FCC Test Report

Report No.: AGC15873230701FE08

FCC ID	:	2AAXO-ISM1090
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	WIFI ENABLED PEDESTAL KARAOKE SYSTEM
BRAND NAME	:	Singing Machine
MODEL NAME	:	iSM1090, iSM1095, iSM1090XX, iSM1095XX (XX means unit color, it can be A to Z or N/A)
APPLICANT	:	The Singing Machine Company, Inc.
DATE OF ISSUE	:	Aug. 01, 2023
STANDARD(S)	:	FCC Part 15 Subpart E §15.407
REPORT VERSION	:	V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Aug. 01, 2023	Valid	Initial Release

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1. VERIFICATION OF CONFORMITY

Applicant	The Singing Machine Company, Inc.
Address	6301 NW 5th Way, Suite 2900, Fort Lauderdale, FL, 33309, U.S.A.
Manufacturer	The Singing Machine Company, Inc.
Address	6301 NW 5th Way, Suite 2900, Fort Lauderdale, FL, 33309, U.S.A.
Factory	ZHUHAI FULLWING ELECTRONIC CO., LTD ZHONGSHAN BRANCH
Address	4/F & 5/F, No 10, Xingye Road, Xinxu, San Xiang, Zhongshan, Guangdong, China
Product Designation	WIFI ENABLED PEDESTAL KARAOKE SYSTEM
Brand Name	Singing Machine
Test Model	iSM1090
Series Model	iSM1095, iSM1090XX, iSM1095XX (XX means unit color, it can be A to Z or N/A)
Declaration of Difference	All the series models are the same as the test model except for the model names and the color of appearance.
Date of receipt of test item	Jun. 24, 2023
Date of Test	Jun. 27, 2023 to Aug. 01, 2023
Deviation	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Report Template	AGCRT-US-BGN/RF

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with requirement of FCC Part 15 Rules requirement.

Prepared By	Bibo Zhang (Project Engineer)	Aug. 01, 2023
Reviewed By	Calvin Liu (Reviewer)	Aug. 01, 2023
Approved By	Max Zhang (Authorized Officer)	Aug. 01, 2023

2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

Equipment Type	☐ Outdoor access points ☐ Indoor access points ☐ Fixed P2P access points ☒ Client devices
Operation Frequency	☒ U-NII 1:5150MHz~5250MHz ☒ U-NII 2A: 5250MHz~5350MHz ☒ U-NII 2C:5470MHz~5725MHz ☒ U-NII 3: 5725MHz~5850MHz
DFS Design Type	☐ Master ☐ Slave with radar detection ☒ Slave without radar detection
TPC Function	☐ Yes ☒ No
Hardware Version	V1.0
Software Version	V1.0
Test Frequency Range:	For 802.11a/n-HT20: 5180~5240MHz, 5260~5320MHz, 5500~5720MHz, 5745~5825MHz For 802.11n-HT40: 5190~5230MHz, 5270~5310MHz, 5510~5710MHz, 5755~5795MHz
Max. RF Output Power	IEEE 802.11a(HT20):12.16dBm; IEEE 802.11n(HT20):11.91dBm; IEEE802.11n(HT40):12.19dBm
Modulation	802.11a/n:(64-QAM, 16-QAM, QPSK, BPSK) OFDM
Data Rate	802.11a: 6/9/12/18/24/36/48/54Mbps; 802.11n: up to 300Mbps;
Number of channels	6 channels of U-NII-1 Band; 6 channels of U-NII-2A Band; 18 channels of U-NII-2C Band; 7 channels of U-NII-3 Band
Antenna Designation	Copper tube antenna (Comply with requirements of the FCC part 15.203)
Antenna Gain	2.89dBi
Power Supply	DC 16.1V, 3.5A by adapter

2.2. TABLE OF CARRIER FREQUENCYS

For 5180~5240MHz:

4 channels are provided for 802.11a, 802.11n (HT20):

Channel	Frequency	Channel	Frequency
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

2 channels are provided for 802.11n (HT40):

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

For 5260~5320MHz:

4 channels are provided for 802.11a, 802.11n (HT20):

Channel	Frequency	Channel	Frequency
52	5260 MHz	60	5300 MHz
56	5280 MHz	64	5320 MHz

2 channels are provided for 802.11n (HT40):

Channel	Frequency	Channel	Frequency
54	5270 MHz	62	5310 MHz

For 5500~5720MHz:

12 channels are provided for 802.11a, 802.11n (HT20):

Channel	Frequency	Channel	Frequency
100	5500 MHz	124	5620 MHz
104	5520 MHz	128	5640 MHz
108	5540 MHz	132	5660 MHz
112	5560 MHz	136	5680 MHz
116	5580 MHz	140	5700 MHz
120	5600 MHz	144	5720 MHz

6 channels are provided for 802.11n (HT40):

Channel	Frequency	Channel	Frequency
102	5510 MHz	126	5630 MHz
110	5550 MHz	134	5670 MHz
118	5590 MHz	142	5710 MHz

For 5745~5825MHz:

5 channels are provided for 802.11a, 802.11n (HT20):

Channel	Frequency	Channel	Frequency
149	5745 MHz	161	5805 MHz
153	5765 MHz	165	5825 MHz
157	5785 MHz	--	--

2 channels are provided for 802.11n (HT40):

Channel	Frequency	Channel	Frequency
151	5755 MHz	159	5795 MHz

2.3. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2AAXO-ISM1090** filing to comply with the FCC Part 15 requirements.

2.4. TEST METHODOLOGY

No.	Identity	Document Title
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 15	Radio Frequency Devices
3	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
4	KDB 662911	662911 D01 Multiple Transmitter Output v02r01
5	KDB 789033	789033 D02 General U-NII Test Procedures New Rules v02r01

2.5. SPECIAL ACCESSORIES

Refer to section 5.2.

2.6. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

2.7. ANTENNA REQUIREMENT

Standard Requirement
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antennathat uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a brokenantenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.
EUT Antenna:
The non-detachable antenna inside the device cannot be replaced by the user at will. The gain of the antenna is 2.89dbi.

3. TEST ENVIRONMENT

3.1 ADDRESS OF THE TEST LABORATORY

Laboratory: Attestation of Global Compliance (Shenzhen) Co., Ltd.

Address: 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

3.2 TEST FACILITY

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

CNAS-Lab Code: L5488

Attestation of Global Compliance (Shenzhen) Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No.: 5054.02

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC-Registration No.: 975832

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files with Registration 975832.

IC-Registration No.: 24842 (CAB identifier: CN0063)

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Certification and Engineering Bureau of Industry Canada. The acceptance letter from the IC is maintained in our files with Registration 24842.

3.3 ENVIRONMENTAL CONDITIONS

	NORMAL CONDITIONS	EXTREME CONDITIONS
Temperature range (℃)	15 - 35	-20 - 50
Relative humidty range	20 % - 75 %	20 % - 75 %
Pressure range (kPa)	86 - 106	86 - 106
Power supply	DC 16.10V	DC 14.49V-DC 17.71V
Note: The Extreme Temperature and Extreme Voltages declared by the manufacturer.		

3.4 MEASUREMENT UNCERTAINTY

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

Item	Measurement Uncertainty
Uncertainty of Conducted Emission for AC Port	U_c = ±3.1 dB
Uncertainty of Radiated Emission below 1GHz	U_c = ±4.0 dB
Uncertainty of Radiated Emission above 1GHz	U_c = ±4.8 dB
Uncertainty of total RF power, conducted	U_c = ±0.8 dB
Uncertainty of RF power density, conducted	U_c = ±2.6 dB
Uncertainty of spurious emissions, conducted	Uc = ±2.7 %
Uncertainty of Occupied Channel Bandwidth	Uc = ±2.7 %

3.5 LIST OF EQUIPMENTS USED

TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	Aug. 04, 2022	Aug. 03, 2023
LISN	R&S	ESH2-Z5	100086	Jun. 03, 2023	Jun. 02, 2024
Test software	R&S	ES-K1(Ver.V1.71)	N/A	N/A	N/A

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	Feb. 18, 2023	Feb. 17, 2024
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Aug. 04, 2022	Aug. 03, 2023
EXA Signal Analyzer	KEYSIGHT	N9020B	MY56101792	Aug. 04, 2022	Aug. 03, 2023
Power sensor	Aglient	U2021XA	MY54110007	Mar. 03, 2023	Mar. 02, 2024
5GHz Fliter	EM Electronics	5150-5880MHz	N/A	N/A	N/A
Attenuator	ZHINAN	E-002	N/A	Aug. 04, 2022	Aug. 03, 2024
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Oct. 31, 2021	Oct. 30, 2023
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	Mar. 12, 2022	Mar. 11, 2024
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	Apr. 23, 2023	Apr. 22, 2024
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Sep. 01, 2022	Sep. 02, 2024
ANTENNA	SCHWARZBECK	VULB9168	VULB9168-494	Jan. 05, 2023	Jan. 04, 2025
Test software	FARA	EZ-EMC (Ver RA-03A)	Ver.2.5	N/A	N/A

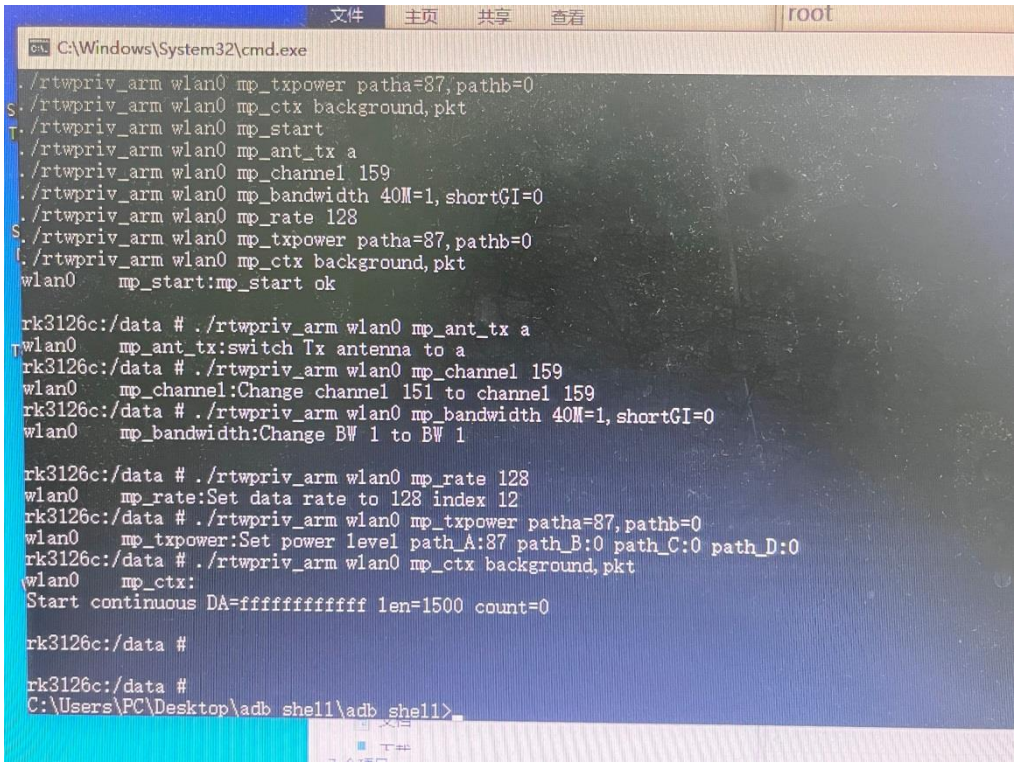
4. DESCRIPTION OF TEST MODES

Mode	Available channel	Tested channel	Modulation	Date rate (Mbps)
802.11a/n (HT20)	36,40,44,48,52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140, 144, 149, 153, 157, 161, 165	36, 40, 48, 52, 60, 64, 100, 120, 140 149, 157, 165	OFDM	6Mbps/MCS0
802.11 n (HT40)	38, 46, 54, 62, 102, 110, 118, 126, 134. 142, 151, 159	38, 46, 54, 62, 102, 118, 134, 151,159	OFDM	MCS0

Note:

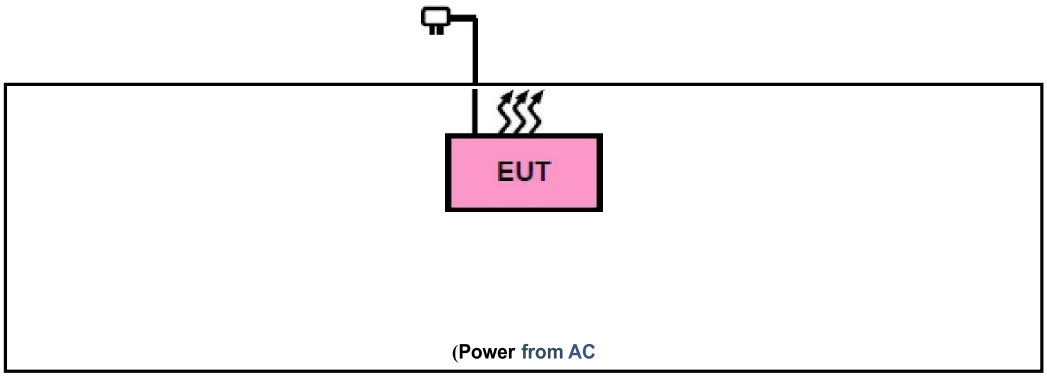
1. All modes under which configure applicable have been tested and the worst mode test data recording in the test report, if no other mode data.

Software Setting



5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	WIFI ENABLED PEDESTAL KARAOKE SYSTEM	iSM1090	2AAXO-ISM1090	EUT
2	Adapter	K65A161350U	AC:100-240V, DC:16.1V3.5A	AE

5.3. SUMMARY OF TEST RESULTS

Item	FCC Rules	Description Of Test	Result
1	§15.203	Antenna Equipment	Pass
2	§15.407(a/1/2/3)	RF Output Power	Pass
3	§15.407(e)	6dB Bandwidth Measurement	Pass
4	§2.1049	26dB bandwidth Measurement	Pass
5	§15.407(a/1/2/3)	Power Spectral Density	Pass
6	§15.407(b)(1/2/3/4)	Conducted Spurious Emission	Pass
7	§15.209,§15.407(b)(1/2/3/4)	Radiated Emission& Band Edge	Pass
8	§15.207	AC Power Line Conducted Emission	Pass

6. DUTY CYCLE MEASUREMENT

5GHz WLAN (NII) operation is possible in 20MHz, and 40MHz channel bandwidths. The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = Peak. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

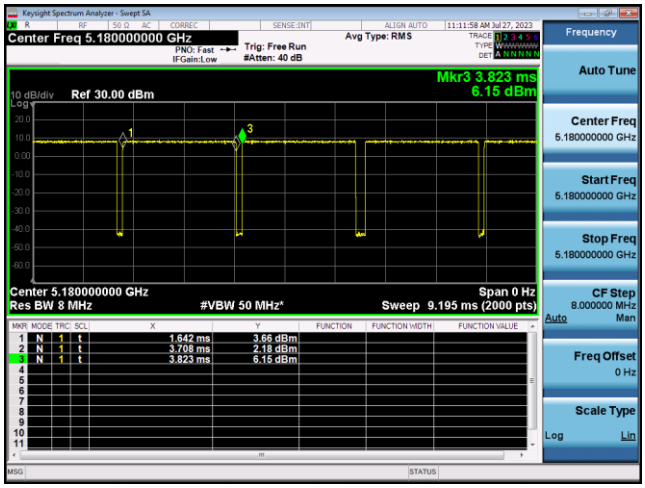
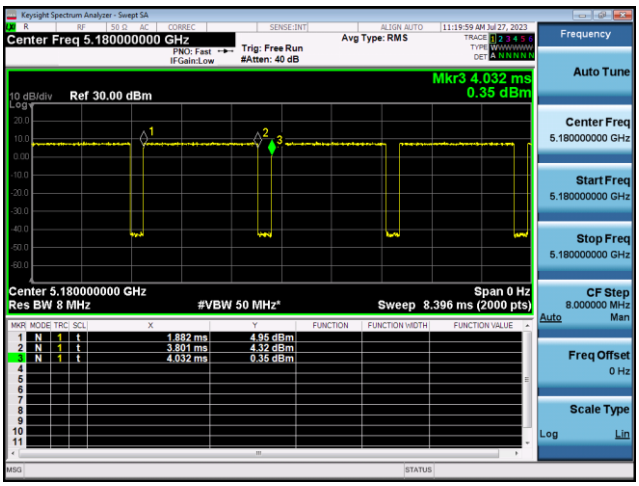
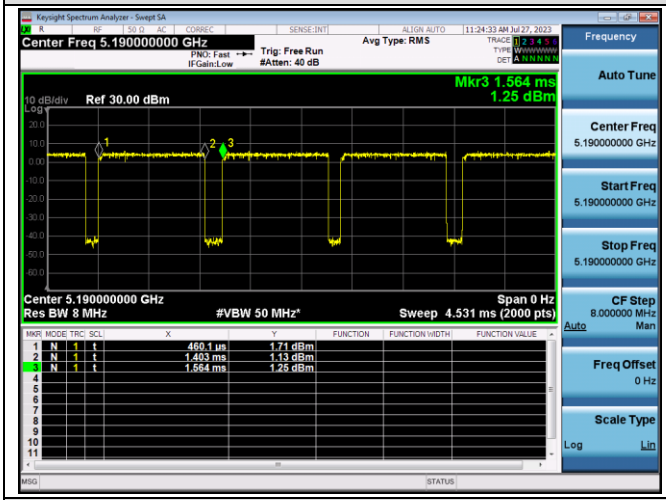
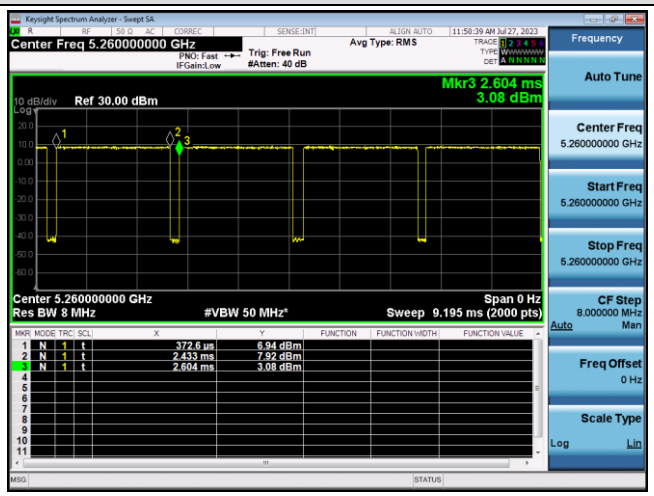
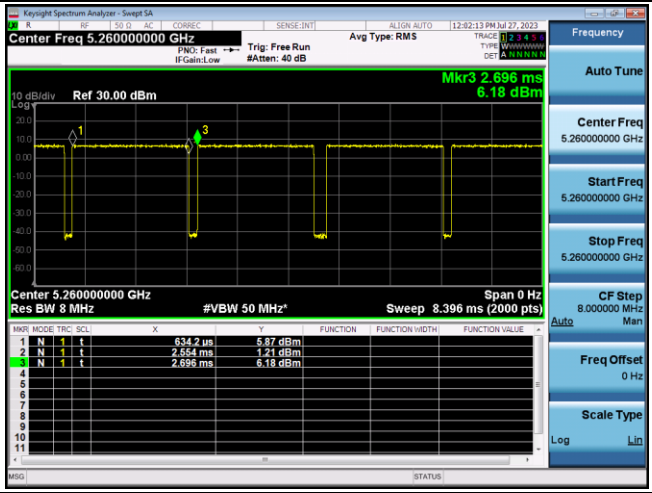
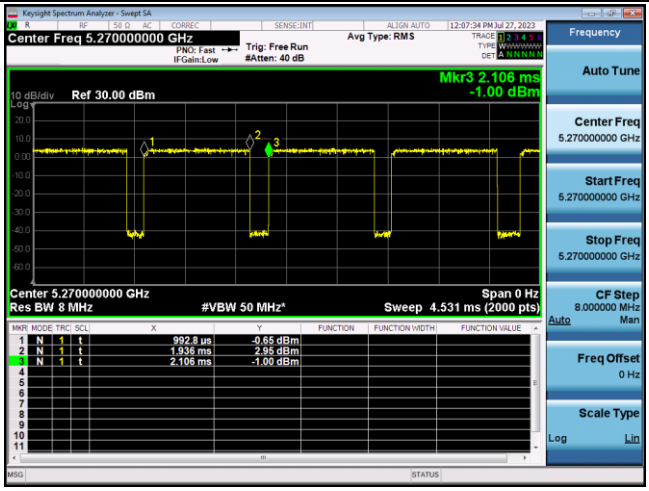
Test Data for band 5.15-5.25 GHz

