



TEST REPORT

Report Number.	90534-21-72-21-PP001	
Date of issue.	Oct.09.2021	
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Factory's name	NANJING MIDAS TECHNOLOGY CO., LTD	
Address	Block A, Kechuang Building, Lishui District, Nanjing City, Jiangsu Province	
Standard(s)	FCC 47 CFR Part 2, Subpart J FCC 47 CFR Part 15, Subpart C	
Test item description	Midas-926 Gateway	
Trade Mark		
Model/Type reference	Midas-926.GB915	
FCC ID	2A293M926GB915	
Date of receipt of test item	Sep.07.2021	
Date (s) of performance of test:	Sep.08.2021 to Sep.30.2021	
Summary of Test Results	Pass	
The Summary of Test Results based on a technical opinion belongs to the standard(s).		
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TABLE OF CONTENTS

1	EUT TECHNICAL DESCRIPTION	3
2	SUMMARY OF TEST RESULT	5
3	TEST METHODOLOGY	6
3.1	GENERAL DESCRIPTION OF APPLIED STANDARDS.....	6
3.2	MEASUREMENT EQUIPMENT USED	6
3.3	DESCRIPTION OF TEST MODES	7
3.4	TABLE OF PARAMETERS OF TEST SOFTWARE SETTING	11
4	FACILITIES AND ACCREDITATIONS	13
4.1	FACILITIES.....	13
4.2	LABORATORY ACCREDITATIONS AND LISTINGS	13
5	TEST SYSTEM UNCERTAINTY	14
6	SETUP OF EQUIPMENT UNDER TEST	15
6.1	RADIO FREQUENCY TEST SETUP	15
6.2	RADIO FREQUENCY TEST SETUP	15
6.3	CONDUCTED EMISSION TEST SETUP	17
6.4	BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM.....	18
6.5	SUPPORT EQUIPMENT	18
7	TEST REQUIREMENTS	19
7.1	BANDWIDTH MEASUREMENT	19
7.2	MAXIMUM CONDUCTED OUTPUT POWER	53
7.3	MAXIMUM PEAK POWER DENSITY	59
7.4	FREQUENCY STABILITY.....	93
7.5	UNDESIRABLE RADIATED SPURIOUS EMISSION	102
7.6	POWER LINE CONDUCTED EMISSIONS	131
7.7	ANTENNA APPLICATION	134



1 EUT TECHNICAL DESCRIPTION

Characteristics	Description	
Product	Midas-926 Gateway	
Model Number	Midas-926.GB915	
Wifi Type	☒ UNII-1: 5150MHz-5250MHz Band ☒ UNII-2A: with 5250MHz-5350MHz Band ☒ UNII-2C: with 5470MHz-5725MHz Band ☒ UNII-3 with 5725MHz-5850MHz Band	
WLAN Supported	☒ 802.11a ☒ 802.11n(20MHz channel bandwidth) ☒ 802.11n(40MHz channel bandwidth) ☒ 802.11ac(20MHz channel bandwidth) ☒ 802.11ac(40MHz channel bandwidth) ☒ 802.11ac(80MHz channel bandwidth)	
Data Rate	802.11a: 54/48/36/24/18/12/9/6Mbps 802.11n: up to 300 Mbps 802.11ac: up to 866.7Mbps	
Modulation	☒ OFDM with BPSK/QPSK/16QAM/64QAM for 802.11a/n; ☒ OFDM with BPSK/QPSK/16QAM/64QAM/256QAM for 802.11ac;	
Frequency Range	☒ UNII-1: 5150MHz-5250MHz Band	
	☒ 5180-5240MHz for 802.11a; ☒ 5180-5240MHz for 802.11n(HT20); ☒ 5180-5240MHz for 802.11ac(VHT20);	☒ 5190-5230MHz for 802.11n(HT40); ☒ 5190-5230MHz for 802.11ac(VHT40); ☒ 5210MHz for 802.11ac(VHT80);
	☒ UNII-2A: 5250MHz-5350MHz Band	
	☒ 5260-5320MHz for 802.11a; ☒ 5260-5320MHz for 802.11n(HT20); ☒ 5260-5320MHz for 802.11ac(VHT20);	☒ 5270-5310MHz for 802.11n(HT40); ☒ 5270-5310MHz for 802.11ac(VHT40); ☒ 5290MHz for 802.11ac(VHT80);
	☒ UNII-2C: 5470MHz-5725MHz Band	
	☒ 5500-5700MHz for 802.11a; ☒ 5500-5700MHz for 802.11n(HT20); ☒ 5500-5700MHz for 802.11ac(HT20);	☒ 5510-5670MHz for 802.11n(HT40); ☒ 5510-5670MHz for 802.11ac(HT40); ☒ 5530-5610MHz for 802.11ac(HT80)
	☒ UNII-3: 5725MHz-5850MHz Band	
	☒ 5745-5825MHz for 802.11a; ☒ 5745-5825MHz for 802.11n(HT20); ☒ 5745-5825MHz for 802.11ac(VHT20);	☒ 5755-5795MHz for 802.11n(HT40); ☒ 5755-5795MHz for 802.11ac(VHT40); ☒ 5775MHz for 802.11ac(VHT80);
TCP Function	☐ Applicable	☒ Not Applicable
Antenna Port	☒ Antenna port A	
Antenna Type	External Antenna	
Antenna Gain	4.0dBi	



Transmit Power	Output Power (Max.) for UNII-1 (1TX)	802.11a: 3.42dBm 802.11n(HT 20 MHz): 2.03dBm 802.11n(HT 40 MHz): 6.17dBm 802.11ac (VHT 20 MHz): 4.14dBm 802.11ac (VHT 40 MHz): 7.16dBm 802.11ac (VHT 80 MHz): 4.11dBm
	Output Power (Max.) for UNII-2A (1TX)	802.11a: 2.53dBm 802.11n(HT 20 MHz): 4.38dBm 802.11n(HT 40 MHz): 6.86dBm 802.11ac (VHT 20 MHz): 2.87dBm 802.11ac (VHT 40 MHz): 7.26dBm 802.11ac (VHT 80 MHz): 4.96dBm
	Output Power (Max.) for UNII-2C (1TX)	802.11a: 3.45dBm 802.11n(HT 20 MHz): 4.08dBm 802.11n(HT 40 MHz): 7.63dBm 802.11ac (VHT 20 MHz): 4.02dBm 802.11ac (VHT 40 MHz): 7.78dBm 802.11ac (VHT 80 MHz): 5.96dBm
	Output Power (Max.) for UNII-3 (1TX)	802.11a: 2.33dBm 802.11n(HT 20 MHz): 3.03dBm 802.11n(HT 40 MHz): 5.44dBm 802.11ac (VHT 20 MHz): 3.43dBm 802.11ac (VHT 40 MHz): 5.75dBm 802.11ac (VHT 80 MHz): 3.36dBm
Power supply	☑DC 5V	
	Adapter information Model:AS2401A-0503000US IN PUT:100~240V 50/60Hz 0.8A MAX OUT PUT: 5V 3000mA	
Temperature Range	-20°C ~ +55°C	

Note: for more details, please refer to the User's manual of the EUT.



2 SUMMARY OF TEST RESULT

FCC Part Clause	Test Parameter	Verdict	Remark
15.407 (a) 15.407 (e)	99% , 6dB and 26dB Bandwidth	PASS	
15.407 (a)	Maximum Conducted Output Power	PASS	
15.407 (a)	Peak Power Spectral Density	PASS	
15.407 (b)	Radiated Spurious Emission	PASS	
15.407(g)	Frequency Stability	PASS	
15.407 (b)(6) 15.207	Power Line Conducted Emission	PASS	
15.407(a) 15.203	Antenna Application	PASS	
NOTE1: N/A (Not Applicable) NOTE2: According to FCC OET KDB 789033 D2 General UNII Test Procedures New Rules v01r02, In addition, the radiated test is also performed to ensure the emissions emanating from the device cabinet also comply with the applicable limits.			

RELATED SUBMITTAL(S) / GRANT(S):

This submittal(s) (test report) is intended for FCC ID: 2A293M926GB915 filing to comply with Section 15.247 of the FCC Part 15, Subpart E Rules.



3 TEST METHODOLOGY

3.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:

FCC 47 CFR Part 2, Subpart J

FCC 47 CFR Part 15, Subpart E

FCC KDB 789033 D2 General UNII Test Procedures New Rules v01r04

3.2 MEASUREMENT EQUIPMENT USED

Equipment	Model	Manufacturer	S/N	Cal. Due
RF Connected Test				
Vector Signal Generater	Rohde & Schwarz	SMBV100B(6G)	101166	2022/07/30
Analog Signal Generator	Rohde & Schwarz	SMB100A(40G)	181333	2022/07/30
Signal Analyzer	Rohde & Schwarz	FSV40	101527	2022/05/24
Power Analyzer	Rohde & Schwarz	OSP-B157W8	N/A	2022/09/23
Wideband Radio Communication Tester	R&S	CMW270	101985	2022/07/30
Temperature&Humidity test chamber	ESPEC	VC 4018	/	2022/04/02
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	166898	2022/09/07
Radiated Emission Test				
EMI Test Receiver	KEYSIGHT	N9010A	MY56070465	2021/12/23
EMI Test Receiver	Rohde & Schwarz	FSV40	101511	2022/05/24
Bilog Antenna	Schwarzbeck	VULB 9163	01335	2023/04/28
Power Amplifier	EMEC	EM330	060676	2021/12/23
Cable	Tuyue	F4309	L-400-NmNm-12000	2021/12/23
Signal Analyzer	Rohde & Schwarz	FSV40	101511	2022/05/24
Horn Antenna	Schwarzbeck	BBHA9170	/	2022/10/09
Power Amplifier	Rohde & Schwarz	SCU-18F	180118	2022/05/17
Active Loop Antenna	ETS LINDGREN	6512	41623	2022/04/26
Test Software	Farad	EZ-EMC	Ver.CPC-3A1	/



3.3 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition.

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.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

☒ Wifi 5G with U-NII - 1

Frequency and Channel list for 802.11a/n (HT20)/802.11ac (VHT20):

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

Frequency and Channel list for 802.11n (HT40)/ 802.11ac (VHT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
38	5190				
46	5230				

Frequency and Channel list for 802.11ac Wave2 (VHT80):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
42	5210				

Test Frequency and Channel for 802.11a/n (HT20)/802.11ac (VHT20):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	40	5200	48	5240

Test Frequency and channel for 802.11n (HT40)/ 802.11ac (VHT40):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
38	5190	N/A	N/A	46	5230

Test Frequency and channel for 802.11ac Wave2 (VHT80):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
42	5210	N/A	N/A	N/A	N/A



☒ Wifi 5G with U-NII -2A

Frequency and Channel list for 802.11a/n (HT20)/802.11ac (VHT20):

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

Frequency and Channel list for 802.11n (HT40)/ 802.11ac (VHT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
54	5270				
62	5310				

Frequency and Channel list for 802.11ac (VHT80):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
58	5290				

Test Frequency and Channel for 802.11a/n (HT20)/802.11ac (VHT20):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
52	5260	56	5280	64	5320

Test Frequency and channel for 802.11n (HT40)/ 802.11ac (VHT40):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
54	5270	N/A	N/A	62	5310

Test Frequency and channel for 802.11ac (VHT80):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
58	5290				



☒ Wifi 5G with U-NII -2C

Frequency and Channel list for 802.11a/n (HT20)/802.11ac (VHT20):

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

Frequency and Channel list for 802.11n (HT40)/ 802.11ac (VHT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
102	5510	118	5590	134	5670
110	5550	126	5630		

Frequency and Channel list for 802.11ac (VHT80):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
106	5530	122	5610		

Test Frequency and Channel for 802.11a/n (HT20)/802.11ac (VHT20):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
100	5500	116	5580	140	5700

Test Frequency and channel for 802.11n (HT40)/ 802.11ac (VHT40):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
102	5510	N/A	N/A	134	5670

Test Frequency and channel for 802.11ac (VHT80):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
106	5530				



☒ Wifi 5G with U-NII -3

Frequency and Channel list for 802.11a/n (HT20)/802.11ac (VHT20):

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

Frequency and Channel list for 802.11n (HT40)/ 802.11ac (VHT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
151	5755				
159	5795				

Frequency and Channel list for 802.11ac (VHT80):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
155	5775				

Test Frequency and Channel for 802.11a/n (HT20)/802.11ac (VHT20):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	157	5785	165	5825

Test Frequency and channel for 802.11n (HT40)/ 802.11ac (VHT40):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
151	5755	N/A	N/A	159	5795

Test Frequency and channel for 802.11ac (VHT80):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
155	5775				



3.4 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product

U-NII - 1 1T1R			
Test Software Version	QRCT		
Frequency (MHz)	5180	5200	5240
802.11a Mode	10	10	10
802.11n(20MHz) Mode	10	10	10
802.11ac Wave2(20MHz) Mode	10	10	10
Frequency (MHz)	5190	5230	
802.11n(40MHz) Mode	9	9	
802.11ac Wave2(40MHz) Mode	9	9	
Frequency (MHz)	5210		
802.11ac Wave2(80 MHz) Mode	9		

U-NII -2A 1T1R			
Test Software Version	QRCT		
Frequency (MHz)	5260	5280	5320
802.11a Mode	10	10	10
802.11n(20MHz) Mode	10	10	10
802.11ac Wave2(20MHz) Mode	10	10	10
Frequency (MHz)	5270	5310	
802.11n(40MHz) Mode	9	9	
802.11ac Wave2(40MHz) Mode	9	9	
Frequency (MHz)	5290		
802.11ac Wave2(80 MHz) Mode	8		



U-NII -2C 1T1R			
Test Software Version	QRCT		
Frequency (MHz)	5500	5580	5700
802.11a Mode	10	10	10
802.11n(20MHz) Mode	10	10	10
802.11ac Wave2(20MHz) Mode	10	0	10
Frequency (MHz)	5510	5670	
802.11n(40MHz) Mode	10	10	
802.11ac Wave2(40MHz) Mode	10	10	
Frequency (MHz)	5530		
802.11ac Wave2(80 MHz) Mode	9		

U-NII -3 1T1R			
Test Software Version	QRCT		
Frequency (MHz)	5745	5785	5825
802.11a Mode	10	10	10
802.11n(20MHz) Mode	10	10	10
802.11ac Wave2(20MHz) Mode	10	10	10
Frequency (MHz)	5755	5795	
802.11n(40MHz) Mode	9	9	
802.11ac Wave2(40MHz) Mode	9	9	
Frequency (MHz)	5775		
802.11ac Wave2(80 MHz) Mode	8		



4 FACILITIES AND ACCREDITATIONS

4.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

No. 11, Wu Song Road, Dongcheng District, Dongguan, Guangdong Province, China 523117

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 22.

4.2 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

EMC Lab.

:

Accredited by A2LA

The Certificate Number is 6325.01.

Name of Firm

:

SLG-CPC Testlaboratory Co., Ltd.

Site Location

:

No. 11, Wu Song Road, Dongcheng District, Dongguan, Guangdong Province, China 523117



5 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-5}$
Maximum Peak Output Power Test	$\pm 1.0\text{dB}$
Conducted Emissions Test	$\pm 2.0\text{dB}$
Radiated Emission Test	$\pm 2.0\text{dB}$
Power Density	$\pm 2.0\text{dB}$
Occupied Bandwidth Test	$\pm 1.0\text{dB}$
Band Edge Test	$\pm 3\text{dB}$
All emission, radiated	$\pm 3\text{dB}$
Antenna Port Emission	$\pm 3\text{dB}$
Temperature	$\pm 0.5^\circ\text{C}$
Humidity	$\pm 3\%$

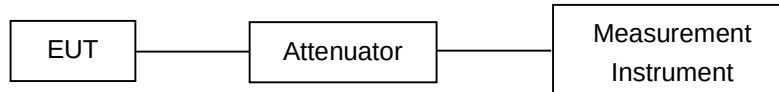
Measurement Uncertainty for a level of Confidence of 95%



6 SETUP OF EQUIPMENT UNDER TEST

6.1 RADIO FREQUENCY TEST SETUP

The WLAN component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



6.2 RADIO FREQUENCY TEST SETUP

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m. The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.

Below 30MHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT.

Above 30MHz:

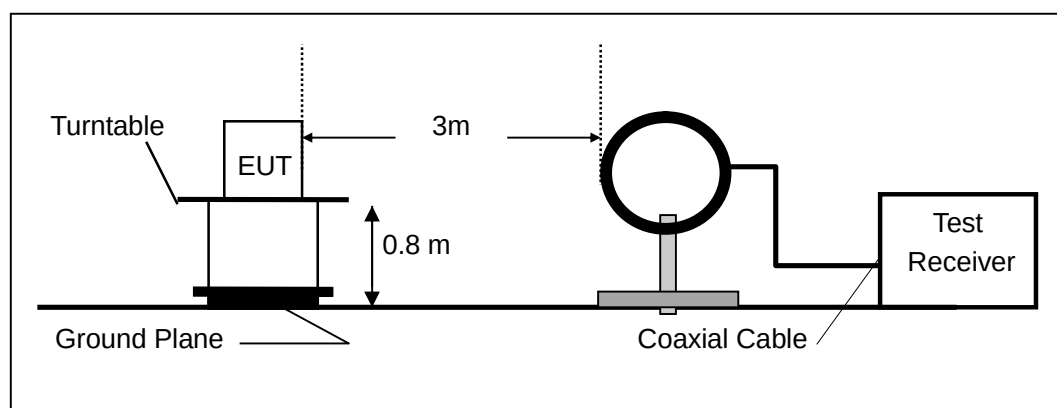
The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

Above 1GHz:

(Note: the FCC's permission to use 1.5m as an alternative per TCBC Conf call of Dec. 2, 2014.)

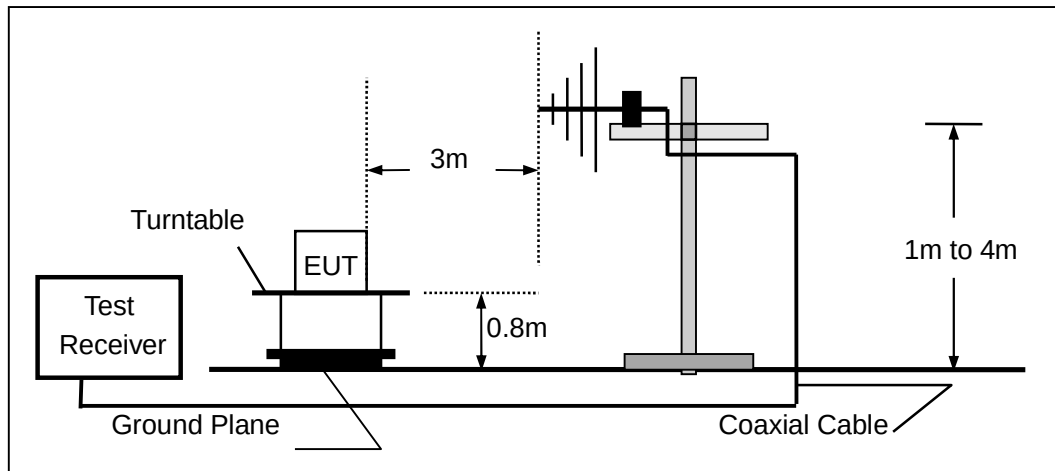
The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

(a) Radiated Emission Test Set-Up, Frequency Below 30MHz

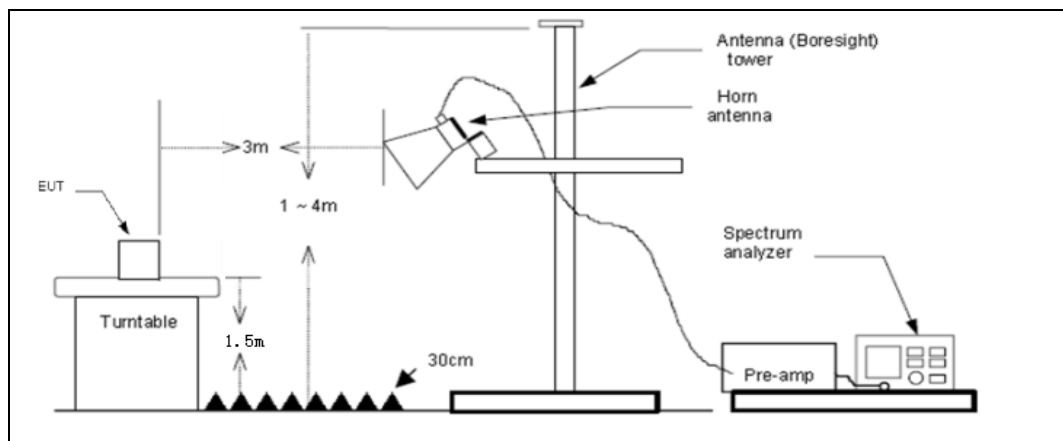




(b) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(c) Radiated Emission Test Set-Up, Frequency above 1000MHz



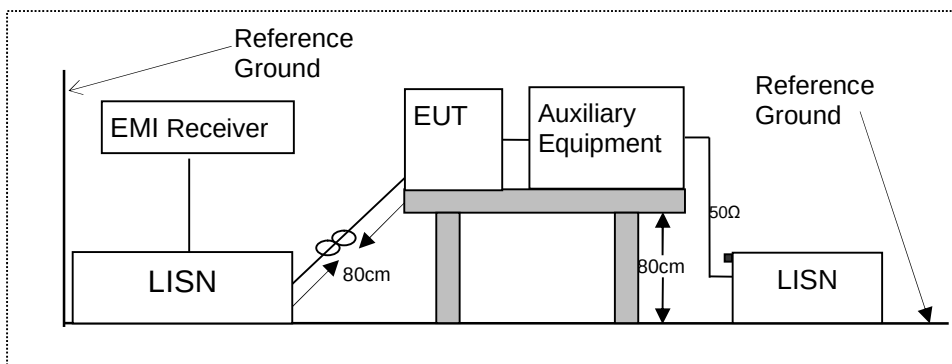


6.3 CONDUCTED EMISSION TEST SETUP

The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

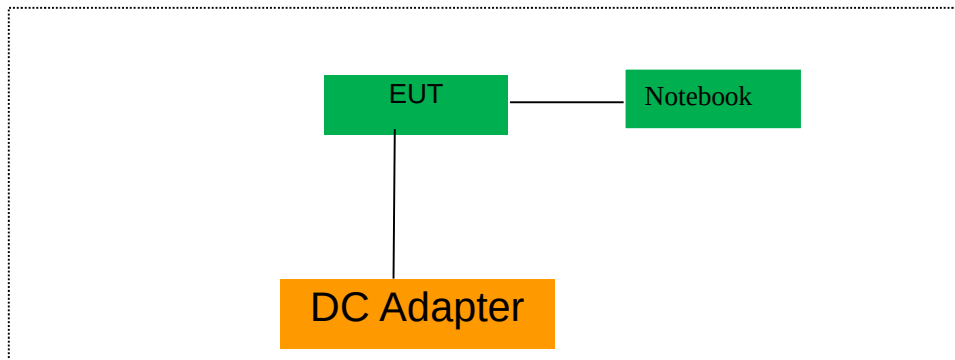
Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.1 m.

According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.





6.4 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



6.5 SUPPORT EQUIPMENT

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
DC cable	1.0	Unshielded	Without Ferrite

Auxiliary Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Notebook	Lenovo	MPNXB1505007	MP1XHYV7

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.



