

TEST REPORT

of

FCC PART 15 SUBPART E

☒ New Application; ☐ Class I PC; ☐ Class II PC

Product : Digital Signage / POS System
Brand: Zunidata
Model: 7NX-RM; 7FX-RM; 7XXX-XXX (X=0~9 or A-Z or Blank or -)
Model Difference: Metal and plastic case. with, and without POE
FCC ID: Z28-7N-7F-RM
FCC Rule Part: §15.407, Cat:NII
Applicant: Zunidata Systems, Inc.
Address: 6F, No. 945, Boai Street, Jubei City, Hsinchu, Taiwan 302

Test Performed by:

International Standards Laboratory Corp.

<LT Lab.>

*Site Registration No.

BSMI: SL2-IN-E-0013; MRA TW0997; TAF: 0997; IC: IC4067B-4;

*Address:

No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist., Tao Yuan City 325, Taiwan

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Report No.: **ISL-20LR343FE**

Issue Date : **2020/11/12**



Test results given in this report apply only to the specific sample(s) tested and are traceable to national or international standard through calibration of the equipment and evaluating measurement uncertainty herein.

The uncertainty of the measurement does not include in consideration of the test result unless the customer required the determination of uncertainty via the agreement, regulation or standard document specification.

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VERIFICATION OF COMPLIANCE

Applicant: Zunidata Systems, Inc.
Product Description: Digital Signage / POS System
Brand Name: Zunidata
Model No.: 7NX-RM; 7FX-RM; 7XXX-XXX (X=0~9 or A-Z or Blank or -)
Model Difference: Metal and plastic case. with, and without POE
FCC ID: Z28-7N-7F-RM
Date of test: 2020/10/15 ~ 2020/11/11
Date of EUT Received: 2020/10/15

We hereby certify that:

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory Corp.

The test results contained in this report accurately represent the measurements of the characteristics and the energy generated by sample equipment under test at the time of the test. The sample equipment tested as described in this report is in compliance with the limits of above standards.

Test By:

Weitin Chen

Date:

2020/11/12

Weitin Chen / Senior Engineer

Prepared By:

Gigi yeh

Date:

2020/11/12

Gigi Yeh / Senior Engineer

Approved By:

Jerry Liu

Date:

2020/11/12

Jerry Liu / Technical Manager

Version

Version No.	Date	Description
00	2020/11/12	Initial creation of document

Uncertainty of Measurement

Description Of Test	Uncertainty
Conducted Emission (AC power line)	2.586 dB
Field Strength of Spurious Radiation	$\leq 30\text{MHz}$: 2.96dB 30-1GHz: 4.22 dB 1-40 GHz: 4.08 dB
Conducted Power	2.412 GHz: 1.30 dB 5.805 GHz: 1.55 dB
Power Density	2.412 GHz: 1.30 dB 5.805 GHz: 1.67 dB
Frequency	0.0032%
Time	0.01%
DC Voltage	1%

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1. General Information

1.1. Product Description

General:

Product Name	Digital Signage / POS System	
Brand Name	Zunidata	
Model Name	7NX-RM; 7FX-RM; 7XXX-XXX (X = 0~9 or A-Z or Blank or -)	
Model Difference	Metal and plastic case. with, and without POE	
Power Supply	12Vdc by AC Adapter, Model No.: 2ABL024F US	
AC In Power Port	One provided	
USB 2.0 Port	Two provided	
COM 2 (RS232)Port	One provided	
COM 1 (RS232)Port	One provided	
Micro USB Port	One provided	
LAN Port	One provided	
Power Supply	12Vdc from AC/DC adapter	
	Adapter:	1. Model : SOY-1200200; Supplier: Shenzhen SOY Technology Co., Ltd. 2. Model : 2ABL024F US; Supplier: CWT 3. Model : 2AAJ024FC ; Supplier: CWT

WLAN

Wi-Fi	Frequency Range (MHz)	Channels	Peak / Average Rated Power	Modulation Technology	
802.11a	5150 – 5350(NII)	8	17.72dBm (AV)	OFDM	
	5470 – 5725(NII)	11	16.85dBm (AV)		
	5725 – 5850(NII)	5	16.94dBm (AV)		
802.11n	HT20 5150 – 5350(NII)	8	16.93dBm (AV)		
	HT20 5470 – 5725(NII)	11	16.93dBm (AV)		
	HT20 5725 – 5850(NII)	5	16.52 dBm (AV)		
	VHT20 5150 – 5350(NII)	8	16.67dBm (AV)		
	VHT20 5470 – 5725(NII)	11	16.85dBm (AV)		
	VHT20 5745 – 5825(NII)	5	16.52dBm (AV)		
	HT40 5150 – 5350(NII)	4	16.64dBm (AV)		
	HT40 5470 – 5725(NII)	5	16.50dBm (AV)		
	HT40 5725 – 5850(NII)	2	16.86dBm (AV)		
	VHT40 5470 – 5725(NII)	5	16.64dBm (AV)		
	VHT40 5745 – 5825(NII)	2	16.50dBm (AV)		
	VHT40 5190 – 5230(NII)	4	16.86dBm (AV)		
	802.11 ac	VHT80 5150 – 5350(NII)	2		16.56dBm (AV)
		VHT80 5470 – 5725(NII)	2		16.18dBm (AV)
		VHT80 5725 – 5850(NII)	1		16.16dBm (AV)
Modulation type		CCK, DQPSK, DBPSK for DSSS 256QAM.64QAM. 16QAM, QPSK, BPSK for OFDM			
Antenna Designation		PCB Antenna WiFi 5G Antenna UNII-1: -1.89 dBi WiFi 5G Antenna UNII-2A : -1.89 dBi WiFi 5G Antenna UNII-2C : -2.68 dBi WiFi 5G Antenna UNII-3 : -3.11 dBi According to KDB662911 D01 SM-MIMO signals could be considered uncorrelated for purposes of directional gain computation. Directional gain = G_{ANT}			

The EUT is compliance with IEEE 802.11 a/b/g/n/ac Standard.

This report applies for Wifi frequency band 5150 MHz– 5350 MHz, 5470MHz – 5725MHz, 5725 MHz– 5850 MHz

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

5G Band Power setting

Mode	Freq(MHz)	Power Setting
802.11a	5180	default
	5200	default
	5240	default
	5260	default
	5280	default
	5320	default
	5500	default
	5600	default
	5700	default
	5745	default
	5785	default
	5825	default
802.11n HT20 / 802.11ac VHT20	5180	default
	5200	default
	5240	default
	5260	default
	5280	default
	5300	default
	5320	default
	5500	default
	5580	default
	5600	default
	5700	default
	5745	default
	5785	default
	5825	default

802.11n HT40 / 802.11ac VHT40	5190	default
	5230	default
	5270	default
	5310	default
	5510	default
	5550	default
	5590	default
	5670	default
	5755	default
	5795	default
802.11ac VHT80	5210	default
	5290	default
	5530	default
	5610	default
	5775	default

1.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: Z28-7N-7F-RM** filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules.

1.3. Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.10: 2013. Radiated testing was performed at an antenna to EUT distance 3 meters.

KDB Document: 789033 D02 General U-NII Test Procedures New Rules v02r01

FCC 14-30 Revision UNII

594280 D02 U-NII Device Security v01r03

1.4. Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of International Standards Laboratory Corp. <LT Lab.> No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist., Tao Yuan City 325, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.10: 2013. FCC Registration Number is: 487532; Designation Number is: TW0997.

1.5. Special Accessories

Not available for this EUT intended for grant.

1.6. Equipment Modifications

Not available for this EUT intended for grant.

2. System Test Configuration

2.1. EUT Configuration

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

2.2. EUT Exercise

The EUT (Transmitter) was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements.

2.3. Test Procedure

2.3.1 Conducted Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. According to the requirements in Section 6 of ANSI C63.10: 2013. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR 16-1-1 Quasi-Peak and Average detector mode.

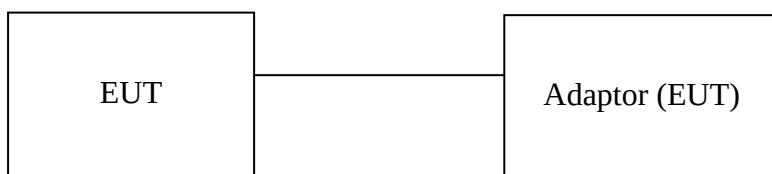
2.3.2 Radiated Emissions

The EUT is placed on a turntable which is 0.8 m/1.5m (Frequency above 1GHz) above the ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. The EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. To find out the maximum emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna according to the requirements in Section 6, 11 and 12 of ANSI C63.10: 2013.

2.4. Configuration of Tested System

Fig. 2-1 Configuration of Tested System

Radiated Emission



1. Table 1-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1	EUT (adaptor)	CWT	2ABL024F US	NA	NA	Non-shielding
2	EUT (adaptor)	Shenzhen SOY Technology Co., Ltd.	SOY-1200200	NA	NA	Non-shielding
3	EUT (adaptor)	CWT	2AAJ024FC	NA	NA	Non-shielding

Note: All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.

Grounding: Grounding was in accordance with the manufacturer's requirements and conditions for the intended use.

2.5. Duty Cycle

If duty cycle of test signal is $\geq 98\%$, duty factor is not required.

If duty cycle of test signal is $< 98\%$, duty factor shall be considered.

The output power = measured power + duty factor.

Mode	ON time (ms)	Total time (ms)	Duty Cycle	Duty Factor	1/Ton (kHz)	VBW for average detector (kHz)
a	1.380	1.440	95.833%	0.18	0.725	1
HT20	1.296	1.348	96.089%	0.17	0.772	1
HT40	0.615	0.690	89.130%	0.50	1.626	3
VHT20	1.310	1.355	96.679%	0.15	0.763	1
VHT40	0.620	0.695	89.209%	0.50	1.613	3
VHT80	0.299	0.365	81.944%	0.86	3.345	10

3. Summary of Test Results

FCC Rules	Description Of Test	Result
§15.207	AC Power Line Conducted Emission	Compliant
§15.407(a)(2)	Output Power/ EIRP/ Spectral Density Measurement	Compliant
§15.407(a)	26dB Emission Bandwidth	Compliant
§15.407(e)	6dB Emission Bandwidth	Compliant
§15.407(b)	Undesirable Emission – Radiated Measurement	Compliant
§15.407(c)	Transmission in case of Absence of Information	Compliant
§15.407(a)	Antenna Requirement	Compliant
§15.407(d)	TPC and DFS Measurement	Compliant
§15.407(i)	Device Security	Compliant

4. Description of Test Modes

The EUT has been tested under operating condition.

Test program used to control the EUT for staying in continuous transmitting mode is programmed.

5150MHz-5350MHz:

802.11a mode: Channel low (5180MHz), mid (5260MHz) and high (5320MHz) with 6Mbps lowest data rate are chosen for pre-test testing of radiated emissions.

802.11 n HT20: Channel low (5180MHz), mid (5260MHz) and high (5320MHz) with 6.5Mbps lowest data rate are chosen for pre-test testing of radiated emissions.

802.11 n HT40: Channel low (5190MHz), mid (5230MHz) and high (5310MHz) with 13.5Mbps lowest data rate are chosen for pre-test testing of radiated emissions.

802.11 ac VHT20: Channel low (5180MHz), mid (5260MHz) and high (5320MHz) with 6.5Mbps lowest data rate are chosen for pre-test testing of radiated emissions.

802.11 ac VHT40: Channel low (5190MHz), mid (5230MHz) and high (5310MHz) with 13.5Mbps lowest data rate are chosen for pre-test testing of radiated emissions.

802.11 ac VHT80: Channel low (5210MHz) and high (5290MHz) with 13.5Mbps lowest data rate is chosen for pre-test testing of radiated emissions.

5470MHz-5725MHz:

802.11a mode: Channel low (5500MHz), mid (5600MHz) and high (5700MHz) with 6Mbps lowest data rate are chosen for pre-test testing of radiated emissions.

802.11 n HT20: Channel low (5500MHz), mid (5600MHz) and high (5700MHz) with 6.5Mbps lowest data rate are chosen for pre-test testing of radiated emissions.

802.11 n HT40: Channel low (5510MHz), mid (5550MHz) and high (5670MHz) with 13.5Mbps lowest data rate are chosen for pre-test testing of radiated emissions.

802.11 ac VHT20: Channel low (5500MHz), mid (5600MHz) and high (5700MHz) with 6.5Mbps lowest data rate are chosen for pre-test testing of radiated emissions.

802.11 ac VHT40: Channel low (5510MHz), mid (5550MHz) and high (5670MHz) with 13.5Mbps lowest data rate are chosen for pre-test testing of radiated emissions.

802.11 ac VHT80: Channel low (5530MHz) and high (5610MHz) with 13.5Mbps lowest data rate is chosen for pre-test testing of radiated emissions.

5725MHz-5850MHz:

802.11a mode: Channel low (5745MHz), mid (5785MHz) and high (5825MHz) with 6Mbps lowest data rate are chosen for pre-test testing of radiated emissions.

802.11 n HT20: Channel low (5745MHz), mid (5785MHz) and high (5825MHz) with 6.5Mbps lowest data rate are chosen for pre-test testing of radiated emissions.

802.11 n HT40: Channel low (5755MHz) and high (5795MHz) with 13.5Mbps lowest data rate are chosen for pre-test testing of radiated emissions.

802.11 ac VHT20: Channel low (5745MHz), mid (5785MHz) and high (5825MHz) with 6.5Mbps lowest data rate are chosen for pre-test testing of radiated emissions.

802.11 ac VHT40: Channel low (5755MHz) and high (5795MHz) with 13.5Mbps lowest data rate are chosen for pre-test testing of radiated emissions.

802.11 ac VHT80: Channel (5775MHz) with 13.5Mbps lowest data rate is chosen for pre-test testing of radiated emissions.

5. Conducted Emission Test

5.1. Standard Applicable

According to §15.207, frequency range within 150kHz to 30MHz shall not exceed the Limit table as below.

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

5.2. Measurement Equipment Used:

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Conduction 02	LISN 26	R&S	ENV216	102378	11/21/2019	11/21/2020
Conduction 02	LISN 21	R&S	ENV216	101476	07/21/2020	07/21/2021
Conduction 02	Conduction 02-1 Cable	WOKEN	CFD 300-NL	Conduction 02 -1	09/11/2020	09/11/2021
Conduction 02	EMI Receiver 14	ROHDE&SCHWARZ	ESCI	101034	05/22/2020	05/22/2021
Conduction 02	ISN T4 07	Teseq GmbH	ISN T400A	49913	08/02/2020	08/02/2021
Conduction 02	ISN T8 10	Teseq GmbH	ISN T800	42773	08/02/2020	08/02/2021

5.3. EUT Setup:

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

5.4. Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.
4. Both 120V & 240V have been verified, and 120V/60Hz was defined as the worst-case and record in the report.

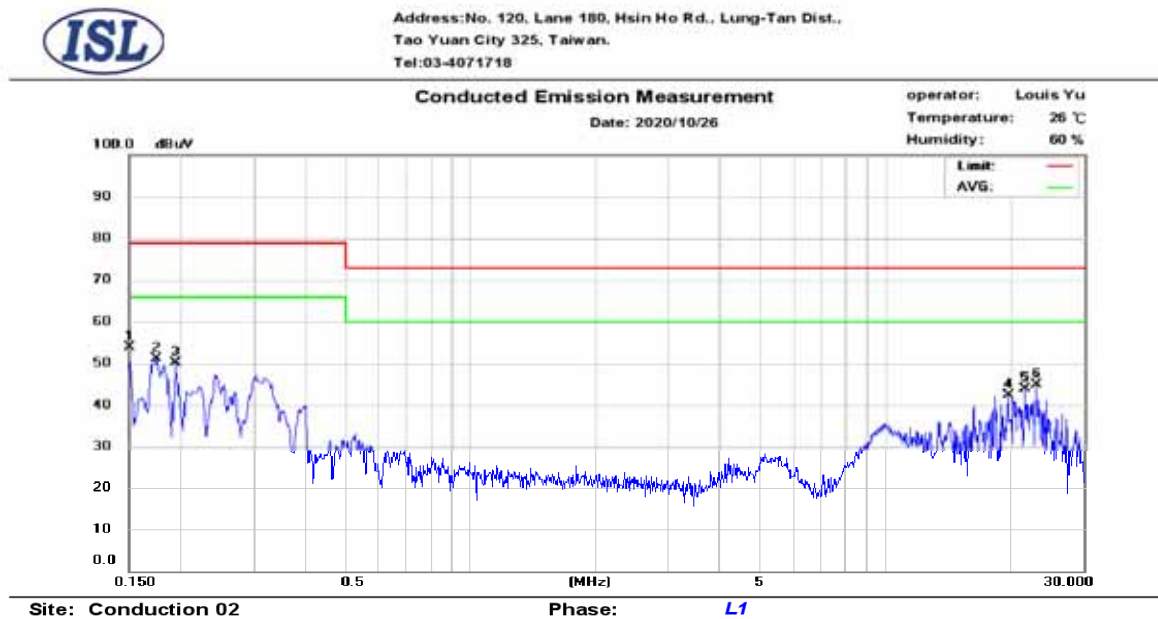
5.5. Measurement Result:

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

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

AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Normal Operation	Worst Case	Adapter module : 2ABL024F
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No.	Frequency (MHz)	QP_R (dBuV)	AVG_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)
1	0.150	43.88	26.32	9.69	53.57	79.00	-25.43	36.01	66.00	-29.99
2	0.174	39.05	24.07	9.69	48.74	79.00	-30.26	33.76	66.00	-32.24
3	0.194	36.74	22.02	9.68	46.42	79.00	-32.58	31.70	66.00	-34.30
4	19.710	31.63	28.96	9.98	41.61	73.00	-31.39	38.94	60.00	-21.06
5	21.662	32.76	30.30	9.98	42.74	73.00	-30.26	40.28	60.00	-19.72
6	23.130	33.94	32.36	9.97	43.91	73.00	-29.09	42.33	60.00	-17.67

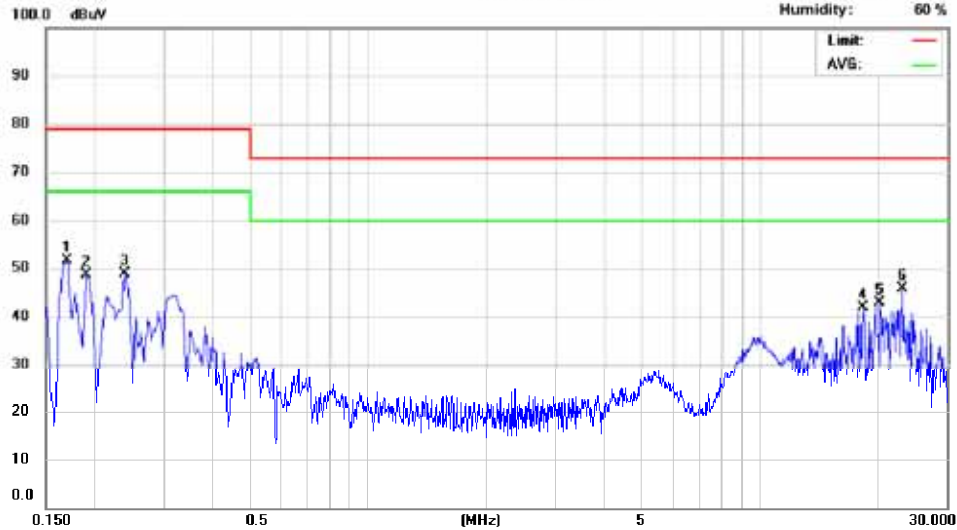


Address: No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist.,
Tao Yuan City 325, Taiwan.
Tel: 03-4071718

Conducted Emission Measurement

Date: 2020/10/26

operator: Louis Yu
Temperature: 26 °C
Humidity: 60 %



Site: Conduction 02

Phase: N

No.	Frequency (MHz)	QP_R (dBuV)	AVG_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)
1	0.170	38.37	24.45	9.68	48.05	79.00	-30.95	34.13	66.00	-31.87
2	0.190	35.91	19.87	9.68	45.59	79.00	-33.41	29.55	66.00	-36.45
3	0.238	34.19	22.66	9.68	43.87	79.00	-35.13	32.34	66.00	-33.66
4	18.242	31.32	28.55	10.06	41.38	73.00	-31.62	38.61	60.00	-21.39
5	20.258	31.78	29.16	10.08	41.86	73.00	-31.14	39.24	60.00	-20.76
6	23.130	34.40	31.88	10.10	44.50	73.00	-28.50	41.98	60.00	-18.02

6. OUTPUT POWER / EIRP /SPECTRAL DENSITY MEASUREMENT

6.1. Standard Applicable

According to §15.407(a) Power limits:

(1) For the band 5.15-5.25 GHz.

(i) For an outdoor access point operating in the band 5.15 – 5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15 – 5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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

(iv) For mobile and portable client devices in the 5.15 – 5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500 kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

6.2. Measurement Procedure

For Output Power

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter
3. Record the max. reading.
4. Repeat above procedures until all frequency measured were complete.

For Power Spectral Density

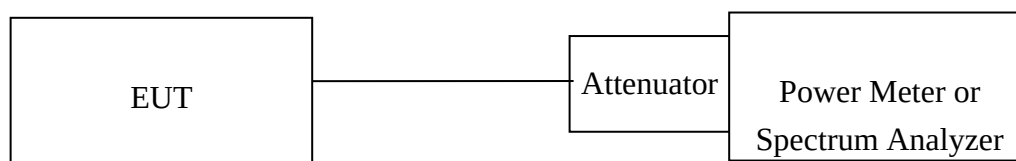
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.
3. Set RBW=1MHz,VBW=3MHz, Span=50MHz (Base Mode), Sweep time = Auto, traces 100 sweeps of video averaging for 5150-5725MHz;
4. Set RBW=500kHz,VBW=1.5MHz, Span=60MHz (Base Mode), Sweep time = Auto, traces 100 sweeps of video averaging for 5725-5850MHz;
5. Record the max. reading.
6. Repeat above procedures until all frequency measured were complete.

Refer to KDB 789033 D02 General UNII Test Procedures New Rules v02r01

6.3. Measurement Equipment Used:

Location Conducted	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Conducted	Power Meter	Anritsu	ML2495A	1116010	09/25/2020	09/25/2021
Conducted	Power Sensor	Anritsu	MA2411B	34NKF50	09/25/2020	09/25/2021
Conducted	Power Sensor	DARE	RPR3006W	13I00030SNO33	01/03/2020	01/03/2021
Conducted	Power Sensor	DARE	RPR3006W	13I00030SNO34	01/09/2020	01/09/2021
Conducted	Power Sensor	DARE	RPR3006W	14I00889SNO35	06/29/2020	06/29/2021
Conducted	Power Sensor	DARE	RPR3006W	14I00889SNO36	06/29/2020	06/29/2021
Conducted	Temperature Chamber	KSON	THS-B4H100	2287	03/11/2020	03/11/2021
Conducted	DC Power supply	ABM	8185D	N/A	01/03/2020	01/03/2021
Conducted	AC Power supply	EXTECH	CFC105W	NA	N/A	N/A
Conducted	Spectrum analyzer	Keysight	N9010A	MY56070257	09/23/2020	09/23/2021
Conducted	Spectrum analyzer	R&S	FSP40	100116	01/10/2020	01/10/2021
Conducted	Test Software	DARE	Radiation Ver:2013.1.23	NA	NA	NA
Conducted	Test Software	R&S	CMUGO Ver:2.0.0	N/A	N/A	N/A
Conducted	Radio Communication Analyzer	R&S	CMU200	111968	11/29/2019	11/29/2020
Conducted	Wideband Radio Communication Tester	R&S	CMW500	1201.002K50108 793-JG	10/28/2020	10/28/2021
Conducted	BT Simulator	Agilent	N4010A	MY48100200	NA	NA

6.4. Measurement Equipment Used:



6.5. Measurement Result

According to §15.407(a)

(iv) For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.

Band	Mode	Freq. (MHz)	Output Power (dBm)				Duty Factor (dB)	Total Output Power (dBm)	Output Power Limit (dBm)
			Chain 0	Chain 1	Chain 2	Chain 3			
UNII-1	11a	5180	16.43				0.18	16.61	23.98
		5200	17.72				0.18	17.90	23.98
		5240	16.93				0.18	17.11	23.98
	HT20	5180	16.54				0.17	16.71	23.98
		5200	16.73				0.17	16.90	23.98
		5240	16.93				0.17	17.10	23.98
	HT40	5190	16.68				0.50	17.18	23.98
		5230	16.35				0.50	16.85	23.98
	VHT20	5180	16.67				0.15	16.82	23.98
		5200	16.26				0.15	16.41	23.98
		5240	16.45				0.15	16.60	23.98
	VHT40	5190	16.64				0.50	17.14	23.98
		5230	16.45				0.50	16.95	23.98
	VHT80	5210	16.01				0.86	16.87	23.98

Band	Mode	Freq. (MHz)	Output Power (dBm)				Duty Factor (dB)	Total Output Power (dBm)	Output Power Limit (dBm)
			Chain 0	Chain 1	Chain 2	Chain 3			
UNII-2A	11a	5260	16.03				0.18	16.21	23.98
		5300	16.48				0.18	16.66	23.98
		5320	16.74				0.18	16.92	23.98
	HT20	5260	16.61				0.17	16.78	23.98
		5300	16.57				0.17	16.74	23.98
		5320	16.46				0.17	16.63	23.98
	HT40	5270	16.97				0.50	17.47	23.98
		5310	16.74				0.50	17.24	23.98
	VHT20	5260	16.5				0.15	16.65	23.98
		5300	16.55				0.15	16.70	23.98
		5320	16.43				0.15	16.58	23.98
	VHT40	5270	16.51				0.50	17.01	23.98
		5310	16.43				0.50	16.93	23.98
	VHT80	5290	16.56				0.86	17.42	23.98

Band	Mode	Freq. (MHz)	Output Power (dBm)				Duty Factor (dB)	Total Output Power (dBm)	Output Power Limit (dBm)
			Chain 0	Chain 1	Chain 2	Chain 3			
UNII-2C	11a	5500	16.43				0.18	16.61	23.98
		5580	16.85				0.18	17.03	23.98
		5700	16.83				0.18	17.01	23.98
	HT20	5500	16.93				0.17	17.10	23.98
		5580	16.05				0.17	16.22	23.98
		5700	16.45				0.17	16.62	23.98
	HT40	5510	16.24				0.50	16.74	23.98
		5550	16.61				0.50	17.11	23.98
		5670	16.62				0.50	17.12	23.98
	VHT20	5500	16.38				0.15	16.53	23.98
		5580	16.16				0.15	16.31	23.98
		5700	16.85				0.15	17.00	23.98
	VHT40	5510	16.5				0.50	17.00	23.98
		5550	16.3				0.50	16.80	23.98
		5670	16.5				0.50	17.00	23.98
	VHT80	5530	16.18				0.86	17.04	23.98
		5610	16.02				0.86	16.88	23.98

Band	Mode	Freq. (MHz)	Output Power (dBm)				Duty Factor (dB)	Total Output Power (dBm)	Output Power Limit (dBm)
			Chain 0	Chain 1	Chain 2	Chain 3			
UNII-3	11a	5745	16.94				0.18	17.12	30.00
		5785	16.76				0.18	16.94	30.00
		5825	16.6				0.18	16.78	30.00
	HT20	5745	16.81				0.17	16.98	30.00
		5785	16.68				0.17	16.85	30.00
		5825	16.27				0.17	16.44	30.00
	HT40	5755	16.44				0.50	16.94	30.00
		5795	16.21				0.50	16.71	30.00
	VHT20	5745	16.52				0.15	16.67	30.00
		5785	16.3				0.15	16.45	30.00
		5825	16.11				0.15	16.26	30.00
	VHT40	5755	16.63				0.50	17.13	30.00
		5795	16.86				0.50	17.36	30.00
	VHT80	5775	16.16				0.86	17.02	30.00

Power Spectral Density Measurement:

Mode	Frequency (MHz)	PSD (dBm/MHz)				Duty Factor (dB)	Total PSD (dBm/MHz)	PSD Limit (dBm/MHz)
		Chain 0	Chain 1	Chain 2	Chain 3			
11a	5180	-3.51				0.18	-3.32	23.98
	5200	-3.19				0.18	-3.00	23.98
	5240	-2.57				0.18	-2.39	23.98
HT20	5180	-3.87				0.17	-3.70	23.98
	5200	-3.55				0.17	-3.38	23.98
	5240	-2.98				0.17	-2.80	23.98
HT40	5190	-6.84				0.50	-6.34	23.98
	5230	-6.11				0.50	-5.61	23.98
VHT20	5180	-3.76				0.15	-3.61	23.98
	5200	-3.51				0.15	-3.36	23.98
	5240	-2.72				0.15	-2.57	23.98
VHT40	5190	-6.77				0.50	-6.28	23.98
	5230	-6.11				0.50	-5.62	23.98
VHT80	5210	-9.39				0.86	-8.53	23.98

Mode	Frequency (MHz)	PSD (dBm/MHz)				Duty Factor (dB)	Total PSD (dBm/MHz)	PSD Limit (dBm/MHz)
		Chain 0	Chain 1	Chain 2	Chain 3			
11a	5260	-2.31				0.18	-2.13	11.00
	5300	-1.92				0.18	-1.74	11.00
	5320	-1.58				0.18	-1.39	11.00
HT20	5260	-2.72				0.17	-2.54	11.00
	5300	-2.45				0.17	-2.28	11.00
	5320	-2.13				0.17	-1.95	11.00
HT40	5270	-6.08				0.50	-5.58	11.00
	5310	-5.50				0.50	-5.00	11.00
VHT20	5260	-2.70				0.15	-2.55	11.00
	5300	-2.41				0.15	-2.26	11.00
	5320	-2.11				0.15	-1.97	11.00
VHT40	5270	-5.93				0.50	-5.44	11.00
	5310	-5.57				0.50	-5.08	11.00
VHT80	5290	-8.62				0.86	-7.76	11.00

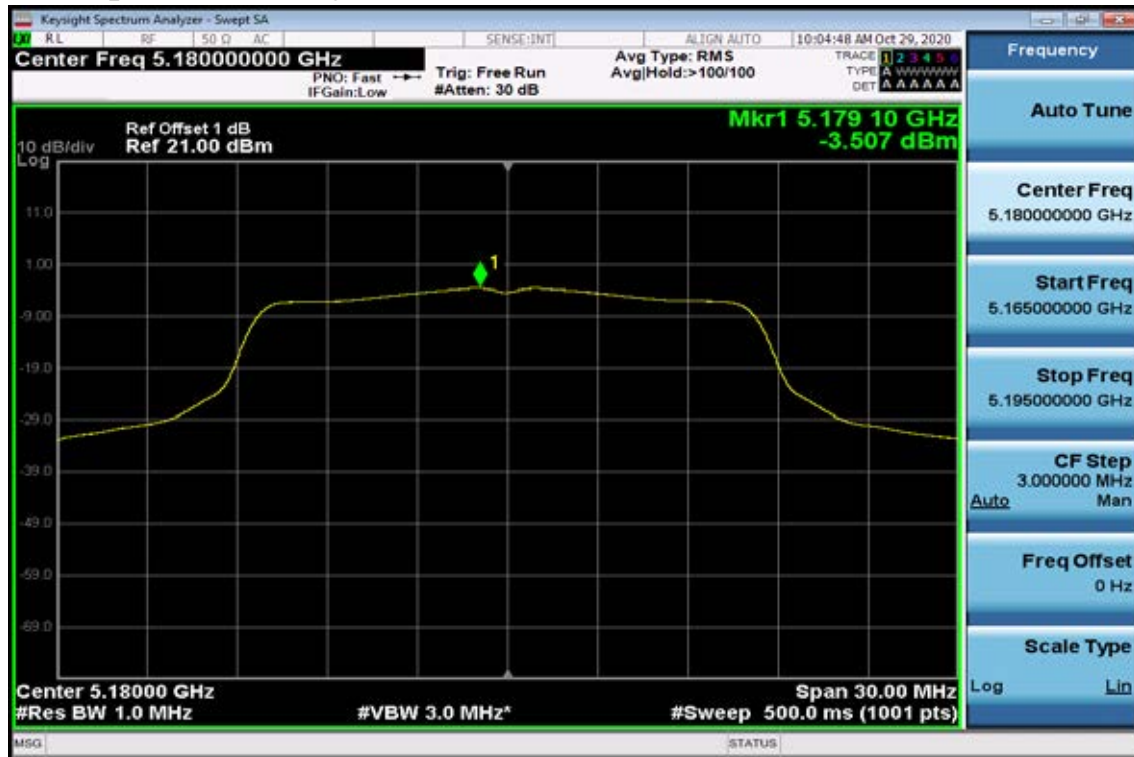
Mode	Frequency (MHz)	PSD (dBm/MHz)				Duty Factor (dB)	Total PSD (dBm/MHz)	PSD Limit (dBm/MHz)
		Chain 0	Chain 1	Chain 2	Chain 3			
11a	5500	-1.97				0.18	-1.79	11.00
	5580	-3.28				0.18	-3.10	11.00
	5700	-4.96				0.18	-4.78	11.00
HT20	5500	-2.60				0.17	-2.43	11.00
	5580	-3.95				0.17	-3.77	11.00
	5700	-5.53				0.17	-5.36	11.00
HT40	5510	-6.13				0.50	-5.63	11.00
	5550	-6.85				0.50	-6.35	11.00
	5670	-8.90				0.50	-8.40	11.00
VHT20	5500	-2.58				0.15	-2.43	11.00
	5580	-3.86				0.15	-3.71	11.00
	5700	-5.39				0.15	-5.24	11.00
VHT40	5510	-6.07				0.50	-5.57	11.00
	5550	-6.74				0.50	-6.24	11.00
	5670	-8.71				0.50	-8.21	11.00
VHT80	5530	-9.14				0.86	-8.28	11.00
	5610	-10.33				0.86	-9.47	11.00

Mode	Frequency (MHz)	PSD (dBm/500kHz)				Duty Factor (dB)	Total PSD (dBm/500kHz)	PSD Limit (dBm/500kHz)
		Chain 0	Chain 1	Chain 2	Chain 3			
11a	5745	-7.93				0.18	-7.74	30
	5785	-8.08				0.18	-7.89	30
	5825	-7.87				0.18	-7.68	30
HT20	5745	-8.53				0.17	-8.35	30
	5785	-8.64				0.17	-8.46	30
	5825	-8.35				0.17	-8.18	30
HT40	5755	-11.79				0.50	-11.29	30
	5795	-11.92				0.50	-11.42	30
VHT20	5745	-8.41				0.15	-8.27	30
	5785	-8.58				0.15	-8.43	30
	5825	-8.29				0.15	-8.14	30
VHT40	5755	-11.82				0.50	-11.32	30
	5795	-11.95				0.50	-11.45	30
VHT80	5775	-14.79				0.86	-13.93	30

