

TEST REPORT

of

FCC PART 15 SUBPART E

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

Product : Wi-Fi / Bluetooth Module
Brand: Zunidata
Model: AP6256
Model Difference: N/A
FCC ID: Z28-AP6256-ZA
FCC Rule Part: §15.407, Cat:NII
Applicant: Zunidata Systems, Inc.
Address: 6F, No.945,Boai Street , Jubei City, Hsinchu,
30265 Taiwan

Test Performed by:

International Standards Laboratory Corp. LT Lab.



TEL: +886-3-263-8888 FAX: +886-3-263-8899

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

Report No.: ISL-22LR0181FE
Issue Date :2022/11/15



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.

This test report shall not be reproduced except in full, without the written approval of International Standards Laboratory Corp.

VERIFICATION OF COMPLIANCE

Applicant: Zunidata Systems, Inc.
Product Description: Wi-Fi / Bluetooth Module
Brand Name: Zunidata
Model No.: AP6256
Model Difference: N/A
FCC ID: Z28-AP6256-ZA
Date of test: 2022/10/12 ~ 2022/11/14
Date of EUT Received: 2022/10/12

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:



Date:

2022/11/15

Barry Lee / Senior Engineer

Prepared By:

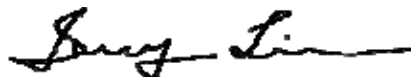


Date:

2022/11/15

Gigi Yeh / Senior Engineer

Approved By:



Date:

2022/11/15

Jerry Liu / Assistant Manager

Version

Version No.	Date	Description
00	2022/11/15	Initial creation of document

Uncertainty of Measurement

ISO/IEC 17025 requires that an estimate of measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor ($k=2$)).

Parameter	Uncertainty ($k=2$)
Conducted Emission (AC power line)	± 0.852 dB
Spurious emissions, radiated	± 3.46 dB
RF power, conducted	± 1.386 dB
Power Density	± 1.432 dB
RF Frequency	$\pm 0.00298\%$
Time	$\pm 0.01\%$
DC Voltage	$\pm 0.808\%$

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1. General Information

1.1. Product Description

General Information	
Product Name:	Wi-Fi / Bluetooth Module
Brand Name:	Zunidata
Model Name:	AP6256
Model Difference:	N/A
Temperature Range	0°C to 50°C
Power Supply:	5V DC

WiFi Information	
WLAN Modular	AP6256
Frequency Range:	WLAN 5GHz Band U-NII-1 5150MHz ~ 5250MHz U-NII-2A 5250MHz ~ 5350MHz U-NII-2C 5470MHz ~ 5725MHz U-NII-3 5725MHz ~ 5825MHz
Max Output Power:	5150MHz ~ 5350MHz: 14.68dBm 5470MHz ~ 5725MHz: 15.45dBm 5725MHz ~ 5825MHz: 15.87dBm
Channel number:	WLAN 5GHz Band 802.11a U-NII-1 : 4ch 802.11a U-NII-2A : 4ch 802.11a U-NII-2C : 11ch 802.11a U-NII-3 : 5ch 802.11n(HT20) U-NII-1 : 4ch 802.11n(HT20) U-NII-2A : 4ch 802.11n(HT20) U-NII-2C : 11ch 802.11n(HT20) U-NII-3 : 5ch 802.11n(HT40) U-NII-1 : 2ch 802.11n(HT40) U-NII-2A : 2ch 802.11n(HT40) U-NII-2C : 5ch 802.11n(HT40) U-NII-3 : 2ch 802.11ac(VHT20) U-NII-1 : 4ch 802.11ac(VHT20) U-NII-2A : 4ch

	802.11ac(VHT20) U-NII-2C :	11ch
	802.11ac(VHT20) U-NII-3 :	5ch
	802.11ac(VHT40) U-NII-1 :	2ch
	802.11ac(VHT40) U-NII-2A :	2ch
	802.11ac(VHT40) U-NII-2C :	5ch
	802.11ac(VHT40) U-NII-3 :	2ch
	802.11ac(VHT80) U-NII-1 :	1ch
	802.11ac(VHT80) U-NII-2A :	1ch
	802.11ac(VHT80) U-NII-2C :	2ch
	802.11ac(VHT80) U-NII-3 :	1ch
	802.11a Straddle	1ch
	802.11n(HT20) Straddle :	1ch
	802.11n(HT40) Straddle	1ch
	802.11ac(VHT20) Straddle	1ch
	802.11ac(VHT40) Straddle	1ch
	802.11ac(VHT80) Straddle	1ch
Product HW Version:	2147	
Product SW Version:	7.45.96.90	
Product FW Version:	7.45.96.90	
Test SW Version:	Linux Terminal	
RF power setting:	802.11a 52 802.11HT20 52 802.11HT40 46 802.11ac20 44 802.11ac40 44 802.11ac080 44	

	Antenna Type	Brand	Model	Peak Gain (dBi)	Frequency Range	Connector Type
1	PIFA	anjil	AJDF1J-B0005	2400~2500MHz :2.46 5150~5350(MHz):4.93 5500~5700(MHz):4.57 5745~5825(MHz):4.66	2.4G&5G	i-pex
2	PIFA	ing 聯慶科技股份有限公司	T-543-9291042-1	2400~2500MHz : -1.65 5150~5350(MHz):-1.14 5500~5700(MHz):-1.46 5745~5825(MHz):-1.73	2.4G&5G	i-pex
3	PIFA	ing 聯慶科技股份有限公司	T-543-9291152-11	2400~2500MHz : -1.65 5150~5350(MHz):-1.14 5500~5700(MHz):-1.46 5745~5825(MHz):-1.73	2.4G&5G	i-pex
4	PIFA	TSKY CO., LTD.	A8-A006-00541	2400~2500MHz :1.47 5150~5350(MHz):4.83 5500~5700(MHz):4.45 5745~5825(MHz):4.5	2.4G&5G	i-pex
5	PIFA	TSKY CO., LTD.	A8-A006-00509	2400~2500MHz :2.7 5150~5350(MHz):6.63 5500~5700(MHz):5.78 5745~5825(MHz):5.55	2.4G&5G	i-pex
6	PIFA	TSKY CO., LTD.	A8-A006-00543	2400~2500MHz :4.37 5150~5350(MHz):3.26 5500~5700(MHz):4.62 5745~5825(MHz):4.17	2.4G&5G	i-pex
7	PIFA	TSKY CO., LTD	A8-A003-00185	2400~2500MHz :2.33 5150~5350(MHz):4.56 5500~5700(MHz):4.33 5745~5825(MHz):3.18	2.4G&5G	i-pex
8	Dipole	亞驪	RFA-25-T42-U-M70	2400~2500MHz :2.9 5150~5350(MHz):4.5 5500~5700(MHz):4.5 5745~5825(MHz):4.5	2.4G&5G	SMA
9	Dipole	TSKY CO., LTD	A8-A003-00178	2400~2500MHz :4.25 5150~5350(MHz):3.64 5500~5700(MHz):3.91 5745~5825(MHz):2.06	2.4G&5G	SMA
10	Dipole	TSKY CO., LTD	A8-A006-00522	2400~2500MHz :5.56 5150~5350(MHz):4.36 5500~5700(MHz):4.66 5745~5825(MHz):4.36	2.4G&5G	SMA
11	PIFA	anjil	AJDF1J-B0003	2400~2500MHz :2.78 5150~5350(MHz):2.47 5500~5700(MHz):2.18 5745~5825(MHz):1.98	2.4G&5G	i-pex

12	PIFA	ing 聯慶科 技股份有限 公司	T-543-92910 48-1	2400~2500MHz :-1.16 5150~5350(MHz):-1.37 5500~5700(MHz):-1.04 5745~5825(MHz):-1.68	2.4G&5G	i-pex
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The EUT is compliance with IEEE 802.11 a/b/g/n/ac Standard.

This report applies for Wifi frequency band 5150 MHz– 5250 MHz, 5150 MHz– 5250 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.

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

This submittal(s) (test report) is intended for **FCC ID: Z28-AP6256-ZA** 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.

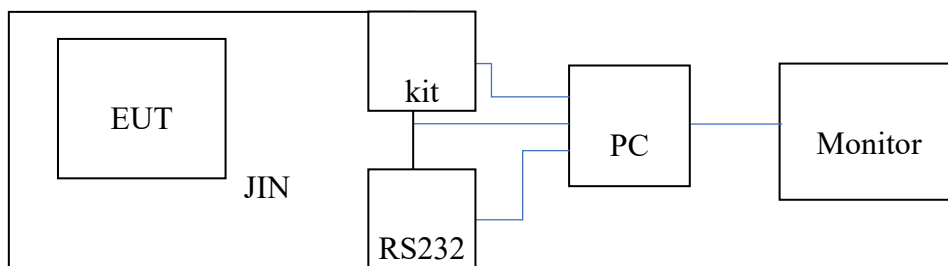
2.3.2 Radiated Emissions

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	Monitor	DELI	P2011H	N/A	N/A	180cm
2	PC	N/A	N/A	N/A	N/A	180cm
3	Jin	Soliton	SCTS SD_SDEXTD-2 IN_V1.1	N/A	50cm	N/A
4	RS232	AMPAK	UART_V07	N/A	N/A	N/A

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	1.386	1.507	92.000%	0.36	0.721	1
HT20	1.300	1.410	92.199%	0.35	0.769	1
HT40	0.648	0.747	86.747%	0.62	1.543	13
VHT20	1.305	1.425	91.579%	0.38	0.766	1
VHT40	0.648	0.754	85.932%	0.66	1.544	1
VHT80	0.324	0.430	75.349%	1.23	3.086	5

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.

5650MHz-5735MHz (Straddle channel) :

802.11a mode: Channel (5720MHz) with 6Mbps lowest data rate are chosen for pre-test testing of radiated emissions.

802.11 n HT20: Channel (5720MHz) with 6.5Mbps lowest data rate are chosen for pre-test testing of radiated emissions.

802.11 n HT40: Channel (5710MHz) with 13.5Mbps lowest data rate are chosen for pre-test

testing of radiated emissions.

802.11 ac VHT20: Channel (5720MHz) with 6.5Mbps lowest data rate are chosen for pre-test testing of radiated emissions.

802.11 ac VHT40: Channel (5710MHz) z) with 13.5Mbps lowest data rate are chosen for pre-test testing of radiated emissions.

802.11 ac VHT80: Channel (5690MHz) 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	EMI Receiver 14	ROHDE&SCHWARZ	ESCI	101034	05/25/2022	05/25/2023
Conduction 02	Conduction 02-1 Cable	WOKEN	CFD 300-NL	Conduction 02 -1	10/11/2022	10/11/2023
Conduction 02	LISN 26	R&S	ENV216	102378	12/03/2021	12/03/2022
Conduction 02	LISN 21	R&S	ENV216	101476	07/20/2022	07/20/2023
Conduction 02	ISN T4 07	Teseq GmbH	ISN T400A	30449	07/28/2022	07/28/2023
Conduction 02	ISN T8 10	TESEQ	ISN T800	42773	08/05/2022	08/05/2023
Conduction 02	ISN T8 CAT6A_01	SCHWARZ-BECK	NTFM 8158	8158 0123	01/25/2022	01/25/2023
Conduction 02	CDN ISN ST08A_1	Teseq GmbH	CDN ISN ST08A	43352	10/04/2022	10/04/2023
Conduction 02	Capacitive Voltage Probe 01	SCHAFFNER	CVP 2200A	18711	02/23/2022	02/23/2023
Conduction 02	Current Probe	SCHAFFNER	SMZ 11	18030	02/23/2022	02/23/2023

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



Address: No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist.,
Tao Yuan City 325, Taiwan.
Tel: 03-2638888

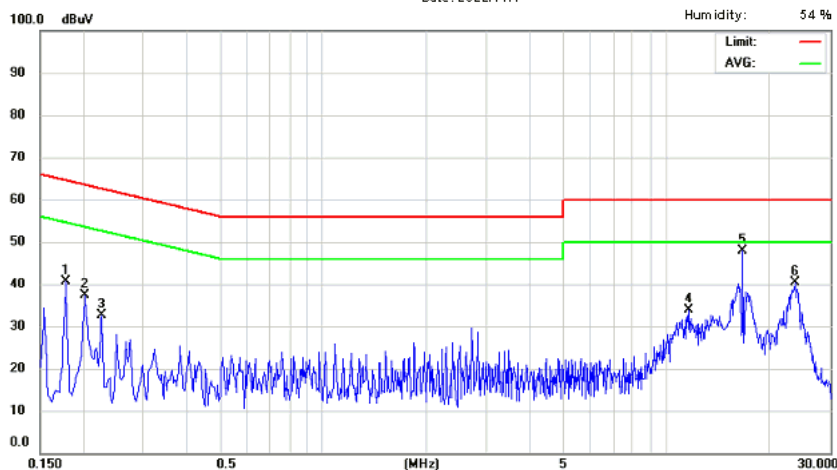
Conducted Emission Measurement

Date: 2022/11/1

operator: Martin

Temperature: 23 °C

Humidity: 54 %



Site: Conduction 02

Phase: L1

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	0.178	24.42	3.91	9.66	34.08	64.58	-30.50	13.57	54.58	-41.01
2	0.202	22.52	19.00	9.66	32.18	63.53	-31.35	28.66	53.53	-24.87
3	0.226	16.60	0.97	9.67	26.27	62.60	-36.33	10.64	52.60	-41.96
4	11.638	20.18	12.38	9.92	30.10	60.00	-29.90	22.30	50.00	-27.70
5	16.666	29.17	29.15	9.94	39.11	60.00	-20.89	39.09	50.00	-10.91
6	23.722	27.50	13.95	9.93	37.43	60.00	-22.57	23.88	50.00	-26.12



Address: No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist.,
Tao Yuan City 325, Taiwan.
Tel: 03-2638888

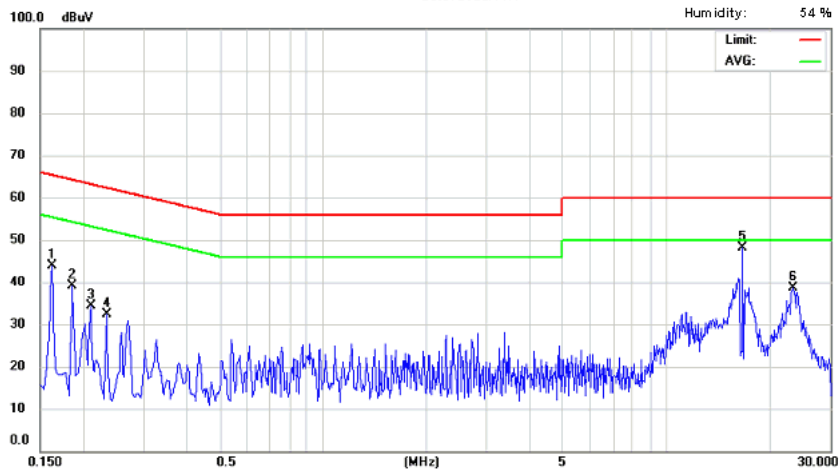
Conducted Emission Measurement

operator: Martin

Date: 2022/11/1

Temperature: 23 °C

Humidity: 54 %



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	0.162	27.43	2.92	9.66	37.09	65.36	-28.27	12.58	55.36	-42.78
2	0.186	22.98	3.37	9.66	32.64	64.21	-31.57	13.03	54.21	-41.18
3	0.210	18.85	4.40	9.66	28.51	63.21	-34.70	4.06	53.21	-39.15
4	0.234	15.26	-0.45	9.67	24.93	62.31	-37.38	9.22	52.31	-43.09
5	16.666	35.01	35.22	10.01	45.02	60.00	-14.98	45.23	50.00	-4.77
6	23.314	25.21	12.37	10.07	35.28	60.00	-24.72	22.44	50.00	-27.56

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

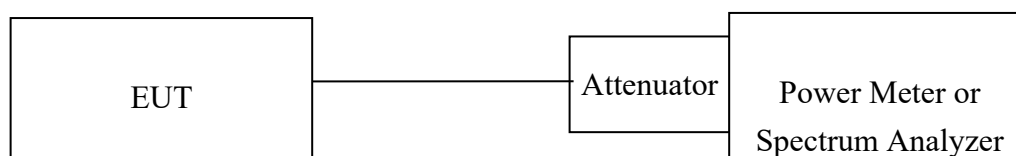
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.
3. Set RBW=1MHz,VBW=3MHz, Span=50MHz (Base Mode), Sweep time = Auto, traces 100 sweeps of video averaging for 5150-5725MHz;
4. Set 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	09/29/2022	09/29/2023
Conducted	Power Sensor	Anritsu	MA2411B	34NKF50	09/29/2022	09/29/2023
Conducted	Power Sensor	DARE	RPR3006W	13I00030SNO33	01/07/2022	01/07/2023
Conducted	Power Sensor	DARE	RPR3006W	13I00030SNO34	01/07/2022	01/07/2023
Conducted	Power Sensor	DARE	RPR3006W	14I00889SNO35	06/29/2022	06/29/2023
Conducted	Power Sensor	DARE	RPR3006W	14I00889SNO36	06/29/2022	06/29/2023
Conducted	Temperature Chamber	KSON	THS-B4H100	2287	05/20/2022	05/20/2023
Conducted	DC Power supply	ABM	8185D	N/A	01/06/2022	01/06/2023
Conducted	AC Power supply	EXTECH	CFC105W	NA	N/A	N/A
Conducted	Spectrum analyzer	Keysight	N9010A	MY56070257	09/28/2022	09/28/2023
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	Universal Digital Radio Communication Tester	R&S	CMU200	111968	11/18/2022	11/18/2023
Conducted	Wideband Radio Communication Tester	R&S	CMW500	1201.002K50108793-JG	10/31/2022	10/31/2023
Conducted	BT Simulator	Agilent	N4010A	MY48100200	NA	NA
Conducted	GPS Simulator	Welnavigate	GS-50	701523	NA	NA
Conducted (TS8997)	Wideband Radio Communication Tester	R&S	CMW500	168811	09/22/2022	09/22/2023
Conducted (TS8997)	Signal Generator	R&S	SMB100B	101085	09/21/2022	09/21/2023
Conducted (TS8997)	Vector Signal Generator	R&S	SMBV100A	263246	09/21/2022	09/21/2023
Conducted (TS8997)	Signal analyzer 40GHz	R&S	FSV40	101884	09/22/2022	09/22/2023
Conducted (TS8997)	OSP150 extension unit CAM-BUS	R&S	OSP150	101107	09/21/2022	09/21/2023
Conducted (TS8997)	Test Software	R&S	EMC32 Ver:11.10.00	NA	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	14.050				0.36	14.41	23.35
		5200	14.310				0.36	14.67	23.35
		5240	14.000				0.36	14.36	23.35
	HT20	5180	12.860				0.35	13.21	23.35
		5200	13.510				0.35	13.86	23.35
		5240	13.040				0.35	13.39	23.35
	HT40	5190	12.200				0.62	12.82	23.35
		5230	12.360				0.62	12.98	23.35
	VHT20	5180	13.190				0.38	13.57	23.35
		5200	13.300				0.38	13.68	23.35
		5240	13.250				0.38	13.63	23.35
	VHT40	5190	11.070				0.66	11.73	23.35
		5230	11.230				0.66	11.89	23.35
	VHT80	5210	10.560				1.23	11.79	23.35

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	13.970				0.36	14.33	23.35
		5300	14.320				0.36	14.68	23.35
		5320	14.250				0.36	14.61	23.35
	HT20	5260	12.780				0.35	13.13	23.35
		5300	13.280				0.35	13.63	23.35
		5320	13.270				0.35	13.62	23.35
	HT40	5270	12.070				0.62	12.69	23.35
		5310	12.360				0.62	12.98	23.35
	VHT20	5260	12.840				0.38	13.22	23.35
		5300	13.260				0.38	13.64	23.35
		5320	13.220				0.38	13.60	23.35
	VHT40	5270	10.960				0.66	11.62	23.35
		5310	10.990				0.66	11.65	23.35
	VHT80	5290	10.620				1.23	11.85	23.35