7 TEST REQUIREMENTS

7.1 BANDWIDTH MEASUREMENT

7.1.1 Applicable Standard

According to FCC Part 15.407(a)(1) for UNII Band I
According to FCC Part 15.407(a)(2) for UNII Band II-A and UNII Band II-C
According to FCC Part 15.407(a)(3) for UNII Band III
According to FCC Part 15.407(e) for UNII Band III
According to 789033 D02 Section II(C)
According to 789033 D02 Section II(D)

7.1.2 Conformance Limit

(1) For the band 5.15-5.25 GHz.

(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.

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

7.1.3 Test Configuration

Test according to clause 6.1 radio frequency test setup

7.1.4 Test Procedure

According to 789033 D02 v01r02 section C&D, the following is the measurement procedure.

1. Emission Bandwidth (EBW)

- Set RBW = approximately 1% of the emission bandwidth.
- Set the VBW > RBW.
- Detector = Peak.
- Trace mode = max hold.
- 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%.



2. Minimum Emission Bandwidth for the band 5.725-5.85 GHz

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) $\geq 3 \times \text{RBW}$.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described above.

D. 99 Percent Occupied Bandwidth

The 99-percent occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5 % of the total mean power of the given emission. Measurement of the 99-percent occupied bandwidth is required only as a condition for using the optional band-edge measurement techniques described in section II.G.3.d). Measurements of 99-percent occupied bandwidth may also optionally be used in lieu of the EBW to 789033 D02 v01r02 General UNII Test Procedures New Rules v01 define the minimum frequency range over which the spectrum is integrated when measuring maximum conducted output power as described in section II.E. However, the EBW must be measured to determine bandwidth dependent limits on maximum conducted output power in accordance with 15.407(a).

The following procedure shall be used for measuring (99 %) power bandwidth:

1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW
4. Set VBW $\geq 3 \cdot \text{RBW}$
5. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
6. Use the 99 % power bandwidth function of the instrument (if available).
7. If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.



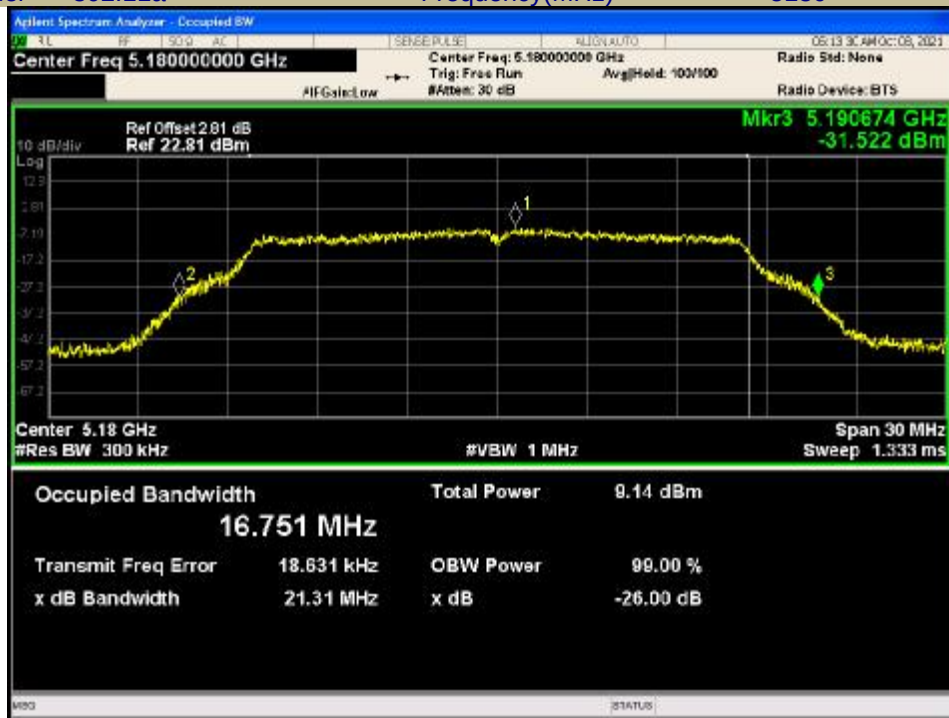
7.1.5 Test Results

5150-5250MHz

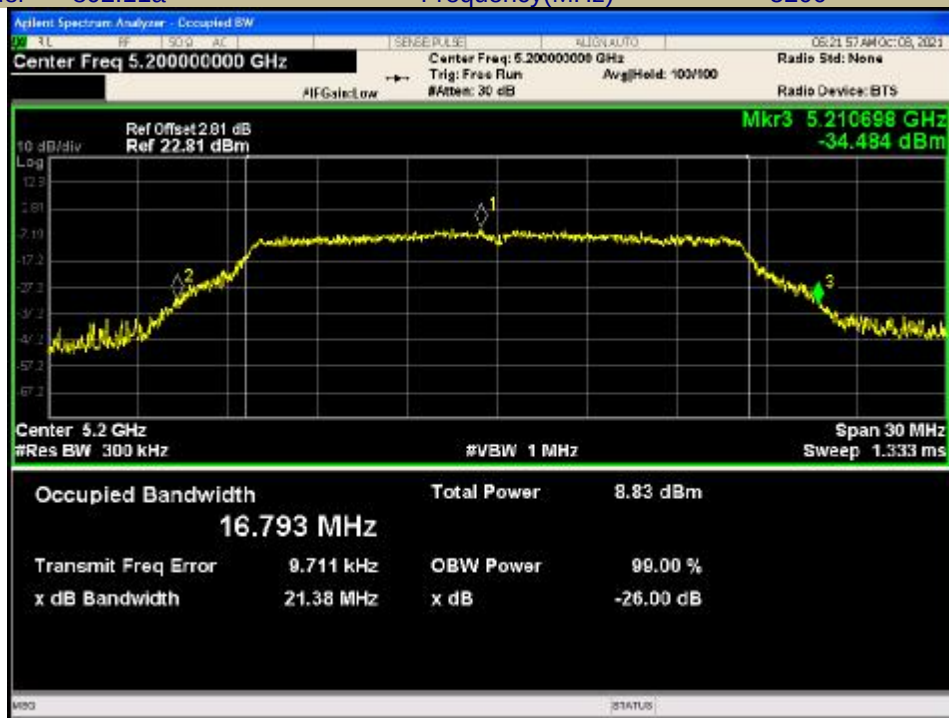
Test Mode	Test Channel MHz		26 dB Bandwidth MHz	99% Bandwidth MHz	Verdict
802.11a	CH36	5180	21.31	16.75	Pass
	CH40	5200	21.38	16.79	Pass
	CH48	5240	21.06	16.73	Pass
802.11n-HT20	CH36	5180	21.44	17.84	Pass
	CH40	5200	21.48	17.86	Pass
	CH48	5240	21.52	17.91	Pass
802.11ac(VHT20)	CH36	5180	20.69	16.55	Pass
	CH40	5200	21.01	16.57	Pass
	CH48	5240	21.00	16.56	Pass
802.11n-HT40	CH38	5190	39.89	36.14	Pass
	CH46	5230	39.78	36.17	Pass
802.11ac(VHT40)	CH38	5190	39.75	36.17	Pass
	CH46	5230	39.52	36.14	Pass
802.11ac(VHT80)	CH42	5210	79.85	75.26	Pass



Emission Bandwidth&99% Occupied Bandwidth U-NII - 1
Test Model 802.11a Frequency(MHz) 5180

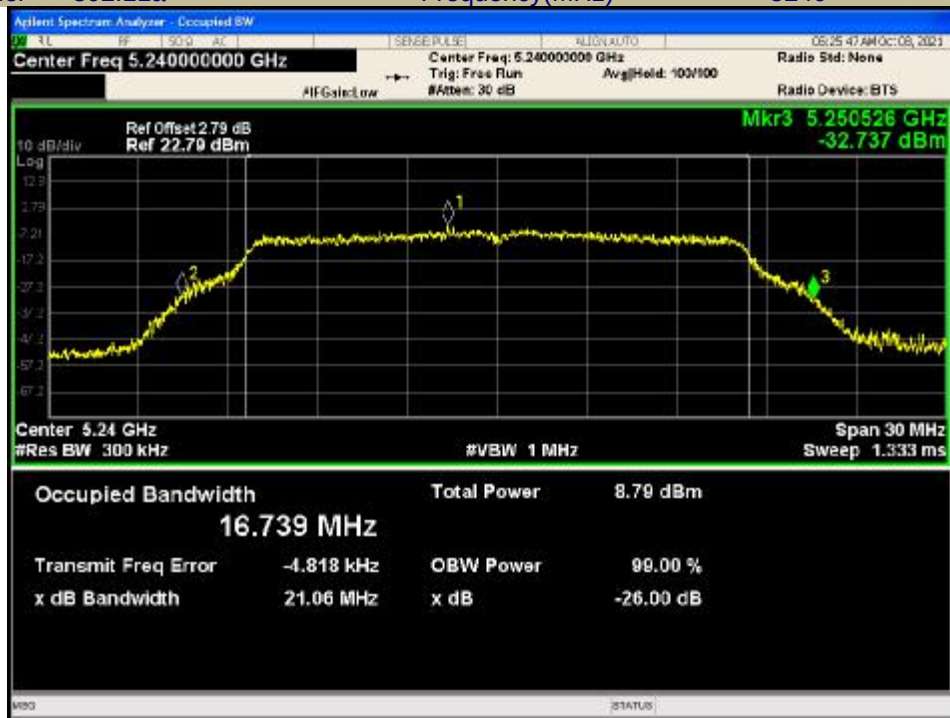


Emission Bandwidth&99% Occupied Bandwidth U-NII - 1
Test Model 802.11a Frequency(MHz) 5200





Emission Bandwidth&99% Occupied Bandwidth U-NII - 1
Test Model 802.11a Frequency(MHz) 5240

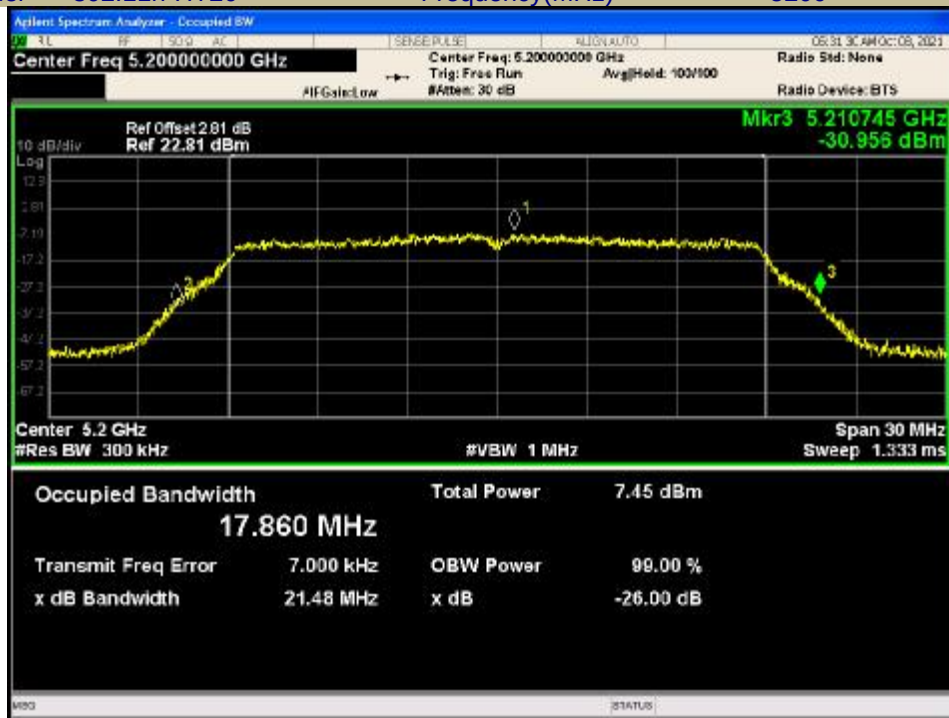


Emission Bandwidth&99% Occupied Bandwidth U-NII - 1
Test Model 802.11n-HT20 Frequency(MHz) 5180





Emission Bandwidth&99% Occupied Bandwidth U-NII - 1
Test Model 802.11n-HT20 Frequency(MHz) 5200

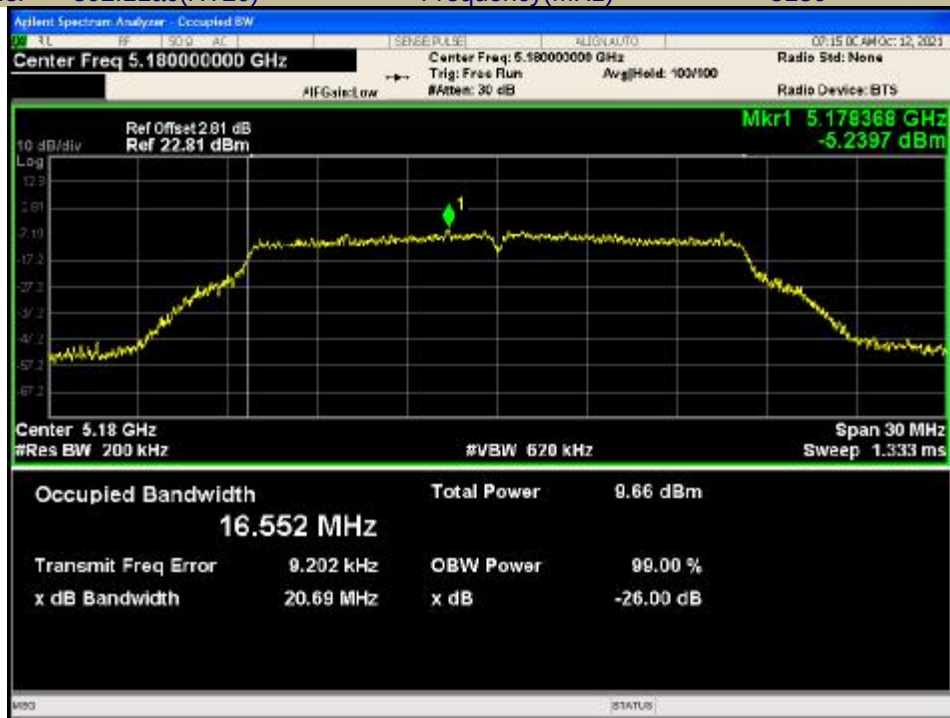


Emission Bandwidth&99% Occupied Bandwidth U-NII - 1
Test Model 802.11n-HT20 Frequency(MHz) 5240

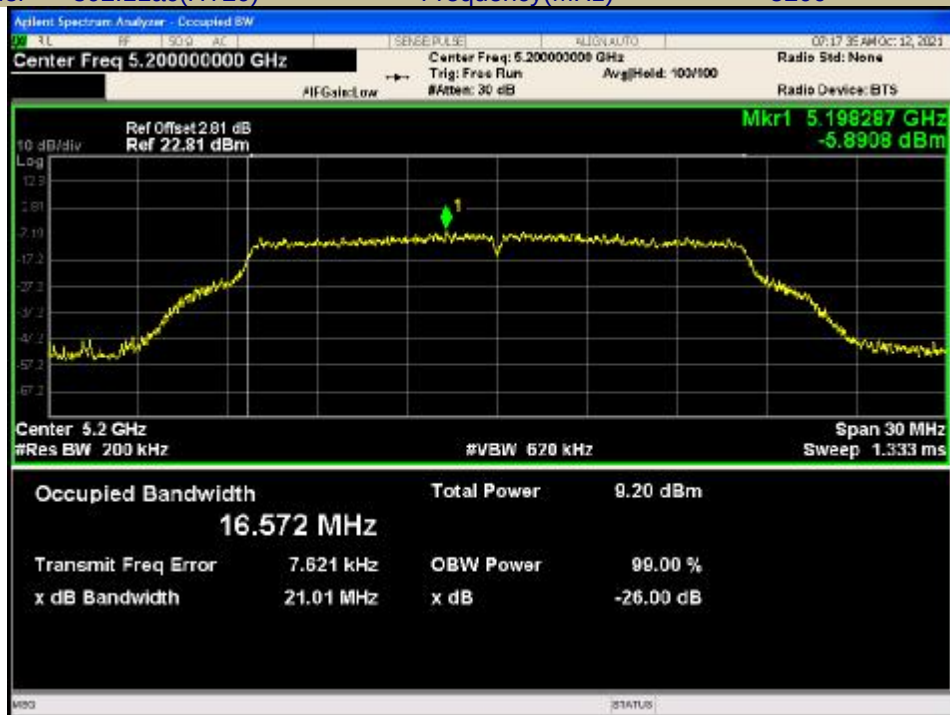




Emission Bandwidth&99% Occupied Bandwidth U-NII - 1
Test Model 802.11ac(HT20) Frequency(MHz) 5180

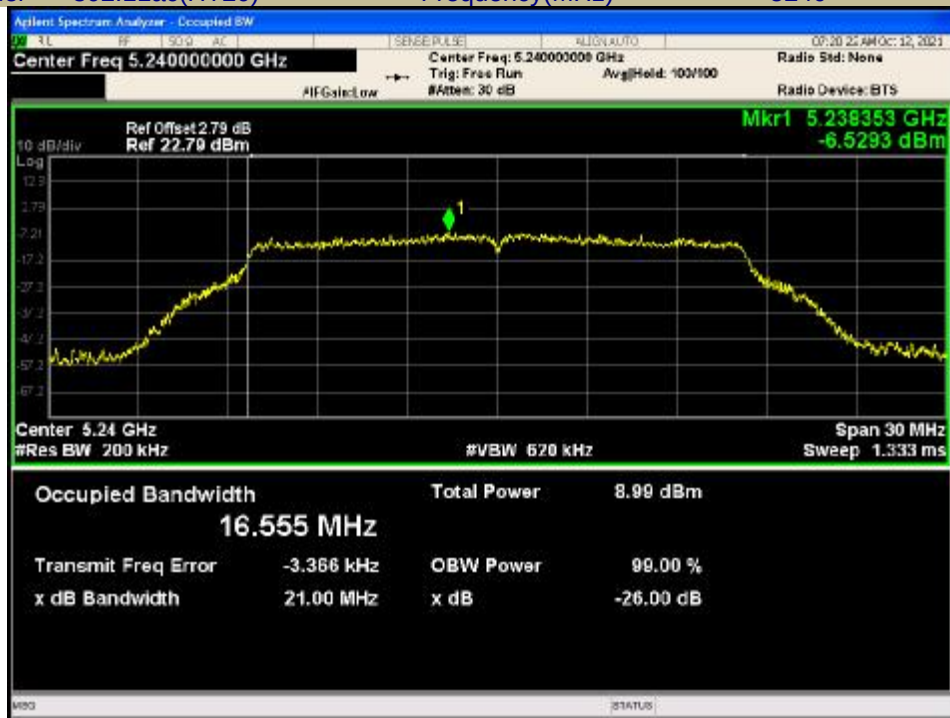


Emission Bandwidth&99% Occupied Bandwidth U-NII - 1
Test Model 802.11ac(HT20) Frequency(MHz) 5200

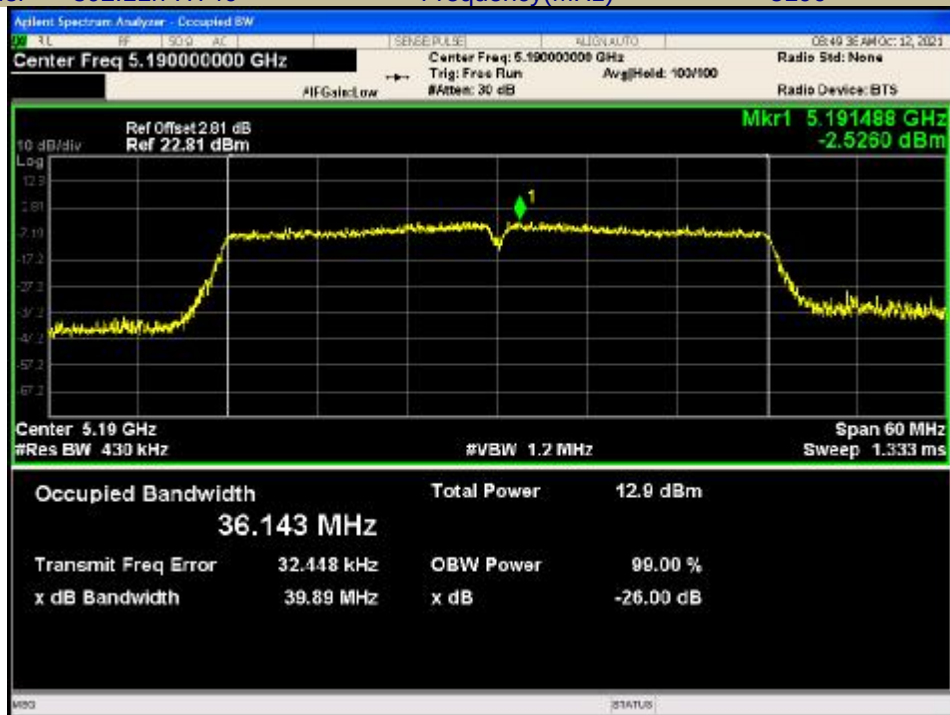




Emission Bandwidth&99% Occupied Bandwidth U-NII - 1
Test Model 802.11ac(HT20) Frequency(MHz) 5240

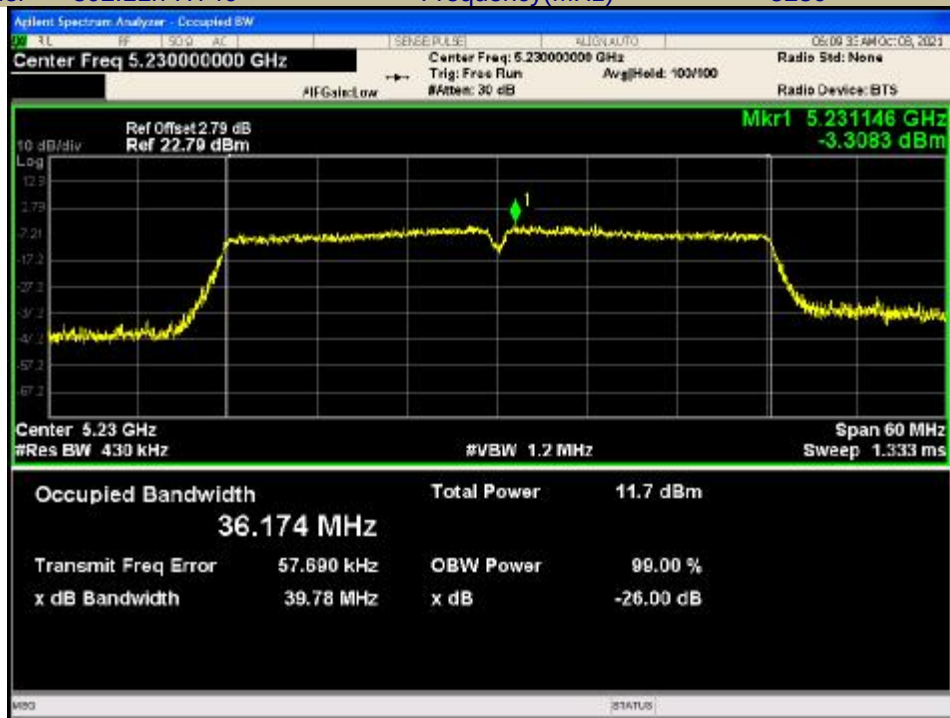


Emission Bandwidth&99% Occupied Bandwidth U-NII - 1
Test Model 802.11n-HT40 Frequency(MHz) 5190