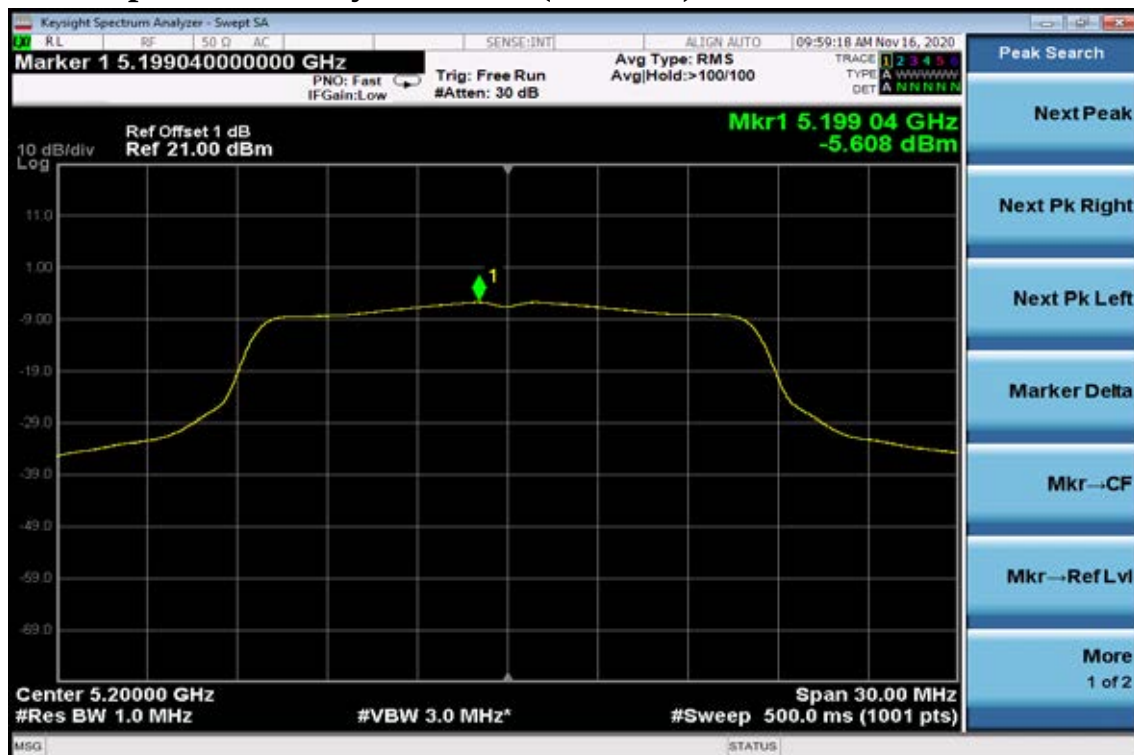
Band UNII-1

802.11a

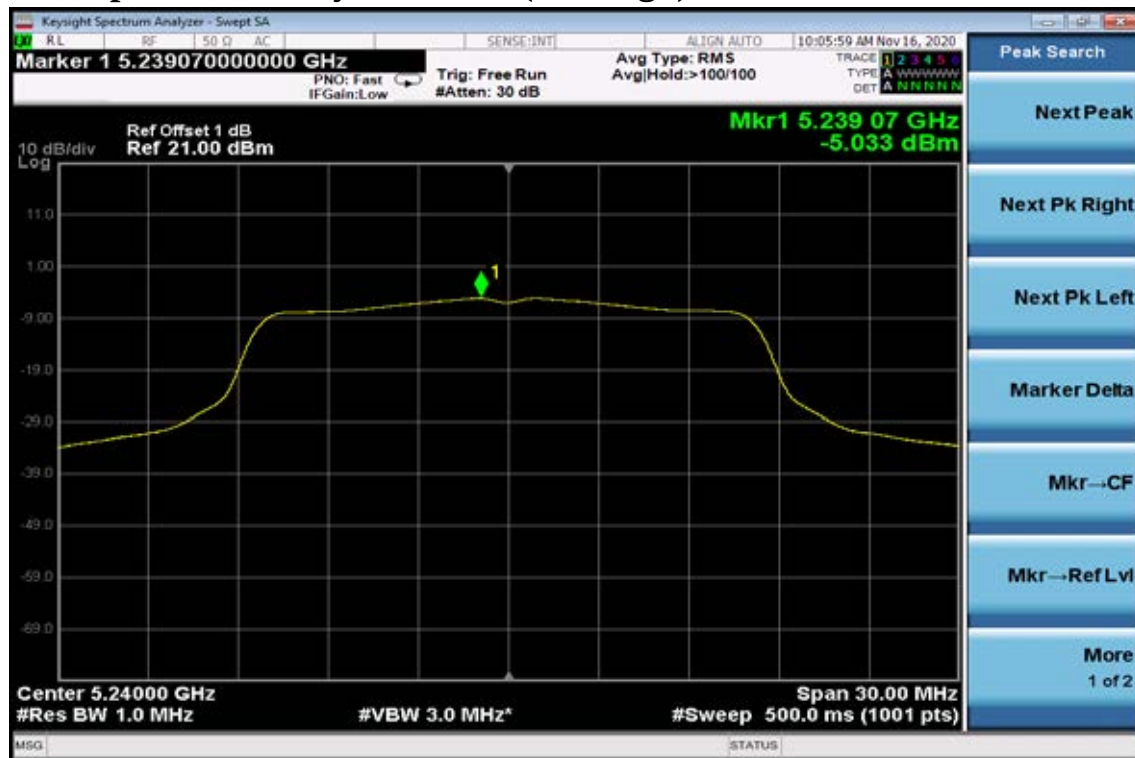
Power Spectral Density Data Plot (CH Low)



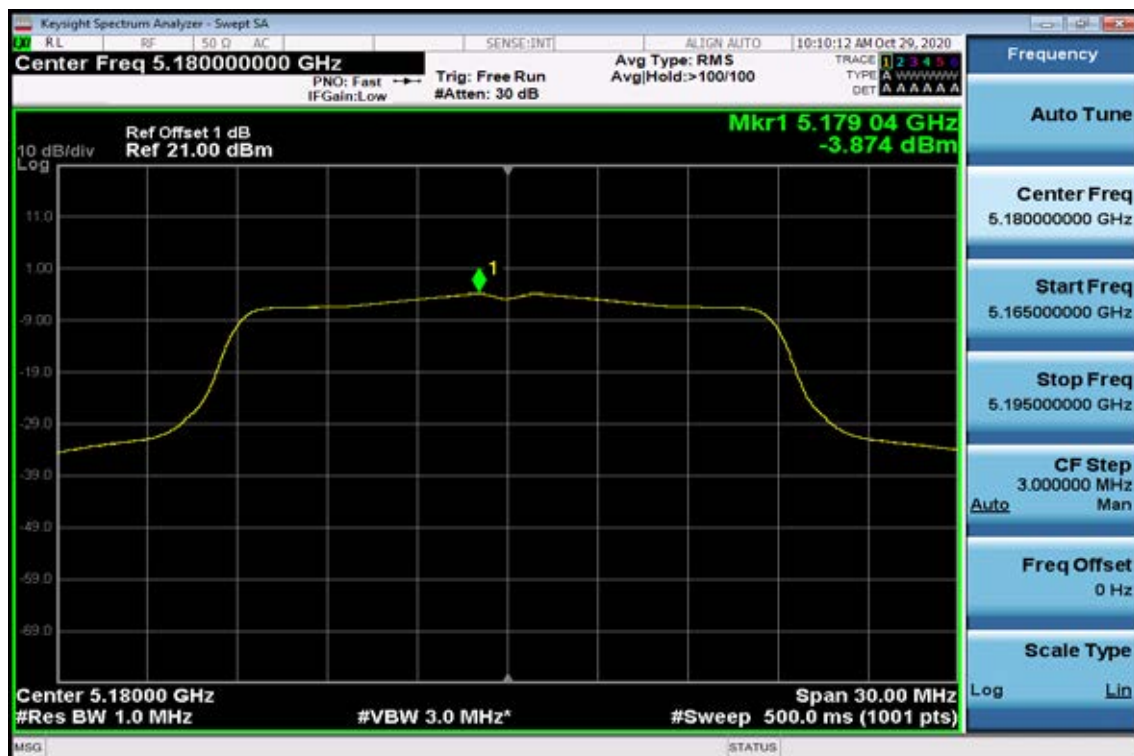
Power Spectral Density Data Plot (CH Mid)



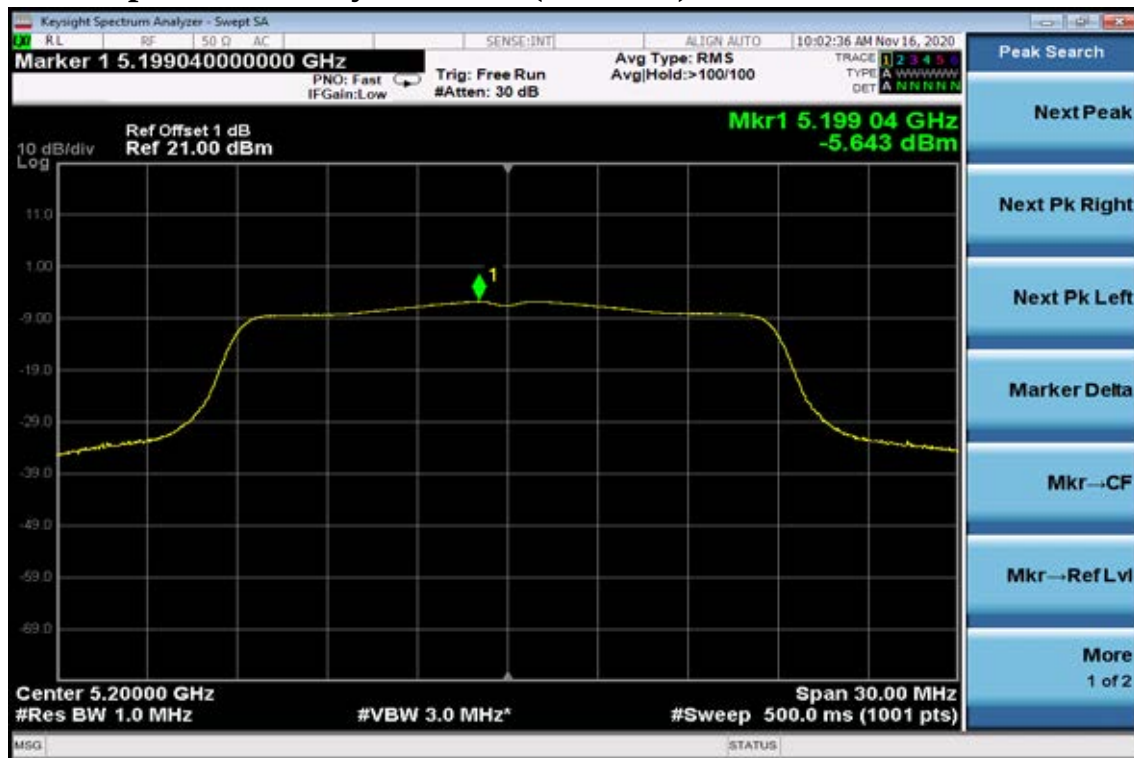
Power Spectral Density Data Plot (CH High)



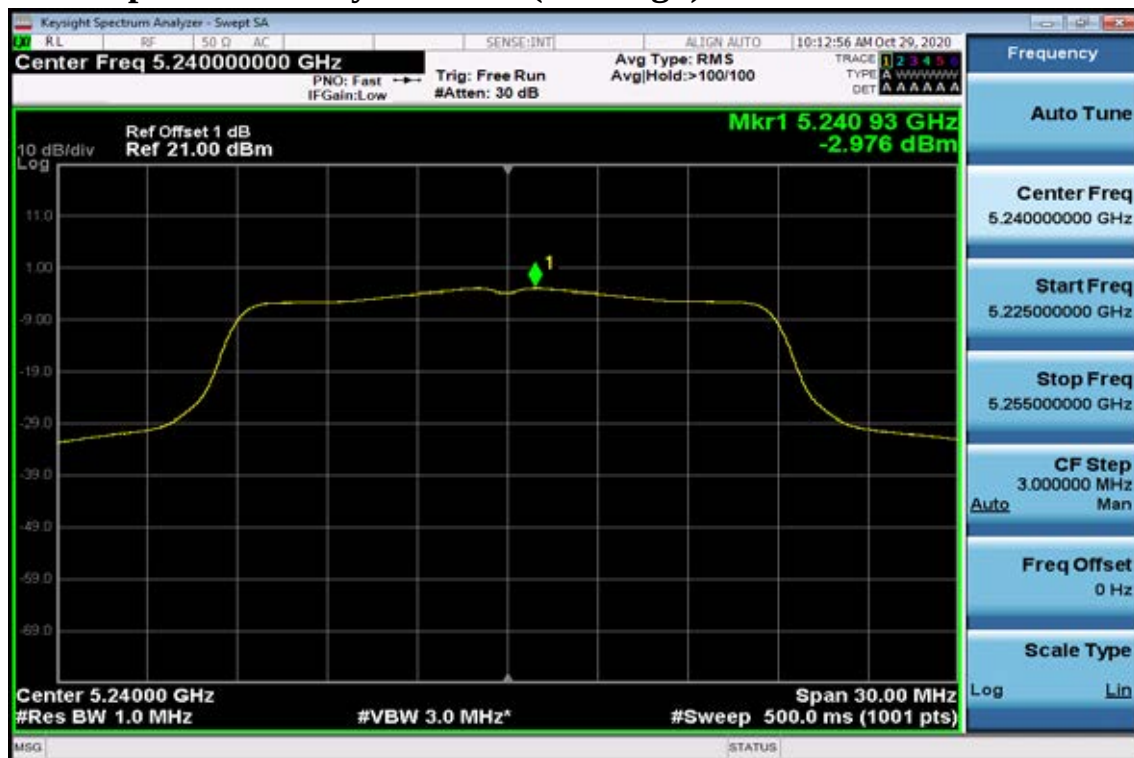
802.11n HT20, Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High)



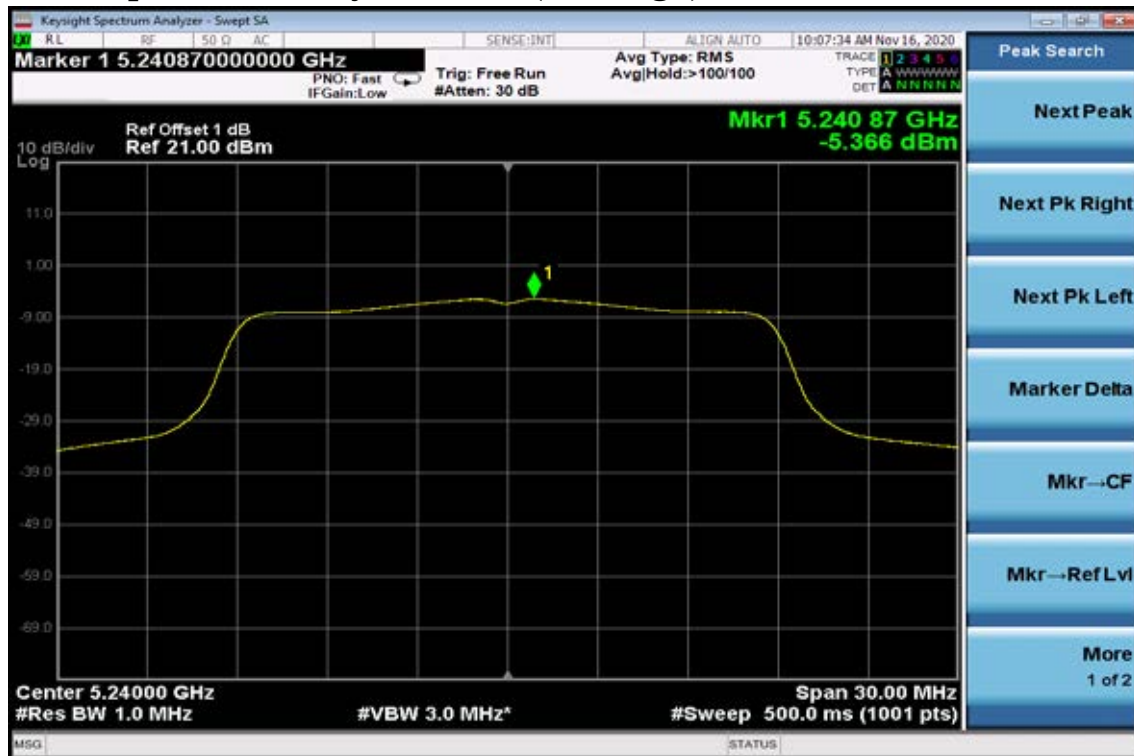
802.11ac VHT20, Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High)



802.11n HT40

Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-High)



802.11ac VHT40

Power Spectral Density Test Plot (CH-Low)

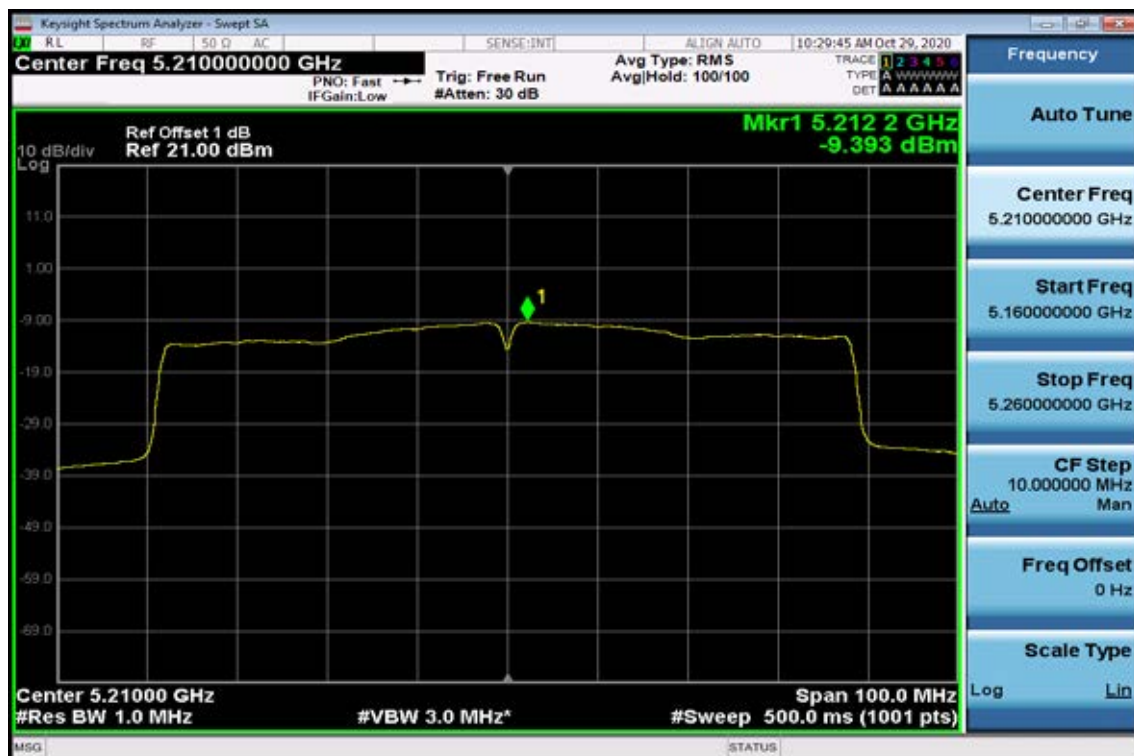


Power Spectral Density Test Plot (CH-High)



802.11 ac VHT80

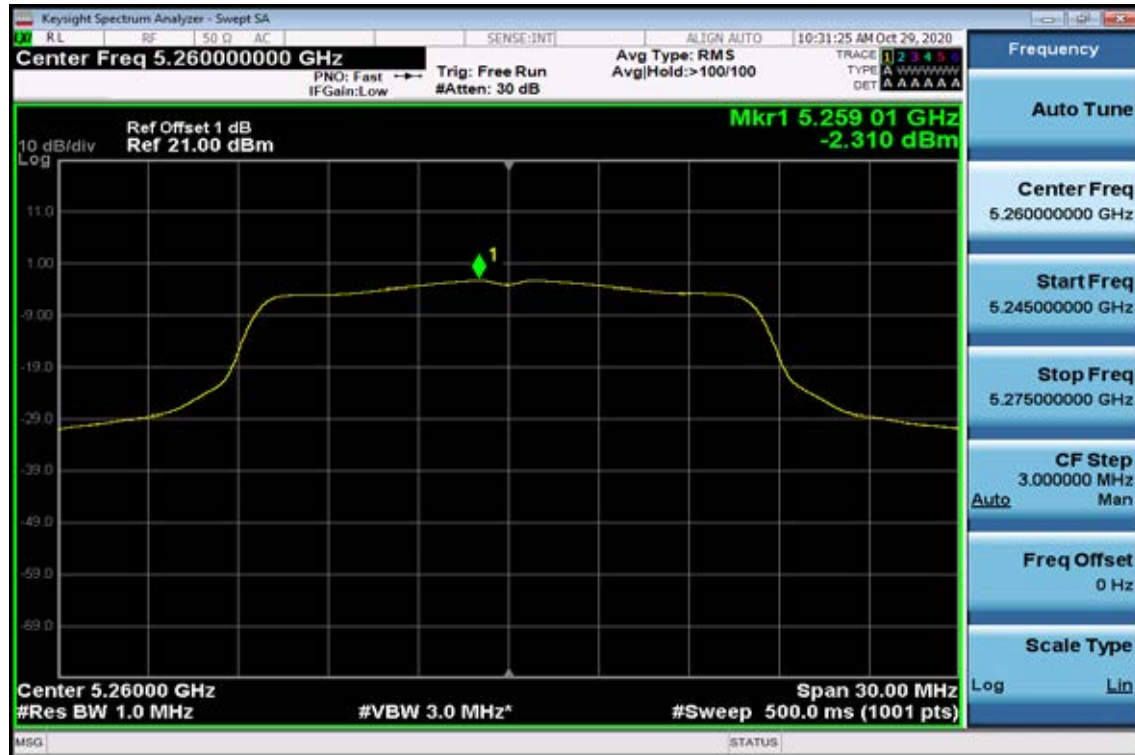
Power Spectral Density Test Plot (CH-Low)



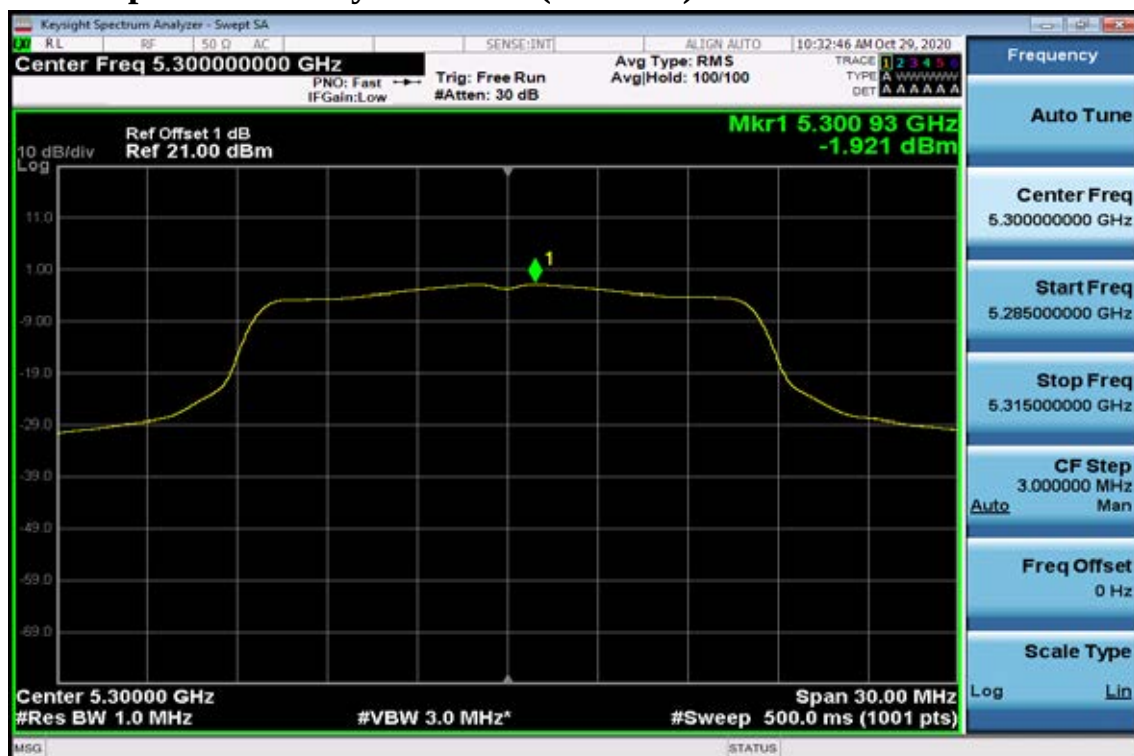
Band UNII-2A

802.11a

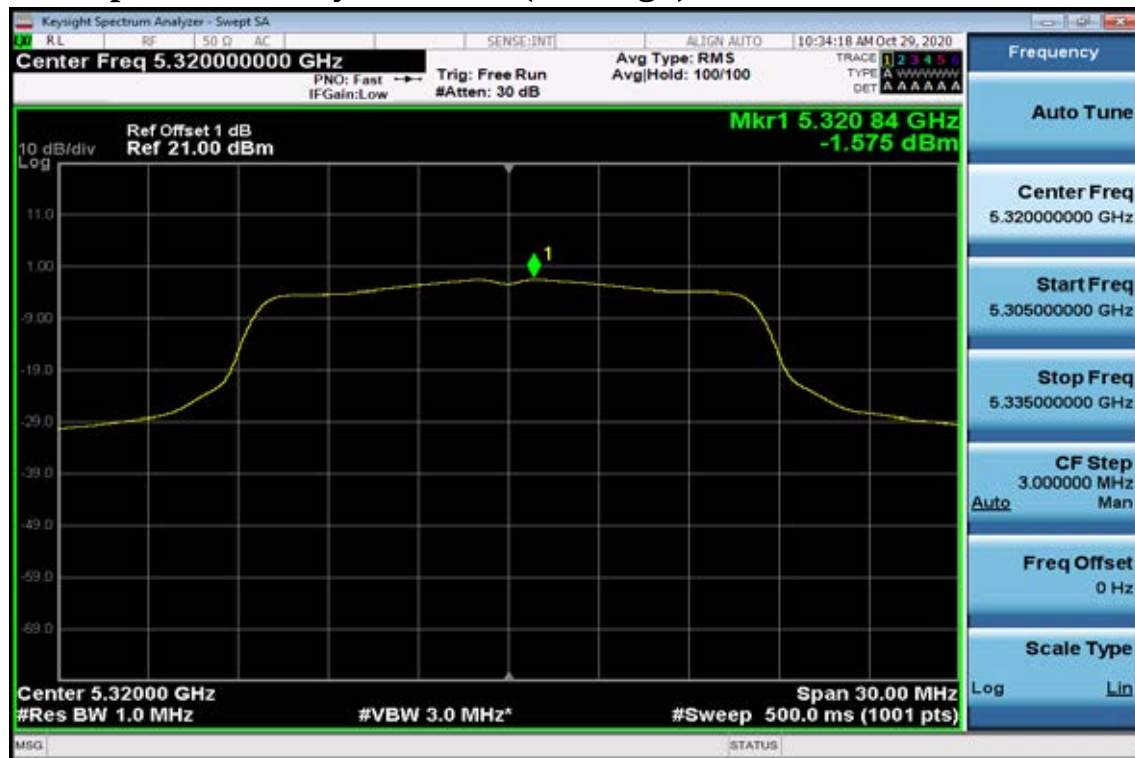
Power Spectral Density Data Plot (CH Low)



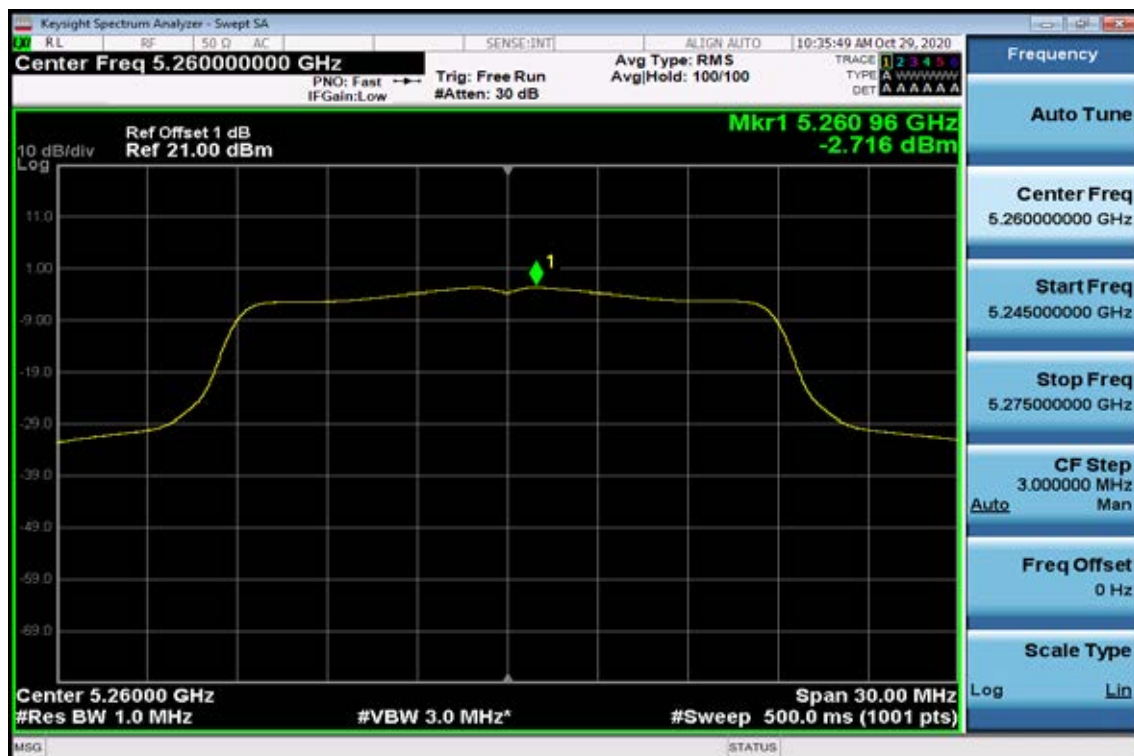
Power Spectral Density Data Plot (CH Mid)



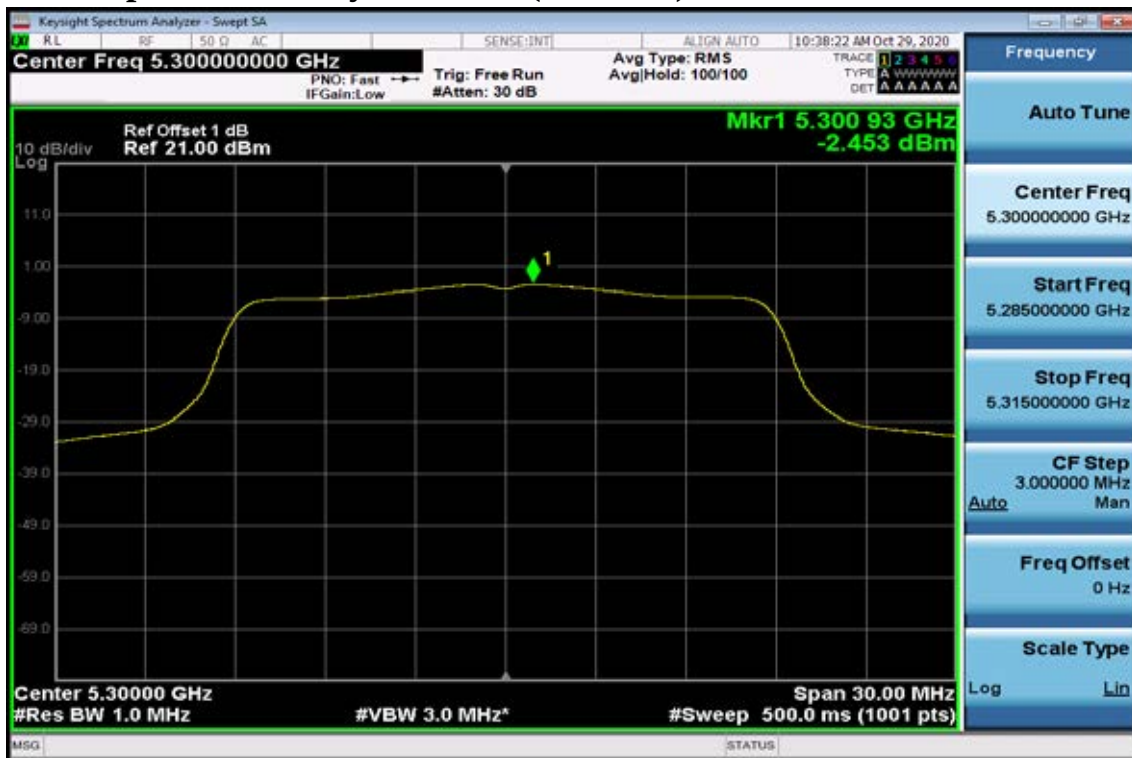
Power Spectral Density Data Plot (CH High)



802.11n HT20, Power Spectral Density Test Plot (CH-Low)



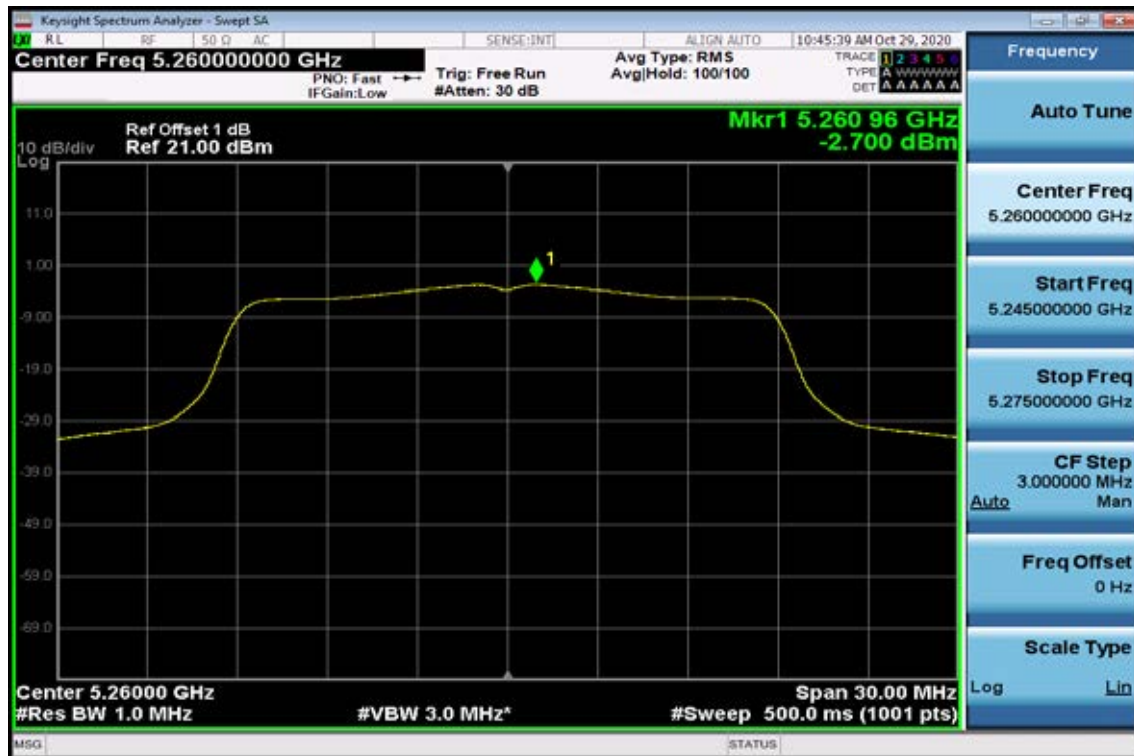
Power Spectral Density Test Plot (CH-Mid)