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	15.090				0.36	15.45	23.98
		5580	14.940				0.36	15.30	23.98
		5700	14.510				0.36	14.87	23.98
	HT20	5500	14.840				0.35	15.19	23.98
		5580	14.720				0.35	15.07	23.98
		5700	14.780				0.35	15.13	23.98
	HT40	5510	12.070				0.62	12.69	23.98
		5550	12.170				0.62	12.79	23.98
		5670	11.870				0.62	12.49	23.98
	VHT20	5500	12.870				0.38	13.25	23.98
		5580	12.920				0.38	13.30	23.98
		5700	12.580				0.38	12.96	23.98
	VHT40	5510	12.020				0.66	12.68	23.98
		5550	12.150				0.66	12.81	23.98
		5670	12.090				0.66	12.75	23.98
	VHT80	5530	11.090				1.23	12.32	23.98
		5610	11.140				1.23	12.37	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	15.510				0.36	15.87	30.00
		5785	15.370				0.36	15.73	30.00
		5825	15.360				0.36	15.72	30.00
	HT20	5745	15.500				0.35	15.85	30.00
		5785	15.090				0.35	15.44	30.00
		5825	15.420				0.35	15.77	30.00
	HT40	5755	12.720				0.62	13.34	30.00
		5795	12.720				0.62	13.34	30.00
	VHT20	5745	13.720				0.38	14.10	30.00
		5785	13.350				0.38	13.73	30.00
		5825	13.720				0.38	14.10	30.00
	VHT40	5755	12.680				0.66	13.34	30.00
		5795	12.640				0.66	13.30	30.00
	VHT80	5775	11.760				1.23	12.99	30.00

Straddle channels

Band	Mode	Freq. (MHz)	Output Power (dBm)				Duty Factor (dB)	Total Out- put Power (dBm)	Output Power Limit (dBm)
			Chain 0	Chain 1	Chain 2	Chain 3			
UNII-2C	11a	5720	15.410				0.36	15.77	23.98
	HT20	5720	14.610				0.35	14.96	23.98
	HT40	5710	11.810				0.62	12.43	23.98
	VHT20	5720	12.770				0.38	13.15	23.98
	VHT40	5710	12.540				0.66	13.20	23.98
	VHT80	5690	11.050				0.51	11.07	23.98

Power Spectral Density Measurement:

Band	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			
UNII-1	11a	5180	-0.478				0.36	-0.12	10.37
		5200	-0.078				0.36	0.28	10.37
		5240	-0.077				0.36	0.29	10.37
	HT20	5180	-1.608				0.35	-1.26	10.37
		5200	-1.289				0.35	-0.94	10.37
		5240	-1.550				0.35	-1.20	10.37
	HT40	5190	-7.048				0.62	-6.43	10.37
		5230	-6.992				0.62	-6.37	10.37
	VHT20	5180	-1.943				0.38	-1.56	10.37
		5200	-1.562				0.38	-1.18	10.37
		5240	-1.682				0.38	-1.30	10.37
	VHT40	5190	-6.119				0.66	-5.46	10.37
		5230	-5.675				0.66	-5.02	10.37
	VHT80	5210	-9.614				1.23	-8.38	10.37

Band	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			
UNII-2A	11a	5260	-0.342				0.36	0.02	10.37
		5300	-0.024				0.36	0.34	10.37
		5320	0.071				0.36	0.43	10.37
	HT20	5260	-1.637				0.35	-1.28	10.37
		5300	-1.427				0.35	-1.07	10.37
		5320	-1.247				0.35	-0.89	10.37
	HT40	5270	-6.942				0.62	-6.32	10.37
		5310	-7.124				0.62	-6.51	10.37
	VHT20	5260	-1.911				0.38	-1.53	10.37
		5300	-1.526				0.38	-1.14	10.37
		5320	-1.258				0.38	-0.88	10.37
	VHT40	5270	-5.937				0.66	-5.28	10.37
		5310	-5.637				0.66	-4.98	10.37
	VHT80	5290	-9.673				1.23	-8.44	10.37

Band	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			
UNII-2C	11a	5500	0.407				0.36	0.77	11.00
		5580	0.616				0.36	0.98	11.00
		5700	0.100				0.36	0.46	11.00
	HT20	5500	-1.877				0.35	-1.52	11.00
		5580	0.180				0.35	0.53	11.00
		5700	-0.167				0.35	0.19	11.00
	HT40	5510	-5.333				0.62	-4.72	11.00
		5550	-5.267				0.62	-4.65	11.00
		5670	-5.583				0.62	-4.97	11.00
	VHT20	5500	-1.862				0.38	-1.48	11.00
		5580	-3.203				0.38	-2.82	11.00
		5700	-2.326				0.38	-1.94	11.00
	VHT40	5510	-5.370				0.66	-4.71	11.00
		5550	-5.390				0.66	-4.73	11.00
		5670	-5.676				0.66	-5.02	11.00
	VHT80	5530	-8.551				1.23	-7.32	11.00
		5610	-9.090				1.23	-7.86	11.00

Band	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			
UNII-3	11a	5745	-1.928				0.36	-1.57	30
		5785	-1.939				0.36	-1.58	30
		5825	-1.843				0.36	-1.48	30
	HT20	5745	-2.233				0.35	-1.88	30
		5785	-2.440				0.35	-2.09	30
		5825	-2.161				0.35	-1.81	30
	HT40	5755	-8.066				0.62	-7.45	30
		5795	-8.008				0.62	-7.39	30
	VHT20	5745	-4.294				0.38	-3.91	30
		5785	-4.677				0.38	-4.29	30
		5825	-4.448				0.38	-4.07	30
	VHT40	5755	-7.885				0.66	-7.23	30
		5795	-8.093				0.66	-7.43	30
	VHT80	5775	-11.864				1.23	-10.63	30

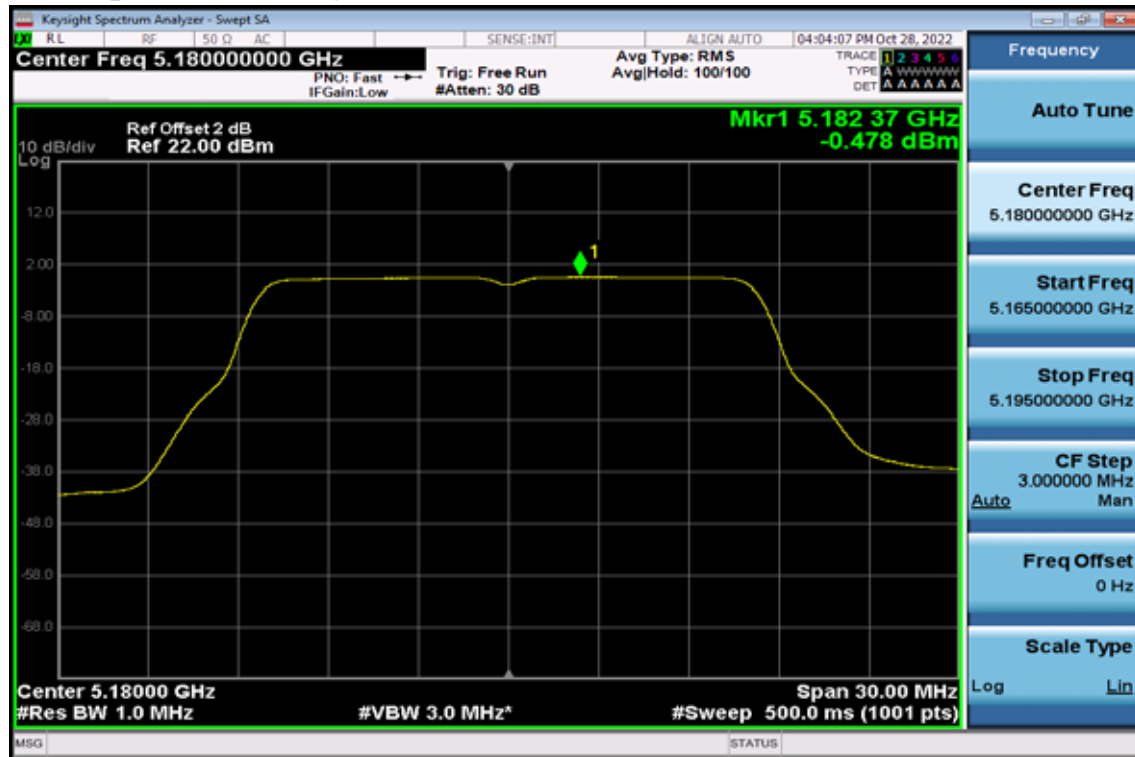
Straddle channels

Band	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			
UNII-2C	11a	5720	0.266				0.36	0.63	11.00
	HT20	5720	-0.356				0.35	0.00	11.00
	HT40	5710	-5.630				0.62	-5.01	11.00
	VHT20	5720	-2.159				0.38	-1.78	11.00
	VHT40	5710	-5.643				0.66	-4.98	11.00
	VHT80	5690	-9.845				1.23	-8.62	11.00

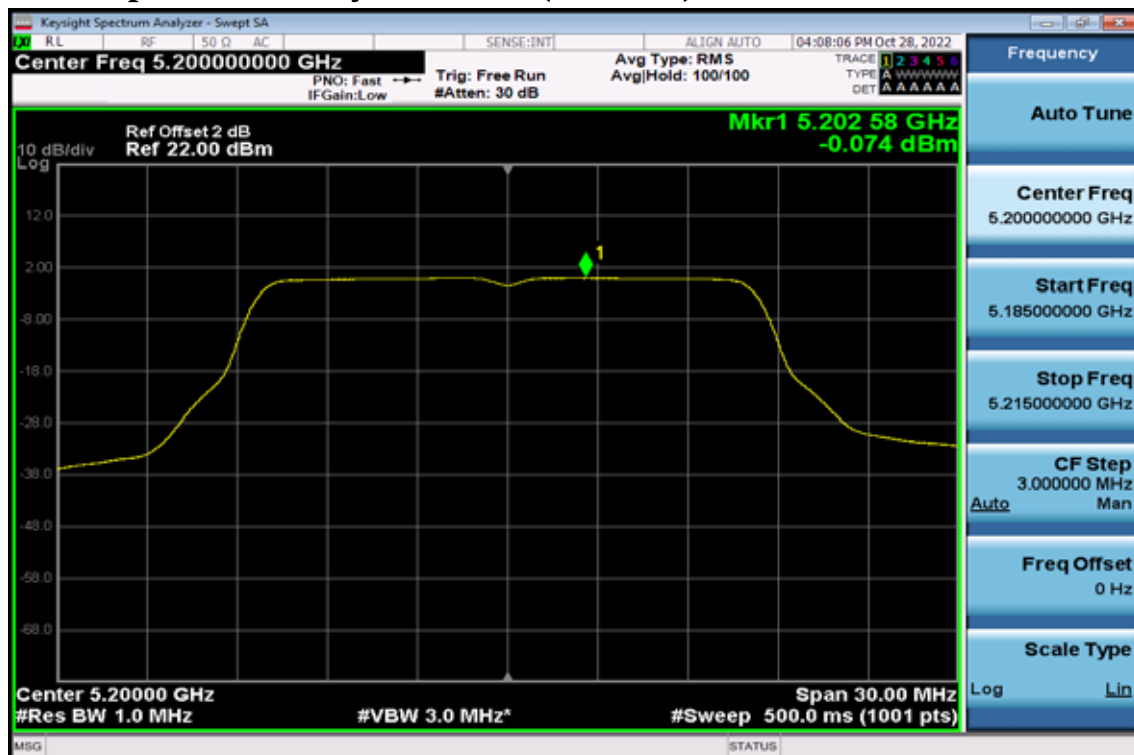
Band UNII-1

802.11a

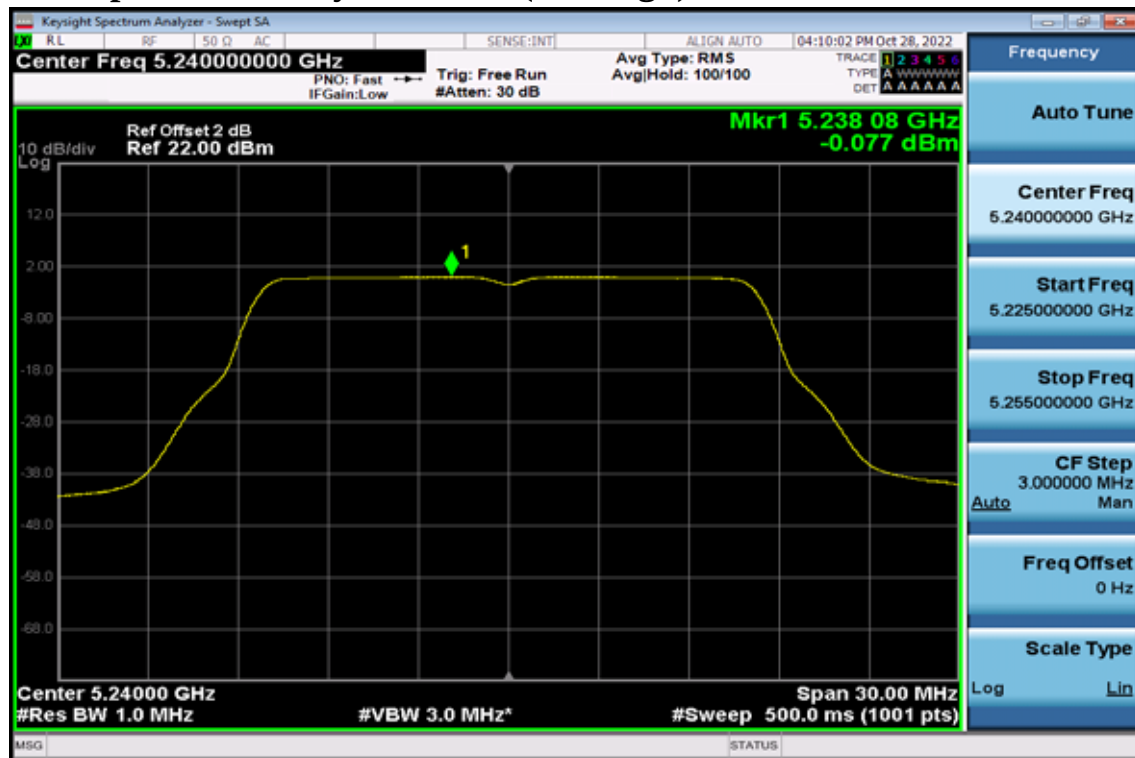
Power Spectral Density Data Plot (CH Low)



Power Spectral Density Data Plot (CH Mid)



Power Spectral Density Data Plot (CH High)



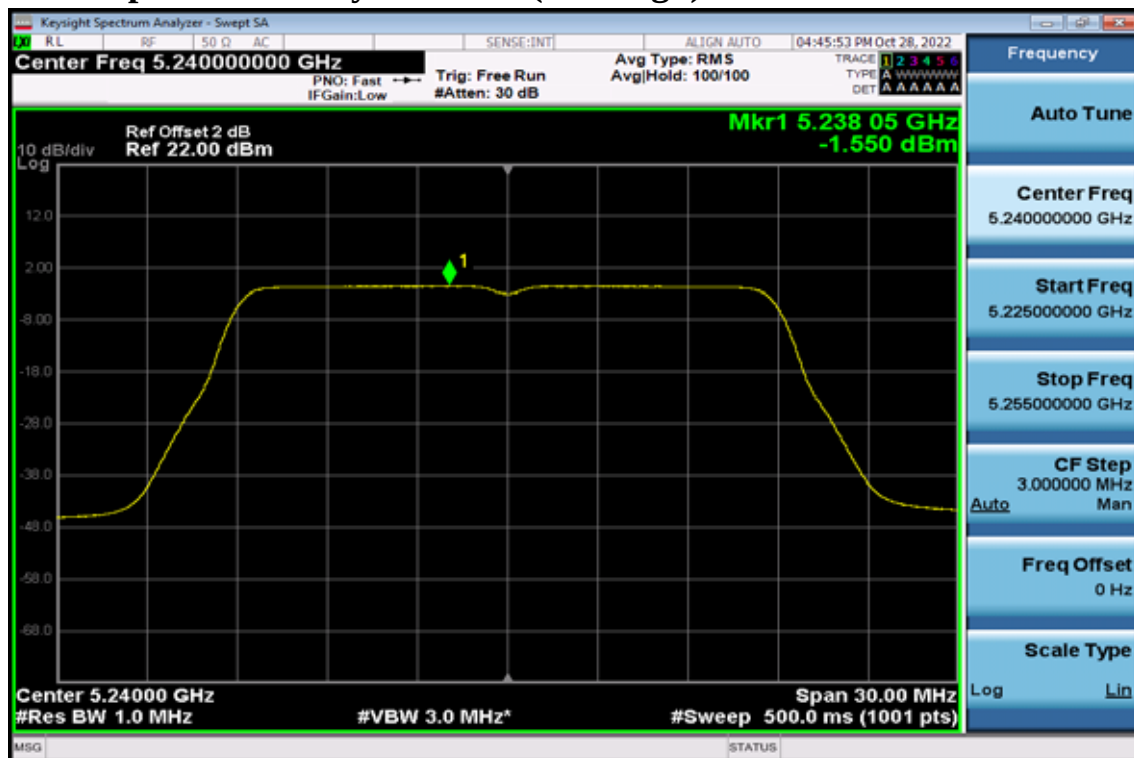
802.11n HT20, Power Spectral Density Test Plot (CH-Low)



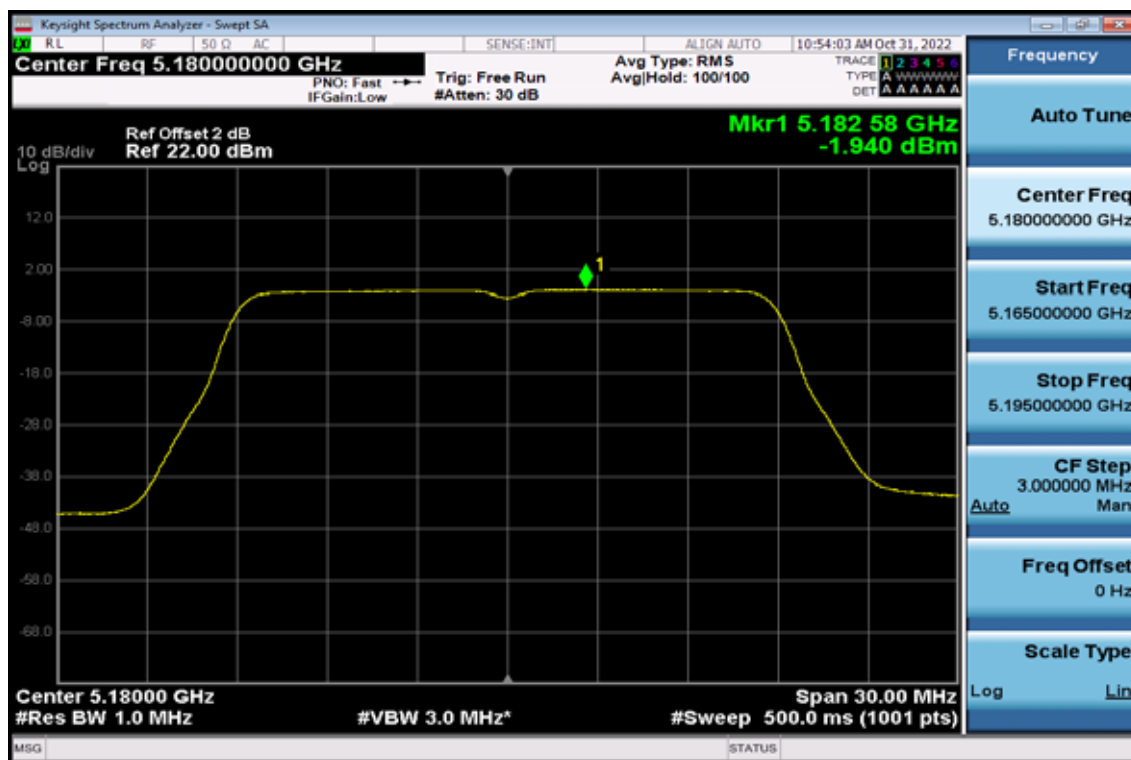
Power Spectral Density Test Plot (CH-Mid)



