

# TEST REPORT

**FCC ID: 2AQOO-N15I581T**

**Product: Notebook**

**Model No.: WWN15I5-8BK1T**

**Additional Model No.: WWN15I5-8WH1T, WWN15I5-8PK1T, WWN15I5-8SL1T,  
WWN15I5-8BL1T, WWN15I5-8T1T, WWN15I5-8GO1T, WWN15I5-4BK256**

**Trade Mark: THOMSON**

**Report No.: TCT200928E030**

**Issued Date: Oct. 27, 2020**

Issued for:

**GROUPSFIT**

**80/84 route de la Liberation, PONTAULT COMBAULT 77340, France**

Issued By:

**Shenzhen Tongce Testing Lab.**

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**Appendix A: Test Result of Conducted Test**

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## 1. Test Certification

<b>Product:</b>	Notebook
<b>Model No.:</b>	WWN15I5-8BK1T
<b>Additional Model No.:</b>	WWN15I5-8WH1T, WWN15I5-8PK1T, WWN15I5-8SL1T, WWN15I5-8BL1T, WWN15I5-8T1T, WWN15I5-8GO1T, WWN15I5-4BK256
<b>Trade Mark:</b>	<b>THOMSON</b>
<b>Applicant:</b>	GROUPSFIT
<b>Address:</b>	80/84 route de la Liberation, PONTAULT COMBAULT 77340, France
<b>Manufacturer:</b>	GROUPSFIT
<b>Address:</b>	80/84 route de la Liberation, PONTAULT COMBAULT 77340, France
<b>Date of Test:</b>	Sep. 29, 2020 – Oct. 26, 2020
<b>Applicable Standards:</b>	FCC CFR Title 47 Part 15 Subpart E Section 15.407: 2016 KDB662911 D01 Multiple Transmitter Output v02r01 KDB789033 D02 General U-NII Test Procedures New Rules v02r01

The above equipment has been tested by Shenzhen Tongce Testing Lab. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

**Tested By:**

*Brews Xu*

**Date:**

**Oct. 26, 2020**

**Brews Xu**

**Reviewed By:**

*Beryl Zhao*

**Date:**

**Oct. 27, 2020**

**Beryl Zhao**

**Approved By:**

*Tomsin*

**Date:**

**Oct. 27, 2020**

**Tomsin**

## 2. Test Result Summary

Requirement	CFR 47 Section	Result
Antenna requirement	§15.203	PASS
AC Power Line Conducted Emission	§15.207	PASS
Maximum Conducted Output Power	§15.407(a)	PASS
6dB Emission Bandwidth	§15.407(a)	PASS
26dB Emission Bandwidth & 99% Occupied Bandwidth	§15.407(a)	PASS
Power Spectral Density	§15.407(a)	PASS
Restricted Bands around fundamental frequency	§15.407(a)	PASS
Radiated Emission	§15.407(a)	PASS
Frequency Stability	§15.407(g)	PASS

**Note:**

1. PASS: Test item meets the requirement.
2. Fail: Test item does not meet the requirement.
3. N/A: Test case does not apply to the test object.
4. The test result judgment is decided by the limit of test standard.

### 3. EUT Description

<b>Product:</b>	Notebook
<b>Model No.:</b>	WWN15I5-8BK1T
<b>Additional Model No.:</b>	WWN15I5-8WH1T, WWN15I5-8PK1T, WWN15I5-8SL1T, WWN15I5-8BL1T, WWN15I5-8T1T, WWN15I5-8GO1T, WWN15I5-4BK256
<b>Trade Mark:</b>	<b>THOMSON</b>
<b>Operation Frequency:</b>	Band 3: 5745 MHz -5825 MHz
<b>Channel Bandwidth:</b>	802.11a: 20MHz 802.11n: 20MHz, 40MHz 802.11ac: 20MHz, 40MHz, 80MHz
<b>Modulation Technology:</b>	Orthogonal Frequency Division Multiplexing(OFDM)
<b>Modulation Type</b>	256QAM, 64QAM, 16QAM, BPSK, QPSK
<b>Antenna Type:</b>	Internal Antenna
<b>Antenna Gain:</b>	2.2dBi
<b>Power Supply:</b>	Rechargeable Li-polymer battery DC 7.6V
<b>AC adapter:</b>	Adapter Information: MODEL: JHD-AD065B-190300BA-A INPUT: AC 100-240V, 50/60Hz, 1.5A OUTPUT: DC 19.0V, 3.0A, 57.0W
<b>Remark:</b>	All models above are identical in interior structure, electrical circuits and components, just model names are different for the marketing requirement.

**Note:** The antenna gain listed in this report is provided by applicant, and the test laboratory is not responsible for this parameter.

**Test Frequency each of channel****Band 3**

20MHz		40MHz		80MHz	
Channel	Frequency	Channel	Frequency	Channel	Frequency
149	5745	151	5755	155	5775
157	5785	159	5795		
165	5825				

**Note:**

*In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below.*

## 4. General Information

### 4.1. Test environment and mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	56 % RH
Atmospheric Pressure:	1010 mbar
Test Mode:	
Engineering mode:	Keep the EUT in continuous transmitting by select channel and modulations(The value of duty cycle is 100%)
<p>The sample was placed 0.8m/1.5m for blow/above 1GHz above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y &amp; Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.</p>	

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

**Per-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.**

Mode	Data rate
802.11a	6 Mbps
802.11n(HT20)	6.5 Mbps
802.11n(HT40)	13.5 Mbps
802.11ac(VHT20)	6.5 Mbps
802.11ac(VHT40)	13.5 Mbps
802.11ac(VHT80)	29.3 Mbps

#### Final Test Mode:

Operation mode:	Keep the EUT in continuous transmitting with modulation
-----------------	---

## 4.2. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
/	/	/	/	/

**Note:**

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.
3. For conducted measurements (Output Power, Emission Bandwidth, Power Spectral Density, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.



## 5. Facilities and Accreditations

### 5.1. Facilities

The test facility is recognized, certified, or accredited by the following organizations:

- FCC - Registration No.: 645098

Shenzhen Tongce Testing Lab

The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

- IC - Registration No.: 10668A-1

The 3m Semi-anechoic chamber of Shenzhen TCT Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

### 5.2. Location

Shenzhen Tongce Testing Lab

Address: 1B/F., Building 1, Yibaolai Industrial Park, Qiaotou, Fuyong, Baoan District, Shenzhen, Guangdong, China

TEL: +86-755-27673339

### 5.3. Measurement Uncertainty

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95 %.

No.	Item	MU
1	Conducted Emission	$\pm 2.56\text{dB}$
2	RF power, conducted	$\pm 0.12\text{dB}$
3	Spurious emissions, conducted	$\pm 0.11\text{dB}$
4	All emissions, radiated(<1G)	$\pm 3.92\text{dB}$
5	All emissions, radiated(>1G)	$\pm 4.28\text{dB}$
6	Temperature	$\pm 0.1^\circ\text{C}$
7	Humidity	$\pm 1.0\%$

## 6. Test Results and Measurement Data

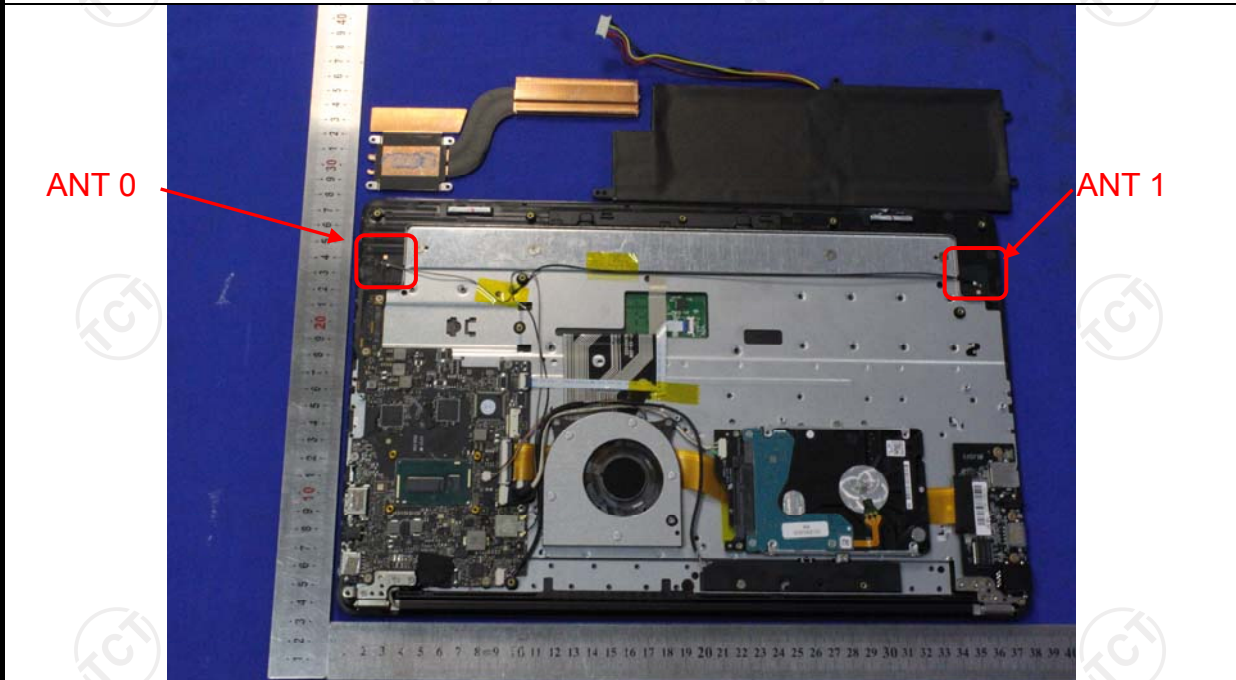
### 6.1. Antenna requirement

<b>Standard requirement:</b>	FCC Part15 C Section 15.203 /247(c)
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15.203 requirement:  
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

<b>E.U.T Antenna:</b>	
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The WIFI antennas are internal antennas, and the best case gains of the both antennas are 2.2dBi.



## 6.2. Conducted Emission

### 6.2.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 C Section 15.207														
<b>Test Method:</b>	ANSI C63.10:2013														
<b>Frequency Range:</b>	150 kHz to 30 MHz														
<b>Receiver setup:</b>	RBW=9 kHz, VBW=30 kHz, Sweep time=auto														
<b>Limits:</b>	<table border="1"> <thead> <tr> <th rowspan="2">Frequency range (MHz)</th> <th colspan="2">Limit (dBuV)</th> </tr> <tr> <th>Quasi-peak</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>0.15-0.5</td> <td>66 to 56*</td> <td>56 to 46*</td> </tr> <tr> <td>0.5-5</td> <td>56</td> <td>46</td> </tr> <tr> <td>5-30</td> <td>60</td> <td>50</td> </tr> </tbody> </table>	Frequency range (MHz)	Limit (dBuV)		Quasi-peak	Average	0.15-0.5	66 to 56*	56 to 46*	0.5-5	56	46	5-30	60	50
Frequency range (MHz)	Limit (dBuV)														
	Quasi-peak	Average													
0.15-0.5	66 to 56*	56 to 46*													
0.5-5	56	46													
5-30	60	50													
<b>Test Setup:</b>	<p><i>Remark</i> E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</p>														
<b>Test Mode:</b>	Tx Mode														
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</li> <li>2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</li> <li>3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.</li> </ol>														
<b>Test Result:</b>	PASS														

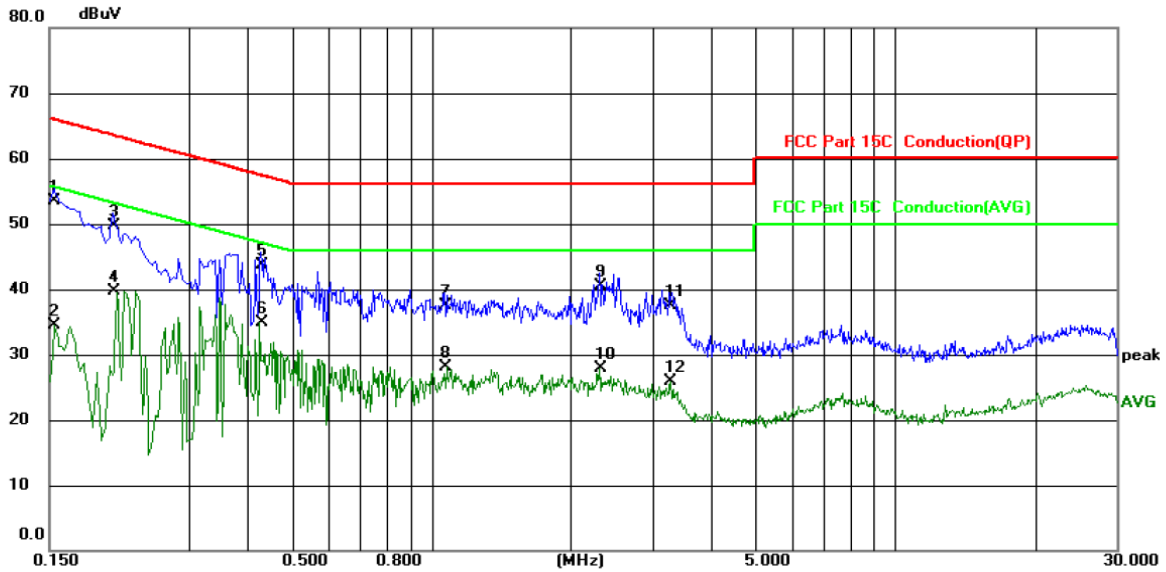
**6.2.2. Test Instruments**

Conducted Emission Shielding Room Test Site (843)				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Test Receiver	R&S	ESPI	101402	Jul. 27, 2021
LISN	Schwarzbeck	NSLK 8126	8126453	Sep. 11, 2021
Line-5	TCT	CE-05	N/A	Sep. 02, 2021
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

6.2.3. Test data

Please refer to following diagram for individual  
Conducted Emission on Line Terminal of the power line (150 kHz to 30MHz)



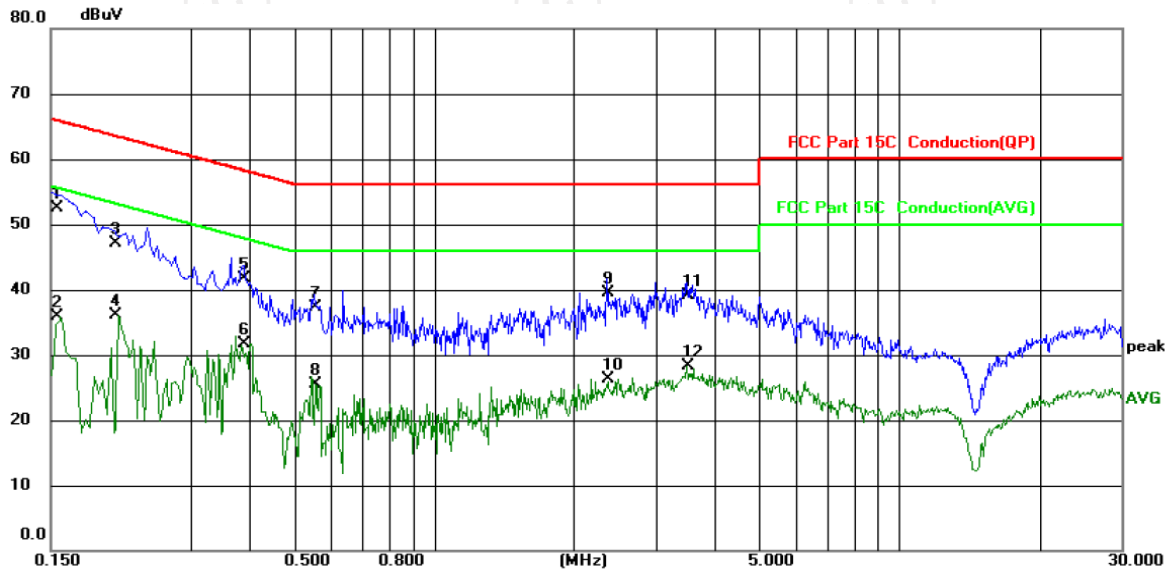
Site: Phase: **L1** Temperature: 25 (C)  
Limit: FCC Part 15C Conduction(QP) Power: AC 120V/60Hz Humidity: 55 %RH

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.1539	43.38	10.22	53.60	65.79	-12.19	QP	
2		0.1539	24.19	10.22	34.41	55.79	-21.38	AVG	
3		0.2060	39.44	10.23	49.67	63.37	-13.70	QP	
4		0.2060	29.49	10.23	39.72	53.37	-13.65	AVG	
5		0.4300	33.42	10.22	43.64	57.25	-13.61	QP	
6		0.4300	24.77	10.22	34.99	47.25	-12.26	AVG	
7		1.0660	27.16	10.37	37.53	56.00	-18.47	QP	
8		1.0660	17.70	10.37	28.07	46.00	-17.93	AVG	
9		2.2980	30.05	10.45	40.50	56.00	-15.50	QP	
10		2.2980	17.46	10.45	27.91	46.00	-18.09	AVG	
11		3.2620	27.08	10.47	37.55	56.00	-18.45	QP	
12		3.2620	15.34	10.47	25.81	46.00	-20.19	AVG	

**Note:**

- Freq. = Emission frequency in MHz
- Reading level (dBuV) = Receiver reading
- Corr. Factor (dB) = LISN factor + Cable loss
- Measurement (dBuV) = Reading level (dBuV) + Corr. Factor (dB)
- Limit (dBuV) = Limit stated in standard
- Margin (dB) = Measurement (dBuV) – Limits (dBuV)
- Q.P. =Quasi-Peak
- AVG =average
- \* is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz.

**Conducted Emission on Neutral Terminal of the power line (150 kHz to 30MHz)**



Site: Phase: **N** Temperature: 25 (C)  
Limit: FCC Part 15C Conduction(QP) Power: AC 120V/60Hz Humidity: 55 %RH

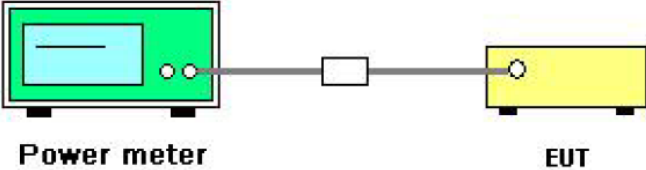
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.1548	42.36	10.22	52.58	65.74	-13.16	QP	
2		0.1548	25.59	10.22	35.81	55.74	-19.93	AVG	
3		0.2060	36.82	10.23	47.05	63.37	-16.32	QP	
4		0.2060	25.89	10.23	36.12	53.37	-17.25	AVG	
5		0.3899	31.56	10.22	41.78	58.07	-16.29	QP	
6		0.3899	21.45	10.22	31.67	48.07	-16.40	AVG	
7		0.5540	27.14	10.23	37.37	56.00	-18.63	QP	
8		0.5540	15.25	10.23	25.48	46.00	-20.52	AVG	
9		2.3500	29.15	10.45	39.60	56.00	-16.40	QP	
10		2.3500	15.80	10.45	26.25	46.00	-19.75	AVG	
11		3.5020	28.54	10.47	39.01	56.00	-16.99	QP	
12		3.5020	17.81	10.47	28.28	46.00	-17.72	AVG	

**Note:**

- Freq. = Emission frequency in MHz
- Reading level (dBuV) = Receiver reading
- Corr. Factor (dB) = LISN factor + Cable loss
- Measurement (dBuV) = Reading level (dBuV) + Corr. Factor (dB)
- Limit (dBuV) = Limit stated in standard
- Margin (dB) = Measurement (dBuV) – Limits (dBuV)
- Q.P. =Quasi-Peak
- AVG =average
- \* is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz.

**6.3. Maximum Conducted Output Power**

**6.3.1. Test Specification**

<b>Test Requirement:</b>	FCC Part15 E Section 15.407(a)	
<b>Test Method:</b>	KDB662911 D01 Multiple Transmitter Output v02r01 KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section E	
<b>Limit:</b>	Frequency Band (MHz)	Limit
	5180 - 5240	24dBm(250mW) for client device
	5260 - 5320	24dBm(250mW) or 11 dBm + 10 log B, B is the 26 dB emission bandwidth in megahertz
	5470 - 5725	24dBm(250mW) or 11 dBm + 10 log B, B is the 26 dB emission bandwidth in megahertz
	5745 - 5825	30dBm(1W)
<b>Test Setup:</b>	 <p>The diagram illustrates the test setup. On the left is a green box labeled 'Power meter'. A grey line representing an RF cable connects it to a small white box labeled 'Attenuator'. Another grey line connects the attenuator to a yellow box labeled 'EUT' (Equipment Under Test).</p>	
<b>Test Mode:</b>	Transmitting mode with modulation	
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. The testing follows the Measurement Procedure of KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section E, 3, a</li> <li>2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.</li> <li>3. Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>5. Measure the conducted output power and record the results in the test report.</li> </ol>	
<b>Test Result:</b>	PASS	
<b>Remark:</b>	<p>Conducted output power= measurement power +10log(1/x) X is duty cycle=1, so 10log(1/1)=0                  Conducted output power= measurement power</p>	

**6.3.2. Test Instruments**

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100619	Sep. 11, 2021
Power Meter	Agilent	E4418B	GB43312526	Sep. 02, 2021
Power Sensor	Agilent	E9301A	MY41497725	Sep. 02, 2021
4 Ch. Simultaneous Sampling 14 Bits 2 MS/s	Agilent	U2531A	N/A	Sep. 02, 2021
Combiner Box	Ascentest	AT890-RFB	N/A	Sep. 02, 2021


**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



Configuration Band 3 (5745 - 5825 MHz) / Antenna 0+Antenna 1						
Mode	Test channel	Maximum Conducted (Average) Output Power (dBm)			Limit (dBm)	Result
		ANT 0	ANT 1	Total		
11a	CH149	10.817	11.304	/	30	PASS
11a	CH157	12.175	12.415	/	30	PASS
11a	CH165	12.322	12.176	/	30	PASS
11n(HT20)	CH149	11.130	11.083	14.117	30	PASS
11n(HT20)	CH157	13.018	12.479	15.767	30	PASS
11n(HT20)	CH165	13.179	12.94	16.071	30	PASS
11n(HT40)	CH151	11.733	10.689	14.253	30	PASS
11n(HT40)	CH159	12.422	11.638	15.058	30	PASS
11ac(VHT20)	CH149	11.269	10.946	14.121	30	PASS
11ac(VHT20)	CH157	13.249	13.318	16.294	30	PASS
11ac(VHT20)	CH165	13.384	13.028	16.220	30	PASS
11ac(VHT40)	CH151	11.758	10.855	14.340	30	PASS
11ac(VHT40)	CH159	12.103	12.504	15.318	30	PASS
11ac(VHT80)	CH155	11.467	11.872	14.685	30	PASS

## 6.4. 6dB Emission Bandwidth

### 6.4.1. Test Specification

<b>Test Requirement:</b>	FCC CFR47 Part 15 Section 15.407(e)
<b>Test Method:</b>	KDB662911 D01 Multiple Transmitter Output v02r01 KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section C
<b>Limit:</b>	>500kHz
<b>Test Setup:</b>	 <p style="text-align: center;">Spectrum Analyzer                      EUT</p>
<b>Test Mode:</b>	Transmitting mode with modulation
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section C</li> <li>2. Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6dB bandwidth must be greater than 500 kHz.</li> <li>4. Measure and record the results in the test report.</li> </ol>
<b>Test Result:</b>	PASS


### 6.4.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100619	Sep. 11, 2021
4 Ch. Simultaneous Sampling 14 Bits 2 MS/s	Agilent	U2531A	N/A	Sep. 02, 2021
Combiner Box	Ascentest	AT890-RFB	N/A	Sep. 02, 2021

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

## 6.5. 26dB Bandwidth and 99% Occupied Bandwidth

### 6.5.1. Test Specification

<b>Test Requirement:</b>	47 CFR Part 15C Section 15.407 (a)
<b>Test Method:</b>	KDB662911 D01 Multiple Transmitter Output v02r01 KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section D
<b>Limit:</b>	No restriction limits
<b>Test Setup:</b>	 <p style="text-align: center;">Spectrum Analyzer                      EUT</p>
<b>Test Mode:</b>	Transmitting mode with modulation
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section D</li> <li>2. Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement.</li> <li>4. Measure and record the results in the test report.</li> </ol>
<b>Test Result:</b>	PASS


### 6.5.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100619	Sep. 11, 2021
4 Ch. Simultaneous Sampling 14 Bits 2 MS/s	Agilent	U2531A	N/A	Sep. 02, 2021
Combiner Box	Ascentest	AT890-RFB	N/A	Sep. 02, 2021

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

## 6.6. Power Spectral Density

### 6.6.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 E Section 15.407 (a)
<b>Test Method:</b>	KDB662911 D01 Multiple Transmitter Output v02r01 KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section F
<b>Limit:</b>	$\leq 11.00\text{dBm/MHz}$ for Band 1 5150MHz-5250MHz(client device) $\leq 11.00\text{dBm/MHz}$ for Band 2A&2C 5250-5350&5470-5725 $\leq 30.00\text{dBm}/500\text{KHz}$ for Band 3 5725MHz-5850MHz The e.i,r,p spectral density for Band 1 5150MHz – 5250 MHz should not exceed 10dBm/MHz
<b>Test Setup:</b>	 Spectrum Analyzer                      EUT
<b>Test Mode:</b>	Transmitting mode with modulation
<b>Test Procedure:</b>	1. Set the spectrum analyzer or EMI receiver span to view the entire emission bandwidth. 1. Set RBW = 510 kHz/1 MHz, VBW $\geq 3$ *RBW, Sweep time = Auto, Detector = RMS. 2. Allow the sweeps to continue until the trace stabilizes. 3. Use the peak marker function to determine the maximum amplitude level. 4. The E.I.R.P spectral density used radiated test method. At a test site that has been validated using the procedures of ANSI C63.4 or the latest CISPR 16-1-4 for measurements above 1 GHz, so as to simulate a near free-space environment.
<b>Test Result:</b>	PASS

### 6.6.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100619	Sep. 11, 2021
4 Ch. Simultaneous Sampling 14 Bits 2 MS/s	Agilent	U2531A	N/A	Sep. 02, 2021
Combiner Box	Ascentest	AT890-RFB	N/A	Sep. 02, 2021

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

## Configuration Band 3(5745-5825MHz ) / Antenna 0+Antenna 1

Mode	Test channel	Power Spectral Density			Limit (dBm/500kHz)	Result
		ANT 0	ANT 1	Total		
11a	CH149	-2.725	-2.587	/	30	PASS
11a	CH157	-1.673	-1.542	/	30	PASS
11a	CH165	-1.908	-2.085	/	30	PASS
11n(HT20)	CH149	-3.017	-3.263	-0.13	30	PASS
11n(HT20)	CH157	-0.919	-0.956	2.07	30	PASS
11n(HT20)	CH165	-1.041	-1.377	1.80	30	PASS
11n(HT40)	CH151	-5.310	-6.236	-2.74	30	PASS
11n(HT40)	CH159	-4.926	-4.731	-1.82	30	PASS
11ac(VHT20)	CH149	-7.416	-7.153	-4.27	30	PASS
11ac(VHT20)	CH157	-3.227	-3.411	-0.31	30	PASS
11ac(VHT20)	CH165	-1.173	-1.766	1.55	30	PASS
11ac(VHT40)	CH151	-1.047	-1.115	1.929	30	PASS
11ac(VHT40)	CH159	-5.734	-6.327	-3.010	30	PASS
11ac(VHT80)	CH155	-4.387	-5.345	-1.829	30	PASS

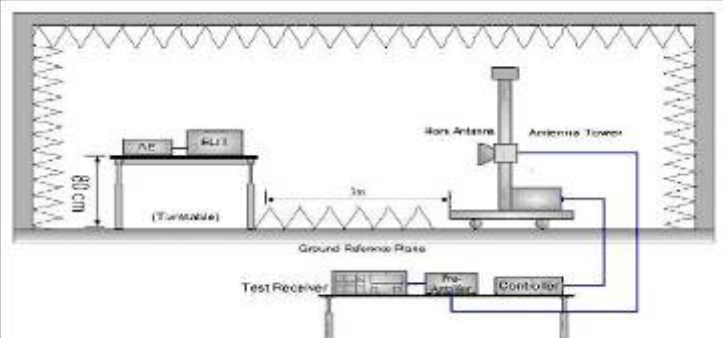
**Note: 1. All antennas have the same gain.  $G_{ANT}=2.2\text{dBi}$ , Array Gain= $10\log(N_{ANT})=3.01\text{dBi}$**

**Directional Gain= $G_{ANT} + \text{Array Gain}=5.21\text{dBi}$ ,  $5.21\text{dBi} < 6\text{dBi}$  so limit= $30\text{dBm}/500\text{KHz}$**

**2. The total PSD method used the sum spectra maxima across the outputs.**

## 6.7. Band edge

### 6.7.1. Test Specification

<b>Test Requirement:</b>	FCC CFR47 Part 15E Section 15.407
<b>Test Method:</b>	ANSI C63.10 2013
<b>Limit:</b>	For Band 1&2A&2C: $E[\text{dB}\mu\text{V}/\text{m}] = \text{EIRP}[\text{dBm}] + 95.2 = 68.2$ dB $\mu\text{V}/\text{m}$ , for EIRP(dBm)= <b>-27dBm</b> For Band 3(5715-5725MHz&5850-5860MHz): $E[\text{dB}\mu\text{V}/\text{m}] = \text{EIRP}[\text{dBm}] + 95.2 = 78.2$ dB $\mu\text{V}/\text{m}$ , for EIRP(dBm)= <b>-17dBm</b> ; For Band 3(other un-restricted band): $E[\text{dB}\mu\text{V}/\text{m}] = \text{EIRP}[\text{dBm}] + 95.2 = 68.2$ dB $\mu\text{V}/\text{m}$ , for EIRP(dBm)= <b>-27dBm</b>
<b>Test Setup:</b>	
<b>Test Mode:</b>	Transmitting mode with modulation
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li> <li>4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak,</li> </ol>

	quasipeak or average method as specified and then reported in a data sheet.
<b>Test Result:</b>	PASS



**6.7.2. Test Instruments**

Radiated Emission Test Site (966)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Test Receiver	ROHDE&SCHWARZ	ESIB7	100197	Jul. 27, 2021
Spectrum Analyzer	ROHDE&SCHWARZ	FSQ40	200061	Sep. 11, 2021
Spectrum Analyzer	Agilent	N9020A	MY49100619	Sep. 11, 2021
Pre-amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	Sep. 02, 2021
Pre-amplifier	HP	8447D	2727A05017	Sep. 02, 2021
Loop antenna	ZHINAN	ZN30900A	12024	Oct. 05, 2022
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep. 04, 2022
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Sep. 04, 2022
Horn Antenna	A-INFO	LB-180400-KF	J211020657	Sep. 02, 2021
Line-4	TCT	RE-high-04	N/A	Sep. 02, 2021
Line-8	TCT	RE-01	N/A	Jul. 27, 2021
Antenna Mast	Keleto	CC-A-4M	N/A	N/A
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



### 6.7.3. Test Data

802.11 a	CH	Freq. (MHz)	Read_level (dBuV/m)	Factor (dB)	Peak (dBuV/m)	Limit (dBuV/m) (Peak)	Limit (dBuV/m) (Avg)	Over	Ant. Pol. H/V
Band 3	Lowest	5725	42.32	5.82	48.14	68.2	/	-20.06	H
		5725	40.19	5.82	46.01	68.2	/	-22.19	V
	Highest	5850	37.85	6.52	44.37	68.2	/	-23.83	H
		5850	40.57	6.52	47.09	68.2	/	-21.11	V

Remark: Factor(dB)=Ant. Factor + Cable Loss-Amp. Factor

802.11 n HT20	CH	Freq. (MHz)	Read_level (dBuV/m)	Factor (dB)	Peak (dBuV/m)	Limit (dBuV/m) (Peak)	Limit (dBuV/m) (Avg)	Over	Ant. Pol. H/V
Band 3	Lowest	5725	42.17	8.21	50.38	68.2	/	-17.82	H
		5725	40.56	8.21	48.77	68.2	/	-19.43	V
	Highest	5850	38.08	8.87	46.95	68.2	/	-21.25	H
		5850	40.87	8.87	49.74	68.2	/	-18.46	V

Remark: Factor(dB)=Ant. Factor + Cable Loss-Amp. Factor

802.11 n HT40	CH	Freq. (MHz)	Read_level (dBuV/m)	Factor (dB)	Peak (dBuV/m)	Limit (dBuV/m) (Peak)	Limit (dBuV/m) (Avg)	Over	Ant. Pol. H/V
Band 3	Lowest	5725	42.26	5.82	48.08	68.2	/	-20.12	H
		5725	40.00	5.82	45.82	68.2	/	-22.38	V
	Highest	5850	37.94	6.52	44.46	68.2	/	-23.74	H
		5850	41.02	6.52	47.54	68.2	/	-20.66	V

Remark: Factor(dB)=Ant. Factor + Cable Loss-Amp. Factor

802.11 ac HT20	CH	Freq. (MHz)	Read_level (dBuV/m)	Factor (dB)	Peak (dBuV/m)	Limit (dBuV/m) (Peak)	Limit (dBuV/m) (Avg)	Over	Ant. Pol. H/V
Band 3	Lowest	5725	42.18	8.21	50.39	68.2	/	-17.81	H
		5725	40.48	8.21	48.69	68.2	/	-19.51	V
	Highest	5850	38.45	8.87	47.32	68.2	/	-20.88	H
		5850	40.59	8.87	49.46	68.2	/	-18.74	V

Remark: Factor(dB)=Ant. Factor + Cable Loss-Amp. Factor

802.11 ac HT40	CH	Freq. (MHz)	Read_level (dBuV/m)	Factor (dB)	Peak (dBuV/m)	Limit (dBuV/m) (Peak)	Limit (dBuV/m) (Avg)	Over	Ant. Pol. H/V
Band 3	Lowest	5725	41.73	5.82	47.55	68.2	/	-20.65	H
		5725	39.82	5.82	45.64	68.2	/	-22.56	V
	Highest	5850	37.81	6.52	44.33	68.2	/	-23.87	H
		5850	40.92	6.52	47.44	68.2	/	-20.76	V

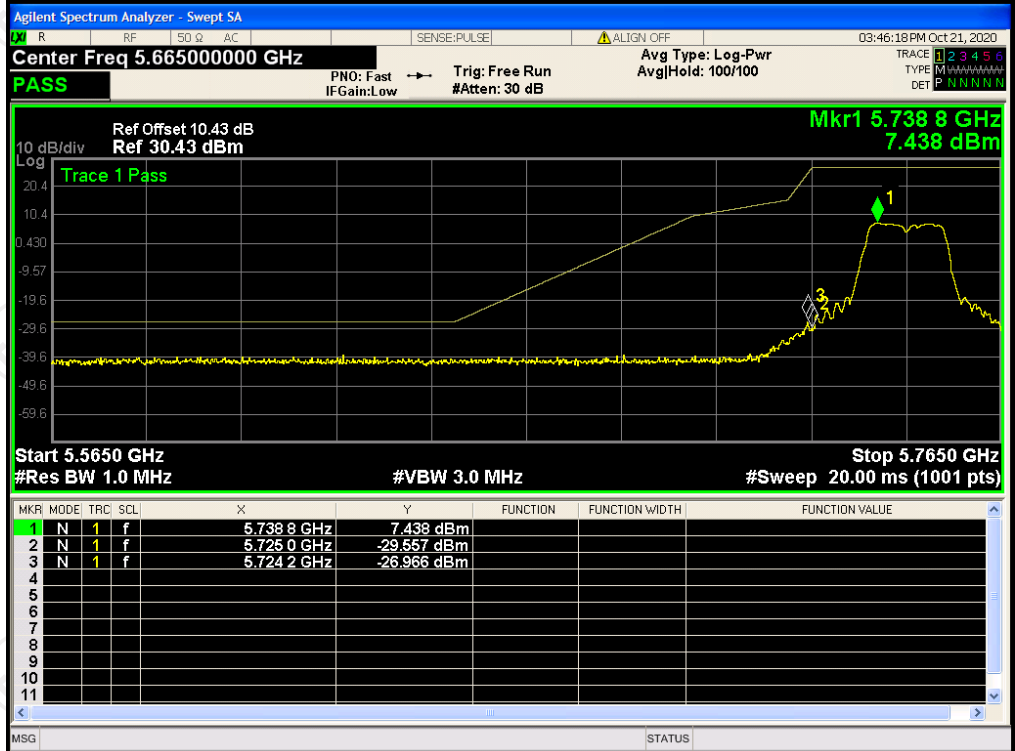
Remark: Factor(dB)=Ant. Factor + Cable Loss-Amp. Factor

