FCC PART 15, SUBPART C
ISED RSS-247, ISSUE 1, MAY 2015

TEST AND MEASUREMENT REPORT

For

GoPro, Inc.

3000 Clearview Way,

San Mateo, CA 94402, USA

FCC ID: CNFKWST1
IC: 10193A-KWST1

Report Type:	**Product Type:**
Original Report	Drone

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Report Number:	R1605031-247
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1605031-247	Original Report	2016-09-20

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test and measurement report was prepared on behalf of *GoPro, Inc.,* and their product model: *KWST1,* FCC ID: CNFKWST1; IC: 10193A-KWST1; or the "EUT" as referred to in this report. The EUT is a drone with 2.4 GHz Wi-Fi capability.

1.2 Mechanical Description of EUT

Dimensions: approximately 33.0 cm (L) x 15.0 cm (W) x 8.0 cm (H)
Weight: approximately 1.7 Kg.

The test data gathered are from typical production sample, serial number: R1605031 -1 and -2, assigned by BACL.

1.3 Objective

This report is prepared on behalf of *GoPro, Inc.,* in accordance with Part 2, Subpart J, and Part 15, Subparts B and C of the Federal Communication Commission's rules and ISED RSS-247, Issue 1, May 2015.

The objective is to determine compliance with FCC Part 15.247 and ISED RSS-247 rules for Output Power, Antenna Requirements, 6 dB Bandwidth, Power Spectral Density, 100 kHz Bandwidth of Band Edges Measurement, Conducted and Radiated Spurious Emissions.

1.4 Related Submittal(s)/Grant(s)

Remote Control unit with FCC ID: CNFKWBH1, 10193A-KWBH1.

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices and FCC KDB 558074 D01 DTS Meas Guidance v03r05: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247.

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Parameter	Measurement uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.57 dB
Power Spectral Density, conducted	±1.48dB
Unwanted Emissions, conducted	±1.57dB
All emissions, radiated	±4.0 dB
AC power line Conducted Emission	±2.0 dB
Temperature	±2 ° C
Humidity	±5 %
DC and low frequency voltages	±1.0 %
Time	±2 %
Duty Cycle	±3 %

1.7 Test Facility Registrations

BACLs test facilities that are used to perform Radiated and Conducted Emissions tests are currently recognized by the Federal Communications Commission as Accredited with NIST Designation Number US1129.

BACL's test facilities that are used to perform Radiated and Conducted Emissions tests are currently registered with Industry Canada under Registration Numbers: 3062A-1, 3062A-2, and 3062A-3.

BACL is a Chinese Taipei Bureau of Standards Metrology and Inspection (BSMI) validated Conformity Assessment Body (CAB), under Appendix B, Phase I Procedures of the APEC Mutual Recognition Arrangement (MRA). BACL's BSMI Lab Code Number is: SL2-IN-E-1002R

BACL's test facilities that are used to perform AC Line Conducted Emissions, Telecommunications Line Conducted Emissions, Radiated Emissions from 30 MHz to 1 GHz, and Radiated Emissions from 1 GHz to 6 GHz are currently recognized as Accredited in accordance with the Voluntary Control Council for Interference [VCCI] Article 15 procedures under Registration Number A-0027.

1.8 Test Facility Accreditations

Bay Area Compliance Laboratories Corp. (BACL) is:

A- ***An independent, 3rd-Party, Commercial Test Laboratory accredited to ISO/IEC 17025:2005 by A2LA (Test Laboratory Accreditation Certificate Number 3279.02),*** in the fields of: Electromagnetic Compatibility and Telecommunications. Unless noted by an Asterisk (*) in the Compliance Matrix (See Section 3 of this Test Report), BACL's ISO/IEC 17025:2005 Scope of Accreditation includes all of the Test Method Standards and/or the Product Family Standards detailed in this Test Report..

BACL's ISO/IEC 17025:2005 Scope of Accreditation includes a comprehensive suite of EMC Emissions, EMC Immunity, Radio, RF Exposure, Safety and wireline Telecommunications test methods applicable to a wide range of product categories. These product categories include Central Office Telecommunications Equipment [including NEBS - Network Equipment Building Systems], Unlicensed and Licensed Wireless and RF devices, Information Technology Equipment (ITE); Telecommunications Terminal Equipment (TTE); Medical Electrical

Equipment; Industrial, Scientific and Medical Test Equipment; Professional Audio and Video Equipment; Industrial and Scientific Instruments and Laboratory Apparatus; Cable Distribution Systems, and Energy Efficient Lighting.

B- ***A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3279.03)*** to certify

- For the USA (Federal Communications Commission):
  - 1- All Unlicensed radio frequency devices within FCC Scopes A1, A2, A3, and A4;
  - 2- All Licensed radio frequency devices within FCC Scopes B1, B2, B3, and B4;
  - 3- All Telephone Terminal Equipment within FCC Scope C.
- For Canada (Industry Canada):
  - 1 All Scope 1-Licence-Exempt Radio Frequency Devices;
  - 2 All Scope 2-Licensed Personal Mobile Radio Services;
  - 3 All Scope 3-Licensed General Mobile & Fixed Radio Services;
  - 4 All Scope 4-Licensed Maritime & Aviation Radio Services;
  - 5 All Scope 5-Licensed Fixed Microwave Radio Services
  - 6 All Broadcasting Technical Standards (BETS) in the Category I Equipment Standards List.
- For Singapore (Info-Communications Development Authority (IDA)):
  - 1 All Line Terminal Equipment: All Technical Specifications for Line Terminal Equipment – Table 1 of IDA MRA Recognition Scheme: 2011, Annex 2
  - 2. All Radio-Communication Equipment: All Technical Specifications for Radio-Communication Equipment – Table 2 of IDA MRA Recognition Scheme: 2011, Annex 2
- For the Hong Kong Special Administrative Region:
  - 1 All Radio Equipment, per KHCA 10XX-series Specifications;
  - 2 All GMDSS Marine Radio Equipment, per HKCA 12XX-series Specifications;
  - 3 All Fixed Network Equipment, per HKCA 20XX-series Specifications.
- For Japan:
  - 1 MIC Telecommunication Business Law (Terminal Equipment):
    - All Scope A1 - Terminal Equipment for the Purpose of Calls;
    - All Scope A2 - Other Terminal Equipment
  - 2 Radio Law (Radio Equipment):
    - All Scope B1 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 1 of the Radio Law
    - All Scope B2 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 2 of the Radio Law
    - All Scope B3 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 3 of the Radio Law

C- ***A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3279.01)*** to certify Products to USA's Environmental Protection Agency (EPA) ENERGY STAR Product Specifications for:

1 Electronics and Office Equipment:
- for Telephony (ver. 3.0)
- for Audio/Video (ver. 3.0)
- for Battery Charging Systems (ver. 1.1)
- for Set-top Boxes & Cable Boxes (ver. 4.1)
- for Televisions (ver. 6.1)
- for Computers (ver. 6.0)
- for Displays (ver. 6.0)
- for Imaging Equipment (ver. 2.0)
- for Computer Servers (ver. 2.0)

2 Commercial Food Service Equipment
- for Commercial Dishwashers (ver. 2.0)
- for Commercial Ice Machines (ver. 2.0)
- for Commercial Ovens (ver. 2.1)
- for Commercial Refrigerators and Freezers

3 Lighting Products
- For Decorative Light Strings (ver. 1.5)
- For Luminaires (including sub-components) and Lamps (ver. 1.2)
- For Compact Fluorescent Lamps (CFLs) (ver. 4.3)
- For Integral LED Lamps (ver. 1.4)

4 Heating, Ventilation, and AC Products
- for Residential Ceiling Fans (ver. 3.0)
- for Residential Ventilating Fans (ver. 3.2)

5 Other
- For Water Coolers (ver. 3.0)

D- ***A NIST Designated Phase-I and Phase-II Conformity Assessment Body (CAB) for the following economies and regulatory authorities under the terms of the stated MRAs/Treaties:***

- Australia: ACMA (Australian Communication and Media Authority) – APEC Tel MRA -Phase I;
- Canada: (Industry Canada - IC) Foreign Certification Body – FCB – APEC Tel MRA -Phase I & Phase II;
- Chinese Taipei (Republic of China – Taiwan):
  - BSMI (Bureau of Standards, Metrology and Inspection) APEC Tel MRA -Phase I;
  - NCC (National Communications Commission) APEC Tel MRA -Phase I;
- European Union:
  - EMC Directive 2004/108/EC US-EU EMC & Telecom MRA CAB
  - Radio & Teleterminal Equipment (R&TTE) Directive 1995/5/EC US -EU EMC & Telecom MRA CAB
- Hong Kong Special Administrative Region: (Office of the Telecommunications Authority – OFTA) APEC Tel MRA -Phase I & Phase II
- Israel – US-Israel MRA Phase I
- Republic of Korea (Ministry of Communications - Radio Research Laboratory) APEC Tel MRA -Phase I
- Singapore: (Infocomm Development Authority - IDA) APEC Tel MRA -Phase I & Phase II;
- Japan: VCCI - Voluntary Control Council for Interference US-Japan Telecom Treaty VCCI Side Letter-
- USA:
  - ENERGY STAR Recognized Test Laboratory – US EPA
  - Telecommunications Certification Body (TCB) – US FCC;
- Vietnam: APEC Tel MRA -Phase I;

2 System Test Configuration

2.1 Justification

The EUT was configured for testing according to ANSI C63.10-2013 and FCC KDB 558074 D01 DTS Meas Guidance v03r05.

The EUT was tested in a testing mode to represent worst-case results during the final qualification test.

The worst-case data rates are determined to be as follows for each mode based upon investigation by measuring the average power, peak power and PPSD across all data rates bandwidths, and modulations.

2.2 EUT Exercise Software

Tera Term

2.3 Duty Cycle Correction Factor

According to KDB 558074 D01 DTS Meas Guidance v03r05 section 6.0:

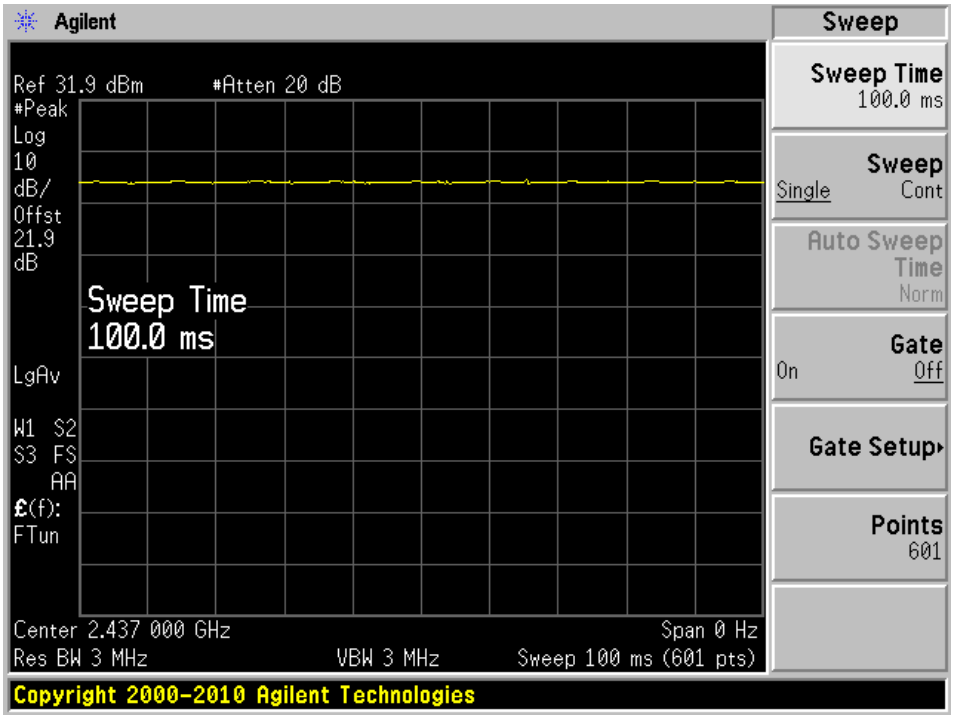
Preferably, all measurements of maximum conducted (average) output power will be performed with the EUT transmitting continuously (i.e., with a duty cycle of greater than or equal to 98%). When continuous operation cannot be realized, then the use of sweep triggering/signal gating techniques can be utilized to ensure that measurements are made only during transmissions at the maximum power control level. Such sweep triggering/signal gating techniques will require knowledge of the minimum transmission duration (T) over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation. Sweep triggering/signal gating techniques can then be used if the measurement/sweep time of the analyzer can be set such that it does not exceed T at any time that data is being acquired (i.e., no transmitter off-time is to be considered).

Radio Mode	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
802.11b	100	100	100	0
802.11g	2.095	2.155	97.22	0.12
802.11n20	1.925	2.000	96.25	0.16

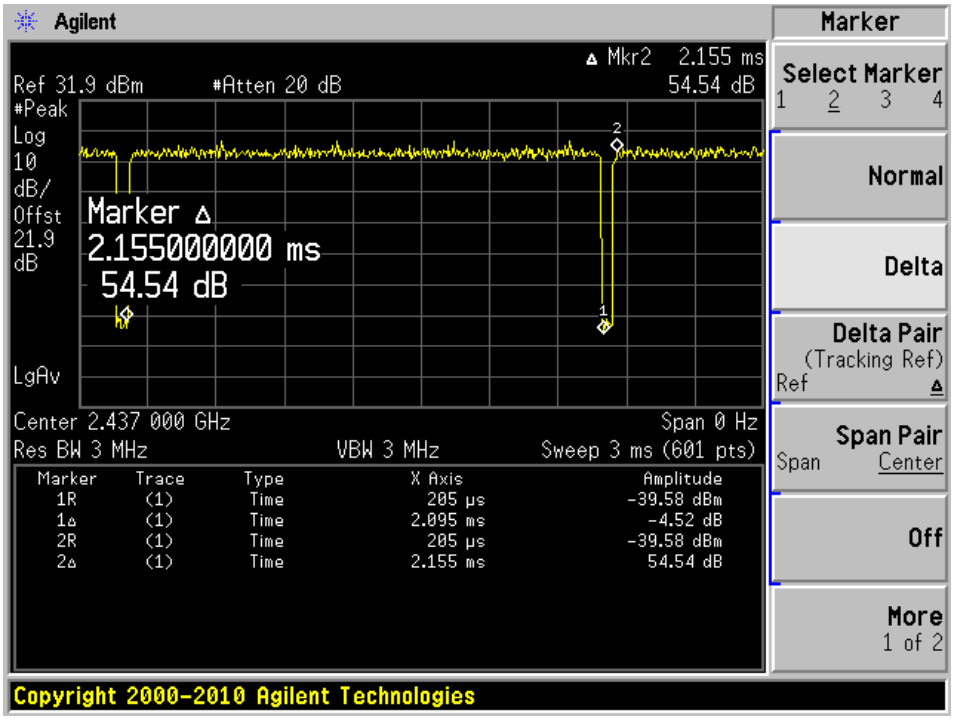
Duty Cycle = On Time (ms)/ Period (ms)
Duty Cycle Correction Factor (dB) = 10*log(1/Duty Cycle)

Please refer to the following plots.

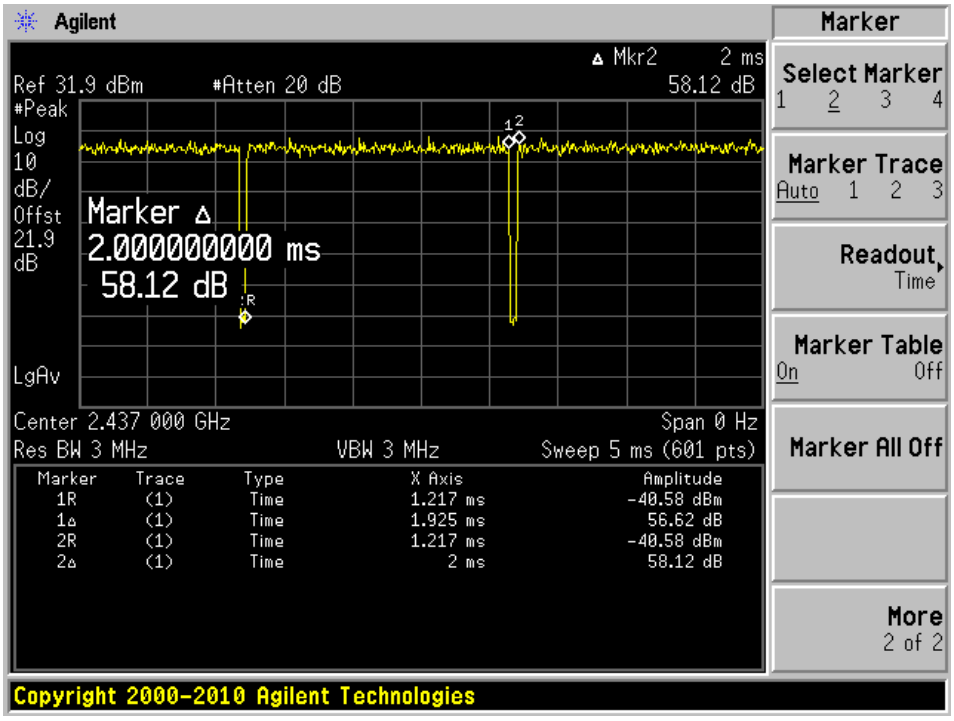
802.11 b mode



802.11 g mode



802.11 n20 mode



2.4 Equipment Modifications

N/A

2.5 Local Support Equipment

Manufacturer	Description	Model
Dell	Laptop	Latitude D630

2.6 Support Equipment

Manufacturer	Description	Model
/	/	/

2.7 Interface Ports and Cabling

Cable Description	Length (m)	To	From
USB Cable	< 1 m	Laptop	EUT

3 Summary of Test Results

Results reported relate only to the product tested.

FCC & ISED Rules	Description of Test	Results
FCC §15.203 ISED RSS-Gen §8.3	Antenna Requirement	Compliant
FCC §15.207 ISED RSS-Gen §8.8	AC Line Conducted Emissions	N/A[1]
FCC §2.1091, §15.247(i) ISED RSS-102	RF Exposure	Compliant
FCC §2.1051, §15.247(d) ISED RSS-247 §5.5	Spurious Emissions at Antenna Port	Compliant
FCC §2.1053, §15.205, §15.209, §15.247(d) ISED RSS-247 §5.5 RSS-Gen §8.9 & §8.10	Radiated Spurious Emissions	Compliant
FCC §15.247(a)(2) ISED RSS-247 §5.2 (1)	6 dB & 99% Emission Bandwidth	Compliant
FCC §15.247(b)(3) ISED RSS-247 §5.4 (4)	Maximum Peak Output Power	Compliant
FCC §15.247(d) ISED RSS-247 §5.5	100 kHz Bandwidth of Frequency Band Edge	Compliant
FCC §15.247(e) ISED RSS-247 §5.2 (2)	Power Spectral Density	Compliant

[1] the EUT is powered by battery only.

4 FCC §15.203 & ISED RSS-Gen §8.3 - Antenna Requirements

4.1 Applicable Standards

According to FCC §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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

And according to FCC §15.247 (b) (4), 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.

According to ISED RSS-Gen §8.3: Transmitter Antenna

The applicant for equipment certification, as per RSP-100, must provide a list of all antenna types that may be used with the license-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna.

License-exempt transmitters that have received equipment certification may operate with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power (e.i.r.p.) limits specified in the applicable standard (RSS) for the license-exempt apparatus.

Testing shall be performed using the highest gain antenna of each combination of license-exempt transmitter and antenna type, with the transmitter output power set at the maximum level. [9] When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.

User manuals for transmitters equipped with detachable antennas shall also contain the following notice in a conspicuous location:

This radio transmitter (identify the device by certification number) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types approved for use with the transmitter, indicating the maximum permissible antenna gain (in dBi).

4.2 Antenna Description

Antenna Type	Maximum Antenna Gain (dBi) @ 2.4 GHz
Patch	4

5 FCC §2.1091 & §15.247(i) & ISED RSS-102 - RF Exposure

5.1 Applicable Standards

According to FCC §15.247(i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minutes)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	* (100)	30
1.34-30	824/f	2.19/f	* ($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

Before equipment certification is granted, the procedure of IC RSS-102 must be followed concerning the exposure of humans to RF field

According to ISED RSS-102 Issue 5 §2.5.2

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz[6] and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

5.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density
P = power input to antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

5.3 MPE Results

Maximum output power at antenna input terminal (dBm):	22.87
Maximum output power at antenna input terminal (mW):	193.6
Prediction distance (cm):	20
Prediction frequency (MHz):	2412
Maximum Antenna Gain, typical (dBi):	4
Maximum Antenna Gain (numeric):	2.512
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.097
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 20 cm is $0.097 mW/cm^2$, limit is $1.0 mW/cm^2$.

5.4 ISED Routine RF Exposure Exemption

The max tune-up peak conducted output power is 22.87 dBm at 2412 MHz and the antenna gain is 4 dBi, so the e.i.r.p is 26.87 dBm (0.486 W).