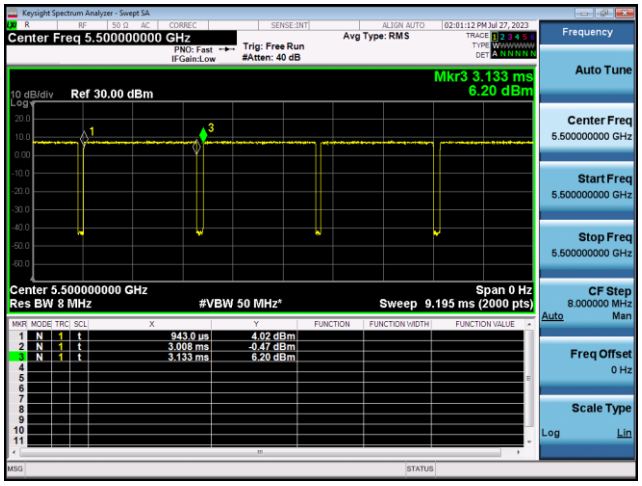
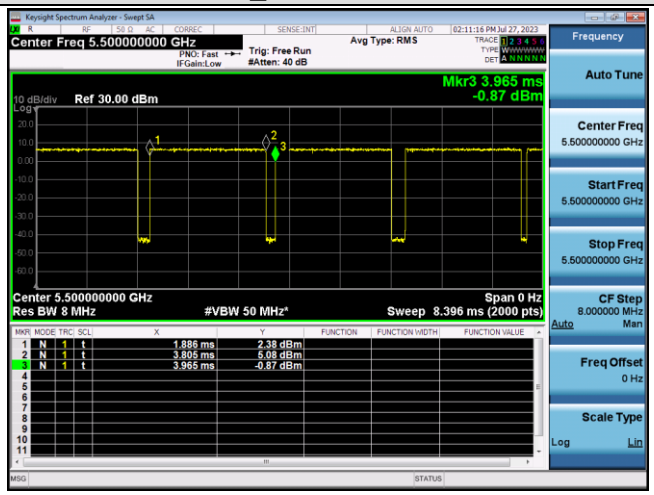
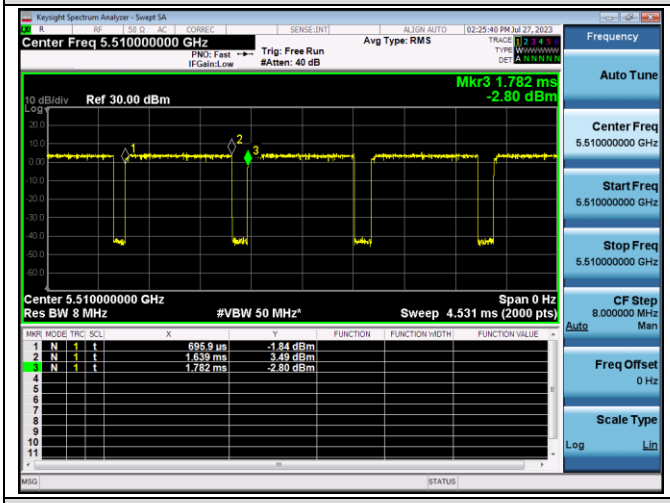
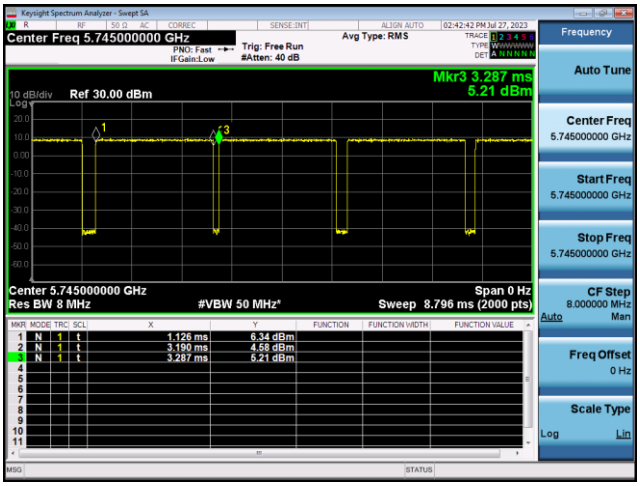
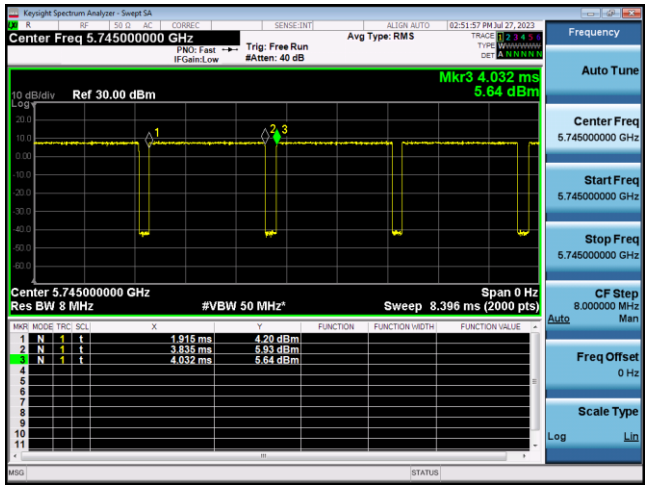
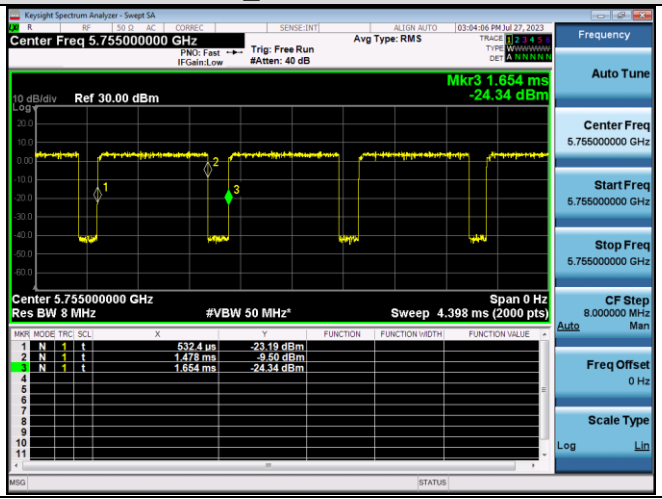
Operating mode	Data rates (Mbps)	Duty Cycle (%)	Duty Cycle Factor (dB)	1/ T Minimum VBW (kHz)	Average Factor (dB)
For band 5.150-5.250 GHz:					
IEEE 802.11a	6	95	0.22	0.48	-0.45
IEEE 802.11n-HT20	MCS0	89	0.51	0.52	-1.01
IEEE 802.11n-HT40	MCS0	85	0.71	1.06	-1.41
For band 5.150-5.350 GHz:					
IEEE 802.11a	6	92	0.36	0.49	-0.72
IEEE 802.11n-HT20	MCS0	93	0.32	0.52	-0.63
IEEE 802.11n-HT40	MCS0	85	0.71	1.06	-1.41
For band 5.470-5.725 GHz:					
IEEE 802.11a	6	94	0.27	0.48	-0.54
IEEE 802.11n-HT20	MCS0	92	0.36	0.52	-0.72
IEEE 802.11n-HT40	MCS0	87	0.60	1.06	-1.21
For band 5.725-5.850 GHz:					
IEEE 802.11a	6	96	0.18	0.48	-0.35
IEEE 802.11n-HT20	MCS0	91	0.41	0.52	-0.82
IEEE 802.11n-HT40	MCS0	84	0.76	1.06	-1.51

Remark:

1. Duty Cycle factor = 10 * log (1/ Duty cycle) 2. Average factor = 20 log10 Duty Cycle
2. The duty cycle of each frequency band mode reflects the determination requirements of the low channel measurement value.
3. The measurement results involving the above compensation parameters have been compensated by soft ware to reflect the final results.

The test plots as follows:

U-NII 1_IEEE 802.11a	U-NII 1_IEEE 802.11n-HT20
	
U-NII 1_IEEE 802.11n-HT40	**U-NII 2A_IEEE 802.11a**
	
U-NII 2A_IEEE 802.11n-HT20	**U-NII 2A_IEEE 802.11n-HT40**
	

U-NII 2C_IEEE 802.11a	U-NII 2C_IEEE 802.11n-HT20
	
U-NII 2C_IEEE 802.11n-HT40	**U-NII 3_IEEE 802.11a**
	
U-NII 3_IEEE 802.11n-HT20	**U-NII 3_IEEE 802.11n-HT40**
	

7. RF OUTPUT POWER MEASUREMENT

7.1 MEASUREMENT LIMITS

Operation Band	EUT Category		LIMIT
U-NII-1	☐	Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p < 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
	☐	Fixed point-to-point Access Point	1 Watt (30 dBm)
	☐	Indoor Access Point	1 Watt (30 dBm)
	☒	Client devices	250mW (23.98 dBm)
U-NII-2A	/		250mW (23.98 dBm) or 11 dBm+10 log B*
U-NII-2C	/		250mW (23.98 dBm) or 11 dBm+10 log B*
U-NII-3	/		1 Watt (30 dBm)

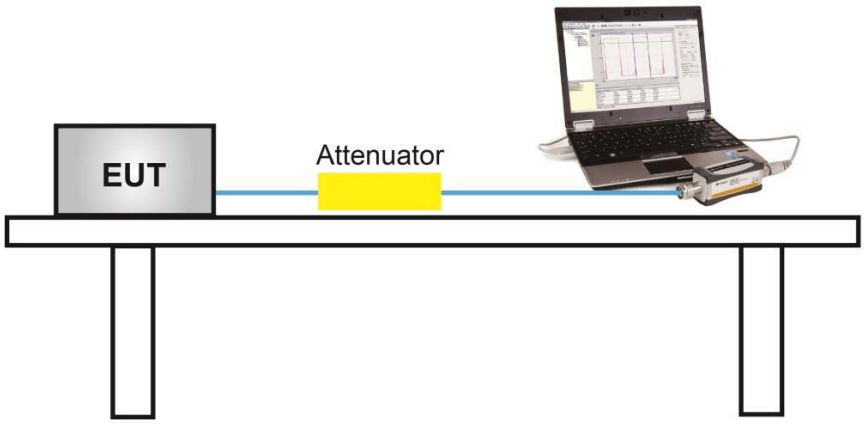
Note: Where B is the 26dB emission bandwidth in MHz.

7.2 MEASUREMENT PROCEDURE

☒Method PM is Measurement using an RF average power meter. The procedure for this method is as follows:

1. The testing follows the ANSI C63.10 Section 12.3.3.1
2. Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the following conditions are satisfied:
3. The EUT is configured to transmit continuously, or to transmit with a constant duty cycle.
4. At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
5. The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
6. Determine according to the duty cycle of the equipment: when it is less than 98%, follow the steps below.
7. Measure the average power of the transmitter. This measurement is an average over both the ON and OFF periods of the transmitter.
8. Adjust the measurement in dBm by adding [10 log (1 / D)], where D is the duty cycle {e.g., [10 log (1 / 0.25)], if the duty cycle is 25%}.
9. Record the test results in the report.

7.3 MEASUREMENT SETUP (BLOCK DIAGRAM OF CONFIGURATION)



7.4 MEASUREMENT RESULT

Test Data of Conducted Output Power for band 5.15-5.25 GHz				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5180	10.99	23.98	Pass
	5200	10.87	23.98	Pass
	5240	11.36	23.98	Pass
802.11n20	5180	10.84	23.98	Pass
	5200	10.65	23.98	Pass
	5240	11.48	23.98	Pass
802.11n40	5190	10.94	23.98	Pass
	5230	11.16	23.98	Pass

Test Data of Conducted Output Power for band 5.25-5.35 GHz				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5260	11.57	23.98	Pass
	5300	12.16	23.98	Pass
	5320	12.04	23.98	Pass
802.11n20	5260	9.76	23.98	Pass
	5300	10.37	23.98	Pass
	5320	10.79	23.98	Pass
802.11n40	5270	10.59	23.98	Pass
	5310	11.31	23.98	Pass

Test Data of Conducted Output Power for band 5.47-5.725 GHz				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5500	10.39	23.98	Pass
	5600	11.45	23.98	Pass
	5700	11.95	23.98	Pass
802.11n20	5500	10.08	23.98	Pass
	5600	10.94	23.98	Pass
	5700	11.91	23.98	Pass
802.11n40	5510	10.42	23.98	Pass
	5590	11.12	23.98	Pass
	5670	12.19	23.98	Pass

Test Data of Conducted Output Power for band 5.725-5.85 GHz				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5745	11.32	30	Pass
	5785	10.70	30	Pass
	5825	9.33	30	Pass
802.11n20	5745	11.03	30	Pass
	5785	9.49	30	Pass
	5825	8.47	30	Pass
802.11n40	5755	10.67	30	Pass
	5795	9.14	30	Pass

8. 6DB&26DB BANDWIDTH MEASUREMENT

8.1 MEASUREMENT LIMITS

The minimum 6dB bandwidth shall be at least 500 kHz.

8.2 MEASUREMENT PROCEDURE

8.2.1 -6dB bandwidth (DTS bandwidth) Test setting:

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on operation frequency individually.
3. Set RBW = 100kHz.
4. Set the VBW ≥3*RBW. Detector = Peak. Trace mode = max hold.
5. Measure the maximum width of the emission that is 6 dB down from the peak of the emission.

8.2.2 99% occupied bandwidth test setting:

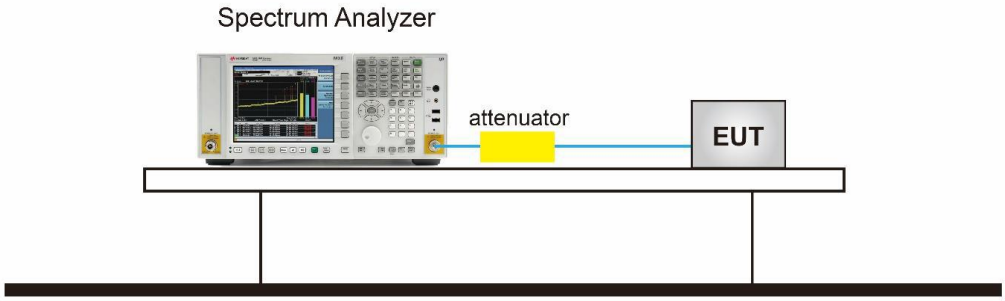
1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set Span = approximately 1.5 to 5 times the OBW, centered on a nominal channel
   The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW; Sweep = auto; Detector function = peak
4. Set SPA Trace 1 Max hold, then View.

8.2.3 -26dB Bandwidth test setting:

1. Set RBW = approximately 1% of the emission bandwidth.
2. Set the VBW > RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

Note: The EUT was tested according to KDB 789033 for compliance to FCC 47CFR 15.407 requirements.

8.3 MEASUREMENT SETUP (BLOCK DIAGRAM OF CONFIGURATION)



8.4 MEASUREMENT RESULTS

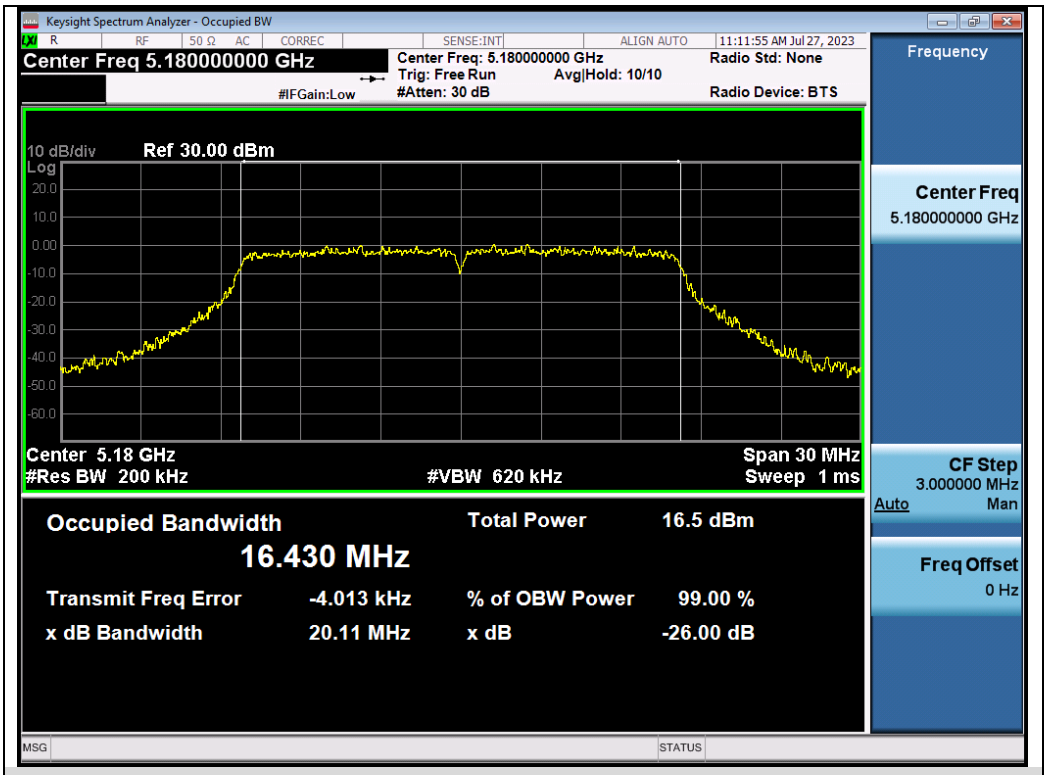
Test Data of Occupied Bandwidth and -26dB Bandwidth for band 5.15-5.25 GHz					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-26dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5180	16.430	20.105	N/A	Pass
	5200	16.447	19.884	N/A	Pass
	5240	16.418	20.141	N/A	Pass
802.11n20	5180	17.553	20.482	N/A	Pass
	5200	17.595	20.607	N/A	Pass
	5240	17.596	20.693	N/A	Pass
802.11n40	5190	35.788	38.227	N/A	Pass
	5230	35.763	38.275	N/A	Pass

Test Data of Occupied Bandwidth and -26dB Bandwidth for band 5.25-5.35 GHz					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-26dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5260	16.448	20.407	N/A	Pass
	5300	16.471	20.323	N/A	Pass
	5320	16.458	20.132	N/A	Pass
802.11n20	5260	17.602	20.484	N/A	Pass
	5300	17.561	20.725	N/A	Pass
	5320	17.576	20.884	N/A	Pass
802.11n40	5270	35.776	38.232	N/A	Pass
	5310	35.795	38.146	N/A	Pass

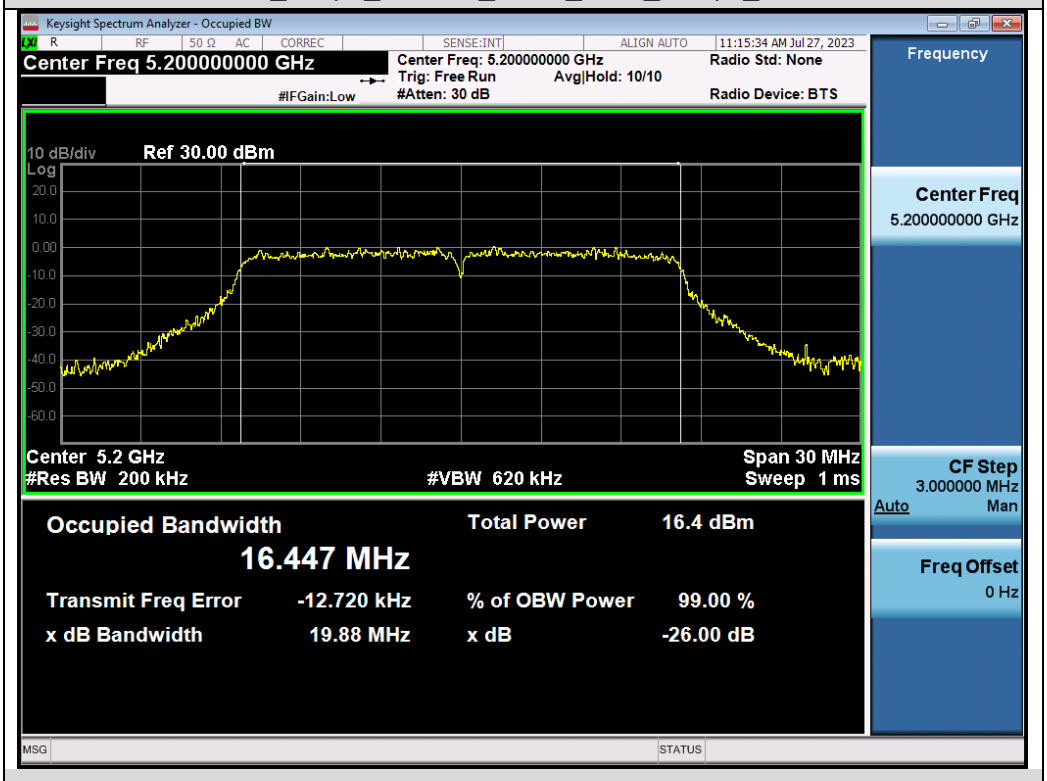
Test Data of Occupied Bandwidth and -26dB Bandwidth for band 5.47-5.725 GHz					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-26dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5500	16.450	19.975	N/A	Pass
	5600	16.470	19.974	N/A	Pass
	5700	16.476	20.843	N/A	Pass
802.11n20	5500	17.577	21.005	N/A	Pass
	5600	17.576	20.542	N/A	Pass
	5700	17.596	21.233	N/A	Pass
802.11n40	5510	35.773	38.232	N/A	Pass
	5590	35.781	38.280	N/A	Pass
	5670	35.778	38.387	N/A	Pass

Test Data of Occupied Bandwidth and DTS Bandwidth for band 5.725-5.85 GHz					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	DTS Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5745	16.443	16.331	0.5	Pass
	5785	16.463	16.067	0.5	Pass
	5825	16.425	16.063	0.5	Pass
802.11n20	5745	17.590	16.660	0.5	Pass
	5785	17.591	16.907	0.5	Pass
	5825	17.589	17.063	0.5	Pass
802.11n40	5755	35.797	35.060	0.5	Pass
	5795	35.812	35.302	0.5	Pass

