FCC PART 15.407

TEST REPORT

For

Actiontec Electronics, Inc.

3301 Olcott Street,

Santa Clara, CA 95054, USA

FCC ID: LNQC3000A

Report Type:	Product Type:
Original Report	802.11n and 802.11ac Wi-Fi Router

Prepared By:	Vincent Licata Test Engineer
Report Number:	R1711062-407
Report Date:	2017-03-07
Reviewed By:	Jin Yang RF Engineer

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* This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "*"

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1711062-407	Original Report	2018-03-07

1 General Description

1.1 Product Description for Equipment under Test (EUT)

This test and measurement report was prepared on behalf of *Actiontec Electronics, Inc.*, and their product model: *C3000A, and multiple model: T3260,* FCC ID: LNQC3000A or the "EUT" as referred to in this report. The EUT is an indoor access point.

1.2 Objective

This report is prepared on behalf of *Actiontec Electronics, Inc.*in accordance with FCC CFR47 §15.407.

The objective is to determine compliance with FCC Part 15.407 rules for Output Power, Antenna Requirements, AC Line Conducted Emissions, Emission Bandwidth, Power spectral density, and Radiated Spurious Emissions.

1.3 Related Submittal(s)/Grant(s)

FCC Part 15, Subpart C, Equipment DTS with FCC ID: LNQC3000A.

1.4 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.10-2013, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz, and FCC KDB 789033 D02 General UNII Test Procedure New Rules v02r01.

1.5 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 º C
Humidity	±5 %
DC and low frequency voltages	±1.0 %
Time	±2 %
Duty Cycle	±3 %

1.6 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.

1.7 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 the 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: (Innovation, Science and Economic development Canada - ISEDC) 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 2014/30/EU US-EU EMC & Telecom MRA CAB (NB)
    - Radio & Teleterminal Equipment (R&TTE) Directive 1995/5/EC US -EU EMC & Telecom MRA CAB (NB)
    - Radio Equipment (RE) Directive 2014/53/EU US-EU EMC & Telecom MRA CAB (NB)
    - Low Voltage Directive (LVD) 2014/35/EU
- 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 Media Development Authority - IMDA) 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;
    - Nationally Recognized Test Laboratory (NRTL) – US OSHA
- Vietnam: APEC Tel MRA -Phase I;

2 EUT Test Configuration

2.1 Justification

The EUT was configured for testing according to ANSI C63.10-2013 and FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

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 by measuring the average power, peak power and PPSD across all data rates bandwidths, and modulations.

2.2 EUT Exercise Software

The test firmware used was CRT 5.0 provided by *Actiontec Electronics, Inc.,* the software is complied with the standard requirements being tested against.

Please refer to the following power setting table.

FCC Result

Modulation	Channel	Frequency (MHz)	Power Setting
802.11a mode	36	5180	20
	40	5200	20
	48	5240	20
	149	5745	22
	157	5785	22
	165	5825	21

Modulation	Channel	Frequency (MHz)	Power Setting
802.11HT/VHT20	36	5180	20
	40	5200	20
	48	5240	20
	149	5745	22
	157	5785	22
	165	5825	21
802.11HT/VHT40	38	5190	18
	46	5230	22
	142	5710	23
	151	5755	23
802.11VHT80	42	5210	17
	155	5775	20

*Data rates tested:
802.11a mode: 6Mbps
802.11n HT20: MCS0
802.11n HT40: MCS0
802.11ac VHT20: MCS0
802.11ac VHT40: MCS0
802.11ac VHT80: MCS0

2.3 Duty Cycle Correction Factor

According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01 section B:

All measurements are to be performed with the EUT transmitting at 100% duty cycle at its maximum power control level; however, if 100% duty cycle cannot be achieved, measurements of duty cycle, x, and maximum-power transmission duration, T, are required for each tested mode of operation.

5.2 GHz Results

Radio Mode	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
802.11a	2.067	2.16	95.69	0.191334454
802.11HT/VHT20	1.933	2.027	95.36	0.206337576
802.11HT/VHT40	0.9533	1.067	89.34	0.489540519
802.11VHT80	0.460	0.490	93.88	0.274269191

5.8 GHz Results

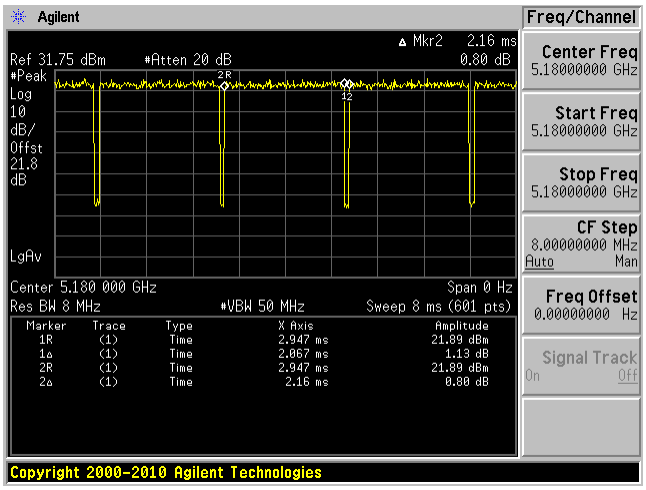
Radio Mode	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
802.11a	2.04	2.147	95.02	0.221849739
802.11HT/VHT20	1.933	2.027	95.36	0.206337576
802.11HT/VHT40	0.9467	1.047	90.42	0.437354973
802.11VHT80	0.460	0.490	93.88	0.274269191

Note: Duty Cycle Correction Factor = 10*log(1/duty cycle)

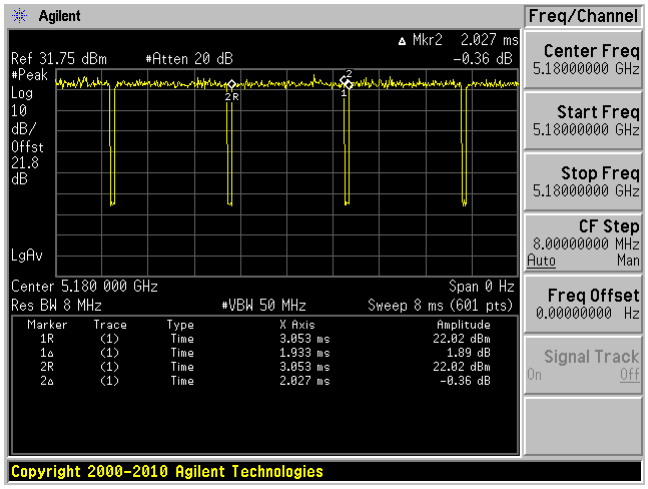
Please refer to the following plots.

5.2 GHz

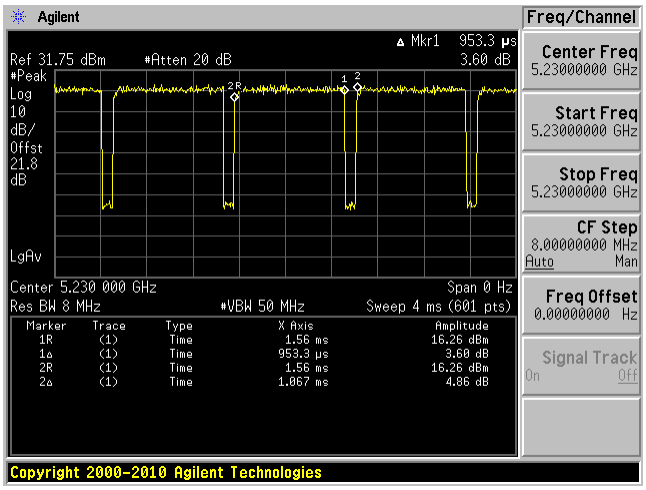
802.11a mode



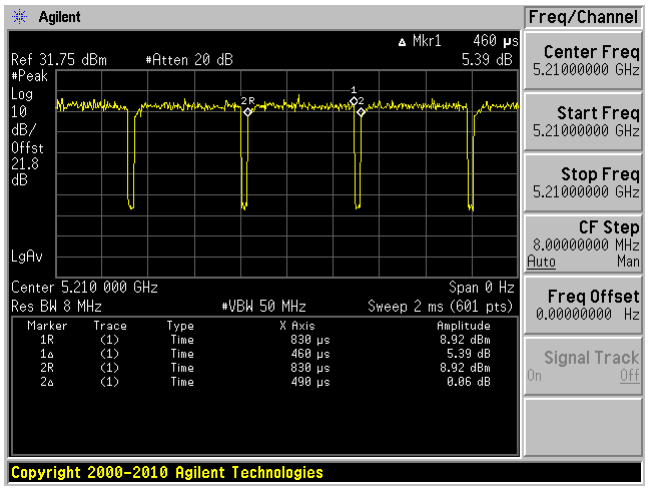
802.11HT/VHT20 mode



802.11HT/VHT40 mode

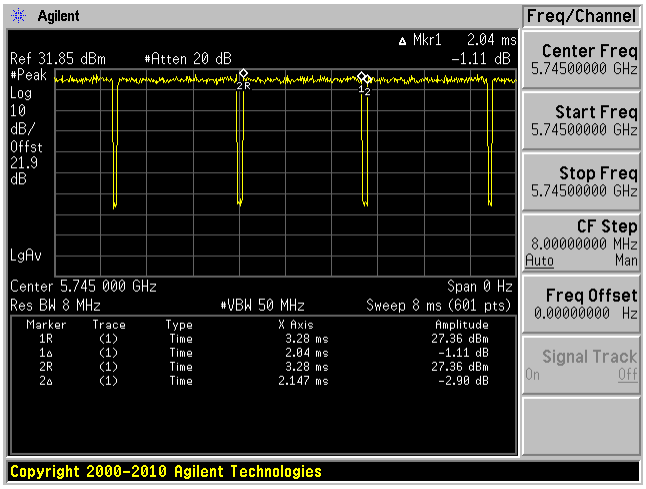


802.11VHT80 mode

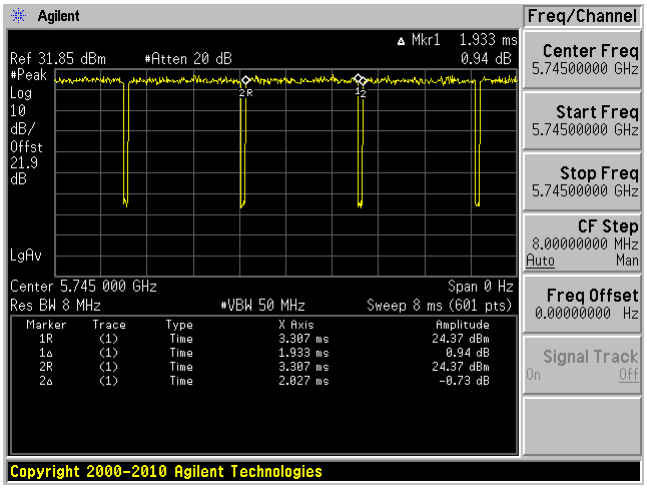


5.8 GHz

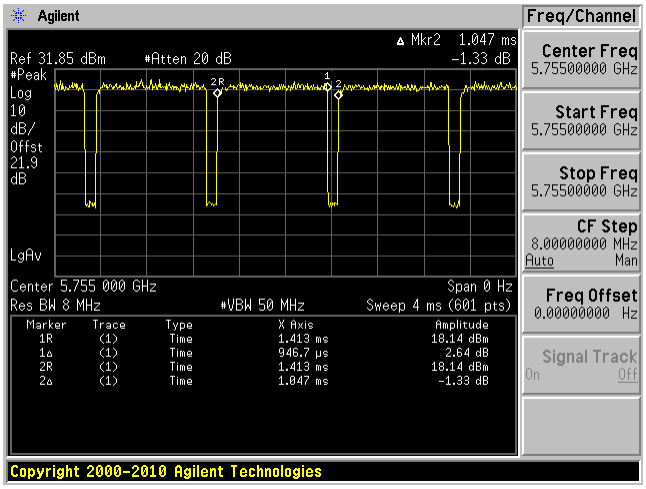
802.11a mode



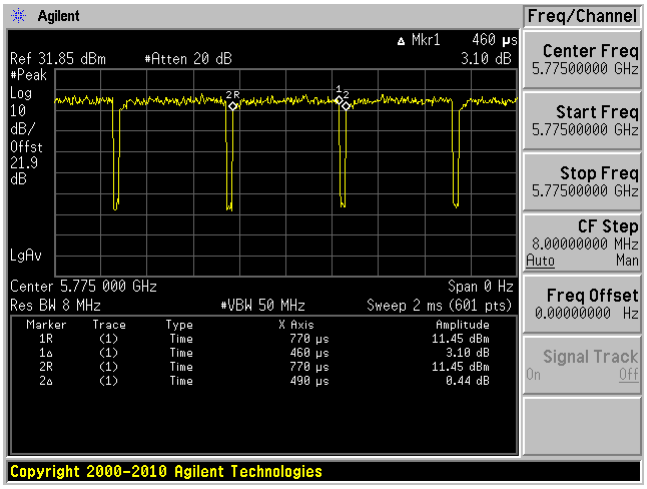
802.11HT/VHT20 mode



802.11HT/VHT40 mode



802.11VHT80 mode



2.4 Equipment Modifications

N/A

2.5 Local Support Equipment

Manufacturer	Description	Model	Serial Number
Dell	Laptop	Latitude E6410	3CKRAQ1

2.6 Support Equipment

There was no support equipment included, or intended for use with EUT during these tests.

2.7 Interface Ports and Cabling

Cable Description	Length (m)	To	From
Ethernet Cable	< 1 m	Laptop	EUT
RF Cable	< 1 m	EUT	PSA
RF Cable	< 1 m	EUT	PSA

3 Summary of Test Results

FCC Rules	Description of Test	Result
FCC §2.1091, §15.407(f),	RF Exposure	Compliant
FCC §15.203	Antenna Requirement	Compliant
FCC §15.207	AC Power Line Conducted Emissions	Compliant
FCC §2.1053, §15.205, §15.209, 15.407(b)	Spurious Emissions	Compliant
FCC §15.407(e)	Emission Bandwidth	Compliant
FCC §407(a)	Output Power	Compliant
FCC §2.1051, §15.407(b)	Band Edges	Compliant
FCC §15.407(a)	Power Spectral Density	Compliant

4 FCC §2.1091, §15.407(f) - RF Exposure

According to FCC §15.407(f) 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

4.1 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

4.2 MPE Results

Standalone 2.4 GHz Wi-Fi

Maximum peak output power at antenna input terminal (dBm):	29.05
Maximum peak output power at antenna input terminal (mW):	803.526
Prediction distance (cm):	30
Prediction frequency (MHz):	2437
Maximum Antenna Gain, typical (dBi):	4.384
Maximum Antenna Gain (numeric):	2.744
Power density of prediction frequency at 30.0 cm (mW/cm^2):	0.195
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 30 cm is 0.195 mW/cm^2. Limit is 1.0 mW/cm^2.

Standalone 5 GHz Wi-Fi

Maximum peak output power at antenna input terminal (dBm):	27.77
Maximum peak output power at antenna input terminal (mW):	598.412
Prediction distance (cm):	30
Prediction frequency (MHz):	5755
Maximum Antenna Gain, typical (dBi):	5.775
Maximum Antenna Gain (numeric):	3.7801
Power density of prediction frequency at 30.0 cm (mW/cm^2):	0.2
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 30 cm is 0.2 mW/cm^2. Limit is 1.0 mW/cm^2.

The conducted power used for MPE calculation is the total power acorss all chains, and the maximum antenna gain used for MPE calculation is the directional gain.

5 GHz Wi-Fi and 2.4 GHz bands can transmit simultaneously. Per FCC KDB 447498, when RF sources have difference frequencies, the fraction of the FCC power density limit shall be determined and the sum of all fractional components shall be less than 1.

Frequency Band	Max Conducted Power(dBm)	Evaluated Distance (cm)	Worst-Case MPE (mW/cm^2)	MPE Limit (mW/cm^2)	Worst-Case MPE Ratios	Sum of MPE Ratios	Limit
Worst Case							
2.4 GHz Wi-Fi	29.05	30	0.195	1.0	19.5 %	39.5 %	100 %
5 GHz Wi-Fi	27.77	30	0.200	1.0	20 %		

5 FCC §15.203 - Antenna Requirements

5.1 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 §15.407 (a) (ii), 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.

5.2 Antenna List

The antennas used by the EUT are permanent attached antennas. The following antenna specifications were provided by the applicant.

Frequency Range (GHz)	PCB No. and Gain (dBi)			Correlated Gain (dBi)
	X6	X4	X5	
2.40	-6.100	-0.896	1.535	3.479
2.45	-8.662	0.141	3.428	4.384
2.50	-9.263	1.679	3.024	4.695

Frequency Range (GHz)	PCB No. and Gain (dBi)				Correlated Gain (dBi)
	X13	X7	X12	X15	
5.15	2.353	3.001	-3.782	-3.146	6.165
5.25	2.435	2.760	-5.916	-3.282	5.776
5.35	3.872	3.229	-9.772	-4.280	5.906
5.725	5.287	0.914	-6.033	-7.128	5.775
5.825	3.069	2.960	-5.396	-6.626	5.651

6 FCC §15.207 - AC Power Line Conducted Emissions

6.1 Applicable Standards

As per FCC §15.207

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56 Note1	56 to 46 Note2
0.5-5	56	46
5-30	60	50

Note1: Decreases with the logarithm of the frequency.
Note2: A linear average detector is required

6.2 Test Setup

The measurement was performed at shield room, using the setup per ANSI C63.10-2013 measurement procedure. The specification used was FCC §15.207 limits.

External I/O cables were draped along the edge of the test table and bundle when necessary.
The AC/DC power adapter of the EUT was connected with LISN-1 which provided 120 V / 60 Hz AC power.

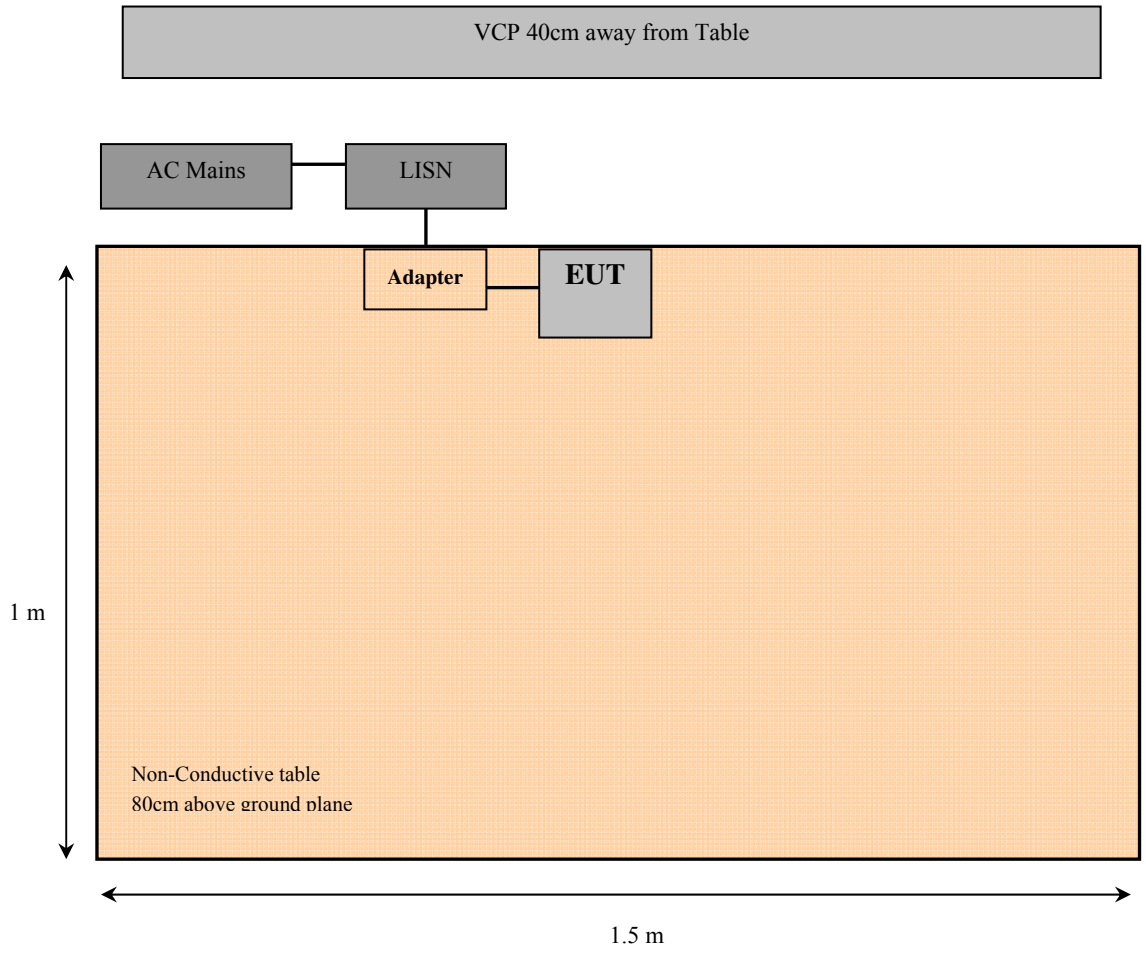
6.3 Test Procedure

During the conducted emissions test, the power cord of the EUT host system was connected to the mains outlet of the LISN-1 and the power cords of support equipment were connected to LISN-2.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the peak, quasi-peak, and average detection mode. Quasi-Peak readings are distinguished with a “QP.” Average readings are distinguished with an “Ave”.

6.4 Test Setup Block Diagram



6.5 Corrected Amplitude and Margin Calculation

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

CA = Ai + CL + Atten

For example, a corrected amplitude of 46.2 dBuV = Indicated Reading (32.5 dBuV) + Cable Loss (3.7 dB) + Attenuator (10 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

6.6 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde and Schwarz	Receiver, EMI Test	ESCI 1166.5950K03	100338	2016-02-04	2 years
Rohde and Schwarz	Impulse Limiter	ESH3-Z2	101964	2017-07-24	1 year
Keysight Technologies	RF Limiter	11867A	MY42242932	2017-02-07	1 year
Solar Electronics Company	High Pass Filter	Type 7930-100	7930150204	2017-03-13	1 year
Suirong	30 ft conductive emission cable	LMR 400	-	N/R	N/A
FCC	LISN	FCC-LISN-50-25-2-10-CISPR16	160129	2017-04-24	1 year

Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 09 June 2016) "A2LA Policy on Metrological Traceability".*

6.7 Test Environmental Conditions

Temperature:	23º C
Relative Humidity:	42 %
ATM Pressure:	101.31 kPa

The testing was performed by Vincent Licata on 2018-01-29 at open area test site.

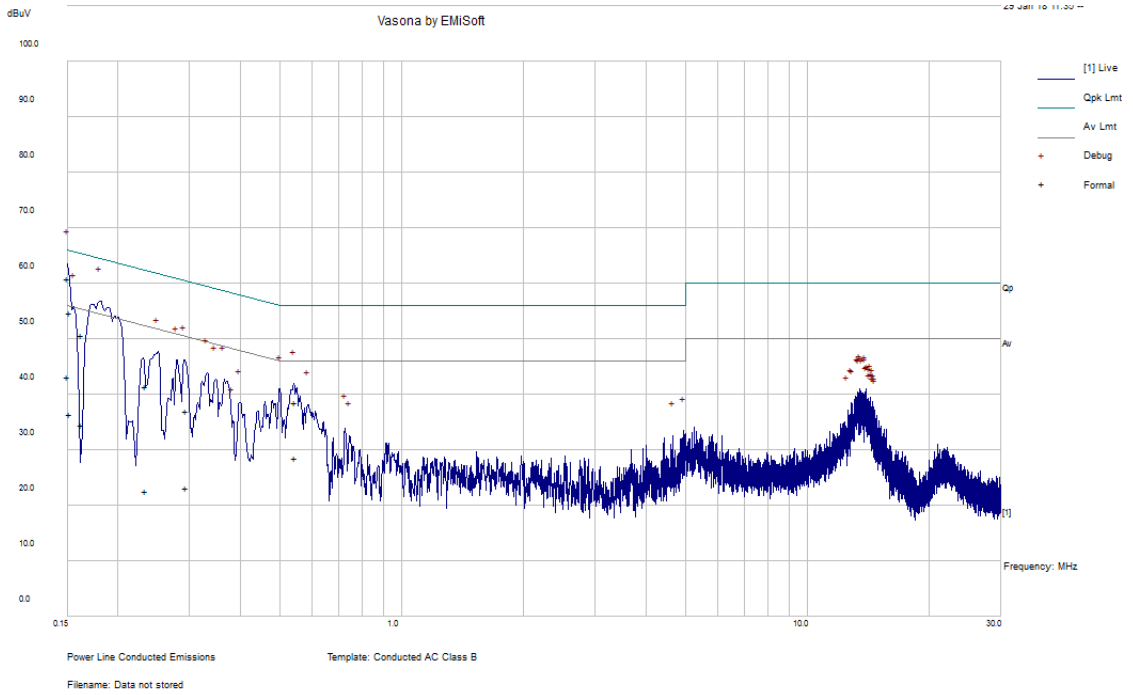
6.8 Summary of Test Results

According to the recorded data in following table, the EUT complied with the FCC Part 15 standards' conducted emissions limits, with the margin reading of:

Connection: AC/DC adapter connected to 120 V/60 Hz, AC			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Live/Neutral)**	**Range (MHz)**
-5.13	0.150182	Line	0.15-30

6.9 Conducted Emissions Test Plots and Data

120 V, 60 Hz – Line

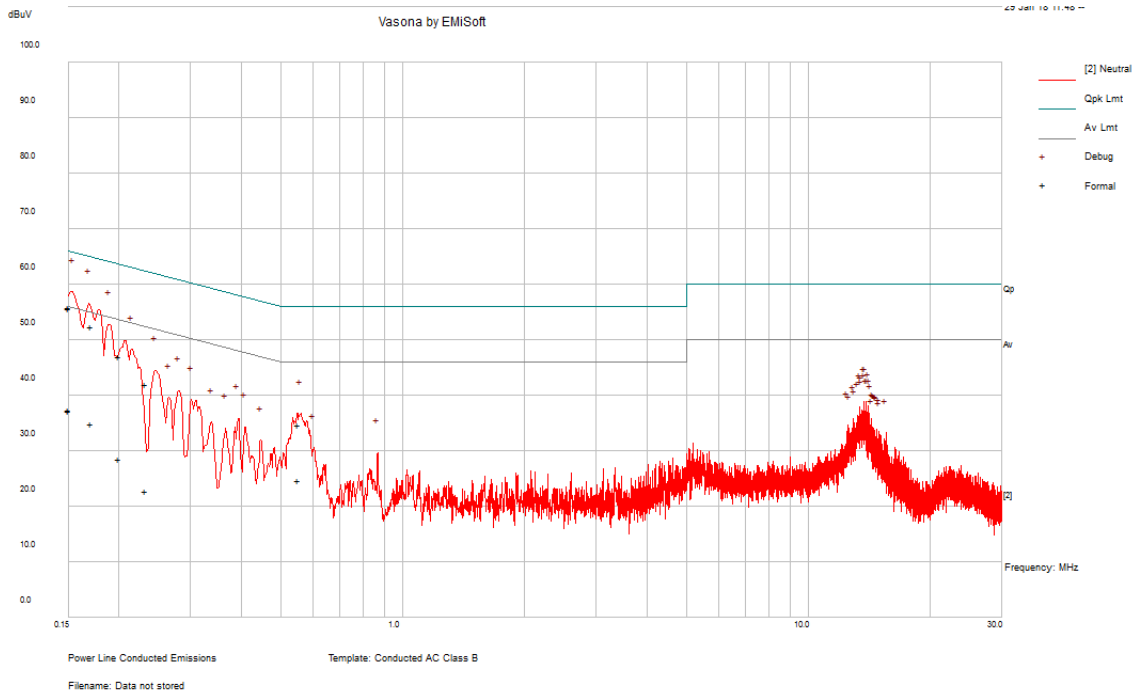


Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.150182	**60.86**	**Line**	**65.99**	**-5.13**	**QP**
0.162712	50.71	Line	65.32	-14.62	QP
0.152591	54.8	Line	65.86	-11.06	QP
0.234213	41.48	Line	62.3	-20.82	QP
0.547803	38.61	Line	56	-17.39	QP
0.295342	37.07	Line	60.37	-23.3	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Live/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.150182	43.18	Line	55.99	-12.8	Ave.
0.162712	34.58	Line	55.32	-20.74	Ave.
0.152591	36.46	Line	55.86	-19.4	Ave.
0.234213	22.62	Line	52.3	-29.68	Ave.
0.547803	28.62	Line	46	-17.38	Ave.
0.295342	23.21	Line	50.37	-27.17	Ave.

Note: testing was prefromed at worst case 5755 MHz 802.11ac40.

120 V, 60 Hz – Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.150059	55.81	Neutral	66	-10.19	QP
0.150655	55.74	Neutral	65.96	-10.22	QP
0.171176	52.45	Neutral	64.9	-12.46	QP
0.200371	46.97	Neutral	63.6	-16.62	QP
0.232523	42.03	Neutral	62.36	-20.33	QP
0.554506	34.8	Neutral	56	-21.2	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.150059	37.28	Neutral	56	-18.72	Ave.
0.150655	37.49	Neutral	55.96	-18.48	Ave.
0.171176	34.9	Neutral	54.9	-20	Ave.
0.200371	28.5	Neutral	53.6	-25.1	Ave.
0.232523	22.76	Neutral	52.36	-29.6	Ave.
0.554506	24.7	Neutral	46	-21.3	Ave.

Note: testing was prefromed at worst case 5755 MHz 802.11ac40.

7 FCC §15.209, §15.407(b) - Spurious Radiated Emissions

7.1 Applicable Standard

As Per FCC §15.205(a) 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: 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 Note 1	3
88 - 216	150 Note 1	3
216 - 960	200 Note 1	3
Above 960	500	3

Note 1: 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 Part 15.407 (b)

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

(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
(3) For transmitters operating in the 5.47 -5.725 GHz band: All emissions outside of the 5.47-5725 GHz band shall not exceed an ei.r.p. of -27 dBm/MHz.
(4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall noet exceed an e.i.r.p. of -27 dBm/MHz.
(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.
(7) The provisions of §15.205 apply to intentional radiators operating under this section.

7.2 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 15.407 and ISEDC 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.

7.3 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 is set 3 meter away from the testing antenna, which is varied from 1-4 meter, and the EUT is placed on a turntable, which is 0.8 meter or 1.5 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

The spectrum analyzer or receiver is set as:

Below 1000 MHz:

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

Above 1000 MHz:

(1) Peak: RBW = 1MHz / VBW = 3MHz / Sweep = 100ms
(2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

7.4 Corrected Amplitude and 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 for Class A. The equation for margin calculation is as follows:

Margin = Corrected Amplitude – Limit

7.5 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde and Schwarz	Receiver, EMI Test	ESCI 1166.5950K03	100338	2016-02-04	2 years
Agilent	Analyzer, Spectrum	E4446A	US44300386	2017-04-20	1 year
Sunol Sciences	System Controller	SC99V	011003-1	N/R	N/A
Sunol Sciences	Antenna, Biconi-Log	JB1	A013105-3	2015-07-11	31 Months
Agilent	Amplifier, Pre	8447D	2944A06639	2017-06-28	1 year
Wisewave	Antenna, Horn 18-26.5GHz	ARH-4223-02	10555-02	2017-12-15	2 years
Wisewave	Antenna, Horn 26.5-40GHz	ARH-2823-02	10555-02	2017-12-15	2 years
AH Systems	Pre-Amplifier 18-40GHz	PAM-1840VH	170	2017-02-28	14 Months
-	N-Type Cable	-	C00014	Each time[1]	N/A
Agilent	Pre-Amplifier	8449B	3147A00400	2017-06-15	1 year
Sunol Sciences	Antenna, Horn	DRH-118	A052704	2017-03-27	2 years
Vasona	Test software	V6.0 build 11	10400213	N/R	N/R

Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 09 June 2016) "A2LA Policy on Metrological Traceability".*

Note[1]: cables and attenuators included in the test set-up will be checked each time before testing.

7.6 Test Environmental Conditions

Temperature:	22-24 ºC
Relative Humidity:	40-41 %
ATM Pressure:	103.1-104.1 kPa

The testing was performed by Vincent Licata 2017-12-13 to 2018-01-25 in 5m chamber 3.

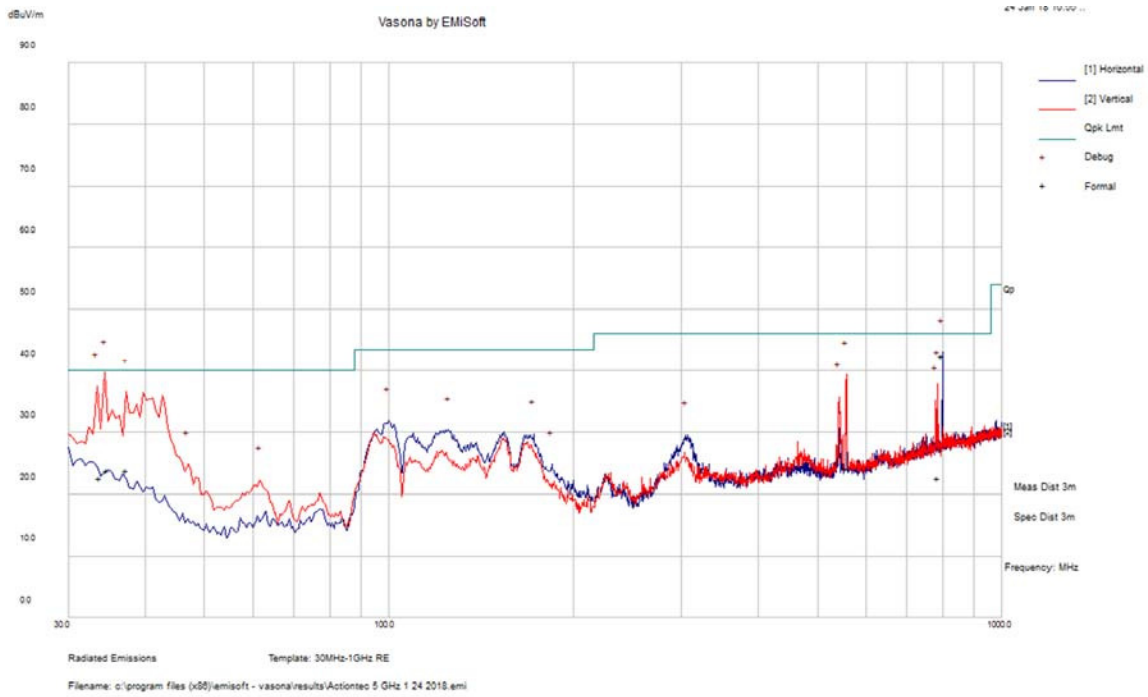
7.7 Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Part 15.407 standards' radiated emissions limits, and had the worst margin of:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Mode, Channel**
-1.10	5150	Vertical	802.11a mode, Low Channel

7.8 Radiated Emissions Test Result Data

1) 30 MHz – 1 GHz



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comments (PK/QP/Ave.)
34.71825	23.9	102	V	231	40	-16.1	QP
33.7515	22.67	109	V	299	40	-17.33	QP
799.206	42.52	100	V	287	46	-3.48	QP
37.3235	23.88	99	V	345	40	-16.12	QP
557.354	24.13	167	V	104	46	-21.87	QP
785.6885	22.59	142	V	359	46	-23.41	QP

Note: testing was prefromed at worst case 5755 MHz 802.11ac40.

