FCC Part 15E
Measurement and Test Report

For

Shenzhen Lenkeng Technology Co., Ltd

West 4F,Jinguangxia Culture&Tech Park, 3 Guangxia Road, Shenzhen ,

China

FCC ID: 2ADXC20WMD3AA

FCC Rule(s):	FCC Part 15.407
Product Description:	wireless extender
Tested Model:	LKV388M-DUAL
Report No.:	WTH20X01001065W
Sample Receipt Date:	Jan.06, 2020
Tested Date:	Jan.06, 2020 to Mar.04, 2020
Issued Date:	Mar.04, 2020
Tested By:	Mike Shi / Engineer
Reviewed By:	Silin Chen / EMC Manager
Approved & Authorized By:	Jandy So / PSQ Manager

Prepared By:

Shenzhen SEM Test Technology Co., Ltd.
1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road,
Bao'an District, Shenzhen, P.R.C.（518101）
Tel.: +86-755-33663308 Fax.: +86-755-33663309 Website: www.semtest.com.cn

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Rev.00	Mar.04, 2020	Original
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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	Shenzhen Lenkeng Technology Co., Ltd
Address of applicant:	West 4F,Jinguangxia Culture&Tech Park, 3 Guangxia Road, Shenzhen, China
Manufacturer:	Shenzhen Lenkeng Technology Co., Ltd
Address of manufacturer:	West 4F,Jinguangxia Culture&Tech Park, 3 Guangxia Road, Shenzhen, China

General Description of EUT	
Product Name:	wireless extender
Brand Name:	/
Model No.:	LKV388M-DUAL
Adding Model(s):	LKV388N-DUAL
Rated Voltage:	DC5V
Battery Capacity:	/
Power Adapter:	MODEL: NBS12E050200VU INPUT: AC100-240V, 50/60Hz, 0.3A OUTPUT: DC5V, 2A
Software Version:	V1.0
Hardware Version:	V1.0
Note: The test data is gathered from a production sample, provided by the manufacturer. The appearance of others models listed in the report is different from main-test model LKV388M-DUAL, but the circuit and the electronic construction do not change, declared by the manufacturer.	

Technical Characteristics of EUT	
Support Standards:	802.11ac-VHT20, 802.11ac-VHT40
Frequency Range:	5150-5250MHz, 5725-5850MHz
RF Output Power:	5150-5250MHz: 10.89dBm (Conducted) 5725-5850MHz: 10.19dBm (Conducted)
Type of Modulation:	BPSK, QPSK,16QAM,64QAM, 256QAM
Data Rate:	6-54Mbps, up to 400Mbps
Type of Antenna:	External Antenna
Antenna Gain:	5dBi

1.2 Test Standards

The tests were performed according to following standards:

FCC Rules Part 15.407: General technical requirements.
ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
KDB789033 D02 v02r01: GUIDELINES FOR COMPLIANCE TESTING OF UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII) DEVICES PART 15, SUBPART E

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, KDB789033 D02 v02r01
The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted accordingly in reference to the Operating Instructions.

1.4 Table for parameters of Test Software setting

Enter "**SecureCRTPortable 7.0.0.326**" into the calculator to enter the engineer mode, you can start to test. During testing, Channel and 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.

Mode	Ant.	Test Frequency (MHz)												
		NCB: 20MHz												
		5180	5200	5240	5260	5300	5320	5500	5580	5700	5720	5745	5785	5825
802.11ac-VHT20 MCS0/Nss2	ANT 1	-	-	-	/	/	/	/	/	/	/	-	-	-
	ANT 2	-	-	-	/	/	/	/	/	/	/	-	-	-
Mode	Ant.	NCB: 40MHz												
		5190	5230	5270	5310	5510	5550	5670	5710	5755	5795			
802.11ac-VHT40 MCS0/Nss2	ANT 1	-	-	/	/	/	/	/	/	-	-			
	ANT 2	-	-	/	/	/	/	/	/	-	-			

Note"-"means' the power as factory default "mp_pwrctldm", not actual value is displayed.

1.5 EUT Operating during test

EUT was programmed to be in continuously transmitting mode. During the test, EUT operation to normal function and programs under Android were executed.

1.6 Test Facility

Address of the test laboratory

Laboratory: Shenzhen SEM Test Technology Co., Ltd.

Address: 1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C. (518101）

FCC – Registration No.: 125990

Shenzhen SEM Test Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintain ed in our files. The Designation Number is CN5010

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Shenzhen SEM Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

1.7 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, with a duty cycle equal to 100%, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	802.11ac-VHT20	5180MHz,5200MHz,5240MHz, 5745MHz, 5785MHz,5825MHz
TM2	802.11ac-VHT40	5190MHz,5230MHz, 5755MHz,5795MHz

Test Conditions	
Temperature:	22~25 °C
Relative Humidity:	50~55 %.
ATM Pressure:	1019 mbar

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
DC CABLE	1.16	Unshielded	Without Ferrite

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

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
/	/	/	/

1.8 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	±0.42dB
Occupied Bandwidth	Conducted	±1.5%
Power Spectral Density	Conducted	±1.8dB
Conducted Spurious Emission	Conducted	±2.17dB
Conducted Emissions	Conducted	9-150kHz ±3.74dB
		0.15-30MHz ±3.34dB
Transmitter Spurious Emissions	Radiated	30-200MHz ±4.52dB
		0.2-1GHz ±5.56dB
		1-6GHz ±3.84dB
		6-18GHz ±3.92dB

1.9 Test Equipment List and Details

No.	Description	Manufacturer	Model	Serial No.	Cal Date	Due Date
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY41440400	2019-04-30	2020-04-29
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2019-04-30	2020-04-29
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2019-04-30	2020-04-29
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2019-04-30	2020-04-29
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2019-04-30	2020-04-29
SEMT-1011	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2019-05-05	2021-05-04
SEMT-1042	Horn Antenna	ETS	3117	00086197	2019-05-05	2021-05-04
SEMT-1121	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170582	2019-05-05	2021-05-04
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2019-05-05	2021-05-04
SEMT-1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2019-04-30	2020-04-29
SEMT-1003	L.I.S.N	Schwarz beck	NSLK8126	8126-224	2019-04-30	2020-04-29
SEMT-1002	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2019-04-30	2020-04-29
SEMT-1168	Pre-amplifier	Direction Systems Inc.	PAP-0126	14141-12838	2019-04-30	2020-04-29
SEMT-1169	Pre-amplifier	Direction Systems Inc.	PAP-2640	14145-14153	2019-04-30	2020-04-29
SEMT-1163	Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2019-04-30	2020-04-29
SEMT-1170	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2019-05-05	2021-05-04
SEMT-1166	Power Limiter	Agilent	N9356B	MY45450376	2019-04-30	2020-04-29
SEMT-1048	RF Limiter	ATTEN	AT-BSF-2400~2500	/	2019-04-30	2020-04-29
SEMT-1076	RF Switcher	Top Precision	RCS03-A2	/	2019-04-30	2020-04-29
SEMT-C001	Cable	Zheng DI	LL142-07-07-10M(A)	/	2019-03-18	2020-03-17
SEMT-C002	Cable	Zheng DI	ZT40-2.92J-2.92J-6M	/	2019-03-18	2020-03-17
SEMT-C003	Cable	Zheng DI	ZT40-2.92J-2.92J-2.5M	/	2019-03-18	2020-03-17
SEMT-C004	Cable	Zheng DI	2M0RFC	/	2019-03-18	2020-03-17
SEMT-C005	Cable	Zheng DI	1M0RFC	/	2019-03-18	2020-03-17
SEMT-C006	Cable	Zheng DI	1M0RFC	/	2019-03-18	2020-03-17

Software List			
Description	**Manufacturer**	**Model**	**Version**
EMI Test Software (Radiated Emission)*	Farad	EZ-EMC	RA-03A1
EMI Test Software (Conducted Emission)*	Farad	EZ-EMC	RA-03A1

*Remark: indicates software version used in the compliance certification testing

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§15.203; §15.405	Antenna Requirement	Compliant
15.407 (c)	Automatically Discontinue Transmission	Compliant
§15.207; §15.407(b)(6)	Conducted Emission	Compliant
§15.407(a)(1),(2)	Power Spectral Density	Compliant
§15.407(e)	Emission Bandwidth and Occupied Bandwidth	Compliant
§15.407(a)(1),(2)	Maximum Conducted Output Power	Compliant
§15.407(b)(1),(2),(3),(4)	Undesirable emission	Compliant
§15.205; §15.407(b)(1),(2),(3)	Radiated Emission	Compliant
§15.407(g)	Frequency Stability	Compliant
§15.407(h)	Dynamic Frequency Selection (DFS)	N/A

N/A: not applicable

3. RF Exposure

3.1 Standard Applicable

According to §1.1307 and §2.1091, the mobile transmitter must comply the RF exposure requirements.

3.2 Test Result

This product complied with the requirement of the RF exposure, please see the MPE Report.

4. Antenna Requirement

4.1 Standard Applicable

According to FCC Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

4.2 Evaluation Information

This product has two External antennas, fulfill the requirement of this section.

5. Automatically Discontinue Transmission

5.1 Standard Applicable

According to FCC Part 15.407(c), the device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization to describe how this requirement is met.

5.2 Summary of Test Results

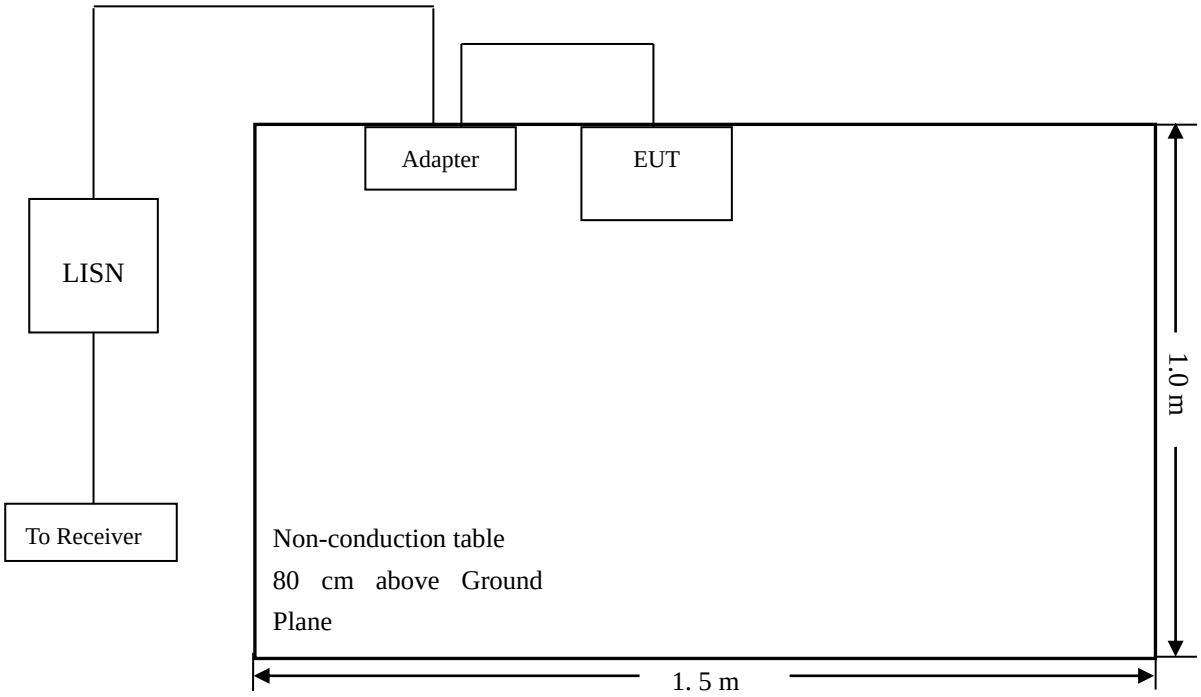
While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.

6. Conducted Emissions

6.1 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 Limit.
The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.
The spacing between the peripherals was 10 cm.

6.2 Basic Test Setup Block Diagram



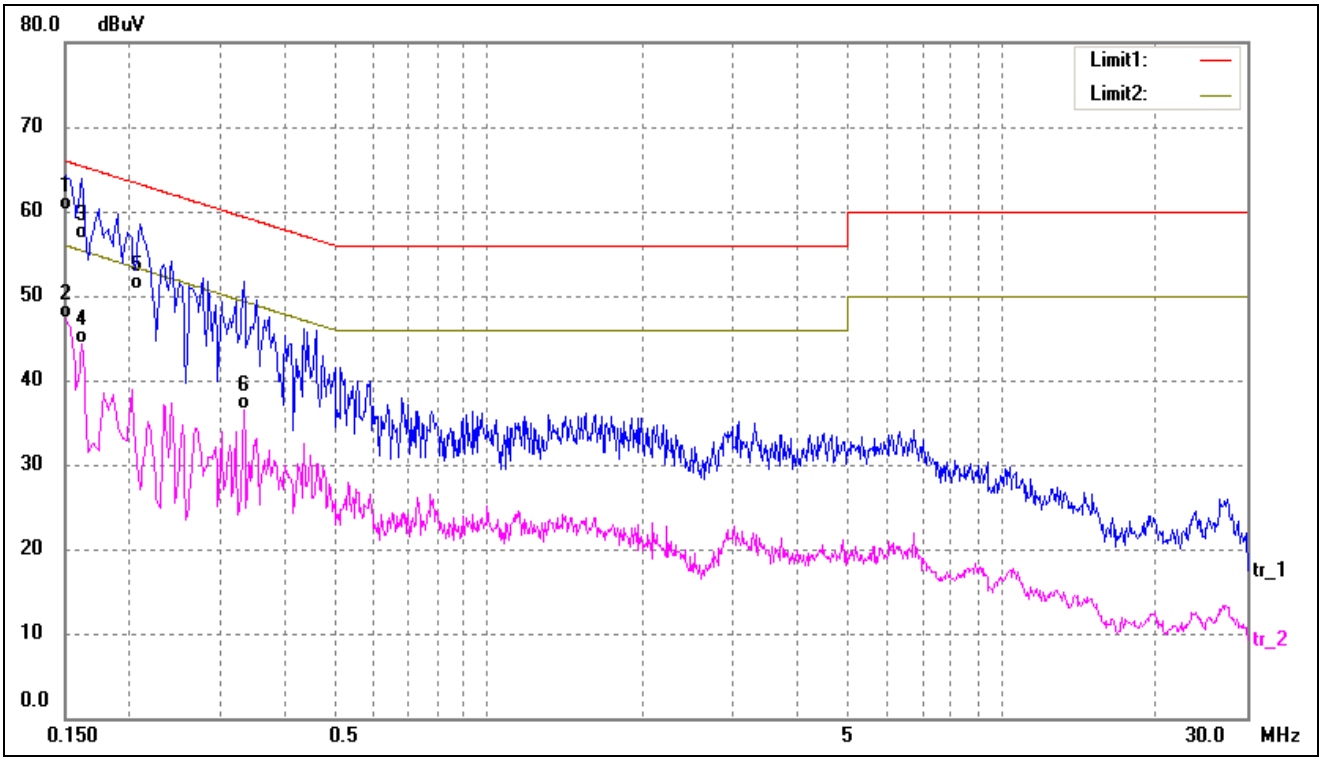
6.3 Test Receiver Setup

During the conducted emission test, the test receiver was set with the following configurations:

Start Frequency ..... 150 kHz
Stop Frequency ..... 30 MHz
Sweep Speed ..... Auto
IF Bandwidth..... 10 kHz
Quasi-Peak Adapter Bandwidth ..... 9 kHz
Quasi-Peak Adapter Mode ..... Normal

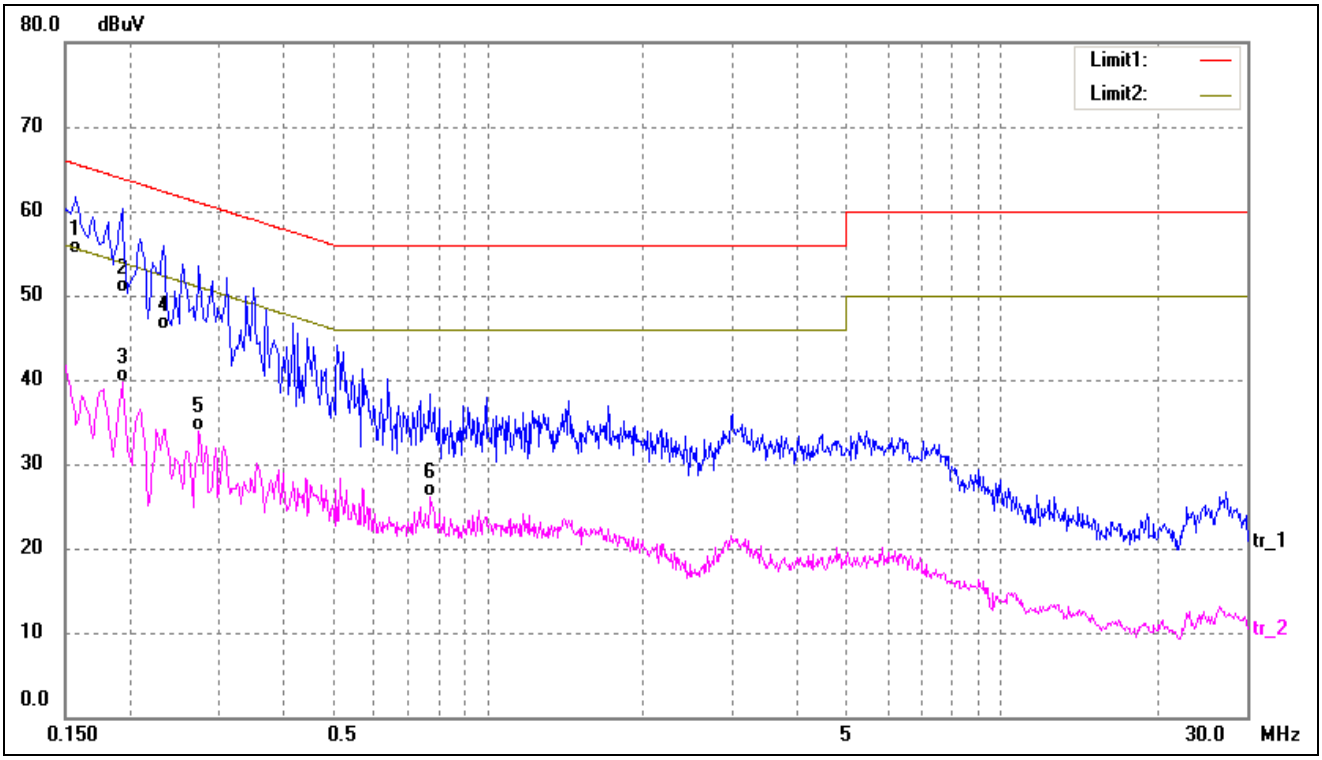
6.4 Summary of Test Results/Plots

Test Mode	Communication	AC120V 60Hz	Polarity:	Neutral



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1*	0.1516	50.25	9.95	60.20	65.91	-5.71	QP
2	0.1516	37.44	9.95	47.39	55.91	-8.52	AVG
3	0.1620	46.78	9.95	56.73	65.36	-8.63	QP
4	0.1620	34.38	9.95	44.33	55.36	-11.03	AVG
5	0.2100	40.66	9.98	50.64	63.20	-12.56	QP
6	0.3340	26.54	10.02	36.56	49.35	-12.79	AVG

Test Mode	Communication	AC120V 60Hz	Polarity:	Line



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1*	0.1580	44.99	9.95	54.94	65.57	-10.63	QP
2	0.1940	40.43	9.97	50.40	63.86	-13.46	QP
3	0.1940	29.76	9.97	39.73	53.86	-14.13	AVG
4	0.2340	35.95	10.00	45.95	62.31	-16.36	QP
5	0.2740	23.83	10.02	33.85	51.00	-17.15	AVG
6	0.7740	15.91	10.14	26.05	46.00	-19.95	AVG

7. Power Spectral Density

7.1 Standard Applicable

Section 15.407(a) Power limits:

(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.

7.2 Test Procedure

According to 789033 D02 v02r01 General UNII Test Procedures New Rules v02, the following is the measurement procedure.
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 500kHz bandwidth, the following adjustments to the procedures apply:

a) Set RBW ≥ 1/T, where T is defined in section II.B.l.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.

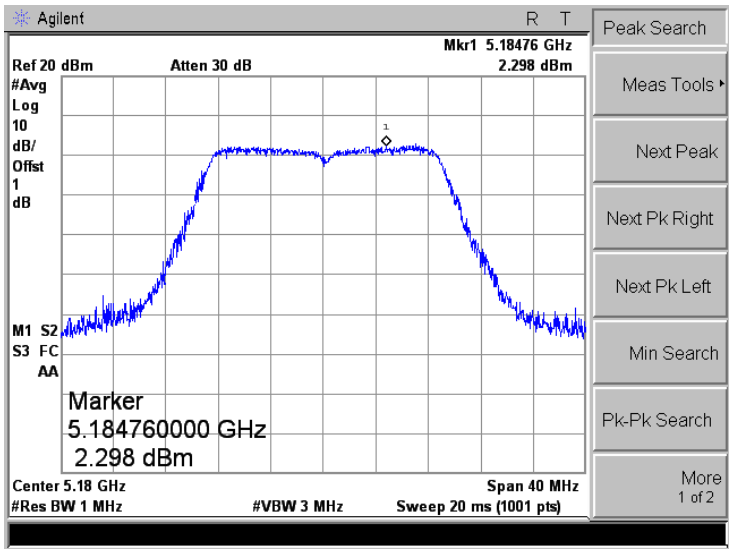
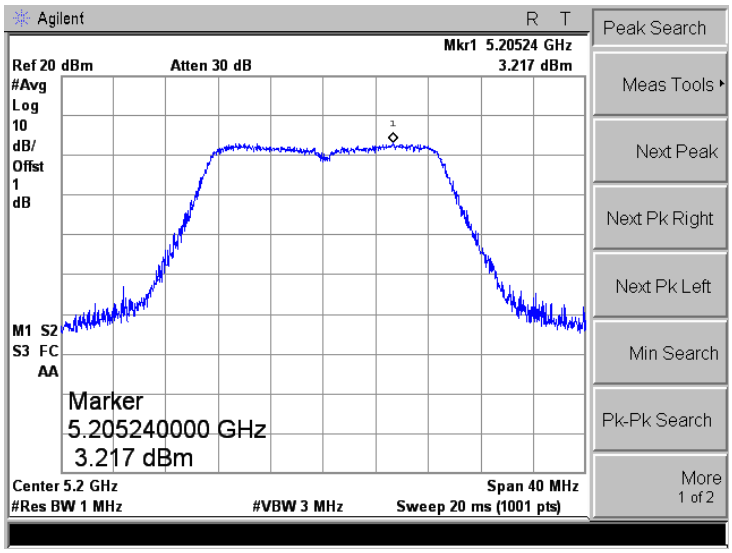
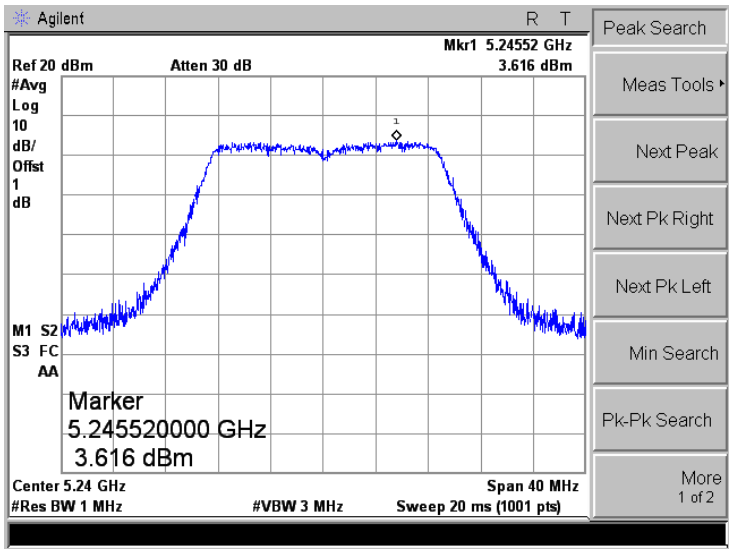
Note: As a practical matter, it is recommended to use reduced RBW of 100 kHz for the sections 5.c) and 5.d) above, since RBW=100 kHZ is available on nearly all spectrum analyzers.

