

RF Test Report

Applicant : Plasma Cloud Limited
Product Type : WiFi Access Point
Trade Name : Plasma Cloud
Model Number : PA300, PA300-E
Applicable Standard : FCC 47 CFR PART 15 SUBPART C
ANSI C63.10:2013
Receive Date : Apr. 12, 2019
Test Period : May 07 ~ Jun. 04, 2019
Issue Date : Jun. 11, 2019

Issue by

A Test Lab Techno Corp.
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Taiwan Accreditation Eoundation accreditation number: 1330
Test Firm MRA designation number: TW0010

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Revision History

| Rev. | Issue Date | Revisions | Revised By |
|------|---------------|---------------|-------------|
| 00 | Jun. 11, 2019 | Initial Issue | Tobey Cheng |
| | | | |
| | | | |
| | | | |

Verification of Compliance

Issued Date: Jun. 11, 2019

Applicant : Plasma Cloud Limited

Product Type : WiFi Access Point

Trade Name : Plasma Cloud

Model Number : PA300, PA300-E

FCC ID : 2ASXXPA300

EUT Rated Voltage : DC 12-24 V, 1 A (DC Power Adapter)
DC 24 V, 1 A (passive PoE injector)
DC 48-54 V, 0.5 A (PoE injector (802.3af/at))

Test Voltage : 120 Vac / 60 Hz

Applicable Standard : FCC 47 CFR PART 15 SUBPART C
ANSI C63.10:2013

Test Result : Complied

Performing Lab. : A Test Lab Techno Corp.
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Taiwan Accreditation Foundation accreditation number: 1330
<http://www.atl-lab.com.tw/e-index.htm>



A Test Lab Techno Corp. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by A Test Lab Techno Corp. based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Approved By
(Manager)

: Fly Lu
(Fly Lu)

Reviewed By

(Testing Engineer)

: Eric Ou Yang
(Eric Ou Yang)



TABLE OF CONTENTS

| | | |
|----------|---|-----------|
| 1 | General Information | 5 |
| 1.1. | Summary of Test Result..... | 5 |
| 1.2. | Measurement Uncertainty..... | 6 |
| 2 | EUT Description | 7 |
| 3 | Test Methodology | 9 |
| 3.1. | Mode of Operation..... | 9 |
| 3.2. | EUT Test Step | 15 |
| 3.3. | Configuration of Test System Details | 16 |
| 3.4. | Test Instruments | 19 |
| 3.5. | Test Site Environment..... | 20 |
| 4 | Measurement Procedure | 21 |
| 4.1. | AC Power Line Conducted Emission Measurement..... | 21 |
| 4.2. | Radiated Emission Measurement..... | 23 |
| 4.3. | Maximum Conducted Output Power Measurement..... | 27 |
| 4.4. | 6 dB RF Bandwidth Measurement | 28 |
| 4.5. | Maximum Power Density Measurement | 29 |
| 4.6. | Out of Band Conducted Emissions Measurement..... | 31 |
| 4.7. | Antenna Measurement | 32 |
| 5 | Test Results..... | 34 |
| | Annex A. Conducted Emission | 34 |
| | Annex B. Conducted Test Results | 38 |
| | Annex C. Radiated Emission Measurement | 122 |



1 General Information

1.1. Summary of Test Result

| Standard | Item | Result | Remark |
|--------------|---|--------|--------|
| FCC | | | |
| 15.207 | AC Power Conducted Emission | PASS | ---- |
| 15.247(d) | Transmitter Radiated Emissions | PASS | ---- |
| 15.247(b)(3) | Max. Output Power | PASS | ---- |
| 15.247(a)(2) | 6 dB RF Bandwidth | PASS | ---- |
| 15.247(e) | Maximum Power Spectral Density | PASS | ---- |
| 15.247(d) | Out of Band Conducted Spurious Emission | PASS | ---- |
| 15.203 | Antenna Requirement | PASS | ---- |

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

| Standard | Description |
|---|--|
| CFR47, Part 15, Subpart C | Intentional Radiators |
| ANSI C63. 10: 2013 | American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices |
| KDB 558074 D01 15.247 Meas Guidance v05r02 | GUIDANCE FOR COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEM, FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM, AND HYBRID SYSTEM DEVICES OPERATING UNDER SECTION 15.247 OF THE FCC RULES |



1.2. Measurement Uncertainty

| Test Item | Frequency Range | Uncertainty (dB) |
|------------------------|-----------------------|------------------|
| Conducted Emission | 9 kHz ~ 150 kHz | 2.7 |
| | 150 kHz ~ 30 MHz | 2.7 |
| Radiated Emission | 9 kHz ~ 30 MHz | 1.7 |
| | 30 MHz ~ 1000 MHz | 5.7 |
| | 1000 MHz ~ 18000 MHz | 5.5 |
| | 18000 MHz ~ 26500 MHz | 4.8 |
| | 26500 MHz ~ 40000 MHz | 4.8 |
| Conducted Output Power | +0.27 dB / -0.28 dB | |
| RF Bandwidth | 4.96 % | |
| Power Spectral Density | +0.71 dB / -0.77 dB | |

2 EUT Description

| | | | | |
|-----------------------------|---|--------------|-------------------|------------------------------|
| Applicant | Plasma Cloud Limited 5/F, Yat Chau Building 262 Des Voeux Road Central Hong Kong | | | |
| Manufacturer | Emplus Technologies, Inc. Bldg. B, 10F., No.209, Sec. 1, Nangang Rd., Nangang Dist., Taipei City 11568, Taiwan | | | |
| Product Type | WiFi Access Point | | | |
| Trade Name | Plasma Cloud | | | |
| Model Number | PA300, PA300-E | | | |
| Model Different Description | PA300: built-in antenna PA300-E: External antenna | | | |
| FCC ID | 2ASXXPA300 | | | |
| Operate Freq. Band | Frequency Range (MHz) | Modulation | Channel Bandwidth | Data Rate 400 / 800 GI (ns) |
| IEEE 802.11b | 2412 ~ 2462 | DSSS | 20 MHz | Up to 11 Mbps |
| IEEE 802.11g | 2412 ~ 2462 | OFDM | 20 MHz | Up to 54 Mbps |
| IEEE 802.11n 2.4 GHz 20 MHz | 2412 ~ 2462 | OFDM | 20 MHz | Up to 173.4 Mbps |
| IEEE 802.11n 2.4 GHz 40 MHz | 2422 ~ 2452 | OFDM | 40 MHz | Up to 400 Mbps |
| Antenna information | Model: PA300: built-in antenna | | | |
| | ANT | Manufacturer | Model Number | Type |
| | ANT-0 | SENAO | 5718A0436300 | PIFA Antenna |
| | ANT-1 | SENAO | 5718A0437300 | PIFA Antenna |
| | Model: PA300-E: External antenna | | | |
| | ANT | Manufacturer | Model Number | Type |
| | ANT-0 | Master Wave | 98143MRSX000 | Dipole Antenna (Reverse SMA) |
| | ANT-1 | Master Wave | 98143MRSX000 | Dipole Antenna (Reverse SMA) |
| Antenna Delivery | See section 3.1 | | | |
| Operate Temp. Range | 0 ~ +40 °C | | | |



| Model: PA300: built-in antenna | |
|--------------------------------|--------------------------|
| Frequency Band | Max. RF Output Power (W) |
| IEEE 802.11b | 0.364 |
| IEEE 802.11g | 0.378 |
| IEEE 802.11n 2.4 GHz 20 MHz | 0.365 |
| IEEE 802.11n 2.4 GHz 40 MHz | 0.345 |

| Model: PA300-E: External antenna | |
|----------------------------------|--------------------------|
| Frequency Band | Max. RF Output Power (W) |
| IEEE 802.11b | 0.398 |
| IEEE 802.11g | 0.055 |
| IEEE 802.11n 2.4 GHz 20 MHz | 0.055 |
| IEEE 802.11n 2.4 GHz 40 MHz | 0.399 |



3 Test Methodology

3.1. Mode of Operation

Decision of Test ATL has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

| Test Mode |
|--|
| Mode 1: Transmit mode |
| Mode 2: IEEE 802.11b Continuous TX mode |
| Mode 3: IEEE 802.11g Continuous TX mode |
| Mode 4: IEEE 802.11n 2.4 GHz 20 MHz Continuous TX mode |
| Mode 5: IEEE 802.11n 2.4 GHz 40 MHz Continuous TX mode |

Software used to control the EUT for staying in continuous transmitting mode was programmed.

After verification, all tests were carried out with the worst case test modes.

| Model: PA300: built-in antenna | | | |
|--------------------------------|------------------|------------------|--------------|
| Test Mode | ANT-0 | ANT-1 | ANT-0+1 |
| Mode 2 | V | V | V |
| Mode 3 | V | V | V |
| Mode 4 | V | V | V |
| Mode 5 | V | V | V |
| Test Mode | Antenna Delivery | Data Rate (Mbps) | Test Channel |
| Mode 2 | 2TX(CDD) | 1 | 1, 6, 11 |
| Mode 3 | 2TX(CDD) | 6 | 1, 6, 11 |
| Mode 4 | 2TX(CDD) | 13 | 1, 6, 11 |
| Mode 5 | 2TX(CDD) | 27 | 3, 6, 9 |

| Model: PA300-E: External antenna | | | |
|----------------------------------|------------------|------------------|--------------|
| Test Mode | ANT-0 | ANT-1 | ANT-0+1 |
| Mode 2 | V | V | V |
| Mode 3 | V | V | V |
| Mode 4 | V | V | V |
| Mode 5 | V | V | V |
| Test Mode | Antenna Delivery | Data Rate (Mbps) | Test Channel |
| Mode 2 | 2TX(CDD) | 1 | 1, 6, 11 |
| Mode 3 | 2TX(CDD) | 6 | 1, 6, 11 |
| Mode 4 | 2TX(CDD) | 13 | 1, 6, 11 |
| Mode 5 | 2TX(CDD) | 27 | 3, 6, 9 |



Duty cycle

| Model: PA300: built-in antenna | | | | | | |
|--------------------------------|-----------------|--------------|------------------|------------|------------------|-----------------------|
| Test Mode | Frequency (MHz) | on time (ms) | on+off time (ms) | Duty cycle | Duty Factor (dB) | 1/T Minimum VBW (kHz) |
| Mode 2 | 2412.0 | 10.000 | 10.000 | 1.000 | 0.000 | 0.010 |
| Mode 3 | 2412.0 | 2.040 | 2.070 | 0.986 | 0.063 | 0.010 |
| Mode 4 | 2412.0 | 0.980 | 1.020 | 0.961 | 0.174 | 1.020 |
| Mode 5 | 2422.0 | 0.494 | 0.526 | 0.939 | 0.273 | 2.024 |

| Model: PA300-E: External antenna | | | | | | |
|----------------------------------|-----------------|--------------|------------------|------------|------------------|-----------------------|
| Test Mode | Frequency (MHz) | on time (ms) | on+off time (ms) | Duty cycle | Duty Factor (dB) | 1/T Minimum VBW (kHz) |
| Mode 2 | 2412.0 | 10.000 | 10.000 | 1.000 | 0.000 | 0.010 |
| Mode 3 | 2412.0 | 2.040 | 2.070 | 0.986 | 0.063 | 0.010 |
| Mode 4 | 2412.0 | 0.980 | 1.020 | 0.961 | 0.174 | 1.020 |
| Mode 5 | 2422.0 | 0.494 | 0.526 | 0.939 | 0.273 | 2.024 |