2) 1–40 GHz

5150 - 5250 MHz

802.11a mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5180 MHz											
5180	72.77	156	206	H	33.58	5.26	0.00	111.61	-	-	PK
5180	64.49	156	206	H	33.58	5.26	0.00	103.33	-	-	AV
5180	78.57	108	290	V	33.58	5.26	0.00	117.41	-	-	PK
5180	69.67	108	290	V	33.58	5.26	0.00	108.51	-	-	AV
5150	61.26	71	210	H	33.42	6.55	36.19	65.04	74.00	-8.96	PK
5150	43.17	71	210	H	33.42	6.55	36.19	46.95	54.00	-7.05	AV
5150	66.86	35	230	V	33.42	6.55	36.19	70.64	74.00	-3.36	PK
5150	**49.12**	**35**	**230**	**V**	**33.42**	**6.55**	**36.19**	**52.90**	**54.00**	**-1.10**	**AV**
10360	43.16	0	100	H	38.09	14.58	35.51	60.32	74.00	-13.7	PK
10360	32.06	0	100	H	38.09	14.58	35.51	49.22	54.00	-4.78	AV
10360	45.10	87	228	V	38.09	14.58	35.51	62.26	74.00	-11.7	PK
10360	34.10	87	228	V	38.09	14.58	35.51	51.26	54.00	-2.74	AV
Middle Channel 5200 MHz											
5200	71.76	270	247	H	33.58	8.53	0.00	113.87	-	-	PK
5200	62.77	270	247	H	33.58	8.53	0.00	104.88	-	-	AV
5200	72.22	296	274	V	33.58	8.53	0.00	114.33	-	-	PK
5200	64.07	296	274	V	33.58	8.53	0.00	106.18	-	-	AV
10400	43.69	0	100	H	38.12	14.58	35.51	60.88	74.00	-13.1	PK
10400	32.42	0	100	H	38.12	14.58	35.51	49.61	54.00	-4.39	AV
10400	47.36	92	226	V	38.12	14.58	35.51	64.55	74.00	-9.45	PK
10400	35.01	92	226	V	38.12	14.58	35.51	52.20	54.00	-1.80	AV
High Channel 5240 MHz											
5240	72.27	269	244	H	33.56	8.53	0.00	114.36	-	-	PK
5240	63.81	269	244	H	33.56	8.53	0.00	105.90	-	-	AV
5240	73.46	253	300	V	33.56	8.53	0.00	115.55	-	-	PK
5240	64.55	253	300	V	33.56	8.53	0.00	106.64	-	-	AV
10480	44.13	0	100	H	38.19	14.90	35.44	61.78	74.00	-12.2	PK
10480	32.05	0	100	H	38.19	14.90	35.44	49.70	54.00	-4.30	AV
10480	44.47	156	250	V	38.19	14.90	35.44	62.12	74.00	-11.9	PK
10480	33.26	156	250	V	38.19	14.90	35.44	50.91	54.00	-3.09	AV

802.11ac20 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5180 MHz											
5180	73.45	156	190	H	33.58	5.26	0.00	112.29	-	-	PK
5180	63.24	156	190	H	33.58	5.26	0.00	102.08	-	-	AV
5180	78.73	243	300	V	33.58	5.26	0.00	117.57	-	-	PK
5180	68.49	243	300	V	33.58	5.26	0.00	107.33	-	-	AV
5150	63.06	72	222	H	33.42	6.55	36.19	66.84	74.00	-7.16	PK
5150	44.94	72	222	H	33.42	6.55	36.19	48.72	54.00	-5.28	AV
5150	65.02	105	263	V	33.42	6.55	36.19	68.80	74.00	-5.20	PK
5150	48.26	105	263	V	33.42	6.55	36.19	52.04	54.00	-1.96	AV
10360	43.72	0	100	H	38.09	14.58	35.51	60.88	74.00	-13.1	PK
10360	31.81	0	100	H	38.09	14.58	35.51	48.97	54.00	-5.03	AV
10360	45.20	0	110	V	38.09	14.58	35.51	62.36	74.00	-11.6	PK
10360	33.56	0	110	V	38.09	14.58	35.51	50.72	54.00	-3.28	AV
Middle Channel 5200 MHz											
5200	70.72	149	206	H	33.58	8.53	0.00	112.83	-	-	PK
5200	61.12	149	206	H	33.58	8.53	0.00	103.23	-	-	AV
5200	74.52	0	300	V	33.58	8.53	0.00	116.63	-	-	PK
5200	65.42	0	300	V	33.58	8.53	0.00	107.53	-	-	AV
10400	43.63	0	100	H	38.12	14.58	35.51	60.82	74.00	-13.2	PK
10400	31.84	0	100	H	38.12	14.58	35.51	49.03	54.00	-4.97	AV
10400	45.14	0	100	V	38.12	14.58	35.51	62.33	74.00	-11.7	PK
10400	33.57	0	100	V	38.12	14.58	35.51	50.76	54.00	-3.24	AV
High Channel 5240 MHz											
5240	70.57	147	205	H	33.56	8.53	0.00	112.66	-	-	PK
5240	60.35	147	205	H	33.56	8.53	0.00	102.44	-	-	AV
5240	74.50	7	300	V	33.56	8.53	0.00	116.59	-	-	PK
5240	64.64	7	300	V	33.56	8.53	0.00	106.73	-	-	AV
10480	43.57	0	100	H	38.19	14.90	35.44	61.22	74.00	-12.8	PK
10480	31.72	0	100	H	38.19	14.90	35.44	49.37	54.00	-4.63	AV
10480	44.73	0	100	V	38.19	14.90	35.44	62.38	74.00	-11.6	PK
10480	33.42	0	100	V	38.19	14.90	35.44	51.07	54.00	-2.93	AV

802.11ac40 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5190 MHz											
5190	68.95	160	222	H	33.58	5.26	0.00	107.79	-	-	PK
5190	57.99	160	222	H	33.58	5.26	0.00	96.83	-	-	AV
5190	72.86	88	290	V	33.58	5.26	0.00	111.70	-	-	PK
5190	62.77	88	290	V	33.58	5.26	0.00	101.61	-	-	AV
5150	62.37	296	300	H	33.42	6.55	36.19	66.15	74.00	-7.85	PK
5150	46.10	296	300	H	33.42	6.55	36.19	49.88	54.00	-4.12	AV
5150	67.98	101	219	V	33.42	6.55	36.19	71.76	74.00	-2.24	PK
5150	48.27	101	219	V	33.42	6.55	36.19	52.05	54.00	-1.95	AV
10380	42.62	0	100	H	38.09	14.58	35.51	59.78	74.00	-14.2	PK
10380	31.85	0	100	H	38.09	14.58	35.51	49.01	54.00	-4.99	AV
10380	43.67	0	100	V	38.09	14.58	35.51	60.83	74.00	-13.2	PK
10380	32.00	0	100	V	38.09	14.58	35.51	49.16	54.00	-4.84	AV
High Channel 5230 MHz											
5230	69.63	298	229	H	33.56	8.53	0.00	111.72	-	-	PK
5230	60.52	298	229	H	33.56	8.53	0.00	102.61	-	-	AV
5230	72.15	3	290	V	33.56	8.53	0.00	114.24	-	-	PK
5230	63.86	3	290	V	33.56	8.53	0.00	105.95	-	-	AV
5150	56.83	293	274	H	33.42	6.55	36.19	60.61	74.00	-13.4	PK
5150	42.79	293	274	H	33.42	6.55	36.19	46.57	54.00	-7.43	AV
5150	59.68	33	300	V	33.42	6.55	36.19	63.46	74.00	-10.5	PK
5150	45.93	33	300	V	33.42	6.55	36.19	49.71	54.00	-4.29	AV
10460	43.21	0	100	H	38.19	14.90	35.44	60.86	74.00	-13.1	PK
10460	32.44	0	100	H	38.19	14.90	35.44	50.09	54.00	-3.91	AV
10460	44.79	0	100	V	38.19	14.90	35.44	62.44	74.00	-11.6	PK
10460	33.66	0	100	V	38.19	14.90	35.44	51.31	54.00	-2.69	AV

802.11ac80 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
5210 MHz											
5210	64.35	160	220	H	33.58	8.35	0.00	106.28	-	-	PK
5210	55.19	160	220	H	33.58	8.35	0.00	97.12	-	-	AV
5210	68.98	274	262	V	33.58	8.35	0.00	110.91	-	-	PK
5210	61.44	274	262	V	33.58	8.35	0.00	103.37	-	-	AV
5150	61.24	46	300	H	33.42	6.55	36.19	65.02	74.00	-8.98	PK
5150	45.44	46	300	H	33.42	6.55	36.19	49.22	54.00	-4.78	AV
5150	64.07	95	115	V	33.42	6.55	36.19	67.85	74.00	-6.15	PK
5150	47.56	95	115	V	33.42	6.55	36.19	51.34	54.00	-2.66	AV
10420	43.60	0	100	H	38.12	14.58	35.51	60.79	74.00	-13.2	PK
10420	32.54	0	100	H	38.12	14.58	35.51	49.73	54.00	-4.27	AV
10420	43.62	0	100	V	38.12	14.58	35.51	60.81	74.00	-13.2	PK
10420	32.58	0	100	V	38.12	14.58	35.51	49.77	54.00	-4.23	AV

5725 - 5850 MHz

802.11a mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5745 MHz											
5745	71.54	156	196	H	33.94	9.00	0.00	114.48	-	-	PK
5745	63.19	156	196	H	33.94	9.00	0.00	106.13	-	-	AV
5745	75.82	111	248	V	33.94	9.00	0.00	118.76	-	-	PK
5745	67.04	111	248	V	33.94	9.00	0.00	109.98	-	-	AV
5650	55.04	211	240	H	33.94	6.91	36.16	59.73	68.26	-8.54	PK
5650	59.19	109	225	V	33.94	6.91	36.16	63.88	68.26	-4.39	PK
5700	59.75	211	240	H	33.94	6.91	36.16	64.44	105.20	-40.8	PK
5700	62.90	109	225	V	33.94	6.91	36.16	67.59	105.20	-37.6	PK
5720	71.31	211	240	H	33.94	6.91	36.16	76.00	110.90	-34.9	PK
5720	75.56	109	225	V	33.94	6.91	36.16	80.25	110.90	-30.7	PK
5725	80.04	211	240	H	33.94	6.91	36.16	84.73	122.00	-37.3	PK
5725	82.38	109	225	V	33.94	6.91	36.16	87.07	122.00	-34.9	PK
11490	44.84	0	274	H	38.96	12.88	35.09	61.58	74.00	-12.4	PK
11490	33.57	0	274	H	38.96	12.88	35.09	50.31	54.00	-3.69	AV
11490	45.75	81	273	V	38.96	12.88	35.09	62.49	74.00	-11.5	PK
11490	34.54	81	273	V	38.96	12.88	35.09	51.28	54.00	-2.72	AV
Middle Channel 5785 MHz											
5785	73.23	245	195	H	33.86	9.10	0.00	116.19	-	-	PK
5785	65.48	245	195	H	33.86	9.10	0.00	108.44	-	-	AV
5785	73.63	87	100	V	33.86	9.10	0.00	116.59	-	-	PK
5785	66.08	87	100	V	33.86	9.10	0.00	109.04	-	-	AV
11570	44.37	0	272	H	39.27	12.95	35.14	61.45	74.00	-12.6	PK
11570	33.29	0	272	H	39.27	12.95	35.14	50.37	54.00	-3.63	AV
11570	46.30	0	214	V	39.27	12.95	35.14	63.38	74.00	-10.6	PK
11570	34.07	0	214	V	39.27	12.95	35.14	51.15	54.00	-2.85	AV

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 5825 MHz											
5825	73.10	154	181	H	33.86	9.10	0.00	116.06	-	-	PK
5825	64.31	154	181	H	33.86	9.10	0.00	107.27	-	-	AV
5825	73.58	85	200	V	33.86	9.10	0.00	116.54	-	-	PK
5825	66.02	85	200	V	33.86	9.10	0.00	108.98	-	-	AV
5850	67.13	158	263	H	33.93	5.60	36.24	70.42	122.00	-51.6	PK
5850	72.99	91	191	V	33.93	5.60	36.24	76.28	122.00	-45.7	PK
5855	63.45	158	263	H	33.93	5.60	36.24	66.74	110.90	-44.2	PK
5855	68.26	91	191	V	33.93	5.60	36.24	71.55	110.90	-39.4	PK
5875	53.69	158	263	H	33.93	5.60	36.24	56.98	105.20	-48.2	PK
5875	57.89	91	191	V	33.93	5.60	36.24	61.18	105.20	-44.0	PK
5925	49.76	158	263	H	33.93	5.60	36.24	53.05	68.26	-15.2	PK
5925	51.92	91	191	V	33.93	5.60	36.24	55.21	68.26	-13.1	PK
11650	44.20	0	268	H	39.46	12.80	35.16	61.30	74.00	-12.7	PK
11650	33.02	0	268	H	39.46	12.80	35.16	50.12	54.00	-3.88	AV
11650	45.36	83	284	V	39.46	12.80	35.16	62.46	74.00	-11.5	PK
11650	33.83	83	284	V	39.46	12.80	35.16	50.93	54.00	-3.07	AV

802.11ac20 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5745 MHz											
5745	72.98	251	214	H	33.94	9.00	0.00	115.92	-	-	PK
5745	63.32	251	214	H	33.94	9.00	0.00	106.26	-	-	AV
5745	73.31	98	108	V	33.94	9.00	0.00	116.25	-	-	PK
5745	64.06	98	108	V	33.94	9.00	0.00	107.00	-	-	AV
5650	54.59	221	300	H	33.94	6.91	36.16	59.28	68.26	-8.99	PK
5650	59.22	110	157	V	33.94	6.91	36.16	63.91	68.26	-4.36	PK
5700	65.77	221	300	H	33.94	6.91	36.16	70.46	105.20	-34.8	PK
5700	66.36	110	157	V	33.94	6.91	36.16	71.05	105.20	-34.2	PK
5720	79.36	221	300	H	33.94	6.91	36.16	84.05	110.90	-26.9	PK
5720	81.83	110	157	V	33.94	6.91	36.16	86.52	110.90	-24.4	PK
5725	85.88	221	300	H	33.94	6.91	36.16	90.57	122.00	-31.4	PK
5725	88.13	110	157	V	33.94	6.91	36.16	92.82	122.00	-29.2	PK
11490	44.81	0	276	H	38.96	12.88	35.09	61.55	74.00	-12.5	PK
11490	34.06	0	276	H	38.96	12.88	35.09	50.80	54.00	-3.20	AV
11490	47.16	333	273	V	38.96	12.88	35.09	63.90	74.00	-10.1	PK
11490	35.85	333	273	V	38.96	12.88	35.09	52.59	54.00	-1.41	AV
Middle Channel 5785 MHz											
5785	72.20	245	191	H	33.86	9.10	0.00	115.16	-	-	PK
5785	63.98	245	191	H	33.86	9.10	0.00	106.94	-	-	AV
5785	73.15	87	100	V	33.86	9.10	0.00	116.11	-	-	PK
5785	64.86	87	100	V	33.86	9.10	0.00	107.82	-	-	AV
11570	44.27	0	268	H	39.27	12.95	35.14	61.35	74.00	-12.7	PK
11570	33.42	0	268	H	39.27	12.95	35.14	50.50	54.00	-3.50	AV
11570	46.05	329	200	V	39.27	12.95	35.14	63.13	74.00	-10.9	PK
11570	34.54	329	200	V	39.27	12.95	35.14	51.62	54.00	-2.38	AV
High Channel 5825 MHz											
5825	71.60	150	170	H	33.86	9.10	0.00	114.56	-	-	PK
5825	62.53	150	170	H	33.86	9.10	0.00	105.49	-	-	AV
5825	72.25	98	100	V	33.86	9.10	0.00	115.21	-	-	PK
5825	63.95	98	100	V	33.86	9.10	0.00	106.91	-	-	AV
5850	71.75	156	180	H	33.93	5.60	36.24	75.04	122.00	-46.9	PK
5850	77.55	114	184	V	33.93	5.60	36.24	80.84	122.00	-41.2	PK
5855	67.81	156	180	H	33.93	5.60	36.24	71.10	110.90	-39.8	PK
5855	72.88	114	184	V	33.93	5.60	36.24	76.17	110.90	-34.7	PK
5875	58.16	156	180	H	33.93	5.60	36.24	61.45	105.20	-43.7	PK
5875	62.34	114	184	V	33.93	5.60	36.24	65.63	105.20	-39.6	PK
5925	53.99	156	180	H	33.93	5.60	36.24	57.28	68.26	-10.9	PK
5925	56.59	114	184	V	33.93	5.60	36.24	59.88	68.26	-8.38	PK
11650	44.45	0	263	H	39.46	12.80	35.16	61.55	74.00	-12.5	PK
11650	33.82	0	263	H	39.46	12.80	35.16	50.92	54.00	-3.08	AV
11650	45.52	331	192	V	39.46	12.80	35.16	62.62	74.00	-11.4	PK
11650	34.26	331	192	V	39.46	12.80	35.16	51.36	54.00	-2.64	AV

802.11ac40 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5755 MHz											
5755	69.80	151	175	H	33.86	9.10	0.00	112.76	-	-	PK
5755	61.26	151	175	H	33.86	9.10	0.00	104.22	-	-	AV
5755	70.98	94	148	V	33.86	9.10	0.00	113.94	-	-	PK
5755	62.99	94	148	V	33.86	9.10	0.00	105.95	-	-	AV
5650	56.27	207	230	H	33.94	6.91	36.16	60.96	68.26	-7.31	PK
5650	61.00	108	165	V	33.94	6.91	36.16	65.69	68.26	-2.58	PK
5700	71.05	207	230	H	33.94	5.60	36.16	74.43	105.20	-30.8	PK
5700	75.47	108	165	V	33.94	5.60	36.16	78.85	105.20	-26.4	PK
5720	82.33	207	230	H	33.94	5.60	36.16	85.71	110.90	-25.2	PK
5720	87.03	108	165	V	33.94	5.60	36.16	90.41	110.90	-20.5	PK
5725	83.37	207	230	H	33.94	5.60	36.16	86.75	122.00	-35.3	PK
5725	87.86	108	165	V	33.94	5.60	36.16	91.24	122.00	-30.8	PK
11510	44.41	0	273	H	38.96	12.88	35.09	61.15	74.00	-12.9	PK
11510	33.24	0	273	H	38.96	12.88	35.09	49.98	54.00	-4.02	AV
11510	44.92	0	202	V	38.96	12.88	35.09	61.66	74.00	-12.3	PK
11510	34.99	0	202	V	38.96	12.88	35.09	51.73	54.00	-2.27	AV
High Channel 5795 MHz											
5795	70.50	245	255	H	33.86	9.10	0.00	113.46	-	-	PK
5795	61.27	245	255	H	33.86	9.10	0.00	104.23	-	-	AV
5795	71.19	95	201	V	33.86	9.10	0.00	114.15	-	-	PK
5795	63.45	95	201	V	33.86	9.10	0.00	106.41	-	-	AV
5850	69.62	202	220	H	33.93	5.60	36.24	72.91	122.00	-49.1	PK
5850	76.35	110	256	V	33.93	5.60	36.24	79.64	122.00	-42.4	PK
5855	69.13	202	220	H	33.93	5.60	36.24	72.42	110.90	-38.5	PK
5855	74.19	110	256	V	33.93	5.60	36.24	77.48	110.90	-33.4	PK
5875	62.65	202	220	H	33.93	5.60	36.24	65.94	105.20	-39.3	PK
5875	64.43	110	256	V	33.93	5.60	36.24	67.72	105.20	-37.5	PK
5925	53.55	202	220	H	33.93	5.60	36.24	56.84	68.26	-11.4	PK
5925	58.55	110	256	V	33.93	5.60	36.24	61.84	68.26	-6.42	PK
11590	44.29	0	262	H	38.38	12.95	35.14	60.48	74.00	-13.5	PK
11590	33.51	0	262	H	38.38	12.95	35.14	49.70	54.00	-4.30	AV
11590	44.57	0	198	V	38.38	12.95	35.14	60.76	74.00	-13.2	PK
11590	34.82	0	198	V	38.38	12.95	35.14	51.01	54.00	-2.99	AV

802.11ac80 mode

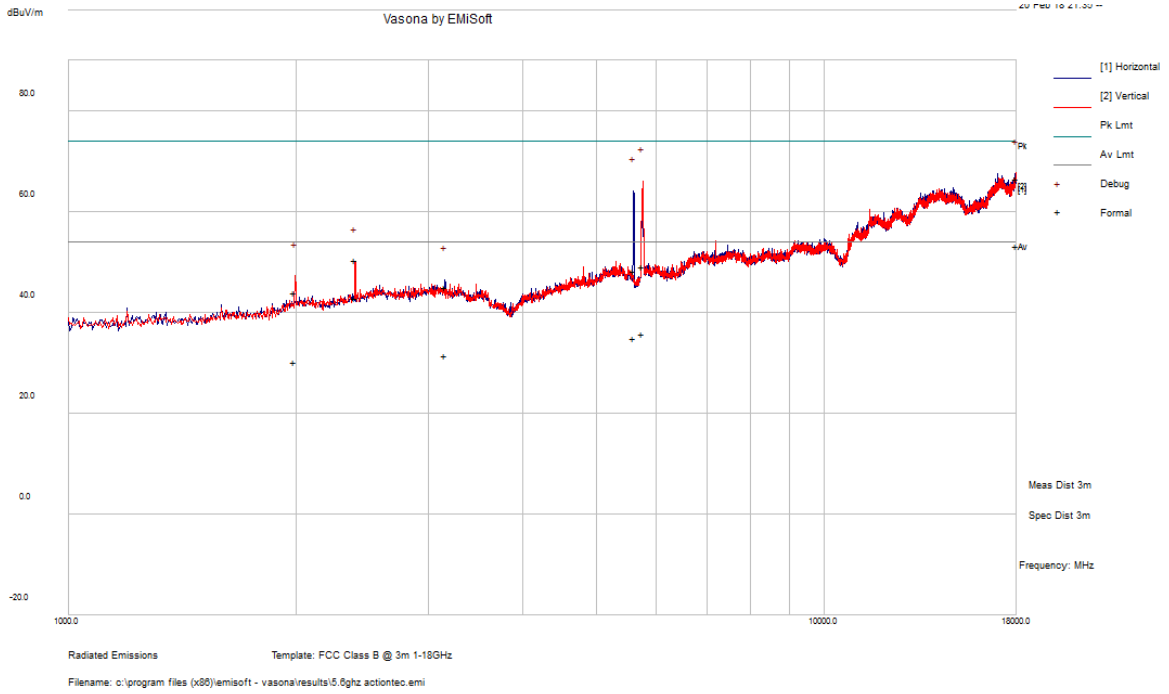
Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
5775 MHz											
5775	64.77	151	150	H	33.86	9.10	0.00	107.73	-	-	PK
5775	56.14	151	150	H	33.86	9.10	0.00	99.10	-	-	AV
5775	65.76	96	149	V	33.86	9.10	0.00	108.72	-	-	PK
5775	57.41	96	149	V	33.86	9.10	0.00	100.37	-	-	AV
5650	53.74	154	194	H	33.94	6.91	36.16	58.43	68.26	-9.84	PK
5650	60.30	114	247	V	33.94	6.91	36.16	64.99	68.26	-3.28	PK
5700	71.10	154	194	H	33.94	5.60	36.16	74.48	105.20	-30.7	PK
5700	75.32	114	247	V	33.94	5.60	36.16	78.70	105.20	-26.5	PK
5720	72.74	154	194	H	33.94	5.60	36.16	76.12	110.90	-34.8	PK
5720	76.98	114	247	V	33.94	5.60	36.16	80.36	110.90	-30.5	PK
5725	73.97	154	194	H	33.94	5.60	36.16	77.35	122.00	-44.7	PK
5725	79.55	114	247	V	33.94	5.60	36.16	82.93	122.00	-39.1	PK
5850	70.95	206	187	H	33.93	5.60	36.24	74.24	122.00	-47.8	PK
5850	73.67	277	232	V	33.93	5.60	36.24	76.96	122.00	-45.0	PK
5855	68.94	206	187	H	33.93	5.60	36.24	72.23	110.90	-38.7	PK
5855	71.28	277	232	V	33.93	5.60	36.24	74.57	110.90	-36.3	PK
5875	60.23	206	187	H	33.93	5.60	36.24	63.52	105.20	-41.7	PK
5875	63.09	277	232	V	33.93	5.60	36.24	66.38	105.20	-38.8	PK
5925	54.24	206	187	H	33.93	5.60	36.24	57.53	68.26	-10.7	PK
5925	57.99	277	232	V	33.93	5.60	36.24	61.28	68.26	-6.98	PK
11550	42.82	0	100	H	38.46	12.95	35.14	59.10	74.00	-14.9	PK
11550	32.36	0	100	H	38.46	12.95	35.14	48.64	54.00	-5.36	AV
11550	43.59	0	100	V	38.38	12.95	35.14	59.78	74.00	-14.2	PK
11550	32.75	0	100	V	38.38	12.95	35.14	48.94	54.00	-5.06	AV

Note 1: Any emissions above 12 GHz are emissions from the noise floor.
Note 2: Duty Cycle Correction Factor has been added to the measurements.
Note 3: After pre-scan 802.11ac and 802.11n, 802.11ac was determined to be the worst-case modulation used to show compliance.

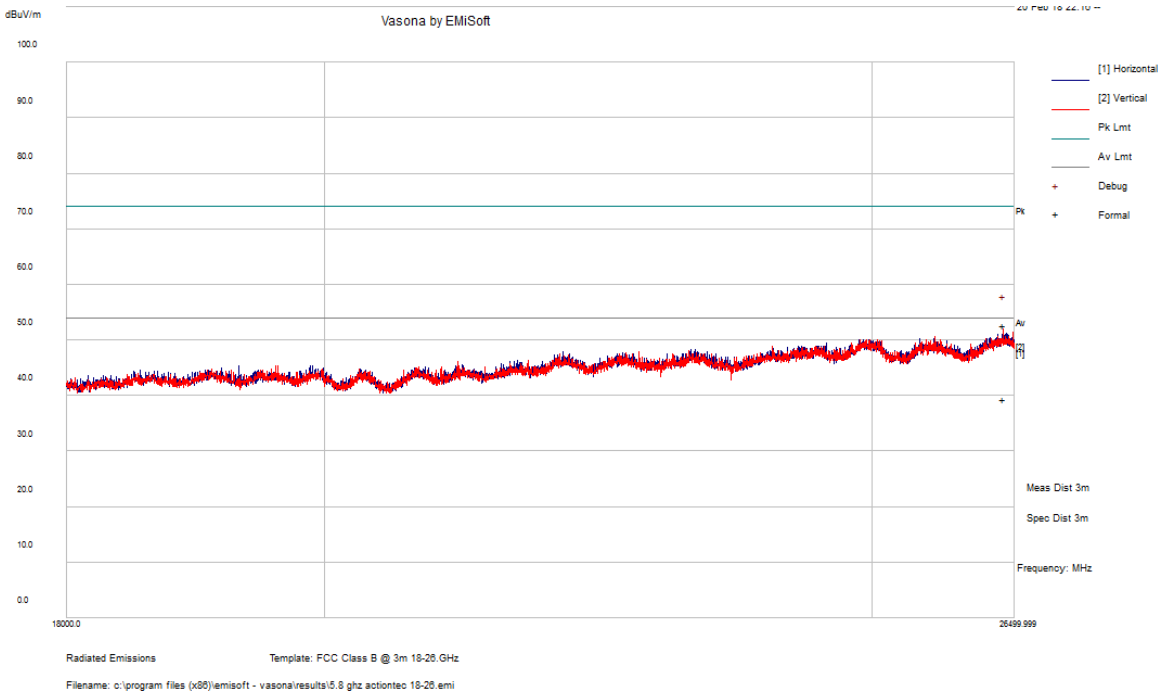
The worst case 5755 MHz 802.11ac40 has been listed below.

1 GHz – 18 GHz

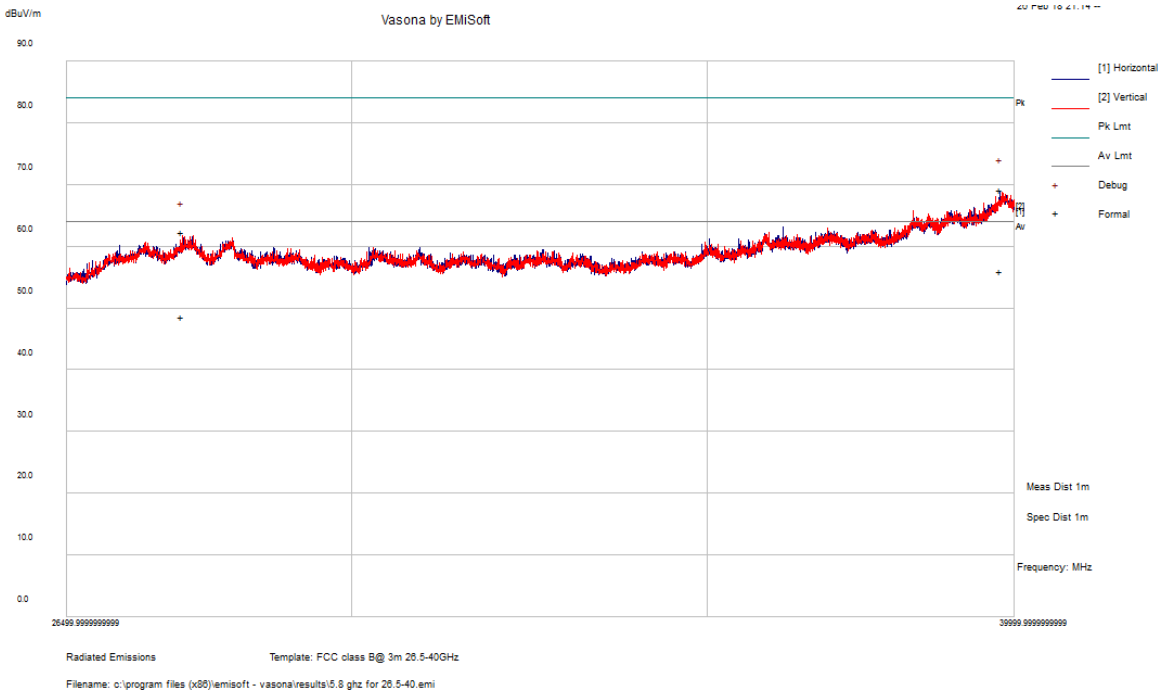
This test was performed with a 5745-5825 MHz band reject filter.



18 GHz – 26.5 GHz



26.5GHz – 40 GHz



8 FCC §15.407(e) - 6 dB, 26 dB & 99% Occupied Bandwidth

8.1 Applicable Standards

As per FCC §15.407(e): for equipment operating in the band 5725 – 5850 MHz, the minimum 6 dB bandwidth of U-NII devices shall be 500 kHz.

8.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 or 26 dB from the reference level. Record the frequency difference as the minimum emission or emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

8.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4446A	US44300386	2017-04-20	1 year
-	20dB attenuator	-	-	Each time[1]	N/A
-	RF cable	-	-	Each time[1]	N/A
-	RF cable	-	-	Each time[1]	N/A

Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 09 June 2016) "A2LA Policy on Metrological Traceability".*

Note[1]: cables and attenuators included in the test set-up will be checked each time before testing.

8.4 Test Environmental Conditions

Temperature:	22-24 ºC
Relative Humidity:	40-41 %
ATM Pressure:	103.1-104.1 kPa

The testing was performed by Vincent Licata on 2018-01-22 at RF site.

8.5 Test Results

Please refer to the following tables and plots.