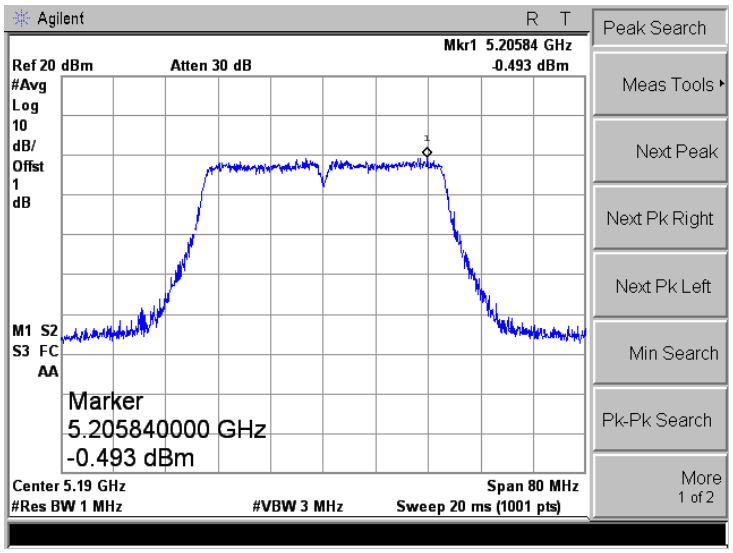
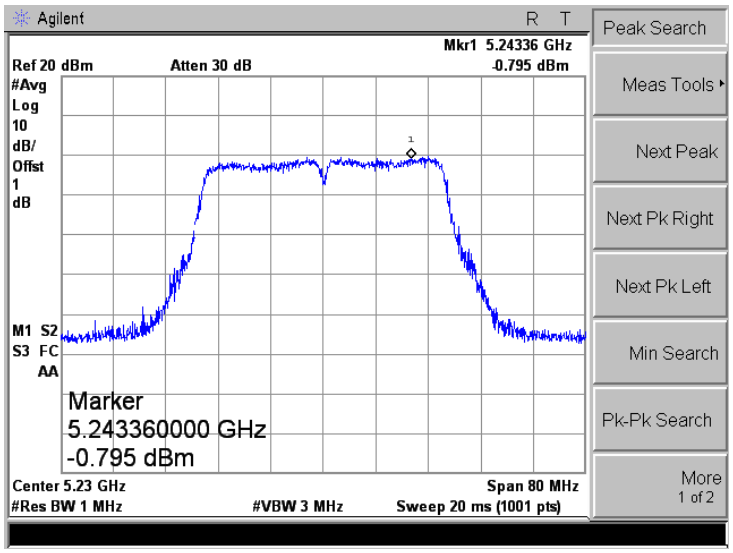
7.3 Summary of Test Results/Plots

U-NII-1:5150-5250MHz					
Operating mode	Test Channel	Power Spectral Density dBm/MHz		Total dBm/MHz	Limit (dBm/MHz)
		ANT1	ANT2		
802.11ac-VHT20	5180	2.30	4.21	6.37	11
	5200	3.22	4.96	7.19	11
	5240	3.62	3.54	6.59	11
802.11ac-VHT40	5190	-0.49	-0.04	2.75	11
	5230	-0.80	-0.26	2.49	11

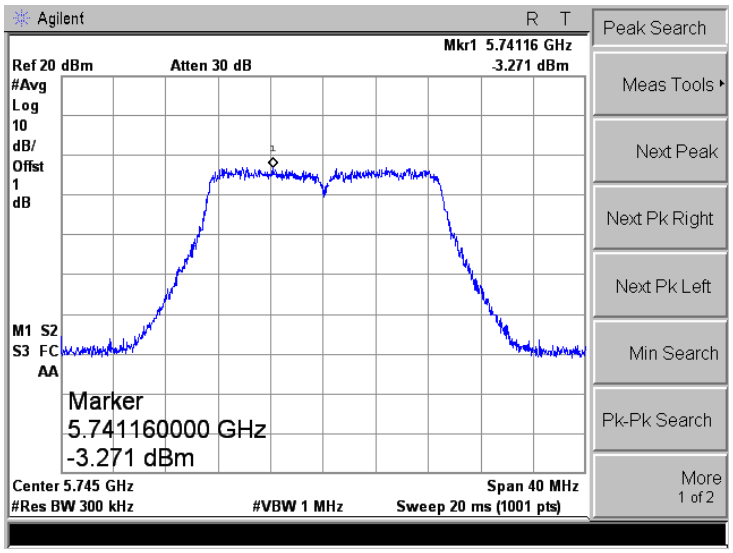
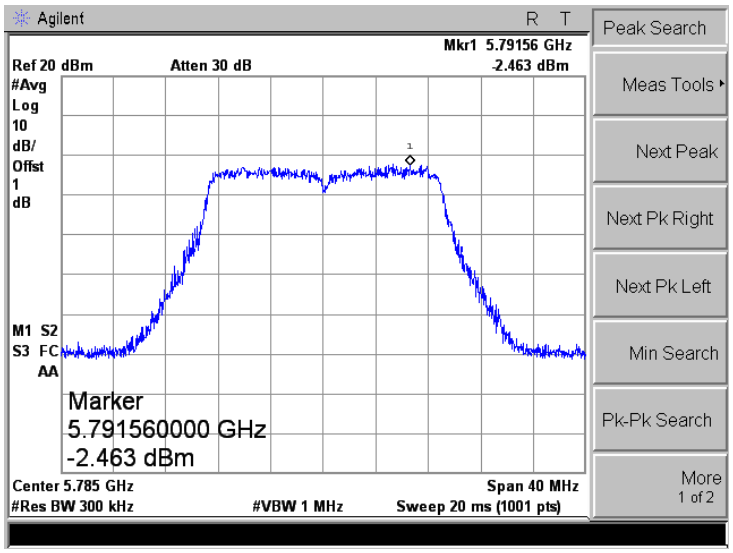
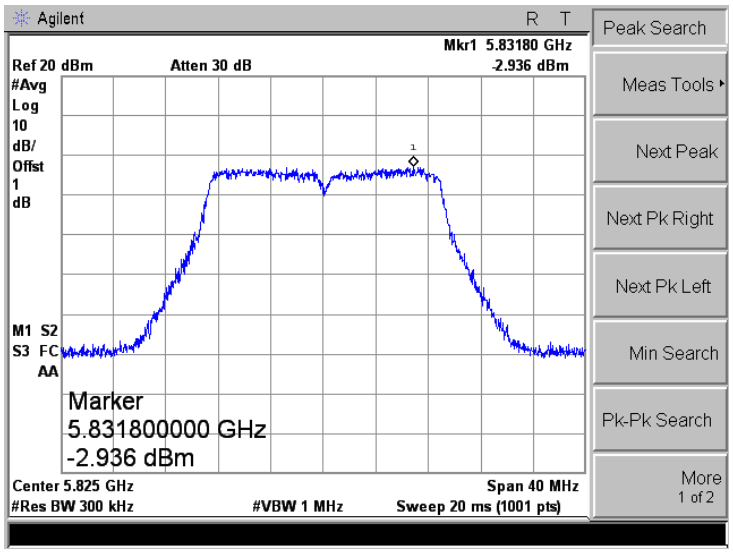
U-NII-3: 5725-5850MHz								
Operating mode	Test Channel	Power Spectral Density dBm/300kHz		Factor	Power Spectral Density* dBm/500kHz		Total dBm/500kHz	Limit dBm/500kHz
		ANT1	ANT2		ANT1	ANT2		
802.11ac-VHT 20	5745	-3.27	-0.27	2.22	-1.05	1.95	3.71	30
	5785	-2.46	-0.72	2.22	-0.24	1.5	3.73	30
	5825	-2.94	-0.68	2.22	-0.72	1.54	3.57	30
802.11ac-VHT 40	5755	-6.16	-4.56	2.22	-3.94	-2.34	-0.06	30
	5795	-5.78	-5.20	2.22	-3.56	-2.98	-0.25	30
*Note: Maximum PSD=PSD(dBm/300kHz)+10log(500kHz/300kHz)=PSD(dBm/300kHz)+2.22								

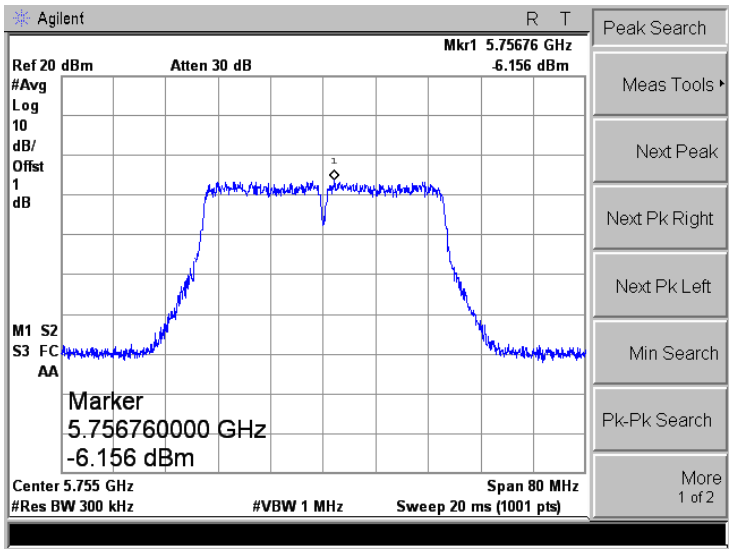
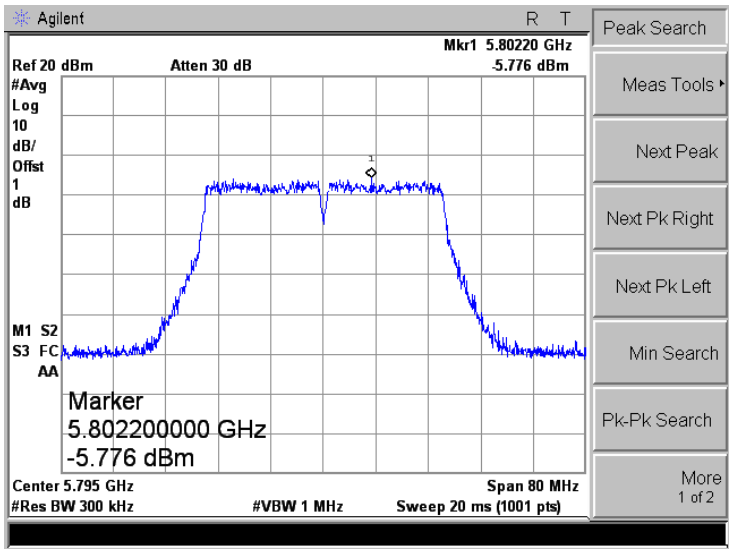
➢ Antenna 1: 5150-5250MHz

Mode:	**802.11ac-VHT20**
5180MHz	
5200MHz	
5240MHz	

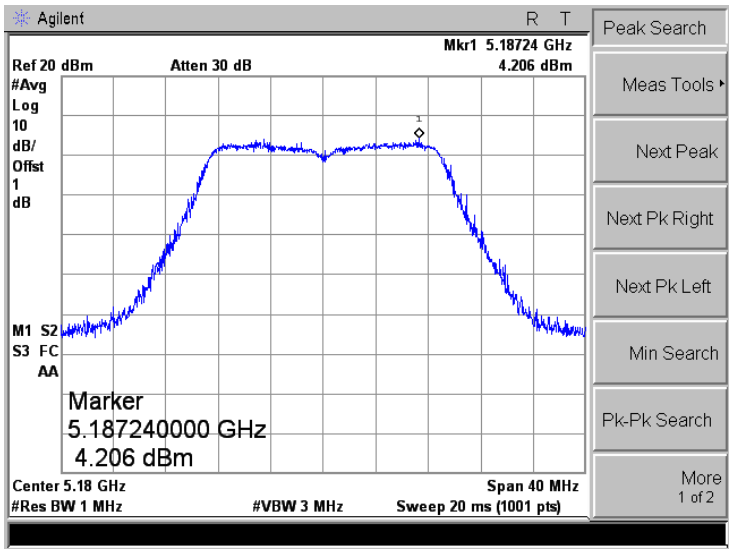
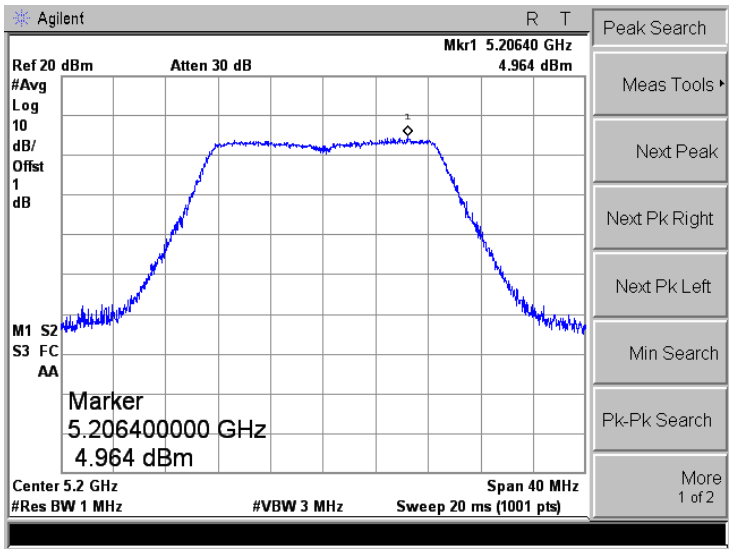
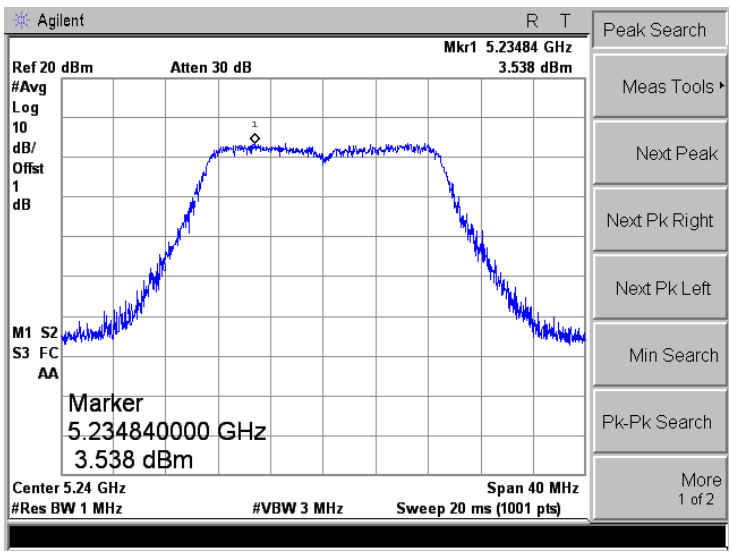
Mode:	802.11ac-VHT40
5190MHz	
5230MHz	

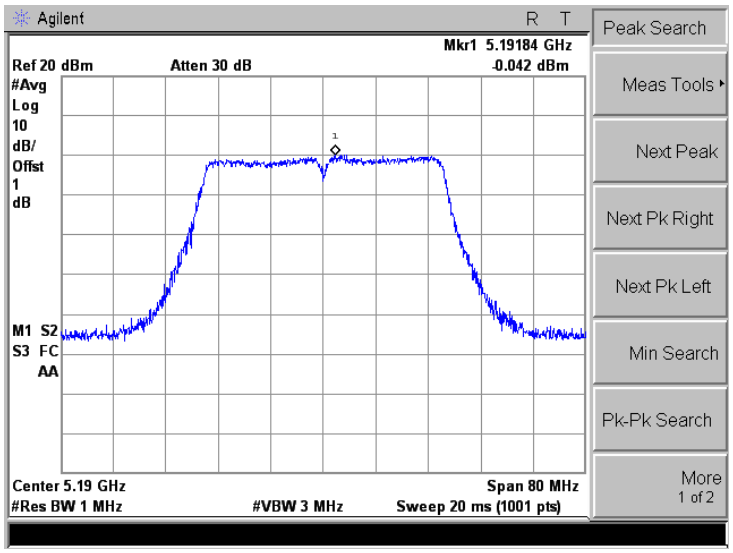
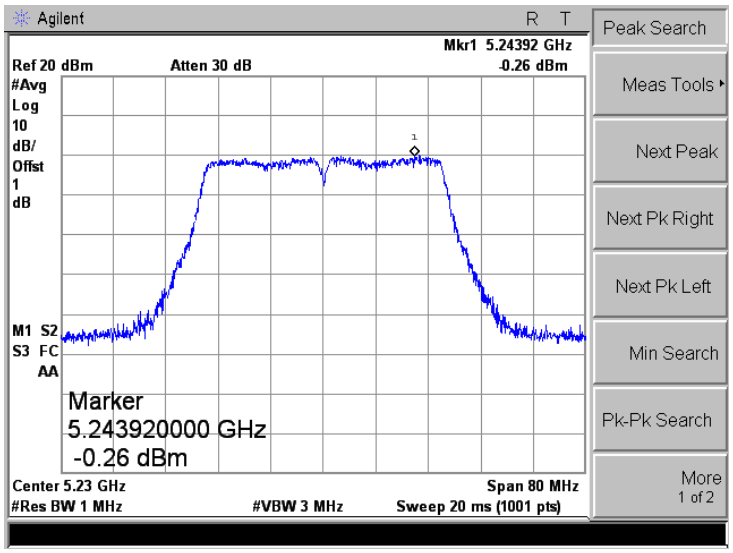
➢ Antenna 1: 5725-5850MHz

Mode:	**802.11ac-VHT20**
5745MHz	
5785MHz	
5825MHz	

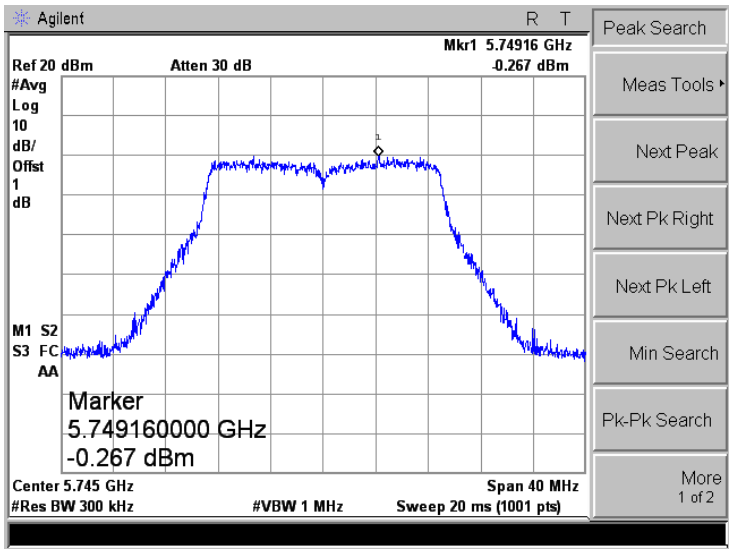
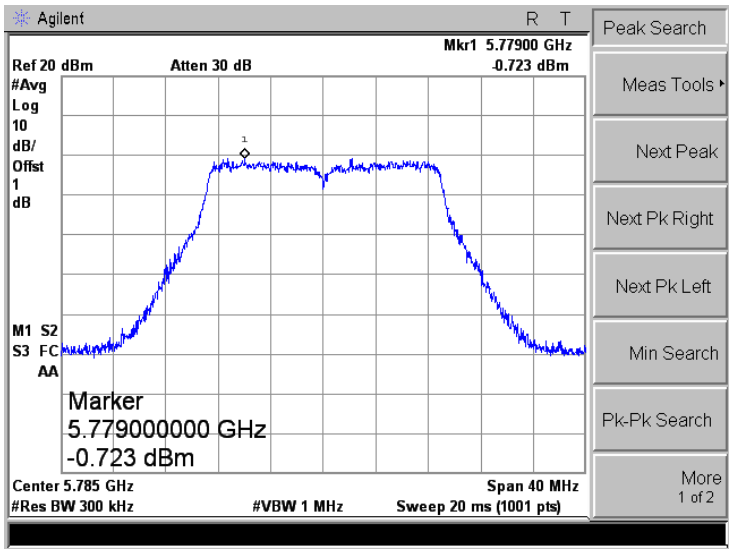
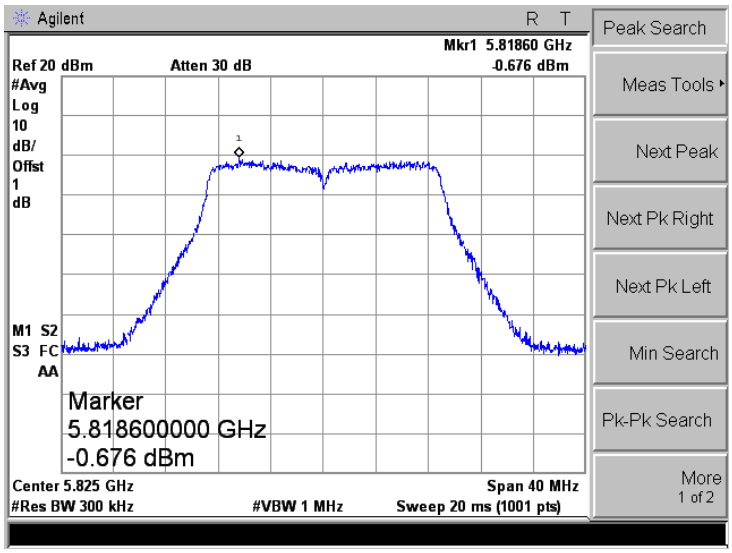
Mode:	802.11ac-VHT40
5755MHz	
5795MHz	