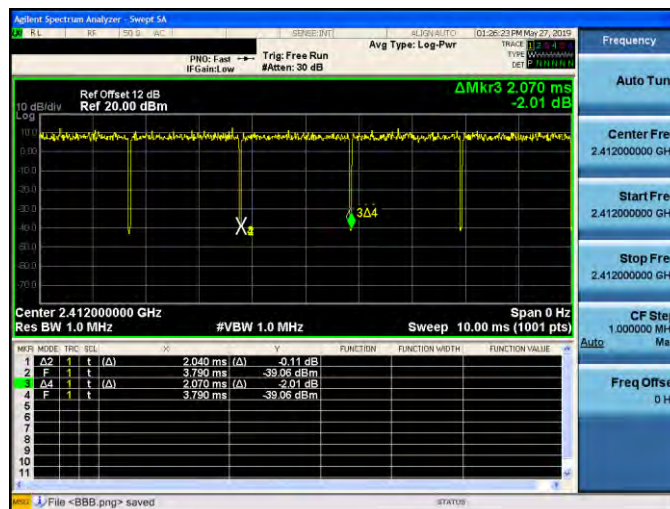
Duty Cycle Graphs

Model: PA300: built-in antenna

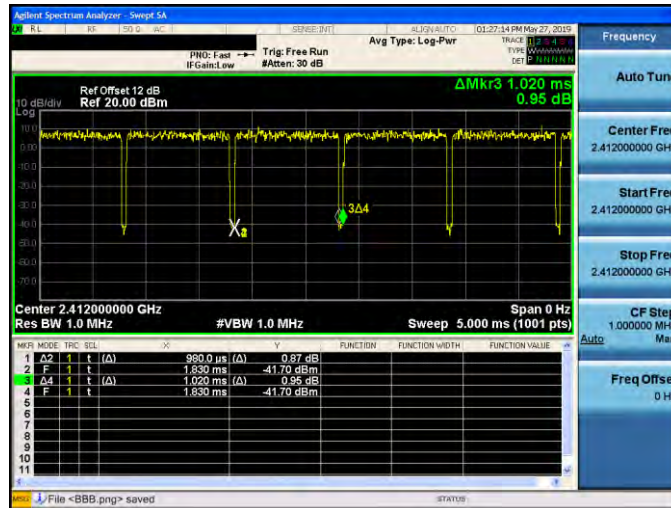
Mode 2: IEEE 802.11b Continuous TX mode



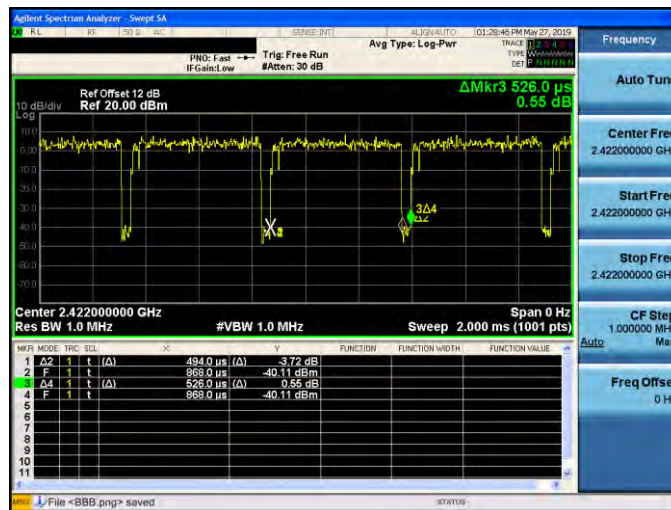
Mode 3: IEEE 802.11g Continuous TX mode



Mode 4: IEEE 802.11n 2.4 GHz 20 MHz Continuous TX mode



Mode 5: IEEE 802.11n 2.4 GHz 40 MHz Continuous TX mode

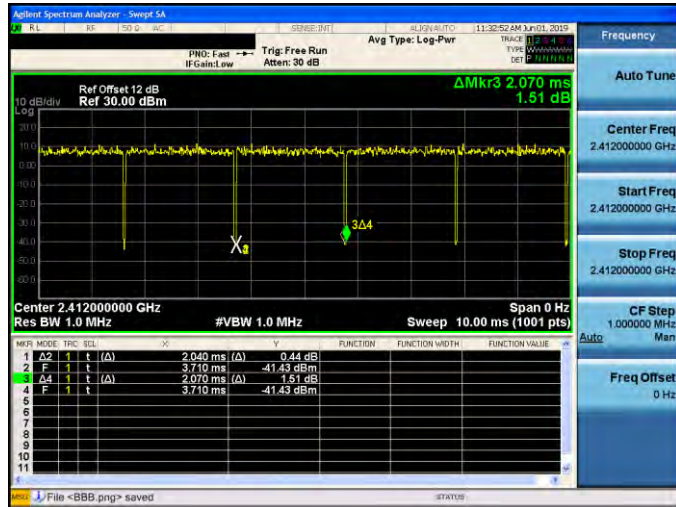


Model: PA300-E: External antenna

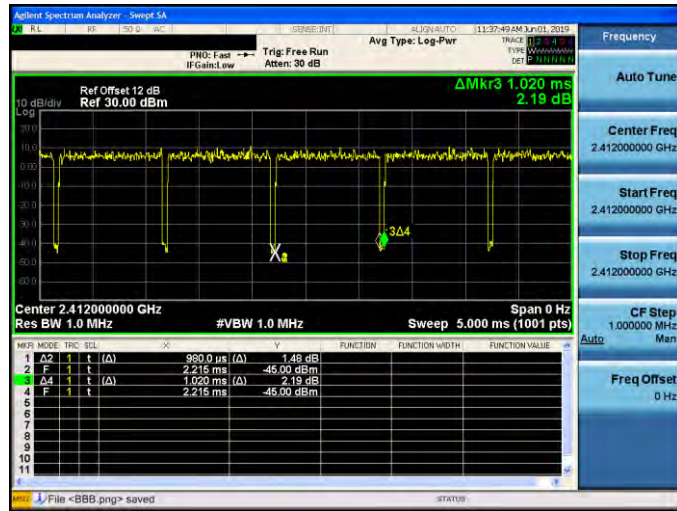
Mode 2: IEEE 802.11b Continuous TX mode



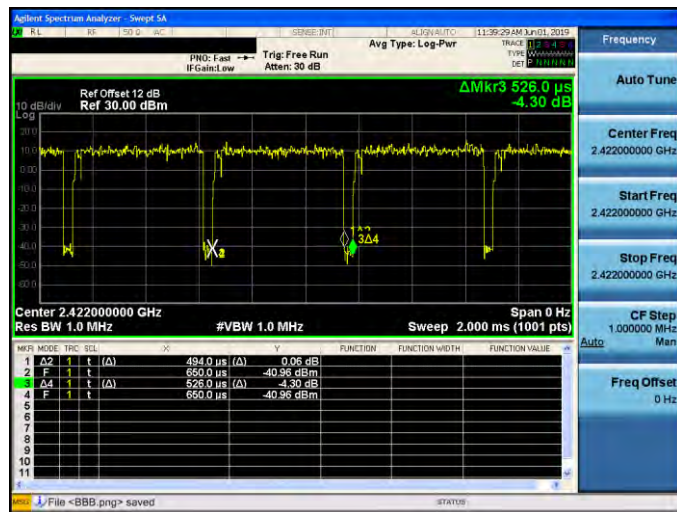
Mode 3: IEEE 802.11g Continuous TX mode



Mode 4: IEEE 802.11n 2.4 GHz 20 MHz Continuous TX mode



Mode 5: IEEE 802.11n 2.4 GHz 40 MHz Continuous TX mode





3.2. EUT Test Step

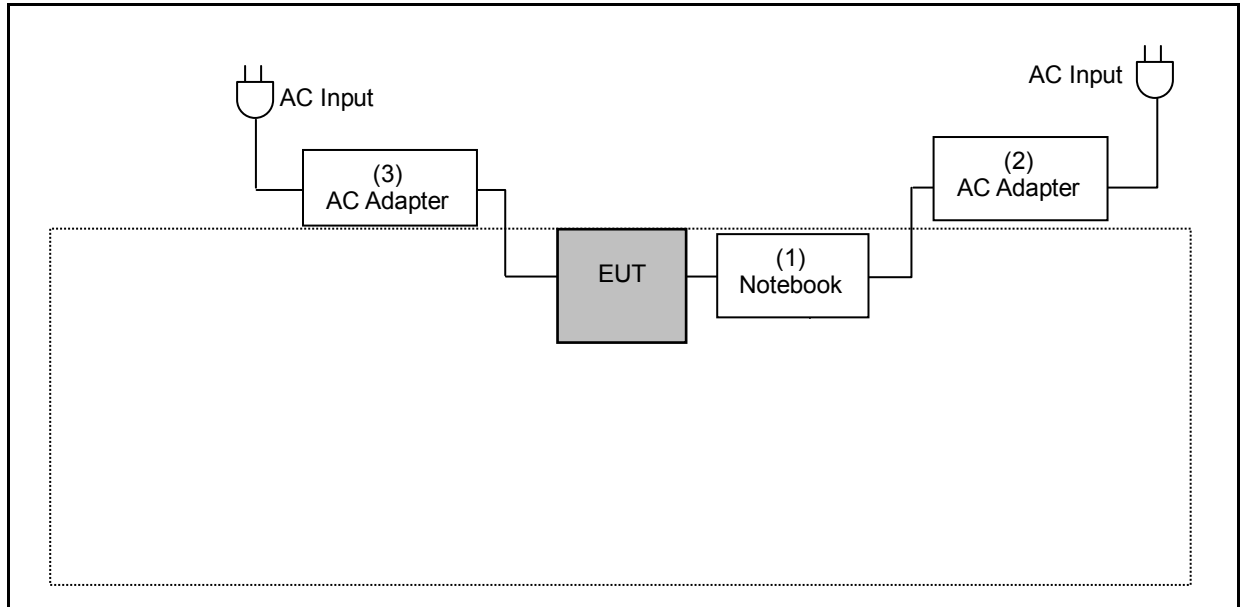
| | |
|----|--|
| 1. | Setup the EUT shown on "Configuration of Test System Details". |
| 2. | Turn on the power of all equipment. |
| 3. | Turn Wi-Fi function link to Notebook. |
| 4. | EUT run test program. |

| Measurement Software | | | |
|----------------------|--------------------|----------|---------|
| No. | Description | Software | Version |
| 1 | Conducted Emission | EZ EMC | 1.1.4.3 |
| 2 | Radiated Emission | EZ EMC | 1.1.4.4 |

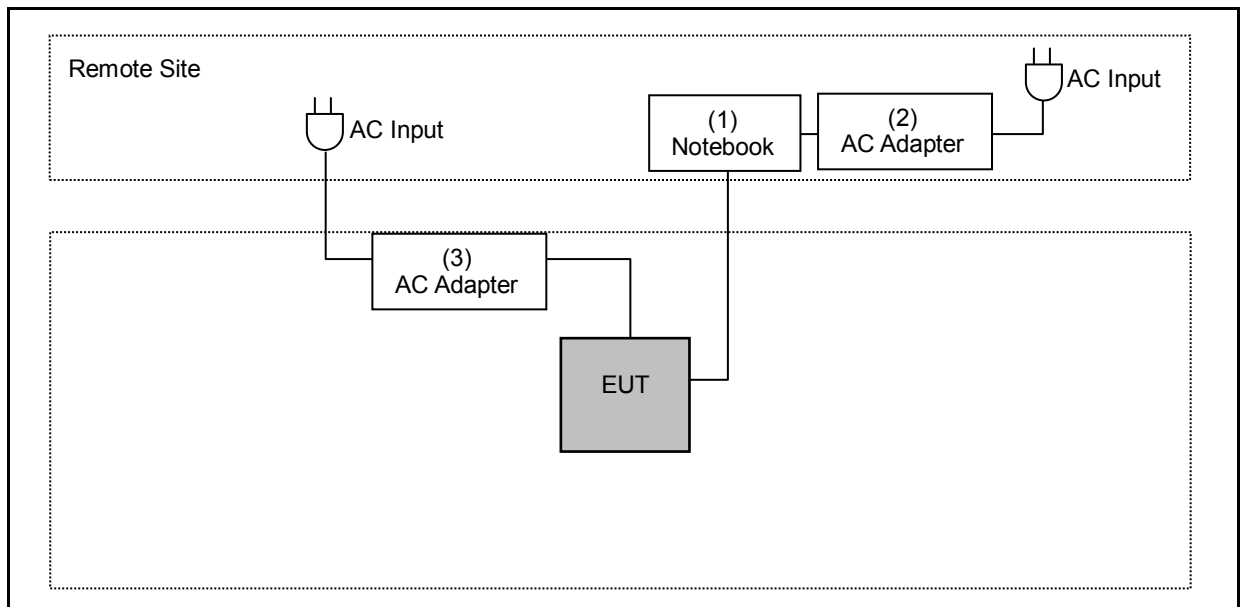
3.3. Configuration of Test System Details

Model: PA300: built-in antenna

Conducted Emissions

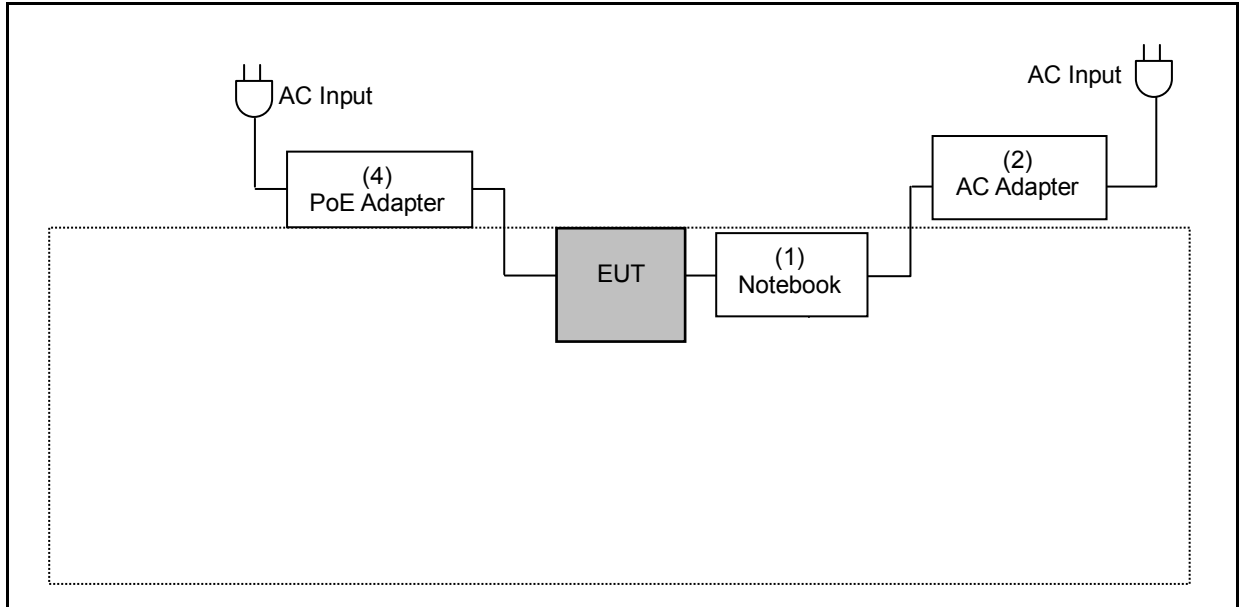


Radiated Emissions

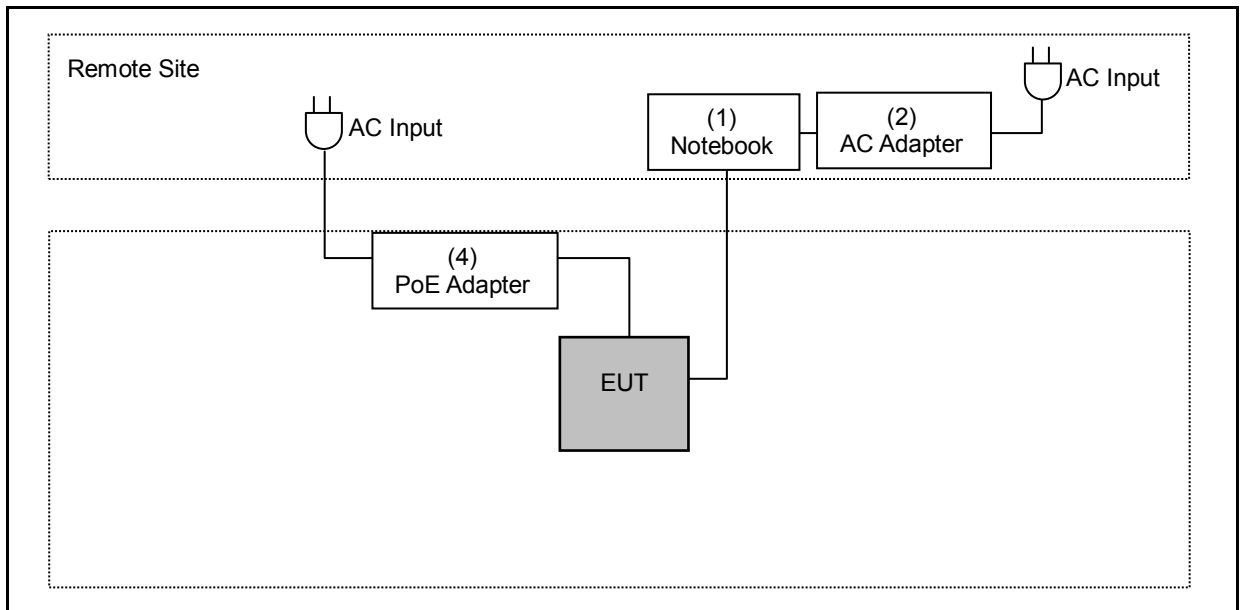


Model: PA300-E: External antenna

Conducted Emissions



Radiated Emissions





| Devices Description | | | | | |
|---------------------|-------------|--------------------------------|----------------------|-----------------|---------------------|
| Product | | Manufacturer | Model Number | Serial Number | Power Cord |
| (1) | Notebook | ASUS | P2430U | GANXCV04H86940A | --- |
| (2) | AC Adapter | ASUS | ADP-65GD B | --- | Non-Shielded, 0.8 m |
| (3) | AC Adapter | Powertron Electronics Corp. | PA1024 -120HUB200 | --- | --- |
| (4) | PoE Adapter | EnGenius | EPA2406GR | 177214704 | Non-Shielded, 1.0 m |



3.4. Test Instruments

For Conducted Emission

Test Period: Jun. 04, 2019

| Equipment | Manufacturer | Model Number | Serial Number | Cal. Date | Cal. Period |
|---------------|--------------|----------------|---------------|------------|-------------|
| Test Receiver | R&S | ESCI | 100367 | 05/23/2019 | 1 year |
| LISN | R&S | ENV216 | 101040 | 04/03/2019 | 1 year |
| LISN | R&S | ENV216 | 101041 | 03/28/2019 | 1 year |
| RF Cable | Woken | 00100D1380194M | TE-02-03 | 05/23/2019 | 1 year |

For Radiated Emissions

Test Period: May 07 ~ May 28, 2019

| Equipment | Manufacturer | Model Number | Serial Number | Cal. Date | Cal. Period |
|--------------------------|-----------------------------|--------------|---------------|------------|-------------|
| EXA Signal Analyzer | Keysight | N9010A | MY52221312 | 01/14/2019 | 1 year |
| Amplifier | Agilent | 8449B | 3008A02237 | 10/16/2018 | 1 year |
| Amplifier | Agilent | 8447D | 2944A11119 | 01/14/2019 | 1 year |
| Trilog Broadband Antenna | Schwarzbeck Mess-Elektronik | VULB9168 | 416 | 10/23/2018 | 1 year |
| Horn Antenna (1~18 GHz) | SCHWARZBECK MESS-ELEKTRONIK | BBHA9120D | 9120D-550 | 08/23/2018 | 1 year |
| Horn Antenna (18~40 GHz) | SCHWARZBECK MESS-ELEKTRONIK | BBHA9170 | 9170-320 | 08/07/2018 | 1 year |

For Conducted

Test Period: May 27 ~ Jun. 01, 2019

| Equipment | Manufacturer | Model Number | Serial Number | Cal. Date | Cal. Period |
|------------------------------------|--------------|--------------|---------------|------------|-------------|
| Spectrum Analyzer (20 Hz~26.5 GHz) | Agilent | N9020A | US47520902 | 09/25/2018 | 1 year |
| Power Sensor | Anritsu | MA2411B | 1126022 | 08/29/2018 | 1 year |
| Power Meter | Anritsu | ML2495A | 1135009 | 08/29/2018 | 1 year |

Note: N.C.R. = No Calibration Request.



3.5. Test Site Environment

| Items | Required (IEC 60068-1) | Actual |
|----------------------------|------------------------|--------|
| Temperature (°C) | 15-35 | 26 |
| Humidity (%RH) | 25-75 | 60 |
| Barometric pressure (mbar) | 860-1060 | 990 |

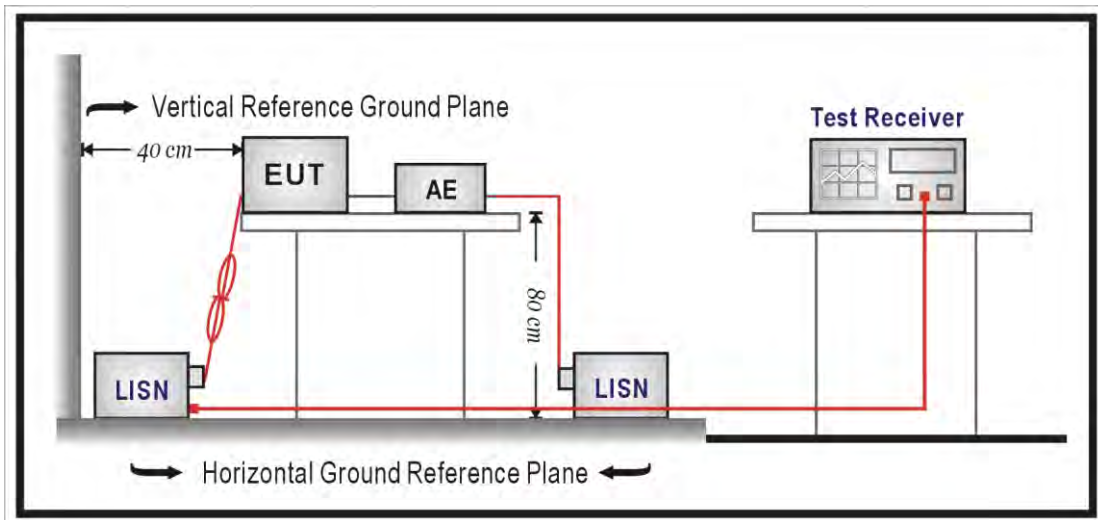
4 Measurement Procedure

4.1. AC Power Line Conducted Emission Measurement

■ Limit

| Frequency (MHz) | Quasi-peak | Average |
|-----------------|------------|----------|
| 0.15 - 0.5 | 66 to 56 | 56 to 46 |
| 0.50 - 5.0 | 56 | 46 |
| 5.0 - 30.0 | 60 | 50 |

■ Test Setup



■ Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a $50 \Omega // 50 \mu\text{H}$ coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a $50 \Omega // 50 \mu\text{H}$ coupling impedance with 50 ohm termination.

