TEST REPORT

Product Name	:	**Soundbar speaker with built-in subwoofer**
Model Number	:	**PDB70, PDB70/00**
FCC ID	:	**2AR2SPDB70**

Prepared for	:	MMD Hong Kong Holding Limited
Address	:	Units 1006-1007, 10th Floor, C-Bons International Center, 108 Wai Yip Street, Kwun Tong, Kowloon, Hong Kong
Prepared by	:	EMTEK (SHENZHEN) CO., LTD.
Address	:	Building 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China Tel: (0755) 26954280 Fax: (0755) 26954282

Report Number	:	ES200811001W3
Date(s) of Tests	:	August 11, 2020 to September 02, 2020
Date of issue	:	September 02, 2020

1 TEST RESULT CERTIFICATION

Applicant:	MMD Hong Kong Holding Limited Units 1006-1007, 10th Floor, C-Bons International Center, 108 Wai Yip Street, Kwun Tong, Kowloon, Hong Kong
Manufacturer:	MMD Hong Kong Holding Limited Units 1006-1007, 10th Floor, C-Bons International Center, 108 Wai Yip Street, Kwun Tong, Kowloon, Hong Kong
Factory:	Zhong Shan City Richsound Electronic Industrial Ltd No.16, East Shagang Road, Gangkou, Zhongshan, Guangdong, China
EUT Description:	Soundbar speaker with built-in subwoofer
Model Number:	PDB70, PDB70/00
Trade Mark:	Porsche Design

Measurement Procedure Used:

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
FCC 47 CFR Part 2, Subpart J FCC 47 CFR Part 15, Subpart E	**PASS**

The above equipment was tested by EMTEK (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 the requirements of FCC Rules Part 2 and Part 15.407

The test results of this report relate only to the tested sample identified in this report.

Date of Test : August 11, 2020 to September 02, 2020

Prepared by : Sewen Guo /Editor

Reviewer : Joe Xia /Supervisor

Approve & Authorized Signer : Lisa Wang/Manager

EMTEK (SHENZHEN) CO., LTD. TESTING

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2 EUT TECHNICAL DESCRIPTION

Characteristics	Description	
Product	Soundbar speaker with built-in subwoofer	
Model Number	PDB70, PDB70/00	
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: with 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: with 5470MHz-5725MHz Band	
	☒ 5500-5720MHz for 802.11a; ☒ 5500-5720MHz for 802.11n(HT20); ☒ 5500-5720MHz for 802.11ac(VHT20);	☒ 5510-5710MHz for 802.11n(HT40); ☒ 5510-5710MHz for 802.11ac(VHT40); ☒ 5530-5690MHz for 802.11ac(VHT80)
	☒ UNII-3 with 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 Type	Internal Antenna	

Antenna Gain	Wifi 5150MHz-5250MHz: 4.64 dBi; Wifi 5250MHz-5350MHz: 4.64 dBi; Wifi 5470MHz-5725MHz: 4.64 dBi; Wifi 5725MHz-5875MHz: 3.44 dBi;	
Transmit Power	Output Power (Max.) for UNII-1	802.11a: 13.45dBm 802.11n(HT 20 MHz): 13.08dBm 802.11n(HT 40 MHz): 14.45dBm 802.11ac (VHT 20 MHz): 13.48dBm 802.11ac (VHT 40 MHz): 13.69dBm 802.11ac (VHT 80 MHz): 13.94dBm
	Output Power (Max.) for UNII-2A	802.11a: 15.26dBm 802.11n(HT 20 MHz): 15.35dBm 802.11n(HT 40 MHz): 15.31dBm 802.11ac (VHT 20 MHz): 15.53dBm 802.11ac (VHT 40 MHz): 15.44dBm 802.11ac (VHT 80 MHz): 15.28dBm
	Output Power (Max.) for UNII-2C	802.11a: 13.37dBm 802.11n(HT 20 MHz): 13.43dBm 802.11n(HT 40 MHz): 13.72dBm 802.11ac (VHT 20 MHz):13.38dBm 802.11ac (VHT 40 MHz): 13.91dBm 802.11ac (VHT 80 MHz): 13.29dBm
	Output Power (Max.) for UNII-3	802.11a: 14.39dBm 802.11n(HT 20 MHz): 14.34dBm 802.11n(HT 40 MHz): 14.07dBm 802.11ac (VHT 20 MHz): 14.24dBm 802.11ac (VHT 40 MHz): 14.35dBm 802.11ac (VHT 80 MHz): 13.22dBm
Power supply	AC 100-240V, 50Hz/60Hz	
Temperature Range	-10°C ~ +45° C	

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

3 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: 2AR2SPDB70 filing to comply with Section 15.247 of the FCC Part 15, Subpart E Rules.

4 TEST METHODOLOGY

4.1 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 v02r01

4.2 MEASUREMENT EQUIPMENT USED

4.2.1 Conducted Emission Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.
Test Receiver	Rohde & Schwarz	ESCI	26115-010-0027	05/22/2020
L.I.S.N.	Rohde & Schwarz	ENV216	101161	05/22/2020
50Ω Coaxial Switch	Anritsu	MP59B	6100175589	05/22/2020
Voltage Probe	Rohde & Schwarz	ESH2-Z3	100122	05/22/2020
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100006	05/22/2020
I.S.N	Teseq GmbH	ISN T800	30327	05/22/2020

4.2.2 Radiated Emission Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	05/22/2020
Pre-Amplifier	HP	8447F	2944A07999	05/22/2020
Bilog Antenna	Schwarzbeck	VULB9163	142	05/22/2020
Loop Antenna	ARA	PLA-1030/B	1029	05/22/2020
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	05/22/2020
Horn Antenna	Schwarzbeck	BBHA 9120	D143	05/22/2020
Cable	Schwarzbeck	AK9513	ACRX1	05/22/2020
Cable	Rosenberger	N/A	FP2RX2	05/22/2020
Cable	Schwarzbeck	AK9513	CRPX1	05/22/2020
Cable	Schwarzbeck	AK9513	CRRX2	05/22/2020

4.2.3 Radio Frequency Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.
Spectrum Analyzer	Agilent	E4407B	88156318	05/22/2020
Signal Analyzer	Agilent	N9010A	My53470879	05/22/2020
Power meter	Anritsu	ML2495A	0824006	05/22/2020
Power sensor	Anritsu	MA2411B	0738172	05/22/2020
Spectrum Analyzer	Agilent	E4407B	88156318	05/22/2020

Remark: *Each piece of equipment is scheduled for calibration once a year.*

4.3 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	60	5300	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	144	5720

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	142	5710

Frequency and Channel list for 802.11ac (VHT80):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
106	5530	122	5610		
138	5690				

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	144	5720

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	110	5550	142	5710

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	138	5690		

☒ 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				

4.4 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	17	17	17
802.11n(20MHz) Mode	17	17	17
802.11ac Wave2(20MHz) Mode	17	17	17
Frequency (MHz)	5190	5230	
802.11n(40MHz) Mode	18	20	
802.11ac Wave2(40MHz) Mode	18	20	
Frequency (MHz)	5210		
802.11ac Wave2(80 MHz) Mode	21		

U-NII -2A 1T1R			
Test Software Version	QRCT		
Frequency (MHz)	5260	5300	5320
802.11a Mode	17	17	17
802.11n(20MHz) Mode	17	17	17
802.11ac Wave2(20MHz) Mode	17	17	17
Frequency (MHz)	5270	5310	
802.11n(40MHz) Mode	18	20	
802.11ac Wave2(40MHz) Mode	18	20	
Frequency (MHz)	5290		
802.11ac Wave2(80 MHz) Mode	18		

U-NII -2C 1T1R			
Test Software Version	QRCT		
Frequency (MHz)	5500	5580	5720
802.11a Mode	17	17	17
802.11n(20MHz) Mode	17	17	17
802.11ac Wave2(20MHz) Mode	17	17	17
Frequency (MHz)	5510	5550	5710
802.11n(40MHz) Mode	18	18	18
802.11ac Wave2(40MHz) Mode	18	18	18
Frequency (MHz)	5530	5690	
802.11ac Wave2(80 MHz) Mode	18	18	

U-NII -3 1T1R			
Test Software Version	QRCT		
Frequency (MHz)	5745	5785	5825
802.11a Mode	17	17	17
802.11n(20MHz) Mode	17	17	17
802.11ac Wave2(20MHz) Mode	17	17	17
Frequency (MHz)	5755	5795	
802.11n(40MHz) Mode	18	18	
802.11ac Wave2(40MHz) Mode	18	18	
Frequency (MHz)	5775		
802.11ac Wave2(80 MHz) Mode	18		

5 FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

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

Bldg 69, Majialong Industry Zone District, Nanshan District, Shenzhen, China
The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 22.

5.2 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

EMC Lab. : Accredited by CNAS,2016.10.24
The certificate is valid until 2022.10.28
The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2005)
The Certificate Registration Number is L2291.

Accredited by TUV Rheinland Shenzhen 2016.5.19
The Laboratory has been assessed according to the requirements ISO/IEC 17025.

Designation Number: CN1204
Test Firm Registration Number: 882943
Accredited by A2LA, August 31, 2020
The Certificate Registration Number is 4321.01.

Accredited by Industry Canada, November 09, 2018
The Conformity Assessment Body Identifier is CN0008.

Name of Firm : EMTEK(SHENZHEN) CO., LTD.

Site Location : Bldg 69, Majialong Industry Zone,
Nanshan District, Shenzhen, Guangdong, China

6 TEST SYSTEM UNCERTAINTY

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

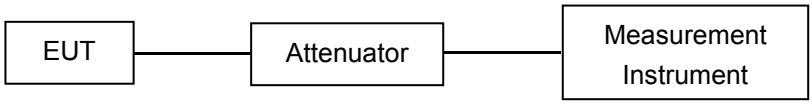
Parameter	Uncertainty
Radio Frequency	±1x10^-5
Maximum Peak Output Power Test	±1.0dB
Conducted Emissions Test	±2.0dB
Radiated Emission Test	±2.0dB
Power Density	±2.0dB
Occupied Bandwidth Test	±1.0dB
Band Edge Test	±3dB
All emission, radiated	±3dB
Antenna Port Emission	±3dB
Temperature	±0.5℃
Humidity	±3%

Measurement Uncertainty for a level of Confidence of 95%

7 SETUP OF EQUIPMENT UNDER TEST

7.1 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.