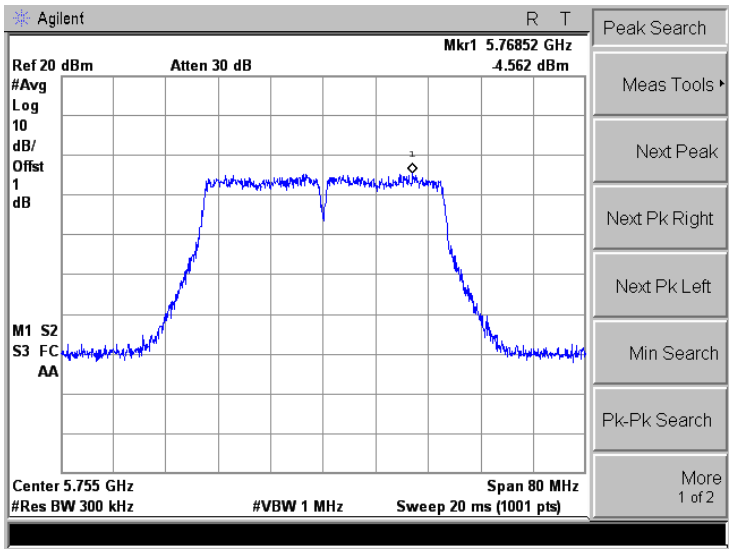
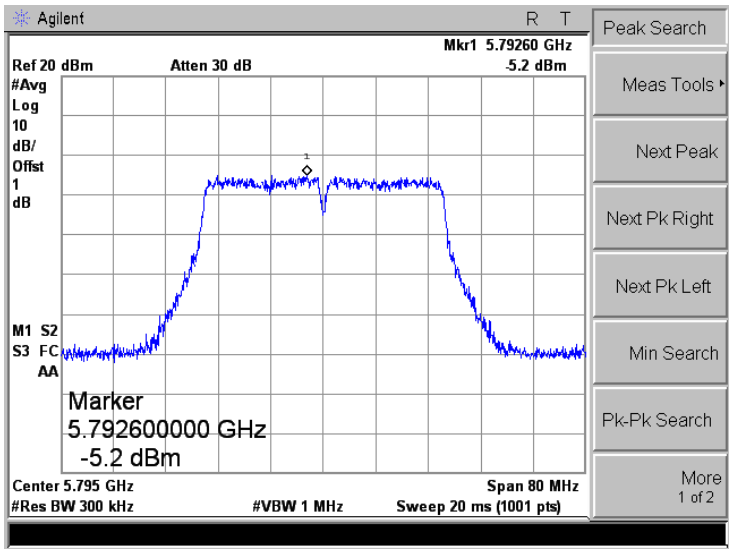
➢ Antenna 2: 5150-5250MHz

Mode:	**802.11ac-VHT20**
5180MHz	
5200MHz	
5240MHz	

Mode:	802.11ac-VHT40
5190MHz	
5230MHz	

➢ Antenna 2: 5725-5850MHz

Mode:	**802.11ac-VHT20**
5745MHz	
5785MHz	
5825MHz	

Mode:	802.11ac-VHT40
5755MHz	
5795MHz	

8. Emission Bandwidth and Occupied Bandwidth

8.1 Standard Applicable

According to 15.407(a) and (e):

(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.

8.2 Test Procedure

According to 789033 D02 v02r0r 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 v02r01 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).

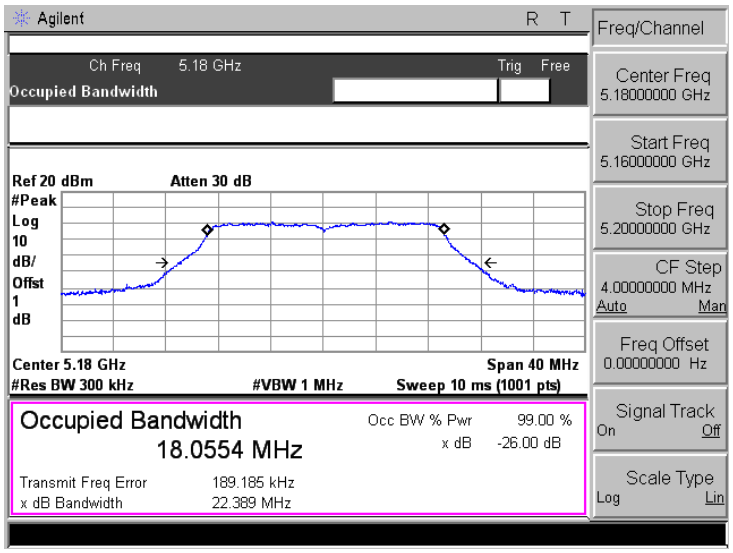
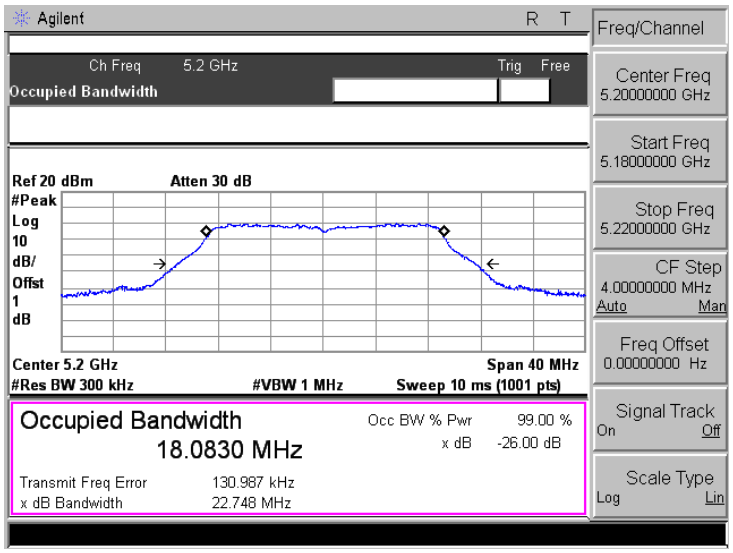
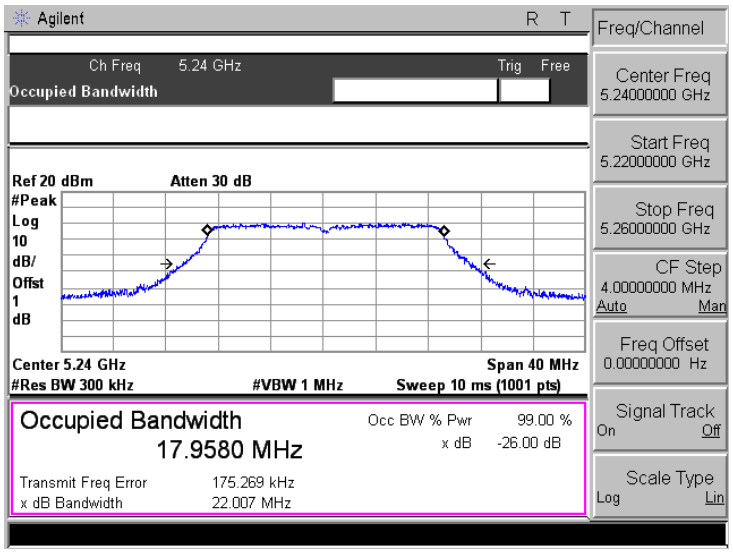
The following procedure shall be used for measuring (99 %) power bandwidth:
1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW
4. Set VBW ≥ 3 * RBW
5. Video averaging is not permitted. Where practical, 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.

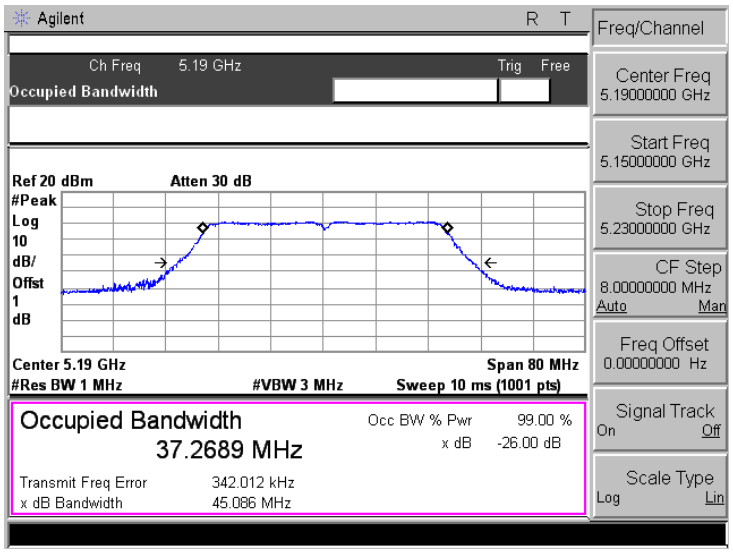
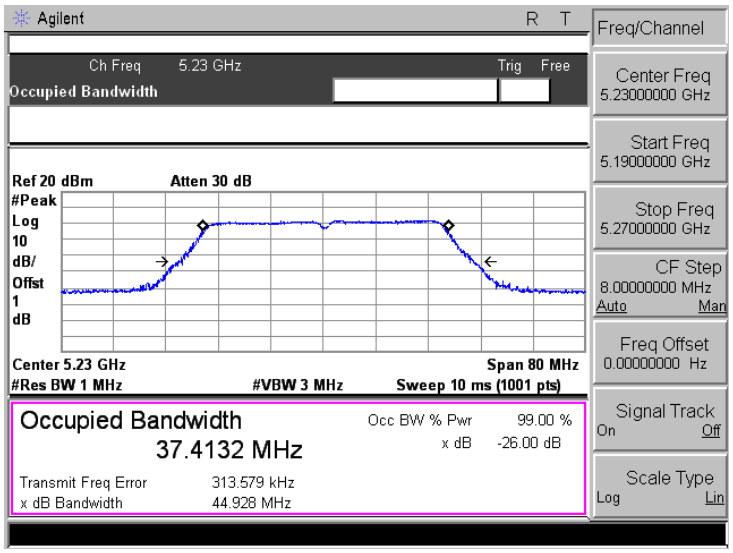
8.3 Summary of Test Results/Plots

U-NII-1:5150-5250MHz						
Test Mode	Test Channel MHz	26 dB Bandwidth MHz		99% Bandwidth MHz		Limit MHz
		ANT1	ANT2	ANT1	ANT2	
802.11ac-VHT20	5180	22.389	23.516	18.0554	18.2395	Pass
	5200	22.748	22.118	18.0830	17.9659	Pass
	5240	22.007	23.483	17.9580	18.1793	Pass
802.11ac-VHT40	5190	45.086	44.992	37.2689	37.1789	Pass
	5230	44.928	45.014	37.4132	37.1321	Pass

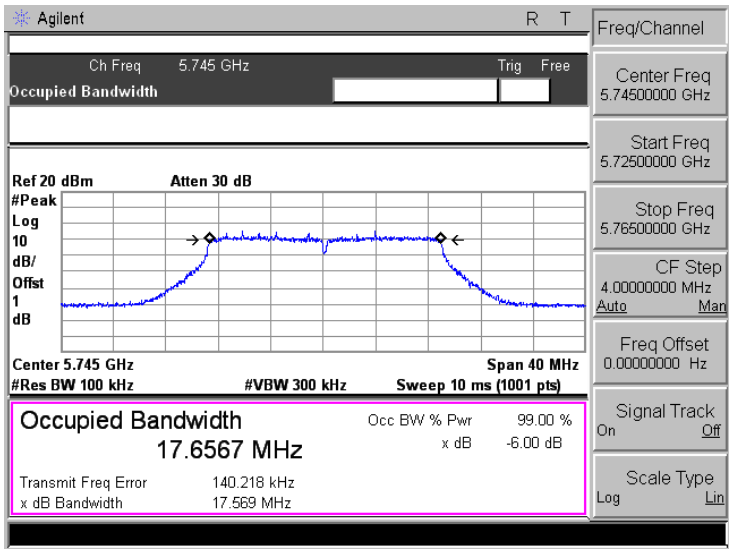
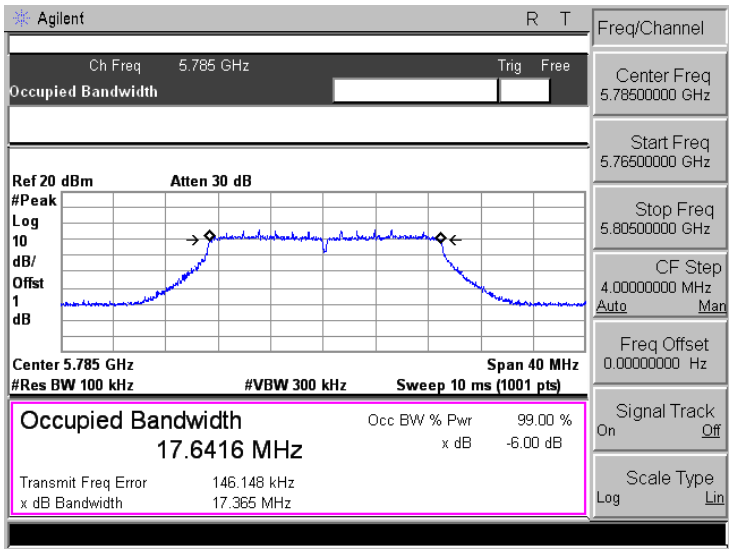
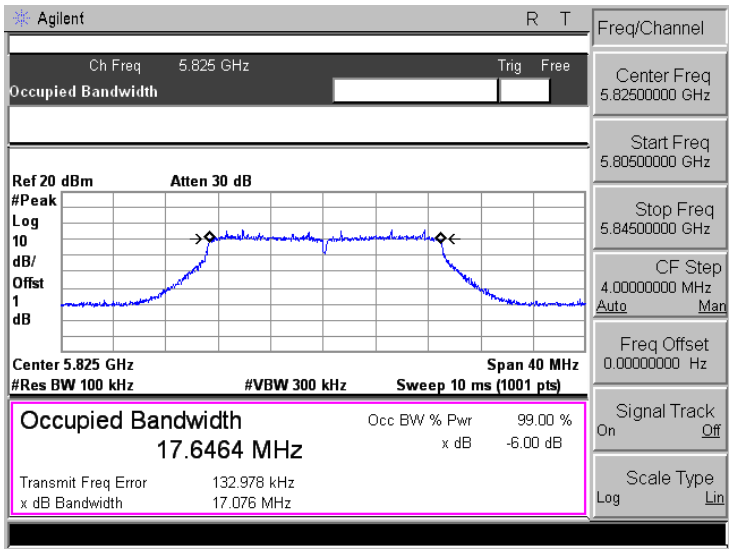
U-NII-3: 5725-5850MHz						
Test Mode	Test Channel MHz	6 dB Bandwidth MHz		99% Bandwidth MHz		Limit MHz
		ANT1	ANT2	ANT1	ANT2	
802.11ac-VHT20	5745	17.569	17.565	17.6567	17.6741	≥500
	5785	17.365	17.584	17.6416	17.6917	≥500
	5825	17.076	17.296	17.6464	17.6706	≥500
802.11ac-VHT40	5755	35.671	35.882	36.0866	36.0750	≥500
	5795	35.800	35.646	36.1413	36.1193	≥500

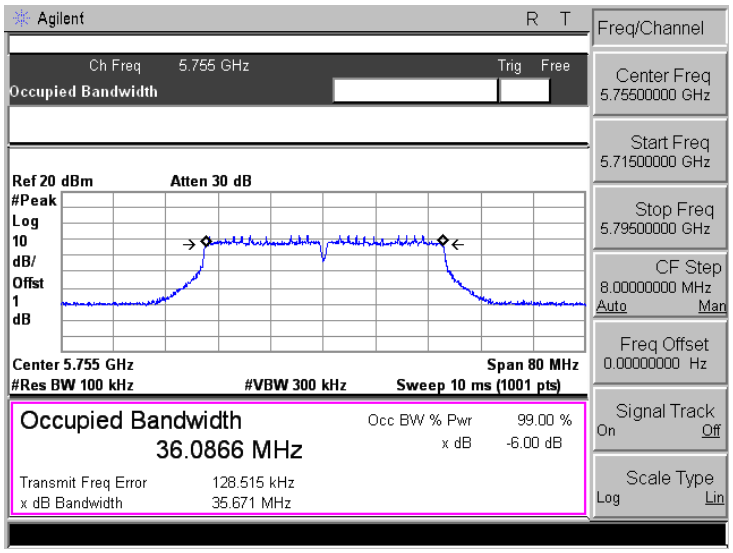
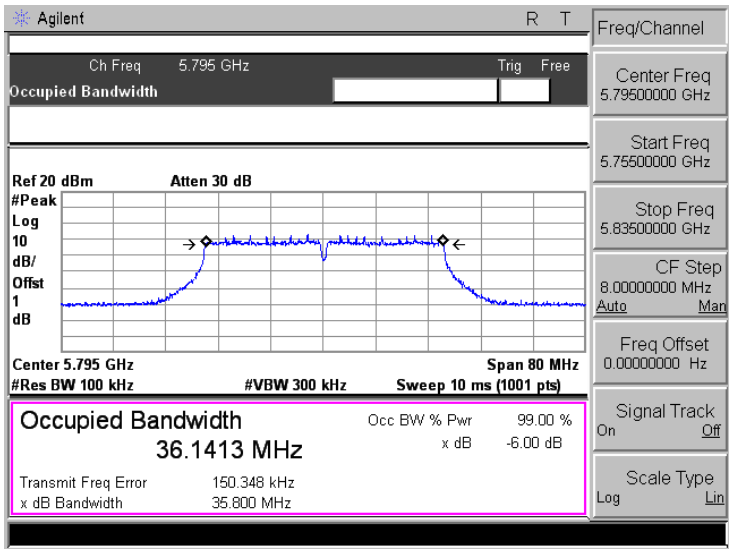
➢ Antenna 1: 5150-5250MHz

Mode:	**802.11ac-VHT20**
5180MHz	
5200MHz	
5240MHz	

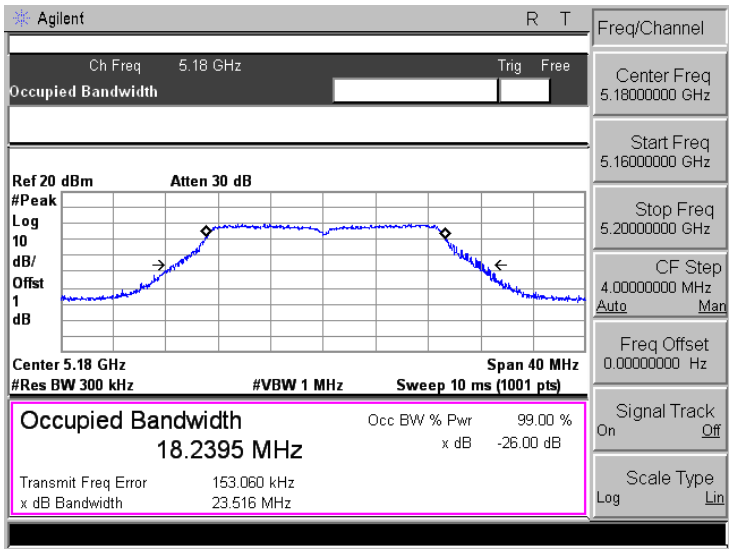
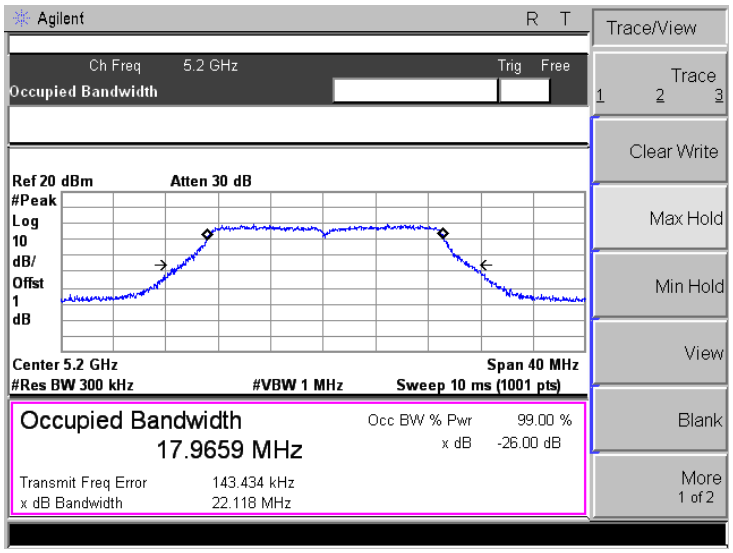
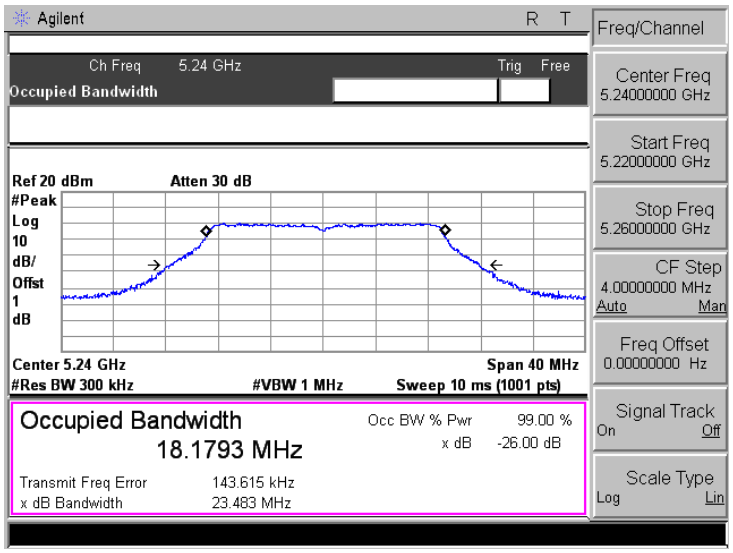
Mode:	802.11ac-VHT40
5190MHz	
5230MHz	