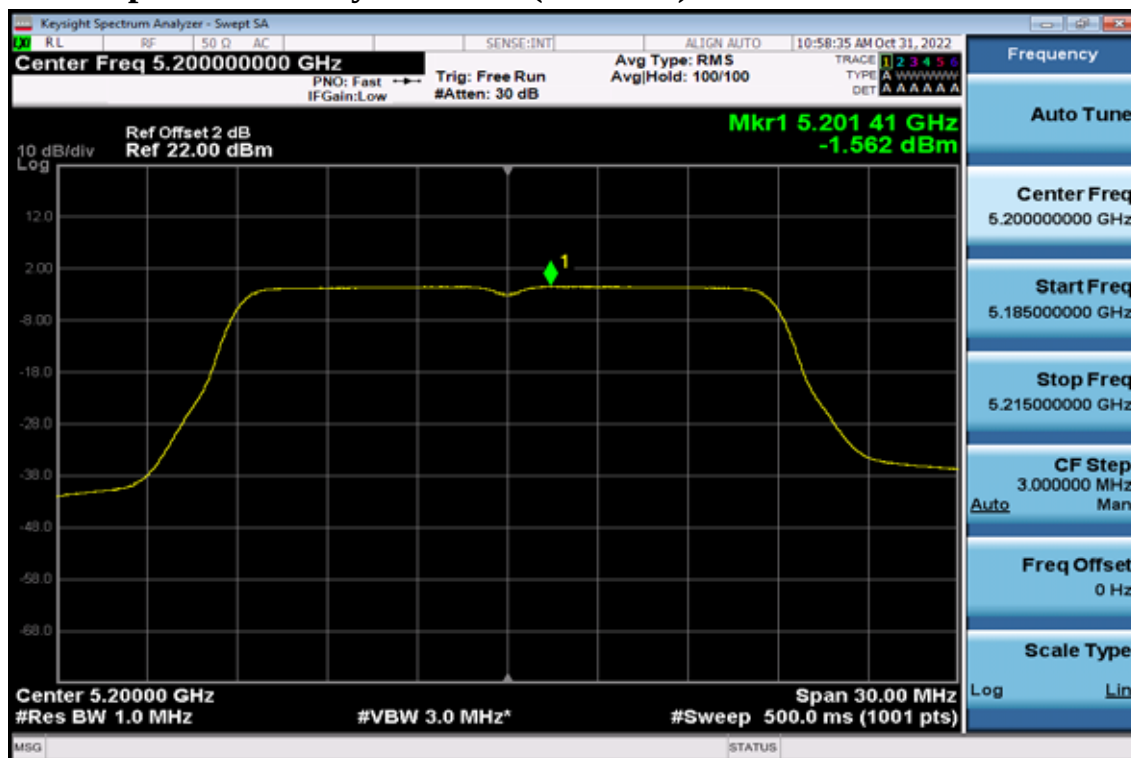
Power Spectral Density Test Plot (CH-High)



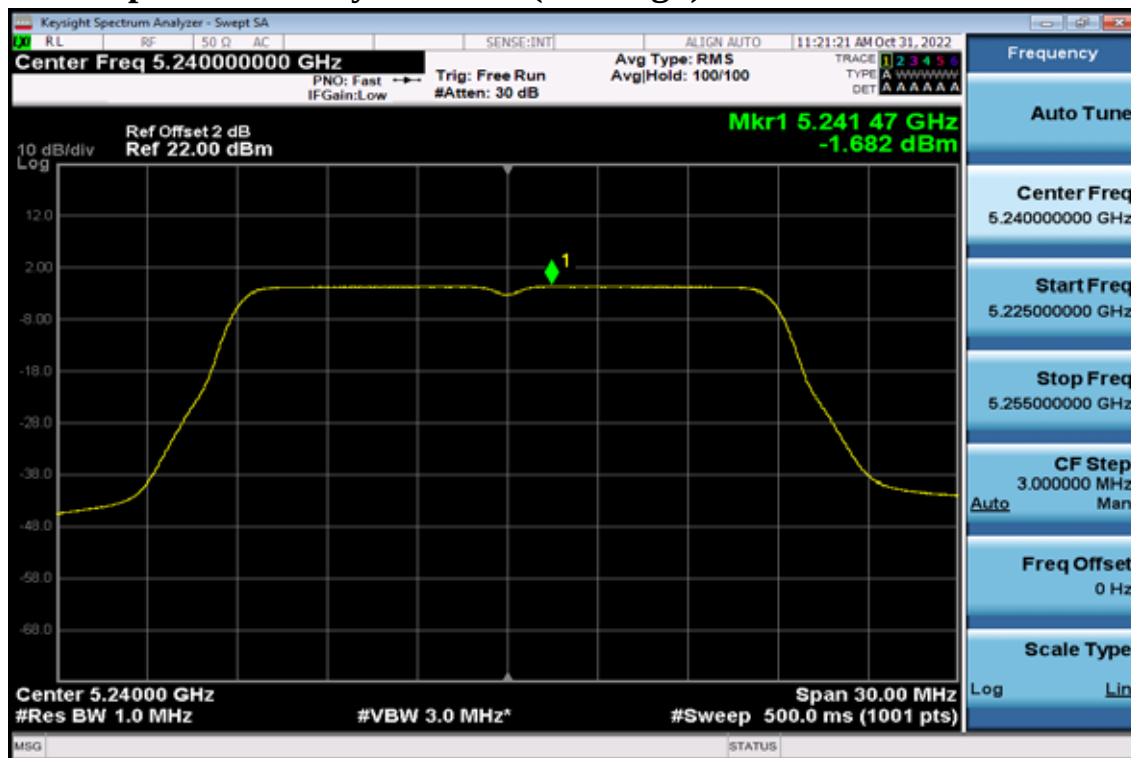
802.11ac VHT20, Power Spectral Density Test Plot (CH-Low)



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)

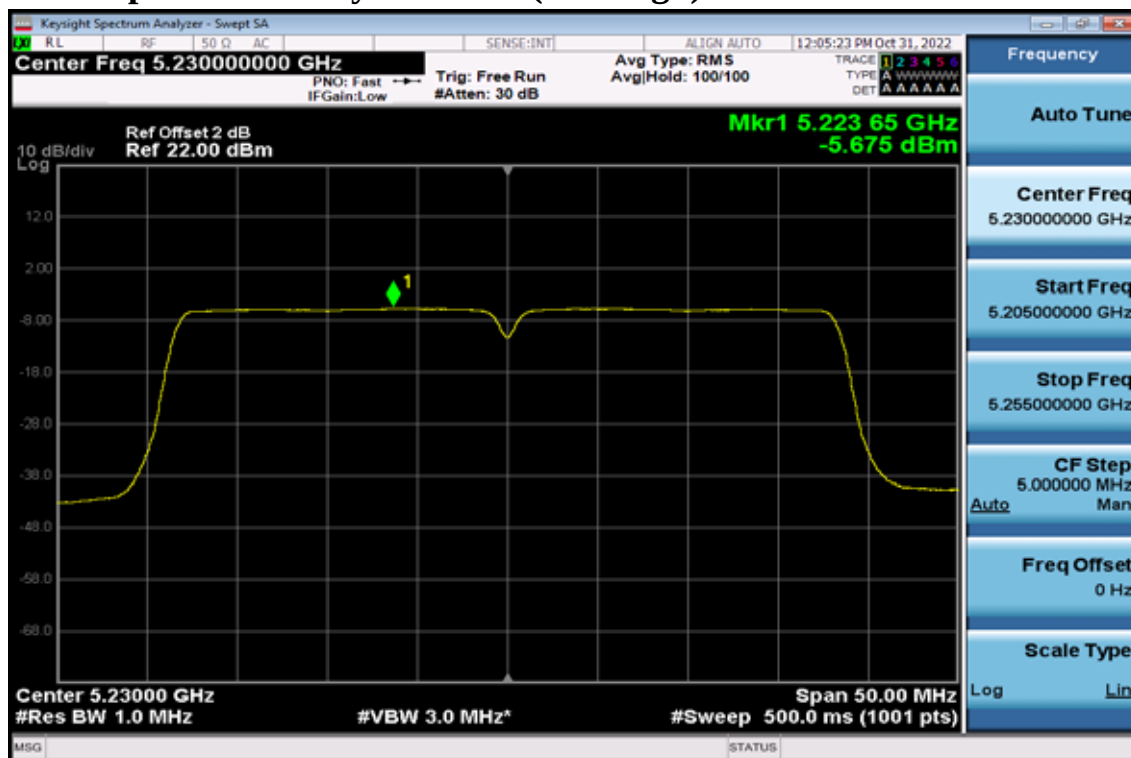


802.11ac VHT40

Power Spectral Density Test Plot (CH-Low)

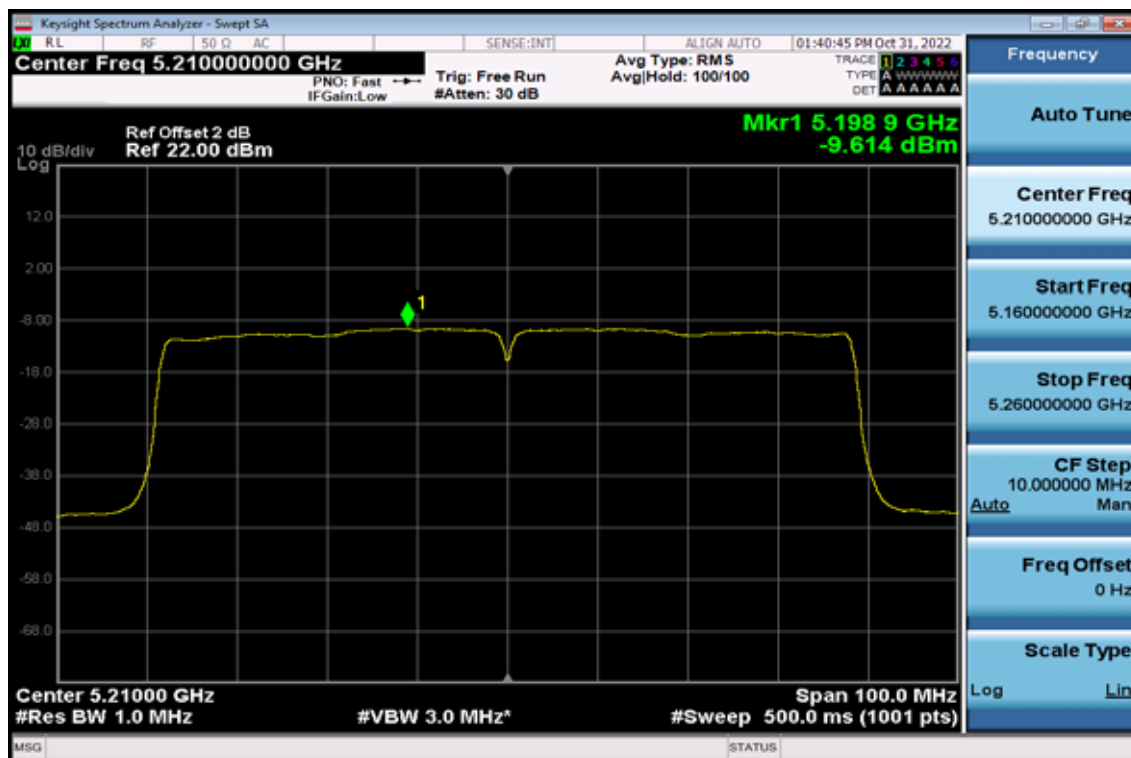


Power Spectral Density Test Plot (CH-High)



802.11 ac VHT80

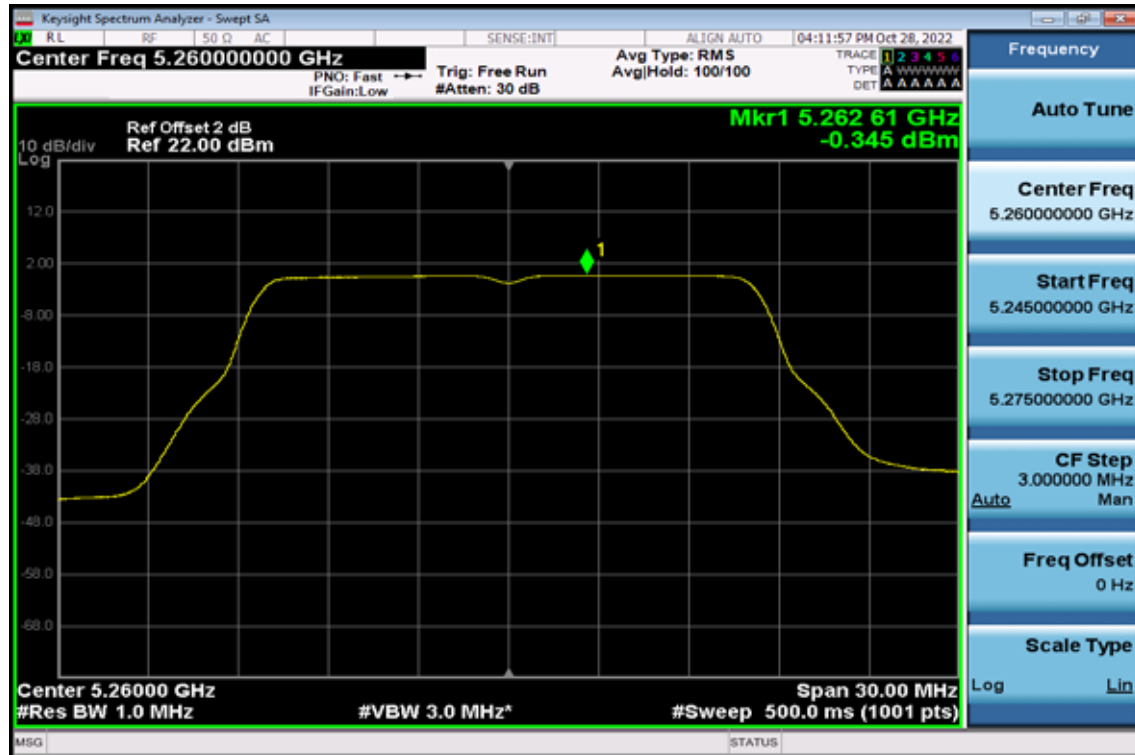
Power Spectral Density Test Plot (CH-Low)



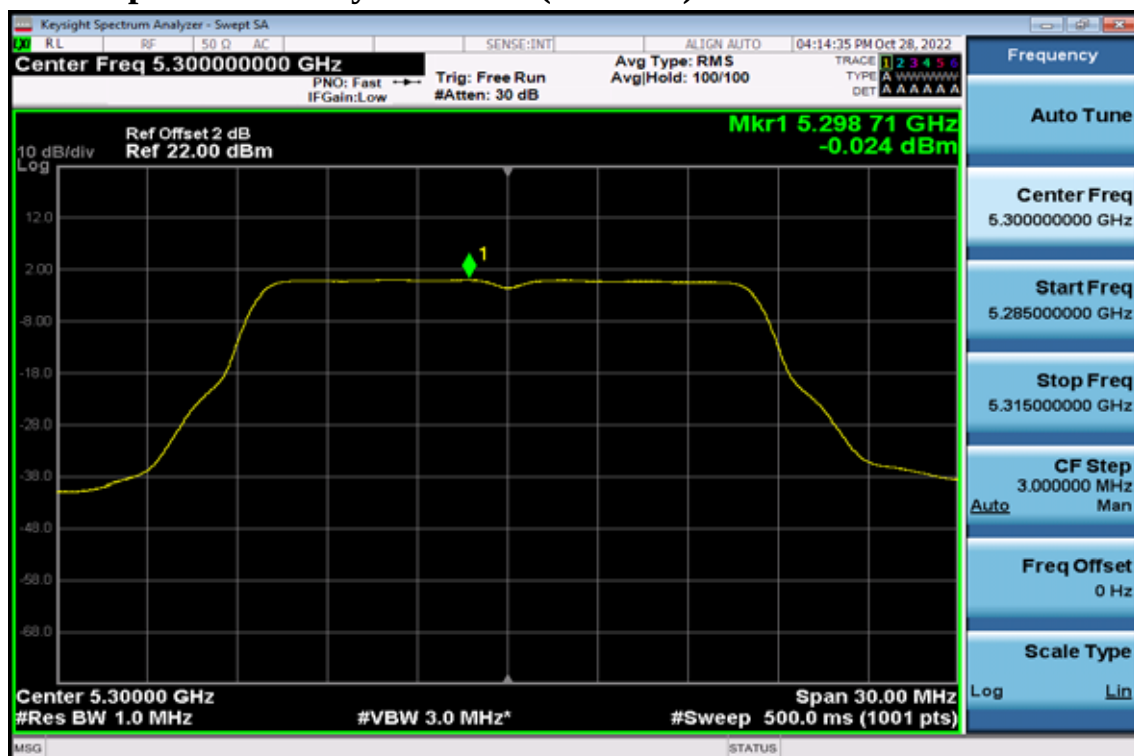
Band UNII-2A

802.11a

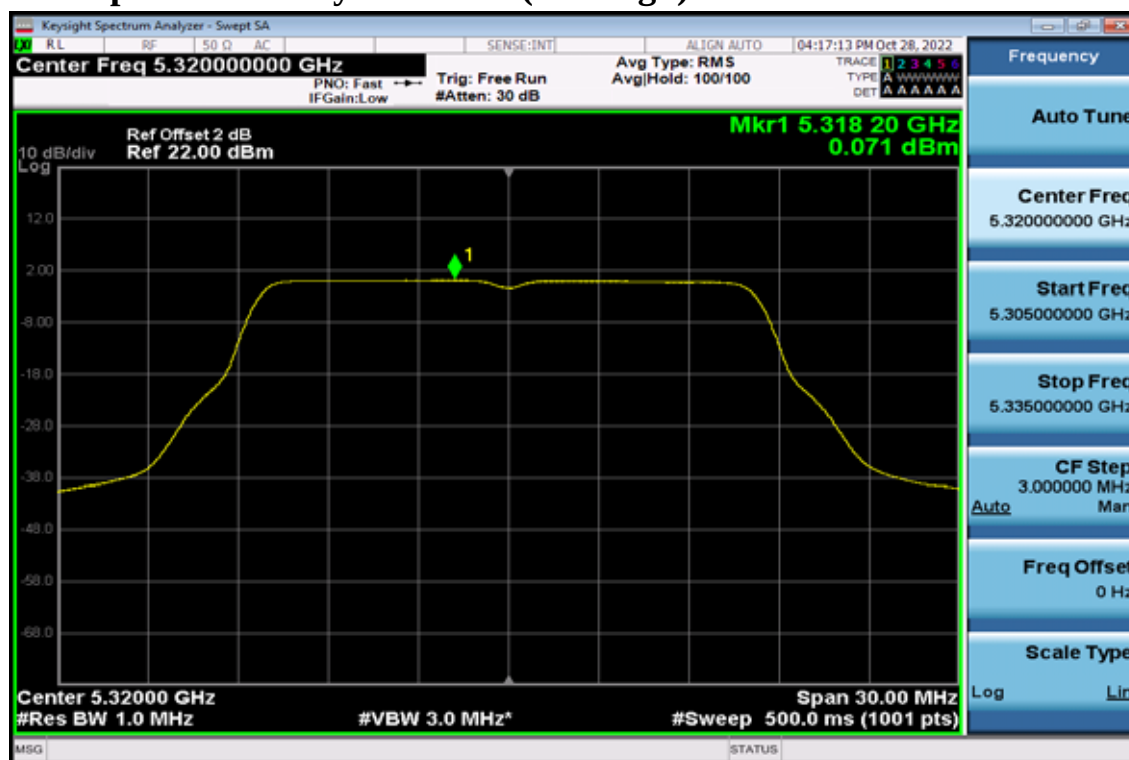
Power Spectral Density Data Plot (CH Low)



Power Spectral Density Data Plot (CH Mid)



Power Spectral Density Data Plot (CH High)