802.11 ac HT80	CH	Freq. (MHz)	Read_level (dBuV/m)	Factor (dB)	Peak (dBuV/m)	Limit (dBuV/m) (Peak)	Limit (dBuV/m) (Avg)	Over	Ant. Pol. H/V
Band 3	Lowest	5725	42.34	5.82	48.16	68.2	/	-20.04	H
		5725	40.55	5.82	46.37	68.2	/	-21.83	V
	Highest	5850	38.46	6.52	44.98	68.2	/	-23.22	H
		5850	41.04	6.52	47.56	68.2	/	-20.64	V

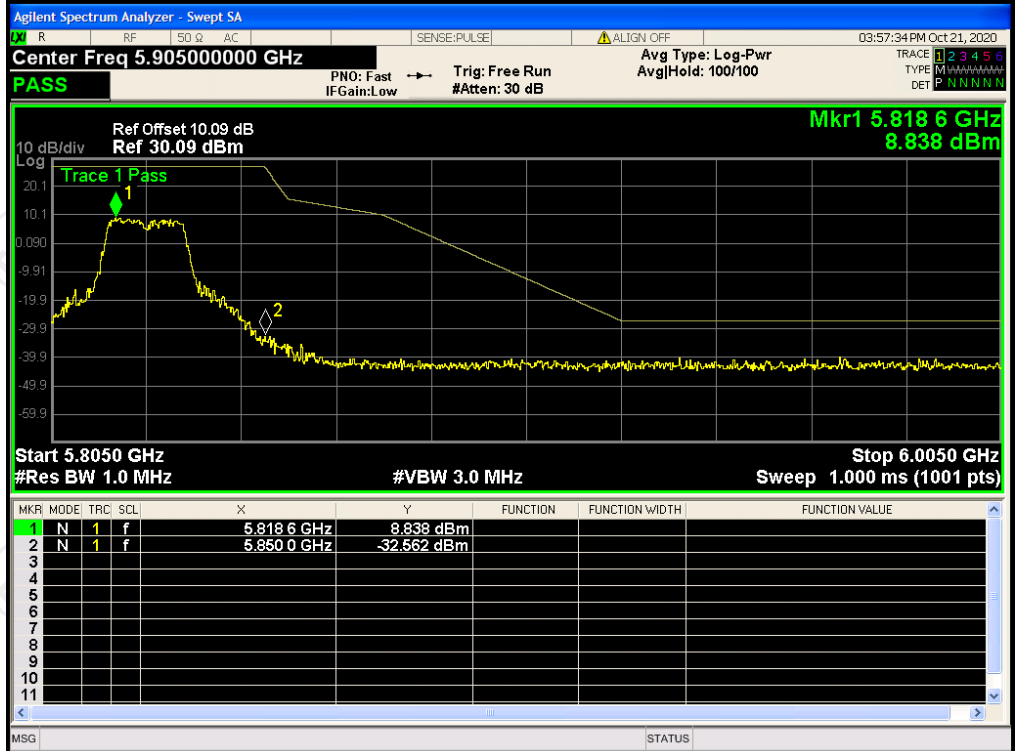
Remark: Factor(dB)=Ant. Factor + Cable Loss-Amp. Factor

### Band 3 Band-edge for RF Conducted Emissions

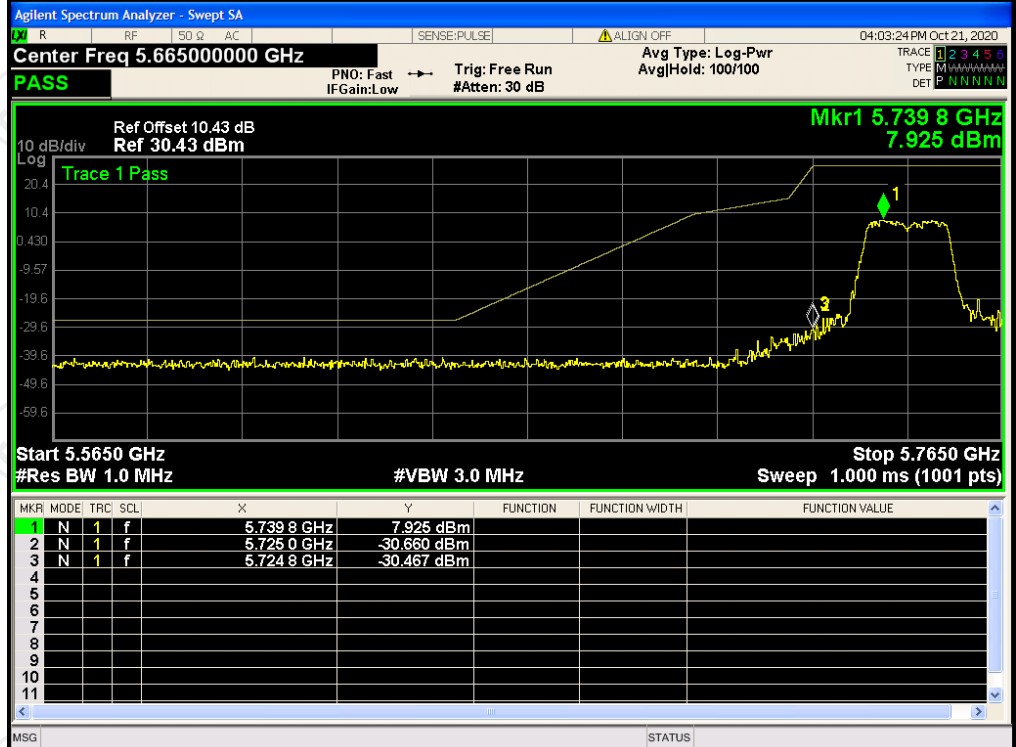
802.11a  
/LCH



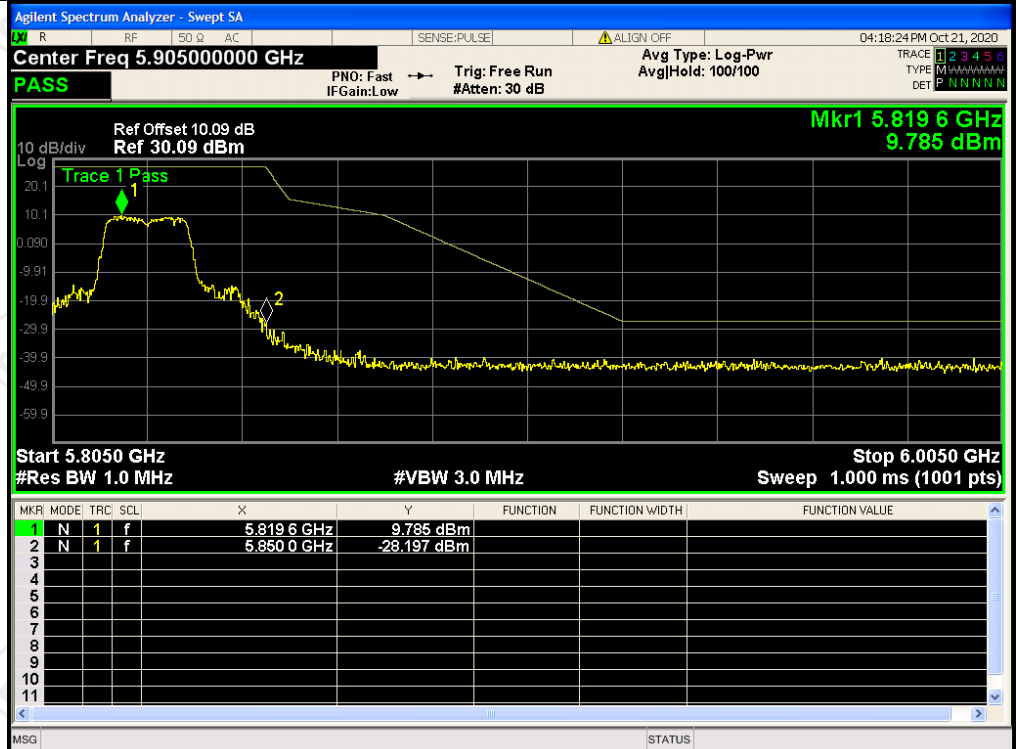
802.11a  
/HCH



802.11n  
HT20/LCH

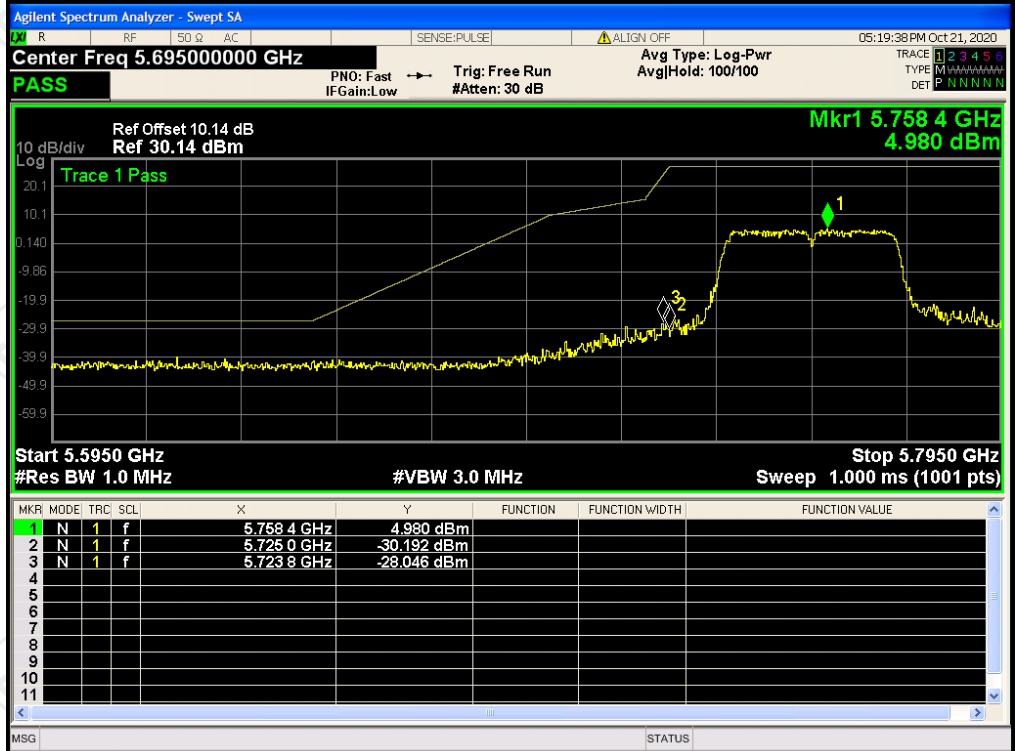


802.11n  
HT20/HCH

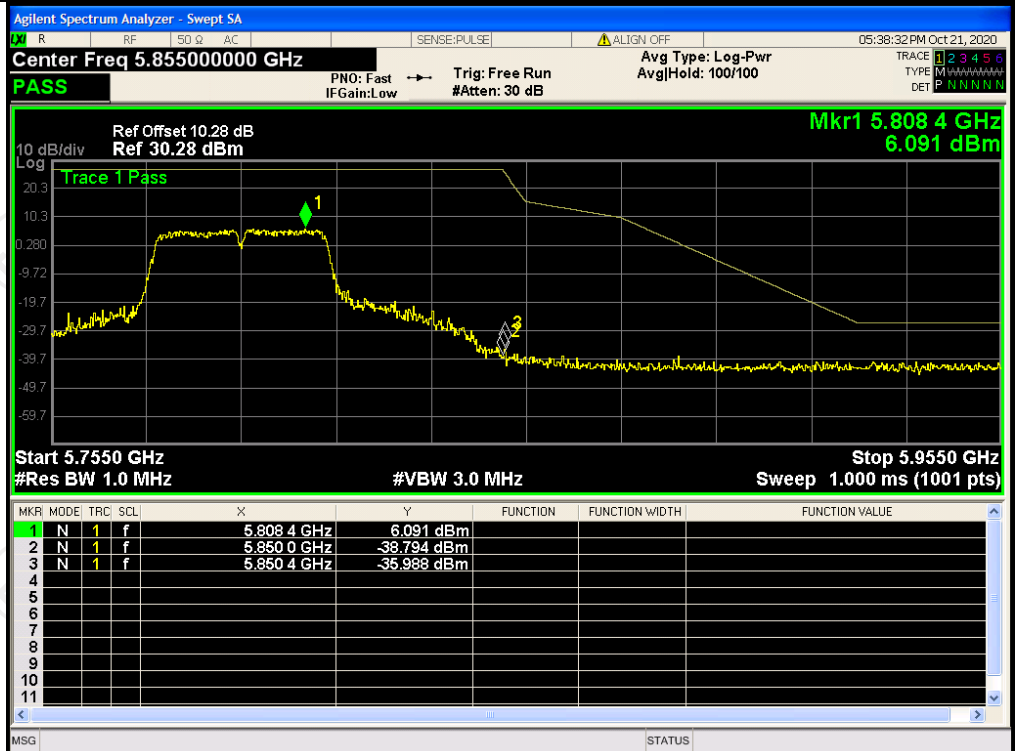


### Band 3 Band-edge for RF Conducted Emissions

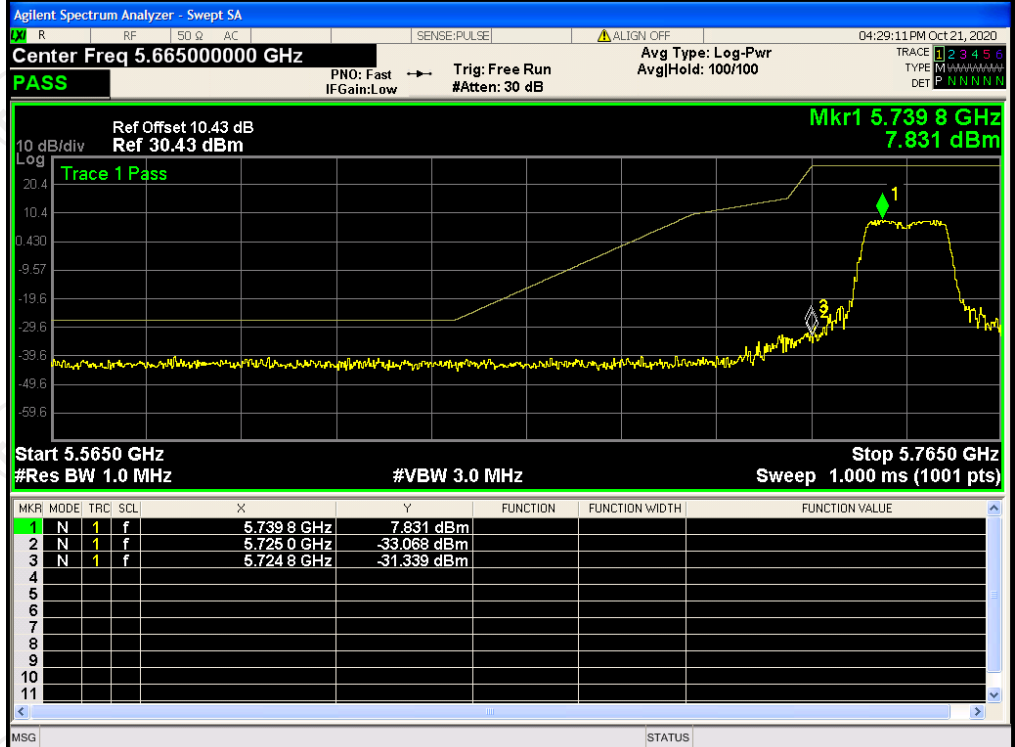
802.11n  
HT40/LCH



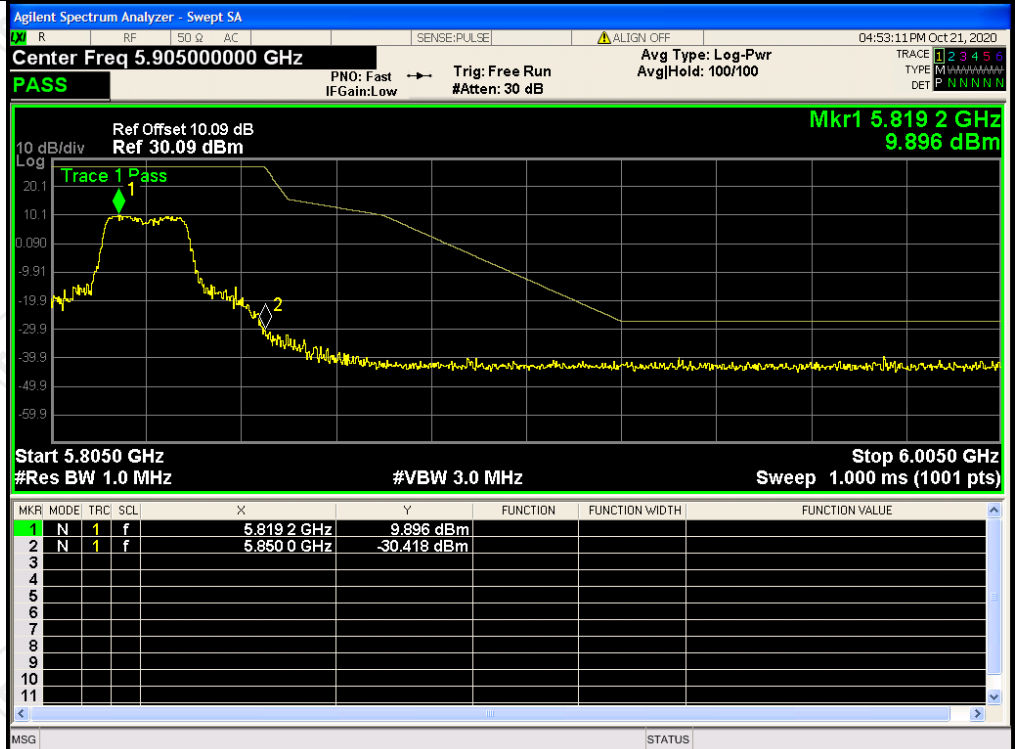
802.11n  
HT40/HCH



802.11ac  
HT20/LCH

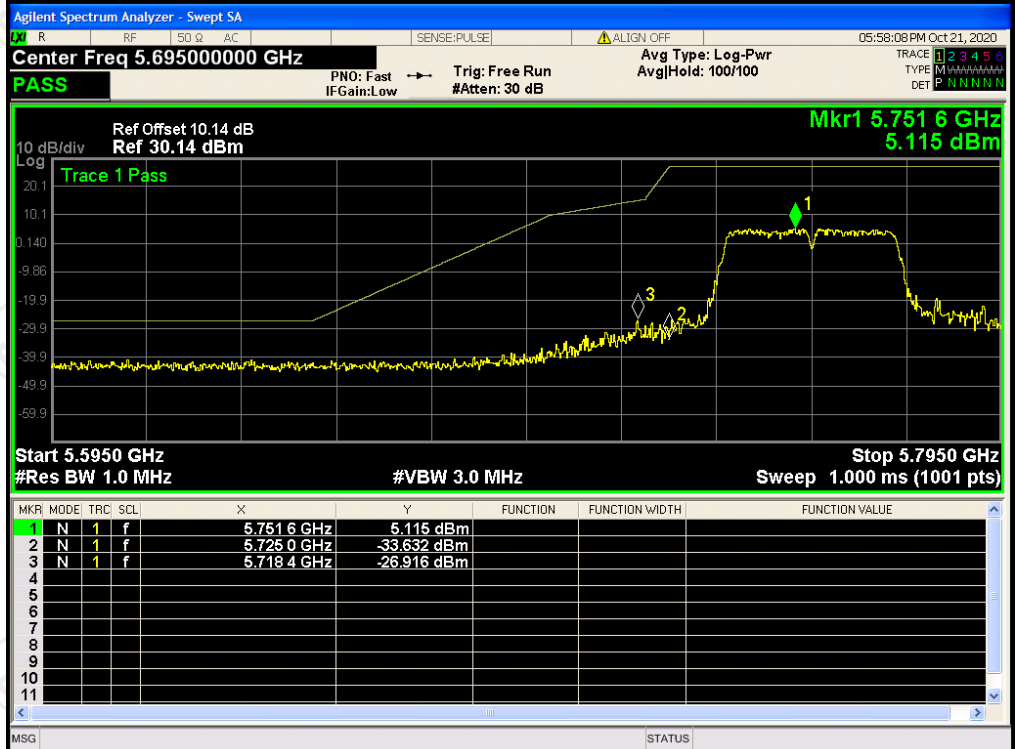


802.11ac  
HT20/HCH

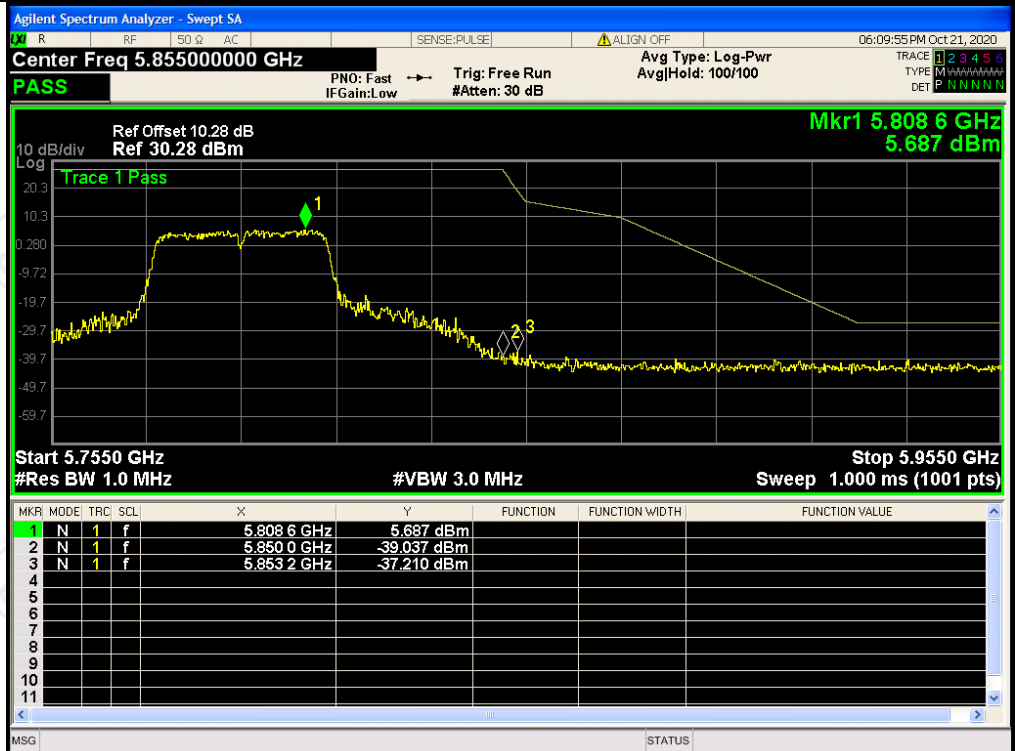


### Band 3 Band-edge for RF Conducted Emissions

802.11ac  
HT40/LCH



802.11ac  
HT40/HCH

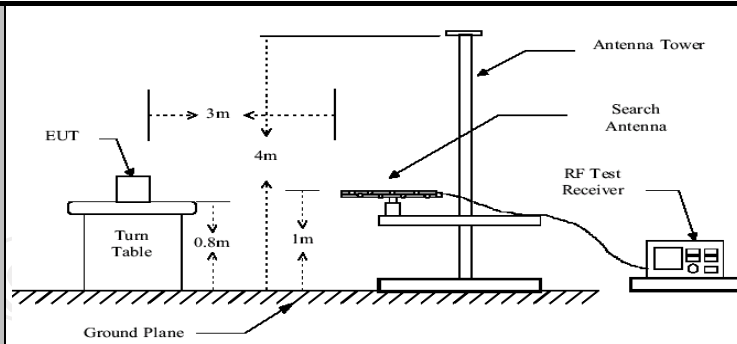


## 6.8. Unwanted Emission

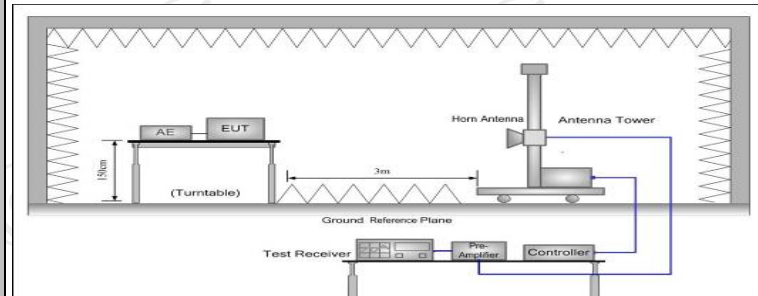
### 6.8.1. Test Specification

<b>Test Requirement:</b>	FCC CFR47 Part 15 Section 15.407 & 15.209 & 15.205				
<b>Test Method:</b>	KDB 789033 D02 v02r01				
<b>Frequency Range:</b>	9kHz to 40GHz				
<b>Measurement Distance:</b>	3 m				
<b>Antenna Polarization:</b>	Horizontal & Vertical				
<b>Operation mode:</b>	Transmitting mode with modulation				
<b>Receiver Setup:</b>	Frequency	Detector	RBW	VBW	Remark
	9kHz- 150kHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value
	150kHz- 30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		Peak	1MHz	10Hz	Average Value
<b>Limit:</b>	Unwanted spurious emissions fallen in restricted bands per FCC Part15.205 shall comply with the general field strength limits set forth in § 15.209 as below table,				
	Frequency	Field Strength (microvolts/meter)	Measurement Distance (meters)		
	0.009-0.490	2400/F(KHz)	300		
	0.490-1.705	24000/F(KHz)	30		
	1.705-30	30	30		
	30-88	100	3		
	88-216	150	3		
	216-960	200	3		
	Above 960	500	3		
	Frequency	Limit (dBuV/m @3m)	Detector		
	Above 1G	74.0	Peak		
		54.0	Average		
	<b>Test setup:</b>	For radiated emissions below 30MHz			
<p>Distance = 3m</p> <p>0.8m</p> <p>Turn table</p> <p>1m</p> <p>Ground Plane</p> <p>Computer</p> <p>Pre-Amplifier</p> <p>Receiver</p>					
	30MHz to 1GHz				





Above 1GHz



**Test Procedure:**

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotating table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

**Test results:**

PASS

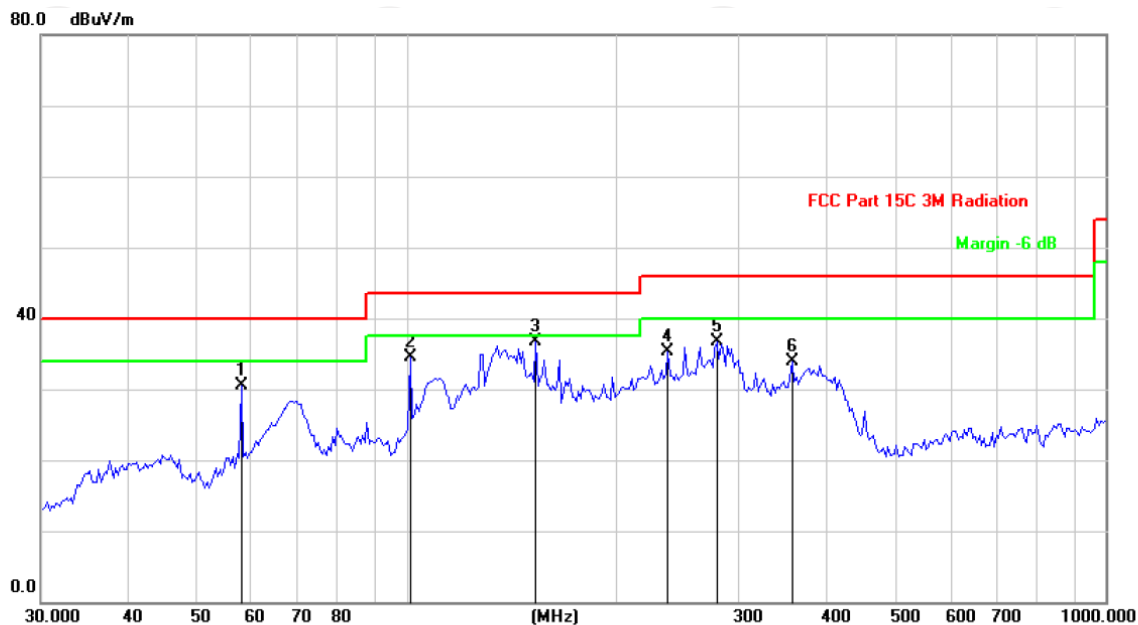
**6.8.2. Test Instruments**

Radiated Emission Test Site (966)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Test Receiver	ROHDE&SCHW ARZ	ESIB7	100197	Jul. 27, 2021
Spectrum Analyzer	ROHDE&SCHW ARZ	FSQ40	200061	Sep. 11, 2021
Pre-amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	Sep. 02, 2021
Pre-amplifier	HP	8447D	2727A05017	Sep. 02, 2021
Loop antenna	ZHINAN	ZN30900A	12024	Oct. 05, 2022
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep. 04, 2022
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Sep. 04, 2022
Horn Antenna	A-INFO	LB-180400-KF	J211020657	Sep. 04, 2022
Antenna Mast	Keleto	RE-AM	N/A	N/A
Line-4	TCT	RE-high-04	N/A	Sep. 02, 2021
Line-8	TCT	RE-01	N/A	Jul. 27, 2021
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

**6.8.3. Test Data**

Please refer to following diagram for individual  
Below 1GHz

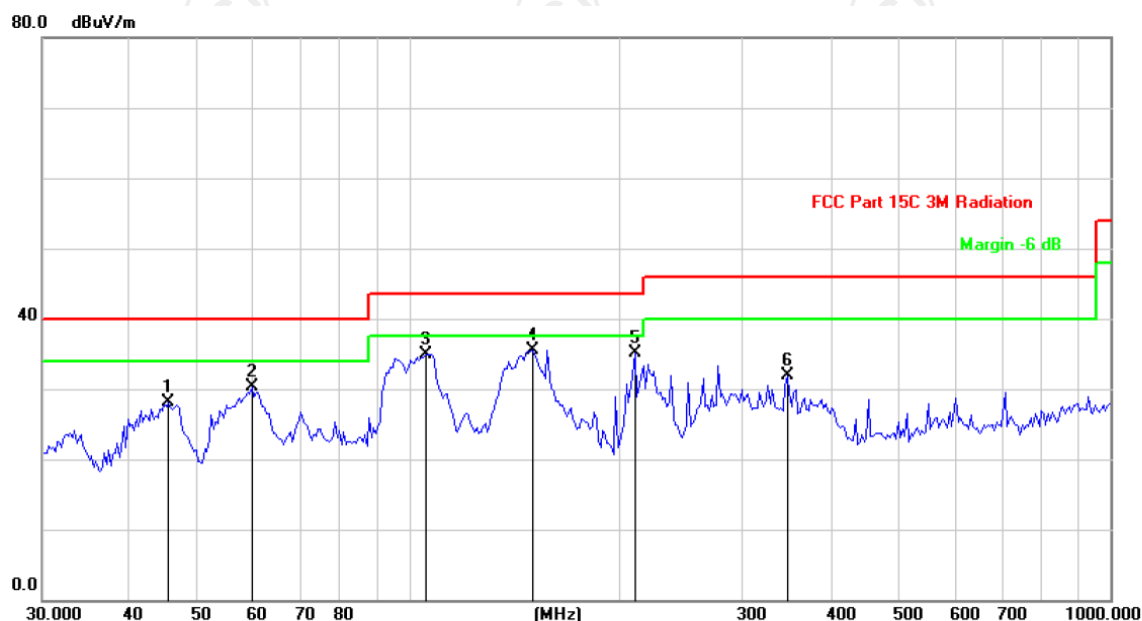
Horizontal:



Site: Polarization: **Horizontal** Temperature: 25  
Limit: FCC Part 15C 3M Radiation Power: AC 120V/60Hz Humidity: 55 %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		58.0758	42.33	-11.92	30.41	40.00	-9.59	peak
2		101.1795	42.65	-8.11	34.54	43.50	-8.96	peak
3	*	153.1627	52.88	-16.11	36.77	43.50	-6.73	peak
4		236.7923	48.34	-12.95	35.39	46.00	-10.61	peak
5		278.3308	48.26	-11.64	36.62	46.00	-9.38	peak
6		355.9397	43.54	-9.60	33.94	46.00	-12.06	peak

Vertical:



Site: Polarization: **Vertical** Temperature: 25  
 Limit: FCC Part 15C 3M Radiation Power: AC 120V/60Hz Humidity: 55 %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		45.4130	38.63	-10.49	28.14	40.00	-11.86	peak
2		59.7314	42.53	-12.31	30.22	40.00	-9.78	peak
3		105.5369	43.47	-8.49	34.98	43.50	-8.52	peak
4	*	149.9676	51.74	-16.26	35.48	43.50	-8.02	peak
5		210.1294	48.76	-13.72	35.04	43.50	-8.46	peak
6		346.0740	41.66	-9.78	31.88	46.00	-14.12	peak

**Note:** 1. The low frequency, which started from 9KHz~30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported

2. Measurements were conducted in all three channels (high, middle, low) and all modulation (802.11a, 802.11n(HT20), 802.11n(HT40), 802.11ac(VHT20), 802.11ac(VHT40) 802.11ac(VHT80), and the worst case Mode (middle channel and 802.11ac(VHT20) in MIMO mode) was submitted only.

