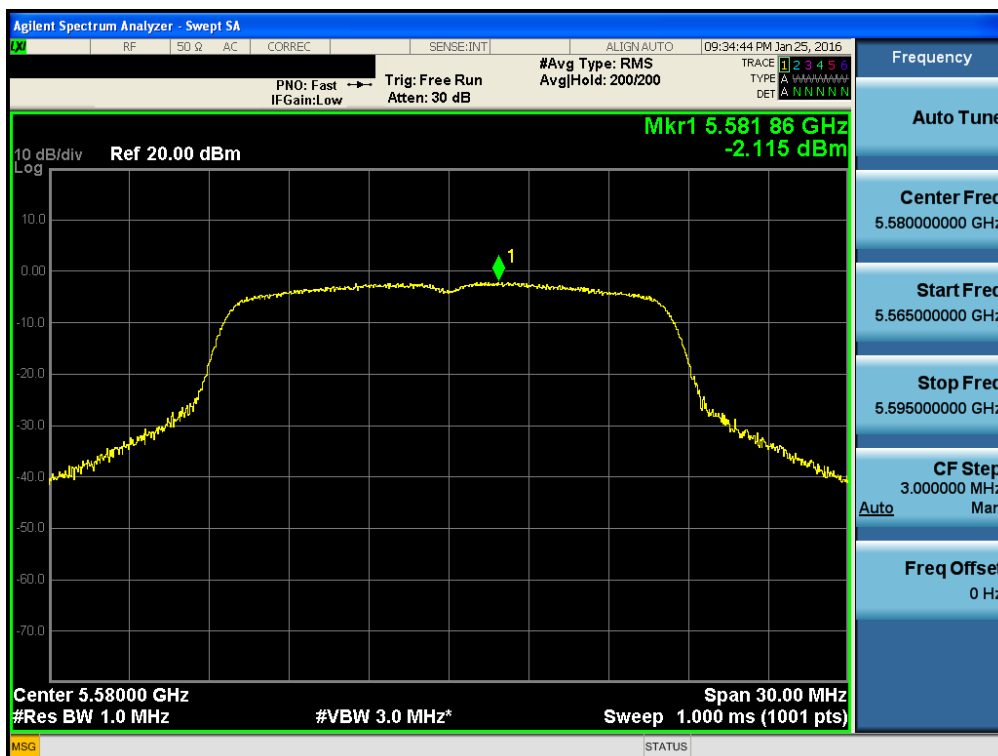
## Maximum Power Spectral Density

Test Mode: 802.11a &amp; Ch.100



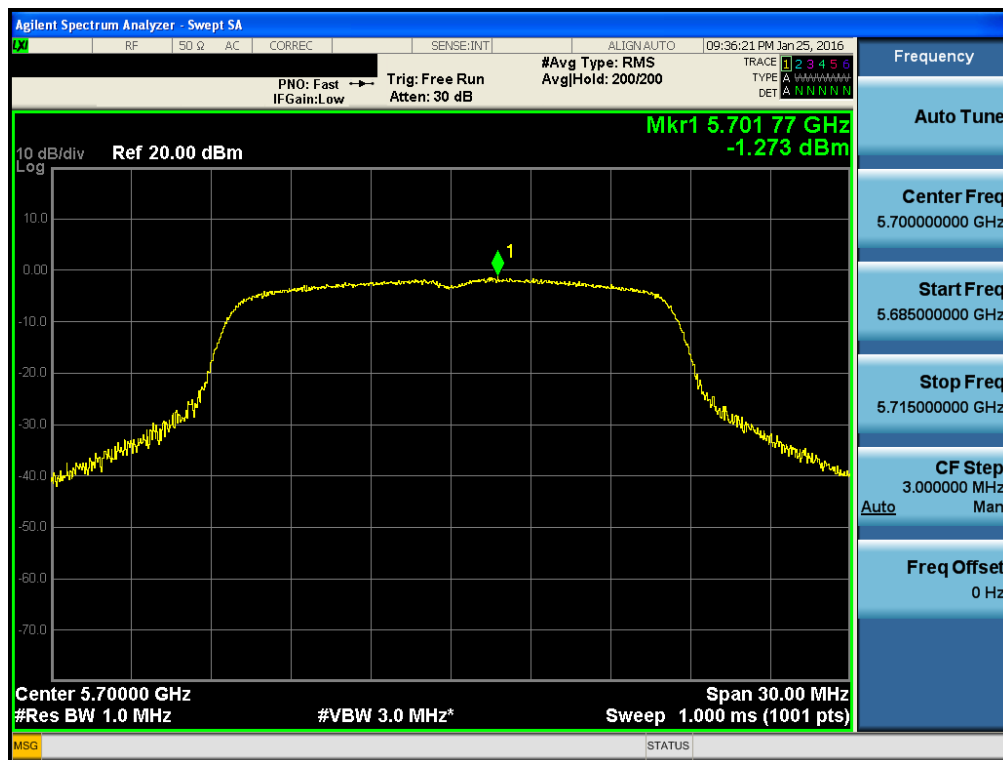
## Maximum Power Spectral Density

Test Mode: 802.11a &amp; Ch.116



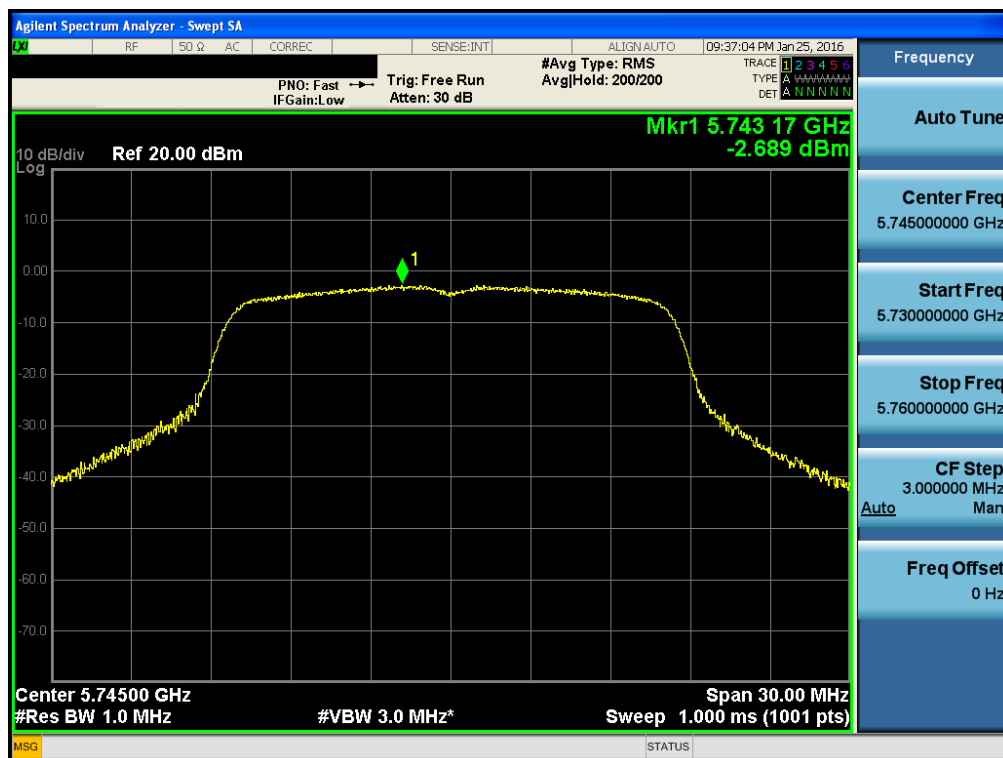
## Maximum Power Spectral Density

Test Mode: 802.11a &amp; Ch.140



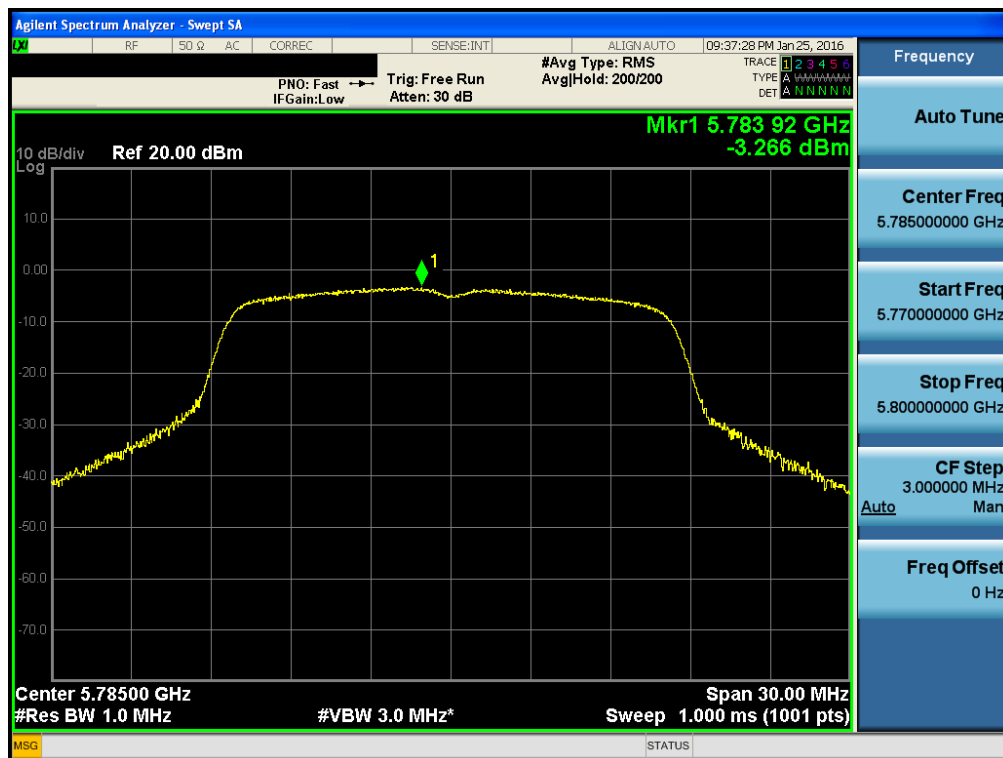
## Maximum Power Spectral Density

Test Mode: 802.11a &amp; Ch.149



## Maximum Power Spectral Density

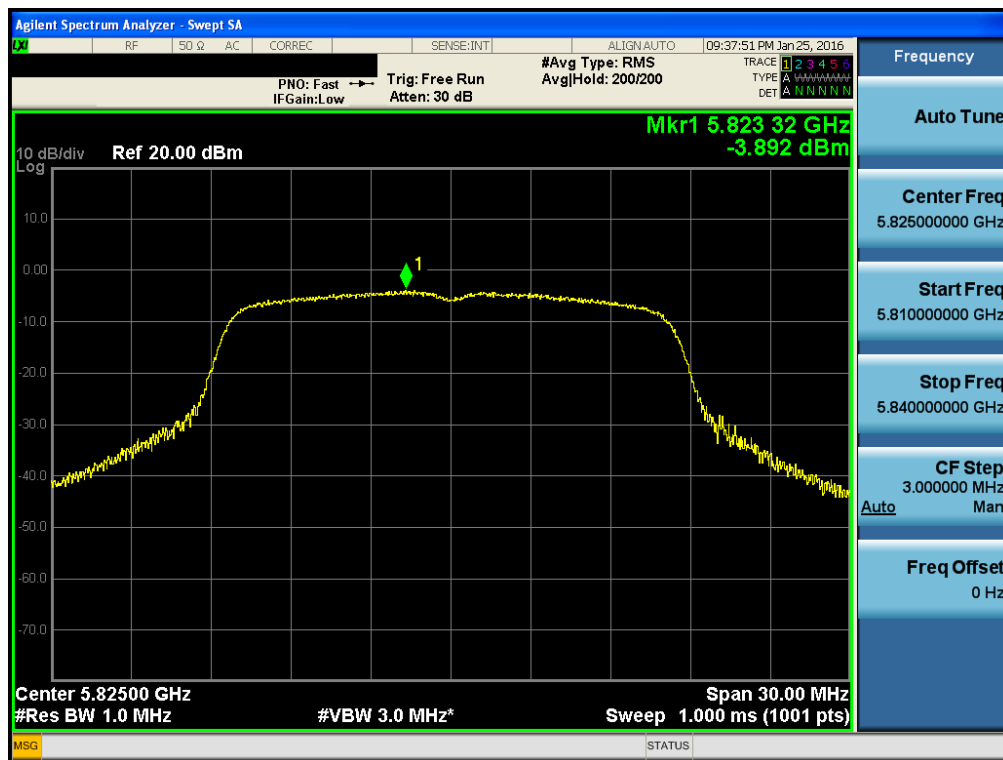
Test Mode: 802.11a &amp; Ch.157





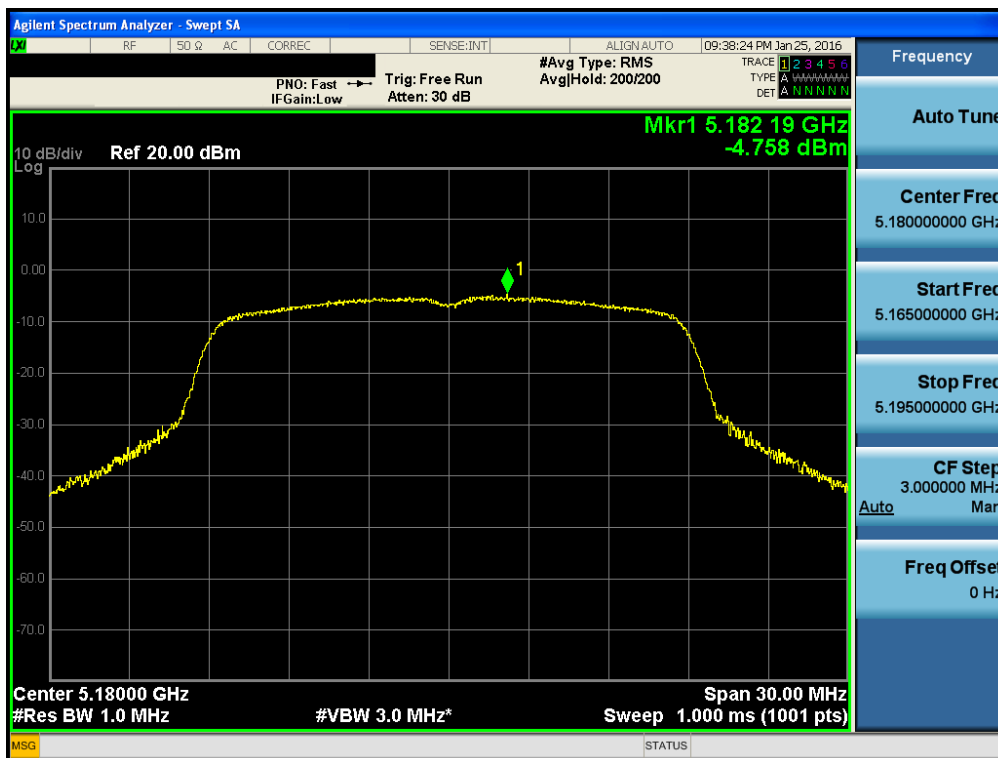
## Maximum Power Spectral Density

Test Mode: 802.11a &amp; Ch.165



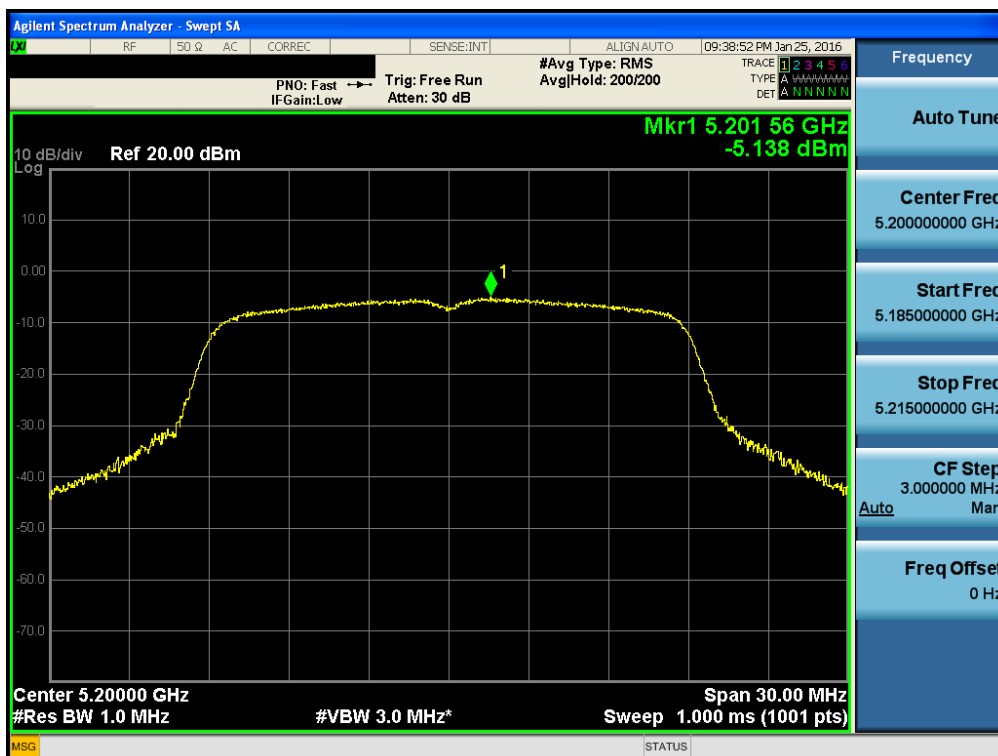
