# TEST REPORT

| | | |
|---|---|---|
| **Reference No.** | : | WTX21X03021564W-1 |
| **FCC ID** | : | 2AZES-AC1L |
| **Applicant** | : | BrosTrend Technology LLC |
| **Address** | : | 8 The Green, Suite A, Dover City, Delaware, U.S.A., Zip Code 19901 |
| **Product Name** | : | USB Wi-Fi Adapter |
| **Test Model** | : | AC1L |
| **Standards** | : | FCC Part 15.407 |
| **Date of Receipt sample** | : | Mar.18, 2021 |
| **Date of Test** | : | Mar.18, 2021 to Apr.08, 2021 |
| **Date of Issue** | : | Apr.08, 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.


**Prepared By:**

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| Rev.00 | Apr.08, 2021 | Original |
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# 1. GENERAL INFORMATION

## 1.1 Product Description for Equipment Under Test (EUT)

**Client Information**

| | |
|---|---|
| Applicant: | BrosTrend Technology LLC |
| Address of applicant: | 8 The Green, Suite A, Dover City, Delaware, U.S.A., Zip Code 19901 |
| Manufacturer: | BrosTrend Technology LLC |
| Address of manufacturer: | Room 205, Building No. 5, YaoXing HuaYuan, XinHuiDaDao No. 45, XinHui District, JiangMen City, GuangDong Province, CHINA, Postage Code:529100 |

| **General Description of EUT** | |
|---|---|
| Product Name: | USB Wi-Fi Adapter |
| Trade Name: | BrosTrend |
| Model No.: | AC1L |
| Adding Model(s): | AC1, AC8, AC9 |
| Rated Voltage: | DC5V |
| Battery Capacity: | / |
| Power Adapter: | / |
| Software Version: | 1030.40.128.2019 |
| Hardware Version: | TC-W8812BU3 |
| *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 AC1L, 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: | 13.69dBm (Conducted) |
| Type of Modulation: | QPSK,16QAM,64QAM, 256QAM |
| Type of Antenna: | PCB Antenna |
| Antenna Gain: | 3dBi |

## 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

Install “QATool” and follow the instructions given by the manufacturer, 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 6Mbps | ANT 1 | 25 | 25 | 25 | / | / | / | / | / | / | / | 23 | 23 | 23 |
| | ANT 2 | 26 | 26 | 26 | / | / | / | / | / | / | / | 27 | 27 | 27 |
| 802.11n-HT20 MCS0 | ANT 1 | 24 | 24 | 20 | / | / | / | / | / | / | / | 20 | 20 | 20 |
| | ANT 2 | 24 | 24 | 23 | / | / | / | / | / | / | / | 25 | 25 | 25 |

| Mode | Ant. | NCB: 40MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 5190 | 5230 | 5270 | 5310 | 5510 | 5550 | 5670 | 5710 | 5755 | 5795 |
| 802.11n-HT40 MCS0 | ANT 1 | 20 | 20 | / | / | / | / | / | / | 15 | 16 |
| | ANT 2 | 20 | 20 | / | / | / | / | / | / | 23 | 23 |

| Mode | Ant. | NCB: 80MHz | | | | | |
|---|---|---|---|---|---|---|---|
| | | 5210 | 5290 | 5530 | 5610 | 5690 | 5775 |
| 802.11ac-VH80 MCS0/Nss2 | ANT 1 | 20 | / | / | / | / | 15 |
| | ANT 2 | 20 | / | / | / | / | 22 |

## 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 |
| / | / | / | / |

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

| **Auxiliary Equipment List and Details** | | | |
|---|---|---|---|
| Description | Manufacturer | Model | Serial Number |
| Notebook | Lenovo | E445 | / |

## 1.8 Measurement Uncertainty

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

## 1.9 Test Equipment List and Details

| No. | Description | Manufacturer | Model | Serial No. | Cal Date | Due Date |
|---|---|---|---|---|---|---|
| SEMT-1072 | Spectrum Analyzer | Agilent | E4407B | MY41440400 | 2020-04-28 | 2021-04-27 |
| SEMT-1031 | Spectrum Analyzer | Rohde & Schwarz | FSP30 | 836079/035 | 2020-04-28 | 2021-04-27 |
| SEMT-1007 | EMI Test Receiver | Rohde & Schwarz | ESVB | 825471/005 | 2020-04-28 | 2021-04-27 |
| SEMT-1008 | Amplifier | Agilent | 8447F | 3113A06717 | 2020-04-28 | 2021-04-27 |
| SEMT-1043 | Amplifier | C&D | PAP-1G18 | 2002 | 2020-04-28 | 2021-04-27 |
| SEMT-1011 | Broadband Antenna | Schwarz beck | VULB9163 | 9163-333 | 2019-05-05 | 2021-05-04 |
| SEMT-1042 | Horn Antenna | ETS | 3117 | 00086197 | 2019-05-05 | 2021-05-04 |
| SEMT-1121 | Horn Antenna | Schwarzbeck | BBHA 9170 | BBHA9170582 | 2019-05-05 | 2021-05-04 |
| SEMT-1069 | Loop Antenna | Schwarz beck | FMZB 1516 | 9773 | 2019-05-05 | 2021-05-04 |
| SEMT-1001 | EMI Test Receiver | Rohde & Schwarz | ESPI | 101611 | 2020-04-28 | 2021-04-27 |
| SEMT-1003 | L.I.S.N | Schwarz beck | NSLK8126 | 8126-224 | 2020-04-28 | 2021-04-27 |
| SEMT-1002 | Pulse Limiter | Rohde & Schwarz | ESH3-Z2 | 100911 | 2020-04-28 | 2021-04-27 |
| SEMT-1168 | Pre-amplifier | Direction Systems Inc. | PAP-0126 | 14141-12838 | 2020-04-28 | 2021-04-27 |
| SEMT-1169 | Pre-amplifier | Direction Systems Inc. | PAP-2640 | 14145-14153 | 2020-04-28 | 2021-04-27 |
| SEMT-1163 | Spectrum Analyzer | Rohde & Schwarz | FSP40 | 100612 | 2020-04-28 | 2021-04-27 |
| SEMT-1170 | DRG Horn Antenna | A.H. SYSTEMS | SAS-574 | 571 | 2019-05-05 | 2021-05-04 |
| SEMT-1166 | Power Limiter | Agilent | N9356B | MY45450376 | 2020-04-28 | 2021-04-27 |
| SEMT-1048 | RF Limiter | ATTEN | AT-BSF-2400~2500 | / | 2020-04-28 | 2021-04-27 |
| SEMT-1076 | RF Switcher | Top Precision | RCS03-A2 | / | 2020-04-28 | 2021-04-27 |
| 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 PCB antennas, fulfill the requirement of this section.

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

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

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

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

kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500kHz bandwidth, the following adjustments to the procedures apply:

a) Set RBW ≥ 1/T, where T is defined in section II.B.l.a).
b) Set VBW ≥ 3 RBW.
c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10log(1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

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

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

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

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

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

## 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 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

2. Minimum Emission Bandwidth for the band 5.725-5.85 GHz
Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:
a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.
Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described above.

D. 99 Percent Occupied Bandwidth
The 99-percent occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5 % of the total mean power of the given emission. Measurement of the 99-percent occupied bandwidth is required only as a condition for using the optional band-edge measurement techniques described in section II.G.3.d). Measurements of 99-percent occupied bandwidth may also optionally be used in lieu of the EBW to 789033 D02 v02r01 General UNII Test Procedures New Rules v01 define the minimum frequency range over which the spectrum is integrated when measuring maximum conducted output power as described in section II.E. However, the EBW must be measured to determine bandwidth dependent limits on maximum conducted output power in accordance with 15.407(a).

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

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

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

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

## 7.2 Test Procedure

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

(i) Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.

(ii) Set RBW = 1 MHz.

(iii) Set VBW ≥ 3 MHz.

(iv) Number of points in sweep ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)

(v) Sweep time = auto.

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

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

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

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

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

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

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

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

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

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

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

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

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

where:

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

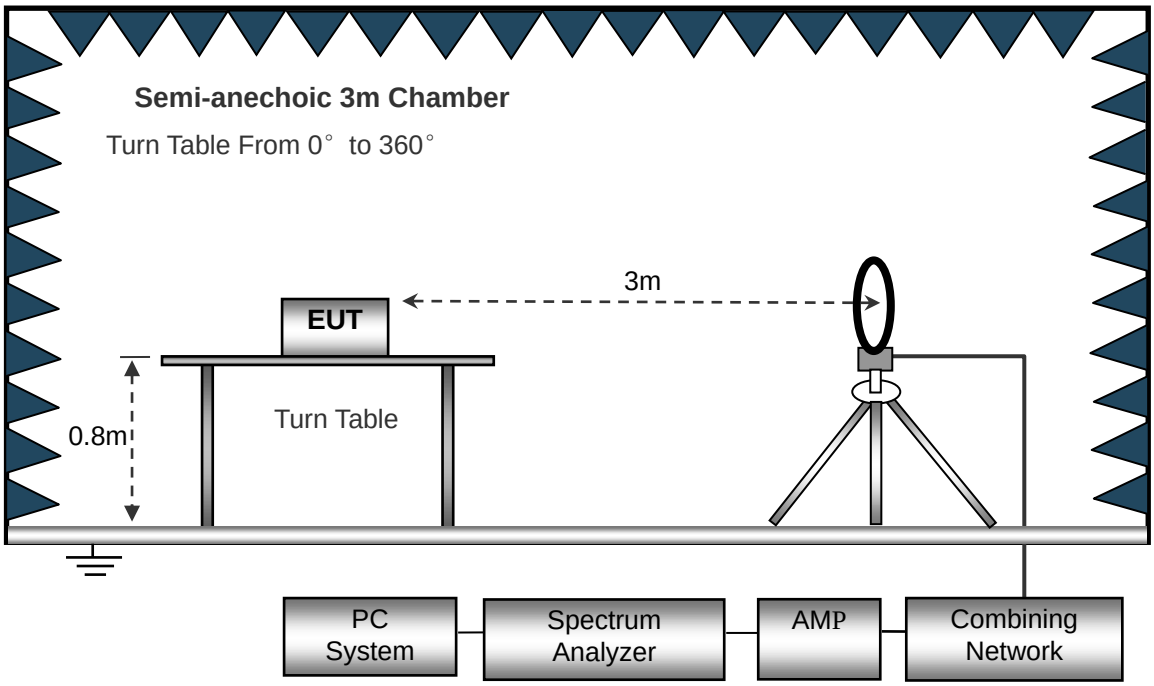
## 8.2 Test Procedure

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..

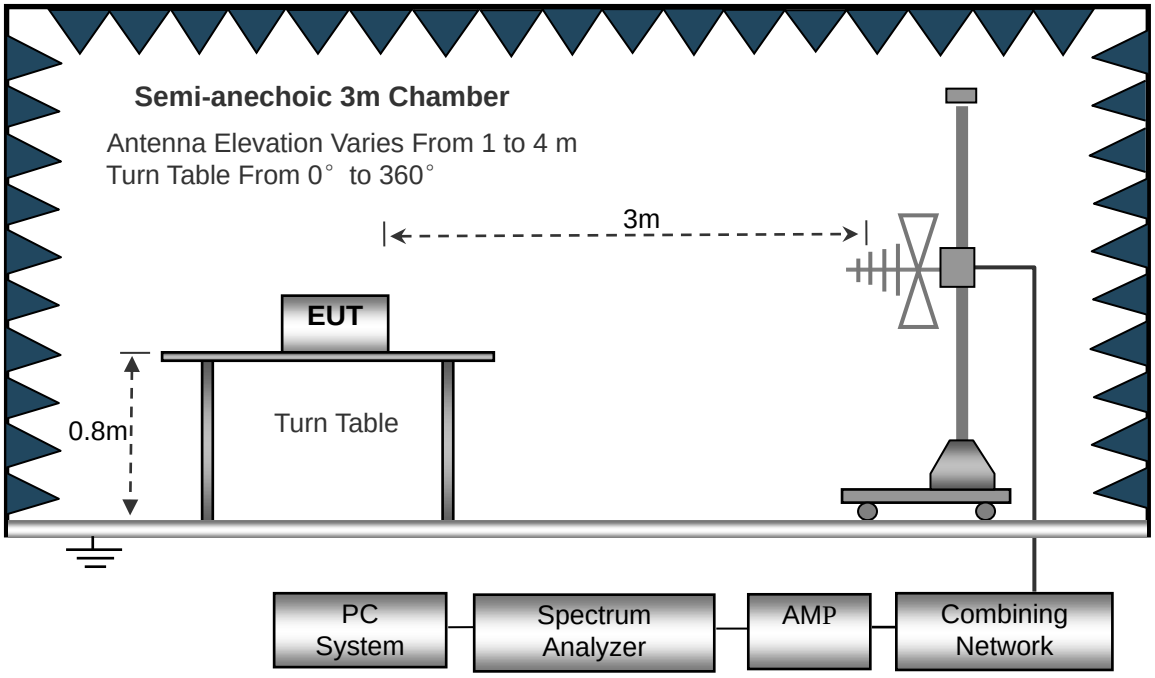
The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

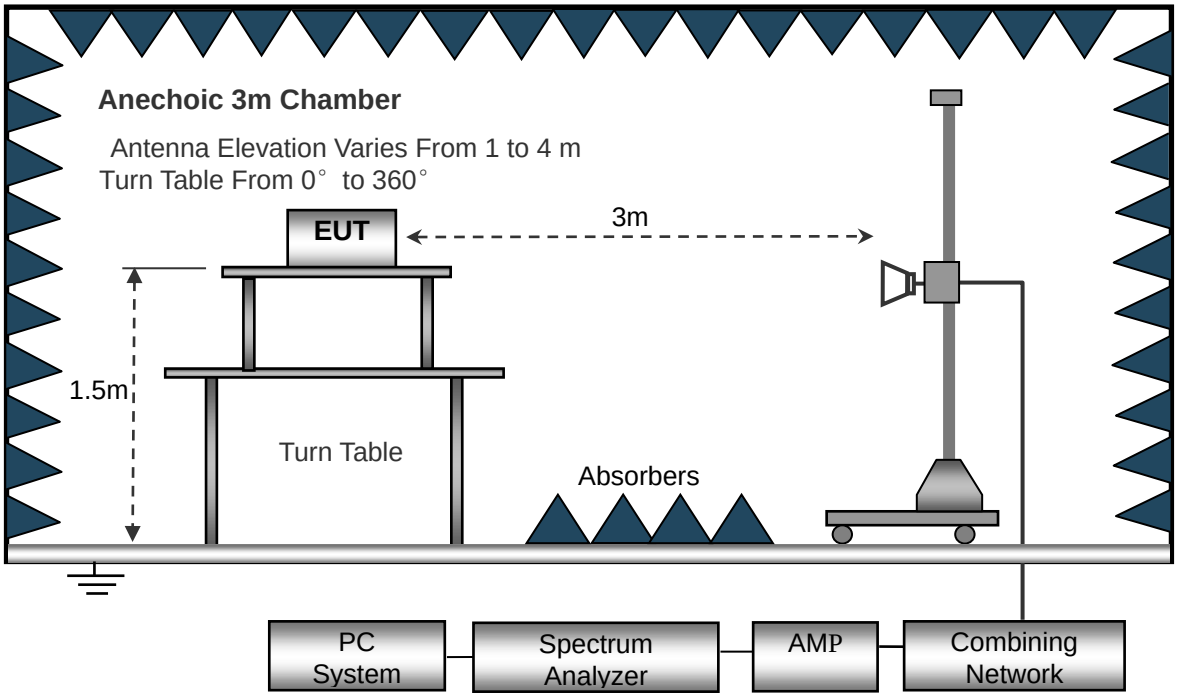
The test setup for emission measurement below 30MHz..




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



The test setup for emission measurement above 1 GHz..




## 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

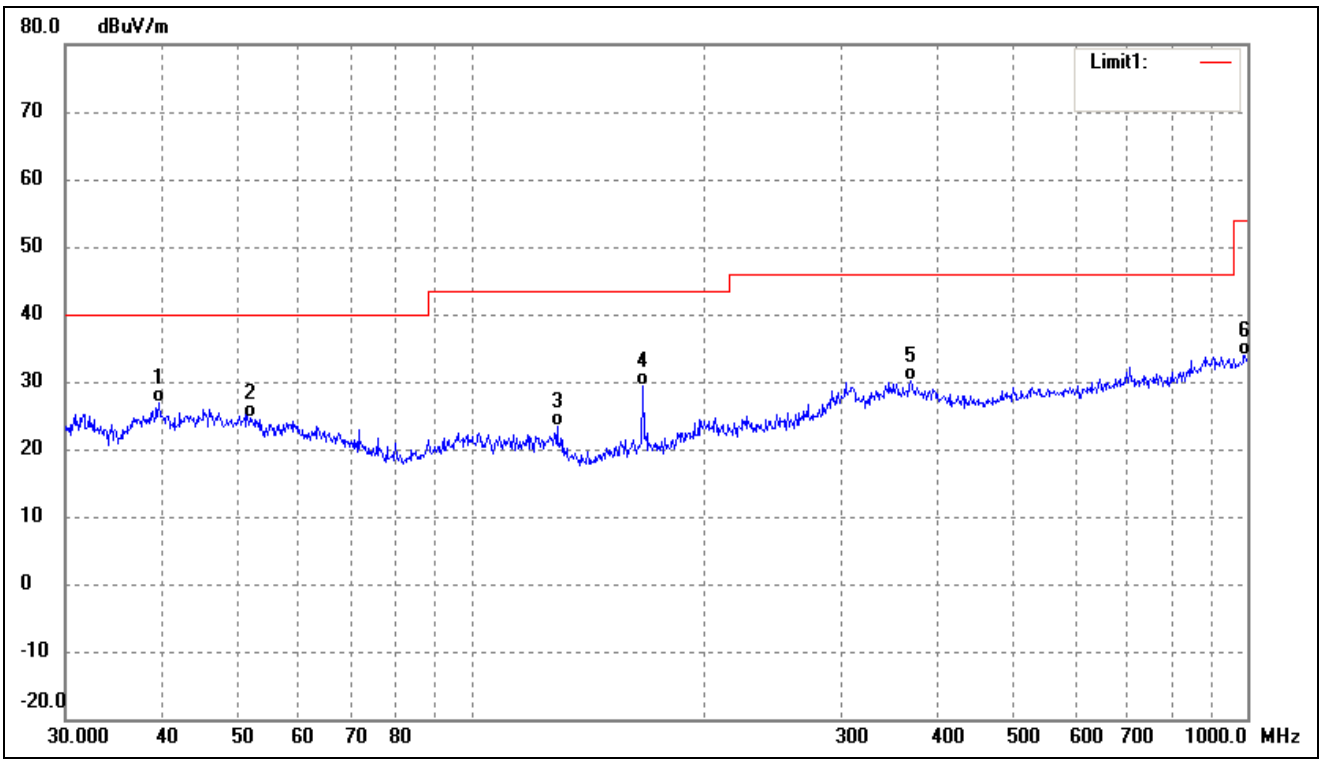
## 8.5 Summary of Test Results/Plots

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

- Spurious Emission From 30 MHz to 1 GHz

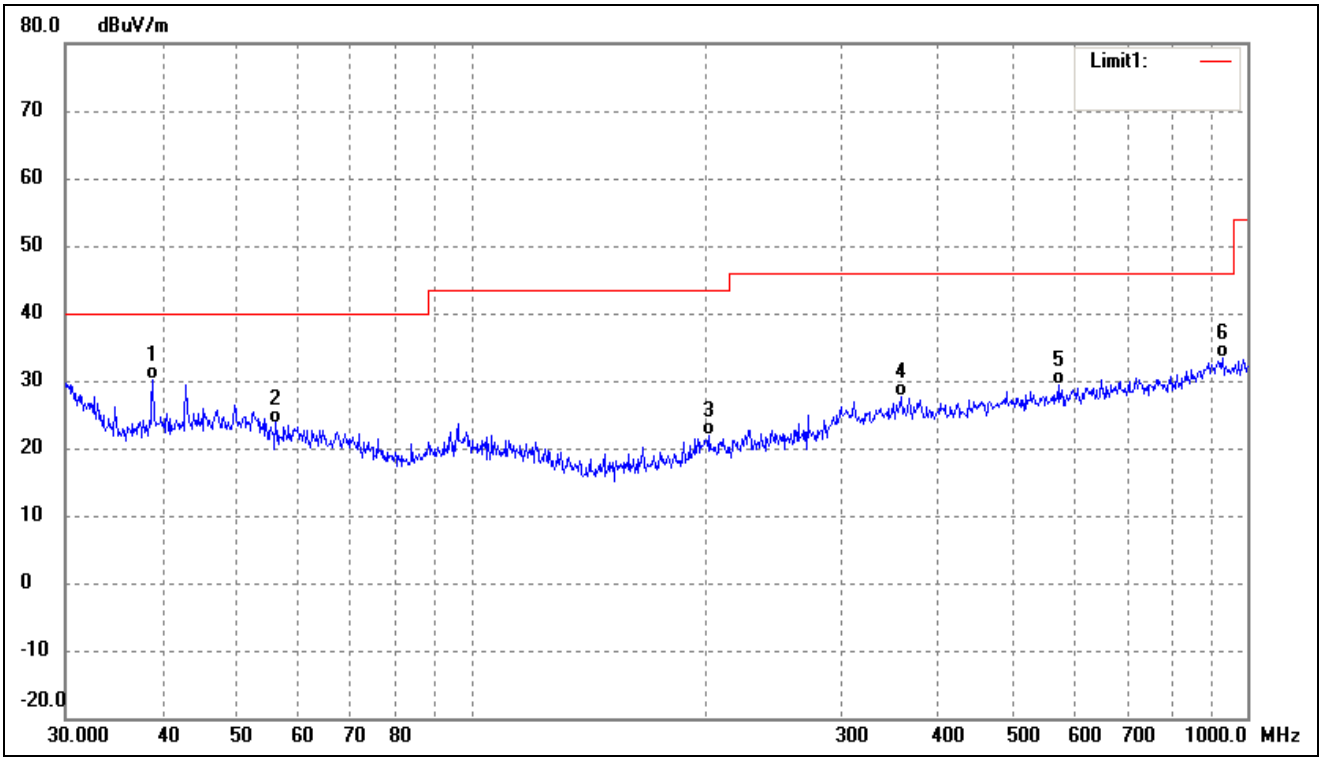
- Antenna A(Worst case)
- 5150-5250MHz

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



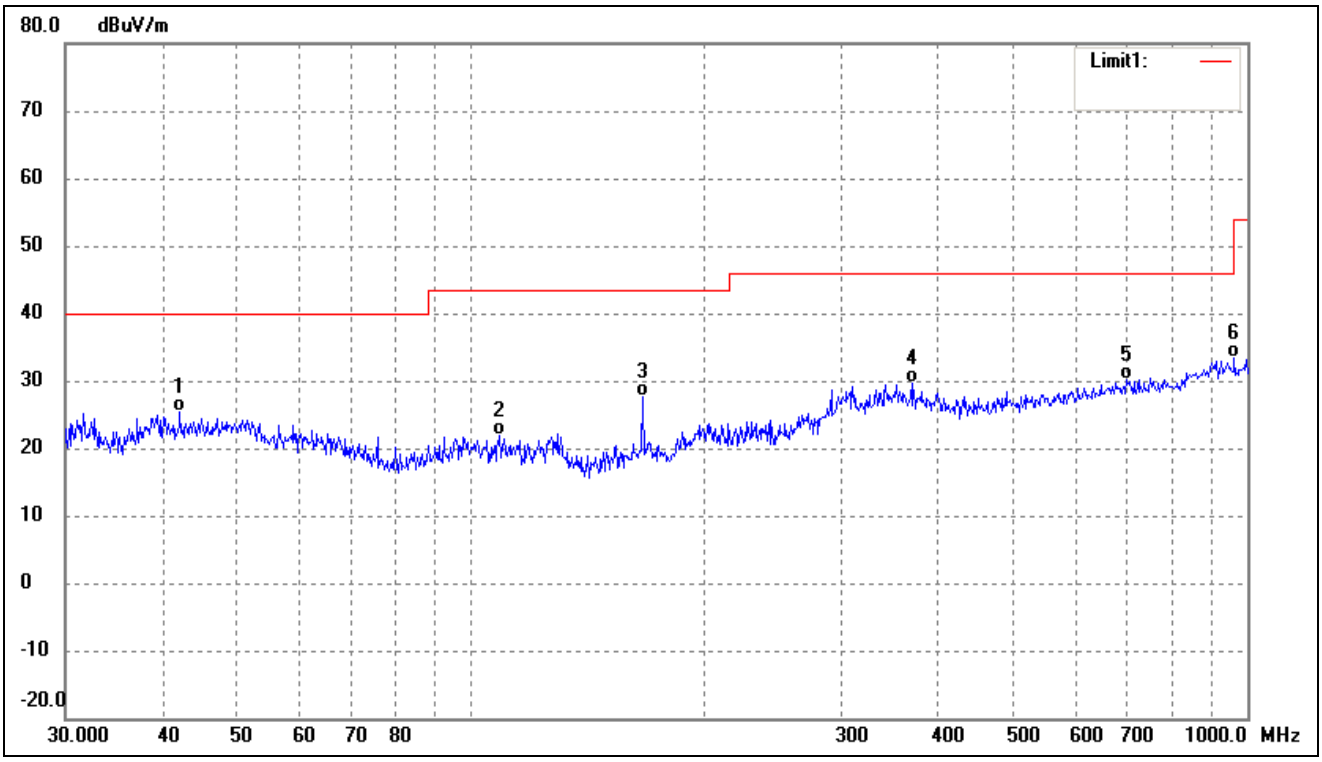

| No. | Frequency | Reading | Correct | Result | Limit | Margin | Degree | Height | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | ( ) | (cm) | |
| 1 | 39.5757 | 39.08 | -12.14 | 26.94 | 40.00 | -13.06 | - | - | QP |
| 2 | 52.0251 | 36.64 | -12.10 | 24.54 | 40.00 | -15.46 | - | - | QP |
| 3 | 129.0146 | 40.12 | -16.70 | 23.42 | 43.50 | -20.08 | - | - | QP |
| 4 | 166.6514 | 44.62 | -15.20 | 29.42 | 43.50 | -14.08 | - | - | QP |
| 5 | 368.1116 | 37.42 | -7.26 | 30.16 | 46.00 | -15.84 | - | - | QP |
| 6 | 993.0114 | 32.20 | 1.78 | 33.98 | 54.00 | -20.02 | - | - | QP |

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



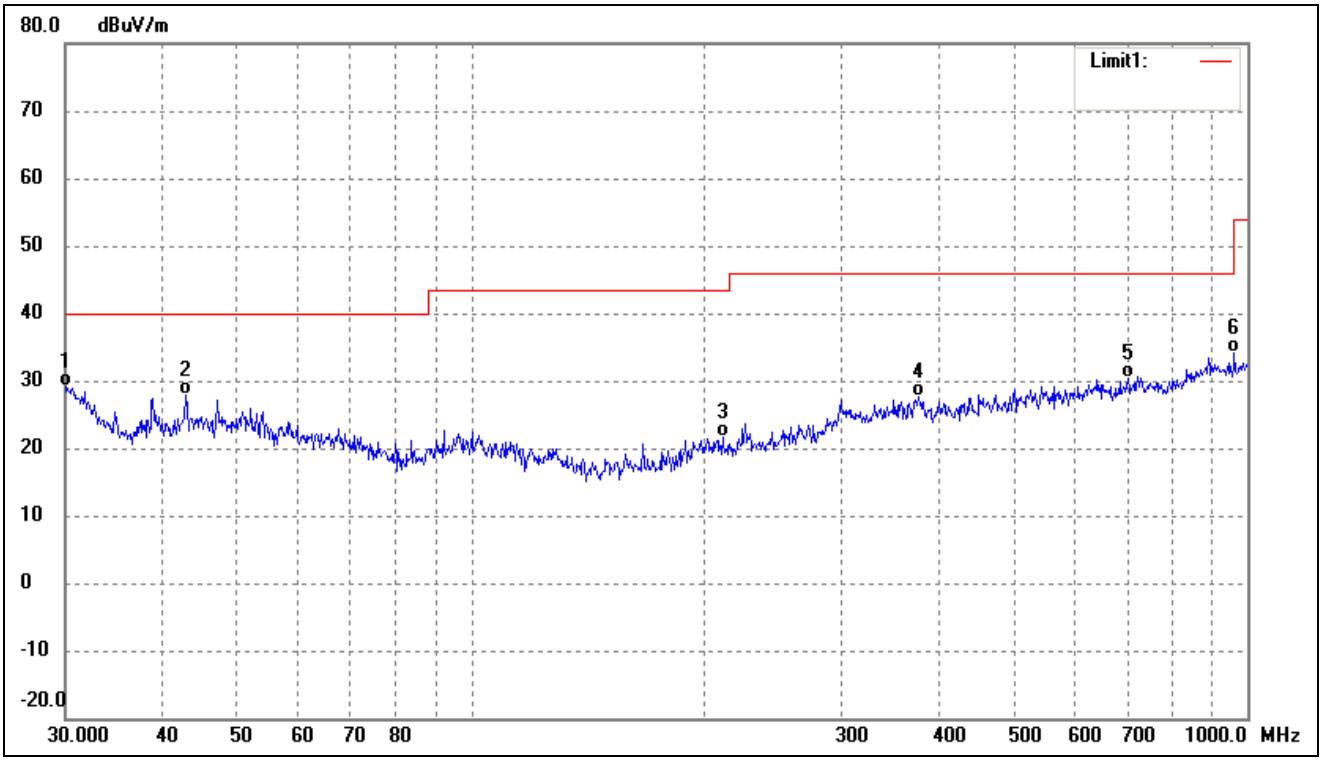

| No. | Frequency | Reading | Correct | Result | Limit | Margin | Degree | Height | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | ( ) | (cm) | |
| 1 | 38.8879 | 42.63 | -12.40 | 30.23 | 40.00 | -9.77 | - | - | QP |
| 2 | 56.0007 | 36.70 | -12.95 | 23.75 | 40.00 | -16.25 | - | - | QP |
| 3 | 202.8104 | 34.22 | -12.39 | 21.83 | 43.50 | -21.67 | - | - | QP |
| 4 | 357.9287 | 34.97 | -7.36 | 27.61 | 46.00 | -18.39 | - | - | QP |
| 5 | 570.6100 | 32.07 | -2.78 | 29.29 | 46.00 | -16.71 | - | - | QP |
| 6 | 929.0082 | 31.64 | 1.77 | 33.41 | 46.00 | -12.59 | - | - | QP |

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



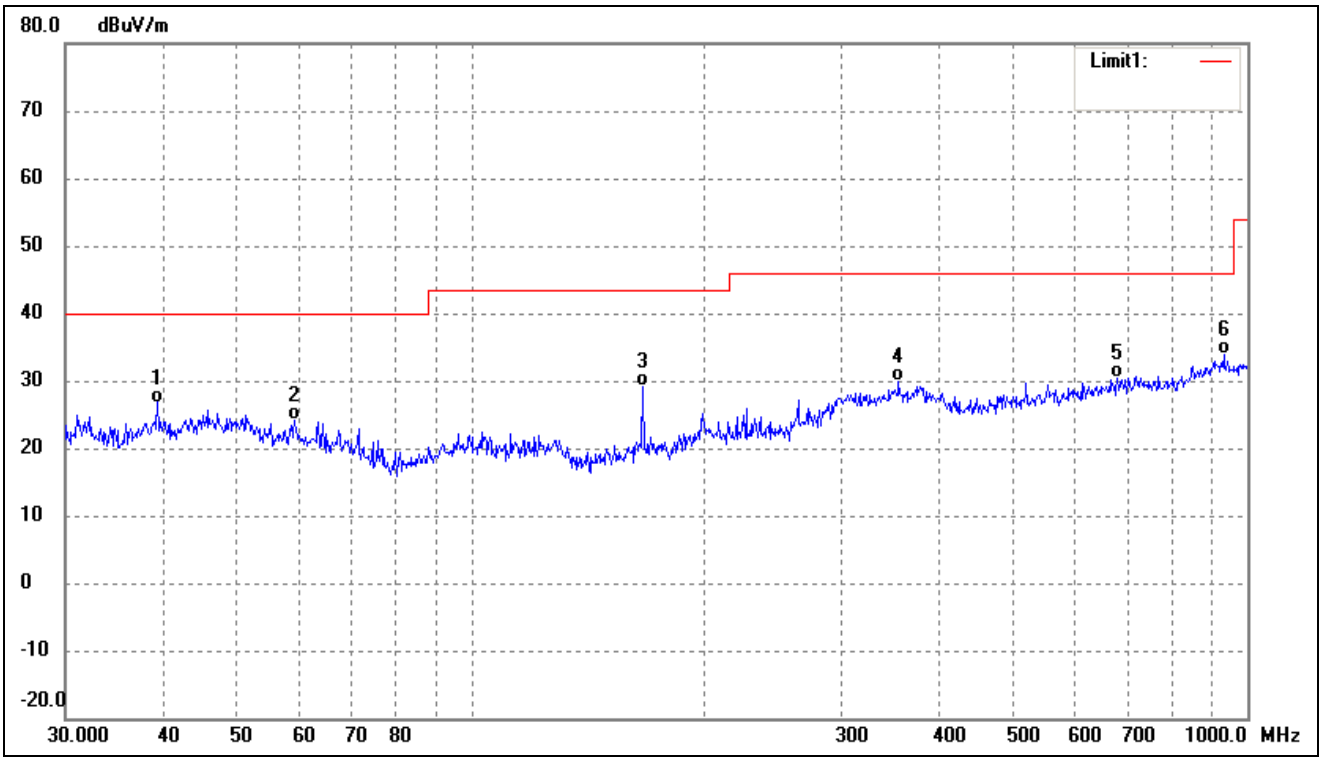

| No. | Frequency | Reading | Correct | Result | Limit | Margin | Degree | Height | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | ( ) | (cm) | |
| 1 | 42.1542 | 37.22 | -11.90 | 25.32 | 40.00 | -14.68 | - | - | QP |
| 2 | 108.6470 | 35.31 | -13.31 | 22.00 | 43.50 | -21.50 | - | - | QP |
| 3 | 166.0680 | 42.76 | -15.23 | 27.53 | 43.50 | -15.97 | - | - | QP |
| 4 | 369.4047 | 36.83 | -7.24 | 29.59 | 46.00 | -16.41 | - | - | QP |
| 5 | 699.3046 | 32.00 | -1.86 | 30.14 | 46.00 | -15.86 | - | - | QP |
| 6 | 962.1623 | 31.86 | 1.41 | 33.27 | 54.00 | -20.73 | - | - | QP |

