TEST REPORT

Reference No.	:	WTX21X08081522W-1
FCC ID	:	2A24ZWR135G
Applicant	:	Shenzhen Ceres Technology Co., Ltd.
Address	:	Room 601, Floor 6, Building F, Songbai Road 1008, Sunshine Community, Xili Street, Nanshan District, Shenzhen
Product Name	:	Wireless Router
Test Model	:	WR135G-M30
Standards	:	FCC Part 15.407
Date of Receipt sample	:	Aug. 10, 2021
Date of Test	:	Aug. 10, 2021 to Aug. 26, 2021
Date of Issue	:	Aug. 26, 2021
Test Result	:	**Pass**

Remarks:
The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

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Report version

Version No.	Date of issue	Description
Rev.00	Aug. 26, 2021	Original
/	/	/

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	Shenzhen Ceres Technology Co., Ltd.
Address of applicant:	Room 601, Floor 6, Building F, Songbai Road 1008, Sunshine Community, Xili Street, Nanshan District, Shenzhen
Manufacturer:	Shenzhen C-DATA Technology Co.,Ltd Baoan Branch
Address of manufacturer:	Fl1, Bldg B, Wentao Industrial zone,Yingrenshiyongxin Village, Shiyan Street, Baoan district, Shenzhen,Guangdong, China

General Description of EUT	
Product Name:	Wireless Router
Trade Name:	/
Model No.:	WR135G-M30
Adding Model(s):	WR135G-M32
Rated Voltage:	DC12V
Battery Capacity:	/
Power Adapter 1:	Model:DCT12W120100US-A0 Input:AC100-240V, 50/60Hz, 0.3A max Output:DC12.0V,1A
Power Adapter 2:	Model:TS-A012-120010AW Input:AC100-240V, 50/60Hz, 0.4A Output:DC12.0V,1A
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 WR135G-M30, 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-VHT80
Frequency Range:	5150-5250MHz, 5725-5850MHz
RF Output Power:	5150-5250MHz:ANT 0:14.46dBm (Conducted) ANT 1:14.12dBm (Conducted) 5725-5850MHz: ANT 0:14.80dBm (Conducted) ANT 1:14.48dBm (Conducted)
Type of Modulation:	BPSK, QPSK,16QAM,64QAM,256QAM
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, Subparte.

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 "3646631+=" 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
802.11a	ANT 0	15	15	15	/	/	/	/	/	/	/	17	17	17
6Mbps	ANT 1	18	18	18	/	/	/	/	/	/	/	1C	1C	1C
802.11n-HT20 MCS0	ANT 0	16	16	16	/	/	/	/	/	/	/	17	17	17
	ANT 1	1A	1A	1E	/	/	/	/	/	/	/	1E	1E	1D
Mode	Ant.	NCB: 40MHz												
		5190	5230	5270	5310	5510	5550	5670	5710	5755	5795			
802.11n-HT40 MCS0	ANT 0	16	16	16/	/	/	/	/	/	17	17			
	ANT 1	19	1F	/	/	/	/	/	/					
Mode	Ant.	NCB: 80MHz												
		5210	5290	5530	5610	5690	5775							
802.11ac-VH80	ANT 0	17	/	/	/	/	18							
MCS0/Nss2	ANT 1	18	/	/	/	/	1B							

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: Waltek Testing Group (Shenzhen) Co., Ltd.

Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C. (518101）

FCC – Registration No.: 125990

Waltek Testing Group (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is 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 Waltek Testing Group (Shenzhen) 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
Note : 802.11ac-VHT20, 802.11ac-VHT40 covered by 802.11n-HT20 and 802.11n-HT40.		

Test Conditions	
Temperature:	22~25 °C
Relative Humidity:	45~55 %.
ATM Pressure:	1019 mbar

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
DC Cable	1.0	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-1075	Communication Tester	Rohde & Schwarz	CMW500	148650	2021-03-27	2022-03-26
SEMT-1063	GSM Tester	Rohde & Schwarz	CMU200	114403	2021-03-27	2022-03-26
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY41440400	2021-03-27	2022-03-26
SEMT-1079	Spectrum Analyzer	Agilent	N9020A	US47140102	2021-03-27	2022-03-26
SEMT-1080	Signal Generator	Agilent	83752A	3610A01453	2021-03-27	2022-03-26
SEMT-1081	Vector Signal Generator	Agilent	N5182A	MY47070202	2021-03-27	2022-03-26
SEMT-1028	Power Divider	Weinschel	1506A	PM204	2021-03-27	2022-03-26
SEMT-1082	Power Divider	RF-Lambda	RFLT4W5M18G	14110400027	2021-03-27	2022-03-26
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2021-03-27	2022-03-26
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2021-03-27	2022-03-26
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2021-04-12	2022-04-11
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2021-04-12	2022-04-11
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2021-03-19	2023-03-18
SEMT-1068	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2021-03-19	2023-03-18
SEMT-1042	Horn Antenna	ETS	3117	00086197	2021-03-19	2023-03-18
SEMT-1121	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170582	2021-04-27	2023-04-26
SEMT-1169	Pre-amplifier	Direction Systems Inc.	PAP-2640	14145-14153	2021-04-27	2022-04-26
SEMT-1163	Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2021-03-27	2022-03-26
SEMT-1166	Power Limiter	Agilent	N9356B	MY45450376	2021-03-27	2022-03-26
SEMT-1076	RF Switcher	Top Precision	RCS03-A2	/	2021-03-19	2023-03-18
SEMT-C001	Cable	Zheng DI	LL142-07-07-10M(A)	/	/	/
SEMT-C002	Cable	Zheng DI	ZT40-2.92J-2.92J-6M	/	/	/
SEMT-C003	Cable	Zheng DI	ZT40-2.92J-2.92J-2.5M	/	/	/
SEMT-C004	Cable	Zheng DI	2M0RFC	/	/	/
SEMT-C005	Cable	Zheng DI	1M0RFC	/	/	/
SEMT-C006	Cable	Zheng DI	1M0RFC	/	/	/

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)	Compliant

N/A: Not applicable.

3. Antenna Requirement

3.1 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.

3.2 Evaluation Information

This product has two External antennas, fulfill the requirement of this section. And the signals at the antennas are completely uncorrelated.

4. Automatically Discontinue Transmission

4.1 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.

4.2 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.

5. Power Spectral Density

5.1 Standard Applicable

Section 15.407(a) Power limits:

(1) For the band 5.15-5.25GHz.
(iv) For mobile and portable client devices in the 5.15-5.25GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250mW provided the maximum antenna gain does not exceed 6dBi. In addition, the maximum power spectral density shall not exceed 11dBm 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 6dBi.

(2) For the 5.25-5.35GHz and 5.47-5.725GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250mW or 11dBm + 10 log B, where B is the 26dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6dBi 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 6dBi.

(3) For the band 5.725-5.85GHz, 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 30dBm in any 500kHz band. If transmitting antennas of directional gain greater than 6dBi 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 6dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6dBi 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.

5.2 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 5.15-5.25GHz, 5.25-5.35GHz, and 5.47-5.725GHz, the above procedures make use of 1MHz RBW to satisfy directly the 1MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85GHz, the rules specify a measurement bandwidth of 500kHz. Many spectrum analyzers do not have 500kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1MHz, or 500kHz, “provided that the measured power is integrated over the full reference bandwidth” to show the total power over the specified measurement bandwidth (i.e., 1MHz, or 500kHz). If

measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500kHz) 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 500kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
d) If measurement bandwidth of Maximum PSD is specified in 1MHz, add 10log(1MHz/RBW) to the measured result, whereas RBW (< 1MHz) 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 100kHz for the sections 5.c) and 5.d) above, since RBW=100kHZ is available on nearly all spectrum analyzers.

5.3 Summary of Test Results/Plots

Please refer to Appendix A

6. Emission Bandwidth and Occupied Bandwidth

6.1 Standard Applicable

According to 15.407(a) and (e):

(1) For the band 5.15-5.25GHz.
(iv) For mobile and portable client devices in the 5.15-5.25GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250mW provided the maximum antenna gain does not exceed 6dBi. In addition, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6dBi 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 6dBi.

(2) For the 5.25-5.35GHz and 5.47-5.725GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250mW or 11dBm + 10 log B, where B is the 26dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6dBi 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 6dBi.

(3) For the band 5.725-5.85GHz, 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 30dBm in any 500kHz band. If transmitting antennas of directional gain greater than 6dBi 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 6dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6dBi 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 5.725-5.85GHz band, the minimum 6dB bandwidth of U-NII devices shall be at least 500kHz.

6.2 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 26dB 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 5.725-5.85GHz
Section 15.407(e) specifies the minimum 6dB emission bandwidth of at least 500KHz for the band 5.715-5.85GHz. The following procedure shall be used for measuring this bandwidth:
a) Set RBW = 100kHz.
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.

6.3 Summary of Test Results/Plots

Please refer to Appendix B

7. Maximum Conducted Output Power

7.1 Standard Applicable

Section 15.407(a) Power limits:

(1) For the band 5.15-5.25GHz.
(iv) For mobile and portable client devices in the 5.15-5.25GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250mW provided the maximum antenna gain does not exceed 6dBi. In addition, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6dBi 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 6dBi.

(2) For the 5.25-5.35GHz and 5.47-5.725GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250mW or 11dBm + 10 log B, where B is the 26dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6dBi 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 6dBi.

(3) For the band 5.725-5.85GHz, 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 30dBm in any 500kHz band. If transmitting antennas of directional gain greater than 6dBi 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 6dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6dBi 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 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 = 1MHz.

(iii) Set VBW ≥ 3MHz.

(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.

7.3 Summary of Test Results/Plots

Please refer to Appendix C

8. Radiated Spurious Emissions

8.1 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 5.15-5.25GHz band: All emissions outside of the 5.15-5.35GHz band shall not exceed an e.i.r.p. of −27dBm/MHz.

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

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

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

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

According to §15.407(b)(6), Unwanted emissions below 1GHz 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.

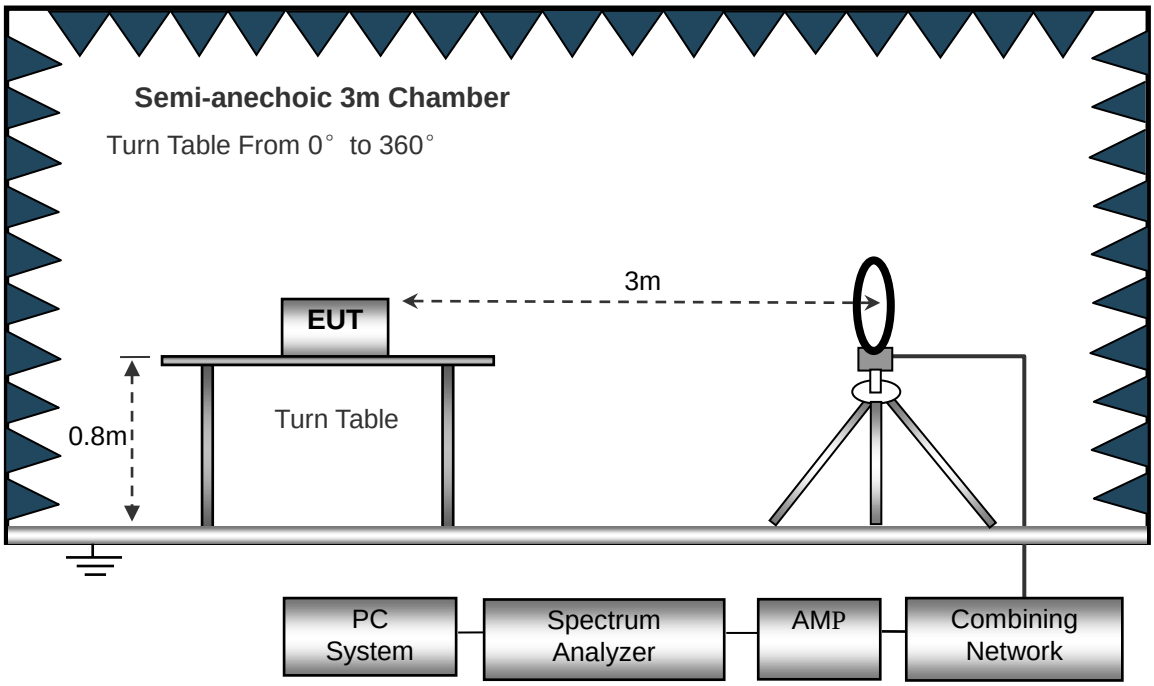
8.2 Test Procedure

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..

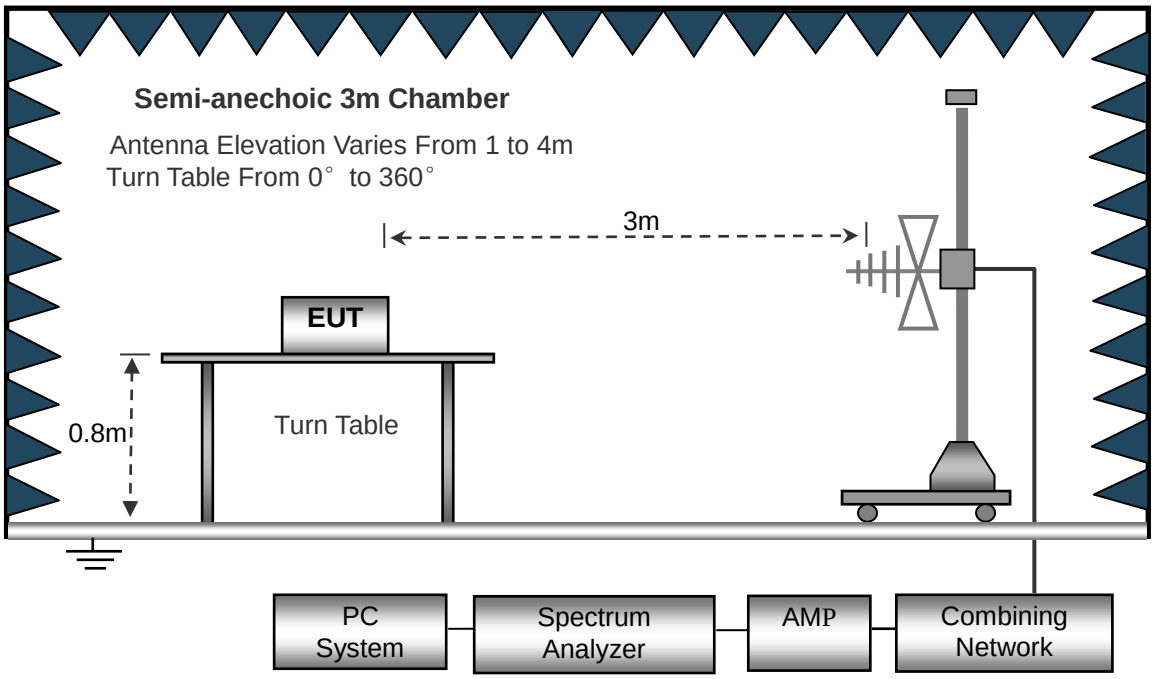
The external I/O cables were draped along the test table and formed a bundle 30 to 40cm long in the middle.

The spacing between the peripherals was 10cm.

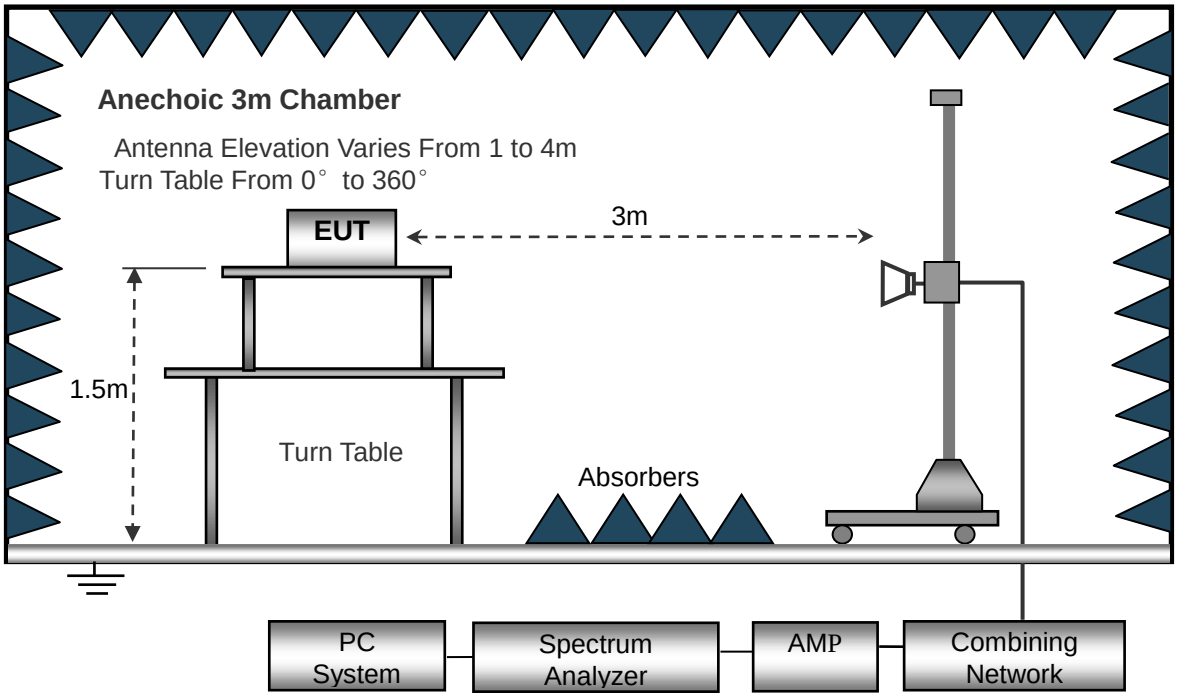
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1GHz.



8.3 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

8.4 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

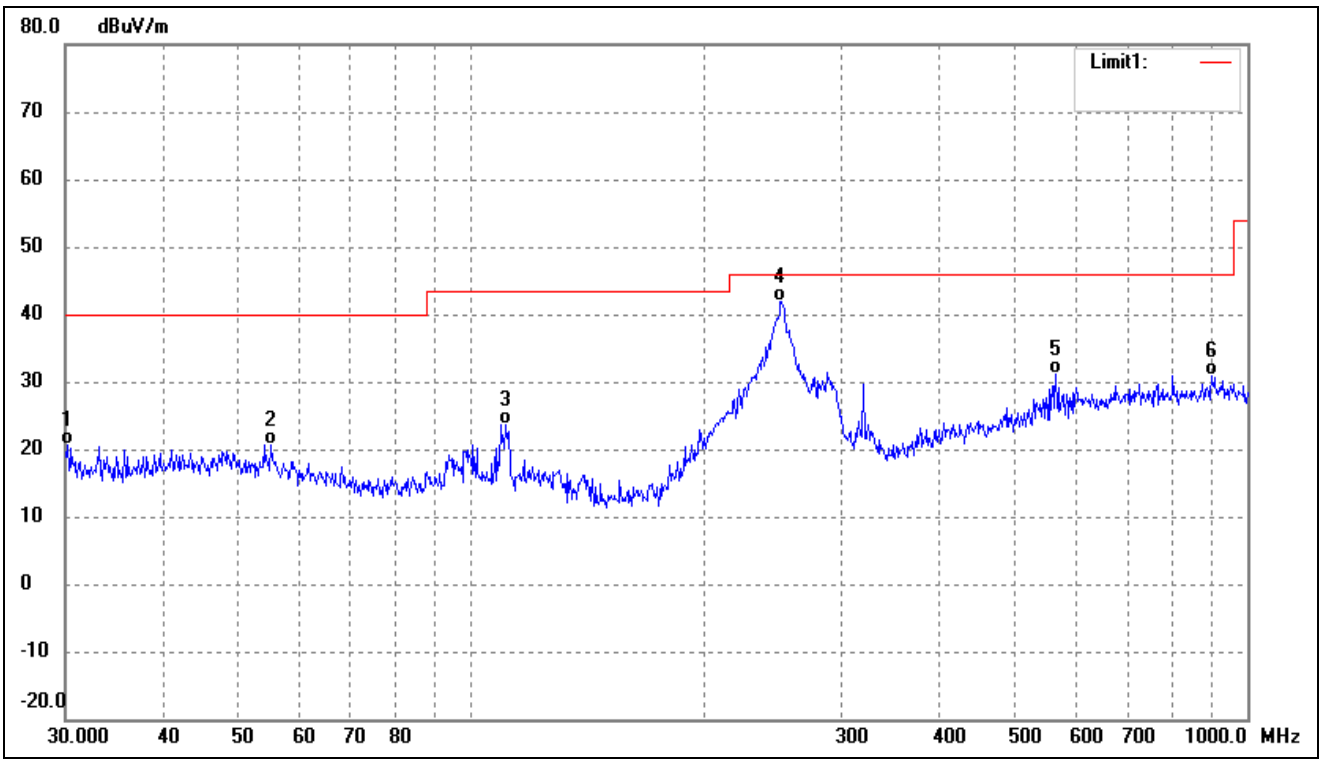
8.5 Summary of Test Results/Plots

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

- Spurious Emission From 30MHz to 1GHz

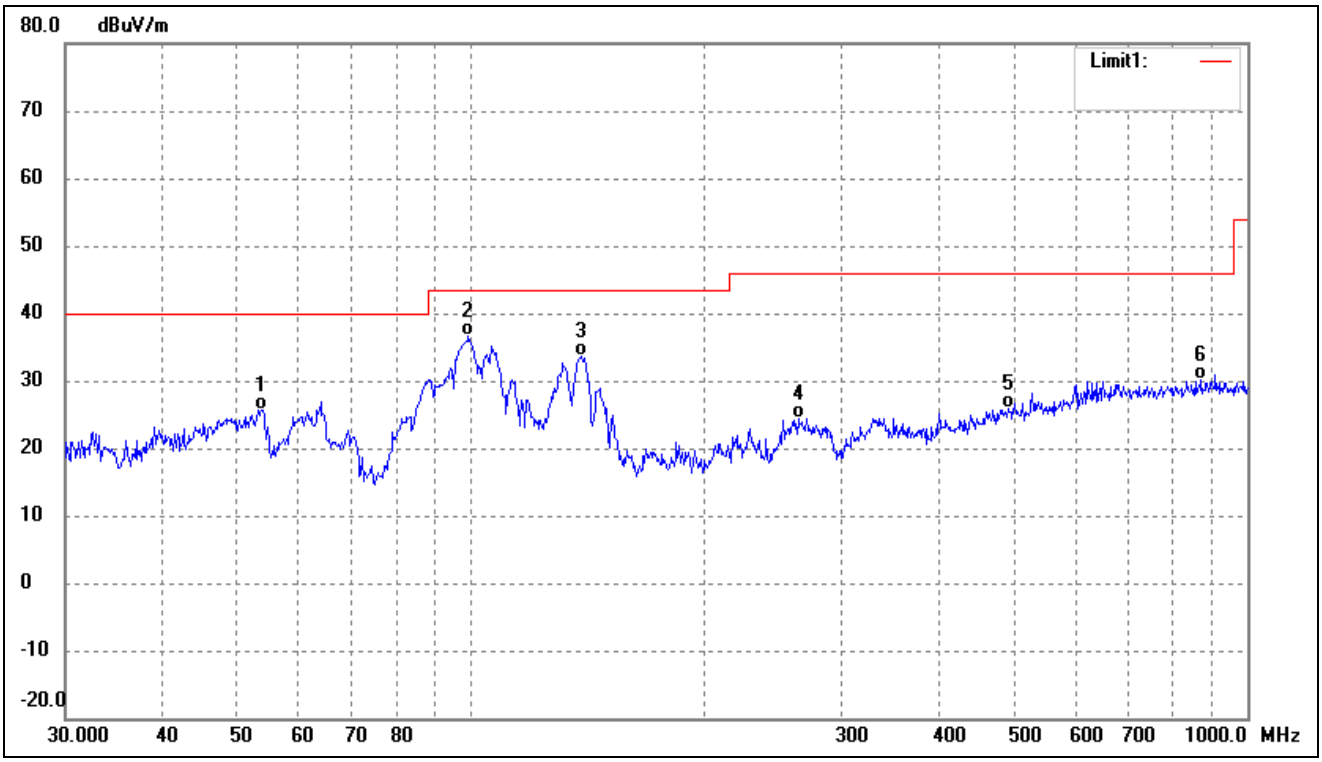
- Antenna 0(Worst case)
- 5150-5250MHz

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



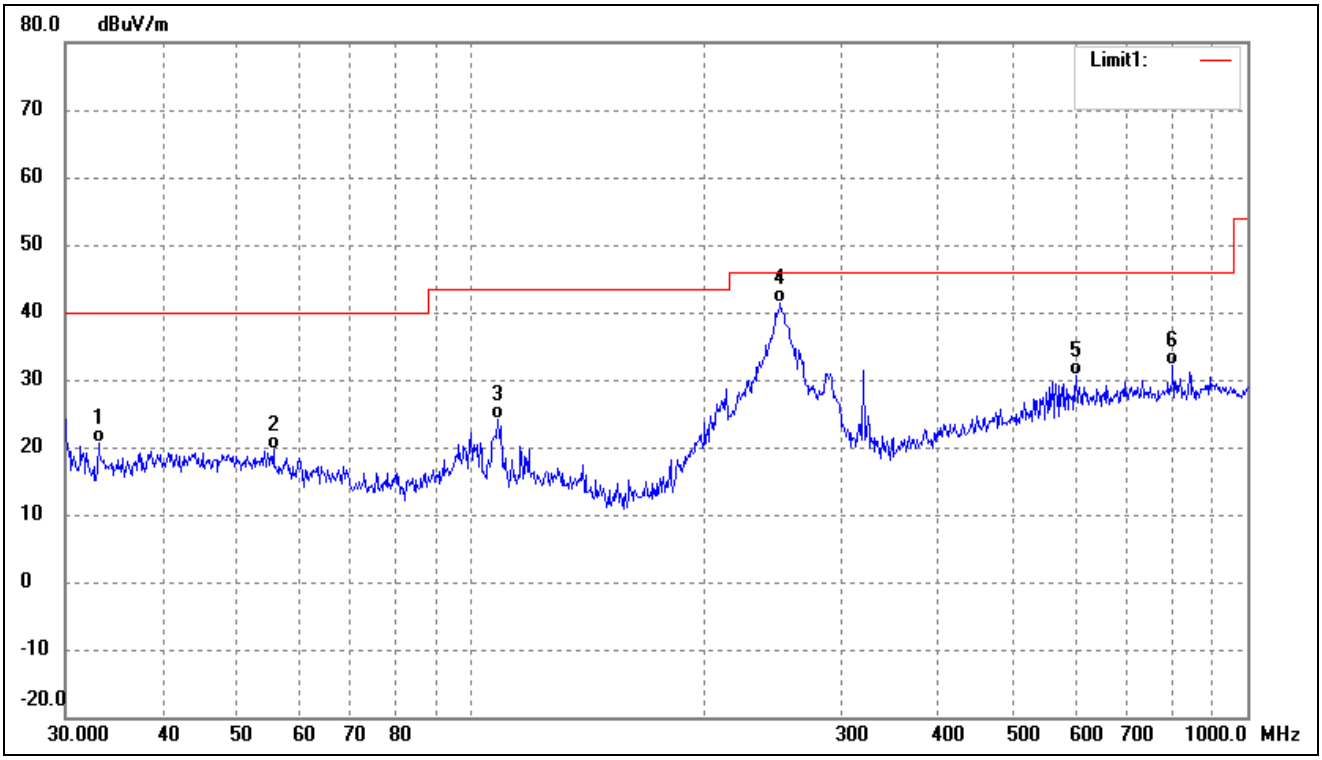
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	30.2111	30.10	-9.41	20.69	40.00	-19.31	-	-	QP
2	55.2207	28.46	-7.73	20.73	40.00	-19.27	-	-	QP
3	110.9571	32.56	-8.94	23.62	43.50	-19.88	-	-	QP
4	250.3012	50.20	-8.31	41.89	46.00	-4.11	-	-	QP
5	566.6223	31.43	-0.20	31.23	46.00	-14.77	-	-	QP
6	900.1474	28.18	2.75	30.93	46.00	-15.07	-	-	QP

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



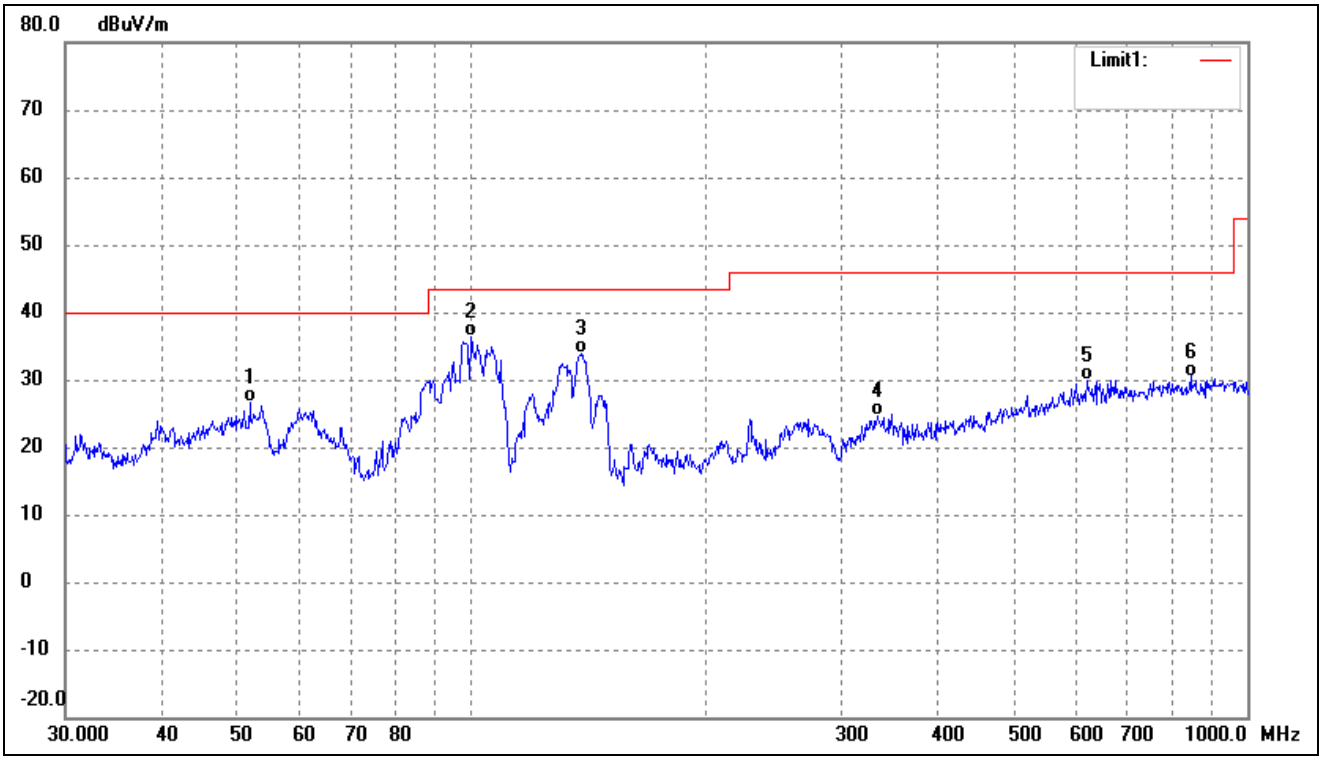
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	53.6932	33.23	-7.49	25.74	40.00	-14.26	-	-	QP
2	99.1797	45.39	-8.88	36.51	43.50	-6.99	-	-	QP
3	138.3873	45.73	-12.13	33.60	43.50	-9.90	-	-	QP
4	263.8190	32.39	-7.94	24.45	46.00	-21.55	-	-	QP
5	492.4685	27.36	-1.49	25.87	46.00	-20.13	-	-	QP
6	872.1832	27.56	2.55	30.11	46.00	-15.89	-	-	QP

