FCC PART 15.407
ISEDC RSS-247, ISSUE 2, FEBRUARY 2017

TEST REPORT

For

ABB Enterprise Software Inc.

3055 Orchard Dr,
San Jose, CA 95134, USA

FCC ID: P9J-NEPTUNE58
IC: 4751A-NEPTUNE58

Report Type:	**Product Type:**
Original Report	5.8 GHz Wi-Fi Module
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Report Number:	R2009021-NII
Report Date:	2020-10-21
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ACCREDITED
CERTIFICATE #3297.02

TABLE OF CONTENTS

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R2009021-NII	Original Report	2020-10-21

1 General Description

1.1 Product Description for Equipment under Test (EUT)

This test report was prepared on behalf of ABB Enterprise Software Inc., and their product model: Neptune 5.8, FCC ID: P9J-NEPTUNE58, IC: 4751A-NEPTUNE58, or the "EUT" as referred to in this report. It is a 5.8 GHz Wi-Fi Module intended for outdoor access point operation in the frequency range: 5150-5250 MHz (FCC only), and 5725-5850 MHz (FCC and IC).

The radio module can simultaneously transmit with cellular module FCC ID: N7NEM75S, IC: 2417C-EM75S.

1.2 Mechanical Description of EUT

The (EUT) measures approximately: 76 mm (L) x 52 mm (W) x 4 mm (H) and weighs approximately 50 grams

The data gathered are from the typical production sample provided by the ABB Enterprise Software Inc. with serial number: R2009021-1 assigned by BACL.

1.3 Objective

This report was prepared on behalf of ABB Enterprise Software Inc. in accordance with FCC CFR47 §15.407 and ISEDC RSS-247 Issue 2, February2017.

The objective was to determine compliance with FCC Part 15.407 and ISEDC RSS-247 rules for Output Power, Antenna Requirements, AC Line Conducted Emissions, Emission Bandwidth, Power spectral density, Conducted and Radiated Spurious Emissions.

1.4 Related Submittal(s)/Grant(s)

None.

1.5 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.

1.6 Measurement Uncertainty

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

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

1.7 Test Facility Registrations

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

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

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

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

1.8 Test Facility Accreditations

Bay Area Compliance Laboratories Corp. (BACL) is:

A- ***An independent, 3rd-Party, Commercial Test Laboratory accredited to ISO/IEC 17025:2005 by A2LA (Test Laboratory Accreditation Certificate Number 3297.02)*****,** 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 3297.03)*** 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 3297.01)*** 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 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 software used was PuTTy. The software is compliant with the standard requirements being tested against.

Please refer to the following power setting table.

Modulation	Frequency (MHz)	Power Setting		
		Ant 1	Ant 2	Ant 3
802.11Non-HT mode (a mode)	5180	18	20	20
	5220	18	20	20
	5240	18	20	20
	5745	19.5	21	20.5
	5785	19.5	21	20.5
	5825	19.5	21	20.5
802.11 VHT20 mode (ac 20 mode)	5180	18	20	20
	5220	18	20	20
	5240	18	20	20
	5745	19.5	21	20.5
	5785	19.5	21	20.5
	5825	19.5	21	20.5
802.11 VHT40 mode (ac 40 mode)	5190	19	19	19
	5230	19	21	21
	5755	20	21	20.5
	5795	20	21	20.5

*Data rates tested:
802.11Non-HT mode: 6Mbps
802.11 VHT20: MCS0
802.11 VHT40: MCS0

2.3 Duty Cycle Correction Factor

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

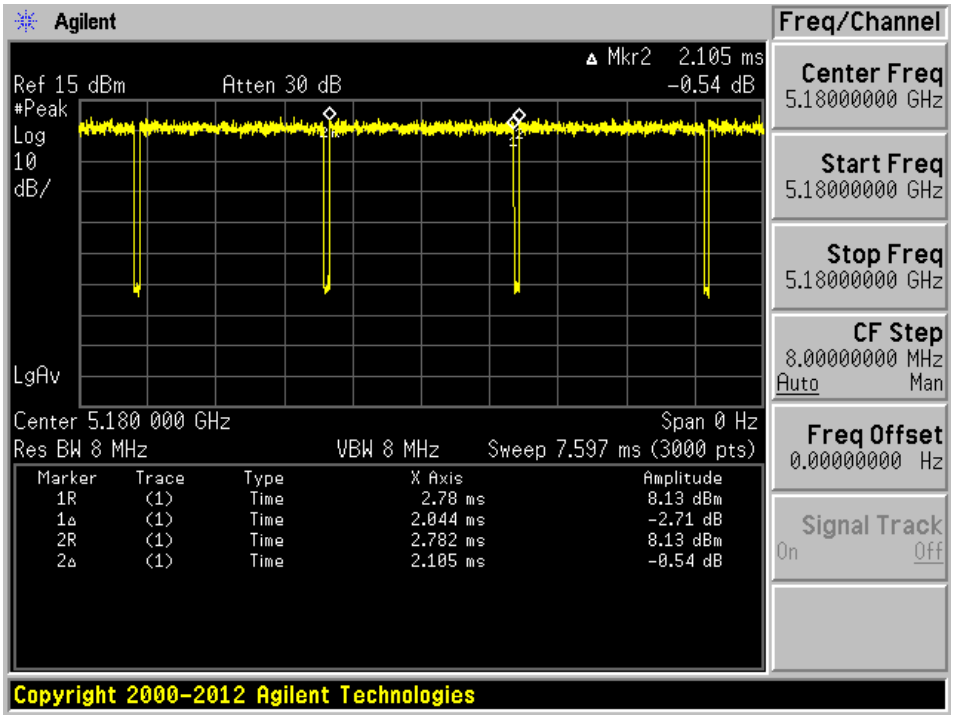
All measurements are to be performed with the EUT transmitting at 100% duty cycle at its maximum power control level; however, if 100% duty cycle cannot be achieved, measurements of duty cycle, x, and maximum-power transmission duration, T, are required for each tested mode of operation.

Radio Mode	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
802.11 Non-HT	2.044	2.105	97.10	0.13
802.11 VHT20	4.989	5.063	98.54	0
802.11 VHT40	2.434	2.513	96.86	0.14

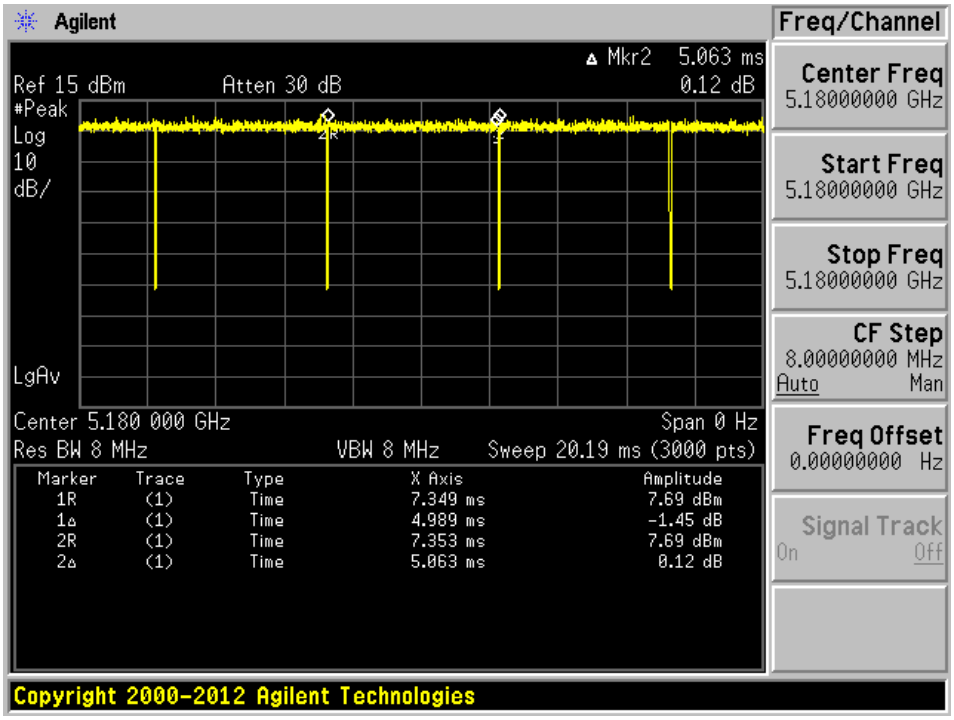
Note: Duty Cycle Correction Factor = 10*log(1/duty cycle)

Please refer to the following plots.

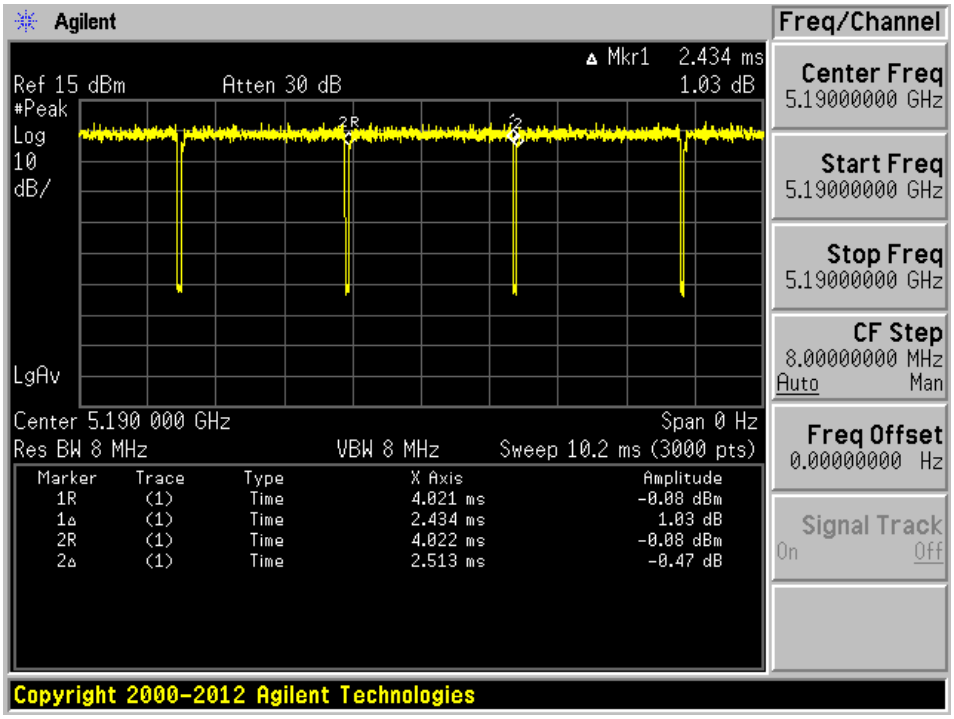
802.11 Non-HT mode



802.11 VHT20 mode



802.11 VHT40 mode



2.4 Equipment Modifications

The EUT was mounted in a host unit.

2.5 Local Support Equipment

None

2.6 Support Equipment

Manufacturer	Description	Model
Lenovo	Laptop	X250
XP Power	PoE	VEC65US24
ABB	Host Unit	N/A

2.7 Interface Ports and Cabling

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

3 Summary of Test Results

FCC, IC Rules	Description of Test	Result
FCC §2.1091, §15.407(f) ISEDC RSS-102	RF Exposure	Compliant
FCC §15.203 ISEDC RSS-Gen §6.8	Antenna Requirement	Compliant
FCC §15.207 ISEDC RSS-Gen §8.8	AC Power Line Conducted Emissions	Compliant
FCC §2.1053, §15.205, §15.209, 15.407(b) ISEDC RSS-247 §6.2	Spurious Radiated Emissions	Compliant
FCC §15.407(e) ISEDC RSS-Gen §6.2	Emission Bandwidth	Compliant
FCC §407(a) ISEDC RSS-247 §6.2	Output Power	Compliant
FCC §2.1051, §15.407(b) ISEDC RSS-247 §6.2	Band Edges	Compliant
FCC §15.407(a) ISEDC RSS-247 §6.2	Power Spectral Density	Compliant
FCC §2.1051, §15.407(b) ISEDC RSS-247 §6.2	Spurious Emissions at Antenna Terminals	Compliant

4 FCC §2.1091, §15.407(f) & ISEDC RSS-102 - RF Exposure

4.1 Applicable Standards

According to FCC §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.

According to KDB 447 498 Section (7.2), "simultaneous transmission of MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on calculated or measured field strengths or power density, is ≤ 1.0. The MPE ratio of each antenna is determined at the minimum *test separation distance* required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency.

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

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

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

According to ISED RSS-102 Issue 5: For the purpose of this standard, Industry Canada has adopted the SAR and RF field strength limits established in Health Canada's RF exposure guideline.

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m^2)	Reference Period (minutes)
0.003-10[21]	83	90	-	Instantaneous*
0.1-10	-	$0.73/f$	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	-2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142f^{0.3417}$	$0.008335f^{0.3417}$	$0.02619f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$

Note: f is frequency in MHz.
* Based on nerve stimulation (NS).
** Based on specific absorption rate (SAR).

4.2 MPE Prediction

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

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

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

4.3 MPE Results

5 GHz Wi-Fi

Worst Case: 802.11VHT40, 5795 MHz

FCC:

Maximum peak output power at 3 antenna input terminal (total) (dBm):	29.1
Maximum peak output power at antenna input terminal (mW):	812.83
Prediction distance (cm):	20
Predication frequency (MHz):	5795
Maximum Antenna Gain, typical (dBi):	6.9
Maximum Antenna Gain (numeric):	4.90
Power density of prediction frequency at prediction distance (mW/cm^2):	0.79
FCC limit (mW/cm^2):	1.00

For the MIMO system, the sum conducted output power 29.1 dBm is considered as the worst case, with the separation distance of 20 cm, the power density is 0.79 mW/cm^2, which complies with the MPE limit of ≤ 1.0.

IC:

Maximum peak output power at antenna input terminal (total) (dBm):	29.1
Maximum peak output power at antenna input terminal (W):	0.813
Prediction distance (cm):	20
Predication frequency (MHz):	5795
Maximum Antenna Gain, typical (dBi):	6.9
Maximum Antenna Gain (numeric):	4.90
Power density of prediction frequency at prediction distance (W/m^2):	7.92
IC limit (W/m^2):	9.77

For the MIMO system, the sum conducted output power 30 dBm is considered as the worst case, with the separation distance of 20 cm, the power density is 7.92 W/m^2, which complies with the MPE limit of ≤ 9.77.

Cellular Module Standalone

FCC ID: N7NEM75S

Band	Frequency (MHz)	Max Conducted Power (dBm)	Evaluated Distance (cm)	Antenna[1] Gain (dBi)	Antenna Cable Loss (dB)	MPE (mW/cm^2)	MPE Limit (mW/cm^2)	MPE Ratio (%)
WCDMA Band II/ LTE Band 2	1850	24.00	20	1.07	2.5	0.036	1	3.595
WCDMA Band IV/ LTE Band 4	1710	24.00	20	1.07	2.5	0.036	1	3.595
WCDMA Band V/ LTE Band 5	824	24.00	20	1	2.5	0.035	0.549	6.440
LTE Band 7	2500	23.80	20	2.16	2.5	0.044	1	4.413
LTE Band 12	699	24.00	20	1	2.5	0.035	0.466	7.592
LTE Band 13	777	24.00	20	1	2.5	0.035	0.518	6.830
LTE Band 26	814	24.00	20	1	2.5	0.035	0.543	6.519
LTE Band 30	2305	23.00	20	1.48	2.5	0.031	1	3.139
LTE Band 41	2496	23.80	20	1.48	2.5	0.038	1	3.773
LTE Band 14	788	24.00	20	1	2.5	0.035	0.525	6.734
LTE Band 66	1710	24.00	20	1.07	2.5	0.036	1	3.595

IC: 2417C-EM75S

Band	Frequency (MHz)	Max Conducted Power (dBm)	Evaluated Distance (cm)	Antenna[1] Gain (dBi)	Antenna Cable Loss (dB)	MPE (W/m^2)	MPE Limit (W/m^2)	MPE Ratio (%)
WCDMA Band II/ LTE Band 2	1850	24.00	20	1.07	2.5	0.360	4.476	8.032
WCDMA Band IV/ LTE Band 4	1710	24.00	20	1.07	2.5	0.360	4.242	8.475
WCDMA Band V/ LTE Band 5	824	24.00	20	1	2.5	0.354	2.576	13.734
LTE Band 7	2500	23.80	20	2.16	2.5	0.441	5.499	8.025
LTE Band 12	699	24.00	20	1	2.5	0.354	2.302	15.368
LTE Band 13	777	24.00	20	1	2.5	0.354	2.474	14.300
LTE Band 26	814	24.00	20	1	2.5	0.354	2.554	13.852
LTE Band 30	2305	23.00	20	1.48	2.5	0.314	5.202	6.033
LTE Band 41	2496	23.80	20	1.48	2.5	0.377	5.493	6.869
LTE Band 14	788	24.00	20	1	2.5	0.354	2.498	14.162
LTE Band 66	1710	24.00	20	1.07	2.5	0.360	4.242	8.475

Note[1]: multi band swivel mount dipole antenna part number: W5095X by PulseLARSEN Antennas.

Radio Co-location

Worst Case Co-location 5 GHz Wi-Fi Radio, and LTE Band FDD12:

FCC

Frequency Band	Max EIRP 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
5 GHz Wi-Fi	36	20	0.792	1.0	79.20%	86.792%	100%
LTE Band FDD12	25	20	0.063	0.466	7.592%		

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum MPE ratio at the distance of 20 cm is 86.792% Limit is 100%.

IC

Frequency Band	Max EIRP Power (dBm)	Evaluated Distance (cm)	Worst-Case MPE (W/cm^2)	MPE Limit (W/cm^2)	Worst-Case MPE Ratios	Sum of MPE Ratios	Limit
5 GHz Wi-Fi	36	20	7.92	9.77	81.06%	96.43%	100%
LTE Band FDD12	25	20	0.354	2.302	15.37%		

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum MPE ratio at the distance of 20 cm is 96.43% Limit is 100%.

5 FCC §15.203 & ISEDC RSS-Gen §6.8 - 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 §15.247 (b) (4), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to ISEDC RSS-Gen §6.8: Transmitter Antenna

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

For licence-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:

This radio transmitter [enter the device's ISED certification number] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

5.2 Antenna List

The antennas used by the EUT are permanent attached antennas.

Manufacturer	Model Number	Frequency Range (MHz)	Antenna Type	Maximum Antenna Gain (dBi)
PCTEL	MHODB24490507NM-IP	5150-5850	Dipole/Omni	6.9

6 FCC §15.207 & ISEDC RSS-Gen §8.8 - AC Power Line Conducted Emissions

6.1 Applicable Standards

As per FCC §15.207 and ISEDC RSS GEN §8.8.

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 and ISEDC RSS GEN §8.8 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 Debug Board was connected with LISN-1 which provided 120 V / 60 Hz AC power.

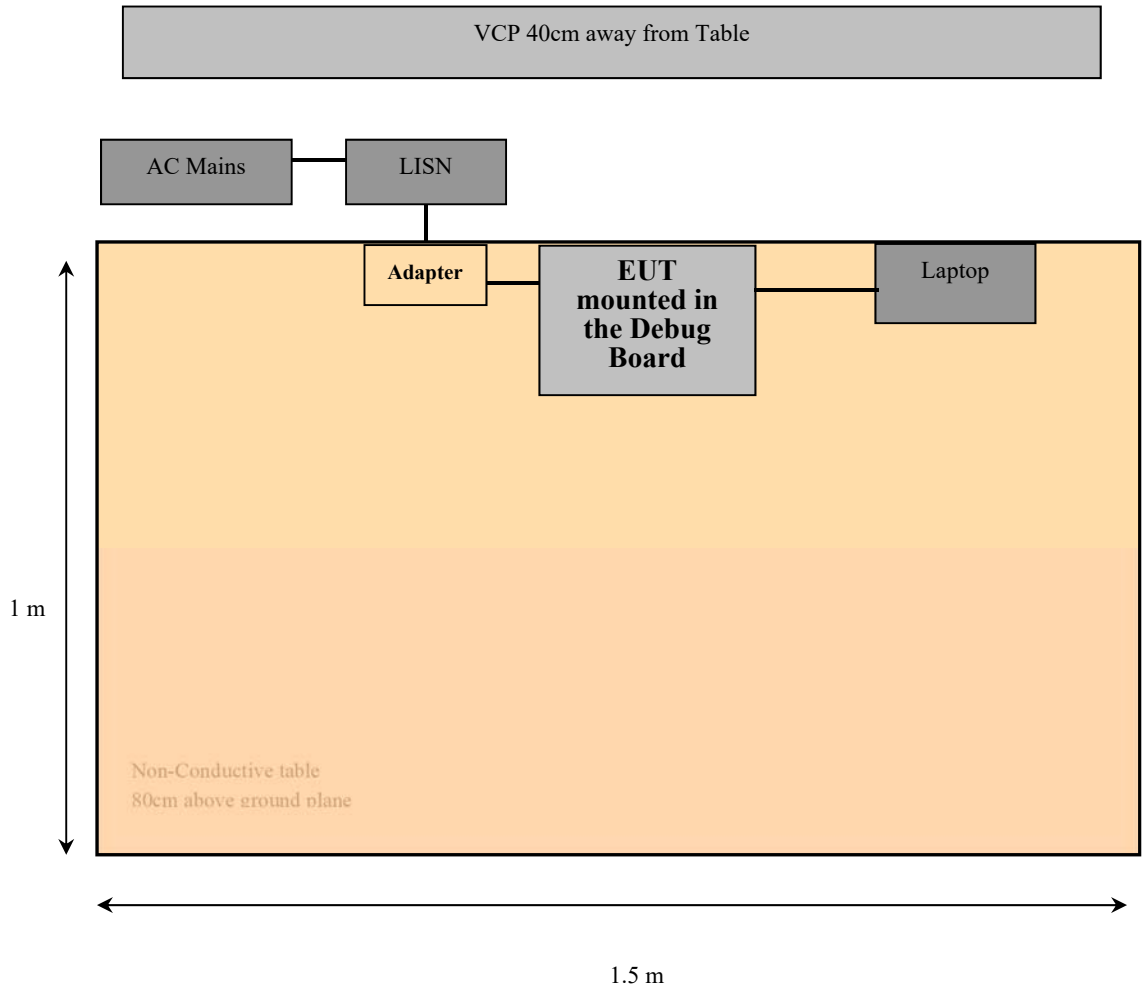
6.3 Test Procedure

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	ESCI1166.5950K03	100044	2018-10-26	2 years
Rohde and Schwarz	Impulse Limiter	ESH3-Z2	101964	2020-07-02	1 year
Solar Electronics Company	High Pass Filter	Type 7930-100	7930150202	2020-02-27	1 year
FCC	LISN	FCC-LISN-50-25-2-10-CISPR16	160131	2019-06-17	18 months
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 the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

6.7 Test Environmental Conditions

Temperature:	23º C
Relative Humidity:	38 %
ATM Pressure:	102.1 kPa

The testing was performed by Zhao Zhao on 2020-09-22 in the Ground Plane test site.