Exemption from Routine Evaluation Limit is:

$1.31 \times 10^{-2} f^{0.6834} = 1.31 \times 10^{-2} \times 2412^{0.6834} = 2.68 > 0.486$

So the device is compliance exemption from Routine Evaluation Limits –RF exposure Evaluation.

6 FCC §15.209, §15.247(d) & ISED RSS-247 §5.5, RSS-Gen §8.9 & §8.10 - Spurious Radiated Emissions

6.1 Applicable Standards

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz.

As Per FCC §15.205(a) and RSS-Gen except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	960 – 1240	4. 5 – 5. 15
0.495 – 0.505	16.69475 – 16.69525	1300 – 1427	5. 35 – 5. 46
2.1735 – 2.1905	25.5 – 25.67	1435 – 1626.5	7.25 – 7.75
4.125 – 4.128	37.5 – 38.25	1645.5 – 1646.5	8.025 – 8.5
4.17725 – 4.17775	73 – 74.6	1660 – 1710	9.0 – 9.2
4.20725 – 4.20775	74.8 – 75.2	1718.8 – 1722.2	9.3 – 9.5
6.215 – 6.218	108 – 121.94	2200 – 2300	10.6 – 12.7
6.26775 – 6.26825	123 – 138	2310 – 2390	13.25 – 13.4
6.31175 – 6.31225	149.9 – 150.05	2483.5 – 2500	14.47 – 14.5
8.291 – 8.294	156.52475 – 156.52525	2690 – 2900	15.35 – 16.2
8.362 – 8.366	156.7 – 156.9	3260 – 3267	17.7 – 21.4
8.37625 – 8.38675	162.0125 –167.17	3.332 – 3.339	22.01 – 23.12
8.41425 – 8.41475	167.72 – 173.2	3 3458 – 3 358	23.6 – 24.0
12.29 – 12.293	240 – 285	3.600 – 4.400	31.2 – 31.8
12.51975 – 12.52025	322 – 335.4		36.43 – 36.5
12.57675 – 12.57725	399.9 – 410		Above 38.6
13.36 – 13.41	608 – 614		

As per FCC §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 (micro volts/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.

As per FCC §15.247 (d), 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, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c).

As per ISED RSS-Gen 8.9,

> Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits shown in Table 4 or Table 5 below. Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission.

Table 4 – General Field Strength Limits for Licence-Exempt Transmitters at Frequencies Above 30 MHz

Frequency (MHz)	Field Strength (µv/m at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960*	500

* Unless otherwise specified, for all frequencies greater than 1 GHz, the radiated emission limits for license-exempt radio apparatus stated in applicable RSSs (including RSS-Gen) are based on measurements using a linear average detector function having a minimum resolution bandwidth of 1 MHz. If an average limit is specified for the EUT, then the peak emission shall also be measured with instrumentation properly adjusted for such factors as pulse desensitization to ensure the peak emission is less than 20 dB above the average limit.

Note: Transmitting devices are not permitted in restricted frequency bands unless stated otherwise in the specific RSS.

As per ISED RSS-247 §5.5, in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

6.2 Test Setup

The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.10-2013. The specification used was the FCC 15 Subpart C and IC RSS-247 limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

6.3 Test Procedure

For the radiated emissions test, the EUT host, and all support equipment power cords were connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT was set 3 meter away from the testing antenna, which was varied from 1-4 meter, and the EUT was placed on a turntable, which was 0.8 meter and 1.5 meter above the ground plane for below and above 1000 MHz measurements, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna's polarity should be changed between horizontal and vertical.

The spectrum analyzer or receiver was set as:

Below 1000 MHz:

RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000 MHz:

(1) Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto
(2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

6.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + AF + CL + Atten – Ga

For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

Margin = Corrected Amplitude - Limit

6.5 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	US42221851	2016-06-10	1 year
Sunol Science Corp	System Controller	SC99V	011003-1	N/R	N/R
Sunol Sciences	Antenna, Biconi-Log	JB3	A020106-2	2015-07-11	2 years
Sunol Sciences	Horn Antenna	DRH-118	A052704	2015-03-09	2 years
Agilent	Amplifier, Pre	8447D	2944A10187	2016-03-23	1 year
Suirong	30 ft conductive emission cable	LMR 400	-	N/R	N/R
-	SMA cable	-	661	Each time[1]	N/A
IW Microwave	High Frequency Cable	DC-1438	SPS-2303-3840-SPS	2016-01-18	1 year
HP/ Agilant	Pre Amplifier	8449B OPT HO2	3008A0113	2016-05-19	1year
Vasona	Test software	V6.0 build 11	10400213	N/R	N/R
R & S	EMI Test Receiver	ESCI	1166.5950.03	2016-06-24	2 years

[1]: attenuator included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL *attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.*

6.6 Test Environmental Conditions

Temperature:	21-23º C
Relative Humidity:	43-45 %
ATM Pressure:	102.7 kPa

The testing was performed by Jimmy Xiao from 2016-09-11 in 5m chamber 3.

6.7 Summary of Test Results

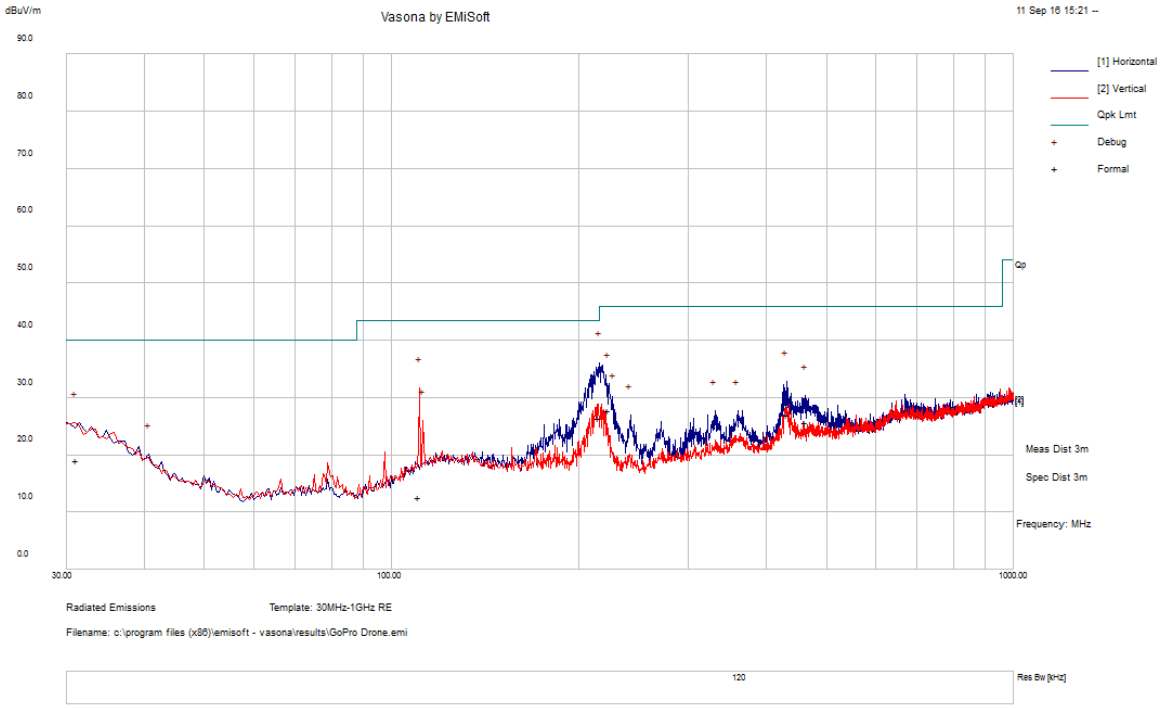
According to the data hereinafter, the EUT complied with FCC Title 47, Part 15C and ISED RSS-247 standard's radiated emissions limits, and had the worst margin of:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Mode, channel**
-0.19	2483.5	Vertical	802.11g High Channel

Please refer to the following table and plots for specific test result details

6.8 Radiated Emissions Test Results

1) 30 MHz – 1 GHz , Measured at 3 meters



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
215.5323	26.49	113	H	360	43.5	-17.01	QP
110.7663	12.63	148	V	293	43.5	-30.87	QP
431.7343	27.08	202	H	240	46.0	-18.92	QP
223.4695	27.85	146	H	26	46.0	-18.15	QP
31.139	19.17	185	V	223	40.0	-20.83	QP
462.9753	25.73	224	H	269	46.0	-20.27	QP

Note: Worst Case: Transmitting 802.11n20, 2412 MHz

2) 1–25 GHz Measured at 3 meters

802.11b mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2412 MHz											
2412	78.26	150	300	H	29.09	5.22	-	112.57	-	-	Peak
2412	75.57	150	300	H	29.09	5.22	-	109.88	-	-	Ave
2412	86.01	240	100	V	29.09	5.22	-	120.32	-	-	Peak
2412	83.43	240	100	V	29.09	5.22	-	117.74	-	-	Ave
2390	29.41	75	120	V	28.98	5.22	-	63.61	74.00	-10.39	Peak
2390	17.72	75	120	V	28.98	5.22	-	51.92	54.00	-2.08	Ave
4824	55.69	215	100	V	32.51	7.89	38.55	57.54	74.00	-16.46	Peak
4824	48.16	215	100	V	32.51	7.89	38.55	50.01	54.00	-3.99	Ave
Middle Channel 2437 MHz											
2437	76.18	160	300	H	29.18	5.22	-	110.58	-	-	Peak
2437	72.72	160	300	H	29.18	5.22	-	107.12	-	-	Ave
2437	83.11	220	100	V	29.18	5.22	-	117.51	-	-	Peak
2437	80.57	220	100	V	29.18	5.22	-	114.97	-	-	Ave
4874	51.27	230	110	V	32.59	7.92	38.54	53.24	74.00	-20.76	Peak
4874	45.38	230	110	V	32.59	7.92	38.54	47.35	54.00	-6.65	Ave
High Channel 2462 MHz											
2462	78.39	157	300	H	29.27	5.22	-	112.88	-	-	Peak
2462	75.74	157	300	H	29.27	5.22	-	110.23	-	-	Ave
2462	83.53	230	100	V	29.27	5.22	-	118.02	-	-	Peak
2462	80.97	230	100	V	29.27	5.22	-	115.46	-	-	Ave
2483.5	29.34	150	120	V	29.35	5.35	-	64.04	74.00	-9.96	Peak
2483.5	18.08	150	120	V	29.35	5.35	-	52.78	54.00	-1.22	Ave
4924	52.05	320	150	V	32.72	7.95	38.53	54.19	74.00	-19.81	Peak
4924	46.21	320	150	V	32.72	7.95	38.53	48.35	54.00	-5.65	Ave

802.11g mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2412 MHz											
2412	75.98	26	290	H	29.09	5.22	-	110.29	-	-	Peak
2412	67.54	26	290	H	29.09	5.22	-	101.85	-	-	Ave
2412	84.42	150	101	V	29.09	5.22	-	118.73	-	-	Peak
2412	73.42	150	101	V	29.09	5.22	-	107.73	-	-	Ave
2390	31.14	350	100	V	28.98	5.22	-	65.34	74.00	-8.66	Peak
2390	17.41	350	100	V	28.98	5.22	-	51.61	54.00	-2.39	Ave
4824	54.55	180	120	V	32.51	7.89	38.55	56.40	74.00	-17.60	Peak
4824	40.54	180	120	V	32.51	7.89	38.55	42.39	54.00	-11.61	Ave
Middle Channel 2437 MHz											
2437	80.37	240	280	H	29.18	5.22	-	114.77	-	-	Peak
2437	71.27	240	280	H	29.18	5.22	-	105.67	-	-	Ave
2437	88.11	160	120	V	29.18	5.22	-	122.51	-	-	Peak
2437	78.97	160	120	V	29.18	5.22	-	113.37	-	-	Ave
4874	50.31	320	100	V	32.59	7.92	38.54	52.28	74.00	-21.72	Peak
4874	38.61	320	100	V	32.59	7.92	38.54	40.58	54.00	-13.42	Ave
High Channel 2462 MHz											
2462	77.14	147	300	H	29.27	5.22	-	111.63	-	-	Peak
2462	69.53	147	300	H	29.27	5.22	-	104.02	-	-	Ave
2462	85.27	250	100	V	29.27	5.22	-	119.76	-	-	Peak
2462	77.21	250	100	V	29.27	5.22	-	111.70	-	-	Ave
2483.5	33.13	180	120	V	29.35	5.35	-	67.83	74.00	-6.17	Peak
2483.5	19.11	180	120	V	29.35	5.35	-	53.81	54.00	-0.19	Ave
4924	54.24	360	105	V	32.72	7.95	38.53	56.38	74.00	-17.62	Peak
4924	42.92	360	105	V	32.72	7.95	38.53	45.06	54.00	-8.94	Ave

802.11n20 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2412 MHz											
2412	77.47	350	280	H	29.09	5.22	-	111.78	-	-	Peak
2412	68.41	350	280	H	29.09	5.22	-	102.72	-	-	Ave
2412	84.71	180	105	V	29.09	5.22	-	119.02	-	-	Peak
2412	75.31	180	105	V	29.09	5.22	-	109.62	-	-	Ave
2390	31.31	192	110	V	28.98	5.22	-	65.51	74.00	-8.49	Peak
2390	17.42	192	110	V	28.98	5.22	-	51.62	54.00	-2.38	Ave
4824	55.51	150	103	V	32.51	7.89	38.55	57.36	74.00	-16.64	Peak
4824	39.77	150	103	V	32.51	7.89	38.55	41.62	54.00	-12.38	Ave
Middle Channel 2437 MHz											
2437	80.46	320	300	H	29.18	5.22	-	114.86	-	-	Peak
2437	71.24	320	300	H	29.18	5.22	-	105.64	-	-	Ave
2437	88.64	180	100	V	29.18	5.22	-	123.04	-	-	Peak
2437	79.51	180	100	V	29.18	5.22	-	113.91	-	-	Ave
4874	51.78	180	100	V	32.59	7.92	38.54	53.75	74.00	-20.25	Peak
4874	38.52	180	100	V	32.59	7.92	38.54	40.49	54.00	-13.51	Ave
High Channel 2462 MHz											
2462	78.75	258	295	H	29.27	5.22	-	113.24	-	-	Peak
2462	68.77	258	295	H	29.27	5.22	-	103.26	-	-	Ave
2462	84.19	160	100	V	29.27	5.22	-	118.68	-	-	Peak
2462	73.94	160	100	V	29.27	5.22	-	108.43	-	-	Ave
2483.5	32.65	170	105	V	29.35	5.35	-	67.35	74.00	-6.65	Peak
2483.5	18.95	170	105	V	29.35	5.32	-	53.65	54.00	-0.35	Ave
4924	60.91	190	110	V	32.72	7.95	38.53	63.05	74.00	-10.95	Peak
4924	48.96	190	110	V	32.72	7.95	38.53	51.10	54.00	-2.90	Ave

Note: 1. Duty Cycle Correction Factor has been added to the measurements.
2. The other spurious emission is noise floor.
3. The two antennas can transmit simultaneously for 11b, 11g and 11n20 mode.

7 FCC§15.247(a) (2) & ISED RSS-247 §5.2 - Emission Bandwidth

7.1 Applicable Standards

According to FCC §15.247(a) (2) and IC RSS-247 §5.2, systems using digital modulation techniques may operate in the 902~928 MHz, 2400~2483.5 MHz, and 5725~5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz

7.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Meas Guidance v03r05: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 8: DTS bandwidth.

7.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	US42221851	2016-06-10	1 year
-	SMA cable	-	C#0001	Each time[1]	N/A
-	20dB attenuator	-	-	Each time[1]	N/A

[1]: cable and attenuator included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

7.4 Test Environmental Conditions

Temperature:	23º C
Relative Humidity:	44 %
ATM Pressure:	102.9 KPa

The testing was performed by Jimmy Xiao on 2016-09-11 in RF site.

7.5 Test Results

Chain 0:

Channel	Frequency (MHz)	99% OBW (MHz)	6 dB OBW (MHz)	6 dB OBW Limit (MHz)
802.11 b mode				
Low	2412	13.8832	10.043	0.5
Middle	2437	13.8612	10.007	0.5
High	2462	13.8702	9.721	0.5
802.11 g mode				
Low	2412	16.4516	16.352	0.5
Middle	2437	16.4693	16.526	0.5
High	2462	16.4585	16.425	0.5
802.11n-HT20 mode				
Low	2412	17.6743	17.753	0.5
Middle	2437	17.6901	17.144	0.5
High	2462	17.6952	17.714	0.5

Chain 1:

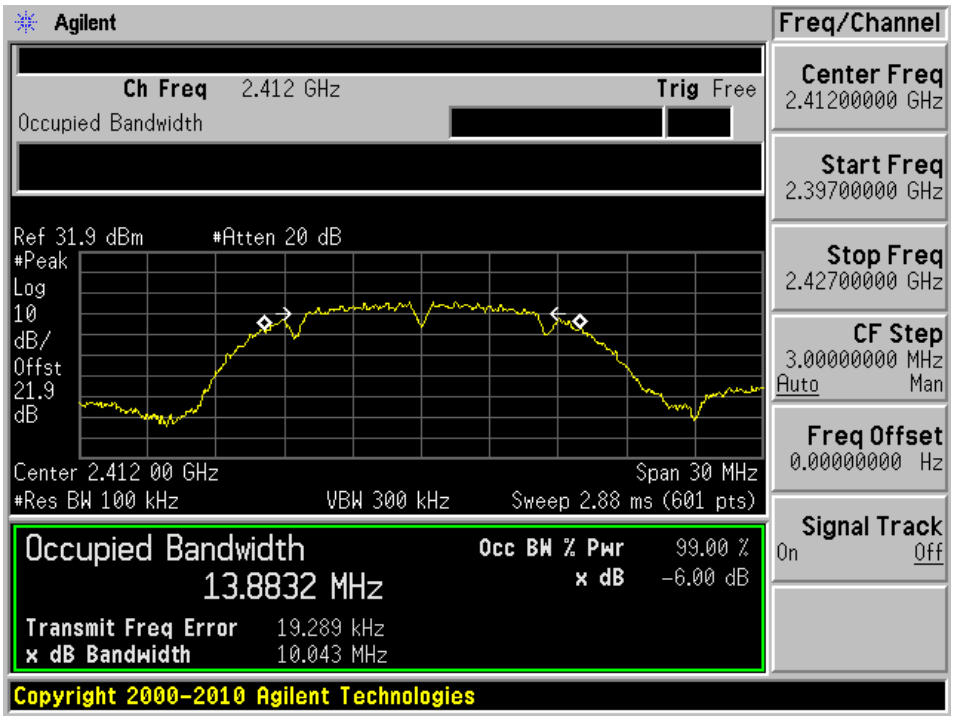
Channel	Frequency (MHz)	99% OBW (MHz)	6 dB OBW (MHz)	6 dB OBW Limit (MHz)
802.11 b mode				
Low	2412	13.7452	9.390	0.5
Middle	2437	13.9354	9.542	0.5
High	2462	13.8679	9.660	0.5
802.11 g mode				
Low	2412	16.4559	16.495	0.5
Middle	2437	16.4932	16.500	0.5
High	2462	16.4523	16.494	0.5
802.11n-HT20 mode				
Low	2412	17.6585	17.751	0.5
Middle	2437	17.6642	17.771	0.5
High	2462	17.6905	17.783	0.5

Please refer to the following plots for detailed test results.