802.11n HT20,

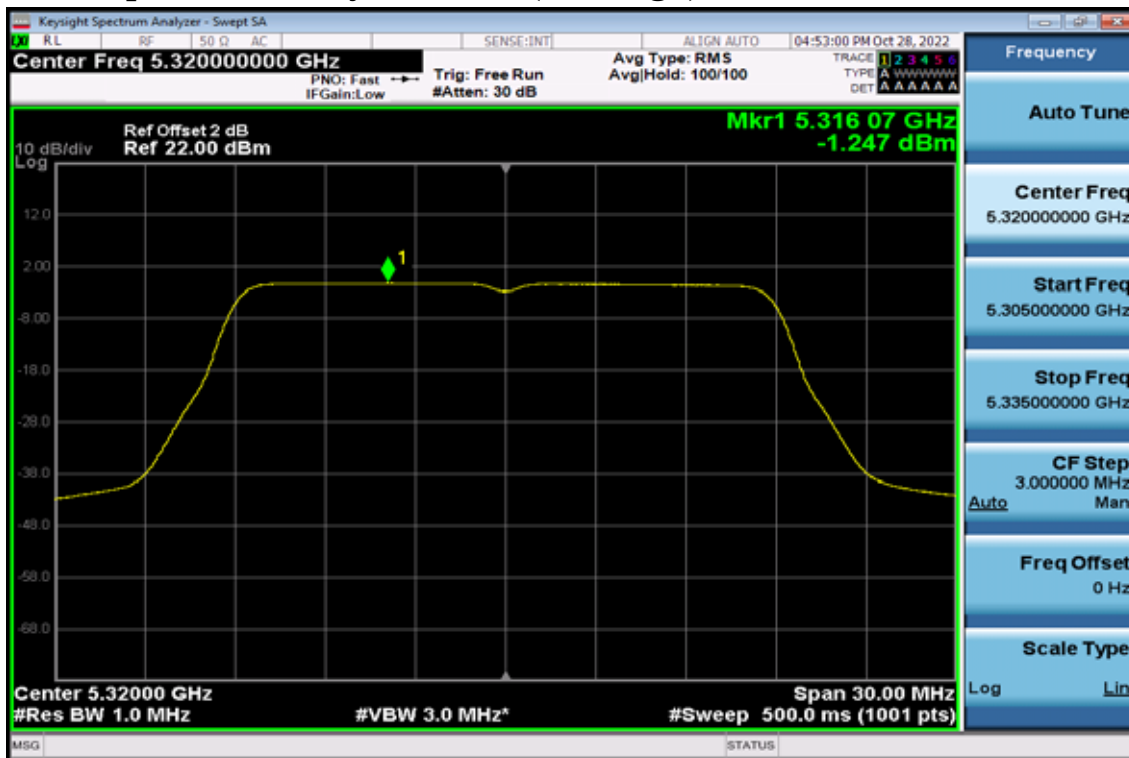
Power Spectral Density Test Plot (CH-Low)



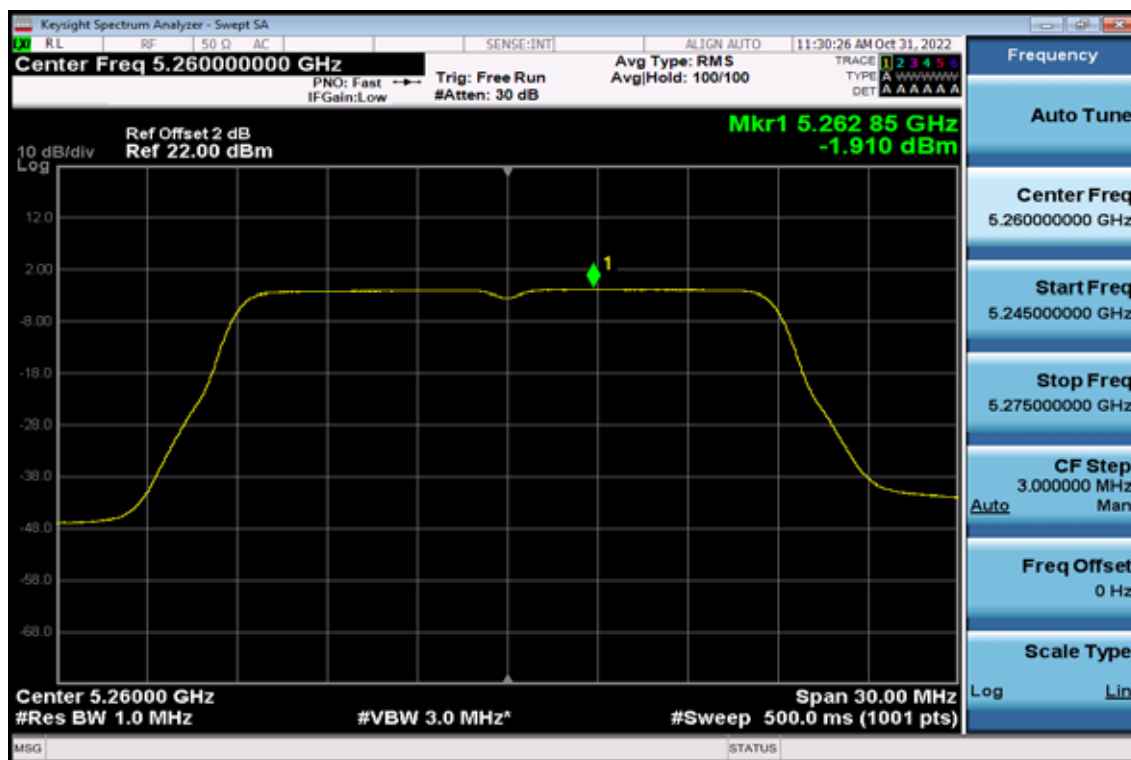
Power Spectral Density Test Plot (CH-Mid)



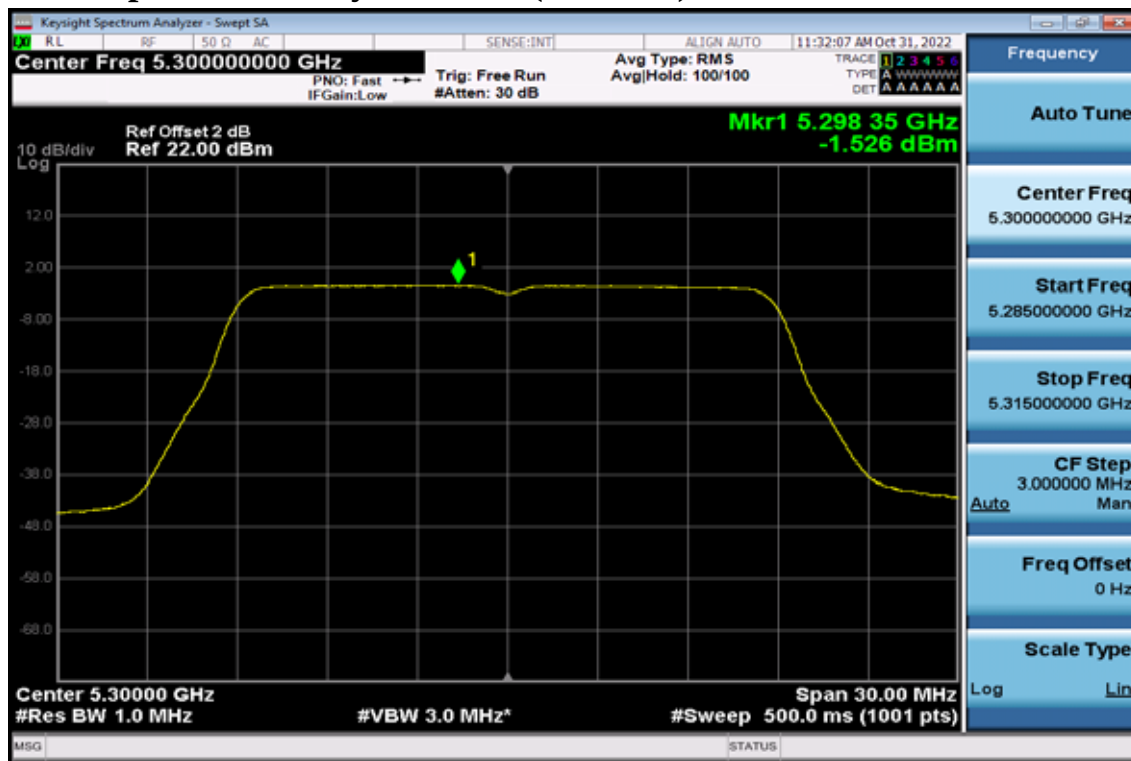
Power Spectral Density Test Plot (CH-High)



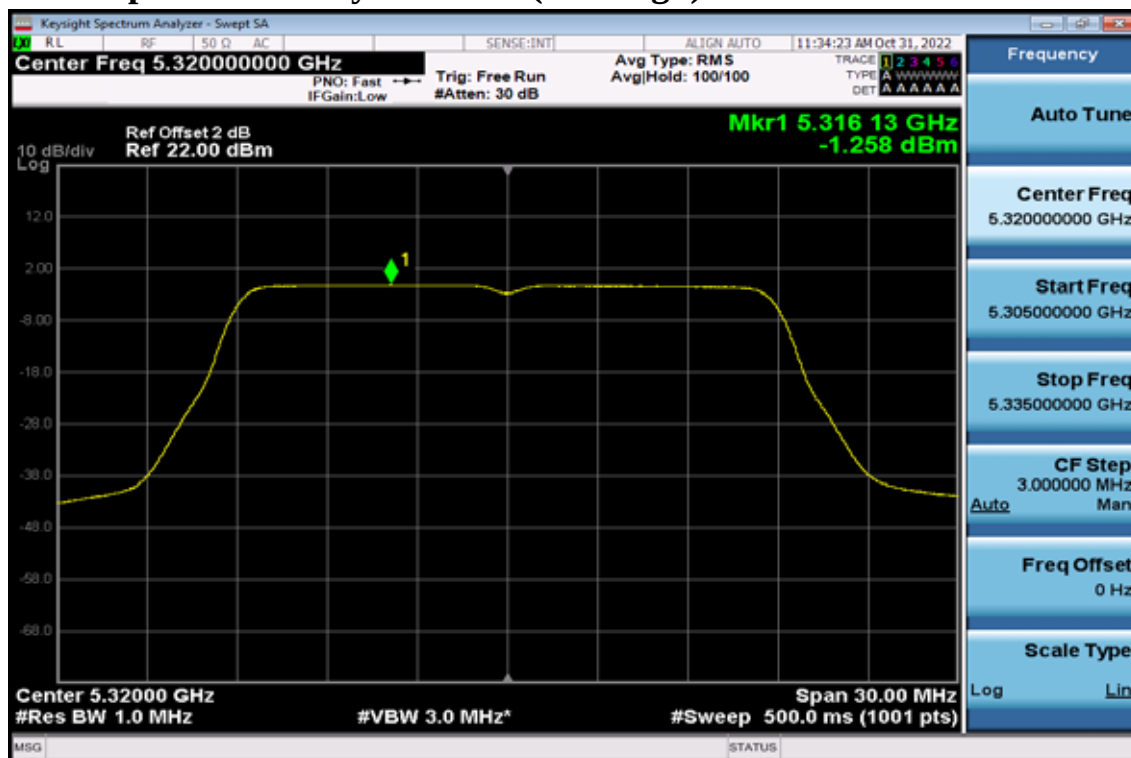
802.11ac VHT20, Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)

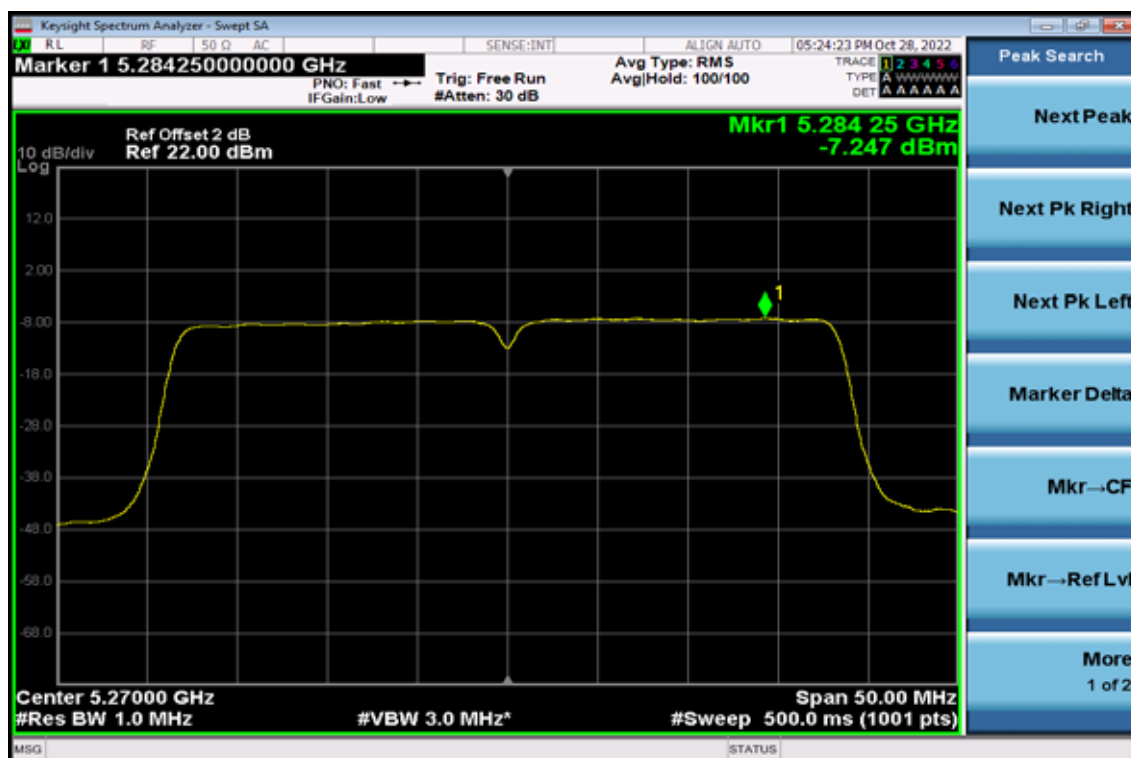


Power Spectral Density Test Plot (CH-High)



802.11n HT40

Power Spectral Density Test Plot (CH-Low)

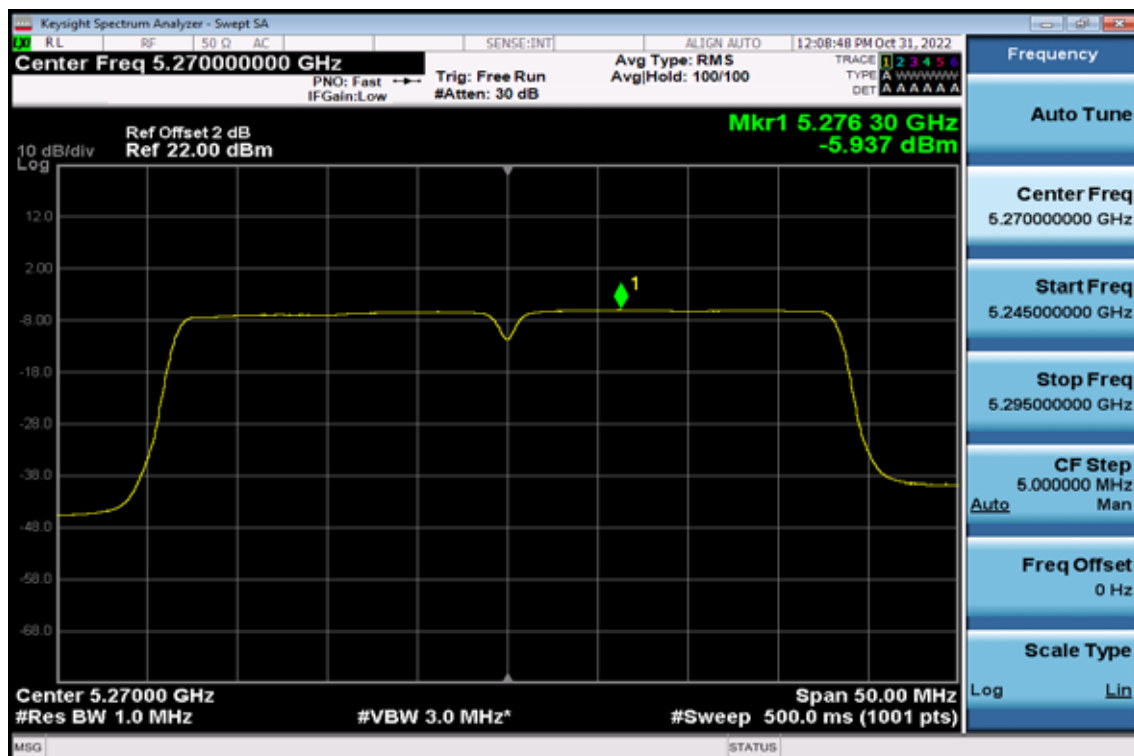


Power Spectral Density Test Plot (CH-High)

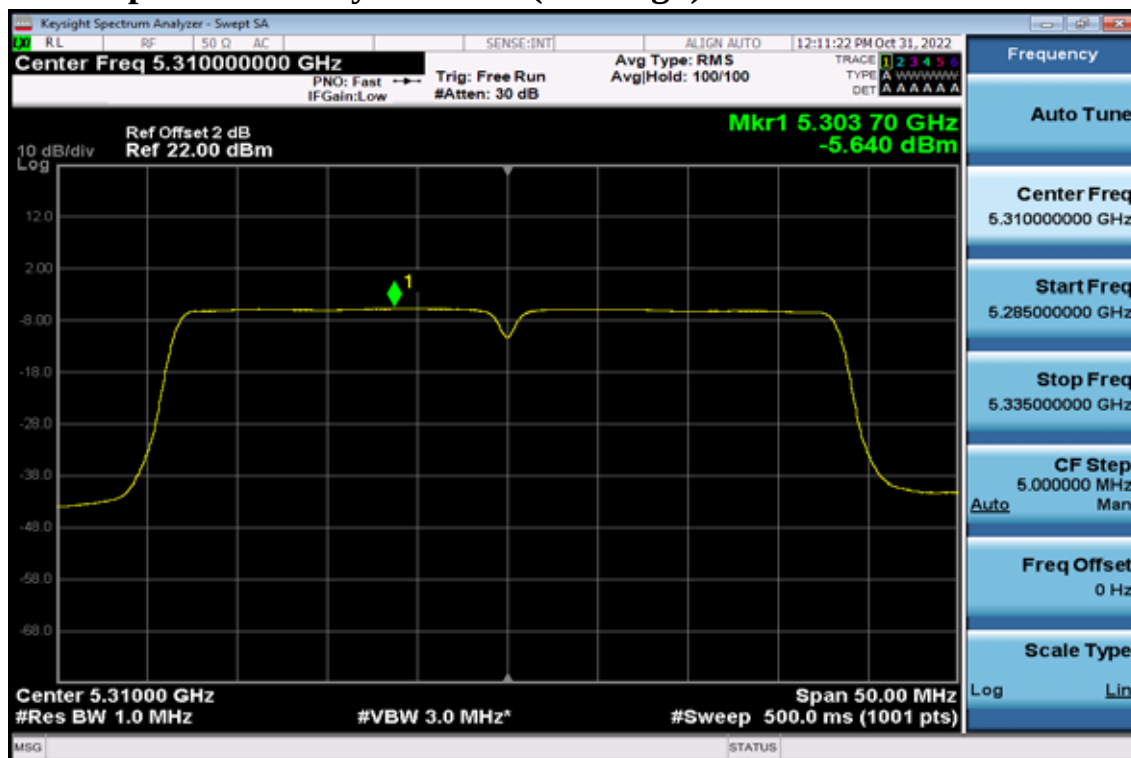


802.11ac VHT40

Power Spectral Density Test Plot (CH-Low)