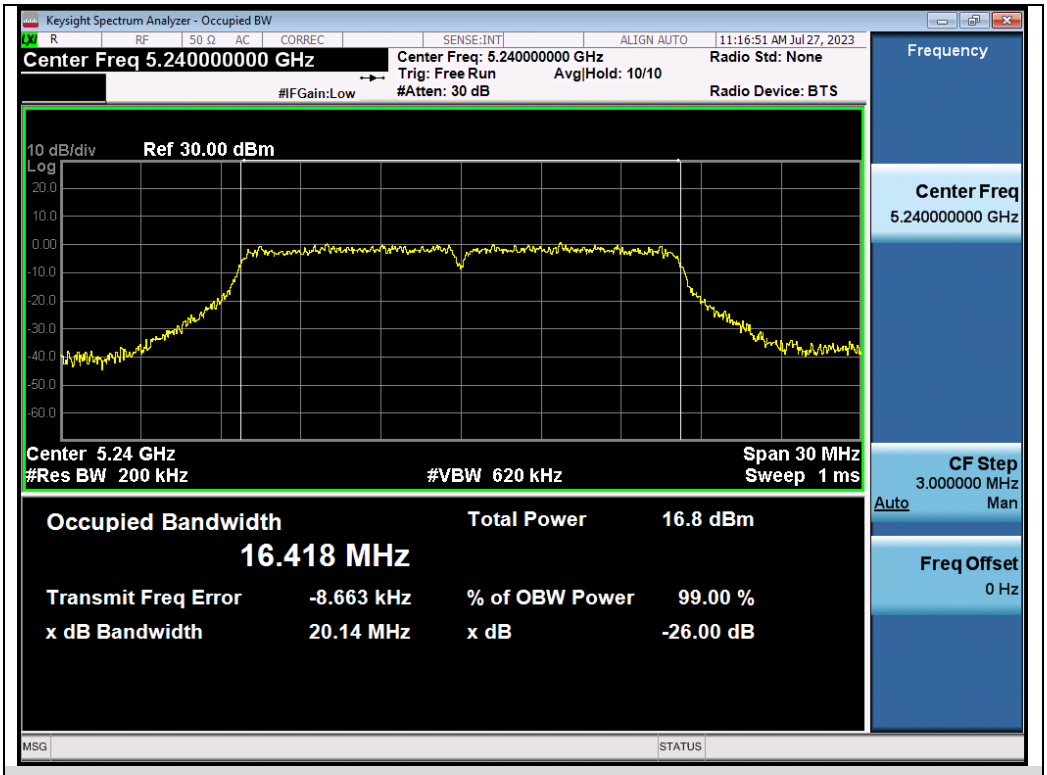
Test Graphs of Occupied Bandwidth and -26dB Bandwidth for band 5.15-5.25 GHz



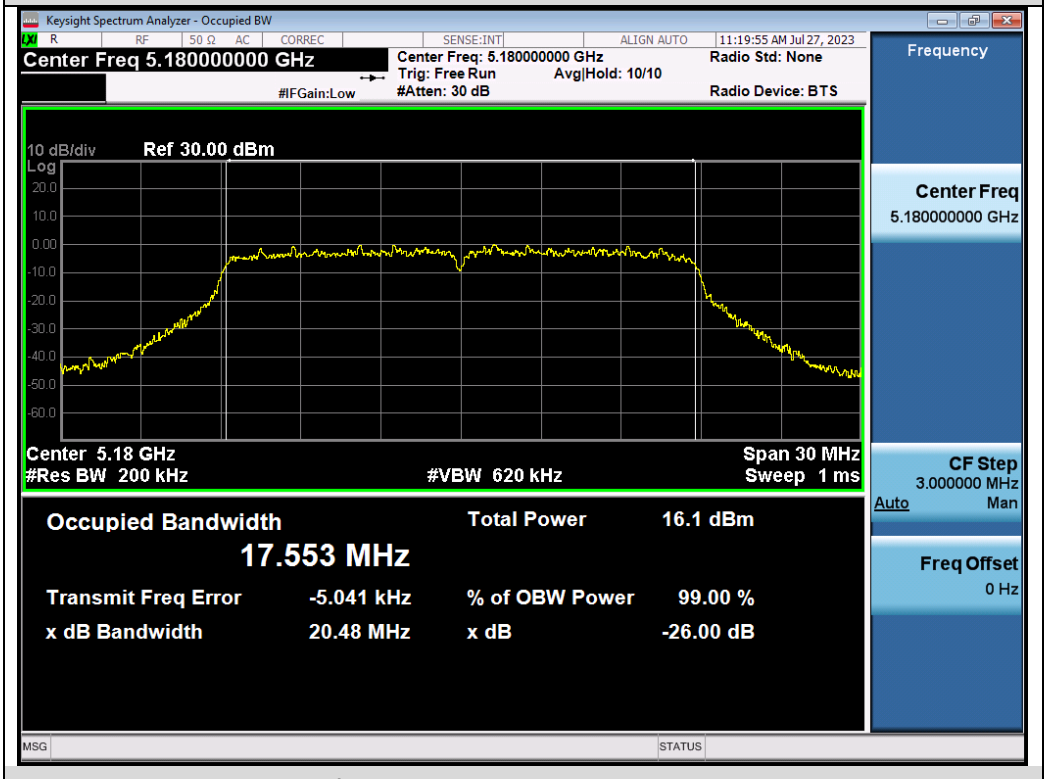
Test_Graph_802.11a_ANT1_5180_6Mbps_OBW



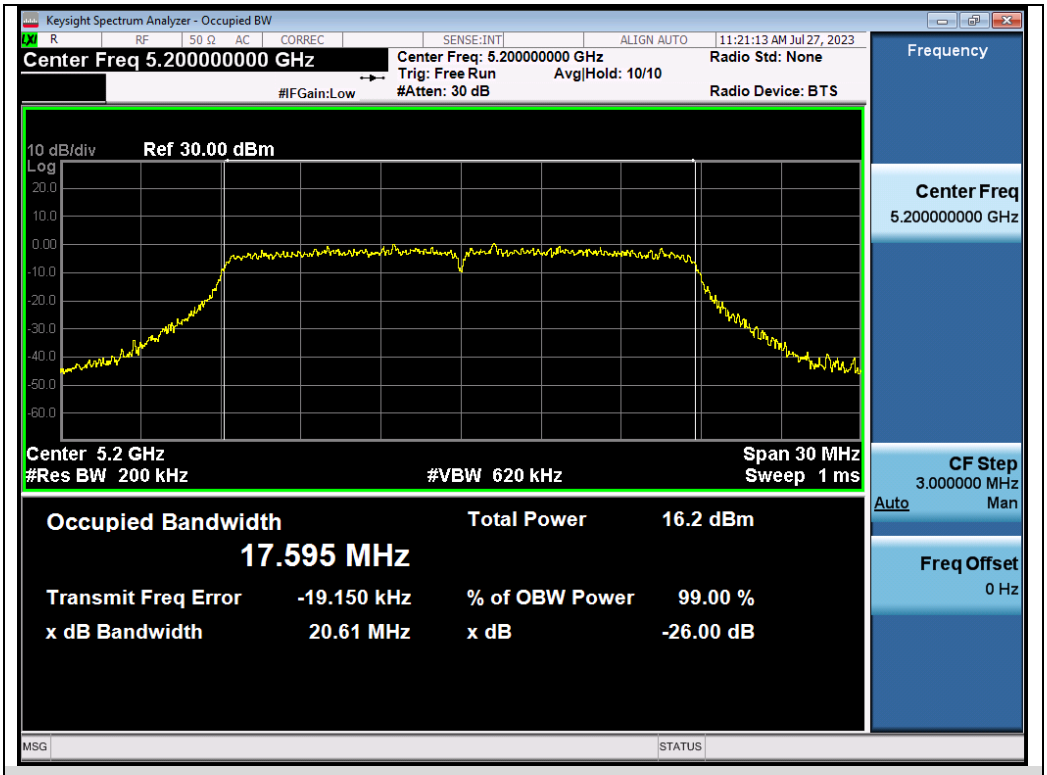
Test_Graph_802.11a_ANT1_5200_6Mbps_OBW



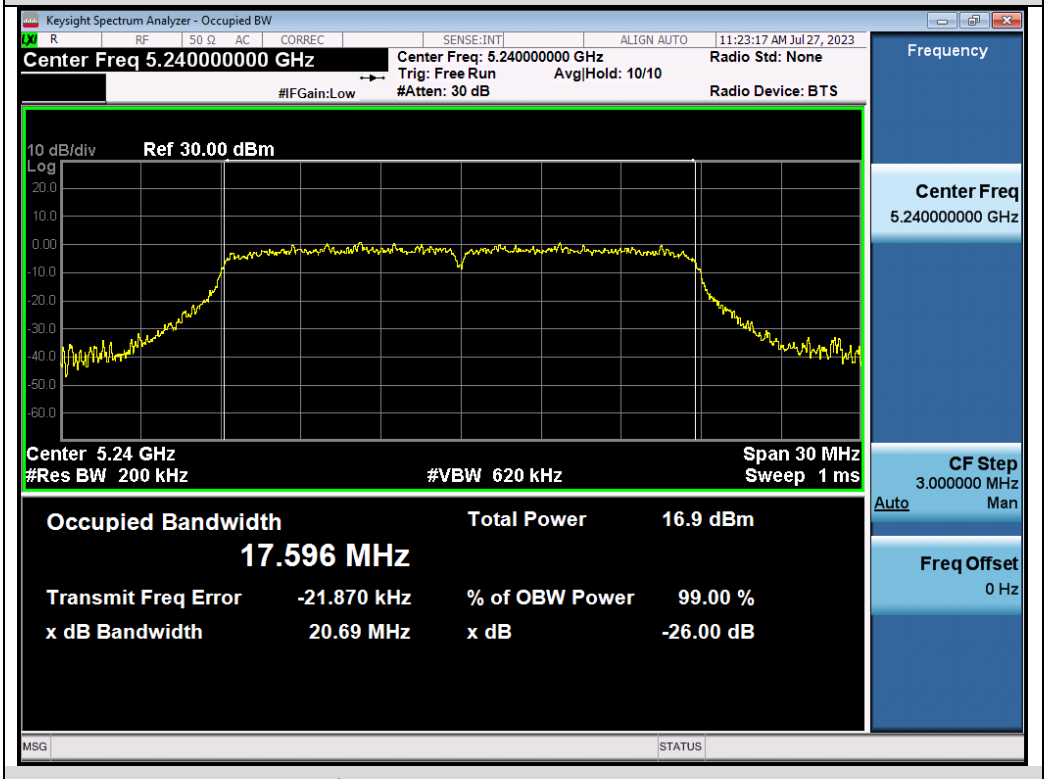
Test_Graph_802.11a_ANT1_5240_6Mbps_OBW



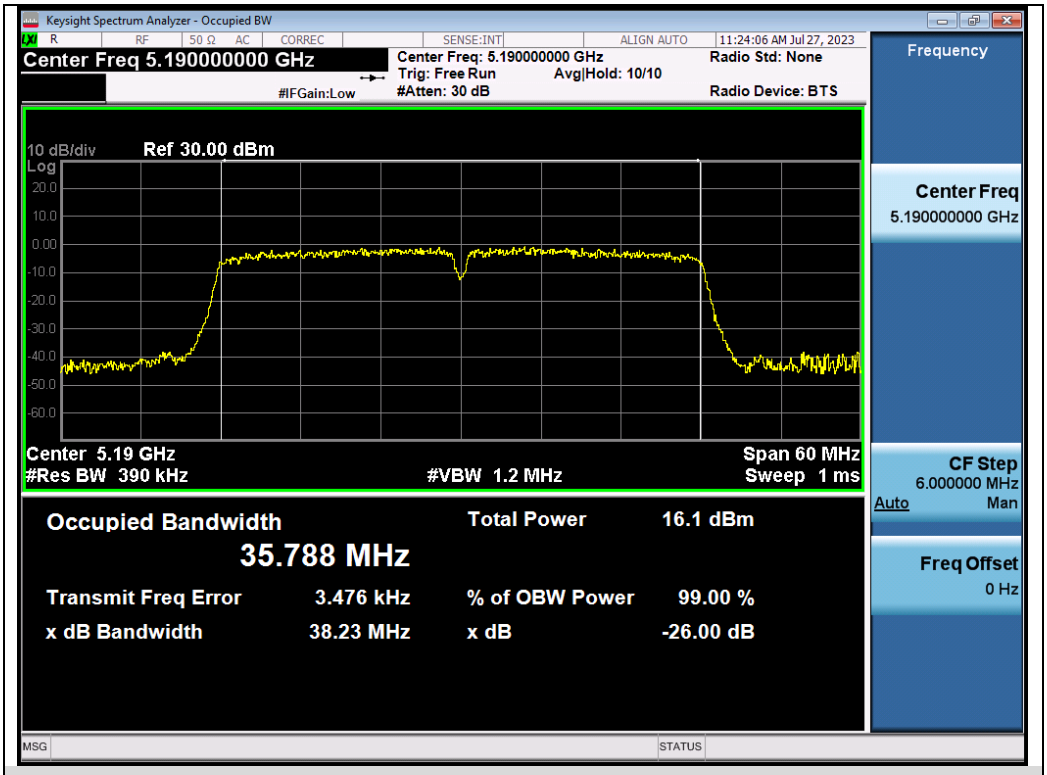
Test_Graph_802.11n20_ANT1_5180_MCS0_OBW



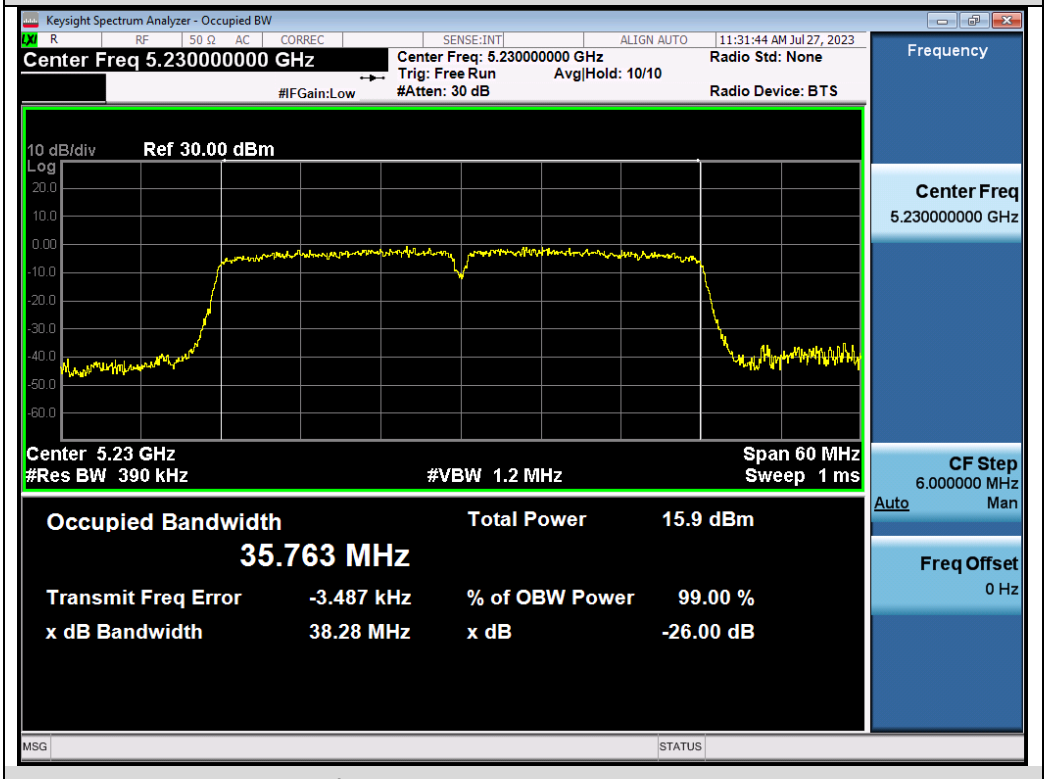
Test_Graph_802.11n20_ANT1_5200_MCS0_OBW



Test_Graph_802.11n20_ANT1_5240_MCS0_OBW

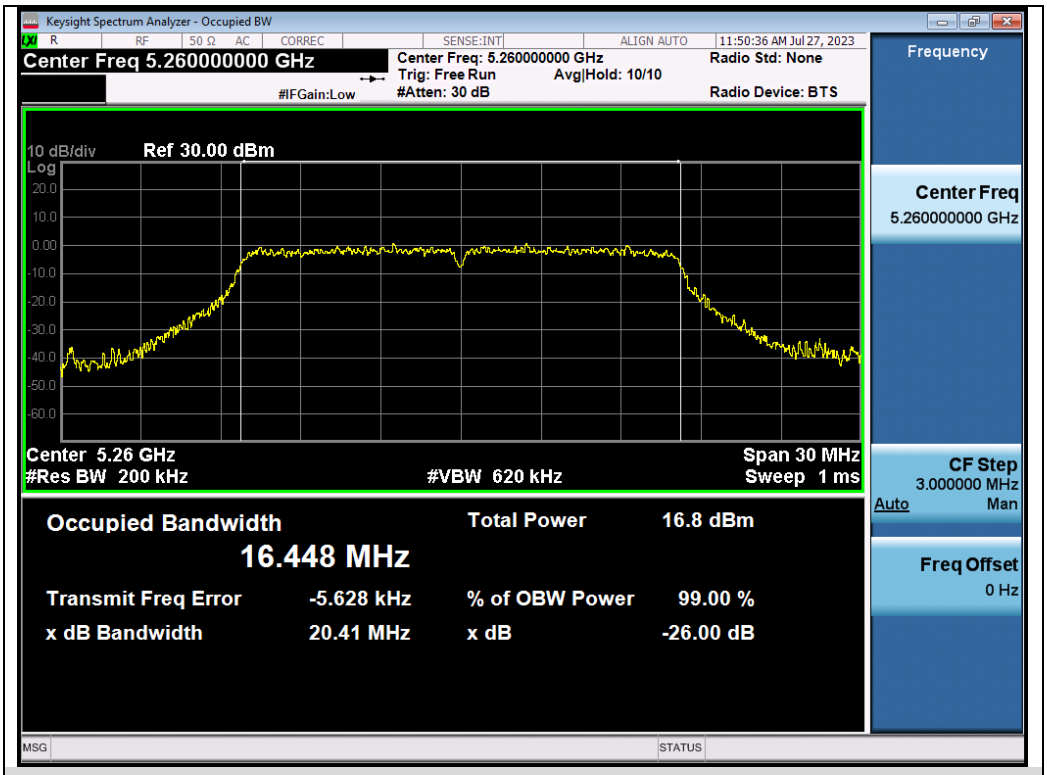


Test_Graph_802.11n40_ANT1_5190_MCS0_OBW

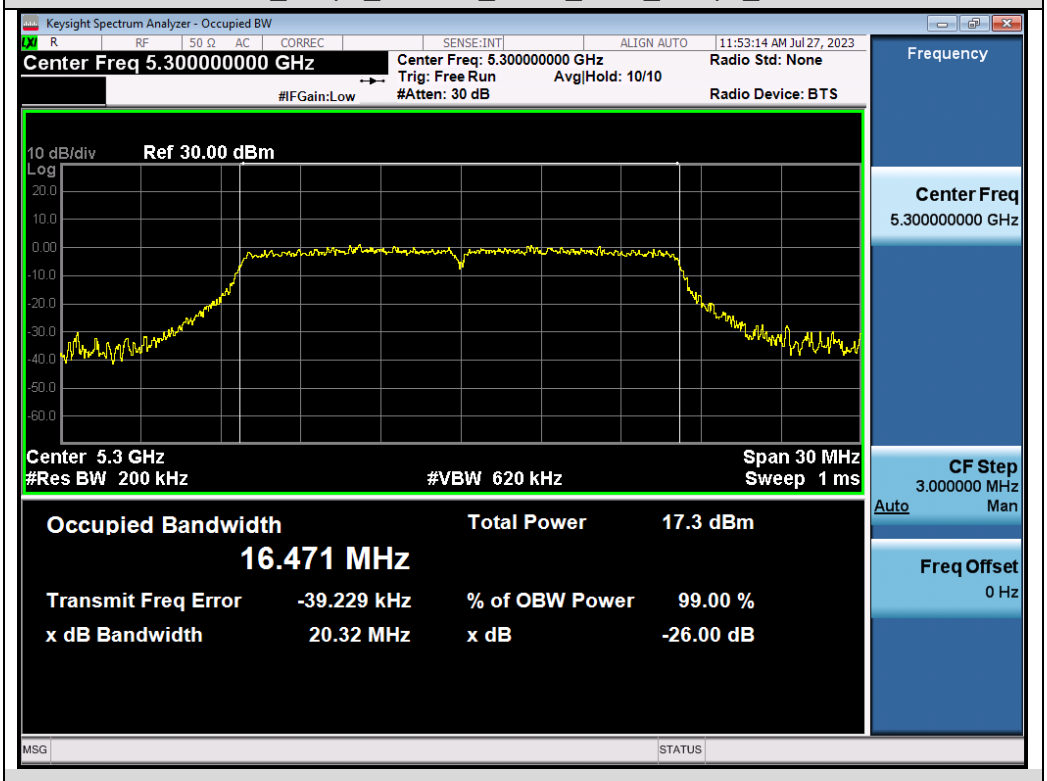


Test_Graph_802.11n40_ANT1_5230_MCS0_OBW

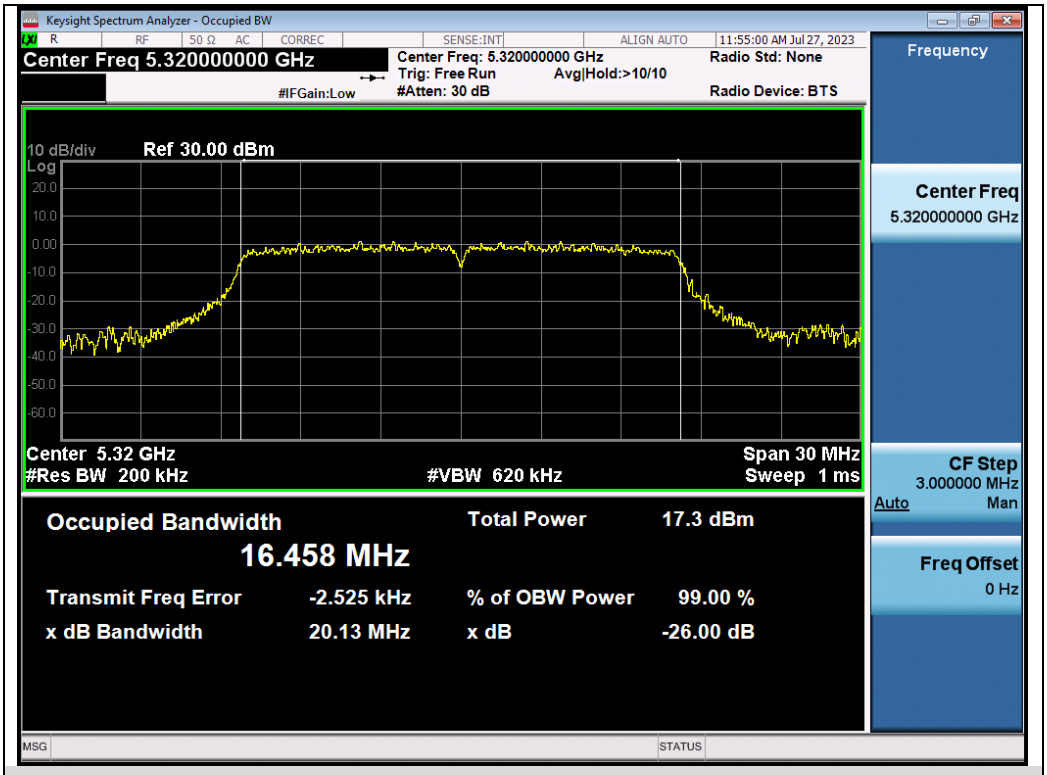
Test Graphs of Occupied Bandwidth and -26dB Bandwidth for band 5.25-5.35 GHz