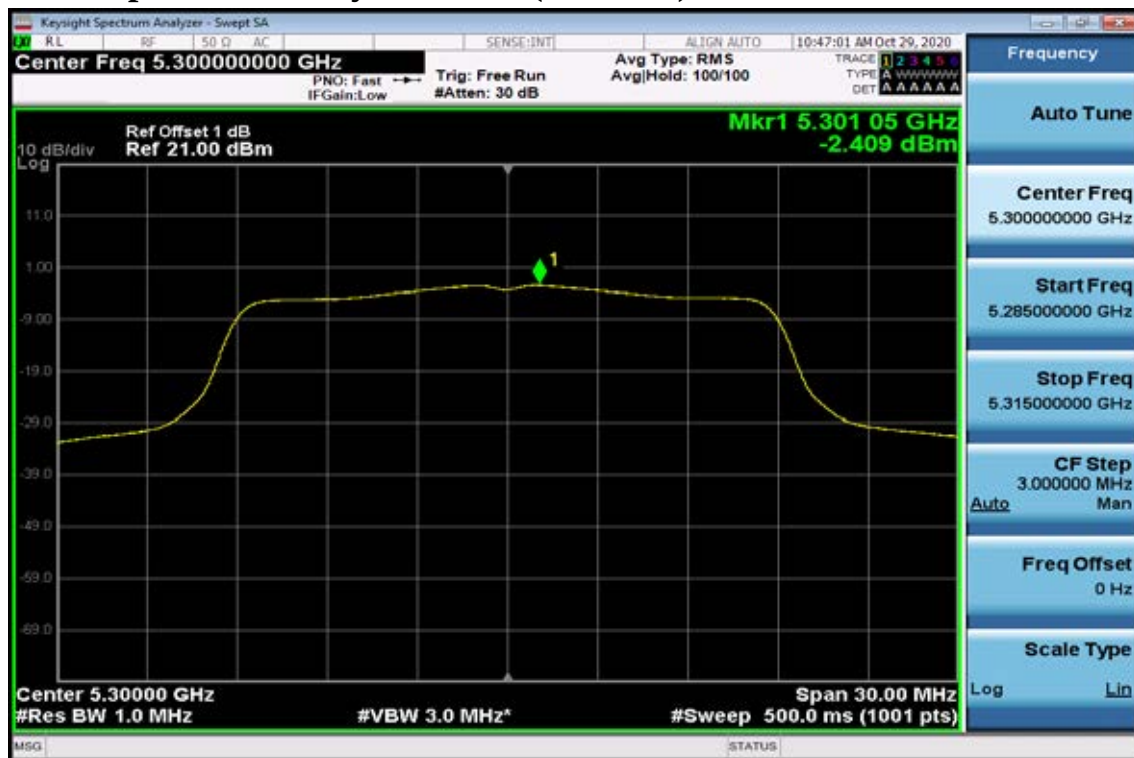
Power Spectral Density Test Plot (CH-High)



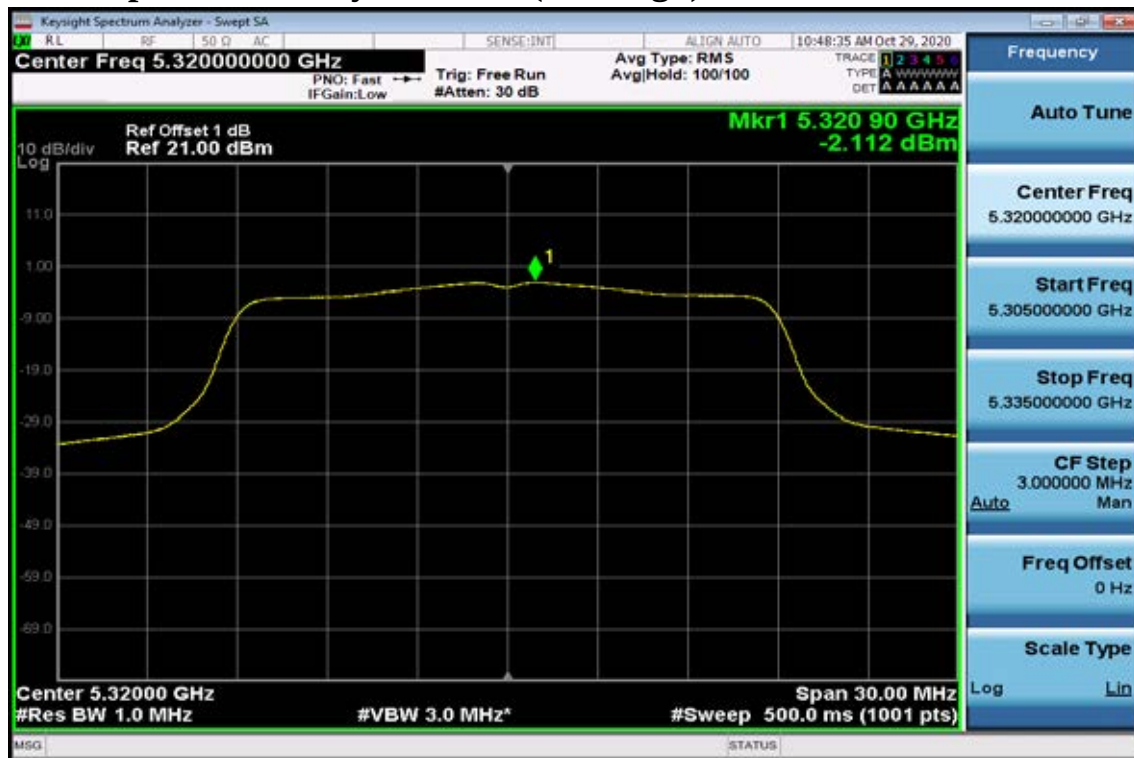
802.11ac VHT20, Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High)



802.11n HT40

Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-High)



802.11ac VHT40

Power Spectral Density Test Plot (CH-Low)

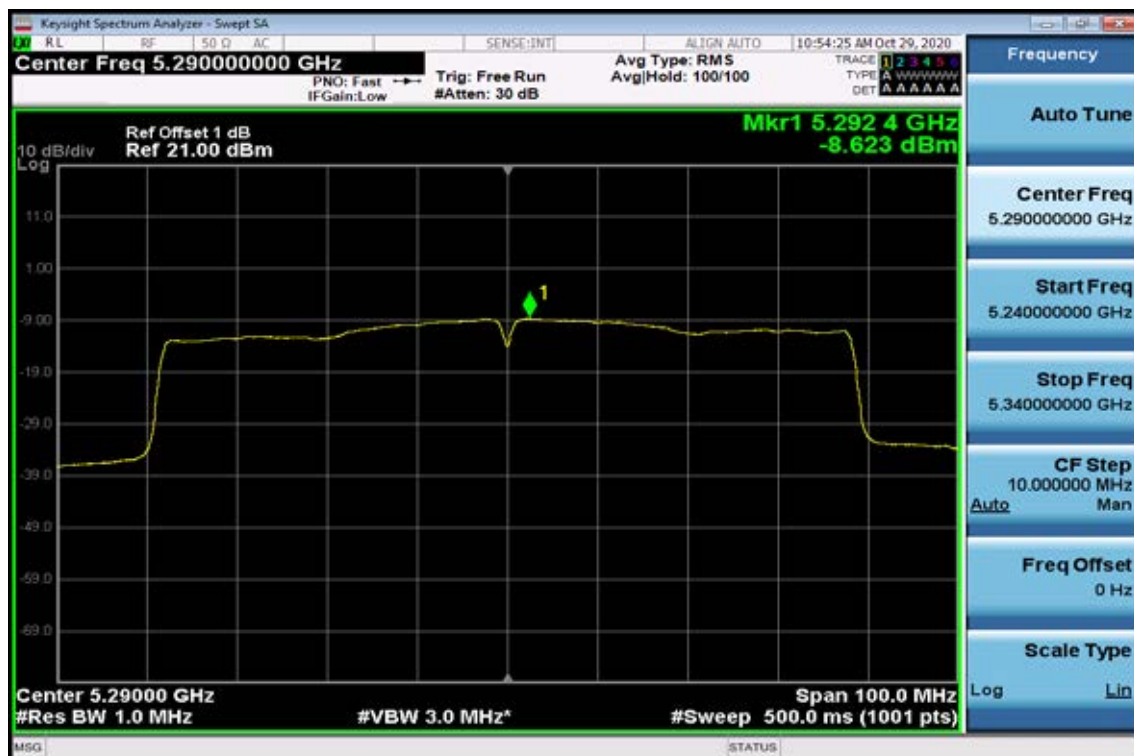


Power Spectral Density Test Plot (CH-High)



802.11 ac VHT80

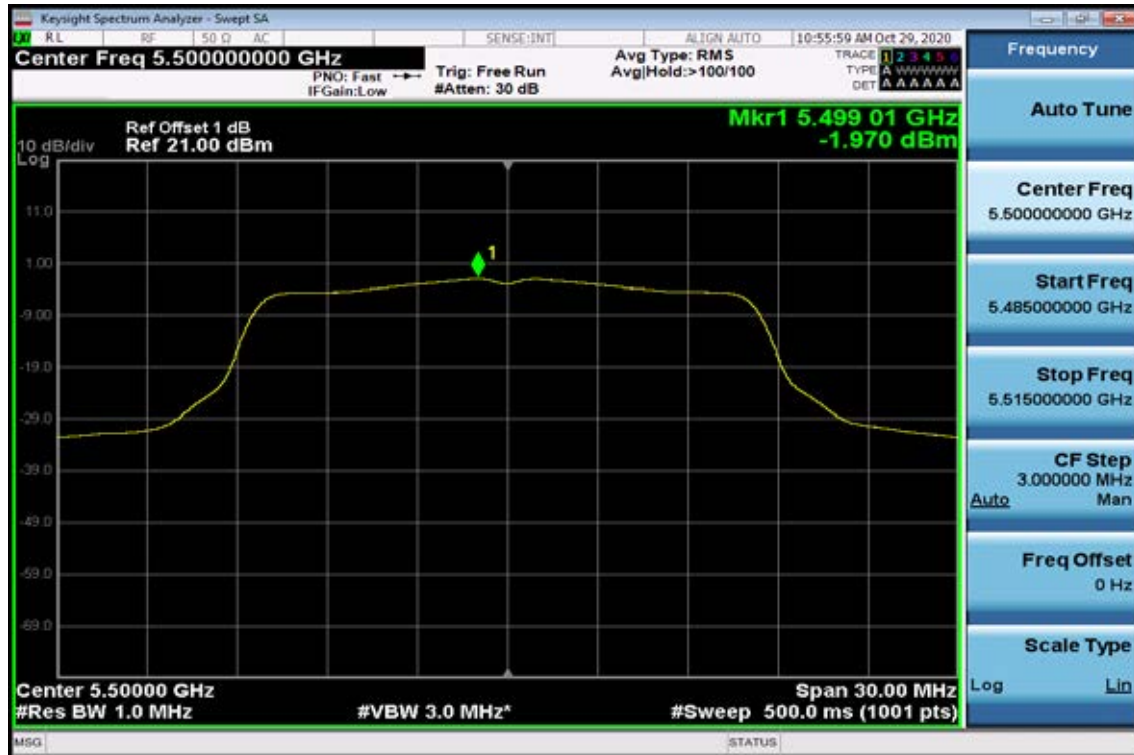
Power Spectral Density Test Plot (CH-Low)



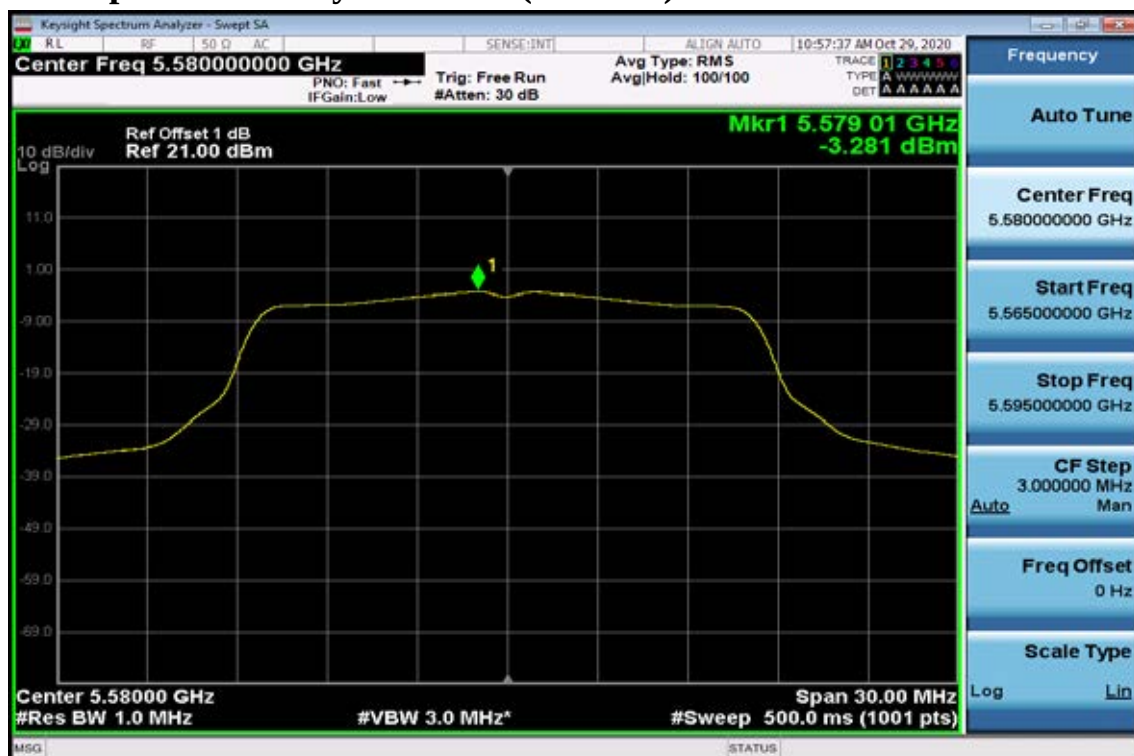
Band UNII-2C

802.11a

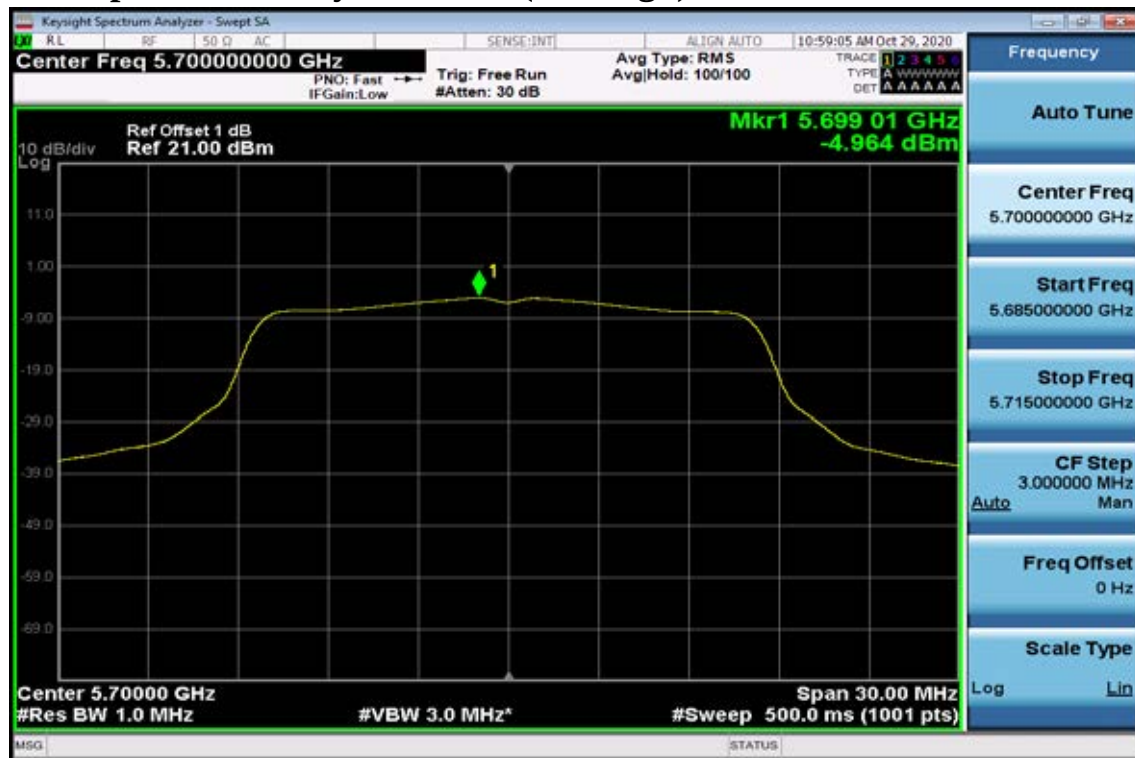
Power Spectral Density Data Plot (CH Low)



Power Spectral Density Data Plot (CH Mid)

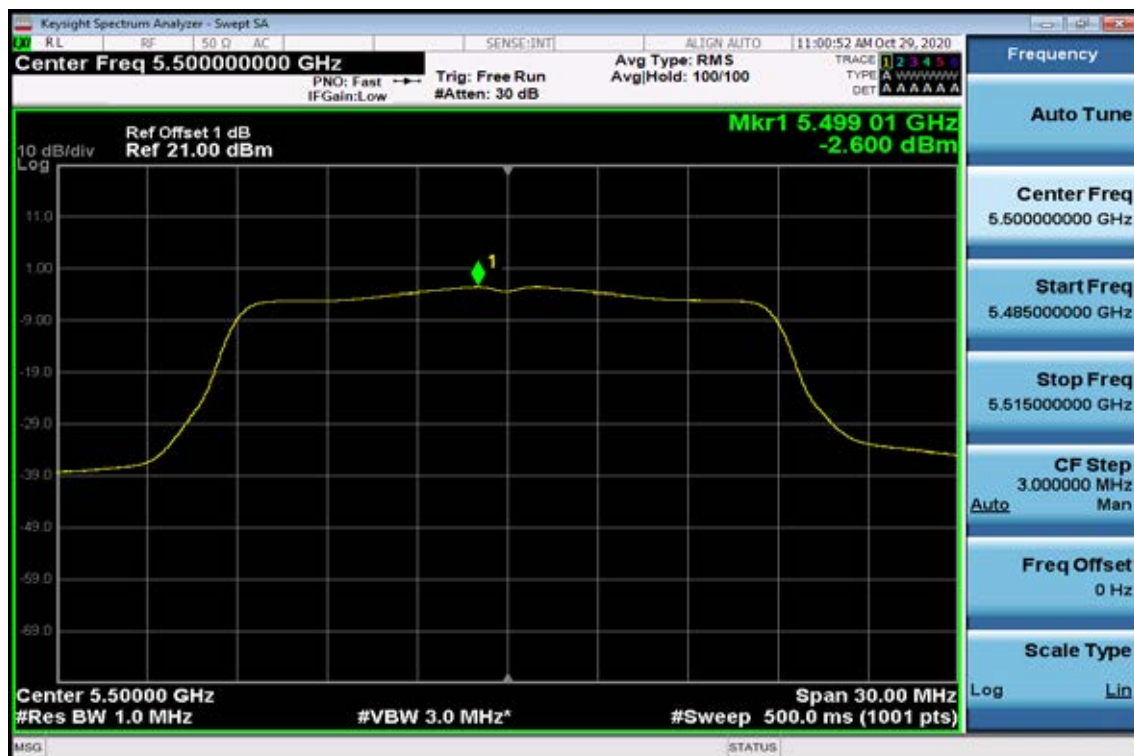


Power Spectral Density Data Plot (CH High)

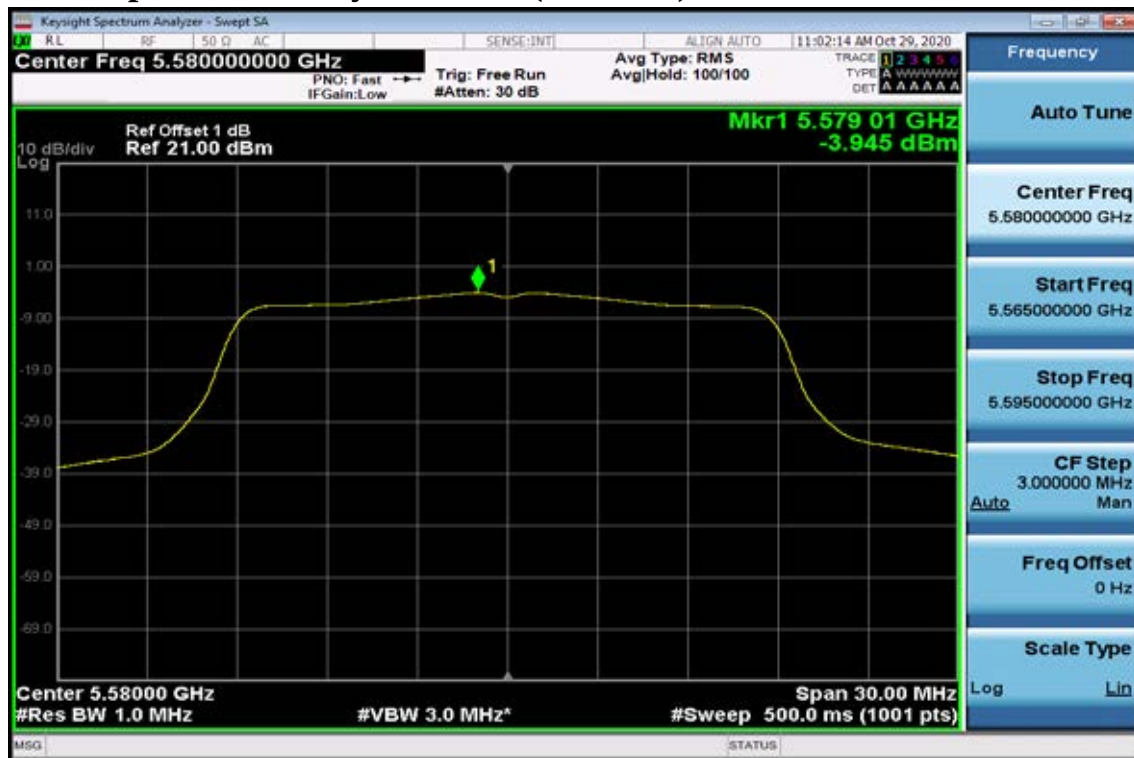


802.11n HT20

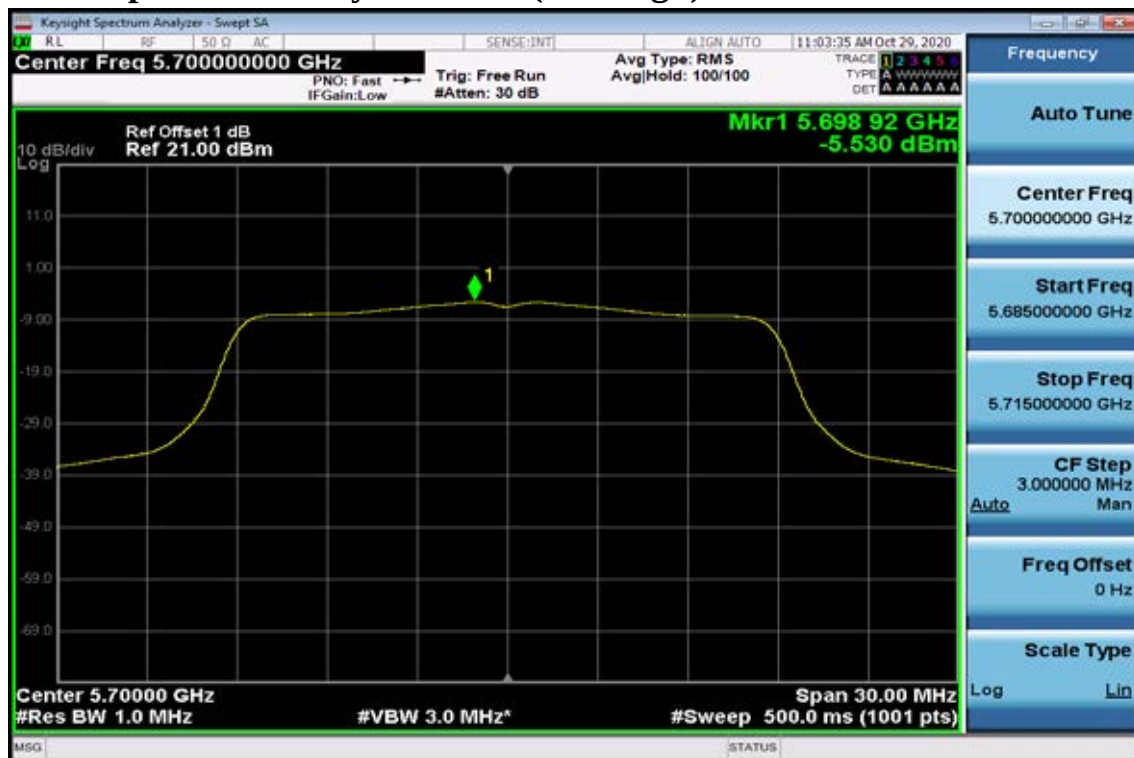
Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High)



802.11ac VHT20

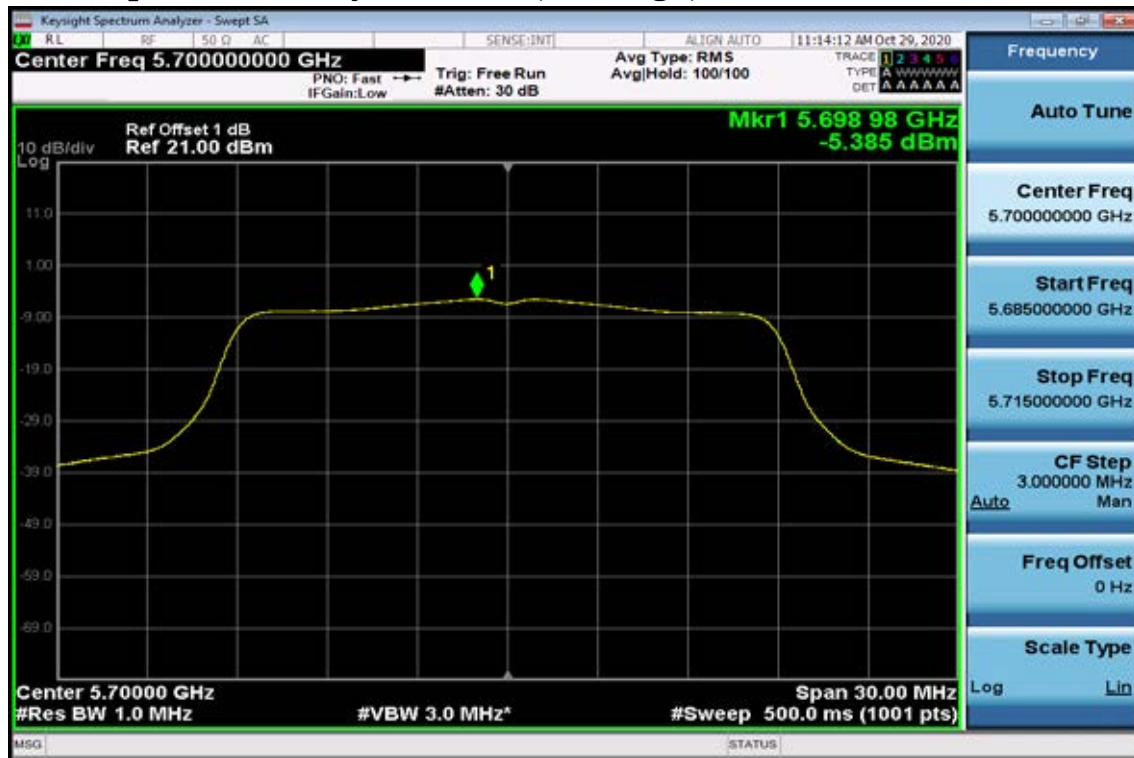
Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High)



802.11n HT40

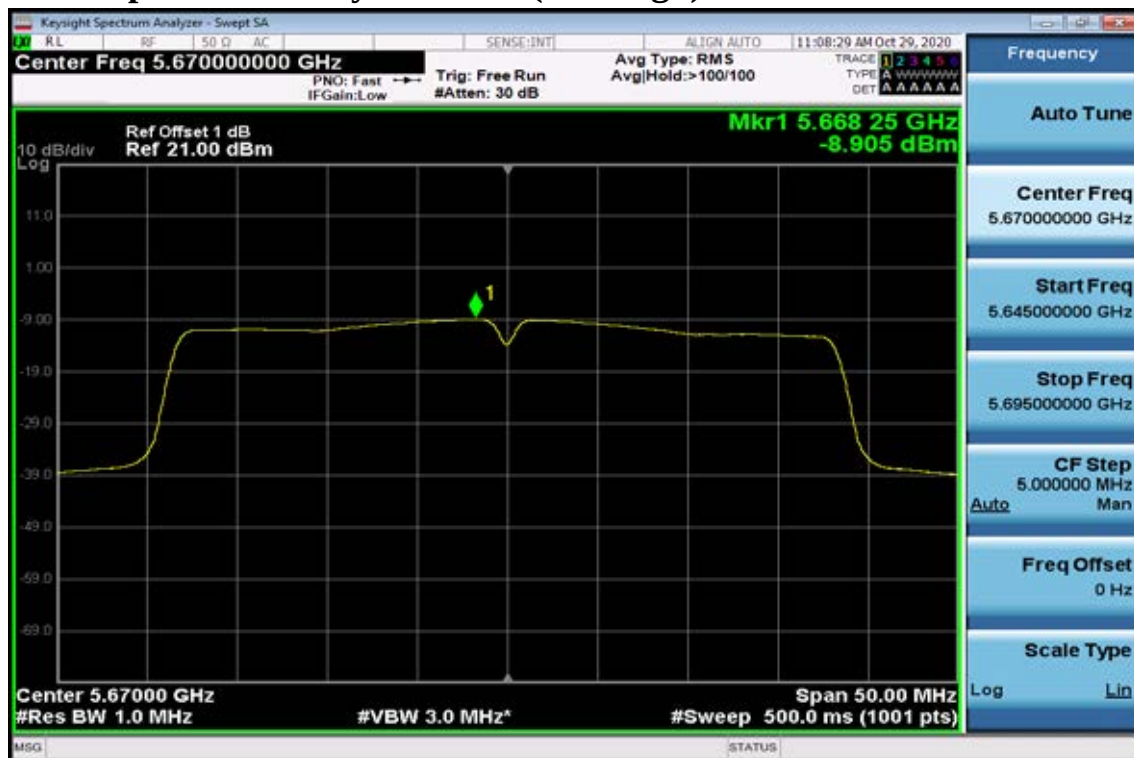
Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High)



802.11ac VHT40

Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)

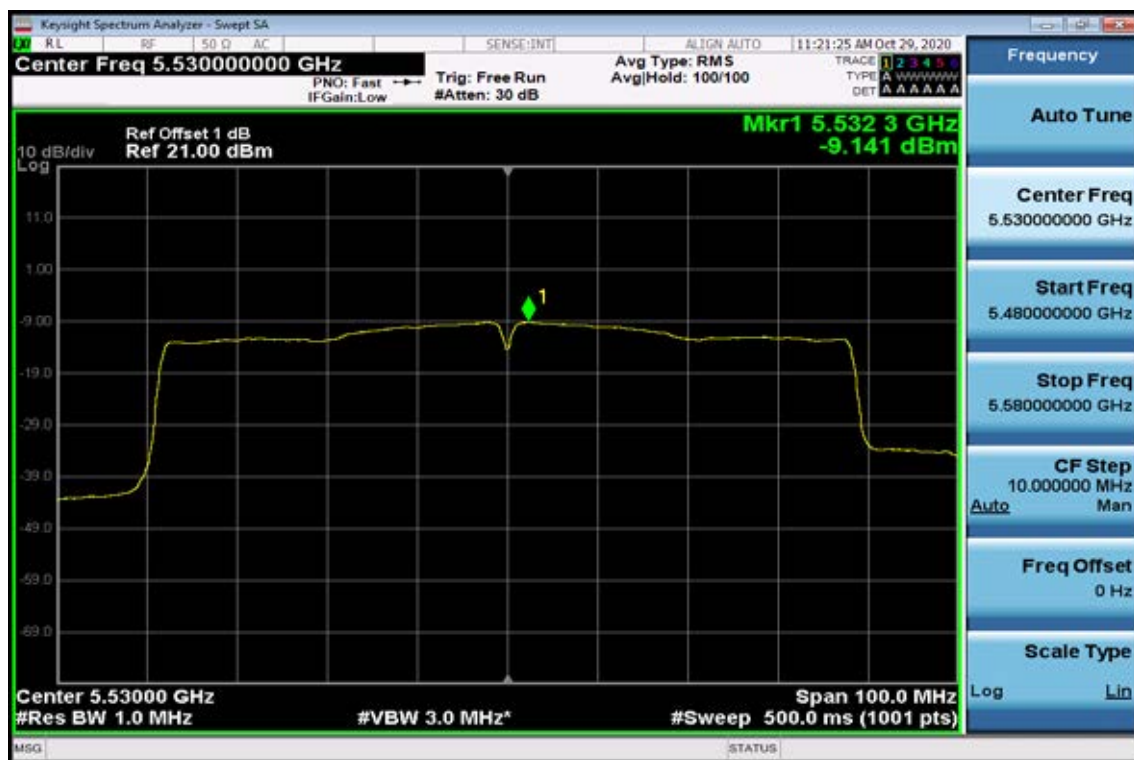


Power Spectral Density Test Plot (CH-High)



802.11 ac VHT80

Power Spectral Density Test Plot (CH-Low)



802.11 ac VHT80

Power Spectral Density Test Plot (CH-High)



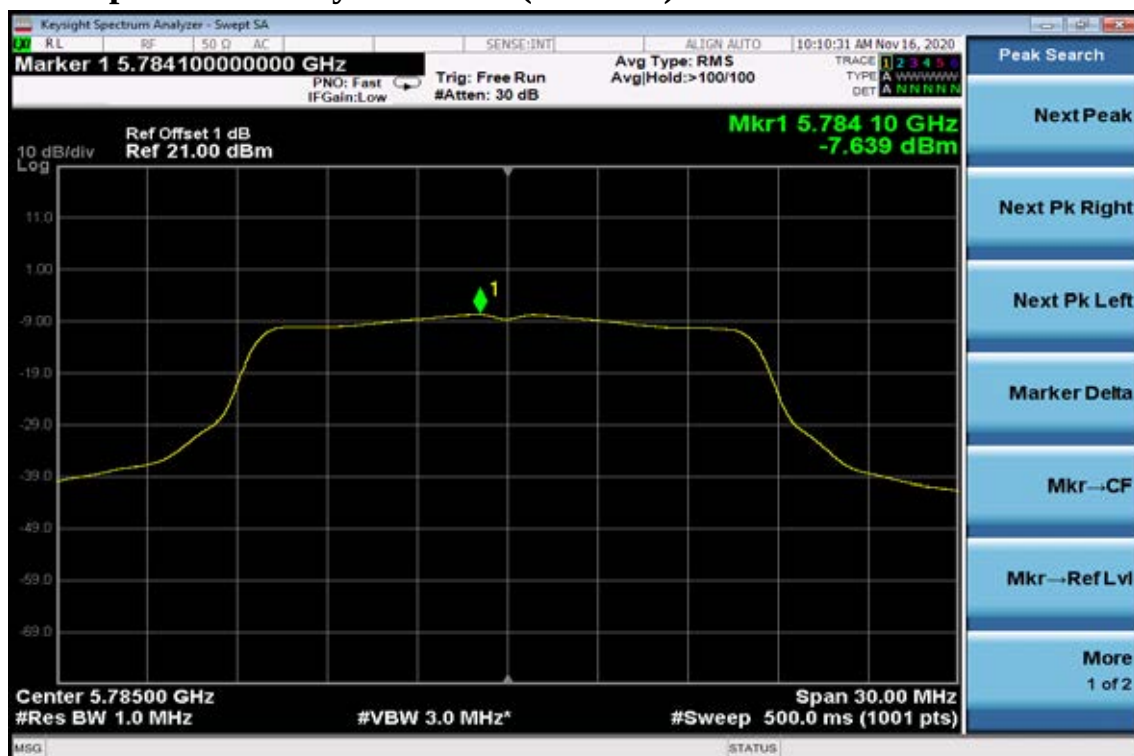
Band UNII-3

802.11a

Power Spectral Density Data Plot (CH Low)



Power Spectral Density Data Plot (CH Mid)



Power Spectral Density Data Plot (CH High)



802.11n HT20

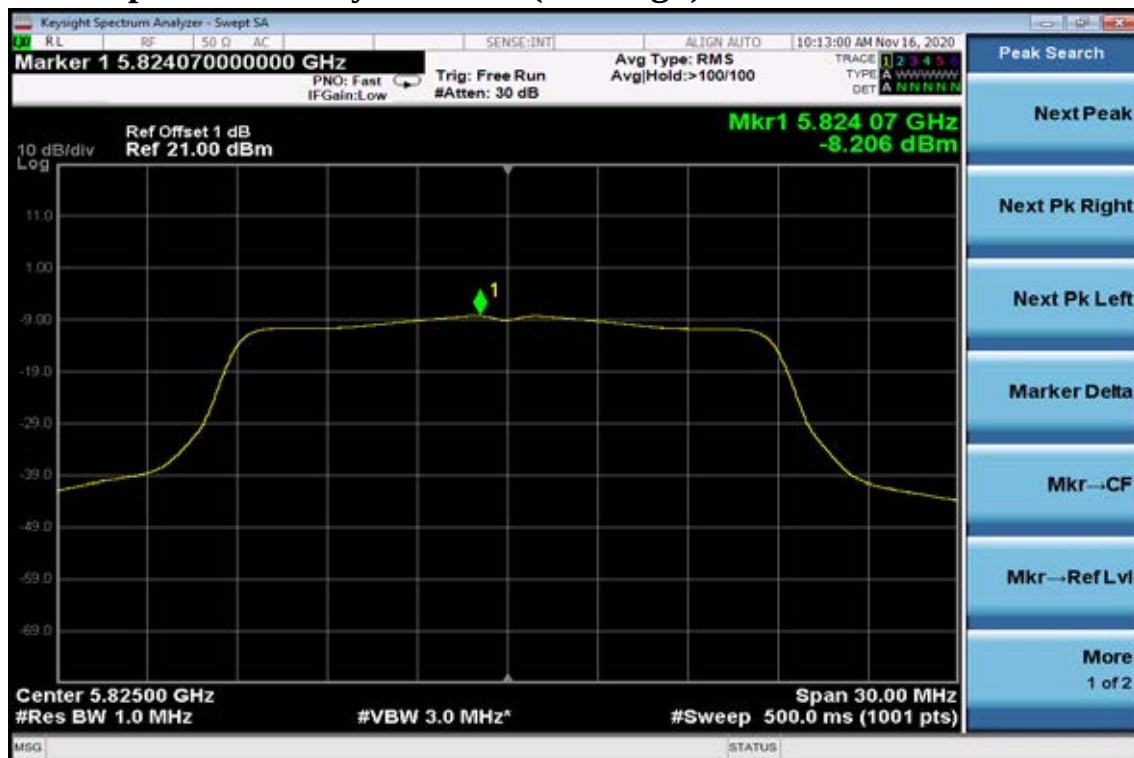
Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High)

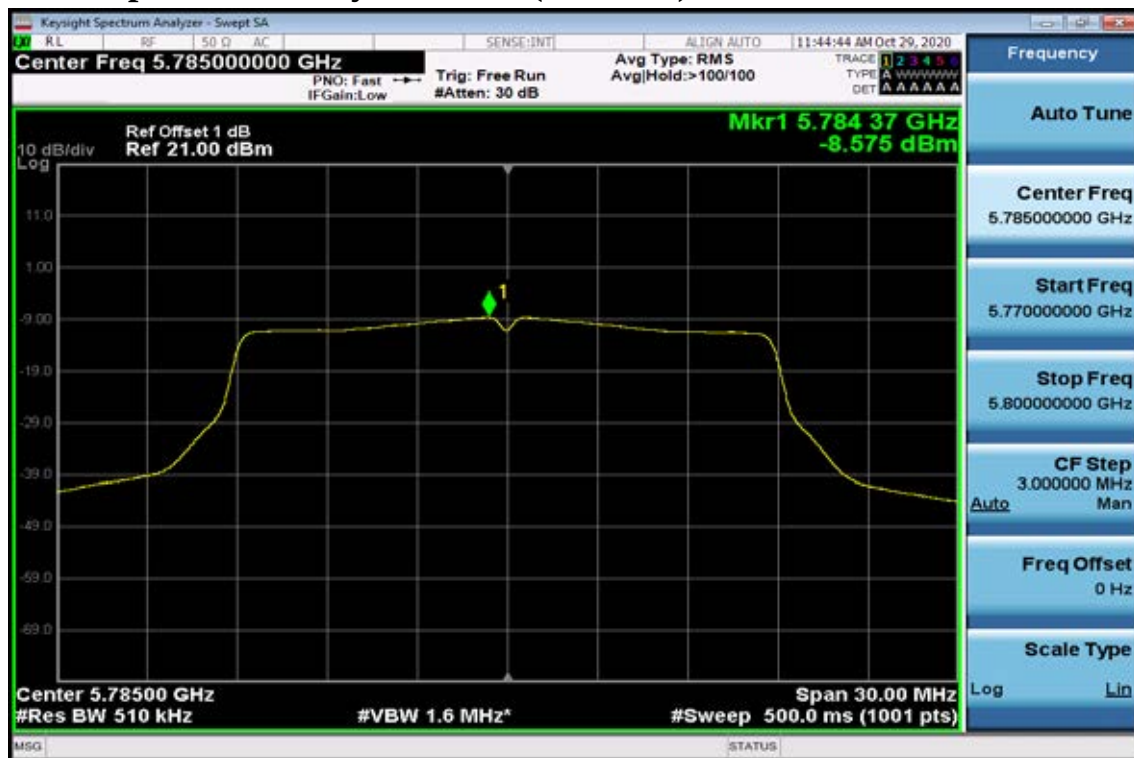


802.11ac VHT20

Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High)



802.11n HT40

Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-High)



802.11ac VHT40

Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-High)



802.11 ac VHT80, Power Spectral Density Test Plot



7. 26dB /99% Emission Bandwidth Measurement

7.1. Standard Applicable

According to §15.407(a) for band 1,2,3. No Limit required.

