FCC Part 15E
Measurement and Test Report

For

Trend-tech Technology Co., Limited

Room 205, Building No. 5, YaoXing HuaYuan, XinHuiDaDao No. 45, XinHui District, JiangMen City, GuangDong Province, China | Postage Code:529100

FCC ID: 2ABM8-AC3

FCC Rule(s):	FCC Part 15.407
Product Description:	AC1200 Dual Band USB WiFi Adapter
Tested Model:	AC3
Report No.:	WTX19X12088111W-1
Sample Receipt Date:	2019-12-18
Tested Date:	2019-12-18 to 2020-01-09
Issued Date:	2020-01-09
Tested By:	Jack Huang / Engineer
Reviewed By:	Lion Cai / RF Manager
Approved & Authorized By:	Silin Chen / Manager

Prepared By:

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Version No.	Date of issue	Description
Rev.00	2020-01-09	Original
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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	Trend-tech Technology Co., Limited
Address of applicant:	Room 205, Building No. 5, YaoXing HuaYuan, XinHuiDaDao No. 45, XinHui District, JiangMen City, GuangDong Province, China | Postage Code:529100
Manufacturer:	Trend-tech Technology Co., Limited
Address of manufacturer:	Room 205, Building No. 5, YaoXing HuaYuan, XinHuiDaDao No. 45, XinHui District, JiangMen City, GuangDong Province, China | Postage Code:529100

General Description of EUT	
Product Name:	AC1200 Dual Band USB WiFi Adapter
Brand Name:	BrosTrend
Model No.:	AC3
Adding Model(s):	AC1, AC5, AC1L, AC3L, AC5L
Rated Voltage:	DC5V
Battery Capacity:	/
Power Adapter:	/
Software Version:	/
Hardware Version:	/
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 AC3, but the circuit and the electronic construction do not change, declared by the manufacturer.	

Technical Characteristics of EUT	
Support Standards:	802.11a, 802.11n(HT20) , 802.11n-HT40, 802.11ac-VH80
Frequency Range:	5150-5250MHz, 5725-5850MHz
RF Output Power:	16.35dBm (Conducted)
Type of Modulation:	BPSK, QPSK,16QAM,64QAM, 256QAM
Data Rate:	6-54Mbps, up to 866.6Mbps
Type of Antenna:	External Antenna
Antenna Gain:	5.0dBi

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 "00006139-MP_Kit_RTL11ac_8822BU_USB_v0.36_20160823(BETA)" 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 ANT1	Test Frequency (MHz)												
	NCB: 20MHz												
	5180	5200	5240	5260	5300	5320	5500	5580	5700	5720	5745	5785	5825
802.11a 6Mbps	40	40	40	/	/	/	/	/	/	/	38	38	38
802.11n-HT20 MCS0	38	38	38	/	/	/	/	/	/	/	36	36	36
Mode	NCB: 40MHz									
	5190	5230	5270	5310	5510	5550	5670	5710	5755	5795
802.11n-HT40 MCS0	36	36	/	/	/	/	/	/	38	38
Mode	NCB: 80MHz					
	5210		5290	5530	5610	5690		5775		
802.11ac-VH80 MCS0/Nss2	36		/	/	/	/		36		

Mode ANT2	Test Frequency (MHz)												
	NCB: 20MHz												
	5180	5200	5240	5260	5300	5320	5500	5580	5700	5720	5745	5785	5825
802.11a 6Mbps	38	38	38	/	/	/	/	/	/	/	38	38	38
802.11n-HT20 MCS0	36	36	36	/	/	/	/	/	/	/	38	38	38
Mode	NCB: 40MHz												
	5190	5230	5270	5310	5510	5550	5670	5710	5755	5795			
802.11n-HT40 MCS0	36	36	/	/	/	/	/	/	38	38			
Mode	NCB: 80MHz												
	5210		5290		5530		5610		5690		5775		
802.11ac-VH80 MCS0/Nss2	38		/		/		/		/		38		

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, and Test Firm Registration Number is 125990.

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	802.11a	5180MHz,5200MHz,5240MHz, 5745MHz, 5785MHz,5825MHz
TM2	802.11n-HT20	5180MHz,5200MHz,5240MHz, 5745MHz, 5785MHz,5825MHz
TM3	802.11n-HT40	5190MHz,5230MHz,5755MHz,5795MHz
TM4	802.11ac-VH80	5210MHz,5775 MHz

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
USB Extension Cradle	1.52	Unshielded	Without Ferrite
CD	/	/	/

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

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Notebook	Lenovo	E445	EB12648265

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
§15.207; §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)	Compliant

N/A: not applicable

3. RF Exposure

3.1 Standard Applicable

According to §1.1307 and §2.1093, the portable 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

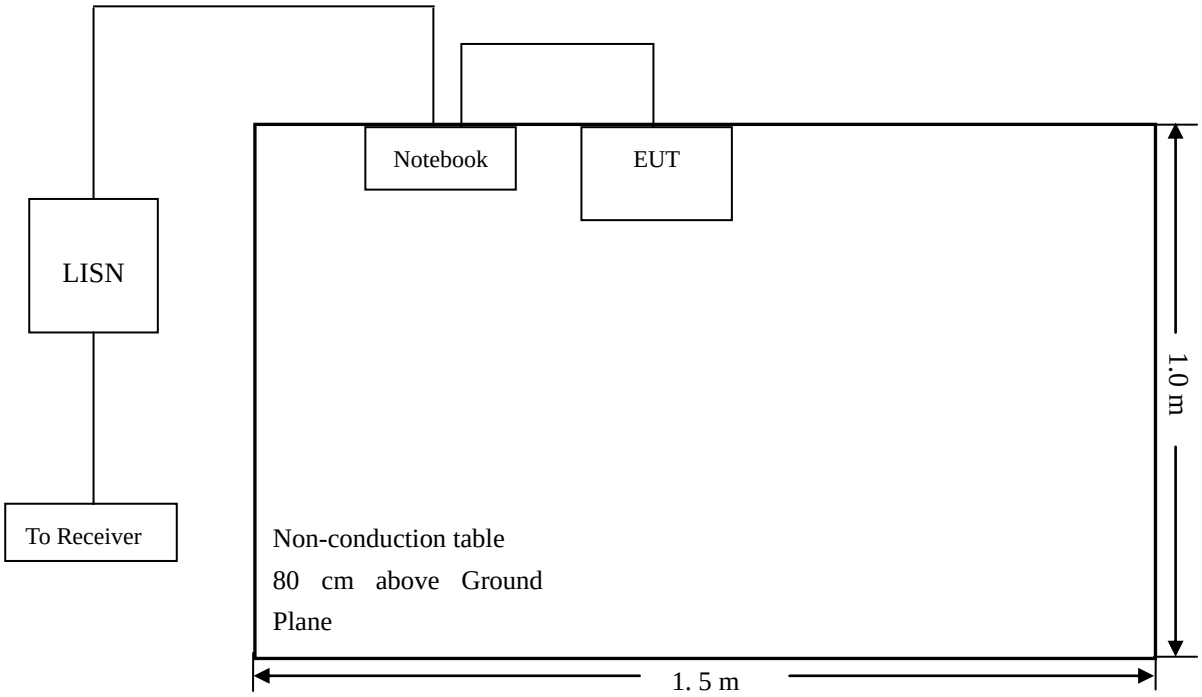
This product has two External antennas, fulfill the requirement of this section.

5. Conducted Emissions

5.1 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.

5.2 Basic Test Setup Block Diagram



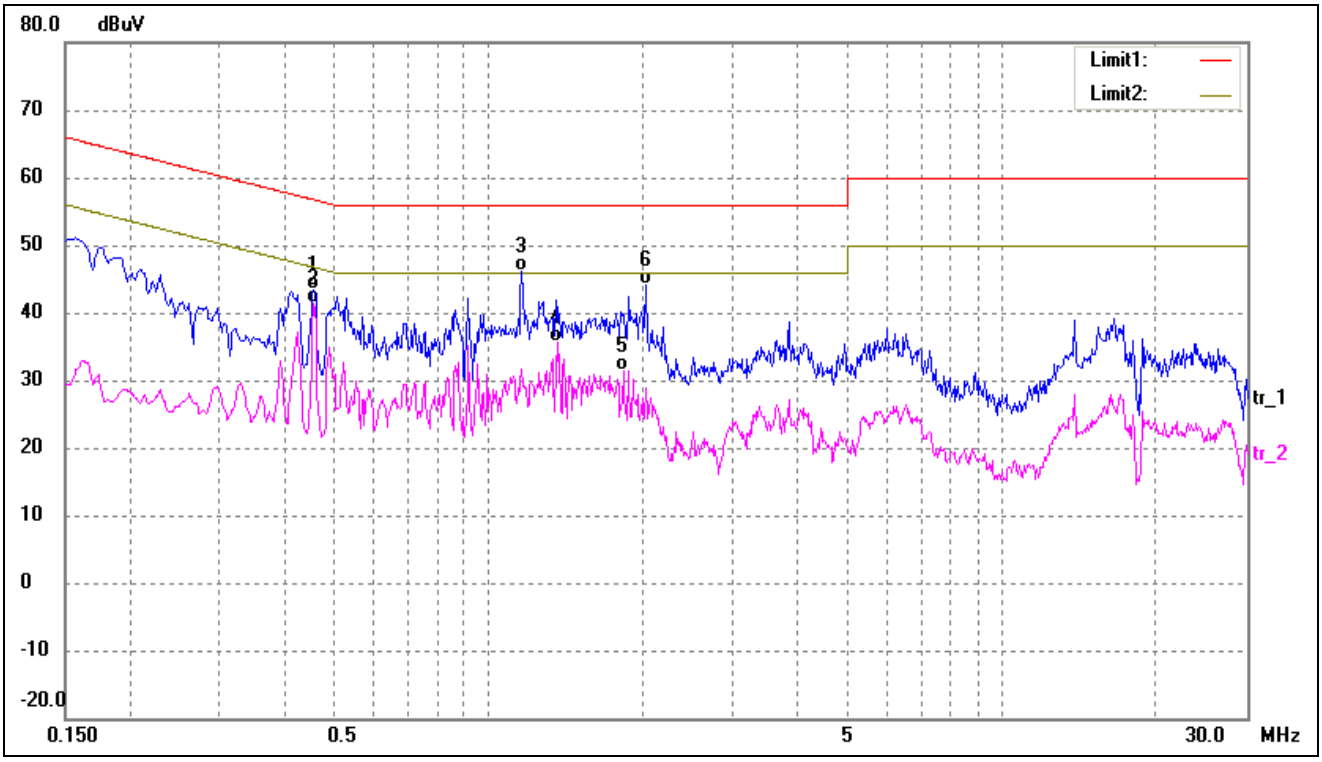
5.3 Test Receiver Setup

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

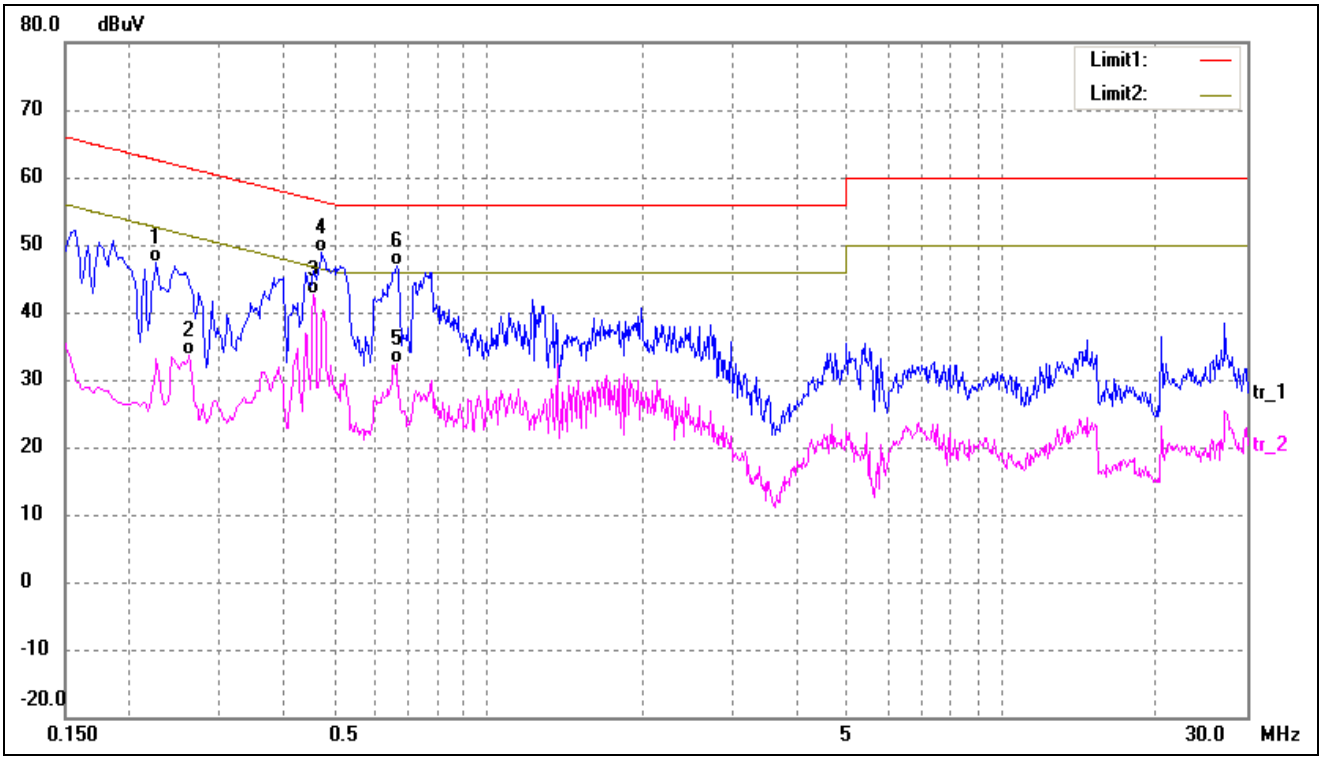
5.4 Summary of Test Results/Plots

Test Mode	Communication	AC120V 60Hz	Polarity:	Neutral



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	0.4580	33.40	10.02	43.42	56.73	-13.31	QP
2*	0.4580	31.37	10.02	41.39	46.73	-5.34	AVG
3	1.1620	35.84	10.38	46.22	56.00	-9.78	QP
4	1.3660	25.32	10.37	35.69	46.00	-10.31	AVG
5	1.8300	20.96	10.37	31.33	46.00	-14.67	AVG
6	2.0260	33.73	10.37	44.10	56.00	-11.90	QP

Test Mode	Communication	AC120V 60Hz	Polarity:	Line



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	0.2260	37.43	9.99	47.42	62.59	-15.17	QP
2	0.2620	23.65	10.02	33.67	51.36	-17.69	AVG
3*	0.4580	32.66	10.02	42.68	46.73	-4.05	AVG
4	0.4740	38.91	10.02	48.93	56.44	-7.51	QP
5	0.6620	22.24	10.05	32.29	46.00	-13.71	AVG
6	0.6660	36.85	10.05	46.90	56.00	-9.10	QP

6. Power Spectral Density

6.1 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.

6.2 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.

6.3 Summary of Test Results/Plots

U-NII-1:5150-5250MHz (Ant1)			
Operating mode	Test Channel	Power Spectral Density dBm/MHz	Limit (dBm/MHz)
802.11a	5180	8.634	11
	5200	9.117	11
	5240	9.320	11

U-NII-1:5150-5250MHz (Ant2)			
Operating mode	Test Channel	Power Spectral Density dBm/MHz	Limit (dBm/MHz)
802.11a	5180	8.499	11
	5200	9.291	11
	5240	8.977	11

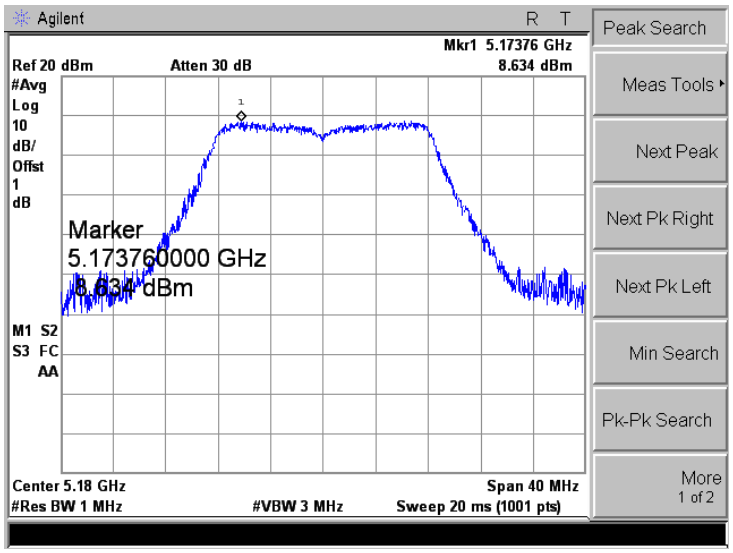
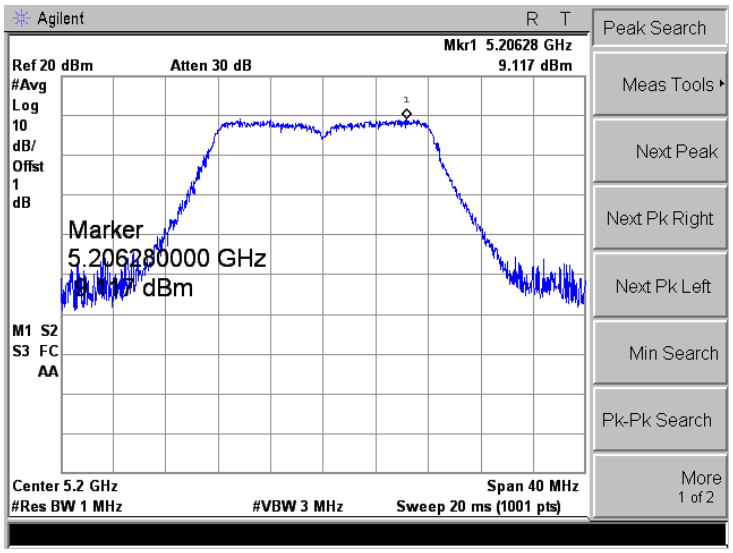
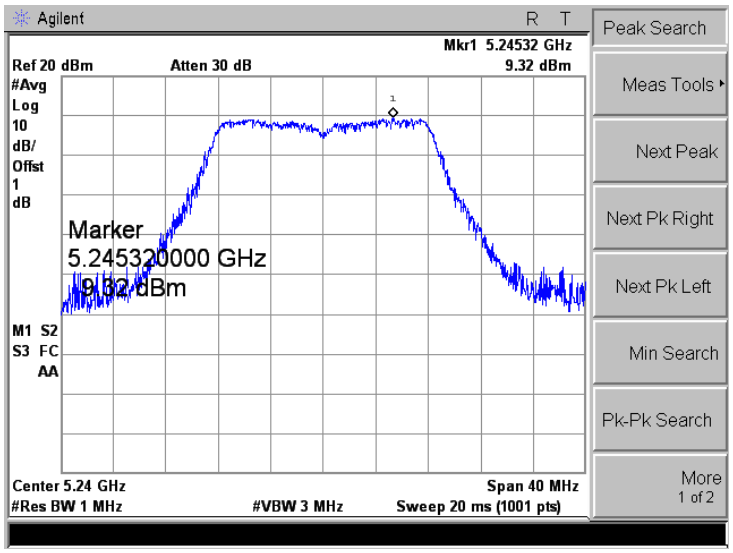
U-NII-1:5150-5250MHz (Ant1+ Ant2)					
Operating mode	Test Channel	Ant1 Power Spectral Density dBm/MHz	Ant2 Power Spectral Density dBm/MHz	ANT0+1 Power Spectral Density dBm/MHz	Limit (dBm/MHz)
802.11n-HT20	5180	7.596	7.590	10.60	11
	5200	6.885	6.847	9.88	11
	5240	7.701	7.224	10.48	11
802.11n-HT40	5190	4.629	5.754	8.24	11
	5230	5.727	6.638	9.22	11
802.11ac-HT80	5210	3.303	3.690	6.51	11

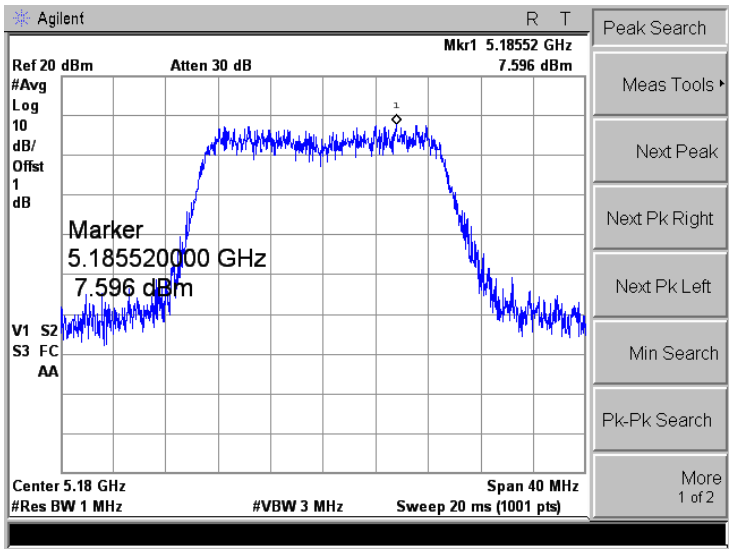
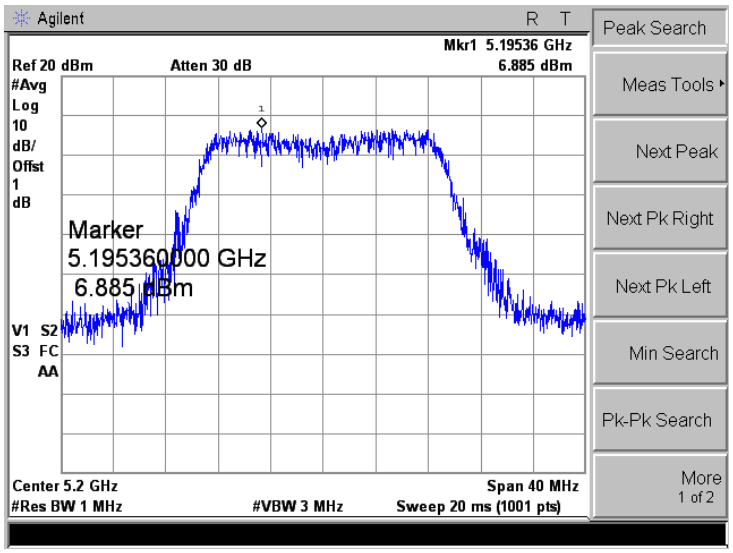
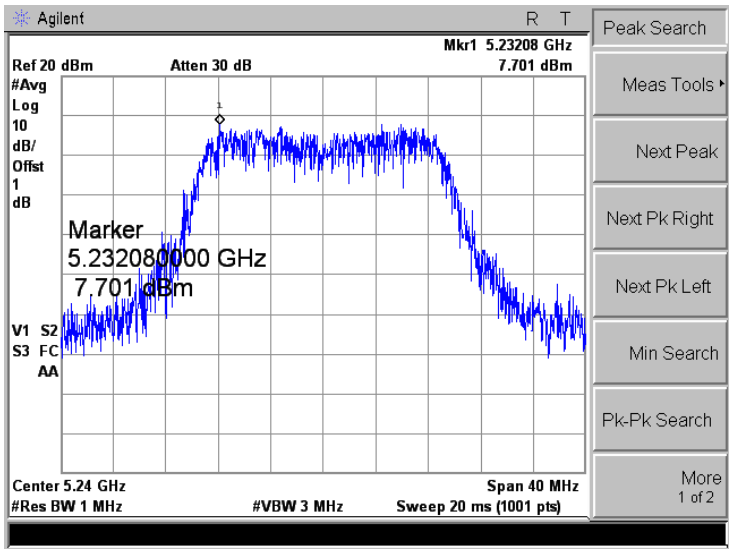
U-NII-3: 5725-5850MHz (Ant1)					
Operating mode	Test Channel	Power Spectral Density dBm/300kHz	Factor	Power Spectral Density* dBm/500kHz	Limit dBm/500kHz
802.11a	5745	4.653	2.22	6.87	30
	5785	5.104	2.22	7.32	30
	5825	4.609	2.22	6.83	30
*Note: Maximum PSD=PSD(dBm/300kHz)+10log(500kHz/300kHz)=2.22					

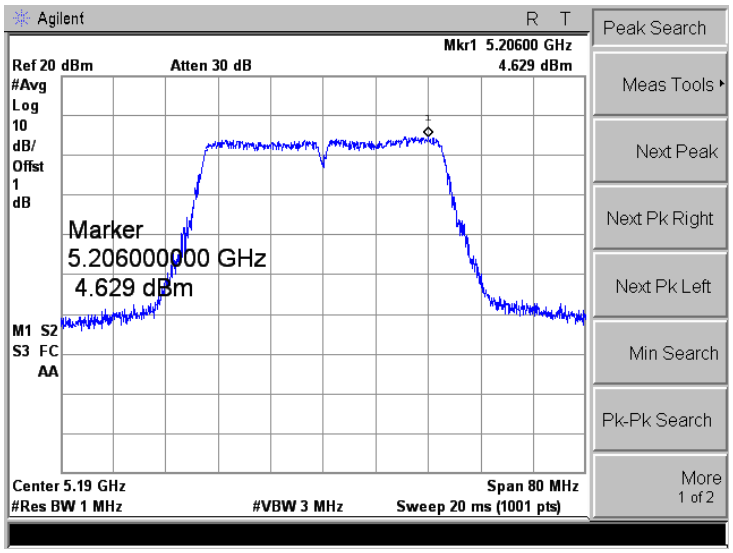
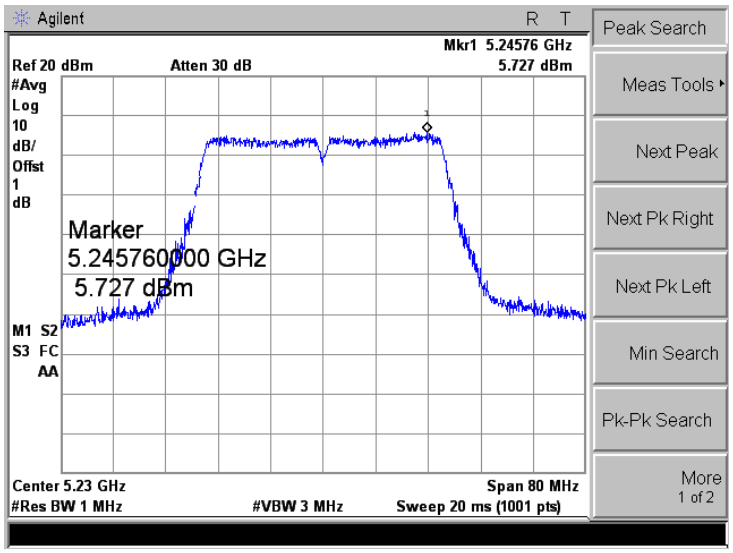
U-NII-3: 5725-5850MHz (Ant2)					
Operating mode	Test Channel	Power Spectral Density dBm/300kHz	Factor	Power Spectral Density* dBm/500kHz	Limit dBm/500kHz
802.11a	5745	4.814	2.22	7.03	30
	5785	4.871	2.22	7.09	30
	5825	4.937	2.22	7.16	30
*Note: Maximum PSD=PSD(dBm/300kHz)+10log(500kHz/300kHz)=2.22					

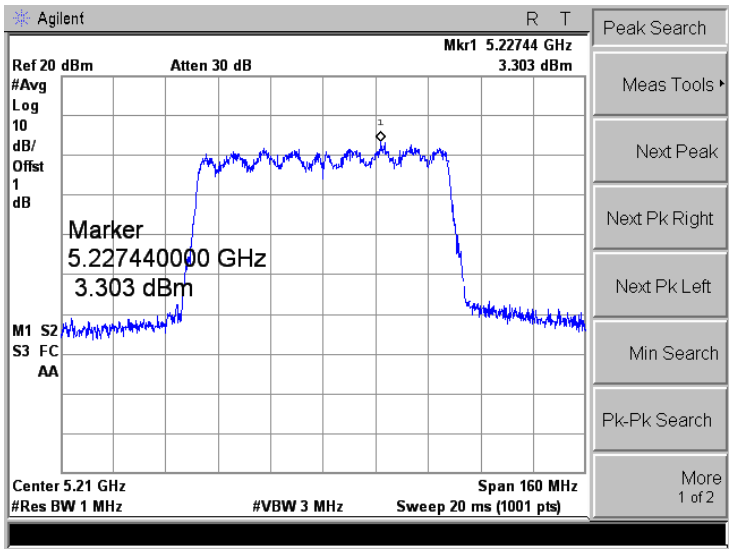
U-NII-3: 5725-5850MHz (Ant1+ Ant2)						
Operating mode	Test Channel	Ant1 Power Spectral Density dBm/300kHz	Ant2 Power Spectral Density dBm/300kHz	Factor	ANT0+1 Power Spectral Density* dBm/500kHz	Limit dBm/500kHz
802.11n-HT20	5745	3.850	3.707	2.22	9.01	30
	5785	3.916	4.703	2.22	9.56	30
	5825	4.907	4.896	2.22	10.13	30
802.11n HT40	5755	1.553	0.953	2.22	6.49	30
	5795	1.265	2.044	2.22	6.90	30
802.11ac VH80	5775	-1.641	-0.855	2.22	4.00	30
*Note: Maximum PSD=PSD(dBm/300kHz)+10log(500kHz/300kHz)=2.22						

