TEST REPORT

of

FCC PART 15 SUBPART E

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

Product :	**Digital Signage / POS System / Kiosk**
Brand:	**Zunidata**
Model:	**15NX-RMXXX; 22PX-RMXXX; 24PX-RMXXX; 27PX-RMXXX; 32PX-RMXXX; 43PX-RMXXX; MCT-156HPQ-POE; MCT-156HPQ-POE-5MC; MCT-156HPQ-XXX; MCT-215HPQ; MCT-215HPQ-5MC; MCT-215HPQ-XXX; MCT-238HPQ-XXX; MCT-270HPQ-XXX; MCT-320HPQ-XXX (X=0~9 or A~Z or Blank or -)**
Model Difference:	**Appearance and LCD size are different**
FCC ID:	**Z28-15-43-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:
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Report No.: **ISL-19LR308FE**
Issue Date : **2020/04/15**

Testing laboratory
0997

VERIFICATION OF COMPLIANCE

Applicant:	Zunidata Systems, Inc.
Product Description:	Digital Signage / POS System / Kiosk
Brand Name:	Zunidata
Model No.:	15NX-RMXXX; 22PX-RMXXX; 24PX-RMXXX; 27PX-RMXXX; 32PX-RMXXX; 43PX-RMXXX; MCT-156HPQ-POE; MCT-156HPQ-POE-5MC; MCT-156HPQ-XXX; MCT-215HPQ; MCT-215HPQ-5MC; MCT-215HPQ-XXX; MCT-238HPQ-XXX; MCT-270HPQ-XXX; MCT-320HPQ-XXX (X=0~9 or A~Z or Blank or -)
Model Difference:	Appearance and LCD size are different
FCC ID:	Z28-15-43-RM
Date of test:	2019/10/16 ~ 2020/04/14
Date of EUT Received:	2019/10/16

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:	Barry Lee	***Date:***	2020/04/15
	Barry Lee / Senior Engineer		
Prepared By:	Gigi yeh	***Date:***	2020/04/15
	Gigi Yeh / Senior Engineer		
Approved By:		***Date:***	2020/04/15
	Jerry Liu / Technical Manager		

Version

Version No.	Date	Description
00	2020/04/15	Initial creation of document

Uncertainty of Measurement

Description Of Test	Uncertainty
Conducted Emission (AC power line)	2.586 dB
Field Strength of Spurious Radiation	≤ 30MHz: 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 / Kiosk	
Brand Name	Zunidata	
Model Name	15NX-RMXXX; 22PX-RMXXX; 24PX-RMXXX; 27PX-RMXXX; 32PX-RMXXX; 43PX-RMXXX; MCT-156HPQ-POE; MCT-156HPQ-POE-5MC; MCT-156HPQ-XXX; MCT-215HPQ; MCT-215HPQ-5MC; MCT-215HPQ-XXX; MCT-238HPQ-XXX; MCT-270HPQ-XXX; MCT-320HPQ-XXX (X=0~9 or A~Z or Blank or -)	
Model Difference	Appearance and LCD size are different	
S/N	Z115N3119B00001 for PIFA antenna Z124P3119B00001 for Dipole Antenna	
AC In Power Port	One provided	
USB 2.0 Port	Two provided	
COM 2 (RJ45)Port	One provided	
COM 1 (RJ45)Port	One provided	
Micro USB Port	One provided	
S/PDIF Port	One provided	
Earphone Port	One provided	
LAN Port	One provided	
Mini HDMI port	One provided	
Test SW Version:	Ampak rftesttool V5.5	
RF power setting:	Refer test table	
Power Supply	12Vdc from AC/DC adapter	
	Adapter:	1. Model : 2ABL024F US; Supplier: CWT 2. Model : FSP060-DHAN3; Supplier: FSP

WLAN

Wi-Fi	Frequency Range (MHz)	Channels	Peak / Average Rated Power	Modulation Technology
802.11a	5150 – 5350(NII)	8	10.44dBm (AV)	OFDM
	5470 – 5725(NII)	11	10.17dBm (AV)	
	5725 – 5850(NII)	5	9.61dBm (AV)	
802.11n	HT20 5150 – 5350(NII)	8	10.05dBm (AV)	
	HT20 5470 – 5725(NII)	11	9.86dBm (AV)	
	HT20 5725 – 5850(NII)	5	9.48dBm (AV)	
	VHT20 5150 – 5350(NII)	8	9.43dBm (AV)	
	VHT20 5470 – 5725(NII)	11	9.49dBm (AV)	
	VHT20 5745 – 5825(NII)	5	8.98dBm (AV)	
	HT40 5150 – 5350(NII)	4	9.07dBm (AV)	
	HT40 5470 – 5725(NII)	5	9.10dBm (AV)	
	HT40 5725 – 5850(NII)	2	8.54dBm (AV)	
	VHT40 5470 – 5725(NII)	5	8.51dBm (AV)	
	VHT40 5745 – 5825(NII)	2	8.62dBm (AV)	
	VHT40 5190 – 5230(NII)	4	8.44dBm (AV)	
802.11 ac	VHT80 5150 – 5350(NII)	2	8.88dBm (AV)	
	VHT80 5470 – 5725(NII)	2	8.73dBm (AV)	
	VHT80 5725 – 5850(NII)	1	8.08dBm (AV)	
Modulation type		CCK, DQPSK, DBPSK for DSSS 256QAM.64QAM. 16QAM, QPSK, BPSK for OFDM		
Antenna Designation		Dipole Antenna WiFi 2.4G Antenna : 1.5 dBi WiFi 5G Antenna : 3.5 dBi PIFA Antenna WiFi 2.4G Antenna : -1.16 dBi WiFi 5G Antenna : -1.04 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 band5150 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 (dBm)	Softwate vale
802.11a	5180	default	default
	5200	default	default
	5240	default	default
	5260	default	default
	5280	default	default
	5320	default	default
	5500	default	default
	5600	default	default
	5700	default	default
	5745	default	default
	5785	default	default
	5825	default	default
802.11n HT20 / 802.11ac VHT20	5180	default	default
	5200	default	default
	5240	default	default
	5260	default	default
	5280	default	default
	5300	default	default
	5320	default	default
	5500	default	default
	5580	default	default
	5600	default	default
	5700	default	default
	5745	default	default
	5785	default	default
	5825	default	default

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

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

This submittal(s) (test report) is intended for **FCC ID: Z28-15-43-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 a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 6 of ANSI C63.10: 2013. Con-ducted 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.

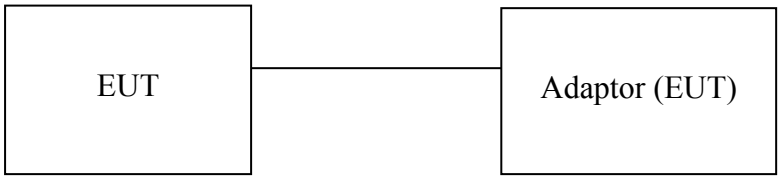
2.3.2 Radiated Emissions

The EUT is a 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

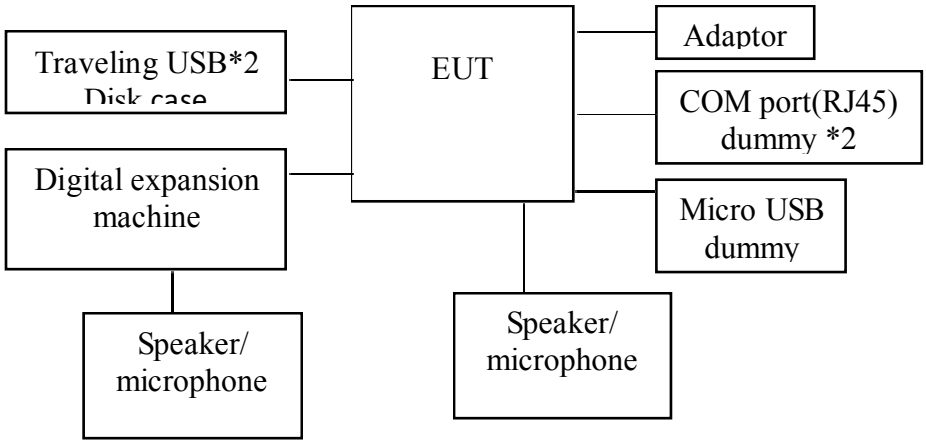
Radiated Emission



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	NA	NA	Non-shielding
2	EUT (adaptor)	FSP	FSP060-DHAN3	NA	NA	Non-shielding

AC Conducted Emission



---------- Remote ----------

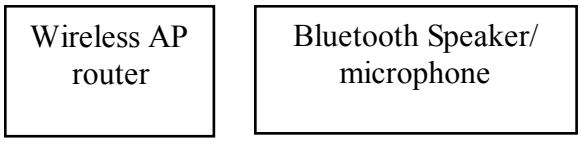


Table 1-1 Support Equipment Used in Tested System

Item	Equipment	Mrf/Brand	Model name	Series No	Data Cable	Power Cable
1	USB3.0 HDD*2	AKiTIO	SK2-U31AS-AKT	N/A	Shielded /1m	N/A
2	LCD monitor	DELL	P2715Qt	N/A	Shielded /1.8m	Non-shielded /1.8m
3	Speaker/ microphone*2	HTC	RC-E160	N/A	Non-shielded /1.5m	N/A
4	Digital expan-sion machine	CREATIVE	DDTS-100	N/A	Non-shielded /1.5m	N/A
5	Portable Com-puter	Lenovo	TP00067B	N/A	N/A	Non-shielded /1.8m
6	Bluetooth Speaker/ microphone	N/A	SA-868	N/A	N/A	N/A
7	Wireless AP router	ASUS	RT-AC66U	80195030	N/A	Non-shield / 1.8m

I/O Cable Condition of EUT and Support Units

Description	Path	Cable Length	Cable Type	Connector Type
AC Power cable	100V (~240V) to EUT SPS	1.8m	Non-shielded	Plastic Head
DC Power cable	EUT SPS to EUT DC input port	1.2m	Non-shielded	Metal Head
USB Data Cable	USB3.0 HDD to EUT USB Port	1m	Shielded	Metal Head
COM 2(RJ45) Data Cable	COM 2(RJ45) Data Cable to EUT COM 2 Port with dummy	1.2m	Non-shielded	Plastic Head
COM 1(RJ45) Data Cable	COM 1(RJ45) Data Cable to EUT COM 1 Port with dummy	1.2m	Non-shielded	Plastic Head
USB Data Cable	USB Data Cable to EUT Micro USB Port with dummy	0.9m	Non-shielded	Metal Head
S/PDIF Data Cable	EUT S/PDIF Port to Digital expansion machine S/PDIF Port	1.5m	Non-shielded	Plastic Head
Audio Data Cable	EUT Audio out Port to Speaker/microphone	1.5m	Non-shielded	Metal Head
LAN Data Cable	NB LAN Port to EUT LAN Port	10m	Non-shielded	Plastic Head
Audio Data Cable	Digital expansion machine S/PDIF Port to Speaker/microphone	1.5m	Non-shielded	Metal Head
Mini HDMI cable	EUT Mini HDMI Port to LCD monitor	1.8m	Shielded	Metal Head

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 ≥ 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	Total time	Duty Cycle	Duty Factor	VBW for average detector (≥ $1/T_{on}$)
a	1.435	1.490	96.309%	0.16	0.697
HT20	1.350	1.400	96.429%	0.16	0.741
HT40	0.692	0.746	92.761%	0.33	1.445
VHT20	1.295	1.355	95.572%	0.20	0.772
VHT40	0.658	0.700	94.000%	0.27	1.520
VHT80	0.363	0.404	89.851%	0.45	2.755

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. Conduced 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	11/21/2018	11/21/2019
Conduction 02	LISN 26	R&S	ENV216	102378	11/21/2019	11/21/2020
Conduction 02	LISN 20	R&S	ENV216	101477	07/31/2019	07/31/2020
Conduction 02	Conduction 02-1 Cable	WOKEN	CFD 300-NL	Conduction 02 -1	09/11/2019	09/11/2020
Conduction 02	EMI Receiver 14	ROHDE& SCHWARZ	ESCI	101034	05/31/2019	05/31/2020
Conduction 02	ISN T8 10	Teseq GmbH	ISN T800	42773	08/02/2019	08/02/2020
Conduction 02	Capacitive Voltage Probe	FCC	F-CVP-1	68	02/19/2019	02/19/2020
Conduction 02	Current Probe	SCHAFFNER	SMZ 11	18030	02/19/2019	02/19/2020

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.

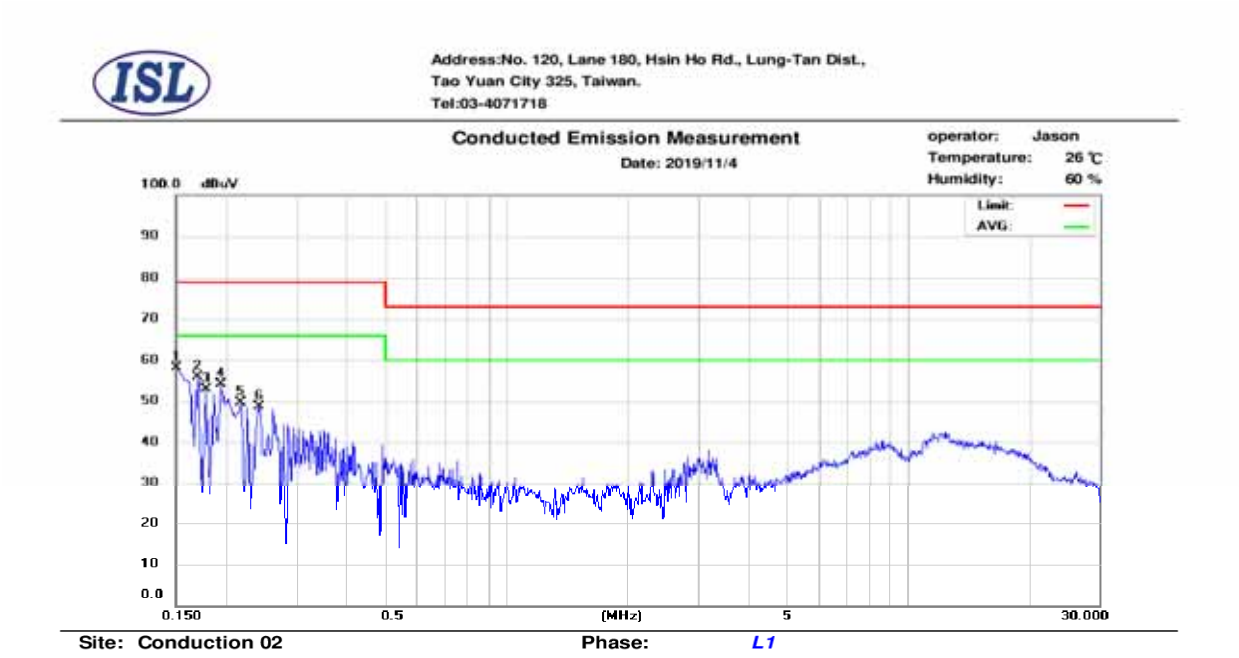
5.5. Measurement Result:

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.

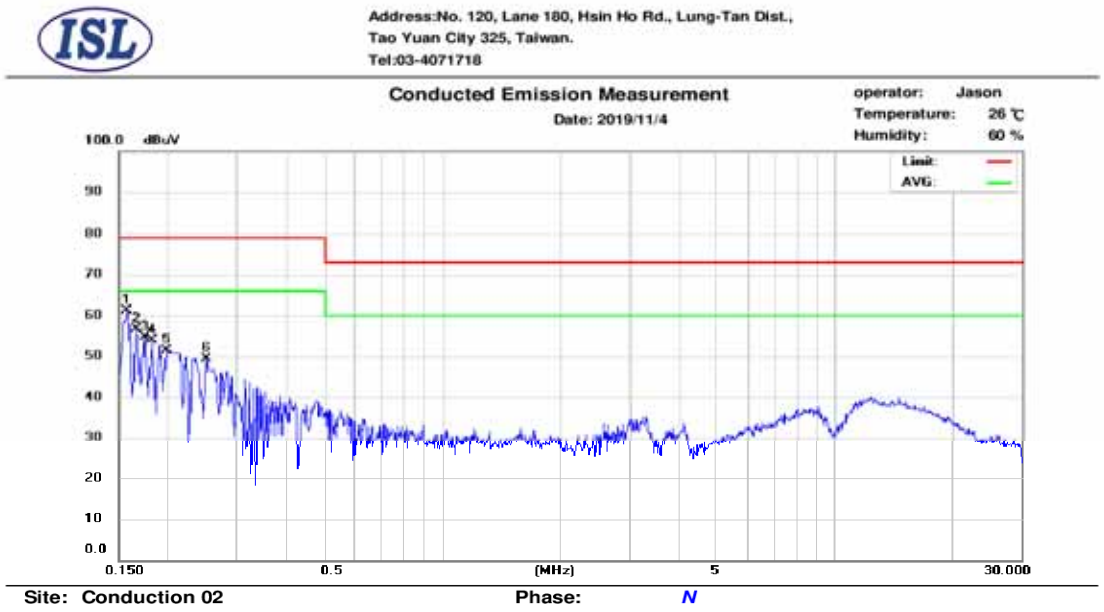
Note: Refer to next page for measurement data and plots.

AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Normal Operation (Worst data)	Adaptor mode:	2ABL024F

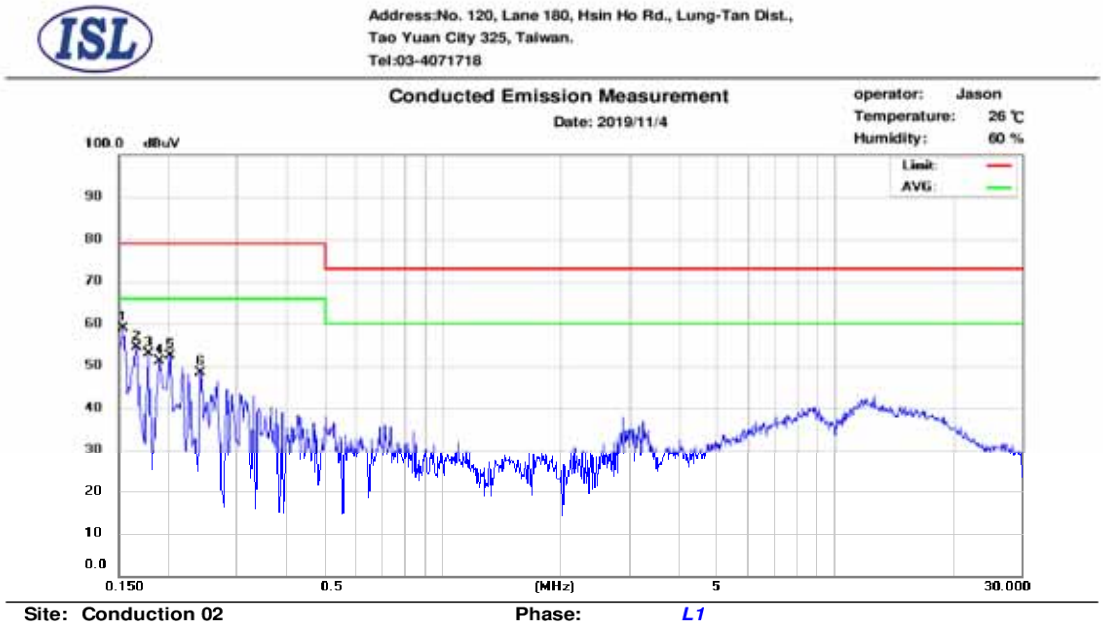


No.	Frequency (MHz)	QP_R (dBuV)	AVG_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)
1	0.150	44.11	28.25	9.63	53.74	79.00	-25.26	37.88	66.00	-28.12
2	0.170	39.44	14.42	9.63	49.07	79.00	-29.93	24.05	66.00	-41.95
3	0.178	37.78	11.01	9.62	47.40	79.00	-31.60	20.63	66.00	-45.37
4	0.194	36.61	15.69	9.62	46.23	79.00	-32.77	25.31	66.00	-40.69
5	0.218	34.36	15.35	9.62	43.98	79.00	-35.02	24.97	66.00	-41.03
6	0.242	31.72	11.84	9.62	41.34	79.00	-37.66	21.46	66.00	-44.54

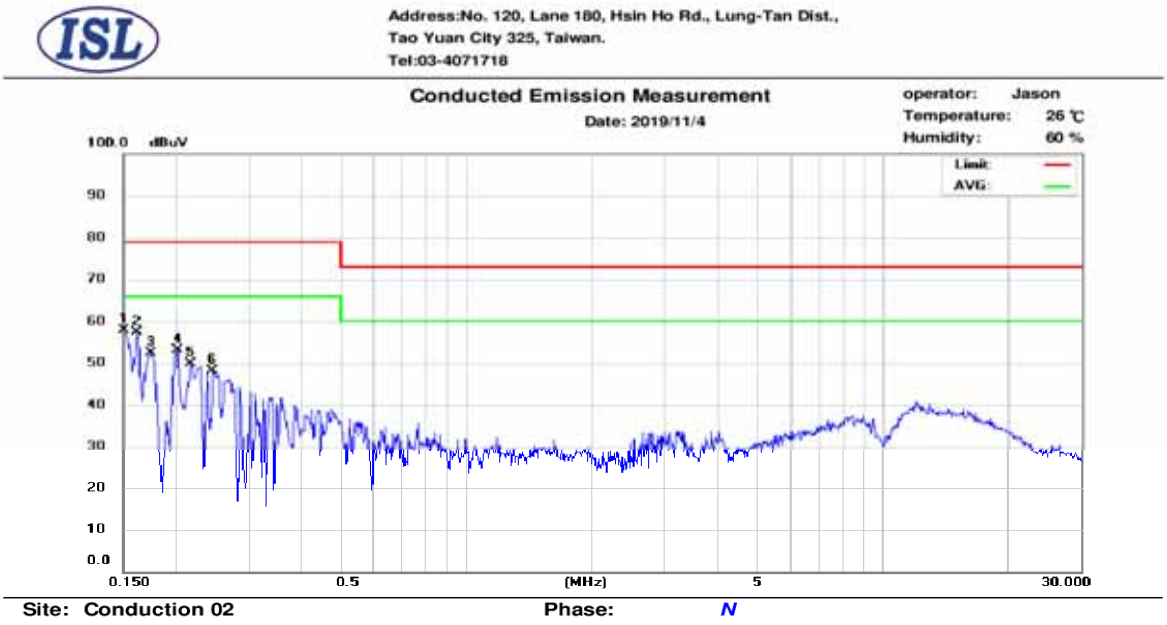


No.	Frequency (MHz)	QP_R (dBuV)	AVG_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)
1	0.158	46.30	30.79	9.63	55.93	79.00	-23.07	40.42	66.00	-25.58
2	0.166	40.58	18.89	9.63	50.21	79.00	-28.79	28.52	66.00	-37.48
3	0.174	38.89	12.05	9.63	48.52	79.00	-30.48	21.68	66.00	-44.32
4	0.182	37.24	10.44	9.62	46.86	79.00	-32.14	20.06	66.00	-45.94
5	0.199	38.92	20.50	9.62	48.54	79.00	-30.46	30.12	66.00	-35.88
6	0.250	33.46	15.21	9.63	43.09	79.00	-35.91	24.84	66.00	-41.16

Operation Mode:	Normal Operation (Worst data)	Adaptor mode:	FSP060-DHAN3



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	0.154	44.36	31.27	9.63	53.99	79.00	-25.01	40.90	66.00	-25.10
2	0.166	39.03	13.73	9.63	48.66	79.00	-30.34	23.36	66.00	-42.64
3	0.178	37.55	11.05	9.62	47.17	79.00	-31.83	20.67	66.00	-45.33
4	0.190	36.47	14.87	9.62	46.09	79.00	-32.91	24.49	66.00	-41.51
5	0.202	37.46	25.66	9.62	47.08	79.00	-31.92	35.28	66.00	-30.72
6	0.242	32.04	15.50	9.62	41.66	79.00	-37.34	25.12	66.00	-40.88



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	45.93	27.38	9.63	55.56	79.00	-23.44	37.01	66.00	-28.99
2	0.162	43.34	27.36	9.63	52.97	79.00	-26.03	36.99	66.00	-29.01
3	0.174	39.39	12.00	9.63	49.02	79.00	-29.98	21.63	66.00	-44.37
4	0.202	38.41	21.43	9.62	48.03	79.00	-30.97	31.05	66.00	-34.95
5	0.218	35.26	15.47	9.62	44.88	79.00	-34.12	25.09	66.00	-40.91
6	0.246	32.60	12.40	9.62	42.22	79.00	-36.78	22.02	66.00	-43.98

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 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 dBiare 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

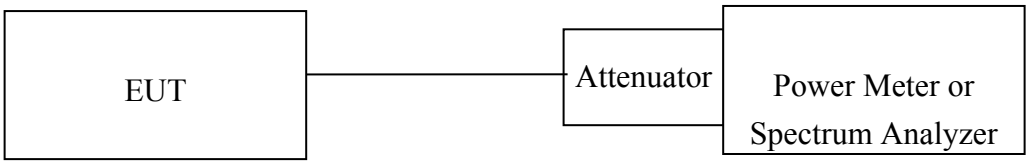
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.
3. Set RBW=1MHz,VBW=3MHz, Span=50MHz (Base Mode), Sweep time = Auto, traces 100 sweeps of video averaging for 5150-5725MHz;
4. Set 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	10/04/2019	10/04/2020
Conducted	Power Sensor	Anritsu	MA2411B	34NKF50	10/04/2019	10/04/2020
Conducted	Power Sensor	DARE	RPR3006W	13I00030SNO33	01/11/2019	01/11/2020
Conducted	Power Sensor	DARE	RPR3006W	14I00889SNO35	06/27/2019	06/27/2020
Conducted	Power Sensor	DARE	RPR3006W	14I00889SNO36	06/27/2019	06/27/2020
Conducted	Temperature Chamber	KSON	THS-B4H100	2287	02/19/2019	02/19/2020
Conducted	DC Power supply	ABM	8185D	N/A	01/10/2019	01/10/2020
Conducted	AC Power supply	EXTECH	CFC105W	NA	N/A	N/A
Conducted	Spectrum analyzer	Keysight	N9010A	MY56070257	10/05/2019	10/05/2020
Conducted	Spectrum analyzer	R&S	FSP40	100116	01/10/2019	01/10/2020
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	10/29/2019	10/29/2020
Conducted	Radio Communication Analyzer	R&S	CMW500	1201.002K50108 793-JG	10/11/2019	10/11/2020
Conducted	BT Simulator	Agilent	N4010A	MY48100200	NA	NA
Conducted	GPS Simulator	Welnavigate	GS-50	701523	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.

Mode	Channel	power (dBm)	Duty Factor	Summary power	limit(dBm)	result
802.11a	5180	10.12	0.16	10.28	23.97	pass
	5200	10.14	0.16	10.30	23.97	pass
	5240	9.40	0.16	9.56	23.97	pass
	5260	9.65	0.16	9.81	23.97	pass
	5280	10.00	0.16	10.16	23.97	pass
	5320	10.28	0.16	10.44	23.97	pass
	5500	9.57	0.16	9.73	23.97	pass
	5600	9.58	0.16	9.74	23.97	pass
	5700	10.01	0.16	10.17	23.97	pass
	5745	9.45	0.16	9.61	30	pass
	5785	9.11	0.16	9.27	30	pass
	5825	8.77	0.16	8.93	30	pass

Mode	Freq(MHz)	power (dBm)	Duty Factor	Summary power	limit(dBm)	result
802.11n HT20	5180	9.61	0.16	9.77	23.97	pass
	5200	9.89	0.16	10.05	23.97	pass
	5240	8.97	0.16	9.13	23.97	pass
	5260	9.5	0.16	9.66	23.97	pass
	5280	9.71	0.16	9.87	23.97	pass
	5320	9.87	0.16	10.03	23.97	pass
	5500	9.51	0.16	9.67	23.97	pass
	5600	9.27	0.16	9.43	23.97	pass
	5700	9.7	0.16	9.86	23.97	pass
	5745	9.32	0.16	9.48	30	pass
	5785	8.86	0.16	9.02	30	pass
	5825	8.54	0.16	8.70	30	pass

Mode	Freq(MHz)	power (dBm)	Duty Factor	Summary power	limit(dBm)	result
802.11ac VHT20	5180	9.07	0.2	9.27	23.97	pass
	5200	8.69	0.2	8.89	23.97	pass
	5240	8.41	0.2	8.61	23.97	pass
	5260	8.45	0.2	8.65	23.97	pass
	5300	8.67	0.2	8.87	23.97	pass
	5320	9.23	0.2	9.43	23.97	pass
	5500	9.12	0.2	9.32	23.97	pass
	5580	9.29	0.2	9.49	23.97	pass
	5700	8.93	0.2	9.13	23.97	pass
	5745	8.78	0.2	8.98	30	pass
	5785	8.69	0.2	8.89	30	pass
	5825	8.32	0.2	8.52	30	pass

Mode	Freq(MHz)	power (dBm)	Duty Factor	Summary power	limit(dBm)	result
802.11n HT40	5190	8.74	0.329	9.07	23.97	pass
	5230	8.28	0.329	8.61	23.97	pass
	5270	8.59	0.329	8.92	23.97	pass
	5310	8.67	0.329	9.00	23.97	pass
	5510	8.56	0.329	8.89	23.97	pass
	5590	8.45	0.329	8.78	23.97	pass
	5670	8.77	0.329	9.10	23.97	pass
	5755	8.21	0.329	8.54	30	pass
	5795	7.86	0.329	8.19	30	pass

Mode	Freq(MHz)	power (dBm)	Duty Factor	Summary power	limit(dBm)	result
802.11ac VHT40	5190	8.12	0.27	8.39	23.97	pass
	5230	7.45	0.27	7.72	23.97	pass
	5270	7.77	0.27	8.04	23.97	pass
	5310	8.24	0.27	8.51	23.97	pass
	5510	8.31	0.27	8.58	23.97	pass
	5550	8.35	0.27	8.62	23.97	pass
	5670	8.31	0.27	8.58	23.97	pass
	5755	8.17	0.27	8.44	30	pass
	5795	7.89	0.27	8.16	30	pass

Mode	Freq(MHz)	power (dBm)	Duty Factor	Summary power	limit(dBm)	result
802.11ac VHT80	5210	7.93	0.45	8.38	23.97	pass
	5290	8.43	0.45	8.88	23.97	pass
	5530	8.28	0.45	8.73	23.97	pass
	5610	8.09	0.45	8.54	23.97	pass
	5775	7.63	0.45	8.08	30	pass

Power Spectral Density Measurement:

802.11a Mode

Frequency MHz	RF Power Density Reading (dBm/MHz)	Maximum Limit (dBm/MHz)
5180	6.527	11
5200	5.995	11
5240	6.155	11
5260	5.565	11
5280	6.033	11
5320	6.383	11
5500	6.926	11
5600	6.193	11
5700	6.517	11
Frequency MHz	**RF Power Density Reading (dBm/500KHz)**	**Maximum Limit (dBm/500KHz)**
5745	1.868	30
5785	1.778	30
5825	1.677	30

802.11n HT20

Frequency MHz	RF Power Density Reading (dBm/MHz)	Maximum Limit (dBm/MHz)
5180	6.919	11
5200	6.372	11
5240	5.343	11
5260	5.529	11
5280	5.539	11
5320	6.125	11
5500	6.556	11
5600	5.773	11
5700	6.527	11
Frequency MHz	**RF Power Density Reading (dBm/500KHz)**	**Maximum Limit (dBm/500KHz)**
5745	1.975	30
5785	1.668	30
5825	1.171	30

802.11ac VHT20

Frequency MHz	RF Power Density Reading (dBm/MHz)	Maximum Limit (dBm/MHz)
5180	-2.345	11
5200	-3.052	11
5240	-3.431	11
5260	-3.102	11
5300	-3.805	11
5320	-2.300	11
5500	-2.327	11
5580	-2.117	11
5700	-2.127	11
Frequency MHz	**RF Power Density Reading (dBm/500KHz)**	**Maximum Limit (dBm/500KHz)**
5745	-5.17	30
5785	-5.53	30
5825	-6.34	30

802.11n HT40 Mode

Frequency MHz	RF Power Density Reading (dBm/MHz)	Maximum Limit (dBm/MHz)
5190	2.472	11
5230	2.371	11
5270	2.278	11
5310	2.801	11
5510	3.465	11
5590	2.501	11
5670	2.770	11
Frequency MHz	**RF Power Density Reading (dBm/500KHz)**	**Maximum Limit (dBm/500KHz)**
5755	-1.423	30
5795	-1.566	30

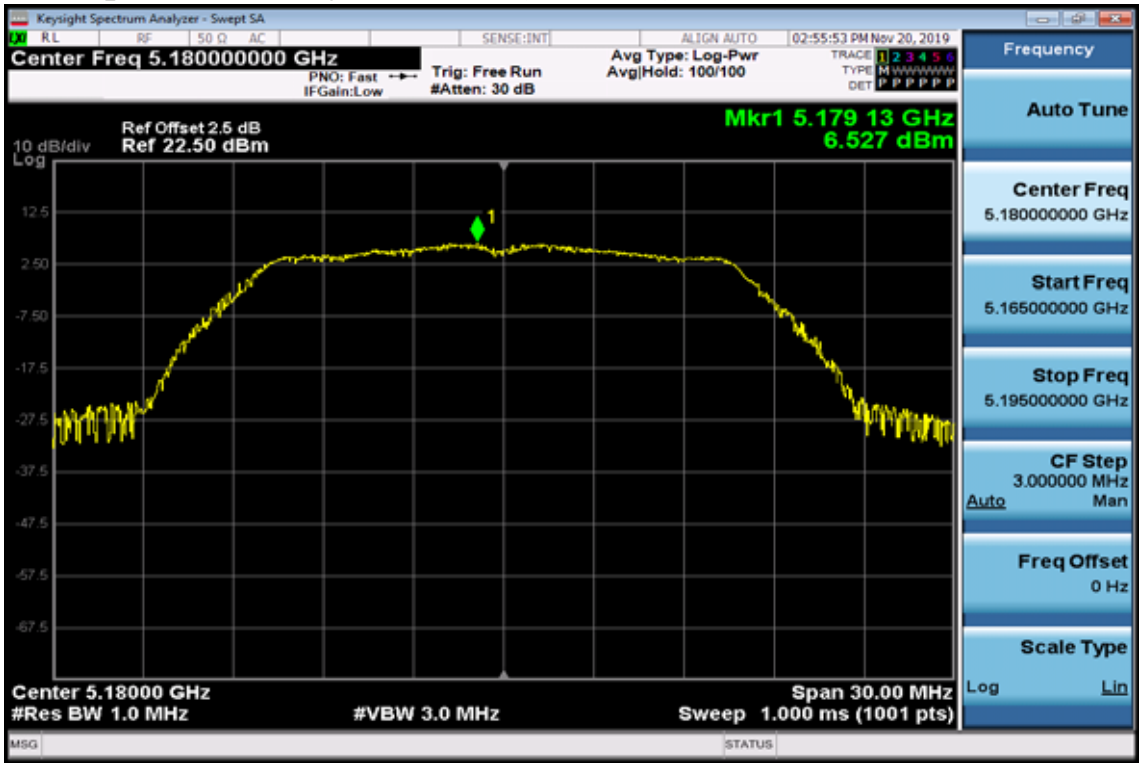
802.11ac VHT40 Mode

Frequency MHz	RF Power Density Reading (dBm/MHz)	Maximum Limit (dBm/MHz)
5190	-6.652	11
5230	-7.597	11
5270	-6.667	11
5310	-6.548	11
5510	-5.843	11
5550	-5.623	11
5670	-5.728	11
Frequency MHz	**RF Power Density Reading (dBm/500KHz)**	**Maximum Limit (dBm/500KHz)**
5755	-9.477	30
5795	-9.335	30

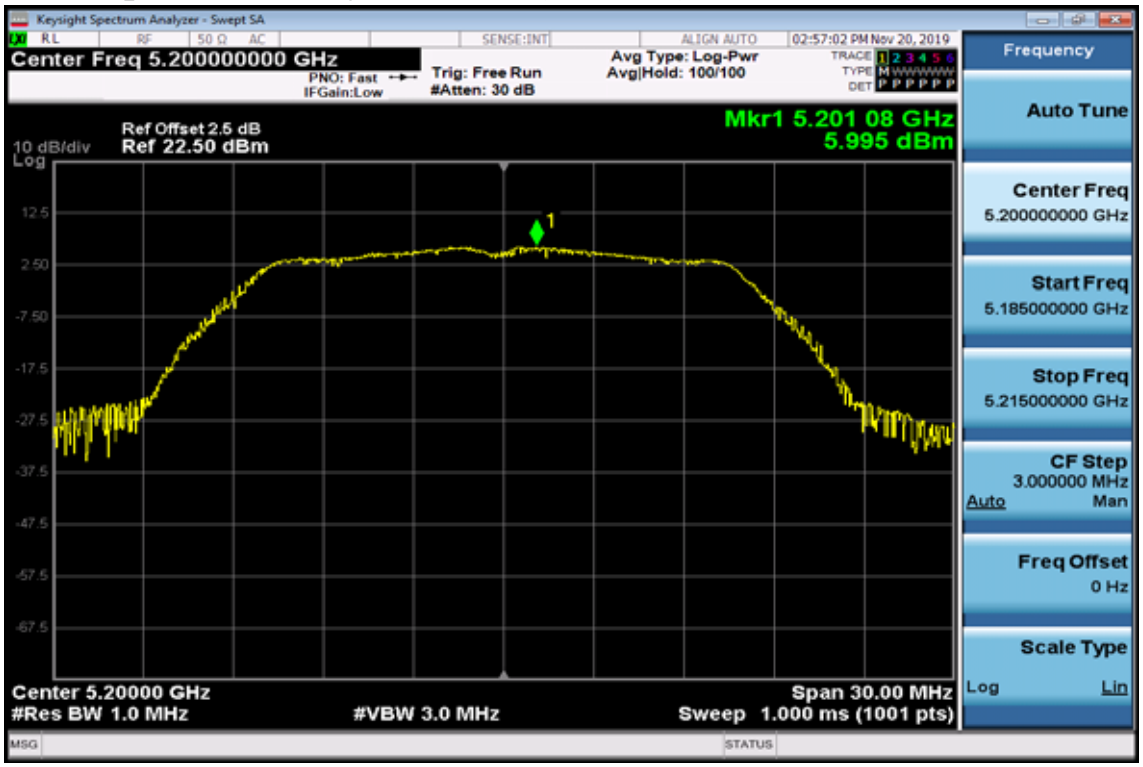
802.11ac VHT80 Mode

Frequency MHz	RF Power Density Reading (dBm/MHz)	Maximum Limit (dBm/MHz)
5210	-0.171	11
5290	-0.355	11
5530	0.635	11
5610	-0.445	11
Frequency MHz	**RF Power Density Reading (dBm/500KHz)**	**Maximum Limit (dBm/500KHz)**
5775	-4.676	30