7.2. Measurement Procedure

2. Place the EUT on the table and set it in transmitting mode.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
4. Set the spectrum analyzer as RBW=300kHz, VBW =1MHz, Span= 50MHz, Sweep=auto
5. Mark the peak frequency and -26dB (upper and lower) frequency.
6. Repeat above procedures until all frequency measured were complete.

Refer to section D of KDB Document: KDB 789033 D02 General UNII Test Procedures New Rules v01r03

7.3. Measurement Equipment Used:

Refer to section 6.3 for details.

7.4. Test Set-up:

Refer to section 6.4 for details.

7.5. Measurement Result

Temperature(C) 23 Humidity(%) 77

Band	Mode	Frequency (MHz)	26dB Bandwidth (MHz)	99% OBW (MHz)
UNII-1	11a	5180	29.95	17.45
		5200	30.00	17.49
		5240	30.00	17.59
	HT20	5180	29.51	18.26
		5200	29.50	18.23
		5240	29.71	18.30
	HT40	5190	49.93	36.45
		5230	49.91	36.47
	VHT20	5180	29.94	18.27
		5200	28.35	18.28
		5240	29.87	18.34
	VHT40	5190	50.00	36.54
		5230	49.98	36.47
	VHT80	5210	98.25	75.75

Band	Mode	Frequency (MHz)	26dB Bandwidth (MHz)	99% OBW (MHz)	Power Limit (dBm)
UNII-2A	11a	5260	29.97	17.42	23.98
		5300	29.74	17.49	23.98
		5320	29.79	17.44	23.98
	HT20	5260	29.85	18.37	23.98
		5300	29.70	18.29	23.98
		5320	28.34	18.28	23.98
	HT40	5270	50.00	36.45	23.98
		5310	49.67	36.48	23.98
	VHT20	5260	28.70	18.23	23.98
		5300	29.02	18.28	23.98
		5320	30.00	18.22	23.98
	VHT40	5270	49.18	36.48	23.98
		5310	49.53	36.52	23.98
	VHT80	5290	99.73	75.72	23.98

For Band UNII-2A:

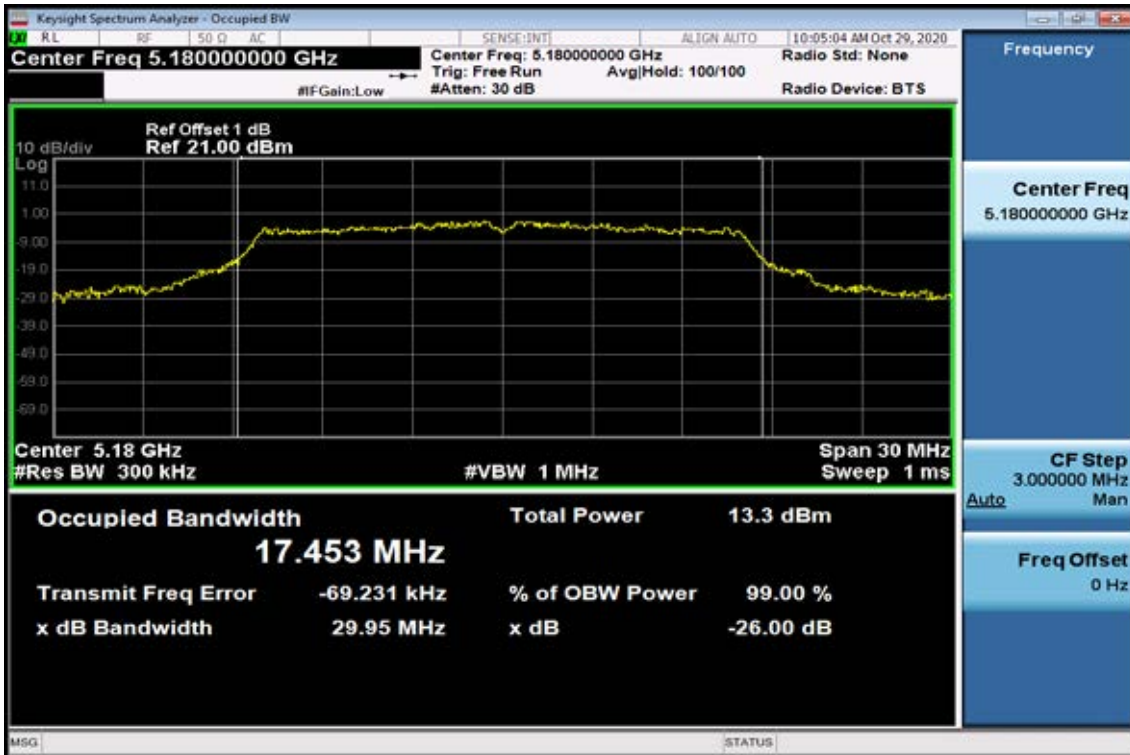
Max. Output Power Limit = 250mW or $11+10*\text{Log}(B)$, whichever is less. Where B is 26dB BW in MHz.

Band	Mode	Frequency (MHz)	26dB Bandwidth (MHz)	99% OBW (MHz)	Power Limit (dBm)
UNII-2C	11a	5500	28.36	17.14	23.98
		5580	23.74	17.11	23.98
		5700	26.83	17.16	23.98
	HT20	5500	24.74	18.10	23.98
		5580	25.96	18.14	23.98
		5700	24.19	18.15	23.98
	HT40	5510	47.44	36.40	23.98
		5550	44.78	36.36	23.98
		5670	48.92	36.41	23.98
	VHT20	5500	24.14	18.11	23.98
		5580	27.83	18.12	23.98
		5700	26.22	18.14	23.98
	VHT40	5510	45.20	36.41	23.98
		5550	45.24	36.39	23.98
		5670	49.92	36.44	23.98
	VHT80	5530	91.02	75.64	23.98
		5610	96.89	75.50	23.98
For Band UNII-2C: Max. Output Power Limit = 250mW or 11+10*Log(B), whichever is less. Where B is 26dB BW in MHz.					