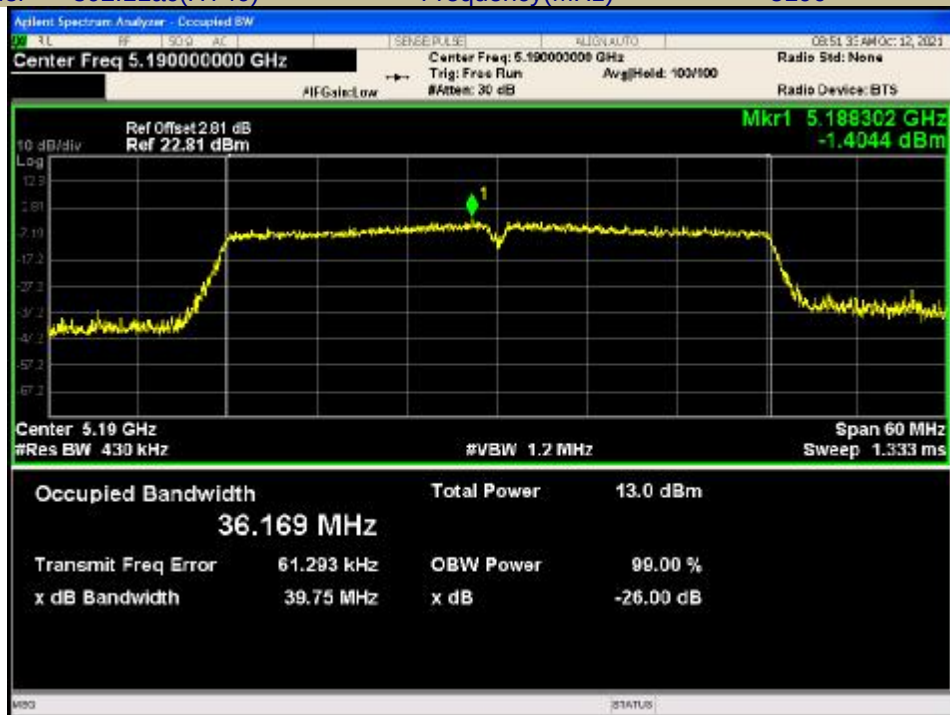




Emission Bandwidth&99% Occupied Bandwidth U-NII - 1
Test Model 802.11n-HT40 Frequency(MHz) 5230

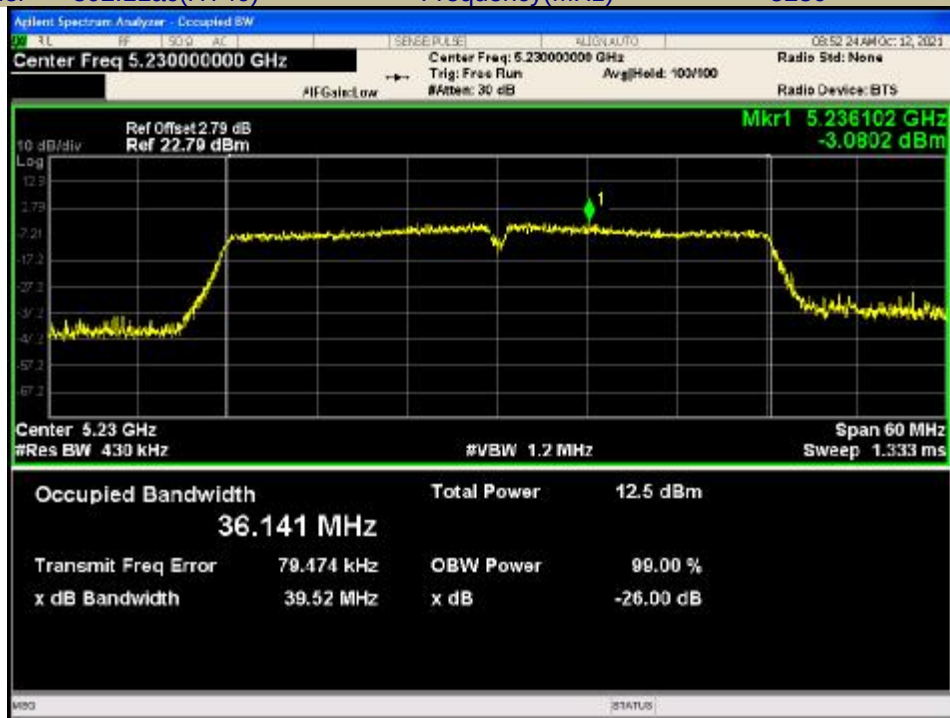


Emission Bandwidth&99% Occupied Bandwidth U-NII - 1
Test Model 802.11ac(HT40) Frequency(MHz) 5190

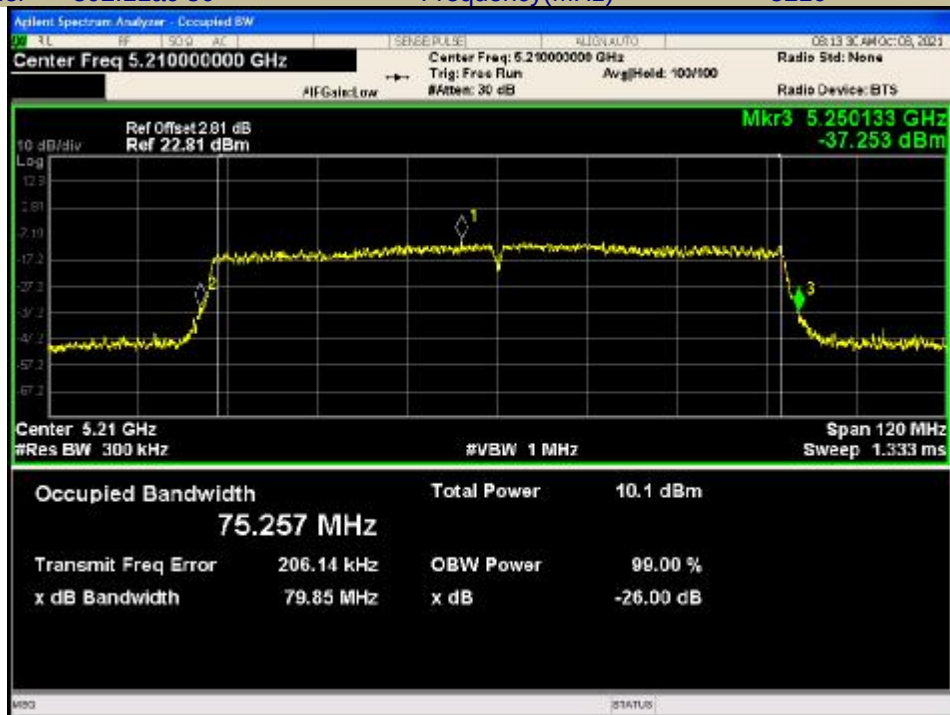




Emission Bandwidth&99% Occupied Bandwidth U-NII - 1
Test Model 802.11ac(HT40) Frequency(MHz) 5230



Emission Bandwidth&99% Occupied Bandwidth U-NII - 1
Test Model 802.11ac 80 Frequency(MHz) 5210



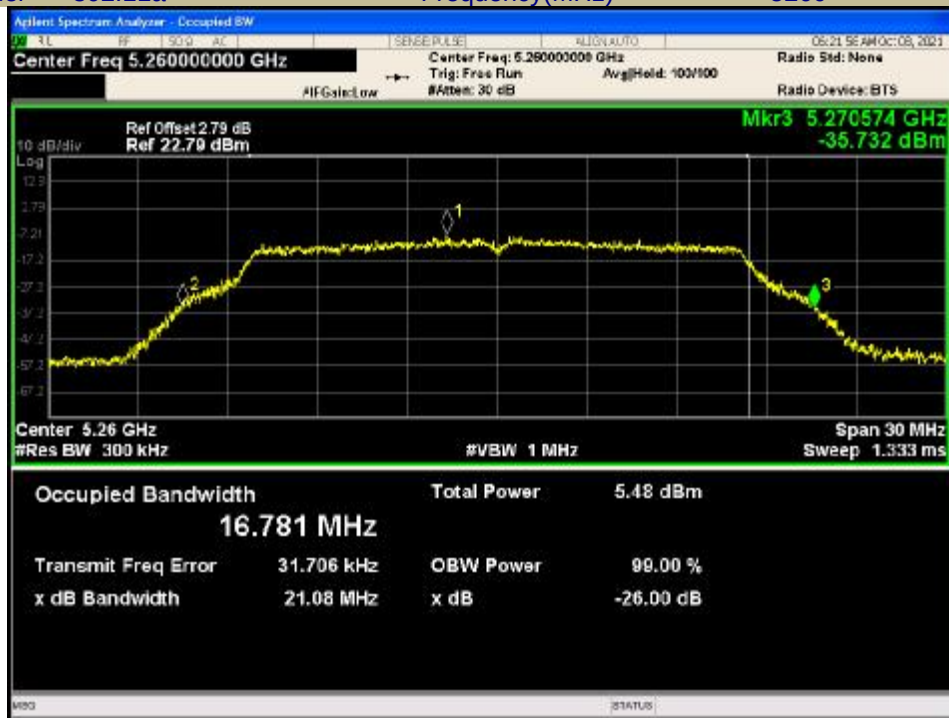


5250-5350MHz

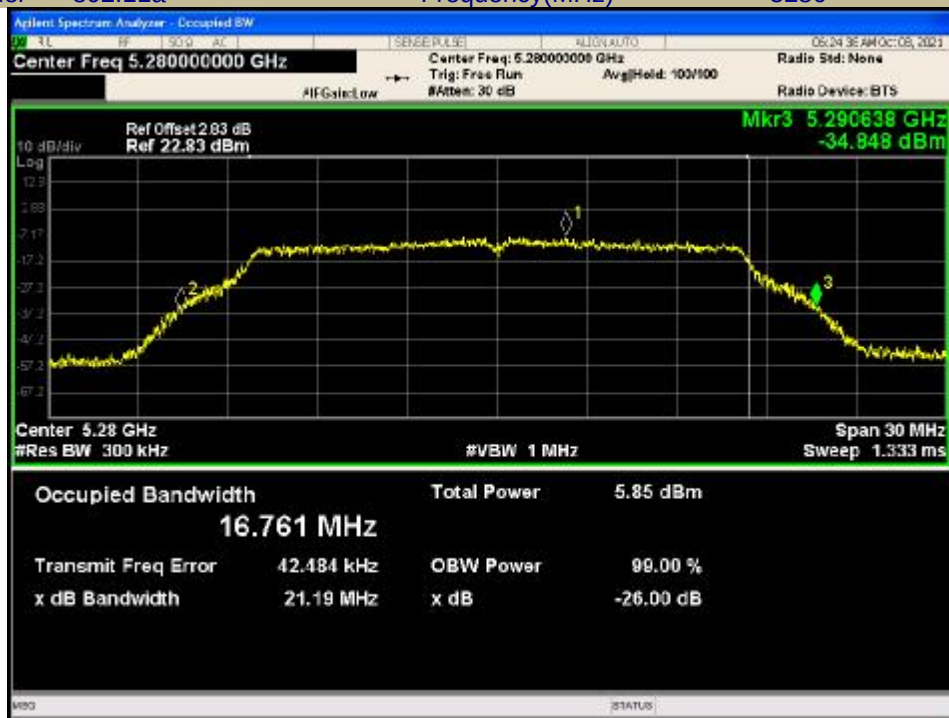
Test Mode	Test Channel MHz		26 dB Bandwidth MHz	99% Bandwidth MHz	Verdict
802.11a	CH52	5260	21.08	16.78	Pass
	CH56	5280	21.19	16.77	Pass
	CH64	5320	21.16	16.80	Pass
802.11n-HT20	CH52	5260	21.33	17.86	Pass
	CH56	5280	21.55	17.89	Pass
	CH64	5320	21.55	17.88	Pass
802.11ac(VHT20)	CH52	5260	21.40	16.78	Pass
	CH56	5280	21.05	16.74	Pass
	CH64	5320	21.03	16.78	Pass
802.11n-HT40	CH54	5270	39.42	36.09	Pass
	CH62	5310	39.19	36.04	Pass
802.11ac(VHT40)	CH54	5270	39.41	36.10	Pass
	CH62	5310	39.54	36.09	Pass
802.11ac(VHT80)	CH58	5290	79.05	75.16	Pass



Emission Bandwidth&99% Occupied Bandwidth U-NII – 2A
Test Model 802.11a Frequency(MHz) 5260

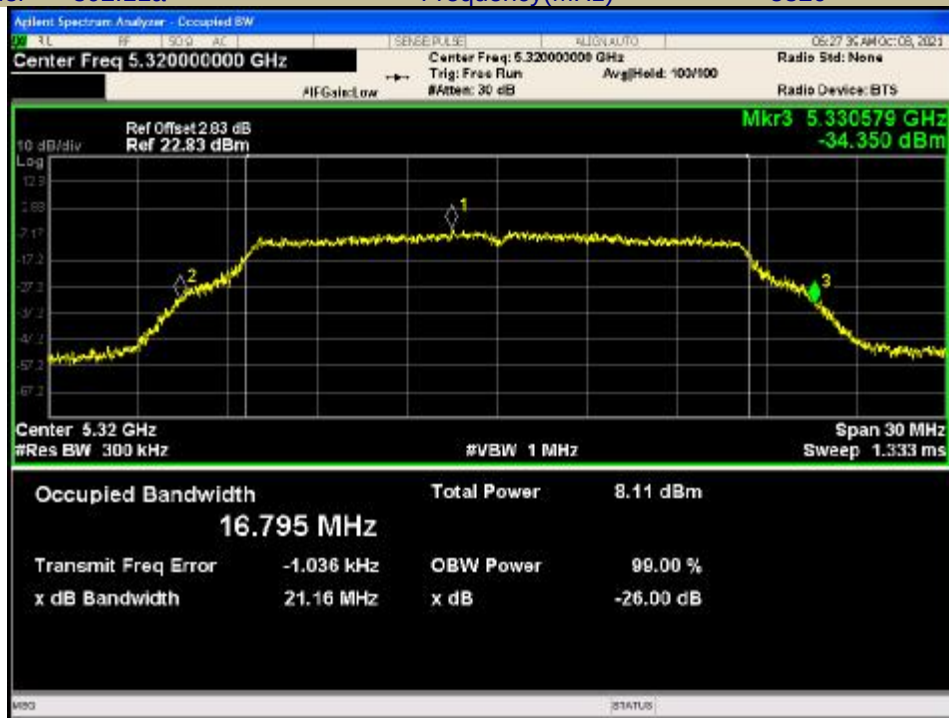


Emission Bandwidth&99% Occupied Bandwidth U-NII – 2A
Test Model 802.11a Frequency(MHz) 5280





Emission Bandwidth&99% Occupied Bandwidth U-NII – 2A
Test Model 802.11a Frequency(MHz) 5320

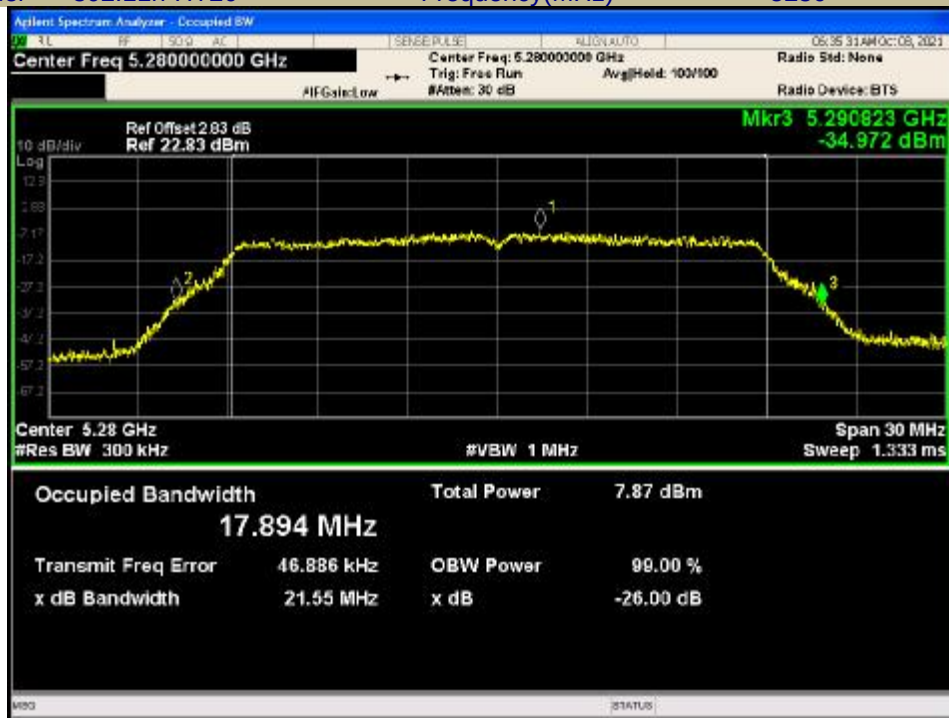


Emission Bandwidth&99% Occupied Bandwidth U-NII – 2A
Test Model 802.11n-HT20 Frequency(MHz) 5260





Emission Bandwidth&99% Occupied Bandwidth U-NII – 2A
Test Model 802.11n-HT20 Frequency(MHz) 5280

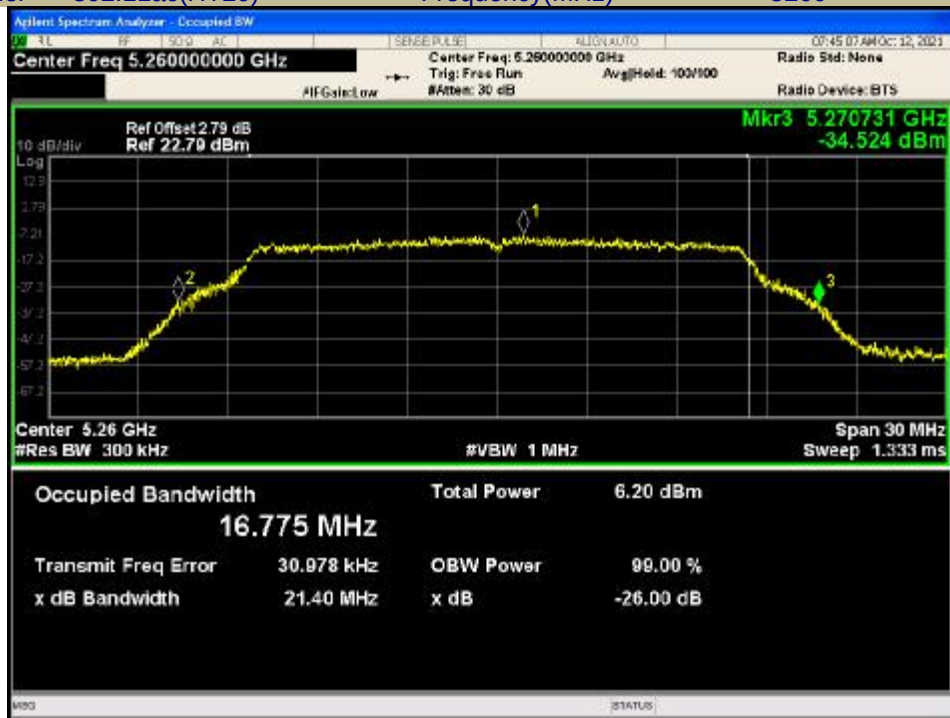


Emission Bandwidth&99% Occupied Bandwidth U-NII – 2A
Test Model 802.11n-HT20 Frequency(MHz) 5320





Emission Bandwidth&99% Occupied Bandwidth U-NII – 2A
Test Model 802.11ac(HT20) Frequency(MHz) 5260

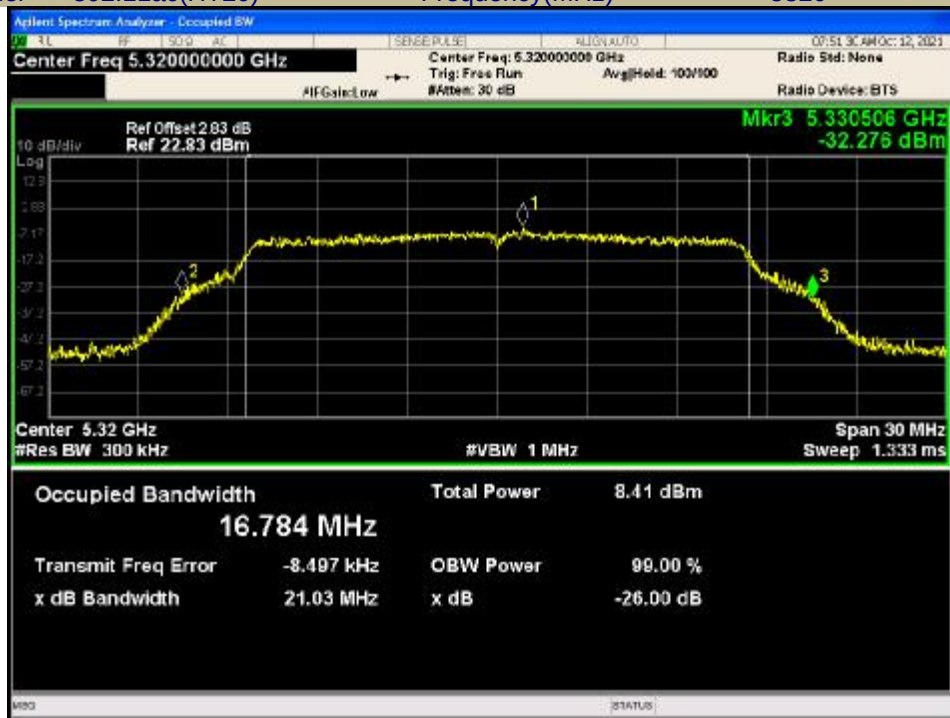


Emission Bandwidth&99% Occupied Bandwidth U-NII – 2A
Test Model 802.11ac(HT20) Frequency(MHz) 5280





Emission Bandwidth&99% Occupied Bandwidth U-NII – 2A
Test Model 802.11ac(HT20) Frequency(MHz) 5320

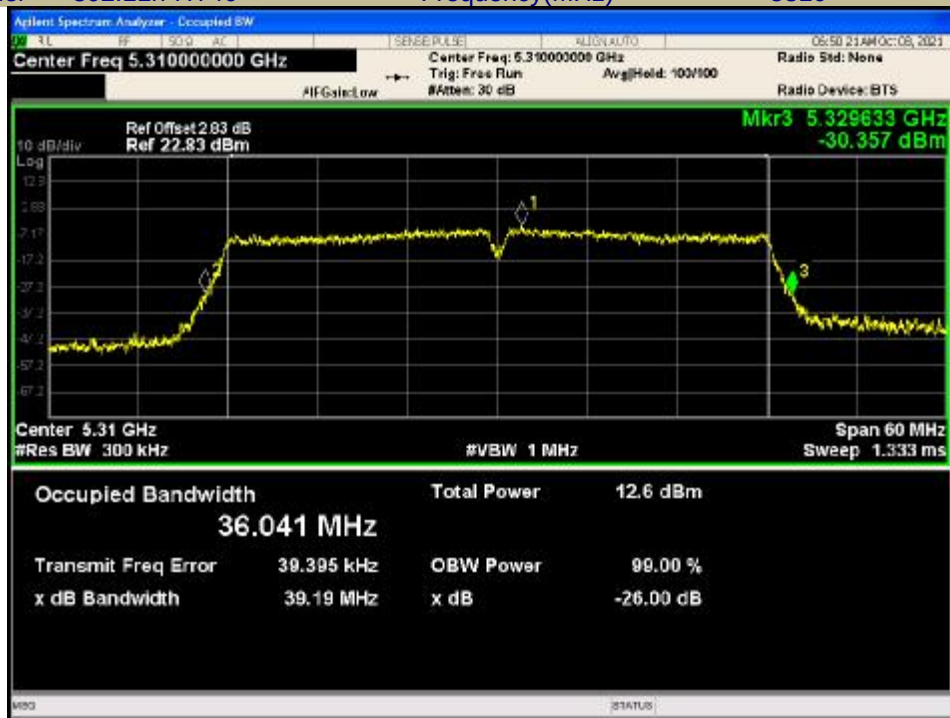


Emission Bandwidth&99% Occupied Bandwidth U-NII – 2A
Test Model 802.11n-HT40 Frequency(MHz) 5270