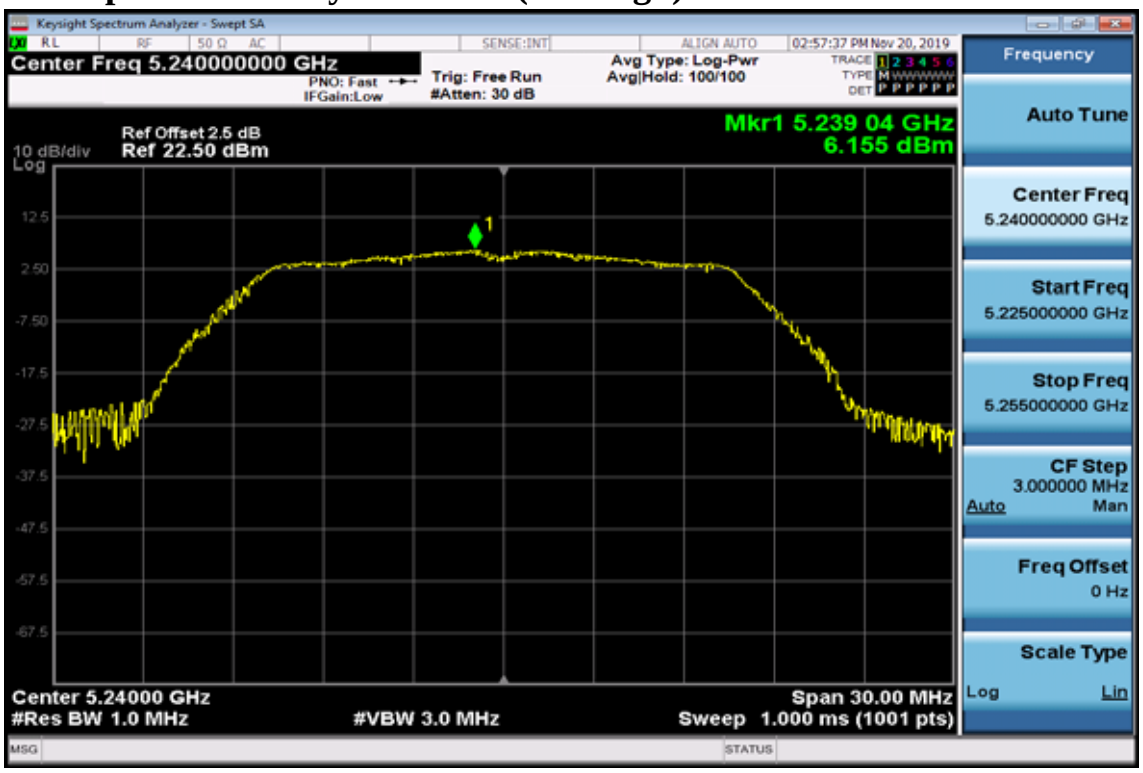
Band UNII-1
802.11a
Power Spectral Density Data Plot (CH Low)



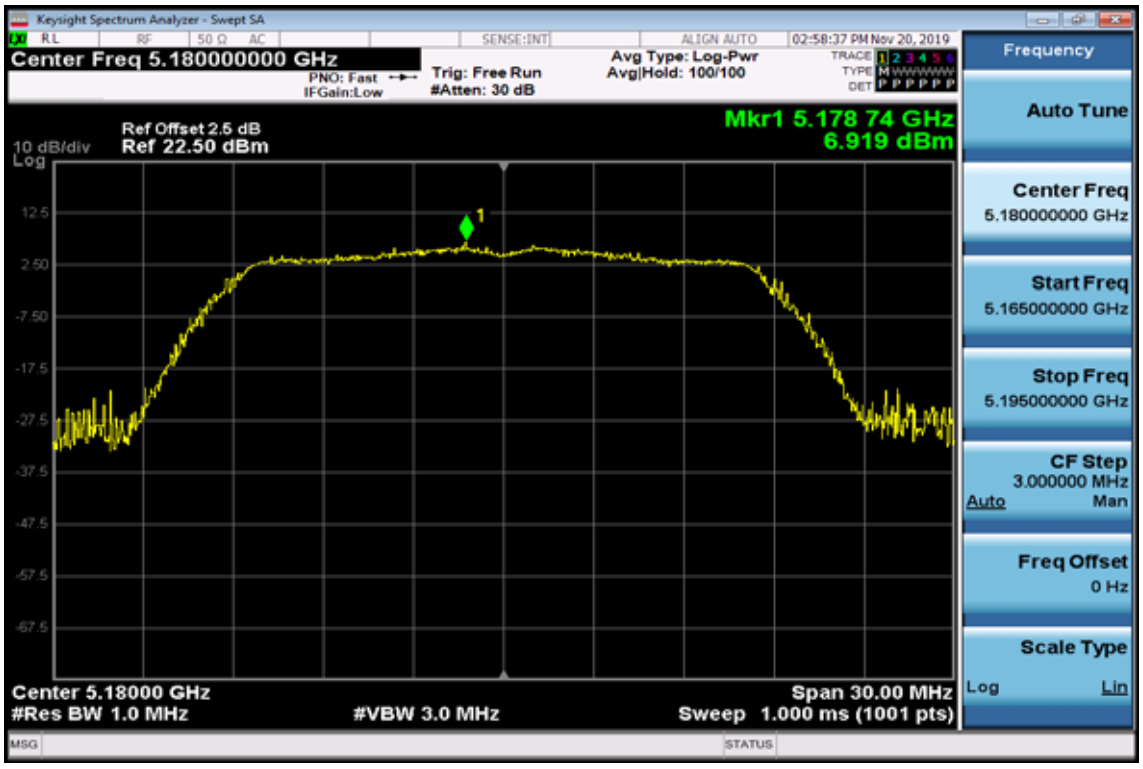
Power Spectral Density Data Plot (CH Mid)



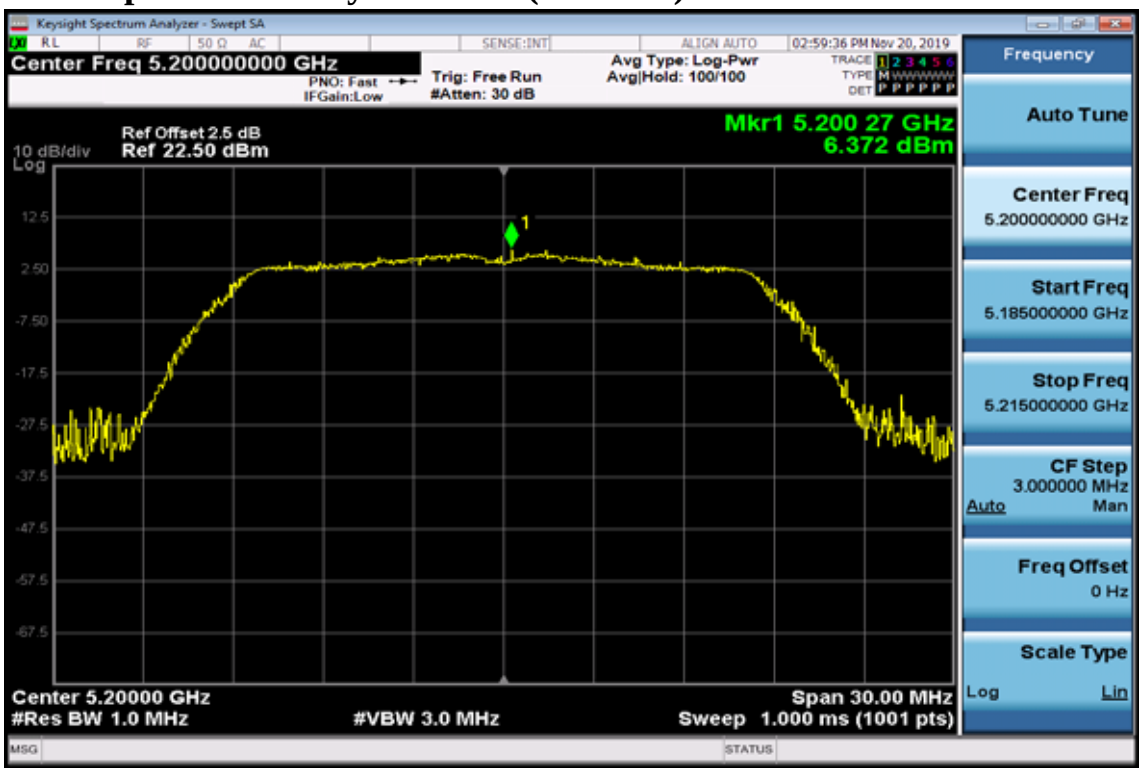
Power Spectral Density Data Plot (CH High)



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

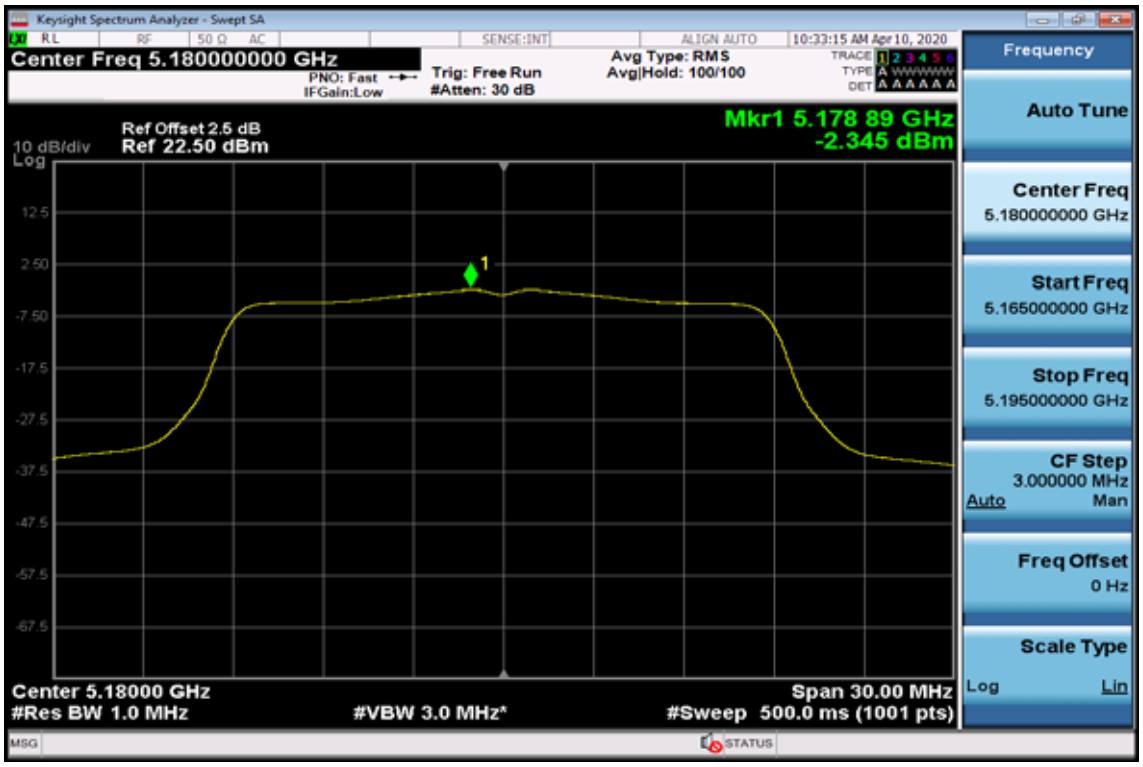


Power Spectral Density Test Plot (CH-Mid)

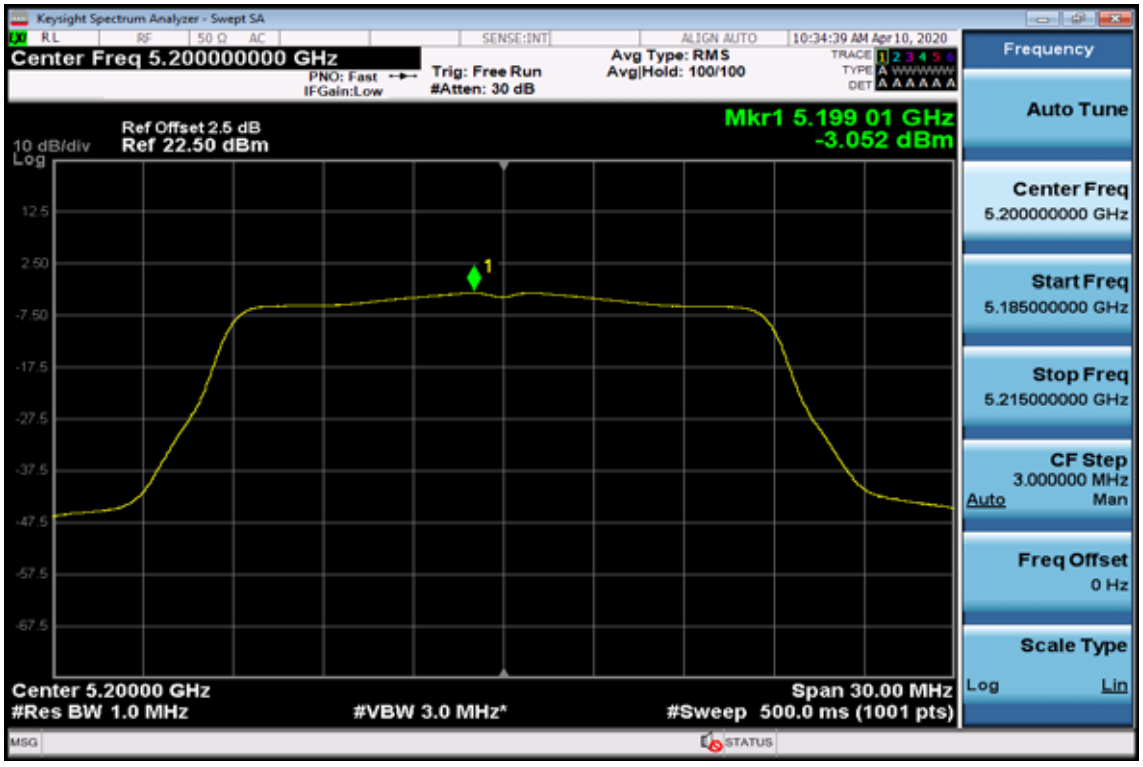


Power Spectral Density Test Plot (CH-High)

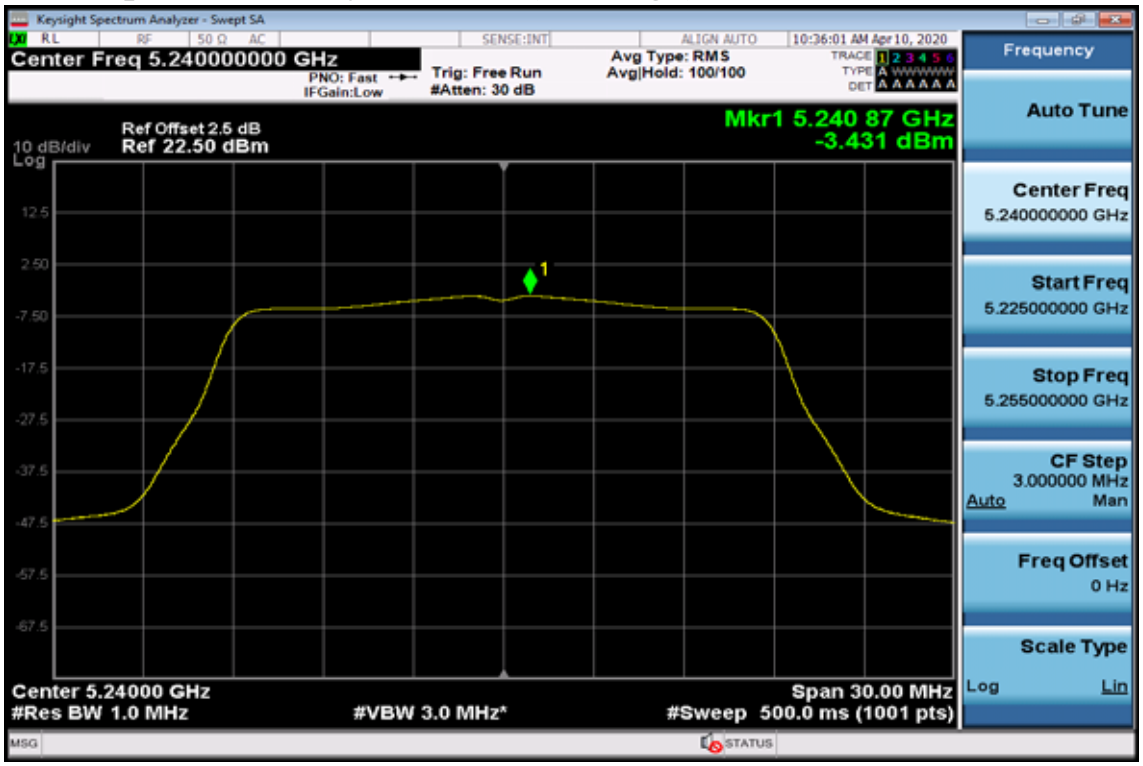
802.11ac VHT20,
Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High)



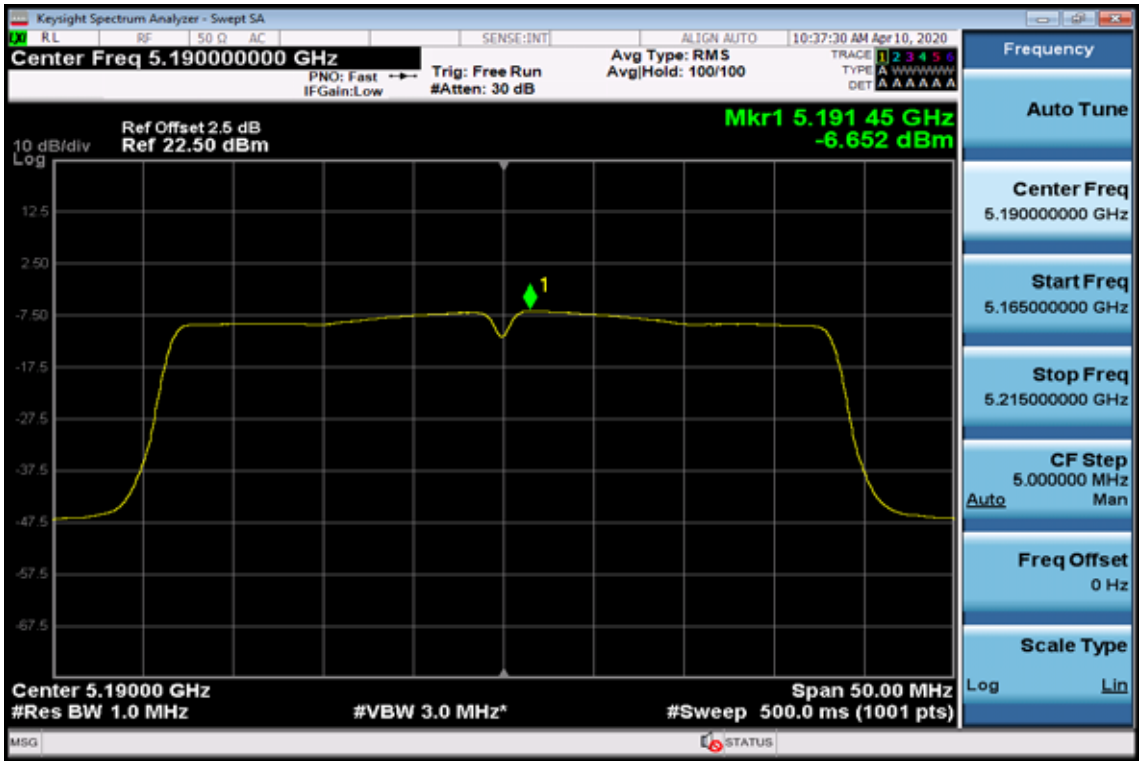
802.11n HT40

Power Spectral Density Test Plot (CH-Low)

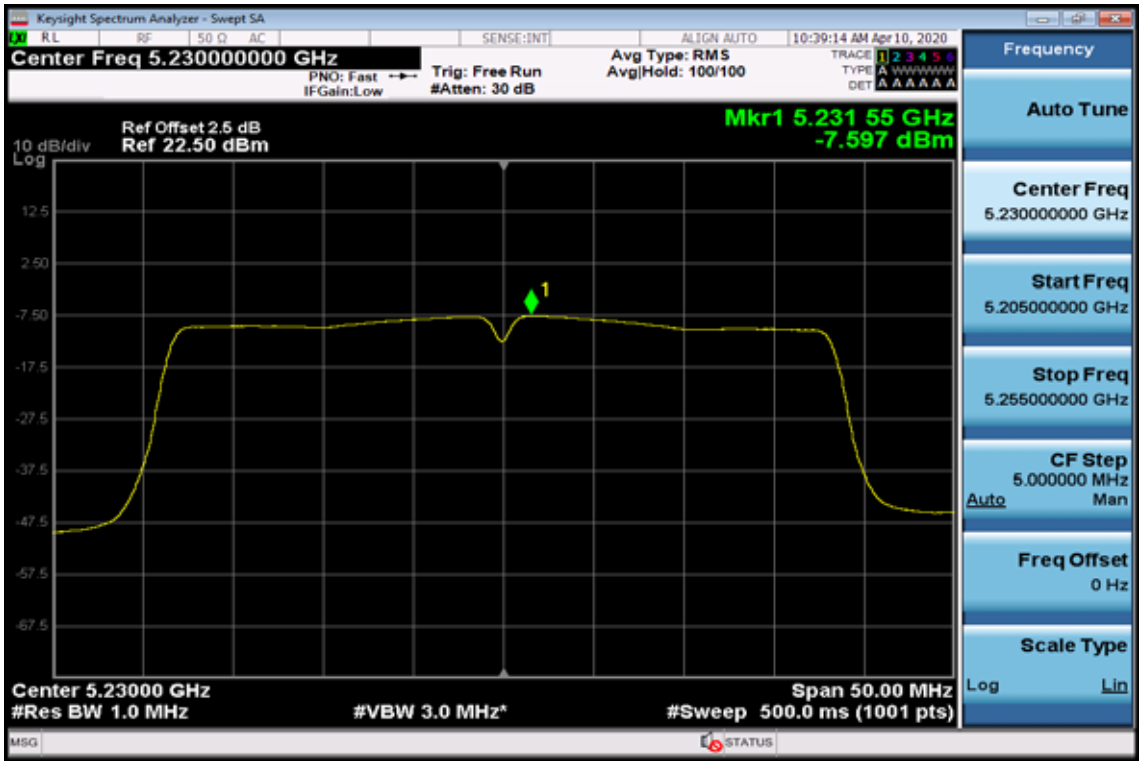
Power Spectral Density Test Plot (CH-High)