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



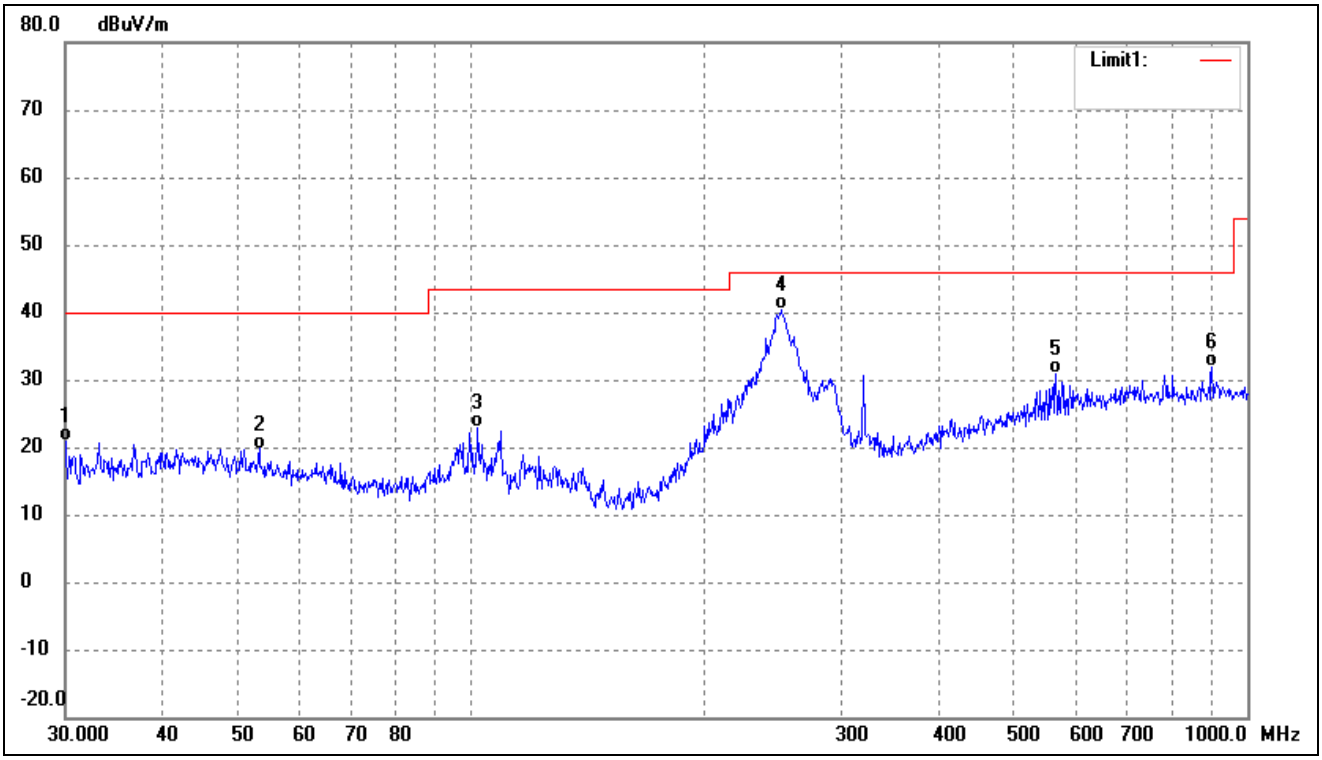
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	33.0950	29.41	-8.69	20.72	40.00	-19.28	-	-	QP
2	55.6094	27.52	-7.78	19.74	40.00	-20.26	-	-	QP
3	108.2667	32.90	-8.85	24.05	43.50	-19.45	-	-	QP
4	250.3012	49.61	-8.31	41.30	46.00	-4.70	-	-	QP
5	601.4265	30.15	0.39	30.54	46.00	-15.46	-	-	QP
6	801.7863	30.02	2.10	32.12	46.00	-13.88	-	-	QP

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



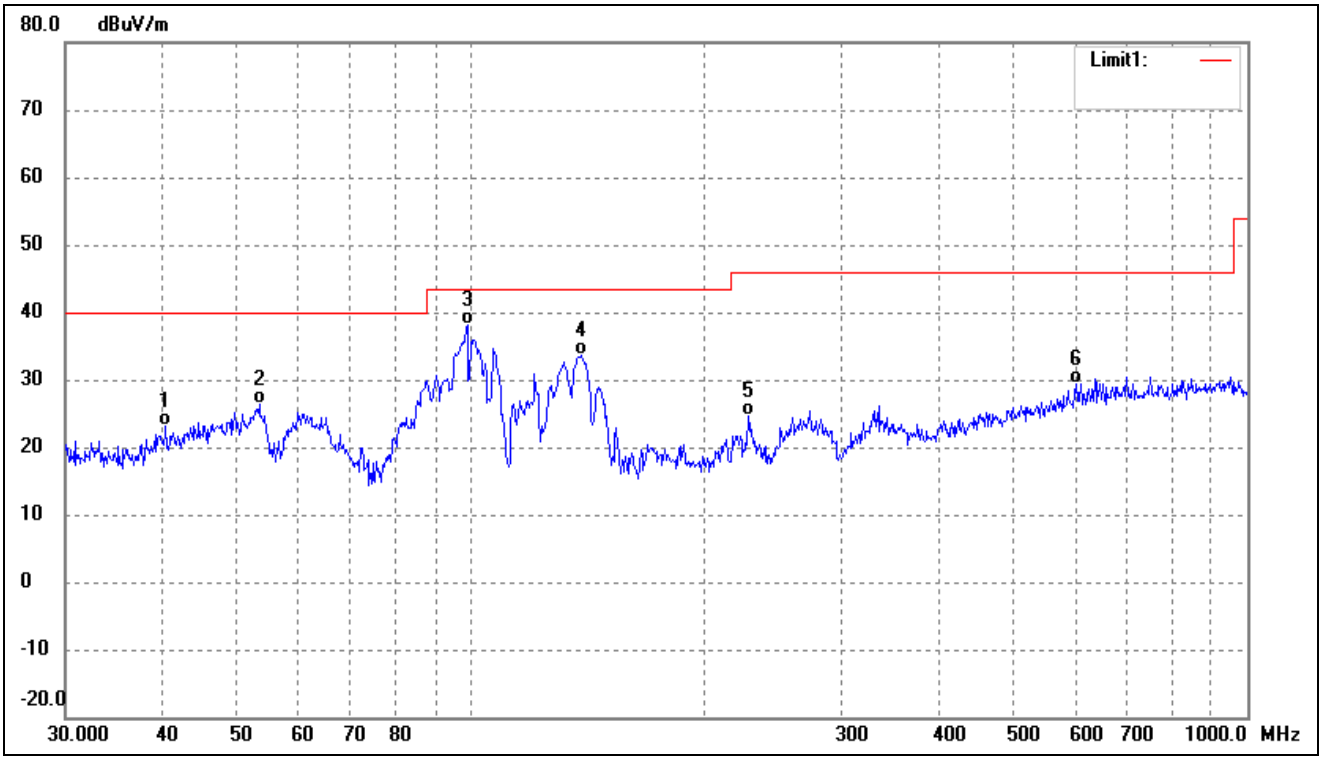
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	51.8430	33.85	-7.23	26.62	40.00	-13.38	-	-	QP
2	99.8777	45.15	-8.75	36.40	43.50	-7.10	-	-	QP
3	138.3873	45.97	-12.13	33.84	43.50	-9.66	-	-	QP
4	333.6867	30.58	-5.91	24.67	46.00	-21.33	-	-	QP
5	620.7096	29.34	0.60	29.94	46.00	-16.06	-	-	QP
6	845.0878	28.14	2.36	30.50	46.00	-15.50	-	-	QP

802.11a(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	30.0000	30.31	-9.45	20.86	40.00	-19.14	-	-	QP
2	53.3179	27.20	-7.45	19.75	40.00	-20.25	-	-	QP
3	102.0014	31.75	-8.76	22.99	43.50	-20.51	-	-	QP
4	251.1804	48.62	-8.28	40.34	46.00	-5.66	-	-	QP
5	566.6223	31.13	-0.20	30.93	46.00	-15.07	-	-	QP
6	900.1474	29.01	2.75	31.76	46.00	-14.24	-	-	QP

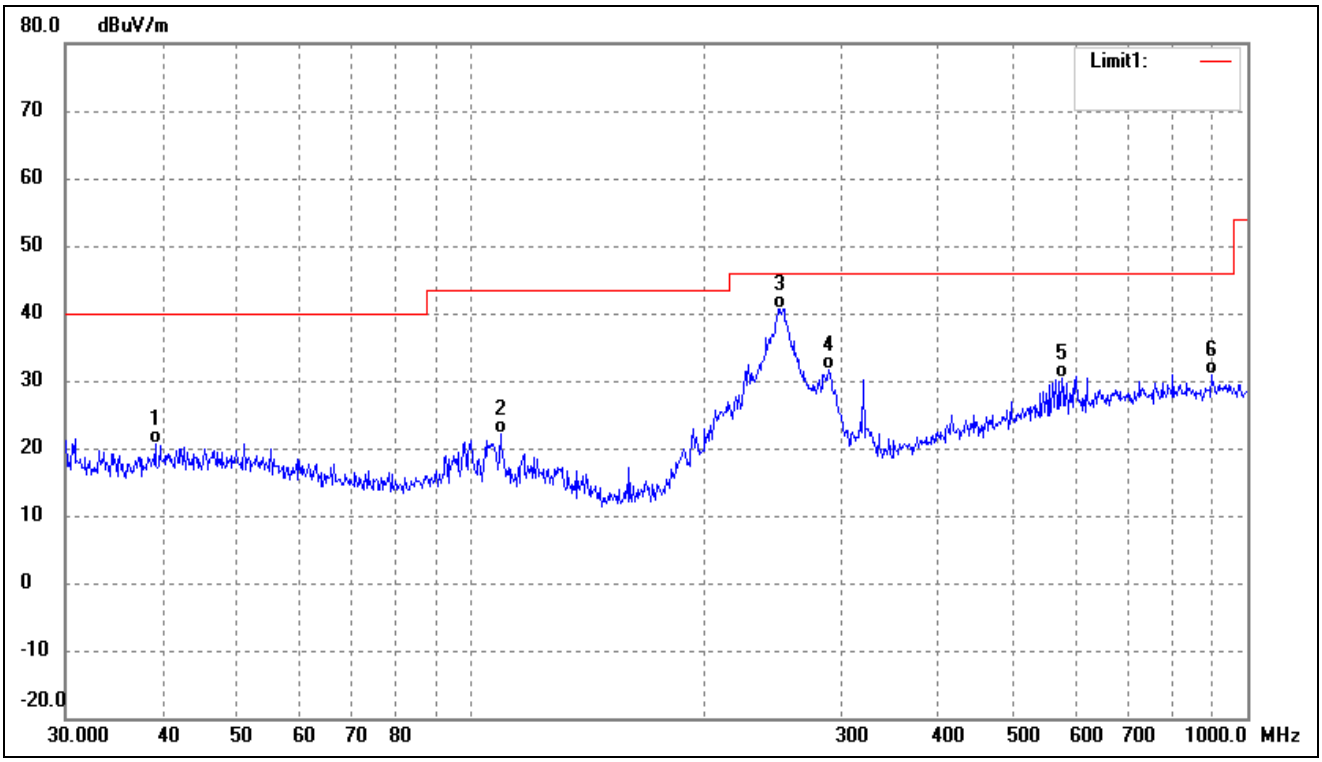
802.11a(Worst case)			
Test Channel	5240MHz	Polarity:	Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	40.4172	30.20	-6.99	23.21	40.00	-16.79	-	-	QP
2	53.3179	33.72	-7.45	26.27	40.00	-13.73	-	-	QP
3	98.8326	47.13	-8.94	38.19	43.50	-5.31	-	-	QP
4	138.3873	45.74	-12.13	33.61	43.50	-9.89	-	-	QP
5	227.6906	33.53	-8.94	24.59	46.00	-21.41	-	-	QP
6	601.4265	29.10	0.39	29.49	46.00	-16.51	-	-	QP

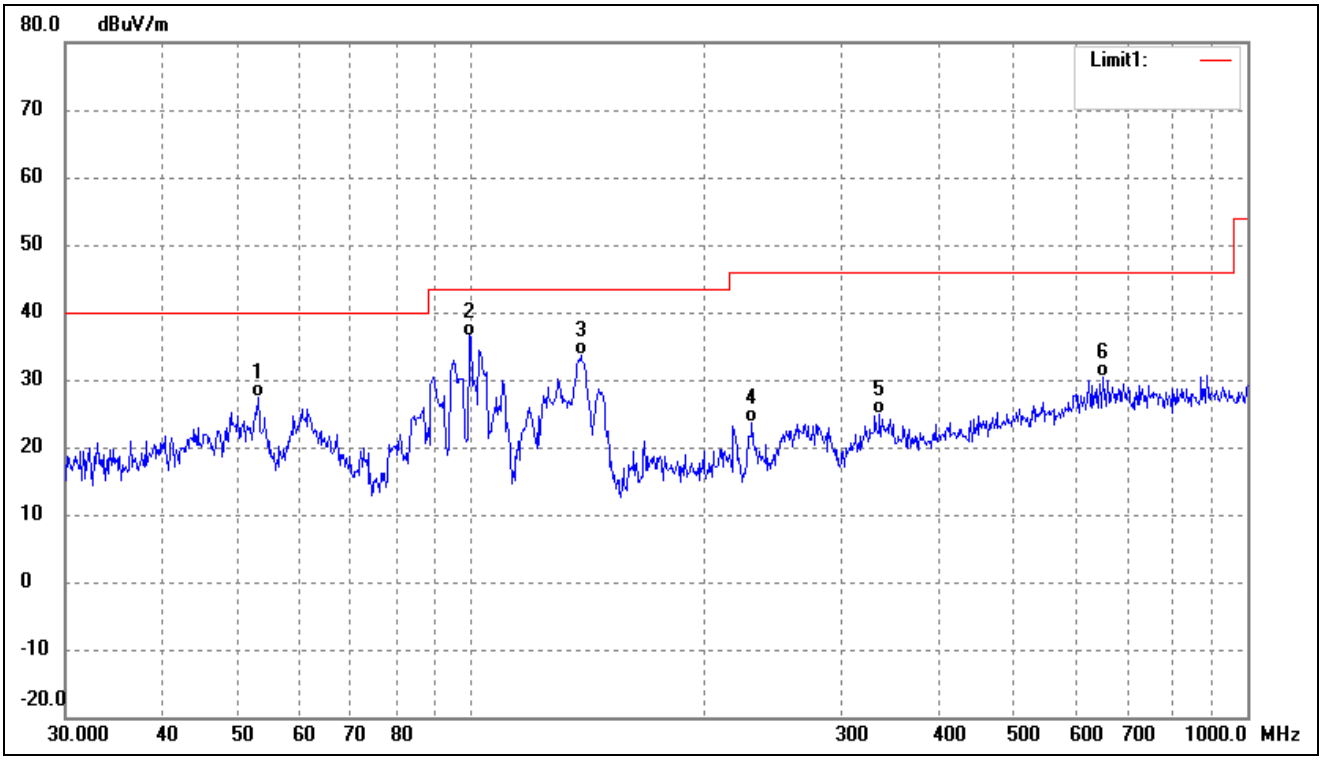
➢ 5725-5850MHz

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



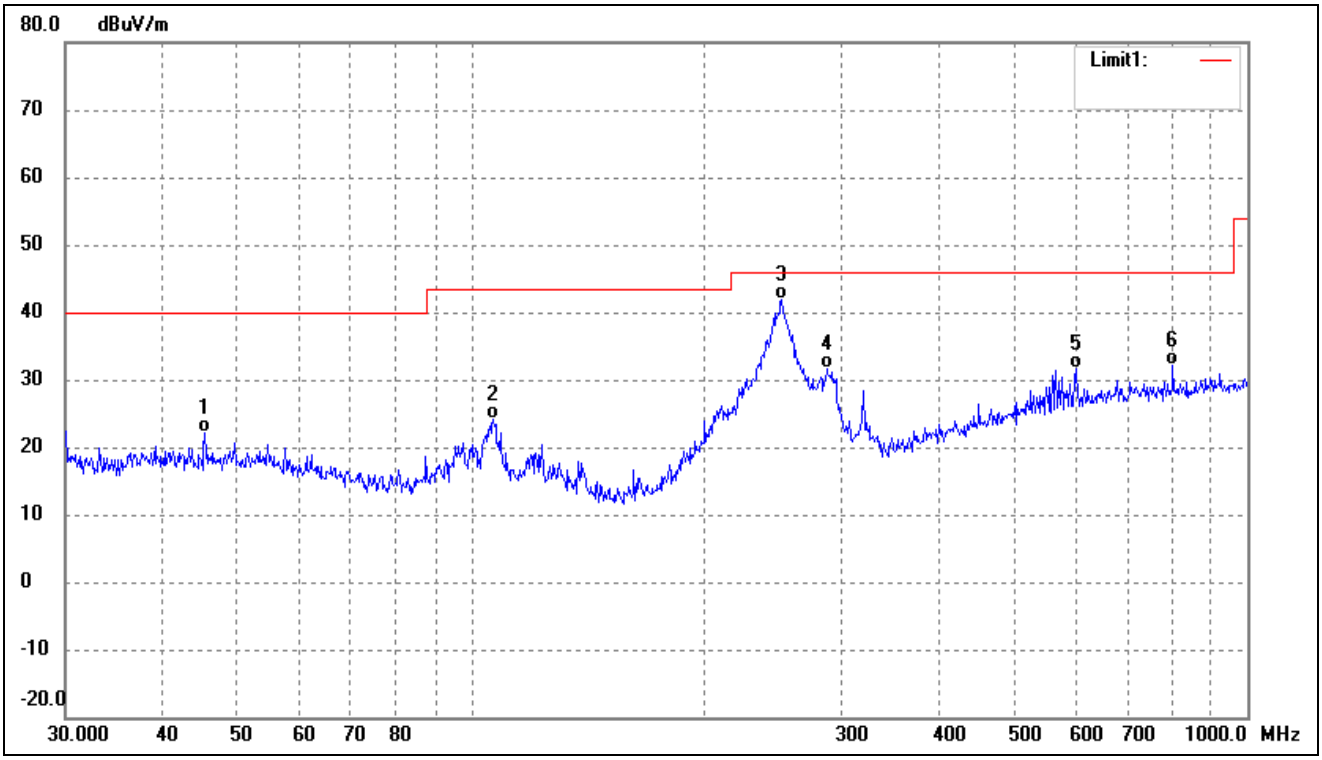
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	39.1616	27.73	-7.21	20.52	40.00	-19.48	-	-	QP
2	109.0286	31.01	-8.85	22.16	43.50	-21.34	-	-	QP
3	250.3012	49.03	-8.31	40.72	46.00	-5.28	-	-	QP
4	289.0021	38.76	-7.24	31.52	46.00	-14.48	-	-	QP
5	576.6443	30.30	-0.03	30.27	46.00	-15.73	-	-	QP
6	900.1474	28.06	2.75	30.81	46.00	-15.19	-	-	QP

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



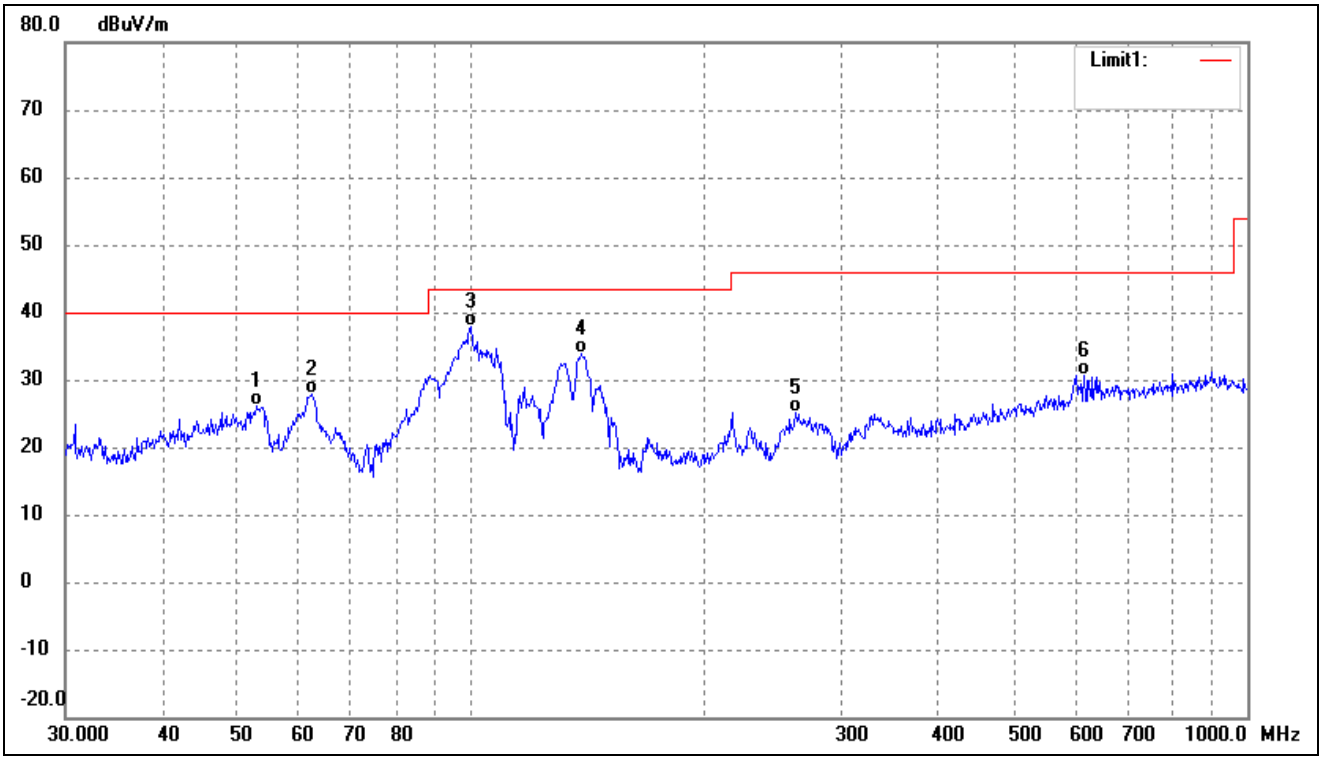
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	53.1313	34.91	-7.42	27.49	40.00	-12.51	-	-	QP
2	99.5281	45.31	-8.81	36.50	43.50	-7.00	-	-	QP
3	138.3873	45.66	-12.13	33.53	43.50	-9.97	-	-	QP
4	230.0985	32.59	-8.88	23.71	46.00	-22.29	-	-	QP
5	336.0352	30.67	-5.83	24.84	46.00	-21.16	-	-	QP
6	651.9417	29.42	0.94	30.36	46.00	-15.64	-	-	QP

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



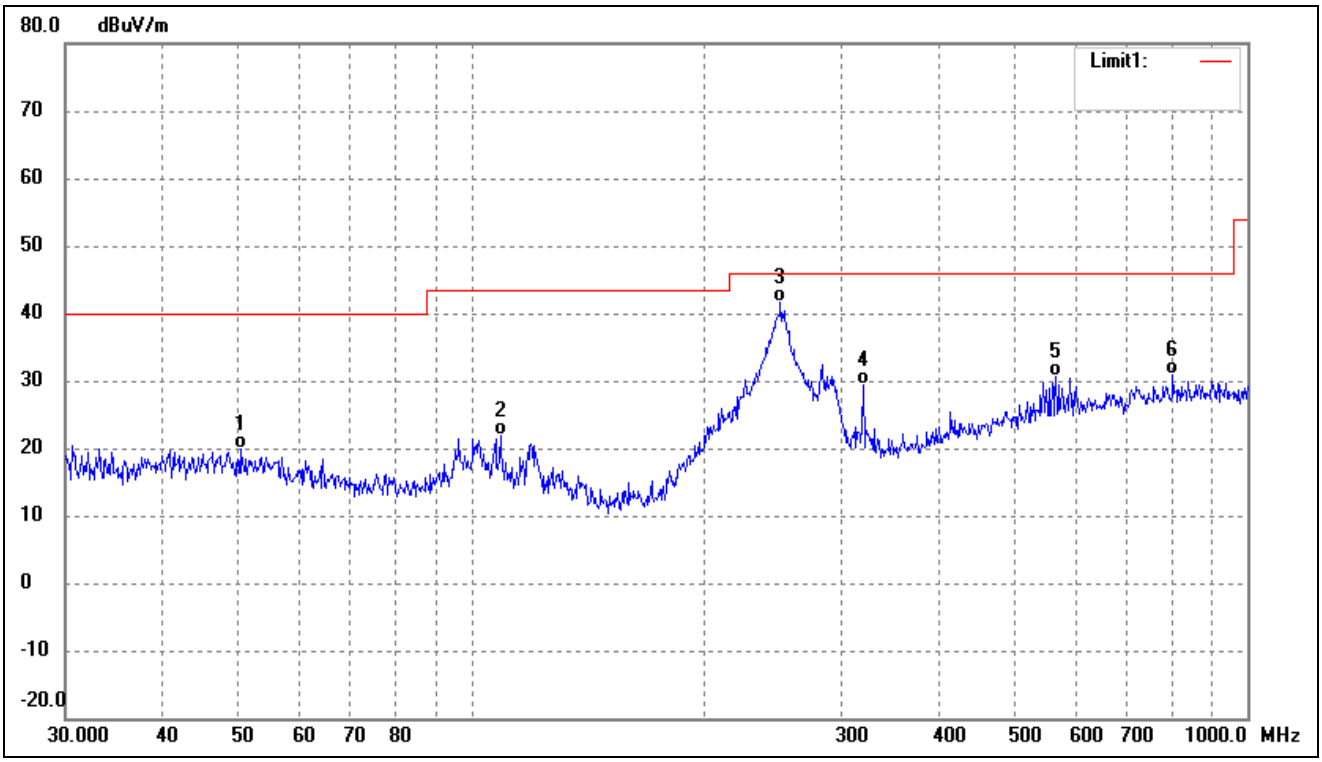
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	45.3755	28.98	-6.97	22.01	40.00	-17.99	-	-	QP
2	106.7587	33.08	-8.83	24.25	43.50	-19.25	-	-	QP
3	251.1804	50.28	-8.28	42.00	46.00	-4.00	-	-	QP
4	286.9823	38.96	-7.31	31.65	46.00	-14.35	-	-	QP
5	601.4265	31.33	0.39	31.72	46.00	-14.28	-	-	QP
6	801.7863	30.00	2.10	32.10	46.00	-13.90	-	-	QP

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



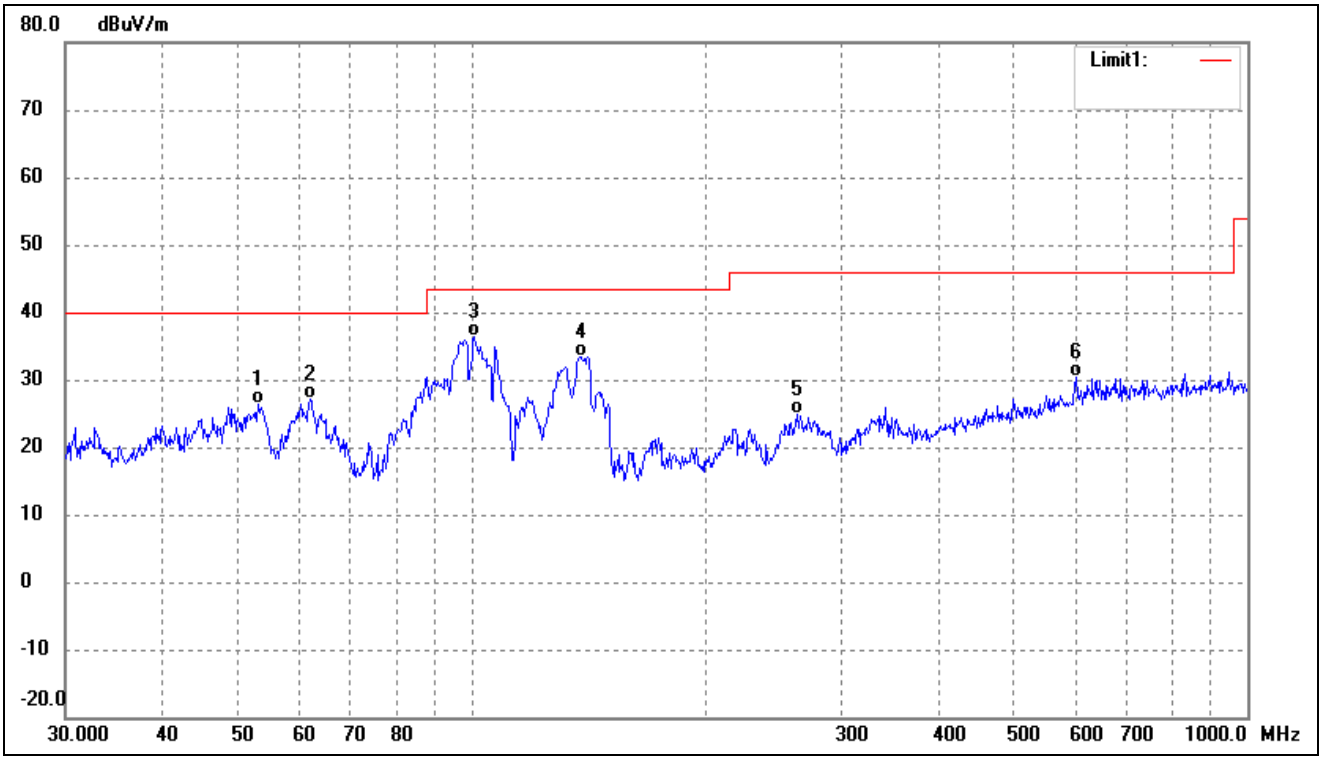
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	52.9453	33.58	-7.39	26.19	40.00	-13.81	-	-	QP
2	62.4314	36.77	-8.85	27.92	40.00	-12.08	-	-	QP
3	99.8777	46.54	-8.75	37.79	43.50	-5.71	-	-	QP
4	138.3873	45.94	-12.13	33.81	43.50	-9.69	-	-	QP
5	261.9753	33.06	-7.98	25.08	46.00	-20.92	-	-	QP
6	616.3718	29.96	0.55	30.51	46.00	-15.49	-	-	QP

802.11a(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	50.4089	26.78	-7.02	19.76	40.00	-20.24	-	-	QP
2	109.0286	30.71	-8.85	21.86	43.50	-21.64	-	-	QP
3	250.3012	49.92	-8.31	41.61	46.00	-4.39	-	-	QP
4	319.9370	35.71	-6.34	29.37	46.00	-16.63	-	-	QP
5	566.6223	30.82	-0.20	30.62	46.00	-15.38	-	-	QP
6	801.7863	28.66	2.10	30.76	46.00	-15.24	-	-	QP

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



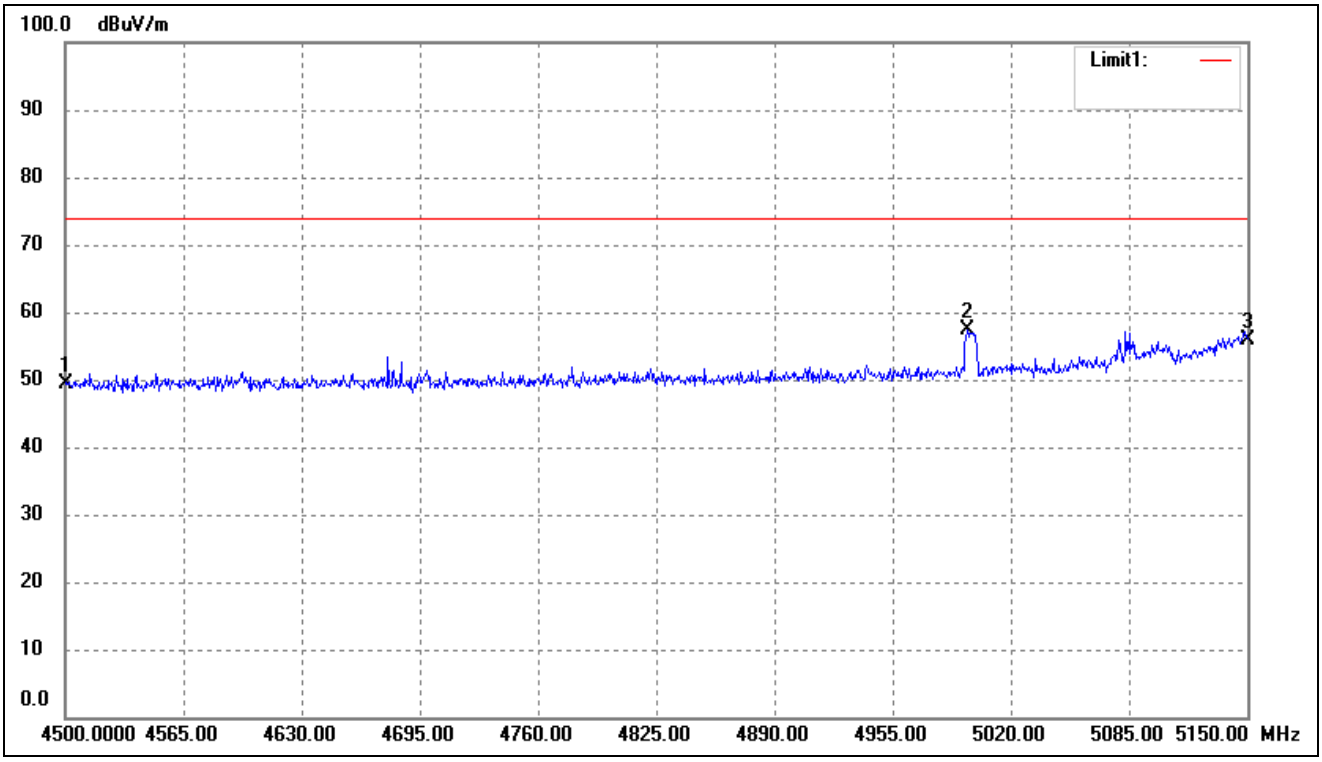
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	53.1313	33.70	-7.42	26.28	40.00	-13.72	-	-	QP
2	61.9951	35.79	-8.78	27.01	40.00	-12.99	-	-	QP
3	100.9340	45.00	-8.74	36.26	43.50	-7.24	-	-	QP
4	138.8735	45.60	-12.18	33.42	43.50	-10.08	-	-	QP
5	262.8955	32.91	-7.96	24.95	46.00	-21.05	-	-	QP
6	601.4265	29.96	0.39	30.35	46.00	-15.65	-	-	QP

Remark: '-'Means' the test Degree and Height are not recorded by the test software and only show the worst case in the test report.