## Maximum Power Spectral Density

Test Mode: 802.11n(HT20) &amp; Ch.36



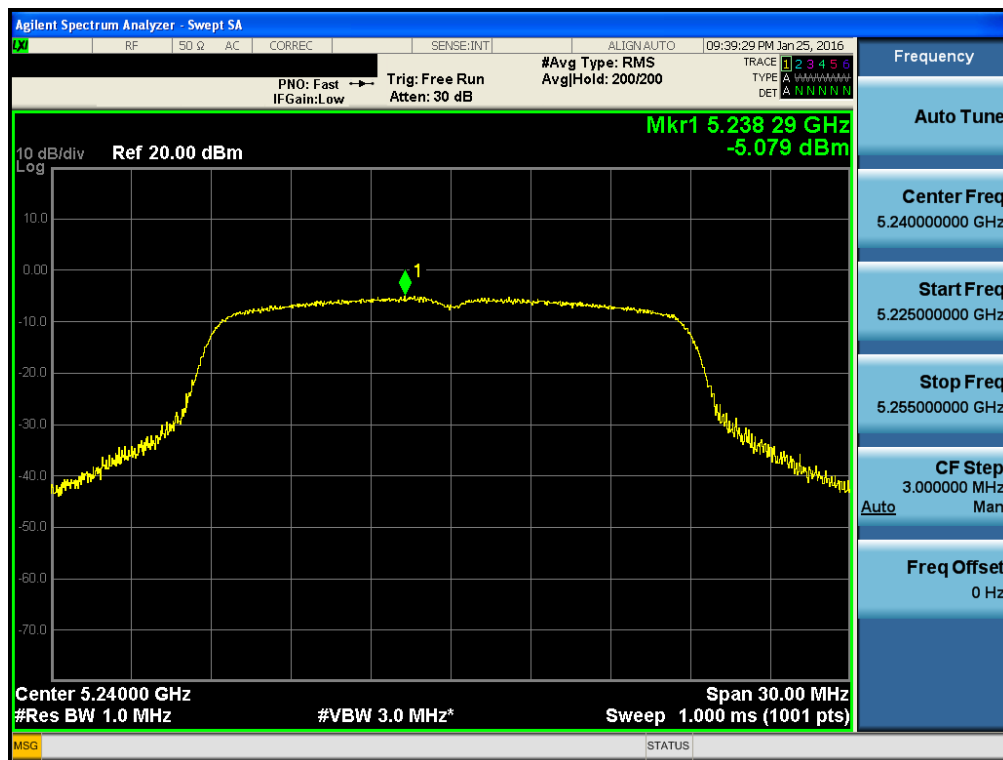
## Maximum Power Spectral Density

Test Mode: 802.11n(HT20) &amp; Ch.40



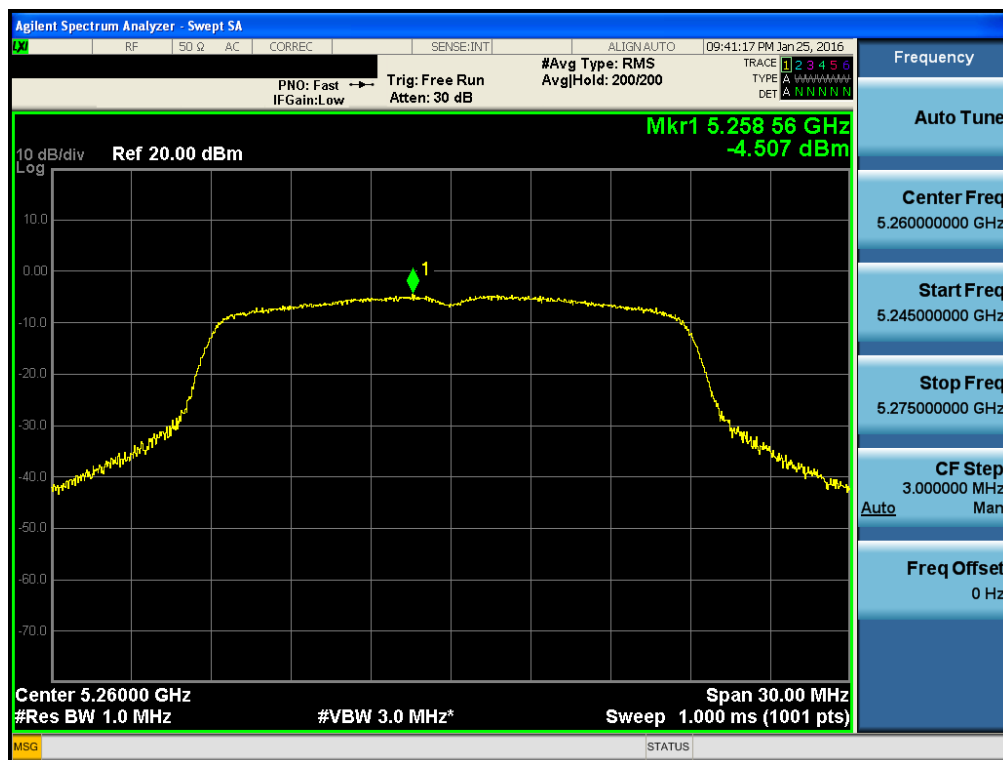
## Maximum Power Spectral Density

Test Mode: 802.11n(HT20) &amp; Ch.48



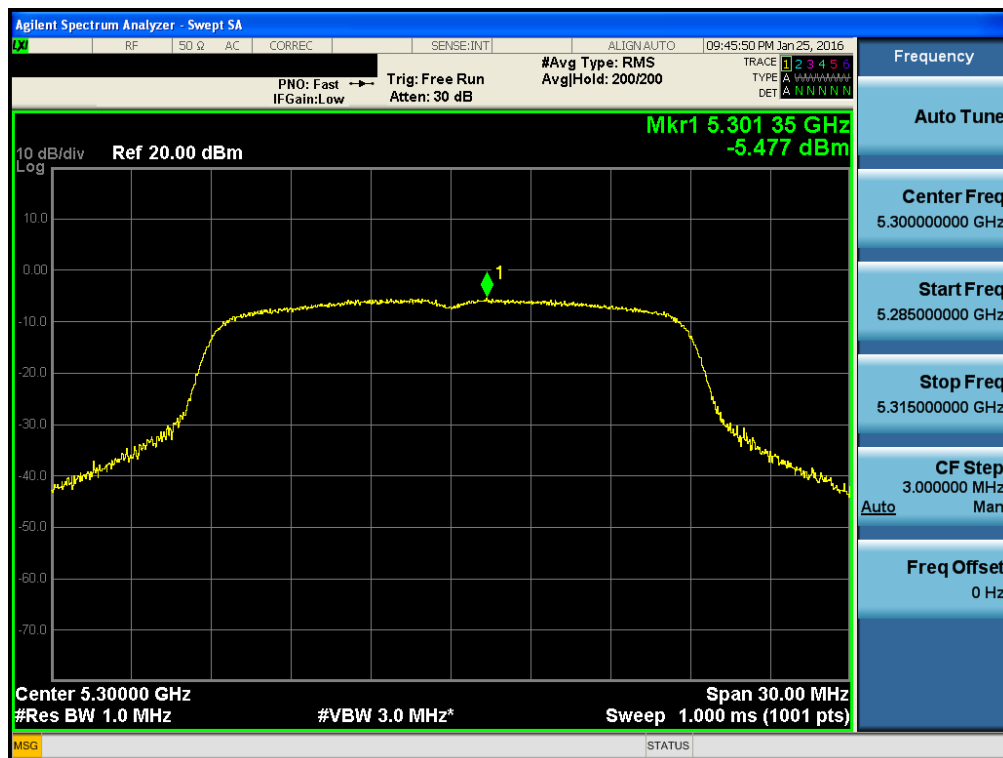
## Maximum Power Spectral Density

Test Mode: 802.11n HT20 &amp; Ch.52



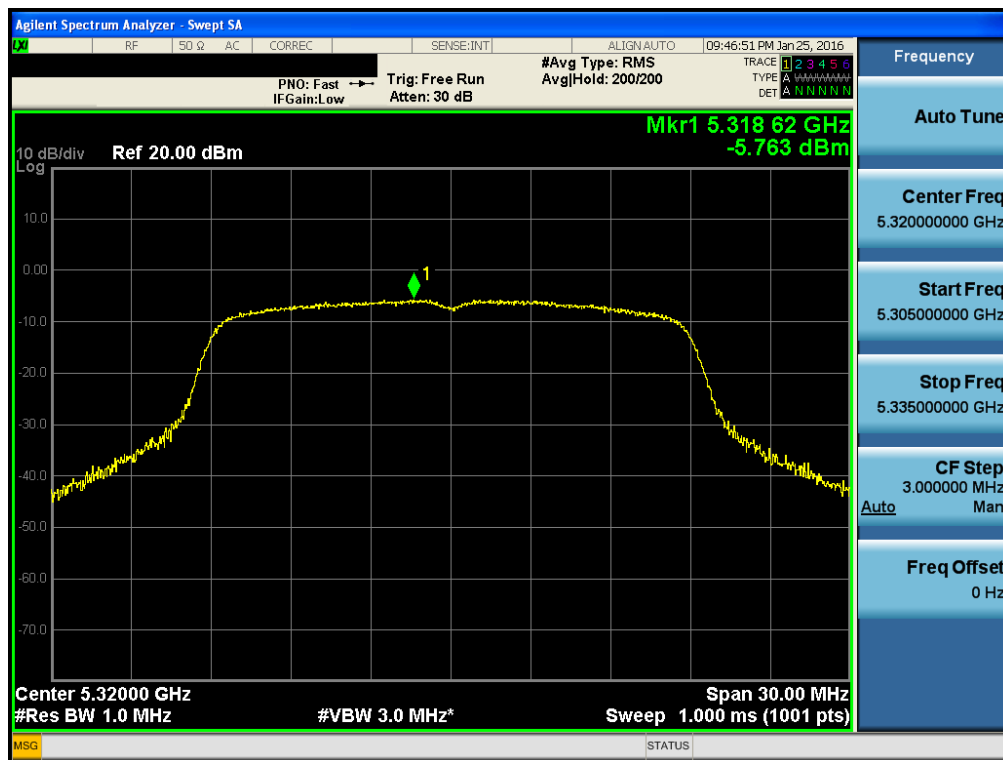
## Maximum Power Spectral Density

Test Mode: 802.11n HT20 &amp; Ch.60



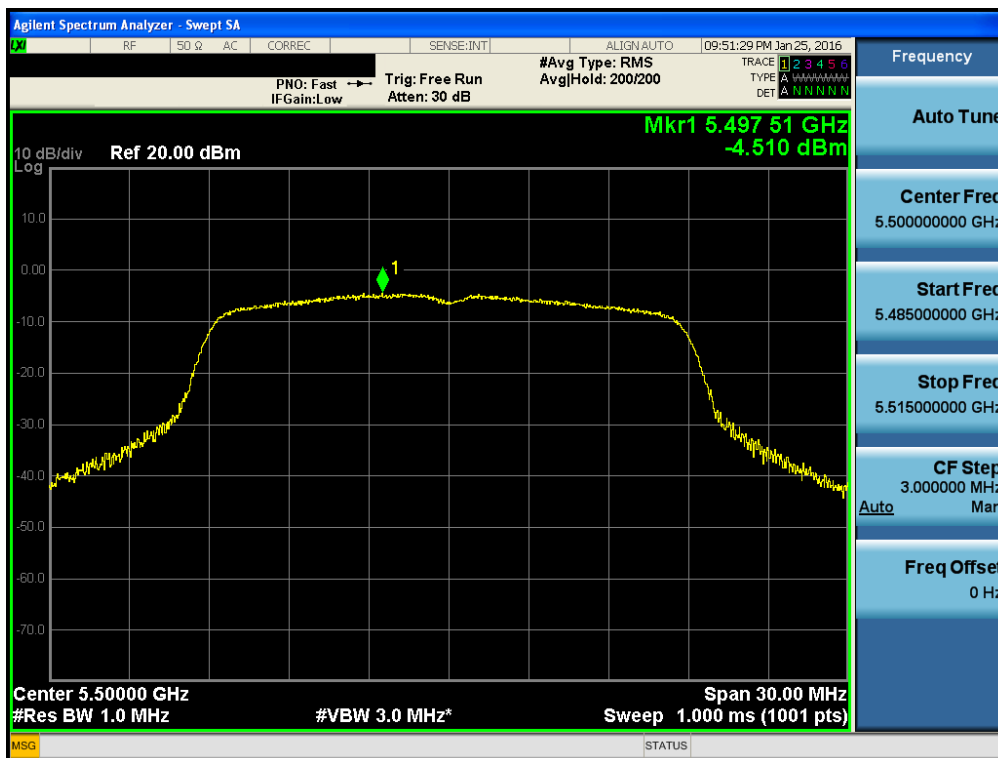
## Maximum Power Spectral Density

Test Mode: 802.11n HT20 &amp; Ch.64



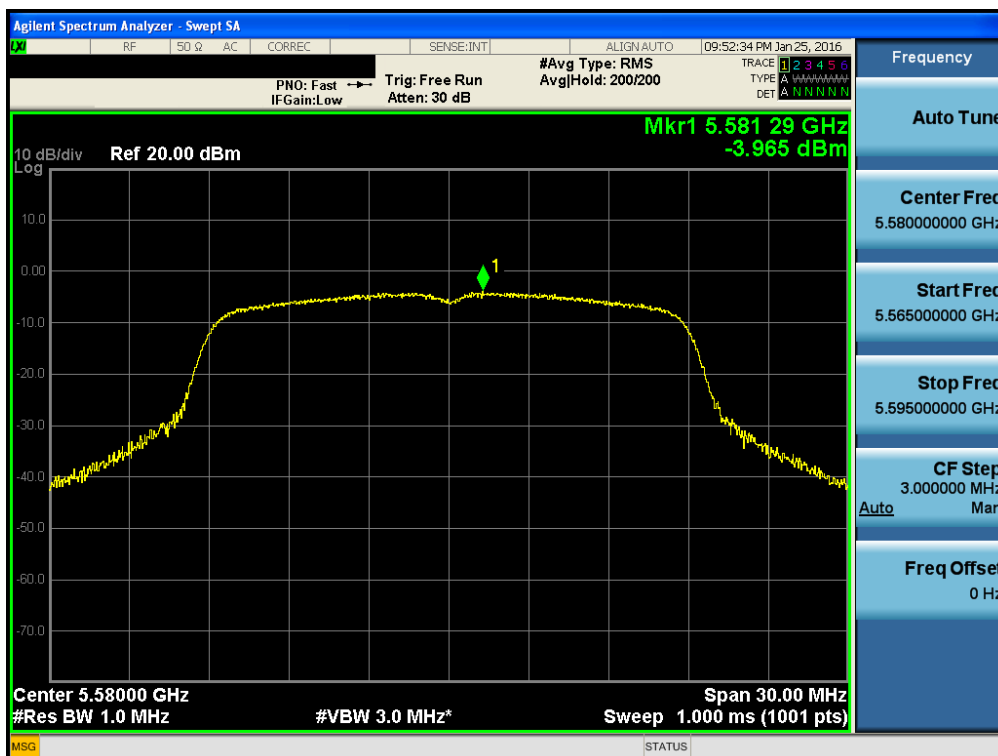