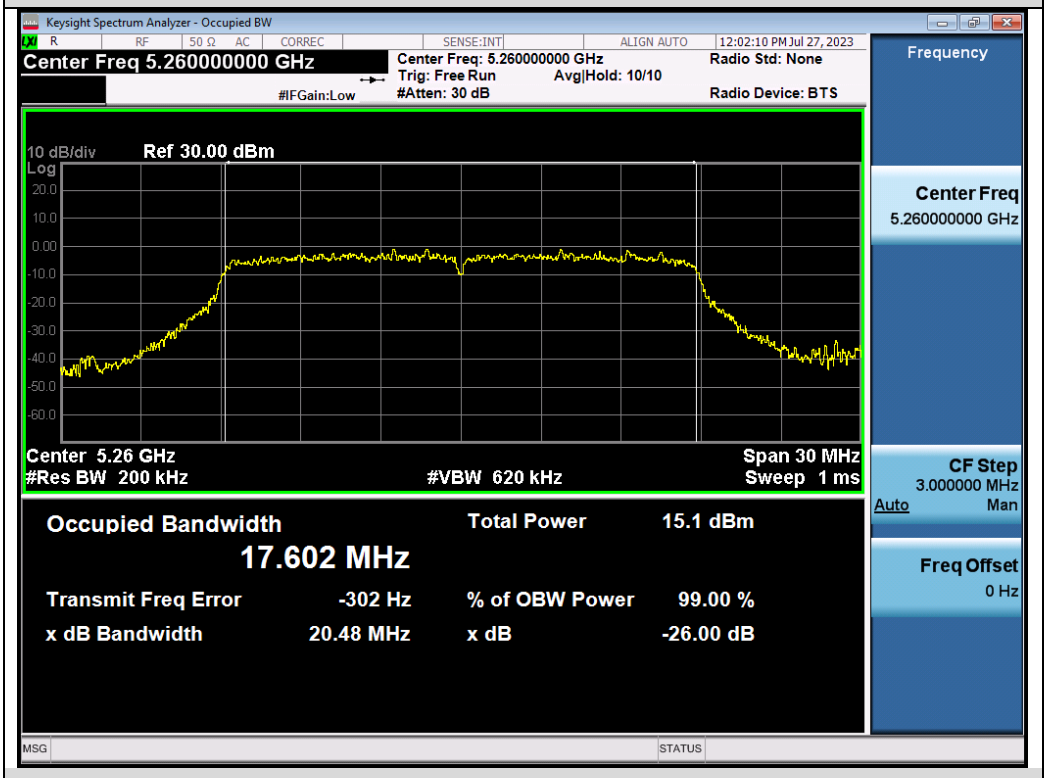
Test_Graph_802.11a_ANT1_5260_6Mbps_OBW



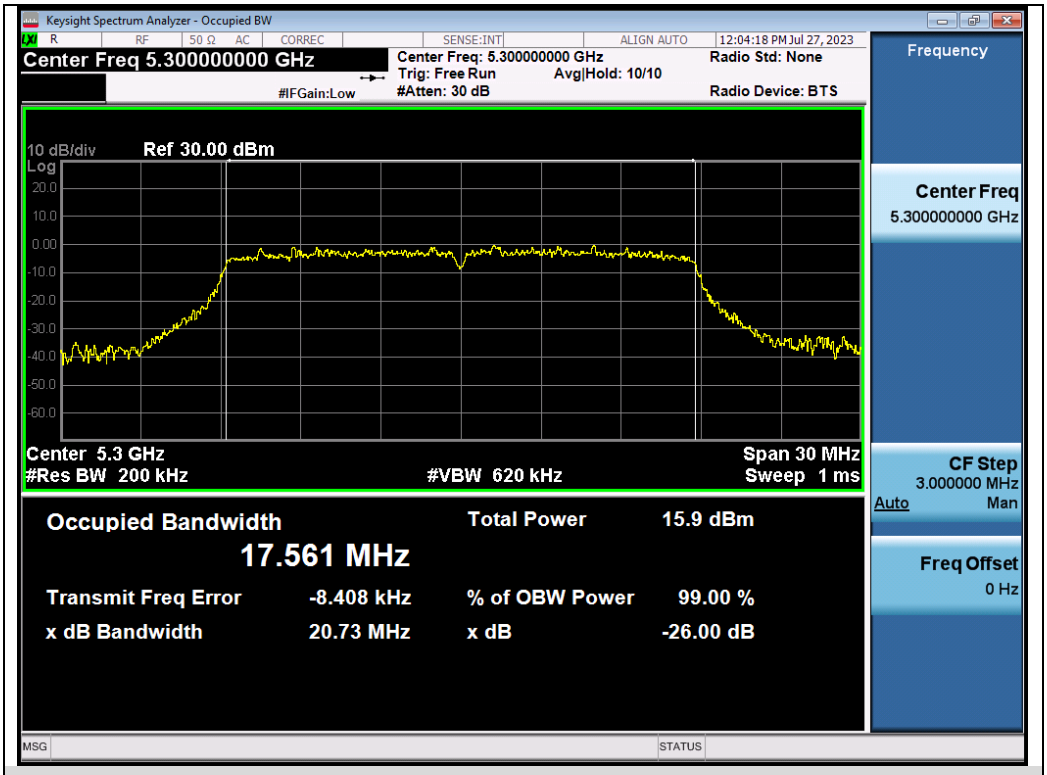
Test_Graph_802.11a_ANT1_5300_6Mbps_OBW



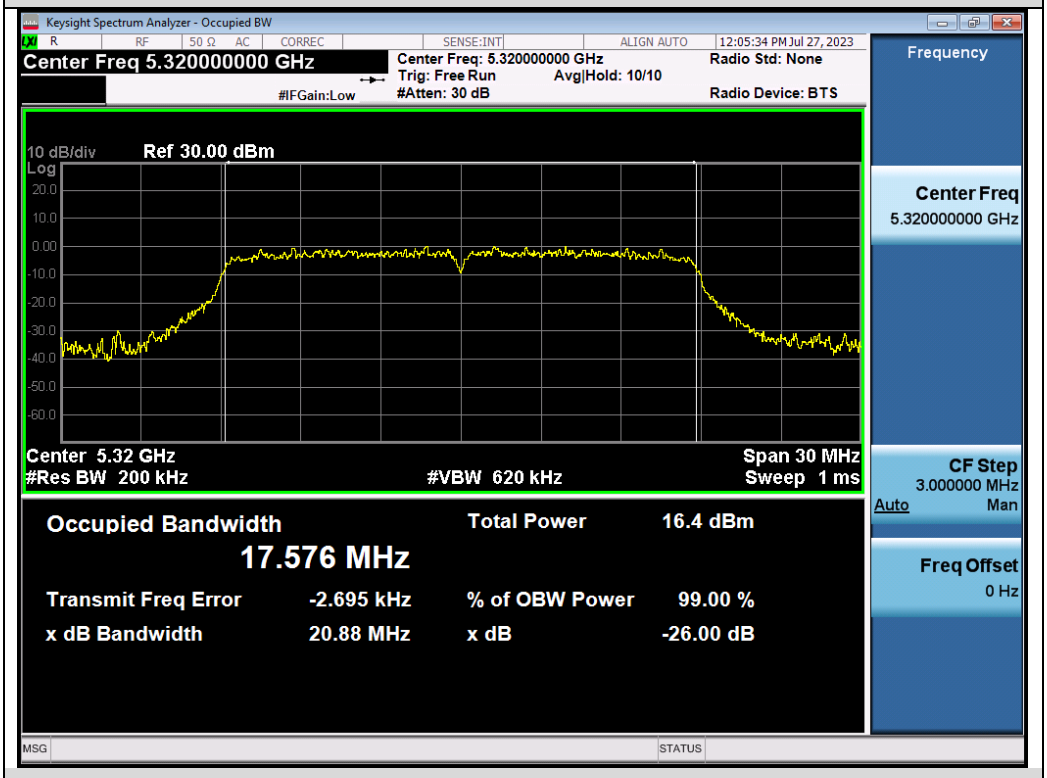
Test_Graph_802.11a_ANT1_5320_6Mbps_OBW



Test_Graph_802.11n20_ANT1_5260_MCS0_OBW



Test_Graph_802.11n20_ANT1_5300_MCS0_OBW



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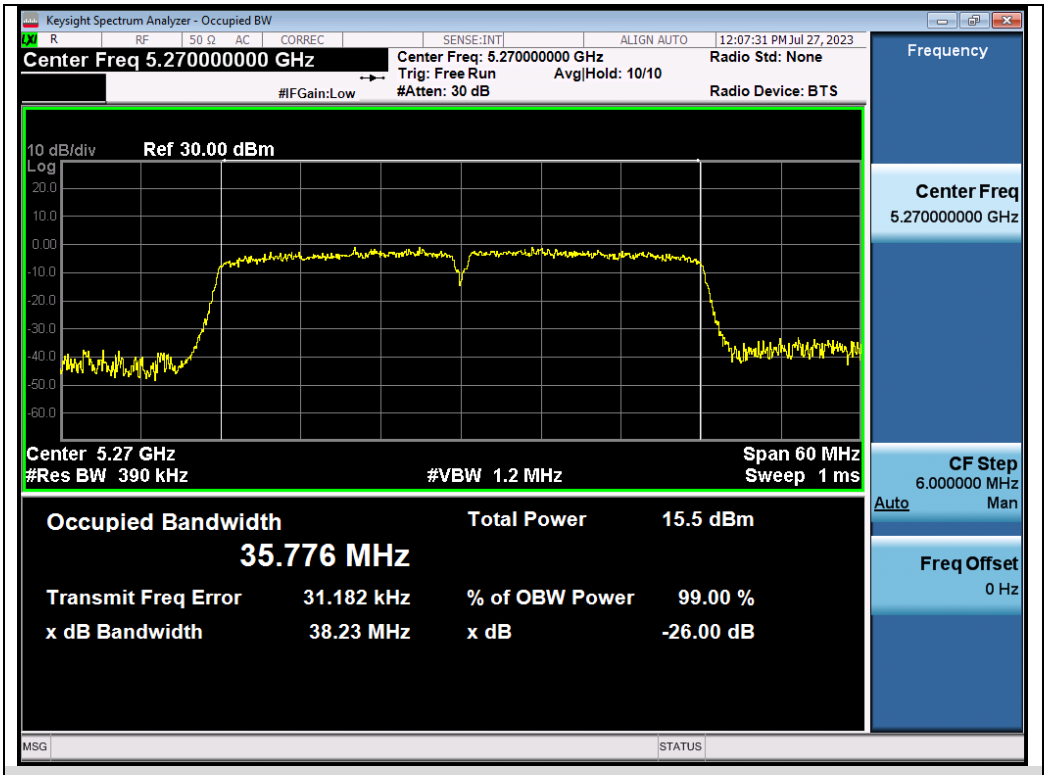
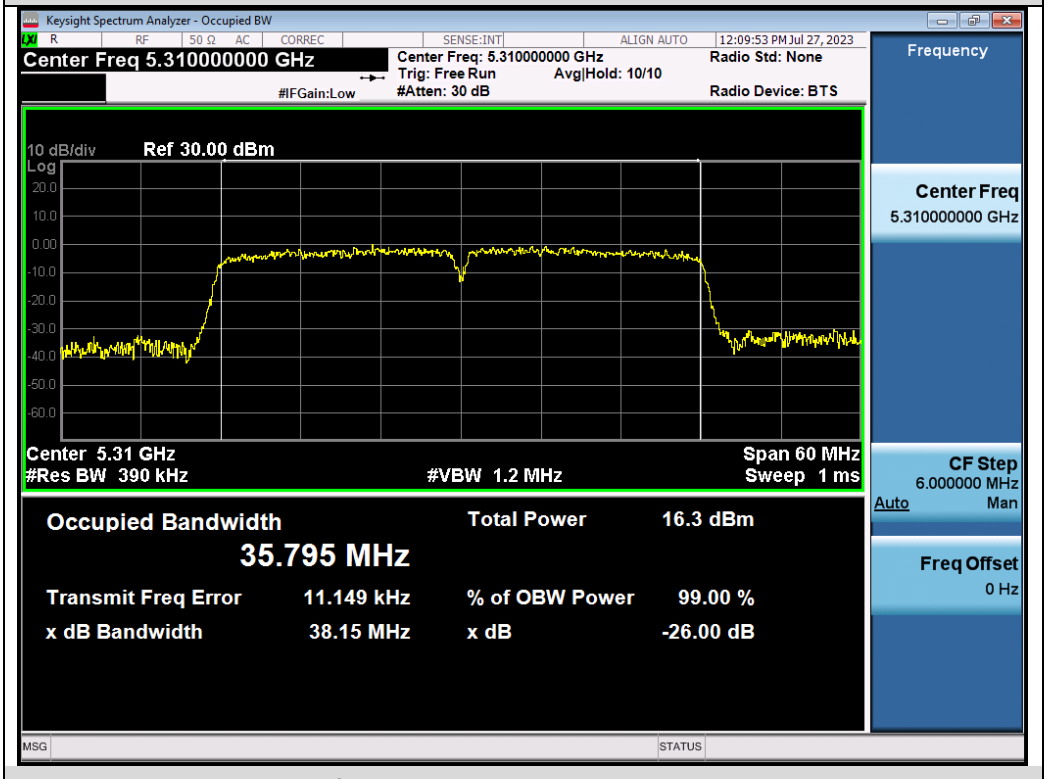
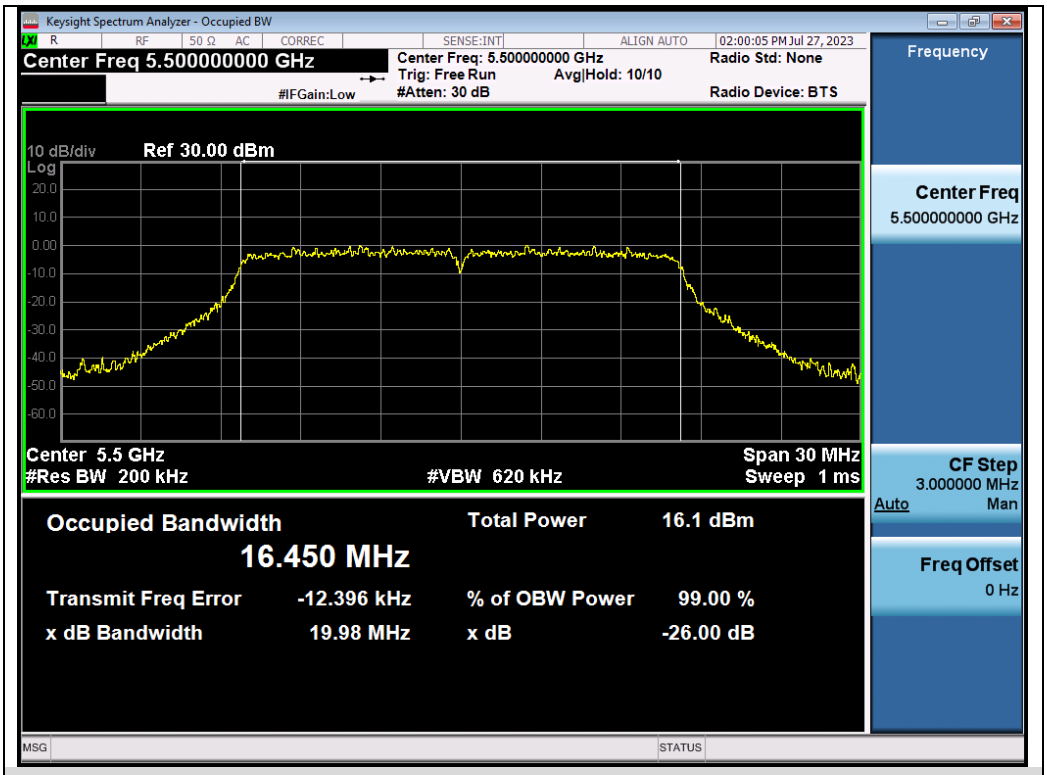


Test_Graph_802.11n40_ANT1_5270_MCS0_OBW

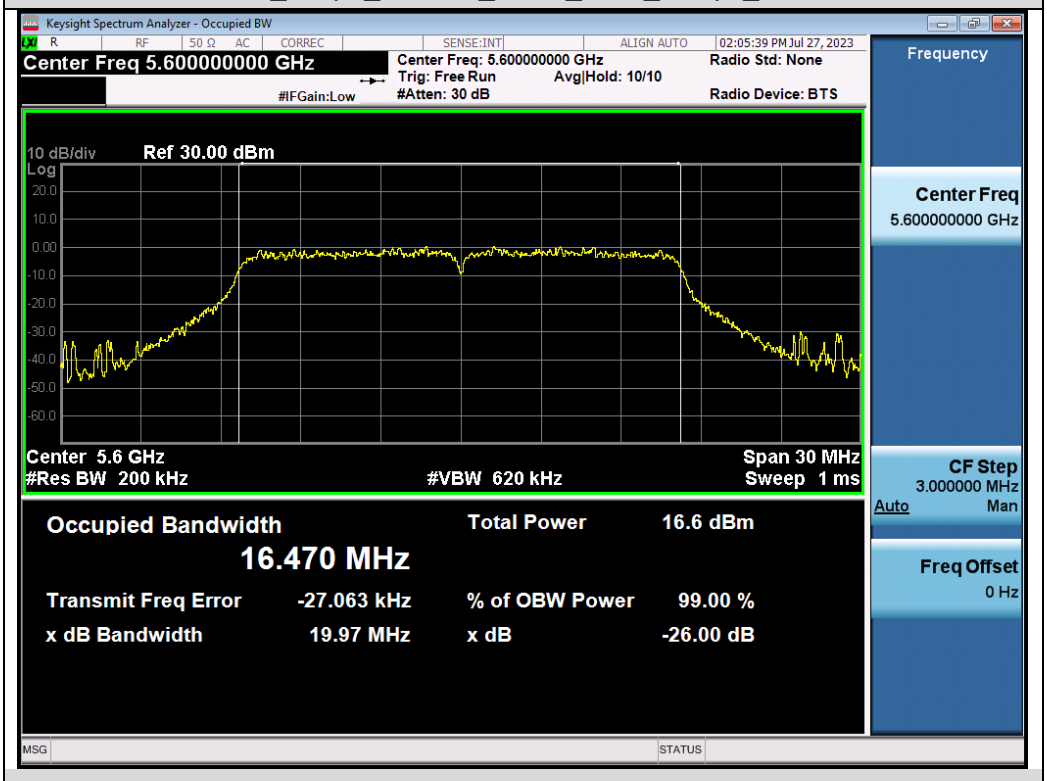


Test_Graph_802.11n40_ANT1_5310_MCS0_OBW

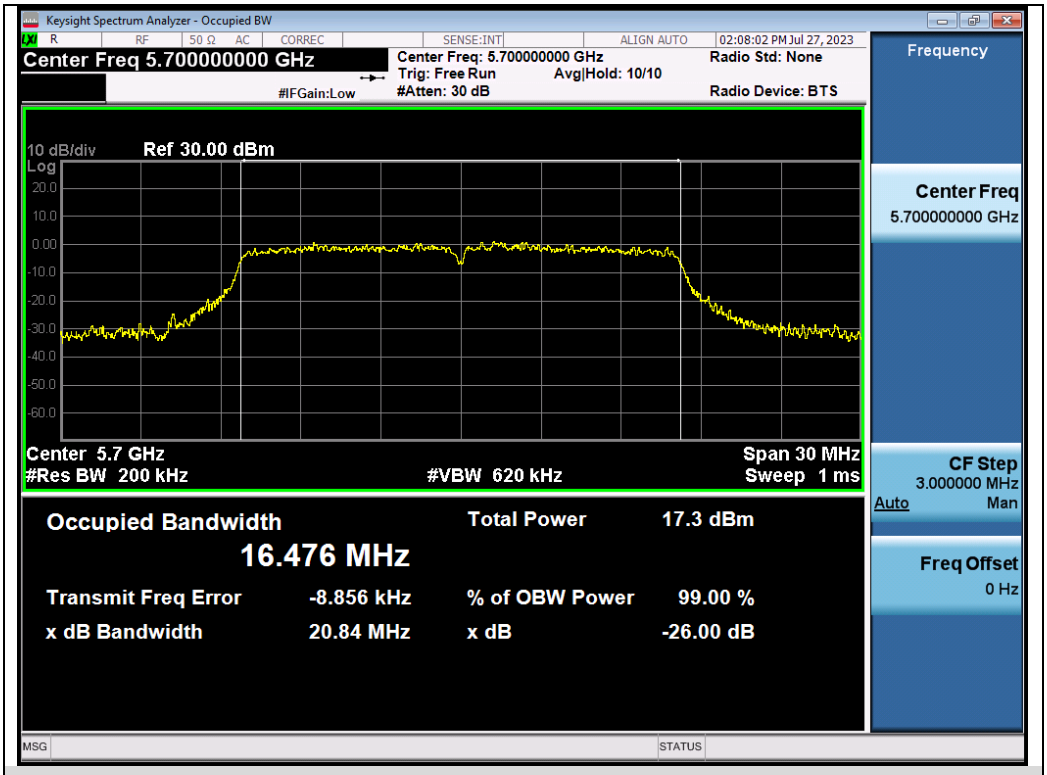
Test Graphs of Occupied Bandwidth and -26dB Bandwidth for band 5.47-5.725 GHz