- Spurious Emission above 1GHz

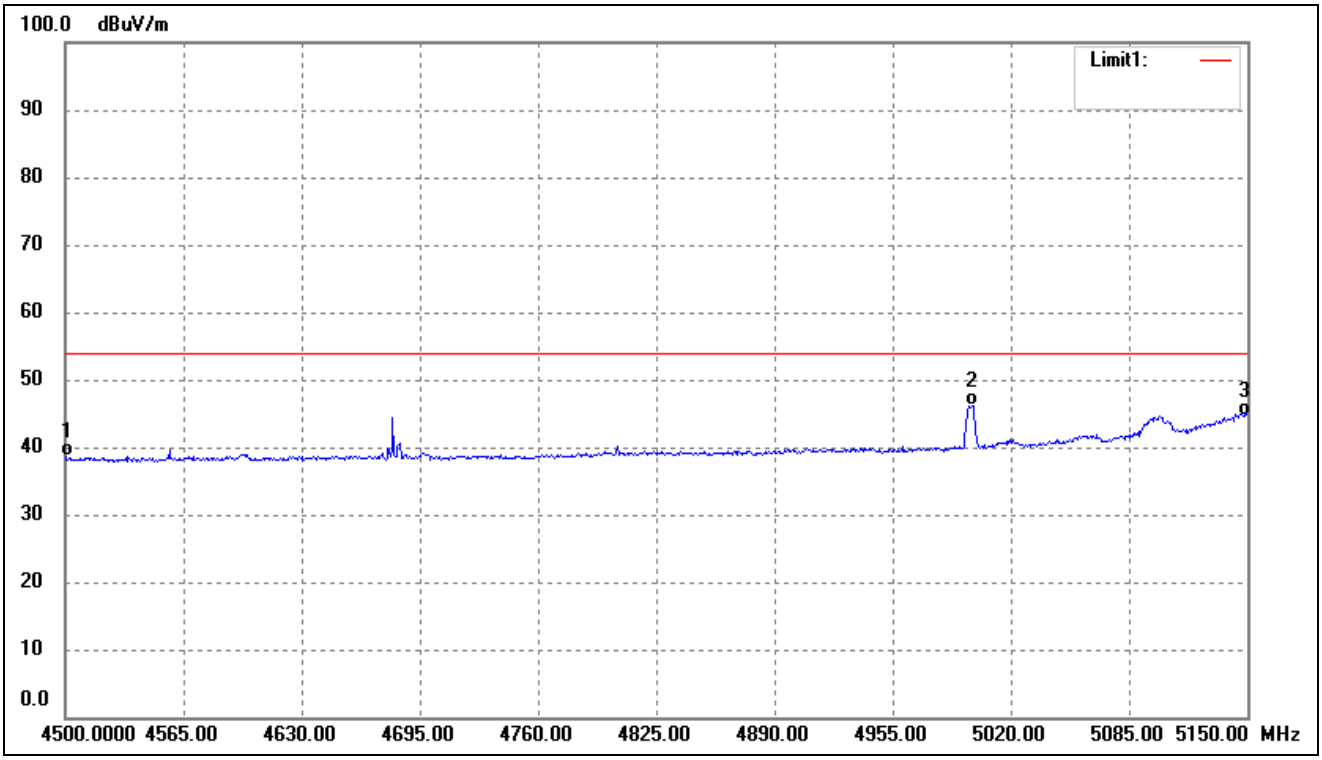
- Antenna 0(worst case)

802.11a- Restricted Bandedge (worst case)			
Test Channel	band 4.50-5.15GHz	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	50.66	-1.32	49.34	74.00	-24.66	-	-	peak
2	4995.950	57.79	-0.41	57.38	74.00	-16.62	-	-	peak
3	5150.000	55.97	-0.10	55.87	74.00	-18.13	-	-	peak

802.11a- Restricted Bandedge (worst case)			
Test Channel	band 4.52-5.15GHz	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	39.96	-1.32	38.64	54.00	-15.36	-	-	AVG
2	4998.550	46.48	-0.41	46.07	54.00	-7.93	-	-	AVG
3	5150.000	44.78	-0.10	44.68	54.00	-9.32	-	-	AVG

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

Remark: '-'Means' the test Degree and Height is not recorded by the test software and only show the worst case in the test report.

- Antenna 0(worst case)
- For the frequency band 5.15-5.25GHz, 5.725-5.850GHz (802.11a)
- 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	58.98	7.11	66.09	74	-7.91	H	PK
15540	39.16	8.22	47.38	54	-6.62	H	AV
10360	57.93	7.11	65.04	74	-8.96	V	PK
15540	38.82	8.22	47.04	54	-6.96	V	AV
Middle Channel (5200MHz)							
10400	57.79	7.22	65.01	74	-8.99	H	PK
15600	37.12	8.67	45.79	54	-8.21	H	AV
10400	52.53	7.22	59.75	74	-14.25	V	PK
15600	39.08	8.67	47.75	54	-6.25	V	AV
High Channel (5240MHz)							
10480	54.59	7.69	62.28	74	-11.72	H	PK
15720	37.46	8.93	46.39	54	-7.61	H	AV
10480	52.41	7.22	59.63	74	-14.37	V	PK
15720	37.88	8.67	46.55	54	-7.45	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	54.43	9.45	63.88	74	-10.12	H	PK
17235	35.31	10.36	45.67	54	-8.33	H	AV
11490	58.60	9.45	68.05	74	-5.95	V	PK
17235	36.39	10.36	46.75	54	-7.25	V	AV
Middle Channel (5785MHz)							
11570	56.86	9.62	66.48	74	-7.52	H	PK
17355	37.36	10.67	48.03	54	-5.97	H	AV
11570	55.23	9.62	64.85	74	-9.15	V	PK
17355	33.61	10.67	44.28	54	-9.72	V	AV
High Channel (5825MHz)							
11650	56.53	9.84	66.37	74	-7.63	H	PK
17475	34.55	10.95	45.50	54	-8.50	H	AV
11650	53.91	9.84	63.75	74	-10.25	V	PK
17475	38.36	10.95	49.31	54	-4.69	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	54.43	9.45	63.88	74	-10.12	H	PK
17235	35.31	10.36	45.67	54	-8.33	H	AV
11490	58.60	9.45	68.05	74	-5.95	V	PK
17235	36.39	10.36	46.75	54	-7.25	V	AV
Middle Channel (5785MHz)							
11570	56.86	9.62	66.48	74	-7.52	H	PK
17355	37.36	10.67	48.03	54	-5.97	H	AV
11570	55.23	9.62	64.85	74	-9.15	V	PK
17355	33.61	10.67	44.28	54	-9.72	V	AV
High Channel (5825MHz)							
11650	56.53	9.84	66.37	74	-7.63	H	PK
17475	34.55	10.95	45.50	54	-8.50	H	AV
11650	53.91	9.84	63.75	74	-10.25	V	PK
17475	38.36	10.95	49.31	54	-4.69	V	AV

- Out of Band edge for 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-31.02	-27
Highest	Above 5350	-41.18	-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	-33.44	-27
	5715 to 5725	-23.56	-17
Highest	5850 to 5860	-32.15	-17
	Above 5860	-38.45	-27
Note: the data just list the worst cases			

- 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	59.53	7.11	66.64	74	-7.36	H	PK
10360	39.86	7.11	46.97	54	-7.03	H	AV
10360	58.48	7.11	65.59	74	-8.41	H	PK
10360	39.5	7.11	46.61	54	-7.39	H	AV
High Channel (5240MHz)							
10480	61.57	7.1	68.67	74	-5.33	H	PK
10480	39.46	7.1	46.56	54	-7.44	H	AV
10480	60.26	7.1	67.36	74	-6.64	V	PK
10480	40.4	7.1	47.5	54	-6.5	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	60.48	9.02	69.5	74	-4.5	H	PK
11490	40.8	9.02	49.82	54	-4.18	H	AV
11490	60.94	9.02	69.96	74	-4.04	V	PK
11490	40.84	9.02	49.86	54	-4.14	V	AV
High Channel (5825MHz)							
11610	58.76	8.94	67.7	74	-6.3	H	PK
11610	41.47	8.94	50.41	54	-3.59	H	AV
11610	59.81	8.94	68.75	74	-5.25	V	PK
11610	40.41	8.94	49.35	54	-4.65	V	AV

- Out of Band edge for 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-41.25	-27
Highest	Above 5350	-37.18	-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	-39.52	-27
	5715 to 5725	-29.44	-17
Highest	5850 to 5860	-37.52	-17
	Above 5860	-27.46	-27
Note: the data just list the worst cases.			

- For the frequency band 5.15-5.25GHz5.725-5.850GHz (802.11n HT20)
- 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	59.94	7.11	67.05	74	-6.95	H	PK
15540	38.17	8.22	46.39	54	-7.61	H	AV
10360	60.85	7.11	67.96	74	-6.04	V	PK
15540	36.00	8.22	44.22	54	-9.78	V	AV
Middle Channel (5200MHz)							
10400	57.17	7.22	64.39	74	-9.61	H	PK
15600	34.24	8.67	42.91	54	-11.09	H	AV
10400	57.93	7.22	65.15	74	-8.85	V	PK
15600	39.26	8.67	47.93	54	-6.07	V	AV
High Channel (5240MHz)							
10480	56.87	7.69	64.56	74	-9.44	H	PK
15720	34.12	8.93	43.05	54	-10.95	H	AV
10480	58.27	7.69	65.96	74	-8.04	V	PK
15720	39.03	8.93	47.96	54	-6.04	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	57.37	9.45	66.82	74	-7.18	H	PK
17235	36.19	10.36	46.55	54	-7.45	H	AV
11490	54.68	9.45	64.13	74	-9.87	V	PK
17235	37.86	10.36	48.22	54	-5.78	V	AV
Middle Channel (5785MHz)							
11570	58.89	9.62	68.51	74	-5.49	H	PK
17355	34.02	10.67	44.69	54	-9.31	H	AV
11570	58.41	9.62	68.03	74	-5.97	V	PK
17355	36.53	10.67	47.20	54	-6.80	V	AV
High Channel (5825MHz)							
11650	54.19	9.84	64.03	74	-9.97	H	PK
17475	34.73	10.95	45.68	54	-8.32	H	AV
11650	57.19	9.84	67.03	74	-6.97	V	PK
17475	36.33	10.95	47.28	54	-6.72	V	AV

- Out of Band edge 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-30.68	-27
Highest	Above 5350	-41.93	-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	-33.88	-27
	5715 to 5725	-23.93	-17
Highest	5850 to 5860	-31.28	-17
	Above 5860	-38.69	-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)
- 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	55.90	7.25	63.15	74	-10.85	H	PK
15570	36.04	8.33	44.37	54	-9.63	H	AV
10380	59.05	7.25	66.30	74	-7.70	V	PK
15570	37.54	8.33	45.87	54	-8.13	V	AV
High Channel (5230MHz)							
10460	56.71	7.54	64.25	74	-9.75	H	PK
15690	36.20	8.86	45.06	54	-8.94	H	AV
10460	58.69	7.54	66.23	74	-7.77	V	PK
15690	36.73	8.86	45.59	54	-8.41	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	54.81	9.65	64.46	74	-9.54	H	PK
17265	36.06	10.87	46.93	54	-7.07	H	AV
11510	55.94	9.65	65.59	74	-8.41	V	PK
17265	35.23	10.87	46.10	54	-7.90	V	AV
High Channel (5795MHz)							
11590	52.58	9.81	62.39	74	-11.61	H	PK
17385	34.32	10.89	45.21	54	-8.79	H	AV
11590	55.06	9.81	64.87	74	-9.13	V	PK
17385	35.98	10.89	46.87	54	-7.13	V	AV

- Out of Band edge for 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-31.41	-27
Highest	Above 5350	-41.06	-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	-32.89	-27
	5715 to 5725	-24.09	-17
Highest	5850 to 5860	-32.34	-17
	Above 5860	-38.35	-27
Note: the data just list the worst cases.			

- For the frequency band 5.15-5.25GHz, 5.725-5.850GHz (802.11ac VH80)
- 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	59.37	7.33	66.70	74	-7.30	H	PK
15630	36.37	8.75	45.12	54	-8.88	H	AV
10420	56.32	7.33	63.65	74	-10.35	H	PK
15630	33.68	8.75	42.43	54	-11.57	H	AV

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
5775MHz							
11550	56.88	9.54	66.42	74	-7.58	H	PK
17325	37.09	10.59	47.68	54	-6.32	H	AV
11550	55.67	9.54	65.21	74	-8.79	H	PK
17325	33.94	10.59	44.53	54	-9.47	H	AV

- Out of Band edge for 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-30.43	-27
Highest	Above 5350	-41.41	-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	-34.35	-27
	5715 to 5725	-23.92	-17
Highest	5850 to 5860	-31.31	-17
	Above 5860	-38.14	-27
Note: the data just list the worst cases.			

Note: Testing is carried out with frequency rang 9kHz to 40GHz, 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.

9. Frequency Stability

9.1 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.

9.2 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.

9.3 Summary of Test Results/Plots

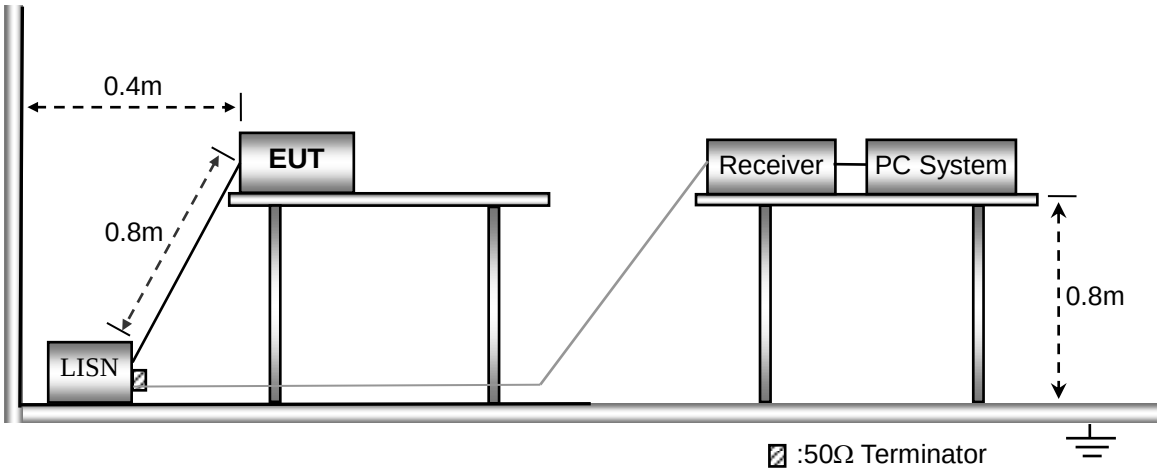
Please refer to Appendix D

10 Conducted Emissions

10.1 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 40cm long in the middle.
The spacing between the peripherals was 10cm.

10.2 Basic Test Setup Block Diagram



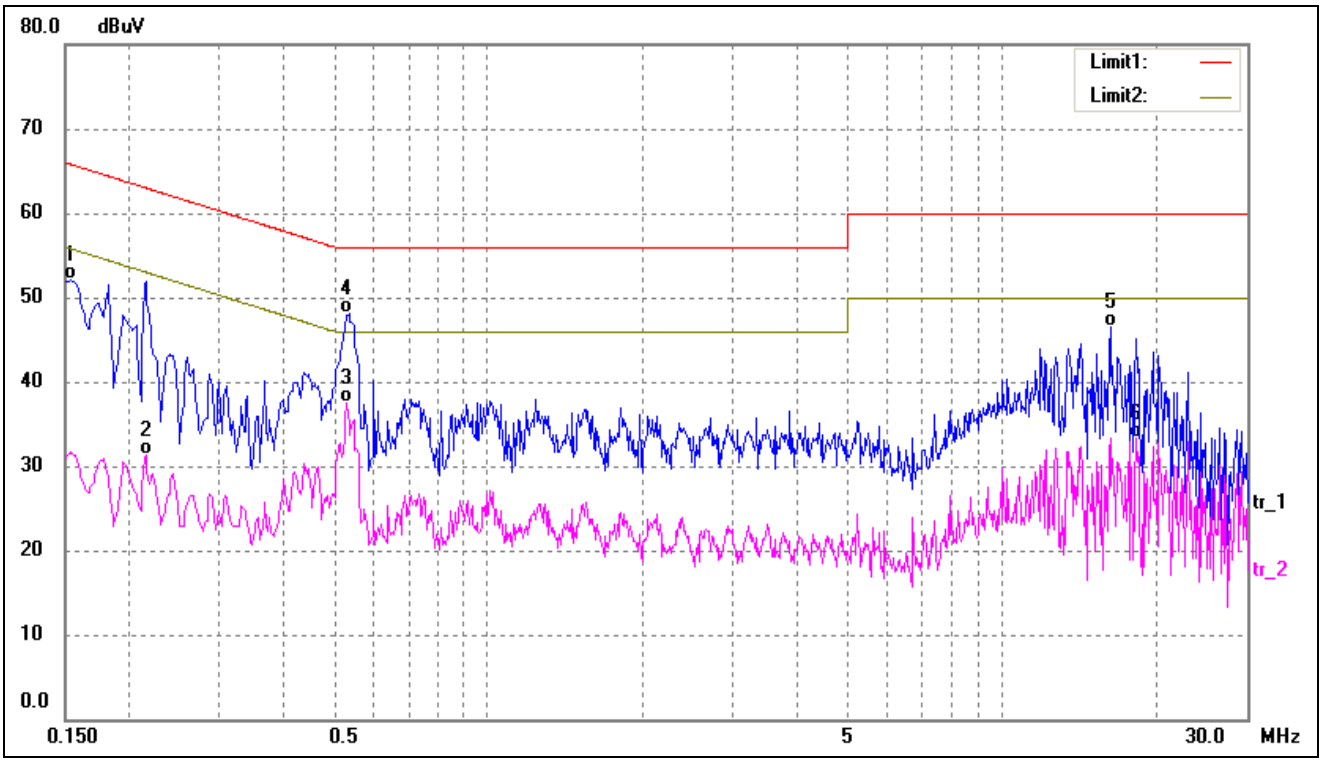
10.3 Test Receiver Setup

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

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

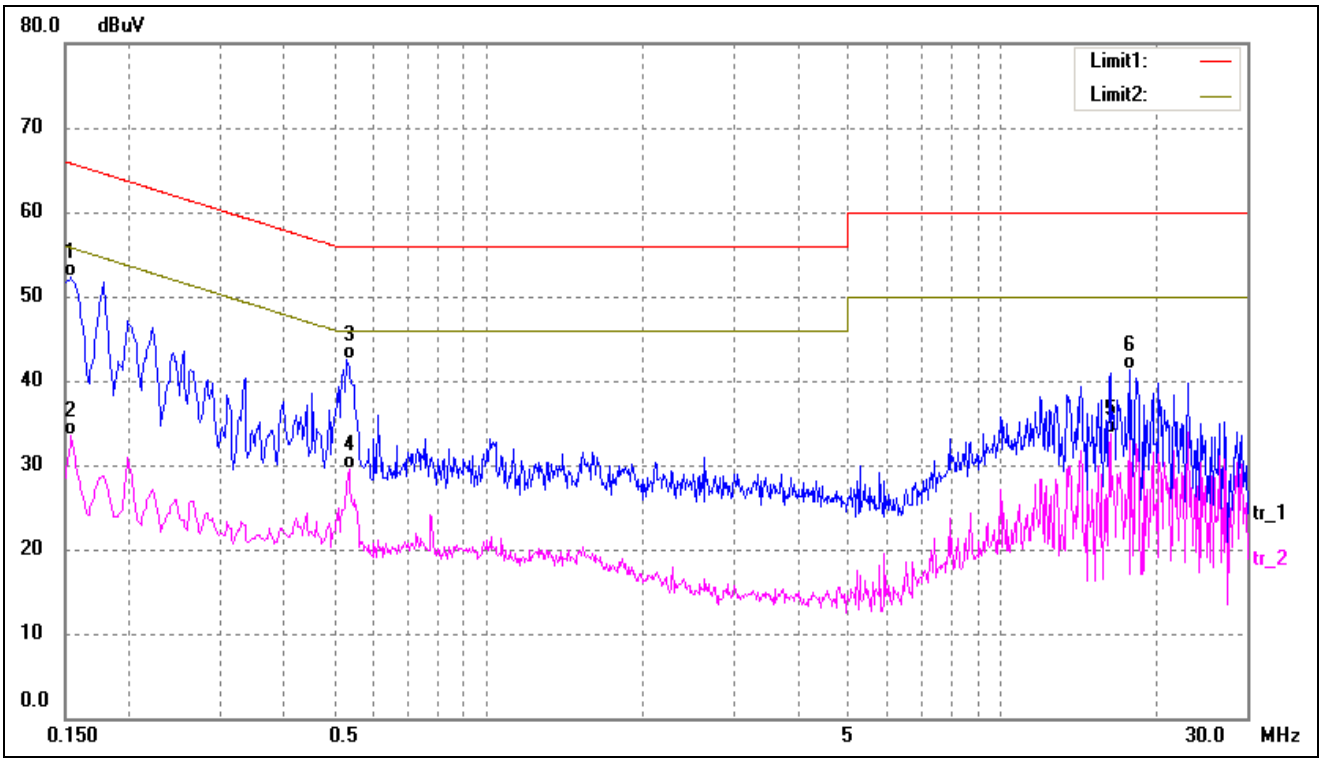
10.4 Summary of Test Results/Plots

Test Mode	Communication	AC120V 60Hz	Polarity:	Neutral



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)	
1	0.1540	41.85	10.25	52.10	65.78	-13.68	QP
2	0.2140	20.98	10.26	31.24	53.05	-21.81	AVG
3	0.5300	27.37	10.22	37.59	46.00	-8.41	AVG
4*	0.5340	37.79	10.22	48.01	56.00	-7.99	QP
5	16.2260	35.92	10.58	46.50	60.00	-13.50	QP
6	18.2420	22.80	10.58	33.38	50.00	-16.62	AVG

Test Mode	Communication	AC120V 60Hz	Polarity:	Line



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)	
1*	0.1540	41.96	10.25	52.21	65.78	-13.57	QP
2	0.1540	23.33	10.25	33.58	55.78	-22.20	AVG
3	0.5300	32.19	10.22	42.41	56.00	-13.59	QP
4	0.5340	19.28	10.22	29.50	46.00	-16.50	AVG
5	16.2260	23.05	10.58	33.63	50.00	-16.37	AVG
6	17.6940	30.68	10.58	41.26	60.00	-18.74	QP

APPENDIX SUMMARY

Project No.	WTX21X08081522W	Test Engineer	Dashan
Start date	2021/8/20	Finish date	2021/8/23
Temperature	24℃	Humidity	47%
RF specifications	U-NII		

APPENDIX	Description of Test Item	Result
A	Power Spectral Density	Compliant
B	Emission Bandwidth and Occupied Bandwidth	Compliant
C	Maximum Conducted Output Power	Compliant
D	Frequency Stability	Compliant

APPENDIX A

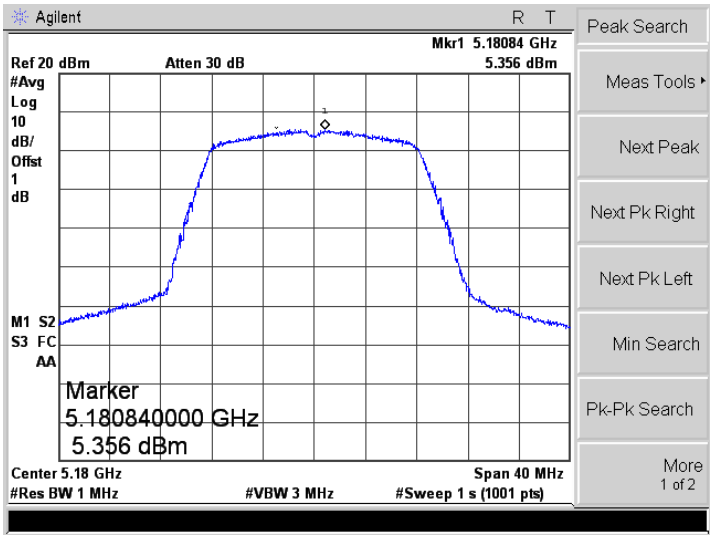
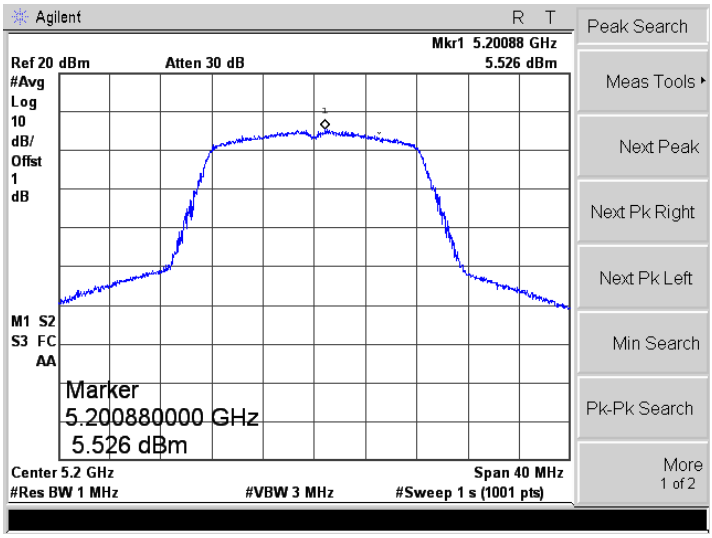
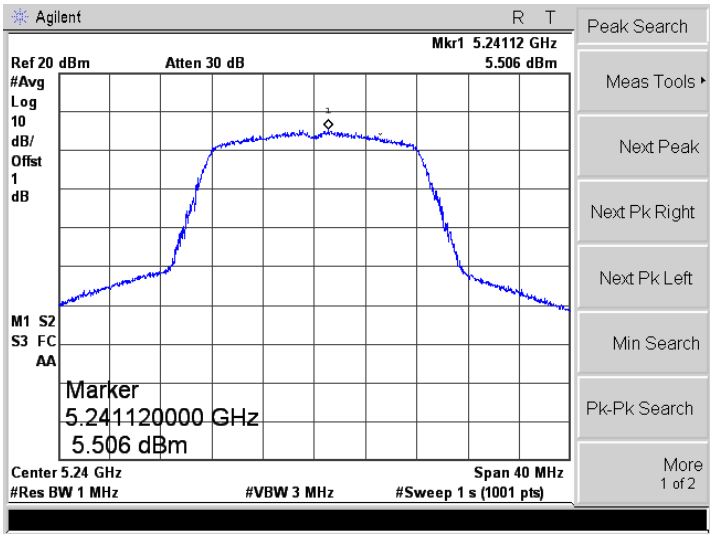
Power Spectral Density					
U-NII-1:5150-5250MHz					
Operating mode	Test Channel	ANT 0 dBm/MHz	ANT 1 dBm/MHz	Total dBm/MHz	Limit (dBm/MHz)
802.11a	5180	5.356	5.77	/	11
	5200	5.526	5.422	/	11
	5240	5.506	5.206	/	11
802.11n-HT20	5180	4.444	4.311	7.39	11
	5200	4.426	4.066	7.26	11
	5240	4.122	4.528	7.34	11
802.11n-HT40	5190	1.19	0.815	4.02	11
	5230	0.965	2.217	4.65	11
802.11ac-HT80	5210	-2.061	-3.734	0.19	11

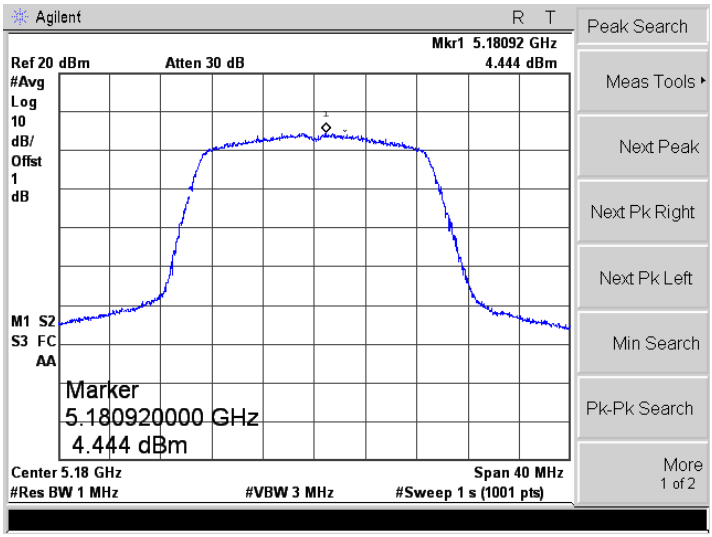
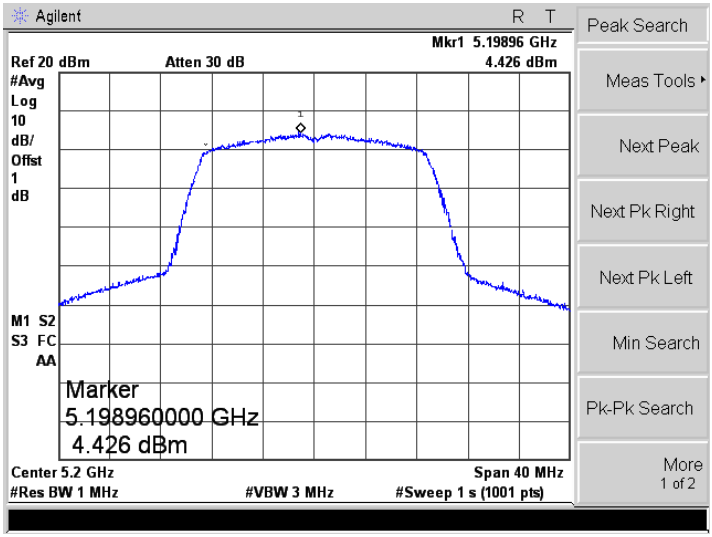
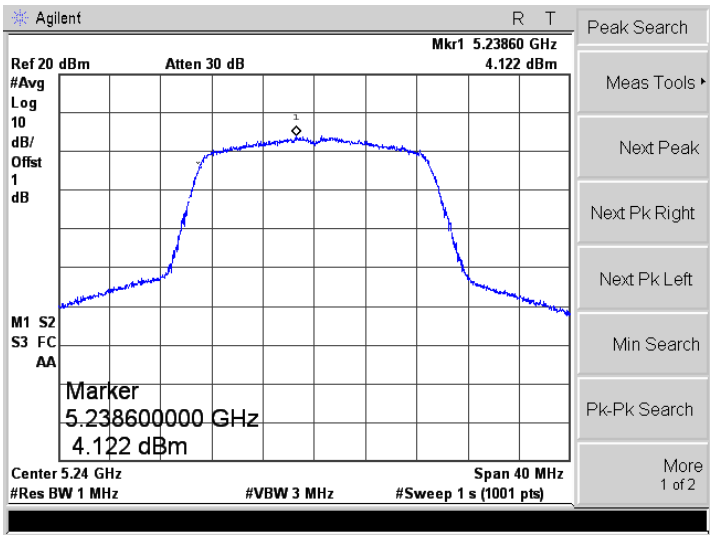
Power Spectral Density							
U-NII-3: 5725-5850MHz							
Operating mode	Test Channel	ANT 0 dBm/300kHz	ANT 1 dBm/300kHz	Factor	ANT 0 dBm/500kHz*	ANT 1 dBm/500kHz*	Limit dBm/500kHz
802.11a	5745	2.527	0.857	2.22	4.747	3.077	30
	5785	2.321	1.151	2.22	4.541	3.371	30
	5825	2.466	2.826	2.22	4.686	5.046	30
*Note: Factor =10log(500kHz/300kHz)=2.22							