802.11ac VHT40

Power Spectral Density Test Plot (CH-Low)

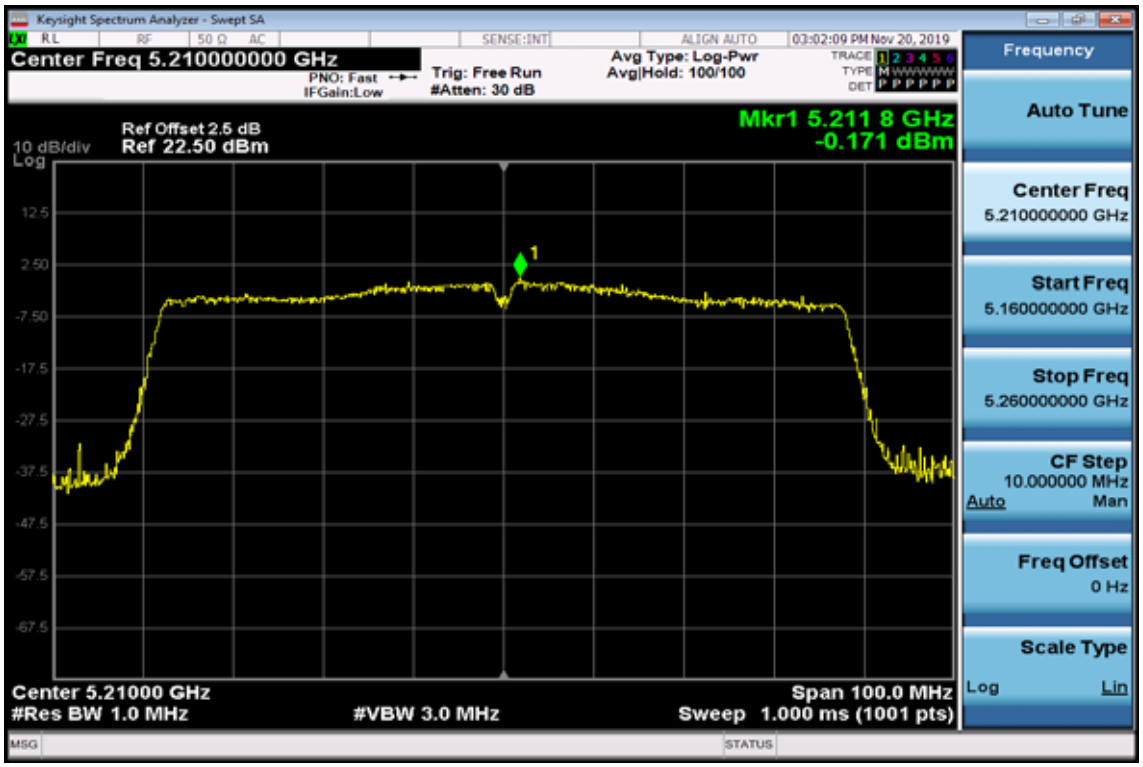


Power Spectral Density Test Plot (CH-High)

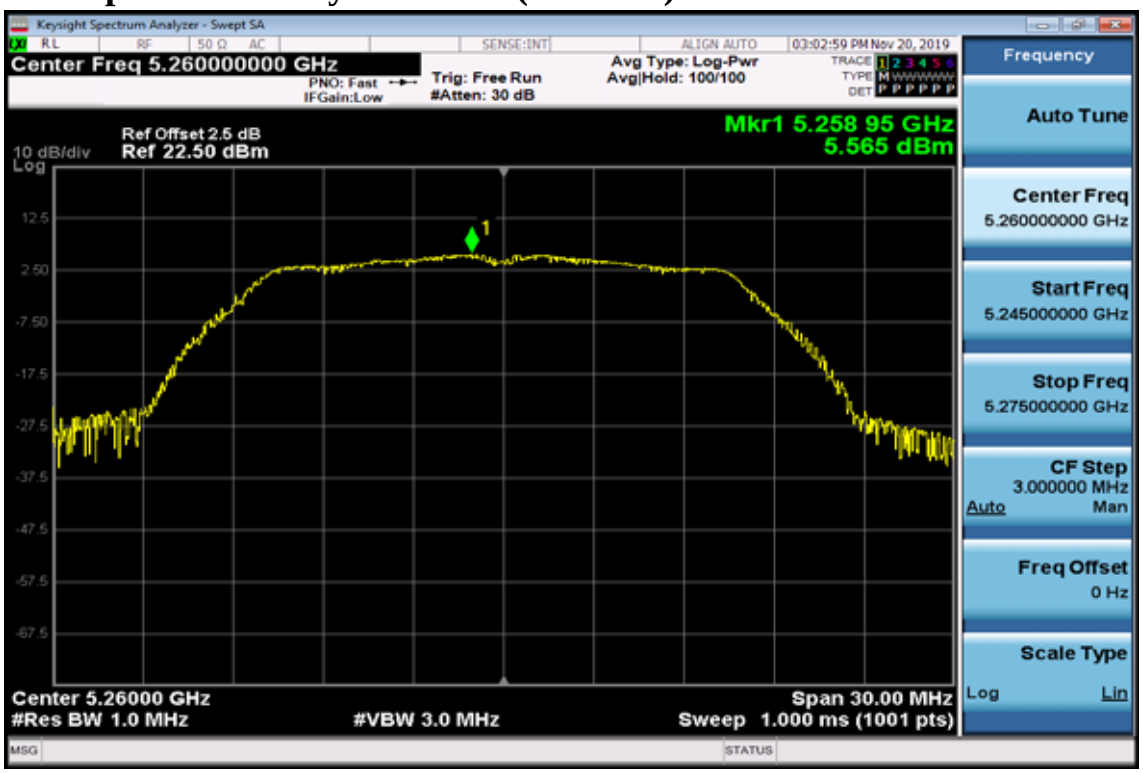


802.11 ac VHT80

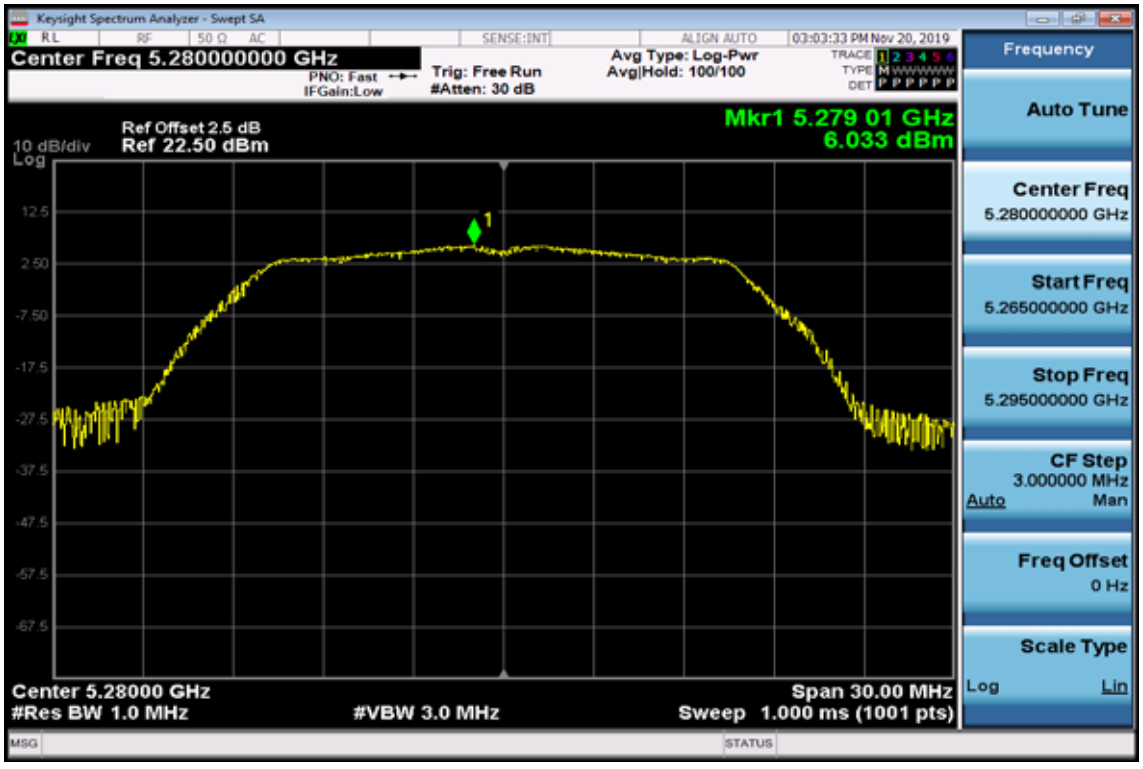
Power Spectral Density Test Plot (CH-Low)



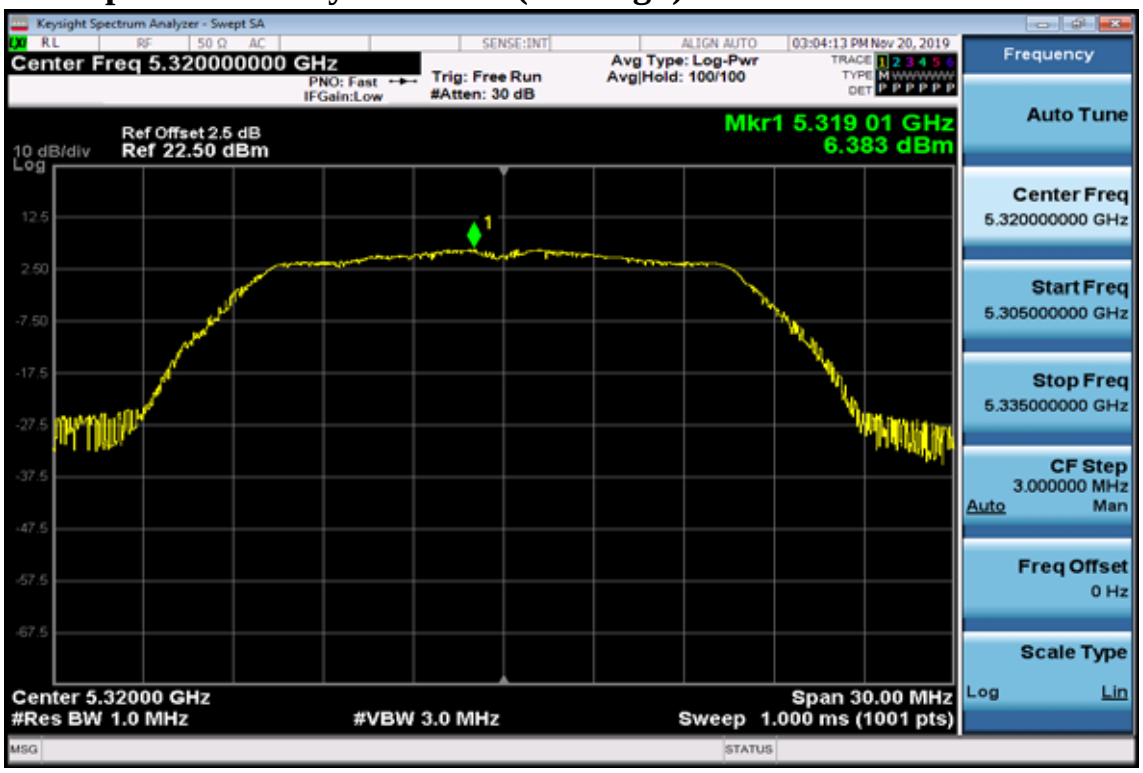
Band UNII-2A
802.11a
Power Spectral Density Data Plot (CH Low)



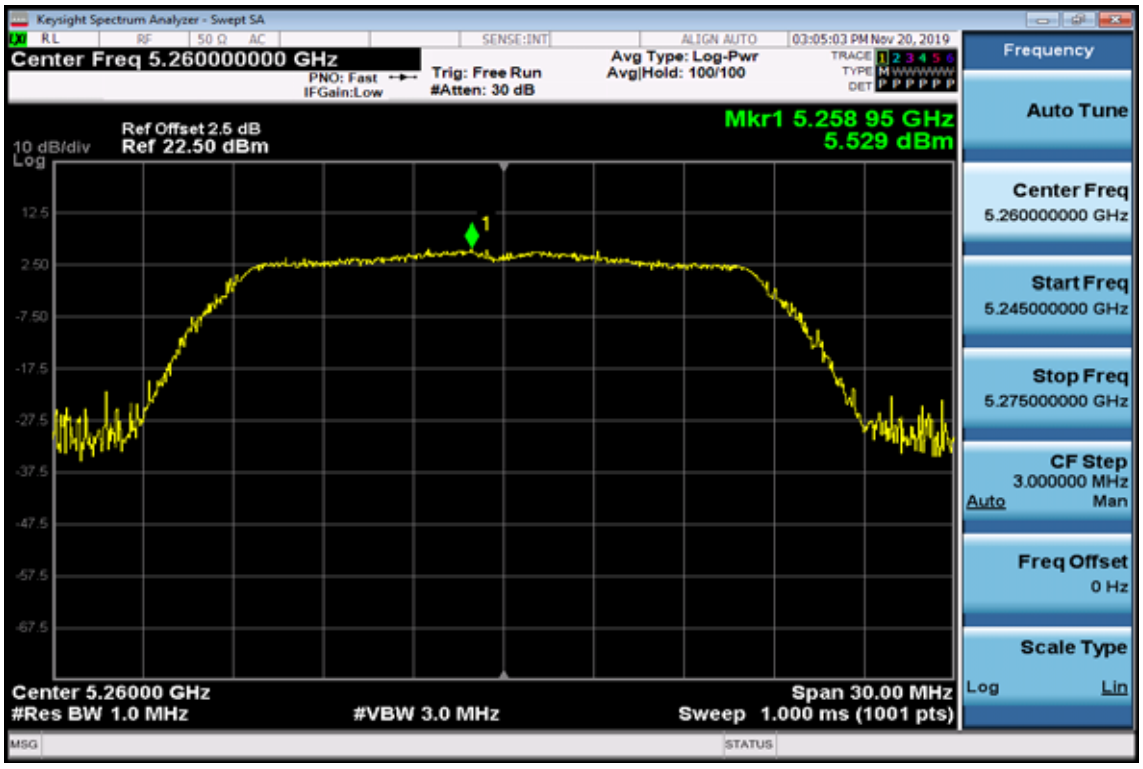
Power Spectral Density Data Plot (CH Mid)



Power Spectral Density Data Plot (CH High)

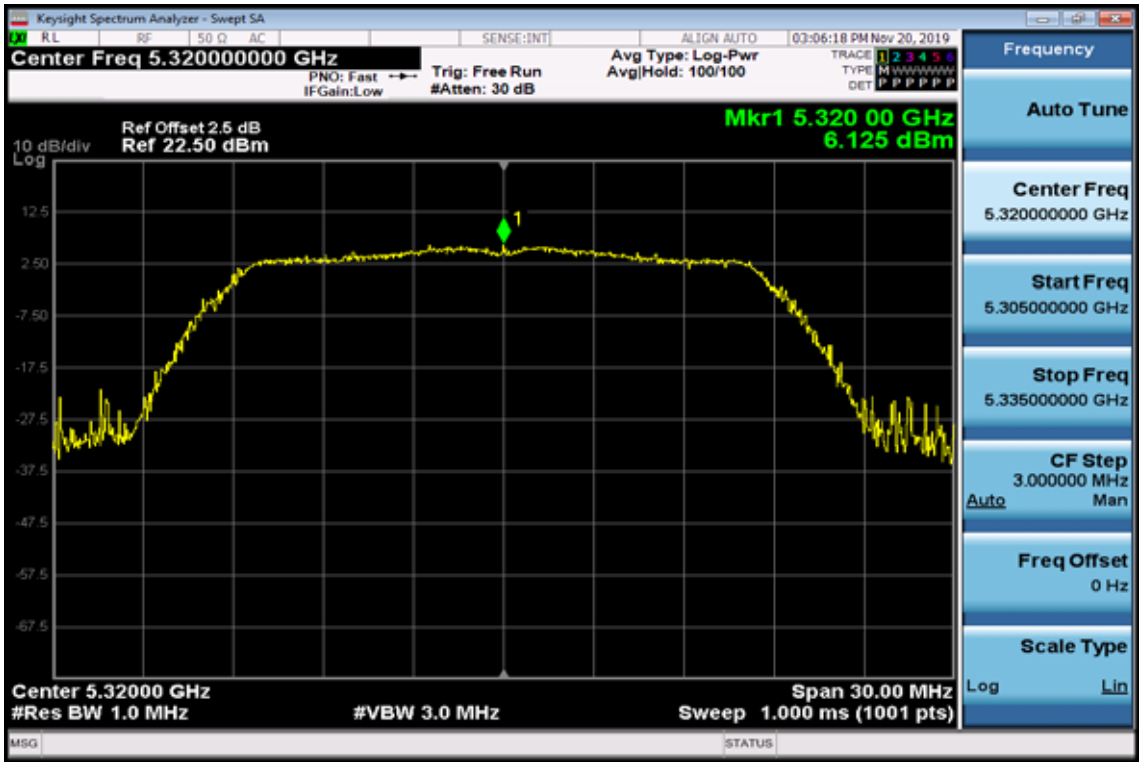


802.11n HT20,
Power Spectral Density Test Plot (CH-Low)

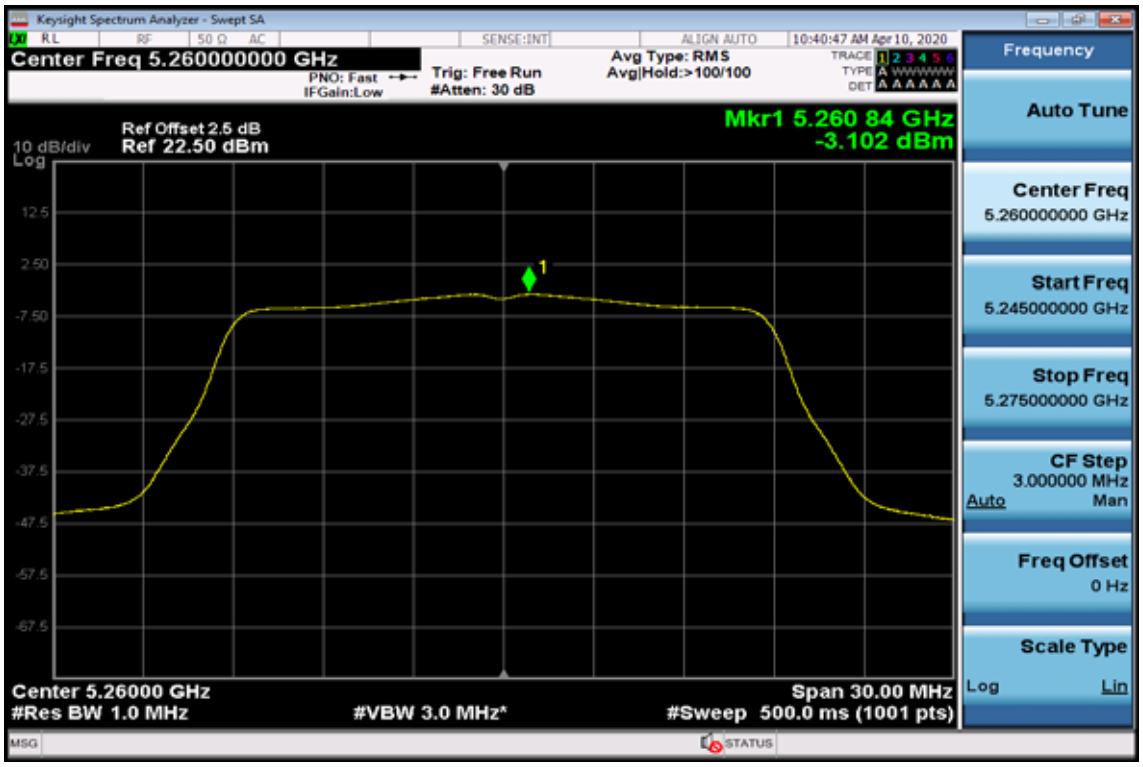


Power Spectral Density Test Plot (CH-Mid)