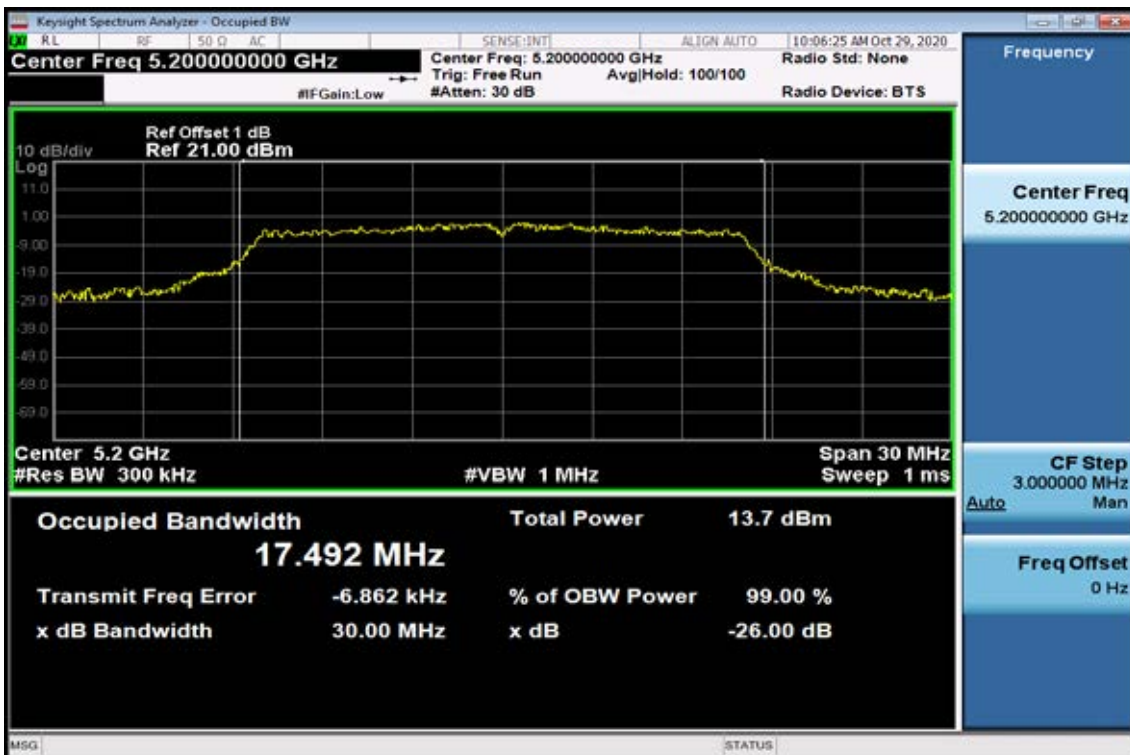
Band UNII-1

802.11a

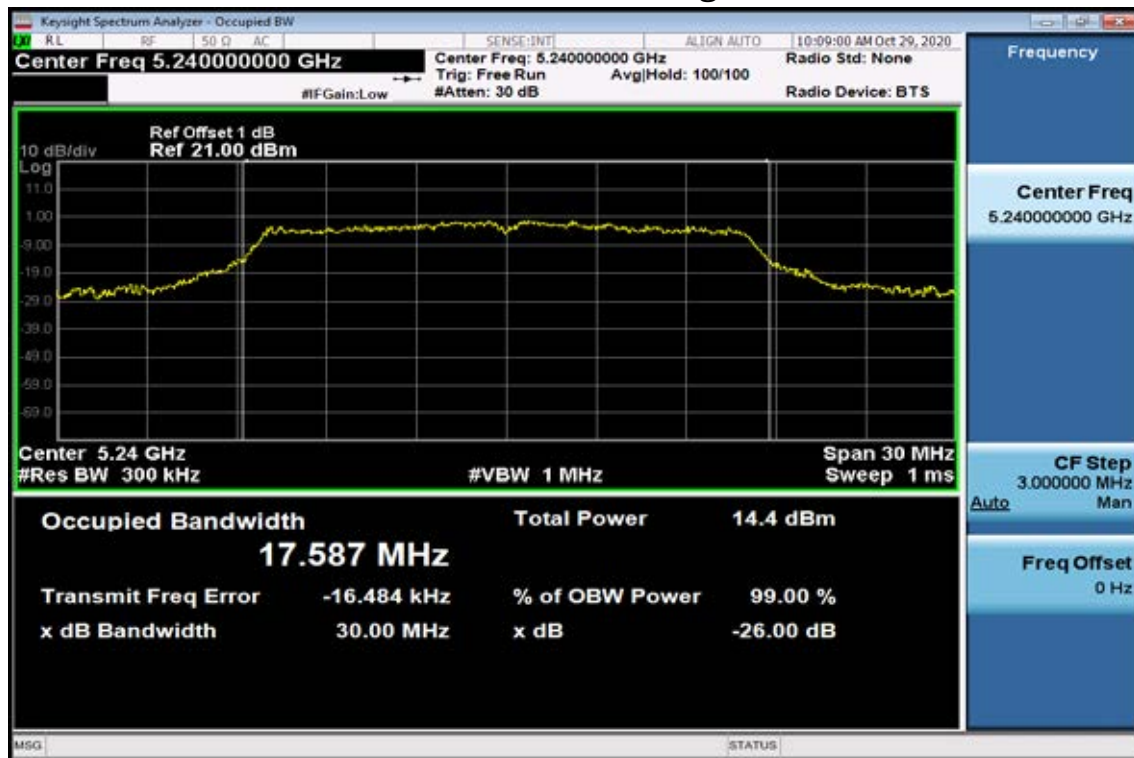
26dB / 99% Band Width Test Data CH-Low



26dB / 99% Band Width Test Data CH-Mid

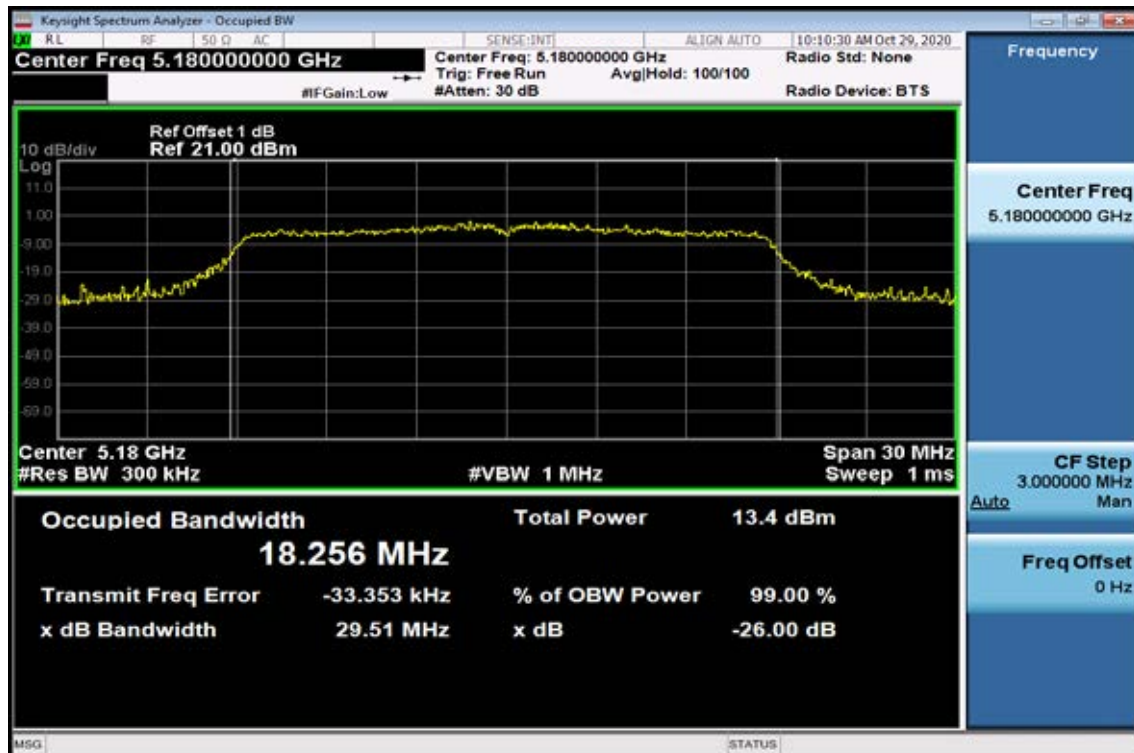


26dB / 99% Band Width Test Data CH-High

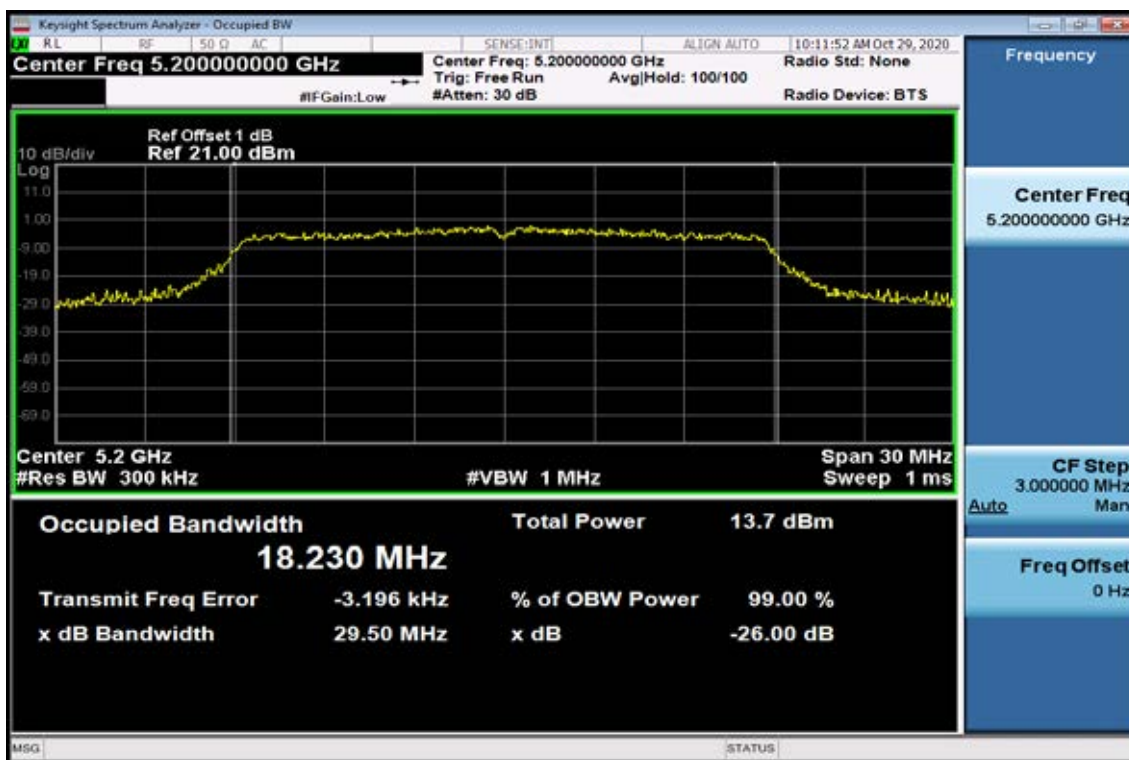


802.11n HT20

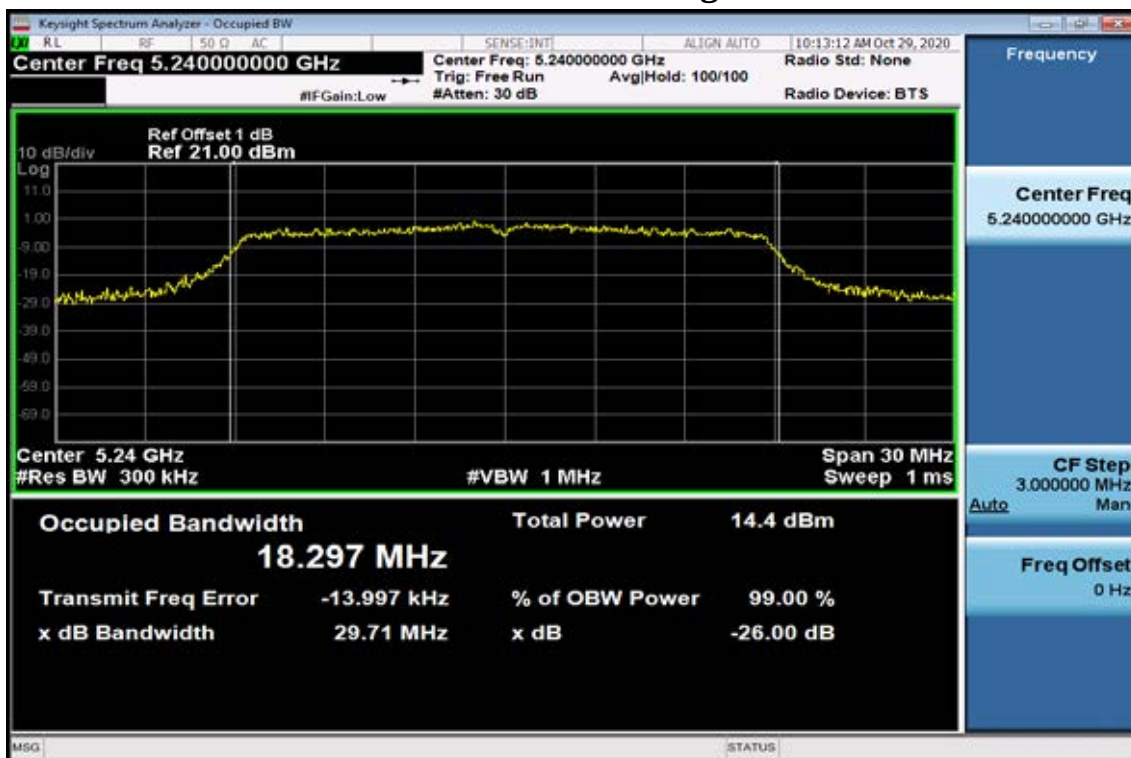
26dB / 99% Band Width Test Data CH-Low



26dB / 99% Band Width Test Data CH-Mid

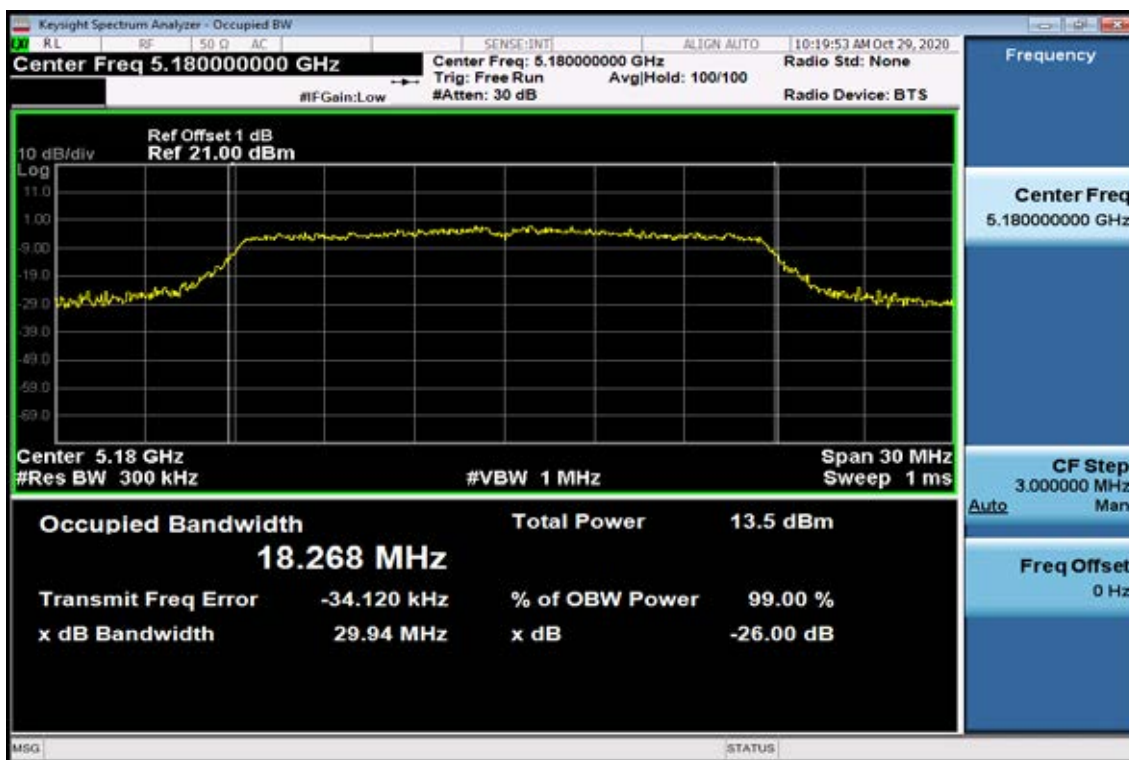


26dB / 99% Band Width Test Data CH-High

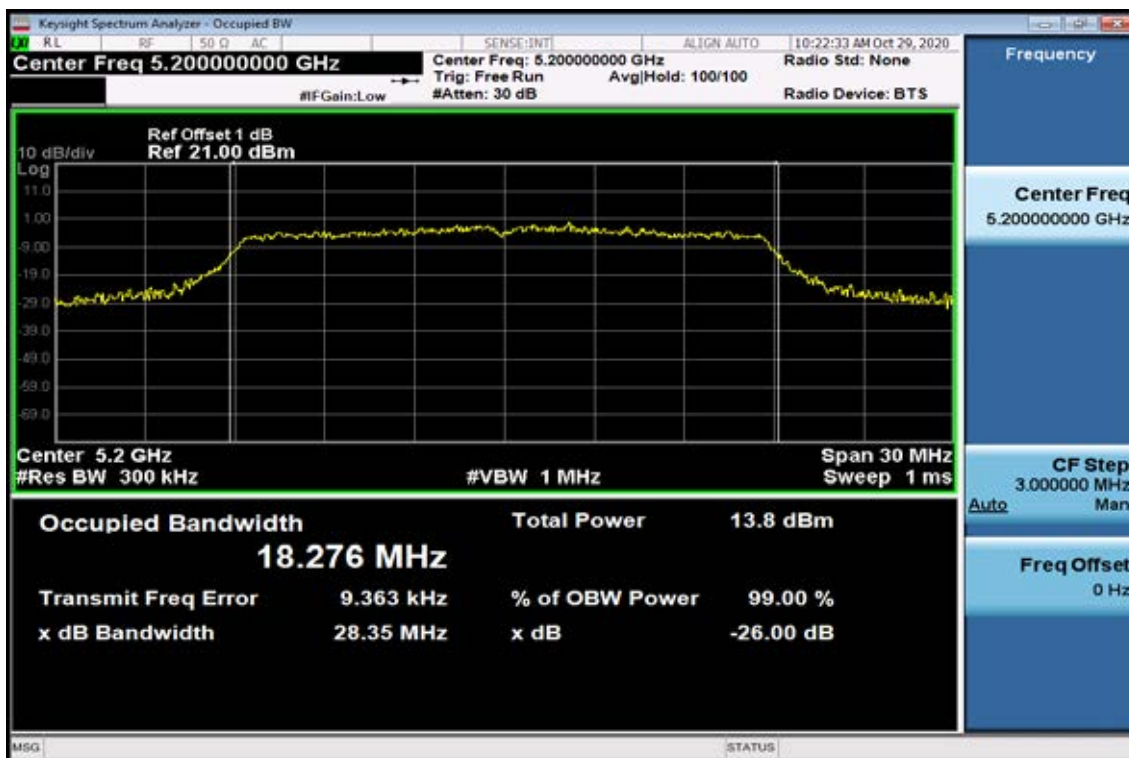


802.11ac VHT20

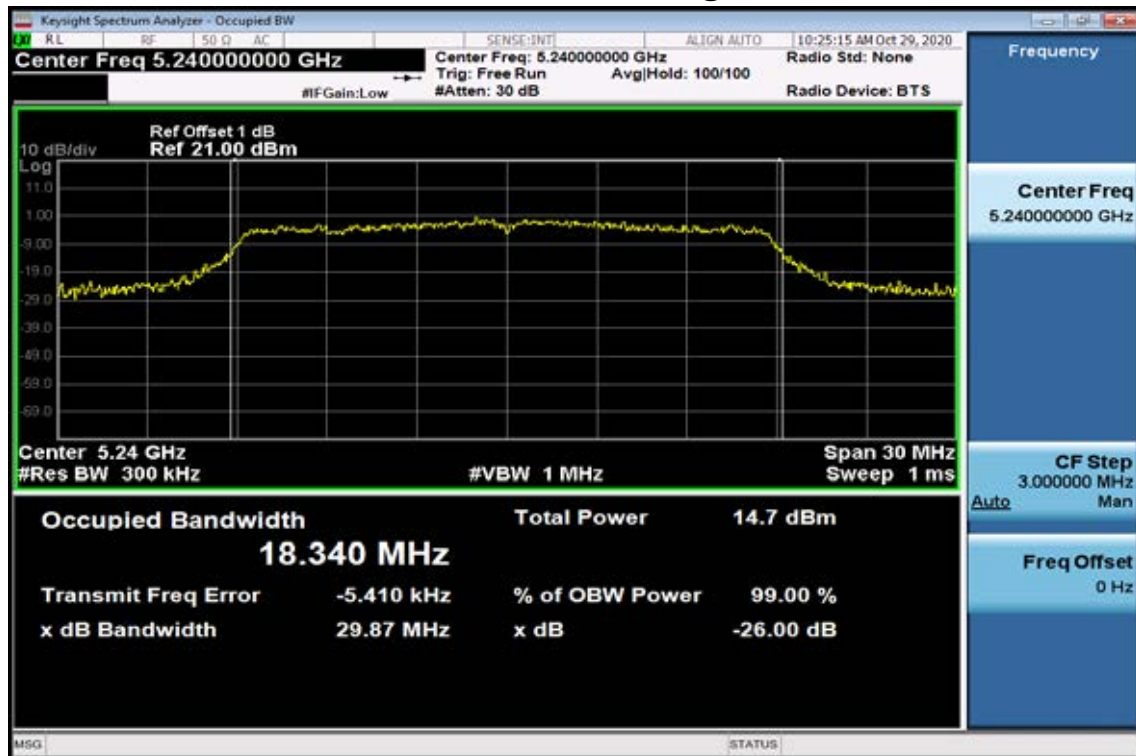
26dB / 99% Band Width Test Data CH-Low



26dB / 99% Band Width Test Data CH-Mid

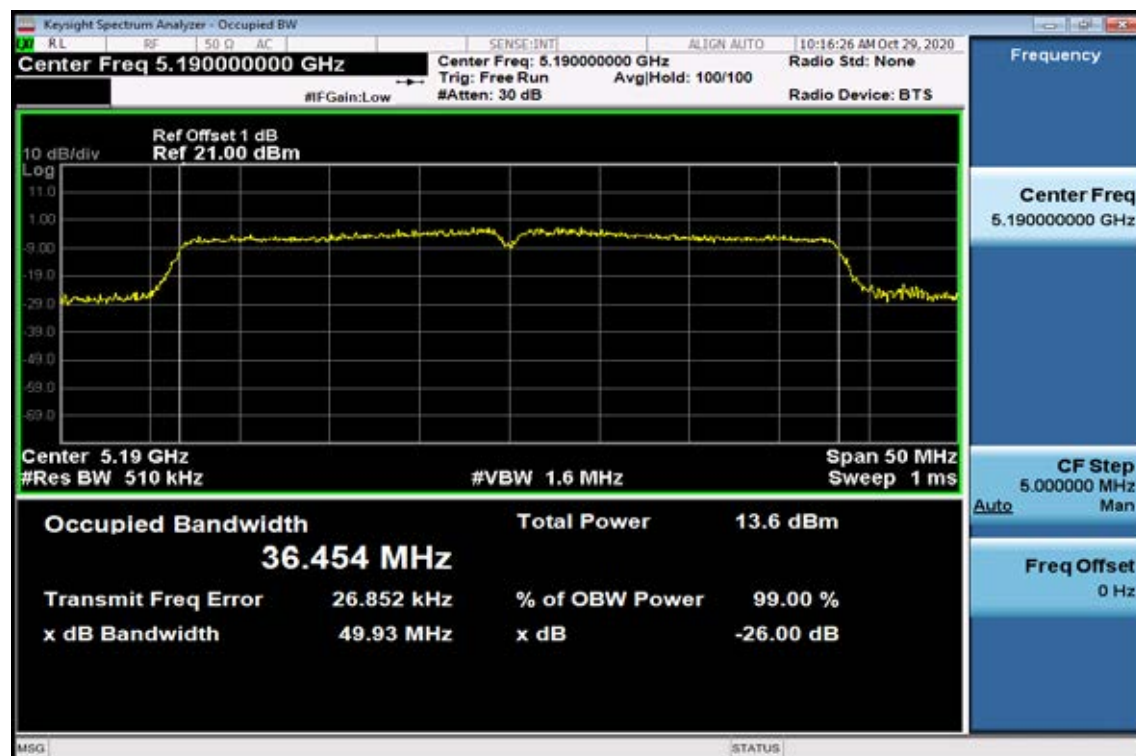


26dB / 99% Band Width Test Data CH-High

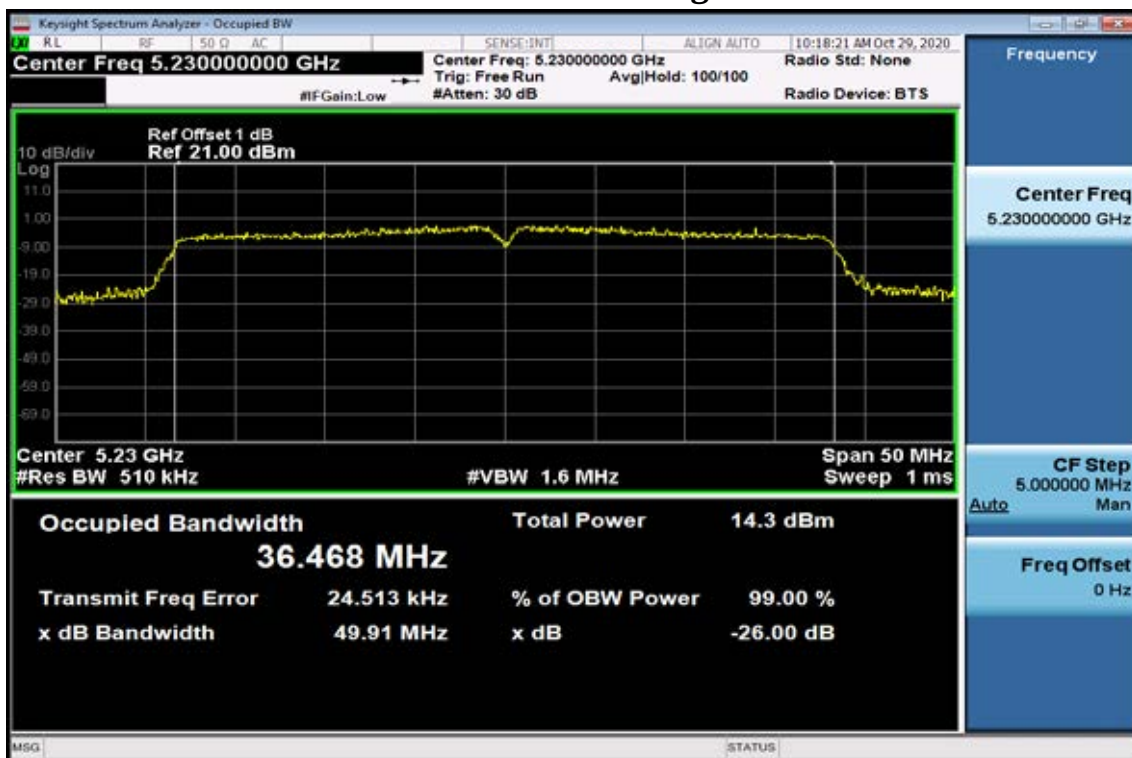


802.11n HT40

26dB / 99% Band Width Test Data CH-Low

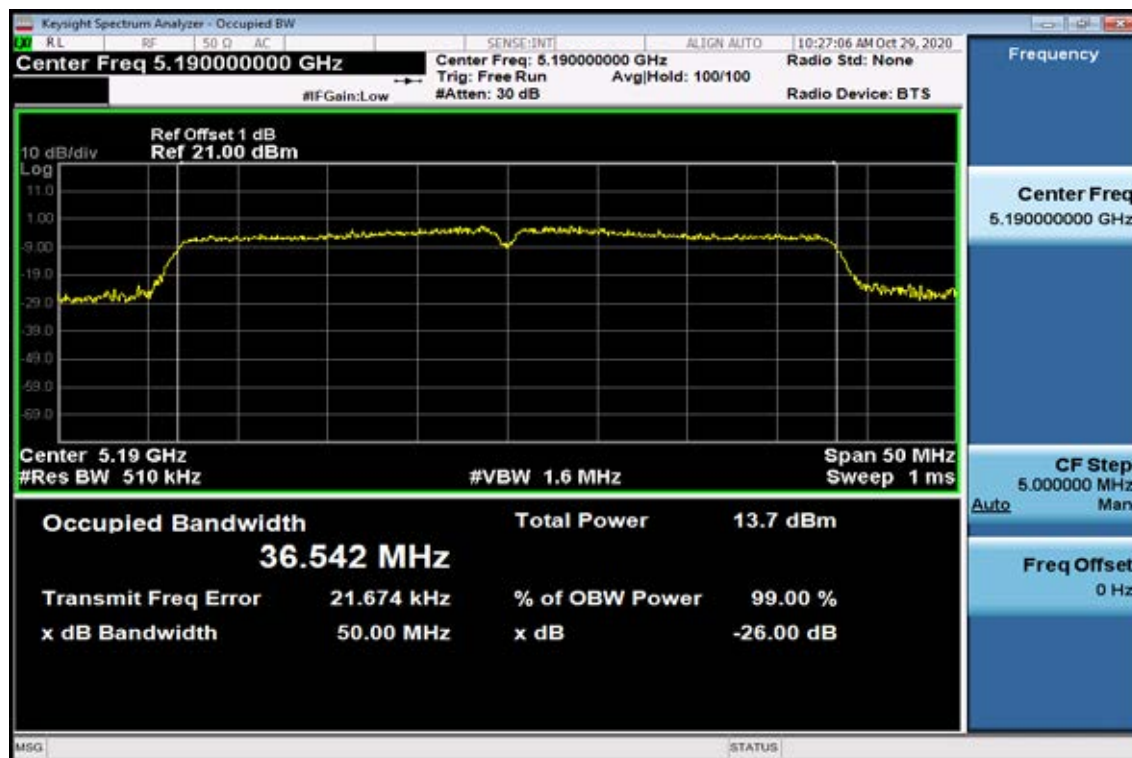


26dB / 99% Band Width Test Data CH-High

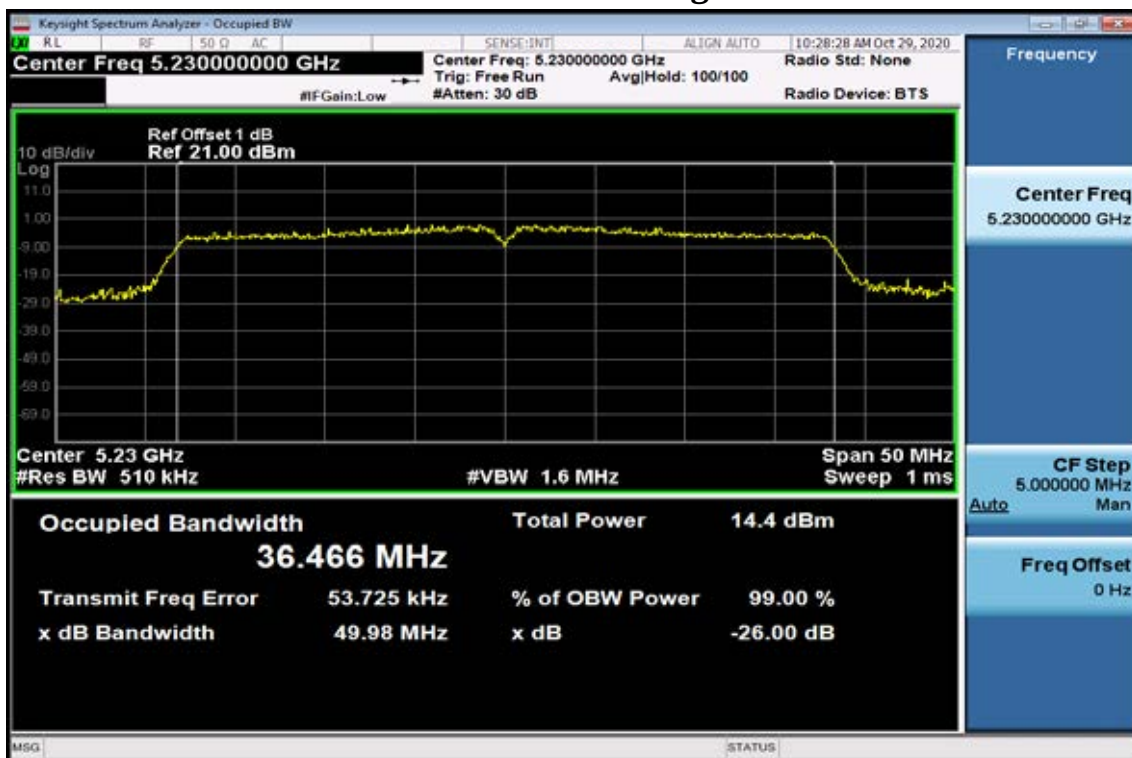


802.11ac VHT40

26dB / 99% Band Width Test Data CH-Low

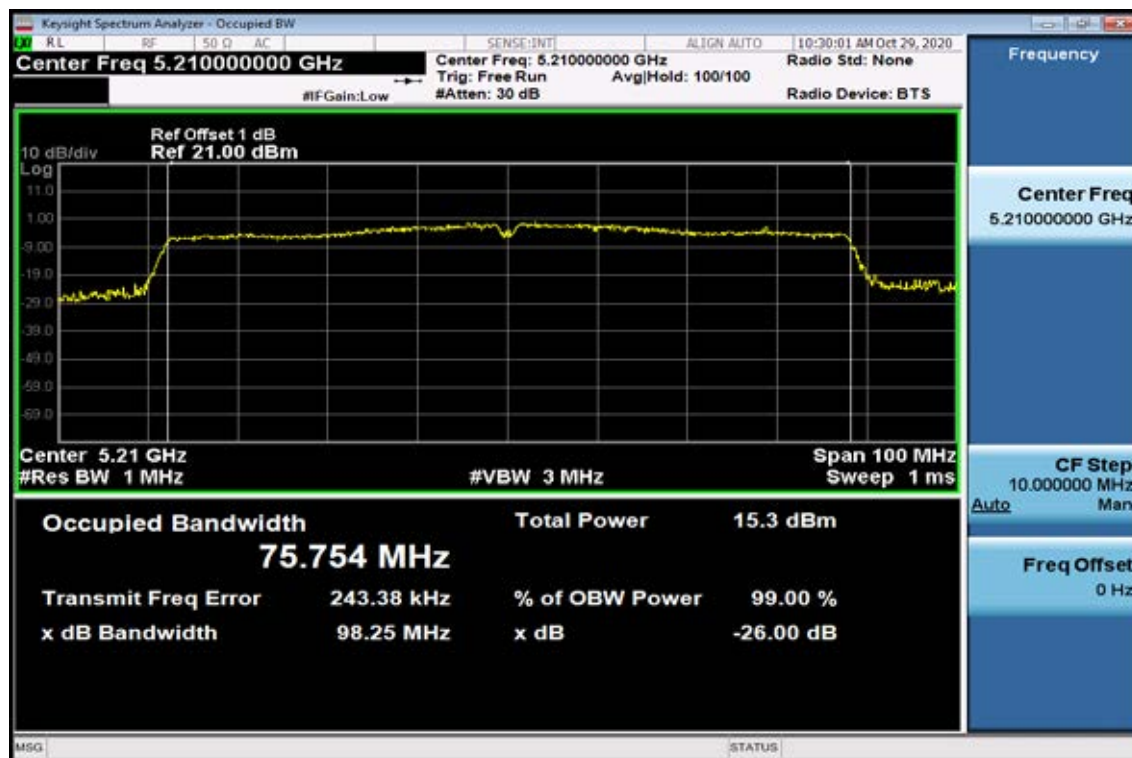


26dB / 99% Band Width Test Data CH-High



802.11 ac VHT80

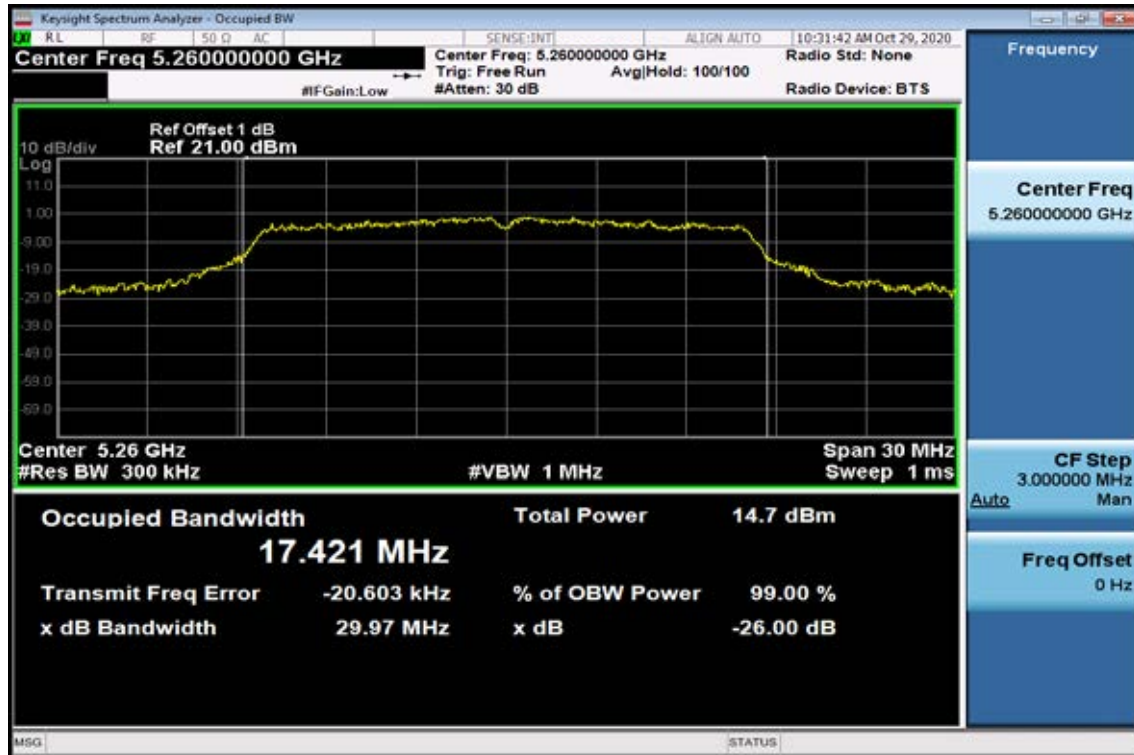
26dB / 99% Band Width Test Data



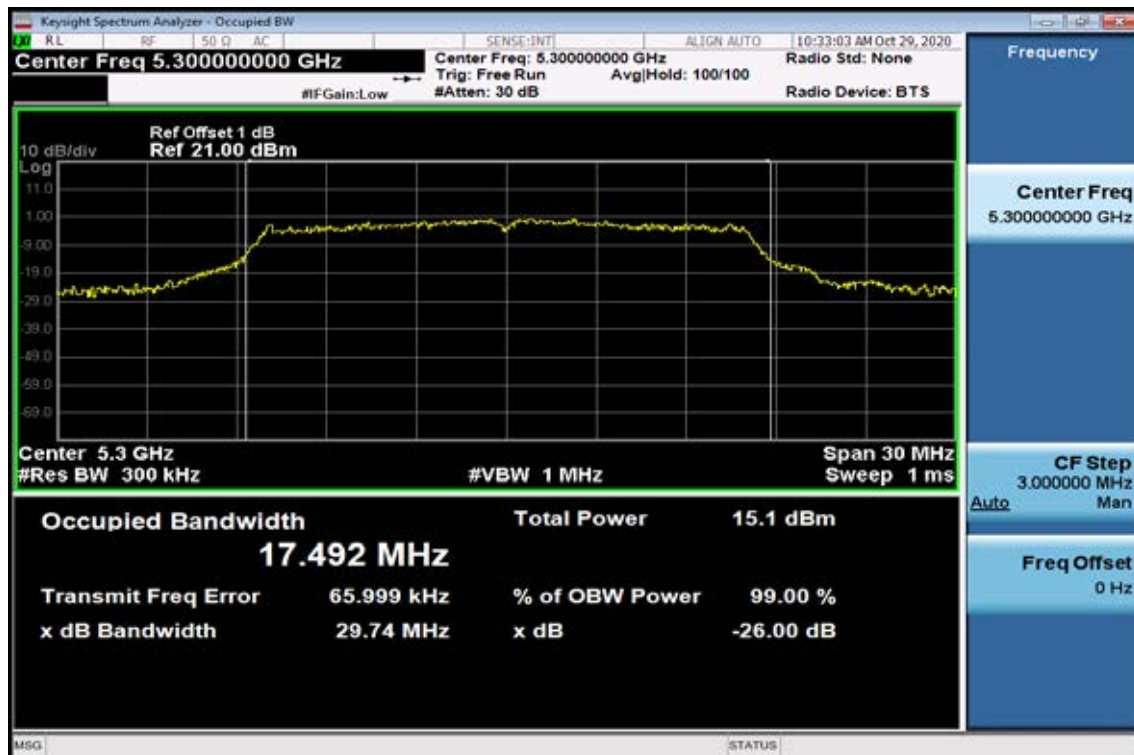
Band UNII-2A

802.11a

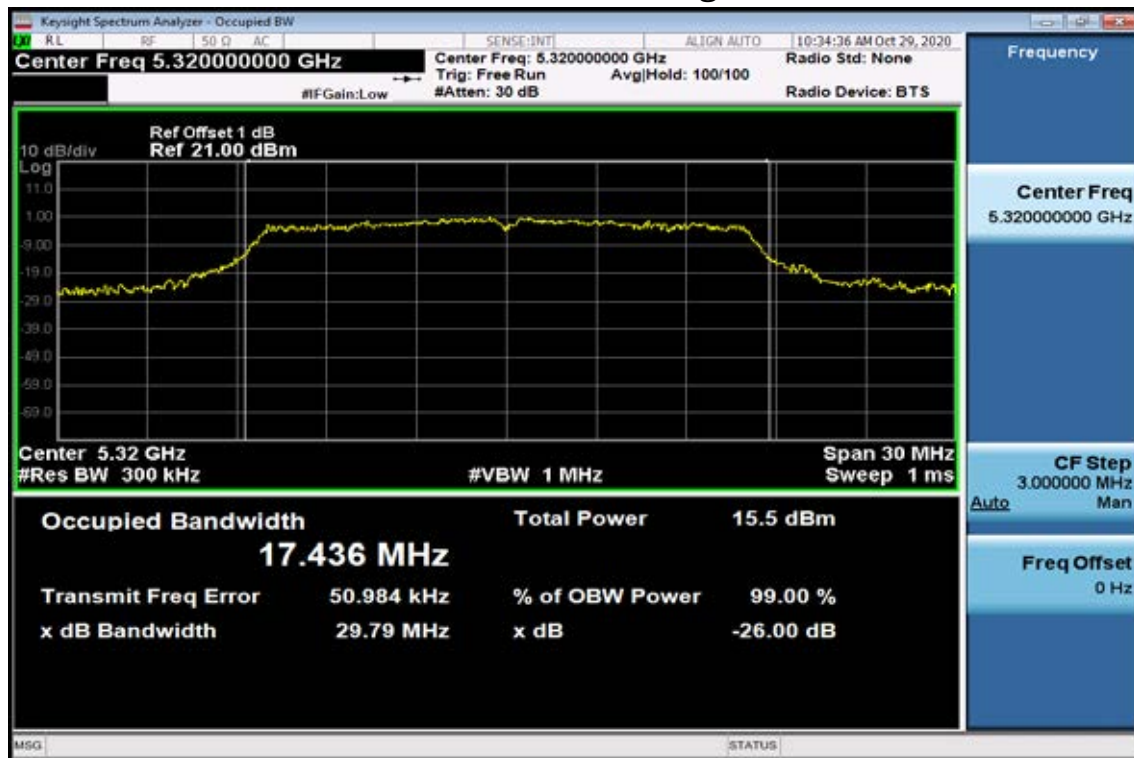
26dB / 99% Band Width Test Data CH-Low



26dB / 99% Band Width Test Data CH-Mid

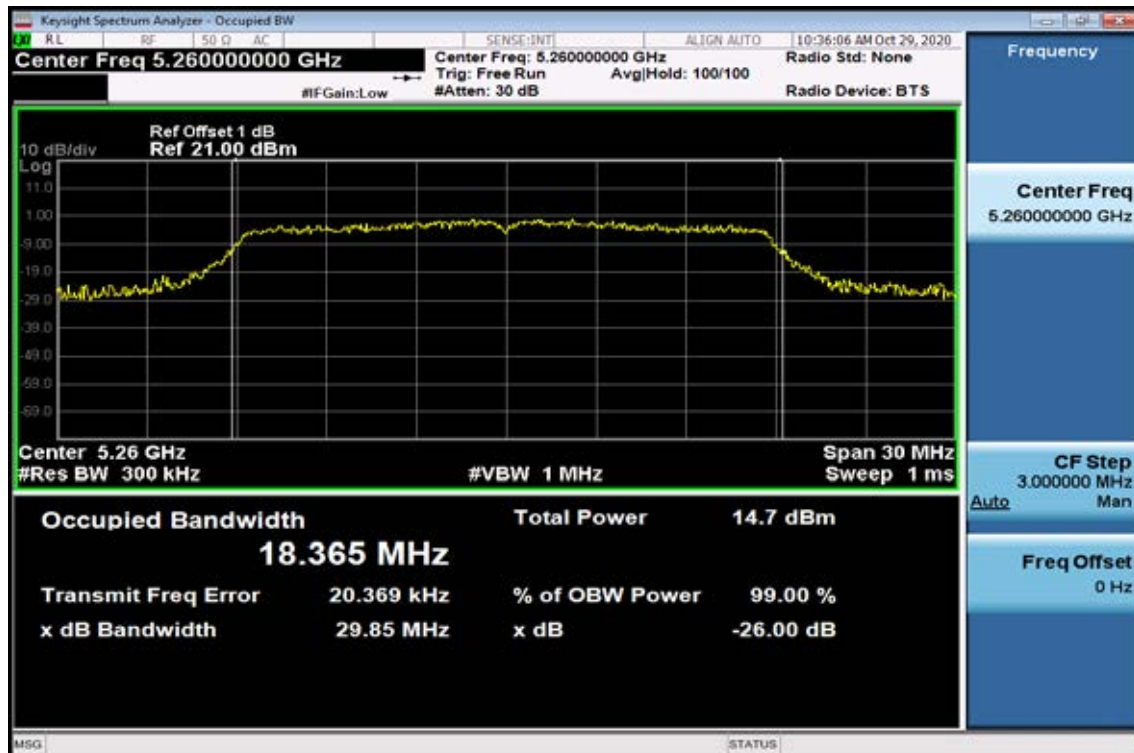


26dB / 99% Band Width Test Data CH-High

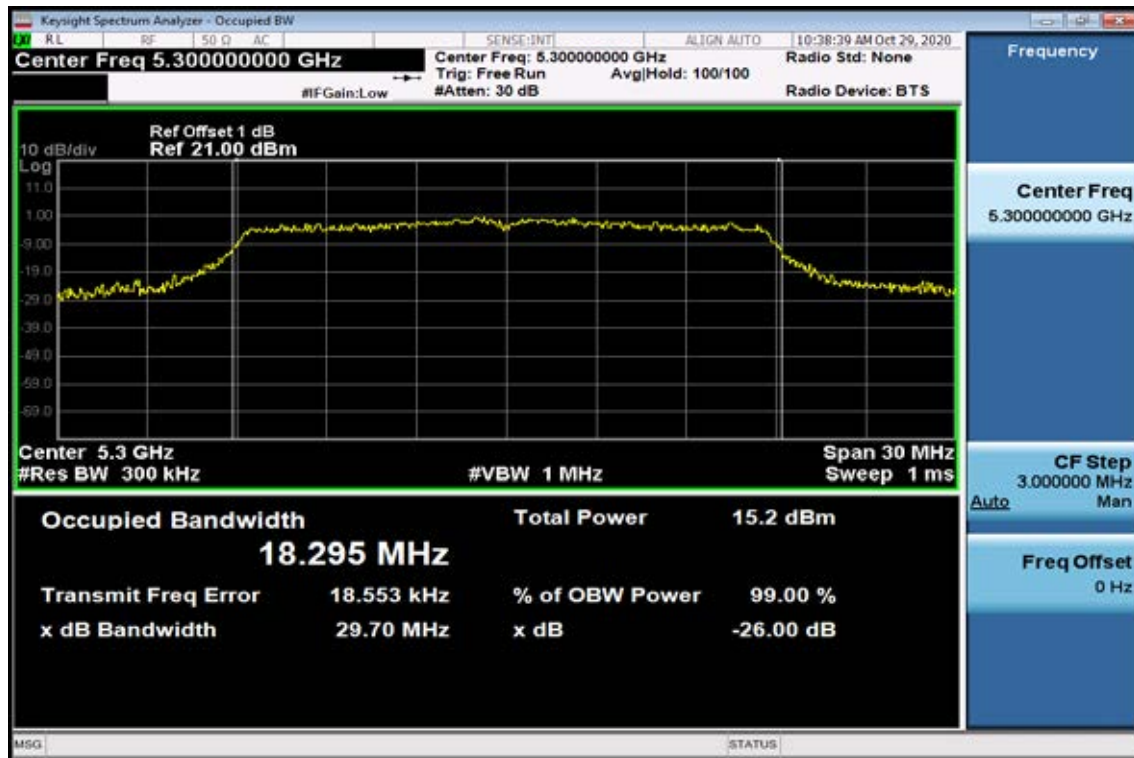


802.11n HT20

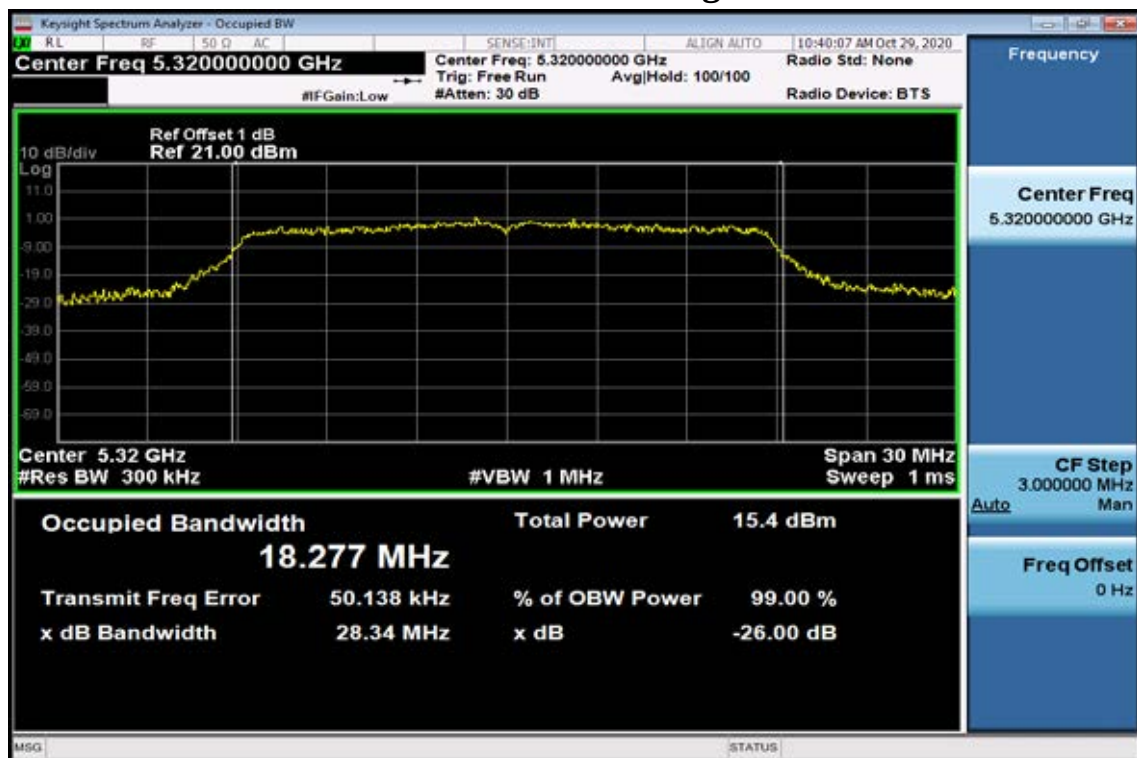
26dB / 99% Band Width Test Data CH-Low



26dB / 99% Band Width Test Data CH-Mid