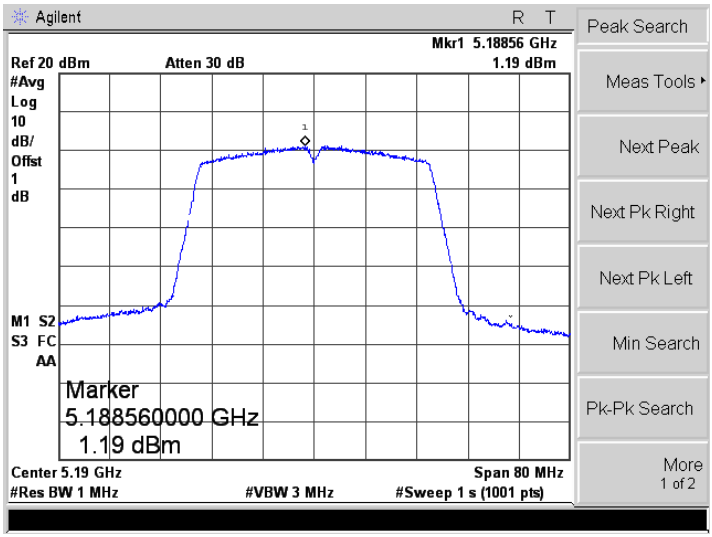
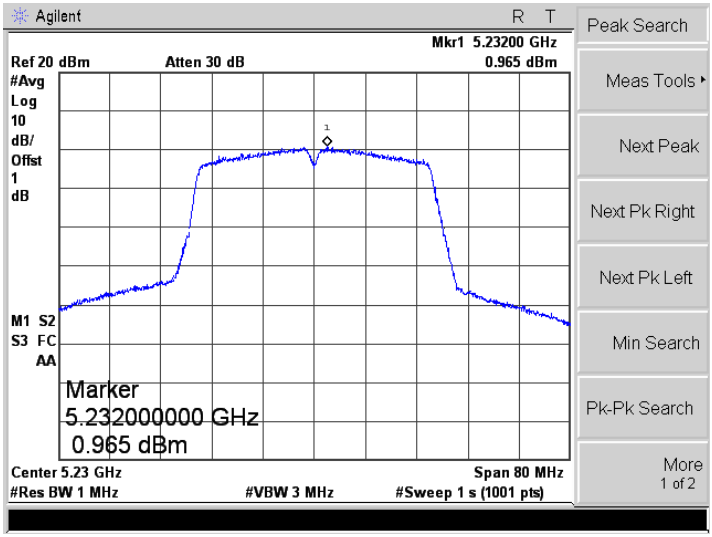
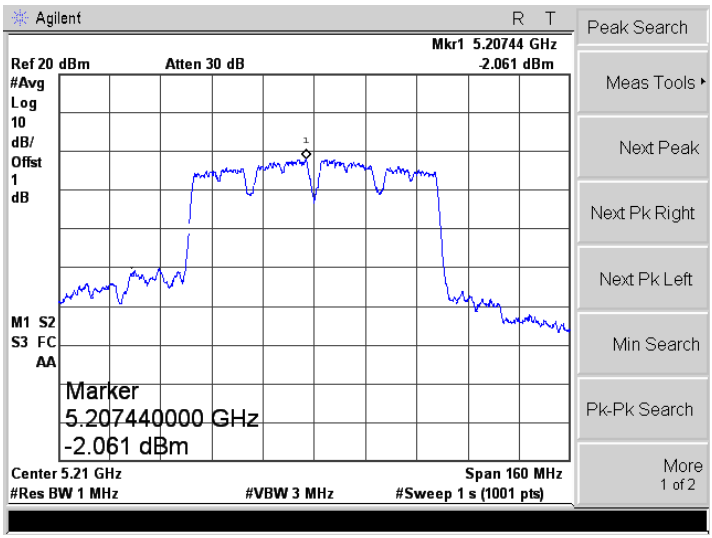
Power Spectral Density						
U-NII-3: 5725-5850MHz						
Operating mode	Test Channel	ANT 0 dBm/300kHz	ANT 1 dBm/300kHz	Factor	Total dBm/500kHz*	Limit dBm/500kHz
802.11n-HT20	5745	0.489	-0.158	2.22	5.41	30
	5785	0.350	0.153	2.22	5.48	30
	5825	0.732	-0.01	2.22	5.61	30
802.11n HT40	5755	-3.638	-3.624	2.22	1.6	30
	5795	-3.572	-3.907	2.22	1.49	30
802.11ac VH80	5775	-4.928	-8.265	2.22	-1.05	30
*Note: Factor =10log(500kHz/300kHz)=2.22						

ANT 0

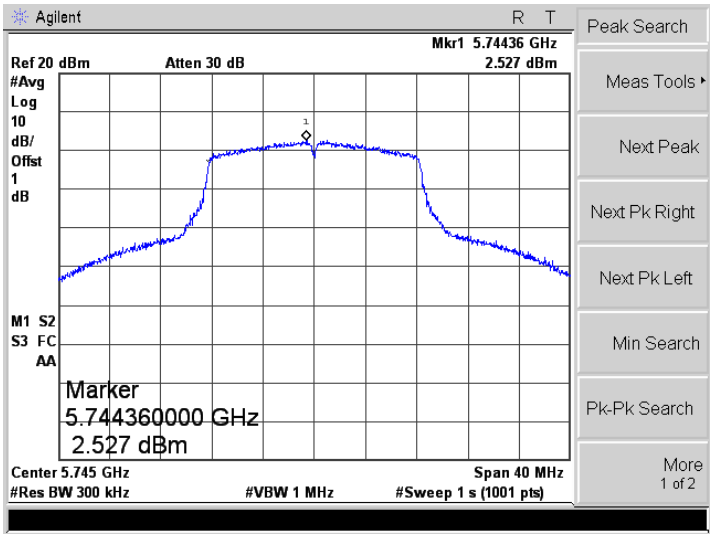
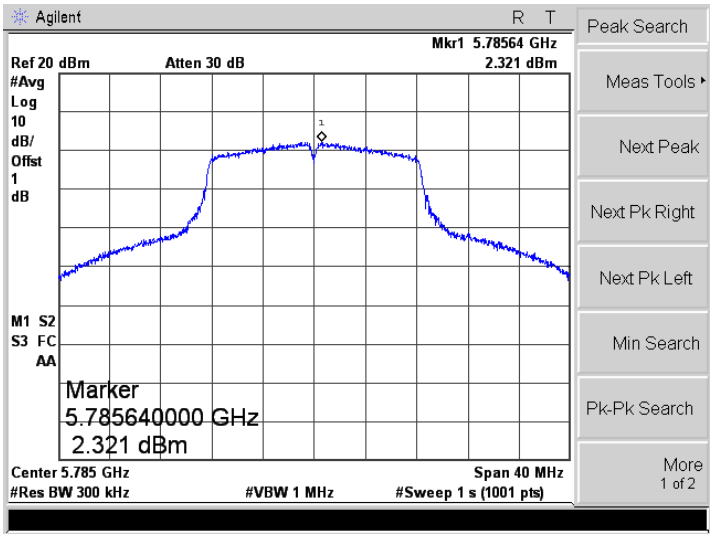
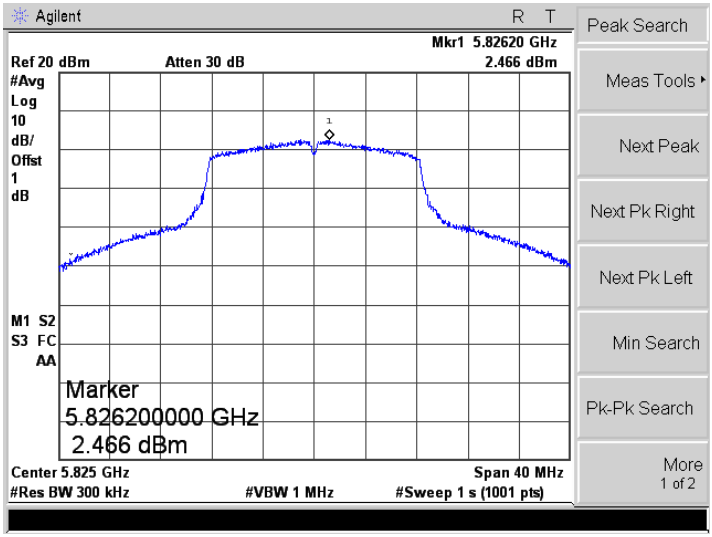
5150-5250MHz

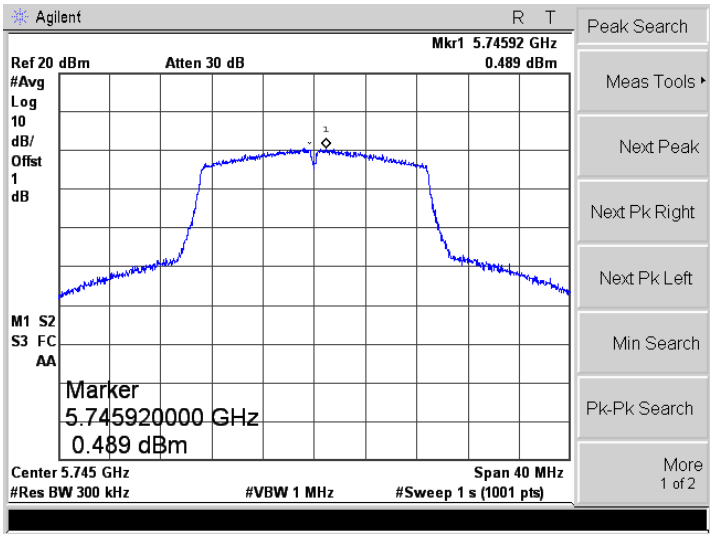
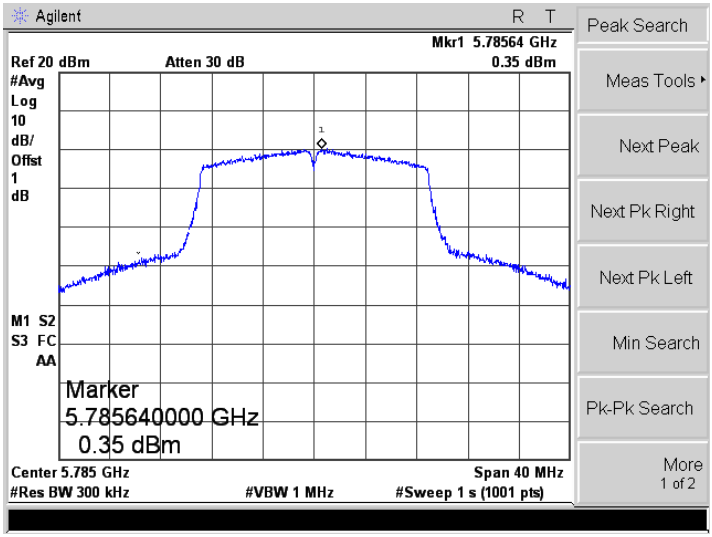
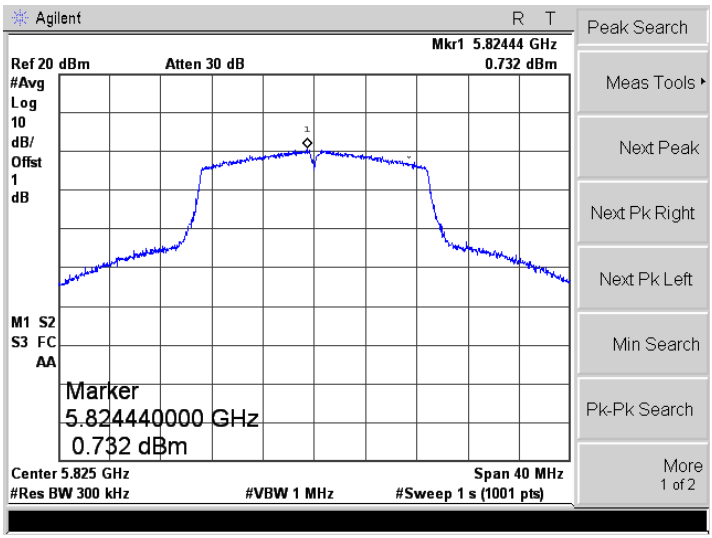
802.11a-Low	
802.11a-Middle	
802.11a-High	

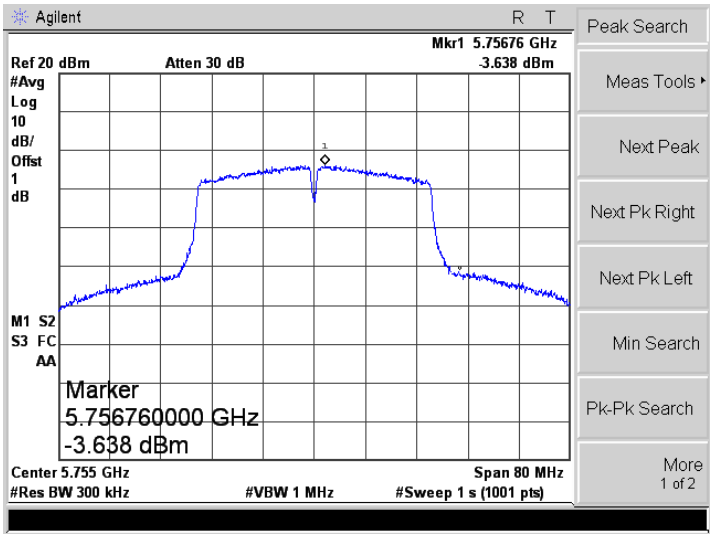
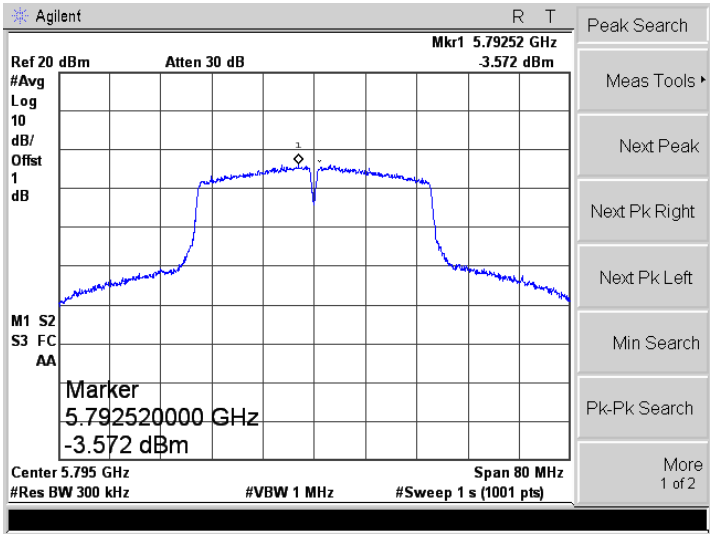
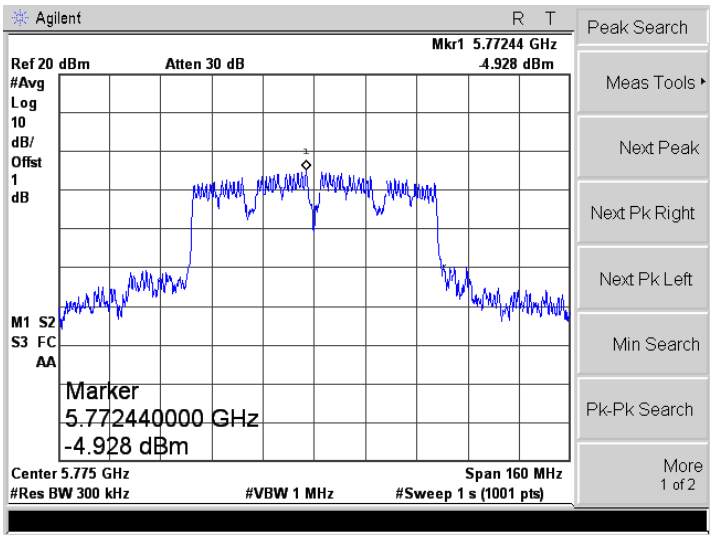
802.11n-HT20-Low	
802.11n-HT20-Middle	
802.11n-HT20-High	

802.11n-HT40-Low	
802.11n-HT40-High	
802.11ac-HT80	

5725-5850MHz

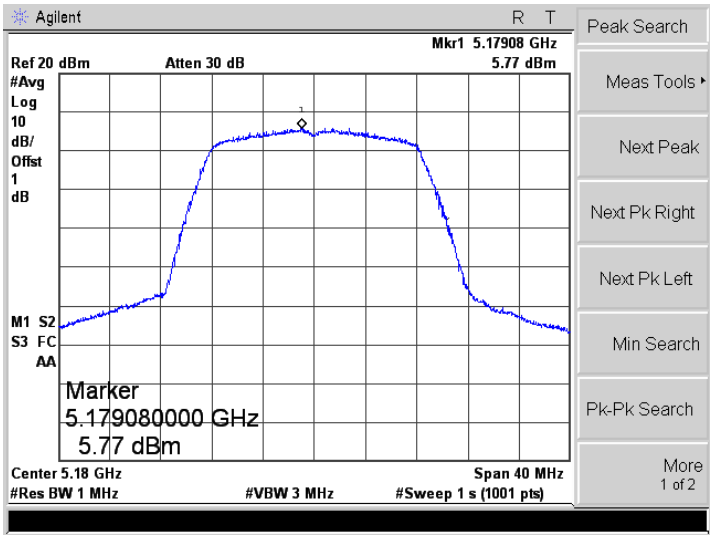
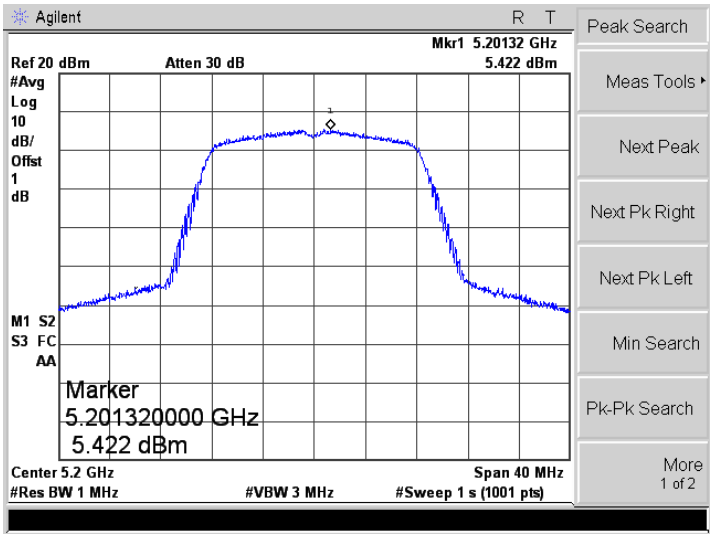
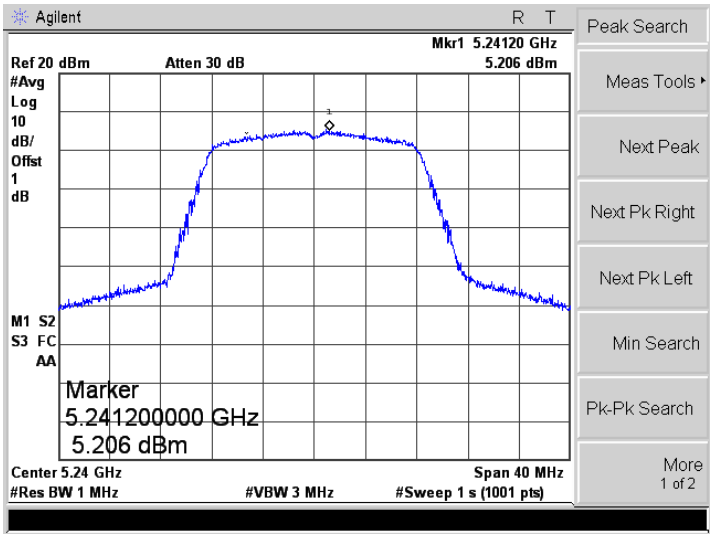
802.11a-Low	
802.11a-Middle	
802.11a-High	

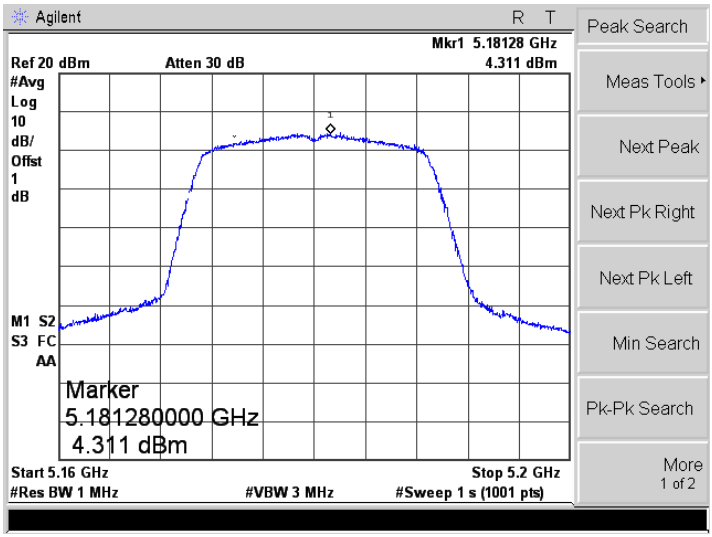
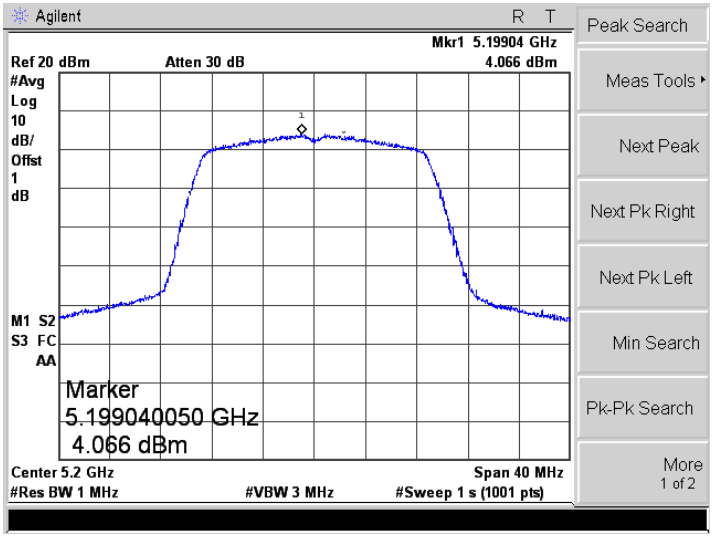
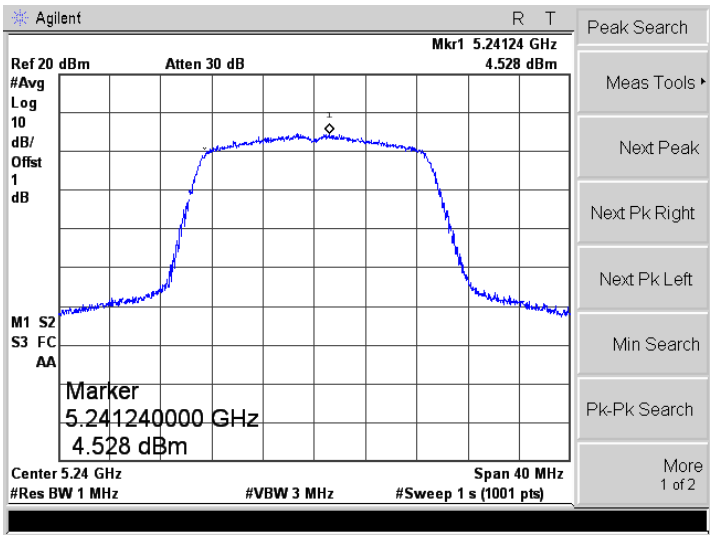
802.11n-HT20-Low	
802.11n-HT20-Middle	
802.11n-HT20-High	

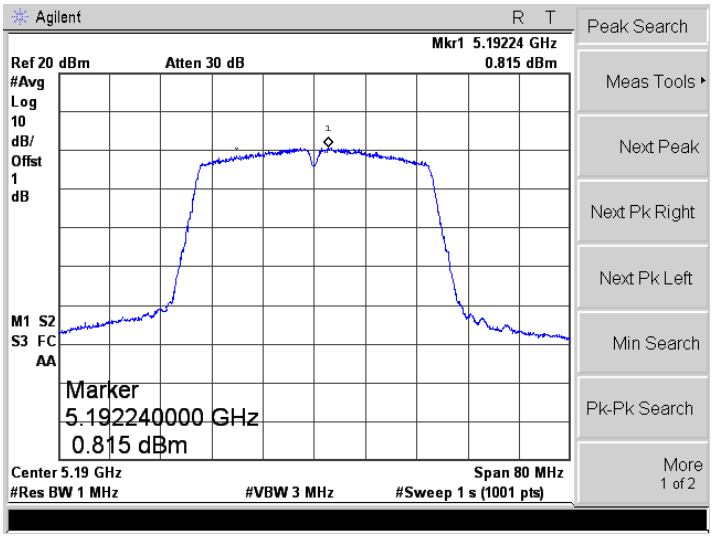
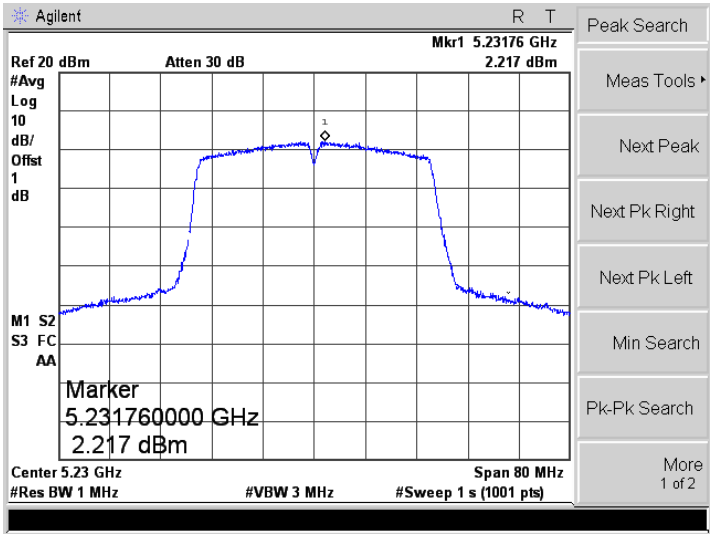
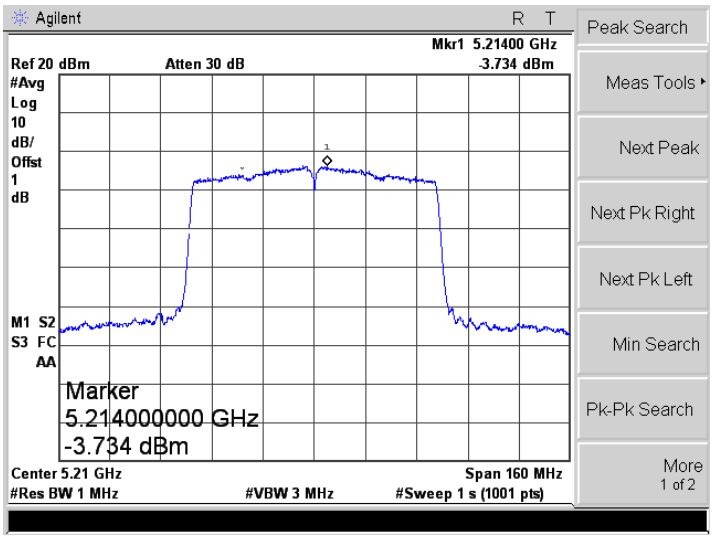
802.11n-HT40-Low	
802.11n-HT40-High	
802.11ac-HT80	

ANT 1

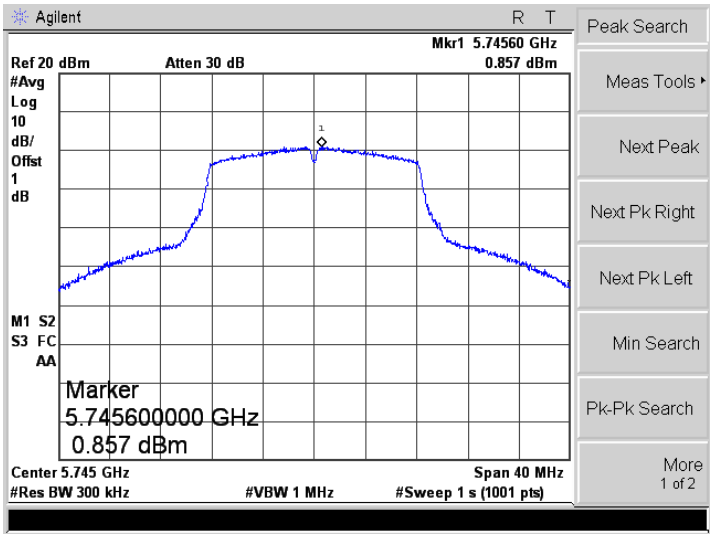
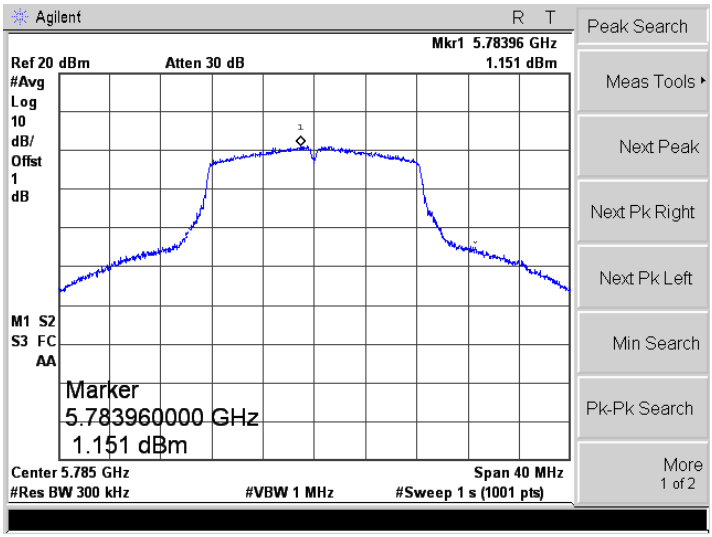
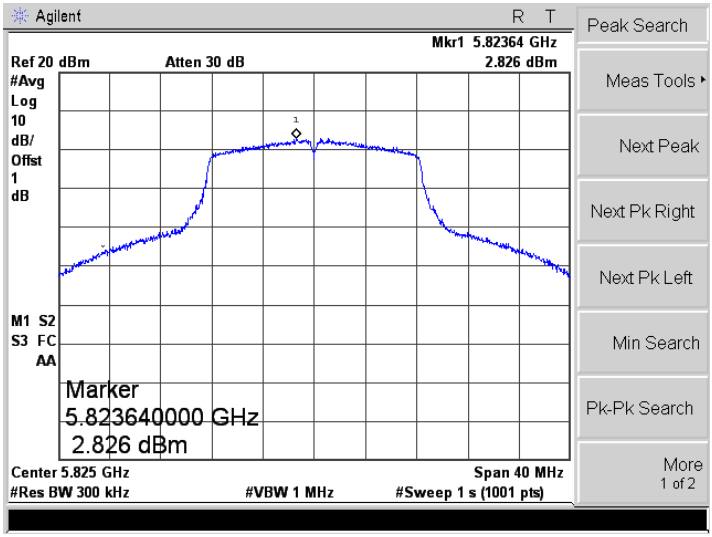
5150-5250MHz