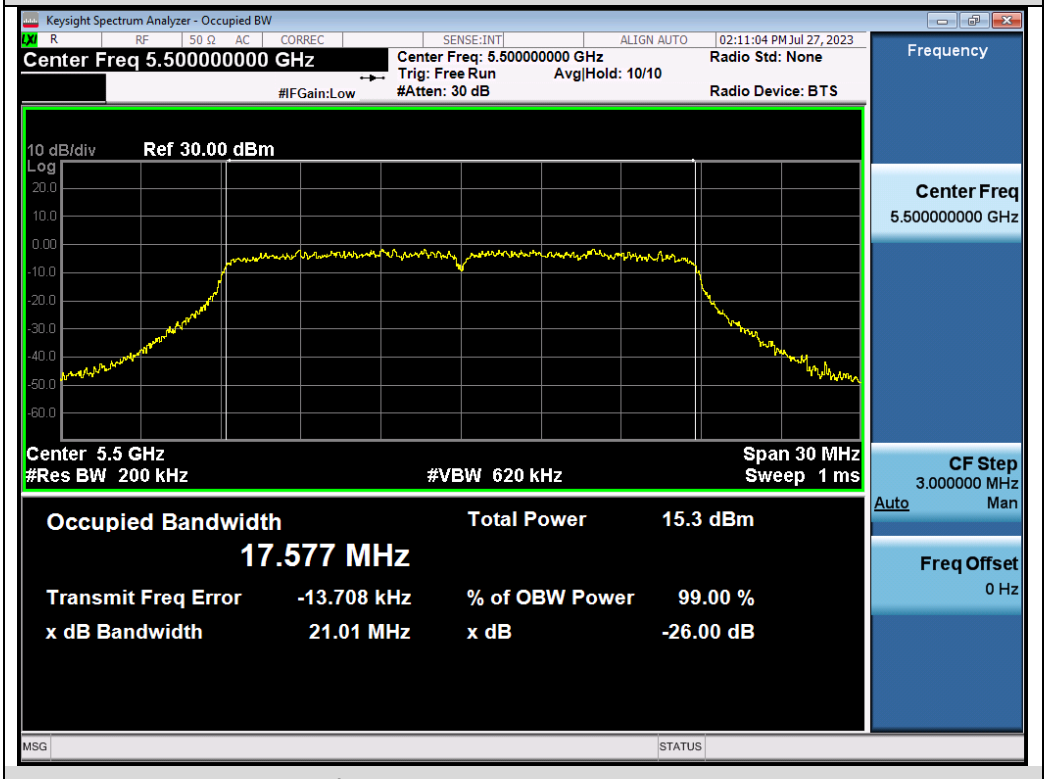
Test_Graph_802.11a_ANT1_5500_6Mbps_OBW



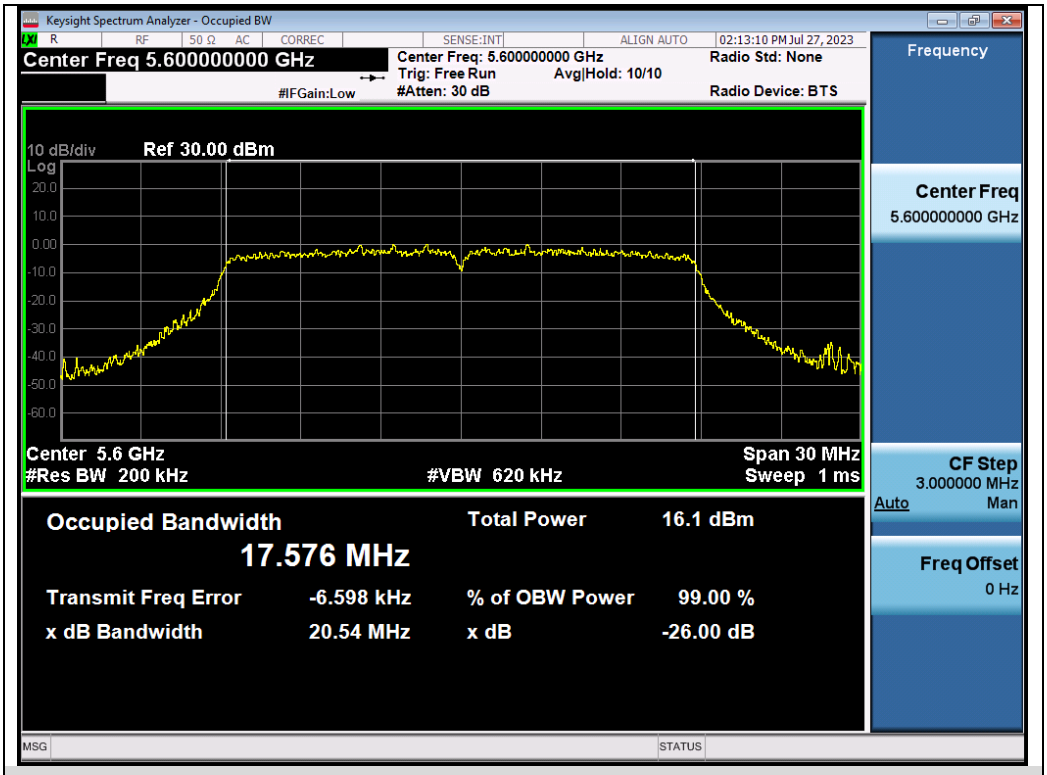
Test_Graph_802.11a_ANT1_5600_6Mbps_OBW



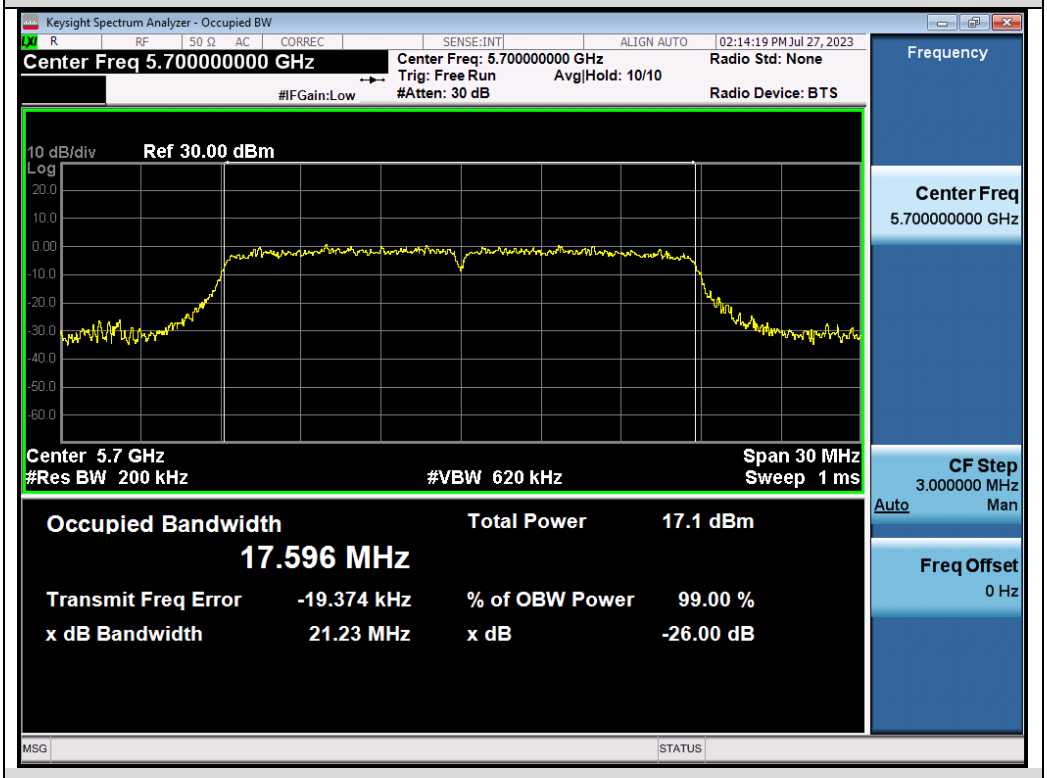
Test_Graph_802.11a_ANT1_5700_6Mbps_OBW



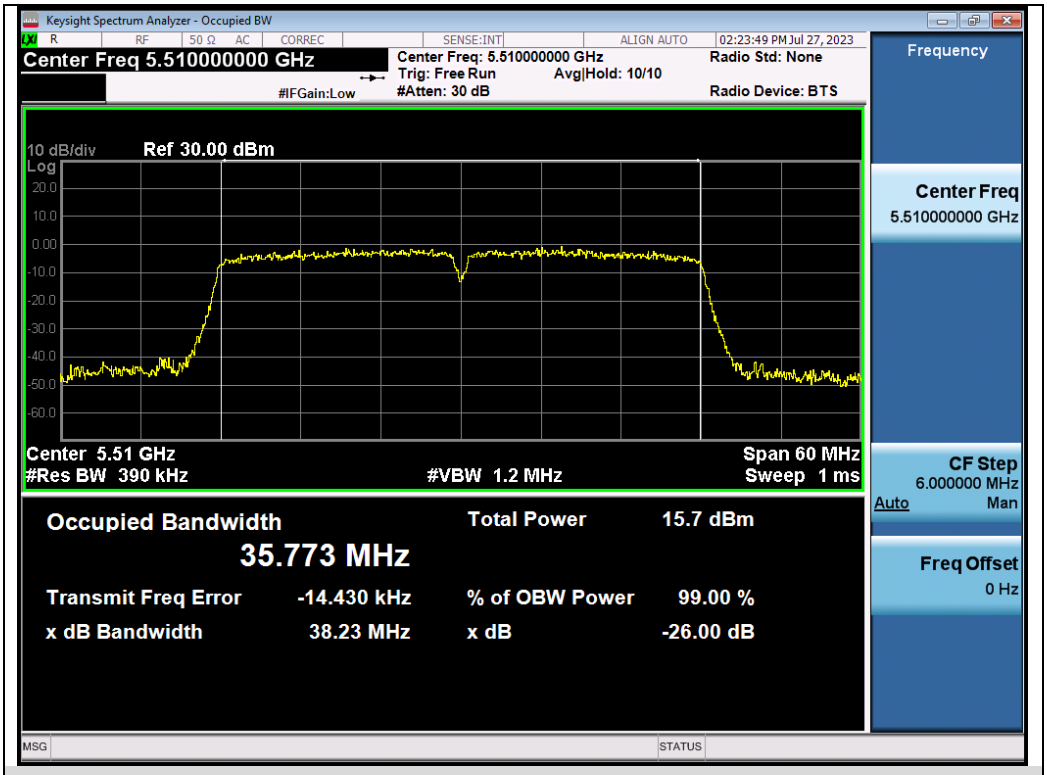
Test_Graph_802.11n20_ANT1_5500_MCS0_OBW



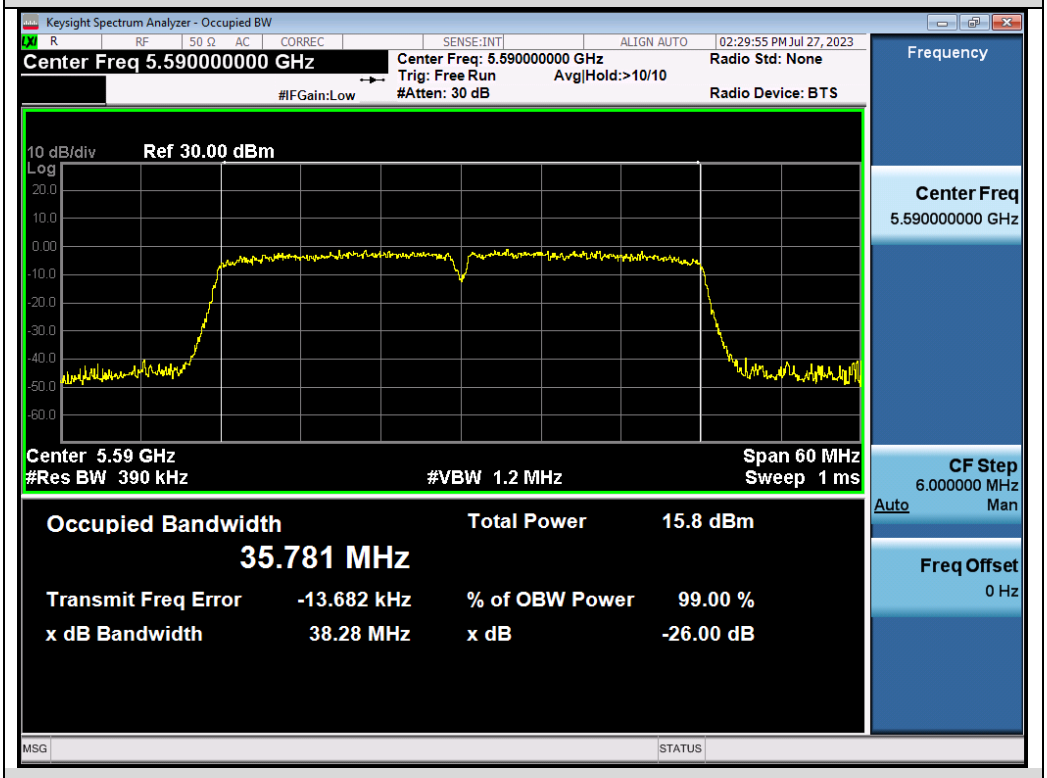
Test_Graph_802.11n20_ANT1_5600_MCS0_OBW



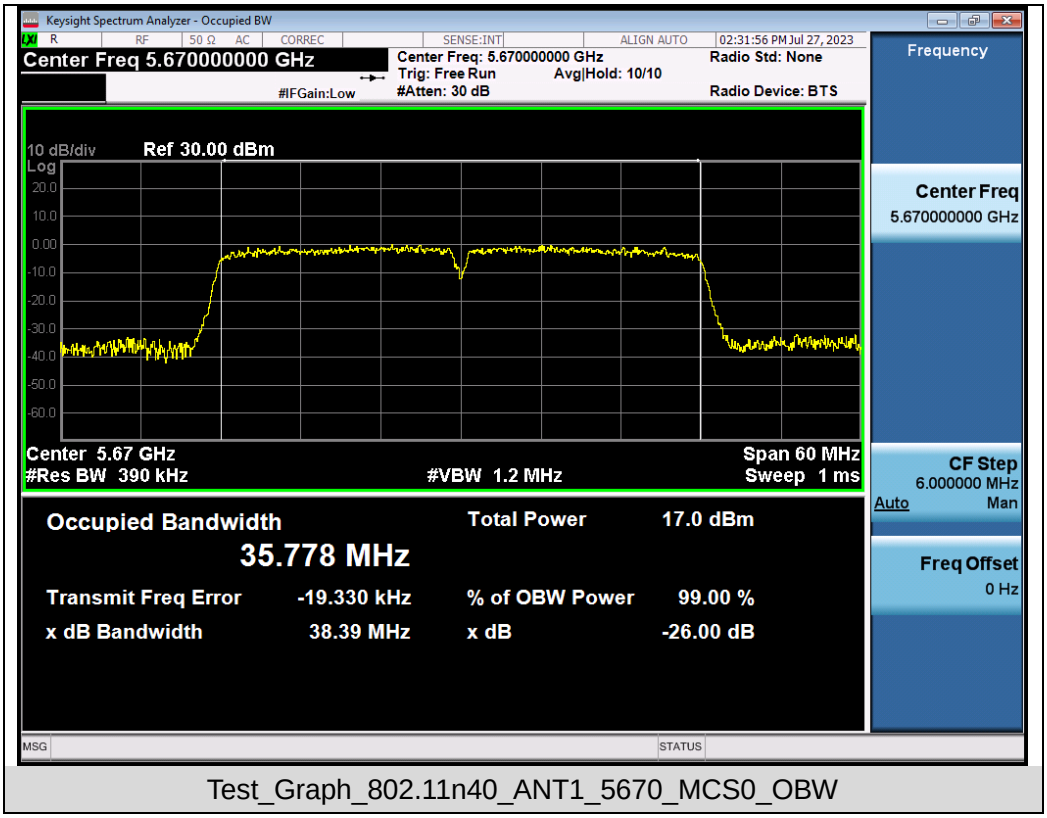
Test_Graph_802.11n20_ANT1_5700_MCS0_OBW



Test_Graph_802.11n40_ANT1_5510_MCS0_OBW

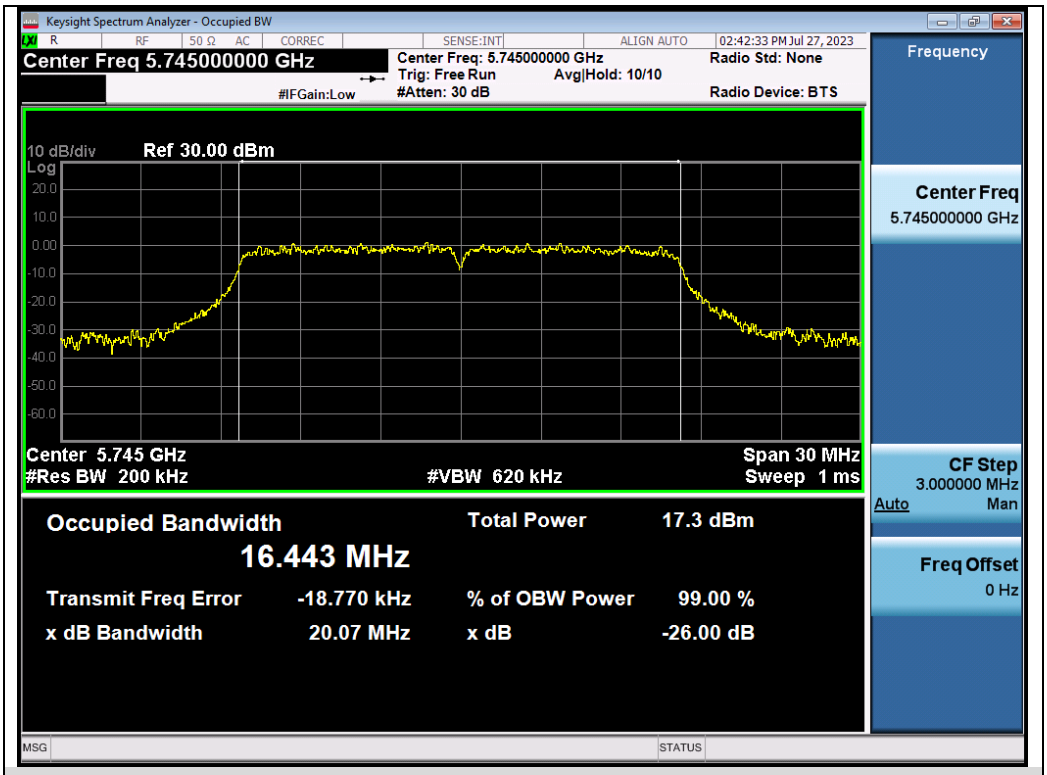


Test_Graph_802.11n40_ANT1_5590_MCS0_OBW

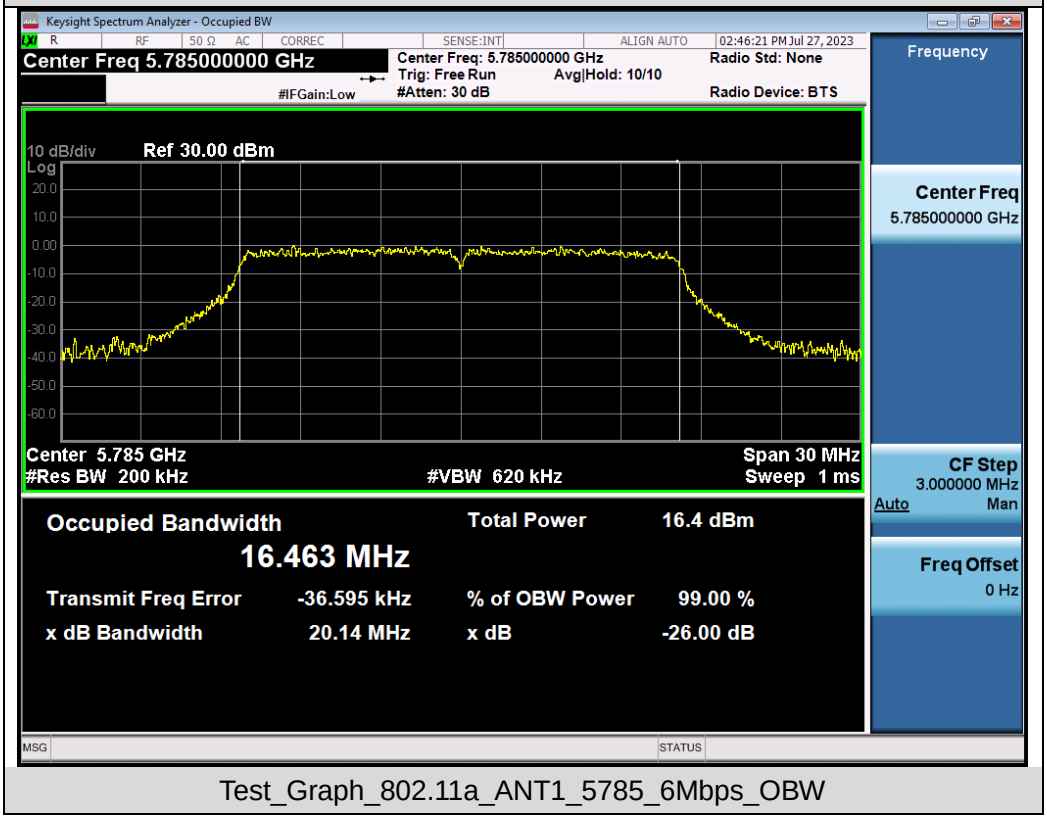


Test_Graph_802.11n40_ANT1_5670_MCS0_OBW

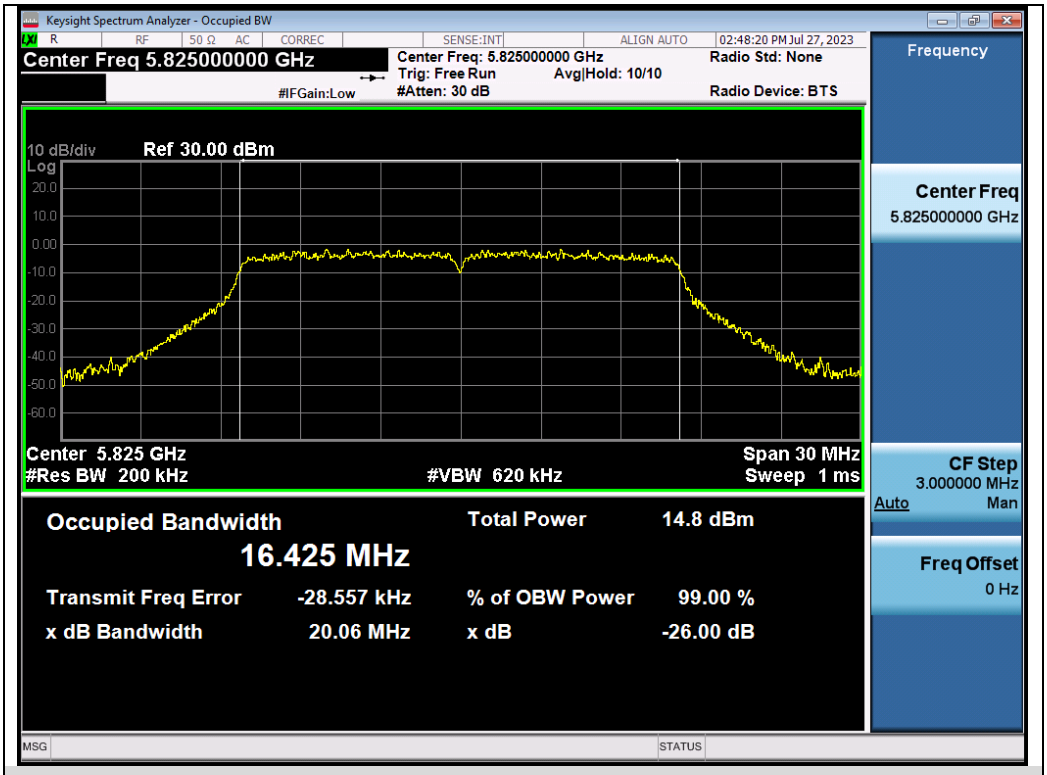