Emission Bandwidth&99% Occupied Bandwidth U-NII – 2A
Test Model 802.11n-HT40 Frequency(MHz) 5310

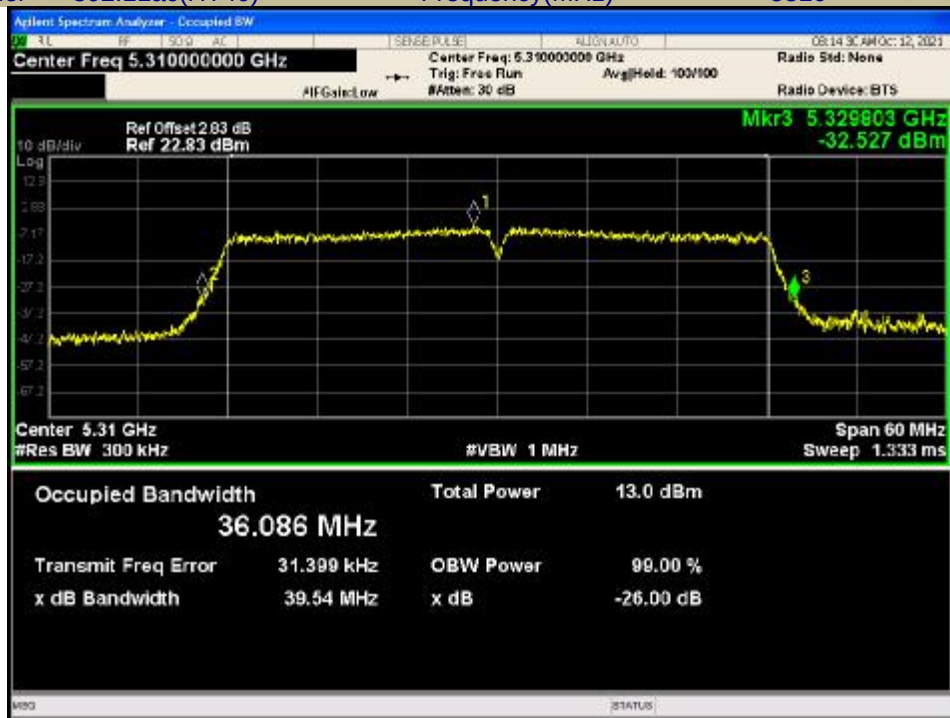


Emission Bandwidth&99% Occupied Bandwidth U-NII – 2A
Test Model 802.11ac(HT40) Frequency(MHz) 5270

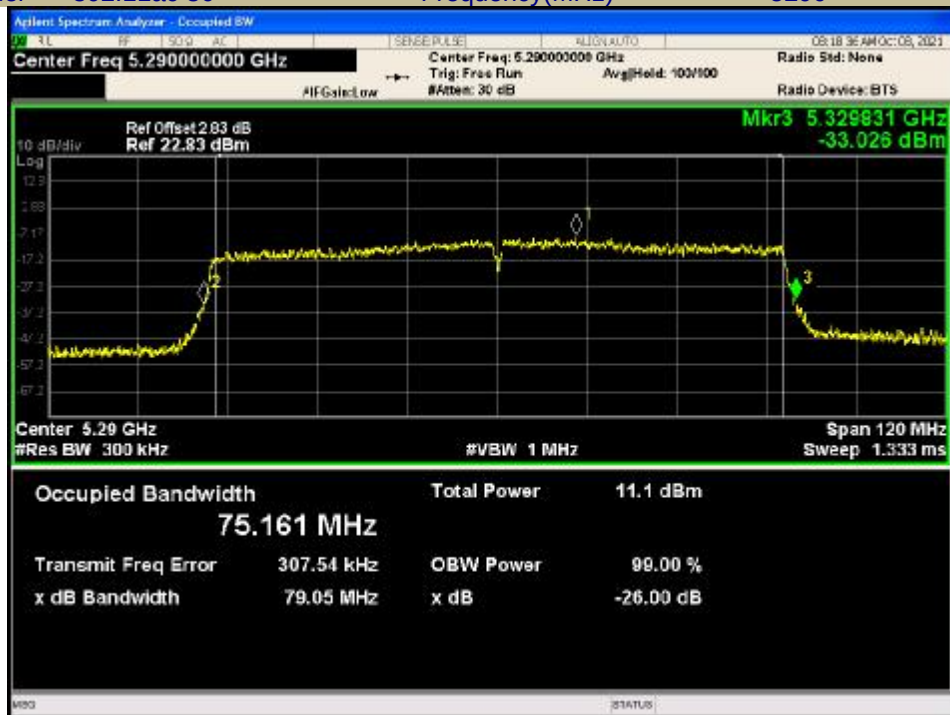




Emission Bandwidth&99% Occupied Bandwidth U-NII – 2A
Test Model 802.11ac(HT40) Frequency(MHz) 5310



Emission Bandwidth&99% Occupied Bandwidth U-NII – 2A
Test Model 802.11ac 80 Frequency(MHz) 5290



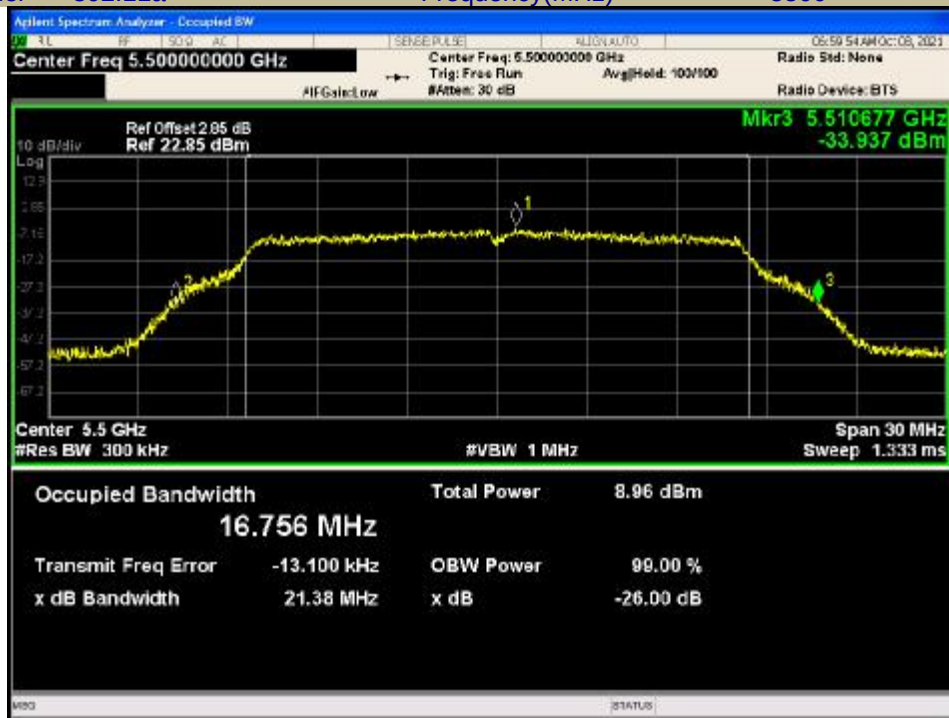


5470-5725MHz

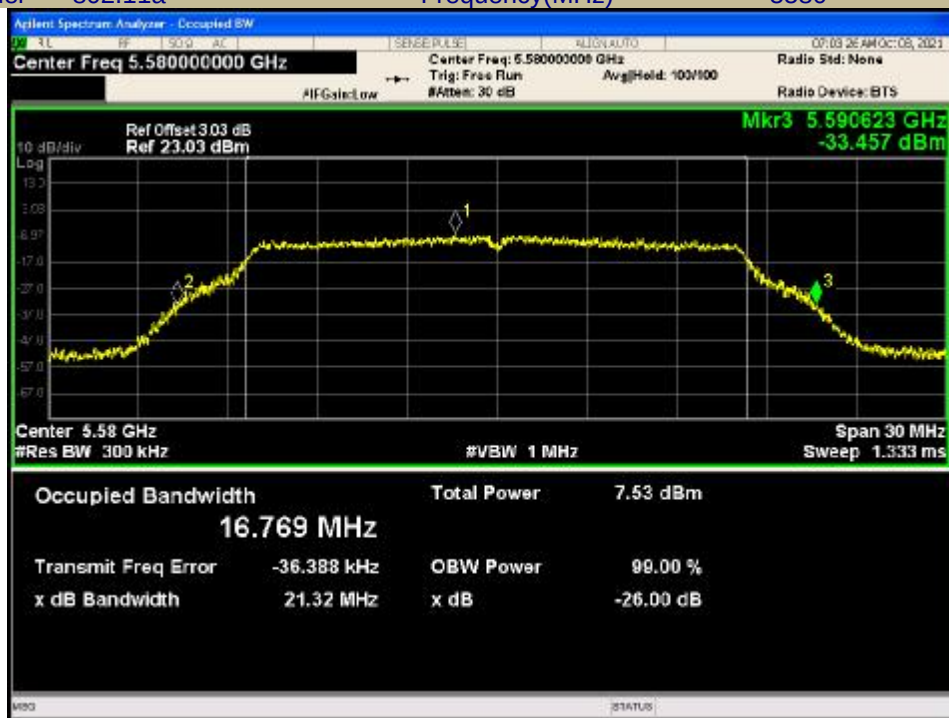
Test Mode	Test Channel MHz		26 dB Bandwidth MHz	99% Bandwidth MHz	Verdict
802.11a	CH100	5500	21.38	16.76	Pass
	CH116	5580	21.32	16.77	Pass
	CH140	5700	21.15	16.82	Pass
802.11n-HT20	CH100	5500	21.39	17.91	Pass
	CH116	5580	21.49	17.90	Pass
	CH140	5700	21.50	17.96	Pass
802.11ac(VHT20)	CH100	5500	21.59	17.90	Pass
	CH116	5580	21.52	17.93	Pass
	CH140	5700	21.51	17.92	Pass
802.11n-HT40	CH102	5510	39.24	36.06	Pass
	CH 134	5670	39.25	36.10	Pass
802.11ac(VHT40)	CH102	5510	39.30	36.09	Pass
	CH 134	5670	38.98	36.12	Pass
802.11ac(VHT80)	CH106	5530	79.77	75.42	Pass



Emission Bandwidth&99% Occupied Bandwidth U-NII – 2C
Test Model 802.11a Frequency(MHz) 5500

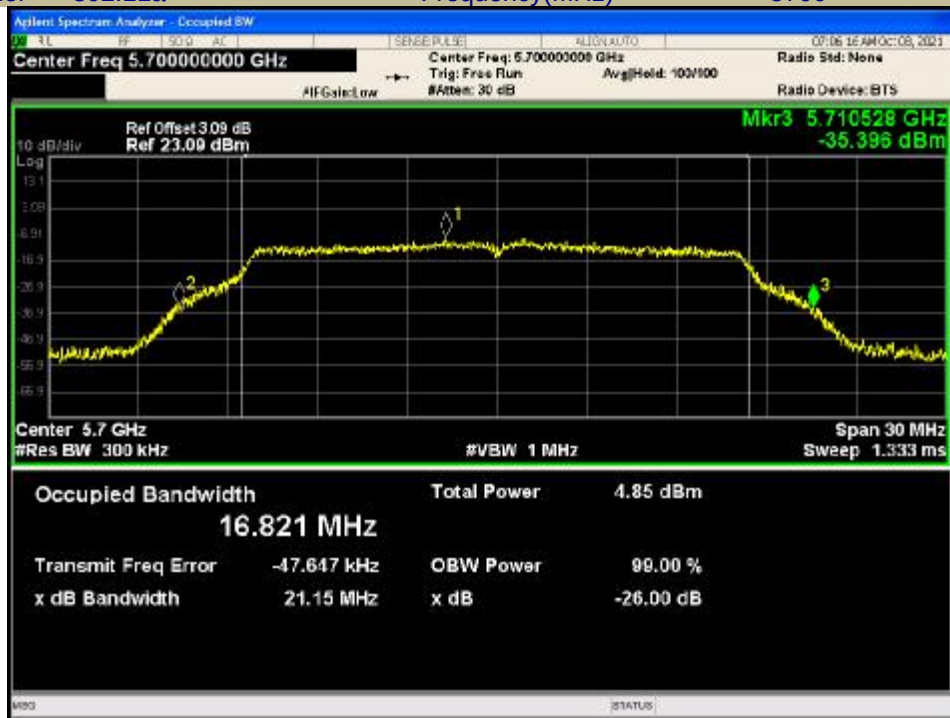


Emission Bandwidth&99% Occupied Bandwidth U-NII – 2C
Test Model 802.11a Frequency(MHz) 5580

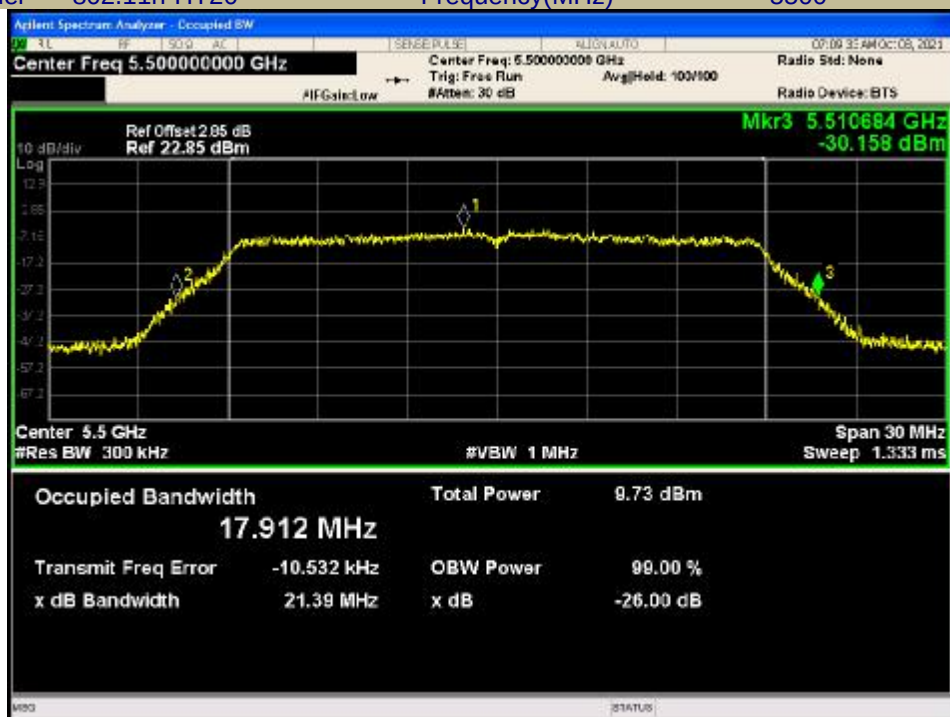




Emission Bandwidth&99% Occupied Bandwidth U-NII – 2C
Test Model 802.11a Frequency(MHz) 5700

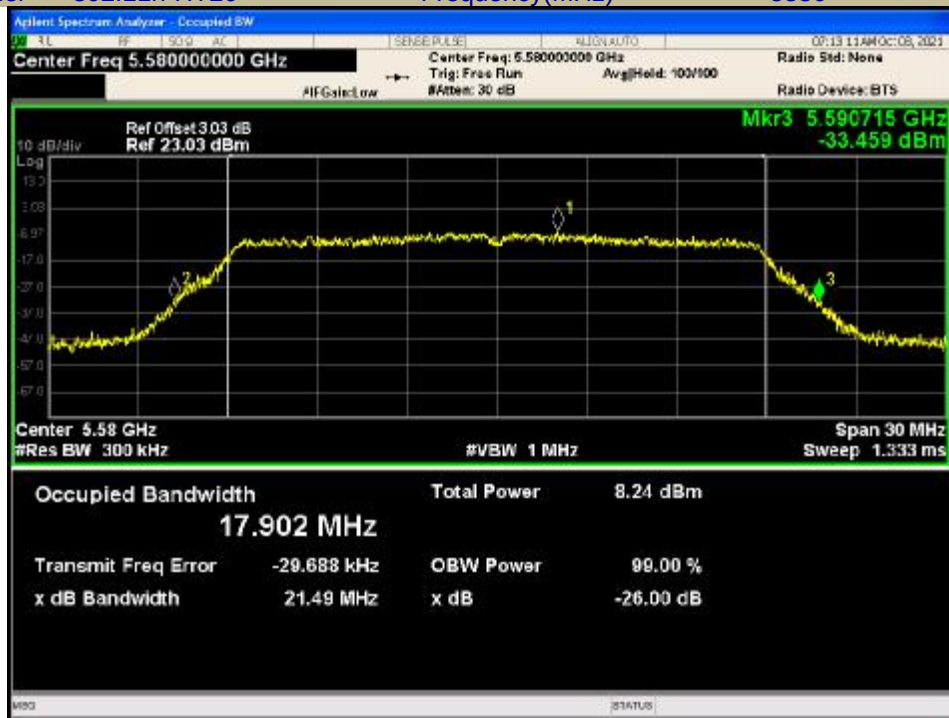


Emission Bandwidth&99% Occupied Bandwidth U-NII – 2C
Test Model 802.11n-HT20 Frequency(MHz) 5500





Emission Bandwidth&99% Occupied Bandwidth U-NII – 2C
Test Model 802.11n-HT20 Frequency(MHz) 5580

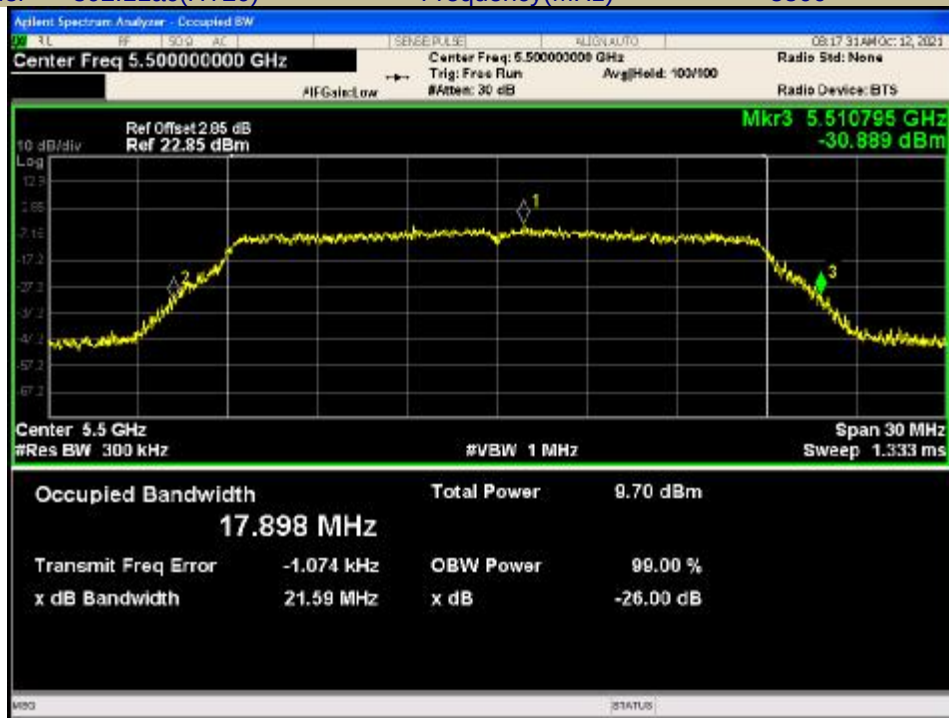


Emission Bandwidth&99% Occupied Bandwidth U-NII – 2C
Test Model 802.11n-HT20 Frequency(MHz) 5700





Emission Bandwidth&99% Occupied Bandwidth U-NII – 2C
Test Model 802.11ac(HT20) Frequency(MHz) 5500

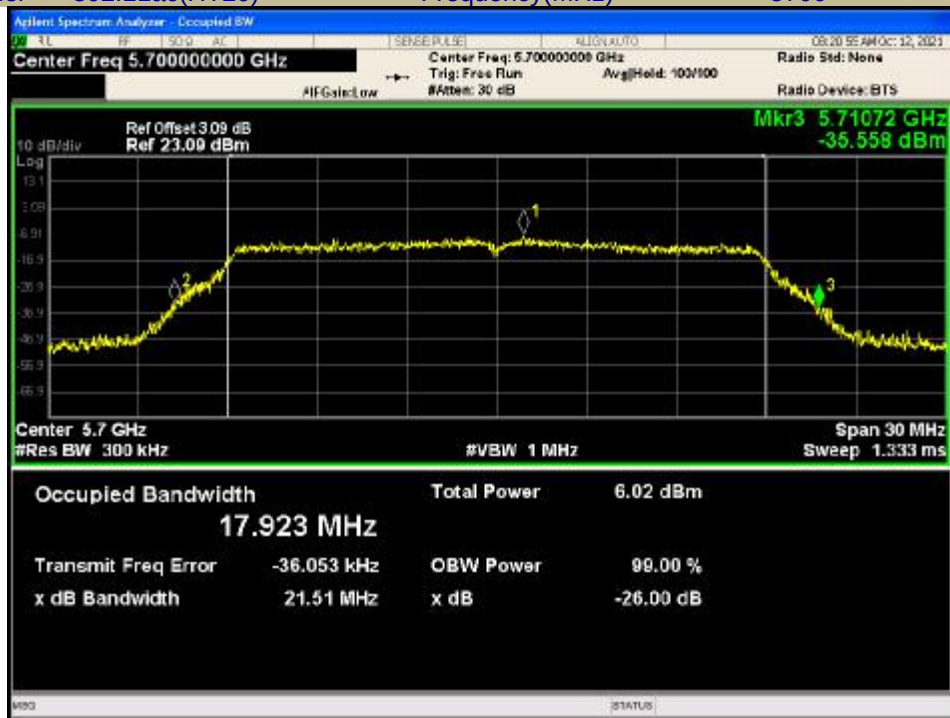


Emission Bandwidth&99% Occupied Bandwidth U-NII – 2C
Test Model 802.11ac(HT20) Frequency(MHz) 5580





Emission Bandwidth&99% Occupied Bandwidth U-NII – 2C
Test Model 802.11ac(HT20) Frequency(MHz) 5700