5150 - 5250 MHz FCC Result

ANT 0 MIMO

Channel	Frequency (MHz)	99% OBW (kHz)	26 dB OBW (kHz)
802.11 a mode			
36	5180	16569.0	21244
40	5200	16602.6	21258
48	5240	16694.8	21052
802.11HT/VHT20 mode			
36	5180	17730.2	21406
40	5200	17861.2	21282
48	5240	17808.5	21180
802.11HT/VHT40 mode			
38	5190	36169.6	39325
46	5230	36326.7	40633
802.11VHT80 mode			
42	5210	74838.7	79809

ANT 1 MIMO

Channel	Frequency (MHz)	99% OBW (kHz)	26 dB OBW (kHz)
802.11 a mode			
36	5180	16641.1	20840
40	5200	16559.8	20876
48	5240	16626.8	21041
802.11HT/VHT20 mode			
36	5180	17699.9	20949
40	5200	17771.1	21430
48	5240	17819.5	21116
802.11HT/VHT40 mode			
38	5190	36282.9	39368
46	5230	36298.7	41023
802.11VHT80 mode			
42	5210	74792.7	79946

ANT 2 MIMO

Channel	Frequency (MHz)	99% OBW (kHz)	26 dB OBW (kHz)
802.11 a mode			
36	5180	16637.0	20768
40	5200	16646.4	21003
48	5240	16624.3	20818
802.11HT/VHT20 mode			
36	5180	17765.2	20896
40	5200	17728.1	21260
48	5240	17812.5	20869
802.11HT/VHT40 mode			
38	5190	36267.8	39233
46	5230	36228.9	39293
802.11VHT80 mode			
42	5210	74803.2	80011

ANT 3 MIMO

Channel	Frequency (MHz)	99% OBW (kHz)	26 dB OBW (kHz)
802.11 a mode			
36	5180	16623.5	21016
40	5200	16670.7	20926
48	5240	16604.3	20837
802.11HT/VHT20 mode			
36	5180	17717.5	21056
40	5200	17722.0	21184
48	5240	17708.1	21188
802.11HT/VHT40 mode			
38	5190	36203.6	38921
46	5230	36222.7	40871
802.11VHT80 mode			
42	5210	74965.8	79805

5725 - 5850 MHz

ANT 0 MIMO

Channel	Frequency (MHz)	99% OBW (kHz)	6 dB OBW (kHz)
802.11 a mode			
149	5745	16882.1	16465
157	5785	16822.3	16549
165	5825	16878.4	16494
802.11HT/VHT20 mode			
149	5745	17912.9	17764
157	5785	17917.1	17811
165	5825	17861.5	17680
802.11HT/VHT40 mode			
151	5755	36473.6	36460
159	5795	36590.3	35988
802.11VHT80 mode			
155	5775	75738.0	76079

ANT 1 MIMO

Channel	Frequency (MHz)	99% OBW (kHz)	6 dB OBW (kHz)
802.11 a mode			
149	5745	16769.1	16355
157	5785	16779.6	16384
165	5825	16816.7	16553
802.11HT/VHT20 mode			
149	5745	17878.0	17692
157	5785	17860.7	17638
165	5825	17863.0	17809
802.11HT/VHT40 mode			
151	5755	36421.4	36038
159	5795	36445.8	35643
802.11VHT80 mode			
155	5775	75688.3	76475

ANT 2 MIMO

Channel	Frequency (MHz)	99% OBW (kHz)	6 dB OBW (kHz)
802.11 a mode			
149	5745	16747.6	16538
157	5785	16738.1	16416
165	5825	16710.3	16539
802.11HT/VHT20 mode			
149	5745	17888.7	17614
157	5785	17879.3	17613
165	5825	17819.7	17665
802.11HT/VHT40 mode			
151	5755	36379.5	36093
159	5795	36455.4	36383
802.11VHT80 mode			
155	5775	75665.2	76418

ANT 3 MIMO

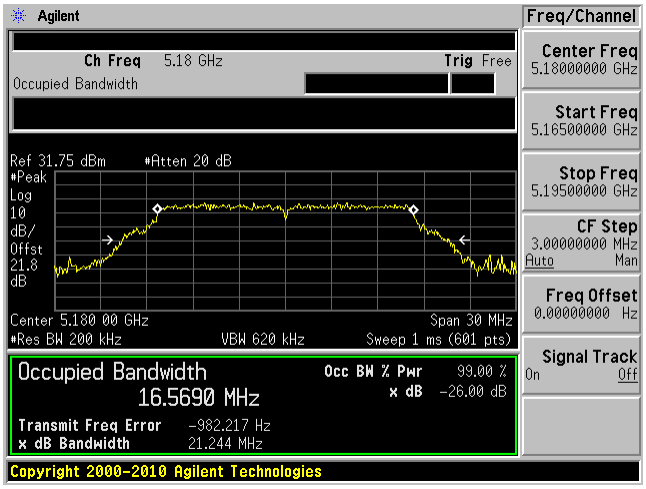
Channel	Frequency (MHz)	99% OBW (kHz)	6 dB OBW (kHz)
802.11 a mode			
149	5745	17031.8	16418
157	5785	16999.0	16554
165	5825	16829.0	16524
802.11HT/VHT20 mode			
149	5745	17993.0	17625
157	5785	17995.0	17632
165	5825	17906.3	17706
802.11HT/VHT40 mode			
151	5755	36831.4	36426
159	5795	36815.0	36465
802.11VHT80 mode			
155	5775	75837.3	75835