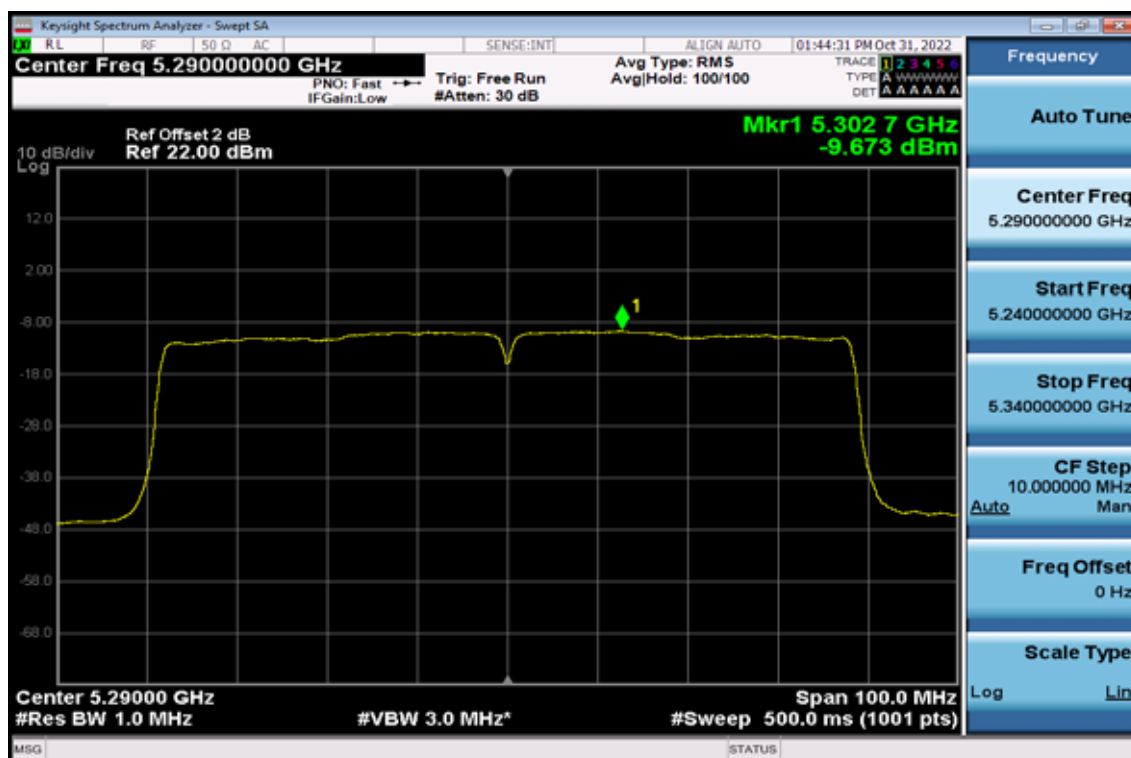


Power Spectral Density Test Plot (CH-High)



802.11 ac VHT80

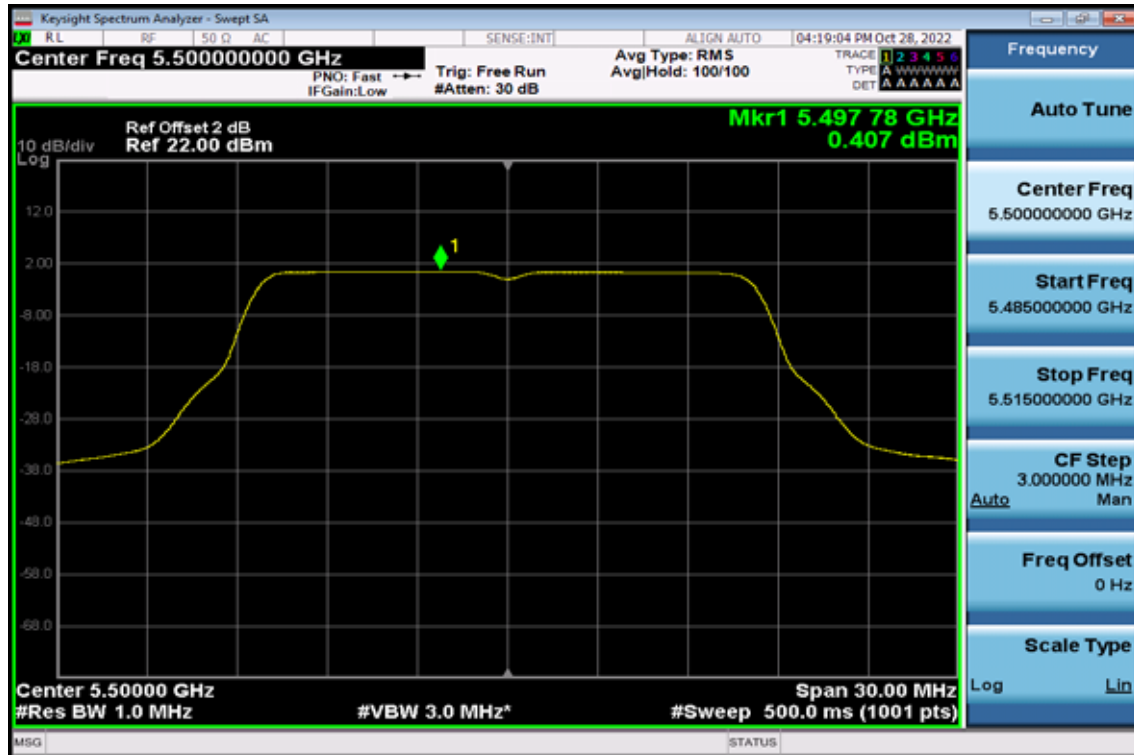
Power Spectral Density Test Plot (CH-Low)



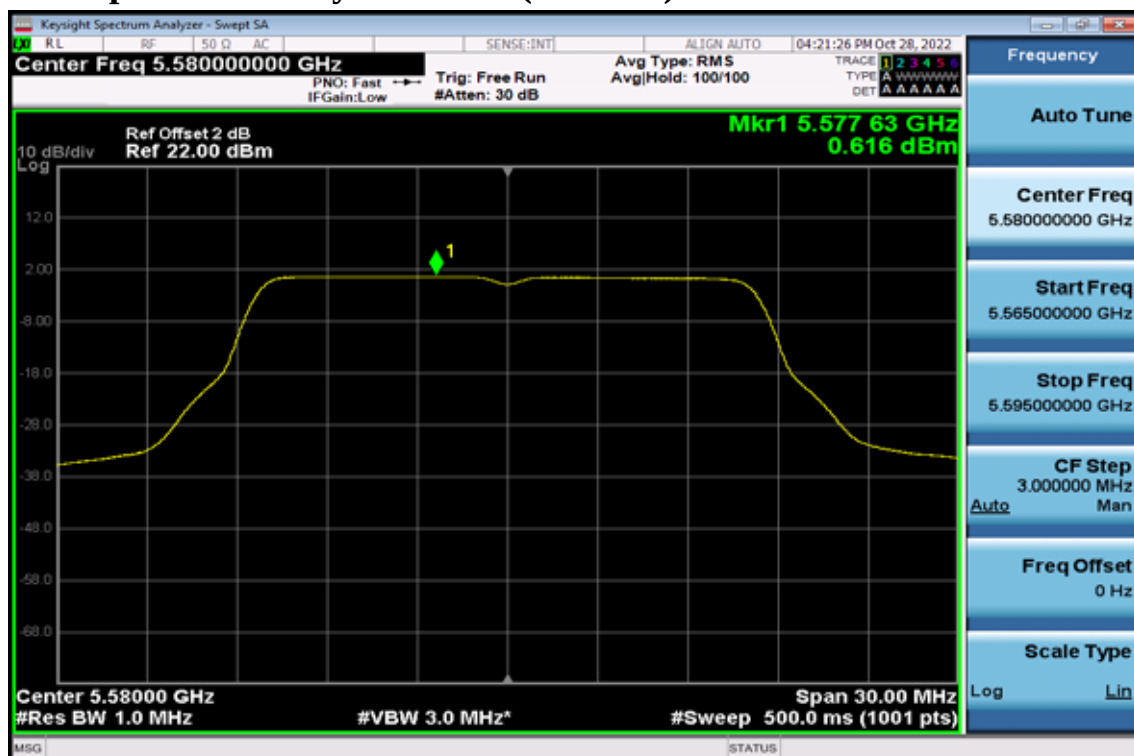
Band UNII-2C

802.11a

Power Spectral Density Data Plot (CH Low)



Power Spectral Density Data Plot (CH Mid)

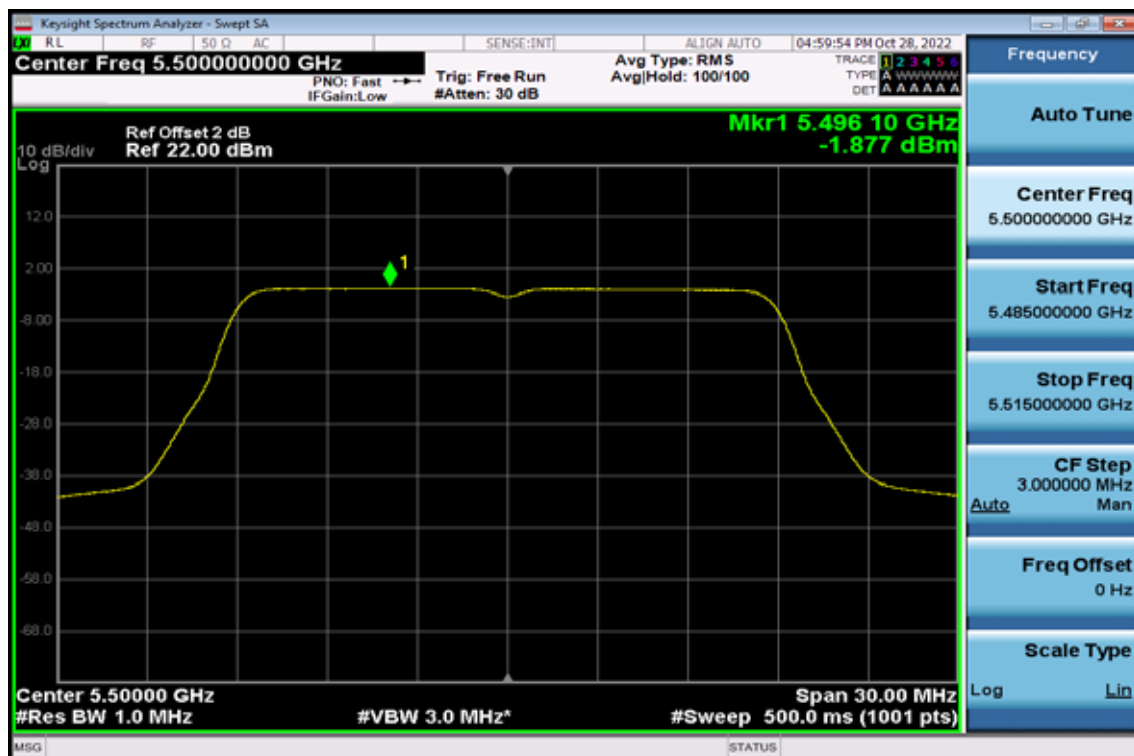


Power Spectral Density Data Plot (CH High)

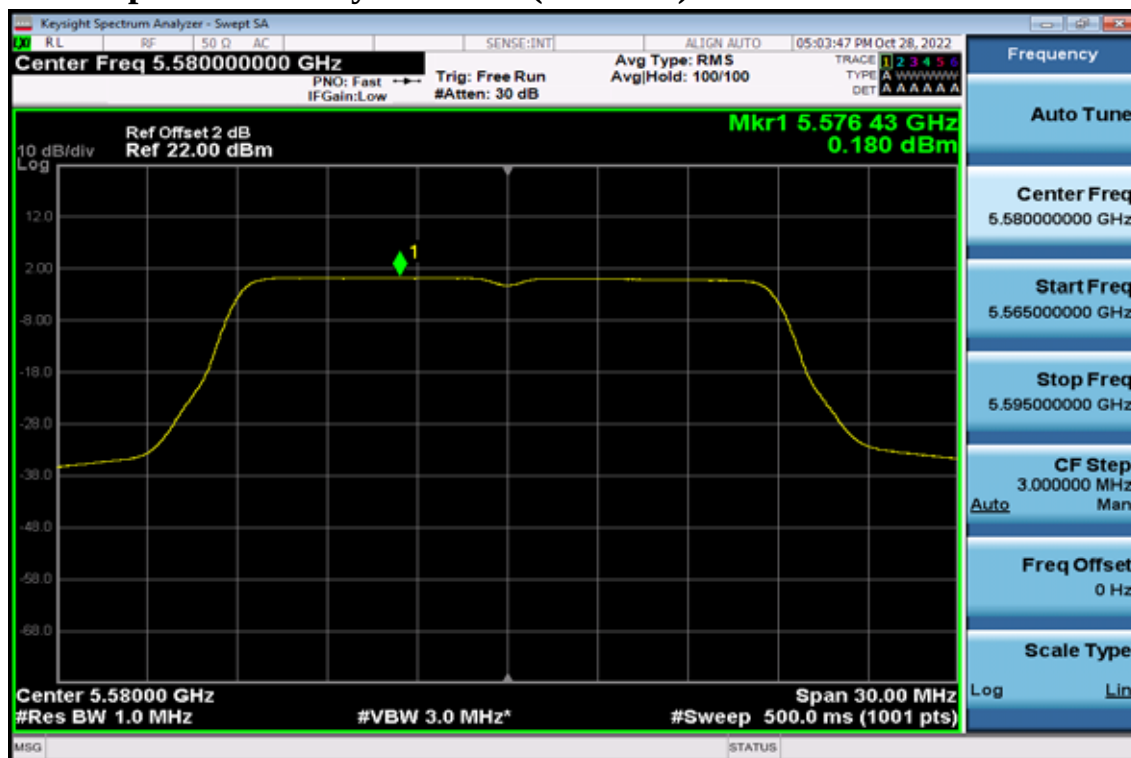


802.11n HT20

Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)

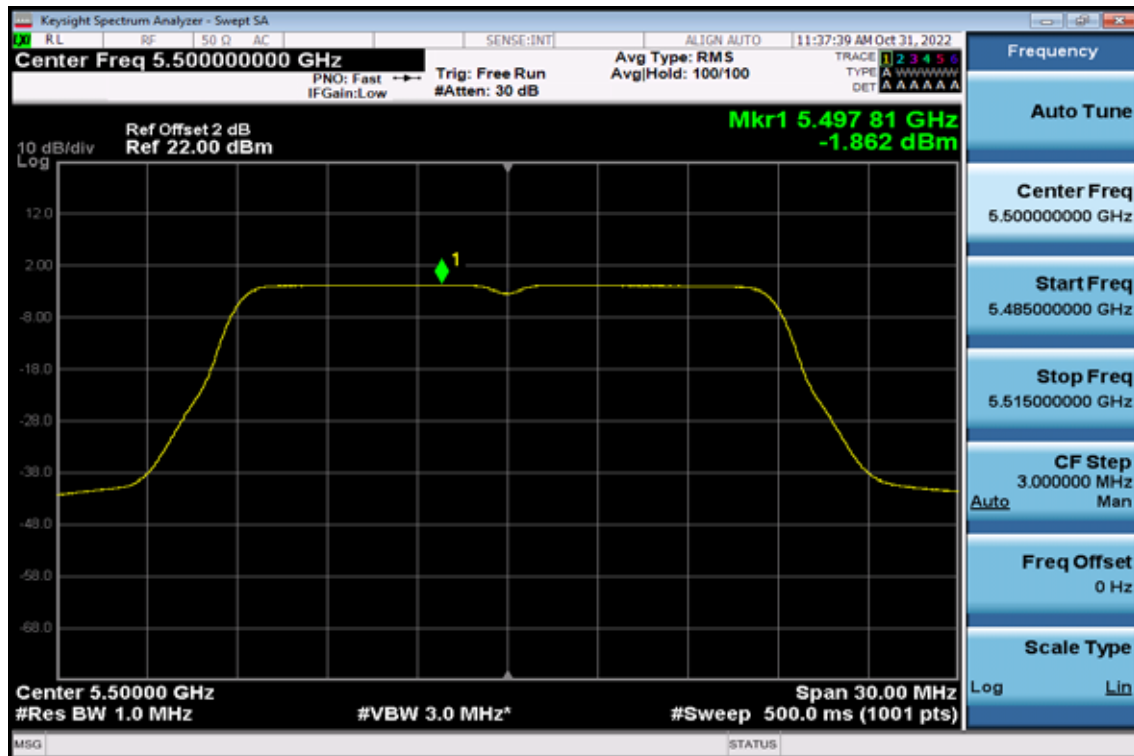


Power Spectral Density Test Plot (CH-High)

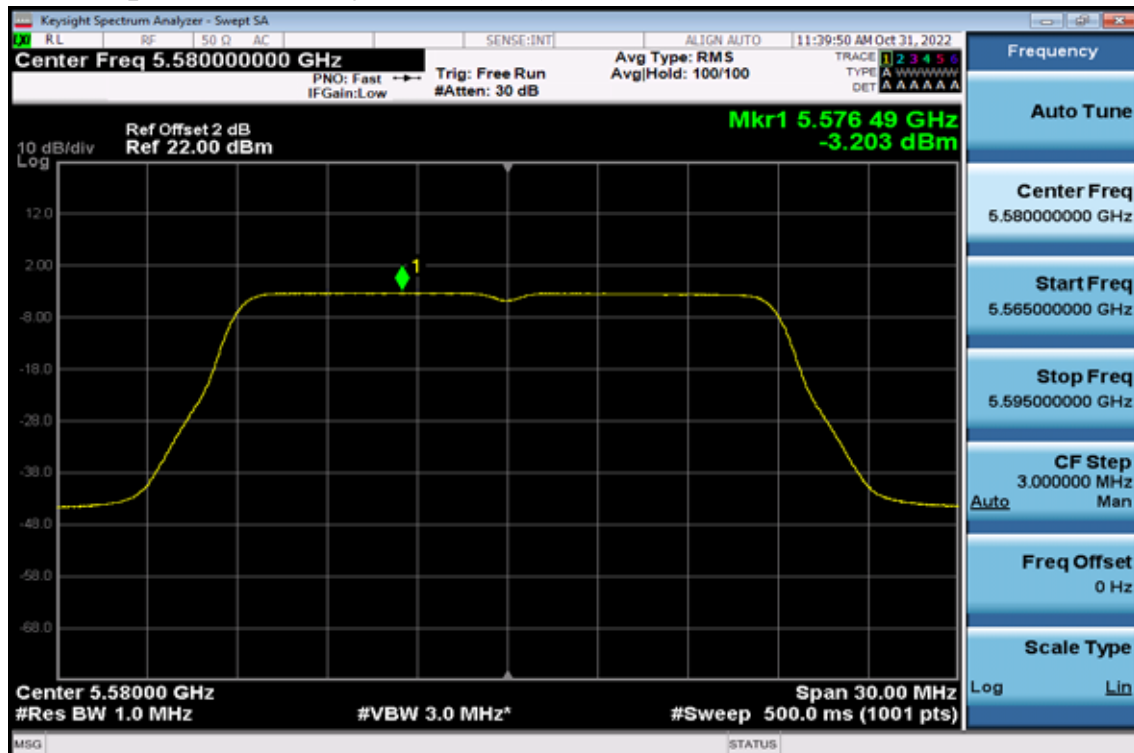


802.11ac VHT20

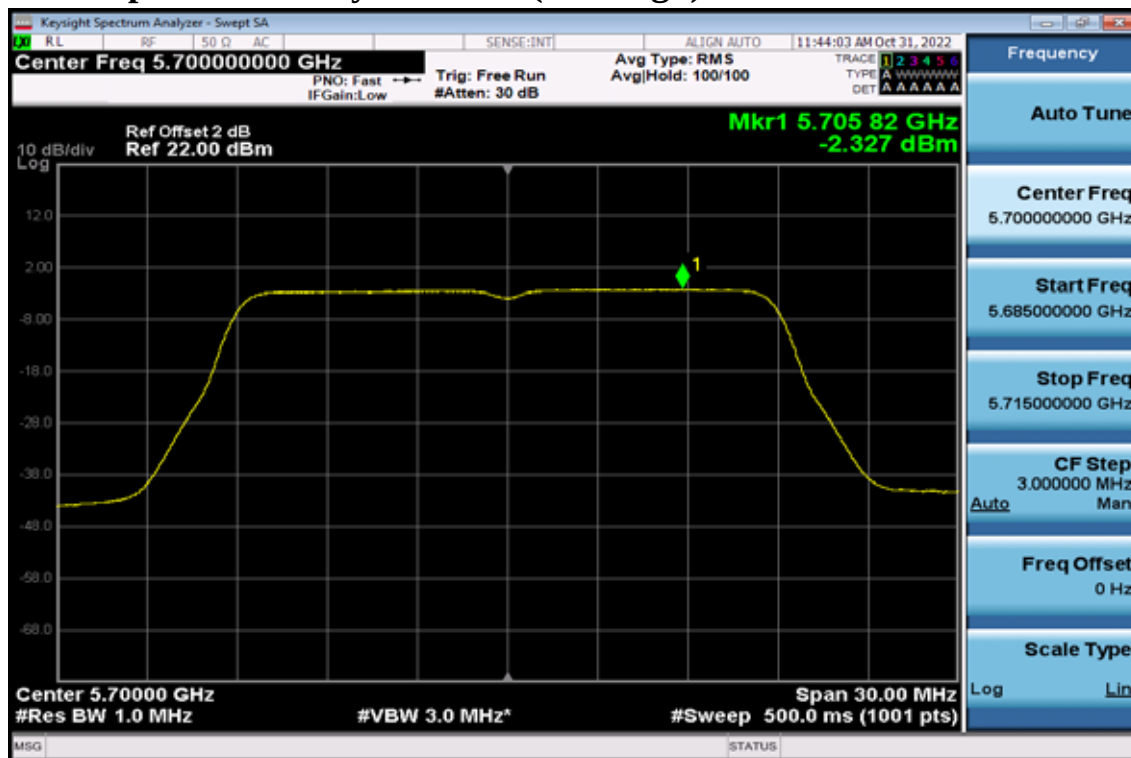
Power Spectral Density Test Plot (CH-Low)