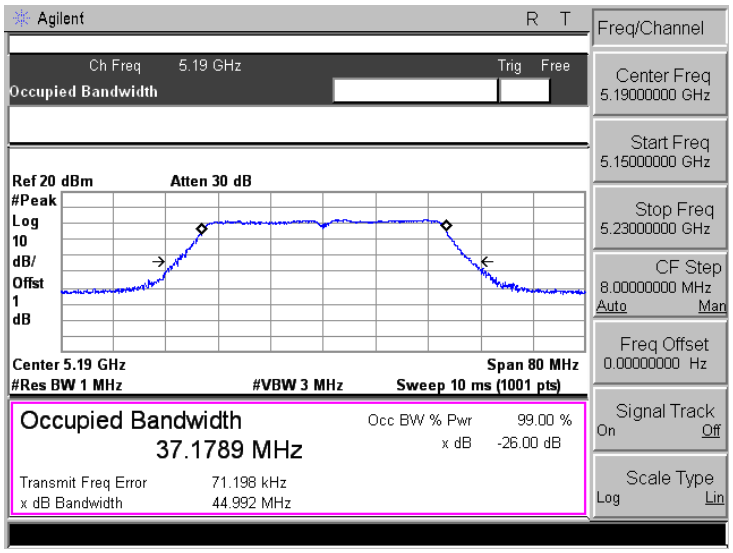
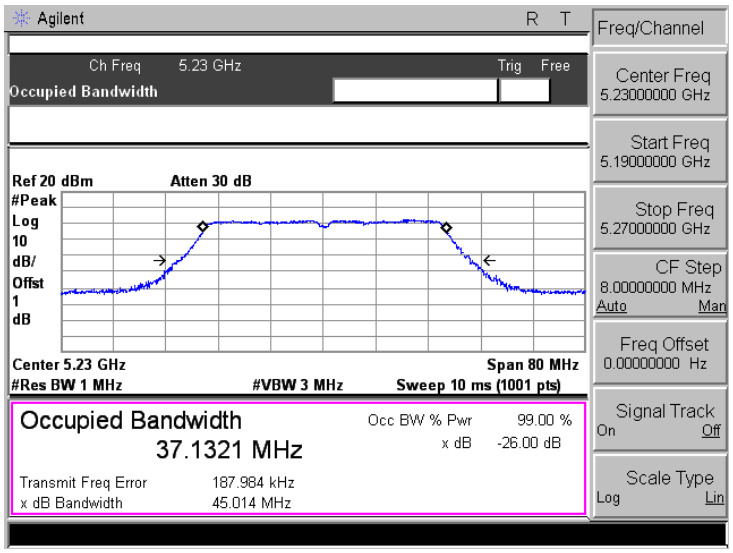
➢ Antenna 1: 5725-5850MHz

Mode:	**802.11ac-VHT20**
5745MHz	
5785MHz	
5825MHz	

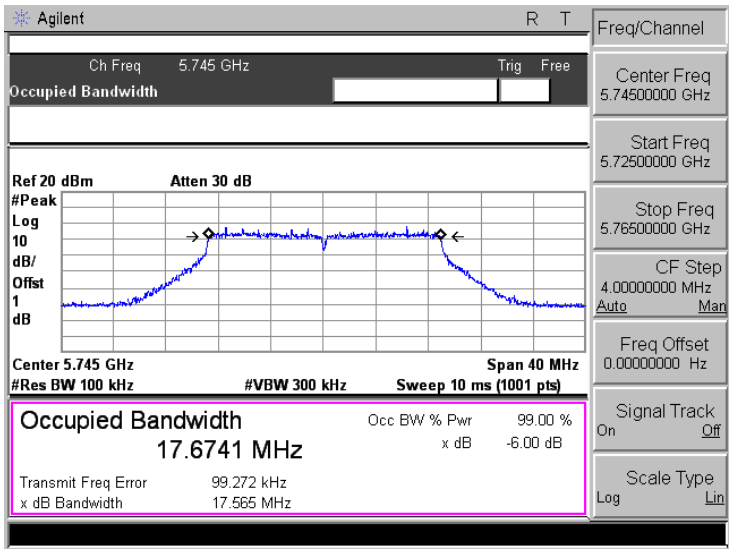
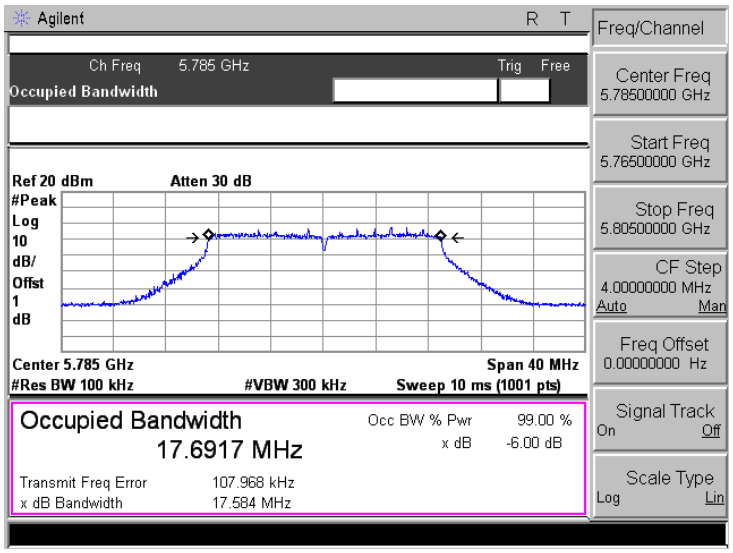
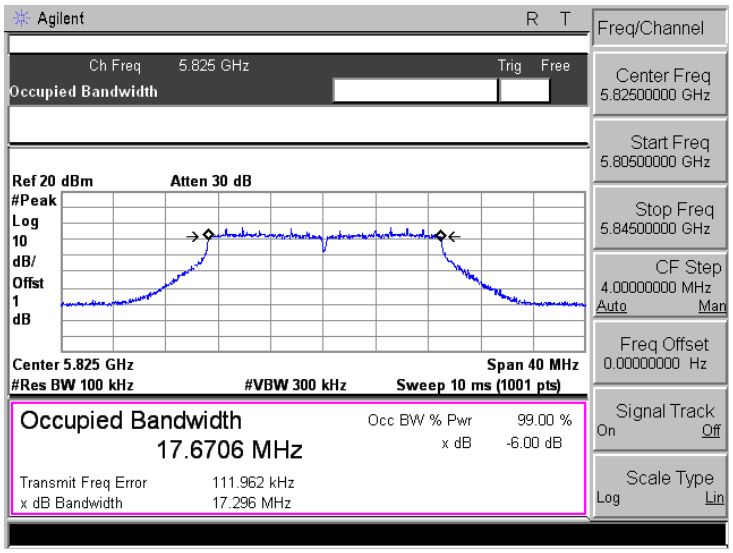
Mode:	802.11ac-VHT40
5755MHz	
5795MHz	

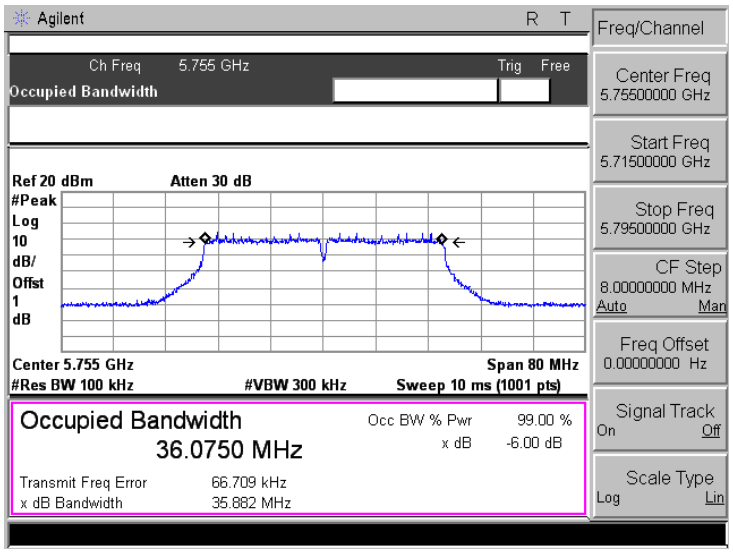
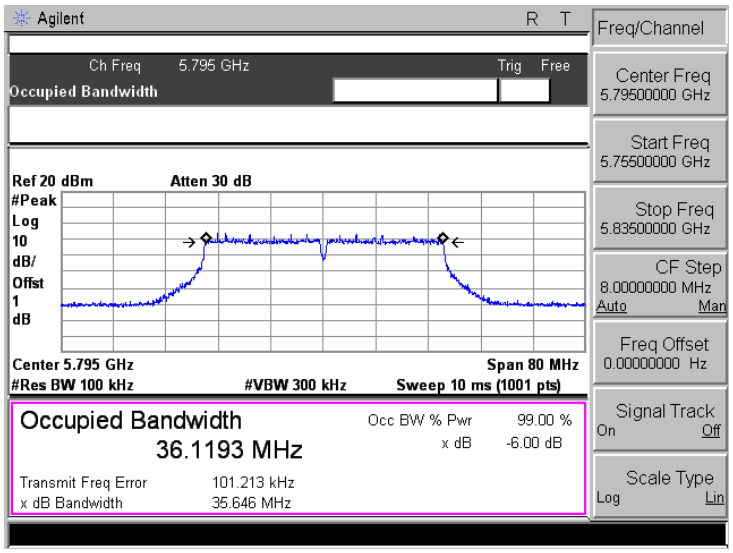
➢ Antenna 2: 5150-5250MHz

Mode:	**802.11ac-VHT20**
5180MHz	
5200MHz	
5240MHz	

Mode:	802.11ac-VHT40
5190MHz	
5230MHz	

➢ Antenna 2: 5725-5850MHz

Mode:	**802.11ac-VHT20**
5745MHz	
5785MHz	
5825MHz	

Mode:	802.11ac-VHT40
5755MHz	
5795MHz	

9. Maximum Conducted Output Power

9.1 Standard Applicable

Section 15.407(a) Power limits:

(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.

9.2 Test Procedure

According to KDB789033 D02 v02r01 section E, the following is the measurement procedure.

(i) Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.
(ii) Set RBW = 1 MHz.
(iii) Set VBW ≥ 3 MHz.
(iv) Number of points in sweep ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
(v) Sweep time = auto.

(vi) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.

(vii) If transmit duty cycle < 98 percent, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run".

(viii) Trace average at least 100 traces in power averaging (i.e., RMS) mode.

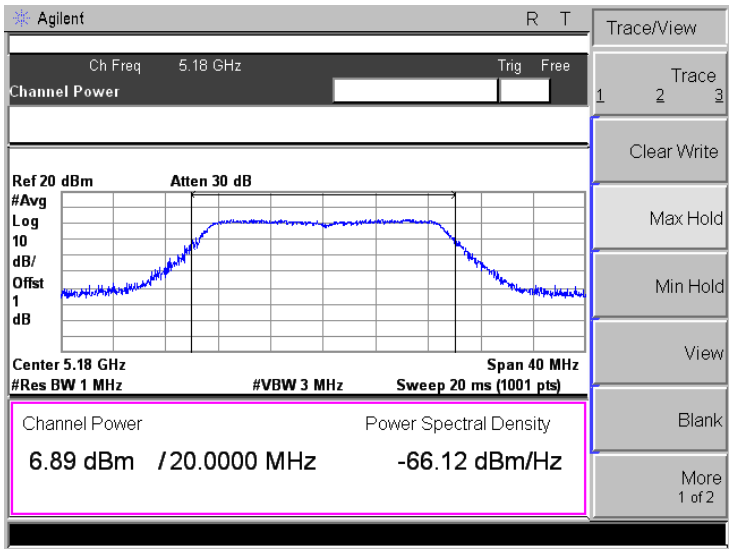
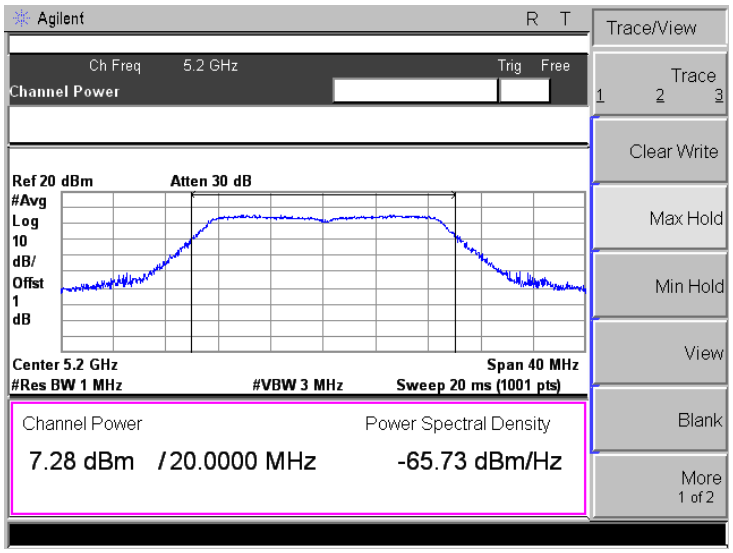
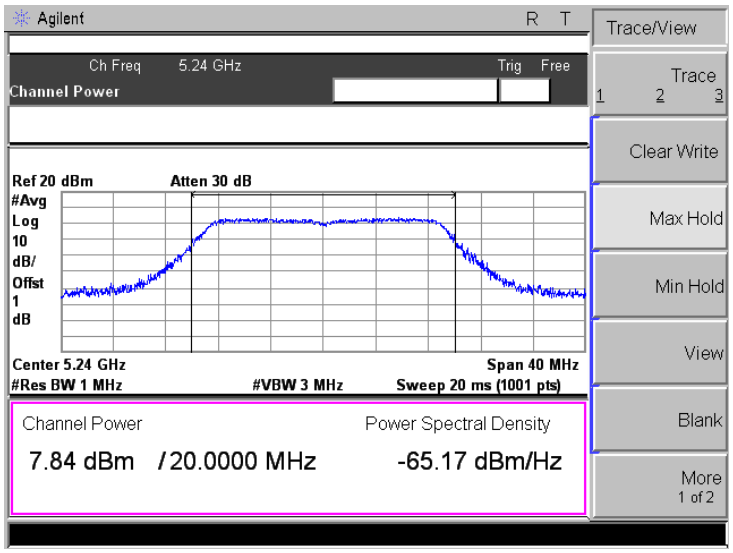
(ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the spectrum.

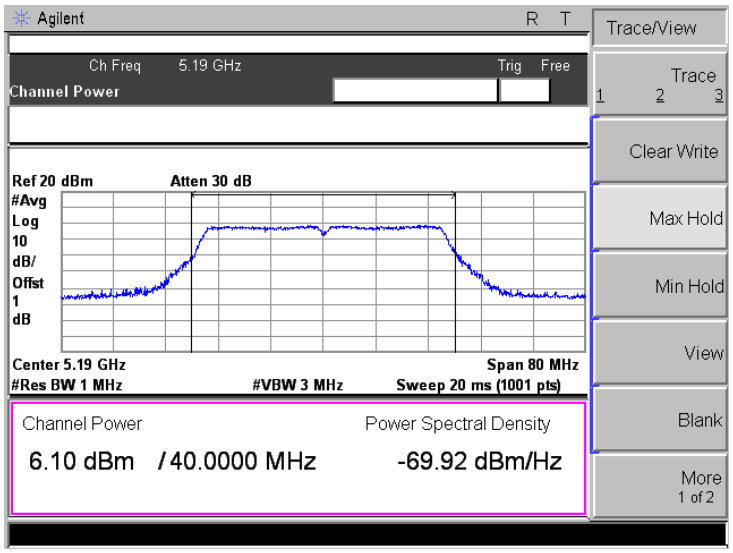
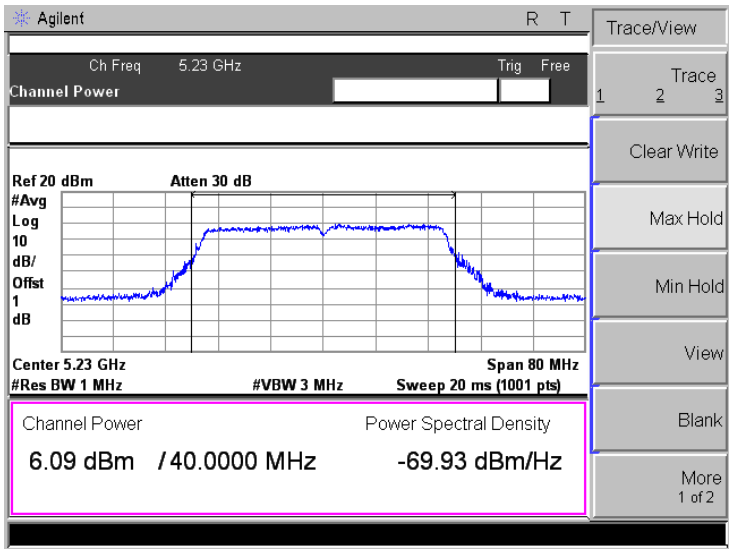
9.3 Summary of Test Results/Plots

U-NII-1:5150-5250MHz						
Test mode	Frequency MHz	Output Power dBm		Total Output Power dBm	Total Output Power mW	Limit mW
		ANT1	ANT2			
802.11ac-VHT20	5180	6.89	7.21	10.06	10.15	250
	5200	7.28	8.01	10.67	11.67	250
	5240	7.84	7.92	10.89	12.28	250
802.11ac-VHT40	5190	6.10	7.39	9.80	9.56	250
	5230	6.09	7.32	9.76	9.46	250

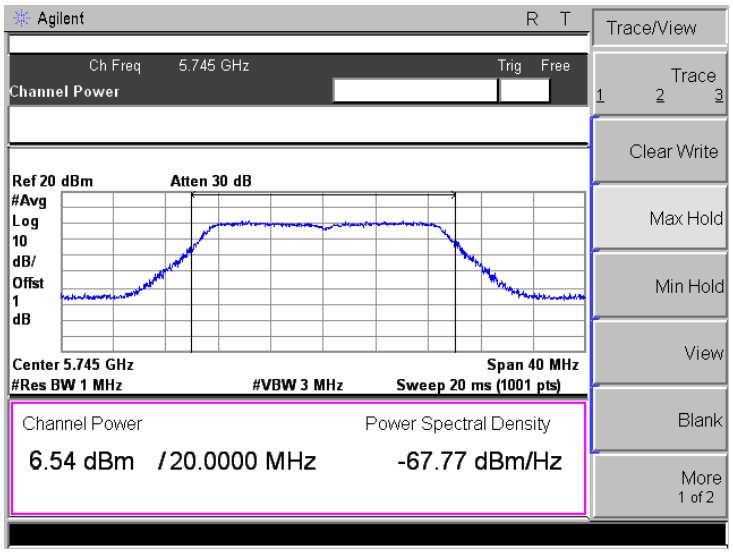
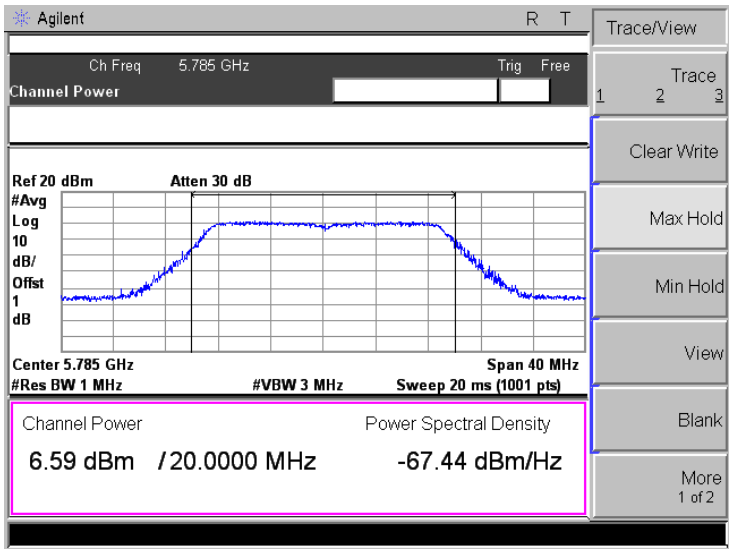
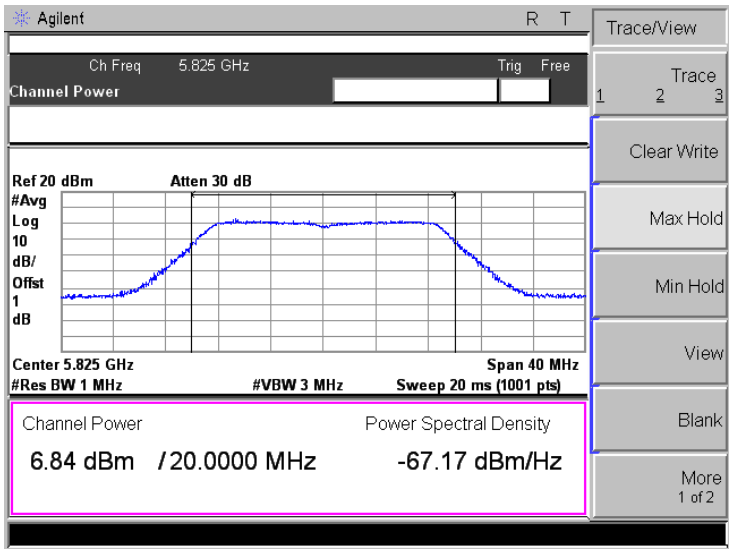
U-NII-3: 5725-5850MHz						
Test mode	Frequency MHz	Output Power dBm		Total Output Power dBm	Total Output Power mW	Limit mW
		ANT1	ANT2			
802.11ac-VHT20	5745	6.54	7.74	10.19	10.45	1000
	5785	6.59	7.17	9.90	9.77	1000
	5825	6.84	6.90	9.88	9.73	1000
802.11ac-VHT40	5755	5.79	6.67	9.26	8.44	1000
	5795	6.32	6.36	9.35	8.61	1000