Tabletop device shall be placed on a non-conducting platform, of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The wall of screened room shall be located 40 cm to the rear of the EUT. Other surfaces of tabletop or floor standing EUT shall be at least 80 cm from any other ground conducting surface including one or more LISNs. For floor-standing device shall be placed under the EUT with a 12 mm insulating material.

Conducted emissions were investigated over the frequency range from 0.15 MHz to 30 MHz using a resolution bandwidth of 9 kHz. The equipment under test (EUT) shall be meet the limits in section 4.1, as applicable, including the average limit and the quasi-peak limit when using respectively, an average detector and quasi-peak detector measured in accordance with the methods described of related standard. When all of peak value were complied with quasi-peak and average limit from 150 kHz to 30 MHz then quasi-peak and average measurement was unnecessary.

The AMN shall be placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for AMNs mounted on top of the ground reference plane. This distance is between the closest points of the AMN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8 m from the AMN. If the mains power cable is longer than 1 m then the cable shall be folded back and forth at the centre of the lead to form a bundle no longer than 0.4 m. All of interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long. All of EUT and AE shall be separate place more than 0.1 m. All 50Ω ports of the LISN shall be resistively terminated into 50Ω loads when not connected to the measuring instrument.

If the reading of the measuring receiver shows fluctuations close to the limit, the reading shall be observed for at least 15 s at each measurement frequency; the higher reading shall be recorded with the exception of any brief isolated high reading which shall be ignored.

4.2. Radiated Emission Measurement

■ Limit

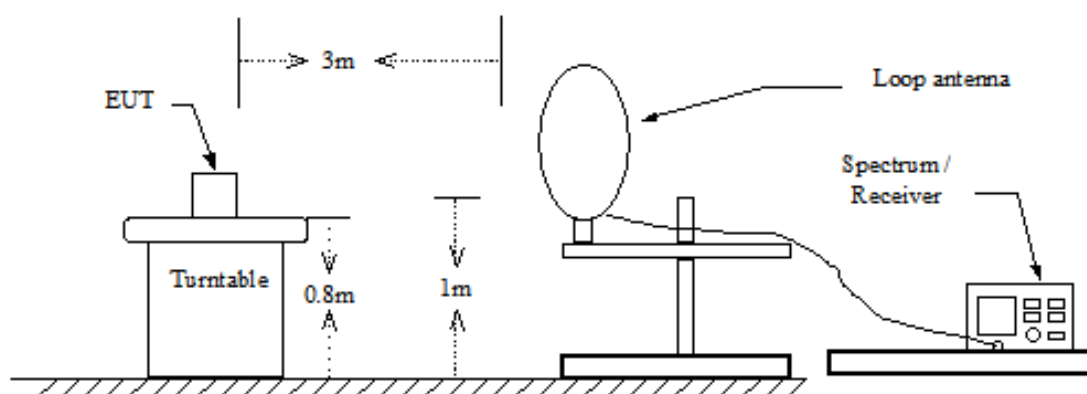
According to §15.209(a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field Strength ($\mu\text{V}/\text{m}$ at meter) | Measurement Distance (meters) |
|-----------------|---|-------------------------------|
| 0.009 – 0.490 | $2400 / F$ (kHz) | 300 |
| 0.490 – 1.705 | $24000 / F$ (kHz) | 30 |
| 1.705 – 30.0 | 30 | 30 |
| 30 - 88 | 100** | 3 |
| 88-216 | 150** | 3 |
| 216-960 | 200** | 3 |
| Above 960 | 500 | 3 |

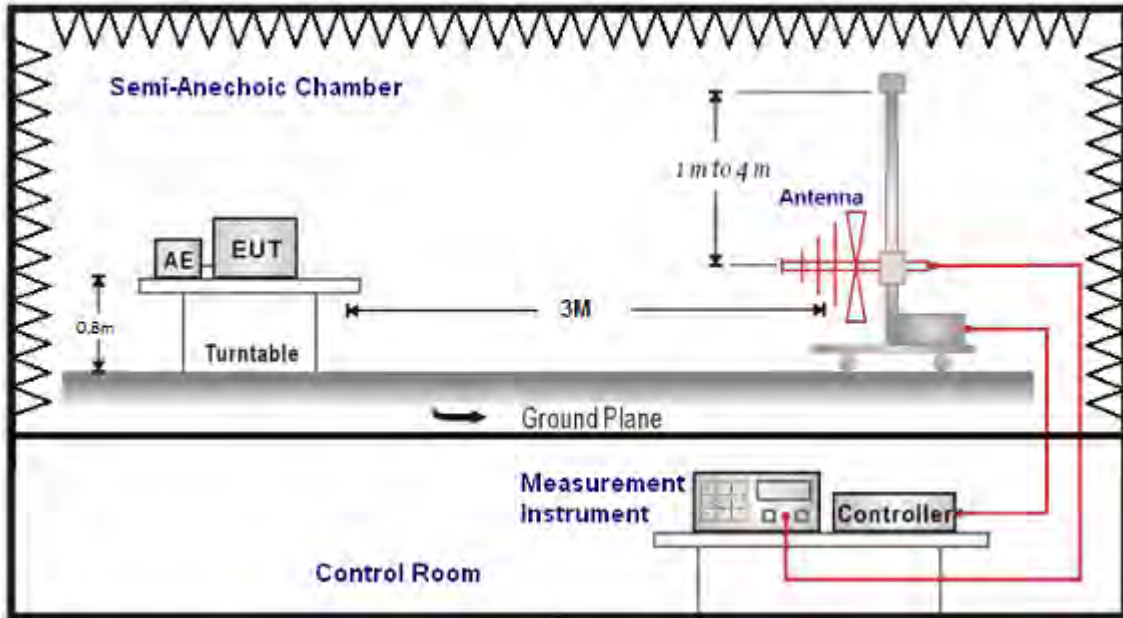
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

■ Setup

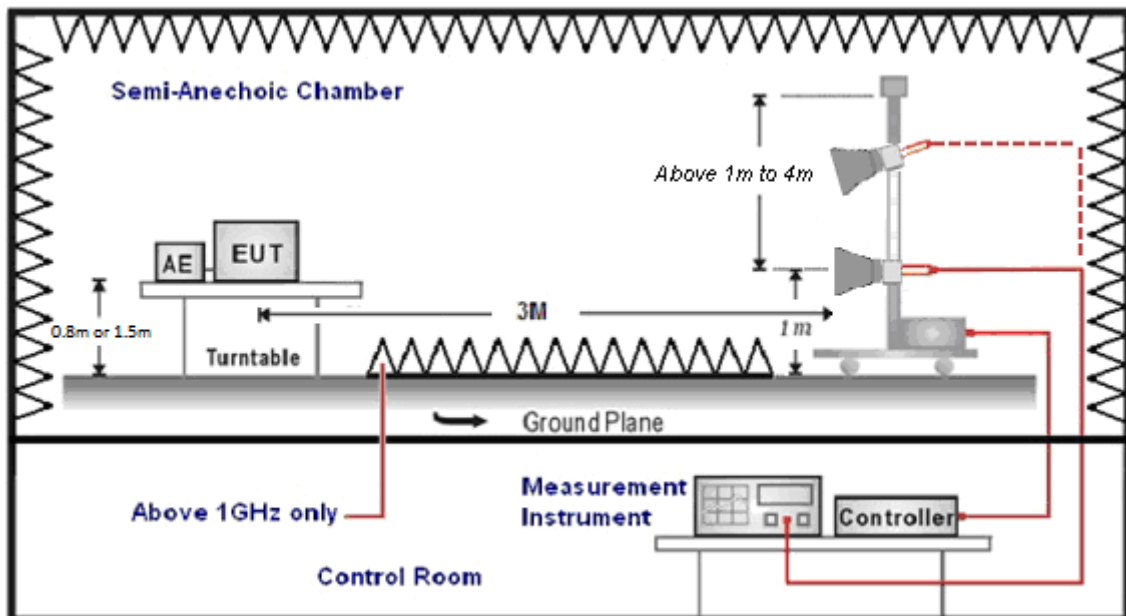
9 kHz ~ 30 MHz



Below 1 GHz



Above 1 GHz



■ Test Procedure

Final radiation measurements were made on a three-meter, Semi Anechoic Chamber. The EUT system was placed on a nonconductive turntable which is 0.8 or 1.5 meters height, top surface 1.0 x 1.5 meter. The spectrum was examined from 250 MHz to 2.5 GHz in order to cover the whole spectrum below 10th harmonic which could generate from the EUT. During the test, EUT was set to transmit continuously & Measurements spectrum range from 9 kHz to 26.5 GHz is investigated.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, and then the video bandwidth is set to 3 MHz for peak measurements and 10 Hz for average measurements when Duty cycle >0.98 / $1/T$ for average measurements when Duty cycle <0.98 . A nonconductive material surrounded the EUT to supporting the EUT for standing on three orthogonal planes. At each condition, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters to find the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarization.

SCHWARZBECK MESS-ELEKTRONIK Biconilog Antenna at 3 Meter and the SCHWARZBECK Double Ridged Guide Antenna was used in frequencies 1 –26.5 GHz at a distance of 3 meter. The antenna at an angle toward the source of the emission. All test results were extrapolated to equivalent signal at 3 meters utilizing an inverse linear distance extrapolation Factor (20 dB/decade).

For testing above 1 GHz, the emission level of the EUT in peak mode was 20 dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

Appropriate preamplifiers were used for improving sensitivity and precautions were taken to avoid overloading or desensitizing the spectrum analyzer. No post – detector video filters were used in the test.

The spectrum analyzer's 6 dB bandwidth was set to 1 MHz, and the analyzer was operated in the peak detection mode, for frequencies both below and up 1 GHz. The average levels were obtained by subtracting the duty cycle correction factor from the peak readings.

The following procedures were used to convert the emission levels measured in decibels referenced to 1 microvolt (dBuV) into field intensity in micro volts pre meter (uV/m).

The actual field intensity in decibels referenced to 1 microvolt in to field intensity in micro volts per meter (dBuV/m).



The actual field intensity in referenced to 1 microvolt per meter (dBuV/m) is determined by algebraically adding the measured reading in dBuV, the antenna factor (dB), and cable loss (dB) and Subtracting the gain of preamplifier (dB) is auto calculate in spectrum analyzer.

(1) $\text{Amplitude (dBuV/m)} = \text{FI (dBuV)} + \text{AF (dBuV)} + \text{CL (dBuV)} - \text{Gain (dB)}$

FI= Reading of the field intensity.

AF= Antenna factor.

CL= Cable loss.

P.S Amplitude is auto calculate in spectrum analyzer.

(2) $\text{Actual Amplitude (dBuV/m)} = \text{Amplitude (dBuV)} - \text{Dis(dB)}$

The FCC specified emission limits were calculated according the EUT operating frequency and by following linear interpolation equations:

(a) For fundamental frequency : Transmitter Output < +30 dBm

(b) For spurious frequency : Spurious emission limits = fundamental emission limit /10

Data of measurement within this frequency range without mark in the table above means the reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.

4.3. Maximum Conducted Output Power Measurement

■ Limit

For systems using digital modulation in the 2400-2483.5 MHz, the limit for maximum output power is 30 dBm.

And According to 15.247 (b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Model: PA300: built-in antenna

IEEE 802.11b / IEEE 802.11g / IEEE 802.11n 2.4 GHz 20 MHz / IEEE 802.11n 2.4 GHz 40 MHz

* Directional Gain = $10 \cdot \log\left\{\frac{10^{G1/10} + 10^{G2/10} + \dots + 10^{Gn/10}}{NANT}\right\} = 3.30 \text{ dBi} < 6\text{dBi}$

* Directional= G_{ANT} : 3.30 dBi

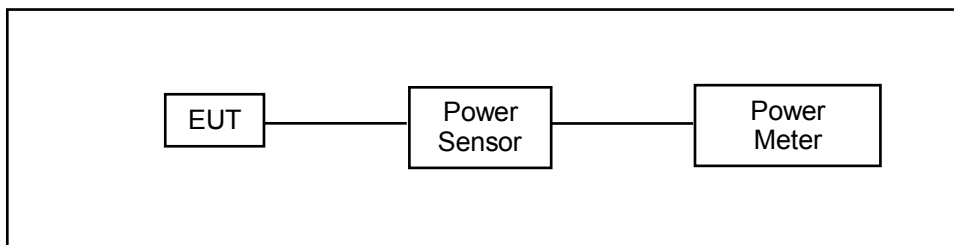
Model: PA300-E: External antenna

IEEE 802.11b / IEEE 802.11g / IEEE 802.11n 2.4 GHz 20 MHz / IEEE 802.11n 2.4 GHz 40 MHz

* Directional Gain = $10 \cdot \log\left\{\frac{10^{G1/10} + 10^{G2/10} + \dots + 10^{Gn/10}}{NANT}\right\} = 5.17 \text{ dBi} < 6\text{dBi}$

* Directional= G_{ANT} : 5.17 dBi

■ Test Setup



■ Test Procedure

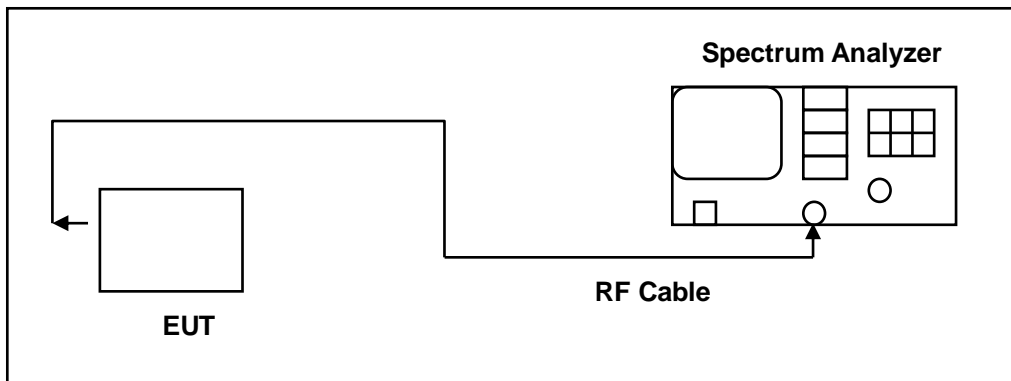
The tests below are run with the EUT's transmitter set at high power in TX mode. The EUT is needed to force selection of output power level and channel number. While testing, EUT was set to transmit continuously. Remove the Subjective device's antenna and connect the RF output port to power sensor.

4.4. 6 dB RF Bandwidth Measurement

■ **Limit**

6 dB RF Bandwidth: Systems using digital modulation techniques may operate in the 2400–2483.5 MHz bands. The minimum 6 dB band-width shall be at least 500 kHz.

■ **Test Setup**



■ **Test Procedure**

The EUT tested to DTS test procedure of ANSI C63.10:2013 section 11.8.2 option2 for compliance to FCC 47CFR 15.247 requirements.

6 dB RF Bandwidth: The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RBW was set to 100 kHz. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A peak output reading was taken, a DISPLAY line was drawn 6 dB lower than peak level. The 6 dB bandwidth was determined from where the channel output spectrum intersected the display line.

The test was performed at 3 channels (Channel low, middle, high)

4.5. Maximum Power Density Measurement

■ Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Model: PA300: built-in antenna

IEEE 802.11b / IEEE 802.11g / IEEE 802.11n 2.4 GHz 20 MHz / IEEE 802.11n 2.4 GHz 40 MHz

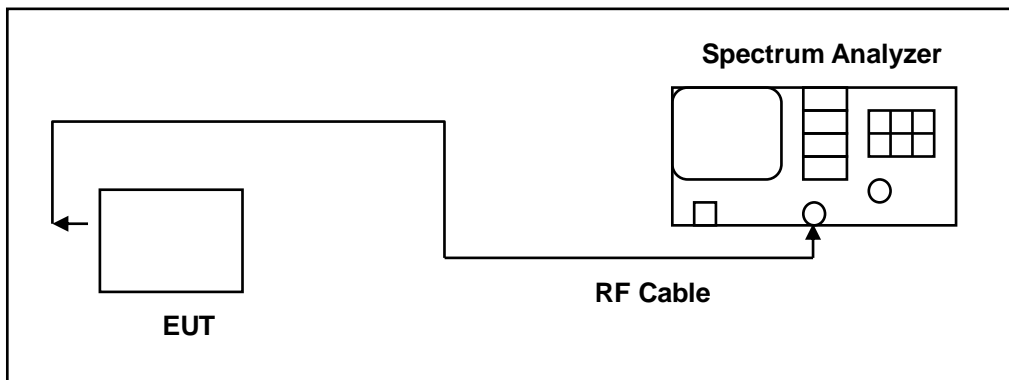
- * Directional Gain = $10 \cdot \log\{[10^{G1/20} + 10^{G2/20} + \dots + 10^{Gn/20}]^2 / NANT\}$ = 6.31 dBi > 6dBi
- * Conducted Power Spectral Density Limit = 8 - 0.31 = 7.69 dBm/3 KHz

Model: PA300-E: External antenna

IEEE 802.11b / IEEE 802.11g / IEEE 802.11n 2.4 GHz 20 MHz / IEEE 802.11n 2.4 GHz 40 MHz

- * Directional Gain = $10 \cdot \log\{[10^{G1/20} + 10^{G2/20} + \dots + 10^{Gn/20}]^2 / NANT\}$ = 8.18 dBi > 6dBi
- * Conducted Power Spectral Density Limit = 8 - 2.18 = 5.82 dBm/3 KHz

■ Test Setup





■ **Test Procedure**

The EUT tested to DTS test procedure of ANSI C63.10:2013 section 11.10.2 for compliance to FCC 47CFR 15.247 requirements.