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)

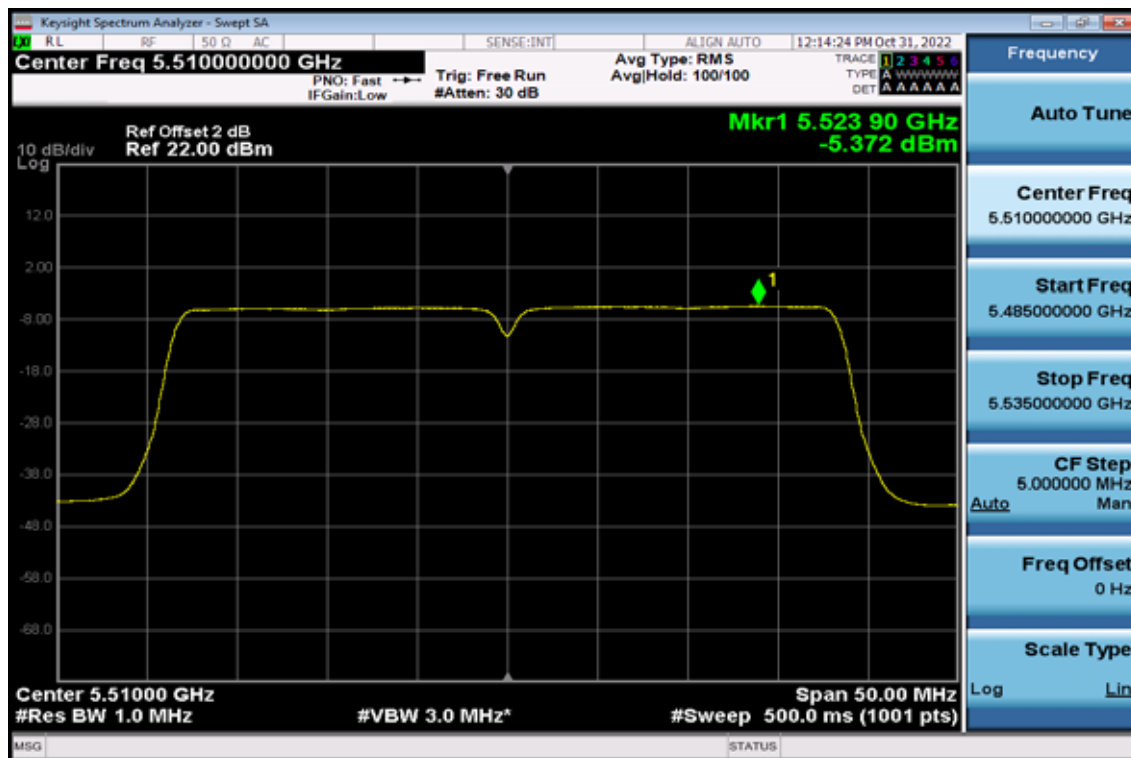


Power Spectral Density Test Plot (CH-High)

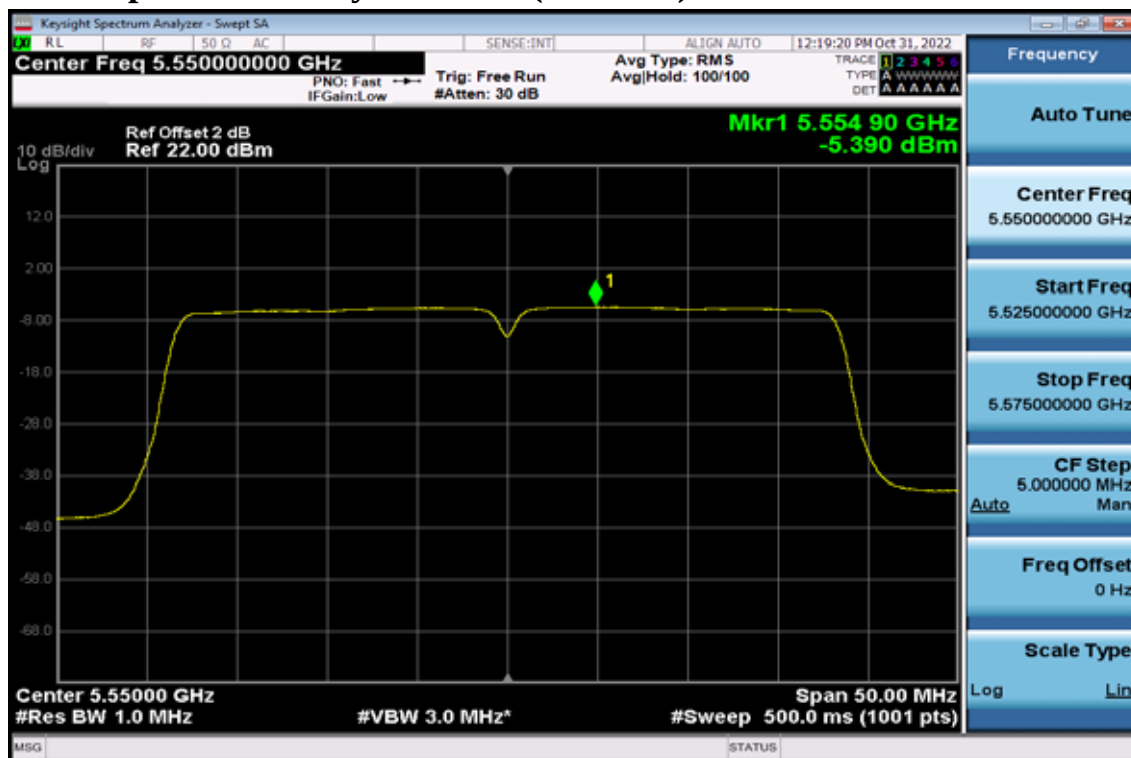


802.11ac VHT40

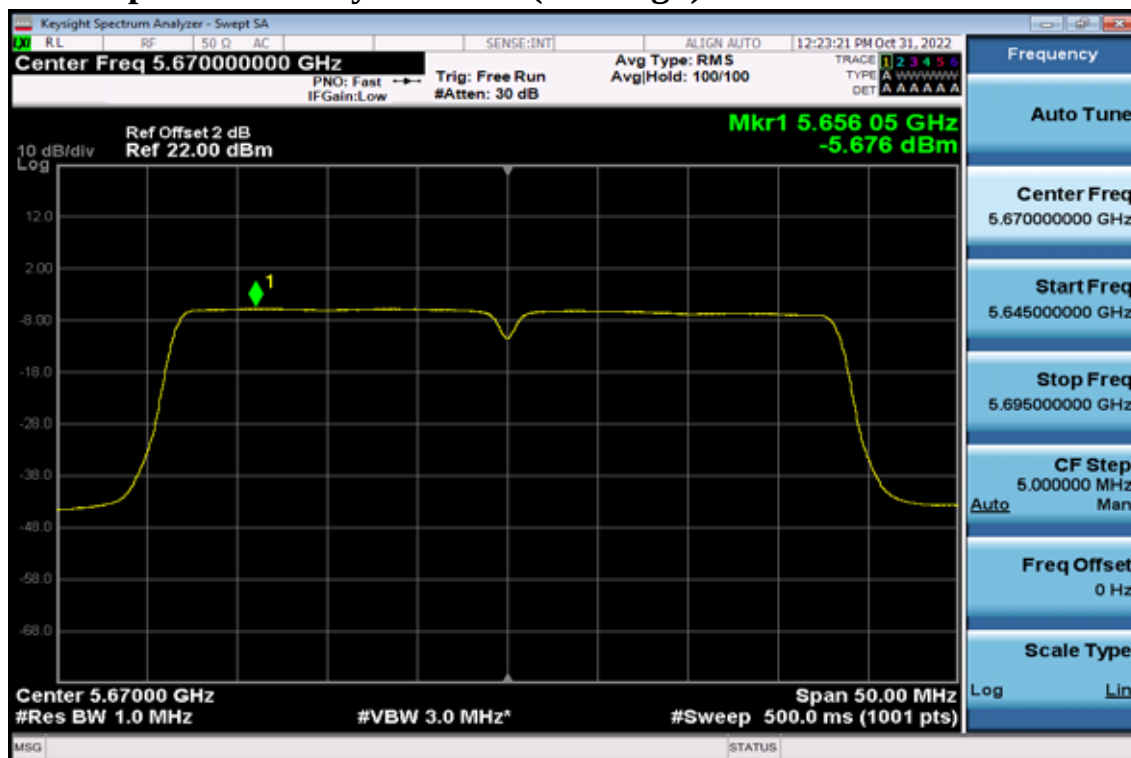
Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)

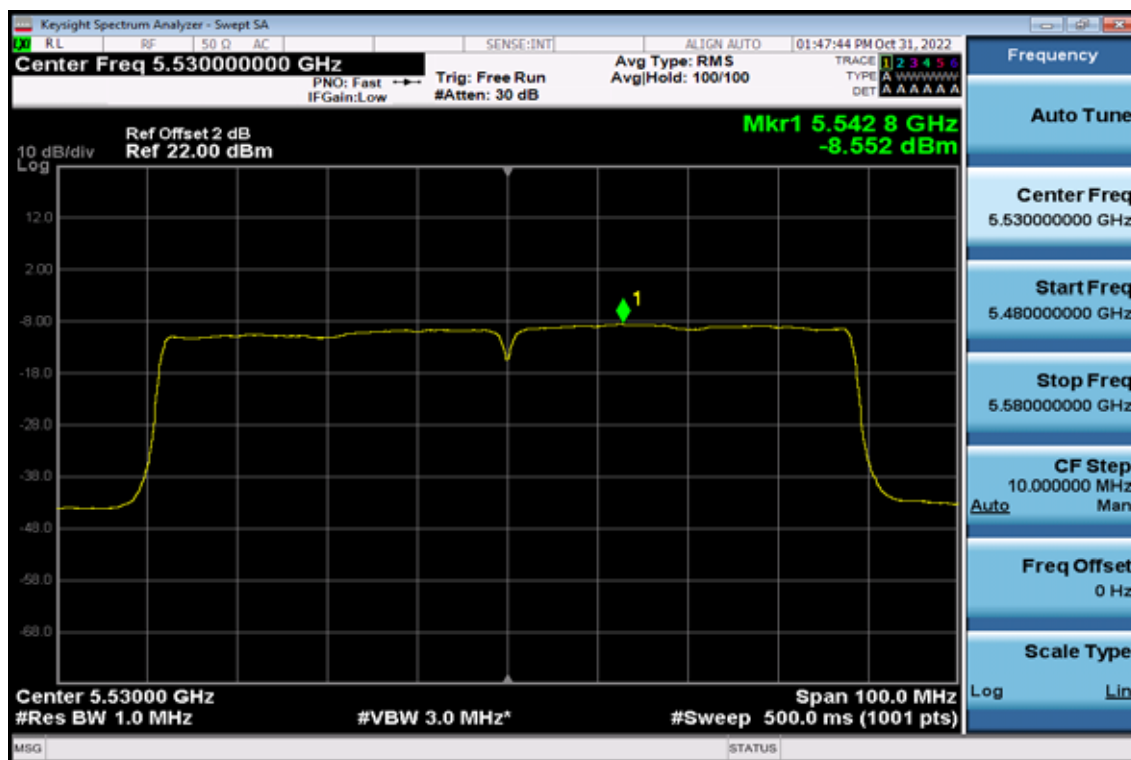


Power Spectral Density Test Plot (CH-High)



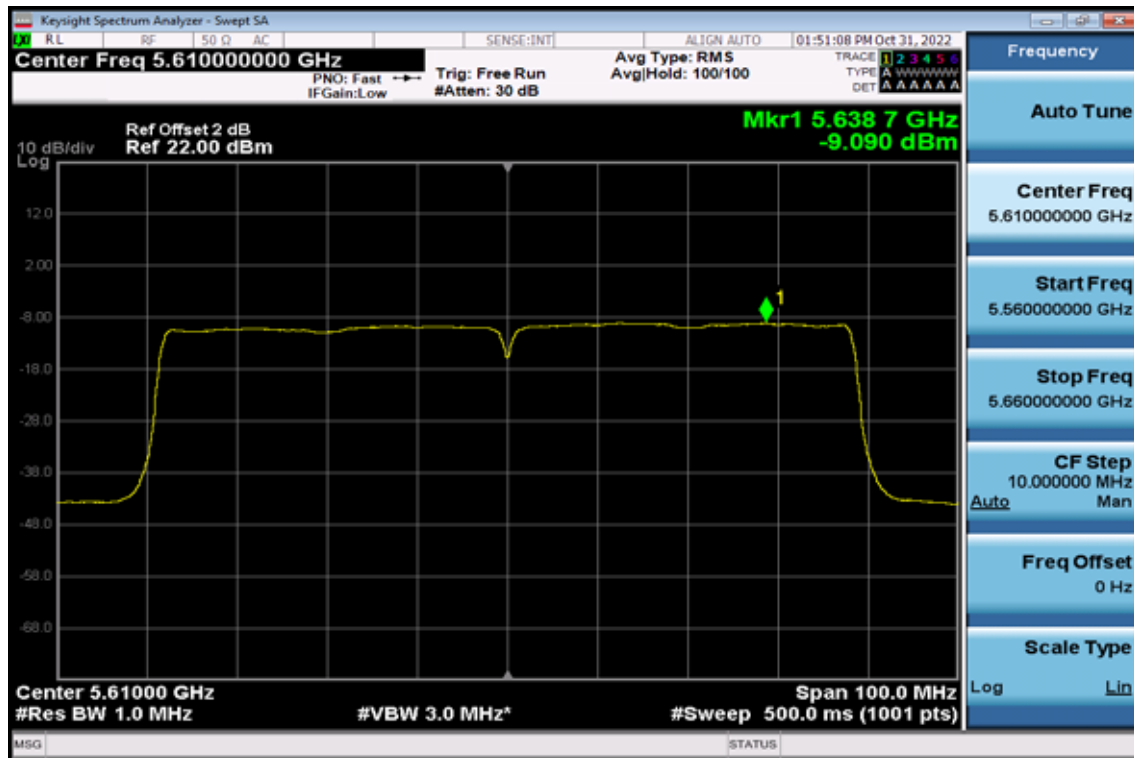
802.11 ac VHT80

Power Spectral Density Test Plot (CH-Low)



802.11 ac VHT80

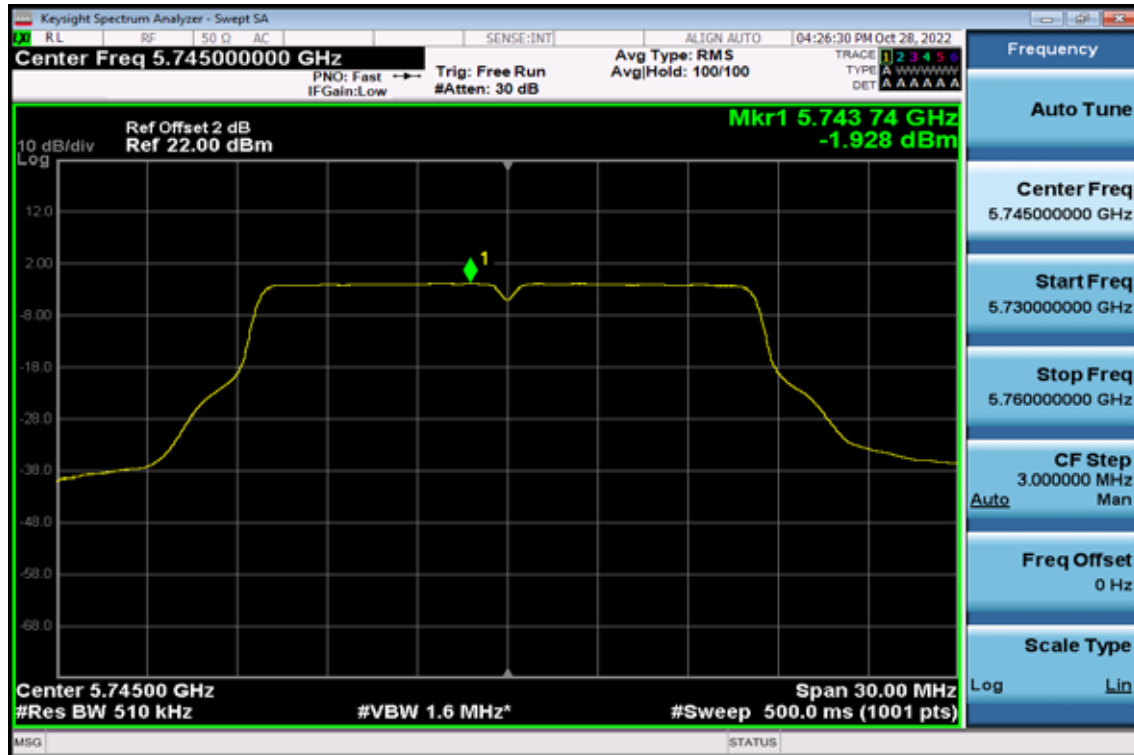
Power Spectral Density Test Plot (CH-High)



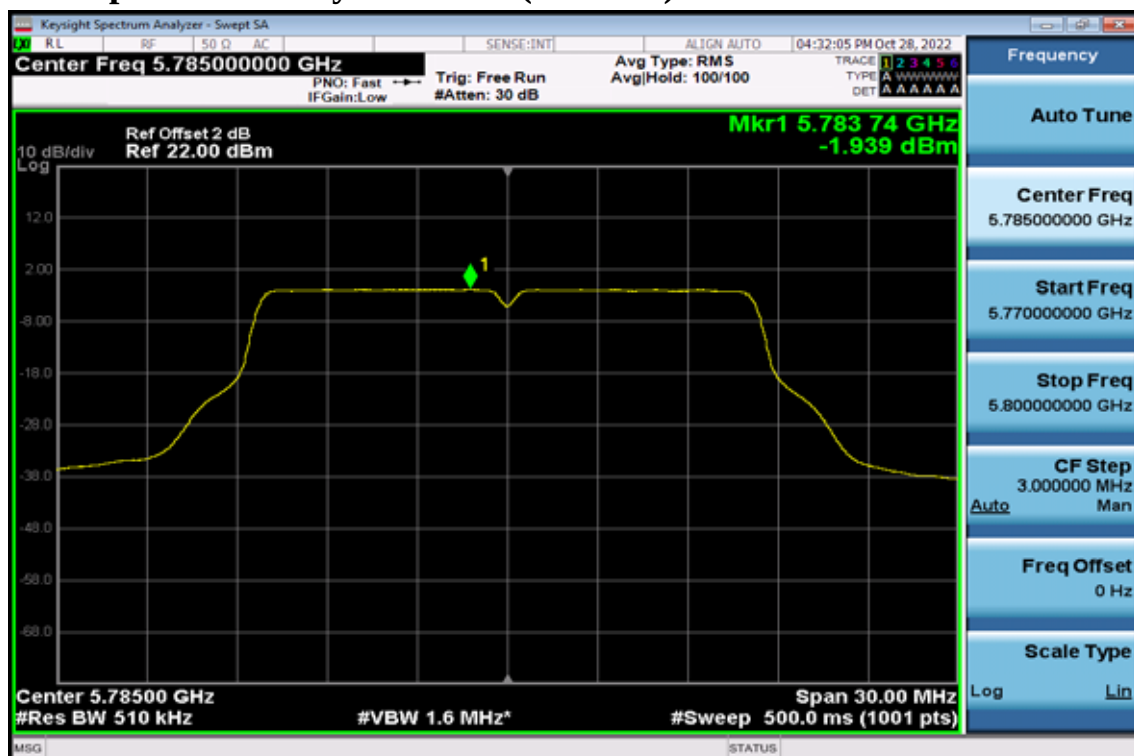
Band UNII-3

802.11a

Power Spectral Density Data Plot (CH Low)