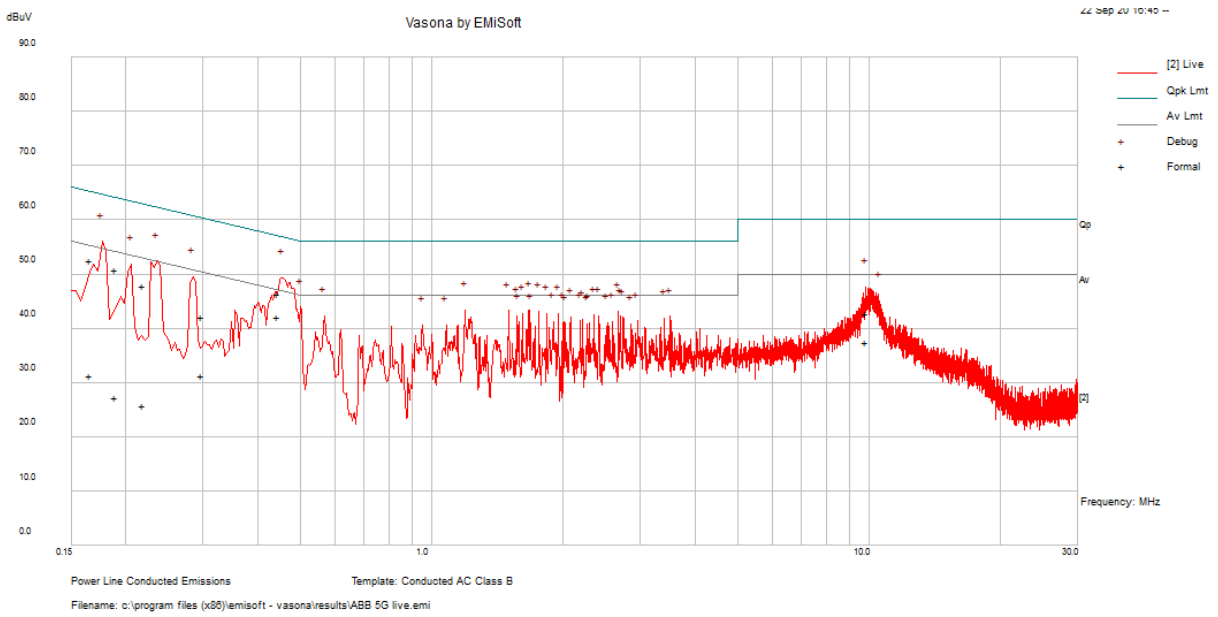
6.8 Summary of Test Results

According to the recorded data in following table, the EUT complied with the FCC Part 15 and RSS-Gen 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 (Line/Neutral)**	**Range (MHz)**
-4.89	0.445525	Line	0.15-30

6.9 Conducted Emissions Test Plots and Data

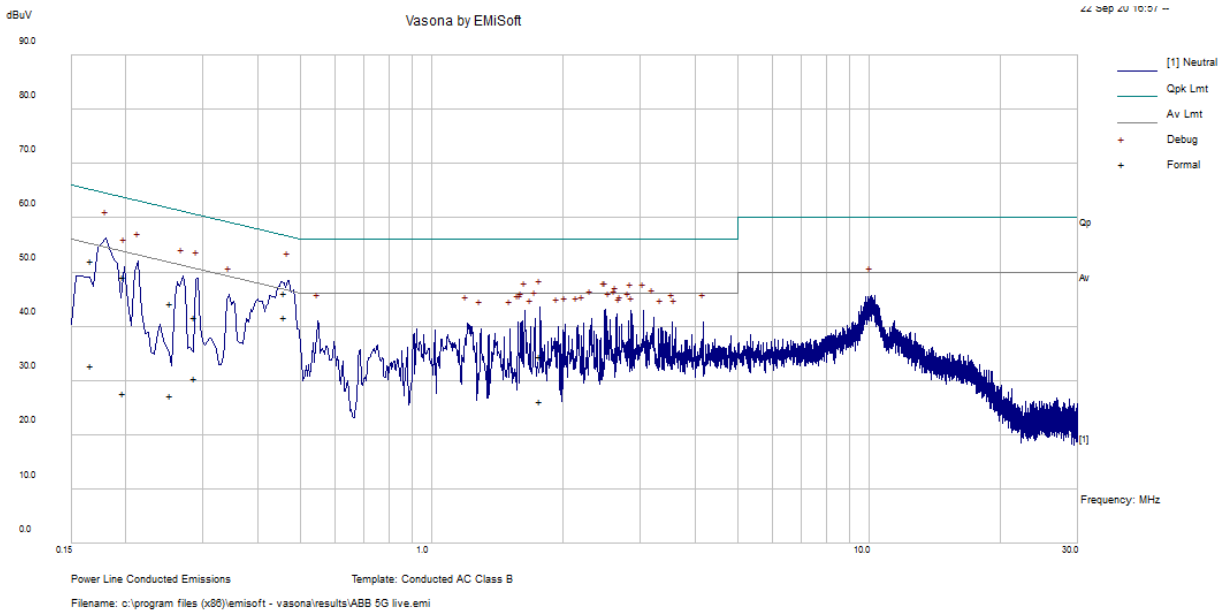
120 V, 60 Hz – Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.445525	46.31	Line	56.96	-10.65	QP
0.165429	52.52	Line	65.19	-12.67	QP
0.218437	47.79	Line	62.88	-15.09	QP
0.298518	42.15	Line	60.28	-18.14	QP
0.188855	50.78	Line	64.09	-13.31	QP
9.808687	42.68	Line	60	-17.32	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.445525	42.07	Line	46.96	-4.89	Ave.
0.165429	31.35	Line	55.19	-23.83	Ave.
0.218437	25.78	Line	52.88	-27.1	Ave.
0.298518	31.37	Line	50.28	-18.91	Ave.
0.188855	27.21	Line	54.09	-26.87	Ave.
9.808687	37.5	Line	50	-12.5	Ave.

120 V, 60 Hz – Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.462071	46.18	Neutral	56.66	-10.48	QP
0.166352	52.06	Neutral	65.14	-13.08	QP
0.19801	49.16	Neutral	63.69	-14.53	QP
0.287405	41.71	Neutral	60.6	-18.89	QP
0.253802	44.14	Neutral	61.63	-17.49	QP
1.773305	34.54	Neutral	56	-21.46	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.462071	41.72	Neutral	46.66	-4.94	Ave.
0.166352	32.69	Neutral	55.14	-22.46	Ave.
0.19801	27.57	Neutral	53.69	-26.12	Ave.
0.287405	30.51	Neutral	50.6	-20.09	Ave.
0.253802	27.2	Neutral	51.63	-24.43	Ave.
1.773305	26.25	Neutral	46	-19.75	Ave.

7 FCC §15.209, §15.407(b) & ISEDC RSS-247 §6.2- 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.

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 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.

As per ISEDC RSS-247 §6.2

For the band 5725-5850 MHz, emissions at frequencies from the band edges to 10 MHz above or below the band edges shall not exceed -17 dBm/MHz e.i.r.p. For emissions at frequencies more than 10 MHz above or below the band edges, the emissions power shall not exceed -27 dBm/MHz.

7.2 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

7.3 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

7.4 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	MY48250238	2019-07-26	18 months
Rhode & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100044	2018-10-26	2 years
BACL	5m3 Sensitivity Box	1	2	2019-10-02	1 year
Sunol Sciences	System Controller	SC99V	011003-1	N/R	N/A
Sunol Sciences	Biconilog Antenna	JB3	A020106-2	2019-11-20	2 years
ETS Lindgren	Horn Antenna	3117	00218973	2019-02-13	2 years
Wisewave	Antenna, Horn	ARH-4223-02	10555-02	2020-02-05	2 years
Wisewave	Antenna, Horn	ARH-2823-02	10555-01	2020-02-05	2 years
-	SMA cable	-	-	Each time[1]	N/A
IW Microwave	150 Series 2.92mm Cable	KPS1501AN-3780-KPS	DC 1925	2019-09-11	18 months
IW Microwave	157 Series Cable Armored with 2.92mm Male Plugs on Both Sides	KPS-1571AN-2400	DC 1922	2020-06-06	1 year
MDP Digital	Times Microwave LMR 400 UltraFex Coaxial Cable 35\'	LMR400UF	BACL1904161	2020-05-20	1 year
AH Systems	Preamplifier	PAM 1840 VH	170	2019-09-24	1 year
Agilent	Preamplifier	8449B	3147A00400	2020-02-27	1 year
HP	Pre Amplifier	8447D	2443A04374	2020-08-17	1 year
Vasona	Test software	V6.0 build 11	10400213	N/R	N/R

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 the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

7.5 Test Environmental Conditions

Temperature:	22-24 ºC
Relative Humidity:	38%
ATM Pressure:	102.1 kPa

The testing was performed by Zhao Zhao on 2020-09-02 and 2020-09-22 in 5m chamber 3.

7.6 Summary of Test Results

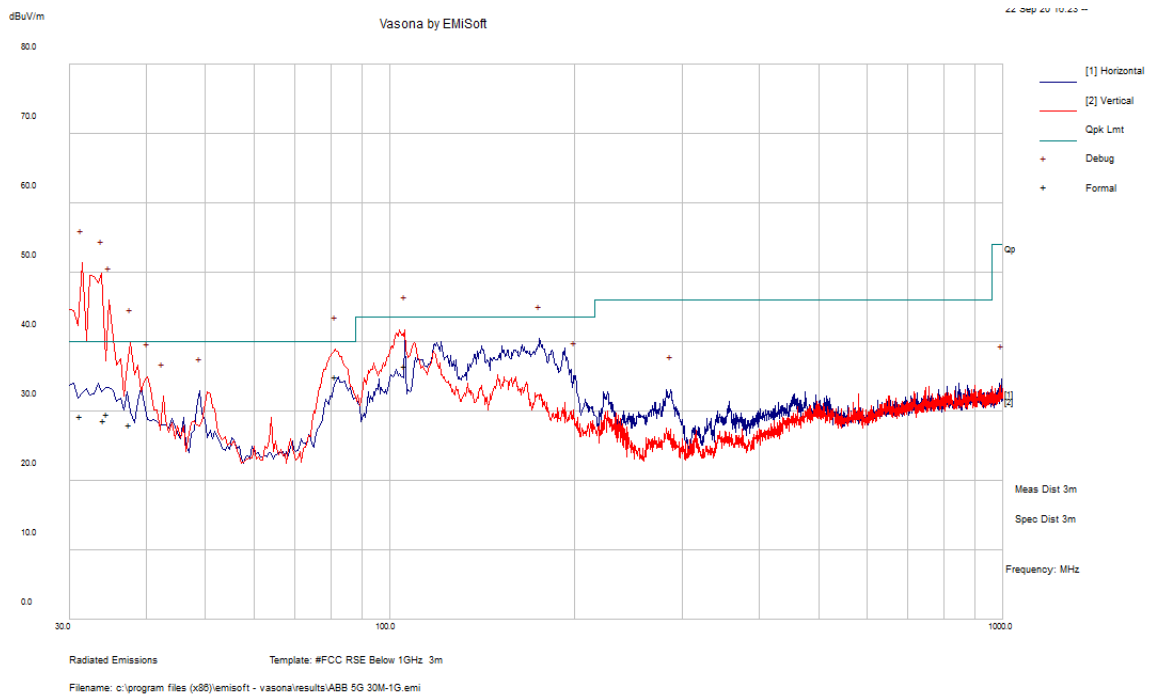
According to the data hereinafter, the EUT complied with the FCC Part 15.407 and RSS-247 standards' radiated emissions limits, and had the worst margin of:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Mode, Channel**
-0.20	5925-5950	Horizontal	VHT20 mode 5825MHz

7.7 Radiated Emissions Test Result Data

1) 30 MHz – 1 GHz at 3 meters

Worst Case:



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
31.31225	29.32	130	V	100	40	-10.68	QP
34.11625	28.7	114	H	353	40	-11.3	QP
34.60175	29.58	160	H	95	40	-10.42	QP
37.5755	28.06	122	V	192	40	-11.94	QP
81.56225	35	114	V	330	40	-5	QP
105.689	36.58	138	V	196	43.5	-6.92	QP

2) 1–40 GHz Band Edges measured at 3 meters, Harmonics measured at 1 meter

5150 - 5250 MHz (FCC only)

802.11Non-HT Mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5180 MHz											
5150	48.90	138	171	V	35.50	8.62	35.50	57.52	74	-16.49	Peak
5150	49.25	0	100	H	35.50	8.62	35.50	57.87	74	-16.14	Peak
5150	37.41	138	171	V	35.50	8.62	35.50	46.03	54	-7.98	Ave
5150	36.42	0	100	H	35.50	8.62	35.50	45.04	54	-8.97	Ave
10360	45.46	162	196	V	38.10	13.40	35.74	61.22	78.2	-16.98	Peak
10360	45.07	221	213	H	38.10	13.40	35.74	60.83	78.2	-17.37	Peak
15540	43.91	0	100	V	40.50	18.91	33.70	69.62	84	-14.38	Peak
15540	43.83	0	100	H	40.50	18.91	33.70	69.54	84	-14.46	Peak
15540	32.57	0	100	V	40.50	18.91	33.70	58.28	64	-5.72	Ave
15540	32.81	0	100	H	40.50	18.91	33.70	58.52	64	-5.48	Ave
Middle Channel 5220 MHz											
10440	45.58	35	199	V	38.10	13.25	35.49	61.44	78.2	-16.76	Peak
10440	43.88	360	180	H	38.10	13.25	35.49	59.74	78.2	-18.46	Peak
15660	43.08	0	100	V	40.70	19.05	33.87	68.96	84	-15.04	Peak
15660	43.29	0	100	H	40.70	19.05	33.87	69.17	84	-14.83	Peak
15660	31.77	0	100	V	40.70	19.05	33.87	57.65	64	-6.35	Ave
15660	31.49	0	100	H	40.70	19.05	33.87	57.37	64	-6.63	Ave
High Channel 5240 MHz											
10480	45.57	353	224	V	38.20	13.25	35.49	61.53	78.2	-16.67	Peak
10480	44.02	17	180	H	38.20	13.25	35.49	59.98	78.2	-18.22	Peak
15720	43.28	0	100	V	40.70	19.09	33.87	69.20	84	-14.80	Peak
15720	43.47	0	100	H	40.70	19.09	33.87	69.39	84	-14.61	Peak
15720	32.03	0	100	V	40.70	19.09	33.87	57.95	64	-6.05	Ave
15720	31.81	0	100	H	40.70	19.09	33.87	57.73	64	-6.27	Ave

802.11 VHT20 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5180 MHz											
5150	50.00	138	171	V	35.50	8.62	35.20	58.92	74	-15.09	Peak
5150	48.99	0	100	H	35.50	8.62	35.20	57.91	74	-16.10	Peak
5150	37.35	138	171	V	35.50	8.62	35.20	46.27	54	-7.74	Ave
5150	36.88	0	100	H	35.50	8.62	35.20	45.80	54	-8.21	Ave
10360	44.71	162	196	V	38.10	13.40	35.74	60.47	78.2	-17.73	Peak
10360	44.35	221	213	H	38.10	13.40	35.74	60.11	78.2	-18.09	Peak
15540	43.65	0	100	V	40.50	18.91	33.70	69.36	84	-14.64	Peak
15540	43.10	0	100	H	40.50	18.91	33.70	68.81	84	-15.19	Peak
15540	31.62	0	100	V	40.50	18.91	33.70	57.33	64	-6.67	Ave
15540	32.08	0	100	H	40.50	18.91	33.70	57.79	64	-6.21	Ave
Middle Channel 5220 MHz											
10440	45.35	0	100	V	38.10	13.25	35.49	61.21	78.2	-16.99	Peak
10440	44.24	0	100	H	38.10	13.25	35.49	60.10	78.2	-18.10	Peak
15660	42.82	0	100	V	40.70	19.05	33.87	68.70	84	-15.30	Peak
15660	43.07	0	100	H	40.70	19.05	33.87	68.95	84	-15.05	Peak
15660	31.43	0	100	V	40.70	19.05	33.87	57.31	64	-6.69	Ave
15660	31.30	0	100	H	40.70	19.05	33.87	57.18	64	-6.82	Ave
High Channel 5240 MHz											
10480	44.76	353	224	V	38.20	13.25	35.49	60.72	78.2	-17.48	Peak
10480	43.91	17	180	H	38.20	13.25	35.49	59.87	78.2	-18.33	Peak
15720	43.23	0	100	V	40.70	19.09	33.87	69.15	84	-14.85	Peak
15720	43.21	0	100	H	40.70	19.09	33.87	69.13	84	-14.87	Peak
15720	31.76	0	100	V	40.70	19.09	33.87	57.68	64	-6.32	Ave
15720	31.65	0	100	H	40.70	19.09	33.87	57.57	64	-6.43	Ave

802.11 VHT40 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5190 MHz											
5150	49.12	277	184	V	35.50	8.62	35.20	58.04	74	-15.97	Peak
5150	38.24	277	174	V	35.50	10.62	35.20	49.16	54	-4.85	Ave
5150	48.61	0	100	H	35.50	8.62	35.20	57.53	74	-16.48	Peak
5150	37.76	0	100	H	35.50	8.62	35.20	46.68	54	-7.33	Ave
10380	45.36	217	222	V	38.10	13.40	35.74	61.12	78.2	-17.08	Peak
10380	44.64	223	187	H	38.10	13.40	35.74	60.40	78.2	-17.80	Peak
15570	43.44	0	100	V	40.50	18.91	33.70	69.15	84	-14.85	Peak
15570	44.09	0	100	H	40.50	18.91	33.70	69.80	84	-14.20	Peak
15570	31.40	0	100	V	40.50	18.91	33.70	57.11	64	-6.89	Ave
15570	31.72	0	100	H	40.50	18.91	33.70	57.43	64	-6.57	Ave
High Channel 5230 MHz											
10480	45.18	35	199	V	38.10	13.25	35.49	61.04	78.2	-17.16	Peak
10480	43.92	336	181	H	38.10	13.25	35.49	59.78	78.2	-18.42	Peak
15720	44.26	0	100	V	40.70	19.05	33.87	70.14	84	-13.86	Peak
15720	44.08	0	100	H	40.70	19.05	33.87	69.96	84	-14.04	Peak
15720	31.81	0	100	V	40.70	19.05	33.87	57.69	64	-6.31	Ave
15720	31.68	0	100	H	40.70	19.05	33.87	57.56	64	-6.44	Ave

5745 - 5825 MHz

802.11Non-HT Mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5745 MHz											
5625-5650	32.49	131	180	V	35.40	9.14	0.00	77.03	78.20	-1.17	Peak
5650-5700	32.69	131	180	V	35.40	9.14	0.00	77.23	115.23	-38.00	Peak
5700-5720	33.54	131	180	V	35.40	9.14	0.00	78.08	120.83	-42.75	Peak
5720-5725	35.35	131	180	V	35.40	9.14	0.00	79.89	132.23	-52.34	Peak
5625-5650	32.03	153	183	H	35.40	9.14	0.00	76.57	78.20	-1.63	Peak
5650-5700	32.38	153	183	H	35.40	9.14	0.00	76.92	115.23	-38.31	Peak
5700-5720	32.65	153	183	H	35.40	9.14	0.00	77.19	120.83	-43.64	Peak
5720-5725	33.18	153	183	H	35.40	9.14	0.00	77.72	132.23	-54.51	Peak
11490	47.57	211	188	V	38.70	13.68	34.47	65.48	84.00	-18.52	Peak
11490	45.65	173	208	H	38.70	13.68	34.47	63.56	84.00	-20.44	Peak
11490	37.3	211	188	V	38.70	13.68	34.47	55.21	64.00	-8.79	Ave
11490	33.87	173	208	H	38.70	13.68	34.47	51.78	64.00	-12.22	Ave
17235	43.09	213	180	V	41.80	16.35	32.84	68.40	78.20	-9.80	Peak
17235	40.81	227	195	H	41.80	16.35	32.84	66.12	78.20	-12.08	Peak
Middle Channel 5785 MHz											
11570	42.43	43	169	V	38.90	13.77	34.47	60.63	84.00	-23.37	Peak
11570	42.31	47	180	H	38.90	13.77	34.47	60.51	84.00	-23.49	Peak
11570	31.98	43	169	V	38.90	13.77	34.47	50.18	64.00	-13.82	Ave
11570	31.1	47	180	H	38.90	13.77	34.47	49.30	64.00	-14.70	Ave
17355	38.69	0	100	V	41.90	17.83	32.84	65.58	78.00	-12.42	Peak
17355	38.2	0	100	H	41.90	17.83	32.84	65.09	78.00	-12.91	Peak
High Channel 5825 MHz											
5850-5855	33.87	136	180	V	35.60	9.14	0.00	78.61	132.23	-53.62	Peak
5855-5875	34.07	136	180	V	35.60	9.14	0.00	78.81	120.83	-42.02	Peak
5875-5925	33.8	136	180	V	35.60	9.14	0.00	78.54	115.23	-36.69	Peak
5925-5950	33.14	136	180	V	35.60	9.14	0.00	77.88	78.20	-0.32	Peak
5850-5855	33.51	157	183	H	35.60	9.14	0.00	78.25	132.23	-53.98	Peak
5855-5875	33.68	157	183	H	35.60	9.14	0.00	78.42	120.83	-42.41	Peak
5875-5925	33.14	157	183	H	35.60	9.14	0.00	77.88	115.23	-37.35	Peak
5925-5950	33.09	157	183	H	35.60	9.14	0.00	77.83	78.20	-0.37	Peak
11650	43.44	26	171	V	39.00	13.69	34.49	61.64	84.00	-22.36	Peak
11650	43.35	58	184	H	39.00	13.69	34.49	61.55	84.00	-22.45	Peak
11650	32.22	26	171	V	39.00	13.69	34.49	50.42	64.00	-13.58	Ave
11650	31.36	58	184	H	39.00	13.69	34.49	49.56	64.00	-14.44	Ave
17475	39.16	0	100	V	41.80	16.70	32.73	64.93	78.00	-13.07	Peak
17475	38.59	0	100	H	41.80	16.70	32.73	64.36	78.00	-13.64	Peak

802.11 VHT20 mode

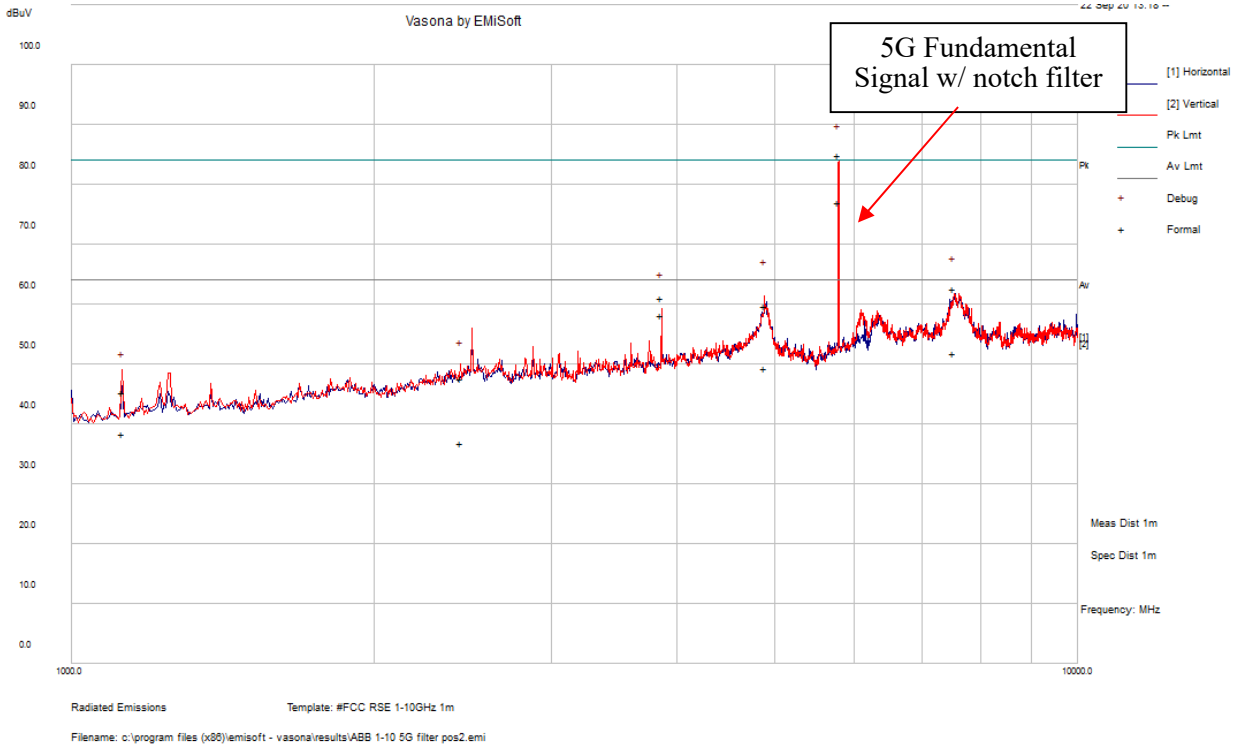
Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5745 MHz											
5625-5650	32.51	131	180	V	35.40	9.14	0.00	77.05	78.20	-1.15	Peak
5650-5700	33.08	131	180	V	35.40	9.14	0.00	77.62	115.23	-37.61	Peak
5700-5720	33.49	131	180	V	35.40	9.14	0.00	78.03	120.83	-42.80	Peak
5720-5725	34.89	131	180	V	35.40	9.14	0.00	79.43	132.23	-52.80	Peak
5625-5650	32.24	153	183	H	35.40	9.14	0.00	76.78	78.20	-1.42	Peak
5650-5700	32.11	153	183	H	35.40	9.14	0.00	76.65	115.23	-38.58	Peak
5700-5720	33.07	153	183	H	35.40	9.14	0.00	77.61	120.83	-43.22	Peak
5720-5725	33.64	153	183	H	35.40	9.14	0.00	78.18	132.23	-54.05	Peak
11490	43.09	42	183	V	38.70	13.68	34.47	61.00	84.00	-23.00	Peak
11490	43.05	46	171	H	38.70	13.68	34.47	60.96	84.00	-23.04	Peak
11490	33.07	42	183	V	38.70	13.68	34.47	50.98	64.00	-13.02	Ave
11490	31.14	46	171	H	38.70	13.68	34.47	49.05	64.00	-14.95	Ave
17235	39.41	0	100	V	41.80	16.35	32.84	64.72	78.20	-13.48	Peak
17235	38.44	0	100	H	41.80	16.35	32.84	63.75	78.20	-14.45	Peak
Middle Channel 5785 MHz											
11570	50.19	228	196	V	38.90	13.77	34.47	68.39	84.00	-15.61	Peak
11570	44.26	203	191	H	38.90	13.77	34.47	62.46	84.00	-21.54	Peak
11570	40.73	228	196	V	38.90	13.77	34.47	58.93	64.00	-5.07	Ave
11570	34.62	203	191	H	38.90	13.77	34.47	52.82	64.00	-11.18	Ave
17355	38.74	0	100	V	41.90	17.83	32.84	65.63	78.00	-12.37	Peak
17355	38.66	0	100	H	41.90	17.83	32.84	65.55	78.00	-12.45	Peak
High Channel 5825 MHz											
5850-5855	34.08	136	180	V	35.60	9.14	0.00	78.82	132.23	-53.41	Peak
5855-5875	33.17	136	180	V	35.60	9.14	0.00	77.91	120.83	-42.92	Peak
5875-5925	33.68	136	180	V	35.60	9.14	0.00	78.42	115.23	-36.81	Peak
5925-5950	33.07	136	180	V	35.60	9.14	0.00	77.81	78.20	-0.39	Peak
5850-5855	33.48	157	183	H	35.60	9.14	0.00	78.22	132.23	-54.01	Peak
5855-5875	33.74	157	183	H	35.60	9.14	0.00	78.48	120.83	-42.35	Peak
5875-5925	33.49	157	183	H	35.60	9.14	0.00	78.23	115.23	-37.00	Peak
5925-5950	33.26	157	183	H	35.60	9.14	0.00	78.00	78.20	-0.20	Peak
11650	43.39	42	183	V	39.00	13.69	34.49	61.59	84.00	-22.41	Peak
11650	42.57	46	171	H	39.00	13.69	34.49	60.77	84.00	-23.23	Peak
11650	33.11	42	183	V	39.00	13.69	34.49	51.31	64.00	-12.69	Ave
11650	30.88	46	171	H	39.00	13.69	34.49	49.08	64.00	-14.92	Ave
17475	39.07	0	100	V	41.80	16.70	32.73	64.84	78.00	-13.16	Peak
17475	38.47	0	100	H	41.80	16.70	32.73	64.24	78.00	-13.76	Peak