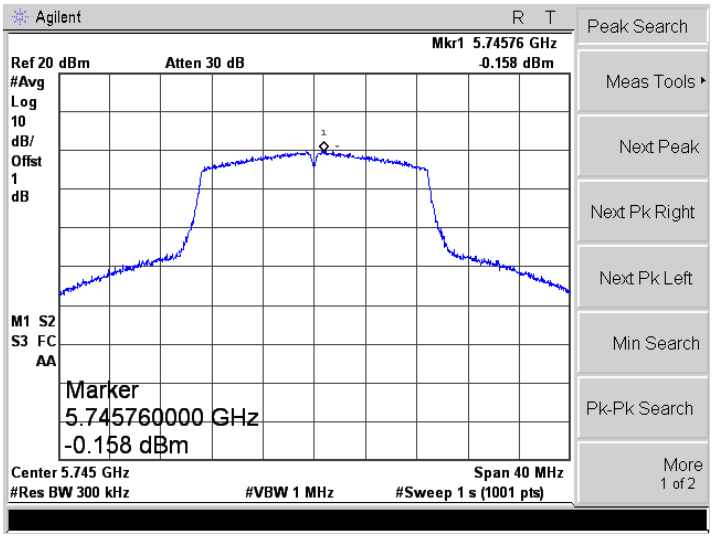
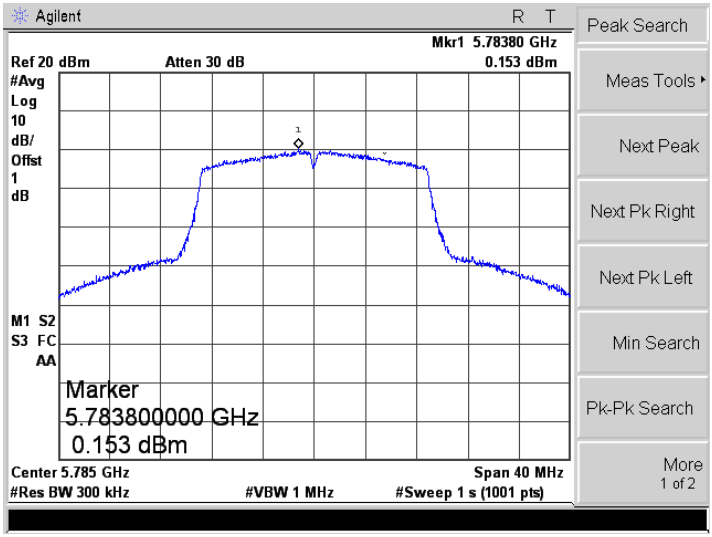
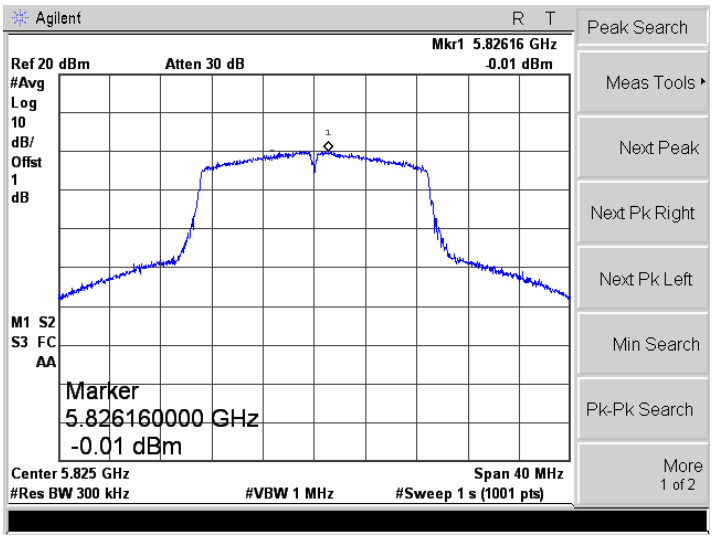
802.11a-Low	
802.11a-Middle	
802.11a-High	

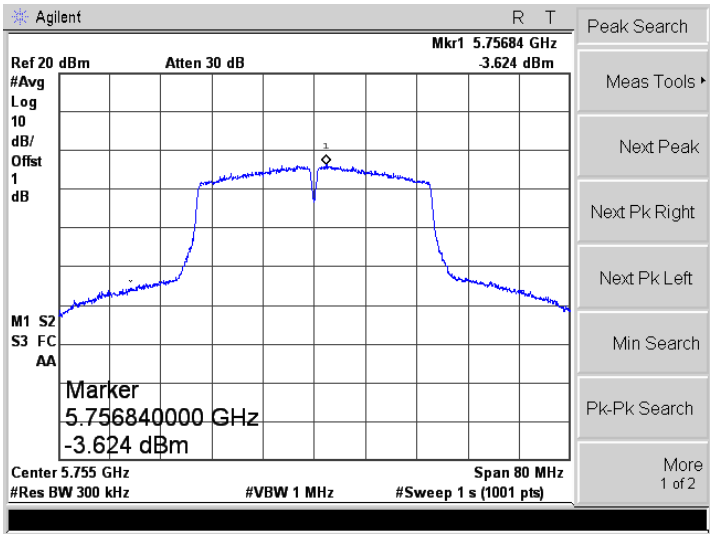
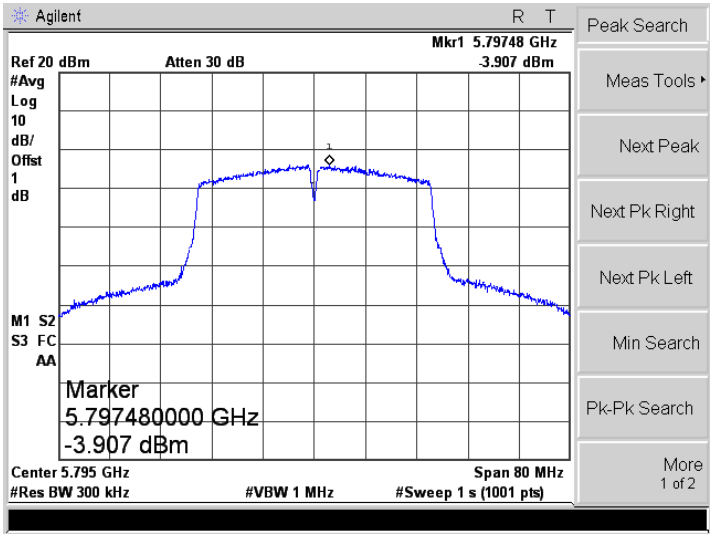
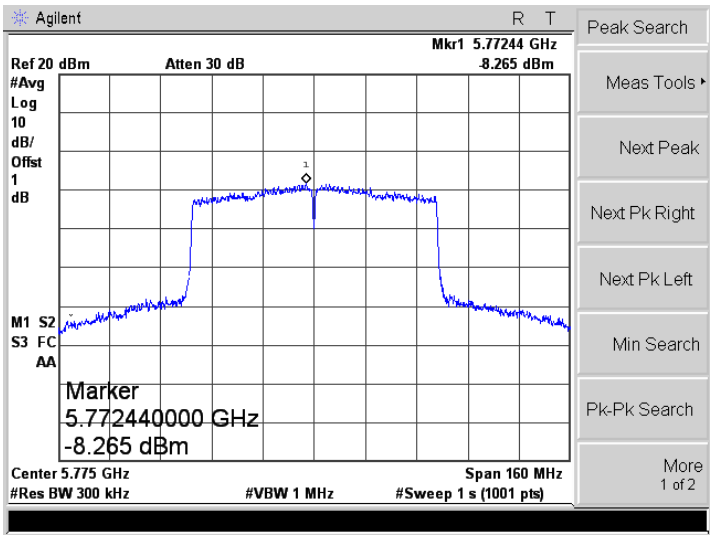
802.11n-HT20-Low	
802.11n-HT20-Middle	
802.11n-HT20-High	

802.11n-HT40-Low	
802.11n-HT40-High	
802.11ac-HT80	

5725-5850MHz

802.11a-Low	
802.11a-Middle	
802.11a-High	

802.11n-HT20-Low	
802.11n-HT20-Middle	
802.11n-HT20-High	

802.11n-HT40-Low	
802.11n-HT40-High	
802.11ac-HT80	

APPENDIX B

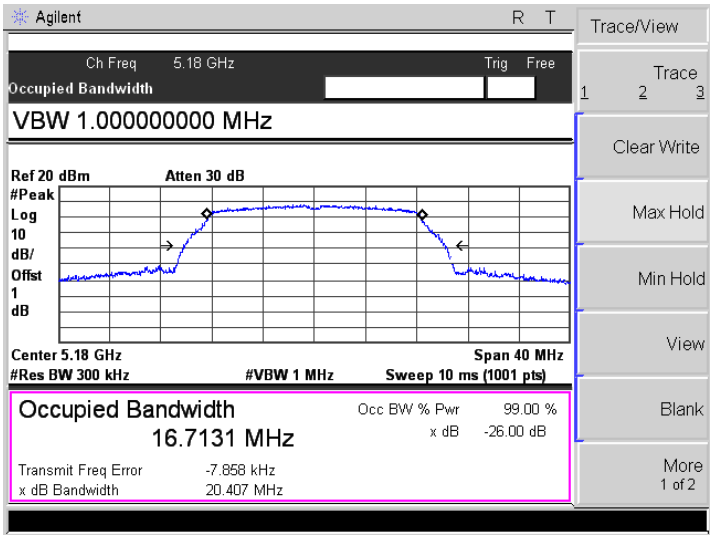
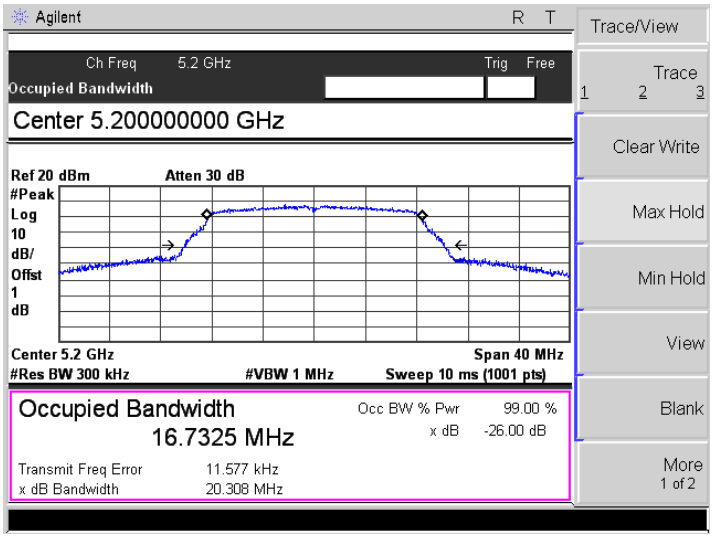
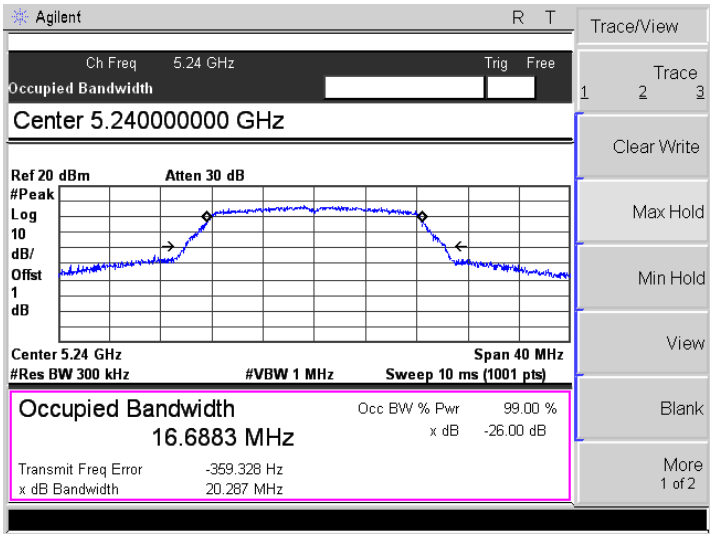
Emission Bandwidth and Occupied Bandwidth

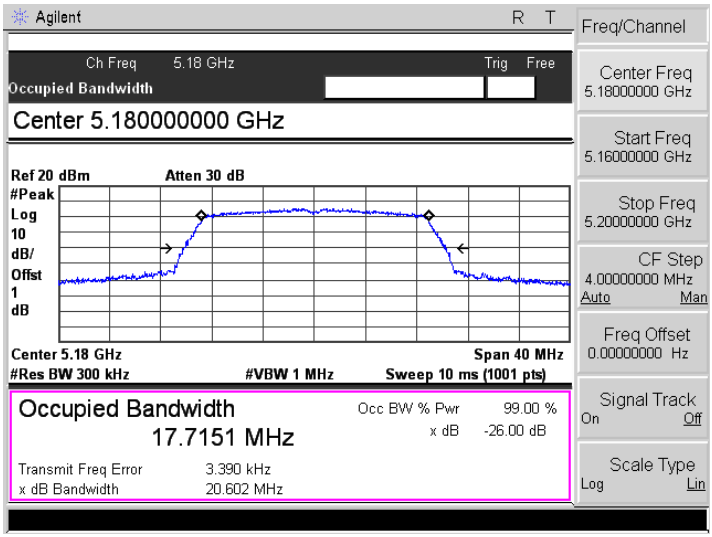
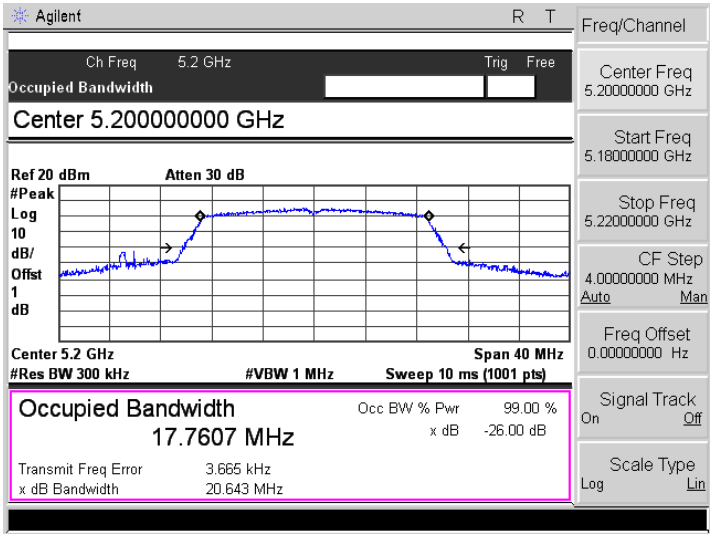
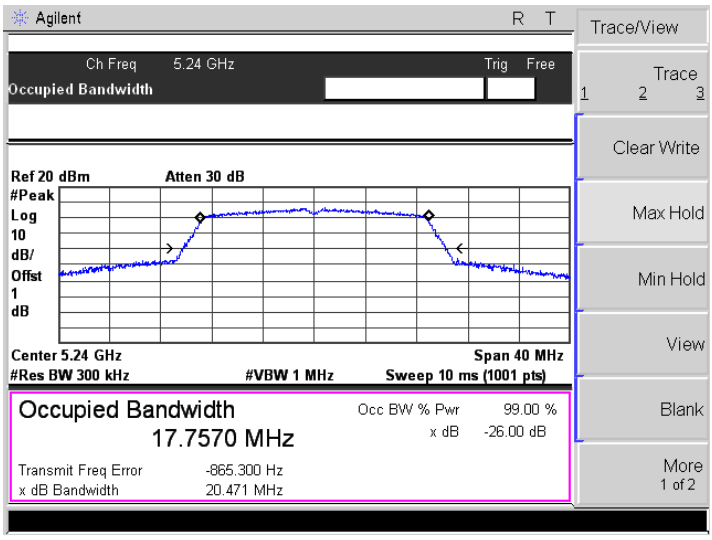
U-NII-1:5150-5250MHz						
Test Mode	**Test Channel MHz**	**ANT 0**		**ANT 1**		**Result**
		26 dB Bandwidth MHz	**99% Bandwidth MHz**	**26 dB Bandwidth MHz**	**99% Bandwidth MHz**	
802.11a	5180	20.407	16.713	20.402	16.731	Pass
	5200	20.308	16.733	20.262	16.682	Pass
	5240	20.287	16.688	20.113	16.670	Pass
802.11n-HT20	5180	20.602	17.715	20.287	16.676	Pass
	5200	20.643	17.761	20.642	17.715	Pass
	5240	20.471	17.757	20.521	17.759	Pass
802.11n-HT40	5190	40.143	35.938	40.287	35.923	Pass
	5230	40.704	35.966	40.625	35.947	Pass
802.11ac-HT80	5210	82.115	76.240	79.588	75.172	Pass

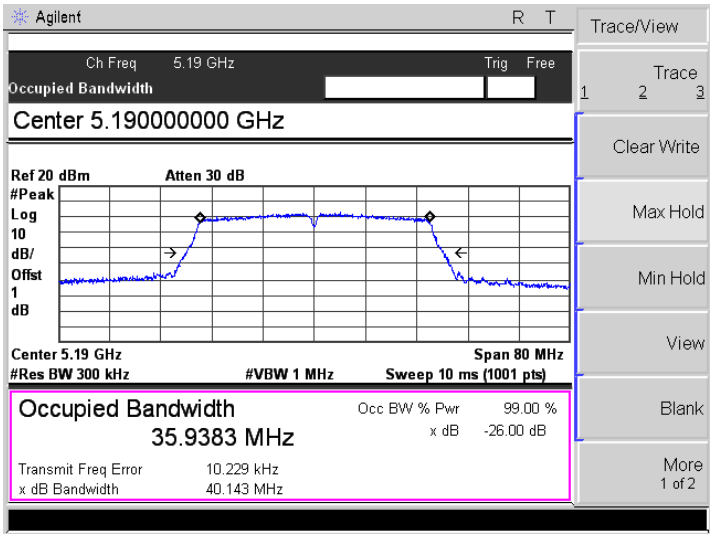
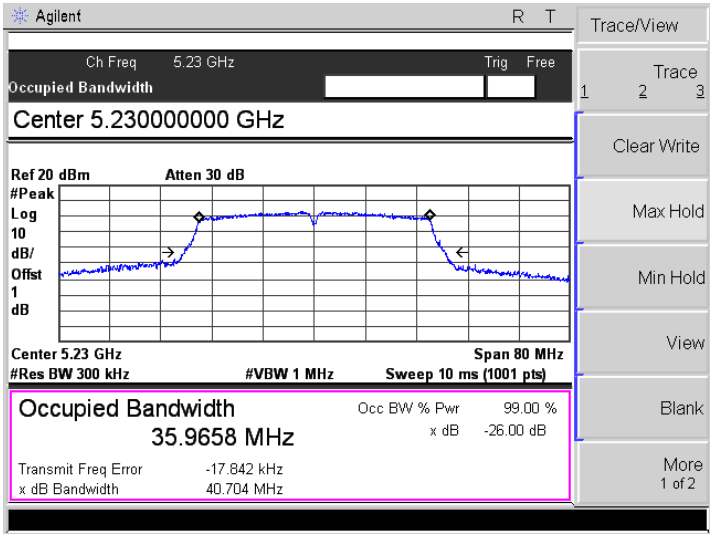
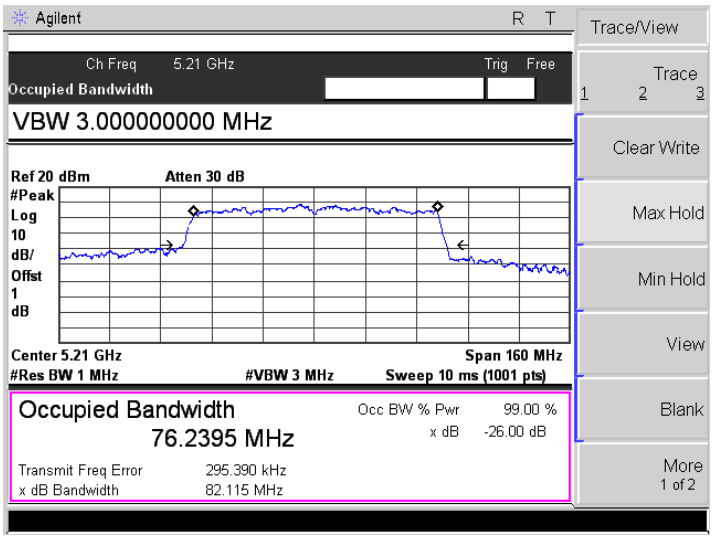
U-NII-3: 5725-5850MHz						
Test Mode	**Test Channel MHz**	**ANT 0**		**ANT 1**		**Limit kHz**
		6 dB Bandwidth MHz	**99% Bandwidth MHz**	**6 dB Bandwidth MHz**	**99% Bandwidth MHz**	
802.11a	5745	15.029	17.952	15.057	17.643	≥500
	5785	15.122	18.454	15.057	17.361	≥500
	5825	15.155	19.637	15.131	17.739	≥500
802.11n-HT20	5745	15.402	17.976	15.139	17.951	≥500
	5785	15.142	18.047	15.127	17.927	≥500
	5825	15.077	18.339	15.082	17.923	≥500
802.11n-HT40	5755	35.161	35.152	35.121	36.073	≥500
	5795	35.163	36.274	35.126	36.075	≥500
802.11ac-HT80	5775	75.386	76.239	75.326	75.488	≥500

ANT 0

5150-5250MHz

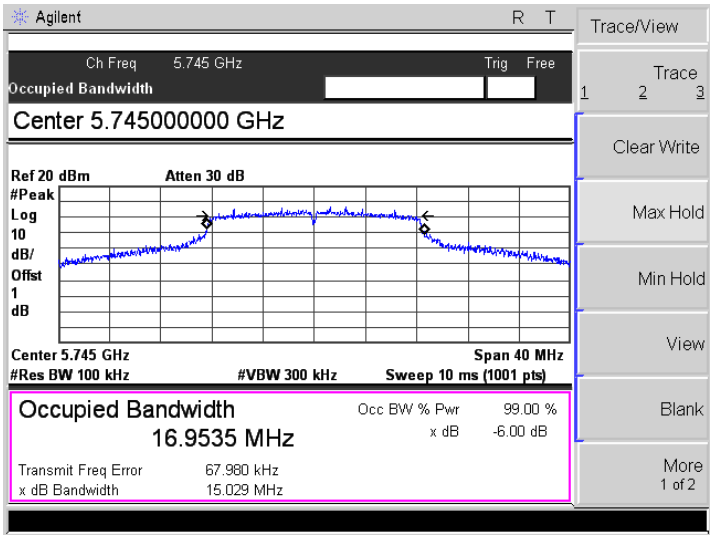
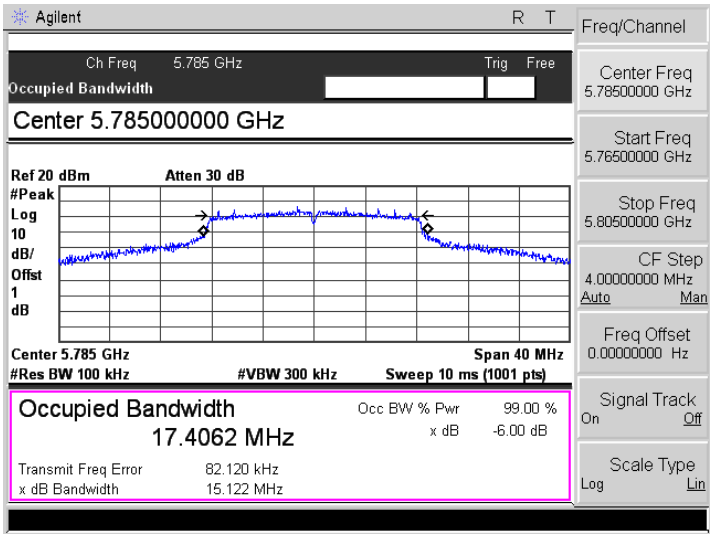
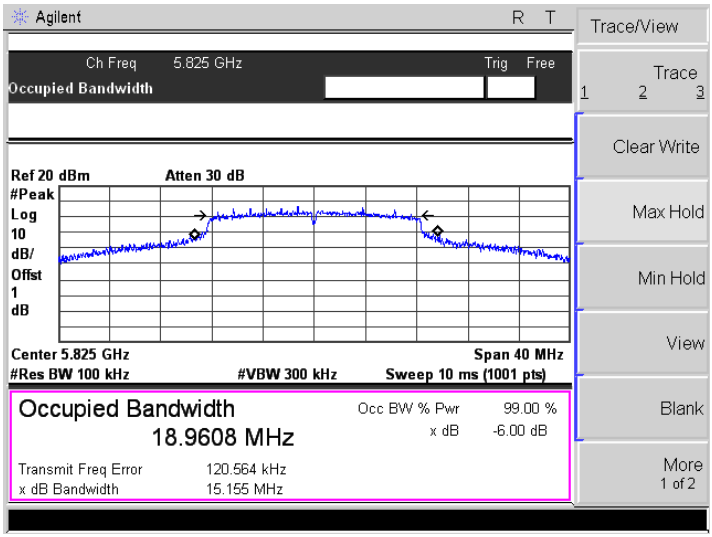
802.11a-Low	
802.11a-Middle	
802.11a-High	

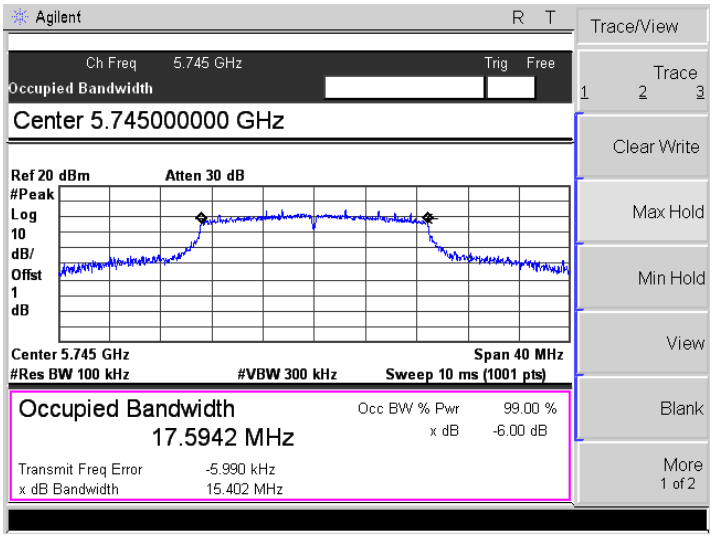
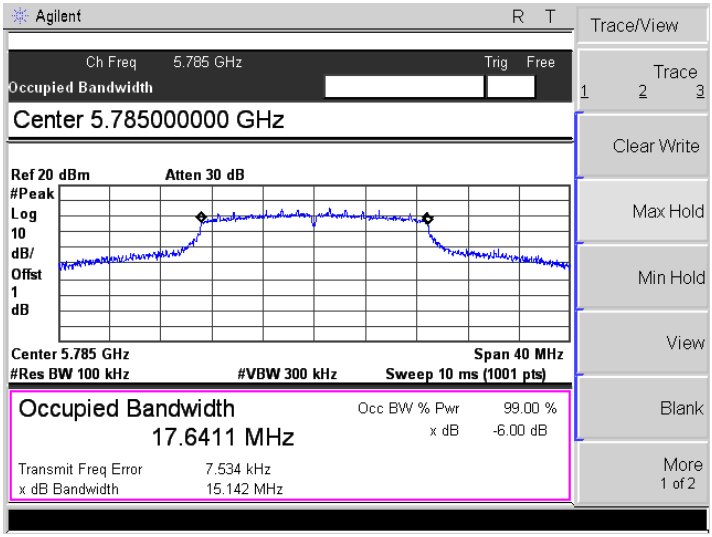
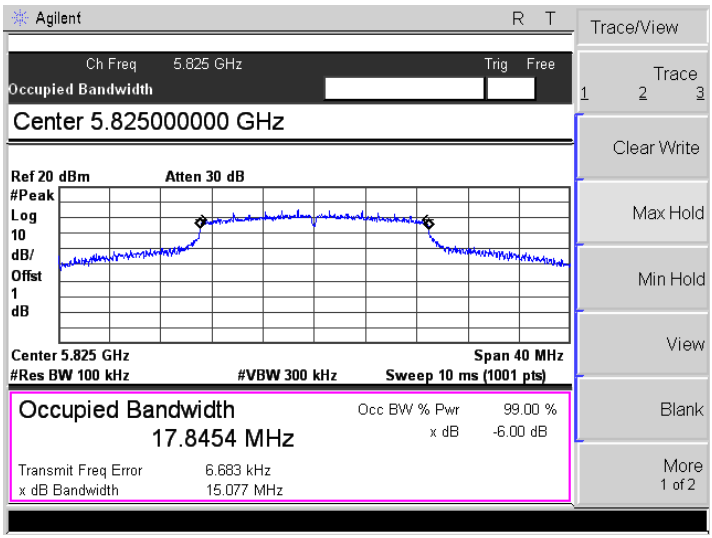
802.11n-HT20-Low	
802.11n-HT20-Middle	
802.11n-HT20-High	

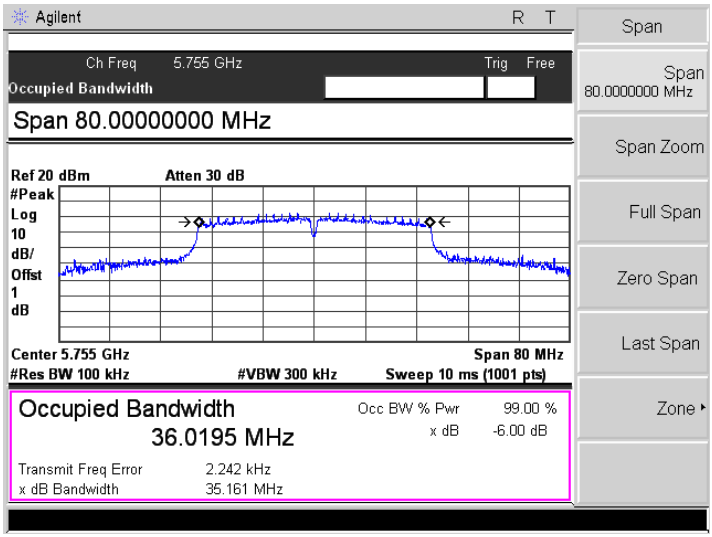
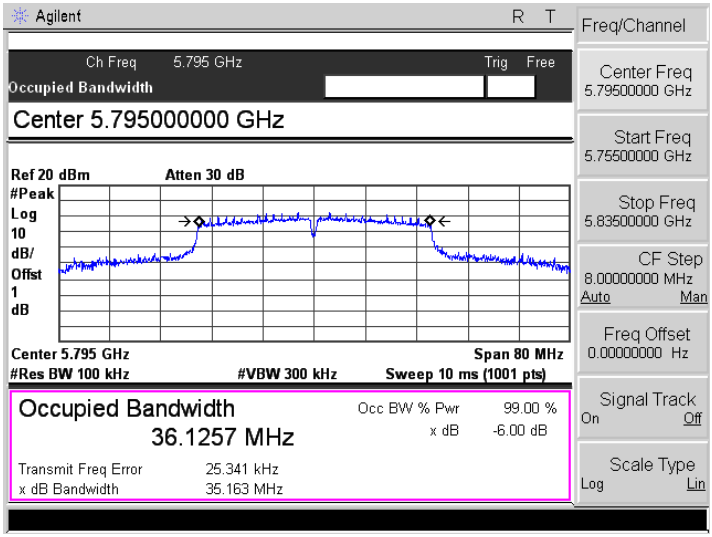
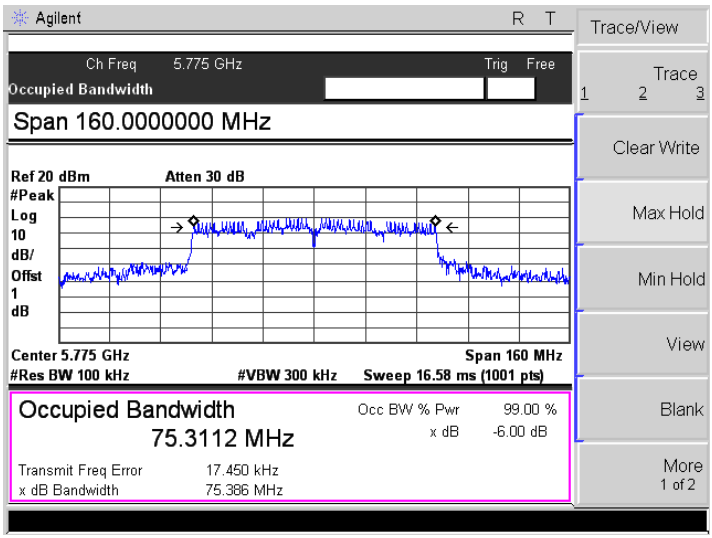
802.11n-HT40-Low	
802.11n-HT40-High	
802.11ac-HT80	