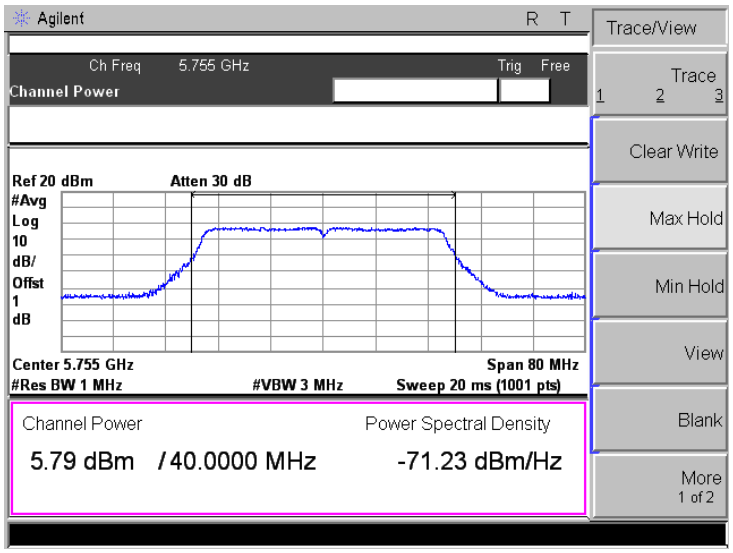
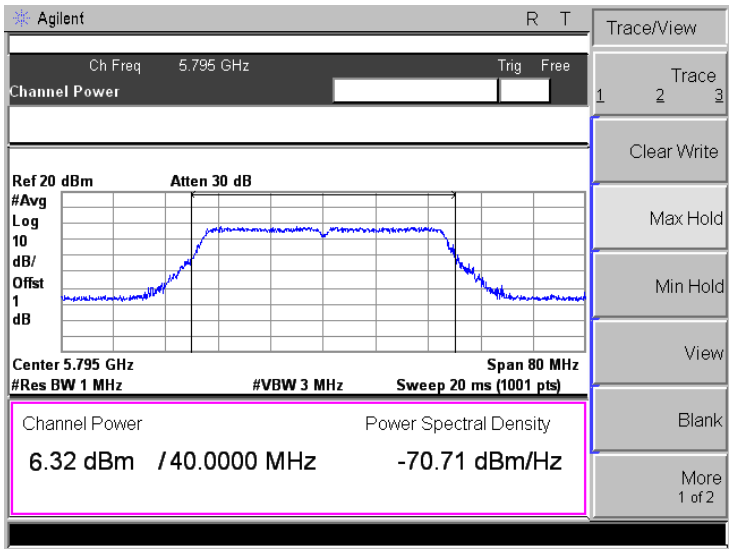
➢ Antenna 1: 5150-5250MHz

Mode:	**802.11ac-VHT20**
5180MHz	
5200MHz	
5240MHz	

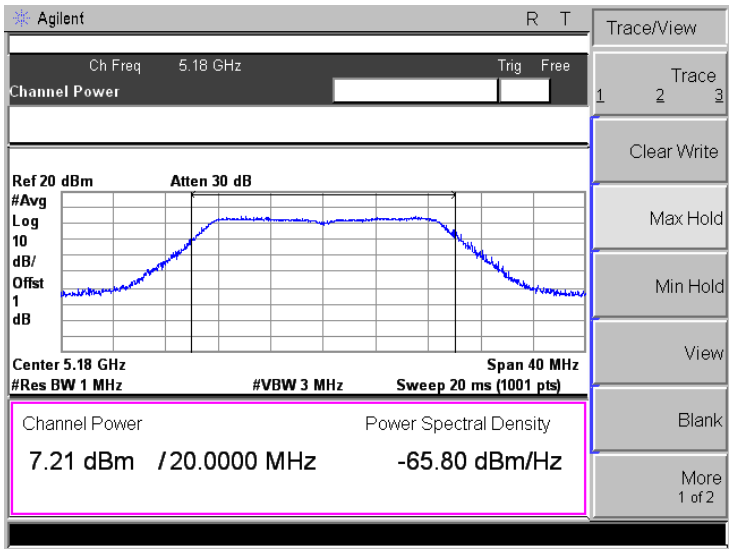
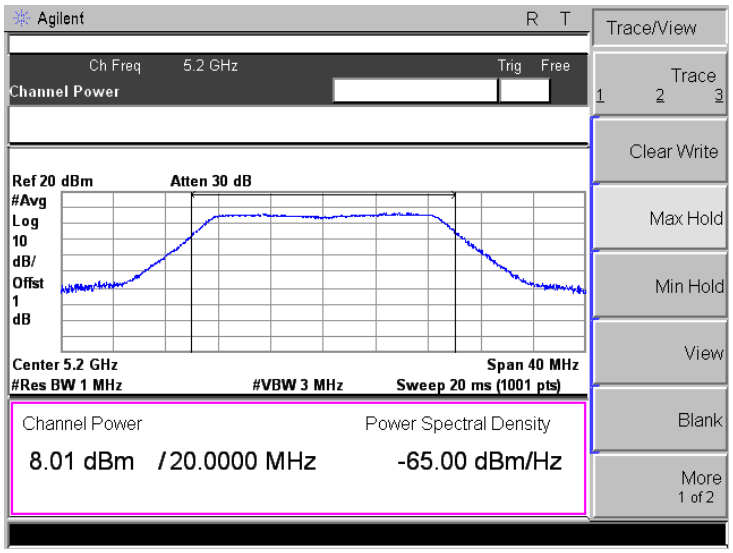
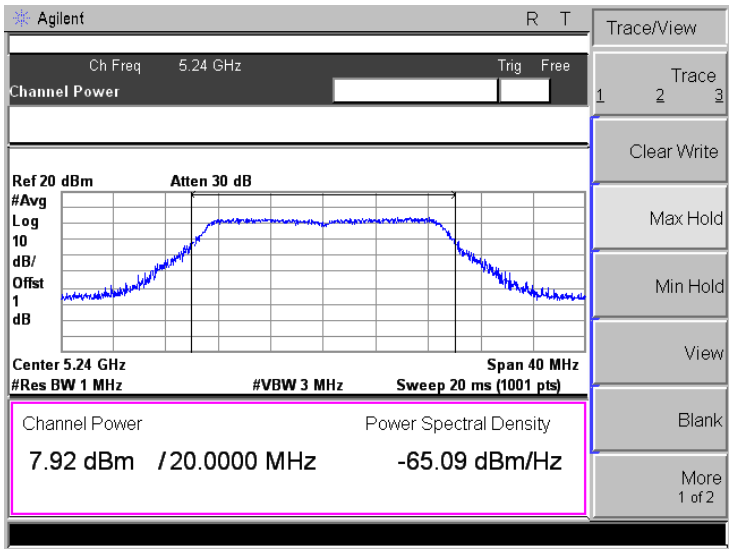
Mode:	802.11ac-VHT40
5190MHz	
5230MHz	

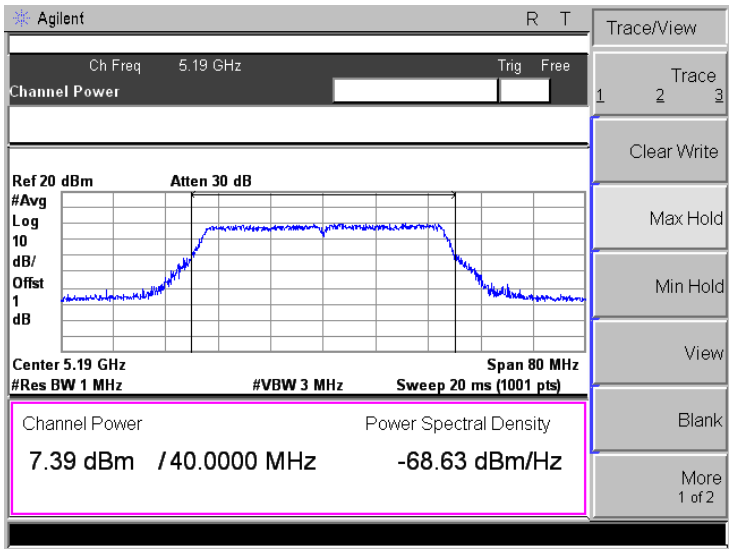
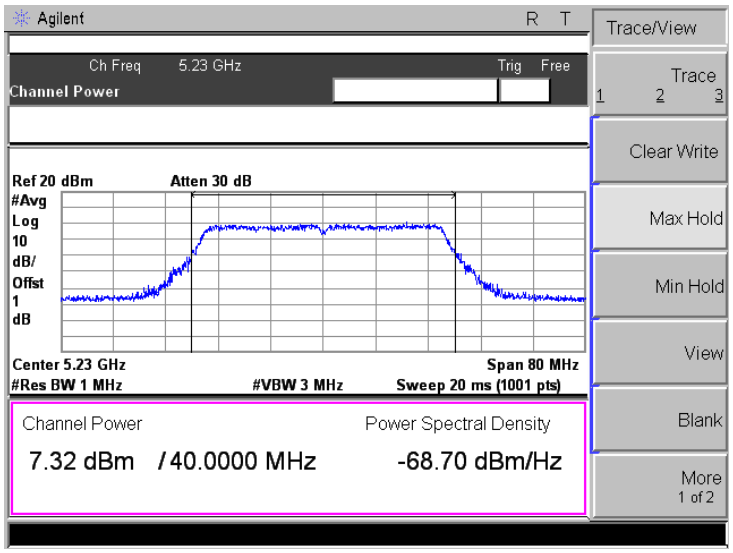
➢ Antenna 1: 5725-5850MHz

Mode:	**802.11ac-VHT20**
5745MHz	
5785MHz	
5825MHz	

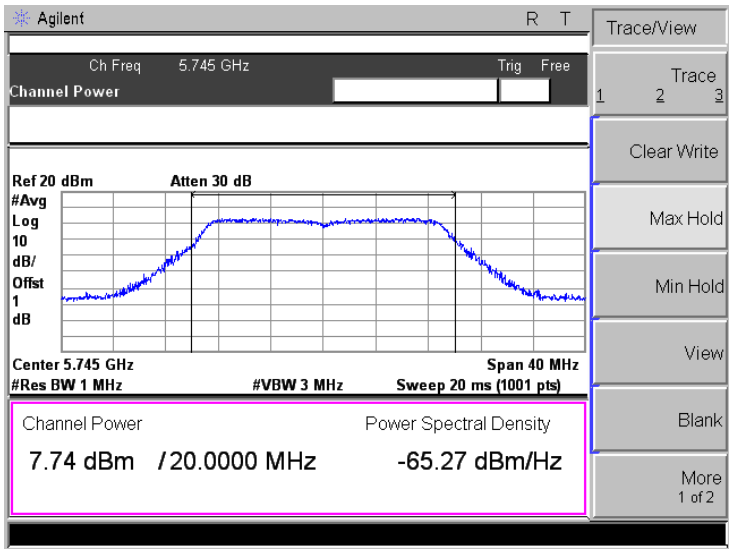
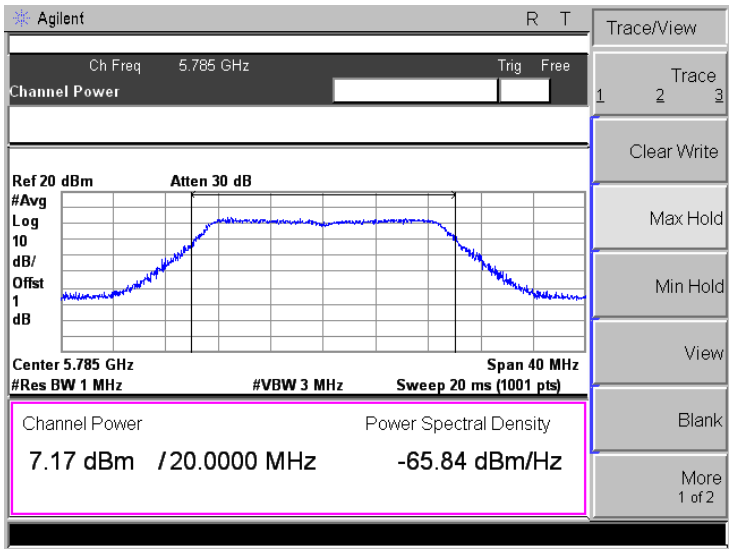
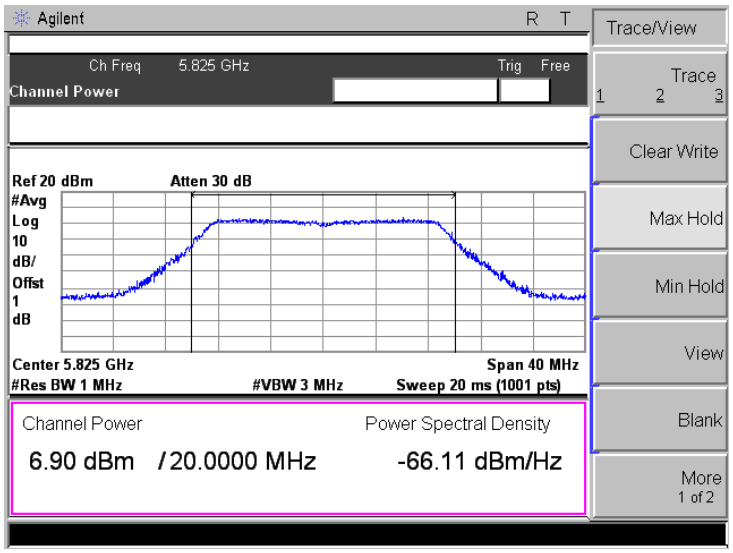
Mode:	802.11ac-VHT40
5755MHz	
5795MHz	

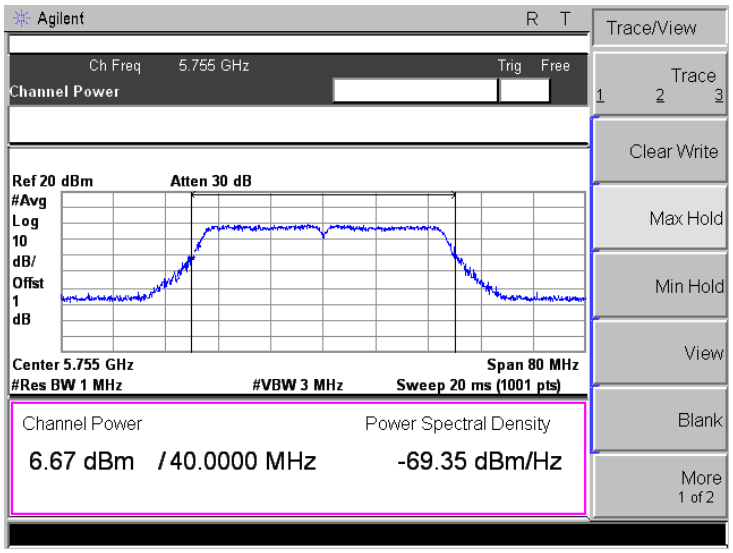
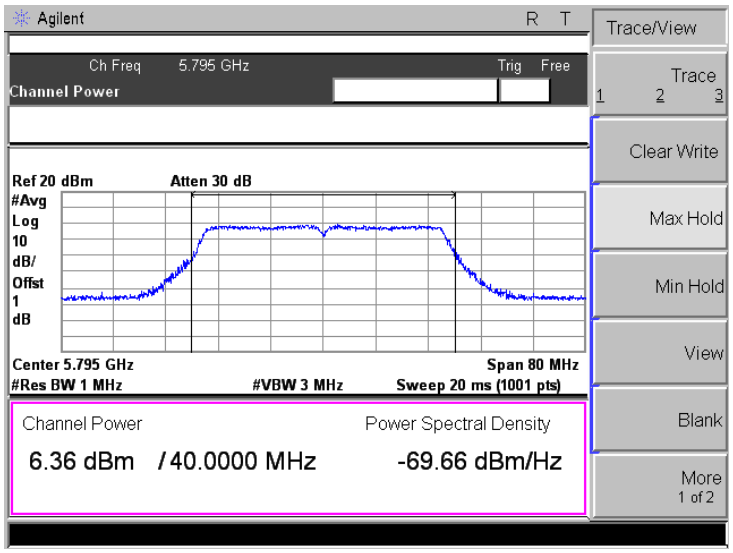
➢ Antenna 2: 5150-5250MHz

Mode:	**802.11ac-VHT20**
5180MHz	
5200MHz	
5240MHz	

Mode:	802.11ac-VHT40
5190MHz	
5230MHz	

➢ Antenna 2: 5725-5850MHz

Mode:	**802.11ac-VHT20**
5745MHz	
5785MHz	
5825MHz	

Mode:	802.11ac-VHT40
5755MHz	
5795MHz	

10. Radiated Spurious Emissions

10.1 Standard Applicable

According to §15.407(b), undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band:

(i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

According to §15.407(b)(6), Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

According to §15.407(b)(7), The provisions of §15.205 apply to intentional radiators operating under this section.

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If radiated measurements are performed, field strength is then converted to EIRP as follows:

EIRP = ((E*d)^2) / 30

where:

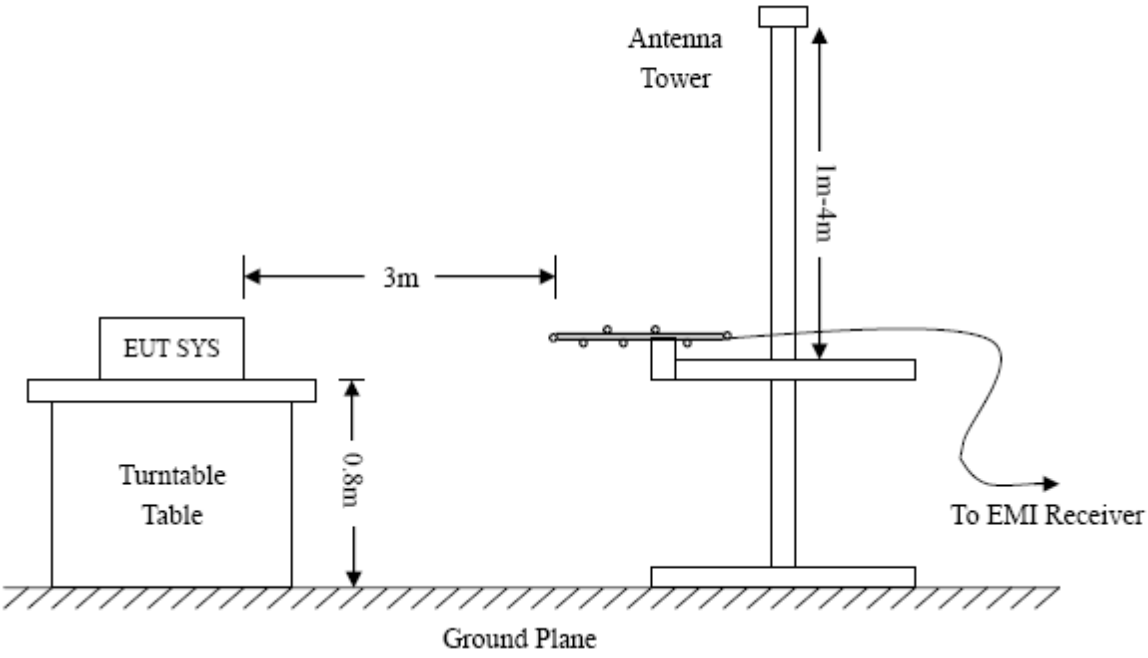
- E is the field strength in V/m;
- d is the measurement distance in meters;
- EIRP is the equivalent isotropically radiated power in watts.

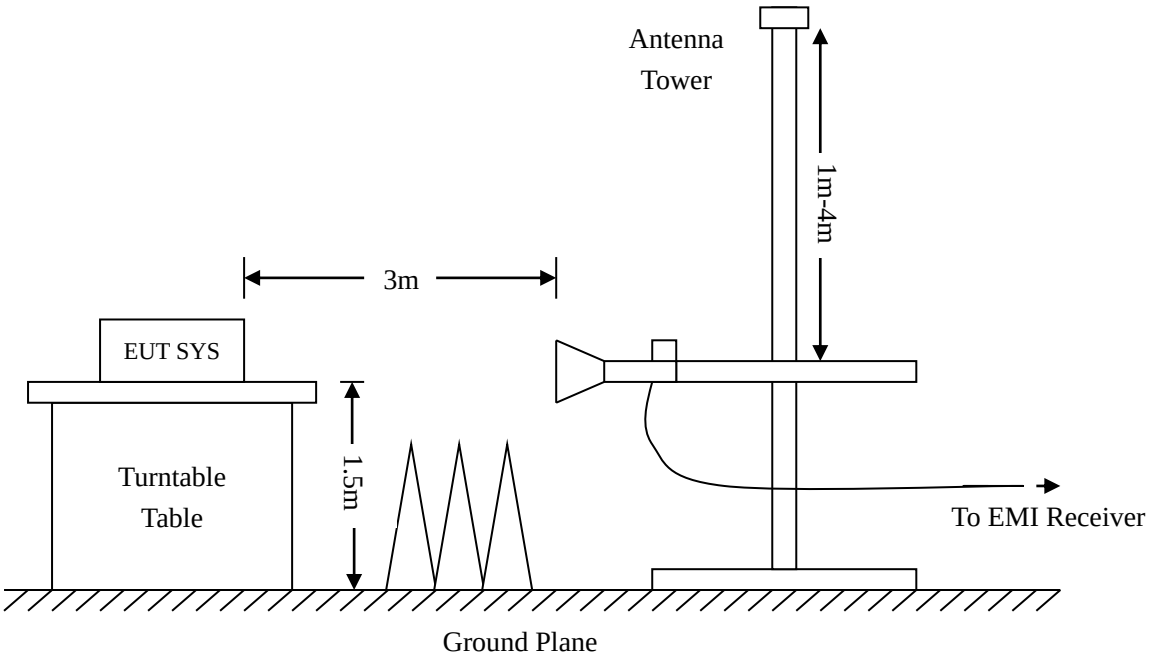
10.2 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.205 15.407(b)(6) and FCC Part 15.209 Limit..

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.