5150 – 5250 MHz FCC Result

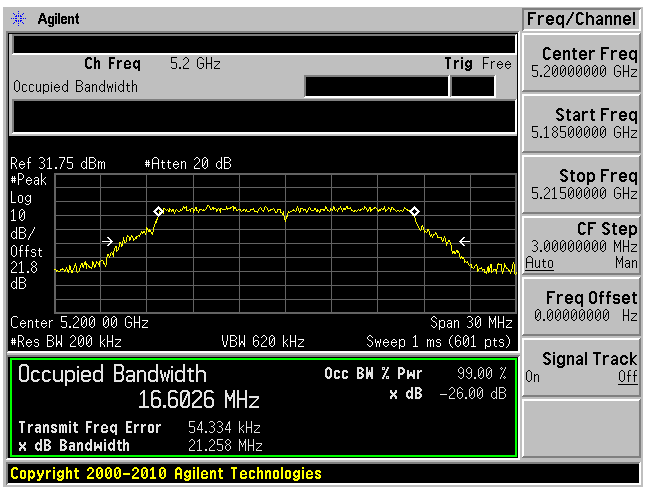
ANT 0 MIMO

802.11a mode

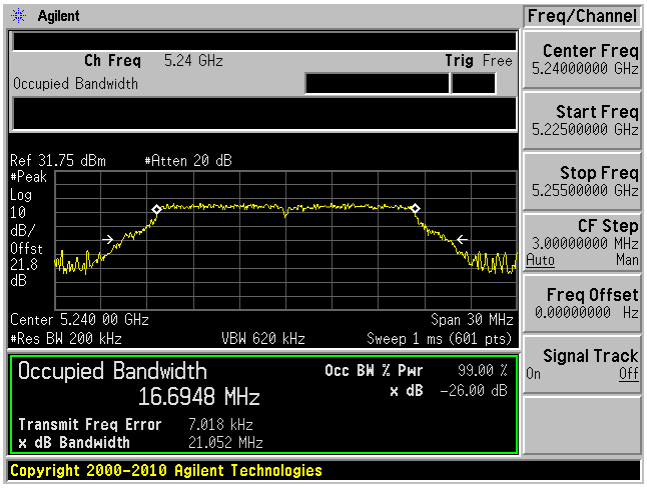
5180 MHz



5200 MHz

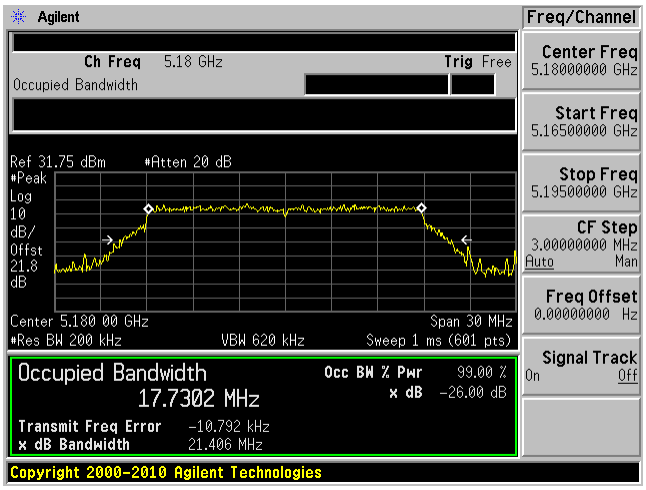


5240 MHz

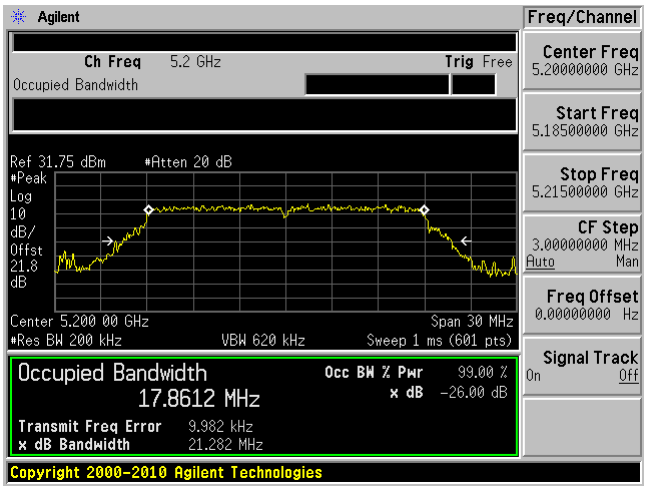


802.11HT/VHT20 mode

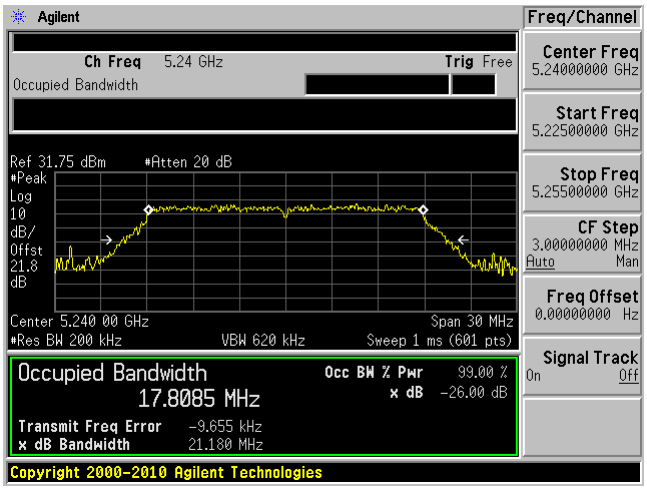
5180 MHz



5200 MHz

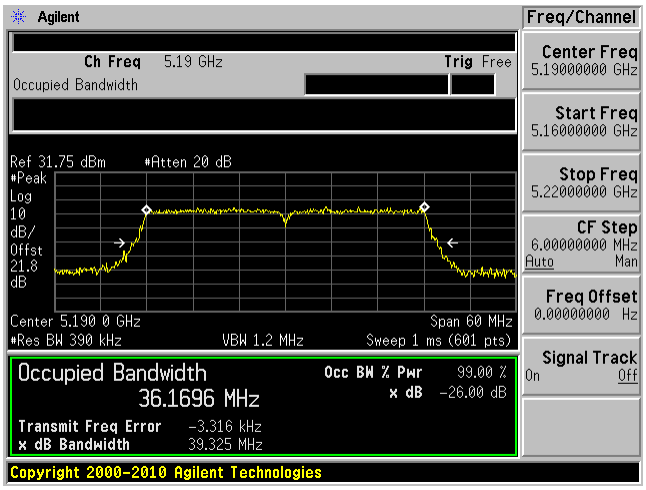


5240 MHz

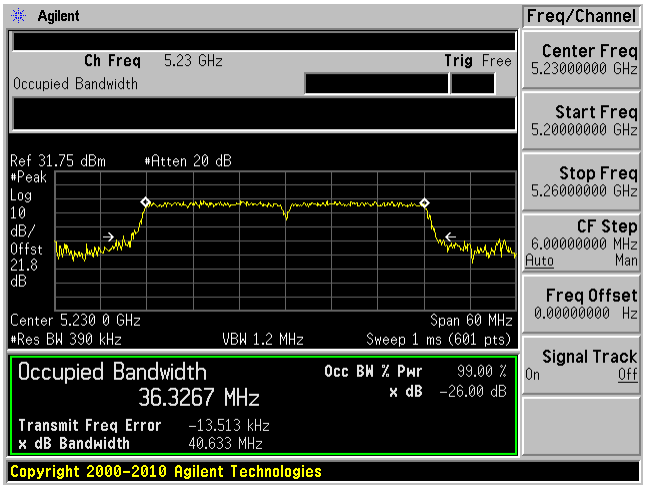


802.11HT/VHT40 mode

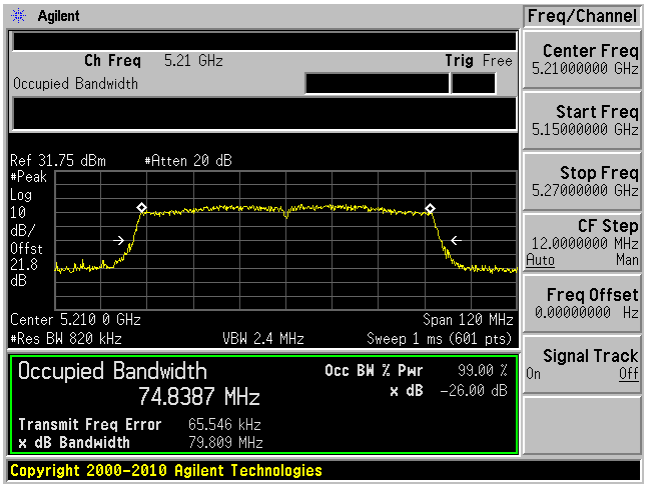
5190 MHz



5230 MHz



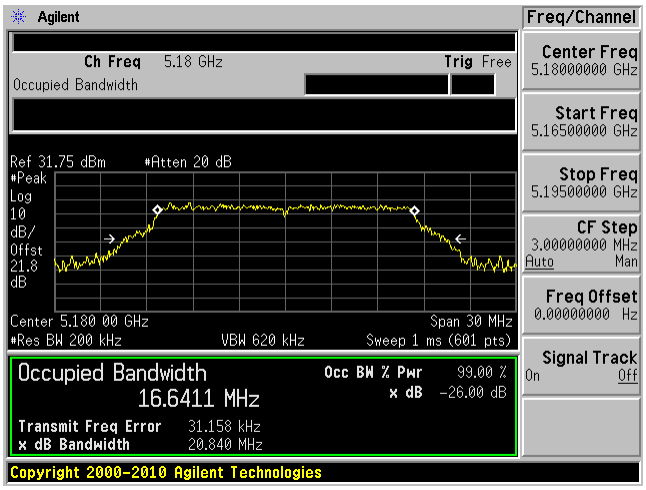
802.11VHT80 mode, 5210 MHz



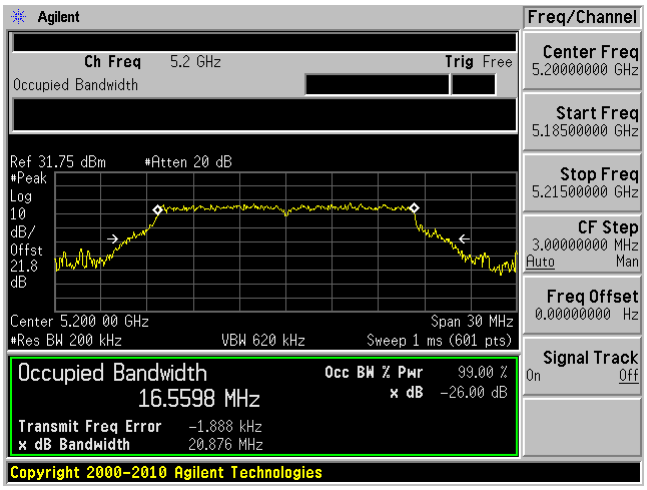
ANT 1 MIMO

802.11a mode

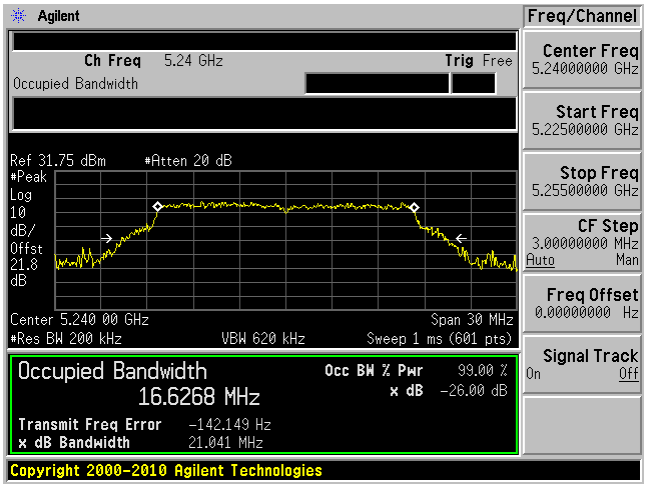
5180 MHz



5200 MHz

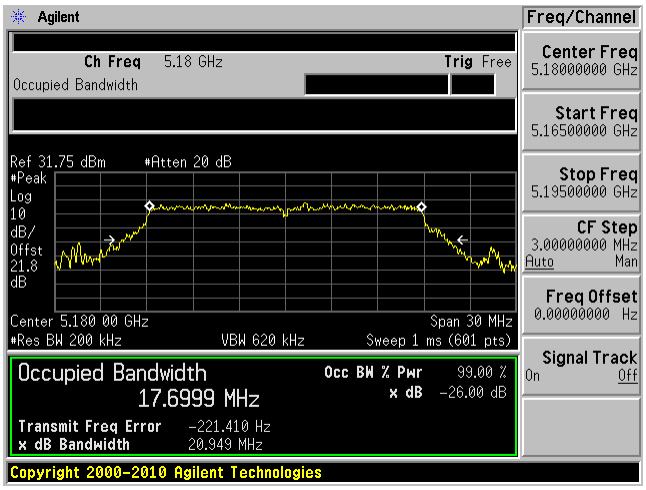


5240 MHz

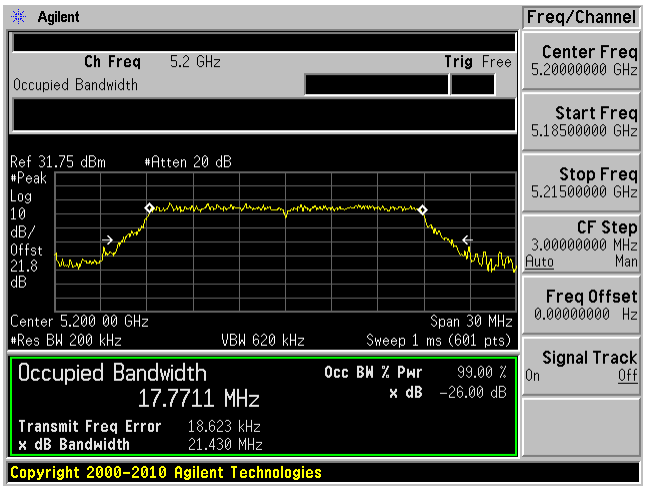


802.11HT/VHT20 mode

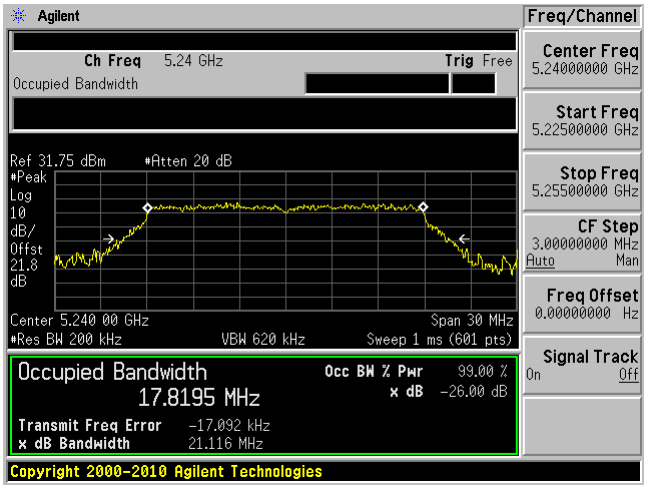
5180 MHz



5200 MHz

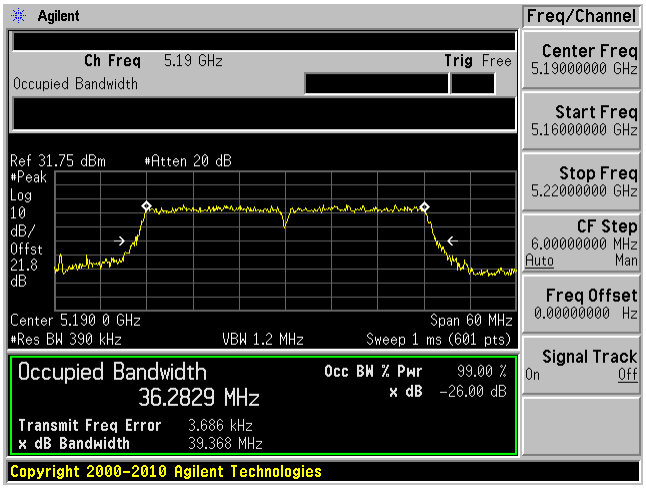


5240 MHz

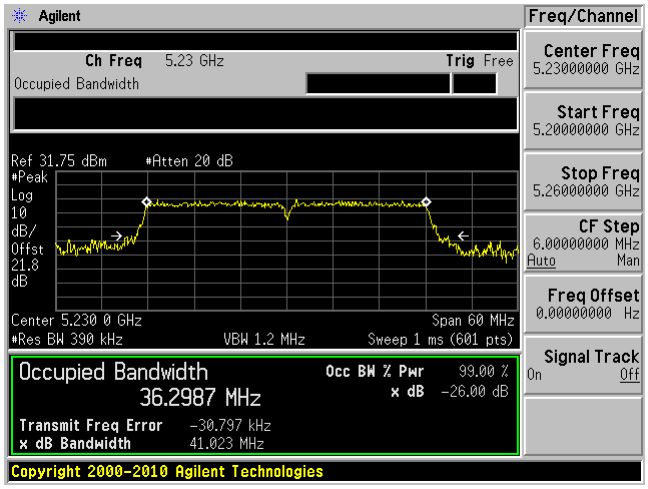


802.11HT/VHT40 mode

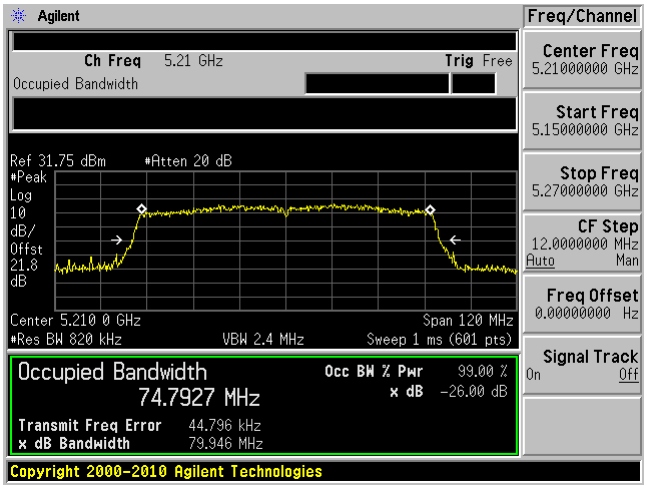
5190 MHz



5230 MHz



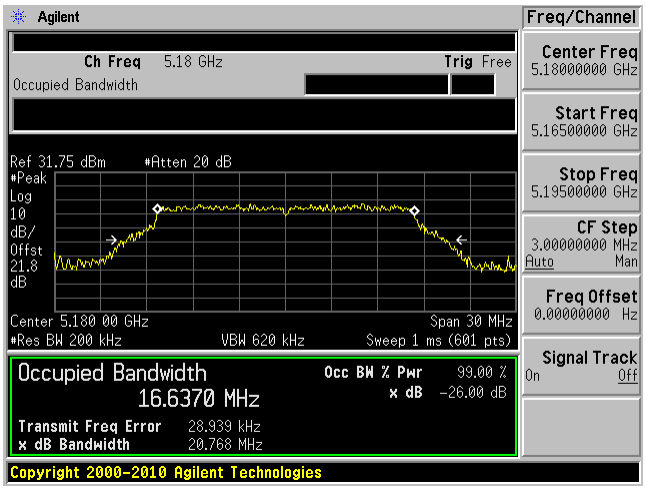
802.11VHT80 mode, 5210 MHz



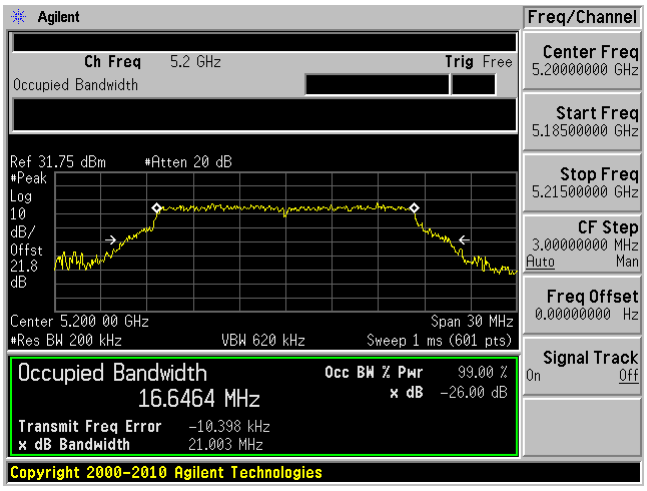
ANT 2 MIMO

802.11a mode

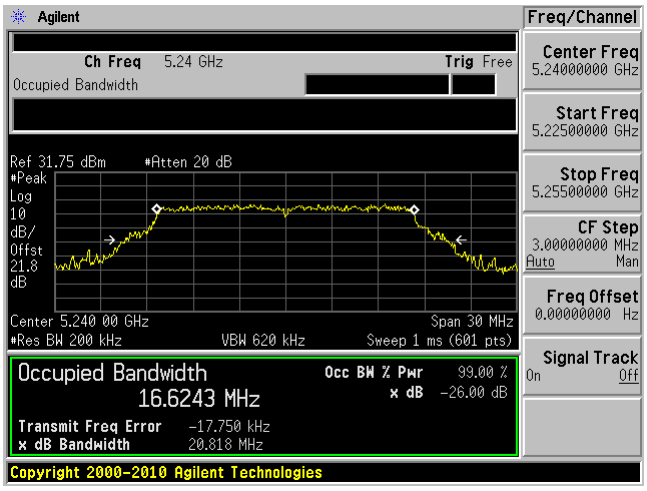
5180 MHz



5200 MHz

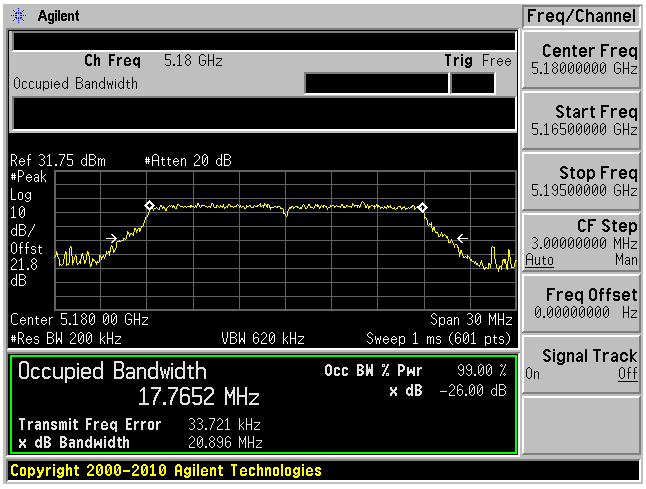


5240 MHz

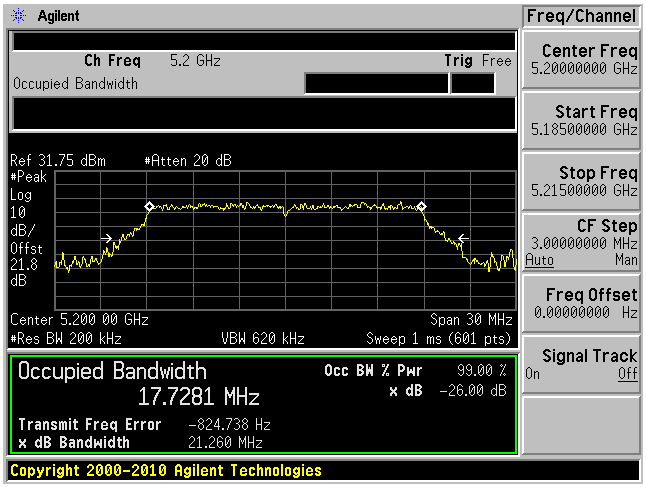


802.11HT/VHT20 mode

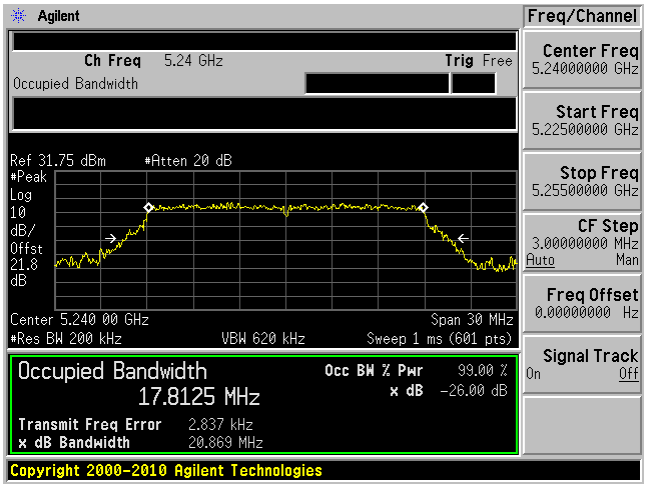
5180 MHz



5200 MHz

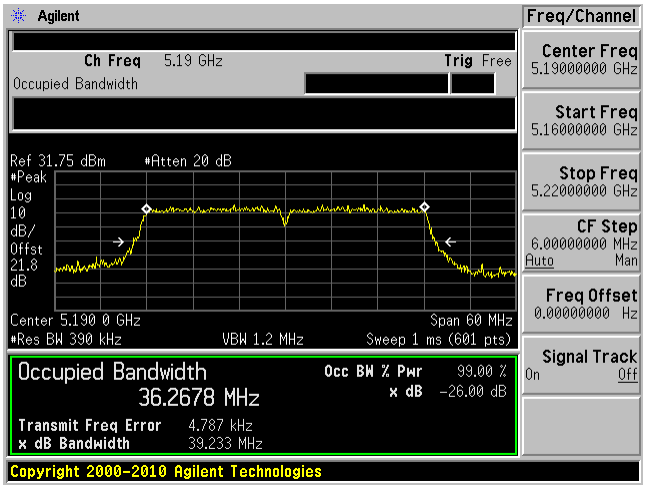


5240 MHz

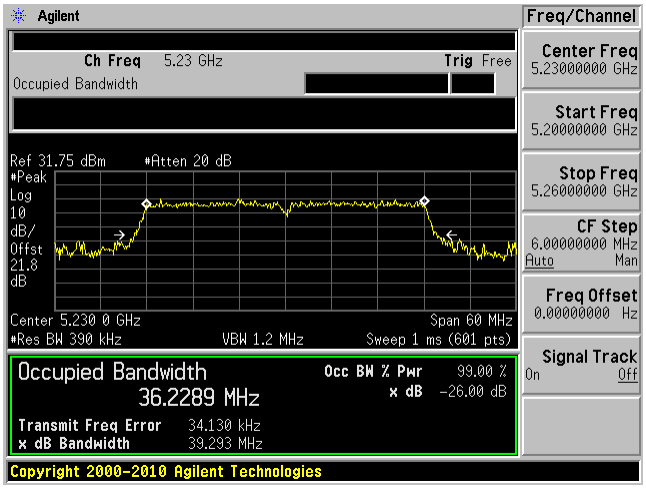


802.11HT/VHT40 mode

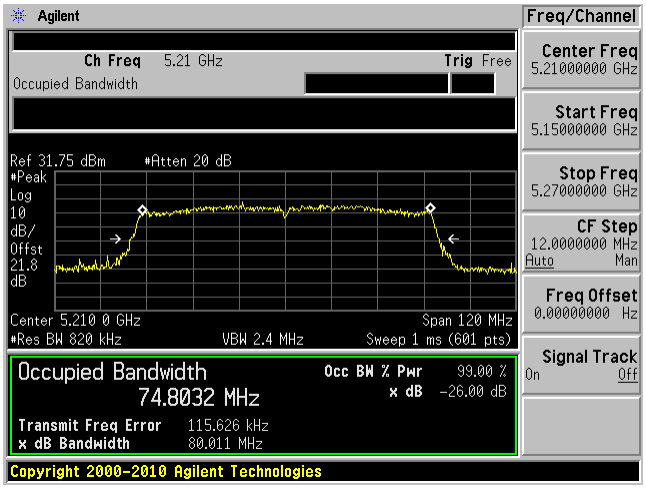
5190 MHz



5230 MHz



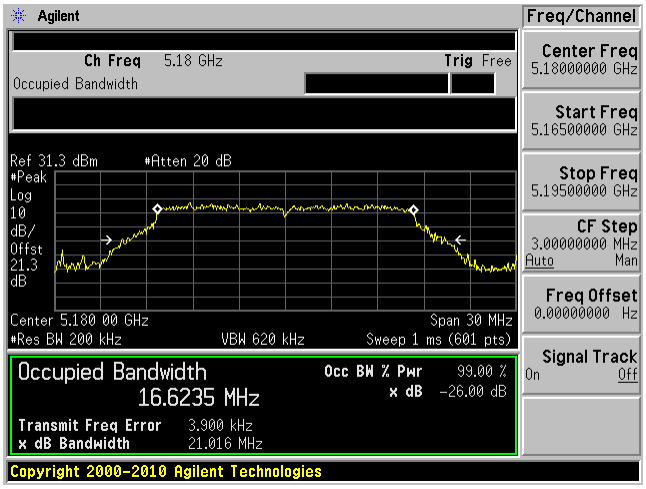
802.11VHT80 mode, 5210 MHz



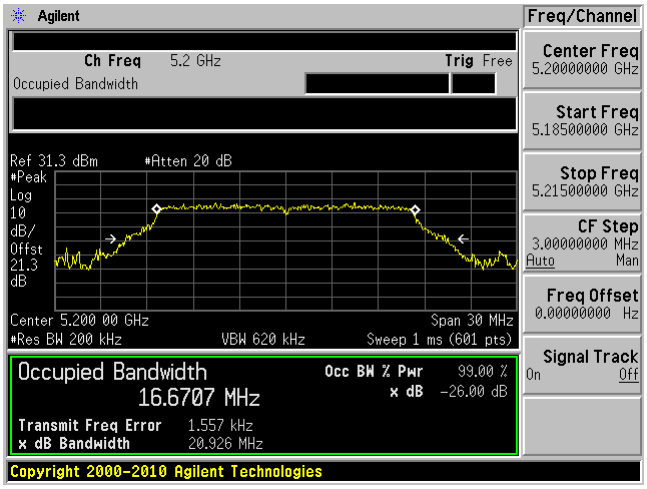
ANT 3 MIMO

802.11a mode

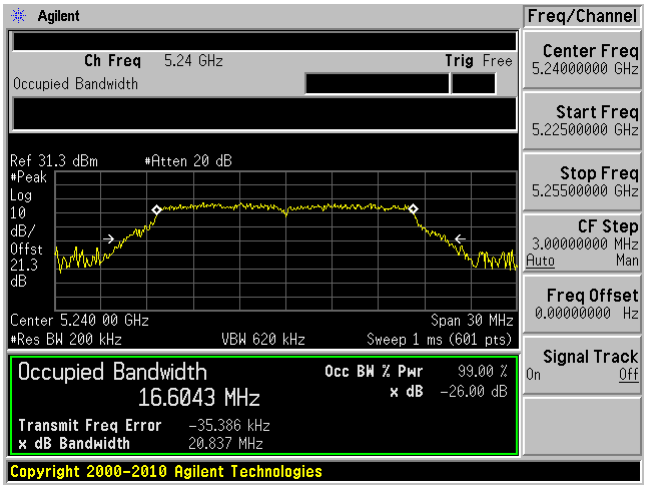
5180 MHz



5200 MHz

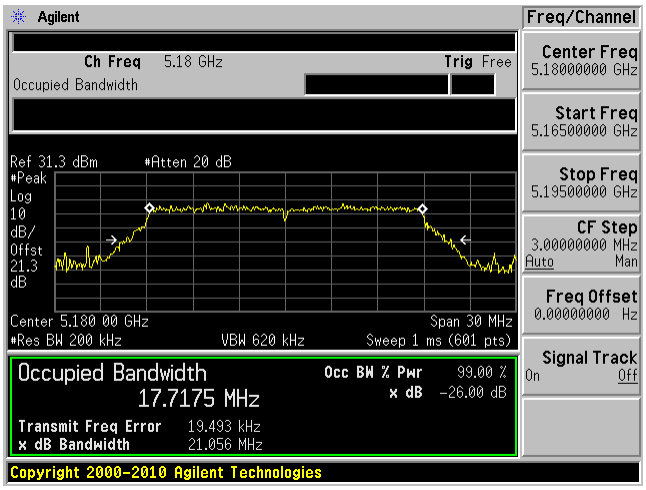


5240 MHz

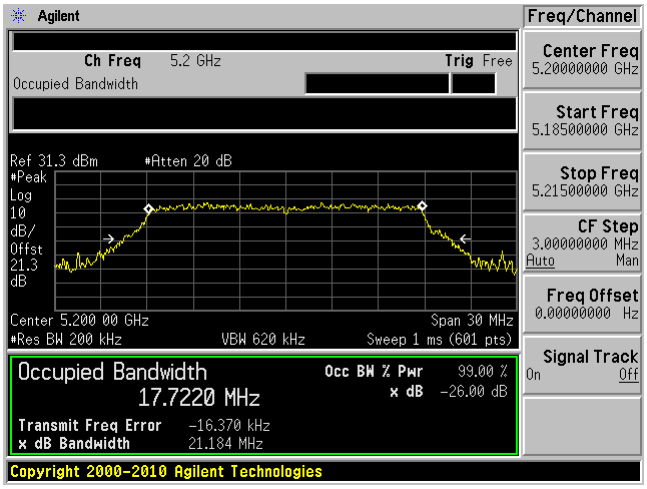


802.11HT/VHT20 mode

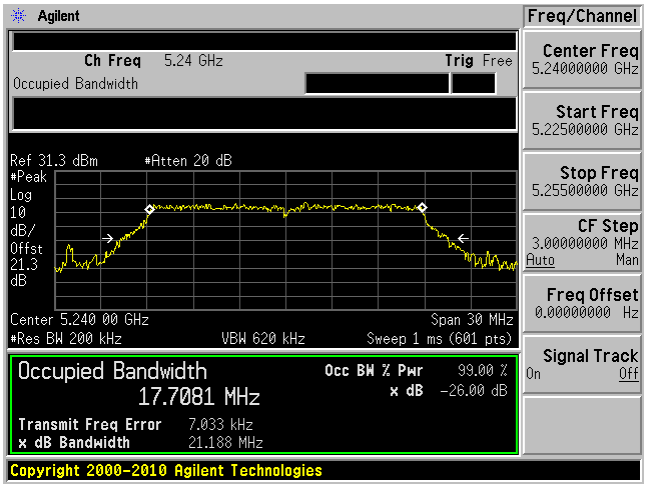