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



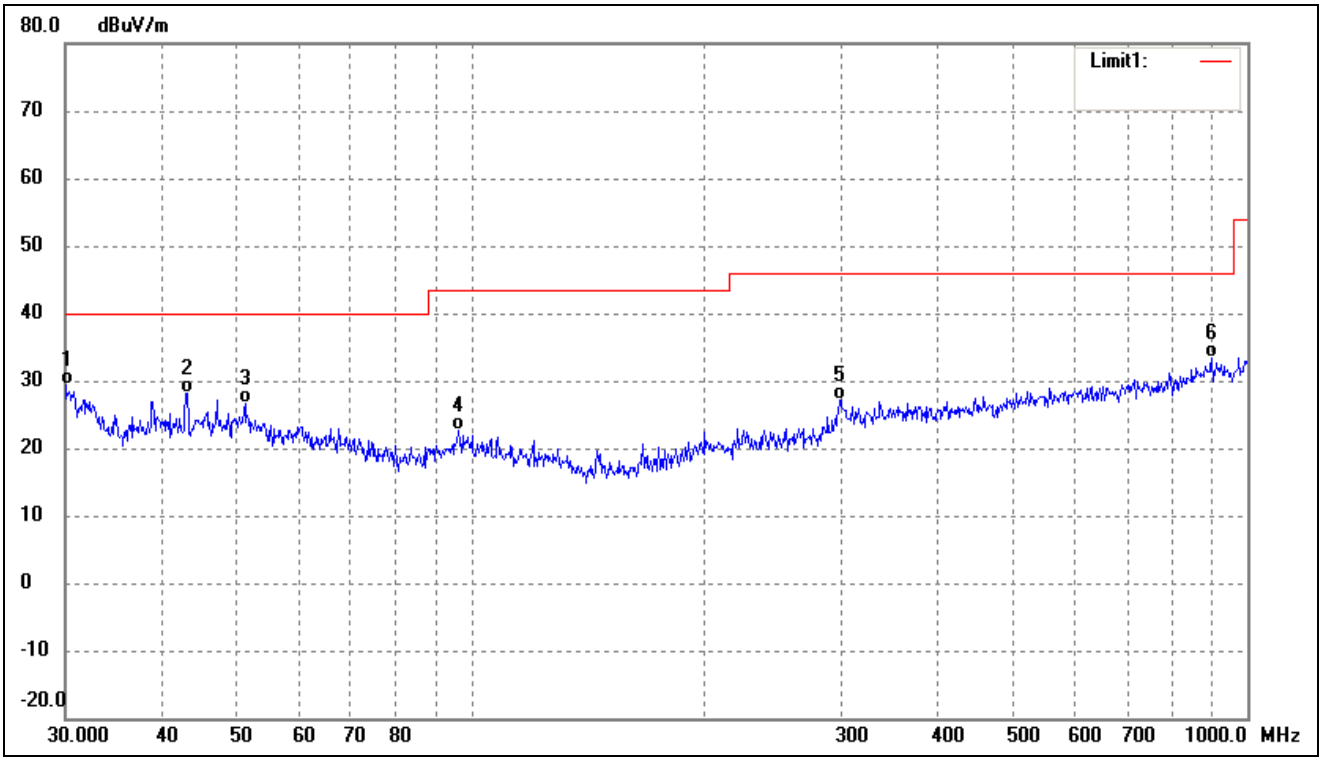

| No. | Frequency | Reading | Correct | Result | Limit | Margin | Degree | Height | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | ( ) | (cm) | |
| 1 | 30.1054 | 43.32 | -14.15 | 29.17 | 40.00 | -10.83 | - | - | QP |
| 2 | 42.8998 | 39.71 | -11.87 | 27.84 | 40.00 | -12.16 | - | - | QP |
| 3 | 210.7860 | 33.81 | -12.30 | 21.51 | 43.50 | -21.99 | - | - | QP |
| 4 | 377.2591 | 34.67 | -7.12 | 27.55 | 46.00 | -18.45 | - | - | QP |
| 5 | 701.7610 | 32.07 | -1.81 | 30.26 | 46.00 | -15.74 | - | - | QP |
| 6 | 962.1623 | 32.82 | 1.41 | 34.23 | 54.00 | -19.77 | - | - | 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 | 39.4372 | 38.94 | -12.19 | 26.75 | 40.00 | -13.25 | - | - | QP |
| 2 | 59.2325 | 37.11 | -12.98 | 24.13 | 40.00 | -15.87 | - | - | QP |
| 3 | 166.0680 | 44.43 | -15.23 | 29.20 | 43.50 | -14.30 | - | - | QP |
| 4 | 355.4273 | 37.34 | -7.38 | 29.96 | 46.00 | -16.04 | - | - | QP |
| 5 | 679.9600 | 32.34 | -1.87 | 30.47 | 46.00 | -15.53 | - | - | QP |
| 6 | 932.2715 | 32.09 | 1.71 | 33.80 | 46.00 | -12.20 | - | - | QP |

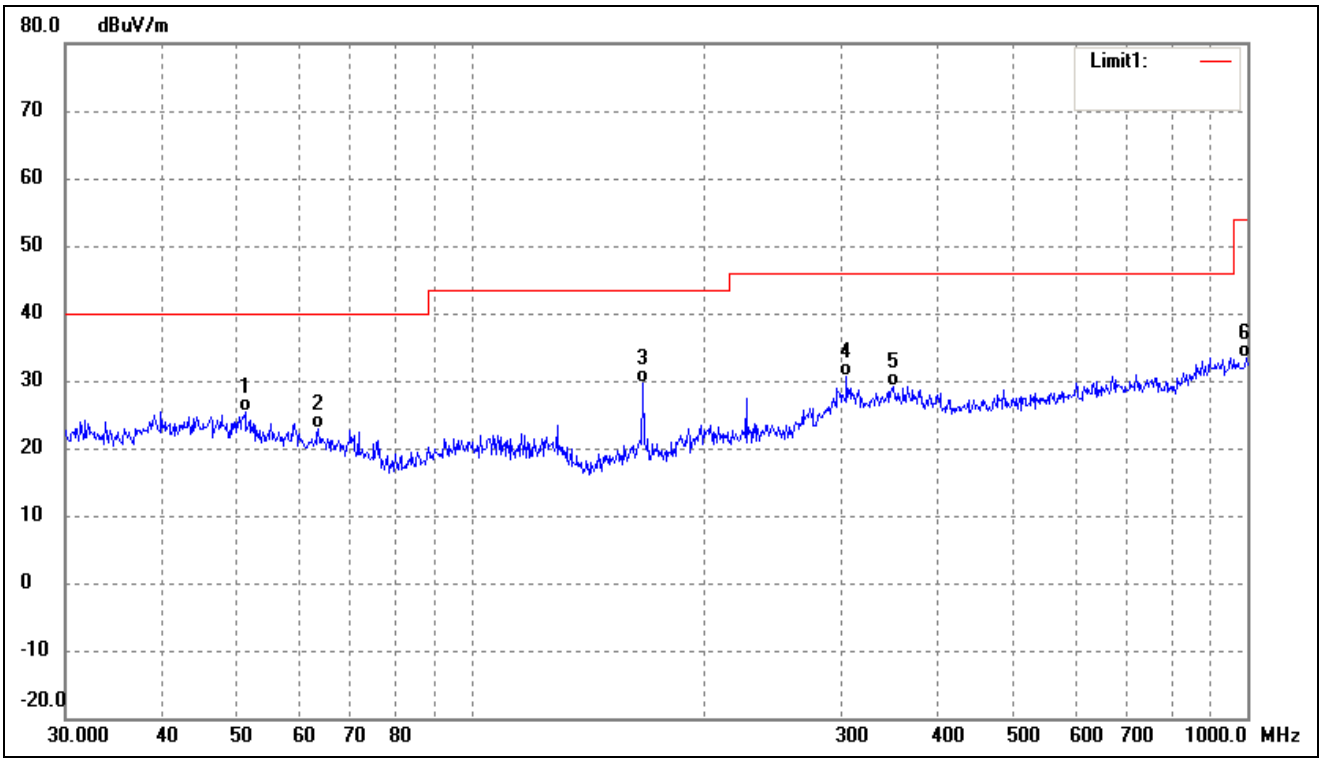
| 802.11a(Worst case) | | | |
|---|---|---|---|
| Test Channel | 5240MHz | Polarity: | Vertical |




| No. | Frequency | Reading | Correct | Result | Limit | Margin | Degree | Height | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | ( ) | (cm) | |
| 1 | 30.0000 | 43.48 | -14.15 | 29.33 | 40.00 | -10.67 | - | - | QP |
| 2 | 43.0505 | 40.00 | -11.87 | 28.13 | 40.00 | -11.87 | - | - | QP |
| 3 | 51.1209 | 38.56 | -11.85 | 26.71 | 40.00 | -13.29 | - | - | QP |
| 4 | 96.4362 | 36.53 | -13.91 | 22.62 | 43.50 | -20.88 | - | - | QP |
| 5 | 298.2681 | 36.19 | -9.05 | 27.14 | 46.00 | -18.86 | - | - | QP |
| 6 | 900.1474 | 31.90 | 1.55 | 33.45 | 46.00 | -12.55 | - | - | QP |

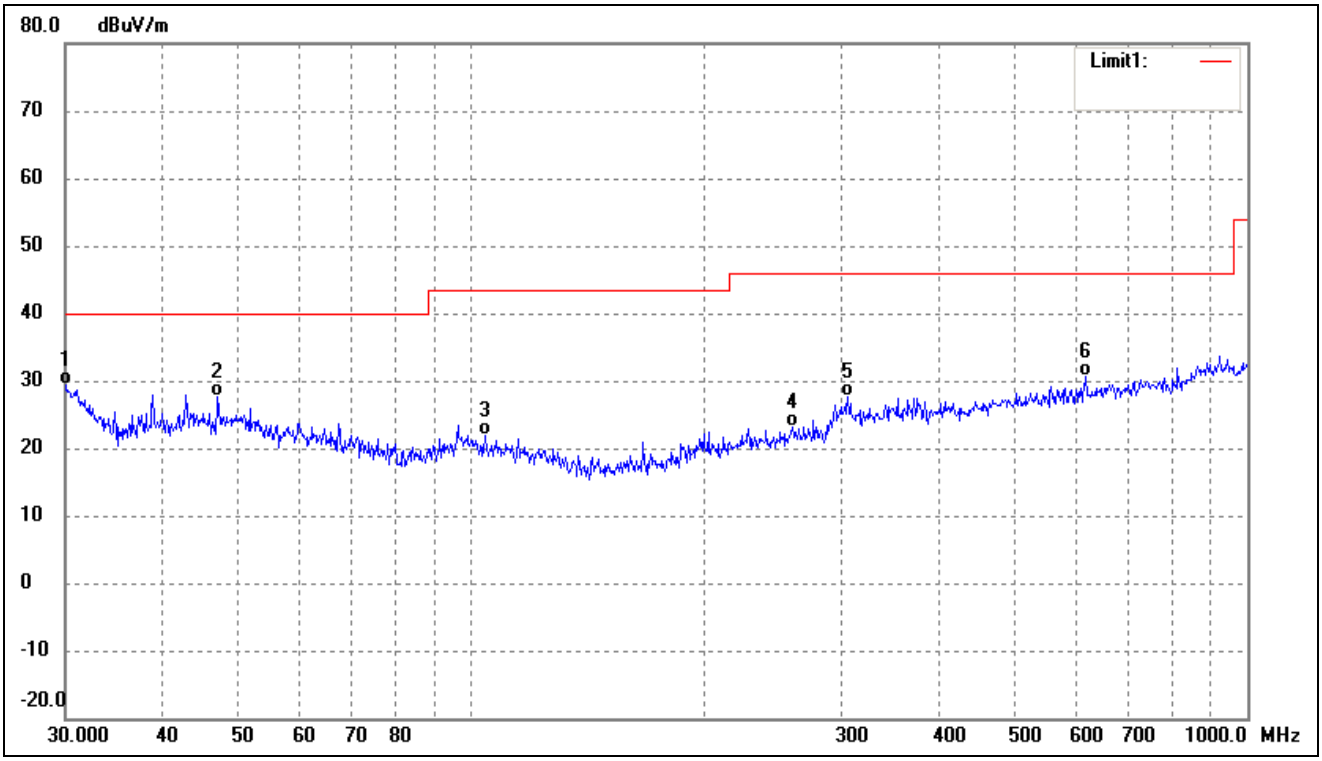
- Antenna A(worst case)
- 5725-5850MHz

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



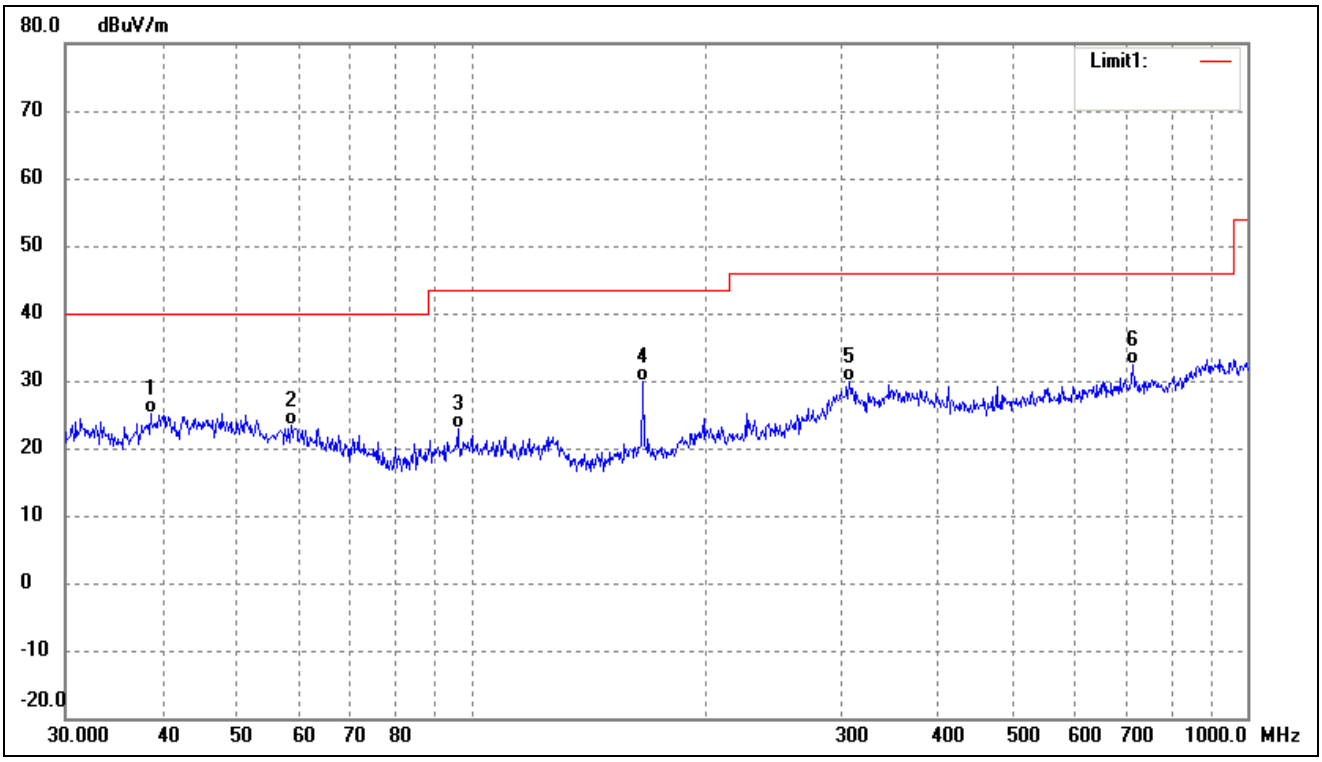

| No. | Frequency | Reading | Correct | Result | Limit | Margin | Degree | Height | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | ( ) | (cm) | |
| 1 | 51.1209 | 37.34 | -11.85 | 25.49 | 40.00 | -14.51 | - | - | QP |
| 2 | 63.5356 | 36.43 | -13.65 | 22.78 | 40.00 | -17.22 | - | - | QP |
| 3 | 166.6514 | 44.87 | -15.20 | 29.67 | 43.50 | -13.83 | - | - | QP |
| 4 | 304.6100 | 39.57 | -8.93 | 30.64 | 46.00 | -15.36 | - | - | QP |
| 5 | 350.4768 | 36.52 | -7.43 | 29.09 | 46.00 | -16.91 | - | - | QP |
| 6 | 996.4996 | 31.64 | 1.83 | 33.47 | 54.00 | -20.53 | - | - | QP |

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



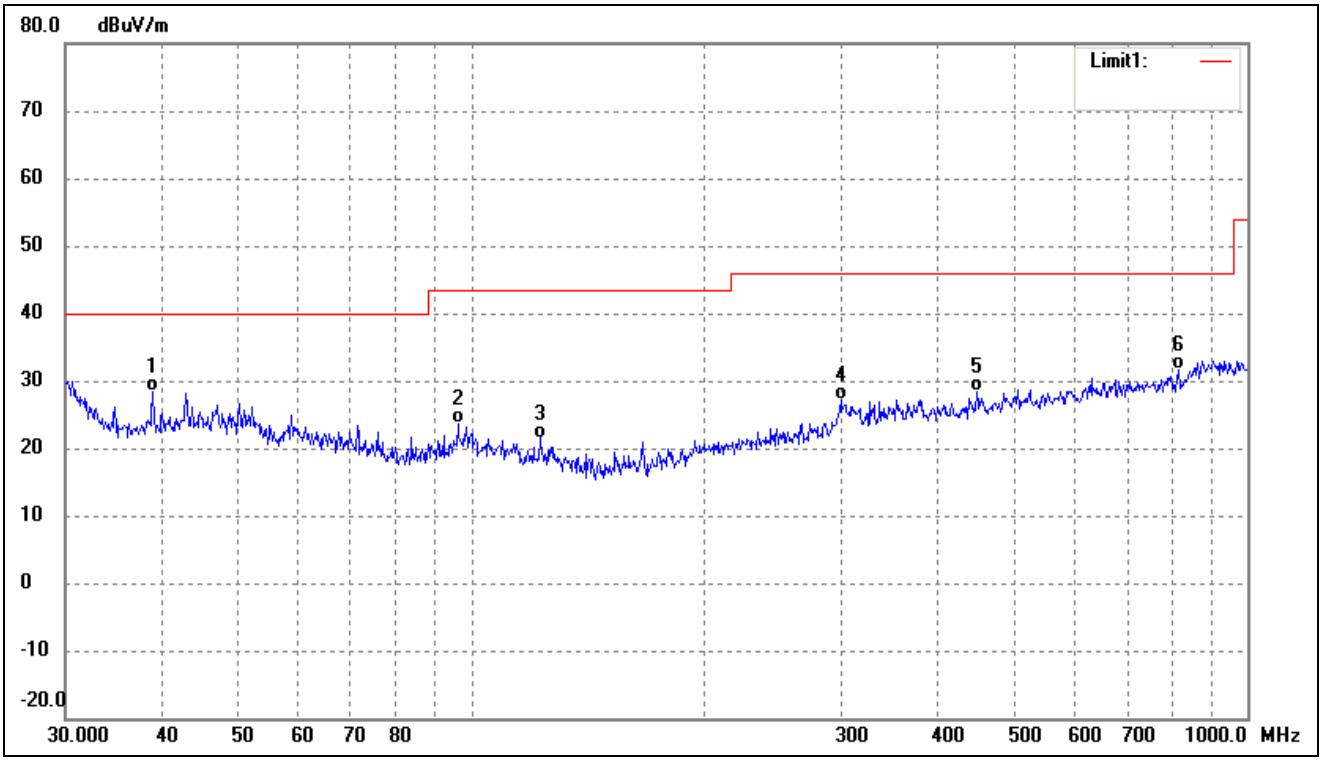

| No. | Frequency | Reading | Correct | Result | Limit | Margin | Degree | Height | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | ( ) | (cm) | |
| 1 | 30.1054 | 43.56 | -14.15 | 29.41 | 40.00 | -10.59 | - | - | QP |
| 2 | 47.1599 | 39.34 | -11.68 | 27.66 | 40.00 | -12.34 | - | - | QP |
| 3 | 104.1701 | 35.28 | -13.31 | 21.97 | 43.50 | -21.53 | - | - | QP |
| 4 | 259.2338 | 33.89 | -10.84 | 23.05 | 46.00 | -22.95 | - | - | QP |
| 5 | 305.6800 | 36.54 | -8.93 | 27.61 | 46.00 | -18.39 | - | - | QP |
| 6 | 618.5369 | 32.76 | -2.10 | 30.66 | 46.00 | -15.34 | - | - | QP |

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



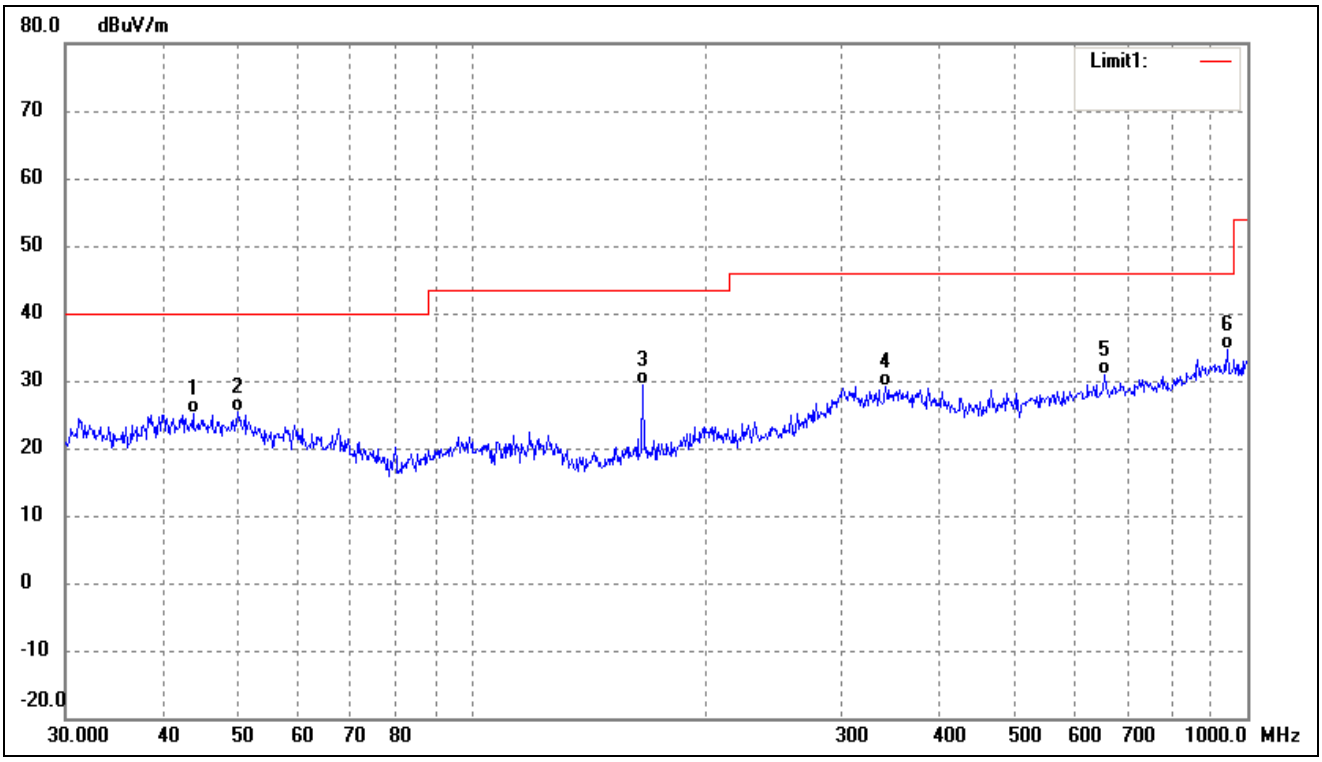

| No. | Frequency | Reading | Correct | Result | Limit | Margin | Degree | Height | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | ( ) | (cm) | |
| 1 | 38.6161 | 37.74 | -12.51 | 25.23 | 40.00 | -14.77 | - | - | QP |
| 2 | 58.6126 | 36.26 | -12.98 | 23.28 | 40.00 | -16.72 | - | - | QP |
| 3 | 96.0986 | 36.74 | -13.96 | 22.78 | 43.50 | -20.72 | - | - | QP |
| 4 | 166.6514 | 44.99 | -15.20 | 29.79 | 43.50 | -13.71 | - | - | QP |
| 5 | 306.7537 | 38.74 | -8.93 | 29.81 | 46.00 | -16.19 | - | - | QP |
| 6 | 711.6734 | 33.93 | -1.45 | 32.48 | 46.00 | -13.52 | - | - | QP |

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



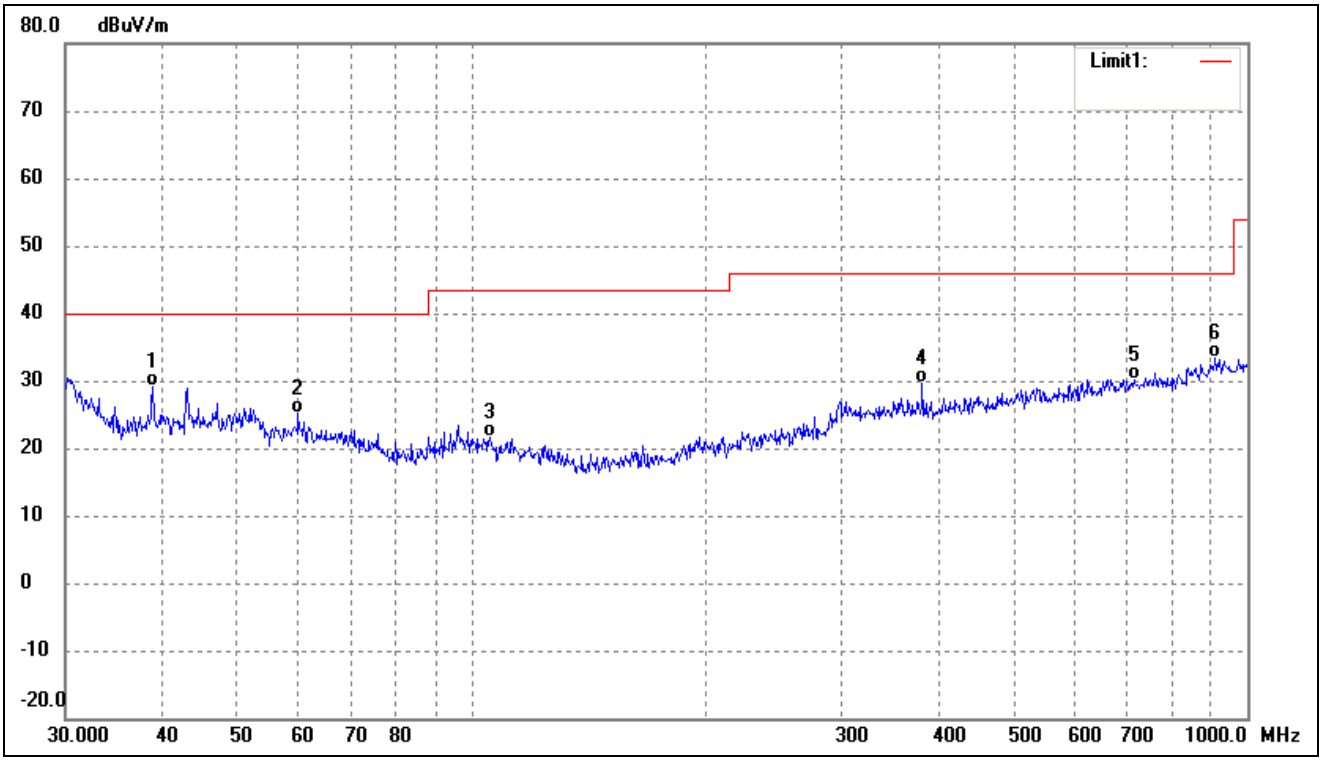

| No. | Frequency | Reading | Correct | Result | Limit | Margin | Degree | Height | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | ( ) | (cm) | |
| 1 | 38.8879 | 40.74 | -12.40 | 28.34 | 40.00 | -11.66 | - | - | QP |
| 2 | 96.0986 | 37.70 | -13.96 | 23.74 | 43.50 | -19.76 | - | - | QP |
| 3 | 122.8340 | 36.55 | -15.05 | 21.50 | 43.50 | -22.00 | - | - | QP |
| 4 | 299.3158 | 36.04 | -8.96 | 27.08 | 46.00 | -18.92 | - | - | QP |
| 5 | 447.9822 | 34.00 | -5.61 | 28.39 | 46.00 | -17.61 | - | - | QP |
| 6 | 815.9678 | 32.16 | -0.45 | 31.71 | 46.00 | -14.29 | - | - | 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 | 43.8119 | 36.93 | -11.84 | 25.09 | 40.00 | -14.91 | - | - | QP |
| 2 | 50.0566 | 36.95 | -11.55 | 25.40 | 40.00 | -14.60 | - | - | QP |
| 3 | 166.0680 | 44.55 | -15.23 | 29.32 | 43.50 | -14.18 | - | - | QP |
| 4 | 341.9787 | 37.11 | -7.92 | 29.19 | 46.00 | -16.81 | - | - | QP |
| 5 | 654.2318 | 33.28 | -2.29 | 30.99 | 46.00 | -15.01 | - | - | QP |
| 6 | 942.1305 | 33.08 | 1.51 | 34.59 | 46.00 | -11.41 | - | - | QP |