7.2 RADIO FREQUENCY TEST SETUP

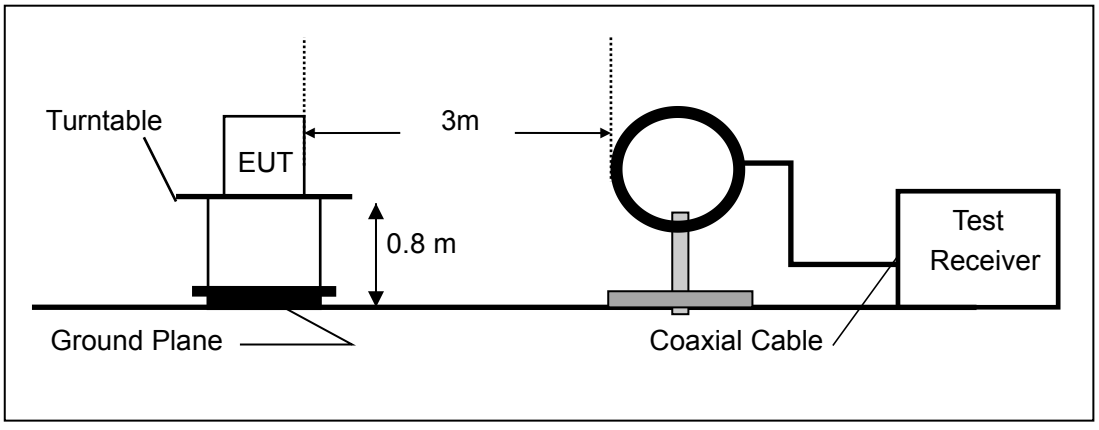
The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m.The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.

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.

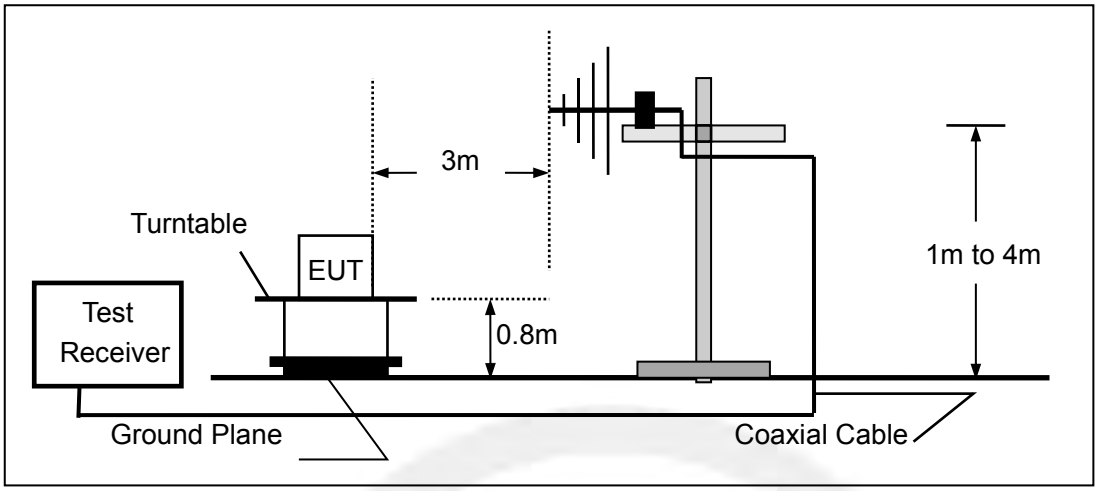
Above 30MHz：
The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of 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).

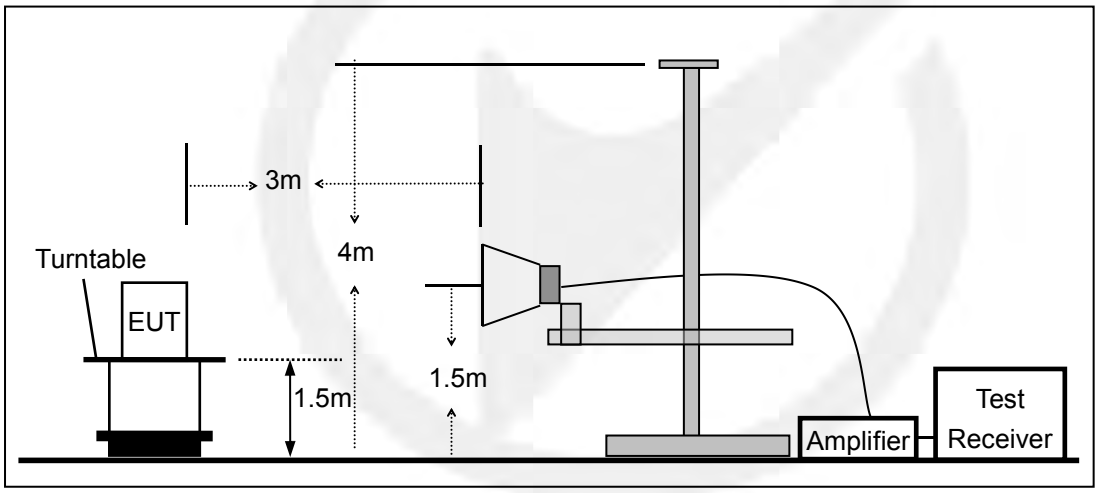
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



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

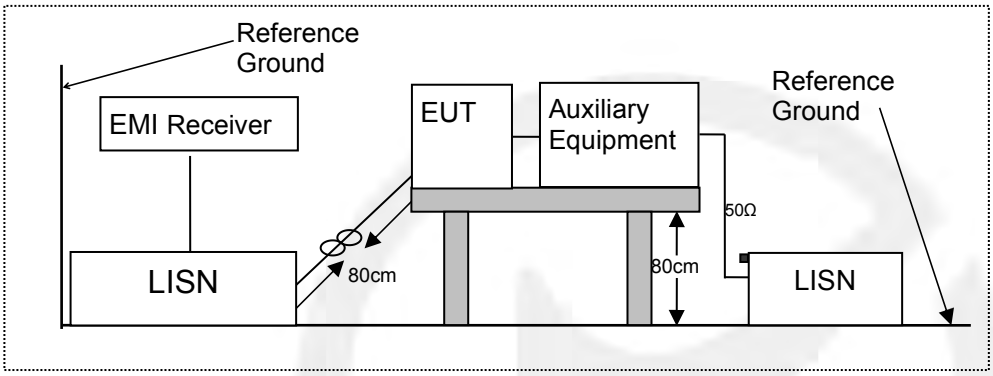


(c) Radiated Emission Test Set-Up, Frequency above 1000MHz

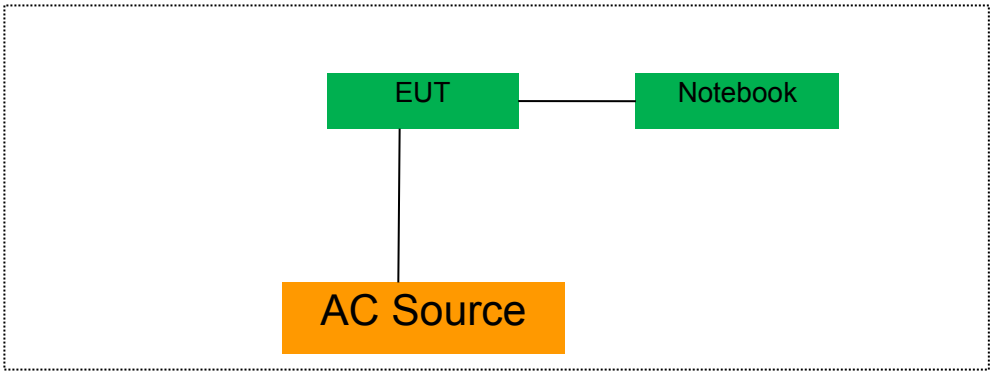


7.3 CONDUCTED EMISSION TEST SETUP

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.



7.4 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



7.5 SUPPORT EQUIPMENT

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / 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	acer	ZR1	LXTECOCO76643158 372500

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.

8 TEST REQUIREMENTS

8.1 BANDWIDTH MEASUREMENT

8.1.1 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)

8.1.2 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 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.

8.1.3 Test Configuration

Test according to clause 6.1 radio frequency test setup

8.1.4 Test Procedure

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

1. Emission Bandwidth (EBW)
a) Set RBW = approximately 1% of the emission bandwidth.
b) Set the VBW > RBW.
c) Detector = Peak.
d) Trace mode = max hold.

e) 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) ≥ 3 × 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 ≥ 3 • 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.