Modulation Type: Band 3									
11a(HT20) CH149: 5745MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
11490	H	40.46	---	8.09	48.55	---	74	54	-5.45
17235	H	38.21	---	9.67	47.88	---	74	54	-6.12
---	H	---	---	---	---	---	---	---	---
11490	V	40.43	---	8.09	48.52	---	74	54	-5.48
17235	V	37.78	---	9.67	47.45	---	74	54	-6.55
---	V	---	---	---	---	---	---	---	---

11a(HT20) CH157: 5785MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
11570	H	40.11	---	8.10	48.21	---	74	54	-5.79
17355	H	37.92	---	9.65	47.57	---	74	54	-6.43
---	H	---	---	---	---	---	---	---	---
11570	V	40.14	---	8.10	48.24	---	74	54	-5.76
17355	V	37.59	---	9.65	47.24	---	74	54	-6.76
---	V	---	---	---	---	---	---	---	---

11a(HT20) CH161: 5825MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
11650	H	41.49	---	8.12	49.61	---	74	54	-4.39
17475	H	40.36	---	9.62	49.98	---	74	54	-4.02
---	H	---	---	---	---	---	---	---	---
11650	V	41.62	---	8.12	49.74	---	74	54	-4.26
17475	V	40.28	---	9.62	49.9	---	74	54	-4.1
---	V	---	---	---	---	---	---	---	---

11n(HT20) CH151: 5745MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
11510	H	41.51	---	8.09	49.6	---	74	54	-4.4
17265	H	37.88	---	9.67	47.55	---	74	54	-6.45
---	H	---	---	---	---	---	---	---	---
11510	V	41.58	---	8.09	49.67	---	74	54	-4.33
17265	V	37.68	---	9.67	47.35	---	74	54	-6.65
---	V	---	---	---	---	---	---	---	---

11n(HT20) CH157: 5785MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
11570	H	41.42	---	8.10	49.52	---	74	54	-4.48
17355	H	38.96	---	9.65	48.61	---	74	54	-5.39
---	H	---	---	---	---	---	---	---	---
11570	V	40.22	---	8.10	48.32	---	74	54	-5.68
17355	V	40.37	---	9.65	50.02	---	74	54	-3.98
---	V	---	---	---	---	---	---	---	---

11n(HT20) CH165: 5825MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
11650	H	40.35	---	8.12	48.47	---	74	54	-5.53
17475	H	39.67	---	9.62	49.29	---	74	54	-4.71
---	H	---	---	---	---	---	---	---	---
11650	V	40.14	---	8.12	48.26	---	74	54	-5.74
17475	V	39.55	---	9.62	49.17	---	74	54	-4.83
---	V	---	---	---	---	---	---	---	---

11n(HT40) CH151: 5755MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
11510	H	42.41	---	8.09	50.5	---	74	54	-3.5
17265	H	40.93	---	9.67	50.6	---	74	54	-3.4
---	H	---	---	---	---	---	---	---	---
11510	V	42.88	---	8.09	50.97	---	74	54	-3.03
17265	V	39.62	---	9.67	49.29	---	74	54	-4.71
---	V	---	---	---	---	---	---	---	---

11n(HT40) CH159: 5795MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
11590	H	41.94	---	8.10	50.04	---	74	54	-3.96
17385	H	39.73	---	9.65	49.38	---	74	54	-4.62
---	H	---	---	---	---	---	---	---	---
11590	V	41.68	---	8.10	49.78	---	74	54	-4.22
17385	V	39.29	---	9.65	48.94	---	74	54	-5.06
---	V	---	---	---	---	---	---	---	---

11ac(VHT20) CH149: 5745MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
11490	H	42.75	---	8.09	50.84	---	74	54	-3.16
17235	H	39.44	---	9.67	49.11	---	74	54	-4.89
---	H	---	---	---	---	---	---	---	---
11490	V	41.16	---	8.09	49.25	---	74	54	-4.75
17235	V	38.79	---	9.67	48.46	---	74	54	-5.54
---	V	---	---	---	---	---	---	---	---

11ac(VHT20) CH157: 5785MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dB $\mu$ V)	AV reading (dB $\mu$ V)	Correction Factor (dB/m)	Emission Level		Peak limit (dB $\mu$ V/m)	AV limit (dB $\mu$ V/m)	Margin (dB)
					Peak (dB $\mu$ V/m)	AV (dB $\mu$ V/m)			
11570	H	40.44	---	8.10	48.54	---	74	54	-5.46
17355	H	38.52	---	9.65	48.17	---	74	54	-5.83
---	H	---	---	---	---	---	---	---	---
11570	V	39.34	---	8.10	47.44	---	74	54	-6.56
17355	V	38.67	---	9.65	48.32	---	74	54	-5.68
---	V	---	---	---	---	---	---	---	---

11ac(VHT20) CH165: 5825MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dB $\mu$ V)	AV reading (dB $\mu$ V)	Correction Factor (dB/m)	Emission Level		Peak limit (dB $\mu$ V/m)	AV limit (dB $\mu$ V/m)	Margin (dB)
					Peak (dB $\mu$ V/m)	AV (dB $\mu$ V/m)			
11650	H	41.52	---	8.12	49.64	---	74	54	-4.36
17475	H	40.66	---	9.62	50.28	---	74	54	-3.72
---	H	---	---	---	---	---	---	---	---
11650	V	41.98	---	8.12	50.10	---	74	54	-3.90
17475	V	37.74	---	9.62	47.36	---	74	54	-6.64
---	V	---	---	---	---	---	---	---	---

11ac(VHT40) CH151: 5755MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dB $\mu$ V)	AV reading (dB $\mu$ V)	Correction Factor (dB/m)	Emission Level		Peak limit (dB $\mu$ V/m)	AV limit (dB $\mu$ V/m)	Margin (dB)
					Peak (dB $\mu$ V/m)	AV (dB $\mu$ V/m)			
11510	H	41.81	---	8.09	49.90	---	74	54	-4.10
17265	H	39.94	---	9.67	49.61	---	74	54	-4.39
---	H	---	---	---	---	---	---	---	---
11510	V	42.73	---	8.09	50.82	---	74	54	-3.18
17265	V	39.84	---	9.67	49.51	---	74	54	-4.49
---	V	---	---	---	---	---	---	---	---

11ac(VHT40) CH159: 5795MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dB $\mu$ V)	AV reading (dB $\mu$ V)	Correction Factor (dB/m)	Emission Level		Peak limit (dB $\mu$ V/m)	AV limit (dB $\mu$ V/m)	Margin (dB)
					Peak (dB $\mu$ V/m)	AV (dB $\mu$ V/m)			
11590	H	41.72	---	8.10	49.82	---	74	54	-4.18
17385	H	39.61	---	9.65	49.26	---	74	54	-4.74
---	H	---	---	---	---	---	---	---	---
11590	V	42.93	---	8.10	51.03	---	74	54	-2.97
17385	V	40.56	---	9.65	50.21	---	74	54	-3.79
---	V	---	---	---	---	---	---	---	---

11ac(VHT80) CH155: 5775MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
11550	H	41.66	---	8.09	49.75	---	74	54	-4.25
17325	H	37.97	---	9.67	47.64	---	74	54	-6.36
---	H	---	---	---	---	---	---	---	---
11550	V	42.41	---	8.09	50.50	---	74	54	-3.50
17325	V	39.62	---	9.67	49.29	---	74	54	-4.71
---	V	---	---	---	---	---	---	---	---

**Note:**

1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier
2. Margin (dB) = Emission Level (Peak) (dBμV/m)-Average limit (dBμV/m)
3. The emission levels of other frequencies are very lower than the limit and not show in test report.
4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency. The highest test frequency is 40GHz.
5. Data of measurement shown “---“in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.



## 6.9. Frequency Stability Measurement

### 6.9.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 Section 15.407(g)
<b>Test Method:</b>	ANSI C63.10: 2013
<b>Limit:</b>	The frequency tolerance shall be maintained within the band of operation frequency over a temperature variation of 0 degrees to 45 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.
<b>Test Setup:</b>	<pre> graph LR     SA[Spectrum Analyzer] --- EUT[EUT]     subgraph TC [Temperature Chamber]         EUT     end     P[AC/DC Power supply] --- EUT     </pre>
<b>Test Procedure:</b>	The EUT was placed inside the environmental test chamber and powered by nominal AC/DC voltage. b. Turn the EUT on and couple its output to a spectrum analyzer. c. Turn the EUT off and set the chamber to the highest temperature specified. d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature. f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.
<b>Test Result:</b>	PASS
<b>Remark:</b>	Pre-scan was performed at all models(11a,11n,11ac), the worst case (11ac) was found and test data was shown in this report.

Test plots as follows:

Test mode:		802.11ac(VHT20)	Frequency(MHz):	5745
Temperature (°C)	Voltage(VDC)	Measurement Frequency(MHz)	Delta Frequency(Hz)	Result
45	7.6V	5745.0010	1000	PASS
35		5745.0035	3500	PASS
25		5744.9970	-3000	PASS
15		5744.9979	-2100	PASS
5		5745.0028	2800	PASS
0		5745.0042	4200	PASS
20		9.6	5745.0021	2100
	7.6	5745.0019	1900	PASS
	6.6	5745.0053	5300	PASS

Test mode:		802.11ac(VHT20)	Frequency(MHz):	5785
Temperature (°C)	Voltage(VDC)	Measurement Frequency(MHz)	Delta Frequency(Hz)	Result
45	7.6V	5785.0067	6700	PASS
35		5785.0077	7700	PASS
25		5785.0051	5100	PASS
15		5785.0059	5900	PASS
5		5785.0044	4400	PASS
0		5785.0062	6200	PASS
20		9.6	5785.0031	3100
	7.6	5785.0039	3900	PASS
	6.6	5784.9983	-1700	PASS

Test mode:		802.11ac(VHT20)	Frequency(MHz):	5825
Temperature (°C)	Voltage(VDC)	Measurement Frequency(MHz)	Delta Frequency(Hz)	Result
45	7.6V	5824.9986	-1400	PASS
35		5825.0032	3200	PASS
25		5824.9973	-2700	PASS
15		5824.9995	-500	PASS
5		5825.0015	1500	PASS
0		5825.0021	2100	PASS
20		9.6	5825.0037	3700
	7.6	5824.9997	-300	PASS
	6.6	5825.0014	1400	PASS

Test mode:		802.11ac(VHT40)	Frequency(MHz):	5755
Temperature (°C)	Voltage(VDC)	Measurement Frequency(MHz)	Delta Frequency(Hz)	Result
45	7.6V	5754.9970	-3000	PASS
35		5755.0062	6200	PASS
25		5755.0033	3300	PASS
15		5755.0011	1100	PASS
5		5755.0025	2500	PASS
0		5755.0040	4000	PASS
20		9.6	5755.0039	3900
	7.6	5755.0016	1600	PASS
	6.6	5755.0024	2400	PASS

Test mode:		802.11ac(VHT40)	Frequency(MHz):	5795
Temperature (°C)	Voltage(VDC)	Measurement Frequency(MHz)	Delta Frequency(Hz)	Result
45	7.6V	5794.9980	-2000	PASS
35		5794.9943	-5700	PASS
25		5795.0028	2800	PASS
15		5795.0035	3500	PASS
5		5795.0019	1900	PASS
0		5795.0044	4400	PASS
20		9.6	5795.0012	1200
	7.6	5794.9983	-1700	PASS
	6.6	5795.0055	5500	PASS

Test mode:		802.11ac(VHT80)	Frequency(MHz):	5775
Temperature (°C)	Voltage(VDC)	Measurement Frequency(MHz)	Delta Frequency(Hz)	Result
45	7.6V	5774.9860	-14000	PASS
35		5775.0034	3400	PASS
25		5775.0072	7200	PASS
15		5774.9957	-4300	PASS
5		5774.9921	-7900	PASS
0		5774.9906	-9400	PASS
20		9.6	5775.0092	9200
	7.6	5775.0041	4100	PASS
	6.6	5775.0010	1000	PASS

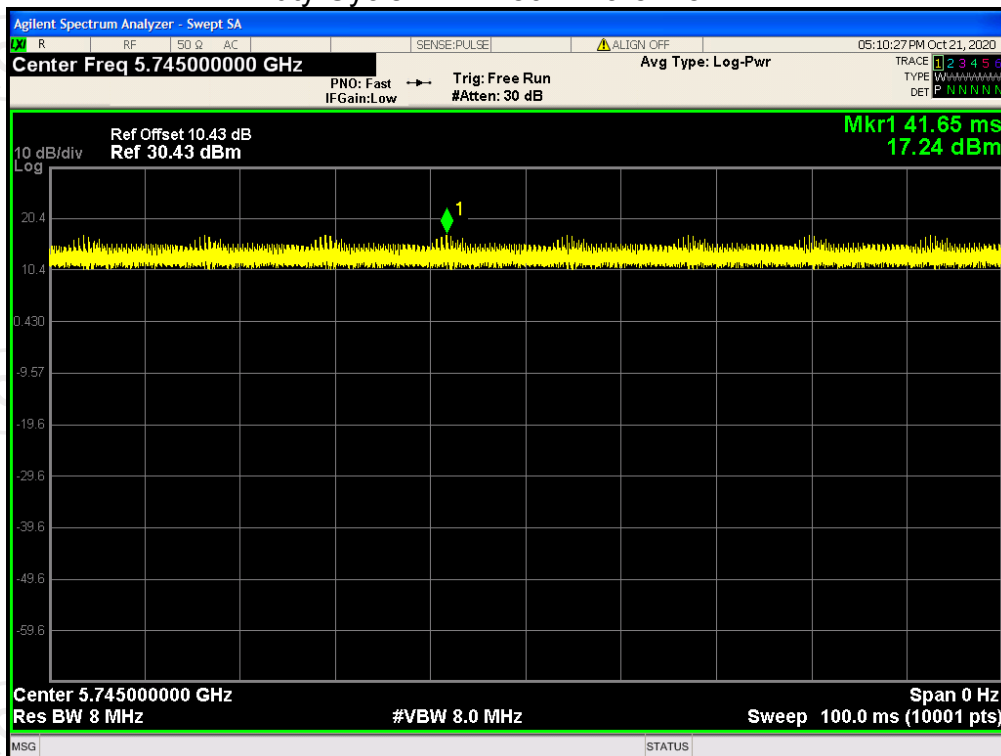
## Appendix A: Test Result of Conducted Test

ANT 0

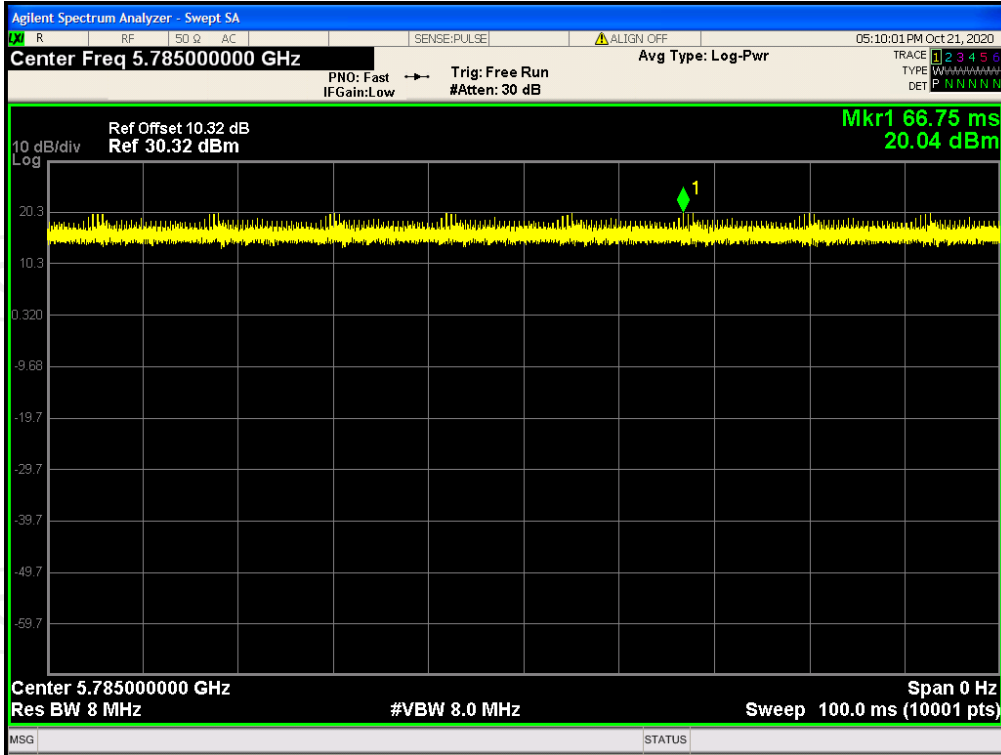
### Duty Cycle

Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)
NVNT	802.11a	5745	100	0
NVNT	802.11a	5785	100	0
NVNT	802.11a	5825	100	0
NVNT	802.11ac20	5745	100	0
NVNT	802.11ac20	5785	100	0
NVNT	802.11ac20	5825	100	0
NVNT	802.11ac40	5755	100	0
NVNT	802.11ac40	5795	100	0
NVNT	802.11ac80	5775	100	0
NVNT	802.11n(HT20)	5745	100	0
NVNT	802.11n(HT20)	5785	100	0
NVNT	802.11n(HT20)	5825	100	0
NVNT	802.11n(HT40)	5755	100	0
NVNT	802.11n(HT40)	5795	100	0