5180 MHz



5200 MHz

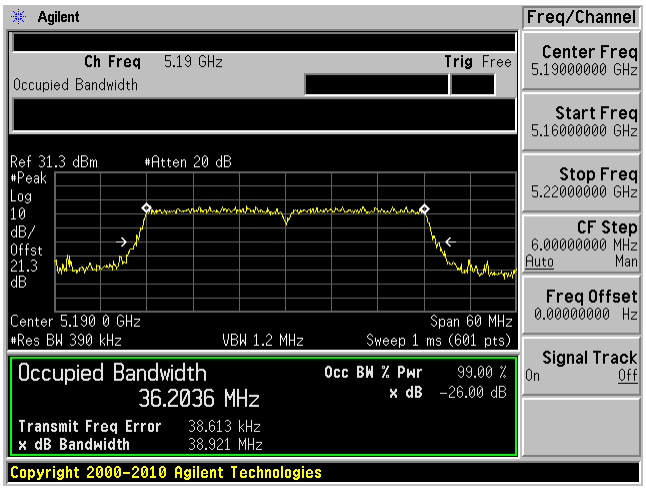


5240 MHz

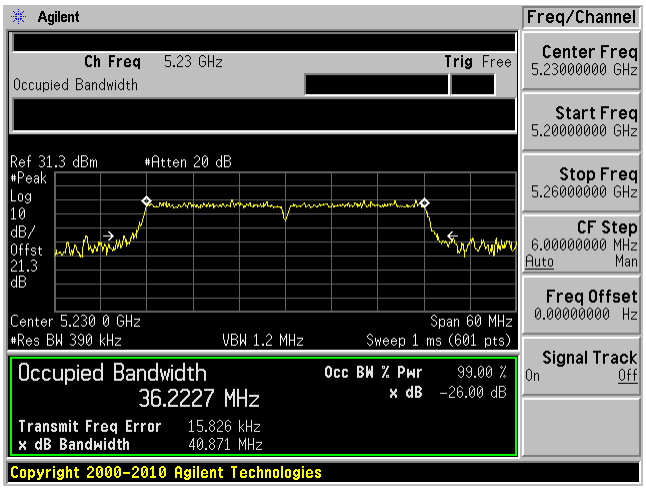


802.11HT/VHT40 mode

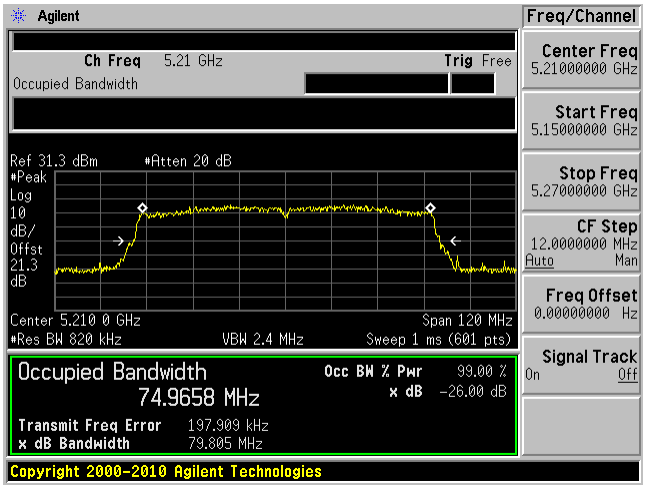
5190 MHz



5230 MHz



802.11VHT80 mode, 5210 MHz

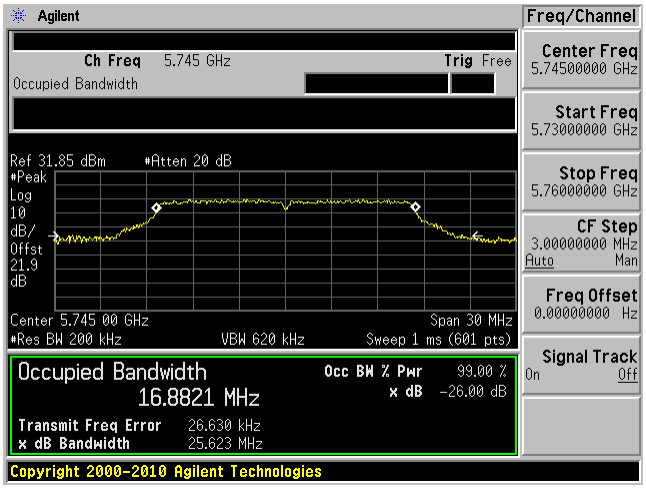


5725 – 5850 MHz 99% OBW

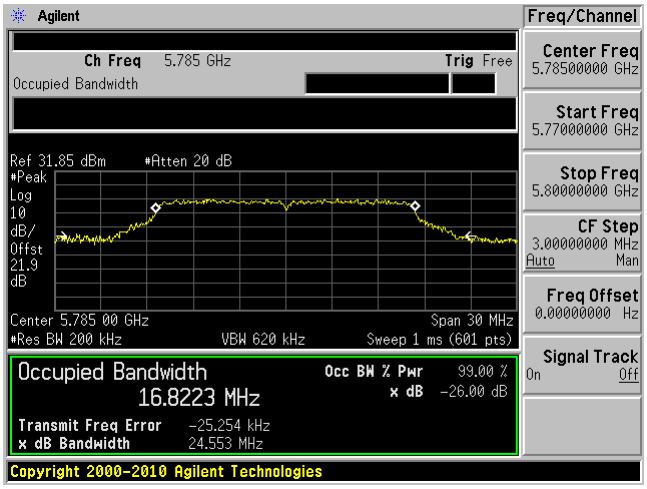
ANT 0 MIMO

802.11a mode

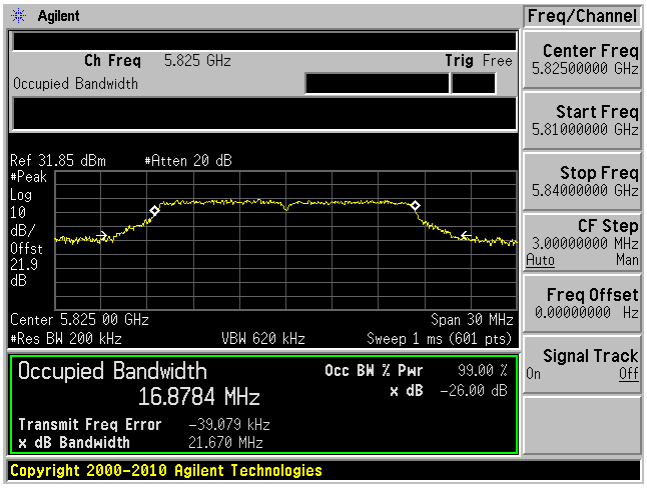
5745 MHz



5785 MHz

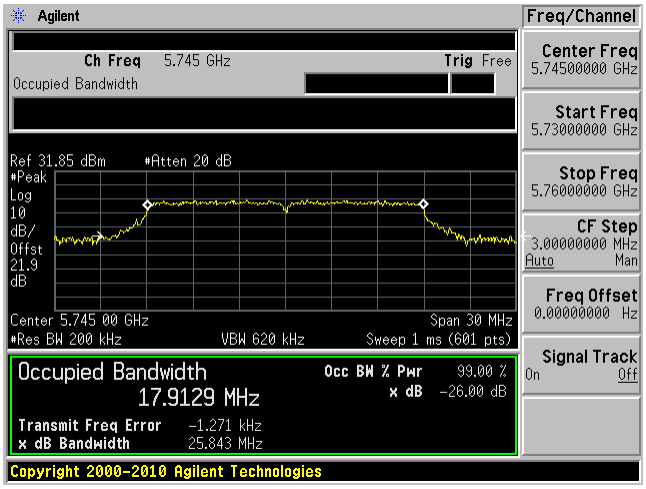


5825 MHz

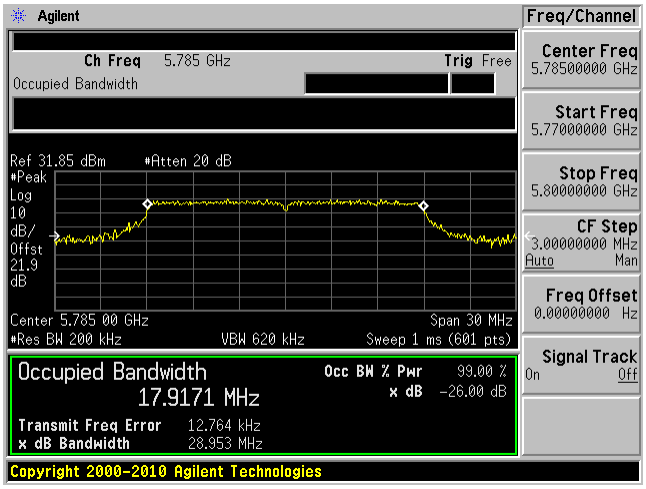


802.11HT/VHT20 mode

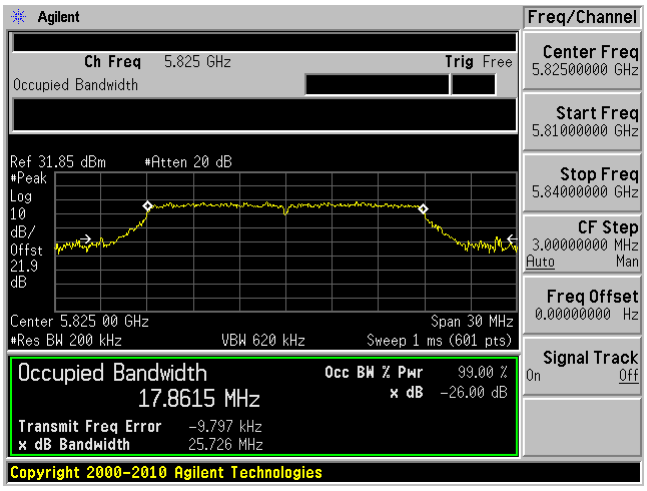
5745 MHz



5785 MHz

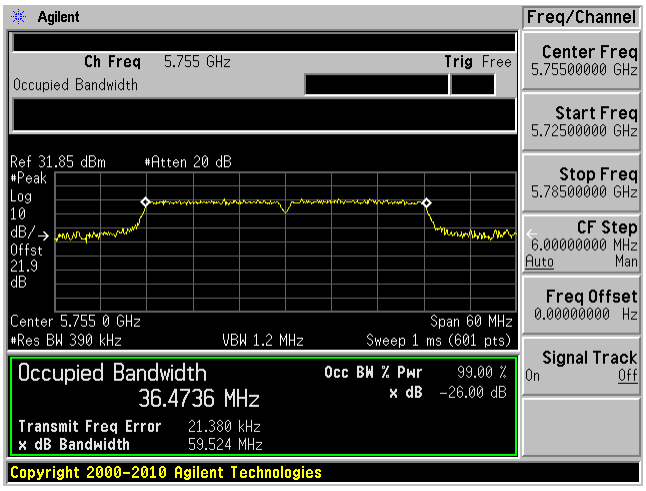


5825 MHz

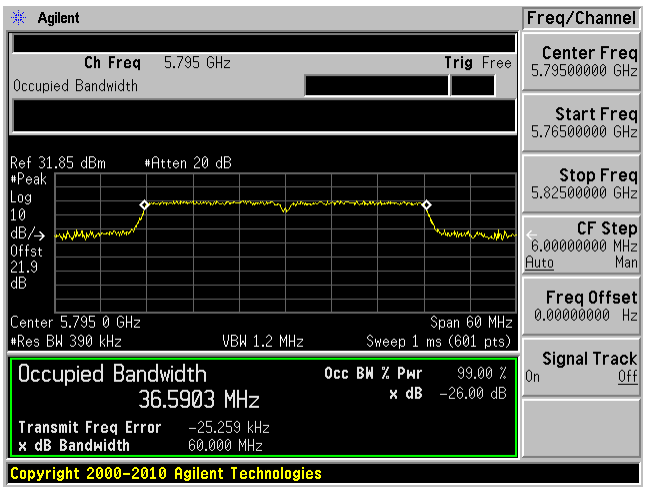


802.11HT/VHT40 mode

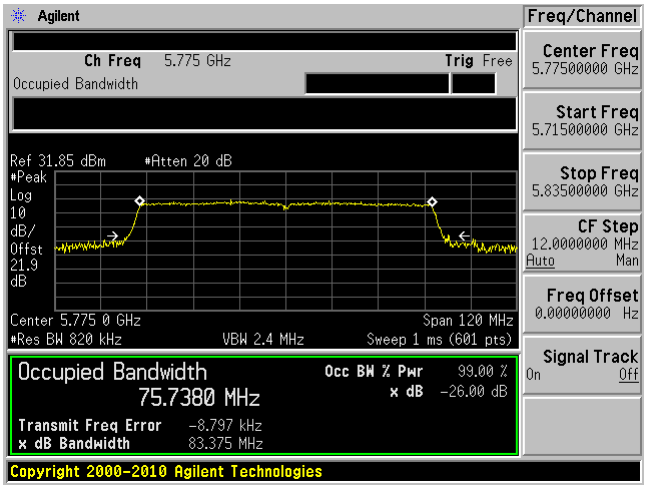
5755 MHz



5795 MHz



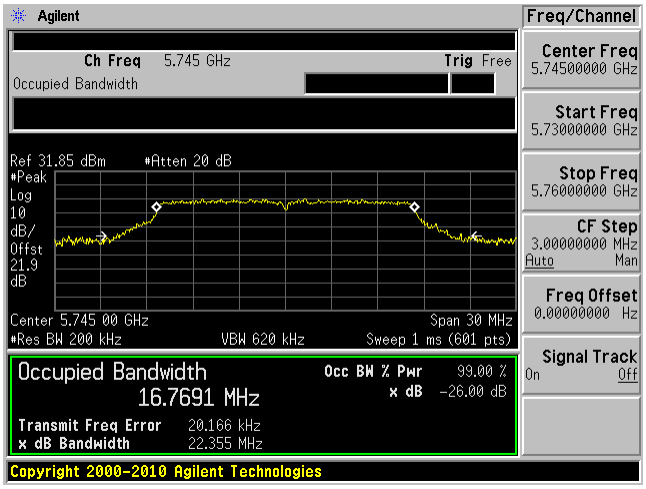
802.11VHT80 mode, 5775 MHz



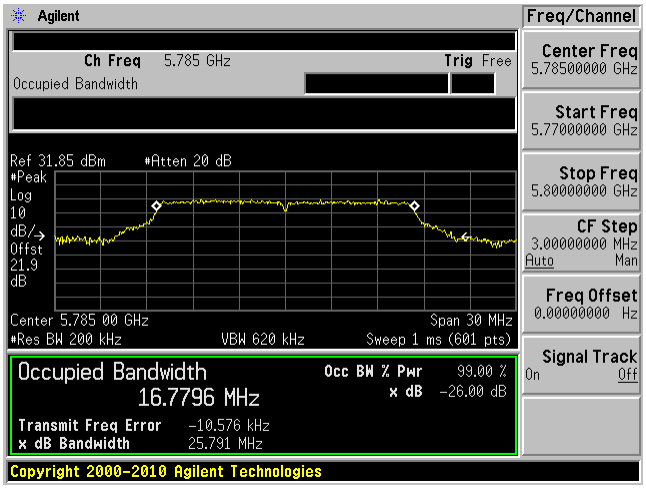
ANT 1 MIMO

802.11a mode

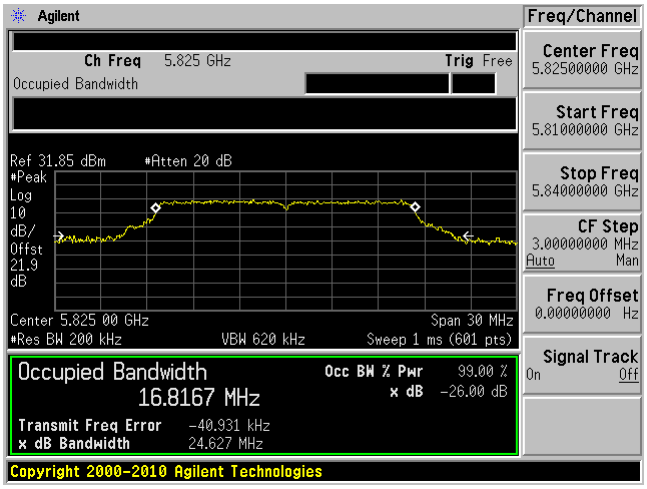
5745 MHz



5785 MHz

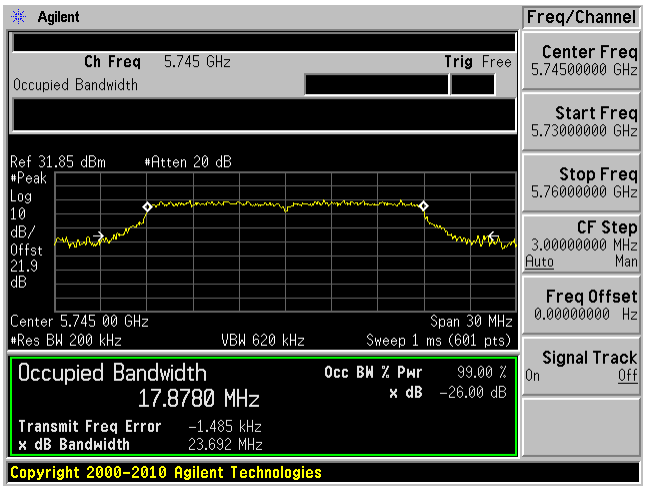


5825 MHz

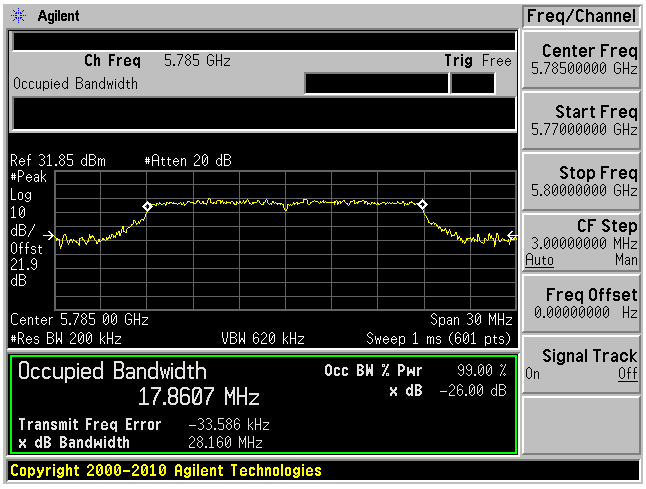


802.11HT/VHT20 mode

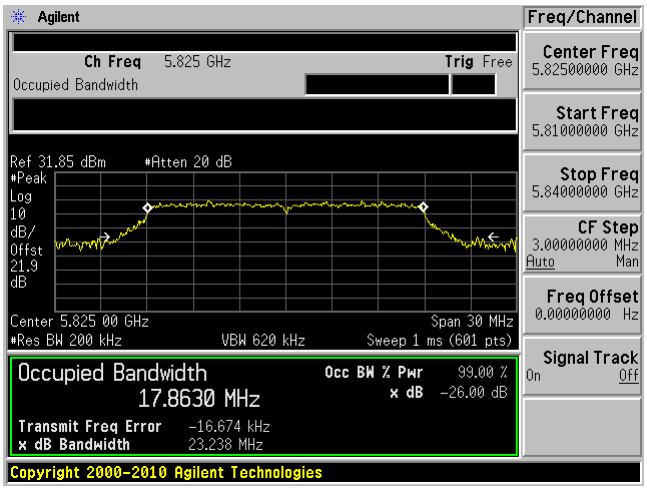
5745 MHz



5785 MHz

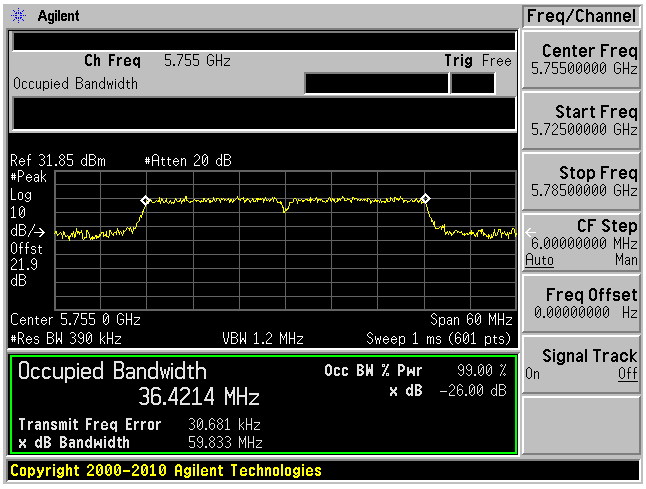


5825 MHz

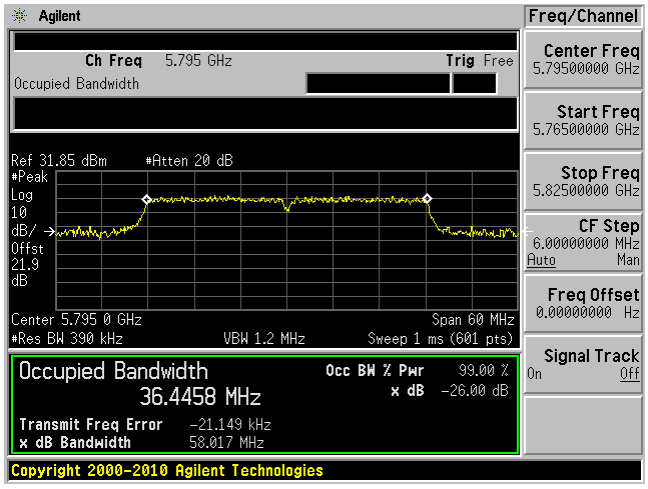


802.11HT/VHT40 mode

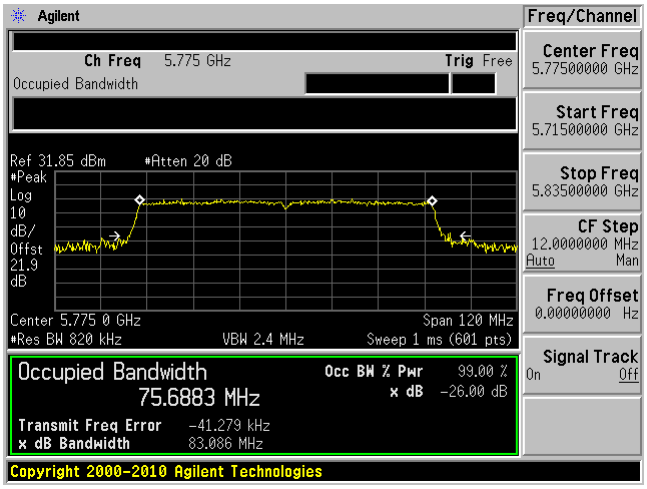
5755 MHz



5795 MHz



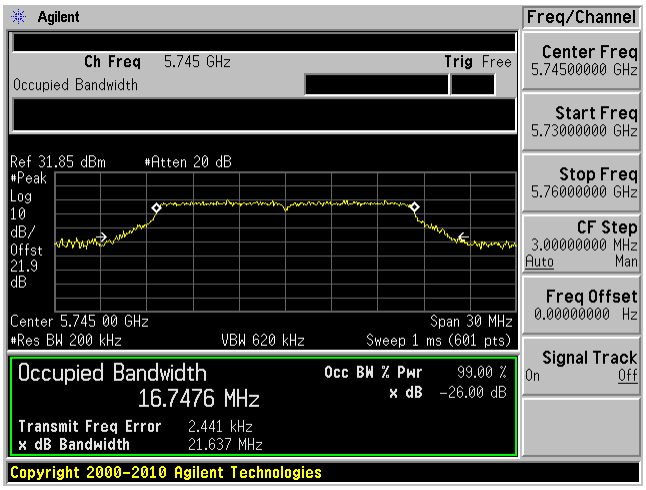
802.11VHT80 mode, 5775 MHz



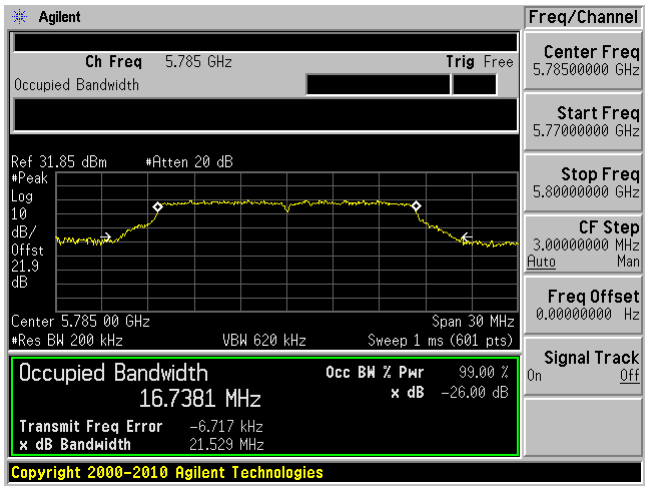
ANT 2 MIMO

802.11a mode

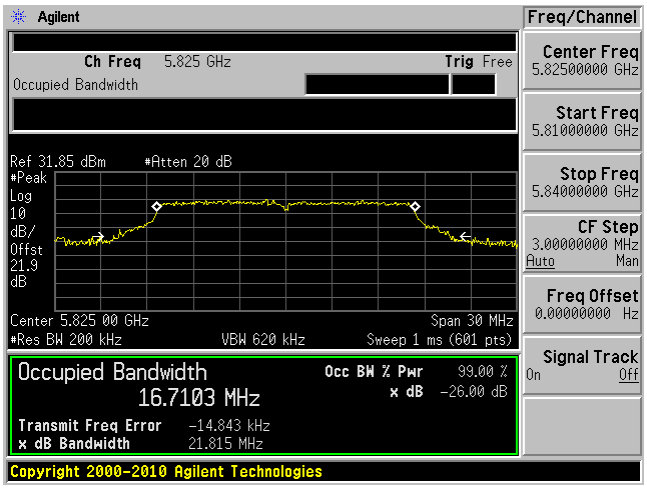
5745 MHz



5785 MHz

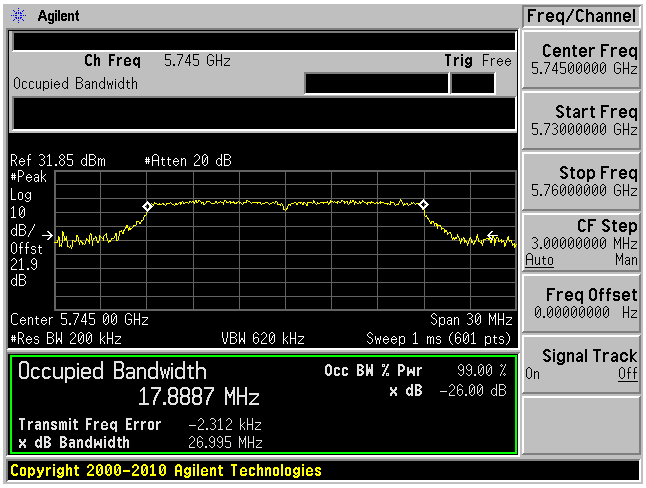


5825 MHz



802.11HT/VHT20 mode

5745 MHz



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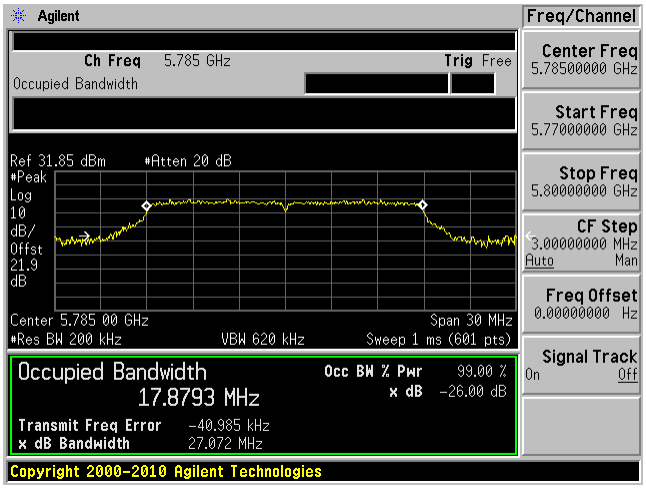
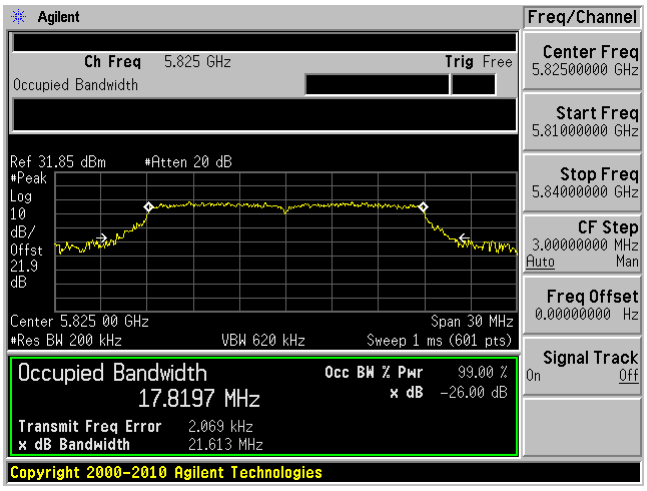
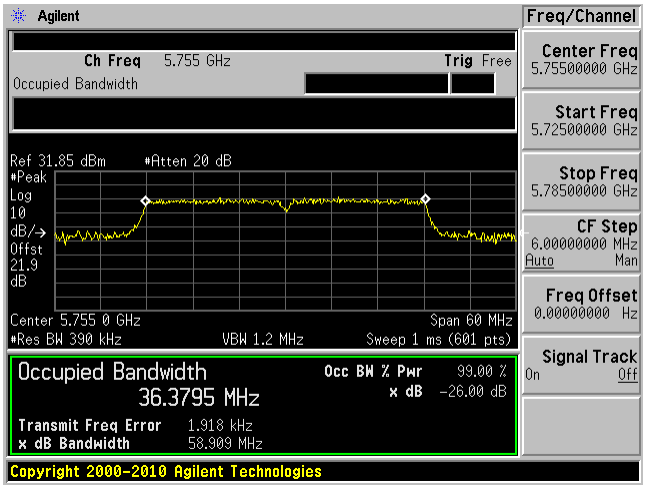


5825 MHz



802.11HT/VHT40 mode

5755 MHz



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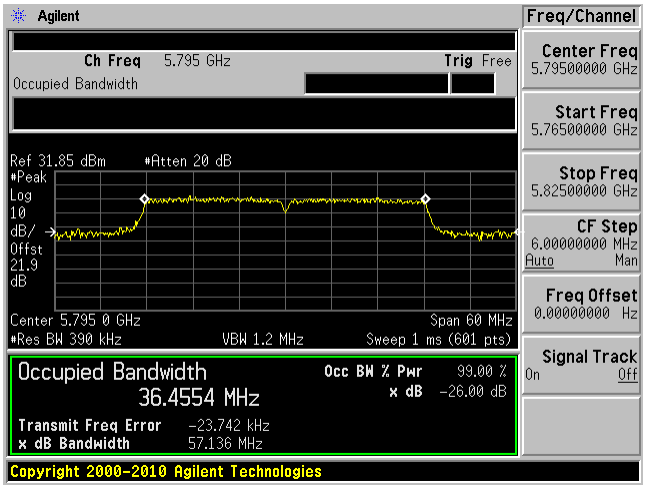
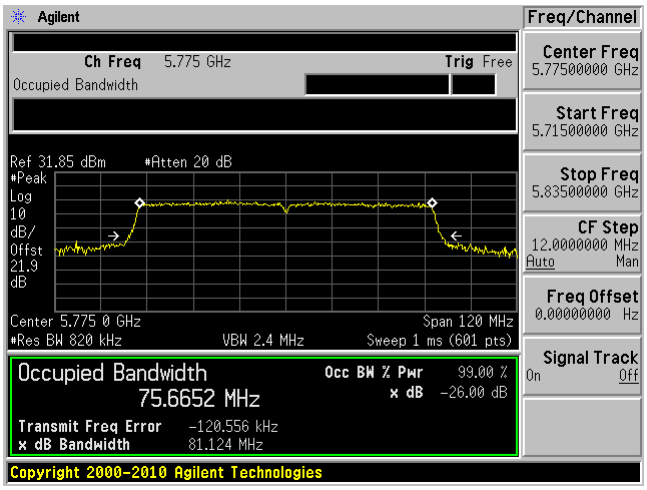