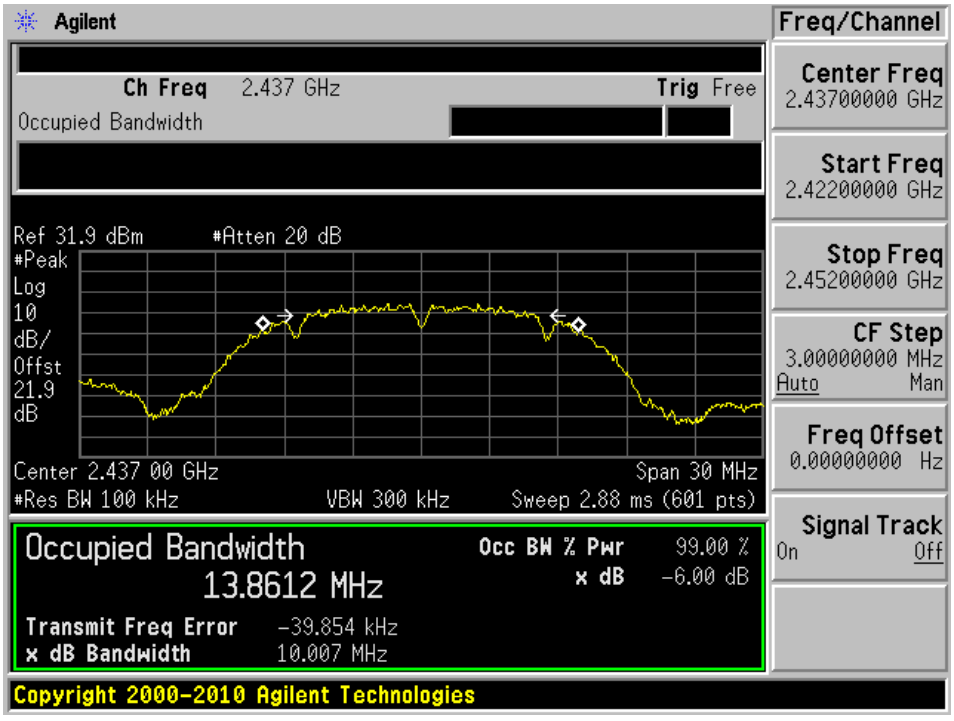
Chain 0:

802.11b mode

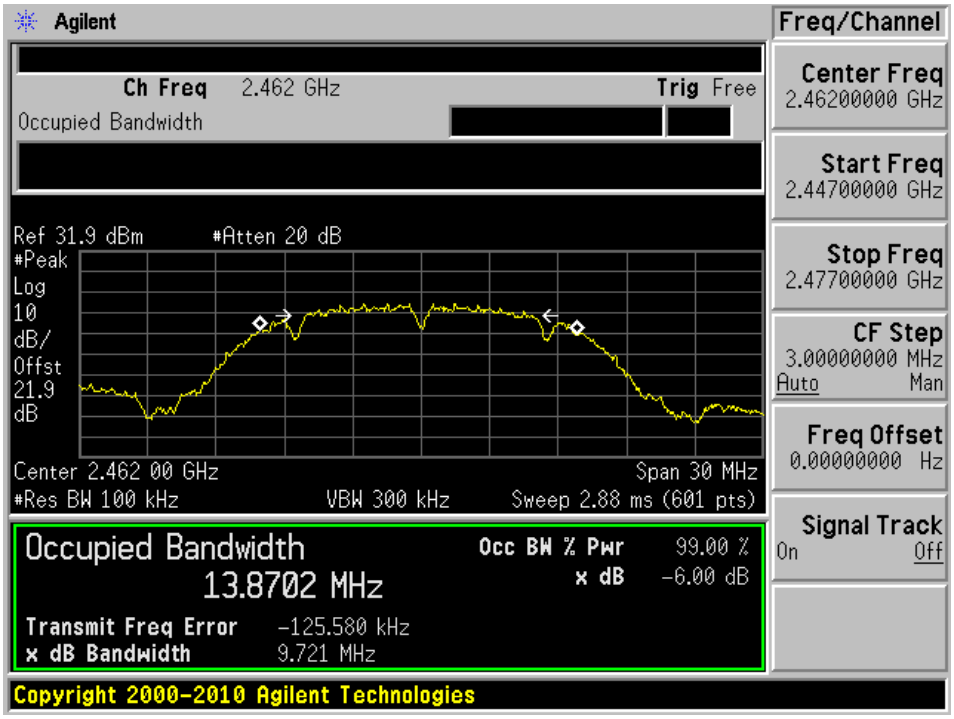
Low Channel



Middle Channel

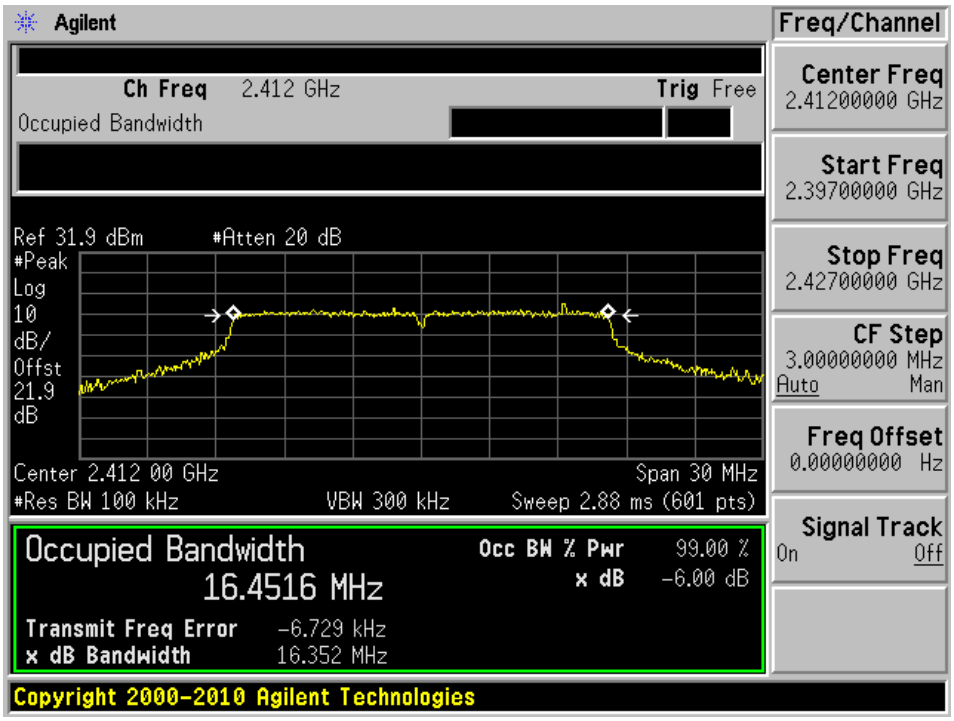


High Channel

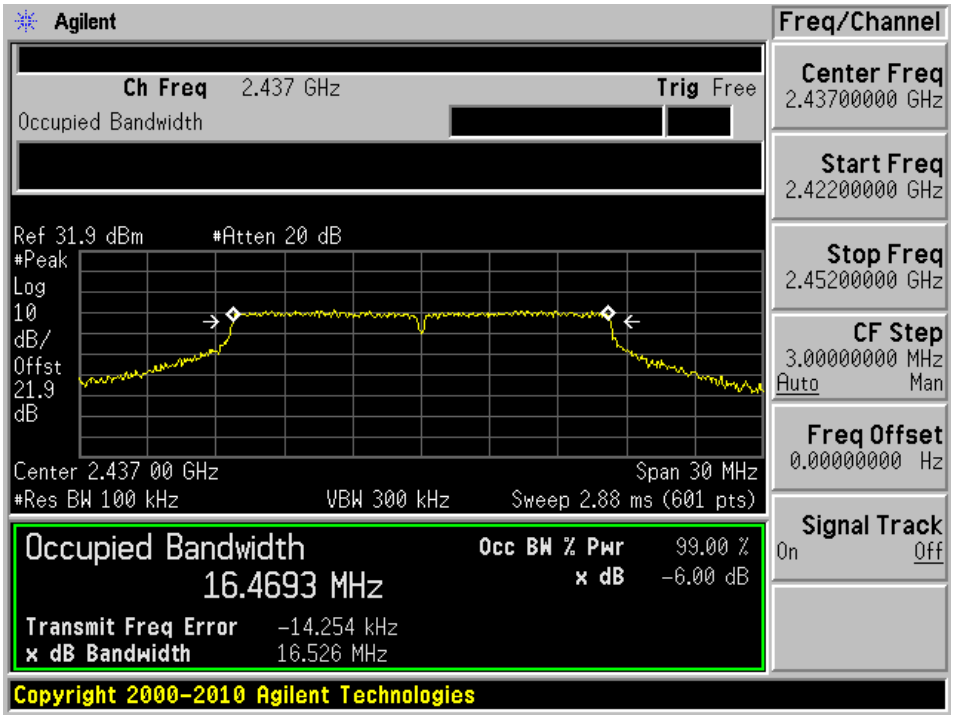


802.11g mode

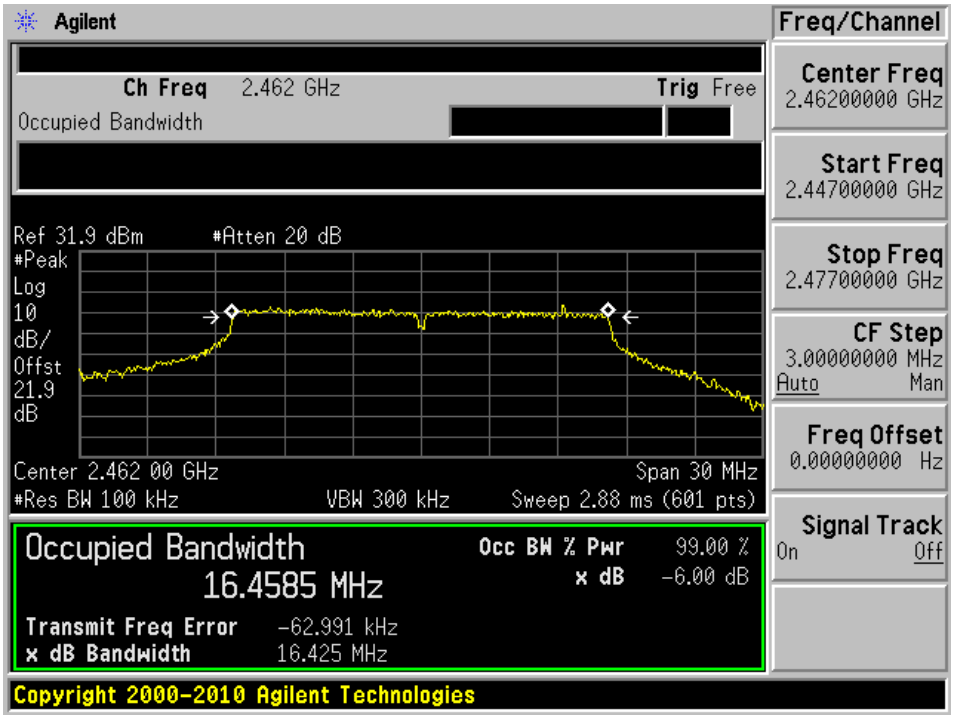
Low Channel



Middle Channel

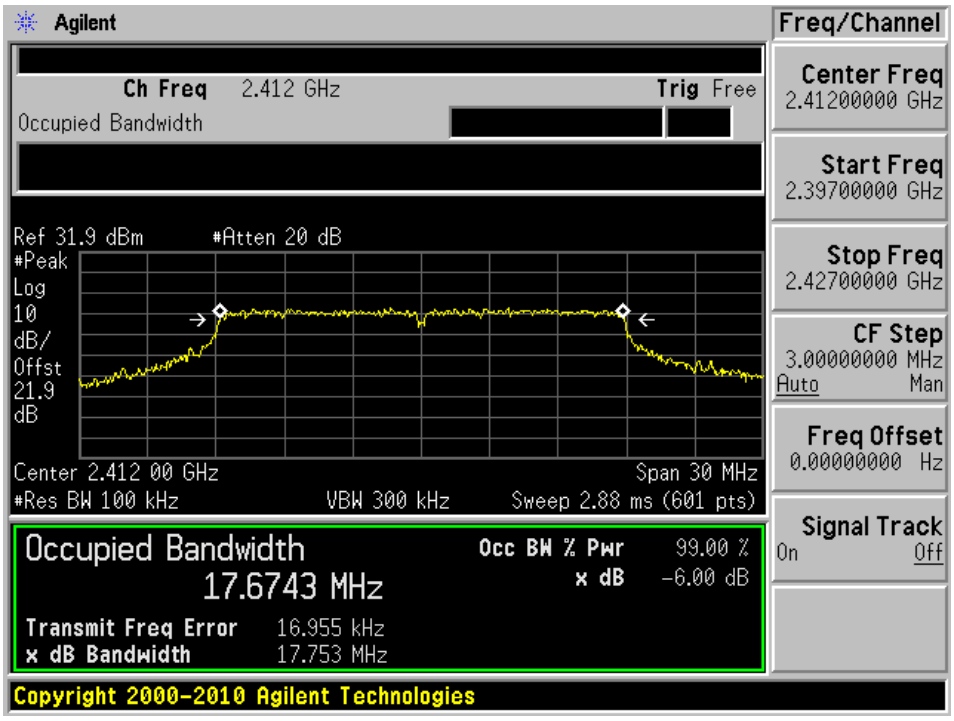


High Channel

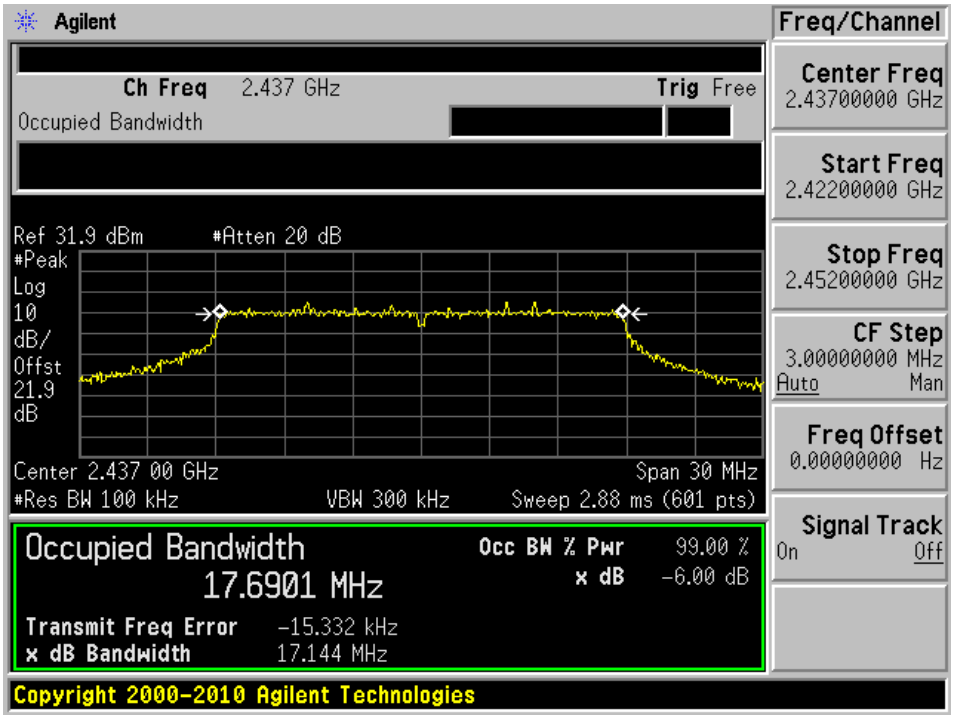


802.11n20 mode

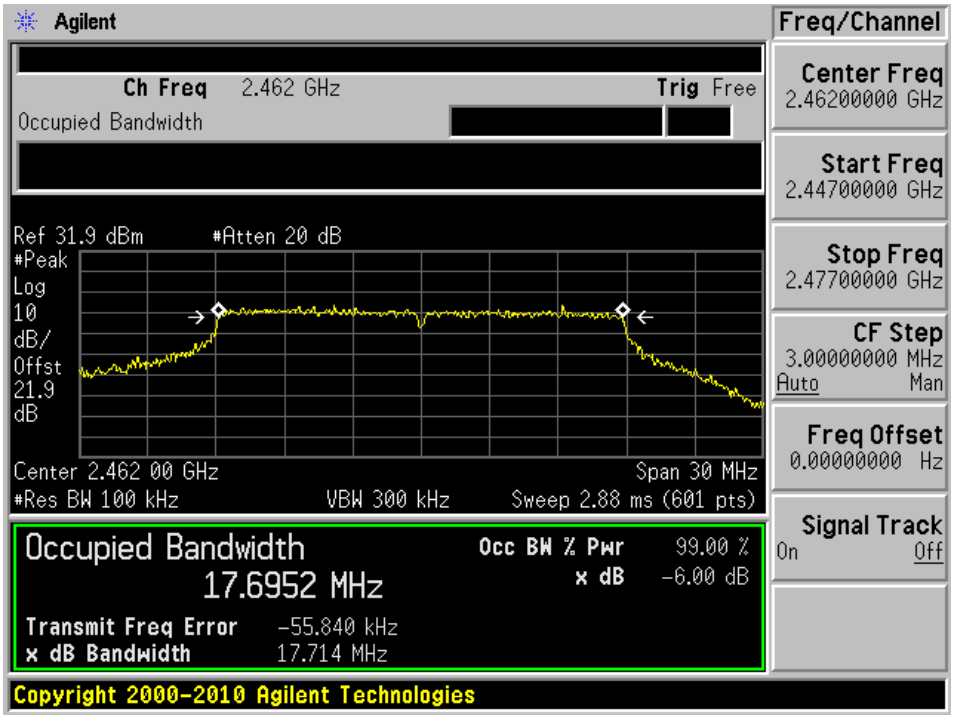
Low Channel



Middle Channel



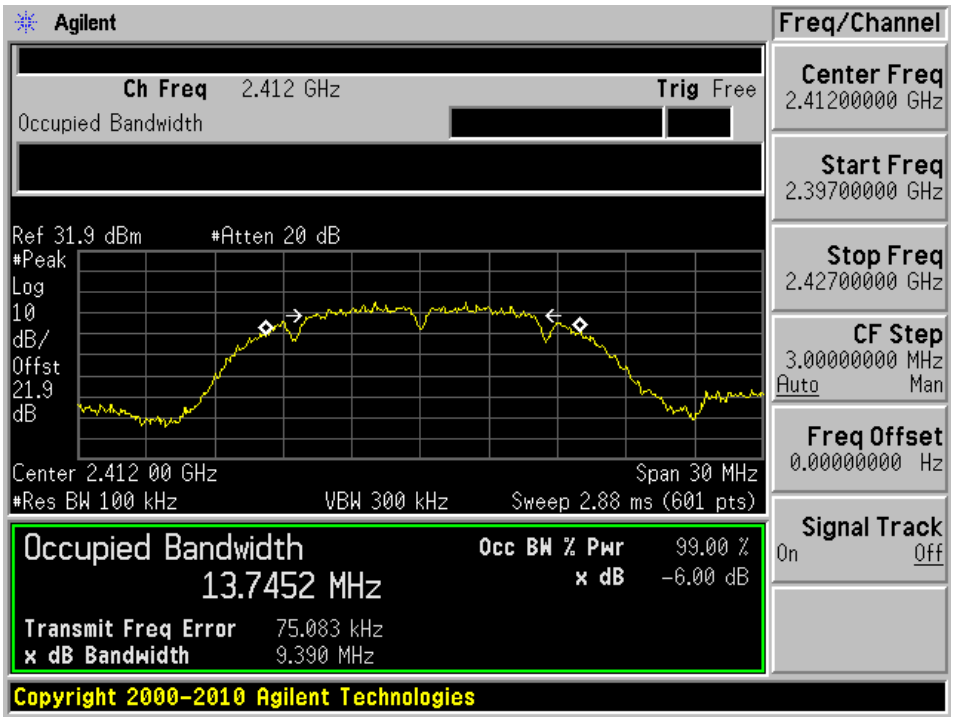
High Channel



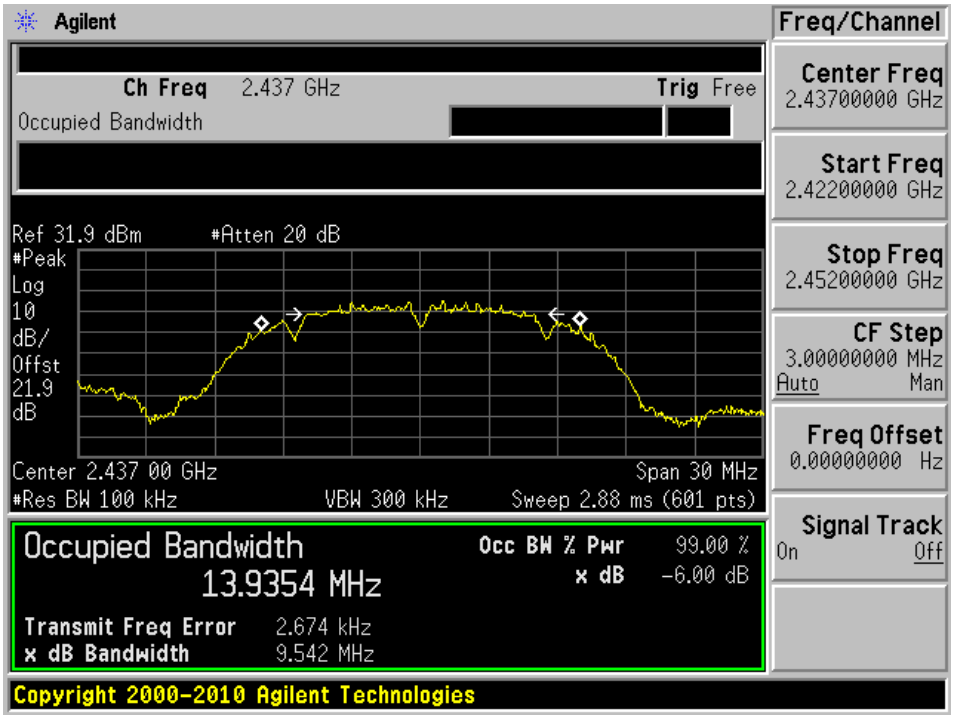
Chain 1:

802.11b mode

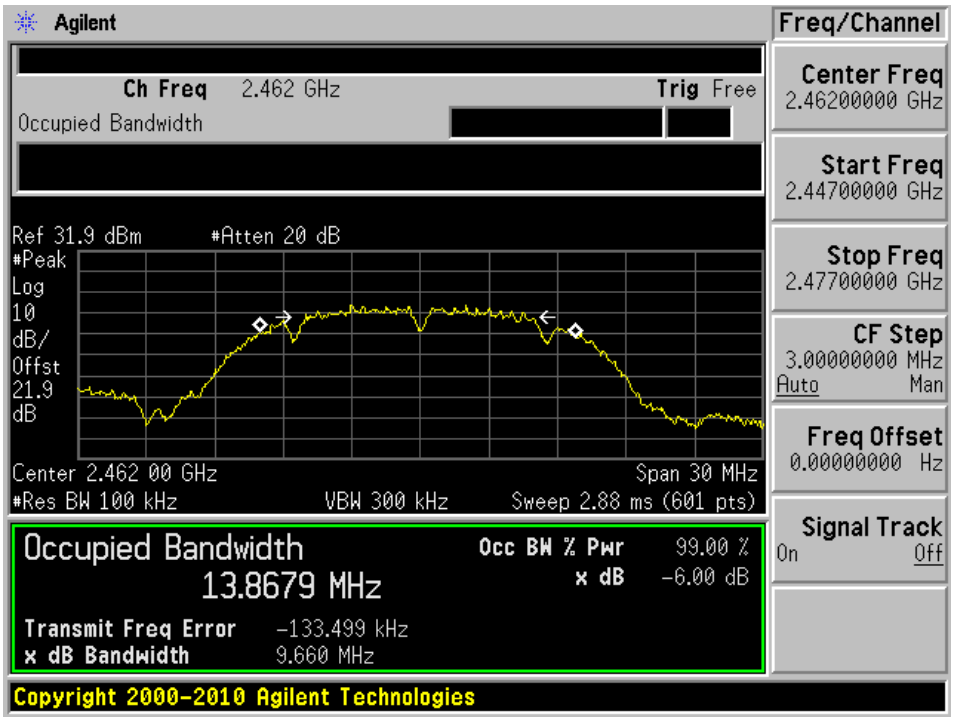
Low Channel



Middle Channel

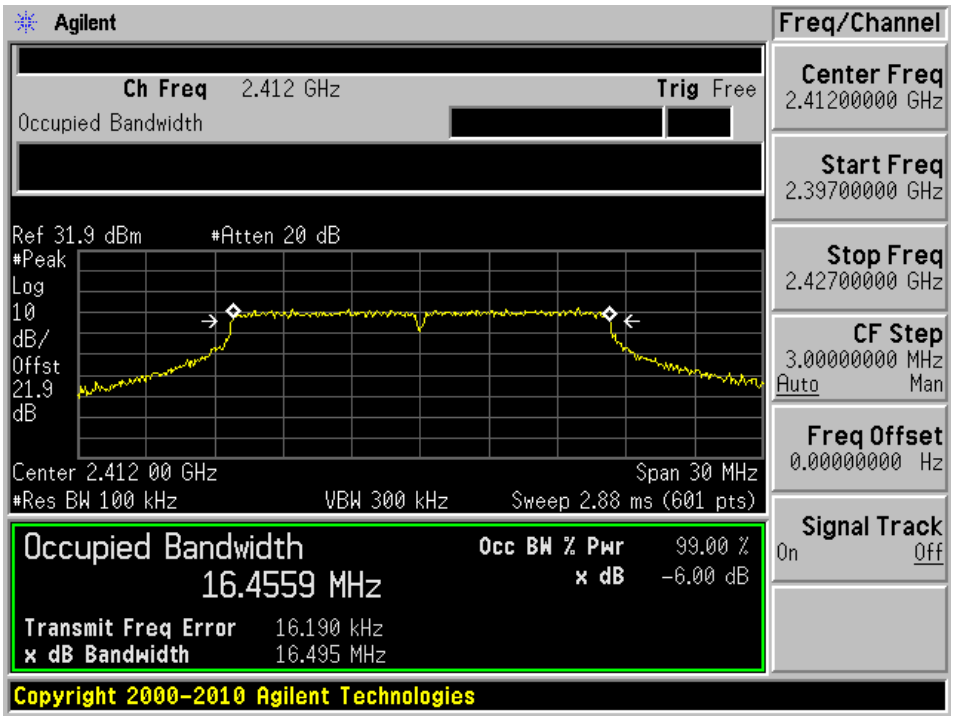


High Channel

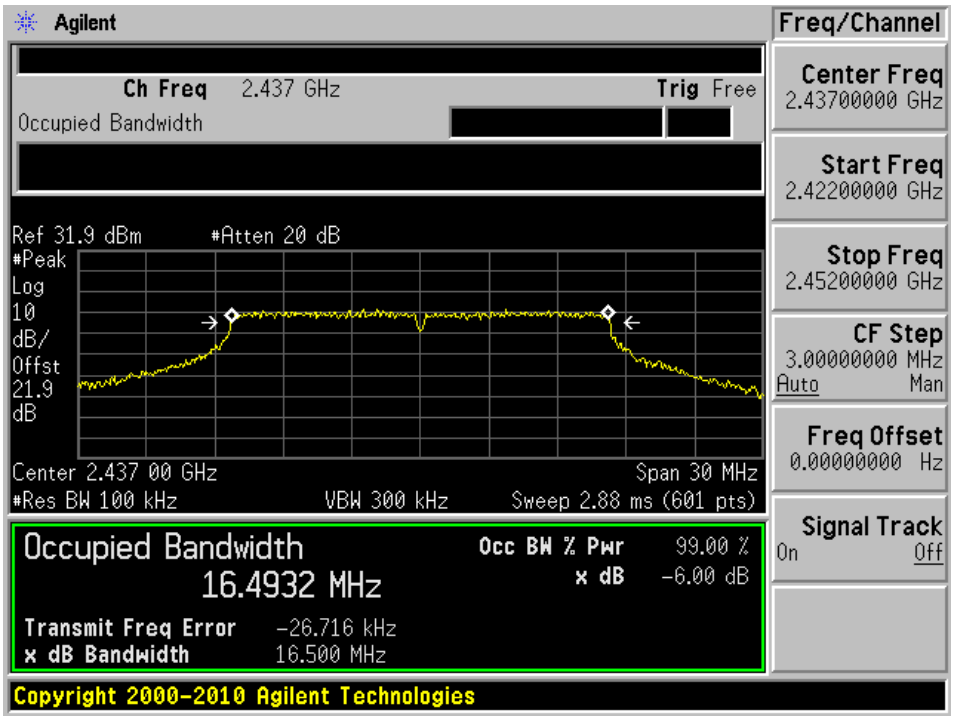


802.11g mode

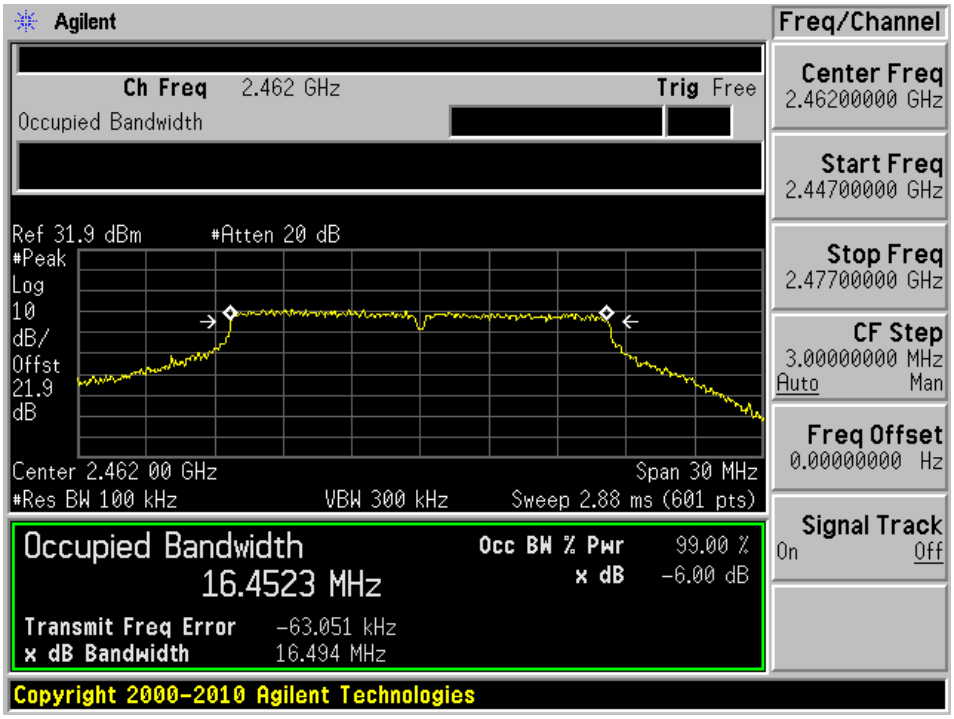
Low Channel



Middle Channel

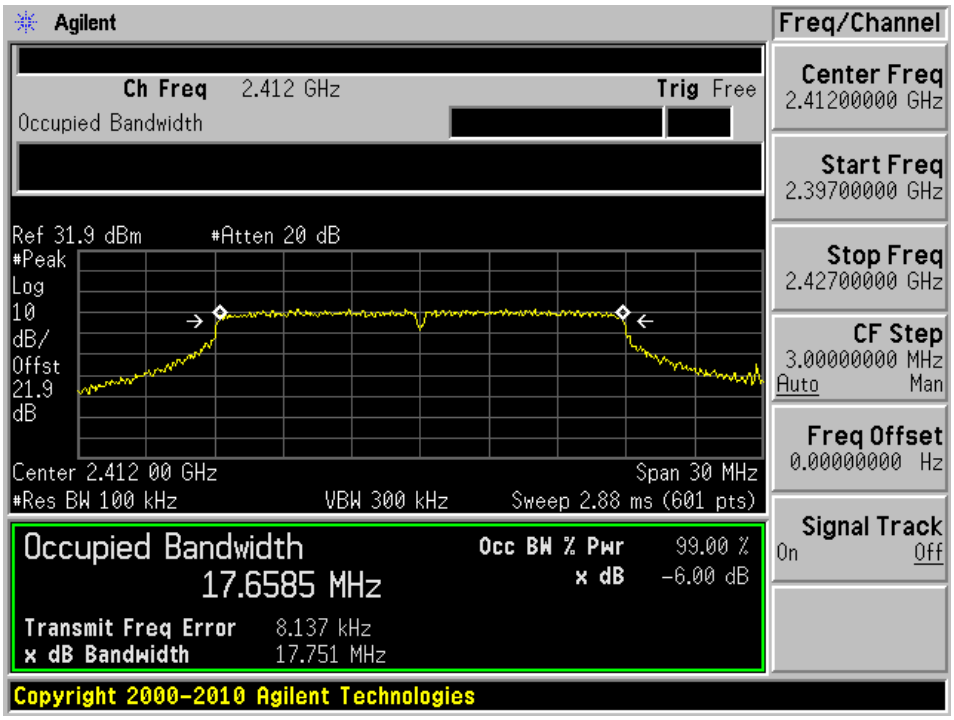


High Channel

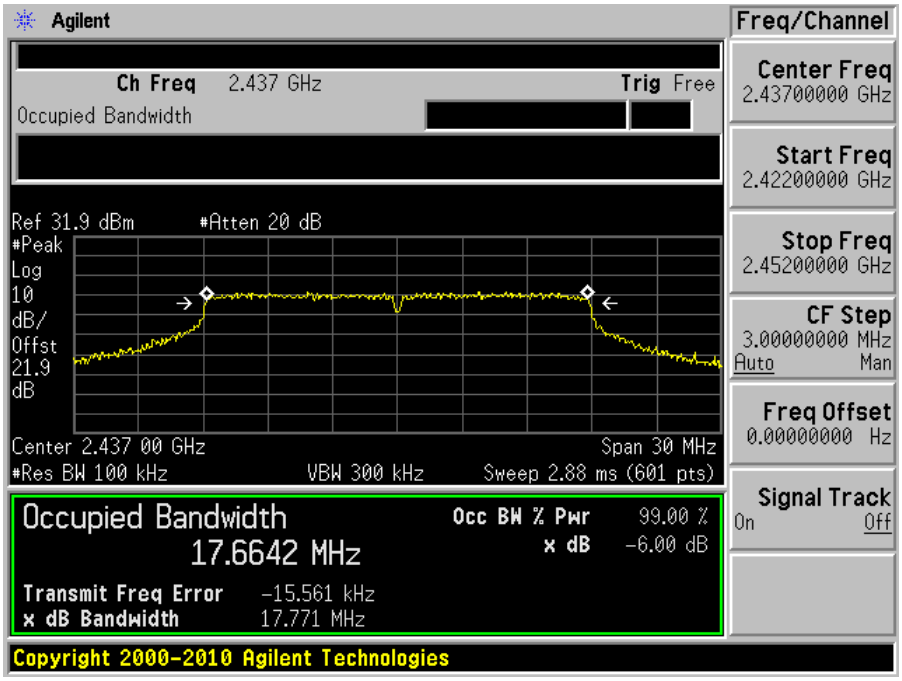


802.11n20 mode

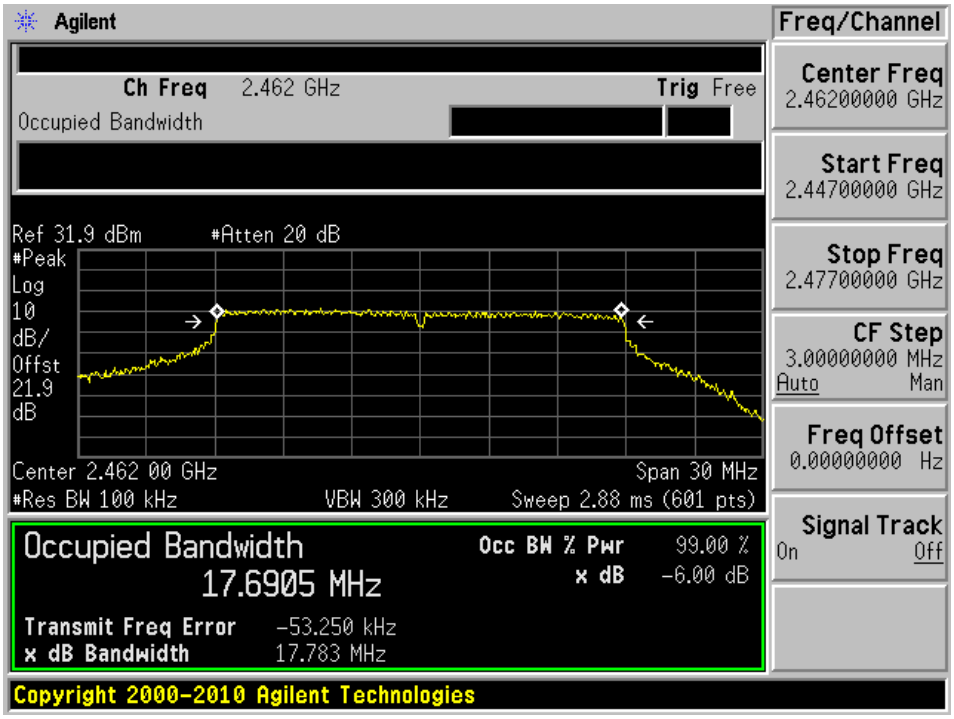
Low Channel



Middle Channel



High Channel



8 FCC §15.247(b)(3) & ISED RSS-247 §5.4 (4) - Output Power Measurement

8.1 Applicable Standards

According to FCC §15.247(b) (3) and IC RSS-247 §5.4 (4) for systems using digital modulation in the 902~928 MHz, 2400~2483.5 MHz, and 5725~5850 MHz bands: 1 Watt.

8.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Meas Guidance v03r05: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 9: Fundamental emission output power

8.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
ETS- Lingerin	Power Sensor	7002-006	160097	2014-10-21	2 years
-	SMA cable	-	C#0001	Each time[1]	N/A
-	20 dB attenuator	-	-	Each time[1]	N/A

[1]: cable and attenuator included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

8.4 Test Environmental Conditions

Temperature:	23º C
Relative Humidity:	44 %
ATM Pressure:	102.9 KPa

The testing was performed by Jimmy Xiao on 2016-09-11 in RF site.

8.5 Test Results

Radio Mode	Channel	Frequency (MHz)	Max Conducted Average Output Power (dBm)		Total Power (dBm)	Limit (dBm)
			Chain 0	Chain 1		
802.11b	Low	2412	19.33	18.23	21.83	29
	Middle	2437	18.46	17.39	20.97	29
	High	2462	18.23	17.44	20.86	29
802.11g	Low	2412	19.73	18.63	22.23	29
	Middle	2437	19.06	18.66	21.87	29
	High	2462	19.56	18.58	22.11	29
802.11n20	Low	2412	20.23	19.46	22.87	29
	Middle	2437	19.52	19.58	22.56	29
	High	2462	19.62	19.06	22.36	29

Note: The antenna gain for each chain is 4 dBi, and these two chains can transmit at the same time, therefore the directional gain = 4 + 10log(2) = 7 dBi;

The limit = 30 dBm-(directional gain-6 dBi) = 29 dBm

Duty Cycle correction factor has already been added to the measurement.

9 FCC §15.247(d) & ISED RSS-247 §5.5 - 100 kHz Bandwidth of Band Edges

9.1 Applicable Standards

According to FCC §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum 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, based on either an RF conducted or a radiated measurement. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emissions limits specified in §15.209(a) see §15.205(c).

According to IC RSS-247 §5.5.In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

9.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Meas Guidance v03r05: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 13: Band-edge measurements

9.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	US42221851	2016-06-10	1 year
-	SMA cable	-	C#0001	Each time[1]	N/A
-	20dB attenuator	-	-	Each time[1]	N/A

[1]: cable and attenuator included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

9.4 Test Environmental Conditions

Temperature:	23º C
Relative Humidity:	44 %
ATM Pressure:	102.9 KPa

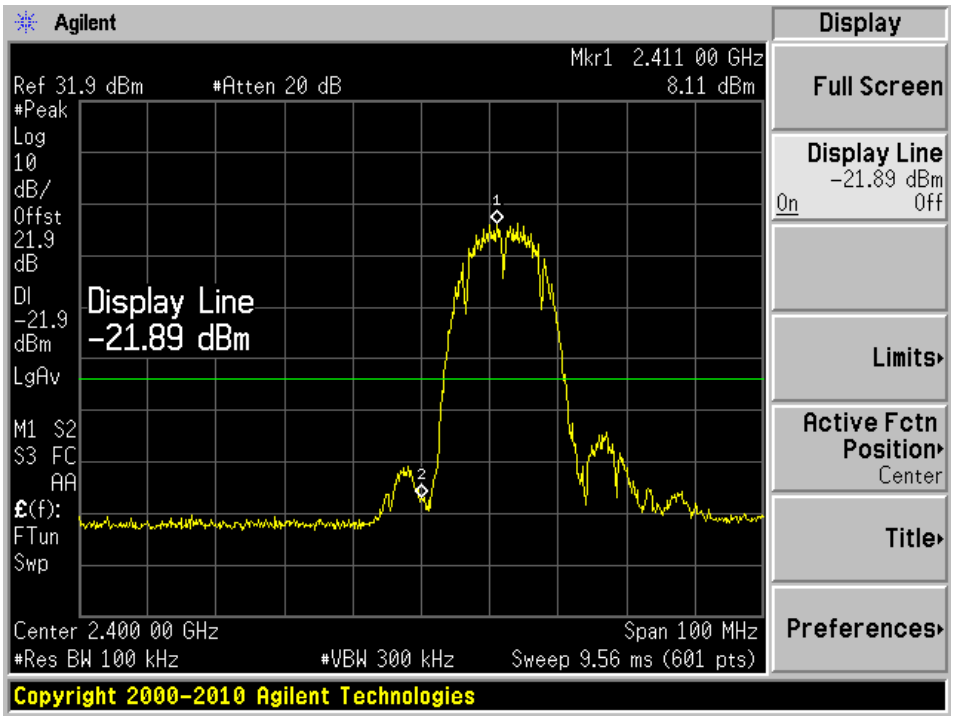
The testing was performed by Jimmy Xiao on 2016-09-11 in RF site.