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



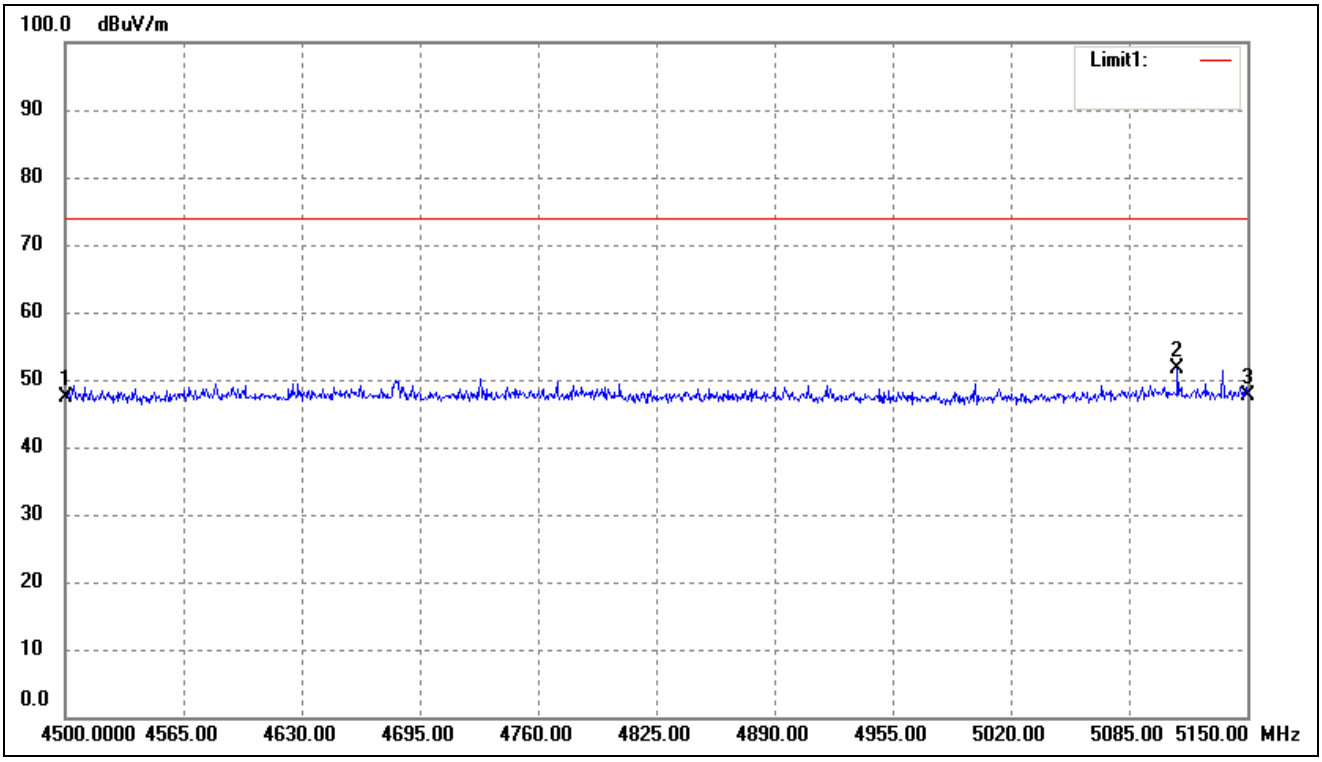

| No. | Frequency | Reading | Correct | Result | Limit | Margin | Degree | Height | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV/m) | dB/m | (dBuV/m) | (dBuV/m) | (dB) | ( ) | (cm) | |
| 1 | 38.8879 | 41.54 | -12.40 | 29.14 | 40.00 | -10.86 | - | - | QP |
| 2 | 59.8588 | 38.15 | -12.99 | 25.16 | 40.00 | -14.84 | - | - | QP |
| 3 | 105.6415 | 35.01 | -13.31 | 21.70 | 43.50 | -21.80 | - | - | QP |
| 4 | 381.2487 | 36.59 | -7.01 | 29.58 | 46.00 | -16.42 | - | - | QP |
| 5 | 714.1734 | 31.47 | -1.36 | 30.11 | 46.00 | -15.89 | - | - | QP |
| 6 | 909.6667 | 31.66 | 1.67 | 33.33 | 46.00 | -12.67 | - | - | 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

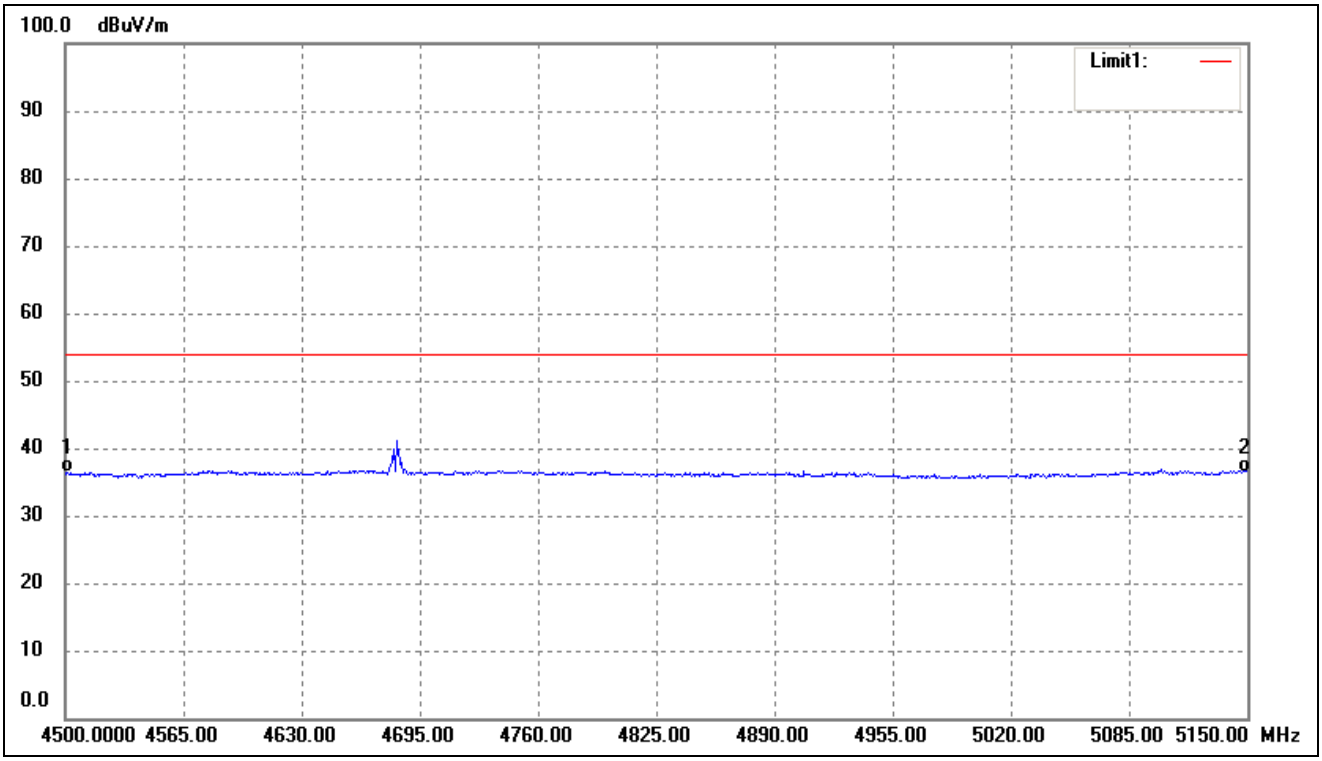
- Antenna A(worst case)

| 802.11a- Restricted Bandedge(worst case) | | | |
|---|---|---|---|
| Test Channel | band 4.50-5.15GHz | Polarity: | Horizontal (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 | 52.10 | -4.71 | 47.39 | 74.00 | -26.61 | - | - | peak |
| 2 | 5111.650 | 56.02 | -4.33 | 51.69 | 74.00 | -22.31 | - | - | peak |
| 3 | 5150.000 | 52.02 | -4.32 | 47.70 | 74.00 | -26.30 | - | - | peak |

| 802.11a- Restricted Bandedge (worst case) | | | |
|---|---|---|---|
| Test Channel | band 4.50-5.15GHz | Polarity: | Horizontal (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 | 41.04 | -4.71 | 36.33 | 54.00 | -17.67 | - | - | AVG |
| 2 | 5150.000 | 40.80 | -4.32 | 36.48 | 54.00 | -17.52 | - | - | 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 A (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 | 56.47 | 7.11 | 63.58 | 74 | -10.42 | H | PK |
| 15540 | 37.96 | 8.22 | 46.18 | 54 | -7.82 | H | AV |
| 10360 | 60.18 | 7.11 | 67.29 | 74 | -6.71 | V | PK |
| 15540 | 38.92 | 8.22 | 47.14 | 54 | -6.86 | V | AV |
| Middle Channel (5200MHz) | | | | | | | |
| 10400 | 58.82 | 7.22 | 66.04 | 74 | -7.96 | H | PK |
| 15600 | 36.41 | 8.67 | 45.08 | 54 | -8.92 | H | AV |
| 10400 | 56.77 | 7.22 | 63.99 | 74 | -10.01 | V | PK |
| 15600 | 39.40 | 8.67 | 48.07 | 54 | -5.93 | V | AV |
| High Channel (5240MHz) | | | | | | | |
| 10480 | 56.92 | 7.69 | 64.61 | 74 | -9.39 | H | PK |
| 15720 | 39.30 | 8.93 | 48.23 | 54 | -5.77 | H | AV |
| 10480 | 59.11 | 7.69 | 66.80 | 74 | -7.20 | V | PK |
| 15720 | 38.81 | 8.93 | 47.74 | 54 | -6.26 | 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 | 56.10 | 9.45 | 65.55 | 74 | -8.45 | H | PK |
| 17235 | 33.46 | 10.36 | 43.82 | 54 | -10.18 | H | AV |
| 11490 | 54.88 | 9.45 | 64.33 | 74 | -9.67 | V | PK |
| 17235 | 37.30 | 10.36 | 47.66 | 54 | -6.34 | V | AV |
| Middle Channel (5785MHz) | | | | | | | |
| 11570 | 58.72 | 9.62 | 68.34 | 74 | -5.66 | H | PK |
| 17355 | 37.80 | 10.67 | 48.47 | 54 | -5.53 | H | AV |
| 11570 | 56.83 | 9.62 | 66.45 | 74 | -7.55 | V | PK |
| 17355 | 35.88 | 10.67 | 46.55 | 54 | -7.45 | V | AV |
| High Channel (5825MHz) | | | | | | | |
| 11650 | 54.60 | 9.84 | 64.44 | 74 | -9.56 | H | PK |
| 17475 | 33.25 | 10.95 | 44.20 | 54 | -9.80 | H | AV |
| 11650 | 54.98 | 9.84 | 64.82 | 74 | -9.18 | V | PK |
| 17475 | 37.31 | 10.95 | 48.26 | 54 | -5.74 | V | AV |

- Out of Band edge for 5150-5250MHz

| Test CH. | Test Segment | Result | Limit |
|---|---|---|---|
| | MHz | dBm/MHz | dBm/MHz |
| Lowest | Below 5150 | -35.79 | -27 |
| Highest | Above 5350 | -42.15 | -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 | -37.28 | -27 |
| | 5715 to 5725 | -40.50 | -17 |
| Highest | 5850 to 5860 | -41.68 | -17 |
| | Above 5860 | -42.99 | -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 | 55.85 | 7.11 | 62.96 | 74 | -11.04 | H | PK |
| 15540 | 40.78 | 8.22 | 49.00 | 54 | -5.00 | H | AV |
| 10360 | 61.51 | 7.11 | 68.62 | 74 | -5.38 | V | PK |
| 15540 | 38.49 | 8.22 | 46.71 | 54 | -7.29 | V | AV |
| Middle Channel (5200MHz) | | | | | | | |
| 10400 | 58.87 | 7.22 | 66.09 | 74 | -7.91 | H | PK |
| 15600 | 36.17 | 8.67 | 44.84 | 54 | -9.16 | H | AV |
| 10400 | 57.62 | 7.22 | 64.84 | 74 | -9.16 | V | PK |
| 15600 | 37.65 | 8.67 | 46.32 | 54 | -7.68 | V | AV |
| High Channel (5240MHz) | | | | | | | |
| 10480 | 55.91 | 7.69 | 63.60 | 74 | -10.40 | H | PK |
| 15720 | 39.47 | 8.93 | 48.40 | 54 | -5.60 | H | AV |
| 10480 | 59.94 | 7.69 | 67.63 | 74 | -6.37 | V | PK |
| 15720 | 39.30 | 8.93 | 48.23 | 54 | -5.77 | V | AV |

| Frequency | Reading | Correct | Result | Limit | Margin | Polar | Detector |
|---|---|---|---|---|---|---|---|
| (MHz) | (dBuV/m) | dB | (dBuV/m) | (dBuV/m) | (dB) | H/V | |
| Low Channel (5745MHz) | | | | | | | |
| 11490 | 58.63 | 9.45 | 68.08 | 74 | -5.92 | H | PK |
| 17235 | 37.91 | 10.36 | 48.27 | 54 | -5.73 | H | AV |
| 11490 | 55.08 | 9.45 | 64.53 | 74 | -9.47 | V | PK |
| 17235 | 36.83 | 10.36 | 47.19 | 54 | -6.81 | V | AV |
| Middle Channel (5785MHz) | | | | | | | |
| 11570 | 56.66 | 9.62 | 66.28 | 74 | -7.72 | H | PK |
| 17355 | 36.25 | 10.67 | 46.92 | 54 | -7.08 | H | AV |
| 11570 | 56.06 | 9.62 | 65.68 | 74 | -8.32 | V | PK |
| 17355 | 35.79 | 10.67 | 46.46 | 54 | -7.54 | V | AV |
| High Channel (5825MHz) | | | | | | | |
| 11650 | 55.84 | 9.84 | 65.68 | 74 | -8.32 | H | PK |
| 17475 | 35.46 | 10.95 | 46.41 | 54 | -7.59 | H | AV |
| 11650 | 56.94 | 9.84 | 66.78 | 74 | -7.22 | V | PK |
| 17475 | 35.92 | 10.95 | 46.87 | 54 | -7.13 | V | AV |

- Out of Band edge 5150-5250MHz

| Test CH. | Test Segment | Result | Limit |
|---|---|---|---|
| | MHz | dBm/MHz | dBm/MHz |
| Lowest | Below 5150 | -33.19 | -27 |
| Highest | Above 5350 | -37.88 | -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 | -46.71 | -27 |
| | 5715 to 5725 | -33.80 | -17 |
| Highest | 5850 to 5860 | -37.02 | -17 |
| | Above 5860 | -42.64 | -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 | 58.09 | 7.25 | 65.34 | 74 | -8.66 | H | PK |
| 15570 | 37.81 | 8.33 | 46.14 | 54 | -7.86 | H | AV |
| 10380 | 58.09 | 7.25 | 65.34 | 74 | -8.66 | V | PK |
| 15570 | 38.94 | 8.33 | 47.27 | 54 | -6.73 | V | AV |
| High Channel (5230MHz) | | | | | | | |
| 10460 | 56.73 | 7.54 | 64.27 | 74 | -9.73 | H | PK |
| 15690 | 39.61 | 8.86 | 48.47 | 54 | -5.53 | H | AV |
| 10460 | 59.35 | 7.54 | 66.89 | 74 | -7.11 | V | PK |
| 15690 | 38.73 | 8.86 | 47.59 | 54 | -6.41 | 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 | 56.97 | 9.65 | 66.62 | 74 | -7.38 | H | PK |
| 17265 | 37.85 | 10.87 | 48.72 | 54 | -5.28 | H | AV |
| 11510 | 55.72 | 9.65 | 65.37 | 74 | -8.63 | V | PK |
| 17265 | 36.01 | 10.87 | 46.88 | 54 | -7.12 | V | AV |
| High Channel (5795MHz) | | | | | | | |
| 11590 | 56.04 | 9.81 | 65.85 | 74 | -8.15 | H | PK |
| 17385 | 35.09 | 10.89 | 45.98 | 54 | -8.02 | H | AV |
| 11590 | 57.99 | 9.81 | 67.80 | 74 | -6.20 | V | PK |
| 17385 | 37.06 | 10.89 | 47.95 | 54 | -6.05 | V | AV |

- Out of Band edge for 5150-5250MHz

| Test CH. | Test Segment | Result | Limit |
|---|---|---|---|
| | MHz | dBm/MHz | dBm/MHz |
| Lowest | Below 5150 | -36.63 | -27 |
| Highest | Above 5350 | -41.38 | -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 | -40.17 | -27 |
| | 5715 to 5725 | -40.52 | -17 |
| Highest | 5850 to 5860 | -42.57 | -17 |
| | Above 5860 | -42.00 | -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 | 59.67 | 7.33 | 67.00 | 74 | -7.00 | H | PK |
| 15630 | 37.54 | 8.75 | 46.29 | 54 | -7.71 | H | AV |
| 10420 | 56.33 | 7.33 | 63.66 | 74 | -10.34 | V | PK |
| 15630 | 37.62 | 8.75 | 46.37 | 54 | -7.63 | V | AV |

| Frequency | Reading | Correct | Result | Limit | Margin | Polar | Detector |
|---|---|---|---|---|---|---|---|
| (MHz) | (dBuV/m) | dB | (dBuV/m) | (dBuV/m) | (dB) | H/V | |
| 5775MHz | | | | | | | |
| 11550 | 56.62 | 9.54 | 66.16 | 74 | -7.84 | H | PK |
| 17325 | 34.16 | 10.59 | 44.75 | 54 | -9.25 | H | AV |
| 11550 | 56.80 | 9.54 | 66.34 | 74 | -7.66 | V | PK |
| 17325 | 33.37 | 10.59 | 43.96 | 54 | -10.04 | V | AV |

- Out of Band edge for 5150-5250MHz

| Test CH. | Test Segment | Result | Limit |
|---|---|---|---|
| | MHz | dBm/MHz | dBm/MHz |
| Lowest | Below 5150 | -32.02 | -27 |
| Highest | Above 5350 | -31.11 | -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 | -35.87 | -27 |
| | 5715 to 5725 | -30.45 | -17 |
| Highest | 5850 to 5860 | -30.98 | -17 |
| | Above 5860 | -38.23 | -27 |
| Note: the data just list the worst cases | | | |

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

# 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

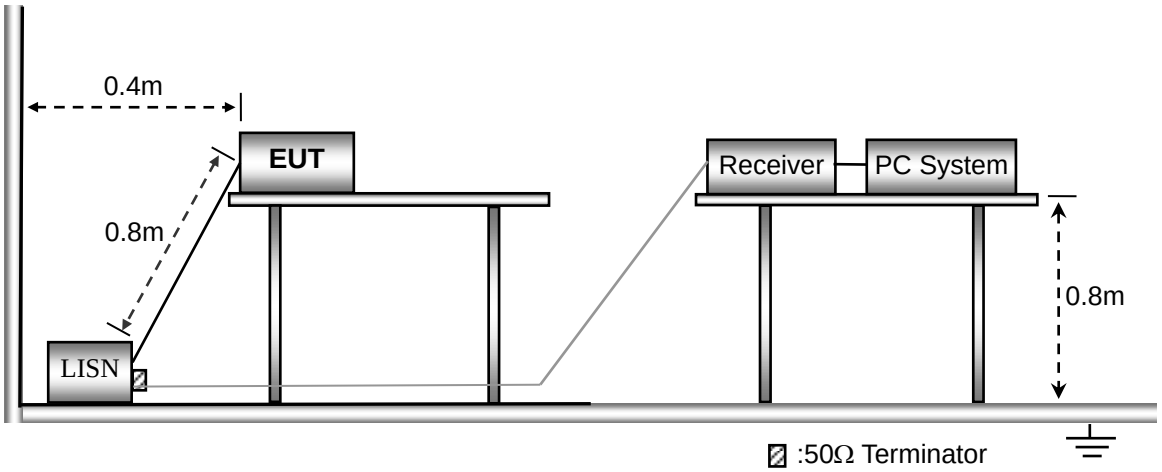
**Please refer to Appendix D**

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

## 10.2 Basic Test Setup Block Diagram



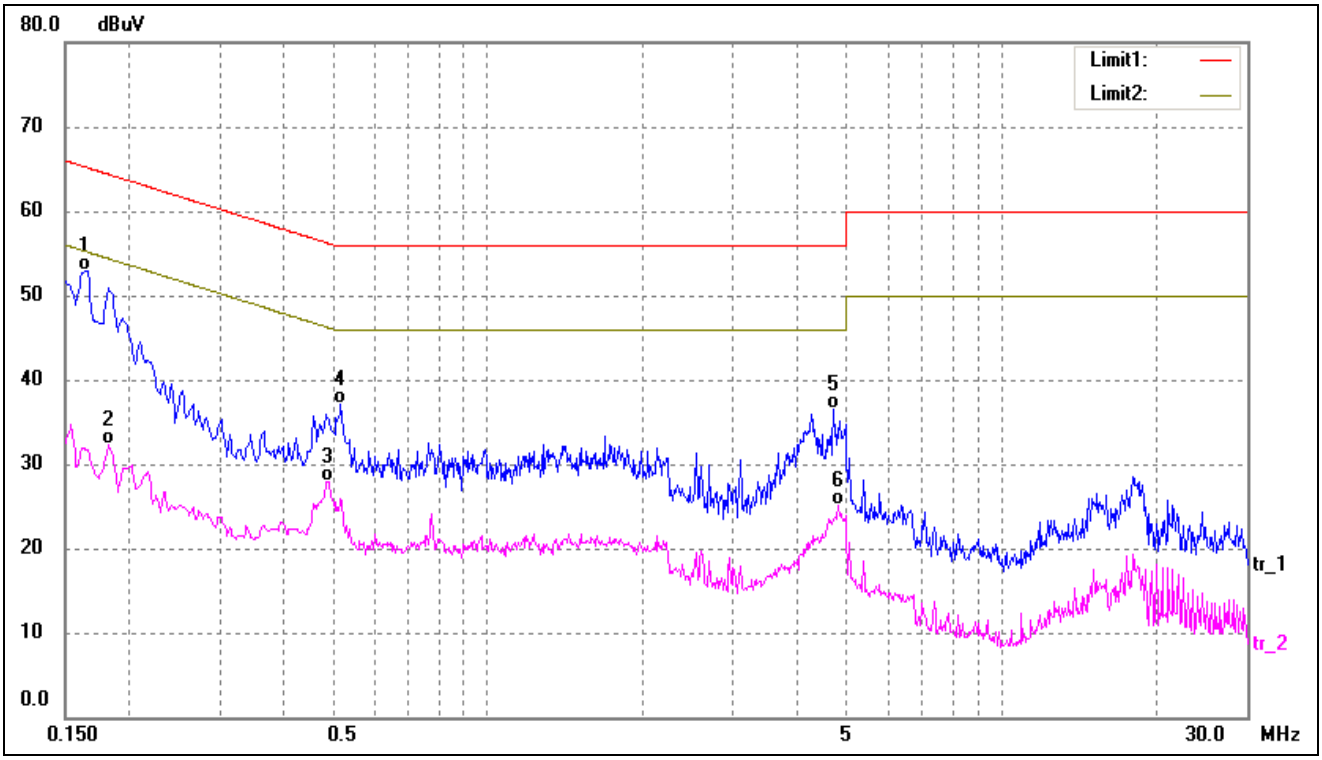

## 10.3 Test Receiver Setup

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

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

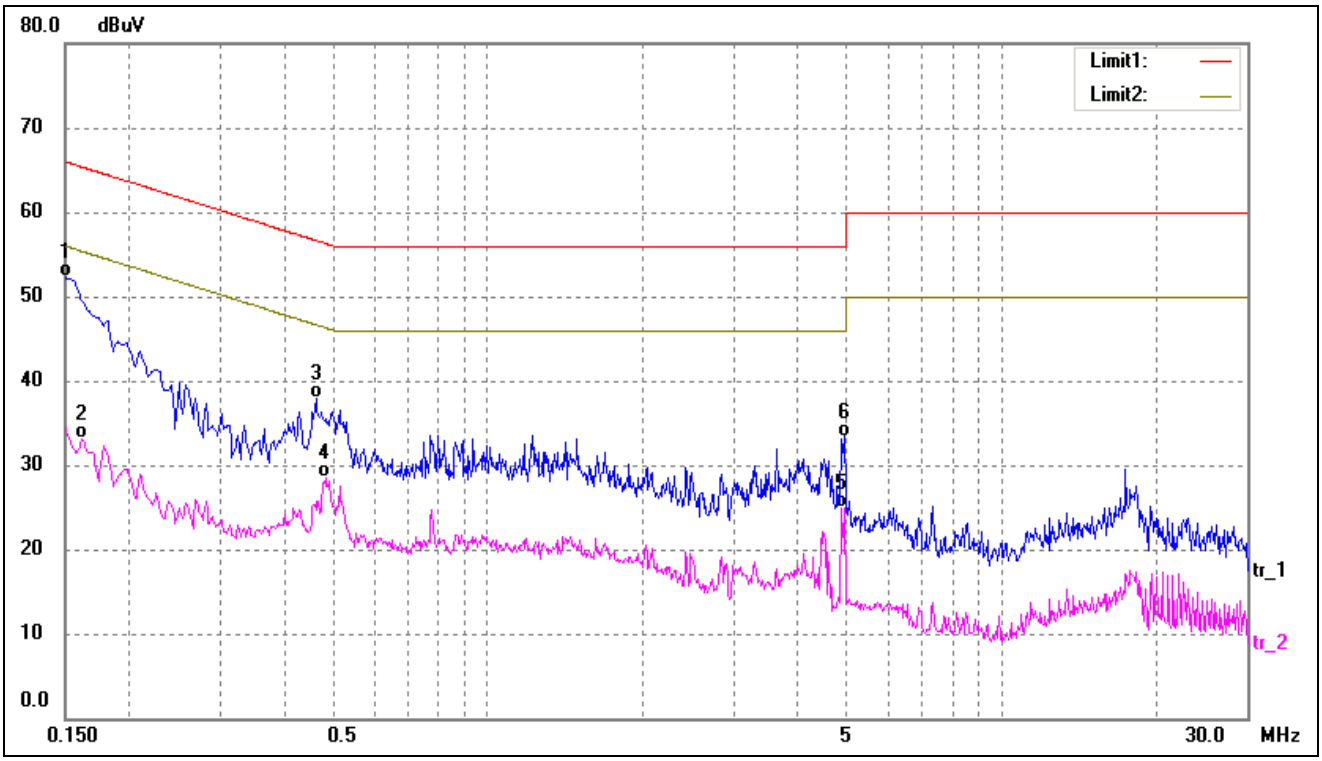
## 10.4 Summary of Test Results/Plots

| Test Mode | Communication | AC120V 60Hz | Polarity: | Neutral |
|---|---|---|---|---|




| No. | Frequency | Reading | Correct | Result | Limit | Margin | Detector |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV) | (dB/m) | (dBuV) | (dBuV) | (dB) | |
| 1* | 0.1660 | 42.73 | 10.26 | 52.99 | 65.16 | -12.17 | QP |
| 2 | 0.1820 | 22.07 | 10.26 | 32.33 | 54.39 | -22.06 | AVG |
| 3 | 0.4900 | 17.71 | 10.22 | 27.93 | 46.17 | -18.24 | AVG |
| 4 | 0.5180 | 26.97 | 10.22 | 37.19 | 56.00 | -18.81 | QP |
| 5 | 4.7020 | 26.29 | 10.23 | 36.52 | 56.00 | -19.48 | QP |
| 6 | 4.8140 | 14.84 | 10.22 | 25.06 | 46.00 | -20.94 | AVG |

| Test Mode | Communication | AC120V 60Hz | Polarity: | Line |
|---|---|---|---|---|




| No. | Frequency | Reading | Correct | Result | Limit | Margin | Detector |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV) | (dB/m) | (dBuV) | (dBuV) | (dB) | |
| 1* | 0.1500 | 41.98 | 10.25 | 52.23 | 66.00 | -13.77 | QP |
| 2 | 0.1620 | 22.87 | 10.26 | 33.13 | 55.36 | -22.23 | AVG |
| 3 | 0.4620 | 27.76 | 10.22 | 37.98 | 56.66 | -18.68 | QP |
| 4 | 0.4820 | 18.33 | 10.22 | 28.55 | 46.30 | -17.75 | AVG |
| 5 | 4.8700 | 14.76 | 10.23 | 24.99 | 46.00 | -21.01 | AVG |
| 6 | 4.9300 | 23.18 | 10.22 | 33.40 | 56.00 | -22.60 | QP |

# APPENDIX SUMMARY

| | | | |
|---|---|---|---|
| Project No. | WTX21X03021564W | Test Engineer | Moon |
| Start date | 2021/03/27 | Finish date | 2021/03/27 |
| Temperature | 23.6℃ | Humidity | 48% |
| 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

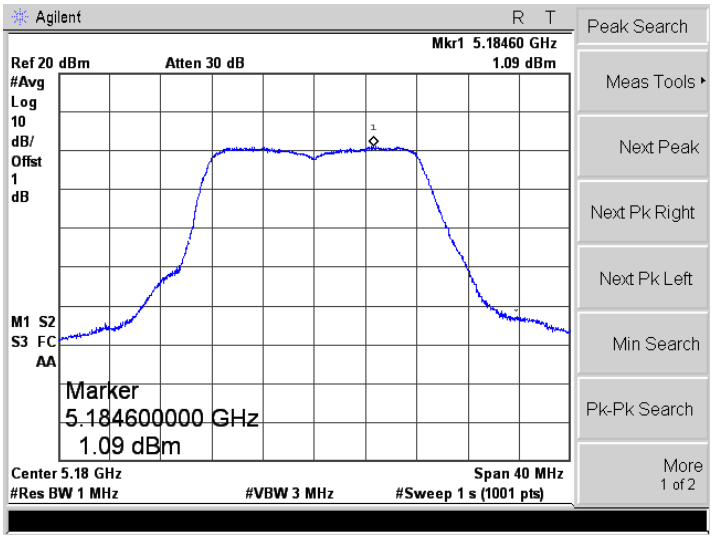
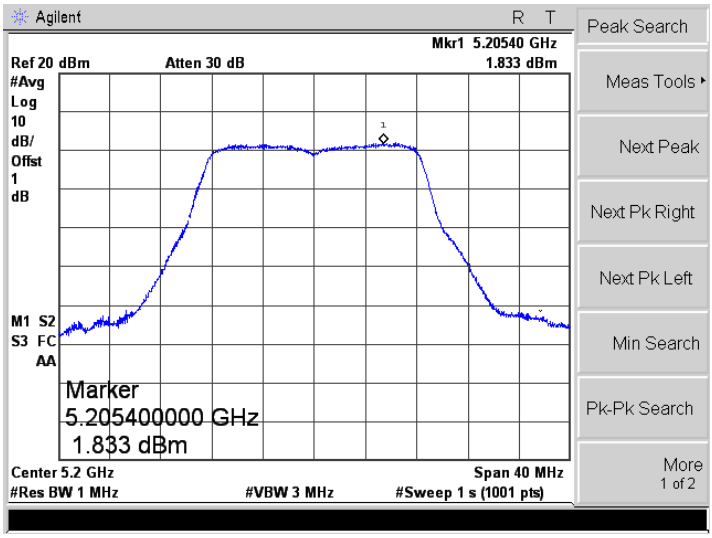
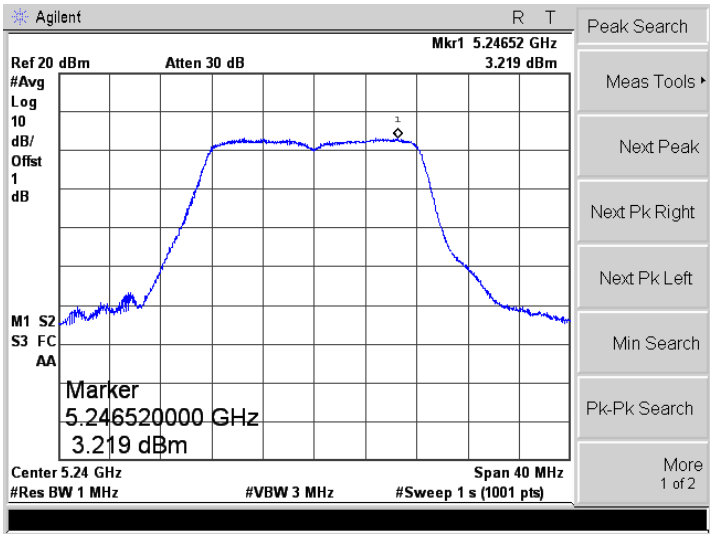
| Power Spectral Density | | | | | |
|---|---|---|---|---|---|
| **U-NII-1:5150-5250MHz** | | | | | |
| Operating mode | Test Channel | ANT A dBm/MHz | ANT B dBm/MHz | Total dBm/MHz | Limit (dBm/MHz) |
| 802.11a | 5180 | 1.090 | 1.480 | / | 11 |
| | 5200 | 1.833 | 1.385 | / | 11 |
| | 5240 | 3.219 | 2.514 | / | 11 |
| 802.11n-HT20 | 5180 | 0.832 | 1.470 | 4.17 | 11 |
| | 5200 | 2.534 | 1.651 | 5.13 | 11 |
| | 5240 | 1.893 | 2.289 | 5.11 | 11 |
| 802.11n-HT40 | 5190 | -3.756 | -4.421 | -1.07 | 11 |
| | 5230 | -2.607 | -3.368 | 0.04 | 11 |
| 802.11ac-HT80 | 5210 | -5.504 | -6.464 | -2.95 | 11 |