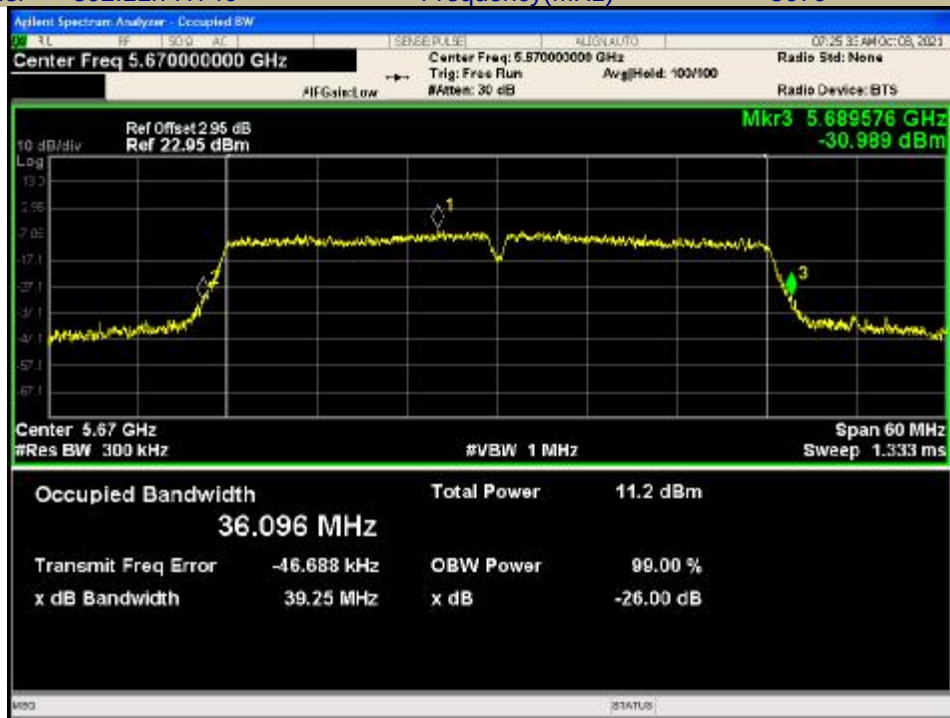


Emission Bandwidth&99% Occupied Bandwidth U-NII – 2C
Test Model 802.11n-HT40 Frequency(MHz) 5510

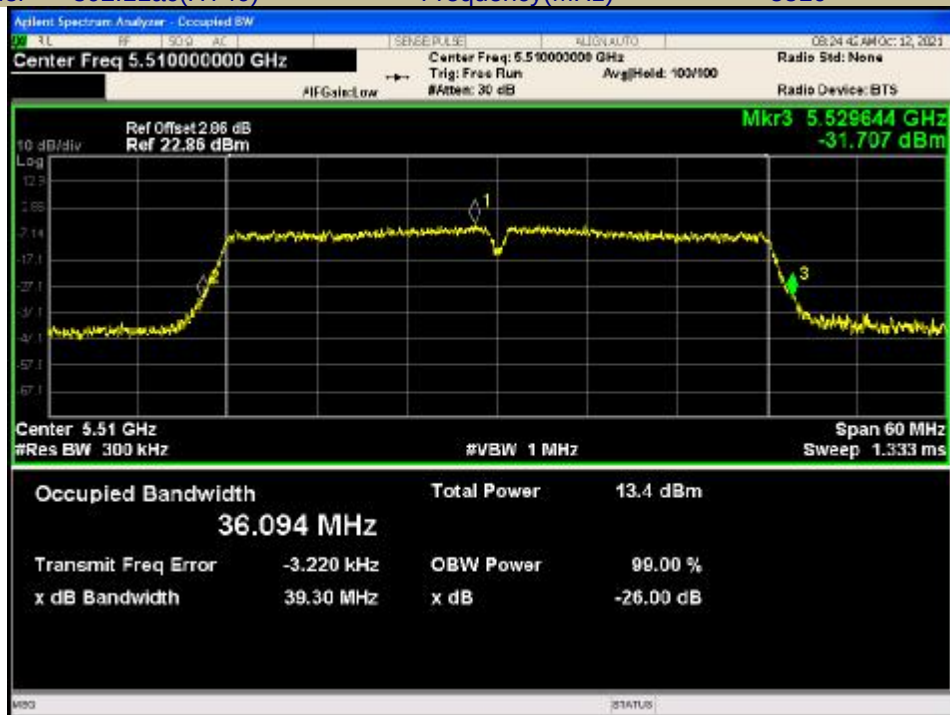




Emission Bandwidth&99% Occupied Bandwidth U-NII – 2C
Test Model 802.11n-HT40 Frequency(MHz) 5670

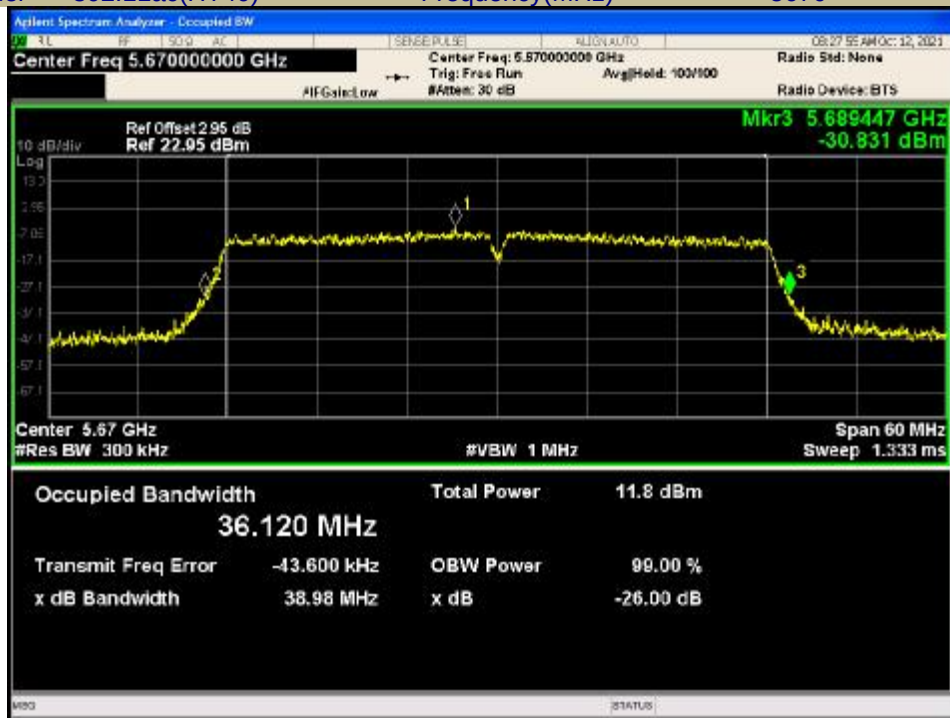


Emission Bandwidth&99% Occupied Bandwidth U-NII – 2C
Test Model 802.11ac(HT40) Frequency(MHz) 5510

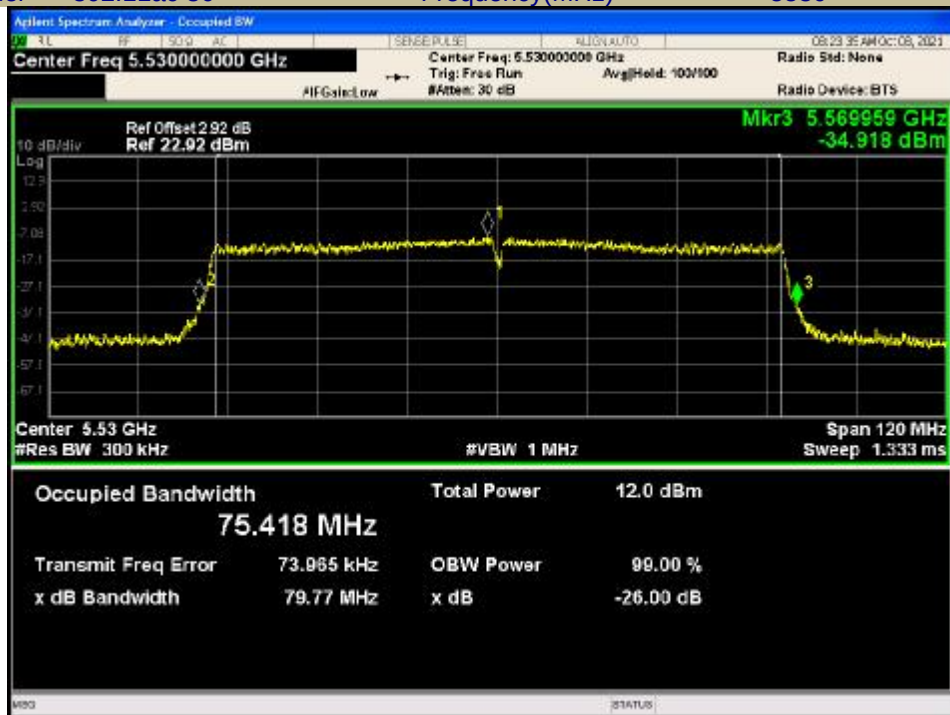




Emission Bandwidth&99% Occupied Bandwidth U-NII – 2C
Test Model 802.11ac(HT40) Frequency(MHz) 5670



Emission Bandwidth&99% Occupied Bandwidth U-NII – 2C
Test Model 802.11ac 80 Frequency(MHz) 5530



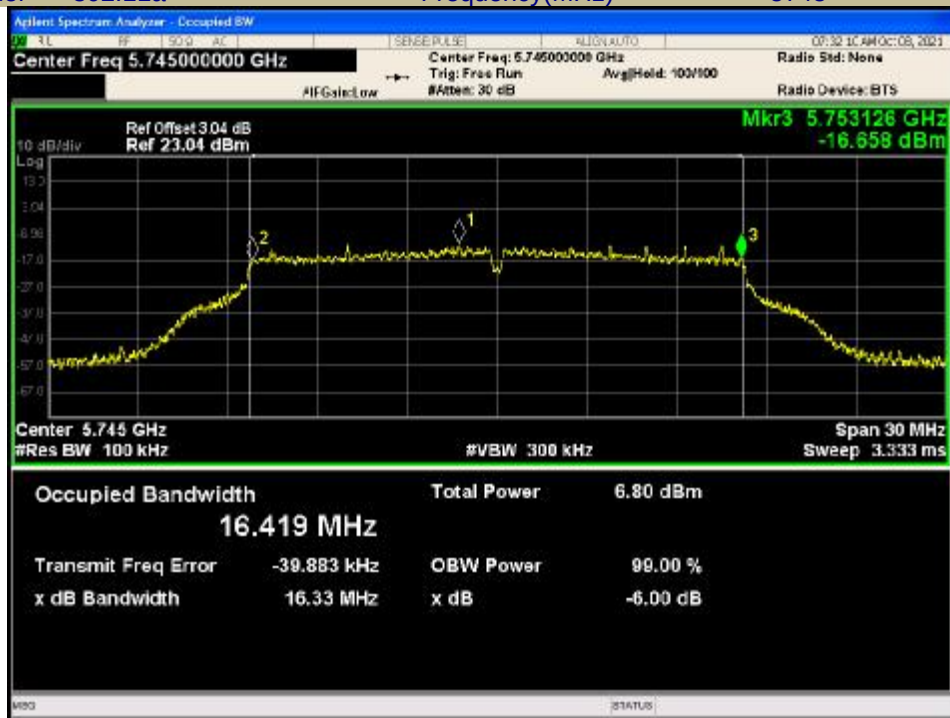


5725-5850MHz

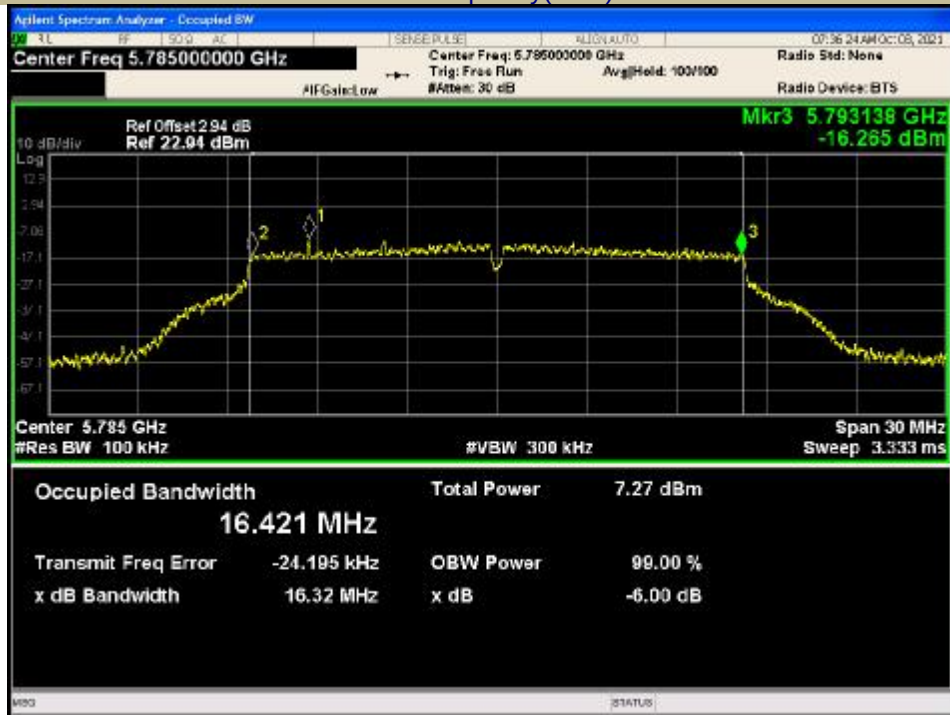
Test Mode	Test Channel MHz		6 dB Bandwidth MHz	99% Bandwidth MHz	Limit kHz
802.11a	CH149	5745	16.33	16.42	≥500
	CH157	5785	16.32	16.42	≥500
	CH165	5825	16.32	16.46	≥500
802.11n-HT20	CH149	5745	17.06	17.65	≥500
	CH157	5785	17.02	17.63	≥500
	CH165	5825	17.26	17.66	≥500
802.11ac(VHT20)	CH149	5745	16.90	17.61	≥500
	CH157	5785	17.56	17.65	≥500
	CH165	5825	17.56	17.66	≥500
802.11n-HT40	CH151	5755	35.53	36.04	≥500
	CH159	5795	36.05	36.05	≥500
802.11ac(VHT40)	CH151	5755	35.91	36.07	≥500
	CH159	5795	35.43	36.05	≥500
802.11ac(VHT80)	CH155	5775	75.45	75.38	≥500



Emission Bandwidth&99% Occupied Bandwidth U-NII - 3
Test Model 802.11a Frequency(MHz) 5745



Emission Bandwidth&99% Occupied Bandwidth U-NII - 3
Test Model 802.11a Frequency(MHz) 5785

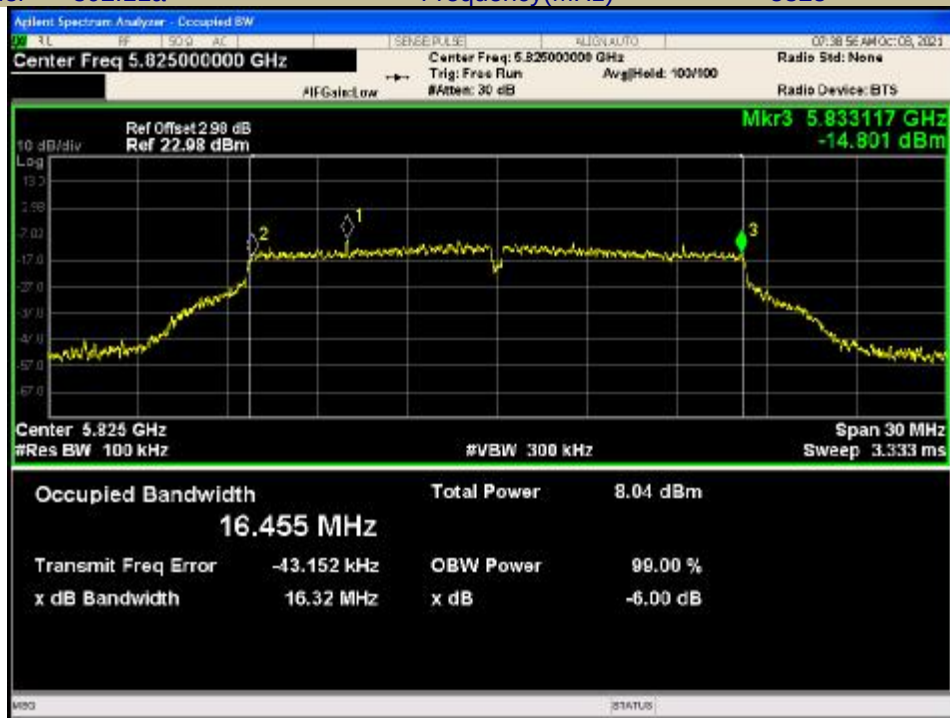




Emission Bandwidth&99% Occupied Bandwidth
Test Model 802.11a

U-NII - 3
Frequency(MHz)

5825



Emission Bandwidth&99% Occupied Bandwidth
Test Model 802.11n-HT20

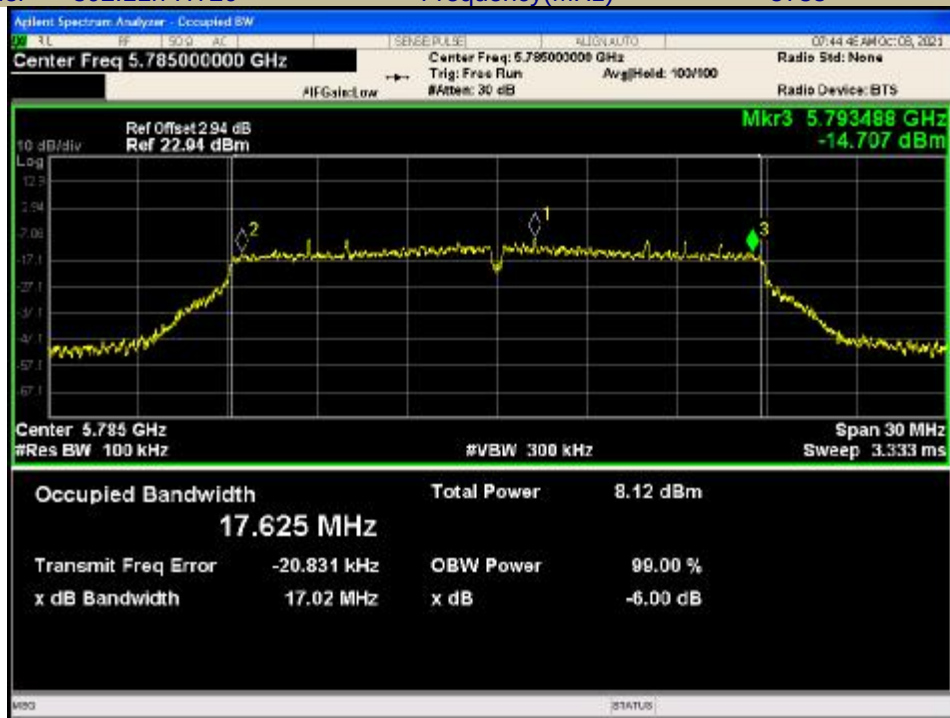
U-NII - 3
Frequency(MHz)

5745





Emission Bandwidth&99% Occupied Bandwidth U-NII - 3
Test Model 802.11n-HT20 Frequency(MHz) 5785

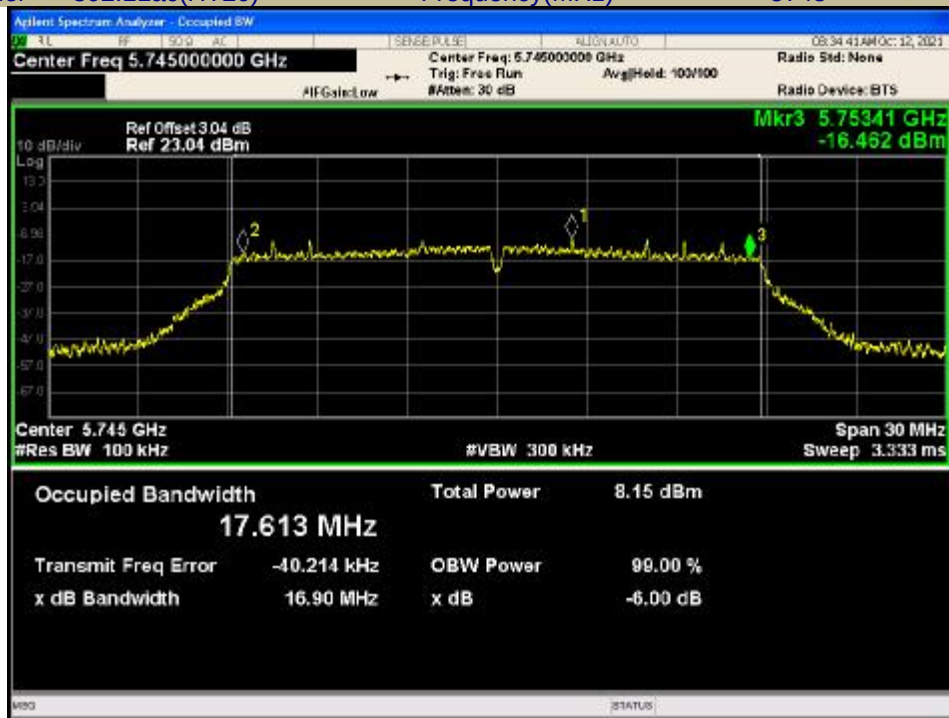


Emission Bandwidth&99% Occupied Bandwidth U-NII - 3
Test Model 802.11n-HT20 Frequency(MHz) 5825

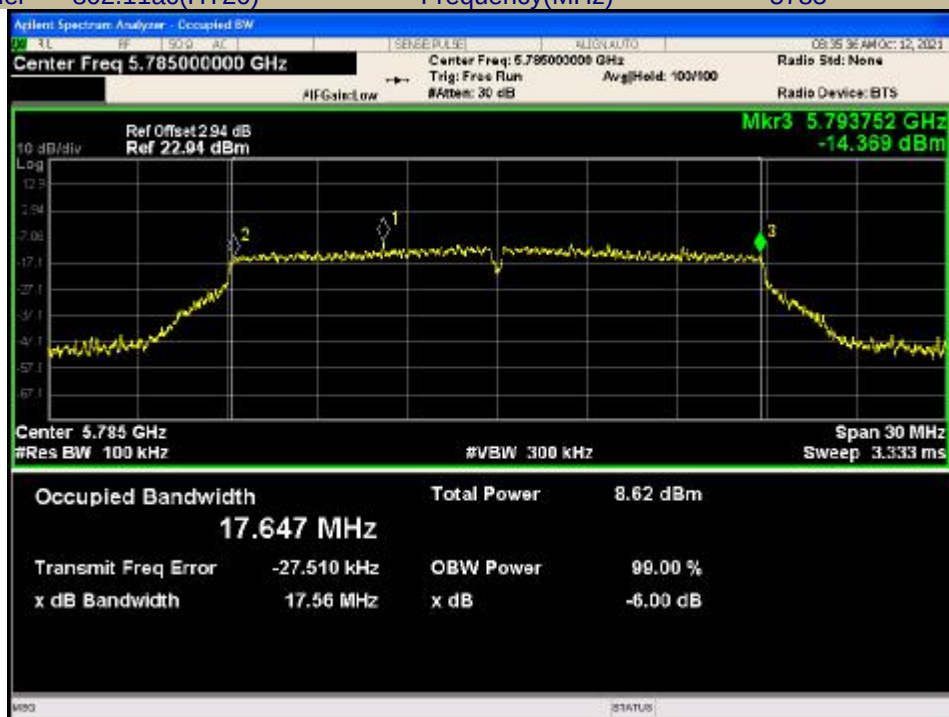




Emission Bandwidth&99% Occupied Bandwidth U-NII - 3
Test Model 802.11ac(HT20) Frequency(MHz) 5745