9.5 Test Results

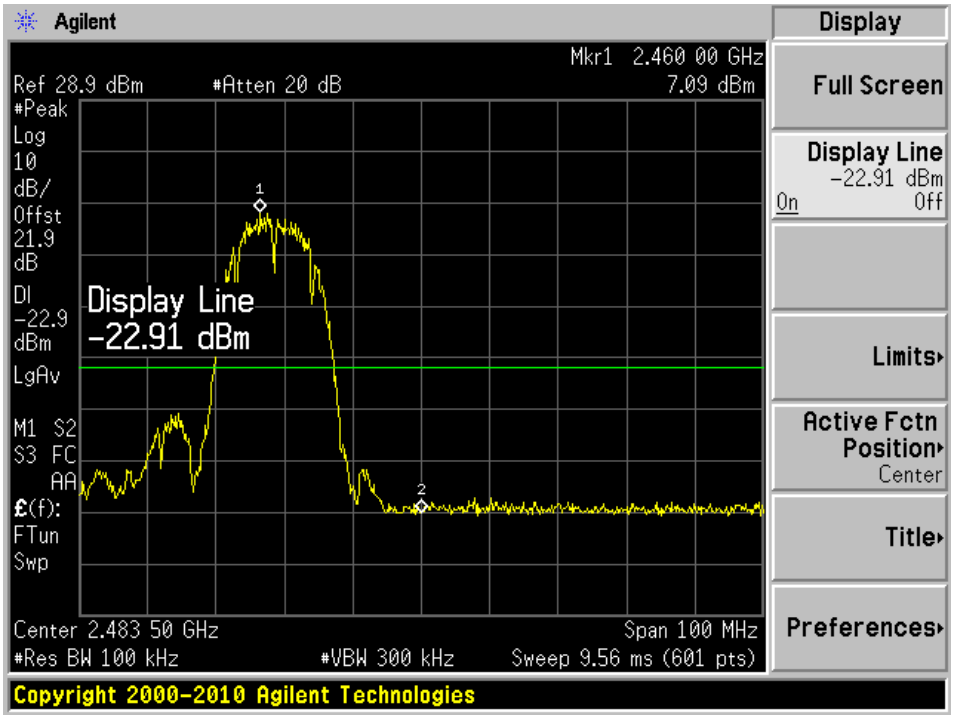
Chain 0:

802.11b mode

Low channel

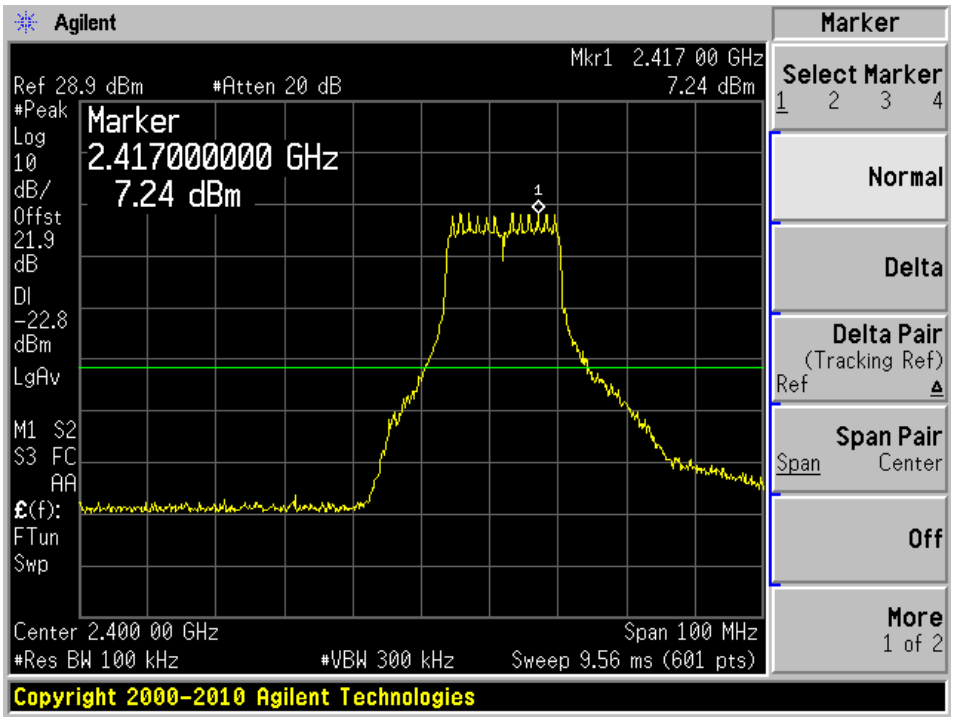


High channel

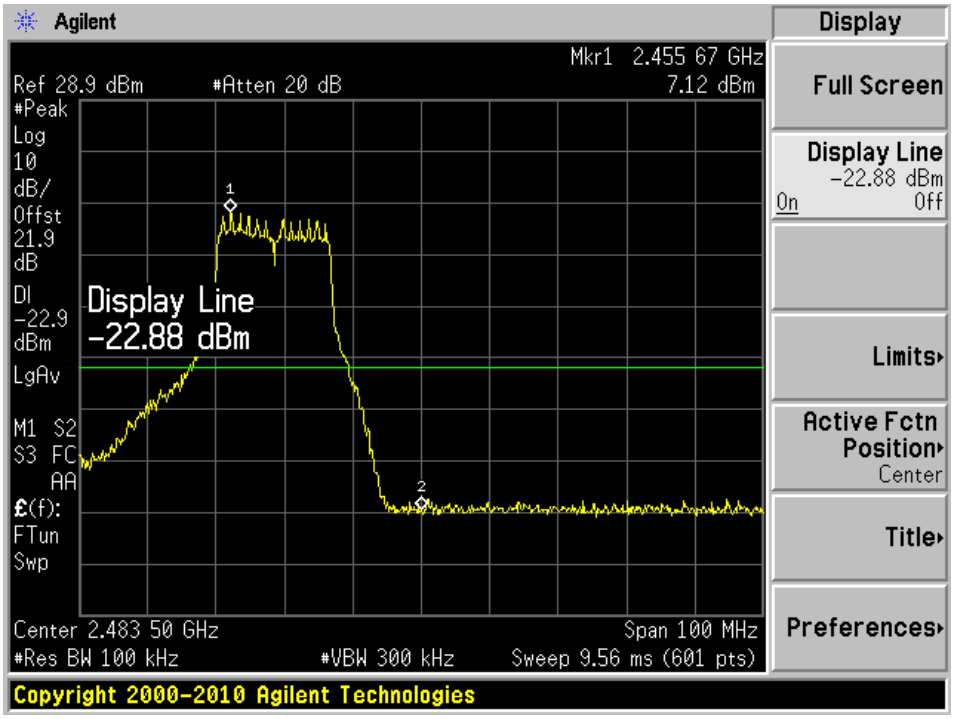


802.11g mode

Low channel

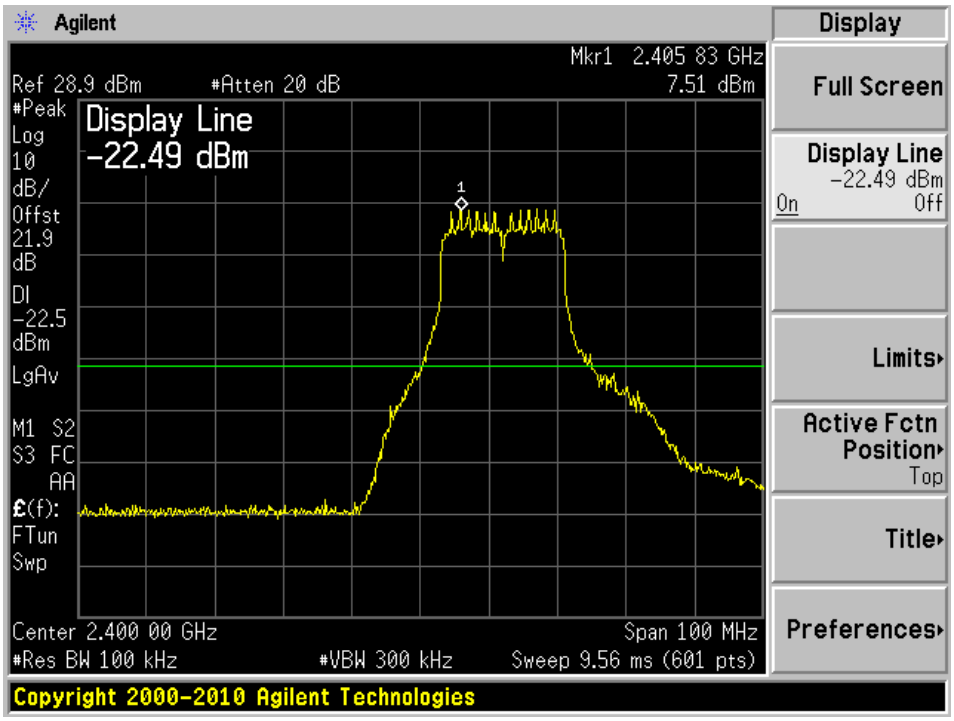


High channel

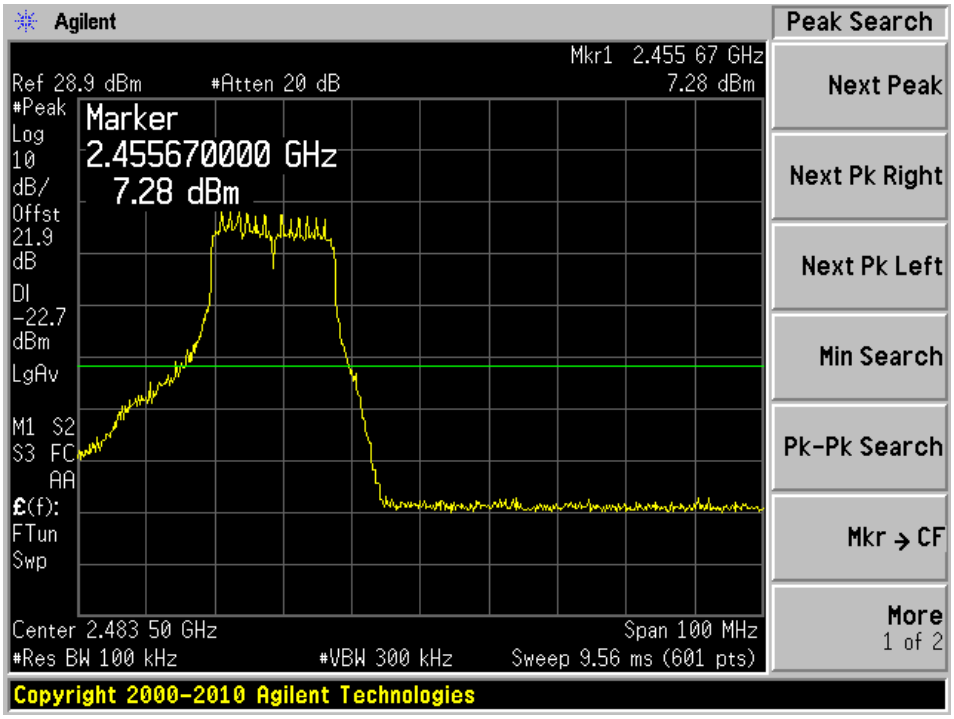


802.11n20 mode

Low channel



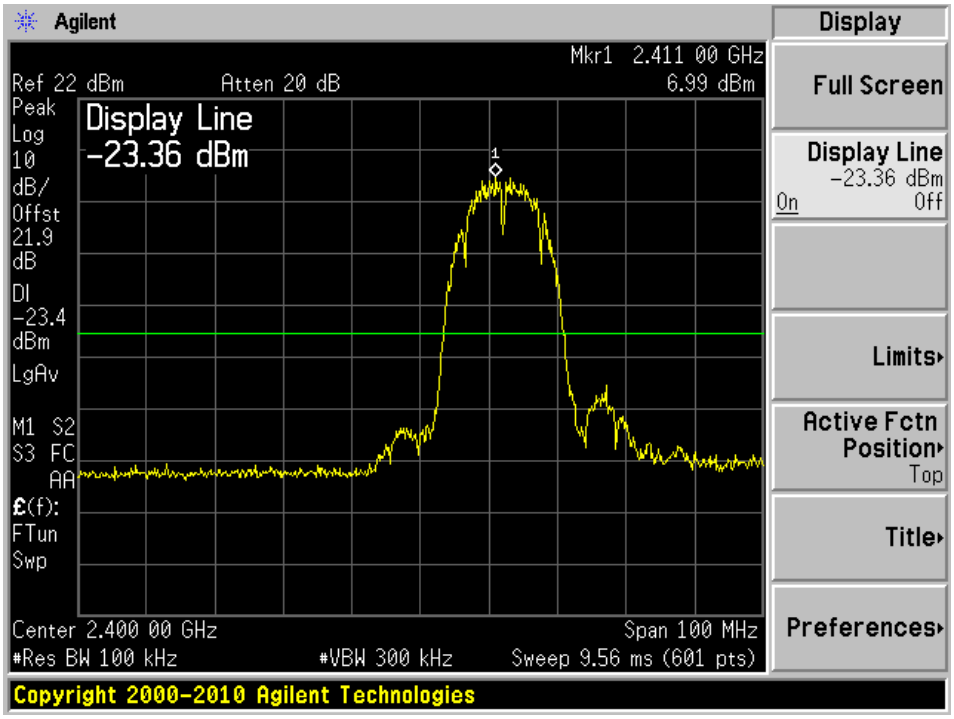
High channel



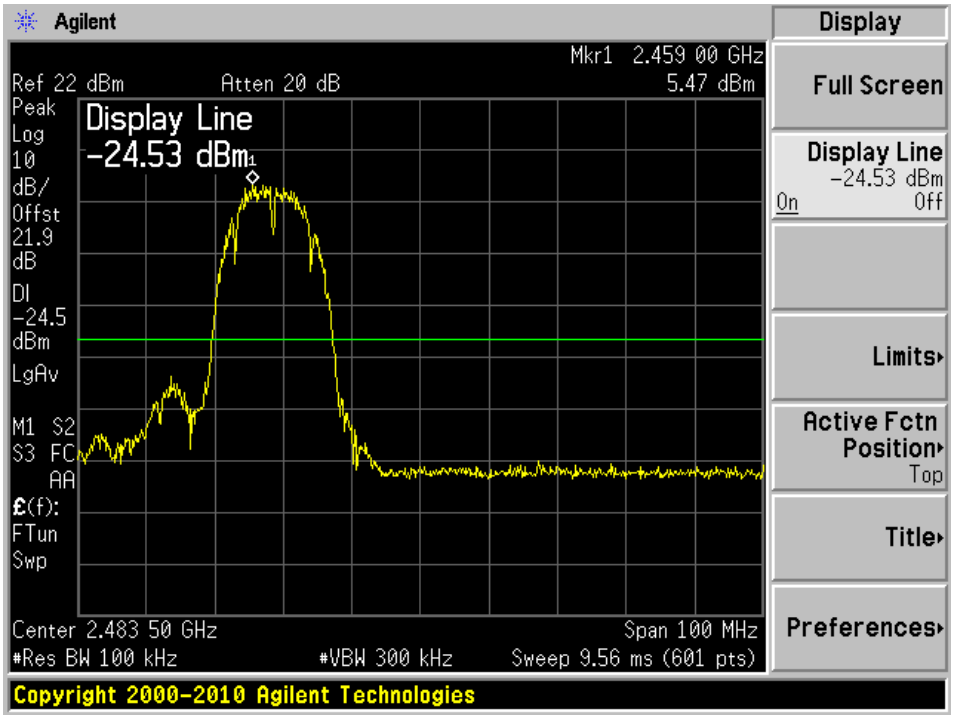
Chain 1:

802.11b mode

Low channel

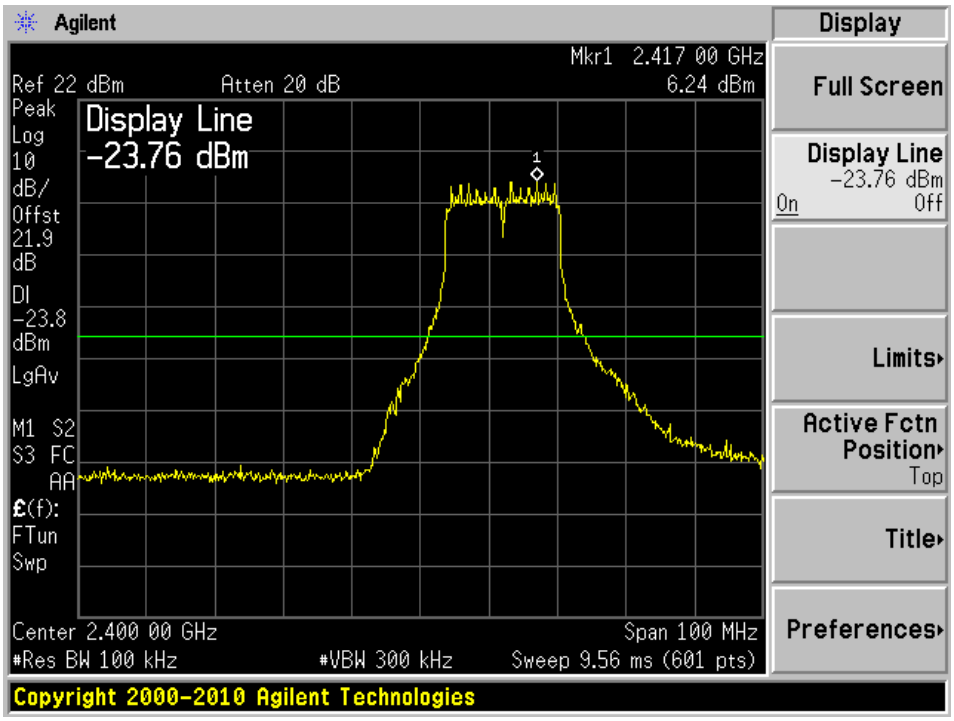


High channel

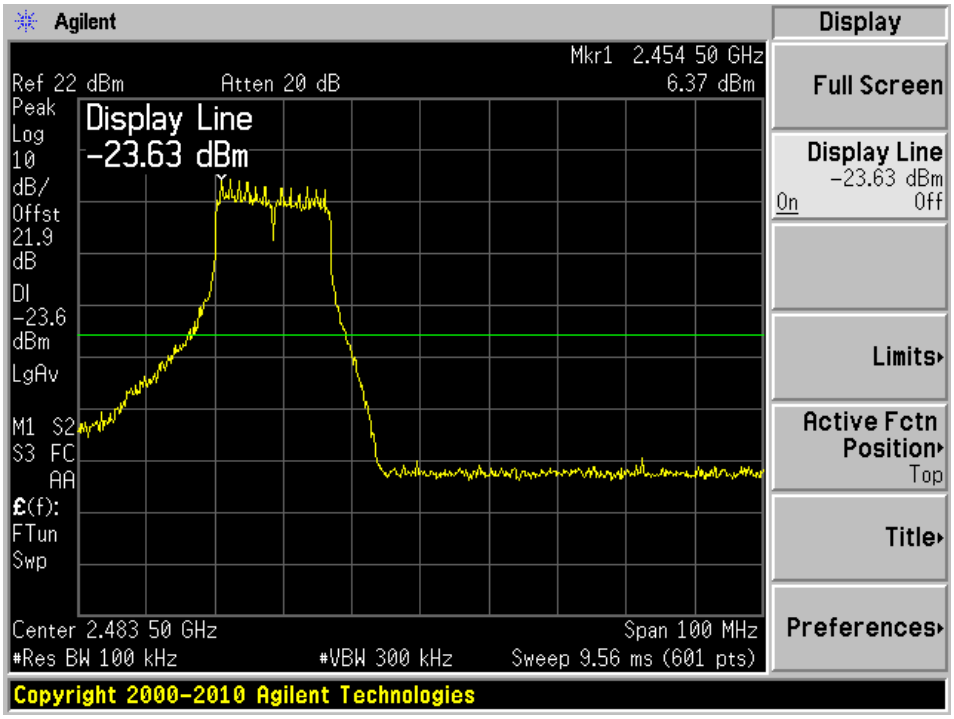


802.11g mode

Low channel

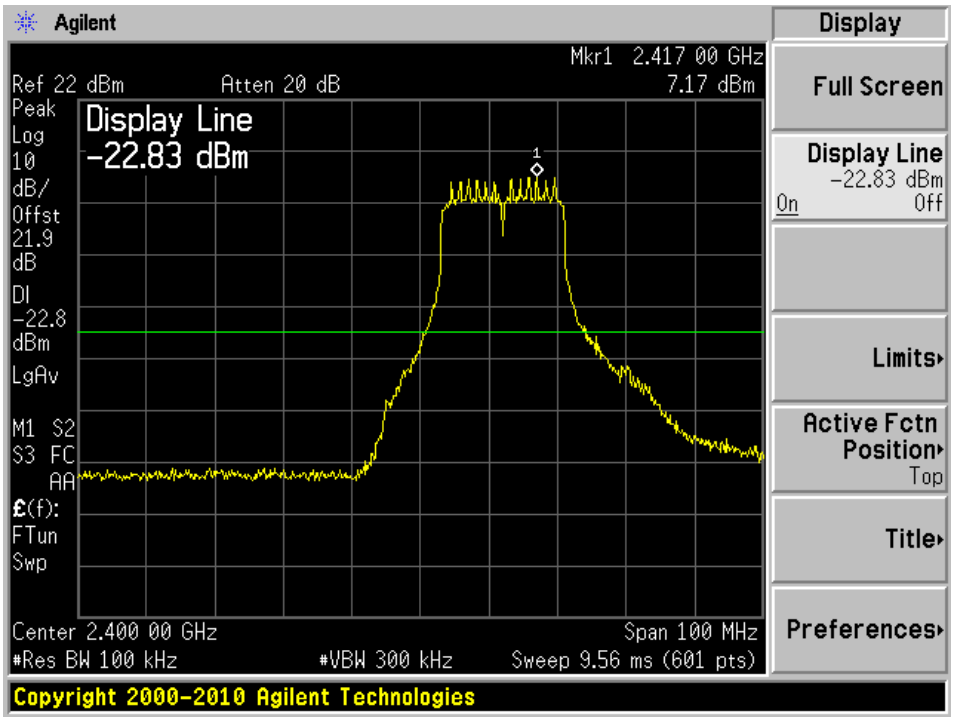


High channel

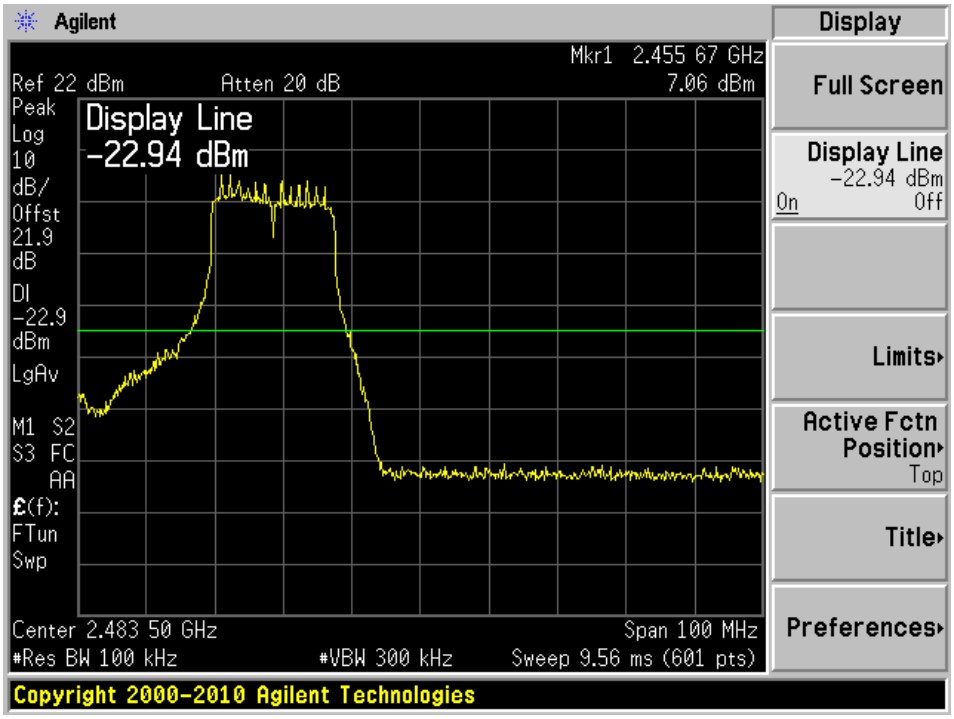


802.11n20 mode

Low channel



High channel



10 FCC §15.247(e) & ISED RSS-247 §5.2(2) - Power Spectral Density

10.1 Applicable Standards

According to FCC §15.247(e) and RSS-247 §5.2 (2) , 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.