## Maximum Power Spectral Density

Test Mode: 802.11n HT20 &amp; Ch.100



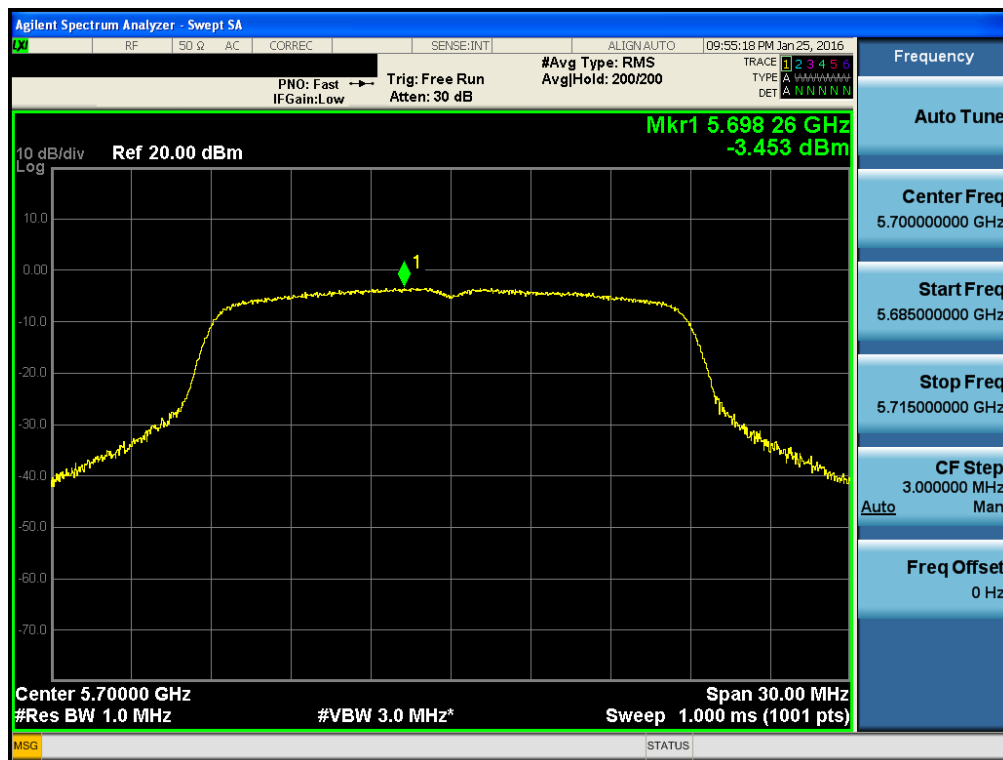
## Maximum Power Spectral Density

Test Mode: 802.11n HT20 &amp; Ch.116



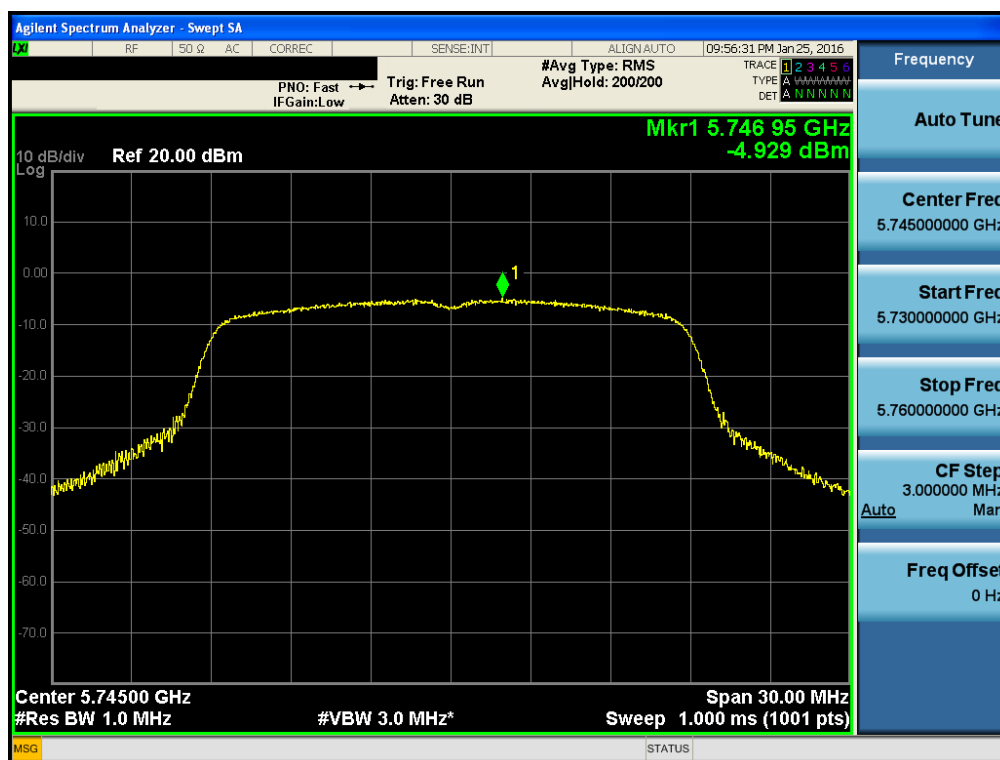
## Maximum Power Spectral Density

Test Mode: 802.11n HT20 &amp; Ch.140



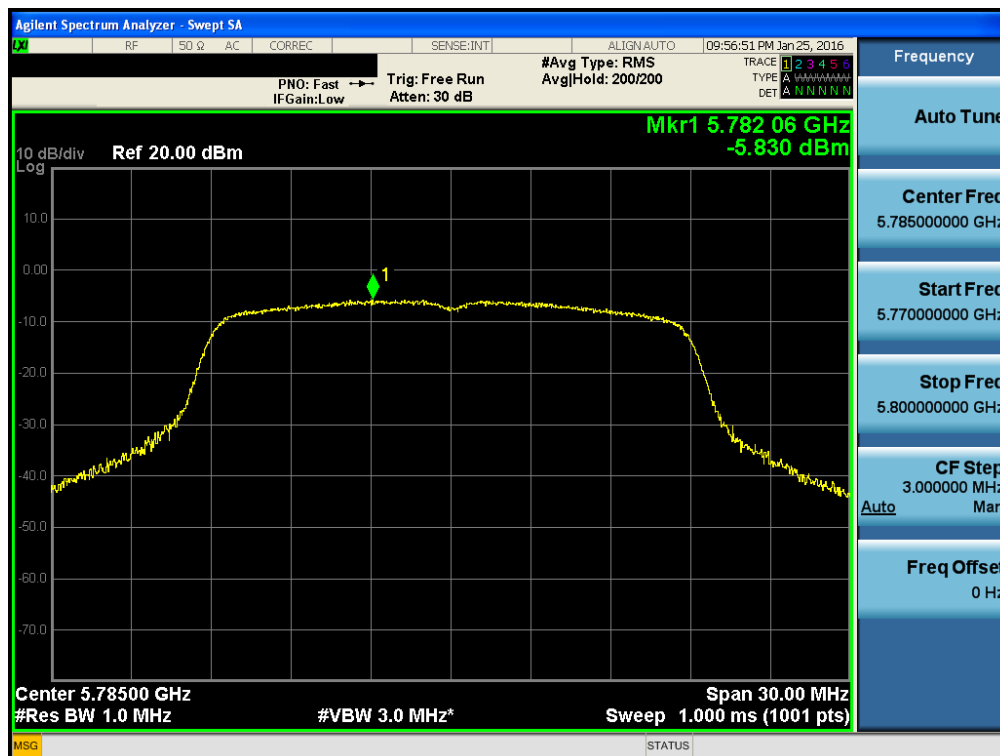
## Maximum Power Spectral Density

Test Mode: 802.11n(HT20) &amp; Ch.149



## Maximum Power Spectral Density

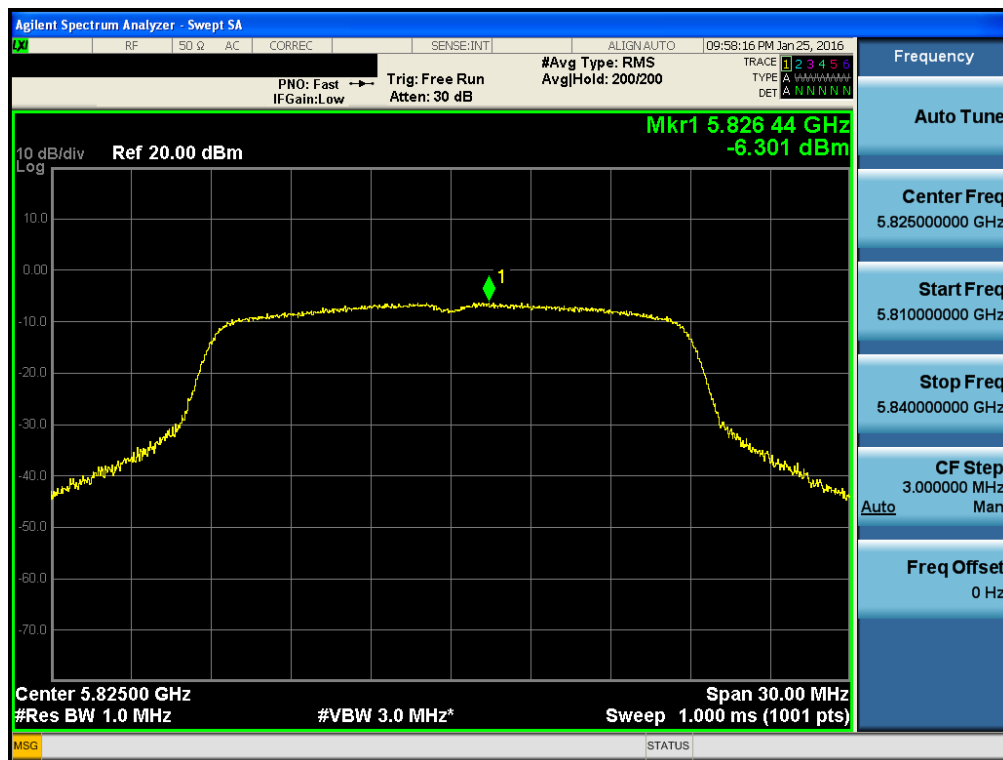
Test Mode: 802.11n(HT20) &amp; Ch.157





## Maximum Power Spectral Density

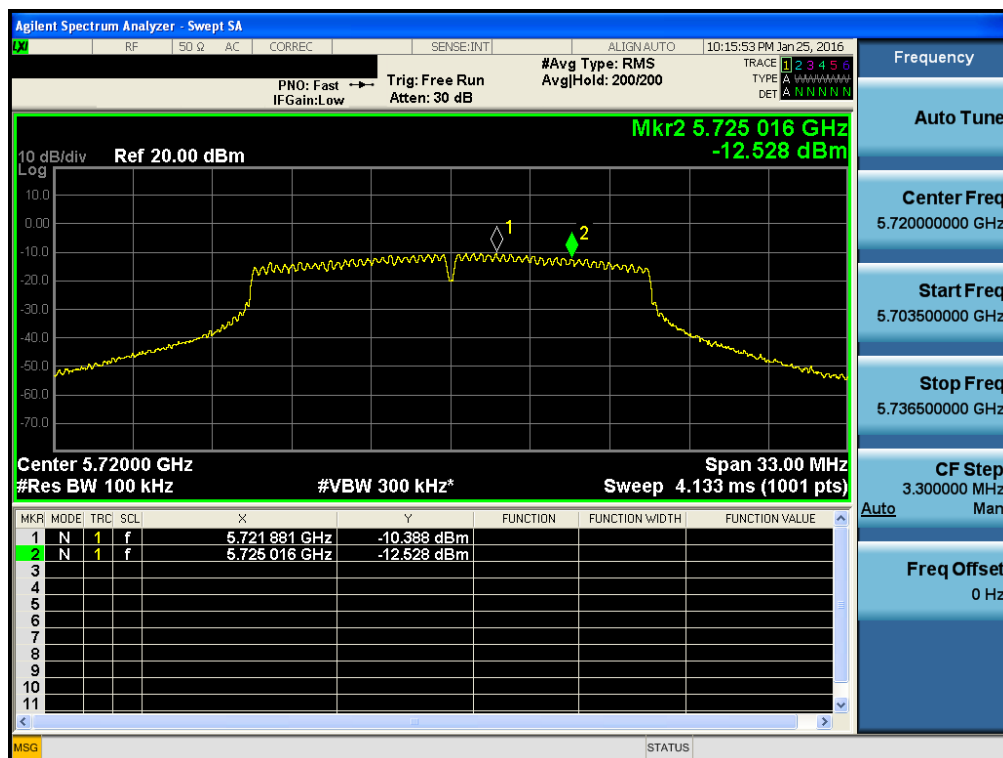
Test Mode: 802.11n(HT20) &amp; Ch.165