Test Graphs of Occupied Bandwidth for band 5.725-5.85 GHz



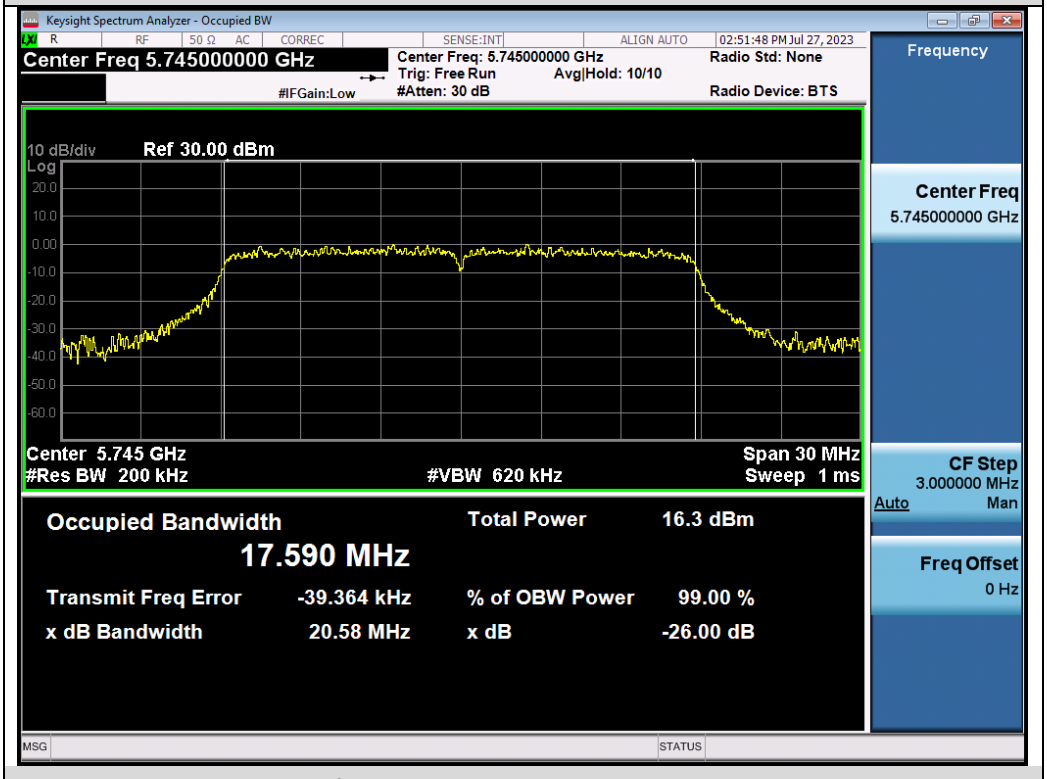
Test_Graph_802.11a_ANT1_5745_6Mbps_OBW



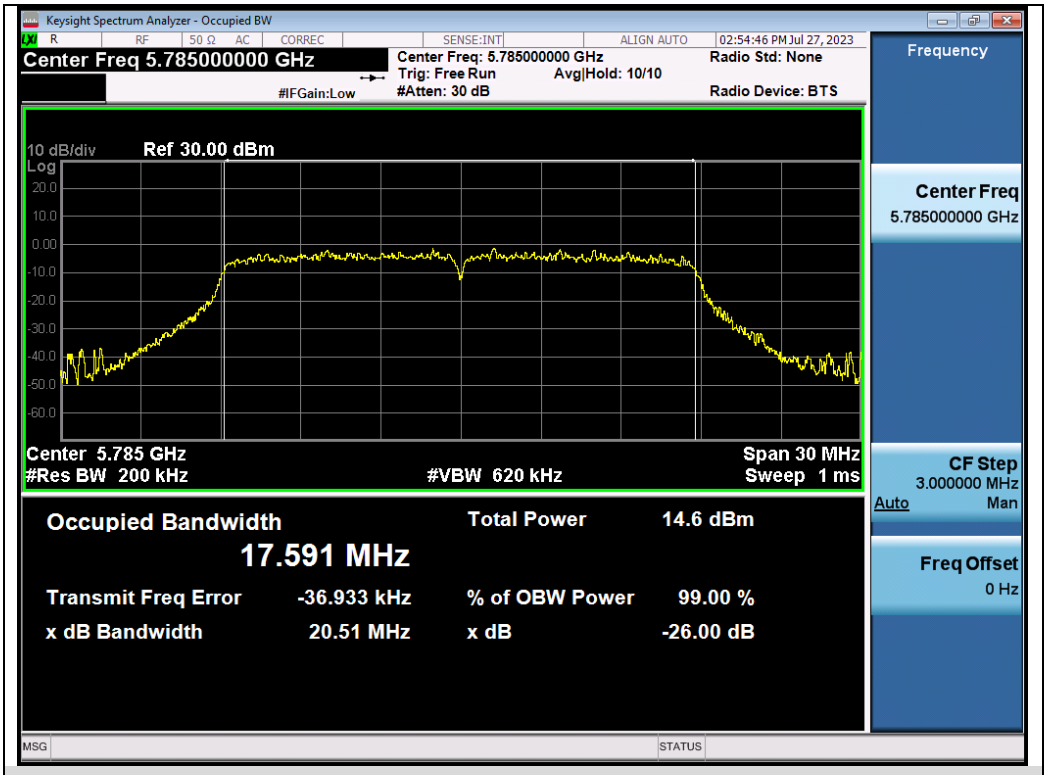
Test_Graph_802.11a_ANT1_5785_6Mbps_OBW



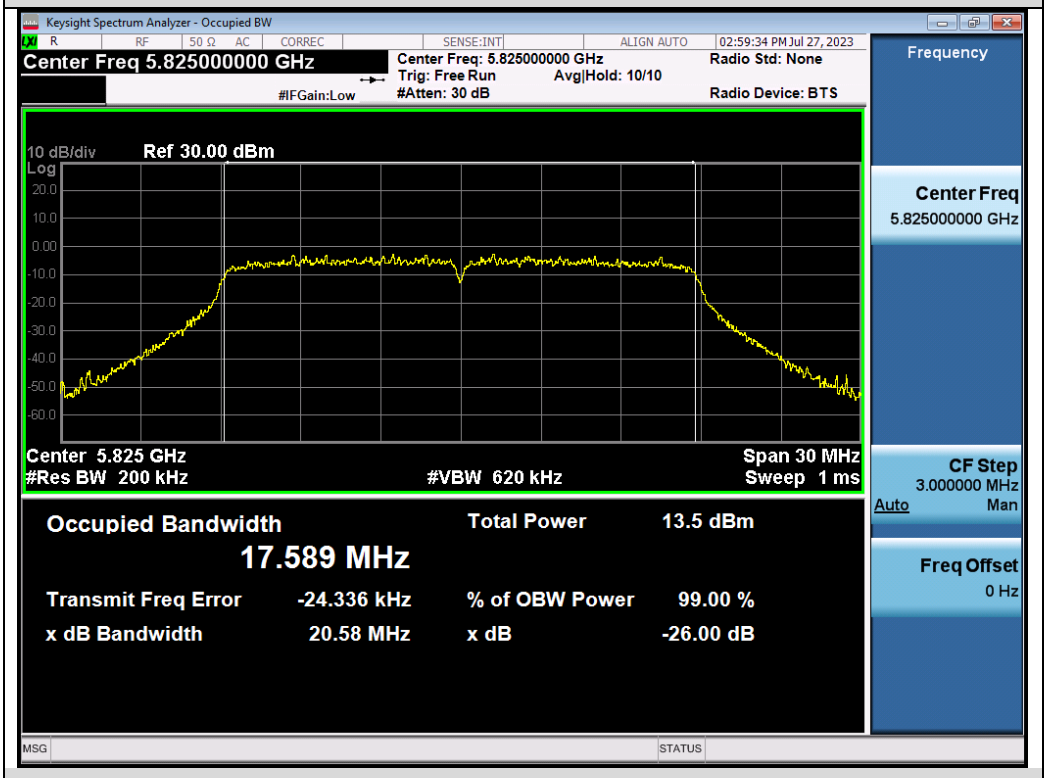
Test_Graph_802.11a_ANT1_5825_6Mbps_OBW



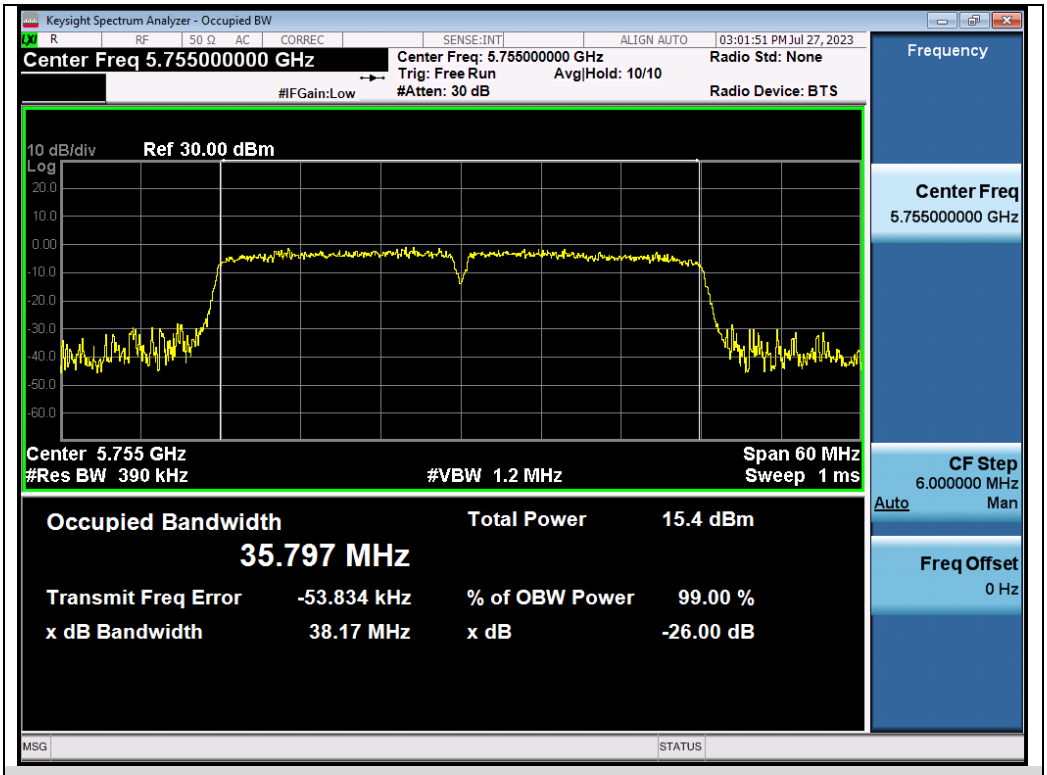
Test_Graph_802.11n20_ANT1_5745_MCS0_OBW



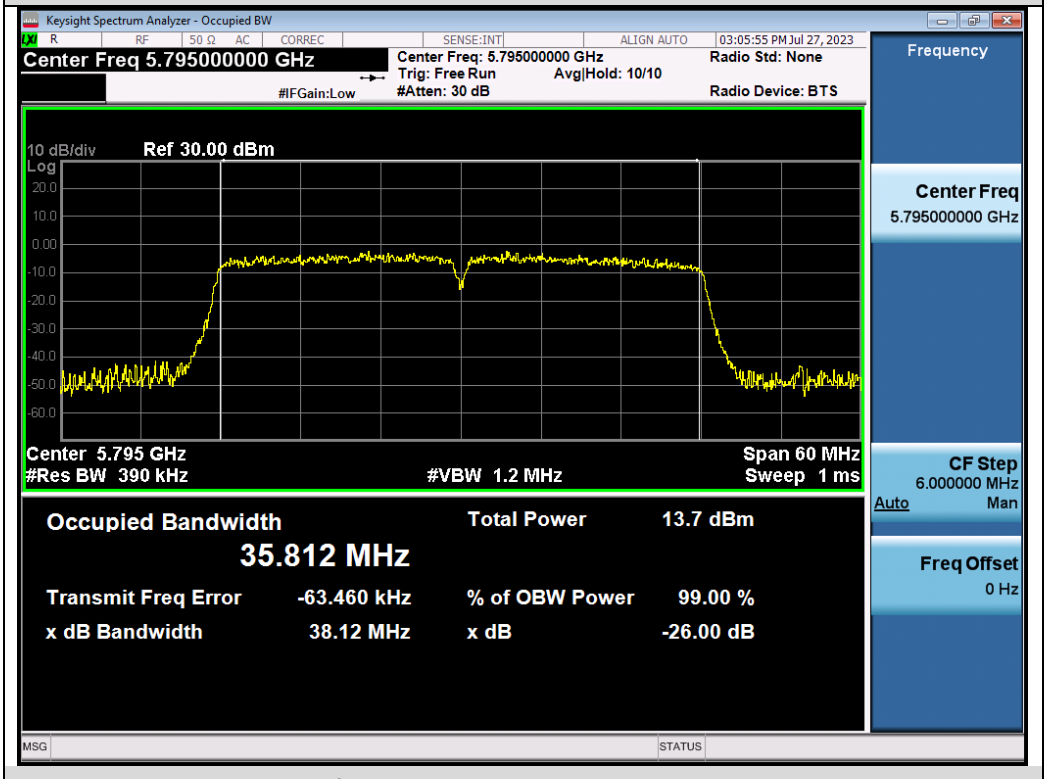
Test_Graph_802.11n20_ANT1_5785_MCS0_OBW



Test_Graph_802.11n20_ANT1_5825_MCS0_OBW

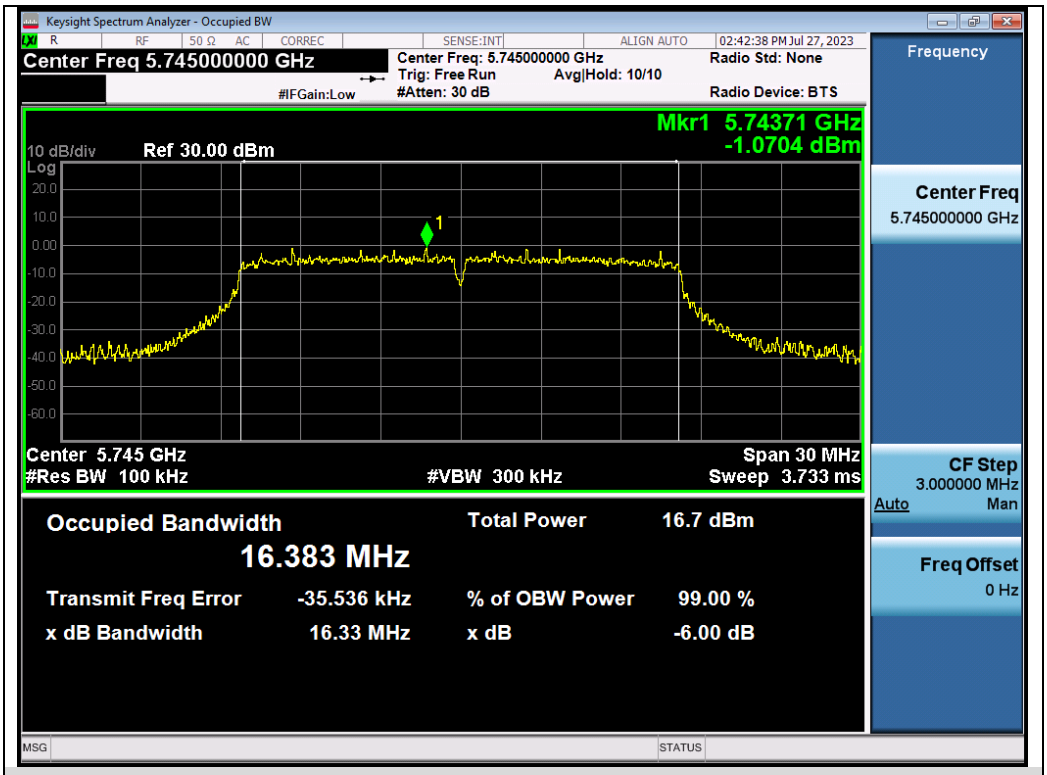


Test_Graph_802.11n40_ANT1_5755_MCS0_OBW

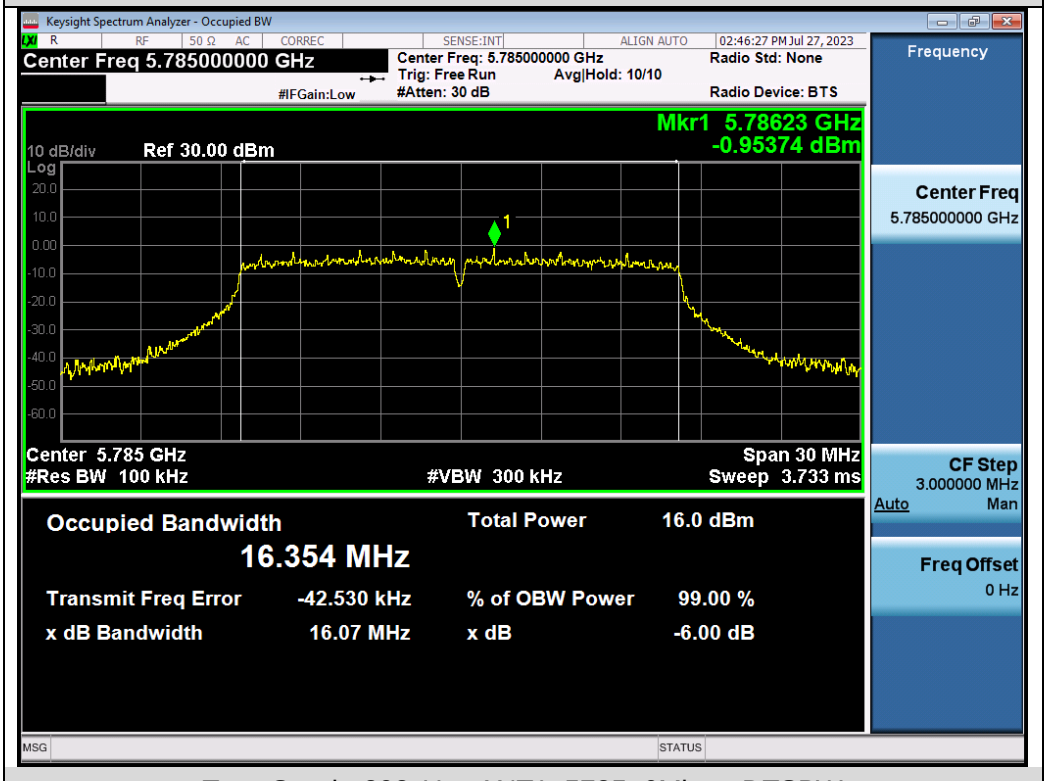


Test_Graph_802.11n40_ANT1_5795_MCS0_OBW

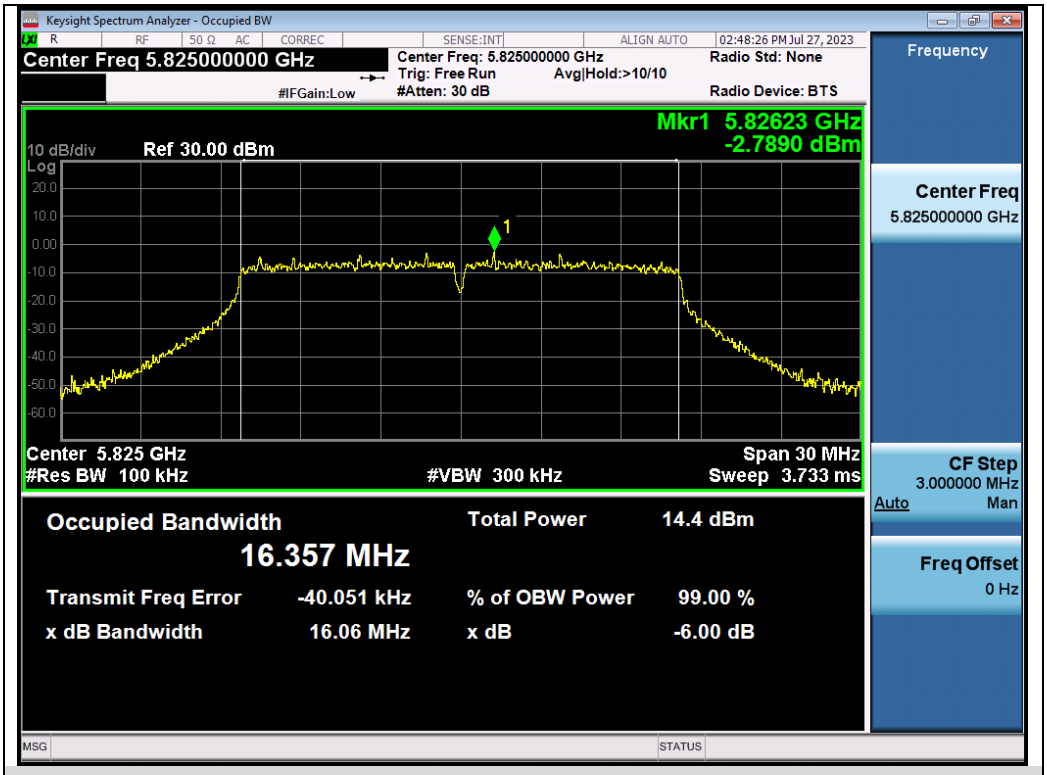
Test Graphs of DTS Bandwidth for band 5.725-5.85 GHz