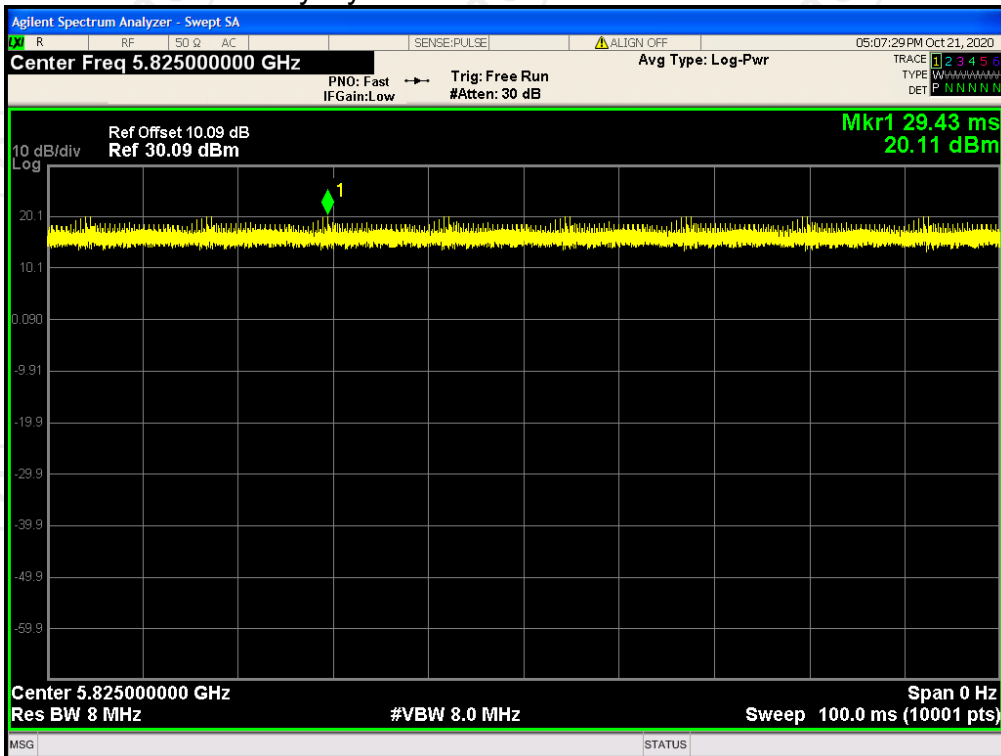
Duty Cycle NVNT 802.11a 5745MHz



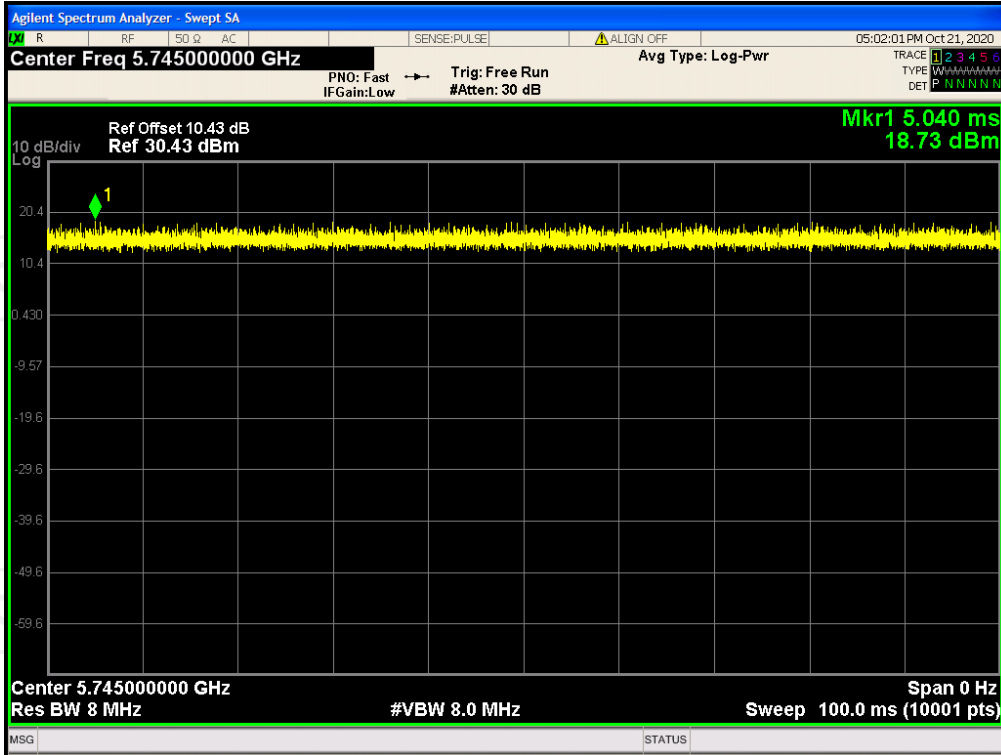
Duty Cycle NVNT 802.11a 5785MHz



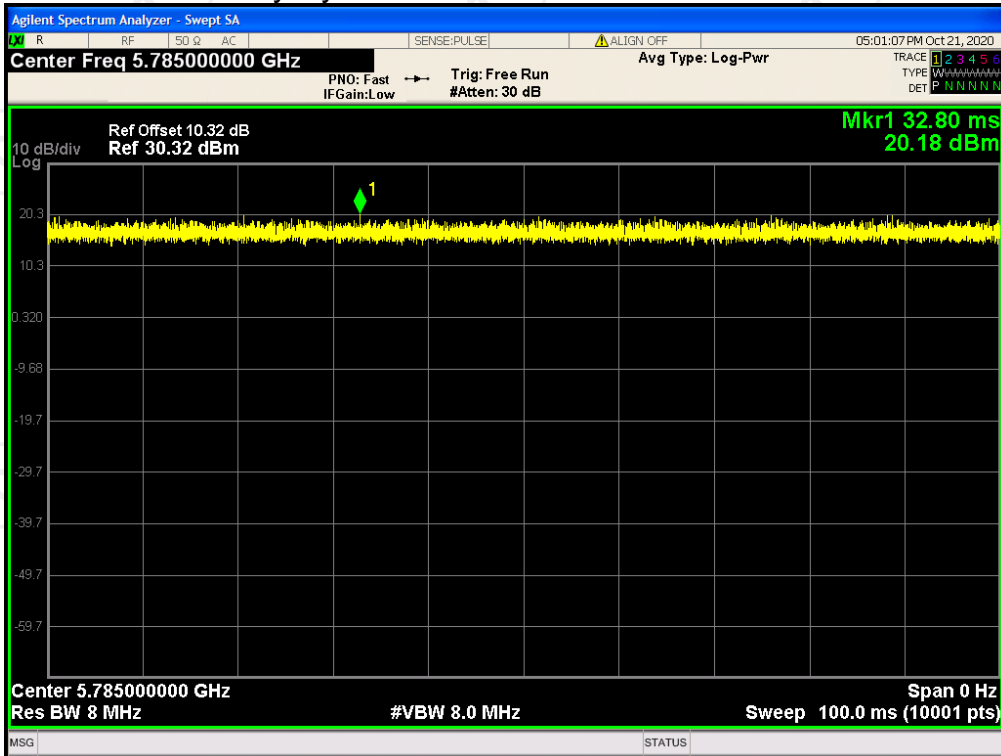
Duty Cycle NVNT 802.11a 5825MHz



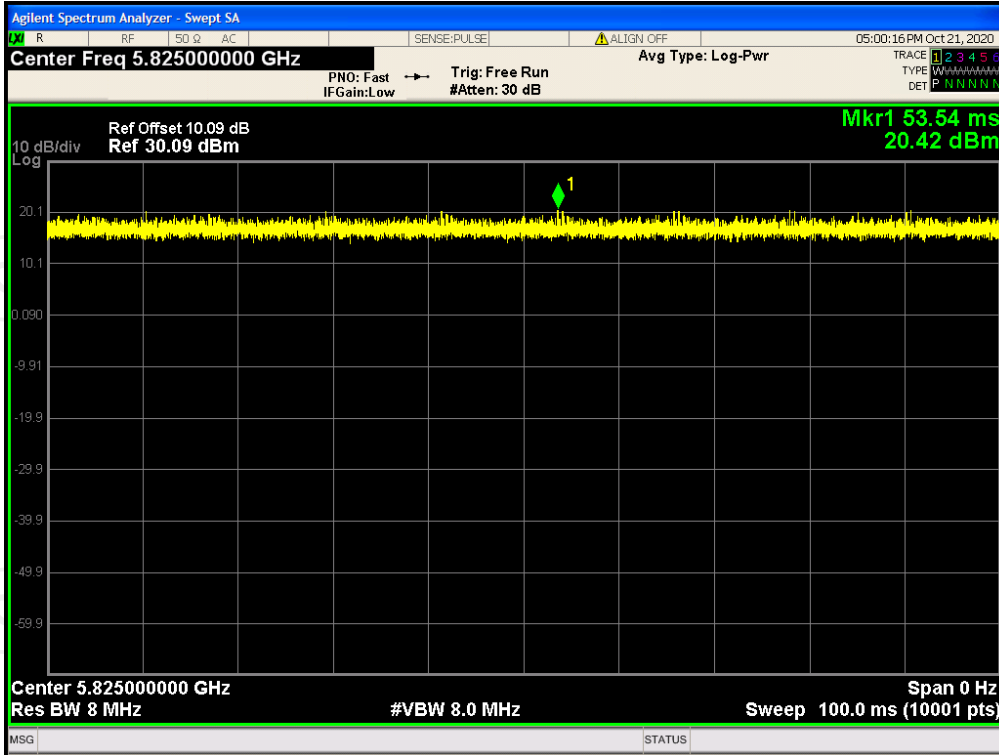
Duty Cycle NVNT 802.11ac20 5745MHz



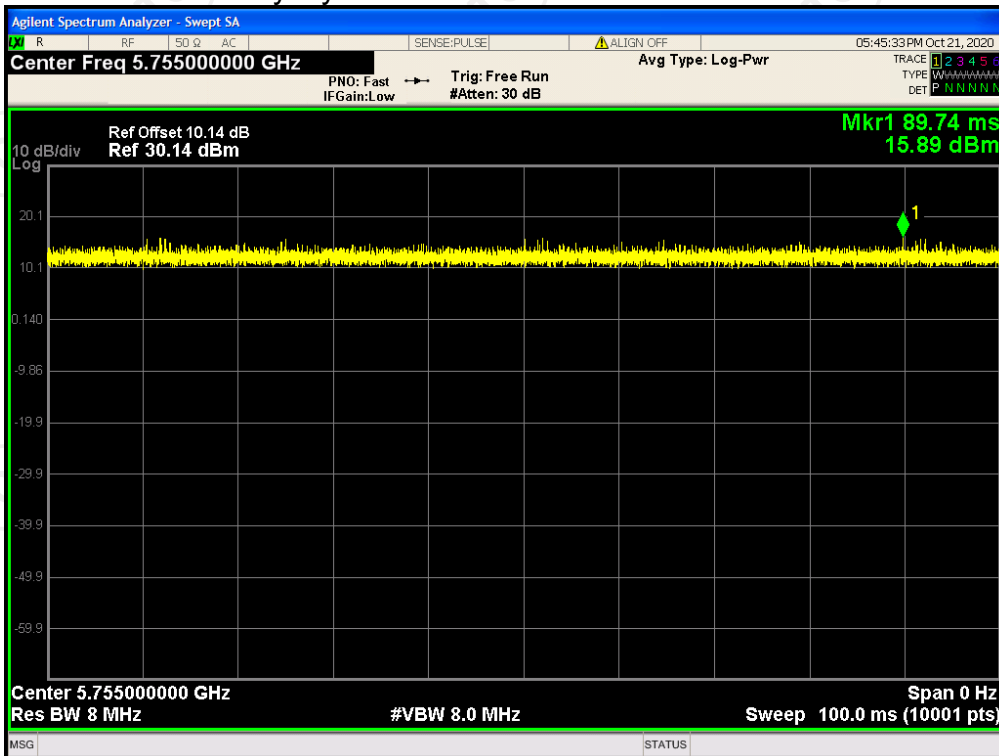
Duty Cycle NVNT 802.11ac20 5785MHz



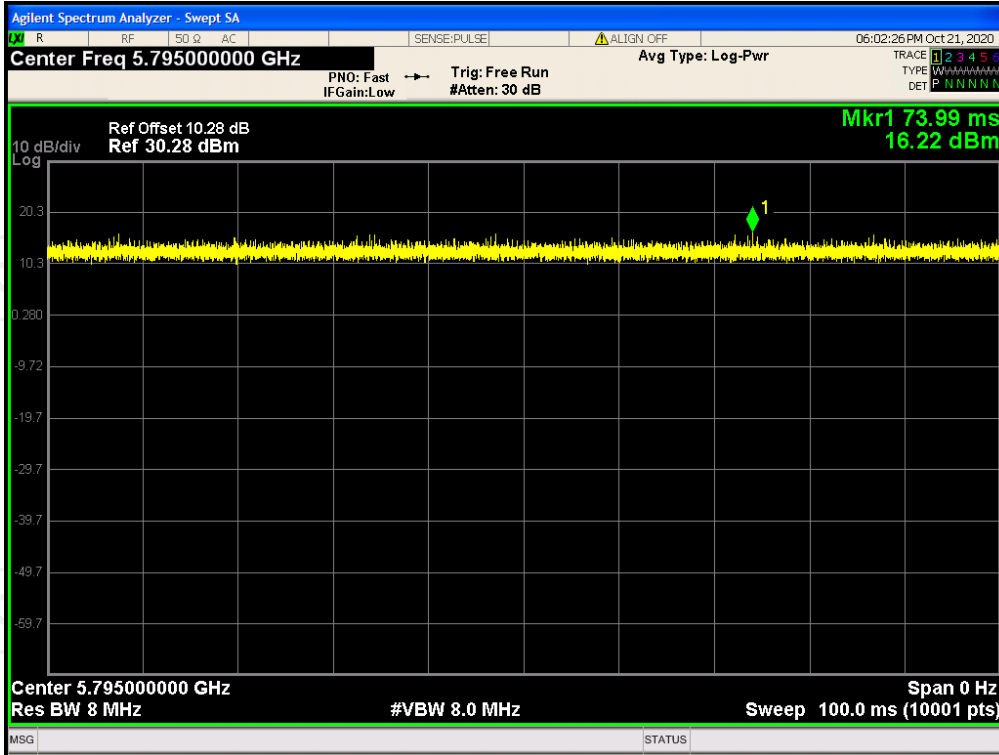
Duty Cycle NVNT 802.11ac20 5825MHz



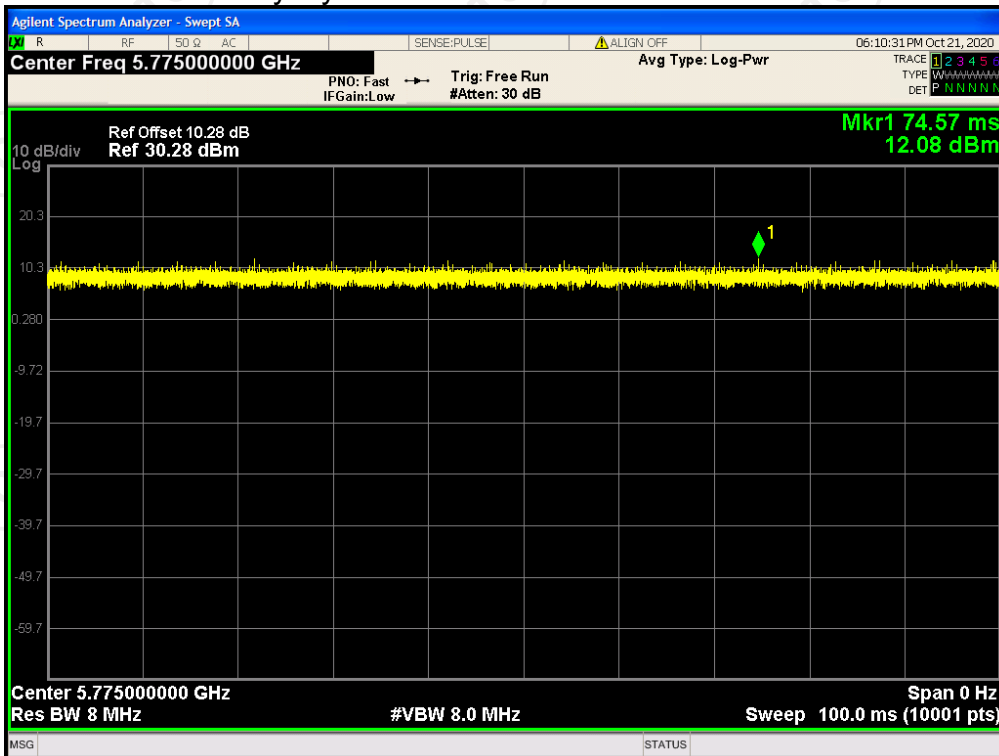
Duty Cycle NVNT 802.11ac40 5755MHz



Duty Cycle NVNT 802.11ac40 5795MHz

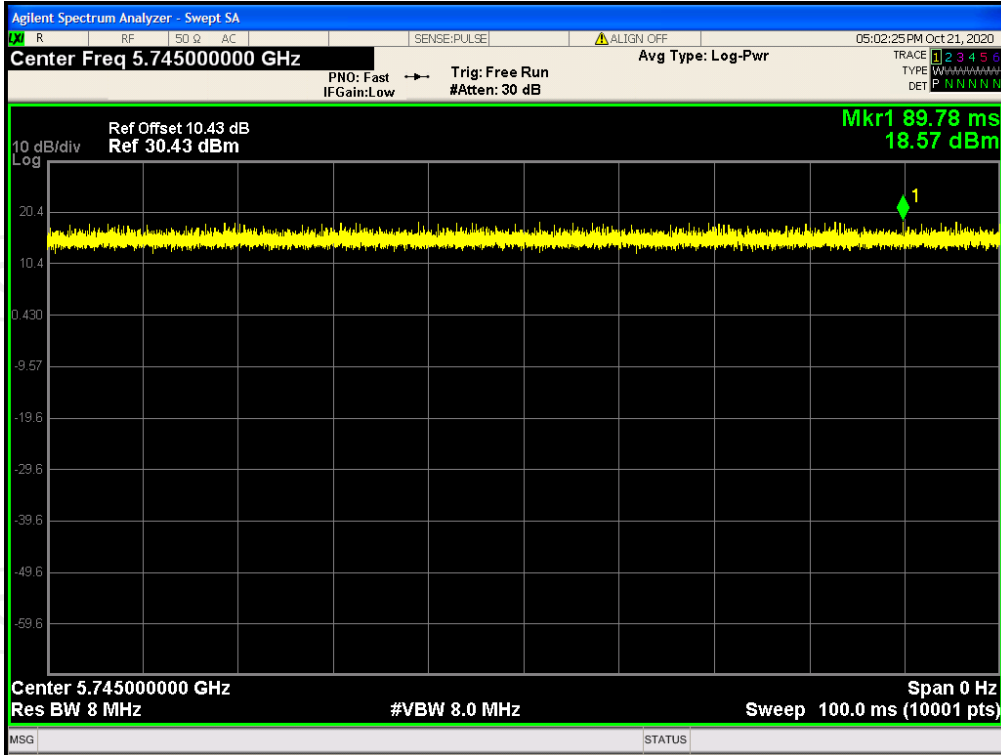


Duty Cycle NVNT 802.11ac80 5775MHz

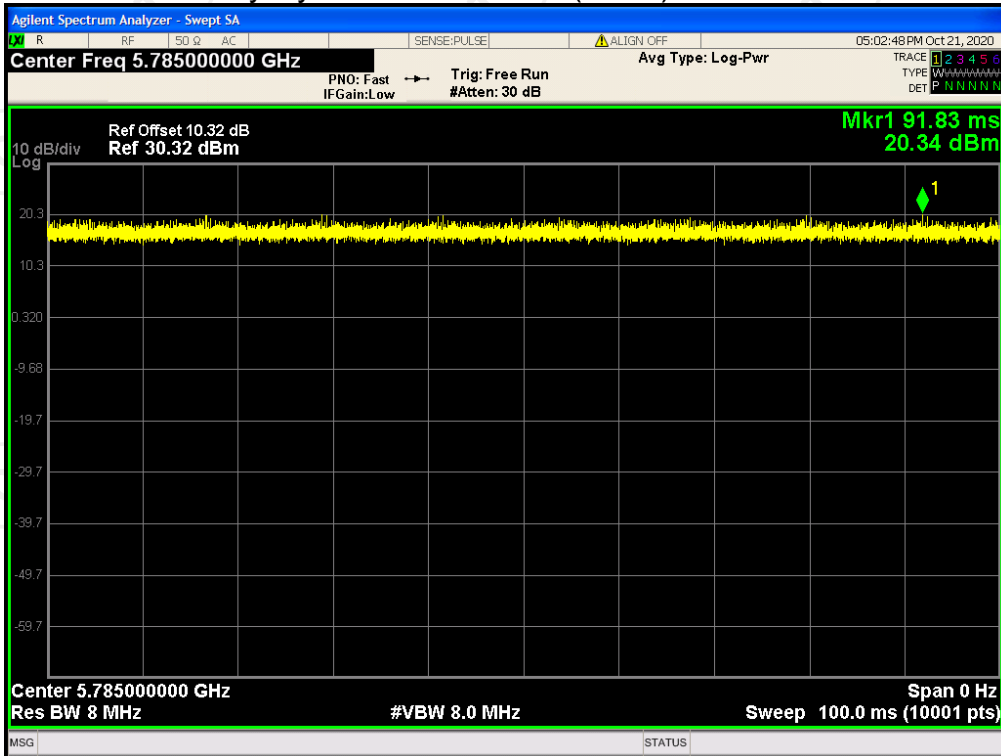


Duty Cycle NVNT 802.11n(HT20) 5745MHz

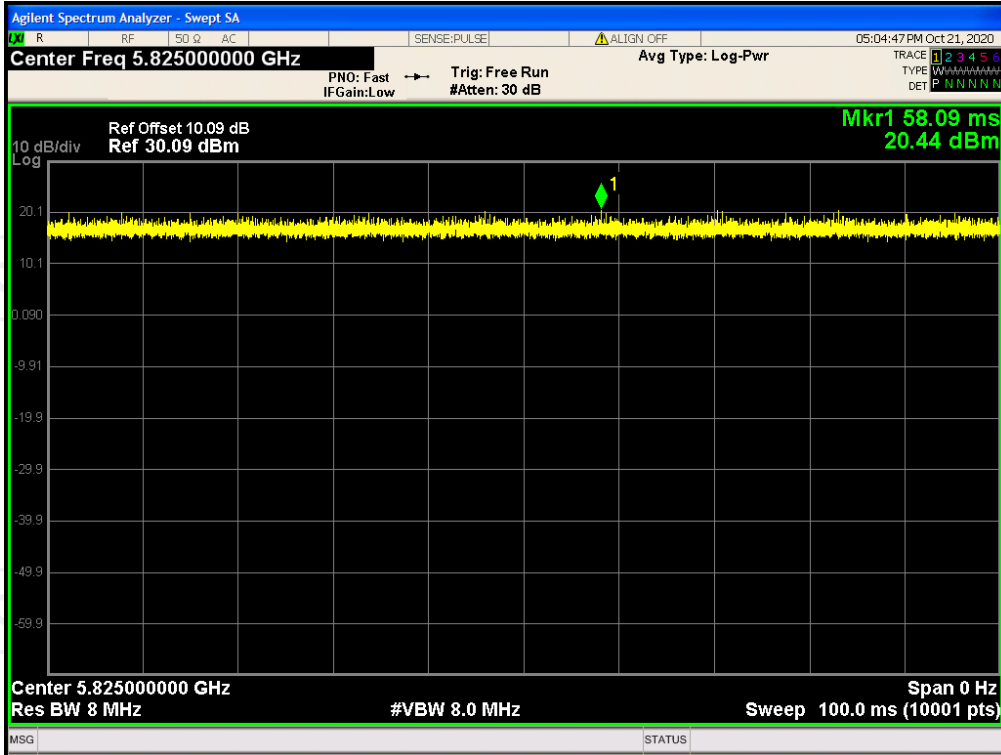




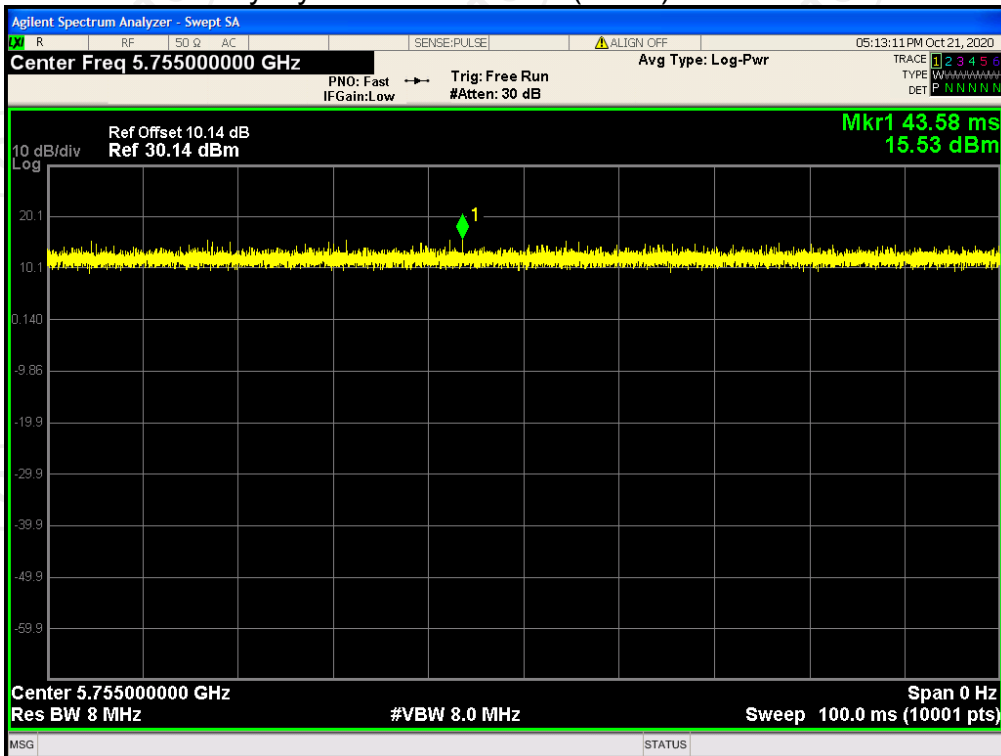
Duty Cycle NVNT 802.11n(HT20) 5785MHz



Duty Cycle NVNT 802.11n(HT20) 5825MHz



Duty Cycle NVNT 802.11n(HT40) 5755MHz



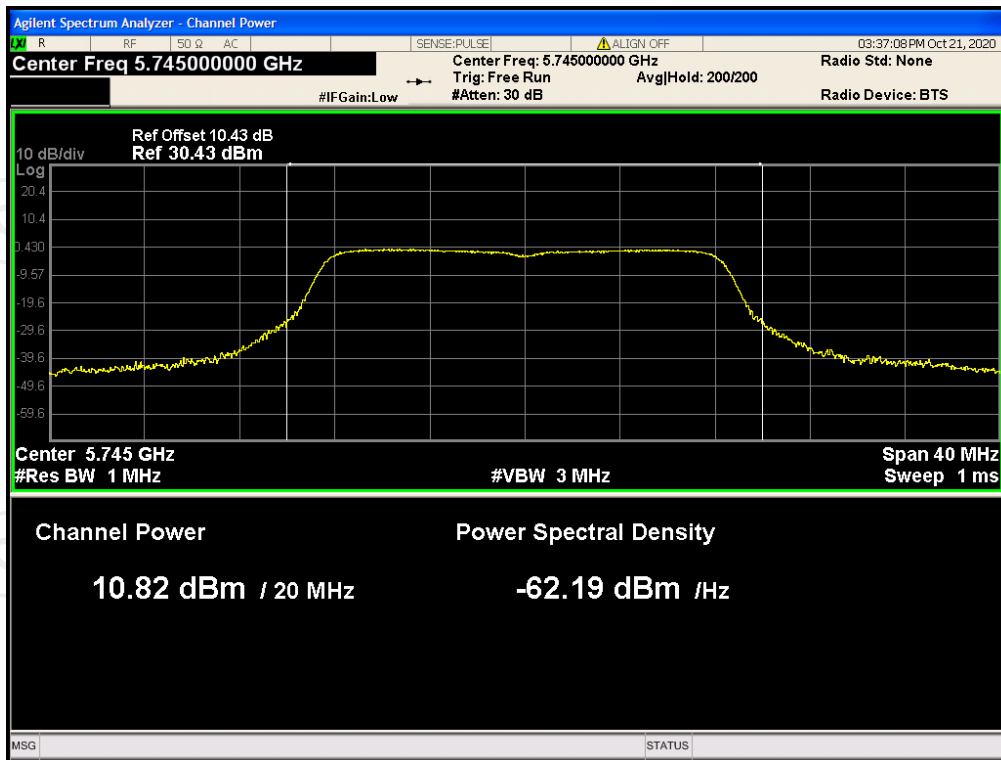
Duty Cycle NVNT 802.11n(HT40) 5795MHz



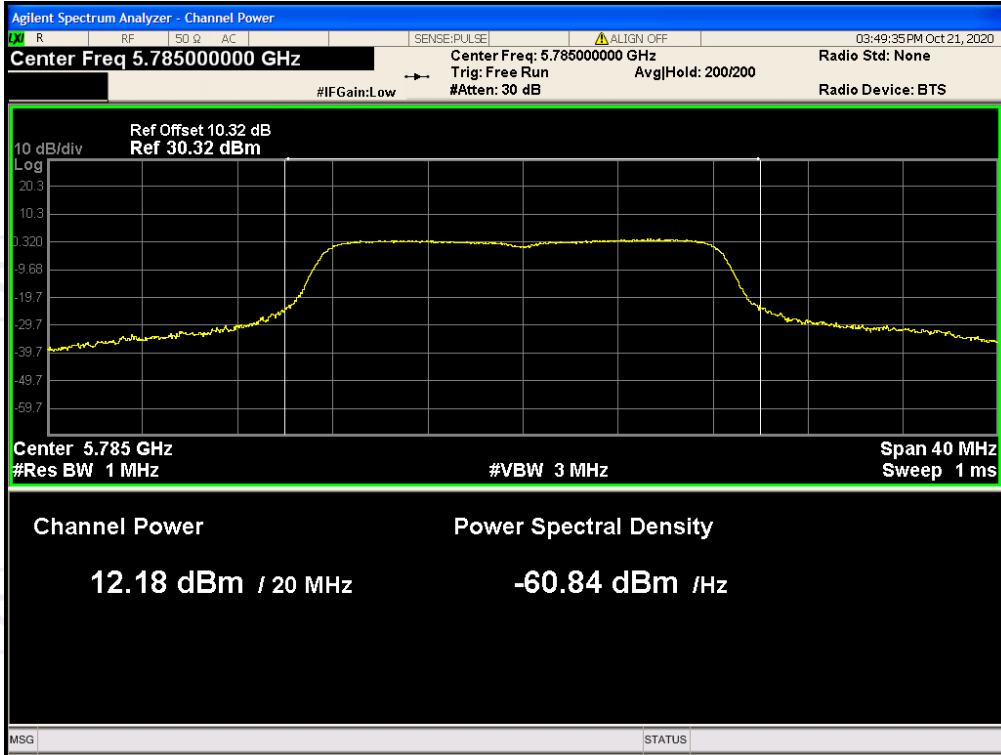
**Maximum Conducted Output Power**

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Duty Factor (dB)	Total Power (dBm)	Limit (dBm)	Verdict
NVNT	802.11a	5745	ANT 0	10.817	0	10.817	30	Pass
NVNT	802.11a	5785	ANT 0	12.175	0	12.175	30	Pass
NVNT	802.11a	5825	ANT 0	12.322	0	12.322	30	Pass
NVNT	802.11ac20	5745	ANT 0	11.269	0	11.269	30	Pass
NVNT	802.11ac20	5785	ANT 0	13.249	0	13.249	30	Pass
NVNT	802.11ac20	5825	ANT 0	13.384	0	13.384	30	Pass
NVNT	802.11ac40	5755	ANT 0	11.758	0	11.758	30	Pass
NVNT	802.11ac40	5795	ANT 0	12.103	0	12.103	30	Pass
NVNT	802.11ac80	5775	ANT 0	11.467	0	11.467	30	Pass
NVNT	802.11n(HT20)	5745	ANT 0	11.130	0	11.13	30	Pass
NVNT	802.11n(HT20)	5785	ANT 0	13.018	0	13.018	30	Pass
NVNT	802.11n(HT20)	5825	ANT 0	13.179	0	13.179	30	Pass
NVNT	802.11n(HT40)	5755	ANT 0	11.733	0	11.733	30	Pass
NVNT	802.11n(HT40)	5795	ANT 0	12.422	0	12.422	30	Pass

