





# Test Report

Curtis-Straus LLC, a wholly owned subsidiary of BV CPS

Report No	ER2501-11
Client	Harman International Industries, Incorporated
Address	30001 Cabot Drive Novi, MI 48377
Phone	248-254-7751
Items tested FCC ID IC	GEN3.1 MID VA 2AHPN-BE2837 6434C-BE2837
Equipment Type Equipment Code	Unlicensed National Information Infrastructure Device NII
FCC/IC Rule Parts	CFR Title 47 FCC Part 15.407, ISED Canada RSS-247 Issue 2
Test Dates	October 20 <sup>th</sup> to November 10 <sup>th</sup> , 2017
Results	As detailed within this report
Prepared by	 Zachary Johnson – EMC Engineer
Authorized by	 Yunus Faziloglu – Sr. Engineer
Issue Date	11/30/2017
Conditions of Issue	This Test Report is issued subject to the conditions stated in the 'Conditions of Testing' section on page 27 of this report.

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Report REV Sep-08-2017 - YF



## **Summary**

This test report supports an application for certification of a transmitter operating pursuant to:  
CFR Title 47 FCC Part 15.407, ISED Canada RSS-247 Issue 2

The product is the GEN3.1 MID VA. It is a transmitter that operates in the following bands:

5.15GHz – 5.25GHz

5.725GHz – 5.85GHz

Antenna Type: PCB Trace

Gain: 0.21dBi maximum peak

We found that the product met the above requirements without modification.

Test samples were received in good condition.

## ***Test Methodology***

All testing was performed according to the following rules/procedures/documents;  
CFR Title 47 FCC Part 15.407, RSS-247 Issue 2, RSS-Gen Issue 4, FCC KDB 789033 D02  
General UNII Test Procedures New Rules v01r04 and ANSI C63.10-2013.

Radiated emissions were maximized by testing the device in the in-vehicle setup orientation and varying the test antenna's height and polarity.

EUT operating voltage is 13.5V DC

The following bandwidths were used during radiated spurious and AC line conducted emissions testing.

<b>Frequency</b>	<b>RBW</b>	<b>VBW</b>
0.15-30MHz	9kHz	30kHz
30-1000MHz	120kHz	1MHz
1-40GHz	1MHz	3MHz

## Product Tested - Configuration Documentation

EUT Configuration											
<b>Work Order:</b>	R2501										
<b>Company:</b>	Harman International Industries, Incorporated										
<b>Company Address:</b>	30001 Cabot Drive										
	Novi, MI, 48377										
<b>Contact:</b>	Mark Bowman										
	MN			PN			SN				
<b>EUT:</b>	GEN3.1 MID VA										
<b>EUT Description:</b>	Car Stereo System										
<b>EUT Components</b>	MN			SN							
audio Harness											
Back up camera											
GPS antenna											
Power Harness											
USB diag port											
<b>Support Equipment</b>	MN			SN							
CS Supplied Laptop.											
<b>Port Label</b>	<b>Port Type</b>	<b># ports</b>	<b># populated</b>	<b>cable type</b>	<b>shielded</b>	<b>ferrites</b>	<b>length (m)</b>	<b>in/out</b>	<b>under test</b>	<b>comment</b>	
Audio	-	1	1	-	No	No	1	in	yes		
DC Power	-	1	1	-	No	No	1	in	yes		
Back up camera	-	1	1	-	No	No	0.1	in	yes		
Dab/XM	-	1	1	Coaxial	Yes	No	1	in	yes		
FM/AM antenna	-	1	1	Coaxial	Yes	No	0.1	in	yes		
Next gen port	-	1	0					in	no		
<b>Software Operating Mode Description:</b>											
EUT may be operating in 1 of 2 modes. For immunity, EUT will connect with a CMW and operate as normal with traffic while doing emissions scans eut will operate by transmitting a constant signal. For Bluetooth eut will still need to be connected to CMW.											
<b>Performance Criteria:</b>											
Eut will connect to CMW and preform less than 10% PER during test.											

### Statement of Conformity

RSS-GEN	RSP-100	RSS 247	Part 15	Comments
6.3			15.15(b)	There are no controls accessible to the user that varies the output power to operate in violation of the regulatory requirements.
	3.1		15.19	The label is shown in the label exhibit.
	4		15.21	Information to the user is shown in the instruction manual exhibit.
			15.27	No special accessories are required for compliance.
3, 6.1			15.31	The EUT was tested in accordance with the measurement standards in this section.
6.13			15.33	Frequency range was investigated according to this section, unless noted in specific rule section under which the equipment operates.
8.1			15.35	The EUT emissions were measured using the measurement detector and bandwidth specified in this section, unless noted in specific rule section under which the equipment operates.
8.3			15.203	EUT employs PCB trace antenna with 0.21dBi maximum peak gain.
8.10			15.205 15.209	The fundamental is not in a Restricted band and the spurious and harmonic emissions in the Restricted bands comply with the general emission limits of 15.209 or RSS-Gen as applicable
8.8			15.207	N/A, EUT is vehicle battery powered only.

Refer to Appendix A of this report for antenna port conducted measurements.

## Test Results

### Radiated Spurious Emissions

#### LIMITS

[15.407(b)(6)]: *Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.*

[15.407(b)(7)]: *The provisions of §15.205 apply to intentional radiators operating under this section.*

[15.407(b)(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

[15.407(b)(4)(i)]: 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

RSS-247 Issue 2 Section 6.2.1.2: For transmitters with operating frequencies in the band 5150-5250 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p

RSS-247 Issue 2 Section 6.2.4.2: Devices operating in the band 5725-5850 MHz shall have e.i.r.p. of unwanted emissions comply with the following:

27 dBm/MHz at frequencies from the band edges decreasing linearly to 15.6 Bm/MHz at 5 MHz above or below the band edges;

15.6 dBm/MHz at 5 MHz above or below the band edges decreasing linearly to 10 dBm/MHz at 25 MHz above or below the band edges;

10 dBm/MHz at 25 MHz above or below the band edges decreasing linearly to -27 dBm/MHz at 75 MHz above or below the band edges; and

-27 dBm/MHz at frequencies more than 75 MHz above or below the band edges.

All the results below are for the in-vehicle setup orientation only.

## MEASUREMENTS / RESULTS

Curtis Straus - a Bureau Veritas Company  
Radiated Emissions Electric Field 3m Distance  
30-1000MHz Vertical Data  
Operator: CCH  
Notes:  
EUT is Transmitting 5g 802.11ac40 mcs2. Filtering 5150-5350MHz

Work Order - R2501  
EUT Power Input - 13.8V DC  
Test Site - CH2  
Conditions - 23.7°C; 25%RH; 1010mBar  
Witnessed by - Filtering 5150-5350MHz  
EUT Maximum Frequency - 802.11ac40 mcs2

Data Taken at 6:46:58 AM Saturday November 18 2017

Frequency (MHz)	Raw QP Reading (dBμV)	Correction Factor (dB/m)	Adjusted QP Amplitude (dBμV/m)	Lim1: FCC_pt15_1 09_Class_B (dBμV/m)	Margin to Lim1 (dB)	Test Results Lim1 (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: FCC_pt15_1 09_Class_B (dBμV/m)	Margin to Lim2 (dB)	Test Results Lim2 (Pass/Fail)	Worst Margin Lim2 (dB)
777.589	36.7	-9.6	27	46	-19	PASS		46	-19	PASS	
796.802	40.8	-9.9	30.9	46	-15.1	PASS	-15.1	46	-15.1	PASS	-15.1
799.495	31.3	-9.9	21.5	46	-24.5	PASS		46	-24.5	PASS	
801.541	32.6	-9.8	22.8	46	-23.2	PASS		46	-23.2	PASS	
805.098	30.6	-9.6	20.9	46	-25.1	PASS		46	-25.1	PASS	
821.135	26.5	-9	17.6	46	-28.5	PASS		46	-28.5	PASS	

Curtis Straus - a Bureau Veritas Company  
Radiated Emissions Electric Field 3m Distance  
30-1000MHz Horizontal Data  
Operator: CCH  
Notes:  
EUT is Transmitting 5g 802.11ac40 mcs2. Filtering 5150-5350MHz

Work Order - R2501  
EUT Power Input - 13.8V DC  
Test Site - CH2  
Conditions - 23.7°C; 25%RH; 1010mBar  
Witnessed by - Filtering 5150-5350MHz  
EUT Maximum Frequency - 802.11ac40 mcs2

Frequency (MHz)	Raw QP Reading (dBμV)	Correction Factor (dB/m)	Adjusted QP Amplitude (dBμV/m)	Lim1: FCC_pt15_1 09_Class_B (dBμV/m)	Margin to Lim1 (dB)	Test Results Lim1 (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: FCC_pt15_1 09_Class_B (dBμV/m)	Margin to Lim2 (dB)	Test Results Lim2 (Pass/Fail)	Worst Margin Lim2 (dB)
130.679	29.8	-20.8	9	43.5	-34.5	PASS		43.5	-34.5	PASS	
187.491	49.8	-23.7	26.1	43.5	-17.4	PASS		43.5	-17.4	PASS	
794.481	31.9	-9.9	21.9	46	-24.1	PASS		46	-24.1	PASS	
798.68	39.2	-9.9	29.3	46	-16.7	PASS	-16.7	46	-16.7	PASS	-16.7
799.823	33.8	-9.9	23.9	46	-22.1	PASS		46	-22.1	PASS	
803.836	28.3	-9.7	18.6	46	-27.4	PASS		46	-27.4	PASS	

30-1000MHz Low Channel Unii 1





**Test Report for Harman International Industries, Incorporated • GEN3.1 MID VA • Report No. ER2501-11 •  
November 30, 2017**

Curtis Straus - a Bureau Veritas Company Radiated Emissions Electric Field 3m Distance 1-6GHz Horizontal Data Operator: CCH Notes: EUT is Transmitting 5g 802.11ac40 mcs2. Filtering 5150-5350MHz						Work Order - R2501 EUT Power Input - 13.8V DC Test Site - CH2 Conditions - 23.7°C; 25%RH; 1010mBar Witnessed by - Filtering 5150-5350MHz EUT Maximum Frequency - 802.11ac40 mcs2					
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Frequency (MHz)	Raw Peak Reading (dBμV)	Raw Avg Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	PK Lim. FCC_pt15_1 09_ClassB_ Peak (dBμV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBμV/m)	AV Lim. FCC_pt15_1 09_ClassB_ AVG (dBμV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Average Margin (dB)
1597.8	18.6	11.2	29.6	48.1	74	-25.8	PASS		40.8	54	-13.1	PASS	
2418.6	22.4	12	31.1	53.5	74	-20.5	PASS		43.2	54	-10.8	PASS	
2455.2	19.8	12	31.3	51.1	74	-22.9	PASS		43.2	54	-10.8	PASS	
3582.1	21.9	12.5	35.9	57.8	74	-16.1	PASS		48.4	54	-5.6	PASS	
4987.6	20.8	9.8	39.7	60.5	74	-13.5	PASS		49.5	54	-4.5	PASS	
5524.7	21.1	9.7	40.3	61.3	74	-12.7	PASS	-12.7	49.9	54	-4.1	PASS	-4.1

Curtis Straus - a Bureau Veritas Company Radiated Emissions Electric Field 3m Distance 1-6GHz Vertical Data Operator: CCH Notes: EUT is Transmitting 5g 802.11ac40 mcs2. Filtering 5150-5350MHz						Work Order - R2501 EUT Power Input - 13.8V DC Test Site - CH2 Conditions - 23.7°C; 25%RH; 1010mBar Witnessed by - Filtering 5150-5350MHz EUT Maximum Frequency - 802.11ac40 mcs2					
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Frequency (MHz)	Raw Peak Reading (dBμV)	Raw Avg Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	PK Lim. FCC_pt15_1 09_ClassB_ Peak (dBμV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBμV/m)	AV Lim. FCC_pt15_1 09_ClassB_ AVG (dBμV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)
2407.5	20.6	13.5	31.1	51.7	74	-22.3	PASS		44.6	54	-9.4	PASS	
2421.3	24	12.5	31.1	55.1	74	-18.8	PASS		43.7	54	-10.3	PASS	
2474.8	21.5	14.1	31.3	52.9	74	-21.1	PASS		45.4	54	-8.5	PASS	
3462.9	22.6	12.2	35.2	57.8	74	-16.2	PASS		47.4	54	-6.6	PASS	
4984	17.4	9.8	39.7	57.1	74	-16.9	PASS		49.5	54	-4.5	PASS	
5987.1	18.9	9.5	40.4	59.3	74	-14.7	PASS	-14.7	49.8	54	-4.1	PASS	-4.1

**1-6GHz Low Channel Unii 1**

Curtis Straus - a Bureau Veritas Company Radiated Emissions Electric Field 3m Distance 1-6GHz Horizontal Data Operator: CCH Notes: EUT is Transmitting 5g 802.11ac40 mcs2. Filtering 5150-5350MHz						Work Order - R2501 EUT Power Input - 13.8V DC Test Site - CH2 Conditions - 23.7°C; 25%RH; 1010mBar Witnessed by - Filtering 5150-5350MHz EUT Maximum Frequency - 802.11ac40 mcs2					
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Frequency (MHz)	Raw Peak Reading (dBμV)	Raw Avg Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	PK Lim. FCC_pt15_1 09_ClassB_ Peak (dBμV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBμV/m)	AV Lim. FCC_pt15_1 09_ClassB_ AVG (dBμV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Average Margin (dB)
1595.8	20.3	11.2	29.6	49.9	74	-24.1	PASS		40.8	54	-13.2	PASS	
2418.2	21.3	12.8	31.1	52.4	74	-21.6	PASS		44	54	-10	PASS	
2476.3	21.6	12.2	31.3	53	74	-21	PASS		43.5	54	-10.5	PASS	
3592.9	22	12.5	36	58	74	-16	PASS	-16	48.5	54	-5.5	PASS	
4991	17.6	9.8	39.8	57.3	74	-16.6	PASS		49.6	54	-4.4	PASS	-4.4



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Curtis Straus - a Bureau Veritas Company Radiated Emissions Electric Field 3m Distance 1-6GHz Vertical Data Operator: CCH Notes: EUT is Transmitting 5g 802.11ac40 mcs2. Filtering 5150-5350MHz						Work Order - R2501 EUT Power Input - 13.8V DC Test Site - CH2 Conditions - 23.7°C; 25%RH; 1010mBar Witnessed by - Filtering 5150-5350MHz EUT Maximum Frequency - 802.11ac40 mcs2							
Frequency (MHz)	Raw Peak Reading (dBμV)	Raw Avg Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	PK Lim. FCC_pt15_1 09_ClassB_1 Peak (dBμV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBμV/m)	AV Lim. FCC_pt15_1 09_ClassB_1 AVG (dBμV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)
2410.1	20.9	12.1	31.1	52.1	74	-21.9	PASS		43.2	54	-10.8	PASS	
2423.8	20.4	12	31.2	51.5	74	-22.5	PASS		43.2	54	-10.8	PASS	
2458.3	20.6	14.1	31.3	51.9	74	-22.1	PASS		45.4	54	-8.6	PASS	
4630.5	18.8	9.8	37.9	56.7	74	-17.3	PASS		47.7	54	-6.3	PASS	
4993.6	18.1	9.8	39.8	57.9	74	-16.1	PASS		49.6	54	-4.4	PASS	-4.4
5829.8	19.4	9.4	39.8	59.2	74	-14.8	PASS	-14.8	49.2	54	-4.8	PASS	

**1-6GHz High Channel Unii 1**

Curtis Straus - a Bureau Veritas Company Radiated Emissions Electric Field 1m Distance 6-18GHz Horizontal Data Operator: CCH Notes: EUT is Transmitting 5g 802.11ac40 mcs2. Filtering 5150-5350MHz						Work Order - R2501 EUT Power Input - 13.8V DC Test Site - CH2 Conditions - 23.7°C; 25%RH; 1010mBar Witnessed by - Filtering 5150-5350MHz EUT Maximum Frequency - 802.11ac40 mcs2							
Frequency (MHz)	Raw Peak Reading (dBμV)	Raw Avg Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	PK Lim. FCC_pt15_1 09_ClassB_1 Peak (dBμV/m)	Peak Margin (dB)	Peak Test Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBμV/m)	AV Lim. FCC_pt15_1 09_ClassB_1 AVG (dBμV/m)	Avg Margin (dB)	Avg Test Results (Pass/Fail)	Worst Avg Margin (dB)
13307.4	43.8	35	11.9	55.7	83.5	-27.8	PASS		47	63.5	-16.5	PASS	
13965.5	43.9	33.9	12.6	56.4	83.5	-27.1	PASS		46.5	63.5	-17	PASS	
15893.8	45.3	36.6	7.3	52.5	83.5	-31	PASS		43.9	63.5	-19.6	PASS	
16306.3	45.6	36.4	9	54.7	83.5	-28.8	PASS		45.5	63.5	-18	PASS	
17048.7	42.2	34.2	14.3	56.5	83.5	-27	PASS		48.4	63.5	-15.1	PASS	
17867.3	43.3	33.5	19.2	62.5	83.5	-21	PASS	-21	52.6	63.5	-10.9	PASS	-10.9

Curtis Straus - a Bureau Veritas Company Radiated Emissions Electric Field 1m Distance 6-18GHz Vertical Data Operator: CCH Notes: EUT is Transmitting 5g 802.11ac40 mcs2. Filtering 5150-5350MHz						Work Order - R2501 EUT Power Input - 13.8V DC Test Site - CH2 Conditions - 23.7°C; 25%RH; 1010mBar Witnessed by - Filtering 5150-5350MHz EUT Maximum Frequency - 802.11ac40 mcs2							
Frequency (MHz)	Raw Peak Reading (dBμV)	Raw Avg Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	PK Lim. FCC_pt15_1 09_ClassB_1 Peak (dBμV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBμV/m)	AV Lim. FCC_pt15_1 09_ClassB_1 AVG (dBμV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)
13302.2	46	35.1	12	58	83.5	-25.5	PASS		47	63.5	-16.5	PASS	
14220.3	42.6	34.3	11.9	54.4	83.5	-29.1	PASS		46.1	63.5	-17.4	PASS	
15930.7	47.7	36	7.2	54.9	83.5	-28.6	PASS		43.2	63.5	-20.3	PASS	
16292.6	46.8	36.1	8.9	55.7	83.5	-27.8	PASS		45	63.5	-18.5	PASS	
17053.1	45	34.3	14.3	59.3	83.5	-24.2	PASS		48.6	63.5	-14.9	PASS	
17857.7	42.9	33.6	19.2	62.1	83.5	-21.4	PASS	-21.4	52.8	63.5	-10.7	PASS	-10.7

**6-18GHz Low Channel Unii 1**



**Test Report for Harman International Industries, Incorporated • GEN3.1 MID VA • Report No. ER2501-11 • November 30, 2017**

Curtis Straus - a Bureau Veritas Company	Work Order - R2501
Radiated Emissions Electric Field 1m Distance	EUT Power Input - 13.8V DC
6-18GHz Horizontal Data	Test Site - CH2
Operator: CCH	Conditions - 23.7°C; 25%RH; 1010mBar
Notes:	Witnessed by - Filtering 5150-5350MHz
EUT is Transmitting 5g 802.11ac40 mcs2. Filtering 5150-5350MHz EUT Maximum Frequency - 802.11ac40 mcs2	

Frequency (MHz)	Raw Peak Reading (dBμV)	Raw Avg Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	FCC_pt15_1 09_ClassB_Peak (dBμV/m)	Peak Margin (dB)	Peak Test Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBμV/m)	FCC_pt15_1 09_ClassB_AVG (dBμV/m)	Avg Margin (dB)	Avg Test Results (Pass/Fail)	Worst Avg Margin (dB)
13303.4	45	35	12	57	83.5	-26.5	PASS		47	63.5	-16.5	PASS	
13975	42.5	33.1	12.6	55.1	83.5	-28.4	PASS		45.6	63.5	-17.9	PASS	
16295.4	44.5	36.6	8.9	53.4	83.5	-30.1	PASS		45.5	63.5	-18	PASS	
16690.3	44.8	33.5	11.8	56.6	83.5	-26.9	PASS		45.3	63.5	-18.2	PASS	
17113.2	41.8	33.4	14.5	56.3	83.5	-27.2	PASS		47.9	63.5	-15.6	PASS	
17911.2	42.9	33.4	19.2	62.1	83.5	-21.4	PASS	-21.4	52.5	63.5	-11	PASS	-11

Curtis Straus - a Bureau Veritas Company	Work Order - R2501
Radiated Emissions Electric Field 1m Distance	EUT Power Input - 13.8V DC
6-18GHz Vertical Data	Test Site - CH2
Operator: CCH	Conditions - 23.7°C; 25%RH; 1010mBar
Notes:	Witnessed by - Filtering 5150-5350MHz
EUT is Transmitting 5g 802.11ac40 mcs2. Filtering 5150-5350MHz EUT Maximum Frequency - 802.11ac40 mcs2	

Frequency (MHz)	Raw Peak Reading (dBμV)	Raw Avg Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	FCC_pt15_1 09_ClassB_Peak (dBμV/m)	Peak Margin (dB)	Peak Test Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBμV/m)	FCC_pt15_1 09_ClassB_AVG (dBμV/m)	Avg Margin (dB)	Avg Test Results (Pass/Fail)	Worst Avg Margin (dB)
13308.7	44.2	35	11.9	56.1	83.5	-27.4	PASS		47	63.5	-16.5	PASS	
13961.8	43.1	33.9	12.6	55.6	83.5	-27.9	PASS		46.5	63.5	-17	PASS	
16328.2	44.9	35.7	9.3	54.2	83.5	-29.3	PASS		45	63.5	-18.5	PASS	
16681.4	42.7	34.6	11.7	54.5	83.5	-29	PASS		46.3	63.5	-17.2	PASS	
17087	43.2	34.2	14.4	57.7	83.5	-25.8	PASS		48.6	63.5	-14.9	PASS	
17923.6	42.1	32.9	19.2	61.3	83.5	-22.2	PASS	-22.2	52.1	63.5	-11.4	PASS	-11.4

**6-18GHz High Channel Unii 1**

**Radiated Emissions Table**

Date: 20-Nov-17				Company: Harman International				Work Order: R2501						
Engineer: Chris Hamel				EUT Desc: GEN3.1 MID VA				EUT Operating Voltage/Frequency: 13.8V DC						
Temp: 24.4°C				Humidity: 26%				Pressure: 996mBar						
Frequency Range: 18-40GHz								Measurement Distance: 0.1 m						
Notes: No Emissions Found								EUT Max Freq:						
Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBμV)	Average Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBμV/m)	Adjusted Avg Reading (dBμV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average		
				---	---	---	---	---	Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)
				---	---	---	---	---	---	---	---	---	---	---
Table Result:				Pass by N/A dB				Worst Freq:				N/A MHz		
Test Site: EMI Chamber 2				Cable 1: Asset #2323				Cable 2: ---				Cable 3: ---		
Analyzer: Gold				Preamp: 18-26.5GHz				Antenna: 18-26.5GHz Horn				Preselector: ---		
CSsoft Radiated Emissions Calculator v 1.017.197														
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor														
Copyright Curtis-Straus LLC 2000														

Test Site: EMI Chamber 2		Cable 1: Asset #2323		Cable 2: Asset #2324		Cable 3: ---	
Analyzer: Gold		Preamp: 40GHz Mixer		Antenna: 40GHz Mixer		Preselector: ---	
CSsoft Radiated Emissions Calculator v 1.017.197						Copyright Curtis-Straus LLC 2000	
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor							

**18-40GHz Low Channel Unii 1**



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Curtis Straus - a Bureau Veritas Company	Work Order - R2501
Radiated Emissions Electric Field 3m Distance	EUT Power Input - 13.8V DC
30-1000MHz Horizontal Data	Test Site - CH2
Operator: CCH	Conditions - 23.7°C; 25%RH; 1010mBar
Notes:	Witnessed by - Filtering 5725-5875MHz
EUT is Transmitting 5g 802.11ac20 mcs8. Filtering 5725-5875MHz	EUT Maximum Frequency - 802.11ac20 mcs8

Frequency (MHz)	Raw QP Reading (dBμV)	Correction Factor (dB/m)	Adjusted QP Amplitude (dBμV/m)	Lim1: FCC_pt15_1 09_Class_B (dBμV/m)	Margin to Lim1 (dB)	Test Results Lim1 (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: FCC_pt15_1 09_Class_B (dBμV/m)	Margin to Lim2 (dB)	Test Results Lim2 (Pass/Fail)	Worst Margin Lim2 (dB)
152.683	28.8	-22.3	6.5	43.5	-37.1	PASS		43.5	-37.1	PASS	
237.38	31.1	-23	8.1	46	-37.9	PASS		46	-37.9	PASS	
430.4	28.3	-17.5	10.8	46	-35.2	PASS		46	-35.2	PASS	
790.922	30.4	-9.9	20.5	46	-25.6	PASS		46	-25.6	PASS	
798.087	42.7	-9.9	32.8	46	-13.2	PASS	-13.2	46	-13.2	PASS	-13.2
798.244	31.8	-9.9	21.9	46	-24.1	PASS		46	-24.1	PASS	

Curtis Straus - a Bureau Veritas Company	Work Order - R2501
Radiated Emissions Electric Field 3m Distance	EUT Power Input - 13.8V DC
30-1000MHz Vertical Data	Test Site - CH2
Operator: CCH	Conditions - 23.7°C; 25%RH; 1010mBar
Notes:	Witnessed by - Filtering 5725-5875MHz
EUT is Transmitting 5g 802.11ac20 mcs8. Filtering 5725-5875MHz EUT Maximum Frequency - 802.11ac20 mcs8	

Frequency (MHz)	Raw QP Reading (dBμV)	Correction Factor (dB/m)	Adjusted QP Amplitude (dBμV/m)	Lim1: FCC_pt15_1 09_Class_B (dBμV/m)	Margin to Lim1 (dB)	Test Results Lim1 (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: FCC_pt15_1 09_Class_B (dBμV/m)	Margin to Lim2 (dB)	Test Results Lim2 (Pass/Fail)	Worst Margin Lim2 (dB)
798.164	39.8	-9.9	29.9	46	-16.1	PASS	-16.1	46	-16.1	PASS	-16.1
798.398	37.2	-9.9	27.3	46	-18.7	PASS		46	-18.7	PASS	
800.726	33.2	-9.8	23.4	46	-22.6	PASS		46	-22.6	PASS	
800.771	32.4	-9.8	22.6	46	-23.4	PASS		46	-23.4	PASS	
803.184	33.3	-9.7	23.6	46	-22.4	PASS		46	-22.4	PASS	
816.001	36.6	-9.2	27.4	46	-18.6	PASS		46	-18.6	PASS	

**30-1000MHz Mid Channel Unii 3**



**Test Report for Harman International Industries, Incorporated • GEN3.1 MID VA • Report No. ER2501-11 •  
November 30, 2017**

Curtis Straus - a Bureau Veritas Company Radiated Emissions Electric Field 3m Distance 1-6GHz Horizontal Data Operator: CCH Notes: EUT is Transmitting 5g 802.11ac20 mcs8. Filtering 5725-5875MHz						Work Order - R2501 EUT Power Input - 13.8V DC Test Site - CH2 Conditions - 23.7°C; 25%RH; 1010mBar Witnessed by - Filtering 5725-5875MHz EUT Maximum Frequency - 802.11ac20 mcs8					
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Frequency (MHz)	Raw Peak Reading (dBμV)	Raw Avg Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	PK Lim. FCC_pt15_1 09_ClassB_ Peak (dBμV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBμV/m)	AV Lim. FCC_pt15_1 09_ClassB_ AVG (dBμV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Average Margin (dB)
1594.1	20.9	11.4	28.9	49.7	74	-24.3	PASS		40.2	54	-13.8	PASS	
2406.2	22.3	12.3	31.3	53.6	74	-20.4	PASS		43.6	54	-10.4	PASS	
2477.4	21.6	12.3	31.5	53.2	74	-20.8	PASS		43.9	54	-10.1	PASS	
3601	18.9	12.6	36	55	74	-19	PASS		48.7	54	-5.3	PASS	
3856.9	19.5	11.5	37	56.5	74	-17.5	PASS		48.4	54	-5.6	PASS	
5592.7	17.4	9.5	43.3	60.7	74	-13.3	PASS	-13.3	52.8	54	-1.2	PASS	-1.2

Curtis Straus - a Bureau Veritas Company Radiated Emissions Electric Field 3m Distance 1-6GHz Vertical Data Operator: CCH Notes: EUT is Transmitting 5g 802.11ac20 mcs8. Filtering 5725-5875MHz						Work Order - R2501 EUT Power Input - 13.8V DC Test Site - CH2 Conditions - 23.7°C; 25%RH; 1010mBar Witnessed by - Filtering 5725-5875MHz EUT Maximum Frequency - 802.11ac20 mcs8					
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Frequency (MHz)	Raw Peak Reading (dBμV)	Raw Avg Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	PK Lim. FCC_pt15_1 09_ClassB_ Peak (dBμV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBμV/m)	AV Lim. FCC_pt15_1 09_ClassB_ AVG (dBμV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)
1597.2	21.4	11.8	28.9	50.3	74	-23.7	PASS		40.6	54	-13.4	PASS	
2409.4	20.1	12.1	31.3	51.4	74	-22.6	PASS		43.4	54	-10.6	PASS	
2454.5	20.7	12.8	31.5	52.2	74	-21.8	PASS		44.3	54	-9.7	PASS	
3586.9	20.7	12.5	35.9	56.7	74	-17.3	PASS		48.4	54	-5.5	PASS	
3856.7	21.5	13.6	36.9	58.5	74	-15.5	PASS		50.5	54	-3.5	PASS	
5597.2	18.6	9.5	43.4	62	74	-11.9	PASS	-11.9	52.9	54	-1.1	PASS	-1.1

**1-6GHz Low Channel Unii 3**

Curtis Straus - a Bureau Veritas Company Radiated Emissions Electric Field 3m Distance 1-6GHz Horizontal Data Operator: CCH Notes: EUT is Transmitting 5g 802.11ac20 mcs8. Filtering 5725-5875MHz						Work Order - R2501 EUT Power Input - 13.8V DC Test Site - CH2 Conditions - 23.7°C; 25%RH; 1010mBar Witnessed by - Filtering 5725-5875MHz EUT Maximum Frequency - 802.11ac20 mcs8					
--	--	--	--	--	--	---	--	--	--	--	--

Frequency (MHz)	Raw Peak Reading (dBμV)	Raw Avg Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	PK Lim. FCC_pt15_1 09_ClassB_ Peak (dBμV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBμV/m)	AV Lim. FCC_pt15_1 09_ClassB_ AVG (dBμV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Average Margin (dB)
1594.6	21.5	11	28.9	50.4	74	-23.6	PASS		39.8	54	-14.1	PASS	
2413.4	21.4	12.5	31.3	52.7	74	-21.3	PASS		43.8	54	-10.1	PASS	
2433.3	21.4	12.4	31.4	52.8	74	-21.2	PASS		43.8	54	-10.2	PASS	
2457.7	22.3	12	31.5	53.8	74	-20.2	PASS		43.4	54	-10.5	PASS	
3588.7	21	12.5	35.9	57	74	-17	PASS		48.5	54	-5.5	PASS	
5590.6	18.1	9.5	43.2	61.3	74	-12.6	PASS	-12.6	52.7	54	-1.3	PASS	-1.3



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Curtis Straus - a Bureau Veritas Company Radiated Emissions Electric Field 3m Distance 1-6GHz Vertical Data Operator: CCH Notes: EUT is Transmitting 5g 802.11ac20 mcs8. Filtering 5725-5875MHz EUT Maximum Frequency - 802.11ac20 mcs8						Work Order - R2501 EUT Power Input - 13.8V DC Test Site - CH2 Conditions - 23.7°C; 25%RH; 1010mBar Witnessed by - Filtering 5725-5875MHz							
Frequency (MHz)	Raw Peak Reading (dBμV)	Raw Avg Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	PK Lim. FCC_pt15_1 09_ClassB_ Peak (dBμV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBμV/m)	AV Lim. FCC_pt15_1 09_ClassB_ AVG (dBμV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)
2407.9	21.7	12.1	31.3	53	74	-21	PASS		43.4	54	-10.6	PASS	
2425.4	20.3	12	31.4	51.6	74	-22.4	PASS		43.4	54	-10.6	PASS	
2472.2	19.7	12.1	31.5	51.2	74	-22.8	PASS		43.7	54	-10.3	PASS	
3590.8	21.5	12.5	36	57.5	74	-16.5	PASS		48.5	54	-5.5	PASS	
3856.9	19.7	12.1	37	56.6	74	-17.4	PASS		49.1	54	-4.9	PASS	
5592.2	20	9.5	43.2	63.2	74	-10.8	PASS	-10.8	52.7	54	-1.2	PASS	-1.2

### 1-6GHz Mid Channel Unii 3

Curtis Straus - a Bureau Veritas Company Radiated Emissions Electric Field 3m Distance 1-6GHz Horizontal Data Operator: CCH Notes: EUT is Transmitting 5g 802.11ac20 mcs8. Filtering 5725-5875MHz EUT Maximum Frequency - 802.11ac20 mcs8						Work Order - R2501 EUT Power Input - 13.8V DC Test Site - CH2 Conditions - 23.7°C; 25%RH; 1010mBar Witnessed by - Filtering 5725-5875MHz							
Frequency (MHz)	Raw Peak Reading (dBμV)	Raw Avg Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	PK Lim. FCC_pt15_1 09_ClassB_ Peak (dBμV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBμV/m)	AV Lim. FCC_pt15_1 09_ClassB_ AVG (dBμV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Average Margin (dB)
1597.3	20.7	11.5	28.9	49.6	74	-24.4	PASS		40.4	54	-13.6	PASS	
2430.4	20.3	12.8	31.4	51.6	74	-22.3	PASS		44.2	54	-9.8	PASS	
3594.9	20.9	12.5	36	56.9	74	-17.1	PASS	-17.1	48.5	54	-5.4	PASS	-5.4
3855.7	19.1	10.4	36.9	56.1	74	-17.9	PASS		47.3	54	-6.6	PASS	
Curtis Straus - a Bureau Veritas Company Radiated Emissions Electric Field 3m Distance 1-6GHz Vertical Data Operator: CCH Notes: EUT is Transmitting 5g 802.11ac20 mcs8. Filtering 5725-5875MHz EUT Maximum Frequency - 802.11ac20 mcs8						Work Order - R2501 EUT Power Input - 13.8V DC Test Site - CH2 Conditions - 23.7°C; 25%RH; 1010mBar Witnessed by - Filtering 5725-5875MHz							
Frequency (MHz)	Raw Peak Reading (dBμV)	Raw Avg Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	PK Lim. FCC_pt15_1 09_ClassB_ Peak (dBμV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBμV/m)	AV Lim. FCC_pt15_1 09_ClassB_ AVG (dBμV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)
2435.3	21.5	12.2	31.4	52.9	74	-21.1	PASS		43.6	54	-10.4	PASS	
2462	21.6	14.2	31.5	53.1	74	-20.9	PASS		45.7	54	-8.3	PASS	
3542.4	21.4	12.4	35.6	57	74	-17	PASS		48	54	-6	PASS	
3856.8	20	12.4	36.9	56.9	74	-17.1	PASS		49.3	54	-4.6	PASS	
5586.3	18.3	9.5	43.1	61.3	74	-12.7	PASS	-12.7	52.6	54	-1.4	PASS	-1.4

### 1-6GHz High Channel Unii 3



Curtis Straus - a Bureau Veritas Company Radiated Emissions Electric Field 1m Distance 6-18GHz Horizontal Data Operator: CCH Notes: EUT is Transmitting 5g 802.11ac20 mcs8. Filtering 5725-5875MHz EUT Maximum Frequency - 802.11ac20 mcs8						Work Order - R2501 EUT Power Input - 13.8V DC Test Site - CH2 Conditions - 23.7°C; 25%RH; 1010mBar Witnessed by - Filtering 5725-5875MHz					
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Frequency (MHz)	Raw Peak Reading (dBμV)	Raw Avg Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	PK Lim. FCC_pt15_1 09_ClassB_ Peak (dBμV/m)	Peak Margin (dB)	Peak Test Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBμV/m)	AV Lim. FCC_pt15_1 09_ClassB_ AVG (dBμV/m)	Avg Margin (dB)	Avg Test Results (Pass/Fail)	Worst Avg Margin (dB)
8781.2	7.6	-0.9	45.6	53.2	83.5	-30.3	PASS		44.7	63.5	-18.8	PASS	
9606.1	10.3	0.1	46.1	56.4	83.5	-27.1	PASS		46.2	63.5	-17.3	PASS	
12494.4	10.6	1.2	48.9	59.5	83.5	-24	PASS		50.1	63.5	-13.4	PASS	
14200.9	10.6	2	52.3	62.9	83.5	-20.6	PASS		54.2	63.5	-9.3	PASS	
17792.2	14.1	3.5	58.9	71.7	83.5	-10.6	PASS	-10.6	63.5	63.5	-1.2	Pass	-1.2

Curtis Straus - a Bureau Veritas Company Radiated Emissions Electric Field 1m Distance 6-18GHz Vertical Data Operator: CCH Notes: EUT is Transmitting 5g 802.11ac20 mcs8. Filtering 5725-5875MHz EUT Maximum Frequency - 802.11ac20 mcs8						Work Order - R2501 EUT Power Input - 13.8V DC Test Site - CH2 Conditions - 23.7°C; 25%RH; 1010mBar Witnessed by - Filtering 5725-5875MHz					
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Frequency (MHz)	Raw Peak Reading (dBμV)	Raw Avg Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	PK Lim. FCC_pt15_1 09_ClassB_ Peak (dBμV/m)	Peak Margin (dB)	Peak Test Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBμV/m)	AV Lim. FCC_pt15_1 09_ClassB_ AVG (dBμV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)
8801.7	7.9	-0.9	45.7	53.6	83.5	-29.9	PASS		44.8	63.5	-18.7	PASS	
10186.1	9.7	0.5	45.6	55.3	83.5	-28.2	PASS		46	63.5	-17.5	PASS	
11711	10.6	1	47.8	58.4	83.5	-25.1	PASS		48.9	63.5	-14.6	PASS	
14182.4	11.9	2	52.2	64.1	83.5	-19.4	PASS		54.2	63.5	-9.3	PASS	
14584.3	11.4	2	50.5	61.9	83.5	-21.6	PASS		52.6	63.5	-10.9	PASS	
17863.6	13.8	4.8	58.5	72.3	83.5	-11.2	PASS	-11.2	63.3	63.5	-0.2	PASS	-0.2