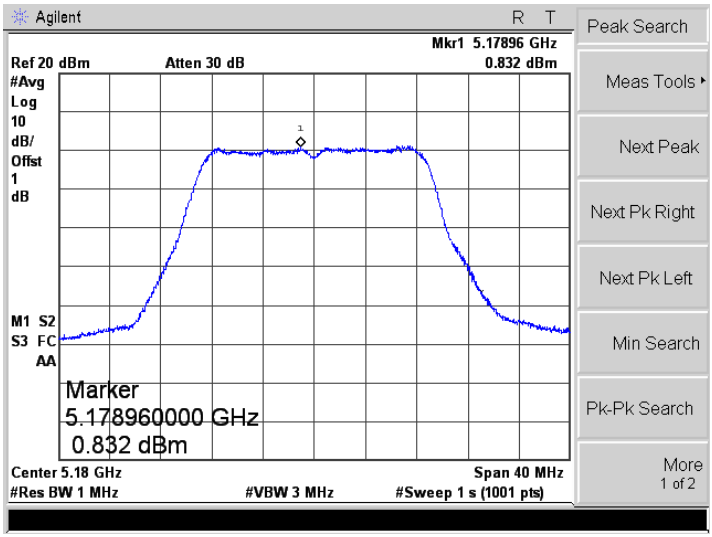
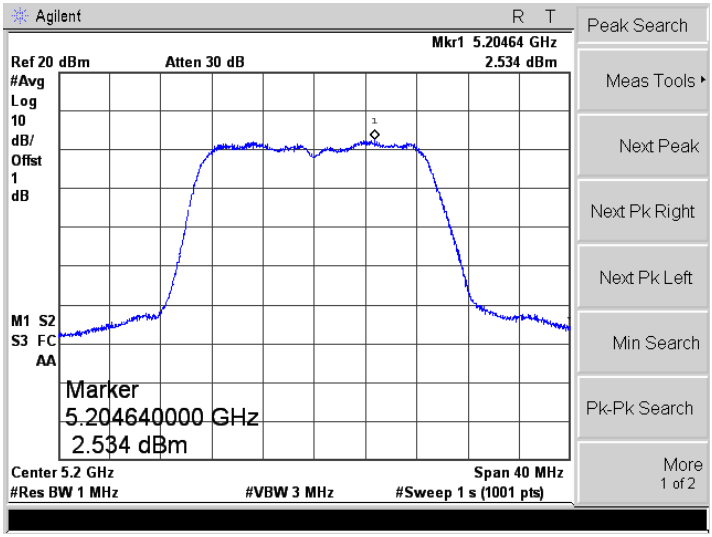
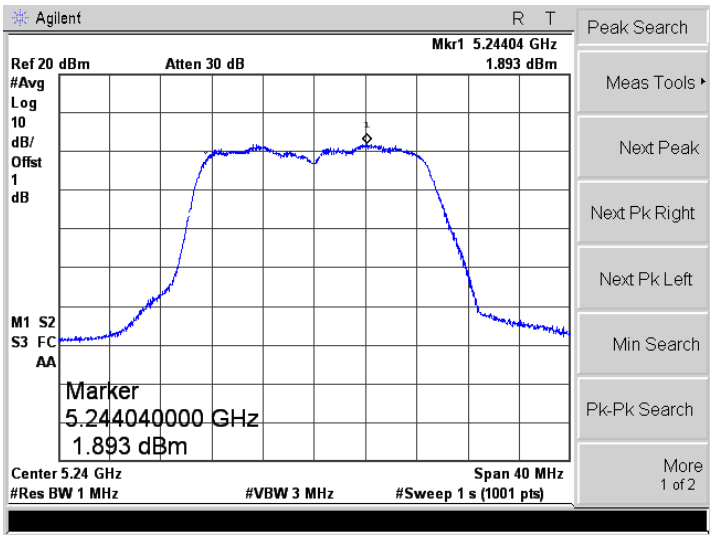
| Power Spectral Density | | | | | | | |
|---|---|---|---|---|---|---|---|
| **U-NII-3: 5725-5850MHz** | | | | | | | |
| Operating mode | Test Channel | ANT A dBm/300kHz | ANT B dBm/300kHz | Factor | ANT A dBm/500kHz* | ANT B dBm/500kHz* | Limit dBm/500kHz |
| 802.11a | 5745 | -2.193 | -3.007 | 2.22 | 0.027 | -0.787 | 30 |
| | 5785 | -2.345 | -2.916 | 2.22 | -0.125 | -0.696 | 30 |
| | 5825 | -2.206 | -3.268 | 2.22 | 0.014 | -1.048 | 30 |
| *Note: Maximum PSD=PSD(dBm/300kHz)+10log(500kHz/300kHz)=2.22 | | | | | | | |

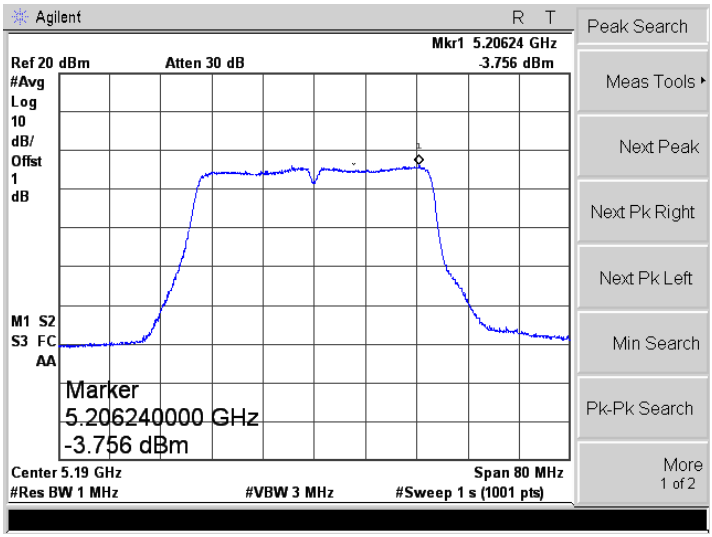
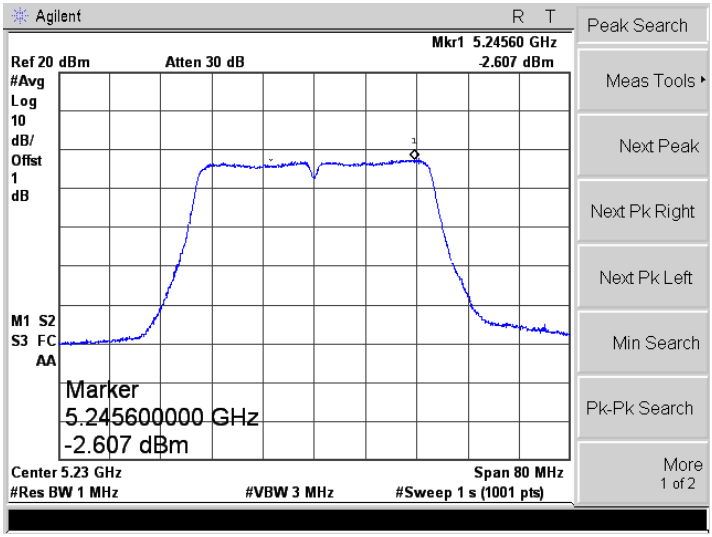
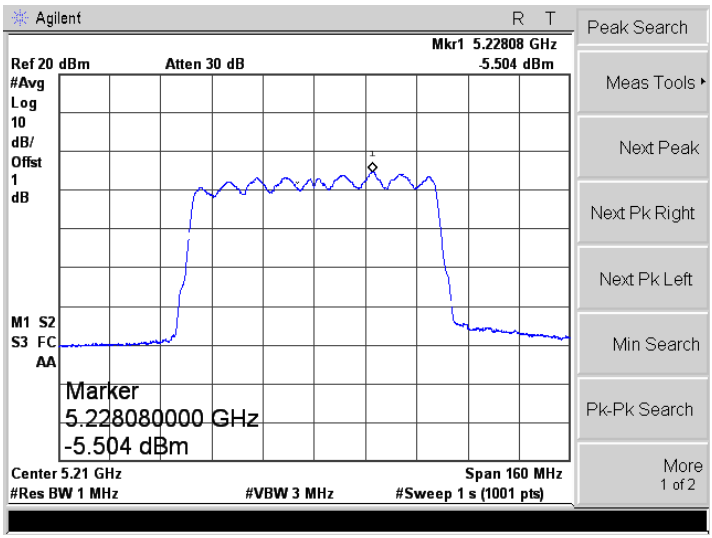
| Power Spectral Density | | | | | | |
|---|---|---|---|---|---|---|
| **U-NII-3: 5725-5850MHz** | | | | | | |
| Operating mode | Test Channel | ANT A dBm/300kHz | ANT B dBm/300kHz | Factor | Total dBm/500kHz* | Limit dBm/500kHz |
| 802.11n-HT20 | 5745 | -3.341 | -3.720 | 2.22 | 1.70 | 30 |
| | 5785 | -3.332 | -4.596 | 2.22 | 1.31 | 30 |
| | 5825 | -3.304 | -4.181 | 2.22 | 1.51 | 30 |
| 802.11n HT40 | 5755 | -9.342 | -7.659 | 2.22 | -3.19 | 30 |
| | 5795 | -9.031 | -8.327 | 2.22 | -3.43 | 30 |
| 802.11ac VH80 | 5775 | -7.329 | -6.864 | 2.22 | -1.86 | 30 |
| *Note: Maximum PSD=PSD(dBm/300kHz)+10log(500kHz/300kHz)=2.22 | | | | | | |

**ANT A**

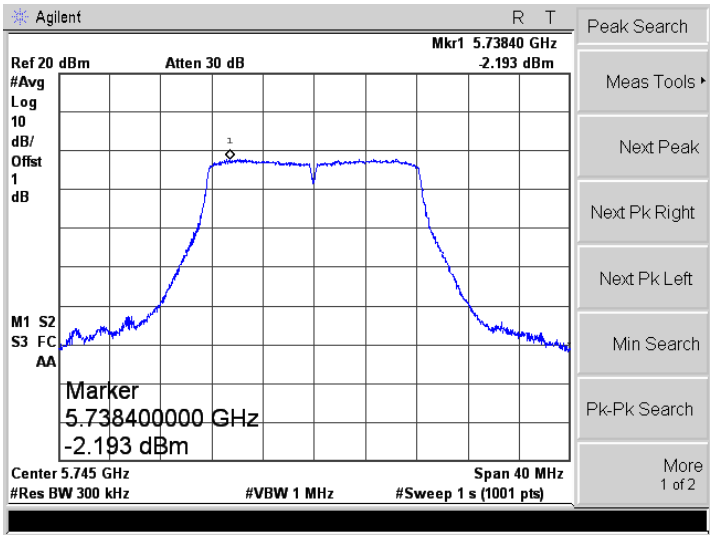
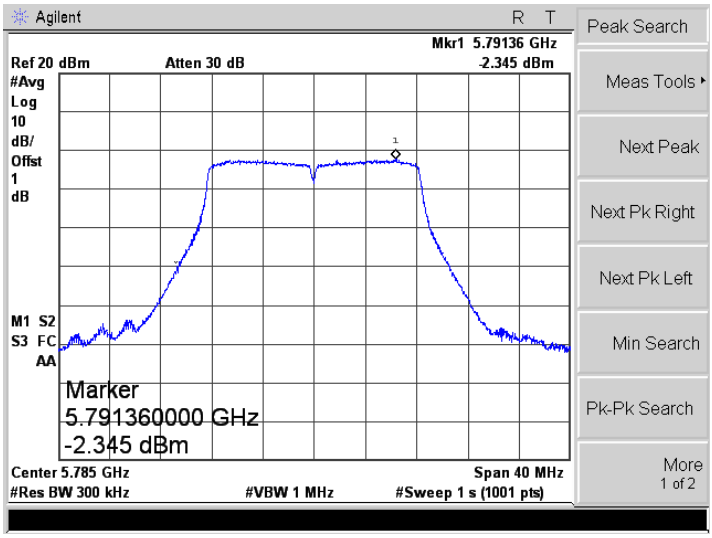
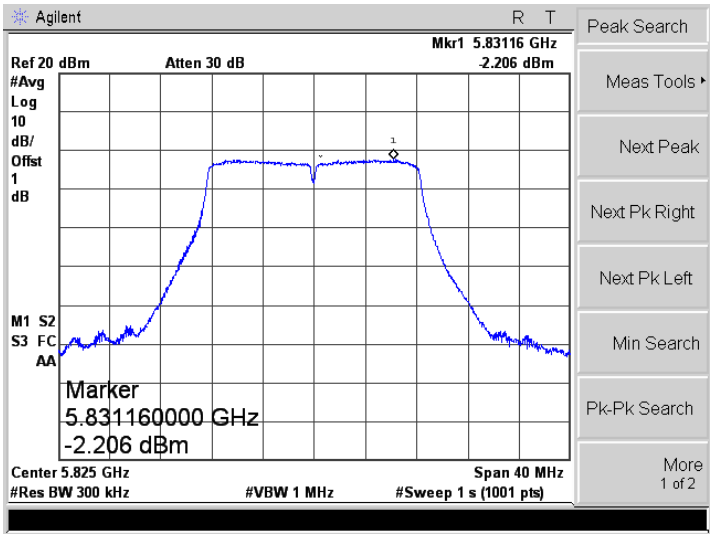
**5150-5250MHz**

| | |
|---|---|
| 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 |  |

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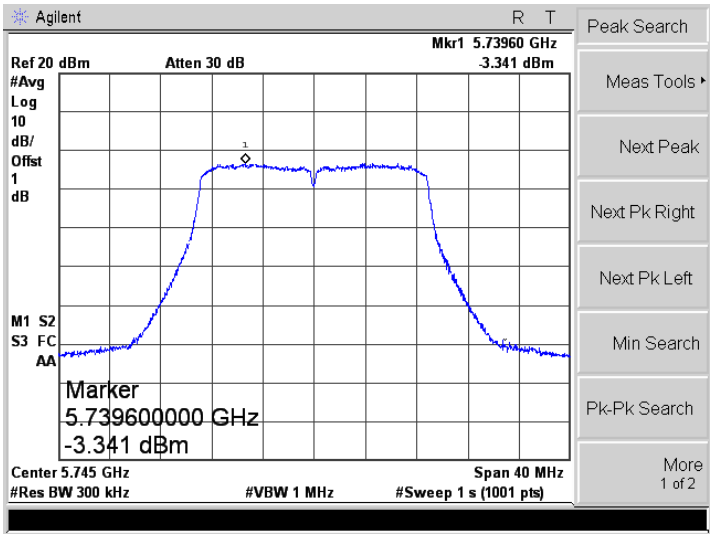
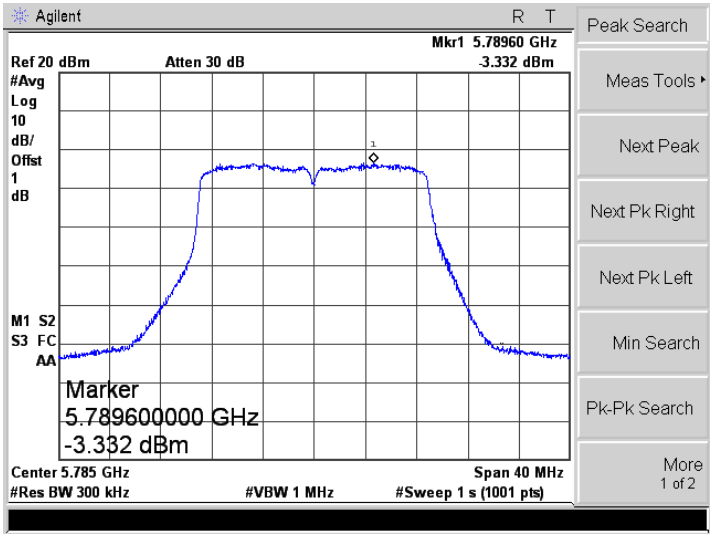
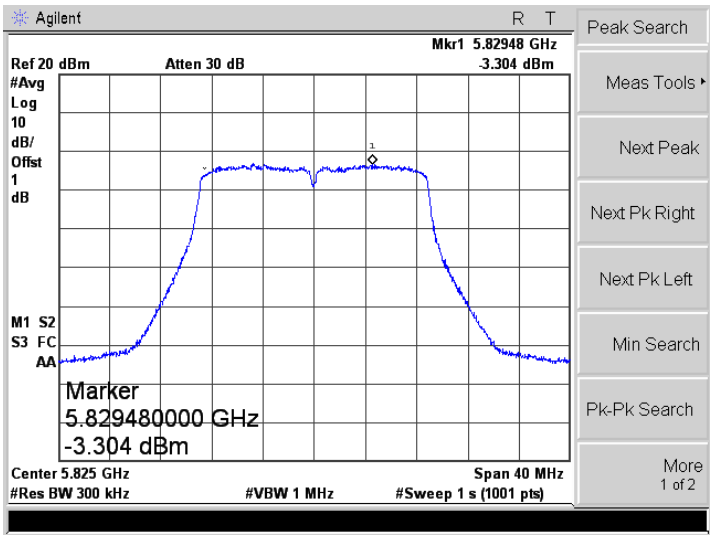
|---|---|
| 802.11n-HT20-Low |  |
| 802.11n-HT20-Middle |  |
| 802.11n-HT20-High |  |

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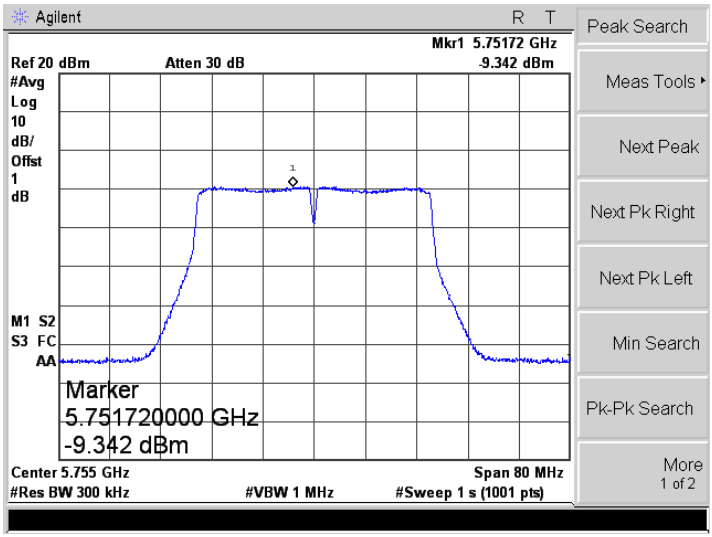
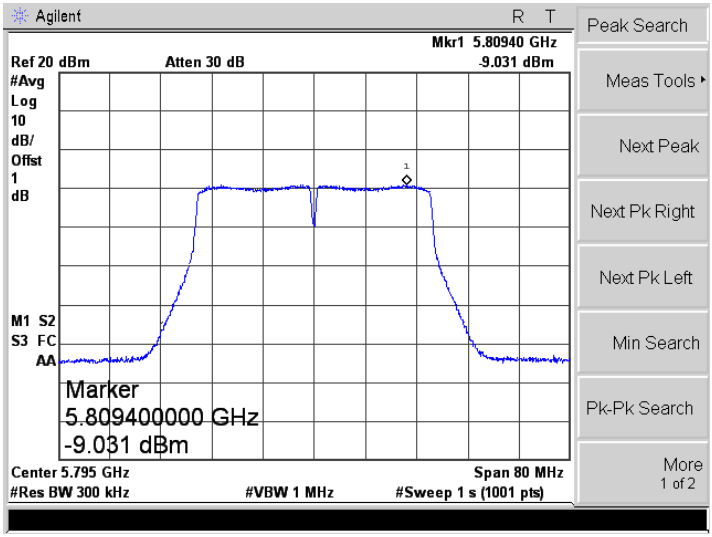
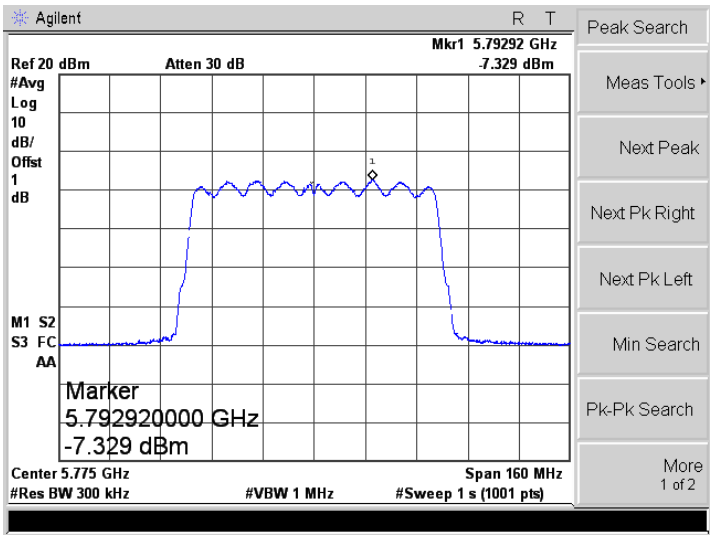
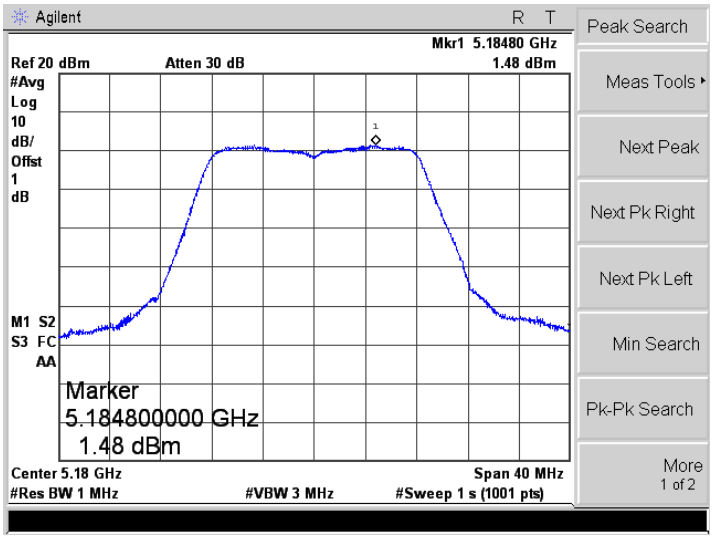
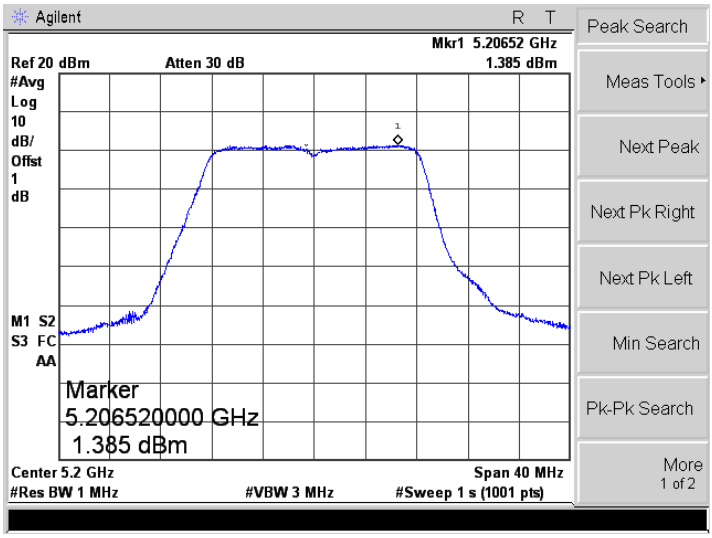
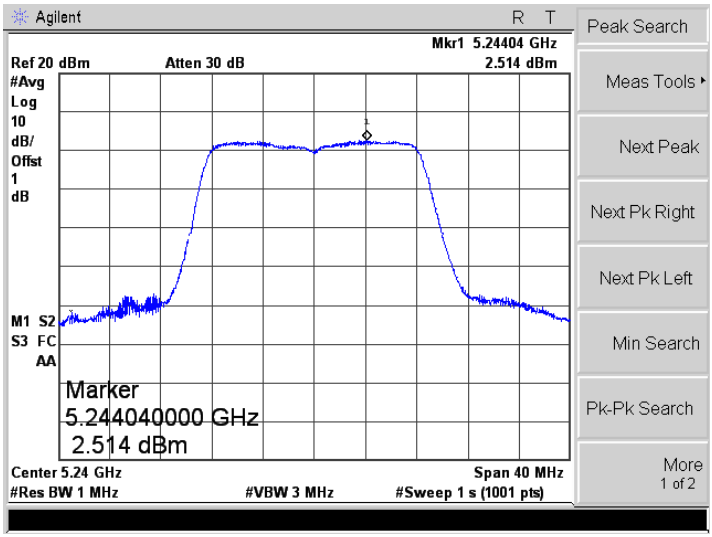
|---|---|
| 802.11n-HT40-Low |  |
| 802.11n-HT40-High |  |
| 802.11ac-HT80 |  |