802.11 VHT40 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5755 MHz											
5625-5650	32.54	131	180	V	35.40	9.14	0.00	77.08	78.20	-1.12	Peak
5650-5700	32.87	131	180	V	35.40	9.14	0.00	77.41	115.23	-37.82	Peak
5700-5720	33.64	131	180	V	35.40	9.14	0.00	78.18	120.83	-42.65	Peak
5720-5725	36.06	131	180	V	35.40	9.14	0.00	80.60	132.23	-51.63	Peak
5625-5650	32.12	153	183	H	35.40	9.14	0.00	76.66	78.20	-1.54	Peak
5650-5700	32.16	153	183	H	35.40	9.14	0.00	76.70	115.23	-38.53	Peak
5700-5720	33.05	153	183	H	35.40	9.14	0.00	77.59	120.83	-43.24	Peak
5720-5725	33.84	153	183	H	35.40	9.14	0.00	78.38	132.23	-53.85	Peak
11490	45.71	288	189	V	38.70	13.68	34.47	63.62	84.00	-20.38	Peak
11490	43.29	234	204	H	38.70	13.68	34.47	61.20	84.00	-22.80	Peak
11490	37.4	288	189	V	38.70	13.68	34.47	55.31	64.00	-8.69	Ave
11490	34.2	234	204	H	38.70	13.68	34.47	52.11	64.00	-11.89	Ave
17235	41.33	217	202	V	41.80	16.35	32.84	66.64	78.20	-11.56	Peak
17235	40.96	0	100	H	41.80	16.35	32.84	66.27	78.20	-11.93	Peak
High Channel 5795 MHz											
11570	46.84	226	202	V	38.90	13.77	34.47	65.04	84.00	-18.96	Peak
11570	43.2	200	198	H	38.90	13.77	34.47	61.40	84.00	-22.60	Peak
11570	38.4	226	202	V	38.90	13.77	34.47	56.60	64.00	-7.40	Ave
11570	34.48	200	198	H	38.90	13.77	34.47	52.68	64.00	-11.32	Ave
17355	39.76	224	207	V	41.90	17.83	32.84	66.65	78.00	-11.35	Peak
17355	40.07	205	194	H	41.90	17.83	32.84	66.96	78.00	-11.04	Peak

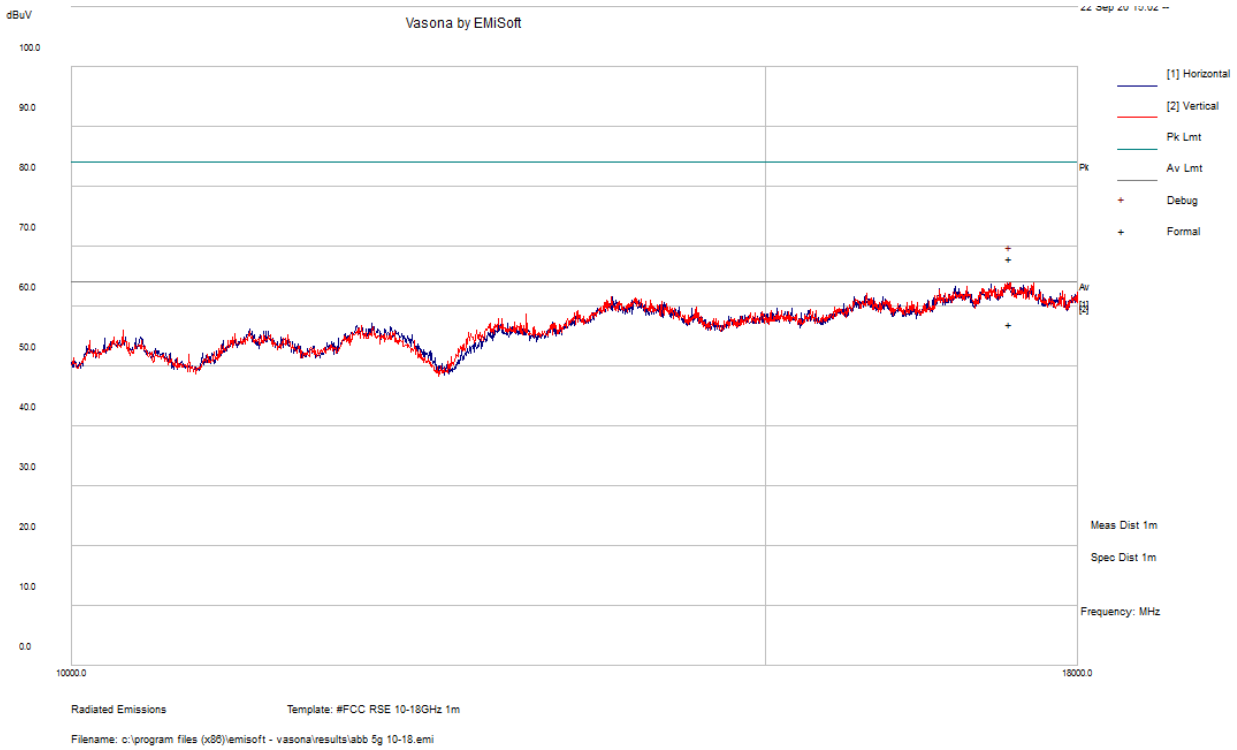
1 GHz – 10 GHz Worst Case Scan at 1 Meter

Worst Case:



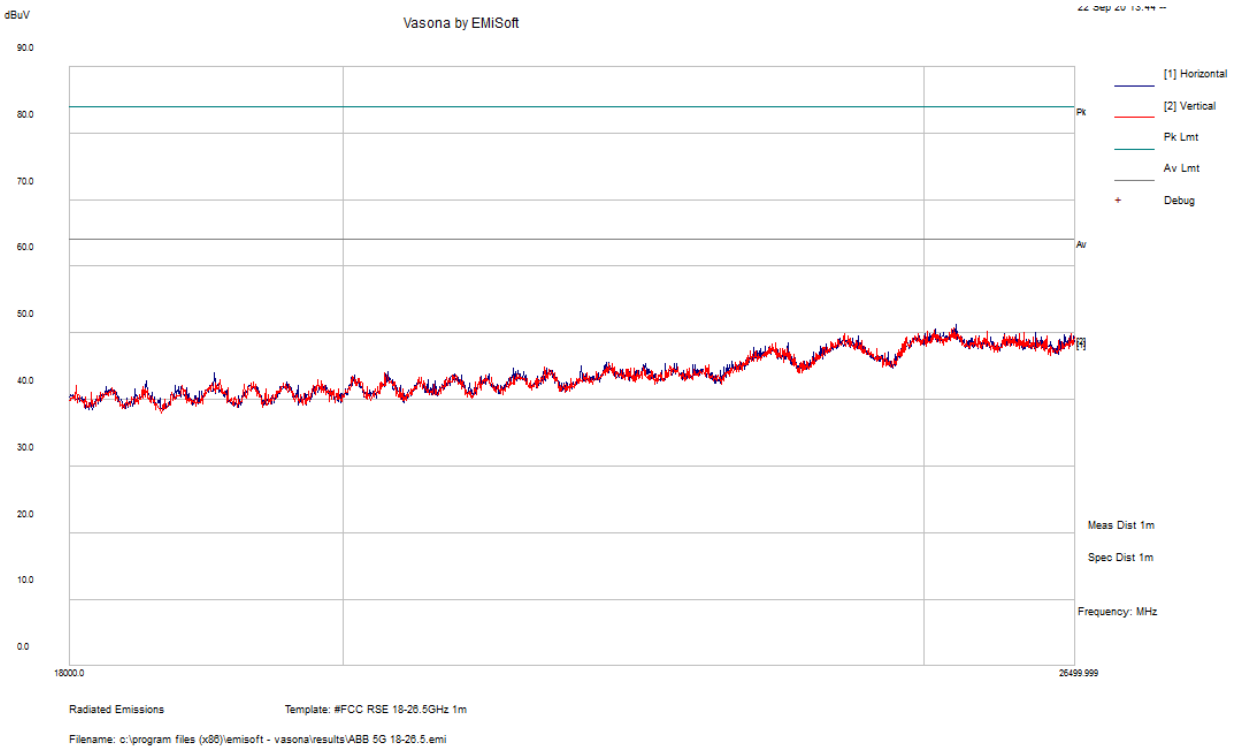
Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
7530.5025	62.56	245	V	244	84	-21.44	Peak
4882.6775	59.75	296	V	222	84	-24.25	Peak
3856.475	61.04	232	V	28	84	-22.96	Peak
1125.211	47.68	200	H	35	84	-36.32	Peak
7530.5025	51.92	245	V	244	64	-12.08	Ave
4882.6775	49.27	296	V	222	64	-14.73	Ave
3856.475	58.23	232	V	28	64	-5.77	Ave
1125.211	38.35	208	V	98	64	-25.65	Ave

10 GHz – 18 GHz Worst Case Scan at 1 Meter



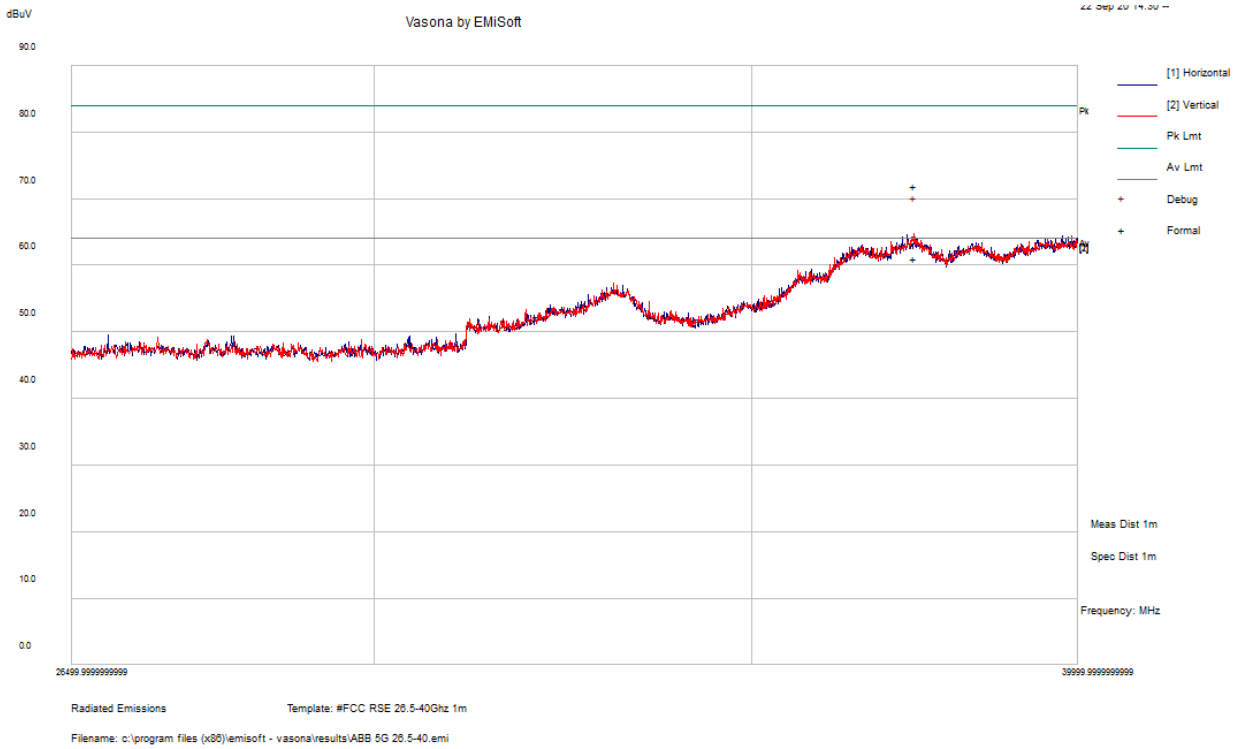
Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
17302.518	43.97	274	H	313	84	-15.94	Peak
17302.518	32.88	292	V	50	64	-7.03	Ave

18 GHz – 26.5 GHz Worst Case Scan at 1 Meter



26.5 GHz – 40 GHz Worst Case Scan at 1 Meter

Worst Case:



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
37409.543	71.98	203	H	191	84	-12.02	Peak
37409.543	61.01	245	V	228	64	-2.99	Average

8 FCC §15.407(e) & ISEDC RSS-247 §6.2 - 6 dB, 26 dB, & 99% - Occupied Bandwidth

8.1 Applicable Standards

As per FCC §15.407(e) and ISEDC RSS-247 6.2.4(1): 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	Spectrum Analyzer	E4446A	MY48250238	2019-06-26	18 Months
Rhode & Schwarz	Signal Analyzer	FSV40	1321.3008K39-101203-UW	2020-02-06	1 year
-	RF cable	-	-	Each time[1]	N/A
-	20 dB attenuator	-	-	Each time[1]	N/A

Note[1]: cable and attenuator included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all 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 the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

8.4 Test Environmental Conditions

Temperature:	22-24 ºC
Relative Humidity:	41 %
ATM Pressure:	102.7 kPa

The testing was performed by Zhao Zhao on 2020-09-09at RF site.

8.5 Test Results

5150 - 5250 MHz (FCC only)

Ant 1

Channel	Frequency (MHz)	99% OBW (MHz)	26 dB OBW (MHz)
802.11Non-HT Mode			
36	5180	16.3402	19.221
44	5220	16.3449	19.213
48	5240	16.3459	18.925
802.11VHT20 mode			
36	5180	17.5437	19.973
44	5220	17.5339	19.974
48	5240	17.5473	19.972
802.11VHT40 mode			
38	5190	35.8172	39.279
46	5230	35.8297	39.371

Ant 2

Channel	Frequency (MHz)	99% OBW (MHz)	26 dB OBW (MHz)
802.11Non-HT Mode			
36	5180	16.3452	18.926
44	5220	16.3454	18.917
48	5240	16.3408	18.908
802.11VHT20 mode			
36	5180	17.5526	19.898
44	5220	17.5619	19.902
48	5240	17.5546	19.915
802.11VHT40 mode			
38	5190	35.8924	39.453
46	5230	35.8560	39.386

Ant 3

Channel	Frequency (MHz)	99% OBW (MHz)	26 dB OBW (MHz)
802.11Non-HT Mode			
36	5180	16.3496	18.940
44	5220	16.3473	18.936
48	5240	16.3417	18.836
802.11VHT20 mode			
36	5180	17.5421	19.993
44	5220	17.5352	19.961
48	5240	17.5391	19.998
802.11VHT40 mode			
38	5190	35.8706	39.456
46	5230	35.8681	39.397

5725 - 5850 MHz

Ant 1

Channel	Frequency (MHz)	99% OBW (MHz)	6 dB OBW (MHz)	6 dB OBW limit (kHz)
802.11Non-HT Mode				
149	5745	16.3591	16.287	≥500
157	5785	16.3743	16.318	≥500
165	5825	16.3896	16.326	≥500
802.11VHT20 mode				
149	5745	17.5535	17.156	≥500
157	5785	17.5660	16.532	≥500
165	5825	17.5656	17.167	≥500
802.11VHT40 mode				
151	5755	35.8941	35.166	≥500
159	5795	35.9062	35.128	≥500

Ant 2

Channel	Frequency (MHz)	99% OBW (MHz)	6 dB OBW (MHz)	6 dB OBW limit (kHz)
802.11Non-HT Mode				
149	5745	16.3547	15.742	≥500
157	5785	16.3593	15.685	≥500
165	5825	16.3839	16.057	≥500
802.11VHT20 mode				
149	5745	17.5385	16.217	≥500
157	5785	17.5608	16.249	≥500
165	5825	17.5751	15.707	≥500
802.11VHT40 mode				
151	5755	35.8828	35.117	≥500
159	5795	35.8997	35.133	≥500

Ant 3

Channel	Frequency (MHz)	99% OBW (MHz)	6 dB OBW (MHz)	6 dB OBW limit (kHz)
802.11Non-HT Mode				
149	5745	16.3559	16.061	≥500
157	5785	16.3687	16.059	≥500
165	5825	13.3732	16.063	≥500
802.11VHT20 mode				
149	5745	17.5860	16.287	≥500
157	5785	17.5560	15.475	≥500
165	5825	17.5769	15.707	≥500
802.11VHT40 mode				
151	5755	35.9115	35.193	≥500
159	5795	35.9201	35.108	≥500

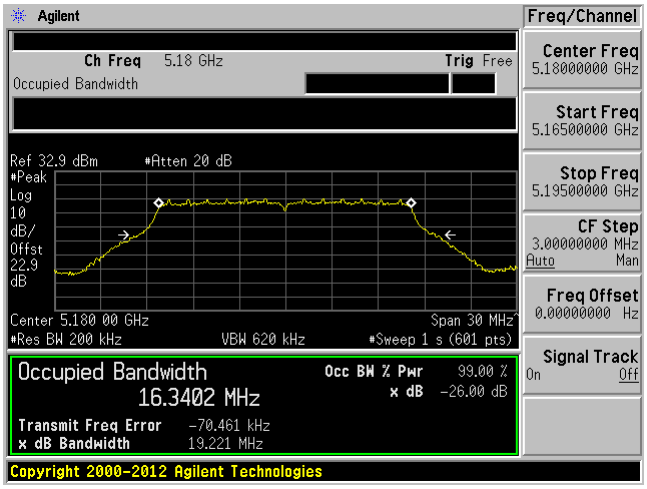
Please refer to the following plots:

5150 - 5250 MHz

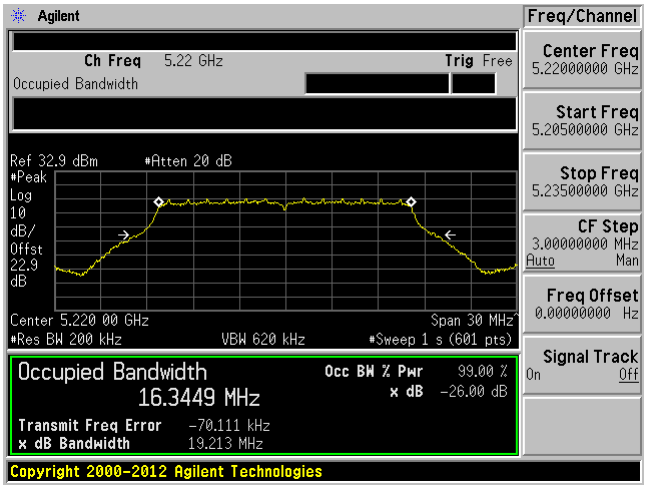
99% OBW and 26dB BW

802.11Non-HT Mode

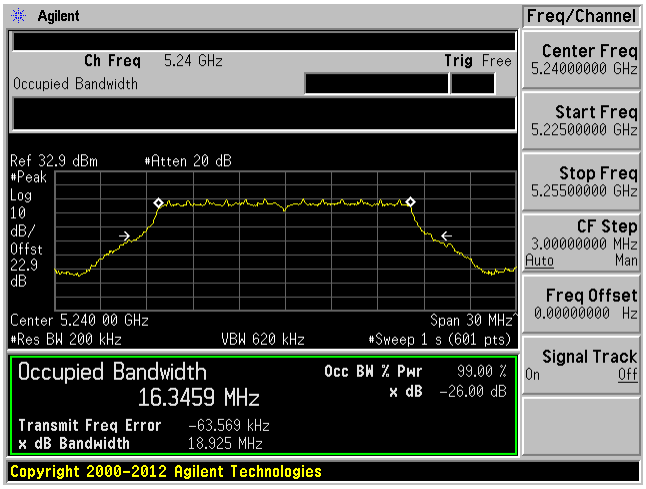
Low Channel ANT 1



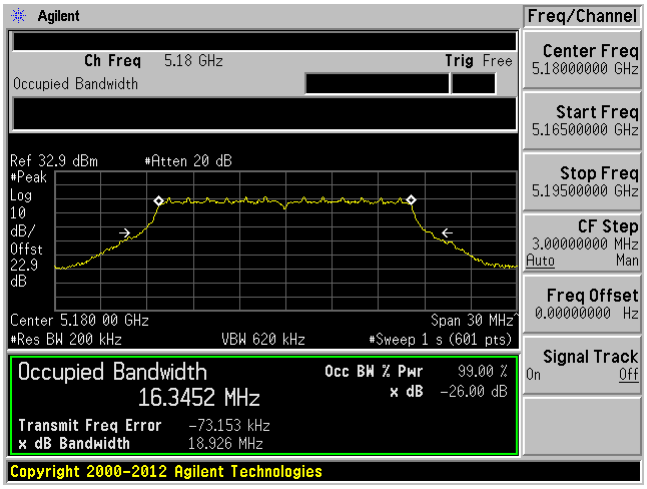
Mid Channel ANT 1



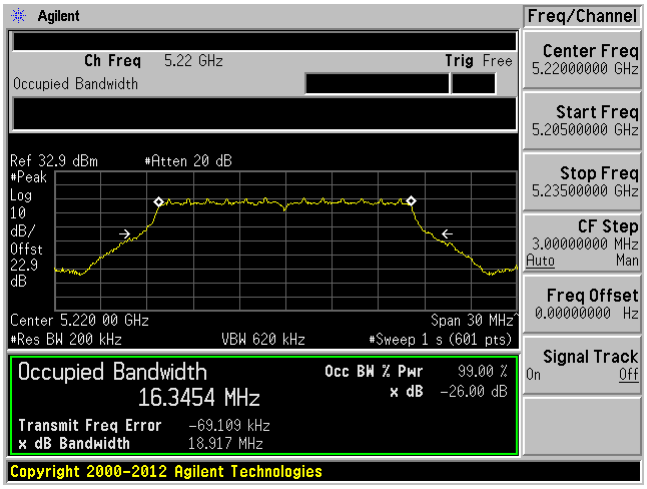
High Channel ANT 1



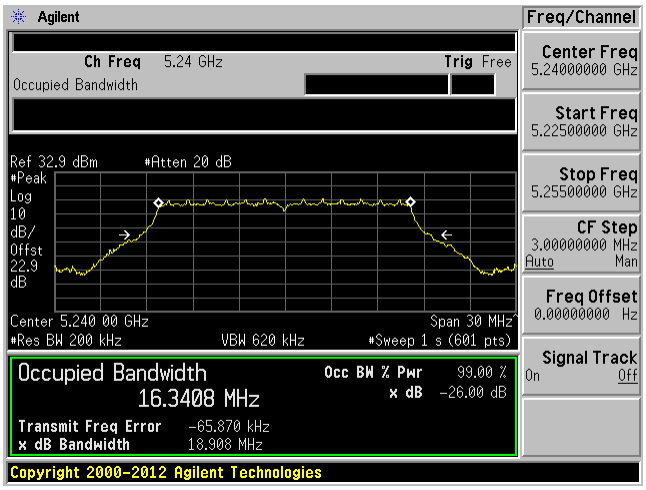
Low Channel ANT 2



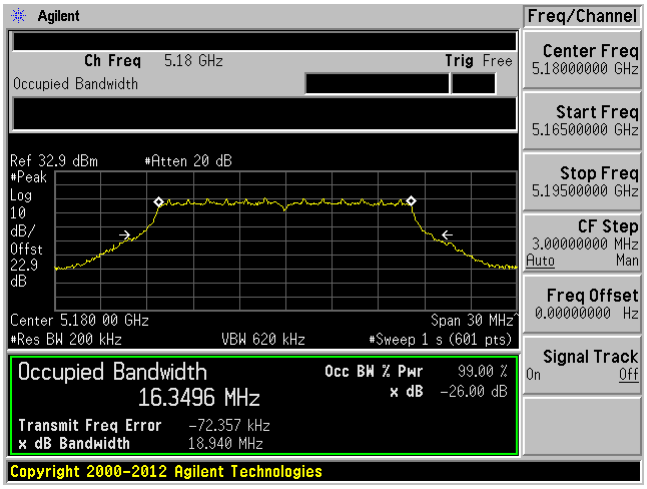
Mid Channel ANT 2



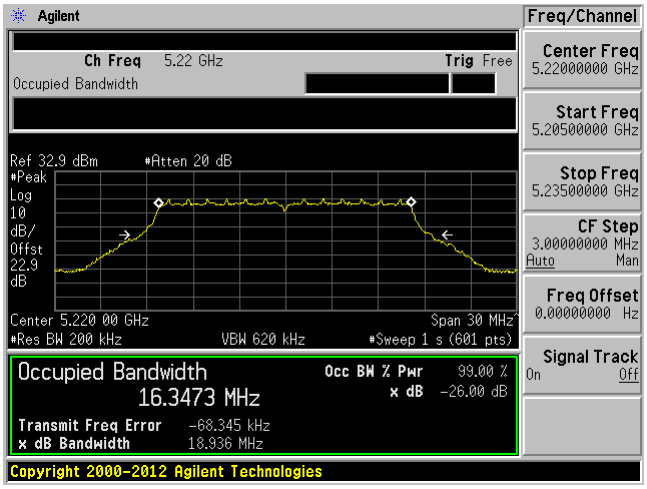
High Channel ANT 2



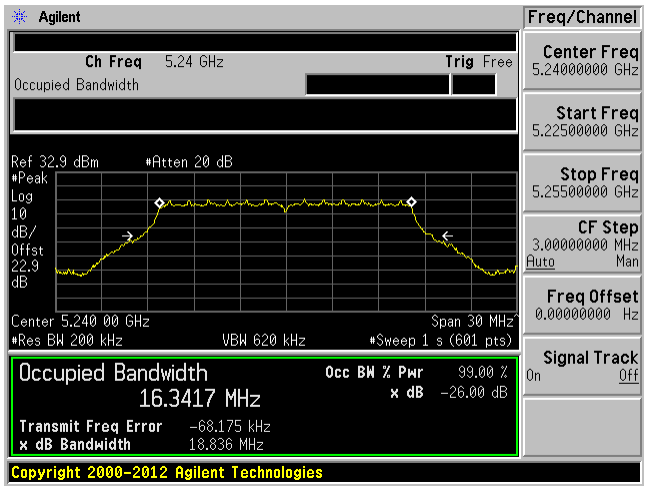
Mid Channel ANT 3



High Channel ANT 3

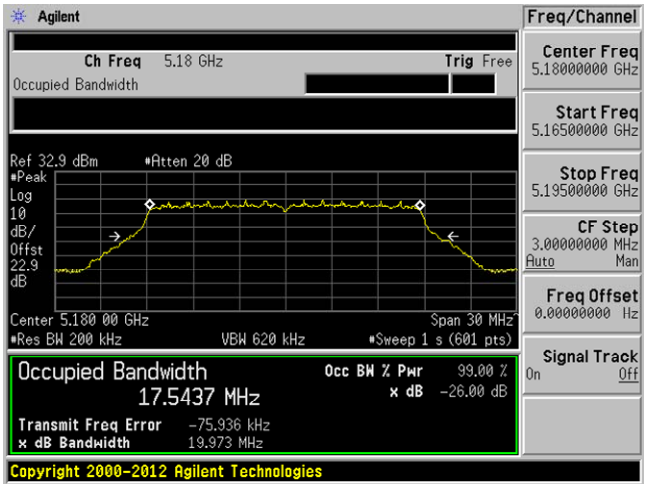


High Channel ANT 3

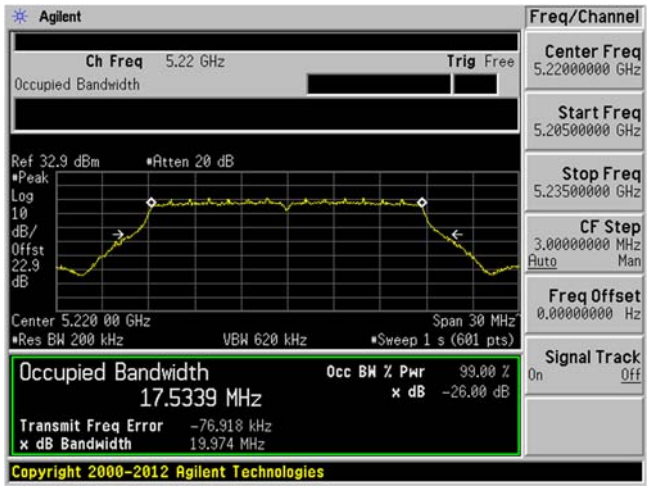


802.11VHT 20 Mode

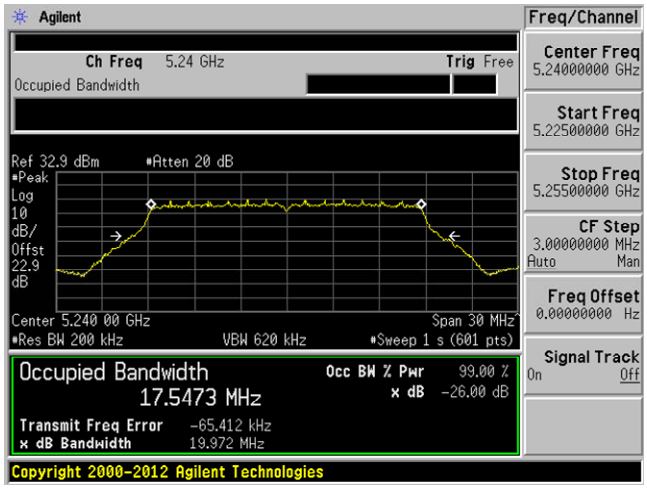
Low Channel ANT 1



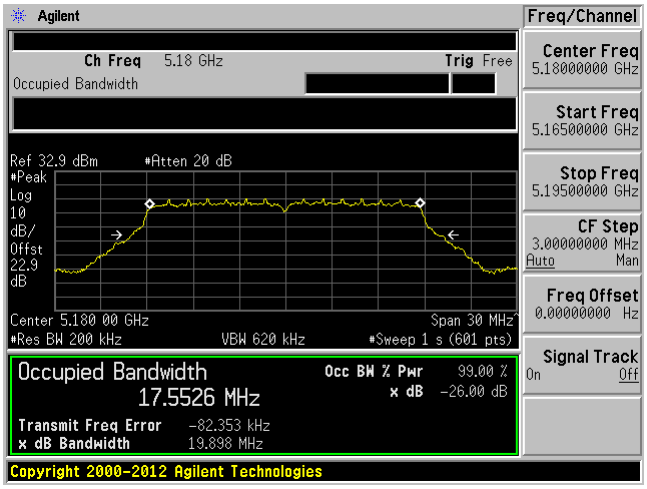
Mid Channel ANT 1



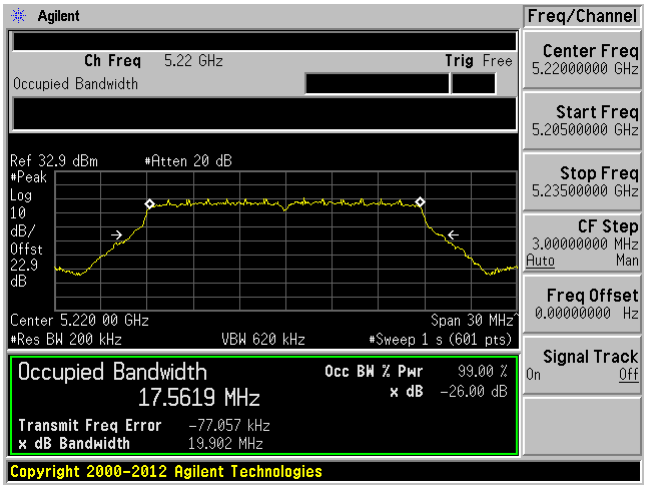
High Channel ANT 1



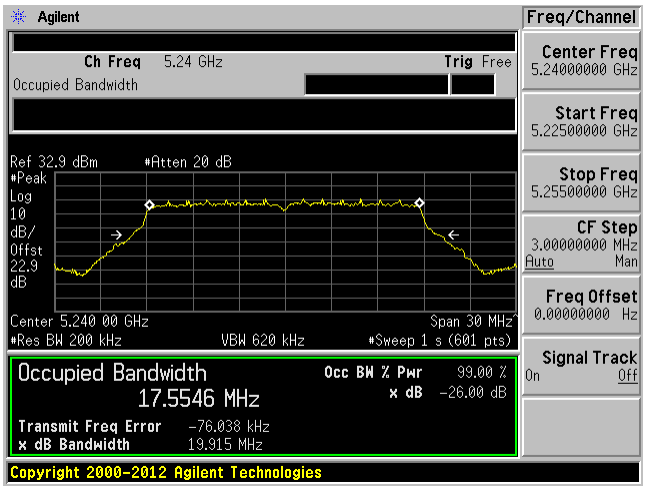
Low Channel ANT 2



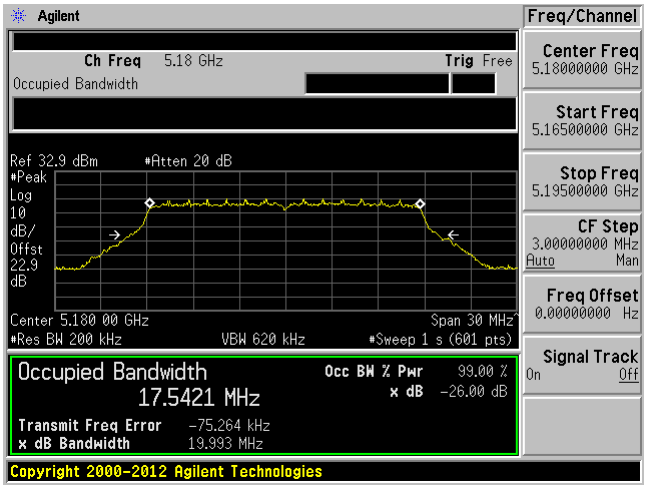
Mid Channel ANT 2



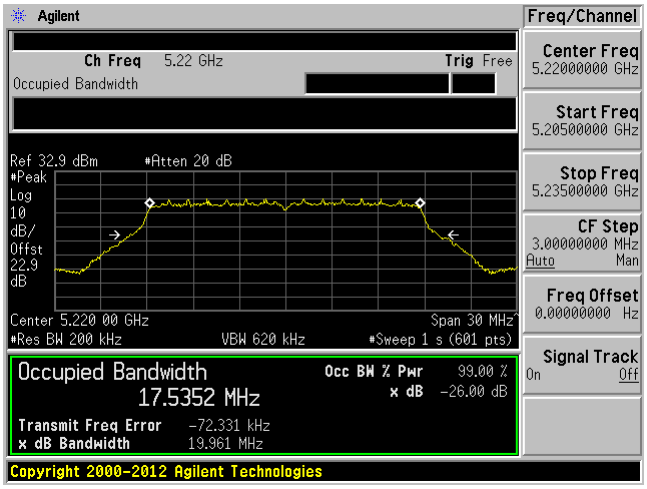
High Channel ANT 2



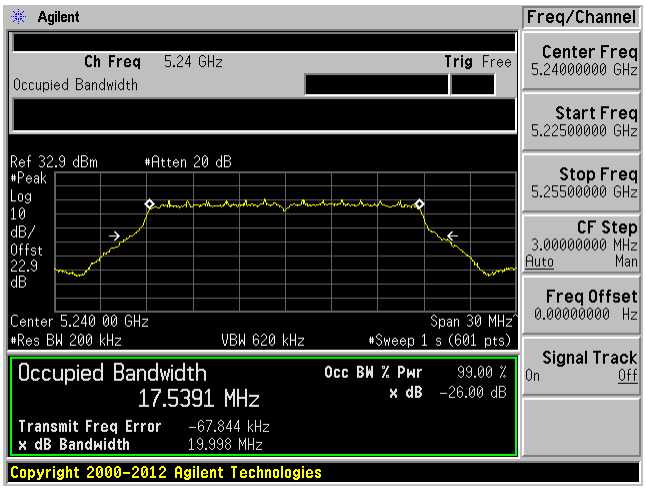
Low Channel ANT 3



Mid Channel ANT 3

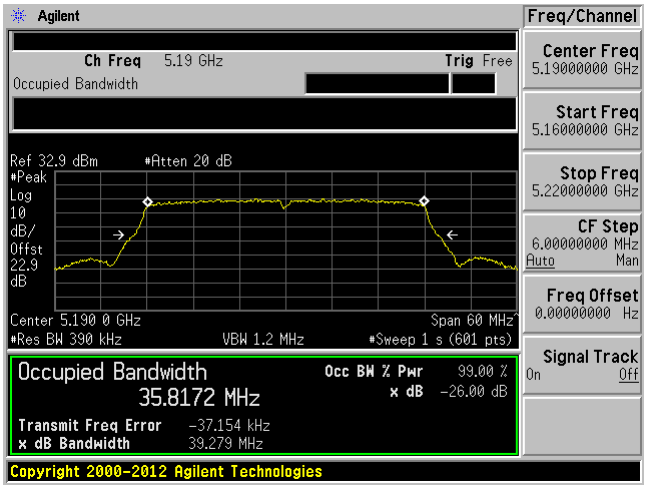


High Channel ANT 3

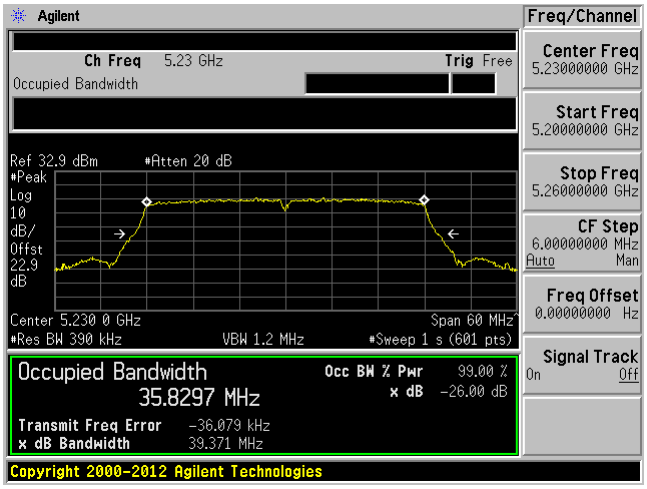


802.11VHT 40 Mode

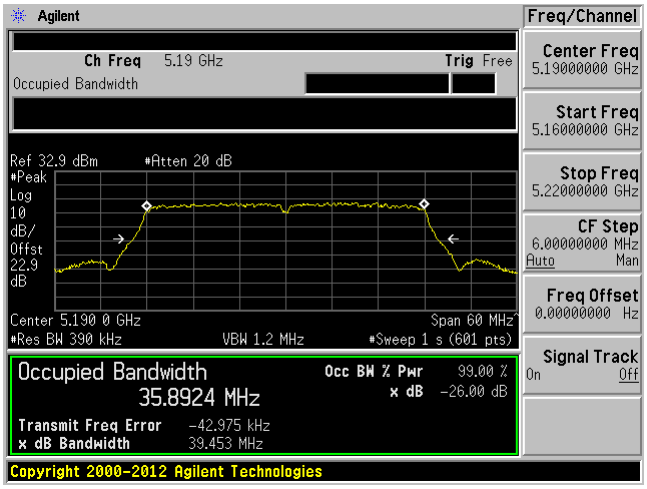
Low Channel ANT 1



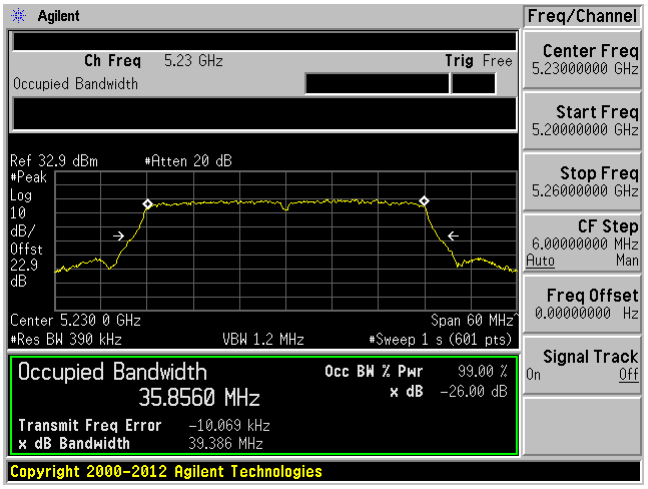
High Channel ANT 1



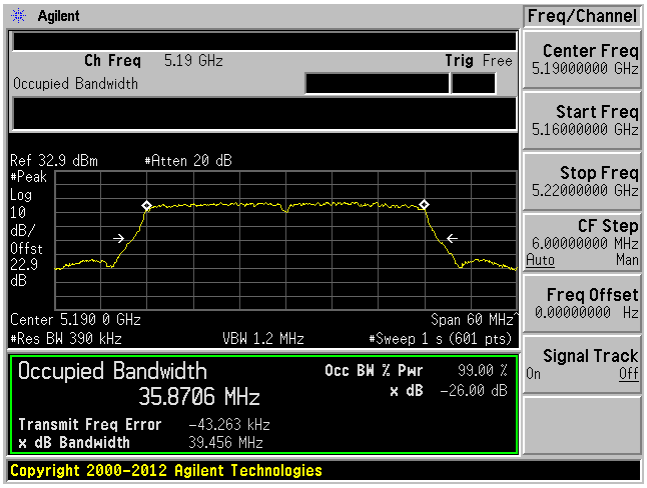
Low Channel ANT 2



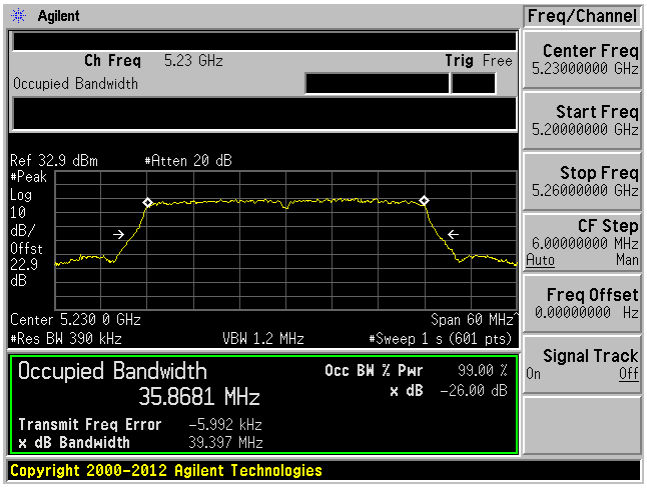
High Channel ANT 2



Low Channel ANT 3



High Channel ANT 3

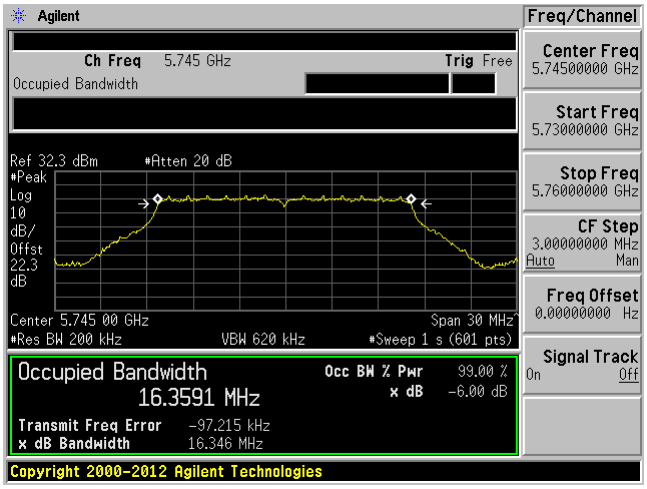


99% OBW

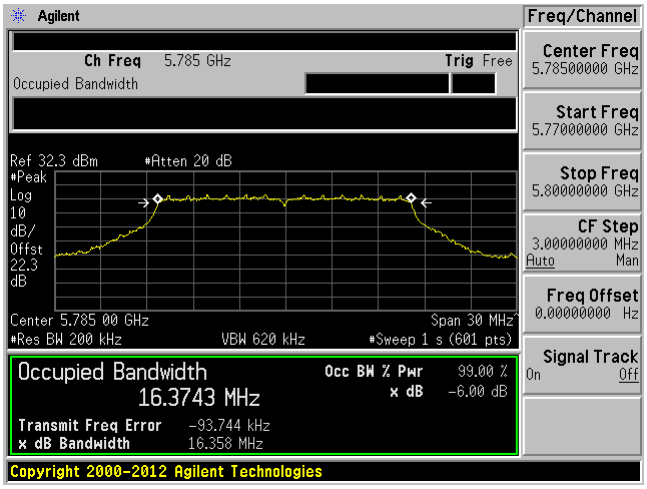
5725 - 5850 MHz