### 6-18GHz Low Channel Unii 3

Curtis Straus - a Bureau Veritas Company Radiated Emissions Electric Field 1m Distance 6-18GHz Vertical Data Operator: CCH Notes: EUT is Transmitting 5g 802.11ac20 mcs8. Filtering 5725-5875MHz EUT Maximum Frequency - 802.11ac20 mcs8						Work Order - R2501 EUT Power Input - 13.8V DC Test Site - CH2 Conditions - 23.7°C; 25%RH; 1010mBar Witnessed by - Filtering 5725-5875MHz					
---	--	--	--	--	--	--	--	--	--	--	--

Frequency (MHz)	Raw Peak Reading (dBμV)	Raw Avg Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	PK Lim. FCC_pt15_1 09_ClassB_ Peak (dBμV/m)	Peak Margin (dB)	Peak Test Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBμV/m)	AV Lim. FCC_pt15_1 09_ClassB_ AVG (dBμV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)
13516.6	9.8	1.4	51.7	61.4	83.5	-22.1	PASS		53	63.5	-10.5	PASS	
17974.6	13.5	4.6	58.6	72.1	83.5	-11.4	PASS	-11.4	63.2	63.5	-0.3	PASS	-0.3



Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 1m Distance
6-18GHz Horizontal Data
Operator: CCH
Notes:
EUT is Transmitting 5g 802.11ac20 mcs8. Filtering 5725-5875MHz EUT Maximum Frequency - 802.11ac20 mcs8

Work Order - R2501
EUT Power Input - 13.8V DC
Test Site - CH2
Conditions - 23.7°C; 25%RH; 1010mBar
Witnessed by - Filtering 5725-5875MHz

Frequency (MHz)	Raw Peak Reading (dBμV)	Raw Avg Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	PK Lim. FCC_pt15_1 09_ClassB_ Peak (dBμV/m)	Peak Margin (dB)	Peak Test Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBμV/m)	AV Lim. FCC_pt15_1 09_ClassB_ AVG (dBμV/m)	Avg Margin (dB)	Avg Test Results (Pass/Fail)	Worst Avg Margin (dB)
8781.2	7.6	-0.9	45.6	53.2	83.5	-30.3	PASS		44.7	63.5	-18.8	PASS	
9606.1	10.3	0.1	46.1	56.4	83.5	-27.1	PASS		46.2	63.5	-17.3	PASS	
12494.4	10.6	1.2	48.9	59.5	83.5	-24	PASS		50.1	63.5	-13.4	PASS	
14200.9	10.6	2	52.3	62.9	83.5	-20.6	PASS		54.2	63.5	-9.3	PASS	
17792.2	14.1	3.5	58.9	71.7	83.5	-10.6	PASS	-10.6	63.5	63.5	-1.2	Pass	-1.2

**6-18GHz Mid Channel Unii 3**

Curtis Straus - a Bureau Veritas Company							Work Order - R2501						
Radiated Emissions Electric Field 1m Distance							EUT Power Input - 13.8V DC						
6-18GHz Horizontal Data							Test Site - CH2						
Operator: CCH							Conditions - 23.7°C; 25%RH; 1010mBar						
Notes:							Witnessed by - Filtering 5725-5875MHz						
EUT is Transmitting 5g 802.11ac20 mcs8. Filtering 5725-5875MHz EUT Maximum Frequency - 802.11ac20 mcs8													
Frequency (MHz)	Raw Peak Reading (dBμV)	Raw Avg Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	PK Lim. FCC_pt15_1 09_ClassB_ Peak (dBμV/m)	Peak Margin (dB)	Peak Test Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBμV/m)	AV Lim. FCC_pt15_1 09_ClassB_ AVG (dBμV/m)	Avg Margin (dB)	Avg Test Results (Pass/Fail)	Worst Avg Margin (dB)
9601.4	10.1	0.2	46.1	56.2	83.5	-27.3	PASS		46.3	63.5	-17.2	PASS	
10488.5	10.1	1.2	45.5	55.6	83.5	-27.9	PASS		46.7	63.5	-16.8	PASS	
11797.6	9.7	0.8	47.8	57.5	83.5	-26	PASS		48.6	63.5	-14.9	PASS	
12480.6	9.6	1.3	48.7	58.3	83.5	-25.2	PASS		50	63.5	-13.5	PASS	
13941.4	9.9	1.6	52.3	62.1	83.5	-21.4	PASS		53.9	63.5	-9.6	PASS	
17792.2	14.1	3.5	58.9	71.7	83.5	-10.6	PASS	-10.6	63.5	63.5	-1.2	Pass	-1.2

Curtis Straus - a Bureau Veritas Company Radiated Emissions Electric Field 1m Distance 6-18GHz Vertical Data Operator: CCH Notes: EUT is Transmitting 5g 802.11ac20 mcs8. Filtering 5725-5875MHz								Work Order - R2501 EUT Power Input - 13.8V DC Test Site - CH2 Conditions - 23.7°C; 25%RH; 1010mBar Witnessed by - Filtering 5725-5875MHz EUT Maximum Frequency - 802.11ac20 mcs8							
Frequency (MHz)	Raw Peak Reading (dBμV)	Raw Avg Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	PK Lim. FCC_pt15_1 09_ClassB_ Peak (dBμV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBμV/m)	AV Lim. FCC_pt15_1 09_ClassB_ AVG (dBμV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)		
10460.2	11.6	3.9	45.5	57.1	83.5	-26.4	PASS		49.4	63.5	-14.1	PASS			
10532.1	10.7	0.9	45.6	56.3	83.5	-27.2	PASS		46.5	63.5	-17	PASS			
11849.3	10.9	0.9	47.9	58.9	83.5	-24.6	PASS		48.8	63.5	-14.7	PASS			
12507.5	9.8	1.3	48.8	58.7	83.5	-24.8	PASS		50.2	63.5	-13.3	PASS			
14404.3	10.6	1.8	51.9	62.5	83.5	-21	PASS		53.7	63.5	-9.8	PASS			
17973.6	13	4.6	58.6	71.6	83.5	-11.9	PASS	-11.9	63.2	63.5	-0.3	PASS	-0.3		

**6-18GHz High Channel Unii 3**





Radiated Emissions Table															
Date: 20-Nov-17 Engineer: Chris Hamel Temp: 24.4°C				Company: Harman International EUT Desc: GEN3.1 MID VA Humidity: 26% Pressure: 996mBar					Work Order: R2501 EUT Operating Voltage/Frequency: 13.8V DC						
Frequency Range: 18-40GHz									Measurement Distance: 0.1 m						
Notes: No Emissions Found									EUT Max Freq:						
Antenna Polarization (H/V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average			
									Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	
Table Result: Pass by N/A dB									Worst Freq: N/A MHz						
Test Site: EMI Chamber 2 Analyzer: Gold				Cable 1: Asset #2323 Preamp: 18-26.5GHz					Cable 2: --- Antenna: 18-26.5GHz Horn			Cable 3: --- Preselector: ---			
CSsoft Radiated Emissions Calculator v 1.017.197 Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor														Copyright Curtis-Straus LLC 2000	
Test Site: EMI Chamber 2 Analyzer: Gold				Cable 1: Asset #2323 Preamp: 40GHz Mixer					Cable 2: Asset #2324 Antenna: 40GHz Mixer			Cable 3: --- Preselector: ---			
CSsoft Radiated Emissions Calculator v 1.017.197 Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor														Copyright Curtis-Straus LLC 2000	

### 18-40GHz Mid Channel Unii 3

Rev. 10/22/2017

<b>Spectrum Analyzers / Receivers / Preselectors</b>		<b>Range</b>	<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
Gold		100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	2/28/2018	2/28/2017
Rental MXE EMI Receiver(1170725)		20Hz-26.5GHz	N9038A	Agilent	MY51210151	1170725	I	12/22/2017	12/22/2016
<b>Radiated Emissions Sites</b>		<b>FCC Code</b>	<b>IC Code</b>	<b>VCCI Code</b>	<b>Range</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
EMI Chamber 2		719150	2762A-7	A-0015	30-1000MHz	1686	I	12/21/2018	12/21/2016
EMI Chamber 2		719150	2762A-7	A-0015	1-18GHz	1686	I	12/21/2018	12/21/2016
<b>Mixers/Duplexers</b>		<b>Range</b>	<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
Mixer / Horn		26.5-40 GHz	11970A	Agilent	3003A10230	2154	I	3/12/2019	3/12/2016
<b>Antennas</b>		<b>Range</b>	<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
Red-Black Bilog		30-2000MHz	JB1	Sunol	A091604-2	1106	I	2/28/2019	2/28/2017
HF (White) Horn		18-26.5GHz	801-VLM	Waveline	758	758	III	Verify before Use	date of test
Blue Horn		1-18Ghz	3117	ETS	157647	1861	I	2/14/2019	2/14/2017
<b>Meteorological Meters/Chambers</b>		<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>	
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	4/28/2018	4/28/2016	
TH A#2078		HTC-1	HDE		2078	II	3/23/2018	3/23/2017	
<b>Preamps/Couplers Attenuators / Filters</b>		<b>Range</b>	<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
Blue		0.009-2000MHz	ZFL-1000-LN	CS	N/A	759	II	5/9/2018	5/9/2017
2463 HF PA		5-18GHz	PAM-118A	COM-POWER	443005	2463	II	10/9/2018	10/9/2017
HF (Yellow)		18-26.5GHz	AFS4-18002650-60-8P-4	CS	467559	1266	II	10/16/2018	10/16/2017

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

### Test Equipment Used 30MHz – 40GHz



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## Radiated Band Edge

Radiated Emissions Table																			
Date: 07-Nov-17					Company: Harmon					Work Order: R2501									
Engineer: Aristotelis Casternopoulos					EUT Desc: VG4 FCC Mid					EUT Operating Voltage/Frequency: 12VDC									
Temp: 23.6					Humidity: 22%					Pressure: 1015									
Frequency Range: 1-6GHz										Measurement Distance: 3 m									
Notes: 5.0GHz 802.11a 20MHz Tx Power=Default										EUT Max Freq: None									
Antenna Polarization (H/V)	Frequency (MHz)	Peak Reading (dBuV)	Average Reading (dBuV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBuV/m)	Adjusted Avg Reading (dBuV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average							
									Limit (dBuV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBuV/m)	Margin (dB)	Result (Pass/Fail)					
Power=Default																			
Low Edge																			
V Max	5186.504	63.934		0.0	34.2	5.4	---	---	74.0	---	---	54.0	---	---					
H Max	5175.755	60.11		0.0	34.2	5.3	---	---	74.0	---	---	54.0	---	---					
V	5150.0	19.89	11.7	0.0	34.2	5.1	59.2	51.0	74.0	-14.8	Pass	54.0	-3.0	Pass					
V	5146.89	23.924	11.6	0.0	34.2	5.1	63.2	50.9	74.0	-10.8	Pass	54.0	-3.1	Pass					
V	5144.055	22.32	11.5	0.0	34.2	5.1	61.6	50.8	74.0	-12.4	Pass	54.0	-3.2	Pass					
High Edge																			
V Max	5242.399	64.367		0.0	34.2	5.4	---	---	74.0	---	---	54.0	---	---					
H Max	5244.717	62.025		0.0	34.2	5.4	---	---	74.0	---	---	54.0	---	---					
V	5350.0	17.301	11.1	0.0	34.3	5.2	56.8	50.6	74.0	-17.2	Pass	54.0	-3.4	Pass					
V	5381.46	18.108	10.8	0.0	34.3	5.1	57.5	50.2	74.0	-16.5	Pass	54.0	-3.8	Pass					
V	5427.465	18.888	10.7	0.0	34.4	5.2	58.5	50.3	74.0	-15.5	Pass	54.0	-3.7	Pass					
Table Result: Pass by -3.0 dB Worst Freq: 5150.0 MHz																			
Test Site: EMI Chamber 1					Cable 1: Asset #2456					Cable 2: Asset #2457					Cable 3: ---				
Analyzer: Rental SA#3					Preamp: None					Antenna: Blue Horn					Preselector: ---				
CSsoft Radiated Emissions Calculator v 1.017.197																			
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor																			
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## 802.11a 20MHz

Radiated Emissions Table																			
Date: 07-Nov-17					Company: Harmon					Work Order: R2501									
Engineer: Aristotelis Casternopoulos/NS					EUT Desc: VG4 FCC Mid					EUT Operating Voltage/Frequency: 12VDC									
Temp: 25					Humidity: 20%					Pressure: 1009									
Frequency Range: 1-6GHz										Measurement Distance: 3 m									
Notes: 5.0GHz 802.11ac 20MHz Tx Power=Default										EUT Max Freq: None									
Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBuV)	Average Reading (dBuV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBuV/m)	Adjusted Avg Reading (dBuV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average							
									Limit (dBuV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBuV/m)	Margin (dB)	Result (Pass/Fail)					
Power=Default				---	---	---	---	---	---	---	---	---	---	---					
Low Edge				---	---	---	---	---	---	---	---	---	---	---					
V Max	5183.031	60.087		0.0	34.2	5.4	---	---	74.0	---	---	54.0	---	---					
H Max	5183.129	55.911		0.0	34.2	5.4	---	---	74.0	---	---	54.0	---	---					
				---	---	---	---	---	---	---	---	---	---	---					
V	5150.0	16.361	6.8	0.0	34.2	5.1	55.7	46.1	74.0	-18.3	Pass	54.0	-7.9	Pass					
V	5083.055	20.263	6.8	0.0	34.1	4.9	59.3	45.8	74.0	-14.7	Pass	54.0	-8.2	Pass					
				---	---	---	---	---	---	---	---	---	---	---					
				---	---	---	---	---	---	---	---	---	---	---					
High Edge				---	---	---	---	---	---	---	---	---	---	---					
V Max	5237.19	58.17		0.0	34.2	5.4	---	---	74.0	---	---	54.0	---	---					
H Max	5237.327	54.3		0.0	34.2	5.4	---	---	74.0	---	---	54.0	---	---					
				---	---	---	---	---	---	---	---	---	---	---					
V	5350.0	15.9	6.7	0.0	34.3	5.2	55.4	46.2	74.0	-18.6	Pass	54.0	-7.8	Pass					
V	5386.36	18.857	6.6	0.0	34.3	5.1	58.3	46.0	74.0	-15.7	Pass	54.0	-8.0	Pass					
				---	---	---	---	---	---	---	---	---	---	---					
Table Result: Pass by -7.8 dB Worst Freq: 5350.0 MHz																			
Test Site: EMI Chamber 1					Cable 1: Asset #2456					Cable 2: Asset #2457					Cable 3: ---				
Analyzer: Rental SA#3					Preamp: None					Antenna: Blue Horn					Preselector: ---				
CSsoft Radiated Emissions Calculator v 1.017.197																			
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor																			
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## 802.11ac 20MHz

Radiated Emissions Table														
Date: 07-Nov-17			Company: Harmon						Work Order: R2501					
Engineer: Aristotelis Castemopoulos/NS			EUT Desc: VG4 FCC Mid						EUT Operating Voltage/Frequency: 12VDC					
Temp: 25C			Humidity: 20%						Pressure: 1009mBar					
Frequency Range: 1-6GHz									Measurement Distance: 3 m					
Notes: 5.0GHz 802.11ac 40MHz Tx Power=Default									EUT Max Freq: None					
Antenna Polarization (H/V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dBm)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average		
									Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
Power=Default														
Low Edge														
V Max	5188.685	61.8		0.0	34.2	5.4			74.0			54.0		
H Max	5199.46	57.64		0.0	34.2	5.5			74.0			54.0		
V	5150.0	17.02	7.6	0.0	34.2	5.1	56.3	46.9	74.0	-17.7	Pass	54.0	-7.1	Pass
V	5147.7	19.38	7.4	0.0	34.2	5.1	58.7	46.7	74.0	-15.3	Pass	54.0	-7.3	Pass
High Edge														
V Max	5240.452	62.516		0.0	34.2	5.4			74.0			54.0		
H Max	5237.715	59.245		0.0	34.2	5.4			74.0			54.0		
V	5350.0	15.82	6.7	0.0	34.3	5.2	55.3	46.2	74.0	-18.7	Pass	54.0	-7.8	Pass
V	5439.0	18.56	6.7	0.0	34.4	5.3	58.3	46.4	74.0	-15.7	Pass	54.0	-7.6	Pass
Table Result:				Pass by -7.1 dB					Worst Freq: 5150.0 MHz					
Test Site: EMI Chamber 1			Cable 1: Asset #2456						Cable 2: Asset #2457			Cable 3: ---		
Analyzer: Rental SA#3			Preamp: None						Antenna: Blue Horn			Preselector: ---		
CSsoft Radiated Emissions Calculator v 1.017.197														
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor														
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## 802.11ac 40MHz

Radiated Emissions Table														
Date: 07-Nov-17			Company: Harmon						Work Order: R2501					
Engineer: Aristotelis Castemopoulos/NS			EUT Desc: VG4 FCC Mid						EUT Operating Voltage/Frequency: 12VDC					
Temp: 25C			Humidity: 20%						Pressure: 1009mBar					
Frequency Range: 1-6GHz									Measurement Distance: 3 m					
Notes: 5.0GHz 802.11ac 80MHz Tx Power=Default									EUT Max Freq: None					
Antenna Polarization (H/V)	Frequency (MHz)	Peak Reading (dBμV)	Average Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBμV/m)	Adjusted Avg Reading (dBμV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average		
									Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)
Power=Default				---	---	---	---	---	---	---	---	---	---	---
Low Edge				---	---	---	---	---	---	---	---	---	---	---
V Max	5226.79	56.8		0.0	34.2	5.4			74.0			54.0		
H Max	5240.65	54.1		0.0	34.2	5.4			74.0			54.0		
				---	---	---	---	---	---	---	---	---	---	---
V	5150.0	16.938	6.7	0.0	34.2	5.1	56.2	46.0	74.0	-17.8	Pass	54.0	-8.0	Pass
V	5137.47	18.37	7.1	0.0	34.2	5.1	57.7	46.4	74.0	-16.3	Pass	54.0	-7.6	Pass
				---	---	---	---	---	---	---	---	---	---	---
High Edge				---	---	---	---	---	---	---	---	---	---	---
V Max	5226.79	56.8		0.0	34.2	5.4			74.0			54.0		
H Max	5240.65	54.1		0.0	34.2	5.4			74.0			54.0		
				---	---	---	---	---	---	---	---	---	---	---
V	5350.0	15.866	6.7	0.0	34.3	5.2	55.4	46.2	74.0	-18.6	Pass	54.0	-7.8	Pass
V	5396.81	17.619	6.7	0.0	34.3	5.1	57.0	46.1	74.0	-17.0	Pass	54.0	-7.9	Pass
Table Result: Pass by -7.6 dB Worst Freq: 5137.47 MHz														
Test Site: EMI Chamber 1			Cable 1: Asset #2456			Cable 2: Asset #2457			Cable 3: ---					
Analyzer: Rental SA#3			Preamp: None			Antenna: Blue Horn			Preselector: ---					
CSsoft Radiated Emissions Calculator v 1.017.197														
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor														
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## 802.11ac 80MHz



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Radiated Emissions Table																			
Date: 07-Nov-17					Company: Harmon					Work Order: R2501									
Engineer: Aristotelis Casternopoulos/NS					EUT Desc: VG4 FCC Mid					EUT Operating Voltage/Frequency: 12VDC									
Temp: 25C					Humidity: 20%					Pressure: 1009mBar									
Frequency Range: 1-6GHz										Measurement Distance: 3 m									
Notes: 5.0GHz 802.11 N 20MHz Tx Power=Default										EUT Max Freq: None									
Antenna Polarization (H/V)	Frequency (MHz)	Peak Reading (dBμV)	Average Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBμV/m)	Adjusted Avg Reading (dBμV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average							
									Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)					
Power=Default																			
Low Edge																			
V Max	5184.0	66.08		0.0	34.2	5.4			74.0			54.0							
H Max	5179.0	63.351		0.0	34.2	5.4			74.0			54.0							
V	5150.0	19.03	10.2	0.0	34.2	5.1	58.3	49.5	74.0	-15.7	Pass	54.0	-4.5	Pass					
V	5147.8	21.974	9.9	0.0	34.2	5.1	61.3	49.2	74.0	-12.7	Pass	54.0	-4.8	Pass					
High Edge																			
V Max	5244.2	66.272		0.0	34.2	5.4			74.0			54.0							
H Max	5244.6	62.2		0.0	34.2	5.4			74.0			54.0							
V	5350.0	18.02	9.0	0.0	34.3	5.2	57.5	48.5	74.0	-16.5	Pass	54.0	-5.5	Pass					
V	5399.3	19.998	8.7	0.0	34.3	5.1	59.4	48.1	74.0	-14.6	Pass	54.0	-5.9	Pass					
Table Result:					Pass by -4.5 dB					Worst Freq: 5150.0 MHz									
Test Site: EMI Chamber 1					Cable 1: Asset #2456					Cable 2: Asset #2457					Cable 3: ---				
Analyzer: Rental SA#3					Preamp: None					Antenna: Blue Horn					Preselector: ---				
CSsoft Radiated Emissions Calculator v 1.017.197																			
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor																			
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802.11n 20MHz

Radiated Emissions Table														
Date: 07-Nov-17			Company: Harmon						Work Order: R2501					
Engineer: Nirak So			EUT Desc: VG4 FCC Mid						EUT Operating Voltage/Frequency: 12VDC					
Temp: 25C			Humidity: 20%						Pressure: 1009mBar					
Frequency Range: 1-6GHz									Measurement Distance: 3 m					
Notes: 5.0GHz 802.11 N 40 MHz Tx Power=Default									EUT Max Freq: None					
Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average		
									Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
Power=70														
Low Edge														
V Max	5188.6	59.6		0.0	34.2	5.4			74.0			54.0		
H Max	5200.2	56.975		0.0	34.2	5.5			74.0			54.0		
V	5150.0	19.5	10.2	0.0	34.2	5.1	58.8	49.5	74.0	-15.2	Pass	54.0	-4.5	Pass
V	5147.1	21.9	9.8	0.0	34.2	5.1	61.2	49.1	74.0	-12.8	Pass	54.0	-4.9	Pass
Power=Default														
High Edge														
V Max	5235.7	63.5		0.0	34.2	5.4			74.0			54.0		
H Max	5233.0	60.2		0.0	34.2	5.4			74.0			54.0		
V	5350.0	18.09	8.7	0.0	34.3	5.2	57.6	48.2	74.0	-16.4	Pass	54.0	-5.8	Pass
V	5392.0	20.3	8.7	0.0	34.3	5.1	59.7	48.1	74.0	-14.3	Pass	54.0	-5.9	Pass
Power=70														
High Edge														
V Max	5239.0	60.821		0.0	34.2	5.4			74.0			54.0		
H Max	5240.0	59.9		0.0	34.2	5.4			74.0			54.0		
V	5350.0	18.2	8.7	0.0	34.3	5.2	57.7	48.2	74.0	-16.3	Pass	54.0	-5.8	Pass
V	5386.0	20.156	8.7	0.0	34.3	5.1	59.6	48.1	74.0	-14.4	Pass	54.0	-5.9	Pass
Table Result: Pass by -4.5 dB Worst Freq: 5150.0 MHz														
Test Site: EMI Chamber 1			Cable 1: Asset #2456			Cable 2: Asset #2457			Cable 3: ---					
Analyzer: Rental SA#3			Preamp: None			Antenna: Blue Horn			Preselector: ---					
CSsoft Radiated Emissions Calculator v 1.017.197														
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor														
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802.11n 40MHz



Radiated Emissions Table														
Date: 07-Nov-17			Company: Harman			Work Order: R2501								
Engineer: Chris Hamel			EUT Desc: NA Mid			EUT Operating Voltage/Frequency: 13.8V DC								
Temp: 24.2°C			Humidity: 40%			Pressure: 1016mBar								
Frequency Range:									Measurement Distance: 3 m					
Notes: 802.11A 6Mbps Reduced power to 47									EUT Max Freq:					
Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBμV)	Average Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBμV/m)	Adjusted Avg Reading (dBμV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average		
									Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)
Low				---	---	---	---	---	---	---	---	---	---	---
Max H	5743.3	61.2		0.0	33.8	5.7	---	---	74.0	---	---	54.0	---	---
Max V	5743.6	61.2		0.0	33.8	5.7	---	---	74.0	---	---	54.0	---	---
V	5725.0	26.3	11.4	0.0	33.8	5.6	65.7	50.8	74.0	-8.3	Pass	54.0	-3.2	Pass
V	5723.2	25.7	9.6	0.0	33.8	5.6	65.1	49.0	74.0	-8.9	Pass	54.0	-5.0	Pass
V	5722.7	24.3	9.1	0.0	33.8	5.6	63.7	48.5	74.0	-10.3	Pass	54.0	-5.5	Pass
V	5722.0	23.4	8.3	0.0	33.8	5.6	62.8	47.7	74.0	-11.2	Pass	54.0	-6.3	Pass
High				---	---	---	---	---	---	---	---	---	---	---
Max H	5820.9	60.7		0.0	33.8	5.8	---	---	74.0	---	---	54.0	---	---
Max V	5831.3	62.0		0.0	33.9	5.7	---	---	74.0	---	---	54.0	---	---
V	5850.0	15.1	7.6	0.0	33.9	5.6	54.6	47.1	74.0	-19.4	Pass	54.0	-6.9	Pass
V	5851.0	20.5	7.3	0.0	33.9	5.6	60.0	46.8	74.0	-14.0	Pass	54.0	-7.2	Pass
V	5900.0	19.3	7.8	0.0	34.0	5.3	58.6	47.1	74.0	-15.4	Pass	54.0	-6.9	Pass
Table Result: Pass by -3.2 dB Worst Freq: 5725.0 MHz														
Test Site: EMI Chamber 2			Cable 1: Asset #2458			Cable 2: Asset #2459			Cable 3: ---					
Analyzer: Rental SA#3			Preamp: None			Antenna: Orange Horn			Preselector: ---					
CSsoft Radiated Emissions Calculator v 1.017.197														
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor														
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### 802.11a 20MHz Unii 3

Radiated Emissions Table																			
Date: 08-Nov-17					Company: Harman					Work Order: R2501									
Engineer: Chris Hamel					EUT Desc: NA Mid					EUT Operating Voltage/Frequency: 13.8V DC									
Temp: 24.2°C					Humidity: 40%					Pressure: 1016mBar									
Frequency Range:										Measurement Distance: 3 m									
Notes: 802.11AC20 MCS 0 Reduced power to 52										EUT Max Freq:									
Antenna Polarization (H/V)	Frequency (MHz)	Peak Reading (dBμV)	Average Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBμV/m)	Adjusted Avg Reading (dBμV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average							
									Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)					
Low				---	---	---	---	---	---	---	---	---	---	---					
Max V	5738.5	61.6		0.0	33.8	5.7	---	---	74.0	---	---	54.0	---	---					
Max H	5746.3	62.1		0.0	33.8	5.7	---	---	74.0	---	---	54.0	---	---					
H	5725.0	19.7	10.5	0.0	33.8	5.6	59.1	49.9	74.0	-14.9	Pass	54.0	-4.1	Pass					
H	5724.7	22.6	10.0	0.0	33.8	5.6	62.0	49.4	74.0	-12.0	Pass	54.0	-4.6	Pass					
H	5721.4	26.9	8.2	0.0	33.8	5.6	66.3	47.6	74.0	-7.7	Pass	54.0	-6.4	Pass					
H	5723.6	29.6	9.4	0.0	33.8	5.6	69.0	48.8	74.0	-5.0	Pass	54.0	-5.2	Pass					
				---	---	---	---	---	---	---	---	---	---	---					
High				---	---	---	---	---	---	---	---	---	---	---					
Max H	5820.6	59.8		0.0	33.8	5.8	---	---	74.0	---	---	54.0	---	---					
Max V	5826.5	61.0		0.0	33.9	5.7	---	---	74.0	---	---	54.0	---	---					
V	5850.0	20.1	9.6	0.0	33.9	5.6	59.6	49.1	74.0	-14.4	Pass	54.0	-4.9	Pass					
V	5910.5	20.0	9.0	0.0	34.0	5.3	59.3	48.3	74.0	-14.7	Pass	54.0	-5.7	Pass					
V	5885.4	18.0	6.3	0.0	34.0	5.4	57.4	45.7	74.0	-16.6	Pass	54.0	-8.3	Pass					
Table Result: Pass by -4.1 dB Worst Freq: 5725.0 MHz																			
Test Site: EMI Chamber 2					Cable 1: Asset #2458					Cable 2: Asset #2459					Cable 3: ---				
Analyzer: Rental SA#3					Preamp: None					Antenna: Orange Horn					Preselector: ---				
CSsoft Radiated Emissions Calculator v 1.017.197																			
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor																			
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### 802.11ac 20MHz Unii 3



Radiated Emissions Table														
Date: 08-Nov-17			Company: Harman			Work Order: R2501								
Engineer: Chris Hamel			EUT Desc: NA Mid			EUT Operating Voltage/Frequency: 13.8V DC								
Temp: 24.2°C			Humidity: 40%			Pressure: 1016mBar								
Frequency Range:									Measurement Distance: 3 m					
Notes: 802.11AC 40 MCS 0 Reduced Power to 50									EUT Max Freq:					
Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBμV)	Average Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBμV/m)	Adjusted Avg Reading (dBμV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average		
									Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)
Low				---	---	---	---	---	---	---	---	---	---	---
MaxH	5749.3	58.3		0.0	33.8	5.7	---	---	74.0	---	---	54.0	---	---
MaxV	5761.3	58.6		0.0	33.8	5.8	---	---	74.0	---	---	54.0	---	---
V	5725.0	20.2	10.9	0.0	33.8	5.6	59.6	50.3	74.0	-14.4	Pass	54.0	-3.7	Pass
V	5722.9	27.2	10.4	0.0	33.8	5.6	66.6	49.8	74.0	-7.4	Pass	54.0	-4.2	Pass
V	5714.4	26.8	8.6	0.0	33.8	5.6	66.2	48.0	74.0	-7.8	Pass	54.0	-6.0	Pass
V	5710.8	26.1	7.7	0.0	33.8	5.6	65.5	47.1	74.0	-8.5	Pass	54.0	-6.9	Pass
High				---	---	---	---	---	---	---	---	---	---	---
MaxH	5801.2	58.6		0.0	33.8	5.9	---	---	74.0	---	---	54.0	---	---
Max V	5801.3	58.6		0.0	33.8	5.9	---	---	74.0	---	---	54.0	---	---
V	5850.0	15.1	7.3	0.0	33.9	5.6	54.6	46.8	74.0	-19.4	Pass	54.0	-7.2	Pass
V	5879.6	19.2	6.9	0.0	33.9	5.4	58.5	46.2	74.0	-15.5	Pass	54.0	-7.8	Pass
V	5867.6	20.3	7.0	0.0	33.9	5.5	59.7	46.4	74.0	-14.3	Pass	54.0	-7.6	Pass
Table Result: Pass by -3.7 dB									Worst Freq: 5725.0 MHz					
Test Site: EMI Chamber 2			Cable 1: Asset #2458			Cable 2: Asset #2459			Cable 3: ---					
Analyzer: Rental SA#3			Preamp: None			Antenna: Orange Horn			Preselector: ---					
CSsoft Radiated Emissions Calculator v 1.017.197														
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor														
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802.11ac 40MHz Unii 3

Radiated Emissions Table																			
Date: 08-Nov-17				Company: Harman				Work Order: R2501											
Engineer: Chris Hamel				EUT Desc: NA Mid				EUT Operating Voltage/Frequency: 13.8V DC											
Temp: 24.2°C				Humidity: 40%				Pressure: 1016mBar											
Frequency Range:									Measurement Distance: 3 m										
Notes: 802.11AC 80 MCS 0									EUT Max Freq:										
Antenna Polarization (H/V)	Frequency (MHz)	Peak Reading (dBμV)	Average Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBμV/m)	Adjusted Avg Reading (dBμV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average							
									Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)					
Low				---	---	---	---	---	---	---	---	---	---	---					
Max V	5788.7	52.3		0.0	33.8	5.9	---	---	74.0	---	---	54.0	---	---					
Max H	5755.4	51.7		0.0	33.8	5.7	---	---	74.0	---	---	54.0	---	---					
V	5725.0	13.1	6.1	0.0	33.8	5.6	52.5	45.5	74.0	-21.5	Pass	54.0	-8.5	Pass					
V	5724.7	20.0	6.1	0.0	33.8	5.6	59.4	45.5	74.0	-14.6	Pass	54.0	-8.5	Pass					
				---	---	---	---	---	---	---	---	---	---	---					
High				---	---	---	---	---	---	---	---	---	---	---					
Max V	5788.7	52.3		0.0	33.8	5.9	---	---	74.0	---	---	54.0	---	---					
Max H	5755.4	51.7		0.0	33.8	5.7	---	---	74.0	---	---	54.0	---	---					
V	5850.0	13.5	6.6	0.0	33.9	5.6	53.0	46.1	74.0	-21.0	Pass	54.0	-7.9	Pass					
V	5856.4	18.2	6.6	0.0	33.9	5.5	57.6	46.0	74.0	-16.4	Pass	54.0	-8.0	Pass					
Table Result: Pass by -7.9 dB Worst Freq: 5850.0 MHz																			
Test Site: EMI Chamber 2					Cable 1: Asset #2458					Cable 2: Asset #2459					Cable 3: ---				
Analyzer: Rental SA#3					Preamp: None					Antenna: Orange Horn					Preselector: ---				
CSsoft Radiated Emissions Calculator v 1.017.197																			
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor																			
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802.11ac 80MHz Unii 3

Radiated Emissions Table																			
Date: 08-Nov-17 Engineer: Chris Hamel Temp: 24.2°C				Company: Harman EUT Desc: NA Mid Humidity: 40%				Work Order: R2501 EUT Operating Voltage/Frequency: 13.8V DC Pressure: 1016mBar											
Frequency Range:									Measurement Distance: 3 m										
Notes: 802.11n 20 MCS 0 reduced power to 50									EUT Max Freq:										
Antenna Polarization (H/V)	Frequency (MHz)	Peak Reading (dBμV)	Average Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBμV/m)	Adjusted Avg Reading (dBμV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average							
									Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)					
Low																			
Max H	5741.6	63.3		0.0	33.8	5.7	---	---	74.0	---	---	54.0	---	---					
Max V	5740.8	60.9		0.0	33.8	5.7	---	---	74.0	---	---	54.0	---	---					
H	5725.0	20.3	10.4	0.0	33.8	5.6	59.7	49.8	74.0	-14.3	Pass	54.0	-4.2	Pass					
H	5724.8	27.9	10.3	0.0	33.8	5.6	67.3	49.7	74.0	-6.7	Pass	54.0	-4.3	Pass					
H	5723.3	24.8	9.3	0.0	33.8	5.6	64.2	48.7	74.0	-9.8	Pass	54.0	-5.3	Pass					
High																			
Max H	5873.0	61.0		0.0	33.9	5.4	---	---	74.0	---	---	54.0	---	---					
Max V	5829.9	62.4		0.0	33.9	5.7	---	---	74.0	---	---	54.0	---	---					
V	5850.0	24.4	9.6	0.0	33.9	5.6	63.9	49.1	74.0	-10.1	Pass	54.0	-4.9	Pass					
V	5851.8	22.3	7.9	0.0	33.9	5.6	61.8	47.4	74.0	-12.2	Pass	54.0	-6.6	Pass					
V	5906.8	19.8	8.3	0.0	34.0	5.3	59.1	47.6	74.0	-14.9	Pass	54.0	-6.4	Pass					
Table Result: Pass by -4.2 dB Worst Freq: 5725.0 MHz																			
Test Site: EMI Chamber 2					Cable 1: Asset #2458					Cable 2: Asset #2459					Cable 3: ---				
Analyzer: Rental SA#3					Preamp: None					Antenna: Orange Horn					Preselector: ---				
CSsoft Radiated Emissions Calculator v 1.017.197																			
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor																			
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### 802.11n 20MHz Unii 3

Radiated Emissions Table														
Date: 08-Nov-17 Engineer: Chris Hamel Temp: 24.2°C				Company: Harman EUT Desc: NA Mid Humidity: 40%				Work Order: R2501 EUT Operating Voltage/Frequency: 13.8V DC Pressure: 1016mBar						
Frequency Range:								Measurement Distance: 3 m						
Notes: 802.11n 40 MCS 0 reduced power to 52								EUT Max Freq:						
Antenna Polarization (H/V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average		
									Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
Low				---	---	---	---	---	---	---	---	---	---	---
Max V	5761.1	58.0		0.0	33.8	5.8	---	---	74.0	---	---	54.0	---	---
Max H	5752.0	58.8		0.0	33.8	5.7	---	---	74.0	---	---	54.0	---	---
H	5725.0	18.4	10.6	0.0	33.8	5.6	57.8	50.0	74.0	-16.2	Pass	54.0	-4.0	Pass
H	5720.3	28.9	10.0	0.0	33.8	5.6	68.3	49.4	74.0	-5.7	Pass	54.0	-4.6	Pass
H	5724.3	23.3	10.5	0.0	33.8	5.6	62.7	49.9	74.0	-11.3	Pass	54.0	-4.1	Pass
H	5724.0	27.5	10.4	0.0	33.8	5.6	66.9	49.8	74.0	-7.1	Pass	54.0	-4.2	Pass
				---	---	---	---	---	---	---	---	---	---	---
High				---	---	---	---	---	---	---	---	---	---	---
Max H	5809.0	56.5		0.0	33.8	5.8	---	---	74.0	---	---	54.0	---	---
Max V	5793.1	55.9		0.0	33.8	5.9	---	---	74.0	---	---	54.0	---	---
H	5850.0	13.9	6.5	0.0	33.9	5.6	53.4	46.0	74.0	-20.6	Pass	54.0	-8.0	Pass
H	5876.4	19.4	6.4	0.0	33.9	5.4	58.7	45.7	74.0	-15.3	Pass	54.0	-8.3	Pass
Table Result: Pass by -4.0 dB Worst Freq: 5725.0 MHz														
Test Site: EMI Chamber 2				Cable 1: Asset #2458				Cable 2: Asset #2459				Cable 3: ---		
Analyzer: Rental SA#3				Preamp: None				Antenna: Orange Horn				Preselector: ---		
CSsoft Radiated Emissions Calculator v 1.017.197 Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor														
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### 802.11n 40MHz Unii 3



**Test Report for Harman International Industries, Incorporated • GEN3.1 MID VA • Report No. ER2501-11 •  
November 30, 2017**

Rev. 11/5/2017

<b>Spectrum Analyzers / Receivers/Preselectors</b>	<b>Range</b>	<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
Rental MXE EMI Receiver(1170725)	20Hz-26.5GHz	N9038A	Agilent	MY51210151	1170725	I	12/22/2017	12/22/2016
<b>Radiated Emissions Sites</b>	<b>FCC Code</b>	<b>IC Code</b>	<b>VCCI Code</b>	<b>Range</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
EMI Chamber 1	719150	2762A-6	A-0015	30-1000MHz	1685	I	12/21/2018	12/21/2016
<b>Antennas</b>	<b>Range</b>	<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
Blue Horn	1-18GHz	3117	ETS	157647	1861	I	2/14/2019	2/14/2017
<b>Meteorological Meters/Chambers</b>		<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	4/28/2018	4/28/2016
TH A#2081		HTC-1	HDE		2081	II	3/23/2018	3/23/2017
<b>Cables</b>	<b>Range</b>		<b>Mfr</b>			<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
Asset #2456	9KHz-18GHz		MegaPhase			II	10/29/2018	10/29/2017
Asset #2457	9KHz-18GHz		MegaPhase			II	10/29/2018	10/29/2017

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

### Unii 1

<b>Spectrum Analyzers / Receivers/Preselectors</b>	<b>Range</b>	<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
Rental MXE EMI Receiver(1168255)	20Hz-8.4GHz	N9038A	Agilent	MY53290009	1168255	I	8/15/2018	8/15/2017
<b>Radiated Emissions Sites</b>	<b>FCC Code</b>	<b>IC Code</b>	<b>VCCI Code</b>	<b>Range</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
EMI Chamber 2	719150	2762A-7	A-0015	1-18GHz	1686	I	12/21/2018	12/21/2016
<b>Antennas</b>	<b>Range</b>	<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
Orange Horn	1-18GHz	3115	EMCO	0004-6123	390	I	10/13/2018	10/13/2016
<b>Meteorological Meters/Chambers</b>		<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	4/28/2018	4/28/2016
TH A#2085		HTC-1	HDE		2085	II	3/23/2018	3/23/2017
<b>Cables</b>	<b>Range</b>		<b>Mfr</b>			<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
Asset #2468	9KHz-18GHz		MegaPhase			II	10/29/2018	10/29/2017
Asset #2469	9KHz-18GHz		Florida RF			II	11/4/2018	11/4/2017

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

### Unii 3

### Bandedge Test Equipment Used



**Curtis-Straus LLC, a wholly owned subsidiary of BV CPS**  
One Distribution Center Circle, #1 • Littleton, MA • TEL (978) 486-8880 • FAX (978) 486-8828





## AC Line Conducted Emissions LIMITS

Frequency of emission (MHz)	Quasi-peak limit (dB $\mu$ V)	Average limit (dB $\mu$ V)
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.