## ■ RESULT PLOTS(Band-Crossing Channels)

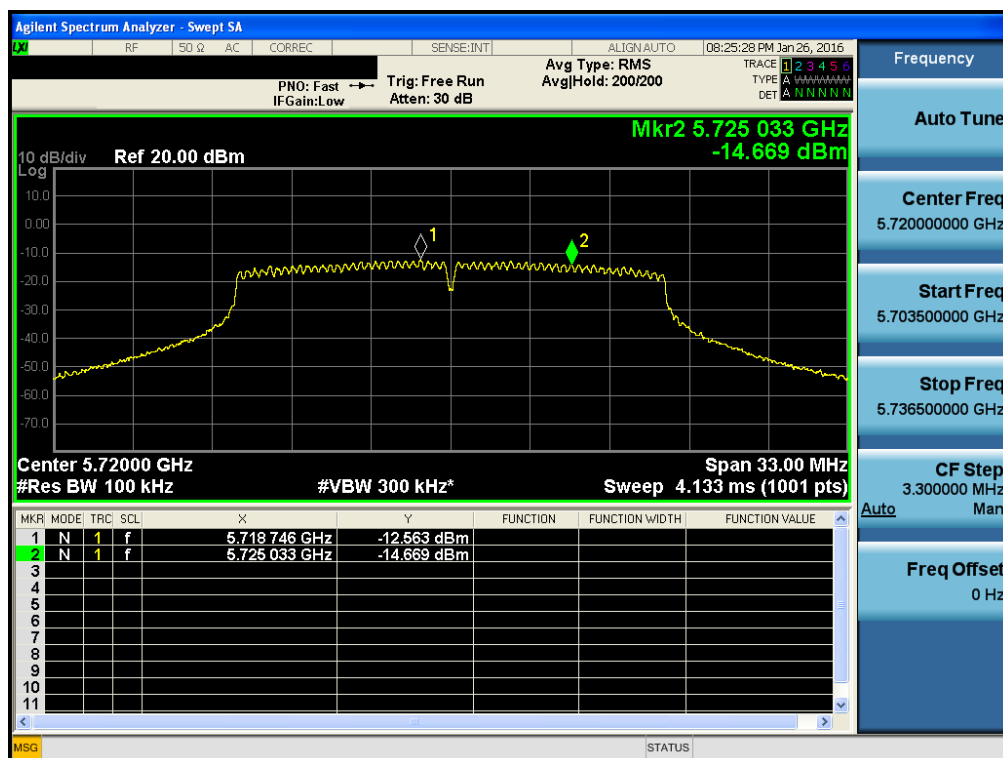
## Maximum Power Spectral Density

Test Mode: 802.11a &amp; Ch.144



## Maximum Power Spectral Density

Test Mode: 802.11n HT20 &amp; Ch.144



## 8.5 Frequency Stability

### ■ Test requirements

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.

### ■ Test Procedure

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between -20 °C and +50 °C. The temperature was incremented by 10 °C intervals and the unit was allowed to stabilize at each measurement.

Test of frequency stability was performed in modulated carrier.

The edge point of EBW(26dB or 6dB bandwidth) for transmitting channel was evaluated at each temperature and was recorded.