Antenna
Tower
1m-4m
3m
EUT SYS
Turntable
Table
0.8m
To EMI Receiver
Ground Plane


Antenna
Tower
1m-4m
3m
EUT SYS
Turntable
Table
1.5m
To EMI Receiver
Ground Plane

10.3 Test Receiver Setup

During the radiated emission test for above 1GHz, the test receiver was set with the following configurations:

For peak detector:
RBW = 1000kHz, VBW = 3000kHz, Sweep Time = Auto

For average detector:
RBW = 1000kHz, VBW = 10Hz, Sweep Time = Auto

10.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Ant. Factor + Cable Loss – Ampl. Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – FCC Part 15 Limit

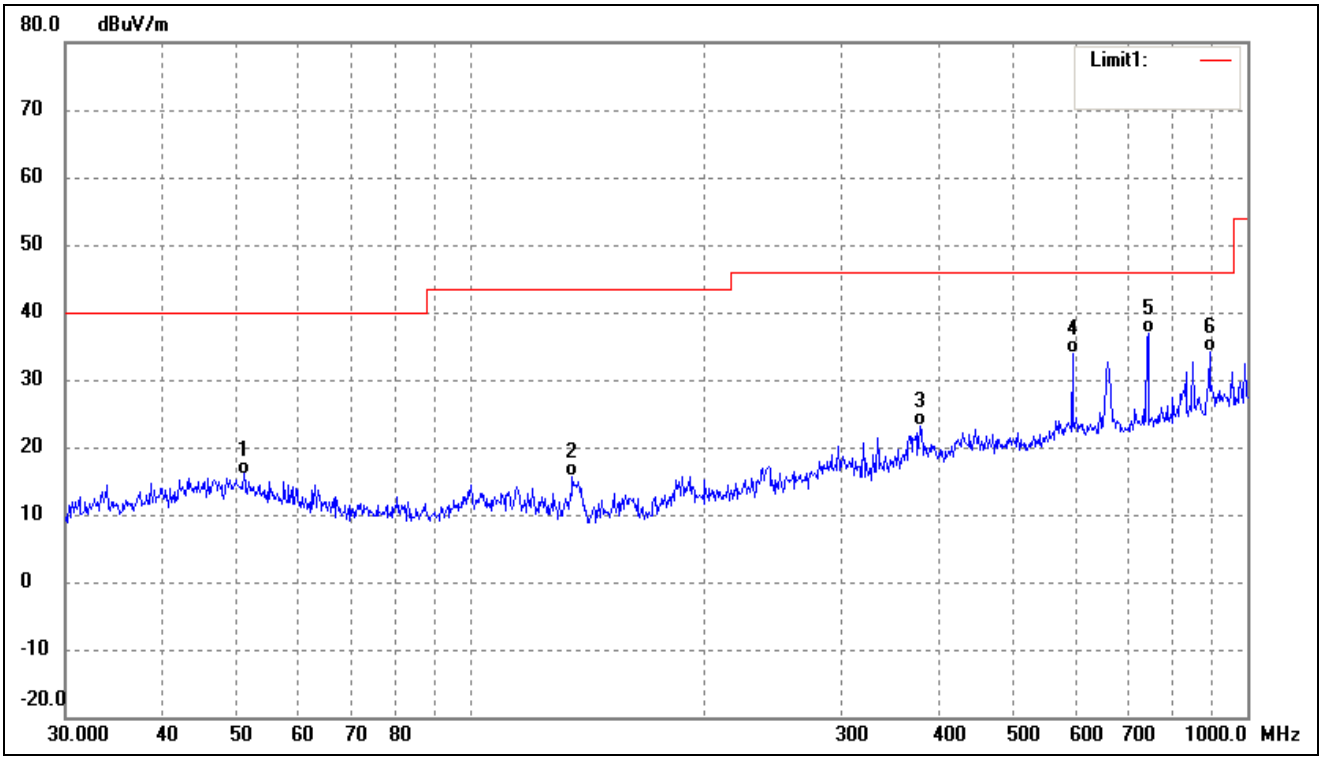
10.5 Summary of Test Results/Plots

Note: *this EUT was tested in 3 orthogonal positions and the worst case position data was reported.*

- Spurious Emission From 30 MHz to 1 GHz

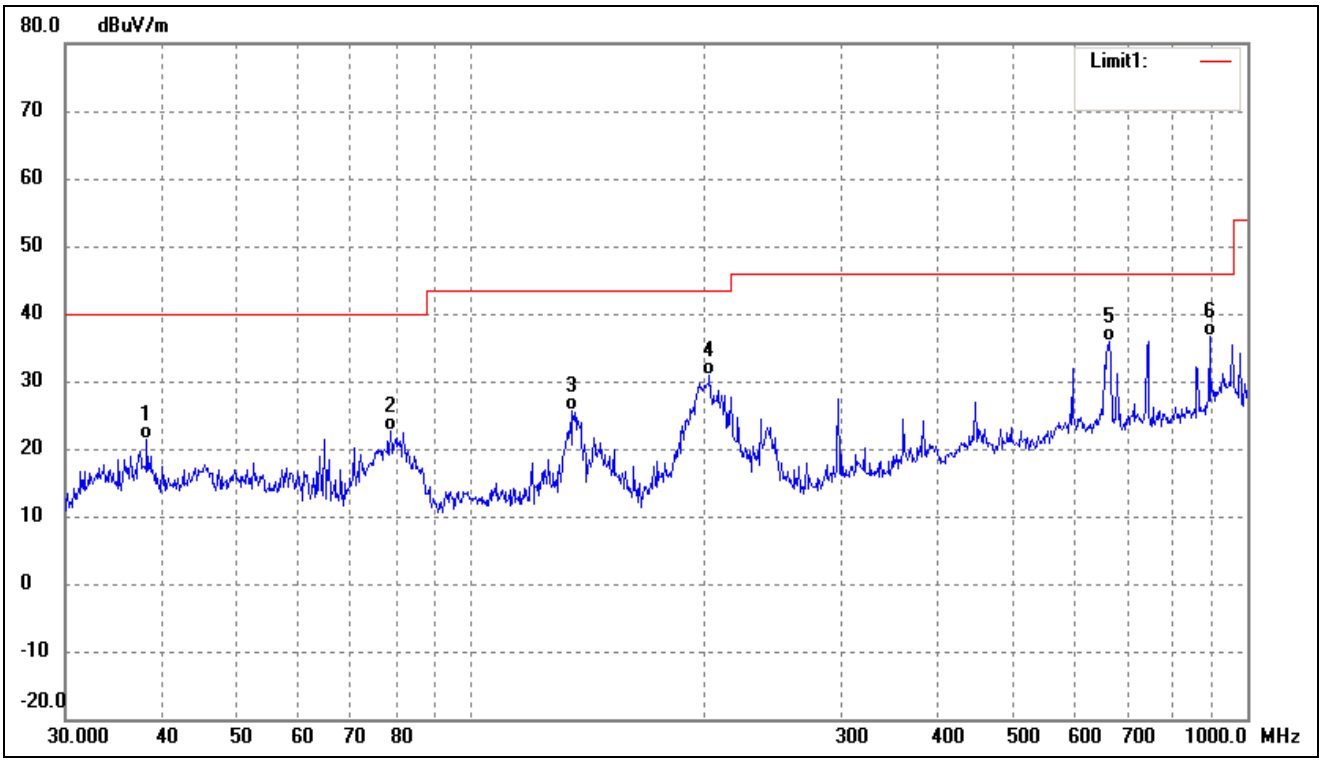
- Antenna 2 (worst case)
- 5150-5250MHz

802.11ac-VHT20(worst case)			
Test Channel	5180MHz	Polarity:	Horizontal



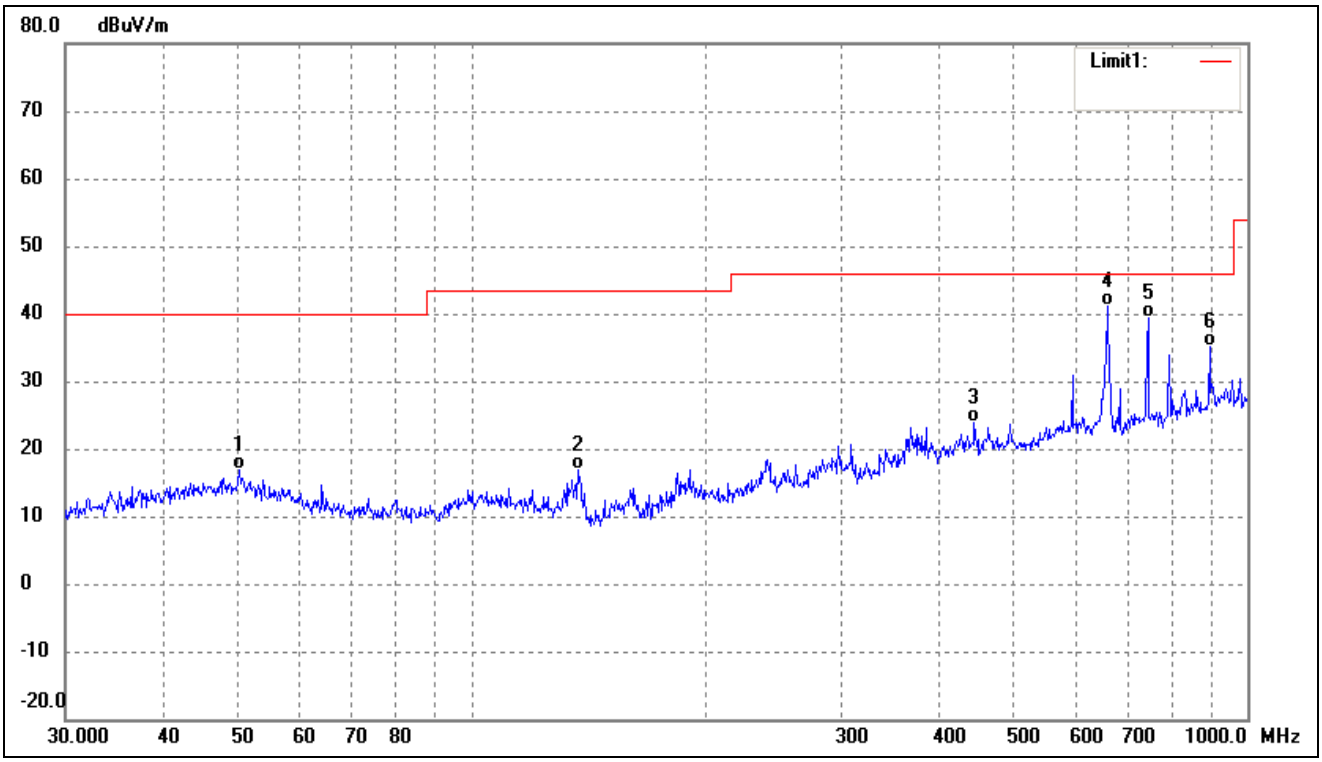
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	50.9420	27.21	-11.21	16.00	40.00	-24.00	166	100	peak
2	135.0319	31.68	-16.17	15.51	43.50	-27.99	139	100	peak
3	378.5843	30.75	-7.56	23.19	46.00	-22.81	82	100	peak
4	595.1329	38.03	-4.06	33.97	46.00	-12.03	107	100	peak
5	744.8661	39.62	-2.72	36.90	46.00	-9.10	199	100	peak
6	893.8567	34.68	-0.67	34.01	46.00	-11.99	280	100	peak

802.11ac-VHT20(worst case)			
Test Channel	5180MHz	Polarity:	Vertical



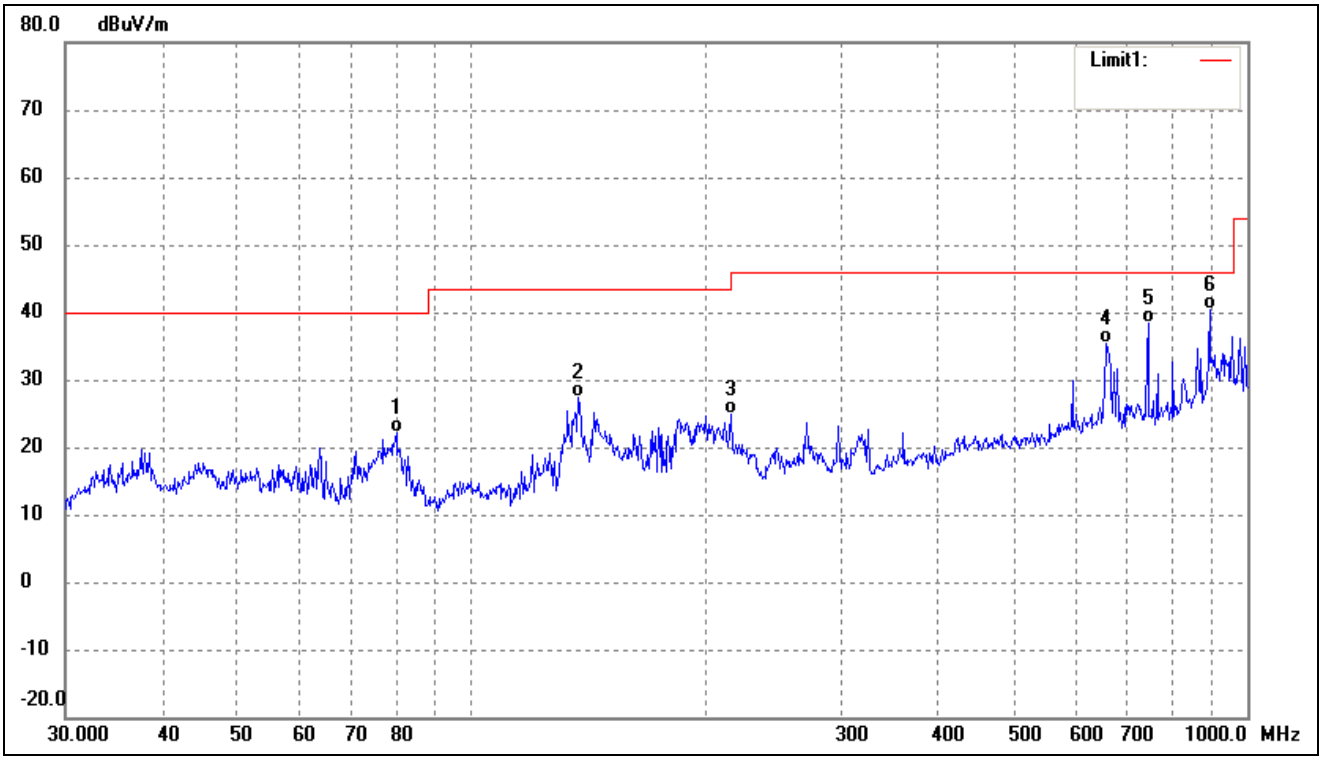
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	38.2120	34.21	-12.81	21.40	40.00	-18.60	57	100	peak
2	78.6888	37.98	-15.39	22.59	40.00	-17.41	148	100	peak
3	135.0319	41.86	-16.17	25.69	43.50	-17.81	123	100	peak
4	202.8104	43.57	-12.66	30.91	43.50	-12.59	114	100	peak
5	663.4729	40.16	-4.24	35.92	46.00	-10.08	337	100	peak
6	893.8567	37.41	-0.67	36.74	46.00	-9.26	224	100	peak

802.11ac-VHT20(worst case)			
Test Channel	5200MHz	Polarity:	Horizontal



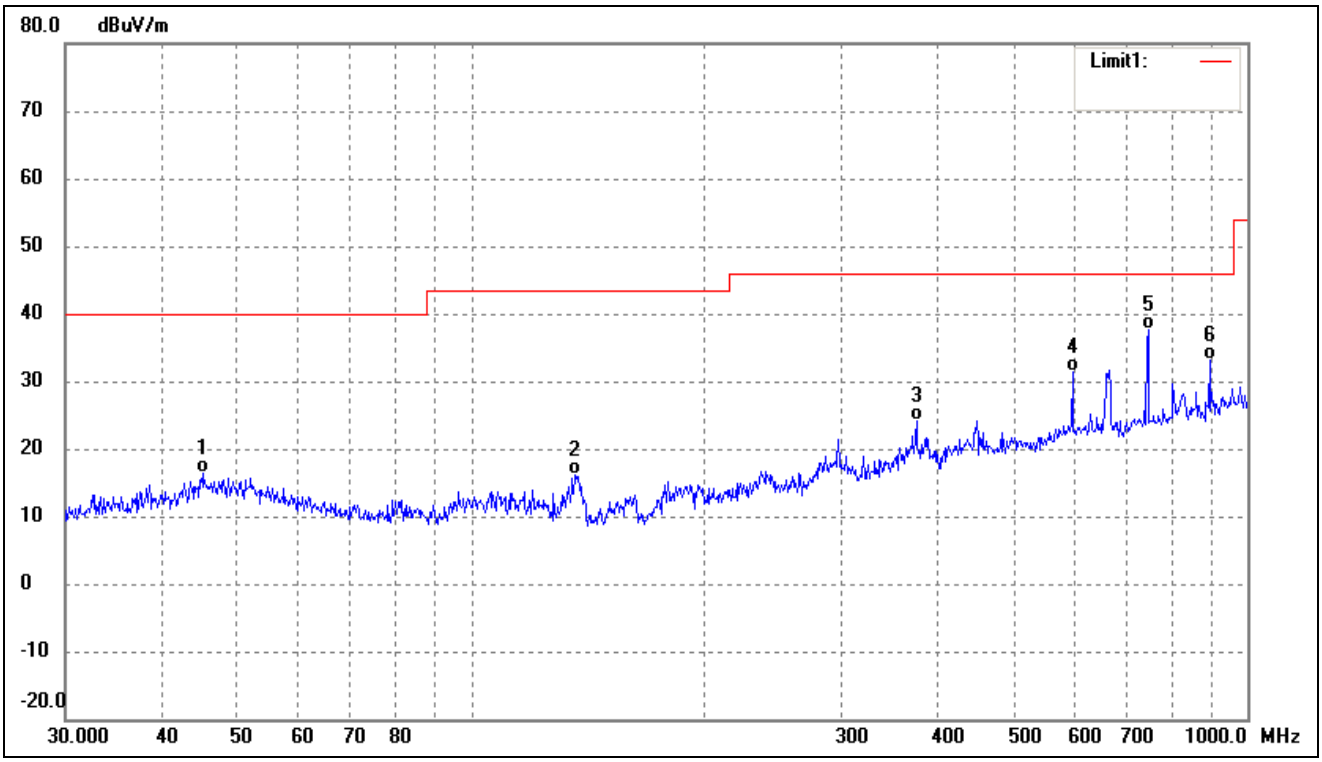
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	50.2325	27.90	-11.04	16.86	40.00	-23.14	325	100	peak
2	137.4202	32.69	-15.86	16.83	43.50	-26.67	93	100	peak
3	444.8514	30.21	-6.28	23.93	46.00	-22.07	242	100	peak
4	661.1505	45.47	-4.25	41.22	46.00	-4.78	108	100	peak
5	744.8661	42.14	-2.72	39.42	46.00	-6.58	88	100	peak
6	893.8567	35.72	-0.67	35.05	46.00	-10.95	303	100	peak

802.11ac-VHT20(worst case)			
Test Channel	5200MHz	Polarity:	Vertical



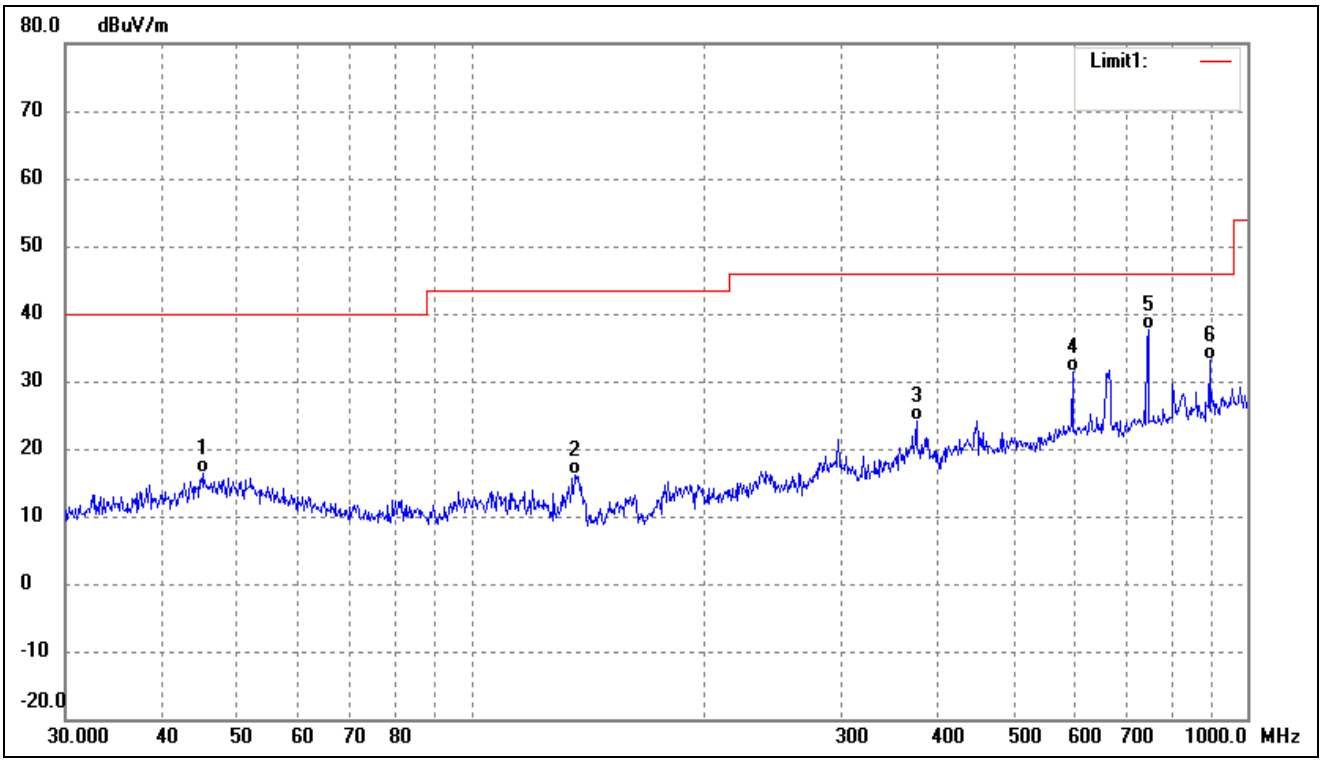
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	80.0806	37.70	-15.47	22.23	40.00	-17.77	305	100	peak
2	137.4202	43.24	-15.86	27.38	43.50	-16.12	94	100	peak
3	216.0240	37.43	-12.45	24.98	46.00	-21.02	359	100	peak
4	658.8362	39.64	-4.25	35.39	46.00	-10.61	107	100	peak
5	744.8661	41.05	-2.72	38.33	46.00	-7.67	320	100	peak
6	893.8567	40.93	-0.67	40.26	46.00	-5.74	253	100	peak

802.11ac-VHT20(worst case)			
Test Channel	5240MHz	Polarity:	Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	45.2166	27.79	-11.33	16.46	40.00	-23.54	142	100	peak
2	135.9822	32.13	-16.04	16.09	43.50	-27.41	115	100	peak
3	374.6226	31.79	-7.58	24.21	46.00	-21.79	69	100	peak
4	595.1329	35.35	-4.06	31.29	46.00	-14.71	158	100	peak
5	744.8661	40.33	-2.72	37.61	46.00	-8.39	140	100	peak
6	893.8567	33.87	-0.67	33.20	46.00	-12.80	200	100	peak