5725-5850MHz

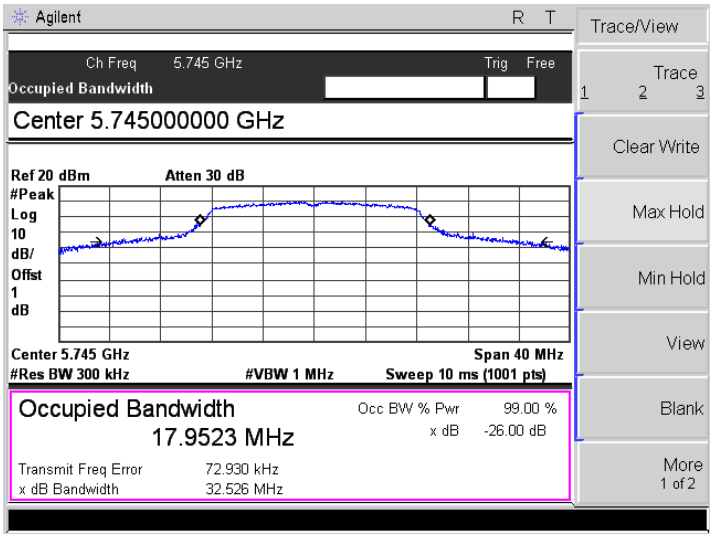
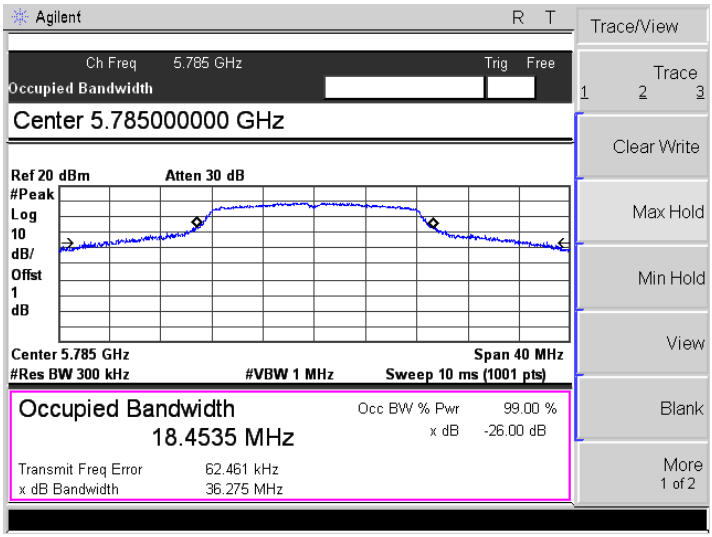
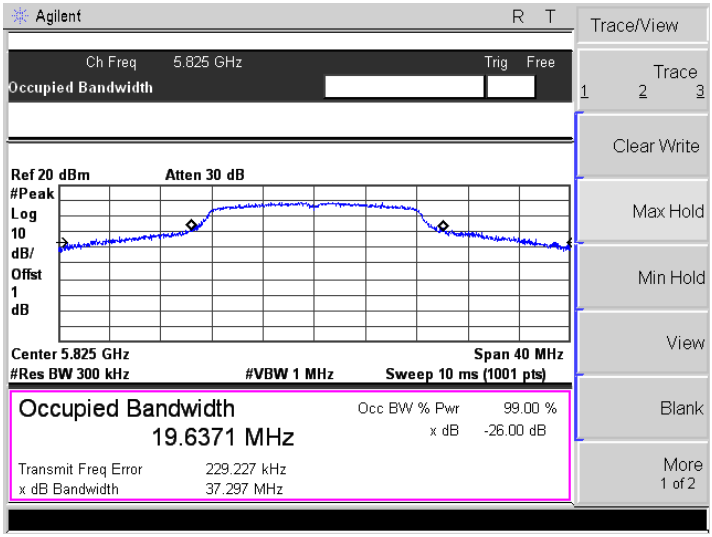
6db

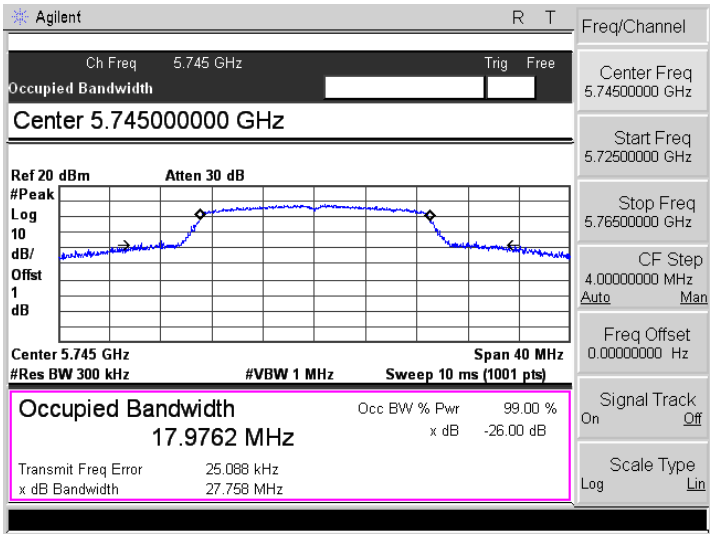
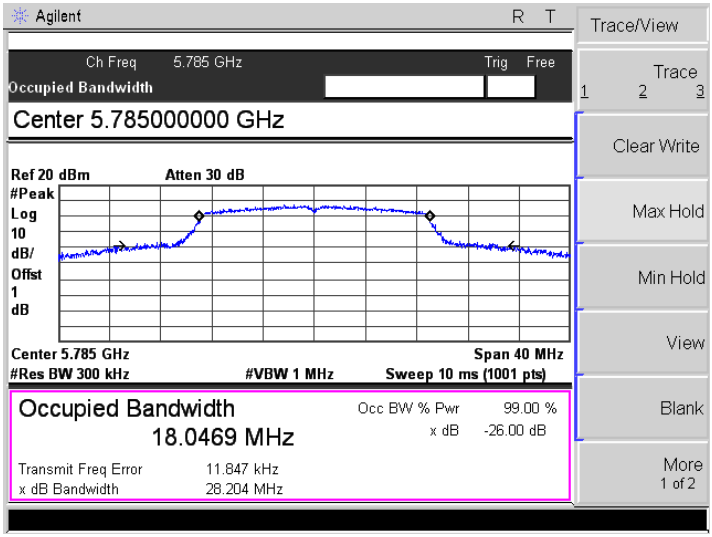
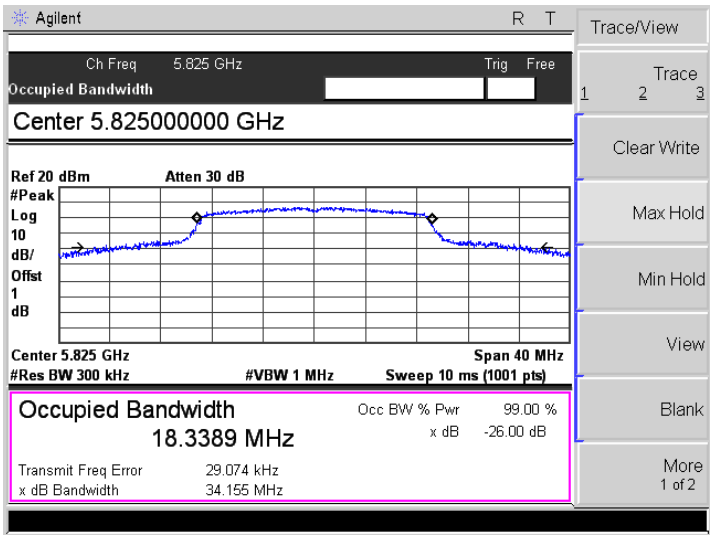
802.11a-Low	
802.11a-Middle	
802.11a-High	

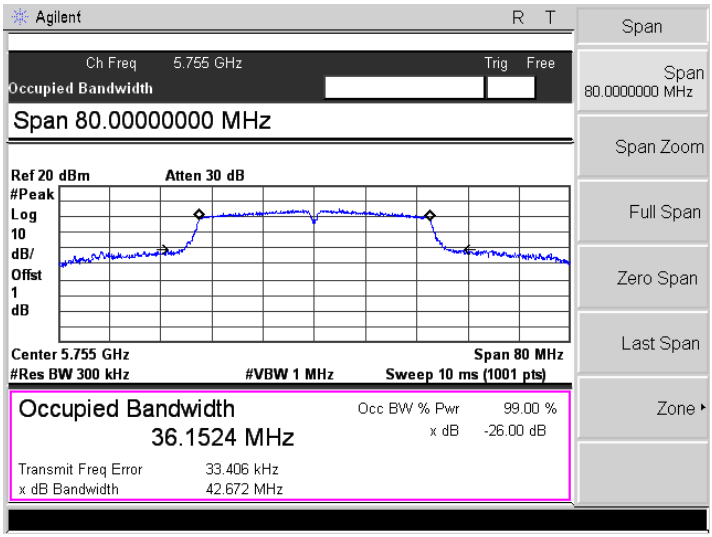
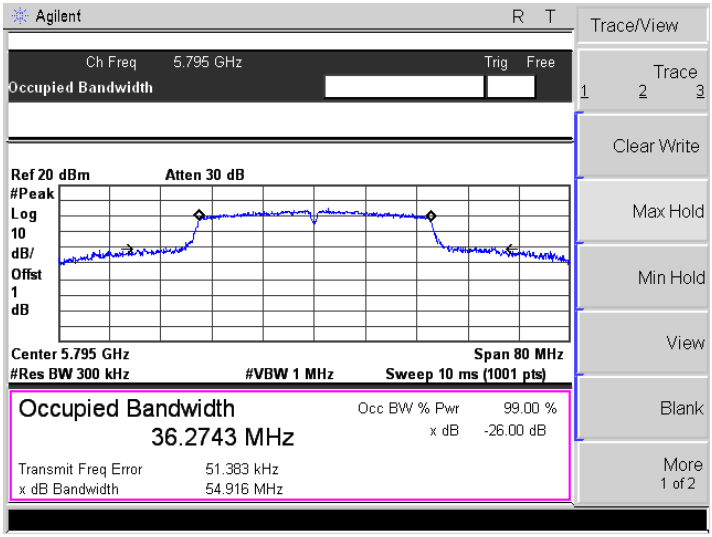
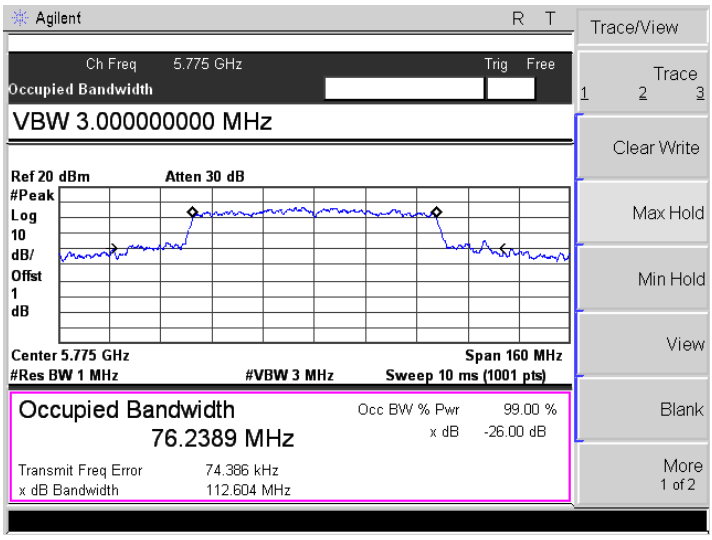
802.11n-HT20-Low	
802.11n-HT20-Middle	
802.11n-HT20-High	

802.11n-HT40-Low	
802.11n-HT40-High	
802.11ac-HT80	

99%

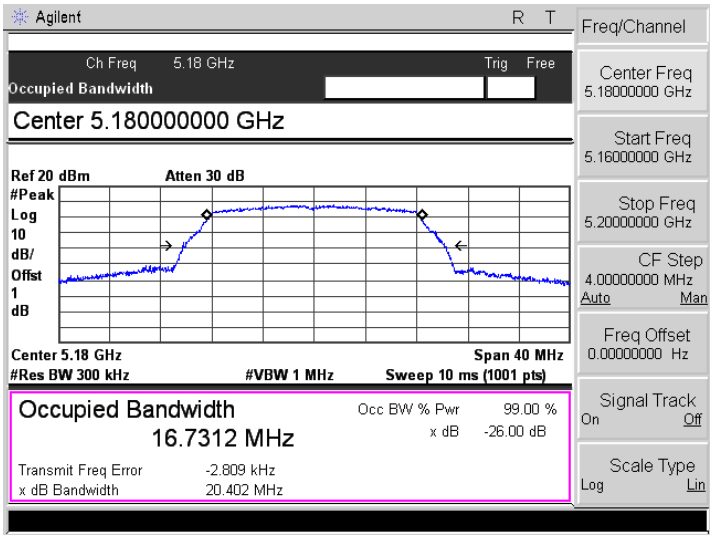
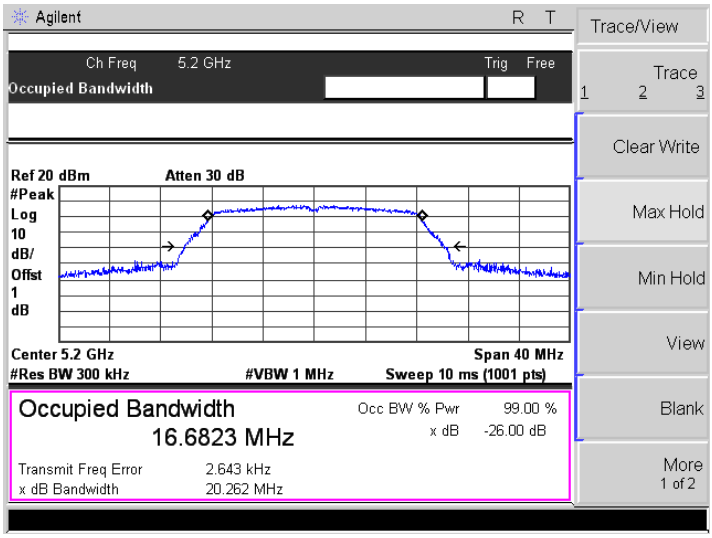
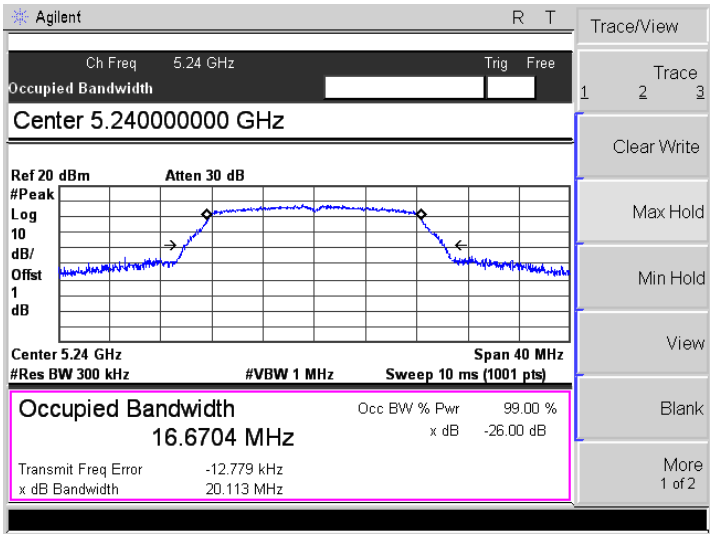
802.11a-Low	
802.11a-Middle	
802.11a-High	

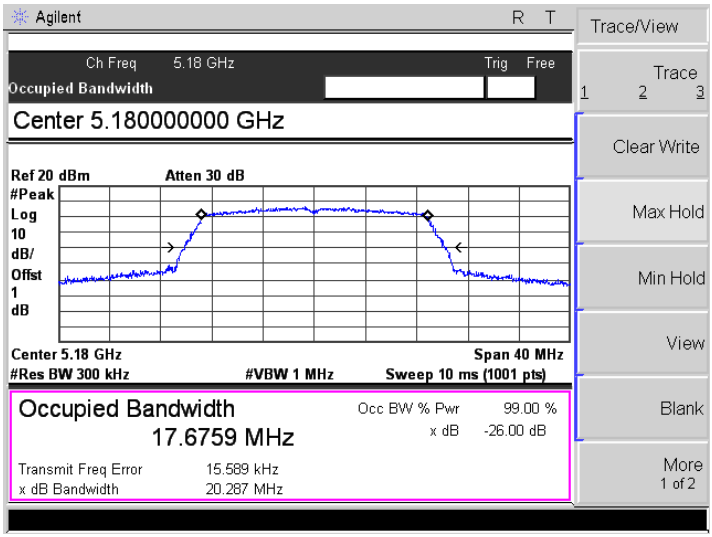
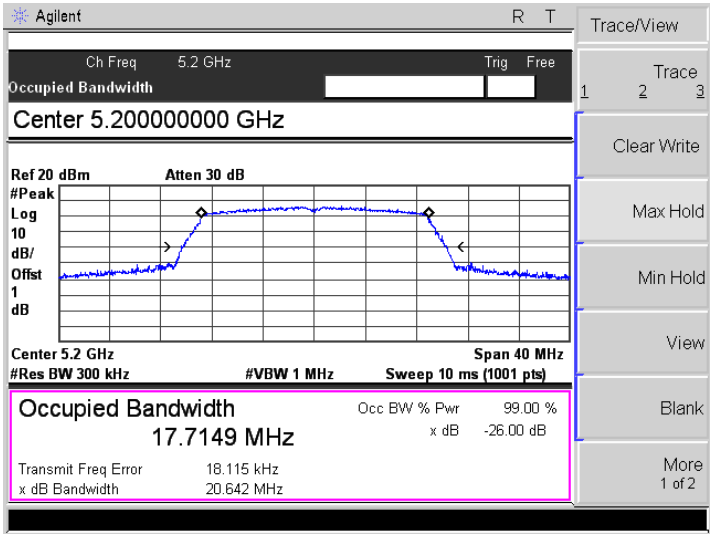
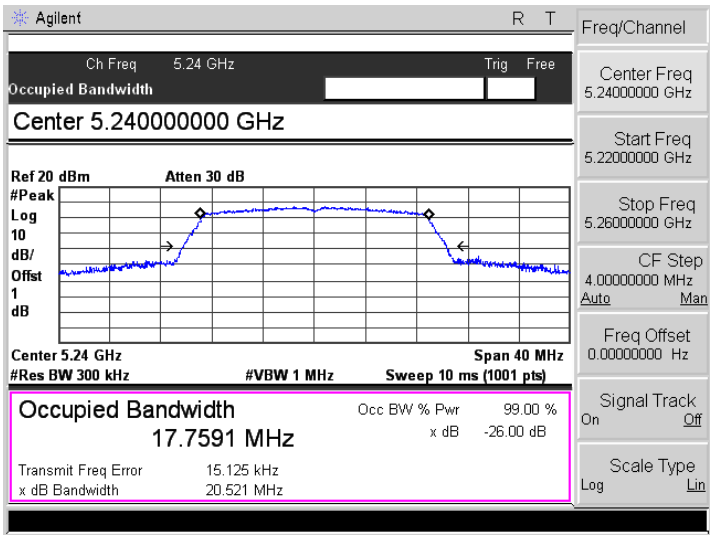
802.11n-HT20-Low	
802.11n-HT20-Middle	
802.11n-HT20-High	

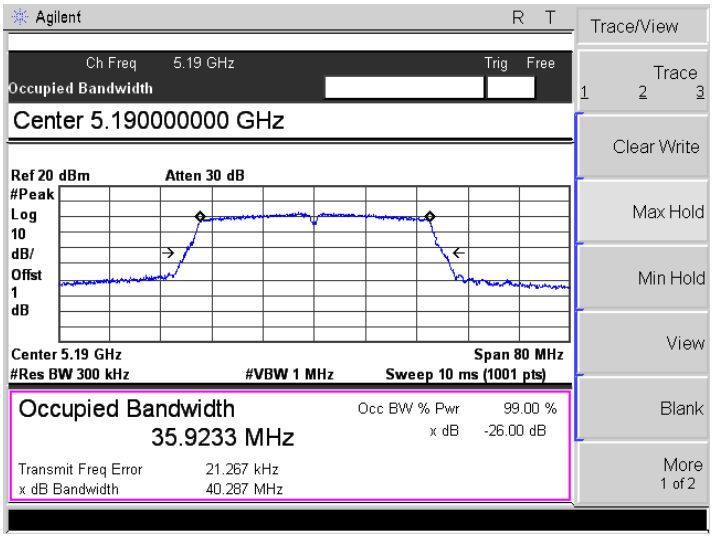
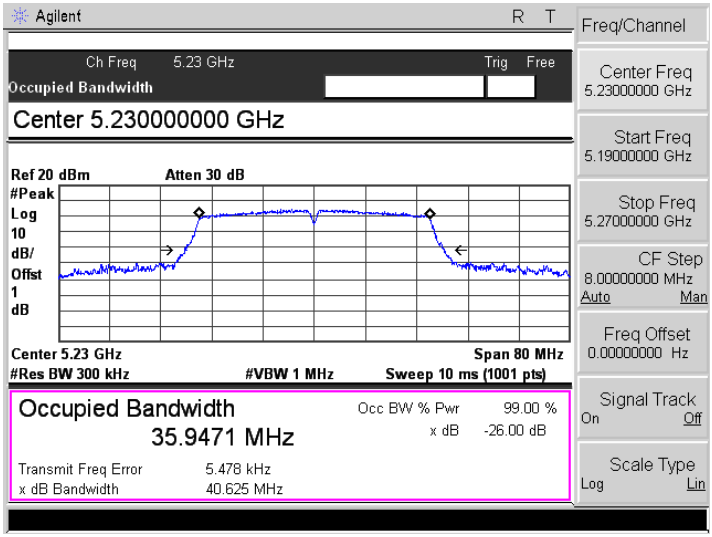
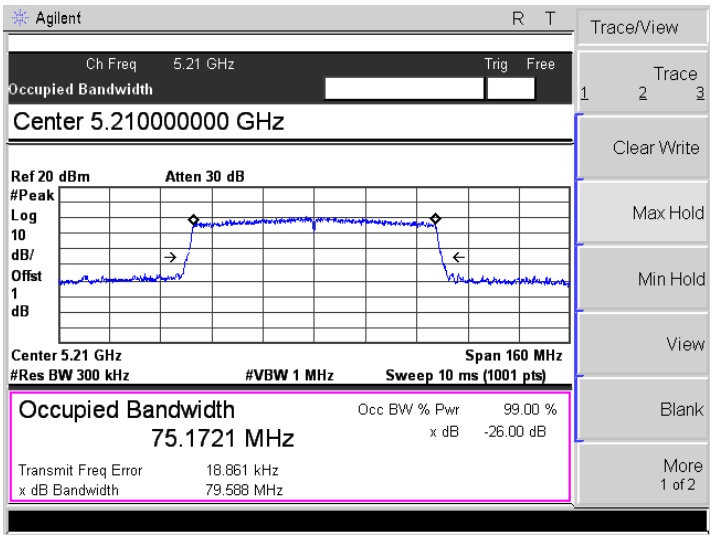
802.11n-HT40-Low	
802.11n-HT40-High	
802.11ac-HT80	

ANT 1

5150-5250MHz

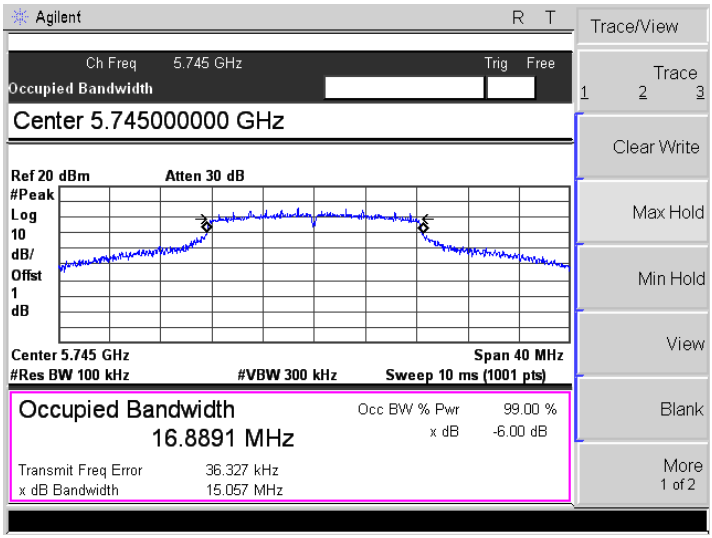
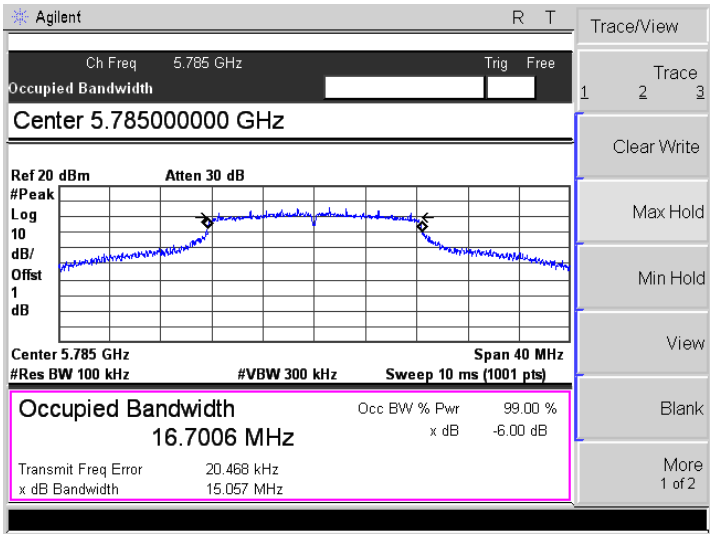
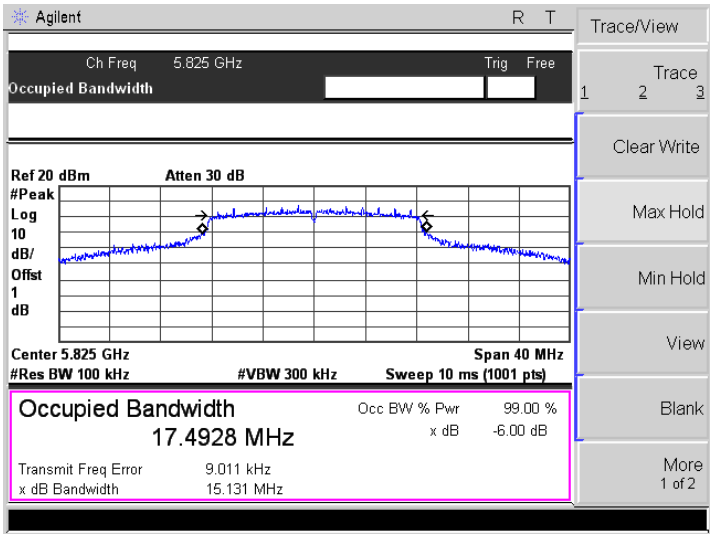
802.11a-Low	
802.11a-Middle	
802.11a-High	

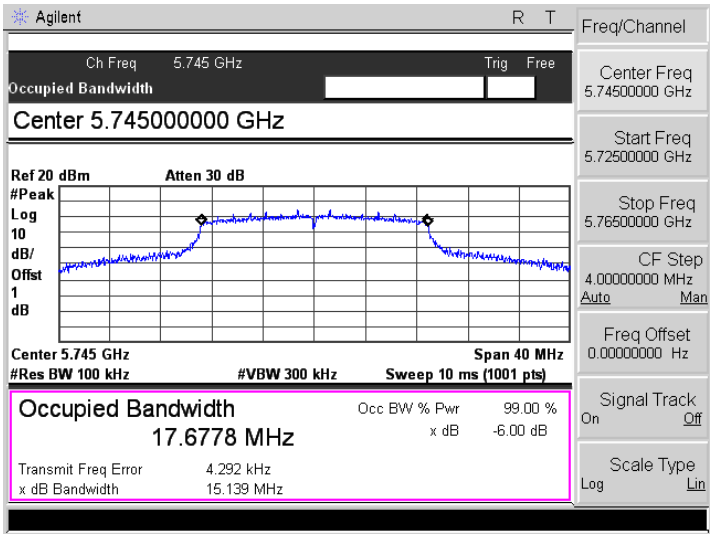
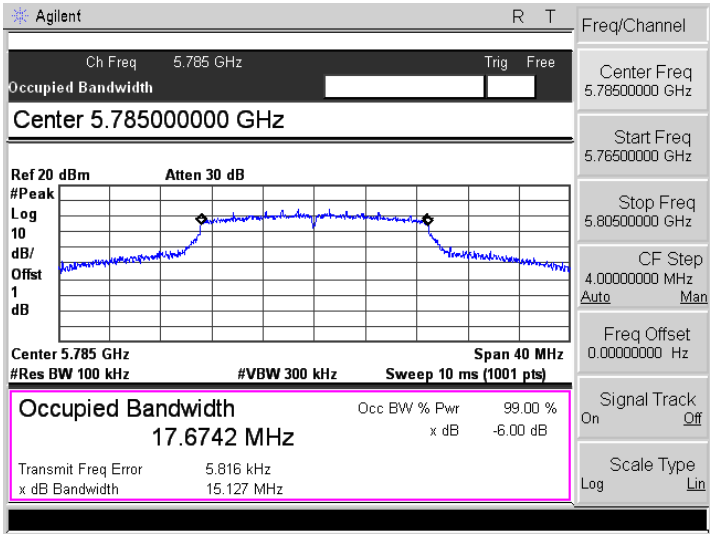
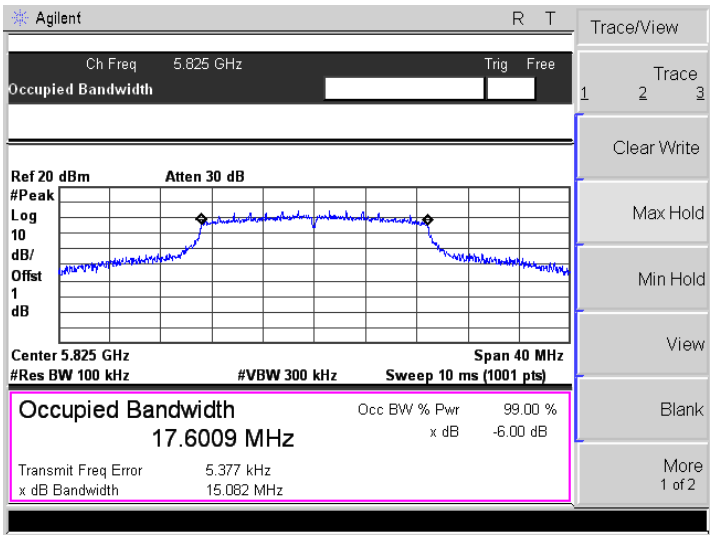
802.11n-HT20-Low	
802.11n-HT20-Middle	
802.11n-HT20-High	