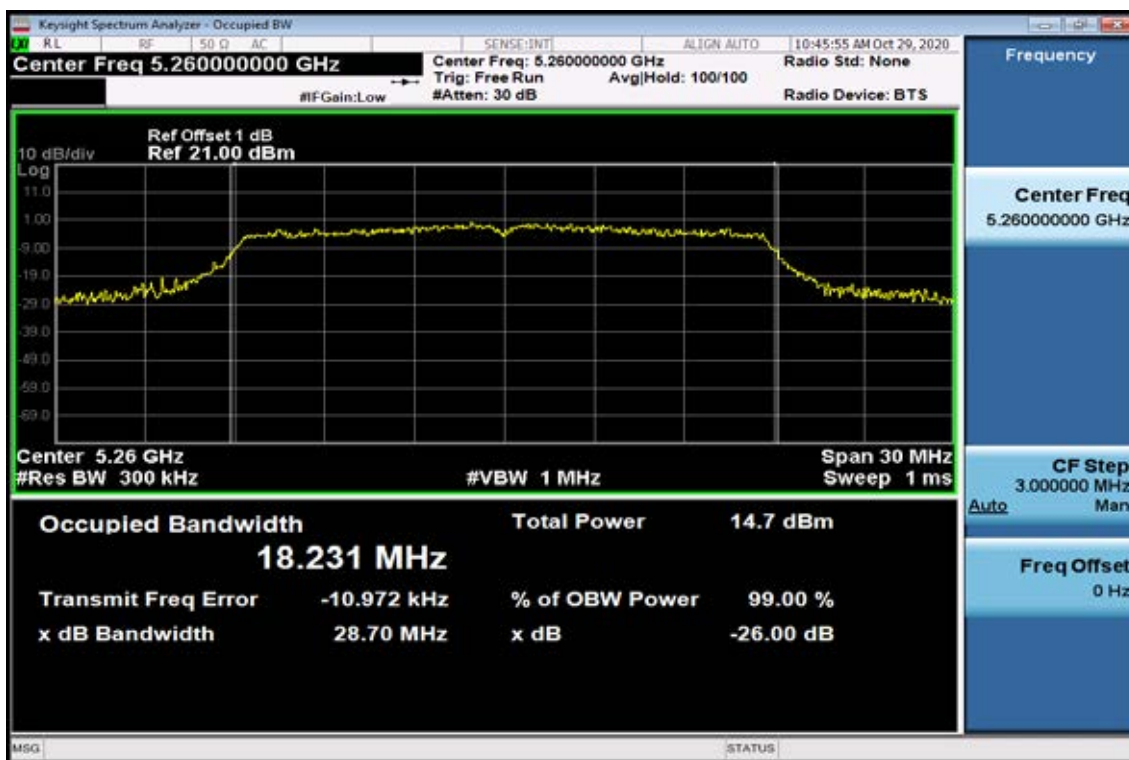


26dB / 99% Band Width Test Data CH-High

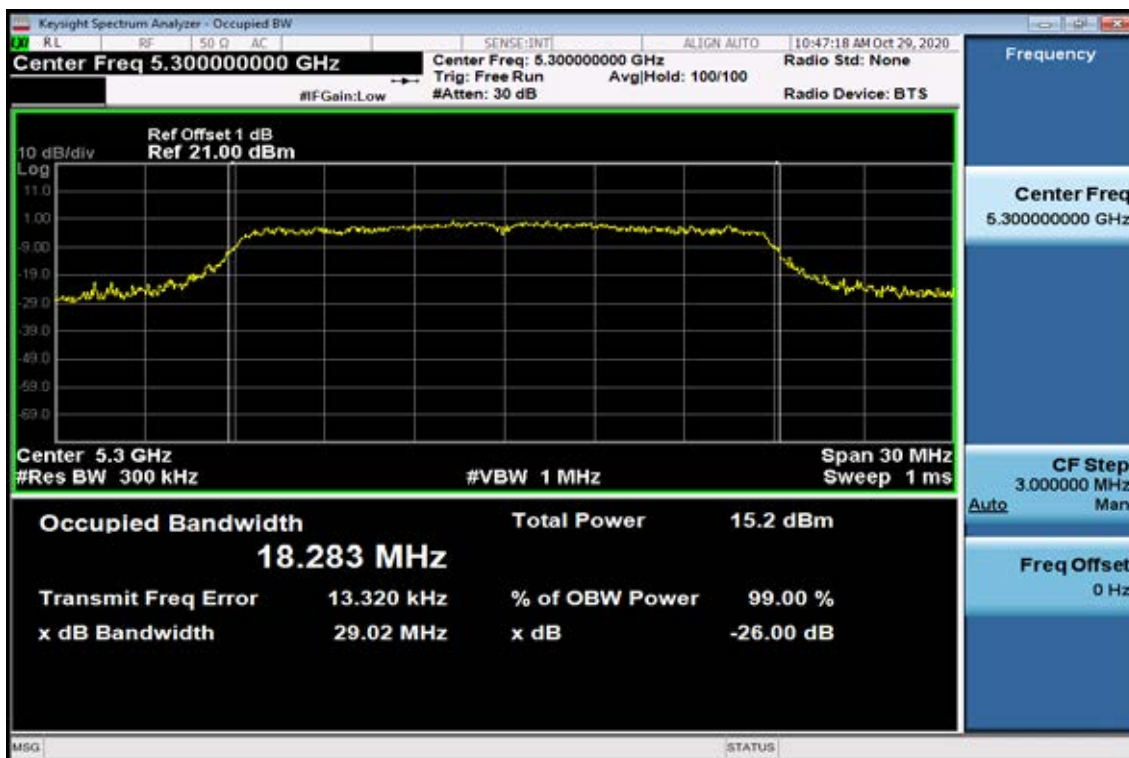


802.11ac VHT20

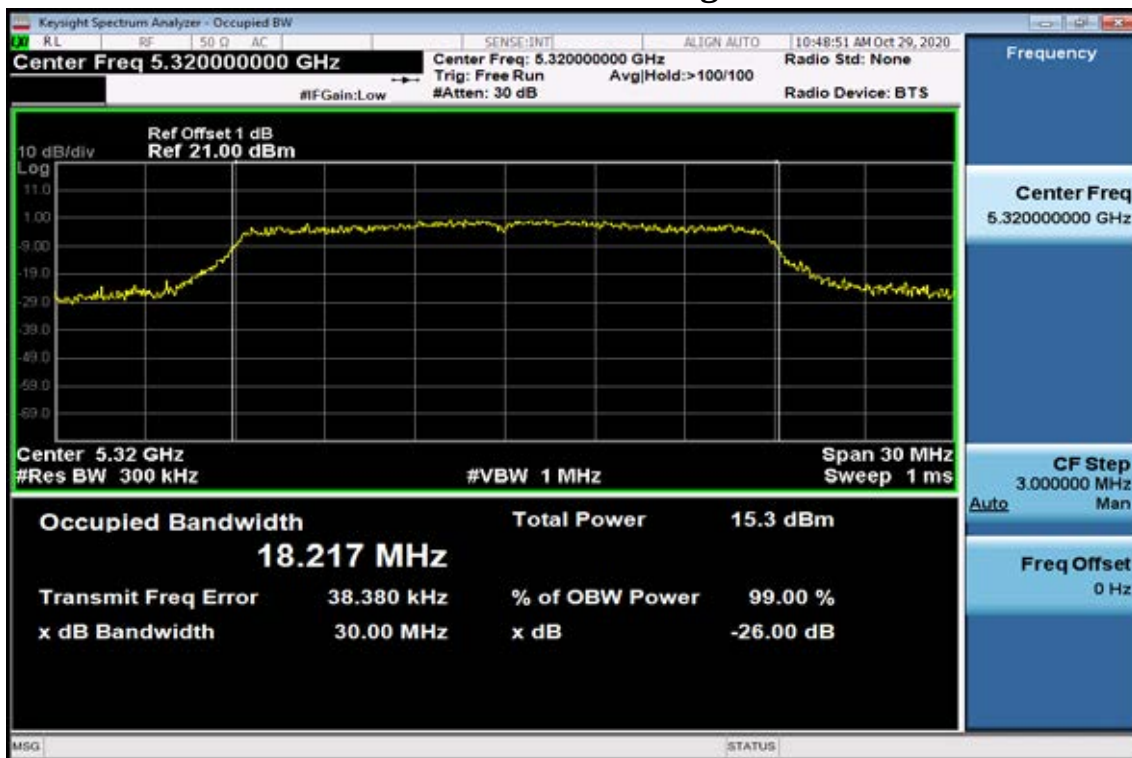
26dB / 99% Band Width Test Data CH-Low



26dB / 99% Band Width Test Data CH-Mid

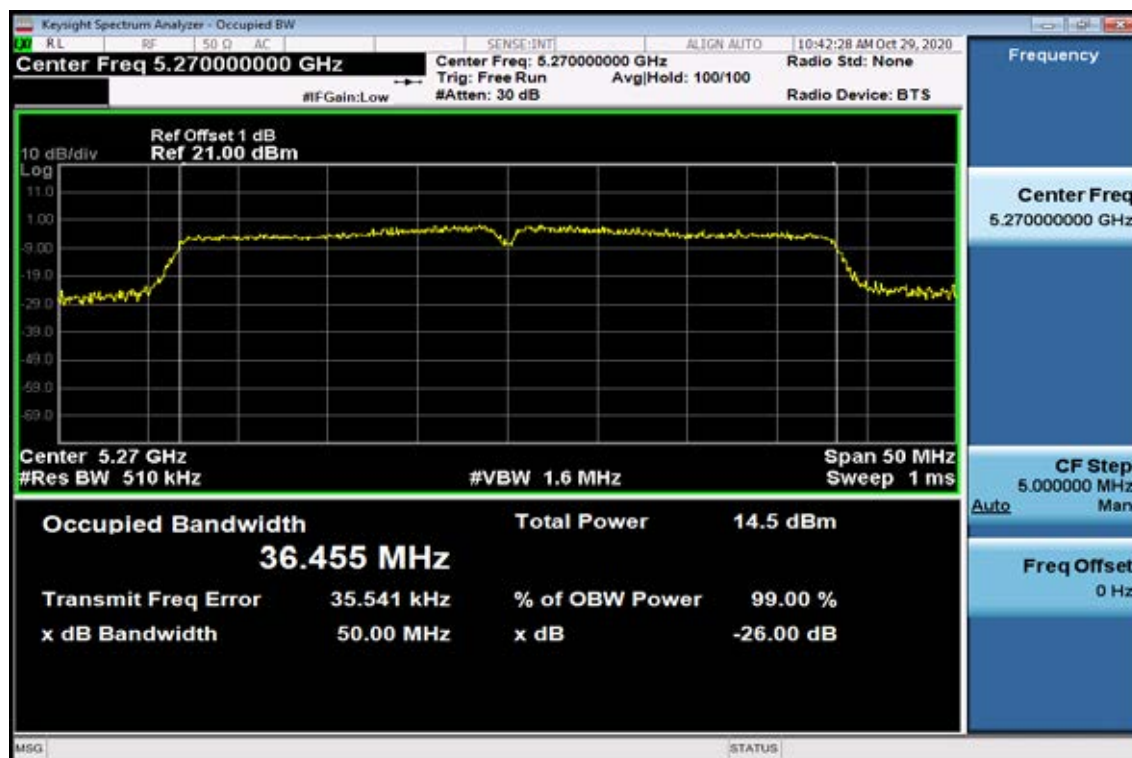


26dB / 99% Band Width Test Data CH-High

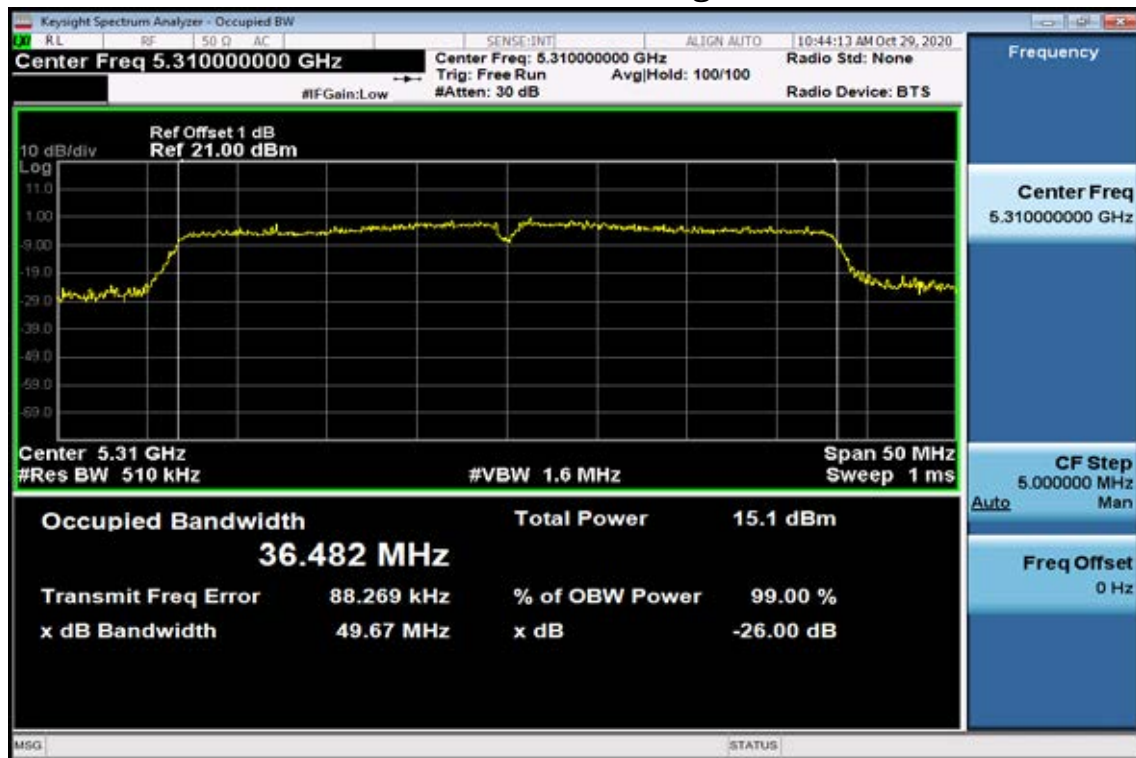


802.11n HT40

26dB / 99% Band Width Test Data CH-Low

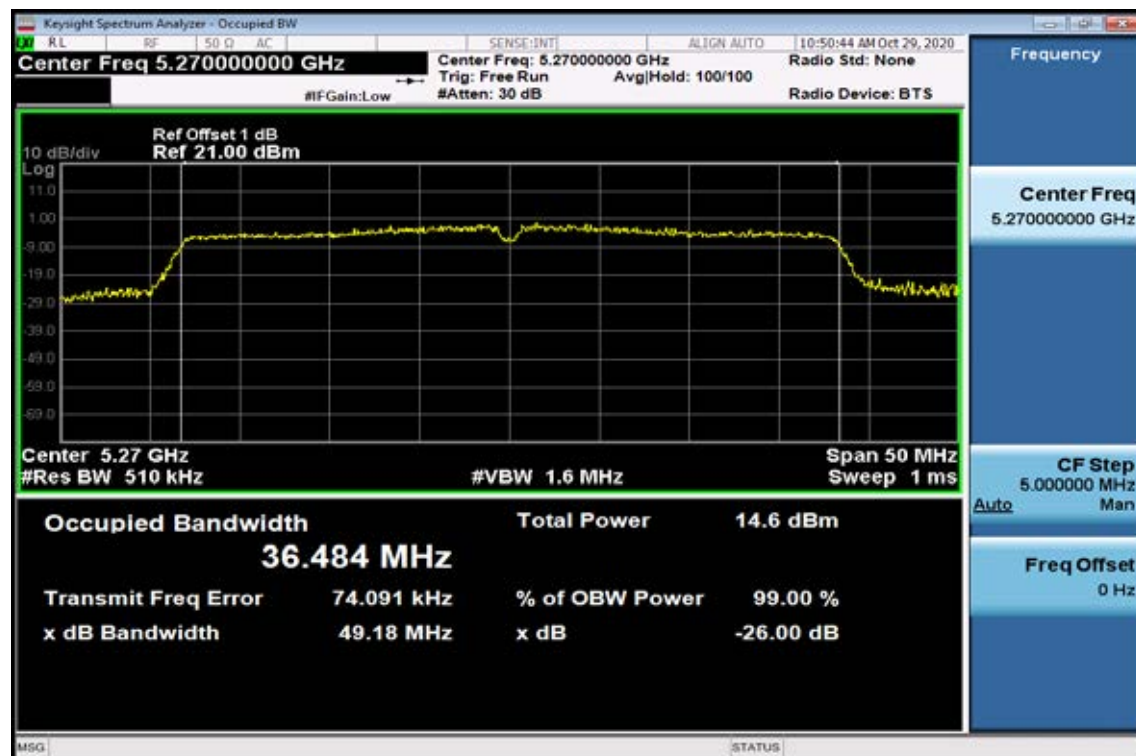


26dB / 99% Band Width Test Data CH-High

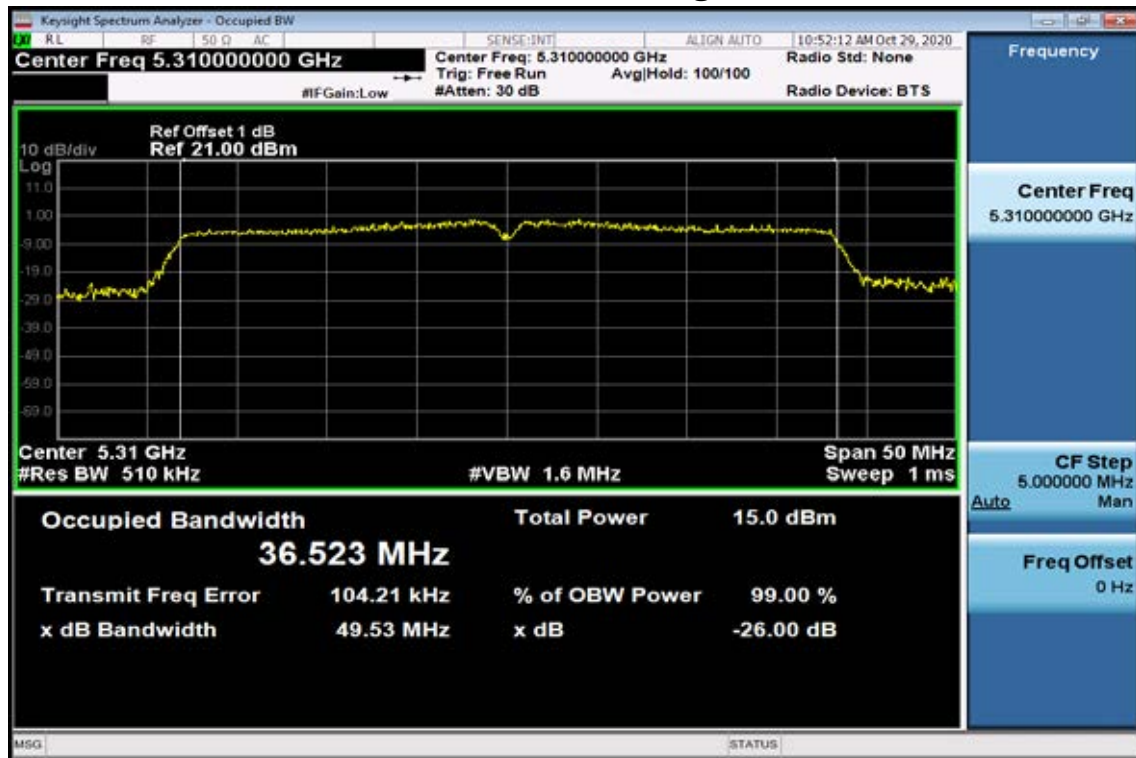


802.11ac VHT40

26dB / 99% Band Width Test Data CH-Low

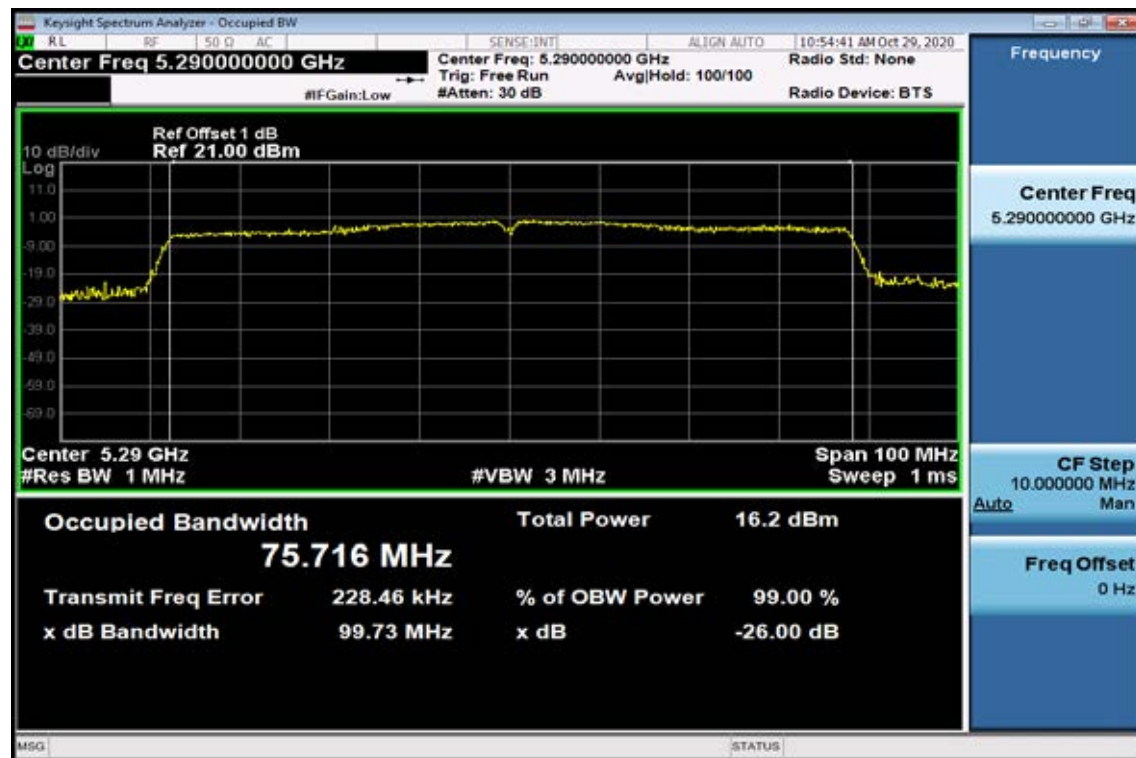


26dB / 99% Band Width Test Data CH-High



802.11 ac VHT80

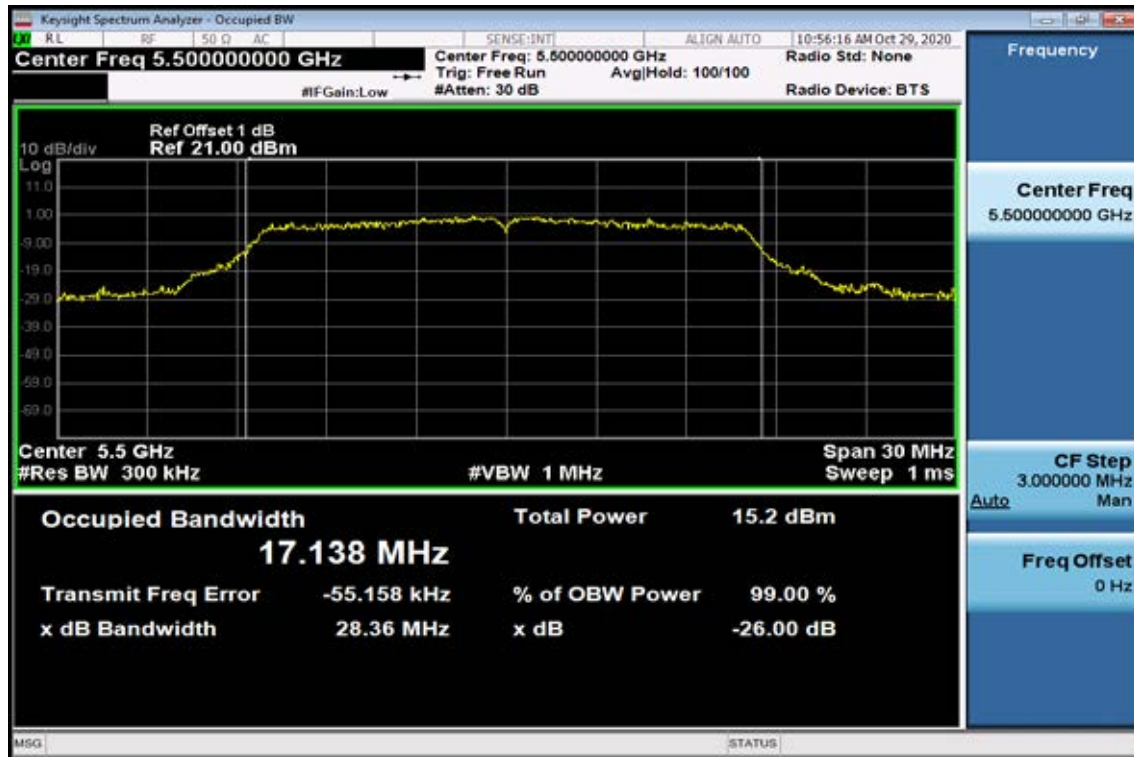
26dB / 99% Band Width Test Data



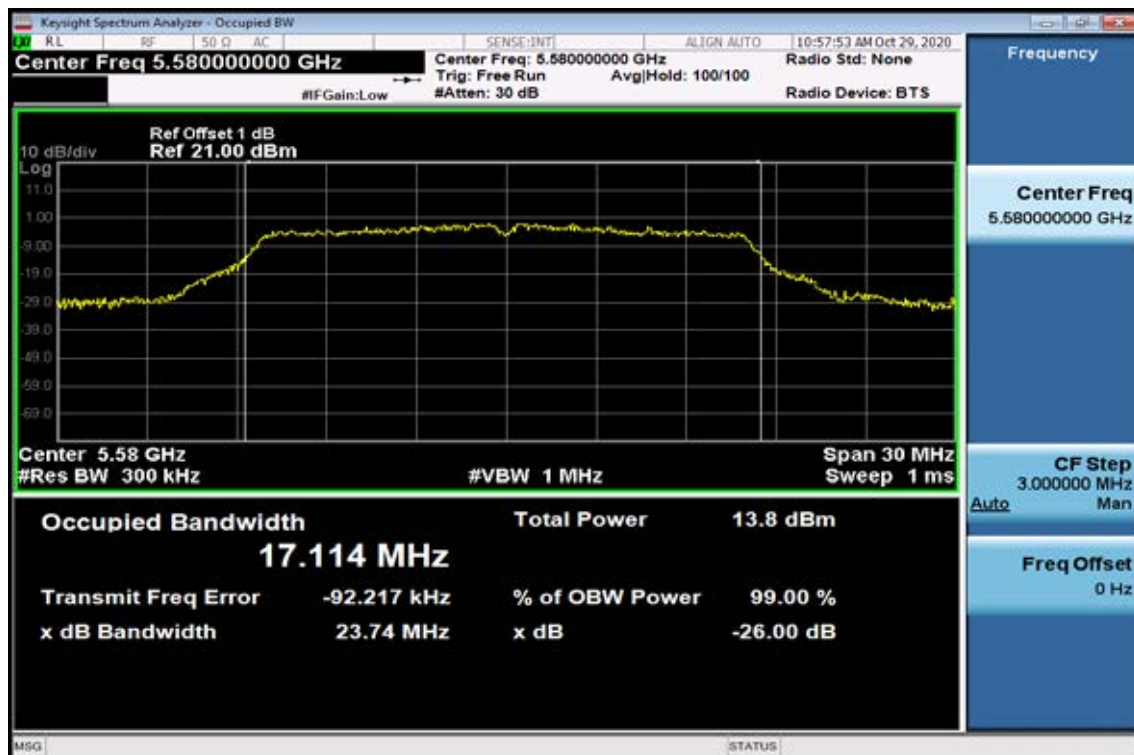
Band UNII-2C

802.11a

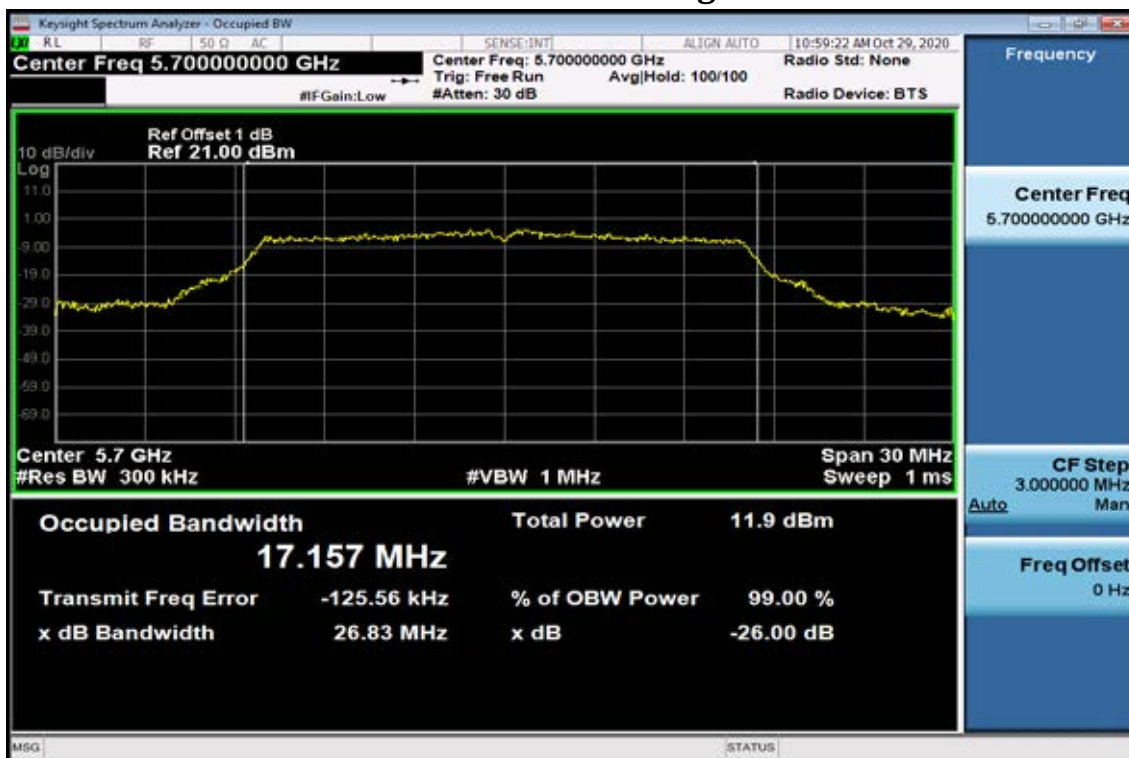
26dB / 99% Band Width Test Data CH-Low



26dB / 99% Band Width Test Data CH-Mid



26dB / 99% Band Width Test Data CH-High

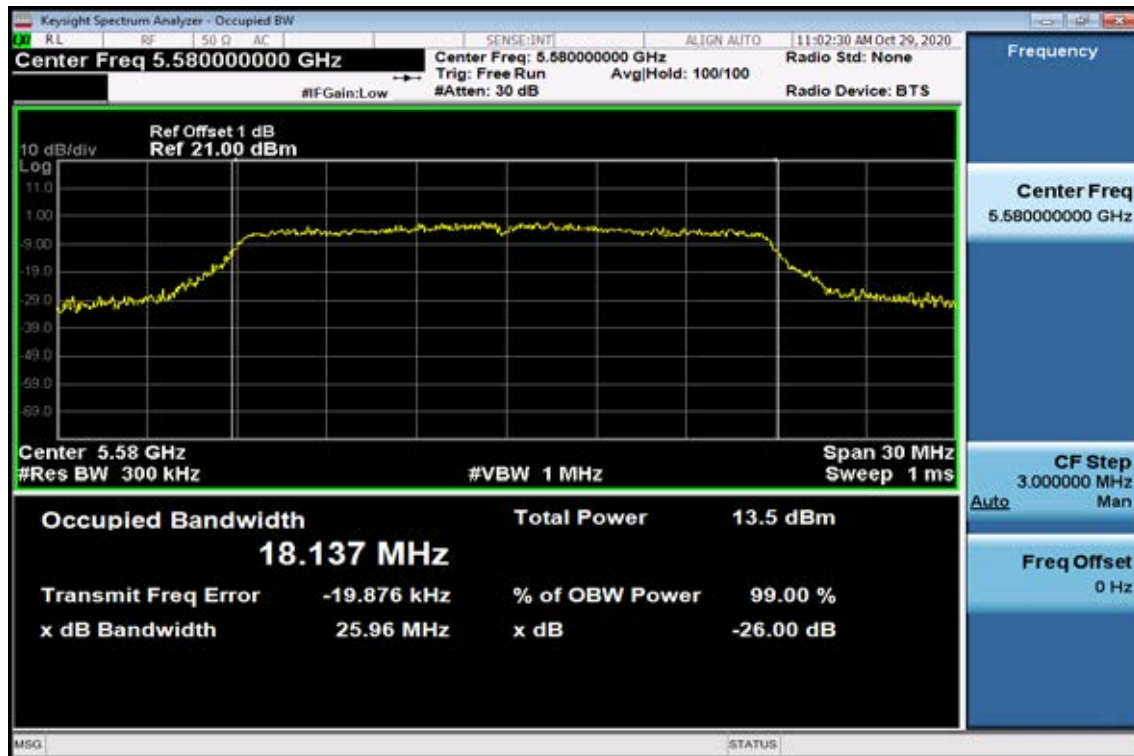


802.11n HT20

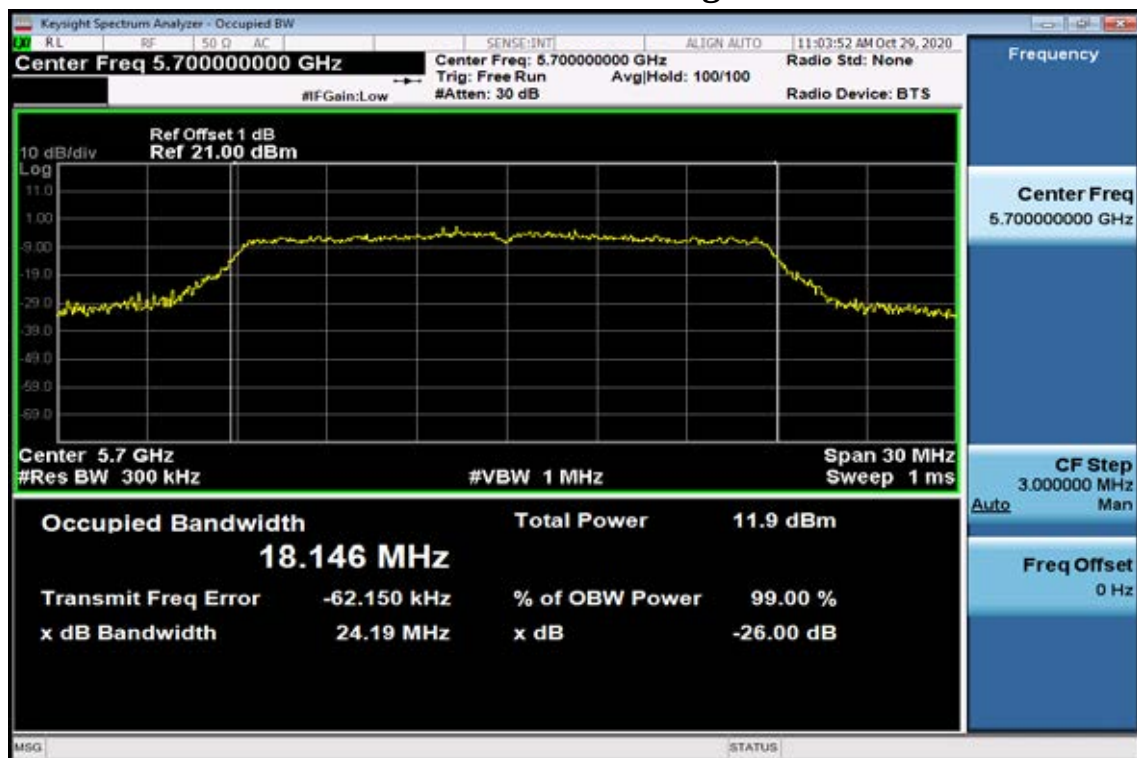
26dB / 99% Band Width Test Data CH-Low



26dB / 99% Band Width Test Data CH-Mid

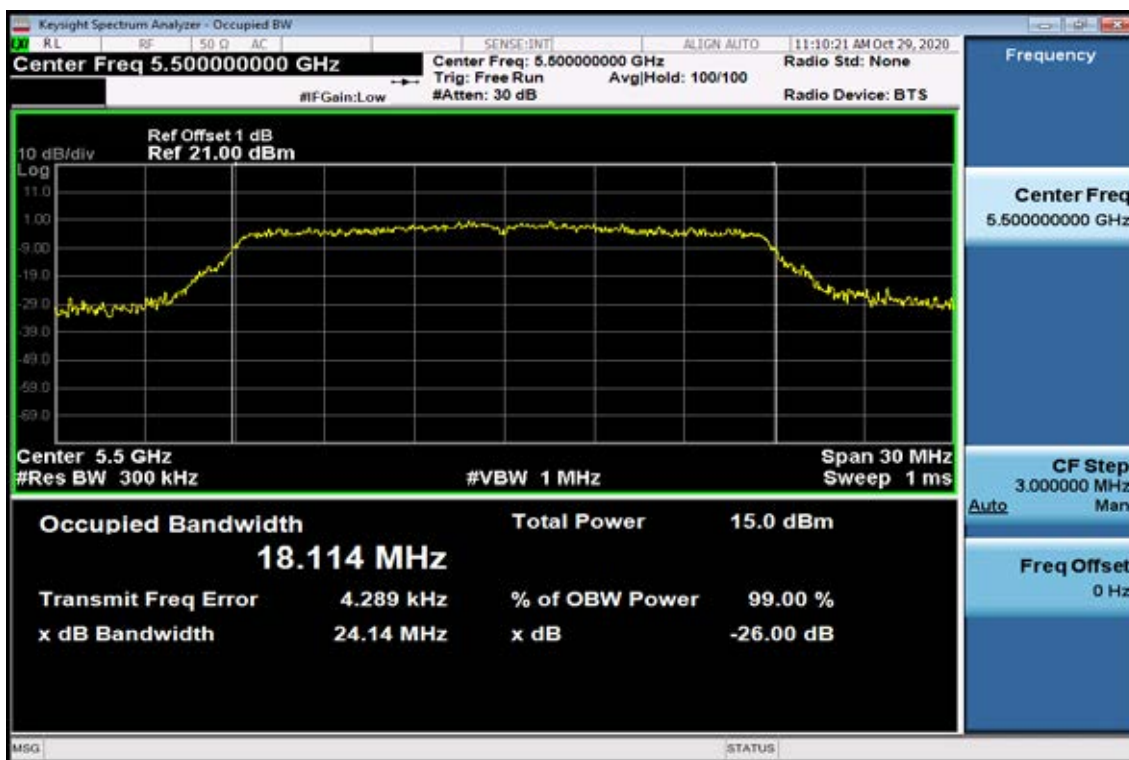


26dB / 99% Band Width Test Data CH-High

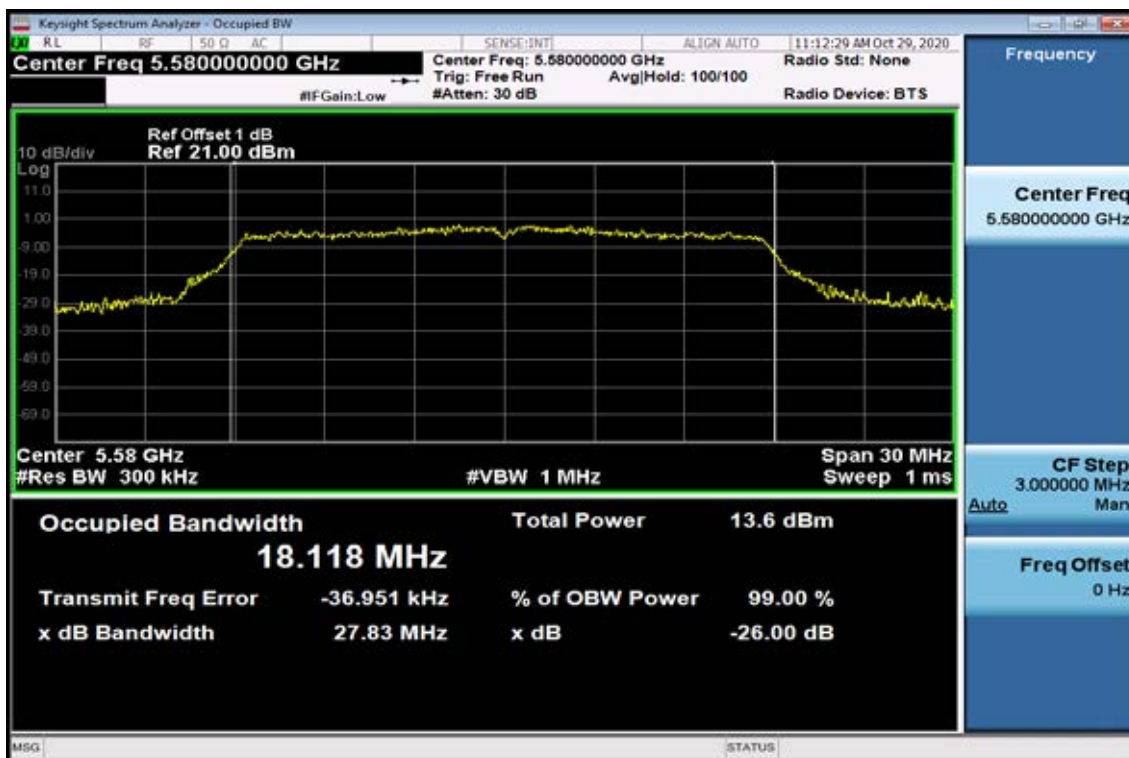


802.11ac VHT20

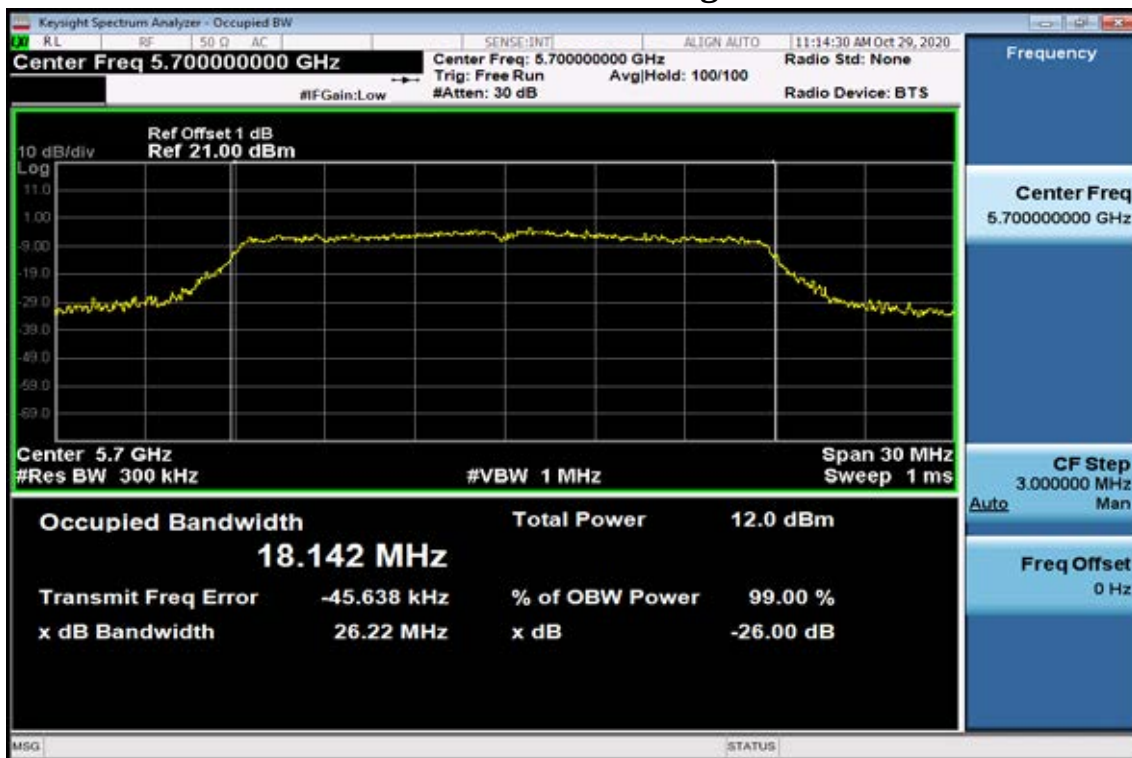
26dB / 99% Band Width Test Data CH-Low



26dB / 99% Band Width Test Data CH-Mid

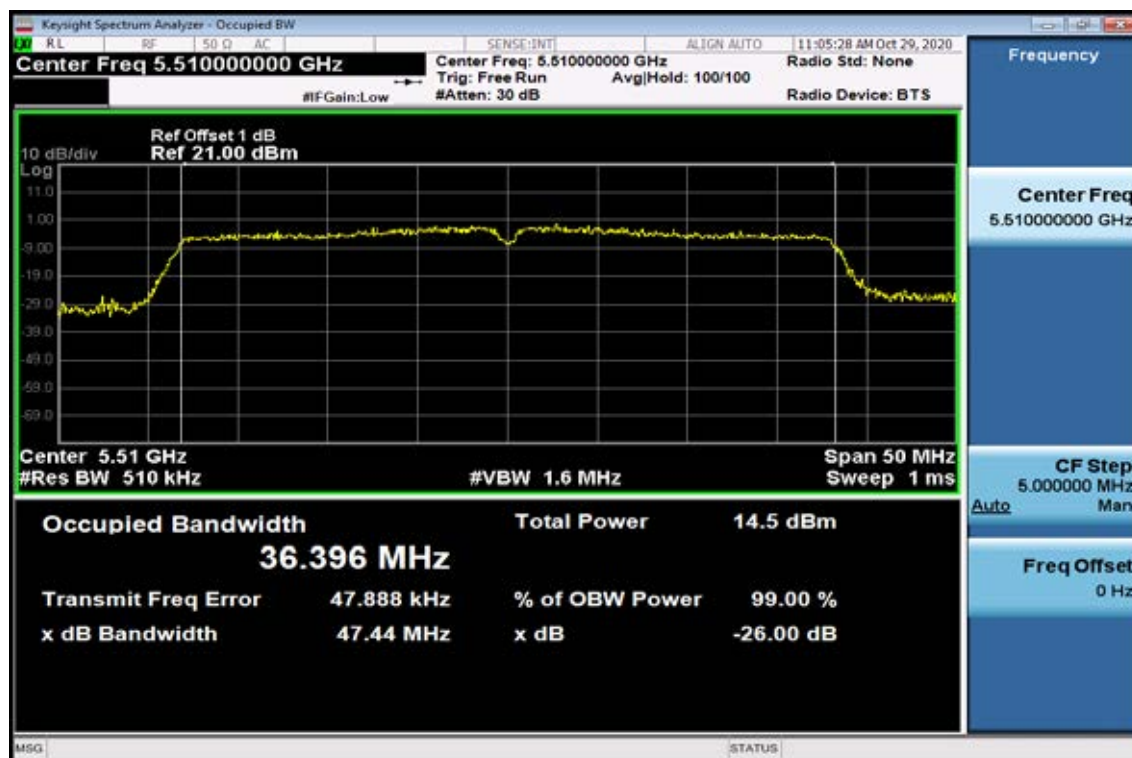


26dB / 99% Band Width Test Data CH-High

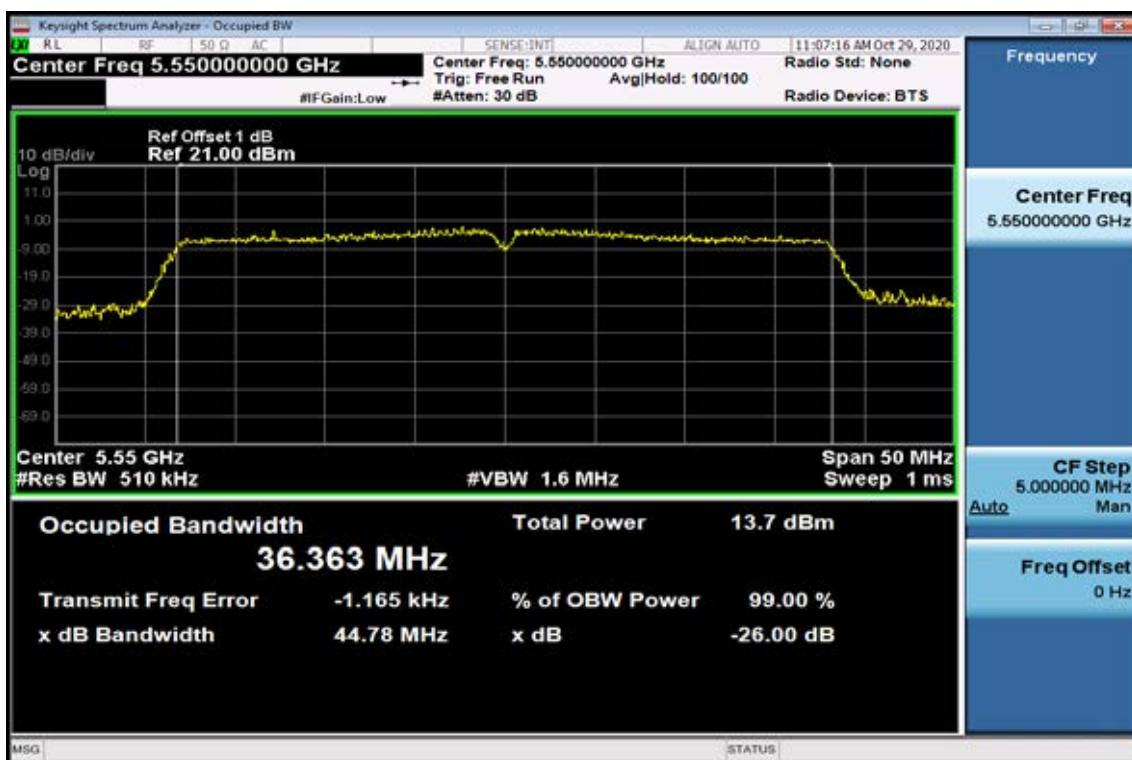


802.11n HT40

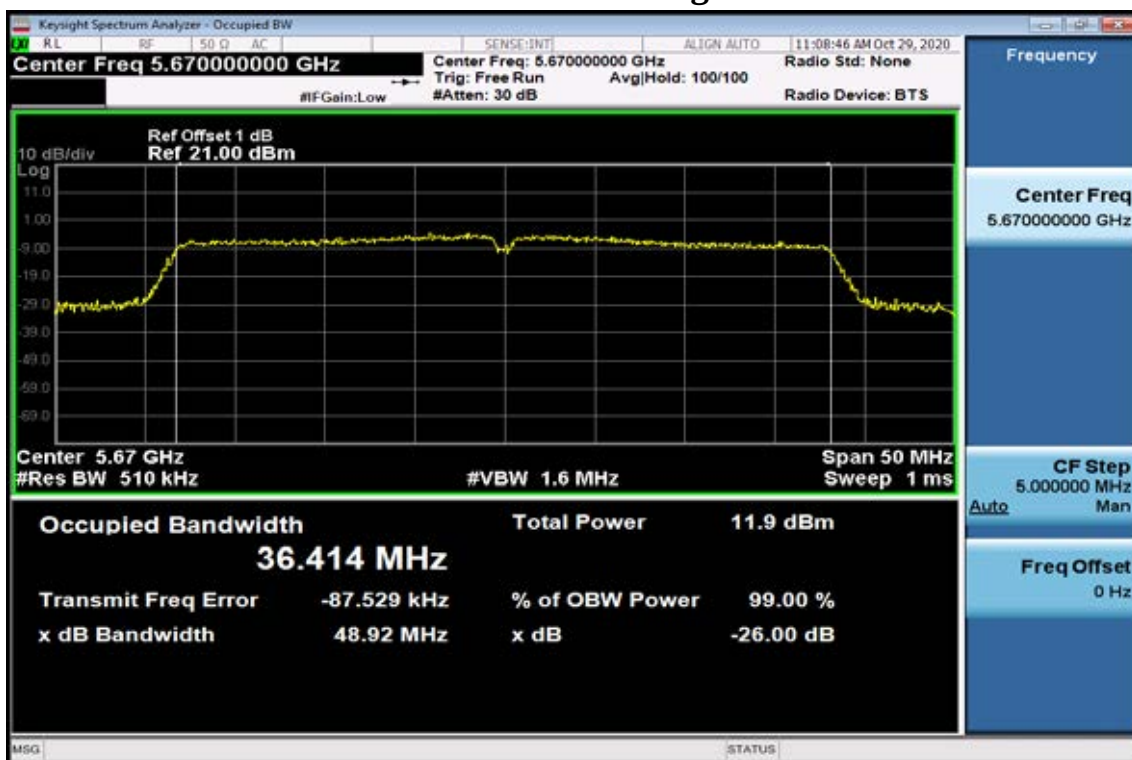
26dB / 99% Band Width Test Data CH-Low