Power Spectral Density Data Plot (CH Mid)

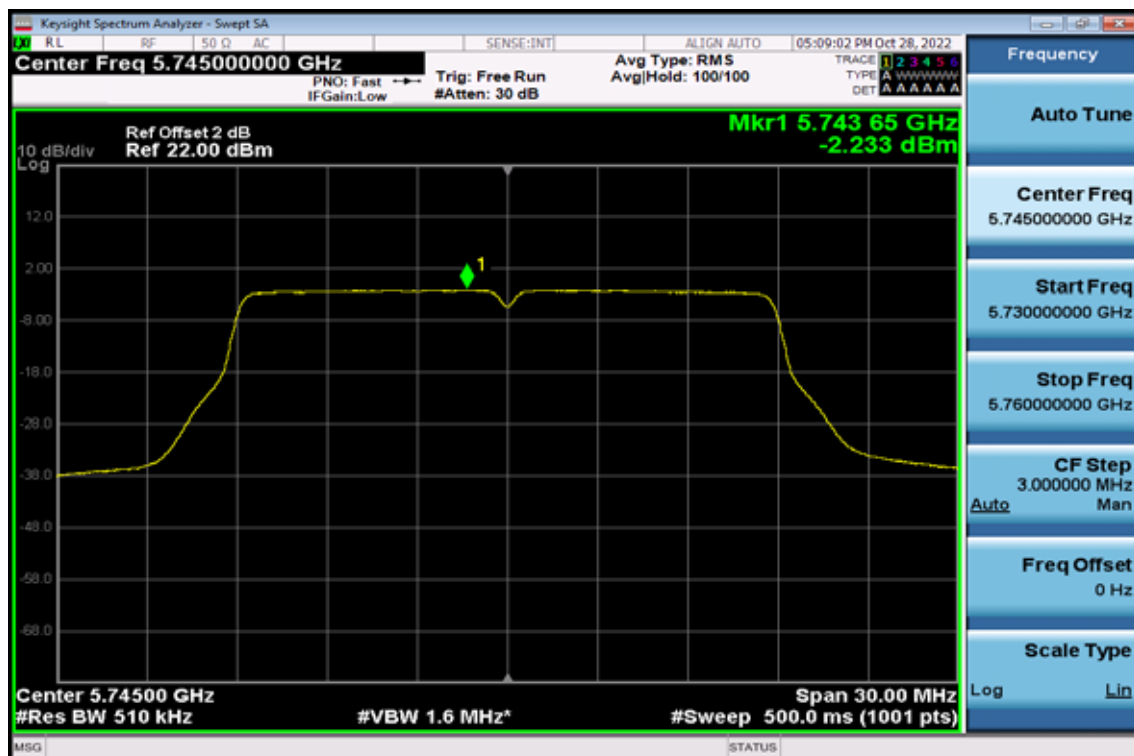


Power Spectral Density Data Plot (CH High)



802.11n HT20

Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)

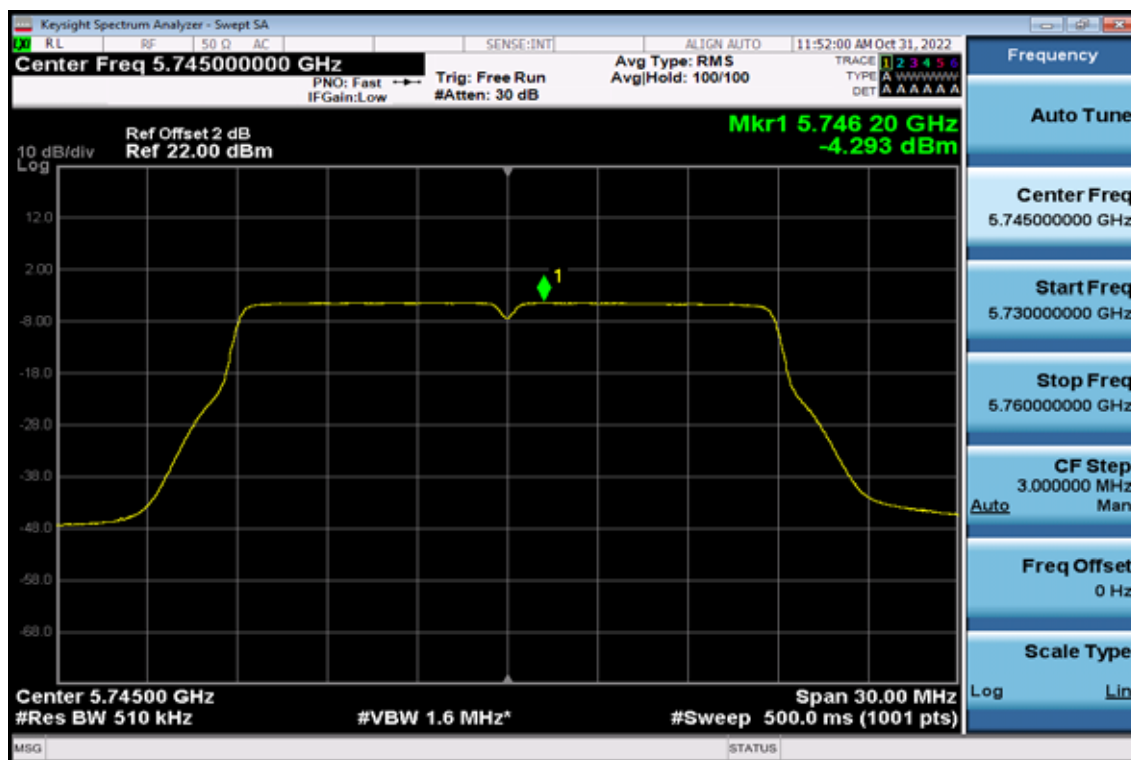


Power Spectral Density Test Plot (CH-High)

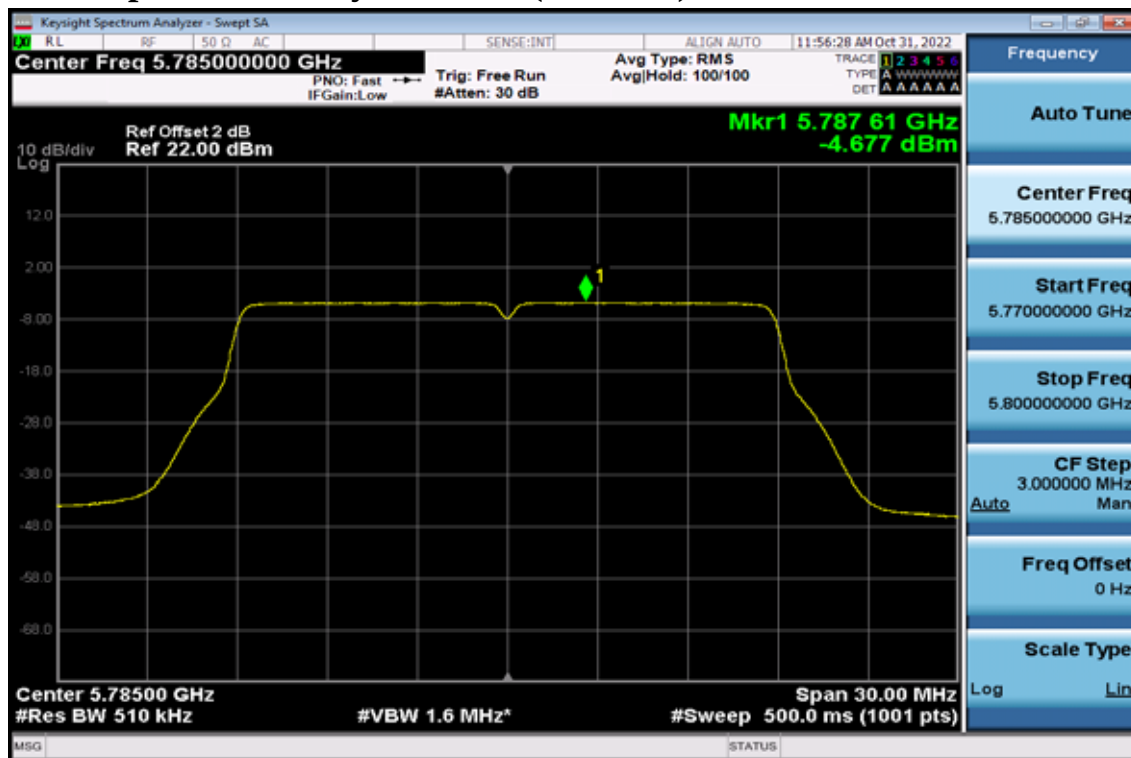


802.11ac VHT20

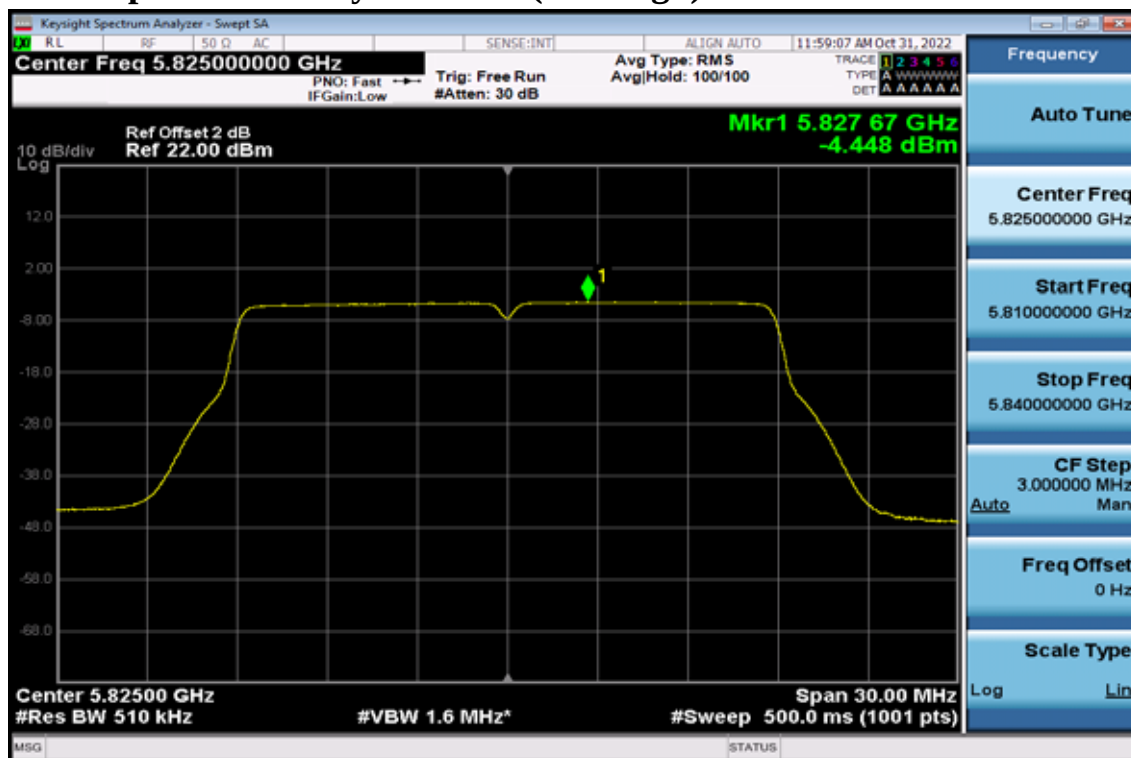
Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)

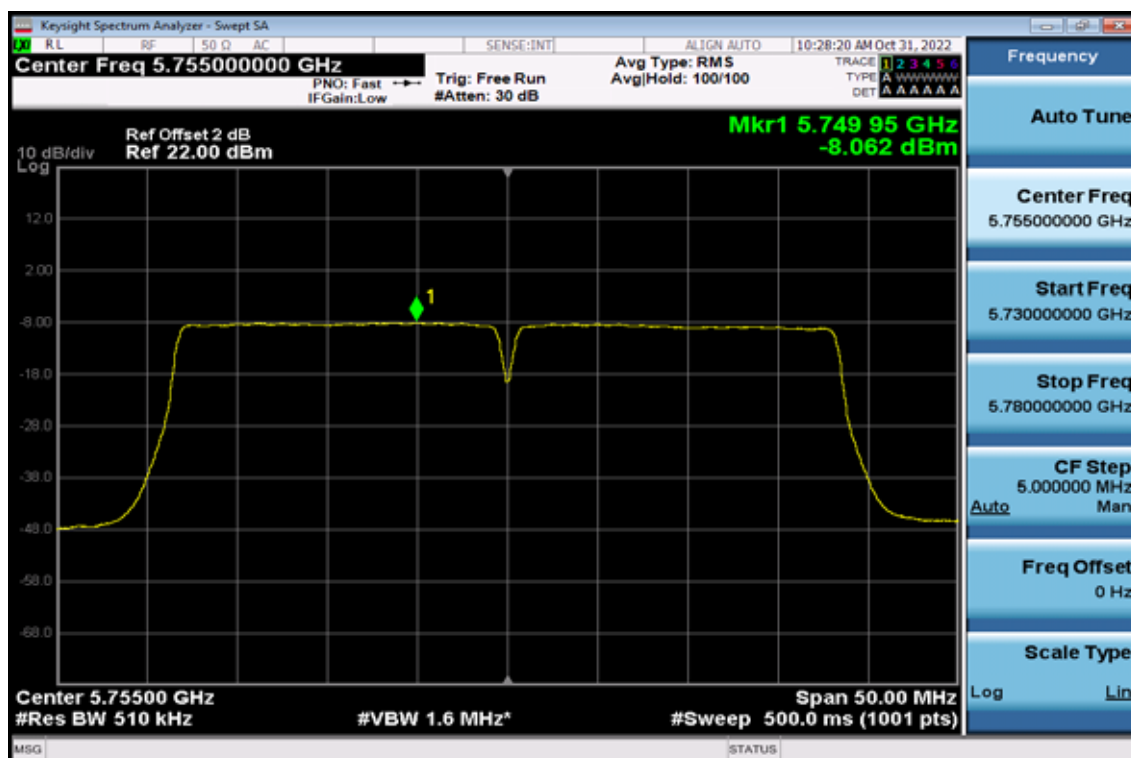


Power Spectral Density Test Plot (CH-High)

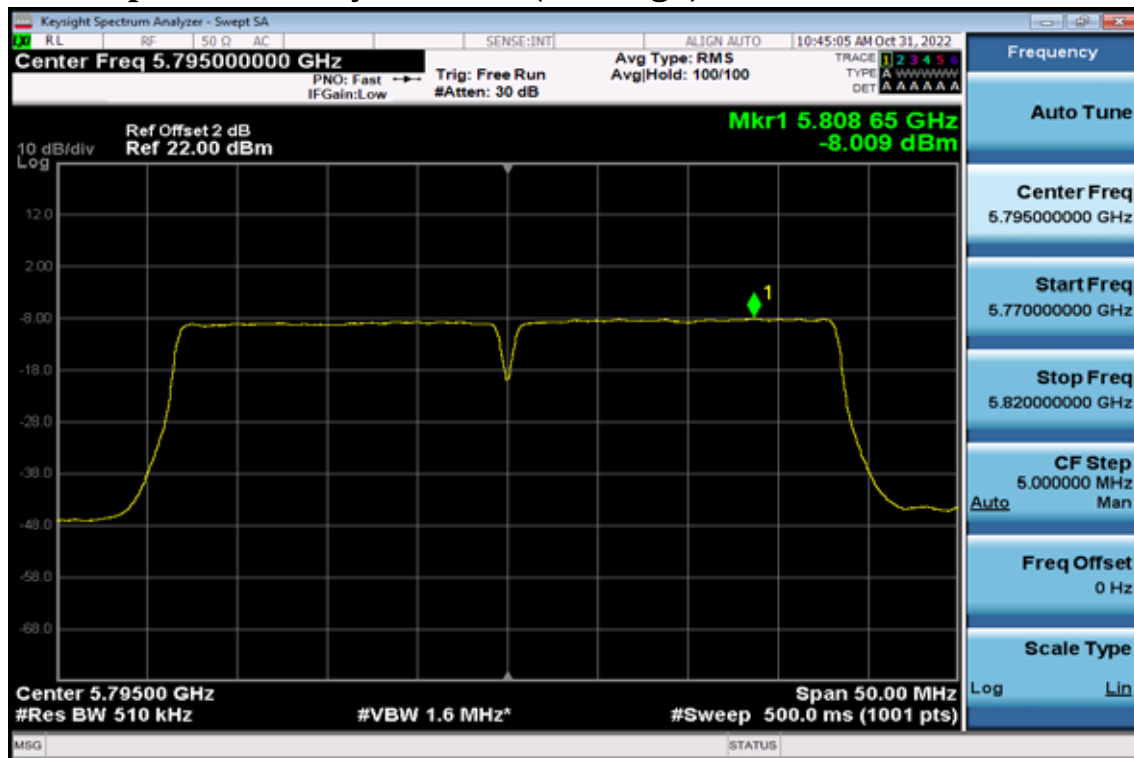


802.11n HT40

Power Spectral Density Test Plot (CH-Low)

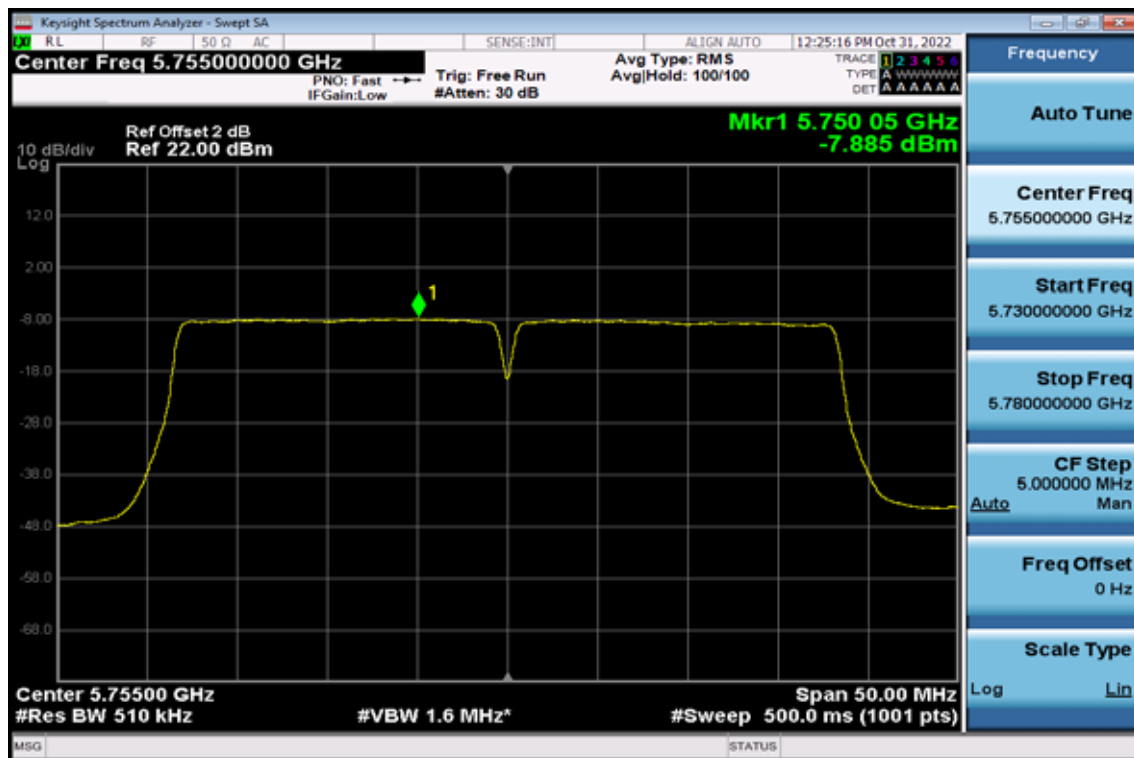


Power Spectral Density Test Plot (CH-High)