8.1.5 Test Results

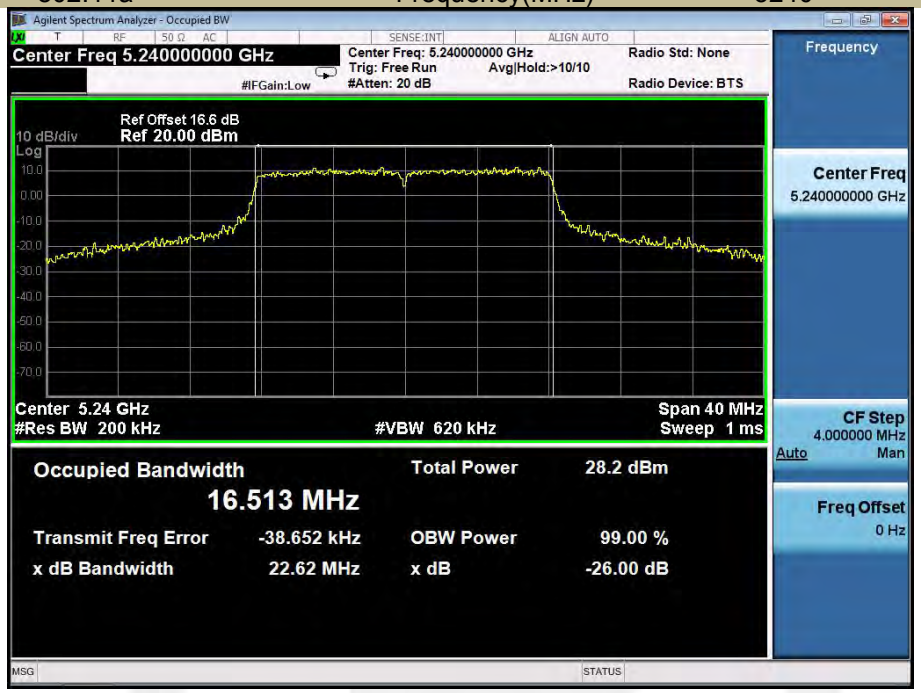
5150-5250MHz

Test Mode	Test Channel MHz		26 dB Bandwidth MHz	99% Bandwidth MHz	Verdict
802.11a	CH36	5180	21.35	16.518	Pass
	CH40	5200	23.86	16.528	Pass
	CH48	5240	22.62	16.513	Pass
802.11n-HT20	CH36	5180	27.30	17.953	Pass
	CH40	5200	27.33	17.869	Pass
	CH48	5240	23.63	17.869	Pass
802.11ac(VHT20)	CH36	5180	24.84	17.862	Pass
	CH40	5200	26.58	17.855	Pass
	CH48	5240	26.09	17.858	Pass
802.11n-HT40	CH38	5190	49.59	36.590	Pass
	CH46	5230	48.12	36.648	Pass
802.11ac(VHT40)	CH38	5190	44.33	36.571	Pass
	CH46	5230	50.27	36..607	Pass
802.11ac(VHT80)	CH42	5210	90.16	76.181	Pass

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

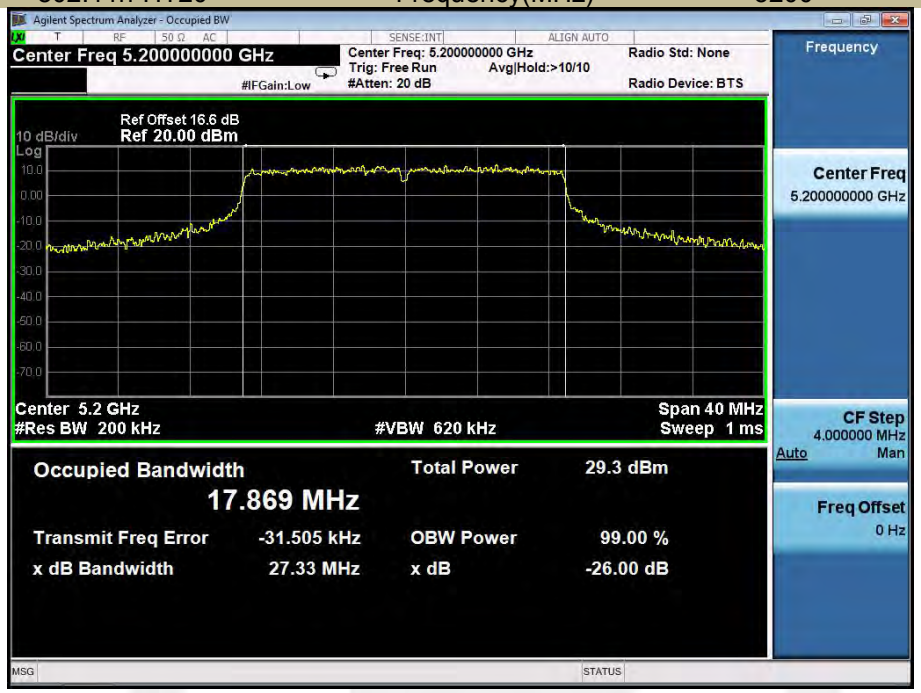
Emission Bandwidth&99% Occupied Bandwidth	U-NII - 1		
Test Model	802.11a	Frequency(MHz)	5200

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	20.44	16.469	Pass
	CH60	5300	21.05	16.517	Pass
	CH64	5320	24.19	16.497	Pass
802.11n-HT20	CH52	5260	24.81	17.858	Pass
	CH60	5300	24.80	17.890	Pass
	CH64	5320	23.84	17.856	Pass
802.11ac(VHT20)	CH52	5260	23.84	17.855	Pass
	CH60	5300	25.80	17.842	Pass
	CH64	5320	24.43	17.856	Pass
802.11n-HT40	CH54	5270	43.98	36.582	Pass
	CH62	5310	45.23	36.496	Pass
802.11ac(VHT40)	CH54	5270	43.14	36.467	Pass
	CH62	5310	43.55	36.498	Pass
802.11ac(VHT80)	CH58	5290	87.73	75.981	Pass

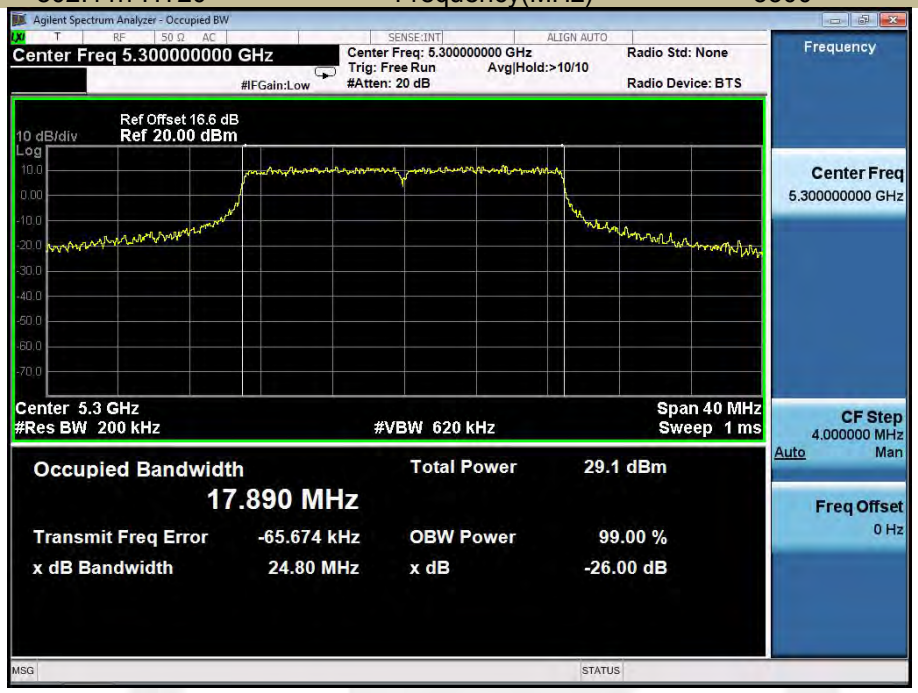
Emission Bandwidth&99% Occupied Bandwidth		U-NII – 2A	
Test Model	802.11a	Frequency(MHz)	5260

Emission Bandwidth&99% Occupied Bandwidth		U-NII – 2A	
Test Model	802.11a	Frequency(MHz)	5300

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

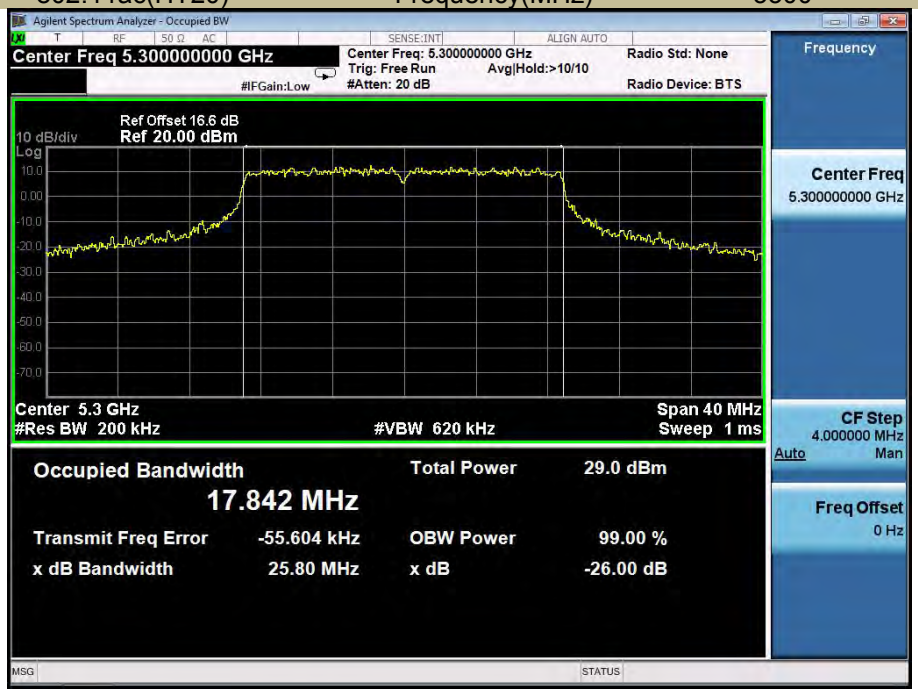
Emission Bandwidth&99% Occupied Bandwidth	U-NII – 2A		
Test Model	802.11n-HT20	Frequency(MHz)	5300