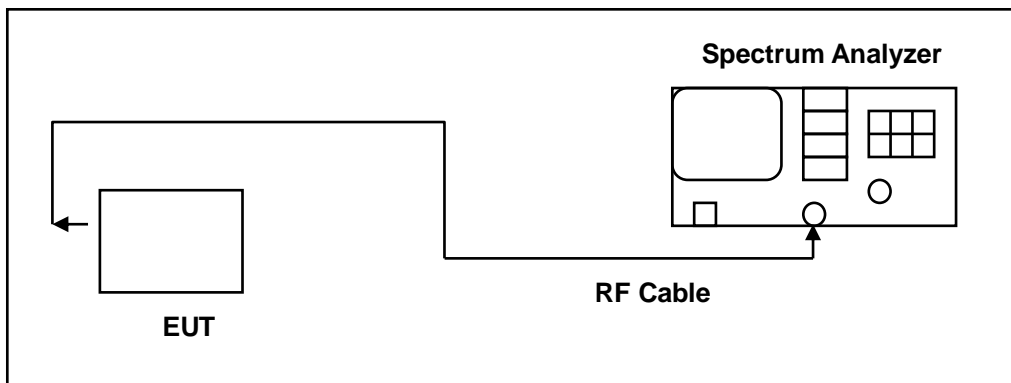
1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
4. Set the VBW $\geq 3 \times \text{RBW}$.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

4.6. Out of Band Conducted Emissions Measurement

■ **Limit**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

■ **Test Setup**



■ **Test Procedure**

In any 100 kHz bandwidth outside the EUT pass band, the RF power produced by the modulation products of the spreading sequence, the information sequence, and the carrier frequency shall be at least 20 dB below that of the maximum in-band 100 kHz emission, antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are compensated for with the analyzer OFFSET function. All other types of emissions from the EUT shall meet the general limits for radiated frequencies outside the pass band. The test was performed at 3 channels.



4.7. Antenna Measurement

■ Limit

For intentional device, according to 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.

And According to 15.247 (b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

■ Antenna Description

See section 2 – antenna information.



■ **Directional Gain Calculated**

Model: PA300: built-in antenna

For Maximum Conducted Output Power

$$\text{Directional Gain} = 10 \cdot \log\left\{\frac{10^{G1/10} + 10^{G2/10} + \dots + 10^{Gn/10}}{NANT}\right\}$$

| Operate Freq. Band | Directional Gain (dBi) |
|-----------------------------|------------------------|
| IEEE 802.11b | 3.30 |
| IEEE 802.11g | 3.30 |
| IEEE 802.11n 2.4 GHz 20 MHz | 3.30 |
| IEEE 802.11n 2.4 GHz 40 MHz | 3.30 |

For Maximum Power Density

$$\text{Directional Gain} = 10 \cdot \log\left\{\frac{10^{G1/20} + 10^{G2/20} + \dots + 10^{Gn/20}}{NANT}\right\}^2$$

| Operate Freq. Band | Directional Gain (dBi) |
|-----------------------------|------------------------|
| IEEE 802.11b | 6.31 |
| IEEE 802.11g | 6.31 |
| IEEE 802.11n 2.4 GHz 20 MHz | 6.31 |
| IEEE 802.11n 2.4 GHz 40 MHz | 6.31 |

Model: PA300-E: External antenna

For Maximum Conducted Output Power

$$\text{Directional Gain} = 10 \cdot \log\left\{\frac{10^{G1/10} + 10^{G2/10} + \dots + 10^{Gn/10}}{NANT}\right\}$$

| Operate Freq. Band | Directional Gain (dBi) |
|-----------------------------|------------------------|
| IEEE 802.11b | 5.17 |
| IEEE 802.11g | 5.17 |
| IEEE 802.11n 2.4 GHz 20 MHz | 5.17 |
| IEEE 802.11n 2.4 GHz 40 MHz | 5.17 |

For Maximum Power Density

$$\text{Directional Gain} = 10 \cdot \log\left\{\frac{10^{G1/20} + 10^{G2/20} + \dots + 10^{Gn/20}}{NANT}\right\}^2$$

| Operate Freq. Band | Directional Gain (dBi) |
|-----------------------------|------------------------|
| IEEE 802.11b | 8.18 |
| IEEE 802.11g | 8.18 |
| IEEE 802.11n 2.4 GHz 20 MHz | 8.18 |
| IEEE 802.11n 2.4 GHz 40 MHz | 8.18 |

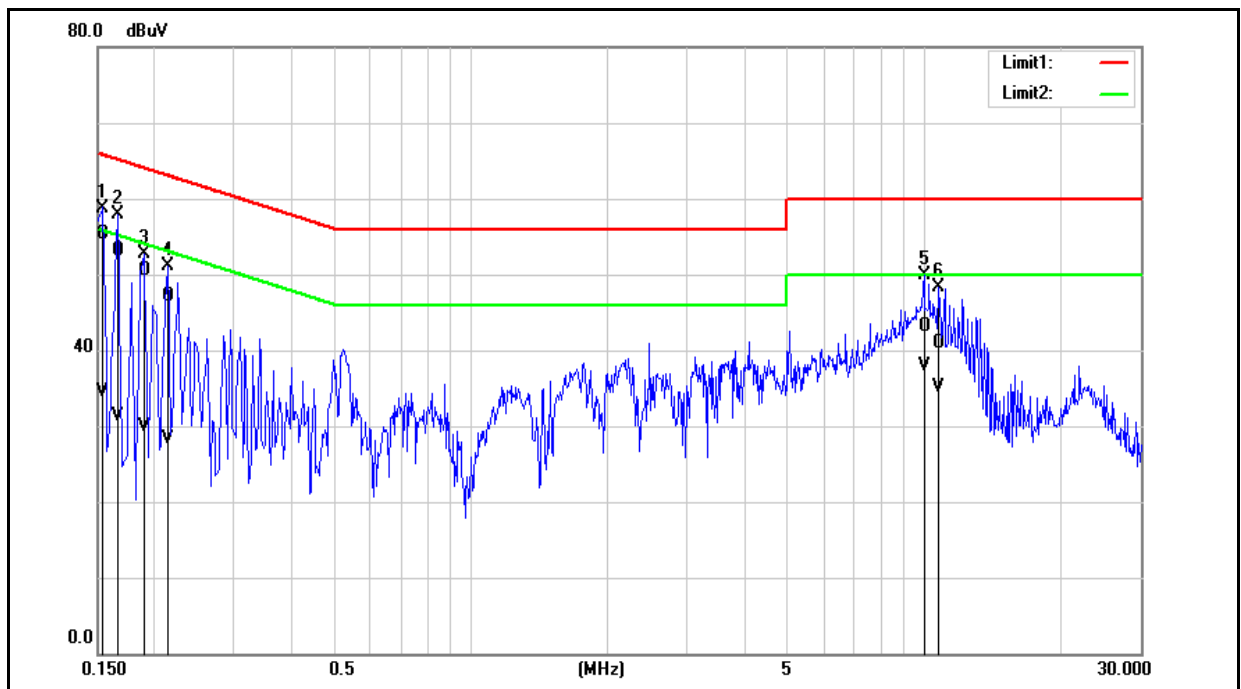
5 Test Results

Annex A. Conducted Emission

Model: PA300: built-in antenna

| | | | |
|------------|--------------------|----------------------|----------------|
| Standard: | FCC Part 15.247 | Line: | L1 |
| Test item: | Conducted Emission | Power: | AC 120 V/60 Hz |
| Test Mode: | Mode 1 | Temp.(°C)/Hum.(%RH): | 26(°C)/60 %RH |

Description:



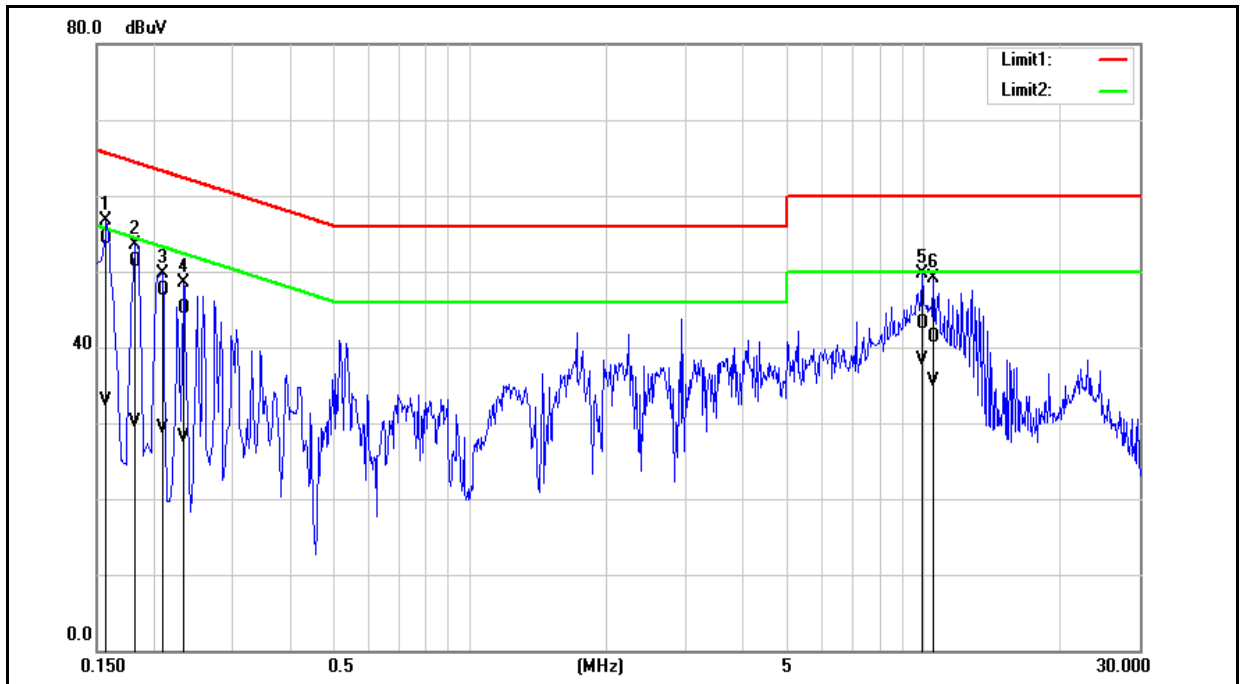
| No. | Frequency (MHz) | QP reading (dBuV) | AVG reading (dBuV) | Correction factor (dB) | QP result (dBuV) | AVG result (dBuV) | QP limit (dBuV) | AVG limit (dBuV) | QP margin (dB) | AVG margin (dB) | Remark |
|-----|--------------------|-------------------------|--------------------------|------------------------------|------------------------|-------------------------|-----------------------|------------------------|----------------------|-----------------------|--------|
| 1 | 0.1540 | 45.71 | 24.83 | 9.65 | 55.36 | 34.48 | 65.78 | 55.78 | -10.42 | -21.30 | Pass |
| 2 | 0.1660 | 43.43 | 21.64 | 9.65 | 53.08 | 31.29 | 65.16 | 55.16 | -12.08 | -23.87 | Pass |
| 3 | 0.1900 | 40.95 | 20.24 | 9.64 | 50.59 | 29.88 | 64.04 | 54.04 | -13.45 | -24.16 | Pass |
| 4 | 0.2140 | 37.46 | 18.65 | 9.64 | 47.10 | 28.29 | 63.05 | 53.05 | -15.95 | -24.76 | Pass |
| 5 | 9.9900 | 33.22 | 28.06 | 9.90 | 43.12 | 37.96 | 60.00 | 50.00 | -16.88 | -12.04 | Pass |
| 6 | 10.7740 | 31.00 | 25.16 | 9.91 | 40.91 | 35.07 | 60.00 | 50.00 | -19.09 | -14.93 | Pass |

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB) = Cable loss (dB) + L.I.S.N. factor (dB).



| | | | |
|--------------|--------------------|----------------------|----------------|
| Standard: | FCC Part 15.247 | Line: | N |
| Test item: | Conducted Emission | Power: | AC 120 V/60 Hz |
| Test Mode: | Mode 1 | Temp.(°C)/Hum.(%RH): | 26(°C)/60 %RH |
| Description: | | | |



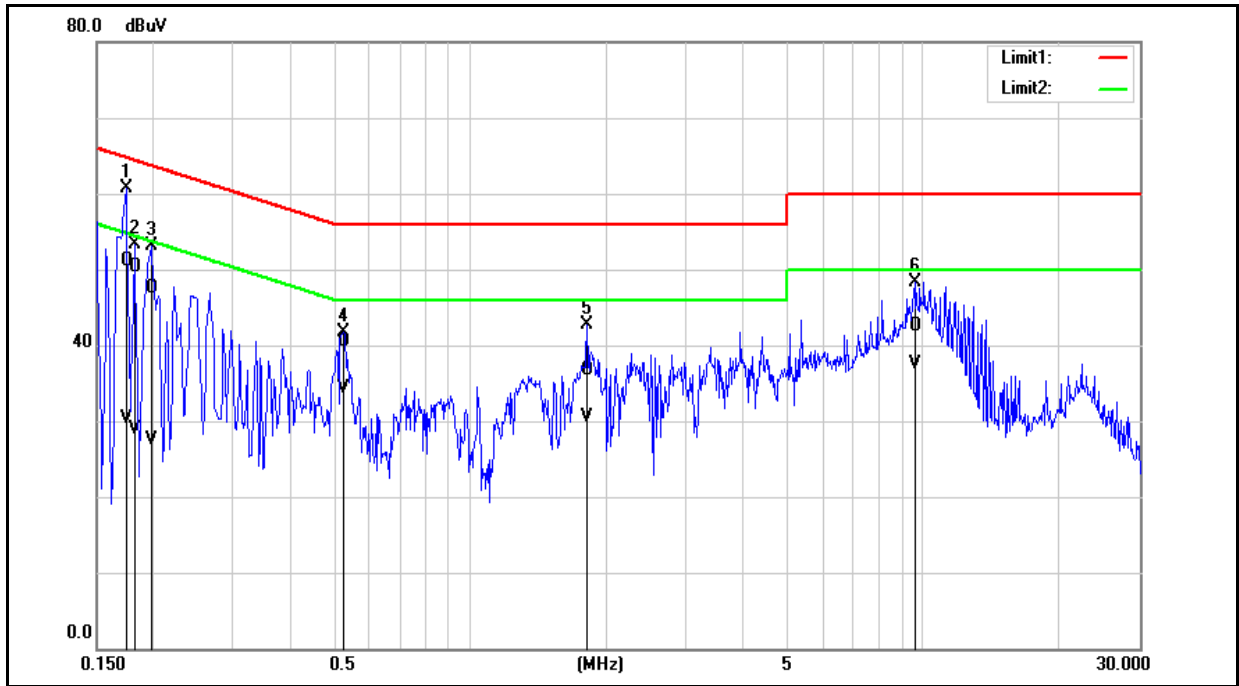
| No. | Frequency (MHz) | QP reading (dBuV) | AVG reading (dBuV) | Correction factor (dB) | QP result (dBuV) | AVG result (dBuV) | QP limit (dBuV) | AVG limit (dBuV) | QP margin (dB) | AVG margin (dB) | Remark |
|-----|-----------------|-------------------|--------------------|------------------------|------------------|-------------------|-----------------|------------------|----------------|-----------------|--------|
| 1 | 0.1580 | 44.70 | 23.14 | 9.68 | 54.38 | 32.82 | 65.57 | 55.57 | -11.19 | -22.75 | Pass |
| 2 | 0.1820 | 41.55 | 20.52 | 9.67 | 51.22 | 30.19 | 64.39 | 54.39 | -13.17 | -24.20 | Pass |
| 3 | 0.2100 | 37.91 | 19.56 | 9.67 | 47.58 | 29.23 | 63.21 | 53.21 | -15.63 | -23.98 | Pass |
| 4 | 0.2340 | 35.41 | 18.39 | 9.67 | 45.08 | 28.06 | 62.31 | 52.31 | -17.23 | -24.25 | Pass |
| 5 | 9.9380 | 33.24 | 28.26 | 9.96 | 43.20 | 38.22 | 60.00 | 50.00 | -16.80 | -11.78 | Pass |
| 6 | 10.5580 | 31.36 | 25.52 | 9.98 | 41.34 | 35.50 | 60.00 | 50.00 | -18.66 | -14.50 | Pass |

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).
2. Correction factor (dB) = Cable loss (dB) + L.I.S.N. factor (dB).