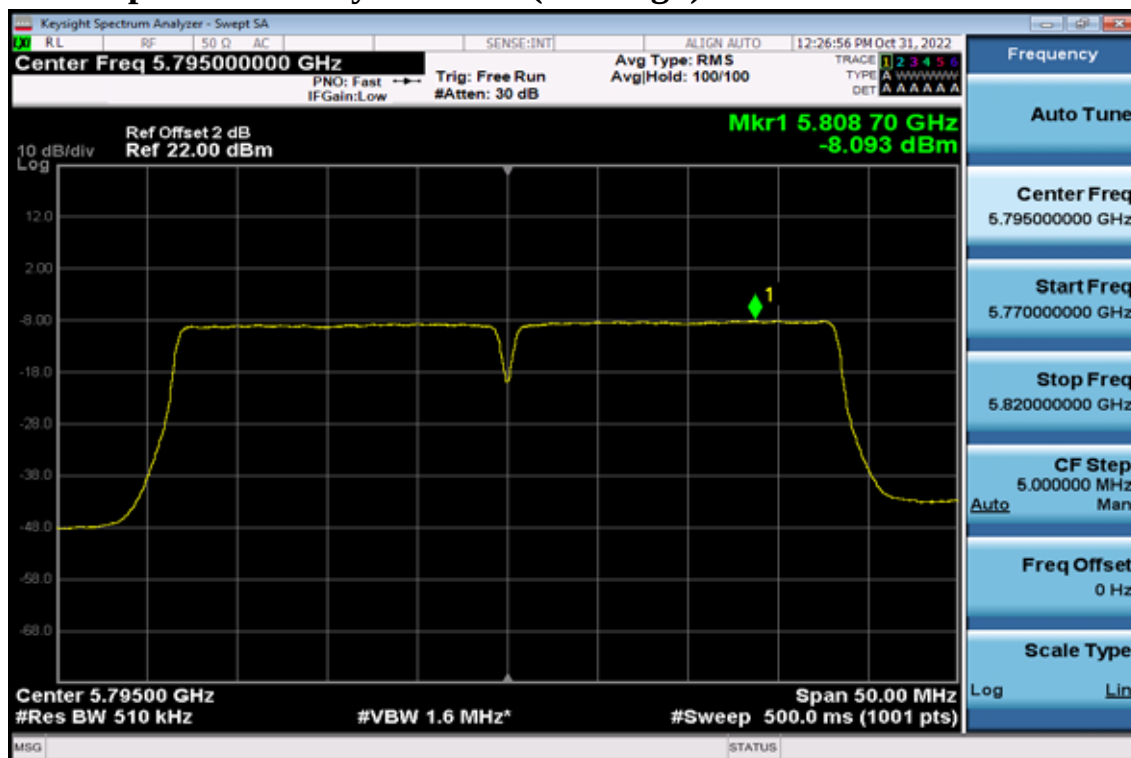


802.11ac VHT40

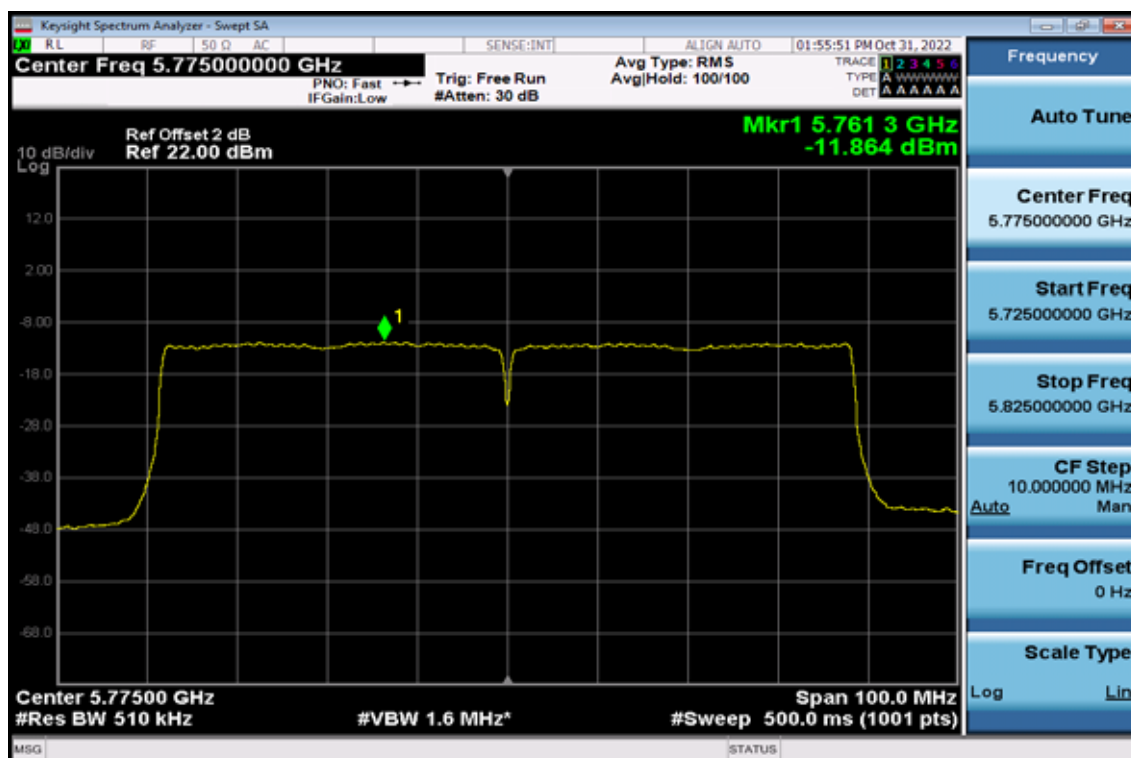
Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-High)



802.11 ac VHT80, Power Spectral Density Test Plot

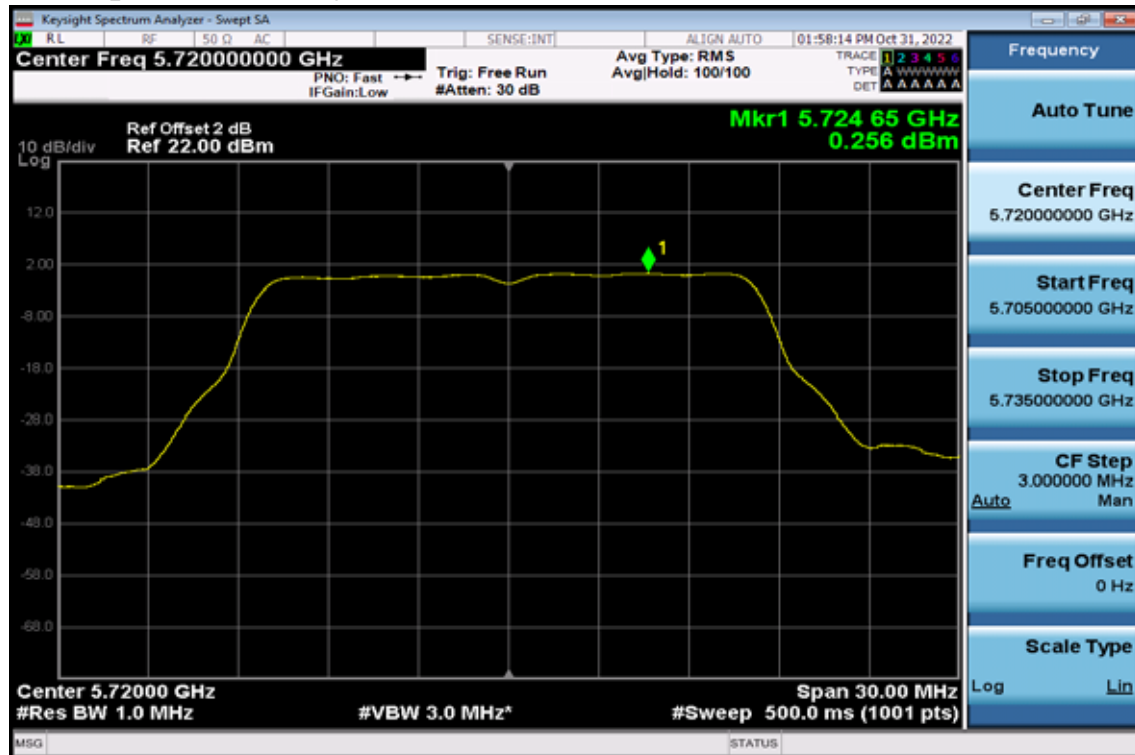


Straddle Channels

Band UNII-2C

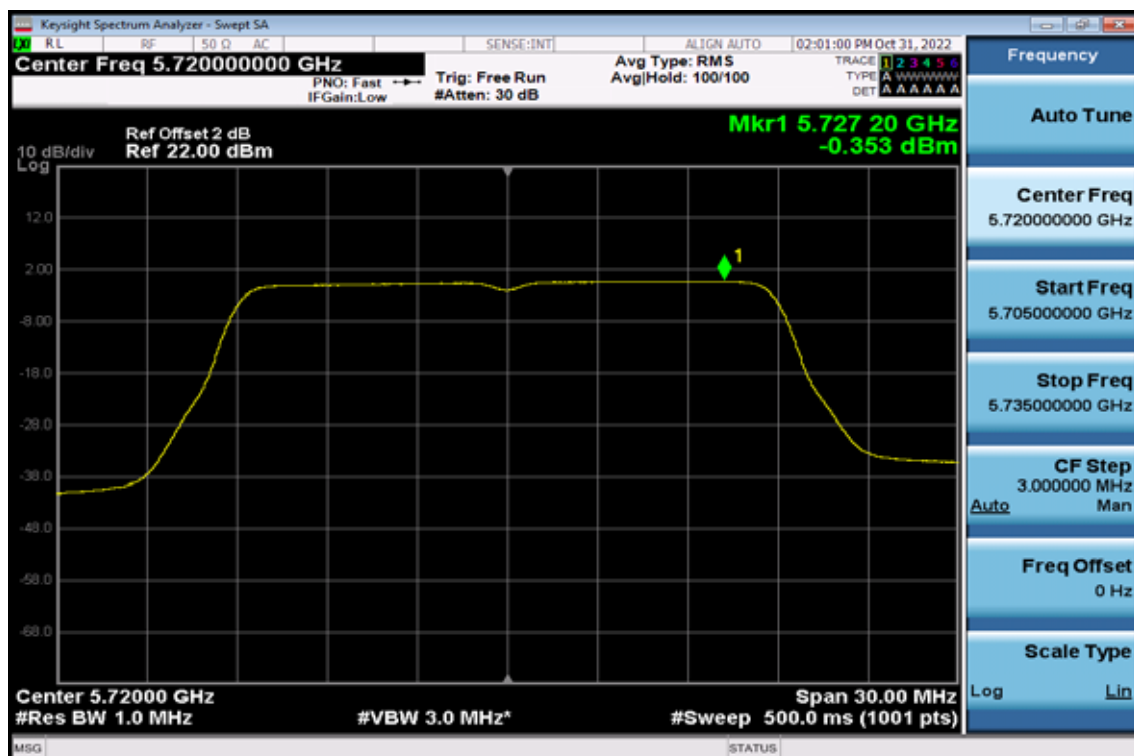
802.11a

Power Spectral Density Data Plot



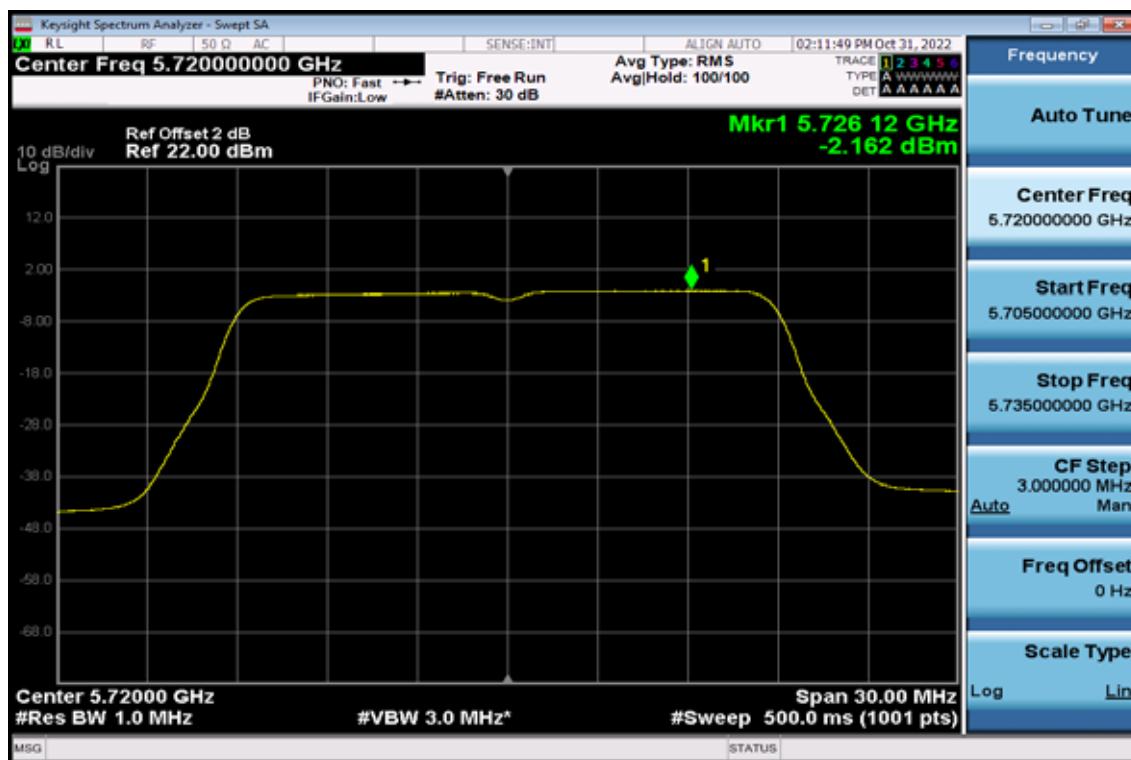
802.11n HT20

Power Spectral Density Test Plot



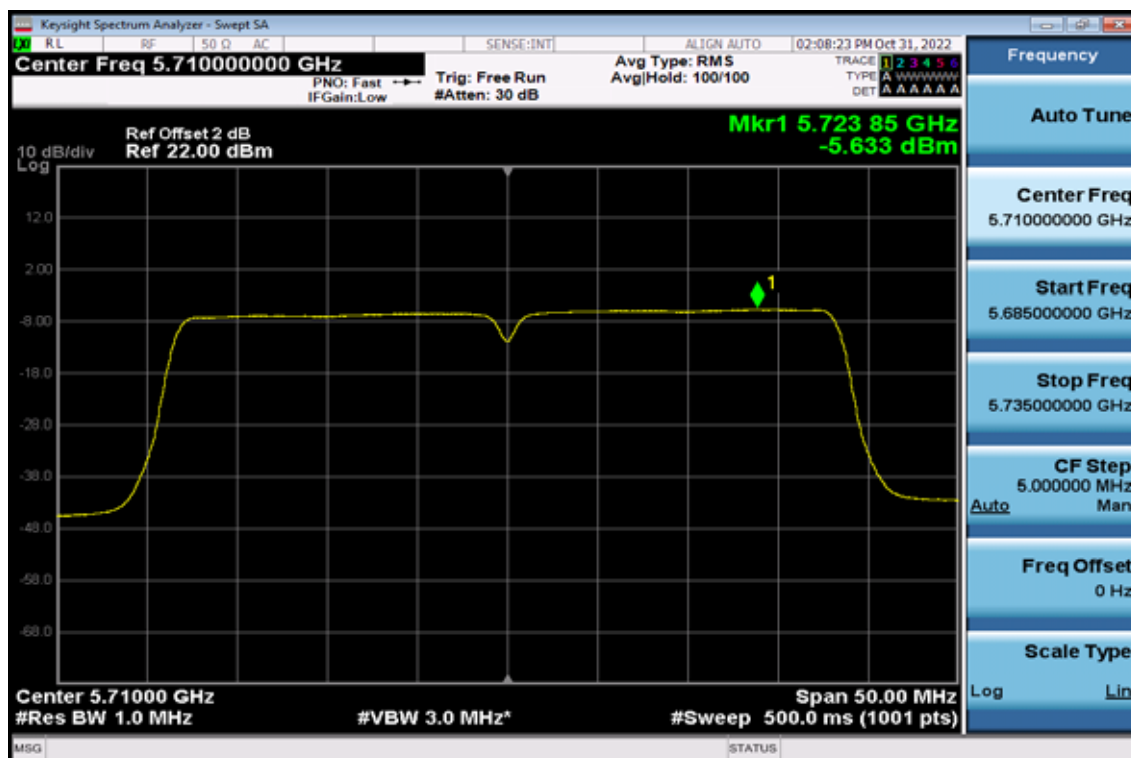
802.11ac VHT20

Power Spectral Density Test Plot



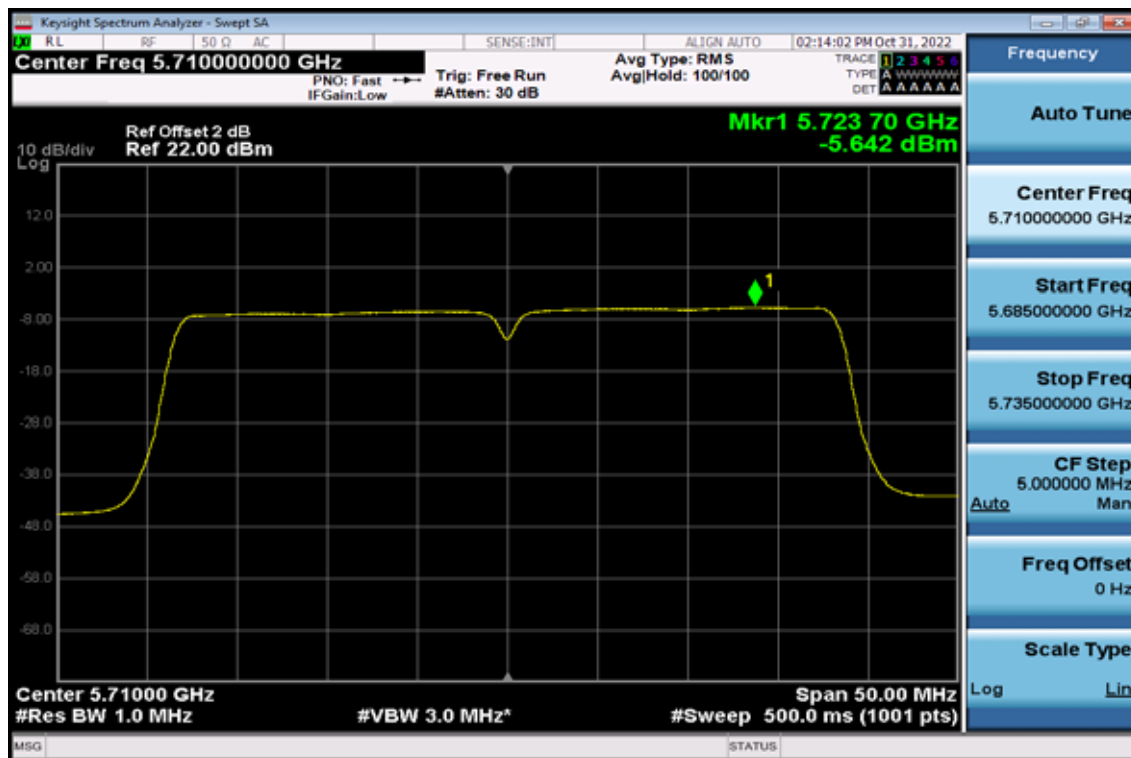
802.11n HT40

Power Spectral Density Test Plot



802.11ac VHT40

Power Spectral Density Test Plot



802.11 ac VHT80

Power Spectral Density Test Plot