➢ Ant1: 5150-5250MHz

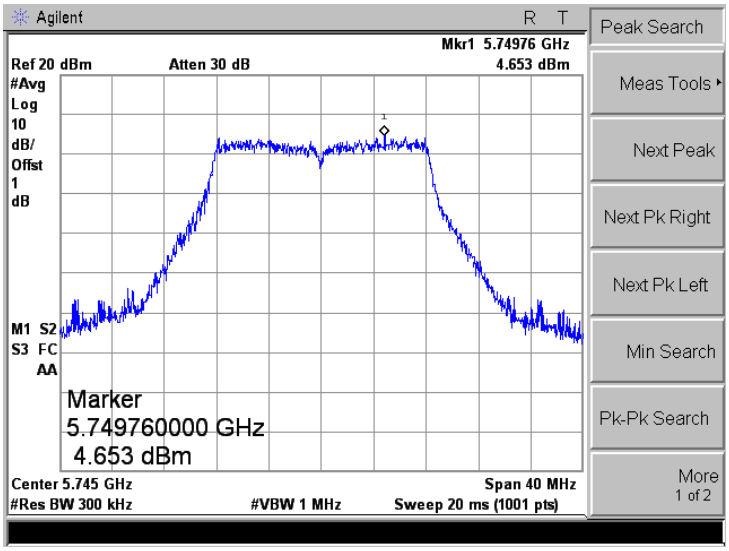
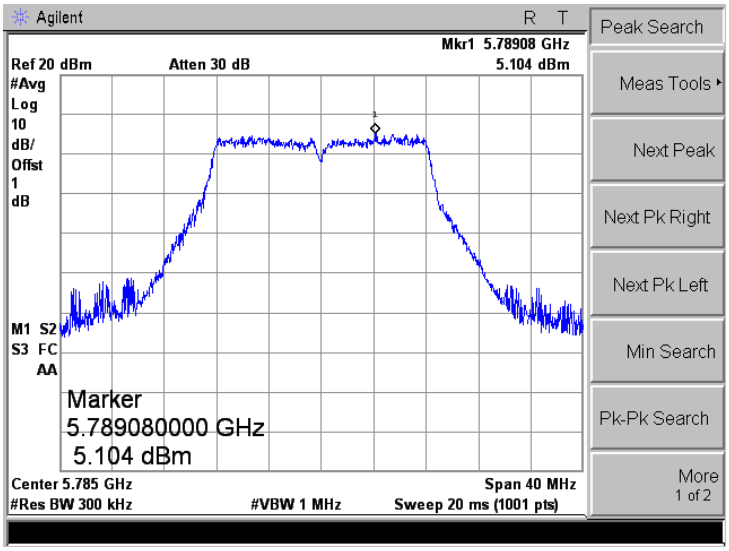
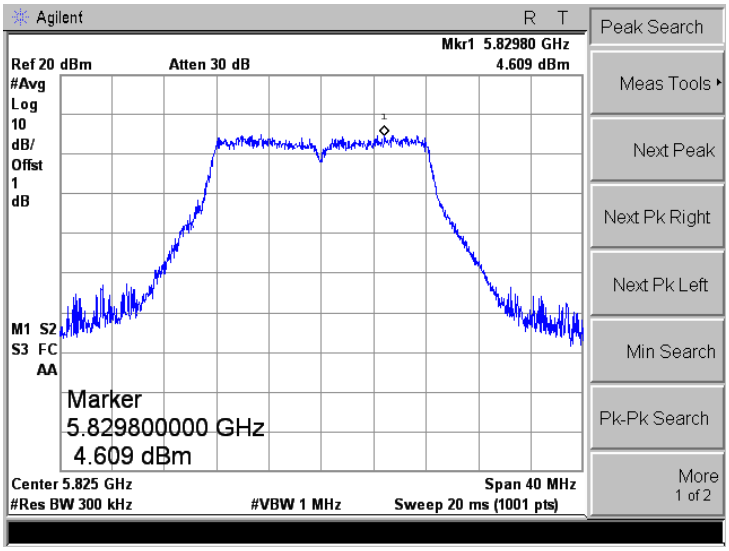
Mode:	**802.11a**
5180MHz	
5200MHz	
5240MHz	

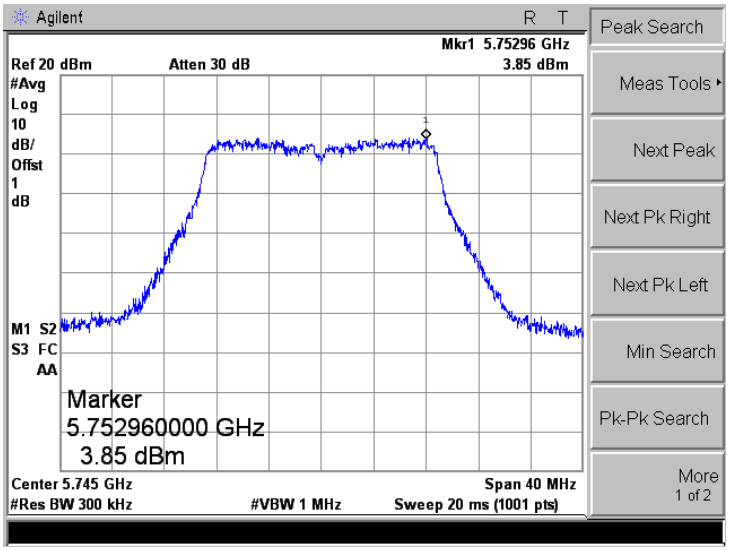
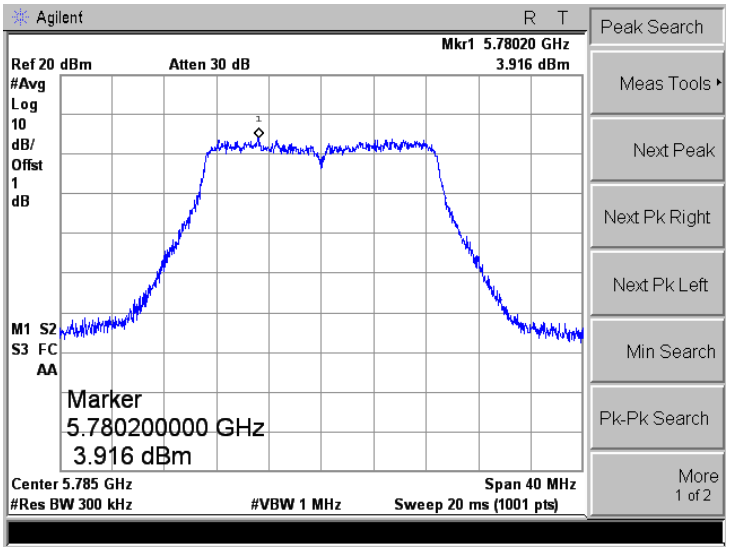
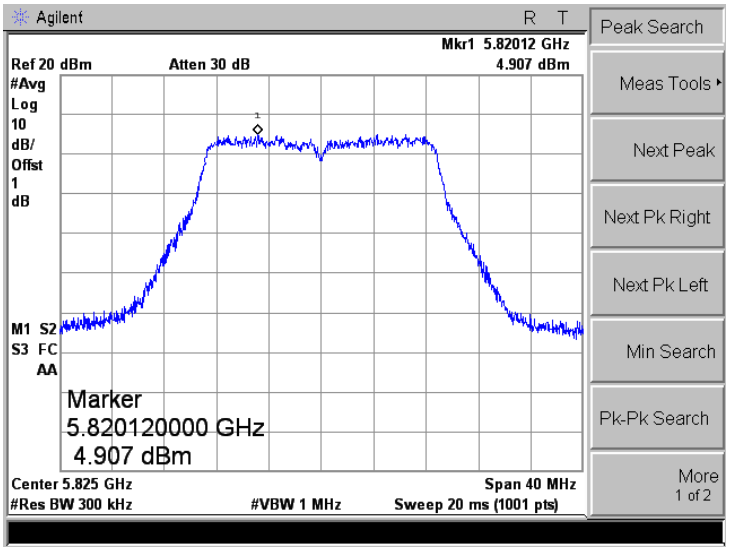
Mode:	802.11n-HT20
5180MHz	
5200MHz	
5240MHz	

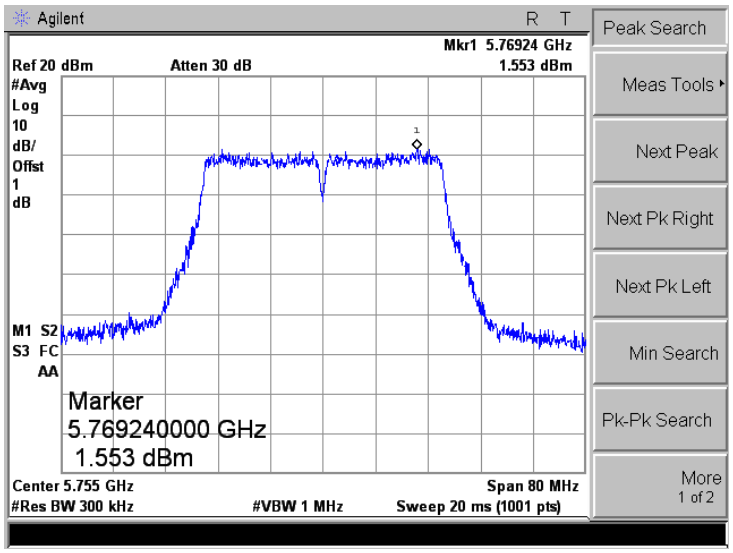
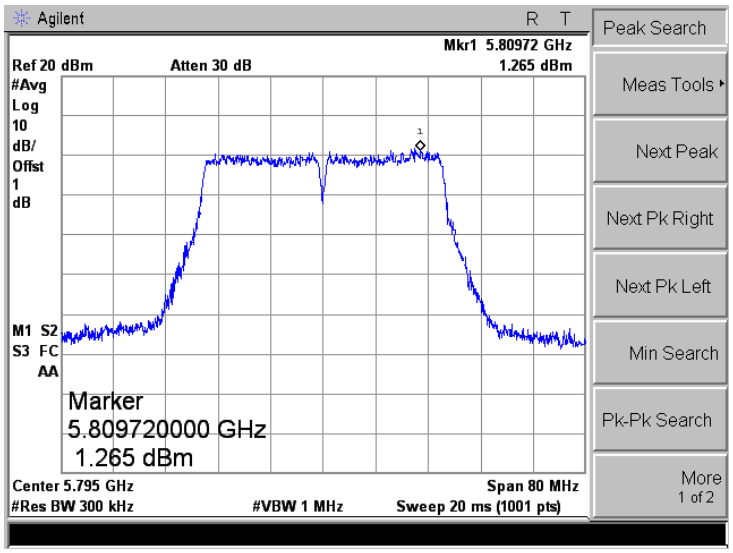
Mode:	802.11n-HT40
5190 MHz	
5230 MHz	

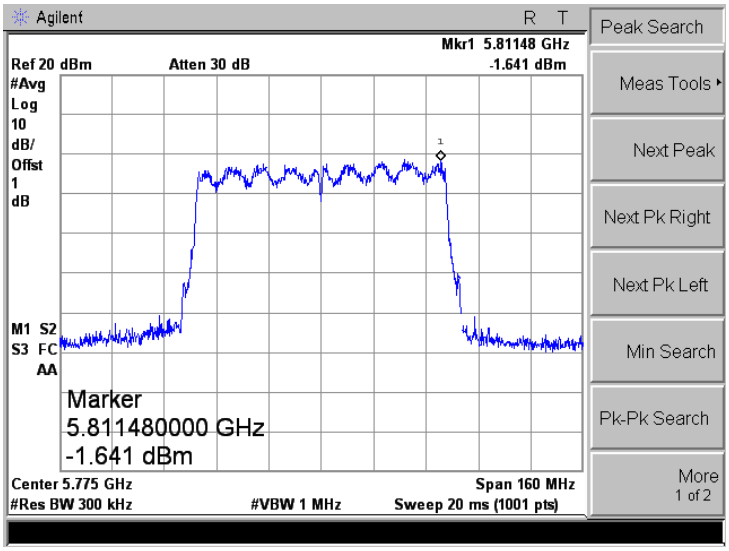
Mode:	802.11ac VH80
5210MHz	

➢ Ant1: 5725-5850MHz

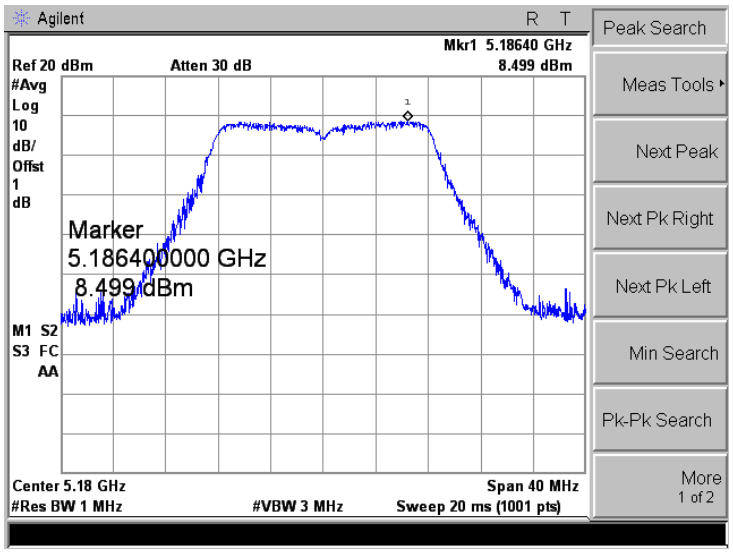
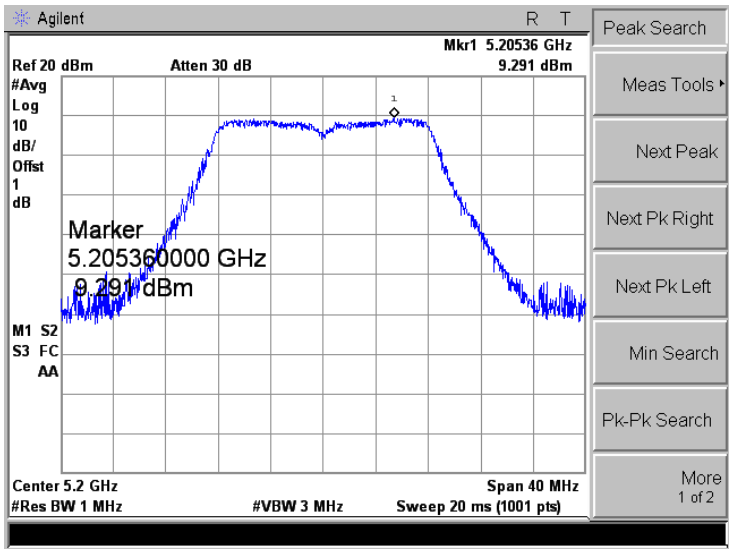
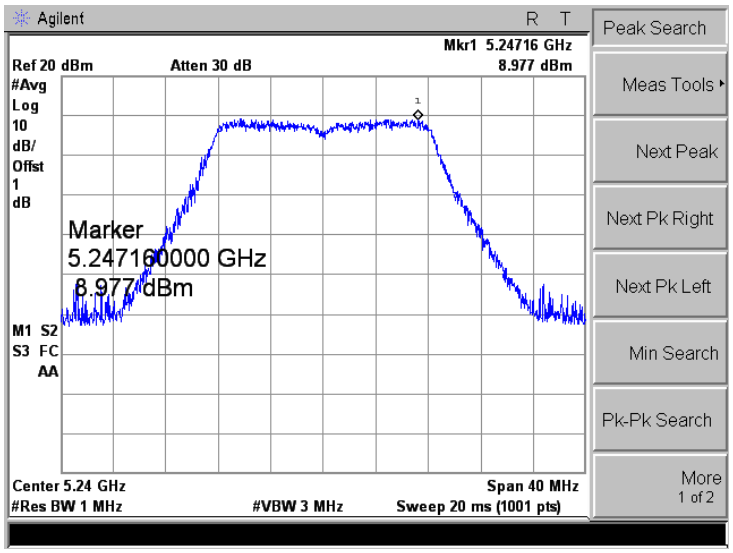
Mode:	**802.11a**
5745MHz	
5785MHz	
5825MHz	

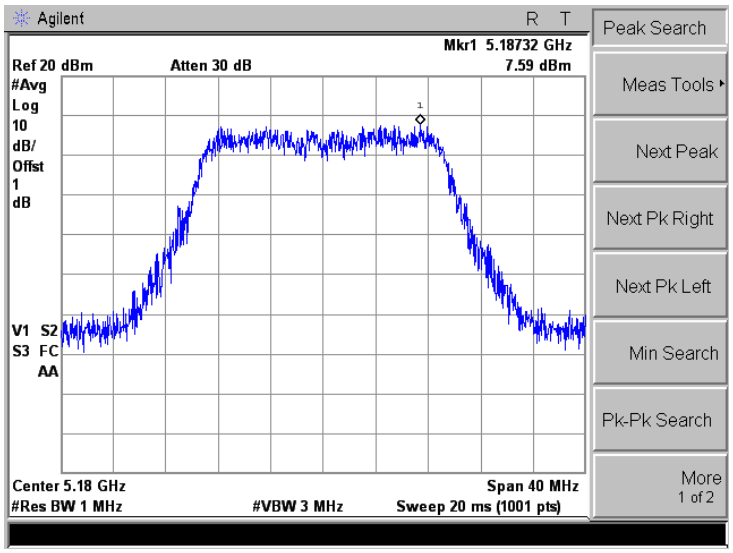
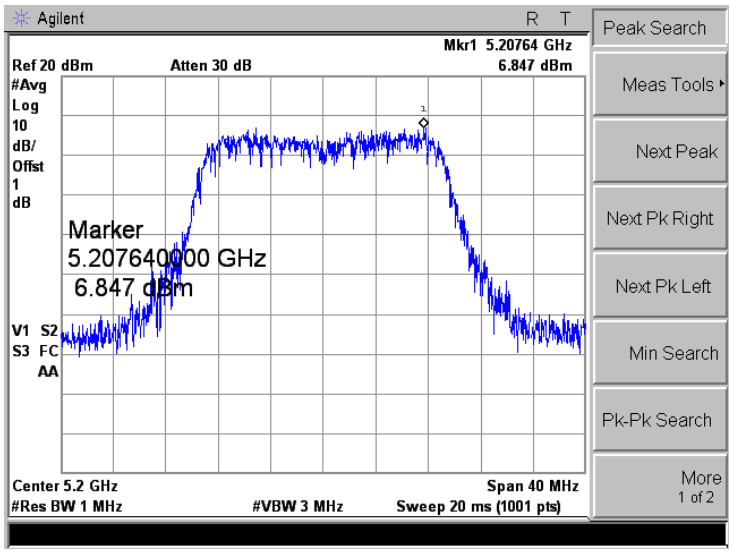
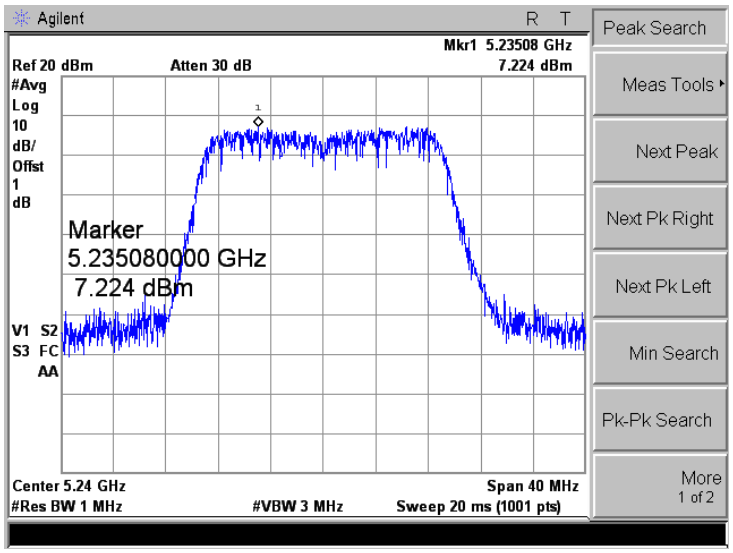
Mode:	802.11n-HT20
5745MHz	
5785MHz	
5825MHz	

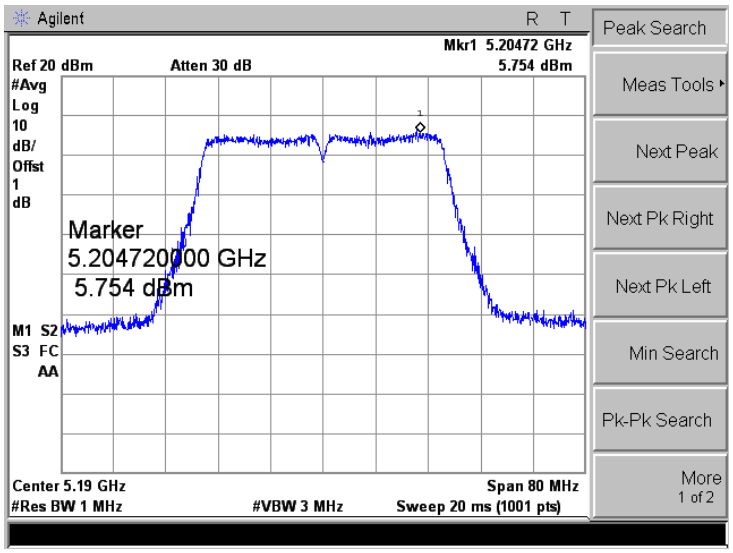
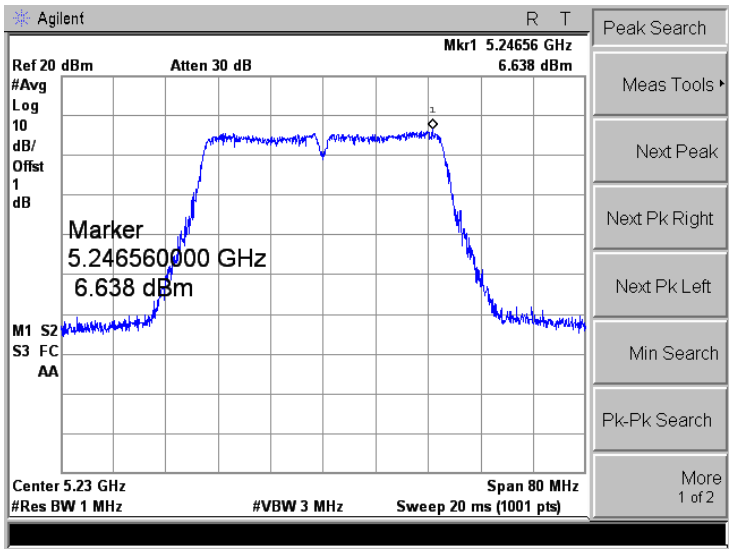
Mode:	802.11n-HT40
5755 MHz	
5795 MHz	

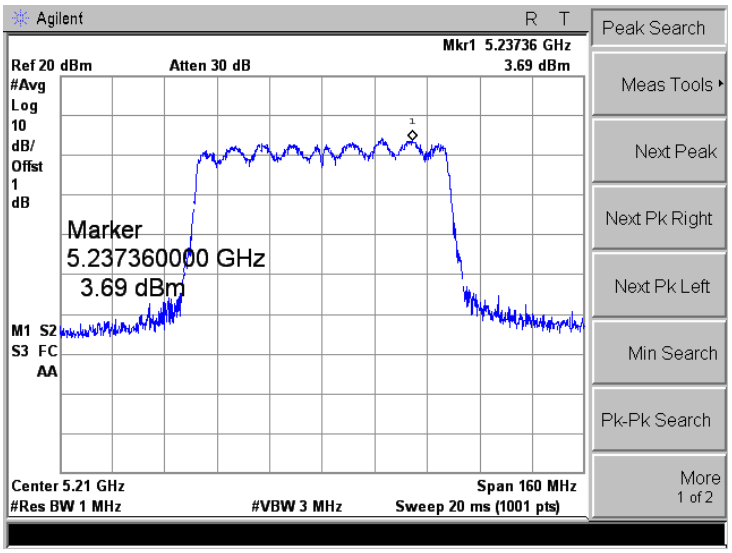
Mode:	802.11ac VH80
5775 MHz	

➢ Ant2: 5150-5250MHz

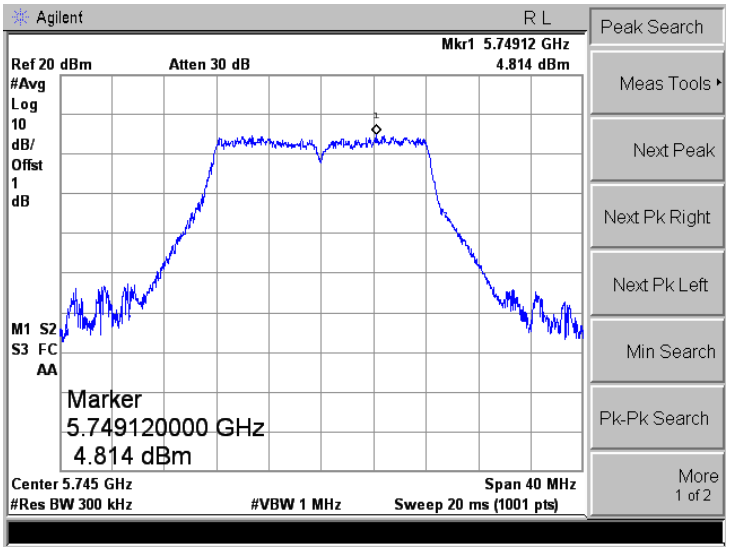
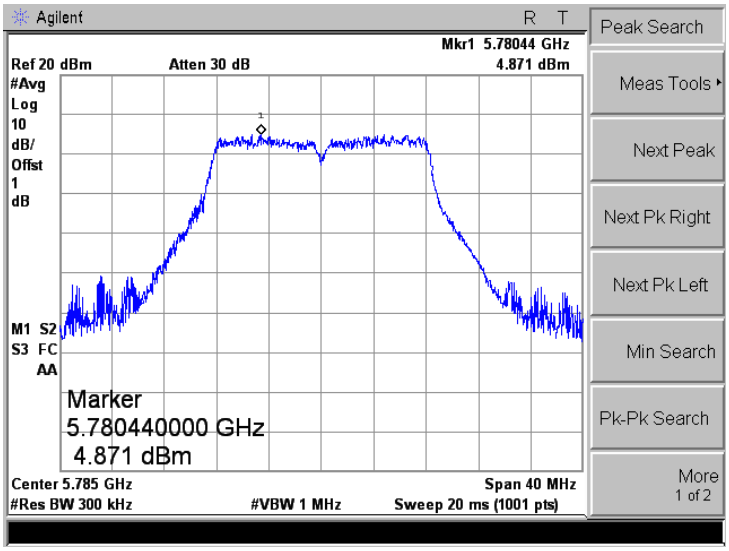
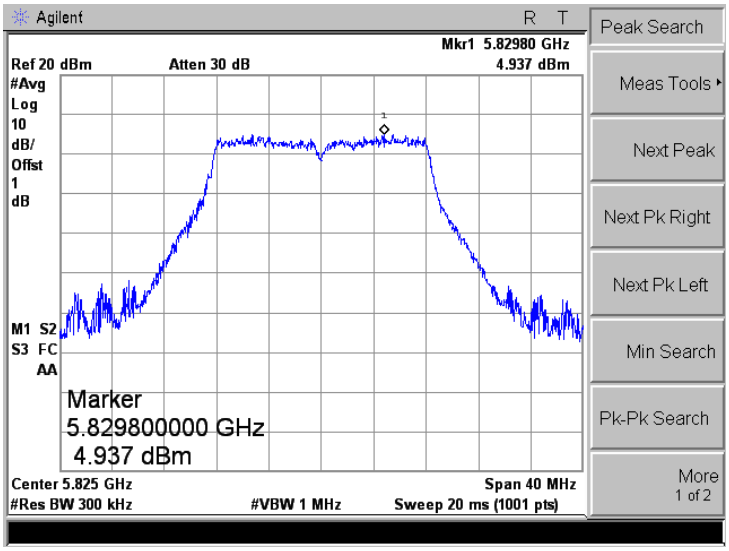
Mode:	**802.11a**
5180MHz	
5200MHz	
5240MHz	

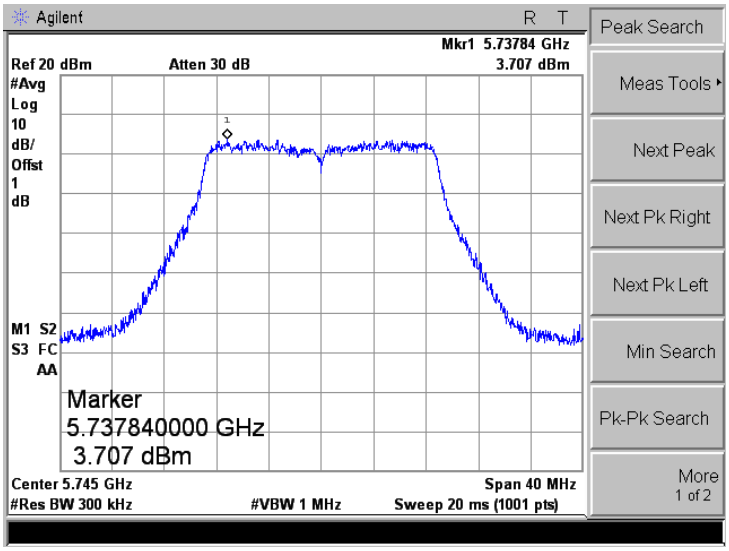
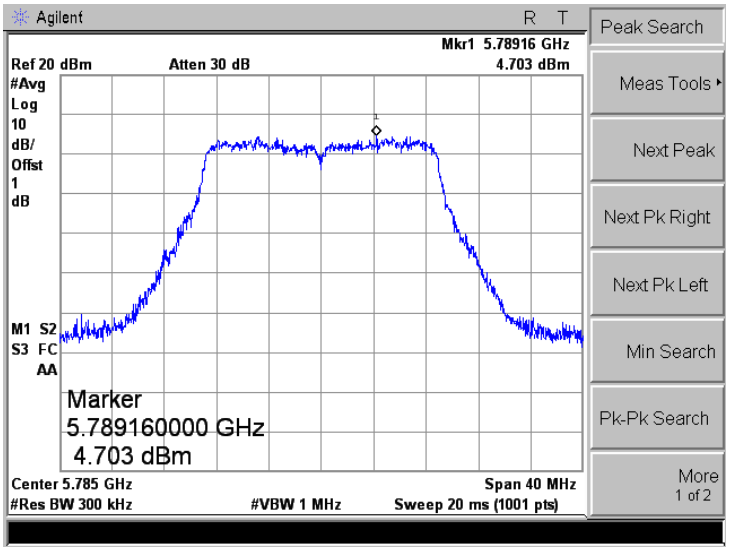
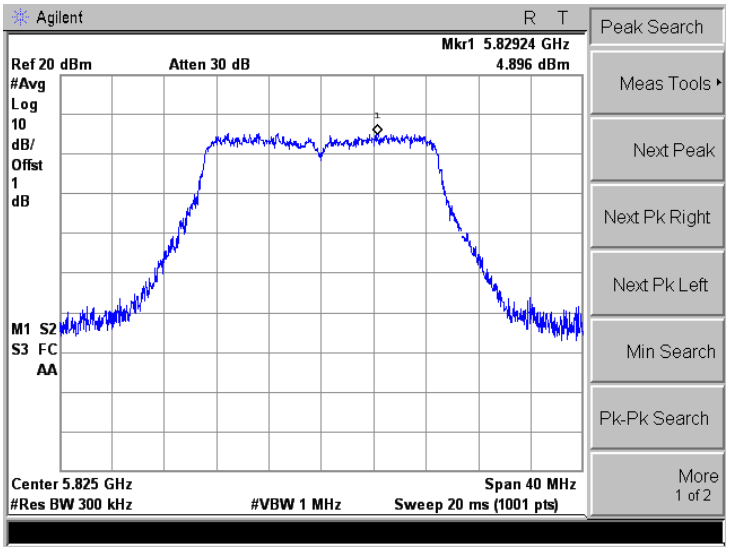
Mode:	802.11n-HT20
5180MHz	
5200MHz	
5240MHz	