Model: PA300-E: External antenna

| | | | |
|--------------|--------------------|----------------------|----------------|
| Standard: | FCC Part 15.247 | Line: | L1 |
| Test item: | Conducted Emission | Power: | AC 120 V/60 Hz |
| Test Mode: | Mode 1 | Temp.(°C)/Hum.(%RH): | 26(°C)/60 %RH |
| Description: | | | |



| No. | Frequency (MHz) | QP reading (dBuV) | AVG reading (dBuV) | Correction factor (dB) | QP result (dBuV) | AVG result (dBuV) | QP limit (dBuV) | AVG limit (dBuV) | QP margin (dB) | AVG margin (dB) | Remark |
|-----|-----------------|-------------------|--------------------|------------------------|------------------|-------------------|-----------------|------------------|----------------|-----------------|--------|
| 1 | 0.1740 | 41.40 | 20.59 | 9.65 | 51.05 | 30.24 | 64.77 | 54.77 | -13.72 | -24.53 | Pass |
| 2 | 0.1820 | 40.74 | 19.22 | 9.64 | 50.38 | 28.86 | 64.39 | 54.39 | -14.01 | -25.53 | Pass |
| 3 | 0.1980 | 37.86 | 17.95 | 9.64 | 47.50 | 27.59 | 63.69 | 53.69 | -16.19 | -26.10 | Pass |
| 4 | 0.5260 | 30.78 | 24.57 | 9.66 | 40.44 | 34.23 | 56.00 | 46.00 | -15.56 | -11.77 | Pass |
| 5 | 1.8140 | 26.95 | 20.74 | 9.71 | 36.66 | 30.45 | 56.00 | 46.00 | -19.34 | -15.55 | Pass |
| 6 | 9.6460 | 32.63 | 27.62 | 9.90 | 42.53 | 37.52 | 60.00 | 50.00 | -17.47 | -12.48 | Pass |

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).
2. Correction factor (dB) = Cable loss (dB) + L.I.S.N. factor (dB).

Annex B. Conducted Test Results

Maximum Conducted Output Power Measurement

Model: PA300: built-in antenna

| Test Mode | Frequency (MHz) | Data Rate | Average Output Power | | | | |
|-----------|-----------------|-----------|----------------------|-------|-------|-------|---------|
| | | | ANT-0 | | ANT-1 | | Limit |
| | | | (dBm) | (W) | (dBm) | (W) | dBm |
| Mode 2 | 2412 | 1 M | 22.55 | 0.180 | 21.87 | 0.154 | ≤ 30.00 |
| | 2437 | | 21.23 | 0.133 | 21.31 | 0.135 | ≤ 30.00 |
| | 2462 | | 22.69 | 0.186 | 22.50 | 0.178 | ≤ 30.00 |
| Mode 3 | 2412 | 6 M | 22.23 | 0.167 | 22.10 | 0.162 | ≤ 30.00 |
| | 2437 | | 22.42 | 0.175 | 21.82 | 0.152 | ≤ 30.00 |
| | 2462 | | 22.90 | 0.195 | 22.63 | 0.183 | ≤ 30.00 |
| Mode 4 | 2412 | 13 M | 22.59 | 0.182 | 22.12 | 0.163 | ≤ 30.00 |
| | 2437 | | 22.46 | 0.176 | 22.06 | 0.161 | ≤ 30.00 |
| | 2462 | | 22.52 | 0.179 | 22.71 | 0.187 | ≤ 30.00 |
| Mode 5 | 2422 | 27 M | 20.82 | 0.121 | 20.40 | 0.110 | ≤ 30.00 |
| | 2437 | | 22.54 | 0.179 | 22.20 | 0.166 | ≤ 30.00 |
| | 2452 | | 20.60 | 0.115 | 20.46 | 0.111 | ≤ 30.00 |

| Test Mode | Frequency (MHz) | Data Rate | Average Output Power | | |
|-----------|-----------------|-----------|----------------------|--------------|---------|
| | | | ANT-0+1 | | Limit |
| | | | (dBm) | (W) | dBm |
| Mode 2 | 2412 | 1 M | 25.23 | 0.334 | ≤ 30.00 |
| | 2437 | | 24.28 | 0.268 | ≤ 30.00 |
| | 2462 | | 25.61 | 0.364 | ≤ 30.00 |
| Mode 3 | 2412 | 6 M | 25.18 | 0.329 | ≤ 30.00 |
| | 2437 | | 25.14 | 0.327 | ≤ 30.00 |
| | 2462 | | 25.78 | 0.378 | ≤ 30.00 |
| Mode 4 | 2412 | 13 M | 25.37 | 0.344 | ≤ 30.00 |
| | 2437 | | 25.27 | 0.337 | ≤ 30.00 |
| | 2462 | | 25.63 | 0.365 | ≤ 30.00 |
| Mode 5 | 2422 | 27 M | 23.63 | 0.230 | ≤ 30.00 |
| | 2437 | | 25.38 | 0.345 | ≤ 30.00 |
| | 2452 | | 23.54 | 0.226 | ≤ 30.00 |

Note: The relevant measured result has the offset with cable loss already.

Model: PA300-E: External antenna

| Test Mode | Frequency (MHz) | Data Rate | Average Output Power | | | | |
|-----------|-----------------|-----------|----------------------|-------|-------|-------|---------|
| | | | ANT-0 | | ANT-1 | | Limit |
| | | | (dBm) | (W) | dBm | (W) | dBm |
| Mode 2 | 2412 | 1 M | 23.15 | 0.207 | 22.54 | 0.179 | ≤ 30.00 |
| | 2437 | | 16.67 | 0.046 | 16.47 | 0.044 | ≤ 30.00 |
| | 2462 | | 23.28 | 0.213 | 22.68 | 0.185 | ≤ 30.00 |
| Mode 3 | 2412 | 6 M | 14.48 | 0.028 | 14.25 | 0.027 | ≤ 30.00 |
| | 2437 | | 11.22 | 0.013 | 11.17 | 0.013 | ≤ 30.00 |
| | 2462 | | 11.61 | 0.014 | 11.40 | 0.014 | ≤ 30.00 |
| Mode 4 | 2412 | 13 M | 13.86 | 0.024 | 13.56 | 0.023 | ≤ 30.00 |
| | 2437 | | 10.84 | 0.012 | 10.58 | 0.011 | ≤ 30.00 |
| | 2462 | | 14.65 | 0.029 | 14.20 | 0.026 | ≤ 30.00 |
| Mode 5 | 2422 | 27 M | 21.32 | 0.136 | 20.51 | 0.112 | ≤ 30.00 |
| | 2437 | | 23.19 | 0.208 | 22.79 | 0.190 | ≤ 30.00 |
| | 2452 | | 22.35 | 0.172 | 21.97 | 0.157 | ≤ 30.00 |

| Test Mode | Frequency (MHz) | Data Rate | Average Output Power | | |
|-----------|-----------------|-----------|----------------------|--------------|---------|
| | | | ANT-0+1 | | Limit |
| | | | (dBm) | (W) | dBm |
| Mode 2 | 2412 | 1 M | 25.87 | 0.386 | ≤ 30.00 |
| | 2437 | | 19.58 | 0.091 | ≤ 30.00 |
| | 2462 | | 26.00 | 0.398 | ≤ 30.00 |
| Mode 3 | 2412 | 6 M | 17.38 | 0.055 | ≤ 30.00 |
| | 2437 | | 14.21 | 0.026 | ≤ 30.00 |
| | 2462 | | 14.52 | 0.028 | ≤ 30.00 |
| Mode 4 | 2412 | 13 M | 16.72 | 0.047 | ≤ 30.00 |
| | 2437 | | 13.72 | 0.024 | ≤ 30.00 |
| | 2462 | | 17.44 | 0.055 | ≤ 30.00 |
| Mode 5 | 2422 | 27 M | 23.94 | 0.248 | ≤ 30.00 |
| | 2437 | | 26.00 | 0.399 | ≤ 30.00 |
| | 2452 | | 25.17 | 0.329 | ≤ 30.00 |

Note: The relevant measured result has the offset with cable loss already.



6 dB RF Bandwidth Measurement

| Model: PA300: built-in antenna | | | | |
|--------------------------------|-----------------|-------------------|-------|-------------|
| Test Mode | Frequency (MHz) | Measurement (kHz) | | Limit (kHz) |
| | | ANT-0 | ANT-1 | |
| Mode 2 | 2412 | 9596 | 10020 | ≥ 500 |
| | 2437 | 9588 | 10060 | ≥ 500 |
| | 2462 | 10100 | 9601 | ≥ 500 |
| Mode 3 | 2412 | 15130 | 15120 | ≥ 500 |
| | 2437 | 15120 | 15100 | ≥ 500 |
| | 2462 | 15130 | 15100 | ≥ 500 |
| Mode 4 | 2412 | 15120 | 15130 | ≥ 500 |
| | 2437 | 15140 | 15140 | ≥ 500 |
| | 2462 | 15130 | 15140 | ≥ 500 |
| Mode 5 | 2422 | 33880 | 33870 | ≥ 500 |
| | 2437 | 33840 | 33820 | ≥ 500 |
| | 2452 | 33890 | 33880 | ≥ 500 |

| Model: PA300-E: External antenna | | | | |
|----------------------------------|-----------------|-------------------|-------|-------------|
| Test Mode | Frequency (MHz) | Measurement (kHz) | | Limit (kHz) |
| | | ANT-0 | ANT-1 | |
| Mode 2 | 2412 | 9593 | 9587 | ≥ 500 |
| | 2437 | 9547 | 9615 | ≥ 500 |
| | 2462 | 9580 | 10080 | ≥ 500 |
| Mode 3 | 2412 | 15130 | 15120 | ≥ 500 |
| | 2437 | 15130 | 15120 | ≥ 500 |
| | 2462 | 15130 | 15140 | ≥ 500 |
| Mode 4 | 2412 | 15130 | 15120 | ≥ 500 |
| | 2437 | 15130 | 15140 | ≥ 500 |
| | 2462 | 15130 | 15100 | ≥ 500 |
| Mode 5 | 2422 | 33860 | 33870 | ≥ 500 |
| | 2437 | 33890 | 33810 | ≥ 500 |
| | 2452 | 33890 | 32600 | ≥ 500 |

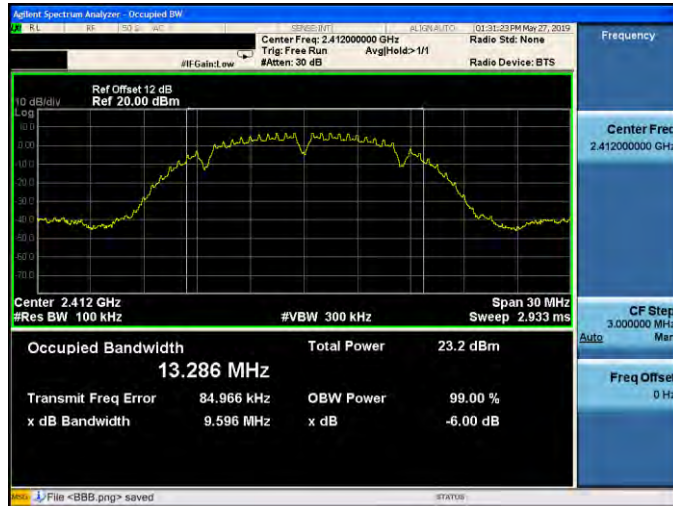
■ Test Graphs

Model: PA300: built-in antenna

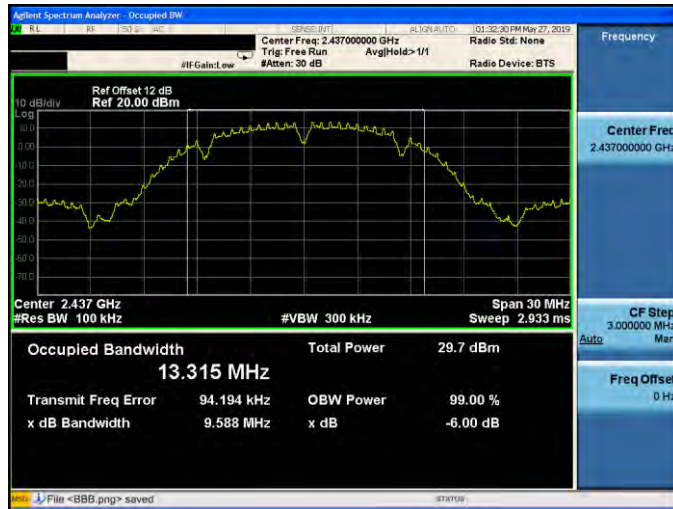
6 dB RF Bandwidth

Mode 2: IEEE 802.11b Continuous TX mode_ANT-0

2412



2437



2462




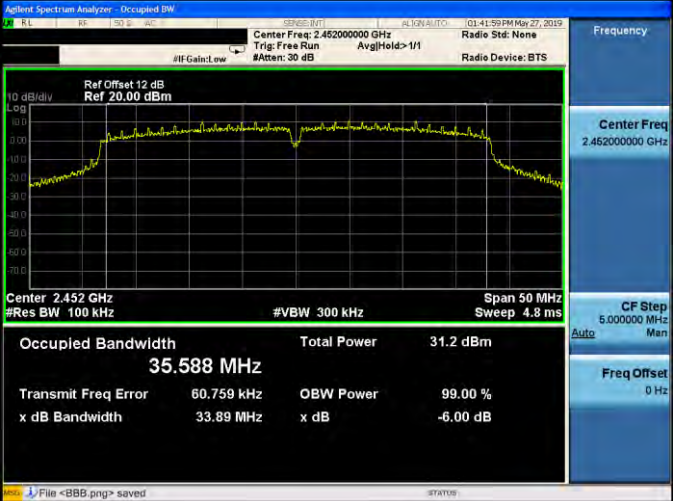


| Mode 3: IEEE 802.11g Continuous TX mode_ANT-0 | |
|---|--|
| 2412 | <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.41200000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Ref Offset 12 dB Ref 20.00 dBm</p> <p>Center 2.412 GHz Res BW 100 kHz Span 30 MHz Sweep 2.933 ms</p> <p>Occupied Bandwidth 16.183 MHz Total Power 30.9 dBm</p> <p>Transmit Freq Error -10.905 kHz OBW Power 99.00 % x dB Bandwidth 15.13 MHz x dB -6.00 dB</p> |
| 2437 | <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.43700000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Ref Offset 12 dB Ref 20.00 dBm</p> <p>Center 2.437 GHz Res BW 100 kHz Span 30 MHz Sweep 2.933 ms</p> <p>Occupied Bandwidth 16.173 MHz Total Power 30.6 dBm</p> <p>Transmit Freq Error -19.776 kHz OBW Power 99.00 % x dB Bandwidth 15.12 MHz x dB -6.00 dB</p> |
| 2462 | <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.46200000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Ref Offset 12 dB Ref 20.00 dBm</p> <p>Center 2.462 GHz Res BW 100 kHz Span 30 MHz Sweep 2.933 ms</p> <p>Occupied Bandwidth 16.182 MHz Total Power 31.6 dBm</p> <p>Transmit Freq Error -24.581 kHz OBW Power 99.00 % x dB Bandwidth 15.13 MHz x dB -6.00 dB</p> |



| Mode 4: IEEE 802.11n 2.4 GHz 20 MHz link mode_ANT-0 | |
|---|---|
| 2412 | <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.41200000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Ref Offset 12 dB Ref 20.00 dBm</p> <p>Center 2.412 GHz Res BW 100 kHz Span 30 MHz Sweep 2.933 ms</p> <p>Occupied Bandwidth 17.184 MHz Total Power 30.6 dBm</p> <p>Transmit Freq Error -4.303 kHz OBW Power 99.00 % x dB Bandwidth 15.12 MHz x dB -6.00 dB</p> |
| 2437 | <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.43700000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Ref Offset 12 dB Ref 20.00 dBm</p> <p>Center 2.437 GHz Res BW 100 kHz Span 30 MHz Sweep 2.933 ms</p> <p>Occupied Bandwidth 17.179 MHz Total Power 30.6 dBm</p> <p>Transmit Freq Error -1.637 kHz OBW Power 99.00 % x dB Bandwidth 15.14 MHz x dB -6.00 dB</p> |
| 2462 | <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.46200000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Ref Offset 12 dB Ref 20.00 dBm</p> <p>Center 2.462 GHz Res BW 100 kHz Span 30 MHz Sweep 2.933 ms</p> <p>Occupied Bandwidth 17.198 MHz Total Power 31.3 dBm</p> <p>Transmit Freq Error -5.746 kHz OBW Power 99.00 % x dB Bandwidth 15.13 MHz x dB -6.00 dB</p> |






| Mode 5: IEEE 802.11n 2.4 GHz 40 MHz link mode_ANT-0 | |
|---|--|
| 2422 |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.42200000 GHz Trig: Free Run #Att: 30 dB</p> <p>Ref Offset 12 dB Ref 20.00 dBm</p> <p>Center 2.422 GHz Res BW 100 kHz Span 50 MHz Sweep 4.8 ms</p> <p>Occupied Bandwidth: 35.651 MHz Total Power: 31.2 dBm</p> <p>Transmit Freq Error: 68.226 kHz OBW Power: 99.00 % x dB Bandwidth: 33.88 MHz x dB: -6.00 dB</p> |
| 2437 |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.43700000 GHz Trig: Free Run #Att: 30 dB</p> <p>Ref Offset 12 dB Ref 20.00 dBm</p> <p>Center 2.437 GHz Res BW 100 kHz Span 50 MHz Sweep 4.8 ms</p> <p>Occupied Bandwidth: 35.589 MHz Total Power: 31.2 dBm</p> <p>Transmit Freq Error: 73.344 kHz OBW Power: 99.00 % x dB Bandwidth: 33.84 MHz x dB: -6.00 dB</p> |
| 2452 |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.45200000 GHz Trig: Free Run #Att: 30 dB</p> <p>Ref Offset 12 dB Ref 20.00 dBm</p> <p>Center 2.452 GHz Res BW 100 kHz Span 50 MHz Sweep 4.8 ms</p> <p>Occupied Bandwidth: 35.588 MHz Total Power: 31.2 dBm</p> <p>Transmit Freq Error: 60.759 kHz OBW Power: 99.00 % x dB Bandwidth: 33.89 MHz x dB: -6.00 dB</p> |