[47 CFR 15.207(a)]

## MEASUREMENTS / RESULTS

N/A, EUT is vehicle battery powered only.

## Measurement Uncertainty

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

Measurement	Expanded Uncertainty k=2	Maximum allowable uncertainty
Radiated Emissions (30-1000MHz)		
NIST	5.6dB	N/A
CISPR	4.6dB	5.2dB (Ucispri)
Radiated Emissions (1-26.5GHz)	4.6dB	N/A
Radiated Emissions (above 26.5GHz)	4.9dB	N/A
Magnetic Radiated Emissions	5.6dB	N/A
Conducted Emissions		
NIST	3.9dB	N/A
CISPR	3.6dB	3.6dB (Ucispri)
Telco Conducted Emissions (Current)	2.9dB	N/A
Telco Conducted Emissions (Voltage)	4.4dB	N/A
Electrostatic Discharge	11.5%	N/A
Radiated RF Immunity (Uniform Field)	1.6dB	N/A
Electrical Fast Transients	23.1%	N/A
Surge	23.1%	N/A
Conducted RF Immunity	3dB	N/A
Magnetic Immunity	12.8%	N/A
Dips and Interrupts	2.3V	N/A
Harmonics	3.5%	N/A
Flicker	3.5%	N/A
Radio frequency (@ 2.4GHz)	$3.23 \times 10^{-8}$	$1 \times 10^{-7}$
RF power, conducted	0.40dB	0.75dB
Maximum frequency deviation:		
• Within 300Hz and 6kHz of audio frequency / Within 6kHz and 25kHz of audio frequency	3.4% 0.3dB	5% 3dB
Adjacent channel power	1.9dB	3dB
Conducted spurious emission of transmitter, valid up to 12.75GHz	2.39dB	3dB
Conducted emission of receivers	1.3dB	3dB
Radiated emission of transmitter, valid up to 26.5GHz	3.9dB	6dB
Radiated emission of transmitter, valid up to 80GHz	3.3dB	6dB
Radiated emission of receiver, valid up to 26.5GHz	3.9dB	6dB
Radiated emission of receiver, valid up to 80GHz	3.3dB	6dB
Humidity	2.37%	5%
Temperature	0.7°C	1.0°C
Time	4.1%	10%
RF Power Density, Conducted	0.4dB	3dB
DC and low frequency voltages	1.3%	3%
Voltage (AC, <10kHz)	1.3%	2%
Voltage (DC)	0.62%	1%
The above reflects a 95% confidence level		



## Conditions Of Testing

[Bureau Veritas Consumer Products Services, Inc., a Massachusetts corporation], and/or its affiliates (collectively, the "Company") will conduct, at the request of the Submitter ("Client"), the tests specified on the submitted Test Request Form or equivalent in accordance with, and subject to, the following terms and conditions (collectively, "Conditions"):

1. All orders for tests are subject to acceptance by the Company, and no order will constitute a binding commitment of the Company unless and until such order is accepted by it, as evidenced by the issuance of a written report ("Test Report") by the Company. The Test Report is issued solely by the Company, is intended for the exclusive use of Client and shall not be published, used for advertising purposes, copied or replicated for distribution to any other person or entity or otherwise publicly disclosed without the prior written consent of the Company. By submitting a request for services to the Company, Client consents to the disclosure to accreditation bodies of those records of Client relevant to the accreditation body's assessment of the Company's competence and compliance with relevant accreditation criteria. The Company shall not be liable for any loss or damage whatsoever resulting from the failure of the Company to provide its services within any time period for completion estimated by the Company. If Client anticipates using the Test Report in any legal proceeding, arbitration, dispute resolution forum or other proceeding, it shall so notify the Company prior to submitting the Test Report in such proceeding. The Company has no obligation to provide a fact or expert witness at such proceeding unless the Company agrees in advance to do so for a separate and additional fee.
2. The Test Report will set forth the findings of the Company solely with respect to the test samples identified therein. Unless specifically and expressly indicated in the Test Report, the results set forth in such Test Report are not intended to be indicative or representative of the quality or characteristics of the lot from which a test sample is taken, and Client shall not rely upon the Test Report as being so indicative or representative of the lot or of the tested product in general. The Test Report will reflect the findings of the Company at the time of testing only, and the Company shall have no obligation to update the Test Report after its issuance. The Test Report will set forth the results of the tests performed by the Company based upon the written information provided to the Company. The Test Report will be based solely on the samples and written information submitted to the Company by Client, and the Company shall not be obligated to conduct any independent investigation or inquiry with respect thereto.
3. The Company may, in its sole discretion, destroy samples which have been furnished to the Company for testing and which have not been destroyed in the course of testing. The Company may delegate the performance of all or a portion of the services contemplated hereunder to an affiliate, agent or subcontractor of the Company, and Client consents to such delegation.
4. These Conditions and the Test Report represent the entire understanding of the parties hereto with respect to the subject matter hereof and of the Test Report, and no modification, variance or extrapolation with respect thereto shall be permitted without the prior written consent of the Company.
5. The names, service marks, trademarks and copyrights of the Company and its affiliates, including the names "BUREAU VERITAS," "BUREAU VERITAS CONSUMER PRODUCTS SERVICES," "BVCPs", "MTL", "ACTS", "MTL-ACTS" and CURTIS-STRAUS (collectively, the "Marks") are and shall remain the sole property of the Company or its affiliates and shall not be used by Client except solely to the extent that Client obtains the prior written approval of the Company and then only in the manner prescribed by the Company. Client shall not contest the validity of the Marks or take any action that might impair the value or goodwill associated with the Marks or the image or reputation of the Company or its affiliates.
6. Payment in full shall be due 30 days after the date of invoice. Interest shall be due on overdue amounts from the due date until paid at an interest rate of 1.5% per month or, if less, the maximum rate permitted by law. The Company reserves the right, at any time and from time to time, to revoke any credit extended to Client. Client shall reimburse the Company for any costs it incurs in collecting past due amounts, including court costs and fees and expenses of attorneys and collection agencies. The Test Report may not be used or relied upon by Client if and for so long as Client fails to pay when due any invoice issued by the Company or any affiliate of it to Client or any affiliate or subsidiary of Client together with interest and penalties, if any, accrued thereon.
7. The Company disclaims any and all responsibility or liability arising out of or in connection with e-mail transmissions of such information.
8. Client understands and agrees that the Company is neither an insurer nor a guarantor, that the Company does not take the place of Client or any designer, manufacturer, agent, buyer, distributor or transportation or shipping company, and that the Company disclaims all liability in such capacities. Client further understands that if it seeks assurance against loss or damage, it should obtain appropriate insurance.
9. Client agrees that the Company, by providing the services, does not take the place of Client nor any third party, nor does the Company release them from any of their obligations, nor does the Company otherwise assume, abridge, abrogate or undertake to discharge any duty of any third party to Client or any duty of Client or any third party to any other third party, and Client will not release any third party from its obligations and duties with respect to the tested goods.
10. Client shall, on a timely basis, (a) provide adequate instructions to the Company in order to enable the Company to perform properly its services, (b) provide, or cause Client's suppliers and contractors to provide, the Company with all documents necessary to enable the Company to perform its services, (c) furnish the Company with all relevant information regarding Client's intended use and purposes of the tested goods, (d) advise the Company of essential dates and deadlines relevant to the tested goods and (e) fully exercise all rights and remedies available to Client against third parties in respect of the tested goods.
11. The Company shall undertake due care and ordinary skill in the performance of its services to Client, and the Company shall accept responsibility only where such skill has not been exercised and, even in such event, only to the extent of the limitation of liability set forth herein.
12. If Client desires to assert a claim arising from or relating to (i) the performance, purported performance or non-performance of any services by the Company or (ii) the sale, resale, manufacture, distribution or use of any tested goods, it must submit that claim to the Company in a writing that sets forth with particularity the basis for such claim within 60 days from discovery of the potential claim and not more than six months after the date of issuance of the Test Report to Client. Client waives any and all such claims including, without limitation, claims that the Test Report is inaccurate, incomplete or misleading or that additional or different testing is required, unless and then only to the extent that Client submits a written claim to the Company within both such time periods.
13. CLIENT SHALL, EXCEPT TO THE EXTENT OF COMPANY'S LIABILITY TO CLIENT HEREUNDER (WHICH IN NO EVENT SHALL EXCEED THE LIMITATION OF LIABILITY HEREIN), HOLD HARMLESS AND INDEMNIFY THE COMPANY, ITS AFFILIATES AND THEIR RESPECTIVE DIRECTORS, OFFICERS, EMPLOYEES, AGENTS AND SUBCONTRACTORS AGAINST ALL ACTUAL OR ALLEGED THIRD PARTY CLAIMS FOR LOSS, DAMAGE OR EXPENSE OF WHATSOEVER NATURE AND HOWSOEVER ARISING FROM OR RELATING TO (i) THE PERFORMANCE, PURPORTED PERFORMANCE OR NON-PERFORMANCE OF ANY SERVICES BY THE COMPANY OR (ii) THE SALE, RESALE, MANUFACTURE, DISTRIBUTION OR USE OF ANY TESTED GOODS.



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14. EXCEPT AS MAY OTHERWISE BE EXPRESSLY AGREED TO IN WRITING BY THE COMPANY AND NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN OR IN ANY TEST REPORT, NO WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, IS MADE.

15. (A) IN NO EVENT WHATSOEVER SHALL THE COMPANY BE LIABLE FOR ANY CONSEQUENTIAL, SPECIAL, INCIDENTAL, EXEMPLARY OR PUNITIVE DAMAGES IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE TEST REPORT OR THE SERVICES PROVIDED BY THE COMPANY HEREUNDER, INCLUDING WITHOUT LIMITATION LOSS OF OR DAMAGE TO PROPERTY; LOSS OF INCOME, PROFIT OR USE; OR ANY CLAIMS OR DEMANDS MADE AGAINST CLIENT OR ANY OTHER PERSON BY ANY THIRD PARTY IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE SERVICES PROVIDED BY THE COMPANY HEREUNDER.

(B) NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN, AND IN RECOGNITION OF THE RELATIVE RISKS AND BENEFITS TO CLIENT AND THE COMPANY ASSOCIATED WITH THE TESTING SERVICES CONTEMPLATED HEREBY, THE RISKS HAVE BEEN ALLOCATED SUCH THAT UNDER NO CIRCUMSTANCES WHATSOEVER SHALL THE LIABILITY OF THE COMPANY TO CLIENT OR ANY THIRD PARTY IN RESPECT OF ANY CLAIM FOR LOSS, DAMAGE OR EXPENSE, OF WHATSOEVER NATURE OR MAGNITUDE, AND HOWSOEVER ARISING, EXCEED AN AMOUNT EQUAL TO FIVE (5) TIMES THE AMOUNT OF THE FEES PAID TO THE COMPANY FOR THE SPECIFIC SERVICES WHICH GAVE RISE TO SUCH CLAIM OR U.S.\$10,000, WHICHEVER IS THE LESSER AMOUNT.

16. The Company shall not be liable for any loss or damage resulting from any delay or failure in performance of its obligations hereunder resulting directly or indirectly from any event of force majeure or any event outside the control of the Company. If any such event occurs, the Company may immediately cancel or suspend its performance hereunder without incurring any liability whatsoever to Client.

17. Company's services, including these Conditions, shall be governed by, and construed in accordance with, the local laws of the country where the Company performs the tests or, in the case of tests performed in the United States of America, the laws of Massachusetts without regard to conflicts of laws principles. If any aspect(s) of these Conditions is found to be illegal or unenforceable, the validity, legality and enforceability of all remaining aspects of these Conditions shall not in any way be affected or impaired thereby. Any proceeding related to the subject matter hereof shall be brought, if at all, in the courts of the country where the Company performs the tests or, in the case of tests performed in the United States of America, in the courts of Massachusetts. Client waives the right to interpose any counterclaim or setoffs of any nature in any litigation arising hereunder.

The complete list of the Approved Subcontractors Curtis-Straus may use to delegate the performance of work can be provided upon request.  
Rev.160009121(2)\_#684340 v14CS



## Appendix A:

### CFR Title 47 FCC Part §15.407 and ISSED Canada RSS-247 Issue 2

#### DUT Information

Model: GEN3.1 MID VA  
Manufacturer: Harman International Industries, Inc.  
Serial Number: 096

#### U-NII-1

Mode	Channel	Frequency
802.11a 802.11n(HT20) 802.11ac(VHT20)	36	5180
802.11n(HT40) 802.11ac(VHT40)	38	5190
802.11a 802.11n(HT20) 802.11ac(VHT20)	40	5200
802.11ac(VHT80)	42	5210
802.11a 802.11n(HT20) 802.11ac(VHT20)	44	5220
802.11n(HT40) 802.11ac(VHT40)	46	5230
802.11a 802.11n(HT20) 802.11ac(VHT20)	48	5240

#### U-NII-3

Mode	Channel	Frequency
802.11a 802.11n(HT20) 802.11ac(VHT20)	149	5745
802.11n(HT40) 802.11ac(VHT40)	151	5755
802.11a 802.11n(HT20) 802.11ac(VHT20)	153	5765
802.11ac(VHT80)	155	5775
802.11a 802.11n(HT20) 802.11ac(VHT20)	157	5785
802.11n(HT40) 802.11ac(VHT40)	159	5795
802.11a 802.11n(HT20) 802.11ac(VHT20)	161	5805
802.11a 802.11n(HT20) 802.11ac(VHT20)	165	5825

Antenna Gain:

Frequency	Efficiency [%]	Peak Gain [dBi]	Efficiency [dB]
5000	17.0888	-0.949348	-7.67288433
5020	18.1437	-0.744393	-7.412741436
5040	20.3126	-0.45403	-6.922344836
5060	21.7457	-0.424927	-6.626266077
5080	24.0396	-0.507132	-6.190727629
5100	25.569	-0.765713	-5.922862568
5120	26.9622	-0.114897	-5.692446741
5140	27.9942	0.211953	-5.52931939
5160	27.8259	0.0841446	-5.5555078
5180	27.0788	-0.21981	-5.673705854
5200	24.6218	-0.645822	-6.086802007
5220	23.4933	-0.921127	-6.290559755
5240	21.415	-0.981161	-6.692819213
5260	20.076	-0.974278	-6.97322813
5280	17.9588	-1.0255	-7.457226861
5300	16.3547	-1.39146	-7.863574179
5320	14.9556	-1.74859	-8.251961589
5340	13.6018	-1.73908	-8.664036153
5360	12.9489	-1.69763	-8.87767123
5380	11.6046	-2.07097	-9.353698247
5400	10.8606	-2.401	-9.641461812
5420	9.87545	-2.99508	-10.05443106
5440	9.54063	-3.45061	-10.20422946
5460	9.07869	-3.91637	-10.41976813
5480	8.9238	-4.05171	-10.49450172
5500	8.51278	-4.25077	-10.6992859
5520	8.4359	-4.2063	-10.73868577
5540	8.13659	-4.18781	-10.89557567
5560	7.50372	-4.50665	-11.2472338
5580	7.23853	-4.56894	-11.40349621
5600	6.74936	-4.54815	-11.70737407
5620	6.64321	-4.4533	-11.77622019
5640	6.27211	-4.57246	-12.02586334
5660	6.18944	-4.53878	-12.08348643
5680	6.2233	-4.46523	-12.05979263
5700	6.36006	-4.33255	-11.96538787
5720	6.69283	-4.17606	-11.74390206

5740	6.95704	-4.07671	-11.575755
5760	7.27465	-4.09717	-11.38187897
5780	7.75395	-4.04437	-11.10477004
5800	8.07838	-3.86224	-10.92675722
5820	8.36421	-3.71688	-10.77575072
5840	8.20412	-3.96917	-10.85967996
5860	8.06364	-3.83113	-10.93468869
5880	7.56128	-4.09804	-11.21404679
5900	7.37326	-4.14055	-11.32340451
5920	7.05471	-4.47184	-11.51520834
5940	6.76225	-4.6428	-11.69908777
5960	6.69557	-4.58469	-11.74212445
5980	6.94873	-4.43099	-11.58094563
6000	7.54979	-4.12945	-11.22065128

Number of transmission chains  
Equipment Type

1  
Unlicensed National Information Infrastructure Device (NII)

### Test Equipment Used:

Rev. 11/9/2017								
<b>Spectrum Analyzers / Receivers /Preselectors</b>	<b>Range</b>	<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
FSV40 Signal/Spectrum Analyzer	10Hz-40GHz	FSV40	ROHDE & SCHWARZ	101551	2200	I	6/30/2018	6/30/2017
<b>Signal Generators/Comparison Noise Emitter</b>	<b>Range</b>	<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
SMBV100A Vector Signal Generator	9KHz-6GHz	SMBV100A	ROHDE & SCHWARZ	261919	2201	I	6/26/2018	6/26/2017
SMB100A Signal Generator	100kHz-40GHz	SMB100A	ROHDE & SCHWARZ	179846	2434	I	5/30/2018	5/30/2017
<b>Power/Noise Meters</b>		<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
OSP - open switch and control platform	30MHz-18GHz	OSP120	ROHDE & SCHWARZ	101674		I	6/1/2018	6/1/2017
<b>Cables</b>	<b>Range</b>		<b>Mfr</b>			<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
DUT1	30MHz-26GHz		Micro-Coax			II	6/21/2018	6/21/2017
DUT2	30MHz-26GHz		Micro-Coax			II	6/22/2018	6/22/2017
DUT3	30MHz-26GHz		Micro-Coax			II	6/23/2018	6/23/2017
DUT4	30MHz-26GHz		Micro-Coax			II	6/24/2018	6/24/2017
<b>Attenuators / Couplers</b>	<b>Range</b>	<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
10dB Attenuator-01 Brown	30MHz-26GHz		Mini Circuits			II	7/13/2018	7/14/2017
10dB Attenuator-02 Yellow	30MHz-26GHz		Mini Circuits			II	7/13/2018	7/14/2017
10dB Attenuator-03 Red	30MHz-26GHz		Mini Circuits			II	7/13/2018	7/14/2017
10dB Attenuator-04 orange	30MHz-26GHz		Mini Circuits			II	7/13/2018	7/14/2017
API - 30dB 20W Attenuator	9KHz-40GHz	89-30-11	API Weinschel	703	2121	I	3/22/2018	3/22/2017
Directional Coupler	0.5GHz-18GHz	UDC	AA MCS	001040		II	8/11/2018	8/11/2017
<b>Communication Tester</b>	<b>Range</b>	<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
CMW500 Wideband Radio Communication Tester	DC to 6GHz	CMW500	ROHDE & SCHWARZ	155905		I	6/2/2018	6/2/2017
<b>Meteorological Meters/Chambers</b>		<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
Temp/Humidity Chamber #18		EPX-2H	Espec	137664	1645	I	4/21/2018	4/21/2017
All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.								



## Test Results Summary

### UNII-1

Test	Frequency (MHz)	802.11a	802.11n(HT20)	802.11ac (VHT20)
Average Output Power	5180/5200/5240	PASS	PASS	PASS
Power Spectral Density	5180/5200/5240	PASS	PASS	PASS
DTS Bandwidth (6dB)	5180/5200/5240	PASS	PASS	PASS
Occupied Channel Bandwidth 99%	5180/5200/5240	PASS	PASS	PASS
		802.11n(HT40)	802.11ac(VHT40)	
Average Output Power	5190/5230	PASS	PASS	
Power Spectral Density	5190/5230	PASS	PASS	
DTS Bandwidth (6dB)	5190/5230	PASS	PASS	
Occupied Channel Bandwidth 99%	5190/5230	PASS	PASS	
		802.11ac(VHT80)		
Average Output Power	5210	PASS		
Power Spectral Density	5210	PASS		
DTS Bandwidth (6dB)	5210	PASS		
Occupied Channel Bandwidth 99%	5210	PASS		

### UNII-3

Test	Frequency (MHz)	802.11a	802.11n(HT20)	802.11ac (VHT20)
Average Output Power	5745/5785/5825	PASS	PASS	PASS
Power Spectral Density	5745/5785/5825	PASS	PASS	PASS
DTS Bandwidth (6dB)	5745/5785/5825	PASS	PASS	PASS
Occupied Channel Bandwidth 99%	5745/5785/5825	PASS	PASS	PASS
		802.11n(HT40)	802.11ac(VHT40)	
Average Output Power	5755/5795	PASS	PASS	
Power Spectral Density	5755/5795	PASS	PASS	
DTS Bandwidth (6dB)	5755/5795	PASS	PASS	
Occupied Channel Bandwidth 99%	5755/5795	PASS	PASS	
		802.11ac(VHT80)		
Average Output Power	5775	PASS		
Power Spectral Density	5775	PASS		
DTS Bandwidth (6dB)	5775	PASS		
Occupied Channel Bandwidth 99%	5775	PASS		



## Average Output Power (Gated)

Tested according to FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04 Section II.E.3.b.

Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Combined Uncertainty of absolute Level Measurement ( $K=2$ ) < 1 dB

### FCC UNII-1

Limit is 250mW (23.97dBm) for client devices with antenna gains less than 6dBi.

#### 802.11a (Power Setting: Default)

Data Rate	Gated RMS (dBm) 5180 MHz	Gated RMS (dBm) 5200 MHz	Gated RMS (dBm) 5240 MHz	Limit (dBm)	Duty Cycle (%)
6 Mbps	12.522	12.523	12.213	23.97	93.430
9 Mbps	12.5	12.513	12.195	23.97	90.527
12 Mbps	12.563	12.554	12.251	23.97	87.822
18 Mbps	12.603	12.454	12.317	23.97	83.069
24 Mbps	11.041	11.045	10.805	23.97	78.791
36 Mbps	10.198	10.25	9.826	23.97	71.895
48 Mbps	10.346	10.169	9.956	23.97	66.164
54 Mbps	10.196	10.135	9.936	23.97	64.275

#### 802.11n(HT20) (Power Setting: Default)

Data Rate	Gated RMS (dBm) 5180 MHz	Gated RMS (dBm) 5200 MHz	Gated RMS (dBm) 5240 MHz	Limit (dBm)	Duty Cycle (%)
MCS0	12.488	12.436	12.211	23.97	93.008
MCS1	12.547	12.485	12.272	23.97	87.270
MCS2	12.451	12.555	12.361	23.97	82.428
MCS3	11.109	11.142	10.832	23.97	78.393
MCS4	10.298	10.137	9.838	23.97	71.860
MCS5	10.125	10.192	9.881	23.97	66.629
MCS6	10.164	10.222	9.925	23.97	64.761
MCS7	10.17	10.216	9.91	23.97	62.644

#### 802.11ac(VHT20) (Power Setting: Default)

Data Rate	Gated RMS (dBm) 5180 MHz	Gated RMS (dBm) 5200 MHz	Gated RMS (dBm) 5240 MHz	Limit (dBm)	Duty Cycle (%)
MCS0	12.542	12.576	12.345	23.97	93.047
MCS1	12.555	12.539	12.286	23.97	87.331
MCS2	12.461	12.572	12.364	23.97	82.548
MCS3	11.105	11.126	10.84	23.97	78.580
MCS4	10.246	10.152	9.865	23.97	72.173
MCS5	10.133	10.199	9.899	23.97	67.063
MCS6	10.157	10.236	9.92	23.97	65.235
MCS7	10.204	10.255	9.949	23.97	63.195
MCS8	8.746	8.741	8.324	23.97	60.296

#### 802.11n(HT40) (Power Setting: 70)

Data Rate	Gated RMS (dBm) 5190 MHz	Gated RMS (dBm) 5230 MHz	Limit (dBm)	Duty Cycle (%)
MCS0	8.714	8.836	23.97	86.889
MCS1	8.756	8.892	23.97	77.866
MCS2	8.83	8.979	23.97	71.268
MCS3	8.918	9.024	23.97	66.237
MCS4	8.988	9.096	23.97	59.065
MCS5	9.02	9.13	23.97	53.786
MCS6	9.055	9.162	23.97	52.007
MCS7	9.038	9.16	23.97	50.112



**802.11ac(VHT40) (Power Setting: Default)**

Data Rate	Gated RMS (dBm) 5190 MHz	Gated RMS (dBm) 5230 MHz	Limit (dBm)	Duty Cycle (%)
MCS0	13.081	12.844	23.97	86.949
MCS1	13.057	12.878	23.97	78.040
MCS2	13.111	12.97	23.97	71.578
MCS3	11.608	11.187	23.97	66.657
MCS4	10.577	10.175	23.97	59.705
MCS5	10.621	10.232	23.97	54.600
MCS6	10.635	10.259	23.97	52.893
MCS7	10.517	10.249	23.97	51.057
MCS8	8.624	8.376	23.97	49.082
MCS9	8.65	8.388	23.97	46.920

**802.11ac(VHT80) (Power Setting: Default)**

Data Rate	Gated RMS (dBm) 5210 MHz	Limit (dBm)	Duty Cycle (%)
MCS0	12.361	23.97	76.825
MCS1	12.421	23.97	65.259
MCS2	12.171	23.97	58.362
MCS3	10.897	23.97	53.779
MCS4	9.882	23.97	47.978
MCS5	9.843	23.97	44.582
MCS6	9.844	23.97	43.304
MCS7	9.856	23.97	42.034
MCS8	8.261	23.97	40.655
MCS9	8.263	23.97	39.202



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### **RSS-247 UNII-1**

Per RSS-247 Issue 2 Section 6.2.1.1, limit for OEM devices installed in vehicles: Maximum EIRP shall not exceed 30mW or  $1.76 + 10 \cdot \log B$ , dBm, whichever is less (where B is 99% OBW in MHz).

In addition devices must be capable of reducing power by at least 3dB below the maximum permitted EIRP of 30mW, which is 11.77dBm.

For modulations with less than 20MHz 99% OBW; 802.11a, 802.11n(HT20) and 802.11ac(VHT20), worst case 99% OBW of 16MHz is assumed with resulting conservative limit of 13.8dBm.

For modulations with more than 20MHz 99% OBW; 802.11n(HT40), 802.11ac(VHT40) and 802.11ac(VHT80), the limit is 30mW (14.77dBm)

### **802.11a**

Data Rate	Gated RMS (dBm) 5180 MHz	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Gated RMS (dBm) with TPC	Difference	Power Setting Nominal	Power Setting with TPC
6 Mbps	12.522	-0.22	12.302	13.8	7.882	4.42	Default	73
9 Mbps	12.5	-0.22	12.28	13.8	7.898	4.382	Default	73
12 Mbps	12.563	-0.22	12.343	13.8	7.98	4.363	Default	73
18 Mbps	12.603	-0.22	12.383	13.8	7.968	4.415	Default	73
24 Mbps	11.041	-0.22	10.821	13.8	n/a	n/a	Default	n/a
36 Mbps	10.198	-0.22	9.978	13.8	n/a	n/a	Default	n/a
48 Mbps	10.346	-0.22	10.126	13.8	n/a	n/a	Default	n/a
54 Mbps	10.196	-0.22	9.976	13.8	n/a	n/a	Default	n/a
Data Rate	Gated RMS (dBm) 5200 MHz	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Gated RMS (dBm) with TPC	Difference	Power Setting Nominal	Power Setting with TPC
6 Mbps	12.523	-0.65	11.873	13.8	8.172	3.701	Default	73
9 Mbps	12.513	-0.65	11.863	13.8	8.187	3.676	Default	73
12 Mbps	12.554	-0.65	11.904	13.8	8.241	3.663	Default	73
18 Mbps	12.454	-0.65	11.804	13.8	8.264	3.54	Default	73
24 Mbps	11.045	-0.65	10.395	13.8	n/a	n/a	Default	n/a
36 Mbps	10.25	-0.65	9.6	13.8	n/a	n/a	Default	n/a
48 Mbps	10.169	-0.65	9.519	13.8	n/a	n/a	Default	n/a
54 Mbps	10.135	-0.65	9.485	13.8	n/a	n/a	Default	n/a
Data Rate	Gated RMS (dBm) 5240 MHz	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Gated RMS (dBm) with TPC	Difference	Power Setting Nominal	Power Setting with TPC
6 Mbps	12.213	-0.98	11.233	13.8	8.031	3.202	Default	73
9 Mbps	12.195	-0.98	11.215	13.8	8.13	3.085	Default	73
12 Mbps	12.251	-0.98	11.271	13.8	8.187	3.084	Default	73
18 Mbps	12.317	-0.98	11.337	13.8	8.321	3.016	Default	73
24 Mbps	10.805	-0.98	9.825	13.8	n/a	n/a	Default	n/a
36 Mbps	9.826	-0.98	8.846	13.8	n/a	n/a	Default	n/a
48 Mbps	9.956	-0.98	8.976	13.8	n/a	n/a	Default	n/a
54 Mbps	9.936	-0.98	8.956	13.8	n/a	n/a	Default	n/a

802.11n(HT20)

Data Rate	Gated RMS (dBm) 5180 MHz	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Gated RMS (dBm) with TPC	Difference	Power Setting Nominal	Power Setting with TPC
MCS0	12.488	-0.22	12.268	13.8	8.225	4.043	Default	73
MCS1	12.547	-0.22	12.327	13.8	8.244	4.083	Default	73
MCS2	12.451	-0.22	12.231	13.8	8.275	3.956	Default	73
MCS3	11.109	-0.22	10.889	13.8	n/a	n/a	Default	n/a
MCS4	10.298	-0.22	10.078	13.8	n/a	n/a	Default	n/a
MCS5	10.125	-0.22	9.905	13.8	n/a	n/a	Default	n/a
MCS6	10.164	-0.22	9.944	13.8	n/a	n/a	Default	n/a
MCS7	10.17	-0.22	9.95	13.8	n/a	n/a	Default	n/a
Data Rate	Gated RMS (dBm) 5200 MHz	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Gated RMS (dBm) with TPC	Difference	Power Setting Nominal	Power Setting with TPC
MCS0	12.436	-0.65	11.786	13.8	8.51	3.276	Default	73
MCS1	12.485	-0.65	11.835	13.8	8.53	3.305	Default	73
MCS2	12.555	-0.65	11.905	13.8	8.6	3.305	Default	73
MCS3	11.142	-0.65	10.492	13.8	n/a	n/a	Default	n/a
MCS4	10.137	-0.65	9.487	13.8	n/a	n/a	Default	n/a
MCS5	10.192	-0.65	9.542	13.8	n/a	n/a	Default	n/a
MCS6	10.222	-0.65	9.572	13.8	n/a	n/a	Default	n/a
MCS7	10.216	-0.65	9.566	13.8	n/a	n/a	Default	n/a
Data Rate	Gated RMS (dBm) 5240 MHz	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Gated RMS (dBm) with TPC	Difference	Power Setting Nominal	Power Setting with TPC
MCS0	12.211	-0.98	11.231	13.8	8.151	3.08	Default	73
MCS1	12.272	-0.98	11.292	13.8	8.2	3.092	Default	73
MCS2	12.361	-0.98	11.381	13.8	8.344	3.037	Default	73
MCS3	10.832	-0.98	9.852	13.8	n/a	n/a	Default	n/a
MCS4	9.838	-0.98	8.858	13.8	n/a	n/a	Default	n/a
MCS5	9.881	-0.98	8.901	13.8	n/a	n/a	Default	n/a
MCS6	9.925	-0.98	8.945	13.8	n/a	n/a	Default	n/a
MCS7	9.91	-0.98	8.93	13.8	n/a	n/a	Default	n/a

802.11ac(VHT20)

Data Rate	Gated RMS (dBm) 5180 MHz	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Gated RMS (dBm) with TPC	Difference	Power Setting Nominal	Power Setting with TPC
MCS0	12.542	-0.22	12.322	13.8	8.21	4.112	Default	73
MCS1	12.555	-0.22	12.335	13.8	8.201	4.1346	Default	73
MCS2	12.461	-0.22	12.241	13.8	8.263	3.978	Default	73
MCS3	11.105	-0.22	10.885	13.8	n/a	n/a	Default	n/a
MCS4	10.246	-0.22	10.026	13.8	n/a	n/a	Default	n/a
MCS5	10.133	-0.22	9.913	13.8	n/a	n/a	Default	n/a
MCS6	10.157	-0.22	9.937	13.8	n/a	n/a	Default	n/a
MCS7	10.204	-0.22	9.984	13.8	n/a	n/a	Default	n/a
MCS8	8.746	-0.22	8.526	13.8	n/a	n/a	Default	n/a
Data Rate	Gated RMS (dBm) 5200 MHz	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Gated RMS (dBm) with TPC	Difference	Power Setting Nominal	Power Setting with TPC
MCS0	12.576	-0.65	11.926	13.8	8.511	3.415	Default	73
MCS1	12.539	-0.65	11.889	13.8	8.516	3.373	Default	73
MCS2	12.572	-0.65	11.922	13.8	8.568	3.354	Default	73
MCS3	11.126	-0.65	10.476	13.8	n/a	n/a	Default	n/a
MCS4	10.152	-0.65	9.502	13.8	n/a	n/a	Default	n/a
MCS5	10.199	-0.65	9.549	13.8	n/a	n/a	Default	n/a
MCS6	10.236	-0.65	9.586	13.8	n/a	n/a	Default	n/a
MCS7	10.255	-0.65	9.605	13.8	n/a	n/a	Default	n/a
MCS8	8.741	-0.65	8.091	13.8	n/a	n/a	Default	n/a
Data Rate	Gated RMS (dBm) 5240 MHz	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Gated RMS (dBm) with TPC	Difference	Power Setting Nominal	Power Setting with TPC
MCS0	12.345	-0.98	11.365	13.8	8.323	3.042	Default	73
MCS1	12.286	-0.98	11.306	13.8	8.301	3.005	Default	73
MCS2	12.364	-0.98	11.384	13.8	8.309	3.075	Default	73
MCS3	10.84	-0.98	9.86	13.8	n/a	n/a	Default	n/a
MCS4	9.865	-0.98	8.885	13.8	n/a	n/a	Default	n/a
MCS5	9.899	-0.98	8.919	13.8	n/a	n/a	Default	n/a
MCS6	9.92	-0.98	8.94	13.8	n/a	n/a	Default	n/a
MCS7	9.949	-0.98	8.969	13.8	n/a	n/a	Default	n/a
MCS8	8.324	-0.98	7.344	13.8	n/a	n/a	Default	n/a