26dB / 99%Band Width Test Data CH-Mid

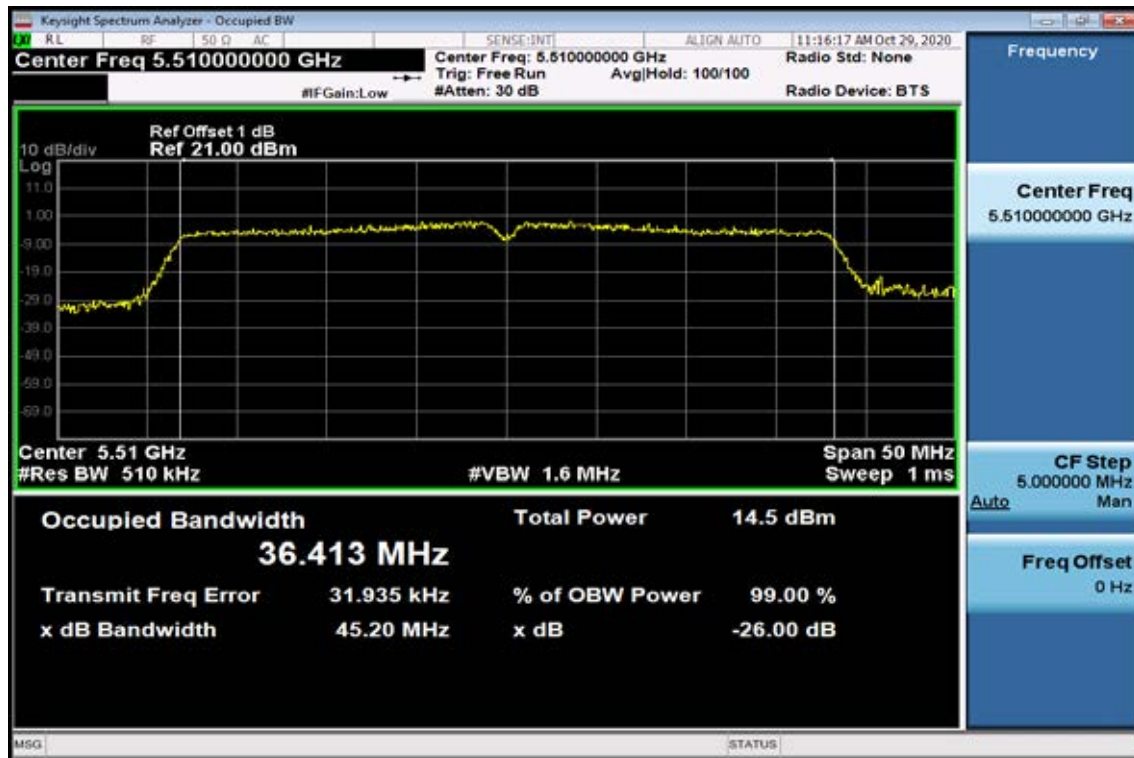


26dB / 99%Band Width Test Data CH-High

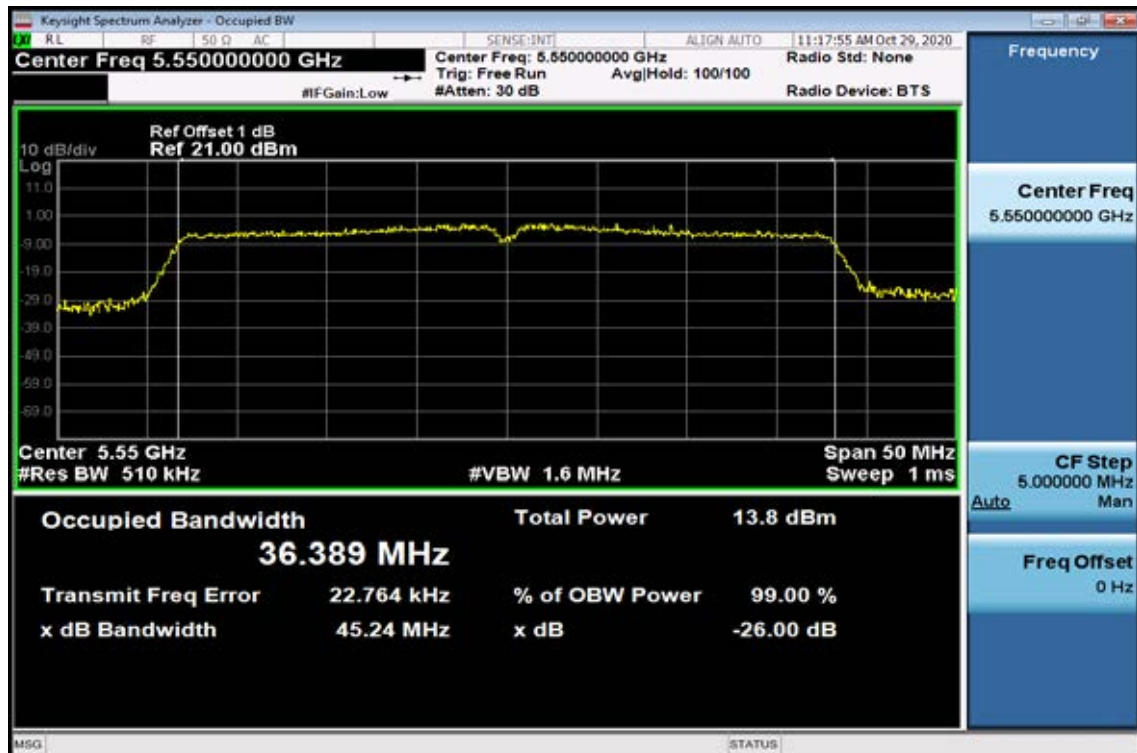


802.11ac VHT40

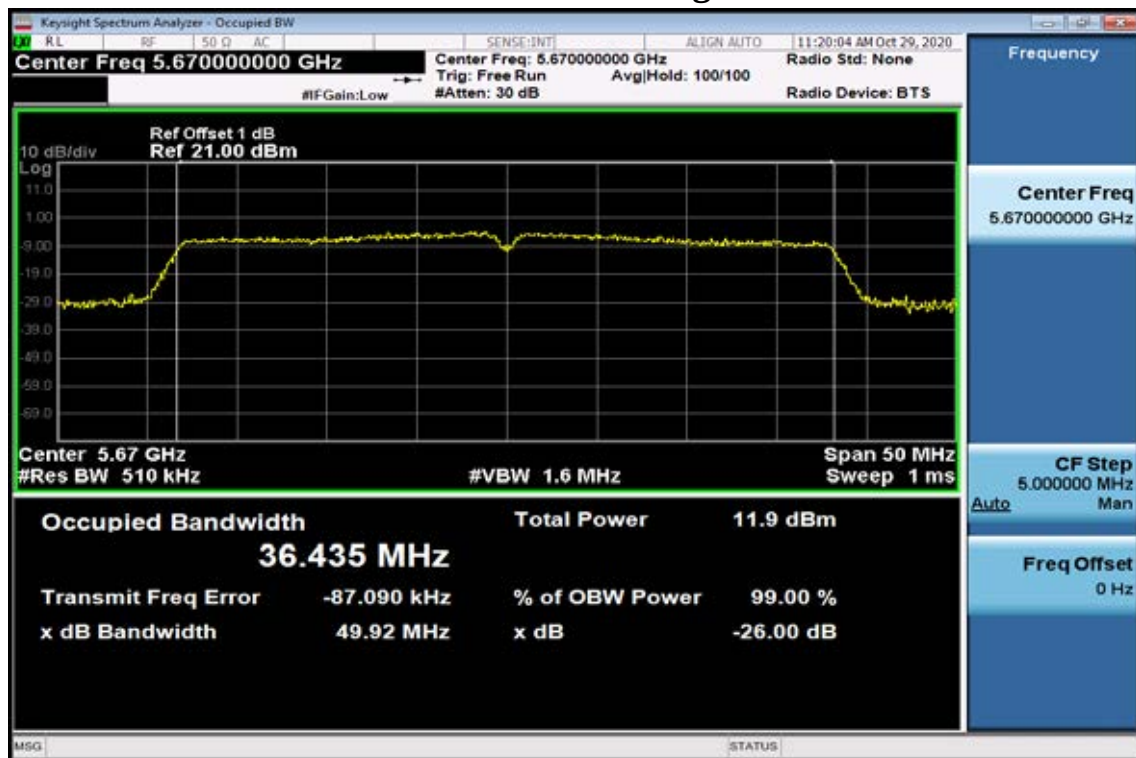
26dB / 99% Band Width Test Data CH-Low



26dB / 99%Band Width Test Data CH-Mid

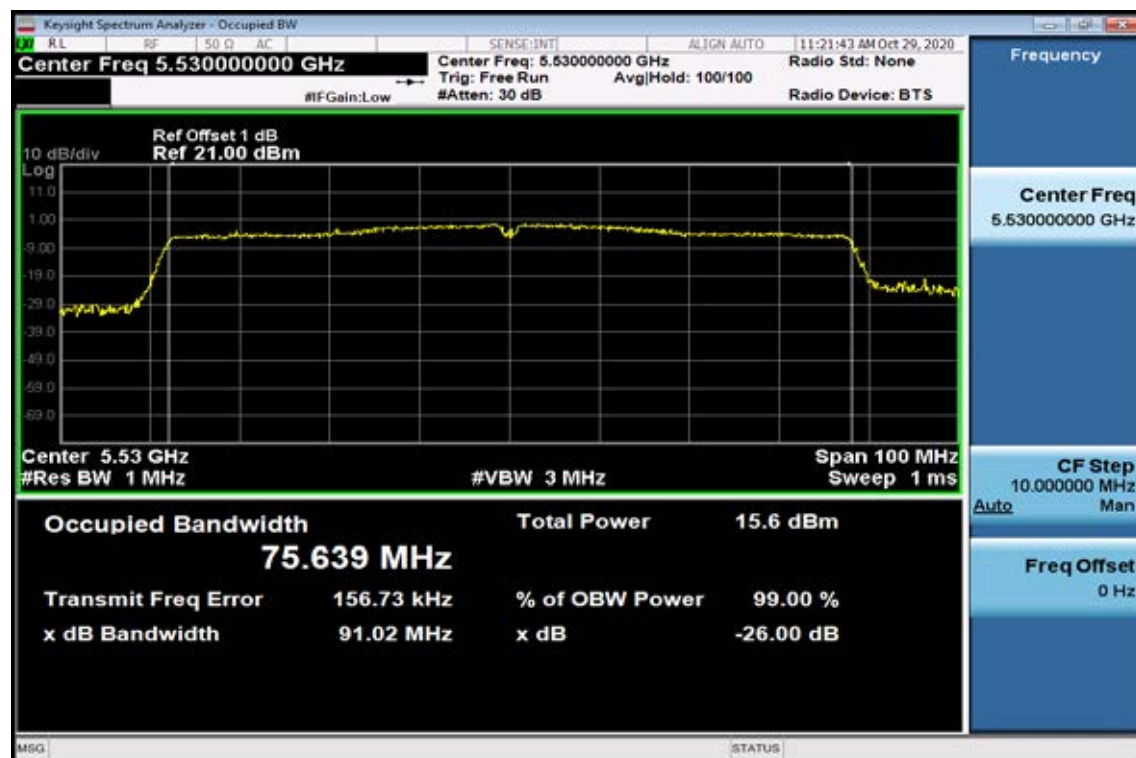


26dB / 99% Band Width Test Data CH-High



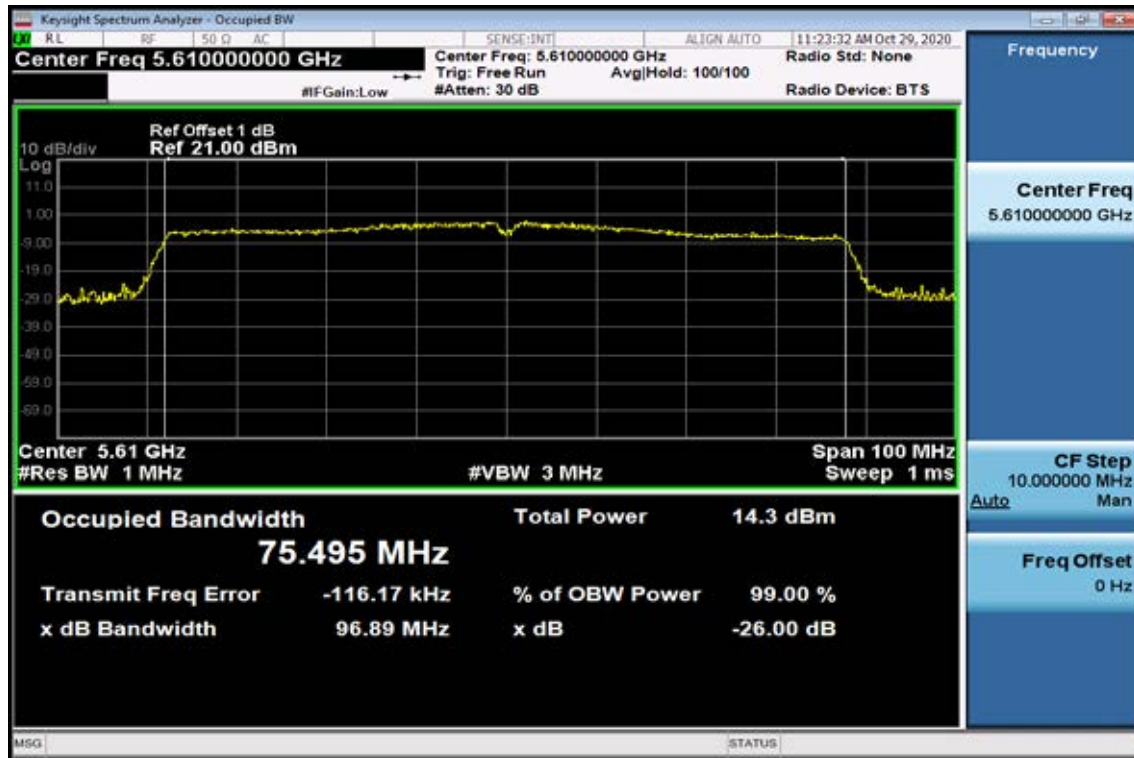
802.11 ac VHT80

26dB / 99% Band Width Test Data CH-Low



802.11 ac VHT80

26dB / 99% Band Width Test Data CH-High



8. 6dB Emission Bandwidth Measurement

8.1. Standard Applicable

According to §15.407 (e) Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

8.2. Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW=100kHz, VBW =300MHz, Span= 50MHz, Sweep=auto
4. Mark the peak frequency and -6dB (upper and lower) frequency.
5. Repeat above procedures until all frequency measured were complete.

Refer to section D of KDB Document: KDB 789033 D02 General UNII Test Procedures New Rules v01r03

8.3. Measurement Equipment Used:

Refer to section 6.3 for details.

8.4. Test Set-up:

Refer to section 6.4 for details.

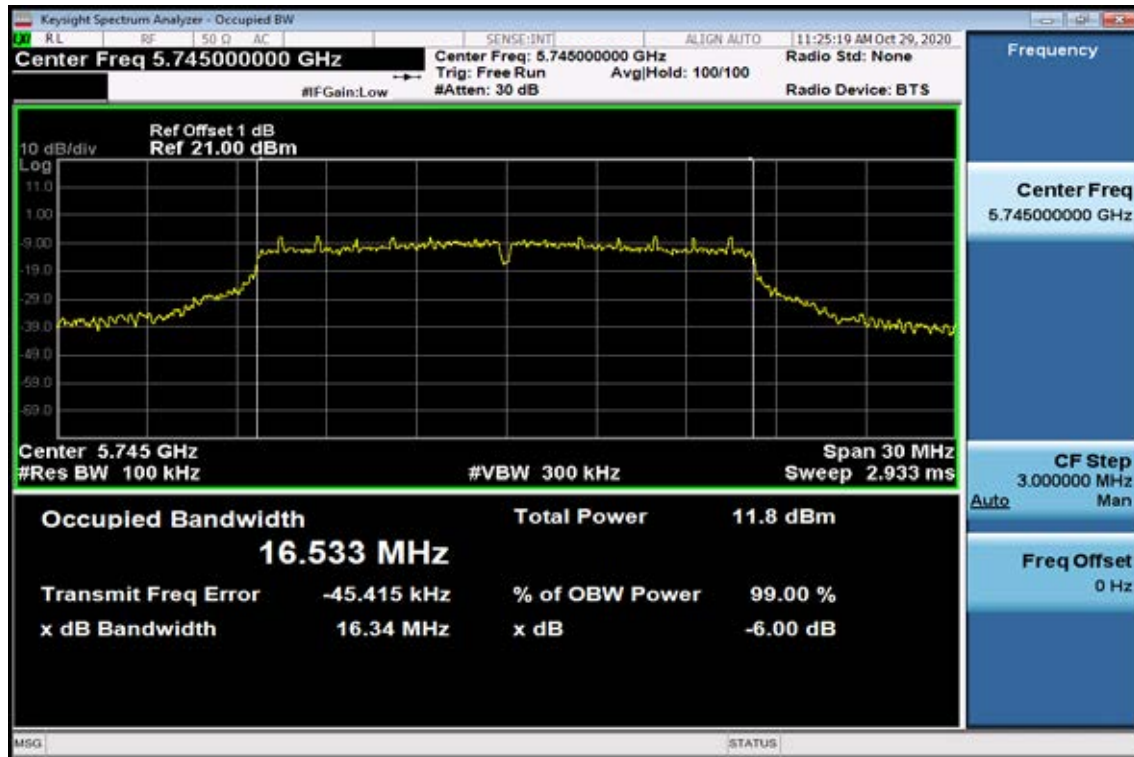
8.5. Measurement Result

Band	Mode	Frequency (MHz)	6dB Bandwidth (MHz)	99% OBW (MHz)	6dB BW Limit (kHz)
UNII-3	11a	5745	16.34	16.53	> 500
		5785	16.33	16.53	> 500
		5825	16.34	16.54	> 500
	HT20	5745	17.57	17.70	> 500
		5785	17.15	17.71	> 500
		5825	17.53	17.70	> 500
	HT40	5755	36.07	36.06	> 500
		5795	35.98	36.09	> 500
	VHT20	5745	17.53	17.69	> 500
		5785	17.20	17.68	> 500
		5825	17.30	17.69	> 500
	VHT40	5755	35.74	36.08	> 500
		5795	35.65	36.10	> 500
	VHT80	5775	75.30	75.32	> 500