### ■ Test Result : **Comply**

#### U-NII-1 & U-NII-2A : (5150 MHz ~ 5350 MHz)

26 dB Bandwidth Reference	
Low edge(MHz)	High edge(MHz)
5167.997750	5331.766000

Supply Voltage (V DC)	TEMP (°C)	Operating Frequency					
		5180 MHz			5320 MHz		
		Measured Frequency (Hz)	Deviation (%)	26dBc low edge <sup>Note 1</sup> (Hz)	Measured Frequency (Hz)	Deviation (%)	26dBc High edge <sup>Note 2</sup> (Hz)
3.700	+25(Ref)	5,180,000,333	0.000006	5,167,997,750	5,320,000,393	0.000007	5,331,766,000
	+50	5,180,002,247	0.000043	5,167,999,664	5,320,004,145	0.000078	5,331,769,753
	+40	5,180,001,956	0.000038	5,167,999,372	5,320,003,454	0.000065	5,331,769,061
	+30	5,180,000,636	0.000012	5,167,998,053	5,320,002,469	0.000046	5,331,768,076
	+20	5,180,000,152	0.000003	5,167,997,568	5,320,000,752	0.000014	5,331,766,359
	+10	5,179,999,629	-0.000007	5,167,997,045	5,319,999,540	-0.000009	5,331,765,147
	0	5,179,998,780	-0.000024	5,167,996,197	5,319,998,956	-0.000020	5,331,764,564
	-10	5,179,995,462	-0.000088	5,167,992,878	5,319,994,099	-0.000111	5,331,759,706
	-20	5,179,992,059	-0.000153	5,167,989,476	5,319,989,536	-0.000197	5,331,755,144
3.145	+25	5,179,999,154	-0.000016	5,167,996,571	5,320,000,115	0.000002	5,331,765,722
4.255	+25	5,180,000,321	0.000006	5,167,997,737	5,320,000,261	0.000005	5,331,765,869

Note 1: 26 dB Bandwidth Reference Low edge (Hz) + (Measured Frequency (Hz) - Operating Frequency (Hz)) = 26dBc low edge (Hz)

Note 2: 26 dB Bandwidth Reference High edge (Hz) + (Measured Frequency (Hz) - Operating Frequency (Hz)) = 26dBc High edge (Hz)

## U-NII-2C : (5470 MHz ~ 5725 MHz)

26 dB Bandwidth Reference	
Low edge	High edge
5488.093000	5711.583750

Supply Voltage (V DC)	TEMP (°C)	Operating Frequency					
		5500 MHz			5700 MHz		
		Measured Frequency (Hz)	Deviation (%)	26dBc low edge <sup>Note 1</sup> (Hz)	Measured Frequency (Hz)	Deviation (%)	26dBc high edge <sup>Note 2</sup> (Hz)
3.700	+25(Ref)	5,500,000,448	0.000008	5,488,093,000	5,700,000,355	0.000006	5,711,583,750
	+50	5,500,004,341	0.000079	5,488,096,893	5,700,004,170	0.000073	5,711,587,565
	+40	5,500,003,743	0.000068	5,488,096,295	5,700,003,682	0.000065	5,711,587,077
	+30	5,500,003,002	0.000055	5,488,095,554	5,700,002,213	0.000039	5,711,585,608
	+20	5,500,002,157	0.000039	5,488,094,709	5,700,000,371	0.000007	5,711,583,766
	+10	5,500,001,269	0.000023	5,488,093,821	5,700,000,139	0.000002	5,711,583,534
	0	5,499,999,447	-0.000010	5,488,091,999	5,699,998,895	-0.000019	5,711,582,290
	-10	5,499,995,232	-0.000087	5,488,087,784	5,699,994,466	-0.000097	5,711,577,860
	-20	5,499,992,265	-0.000141	5,488,084,817	5,699,991,882	-0.000142	5,711,575,277
3.145	+25	5,499,999,720	-0.000005	5,488,092,272	5,700,000,212	0.000004	5,711,583,607
4.255	+25	5,500,000,430	0.000008	5,488,092,982	5,700,000,310	0.000005	5,711,583,705

Note 1: 26 dB Bandwidth Reference Low edge (Hz) + (Measured Frequency (Hz) - Operating Frequency (Hz)) = 26dBc low edge (Hz)

Note 2: 26 dB Bandwidth Reference High edge (Hz) + (Measured Frequency (Hz) - Operating Frequency (Hz)) = 26dBc High edge (Hz)

## U-NII-3 : (5725 MHz ~ 5850 MHz)

6 dB Bandwidth Reference <sup>Note 1</sup>	
Low edge	High edge
5737.434750	5832.758750

Supply Voltage (V DC)	TEMP (°C)	Operating Frequency					
		5745 MHz			5825 MHz		
		Measured Frequency (Hz)	Deviation (%)	6dBc low edge <sup>Note 1</sup> (Hz)	Measured Frequency (Hz)	Deviation (%)	6dBc high edge <sup>Note 2</sup> (Hz)
3.700	+25(Ref)	5,745,000,453	0.000008	5,737,434,750	5,825,000,457	0.000008	5,832,758,750
	+50	5,745,003,630	0.000063	5,737,437,927	5,825,004,760	0.000082	5,832,763,053
	+40	5,745,003,225	0.000056	5,737,437,523	5,825,004,378	0.000075	5,832,762,671
	+30	5,745,002,099	0.000037	5,737,436,396	5,825,003,065	0.000053	5,832,761,358
	+20	5,745,001,509	0.000026	5,737,435,806	5,825,001,109	0.000019	5,832,759,402
	+10	5,745,000,162	0.000003	5,737,434,459	5,825,000,256	0.000004	5,832,758,549
	0	5,744,999,160	-0.000015	5,737,433,457	5,824,998,609	-0.000024	5,832,756,901
	-10	5,744,994,418	-0.000097	5,737,428,715	5,824,997,087	-0.000050	5,832,755,380
	-20	5,744,992,727	-0.000127	5,737,427,024	5,824,996,091	-0.000067	5,832,754,383
3.145	+25	5,745,000,379	0.000007	5,737,434,676	5,825,000,245	0.000004	5,832,758,538
4.255	+25	5,745,000,036	0.000001	5,737,434,333	5,825,000,441	0.000008	5,832,758,733

## 8.6 Radiated Spurious Emission Measurements

### ■ Test Procedure

#### • FCC Part 15.209(a) and (b)

Frequency (MHz)	Limit (uV/m)	Measurement Distance (meter)
0.009 – 0.490	2400/F(KHz)	300
0.490 – 1.705	24000/F(KHz)	30
1.705 – 30.0	30	30
30 ~ 88	100 **	3
88 ~ 216	150 **	3
216 ~ 960	200 **	3
Above 960	500	3

\*\* Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 - 72 MHz, 76 – 88 MHz, 174 – 216 MHz or 470 – 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

#### • FCC Part 15.205 (a): Only spurious emissions are permitted in any of the frequency bands listed below:

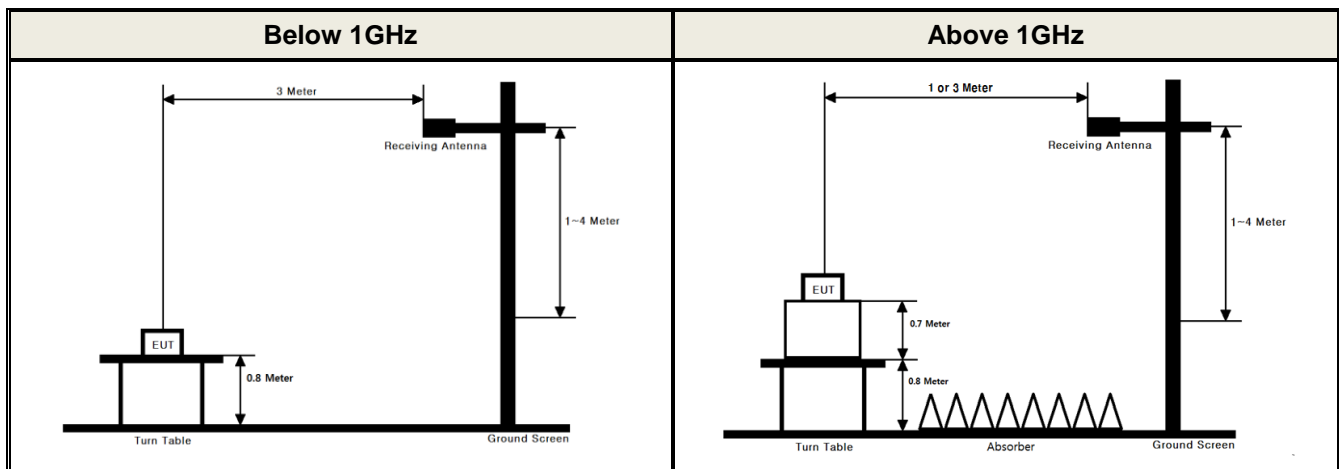
MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~ 12.52025	149.9 ~ 150.05	1645.5 ~ 1646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.57675 ~ 12.57725	160.52475 ~	1660 ~ 1710	8.025 ~ 8.5	22.01 ~ 23.12
4.17725 ~ 4.17775	13.36 ~ 13.41	160.52525	1718.8 ~ 1722.2	9.0 ~ 9.2	23.6 ~ 24.0
4.20725 ~ 4.20775	16.42 ~ 16.423	160.7 ~ 160.9	2200 ~ 2300	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	16.69475 ~ 16.69525	162.0125 ~ 167.17	2310 ~ 2390	10.6 ~ 12.7	36.43 ~ 36.5
6.26775 ~ 6.26825	16.80425 ~ 16.80475	167.72 ~ 173.2	2483.5 ~ 2500	13.25 ~ 13.4	Above 38.6
6.31175 ~ 6.31225	25.5 ~ 25.67	240 ~ 285	2655 ~ 2900		
8.291 ~ 8.294	37.5 ~ 38.25	322 ~ 335.4	3260 ~ 3267		
8.362 ~ 8.366	73 ~ 74.6	399.90 ~ 410	3332 ~ 3339		
8.37625 ~ 8.38675	74.8 ~ 75.2	608 ~ 614	3345.8 ~ 3358		
		960 ~ 1240	3600 ~ 4000		

• **FCC Part 15.205(b):** The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

• **FCC Part 15.407 (b):** Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, 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 **EIRP of -27 dBm / MHz**.
- (2) For transmitters operating in the **5.25 - 5.35 GHz band**: all emissions outside of the **5.15 - 5.35 GHz band** shall not exceed an **EIRP of -27 dBm / MHz**.
- (3) For transmitters operating in the **5.47 - 5.725 GHz band**: all emissions outside of the **5.47 - 5.725 GHz band** shall not exceed an **EIRP of -27 dBm / MHz**.
- (4) For transmitters operating in the **5.725 - 5.85 GHz band**: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm / MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm / MHz.
- (5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
- (6) Unwanted emissions **below 1 GHz** must comply with the general field strength limits set forth in **Section 15.209**. Further, any U-NII devices using an **AC power line** are required to comply also with the conducted limits set forth in **Section 15.207**.
- (7) The provisions of §15.205 apply to intentional radiators operating under this section
- (8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

## ■ Test Procedure



## ■ Test Procedure

1. The EUT is placed on a non-conductive table. For emission measurements at or below 1 GHz, the table height is 80 cm. For emission measurements above 1 GHz, the table height is 1.5 m.
2. The turn table shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 1 or 3 m away from the receiving antenna, which is varied from 1m to 4 m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

Radiated spurious emission measured using following Measurement Procedure of KDB789033 D02 V01

### ► General Requirements for Unwanted Emissions Measurements

The following requirements apply to all unwanted emissions measurements, both in and outside of the restricted bands:

#### ■ EUT Duty Cycle

- (1) The EUT shall be configured or modified to **transmit continuously** except as stated in (ii), below. The intent is to test at 100 percent duty cycle; however a small reduction in duty cycle (**to no lower than 98 percent**) is permitted if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.
- (2) If **continuous transmission (or at least 98 percent duty cycle) cannot be achieved** due to hardware limitations of the EUT (e.g., overheating), the following additions to the measurement and reporting procedures are required:
  - The EUT shall be configured to operate at the maximum achievable duty cycle.
  - Measure the duty cycle, x, of the transmitter output signal.
  - Adjustments to measurement procedures (e.g., increasing test time and number of traces averaged) shall be performed as described in the procedures below.
  - The test report shall include the following additional information:
    - The reason for the duty cycle limitation.
    - The duty cycle achieved for testing and the associated transmit duration and interval between transmissions.
    - The sweep time and the amount of time used for trace stabilization during max-hold measurements for peak emission measurements.
- (3) **Reduction of the measured emission amplitude levels to account for operational duty factor is not permitted. Compliance is based on emission levels occurring during transmission - not on an average across on and off times of the transmitter.**

### ► Measurements below 1000 MHz

- a) Follow the requirements in section II.G.3, "General Requirements for Unwanted Emissions Measurements".
- b) Compliance shall be demonstrated using **CISPR quasi-peak detection**; however, **peak detection** is permitted as an alternative to quasi-peak detection.

► **Measurements Above 1000 MHz (Peak)**

- a) Follow the requirements in section II.G.3, "General Requirements for Unwanted Emissions Measurements".
- b) Peak emission levels are measured by setting the analyzer as follows:
  - (i) **RBW = 1 MHz.**
  - (ii) **VBW  $\geq$  3 MHz.**
  - (iii) **Detector = Peak.**
  - (iv) Sweep time = Auto.
  - (v) Trace mode = Max hold.
  - (vi) Allow sweeps to continue until the trace stabilizes. Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately  $1/x$ , where  $x$  is the duty cycle. For example, at 50 percent duty cycle, the measurement time will increase by a factor of two relative to measurement time for continuous transmission.