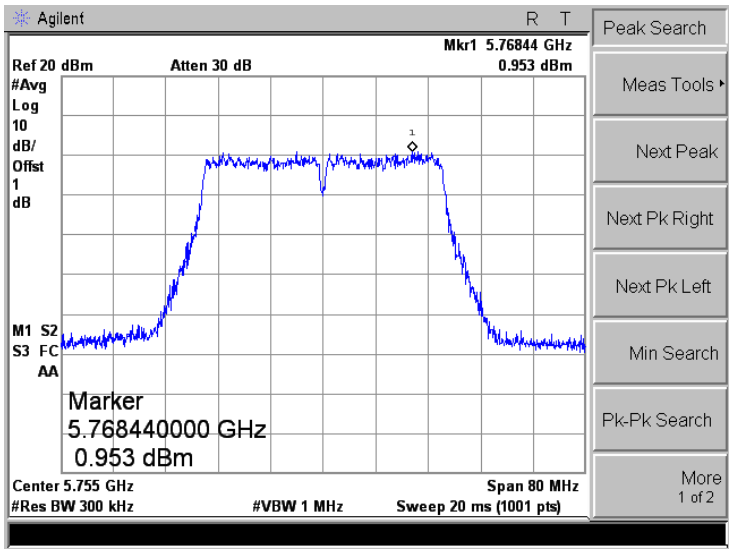
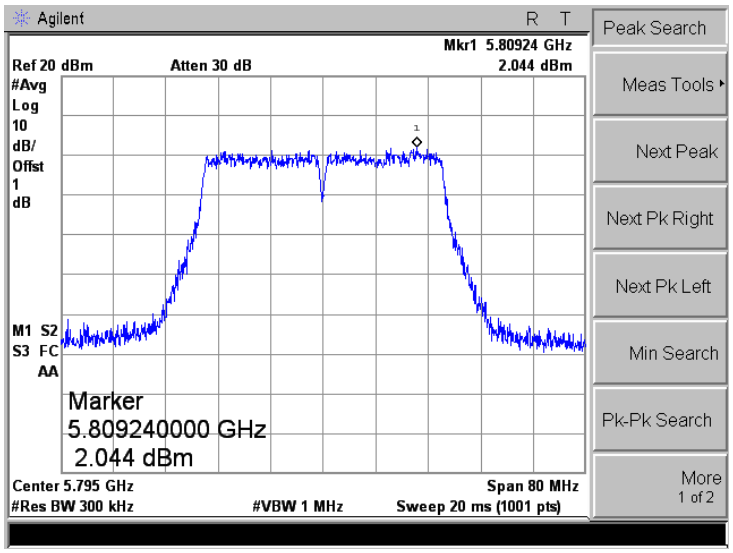
Mode:	802.11n-HT40
5190 MHz	
5230 MHz	

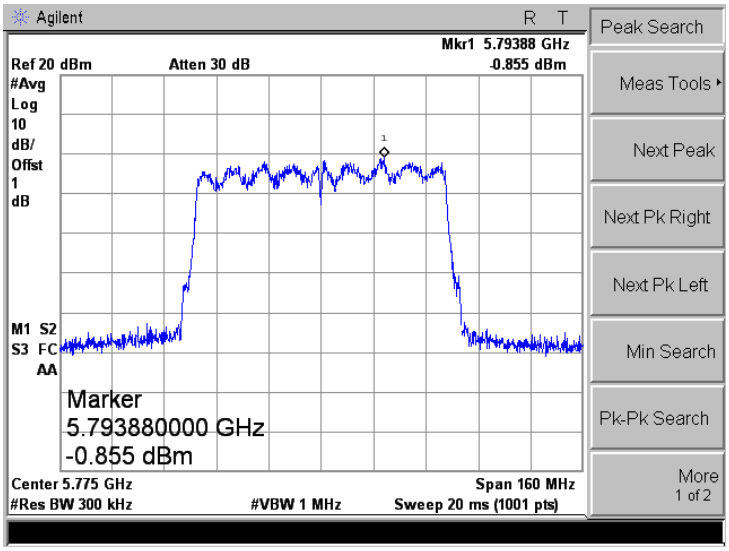
Mode:	802.11ac VH80
5210MHz	

➢ Ant2: 5725-5850MHz

Mode:	**802.11a**
5745MHz	
5785MHz	
5825MHz	

Mode:	802.11n-HT20
5745MHz	
5785MHz	
5825MHz	

Mode:	802.11n-HT40
5755 MHz	
5795 MHz	

Mode:	802.11ac VH80
5775 MHz	

7. Emission Bandwidth and Occupied Bandwidth

7.1 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.

7.2 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.

7.3 Summary of Test Results/Plots

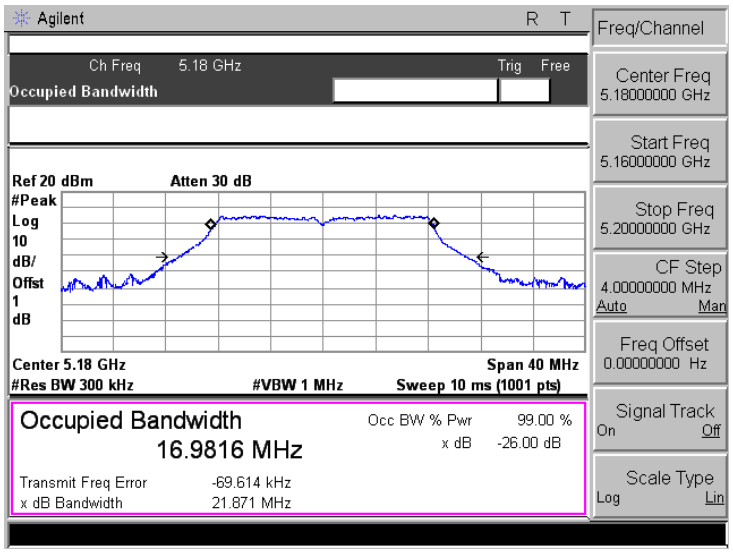
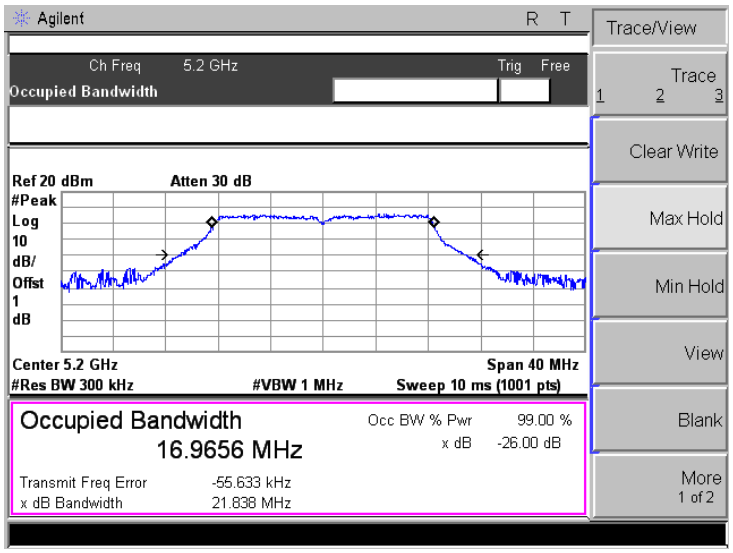
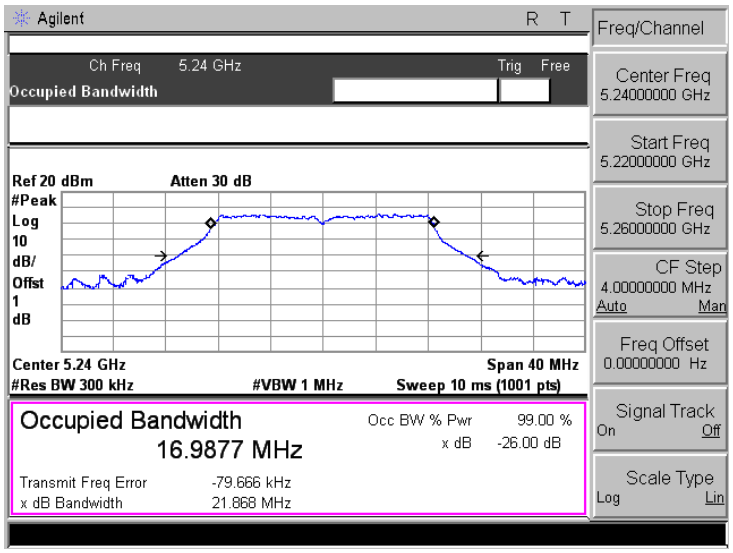
U-NII-1:5150-5250MHz (Ant1)				
Test Mode	Test Channel MHz	26 dB Bandwidth MHz	99% Bandwidth MHz	Limit MHz
802.11a	5180	21.871	16.9816	Pass
	5200	21.838	16.9656	Pass
	5240	21.868	16.9877	Pass
802.11n-HT20	5180	22.268	17.9813	Pass
	5200	22.556	18.0511	Pass
	5240	22.539	18.0375	Pass
802.11n-HT40	5190	44.696	37.2267	Pass
	5230	44.603	37.3091	Pass
802.11ac-HT80	5210	82.292	75.5699	Pass

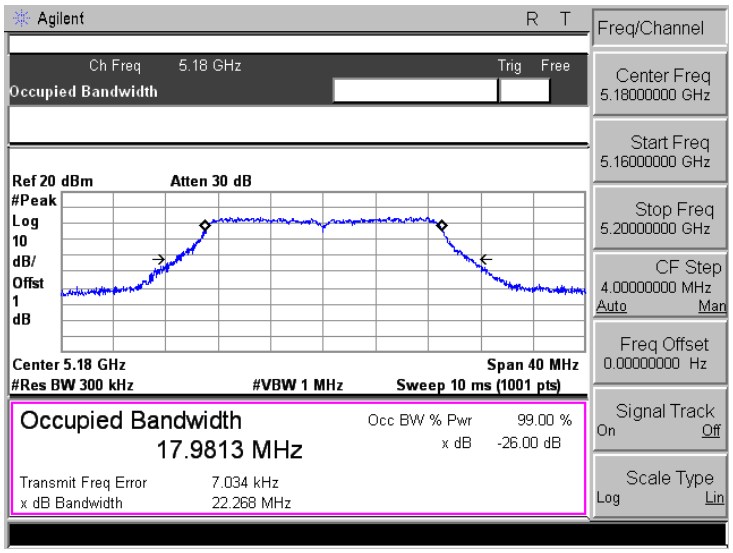
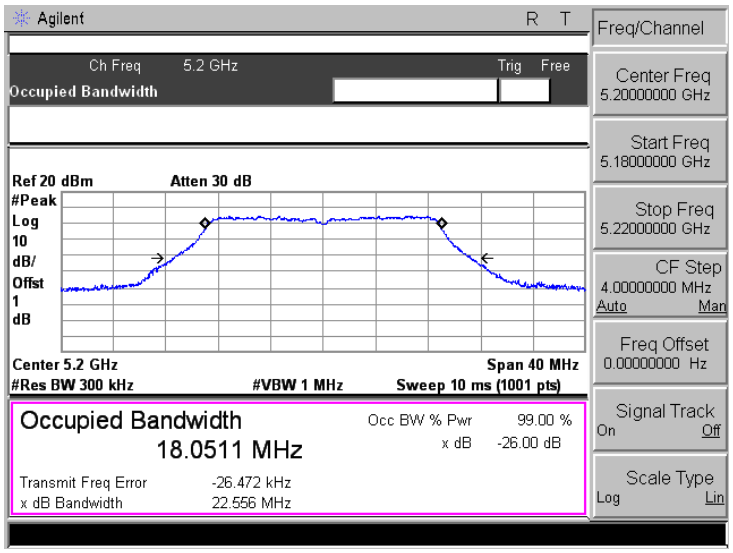
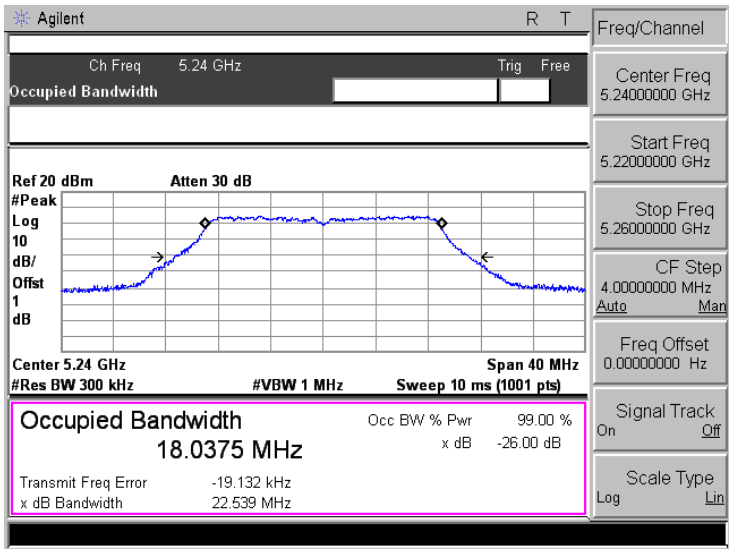
U-NII-1:5150-5250MHz (Ant2)				
Test Mode	Test Channel MHz	26 dB Bandwidth MHz	99% Bandwidth MHz	Limit MHz
802.11a	5180	21.832	16.9564	Pass
	5200	21.675	16.9530	Pass
	5240	21.888	16.9320	Pass
802.11n-HT20	5180	22.542	18.0204	Pass
	5200	22.674	17.9984	Pass
	5240	22.543	17.9948	Pass
802.11n-HT40	5190	44.252	37.1637	Pass
	5230	44.723	37.2305	Pass
802.11ac-HT80	5210	82.021	75.4452	Pass

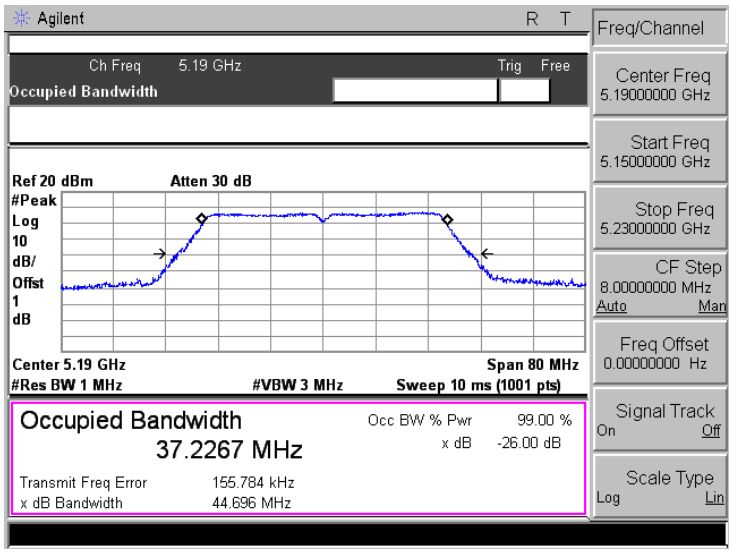
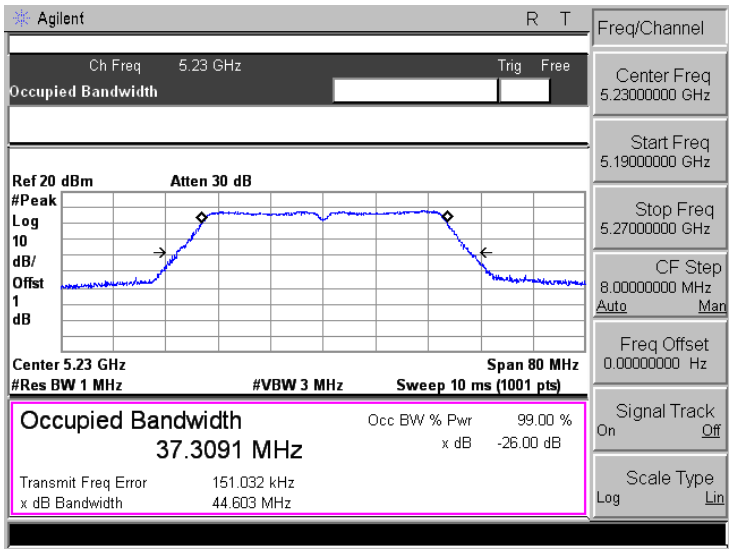
U-NII-3: 5725-5850MHz (Ant1)				
Test Mode	Test Channel MHz	6 dB Bandwidth MHz	99% Bandwidth MHz	Limit MHz
802.11a	5745	16.567	16.9677	≥500
	5785	16.577	16.9336	≥500
	5825	16.564	16.9599	≥500
802.11n-HT20	5745	17.775	17.9999	≥500
	5785	17.757	18.0052	≥500
	5825	17.765	17.9870	≥500
802.11n-HT40	5755	36.607	37.3467	≥500
	5795	36.577	37.1757	≥500
802.11ac VH80	5775	75.718	75.5601	≥500

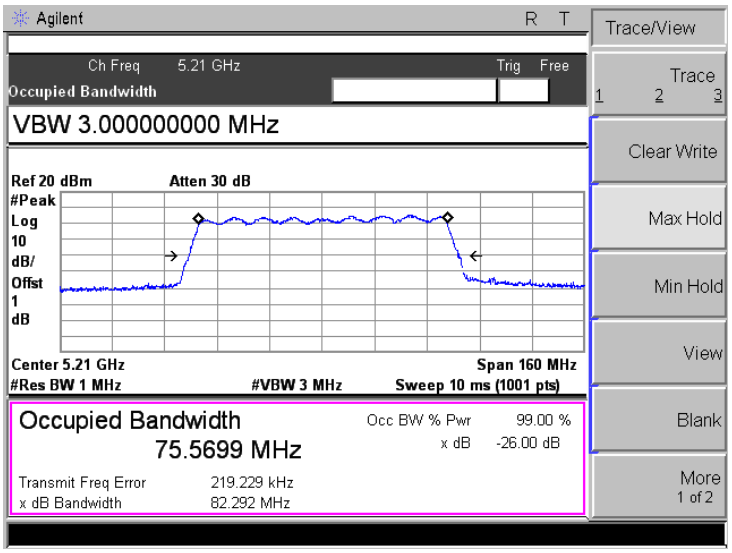
U-NII-3: 5725-5850MHz (Ant2)				
Test Mode	Test Channel MHz	6 dB Bandwidth MHz	99% Bandwidth MHz	Limit MHz
802.11a	5745	16.510	16.9397	≥500
	5785	16.524	16.9160	≥500
	5825	16.533	16.9164	≥500
802.11n-HT20	5745	17.694	17.9536	≥500
	5785	17.741	18.0006	≥500
	5825	17.742	17.9799	≥500
802.11n-HT40	5755	36.684	37.2650	≥500
	5795	36.582	37.2004	≥500
802.11ac VH80	5775	75.689	75.3875	≥500

➢ Ant1: 5150-5250MHz

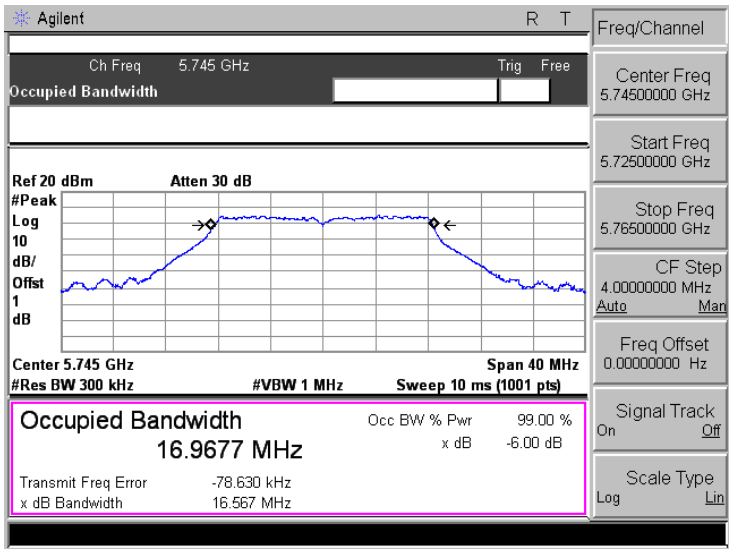
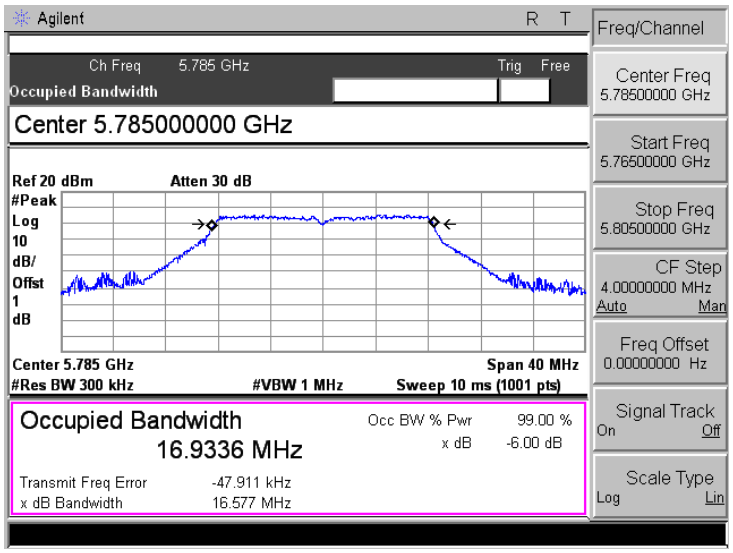
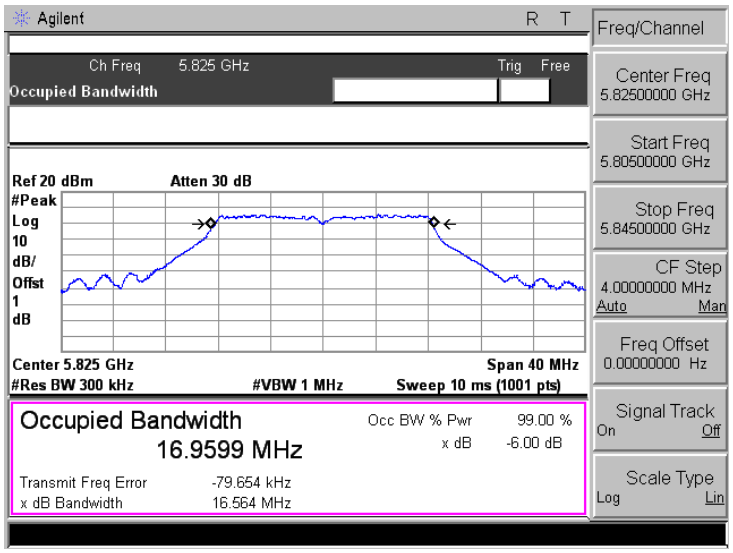
Mode:	**802.11a**
5180MHz	
5200MHz	
5240MHz	

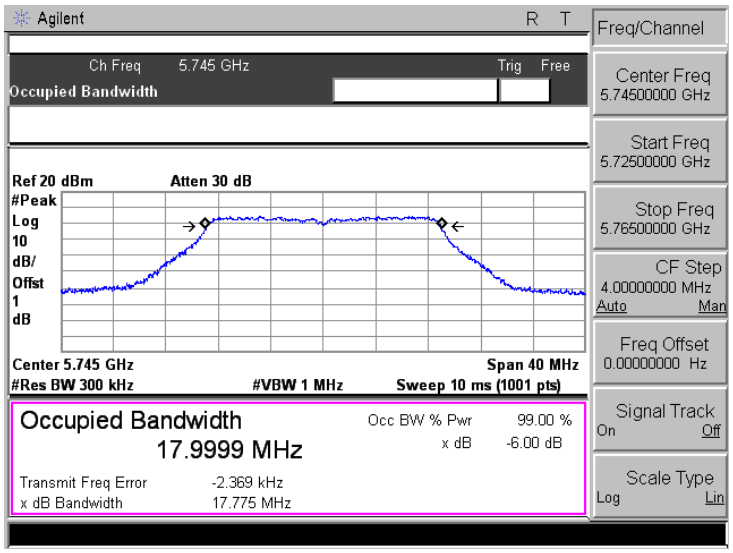
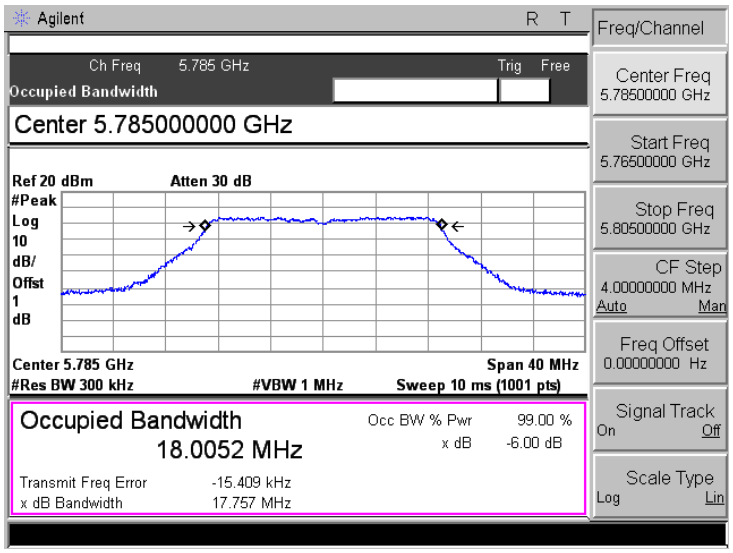
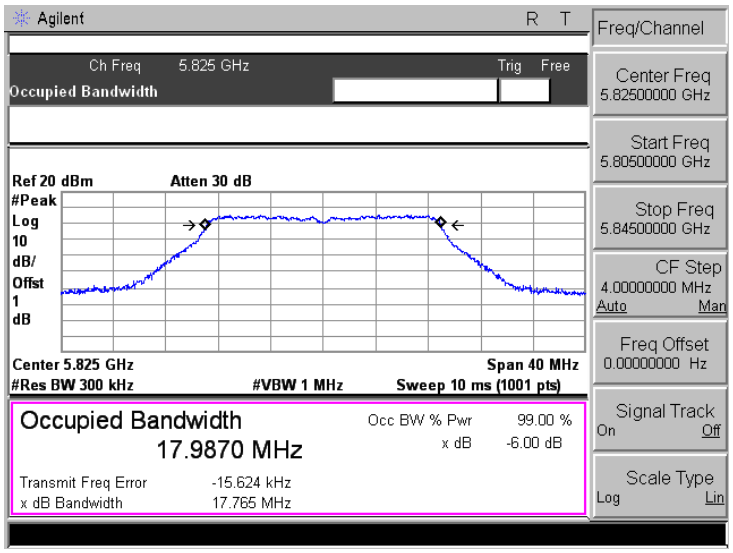
Mode:	802.11n-HT20
5180MHz	
5200MHz	
5240MHz	