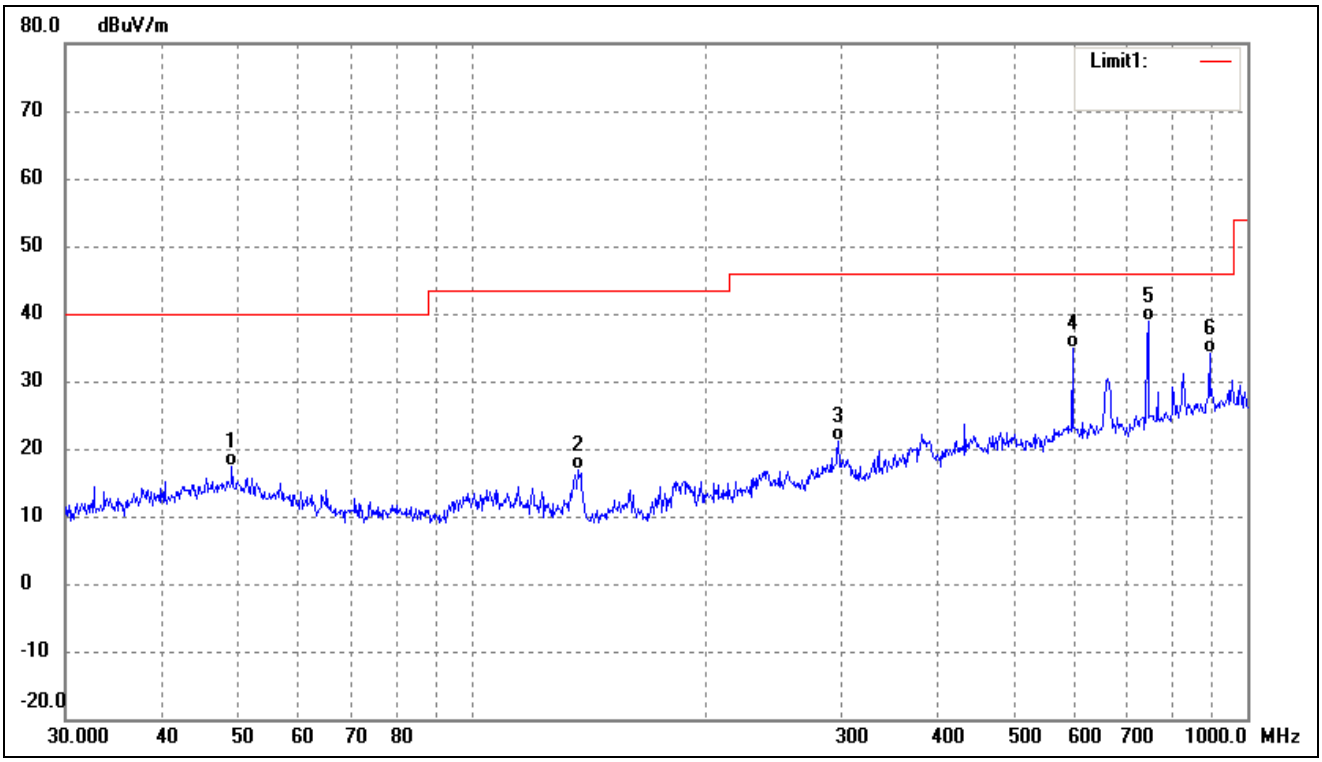
802.11ac-VHT20(worst case)			
Test Channel	5240MHz	Polarity:	Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	45.2166	27.79	-11.33	16.46	40.00	-23.54	57	100	peak
2	135.9822	32.13	-16.04	16.09	43.50	-27.41	148	100	peak
3	374.6226	31.79	-7.58	24.21	46.00	-21.79	123	100	peak
4	595.1329	35.35	-4.06	31.29	46.00	-14.71	114	100	peak
5	744.8661	40.33	-2.72	37.61	46.00	-8.39	337	100	peak
6	893.8567	33.87	-0.67	33.20	46.00	-12.80	224	100	peak

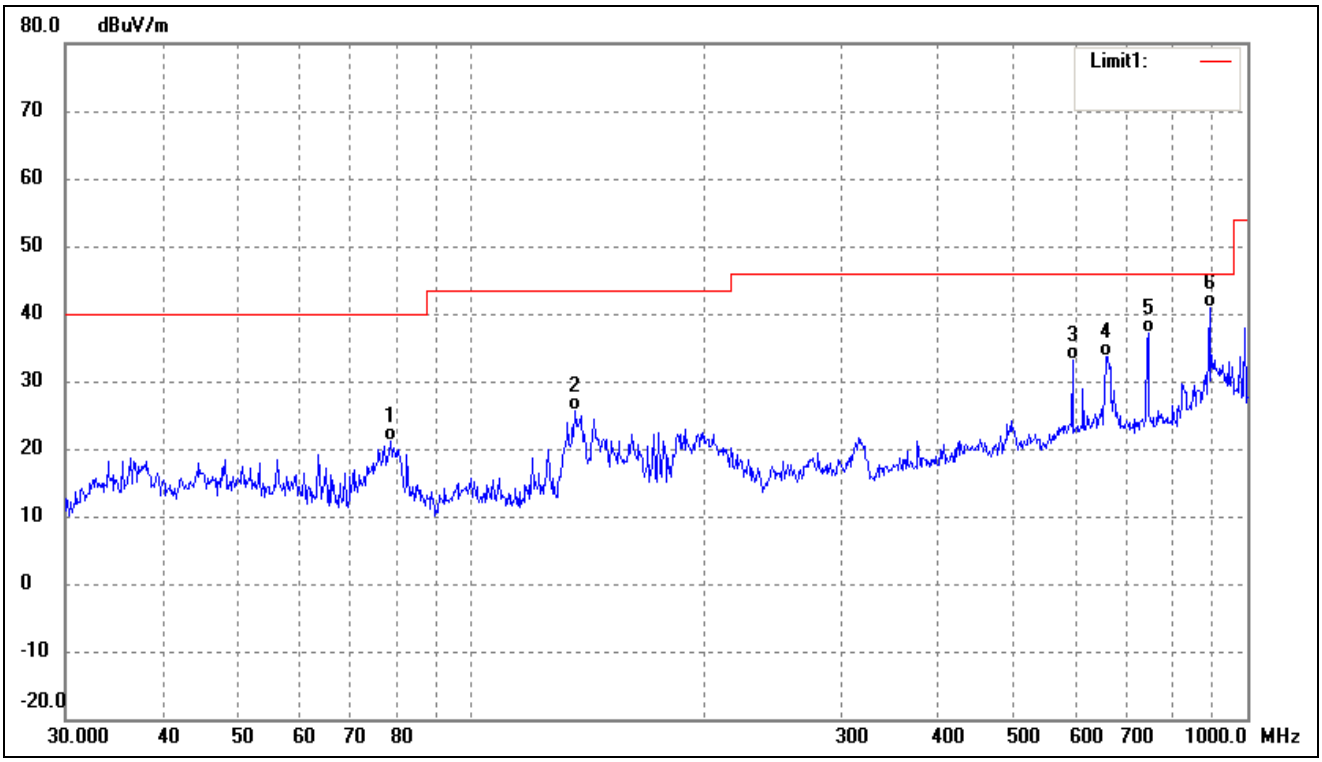
➢ 5725-5850MHz

802.11ac-VHT20(worst case)			
Test Channel	5745MHz	Polarity:	Horizontal



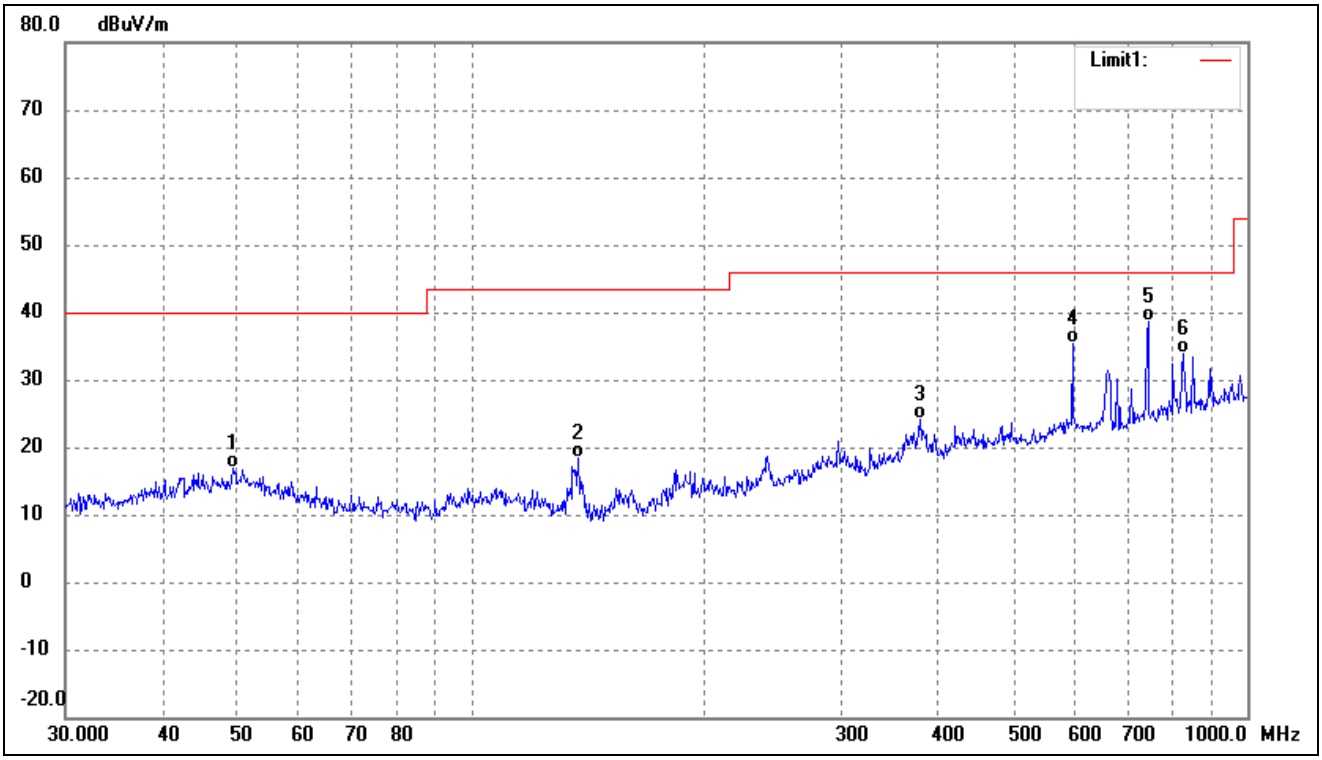
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	49.1866	28.44	-11.05	17.39	40.00	-22.61	215	100	peak
2	137.4202	32.86	-15.86	17.00	43.50	-26.50	98	100	peak
3	297.2241	30.62	-9.38	21.24	46.00	-24.76	222	100	peak
4	595.1329	38.92	-4.06	34.86	46.00	-11.14	96	100	peak
5	744.8661	41.67	-2.72	38.95	46.00	-7.05	143	100	peak
6	893.8567	34.76	-0.67	34.09	46.00	-11.91	225	100	peak

802.11ac-VHT20(worst case)			
Test Channel	5745MHz	Polarity:	Vertical



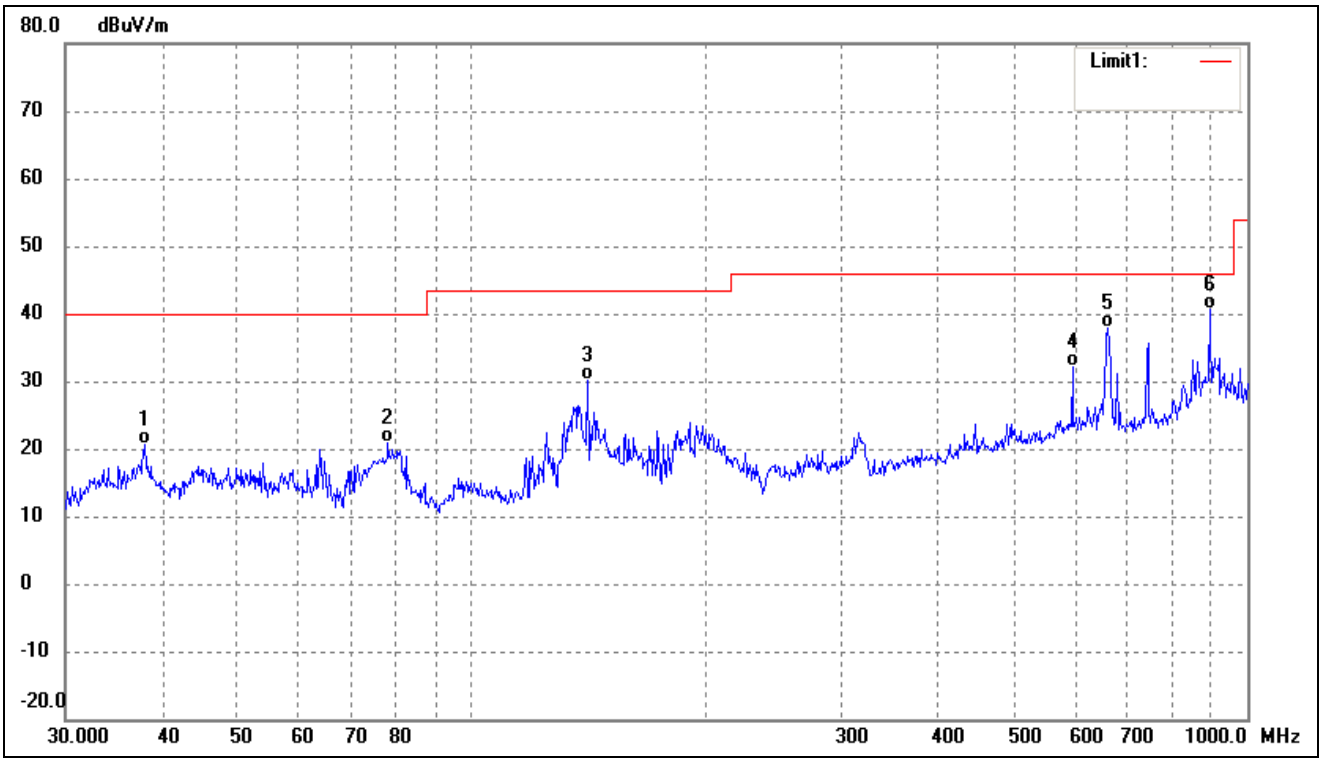
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	78.6888	36.40	-15.39	21.01	40.00	-18.99	152	100	peak
2	135.9822	41.78	-16.04	25.74	43.50	-17.76	217	100	peak
3	595.1329	37.26	-4.06	33.20	46.00	-12.80	61	100	peak
4	658.8362	37.92	-4.25	33.67	46.00	-12.33	259	100	peak
5	744.8661	39.84	-2.72	37.12	46.00	-8.88	232	100	peak
6	893.8567	41.57	-0.67	40.90	46.00	-5.10	173	100	peak

802.11ac-VHT20(worst case)			
Test Channel	5785MHz	Polarity:	Horizontal



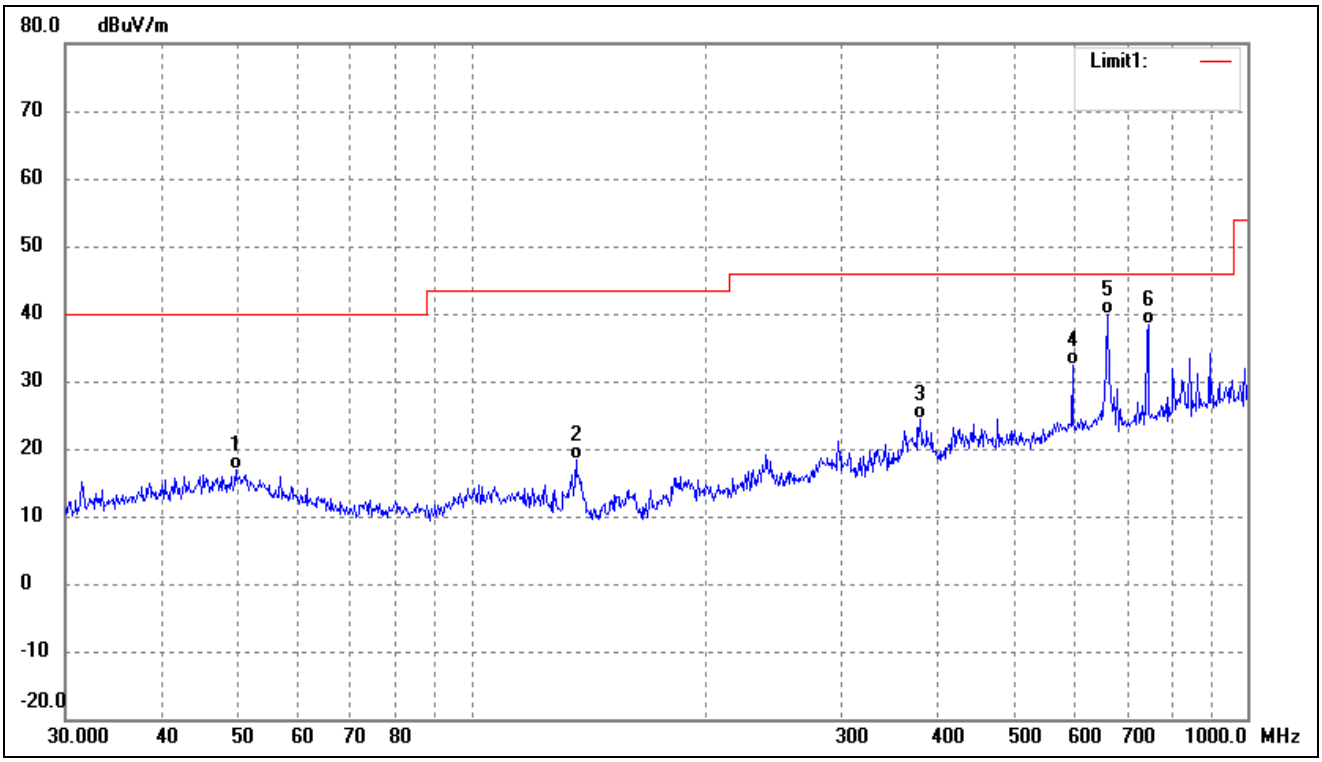
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	49.3594	27.84	-11.04	16.80	40.00	-23.20	121	100	peak
2	137.4202	34.32	-15.86	18.46	43.50	-25.04	118	100	peak
3	378.5843	31.61	-7.56	24.05	46.00	-21.95	62	100	peak
4	595.1329	39.47	-4.06	35.41	46.00	-10.59	277	100	peak
5	744.8661	41.31	-2.72	38.59	46.00	-7.41	136	100	peak
6	827.4934	35.54	-1.59	33.95	46.00	-12.05	188	100	peak

802.11ac-VHT20(worst case)			
Test Channel	5785MHz	Polarity:	Vertical



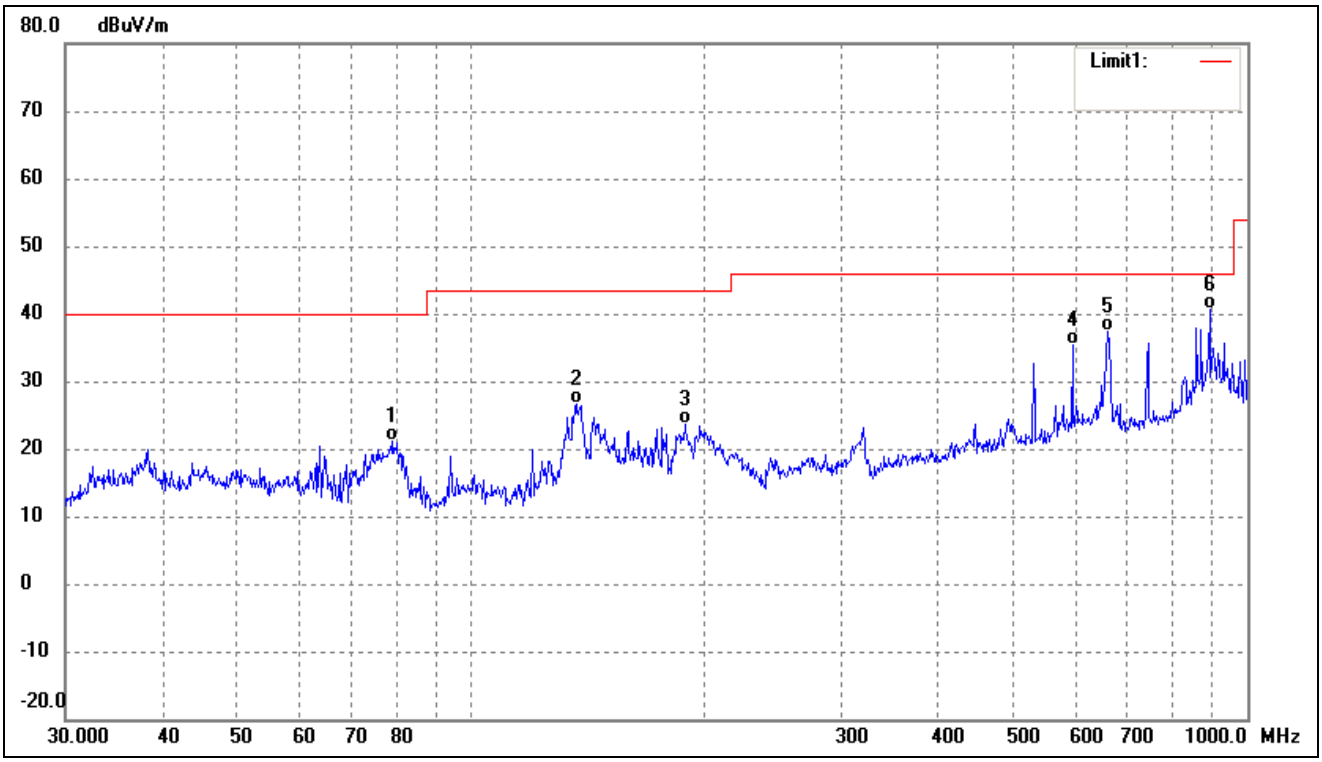
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	37.9450	33.55	-12.85	20.70	40.00	-19.30	147	100	peak
2	78.1389	36.17	-15.34	20.83	40.00	-19.17	103	100	peak
3	141.3298	45.64	-15.58	30.06	43.50	-13.44	135	100	peak
4	595.1329	36.22	-4.06	32.16	46.00	-13.84	130	100	peak
5	661.1505	42.03	-4.25	37.78	46.00	-8.22	107	100	peak
6	893.8567	41.18	-0.67	40.51	46.00	-5.49	194	100	peak