**ANT B**

**5150-5250MHz**

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

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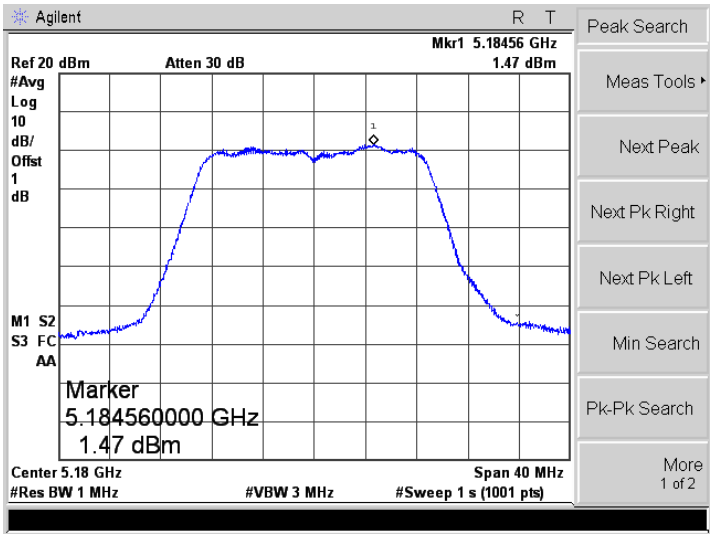
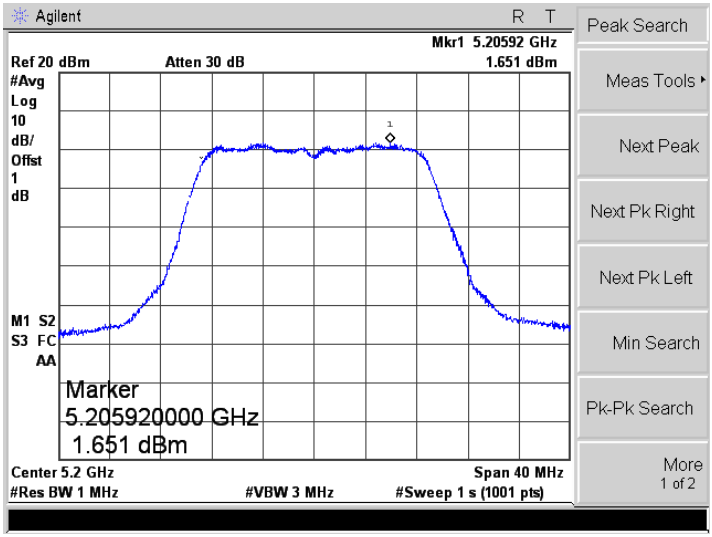
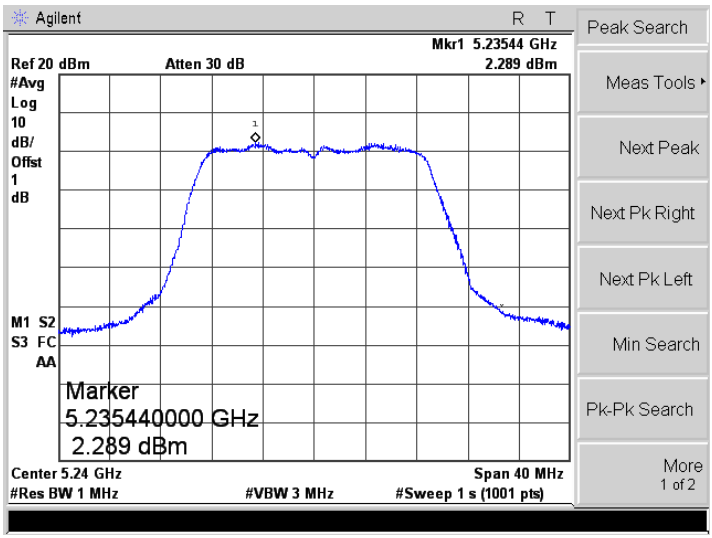
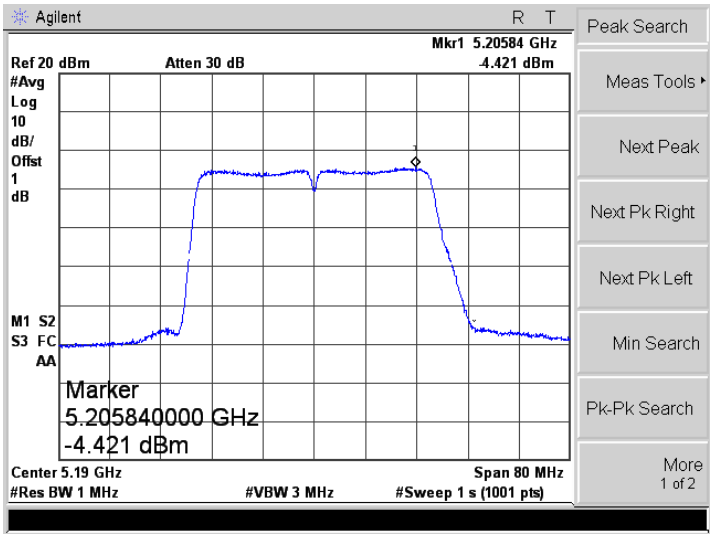
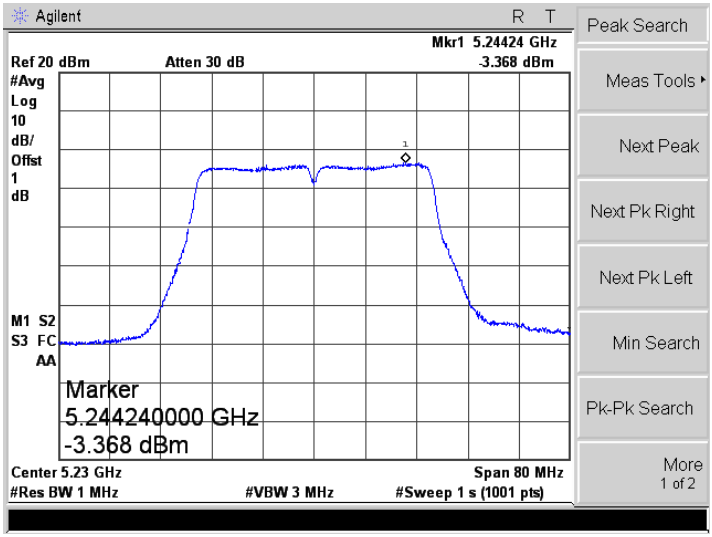
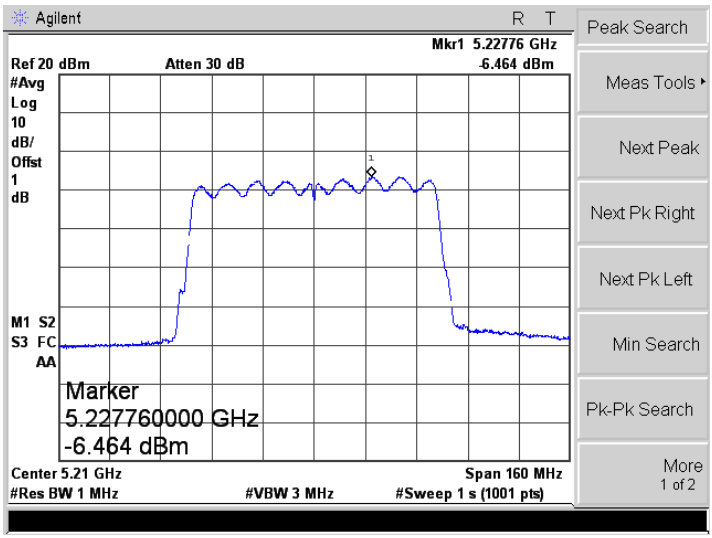
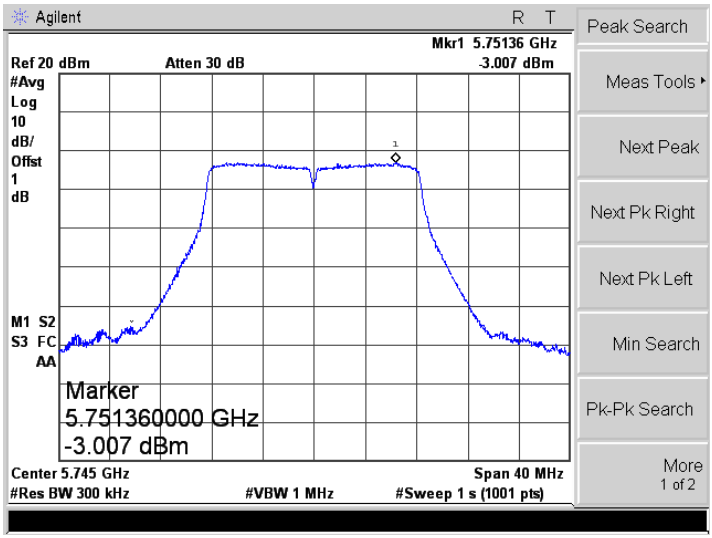
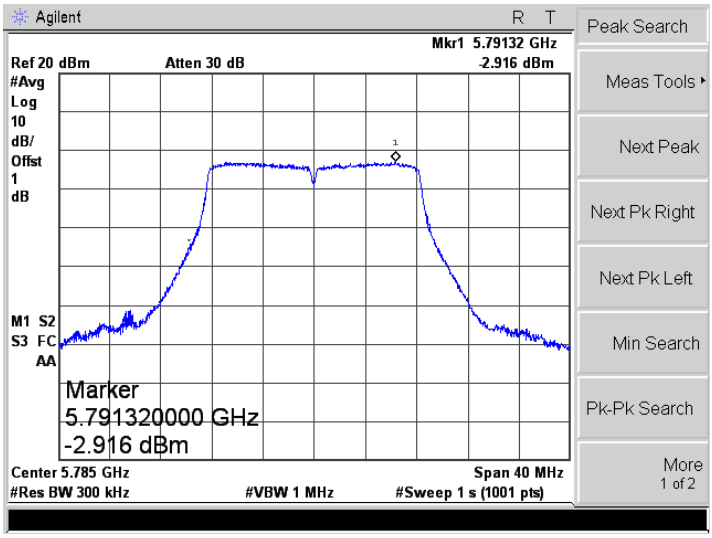
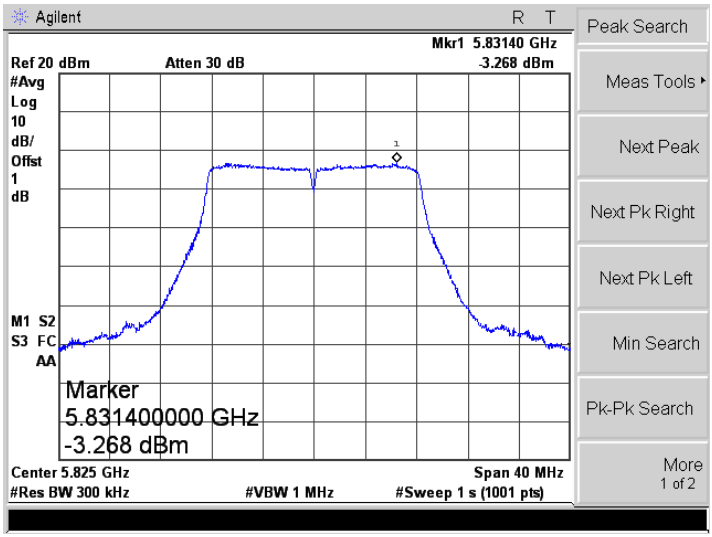
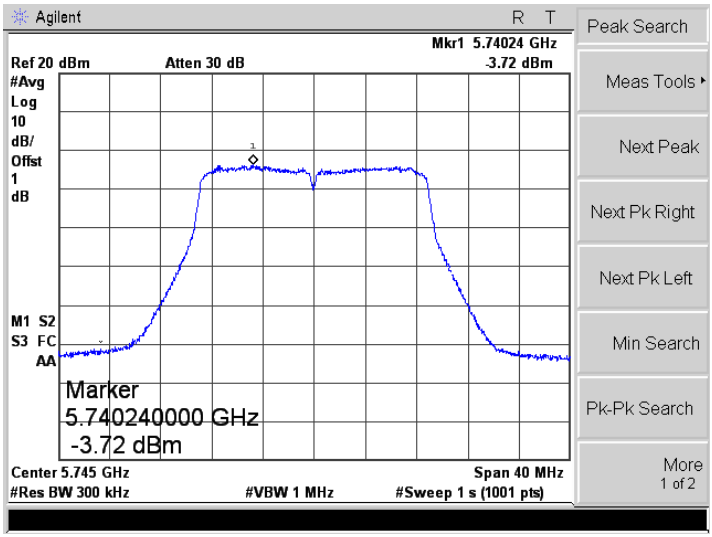
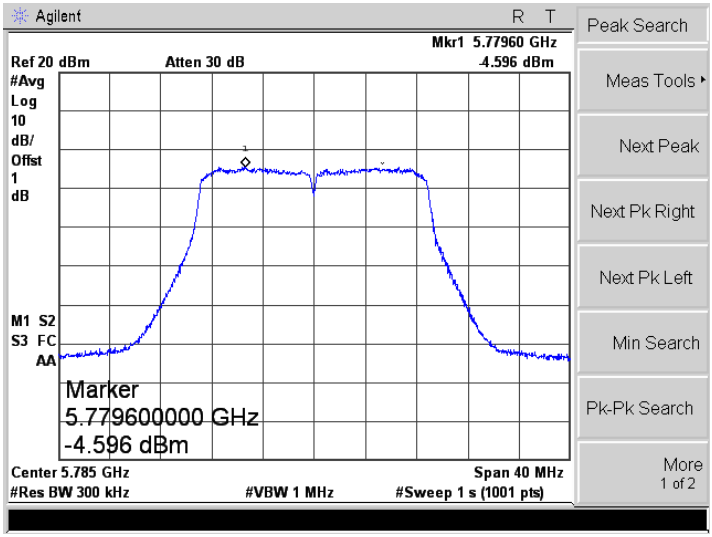
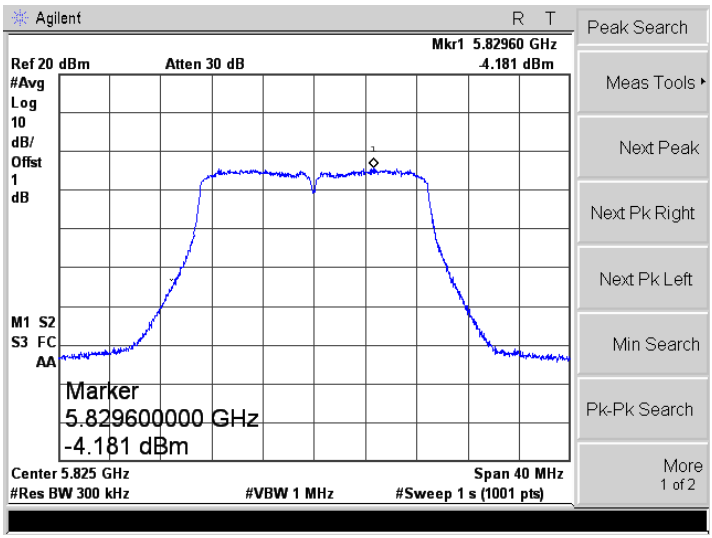
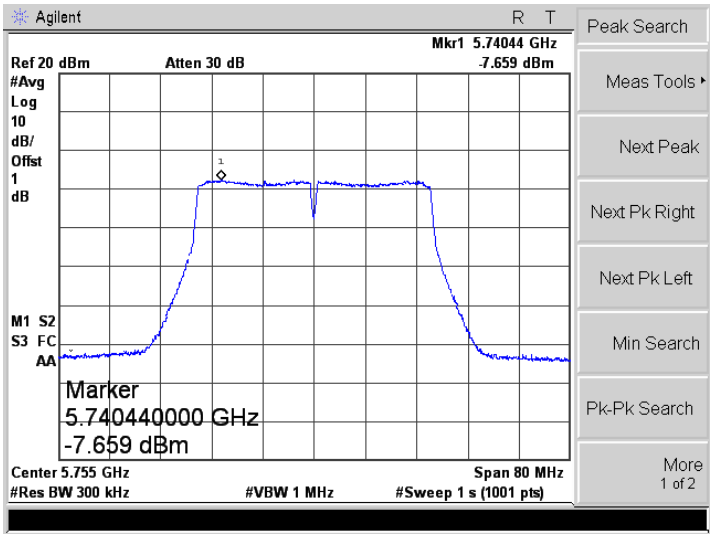
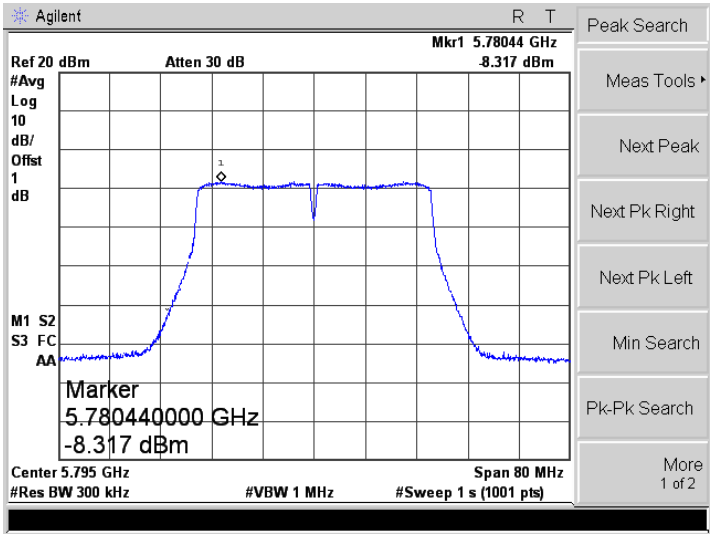
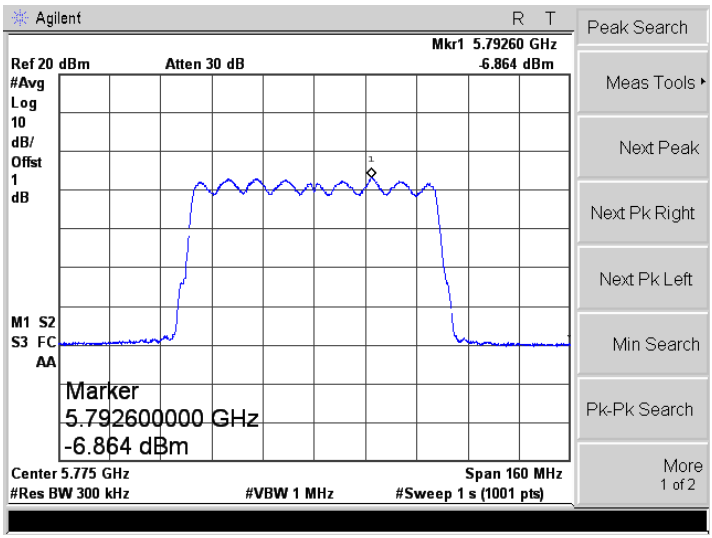
|---|---|
| 802.11n-HT20-Low |  |
| 802.11n-HT20-Middle |  |
| 802.11n-HT20-High |  |

| | |
|---|---|
| 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

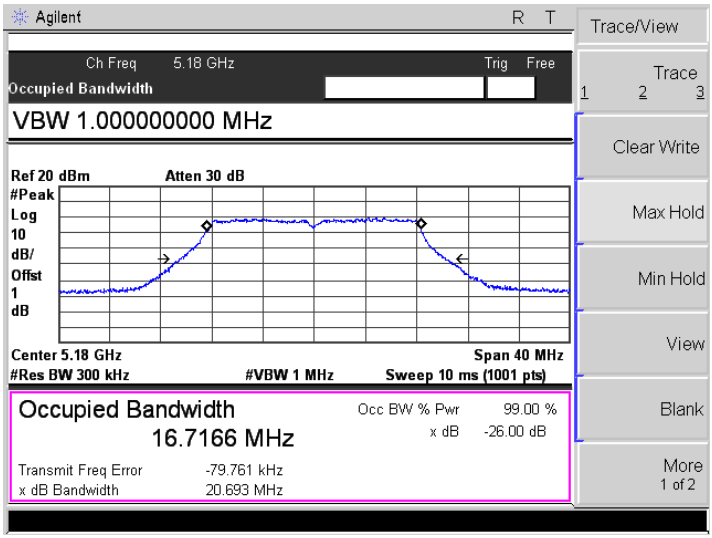
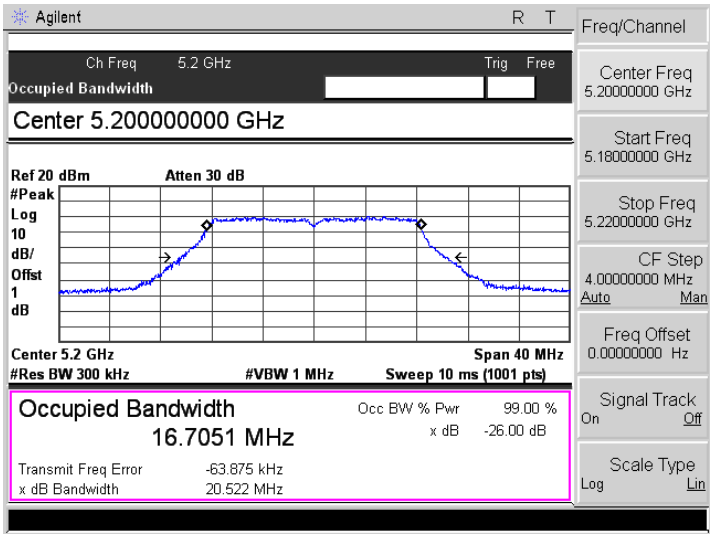
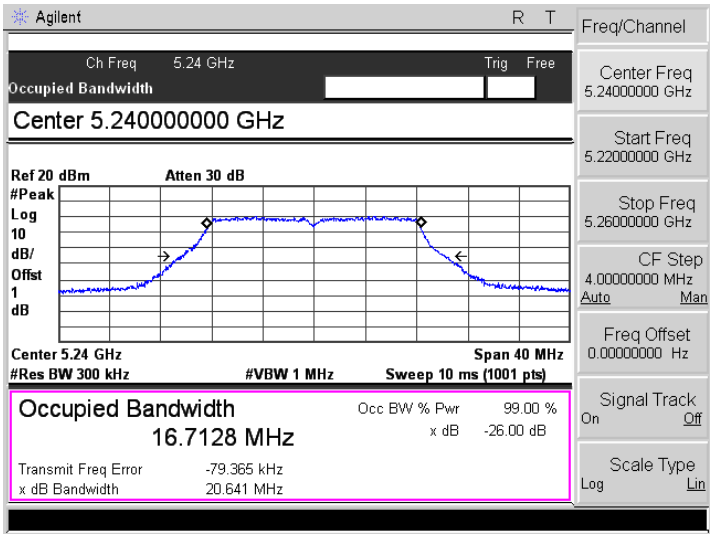
**Emission Bandwidth and Occupied Bandwidth**

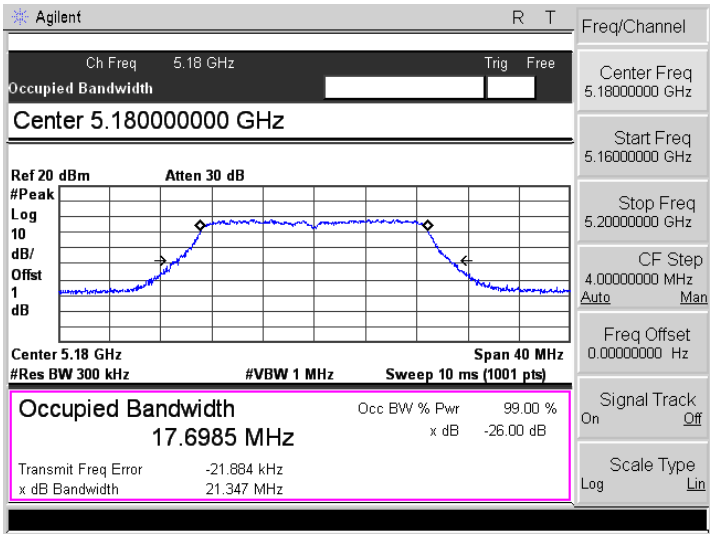
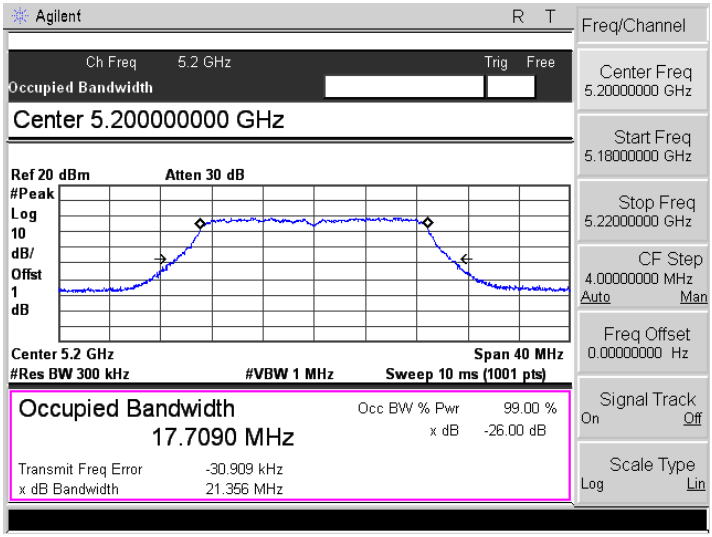
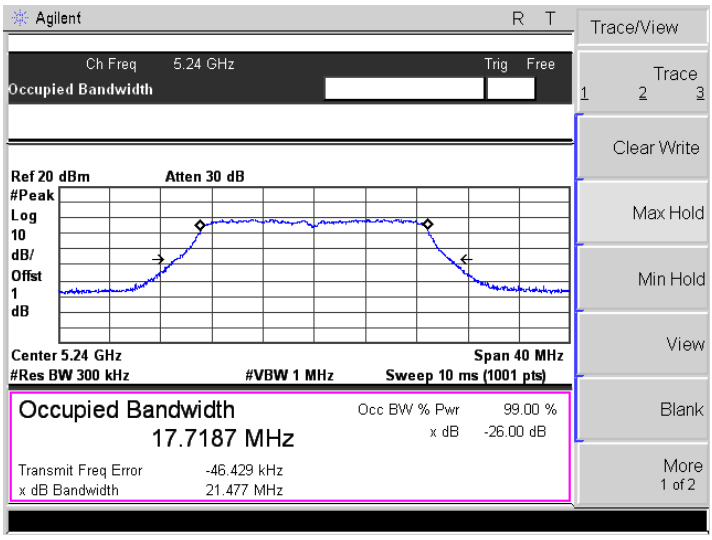
| U-NII-1:5150-5250MHz | | | | | | |
|---|---|---|---|---|---|---|
| **Test Mode** | **Test Channel MHz** | **ANT A** | | **ANT B** | | **Result** |
| | | **26 dB Bandwidth MHz** | **99% Bandwidth MHz** | **26 dB Bandwidth MHz** | **99% Bandwidth MHz** | |
| 802.11a | 5180 | 20.693 | 16.717 | 20.762 | 16.765 | Pass |
| | 5200 | 20.522 | 16.705 | 20.694 | 16.725 | Pass |
| | 5240 | 20.641 | 16.713 | 20.707 | 16.767 | Pass |
| 802.11n-HT20 | 5180 | 21.347 | 17.699 | 21.293 | 17.751 | Pass |
| | 5200 | 21.3556 | 17.709 | 21.389 | 17.719 | Pass |
| | 5240 | 21.477 | 17.719 | 21.339 | 17.740 | Pass |
| 802.11n-HT40 | 5190 | 42.361 | 36.186 | 42.728 | 36.264 | Pass |
| | 5230 | 42.303 | 36.203 | 42.675 | 36.281 | Pass |
| 802.11ac-HT80 | 5210 | 82.421 | 75.357 | 82.705 | 75.601 | Pass |

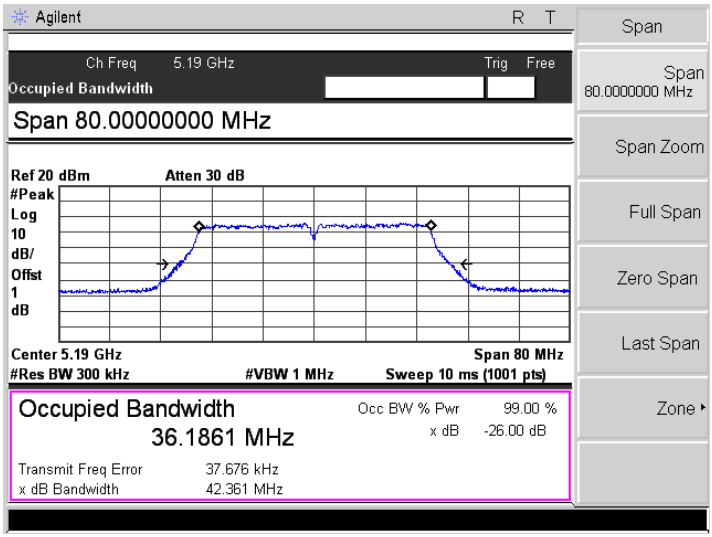
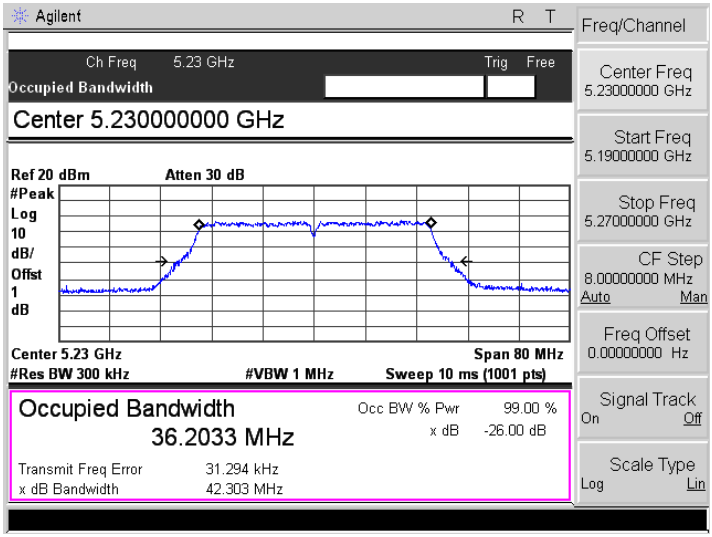
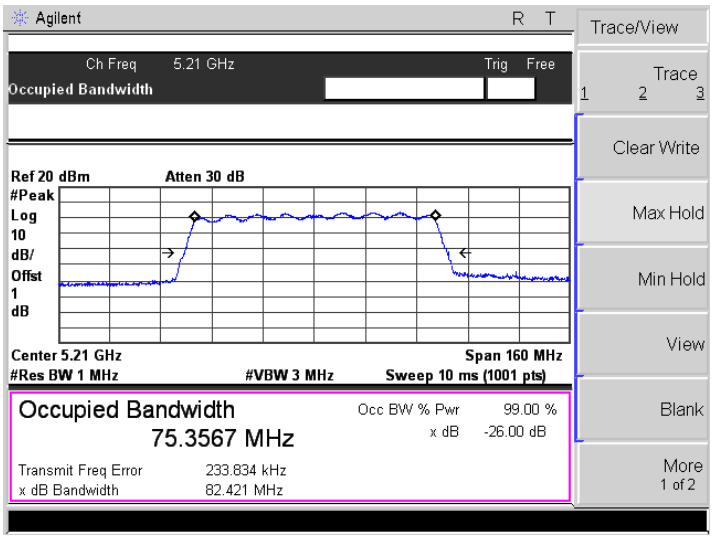
| U-NII-3: 5725-5850MHz | | | | | | |
|---|---|---|---|---|---|---|
| **Test Mode** | **Test Channel MHz** | **ANT A** | | **ANT B** | | **Limit kHz** |
| | | **6 dB Bandwidth MHz** | **99% Bandwidth MHz** | **6 dB Bandwidth MHz** | **99% Bandwidth MHz** | |
| 802.11a | 5745 | 16.449 | 16.765 | 16.488 | 16.756 | ≥500 |
| | 5785 | 16.452 | 16.746 | 16.437 | 16.754 | ≥500 |
| | 5825 | 16.438 | 16.687 | 16.479 | 16.769 | ≥500 |
| 802.11n-HT20 | 5745 | 17.647 | 17.705 | 17.632 | 17.716 | ≥500 |
| | 5785 | 17.645 | 17.728 | 17.643 | 17.724 | ≥500 |
| | 5825 | 17.655 | 17.724 | 17.646 | 17.727 | ≥500 |
| 802.11n-HT40 | 5755 | 36.475 | 36.217 | 35.514 | 36.256 | ≥500 |
| | 5795 | 36.498 | 36.195 | 36.521 | 36.253 | ≥500 |
| 802.11ac-HT80 | 5775 | 76.223 | 75.523 | 76.391 | 75.656 | ≥500 |

**ANT A**

**5150-5250MHz**

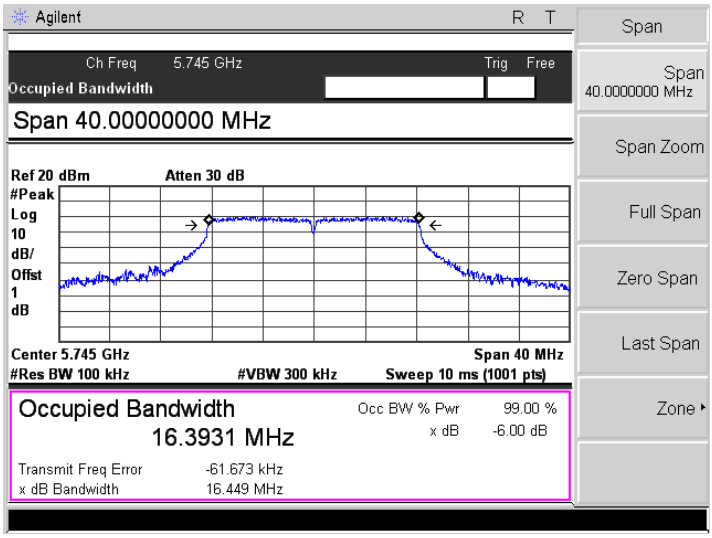
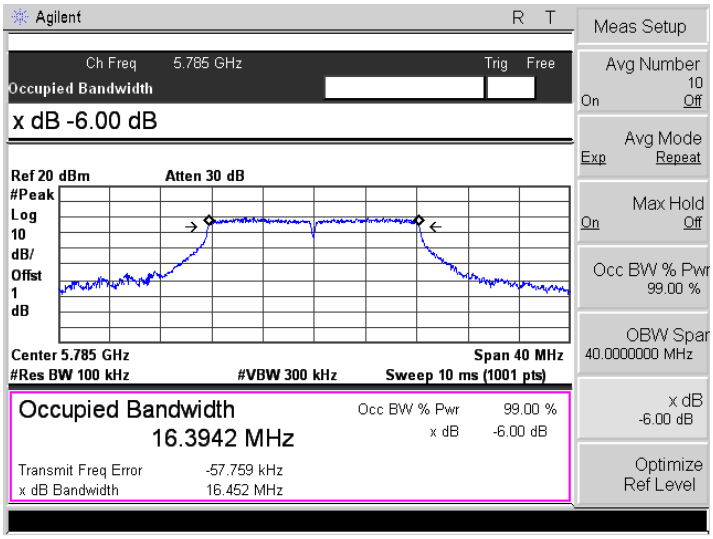
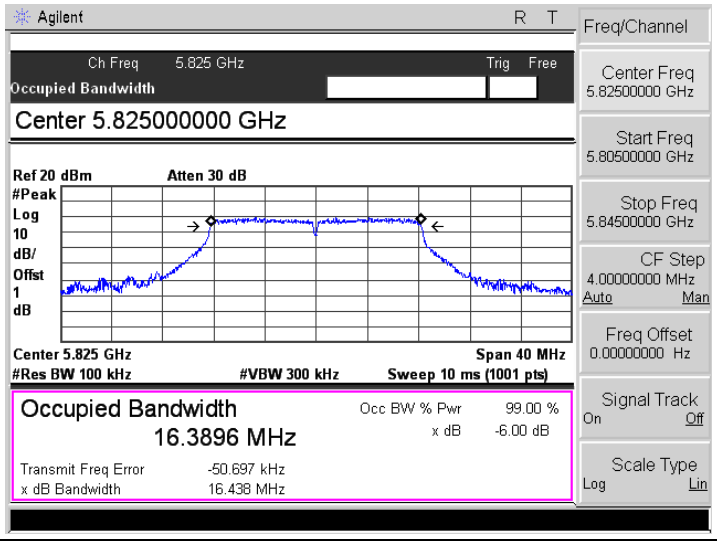
| | |
|---|---|
| 802.11a-Low |  |
| 802.11a-Middle |  |
| 802.11a-High |  |

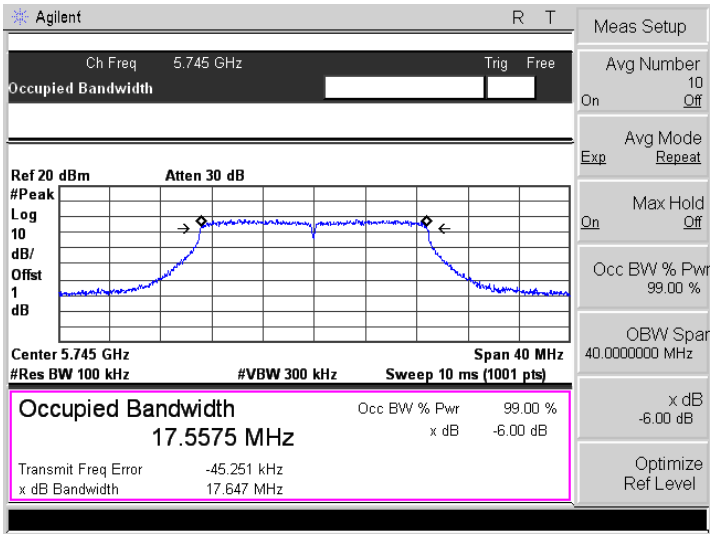
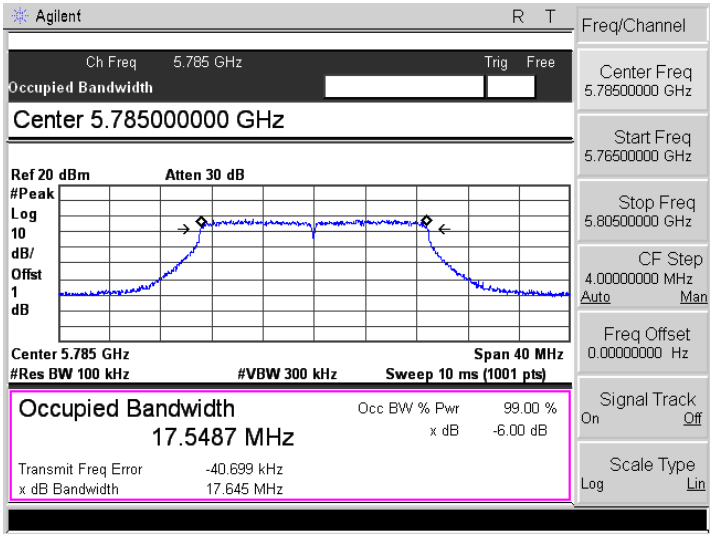
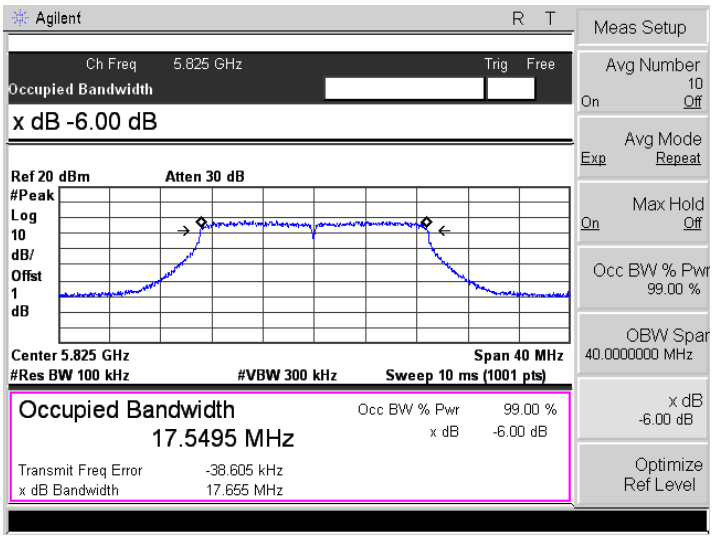
| | |
|---|---|
| 802.11n-HT20-Low |  |
| 802.11n-HT20-Middle |  |
| 802.11n-HT20-High |  |