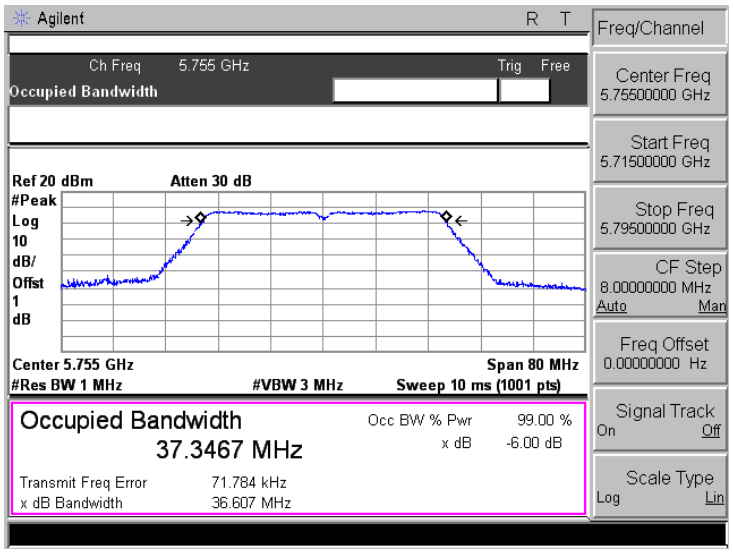
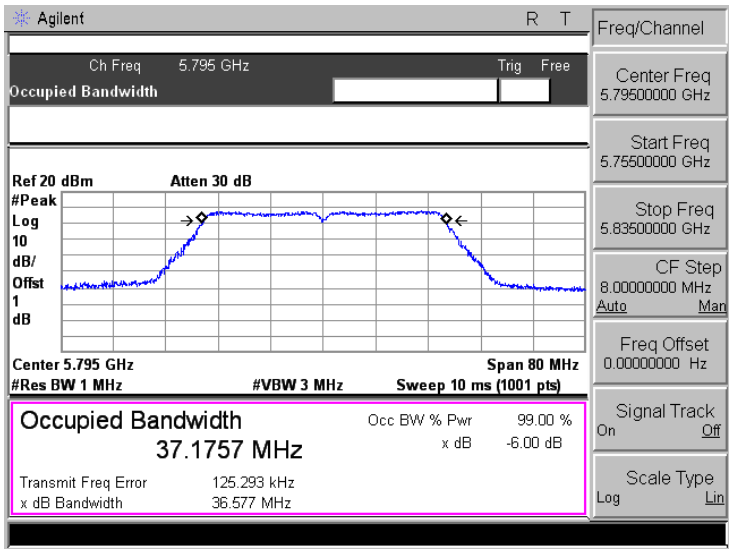
Mode:	802.11n-HT40
5190 MHz	
5230 MHz	

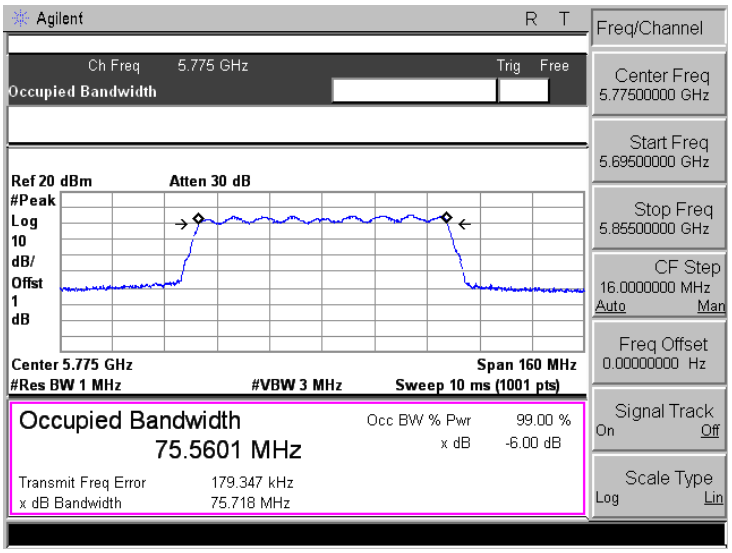
Mode:	802.11ac VH80
5210MHz	

➢ Ant1: 5725-5850MHz

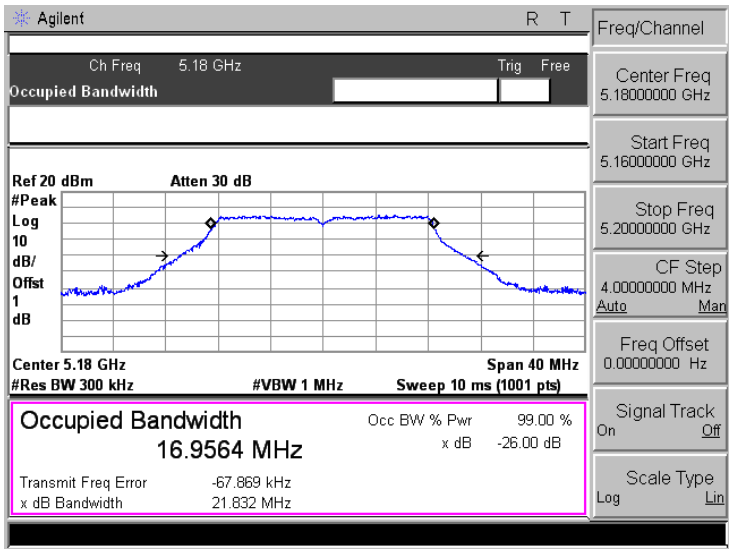
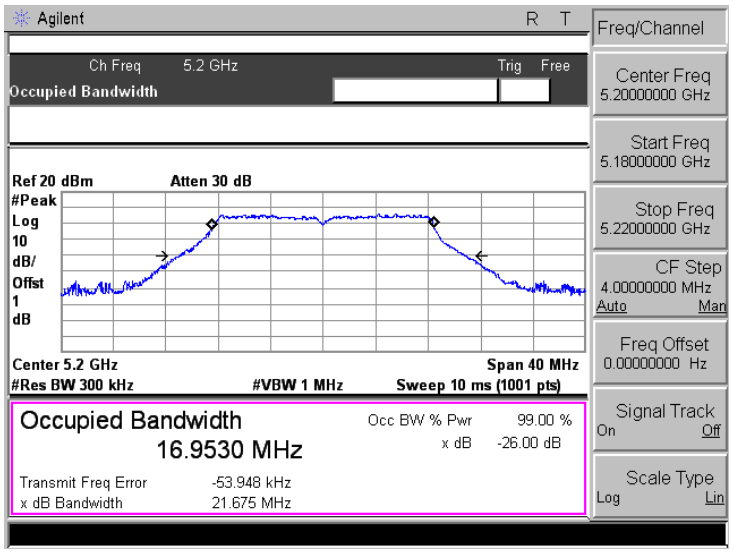
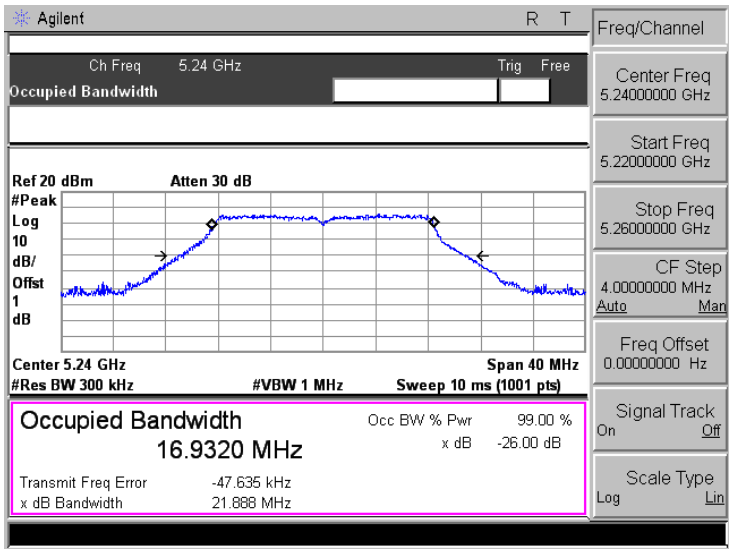
Mode:	**802.11a**
5745MHz	
5785MHz	
5825MHz	

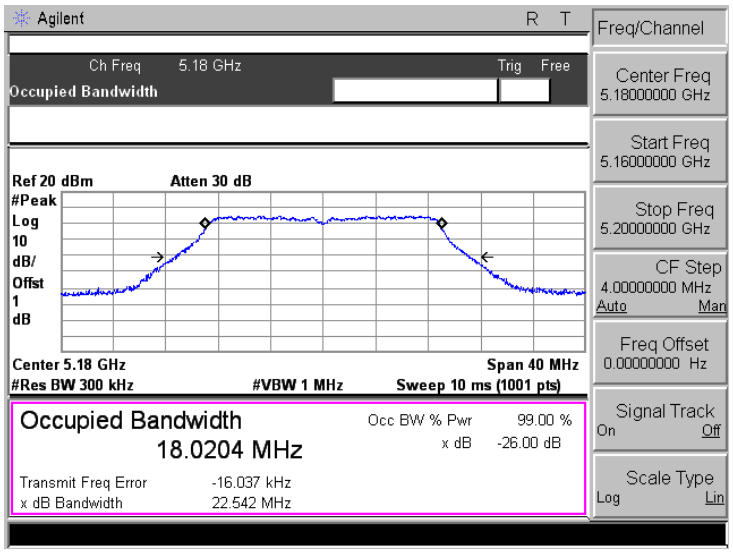
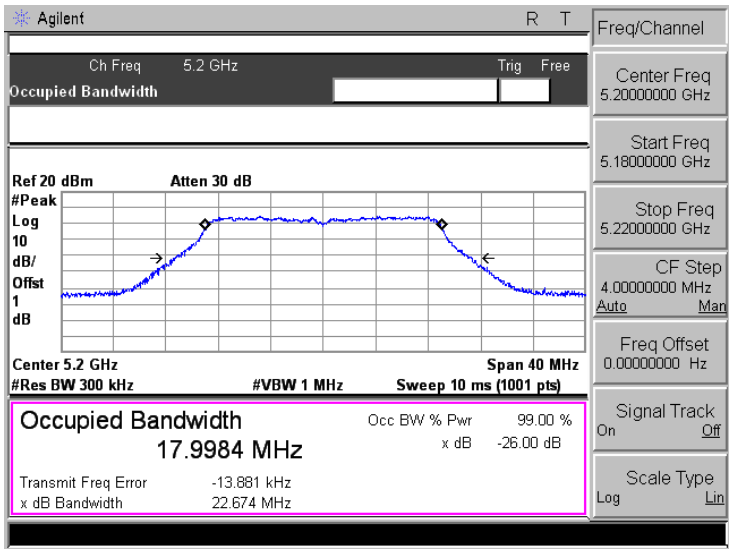
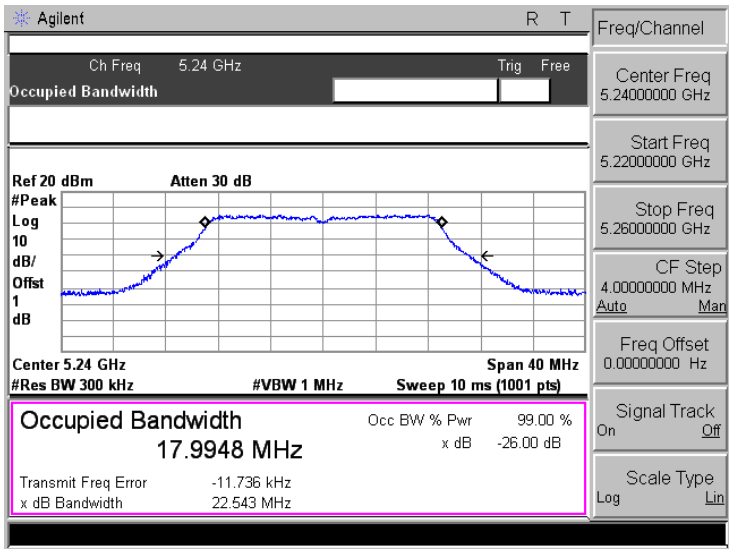
Mode:	802.11n-HT20
5745MHz	
5785MHz	
5825MHz	

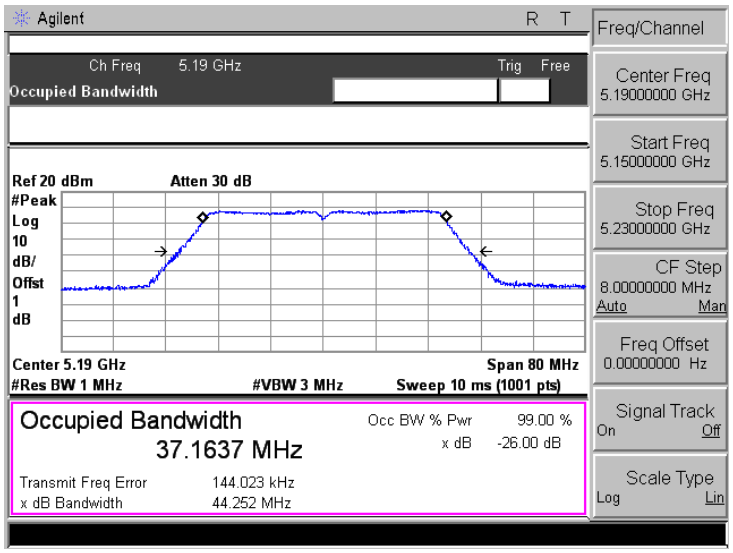
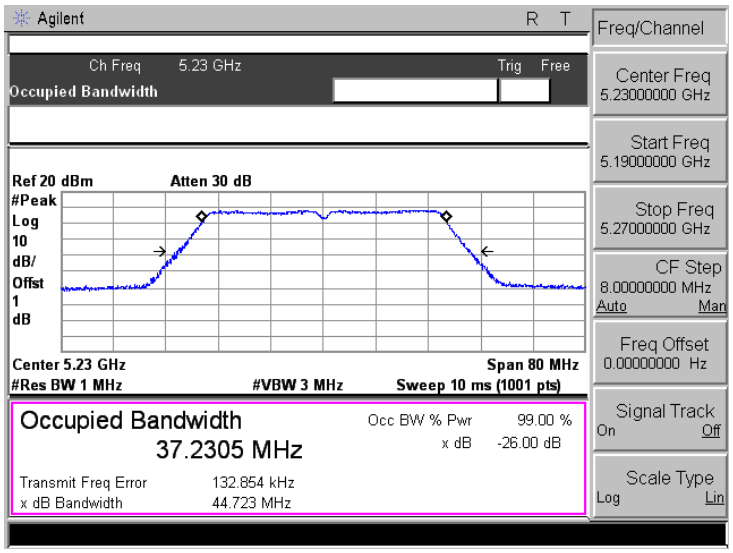
Mode:	802.11n-HT40
5755 MHz	
5795 MHz	

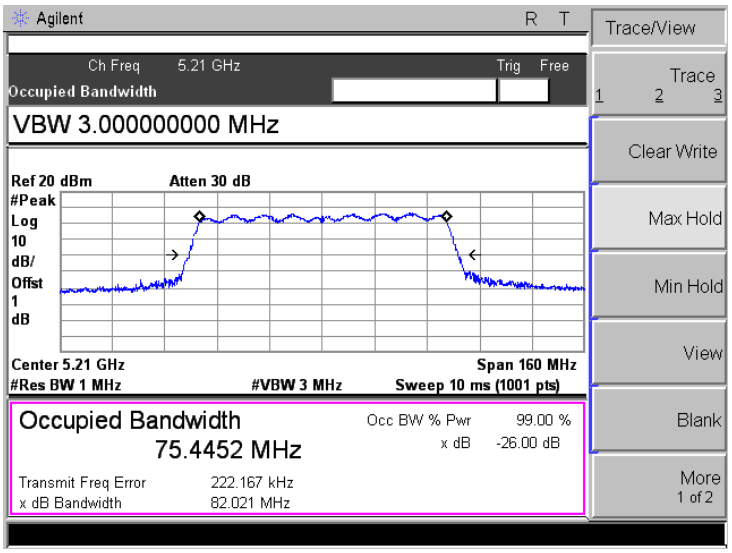
Mode:	802.11ac VH80
5775 MHz	

➢ Ant2: 5150-5250MHz

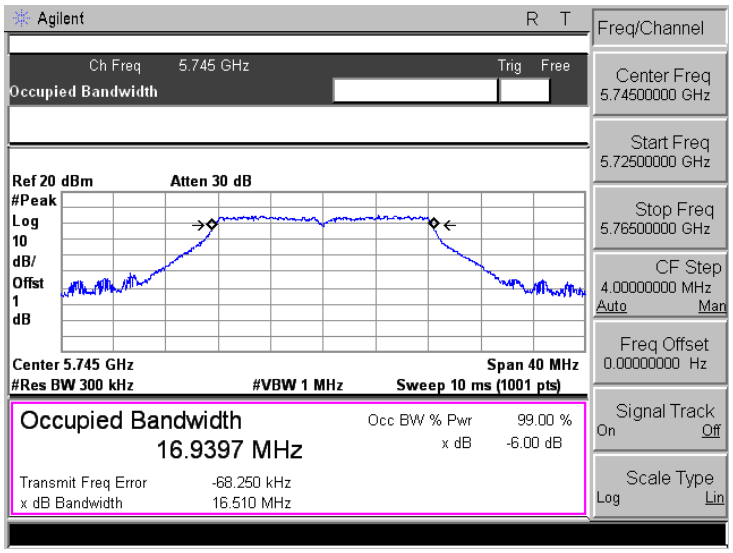
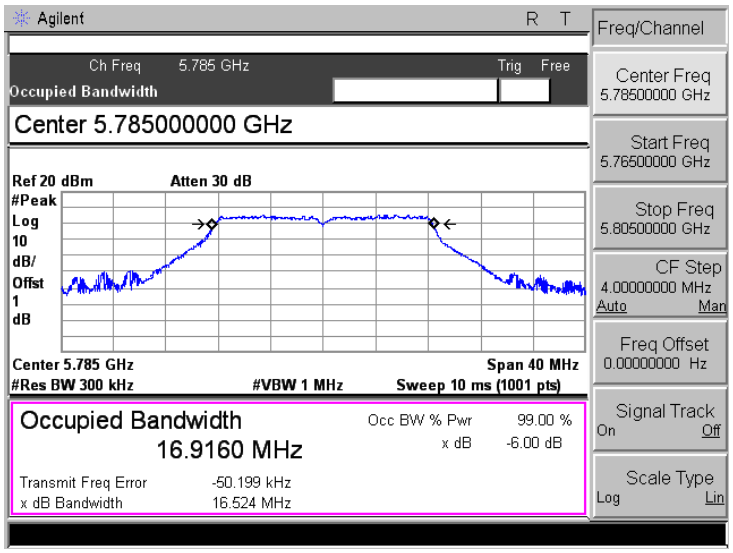
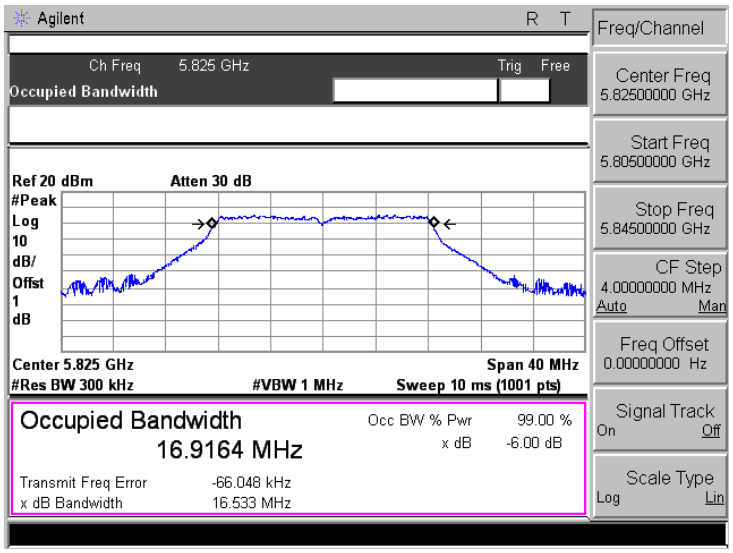
Mode:	**802.11a**
5180MHz	
5200MHz	
5240MHz	

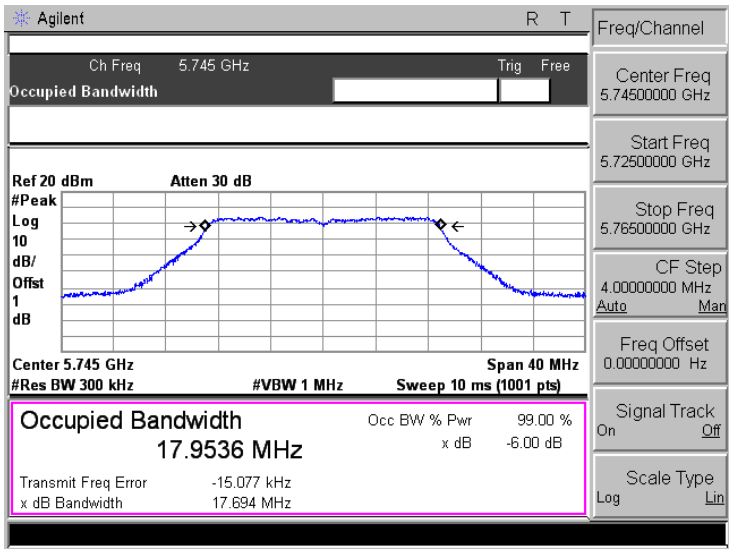
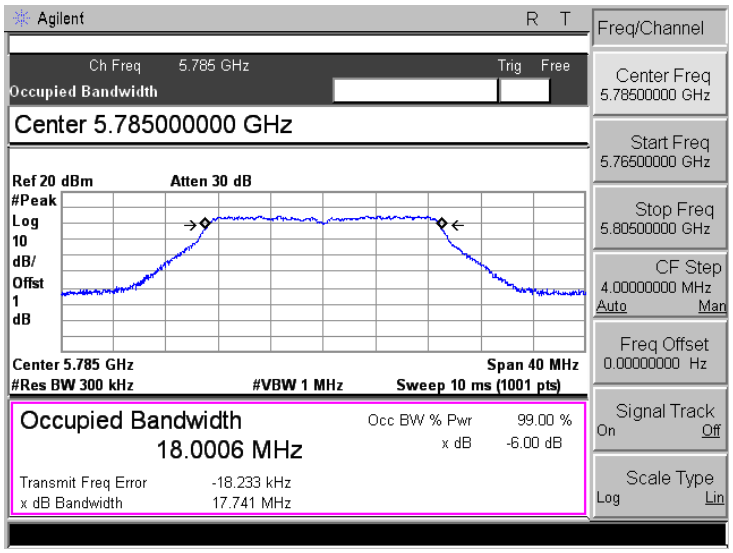
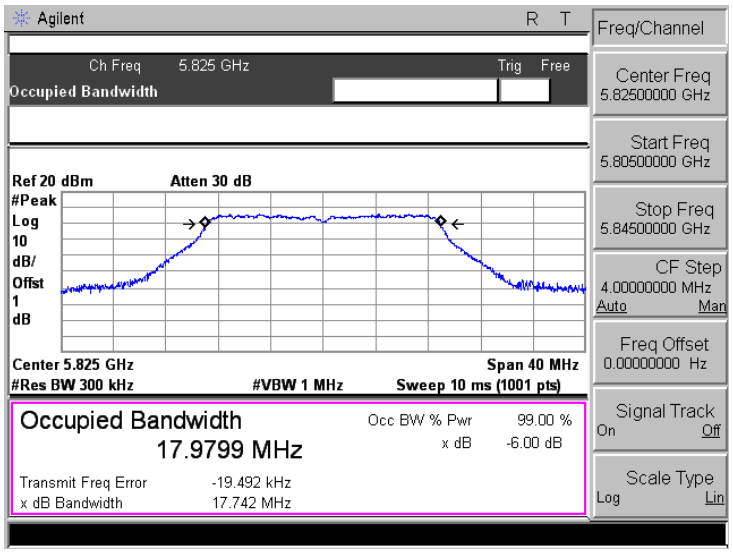
Mode:	802.11n-HT20
5180MHz	
5200MHz	
5240MHz	

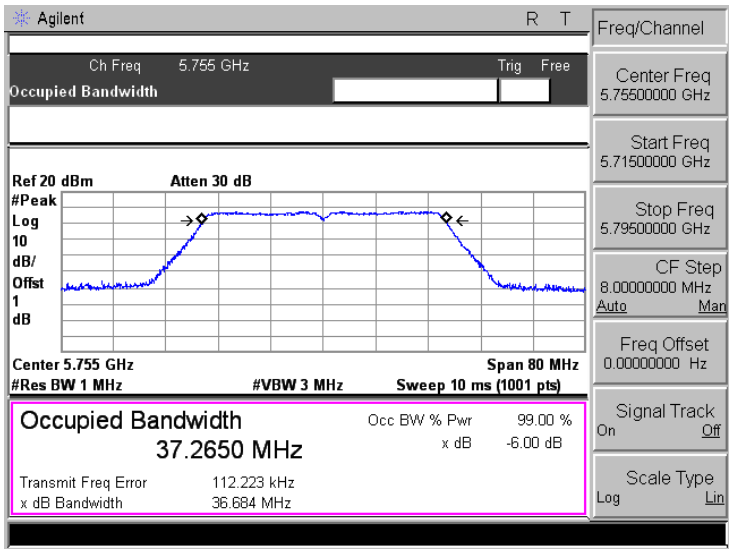
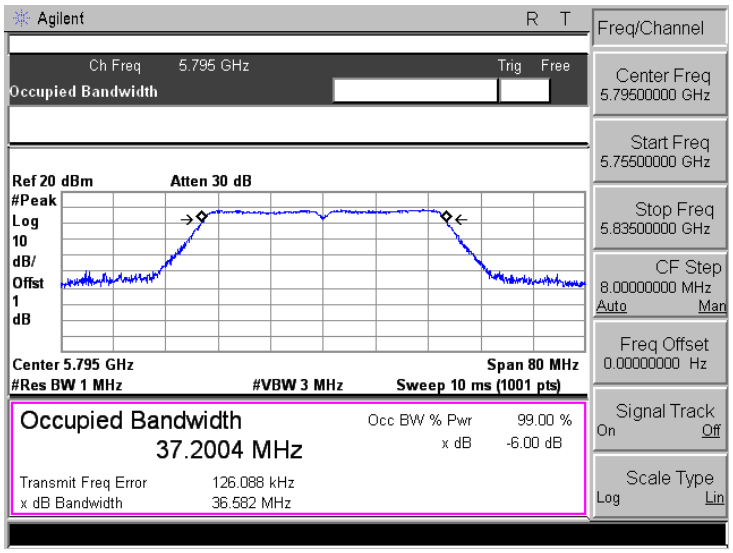
Mode:	802.11n-HT40
5190 MHz	
5230 MHz	

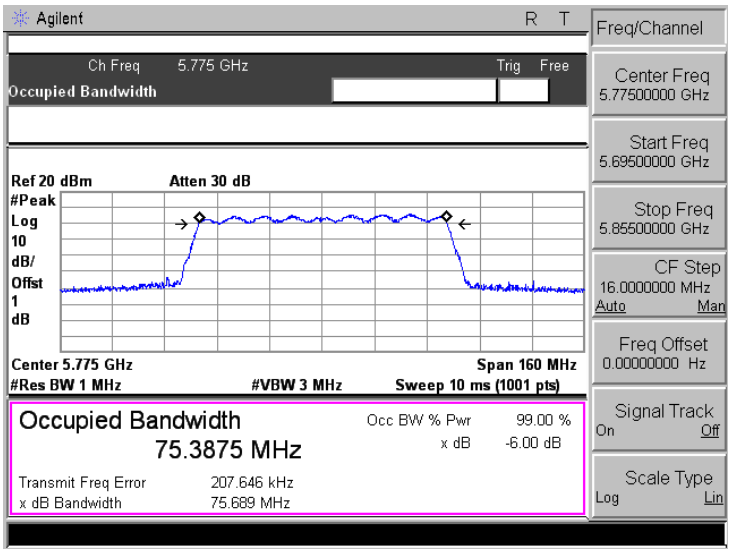
Mode:	802.11ac VH80
5210MHz	

➢ Ant2: 5725-5850MHz

Mode:	**802.11a**
5745MHz	
5785MHz	
5825MHz	

Mode:	802.11n-HT20
5745MHz	
5785MHz	
5825MHz	

Mode:	802.11n-HT40
5755 MHz	
5795 MHz	

Mode:	802.11ac VH80
5775 MHz	

8. Maximum Conducted Output Power

8.1 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.

8.2 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.