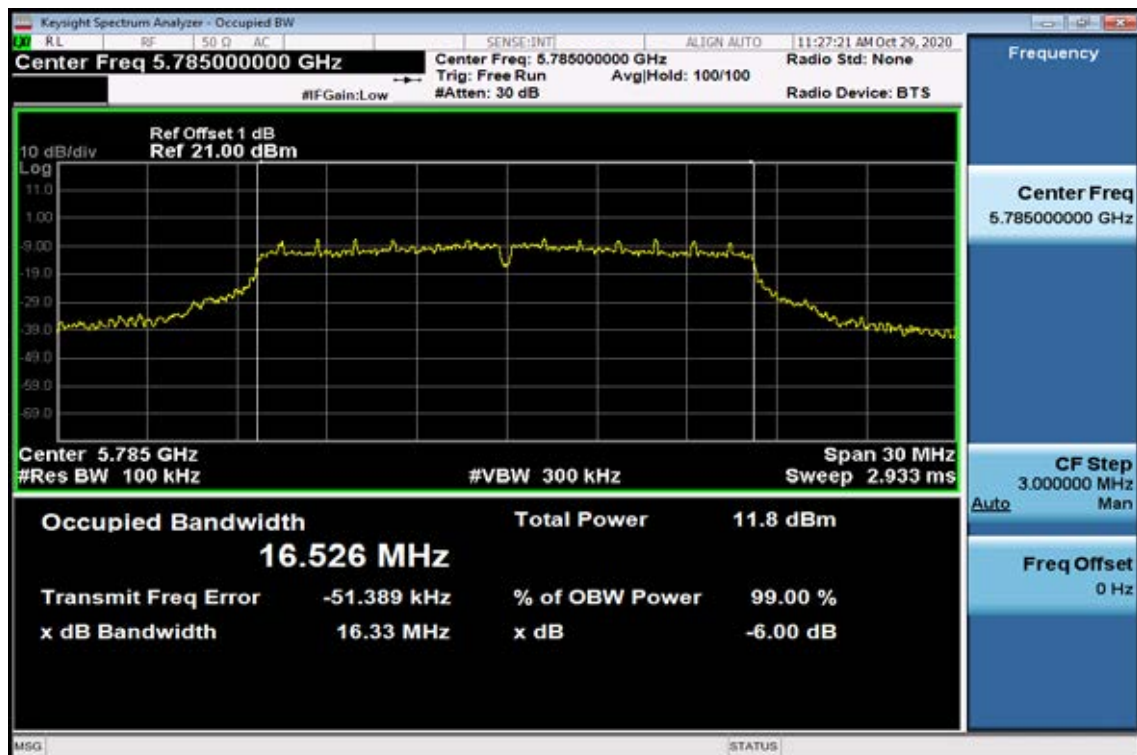
Band UNII-3

802.11a

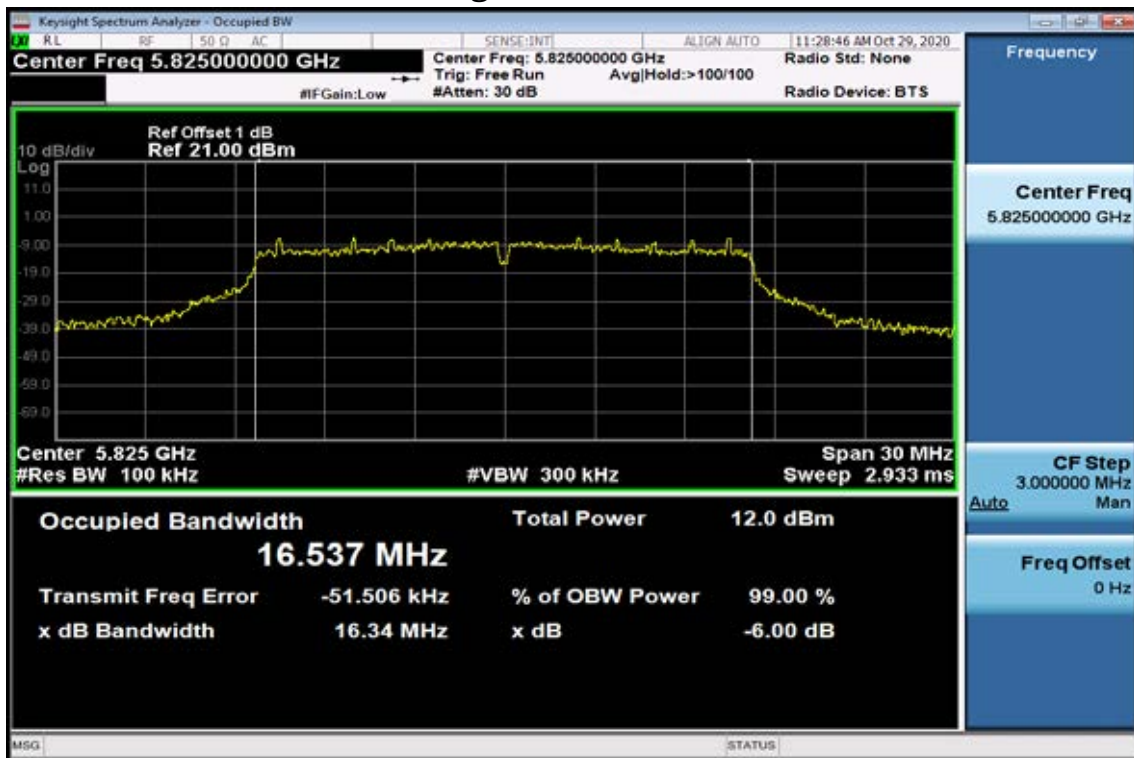
6dB Band Width Test Data CH-Low



6dB Band Width Data CH-Mid

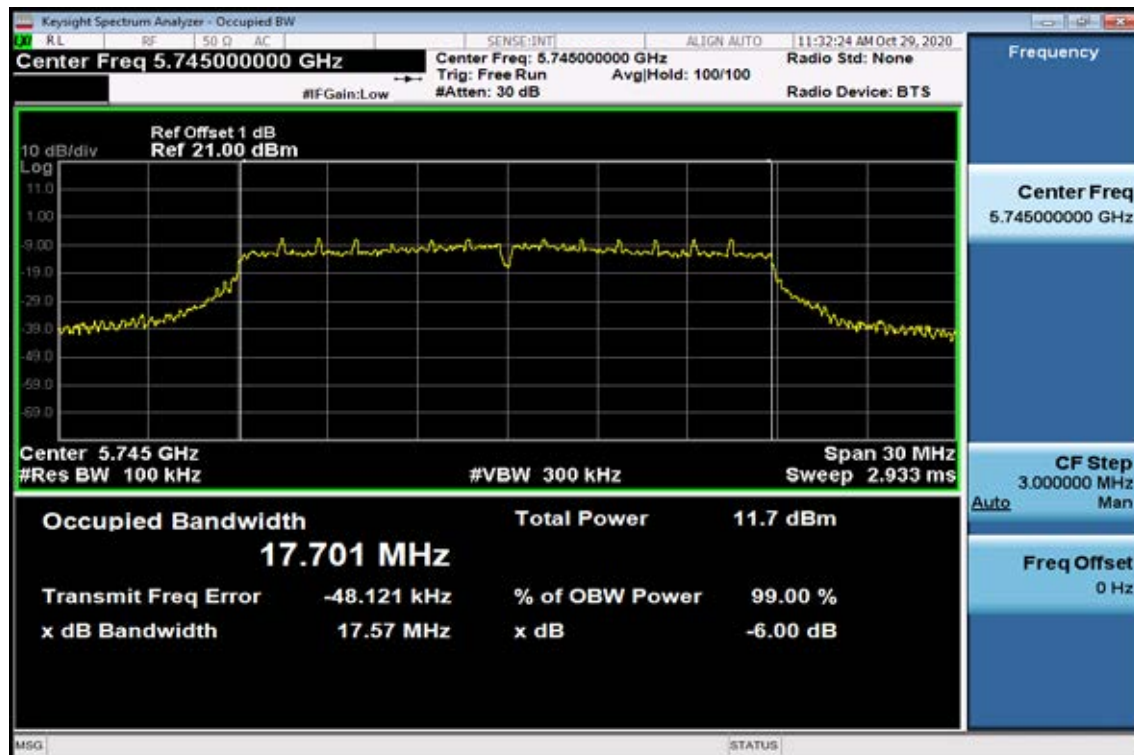


6dB Band Width Data CH-High

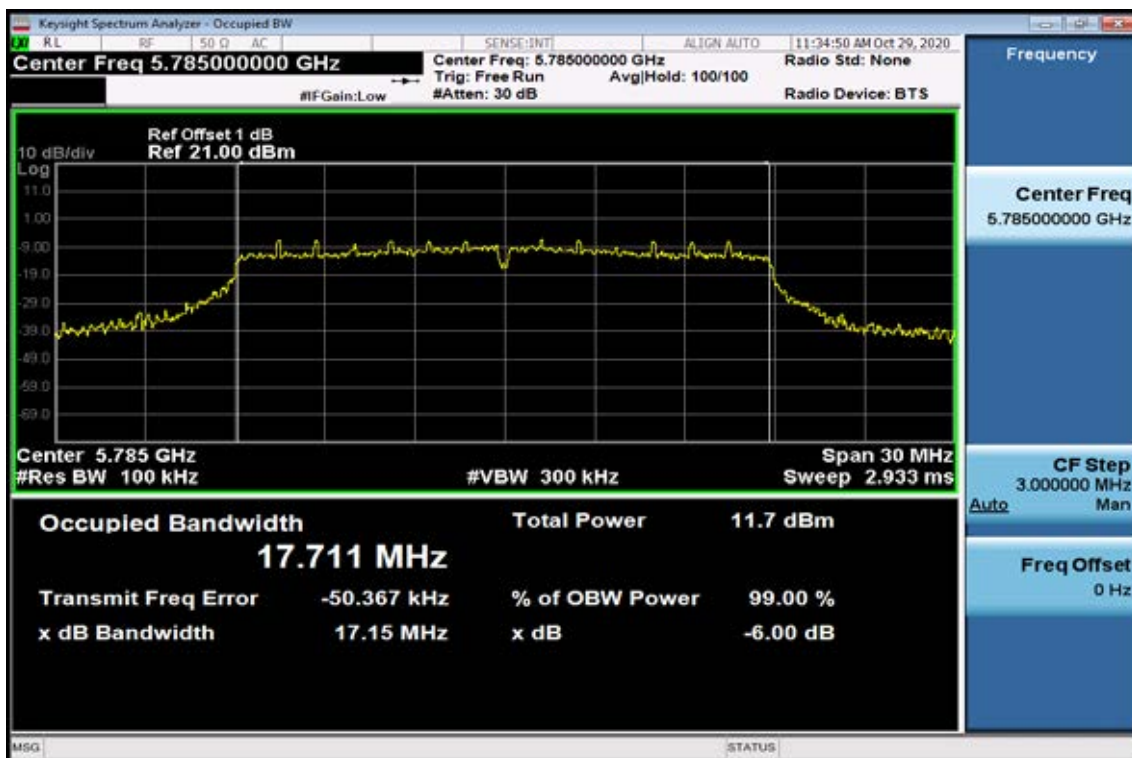


802.11n HT20

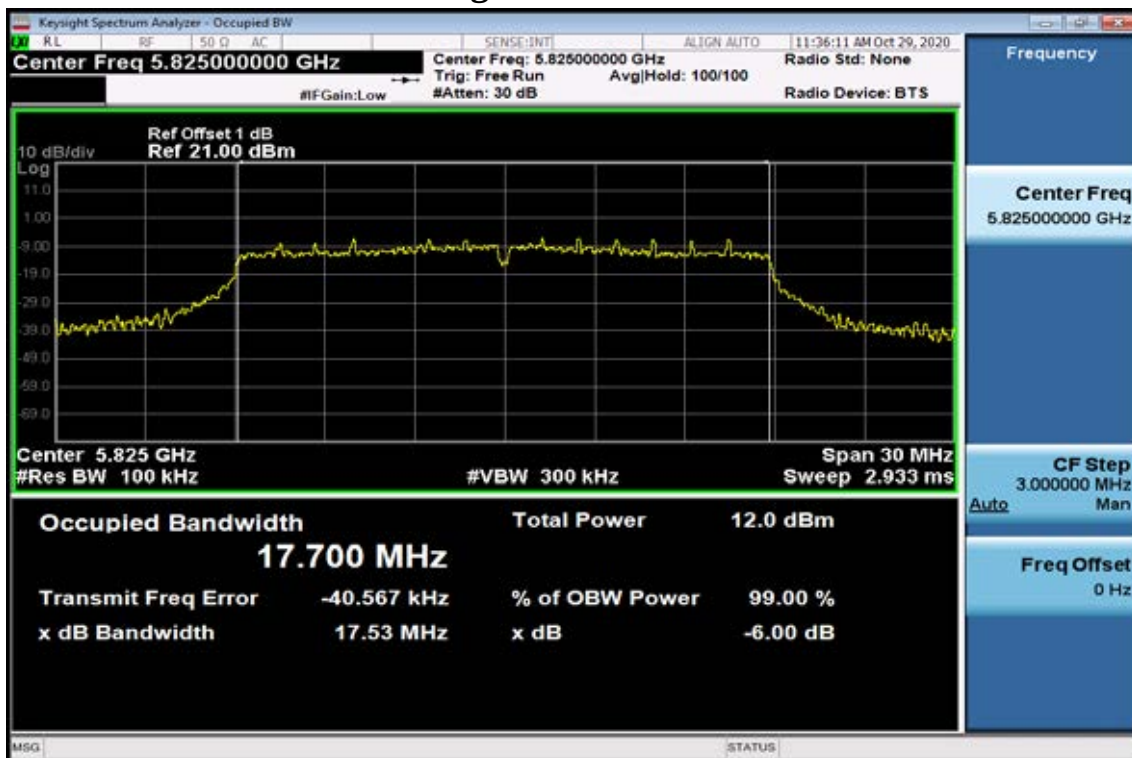
6dB Band Width Data CH-Low



6dB Band Width Data CH-Mid

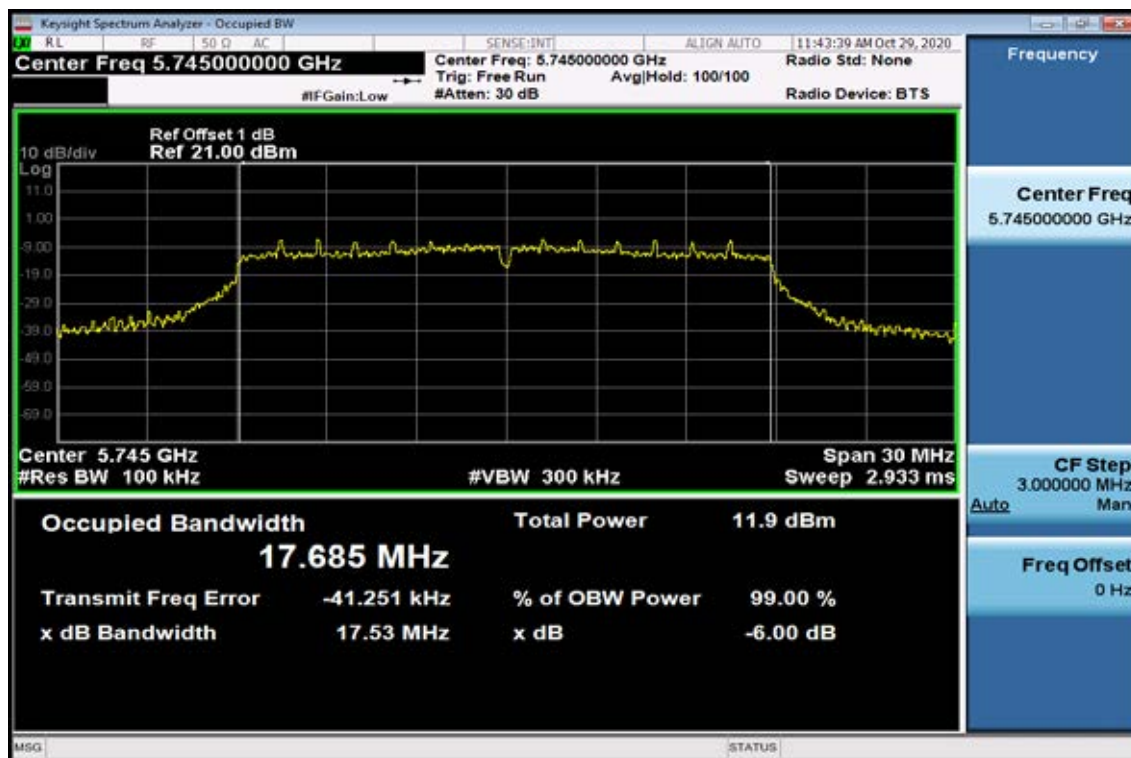


6dB Band Width Data CH-High

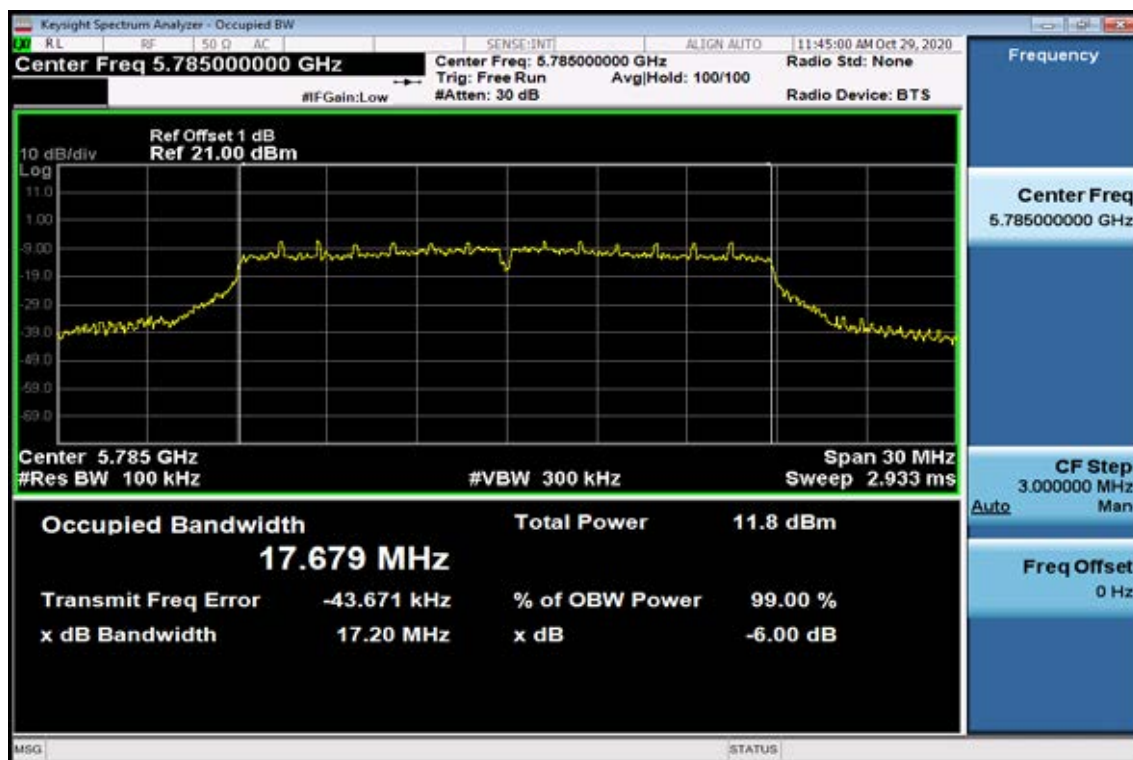


802.11ac VHT20

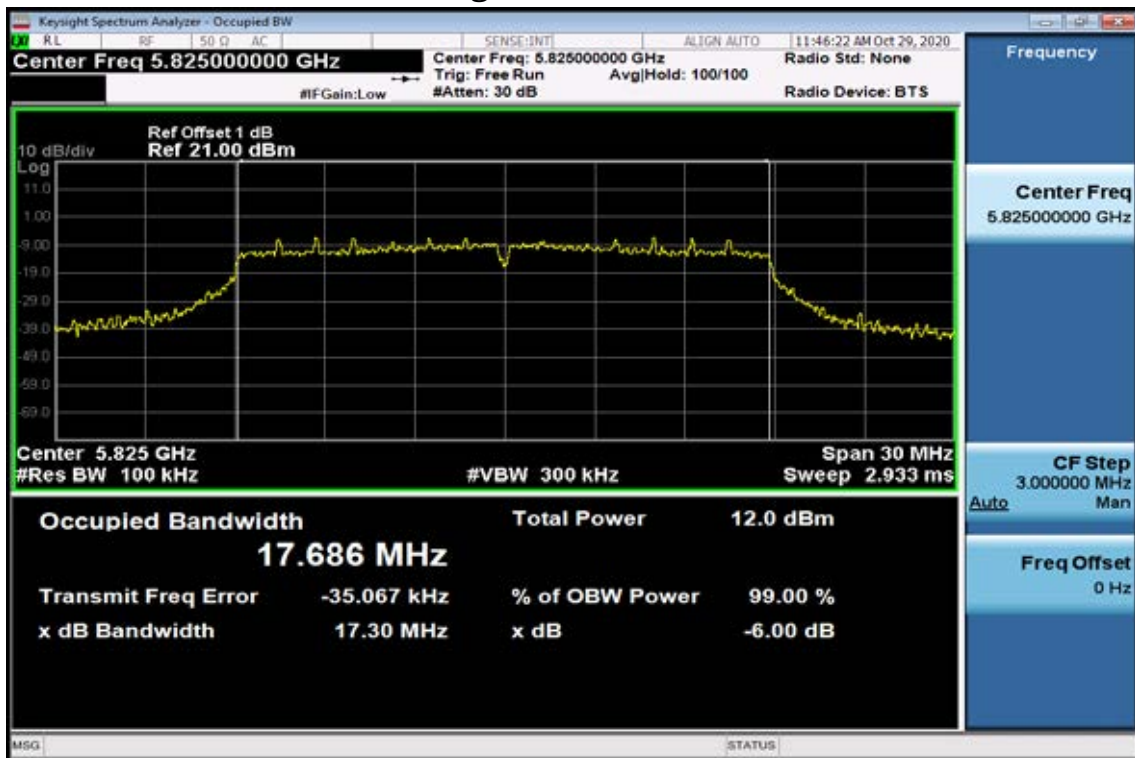
6dB Band Width Data CH-Low



6dB Band Width Data CH-Mid

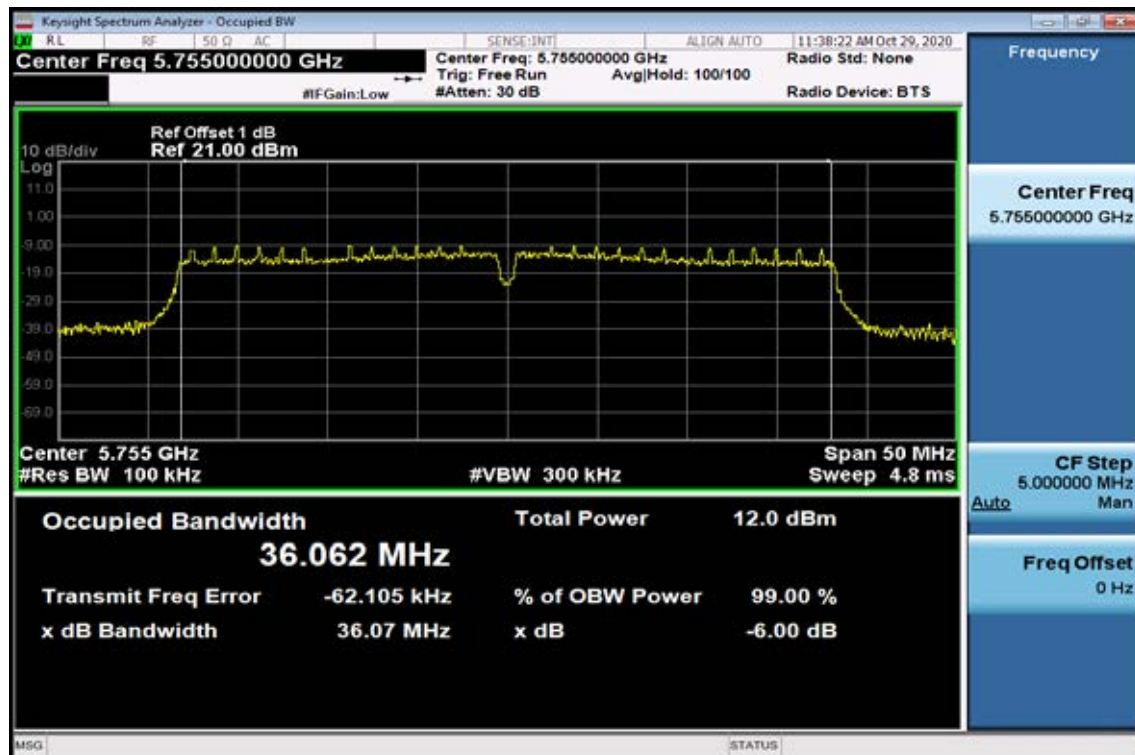


6dB Band Width Data CH-High

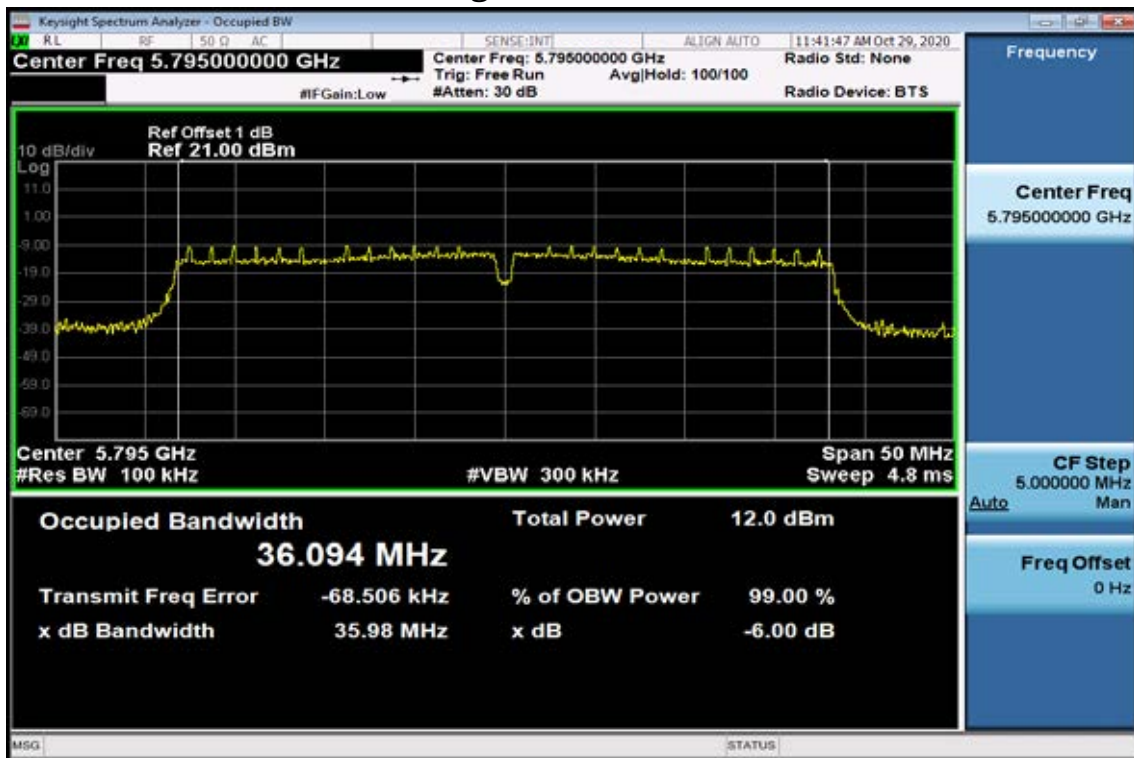


802.11n HT40

6dB Band Width Data CH-Low

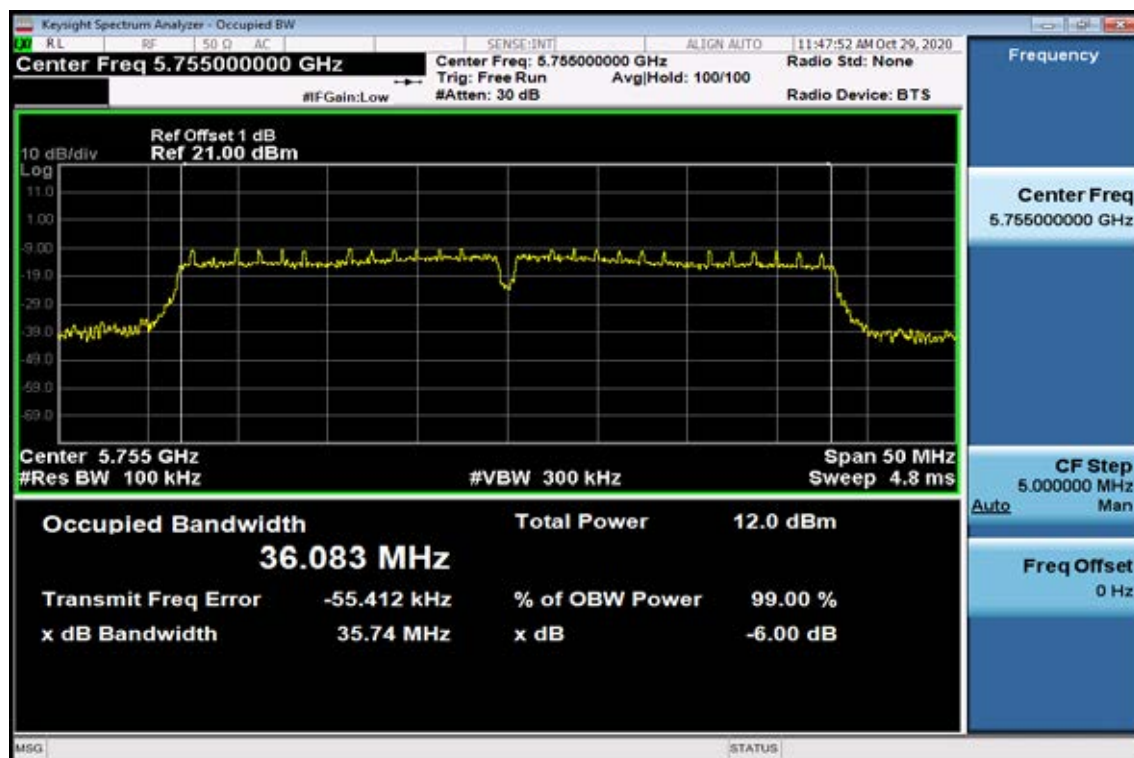


6dB Band Width Data CH-High

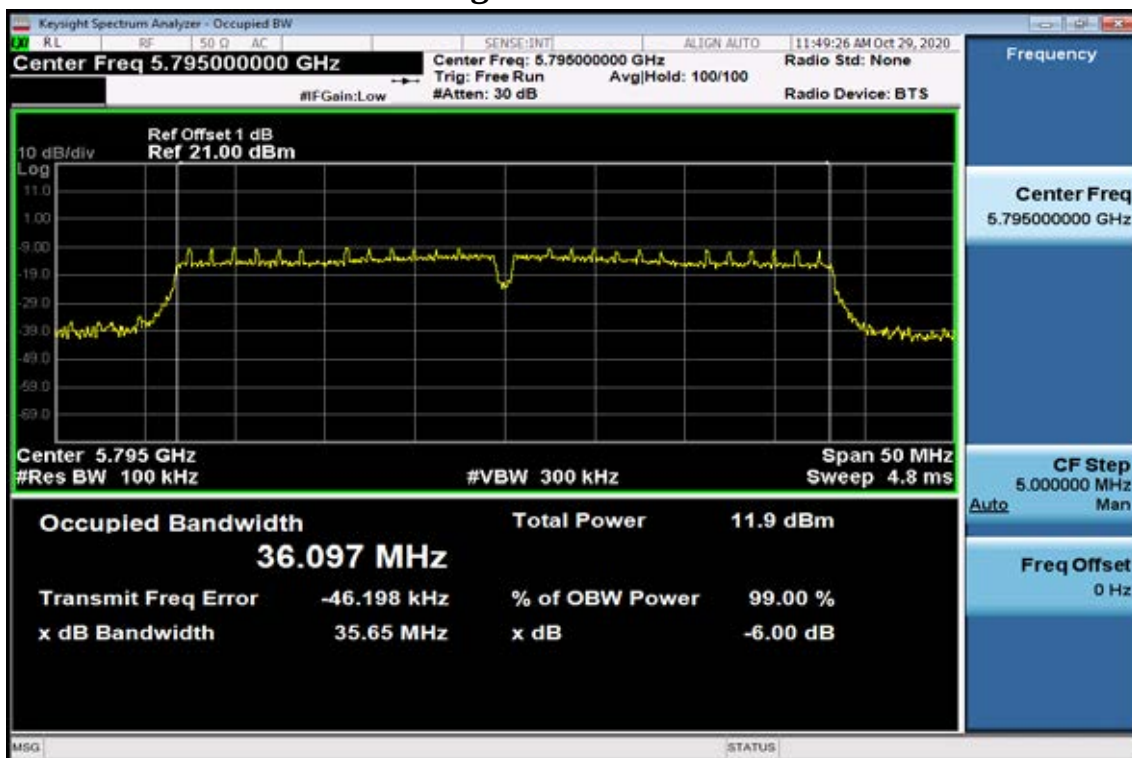


802.11ac VHT40

6dB Band Width Data CH-Low

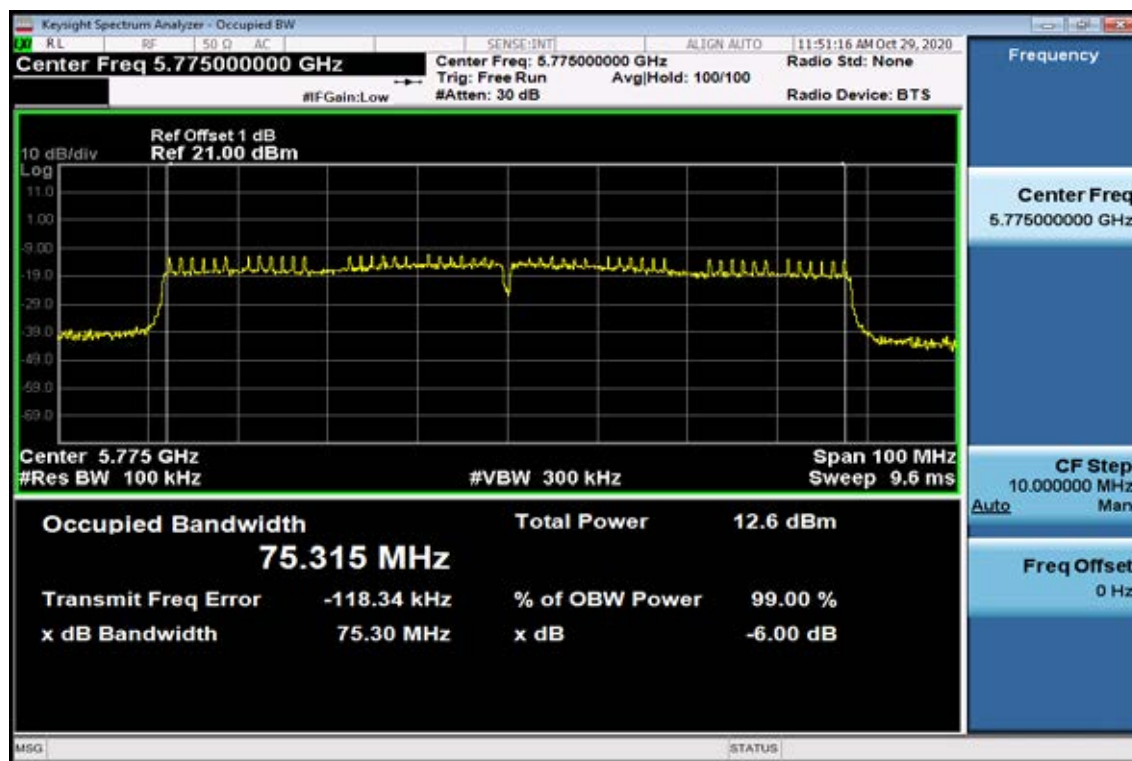


6dB Band Width Data CH-High



802.11 ac VHT80

6dB Band Width Data CH-Low



9. Undesirable emission – Radiated Measurement

9.1. Standard Applicable

According to §15.407(b), Undesirable Emission Limits: Except as shown in Paragraph (b)(7) of this section, the peak emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

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

§15.205- RESTRICTED BANDS OF OPERATIONS

- (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	(²)
13.36 - 13.41	322 - 335.4		

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

- (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209- RADIATED EMISSION LIMITS: GENERAL REQUIREMENTS

FCC PART 15.209

MEASURING DISTANCE OF 3 METER		
FREQUENCY RANGE (MHz)	FIELD STRENGTH (Microvolts/m)	FIELD STRENGTH (dBuV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

9.2. EUT Setup

1. The radiated emission tests were performed in the 3 meter open-test site, using the setup in accordance with the ANSI C63.10: 2013
2. The EUT was put in the front of the test table. The host PC system was placed on the center of the back edge on the test table. The peripherals like modem, monitor printer, K/B, and mouse were placed on the side of the host PC system. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The keyboard was placed directly in the front of the monitor, flushed with the front tabletop. The mouse was placed next to the Keyboard, flushed with the back of keyboard.
4. The spacing between the peripherals was 10 centimeters.
5. External I/O cables were draped along the edge of the test table and bundle when necessary.
6. The host PC system was connected with 120Vac/60Hz power source.

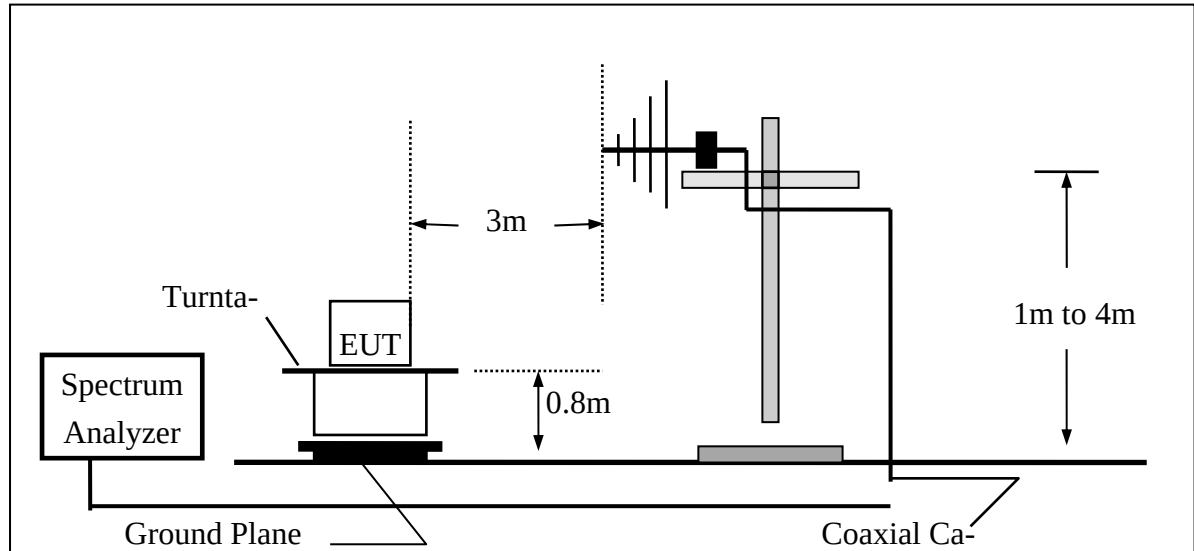
9.3. Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until all frequency measured were complete.

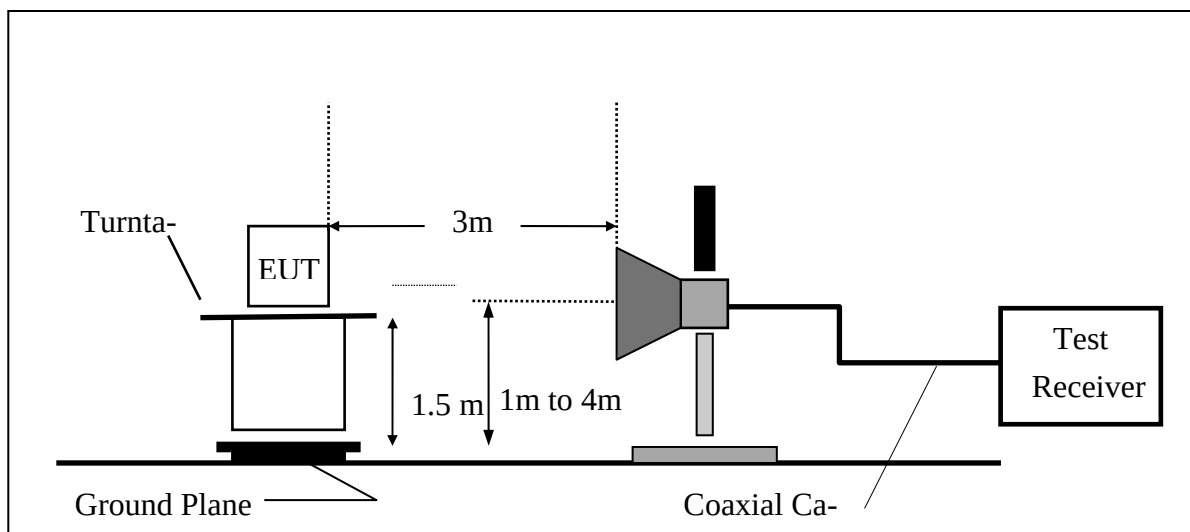
Refer to section F of KDB Document: KDB 789033 D02 General U-NII Test Procedures New Rules v02r01

9.4. Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



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



9.5. Measurement Equipment Used:

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Chamber 19	Signal analyzer	R&S	FSV40	101919	8/13/2020	8/13/2021
Chamber 19	EMI Receiver	R&S	ESR3	102461	05/05/2020	05/05/2021
Chamber 19	Loop Antenna	EM	EM-6879	271	05/21/2020	05/21/2021
Chamber 19	Bilog Antenna (30MHz-1GHz)	Schwarzbeck	VULB9168 w 6dB Att.	736	02/11/2020	02/11/2021
Chamber 19	Horn antenna (1GHz-18GHz)	ETS LINDGREN	3117	00218718	09/25/2020	09/25/2021
Chamber 19	Horn antenna (18GHz-26GHz)	Com-power	AH-826	081001	11/25/2019	11/25/2020
Chamber 19	Horn antenna (26GHz-40GHz)	Com-power	AH-640	100A	03/13/2020	03/13/2021
Chamber 19	Preamplifier (9kHz-1GHz)	HP	8447F	3113A04621	06/19/2020	06/19/2021
Chamber 19	Preamplifier (1GHz - 26GHz)	EM	EM01M26G	060681	05/04/2020	05/04/2021
Chamber 19	Preamplifier (26GHz-40GHz)	MITEQ	JS4-26004000- 27-5A	818471	05/04/2020	05/04/2021
Chamber 19	RF Cable (9kHz-18GHz)	HUBER SU- HNER	Sucoflex 104A	MY1397/4A	01/10/2020	01/10/2021
Chamber 19	RF Cable (18GHz-40GHz)	HUBER SU- HNER	Sucoflex 102	27963/2&374 21/2	11/21/2019	11/21/2020
Chamber 19	Signal Generator	Anritsu	MG3692A	20311	01/06/2020	01/06/2021
Chamber 19	Test Software	Audix	E3 Ver:6.12023	N/A	N/A	N/A

9.6. Field Strength Calculation

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

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

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

9.7. Measurement Result

Refer to attach tabular data sheets.

NOTE:

The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 100kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz. And RBW 1MHz for frequency above 1GHz.