### 802.11n(HT40)

Data Rate	Gated RMS (dBm) 5190 MHz	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Gated RMS (dBm) with TPC	Difference	Power Setting Nominal	Power Setting with TPC
MCS0	8.714	-0.435	8.279	13.8	n/a	n/a	70	n/a
MCS1	8.756	-0.435	8.321	13.8	n/a	n/a	70	n/a
MCS2	8.83	-0.435	8.395	13.8	n/a	n/a	70	n/a
MCS3	8.918	-0.435	8.483	13.8	n/a	n/a	70	n/a
MCS4	8.988	-0.435	8.553	13.8	n/a	n/a	70	n/a
MCS5	9.02	-0.435	8.585	13.8	n/a	n/a	70	n/a
MCS6	9.055	-0.435	8.62	13.8	n/a	n/a	70	n/a
MCS7	9.038	-0.435	8.603	13.8	n/a	n/a	70	n/a
Data Rate	Gated RMS (dBm) 5230 MHz	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Gated RMS (dBm) with TPC	Difference	Power Setting Nominal	Power Setting with TPC
MCS0	8.836	-0.95	7.886	13.8	n/a	n/a	70	n/a
MCS1	8.892	-0.95	7.942	13.8	n/a	n/a	70	n/a
MCS2	8.979	-0.95	8.029	13.8	n/a	n/a	70	n/a
MCS3	9.024	-0.95	8.074	13.8	n/a	n/a	70	n/a
MCS4	9.096	-0.95	8.146	13.8	n/a	n/a	70	n/a
MCS5	9.13	-0.95	8.18	13.8	n/a	n/a	70	n/a
MCS6	9.162	-0.95	8.212	13.8	n/a	n/a	70	n/a
MCS7	9.16	-0.95	8.21	13.8	n/a	n/a	70	n/a

### 802.11ac(VHT40)

Data Rate	Gated RMS (dBm) 5190 MHz	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Gated RMS (dBm) with TPC	Difference	Power Setting Nominal	Power Setting with TPC
MCS0	13.081	-0.435	12.646	13.8	8.717	3.929	Default	71
MCS1	13.057	-0.435	12.622	13.8	8.754	3.868	Default	71
MCS2	13.111	-0.435	12.676	13.8	8.8	3.876	Default	71
MCS3	11.608	-0.435	11.173	13.8	n/a	n/a	Default	n/a
MCS4	10.577	-0.435	10.142	13.8	n/a	n/a	Default	n/a
MCS5	10.621	-0.435	10.186	13.8	n/a	n/a	Default	n/a
MCS6	10.635	-0.435	10.2	13.8	n/a	n/a	Default	n/a
MCS7	10.517	-0.435	10.082	13.8	n/a	n/a	Default	n/a
MCS8	8.624	-0.435	8.189	13.8	n/a	n/a	Default	n/a
MCS9	8.65	-0.435	8.215	13.8	n/a	n/a	Default	n/a
Data Rate	Gated RMS (dBm) 5230 MHz	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Gated RMS (dBm) with TPC	Difference	Power Setting Nominal	Power Setting with TPC
MCS0	12.844	-0.95	11.894	13.8	8.781	3.113	Default	71
MCS1	12.878	-0.95	11.928	13.8	8.841	3.087	Default	71
MCS2	12.97	-0.95	12.02	13.8	8.864	3.156	Default	71
MCS3	11.187	-0.95	10.237	13.8	n/a	n/a	Default	n/a
MCS4	10.175	-0.95	9.225	13.8	n/a	n/a	Default	n/a
MCS5	10.232	-0.95	9.282	13.8	n/a	n/a	Default	n/a
MCS6	10.259	-0.95	9.309	13.8	n/a	n/a	Default	n/a
MCS7	10.249	-0.95	9.299	13.8	n/a	n/a	Default	n/a
MCS8	8.376	-0.95	7.426	13.8	n/a	n/a	Default	n/a
MCS9	8.388	-0.95	7.438	13.8	n/a	n/a	Default	n/a



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**802.11ac(VHT80)**

Data Rate	Gated RMS (dBm) 5210 MHz	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Gated RMS (dBm) with TPC	Difference	Power Setting Nominal	Power Setting with TPC
MCS0	12.361	-0.785	11.576	13.8	n/a	n/a	Default	n/a
MCS1	12.421	-0.785	11.636	13.8	n/a	n/a	Default	n/a
MCS2	12.171	-0.785	11.386	13.8	n/a	n/a	Default	n/a
MCS3	10.897	-0.785	10.112	13.8	n/a	n/a	Default	n/a
MCS4	9.882	-0.785	9.097	13.8	n/a	n/a	Default	n/a
MCS5	9.843	-0.785	9.058	13.8	n/a	n/a	Default	n/a
MCS6	9.844	-0.785	9.059	13.8	n/a	n/a	Default	n/a
MCS7	9.856	-0.785	9.071	13.8	n/a	n/a	Default	n/a
MCS8	8.261	-0.785	7.476	13.8	n/a	n/a	Default	n/a
MCS9	8.263	-0.785	7.478	13.8	n/a	n/a	Default	n/a

## FCC and RSS-247 UNII-3

### 802.11a (Power Setting: 47)

Data Rate	Gated RMS (dBm) 5745 MHz	Gated RMS (dBm) 5785 MHz	Gated RMS (dBm) 5825 MHz	Limit (dBm)	Duty Cycle (%)
6 Mbps	14.42	14.105	14.324	30	93.433
9 Mbps	14.357	14.083	14.31	30	90.533
12 Mbps	14.391	14.109	14.366	30	87.827
18 Mbps	14.448	14.166	14.414	30	83.079
24 Mbps	14.445	14.545	14.422	30	78.793
36 Mbps	14.49	14.227	14.47	30	71.9
48 Mbps	14.644	14.359	14.619	30	66.178
54 Mbps	14.616	14.33	14.586	30	64.281

### 802.11n(HT20) (Power Setting: 50)

Data Rate	Gated RMS (dBm) 5745 MHz	Gated RMS (dBm) 5785 MHz	Gated RMS (dBm) 5825 MHz	Limit (dBm)	Duty Cycle (%)
MCS0	13.809	13.509	13.755	30	93.011
MCS1	13.808	13.512	13.773	30	87.279
MCS2	13.892	13.576	13.833	30	82.479
MCS3	13.908	13.625	13.883	30	78.403
MCS4	13.973	13.706	13.971	30	71.874
MCS5	14.023	13.747	14.006	30	66.637
MCS6	14.07	13.789	13.531	30	64.771
MCS7	14.092	13.802	14.069	30	62.667

### 802.11ac(VHT20) (Power Setting: 52)

Data Rate	Gated RMS (dBm) 5745 MHz	Gated RMS (dBm) 5785 MHz	Gated RMS (dBm) 5825 MHz	Limit (dBm)	Duty Cycle (%)
MCS0	13.557	13.178	13.433	30	93.051
MCS1	13.455	13.179	13.455	30	87.339
MCS2	13.512	13.215	13.483	30	82.601
MCS3	13.58	13.302	13.549	30	78.587
MCS4	13.681	13.367	13.615	30	72.188
MCS5	13.694	13.415	13.673	30	67.081
MCS6	13.784	13.429	13.692	30	65.243
MCS7	13.758	13.471	13.704	30	63.212
MCS8	14.695	14.314	14.491	30	60.304



**802.11n(HT40) (Power Setting: 52)**

Data Rate	Gated RMS (dBm) 5755 MHz	Gated RMS (dBm) 5795 MHz	Limit (dBm)	Duty Cycle (%)
MCS0	13.235	13	30	86.891
MCS1	13.297	13.073	30	77.870
MCS2	13.357	13.141	30	71.264
MCS3	13.396	13.16	30	66.226
MCS4	13.457	13.23	30	59.067
MCS5	13.503	13.3	30	53.779
MCS6	13.531	13.308	30	52.017
MCS7	13.534	13.309	30	50.107

**802.11ac(VHT40) (Power Setting: 50)**

Data Rate	Gated RMS (dBm) 5755 MHz	Gated RMS (dBm) 5795 MHz	Limit (dBm)	Duty Cycle (%)
MCS0	13.689	13.425	30	86.952
MCS1	13.728	13.48	30	78.046
MCS2	13.766	13.531	30	71.588
MCS3	13.805	13.587	30	66.663
MCS4	13.882	13.636	30	59.696
MCS5	13.919	13.667	30	54.596
MCS6	13.923	13.676	30	52.901
MCS7	13.947	13.706	30	51.050
MCS8	14.669	14.323	30	49.024
MCS9	14.519	14.172	30	46.877

**802.11ac(VHT80) (Power Setting: Default)**

Data Rate	Gated RMS (dBm) 5775 MHz	Limit (dBm)	Duty Cycle (%)
MCS0	12.797	30	76.842
MCS1	12.767	30	65.274
MCS2	12.7	30	58.380
MCS3	11.531	30	53.793
MCS4	10.635	30	47.975
MCS5	10.677	30	44.609
MCS6	10.674	30	43.332
MCS7	10.583	30	42.064
MCS8	8.96	30	40.707
MCS9	8.953	30	39.201

## Power Spectral Density

Tested according to FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04 Section II.F

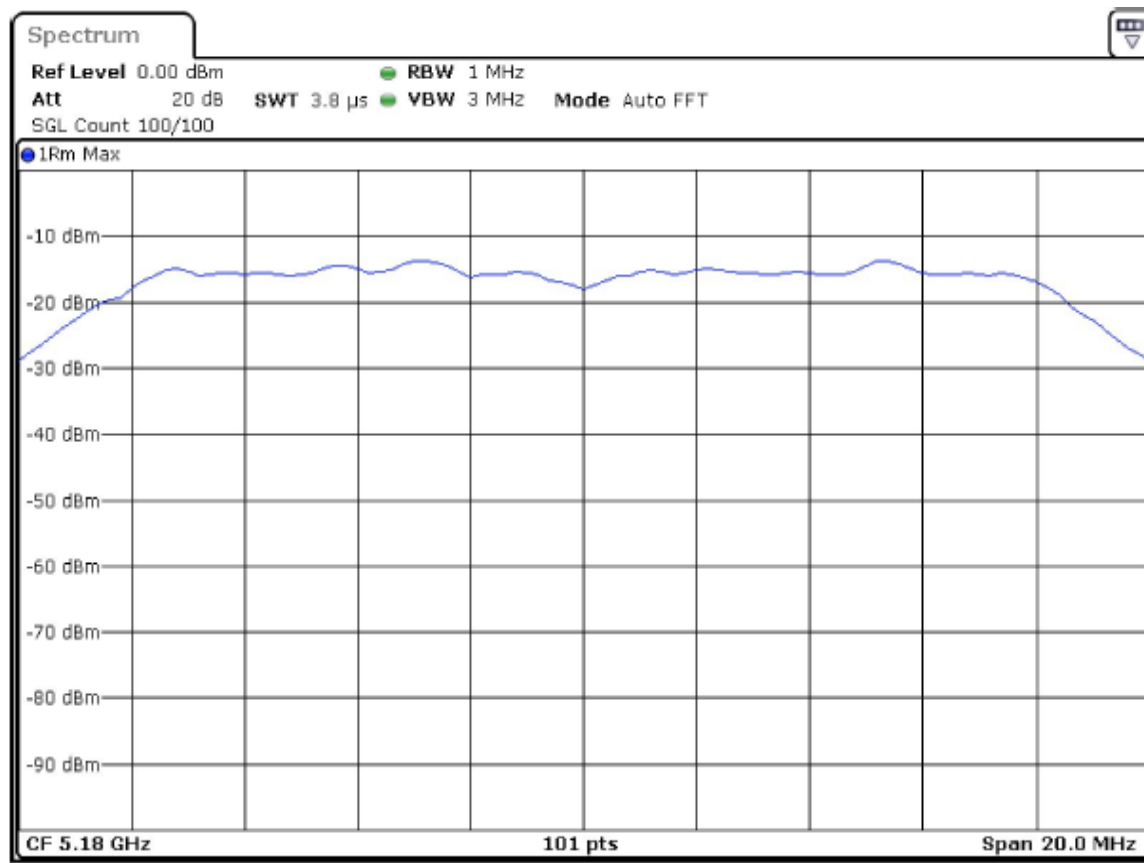
Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 1.3 dB

## FCC UNII-1

### 802.11a

Data Rate	Peak PSD (dBm) 5180 MHz	Peak PSD (dBm) 5200 MHz	Peak PSD (dBm) 5240 MHz	Limit (dBm)
6 Mbps	8.819	8.763	8.244	11
9 Mbps	8.924	8.978	8.504	11
12 Mbps	8.522	9.482	9.183	11
18 Mbps	10.144	9.836	9.727	11
24 Mbps	8.722	8.621	8.456	11
36 Mbps	8.425	8.190	7.839	11
48 Mbps	8.448	8.337	8.005	11
54 Mbps	8.672	8.7	8.149	11

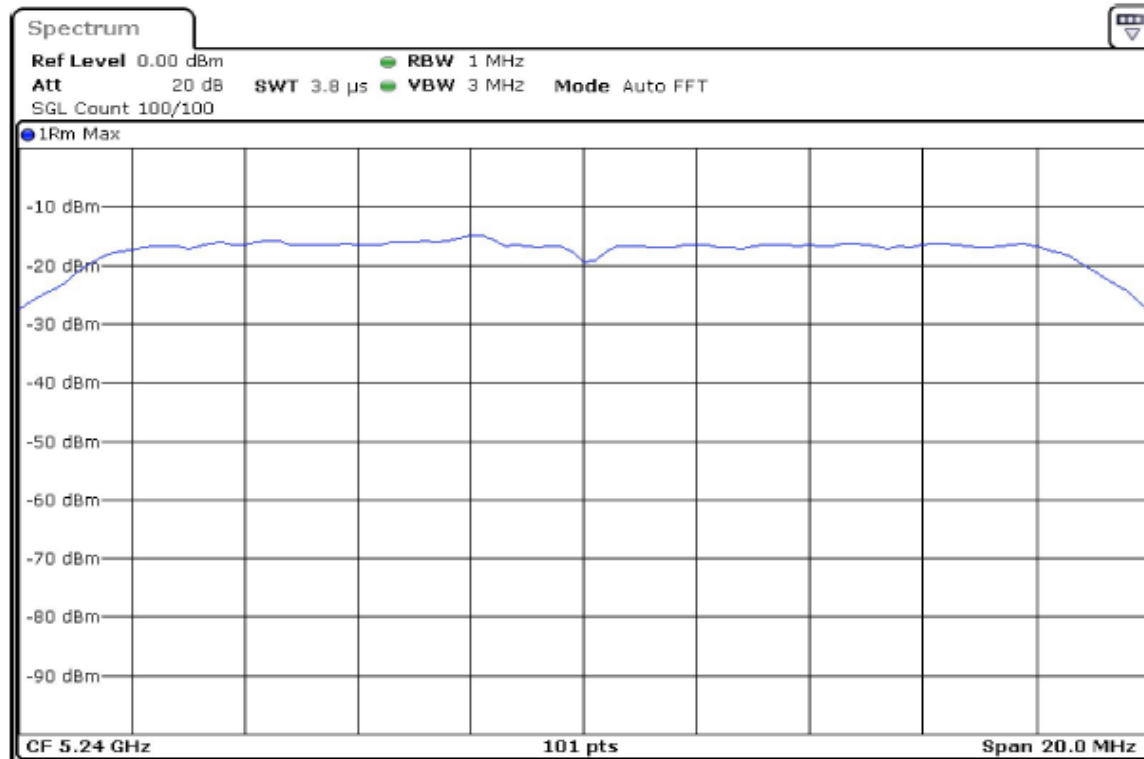
### 802.11a 18 Mbps 5180MHz



### 802.11n(HT20)

Data Rate	Peak PSD (dBm) 5180 MHz	Peak PSD (dBm) 5200 MHz	Peak PSD (dBm) 5240 MHz	Limit (dBm)
MCS0	8.638	7.976	8.570	11
MCS1	8.533	8.849	8.014	11
MCS2	8.191	8.147	9.074	11
MCS3	8.363	7.787	8.793	11
MCS4	7.836	7.605	7.662	11
MCS5	8.054	7.875	7.243	11
MCS6	7.809	8.587	7.621	11
MCS7	8.042	8.480	7.860	11

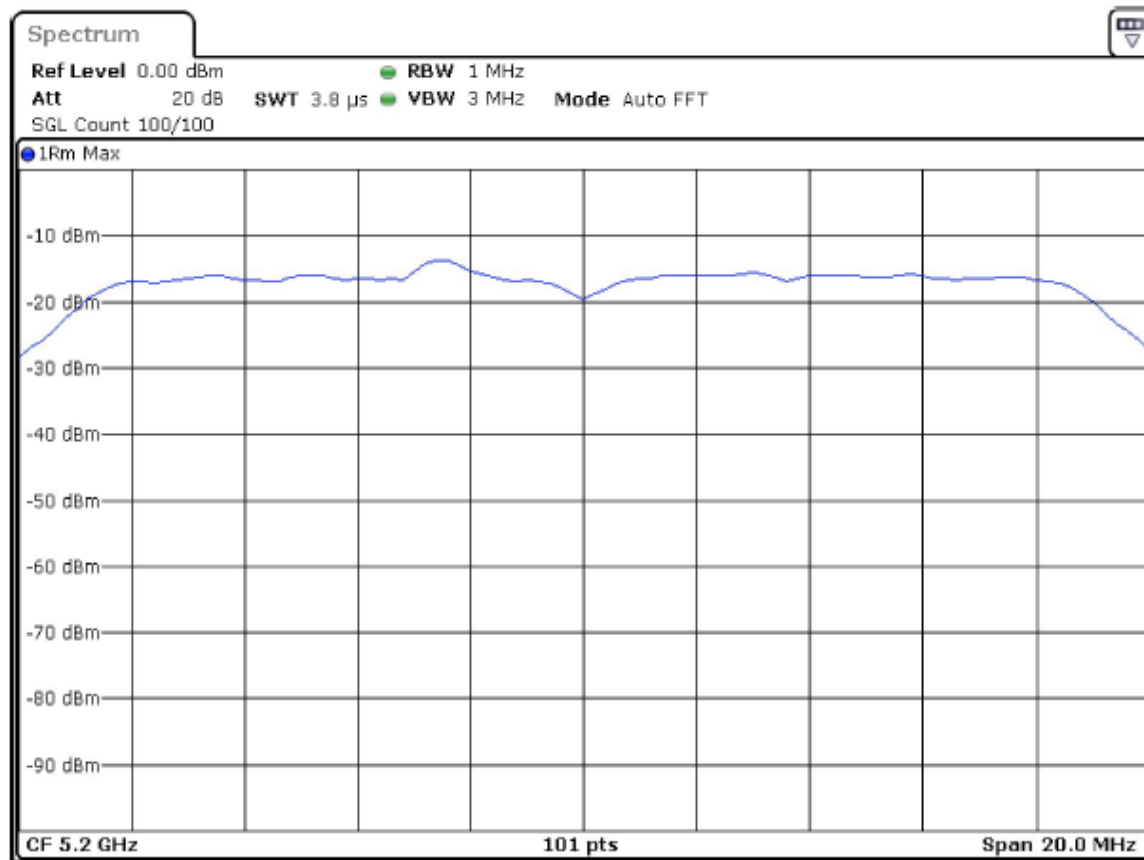
### 802.11n(HT20) MCS2 5240 MHz



### 802.11ac(VHT20)

Data Rate	Peak PSD (dBm) 5180 MHz	Peak PSD (dBm) 5200 MHz	Peak PSD (dBm) 5240 MHz	Limit (dBm)
MCS0	8.243	8.094	8.121	11
MCS1	9.598	8.908	8.415	11
MCS2	8.722	10.186	9.091	11
MCS3	7.520	8.611	7.240	11
MCS4	7.569	9.683	6.874	11
MCS5	8.385	8.136	7.422	11
MCS6	8.112	7.911	7.798	11
MCS7	7.759	7.471	7.541	11
MCS8	7.720	7.419	6.851	11

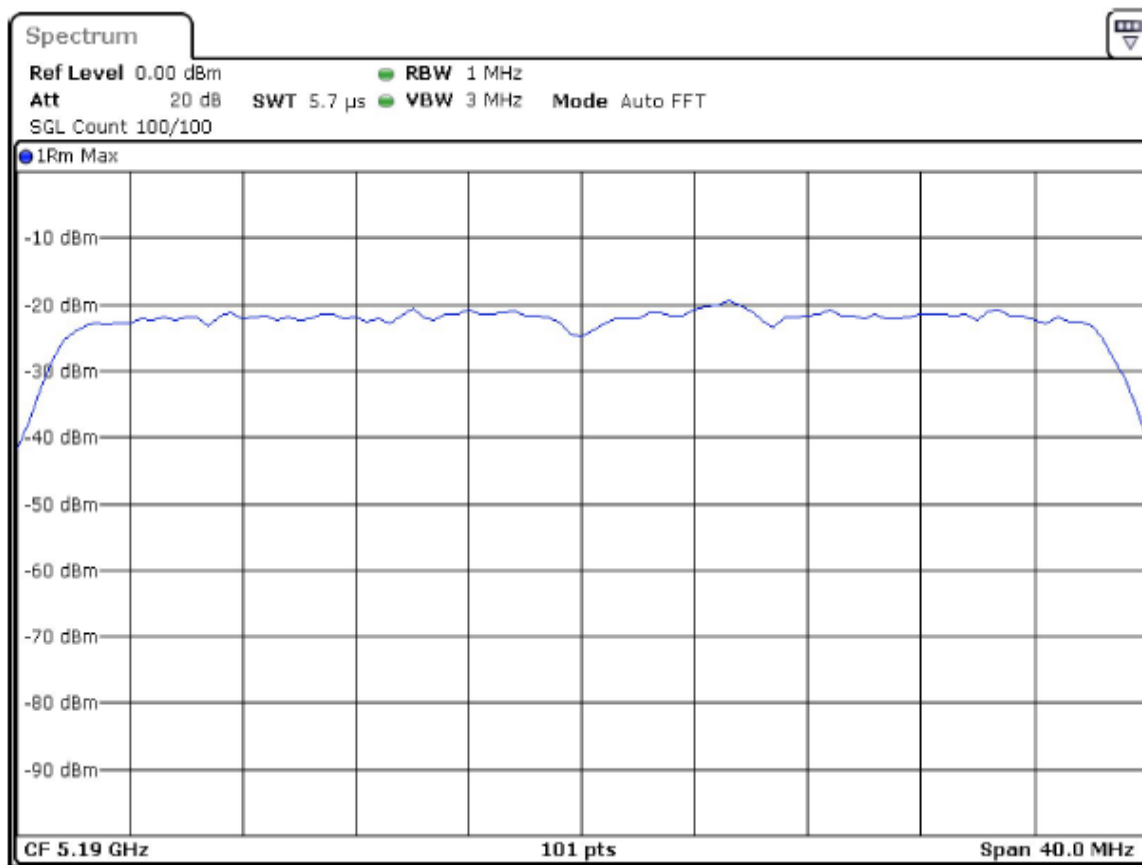
### 802.11ac(VHT20) MCS2 5200MHz



### 802.11n(HT40)

Data Rate	Peak PSD (dBm) 5190 MHz	Peak PSD (dBm) 5230 MHz	Limit (dBm)
MCS0	3.026	2.704	11
MCS1	3.664	3.269	11
MCS2	4.343	4.121	11
MCS3	5.280	5.121	11
MCS4	6.101	5.075	11
MCS5	5.329	5.959	11
MCS6	5.450	5.674	11
MCS7	6.582	6.206	11

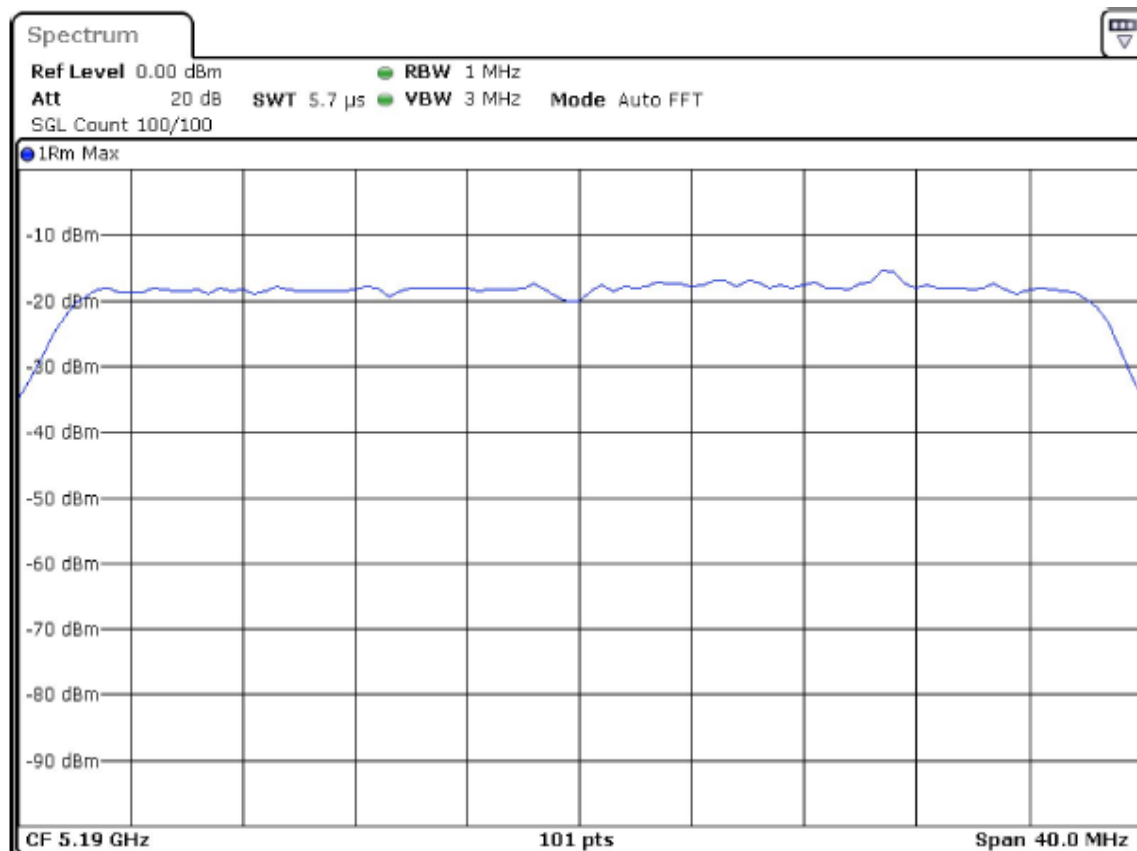
### 802.11n(HT40) MCS7 5190MHz



### 802.11ac(VHT40)

Data Rate	Peak PSD (dBm) 5190 MHz	Peak PSD (dBm) 5230 MHz	Limit (dBm)
MCS0	7.645	6.391	11
MCS1	7.723	7.059	11
MCS2	8.148	7.544	11
MCS3	7.526	6.640	11
MCS4	7.247	5.766	11
MCS5	7.052	6.423	11
MCS6	7.378	6.808	11
MCS7	8.020	6.785	11
MCS8	5.419	4.925	11
MCS9	6.651	5.738	11

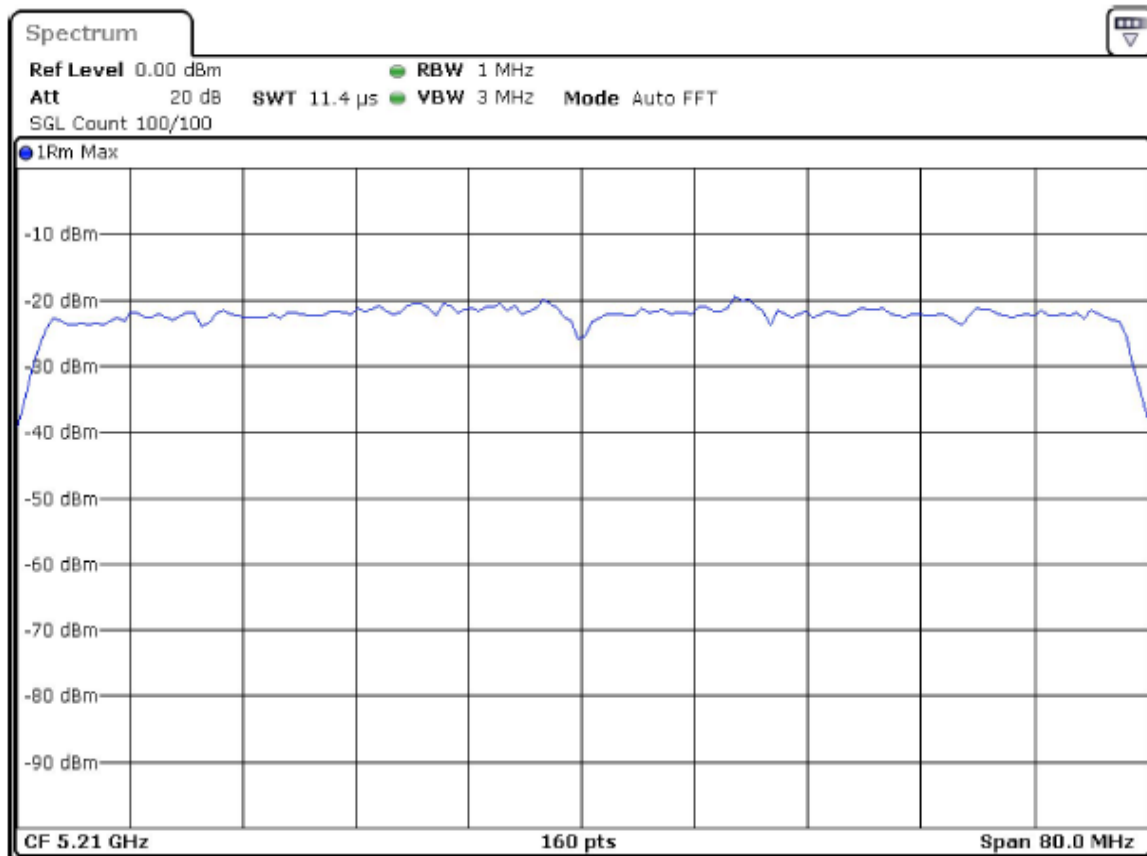
### 802.11ac(VHT40) MCS2 5190MHz



### 802.11ac(VHT80)

Data Rate	Peak PSD (dBm) 5210 MHz	Limit (dBm)
MCS0	4.424	11
MCS1	5.569	11
MCS2	5.064	11
MCS3	4.666	11
MCS4	3.724	11
MCS5	4.089	11
MCS6	5.142	11
MCS7	4.227	11
MCS8	2.592	11
MCS9	2.854	11

### 802.11ac(VHT80) MCS1 5210MHz



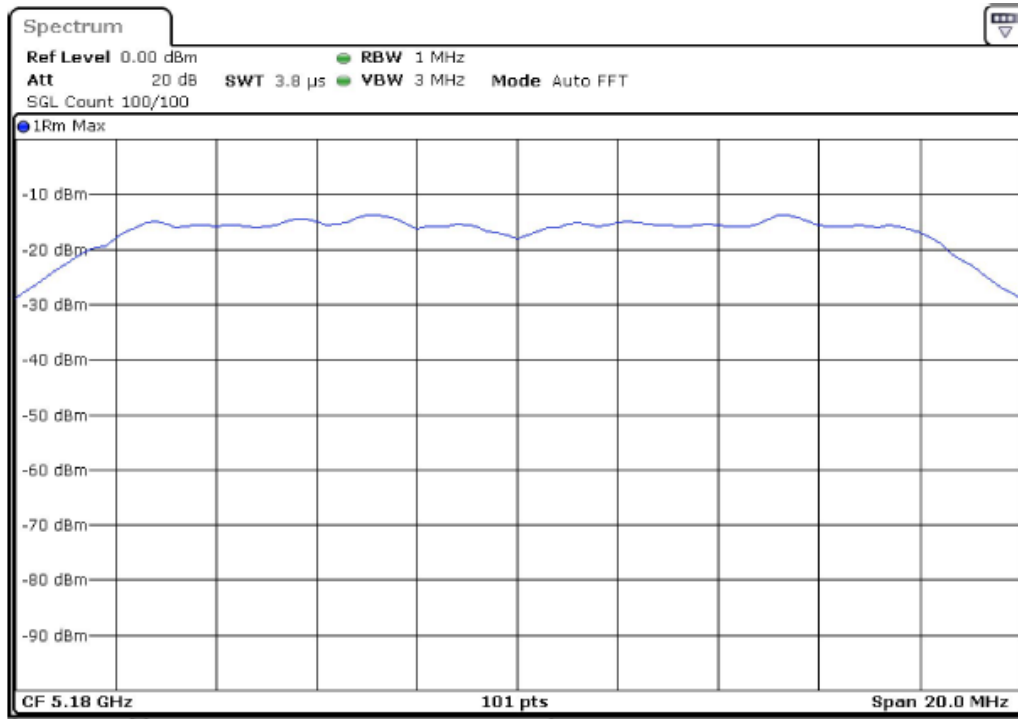
## RSS-247 UNII-1

### 802.11a

Data Rate	PSD (dBm) 5180 MHz	Antenna Gain (dBi)	EIRP PSD (dBm) 5180 MHz	Limit (dBm)
6 Mbps	8.819	-0.22	8.599	10
9 Mbps	8.924	-0.22	8.704	10
12 Mbps	8.522	-0.22	8.302	10
18 Mbps	10.144	-0.22	9.924	10
24 Mbps	8.722	-0.22	8.502	10
36 Mbps	8.425	-0.22	8.205	10
48 Mbps	8.448	-0.22	8.228	10
54 Mbps	8.672	-0.22	8.452	10
Data Rate	PSD (dBm) 5200 MHz	Antenna Gain (dBi)	EIRP PSD (dBm) 5200 MHz	Limit (dBm)
6 Mbps	8.763	-0.65	8.113	10
9 Mbps	8.978	-0.65	8.328	10
12 Mbps	9.482	-0.65	8.832	10
18 Mbps	9.836	-0.65	9.186	10
24 Mbps	8.621	-0.65	7.971	10
36 Mbps	8.190	-0.65	7.54	10
48 Mbps	8.337	-0.65	7.687	10
54 Mbps	8.7	-0.65	8.05	10
Data Rate	PSD (dBm) 5240 MHz	Antenna Gain (dBi)	EIRP PSD (dBm) 5240 MHz	Limit (dBm)
6 Mbps	8.244	-0.98	7.264	10
9 Mbps	8.504	-0.98	7.524	10
12 Mbps	9.183	-0.98	8.203	10
18 Mbps	9.727	-0.98	8.747	10
24 Mbps	8.456	-0.98	7.476	10
36 Mbps	7.839	-0.98	6.859	10
48 Mbps	8.005	-0.98	7.025	10
54 Mbps	8.149	-0.98	7.169	10



**802.11a 18 Mbps 5180MHz**



**802.11n(HT20)**

Data Rate	PSD (dBm) 5180 MHz	Antenna Gain (dBi)	EIRP PSD (dBm) 5180 MHz	Limit (dBm)
MCS0	8.638	-0.22	8.418	10
MCS1	8.533	-0.22	8.313	10
MCS2	8.191	-0.22	7.971	10
MCS3	8.363	-0.22	8.143	10
MCS4	7.836	-0.22	7.616	10
MCS5	8.054	-0.22	7.834	10
MCS6	7.809	-0.22	7.589	10
MCS7	8.042	-0.22	7.822	10
Data Rate	PSD (dBm) 5200 MHz	Antenna Gain (dBi)	EIRP PSD (dBm) 5200 MHz	Limit (dBm)
MCS0	7.976	-0.65	7.326	10
MCS1	8.849	-0.65	8.199	10
MCS2	8.147	-0.65	7.497	10
MCS3	7.787	-0.65	7.137	10
MCS4	7.605	-0.65	6.955	10
MCS5	7.875	-0.65	7.225	10
MCS6	8.587	-0.65	7.937	10
MCS7	8.480	-0.65	7.83	10
Data Rate	PSD (dBm) 5240 MHz	Antenna Gain (dBi)	EIRP PSD (dBm) 5240 MHz	Limit (dBm)
MCS0	8.570	-0.98	7.59	10
MCS1	8.014	-0.98	7.034	10
MCS2	9.074	-0.98	8.094	10
MCS3	8.793	-0.98	7.813	10
MCS4	7.662	-0.98	6.682	10
MCS5	7.243	-0.98	6.263	10
MCS6	7.621	-0.98	6.641	10
MCS7	7.860	-0.98	6.88	10