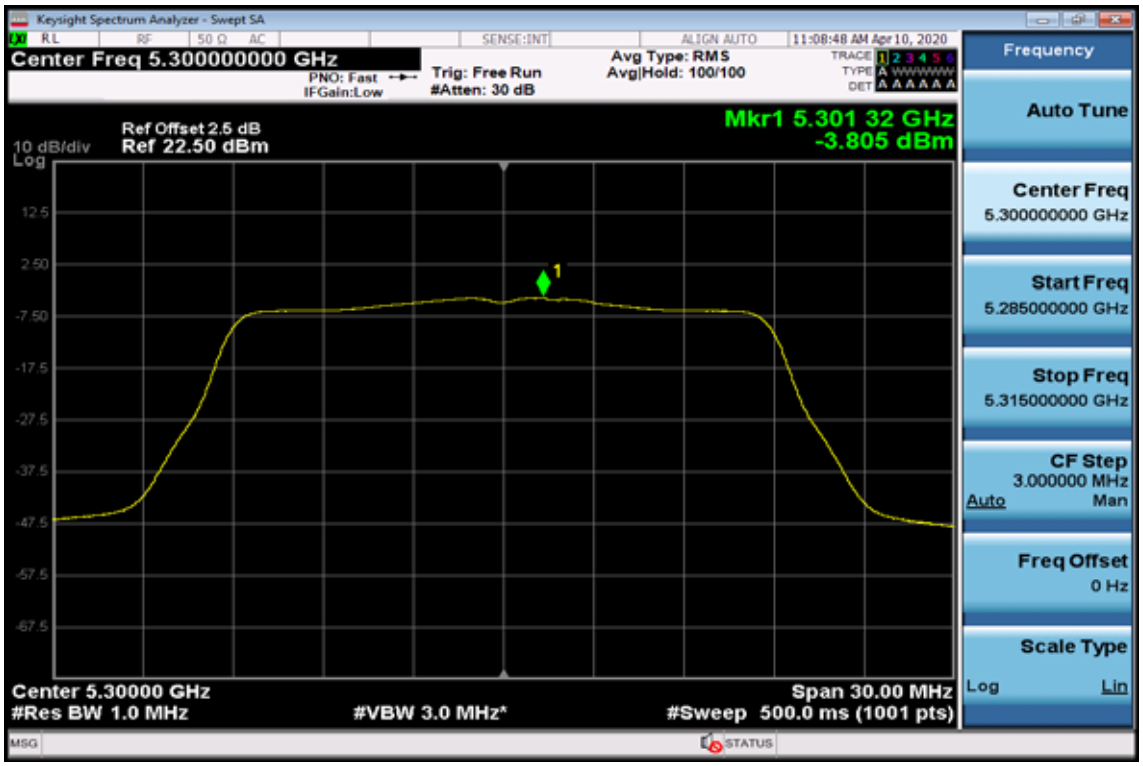
Power Spectral Density Test Plot (CH-High)



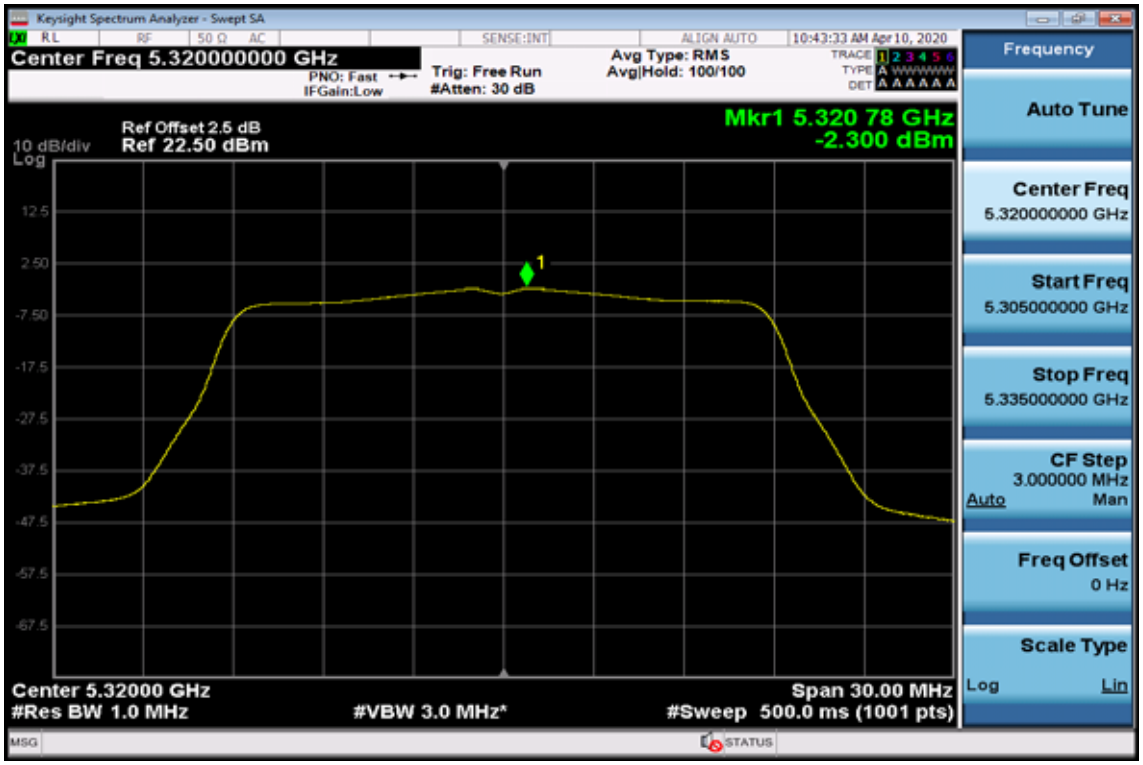
802.11ac VHT20,
Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)

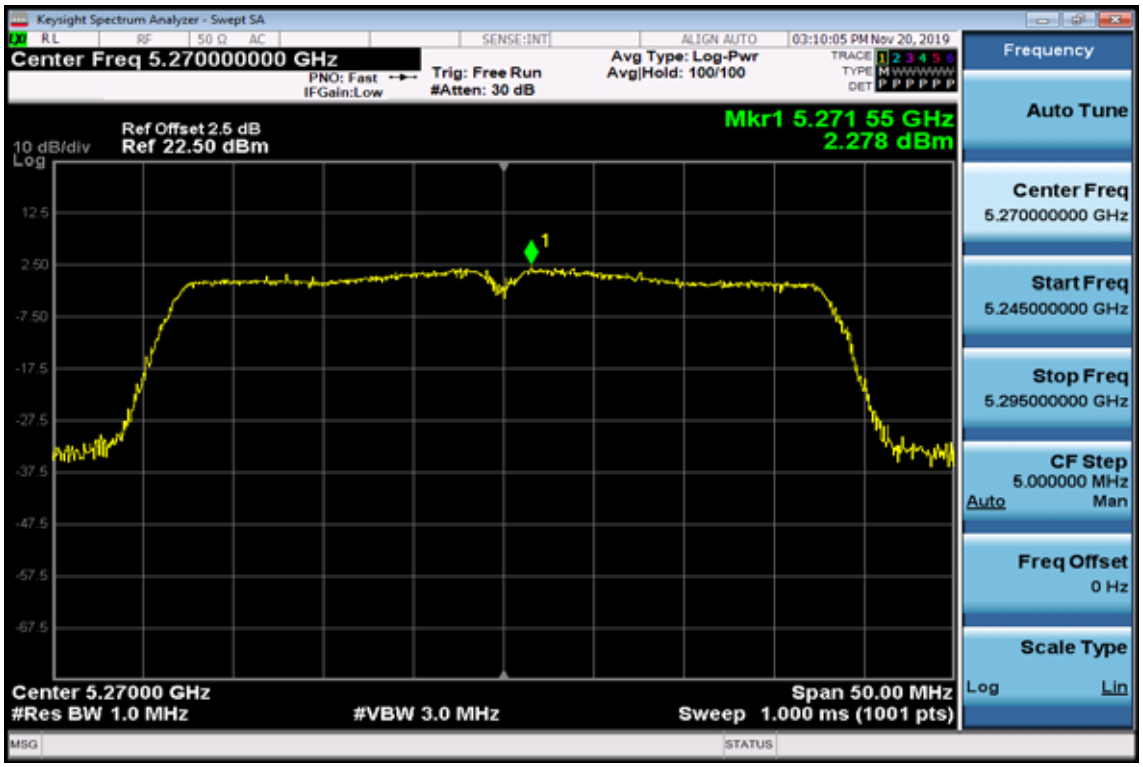


Power Spectral Density Test Plot (CH-High)

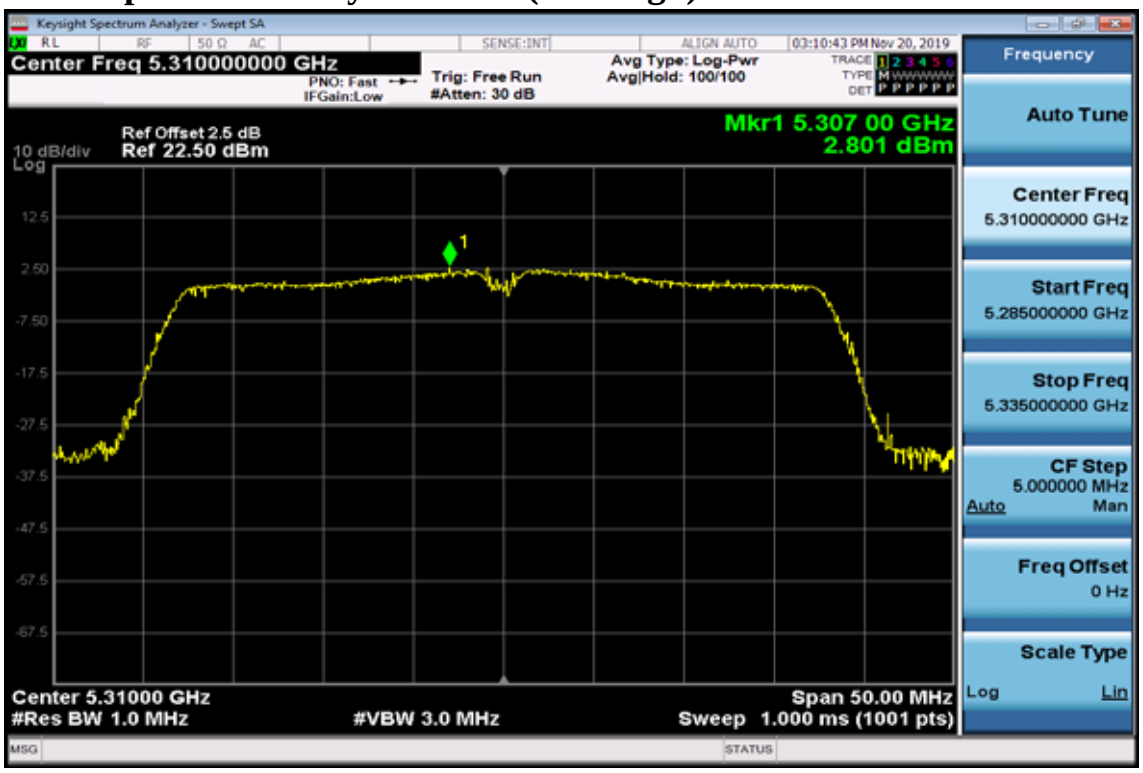


802.11n HT40

Power Spectral Density Test Plot (CH-Low)

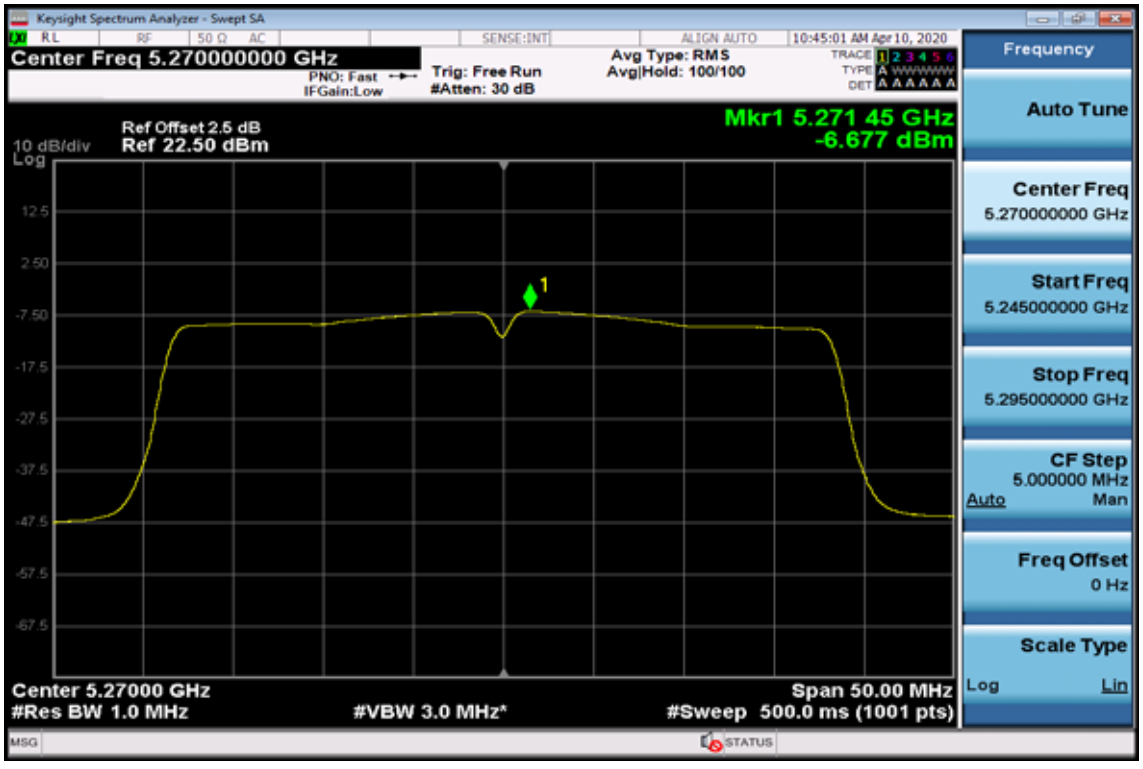


Power Spectral Density Test Plot (CH-High)

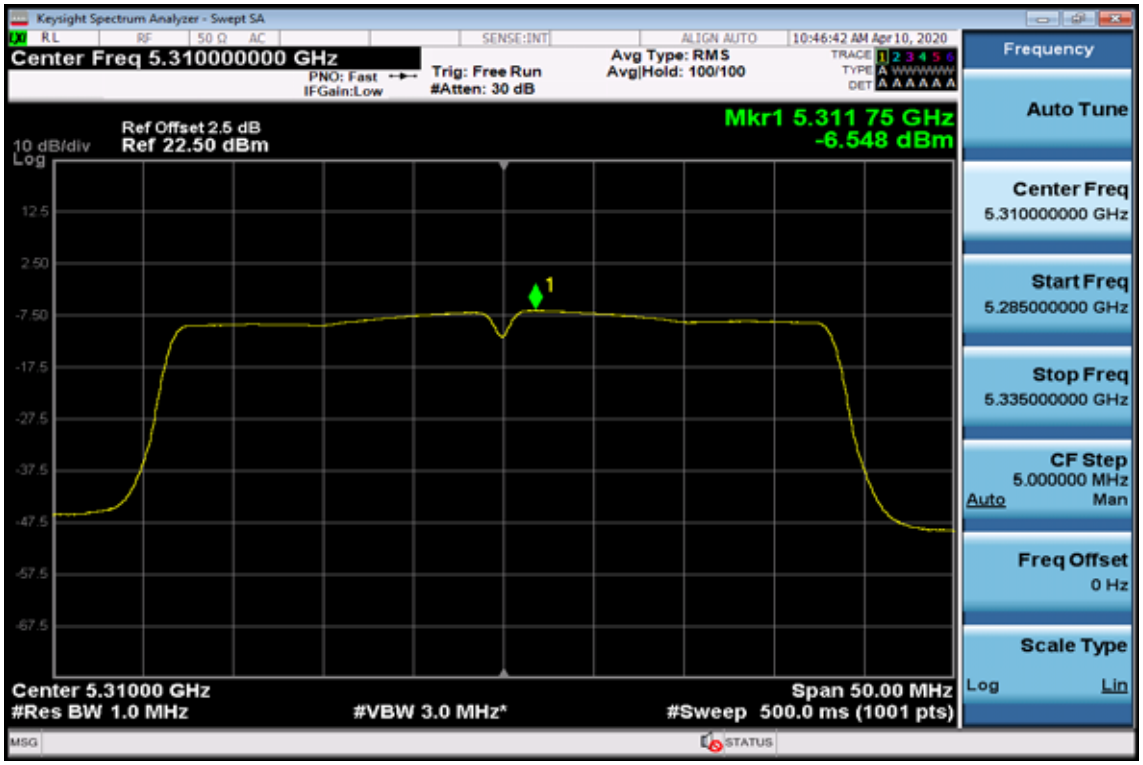


802.11ac VHT40

Power Spectral Density Test Plot (CH-Low)

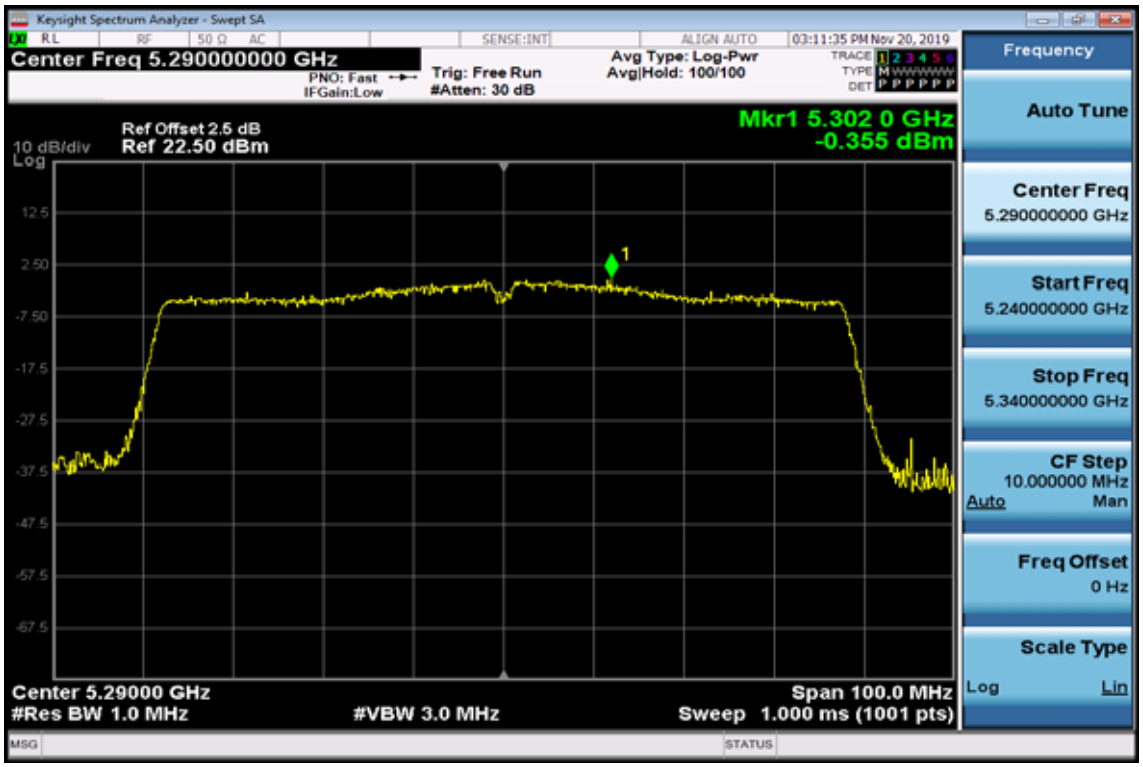


Power Spectral Density Test Plot (CH-High)