► **Measurements Above 1000 MHz (Method AD)**

- (i) **RBW = 1 MHz.**
- (ii) **VBW  $\geq$  3 MHz.**
- (iii) **Detector = RMS**, if  $\text{span} / (\# \text{ of points in sweep}) \leq \text{RBW} / 2$ . Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, the detector mode shall be set to peak.
- (iv) Averaging type = power (i.e., RMS)
  - As an alternative, the detector and averaging type may be set for linear voltage averaging. Some analyzers require linear display mode in order to use linear voltage averaging. Log or dB averaging shall not be used.
- (v) Sweep time = Auto.
- (vi) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, the number of traces shall be increased by a factor of  $1/x$ , where  $x$  is the duty cycle. For example, with 50 percent duty cycle, at least 200 traces shall be averaged.
- (vii) If tests are performed with the EUT transmitting at a duty cycle less than 98 percent, a correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:
  - **If power averaging (RMS) mode was used in step (iv) above, the correction factor is  $10 \log(1/x)$ , where  $x$  is the duty cycle.**  
For example, if the transmit duty cycle was 50 percent, then 3 dB must be added to the measured emission levels.
    - If linear voltage averaging mode was used in step (iv) above, the correction factor is  $20 \log(1/x)$ , where  $x$  is the duty cycle. For example, if the transmit duty cycle was 50 percent, then 6 dB must be added to the measured emission levels.
    - If a specific emission is demonstrated to be continuous (100 percent duty cycle) rather than turning on and off with the transmit cycle, no duty cycle correction is required for that emission.

Please refer to Appendix II for the duty correction factor



■ **Measurement Data:**

**Radiated Spurious Emissions data(9kHz ~ 40GHz) : 802.11a & U-NII-1**

Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
36 (5180 MHz)	5148.100	H	Z	PK	46.44	7.90	N/A	N/A	54.34	74.00	19.66
	5149.700	H	Z	AV	34.65	7.90	2.37	N/A	44.92	54.00	9.08
	10360.545	H	Z	PK	44.43	12.69	N/A	-9.54	47.58	68.20	20.62
	-	-	-	-	-	-	-	-	-	-	-
40 (5200 MHz)	5147.450	H	Z	PK	44.82	7.89	N/A	N/A	52.71	74.00	21.29
	5147.900	H	Z	AV	34.15	7.89	2.37	N/A	44.41	54.00	9.59
	10398.900	H	Z	PK	44.02	12.80	N/A	-9.54	47.28	68.20	20.92
48 (5240 MHz)	10480.035	H	Z	PK	43.93	13.02	N/A	-9.54	47.41	68.20	20.79
	-	-	-	-	-	-	-	-	-	-	-

**Radiated Spurious Emissions data(9kHz ~ 40GHz) : 802.11a & U-NII-2A**

Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
52 (5260 MHz)	10520.080	H	Z	PK	43.97	13.12	N/A	-9.54	47.55	68.20	20.65
	-	-	-	-	-	-	-	-	-	-	-
60 (5300 MHz)	5355.250	H	Z	PK	45.14	7.95	N/A	N/A	53.09	74.00	20.91
	5354.500	H	Z	AV	34.38	7.95	2.37	N/A	44.70	54.00	9.30
	10600.625	H	Z	PK	45.04	13.26	N/A	-9.54	48.76	68.20	19.44
	10600.175	H	Z	AV	33.35	13.26	2.37	-9.54	39.44	68.20	28.76
64 (5320 MHz)	5352.000	H	Z	PK	45.27	7.95	N/A	N/A	53.22	74.00	20.78
	5351.600	H	Z	AV	34.51	7.95	2.37	N/A	44.83	54.00	9.17
	10639.705	H	Z	PK	44.27	13.33	N/A	-9.54	48.06	74.00	25.94
	10640.300	H	Z	AV	33.39	13.33	2.37	-9.54	39.55	54.00	14.45

**Note.**

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.  
 $\text{Margin} = \text{Limit} - \text{Result}$  /  $\text{Result} = \text{Reading} + \text{T.F} + \text{DCCF} + \text{DCF}$  /  $\text{T.F} = \text{AF} + \text{CL} - \text{AG}$   
 Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,  
 DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.  
 Therefore Distance Correction Factor (DCF) :  $-9.54 \text{ dB} = 20 \cdot \log(1\text{m} / 3\text{m})$
4. The limit is converted to field strength.  

$$\begin{aligned} \text{E [dBuV/m]} &= \text{EIRP [dBm]} + 95.2 \text{ dB} = -27 \text{ dBm} + 95.2 = 68.2 \text{ dBuV/m} \\ &= -17 \text{ dBm} + 95.2 = 78.2 \text{ dBuV/m} \end{aligned}$$

**Radiated Spurious Emissions data(9kHz ~ 40GHz) : 802.11a & U-NII-2C**

Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
100 (5500 MHz)	5453.900	H	Z	PK	45.40	8.02	N/A	N/A	53.42	74.00	20.58
	5454.000	H	Z	AV	34.78	8.02	2.37	N/A	45.17	54.00	8.83
	5469.900	H	Z	PK	34.98	8.04	N/A	N/A	43.02	68.20	25.18
	10999.885	H	Z	PK	43.32	13.98	N/A	-9.54	47.76	74.00	26.24
	11000.570	H	Z	AV	32.88	13.98	2.37	-9.54	39.69	54.00	14.31
116 (5580 MHz)	11159.165	H	Z	PK	43.81	14.23	N/A	-9.54	48.50	74.00	25.50
	11158.815	H	Z	AV	32.99	14.23	2.37	-9.54	40.05	54.00	13.95
140 (5700 MHz)	5725.500	H	Z	PK	44.04	8.97	N/A	N/A	53.01	68.20	15.19
	11399.980	H	Z	PK	43.40	14.61	N/A	-9.54	48.47	74.00	25.53
	11400.535	H	Z	AV	32.70	14.61	2.37	-9.54	40.14	54.00	13.86

**Radiated Spurious Emissions data(9kHz ~ 40GHz) : 802.11a & U-NII-3**

Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
149 (5745 MHz)	5700.800	H	Z	PK	44.39	8.82	N/A	N/A	53.21	68.20	14.99
	5724.900	H	Z	PK	45.13	8.97	N/A	N/A	54.10	78.20	24.10
	11490.520	H	Z	PK	44.43	14.75	N/A	-9.54	49.64	74.00	24.36
	11491.090	H	Z	AV	32.97	14.75	2.37	-9.54	40.55	54.00	13.45
157 (5785 MHz)	11569.935	H	Z	PK	43.45	14.86	N/A	-9.54	48.77	74.00	25.23
	11570.230	H	Z	AV	32.83	14.86	2.37	-9.54	40.52	54.00	13.48
165 (5825 MHz)	5856.900	H	Z	PK	43.59	8.84	N/A	N/A	52.43	78.20	25.77
	5868.800	H	Z	PK	44.86	8.86	N/A	N/A	53.72	68.20	14.48
	11649.825	H	Z	PK	43.45	14.95	N/A	-9.54	48.86	74.00	25.14
	11650.030	H	Z	AV	32.83	14.95	2.37	-9.54	40.61	54.00	13.39

**Note.**

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.  
 $\text{Margin} = \text{Limit} - \text{Result}$  /  $\text{Result} = \text{Reading} + \text{T.F} + \text{DCCF} + \text{DCF}$  /  $\text{T.F} = \text{AF} + \text{CL} - \text{AG}$   
 Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,  
 DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.  
 Therefore Distance Correction Factor (DCF) :  $-9.54 \text{ dB} = 20 \cdot \log(1\text{m} / 3\text{m})$
4. The limit is converted to field strength.  

$$\begin{aligned} \text{E [dBuV/m]} &= \text{EIRP [dBm]} + 95.2 \text{ dB} = -27 \text{ dBm} + 95.2 = 68.2 \text{ dBuV/m} \\ &= -17 \text{ dBm} + 95.2 = 78.2 \text{ dBuV/m} \end{aligned}$$

Radiated Spurious Emissions data(9kHz ~ 40GHz) : **802.11n(HT20) & U-NII-1**

Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
36 (5180 MHz)	5147.400	H	Z	PK	46.38	7.89	N/A	N/A	54.27	74.00	19.73
	5146.800	H	Z	AV	34.72	7.89	2.52	N/A	45.13	54.00	8.87
	10360.305	H	Z	PK	44.02	12.69	N/A	-9.54	47.17	68.20	21.03
	-	-	-	-	-	-	-	-	-	-	-
40 (5200 MHz)	5140.350	H	Z	PK	44.26	7.86	N/A	N/A	52.12	74.00	21.88
	5139.750	H	Z	AV	34.01	7.86	2.52	N/A	44.39	54.00	9.61
	10400.235	H	Z	PK	43.75	12.80	N/A	-9.54	47.01	68.20	21.19
48 (5240 MHz)	10479.785	H	Z	PK	43.50	13.02	N/A	-9.54	46.98	68.20	21.22
	-	-	-	-	-	-	-	-	-	-	-

Radiated Spurious Emissions data(9kHz ~ 40GHz) : **802.11 n(HT20) & U-NII-2A**

Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
52 (5260 MHz)	10519.470	H	Z	PK	43.89	13.12	N/A	-9.54	47.47	68.20	20.73
	-	-	-	-	-	-	-	-	-	-	-
60 (5300 MHz)	5355.400	H	Z	PK	45.03	7.95	N/A	N/A	52.98	74.00	21.02
	5354.050	H	Z	AV	34.28	7.95	2.52	N/A	44.75	54.00	9.25
	10600.305	H	Z	PK	44.54	13.26	N/A	-9.54	48.26	74.00	25.74
	10600.440	H	Z	AV	33.31	13.26	2.52	-9.54	39.55	54.00	14.45
64 (5320 MHz)	5354.000	H	Z	PK	44.88	7.95	N/A	N/A	52.83	74.00	21.17
	5353.700	H	Z	AV	34.53	7.95	2.52	N/A	45.00	54.00	9.00
	10639.560	H	Z	PK	44.54	13.33	N/A	-9.54	48.33	74.00	25.67
	10639.370	H	Z	AV	33.40	13.33	2.52	-9.54	39.71	54.00	14.29

**Note.**

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.

Margin = Limit – Result / Result = Reading + T.F + DCCF + DCF / T.F = AF + CL – AG  
 Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,  
 DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor

3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.

Therefore Distance Correction Factor (DCF) : - 9.54 dB = 20\*log (1m / 3m)

4. The limit is converted to field strength.

$$E \text{ [dBuV/m]} = \text{EIRP [dBm]} + 95.2 \text{ dB} = -27 \text{ dBm} + 95.2 = 68.2 \text{ dBuV/m}$$

$$= -17 \text{ dBm} + 95.2 = 78.2 \text{ dBuV/m}$$

**Radiated Spurious Emissions data(9kHz ~ 40GHz) : 802.11n(HT20) & U-NII-2C**

Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
100 (5500 MHz)	5459.900	H	Z	PK	44.03	8.03	N/A	N/A	52.06	74.00	21.94
	5459.300	H	Z	AV	34.05	8.03	2.52	N/A	44.60	54.00	9.40
	5468.500	H	Z	PK	44.50	8.04	N/A	N/A	52.54	68.20	15.66
	11000.580	H	Z	PK	44.08	13.98	N/A	-9.54	48.52	74.00	25.48
	10999.990	H	Z	AV	33.18	13.98	2.52	-9.54	40.14	54.00	13.86
116 (5580 MHz)	11160.375	H	Z	PK	43.49	14.23	N/A	-9.54	48.18	74.00	25.82
	11160.240	H	Z	AV	32.21	14.23	2.52	-9.54	39.42	54.00	14.58
140 (5700 MHz)	5726.200	H	Z	PK	44.17	8.98	N/A	N/A	53.15	68.20	15.05
	11400.160	H	Z	PK	44.15	14.61	N/A	-9.54	49.22	74.00	24.78
	11400.490	H	Z	AV	32.63	14.61	2.52	-9.54	40.22	54.00	13.78

**Radiated Spurious Emissions data(9kHz ~ 40GHz) : 802.11n(HT20) & U-NII-3**

Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
149 (5745 MHz)	5712.800	H	Z	PK	44.97	8.90	N/A	N/A	53.87	68.20	14.33
	5724.200	H	Z	PK	45.55	8.97	N/A	N/A	54.52	78.20	23.68
	11489.835	H	Z	PK	43.91	14.75	N/A	-9.54	49.12	74.00	24.88
	11490.925	H	Z	AV	33.02	14.75	2.52	-9.54	40.75	54.00	13.25
157 (5785 MHz)	11569.920	H	Z	PK	44.18	14.86	N/A	-9.54	49.50	74.00	24.50
	11570.360	H	Z	AV	32.71	14.86	2.52	-9.54	40.55	54.00	13.45
165 (5825 MHz)	5852.600	H	Z	PK	43.59	8.83	N/A	N/A	52.42	78.20	25.78
	5863.100	H	Z	PK	43.62	8.85	N/A	N/A	52.47	68.20	15.73
	11650.405	H	Z	PK	44.02	14.95	N/A	-9.54	49.43	74.00	24.57
	11650.010	H	Z	AV	32.95	14.95	2.52	-9.54	40.88	54.00	13.12