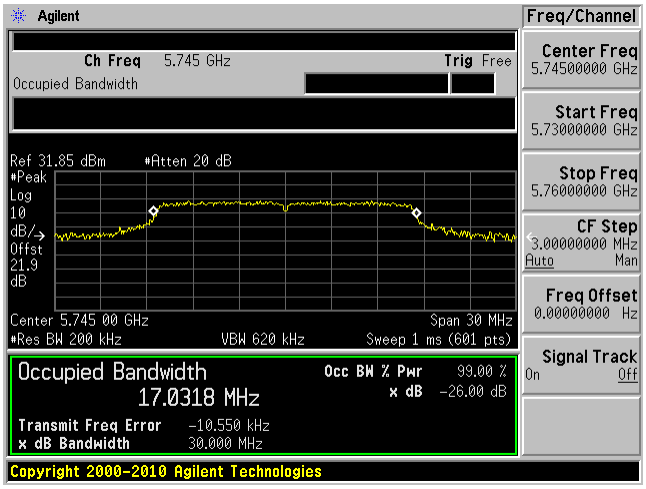
802.11VHT80 mode, 5775 MHz



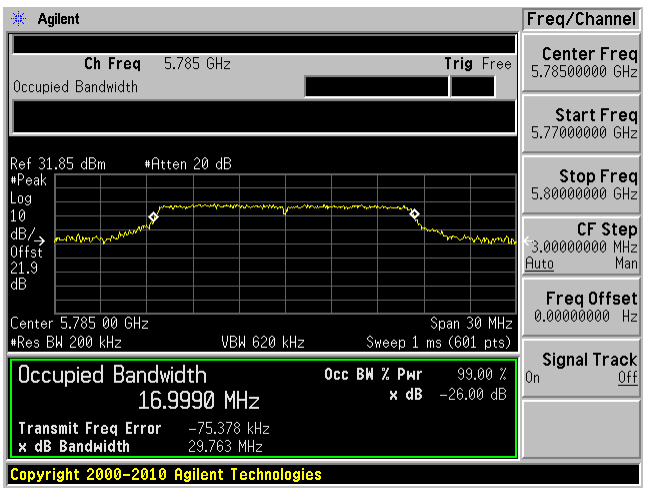
ANT 3 MIMO

802.11a mode

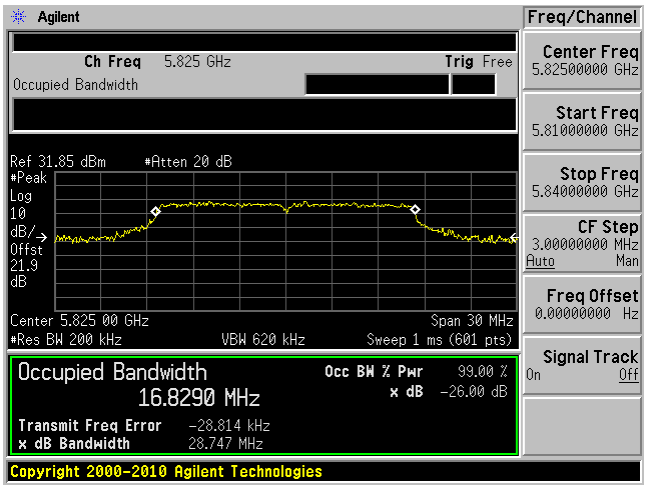
5745 MHz



5785 MHz

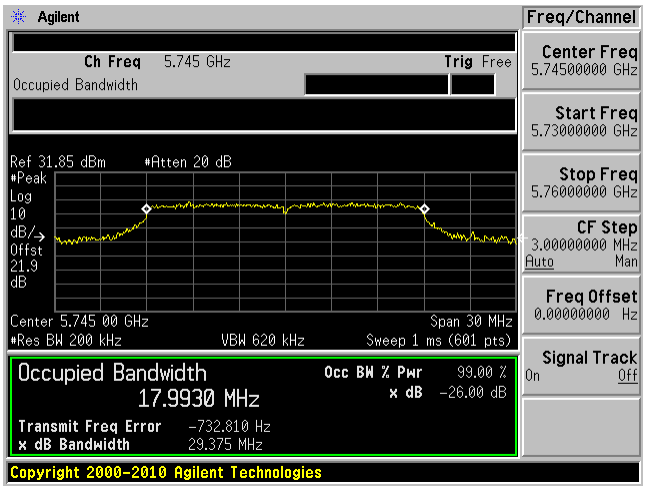


5825 MHz

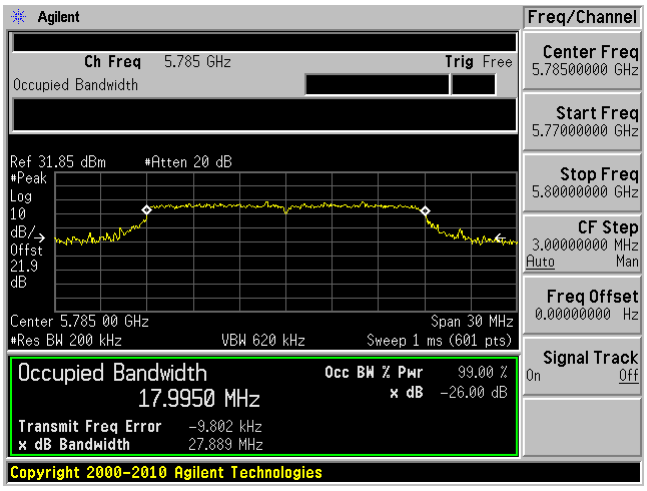


802.11HT/VHT20 mode

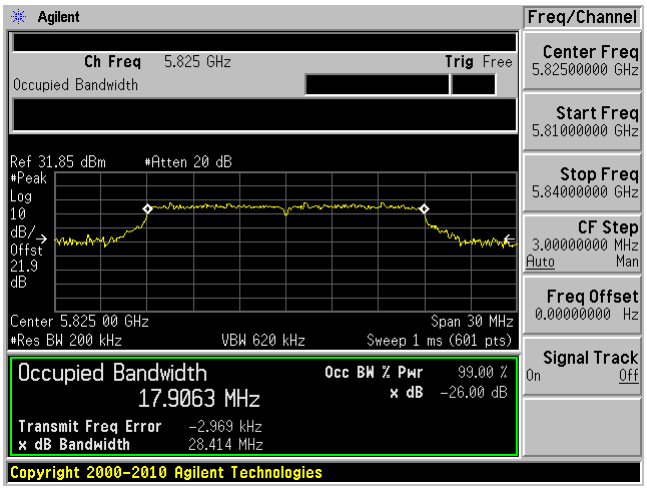
5745 MHz



5785 MHz

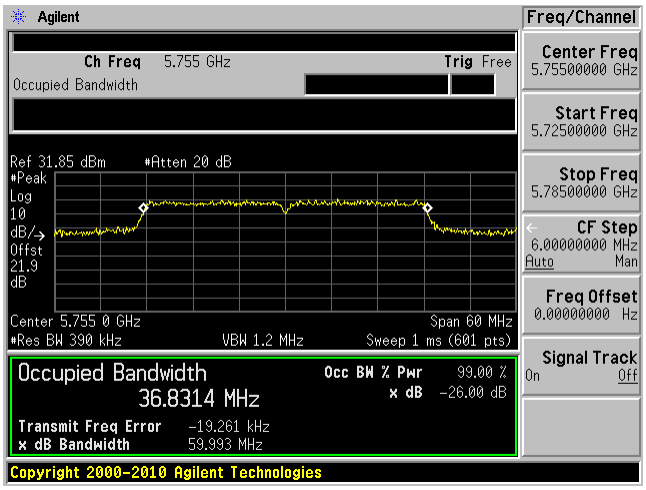


5825 MHz

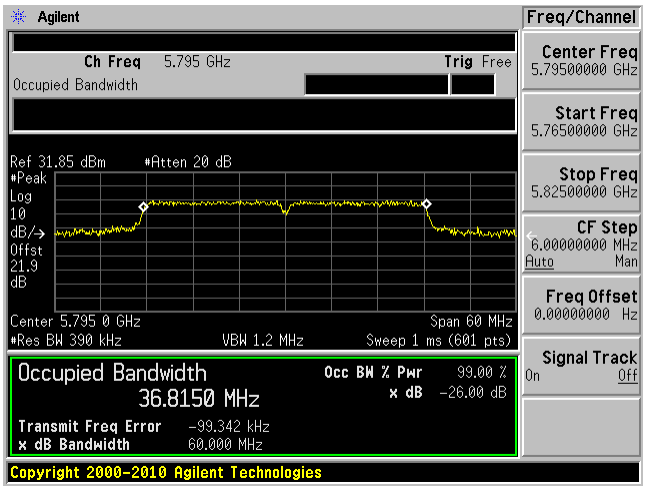


802.11HT/VHT40 mode

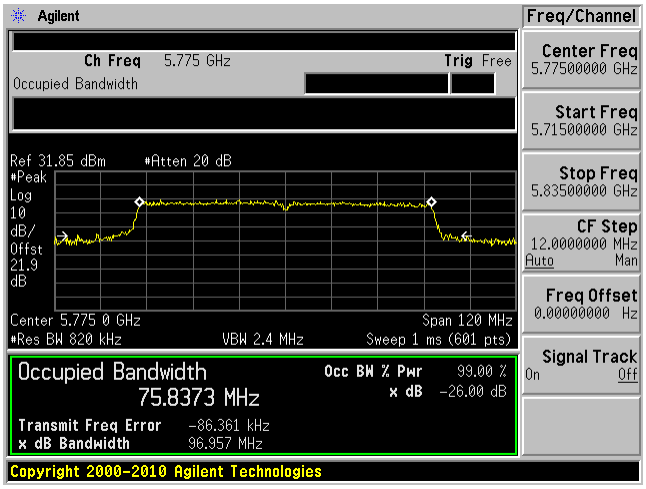
5755 MHz



5795 MHz



802.11VHT80 mode, 5775 MHz

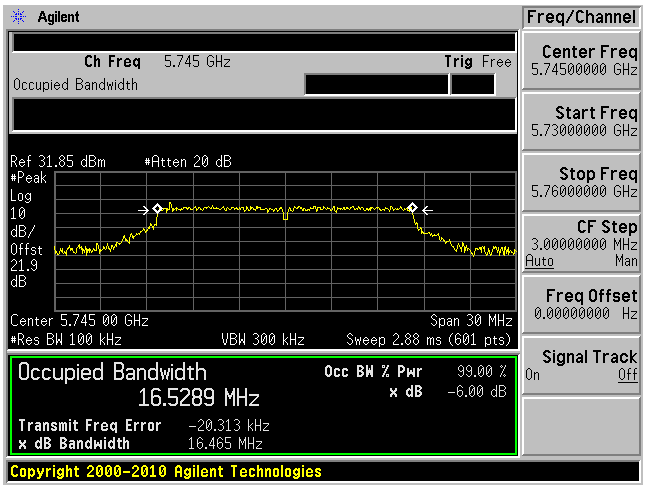


5725 – 5850 MHz 6 dB OBW

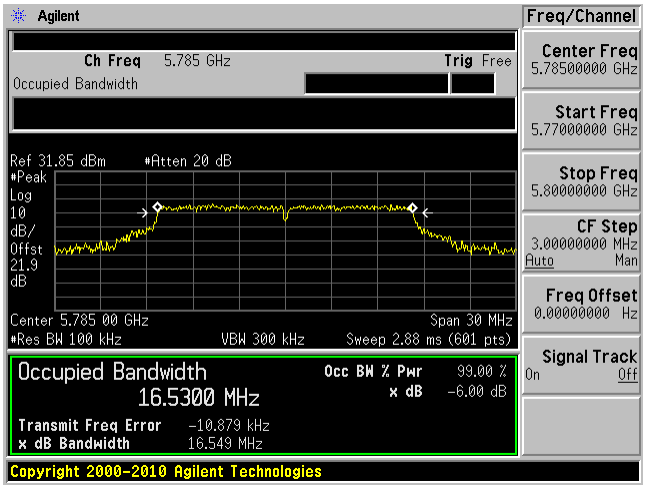
ANT 0 MIMO

802.11a mode

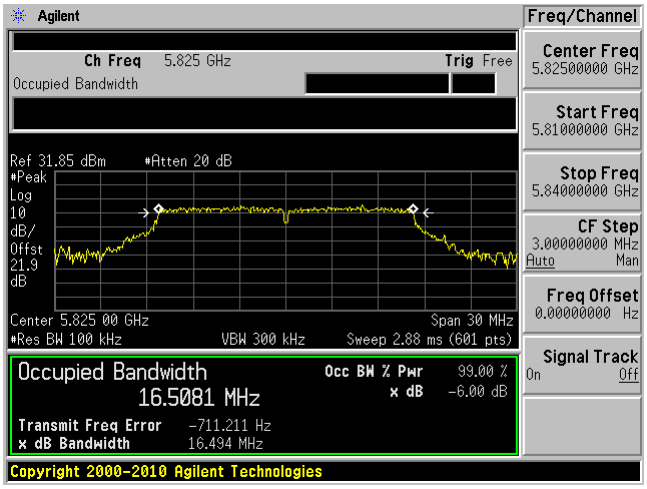
5745 MHz



5785 MHz

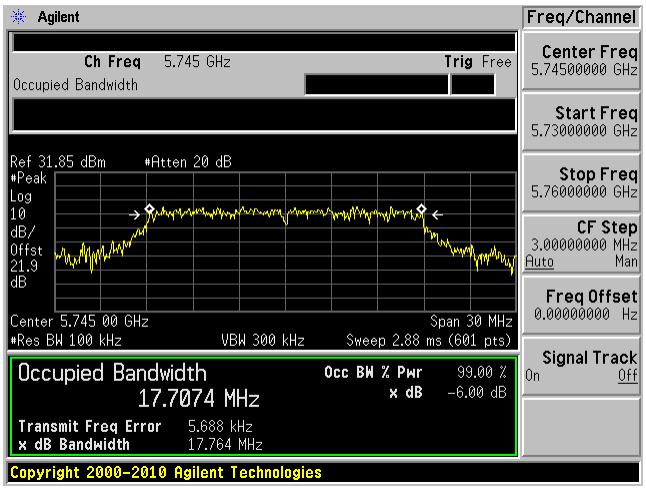


5825 MHz

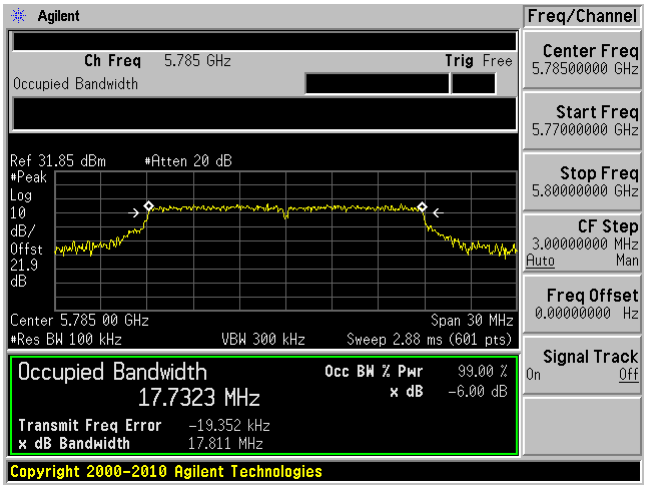


802.11HT/VHT20 mode

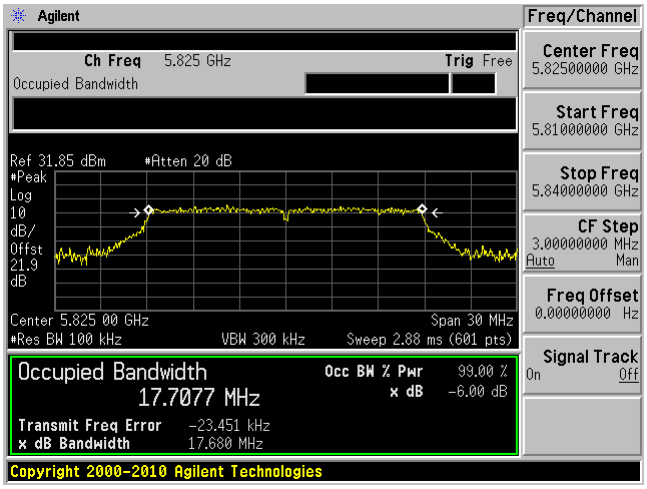
5745 MHz



5785 MHz

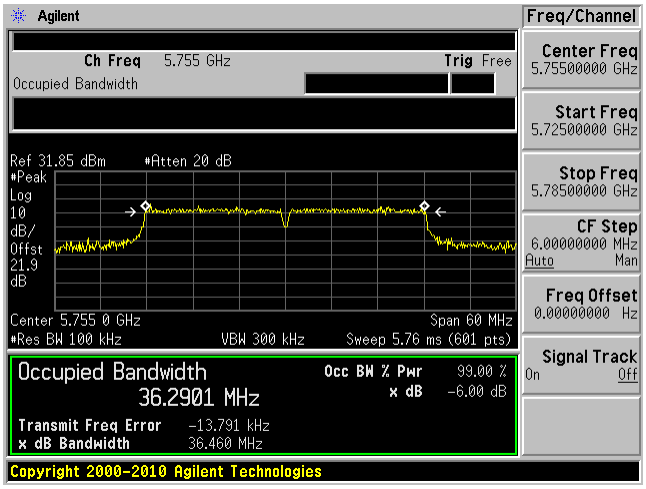


5825 MHz

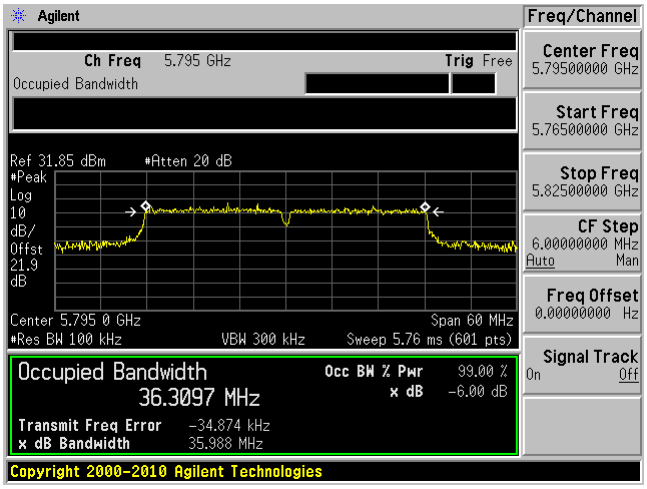


802.11HT/VHT40 mode

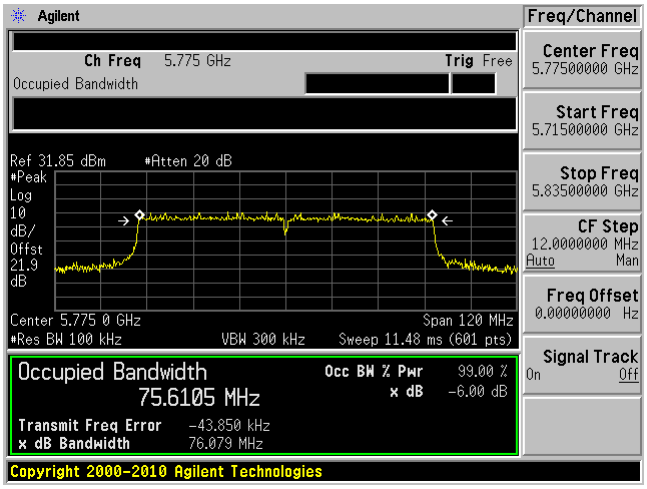
5755 MHz



5795 MHz



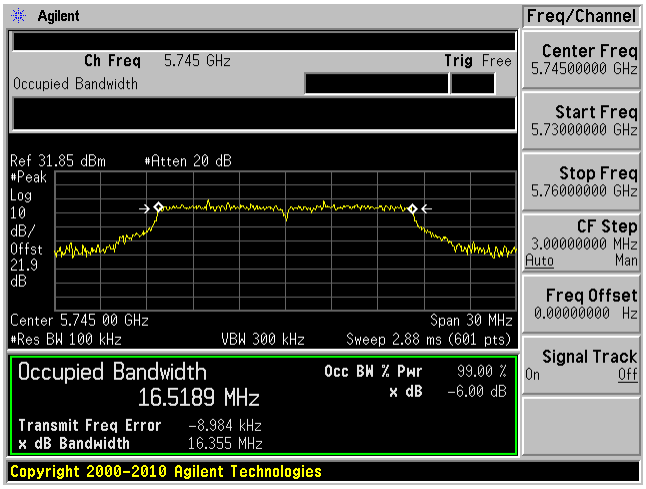
802.11VHT80 mode, 5775 MHz



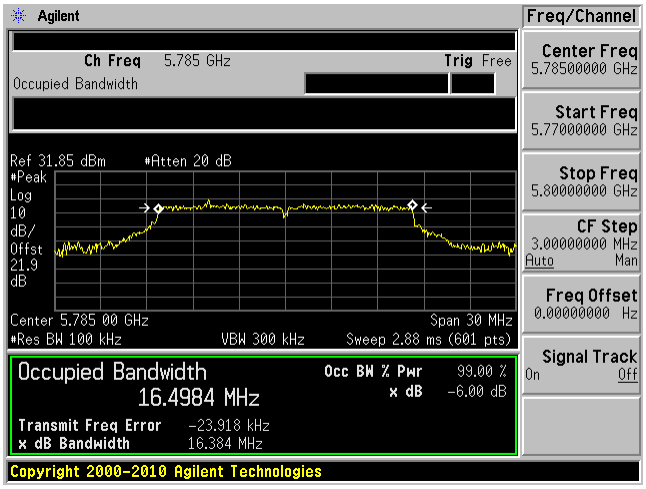
ANT 1 MIMO

802.11a mode

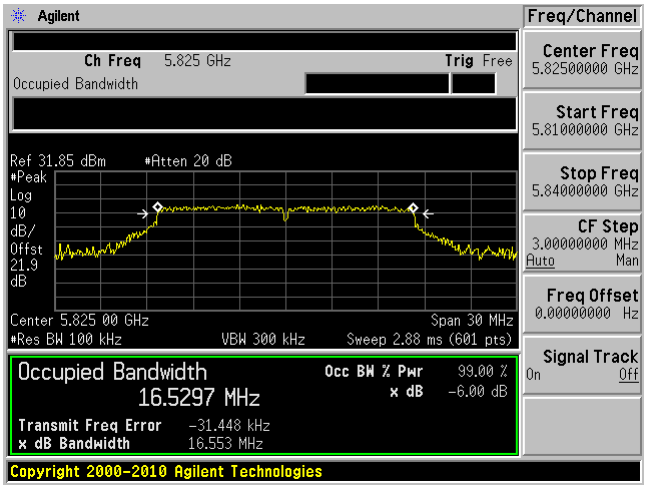
5745 MHz



5785 MHz

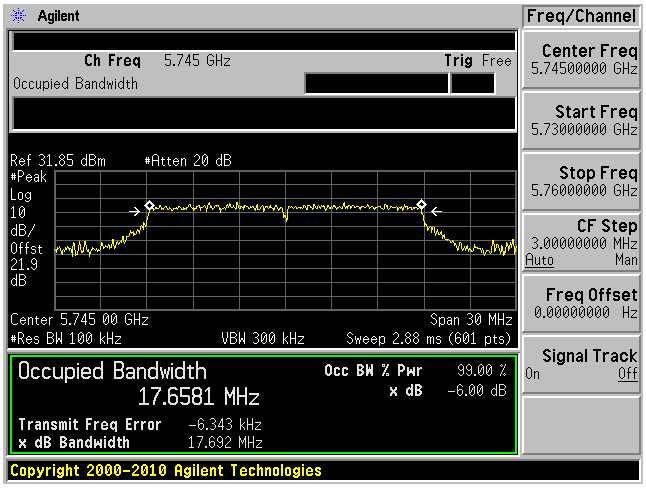


5825 MHz

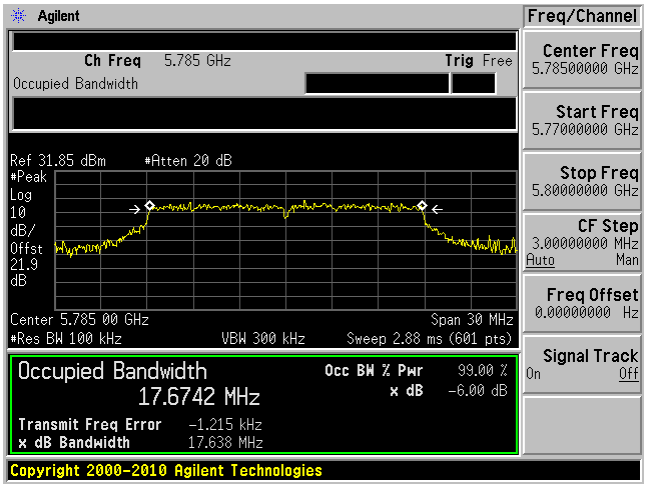


802.11HT/VHT20 mode

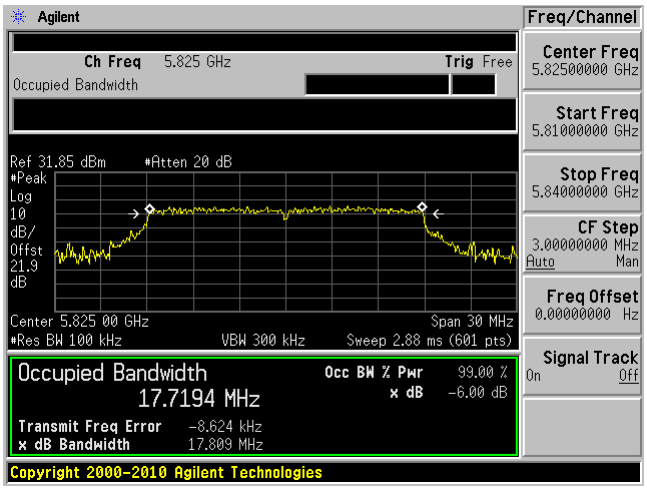
5745 MHz



5785 MHz

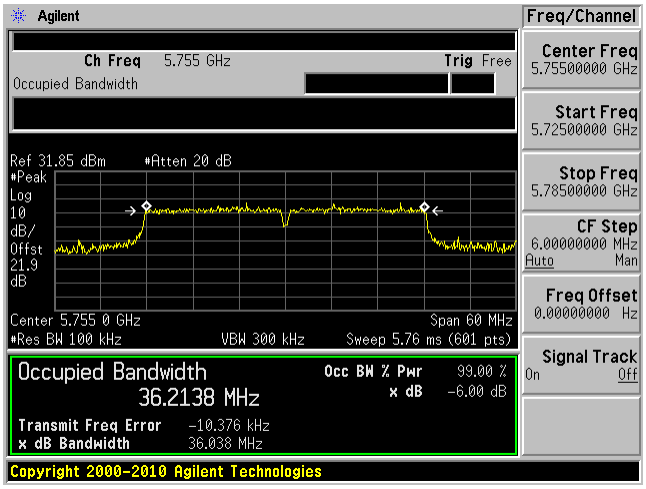


5825 MHz

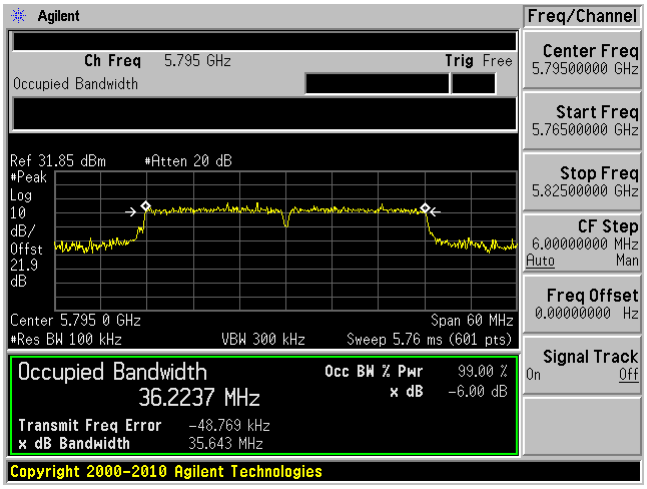


802.11HT/VHT40 mode

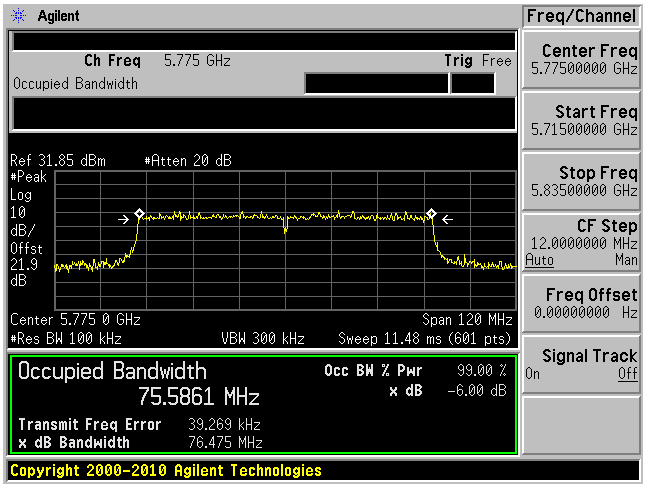
5755 MHz



5795 MHz



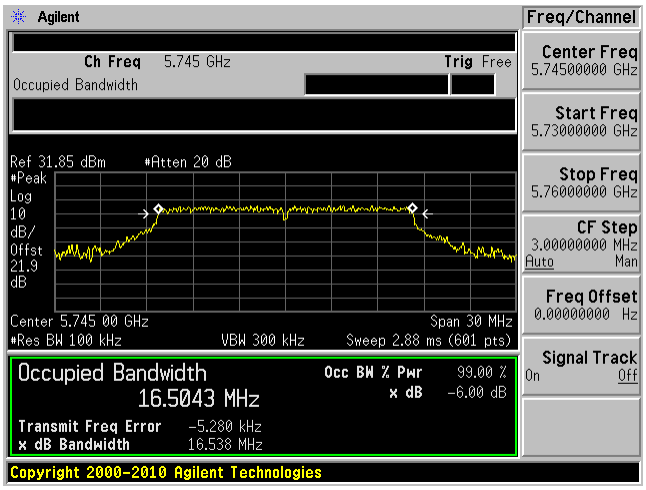
802.11VHT80 mode, 5775 MHz



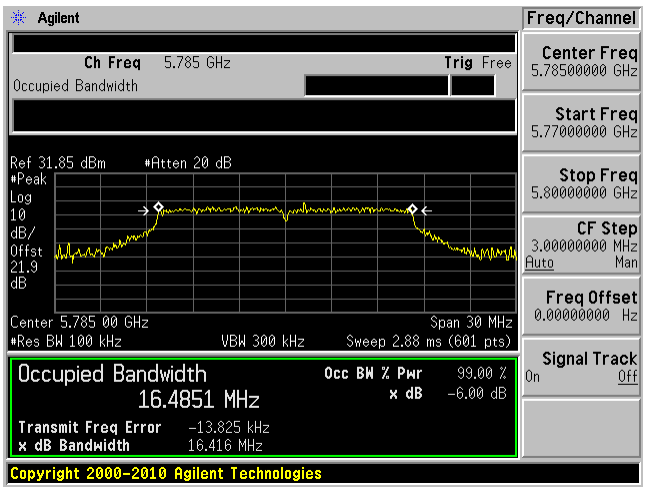
ANT 2 MIMO

802.11a mode

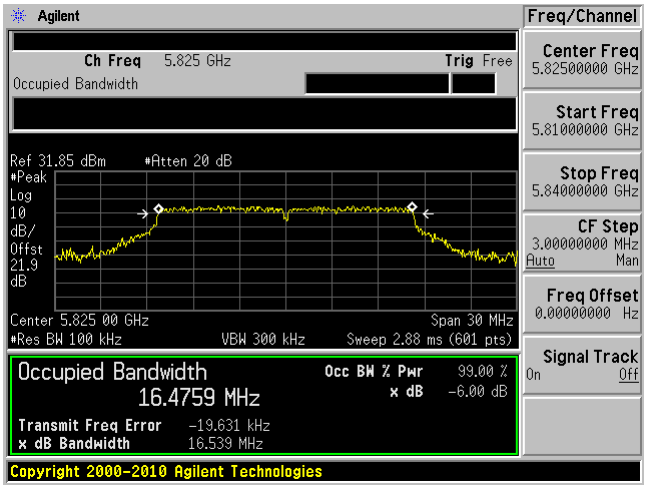
5745 MHz



5785 MHz

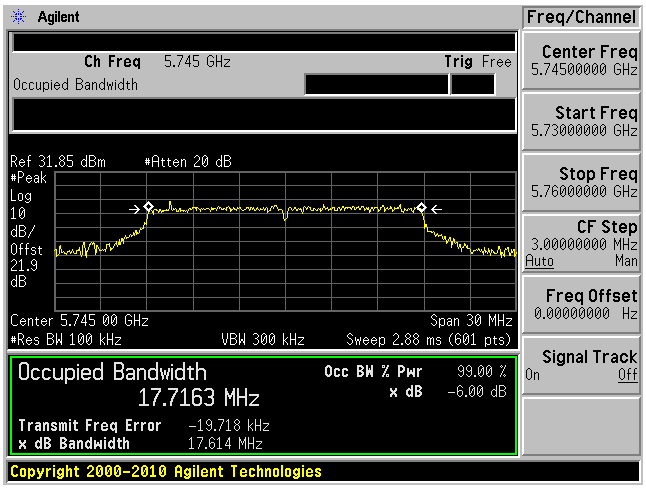


5825 MHz

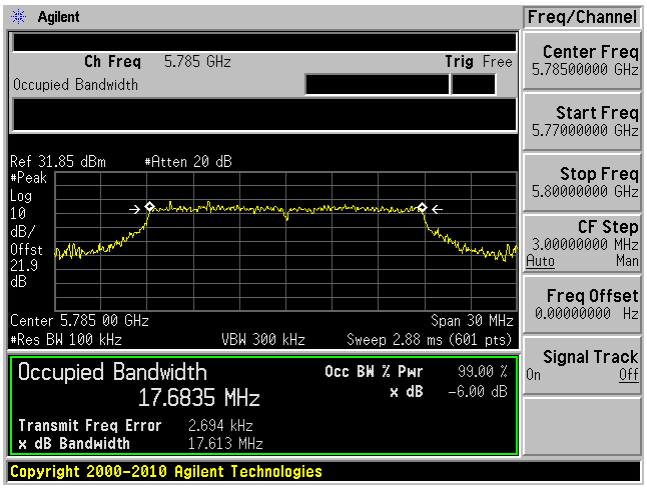


802.11HT/VHT20 mode

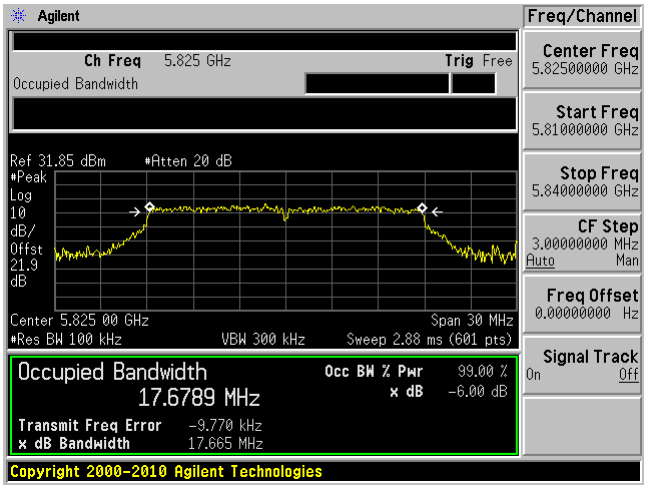
5745 MHz



5785 MHz

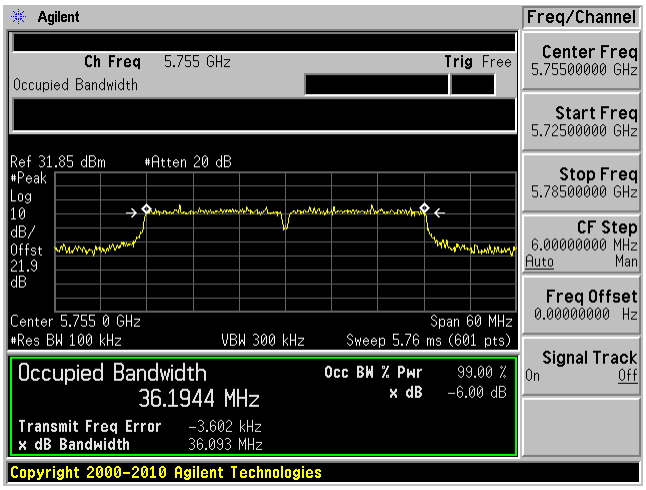


5825 MHz

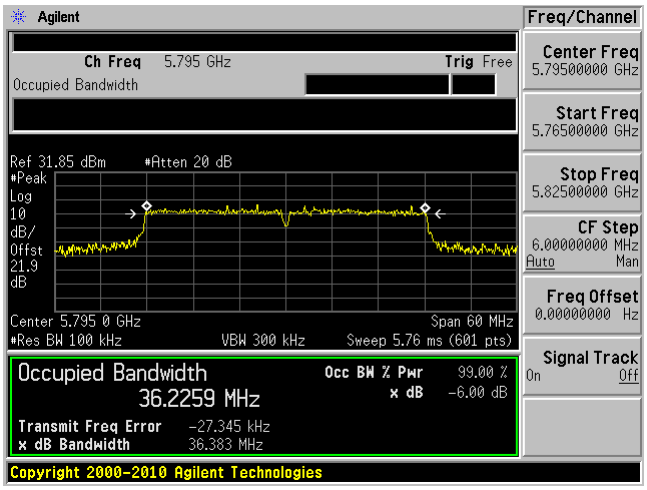


802.11HT/VHT40 mode

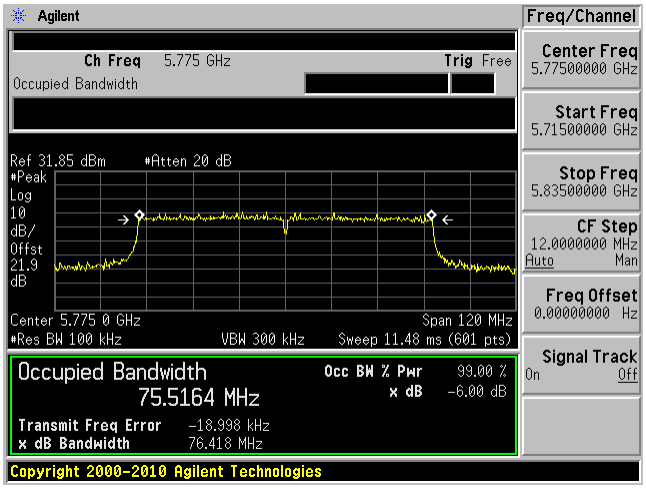
5755 MHz



5795 MHz



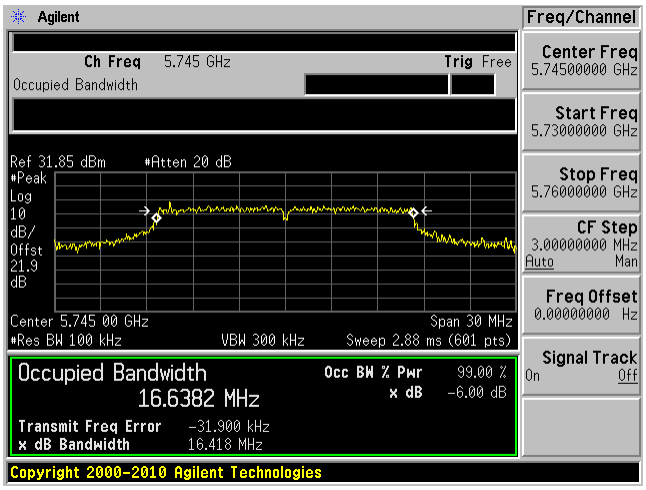
802.11VHT80 mode, 5775 MHz



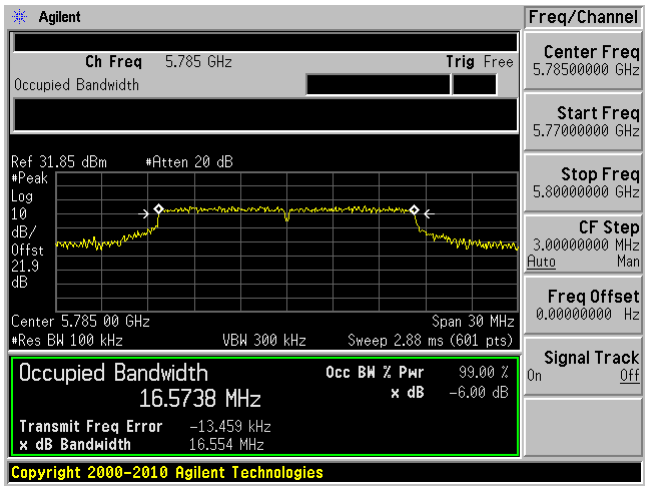
ANT 3 MIMO

802.11a mode

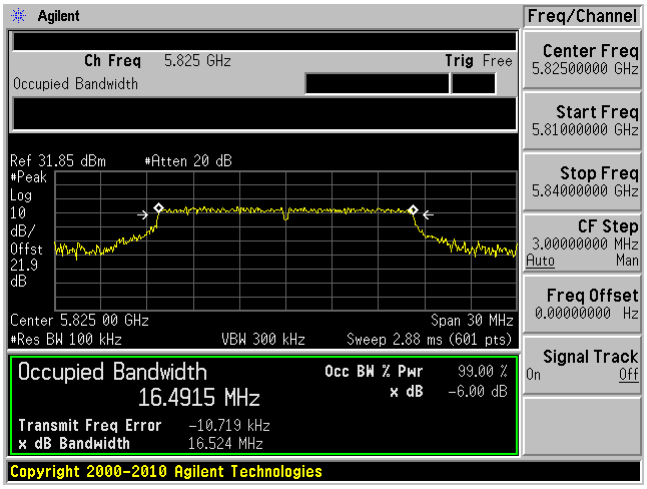
5745 MHz



5785 MHz

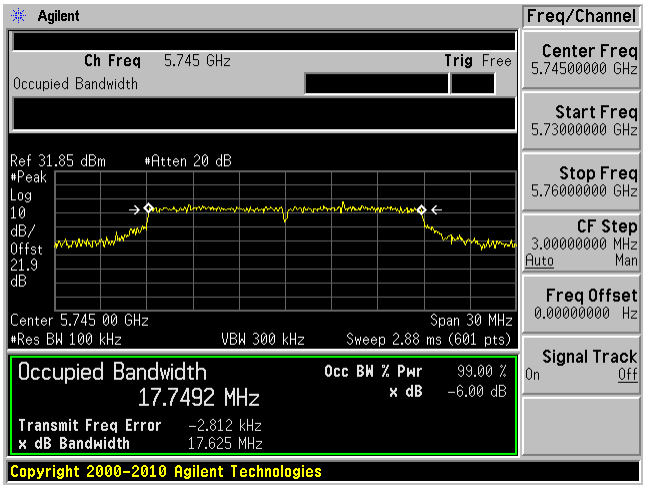


5825 MHz

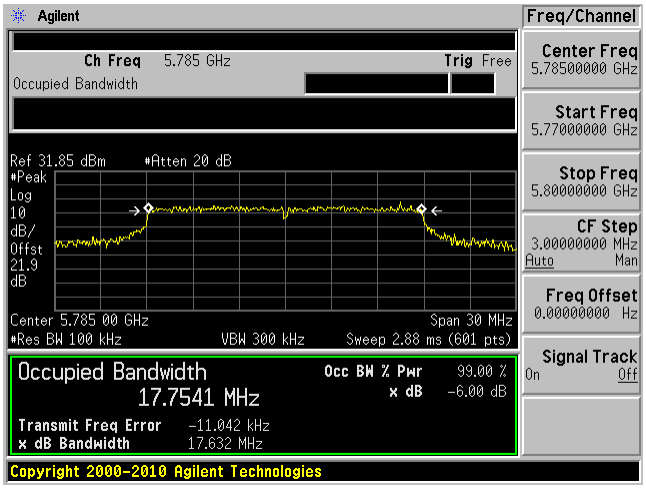


802.11HT/VHT20 mode

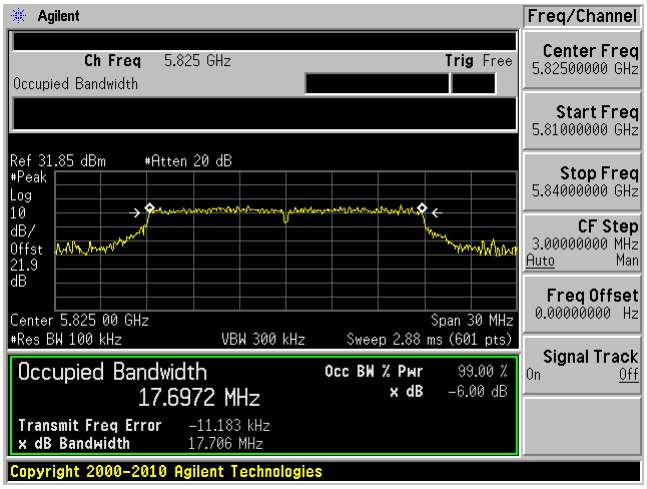
5745 MHz



5785 MHz

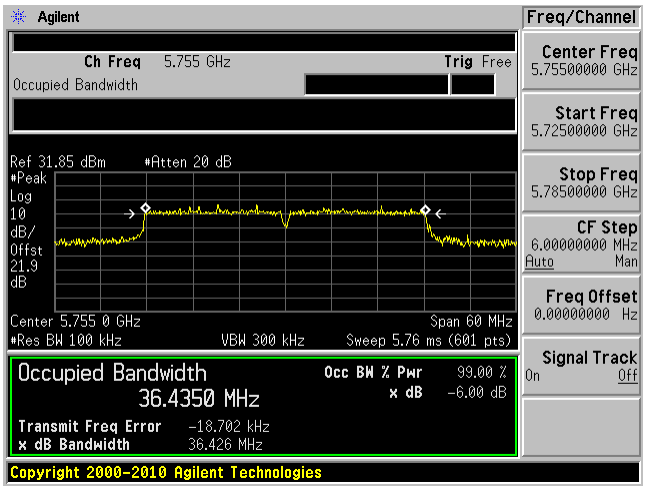


5825 MHz

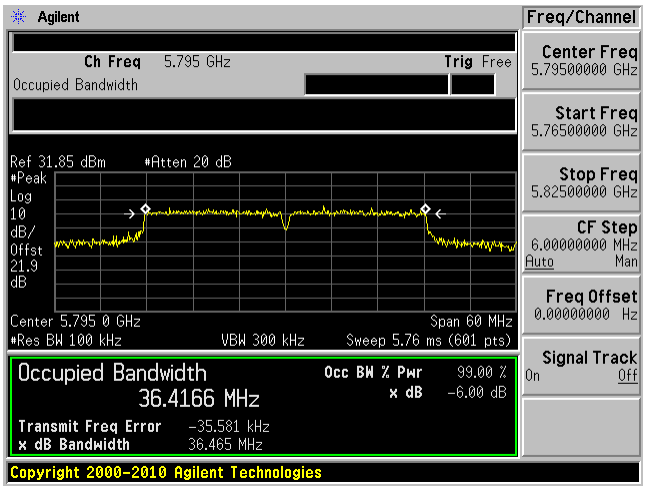


802.11HT/VHT40 mode

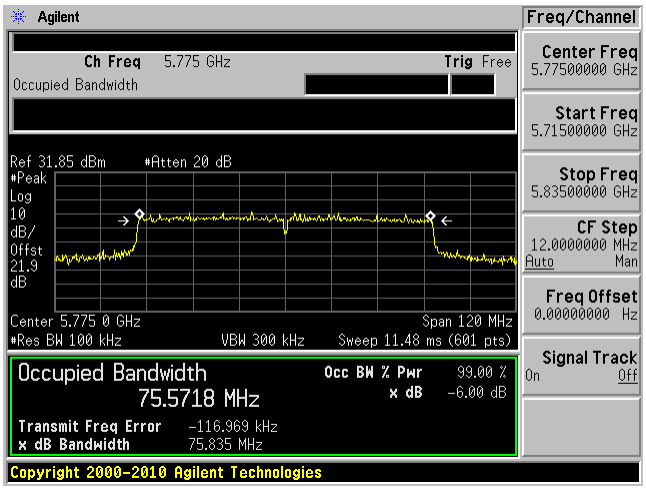
5755 MHz



5795 MHz



802.11VHT80 mode, 5775 MHz



9 FCC §407(a) - Output Power

9.1 Applicable Standards

According to FCC §15.407(a):

For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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

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

9.2 Measurement Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Connect EUT to a low loss RF cable from the antenna port to a power meter.

9.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
ETS- Lingerin	Power Sensor	7002-006	160097	2016-12-05	2 years
-	RF Cable	-	-	Each time[1]	N/A
-	RF Cable	-	-	Each time[1]	N/A
-	20dB attenuator	-	-	Each time[1]	N/A

Note[1]: cables and attenuators included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 09 June 2016) "A2LA Policy on Metrological Traceability".*

9.4 Test Environmental Conditions

Temperature:	23º C
Relative Humidity:	42 %
ATM Pressure:	102.7 KPa

The testing was performed by Vincent Licata on 2018-01-16 in RF site.

9.5 Test Results

5150 - 5250 MHz

FCC Results

Frequency (MHz)	Mode	TX Paths	Ant-0 (dBm)	Ant-1 (dBm)	Ant-2 (dBm)	Ant-3 (dBm)	Total Conducted Ave Power (dBm)	FCC Limit (dBm)
5180	802.11a	4	19.61	19.75	19.44	18.77	25.43	29.84
	802.11 HT/VHT20	4	19.62	19.81	19.41	18.69	25.42	29.84
5200	802.11a	4	19.53	19.79	19.36	18.78	25.40	29.84
	802.11 HT/VHT20	4	19.2	19.69	19.27	18.84	25.28	29.84
5240	802.11a	4	19.25	19.77	19.23	18.91	25.32	29.84
	802.11 HT/VHT20	4	19.65	19.75	19.32	18.99	25.46	29.84
5190	802.11 HT/VHT40	4	17.18	17.72	17.08	16.65	23.19	29.84
5230	802.11 HT/VHT40	4	21.09	21.11	20.88	20.52	26.93	29.84
5210	802.11 VHT80	4	16.05	16.44	15.92	15.86	22.09	29.84

Note: the directional gain at 5.15GHz is 6.165dBi, thus the limit = 30 - (6.165 - 6) dBm.

5725 - 5850 MHz

Frequency (MHz)	Mode	TX Paths	Ant-0 (dBm)	Ant-1 (dBm)	Ant-2 (dBm)	Ant-3 (dBm)	Total Conducted Ave Power (dBm)	Limit (dBm)
5745	802.11a	4	21.17	21.26	21.08	20.89	27.12	30
	802.11 HT/VHT20	4	20.71	20.97	20.83	20.9	26.87	30
5785	802.11a	4	21.01	21.07	20.94	20.76	26.97	30
	802.11 HT/VHT20	4	20.72	20.96	20.87	20.71	26.84	30
5825	802.11a	4	19.77	20.18	20.06	19.73	25.96	30
	802.11 HT/VHT20	4	19.92	20.11	19.89	19.69	25.93	30
5755	802.11 HT/VHT40	4	21.96	22.06	21.63	21.29	27.77	30
5795	802.11 HT/VHT40	4	21.83	21.91	21.74	21.12	27.68	30
5775	802.11 VHT80	4	18.94	19.15	18.77	19.03	25.00	30

Note: Duty cycle correction factor has already been added to the measurements.

10 FCC §15.407(a) - Power Spectral Density

10.1 Applicable Standards

According to FCC §15.407(a):

For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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

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

10.2 Measurement Procedure

(i) Set span to encompass the entire emission bandwidth (EBW) of the signal.
(ii) Set RBW = 1 MHz.
(iii) Set VBW ≥ 3 MHz.
(iv) Number of points in sweep ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
(v) Sweep time = auto.
(vi) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
(vii) If transmit duty cycle < 98 percent, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run".
(viii) Trace average at least 100 traces in power averaging (i.e., RMS) mode.
(ix) Compute power by integrating the spectrum across the 26 dB EBW of the signal using the spectrum analyzer's band power measurement function with band limits set equal to the EBW band edges. If the spectrum analyzer does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the 26 dB EBW of the spectrum.

10.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4446A	US44300386	2017-04-20	1 year
-	20dB attenuator	-	-	Each time[1]	N/A
-	RF cable	-	-	Each time[1]	N/A
-	RF cable	-	-	Each time[1]	N/A

Note[1]: cables and attenuators included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 09 June 2016) "A2LA Policy on Metrological Traceability".*

10.4 Test Environmental Conditions

Temperature:	22-24 ºC
Relative Humidity:	40-41 %
ATM Pressure:	103.1-104.1 kPa

The testing was performed by Vincent Licata on 2018-01-22 at RF site.

10.5 Test Results

Please refer to the result table below,

5150 – 5250 MHz

FCC Results:

Frequency (MHz)	Mode	Ant-0 (dBm/MHz)	Ant-1 (dBm/MHz)	Ant-2 (dBm/MHz)	Ant-3 (dBm/MHz)	DC Correction	Total (dBm/MHz)	FCC Limit (dBm/MHz)
5180	802.11a	8.49	9.399	8.697	8.152	0.19	14.92	17.00
5200	802.11a	8.746	8.805	8.926	8.214	0.19	14.89	17.00
5240	802.11a	8.75	9.663	8.676	8.492	0.19	15.13	17.00
5180	802.11 HT/VHT20	8.783	9.112	8.971	8.113	0.21	14.99	17.00
5200	802.11 HT/VHT20	8.297	8.8	8.483	7.806	0.21	14.59	17.00
5240	802.11 HT/VHT20	8.686	8.901	8.733	7.997	0.21	14.82	17.00
5190	802.11 HT/VHT40	3.466	3.93	3.506	2.84	0.49	9.96	17.00
5230	802.11 HT/VHT40	7.378	7.237	7.07	7.1	0.49	13.71	17.00
5210	802.11 VHT80	0.456	0.937	0.476	0.023	0.27	6.78	17.00

Note: Corrected PSD (dBm/MHz) = PSD (dBm/MHz) + Duty Cycle Correction (dB)

5725 - 5850 MHz

Frequency (MHz)	Mode	Ant-0 (dBm/100kHz)	Ant-1 (dBm/100kHz)	Ant-2 (dBm/100kHz)	Ant-3 (dBm/100kHz)	DC Correction	Total (dBm/100kHz)	Corrected (dBm/500kHz)	FCC Limit (dBm/500kHz)
5745	802.11a	1.744	2.142	1.818	1.335	0.22	8.01	15.00	30.00
5785	802.11a	2.019	2.451	2.019	1.464	0.22	8.24	15.23	30.00
5825	802.11a	0.704	1.512	1.145	0.126	0.22	7.14	14.13	30.00
5745	802.11 HT/VHT20	1.49	1.638	1.688	1.04	0.21	7.70	14.69	30.00
5785	802.11 HT/VHT20	1.507	1.864	1.74	1.183	0.21	7.81	14.80	30.00
5825	802.11 HT/VHT20	0.426	0.667	0.871	0.089	0.21	6.75	13.74	30.00
5755	802.11 HT/VHT40	-0.846	-0.384	-0.824	-1.619	0.44	5.56	12.55	30.00
5795	802.11 HT/VHT40	-0.747	-0.571	-0.992	-1.438	0.44	5.53	12.52	30.00
5775	802.11 VHT80	-7.157	-6.604	-6.823	-6.489	0.27	-0.47	6.52	30.00

Note: For the 5725-5850 MHz band, the Corrected PSD (dBm/500 kHz) is equal to:

Correct PSD (dBm/500 kHz) = PSD (dBm/100 kHz) + Duty Cycle Correction (dB) + 10*log(500 kHz/100 kHz)

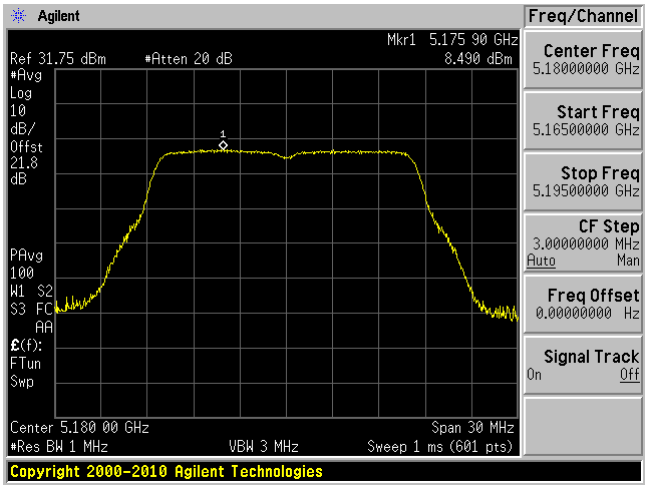
Please refer to the following plots.

FCC Result 5150 – 5250 MHz

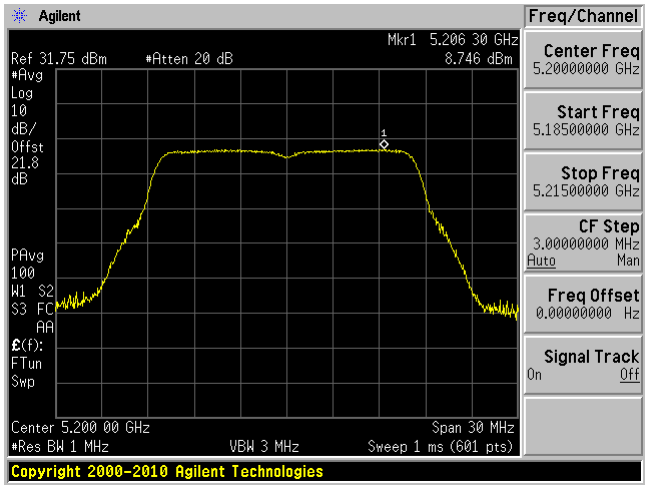
ANT 0 MIMO

802.11a mode

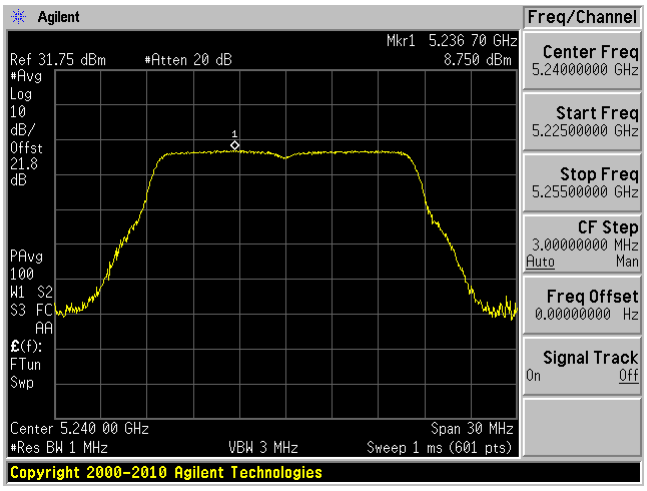
5180 MHz



5200 MHz

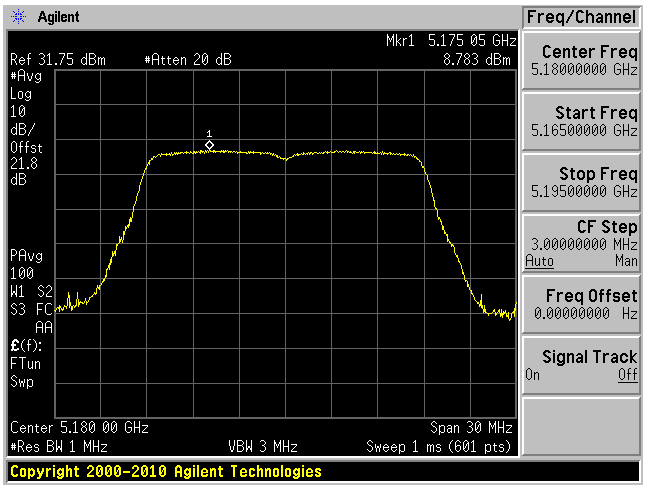


5240 MHz



802.11HT/VHT20 mode

5180 MHz



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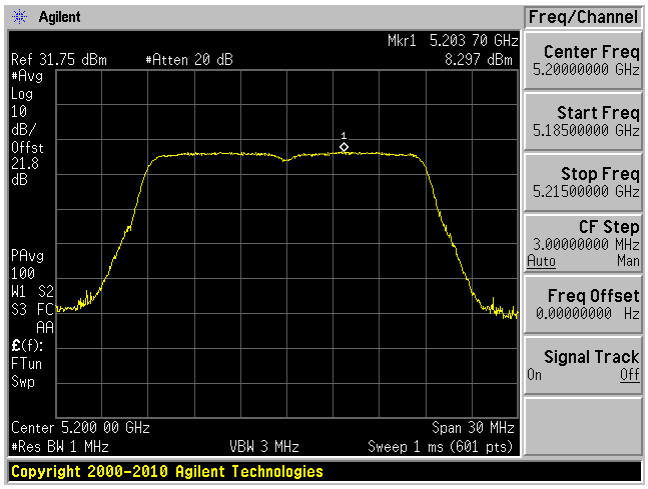
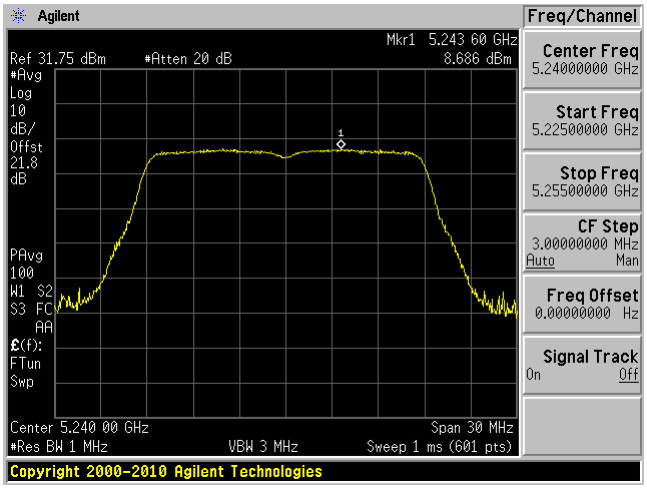
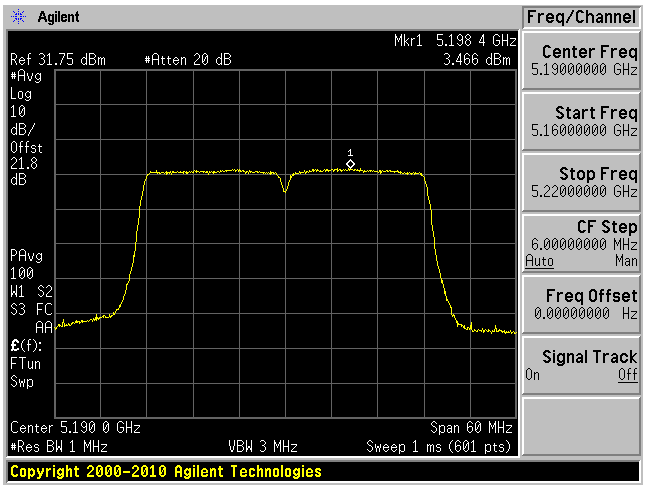