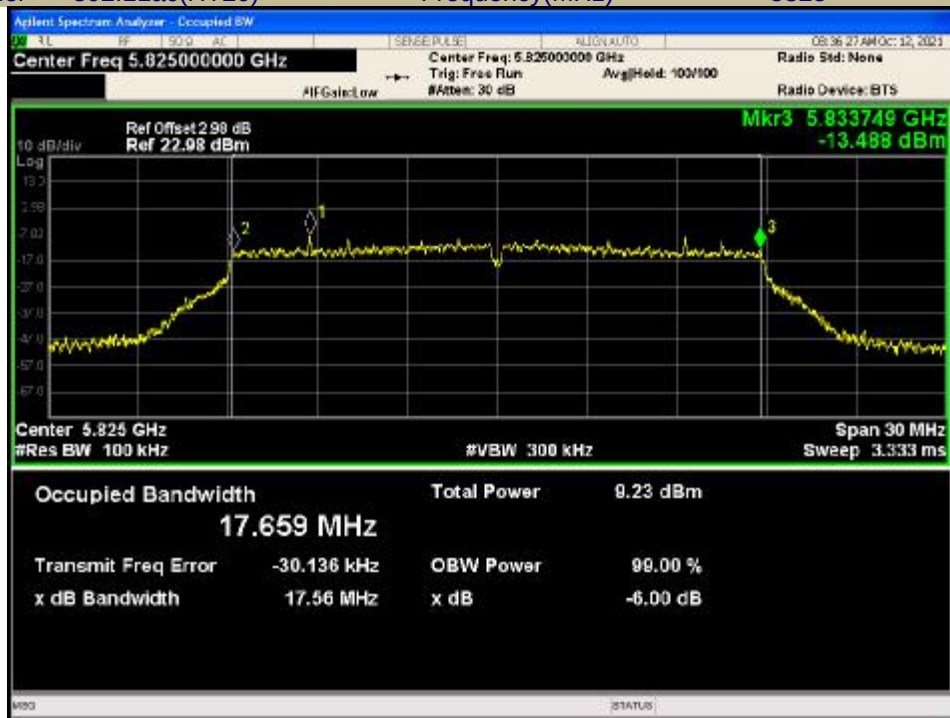


Emission Bandwidth&99% Occupied Bandwidth U-NII - 3
Test Model 802.11ac(HT20) Frequency(MHz) 5785

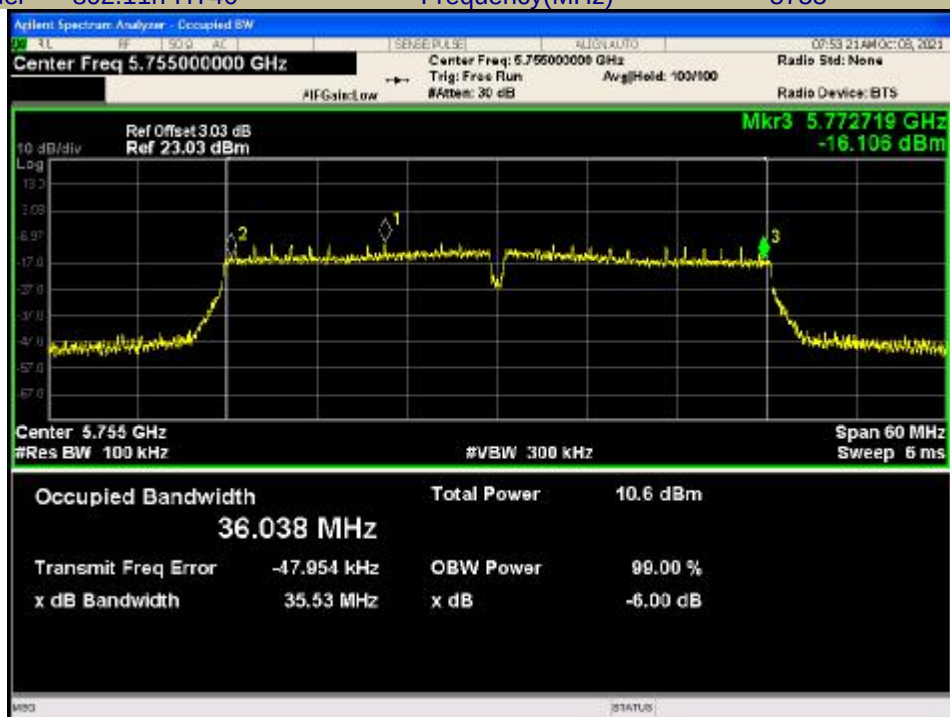




Emission Bandwidth&99% Occupied Bandwidth U-NII - 3
Test Model 802.11ac(HT20) Frequency(MHz) 5825

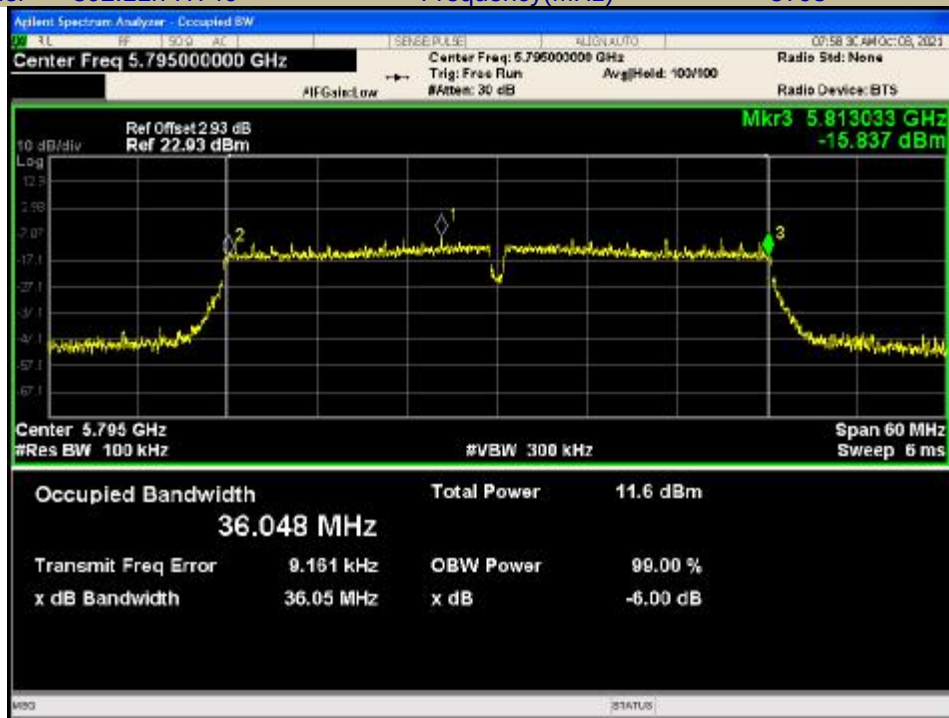


Emission Bandwidth&99% Occupied Bandwidth U-NII - 3
Test Model 802.11n-HT40 Frequency(MHz) 5755

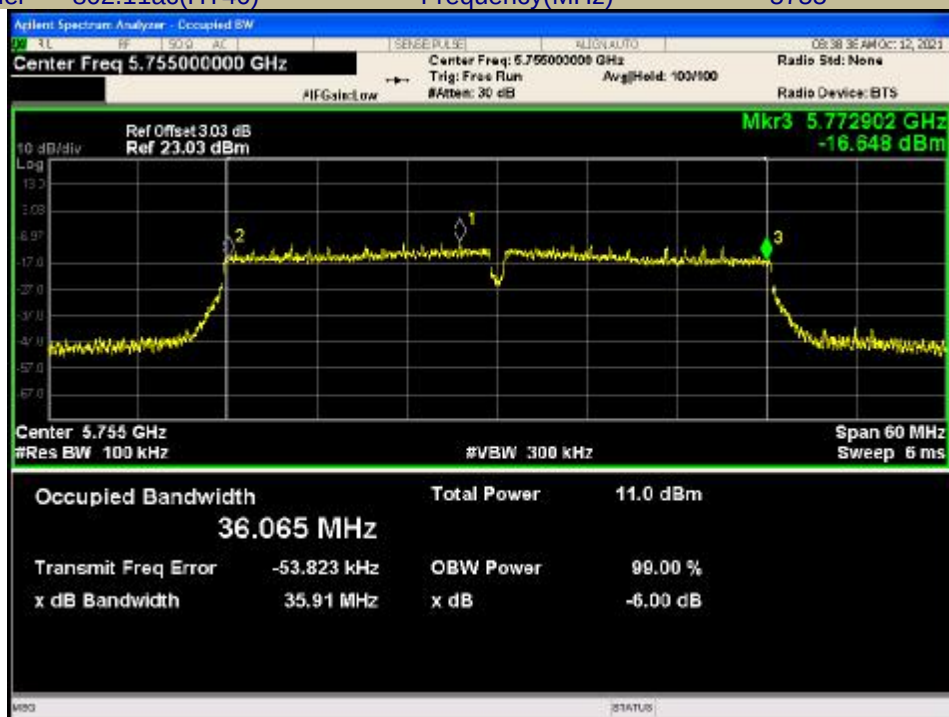




Emission Bandwidth&99% Occupied Bandwidth U-NII - 3
Test Model 802.11n-HT40 Frequency(MHz) 5795

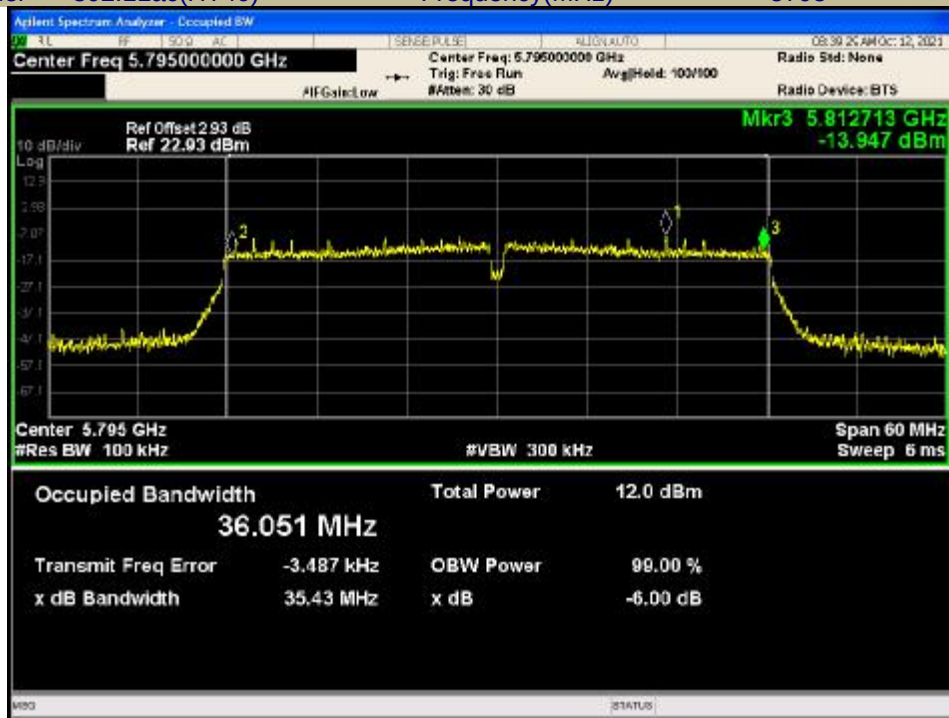


Emission Bandwidth&99% Occupied Bandwidth U-NII - 3
Test Model 802.11ac(HT40) Frequency(MHz) 5755

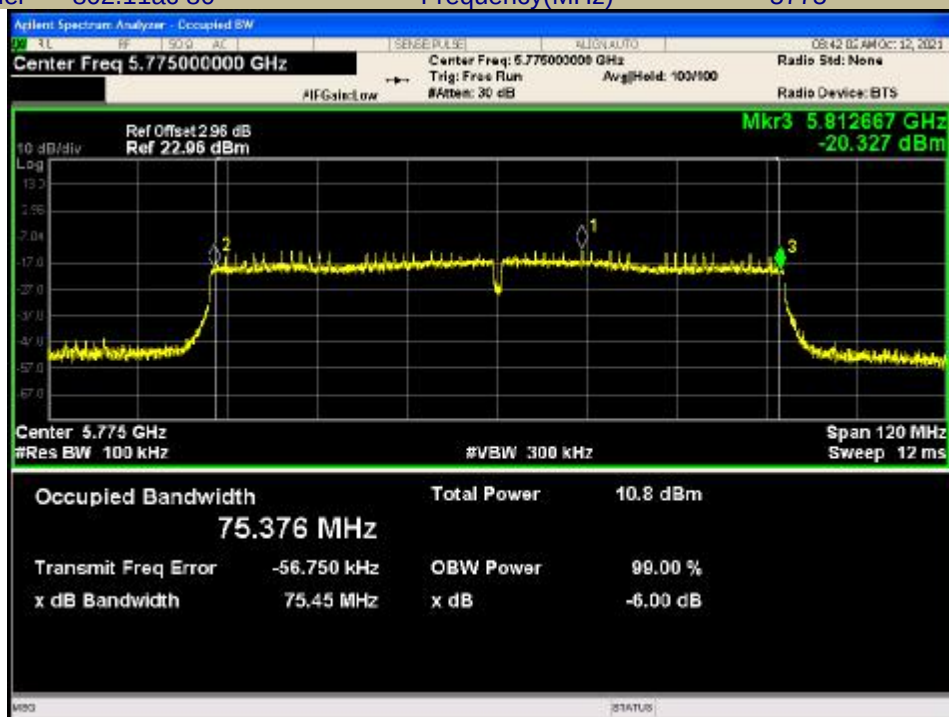




Emission Bandwidth&99% Occupied Bandwidth U-NII - 3
Test Model 802.11ac(HT40) Frequency(MHz) 5795



Emission Bandwidth&99% Occupied Bandwidth U-NII - 3
Test Model 802.11ac 80 Frequency(MHz) 5775





7.2 MAXIMUM CONDUCTED OUTPUT POWER

7.2.1 Applicable Standard

According to FCC Part 15.407(a)(1) for UNII Band I

According to FCC Part 15.407(a)(2) for UNII Band II-A and UNII Band II-C

According to FCC Part 15.407(a)(3) for UNII Band III

According to 789033 D02 Section II(E)

7.2.2 Conformance Limit

n For the band 5.15-5.25 GHz,

(a) (1) (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. 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).

(a) (1) (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. 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.

(a) (1) (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.

(a) (1) (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. 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.

n For the 5.25-5.35 GHz and 5.47-5.725 GHz bands

(a) (2) 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.

n For the band 5.725-5.85 GHz

(a) (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.

7.2.3 Test Configuration

Test according to clause 6.1 radio frequency test setup



7.2.4 Test Procedure

The maximum average conducted output power can be measured using Method PM-G (Measurement using a gated RF average power meter):

Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

- a. The Transmitter output (antenna port) was connected to the power meter.
- b. Turn on the EUT and power meter and then record the power value.
- c. Repeat above procedures on all channels needed to be tested.

7.2.5 Test Results



1T1R - Antenna A

☒ 802.11a mode

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII - 1	CH36	5180	3.32	24	Pass
	CH40	5200	3.25	24	Pass
	CH48	5240	3.42	24	Pass

☒ 802.11n-HT20

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII - 1	CH36	5180	2.03	24	Pass
	CH40	5200	1.81	24	Pass
	CH48	5240	1.52	24	Pass

☒ 802.11 ac (VHT20)

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII - 1	CH36	5180	4.14	24	Pass
	CH40	5200	3.82	24	Pass
	CH48	5240	3.57	24	Pass

☒ 802.11n-HT40

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII - 1	CH38	5190	6.17	24	Pass
	CH46	5230	6.17	24	Pass

☒ 802.11 ac (VHT40)

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII - 1	CH38	5190	7.16	24	Pass
	CH46	5230	6.94	24	Pass

☒ 802.11 ac (VHT80)

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII - 1	CH42	5210	4.11	24	Pass



☒ 802.11a mode

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 2A	CH52	5260	1.03	24	Pass
	CH60	5280	1.24	24	Pass
	CH64	5320	2.53	24	Pass

☒ 802.11n-HT20

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 2A	CH52	5260	1.72	24	Pass
	CH60	5280	2.18	24	Pass
	CH64	5320	4.38	24	Pass

☒ 802.11 ac (VHT20)

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 2A	CH52	5260	1.10	24	Pass
	CH60	5280	1.23	24	Pass
	CH64	5320	2.87	24	Pass

☒ 802.11n-HT40

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 2A	CH54	5270	4.83	24	Pass
	CH62	5310	6.86	24	Pass

☒ 802.11 ac (VHT40)

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 2A	CH54	5270	5.74	24	Pass
	CH62	5310	7.26	24	Pass

☒ 802.11 ac (VHT80)

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 2A	CH58	5290	4.96	24	Pass



☒ 802.11a mode

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 2C	CH100	5500	3.45	24	Pass
	CH116	5580	1.95	24	Pass
	CH140	5700	1.64	24	Pass

☒ 802.11n-HT20

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 2C	CH100	5500	4.08	24	Pass
	CH116	5580	2.58	24	Pass
	CH140	5700	1.11	24	Pass

☒ 802.11 ac (VHT20)

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 2C	CH100	5500	4.02	24	Pass
	CH116	5580	2.87	24	Pass
	CH140	5700	1.42	24	Pass

☒ 802.11n-HT40

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 2C	CH102	5510	7.63	24	Pass
	CH134	5670	5.48	24	Pass

☒ 802.11 ac (VHT40)

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 2C	CH102	5510	7.78	24	Pass
	CH134	5670	5.89	24	Pass

☒ 802.11 ac (VHT80)

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 2C	CH106	5530	5.96	24	Pass



☒ 802.11a mode

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 3	CH149	5745	1.08	30	Pass
	CH157	5785	1.66	30	Pass
	CH165	5825	2.33	30	Pass

☒ 802.11n-HT20

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 3	CH149	5745	1.94	30	Pass
	CH157	5785	2.3	30	Pass
	CH165	5825	3.03	30	Pass

☒ 802.11 ac (VHT20)

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 3	CH149	5745	2.16	30	Pass
	CH157	5785	2.71	30	Pass
	CH165	5825	3.43	30	Pass

☒ 802.11n-HT40

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 3	CH151	5755	4.59	30	Pass
	CH159	5795	5.44	30	Pass

☒ 802.11 ac (VHT40)

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 3	CH151	5755	4.93	30	Pass
	CH159	5795	5.75	30	Pass

☒ 802.11 ac (VHT80)

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 3	CH155	5775	3.36	30	Pass



7.3 MAXIMUM PEAK POWER DENSITY

7.3.1 Applicable Standard

According to FCC Part 15.407(a)(1) for UNII Band I

According to FCC Part 15.407(a)(2) for UNII Band II-A and UNII Band II-C

According to FCC Part 15.407(a)(3) for UNII Band III

According to 789033 D02 Section II(F)

7.3.2 Conformance Limit

n For the band 5.15-5.25 GHz,

(a) (1) (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. 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).

(a) (1) (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. 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.

(a) (1) (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.

(a) (1) (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. 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.

n For the 5.25-5.35 GHz and 5.47-5.725 GHz bands

(b) (2) 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.

n For the band 5.725-5.85 GHz

(a) (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.

7.3.3 Test Configuration

Test according to clause 6.1 radio frequency test setup



7.3.4 Test Procedure

Methods refer to FCC KDB 789033

For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, “provided that the measured power is integrated over the full reference bandwidth” to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 KHz bandwidth, the following adjustments to the procedures apply:

a) Set $RBW \geq 1/T$, where T is defined in section II.B.I.a).

b) Set $VBW \geq 3$ RBW.

c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10\log(500\text{kHz}/RBW)$ to the measured result, whereas RBW (< 500 KHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add $10\log(1\text{MHz}/RBW)$ to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.

e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100 KHz for the sections

5.c) and 5.d) above, since RBW=100 KHz is available on nearly all spectrum analyzers.



7.3.5 Test Results

1T1R - Antenna A

5150-5250MHz

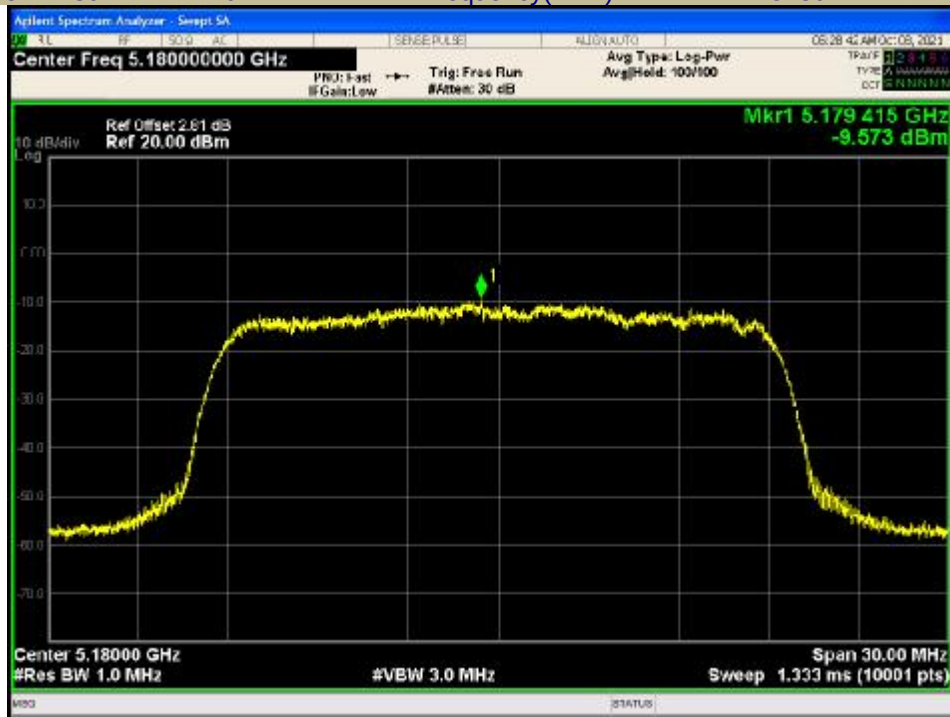
Operating mode	Test Channel	Power Spectral Density dBm/MHz	Limit (dBm/MHz)
802.11a	5180	-7.87	17
	5200	-8.48	17
	5240	-7.82	17
802.11n-HT20	5180	-9.57	17
	5200	-9.76	17
	5240	-10.51	17
802.11ac(VHT20)	5180	-7.6	17
	5200	-7.57	17
	5240	-8.19	17
802.11n-HT40	5190	-8.93	17
	5230	-8.38	17
802.11ac(VHT40)	5190	-7.74	17
	5230	-7.98	17
802.11ac(VHT80)	5210	-13.43	17