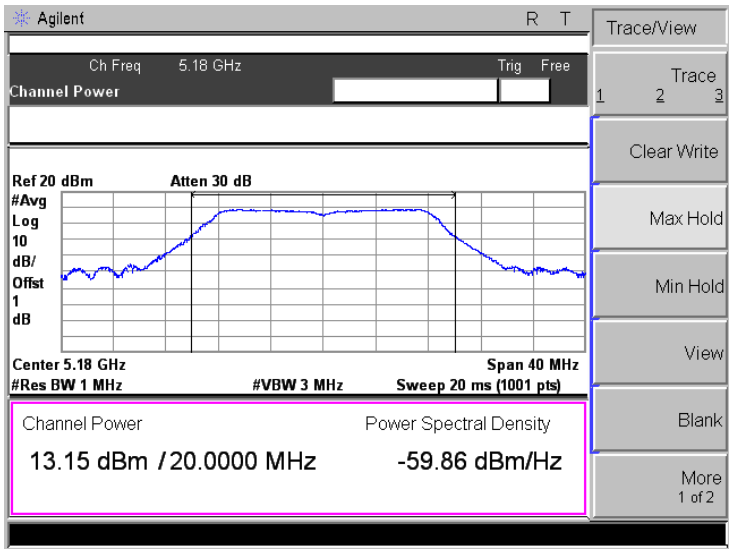
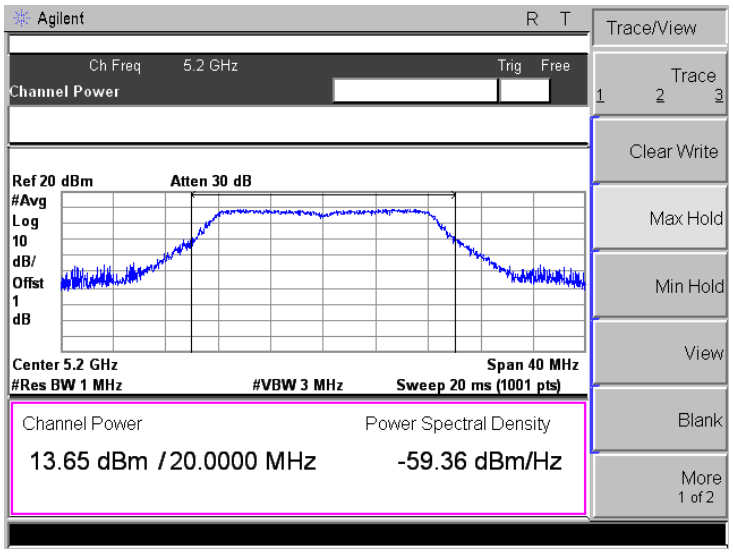
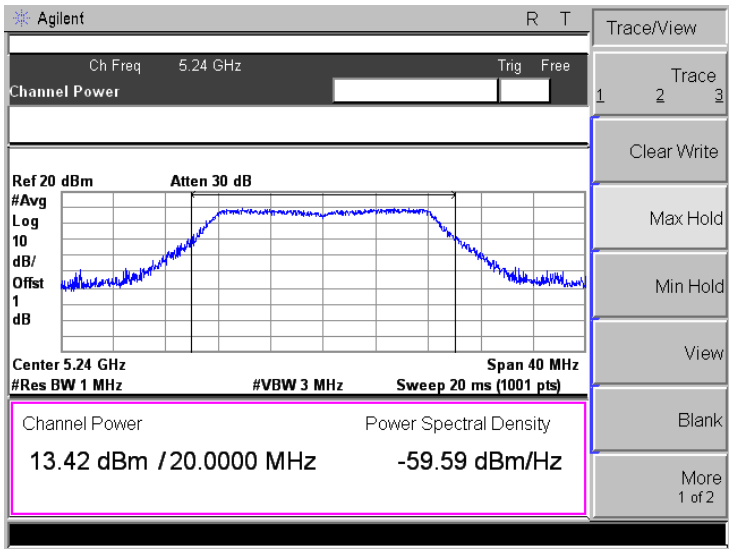
(ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power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

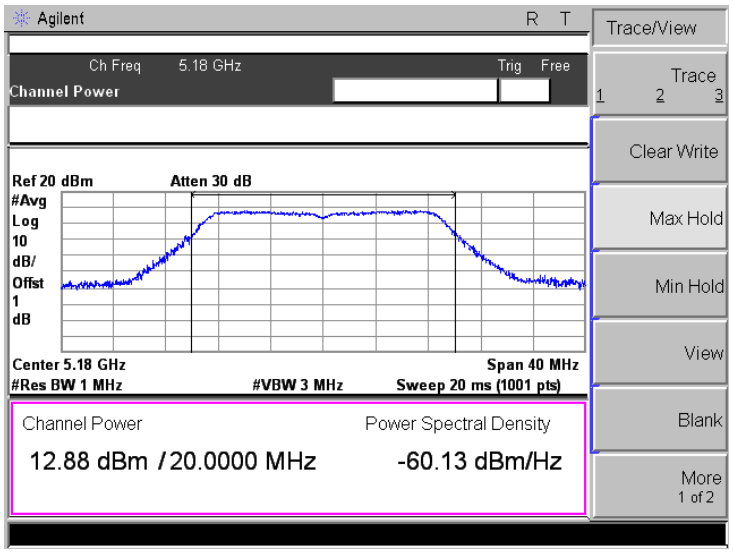
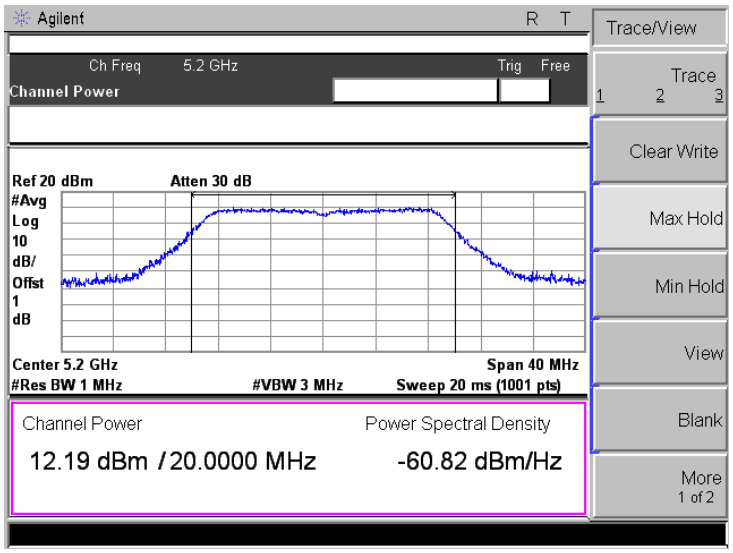
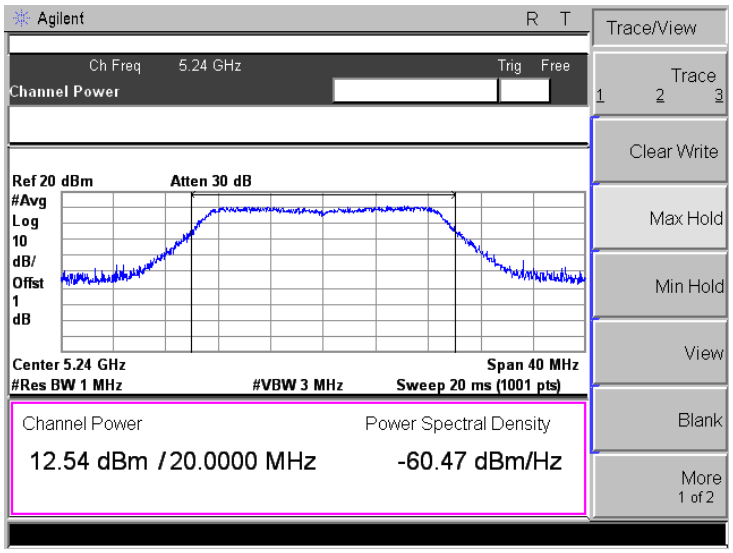
8.3 Summary of Test Results/Plots

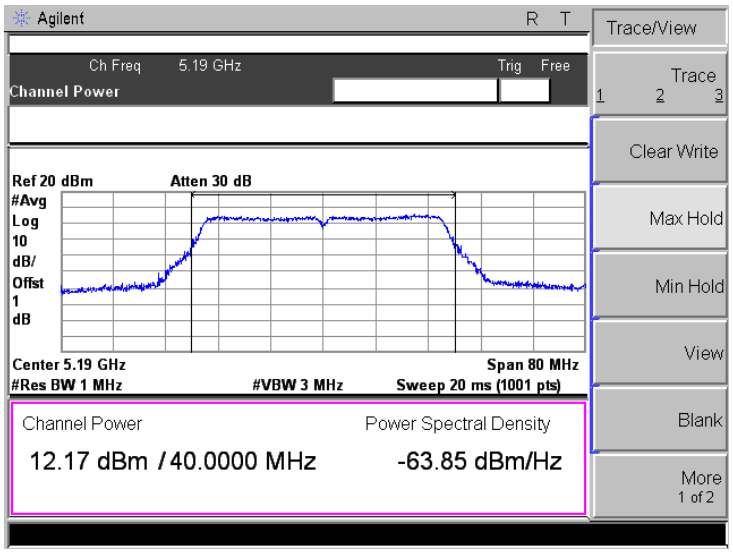
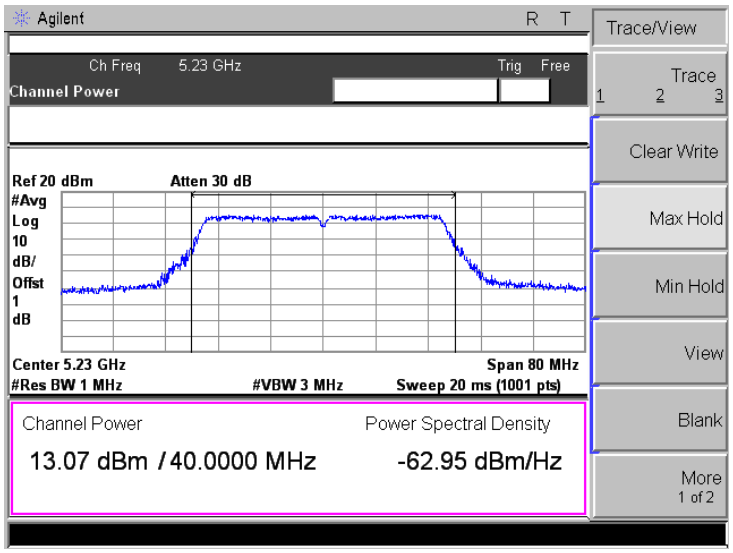
U-NII-1:5150-5250MHz								
Test mode	Frequency MHz	Ant1 Power dBm	Ant2 Power dBm	Ant1 Power mW	Ant2 Power mW	Total Power dBm	Output Power mW	Limit mW
802.11a	5180	13.15	12.98	20.65	19.86	/	/	250
	5200	13.65	13.65	23.17	23.17	/	/	250
	5240	13.42	13.59	21.98	22.86	/	/	250
802.11n-HT20	5180	12.88	12.91	19.41	19.54	15.91	38.95	250
	5200	12.19	13.00	16.56	19.95	15.62	36.51	250
	5240	12.54	13.57	17.95	22.75	16.10	40.70	250
802.11n-HT40	5190	12.17	13.22	16.48	20.99	15.74	37.47	250
	5230	13.07	13.47	20.28	22.23	16.28	42.51	250
802.11ac VH80	5210	12.07	13.16	16.11	20.70	15.66	36.81	250

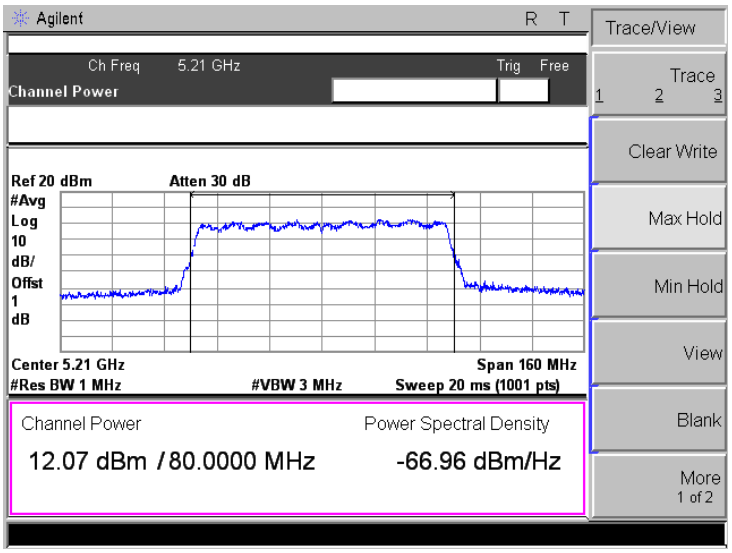
U-NII-3: 5725-5850MHz								
Test mode	Frequency MHz	Ant1 Power dBm	Ant2 Power dBm	Ant1 Power mW	Ant2 Power mW	Total Power dBm	Output Power mW	Limit mW
802.11a	5745	13.04	13.13	20.14	20.56	/	/	250
	5785	13.56	13.38	22.70	21.78	/	/	250
	5825	13.23	13.38	21.04	21.78	/	/	250
802.11n-HT20	5745	12.28	13.36	16.90	21.68	15.86	38.58	250
	5785	12.15	11.97	16.41	15.74	15.07	32.15	250
	5825	12.95	13.70	19.72	23.44	16.35	43.17	250
802.11n-HT40	5755	12.75	12.62	18.84	18.28	15.70	37.12	250
	5795	12.97	13.32	19.82	21.48	16.16	41.29	250
802.11ac VH80	5775	12.01	12.50	15.89	17.78	15.27	33.67	250

➢ Ant1: 5150-5250MHz

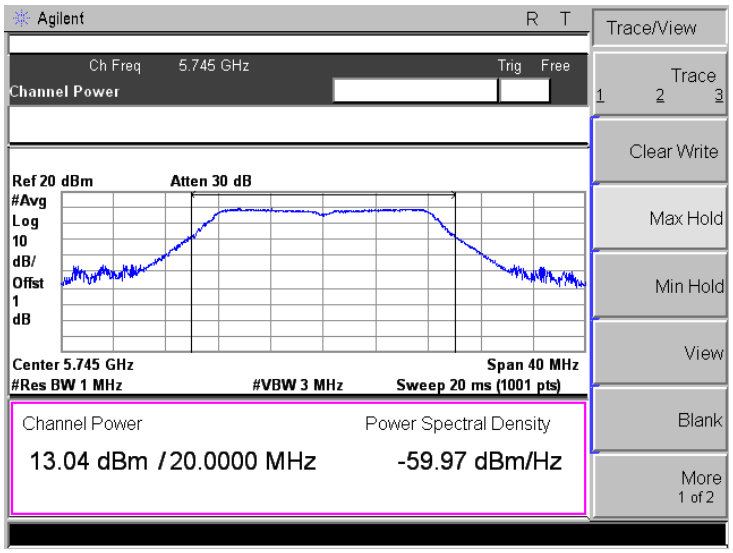
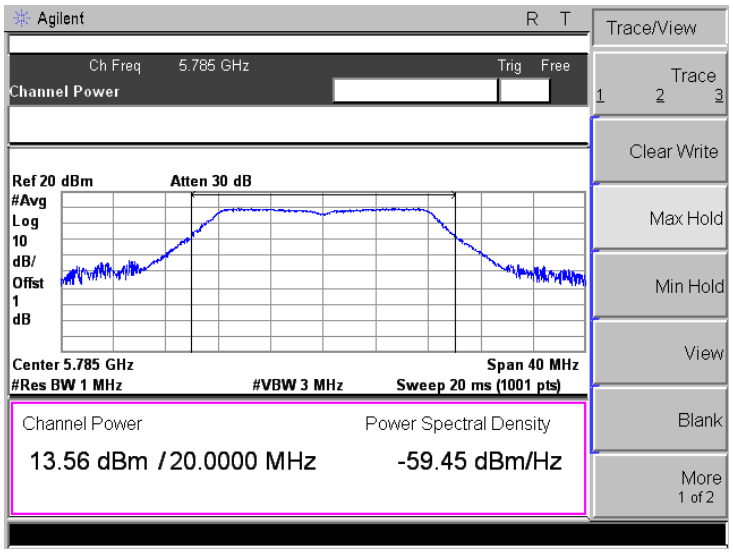
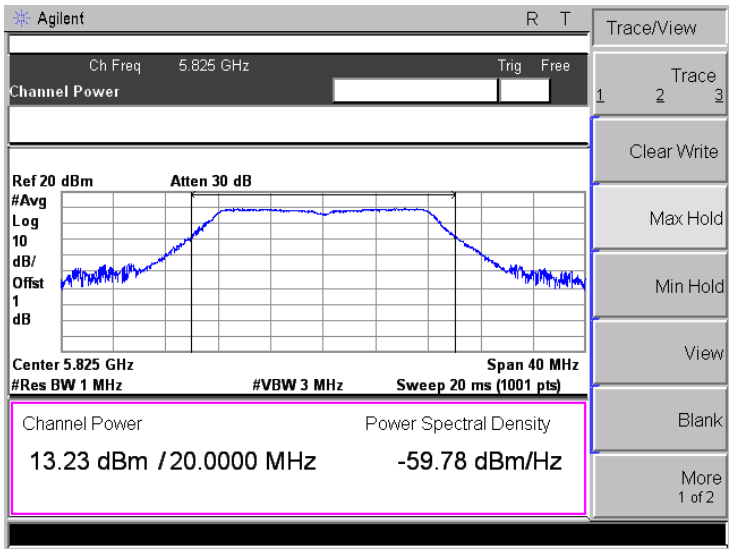
Mode:	**802.11a**
5180MHz	
5200MHz	
5240MHz	

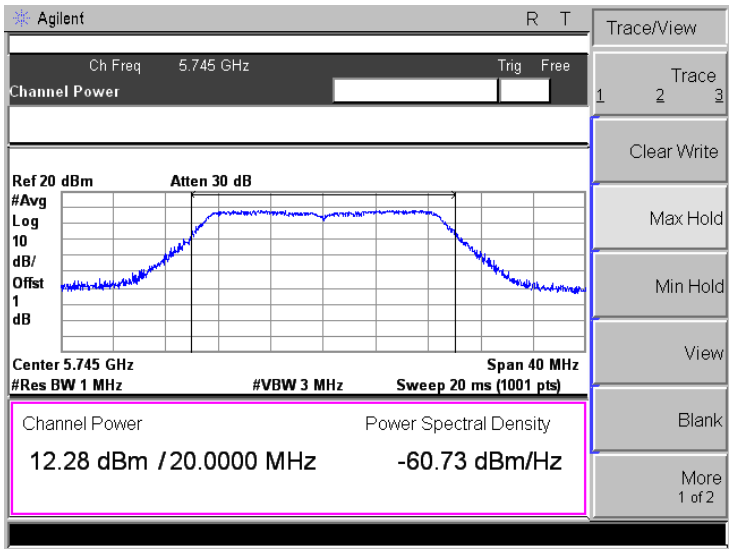
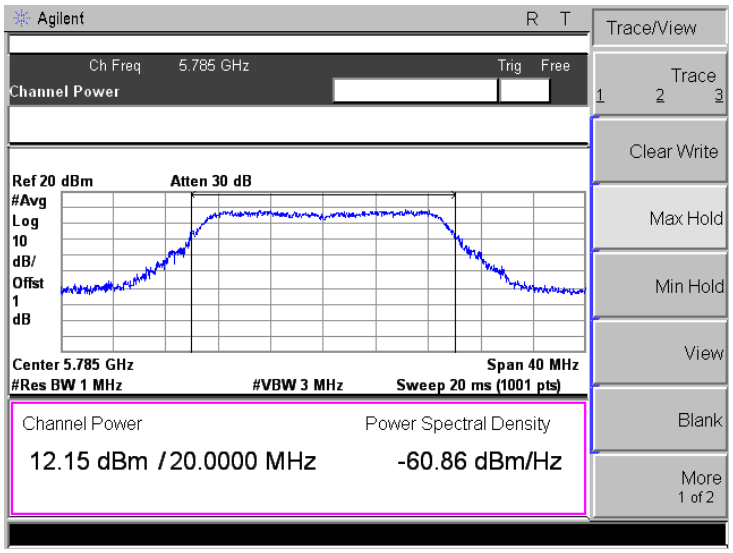
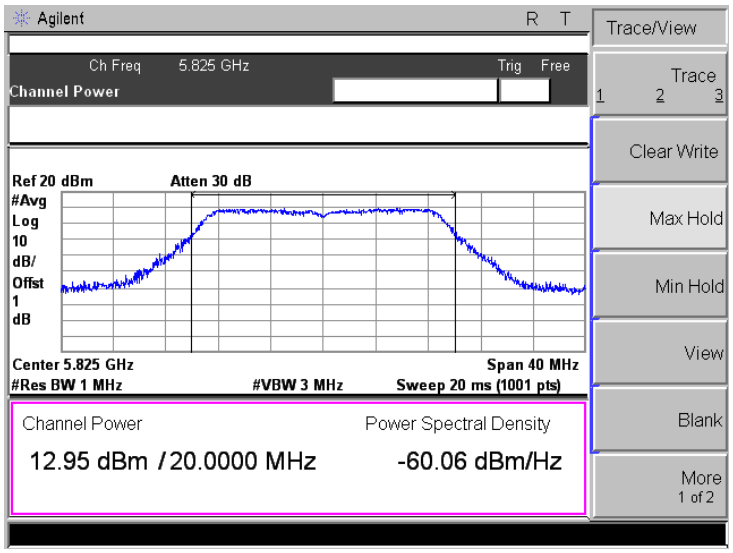
Mode:	802.11n-HT20
5180MHz	
5200MHz	
5240MHz	

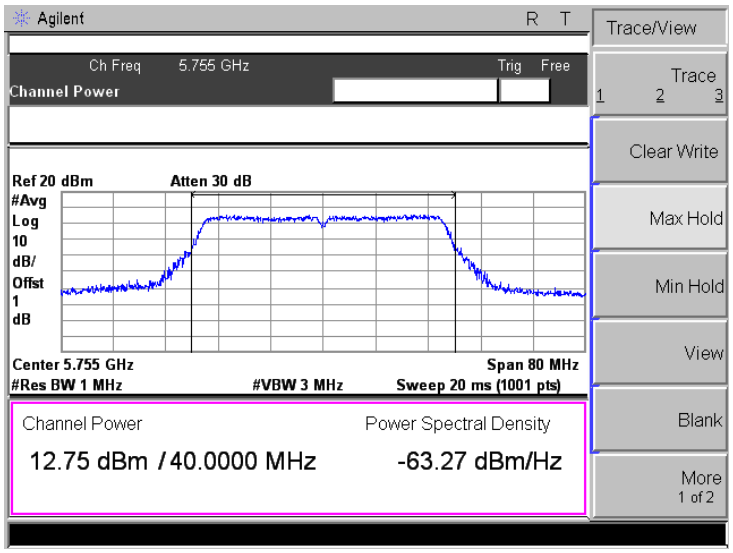
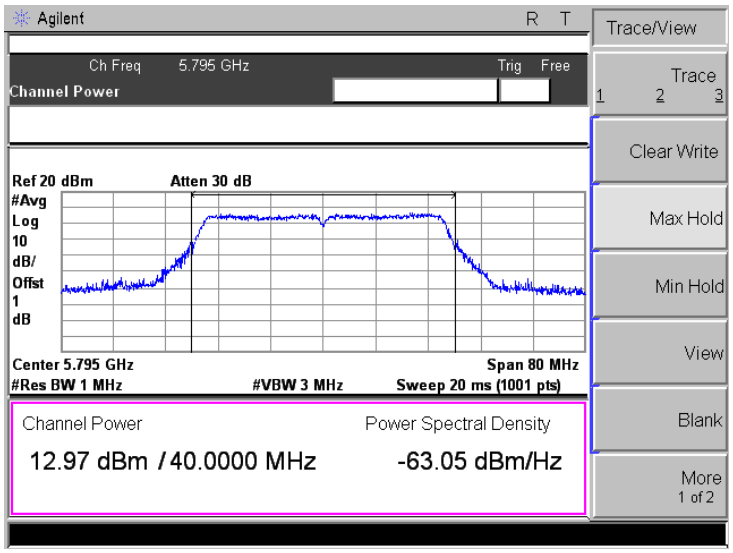
Mode:	802.11n-HT40
5190 MHz	
5230 MHz	

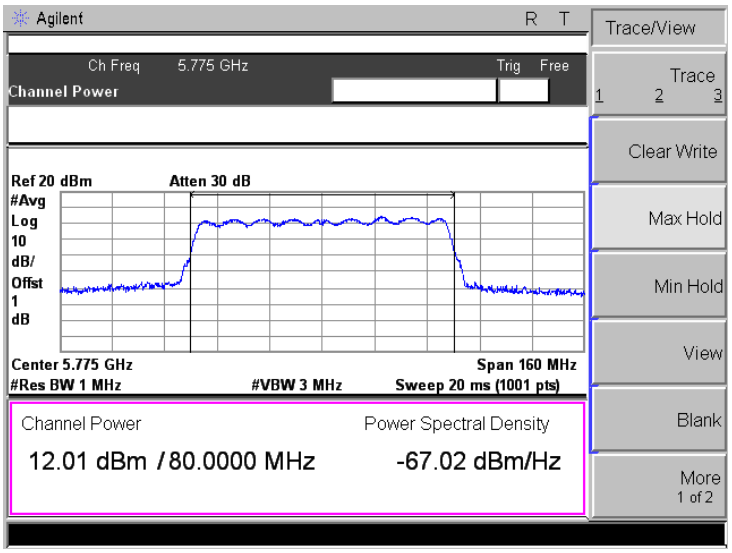
Mode:	802.11ac VH80
5210MHz	

➢ Ant1: 5725-5850MHz

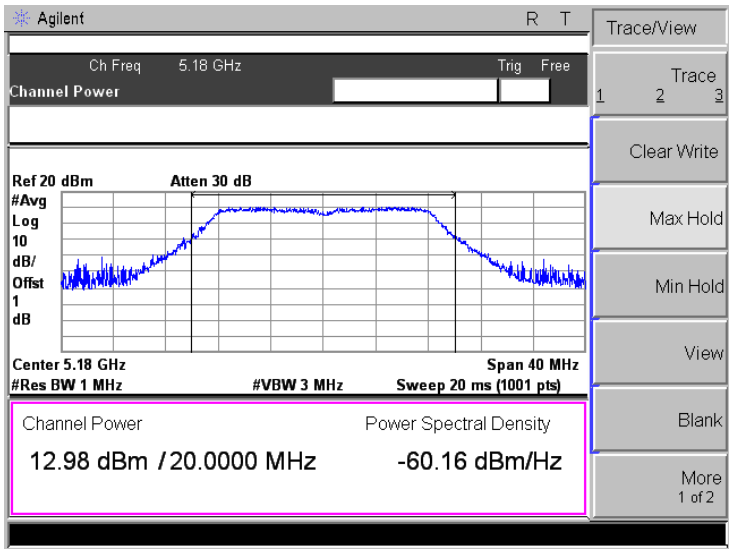
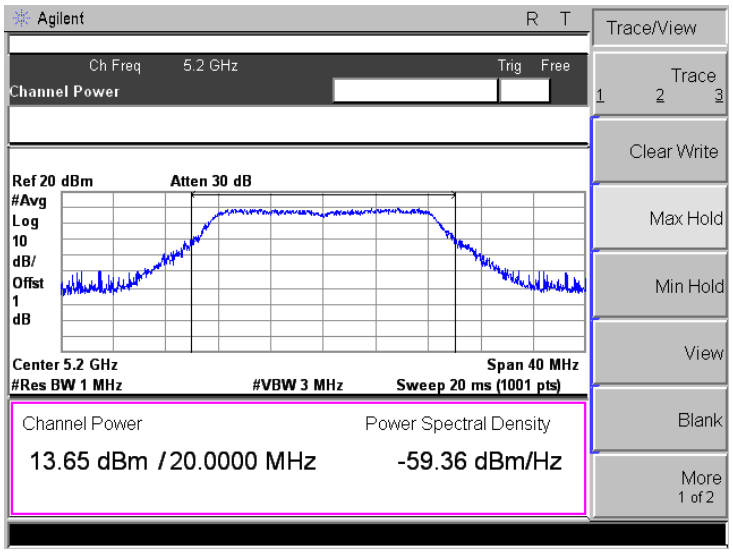
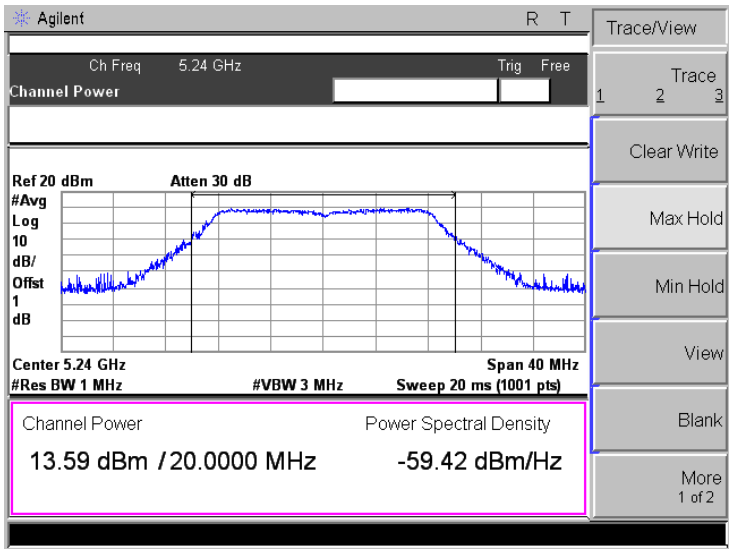
Mode:	**802.11a**
5745MHz	
5785MHz	
5825MHz	

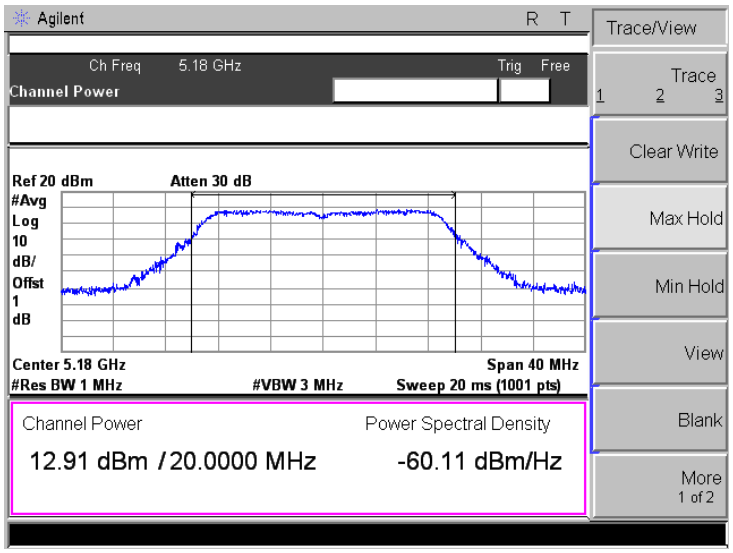
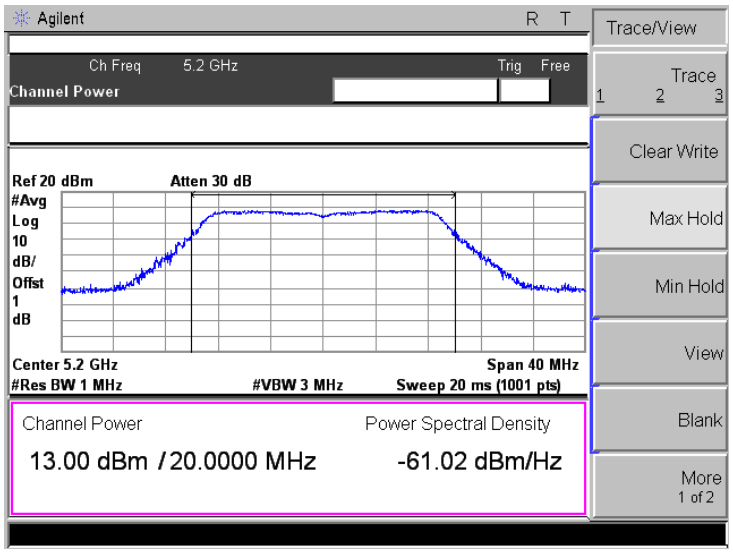
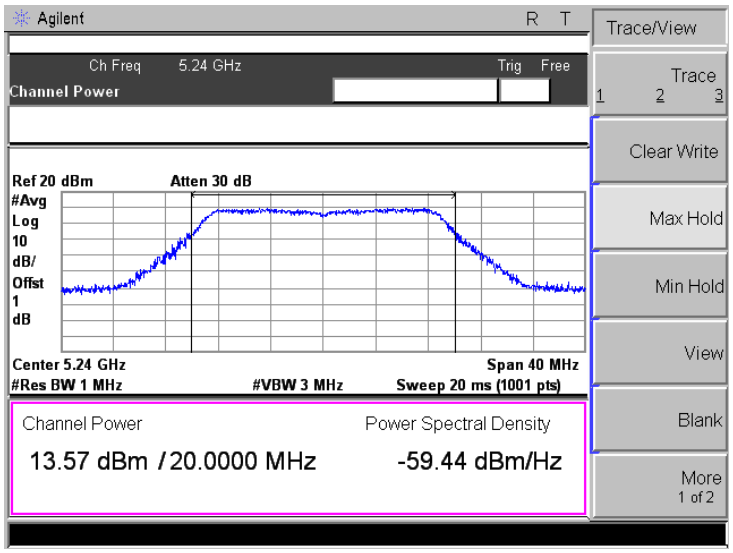
Mode:	802.11n-HT20
5745MHz	
5785MHz	
5825MHz	