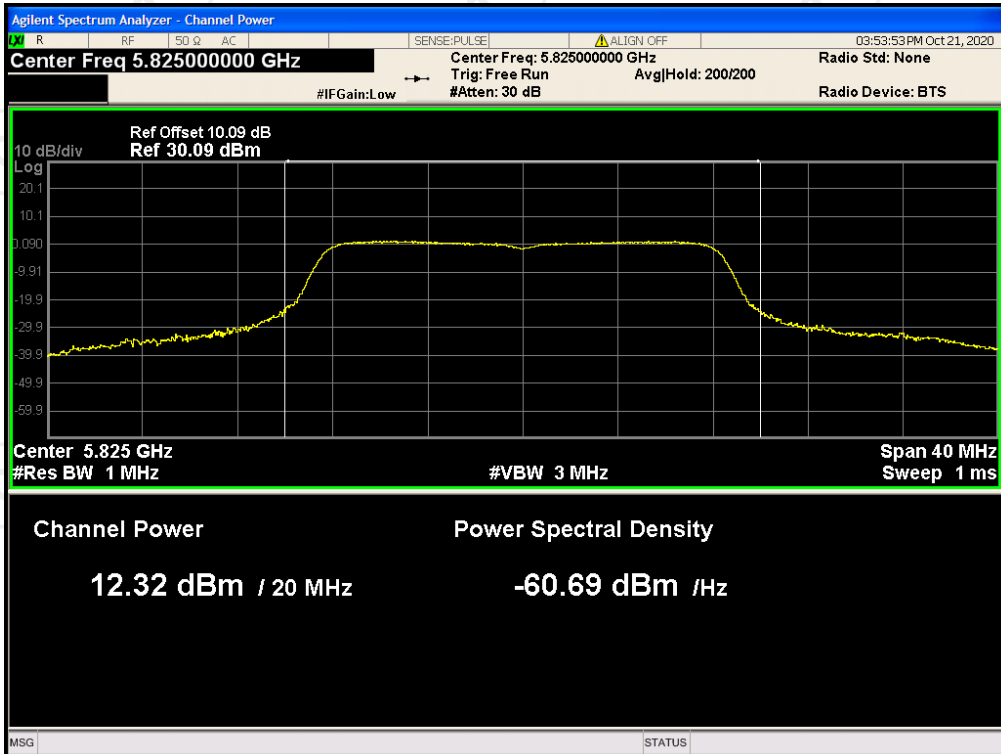
Power NVNT 802.11a 5745MHz ANT0



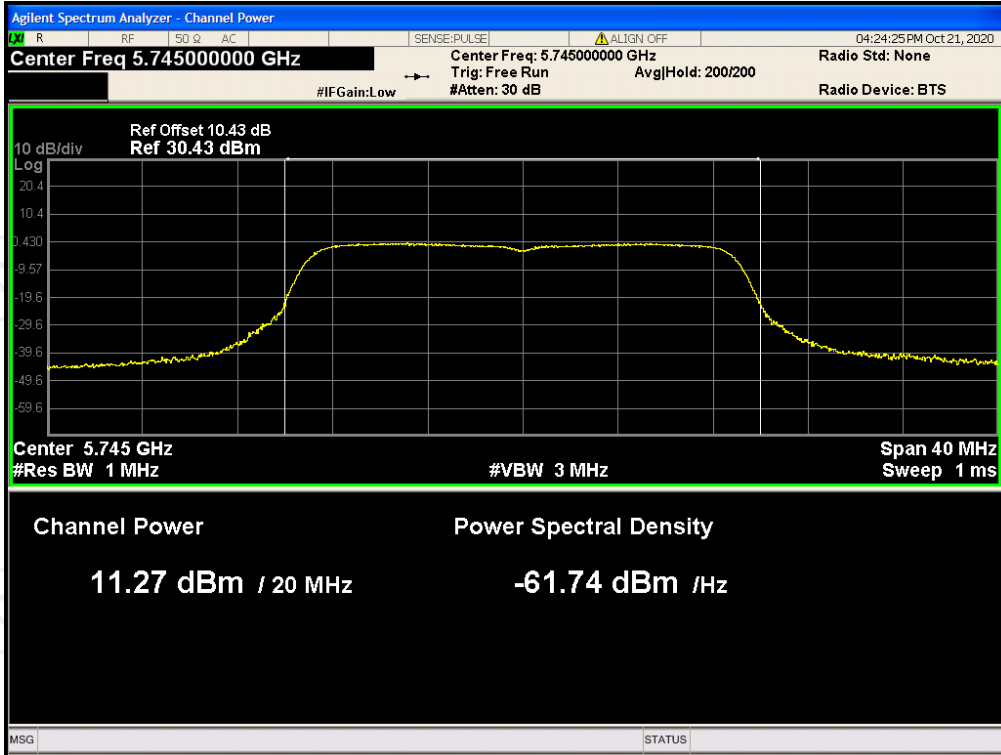
Power NVNT 802.11a 5785MHz ANT0



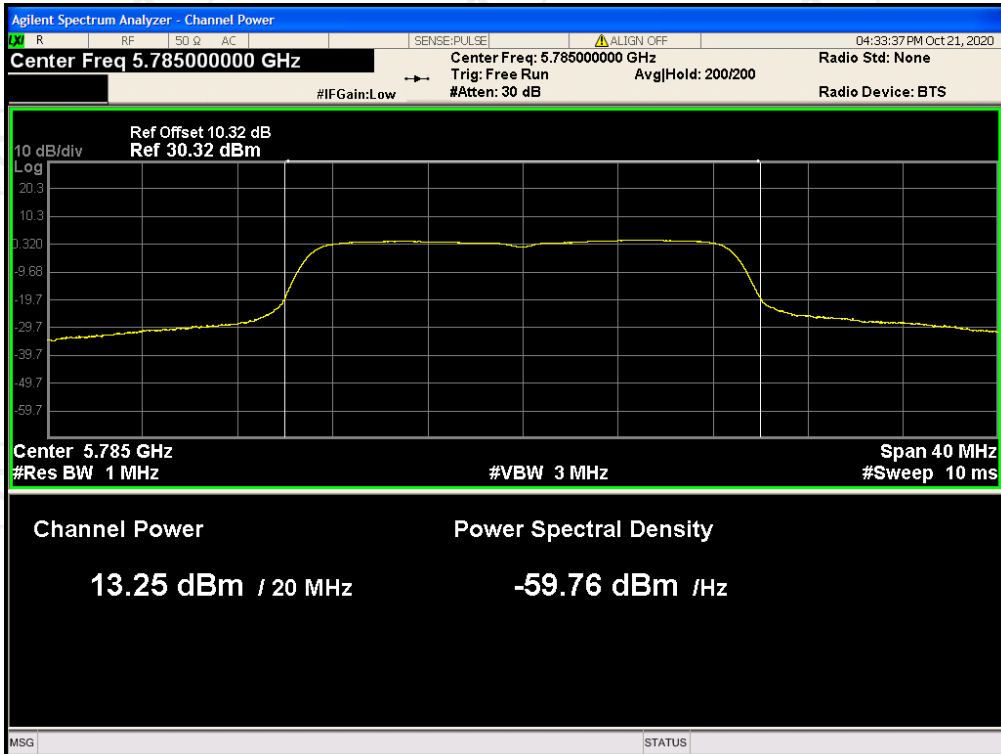
Power NVNT 802.11a 5825MHz ANT0



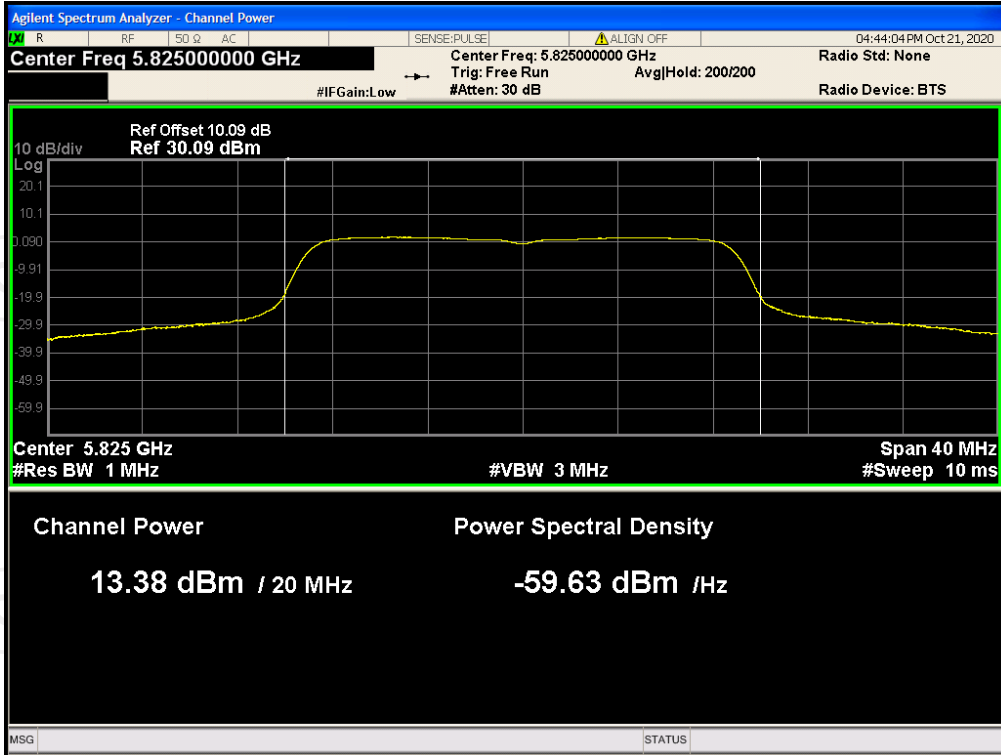
Power NVNT 802.11ac20 5745MHz ANT0



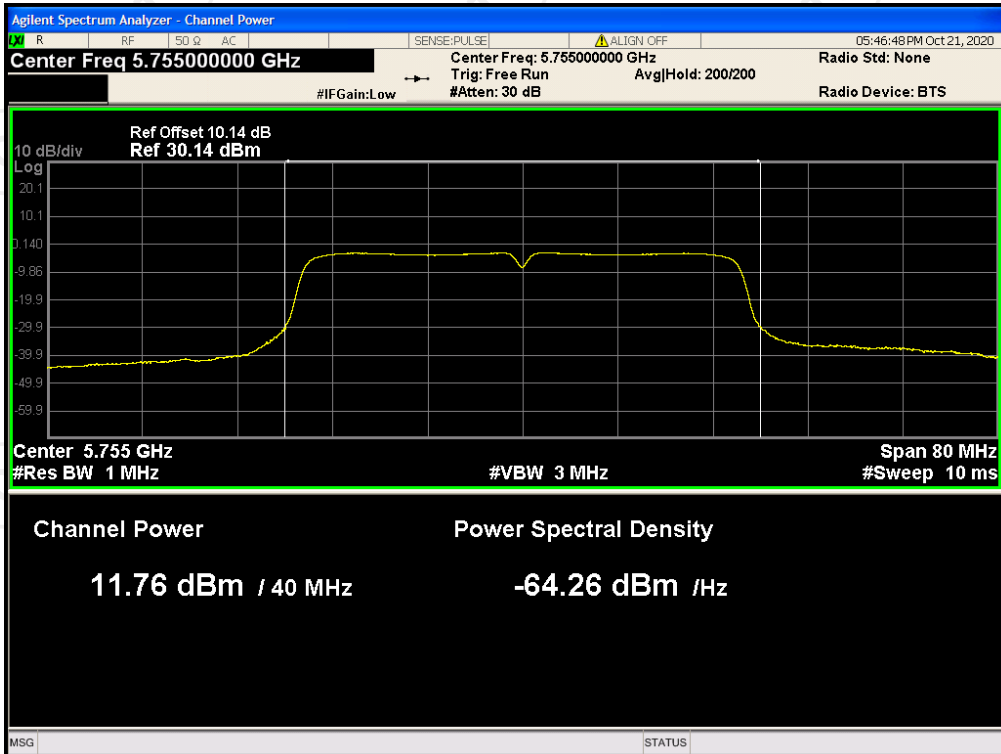
Power NVNT 802.11ac20 5785MHz ANT0



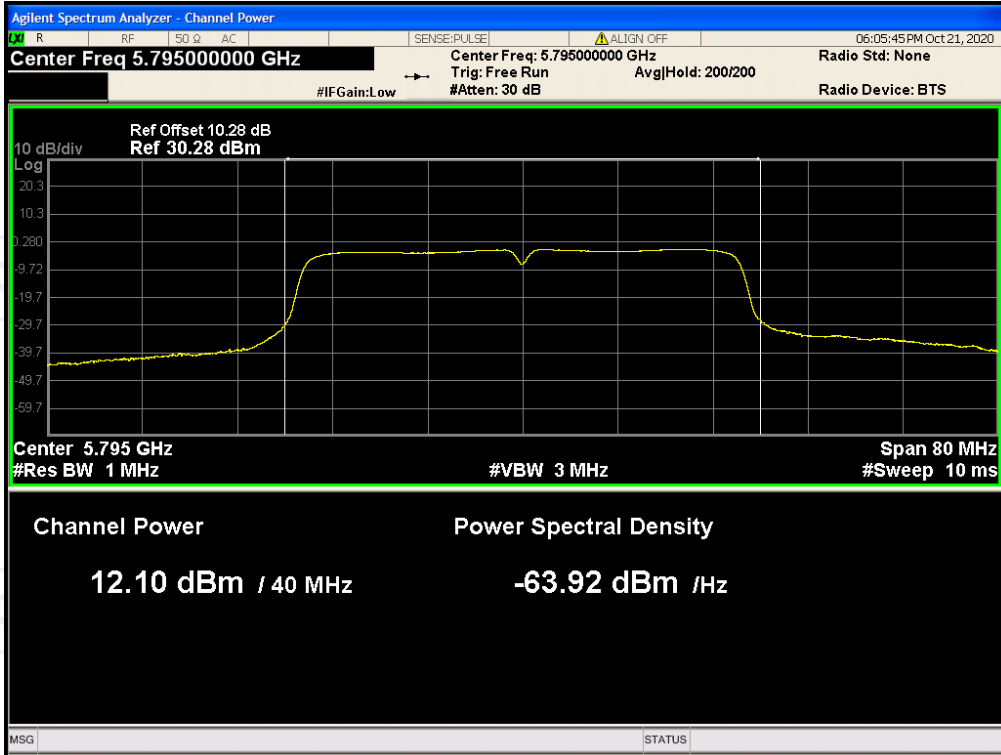
Power NVNT 802.11ac20 5825MHz ANT0



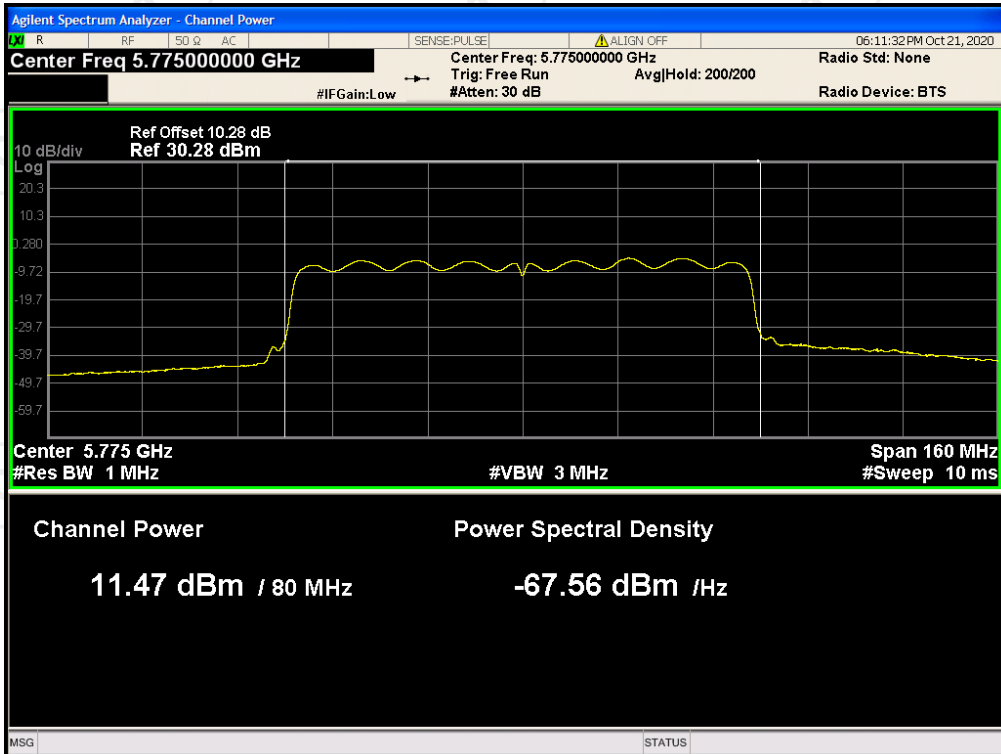
Power NVNT 802.11ac40 5755MHz ANT0



Power NVNT 802.11ac40 5795MHz ANT0

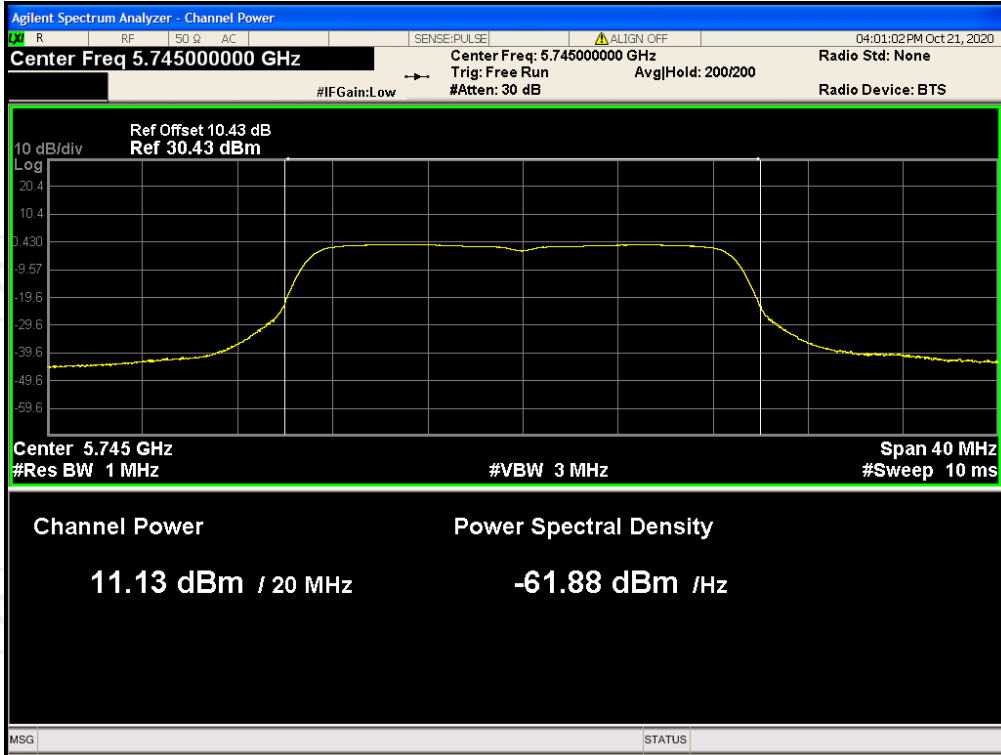


Power NVNT 802.11ac80 5775MHz ANT0

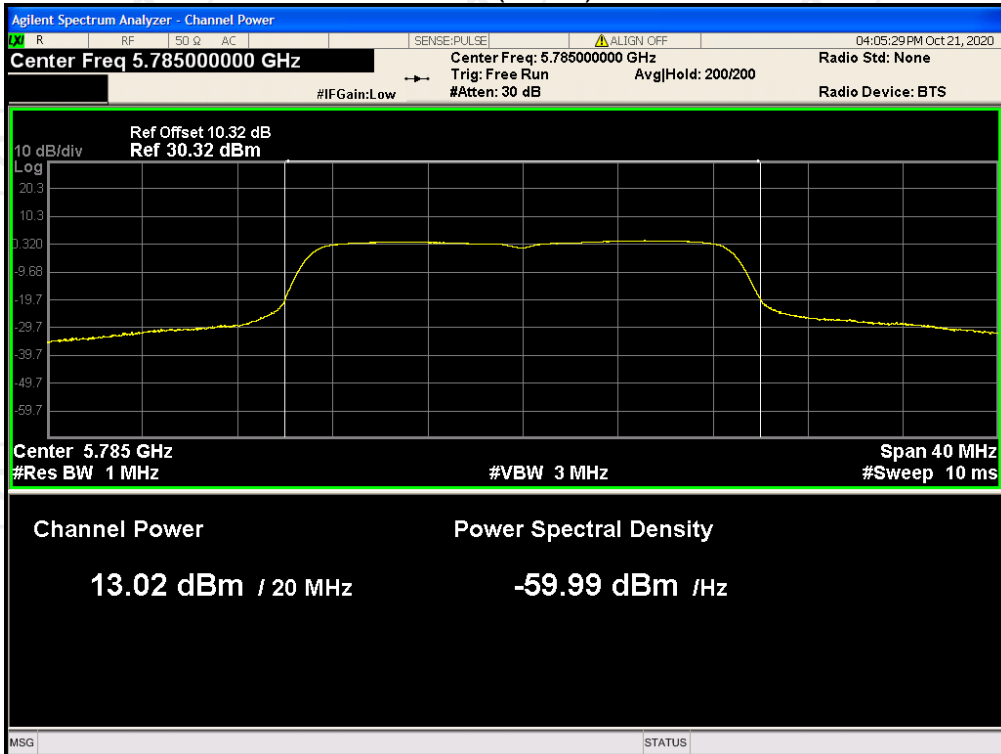


Power NVNT 802.11n(HT20) 5745MHz ANT0

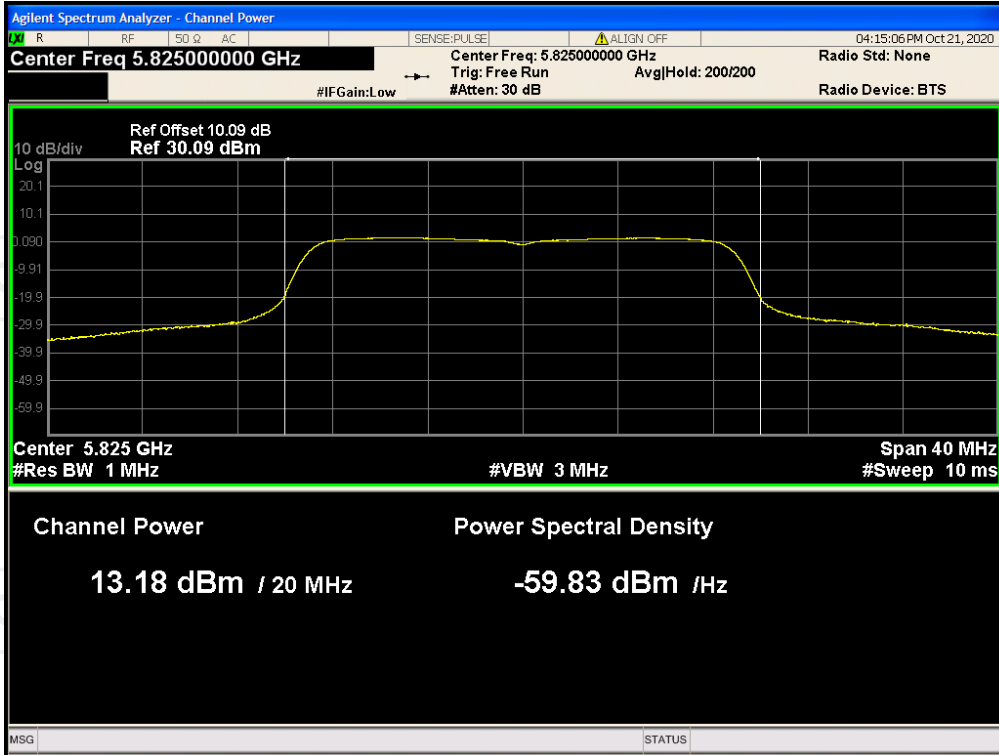




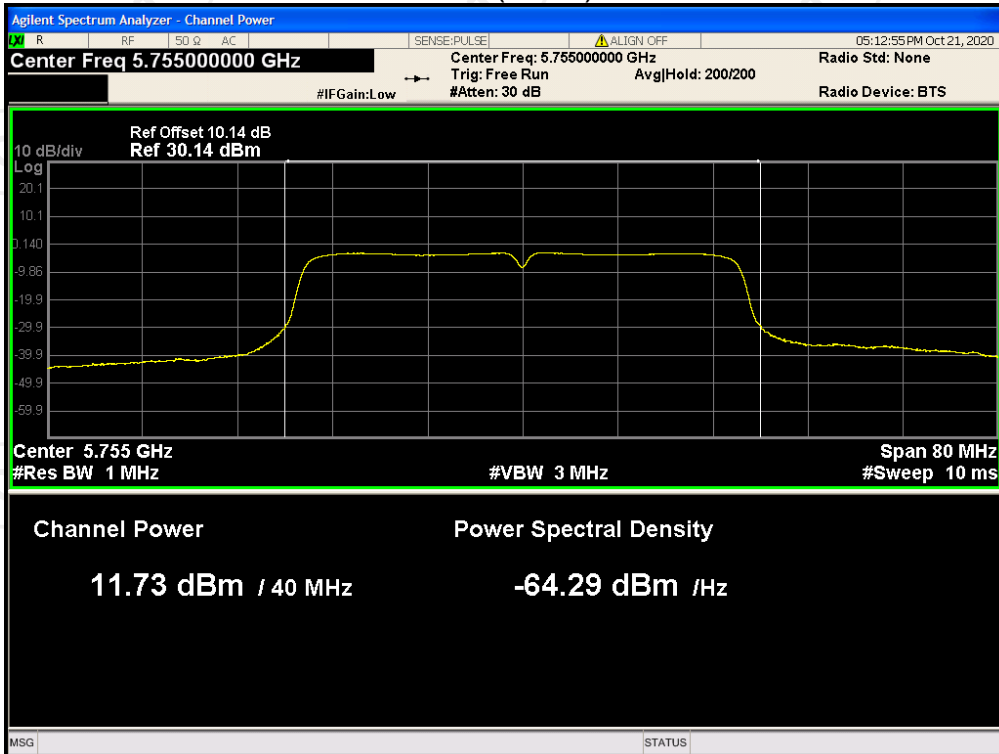
Power NVNT 802.11n(HT20) 5785MHz ANT0



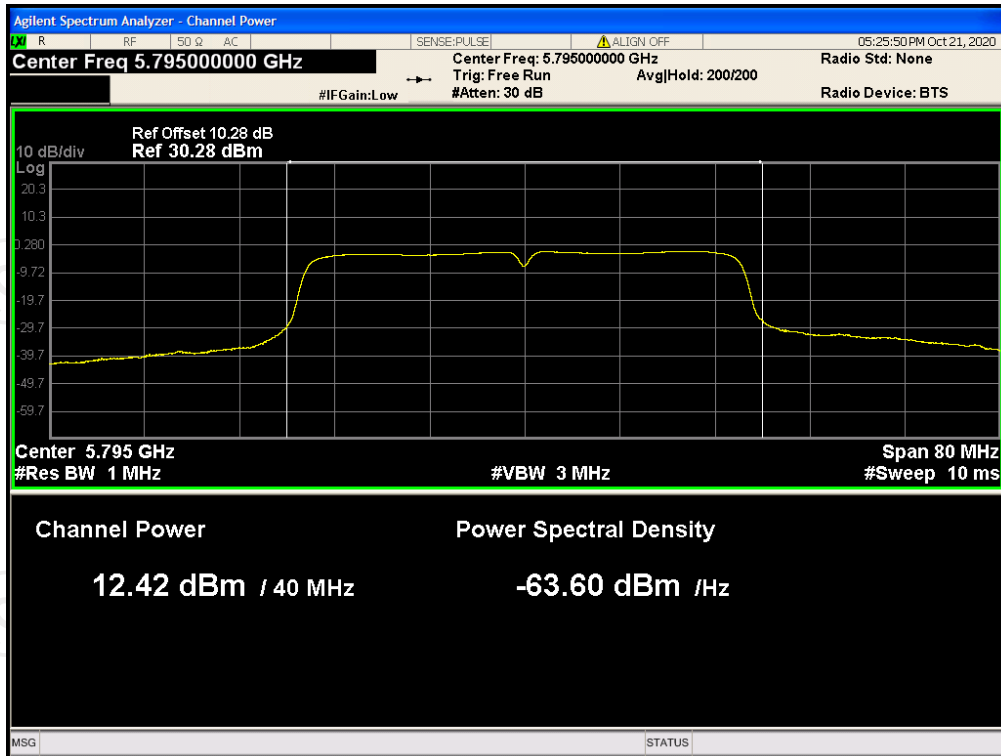
Power NVNT 802.11n(HT20) 5825MHz ANT0



Power NVNT 802.11n(HT40) 5755MHz ANT0



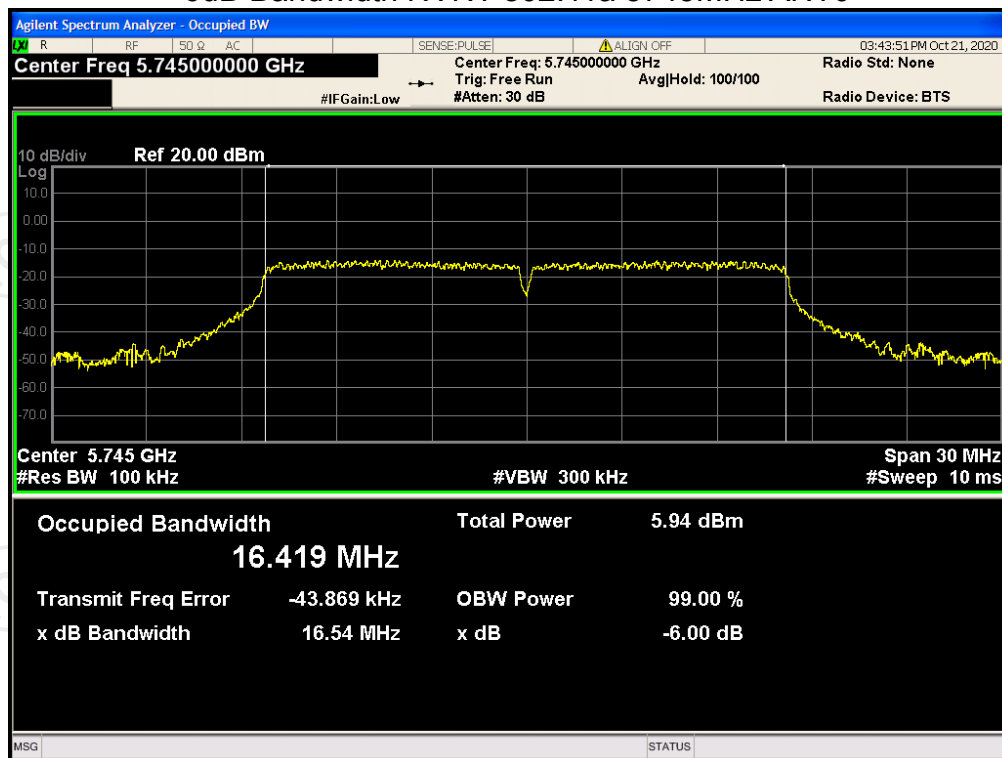
Power NVNT 802.11n(HT40) 5795MHz ANT0



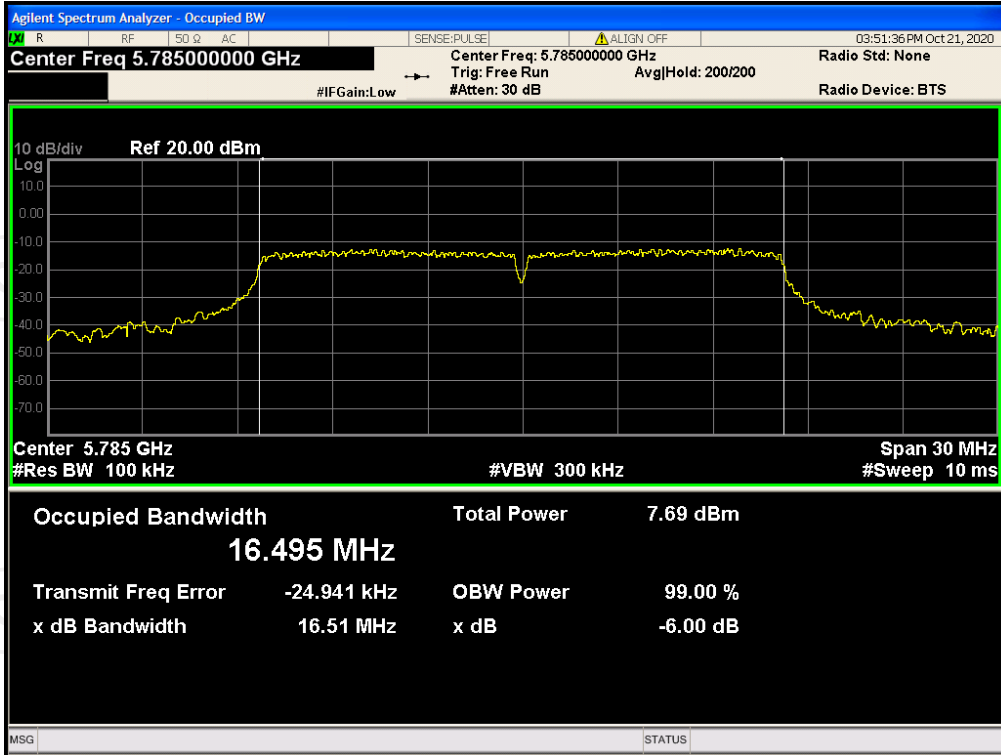
## -6dB Bandwidth

Condition	Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	802.11a	5745	ANT 0	16.538	0.5	Pass
NVNT	802.11a	5785	ANT 0	16.5146	0.5	Pass
NVNT	802.11a	5825	ANT 0	16.5328	0.5	Pass
NVNT	802.11ac20	5745	ANT 0	17.6237	0.5	Pass
NVNT	802.11ac20	5785	ANT 0	17.6511	0.5	Pass
NVNT	802.11ac20	5825	ANT 0	17.6234	0.5	Pass
NVNT	802.11ac40	5755	ANT 0	36.3651	0.5	Pass
NVNT	802.11ac40	5795	ANT 0	36.3581	0.5	Pass
NVNT	802.11ac80	5775	ANT 0	75.9125	0.5	Pass
NVNT	802.11n(HT20)	5745	ANT 0	17.6305	0.5	Pass
NVNT	802.11n(HT20)	5785	ANT 0	17.6426	0.5	Pass
NVNT	802.11n(HT20)	5825	ANT 0	17.6246	0.5	Pass
NVNT	802.11n(HT40)	5755	ANT 0	36.4479	0.5	Pass
NVNT	802.11n(HT40)	5795	ANT 0	36.4257	0.5	Pass

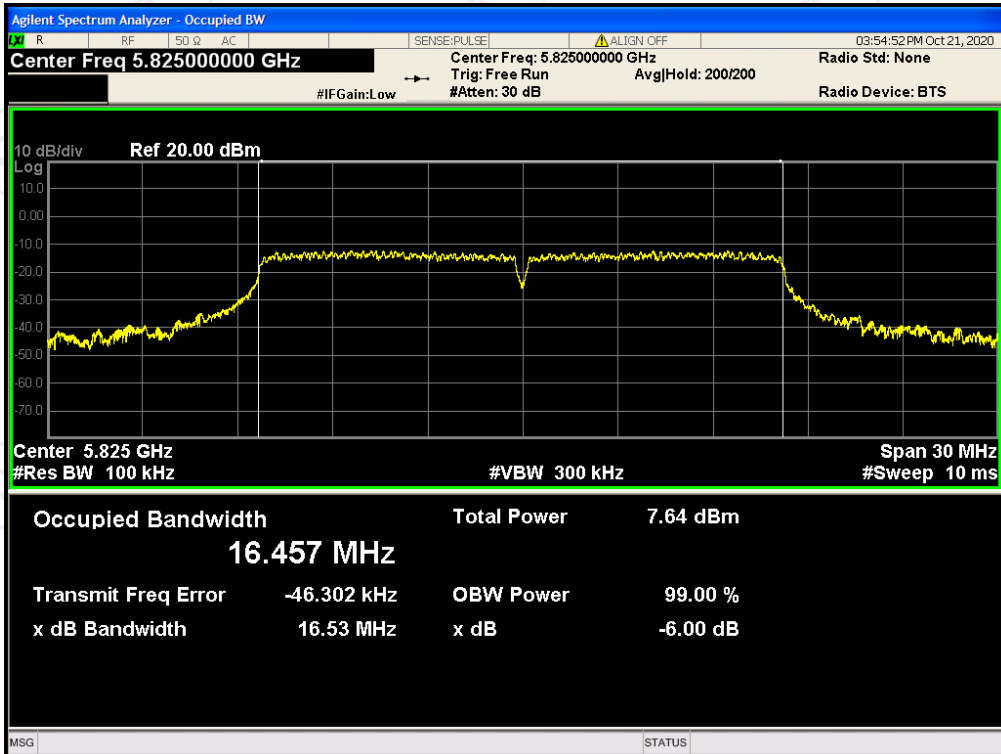
-6dB Bandwidth NVNT 802.11a 5745MHz ANT0



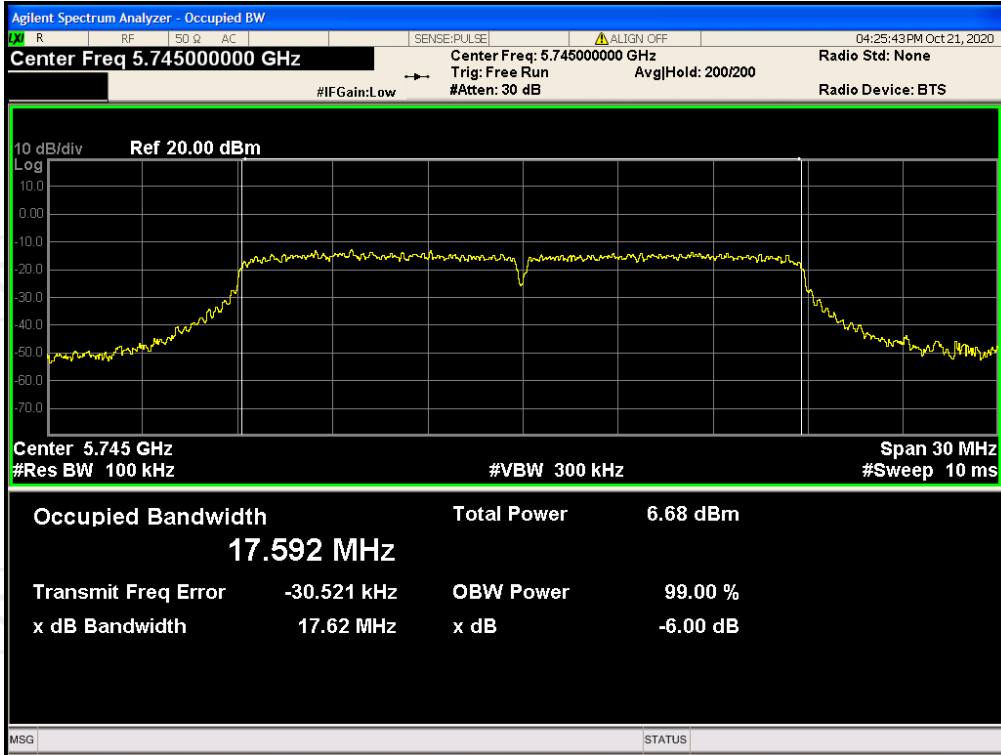
-6dB Bandwidth NVNT 802.11a 5785MHz ANT0



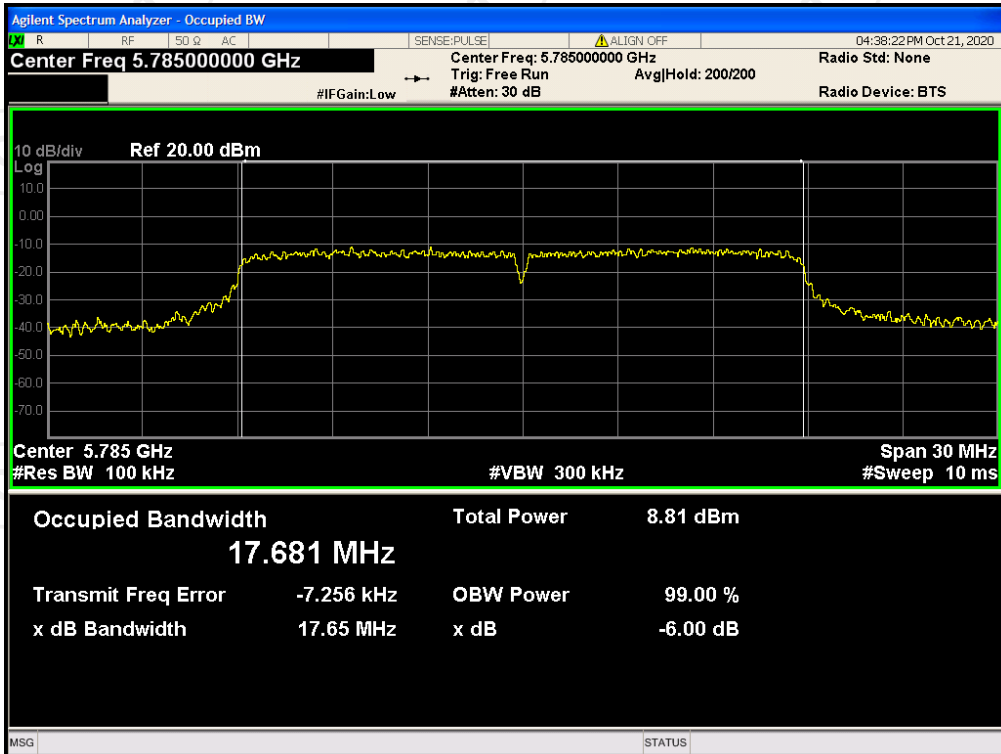
-6dB Bandwidth NVNT 802.11a 5825MHz ANT0



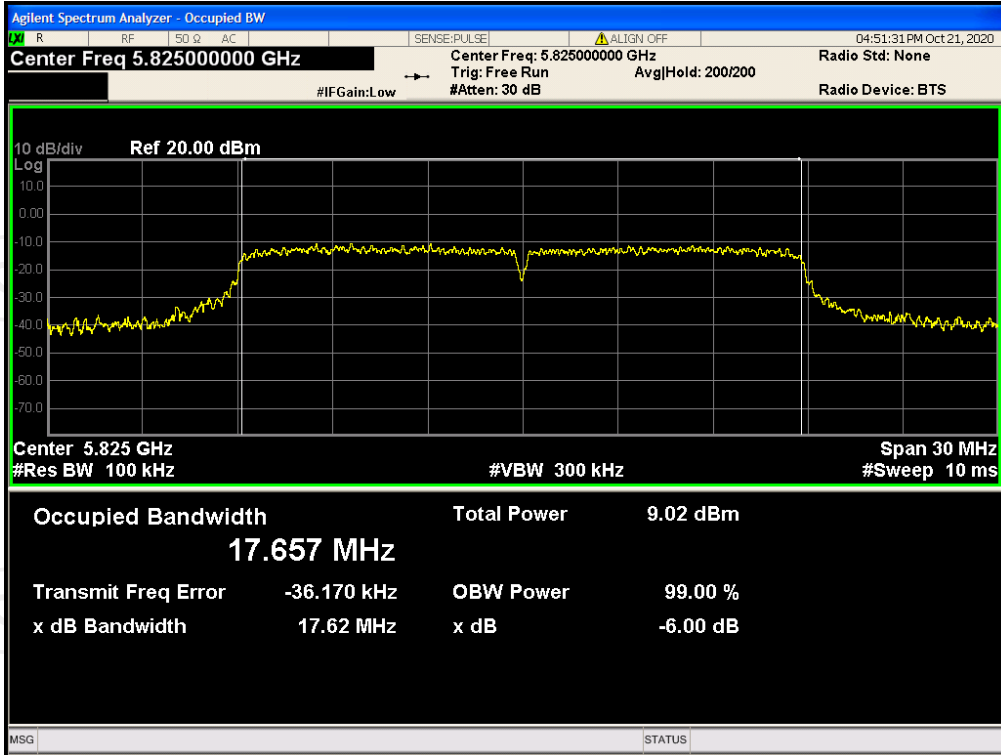
-6dB Bandwidth NVNT 802.11ac20 5745MHz ANT0



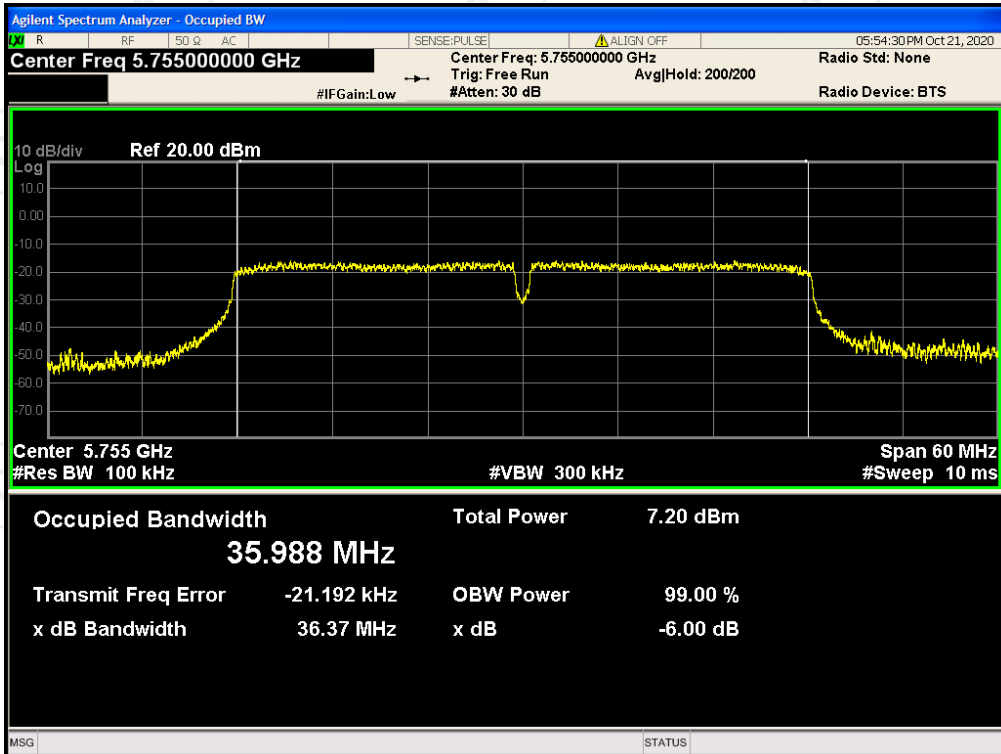
-6dB Bandwidth NVNT 802.11ac20 5785MHz ANT0



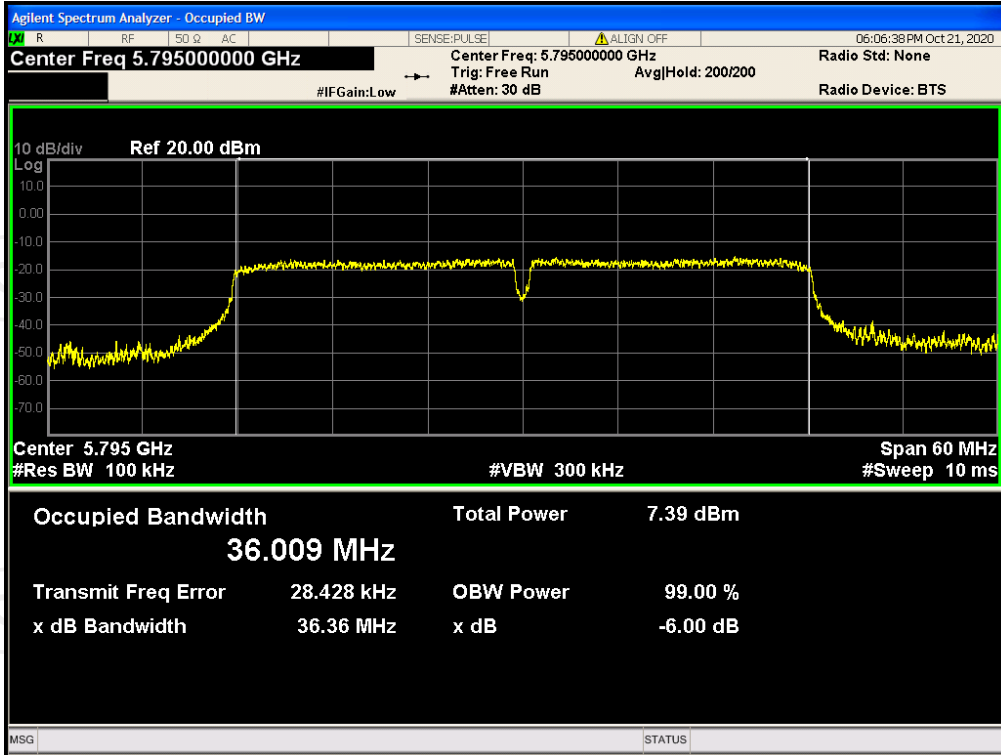
-6dB Bandwidth NVNT 802.11ac20 5825MHz ANT0



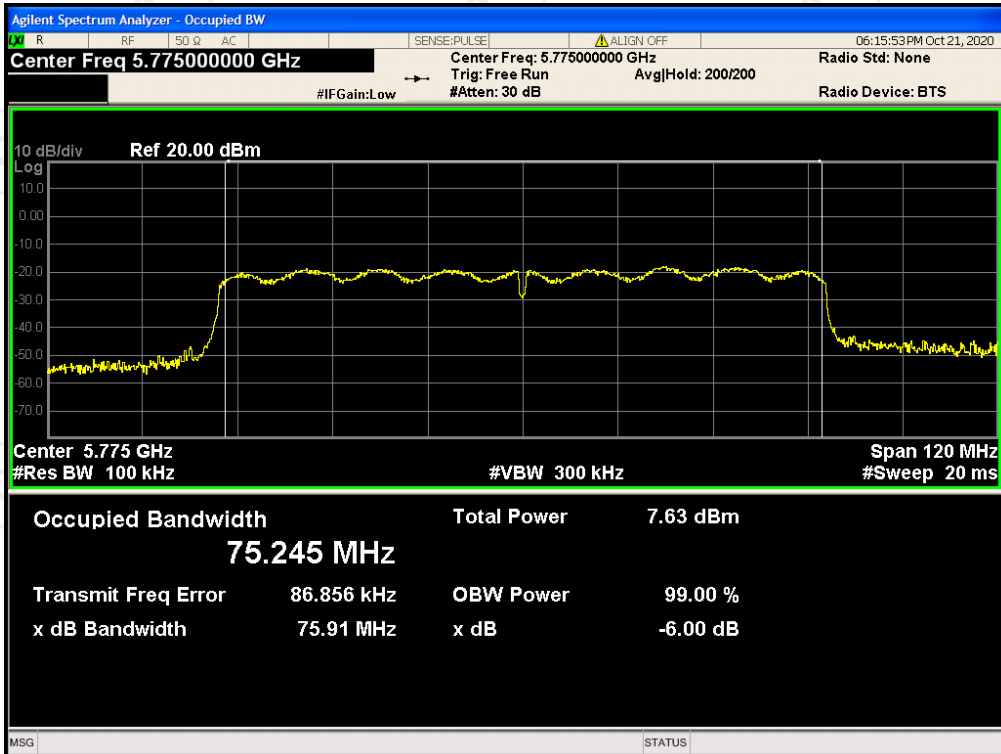
-6dB Bandwidth NVNT 802.11ac40 5755MHz ANT0



-6dB Bandwidth NVNT 802.11ac40 5795MHz ANT0

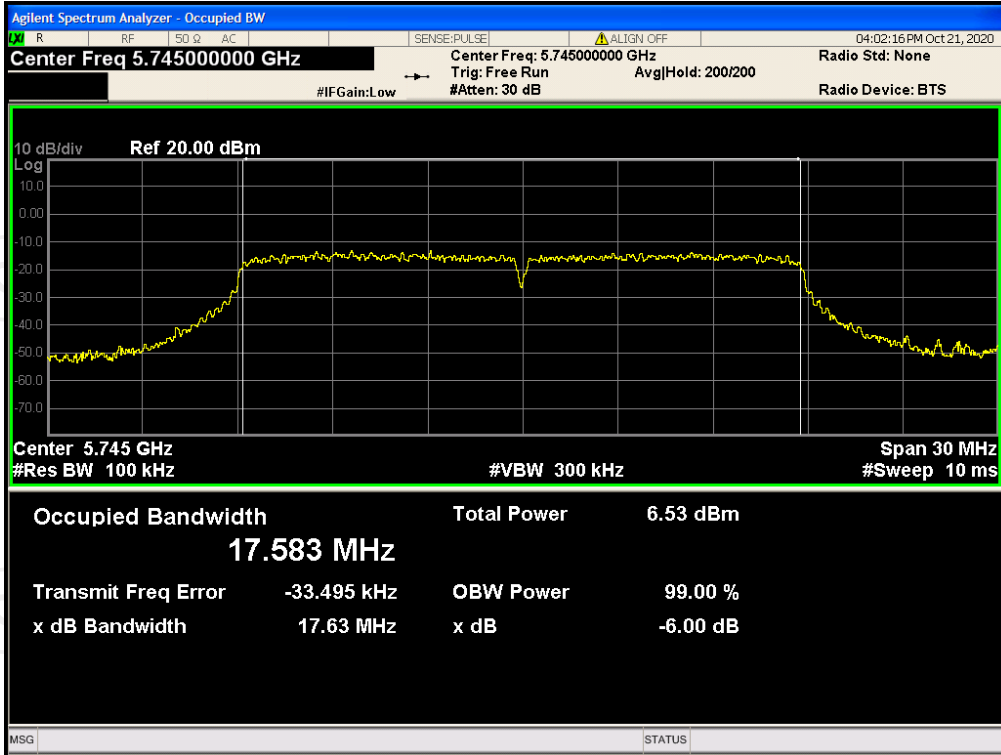


-6dB Bandwidth NVNT 802.11ac80 5775MHz ANT0

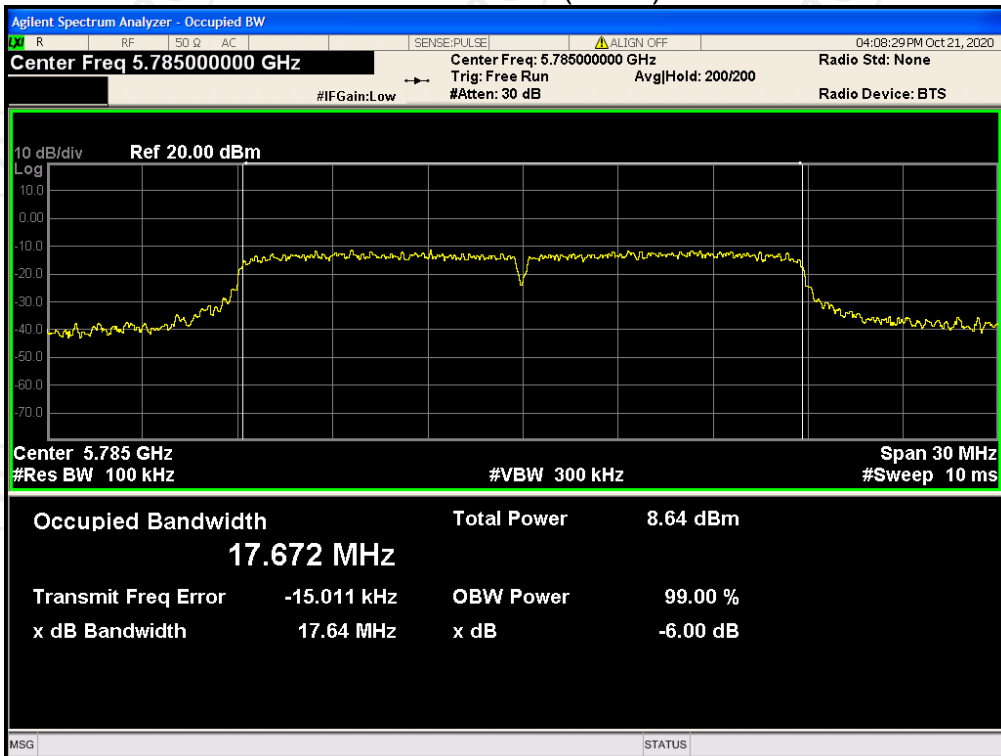


-6dB Bandwidth NVNT 802.11n(HT20) 5745MHz ANT0

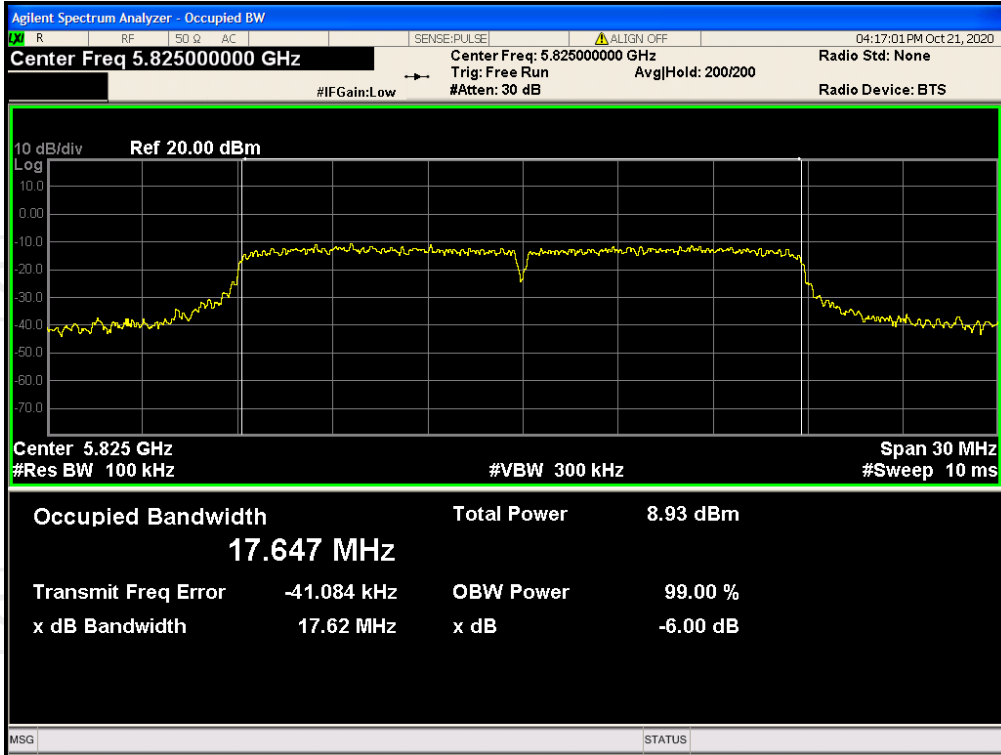




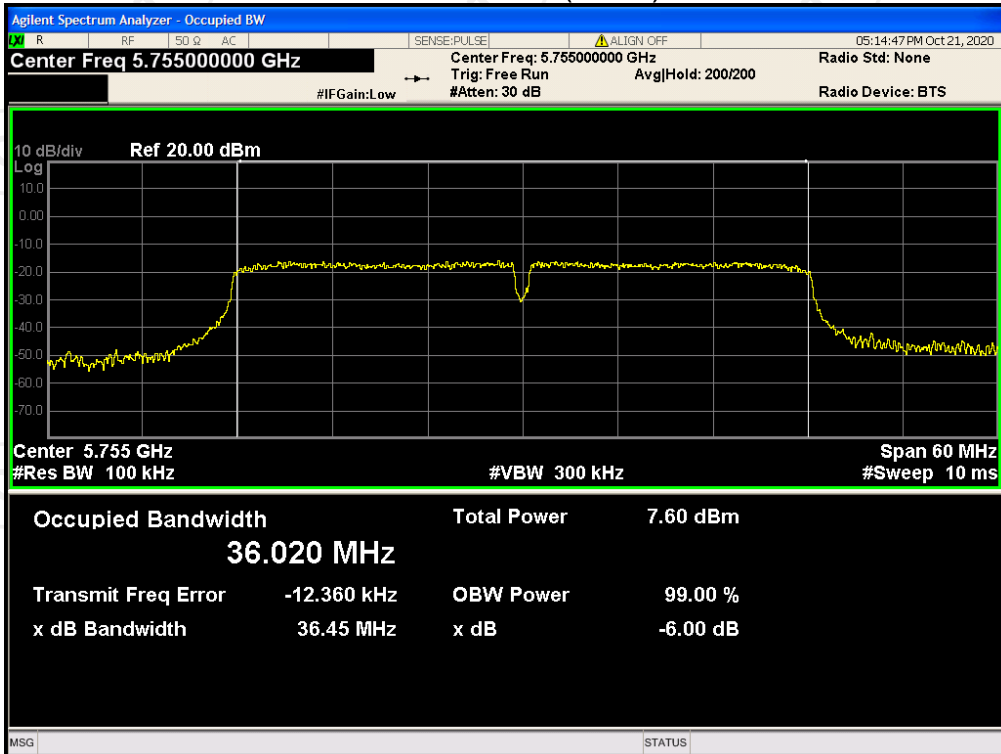
-6dB Bandwidth NVNT 802.11n(HT20) 5785MHz ANT0