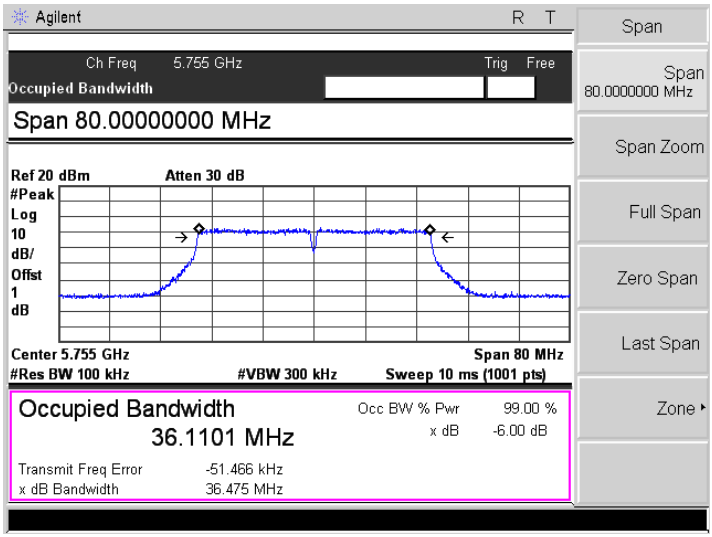
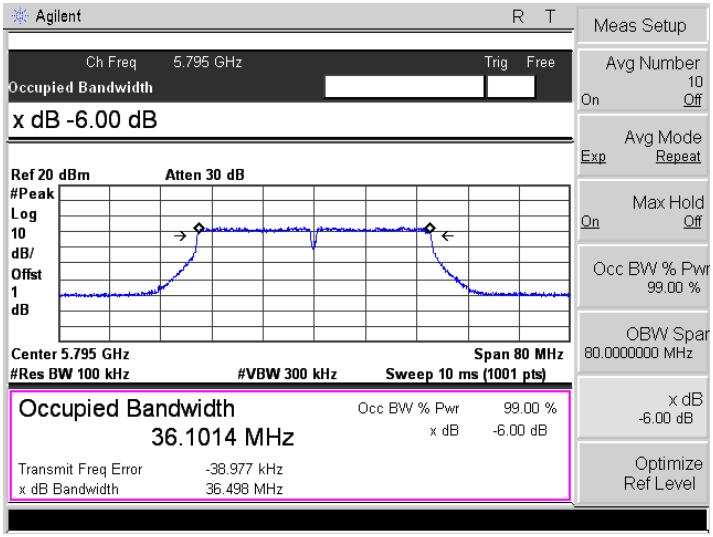
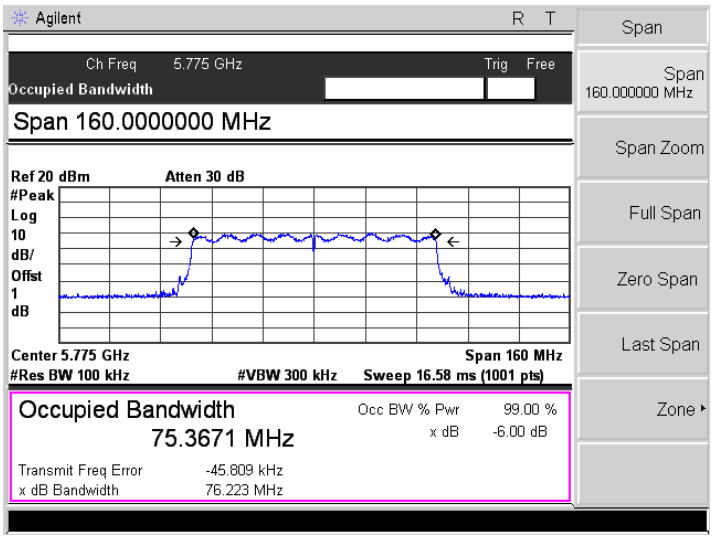
| | |
|---|---|
| 802.11n-HT40-Low |  |
| 802.11n-HT40-High |  |
| 802.11ac-HT80 |  |

**5725-5850MHz**

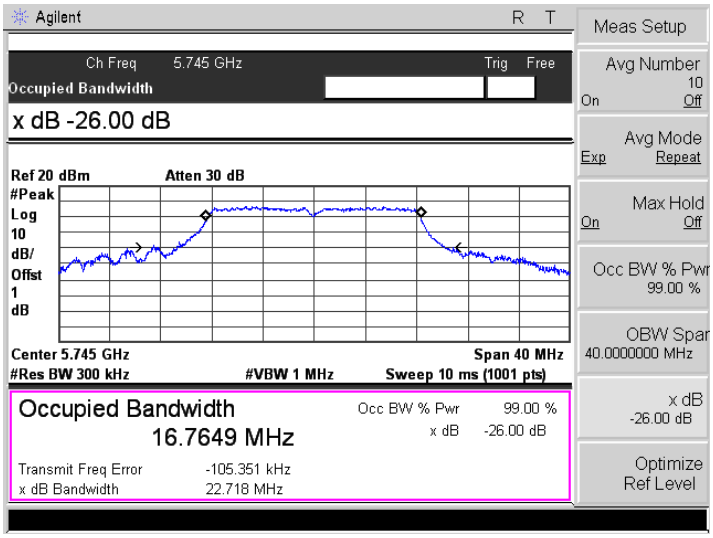
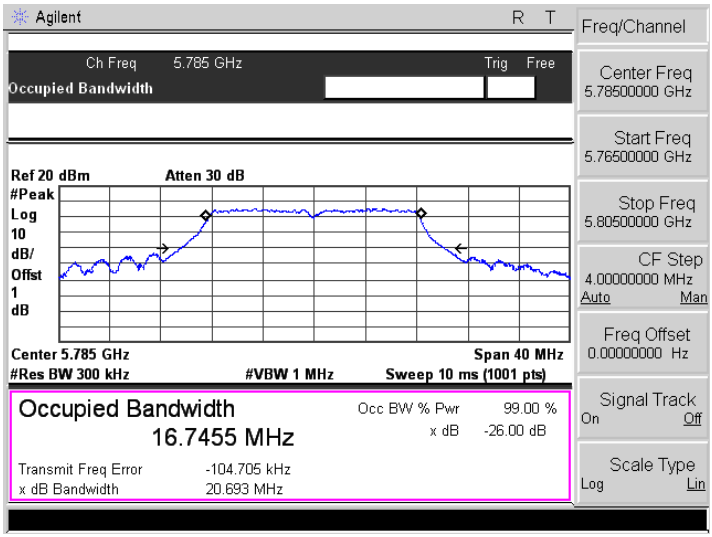
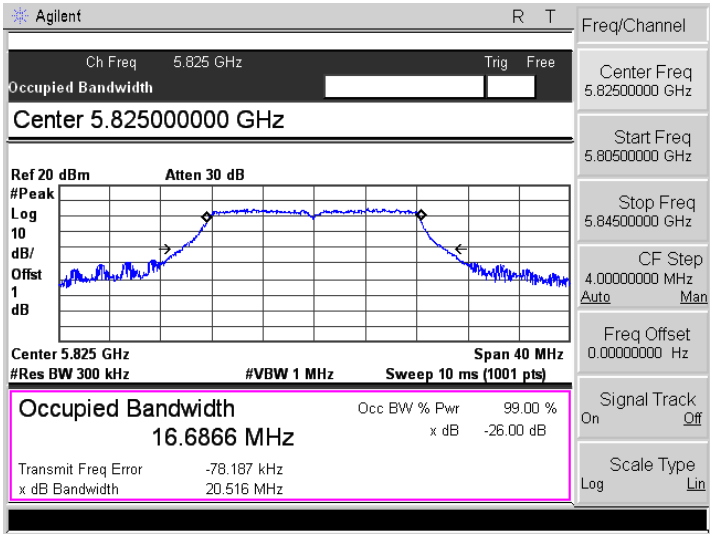
**6 dB Bandwidth**

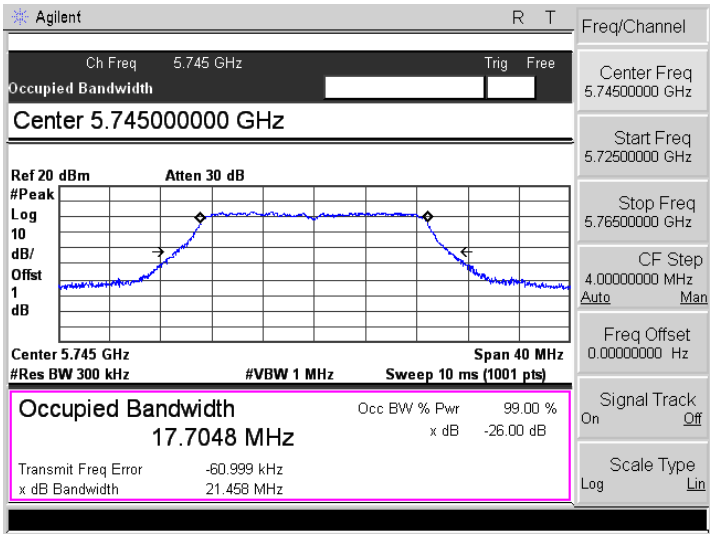
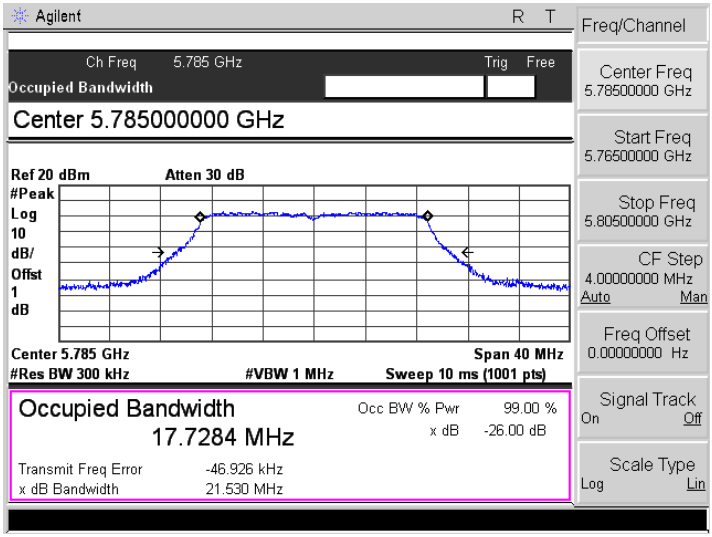
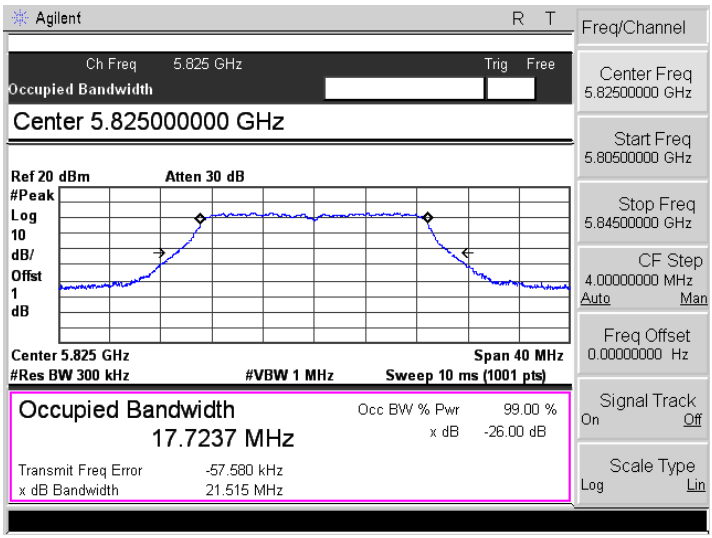
| | |
|---|---|
| 802.11a-Low |  |
| 802.11a-Middle |  |
| 802.11a-High |  |

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

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

**99 % Bandwidth**

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

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

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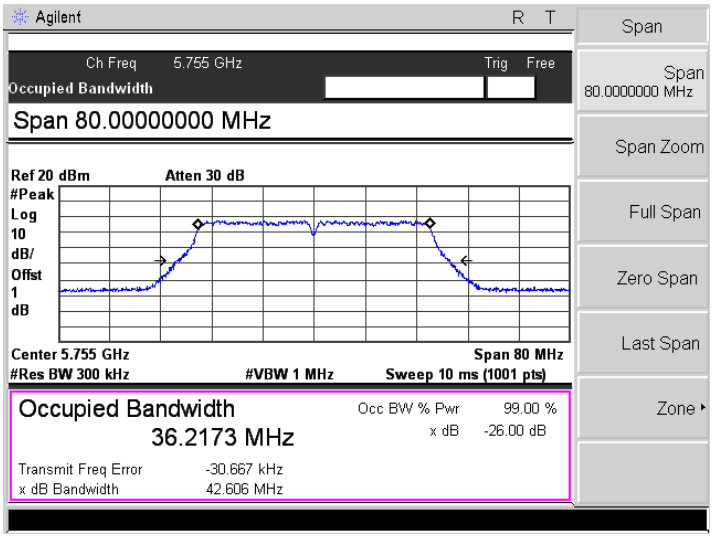
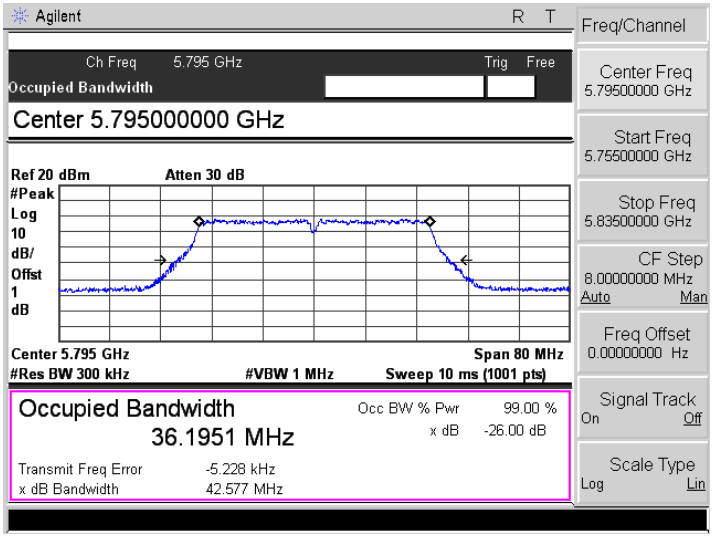
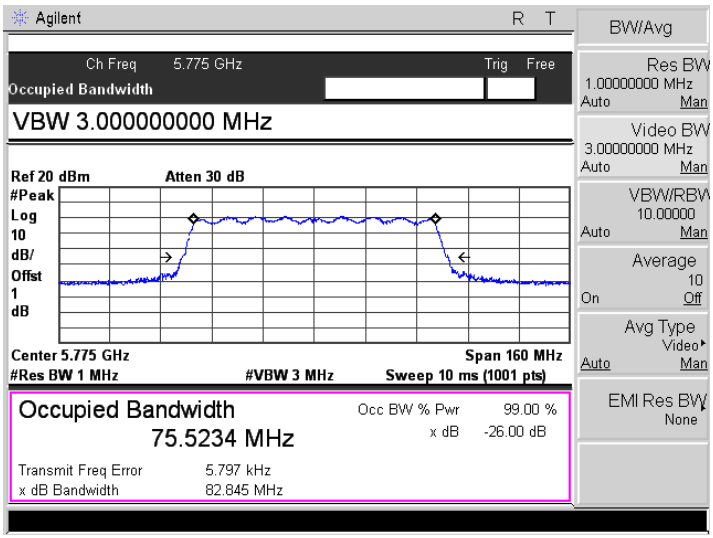
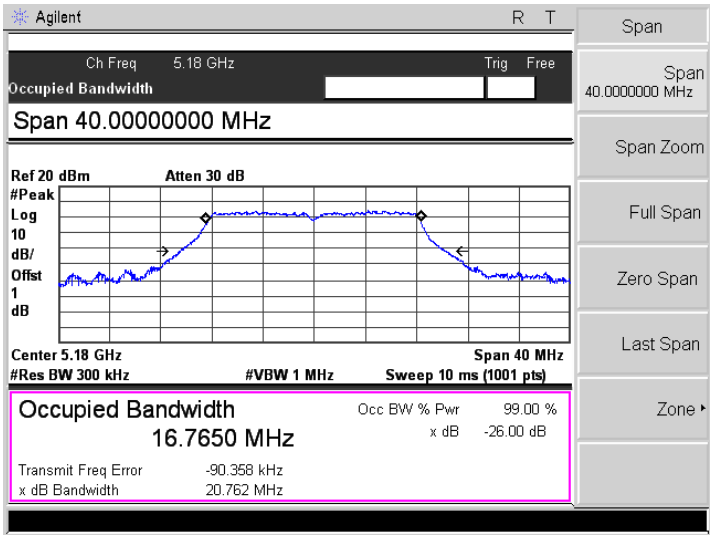
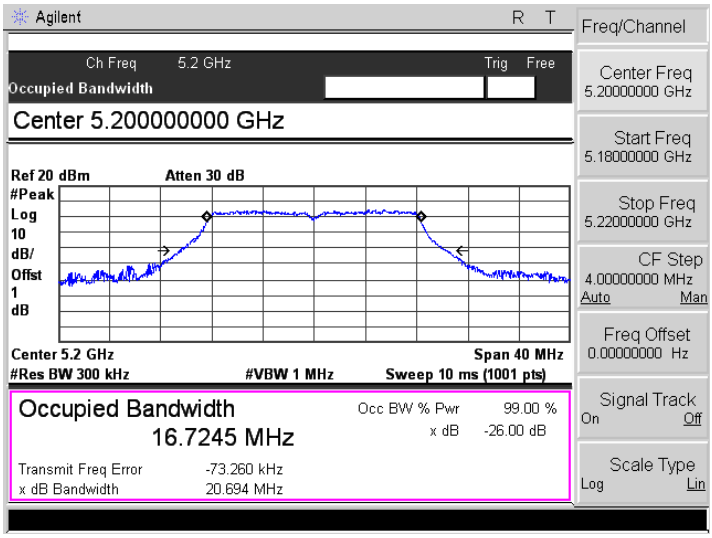
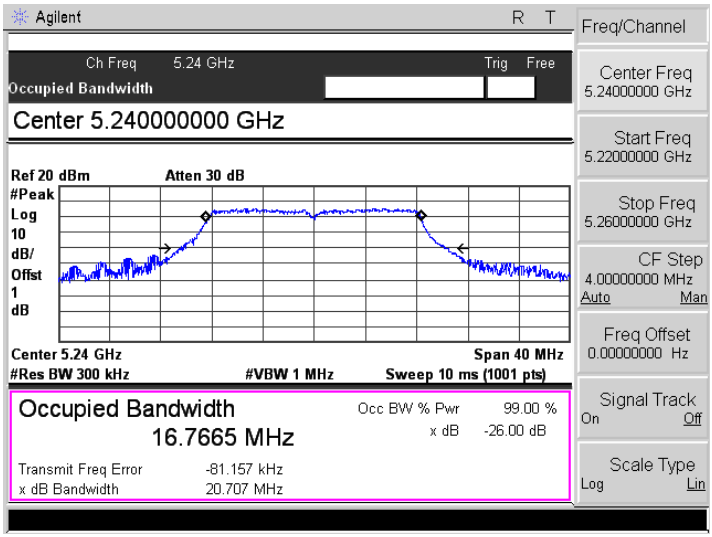
|---|---|
| 802.11n-HT40-Low |  |
| 802.11n-HT40-High |  |
| 802.11ac-HT80 |  |

**ANT B**

**5150-5250MHz**

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

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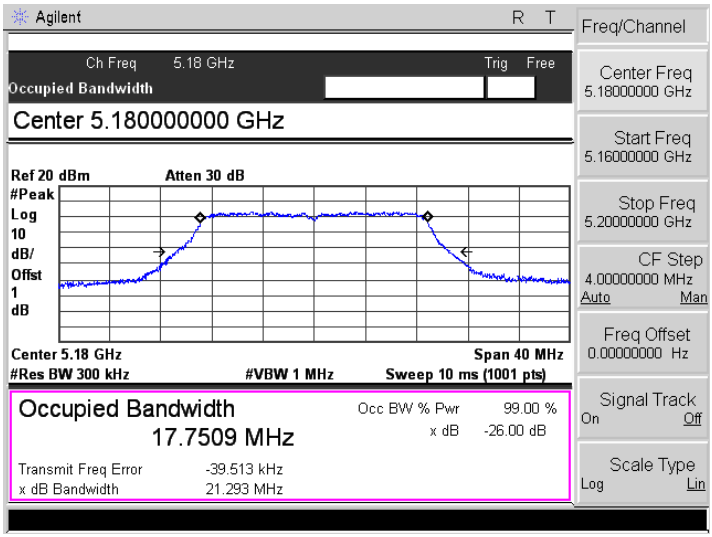
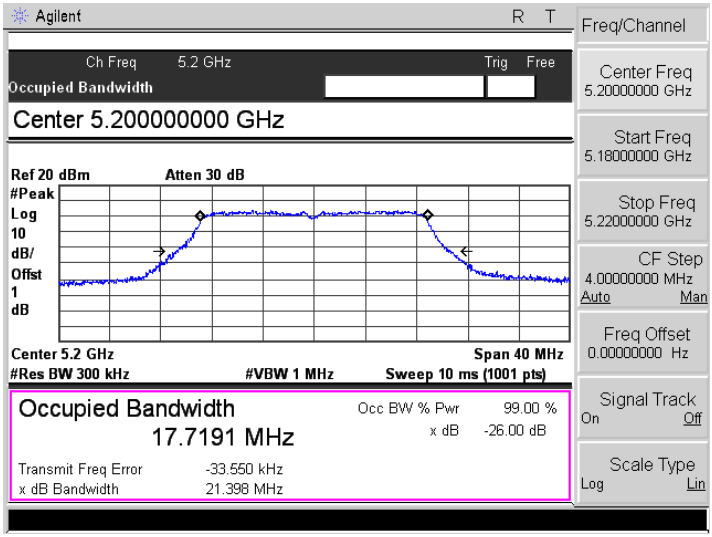
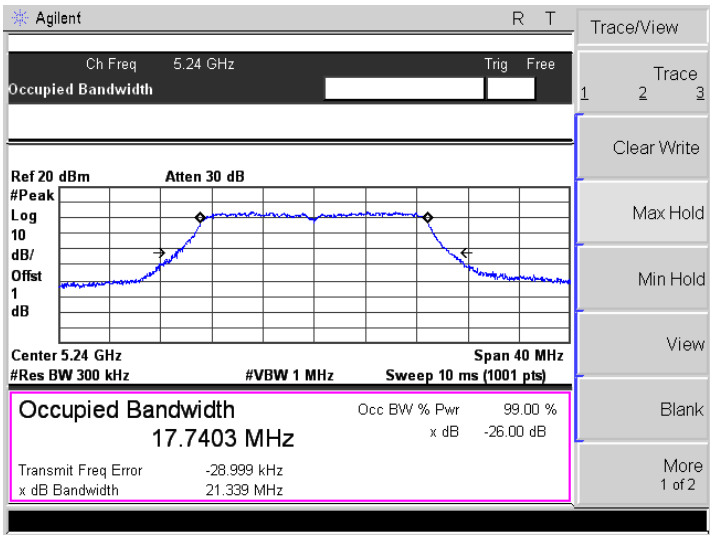
|---|---|
| 802.11n-HT20-Low |  |
| 802.11n-HT20-Middle |  |
| 802.11n-HT20-High |  |

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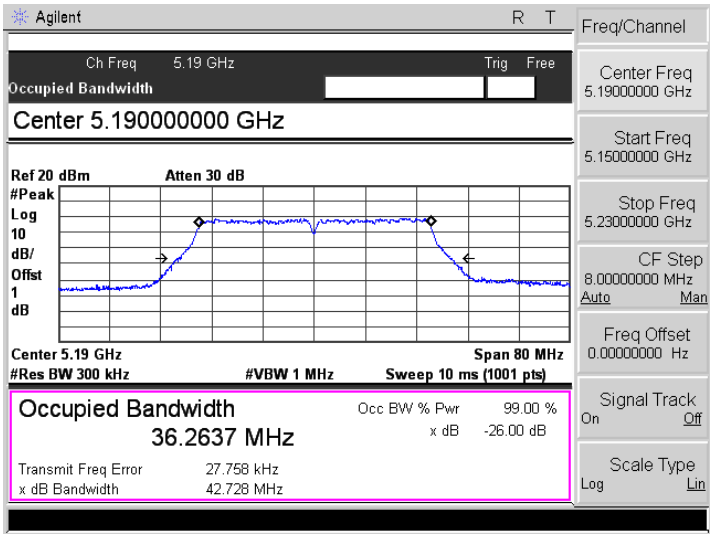
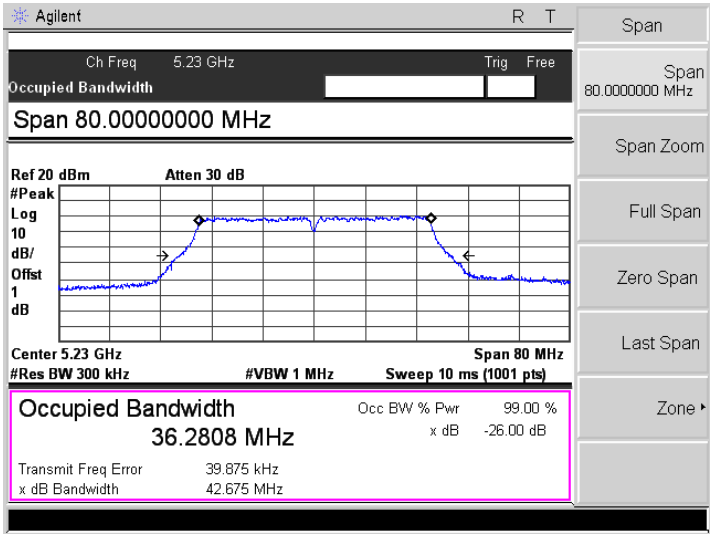
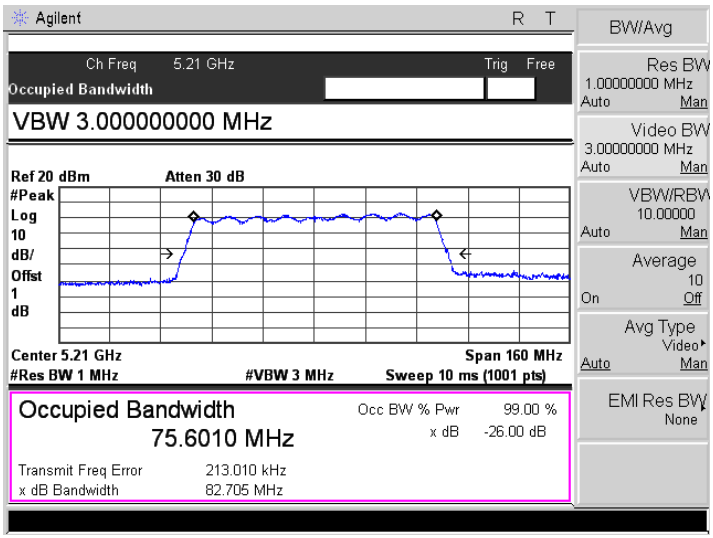
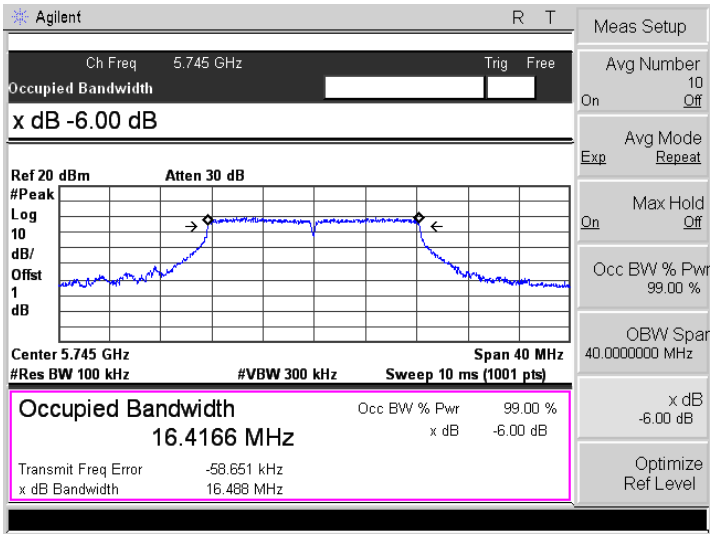
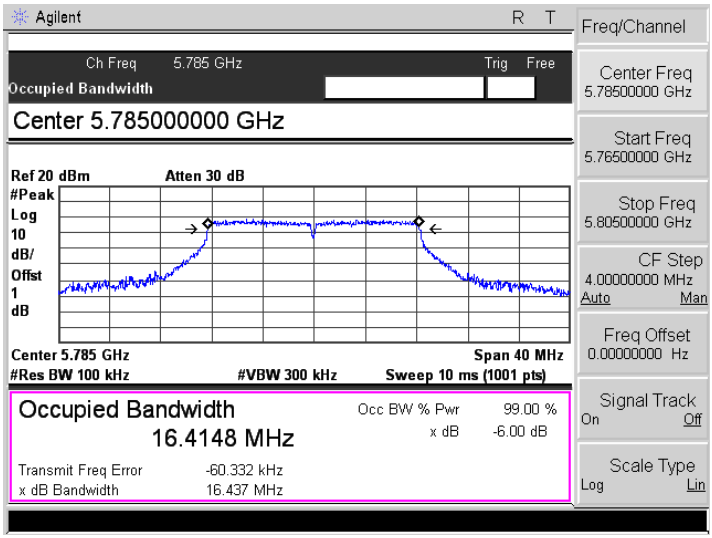
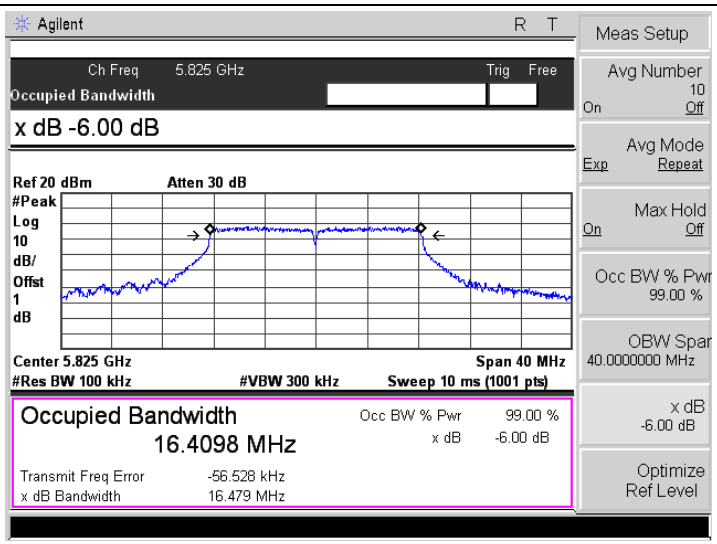
|---|---|
| 802.11n-HT40-Low |  |
| 802.11n-HT40-High |  |
| 802.11ac-HT80 |  |