802.11Non-HT Mode

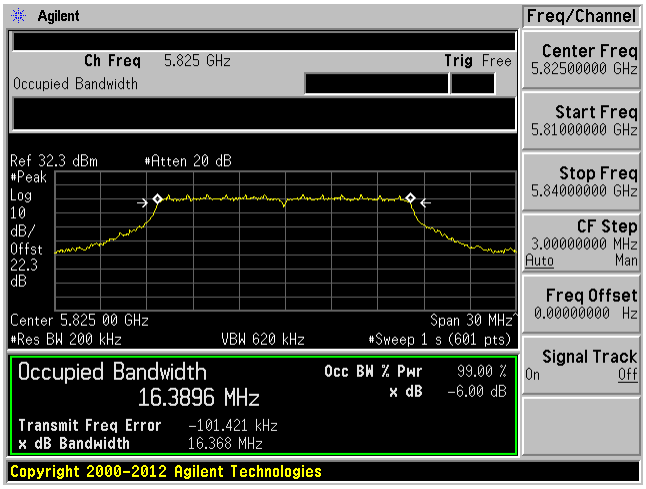
Low Channel ANT 1



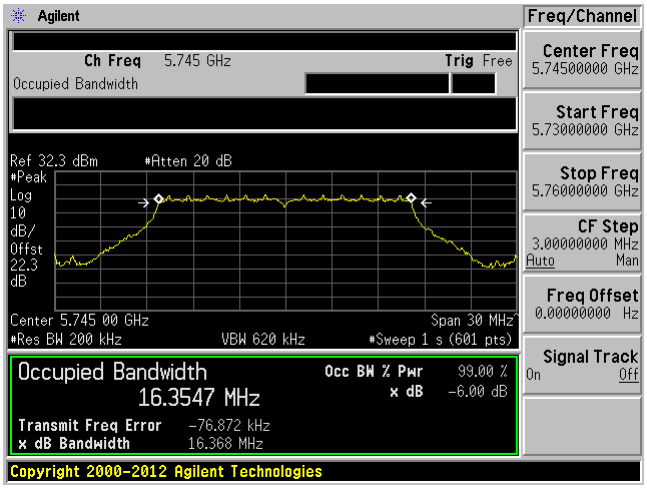
Mid Channel ANT 1



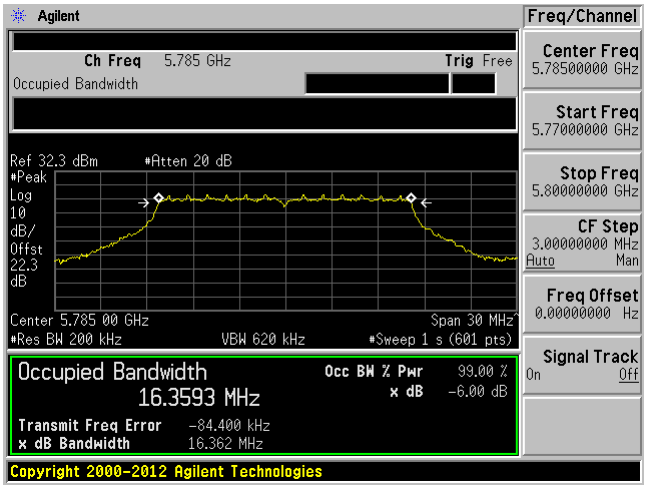
High Channel ANT 1



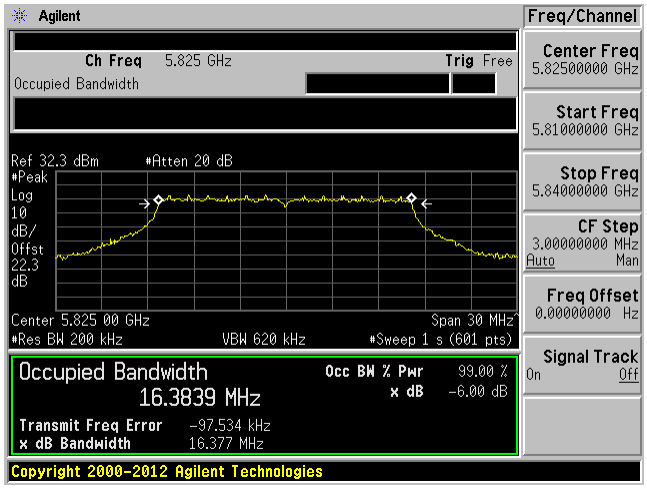
Low Channel ANT 2



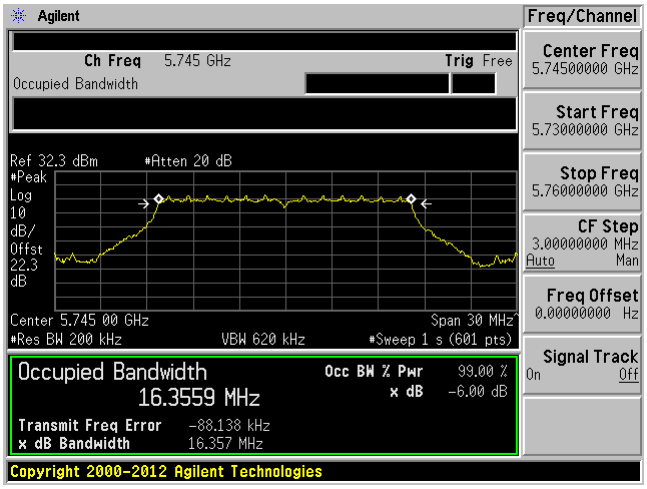
Mid Channel ANT 2



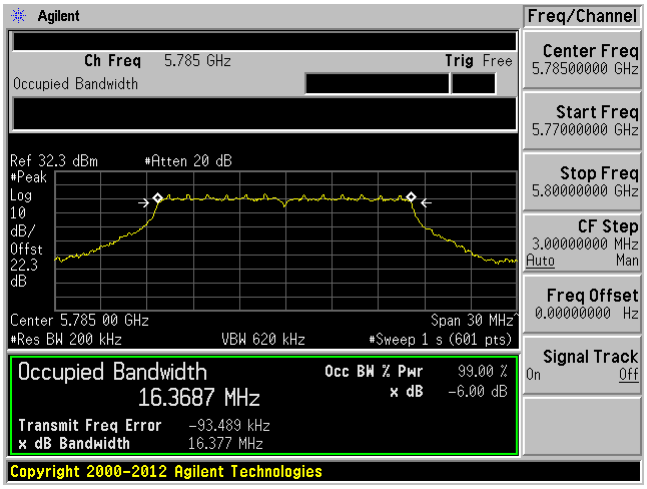
High Channel ANT 3



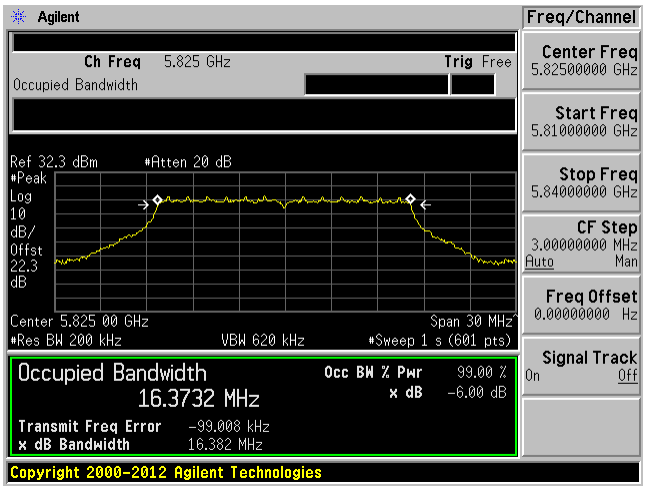
Low Channel ANT 3



Mid Channel ANT 3

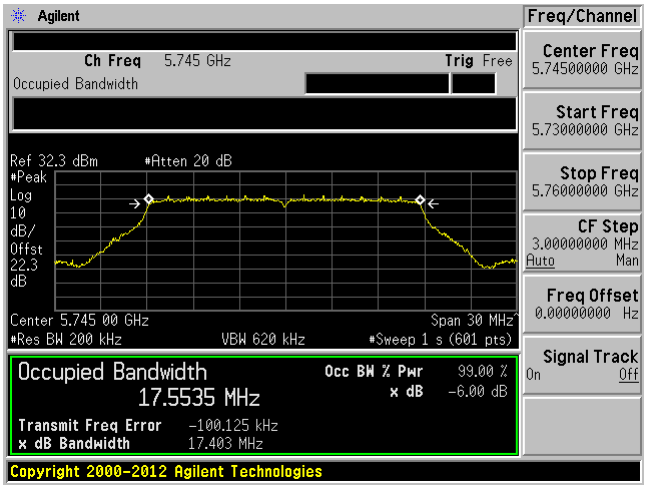


High Channel ANT 3

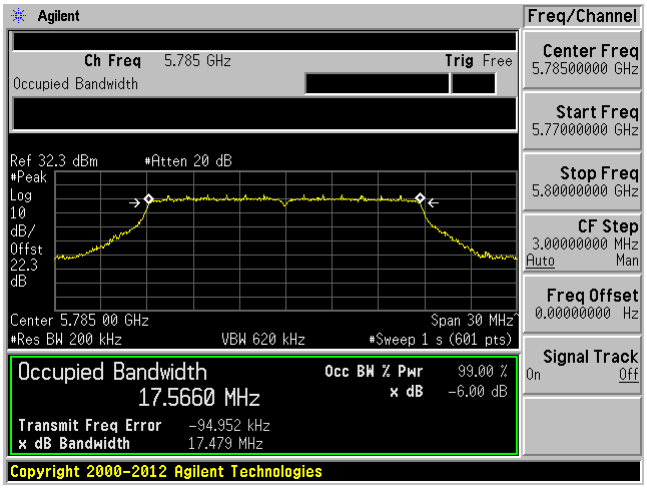


802.11VHT20 Mode

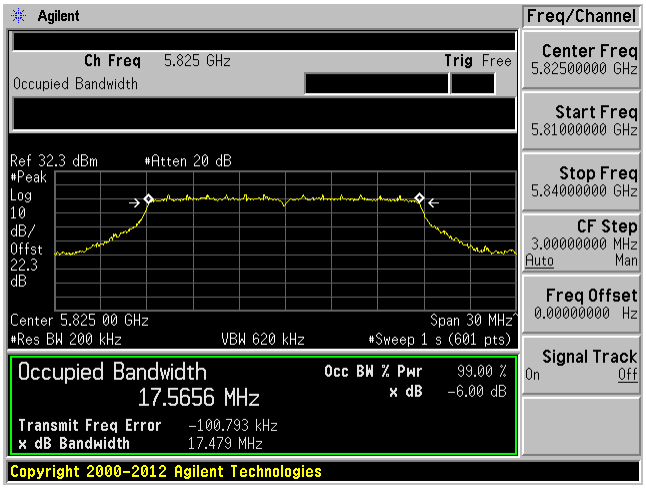
Low Channel ANT 1



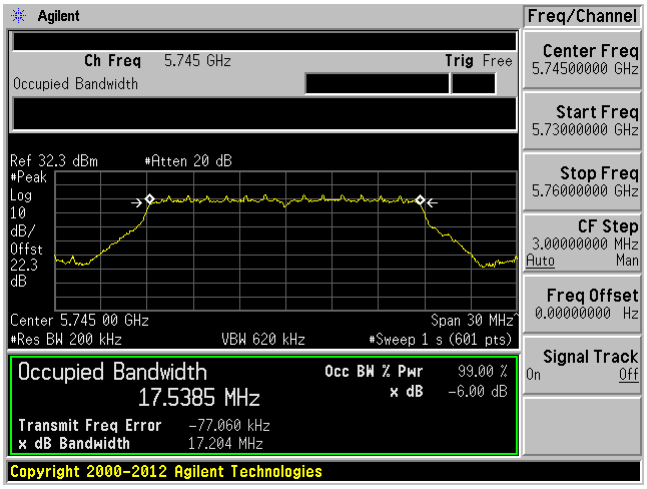
Mid Channel ANT 1



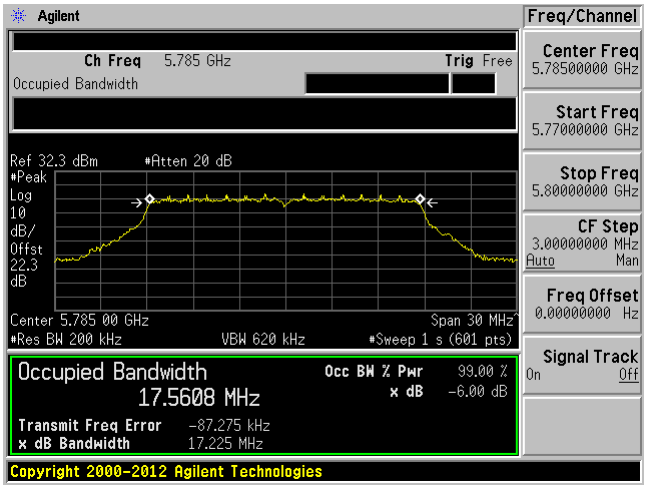
High Channel ANT 1



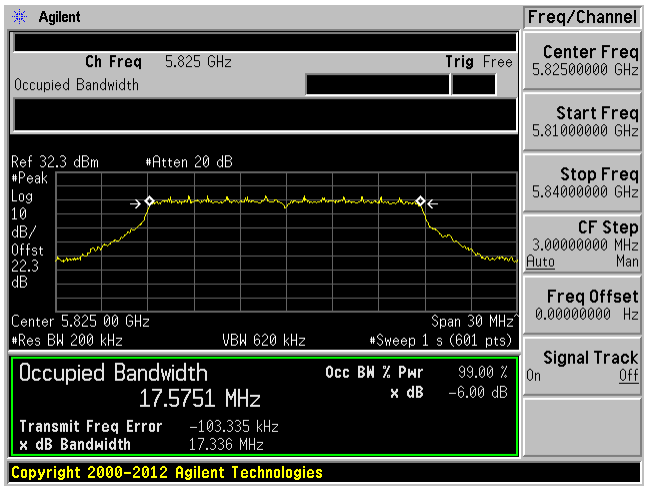
Low Channel ANT 2



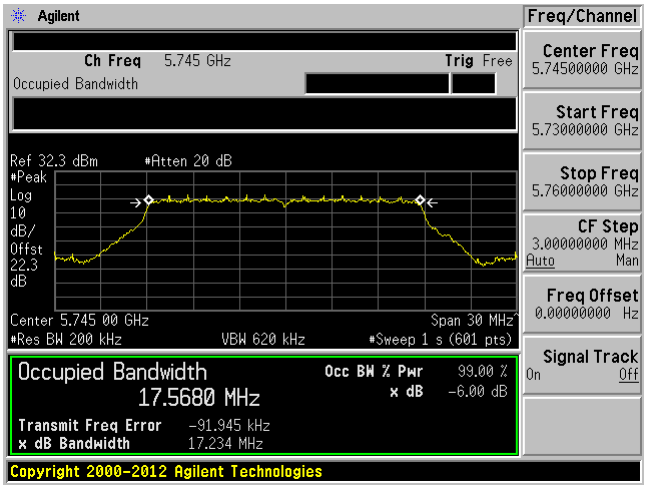
Mid Channel ANT 2



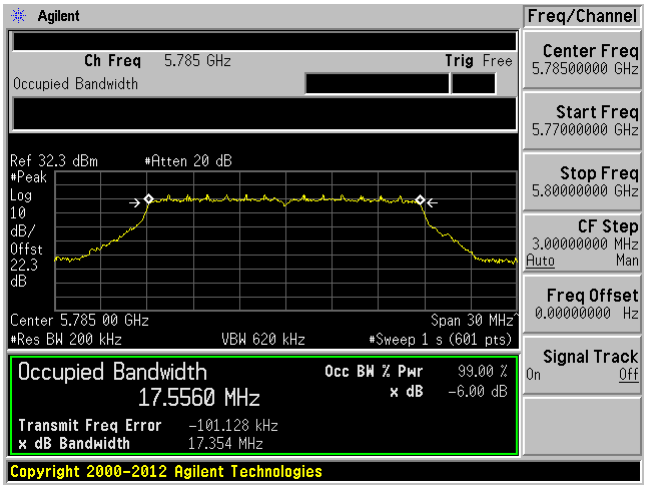
High Channel ANT 2



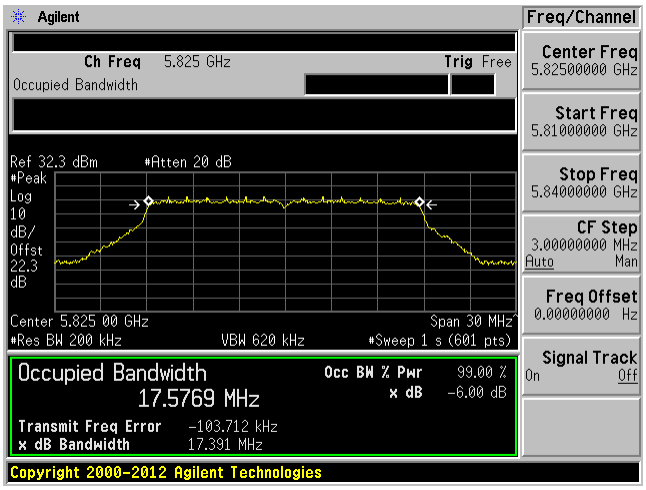
Low Channel ANT 3



Mid Channel ANT 3

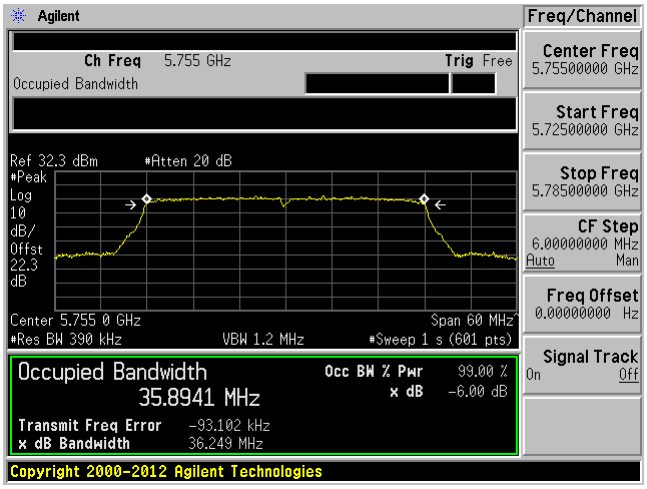


High Channel ANT 3

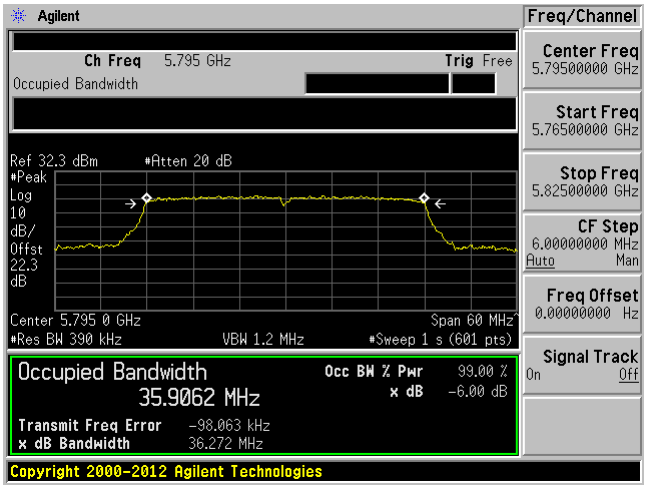


802.11VHT40 Mode

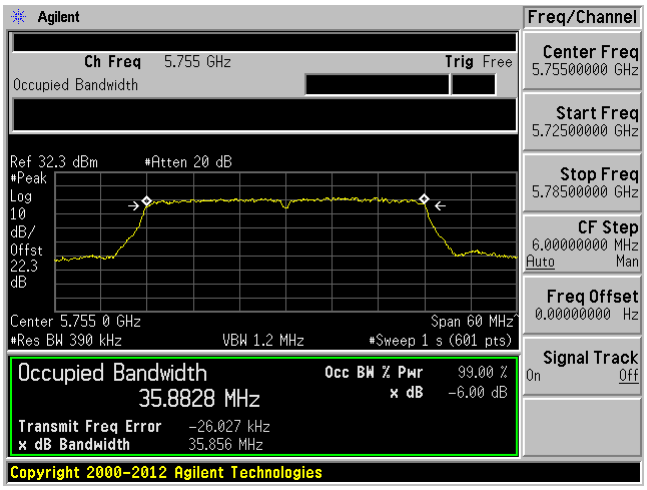
Low Channel ANT 1



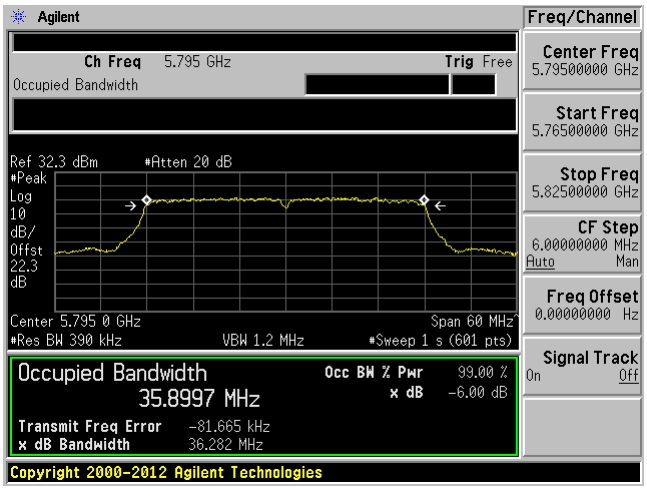
High Channel ANT 1



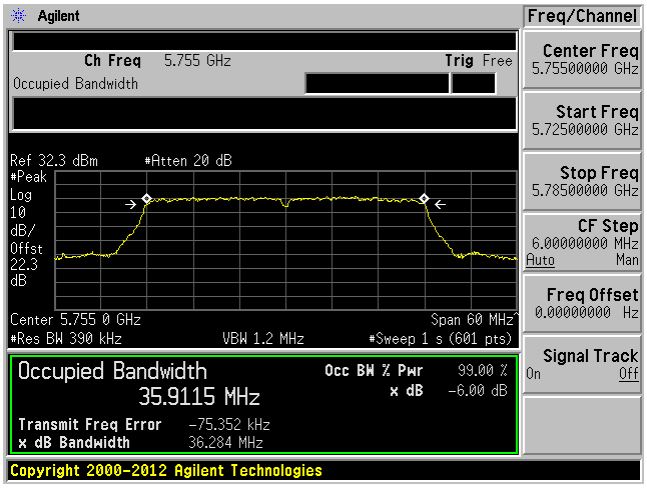
Low Channel ANT 2



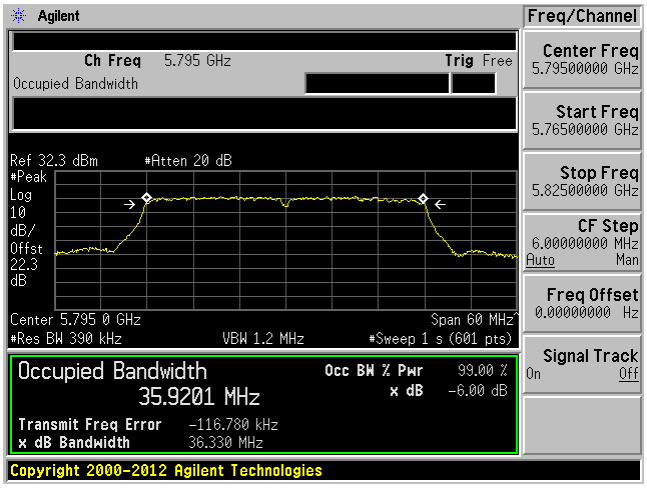
High Channel ANT 2



Low Channel ANT 3



High Channel ANT 3

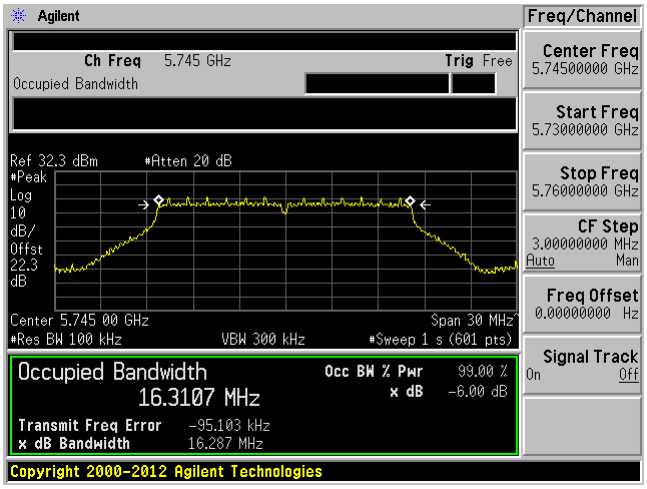


6dB OBW

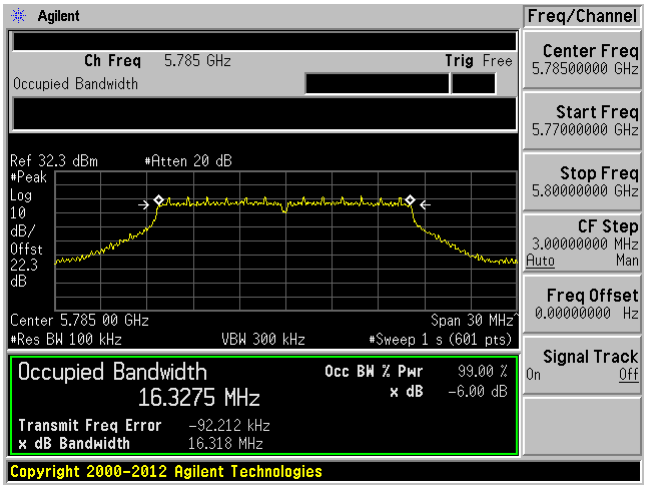
5725 - 5850 MHz

802.11Non-HT Mode

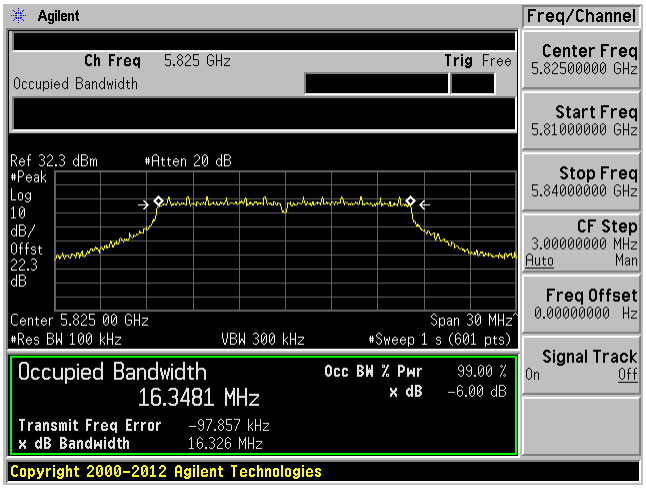
Low Channel ANT 1