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

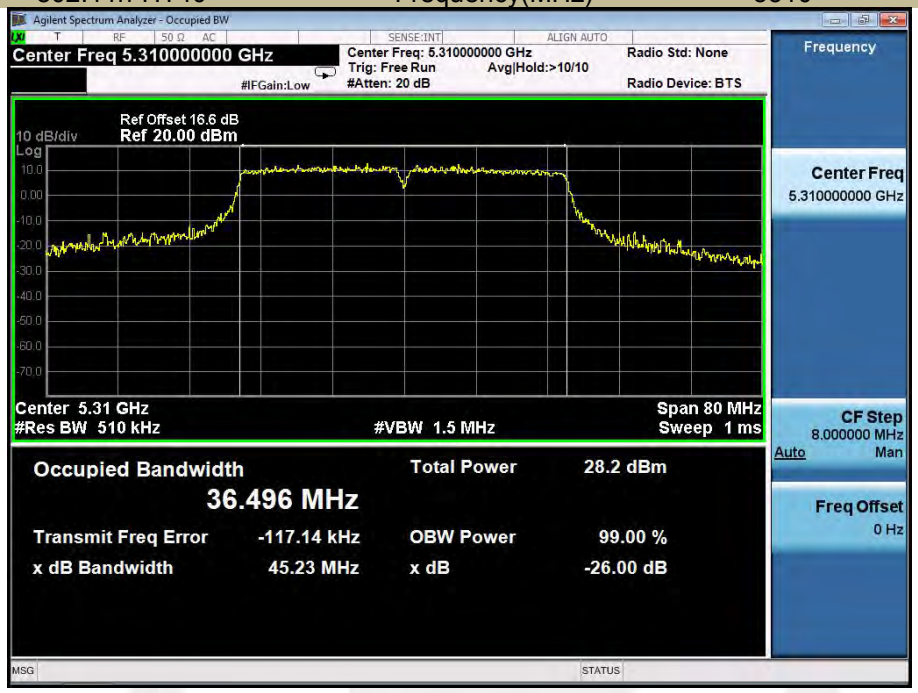
Emission Bandwidth&99% Occupied Bandwidth	U-NII – 2A		
Test Model	802.11ac(HT20)	Frequency(MHz)	5300



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	19.46	16.457	Pass
	CH116	5580	20.24	16.466	Pass
	CH144	5720	25.41	16.536	Pass
802.11n-HT20	CH100	5500	22.92	17.829	Pass
	CH116	5580	24.33	17.848	Pass
	CH144	5720	26.51	17.873	Pass
802.11ac(VHT20)	CH100	5500	22.73	17.842	Pass
	CH116	5580	23.89	17.829	Pass
	CH144	5720	24.64	17.894	Pass
802.11n-HT40	CH102	5510	45.45	36.579	Pass
	CH110	5550	46.75	36.552	Pass
	CH 142	5710	48.51	36.521	Pass
802.11ac(VHT40)	CH102	5510	44.06	36.535	Pass
	CH110	5550	43.74	36.544	Pass
	CH 142	5710	46.58	36.528	Pass
802.11ac(VHT80)	CH106	5530	88.07	76.228	Pass
	CH138	5690	93.33	76.076	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

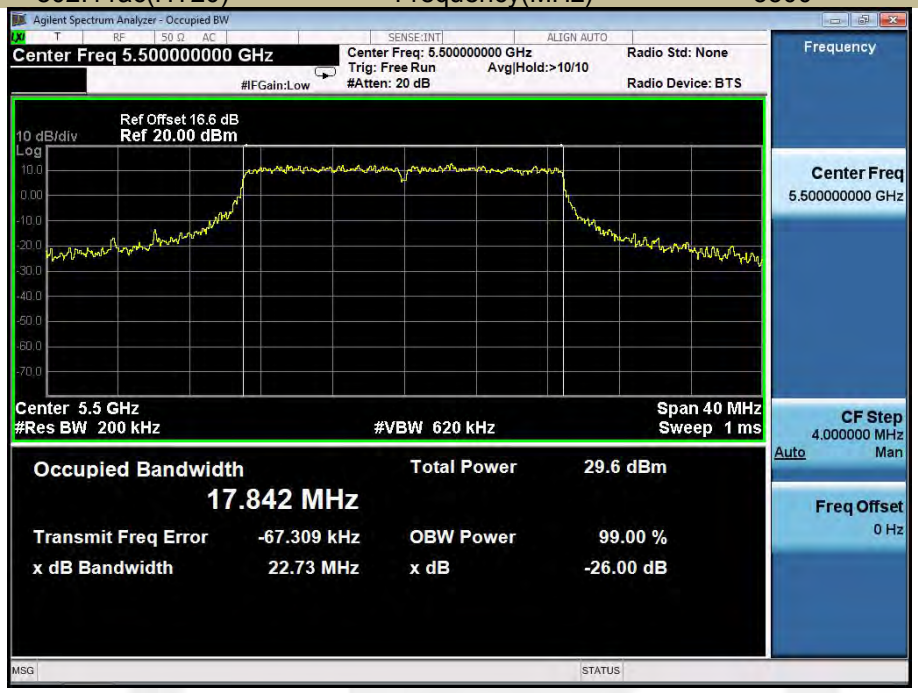
Emission Bandwidth&99% Occupied Bandwidth	U-NII – 2C		
Test Model	802.11a	Frequency(MHz)	5720

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)	5720

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

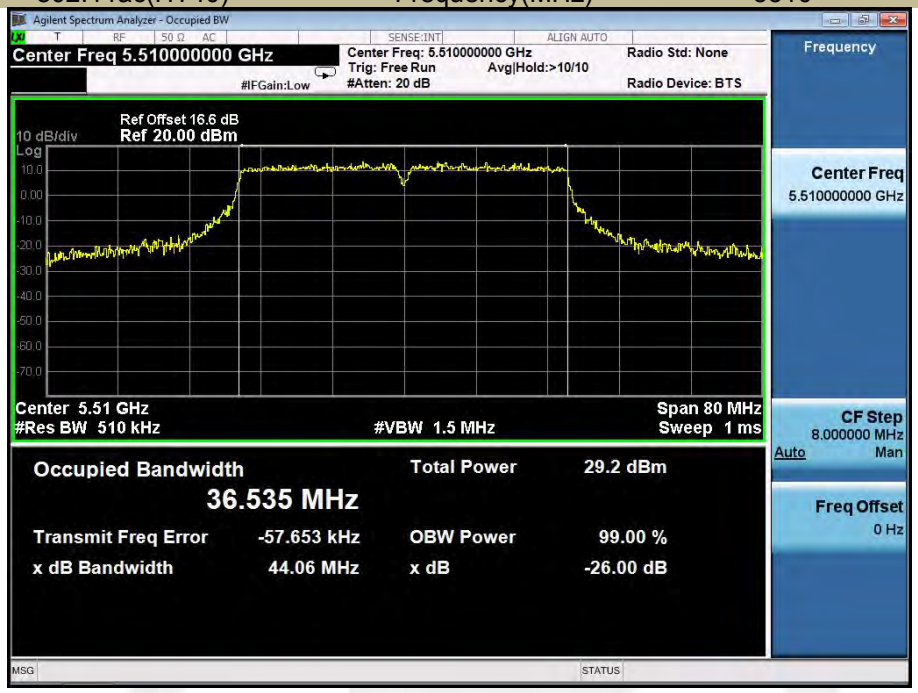
Emission Bandwidth&99% Occupied Bandwidth	U-NII – 2C		
Test Model	802.11ac(HT20)	Frequency(MHz)	5720

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)	5550

Emission Bandwidth&99% Occupied Bandwidth	U-NII – 2C		
Test Model	802.11n-HT40	Frequency(MHz)	5710

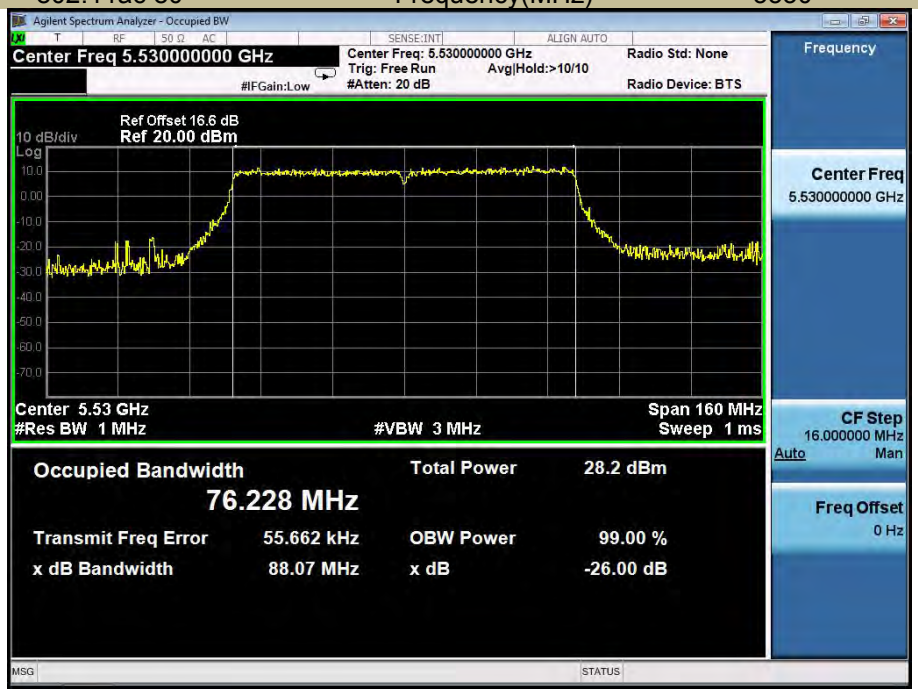
Emission Bandwidth&99% Occupied Bandwidth	U-NII – 2C		
Test Model	802.11ac(HT40)	Frequency(MHz)	5510



Emission Bandwidth&99% Occupied Bandwidth	U-NII – 2C		
Test Model	802.11ac(HT40)	Frequency(MHz)	5550

Emission Bandwidth&99% Occupied Bandwidth	U-NII – 2C		
Test Model	802.11ac(HT40)	Frequency(MHz)	5710