**Note.**

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.  
 $\text{Margin} = \text{Limit} - \text{Result}$  /  $\text{Result} = \text{Reading} + \text{T.F} + \text{DCCF} + \text{DCF}$  /  $\text{T.F} = \text{AF} + \text{CL} - \text{AG}$   
 Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,  
 DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.  
 Therefore Distance Correction Factor (DCF) :  $-9.54 \text{ dB} = 20 \cdot \log(1\text{m} / 3\text{m})$
4. The limit is converted to field strength.  

$$\begin{aligned} \text{E [dBuV/m]} &= \text{EIRP [dBm]} + 95.2 \text{ dB} = -27 \text{ dBm} + 95.2 = 68.2 \text{ dBuV/m} \\ &= -17 \text{ dBm} + 95.2 = 78.2 \text{ dBuV/m} \end{aligned}$$

■ **Measurement Data:**

**Radiated Spurious Emissions data(9kHz ~ 40GHz) : *Band-Crossing Channels***

Mode	Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
802.11a	144 (5720 MHz)	11439.695	H	Z	PK	43.52	14.68	N/A	-9.54	48.66	74.00	25.34
		11440.630	H	Z	AV	32.77	14.68	2.37	-9.54	40.28	54.00	13.72
		-	-	-	-	-	-	-	-	-	-	-
802.11n (HT20)	144 (5720 MHz)	11440.240	H	Z	PK	43.86	14.68	N/A	-9.54	49.00	74.00	25.00
		11440.495	H	Z	AV	32.73	14.68	2.52	-9.54	40.39	54.00	13.61
		-	-	-	-	-	-	-	-	-	-	-

**Note.**

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.  
 $\text{Margin} = \text{Limit} - \text{Result}$  /  $\text{Result} = \text{Reading} + \text{T.F} + \text{DCCF} + \text{DCF}$  /  $\text{T.F} = \text{AF} + \text{CL} - \text{AG}$   
 Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,  
 DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.  
 Therefore Distance Correction Factor (DCF) :  $-9.54 \text{ dB} = 20 \cdot \log(1\text{m} / 3\text{m})$
4. The limit is converted to field strength.  
 $E [\text{dBuV/m}] = \text{EIRP} [\text{dBm}] + 95.2 \text{ dB} = -27 \text{ dBm} + 95.2 = 68.2 \text{ dBuV/m}$   
 $= -17 \text{ dBm} + 95.2 = 78.2 \text{ dBuV/m}$

## 8.7 AC Conducted Emissions

### ■ TEST PROCEDURE:

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. Emissions closest to the limit are measured in the quasi-peak mode (QP) and average mode (AV) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

### ■ Measurement Data: **Comply**

Note 1: See next pages for actual measured spectrum plots and data.

### ■ Minimum Standard: FCC Part 15.207(a)

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

\* Decreases with the logarithm of the frequency

**AC Line Conducted Emissions (Graph)**

Test Mode: U-NII 1 &amp; 802.11n(HT20)

**Results of Conducted Emission**

DTNC

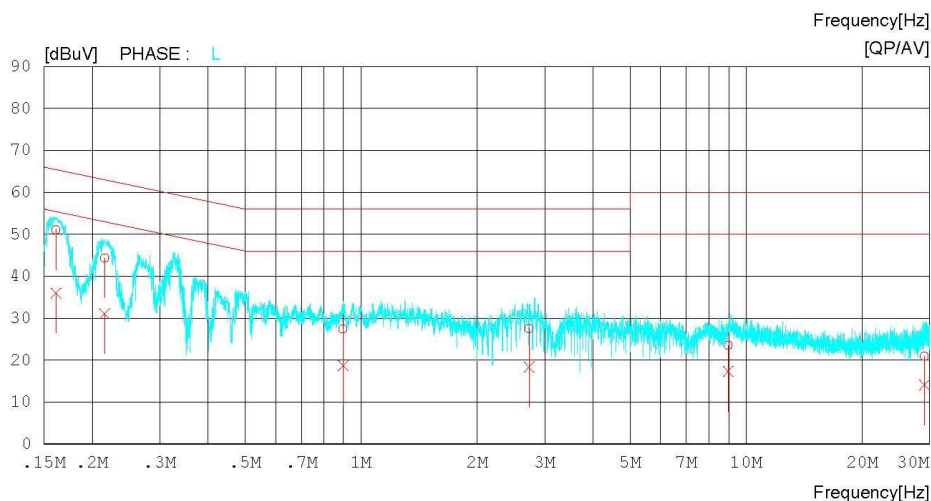
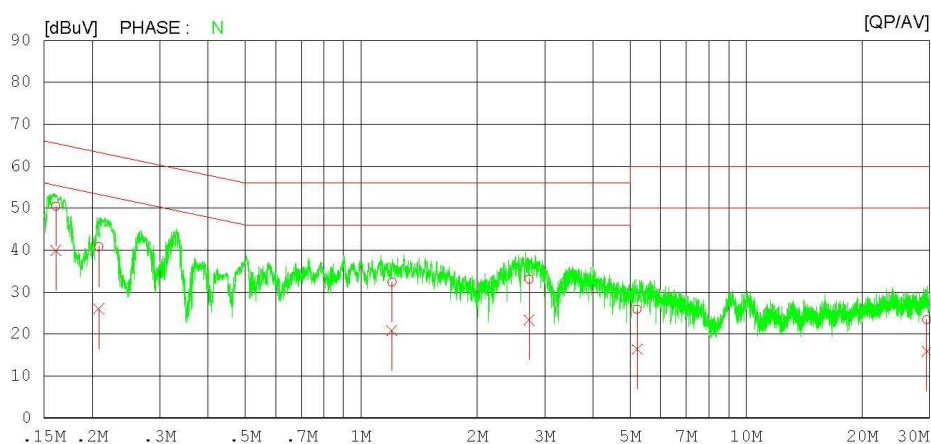
Date : 2016-02-01

Order No. :  
Model No. : Dolphini6510  
Serial No. :  
Test Condition : 802.11n20\_5.1GHz

Reference No. :  
Power Supply : 120 V 60 Hz  
Temp/Humi. : 23 °C 44 % R.H.  
Operator : K.C.YEOM

Memo :

LIMIT : CISPR22\_B QP  
CISPR22\_B AV



**AC Line Conducted Emissions (Data List)**

Test Mode: U-NII 1 &amp; 802.11n(HT20)

**Results of Conducted Emission**

DTNC

Date : 2016-02-01

Order No.	:		Reference No.	:	
Model No.	:	Dolphini6510	Power Supply	:	120 V 60 Hz
Serial No.	:		Temp/Humi.	:	23 'C 44 % R.H.
Test Condition	:	802.11n20_5.1GHz	Operator	:	K.C.YEOM

Memo :

LIMIT : CISPR22\_B QP  
CISPR22\_B AV

NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.16109	40.4	29.8	10.1	50.5	39.9	65.4	55.4	14.9	15.5	N
2	0.20821	30.8	15.9	10.1	40.9	26.0	63.3	53.3	22.4	27.3	N
3	1.20240	22.2	10.7	10.2	32.4	20.9	56.0	46.0	23.6	25.1	N
4	2.73120	22.8	13.1	10.2	33.0	23.3	56.0	46.0	23.0	22.7	N
5	5.21280	15.6	6.1	10.3	25.9	16.4	60.0	50.0	34.1	33.6	N
6	29.52380	12.7	5.0	10.8	23.5	15.8	60.0	50.0	36.5	34.2	N
7	0.16121	40.9	25.8	10.1	51.0	35.9	65.4	55.4	14.4	19.5	L
8	0.21579	34.2	20.9	10.1	44.3	31.0	63.0	53.0	18.7	22.0	L
9	0.89743	17.2	8.5	10.1	27.3	18.6	56.0	46.0	28.7	27.4	L
10	2.73200	17.2	8.1	10.2	27.4	18.3	56.0	46.0	28.6	27.7	L
11	8.98480	12.9	6.6	10.6	23.5	17.2	60.0	50.0	36.5	32.8	L
12	29.08520	9.7	2.7	11.2	20.9	13.9	60.0	50.0	39.1	36.1	L



**AC Line Conducted Emissions (Graph)**

Test Mode: U-NII 2 &amp; 802.11n(HT20)

**Results of Conducted Emission**

DTNC

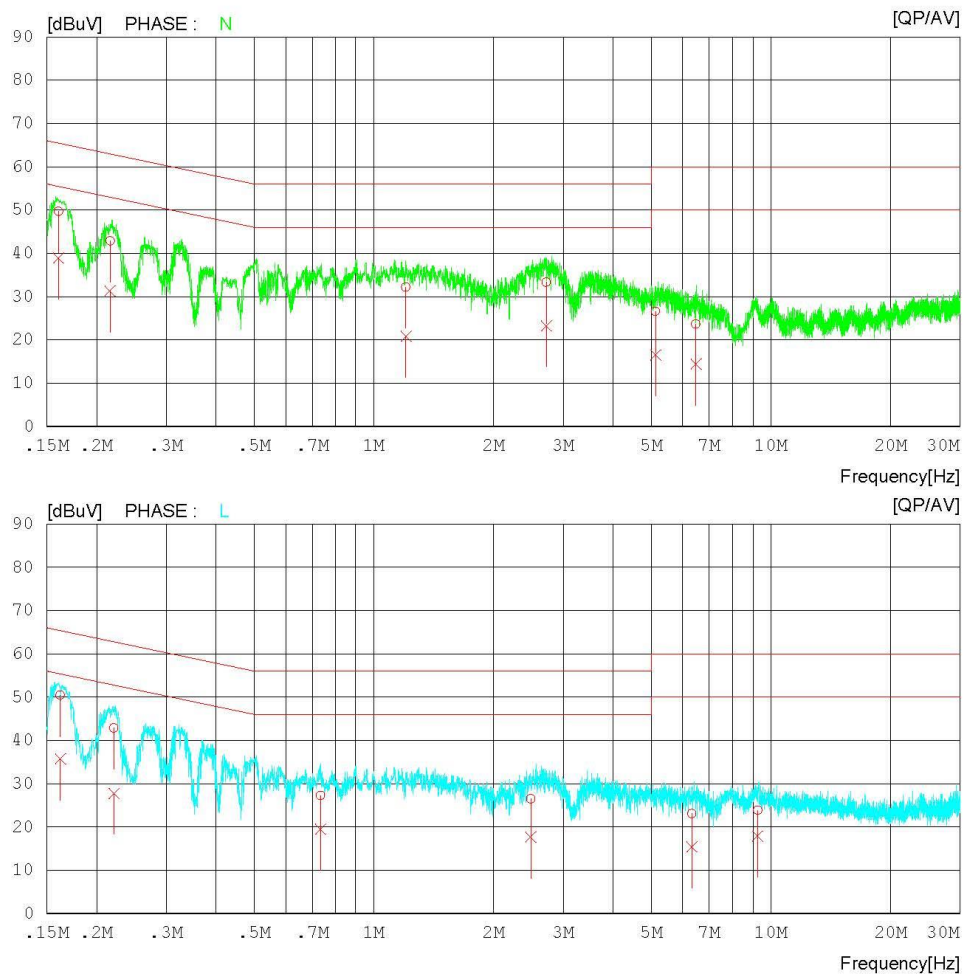
Date : 2016-02-01

Order No. :  
Model No. : Dolphini6510  
Serial No. :  
Test Condition : 802.11n20\_5.3GHz

Reference No. :  
Power Supply : 120 V 60 Hz  
Temp/Humi. : 23 °C 44 % R.H.  
Operator : K.C.YEOM

Memo :

LIMIT : CISPR22\_B QP  
CISPR22\_B AV



**AC Line Conducted Emissions (Data List)**

Test Mode: U-NII 2 &amp; 802.11n(HT20)

**Results of Conducted Emission**

DTNC

Date : 2016-02-01

Order No.	:		Reference No.	:	
Model No.	:	Dolphini6510	Power Supply	:	120 V 60 Hz
Serial No.	:		Temp/Humi.	:	23 'C 44 % R.H.
Test Condition	:	802.11n20_5.3GHz	Operator	:	K.C.YEOM

Memo :

LIMIT : CISPR22\_B QP  
CISPR22\_B AV

NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.16044	39.6	28.8	10.1	49.7	38.9	65.4	55.4	15.7	16.5	N
2	0.21656	32.8	21.2	10.1	42.9	31.3	62.9	52.9	20.0	21.6	N
3	1.20400	22.0	10.6	10.2	32.2	20.8	56.0	46.0	23.8	25.2	N
4	2.71840	23.1	13.1	10.2	33.3	23.3	56.0	46.0	22.7	22.7	N
5	5.12500	16.3	6.2	10.3	26.6	16.5	60.0	50.0	33.4	33.5	N
6	6.47540	13.3	3.9	10.4	23.7	14.3	60.0	50.0	36.3	35.7	N
7	0.16220	40.3	25.6	10.1	50.4	35.7	65.4	55.4	15.0	19.7	L
8	0.22143	32.8	17.6	10.1	42.9	27.7	62.8	52.8	19.9	25.1	L
9	0.73338	17.2	9.4	10.1	27.3	19.5	56.0	46.0	28.7	26.5	L
10	2.48280	16.2	7.4	10.2	26.4	17.6	56.0	46.0	29.6	28.4	L
11	6.31620	12.6	5.0	10.4	23.0	15.4	60.0	50.0	37.0	34.6	L
12	9.26480	13.2	7.2	10.6	23.8	17.8	60.0	50.0	36.2	32.2	L