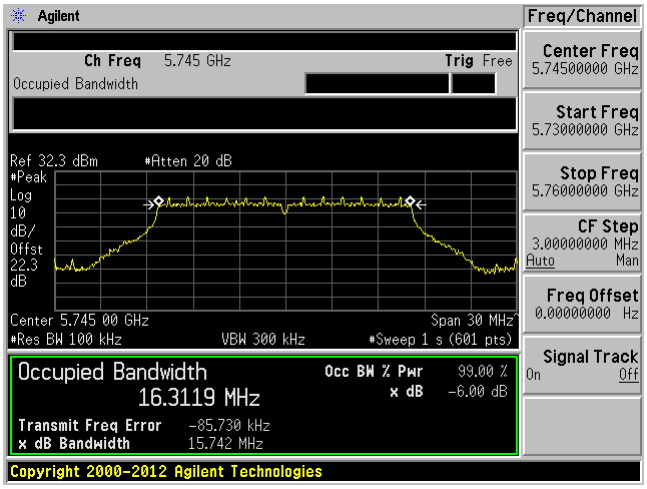
Mid Channel ANT 1



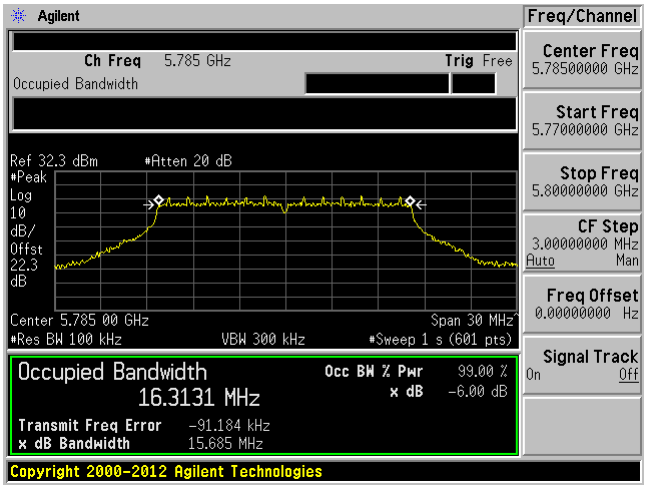
High Channel ANT 1



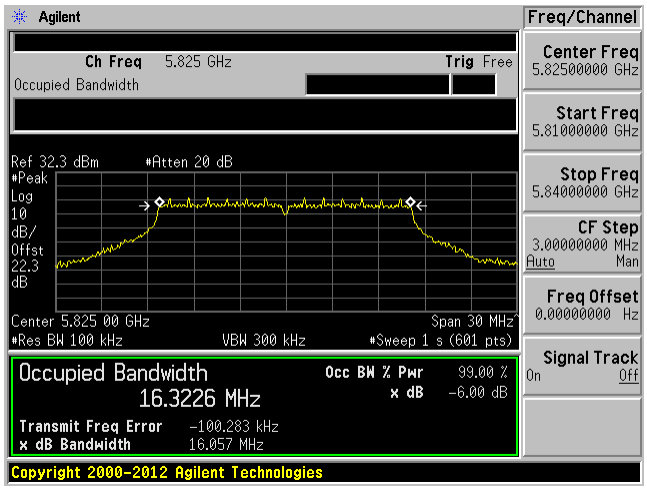
Low Channel ANT 2



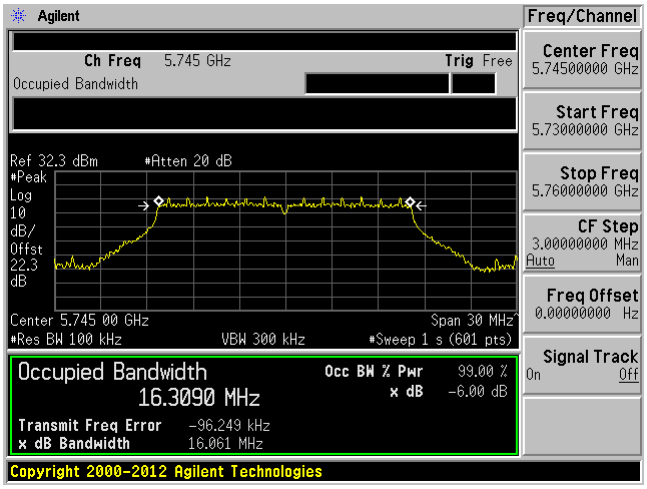
Mid Channel ANT 2



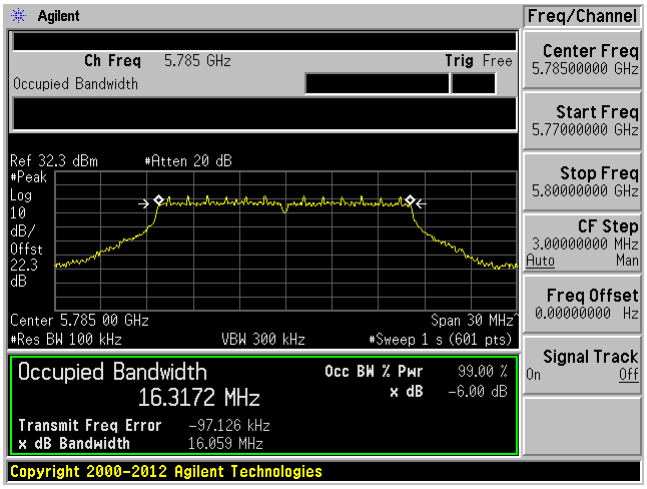
High Channel ANT 2



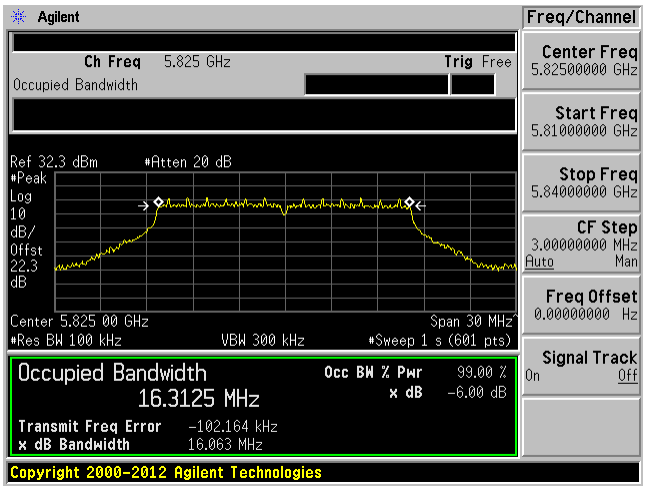
Low Channel ANT 3



Mid Channel ANT 3

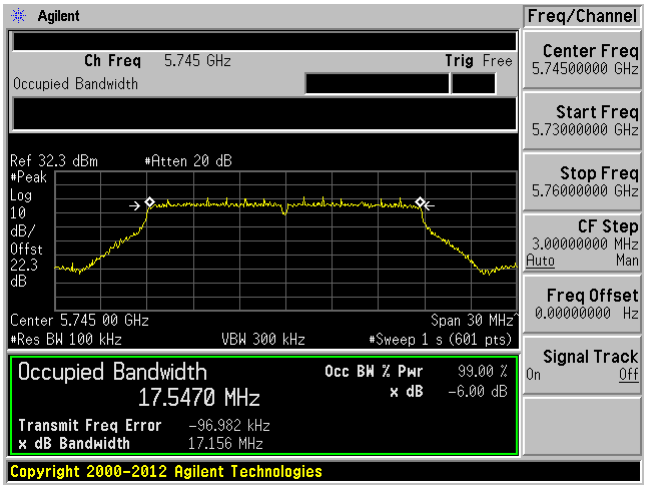


High Channel ANT 3

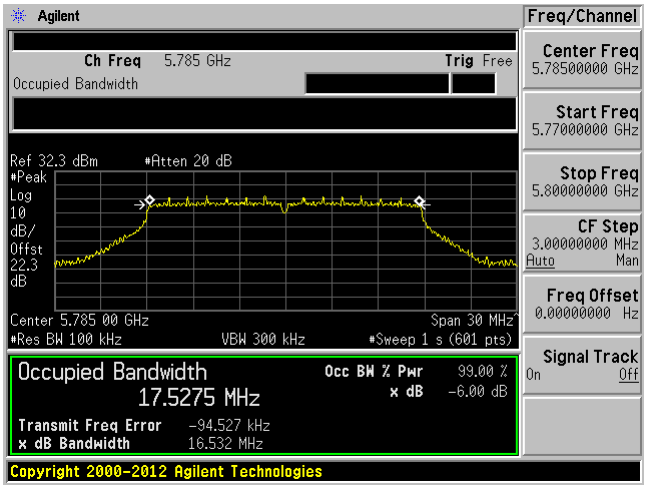


802.11VHT20 Mode

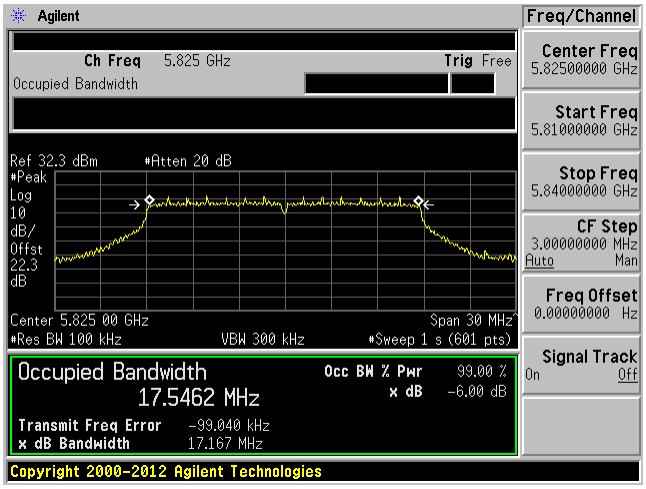
Low Channel ANT 1



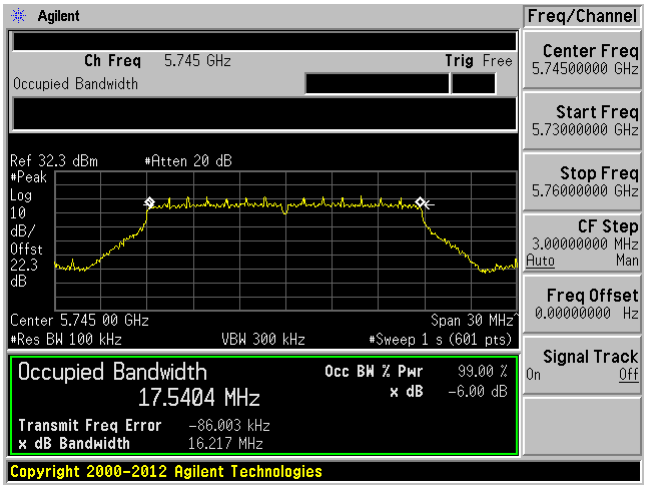
Mid Channel ANT 1



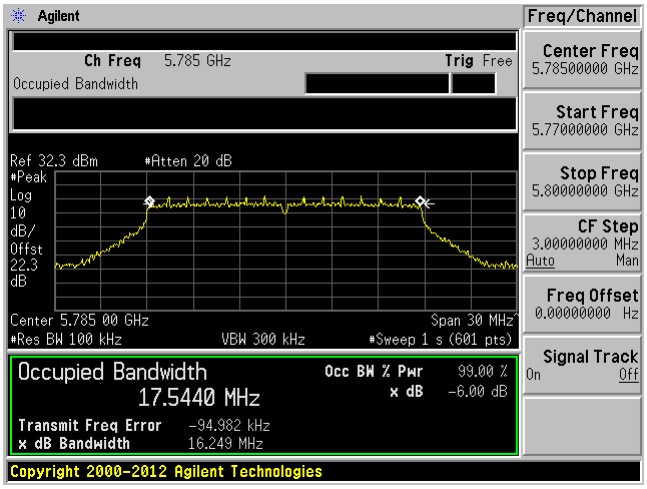
High Channel ANT 1



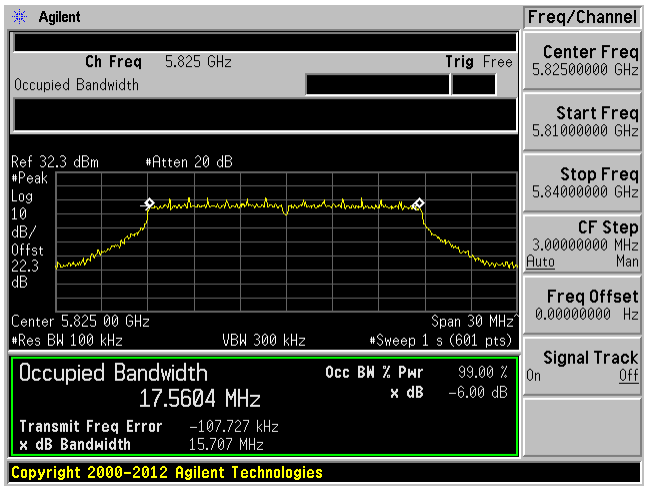
Low Channel ANT 2



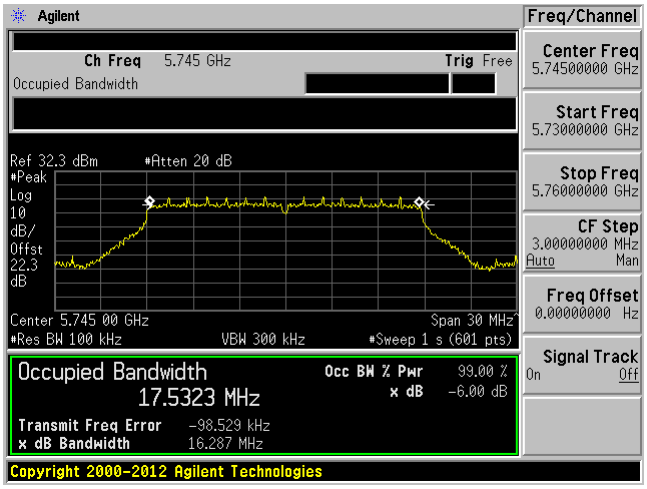
Mid Channel ANT 2



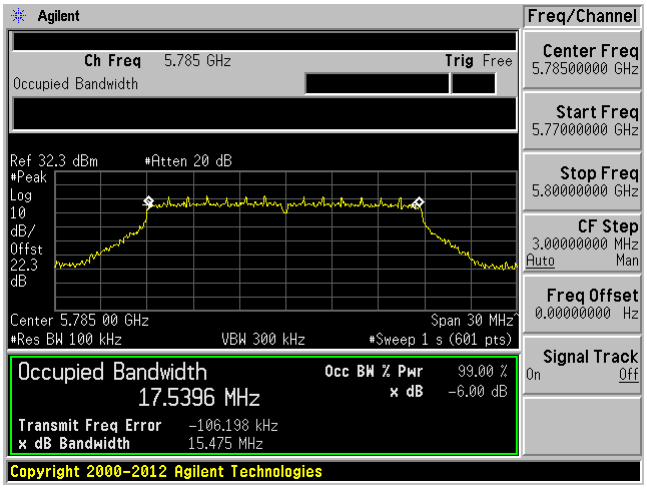
High Channel ANT 2



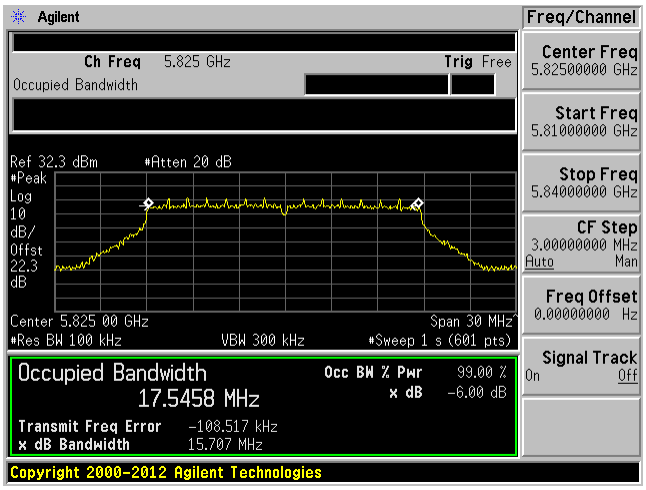
Low Channel ANT 3



Mid Channel ANT 3

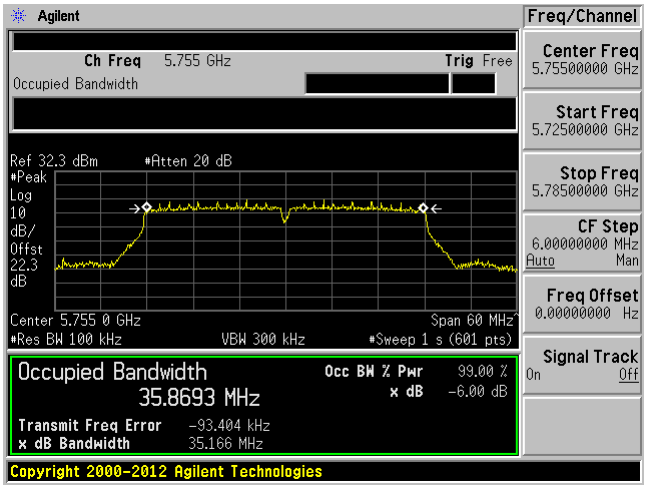


High Channel ANT 3

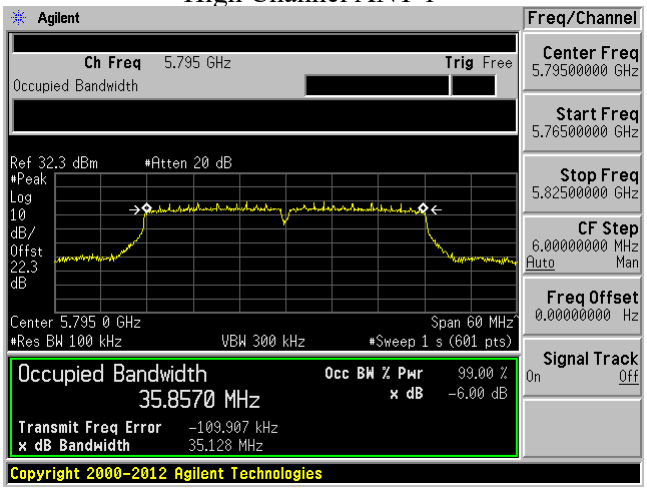


802.11VHT40 Mode

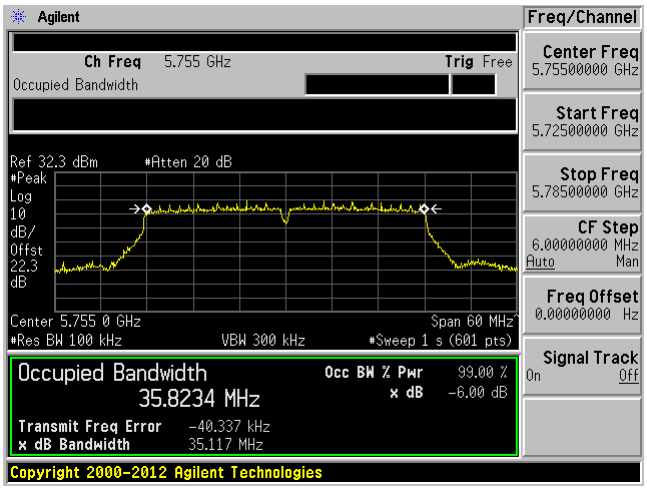
Low Channel ANT 1



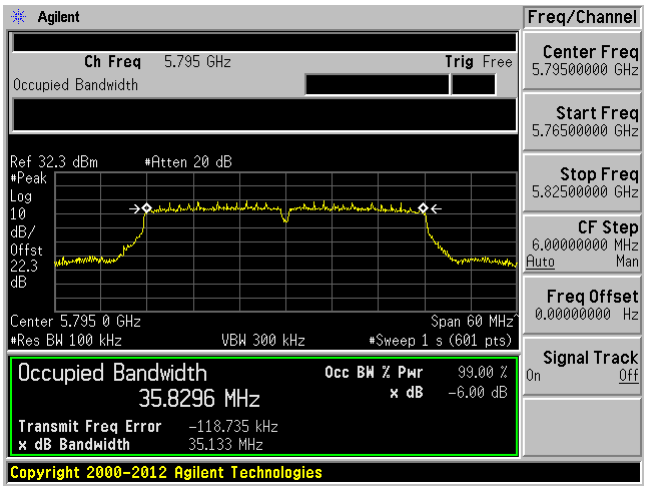
High Channel ANT 1



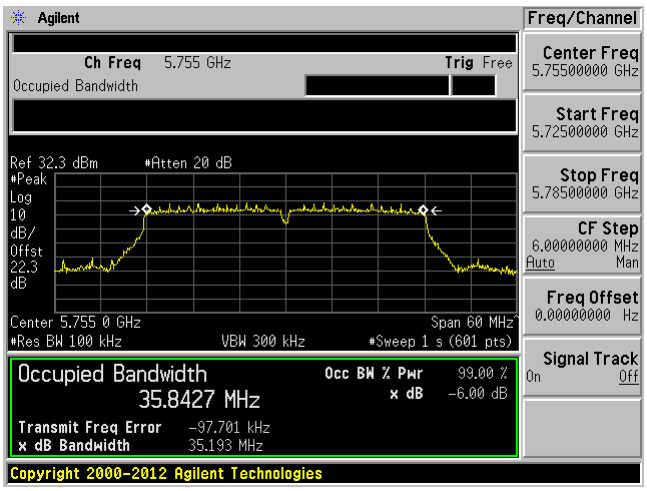
Low Channel ANT 2



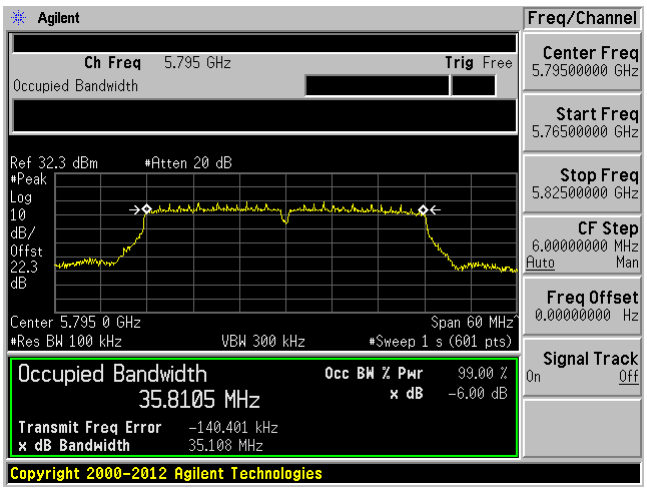
High Channel ANT 2



Low Channel ANT 3



High Channel ANT 3



9 FCC §407(a) & ISEDC RSS-247 §6.2 - Output Power

9.1 Applicable Standards

According to FCC §15.407(a):

For an outdoor 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. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

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.