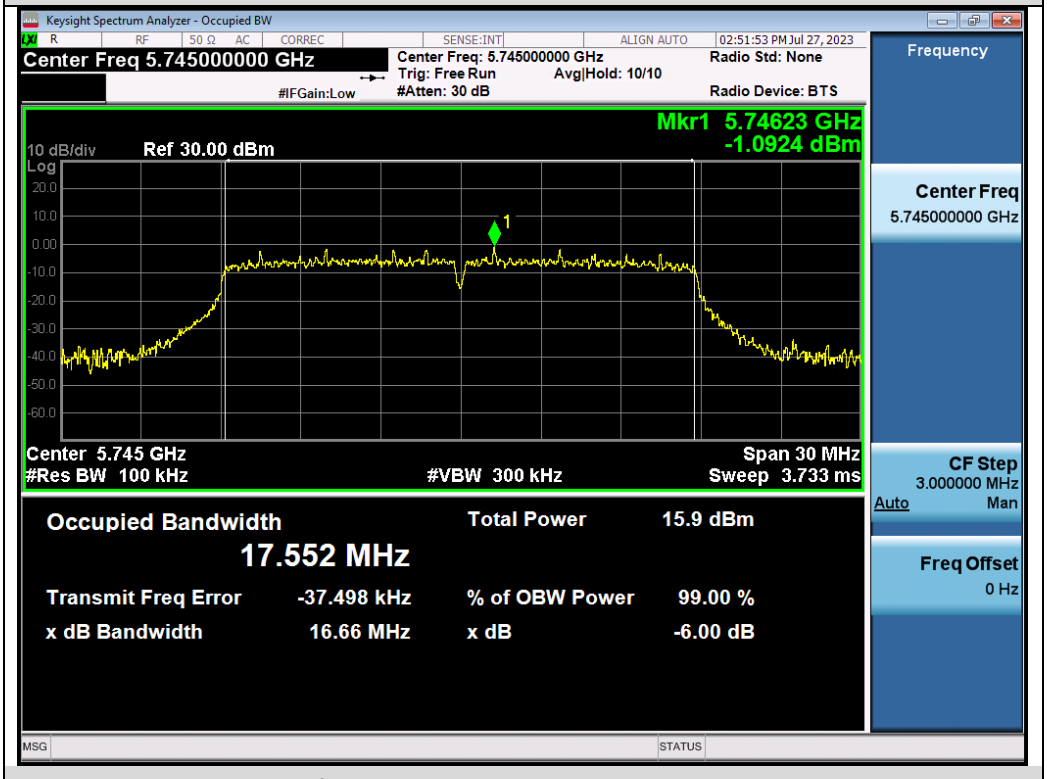
Test_Graph_802.11a_ANT1_5745_6Mbps_DTSBW



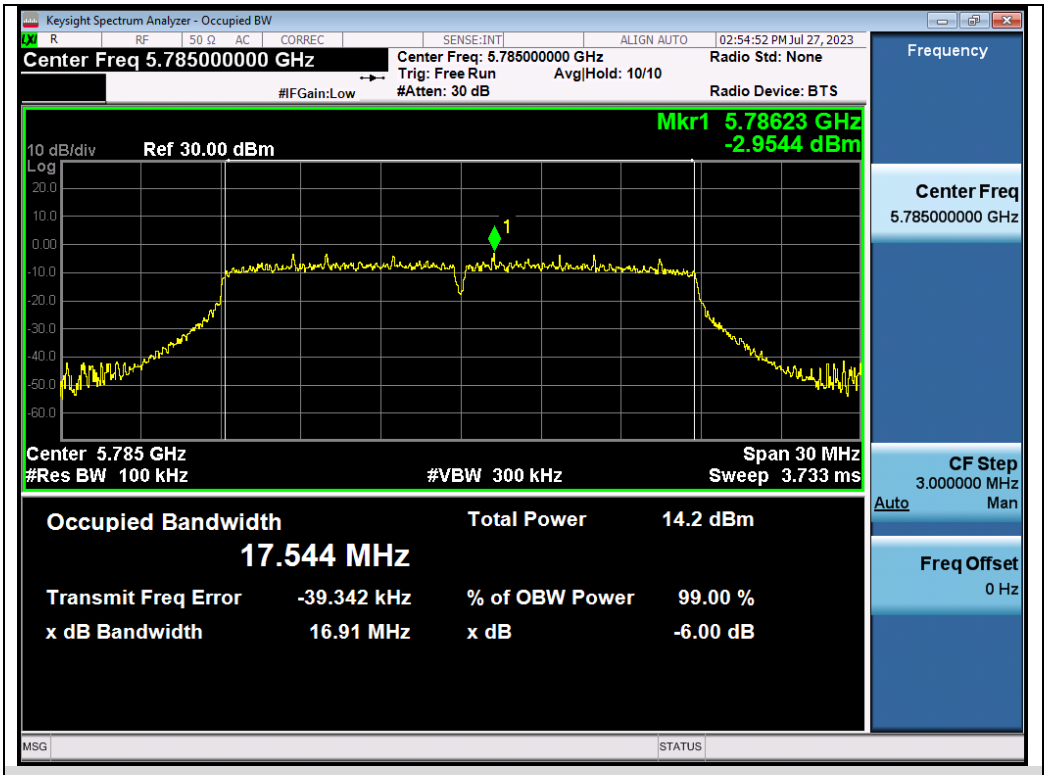
Test_Graph_802.11a_ANT1_5785_6Mbps_DTSBW



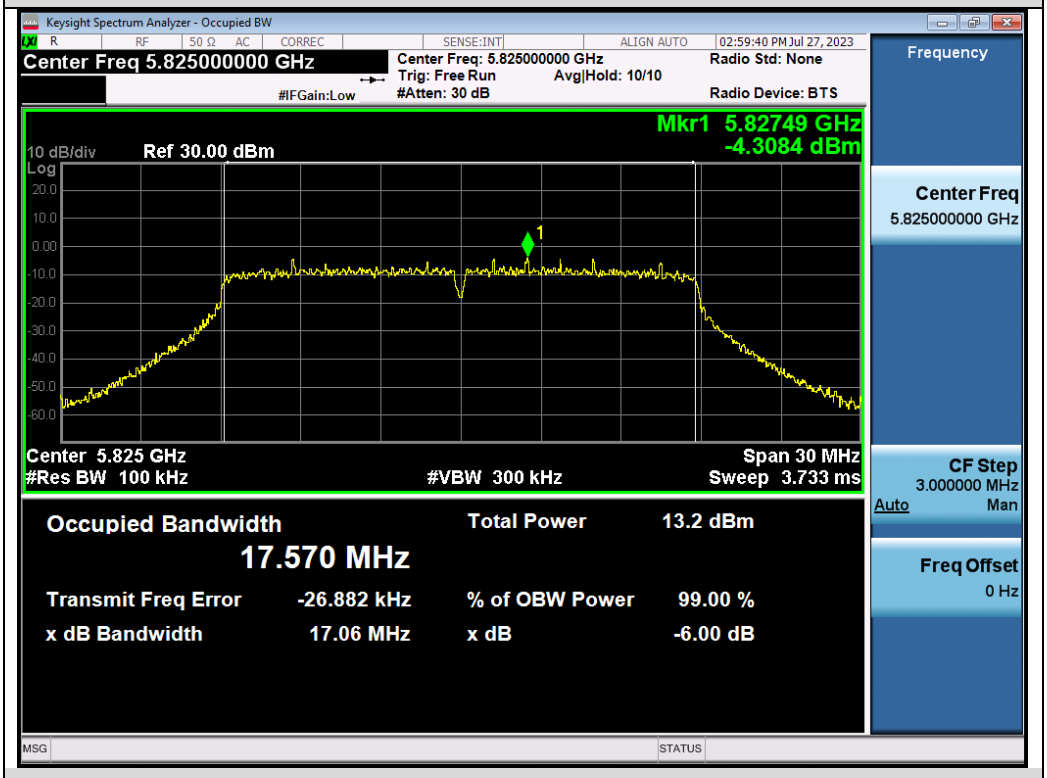
Test_Graph_802.11a_ANT1_5825_6Mbps_DTSBW



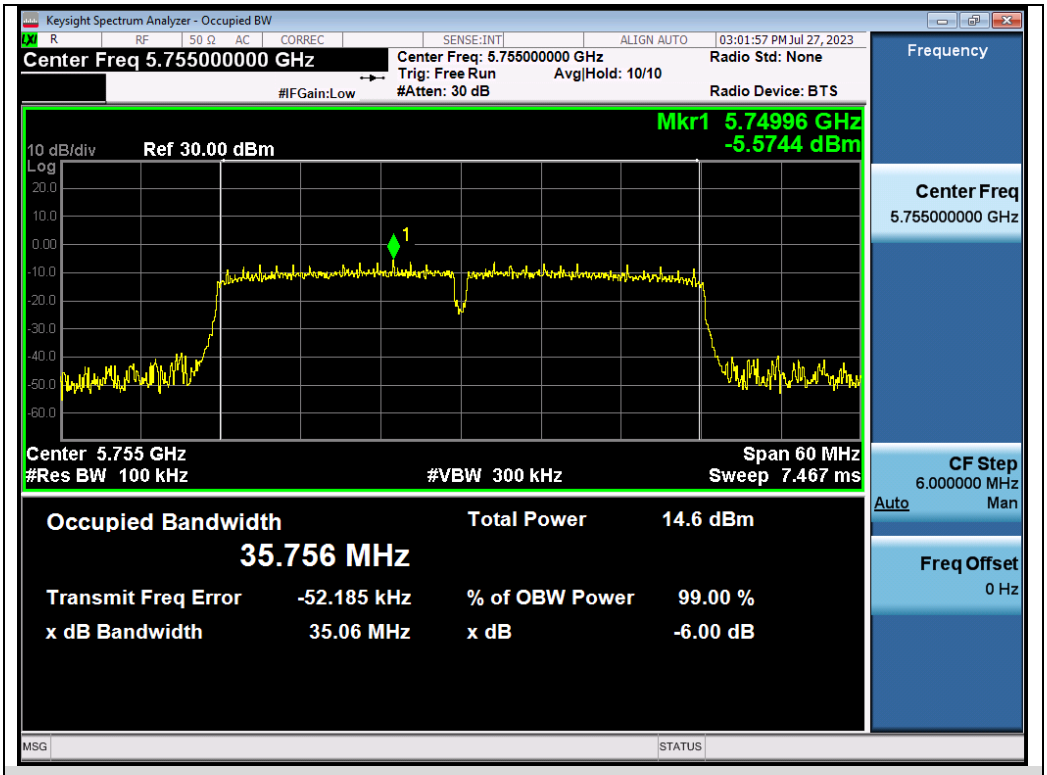
Test_Graph_802.11n20_ANT1_5745_MCS0_DTSBW



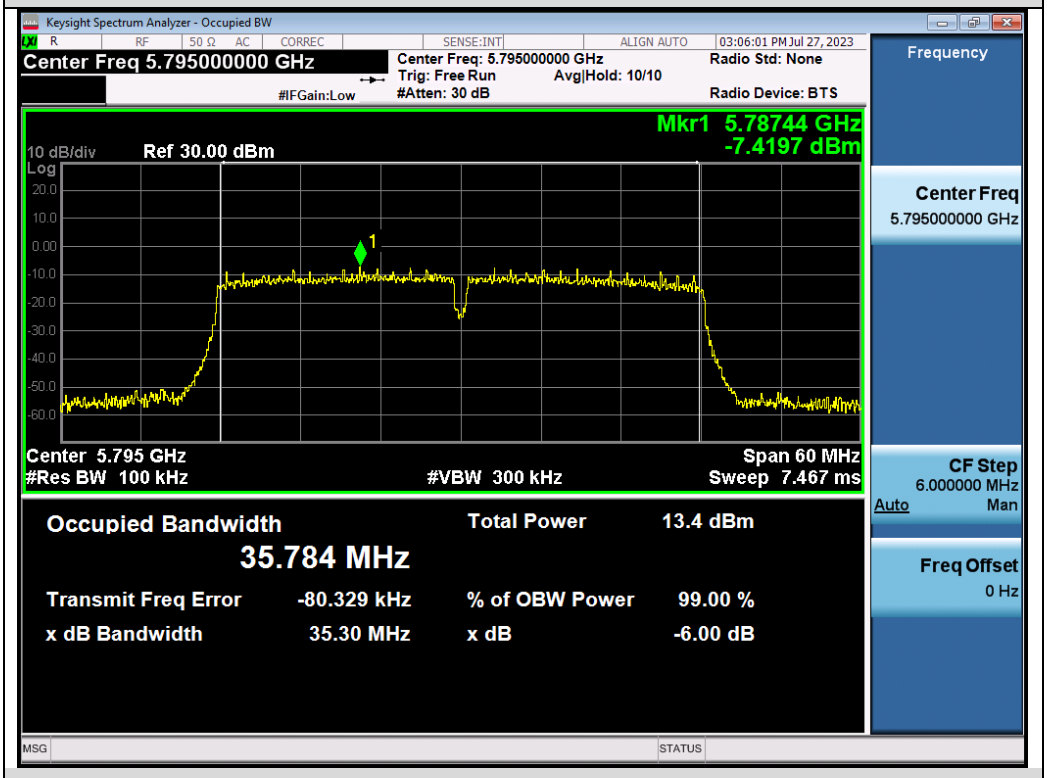
Test_Graph_802.11n20_ANT1_5785_MCS0_DTSBW



Test_Graph_802.11n20_ANT1_5825_MCS0_DTSBW



Test_Graph_802.11n40_ANT1_5755_MCS0_DTSBW



Test_Graph_802.11n40_ANT1_5795_MCS0_DTSBW

9. POWER SPECTRAL DENSITY MEASUREMENT

9.1 MEASUREMENT LIMITS

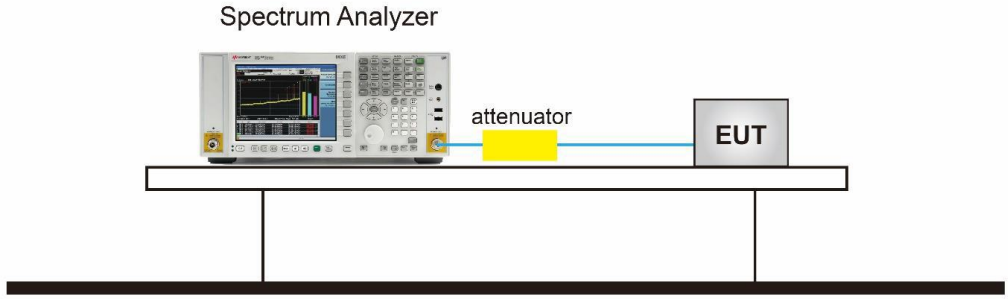
Operation Band	EUT Category		LIMIT
U-NII-1	☐	Outdoor Access Point	17dBm/ MHz
	☐	Fixed point-to-point Access Point	17dBm/ MHz
	☐	Indoor Access Point	17dBm/ MHz
	☒	Client devices	11dBm/ MHz
U-NII-2A	/		11dBm/ MHz
U-NII-2C	/		11dBm/ MHz
U-NII-3	/		30 dBm/500kHz

9.2 MEASUREMENT PROCEDURE

☒For Average power spectral density test:

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator.
2. Span was set to encompass the entire 26dB EBW of the signal.
3. RBW = 1MHz.
4. If measurement bandwidth of Maximum PSD is specified in 500 kHz, RBW = 100KHz
5. Set VBW≥[3×RBW].
6. Sweep Time=Auto couple.
7. Detector function=RMS (i.e., power averaging).
8. Trace average at least 100 traces in power averaging (rms) mode.
9. When the measurement bandwidth of Maximum PSD is specified in 100 kHz, add a constant factor 10*log(500kHz/100kHz) = 6.99 dB to the measured result.
10. Determine according to the duty cycle of the equipment: when it is less than 98%, follow the steps below.
11. Add [10 log (1/D)], where D is the duty cycle, to the measured power to compute the average power during the actual transmission times (because the measurement represents an average over both the ON and OFF times of the transmission). For example, add [10 log (1/0.25)] = 6 dB if the duty cycle is 25%.
12. Record the test results in the report.