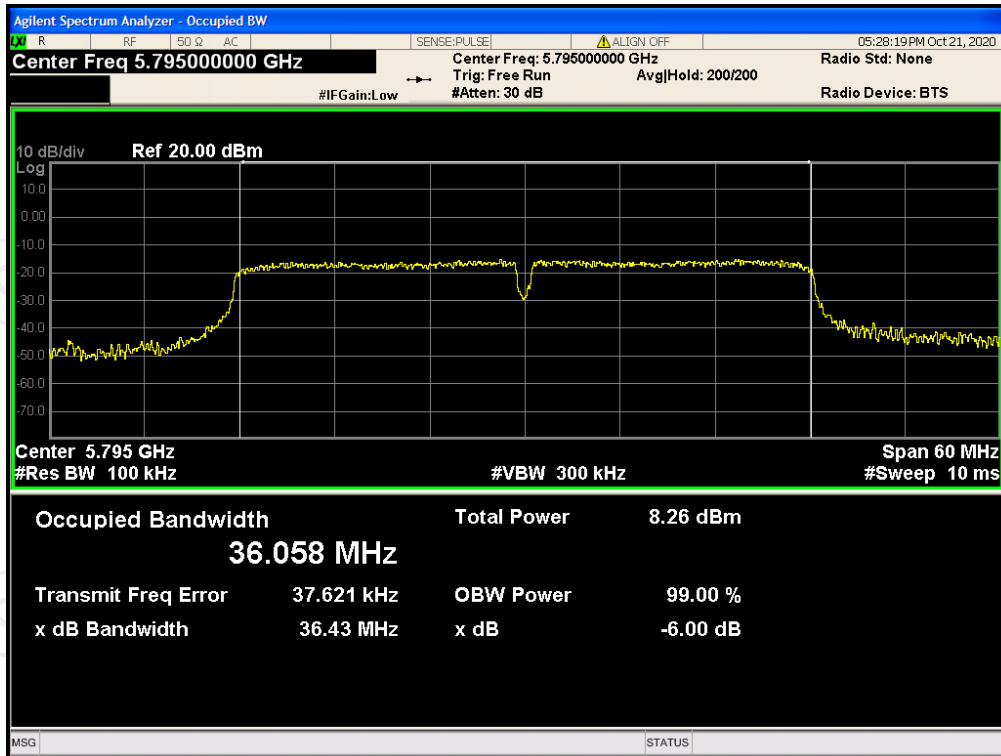
-6dB Bandwidth NVNT 802.11n(HT20) 5825MHz ANT0



-6dB Bandwidth NVNT 802.11n(HT40) 5755MHz ANT0



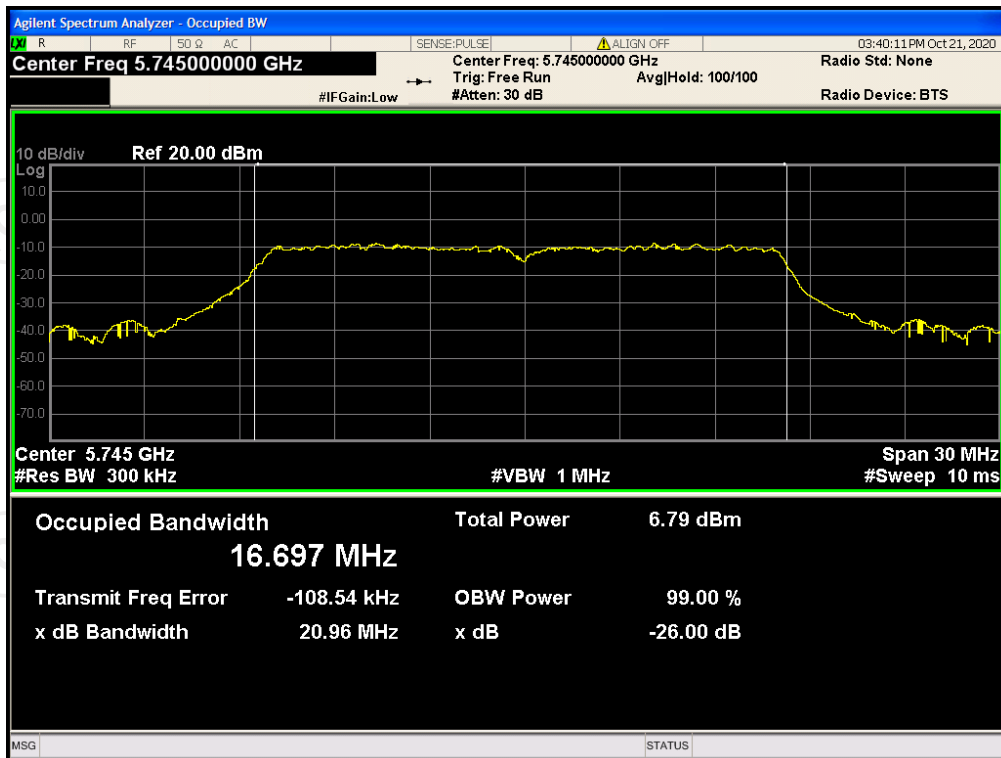
-6dB Bandwidth NVNT 802.11n(HT40) 5795MHz ANT0



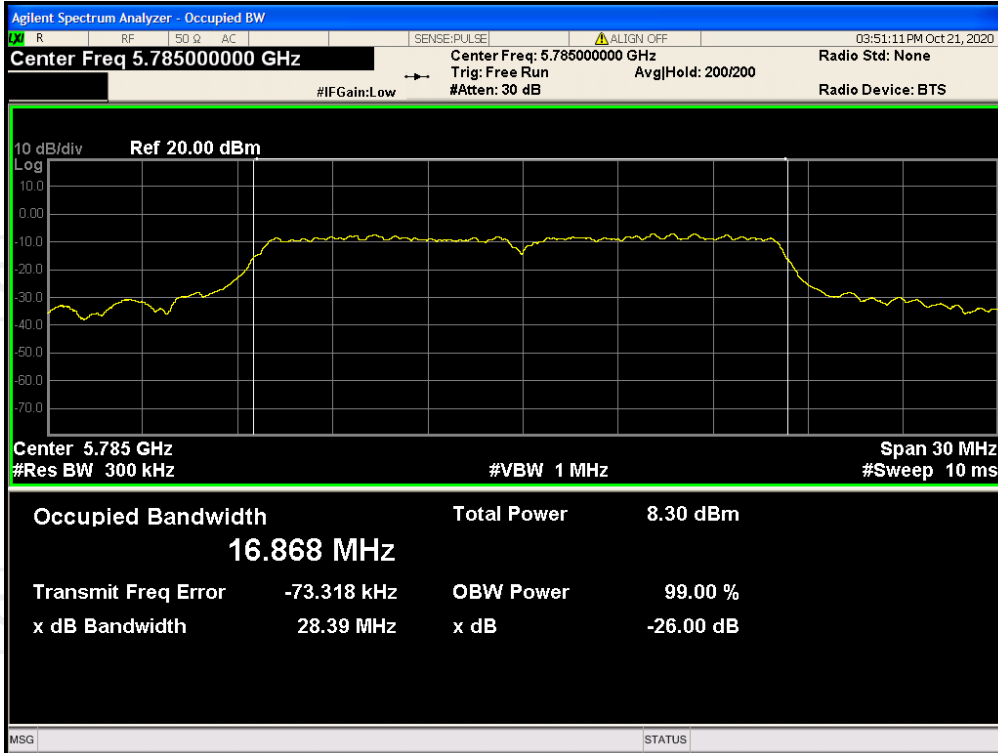
### Occupied Channel Bandwidth

Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)	-26 dB Bandwidth (MHz)	Limit -26 dB Bandwidth (MHz)	Verdict
NVNT	802.11a	5745	ANT 0	16.6967	20.9573	0.5	Pass
NVNT	802.11a	5785	ANT 0	16.8677	28.3947	0.5	Pass
NVNT	802.11a	5825	ANT 0	16.8215	25.5299	0.5	Pass
NVNT	802.11ac20	5745	ANT 0	17.7368	21.691	0.5	Pass
NVNT	802.11ac20	5785	ANT 0	17.9671	28.3893	0.5	Pass
NVNT	802.11ac20	5825	ANT 0	17.9107	28.3952	0.5	Pass
NVNT	802.11ac40	5755	ANT 0	36.3153	44.1966	0.5	Pass
NVNT	802.11ac40	5795	ANT 0	36.3465	48.236	0.5	Pass
NVNT	802.11ac80	5775	ANT 0	75.3862	87.634	0.5	Pass
NVNT	802.11n(HT20)	5745	ANT 0	17.7159	21.5759	0.5	Pass
NVNT	802.11n(HT20)	5785	ANT 0	17.9359	28.4162	0.5	Pass
NVNT	802.11n(HT20)	5825	ANT 0	17.8587	27.4261	0.5	Pass
NVNT	802.11n(HT40)	5755	ANT 0	36.2937	44.1356	0.5	Pass
NVNT	802.11n(HT40)	5795	ANT 0	36.3835	58.8137	0.5	Pass

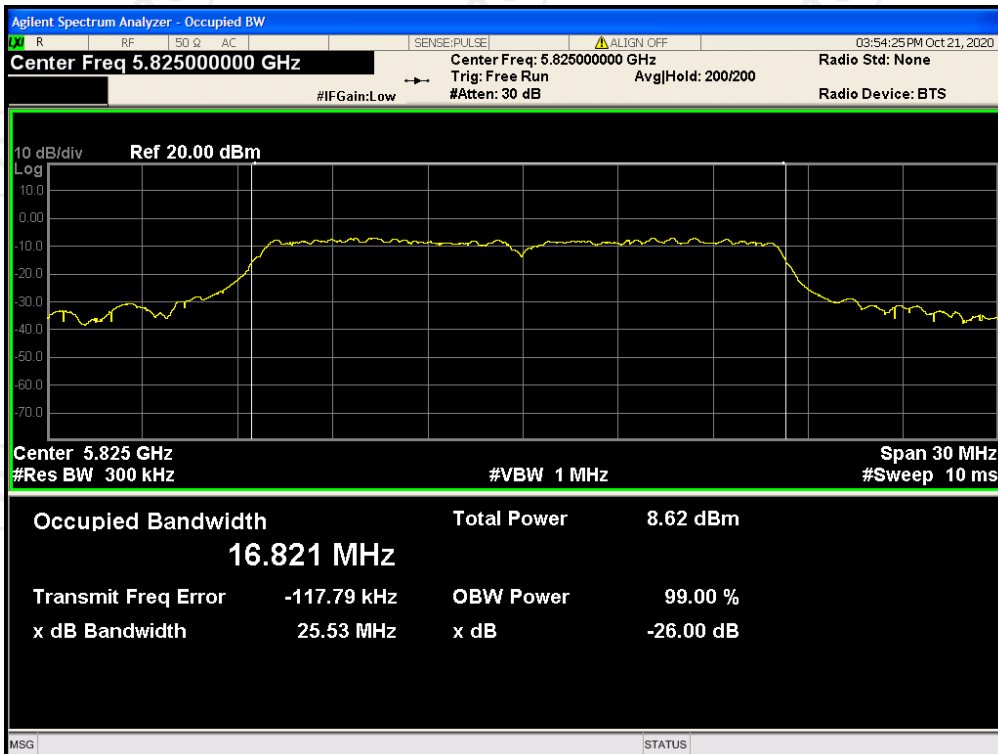
OBW NVNT 802.11a 5745MHz ANT0



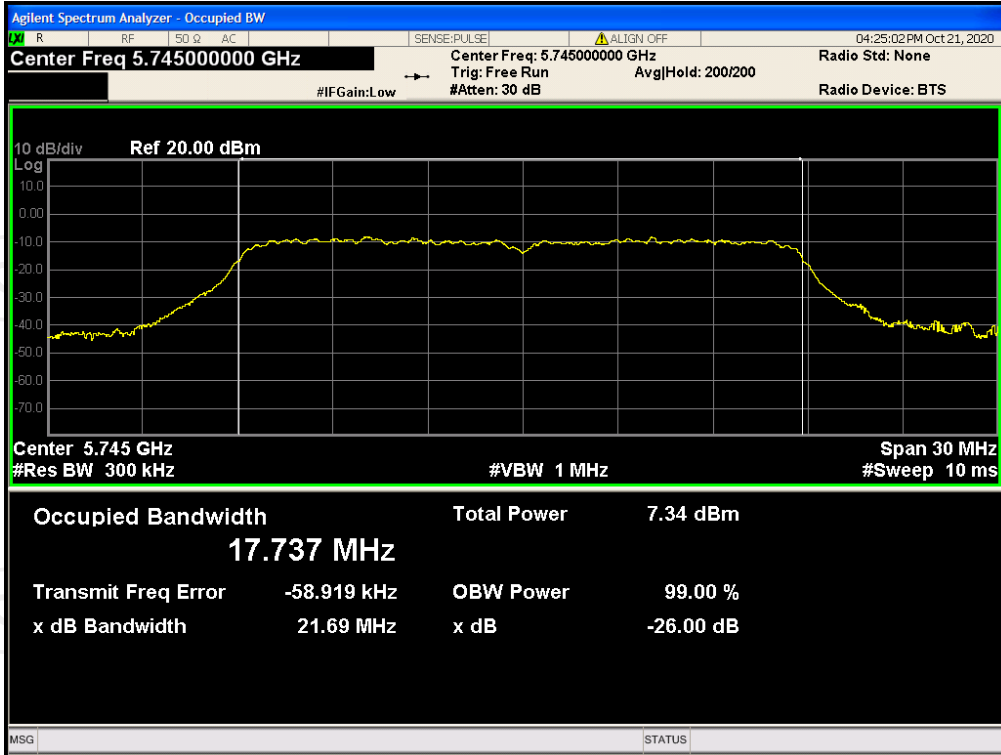
OBW NVNT 802.11a 5785MHz ANT0



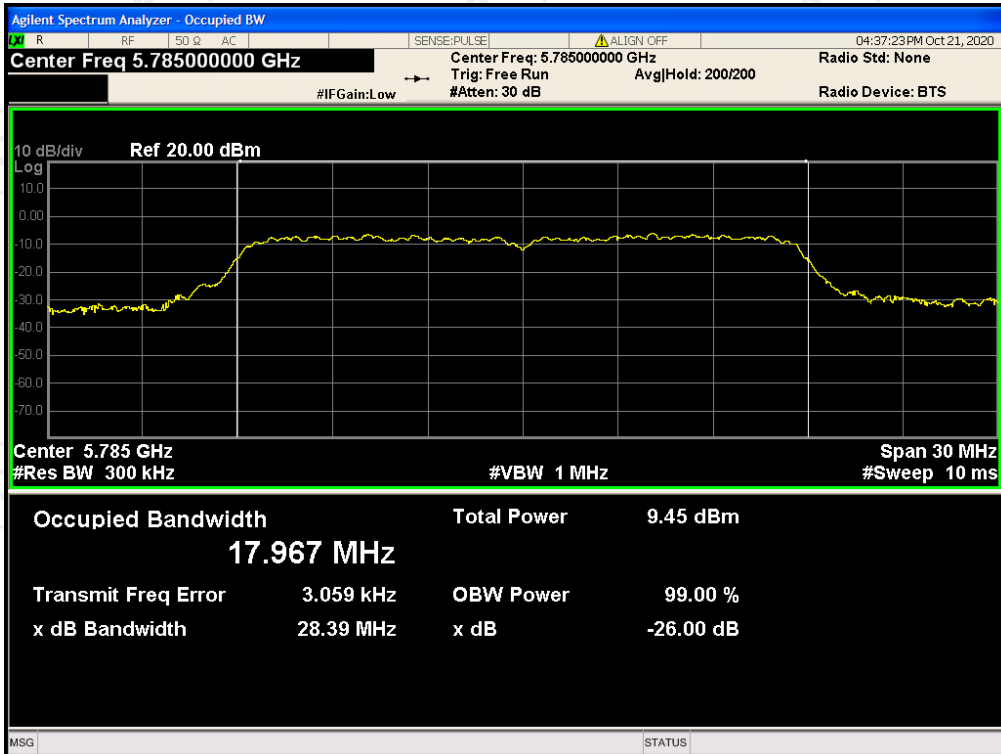
OBW NVNT 802.11a 5825MHz ANT0



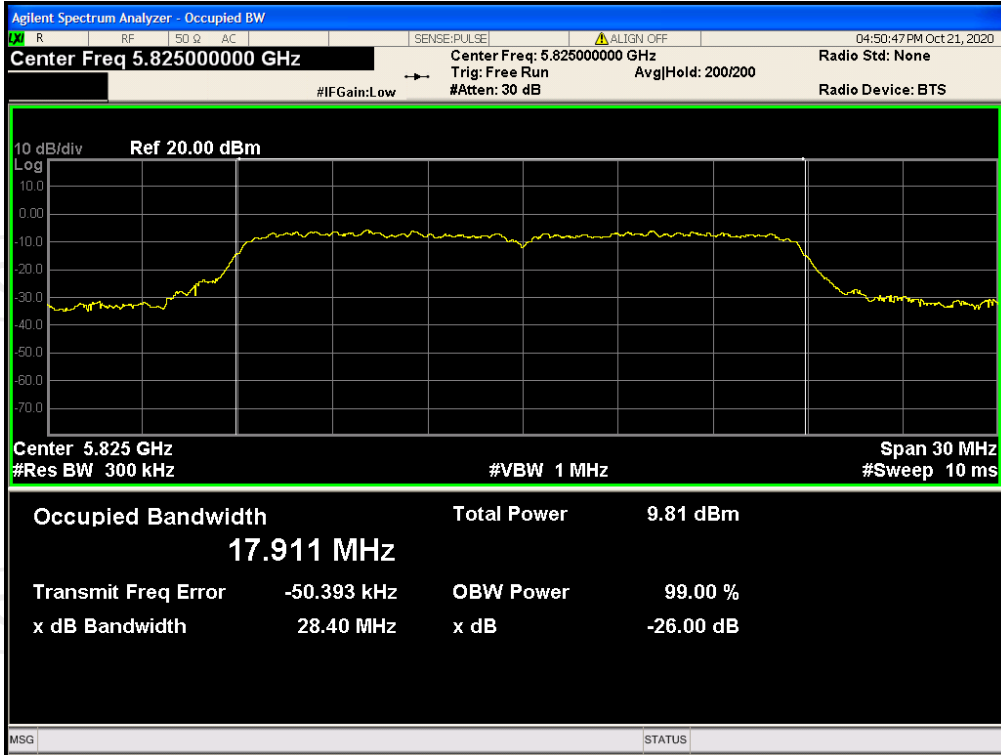
OBW NVNT 802.11ac20 5745MHz ANT0



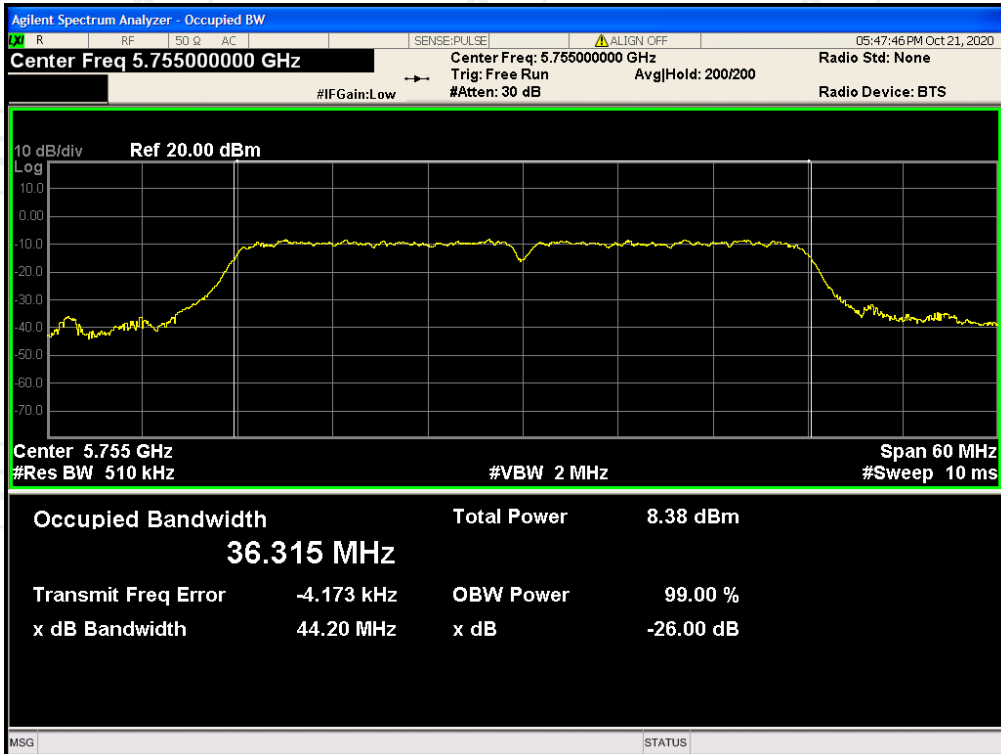
OBW NVNT 802.11ac20 5785MHz ANT0



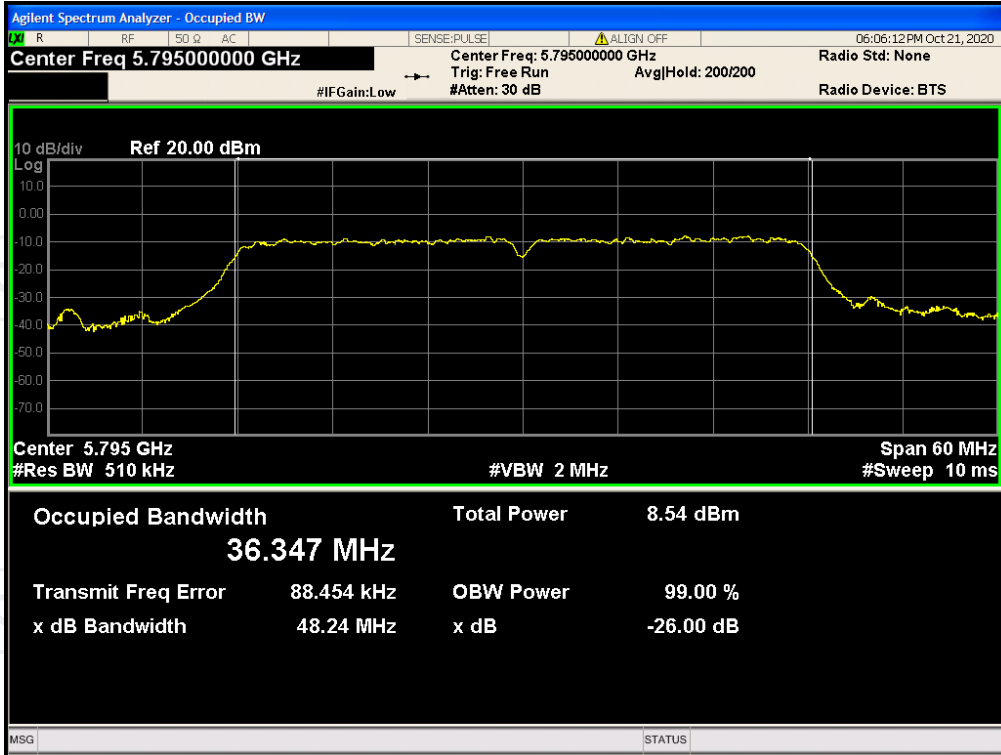
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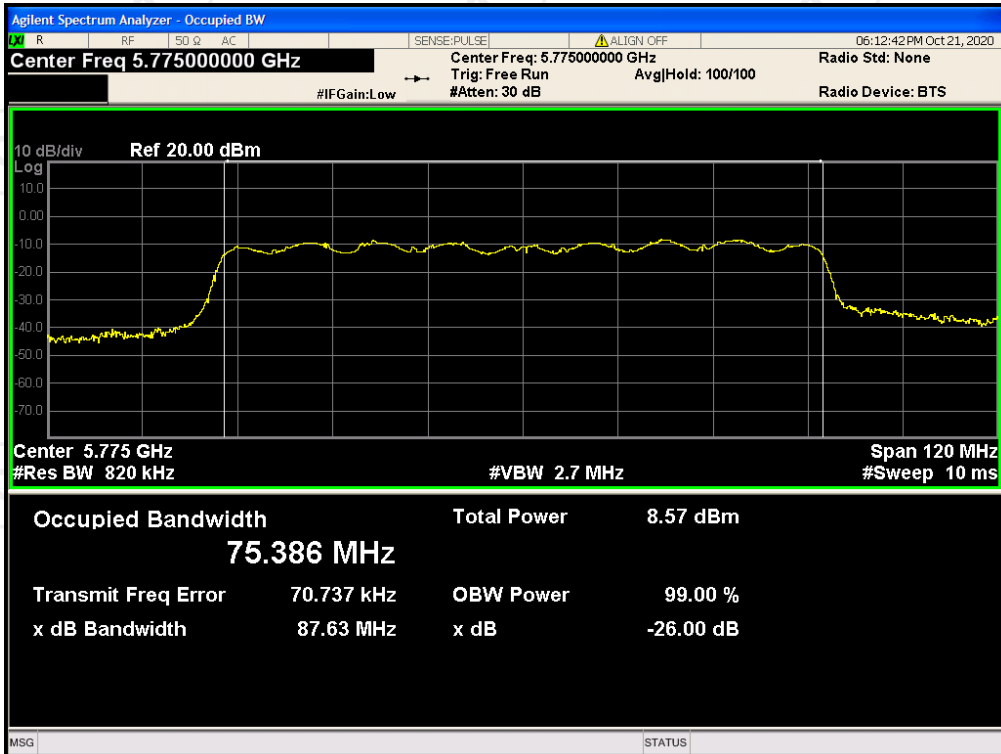
OBW NVNT 802.11ac40 5755MHz ANT0



OBW NVNT 802.11ac40 5795MHz ANT0

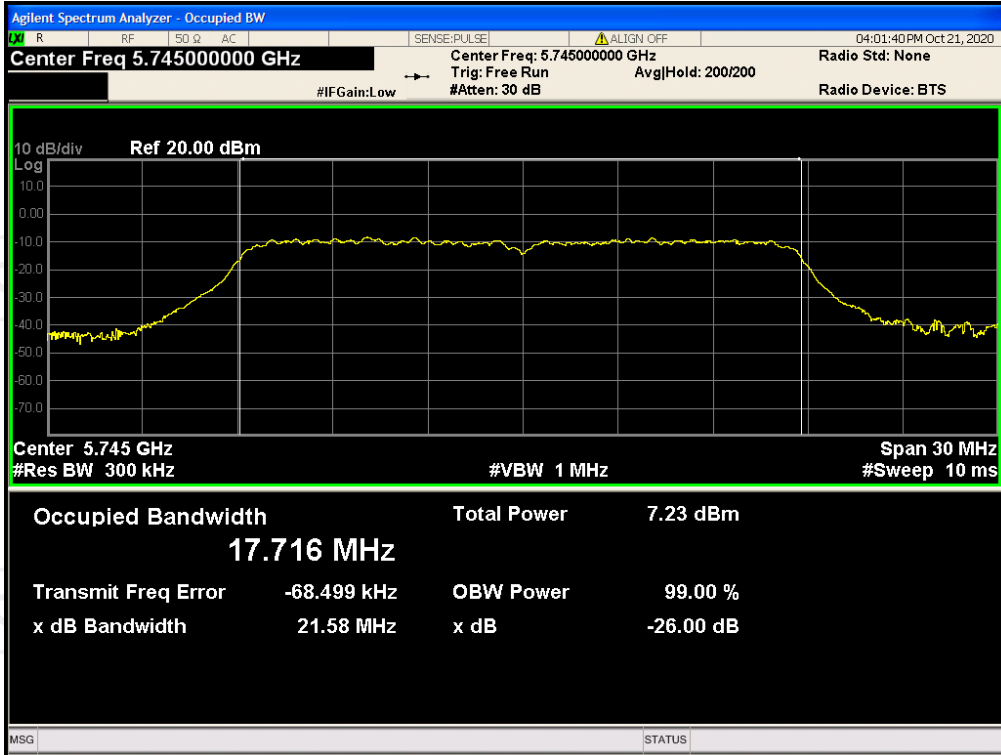


OBW NVNT 802.11ac80 5775MHz ANT0

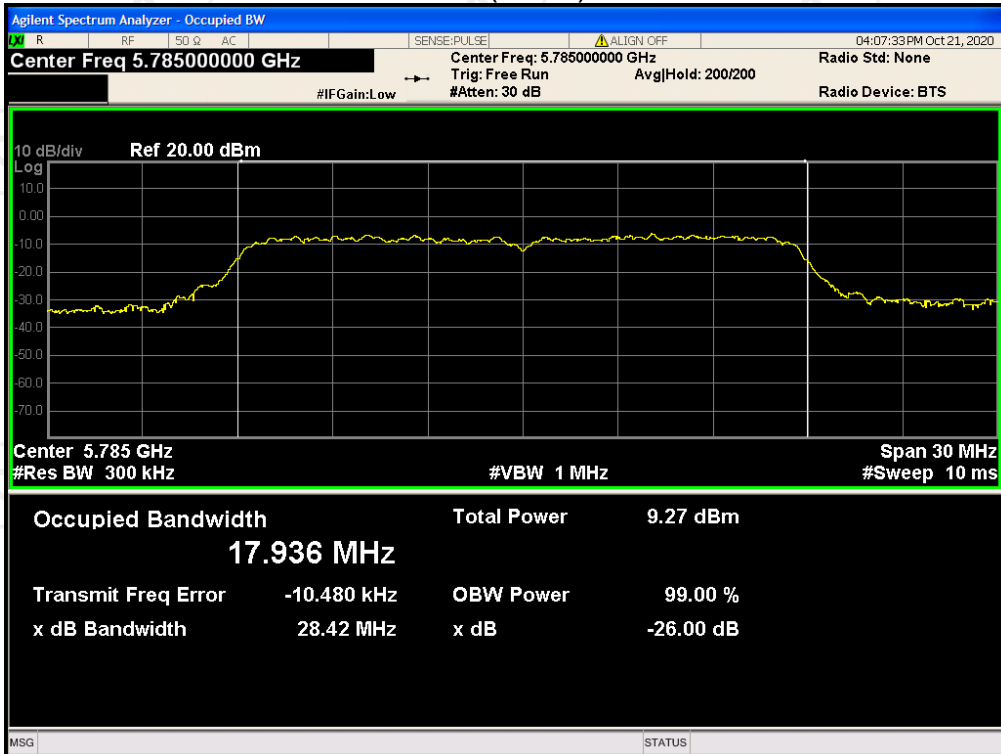


OBW NVNT 802.11n(HT20) 5745MHz ANT0

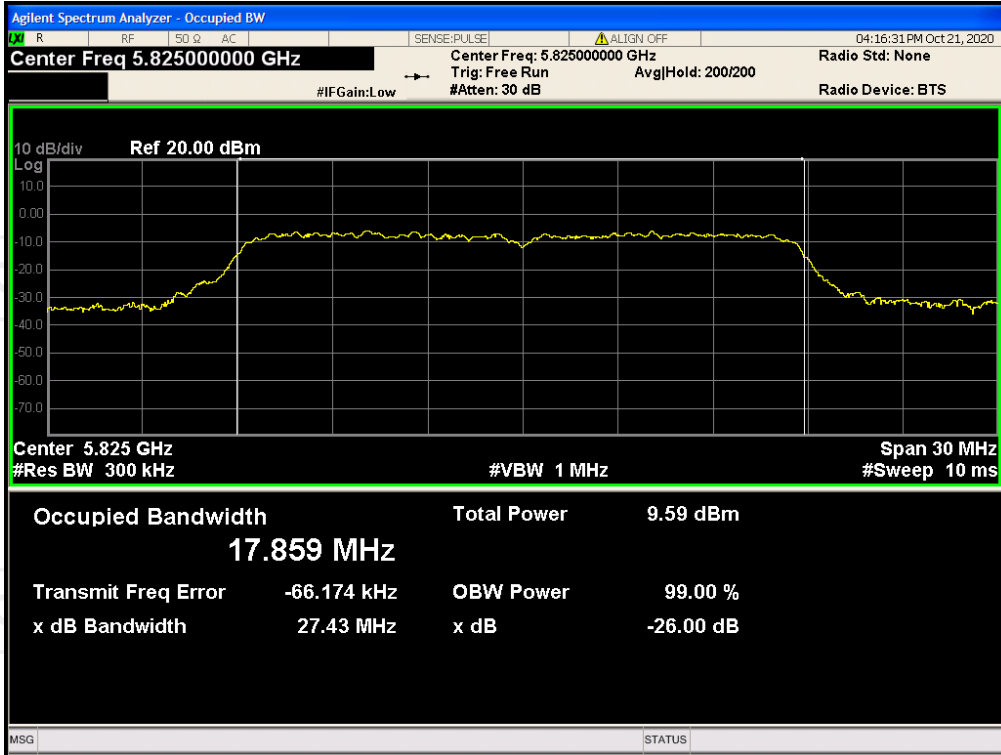




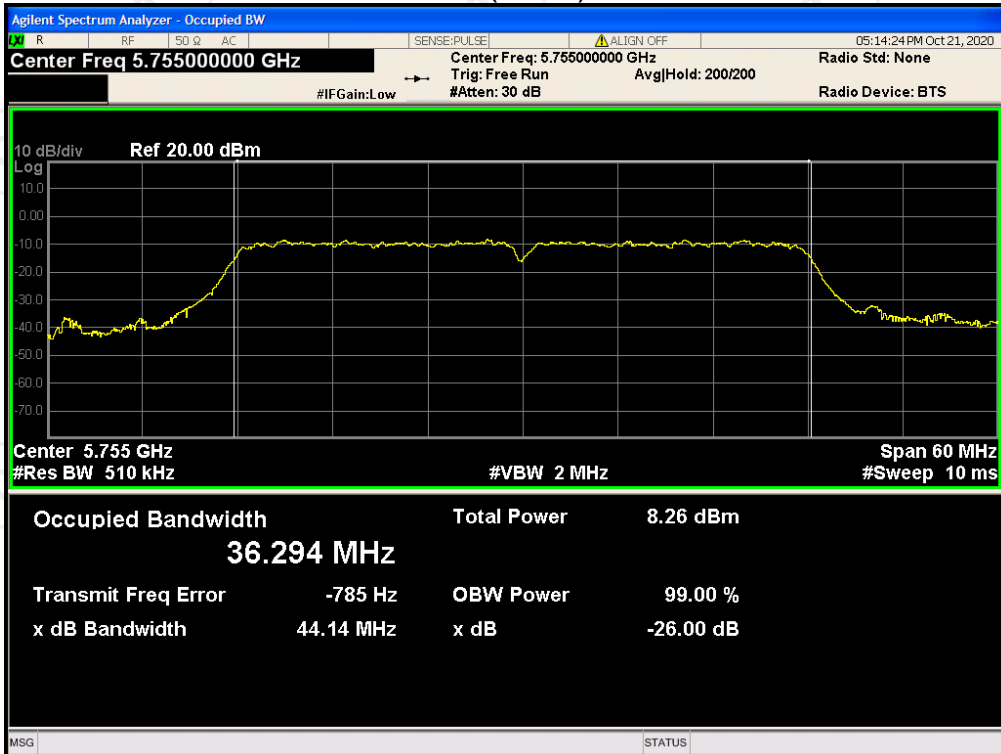
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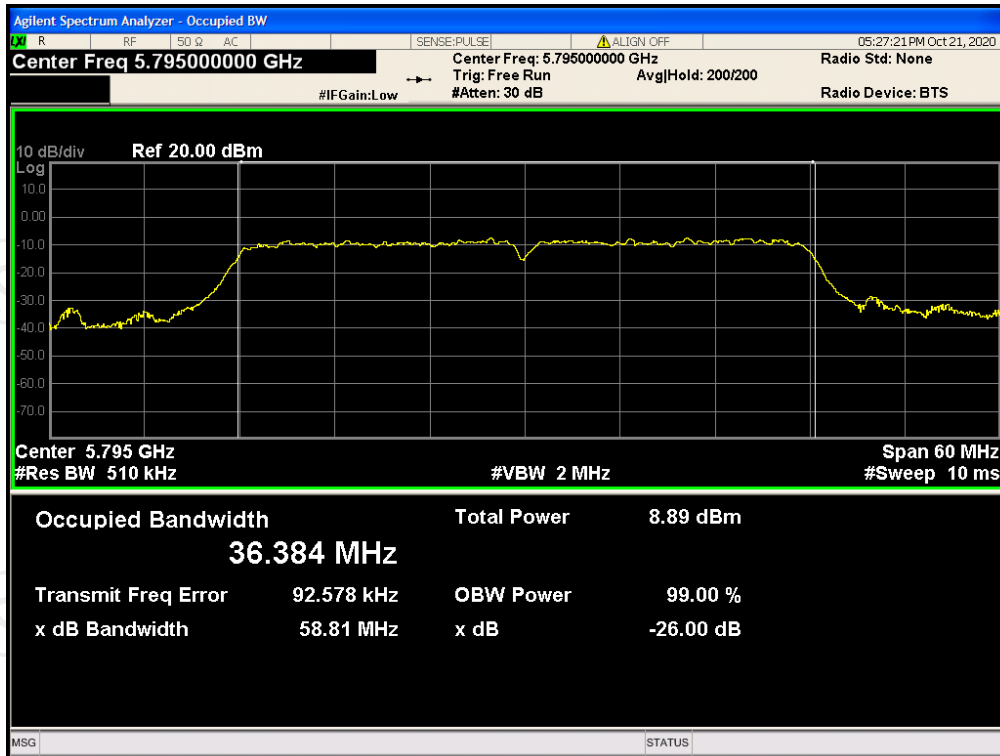
OBW NVNT 802.11n(HT20) 5825MHz ANT0