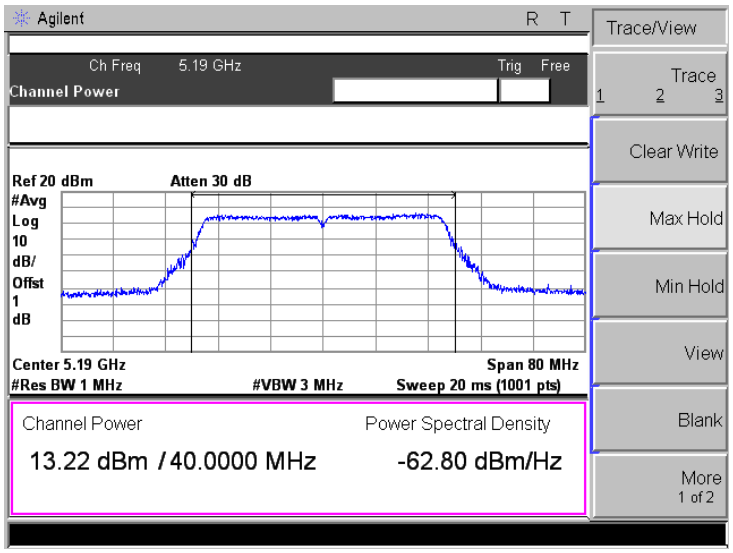
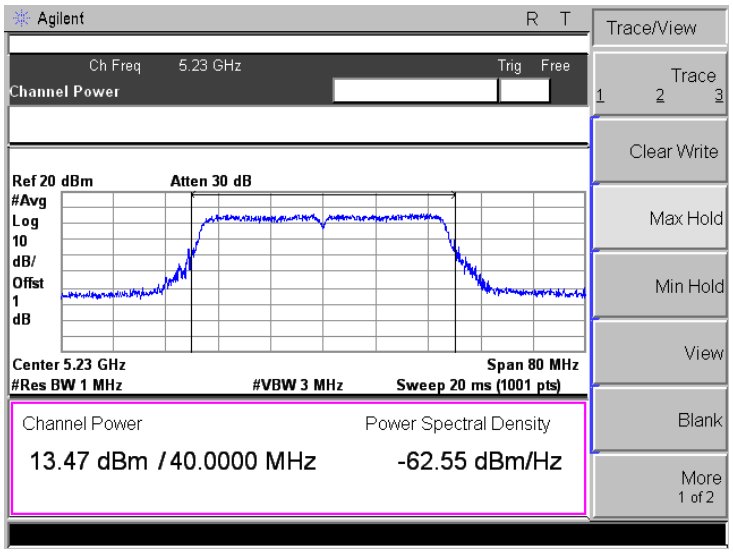
Mode:	802.11n-HT40
5755 MHz	
5795 MHz	

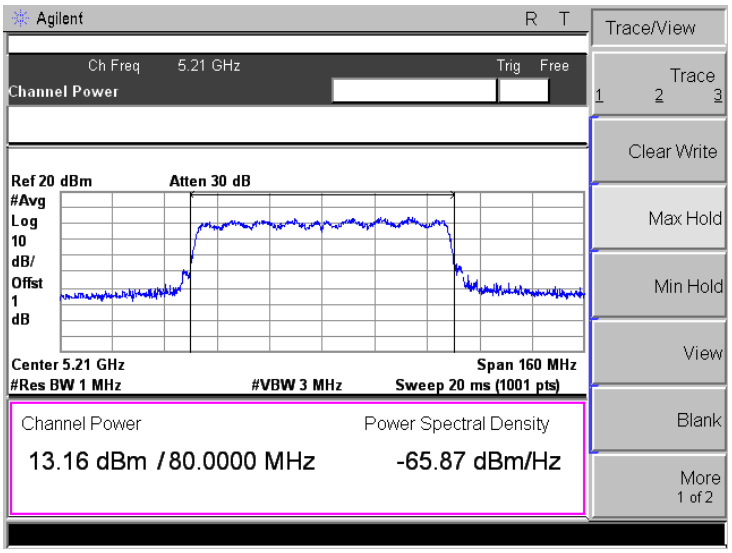
Mode:	802.11ac VH80
5775 MHz	

➢ Ant2: 5150-5250MHz

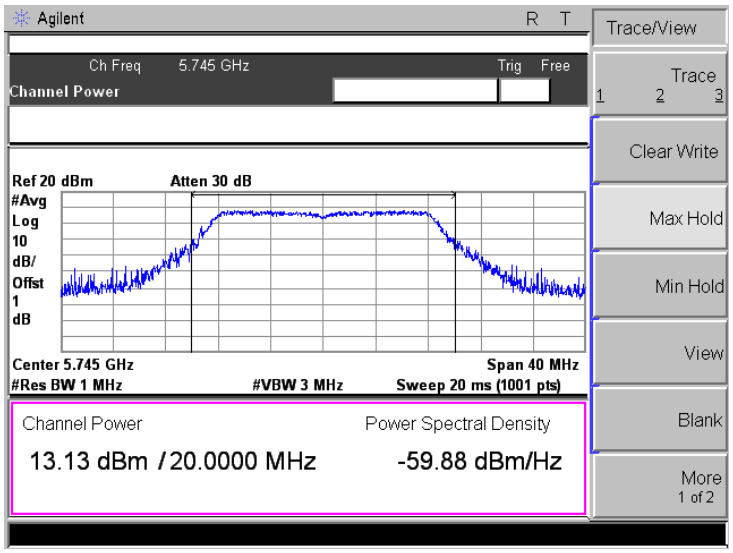
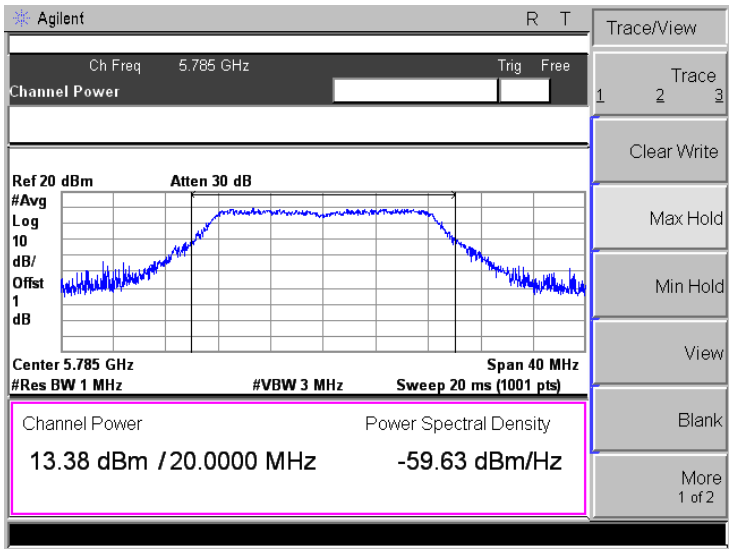
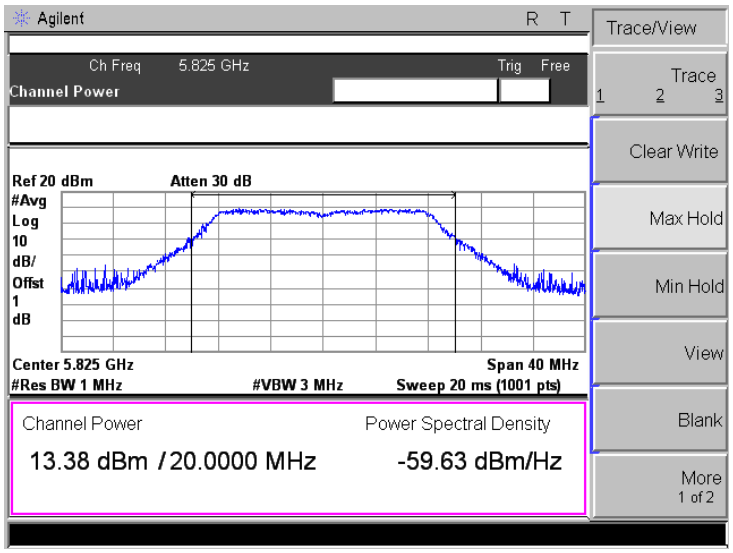
Mode:	**802.11a**
5180MHz	
5200MHz	
5240MHz	

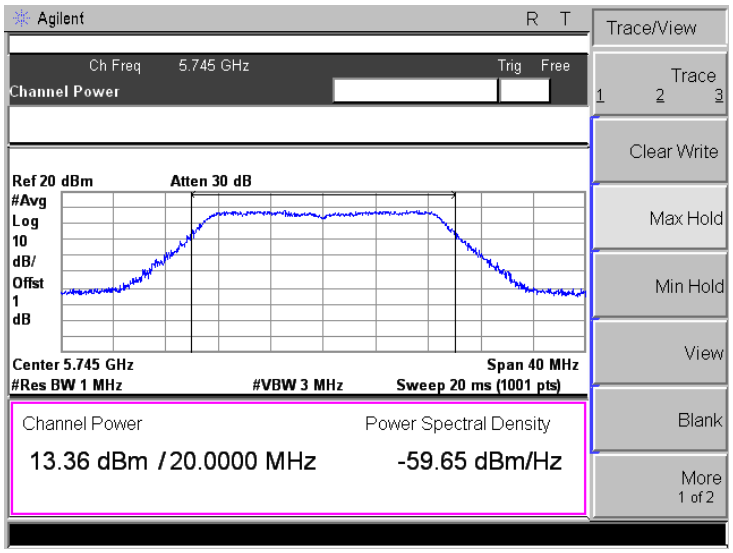
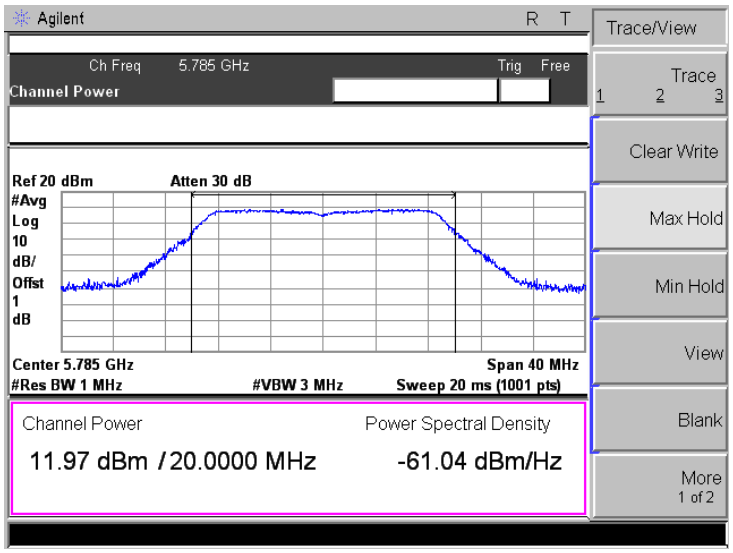
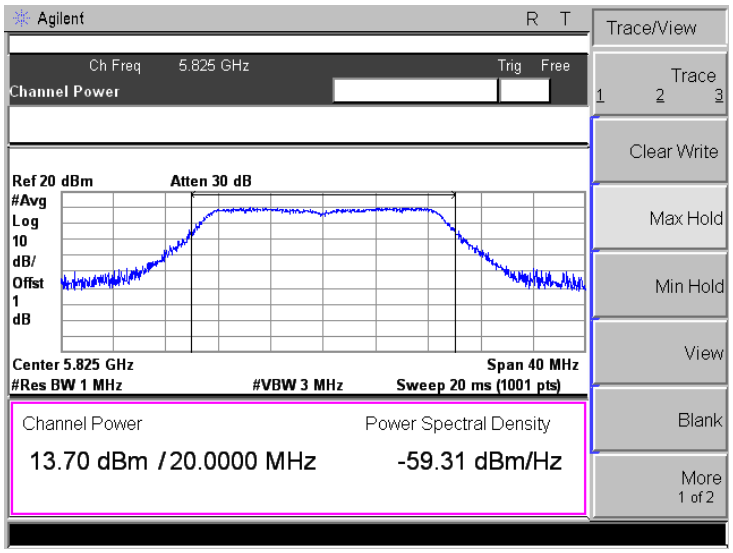
Mode:	802.11n-HT20
5180MHz	
5200MHz	
5240MHz	

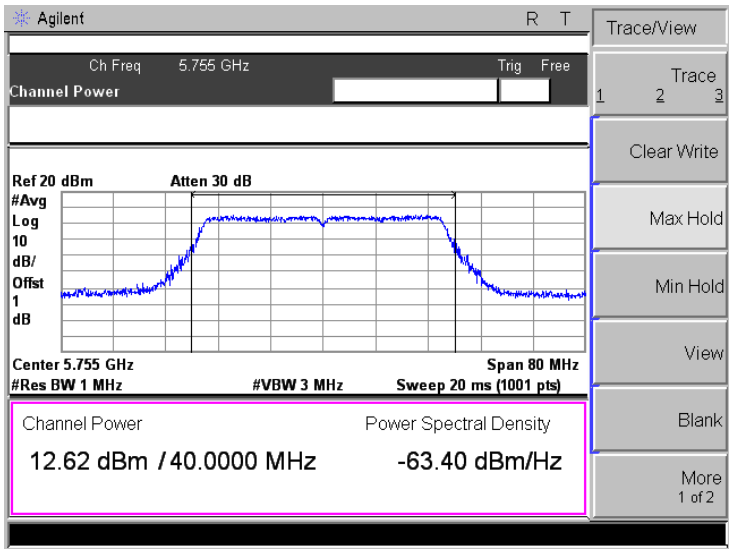
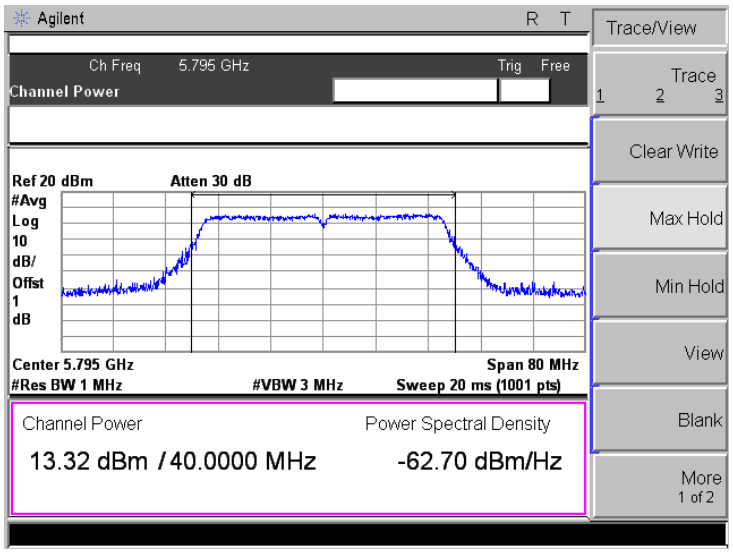
Mode:	802.11n-HT40
5190 MHz	
5230 MHz	

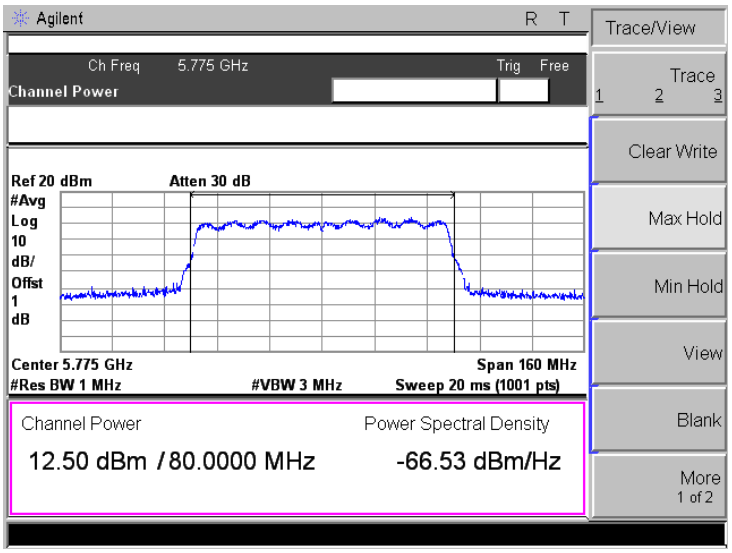
Mode:	802.11ac VH80
5210MHz	

➢ Ant2: 5725-5850MHz

Mode:	**802.11a**
5745MHz	
5785MHz	
5825MHz	

Mode:	802.11n-HT20
5745MHz	
5785MHz	
5825MHz	

Mode:	802.11n-HT40
5755 MHz	
5795 MHz	

Mode:	802.11ac VH80
5775 MHz	

9. Radiated Spurious Emissions

9.1 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:

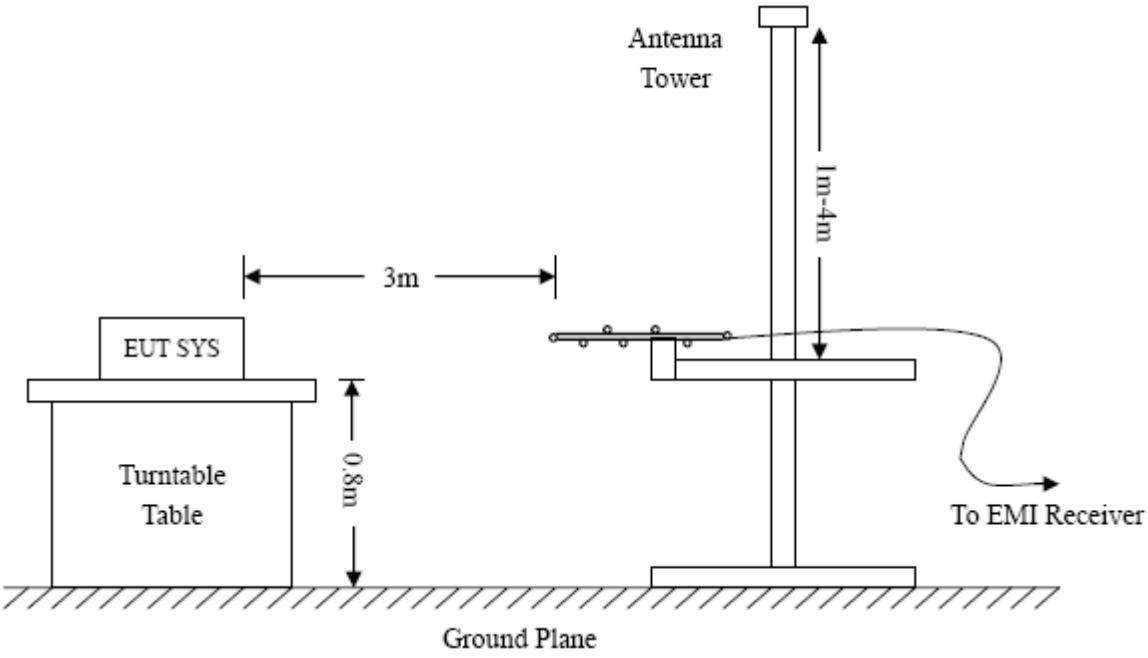
- E is the field strength in V/m;
- d is the measurement distance in meters;
- EIRP is the equivalent isotropically radiated power in watts.

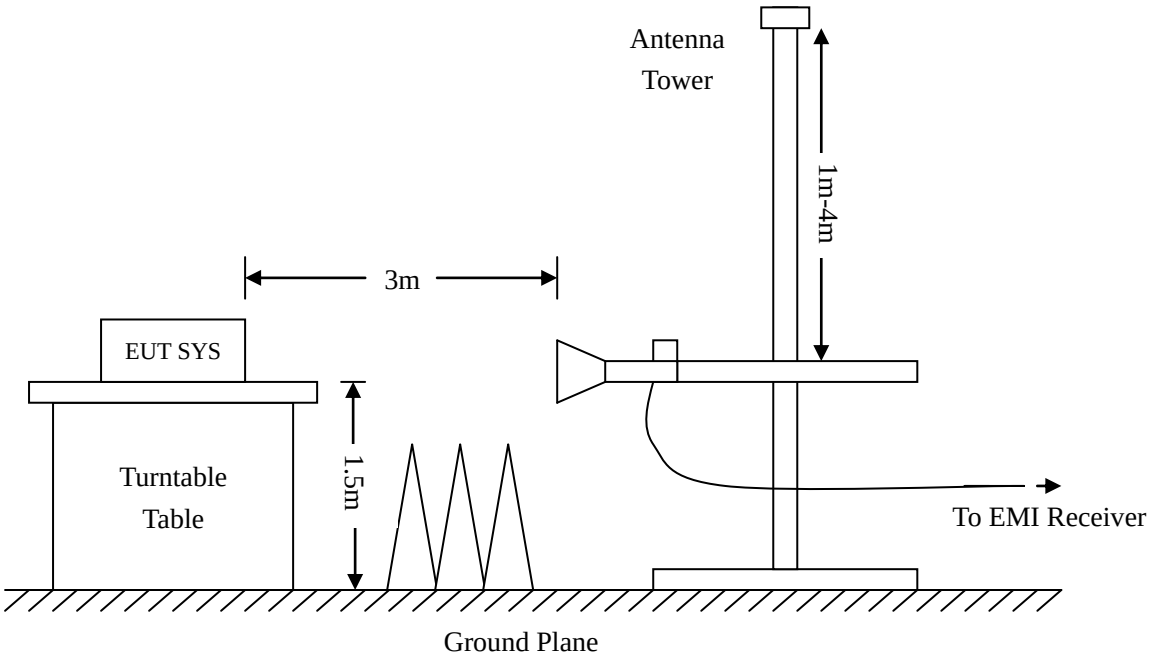
9.2 Test Procedure

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

9.3 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

9.4 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:

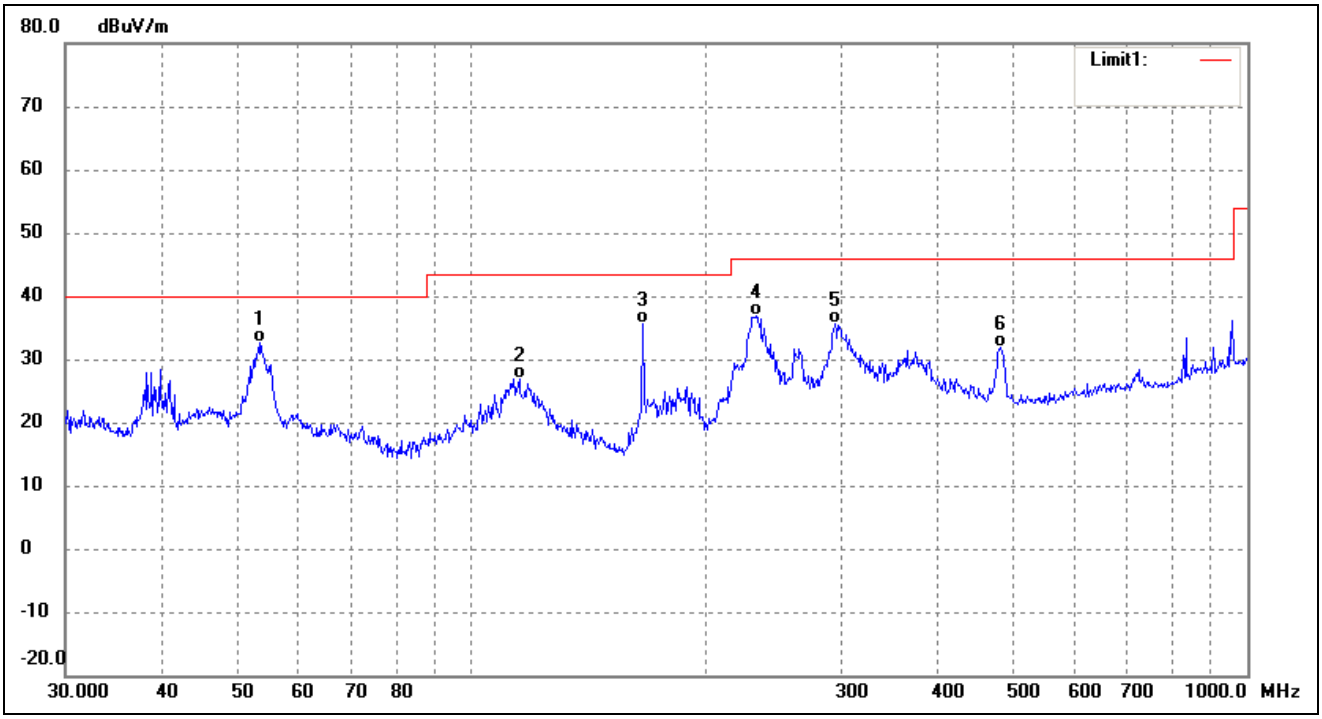
Margin = Corr. Ampl. – FCC Part 15 Limit

9.5 Summary of Test Results/Plots

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

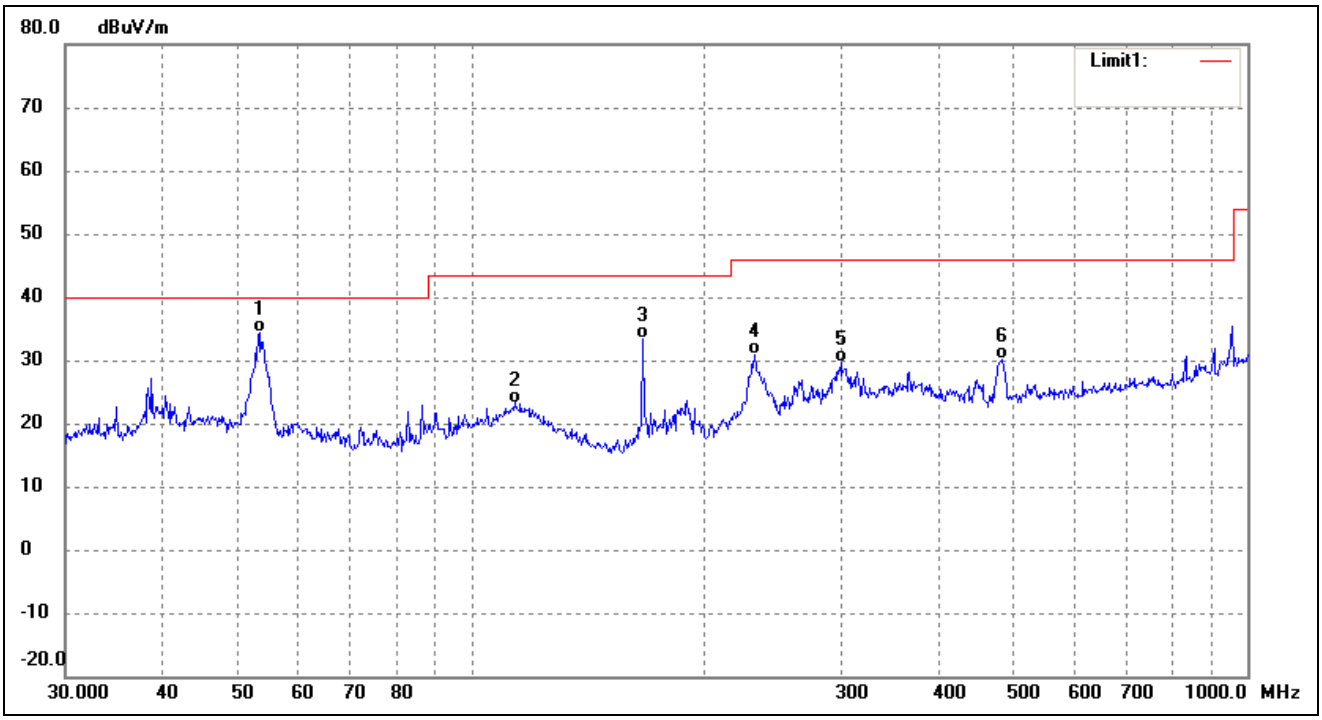
- Spurious Emission From 30 MHz to 1 GHz
- Worst Case ANT1
- 5150-5250MHz