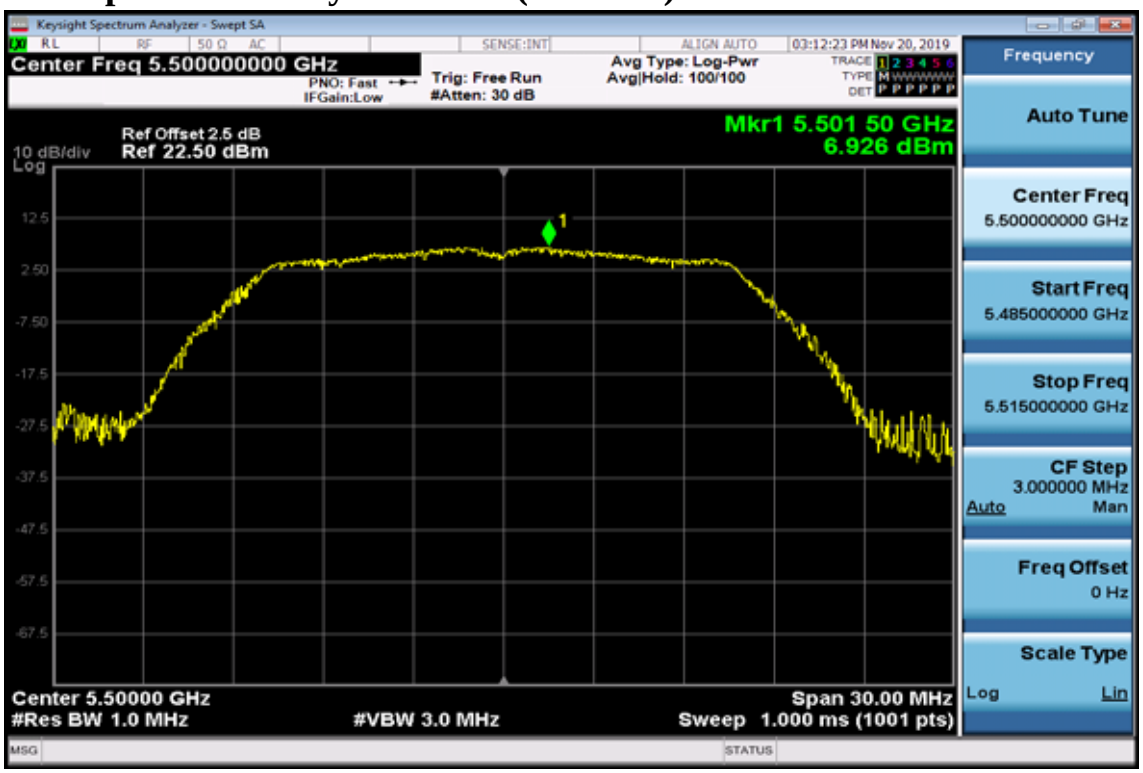


802.11 ac VHT80

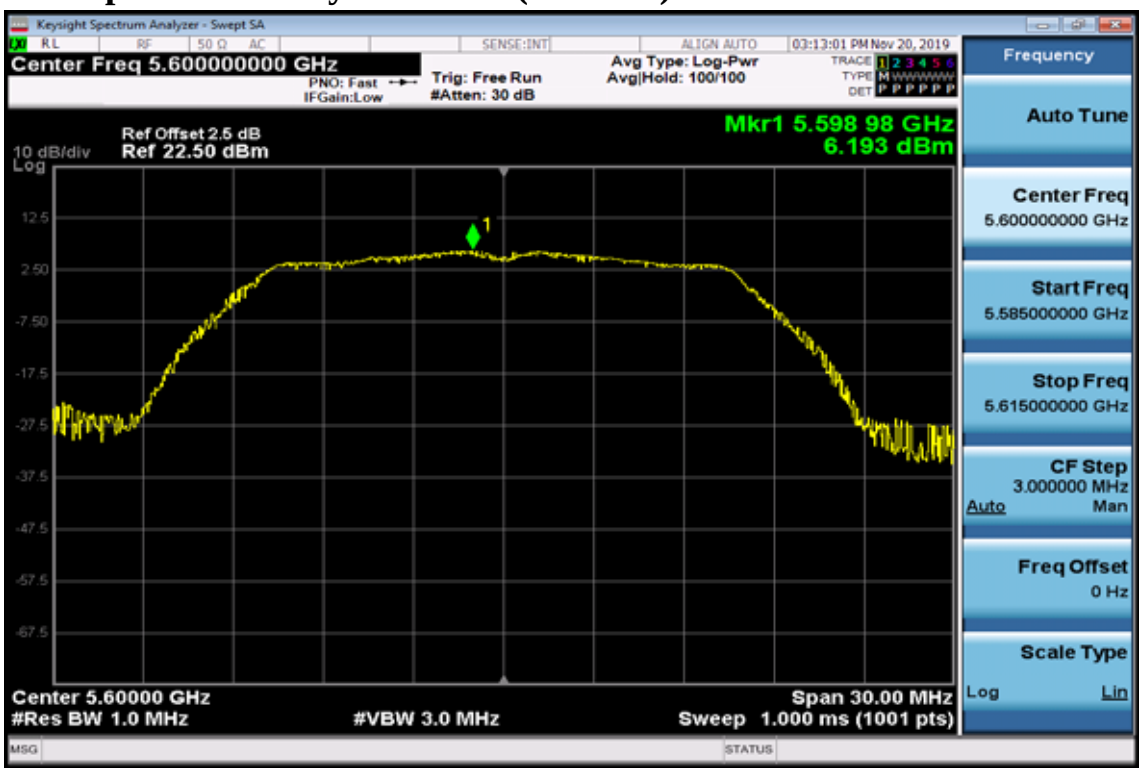
Power Spectral Density Test Plot (CH-Low)



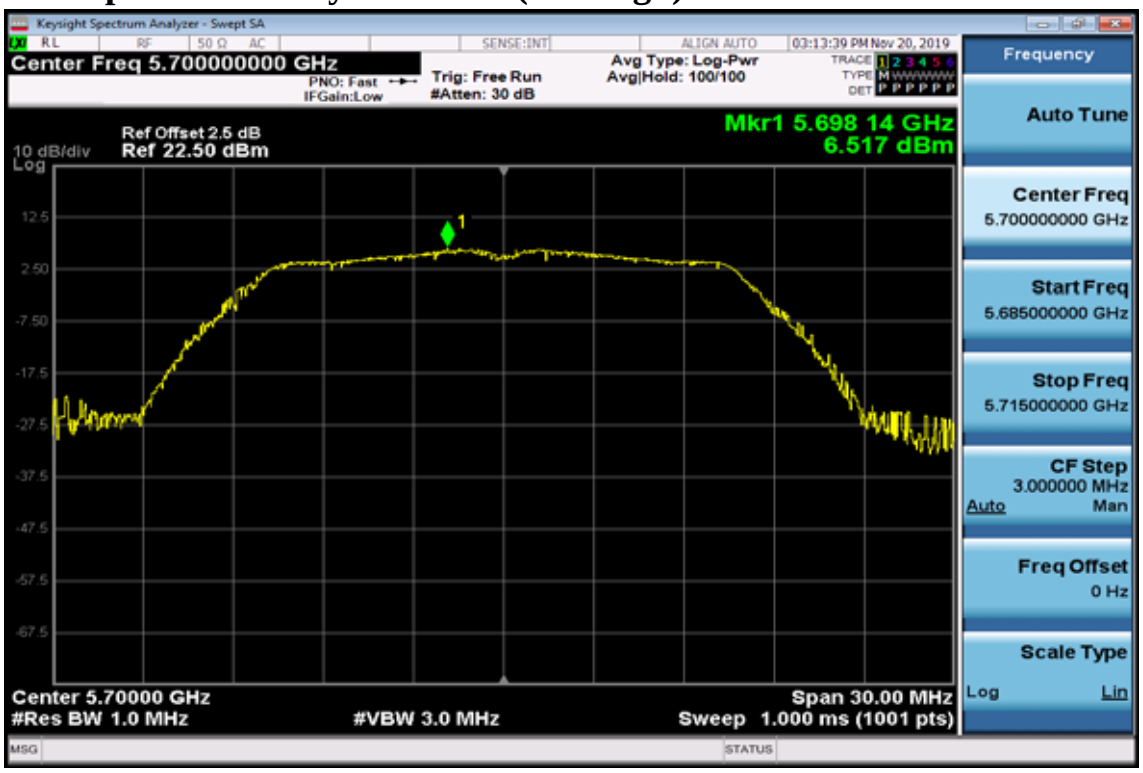
Band UNII-2C
802.11a
Power Spectral Density Data Plot (CH Low)



Power Spectral Density Data Plot (CH Mid)

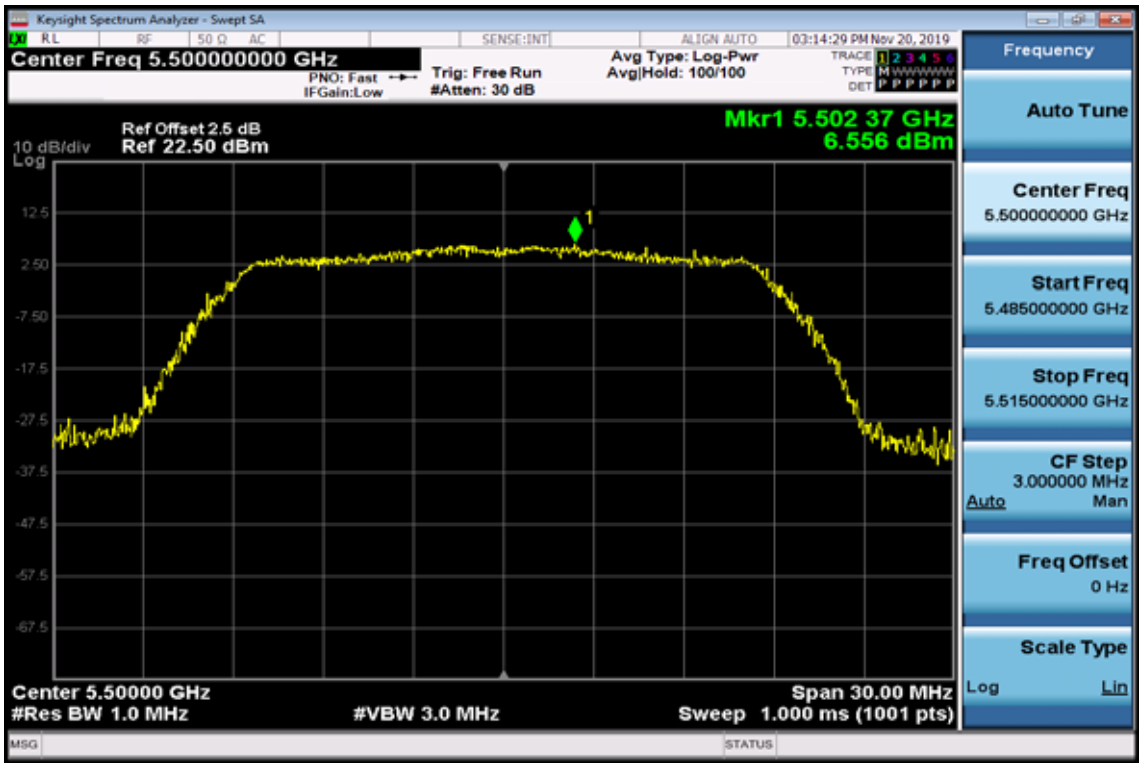


Power Spectral Density Data Plot (CH High)

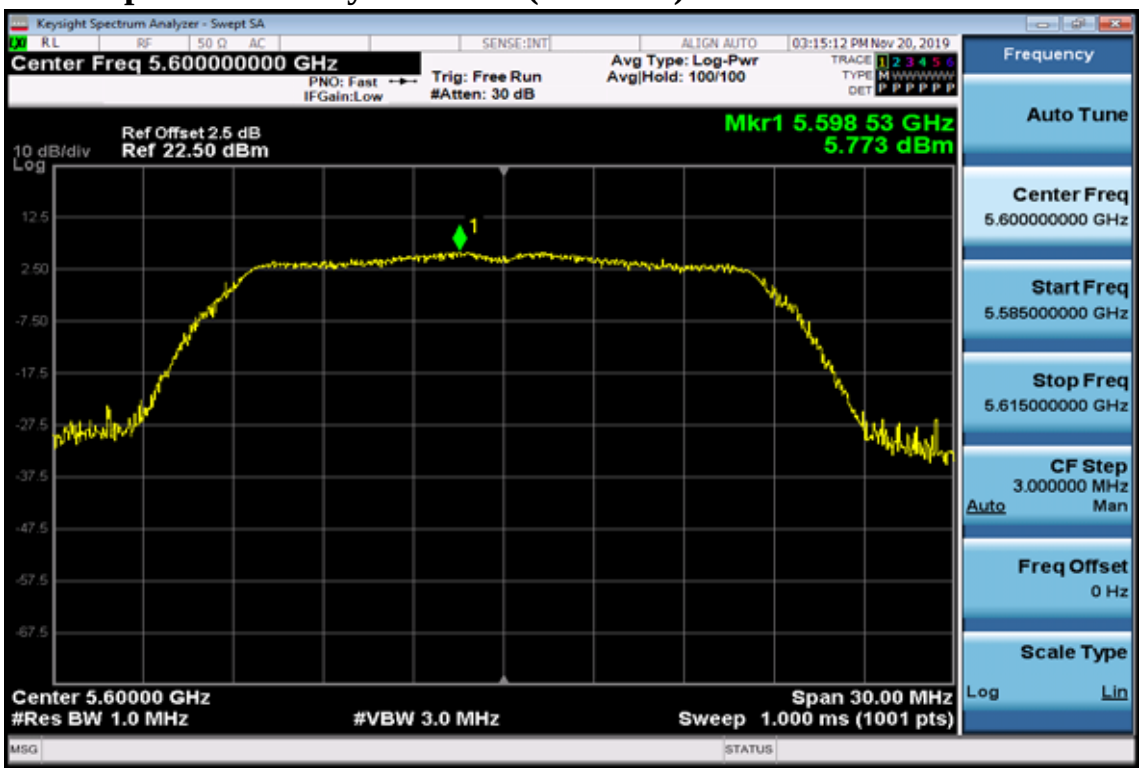


802.11n HT20

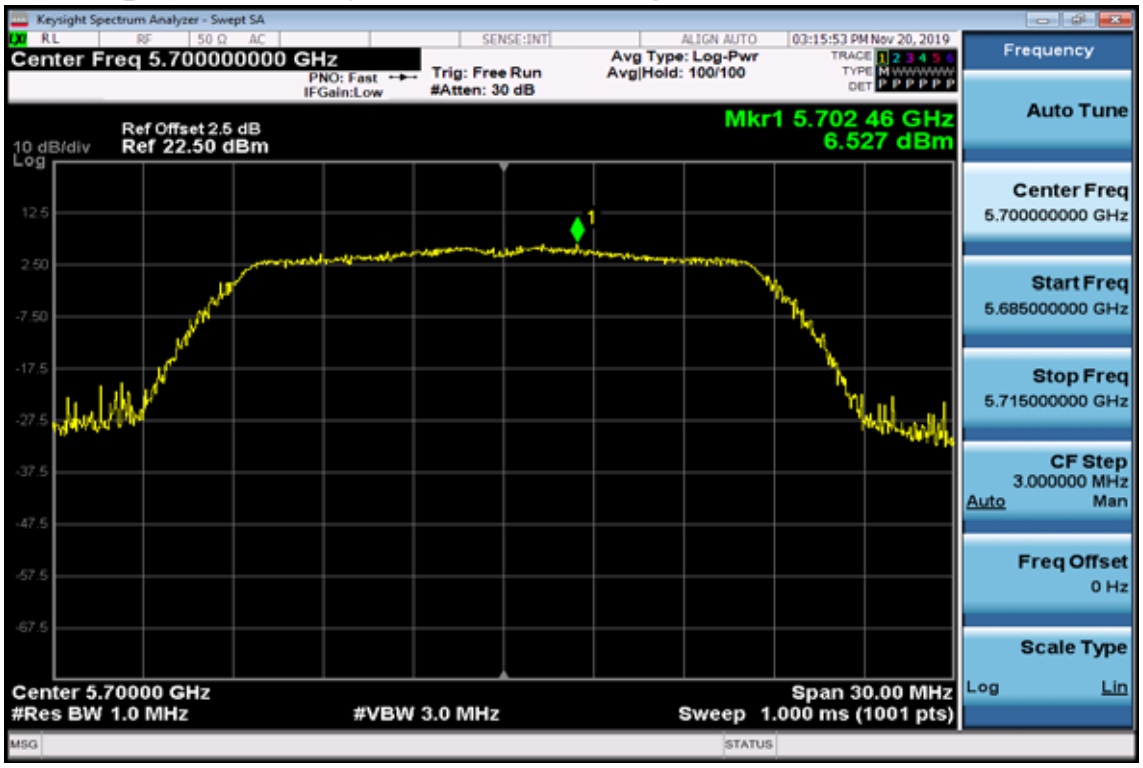
Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)

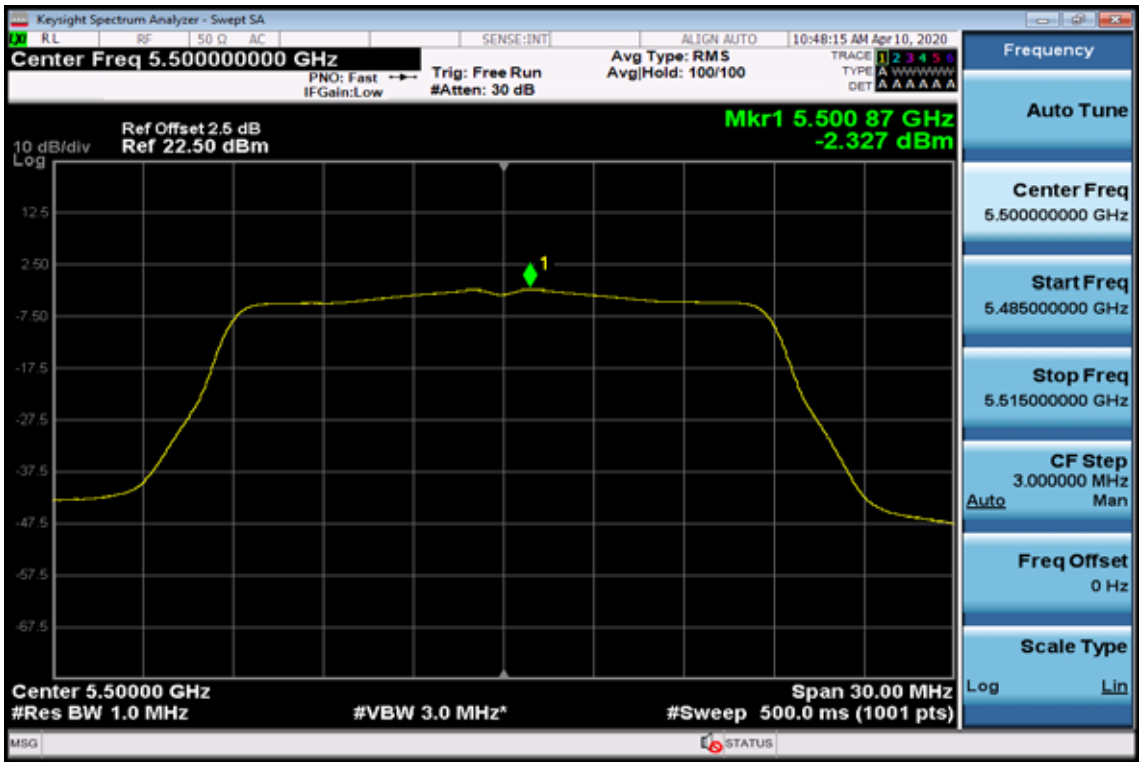


Power Spectral Density Test Plot (CH-High)