5240 MHz

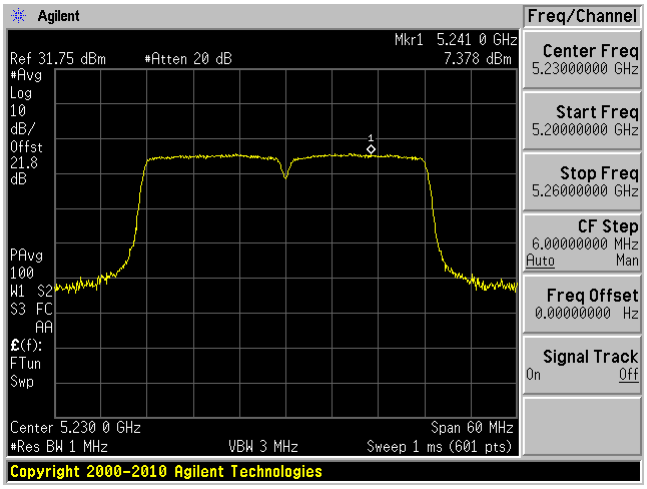


802.11HT/VHT40 mode

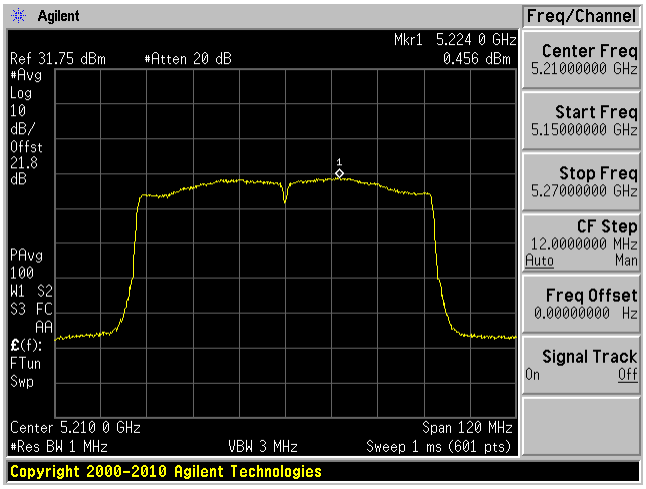
5190 MHz



5230 MHz



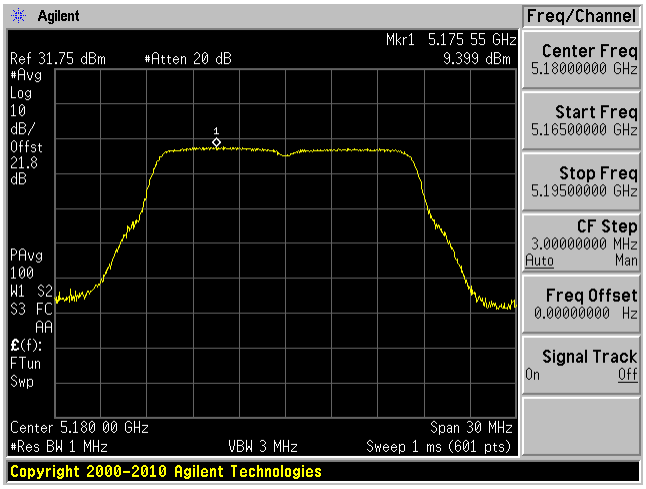
802.11VHT80 mode, 5210 MHz



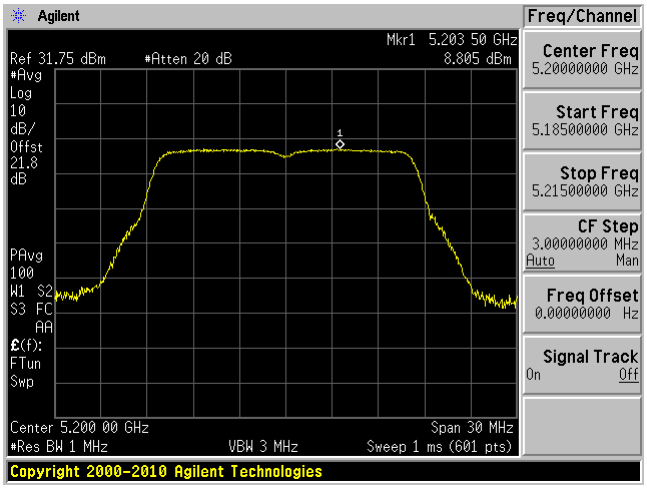
ANT 1 MIMO

802.11a mode

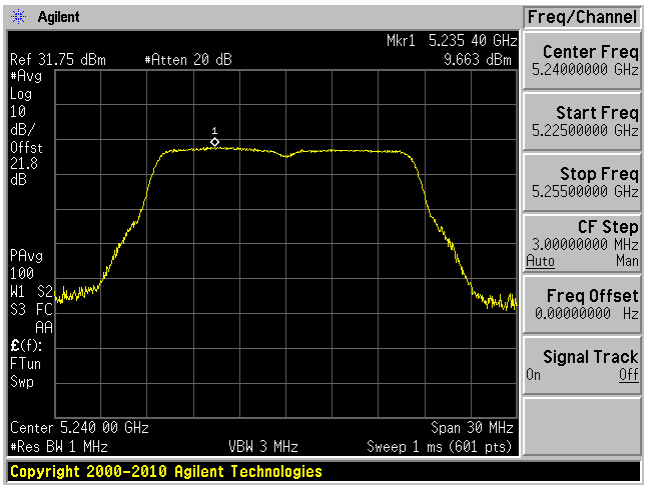
5180 MHz



5200 MHz

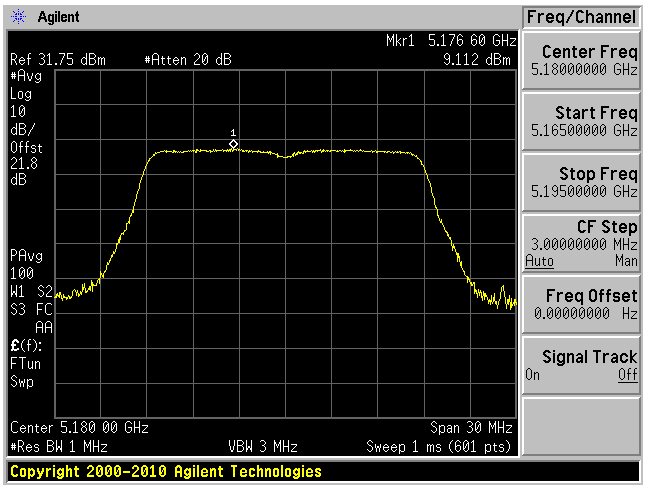


5240 MHz

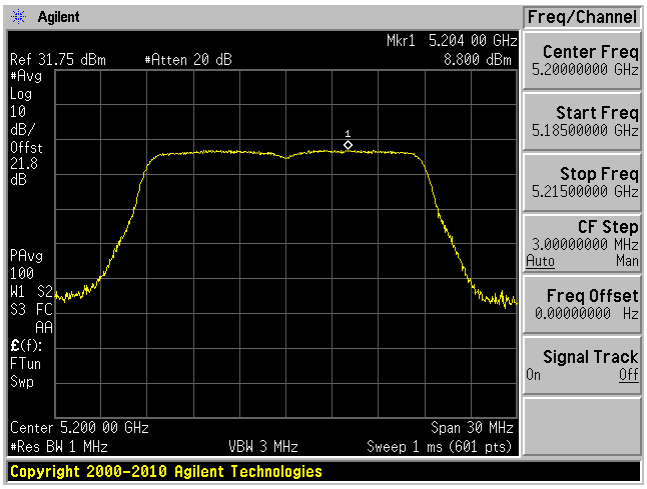


802.11HT/VHT20 mode

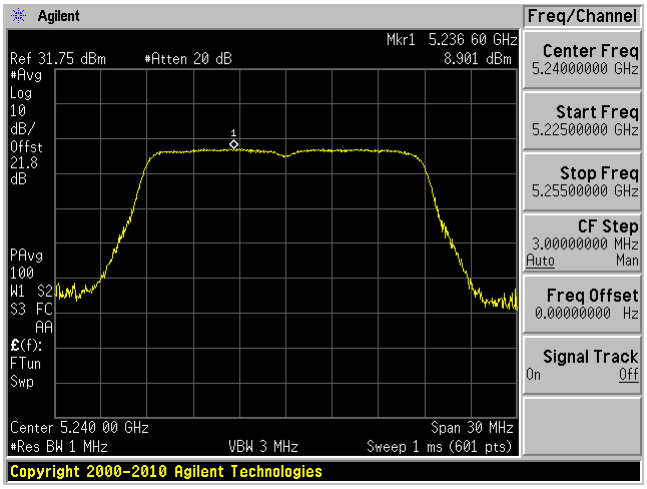
5180 MHz



5200 MHz

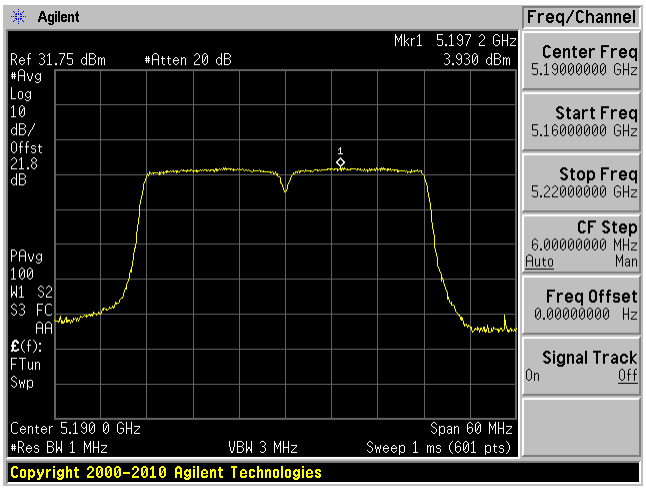


5240 MHz

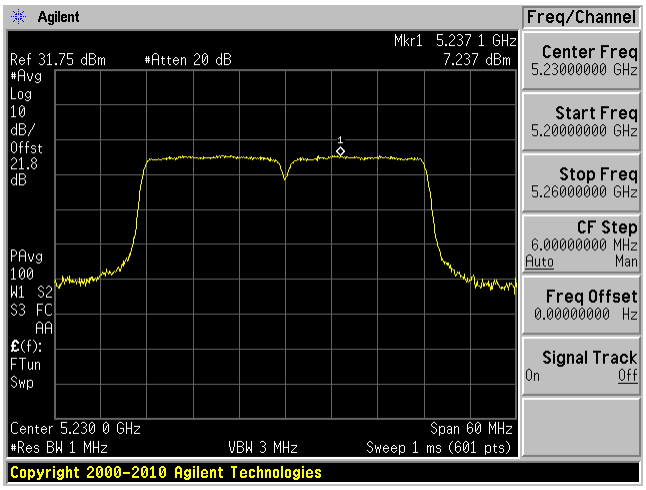


802.11HT/VHT40 mode

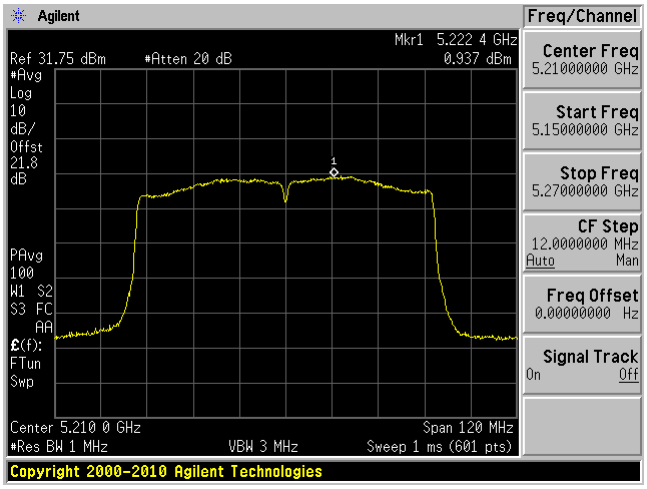
5190 MHz



5230 MHz



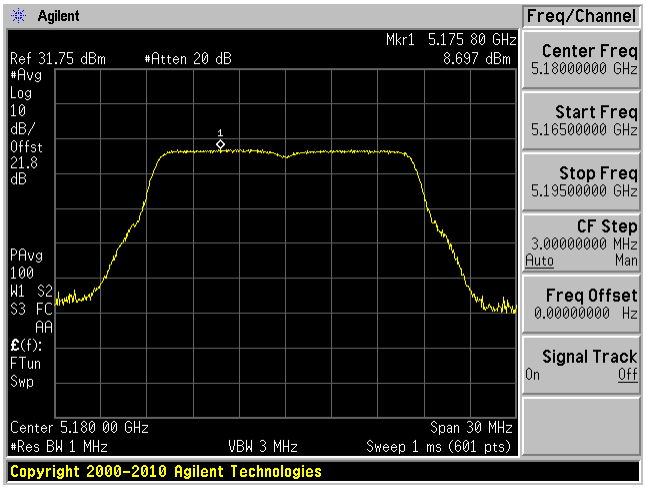
802.11VHT80 mode, 5210 MHz



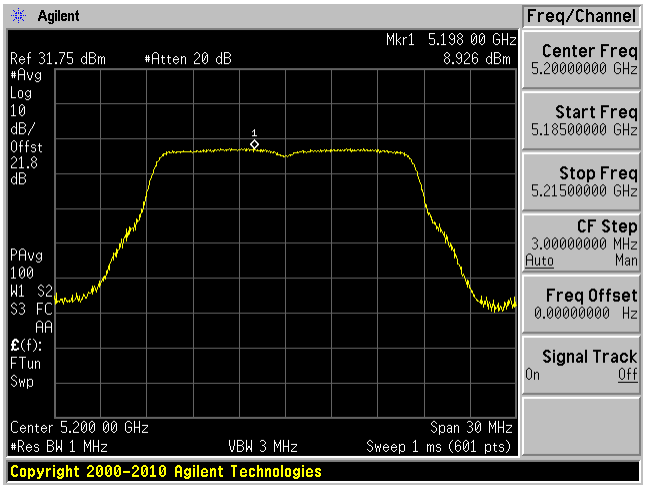
ANT 2 MIMO

802.11a mode

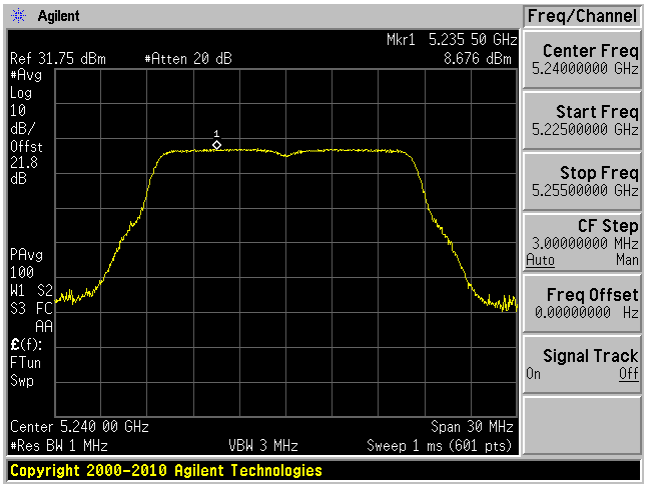
5180 MHz



5200 MHz

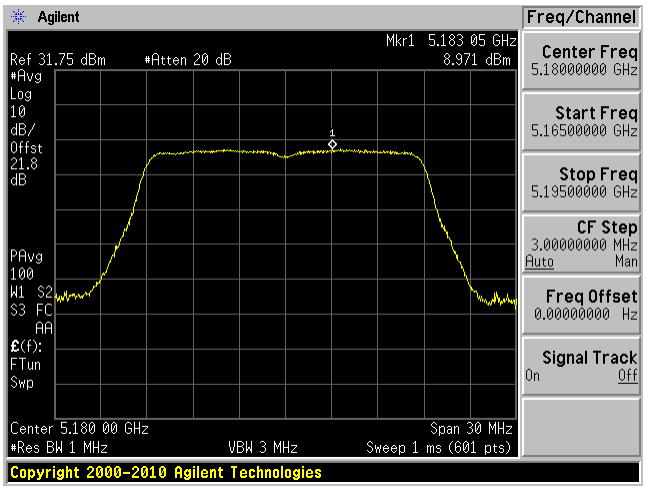


5240 MHz

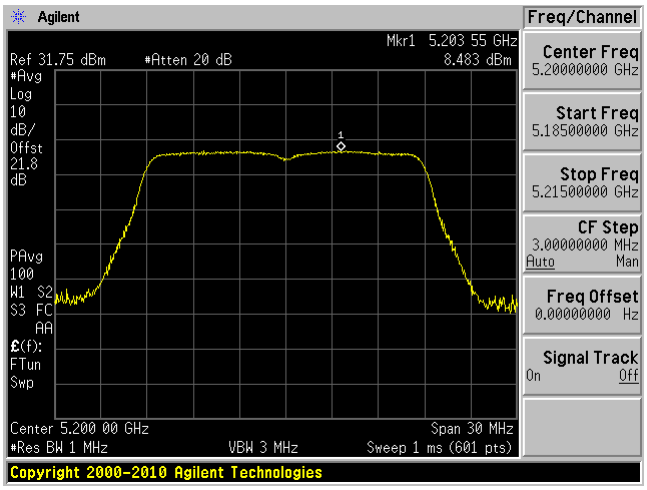


802.11HT/VHT20 mode

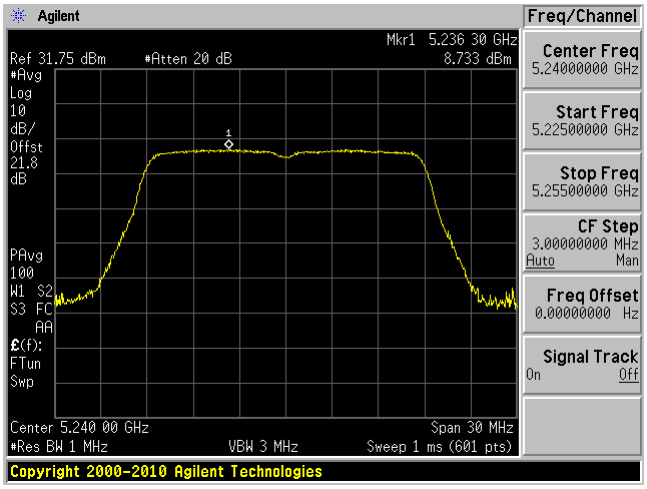
5180 MHz



5200 MHz

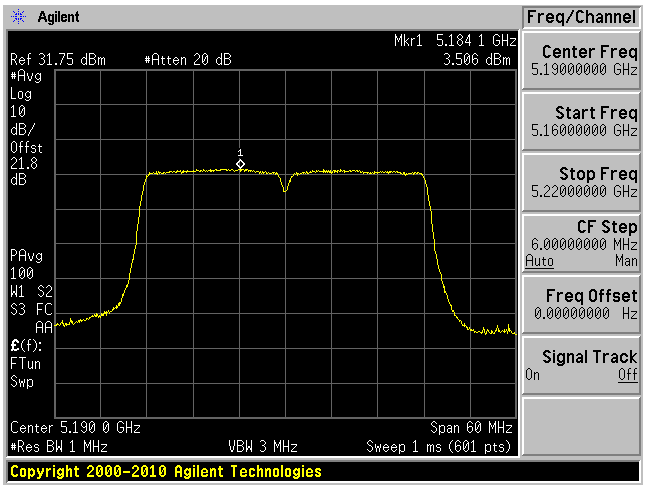


5240 MHz

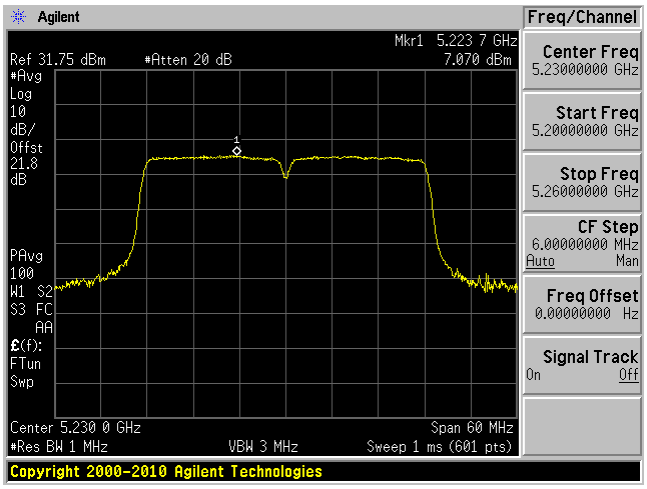


802.11HT/VHT40 mode

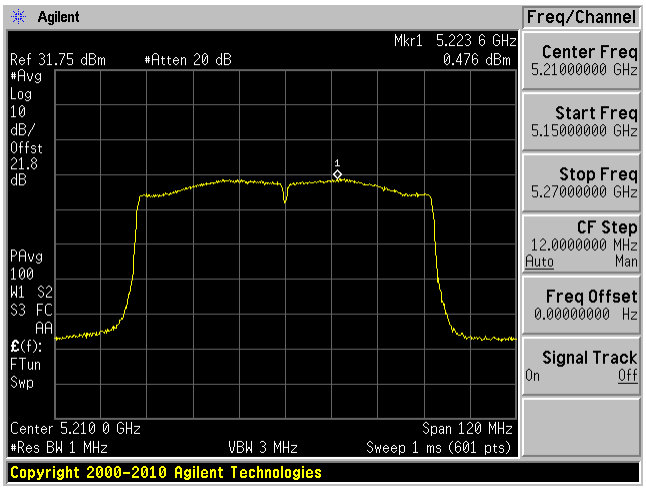
5190 MHz



5230 MHz



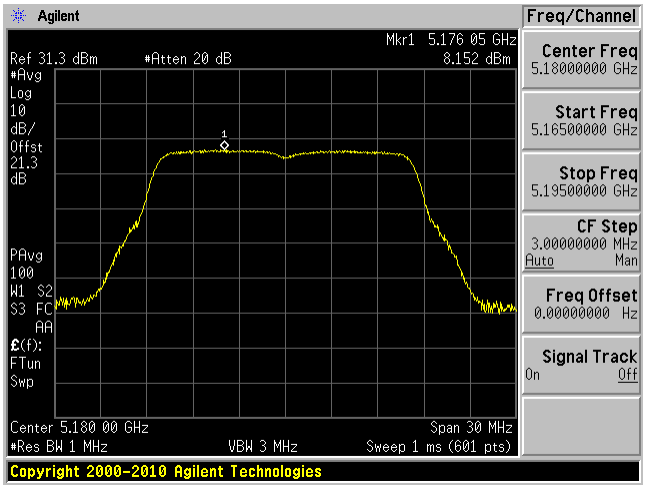
802.11VHT80 mode, 5210 MHz



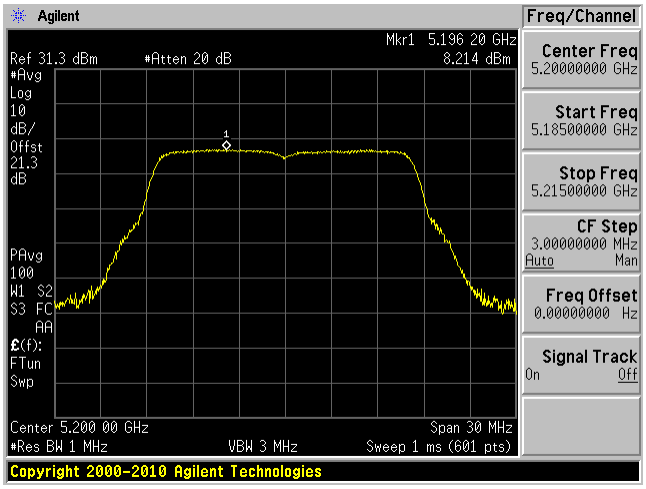
ANT 3 MIMO

802.11a mode

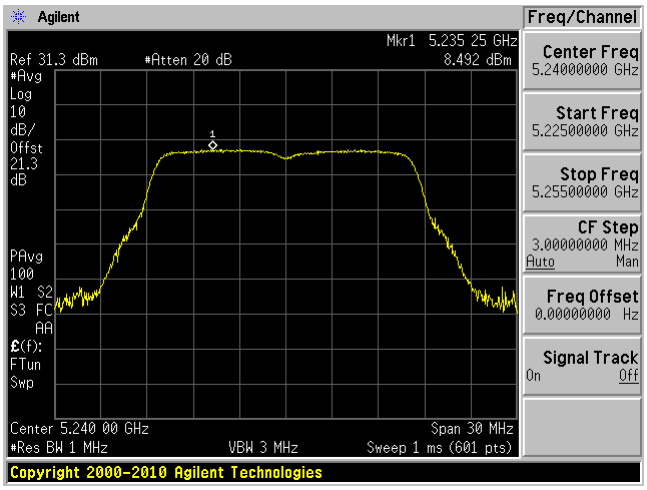
5180 MHz



5200 MHz

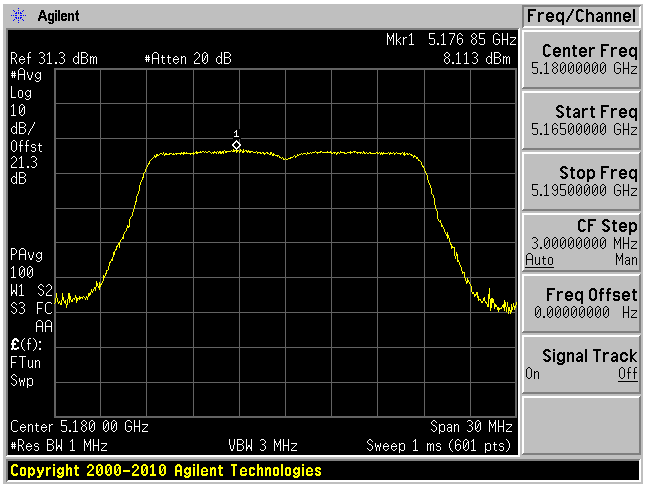


5240 MHz

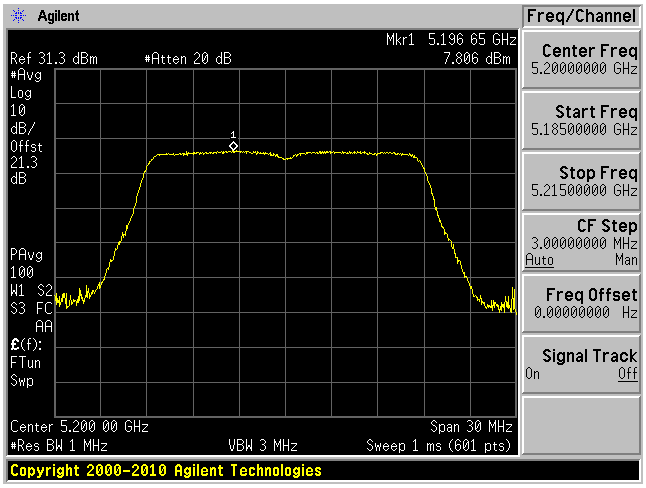


802.11HT/VHT20 mode

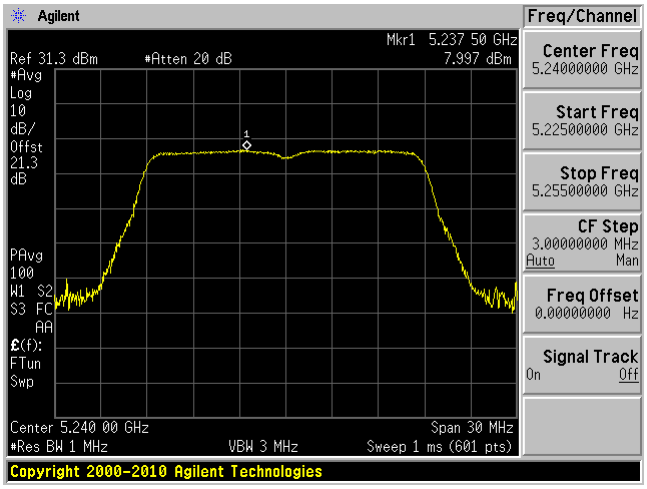
5180 MHz



5200 MHz

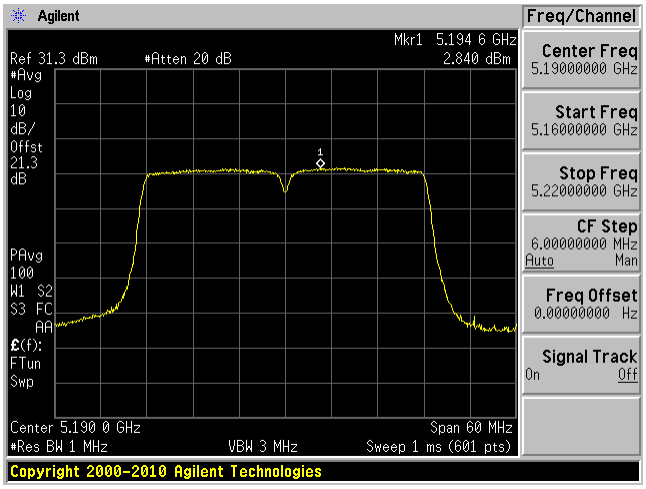


5240 MHz

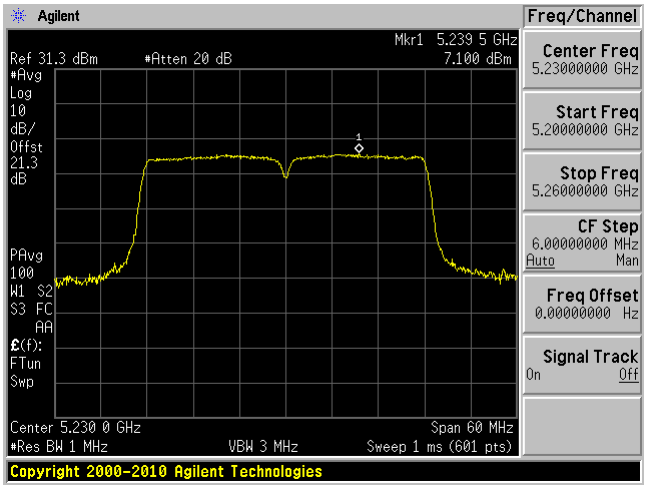


802.11HT/VHT40 mode

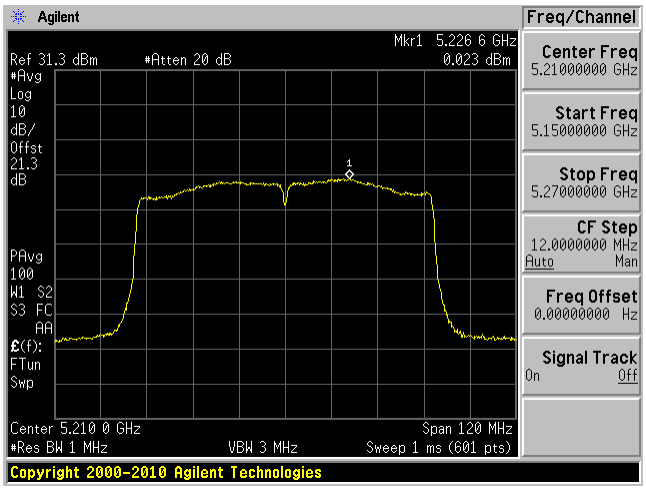
5190 MHz



5230 MHz



802.11VHT80 mode, 5210 MHz

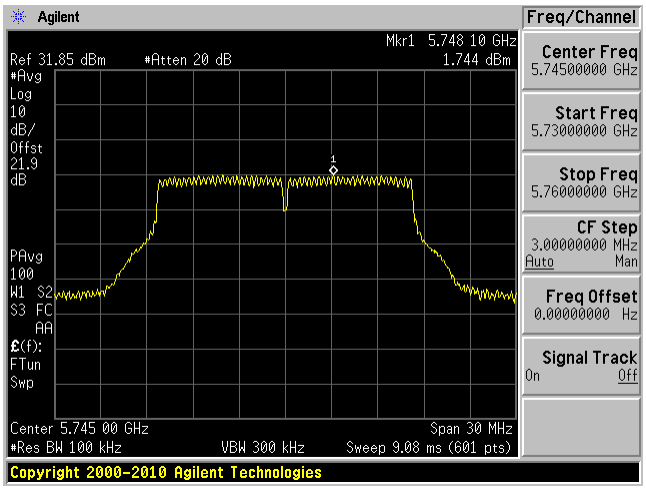


5725 – 5850 MHz

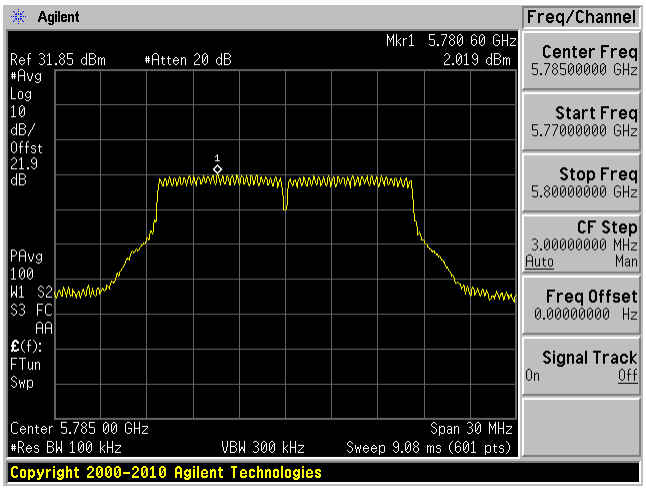
ANT 0 MIMO

802.11a mode

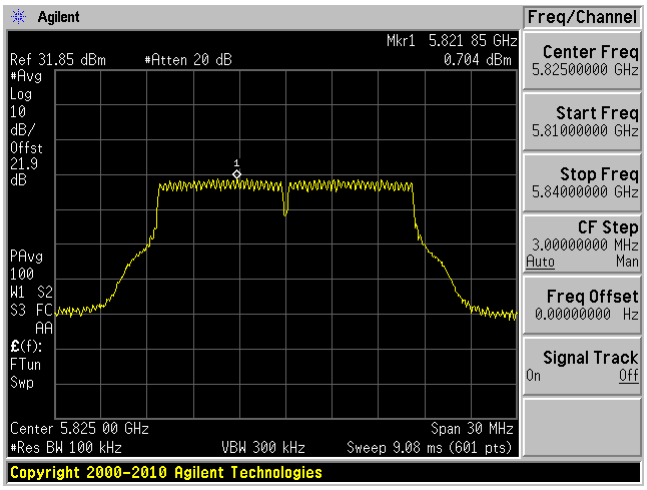
5745 MHz



5785 MHz

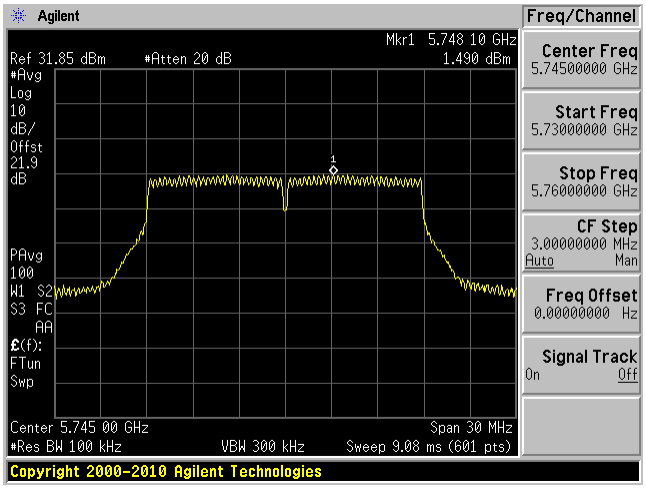


5825 MHz

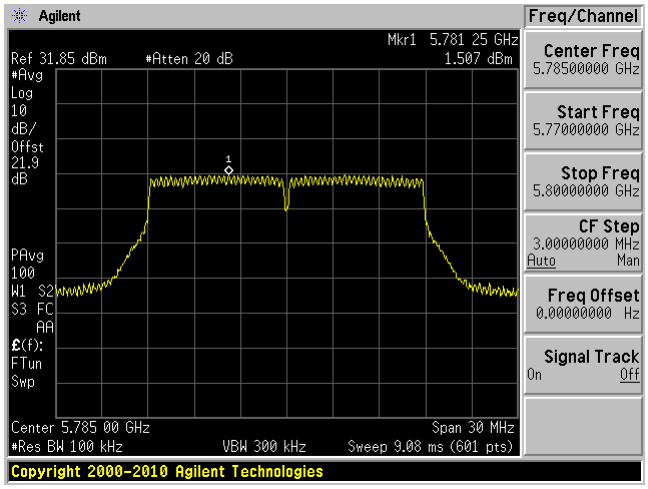


802.11HT/VHT20 mode

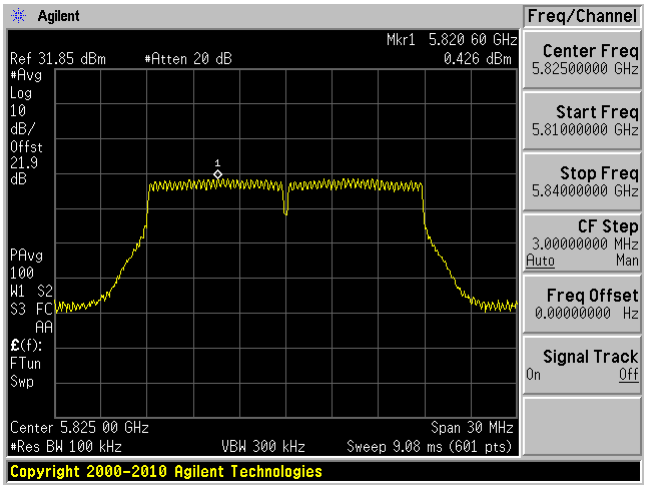
5745 MHz



5785 MHz

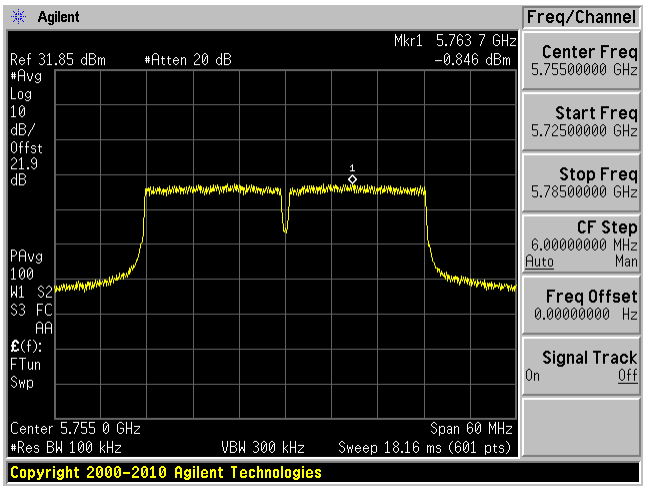


5825 MHz

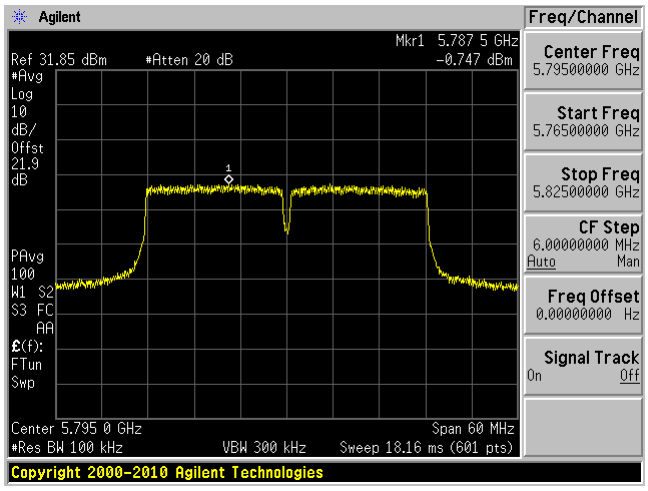


802.11HT/VHT40 mode

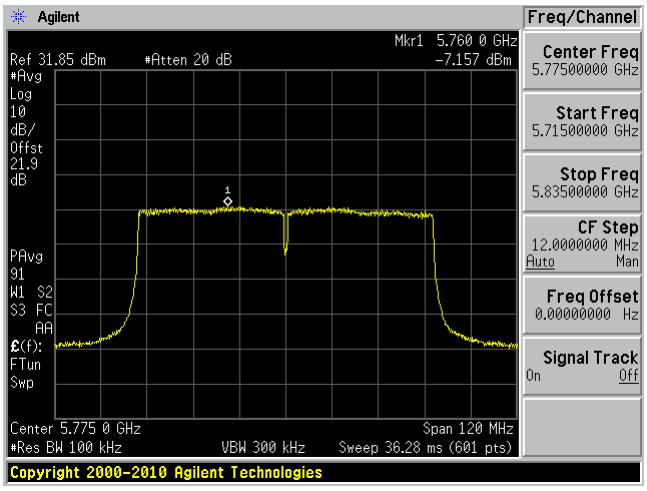
5755 MHz



5795 MHz



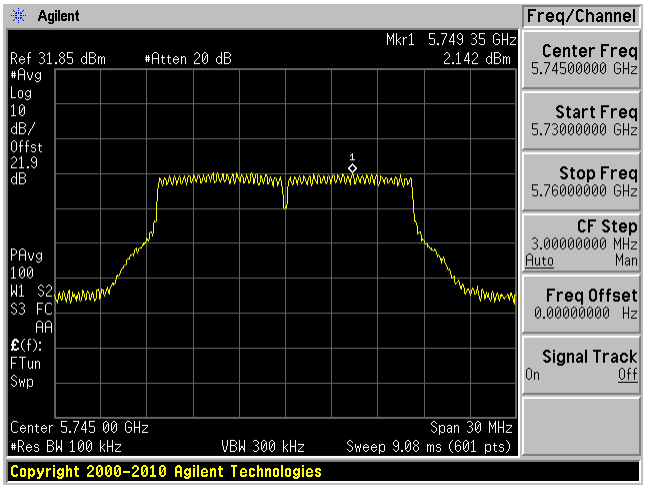
802.11VHT80 mode, 5775 MHz



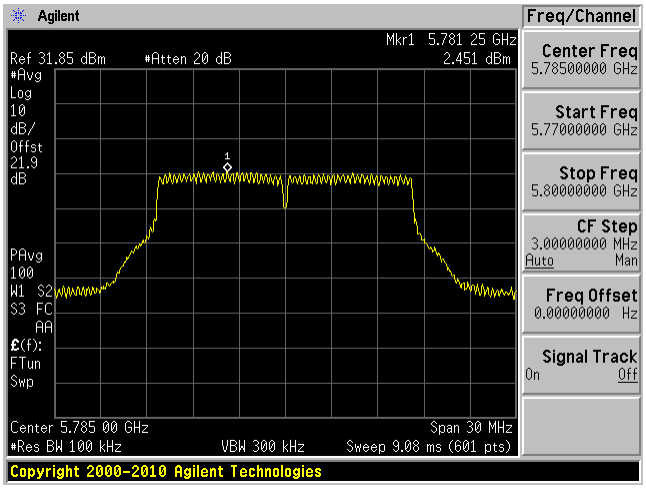
ANT 1 MIMO

802.11a mode

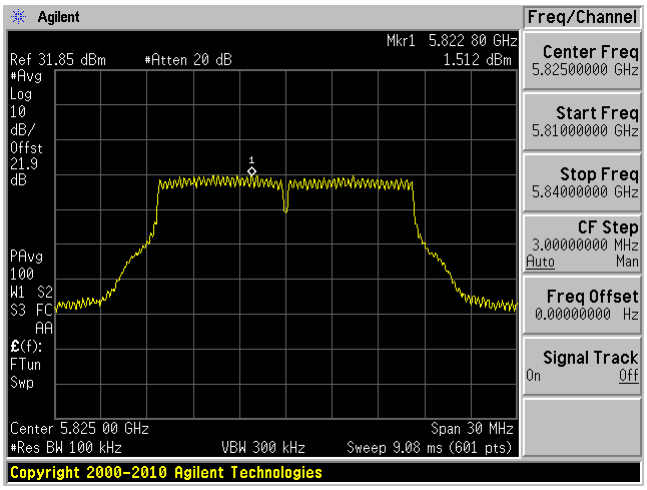
5745 MHz



5785 MHz

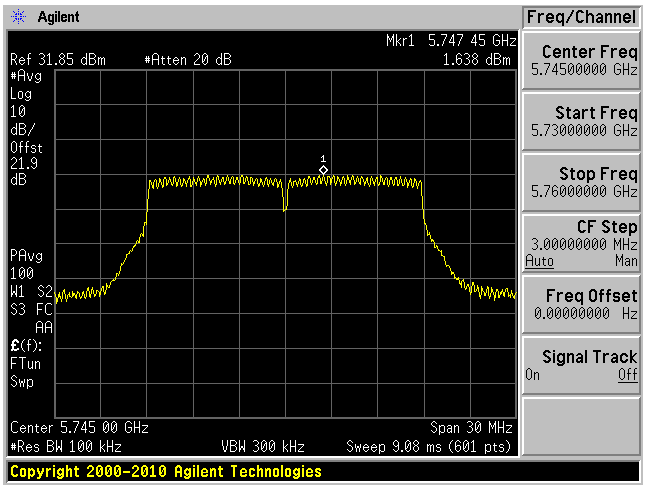


5825 MHz

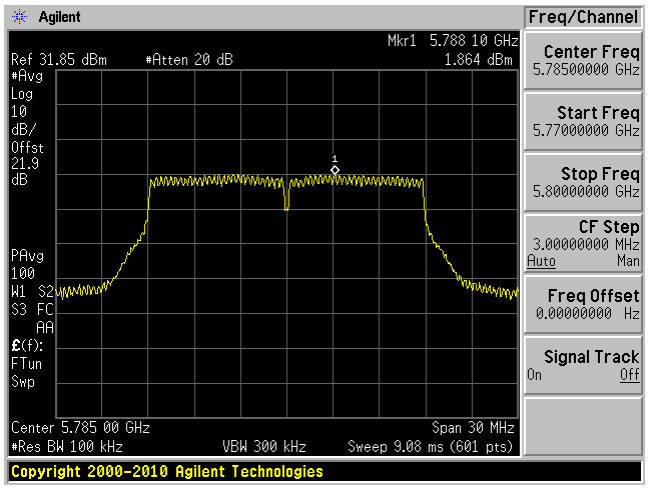


802.11HT/VHT20 mode

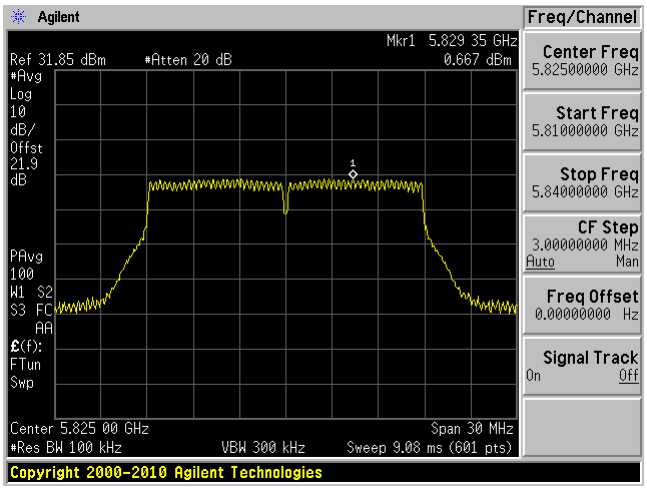
5745 MHz



5785 MHz

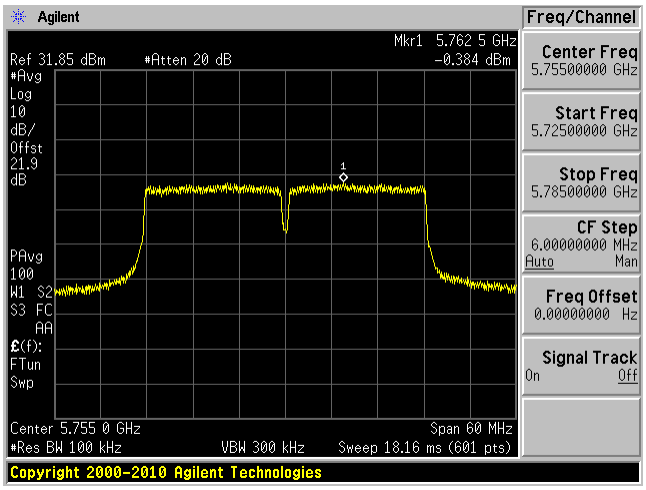


5825 MHz

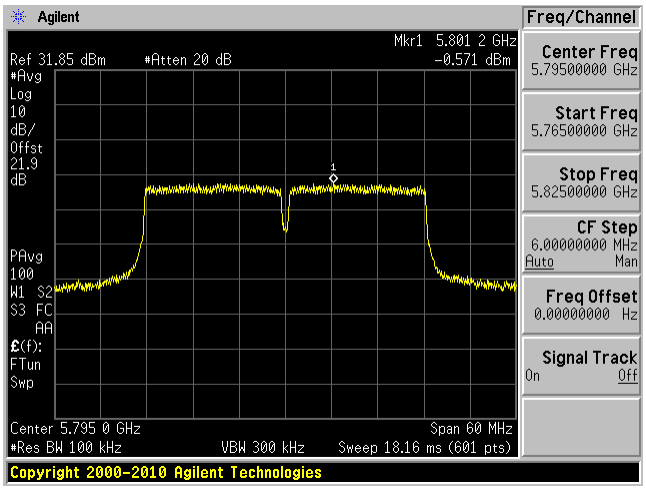


802.11HT/VHT40 mode

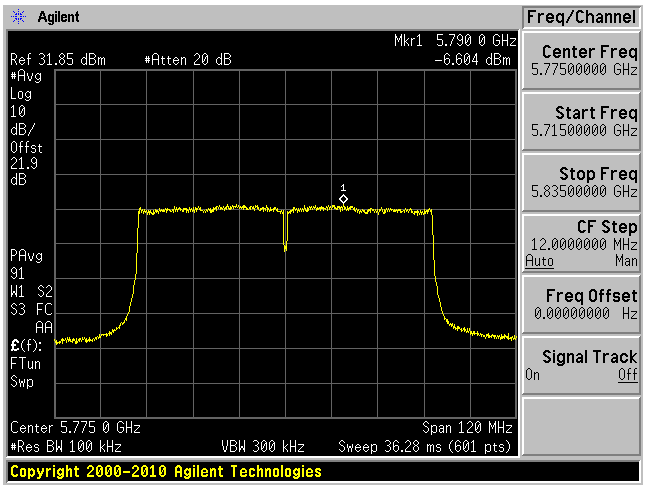
5755 MHz



5795 MHz



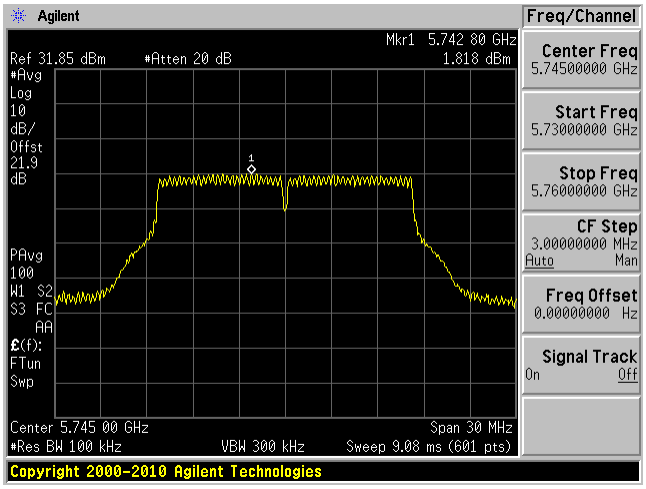
802.11VHT80 mode, 5775 MHz



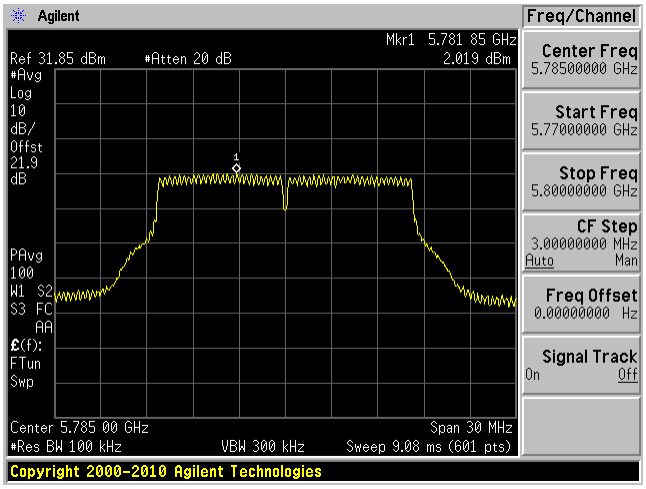
ANT 2 MIMO

802.11a mode

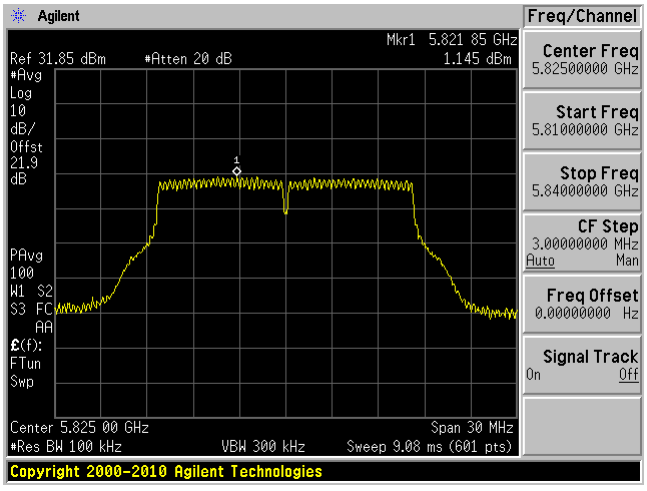
5745 MHz



5785 MHz

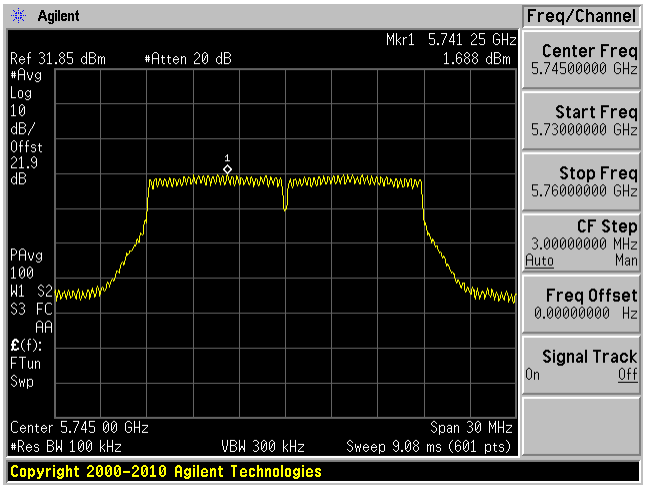


5825 MHz

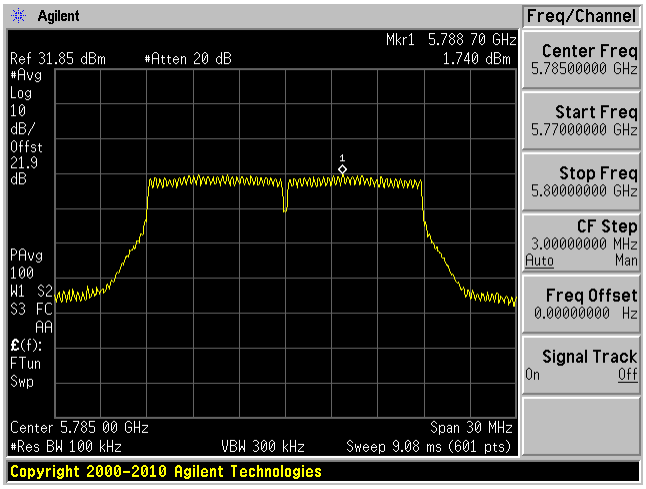


802.11HT/VHT20 mode

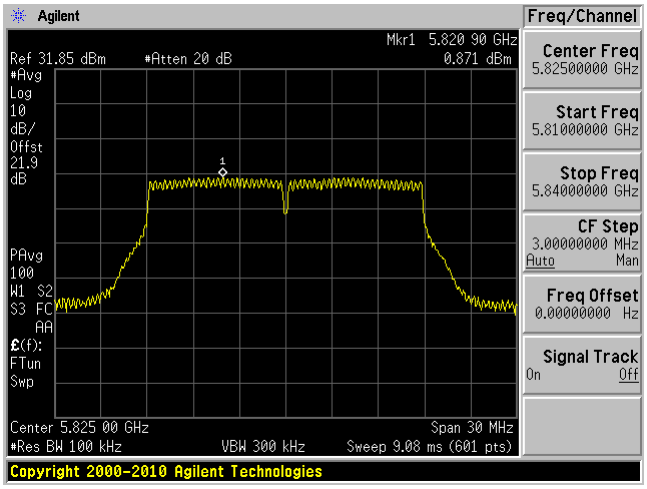
5745 MHz



5785 MHz

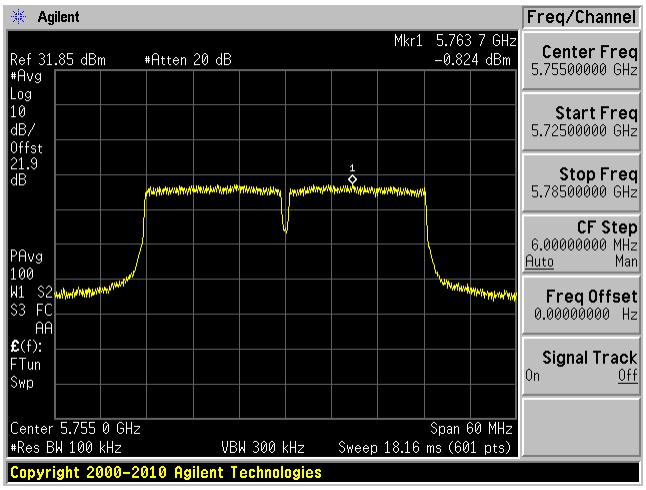


5825 MHz

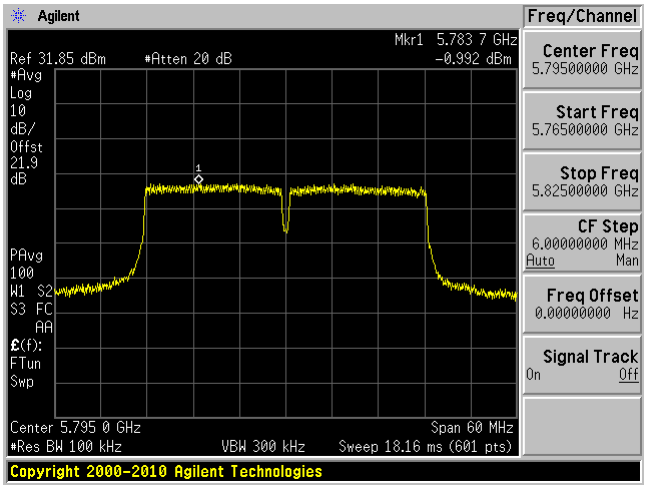


802.11HT/VHT40 mode

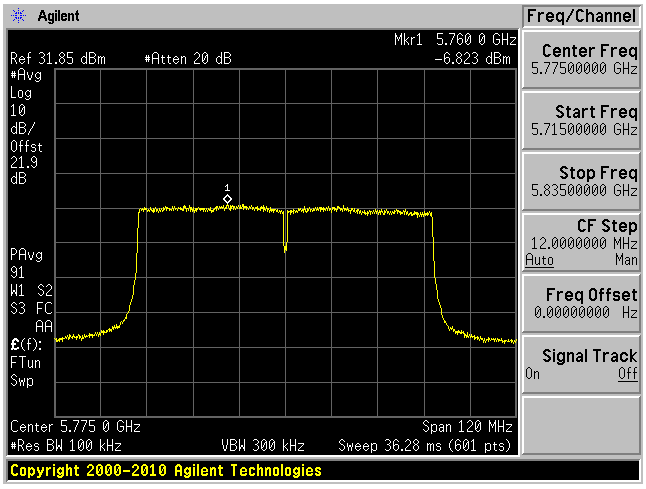
5755 MHz



5795 MHz



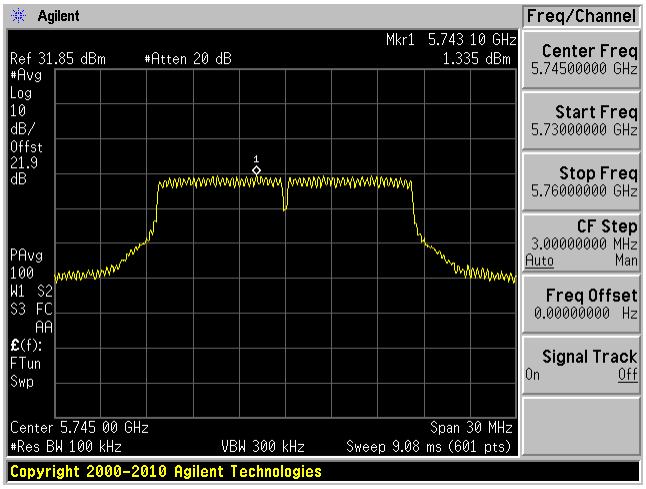
802.11VHT80 mode, 5775 MHz



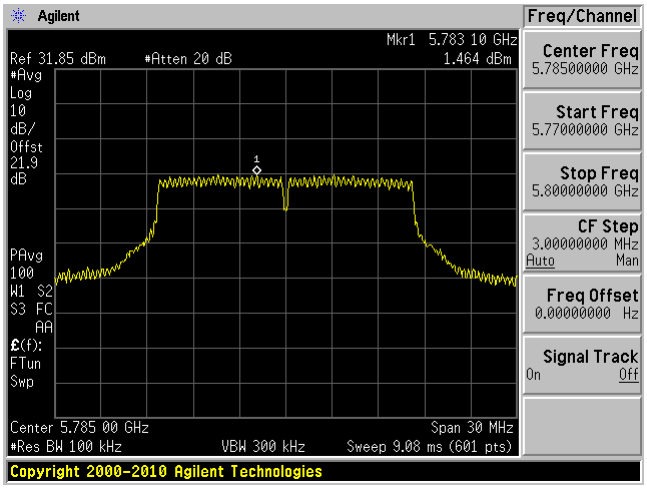
ANT 3 MIMO

802.11a mode

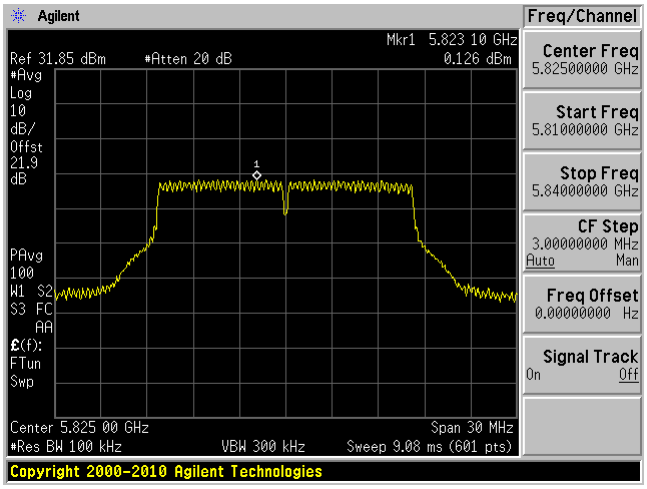
5745 MHz



5785 MHz

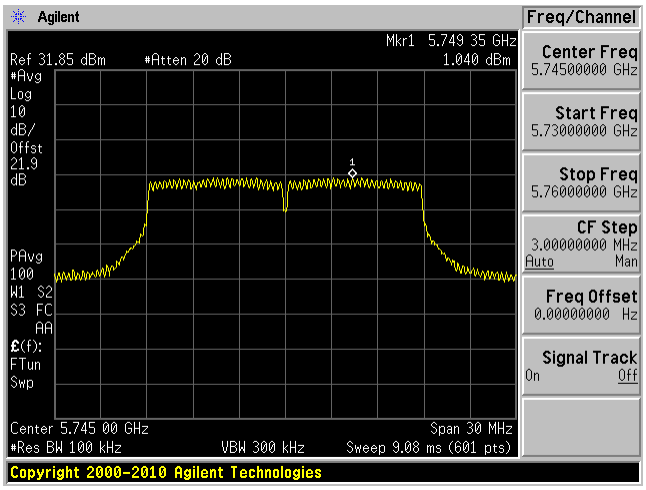