802.11a			
Test Channel	5180MHz(Worst case)	Polarity:	Horizontal



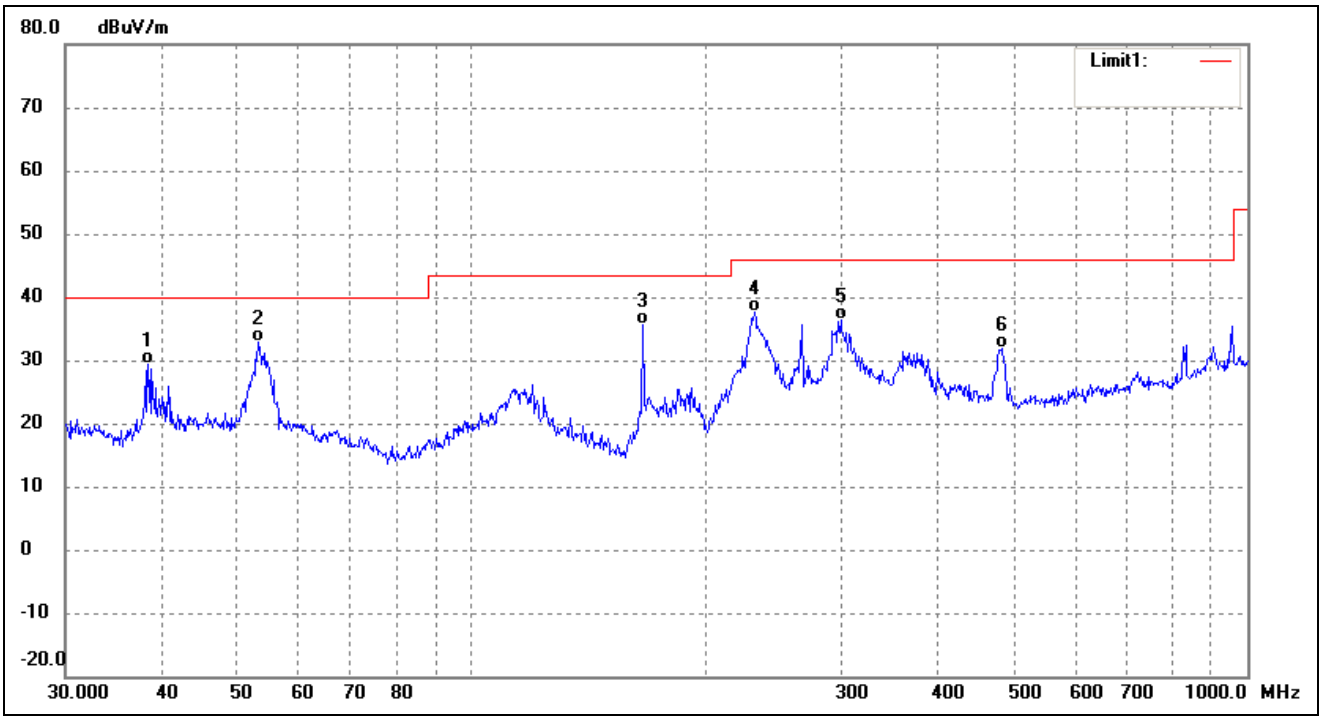
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	53.5052	47.19	-14.64	32.55	40.00	-7.45	81	100	peak
2	115.3205	42.21	-15.23	26.98	43.50	-16.52	164	100	peak
3	166.0680	51.68	-15.94	35.74	43.50	-7.76	138	100	peak
4	233.3487	48.32	-11.53	36.79	46.00	-9.21	149	100	peak
5	294.1137	44.01	-8.34	35.67	46.00	-10.33	230	100	peak
6	480.5276	39.89	-8.05	31.84	46.00	-14.16	255	100	peak

802.11a			
Test Channel	5180MHz(Worst case)	Polarity:	Vertical



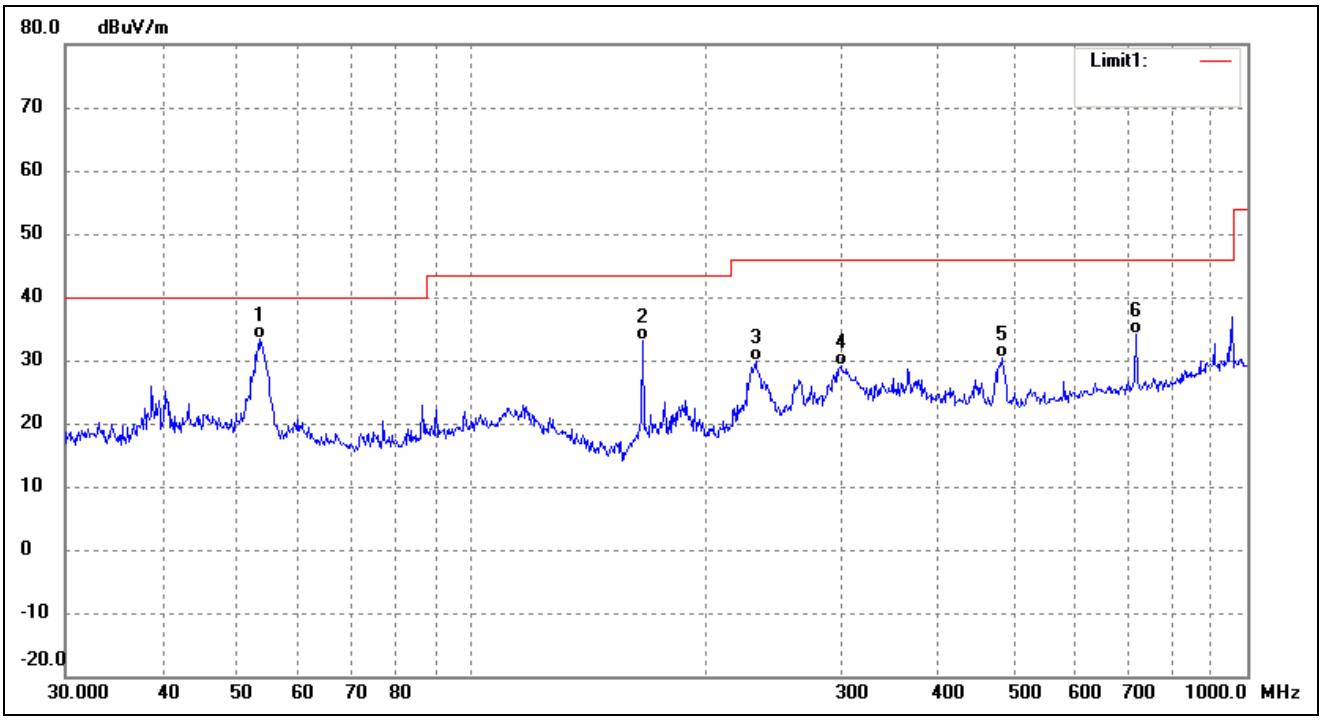
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	53.5052	49.08	-14.64	34.44	40.00	-5.56	70	100	peak
2	113.7143	38.35	-15.10	23.25	43.50	-20.25	159	100	peak
3	166.6514	49.34	-15.90	33.44	43.50	-10.06	100	100	peak
4	231.7179	42.42	-11.64	30.78	46.00	-15.22	212	100	peak
5	299.3158	37.55	-7.87	29.68	46.00	-16.32	55	100	peak
6	483.9094	38.22	-8.02	30.20	46.00	-15.80	265	100	peak

802.11a			
Test Channel	5200MHz(worst case)	Polarity:	Horizontal



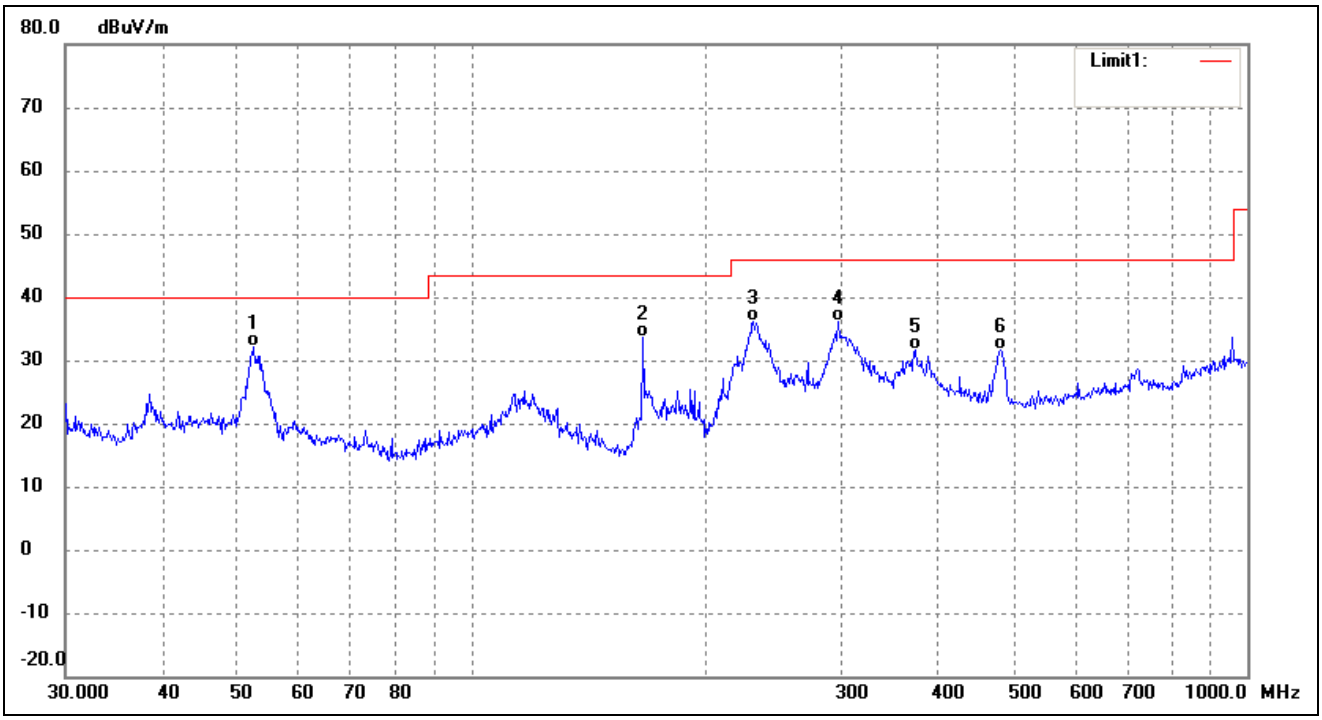
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	38.3462	44.07	-14.80	29.27	40.00	-10.73	259	100	peak
2	53.1313	47.51	-14.53	32.98	40.00	-7.02	92	100	peak
3	166.6514	51.51	-15.90	35.61	43.50	-7.89	297	100	peak
4	231.7179	49.27	-11.64	37.63	46.00	-8.37	118	100	peak
5	299.3158	44.26	-7.87	36.39	46.00	-9.61	204	100	peak
6	482.2156	39.92	-8.04	31.88	46.00	-14.12	202	100	peak

802.11a			
Test Channel	5200MHz(worst case)	Polarity:	Vertical



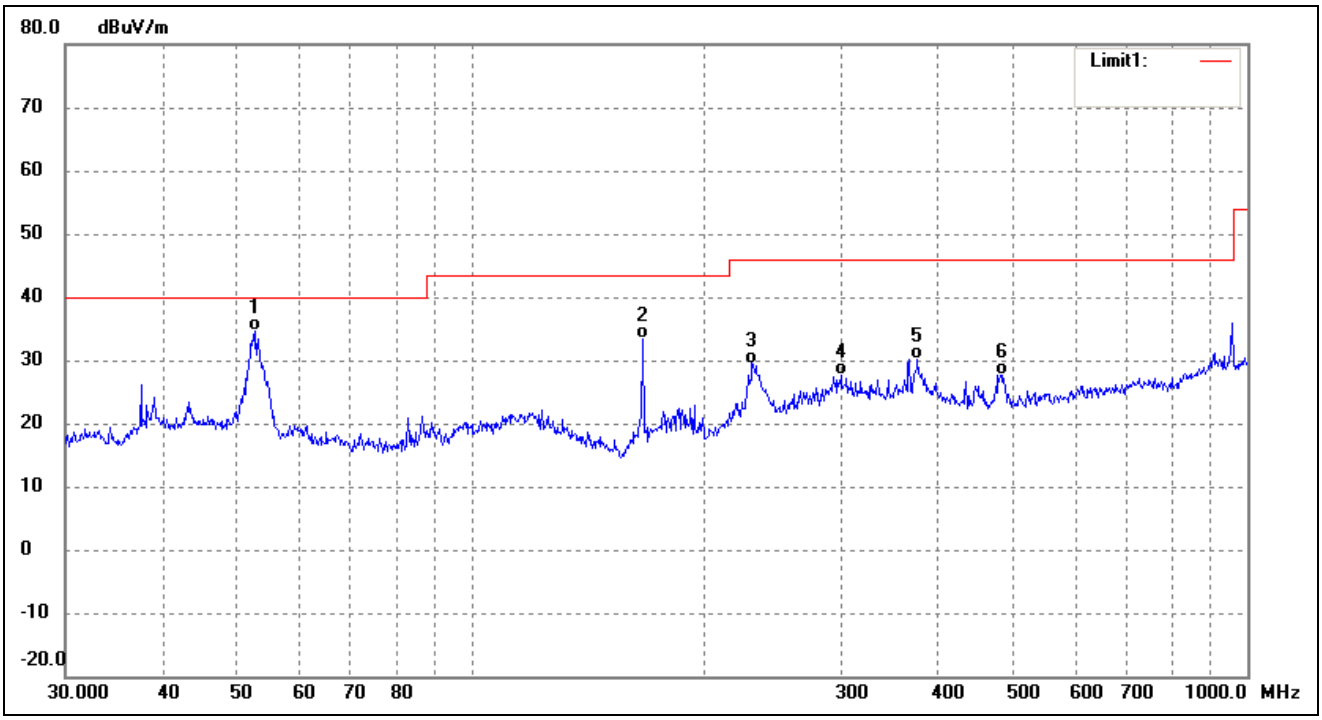
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	53.5052	48.13	-14.64	33.49	40.00	-6.51	165	100	peak
2	166.6514	48.97	-15.90	33.07	43.50	-10.43	331	100	peak
3	232.5318	41.52	-11.59	29.93	46.00	-16.07	70	100	peak
4	300.3672	36.92	-7.83	29.09	46.00	-16.91	304	100	peak
5	482.2156	38.42	-8.04	30.38	46.00	-15.62	138	100	peak
6	719.1995	38.72	-4.57	34.15	46.00	-11.85	281	100	peak

802.11a			
Test Channel	5240MHz(worst case)	Polarity:	Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	52.3913	46.35	-14.32	32.03	40.00	-7.97	352	100	peak
2	166.6514	49.63	-15.90	33.73	43.50	-9.77	182	100	peak
3	230.9068	47.73	-11.69	36.04	46.00	-9.96	82	100	peak
4	297.2241	44.20	-8.07	36.13	46.00	-9.87	293	100	peak
5	373.3112	39.50	-7.94	31.56	46.00	-14.44	145	100	peak
6	480.5276	39.60	-8.05	31.55	46.00	-14.45	305	100	peak

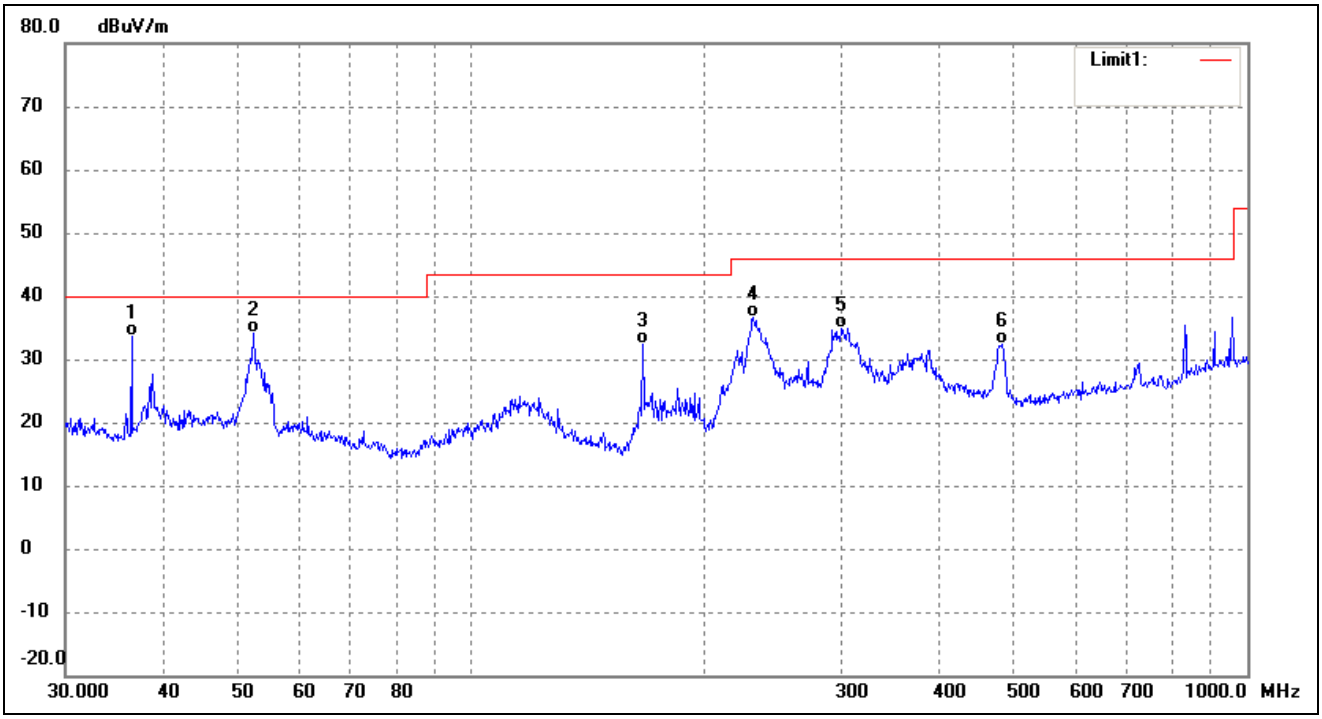
802.11a			
Test Channel	5240MHz(worst case)	Polarity:	Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	52.7600	49.04	-14.43	34.61	40.00	-5.39	76	100	peak
2	166.6514	49.17	-15.90	33.27	43.50	-10.23	198	100	peak
3	230.0985	41.24	-11.74	29.50	46.00	-16.50	125	100	peak
4	299.3158	35.57	-7.87	27.70	46.00	-18.30	106	100	peak
5	375.9385	38.04	-7.96	30.08	46.00	-15.92	175	100	peak
6	482.2156	35.75	-8.04	27.71	46.00	-18.29	134	100	peak

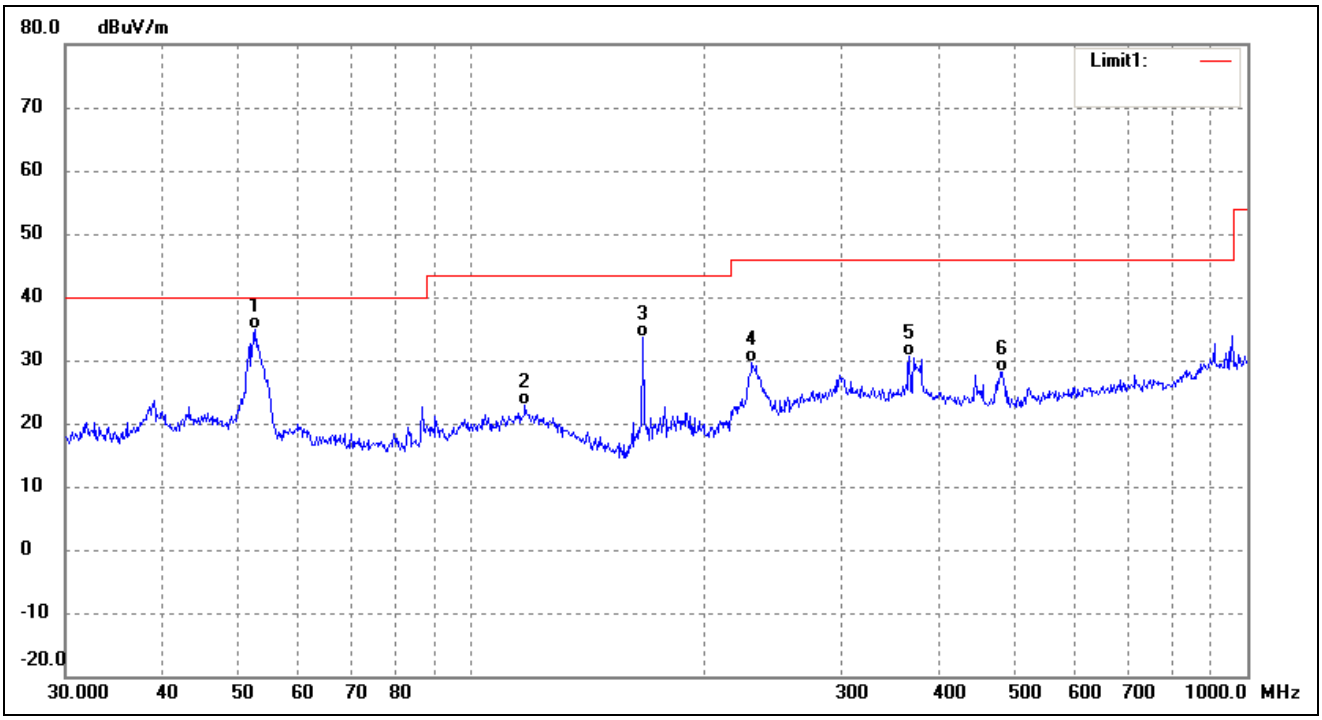
➢ 5725-5850MHz

802.11a			
Test Channel	5745MHz(worst case)	Polarity:	Horizontal



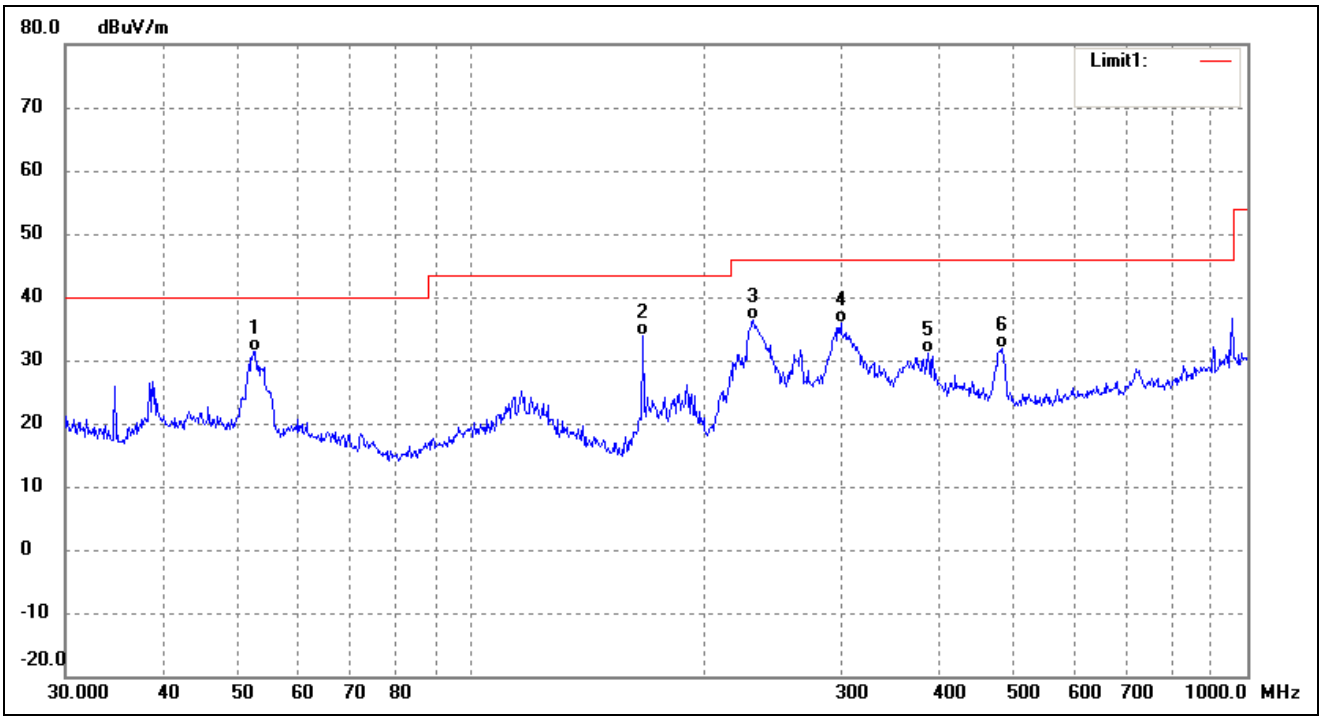
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	36.5092	49.06	-15.51	33.55	40.00	-6.45	304	100	peak
2	52.3913	48.46	-14.32	34.14	40.00	-5.86	187	100	peak
3	166.6514	48.35	-15.90	32.45	43.50	-11.05	93	100	peak
4	230.9068	48.31	-11.69	36.62	46.00	-9.38	217	100	peak
5	300.3673	42.83	-7.83	35.00	46.00	-11.00	170	100	peak
6	482.2156	40.49	-8.04	32.45	46.00	-13.55	323	100	peak

802.11a			
Test Channel	5745MHz(worst case)	Polarity:	Vertical



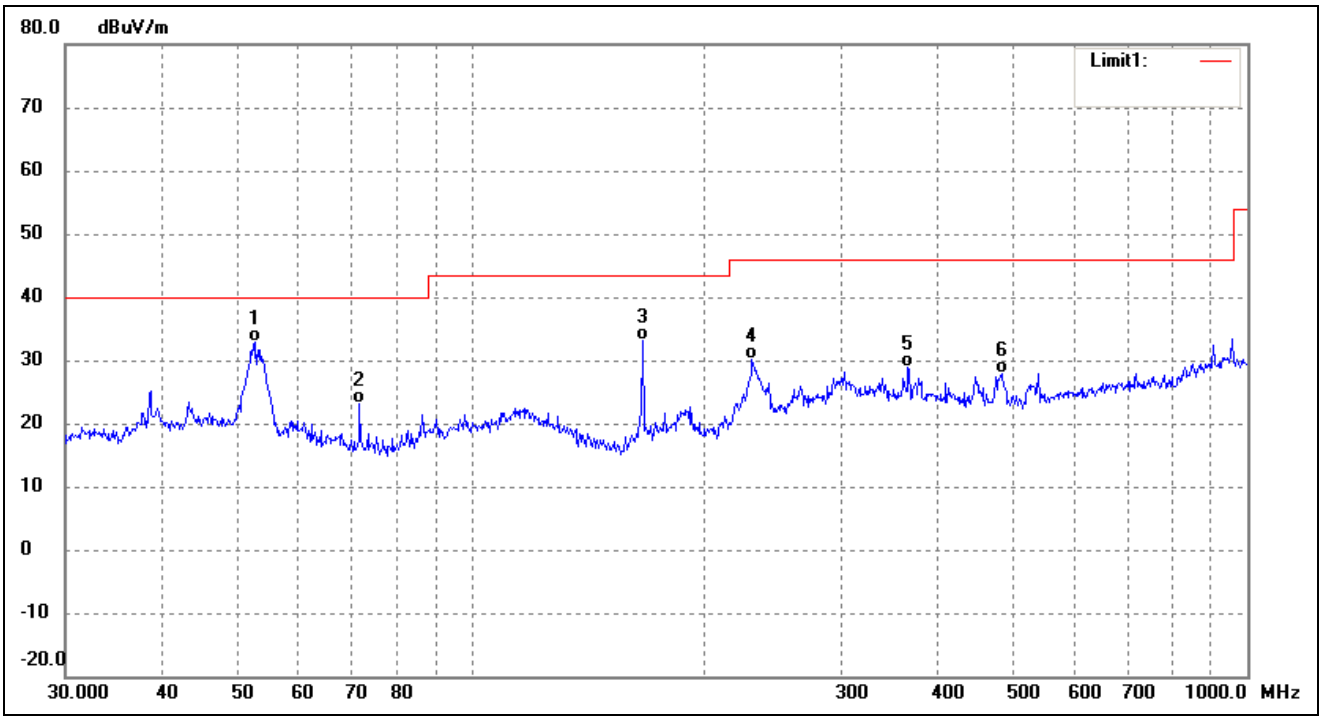
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	52.7600	49.29	-14.43	34.86	40.00	-5.14	257	100	peak
2	117.3603	38.17	-15.40	22.77	43.50	-20.73	91	100	peak
3	166.6514	49.46	-15.90	33.56	43.50	-9.94	253	100	peak
4	230.0985	41.37	-11.74	29.63	46.00	-16.37	102	100	peak
5	366.8231	38.51	-7.84	30.67	46.00	-15.33	93	100	peak
6	483.9094	36.26	-8.02	28.24	46.00	-17.76	263	100	peak

802.11a			
Test Channel	5785MHz(worst case)	Polarity:	Horizontal



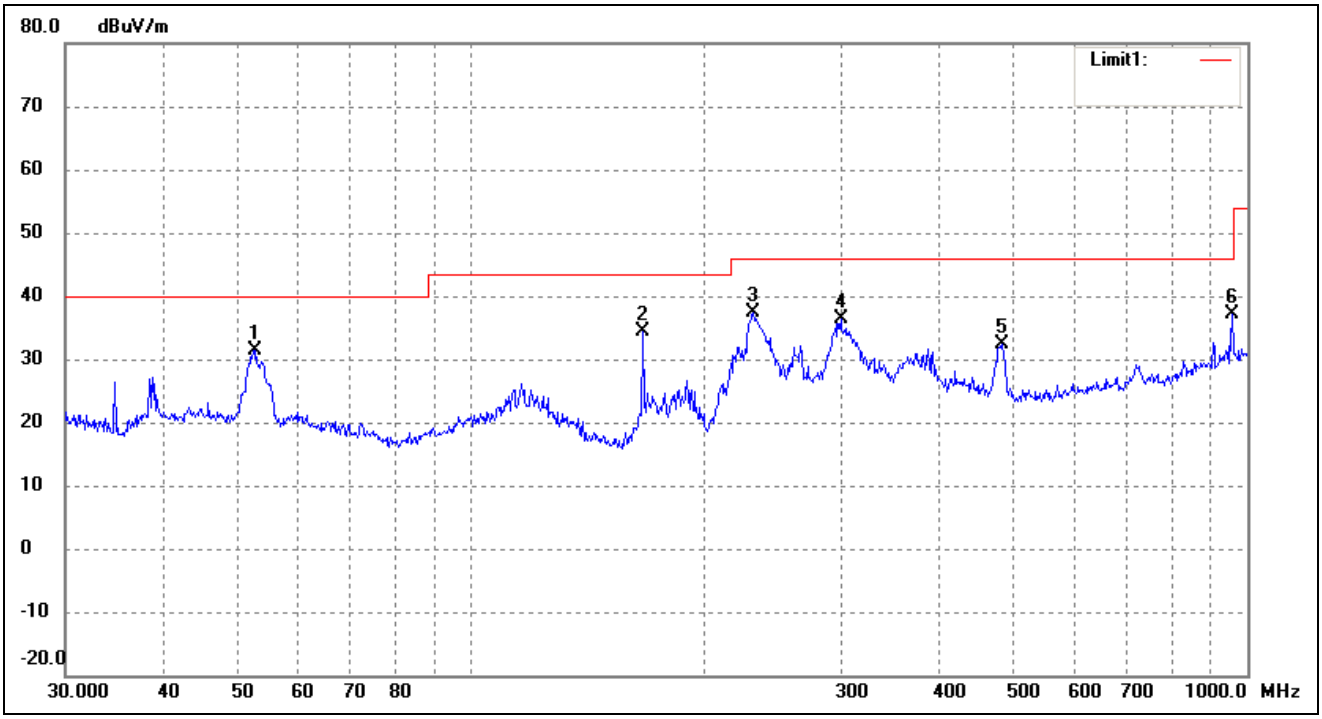
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	52.7600	45.83	-14.43	31.40	40.00	-8.60	358	100	peak
2	166.6514	49.86	-15.90	33.96	43.50	-9.54	154	100	peak
3	230.9068	48.14	-11.69	36.45	46.00	-9.55	53	100	peak
4	299.3158	43.84	-7.87	35.97	46.00	-10.03	198	100	peak
5	387.9920	39.14	-7.91	31.23	46.00	-14.77	70	100	peak
6	482.2156	39.81	-8.04	31.77	46.00	-14.23	321	100	peak