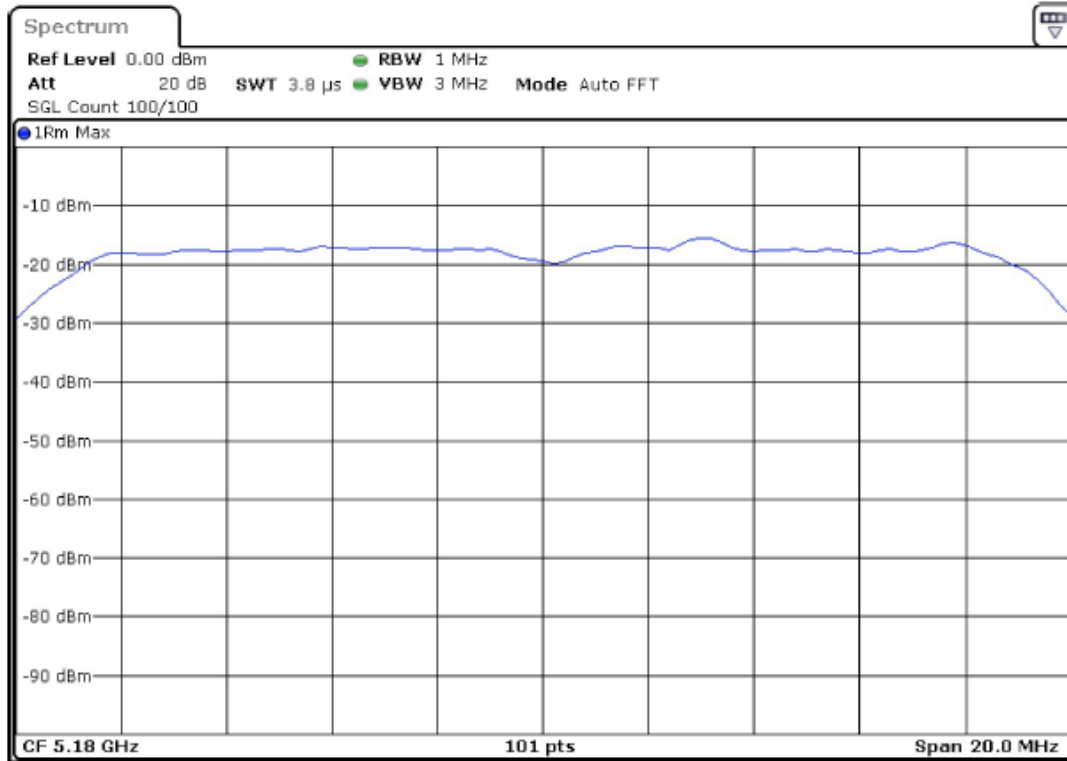


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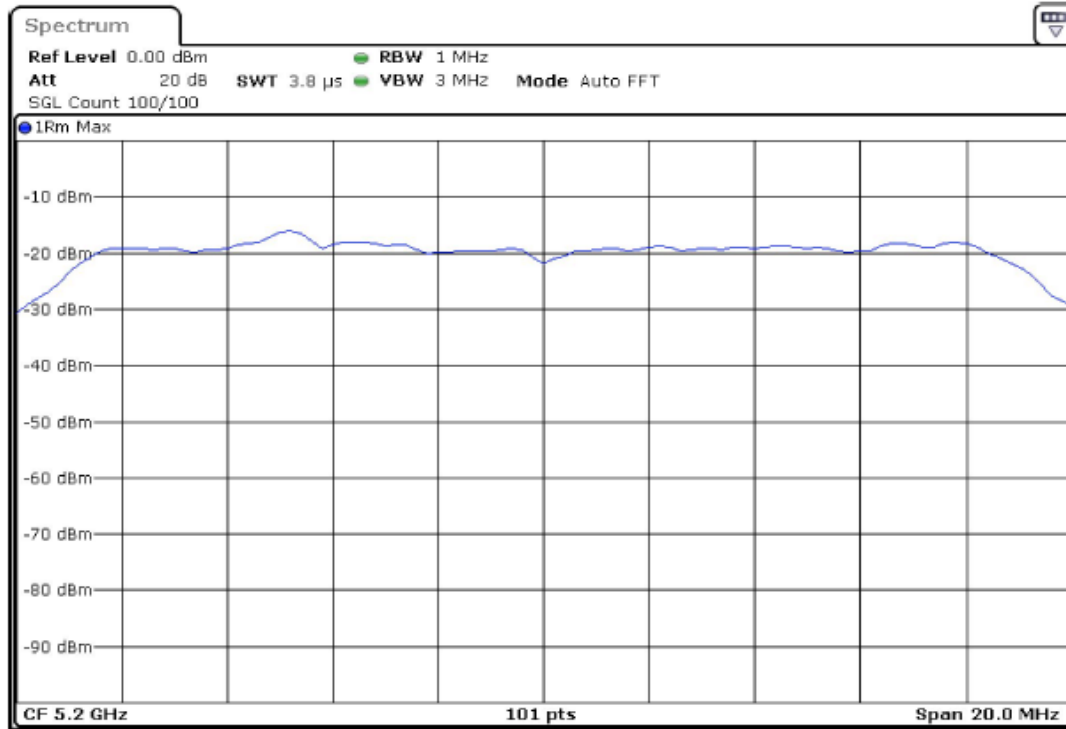
**802.11n(HT20) MCS0 5180MHz**



802.11ac(VHT20)

Data Rate	PSD (dBm) 5180 MHz	Antenna Gain (dBi)	EIRP PSD (dBm) 5180 MHz	Limit (dBm)
MCS0	8.243	-0.22	8.023	10
MCS1	9.598	-0.22	9.378	10
MCS2	8.722	-0.22	8.502	10
MCS3	7.520	-0.22	7.3	10
MCS4	7.569	-0.22	7.349	10
MCS5	8.385	-0.22	8.165	10
MCS6	8.112	-0.22	7.892	10
MCS7	7.759	-0.22	7.539	10
MCS8	7.720	-0.22	7.5	10
Data Rate	PSD (dBm) 5200 MHz	Antenna Gain (dBi)	EIRP PSD (dBm) 5200 MHz	Limit (dBm)
MCS0	8.094	-0.65	7.444	10
MCS1	8.908	-0.65	8.258	10
MCS2	10.186	-0.65	9.536	10
MCS3	8.611	-0.65	7.961	10
MCS4	9.683	-0.65	9.033	10
MCS5	8.136	-0.65	7.486	10
MCS6	7.911	-0.65	7.261	10
MCS7	7.471	-0.65	6.821	10
MCS8	7.419	-0.65	6.769	10
Data Rate	PSD (dBm) 5240 MHz	Antenna Gain (dBi)	EIRP PSD (dBm) 5240 MHz	Limit (dBm)
MCS0	8.121	-0.98	7.141	10
MCS1	8.415	-0.98	7.435	10
MCS2	9.091	-0.98	8.111	10
MCS3	7.240	-0.98	6.26	10
MCS4	6.874	-0.98	5.894	10
MCS5	7.422	-0.98	6.442	10
MCS6	7.798	-0.98	6.818	10
MCS7	7.541	-0.98	6.561	10
MCS8	6.851	-0.98	5.871	10

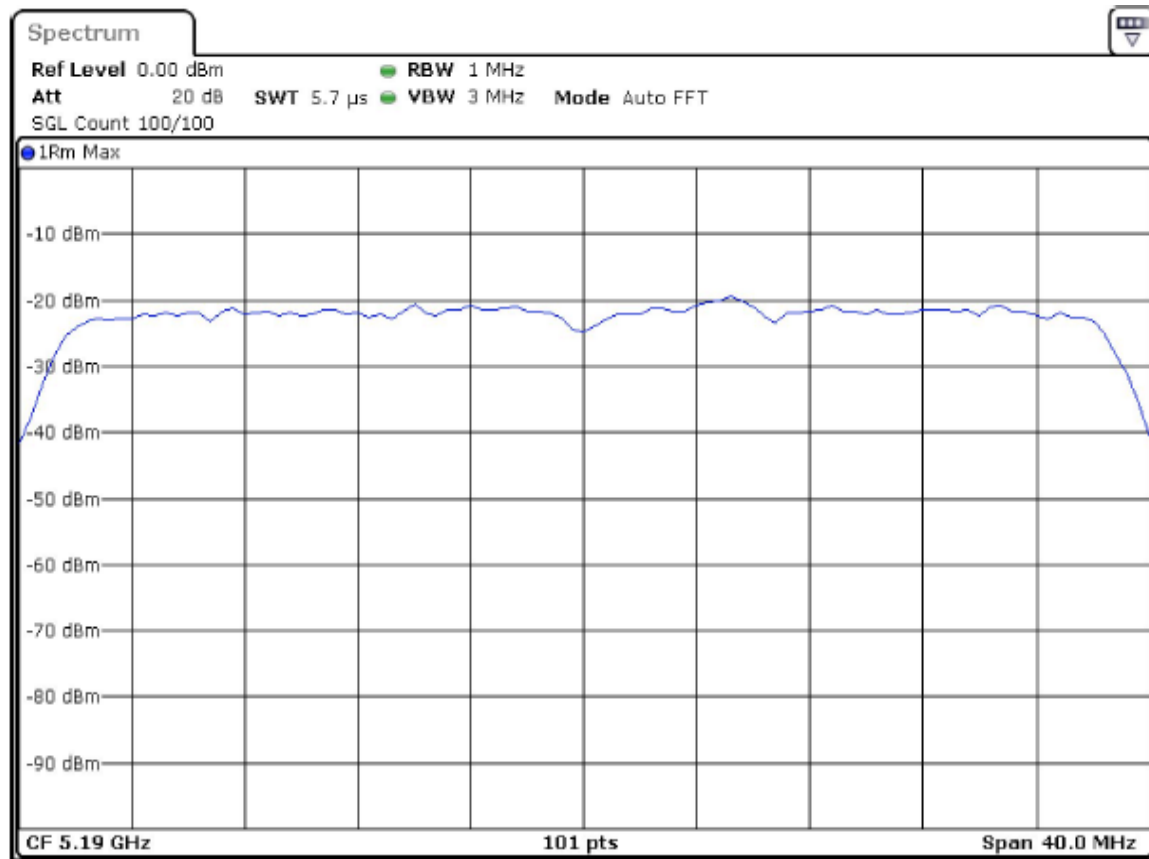
**802.11ac(VHT20) MCS2 5200MHz**



## 802.11n(HT40)

Data Rate	PSD (dBm) 5190 MHz	Antenna Gain (dBi)	EIRP PSD (dBm) 5190 MHz	Limit (dBm)
MCS0	3.026	-0.435	2.591	10
MCS1	3.664	-0.435	3.229	10
MCS2	4.343	-0.435	3.908	10
MCS3	5.280	-0.435	4.845	10
MCS4	6.101	-0.435	5.666	10
MCS5	5.329	-0.435	4.894	10
MCS6	5.450	-0.435	5.015	10
MCS7	6.582	-0.435	6.147	10
Data Rate	PSD (dBm) 5230 MHz	Antenna Gain (dBi)	EIRP PSD (dBm) 5230 MHz	Limit (dBm)
MCS0	2.704	-0.95	1.754	10
MCS1	3.269	-0.95	2.319	10
MCS2	4.121	-0.95	3.171	10
MCS3	5.121	-0.95	4.171	10
MCS4	5.075	-0.95	4.125	10
MCS5	5.959	-0.95	5.009	10
MCS6	5.674	-0.95	4.724	10
MCS7	6.206	-0.95	5.256	10

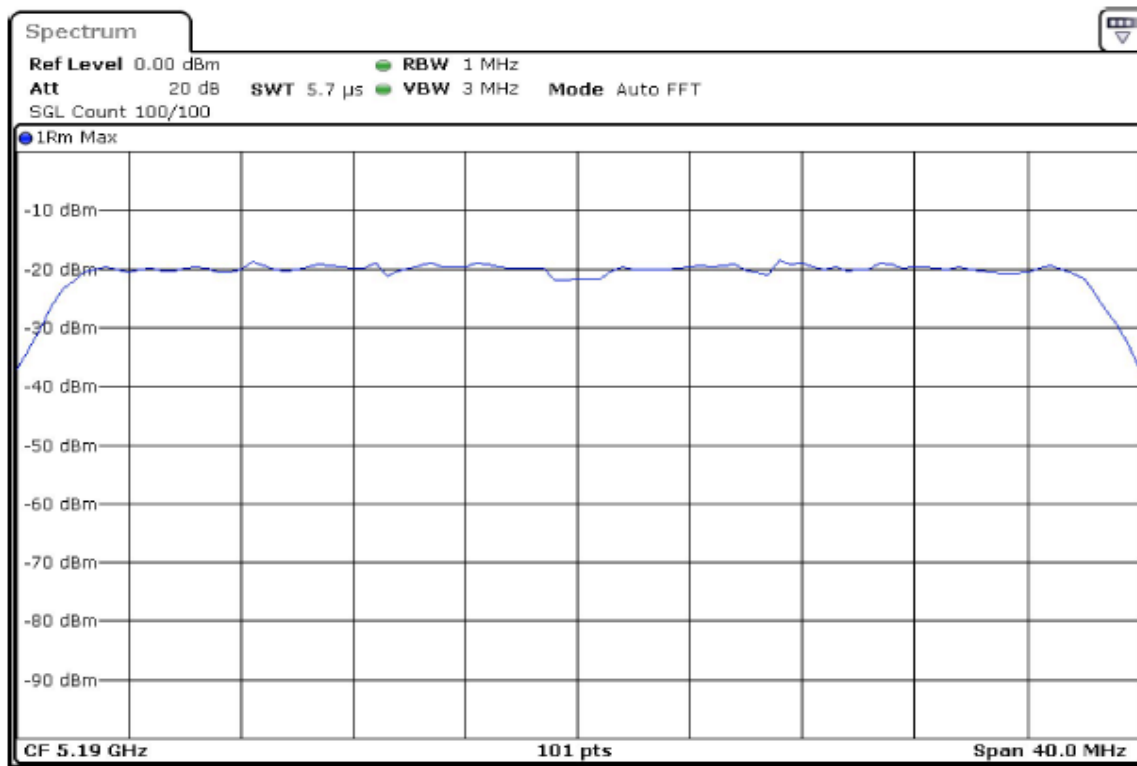
## 802.11n(HT40) MCS7 5190MHz



## 802.11ac(VHT40)

Data Rate	PSD (dBm) 5190 MHz	Antenna Gain (dBi)	EIRP PSD (dBm) 5190 MHz	Limit (dBm)
MCS0	7.645	-0.435	7.21	10
MCS1	7.723	-0.435	7.288	10
MCS2	8.148	-0.435	7.713	10
MCS3	7.526	-0.435	7.091	10
MCS4	7.247	-0.435	6.812	10
MCS5	7.052	-0.435	6.617	10
MCS6	7.378	-0.435	6.943	10
MCS7	8.020	-0.435	7.585	10
MCS8	5.419	-0.435	4.984	10
MCS9	6.651	-0.435	6.216	10
Data Rate	PSD (dBm) 5230 MHz	Antenna Gain (dBi)	EIRP PSD (dBm) 5230 MHz	Limit (dBm)
MCS0	6.391	-0.95	5.441	10
MCS1	7.059	-0.95	6.109	10
MCS2	7.544	-0.95	6.594	10
MCS3	6.640	-0.95	5.69	10
MCS4	5.766	-0.95	4.816	10
MCS5	6.423	-0.95	5.473	10
MCS6	6.808	-0.95	5.858	10
MCS7	6.785	-0.95	5.835	10
MCS8	4.925	-0.95	3.975	10
MCS9	5.738	-0.95	4.788	10

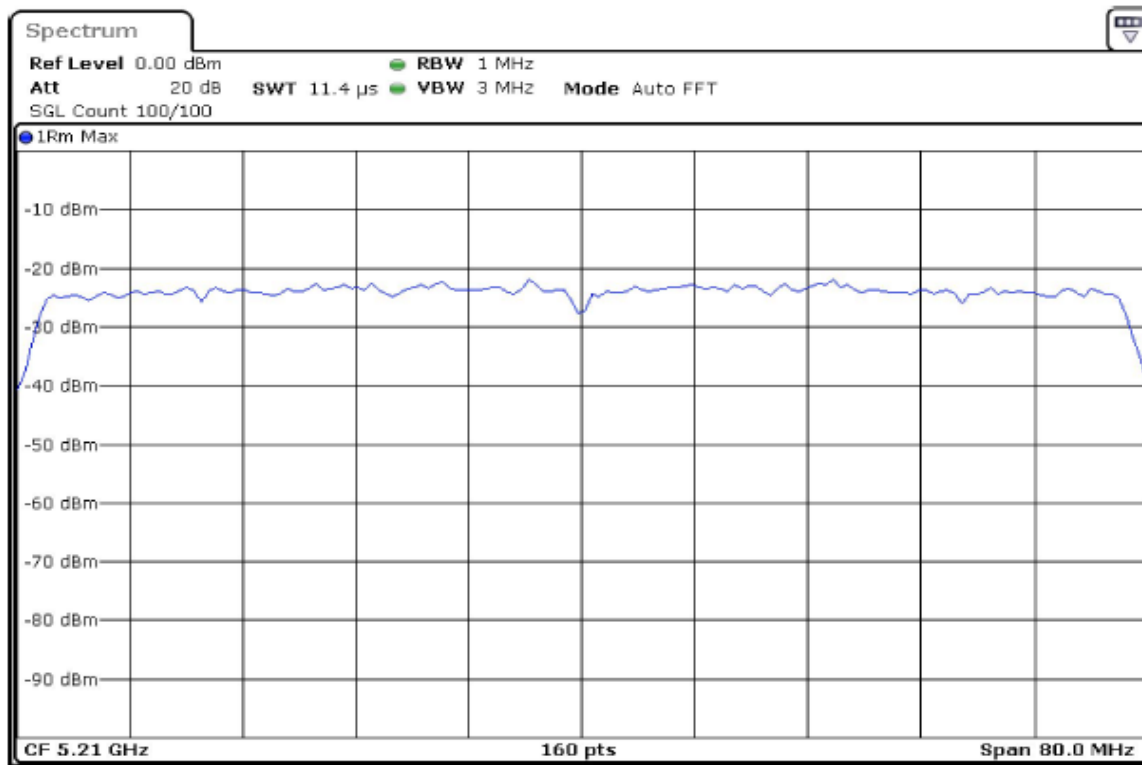
## 802.11ac(VHT40) MCS2 5190MHz



## 802.11ac(VHT80)

Data Rate	PSD (dBm) 5210 MHz	Antenna Gain (dBi)	EIRP PSD (dBm) 5210 MHz	Limit (dBm)
MCS0	4.424	-0.785	3.639	10
MCS1	5.569	-0.785	4.784	10
MCS2	5.064	-0.785	4.279	10
MCS3	4.666	-0.785	3.881	10
MCS4	3.724	-0.785	2.939	10
MCS5	4.089	-0.785	3.304	10
MCS6	5.142	-0.785	4.357	10
MCS7	4.227	-0.785	3.442	10
MCS8	2.592	-0.785	1.807	10
MCS9	2.854	-0.785	2.069	10

## 802.11ac(VHT80) MCS1 5210MHz



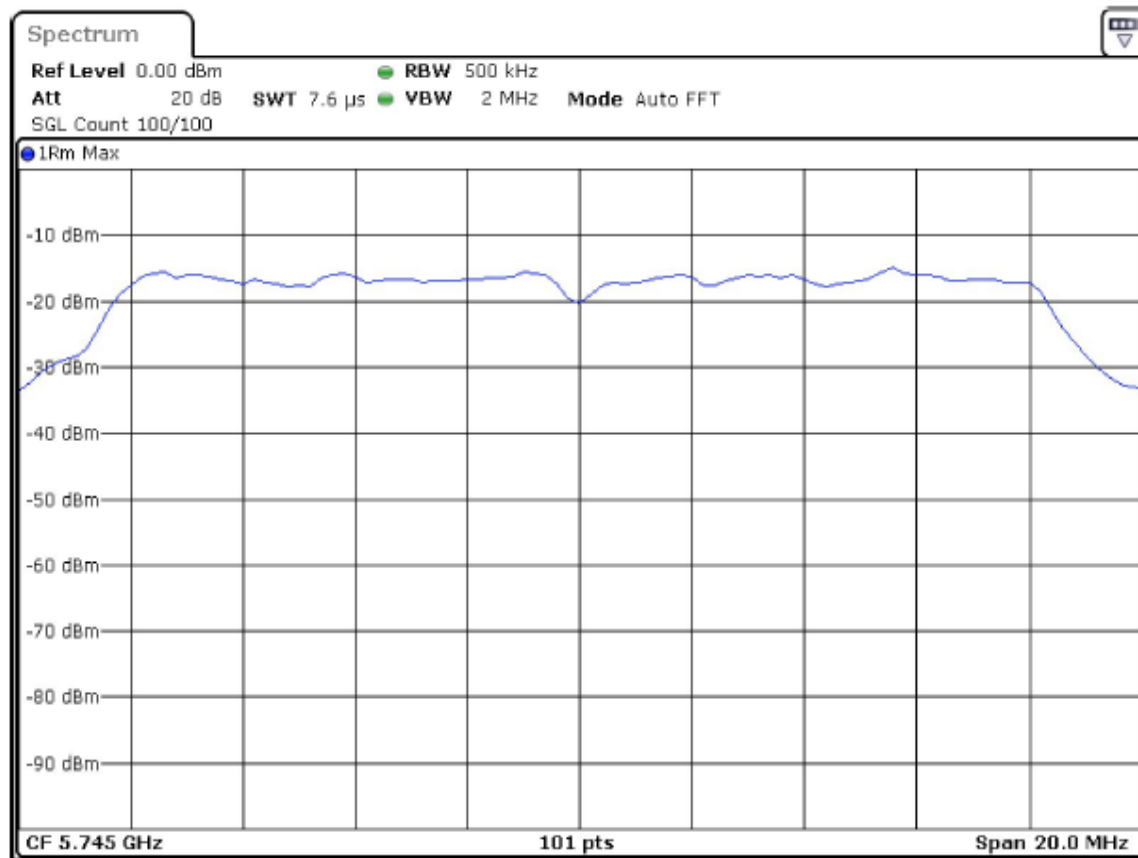


## FCC and RSS-247 UNII-3

### 802.11a

Data Rate	Peak PSD (dBm) 5745 MHz	Peak PSD (dBm) 5785 MHz	Peak PSD (dBm) 5825 MHz	Limit (dBm)
6 Mbps	6.960	6.674	6.883	30.0
9 Mbps	8.765	7.796	8.545	30.0
12 Mbps	7.948	7.653	8.043	30.0
18 Mbps	9.106	8.686	8.877	30.0
24 Mbps	8.982	8.620	8.881	30.0
36 Mbps	9.833	9.537	9.812	30.0
48 Mbps	9.766	9.461	9.703	30.0
54 Mbps	9.896	9.523	9.801	30.0

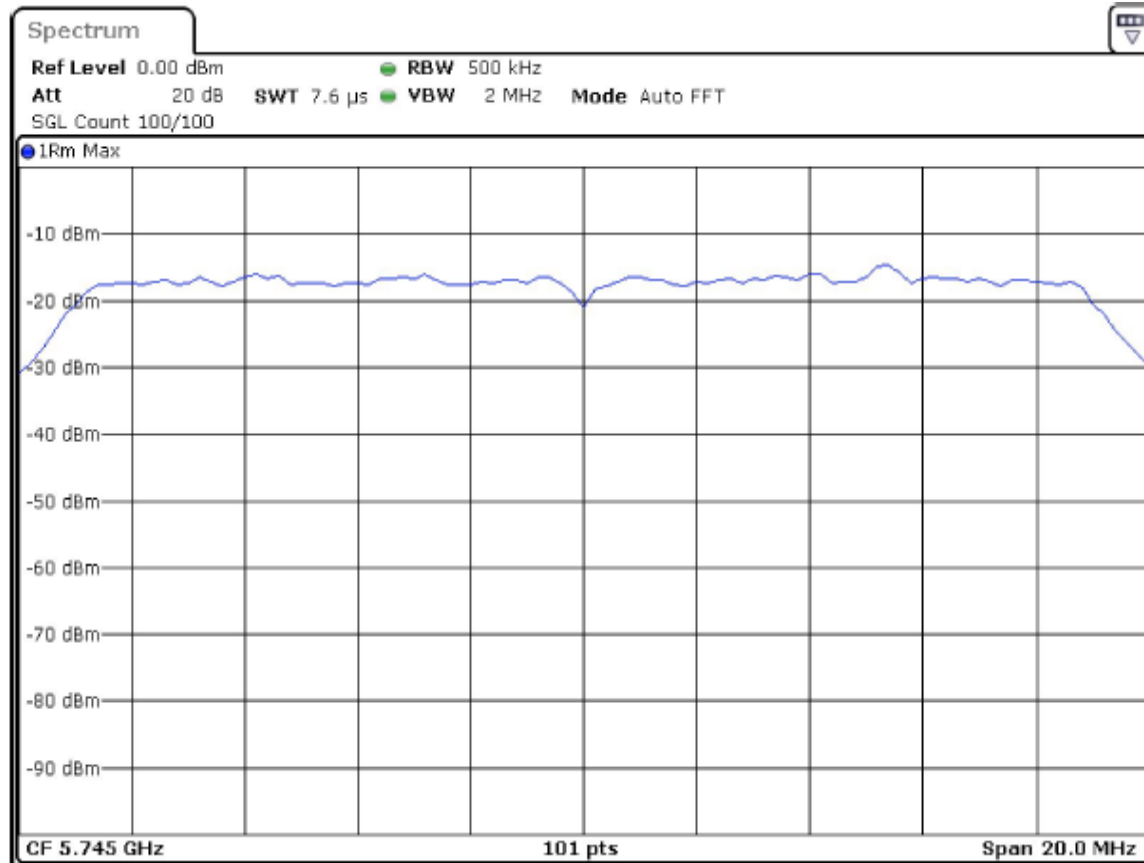
### 802.11a 54 Mbps 5745MHz



### 802.11n(HT20)

Data Rate	Peak PSD (dBm) 5745 MHz	Peak PSD (dBm) 5785 MHz	Peak PSD (dBm) 5825 MHz	Limit (dBm)
MCS0	6.324	6.432	5.918	30
MCS1	7.712	7.263	8.362	30
MCS2	8.202	7.720	7.955	30
MCS3	8.485	7.833	8.807	30
MCS4	9.178	8.295	8.722	30
MCS5	8.958	9.270	9.821	30
MCS6	10.231	9.477	8.988	30
MCS7	10.086	9.418	9.883	30

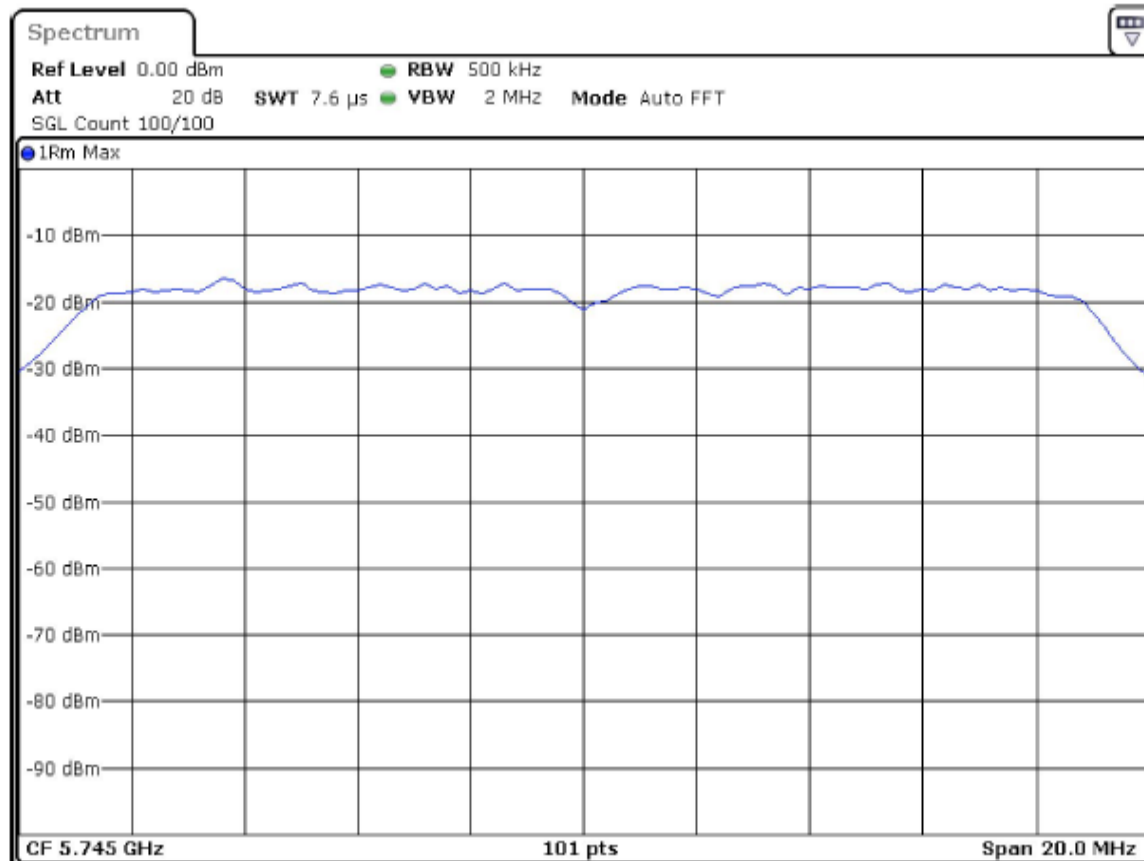
### 802.11n(HT20) MCS6 5745MHz



### 802.11ac(VHT20)

Data Rate	Peak PSD (dBm) 5745 MHz	Peak PSD (dBm) 5785 MHz	Peak PSD (dBm) 5825 MHz	Limit (dBm)
MCS0	6.566	5.581	6.075	30
MCS1	7.944	6.434	6.974	30
MCS2	6.807	6.954	7.784	30
MCS3	8.132	8.275	8.127	30
MCS4	8.347	8.332	8.601	30
MCS5	8.984	9.128	9.543	30
MCS6	9.277	8.642	9.171	30
MCS7	9.336	8.610	9.477	30
MCS8	11.542	10.383	9.969	30

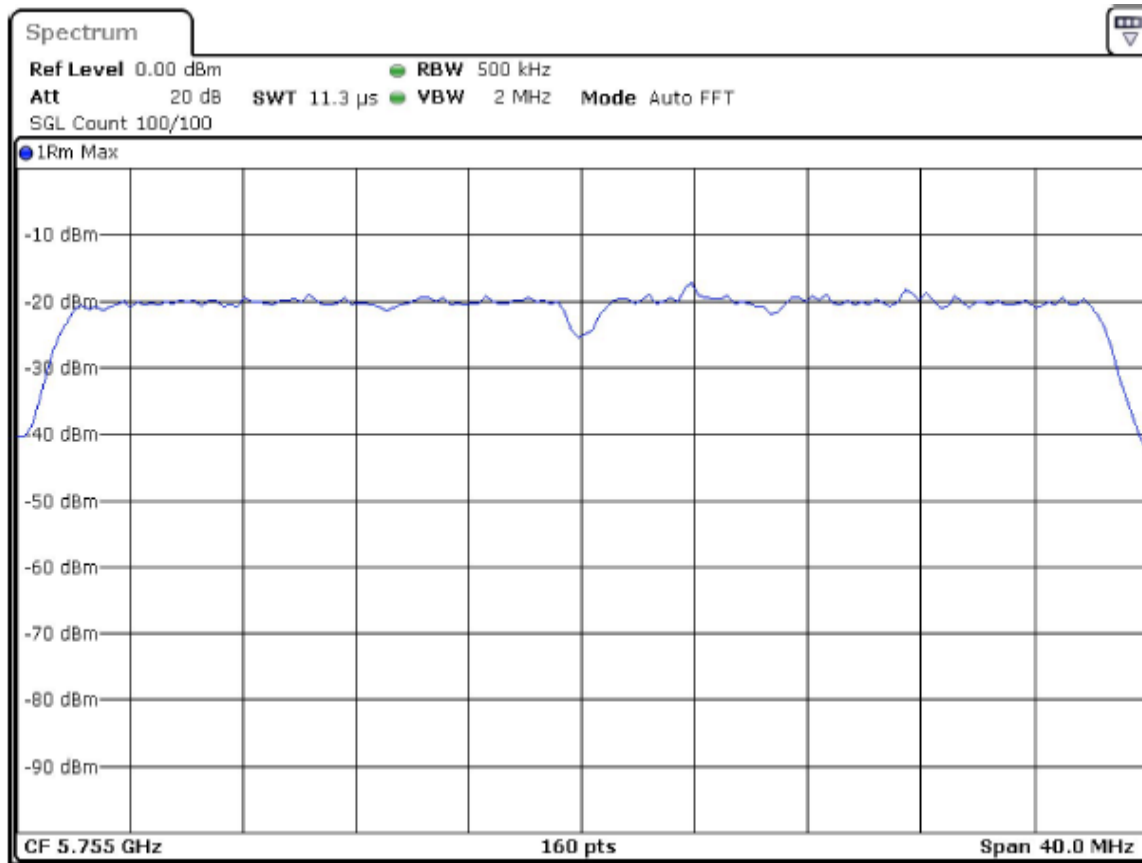
### 802.11ac(VHT20) MCS8 5745MHz



### 802.11n(HT40)

Data Rate	Peak PSD (dBm) 5755 MHz	Peak PSD (dBm) 5795 MHz	Limit (dBm)
MCS0	4.693	3.281	30
MCS1	5.448	5.060	30
MCS2	5.474	5.073	30
MCS3	6.818	6.856	30
MCS4	6.957	6.189	30
MCS5	7.314	6.742	30
MCS6	7.414	6.646	30
MCS7	7.234	7.115	30

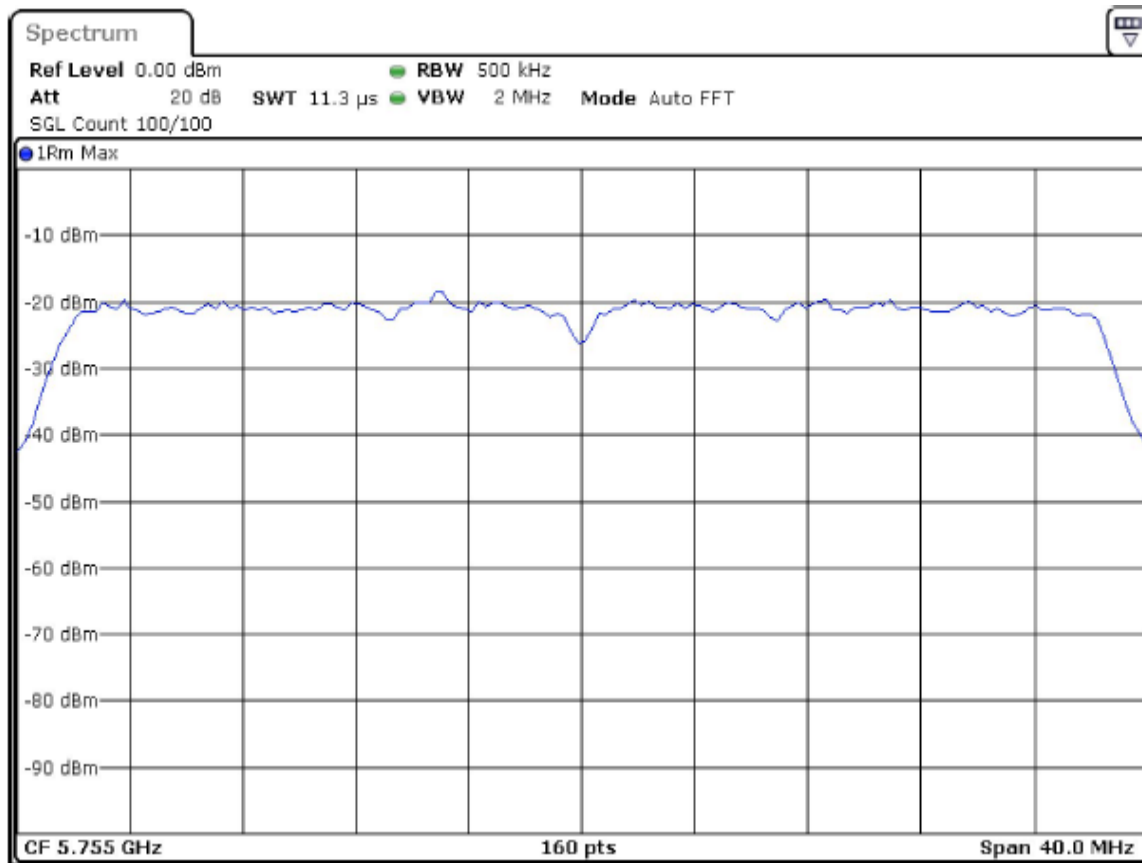
### 802.11n(HT40) MCS6 5755MHz



### 802.11ac(VHT40)

Data Rate	Peak PSD (dBm) 5755 MHz	Peak PSD (dBm) 5795 MHz	Limit (dBm)
MCS0	4.197	3.821	30
MCS1	6.026	5.771	30
MCS2	5.794	5.295	30
MCS3	7.054	6.660	30
MCS4	7.104	6.479	30
MCS5	7.176	7.692	30
MCS6	7.421	6.814	30
MCS7	8.081	7.349	30
MCS8	8.778	8.263	30
MCS9	9.077	8.621	30

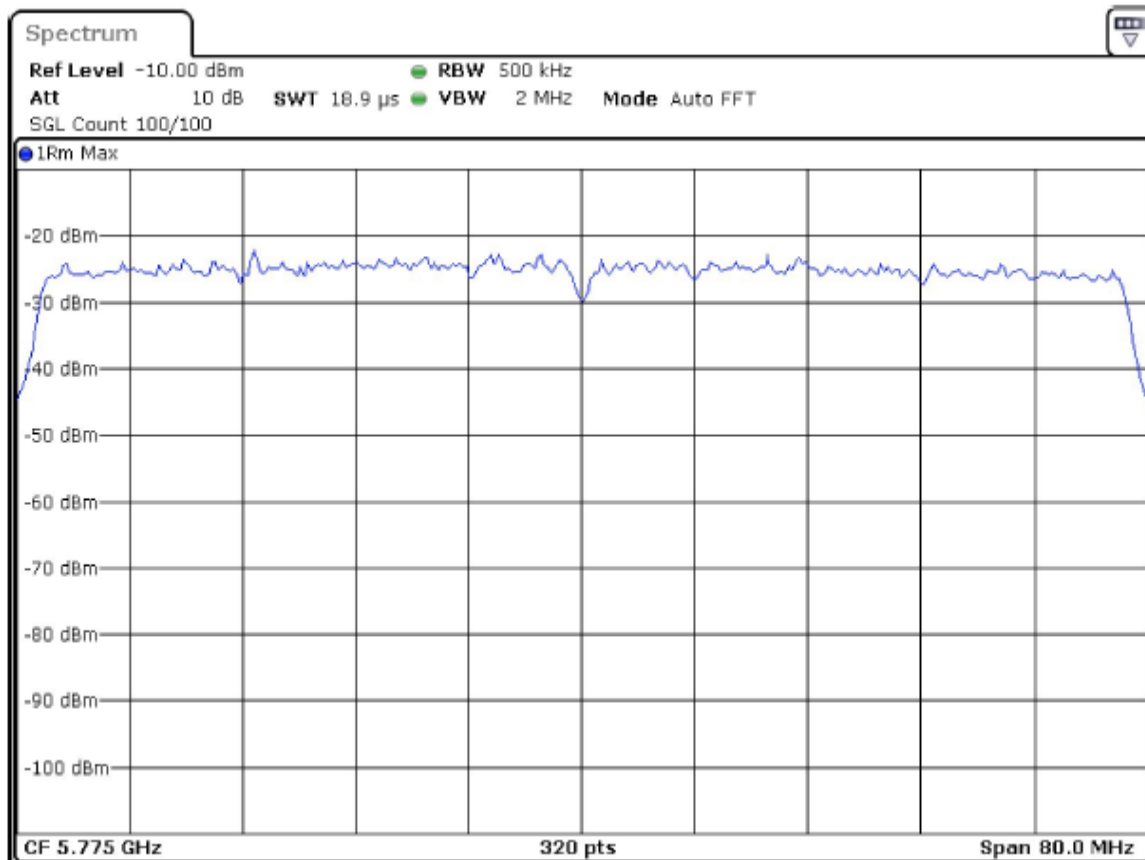
### 802.11ac(VHT40) MCS9 5755MHz



### 802.11ac(VHT80)

Data Rate	Peak PSD (dBm) 5775 MHz	Limit (dBm)
MCS0	1.238	30
MCS1	2.354	30
MCS2	2.532	30
MCS3	2.240	30
MCS4	1.667	30
MCS5	2.433	30
MCS6	1.776	30
MCS7	2.175	30
MCS8	1.404	30
MCS9	1.730	30