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

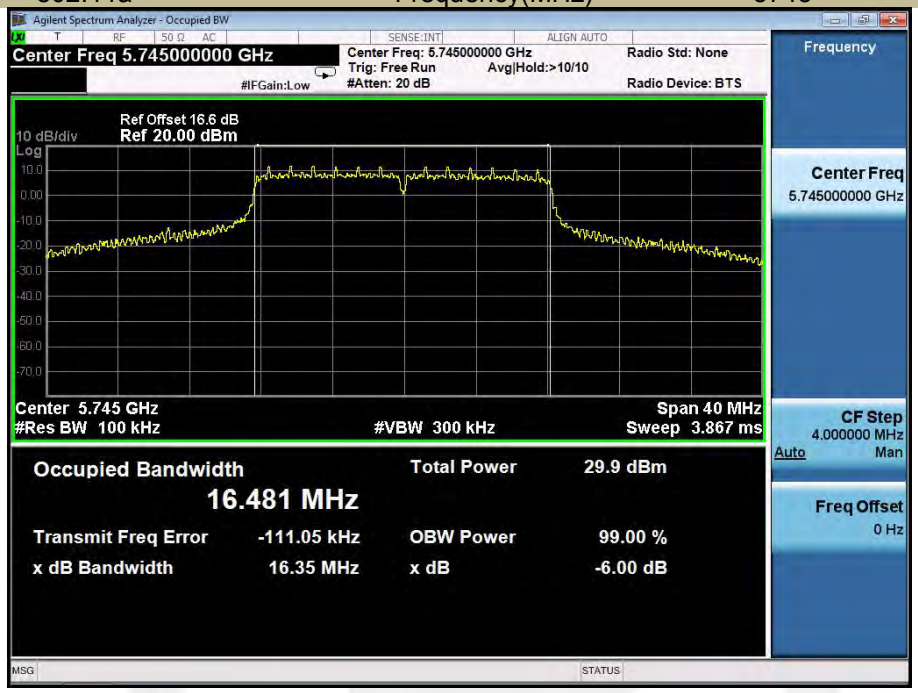


Emission Bandwidth&99% Occupied Bandwidth		U-NII – 2C	
Test Model	802.11ac 80	Frequency(MHz)	5690

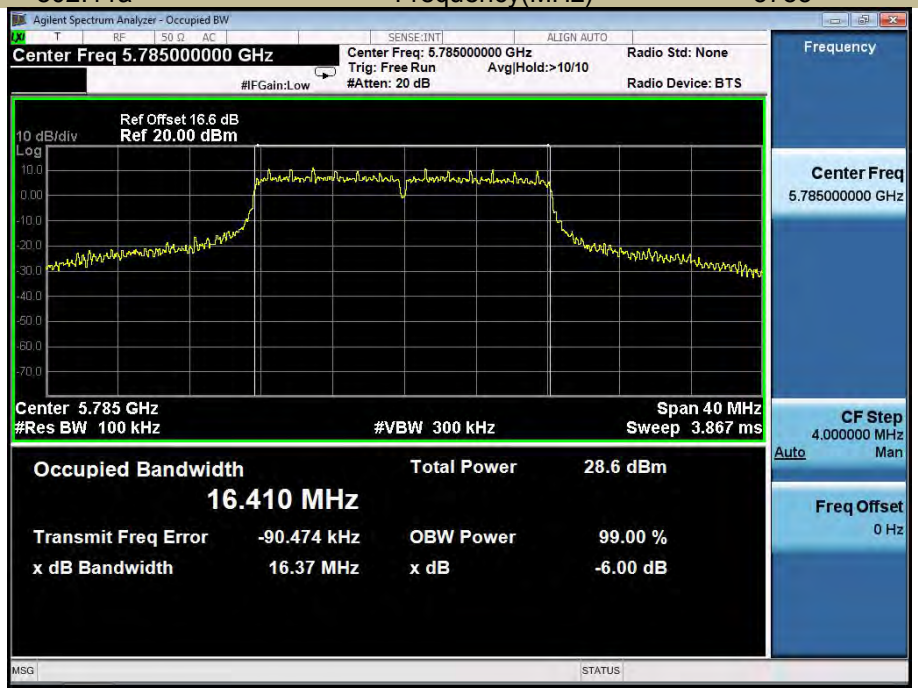
5725-5850MHz

Test Mode	Test Channel MHz		6 dB Bandwidth MHz	99% Bandwidth MHz	Limit kHz
802.11a	CH149	5745	16.35	16.481	≥500
	CH157	5785	16.37	16.410	≥500
	CH165	5825	16.38	16.451	≥500
802.11n-HT20	CH149	5745	17.77	17.974	≥500
	CH157	5785	17.75	17.745	≥500
	CH165	5825	17.75	17.732	≥500
802.11ac(VHT20)	CH149	5745	17.73	17.762	≥500
	CH157	5785	17.74	17.717	≥500
	CH165	5825	17.77	17.759	≥500
802.11n-HT40	CH151	5755	36.09	36.268	≥500
	CH159	5795	36.49	36.306	≥500
802.11ac(VHT40)	CH151	5755	36.41	36.258	≥500
	CH159	5795	36.47	36.276	≥500
802.11ac(VHT80)	CH155	5775	75.95	75.764	≥500

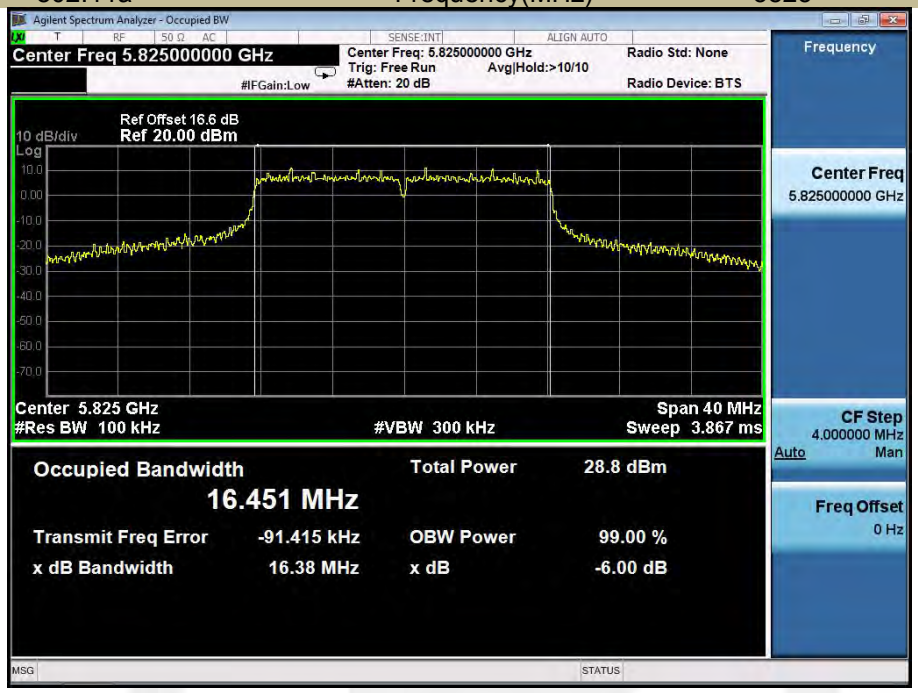
Emission Bandwidth&99% Occupied Bandwidth	U-NII - 3		
Test Model	802.11a	Frequency(MHz)	5745



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



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



Emission Bandwidth&99% Occupied Bandwidth	U-NII - 3		
Test Model	802.11n-HT20	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

8.2 MAXIMUM CONDUCTED OUTPUT POWER

8.2.1 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)

8.2.2 Conformance Limit

■ 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.

■ 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 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.

■ 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.

8.2.3 Test Configuration

Test according to clause 6.1 radio frequency test setup

8.2.4 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.

8.2.5 Test Results

☒ 802.11a mode

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII - 1	CH36	5180	13.45	30	Pass
	CH40	5200	13.29	30	Pass
	CH48	5240	13.34	30	Pass

☒ 802.11n-HT20

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII - 1	CH36	5180	13.02	30	Pass
	CH40	5200	13.06	30	Pass
	CH48	5240	13.08	30	Pass

☒ 802.11 ac (VHT20)

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII - 1	CH36	5180	13.48	30	Pass
	CH40	5200	13.42	30	Pass
	CH48	5240	13.43	30	Pass

☒ 802.11n-HT40

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII - 1	CH38	5190	14.45	30	Pass
	CH46	5230	14.37	30	Pass

☒ 802.11 ac (VHT40)

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII - 1	CH38	5190	13.69	30	Pass
	CH46	5230	13.61	30	Pass

☒ 802.11 ac (VHT80)

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII - 1	CH42	5210	13.94	30	Pass

☒ 802.11a mode

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 2A	CH52	5260	15.13	24	Pass
	CH60	5300	15.26	24	Pass
	CH64	5320	15.14	24	Pass

☒ 802.11n-HT20

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 2A	CH52	5260	15.28	24	Pass
	CH60	5300	15.35	24	Pass
	CH64	5320	15.32	24	Pass

☒ 802.11 ac (VHT20)

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 2A	CH52	5260	15.42	24	Pass
	CH60	5300	15.53	24	Pass
	CH64	5320	15.45	24	Pass

☒ 802.11n-HT40

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 2A	CH54	5270	15.31	24	Pass
	CH62	5310	15.29	24	Pass

☒ 802.11 ac (VHT40)

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 2A	CH54	5270	15.44	24	Pass
	CH62	5310	15.43	24	Pass

☒ 802.11 ac (VHT80)

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 2A	CH58	5290	15.28	24	Pass

☒ 802.11a mode

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 2C	CH100	5500	13.31	24	Pass
	CH116	5580	13.28	24	Pass
	CH144	5720	13.37	24	Pass

☒ 802.11n-HT20

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 2C	CH100	5500	13.41	24	Pass
	CH116	5580	13.43	24	Pass
	CH144	5720	13.39	24	Pass

☒ 802.11 ac (VHT20)

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 2C	CH100	5500	13.34	24	Pass
	CH116	5580	13.26	24	Pass
	CH144	5720	13.38	24	Pass

☒ 802.11n-HT40

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 2C	CH102	5510	13.72	24	Pass
	CH110	5550	13.64	24	Pass
	CH142	5710	13.66	24	Pass

☒ 802.11 ac (VHT40)

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 2C	CH102	5510	13.86	24	Pass
	CH110	5550	13.87	24	Pass
	CH142	5710	13.91	24	Pass

☒ 802.11 ac (VHT80)

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 2C	CH106	5530	13.25	24	Pass
	CH138	5690	13.29	24	Pass

☒ 802.11a mode

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 3	CH149	5745	14.36	30	Pass
	CH157	5785	14.39	30	Pass
	CH165	5825	14.32	30	Pass

☒ 802.11n-HT20

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 3	CH149	5745	14.34	30	Pass
	CH157	5785	14.31	30	Pass
	CH165	5825	14.34	30	Pass

☒ 802.11 ac (VHT20)

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 3	CH149	5745	14.18	30	Pass
	CH157	5785	14.23	30	Pass
	CH165	5825	14.24	30	Pass

☒ 802.11n-HT40

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 3	CH151	5755	14.02	30	Pass
	CH159	5795	14.07	30	Pass

☒ 802.11 ac (VHT40)

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 3	CH151	5755	14.35	30	Pass
	CH159	5795	14.32	30	Pass

☒ 802.11 ac (VHT80)

Band	Channel Number	Channel Freq. (MHz)	Conducted Output Power(dBm)	Limit (dBm)	Verdict
U-NII – 3	CH155	5775	13.22	30	Pass

8.3 MAXIMUM PEAK POWER DENSITY

8.3.1 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)

8.3.2 Conformance Limit

■ 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.