**5725-5850MHz**

**6 dB Bandwidth**

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

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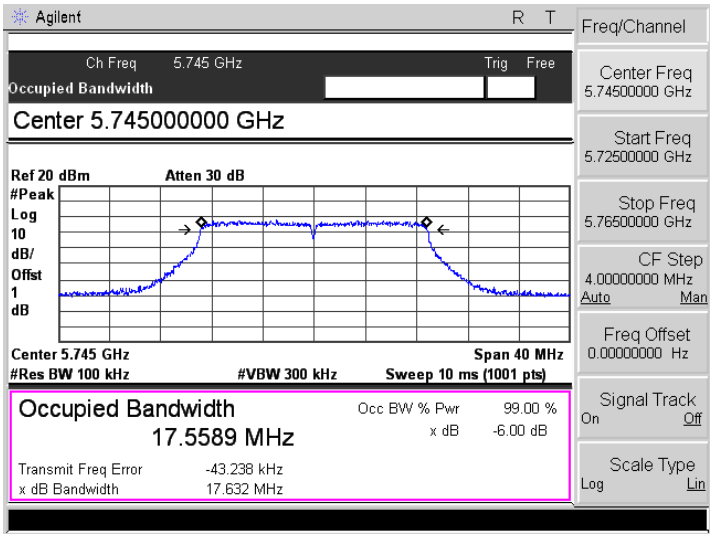
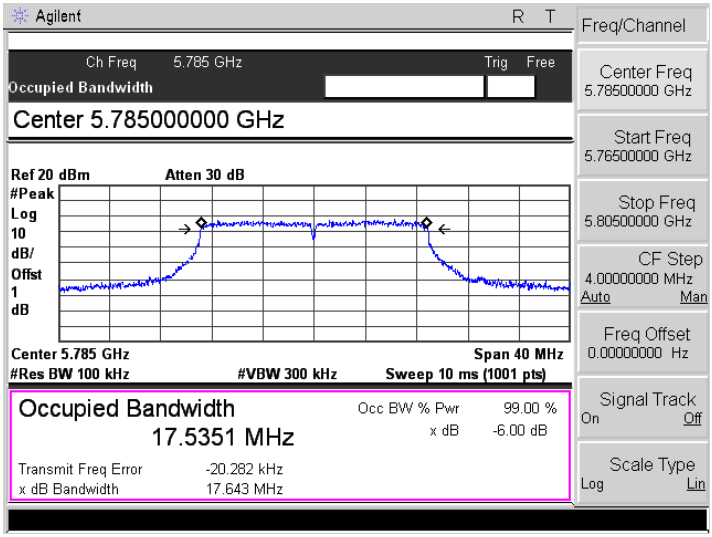
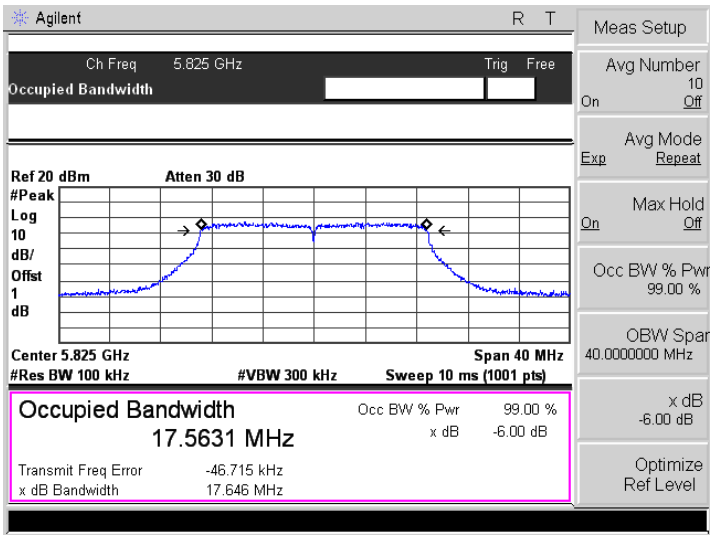
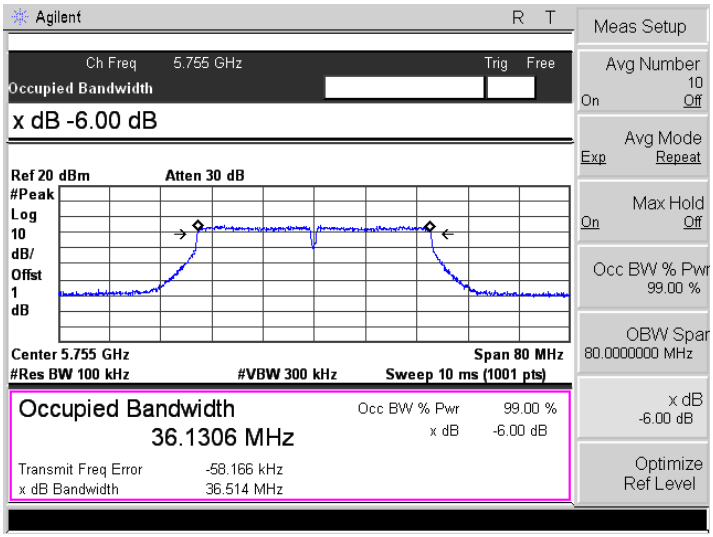
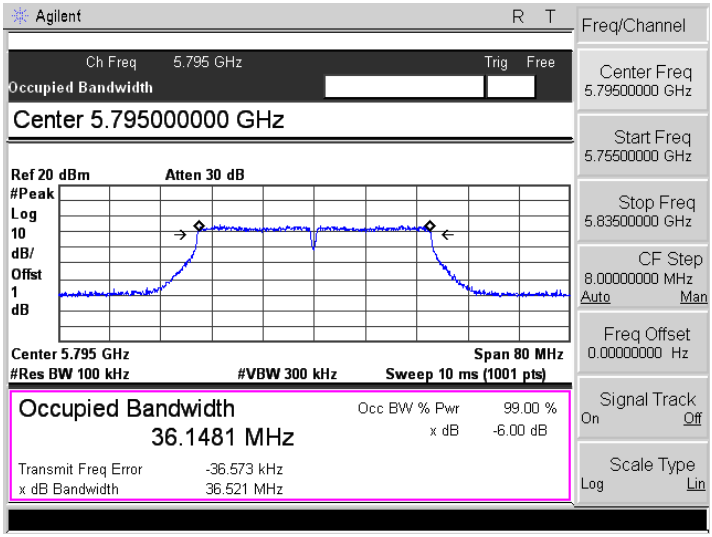
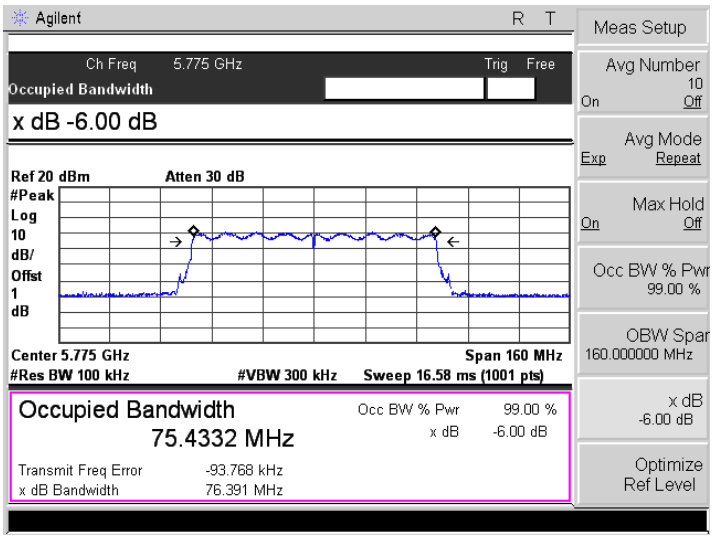
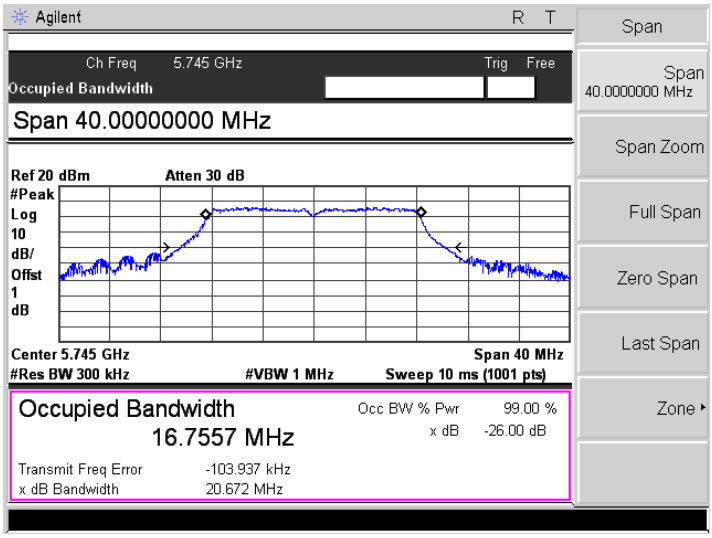
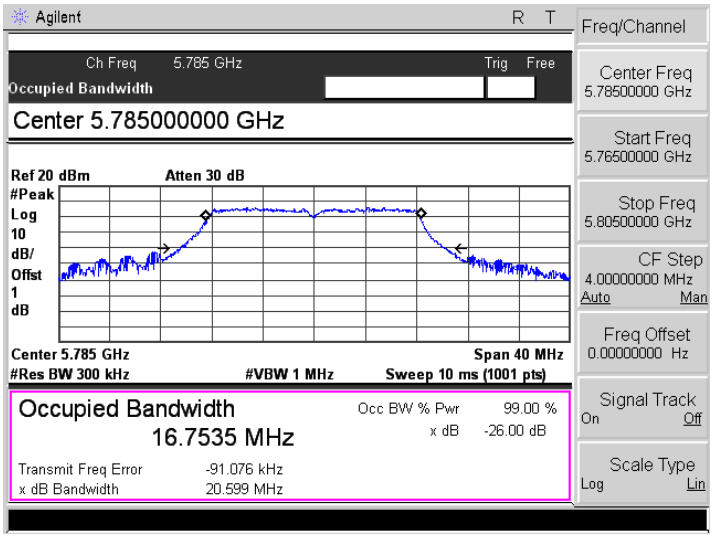
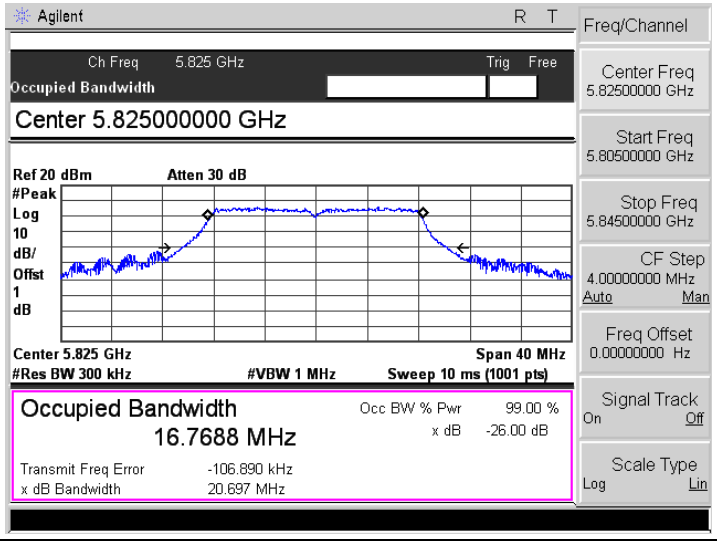
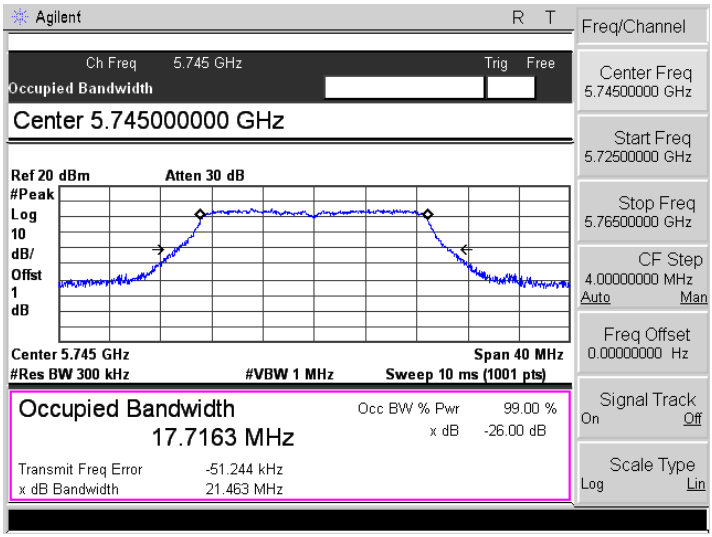
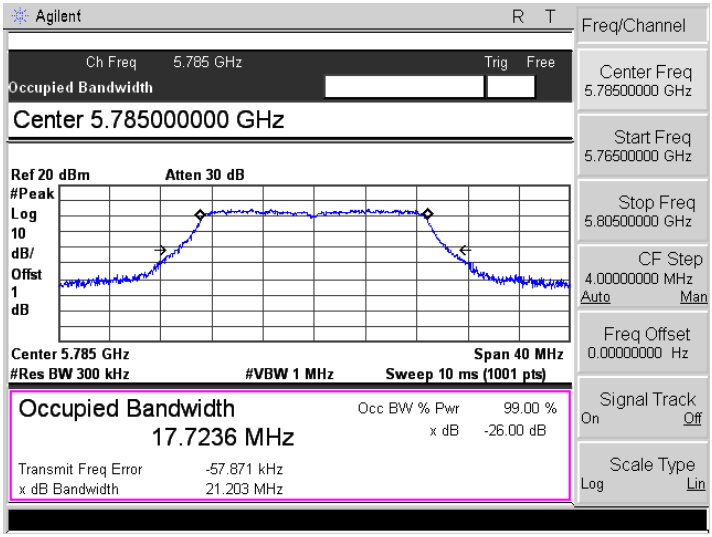
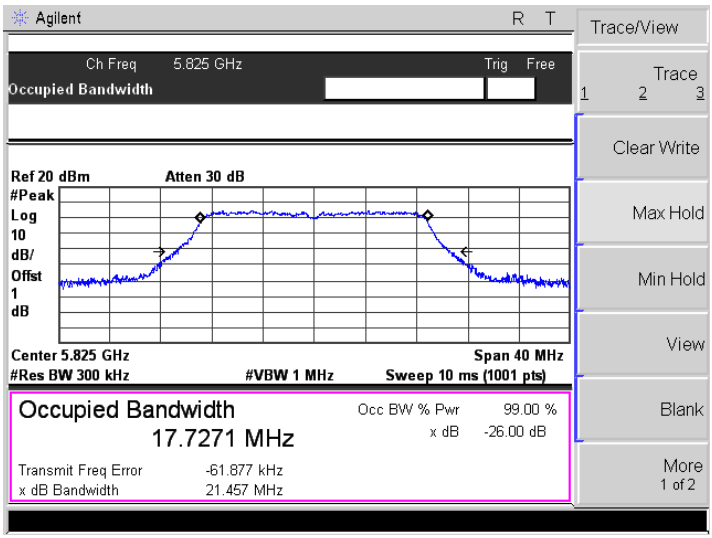
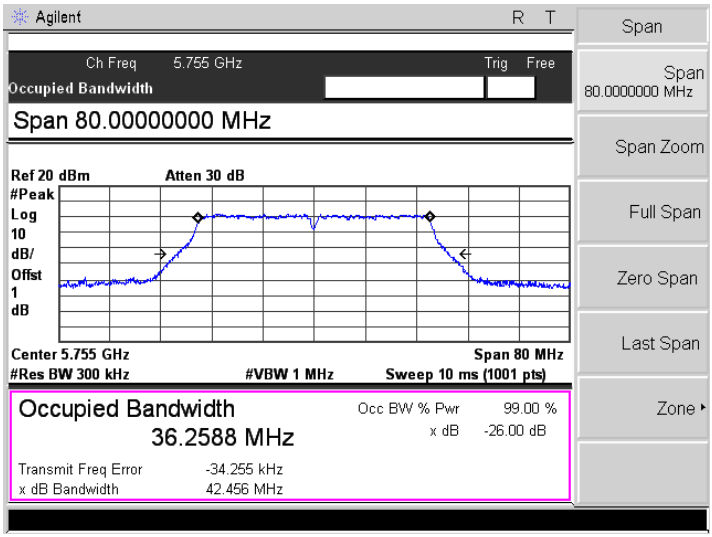
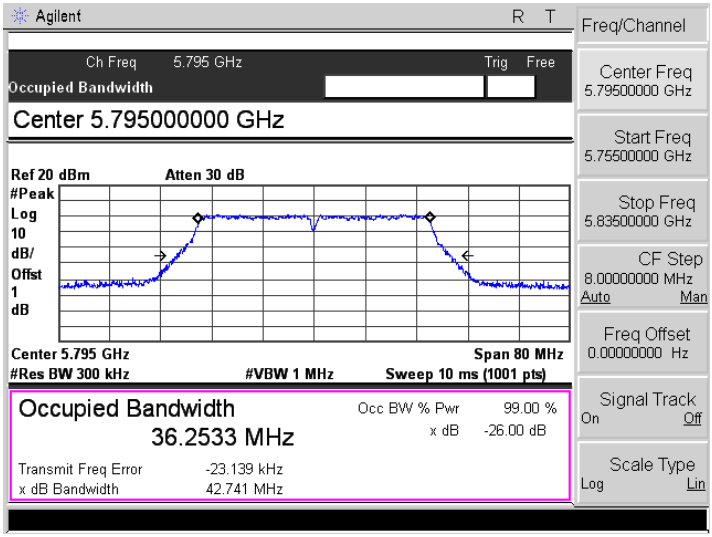
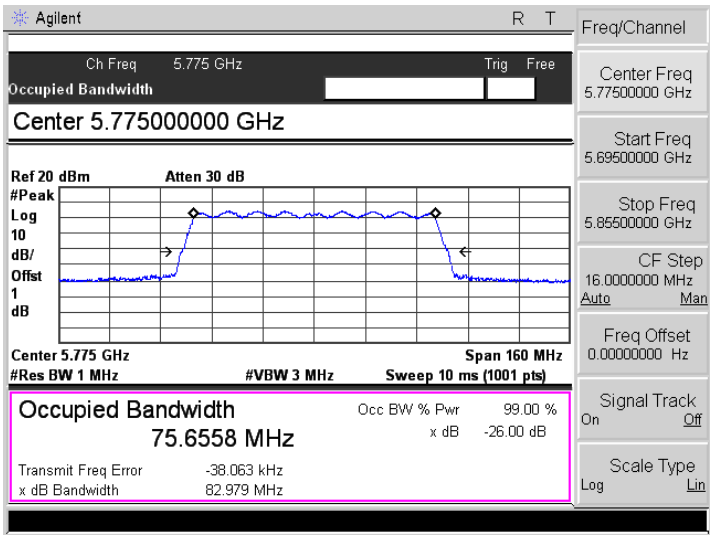
|---|---|
| 802.11n-HT20-Low |  |
| 802.11n-HT20-Middle |  |
| 802.11n-HT20-High |  |

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

**99 % Bandwidth**

| | |
|---|---|
| 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

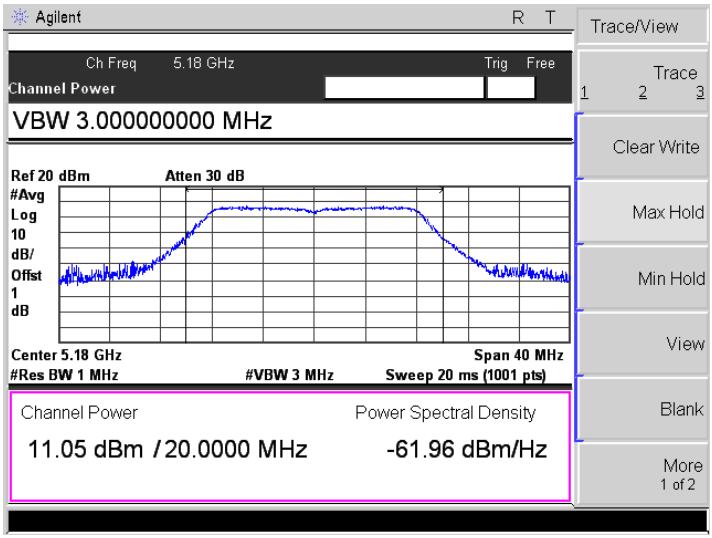
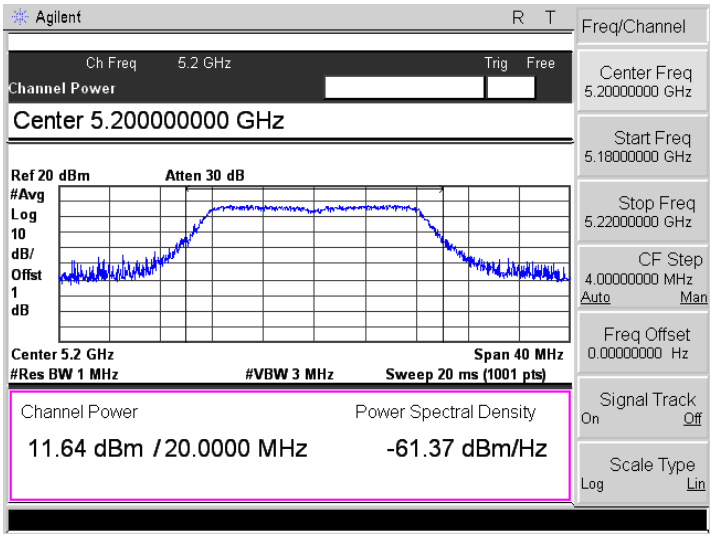
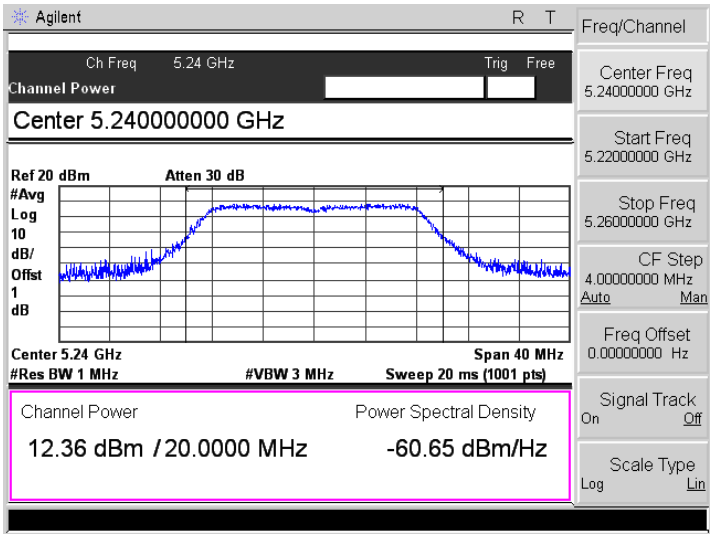
**Maximum Conducted Output Power**

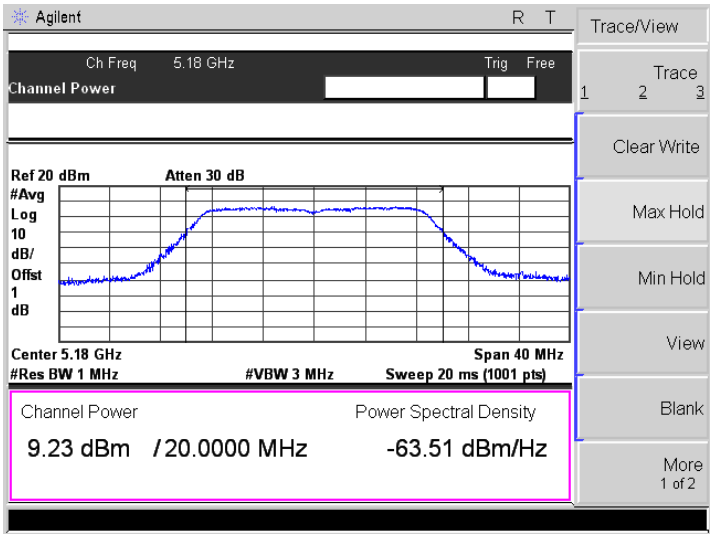
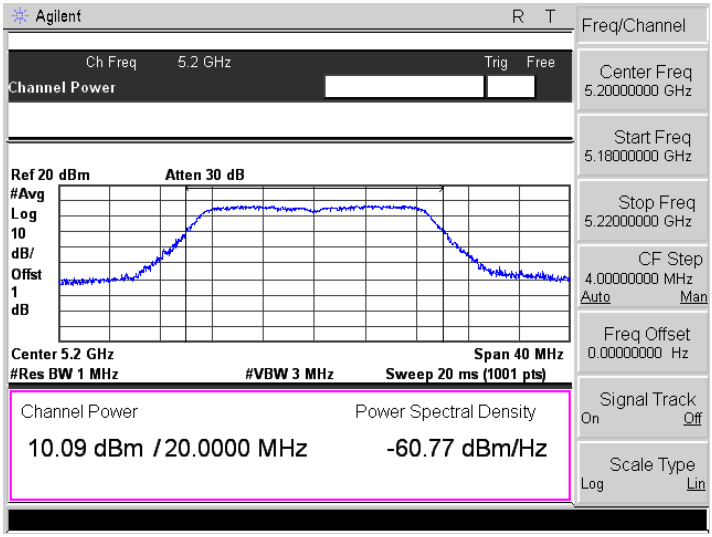
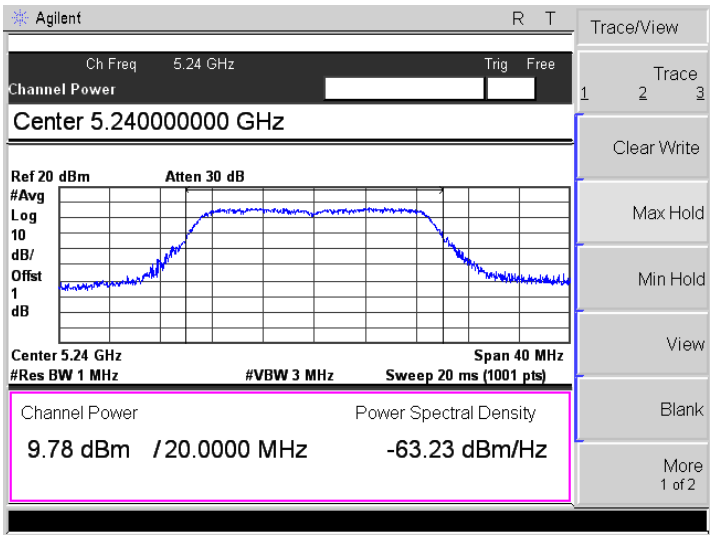
| **U-NII-1:5150-5250MHz** | | | | | |
|---|---|---|---|---|---|
| Test mode | Frequency MHz | Output Power dBm | | Total dBm | Limit dBm |
| | | ANT A | ANT B | | |
| 802.11a | 5180 | 11.05 | 11.03 | / | 23.98 |
| | 5200 | 11.64 | 11.81 | / | 23.98 |
| | 5240 | 12.36 | 12.68 | / | 23.98 |
| 802.11n-HT20 | 5180 | 9.23 | 10.36 | 12.84 | 23.98 |
| | 5200 | 10.09 | 9.83 | 12.97 | 23.98 |
| | 5240 | 9.78 | 11.40 | 13.68 | 23.98 |
| 802.11n-HT40 | 5190 | 9.87 | 9.04 | 12.49 | 23.98 |
| | 5230 | 10.91 | 10.43 | 13.69 | 23.98 |
| 802.11ac VH80 | 5210 | 9.33 | 8.73 | 12.05 | 23.98 |

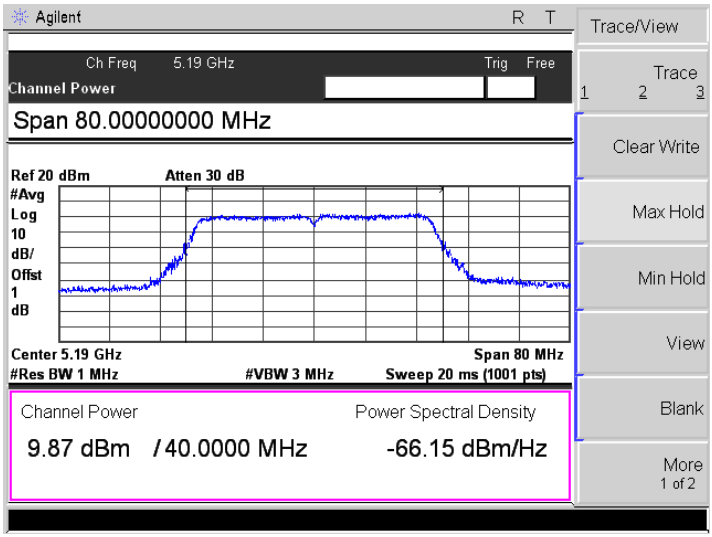
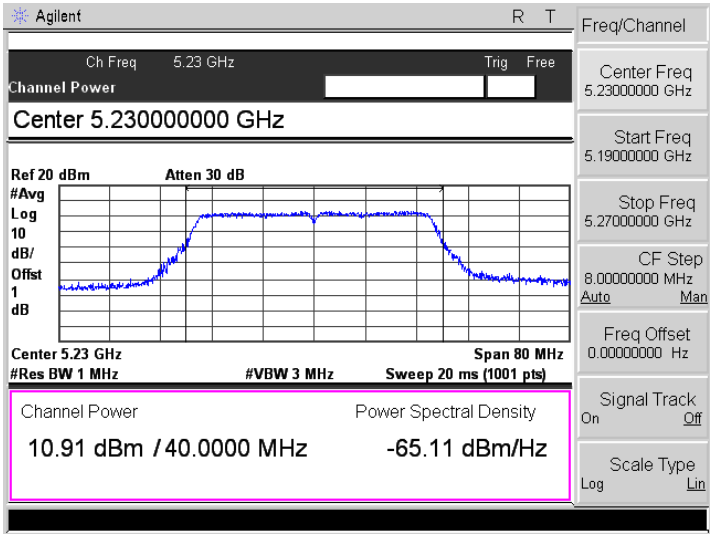
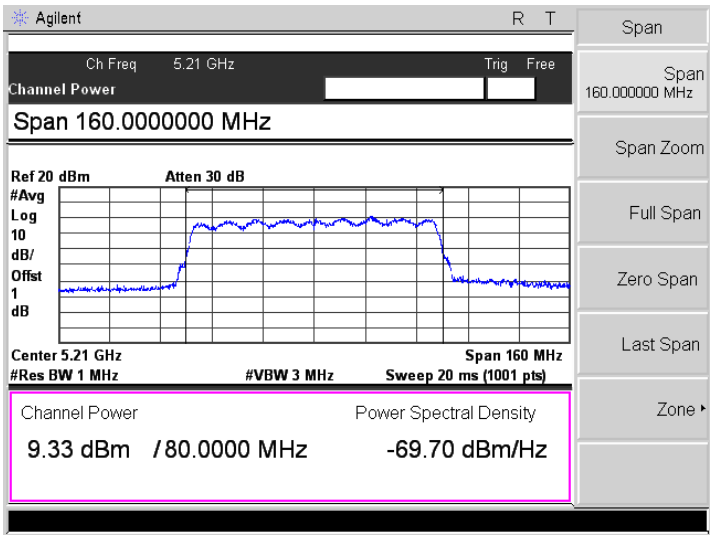
| **U-NII-3: 5725-5850MHz** | | | | | |
|---|---|---|---|---|---|
| Test mode | Frequency MHz | Output Power dBm | | Total dBm | Limit dBm |
| | | ANT A | ANT B | | |
| 802.11a | 5745 | 11.19 | 11.51 | / | 5745 |
| | 5785 | 11.86 | 11.18 | / | 5785 |
| | 5825 | 11.94 | 11.02 | / | 5825 |
| 802.11n-HT20 | 5745 | 10.04 | 10.58 | 13.33 | 5745 |
| | 5785 | 10.94 | 10.40 | 13.69 | 5785 |
| | 5825 | 10.33 | 9.68 | 13.03 | 5825 |
| 802.11n-HT40 | 5755 | 9.53 | 9.71 | 12.63 | 5755 |
| | 5795 | 9.32 | 9.30 | 12.32 | 5795 |
| 802.11ac VH80 | 5775 | 8.27 | 8.56 | 11.43 | 5775 |

**ANT A**

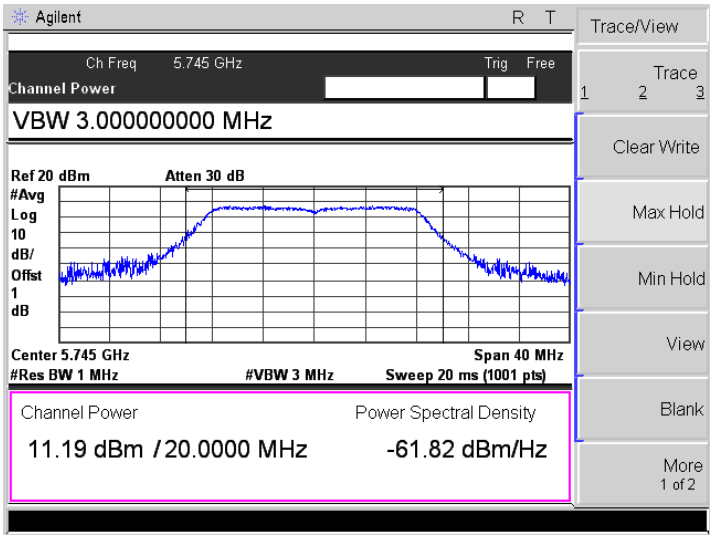
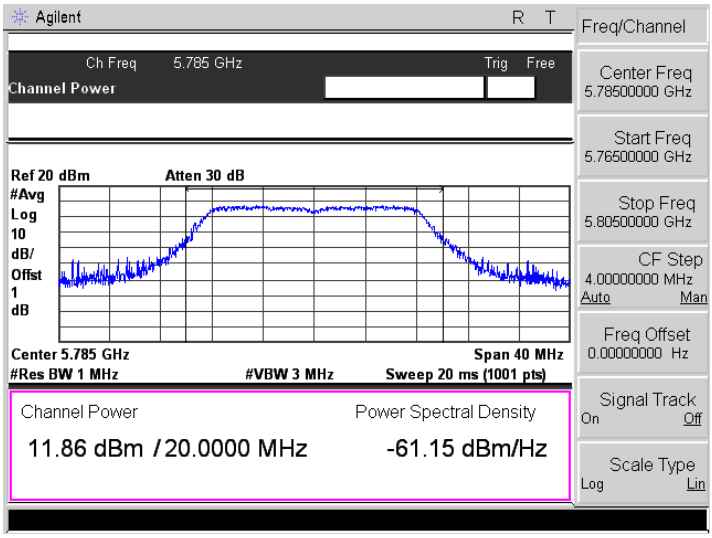
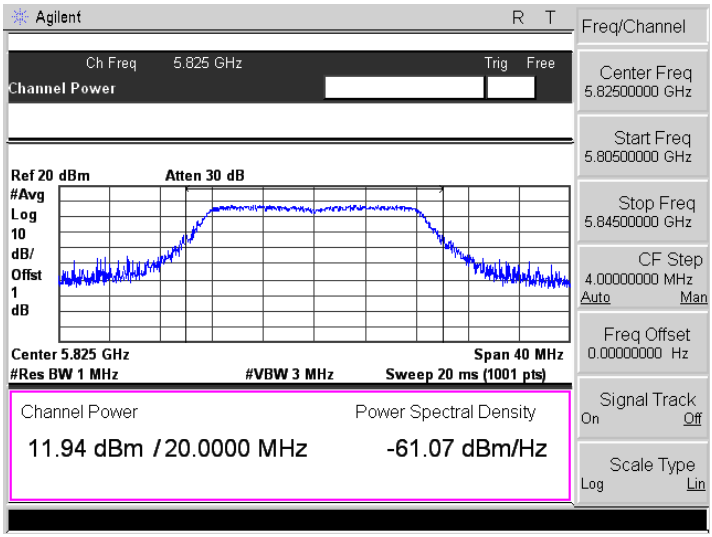
**5150-5250MHz**