Power Spectral Density U-NII - 1
Test Model 802.11a Frequency(MHz) 5240

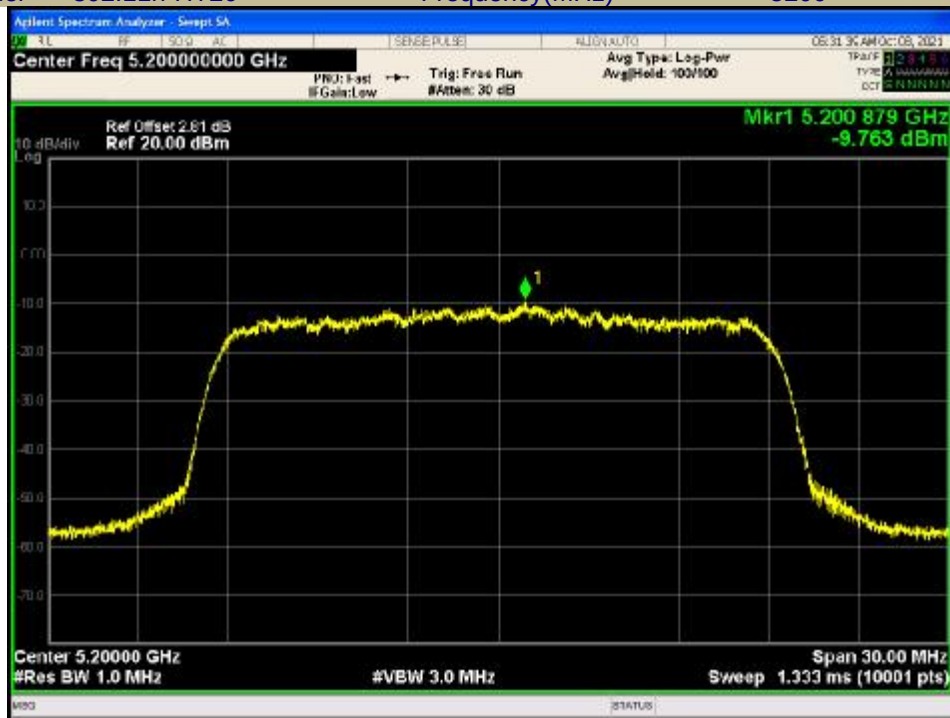


Power Spectral Density U-NII - 1
Test Model 802.11n-HT20 Frequency(MHz) 5180





Power Spectral Density U-NII - 1
Test Model 802.11n-HT20 Frequency(MHz) 5200



Power Spectral Density U-NII - 1
Test Model 802.11n-HT20 Frequency(MHz) 5240

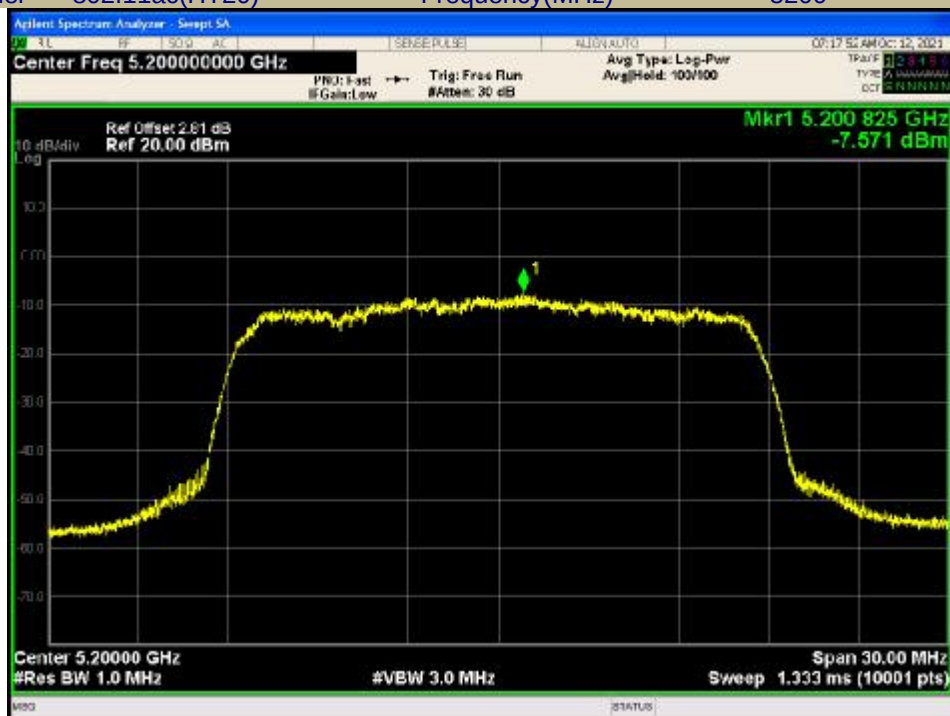




Power Spectral Density U-NII - 1
Test Model 802.11ac(HT20) Frequency(MHz) 5180



Power Spectral Density U-NII - 1
Test Model 802.11ac(HT20) Frequency(MHz) 5200





Power Spectral Density U-NII - 1
Test Model 802.11ac(HT20) Frequency(MHz) 5240



Power Spectral Density U-NII - 1
Test Model 802.11n-HT40 Frequency(MHz) 5190





Power Spectral Density

Test Model 802.11n-HT40

U-NII - 1

Frequency(MHz)

5230



Power Spectral Density

Test Model 802.11ac(HT40)

U-NII - 1

Frequency(MHz)

5190





Power Spectral Density U-NII - 1
Test Model 802.11ac(HT40) Frequency(MHz) 5230



Power Spectral Density U-NII - 1
Test Model 802.11ac 80 Frequency(MHz) 5210





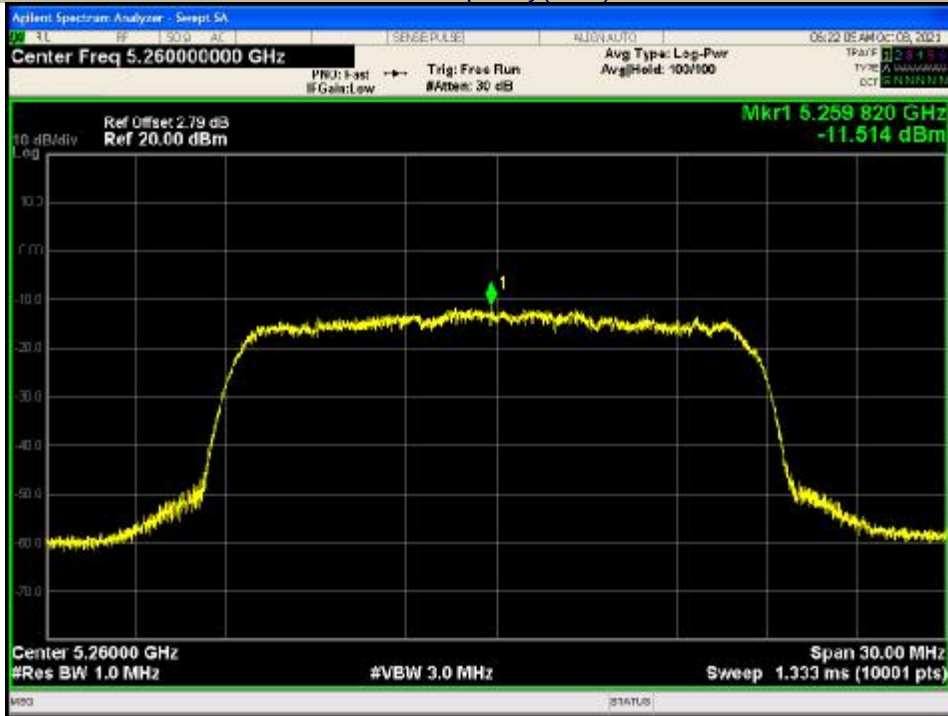
5250-5350MHz

Operating mode	Test Channel	Power Spectral Density dBm/MHz	Limit (dBm/MHz)
802.11a	5260	-11.51	11
	5280	-11.25	11
	5320	-9.04	11
802.11n-HT20	5260	-10.28	11
	5280	-9.97	11
	5320	-7.55	11
802.11ac(VHT20)	5260	-10.91	11
	5280	-10.36	11
	5320	-8.45	11
802.11n-HT40	5270	-9.85	11
	5310	-7.39	11
802.11ac(VHT40)	5270	-9.36	11
	5310	-7.92	11
802.11ac(VHT80)	5290	-13.71	11



Power Spectral Density
Test Model 802.11a

U-NII – 2A
Frequency(MHz) 5260



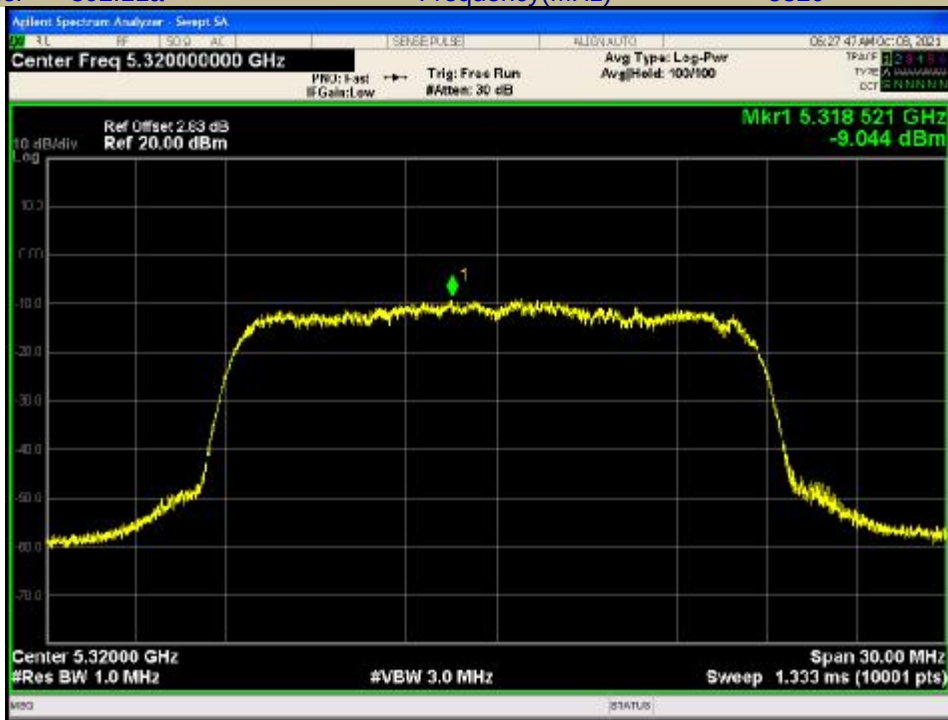
Power Spectral Density
Test Model 802.11a

U-NII – 2A
Frequency(MHz) 5280

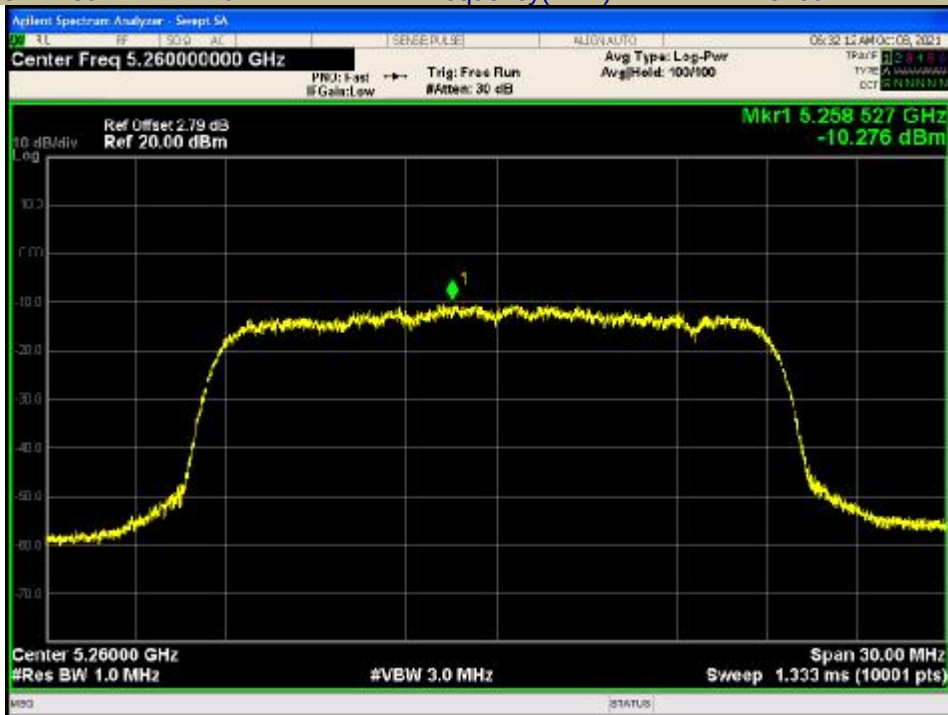




Power Spectral Density Test Model 802.11a	U-NII – 2A Frequency(MHz)	5320
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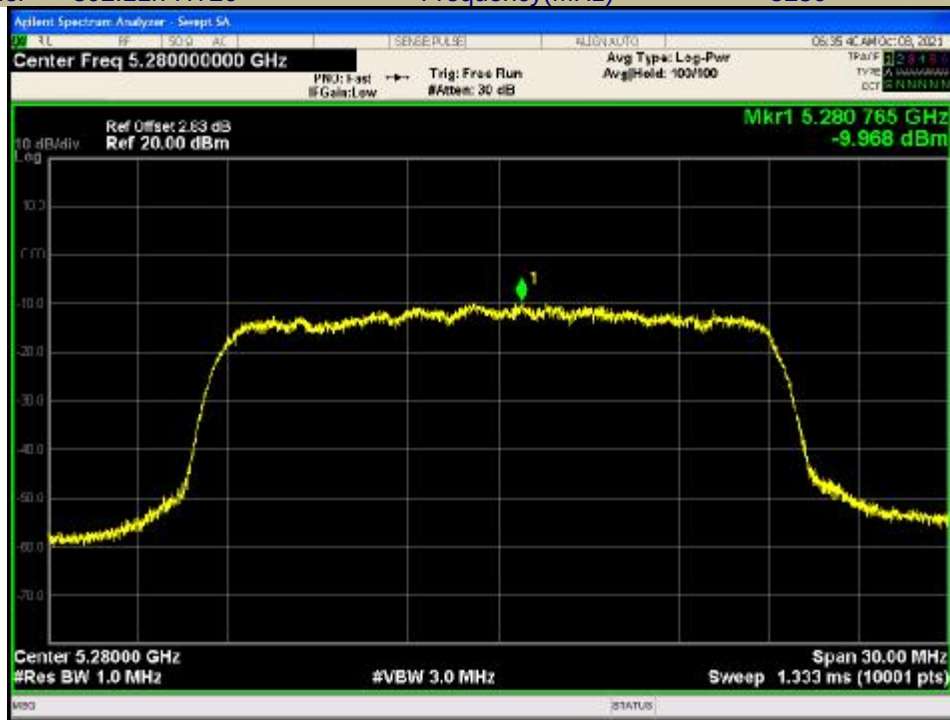


Power Spectral Density Test Model 802.11n-HT20	U-NII – 2A Frequency(MHz)	5260
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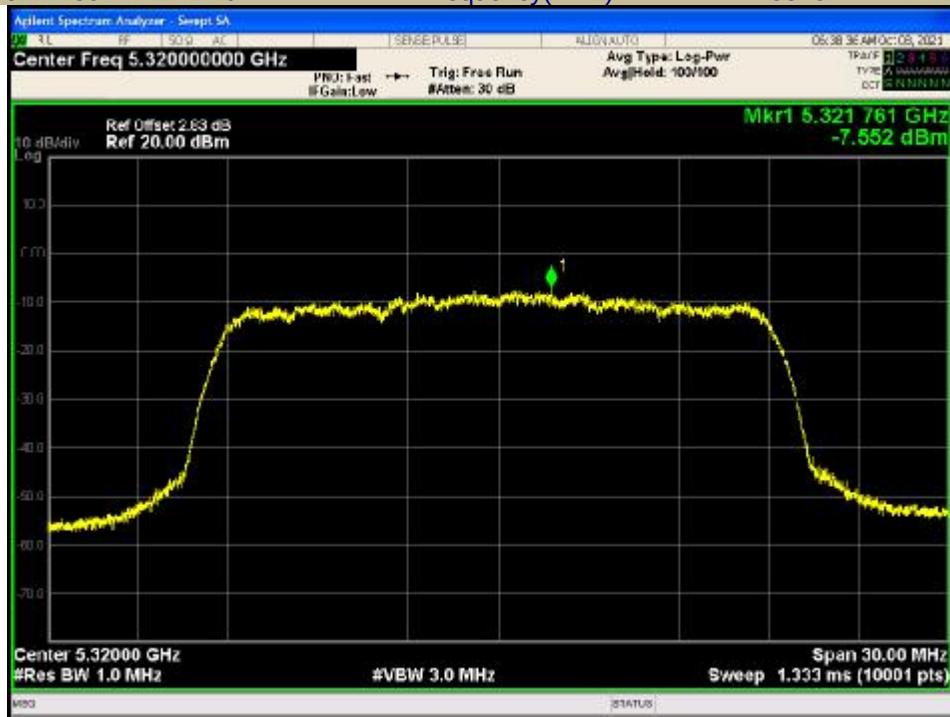




Power Spectral Density U-NII – 2A
Test Model 802.11n-HT20 Frequency(MHz) 5280

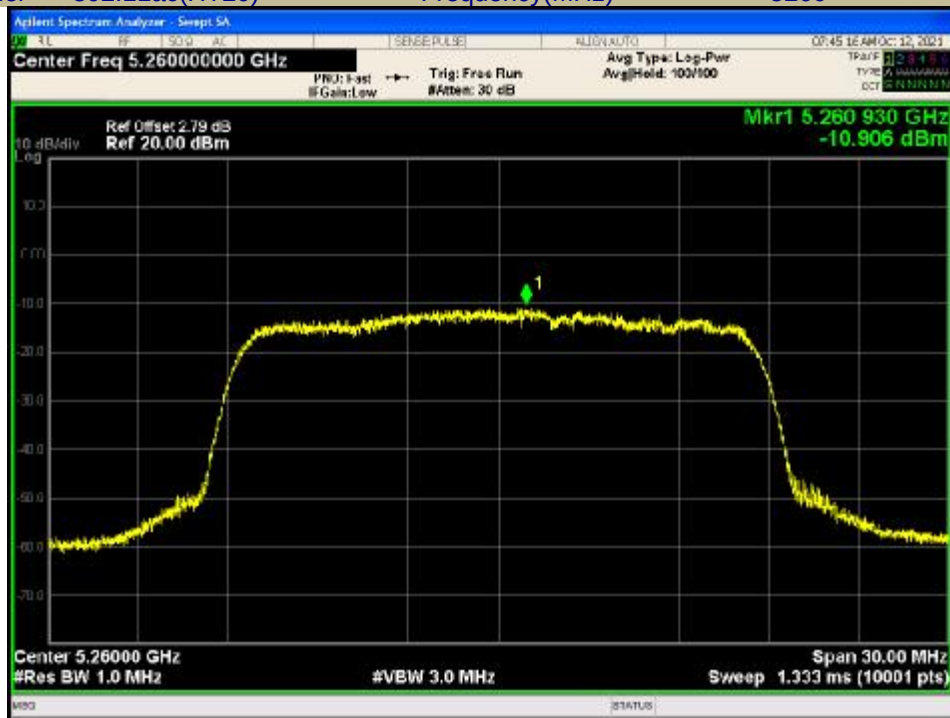


Power Spectral Density U-NII – 2A
Test Model 802.11n-HT20 Frequency(MHz) 5320





Power Spectral Density U-NII – 2A
Test Model 802.11ac(HT20) Frequency(MHz) 5260

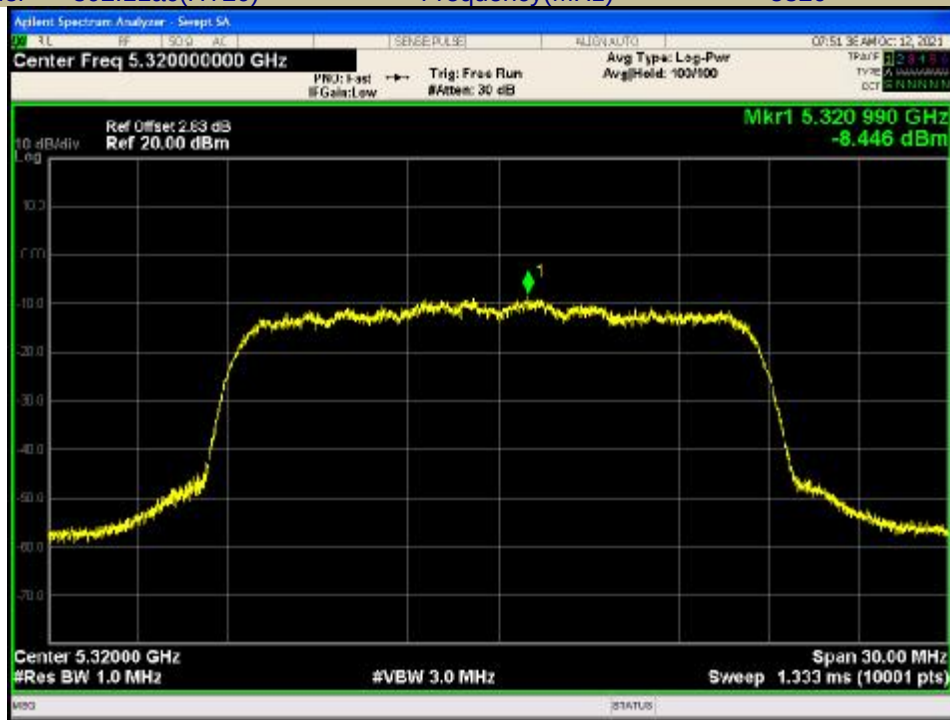


Power Spectral Density U-NII – 2A
Test Model 802.11ac(HT20) Frequency(MHz) 5280

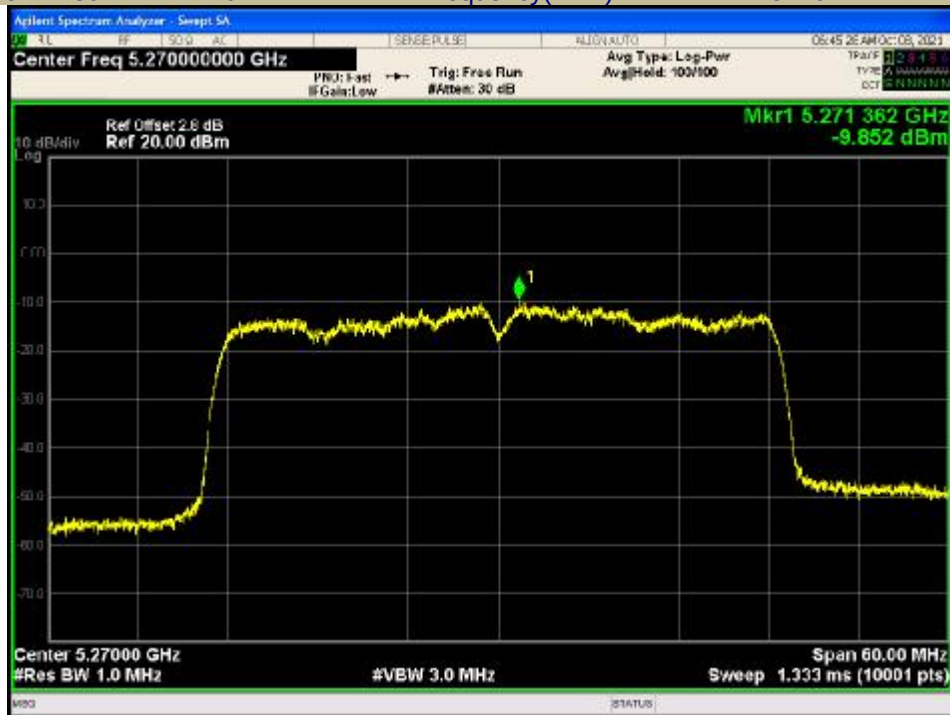




Power Spectral Density U-NII – 2A
Test Model 802.11ac(HT20) Frequency(MHz) 5320



Power Spectral Density U-NII – 2A
Test Model 802.11n-HT40 Frequency(MHz) 5270



Power Spectral Density	U-NII – 2A
Test Model 802.11n-HT40	Frequency(MHz) 5310



Power Spectral Density U-NII – 2A
 Test Model 802.11ac(HT40) Frequency(MHz) 5310



Power Spectral Density U-NII – 2A
 Test Model 802.11ac 80 Frequency(MHz) 5290



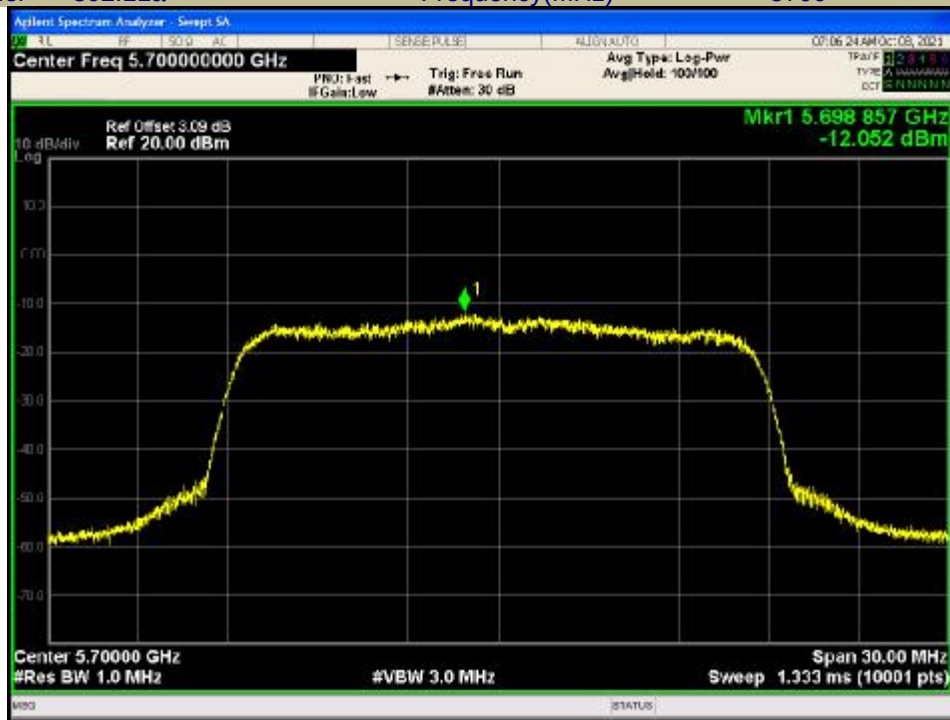


5470-5725MHz

Operating mode	Test Channel	Power Spectral Density dBm/MHz	Limit (dBm/MHz)
802.11a	5500	-8.06	11
	5580	-9.48	11
	5700	-12.05	11
802.11n-HT20	5500	-7.92	11
	5580	-9.50	11
	5700	-11.57	11
802.11ac(VHT20)	5500	-7.80	11
	5580	-9.02	11
	5700	-11.73	11
802.11n-HT40	5510	-7.43	11
	5670	-9.06	11
802.11ac(VHT40)	5510	-7.83	11
	5670	-9.52	11
802.11ac(VHT80)	5530	-12.63	11