■ 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 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.

■ 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.

8.3.3 Test Configuration

Test according to clause 6.1 radio frequency test setup

8.3.4 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 ≥ 1/T, where T is defined in section II.B.I.a).

b) Set VBW ≥ 3 RBW.

c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/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 10log(1MHz/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

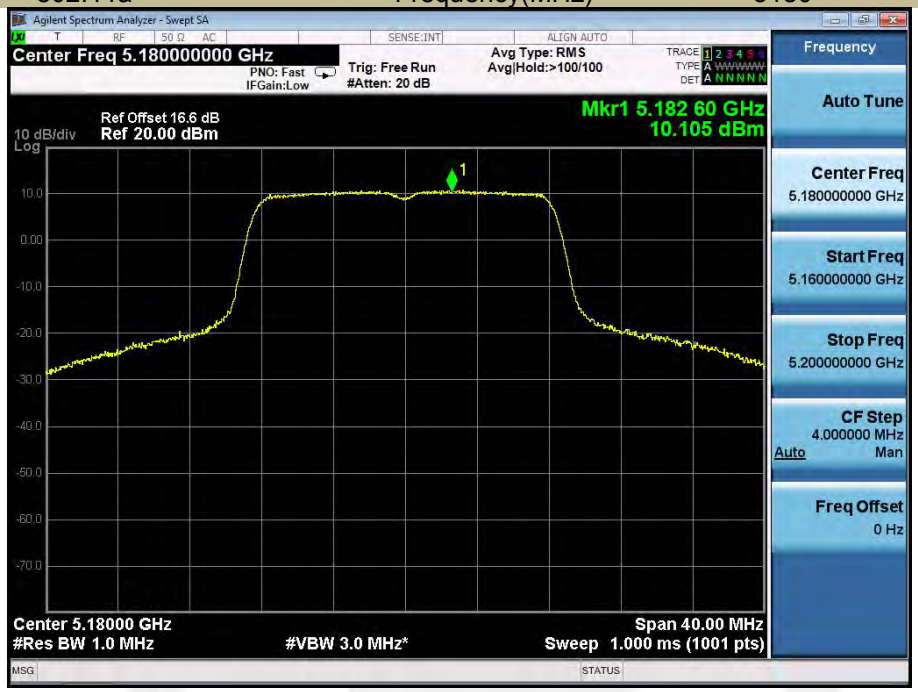
5.c) and 5.d) above, since RBW=100 KHZ is available on nearly all spectrum analyzers.

8.3.5 Test Results

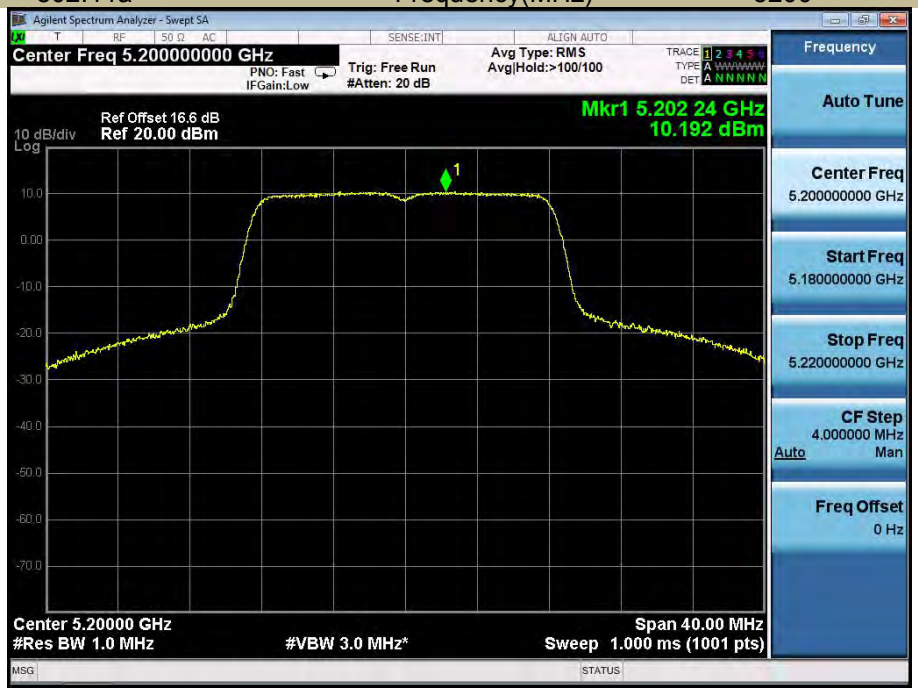
5150-5250MHz

Operating mode	Test Channel	Power Spectral Density dBm/MHz	Limit (dBm/MHz)
802.11a	5180	10.105	17
	5200	10.192	17
	5240	10.075	17
802.11n-HT20	5180	10.155	17
	5200	9.963	17
	5240	10.144	17
802.11ac(VHT20)	5180	9.811	17
	5200	9.485	17
	5240	9.923	17
802.11n-HT40	5190	6.601	17
	5230	6.670	17
802.11ac(VHT40)	5190	5.797	17
	5230	5.718	17
802.11ac(VHT80)	5210	2.031	17

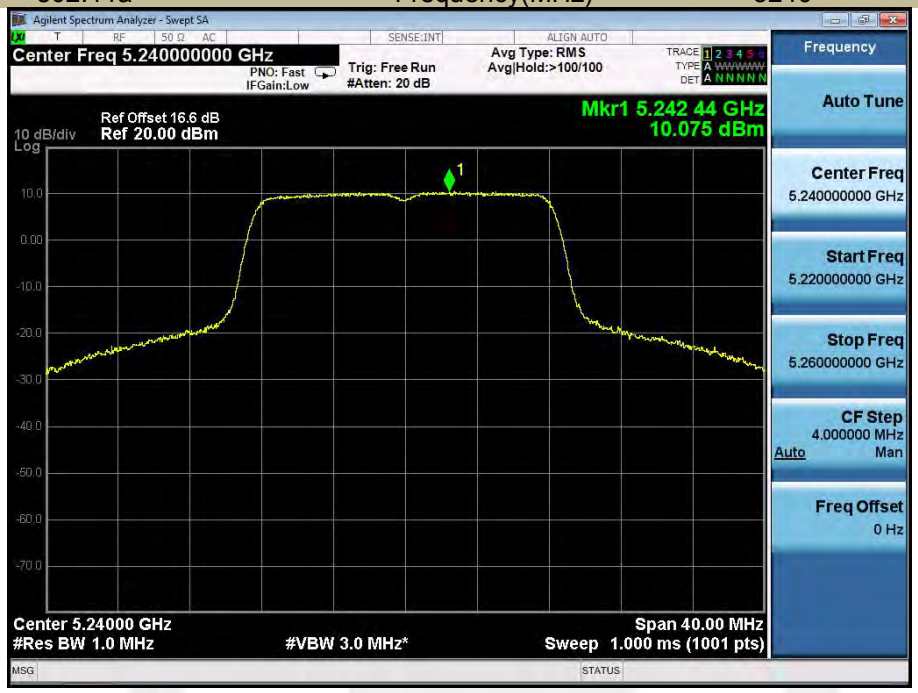
Power Spectral Density		U-NII - 1	
Test Model	802.11a	Frequency(MHz)	5180



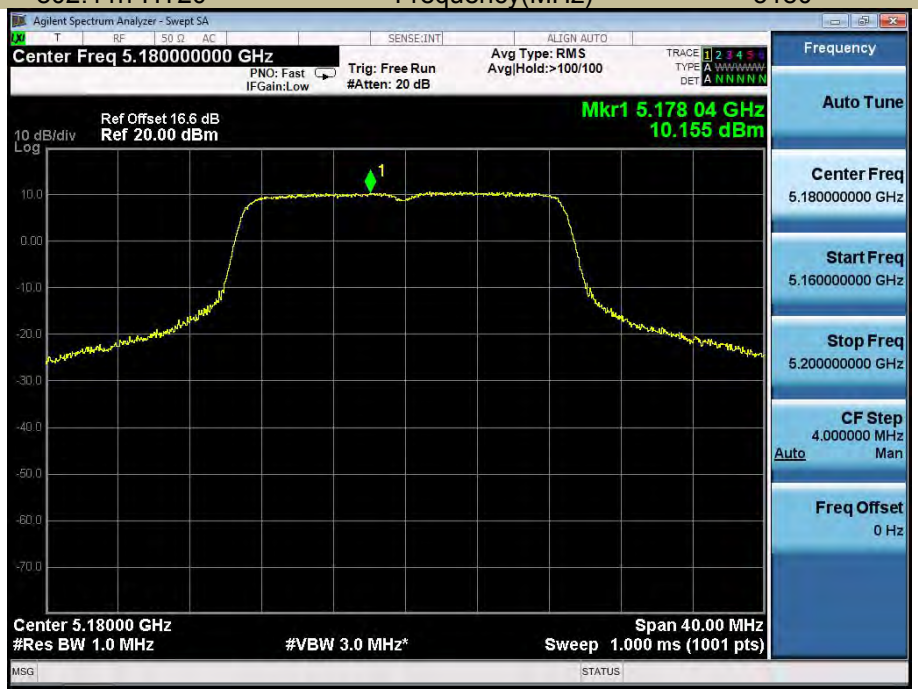
Power Spectral Density		U-NII - 1	
Test Model	802.11a	Frequency(MHz)	5200