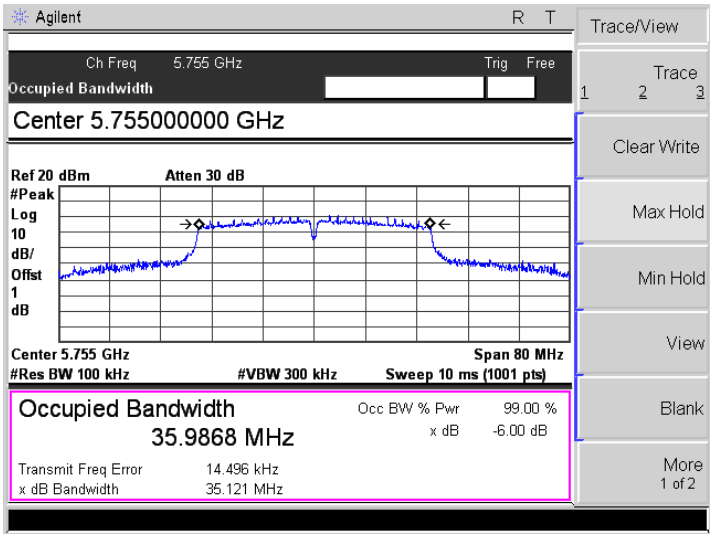
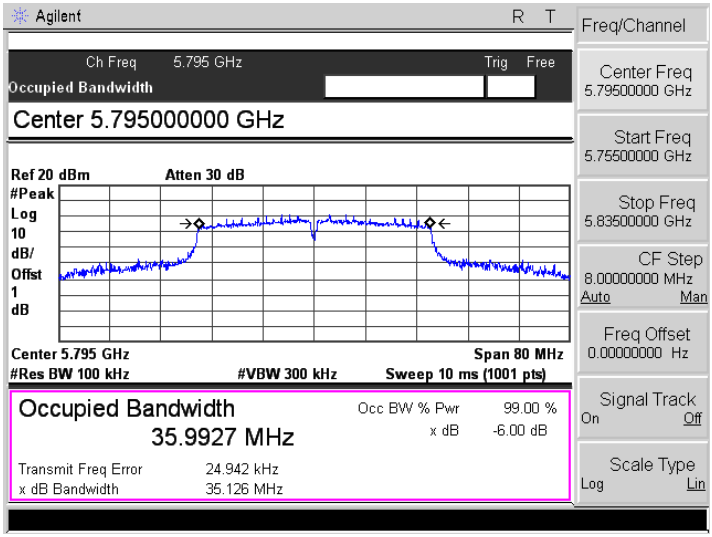
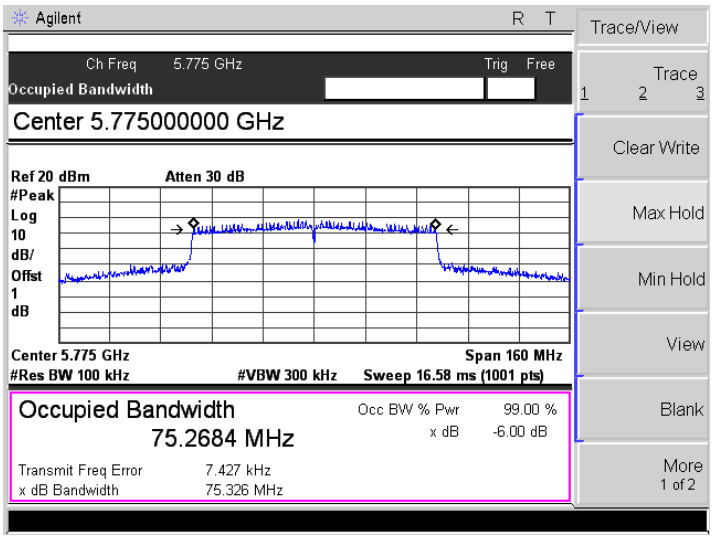
802.11n-HT40-Low	
802.11n-HT40-High	
802.11ac-HT80	

5725-5850MHz

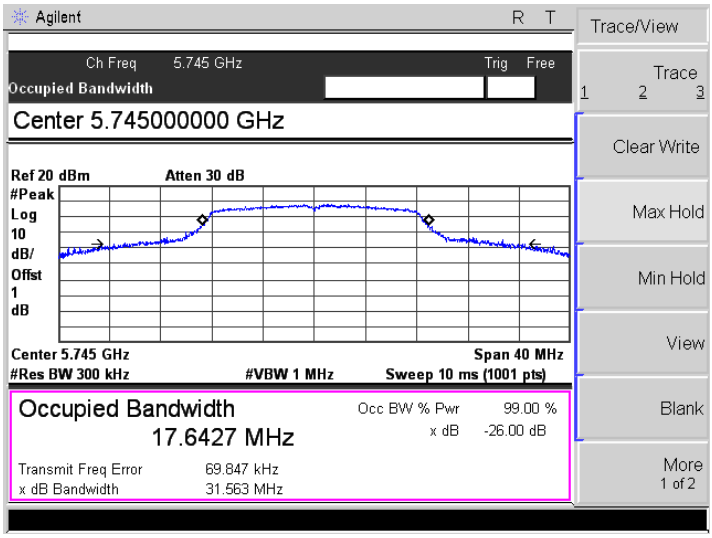
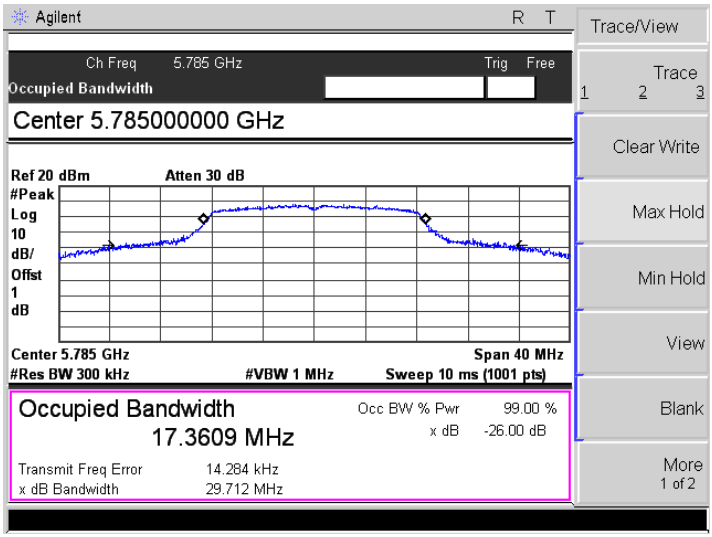
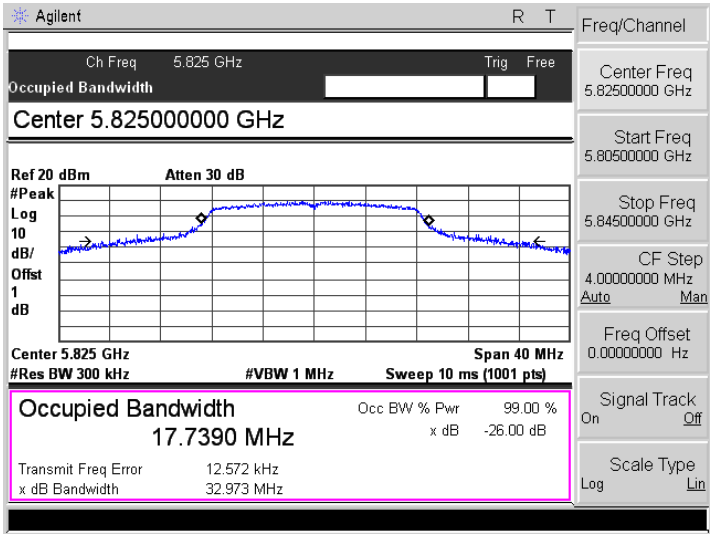
6dB

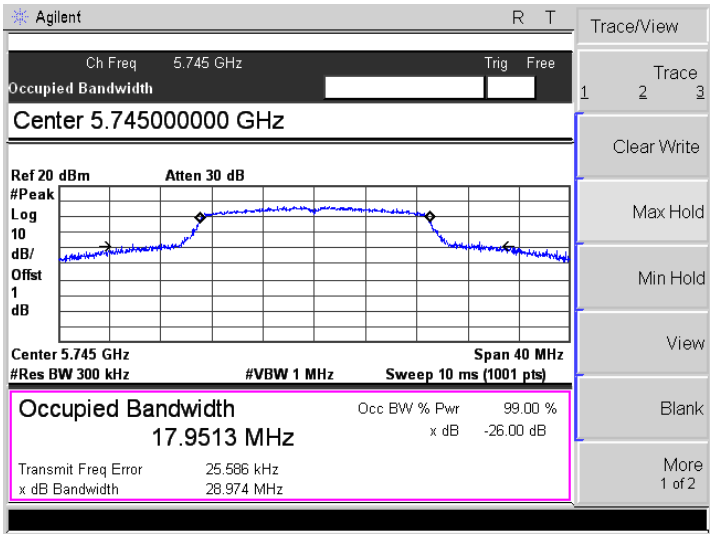
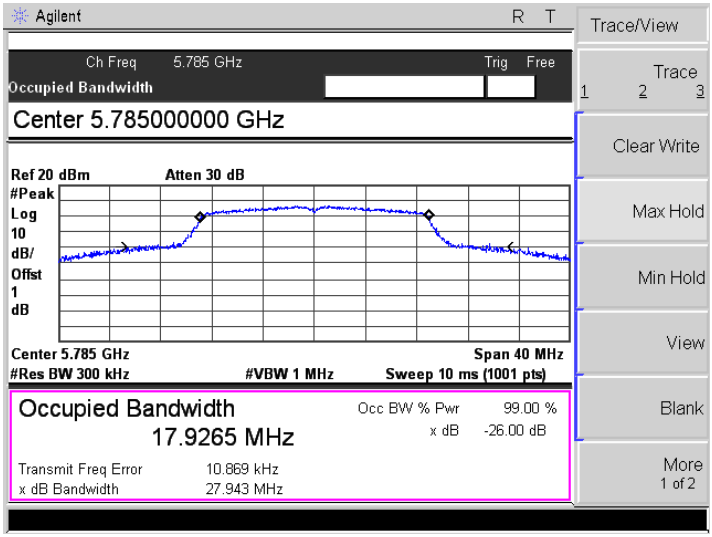
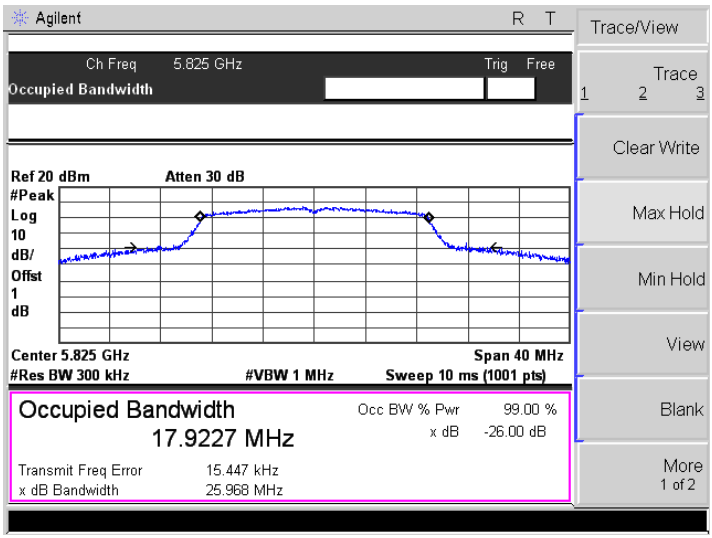
802.11a-Low	
802.11a-Middle	
802.11a-High	

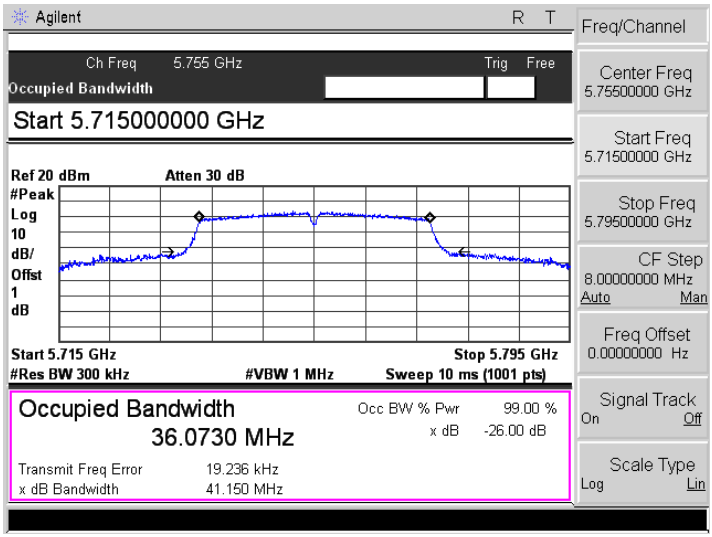
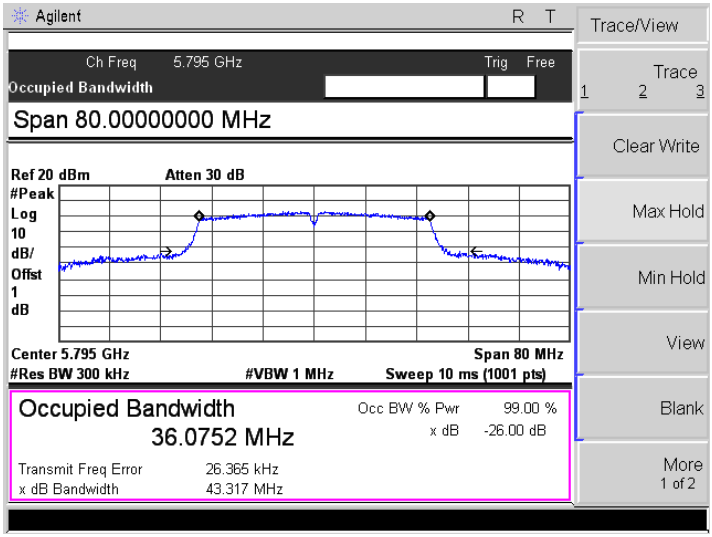
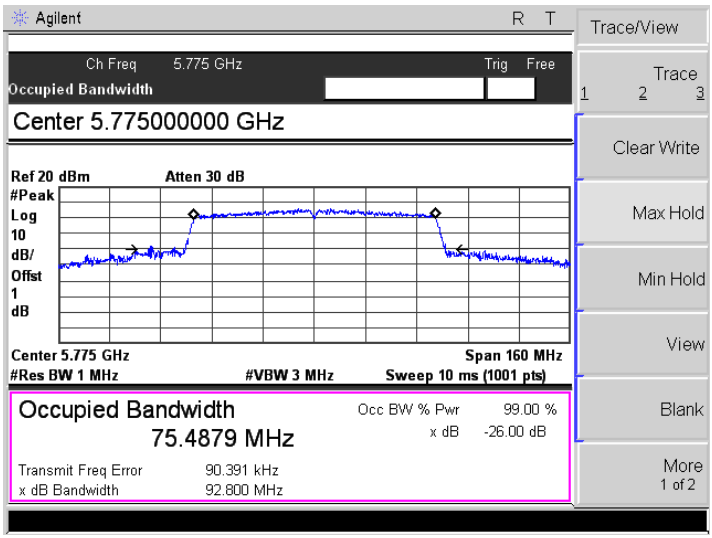
802.11n-HT20-Low	
802.11n-HT20-Middle	
802.11n-HT20-High	

802.11n-HT40-Low	
802.11n-HT40-High	
802.11ac-HT80	

99%OBW

802.11a-Low	
802.11a-Middle	
802.11a-High	

802.11n-HT20-Low	
802.11n-HT20-Middle	
802.11n-HT20-High	

802.11n-HT40-Low	
802.11n-HT40-High	
802.11ac-HT80	

APPENDIX C

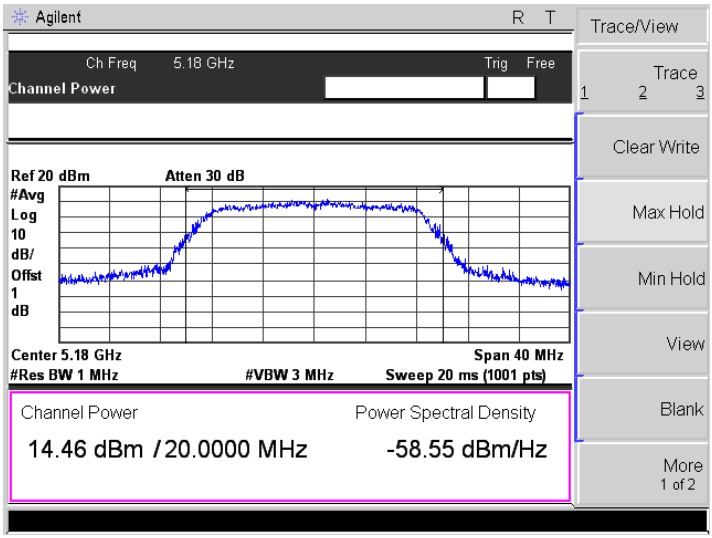
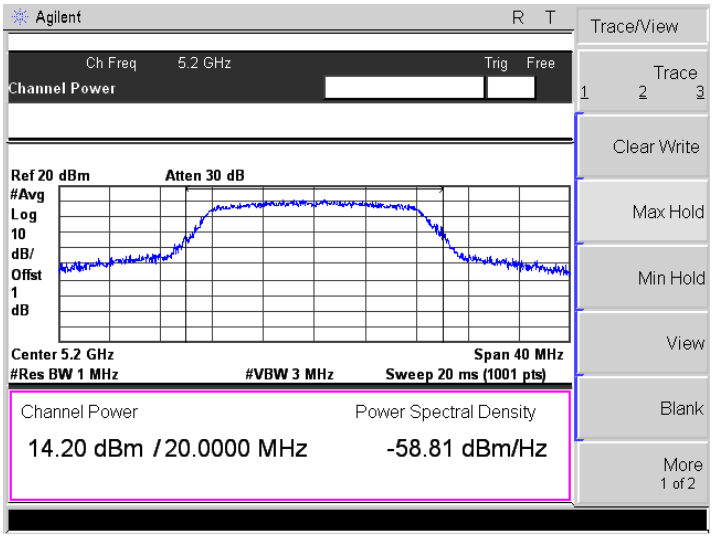
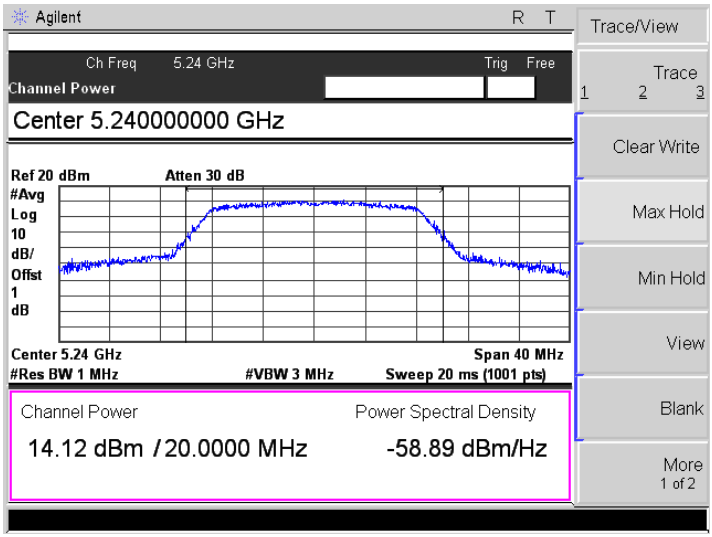
Maximum Conducted Output Power

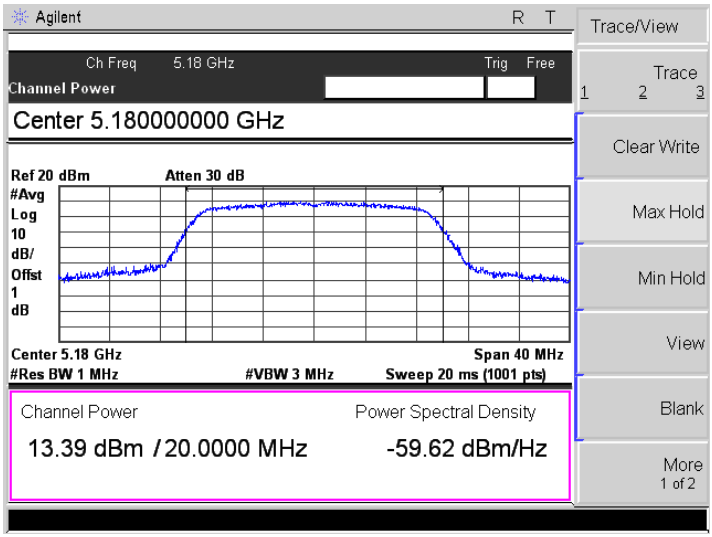
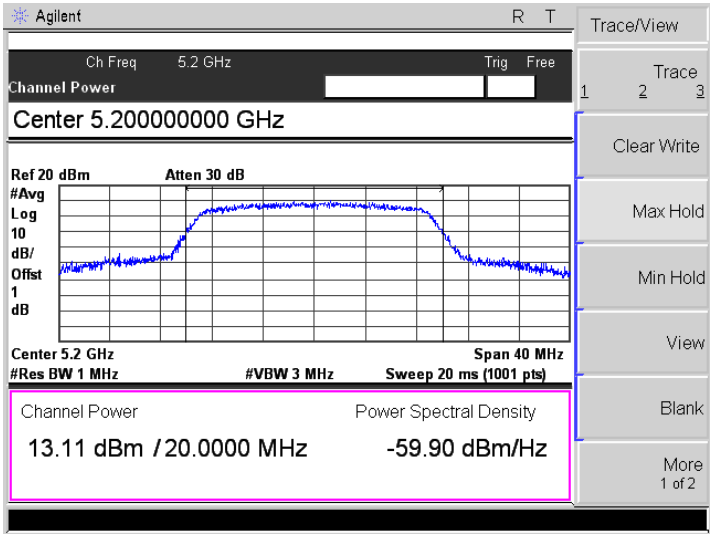
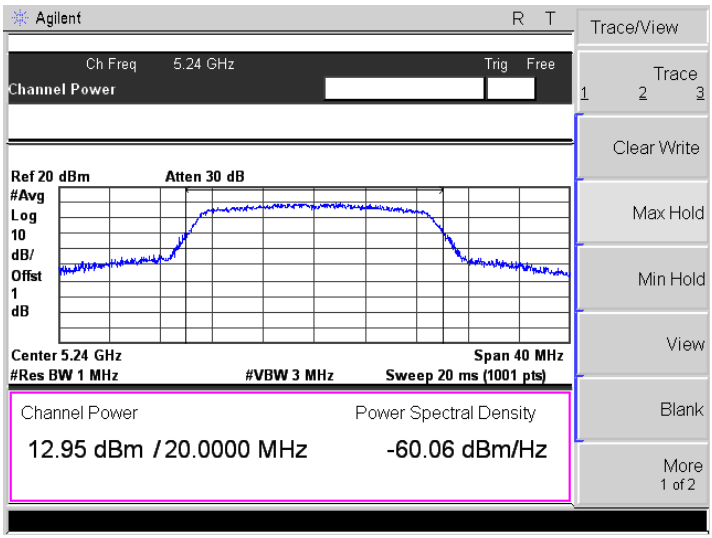
U-NII-1:5150-5250MHz					
Test mode	Frequency MHz	Output Power dBm		Total dBm	Limit dBm
		ANT 0	ANT 1		
802.11a	5180	14.46	14.12	/	23.98
	5200	14.20	14.08	/	23.98
	5240	14.12	14.10	/	23.98
802.11n-HT20	5180	13.39	13.07	16.24	23.98
	5200	13.11	13.23	16.18	23.98
	5240	12.95	13.52	16.25	23.98
802.11n-HT40	5190	12.63	13.00	15.83	23.98
	5230	12.59	12.99	15.80	23.98
802.11ac VH80	5210	11.75	11.43	14.60	23.98

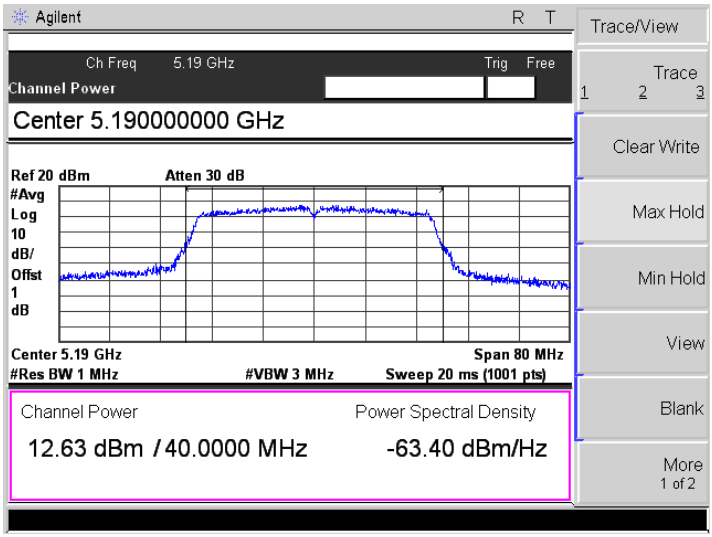
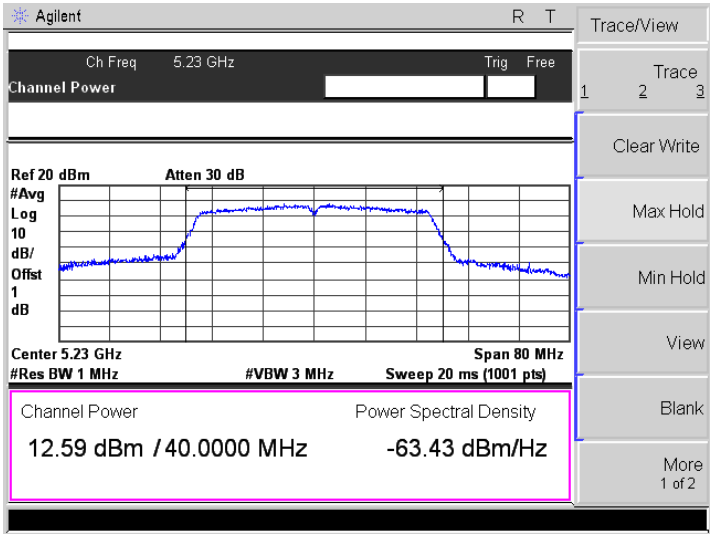
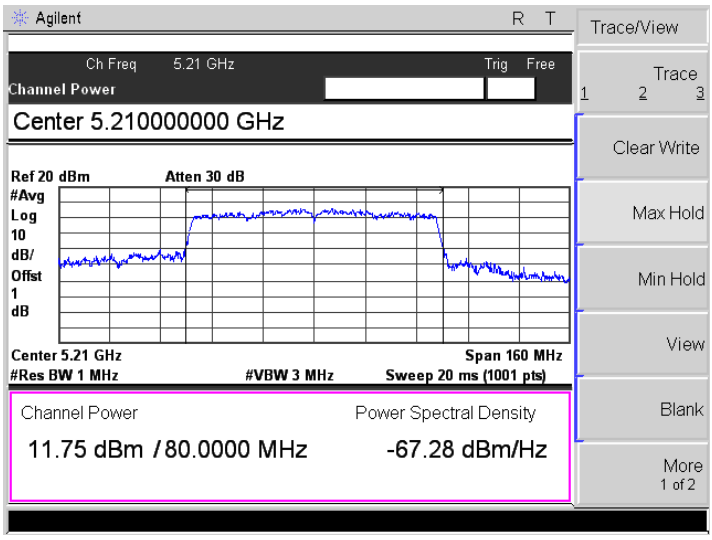
U-NII-3: 5725-5850MHz					
Test mode	Frequency MHz	Output Power dBm		Total dBm	Limit dBm
		ANT 0	ANT 1		
802.11a	5745	14.80	14.06	/	30
	5785	14.73	14.48	/	30
	5825	14.66	14.18	/	30
802.11n-HT20	5745	13.06	13.09	16.09	30
	5785	13.13	13.67	16.42	30
	5825	13.72	13.52	16.63	30
802.11n-HT40	5755	12.40	12.20	15.31	30
	5795	12.79	12.37	15.60	30
802.11ac VH80	5775	11.59	11.52	14.57	30

ANT 0

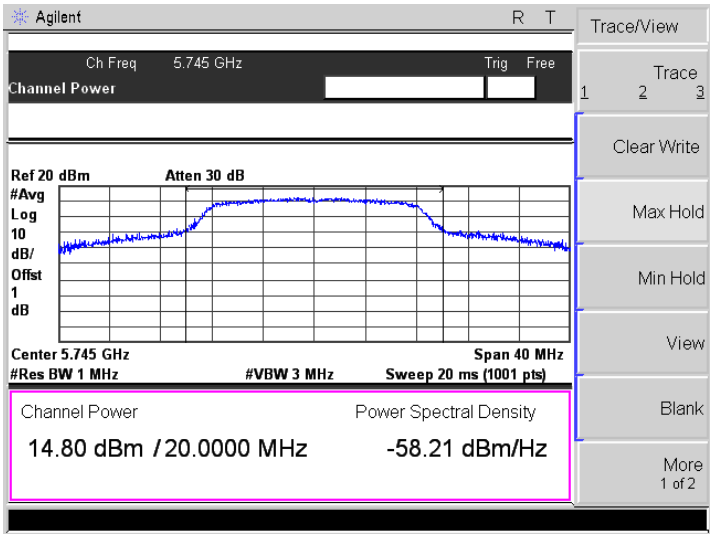
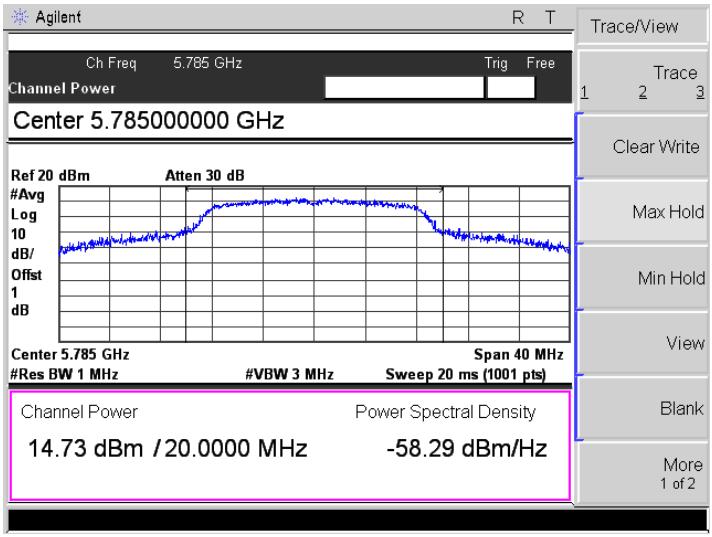
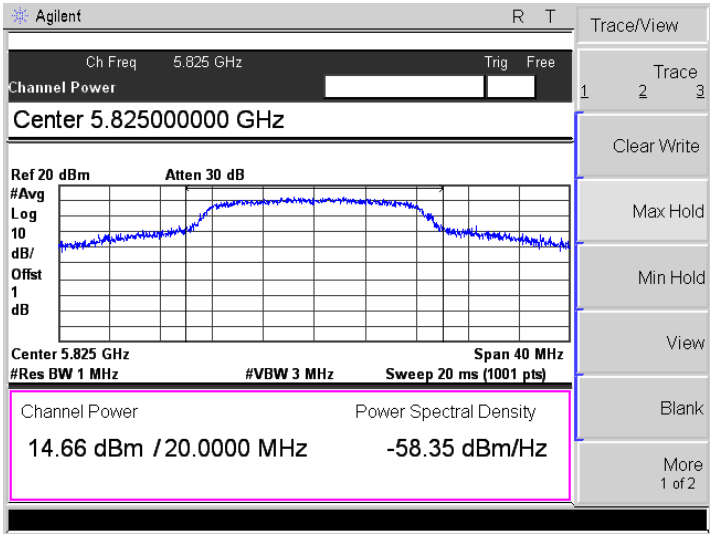
5150-5250MHz