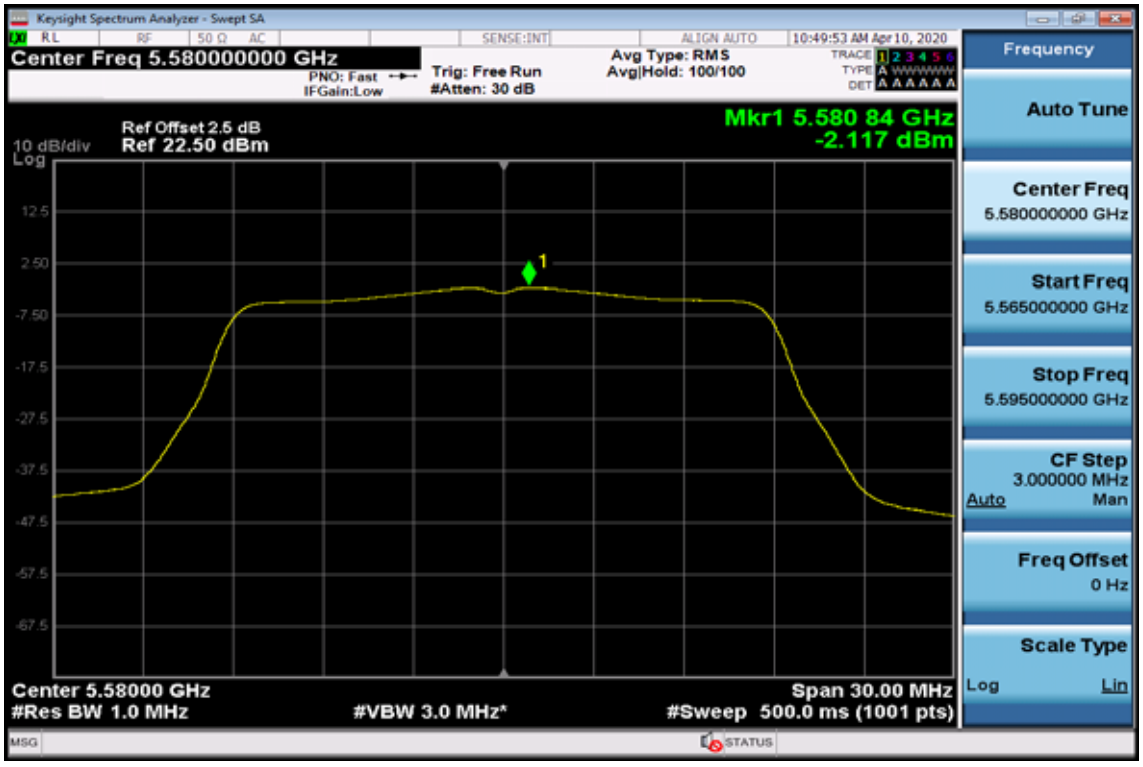


802.11ac VHT20

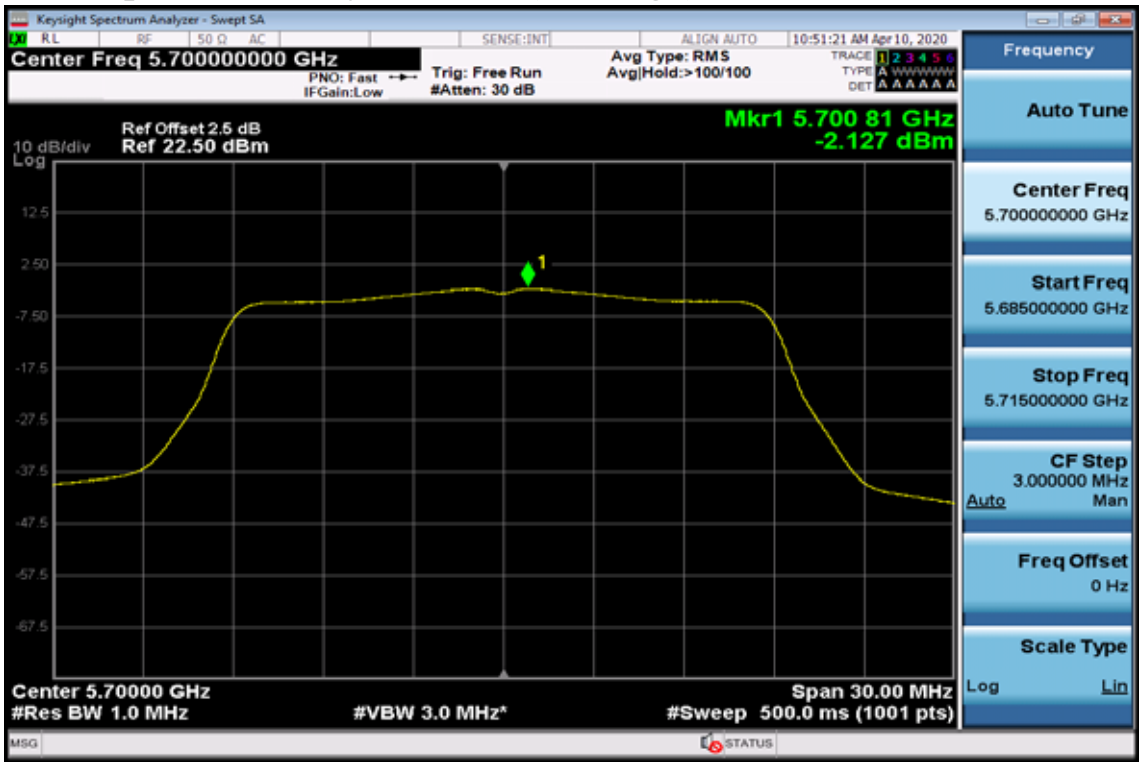
Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)

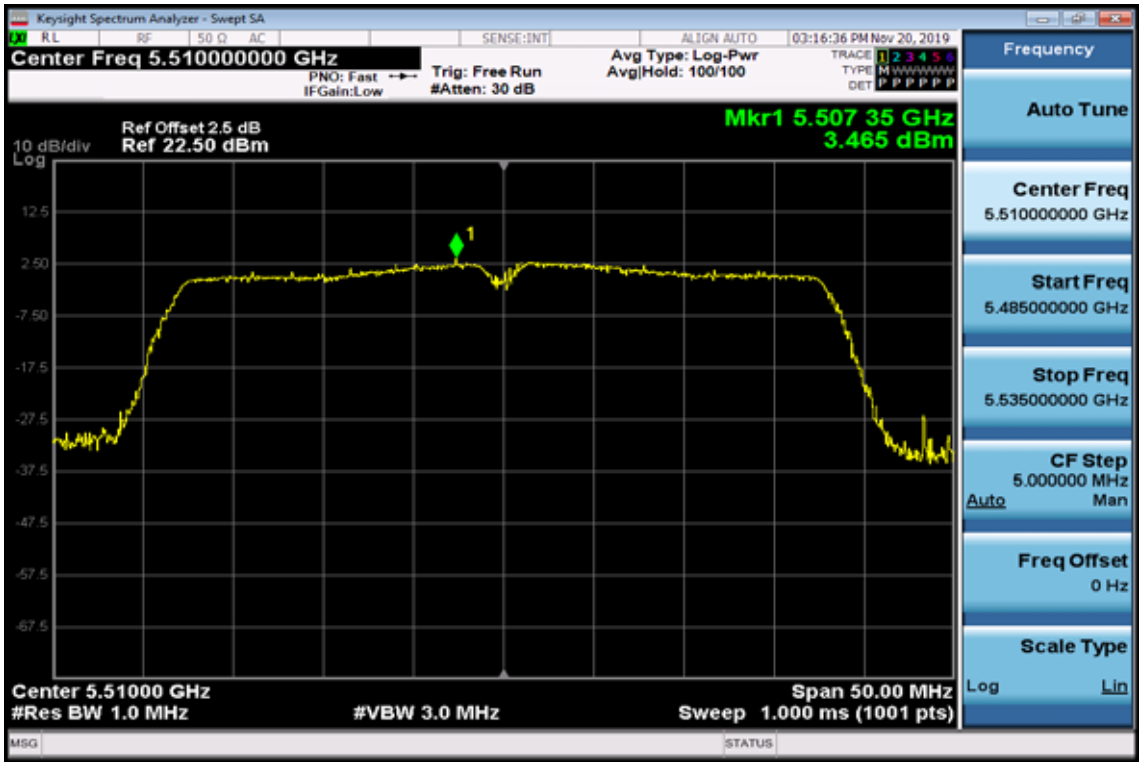


Power Spectral Density Test Plot (CH-High)



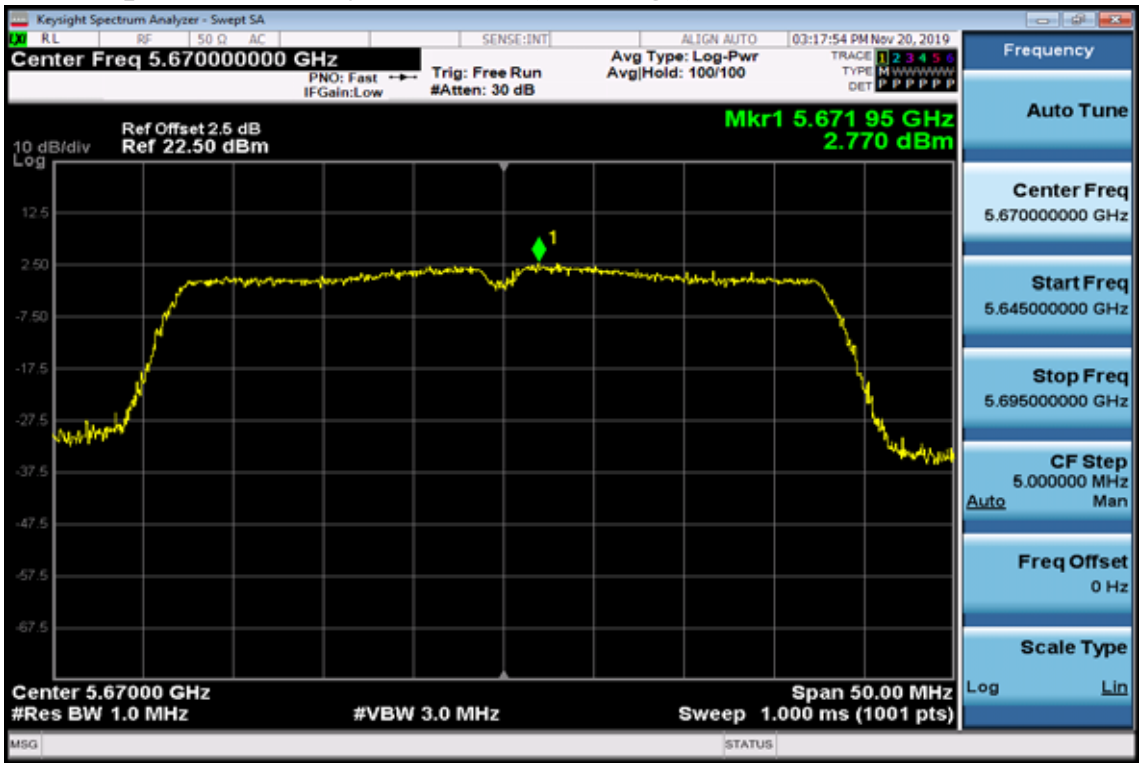
802.11n HT40

Power Spectral Density Test Plot (CH-Low)



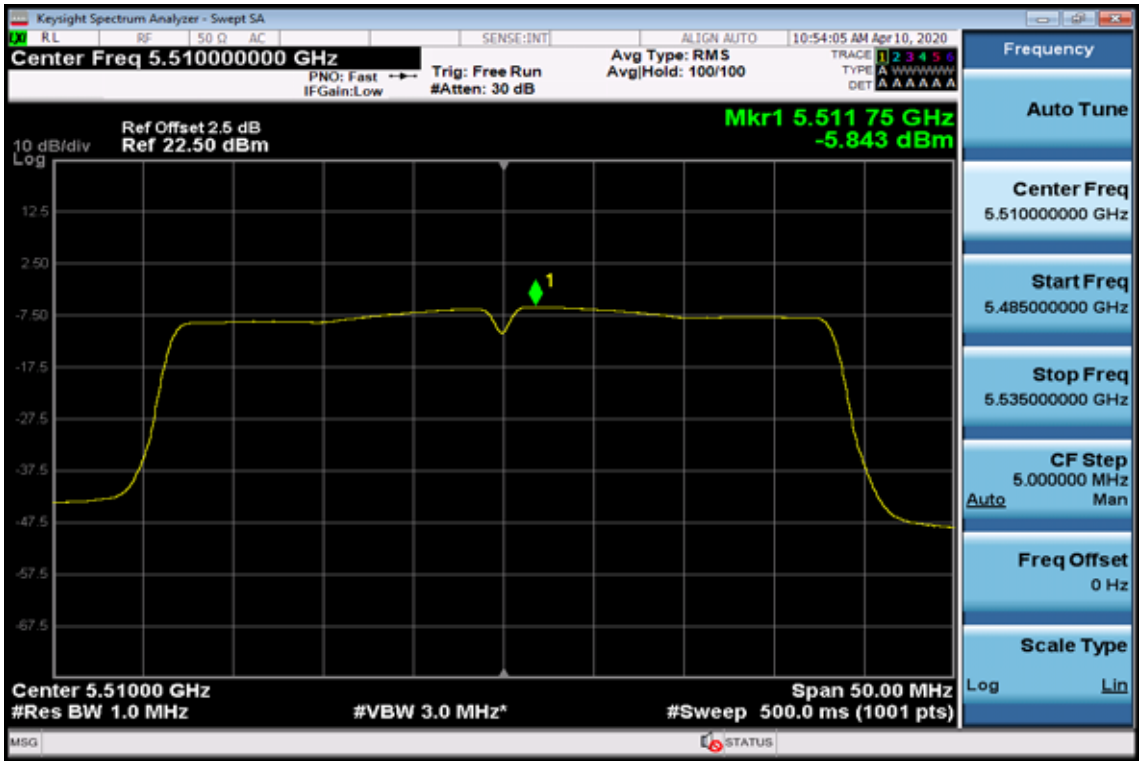
Power Spectral Density Test Plot (CH-Mid)

Power Spectral Density Test Plot (CH-High)

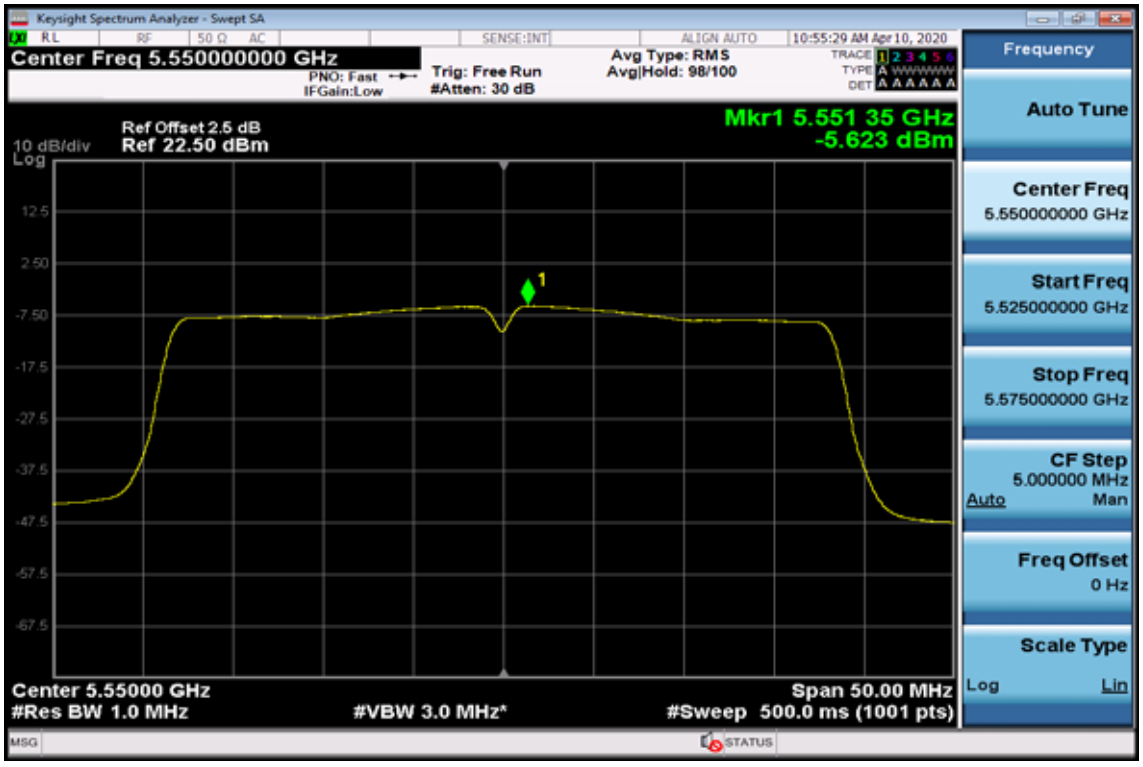


802.11ac VHT40

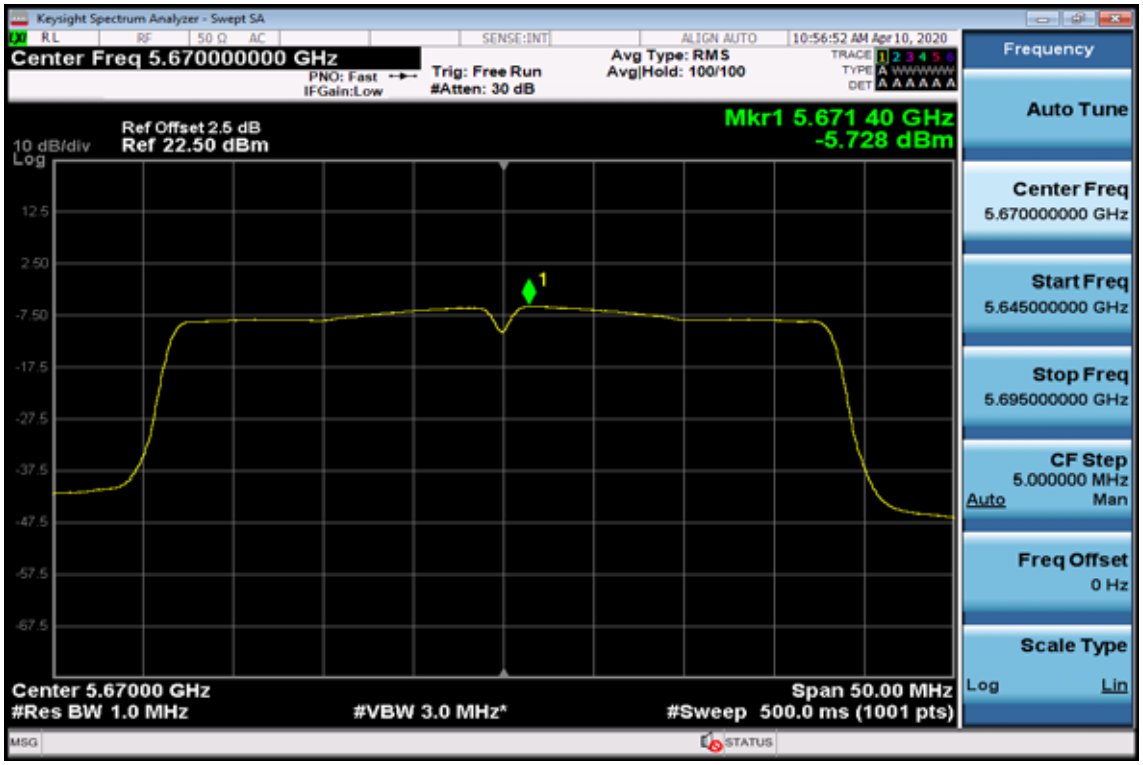
Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)