OBW NVNT 802.11n(HT40) 5755MHz ANT0



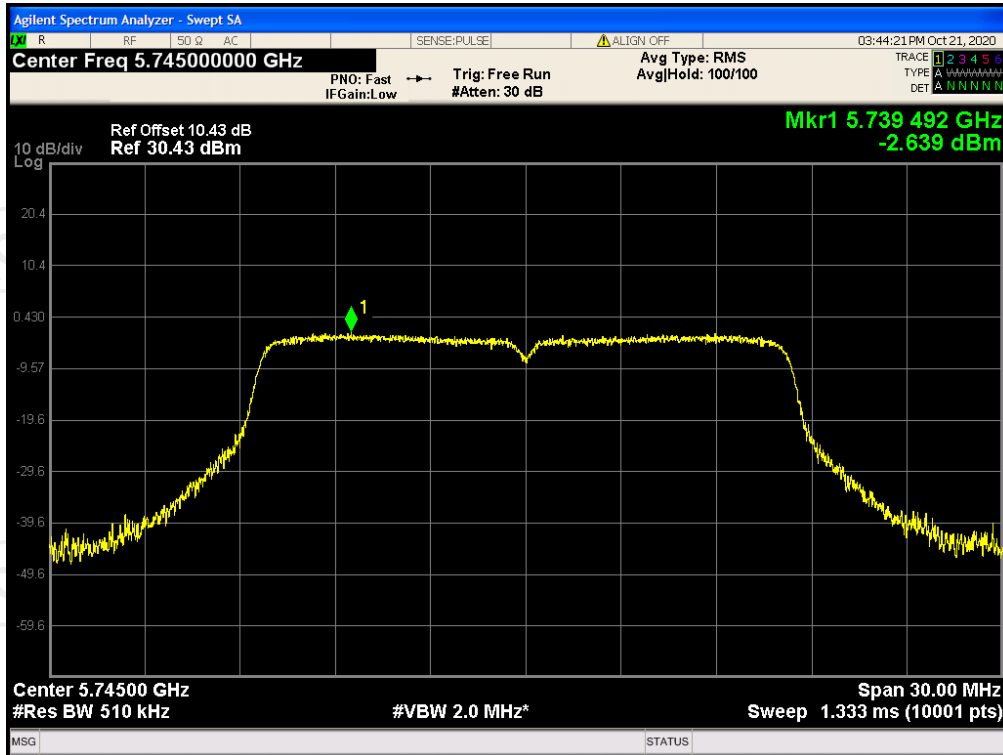
OBW NVNT 802.11n(HT40) 5795MHz ANT0



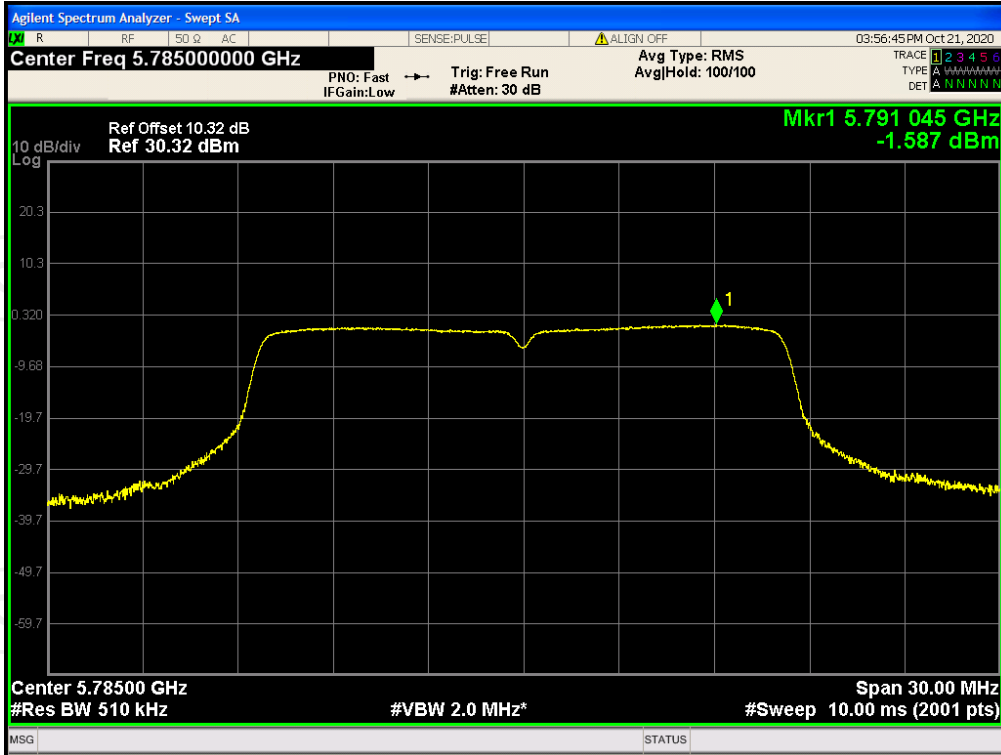
**Maximum Power Spectral Density Level**

Mode	Frequency (MHz)	Max PSD (dBm/510KHz)	Max PSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
802.11a	5745	-2.639	-2.725	30	Pass
802.11a	5785	-1.587	-1.673	30	Pass
802.11a	5825	-1.822	-1.908	30	Pass
802.11ac20	5745	-2.931	-3.017	30	Pass
802.11ac20	5785	-0.833	-0.919	30	Pass
802.11ac20	5825	-0.955	-1.041	30	Pass
802.11ac40	5755	-5.224	-5.310	30	Pass
802.11ac40	5795	-4.840	-4.926	30	Pass
802.11ac80	5775	-7.330	-7.416	30	Pass
802.11n(HT20)	5745	-3.141	-3.227	30	Pass
802.11n(HT20)	5785	-1.087	-1.173	30	Pass
802.11n(HT20)	5825	-0.961	-1.047	30	Pass
802.11n(HT40)	5755	-5.648	-5.734	30	Pass
802.11n(HT40)	5795	-4.301	-4.387	30	Pass