10.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Meas Guidance v03r05: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 10: Maximum power spectral density level in the fundamental emission.

10.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	US42221851	2016-06-10	1 year
-	SMA cable	-	C#0001	Each time[1]	N/A
-	20dB attenuator	-	-	Each time[1]	N/A

[1]: cable and attenuator included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

10.4 Test Environmental Conditions

Temperature:	23º C
Relative Humidity:	44 %
ATM Pressure:	102.9 KPa

The testing was performed by Jimmy Xiao on 2016-09-11 in RF site.

10.5 Test Results

Radio Mode	Channel	Frequency (MHz)	PSD (dBm/3 kHz)		Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)
			Chain 0	Chain 1		
802.11b	Low	2412	-8.21	-7.65	-4.91	7
	Middle	2437	-7.73	-7.96	-4.83	7
	High	2462	-7.74	-8.66	-5.17	7
802.11g	Low	2412	-8.31	-8.36	-5.32	7
	Middle	2437	-9.69	-7.22	-5.27	7
	High	2462	-9.48	-8.93	-6.19	7
802.11n20	Low	2412	-8.49	-6.62	-4.44	7
	Middle	2437	-9.59	-7.59	-5.47	7
	High	2462	-8.98	-7.85	-5.37	7

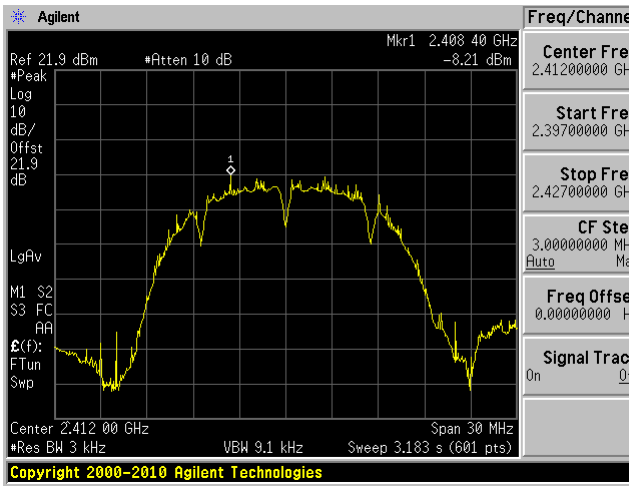
Note: The antenna gain for each chain is 4dBi, and these two chains can transmit at the same time, therefore the directional gain = 4 + 10log(2) = 7 dBi;
The limit = 8 dBm-(directional gain-6 dBi) = 7 dBm/3 kHz

Please refer to the following plots for detailed test results

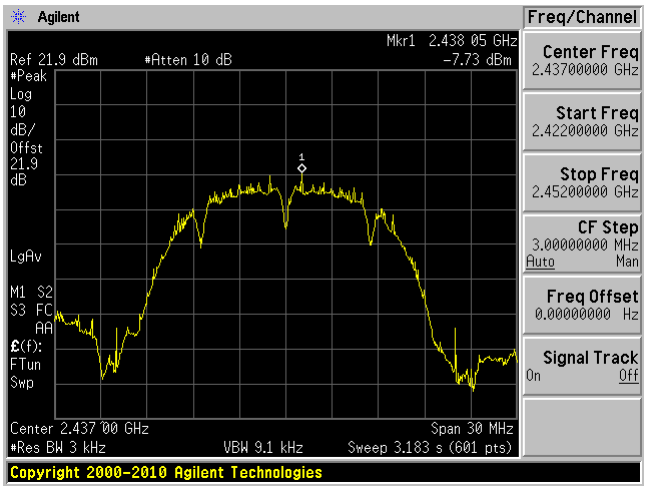
Chain 0:

802.11b mode

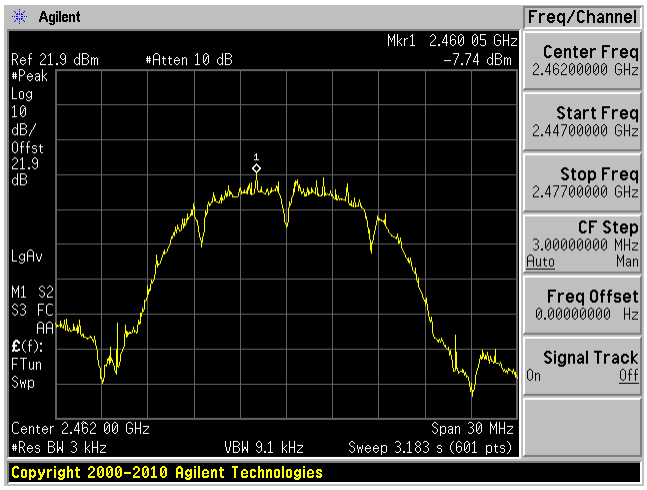
Low Channel 2412 MHz



Middle Channel 2437 MHz

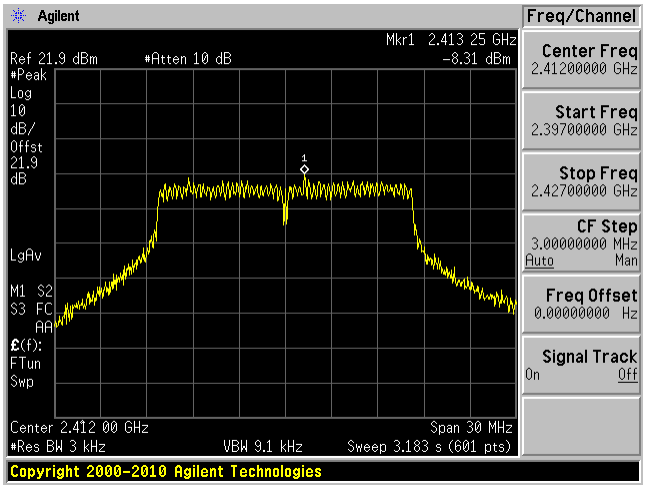


High Channel 2462 MHz

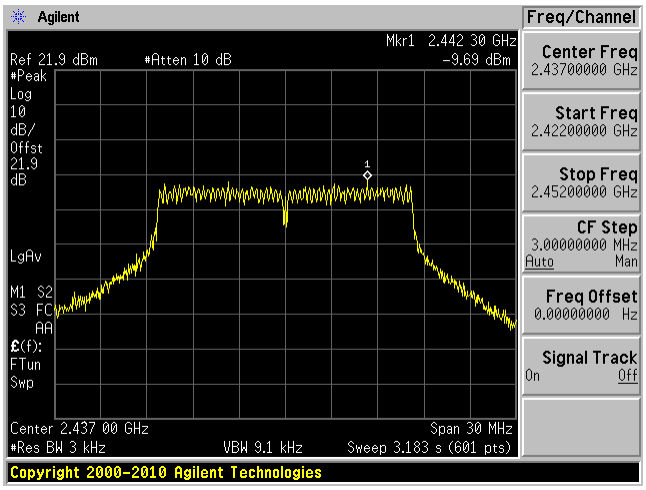


802.11g mode

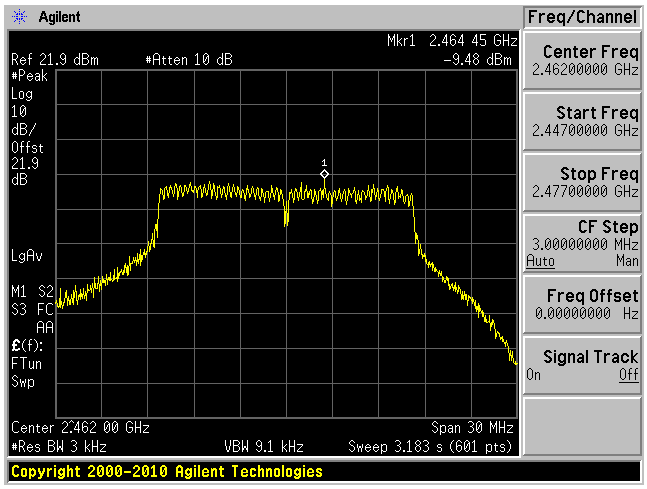
Low Channel 2412 MHz



Middle Channel 2437 MHz

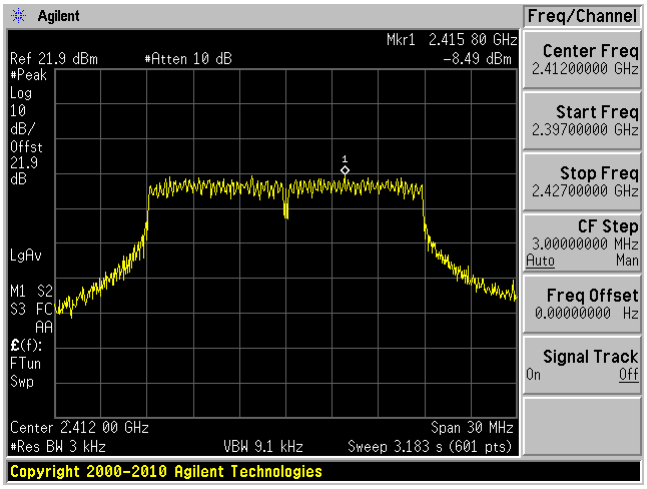


High Channel 2462 MHz

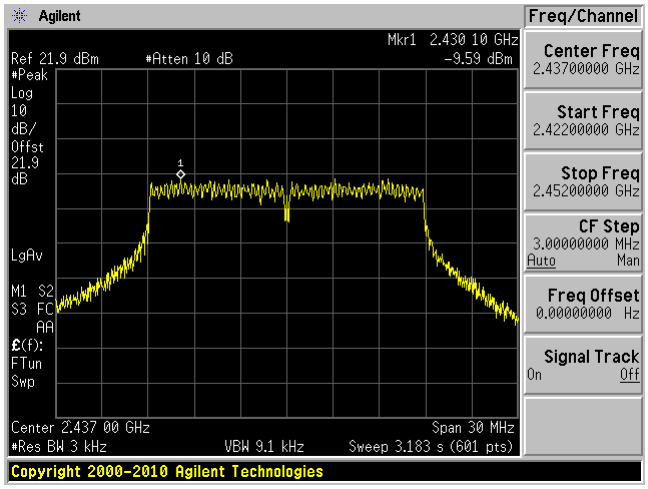


802.11n20 mode

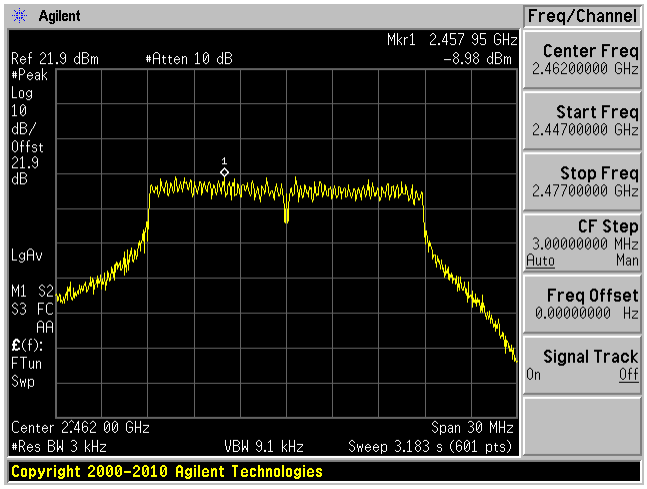
Low Channel 2412 MHz



Middle Channel 2437 MHz



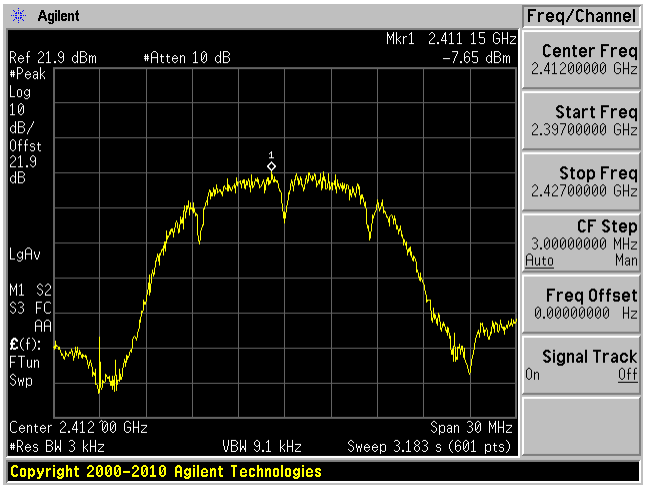
High Channel 2462 MHz



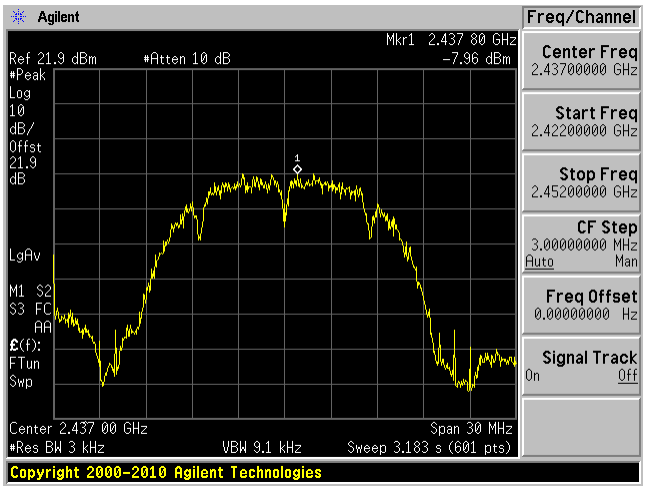
Chain 1:

802.11b mode

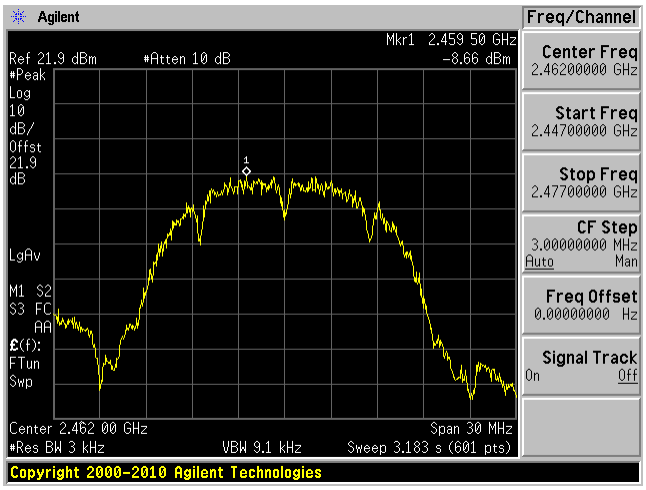
Low Channel 2412 MHz



Middle Channel 2437 MHz

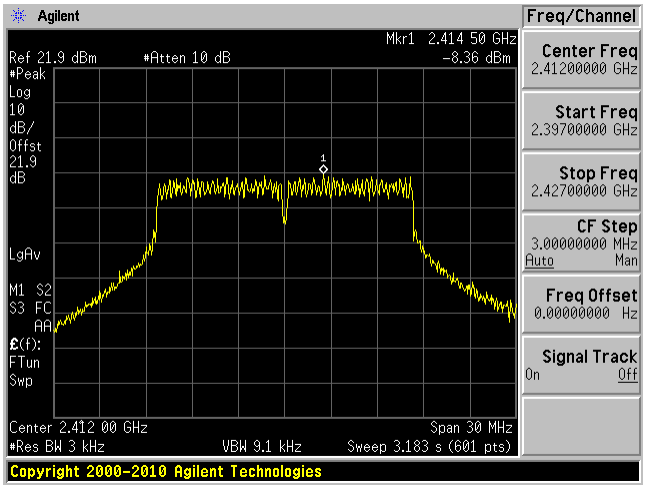


High Channel 2462 MHz

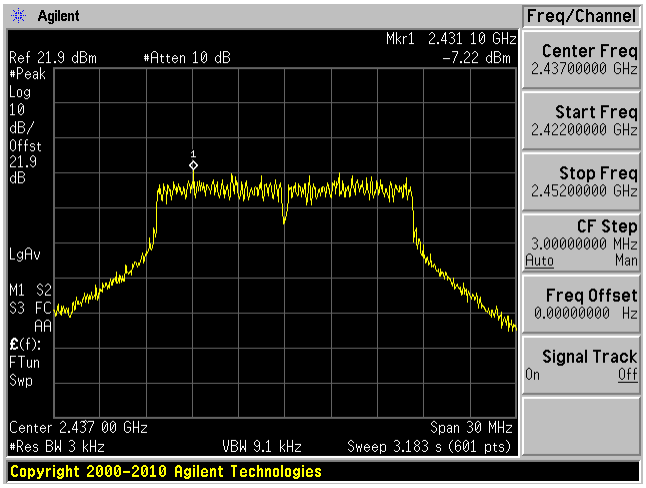


802.11g mode

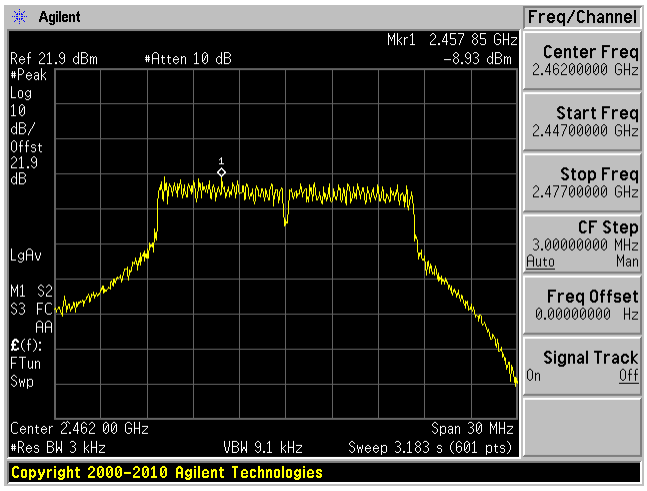
Low Channel 2412 MHz



Middle Channel 2437 MHz

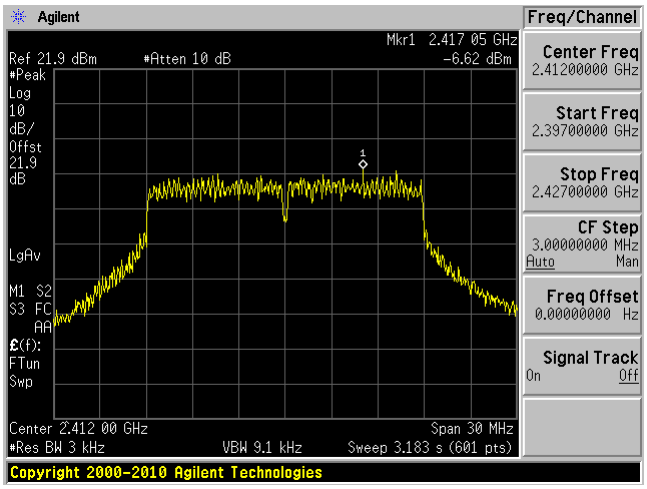


High Channel 2462 MHz

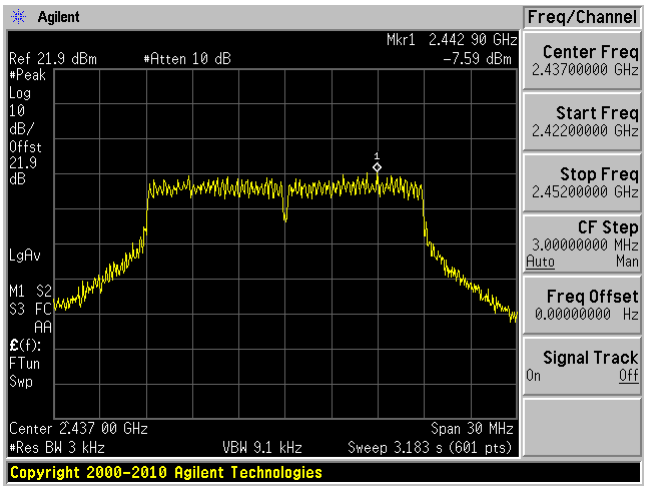


802.11n20 mode

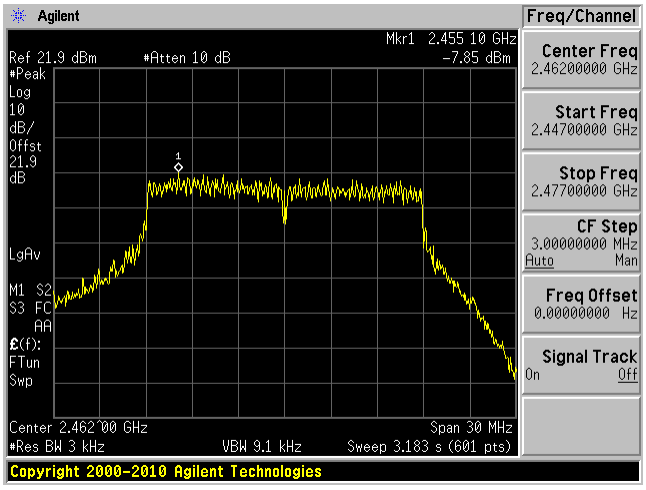
Low Channel 2412 MHz



Middle Channel 2437 MHz



High Channel 2462 MHz



11 FCC §15.247(d) & ISED RSS-247 §5.5, RSS-Gen §8.9 - Spurious Emissions at Antenna Terminals

11.1 Applicable Standards

For FCC §15.247(d) 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, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