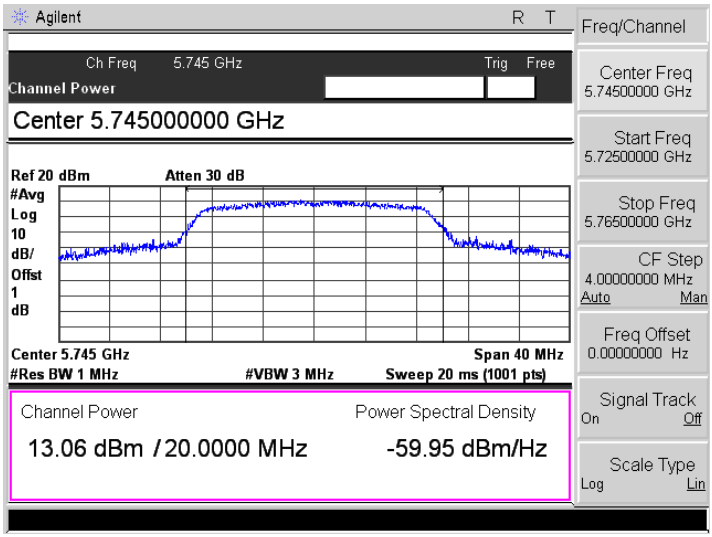
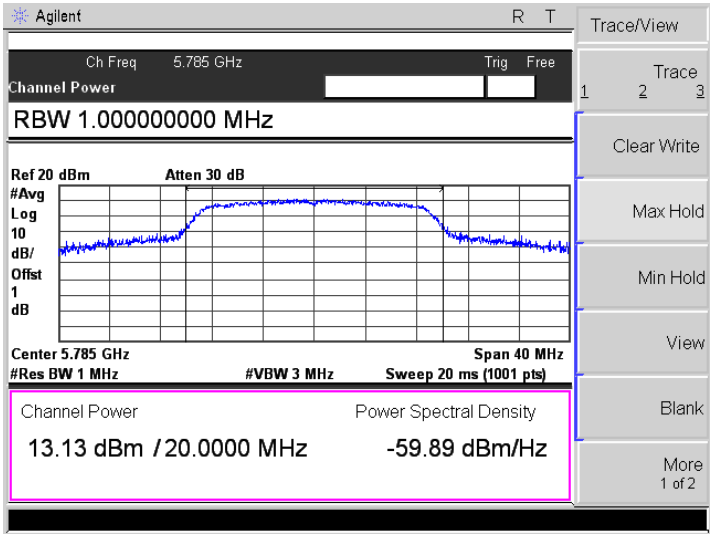
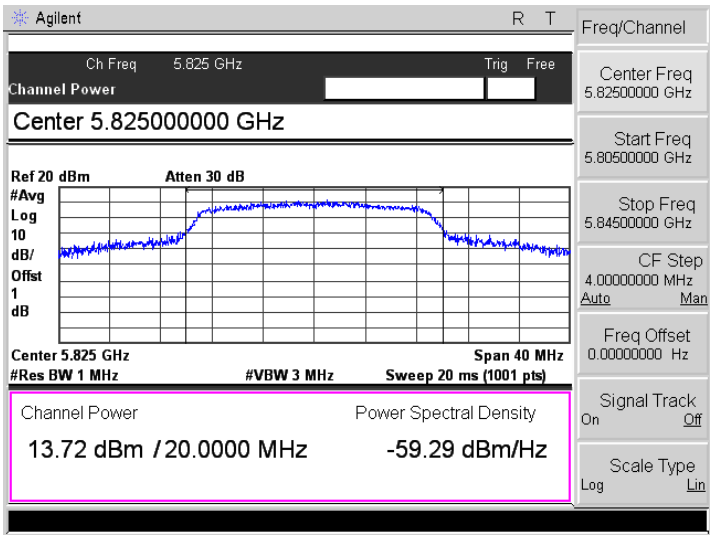
802.11a-Low	
802.11a-Middle	
802.11a-High	

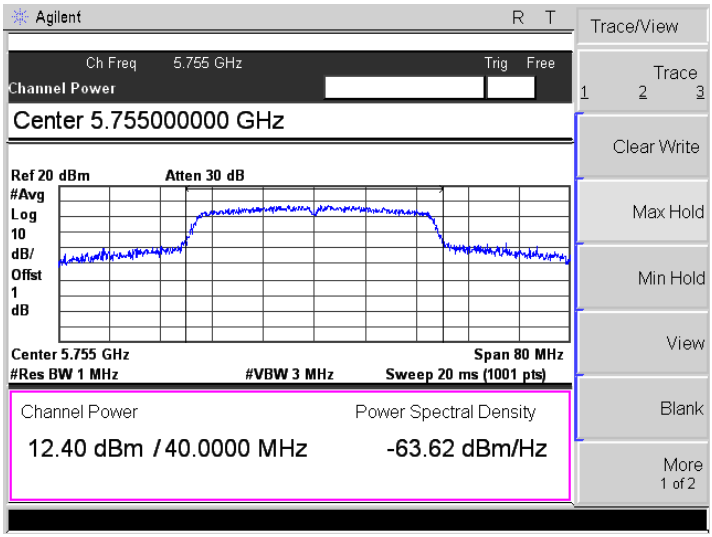
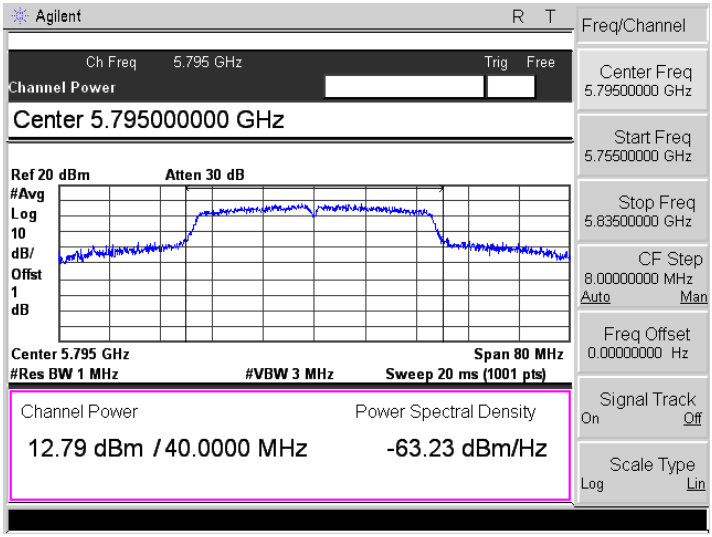
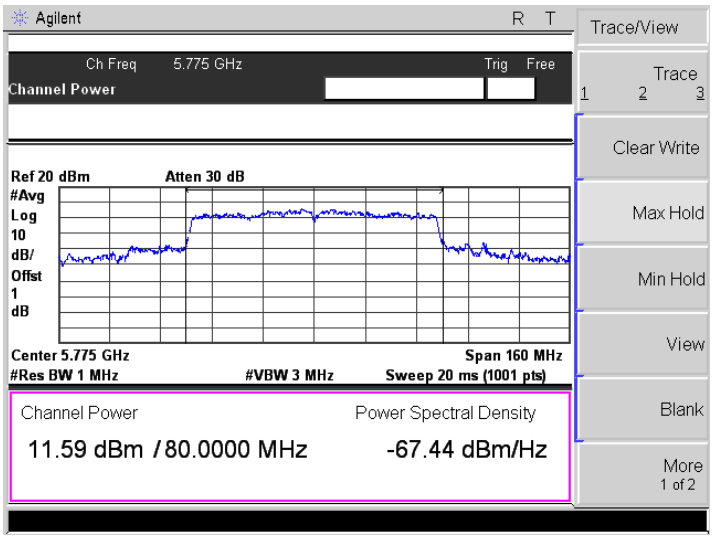
802.11n-HT20-Low	
802.11n-HT20-Middle	
802.11n-HT20-High	

802.11n-HT40-Low	
802.11n-HT40-High	
802.11ac-HT80	

5725-5850MHz

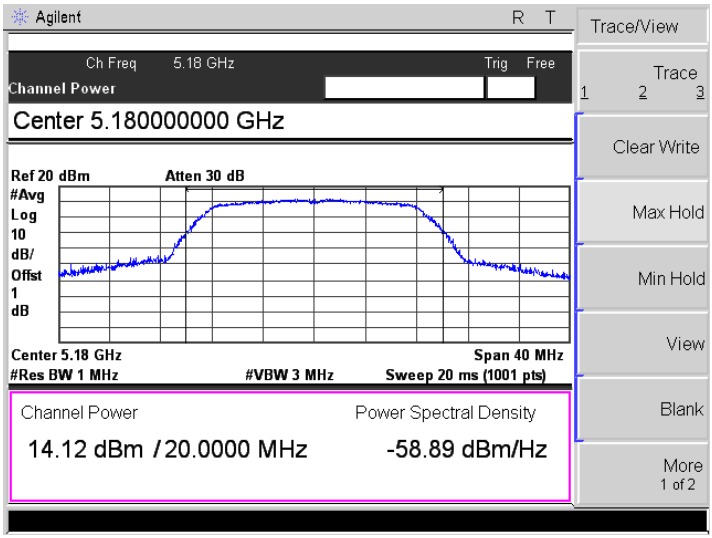
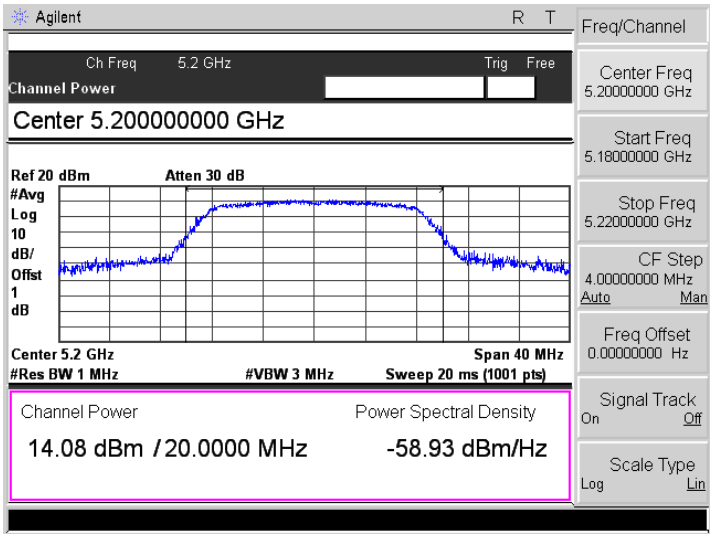
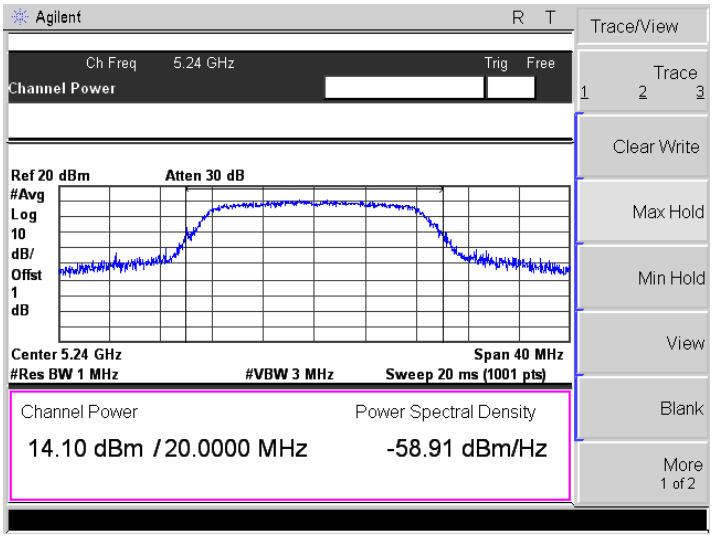
802.11a-Low	
802.11a-Middle	
802.11a-High	

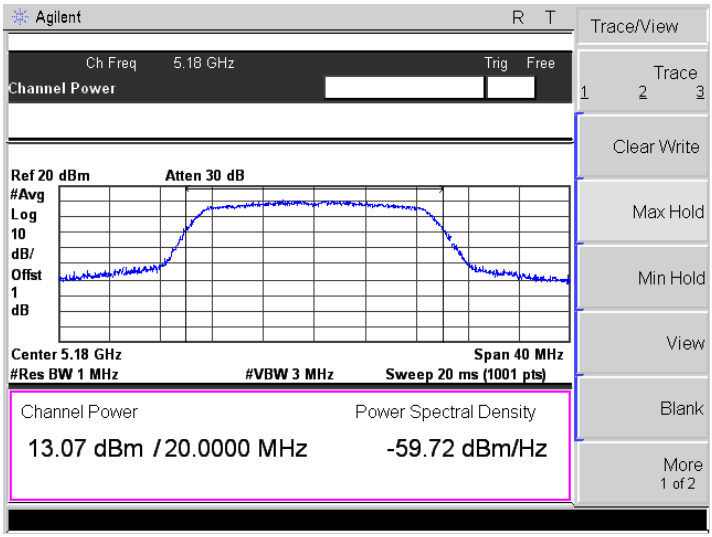
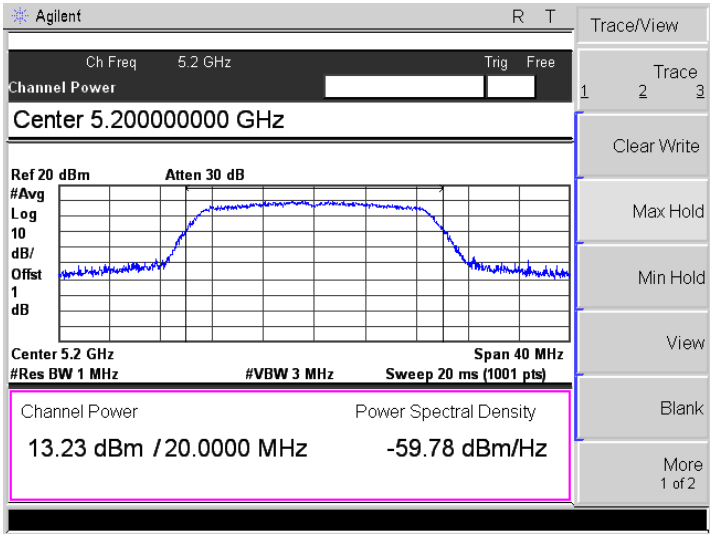
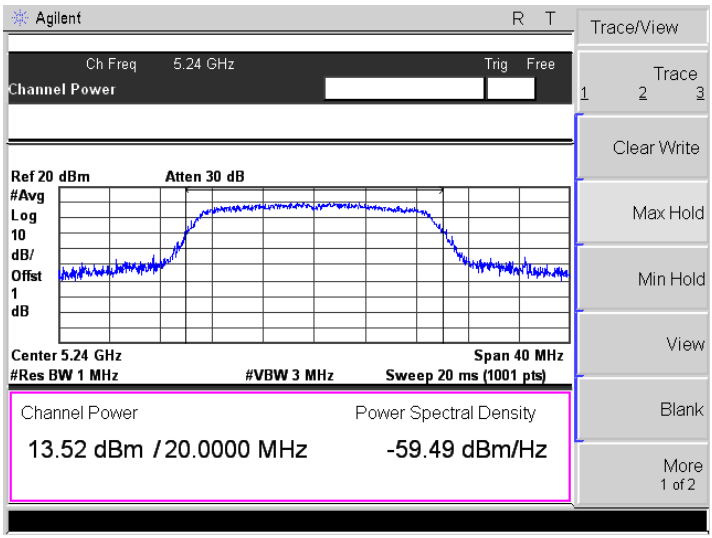
802.11n-HT20-Low	
802.11n-HT20-Middle	
802.11n-HT20-High	

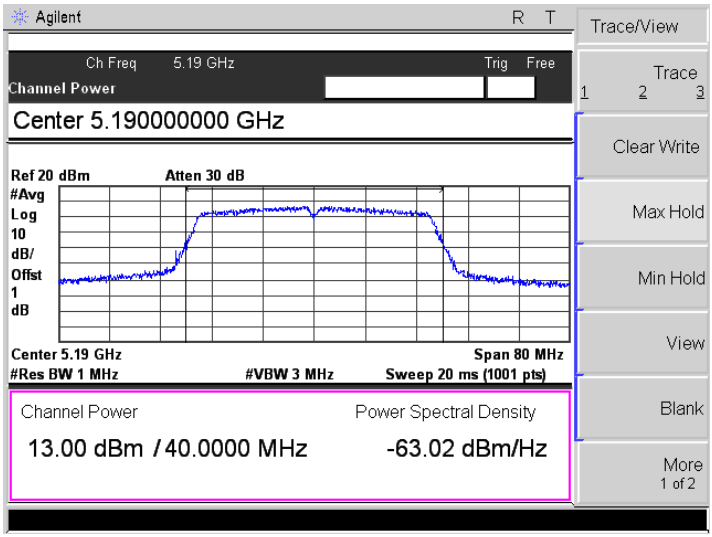
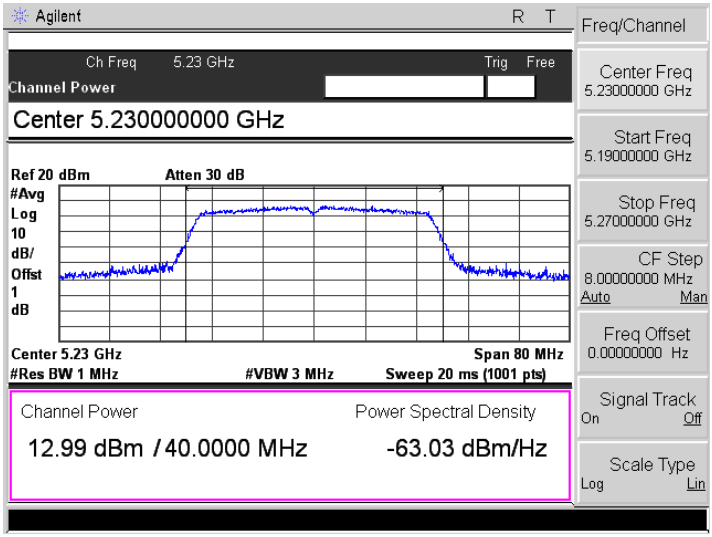
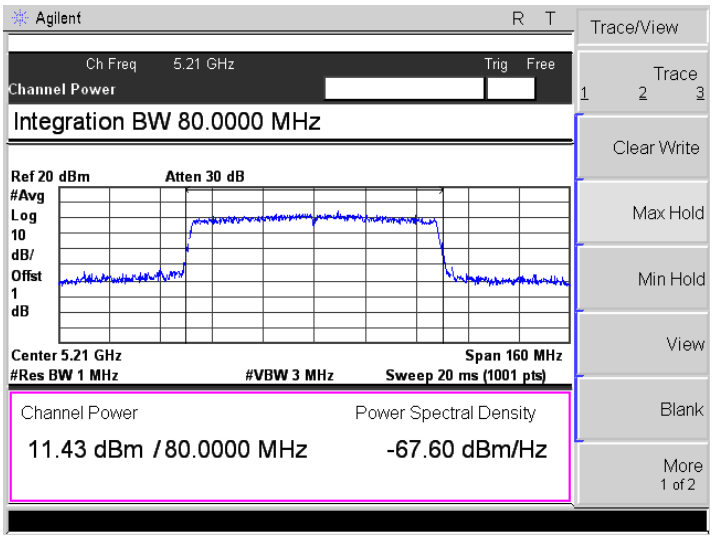
802.11n-HT40-Low	
802.11n-HT40-High	
802.11ac-HT80	

ANT 1

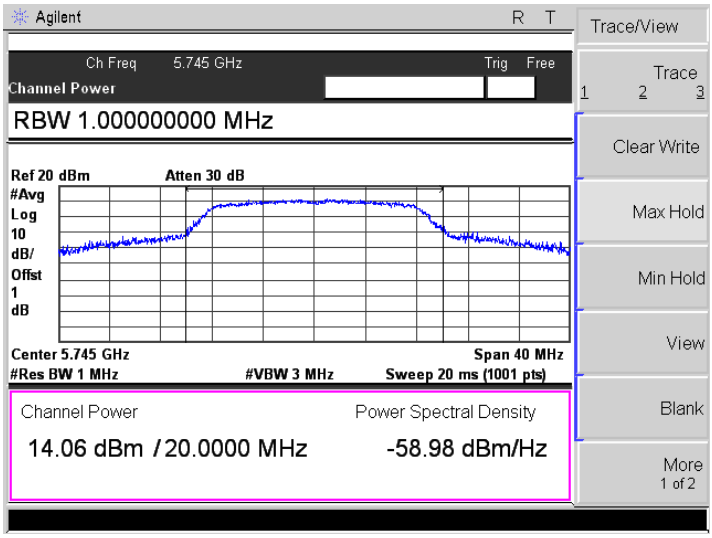
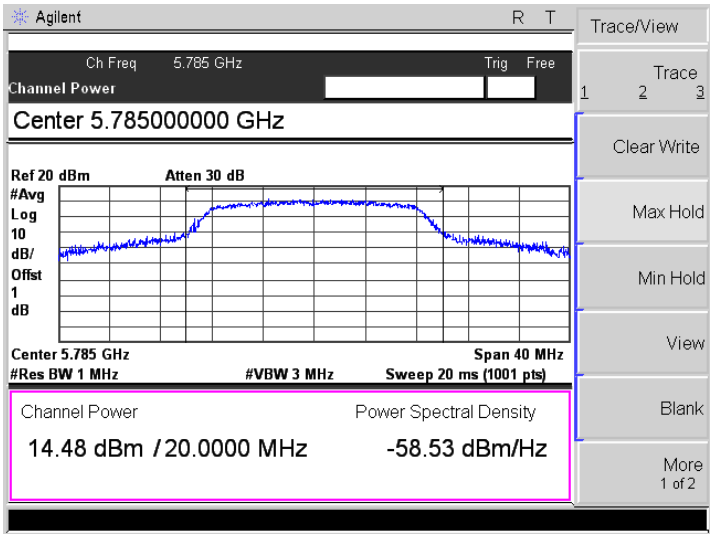
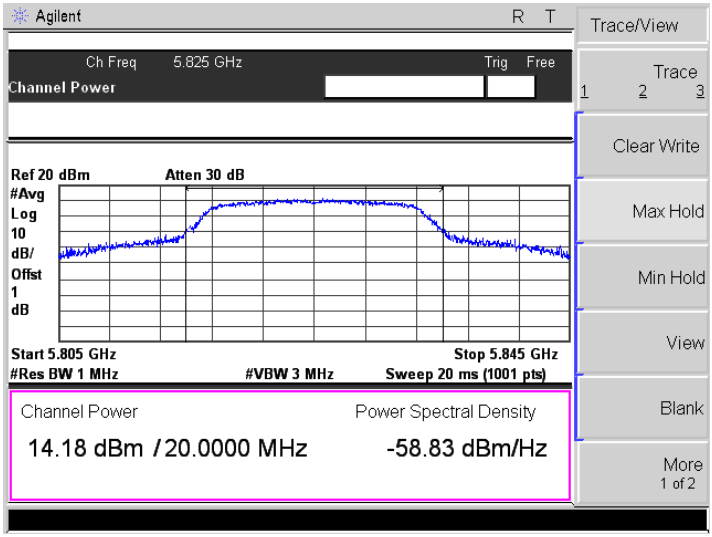
5150-5250MHz

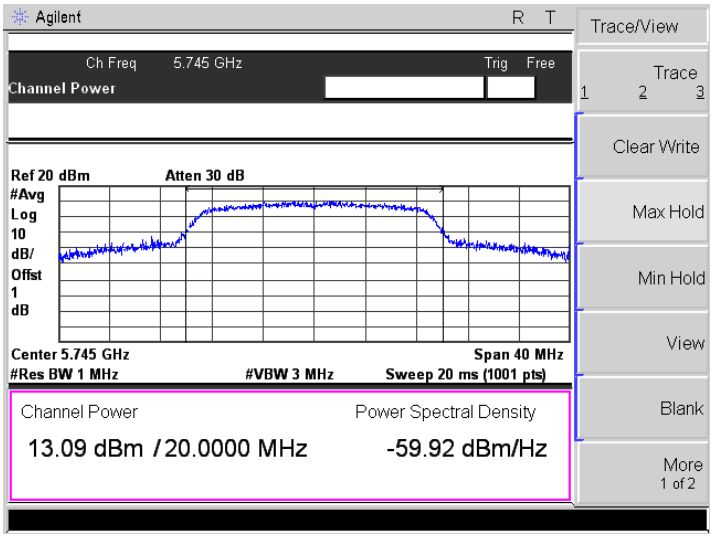
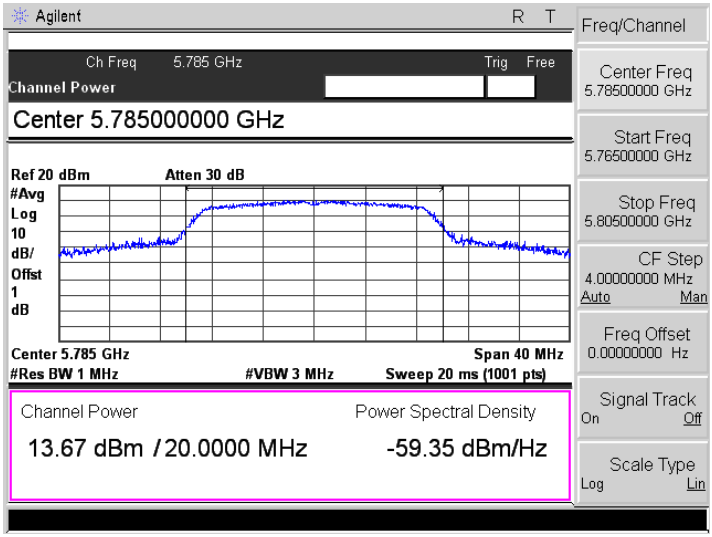
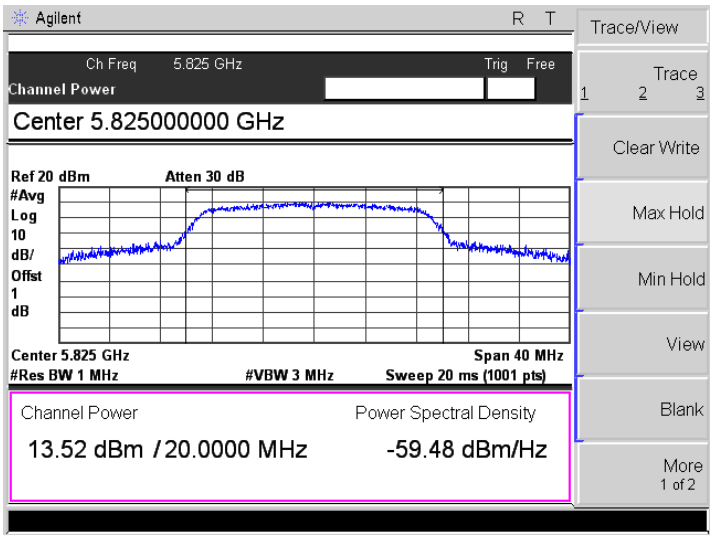
802.11a-Low	
802.11a-Middle	
802.11a-High	

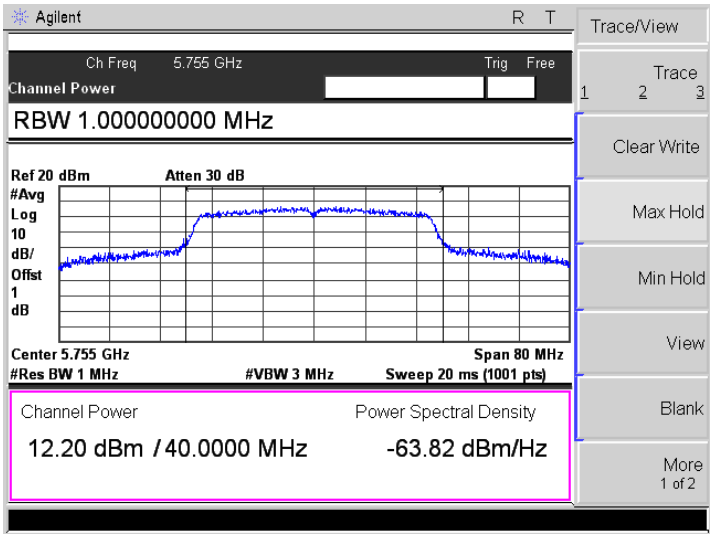
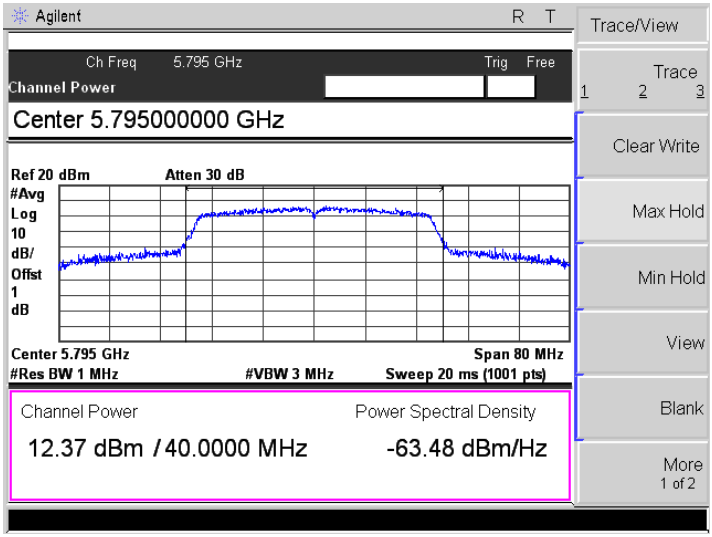
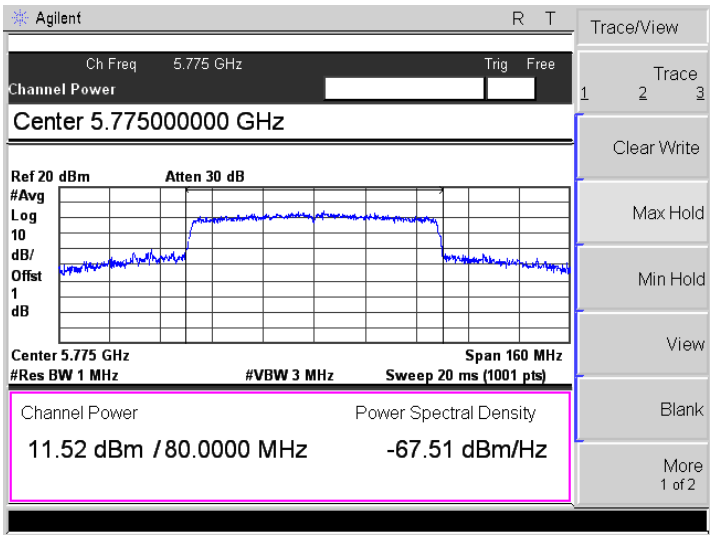
802.11n-HT20-Low	
802.11n-HT20-Middle	
802.11n-HT20-High	

802.11n-HT40-Low	
802.11n-HT40-High	
802.11ac-HT80	

5725-5850MHz

802.11a-Low	
802.11a-Middle	
802.11a-High	

802.11n-HT20-Low	
802.11n-HT20-Middle	
802.11n-HT20-High	

802.11n-HT40-Low	
802.11n-HT40-High	
802.11ac-HT80	

APPENDIX D

Frequency Stability

ANT 0

U-NII-1:5150-5250MHz worst case at 802.11a middle channel				
Voltage(%)	Power(VDC)	TEMP(℃)	Freq.Dev(Hz)	Deviation
100%	12	-30	1514	0.2912
100%		-20	1286	0.2473
100%		-10	1463	0.2813
100%		0	1354	0.2604
100%		+10	1233	0.2371
100%		+20	1533	0.2948
100%		+30	1046	0.2012
100%		+40	1579	0.3037
100%		+50	1335	0.2567
Low power	10.2	+20	1583	0.3044
High power	13.8	+20	1505	0.2894

U-NII-1:5725-5850MHz worst case at 802.11a middle channel				
Voltage(%)	Power(VDC)	TEMP(℃)	Freq.Dev(Hz)	Deviation
100%	12	-30	1513	0.2615
100%		-20	1286	0.2223
100%		-10	1461	0.2525
100%		0	1355	0.2342
100%		+10	1229	0.2124
100%		+20	1540	0.2662
100%		+30	1046	0.1808
100%		+40	1577	0.2726
100%		+50	1330	0.2299
Low power	10.2	+20	1585	0.2740
High power	13.8	+20	1510	0.2610

ANT 1

U-NII-1:5150-5250MHz worst case at 802.11a middle channel				
Voltage(%)	Power(VDC)	TEMP(℃)	Freq.Dev(Hz)	Deviation
100%	12	-30	1514	0.2912
100%		-20	1294	0.2488
100%		-10	1458	0.2804
100%		0	1357	0.2610
100%		+10	1234	0.2373
100%		+20	1542	0.2965
100%		+30	1051	0.2021
100%		+40	1572	0.3023
100%		+50	1330	0.2558
Low power	10.2	+20	1583	0.3044
High power	13.8	+20	1503	0.2890

U-NII-3:5725-5850MHz worst case at 802.11a middle channel				
Voltage(%)	Power(VDC)	TEMP(℃)	Freq.Dev(Hz)	Deviation
100%	12	-30	1511	0.2612
100%		-20	1288	0.2226
100%		-10	1456	0.2517
100%		0	1354	0.2341
100%		+10	1228	0.2123
100%		+20	1535	0.2653
100%		+30	1052	0.1818
100%		+40	1572	0.2717
100%		+50	1333	0.2304
Low power	10.2	+20	1579	0.2729
High power	13.8	+20	1512	0.2614

APPENDIX PHOTOGRAPHS

Please refer to "ANNEX"

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