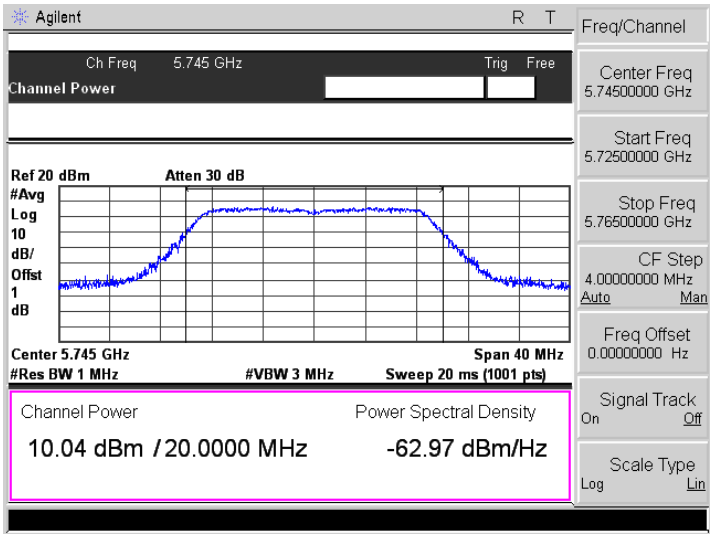
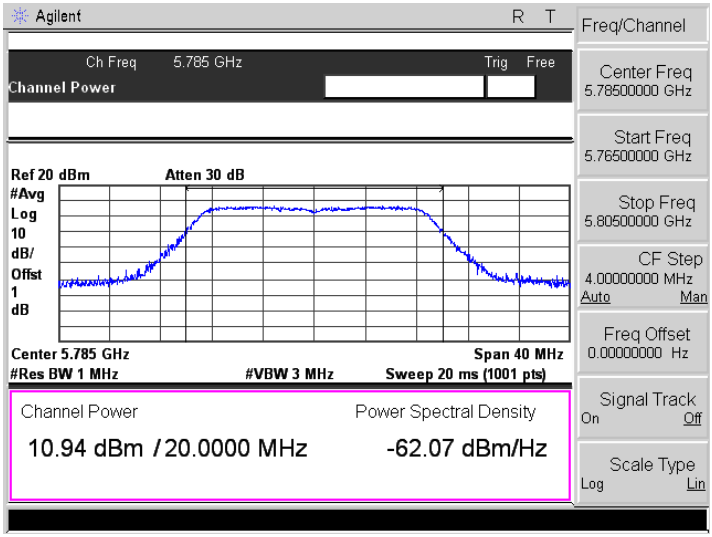
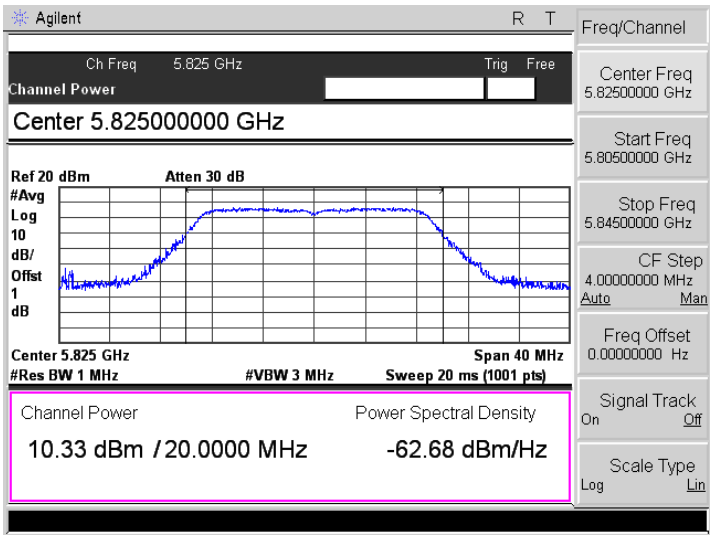
| | |
|---|---|
| 802.11a-Low |  |
| 802.11a-Middle |  |
| 802.11a-High |  |

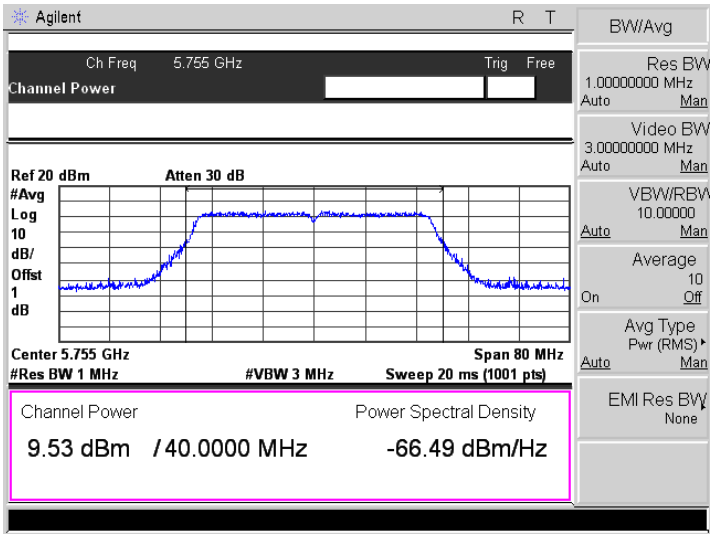
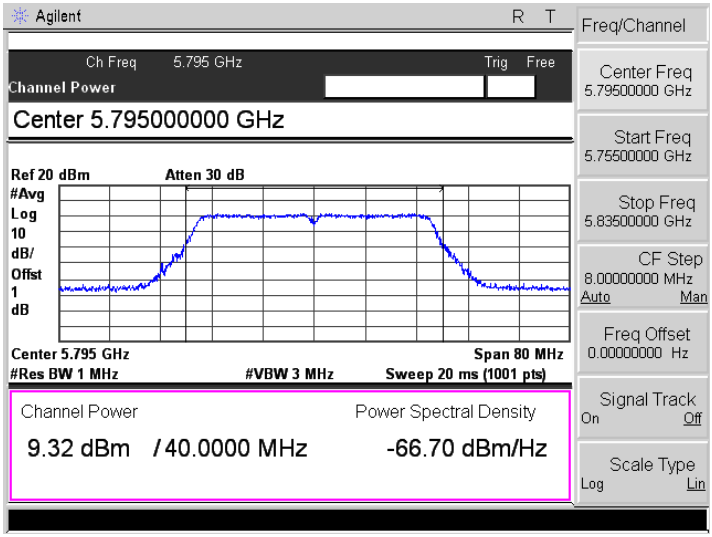
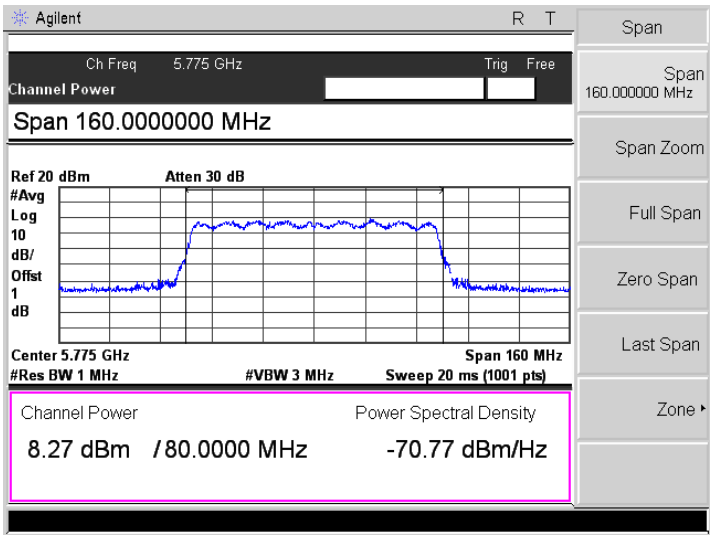
| | |
|---|---|
| 802.11n-HT20-Low |  |
| 802.11n-HT20-Middle |  |
| 802.11n-HT20-High |  |

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

**5725-5850MHz**

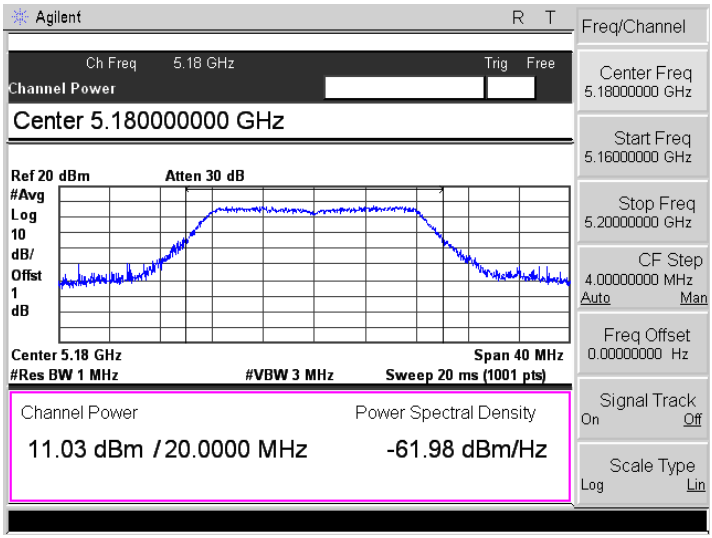
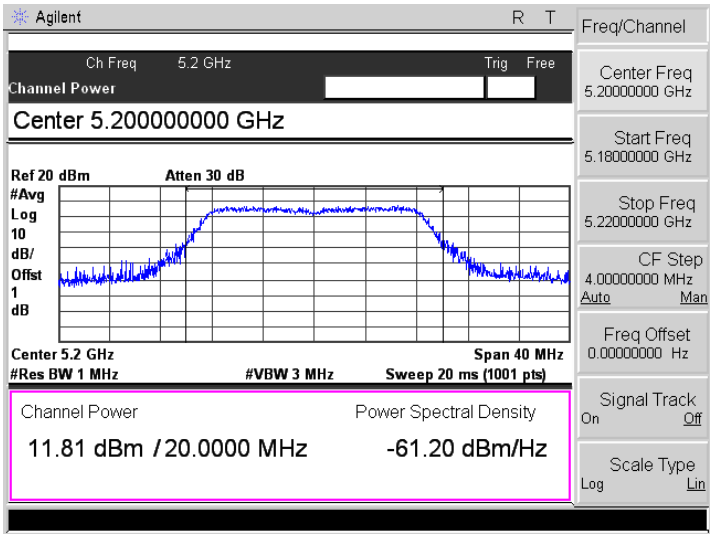
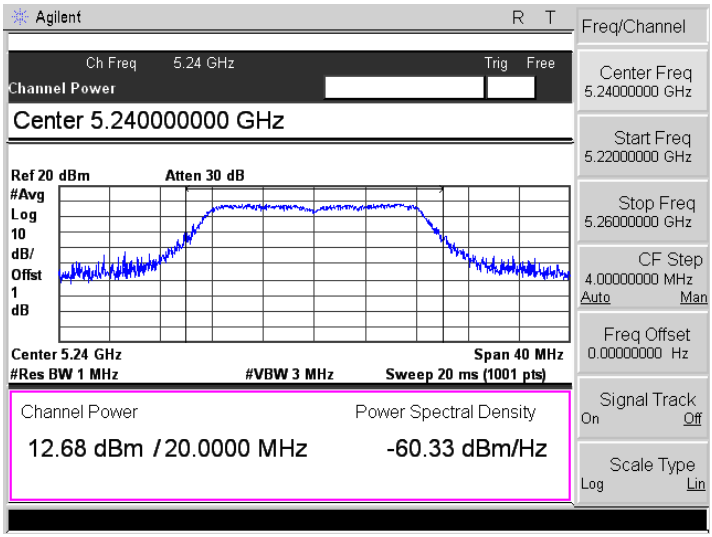
| | |
|---|---|
| 802.11a-Low |  |
| 802.11a-Middle |  |
| 802.11a-High |  |

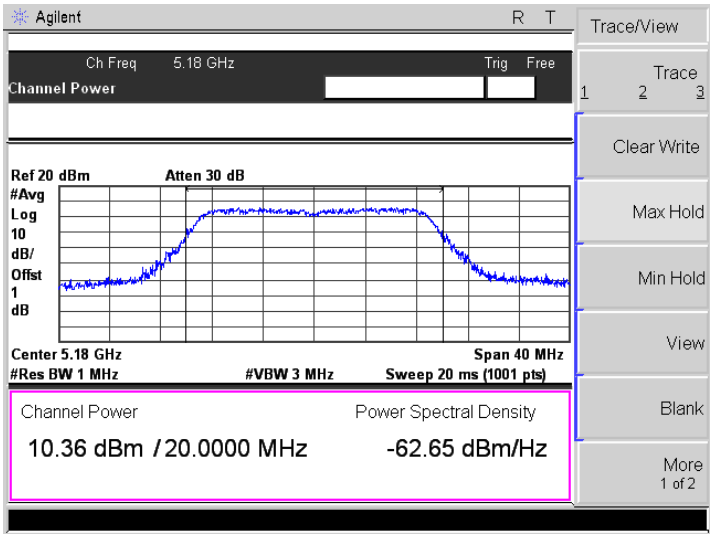
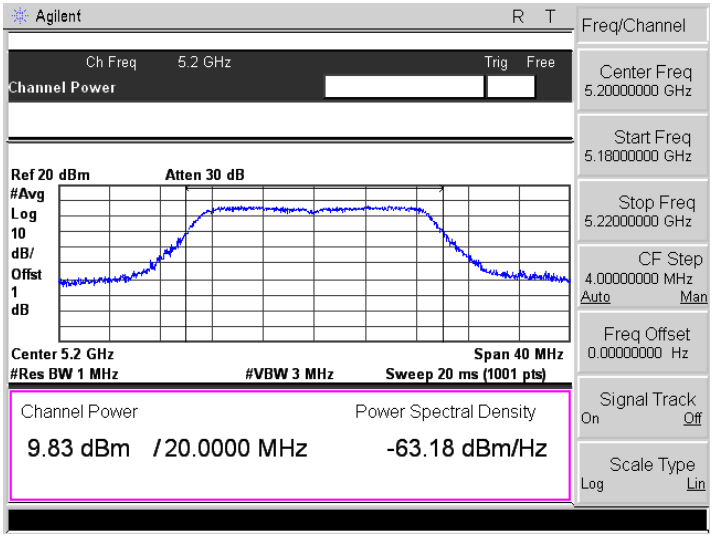
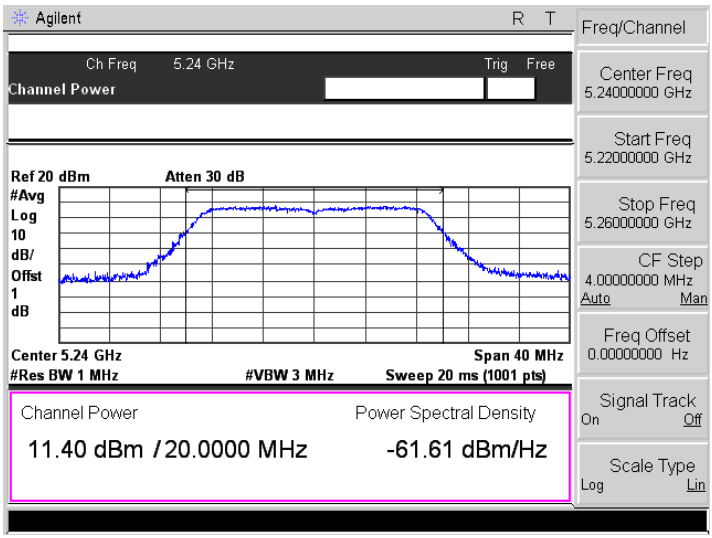
| | |
|---|---|
| 802.11n-HT20-Low |  |
| 802.11n-HT20-Middle |  |
| 802.11n-HT20-High |  |

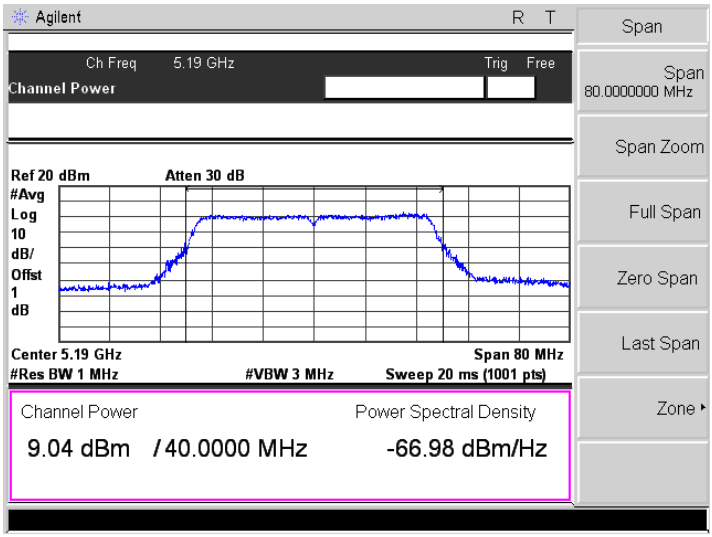
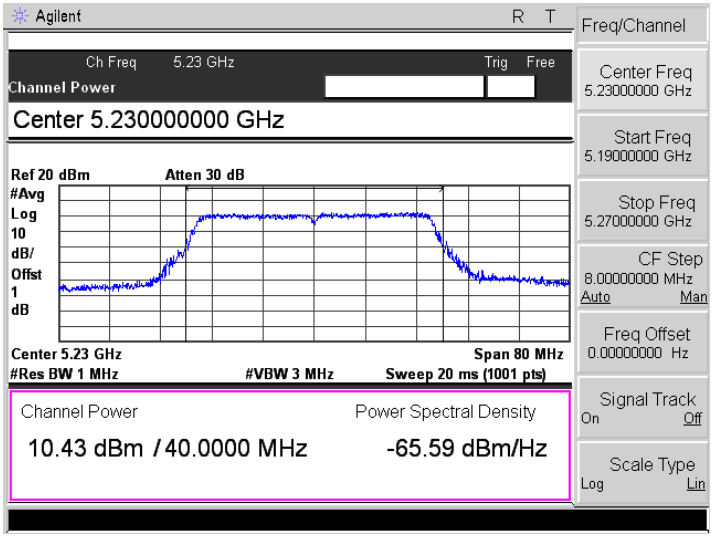
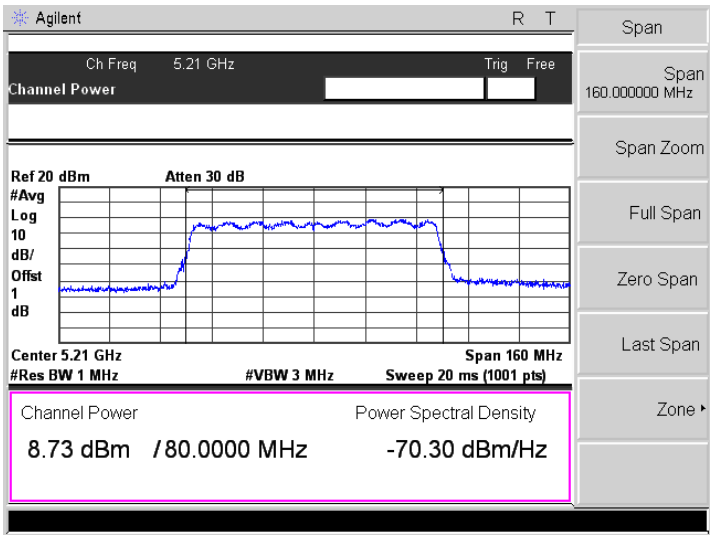
| | |
|---|---|
| 802.11n-HT40-Low |  |
| 802.11n-HT40-High |  |
| 802.11ac-HT80 |  |

**ANT B**

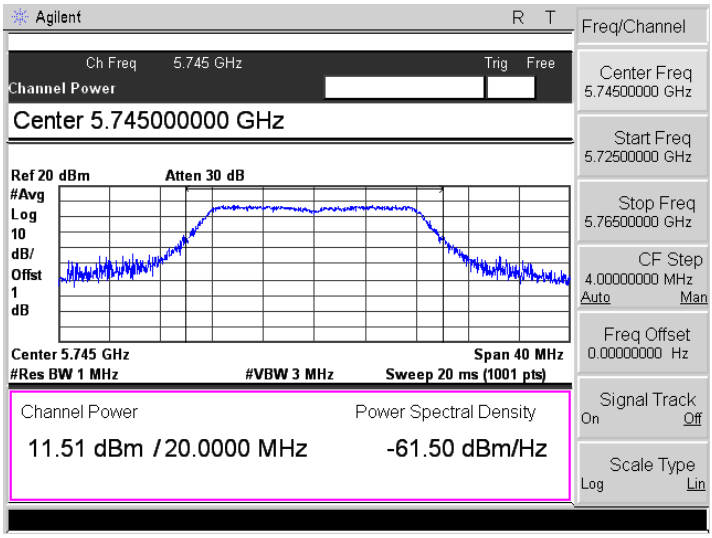
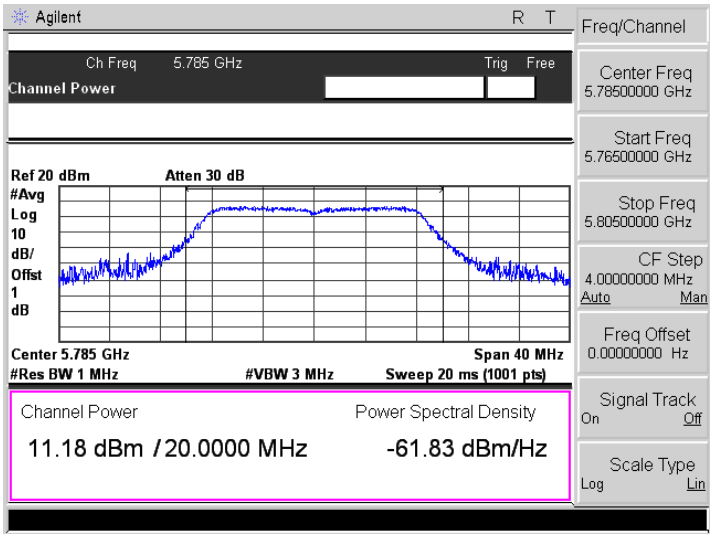
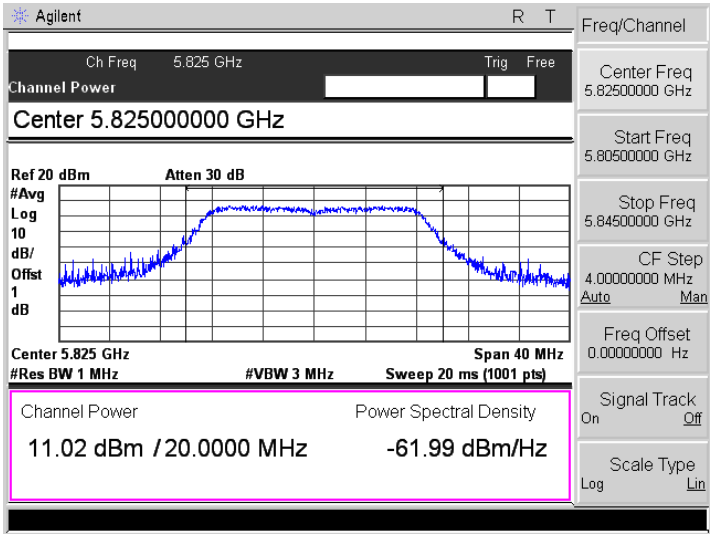
**5150-5250MHz**

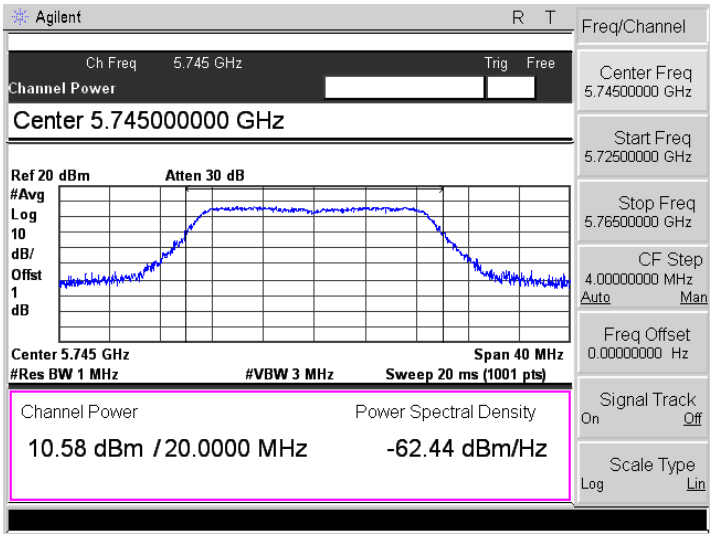
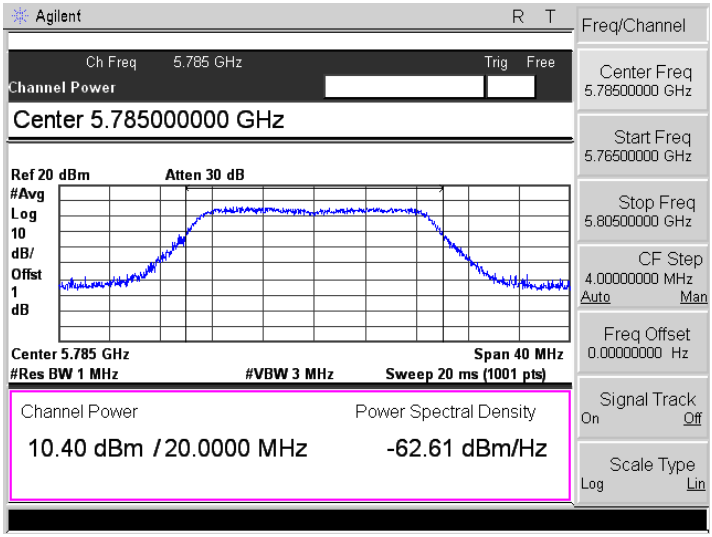
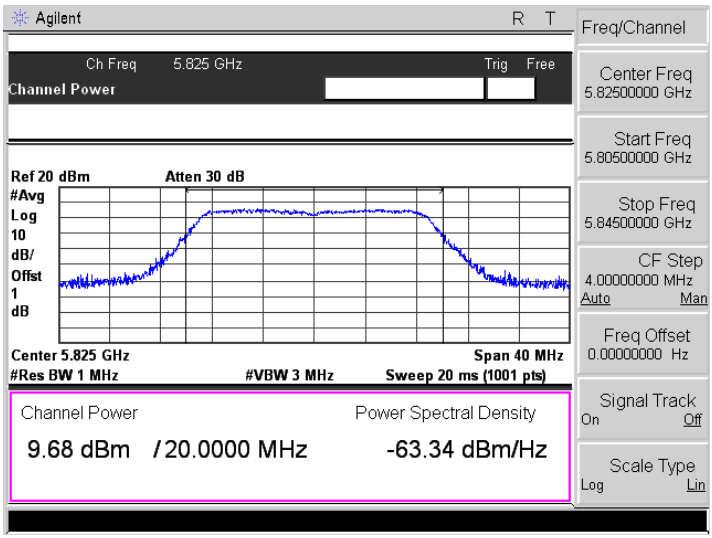
| | |
|---|---|
| 802.11a-Low |  |
| 802.11a-Middle |  |
| 802.11a-High |  |

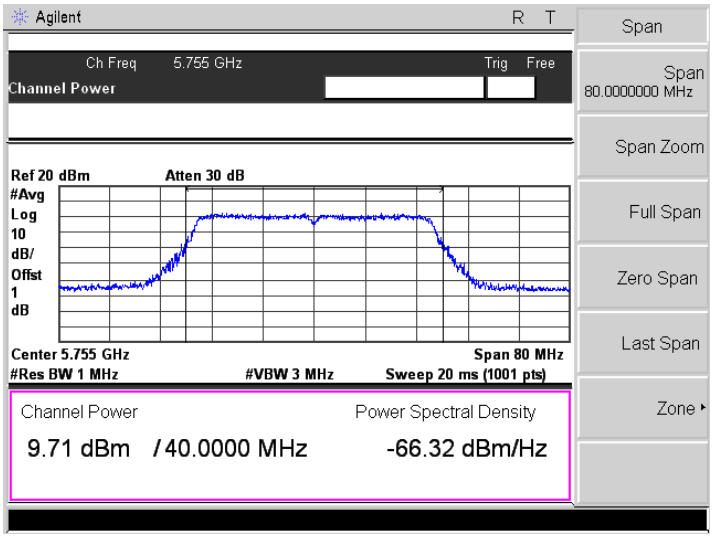
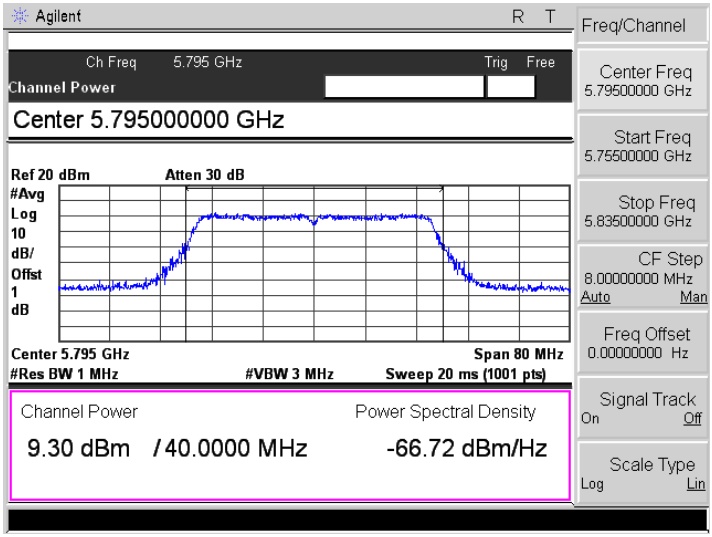
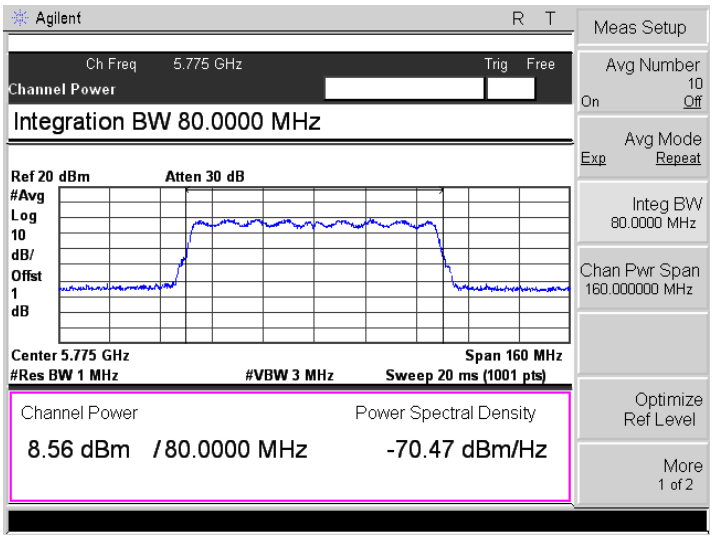
| | |
|---|---|
| 802.11n-HT20-Low |  |
| 802.11n-HT20-Middle |  |
| 802.11n-HT20-High |  |

| | |
|---|---|
| 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**

| U-NII-1:5150-5250MHz worst case at 802.11a middle channel | | | | |
|---|---|---|---|---|
| Voltage(%) | Power(VDC) | TEMP(℃) | Freq.Dev(Hz) | Deviation |
| 100% | 5.0 | -30 | 1593 | 0.3063 |
| 100% | | -20 | 1593 | 0.3063 |
| 100% | | -10 | 1581 | 0.3041 |
| 100% | | 0 | 1595 | 0.3067 |
| 100% | | +10 | 1580 | 0.3039 |
| 100% | | +20 | 1582 | 0.3042 |
| 100% | | +30 | 1593 | 0.3063 |
| 100% | | +40 | 1591 | 0.3059 |
| 100% | | +50 | 1589 | 0.3055 |
| Low Battery power | 5.50 | +20 | 1593 | 0.3063 |
| High Battery power | 4.50 | +20 | 1593 | 0.3063 |

| U-NII-1:5725-5850MHz worst case at 802.11a middle channel | | | | |
|---|---|---|---|---|
| Voltage(%) | Power(VDC) | TEMP(℃) | Freq.Dev(Hz) | Deviation |
| 100% | 5.0 | -30 | 1585 | 0.2745 |
| 100% | | -20 | 1597 | 0.2765 |
| 100% | | -10 | 1581 | 0.2737 |
| 100% | | 0 | 1588 | 0.2750 |
| 100% | | +10 | 1589 | 0.2751 |
| 100% | | +20 | 1585 | 0.2745 |
| 100% | | +30 | 1598 | 0.2767 |
| 100% | | +40 | 1588 | 0.2750 |
| 100% | | +50 | 1582 | 0.2739 |
| Low Battery power | 5.50 | +20 | 1585 | 0.2745 |
| High Battery power | 4.50 | +20 | 1597 | 0.2765 |

# APPENDIX PHOTOGRAPHS

**Please refer to "ANNEX"**

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