### 802.11ac(VHT80) MCS2 5775MHz



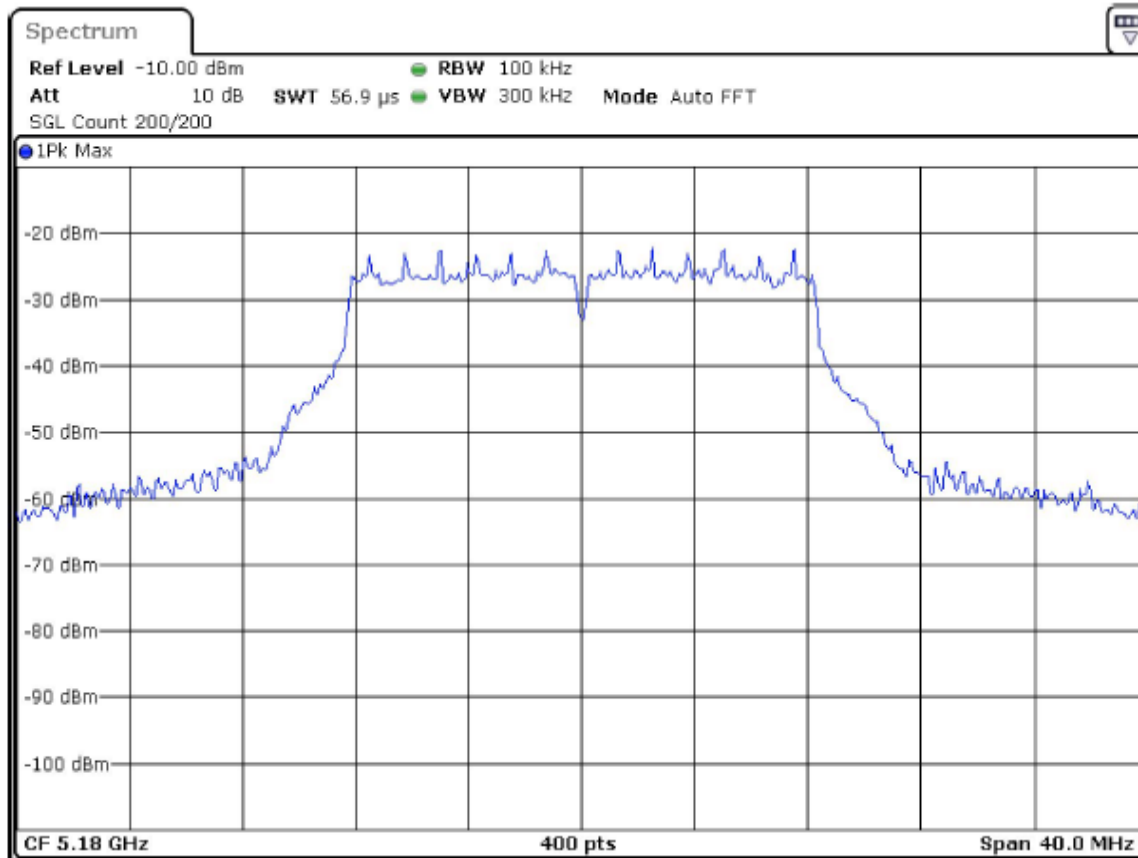
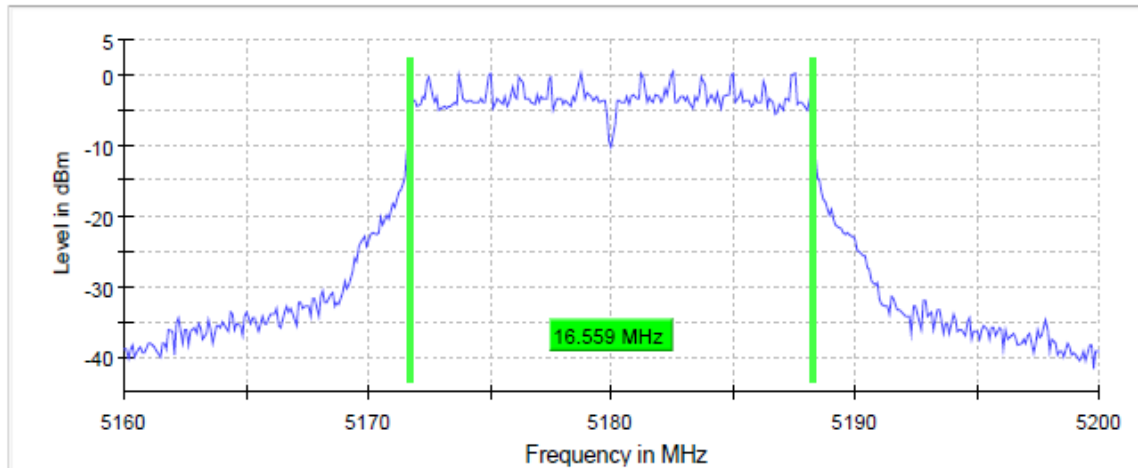
## DTS Bandwidth (6dB)

Tested according to FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04 Section II.C.2.  
Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 2%

### UNII-1

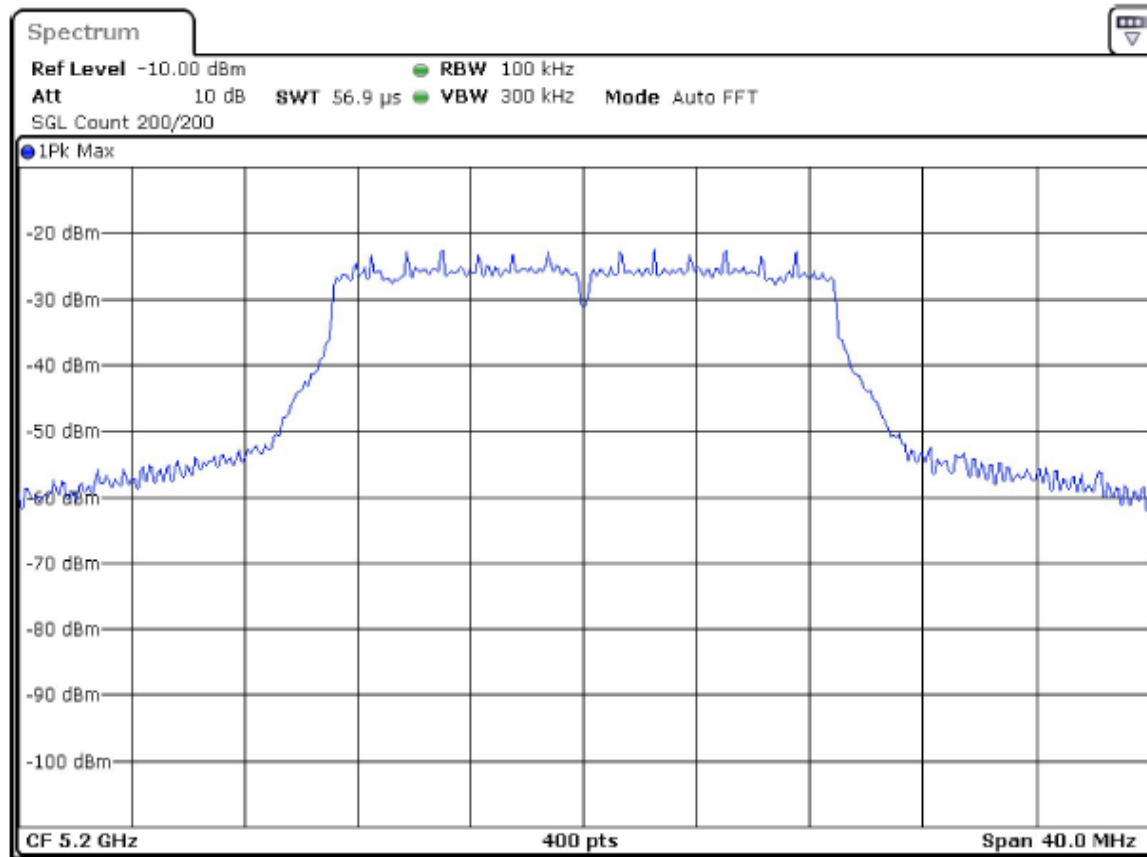
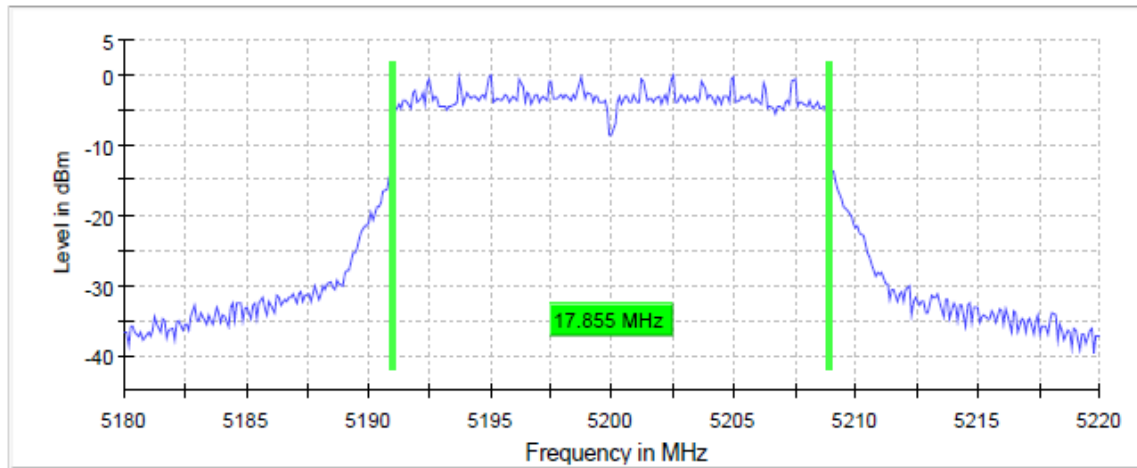
Data Rate	DUT Frequency (MHz)	Bandwidth (MHz)	Minimum Limit (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
802.11a 18 Mbps	5180.000	16.558604	0.5	5171.720698	5188.279302
802.11n(HT20) MSC2	5180.000	17.855361	0.5	5171.022444	5188.877805
802.11ac(VHT20) MCS0	5180.000	17.755610	0.5	5171.122195	5188.877805
802.11n(HT40) MSC6	5190.000	36.654183	0.5	5171.622971	5208.277154
802.11ac(VHT40) MCS2	5190.000	36.554308	0.5	5171.722846	5208.277154
802.11a 18 Mbps	5200.000	16.558604	0.5	5191.720698	5208.279302
802.11n(HT20) MSC2	5200.000	17.855361	0.5	5191.022444	5208.877805
802.11ac(VHT20) MCS0	5200.000	17.755610	0.5	5191.122195	5208.877805
802.11ac(VHT80) MSC1	5210.000	76.452217	0.5	5171.723923	5248.176140
802.11n(HT40) MCS6	5230.000	36.654183	0.5	5211.622971	5248.277154
802.11ac(VHT40) MCS2	5230.000	36.554308	0.5	5211.722846	5248.277154
802.11a 18 Mbps	5240.000	16.558604	0.5	5231.720698	5248.279302
802.11n(HT20) MSC2	5240.000	17.855361	0.5	5231.022444	5248.877805
802.11ac(VHT20) MCS0	5240.000	17.755610	0.5	5231.122195	5248.877805

**802.11a 18 Mbps 5180MHz**

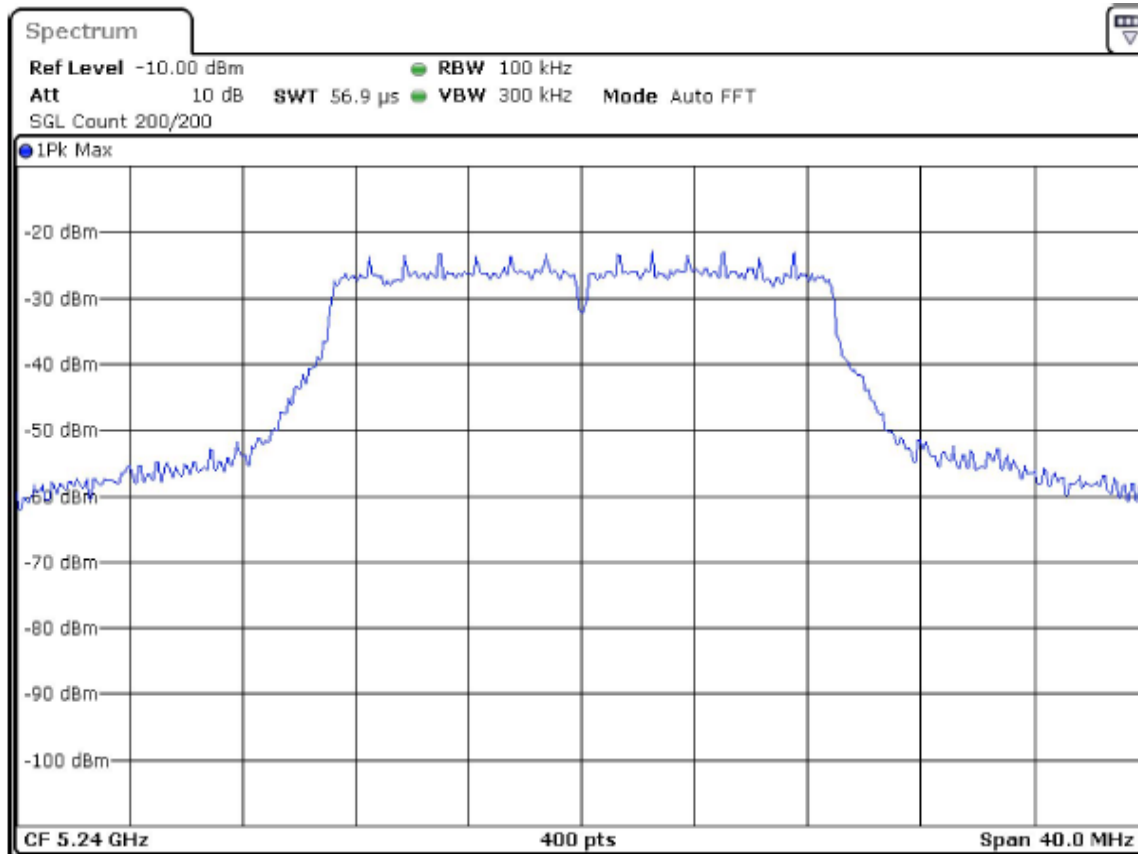
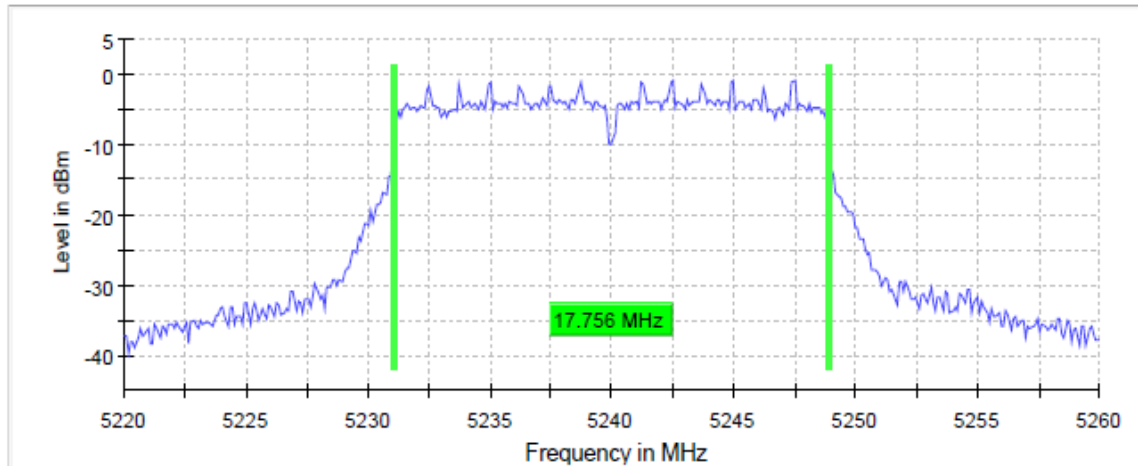




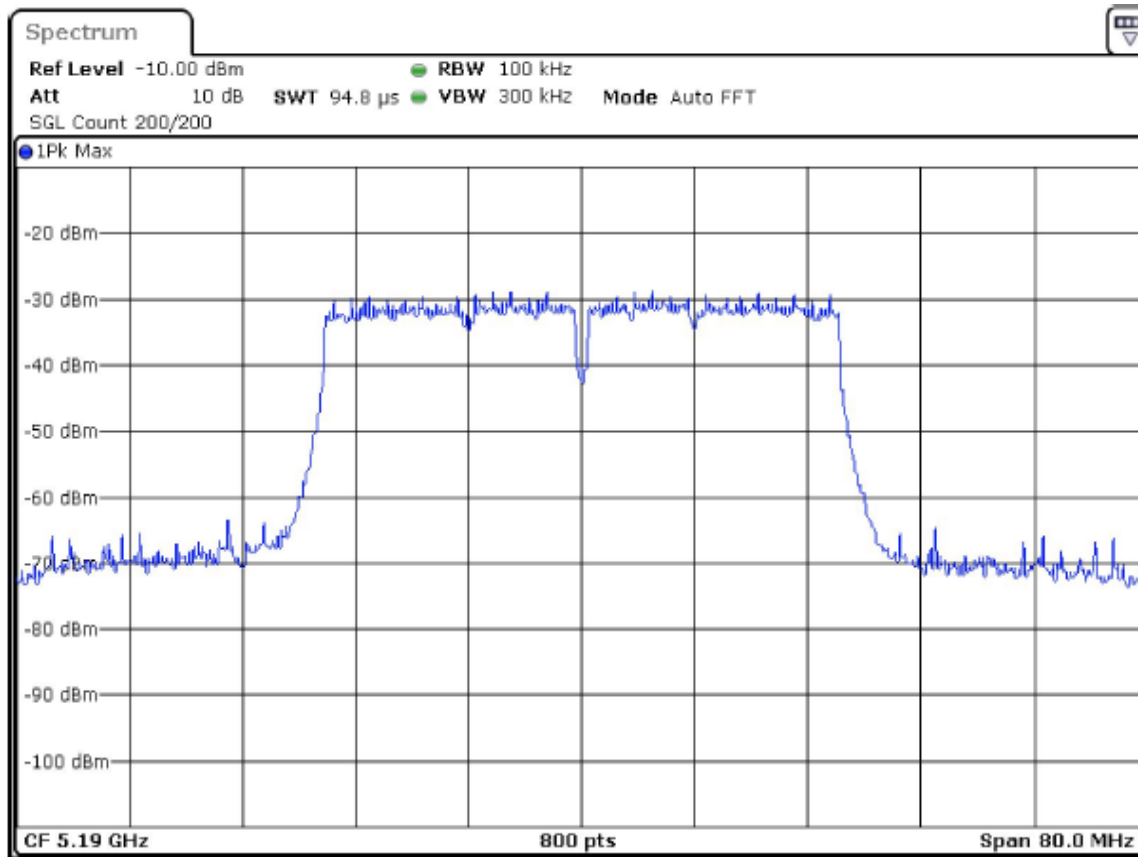
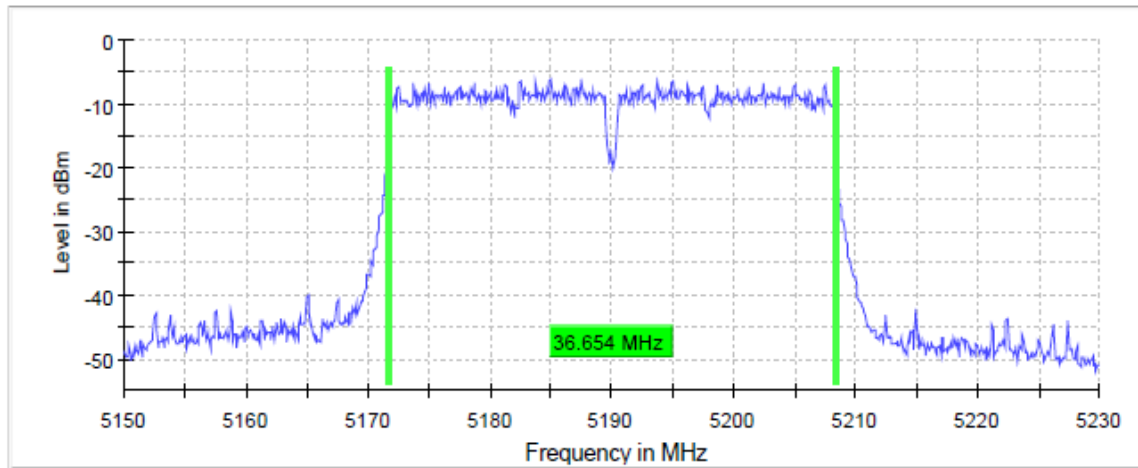
**802.11n(HT20) MCS2 5200MHz**



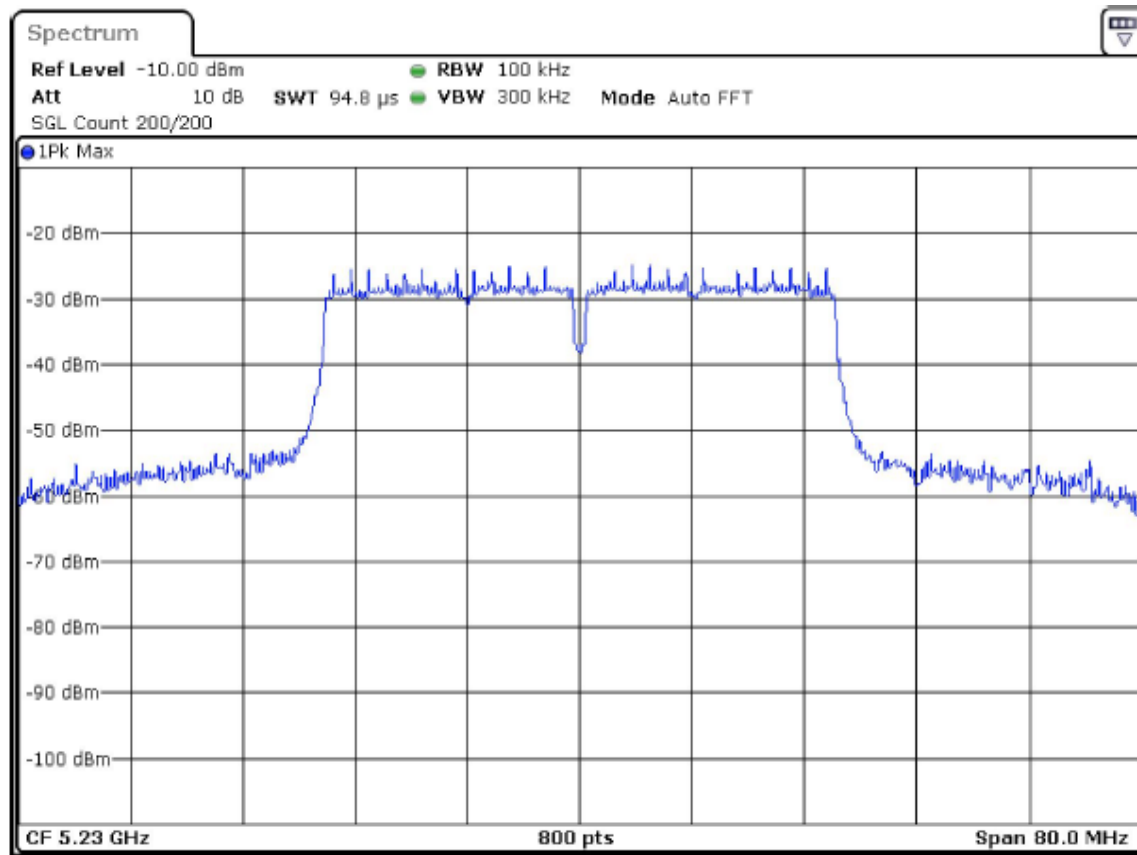
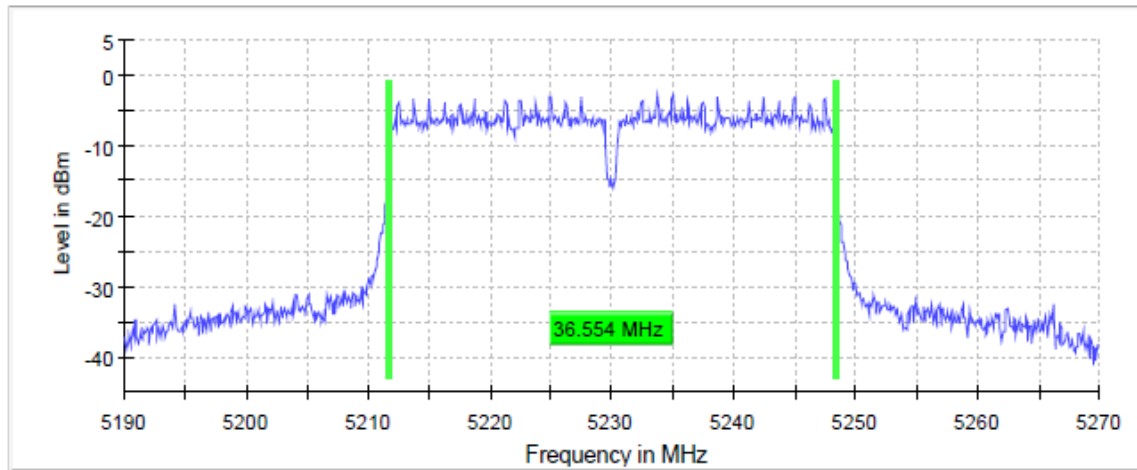
**802.11ac(VHT20) MCS0 5240MHz**



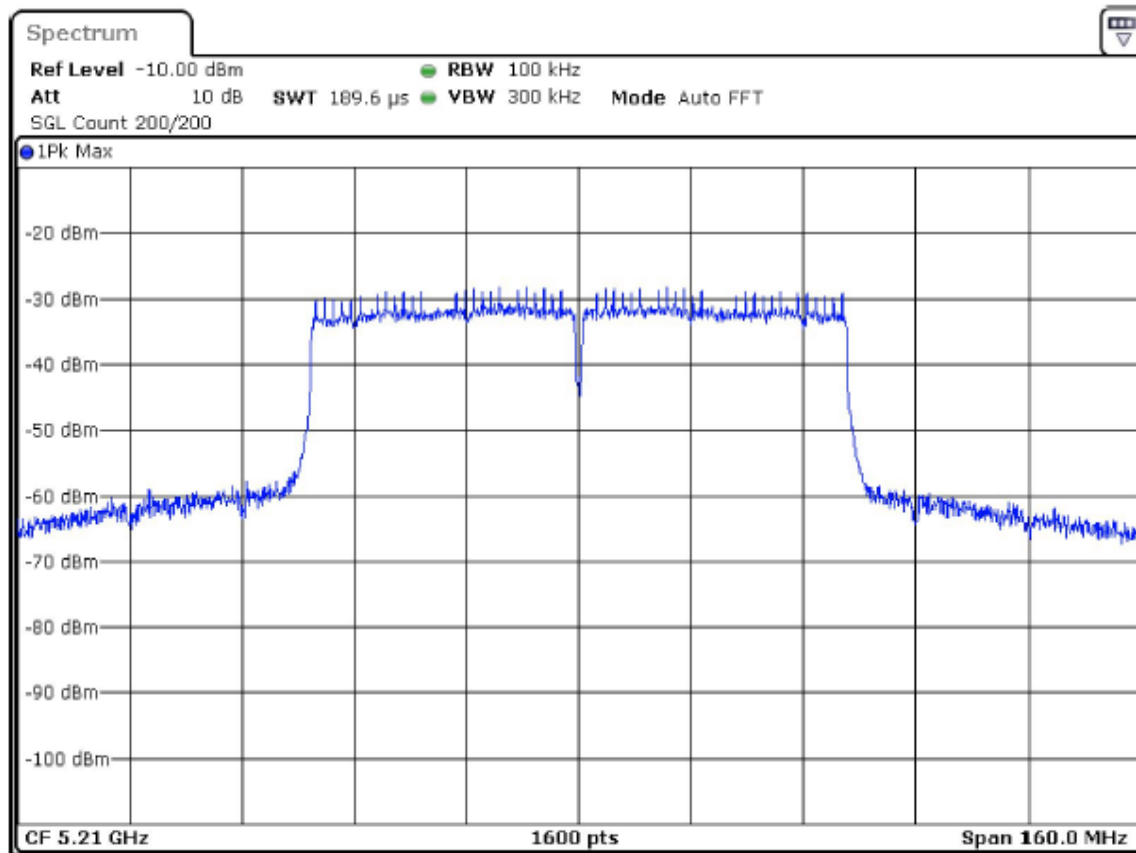
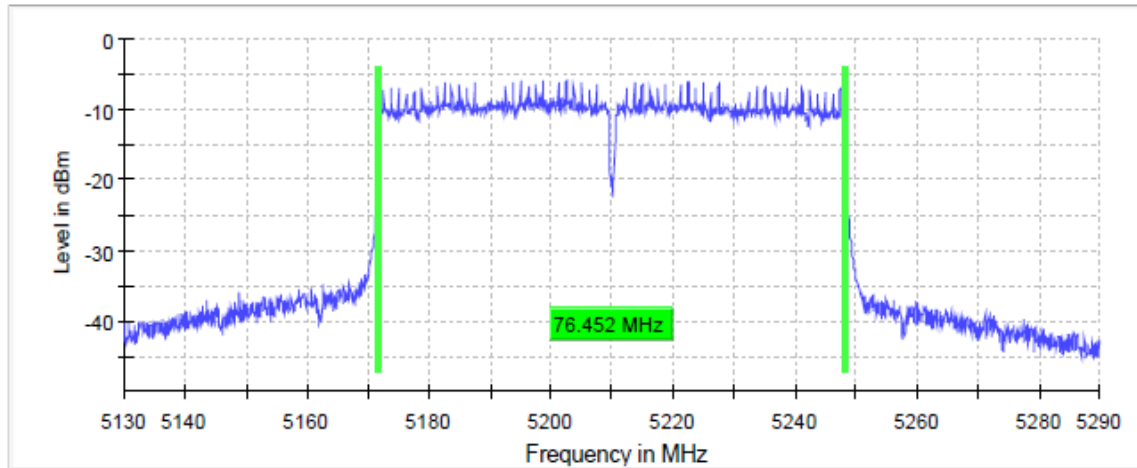
**802.11n(HT40) MCS6 5190 MHz**



**802.11ac(VHT40) MCS2 5230MHz**



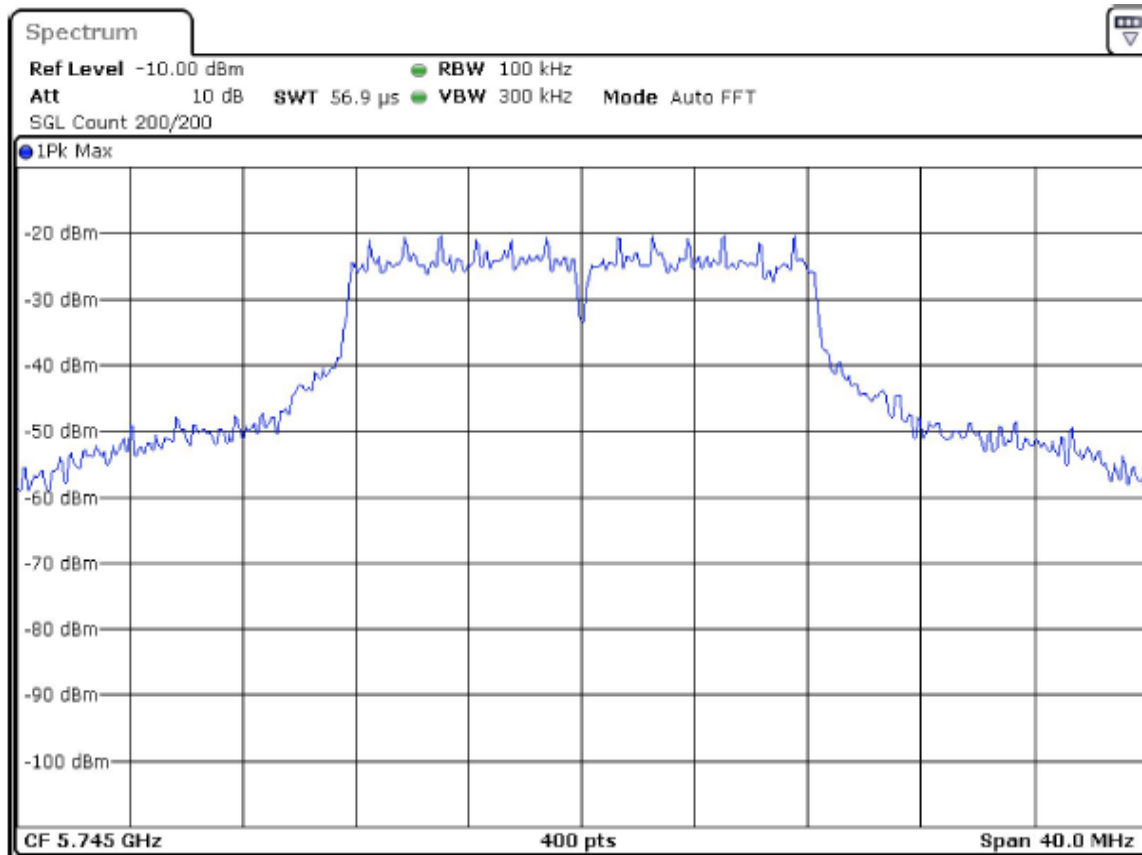
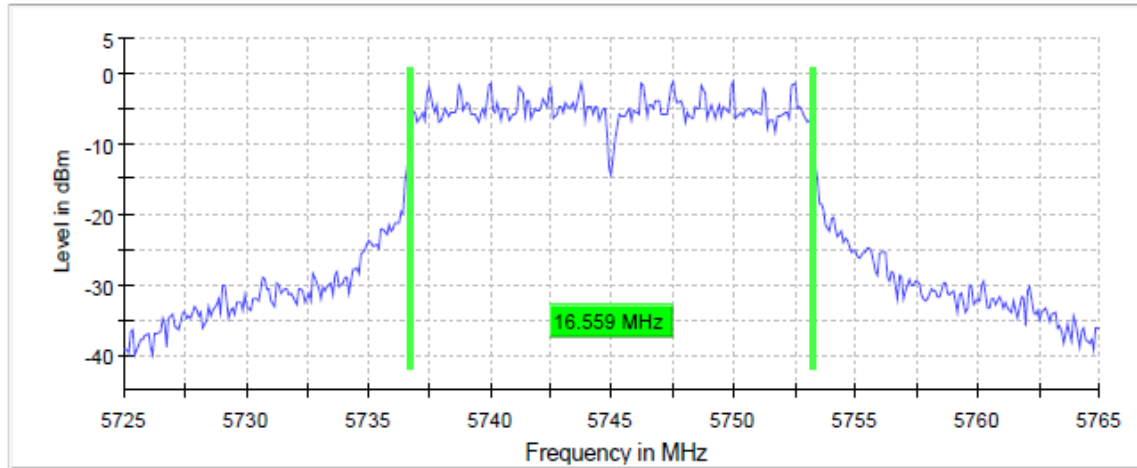
**802.11ac(VHT80) MCS1 5210MHz**