802.11a			
Test Channel	5785MHz(worst case)	Polarity:	Vertical



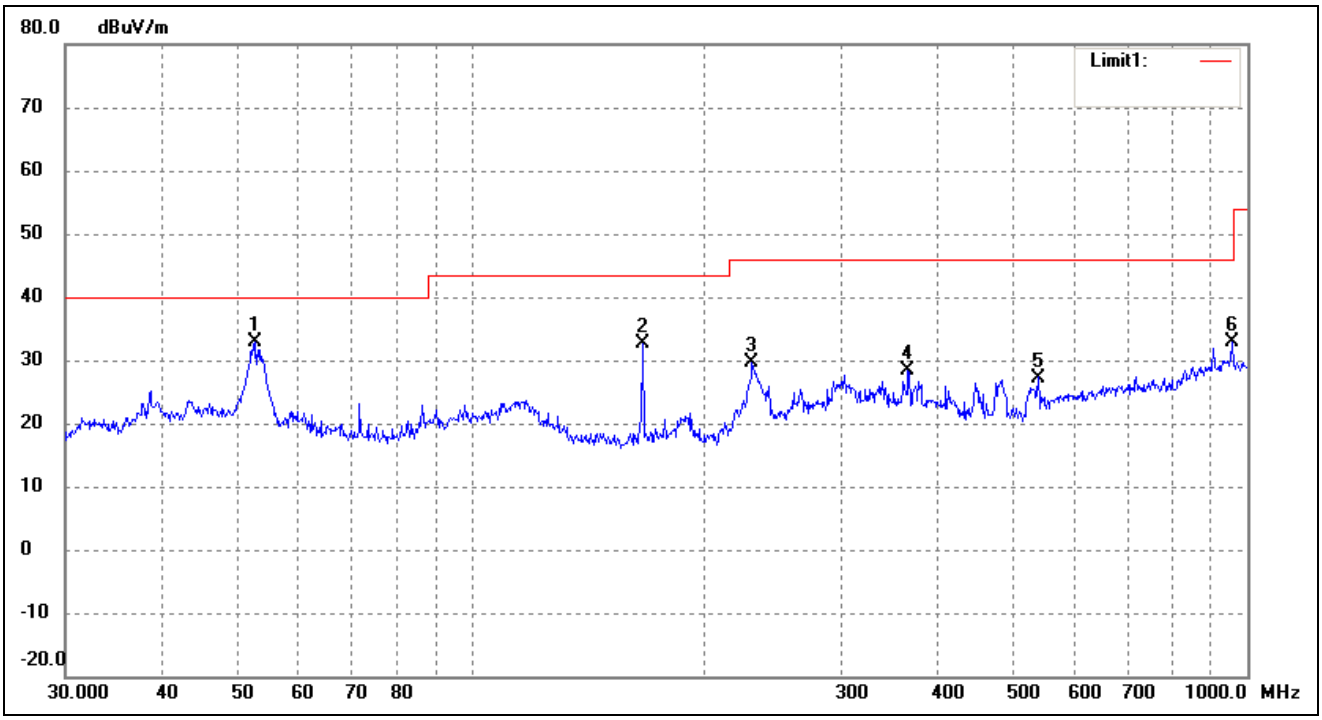
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	52.7600	47.23	-14.43	32.80	40.00	-7.20	286	100	peak
2	71.8320	40.51	-17.39	23.12	40.00	-16.88	154	100	peak
3	166.6514	48.92	-15.90	33.02	43.50	-10.48	60	100	peak
4	230.0985	41.83	-11.74	30.09	46.00	-15.91	113	100	peak
5	365.5391	36.63	-7.83	28.80	46.00	-17.20	164	100	peak
6	482.2156	35.90	-8.04	27.86	46.00	-18.14	163	100	peak

802.11a			
Test Channel	5825MHz(worst case)	Polarity:	Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	52.7599	45.83	-14.43	31.40	40.00	-8.60	338	100	peak
2	166.6511	50.36	-15.90	34.46	43.50	-9.04	269	100	peak
3	230.9068	49.14	-11.69	37.45	46.00	-8.55	100	100	peak
4	299.3158	44.34	-7.87	36.47	46.00	-9.53	219	100	peak
5	482.2155	40.31	-8.04	32.27	46.00	-13.73	311	100	peak
6	955.4379	38.13	-1.12	37.01	46.00	-8.99	223	100	peak

802.11a			
Test Channel	5825MHz(worst case)	Polarity:	Vertical

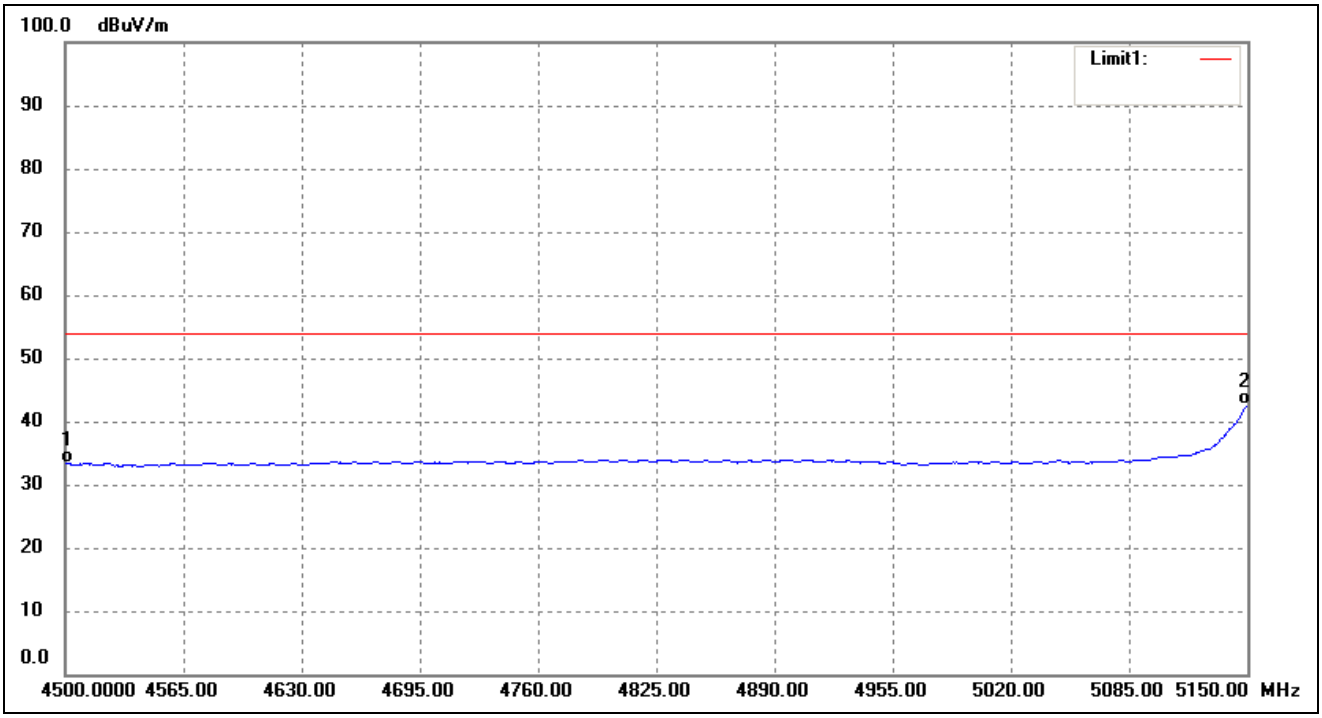


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	52.7599	47.23	-14.43	32.80	40.00	-7.20	311	100	peak
2	166.6511	48.42	-15.90	32.52	43.50	-10.98	91	100	peak
3	230.0985	41.33	-11.74	29.59	46.00	-16.41	263	100	peak
4	365.5391	36.12	-7.82	28.30	46.00	-17.70	93	100	peak
5	537.5891	35.04	-7.79	27.25	46.00	-18.75	192	100	peak
6	955.4379	33.90	-1.12	32.78	46.00	-13.22	232	100	peak

➢ Spurious Emission above 1GHz

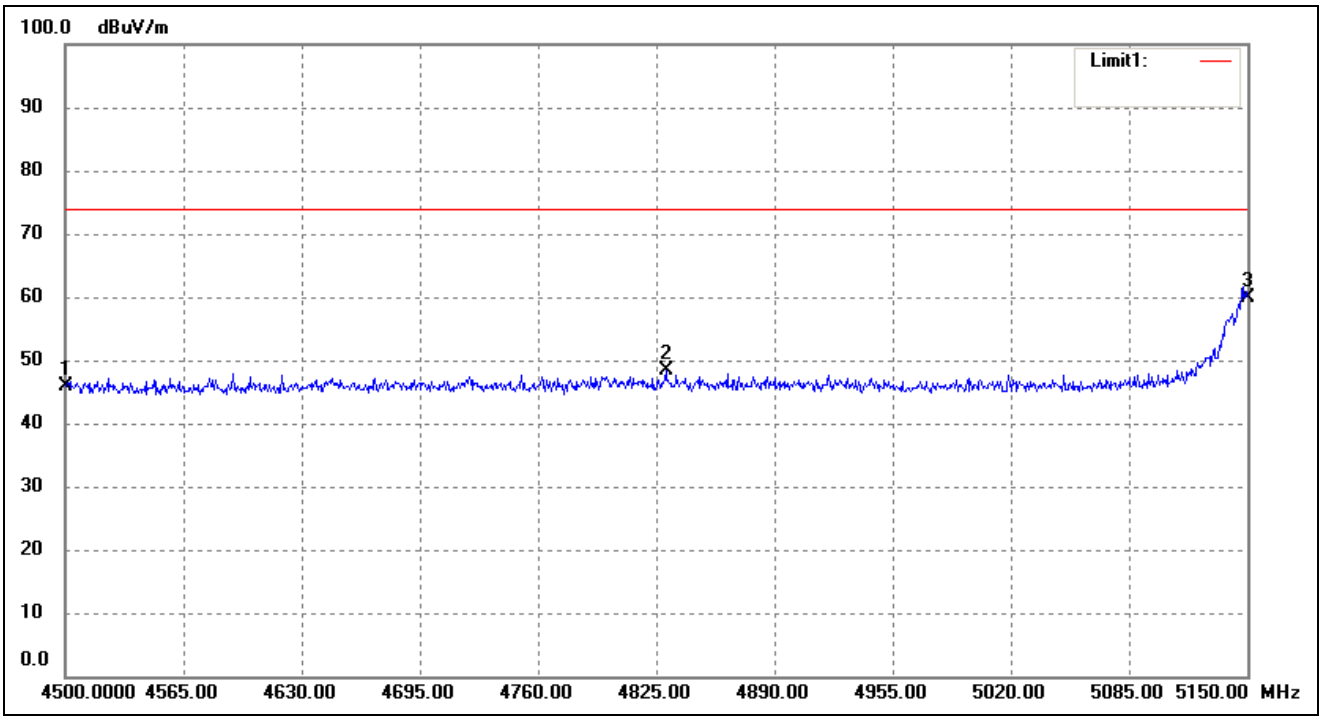
Worst Case ANT1

802.11a- Restricted Bandedge (Worst Case)			
Test Channel	band 5.15-5.25GHz	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	38.14	-4.71	33.43	54.00	-20.57	71	100	AVG
2	5150.000	46.93	-4.32	42.61	54.00	-11.39	177	100	AVG

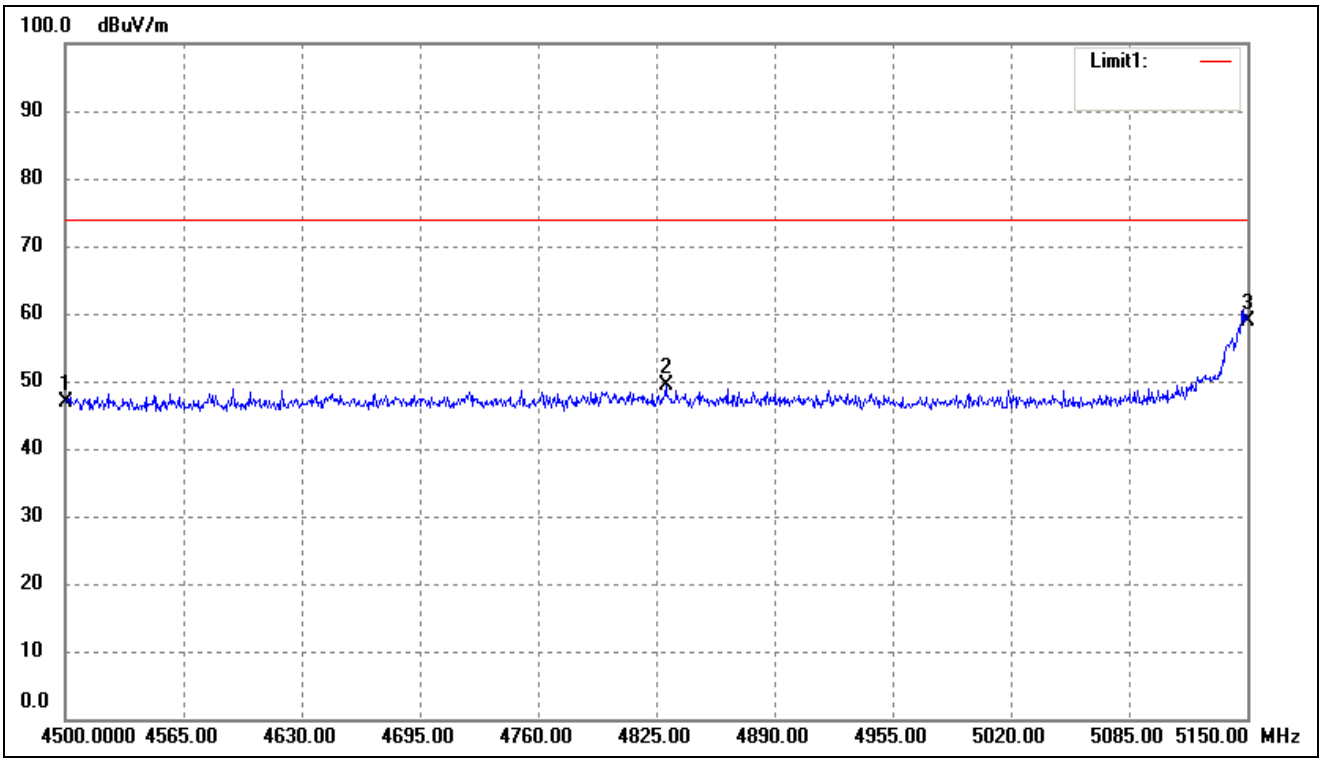
802.11a- Restricted Bandedge (Worst Case)			
Test Channel	band 5.15-5.25GHz	Polarity:	Vertical(worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	4500.000	50.47	-4.71	45.76	74.00	-28.24	55	100	peak
2	4830.200	52.80	-4.50	48.30	74.00	-25.70	199	100	peak
3	5150.000	64.13	-4.32	59.81	74.00	-14.19	75	100	peak

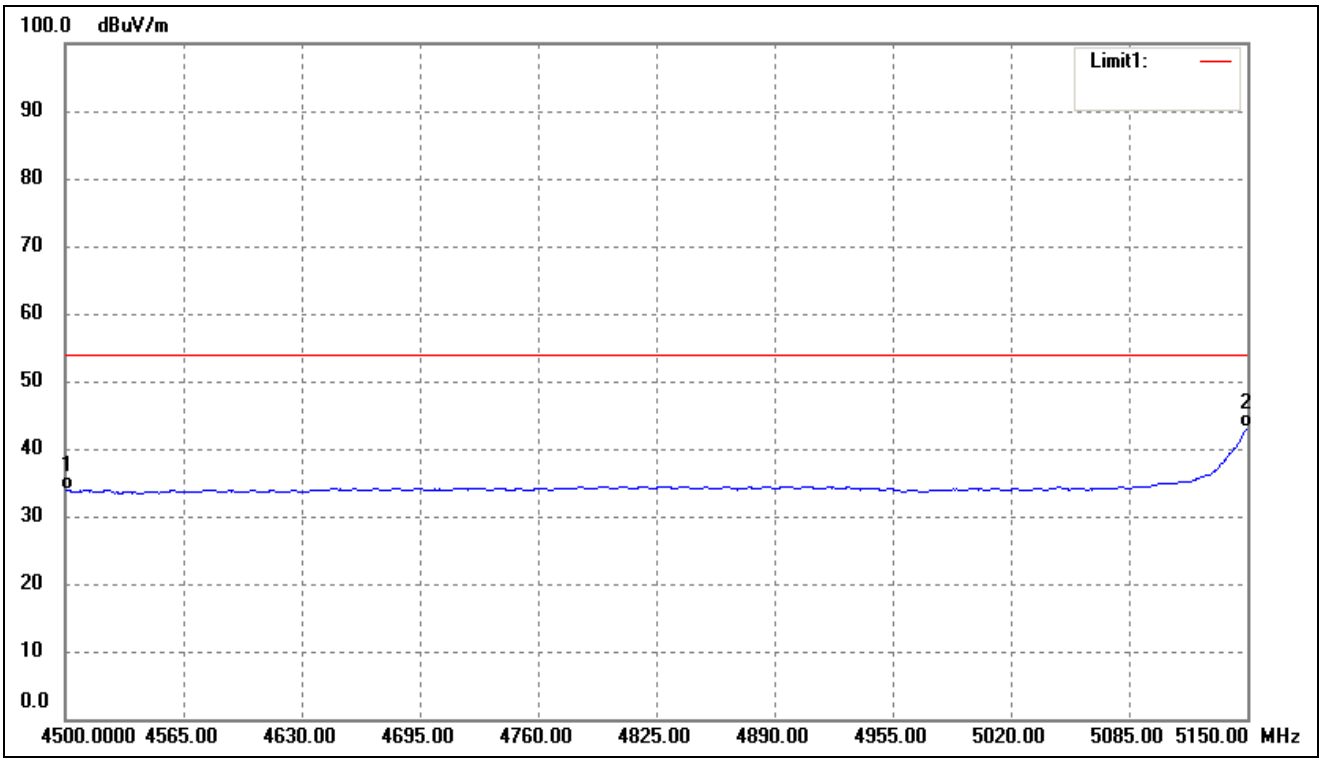
Worst Case ANT2

802.11a- Restricted Bandedge (Worst Case)			
Test Channel	band 5.15-5.25GHz	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	51.47	-4.71	46.76	74.00	-27.24	96	100	peak
2	4830.200	53.80	-4.50	49.30	74.00	-24.70	122	100	peak
3	5150.000	63.13	-4.32	58.81	74.00	-15.19	106	100	peak

802.11a- Restricted Bandedge (Worst Case)			
Test Channel	band 5.15-5.25GHz	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	38.64	-4.71	33.93	54.00	-20.07	148	100	AVG
2	5150.000	47.43	-4.32	43.11	54.00	-10.89	299	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 (802.11a) (Ant1)
- 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	59.50	7.11	66.61	74.00	-7.39	H	PK
10360	39.30	8.22	47.52	54.00	-6.48	H	AV
10360	61.28	7.11	68.39	74.00	-5.61	V	PK
10360	38.35	8.22	46.57	54.00	-7.43	V	AV
High Channel (5240MHz)							
10480	58.01	7.22	65.23	74.00	-8.77	H	PK
10480	34.56	8.67	43.23	54.00	-10.77	H	AV
10480	55.72	7.22	62.94	74.00	-11.06	V	PK
10480	35.67	8.67	44.34	54.00	-9.66	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	53.95	9.45	63.40	74.00	-10.60	H	PK
11490	34.63	10.36	44.99	54.00	-9.01	H	AV
11490	56.37	9.45	65.82	74.00	-8.18	V	PK
11490	32.87	10.36	43.23	54.00	-10.77	V	AV
High Channel (5825MHz)							
11610	57.03	9.84	66.87	74.00	-7.13	H	PK
11610	33.35	10.95	44.30	54.00	-9.70	H	AV
11610	55.75	9.84	65.59	74.00	-8.41	V	PK
11610	35.84	10.95	46.79	54.00	-7.21	V	AV

- Out of Band edge for 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-37.34	-27
Highest	Above 5350	-43.40	-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	-36.58	-27
	5715 to 5725	-39.53	-17
Highest	5850 to 5860	-39.89	-17
	Above 5860	-43.50	-27
Note: the data just list the worst cases			

➢ For the frequency band 5.15-5.25GHz, 5.725-5.850GHz (802.11a) (Ant2)

➢ 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	56.98	7.11	64.09	74.00	-9.91	H	PK
10360	40.50	8.22	48.72	54.00	-5.28	H	AV
10360	63.07	7.11	70.18	74.00	-3.82	V	PK
10360	37.44	8.22	45.66	54.00	-8.34	V	AV
High Channel (5240MHz)							
10480	54.34	7.69	62.03	74.00	-11.97	H	PK
10480	36.63	8.93	45.56	54.00	-8.44	H	AV
10480	58.25	7.69	65.94	74.00	-8.06	V	PK
10480	41.26	8.93	50.19	54.00	-3.81	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	58.68	9.45	68.13	74.00	-5.87	H	PK
11490	37.18	10.36	47.54	54.00	-6.46	H	AV
11490	57.06	9.45	66.51	74.00	-7.49	V	PK
11490	58.68	9.45	68.13	74.00	-5.87	V	AV
High Channel (5825MHz)							
11610	55.23	9.84	65.07	74.00	-8.93	H	PK
11610	32.11	10.95	43.06	54.00	-10.94	H	AV
11610	54.47	9.84	64.31	74.00	-9.69	V	PK
11610	36.79	10.95	47.74	54.00	-6.26	V	AV

➢ Out of Band edge for 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-37.03	-27
Highest	Above 5350	-38.79	-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	-45.39	-27
	5715 to 5725	-33.11	-17
Highest	5850 to 5860	-33.53	-17
	Above 5860	-42.77	-27
Note: the data just list the worst cases			

- For the frequency band 5.15-5.25GHz, 5.725-5.850GHz (802.11n HT20) (Ant1+ Ant2)
- 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	54.98	7.11	62.09	74.00	-11.91	H	PK
10360	38.73	8.22	46.95	54.00	-7.05	H	AV
10360	63.80	7.11	70.91	74.00	-3.09	V	PK
10360	38.52	8.22	46.74	54.00	-7.26	V	AV
High Channel (5240MHz)							
10480	52.35	7.69	60.04	74.00	-13.96	H	PK
10480	36.64	8.93	45.57	54.00	-8.43	H	AV
10480	60.00	7.69	67.69	74.00	-6.31	V	PK
10480	41.29	8.93	50.22	54.00	-3.78	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	55.54	9.84	65.38	74.00	-8.62	H	PK
11490	34.24	10.95	45.19	54.00	-8.81	H	AV
11490	56.11	9.84	65.95	74.00	-8.05	V	PK
11490	37.70	10.95	48.65	54.00	-5.35	V	AV
High Channel (5825MHz)							
11610	54.23	9.84	64.07	74.00	-9.93	H	PK
11610	33.08	10.95	44.03	54.00	-9.97	H	AV
11610	53.68	9.84	63.52	74.00	-10.48	V	PK
11610	36.10	10.95	47.05	54.00	-6.95	V	AV

- Out of Band edge 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-37.48	-27
Highest	Above 5350	-38.26	-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	-45.38	-27
	5715 to 5725	-31.72	-17
Highest	5850 to 5860	-33.26	-17
	Above 5860	-41.71	-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.

- For the frequency band 5.15-5.25GHz, 5.725-5.850GHz (802.11n HT40) (Ant1+ Ant2)
- 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 (5190MHz)							
10380	57.06	7.25	64.31	74.00	-9.69	H	PK
10380	36.03	8.33	44.36	54.00	-9.64	H	AV
10380	60.62	7.25	67.87	74.00	-6.13	V	PK
10380	40.53	8.33	48.86	54.00	-5.14	V	AV
High Channel (5230MHz)							
10460	58.38	7.54	65.92	74.00	-8.08	H	PK
10460	37.02	8.86	45.88	54.00	-8.12	H	AV
10460	59.06	7.54	66.60	74.00	-7.40	V	PK
10460	38.71	8.86	47.57	54.00	-6.43	V	AV

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel (5755MHz)							
11510	53.57	9.65	63.22	74.00	-10.78	H	PK
11510	35.24	10.87	46.11	54.00	-7.89	H	AV
11510	55.94	9.65	65.59	74.00	-8.41	V	PK
11510	35.42	10.87	46.29	54.00	-7.71	V	AV
High Channel (5795MHz)							
11590	57.10	9.81	66.91	74.00	-7.09	H	PK
11590	31.83	10.89	42.72	54.00	-11.28	H	AV
11590	56.35	9.81	66.16	74.00	-7.84	V	PK
11590	35.14	10.89	46.03	54.00	-7.97	V	AV

- Out of Band edge for 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-38.65	-27
Highest	Above 5350	-40.37	-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	-42.85	-27
	5715 to 5725	-40.41	-17
Highest	5850 to 5860	-42.99	-17
	Above 5860	-40.13	-27
Note: the data just list the worst cases			

- For the frequency band 5.15-5.25GHz, 5.725-5.850GHz (802.11ac VH80) (Ant1+ Ant2)
- Harmonics And Spurious Emissions

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
5210MHz							
10420	55.87	7.33	63.20	74.00	-10.80	H	PK
10420	37.15	8.75	45.90	54.00	-8.10	H	AV
10420	57.04	7.33	64.37	74.00	-9.63	V	PK
10420	37.75	8.75	46.50	54.00	-7.50	V	AV

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
5775MHz							
11550	57.66	9.54	67.20	74.00	-6.80	H	PK
11550	37.02	10.59	47.61	54.00	-6.39	H	AV
11550	55.93	9.54	65.47	74.00	-8.53	V	PK
11550	35.79	10.59	46.38	54.00	-7.62	V	AV

- Out of Band edge for 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-34.57	-27
Highest	Above 5350	-31.62	-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	-43.03	-27
	5715 to 5725	-29.45	-17
Highest	5850 to 5860	-32.10	-17
	Above 5860	-41.04	-27
Note: the data just list the worst cases			

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.

10. Frequency Stability

10.1 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.

10.2 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.

10.3 Summary of Test Results/Plots

U-NII-1:5150-5250MHz worst case at 802.11a middle channel（Ant1）				
Voltage(%)	Power(VDC)	TEMP(℃)	Freq.Dev(Hz)	Deviation
100%	5	-30	162	0.0312
100%		-20	172	0.0331
100%		-10	162	0.0312
100%		0	124	0.0238
100%		+10	177	0.0340
100%		+20	137	0.0263
100%		+30	128	0.0246
100%		+40	164	0.0315
100%		+50	127	0.0244
Low Battery power	4.5	+20	133	0.0256
High Battery power	5.5	+20	134	0.0258

U-NII-3:5725-5850MHz worst case at 802.11a middle channel（Ant1）				
Voltage(%)	Power(VDC)	TEMP(℃)	Freq.Dev(Hz)	Deviation
100%	5	-30	163	0.0282
100%		-20	177	0.0306
100%		-10	159	0.0275
100%		0	127	0.0220
100%		+10	179	0.0309
100%		+20	135	0.0233
100%		+30	130	0.0225
100%		+40	167	0.0289
100%		+50	127	0.0220
Low Battery power	4.5	+20	130	0.0225
High Battery power	5.5	+20	137	0.0237

U-NII-1:5150-5250MHz worst case at 802.11a middle channel（Ant2）				
Voltage(%)	Power(VDC)	TEMP(℃)	Freq.Dev(Hz)	Deviation
100%	5	-30	162	0.0312
100%		-20	177	0.0340
100%		-10	161	0.0310
100%		0	121	0.0233
100%		+10	183	0.0352
100%		+20	133	0.0256
100%		+30	133	0.0256
100%		+40	167	0.0321
100%		+50	121	0.0233
Low Battery power	4.5	+20	131	0.0252
High Battery power	5.5	+20	139	0.0267

U-NII-3:5725-5850MHz worst case at 802.11a middle channel（Ant2）				
Voltage(%)	Power(VDC)	TEMP(℃)	Freq.Dev(Hz)	Deviation
100%	5	-30	160	0.0277
100%		-20	180	0.0311
100%		-10	158	0.0273
100%		0	123	0.0213
100%		+10	178	0.0308
100%		+20	132	0.0228
100%		+30	132	0.0228
100%		+40	169	0.0292
100%		+50	127	0.0220
Low Battery power	4.5	+20	132	0.0228
High Battery power	5.5	+20	134	0.0232

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