| Mode 2: IEEE 802.11b Continuous TX mode_ANT-1 | |
|---|--|
| 2412 | <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.41200000 GHz Trig: Free Run #Att: 30 dB</p> <p>Ref Offset 12 dB Ref 20.00 dBm</p> <p>Center 2.412 GHz #Res BW 100 kHz #VBW 300 kHz Span 30 MHz Sweep 2.933 ms</p> <p>Occupied Bandwidth 13.490 MHz Total Power 30.8 dBm</p> <p>Transmit Freq Error 14.225 kHz OBW Power 99.00 % x dB Bandwidth 10.02 MHz x dB -6.00 dB</p> |
| 2437 | <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.43700000 GHz Trig: Free Run #Att: 30 dB</p> <p>Ref Offset 12 dB Ref 20.00 dBm</p> <p>Center 2.437 GHz #Res BW 100 kHz #VBW 300 kHz Span 30 MHz Sweep 2.933 ms</p> <p>Occupied Bandwidth 13.300 MHz Total Power 29.2 dBm</p> <p>Transmit Freq Error -45.348 kHz OBW Power 99.00 % x dB Bandwidth 10.06 MHz x dB -6.00 dB</p> |
| 2462 | <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.46200000 GHz Trig: Free Run #Att: 30 dB</p> <p>Ref Offset 12 dB Ref 20.00 dBm</p> <p>Center 2.462 GHz #Res BW 100 kHz #VBW 300 kHz Span 30 MHz Sweep 2.933 ms</p> <p>Occupied Bandwidth 13.197 MHz Total Power 30.7 dBm</p> <p>Transmit Freq Error -69.794 kHz OBW Power 99.00 % x dB Bandwidth 9.601 MHz x dB -6.00 dB</p> |



| Mode 3: IEEE 802.11g Continuous TX mode_ANT-1 | |
|---|---|
| 2412 |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.41200000 GHz Trig: Free Run #Att: 30 dB</p> <p>Ref Offset 12 dB Ref 20.00 dBm</p> <p>Center 2.412 GHz #Res BW 100 kHz #VBW 300 kHz Span 30 MHz Sweep 2.933 ms</p> <p>Occupied Bandwidth 16.171 MHz Total Power 30.5 dBm</p> <p>Transmit Freq Error -20.689 kHz OBW Power 99.00 % x dB Bandwidth 15.12 MHz x dB -6.00 dB</p> |
| 2437 |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.43700000 GHz Trig: Free Run #Att: 30 dB</p> <p>Ref Offset 12 dB Ref 20.00 dBm</p> <p>Center 2.437 GHz #Res BW 100 kHz #VBW 300 kHz Span 30 MHz Sweep 2.933 ms</p> <p>Occupied Bandwidth 16.157 MHz Total Power 30.6 dBm</p> <p>Transmit Freq Error -29.314 kHz OBW Power 99.00 % x dB Bandwidth 15.10 MHz x dB -6.00 dB</p> |
| 2462 |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.46200000 GHz Trig: Free Run #Att: 30 dB</p> <p>Ref Offset 12 dB Ref 20.00 dBm</p> <p>Center 2.462 GHz #Res BW 100 kHz #VBW 300 kHz Span 30 MHz Sweep 2.933 ms</p> <p>Occupied Bandwidth 16.162 MHz Total Power 31.0 dBm</p> <p>Transmit Freq Error -53.692 kHz OBW Power 99.00 % x dB Bandwidth 15.10 MHz x dB -6.00 dB</p> |



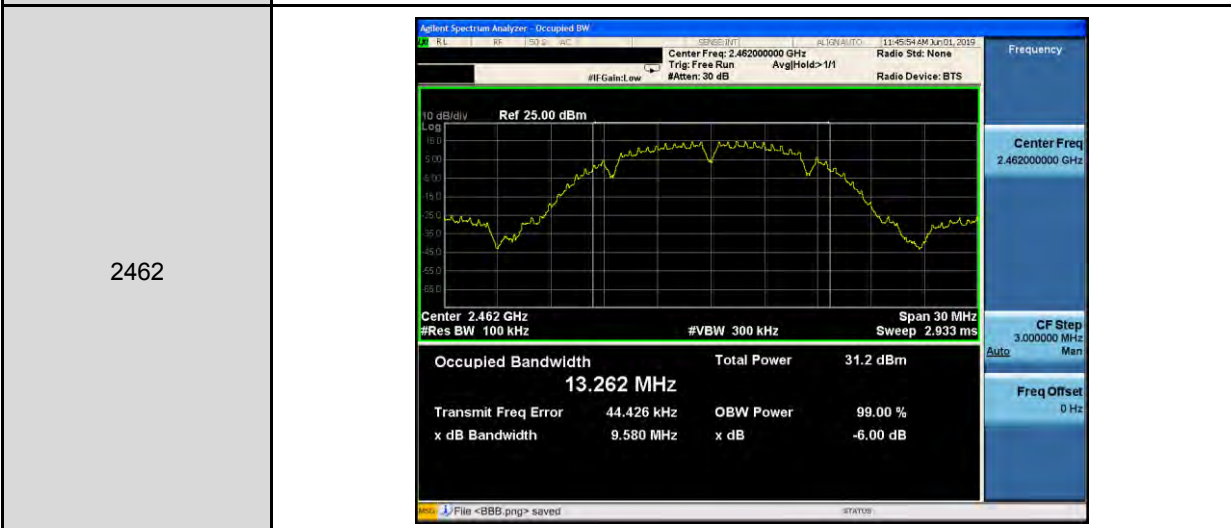
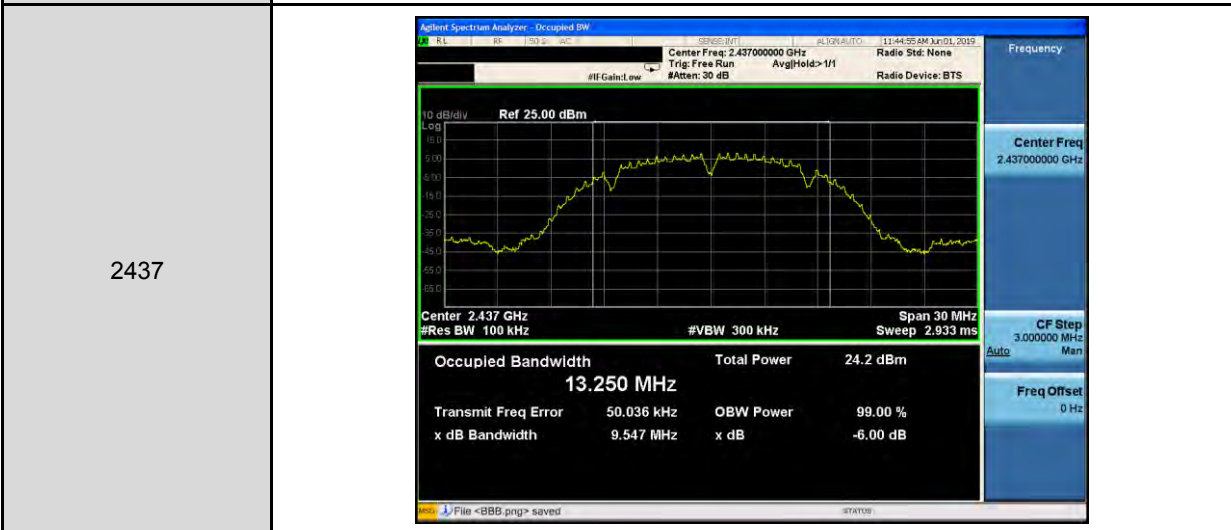
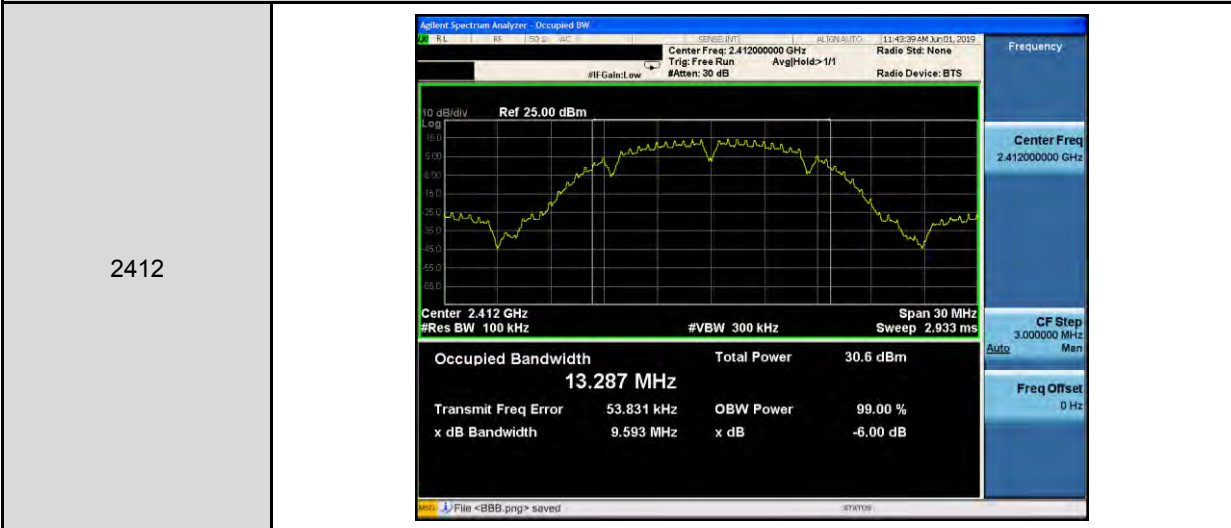
| Mode 4: IEEE 802.11n 2.4 GHz 20 MHz link mode_ANT-1 | |
|---|---|
| 2412 |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.41200000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Ref Offset 12 dB Ref 20.00 dBm</p> <p>Center 2.412 GHz Res BW 100 kHz Span 30 MHz Sweep 2.933 ms</p> <p>Occupied Bandwidth 17.213 MHz Total Power 30.6 dBm</p> <p>Transmit Freq Error -3.055 kHz OBW Power 99.00 % x dB Bandwidth 15.13 MHz x dB -6.00 dB</p> |
| 2437 |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.43700000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Ref Offset 12 dB Ref 20.00 dBm</p> <p>Center 2.437 GHz Res BW 100 kHz Span 30 MHz Sweep 2.933 ms</p> <p>Occupied Bandwidth 17.238 MHz Total Power 30.8 dBm</p> <p>Transmit Freq Error 4.467 kHz OBW Power 99.00 % x dB Bandwidth 15.14 MHz x dB -6.00 dB</p> |
| 2462 |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.46200000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Ref Offset 12 dB Ref 20.00 dBm</p> <p>Center 2.462 GHz Res BW 100 kHz Span 30 MHz Sweep 2.933 ms</p> <p>Occupied Bandwidth 17.237 MHz Total Power 31.4 dBm</p> <p>Transmit Freq Error -13.553 kHz OBW Power 99.00 % x dB Bandwidth 15.14 MHz x dB -6.00 dB</p> |






| Mode 5: IEEE 802.11n 2.4 GHz 40 MHz link mode_ANT-1 | |
|---|---|
| 2422 |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.42200000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Ref Offset 12 dB Ref 20.00 dBm</p> <p>Center 2.422 GHz Res BW 100 kHz #VBW 300 kHz Span 50 MHz Sweep 4.8 ms</p> <p>Occupied Bandwidth: 35.670 MHz Total Power: 31.4 dBm</p> <p>Transmit Freq Error: 70.395 kHz OBW Power: 99.00 % x dB Bandwidth: 33.87 MHz x dB: -6.00 dB</p> |
| 2437 |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.43700000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Ref Offset 12 dB Ref 20.00 dBm</p> <p>Center 2.437 GHz Res BW 100 kHz #VBW 300 kHz Span 50 MHz Sweep 4.8 ms</p> <p>Occupied Bandwidth: 35.672 MHz Total Power: 31.3 dBm</p> <p>Transmit Freq Error: 65.980 kHz OBW Power: 99.00 % x dB Bandwidth: 33.82 MHz x dB: -6.00 dB</p> |
| 2452 |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.45200000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Ref Offset 12 dB Ref 20.00 dBm</p> <p>Center 2.452 GHz Res BW 100 kHz #VBW 300 kHz Span 50 MHz Sweep 4.8 ms</p> <p>Occupied Bandwidth: 35.710 MHz Total Power: 31.6 dBm</p> <p>Transmit Freq Error: 37.133 kHz OBW Power: 99.00 % x dB Bandwidth: 33.88 MHz x dB: -6.00 dB</p> |

Model: PA300-E: External antenna

Mode 2: IEEE 802.11b Continuous TX mode_ANT-0



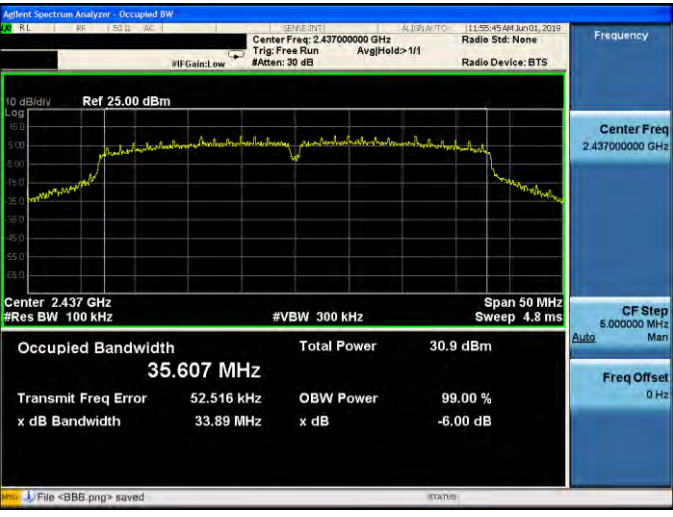


| Mode 3: IEEE 802.11g Continuous TX mode_ANT-0 | |
|---|---|
| 2412 |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.41200000 GHz Trig: Free Run #Atten: 30 dB Radio Std: None Radio Device: BTS</p> <p>Ref 25.00 dBm</p> <p>Center 2.412 GHz Res BW 100 kHz Span 30 MHz Sweep 2.933 ms</p> <p>Occupied Bandwidth 16.128 MHz Total Power 21.9 dBm</p> <p>Transmit Freq Error -30.023 kHz OBW Power 99.00 % x dB Bandwidth 15.13 MHz x dB -6.00 dB</p> |
| 2437 |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.43700000 GHz Trig: Free Run #Atten: 30 dB Radio Std: None Radio Device: BTS</p> <p>Ref 25.00 dBm</p> <p>Center 2.437 GHz Res BW 100 kHz Span 30 MHz Sweep 2.933 ms</p> <p>Occupied Bandwidth 16.119 MHz Total Power 18.9 dBm</p> <p>Transmit Freq Error -33.062 kHz OBW Power 99.00 % x dB Bandwidth 15.13 MHz x dB -6.00 dB</p> |
| 2462 |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.46200000 GHz Trig: Free Run #Atten: 30 dB Radio Std: None Radio Device: BTS</p> <p>Ref 25.00 dBm</p> <p>Center 2.462 GHz Res BW 100 kHz Span 30 MHz Sweep 2.933 ms</p> <p>Occupied Bandwidth 16.045 MHz Total Power 19.7 dBm</p> <p>Transmit Freq Error -4.376 kHz OBW Power 99.00 % x dB Bandwidth 15.13 MHz x dB -6.00 dB</p> |