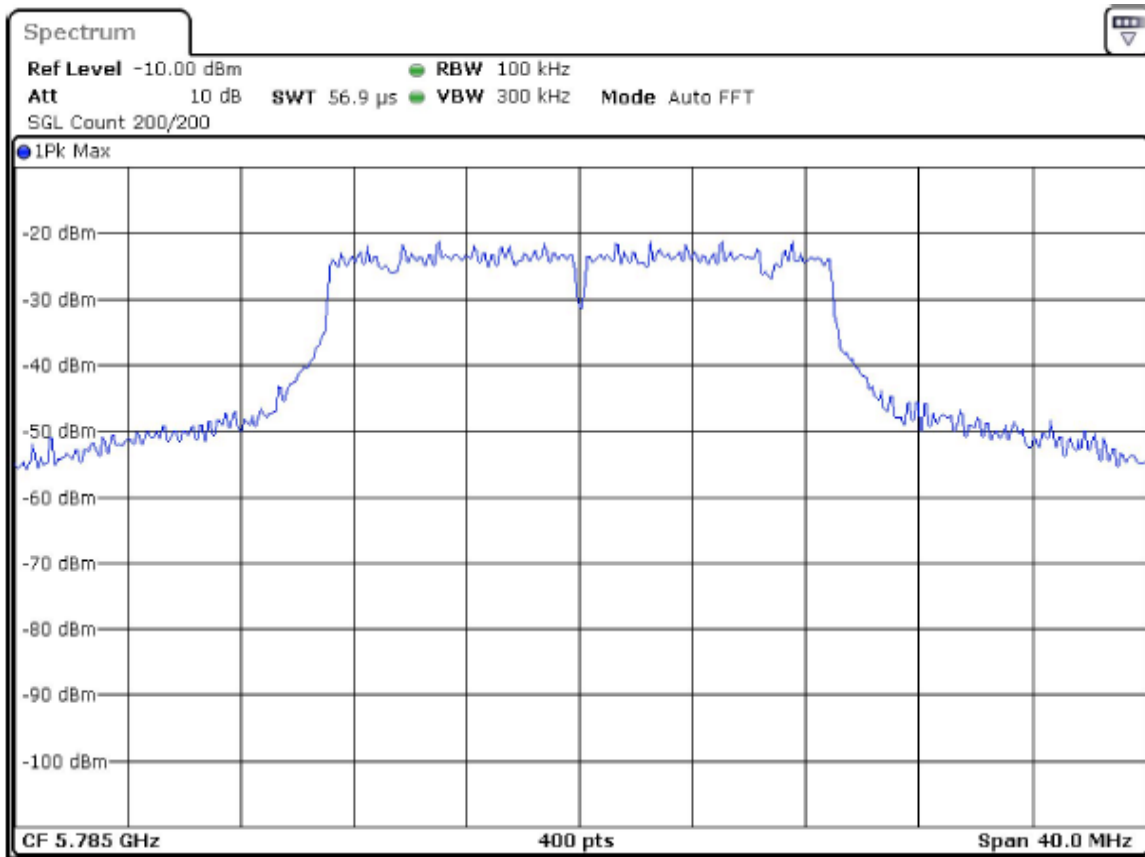
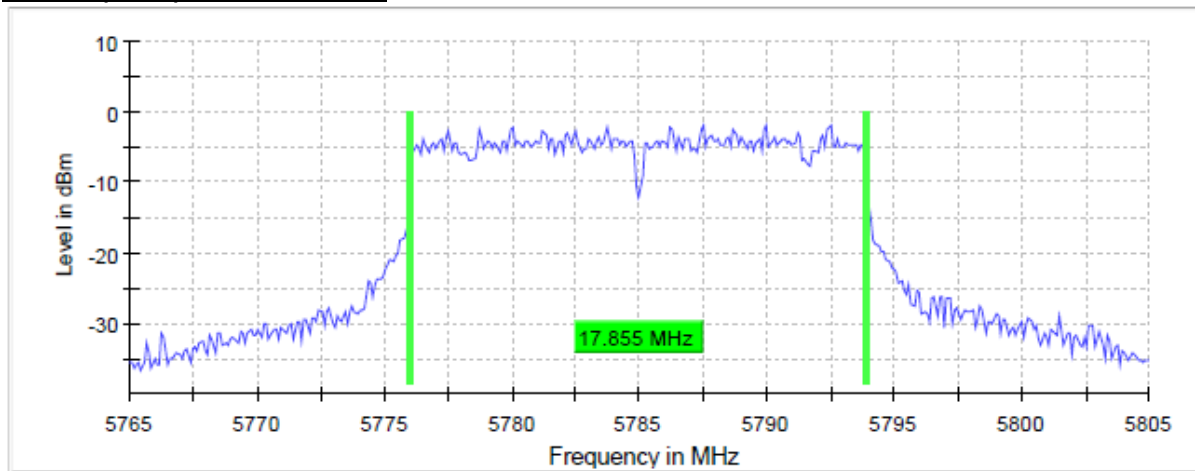
### NII-3

Data Rate	DUT Frequency (MHz)	Bandwidth (MHz)	Minimum Limit (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
802.11a 48 Mbps	5745.00	16.558604	0.5	5736.720698	5753.279302
802.11n(HT20) MSC7	5745.00	17.855361	0.5	5736.022444	5753.877805
802.11ac(VHT20) MCS8	5745.00	17.855361	0.5	5736.022444	5753.877805
802.11n(HT40) MSC7	5755.00	36.654183	0.5	5736.622971	5773.277154
802.11ac(VHT40) MCS8	5755.00	36.654183	0.5	5736.622971	5773.277154
802.11ac(VHT80) MCS0	5775.00	76.452217	0.5	5736.723923	5813.176140
802.11a 48 Mbps	5785.00	16.558604	0.5	5776.720698	5793.279302
802.11n(HT20) MSC7	5785.00	17.855361	0.5	5776.022444	5793.877805
802.11ac(VHT20) MCS8	5785.00	17.855361	0.5	5776.022444	5793.877805
802.11n(HT40) MSC7	5795.00	36.654183	0.5	5776.622971	5813.277154
802.11ac(VHT40) MCS8	5795.00	36.654183	0.5	5776.622971	5813.277154
802.11a 48 Mbps	5825.00	16.558604	0.5	5816.720698	5833.279302
802.11n(HT20) MSC7	5825.00	17.855361	0.5	5816.022444	5833.877805
802.11ac(VHT20) MCS8	5825.00	17.855361	0.5	5816.022444	5833.877805

**802.11a 48 Mbps 5745MHz**

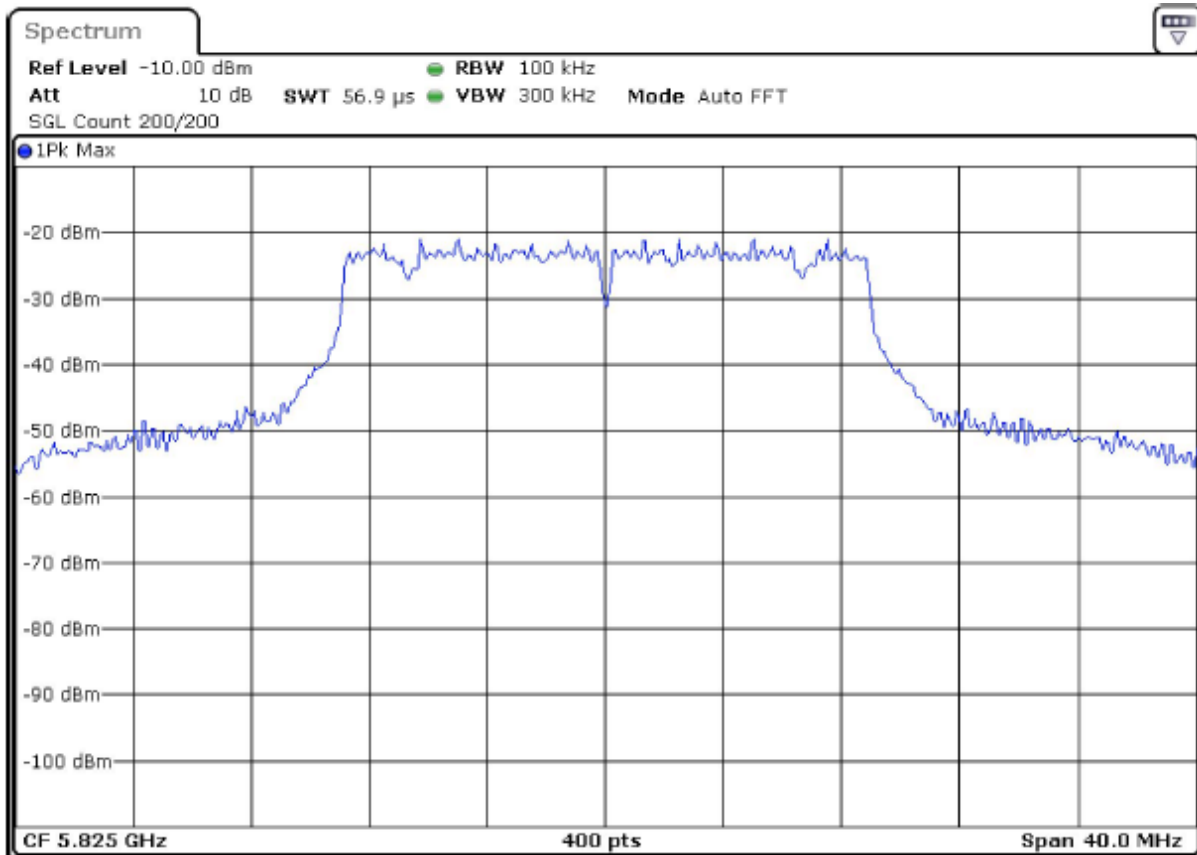
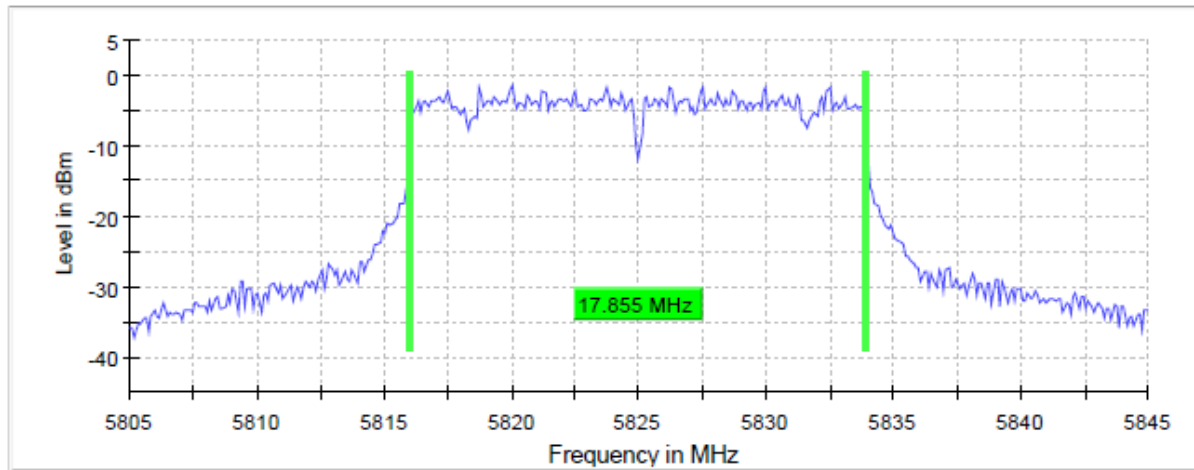


**802.11n(HT20) MCS7 5785MHz**

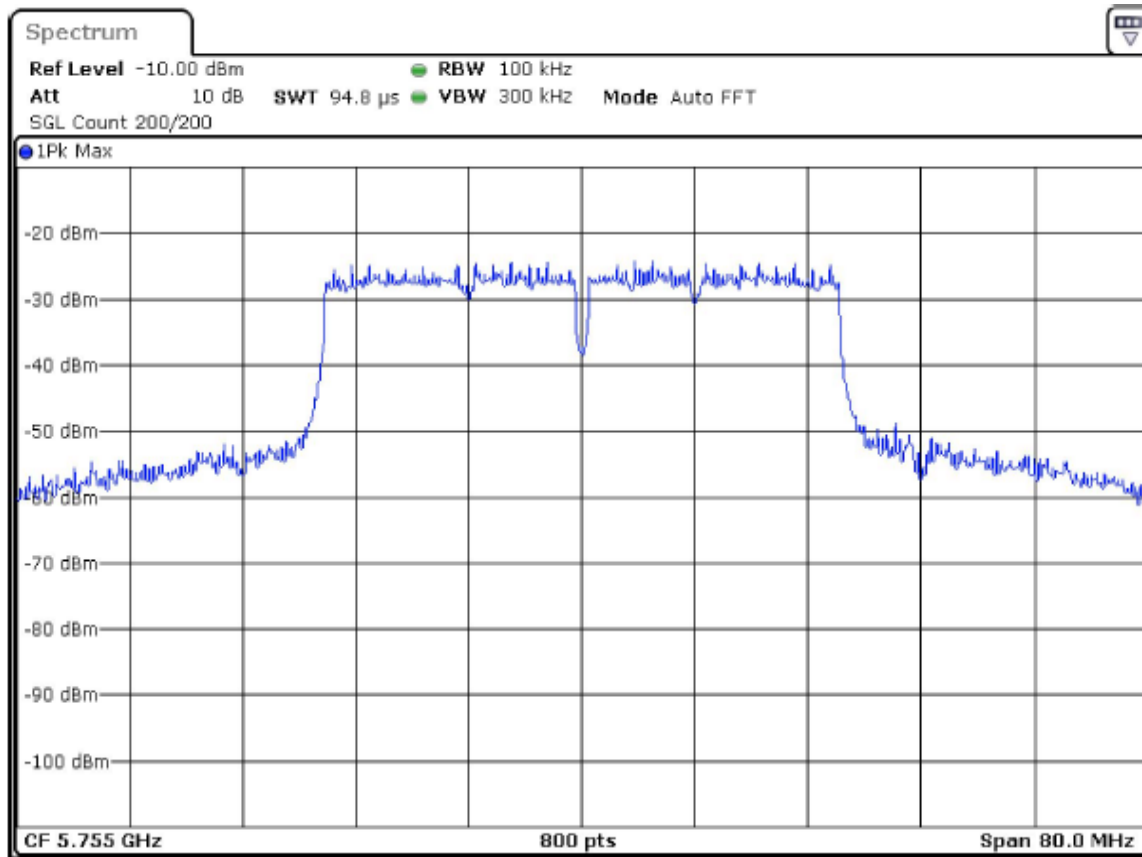
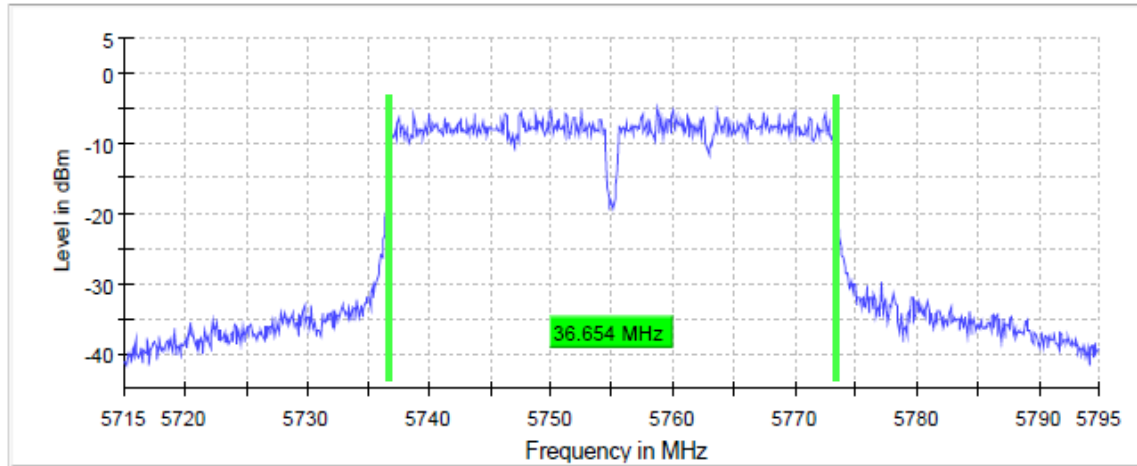




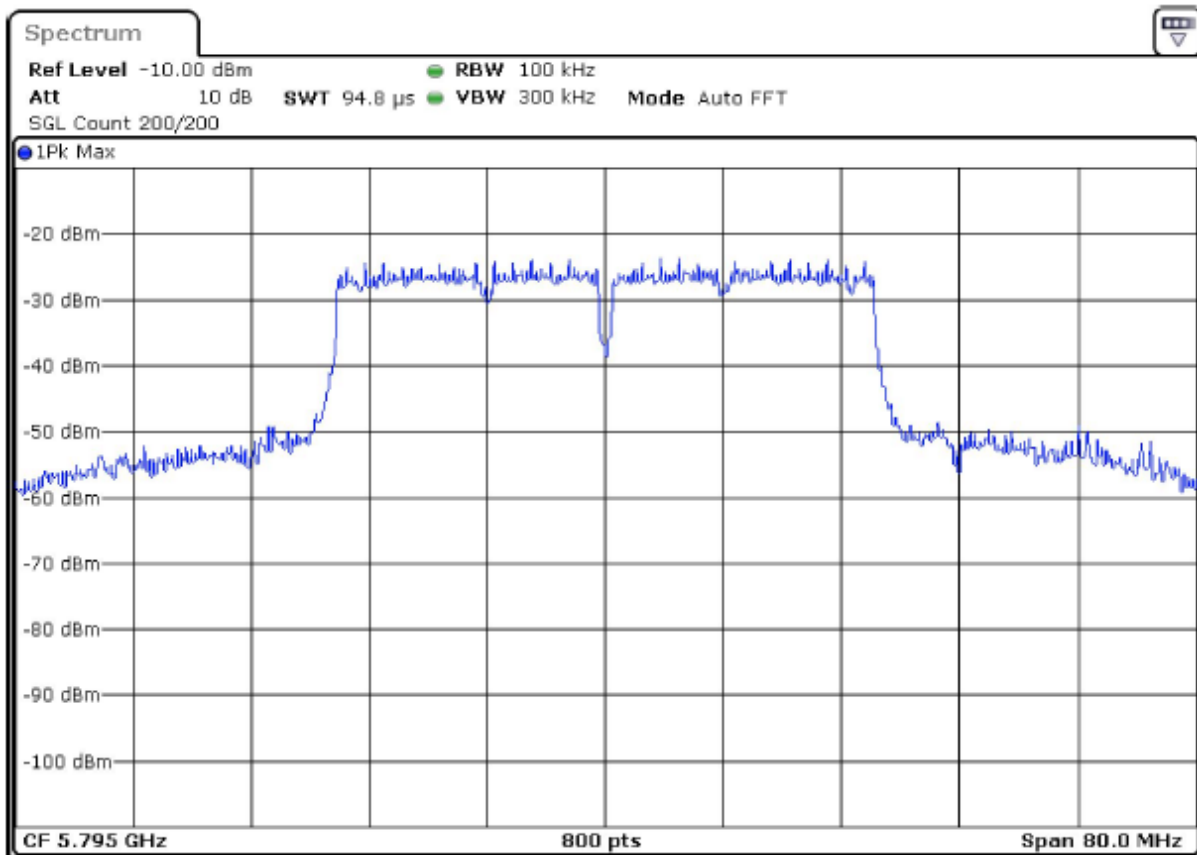
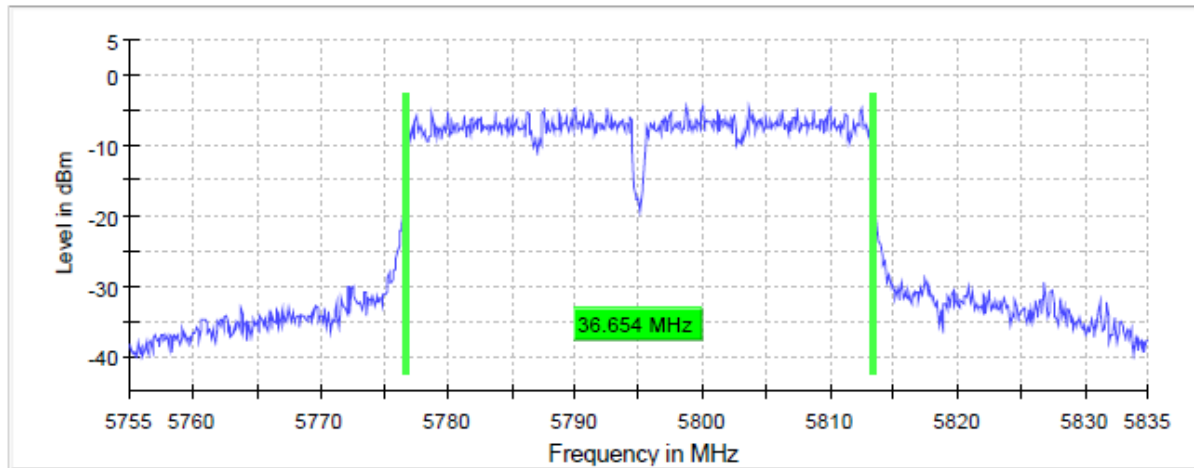
**802.11ac(VHT20) MCS8 5825MHz**



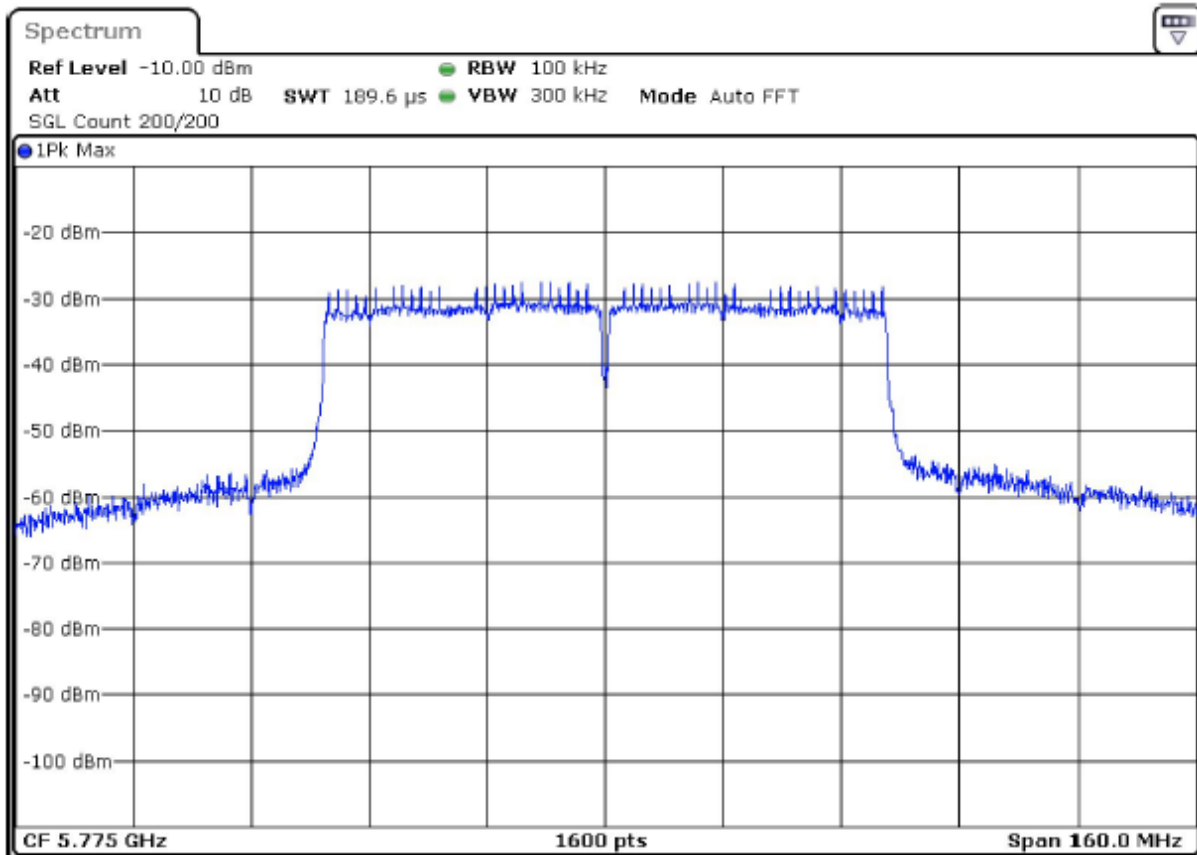
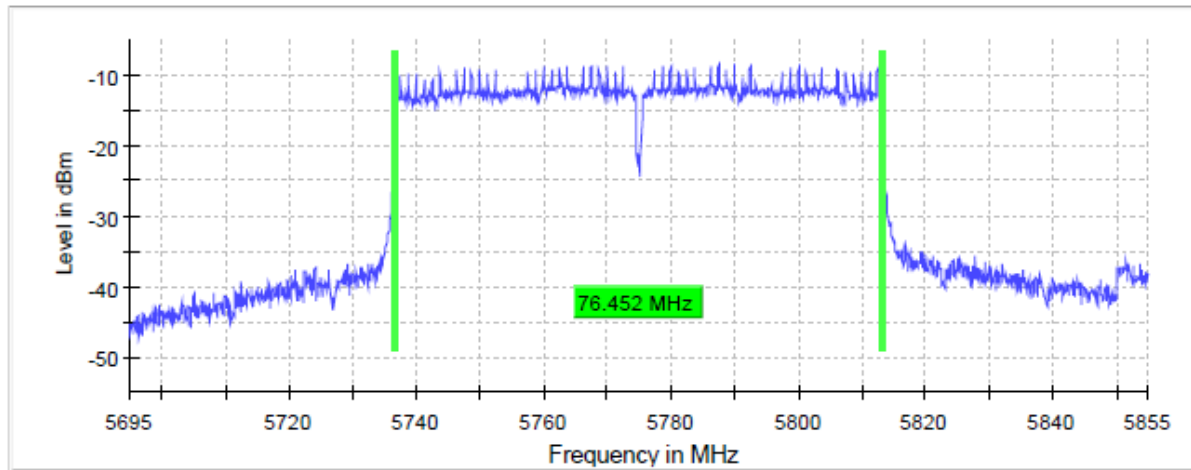
**802.11n(HT40) MCS7 5755MHz**



**802.11ac(VHT40) MCS8 5795MHz**



**802.11ac(VHT80) MCS0 5775MHz**



## Occupied Channel Bandwidth 99%

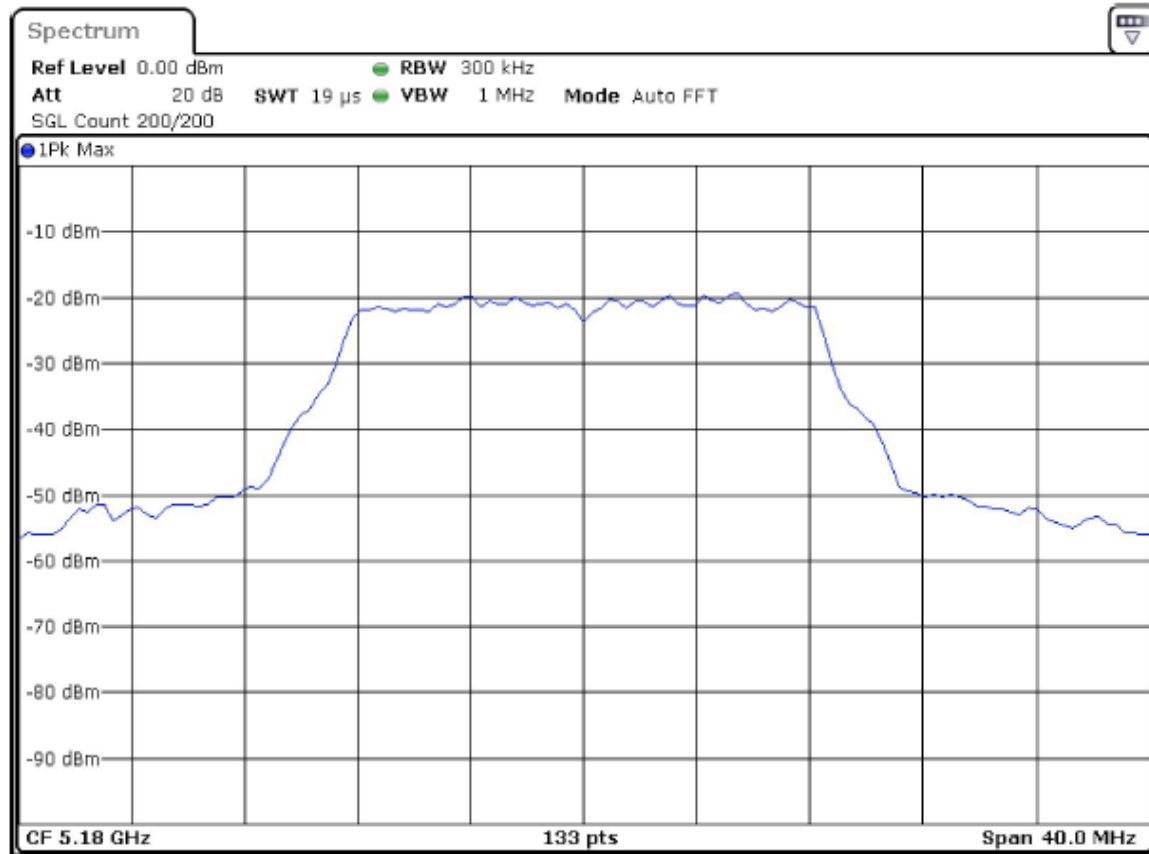
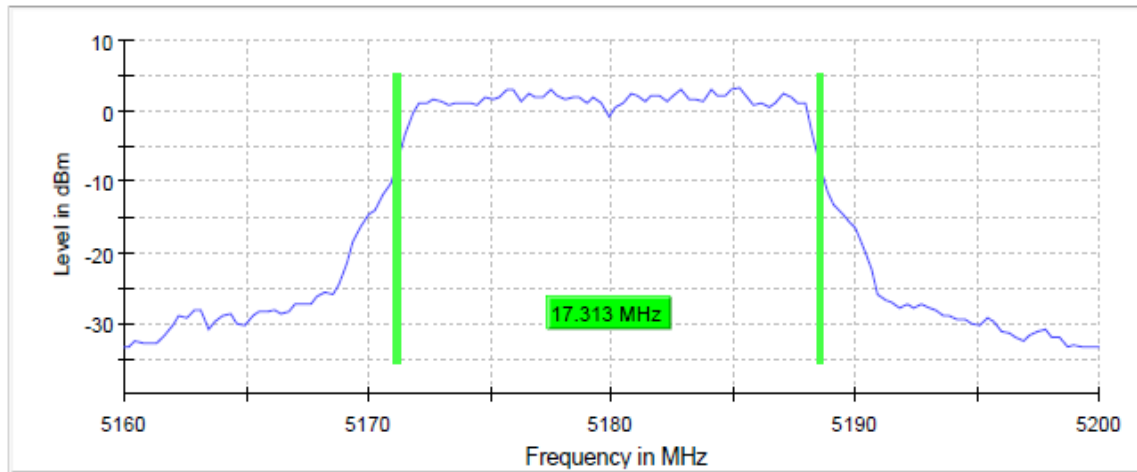
Tested according to FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04 Section II.D.

Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 2%

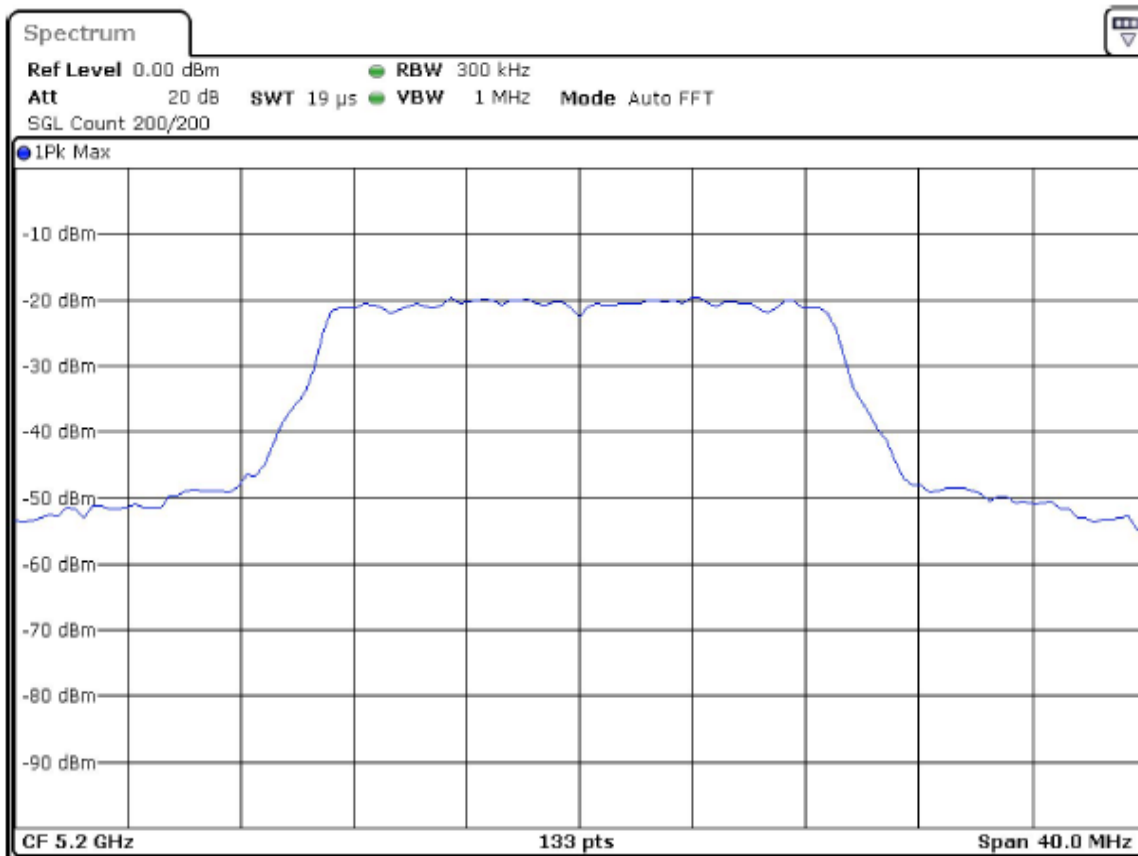
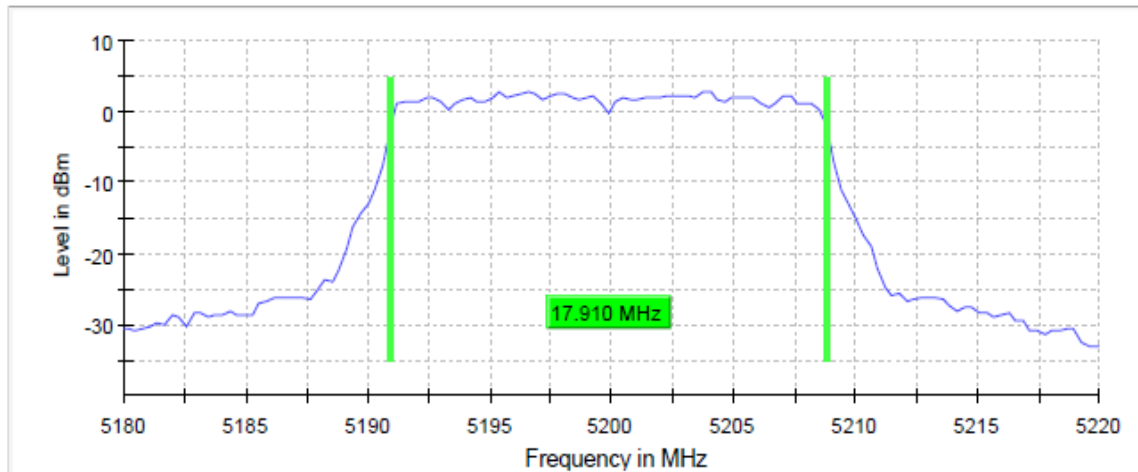
### UNII-1

Data Rate	DUT Frequency (MHz)	Bandwidth (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Band Limits
802.11a 18 Mbps	5180.000	17.313433	5171.194030	5188.507463	5150-5250
802.11n(HT20) MSC2	5180.000	18.208956	5170.895522	5189.104478	5150-5250
802.11ac(VHT20) MCS0	5180.000	18.507463	5170.597015	5189.104478	5150-5250
802.11n(HT40) MSC6	5190.000	36.273292	5171.614907	5207.888199	5150-5250
802.11ac(VHT40) MCS2	5190.000	36.273292	5171.614907	5207.888199	5150-5250
802.11a 18 Mbps	5200.000	17.014925	5191.194030	5208.208955	5150-5250
802.11n(HT20) MSC2	5200.000	17.910448	5190.895522	5208.805970	5150-5250
802.11ac(VHT20) MCS0	5200.000	18.507463	5190.597015	5209.104478	5150-5250
802.11ac(VHT80) MSC1	5210.000	76.521739	5171.242236	5247.763975	5150-5250
802.11n(HT40) MCS6	5230.000	36.273292	5211.614907	5247.888199	5150-5250
802.11ac(VHT40) MCS2	5230.000	36.273292	5211.614907	5247.888199	5150-5250
802.11a 18 Mbps	5240.000	16.558604	5231.720698	5248.279302	5150-5250
802.11n(HT20) MSC2	5240.000	18.208956	5230.895522	5249.104478	5150-5250
802.11ac(VHT20) MCS0	5240.000	18.507463	5230.597015	5249.104478	5150-5250