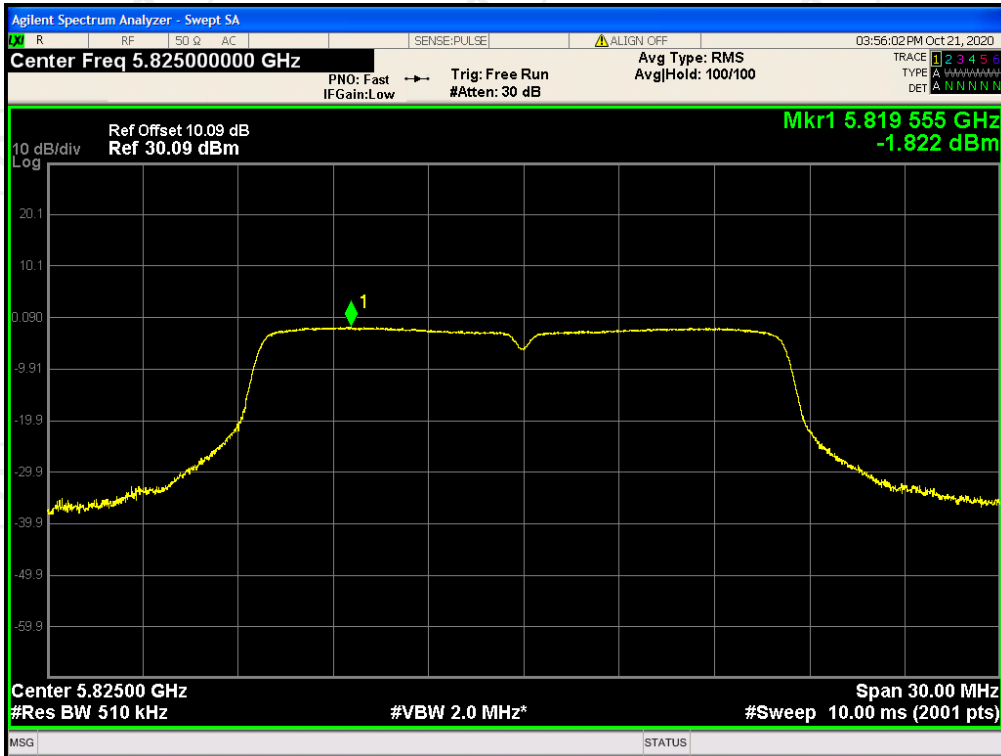
PSD NVNT 802.11a 5745MHz ANT0



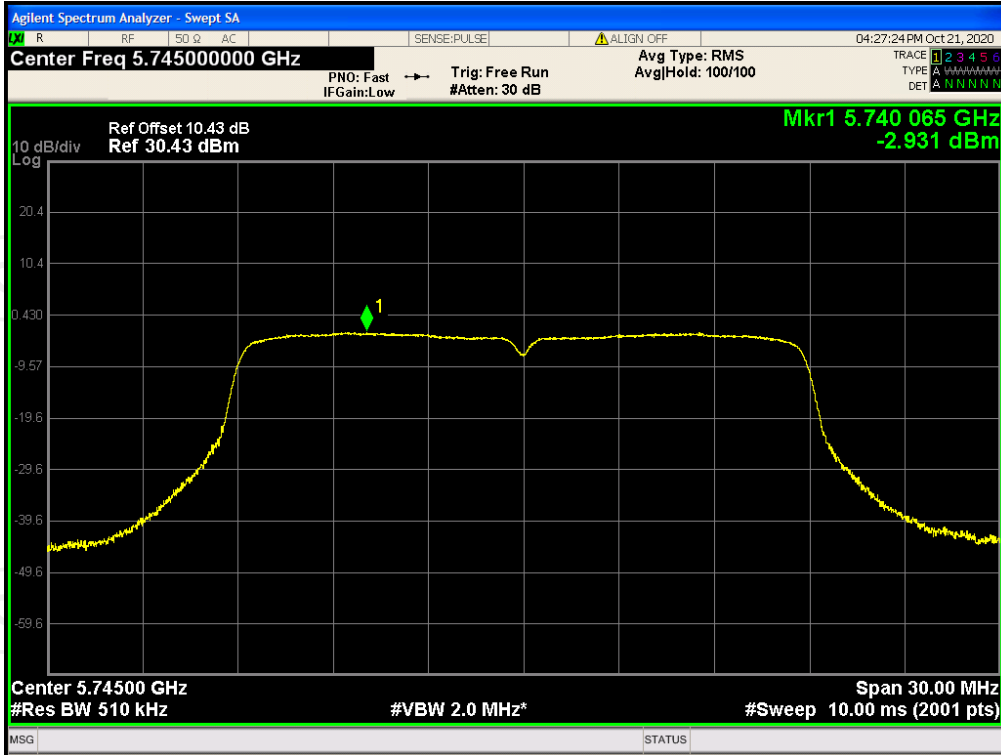
PSD NVNT 802.11a 5785MHz ANT0



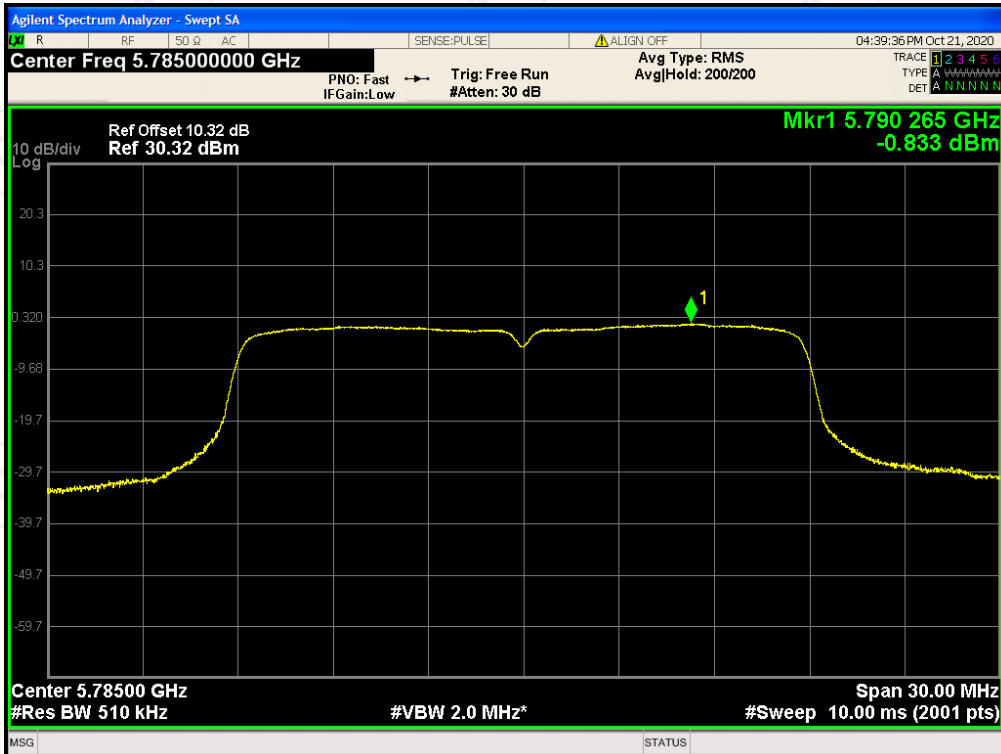
PSD NVNT 802.11a 5825MHz ANT0



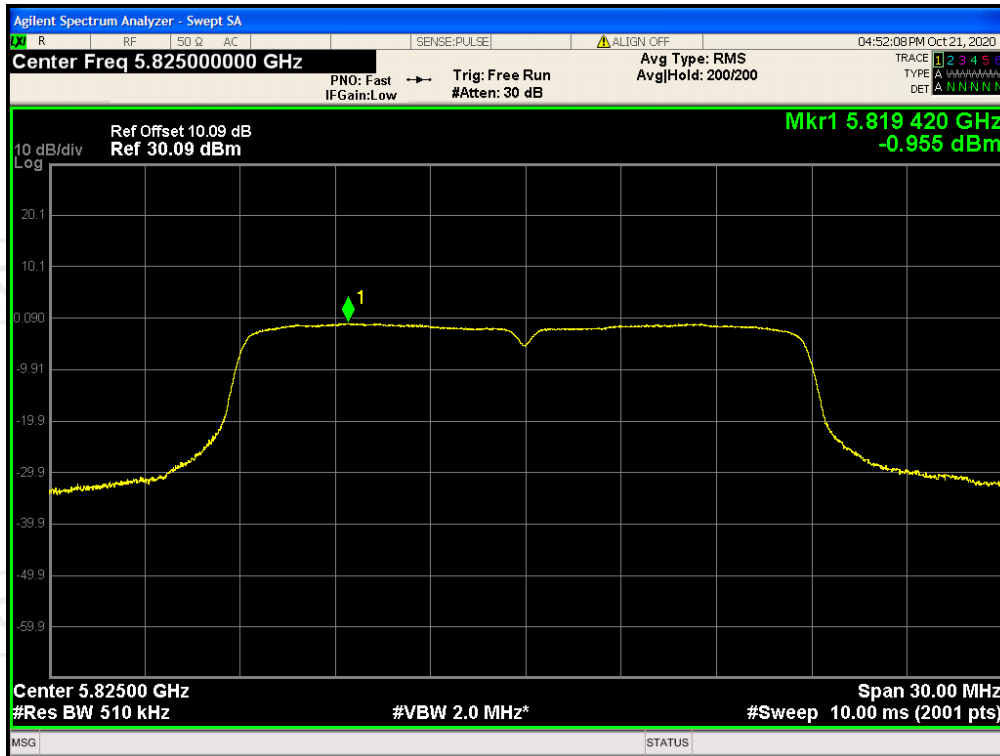
PSD NVNT 802.11ac20 5745MHz ANT0



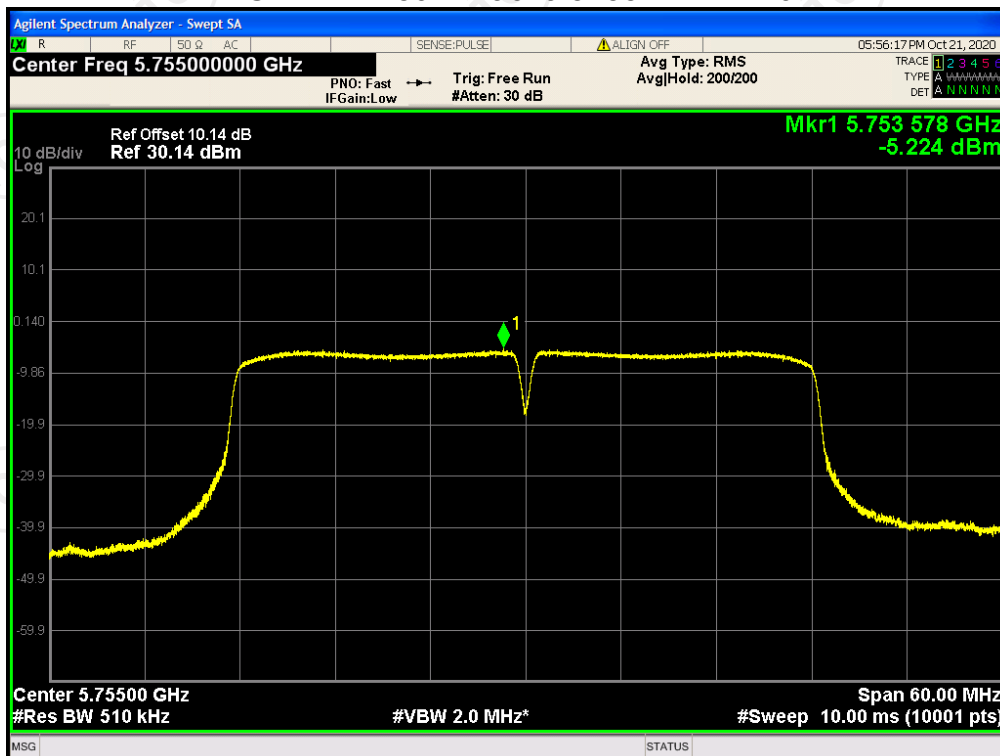
PSD NVNT 802.11ac20 5785MHz ANT0



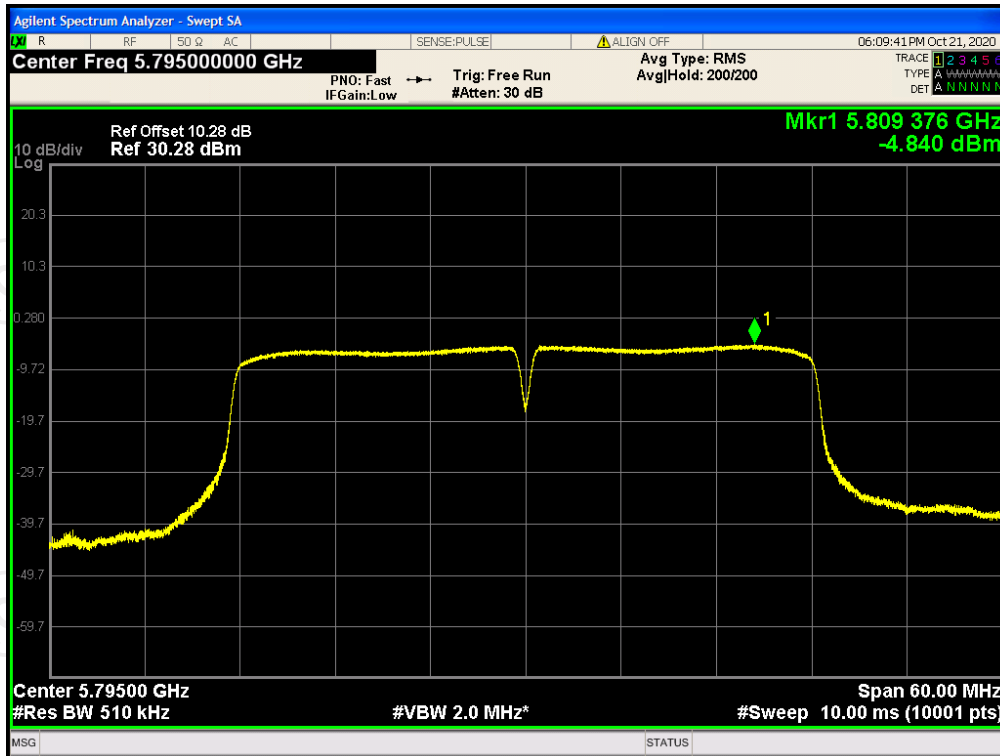
PSD NVNT 802.11ac20 5825MHz ANT0



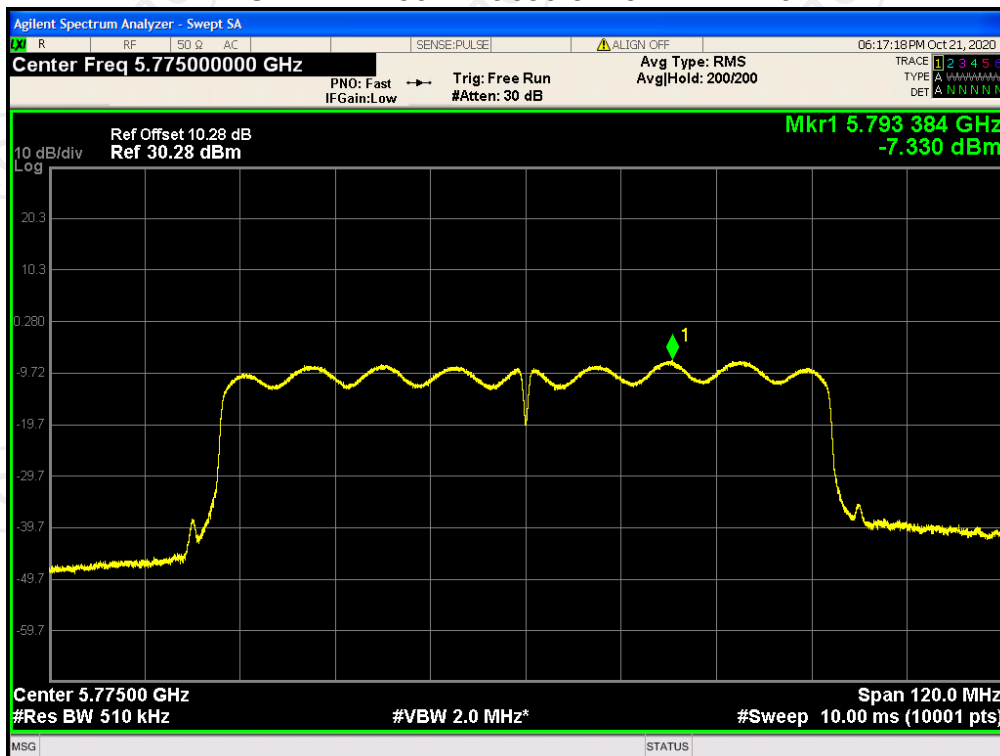
PSD NVNT 802.11ac40 5755MHz ANT0



PSD NVNT 802.11ac40 5795MHz ANT0

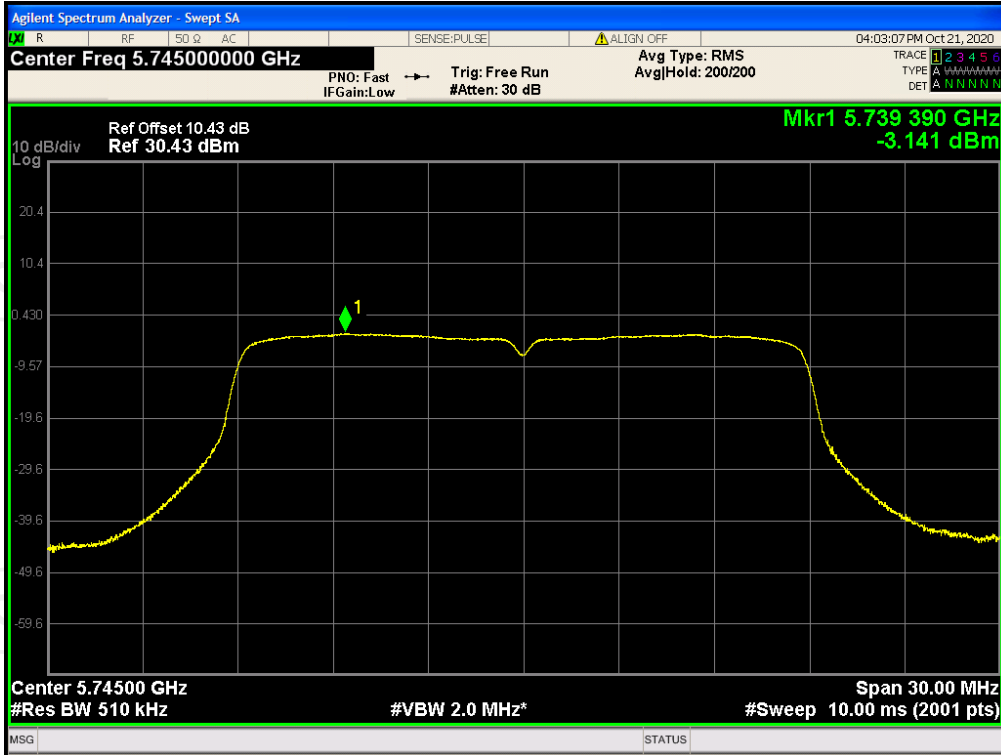


PSD NVNT 802.11ac80 5775MHz ANT0

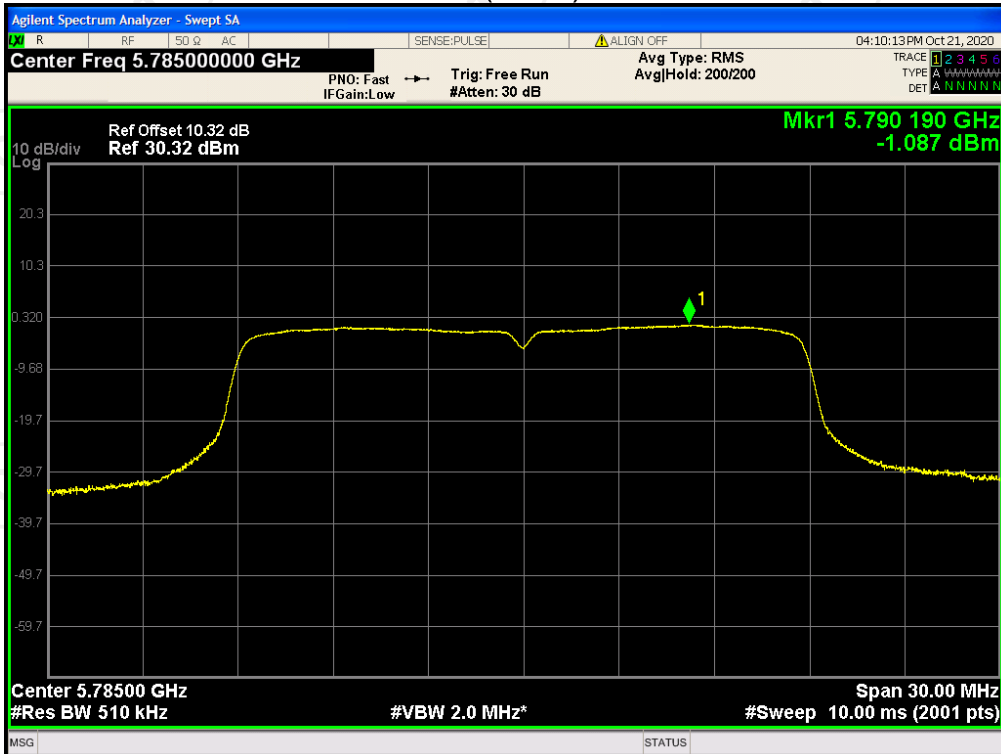


PSD NVNT 802.11n(HT20) 5745MHz ANT0

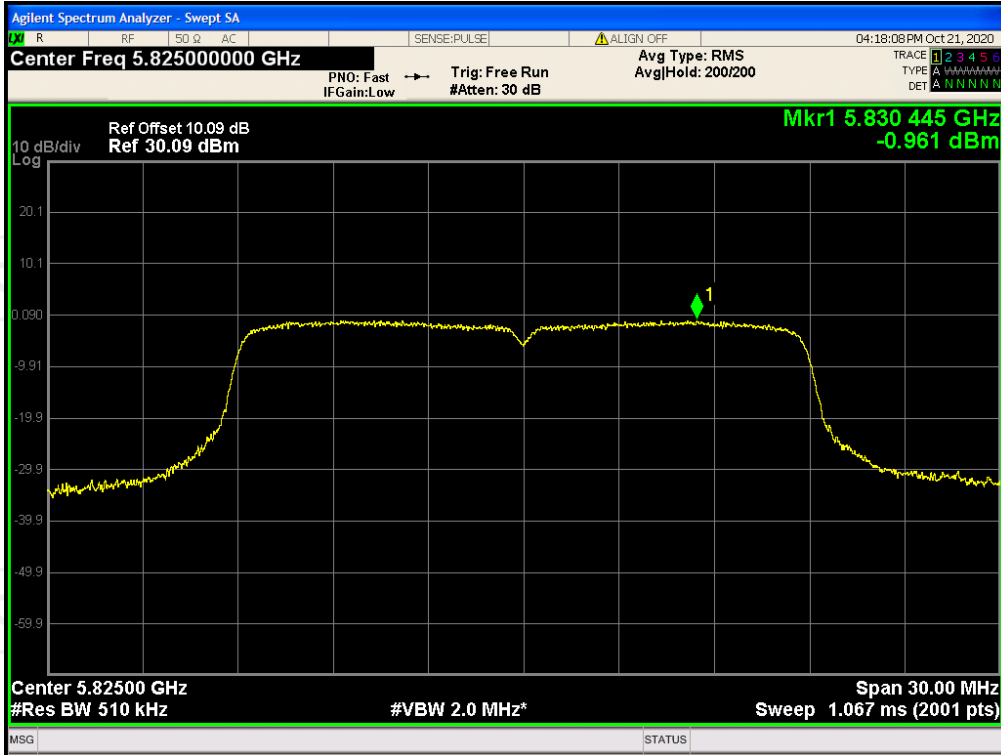




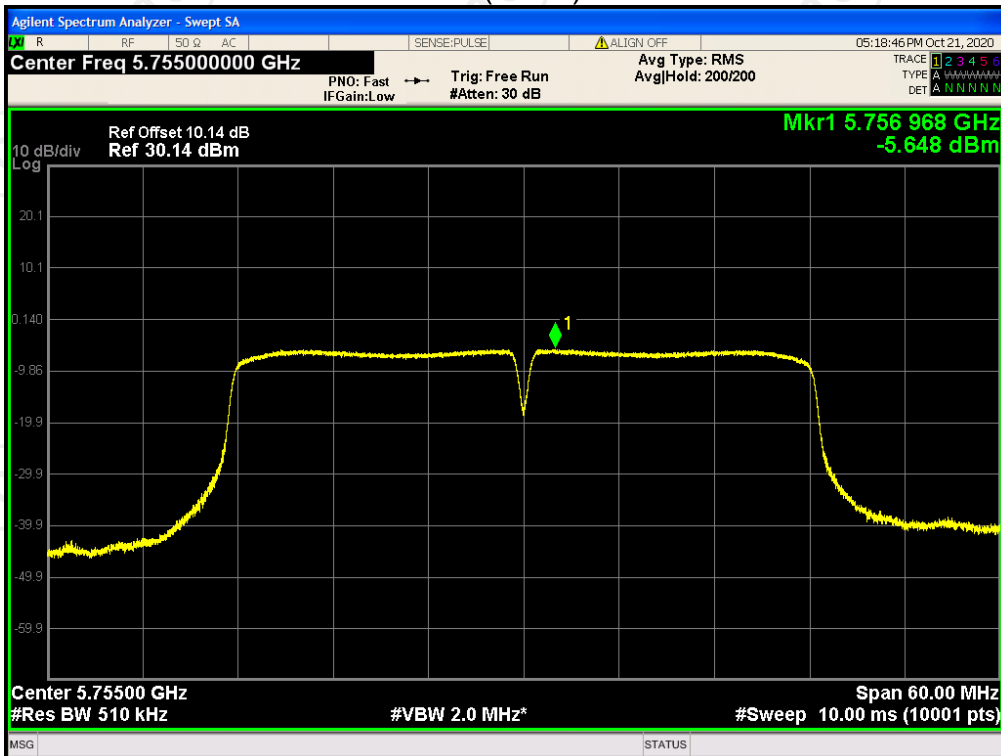
PSD NVNT 802.11n(HT20) 5785MHz ANT0



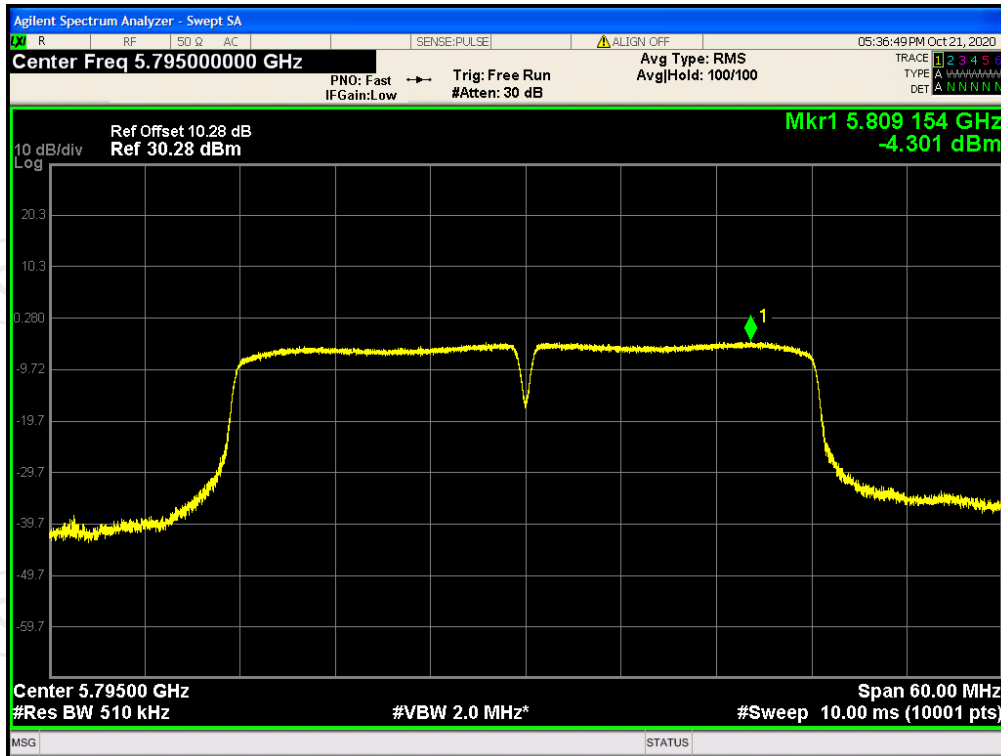
PSD NVNT 802.11n(HT20) 5825MHz ANT0



PSD NVNT 802.11n(HT40) 5755MHz ANT0



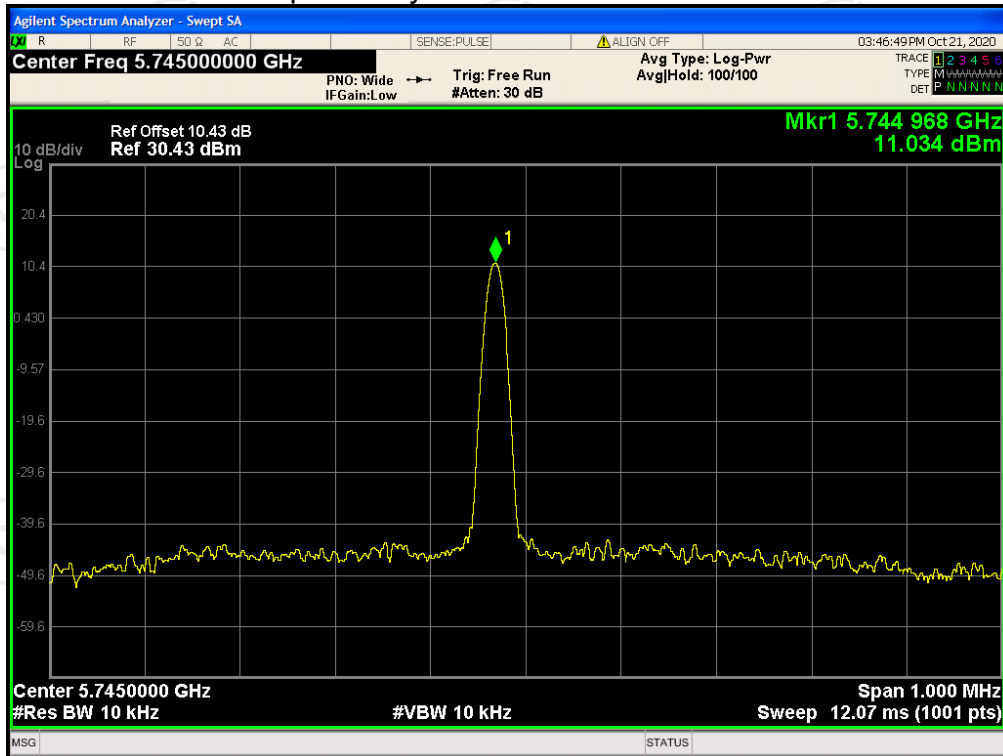
PSD NVNT 802.11n(HT40) 5795MHz ANT0



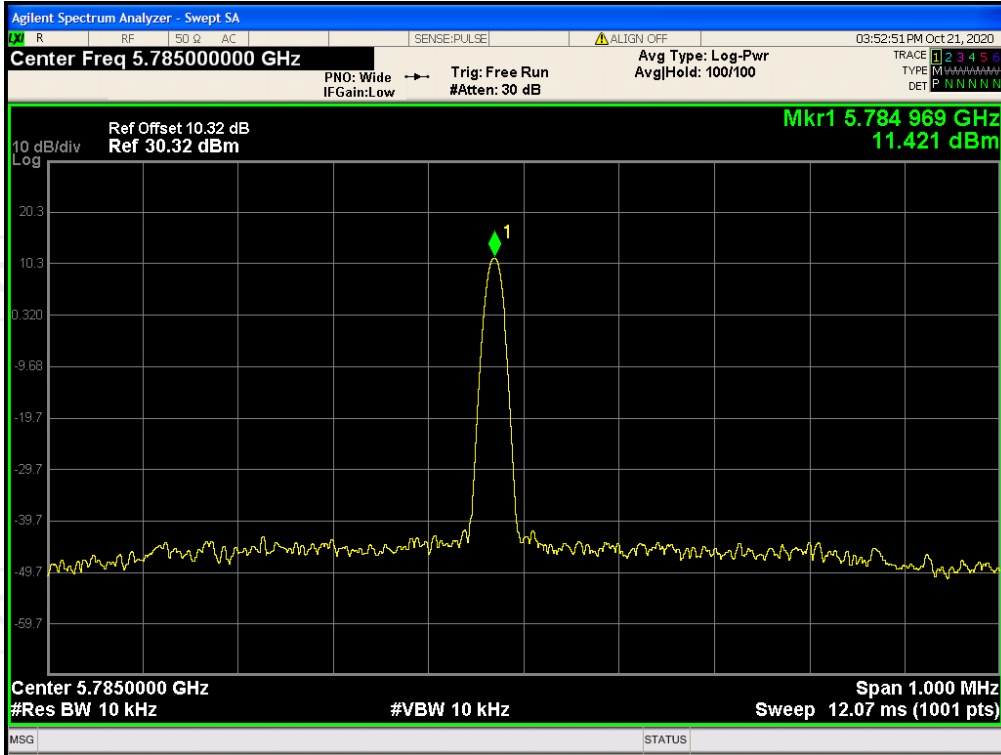
### Frequency Stability

Condition	Mode	Frequency (MHz)	Measured Frequency (MHz)	Deviation (ppm)	Limit (ppm)	Verdict
NVNT	802.11a	5745	5744.968	-5.57	25	Pass
NVNT	802.11a	5785	5784.969	-5.36	25	Pass
NVNT	802.11a	5825	5824.968	-5.49	25	Pass
NVNT	802.11ac20	5745	5744.969	-5.40	25	Pass
NVNT	802.11ac20	5785	5784.969	-5.36	25	Pass
NVNT	802.11ac20	5825	5824.969	-5.32	25	Pass
NVNT	802.11ac40	5755	5754.974	-4.52	25	Pass
NVNT	802.11ac40	5795	5794.972	-4.83	25	Pass
NVNT	802.11ac80	5775	5774.971	-5.02	25	Pass
NVNT	802.11n(HT20)	5745	5744.968	-5.57	25	Pass
NVNT	802.11n(HT20)	5785	5784.968	-5.53	25	Pass
NVNT	802.11n(HT20)	5825	5824.968	-5.49	25	Pass
NVNT	802.11n(HT40)	5755	5754.970	-5.21	25	Pass
NVNT	802.11n(HT40)	5795	5794.970	-5.18	25	Pass

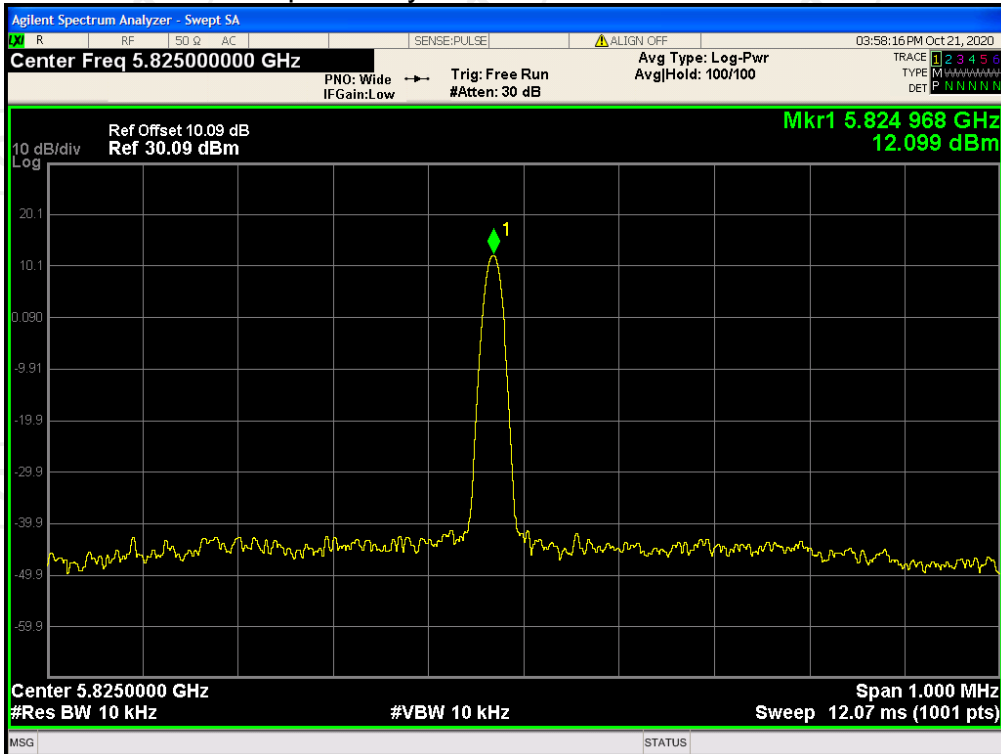
Freq. Stability NVNT 802.11a 5745MHz



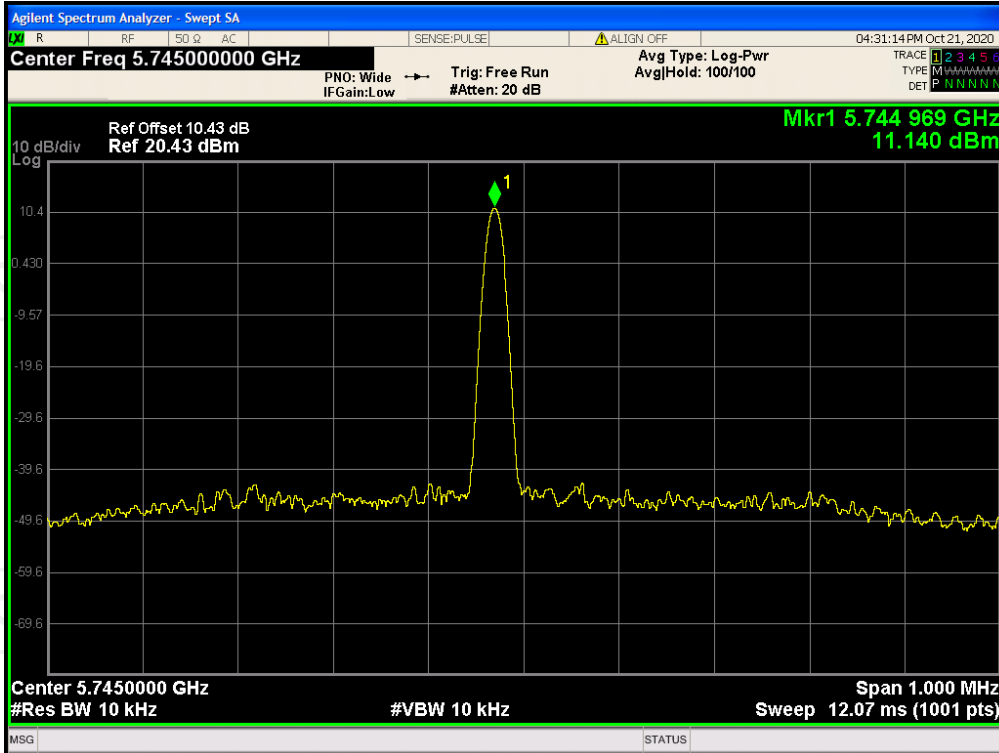
Freq. Stability NVNT 802.11a 5785MHz



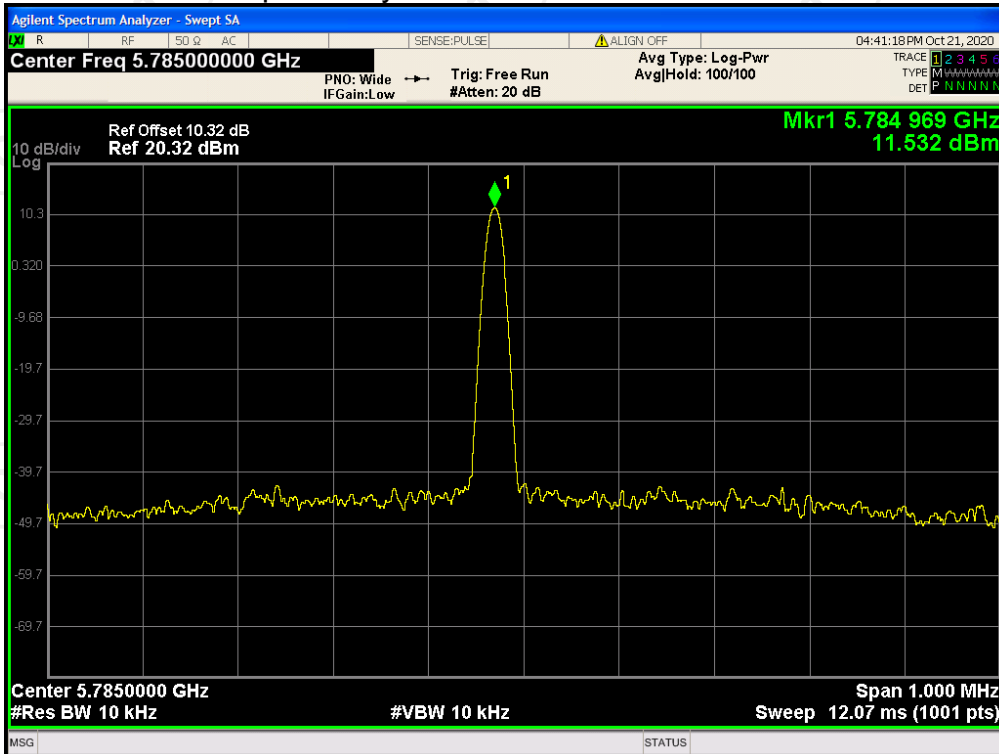
Freq. Stability NVNT 802.11a 5825MHz



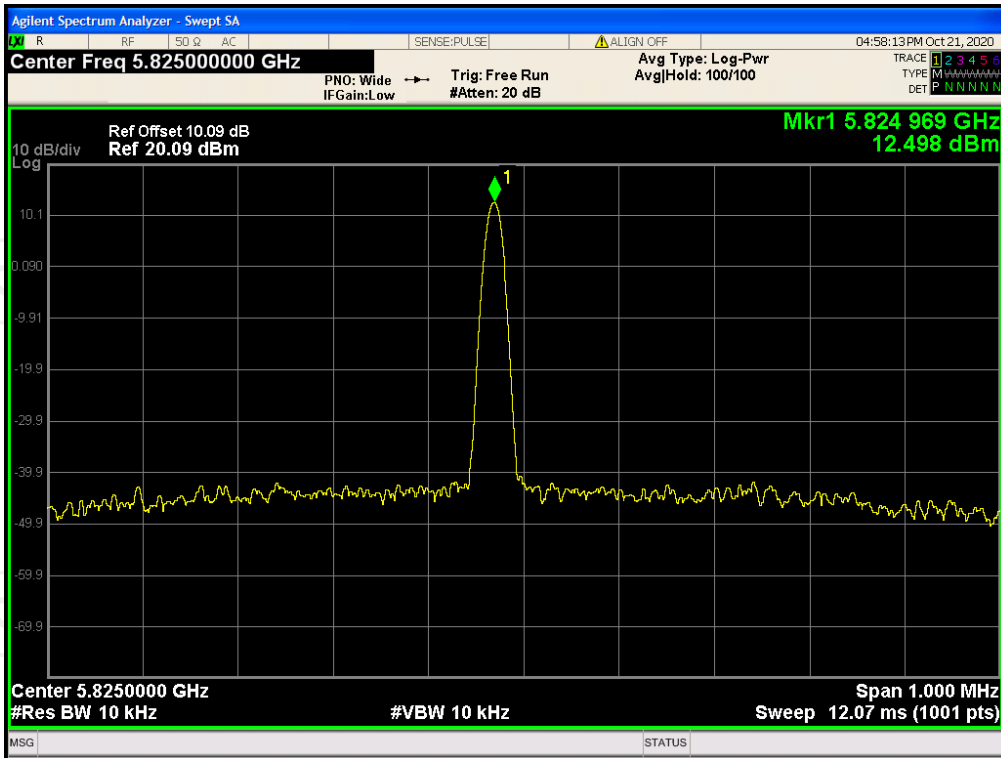
Freq. Stability NVNT 802.11ac20 5745MHz



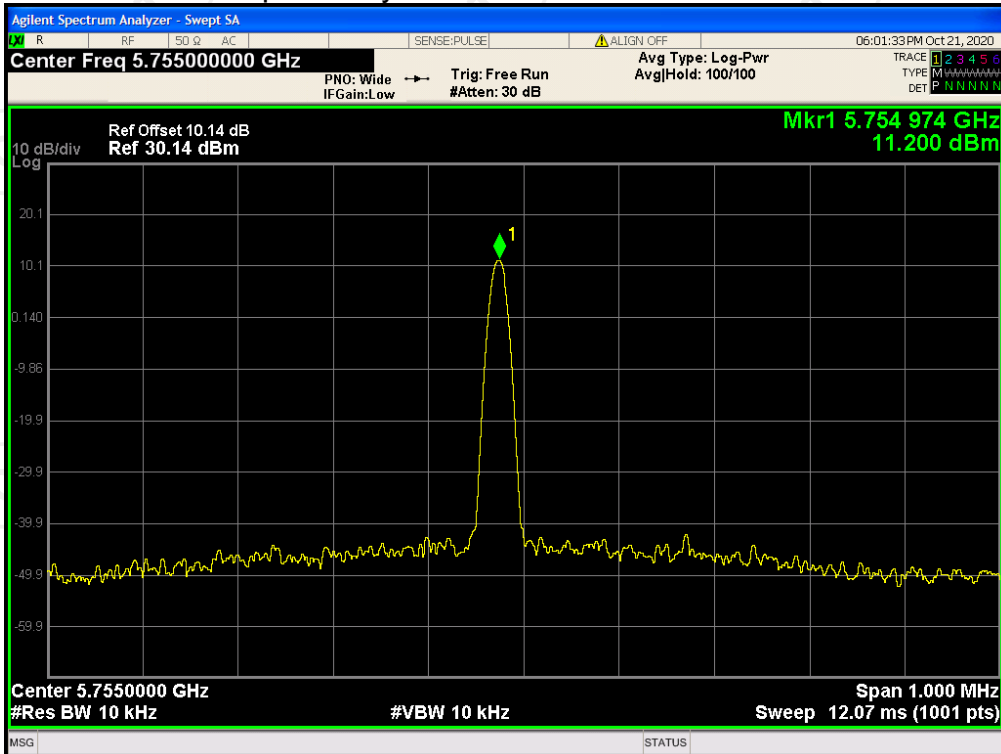
Freq. Stability NVNT 802.11ac20 5785MHz



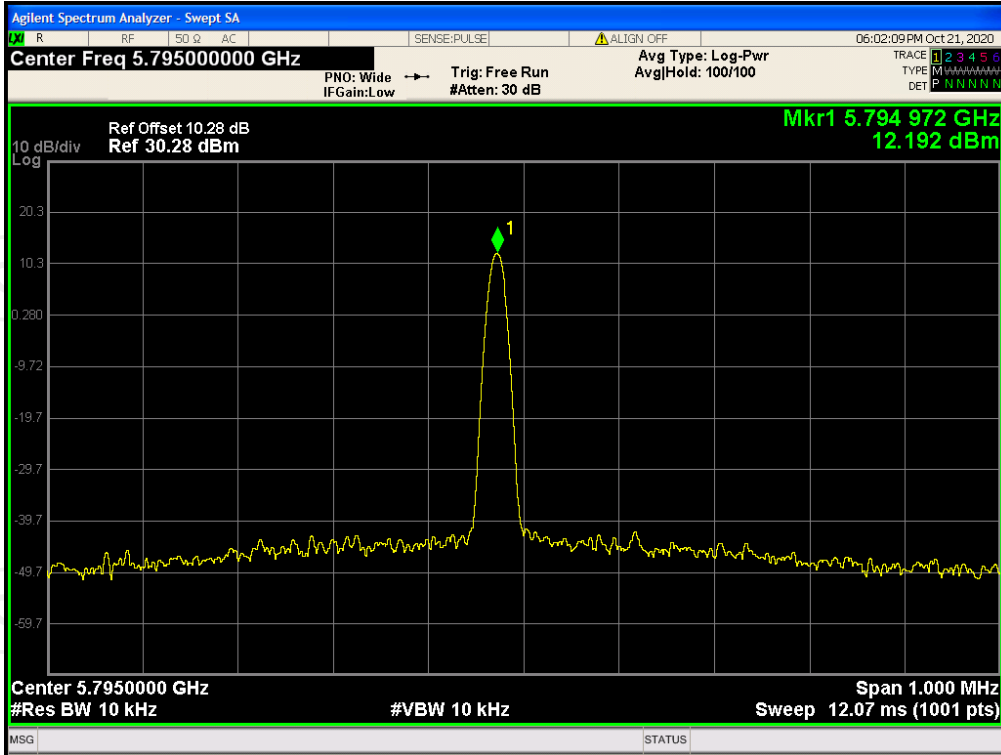
Freq. Stability NVNT 802.11ac20 5825MHz



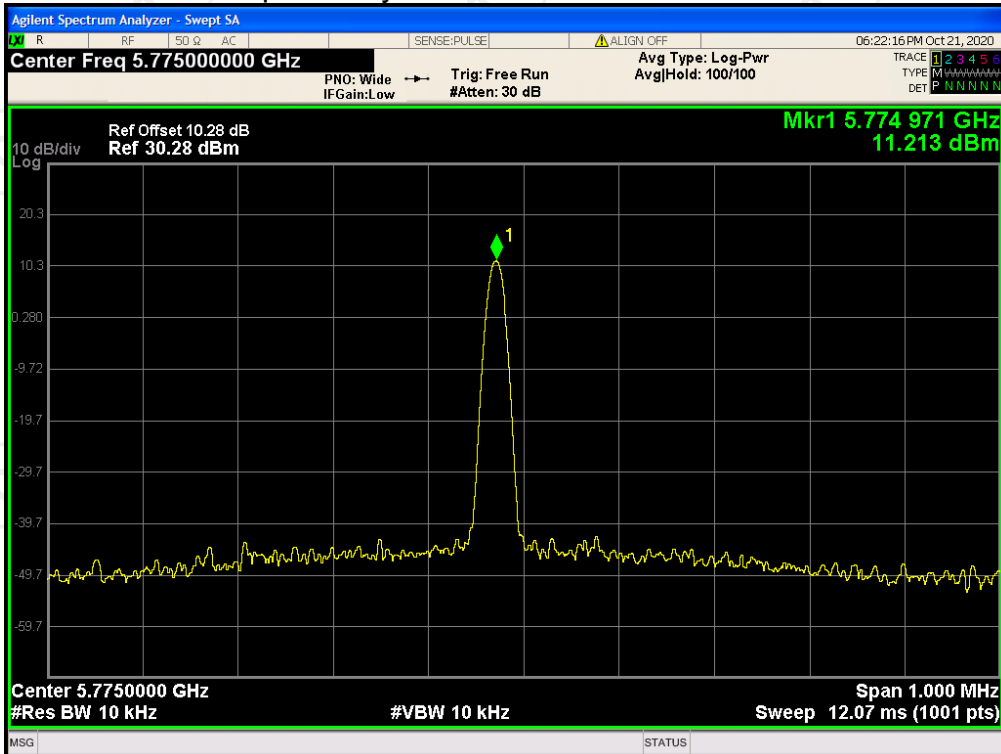
Freq. Stability NVNT 802.11ac40 5755MHz



Freq. Stability NVNT 802.11ac40 5795MHz

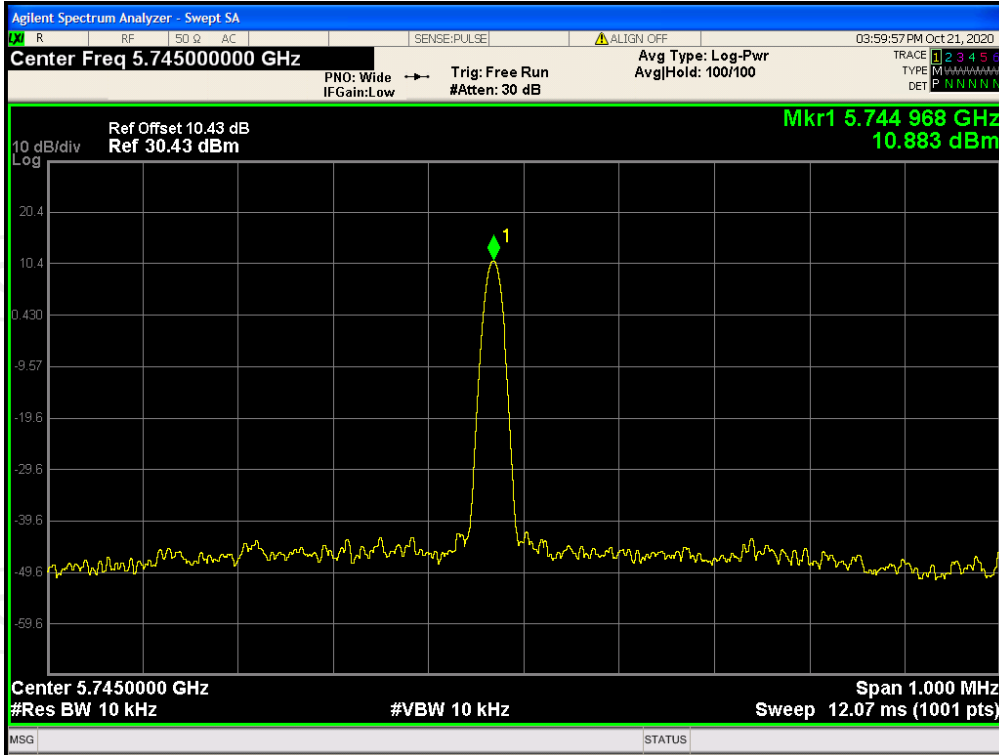


Freq. Stability NVNT 802.11ac80 5775MHz

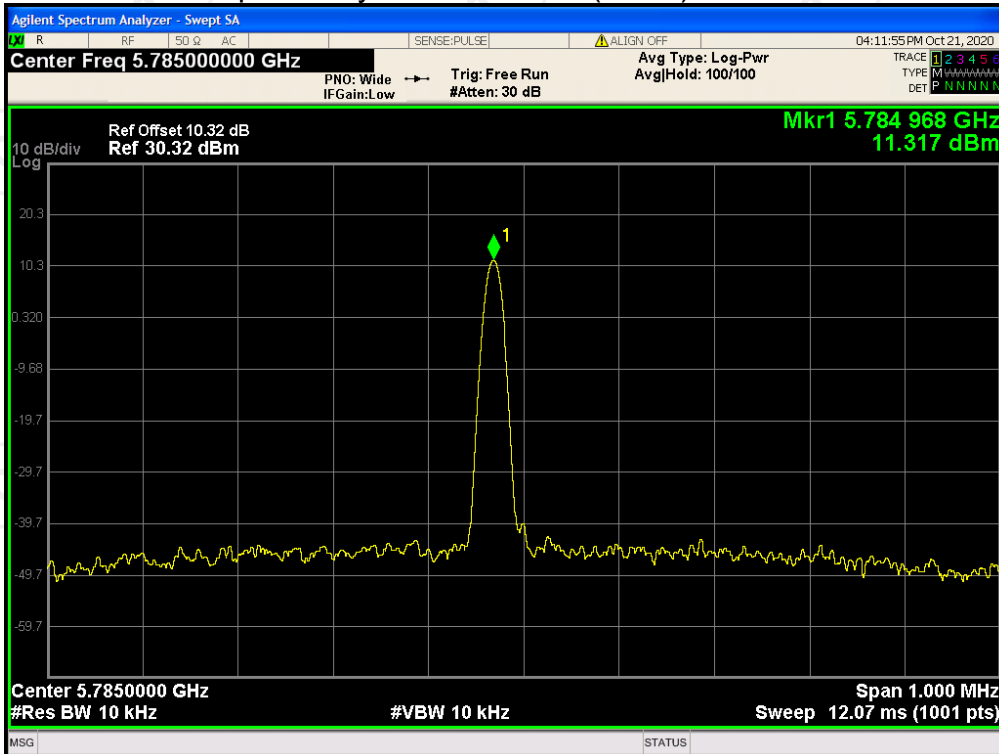


Freq. Stability NVNT 802.11n(HT20) 5745MHz

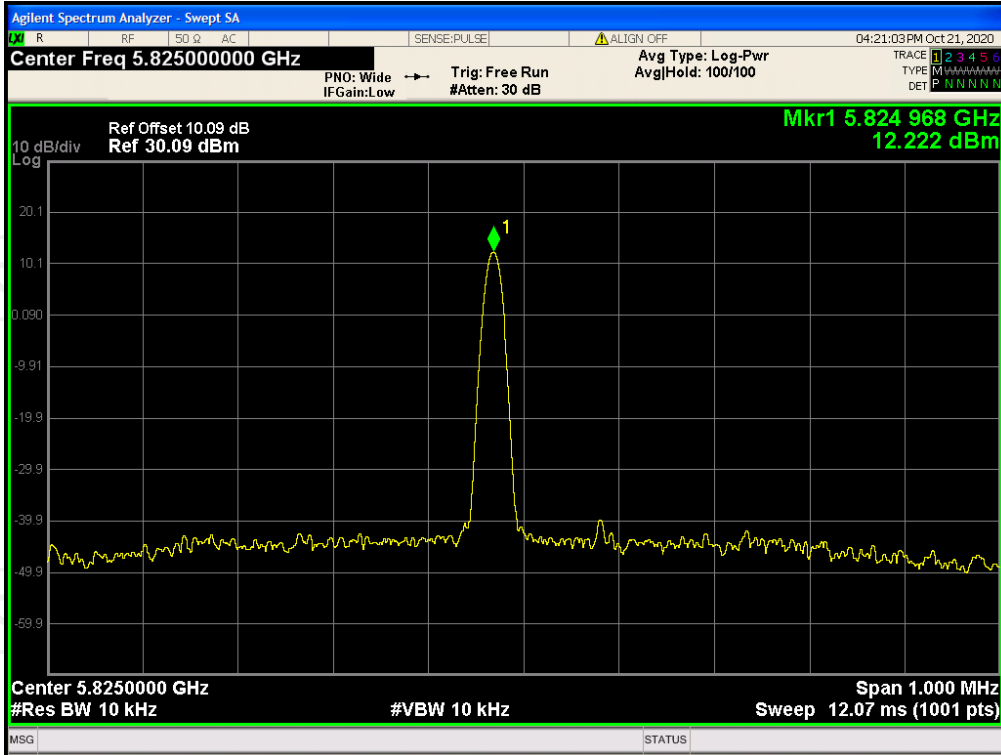




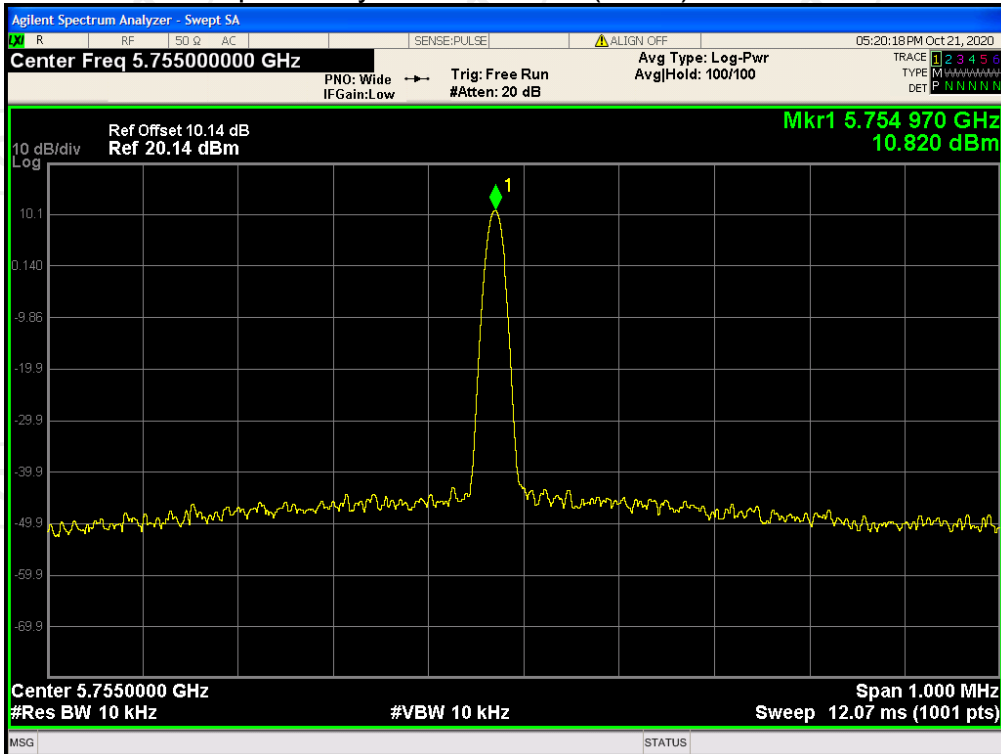
Freq. Stability NVNT 802.11n(HT20) 5785MHz



Freq. Stability NVNT 802.11n(HT20) 5825MHz



Freq. Stability NVNT 802.11n(HT40) 5755MHz



Freq. Stability NVNT 802.11n(HT40) 5795MHz