According to ISEDC RSS-247 §6.2.4 for frequency band 5725-5850 MHz:

The maximum conducted output power shall not exceed 1 W. The output 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 output 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 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.

9.2 Measurement Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to spectrum analyzer.
3. Set the analyzer as follows:

   RBW = 1 MHz.
   VBW ≥ 3 MHz.
   Number of points in sweep ≥ 2 × span / RBW
   Sweep time = auto.
   Detector = power averaging (rms),
   Trace average at least 100 traces in power averaging (rms) mode.

4. Using power measurement function to integrating the spectrum across the measuted occupied bandwidth.

9.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	MY48250238	2019-06-26	18 Months
-	RF cable	-	-	Each time[1]	N/A
-	20 dB attenuator	-	-	Each time[1]	N/A

Note[1]: cable and attenuator included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all 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 the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

9.4 Test Environmental Conditions

Temperature:	22-24 ºC
Relative Humidity:	41 %
ATM Pressure:	102.7 kPa

The testing was performed by Zhao Zhao on 2020-09-09 at RF site.

9.5 Test Results

5150 - 5250 MHz (FCC only)

Channel	Frequency (MHz)	Conducted Output Power (dBm)			Total (dBm)	FCC Limit (dBm)
		ANT 1	ANT 2	ANT 3		
802.11Non-HT mode						
Low	5180	21.92	22.16	21.99	-	29.1
Middle	5220	22.10	22.38	21.83	-	29.1
High	5240	21.45	22.39	22.07	-	29.1
802.11VHT20 mode						
Low	5180	20.62	21.34	21.40	25.91	29.1
Middle	5220	22.13	21.58	21.58	26.54	29.1
High	5240	21.07	21.91	21.69	26.34	29.1
802.11VHT40 mode						
Low	5190	22.61	20.46	20.50	26.08	29.1
High	5230	23.10	22.09	22.90	27.49	29.1

Channel	Frequency (MHz)	Conducted Output Power (dBm)			Antenna Gain at Elevation angel above 30 degree (dBi)	EIRP at Elevation angel above 30 degree (dBm)			FCC Limit (dBm)
		ANT 1	Ant 2	ANT 3		ANT 1	Ant 2	ANT 3	
802.11Non-HT Mode									
Low	5180	21.92	22.16	21.99	-7	14.91	15.16	14.99	21
Middle	5220	22.10	22.38	21.83	-7	15.10	15.38	14.83	21
High	5240	21.45	22.39	22.07	-7	14.45	15.39	15.07	21
802.11VHT20 mode									
Low	5180	25.91			-7	18.91			21
Middle	5220	26.54			-7	19.54			21
High	5240	26.34			-7	19.34			21
802.11VHT40 mode									
Low	5190	26.08			-7	19.08			21
High	5230	27.49			-7	20.49			21

5745 - 5825 MHz

Channel	Frequency (MHz)	Conducted Output Power (dBm)			Total (dBm)	FCC Limit (dBm)
		ANT 1	ANT 2	ANT 3		
802.11Non-HT mode						
Low	5745	23.67	23.83	24.04	-	29.1
Middle	5785	24.11	24.08	24.38	-	29.1
High	5825	24.20	23.73	23.67	-	29.1
802.11VHT20 mode						
Low	5745	23.36	23.59	23.49	28.25	29.1
Middle	5785	23.86	23.82	23.81	28.60	29.1
High	5825	23.89	23.45	23.29	28.32	29.1
802.11VHT40 mode						
Low	5755	23.76	23.97	23.92	28.66	29.1
High	5795	24.39	24.29	24.10	29.03	29.1

Note: Declared by the applicant, this radio module only supports STBC mode in 802.11n and 802.11ac modes. Therefore, the directional antenna gain is 6.9 dBi.

When the directional gain is greater than 6dBi, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Hence, the limit of the output power is 30dBm – (6.9-6) dbi = 29.1 dBm.

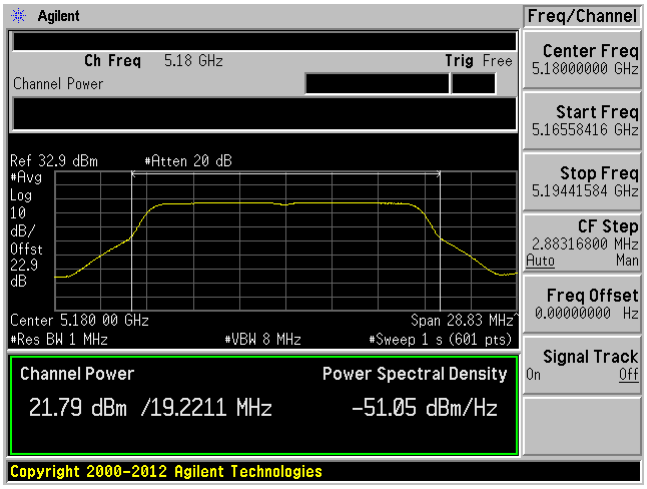
Note: The manufacturer declares the antenna gain at elevation angle above 30 degrees is -7 dBi.

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

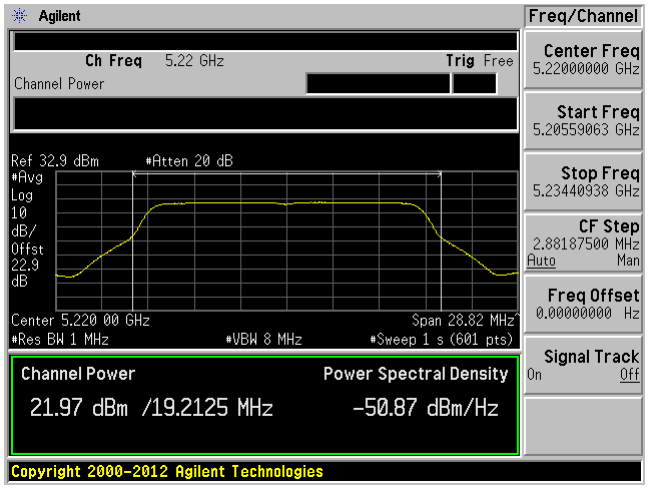
5150 - 5250 MHz

802.11Non-HT Mode

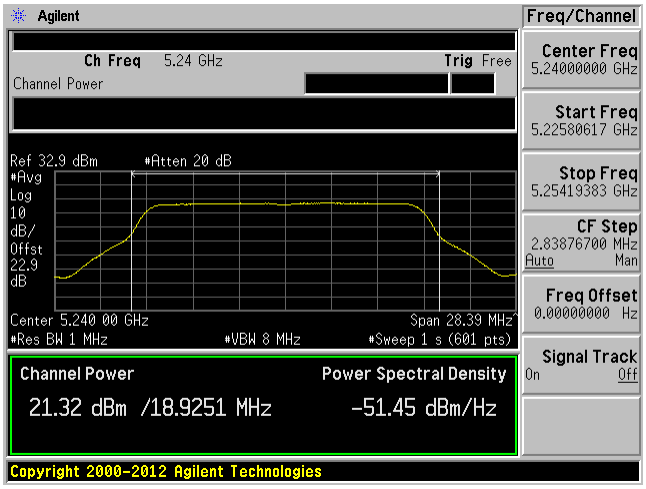
Low Channel ANT 1



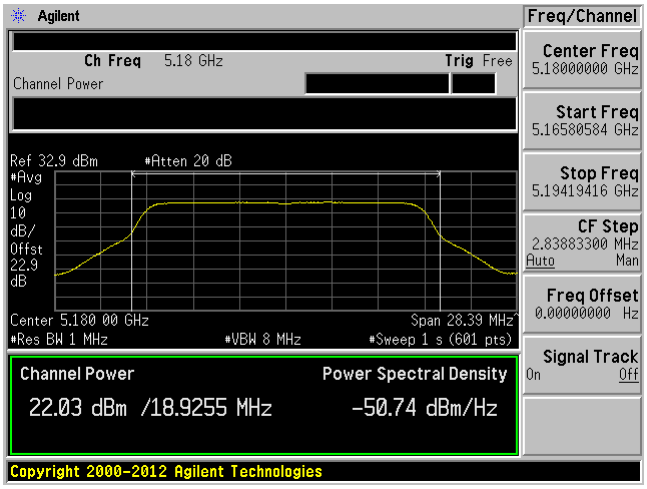
Mid Channel ANT 1



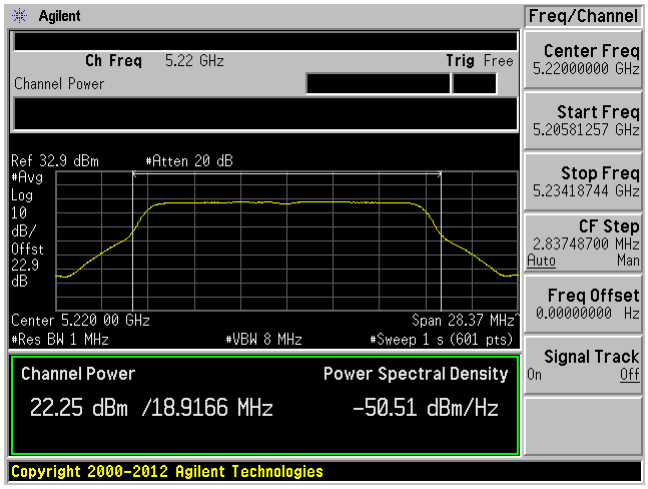
High Channel ANT 1



Low Channel ANT 2



Mid Channel ANT 2



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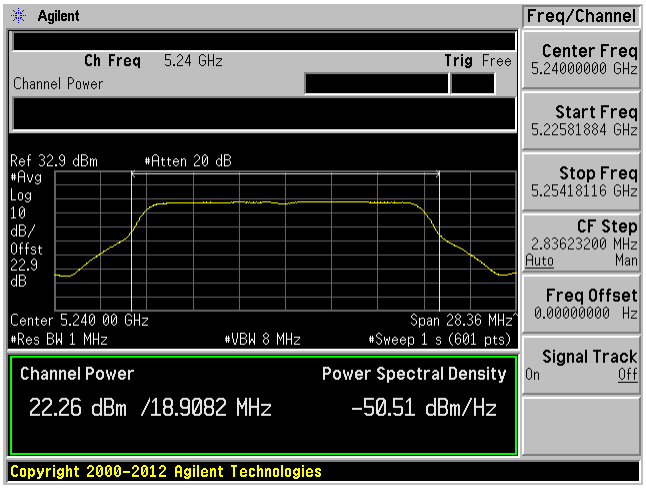
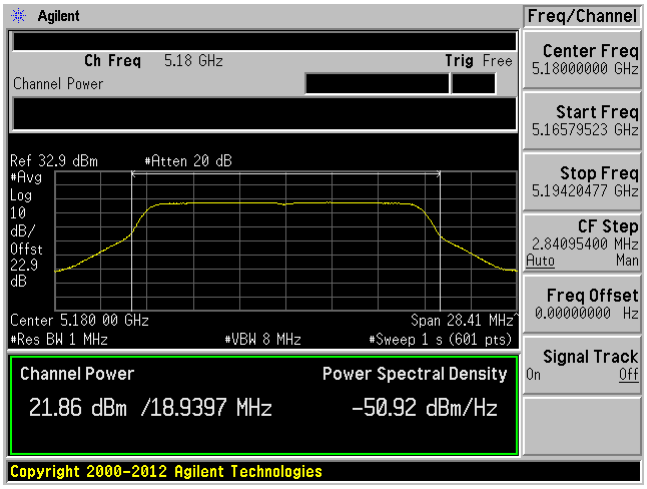
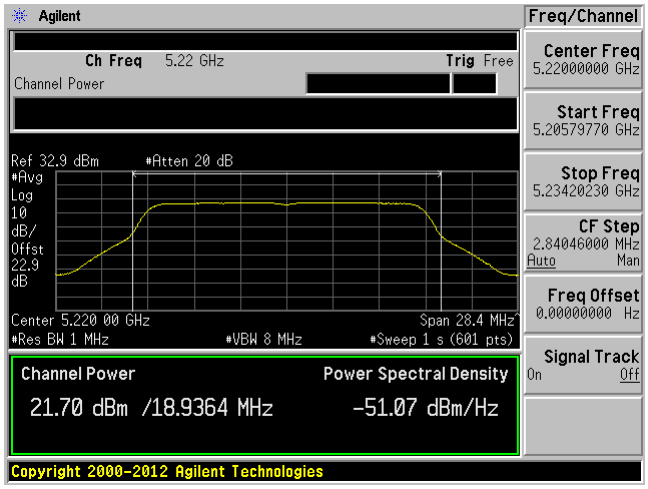


Low Channel ANT 3



Mid Channel ANT 3



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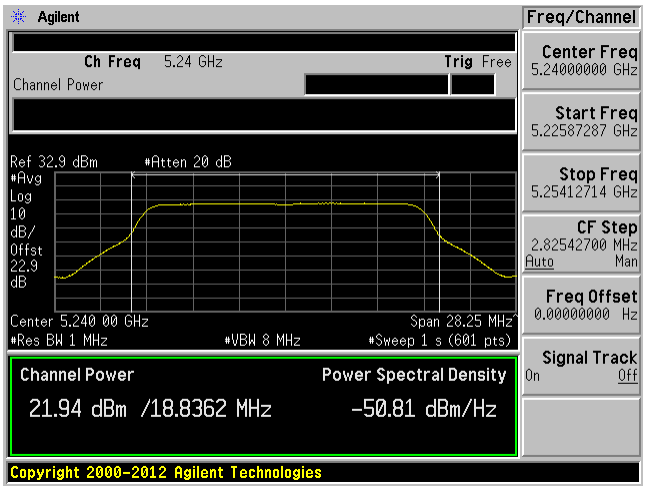
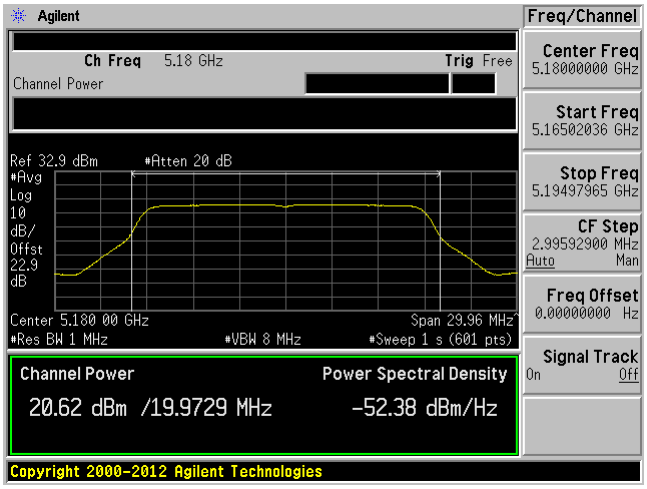
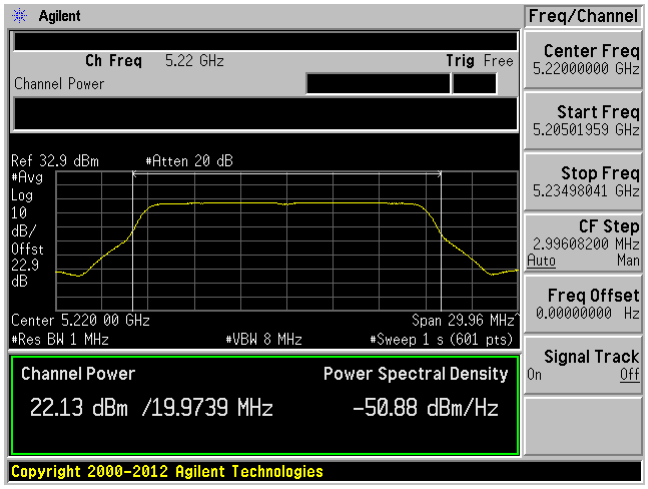


802.11VHT 20 Mode

Low Channel ANT 1



Mid Channel ANT 1



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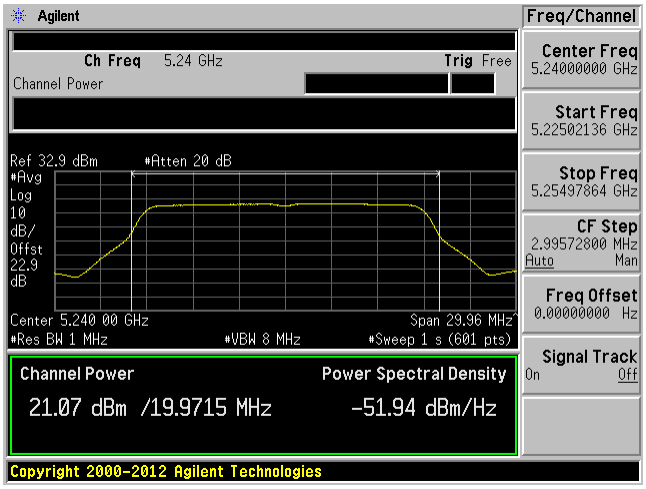

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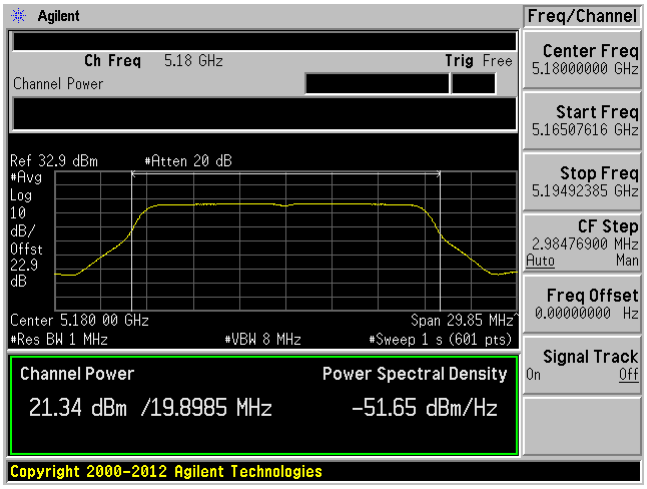

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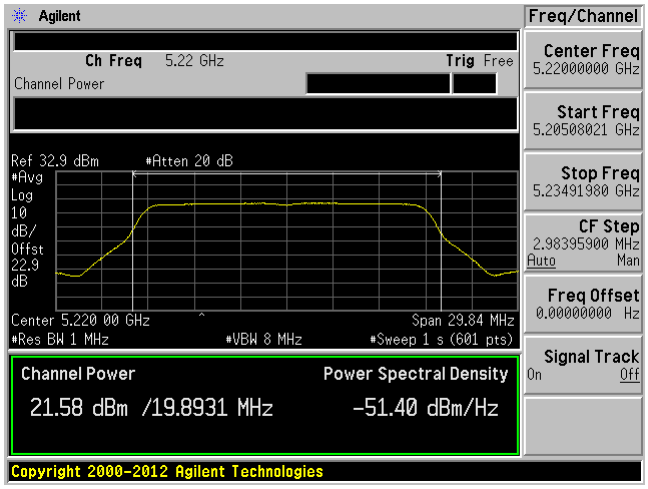

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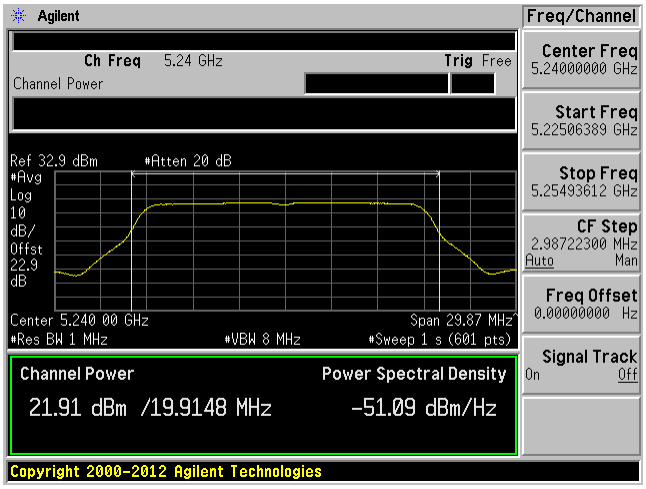
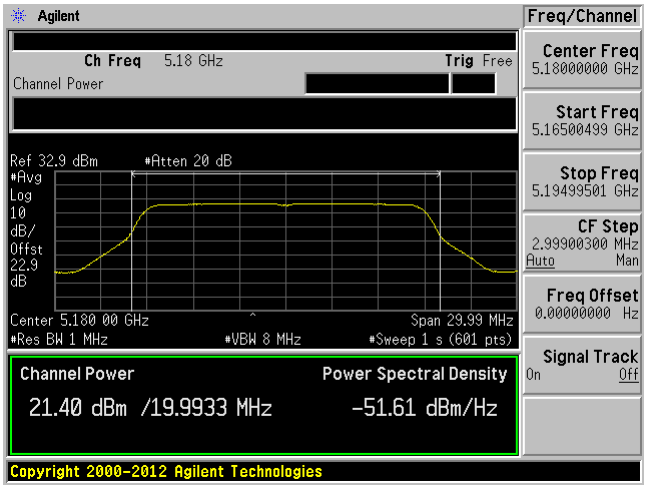


Low Channel ANT 3



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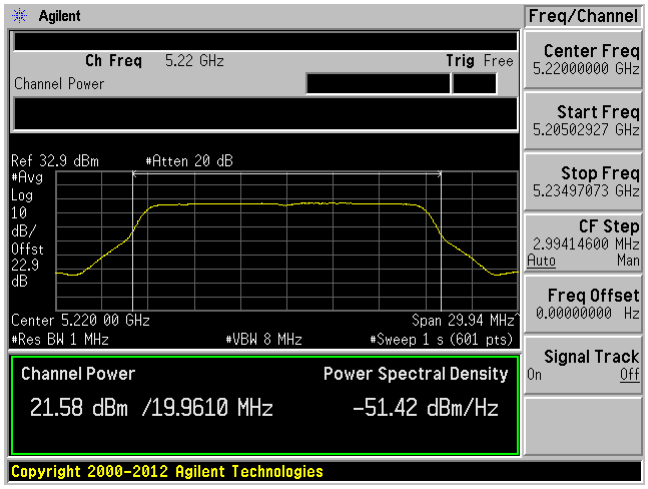
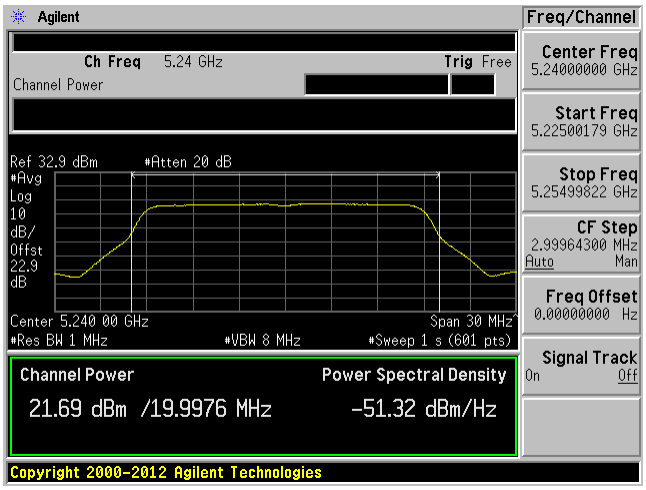
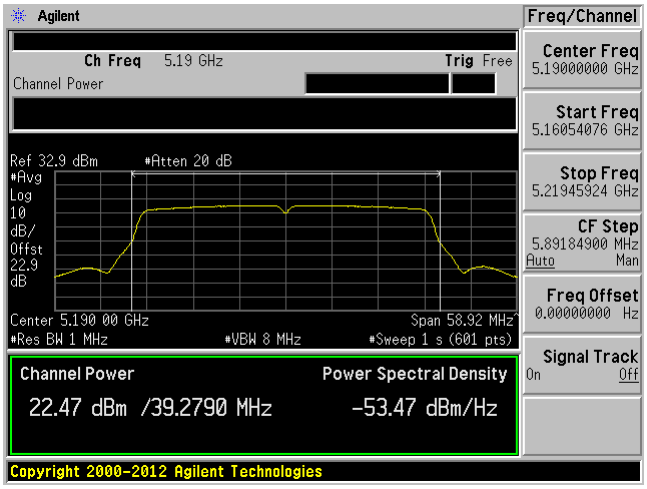