As per IC RSS-247 §5.5, in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

11.2 Test Procedure

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

11.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	US42221851	2016-06-10	1 year
-	SMA cable	-	C#0001	Each time[1]	N/A
-	20 dB attenuator	-	-	Each time[1]	N/A

[1]: cable and attenuator included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

11.4 Test Environmental Conditions

Temperature:	23º C
Relative Humidity:	44 %
ATM Pressure:	102.9 KPa

The testing was performed by Jimmy Xiao on 2016-09-11 in RF site.

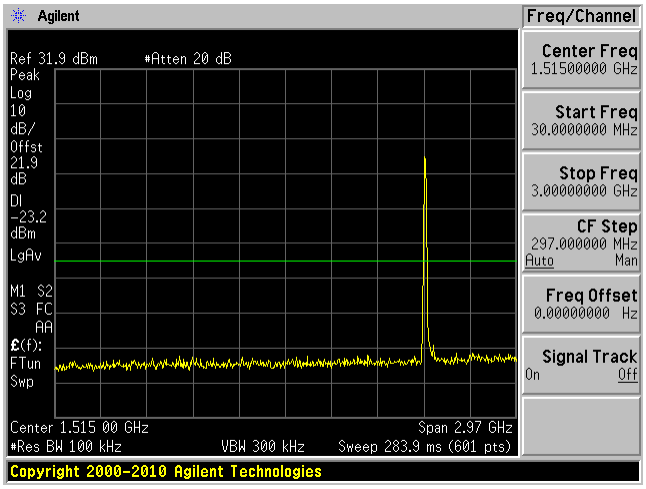
11.5 Test Results

Please refer to following plots.

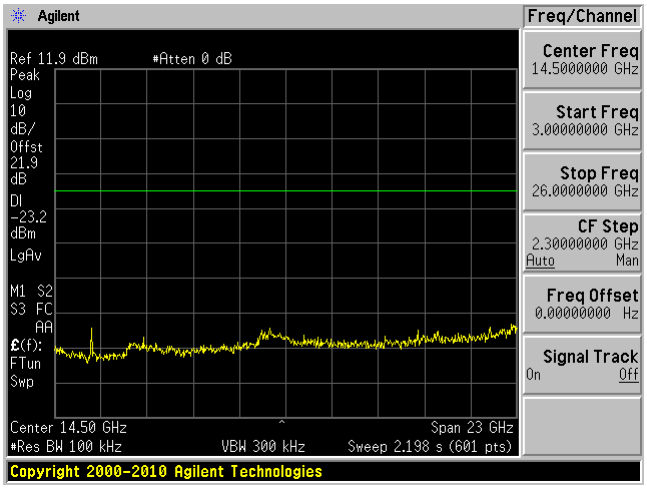
Chain 0:

802.11b mode

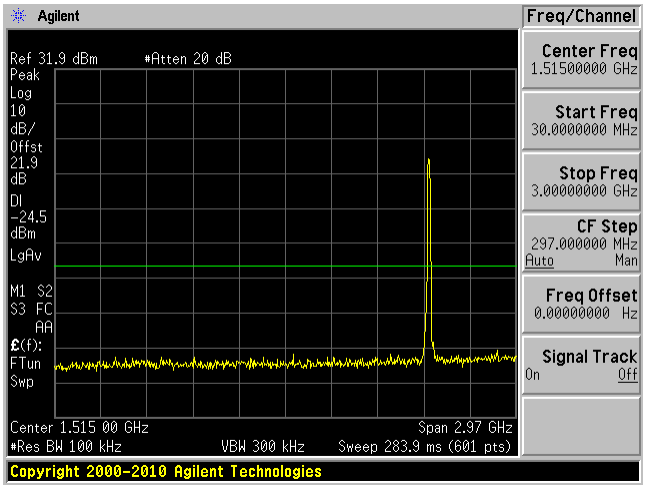
Low Channel 30MHz – 3 GHz



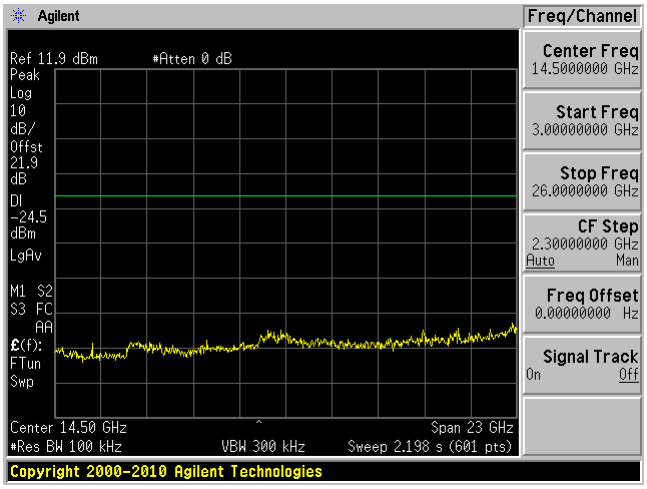
Low Channel 3 GHz – 26 GHz



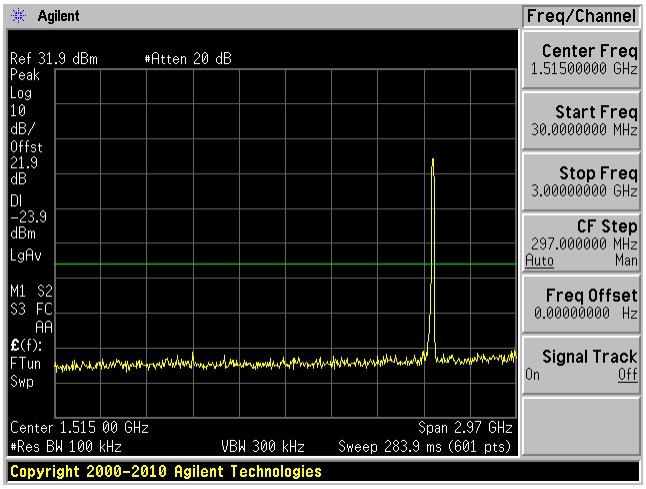
Middle Channel 30 MHz – 3 GHz



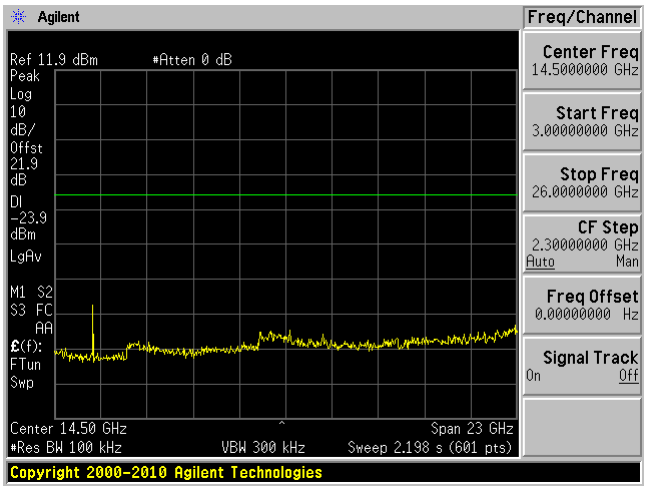
Middle Channel 3 GHz – 26 GHz



High Channel 30 MHz – 3 GHz

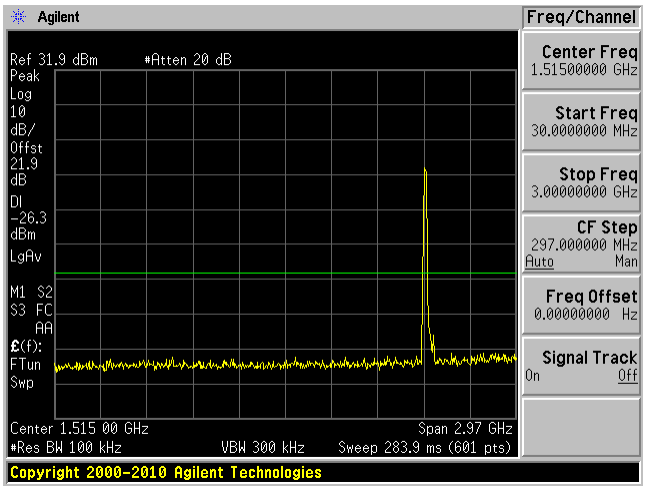


High Channel 3 GHz – 26 GHz

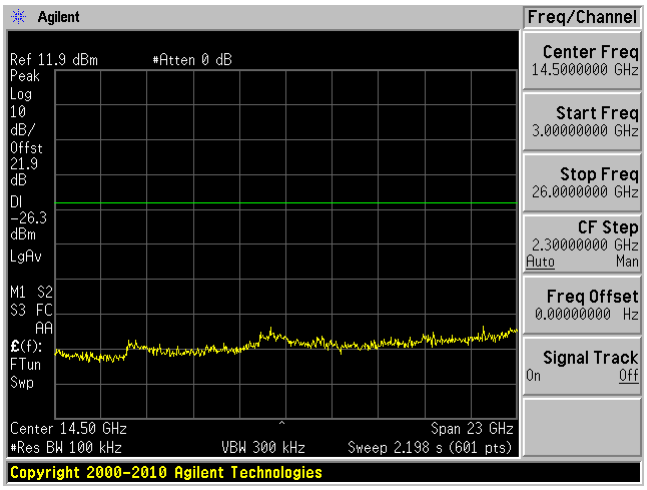


802.11g mode

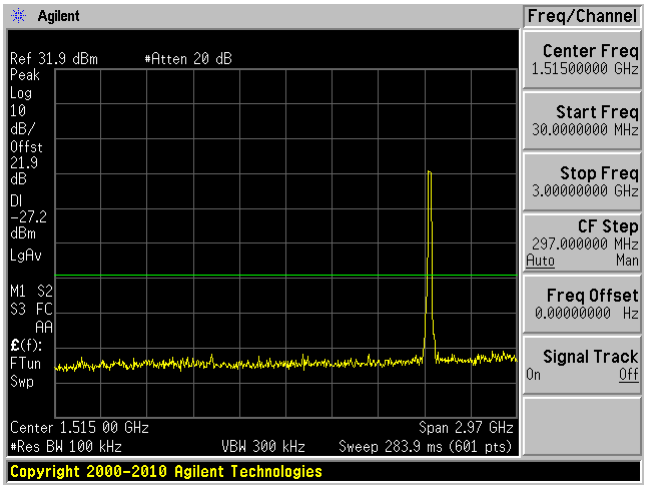
Low Channel 30 MHz – 3 GHz



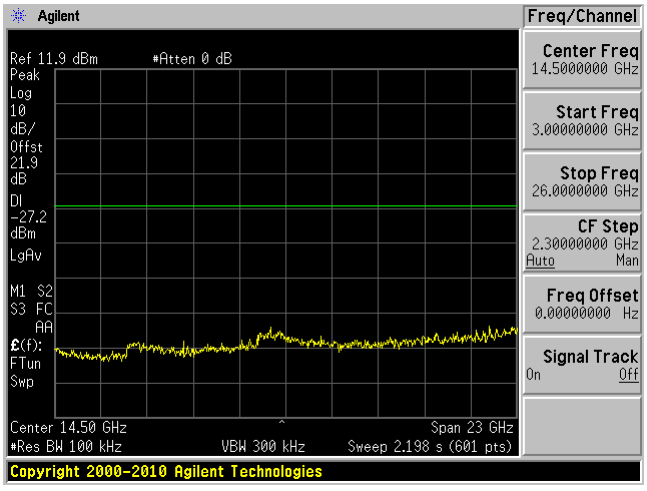
Low Channel 3 GHz – 26 GHz



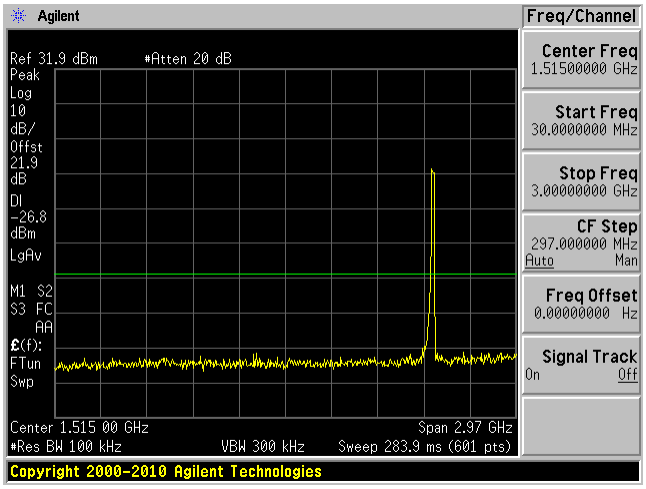
Middle Channel 30 MHz – 3 GHz



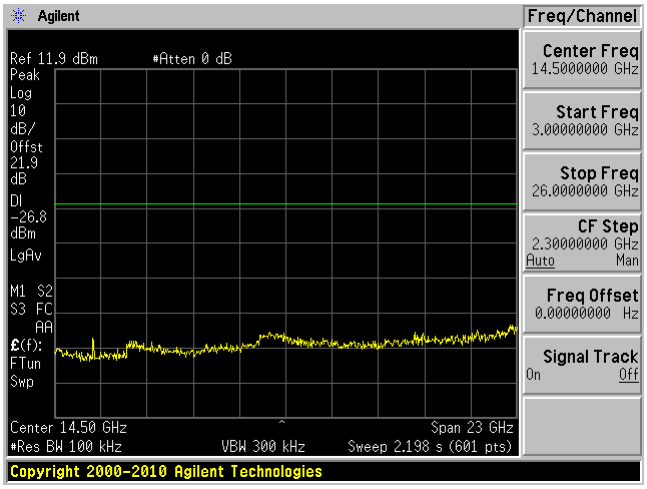
Middle Channel 3 GHz – 26 GHz



High Channel 30 MHz – 3 GHz

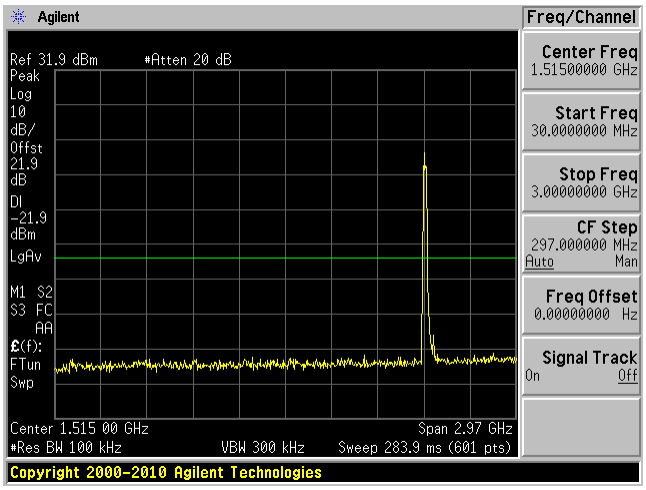


High Channel 3 GHz – 26 GHz

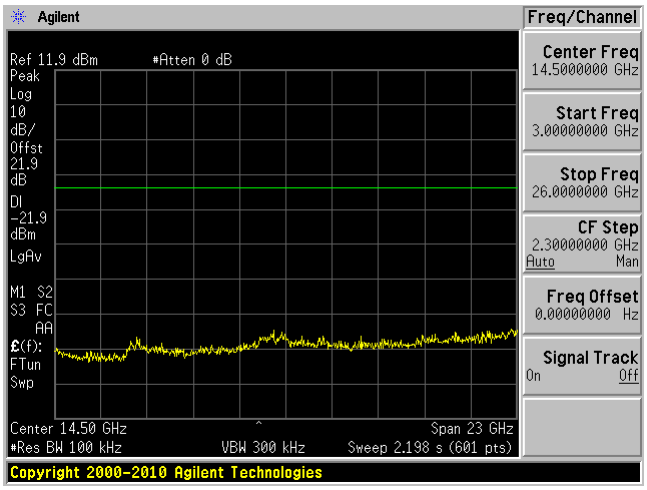


802.11n20 mode

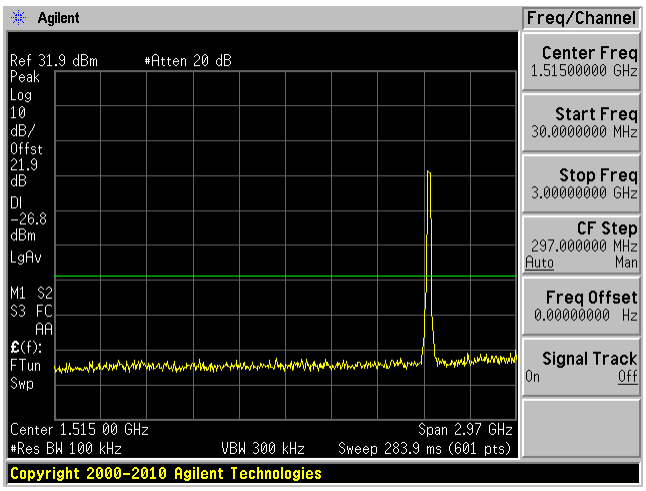
Low Channel 30 MHz – 3 GHz



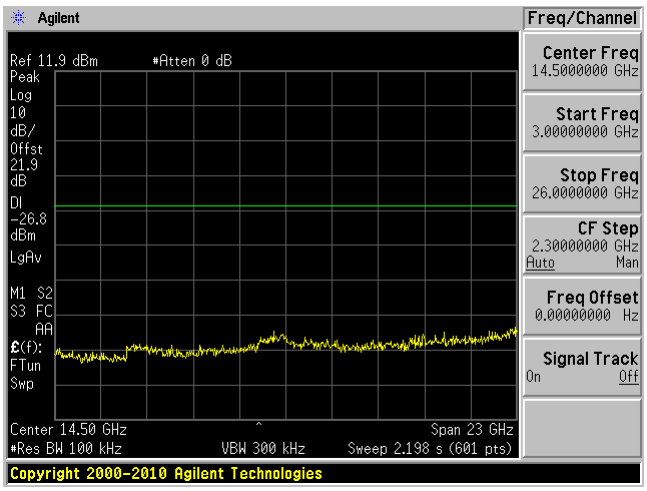
Low Channels 3 GHz – 26 GHz



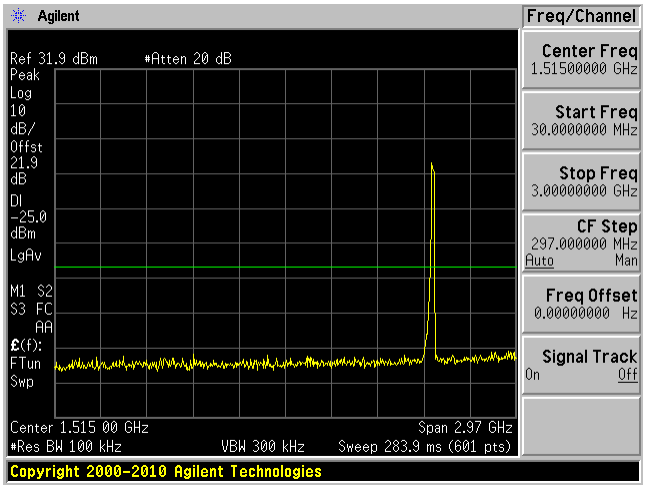
Middle Channel 30 MHz – 3 GHz



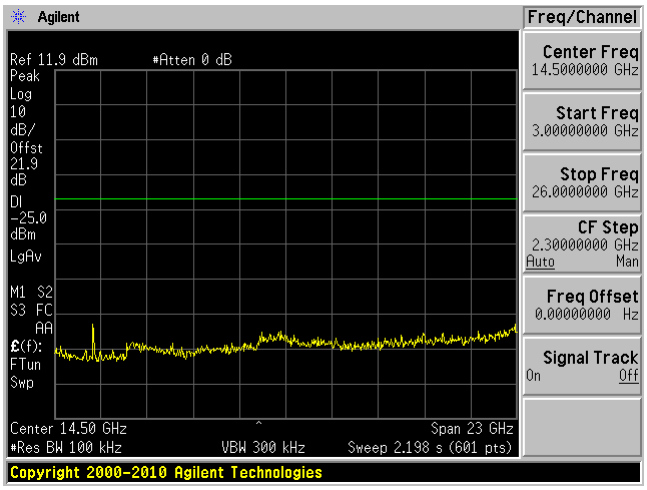
Middle Channels 3 GHz – 26 GHz



High Channel 30 MHz – 3 GHz



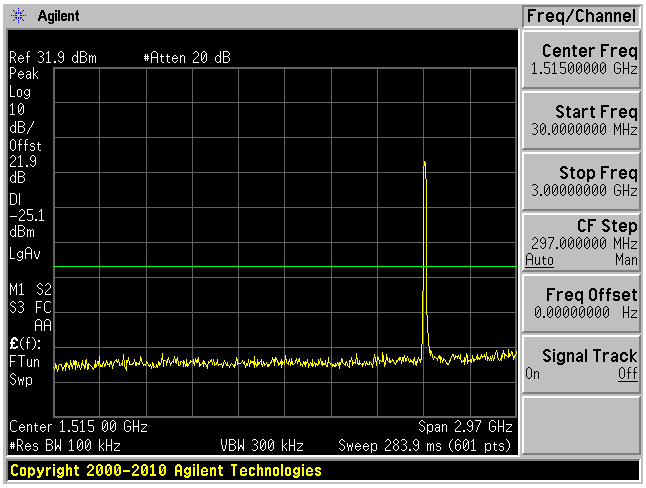
High Channel 3 GHz – 26 GHz



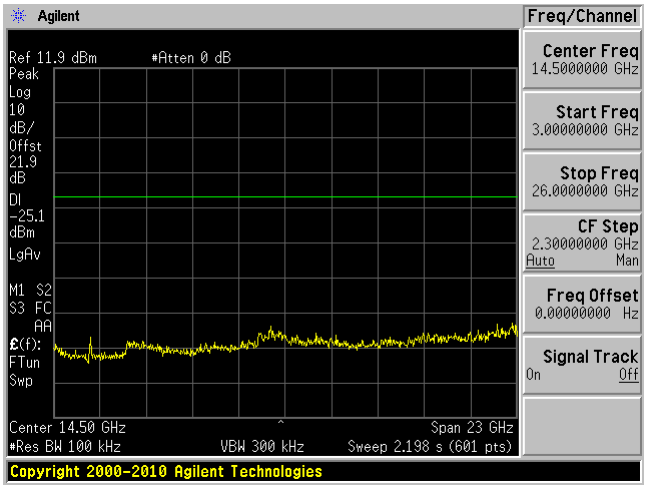
Chain 1:

802.11b mode

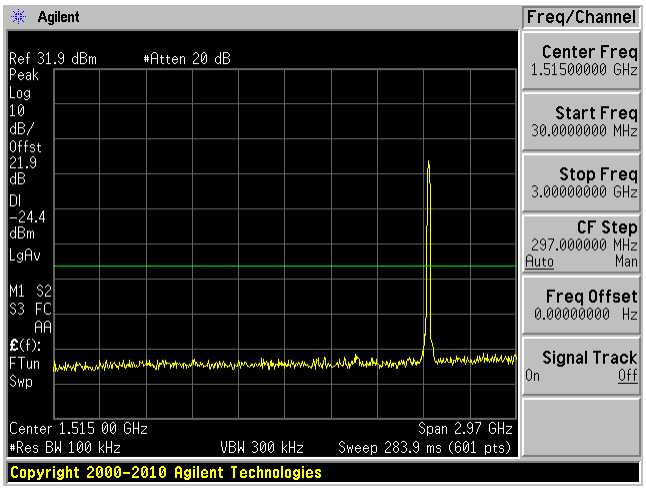
Low Channel 30 MHz – 3 GHz



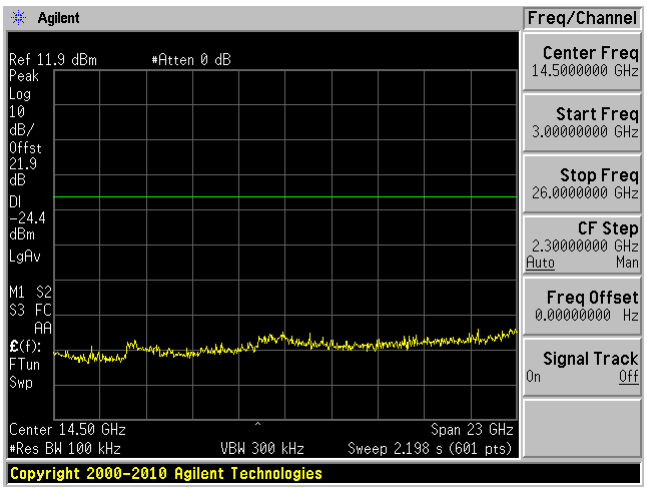
Low Channel 3 GHz – 26 GHz



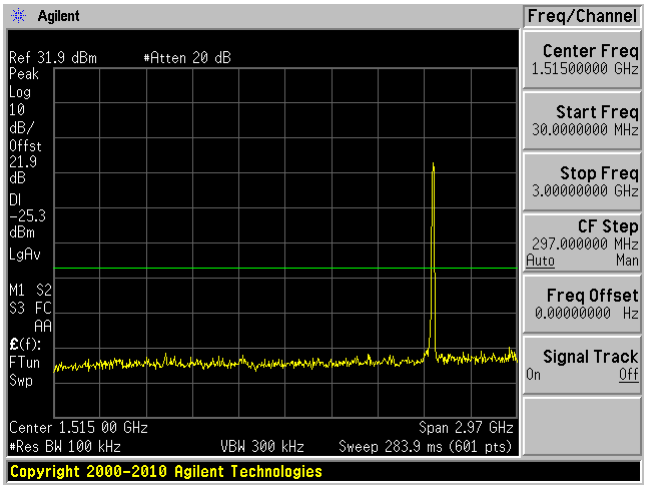
Middle Channel 30 MHz – 3 GHz



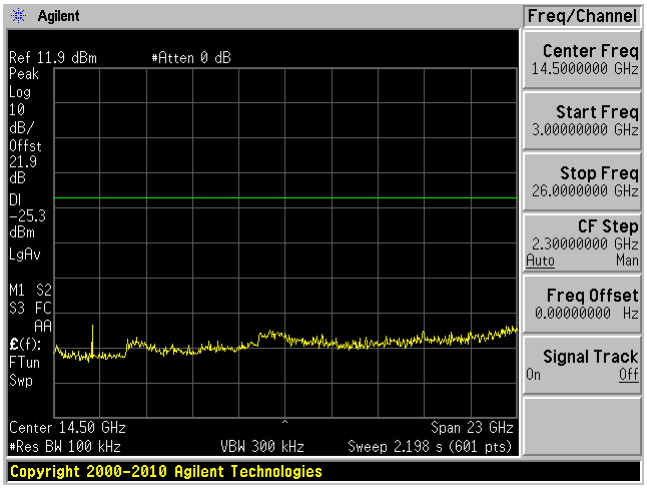
Middle Channel 3 GHz – 26 GHz



High Channel 30 MHz – 3 GHz

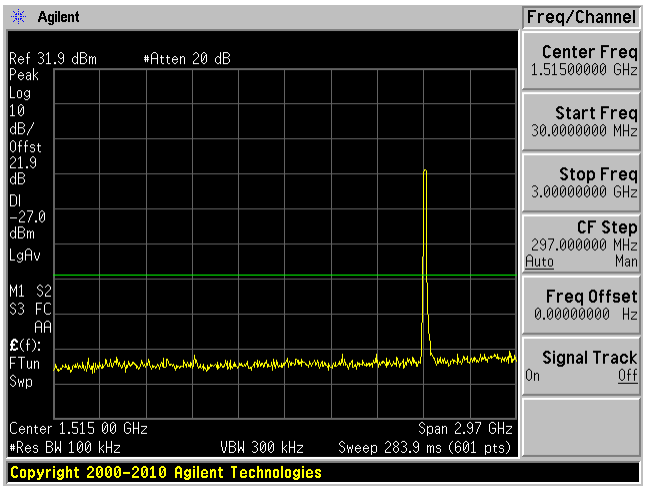


High Channel 3 GHz – 26 GHz

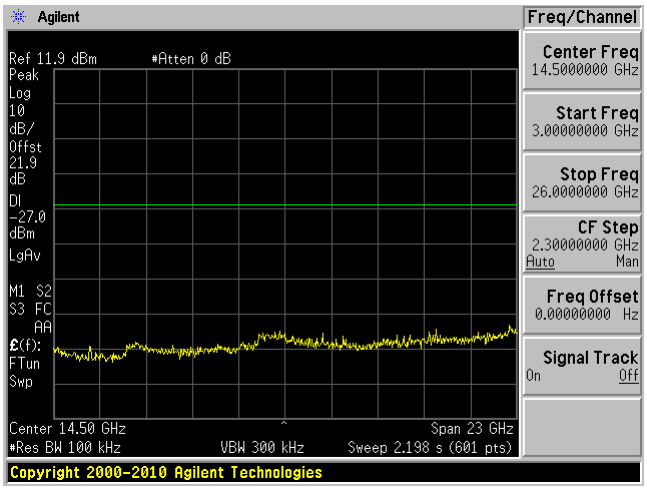


802.11g mode

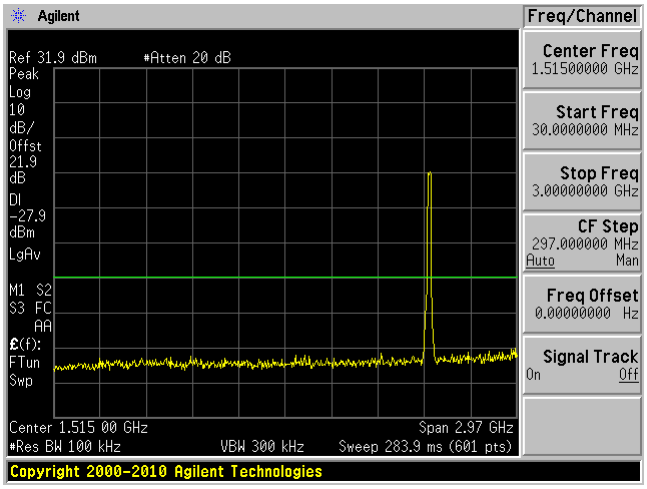
Low Channel 30 MHz – 3 GHz



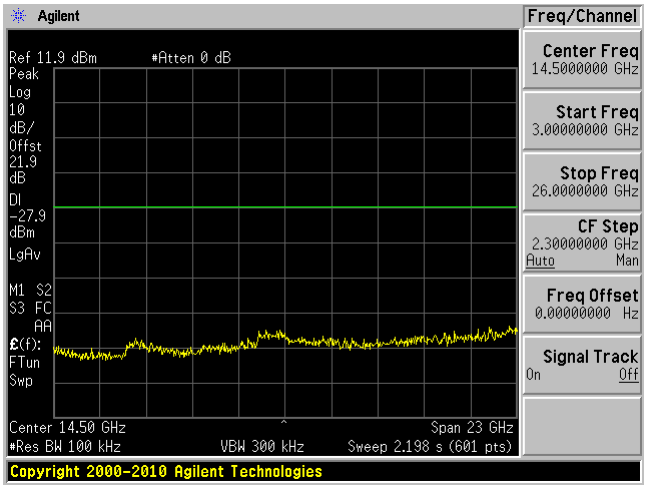
Low Channel 3 GHz – 26 GHz



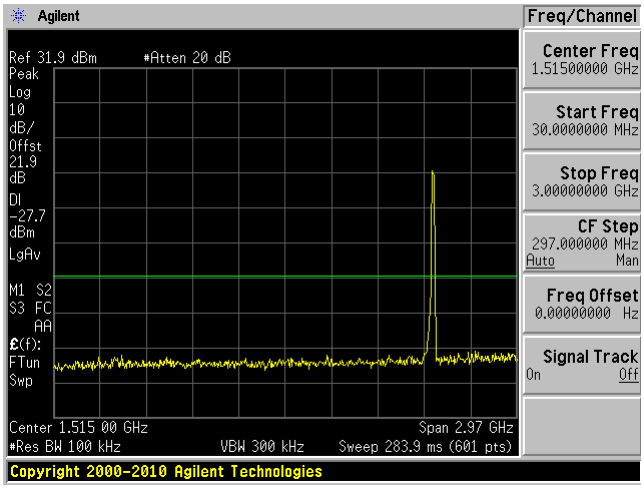
Middle Channel 30 MHz – 3 GHz



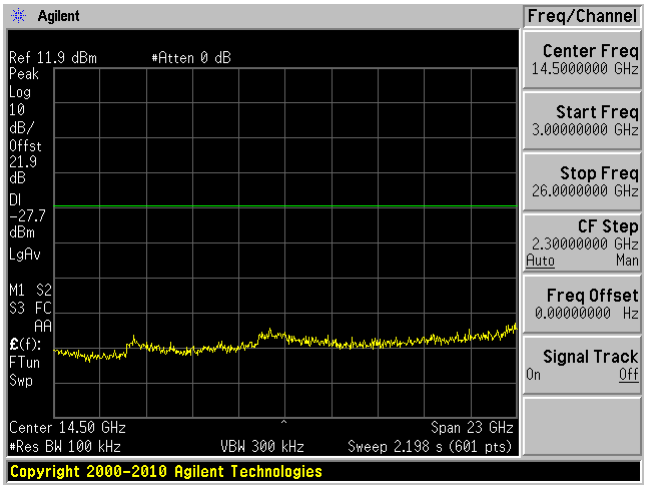
Middle Channel 3 GHz – 26 GHz



High Channel 30 MHz – 3 GHz

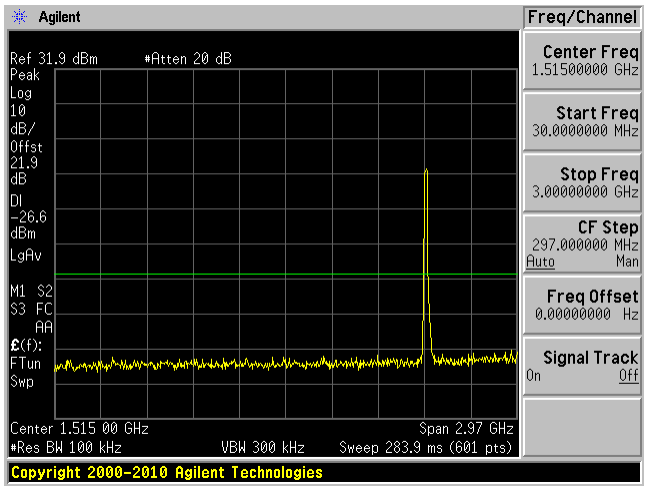


High Channel 3 GHz – 26 GHz

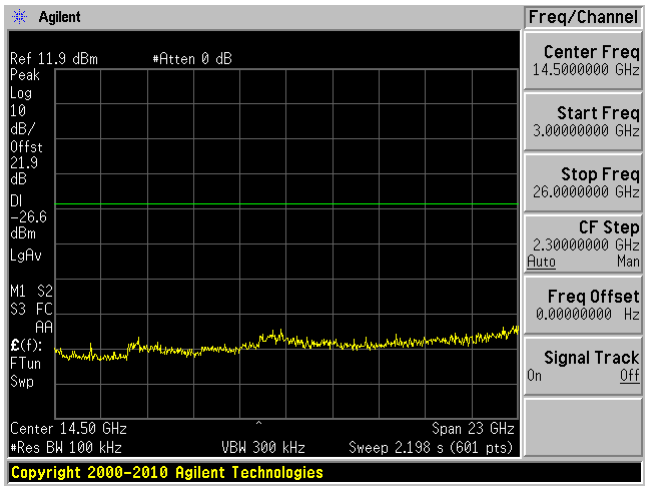


802.11n20 mode

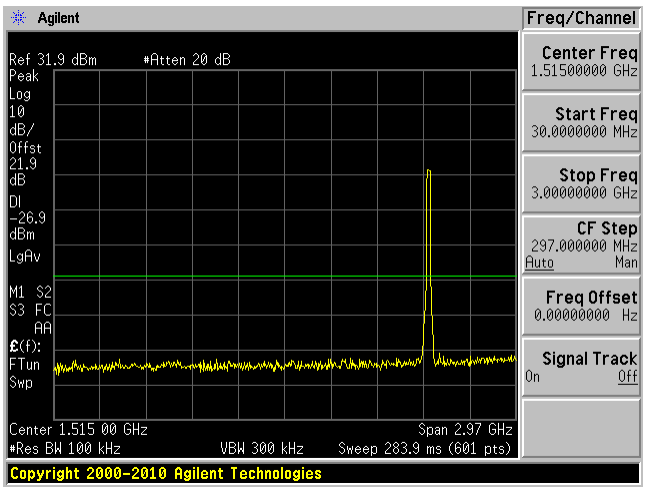
Low Channel 30 MHz – 3 GHz



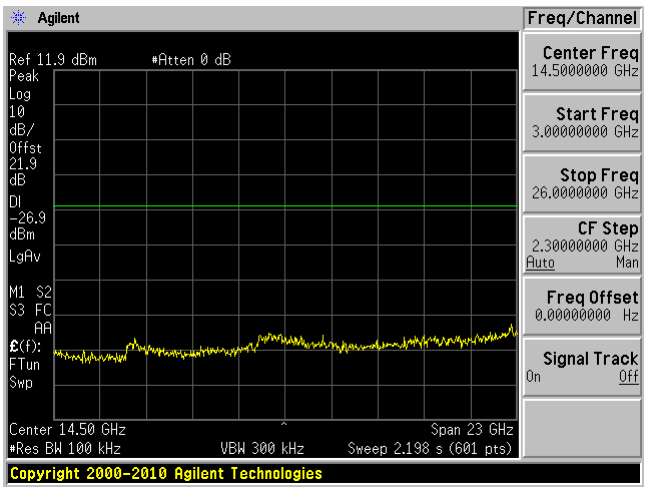
Low Channels 3 GHz – 26 GHz



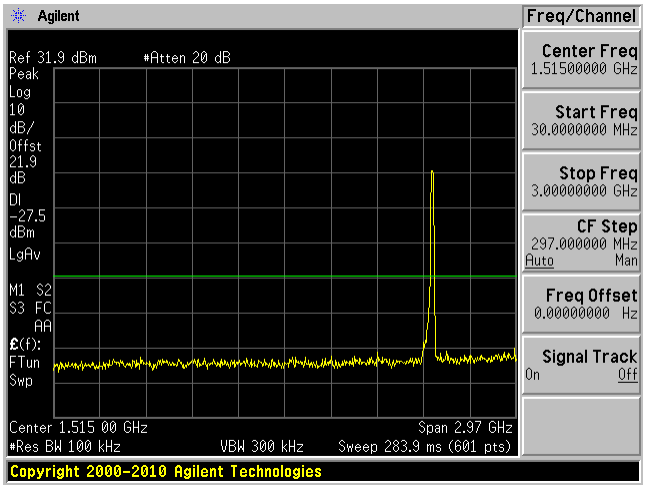
Middle Channel 30 MHz – 3 GHz



Middle Channels 3 GHz – 26 GHz



High Channel 30 MHz – 3 GHz



High Channel 3 GHz – 26 GHz