| Mode 4: IEEE 802.11n 2.4 GHz 20 MHz link mode _ANT-0 | | | | | | | | | | | | | |
|--|--|--------------------|------------|-------------|----------|---------------------|-------------|-----------|---------|----------------|-----------|------|----------|
| 2412 | <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.41200000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Radio Std: None Radio Device: BTS</p> <p>Ref 25.00 dBm</p> <p>Center 2.412 GHz #Res BW 100 kHz #VBW 300 kHz Span 30 MHz Sweep 2.933 ms</p> <table border="1"><tr><td>Occupied Bandwidth</td><td>17.137 MHz</td><td>Total Power</td><td>21.4 dBm</td></tr><tr><td>Transmit Freq Error</td><td>-14.135 kHz</td><td>OBW Power</td><td>99.00 %</td></tr><tr><td>x dB Bandwidth</td><td>15.13 MHz</td><td>x dB</td><td>-6.00 dB</td></tr></table> <p>File <BBB.png> saved</p> | Occupied Bandwidth | 17.137 MHz | Total Power | 21.4 dBm | Transmit Freq Error | -14.135 kHz | OBW Power | 99.00 % | x dB Bandwidth | 15.13 MHz | x dB | -6.00 dB |
| Occupied Bandwidth | 17.137 MHz | Total Power | 21.4 dBm | | | | | | | | | | |
| Transmit Freq Error | -14.135 kHz | OBW Power | 99.00 % | | | | | | | | | | |
| x dB Bandwidth | 15.13 MHz | x dB | -6.00 dB | | | | | | | | | | |
| 2437 | <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.43700000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Radio Std: None Radio Device: BTS</p> <p>Ref 25.00 dBm</p> <p>Center 2.437 GHz #Res BW 100 kHz #VBW 300 kHz Span 30 MHz Sweep 2.933 ms</p> <table border="1"><tr><td>Occupied Bandwidth</td><td>17.125 MHz</td><td>Total Power</td><td>18.4 dBm</td></tr><tr><td>Transmit Freq Error</td><td>-4.219 kHz</td><td>OBW Power</td><td>99.00 %</td></tr><tr><td>x dB Bandwidth</td><td>15.13 MHz</td><td>x dB</td><td>-6.00 dB</td></tr></table> <p>File <BBB.png> saved</p> | Occupied Bandwidth | 17.125 MHz | Total Power | 18.4 dBm | Transmit Freq Error | -4.219 kHz | OBW Power | 99.00 % | x dB Bandwidth | 15.13 MHz | x dB | -6.00 dB |
| Occupied Bandwidth | 17.125 MHz | Total Power | 18.4 dBm | | | | | | | | | | |
| Transmit Freq Error | -4.219 kHz | OBW Power | 99.00 % | | | | | | | | | | |
| x dB Bandwidth | 15.13 MHz | x dB | -6.00 dB | | | | | | | | | | |
| 2462 | <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.46200000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Radio Std: None Radio Device: BTS</p> <p>Ref 25.00 dBm</p> <p>Center 2.462 GHz #Res BW 100 kHz #VBW 300 kHz Span 30 MHz Sweep 2.933 ms</p> <table border="1"><tr><td>Occupied Bandwidth</td><td>17.152 MHz</td><td>Total Power</td><td>22.6 dBm</td></tr><tr><td>Transmit Freq Error</td><td>-5.982 kHz</td><td>OBW Power</td><td>99.00 %</td></tr><tr><td>x dB Bandwidth</td><td>15.13 MHz</td><td>x dB</td><td>-6.00 dB</td></tr></table> <p>File <BBB.png> saved</p> | Occupied Bandwidth | 17.152 MHz | Total Power | 22.6 dBm | Transmit Freq Error | -5.982 kHz | OBW Power | 99.00 % | x dB Bandwidth | 15.13 MHz | x dB | -6.00 dB |
| Occupied Bandwidth | 17.152 MHz | Total Power | 22.6 dBm | | | | | | | | | | |
| Transmit Freq Error | -5.982 kHz | OBW Power | 99.00 % | | | | | | | | | | |
| x dB Bandwidth | 15.13 MHz | x dB | -6.00 dB | | | | | | | | | | |



| Mode 5: IEEE 802.11n 2.4 GHz 40 MHz link mode _ANT-0 | |
|--|--|
| 2422 |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.42200000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Ref 25.00 dBm</p> <p>Center 2.422 GHz Res BW 100 kHz Span 50 MHz Sweep 4.8 ms</p> <p>Occupied Bandwidth: 35.609 MHz Total Power: 30.1 dBm</p> <p>Transmit Freq Error: 44.179 kHz x dB Bandwidth: 33.86 MHz</p> <p>OBW Power: 99.00 % x dB: -6.00 dB</p> |
| 2437 |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.43700000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Ref 25.00 dBm</p> <p>Center 2.437 GHz Res BW 100 kHz Span 50 MHz Sweep 4.8 ms</p> <p>Occupied Bandwidth: 35.607 MHz Total Power: 30.9 dBm</p> <p>Transmit Freq Error: 52.516 kHz x dB Bandwidth: 33.89 MHz</p> <p>OBW Power: 99.00 % x dB: -6.00 dB</p> |
| 2452 |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.45200000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Ref 25.00 dBm</p> <p>Center 2.452 GHz Res BW 100 kHz Span 50 MHz Sweep 4.8 ms</p> <p>Occupied Bandwidth: 35.599 MHz Total Power: 30.4 dBm</p> <p>Transmit Freq Error: 57.465 kHz x dB Bandwidth: 33.89 MHz</p> <p>OBW Power: 99.00 % x dB: -6.00 dB</p> |

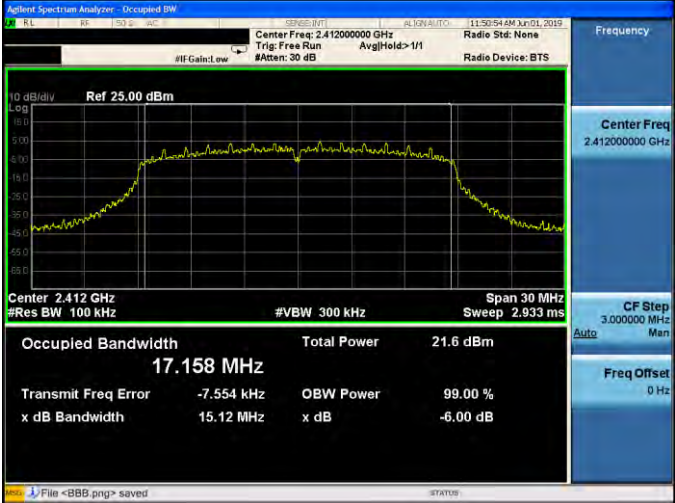
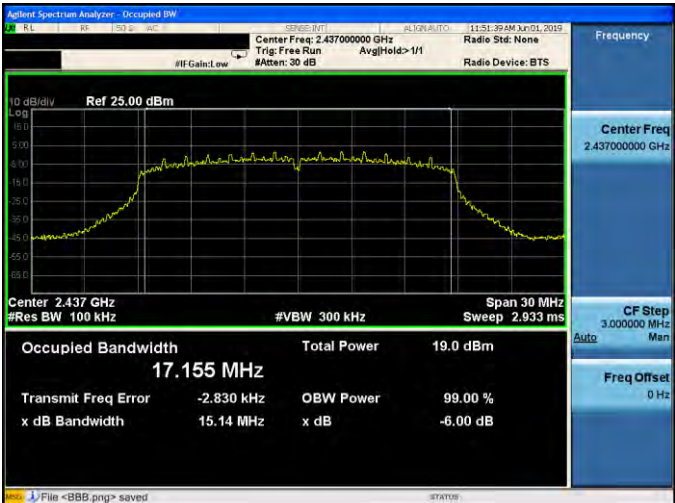
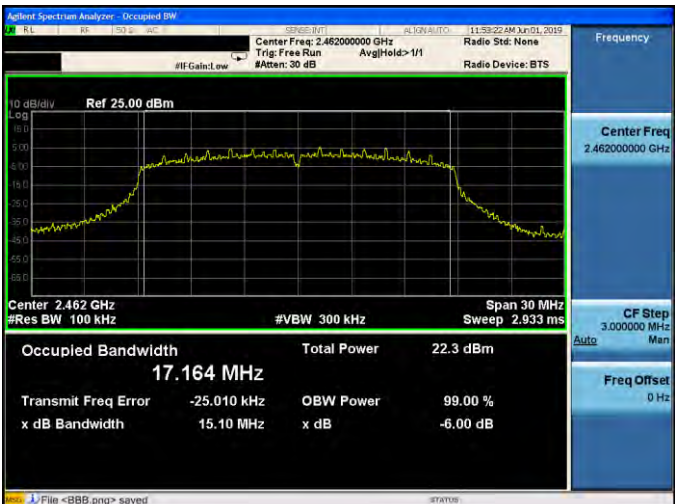


| Mode 2: IEEE 802.11b Continuous TX mode_ANT-1 | |
|---|---|
| 2412 | <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.41200000 GHz Trig: Free Run #Att: 30 dB</p> <p>Ref 25.00 dBm</p> <p>Center 2.412 GHz Res BW 100 kHz Span 30 MHz Sweep 2.933 ms</p> <p>Occupied Bandwidth 13.538 MHz Total Power 29.7 dBm</p> <p>Transmit Freq Error 119.96 kHz x dB Bandwidth 9.587 MHz</p> <p>OBW Power 99.00 % x dB -6.00 dB</p> |
| 2437 | <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.43700000 GHz Trig: Free Run #Att: 30 dB</p> <p>Ref 25.00 dBm</p> <p>Center 2.437 GHz Res BW 100 kHz Span 30 MHz Sweep 2.933 ms</p> <p>Occupied Bandwidth 13.481 MHz Total Power 24.1 dBm</p> <p>Transmit Freq Error 94.593 kHz x dB Bandwidth 9.615 MHz</p> <p>OBW Power 99.00 % x dB -6.00 dB</p> |
| 2462 | <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.46200000 GHz Trig: Free Run #Att: 30 dB</p> <p>Ref 25.00 dBm</p> <p>Center 2.462 GHz Res BW 100 kHz Span 30 MHz Sweep 2.933 ms</p> <p>Occupied Bandwidth 13.583 MHz Total Power 29.7 dBm</p> <p>Transmit Freq Error 61.937 kHz x dB Bandwidth 10.08 MHz</p> <p>OBW Power 99.00 % x dB -6.00 dB</p> |






| Mode 3: IEEE 802.11g Continuous TX mode_ANT-1 | |
|---|---|
| 2412 | <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.41200000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Ref 25.00 dBm</p> <p>Center 2.412 GHz Res BW 100 kHz Span 30 MHz Sweep 2.933 ms</p> <p>Occupied Bandwidth 16.119 MHz Total Power 22.1 dBm</p> <p>Transmit Freq Error -25.246 kHz OBW Power 99.00 % x dB Bandwidth 15.12 MHz x dB -6.00 dB</p> |
| 2437 | <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.43700000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Ref 25.00 dBm</p> <p>Center 2.437 GHz Res BW 100 kHz Span 30 MHz Sweep 2.933 ms</p> <p>Occupied Bandwidth 16.103 MHz Total Power 18.8 dBm</p> <p>Transmit Freq Error -30.746 kHz OBW Power 99.00 % x dB Bandwidth 15.12 MHz x dB -6.00 dB</p> |
| 2462 | <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.46200000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Ref 25.00 dBm</p> <p>Center 2.462 GHz Res BW 100 kHz Span 30 MHz Sweep 2.933 ms</p> <p>Occupied Bandwidth 16.132 MHz Total Power 19.6 dBm</p> <p>Transmit Freq Error -8.955 kHz OBW Power 99.00 % x dB Bandwidth 15.14 MHz x dB -6.00 dB</p> |



| Mode 4: IEEE 802.11n 2.4 GHz 20 MHz link mode_ANT-1 | | | | | | | | | | | | | | | | |
|---|--|--------------------|-------------|----------|------------|--|--|---------------------|-----------|---------|-------------|------|----------|----------------|-----------|--|
| 2412 |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.41200000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Ref 25.00 dBm</p> <p>Center 2.412 GHz Res BW 100 kHz #VBW 300 kHz Span 30 MHz Sweep 2.933 ms</p> <table border="1"><tr><td>Occupied Bandwidth</td><td>Total Power</td><td>21.6 dBm</td></tr><tr><td>17.158 MHz</td><td></td><td></td></tr><tr><td>Transmit Freq Error</td><td>OBW Power</td><td>99.00 %</td></tr><tr><td>-7.554 kHz</td><td>x dB</td><td>-6.00 dB</td></tr><tr><td>x dB Bandwidth</td><td>15.12 MHz</td><td></td></tr></table> | Occupied Bandwidth | Total Power | 21.6 dBm | 17.158 MHz | | | Transmit Freq Error | OBW Power | 99.00 % | -7.554 kHz | x dB | -6.00 dB | x dB Bandwidth | 15.12 MHz | |
| Occupied Bandwidth | Total Power | 21.6 dBm | | | | | | | | | | | | | | |
| 17.158 MHz | | | | | | | | | | | | | | | | |
| Transmit Freq Error | OBW Power | 99.00 % | | | | | | | | | | | | | | |
| -7.554 kHz | x dB | -6.00 dB | | | | | | | | | | | | | | |
| x dB Bandwidth | 15.12 MHz | | | | | | | | | | | | | | | |
| 2437 |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.43700000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Ref 25.00 dBm</p> <p>Center 2.437 GHz Res BW 100 kHz #VBW 300 kHz Span 30 MHz Sweep 2.933 ms</p> <table border="1"><tr><td>Occupied Bandwidth</td><td>Total Power</td><td>19.0 dBm</td></tr><tr><td>17.155 MHz</td><td></td><td></td></tr><tr><td>Transmit Freq Error</td><td>OBW Power</td><td>99.00 %</td></tr><tr><td>-2.830 kHz</td><td>x dB</td><td>-6.00 dB</td></tr><tr><td>x dB Bandwidth</td><td>15.14 MHz</td><td></td></tr></table> | Occupied Bandwidth | Total Power | 19.0 dBm | 17.155 MHz | | | Transmit Freq Error | OBW Power | 99.00 % | -2.830 kHz | x dB | -6.00 dB | x dB Bandwidth | 15.14 MHz | |
| Occupied Bandwidth | Total Power | 19.0 dBm | | | | | | | | | | | | | | |
| 17.155 MHz | | | | | | | | | | | | | | | | |
| Transmit Freq Error | OBW Power | 99.00 % | | | | | | | | | | | | | | |
| -2.830 kHz | x dB | -6.00 dB | | | | | | | | | | | | | | |
| x dB Bandwidth | 15.14 MHz | | | | | | | | | | | | | | | |
| 2462 |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.46200000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Ref 25.00 dBm</p> <p>Center 2.462 GHz Res BW 100 kHz #VBW 300 kHz Span 30 MHz Sweep 2.933 ms</p> <table border="1"><tr><td>Occupied Bandwidth</td><td>Total Power</td><td>22.3 dBm</td></tr><tr><td>17.164 MHz</td><td></td><td></td></tr><tr><td>Transmit Freq Error</td><td>OBW Power</td><td>99.00 %</td></tr><tr><td>-25.010 kHz</td><td>x dB</td><td>-6.00 dB</td></tr><tr><td>x dB Bandwidth</td><td>15.10 MHz</td><td></td></tr></table> | Occupied Bandwidth | Total Power | 22.3 dBm | 17.164 MHz | | | Transmit Freq Error | OBW Power | 99.00 % | -25.010 kHz | x dB | -6.00 dB | x dB Bandwidth | 15.10 MHz | |
| Occupied Bandwidth | Total Power | 22.3 dBm | | | | | | | | | | | | | | |
| 17.164 MHz | | | | | | | | | | | | | | | | |
| Transmit Freq Error | OBW Power | 99.00 % | | | | | | | | | | | | | | |
| -25.010 kHz | x dB | -6.00 dB | | | | | | | | | | | | | | |
| x dB Bandwidth | 15.10 MHz | | | | | | | | | | | | | | | |



| Mode 5: IEEE 802.11n 2.4 GHz 40 MHz link mode_ANT-1 | |
|---|--|
| 2422 |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.42200000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Ref 25.00 dBm</p> <p>Center 2.422 GHz Res BW 100 kHz Span 50 MHz Sweep 4.8 ms</p> <p>Occupied Bandwidth: 35.639 MHz Total Power: 30.7 dBm</p> <p>Transmit Freq Error: 70.562 kHz x dB Bandwidth: 33.87 MHz</p> <p>OBW Power: 99.00 % x dB: -6.00 dB</p> |
| 2437 |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.43700000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Ref 25.00 dBm</p> <p>Center 2.437 GHz Res BW 100 kHz Span 50 MHz Sweep 4.8 ms</p> <p>Occupied Bandwidth: 35.654 MHz Total Power: 31.1 dBm</p> <p>Transmit Freq Error: 53.924 kHz x dB Bandwidth: 33.81 MHz</p> <p>OBW Power: 99.00 % x dB: -6.00 dB</p> |
| 2452 |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.45200000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Ref 25.00 dBm</p> <p>Center 2.452 GHz Res BW 100 kHz Span 50 MHz Sweep 4.8 ms</p> <p>Occupied Bandwidth: 35.601 MHz Total Power: 30.2 dBm</p> <p>Transmit Freq Error: 30.973 kHz x dB Bandwidth: 32.60 MHz</p> <p>OBW Power: 99.00 % x dB: -6.00 dB</p> |