5825 MHz

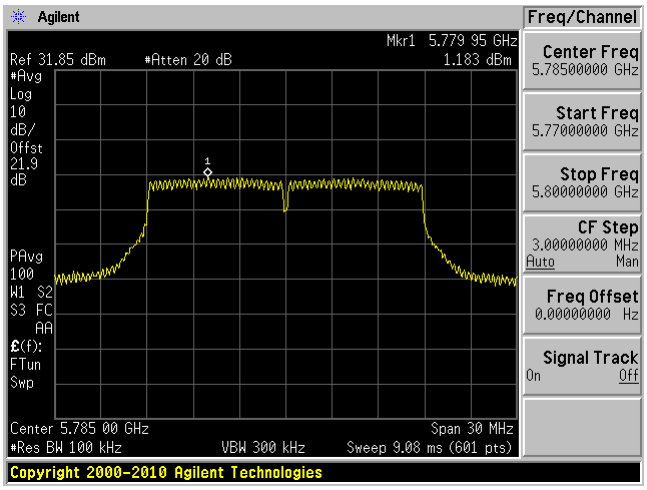


802.11HT/VHT20 mode

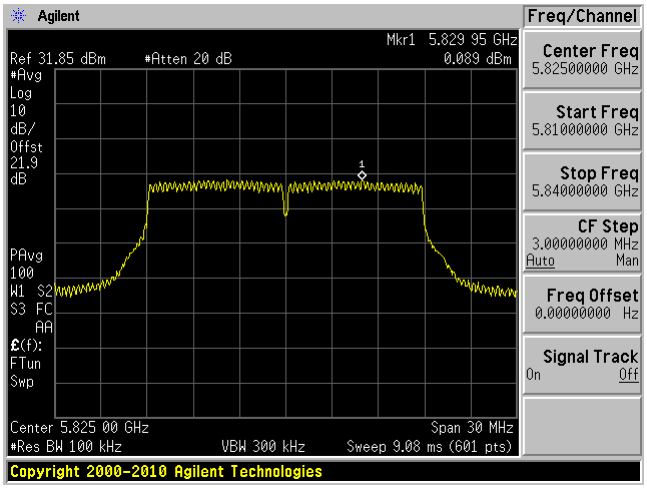
5745 MHz



5785 MHz

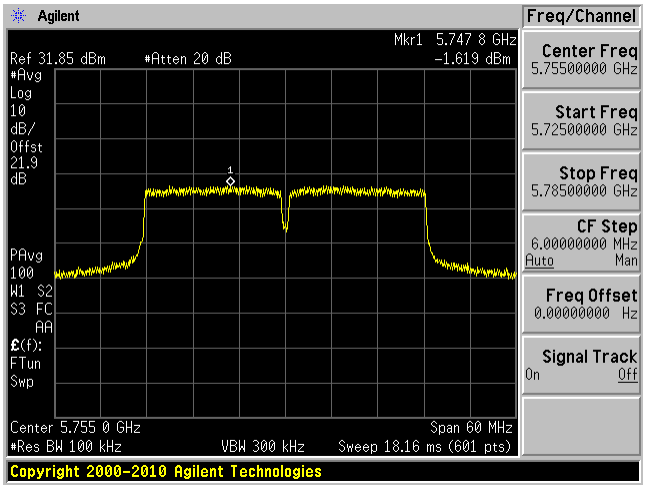


5825 MHz

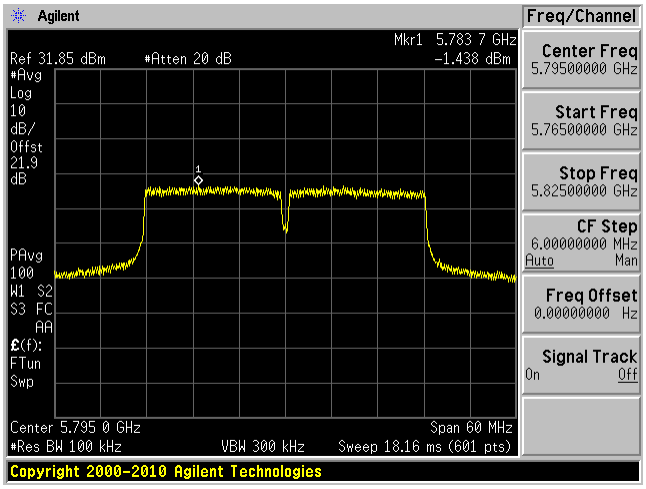


802.11HT/VHT40 mode

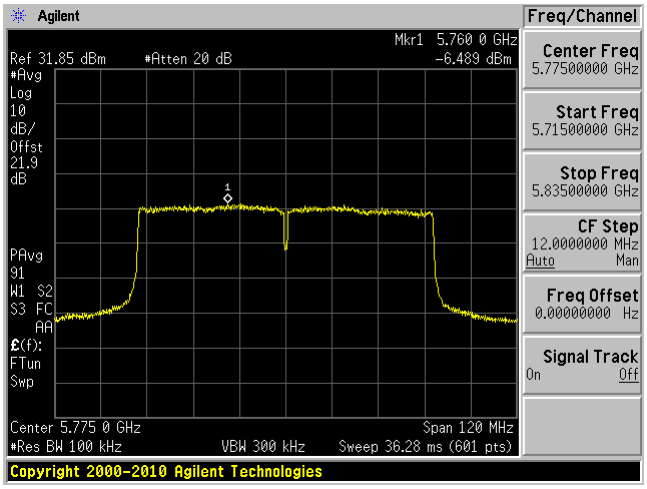
5755 MHz



5795 MHz



802.11VHT80 mode, 5775 MHz



11 Annex A - FCC Equipment Labeling Requirements

11.1 FCC ID Label Requirements

As per FCC §2.925,

(a) Each equipment covered in an application for equipment authorization shall bear a nameplate or label listing the following:

(1) FCC Identifier consisting of the two elements in the exact order specified in §2.926. The FCC Identifier shall be preceded by the term FCC ID in capital letters on a single line, and shall be of a type size large enough to be legible without the aid of magnification.

Example: FCC ID: XXX123

Where: XXX—Grantee Code, 123—Equipment Product Code

As per FCC §15.19,

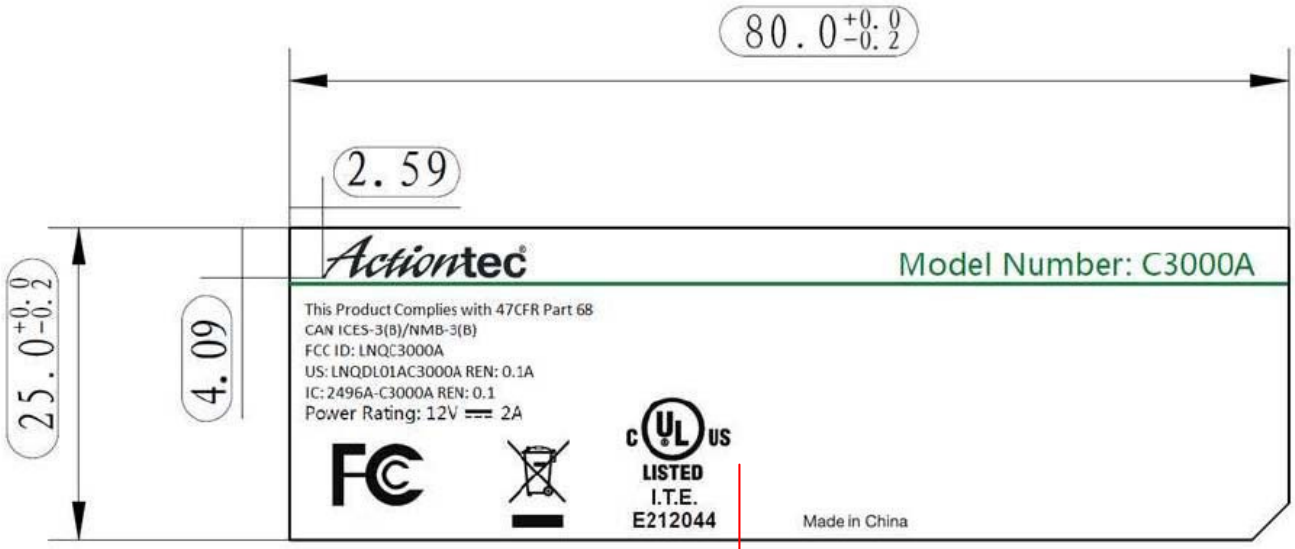
(a) In addition to the requirements in part 2 of this chapter, a device subject to certification, or verification shall be labeled as follows:

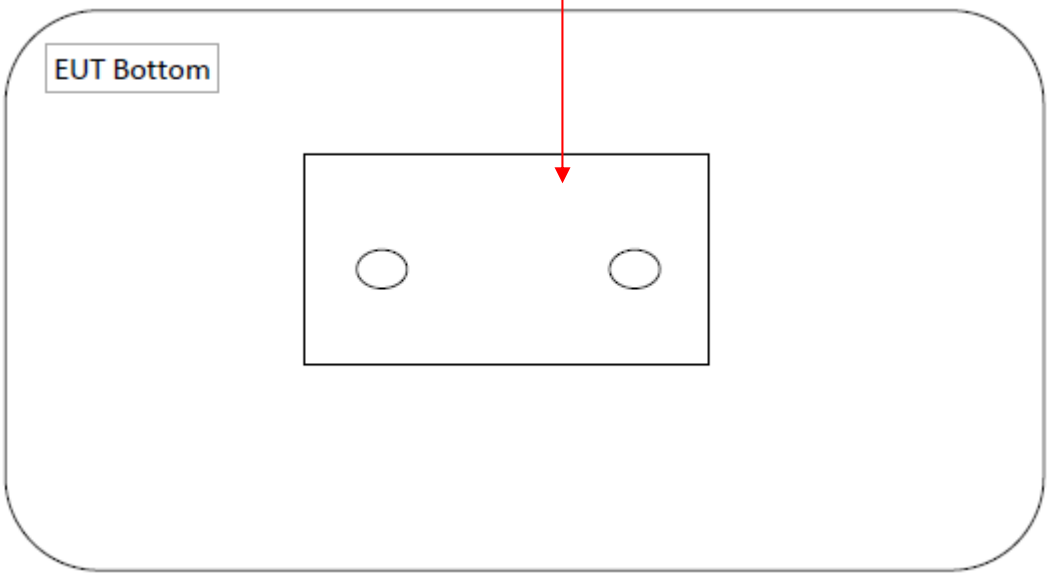
(3) All other devices shall bear the following statement in a conspicuous location on the device:
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

(4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified above is required to be affixed only to the main control unit. If the EUT is integrated within another device then a label affixed to the host shall also state, "Contains FCC ID: XXXXXX"

(5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

11.2 FCC ID Label Contents and Location





12 Annex B-Photographs

The following exhibits can be found in R1711062-407 Photo Reports:

- Exhibit A – EUT Test Setup Photographs
- Exhibit B – EUT External Photographs
- Exhibit C – EUT Internal Photographs

13 Annex C (Informative) – Declaration of Similarity Letter

Actiontec®

DECLARATION OF SIMILARITY

February 6, 2018

To:

FEDERAL COMMUNICATIONS COMMISSIONS
Authorization and Evaluation Division
7435 Oakland Mills Road
Columbia, MD 21046

Innovation, Science and Economic Development Canada
Certification and Engineering Bureau
P.O. Box 11490, Station 'H'
3701 Carling Ave., Building 94
Ottawa, Ontario K2H 8S2
Canada

Dear Sir or Madam:

We *Actiontec Electronics, Inc.* hereby declare that product: *802.11n and 802.11ac Wi-Fi Router,* model(s): *T3260* is electrically identical with the same electromagnetic emissions and electromagnetic compatibility characteristics as model: *C3000A* tested by BACL, the results of which are featured in BACL project: *R1711062*.

Models C3000A and T3260 are identical in hardware design. The purpose for 2 model numbers is to clarify specifically for one large customer versus generic consumer products.

Please contact me should there be need for any additional clarification or information.

Best Regards,

Angela Yao / Sr. Program Manager
Actiontec Electronics, Inc.
3301 Olcott Street,
Santa Clara, CA 95054
Phone: (408) 752-7700
Email: ayao@actiontec.com

3301 Olcott Street
Santa Clara, CA 95054

408—752—7700
Actiontec.com

14 Annex D (Informative) - A2LA Electrical Testing Certificate

Accredited Laboratory

A2LA has accredited

BAY AREA COMPLIANCE LABORATORIES CORP.

Sunnyvale, CA

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of A2LA *R222 - Specific Requirements - EPA ENERGY STAR Accreditation Program*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).

Presented this 30th day of August 2016.

Senior Director of Quality & Communications
For the Accreditation Council
Certificate Number 3297.02
Valid to September 30, 2018

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

--- END OF REPORT ---