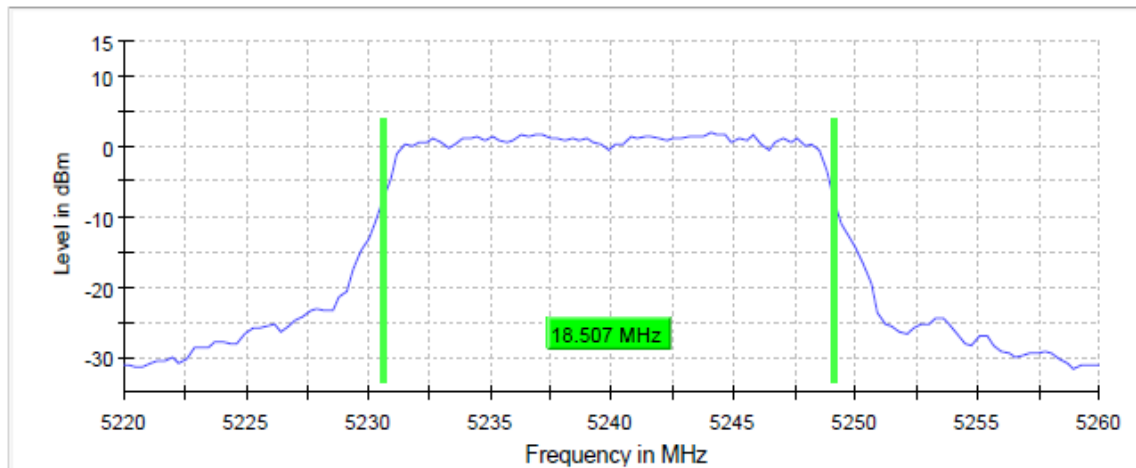
**802.11a 18 Mbps 5180MHz**



**802.11n(HT20) MCS2 5200MHz**

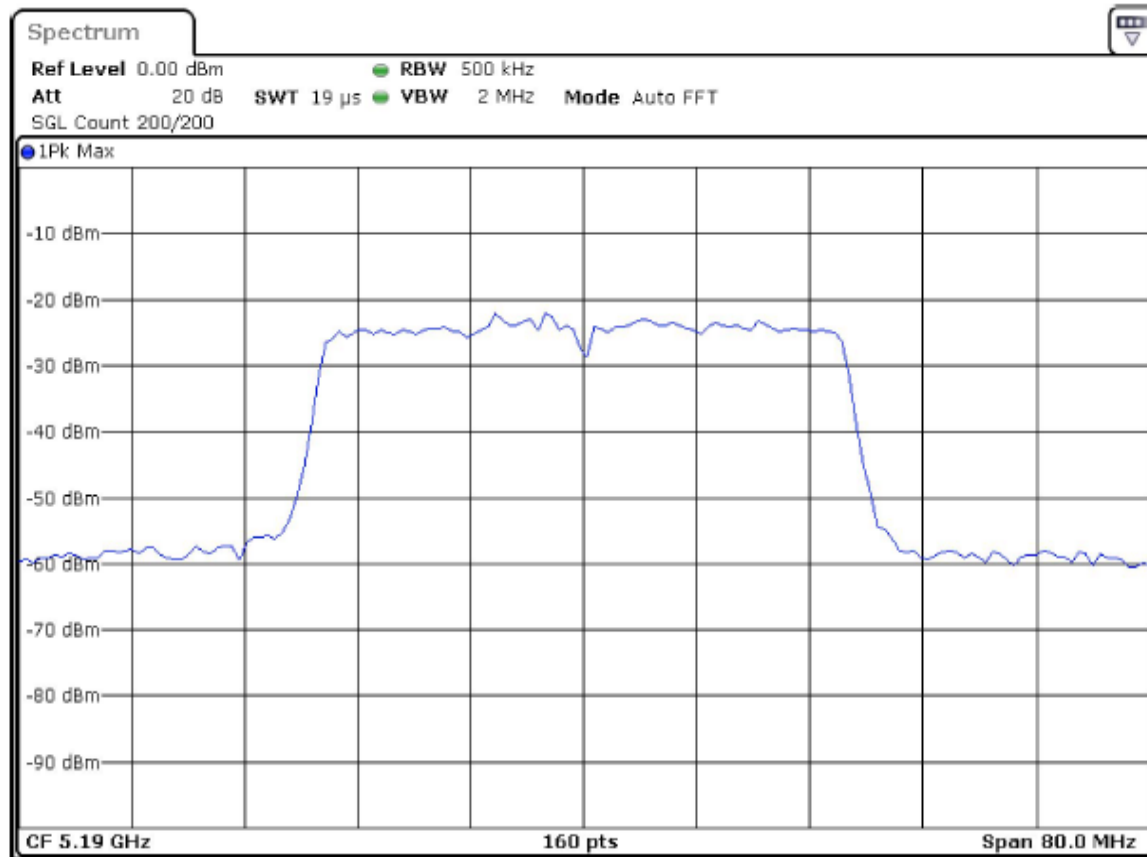
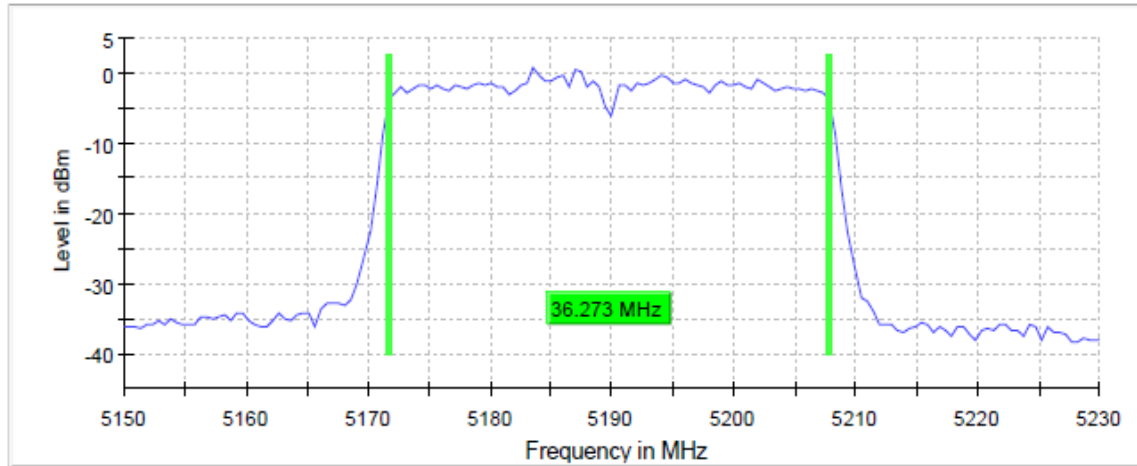


**802.11ac(VHT20) MCS0 5240MHz**

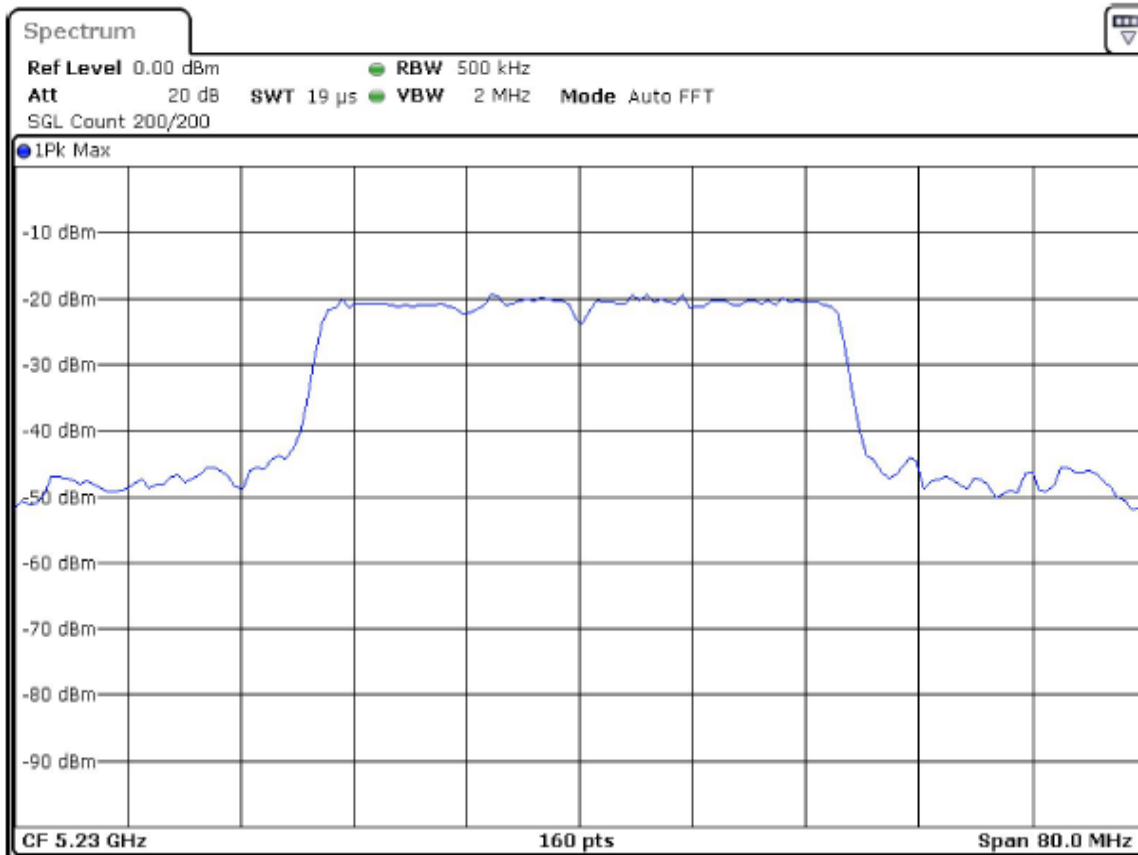
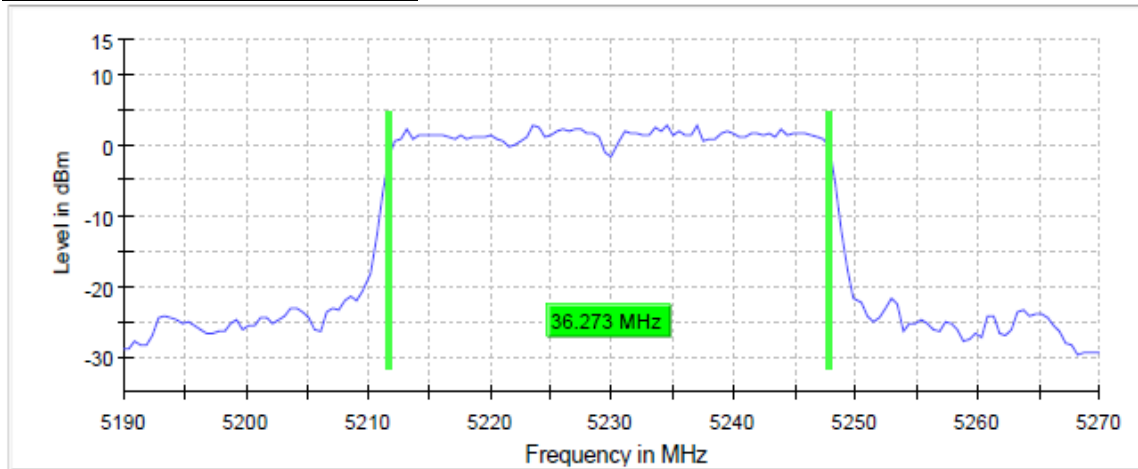




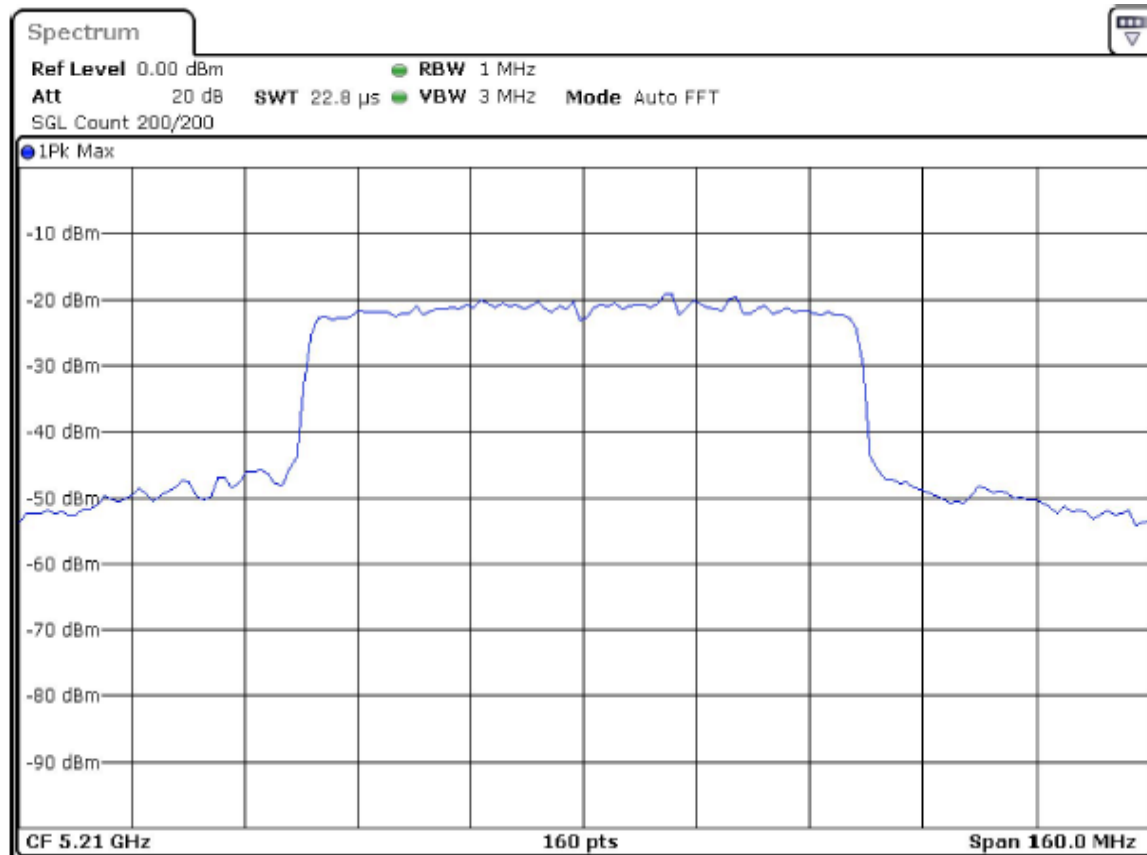
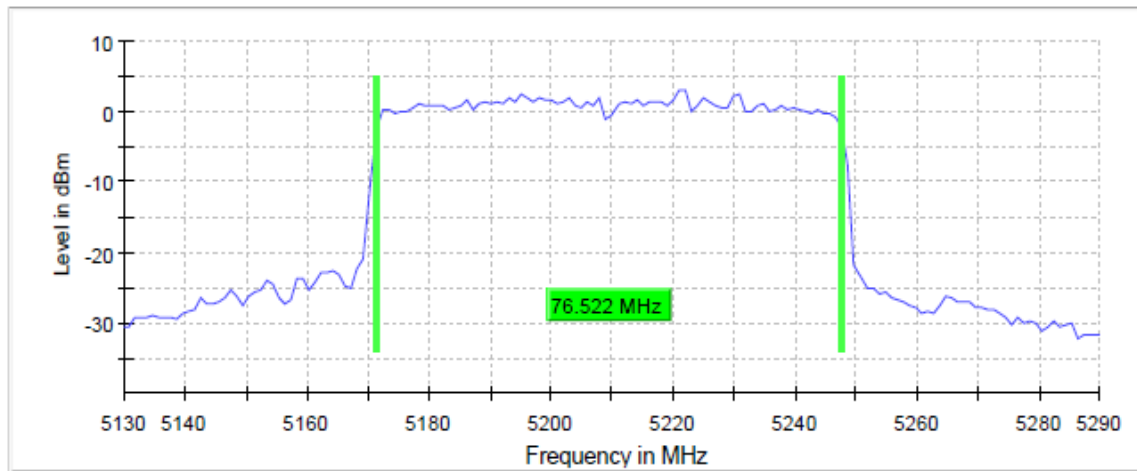
**802.11n(HT40) MCS6 5190 MHz**



**802.11ac(VHT40) MCS2 5230MHz**



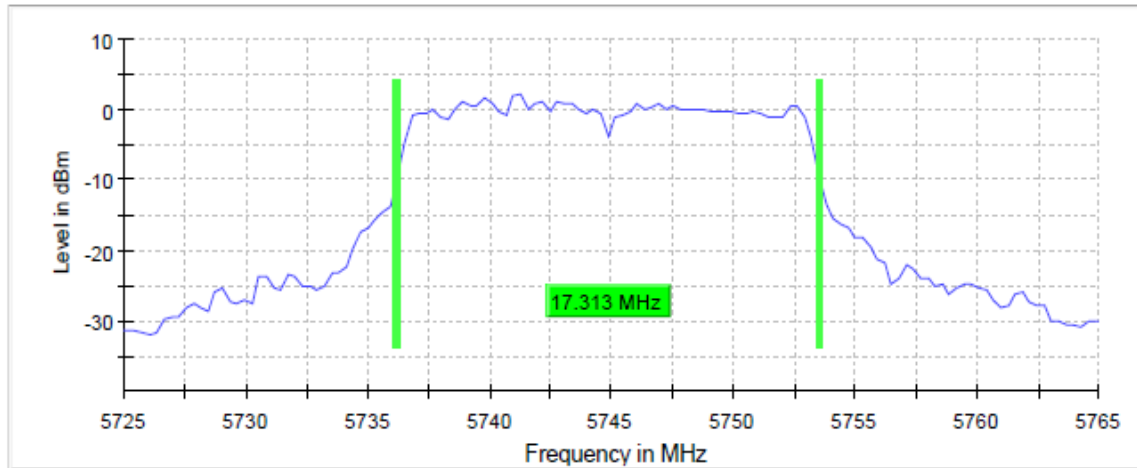
**802.11ac(VHT80) MCS1 5210MHz**



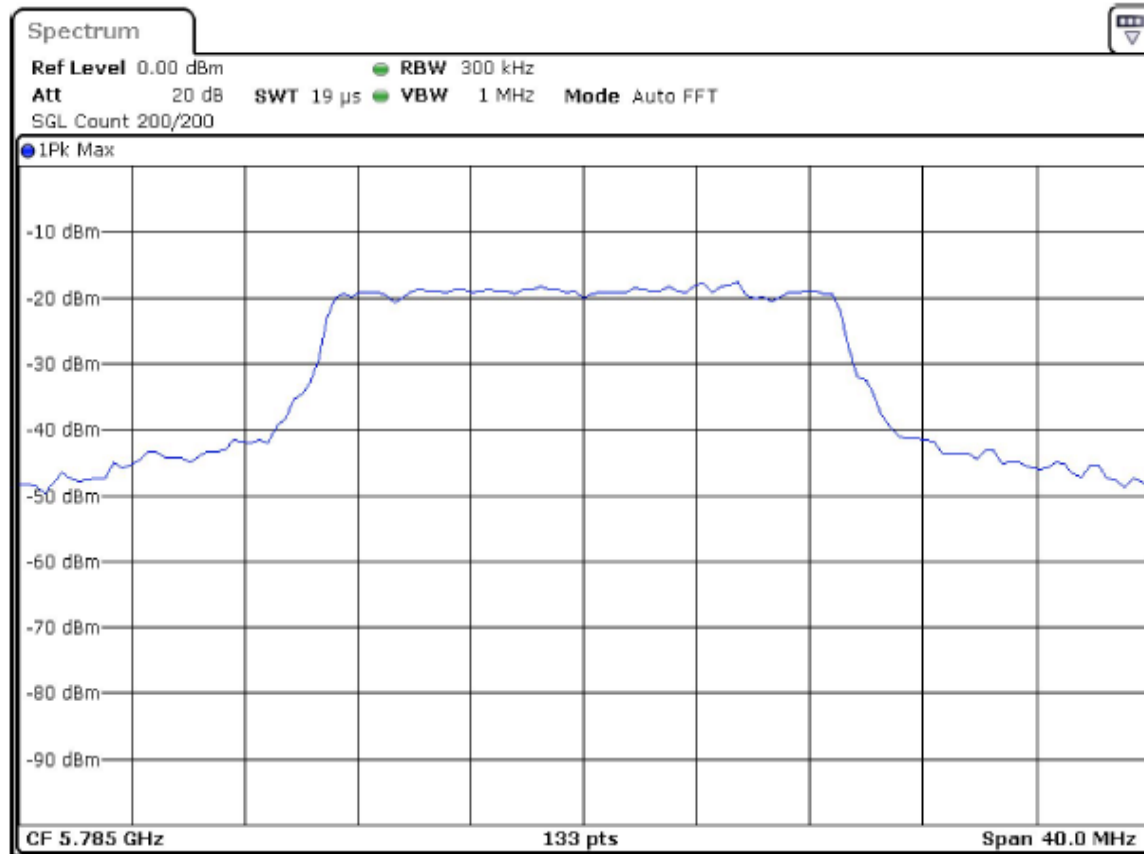
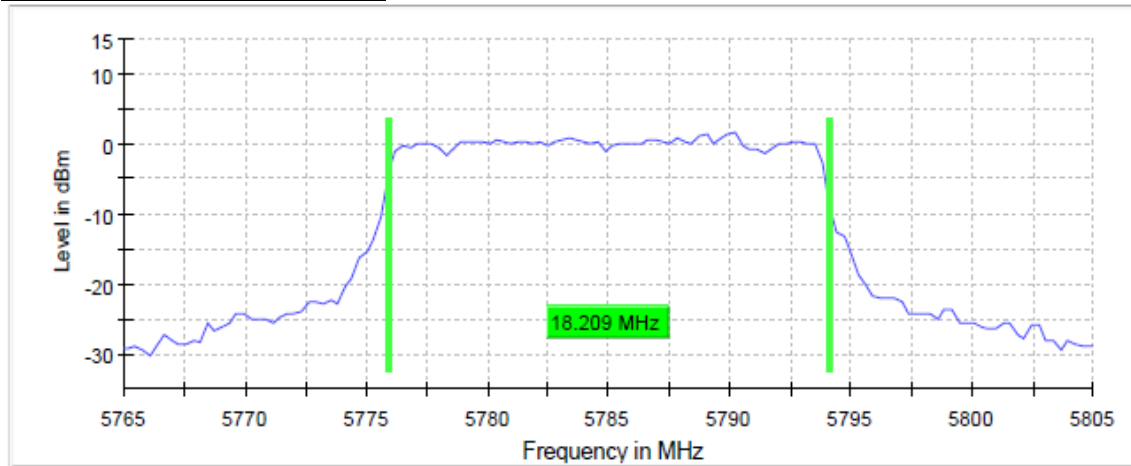
### UNII-3

Data Rate	DUT Frequency (MHz)	Bandwidth (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Band Limits
802.11a 48 Mbps	5745.00	17.313433	5736.194030	5753.507463	5725-5850
802.11n(HT20) MCS7	5745.00	18.208956	5735.895522	5754.104478	5725-5850
802.11ac(VHT20) MCS8	5745.00	18.208956	5735.895522	5754.104478	5725-5850
802.11n(HT40) MCS7	5755.00	36.770186	5736.614907	5773.385093	5725-5850
802.11ac(VHT40) MCS8	5755.00	36.770186	5736.614907	5773.385093	5725-5850
802.11ac(VHT80) MCS0	5775.00	76.521739	5736.242236	5812.763975	5725-5850
802.11a 48 Mbps	5785.00	17.313433	5776.194030	5793.507463	5725-5850
802.11n(HT20) MCS7	5785.00	18.208956	5775.895522	5794.104478	5725-5850
802.11ac(VHT20) MCS8	5785.00	18.208956	5775.895522	5794.104478	5725-5850
802.11n(HT40) MCS7	5795.00	36.770186	5776.614907	5813.385093	5725-5850
802.11ac(VHT40) MCS8	5795.00	36.770186	5776.614907	5813.385093	5725-5850
802.11a 48 Mbps	5825.00	17.313433	5816.194030	5833.507463	5725-5850
802.11n(HT20) MCS7	5825.00	18.507463	5815.597015	5834.104478	5725-5850
802.11ac(VHT20) MCS8	5825.00	18.208956	5815.895522	5834.104478	5725-5850

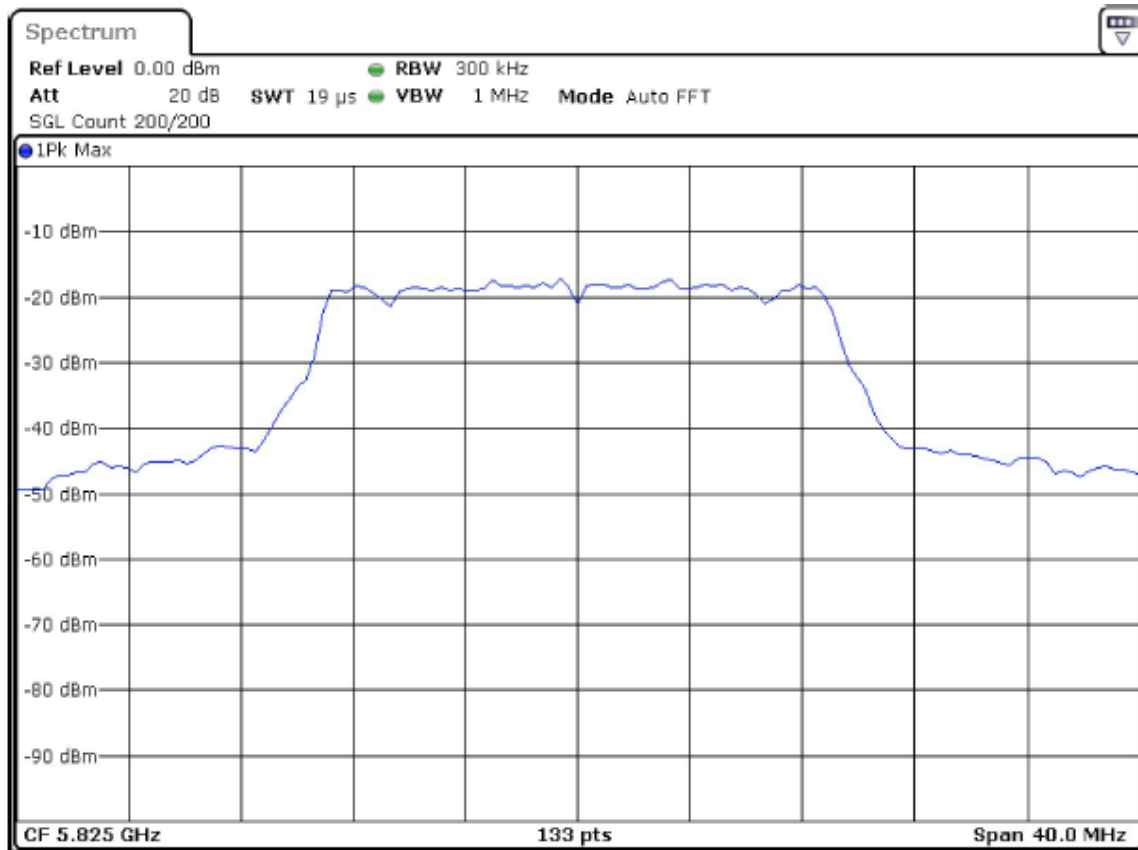
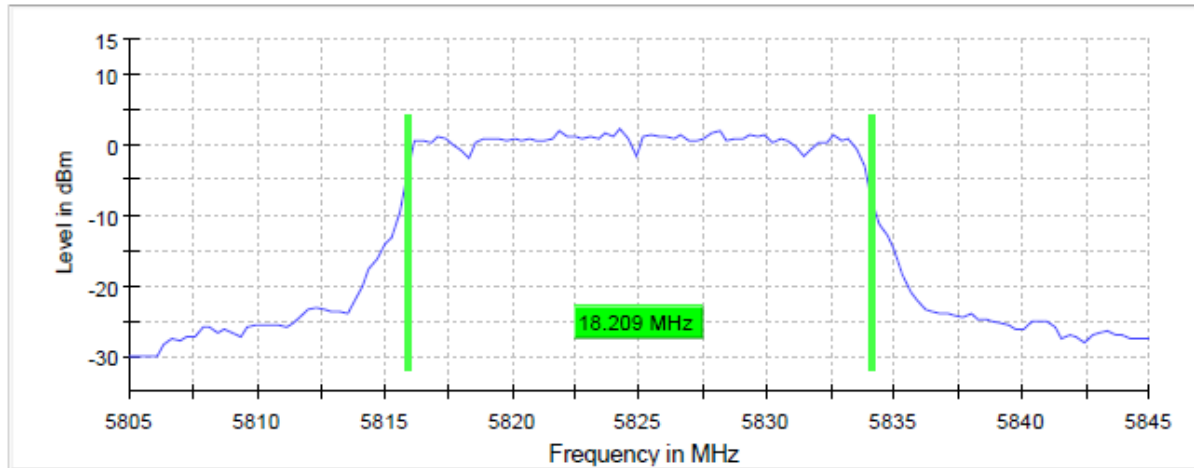
802.11a 48 Mbps 5745MHz



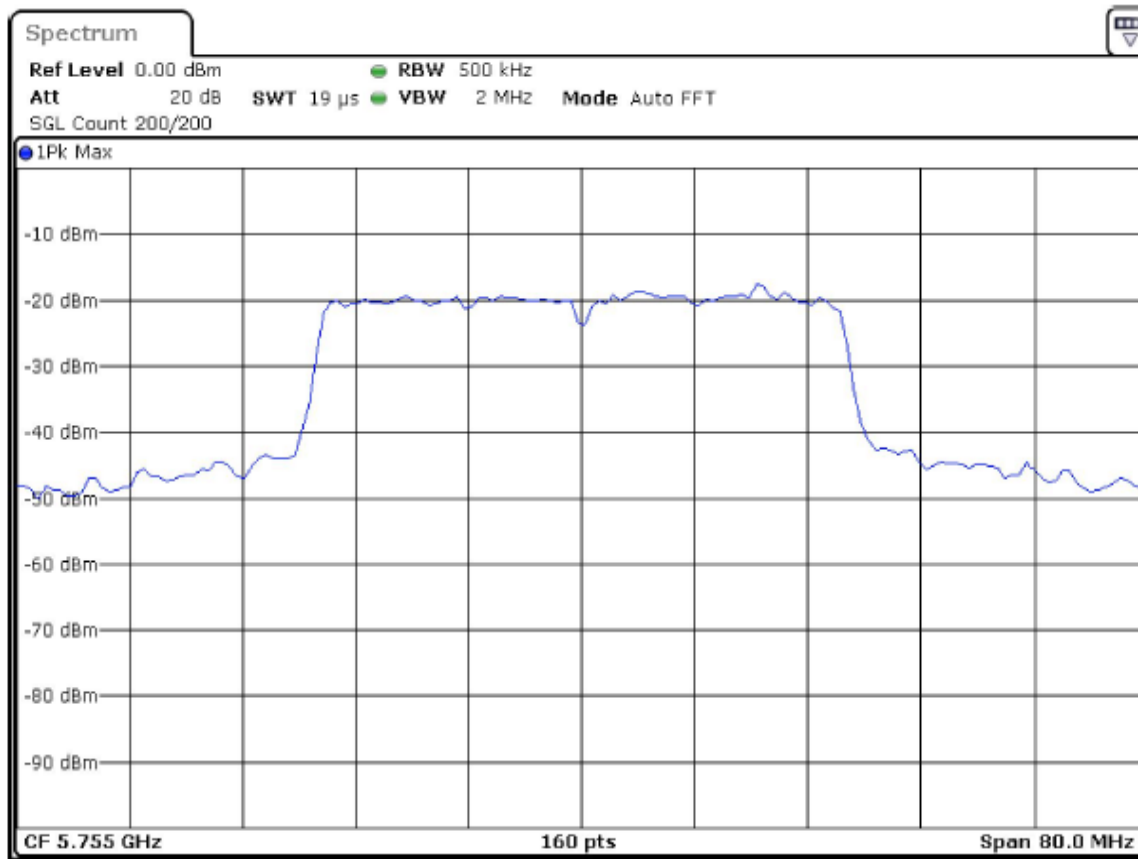
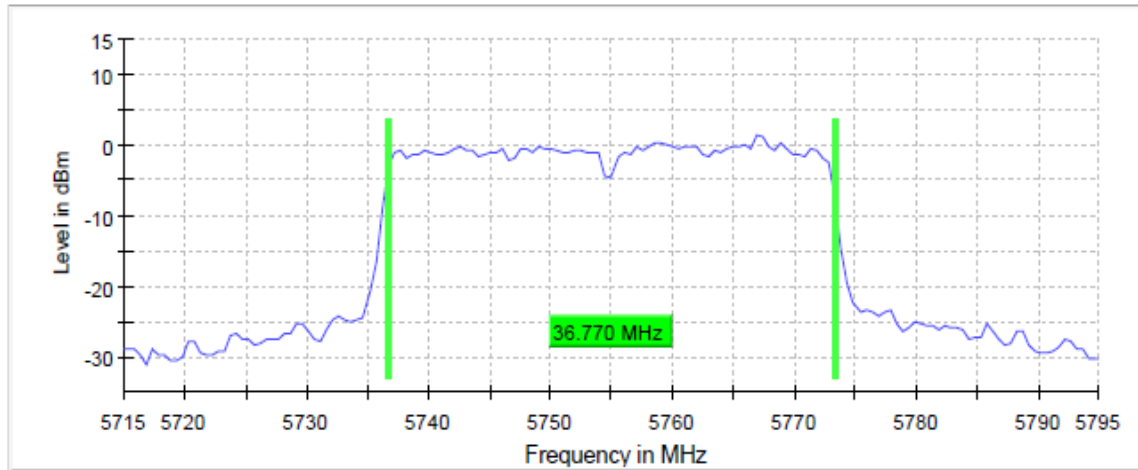
**802.11n(HT20) MCS7 5785MHz**



**802.11ac(VHT20) MCS8 5825MHz**

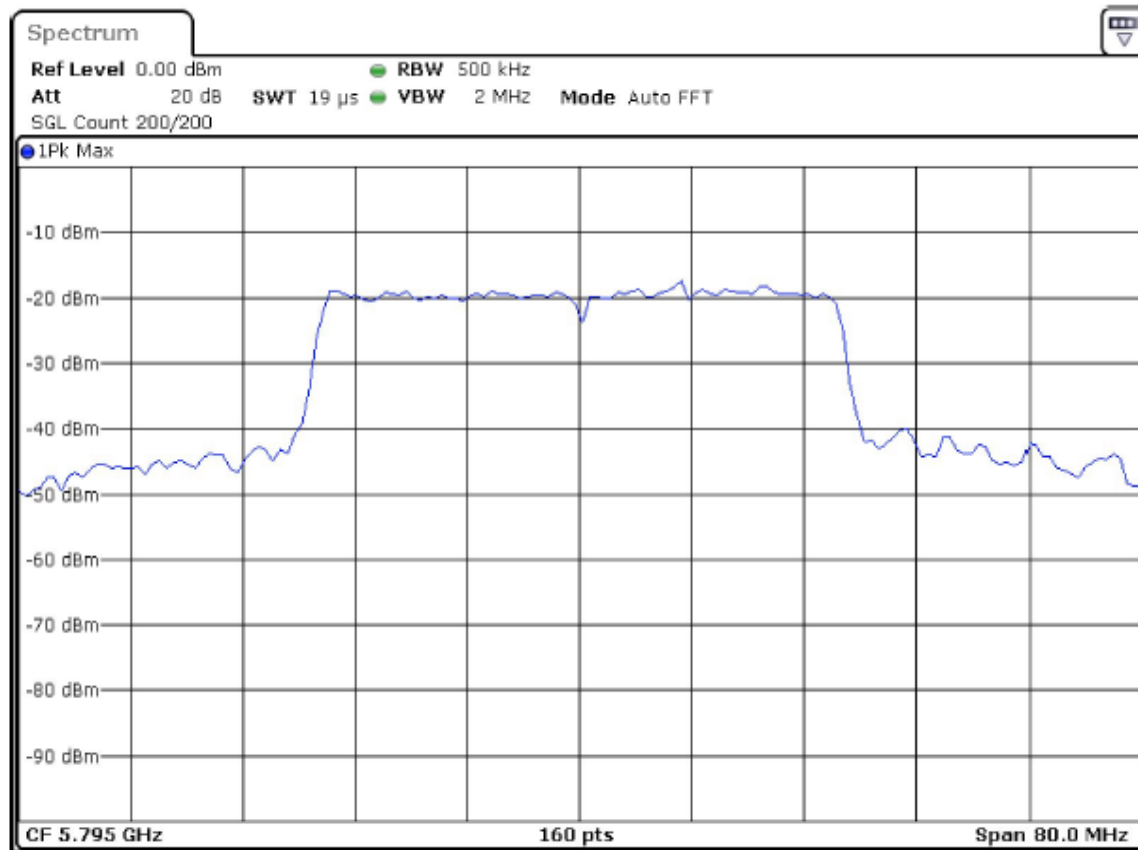
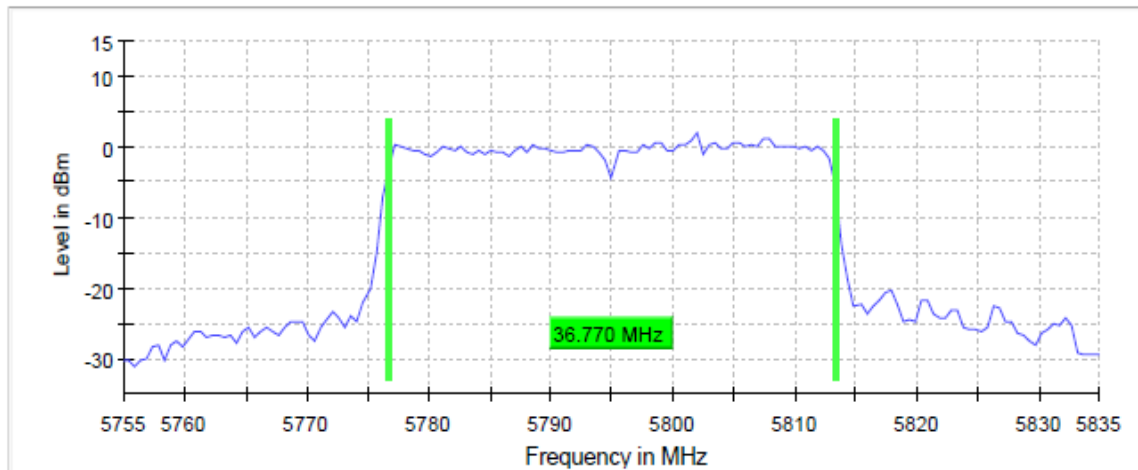


**802.11n(HT40) MCS7 5755MHz**





**802.11ac(VHT40) MCS8 5795MHz**



**802.11ac(VHT80) MCS0 5775MHz**