Maximum Power Density Measurement

| Model: PA300: built-in antenna | | | | | |
|--------------------------------|-----------------|---------------------------------|--------|---------|-------------------|
| est Mode | Frequency (MHz) | Measurement Results (dBm/3 kHz) | | | Limit (dBm/3 kHz) |
| | | ANT-0 | ANT-1 | ANT-0+1 | |
| Mode 2 | 2412 | 0.237 | -0.603 | 2.848 | ≤ 7.69 |
| | 2437 | -0.981 | -1.983 | 1.557 | ≤ 7.69 |
| | 2462 | 0.539 | 0.333 | 3.448 | ≤ 7.69 |
| Mode 3 | 2412 | -1.036 | -0.578 | 2.209 | ≤ 7.69 |
| | 2437 | -0.781 | -0.669 | 2.286 | ≤ 7.69 |
| | 2462 | -0.473 | -0.852 | 2.352 | ≤ 7.69 |
| Mode 4 | 2412 | -1.374 | -1.463 | 1.592 | ≤ 7.69 |
| | 2437 | -1.686 | -1.577 | 1.379 | ≤ 7.69 |
| | 2462 | -1.572 | -0.923 | 1.775 | ≤ 7.69 |
| Mode 5 | 2422 | -5.956 | -5.799 | -2.866 | ≤ 7.69 |
| | 2437 | -4.294 | -4.235 | -1.254 | ≤ 7.69 |
| | 2452 | -6.070 | -5.738 | -2.891 | ≤ 7.69 |

| Model: PA300-E: External antenna | | | | | |
|----------------------------------|-----------------|---------------------------------|---------|---------|-------------------|
| Test Mode | Frequency (MHz) | Measurement Results (dBm/3 kHz) | | | Limit (dBm/3 kHz) |
| | | ANT-0 | ANT-1 | ANT-0+1 | |
| Mode 2 | 2412 | 0.649 | 0.116 | 3.401 | ≤ 5.82 |
| | 2437 | -6.445 | -6.267 | -3.345 | ≤ 5.82 |
| | 2462 | 0.435 | 0.453 | 3.454 | ≤ 5.82 |
| Mode 3 | 2412 | -9.667 | -9.602 | -6.624 | ≤ 5.82 |
| | 2437 | -12.519 | -12.361 | -9.429 | ≤ 5.82 |
| | 2462 | -12.283 | -12.173 | -9.217 | ≤ 5.82 |
| Mode 4 | 2412 | -10.359 | -10.522 | -7.429 | ≤ 5.82 |
| | 2437 | -12.983 | -13.119 | -10.040 | ≤ 5.82 |
| | 2462 | -9.302 | -9.788 | -6.528 | ≤ 5.82 |
| Mode 5 | 2422 | -5.600 | -5.578 | -2.579 | ≤ 5.82 |
| | 2437 | -3.956 | -3.730 | -0.831 | ≤ 5.82 |
| | 2452 | -4.893 | -4.600 | -1.734 | ≤ 5.82 |

■ Test Graphs

Model: PA300: built-in antenna

Mode 2: IEEE 802.11b Continuous TX mode_ANT-0

| | |
|-------------|--|
| <p>2412</p> | |
| <p>2437</p> | |
| <p>2462</p> | |

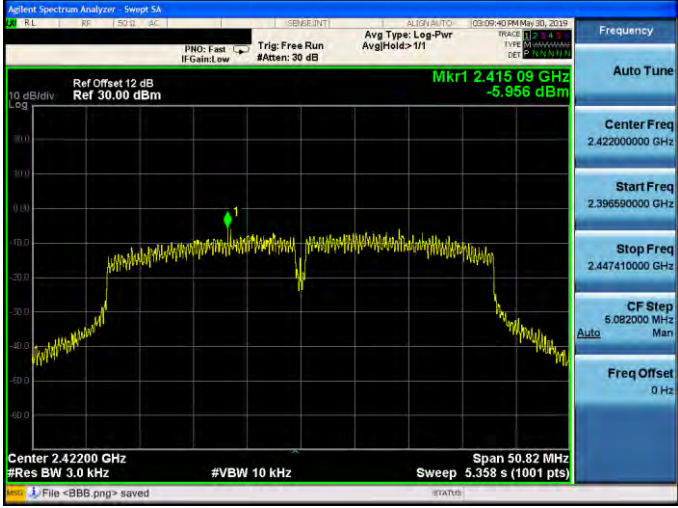

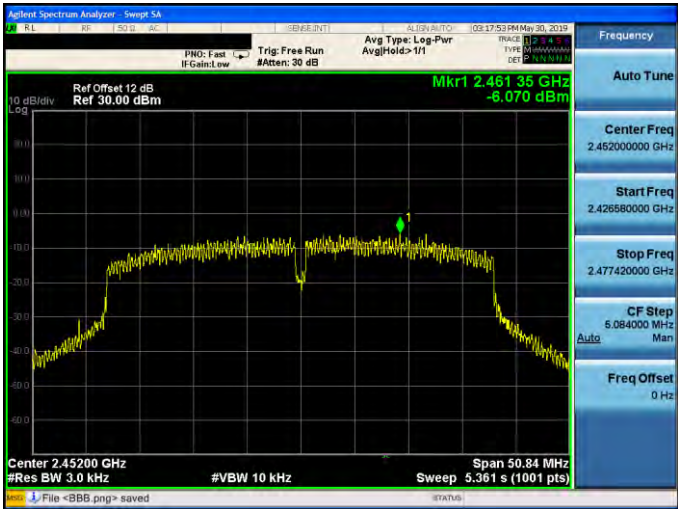


| Mode 3: IEEE 802.11g Continuous TX mode_ANT-0 | | | | | | | | | |
|---|---|-----------|-----------|----------------------------|----------------------------|---------------------------|----------------------|----------|------------------|
| 2412 | <p>Agilent Spectrum Analyzer - Sweep SA 0:01:13.42 PM May 27, 2019 PNO: Fast IF Gain: Low Trig: Free Run #Atten: 30 dB Avg Type: Log-Pwr Avg/Hold: 1/1 Mkr1 2.410 342.9 GHz -1.036 dBm 10 dB/div Ref Offset 12 dB Ref 20.00 dBm LOG Center 2.41200 GHz Span 22.70 MHz #Res BW 3.0 kHz #VBW 10 kHz Sweep 2.394 s (1001 pts) File <BBB.png> saved</p> <table border="1"><thead><tr><th>Frequency</th></tr></thead><tbody><tr><td>Auto Tune</td></tr><tr><td>Center Freq 2.41200000 GHz</td></tr><tr><td>Start Freq 2.400650000 GHz</td></tr><tr><td>Stop Freq 2.423350000 GHz</td></tr><tr><td>CF Step 2.270000 MHz</td></tr><tr><td>Auto Man</td></tr><tr><td>Freq Offset 0 Hz</td></tr></tbody></table> | Frequency | Auto Tune | Center Freq 2.41200000 GHz | Start Freq 2.400650000 GHz | Stop Freq 2.423350000 GHz | CF Step 2.270000 MHz | Auto Man | Freq Offset 0 Hz |
| Frequency | | | | | | | | | |
| Auto Tune | | | | | | | | | |
| Center Freq 2.41200000 GHz | | | | | | | | | |
| Start Freq 2.400650000 GHz | | | | | | | | | |
| Stop Freq 2.423350000 GHz | | | | | | | | | |
| CF Step 2.270000 MHz | | | | | | | | | |
| Auto Man | | | | | | | | | |
| Freq Offset 0 Hz | | | | | | | | | |
| 2437 | <p>Agilent Spectrum Analyzer - Sweep SA 0:01:15.06 PM May 27, 2019 PNO: Fast IF Gain: Low Trig: Free Run #Atten: 30 dB Avg Type: Log-Pwr Avg/Hold: 1/1 Mkr1 2.437 567 GHz -0.781 dBm 10 dB/div Ref Offset 12 dB Ref 20.00 dBm LOG Center 2.43700 GHz Span 22.68 MHz #Res BW 3.0 kHz #VBW 10 kHz Sweep 2.391 s (1001 pts) File <BBB.png> saved</p> <table border="1"><thead><tr><th>Frequency</th></tr></thead><tbody><tr><td>Auto Tune</td></tr><tr><td>Center Freq 2.43700000 GHz</td></tr><tr><td>Start Freq 2.425660000 GHz</td></tr><tr><td>Stop Freq 2.448340000 GHz</td></tr><tr><td>CF Step 2.268000 MHz</td></tr><tr><td>Auto Man</td></tr><tr><td>Freq Offset 0 Hz</td></tr></tbody></table> | Frequency | Auto Tune | Center Freq 2.43700000 GHz | Start Freq 2.425660000 GHz | Stop Freq 2.448340000 GHz | CF Step 2.268000 MHz | Auto Man | Freq Offset 0 Hz |
| Frequency | | | | | | | | | |
| Auto Tune | | | | | | | | | |
| Center Freq 2.43700000 GHz | | | | | | | | | |
| Start Freq 2.425660000 GHz | | | | | | | | | |
| Stop Freq 2.448340000 GHz | | | | | | | | | |
| CF Step 2.268000 MHz | | | | | | | | | |
| Auto Man | | | | | | | | | |
| Freq Offset 0 Hz | | | | | | | | | |
| 2462 | <p>Agilent Spectrum Analyzer - Sweep SA 0:01:16.30 PM May 27, 2019 PNO: Fast IF Gain: Low Trig: Free Run #Atten: 30 dB Avg Type: Log-Pwr Avg/Hold: 1/1 Mkr1 2.461 341.7 GHz -0.473 dBm 10 dB/div Ref Offset 12 dB Ref 20.00 dBm LOG Center 2.46200 GHz Span 22.70 MHz #Res BW 3.0 kHz #VBW 10 kHz Sweep 2.394 s (1001 pts) File <BBB.png> saved</p> <table border="1"><thead><tr><th>Frequency</th></tr></thead><tbody><tr><td>Auto Tune</td></tr><tr><td>Center Freq 2.46200000 GHz</td></tr><tr><td>Start Freq 2.450650000 GHz</td></tr><tr><td>Stop Freq 2.473350000 GHz</td></tr><tr><td>CF Step 2.270000 MHz</td></tr><tr><td>Auto Man</td></tr><tr><td>Freq Offset 0 Hz</td></tr></tbody></table> | Frequency | Auto Tune | Center Freq 2.46200000 GHz | Start Freq 2.450650000 GHz | Stop Freq 2.473350000 GHz | CF Step 2.270000 MHz | Auto Man | Freq Offset 0 Hz |
| Frequency | | | | | | | | | |
| Auto Tune | | | | | | | | | |
| Center Freq 2.46200000 GHz | | | | | | | | | |
| Start Freq 2.450650000 GHz | | | | | | | | | |
| Stop Freq 2.473350000 GHz | | | | | | | | | |
| CF Step 2.270000 MHz | | | | | | | | | |
| Auto Man | | | | | | | | | |
| Freq Offset 0 Hz | | | | | | | | | |



| Mode 4: IEEE 802.11n 2.4 GHz 20 MHz Continuous TX mode_ANT-0 | |
|--|---|
| 2412 | <p>Agilent Spectrum Analyzer - Sweep 5A</p> <p>Ref Offset 12 dB Ref 20.00 dBm</p> <p>Mkr1 2.411 637 GHz -1.374 dBm</p> <p>Center 2.41200 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 22.68 MHz Sweep 2.391 s (1001 pts)</p> <p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.41200000 GHz</p> <p>Start Freq 2.40086000 GHz</p> <p>Stop Freq 2.42334000 GHz</p> <p>CF Step 2.28800 MHz Auto Man</p> <p>Freq Offset 0 Hz</p> |
| 2437 | <p>Agilent Spectrum Analyzer - Sweep 5A</p> <p>Ref Offset 12 dB Ref 20.00 dBm</p> <p>Mkr1 2.437 568 GHz -1.686 dBm</p> <p>Center 2.43700 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 22.74 MHz Sweep 2.395 s (1001 pts)</p> <p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.43700000 GHz</p> <p>Start Freq 2.42584500 GHz</p> <p>Stop Freq 2.44835500 GHz</p> <p>CF Step 2.27100 MHz Auto Man</p> <p>Freq Offset 0 Hz</p> |
| 2462 | <p>Agilent Spectrum Analyzer - Sweep 5A</p> <p>Ref Offset 12 dB Ref 20.00 dBm</p> <p>Mkr1 2.462 590 GHz -1.572 dBm</p> <p>Center 2.46200 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 22.70 MHz Sweep 2.394 s (1001 pts)</p> <p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.46200000 GHz</p> <p>Start Freq 2.45086000 GHz</p> <p>Stop Freq 2.47336000 GHz</p> <p>CF Step 2.27000 MHz Auto Man</p> <p>Freq Offset 0 Hz</p> |



| Mode 5: IEEE 802.11n 2.4 GHz 40 MHz Continuous TX mode_ANT-0 | |
|--|---|
| 2422 |  <p>Ref Offset 12 dB Ref 30.00 dBm Mkr1 2.415 09 GHz -5.956 dBm Center 2.422000 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 50.82 MHz Sweep 5.358 s (1001 pts)</p> |
| 2437 |  <p>Ref Offset 12 dB Ref 20.00 dBm Mkr1 2.443 24 GHz -4.294 dBm Center 2.437000 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 50.76 MHz Sweep 5.352 s (1001 pts)</p> |
| 2452 |  <p>Ref Offset 12 dB Ref 30.00 dBm Mkr1 2.461 35 GHz -8.070 dBm Center 2.452000 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 50.84 MHz Sweep 5.361 s (1001 pts)</p> |



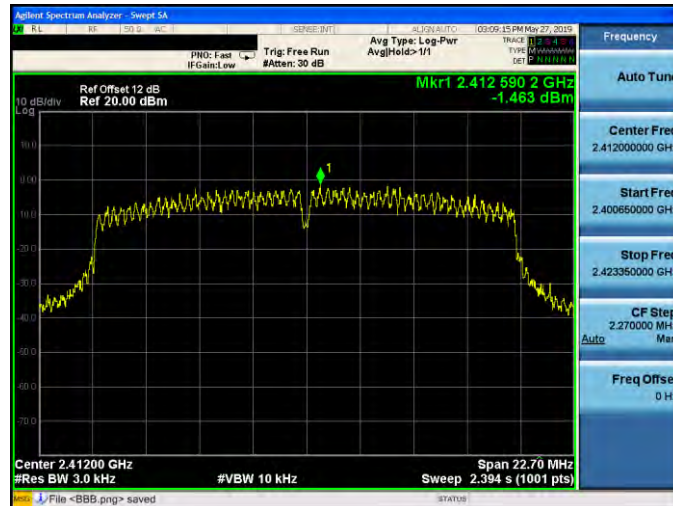
| Mode 2: IEEE 802.11b Continuous TX mode_ANT-1 | |
|---|--|
| 2412 | |
| 2437 | |
| 2462 | |

| Mode 3: IEEE 802.11g Continuous TX mode_ANT-1 | |
|---|--|
| 2412 | |
| 2437 | |
| 2462 | |

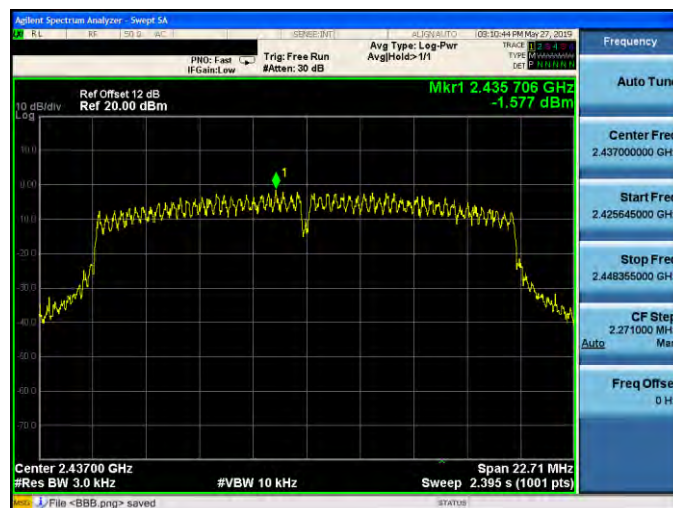


Mode 4: IEEE 802.11n 2.4 GHz 20 MHz Continuous TX mode_ANT-1

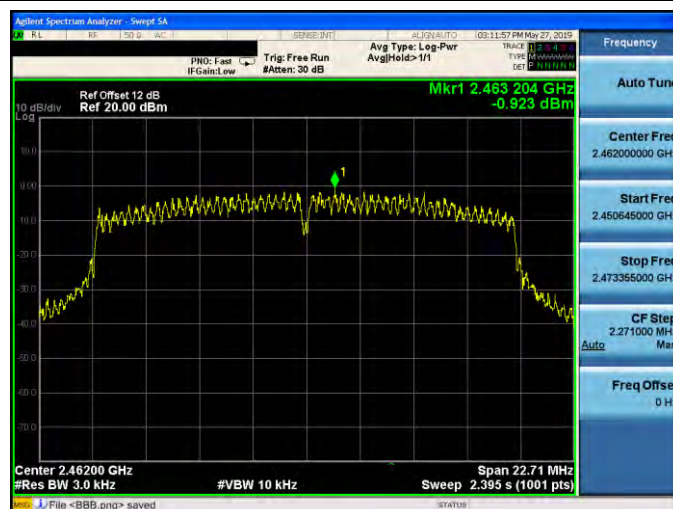
2412



2437



2462





| Mode 5: IEEE 802.11n 2.4 GHz 40 MHz Continuous TX mode_ANT-1 | |
|--|--|
| 2422 | <p>Agilent Spectrum Analyzer - Sweep 5A Ref Offset 12 dB Ref 30.00 dBm Mkr1 2.426 98 GHz -5.799 dBm Center 2.42200 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 50.81 MHz Sweep 5.357 s (1001 pts)</p> |
| 2437 | <p>Agilent Spectrum Analyzer - Sweep 5A Ref Offset 12 dB Ref 20.00 dBm Mkr1 2.445 98 GHz -4.235 dBm Center 2.43700 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 50.73 MHz Sweep 5.349 s (1001 pts)</p> |
| 2452 | <p>Agilent Spectrum Analyzer - Sweep 5A Ref Offset 12 dB Ref 30.00 dBm Mkr1 2.459 11 GHz -5.738 dBm Center 2.45200 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 50.82 MHz Sweep 5.358 s (1001 pts)</p> |