802.11ac-VHT20(worst case)			
Test Channel	5825MHz	Polarity:	Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	49.7068	27.88	-11.01	16.87	40.00	-23.13	57	100	peak
2	136.4598	34.27	-15.98	18.29	43.50	-25.21	98	100	peak
3	378.5843	31.84	-7.56	24.28	46.00	-21.72	87	100	peak
4	595.1329	36.34	-4.06	32.28	46.00	-13.72	142	100	peak
5	661.1505	44.01	-4.25	39.76	46.00	-6.24	74	100	peak
6	744.8661	41.15	-2.72	38.43	46.00	-7.57	97	100	peak

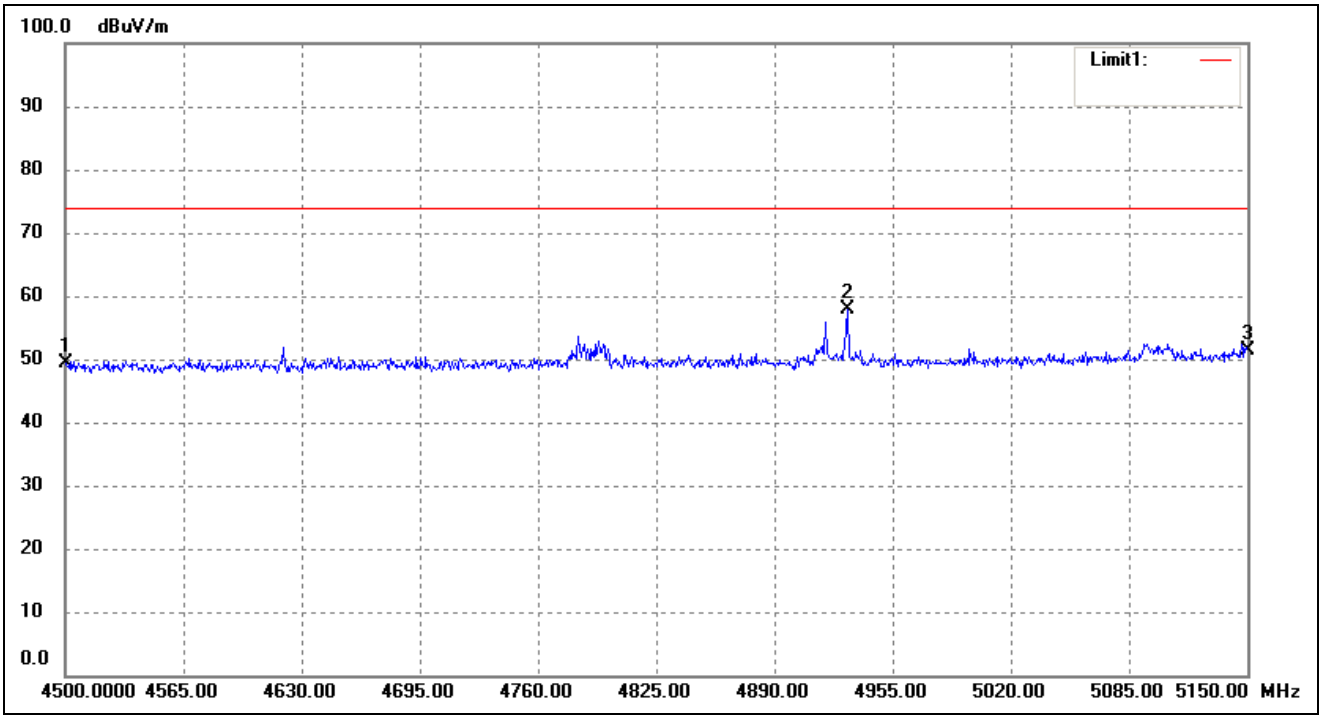
802.11ac-VHT20(worst case)			
Test Channel	5825MHz	Polarity:	Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	79.2426	36.47	-15.42	21.05	40.00	-18.95	76	100	peak
2	136.4598	42.63	-15.98	26.65	43.50	-16.85	123	100	peak
3	188.4125	37.10	-13.58	23.52	43.50	-19.98	53	100	peak
4	595.1329	39.32	-4.06	35.26	46.00	-10.74	297	100	peak
5	661.1505	41.57	-4.25	37.32	46.00	-8.68	135	100	peak
6	893.8567	41.32	-0.67	40.65	46.00	-5.35	170	100	peak

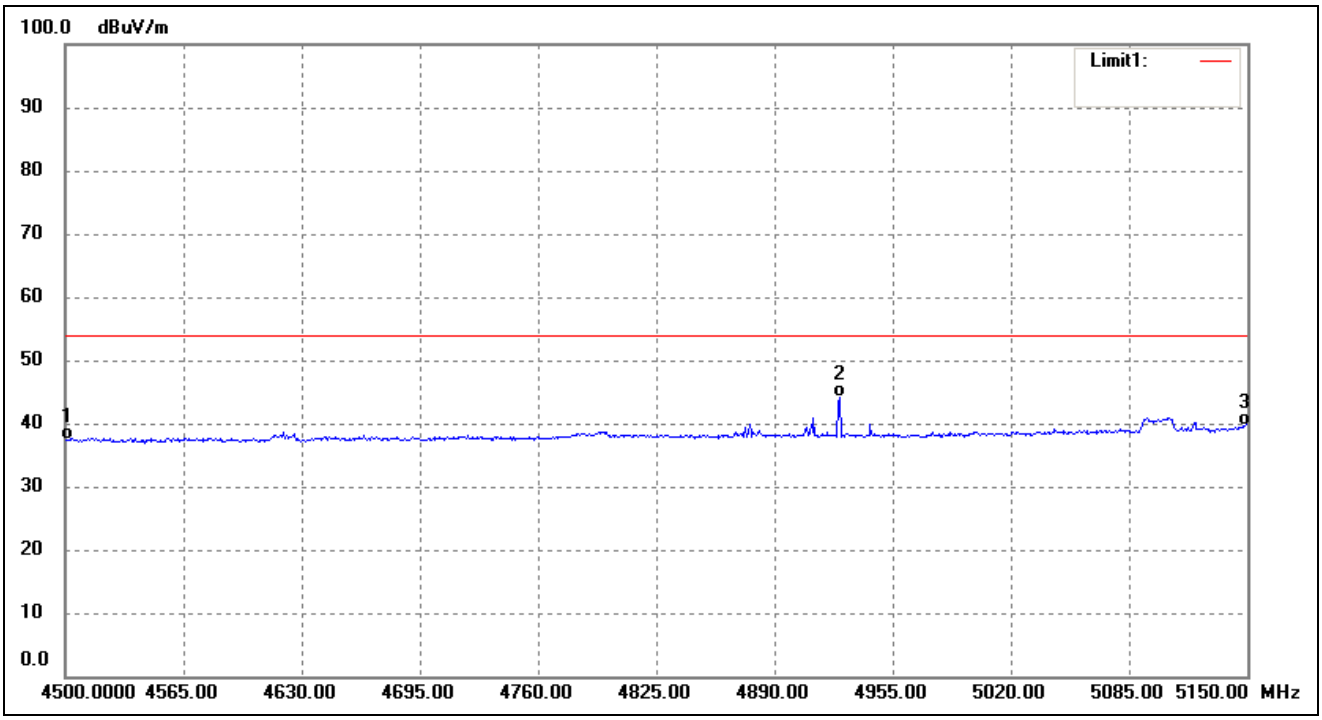
- Spurious Emission above 1GHz
- Antenna 2(worst case)

802.11ac-VHT20- Restricted Bandedge			
Test Channel	band 4.5-5.15GHz	Polarity:	Vertical(worst case)



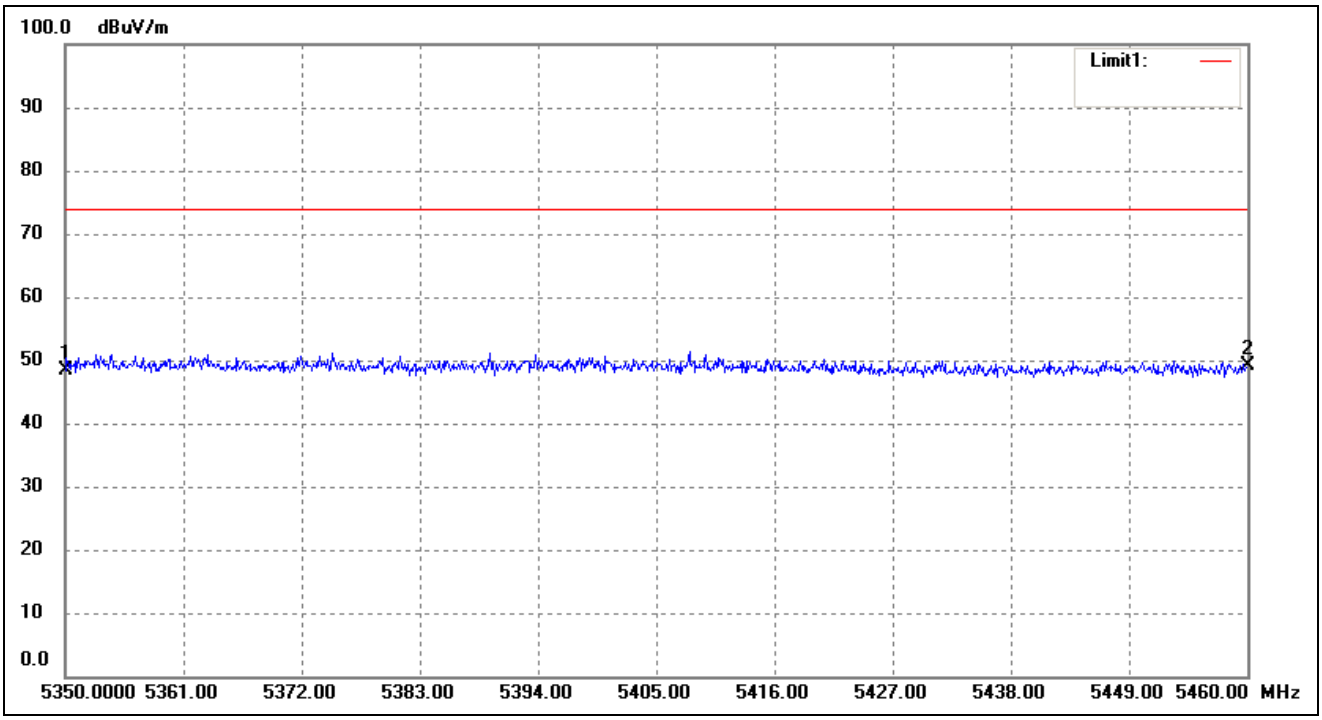
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	4500.000	54.06	-4.71	49.35	74.00	-24.65	222	100	peak
2	4930.300	62.27	-4.44	57.83	74.00	-16.17	98	100	peak
3	5150.000	55.64	-4.32	51.32	74.00	-22.68	147	100	peak

802.11ac-VHT20- Restricted Bandedge			
Test Channel	band 4.5-5.15GHz	Polarity:	Vertical(worst case)



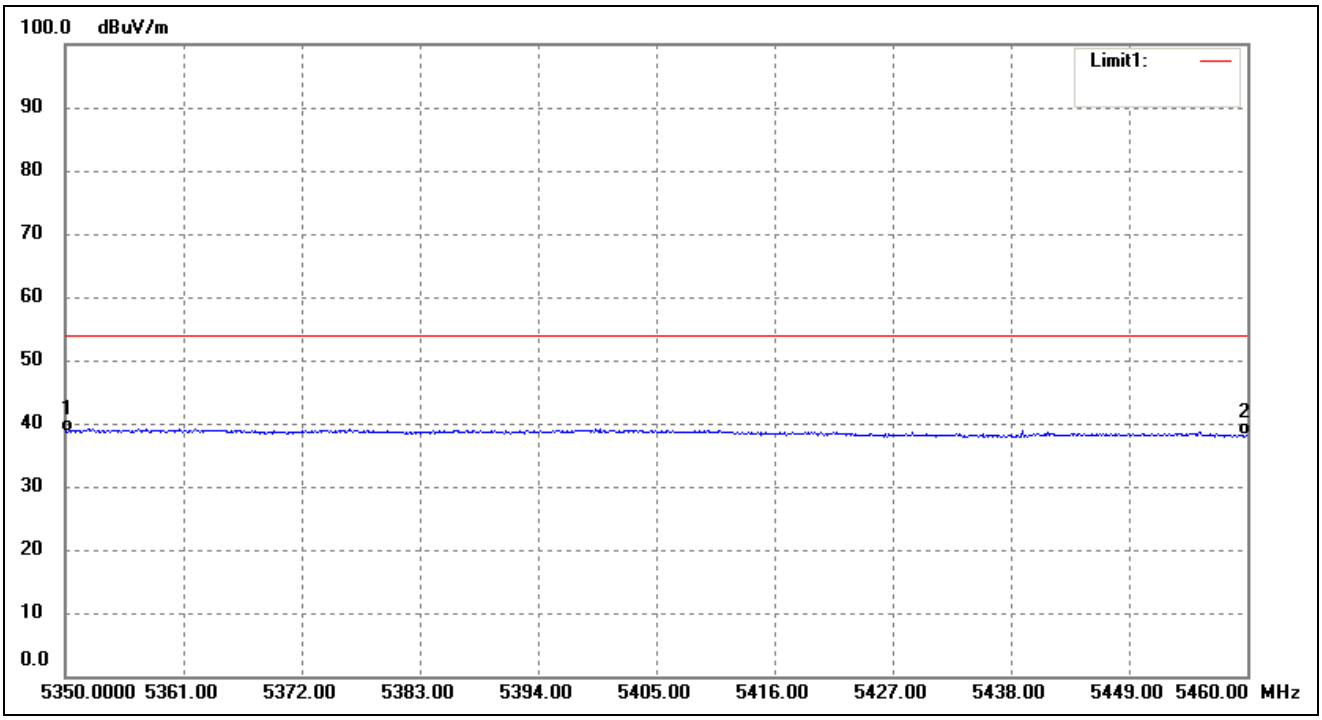
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	4500.000	42.19	-4.71	37.48	54.00	-16.52	125	100	AVG
2	4925.750	48.63	-4.44	44.19	54.00	-9.81	136	100	AVG
3	5150.000	44.04	-4.32	39.72	54.00	-14.28	108	100	AVG

802.11ac-VHT20- Restricted Bandedge			
Test Channel	band 5.35-5.46GHz	Polarity:	Vertical(worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	5350.000	52.65	-4.21	48.44	74.00	-25.56	129	100	peak
2	5460.000	53.17	-4.16	49.01	74.00	-24.99	246	100	peak

802.11ac-VHT20- Restricted Bandedge			
Test Channel	band 5.35-5.46GHz	Polarity:	Vertical(worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	5350.000	42.94	-4.21	38.73	54.00	-15.27	94	100	AVG
2	5460.000	42.21	-4.16	38.05	54.00	-15.95	251	100	AVG

Note: The Restricted Bandedge was tested in Horizontal /Vertical and the worst case position data was reported.

➢ For the frequency band 5.15-5.25GHz, 5.725-5.850GHz (802.11ac-VHT20)

Harmonics And Spurious Emissions

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel (5180MHz)							
10360	58.27	7.11	65.38	74	-8.62	H	PK
15540	40.07	8.22	48.29	54	-5.71	H	AV
10360	60.05	7.11	67.16	74	-6.84	V	PK
15540	37.34	8.22	45.56	54	-8.44	V	AV
Middle Channel (5200MHz)							
10400	58.18	7.22	65.40	74	-8.60	H	PK
15600	36.49	8.67	45.16	54	-8.84	H	AV
10400	56.70	7.22	63.92	74	-10.08	V	PK
15600	37.24	8.67	45.91	54	-8.09	V	AV
High Channel (5240MHz)							
10480	57.09	7.69	64.78	74	-9.22	H	PK
15720	37.91	8.93	46.84	54	-7.16	H	AV
10480	60.39	7.69	68.08	74	-5.92	V	PK
15720	38.09	8.93	47.02	54	-6.98	V	AV

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel (5745MHz)							
11490	57.94	9.45	67.39	74	-6.61	H	PK
17235	33.97	10.36	44.33	54	-9.67	H	AV
11490	56.50	9.45	65.95	74	-8.05	V	PK
17235	36.99	10.36	47.35	54	-6.65	V	AV
Middle Channel (5785MHz)							
11570	58.84	9.62	68.46	74	-5.54	H	PK
17355	37.88	10.67	48.55	54	-5.45	H	AV
11570	58.57	9.62	68.19	74	-5.81	V	PK
17355	34.69	10.67	45.36	54	-8.64	V	AV
High Channel (5825MHz)							
11650	55.92	9.84	65.76	74	-8.24	H	PK
17475	33.23	10.95	44.18	54	-9.82	H	AV
11650	54.09	9.84	63.93	74	-10.07	V	PK
17475	36.04	10.95	46.99	54	-7.01	V	AV

➢ Out of Band edge for 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-35.79	-27
Highest	Above 5350	-44.17	-27
Note: the data just list the worst cases			

➢ Out of Band edge for 5725-5850MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5715	-36.62	-27
	5715 to 5725	-39.05	-17
Highest	5850 to 5860	-39.88	-17
	Above 5860	-42.06	-27
Note: the data just list the worst cases			

- For the frequency band 5.15-5.25GHz5.725-5.850GHz(802.11ac-VHT40)
- Harmonics And Spurious Emissions

Frequency (MHz)	Reading (dBuV/m)	Correct dB	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polar H/V	Detector
Low Channel (5190MHz)							
10380	58.03	7.25	65.28	74	-8.72	H	PK
15570	36.72	8.33	45.05	54	-8.95	H	AV
10380	60.31	7.25	67.56	74	-6.44	V	PK
15570	39.64	8.33	47.97	54	-6.03	V	AV
High Channel (5230MHz)							
10460	57.49	7.54	65.03	74	-8.97	H	PK
15690	39.36	8.86	48.22	54	-5.78	H	AV
10460	59.95	7.54	67.49	74	-6.51	V	PK
15690	37.07	8.86	45.93	54	-8.07	V	AV

Frequency (MHz)	Reading (dBuV/m)	Correct dB	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polar H/V	Detector
Low Channel (5755MHz)							
11510	56.24	9.65	65.89	74	-8.11	H	PK
17265	36.26	10.87	47.13	54	-6.87	H	AV
11510	57.20	9.65	66.85	74	-7.15	V	PK
17265	35.48	10.87	46.35	54	-7.65	V	AV
High Channel (5795MHz)							
11590	54.39	9.81	64.20	74	-9.80	H	PK
17385	34.43	10.89	45.32	54	-8.68	H	AV
11590	57.86	9.81	67.67	74	-6.33	V	PK
17385	37.56	10.89	48.45	54	-5.55	V	AV

- Out of Band edge 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-37.32	-27
Highest	Above 5350	-40.04	-27
Note: the data just list the worst cases			

➢ Out of Band edge for 5725-5850MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5715	-39.60	-27
	5715 to 5725	-39.92	-17
Highest	5850 to 5860	-41.40	-17
	Above 5860	-39.88	-27
Note: the data just list the worst cases			

Note: this EUT was tested in the low, high channel and the worst case position data was reported.

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, other than listed in the table above are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

11. Frequency Stability

11.1 Standard Applicable

According to §15.407(g), manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

11.2 Test Procedure

According to §2.1055, the following test procedure was performed.
The Frequency Stability is measured directly with a Frequency Domain Analyzer. Frequency Deviation in ppm is calculated from the measured peak to peak value.
The Carrier Frequency Stability over Power Supply Voltage and over Temperature is measured with a Frequency Domain Analyzer in histogram mode.

11.3 Summary of Test Results/Plots

U-NII-1:5150-5250MHz worst case at 802.11ac-VHT20 middle channel (Antenna 1)				
Voltage(%)	Power(VDC)	TEMP(℃)	Freq.Dev(Hz)	Deviation
100%	5	-30	100	0.0192
100%		-20	122	0.0235
100%		-10	126	0.0242
100%		0	123	0.0237
100%		+10	121	0.0233
100%		+20	141	0.0271
100%		+30	116	0.0223
100%		+40	140	0.0269
100%		+50	112	0.0215
Low Battery power	4.5	+20	151	0.0290
High Battery power	5.5	+20	128	0.0246

U-NII-3: 5725-5850MHz worst case at 802.11ac-VHT20 middle channel (Antenna 1)				
Voltage(%)	Power(VDC)	TEMP(℃)	Freq.Dev(Hz)	Deviation
100%	5	-30	99	0.0171
100%		-20	119	0.0206
100%		-10	125	0.0216
100%		0	120	0.0207
100%		+10	120	0.0207
100%		+20	146	0.0252
100%		+30	113	0.0195
100%		+40	135	0.0233
100%		+50	112	0.0194
Low Battery power	4.5	+20	154	0.0266
High Battery power	5.5	+20	131	0.0226

U-NII-1:5150-5250MHz worst case at 802.11ac-VHT20 middle channel (Antenna 2)				
Voltage(%)	Power(VDC)	TEMP(℃)	Freq.Dev(Hz)	Deviation
100%	5	-30	102	0.0196
100%		-20	116	0.0223
100%		-10	129	0.0248
100%		0	116	0.0223
100%		+10	121	0.0233
100%		+20	145	0.0279
100%		+30	117	0.0225
100%		+40	135	0.0260
100%		+50	116	0.0223
Low Battery power	4.5	+20	152	0.0292
High Battery power	5.5	+20	132	0.0254

U-NII-3: 5725-5850MHz worst case at 802.11ac-VHT20 middle channel (Antenna 2)				
Voltage(%)	Power(VDC)	TEMP(℃)	Freq.Dev(Hz)	Deviation
100%	5	-30	102	0.0176
100%		-20	123	0.0213
100%		-10	123	0.0213
100%		0	122	0.0211
100%		+10	121	0.0209
100%		+20	149	0.0258
100%		+30	116	0.0201
100%		+40	142	0.0245
100%		+50	119	0.0206
Low Battery power	4.5	+20	153	0.0264
High Battery power	5.5	+20	126	0.0218

******* END OF REPORT *******