**AC Line Conducted Emissions (Graph)**

Test Mode: U-NII 3 &amp; 802.11n(HT20)

**Results of Conducted Emission**

DTNC

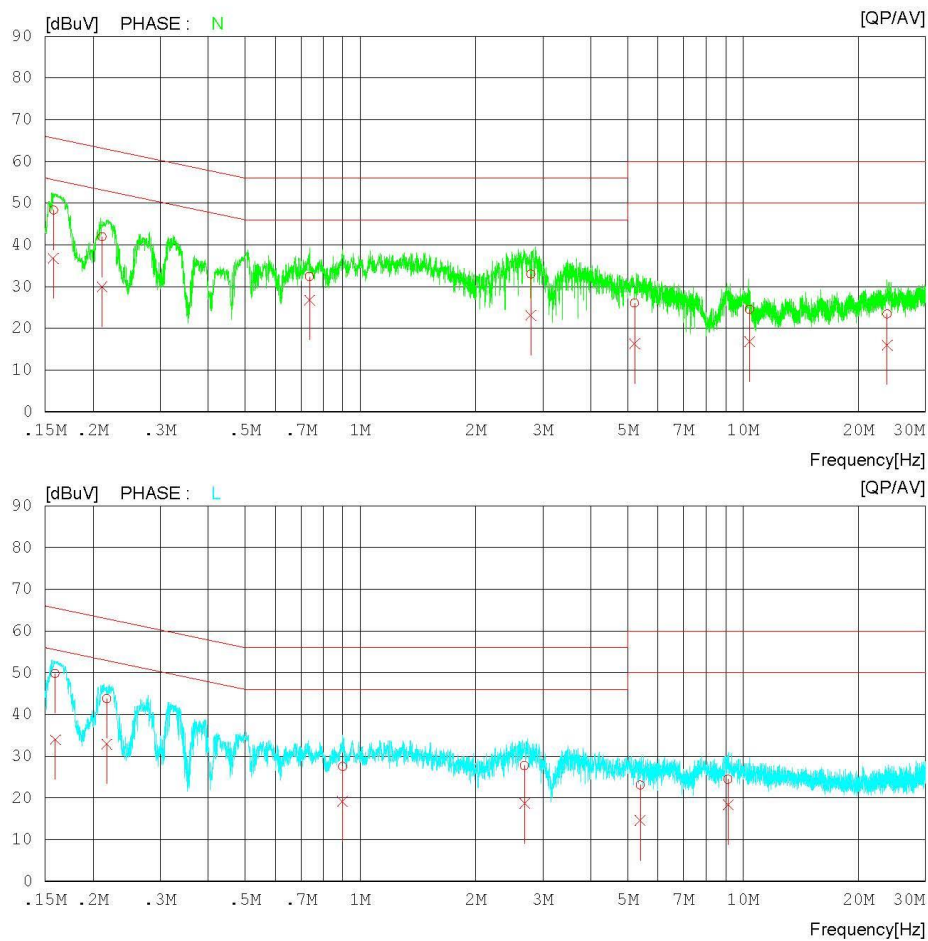
Date : 2016-02-01

Order No. :  
Model No. : Dolphini6510  
Serial No. :  
Test Condition : 802.11n20\_5.5GHz

Reference No. :  
Power Supply : 120 V 60 Hz  
Temp/Humi. : 23 'C 44 % R.H.  
Operator : K.C.YEOM

Memo :

LIMIT : CISPR22\_B QP  
CISPR22\_B AV



**AC Line Conducted Emissions (Data List)**

Test Mode: U-NII 3 &amp; 802.11n(HT20)

**Results of Conducted Emission**

DTNC

Date : 2016-02-01

Order No.	:		Reference No.	:	
Model No.	:	Dolphini6510	Power Supply	:	120 V 60 Hz
Serial No.	:		Temp/Humi.	:	23 'C 44 % R.H.
Test Condition	:	802.11n20_5.5GHz	Operator	:	K.C.YEOM

Memo :

LIMIT : CISPR22\_B QP  
CISPR22\_B AV

NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.15781	38.3	26.7	10.1	48.4	36.8	65.6	55.6	17.2	18.8	N
2	0.21132	31.8	19.9	10.1	41.9	30.0	63.2	53.2	21.3	23.2	N
3	0.73665	22.3	16.7	10.1	32.4	26.8	56.0	46.0	23.6	19.2	N
4	2.79040	22.8	12.9	10.2	33.0	23.1	56.0	46.0	23.0	22.9	N
5	5.20980	15.7	6.1	10.3	26.0	16.4	60.0	50.0	34.0	33.6	N
6	10.40680	14.0	6.2	10.6	24.6	16.8	60.0	50.0	35.4	33.2	N
7	23.81560	12.5	5.1	10.9	23.4	16.0	60.0	50.0	36.6	34.0	N
8	0.15940	39.6	23.8	10.1	49.7	33.9	65.5	55.5	15.8	21.6	L
9	0.21750	33.6	22.8	10.1	43.7	32.9	62.9	52.9	19.2	20.0	L
10	0.89808	17.4	9.0	10.1	27.5	19.1	56.0	46.0	28.5	26.9	L
11	2.68760	17.5	8.5	10.2	27.7	18.7	56.0	46.0	28.3	27.3	L
12	5.38520	12.6	4.2	10.4	23.0	14.6	60.0	50.0	37.0	35.4	L
13	9.14500	13.8	7.7	10.6	24.4	18.3	60.0	50.0	35.6	31.7	L

**AC Line Conducted Emissions (Graph)**

Test Mode: U-NII 4 &amp; 802.11n(HT20)

**Results of Conducted Emission**

DTNC

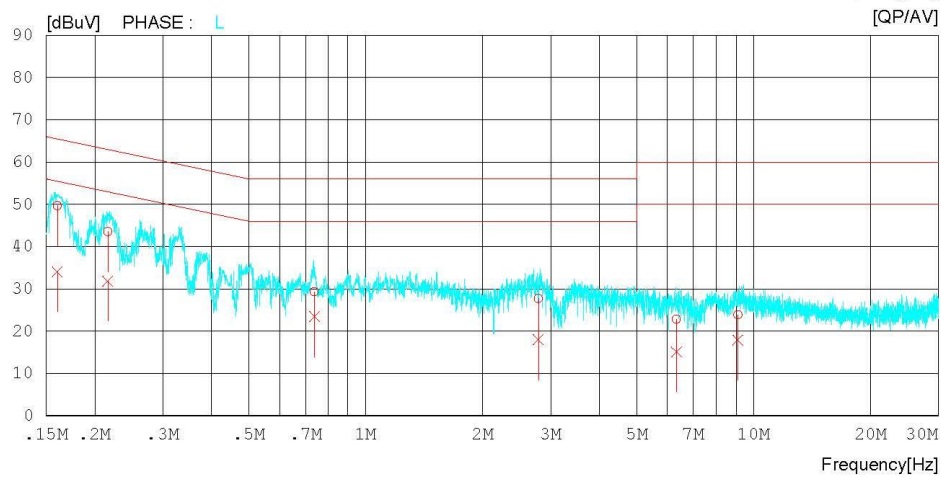
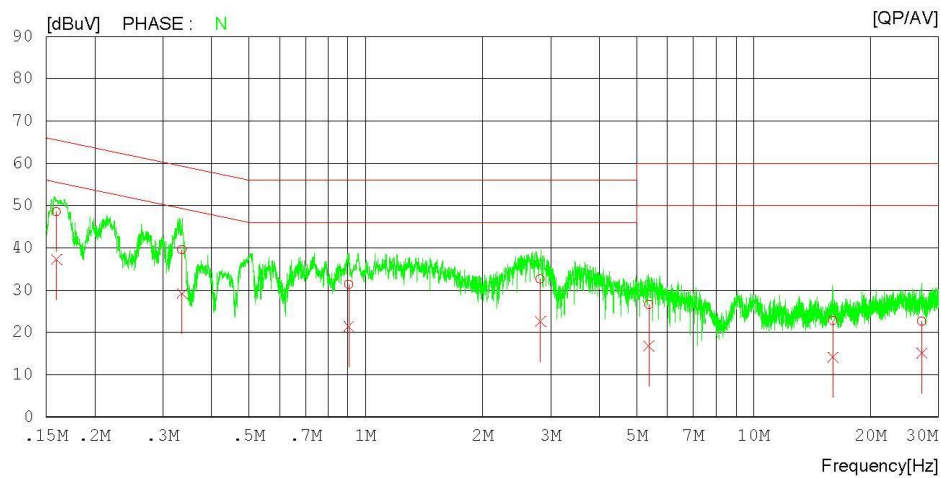
Date : 2016-02-01

Order No. :  
Model No. : Dolphini6510  
Serial No. :  
Test Condition : 802.11n20\_5.7GHz

Reference No. :  
Power Supply : 120 V 60 Hz  
Temp/Humi. : 23 'C 44 % R.H.  
Operator : K.C.YEOM

Memo :

LIMIT : CISPR22\_B QP  
CISPR22\_B AV



**AC Line Conducted Emissions (Data List)**

Test Mode: U-NII 4 &amp; 802.11n(HT20)

**Results of Conducted Emission**

DTNC

Date : 2016-02-01

Order No.	:		Reference No.	:	
Model No.	:	Dolphini6510	Power Supply	:	120 V 60 Hz
Serial No.	:		Temp/Humi.	:	23 'C 44 % R.H.
Test Condition	:	802.11n20_5.7GHz	Operator	:	K.C.YEOM

Memo :

LIMIT : CISPR22\_B QP  
CISPR22\_B AV

NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.15950	38.5	27.1	10.1	48.6	37.2	65.5	55.5	16.9	18.3	N
2	0.33572	29.4	19.1	10.1	39.5	29.2	59.3	49.3	19.8	20.1	N
3	0.90403	21.3	11.3	10.1	31.4	21.4	56.0	46.0	24.6	24.6	N
4	2.81920	22.4	12.3	10.2	32.6	22.5	56.0	46.0	23.4	23.5	N
5	5.36780	16.2	6.4	10.4	26.6	16.8	60.0	50.0	33.4	33.2	N
6	16.01100	12.1	3.4	10.7	22.8	14.1	60.0	50.0	37.2	35.9	N
7	27.16360	11.8	4.2	10.8	22.6	15.0	60.0	50.0	37.4	35.0	N
8	0.16015	39.5	23.9	10.1	49.6	34.0	65.5	55.5	15.9	21.5	L
9	0.21585	33.4	21.7	10.1	43.5	31.8	63.0	53.0	19.5	21.2	L
10	0.73644	19.2	13.3	10.1	29.3	23.4	56.0	46.0	26.7	22.6	L
11	2.78320	17.5	7.7	10.2	27.7	17.9	56.0	46.0	28.3	28.1	L
12	6.32880	12.4	4.7	10.4	22.8	15.1	60.0	50.0	37.2	34.9	L
13	9.11100	13.2	7.3	10.6	23.8	17.9	60.0	50.0	36.2	32.1	L

## 8.8 Occupied Bandwidth

### ■ Test Requirements

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured

### ■ Test Configuration

Refer to the Appendix I.

### ■ Test Procedure :

#### - Procedure: RSS-Gen[6.6]

- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
- The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.

■ Test Result : **Comply**

Mode	Bands	Channel	Frequency [MHz]	Test Result [MHz]
802.11a	U-NII 1	36	5180	16.64
		40	5200	16.64
		48	5240	16.62
	U-NII 2A	52	5260	16.59
		60	5300	16.62
		64	5320	16.65
	U-NII 2C	100	5500	16.60
		116	5580	16.59
		140	5700	16.64
	U-NII 3	149	5745	16.61
		157	5785	16.70
		165	5825	16.63
802.11n (HT20)	U-NII 1	36	5180	17.75
		40	5200	17.71
		48	5240	17.81
	U-NII 2A	52	5260	17.73
		60	5300	17.81
		64	5320	17.74
	U-NII 2C	100	5500	17.71
		116	5580	17.70
		140	5700	17.71
	U-NII 3	149	5745	17.76
		157	5785	17.75
		165	5825	17.72
802.11a	U-NII 2C	144	5720	16.63
802.11n (HT20)	U-NII 2C	144	5720	17.75