Power Spectral Density U-NII – 2C
 Test Model 802.11a Frequency(MHz) 5700

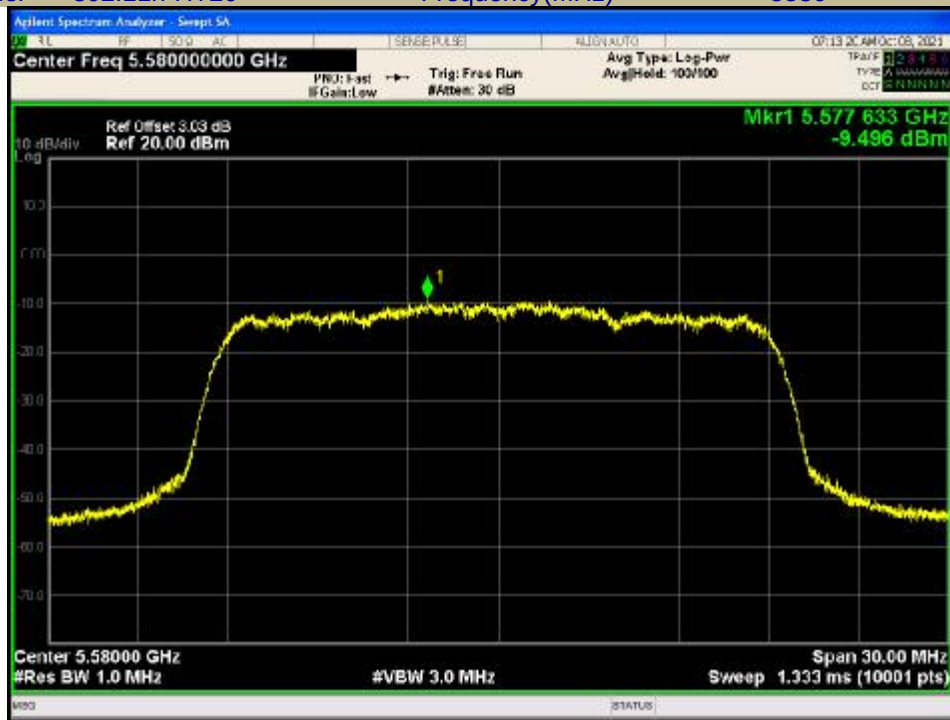


Power Spectral Density U-NII – 2C
 Test Model 802.11n-HT20 Frequency(MHz) 5500

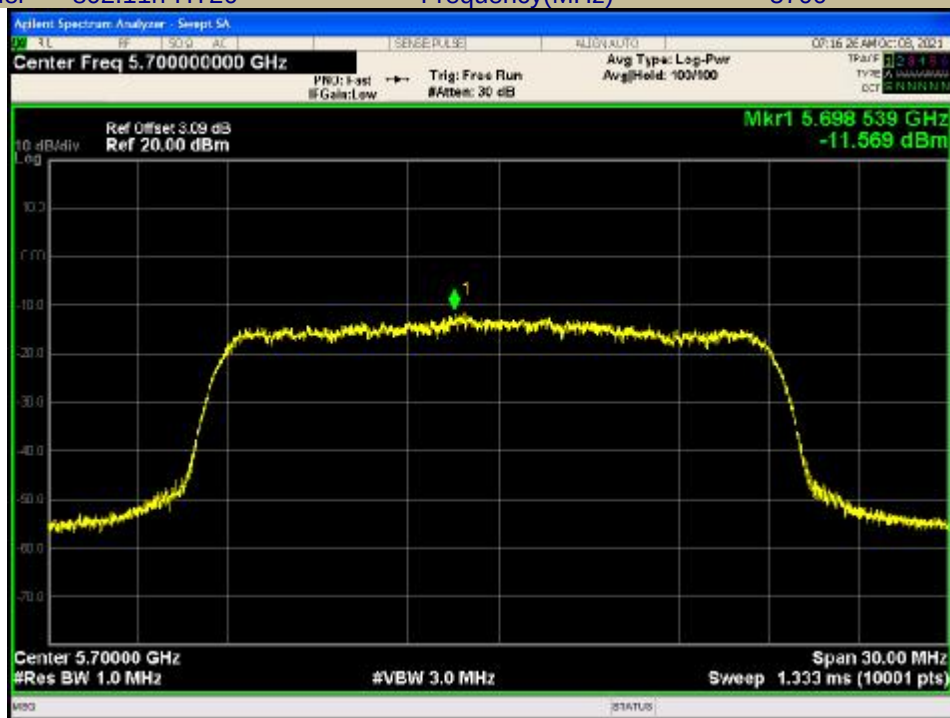




Power Spectral Density Test Model 802.11n-HT20	U-NII – 2C Frequency(MHz)	5580
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Power Spectral Density Test Model 802.11n-HT20	U-NII – 2C Frequency(MHz)	5700
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Power Spectral Density U-NII – 2C
 Test Model 802.11ac(HT20) Frequency(MHz) 5500

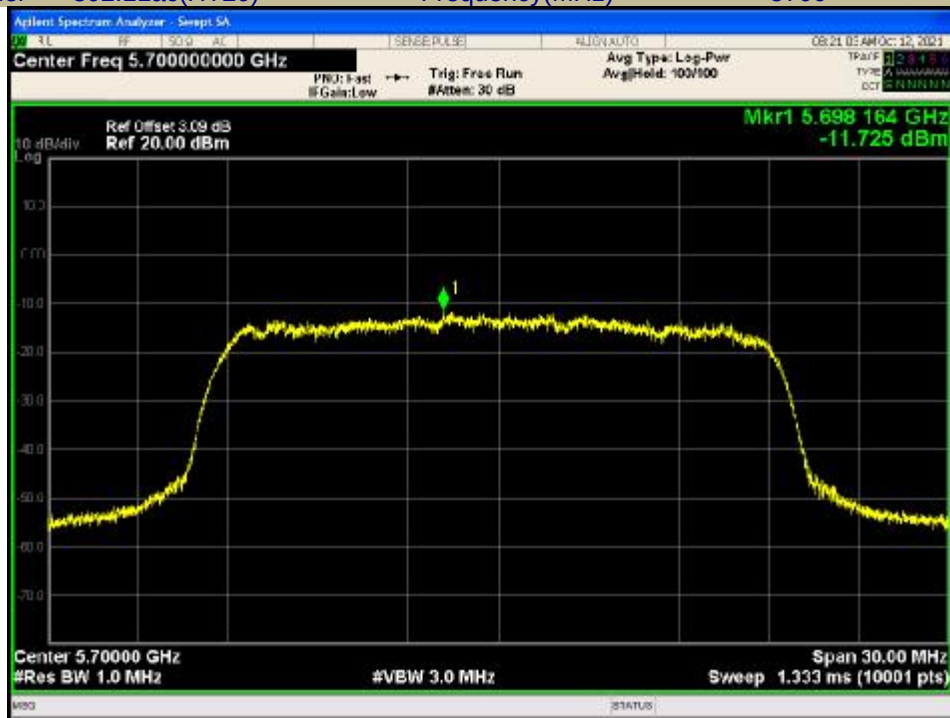


Power Spectral Density U-NII – 2C
 Test Model 802.11ac(HT20) Frequency(MHz) 5580





Power Spectral Density U-NII – 2C
 Test Model 802.11ac(HT20) Frequency(MHz) 5700



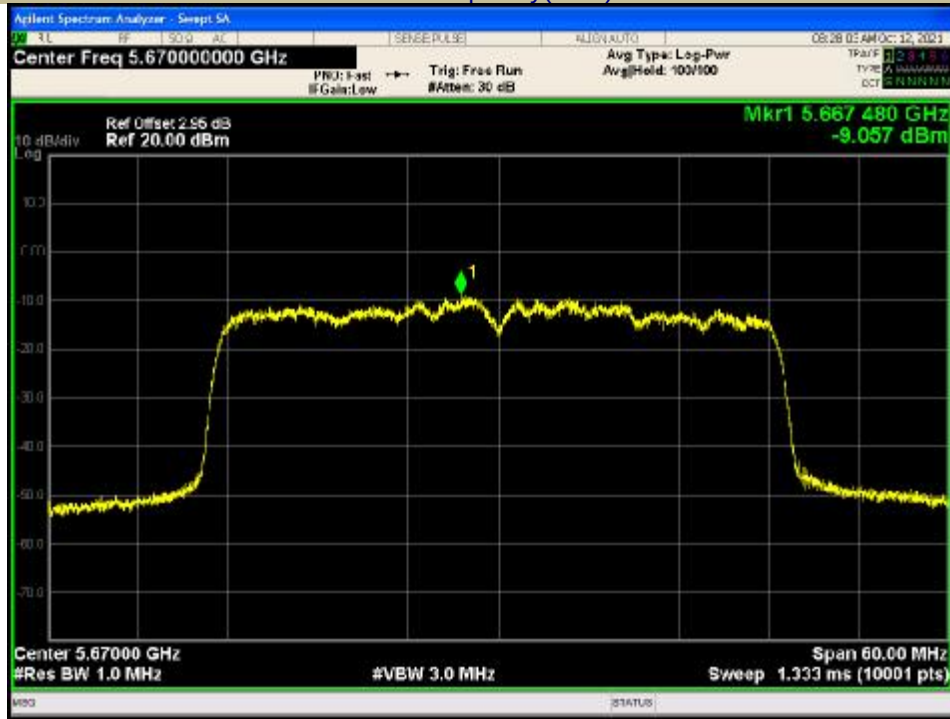
Power Spectral Density U-NII – 2C
 Test Model 802.11n-HT40 Frequency(MHz) 5510





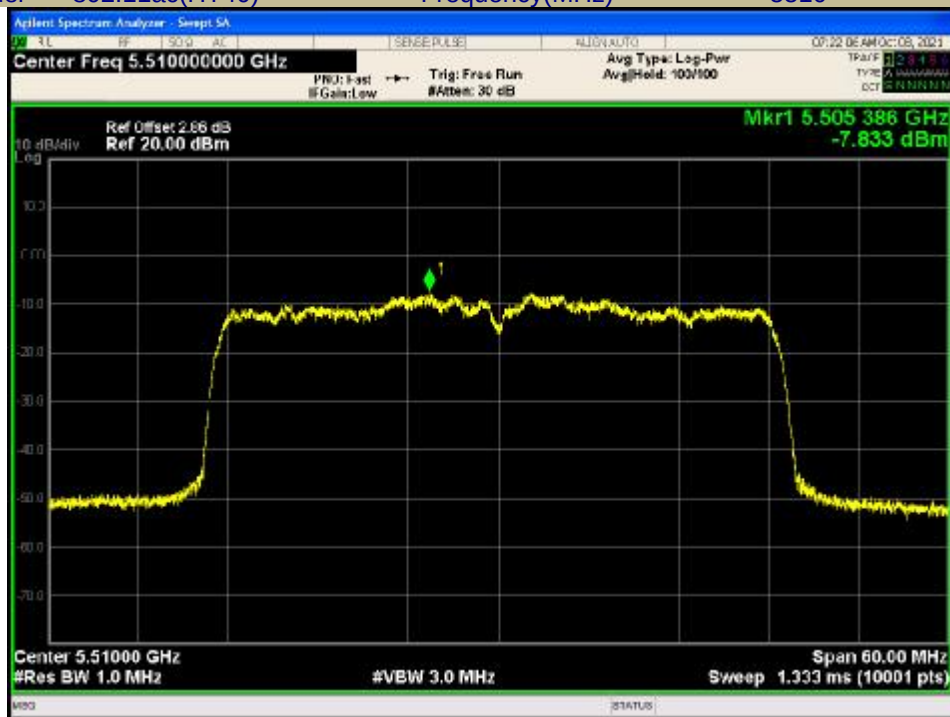
Power Spectral Density
Test Model 802.11n-HT40

U-NII – 2C
Frequency(MHz) 5670



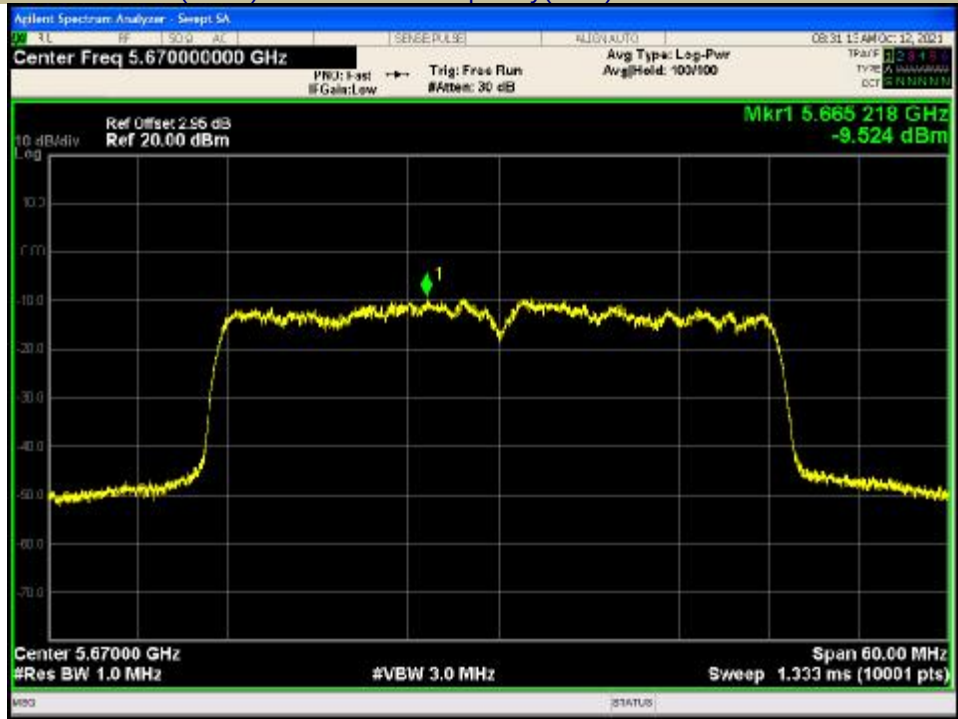
Power Spectral Density
Test Model 802.11ac(HT40)

U-NII – 2C
Frequency(MHz) 5510

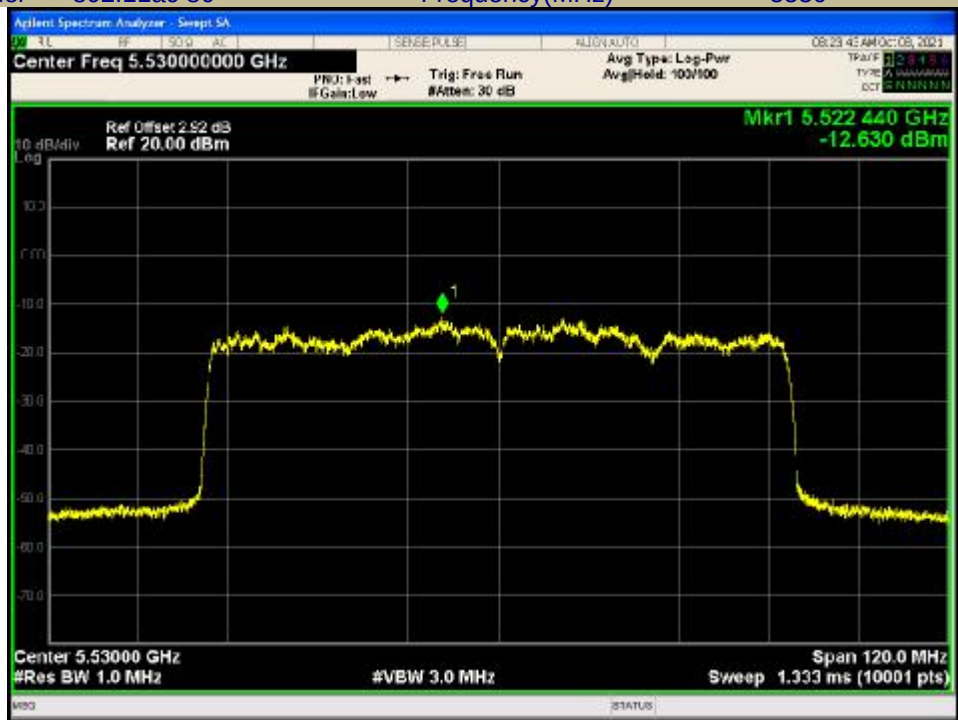




Power Spectral Density	U-NII – 2C
Test Model 802.11ac(HT40)	Frequency(MHz) 5670



Power Spectral Density	U-NII – 2C
Test Model 802.11ac 80	Frequency(MHz) 5530





5725-5850MHz

Operating mode	Test Channel	Power Spectral Density dBm/500KHz	Limit (dBm/MHz)
802.11a	5745	-13.73	30
	5785	-12.81	30
	5825	-11.94	30
802.11n-HT20	5745	-12.89	30
	5785	-12.11	30
	5825	-11.84	30
802.11ac(VHT20)	5745	-12.53	30
	5785	-11.79	30
	5825	-11.31	30
802.11n-HT40	5755	-13.63	30
	5795	-12.74	30
802.11ac(VHT40)	5755	-12.99	30
	5795	-11.59	30
802.11ac(VHT80)	5775	-17.75	30

Power Spectral Density	U-NII - 3
Test Model 802.11a	Frequency(MHz) 5745



Power Spectral Density		U-NII - 3	
Test Model	802.11a	Frequency(MHz)	5785





Power Spectral Density
Test Model 802.11a U-NII - 3
Frequency(MHz) 5825



Power Spectral Density
Test Model 802.11n-HT20 U-NII - 3
Frequency(MHz) 5745





Power Spectral Density U-NII - 3
Test Model 802.11n-HT20 Frequency(MHz) 5785



Power Spectral Density U-NII - 3
Test Model 802.11n-HT20 Frequency(MHz) 5825





Power Spectral Density U-NII - 3
Test Model 802.11ac(HT20) Frequency(MHz) 5745



Power Spectral Density U-NII - 3
Test Model 802.11ac(HT20) Frequency(MHz) 5785





Power Spectral Density U-NII - 3
Test Model 802.11ac(HT20) Frequency(MHz) 5825



Power Spectral Density U-NII - 3
Test Model 802.11n-HT40 Frequency(MHz) 5755





Power Spectral Density Test Model 802.11n-HT40	U-NII - 3 Frequency(MHz)	5795
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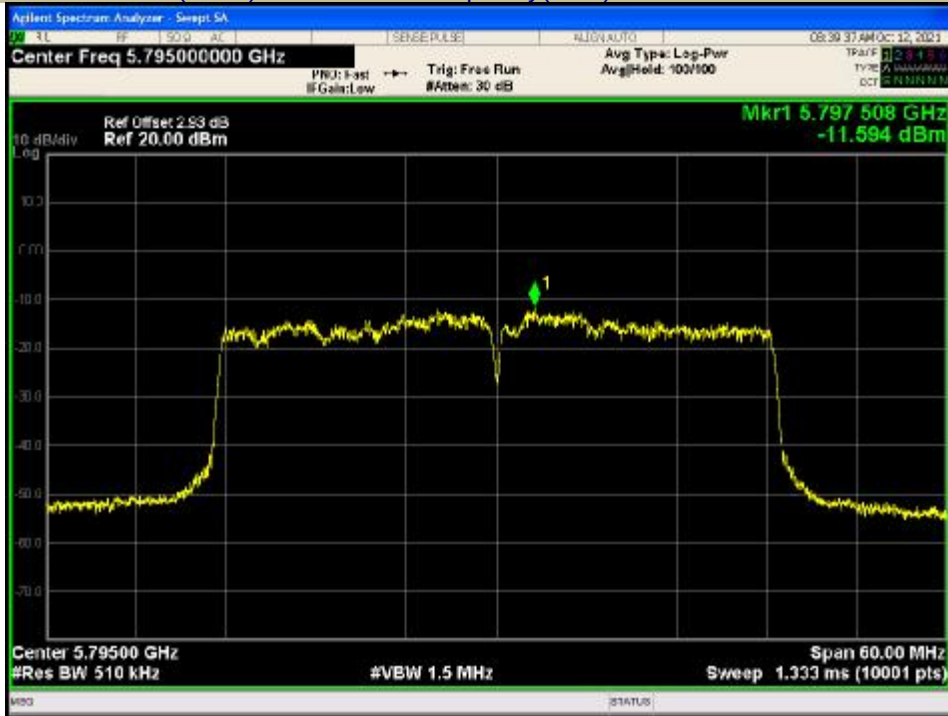


Power Spectral Density Test Model 802.11ac(HT40)	U-NII - 3 Frequency(MHz)	5755
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Power Spectral Density U-NII - 3
 Test Model 802.11ac(HT40) Frequency(MHz) 5795



Power Spectral Density U-NII - 3
 Test Model 802.11ac 80 Frequency(MHz) 5775