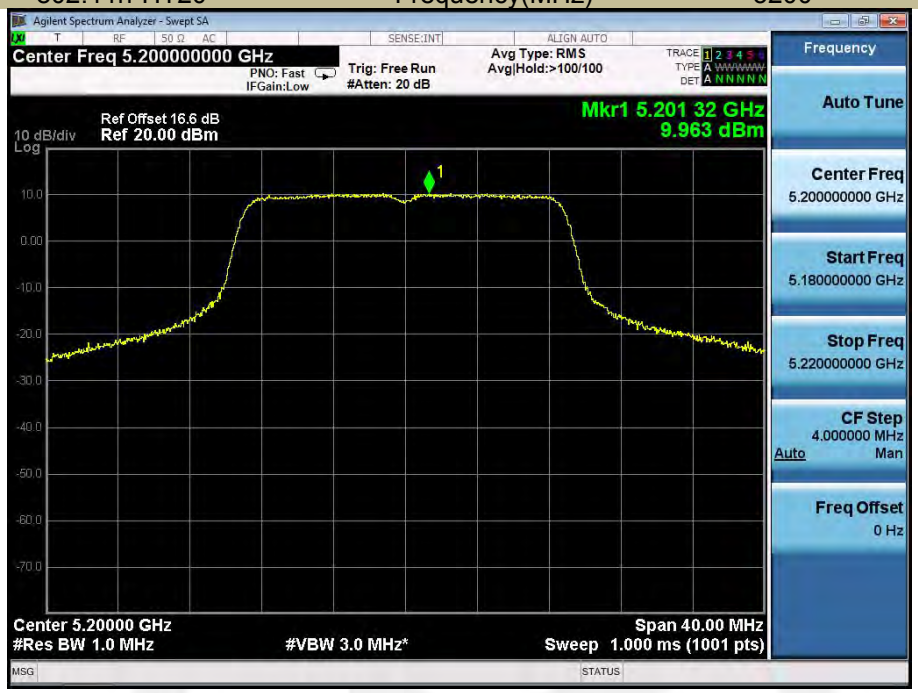
Power Spectral Density		U-NII - 1	
Test Model	802.11a	Frequency(MHz)	5240



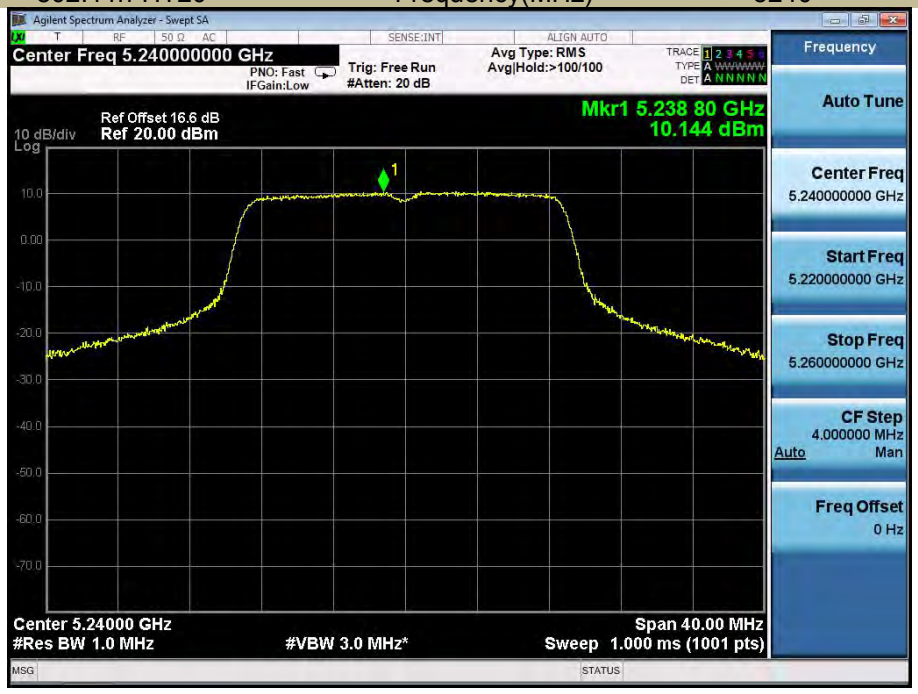
Power Spectral Density		U-NII - 1	
Test Model	802.11n-HT20	Frequency(MHz)	5180



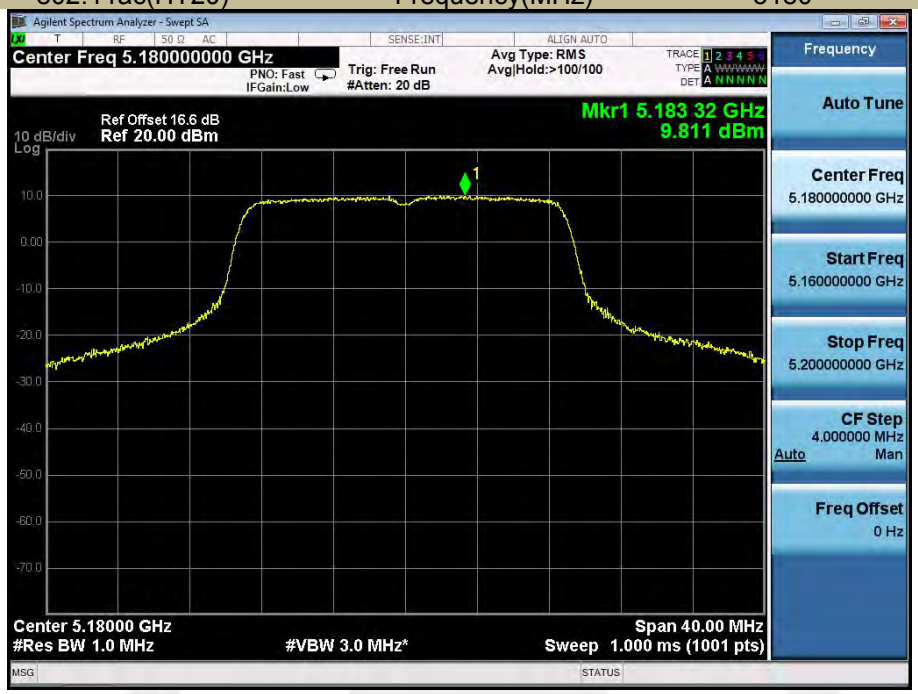
Power Spectral Density		U-NII - 1	
Test Model	802.11n-HT20	Frequency(MHz)	5200



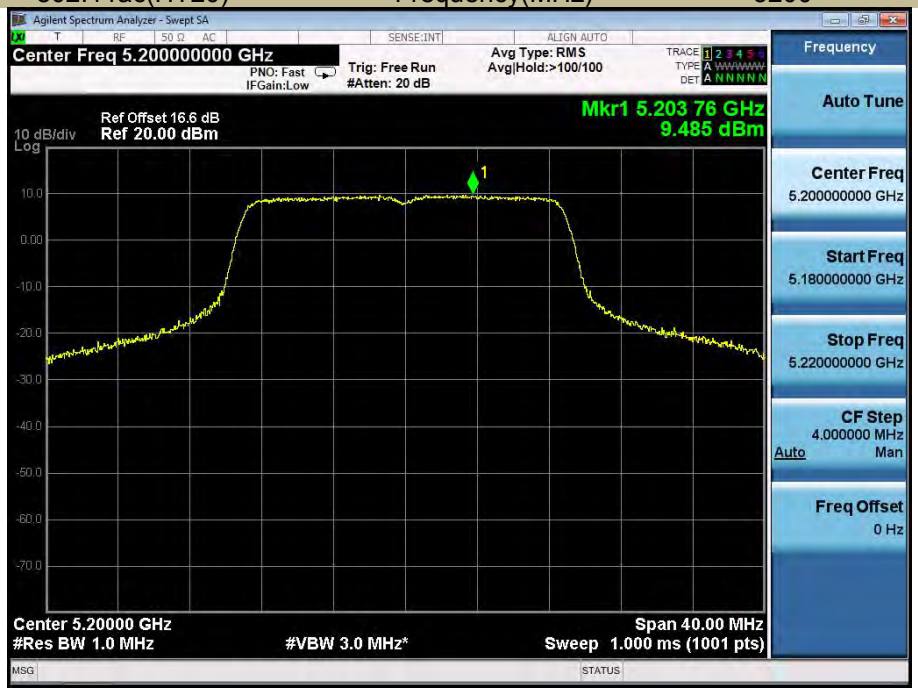
Power Spectral Density		U-NII - 1	
Test Model	802.11n-HT20	Frequency(MHz)	5240



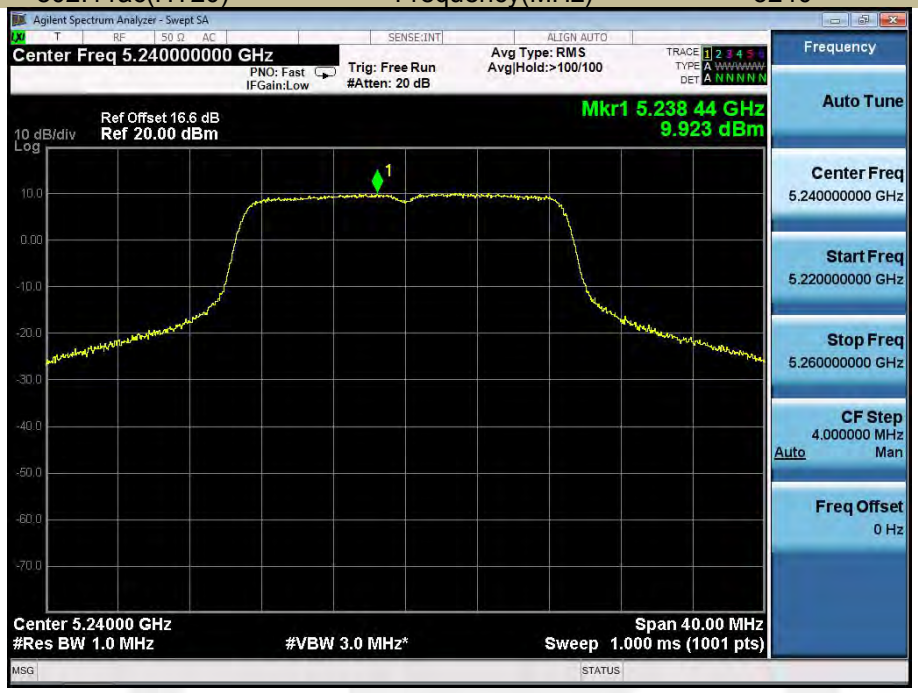
Power Spectral Density		U-NII - 1	
Test Model	802.11ac(HT20)	Frequency(MHz)	5180