9.3 MEASUREMENT SETUP (BLOCK DIAGRAM OF CONFIGURATION)



9.4 MEASUREMENT RESULT

Test Data of Conducted Output Power Density for band 5.15-5.25 GHz				
Test Mode	Test Channel (MHz)	Average Power Density (dBm/MHz)	Limits (dBm/MHz)	Pass or Fail
802.11a	5180	-0.066	11	Pass
	5200	-0.142	11	Pass
	5240	0.263	11	Pass
802.11n20	5180	-0.420	11	Pass
	5200	-0.631	11	Pass
	5240	0.195	11	Pass
802.11n40	5190	-2.910	11	Pass
	5230	-2.859	11	Pass

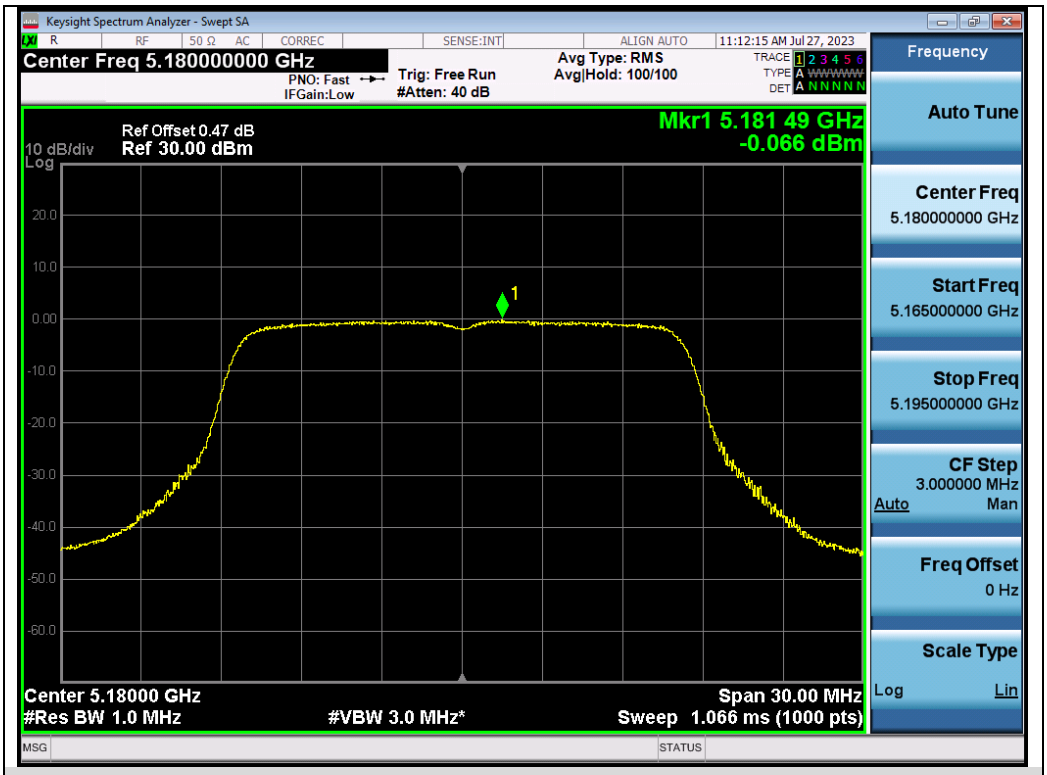
Test Data of Conducted Output Power Density for band 5.25-5.35 GHz				
Test Mode	Test Channel (MHz)	Average Power Density (dBm/MHz)	Limits (dBm/MHz)	Pass or Fail
802.11a	5260	0.420	11	Pass
	5300	1.062	11	Pass
	5320	1.035	11	Pass
802.11n20	5260	-1.479	11	Pass
	5300	-0.691	11	Pass
	5320	-0.443	11	Pass
802.11n40	5270	-3.343	11	Pass
	5310	-2.672	11	Pass

Test Data of Conducted Output Power Density for band 5.47-5.725 GHz				
Test Mode	Test Channel (MHz)	Average Power Density (dBm/MHz)	Limits (dBm/MHz)	Pass or Fail
802.11a	5500	-0.549	11	Pass
	5600	0.391	11	Pass
	5700	0.963	11	Pass
802.11n20	5500	-1.217	11	Pass
	5600	-0.278	11	Pass
	5700	0.697	11	Pass
802.11n40	5510	-3.557	11	Pass
	5590	-2.968	11	Pass
	5670	-3.316	11	Pass

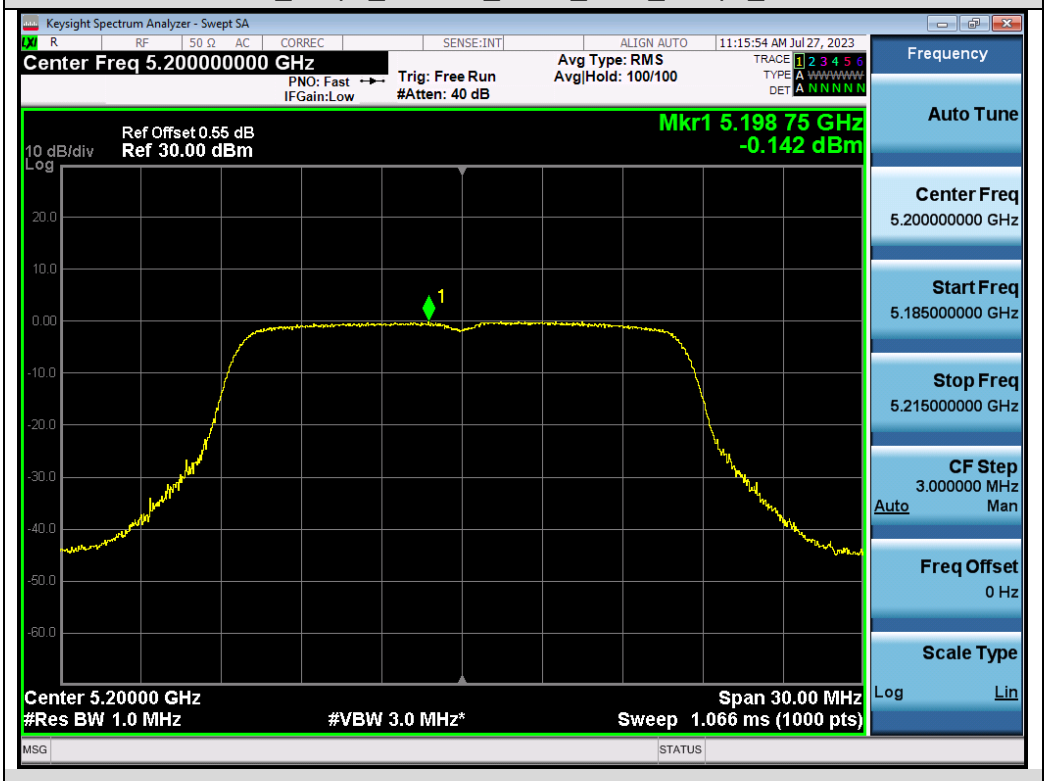
Test Data of Conducted Output Power Density for band 5.725-5.85 GHz					
Test Mode	Test Channel (MHz)	Average Power Density (dBm/100kHz)	Average Power Density (dBm/500kHz)	Limits (dBm/500kHz)	Pass or Fail
802.11a	5745	-8.920	-1.930	30	Pass
	5785	-9.315	-2.325	30	Pass
	5825	-10.399	-3.409	30	Pass
802.11n20	5745	-9.085	-2.095	30	Pass
	5785	-10.332	-3.342	30	Pass
	5825	-11.753	-4.763	30	Pass
802.11n40	5755	-12.405	-5.415	30	Pass
	5795	-13.725	-6.735	30	Pass

Note:1. Power density(dBm/500kHz) = Power density(dBm/100kHz) +10*log(500/100).

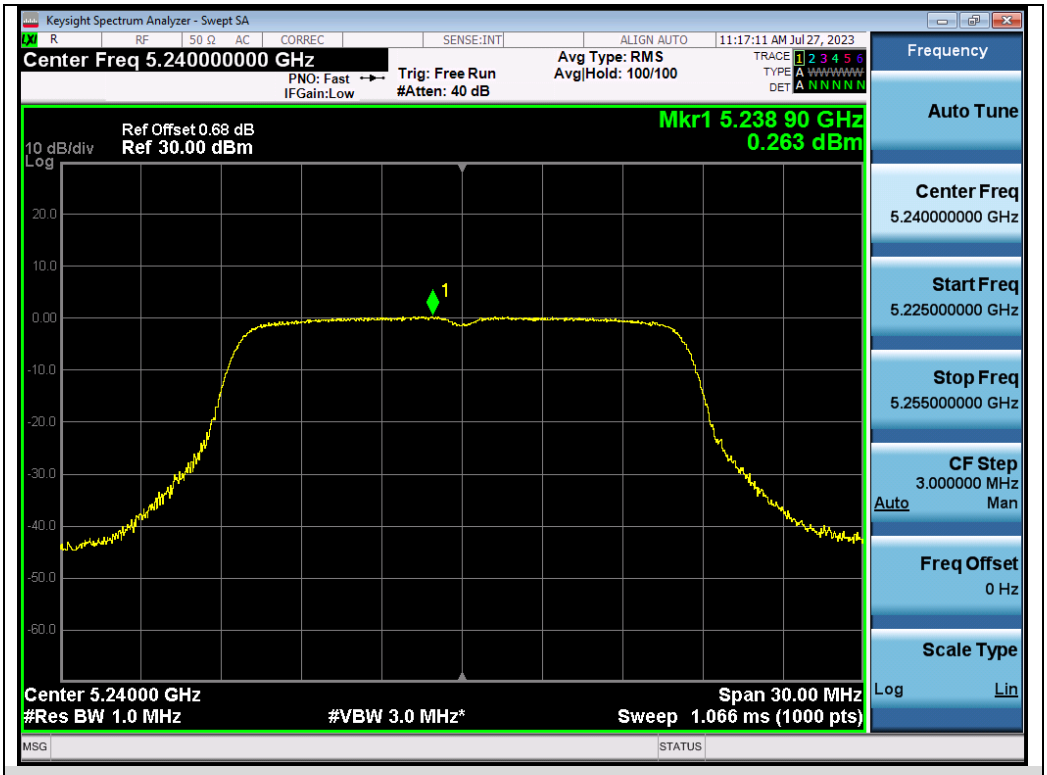
Test Graphs of Conducted Output Power Spectral Density for band 5.15-5.25 GHz



Test_Graph_802.11a_ANT1_5180_6Mbps_PSD



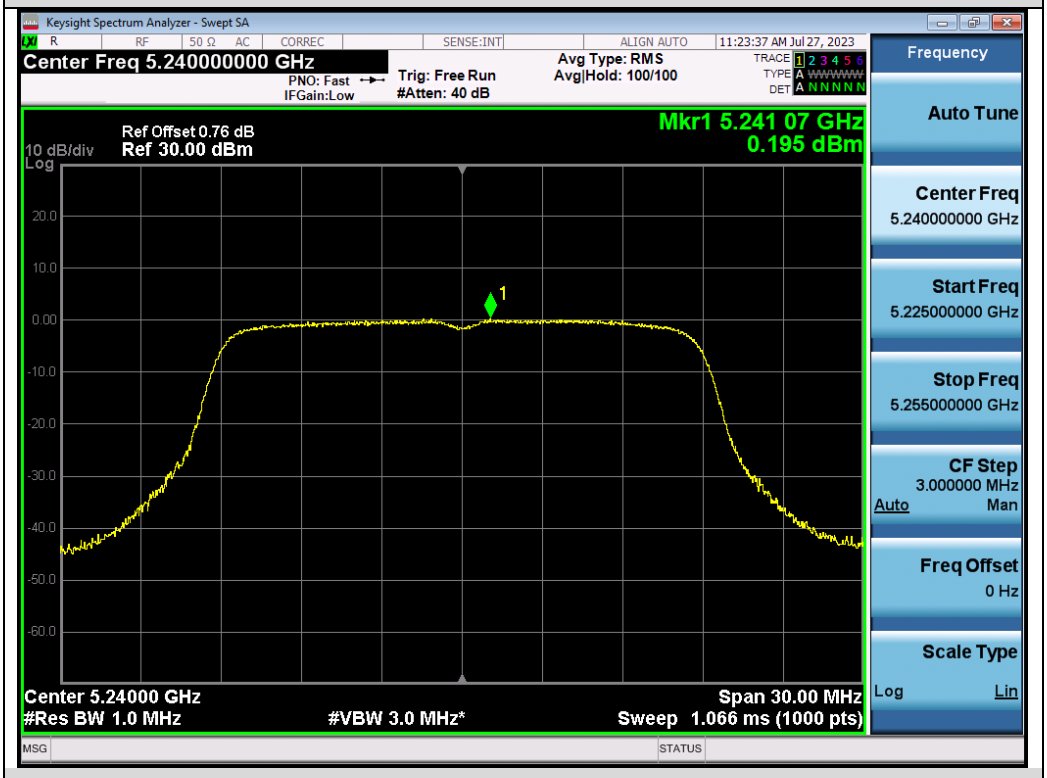
Test_Graph_802.11a_ANT1_5200_6Mbps_PSD



Test_Graph_802.11a_ANT1_5240_6Mbps_PSD

Test_Graph_802.11n20_ANT1_5180_MCS0_PSD

Test_Graph_802.11n20_ANT1_5200_MCS0_PSD

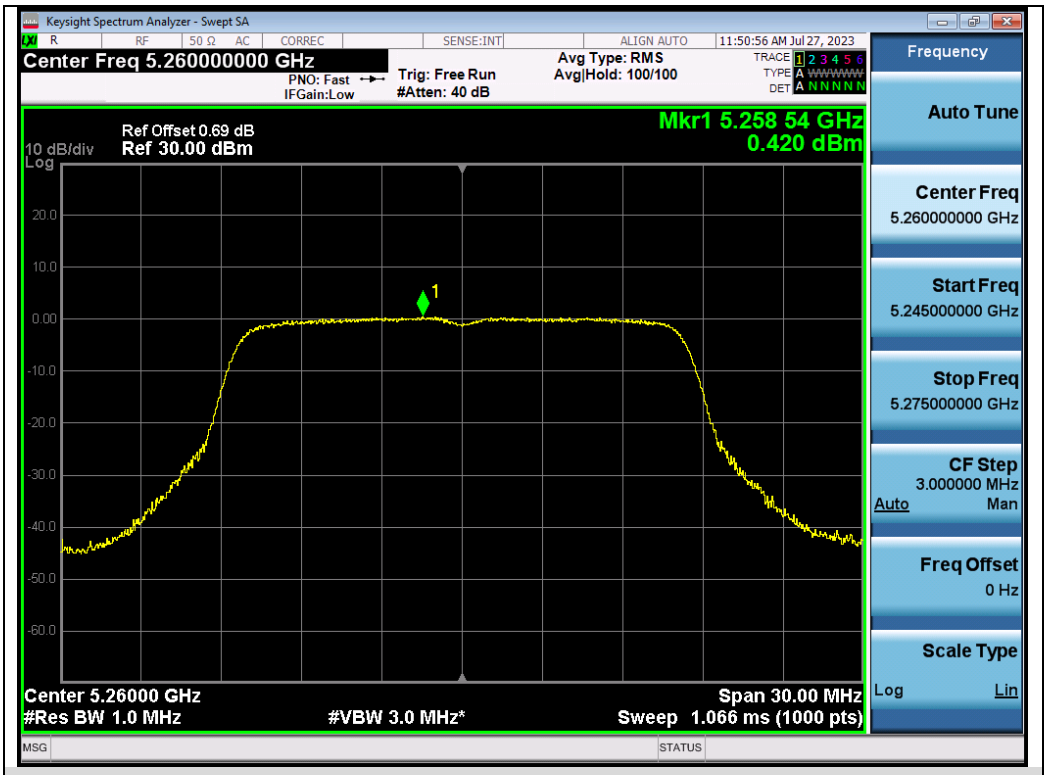


Test_Graph_802.11n20_ANT1_5240_MCS0_PSD

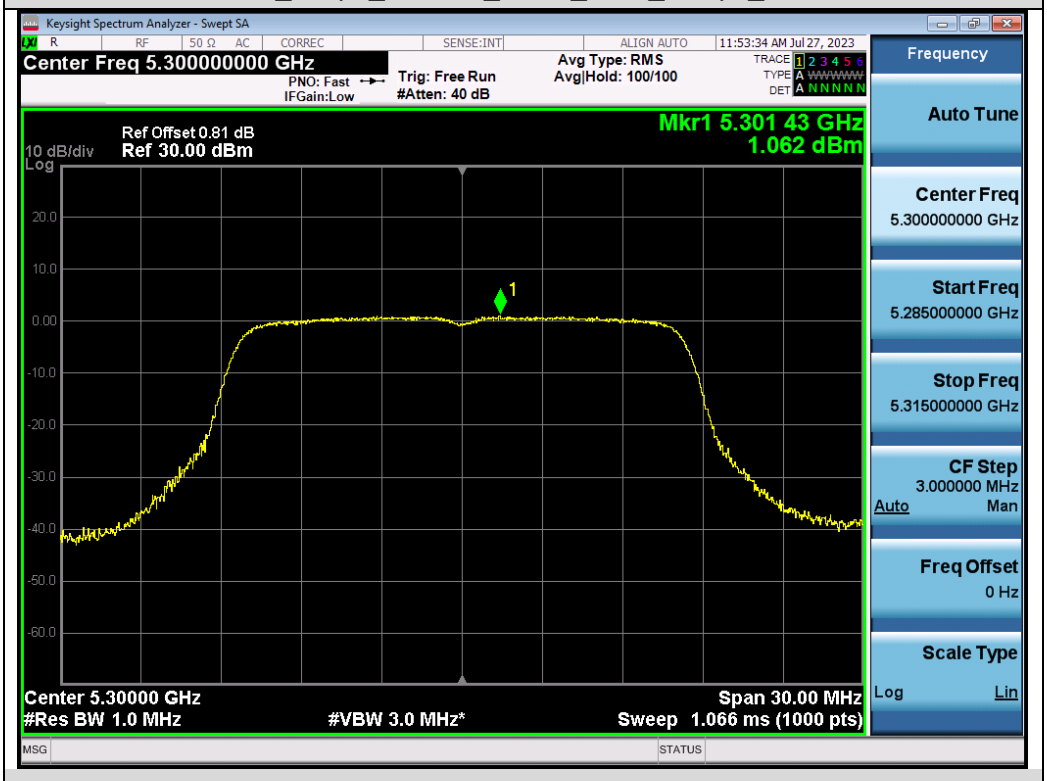
Test_Graph_802.11n40_ANT1_5190_MCS0_PSD

Test_Graph_802.11n40_ANT1_5230_MCS0_PSD

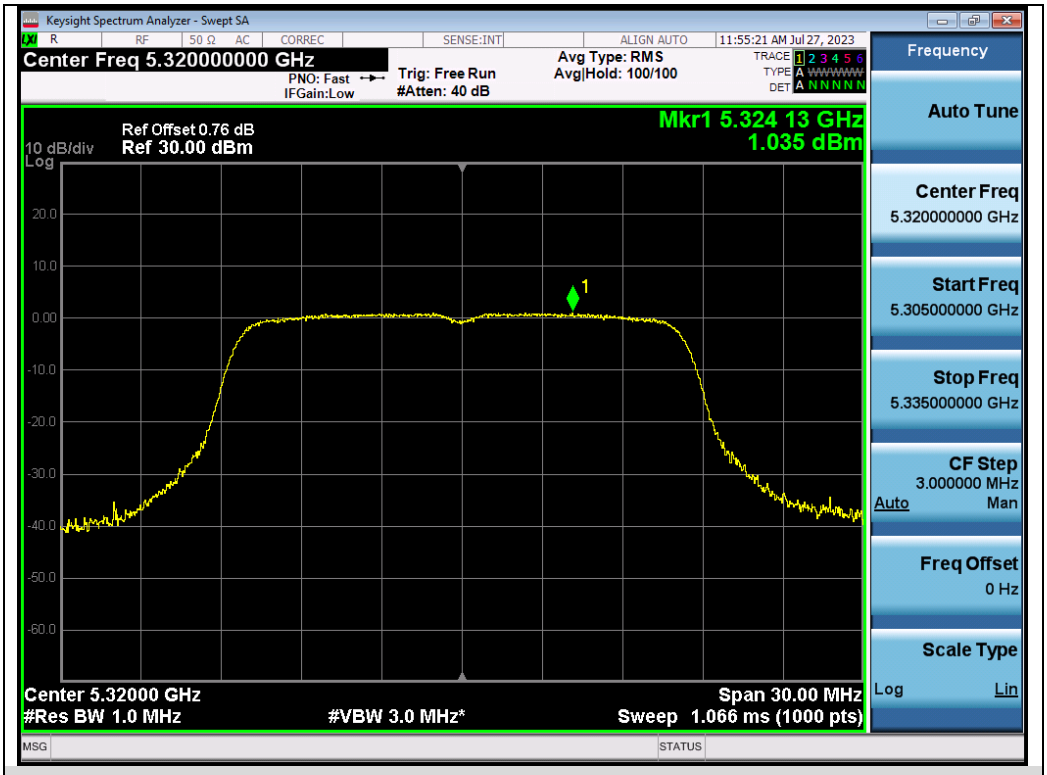
Test Graphs of Conducted Output Power Spectral Density for band 5.25-5.35 GHz



Test_Graph_802.11a_ANT1_5260_6Mbps_PSD

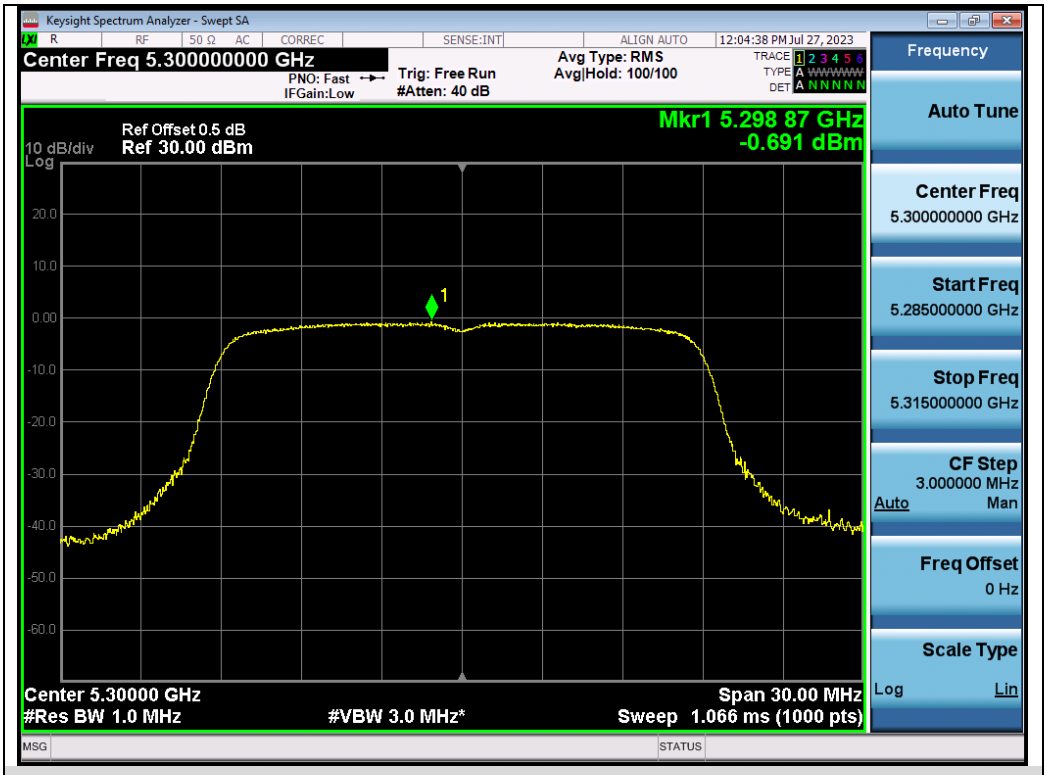


Test_Graph_802.11a_ANT1_5300_6Mbps_PSD



Test_Graph_802.11a_ANT1_5320_6Mbps_PSD

Test_Graph_802.11n20_ANT1_5260_MCS0_PSD



Test_Graph_802.11n20_ANT1_5300_MCS0_PSD

Test_Graph_802.11n20_ANT1_5320_MCS0_PSD