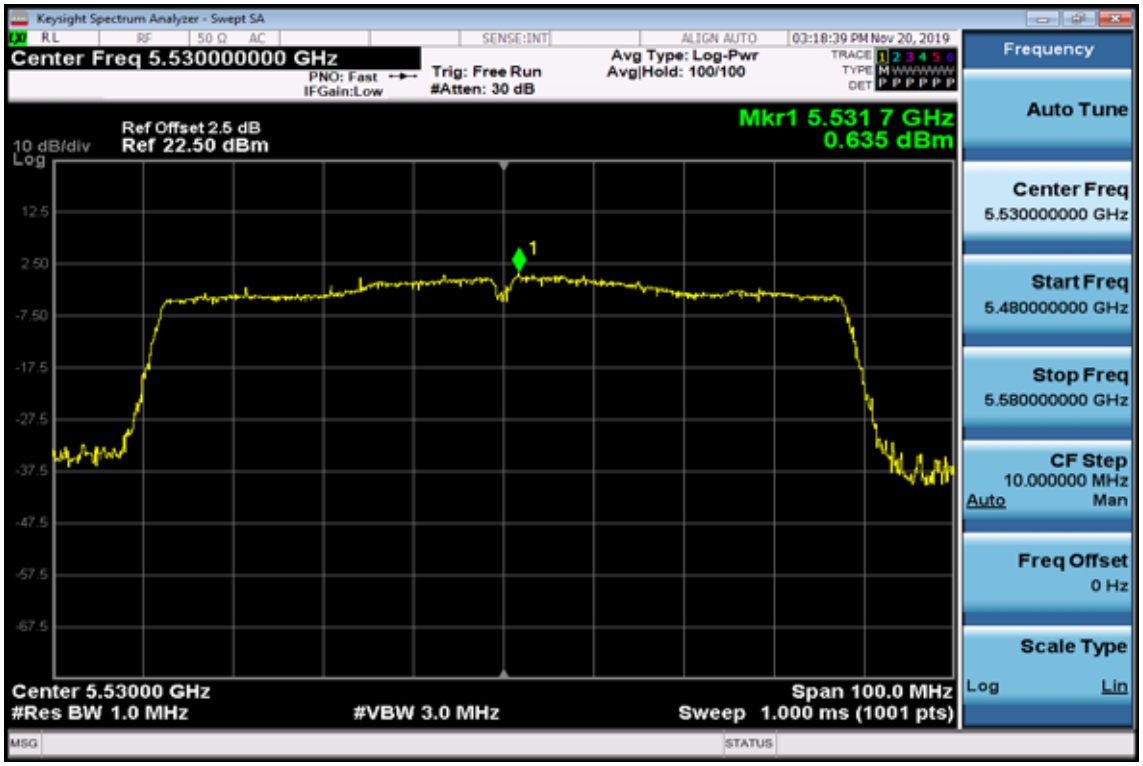


Power Spectral Density Test Plot (CH-High)



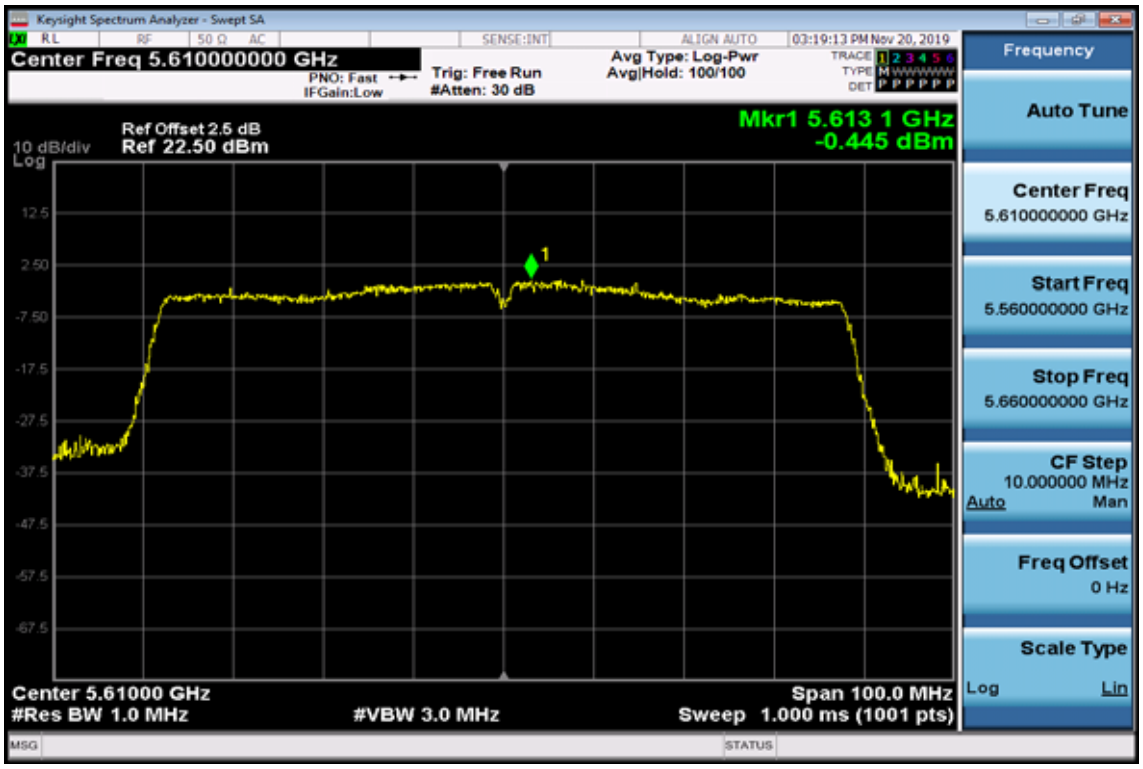
802.11 ac VHT80

Power Spectral Density Test Plot (CH-Low)

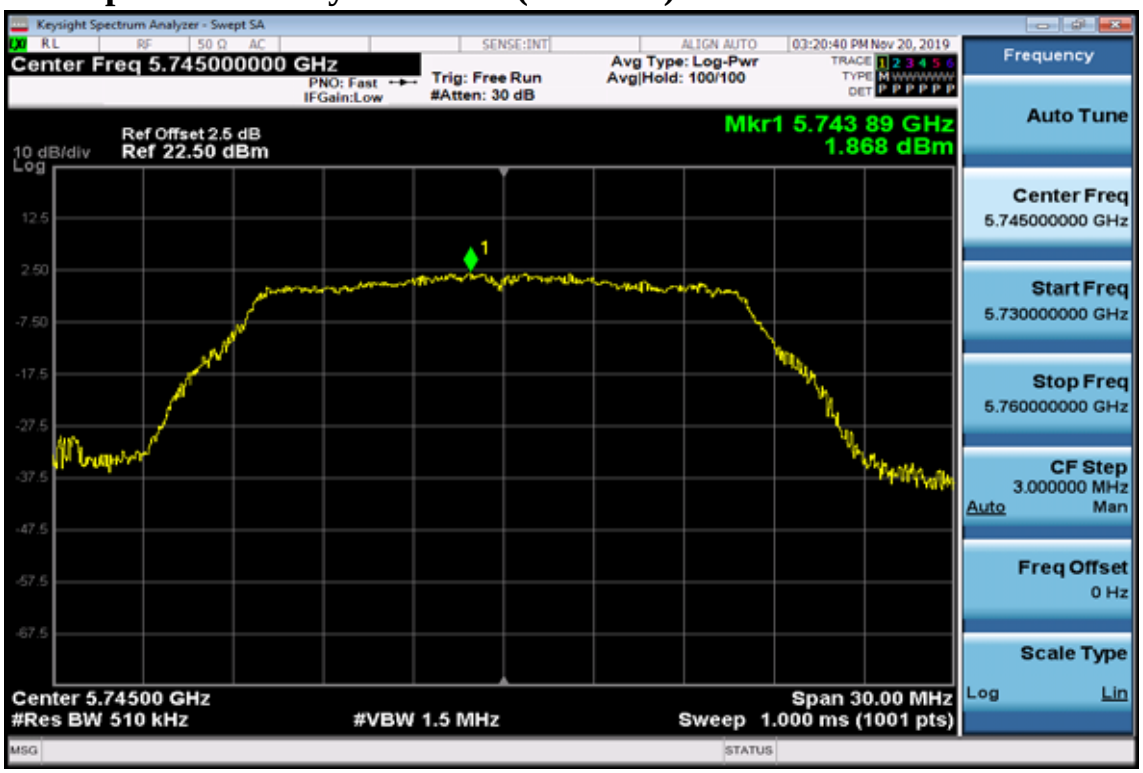


802.11 ac VHT80

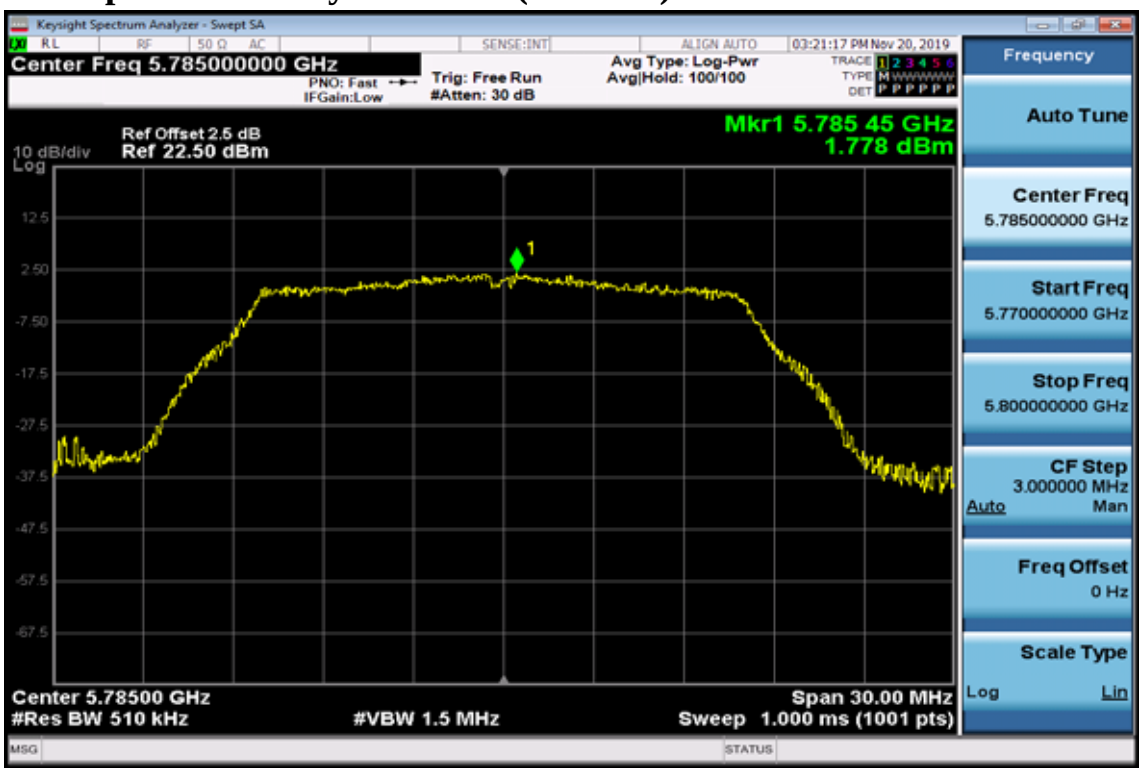
Power Spectral Density Test Plot (CH-High)



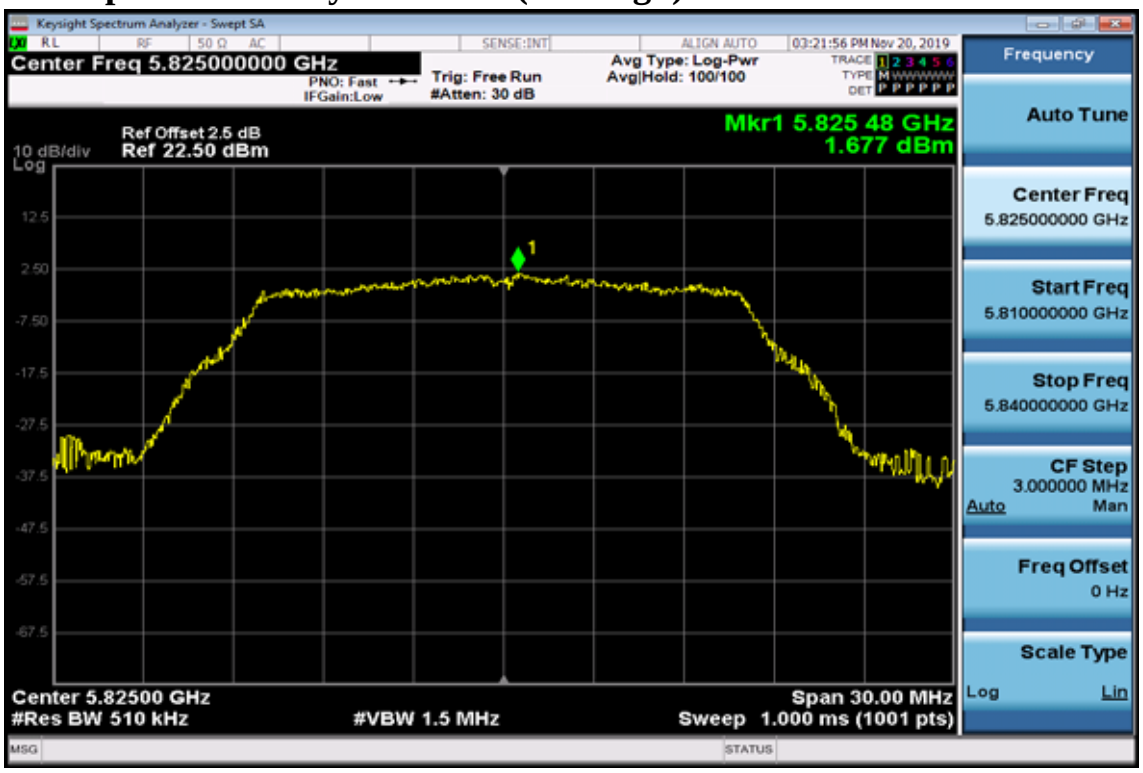
Band UNII-3
802.11a
Power Spectral Density Data Plot (CH Low)



Power Spectral Density Data Plot (CH Mid)

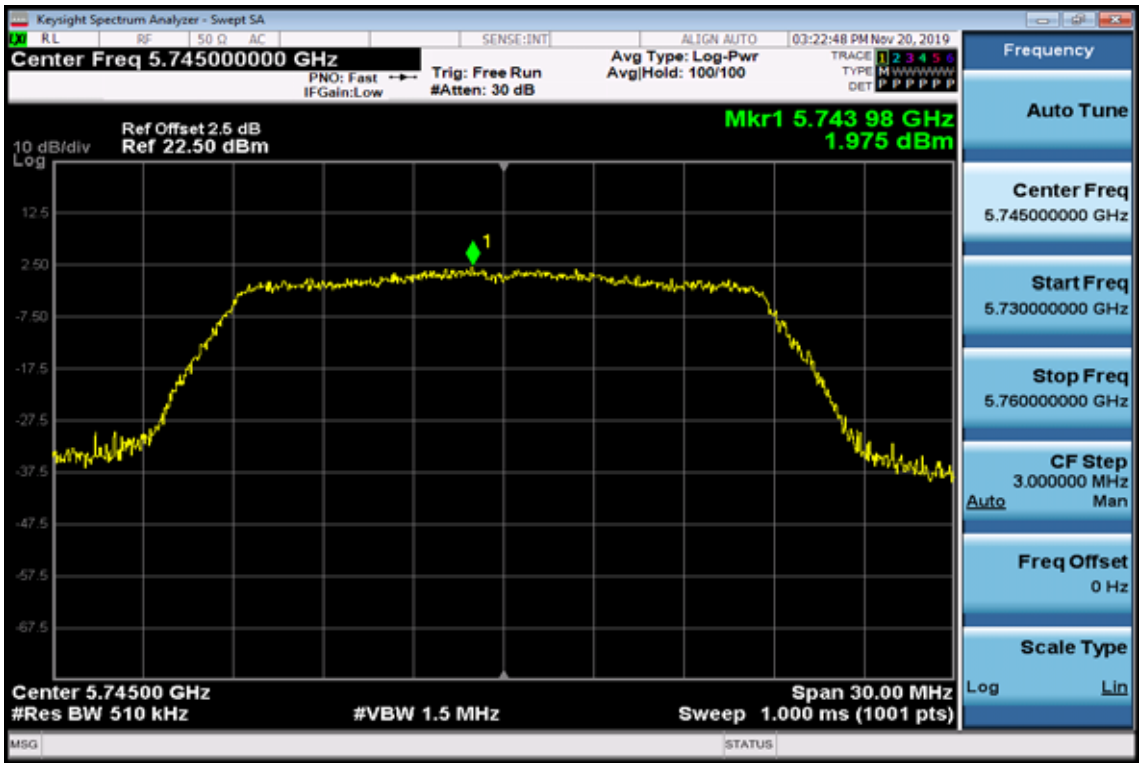


Power Spectral Density Data Plot (CH High)

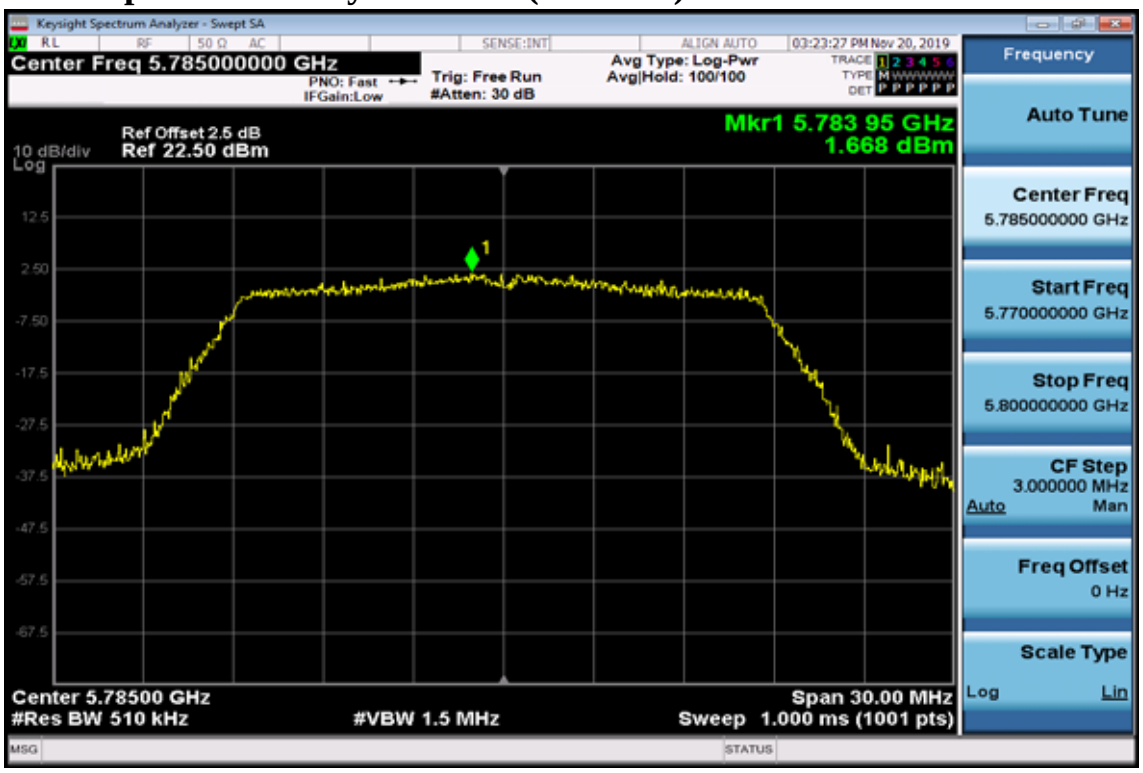


802.11n HT20

Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High)