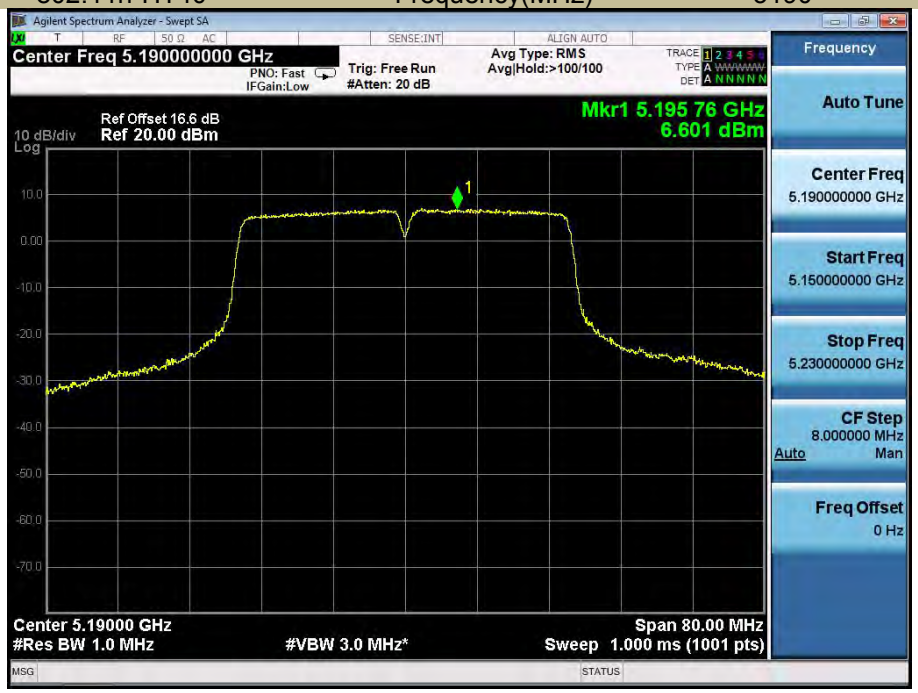
Power Spectral Density		U-NII - 1	
Test Model	802.11ac(HT20)	Frequency(MHz)	5200



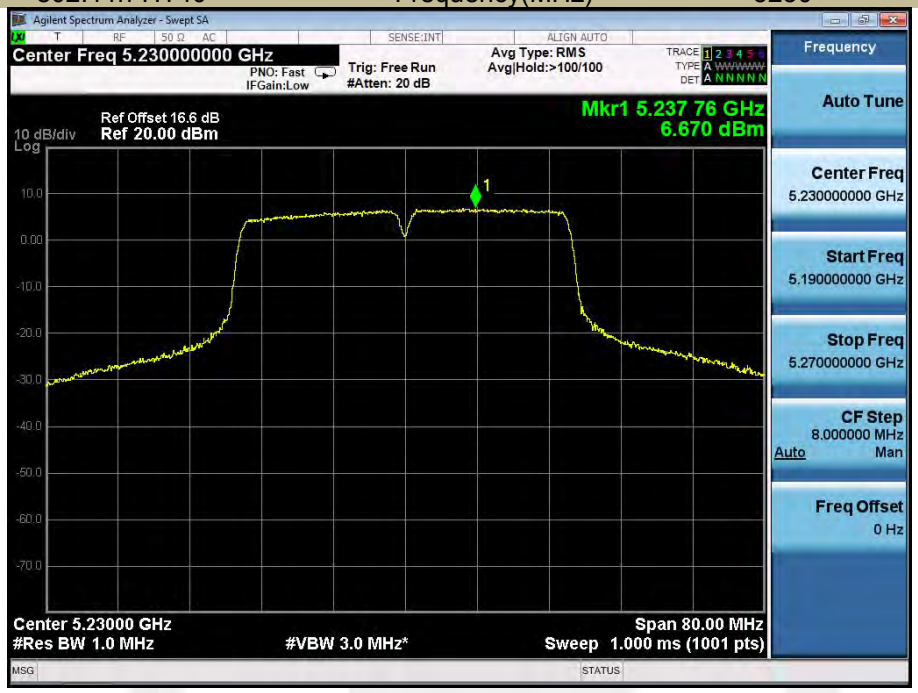
Power Spectral Density		U-NII - 1	
Test Model	802.11ac(HT20)	Frequency(MHz)	5240



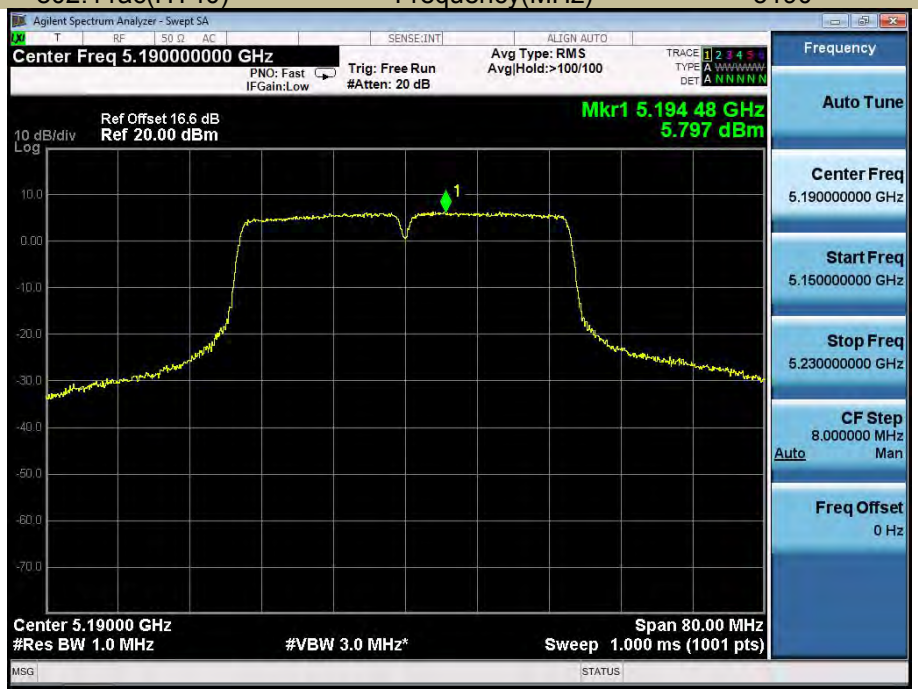
Power Spectral Density		U-NII - 1	
Test Model	802.11n-HT40	Frequency(MHz)	5190



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



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



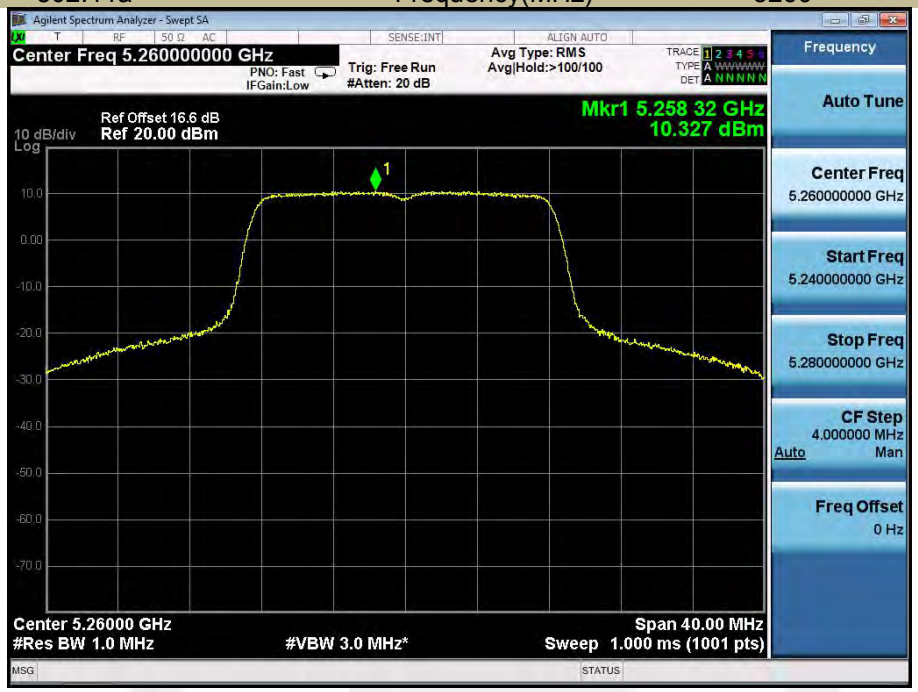
Power Spectral Density		U-NII - 1	
Test Model	802.11ac(HT40)	Frequency(MHz)	5230

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	10.327	11
	5300	10.520	11
	5320	10.048	11
802.11n-HT20	5260	10.219	11
	5300	10.145	11
	5320	10.180	11
802.11ac(VHT20)	5260	9.650	11
	5300	9.329	11
	5320	8.630	11
802.11n-HT40	5270	6.558	11
	5310	6.417	11
802.11ac(VHT40)	5270	5.846	11
	5310	6.239	11
802.11ac(VHT80)	5290	2.074	11

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



Power Spectral Density		U-NII – 2A	
Test Model	802.11a	Frequency(MHz)	5300