High Channel ANT 3



802.11VHT 40 Mode

Low Channel ANT 1



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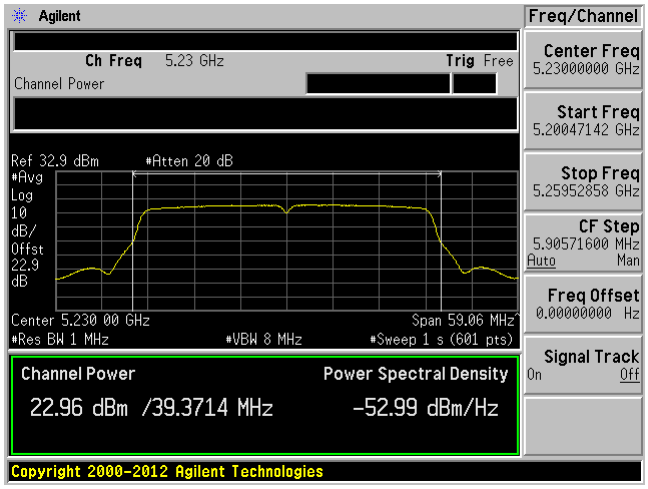
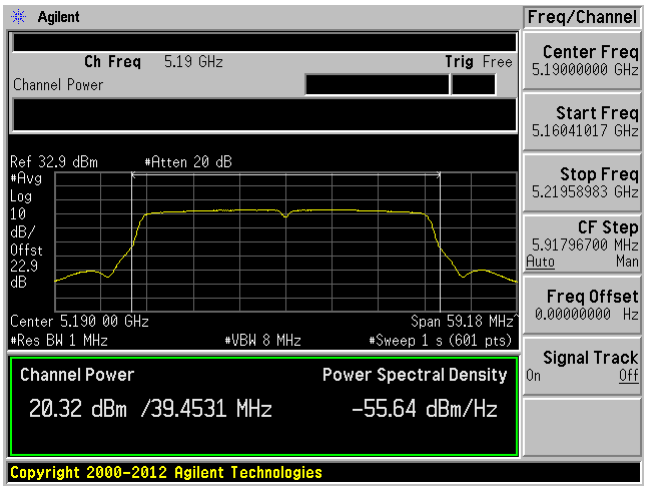


Low Channel ANT 2



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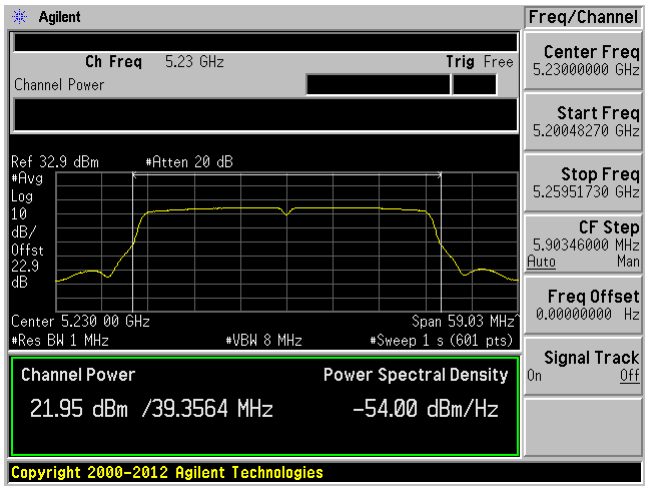
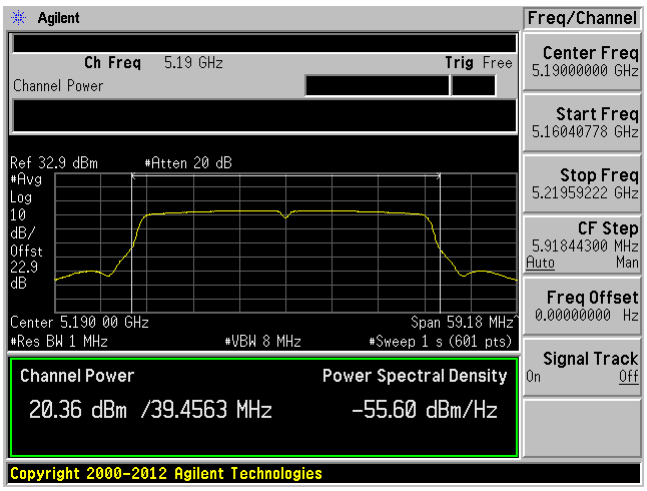
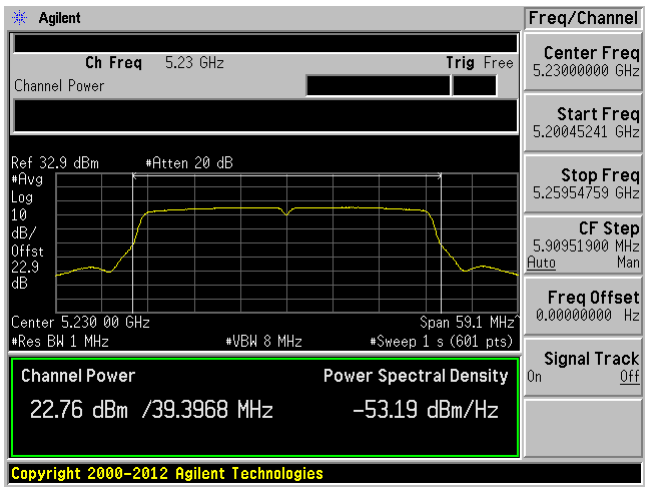


Low Channel ANT 3



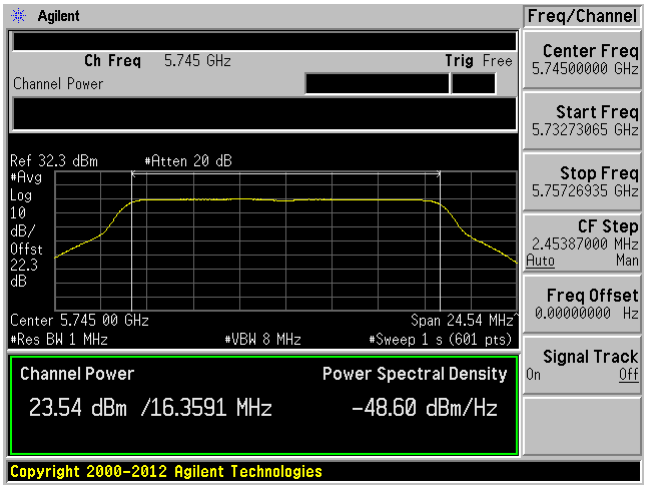
High Channel ANT 3



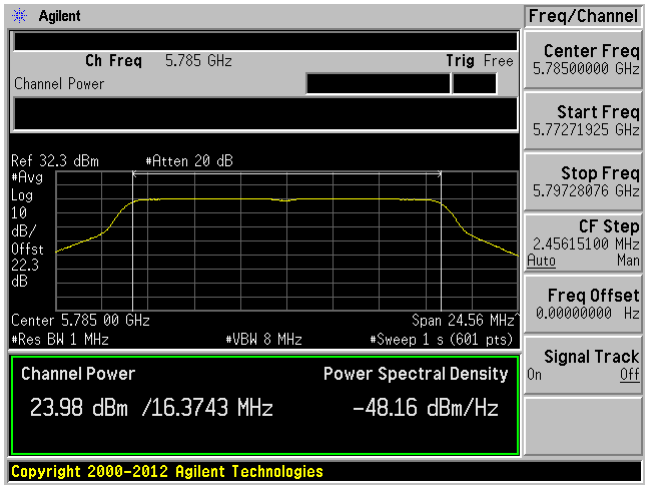
5745 - 5825 MHz

802.11Non-HT Mode

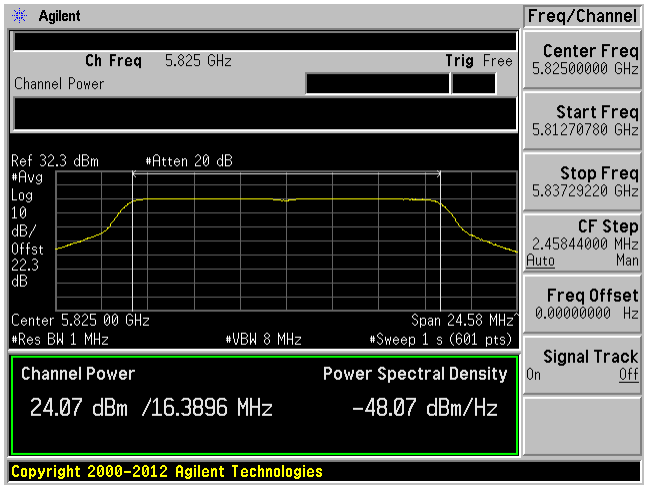
Low Channel ANT 1



Mid Channel ANT 1



High Channel ANT 1



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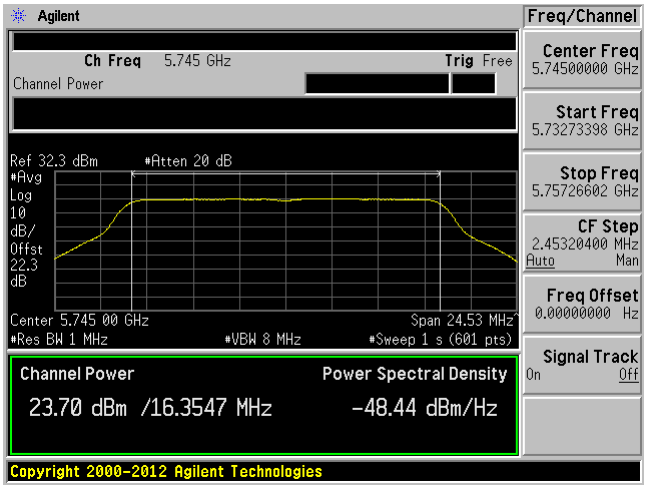
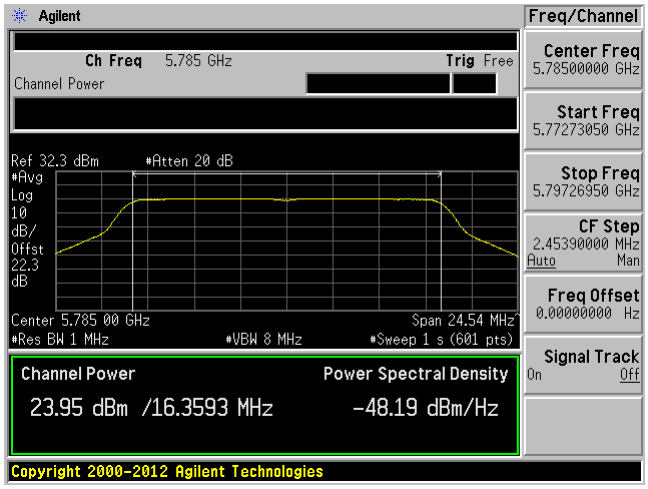
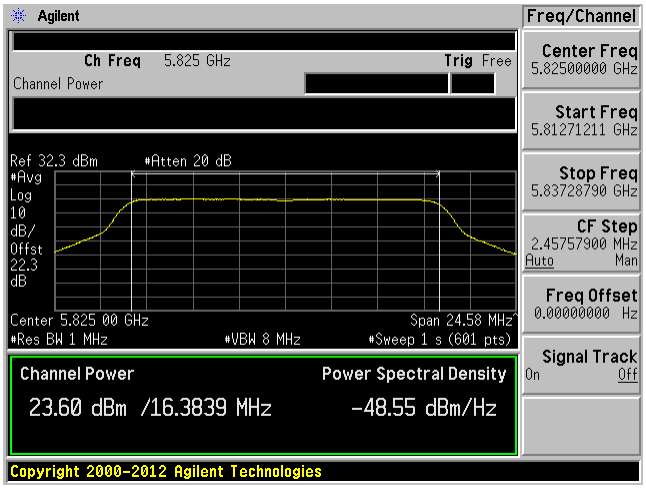


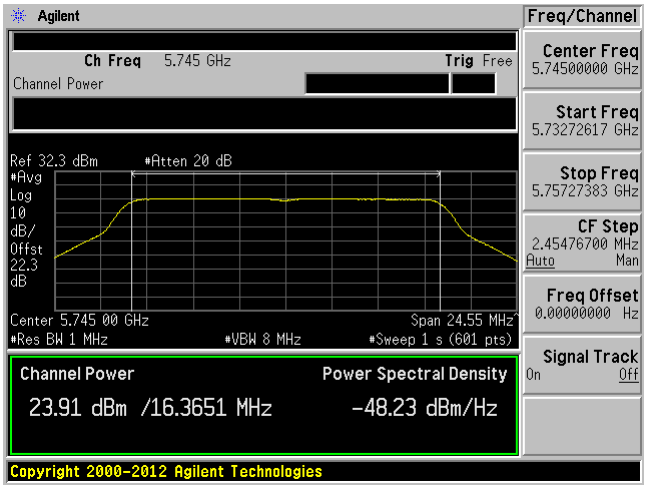
Mid Channel ANT 2



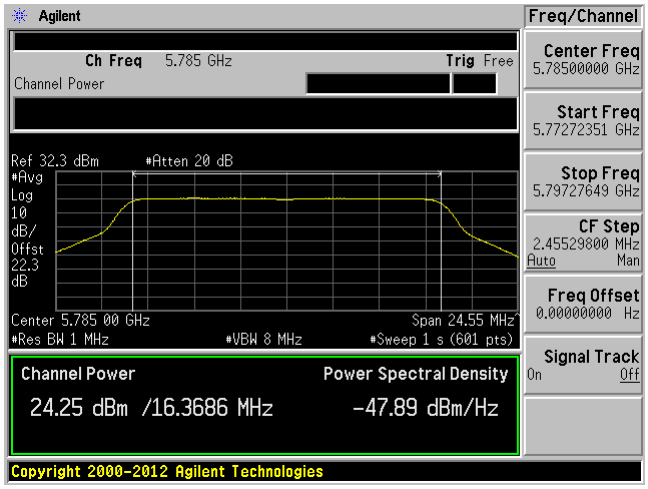
High Channel ANT 2



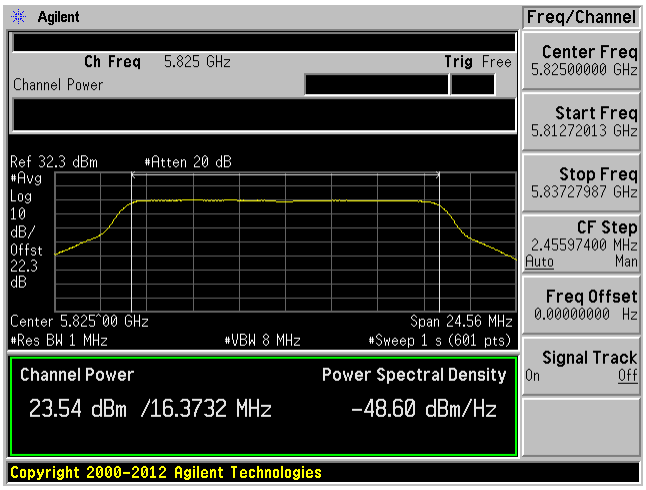
Low Channel ANT 3



Mid Channel ANT 3

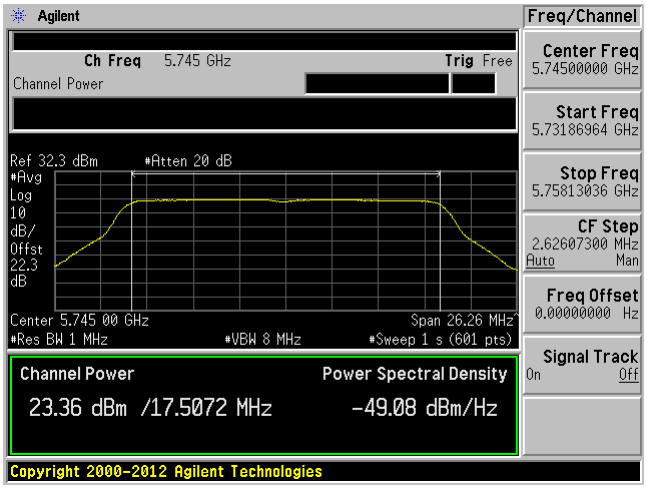


High Channel ANT 3

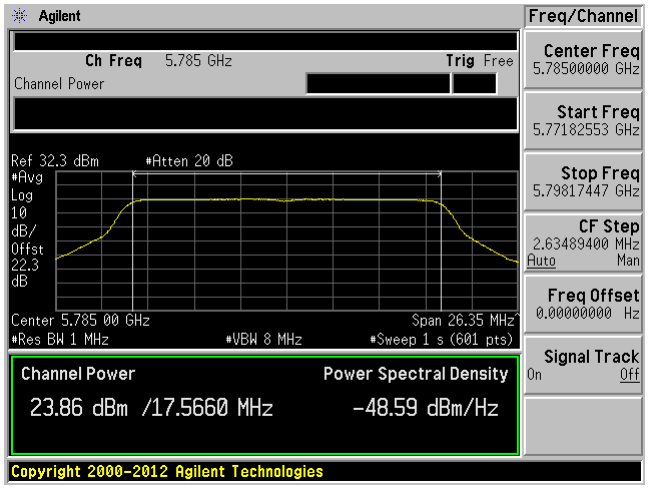


802.11VHT 20 Mode

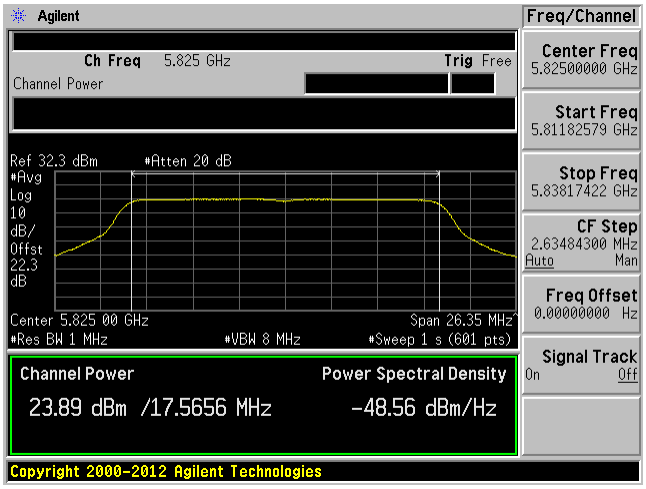
Low Channel ANT 1



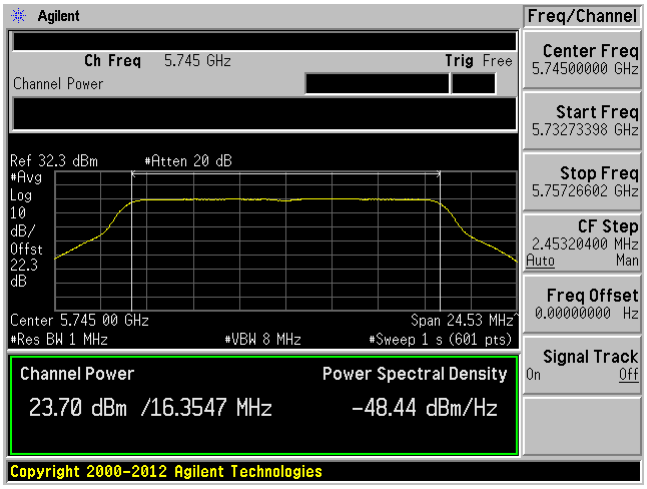
Mid Channel ANT 1



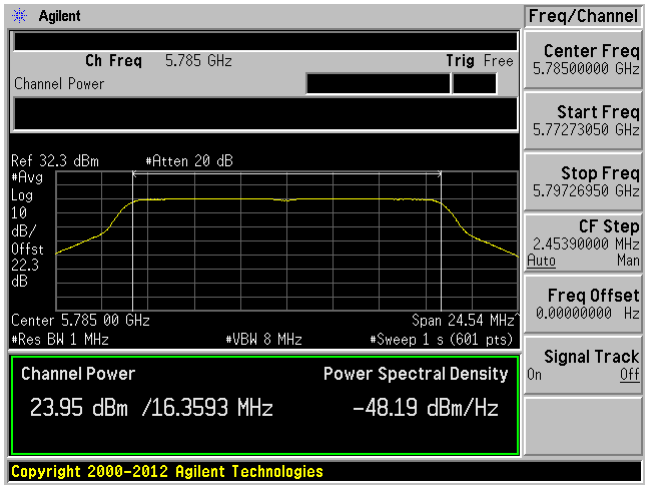
High Channel ANT 1



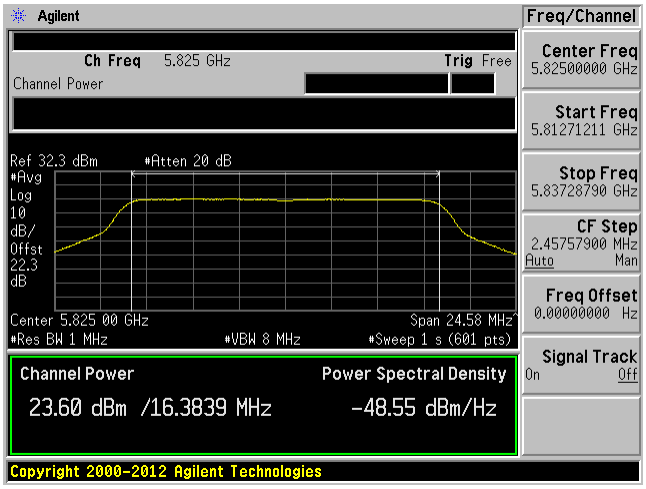
Low Channel ANT 2



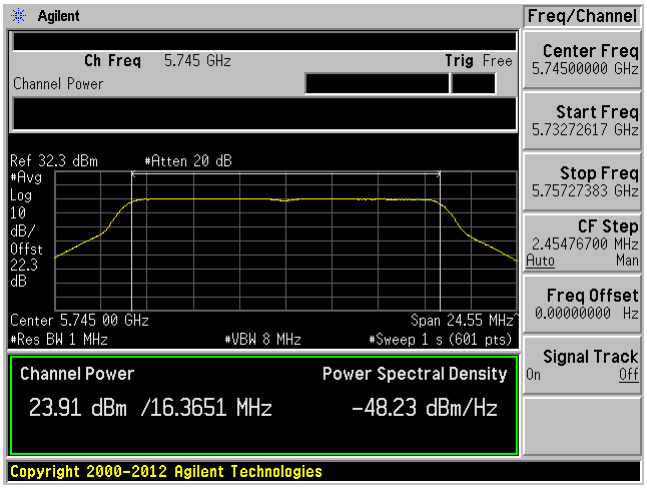
Mid Channel ANT 2



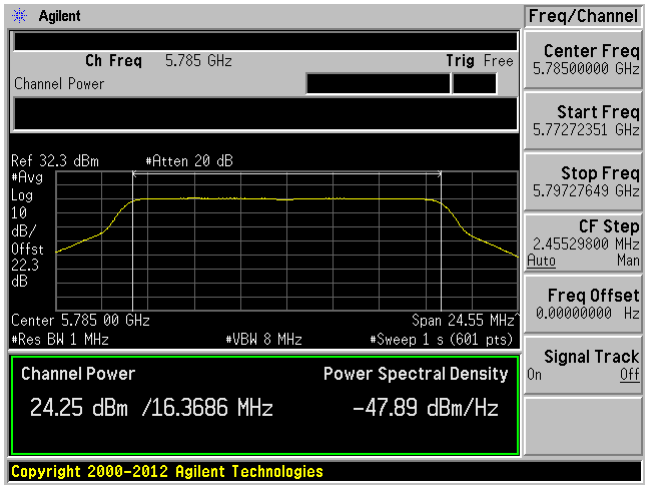
High Channel ANT 2



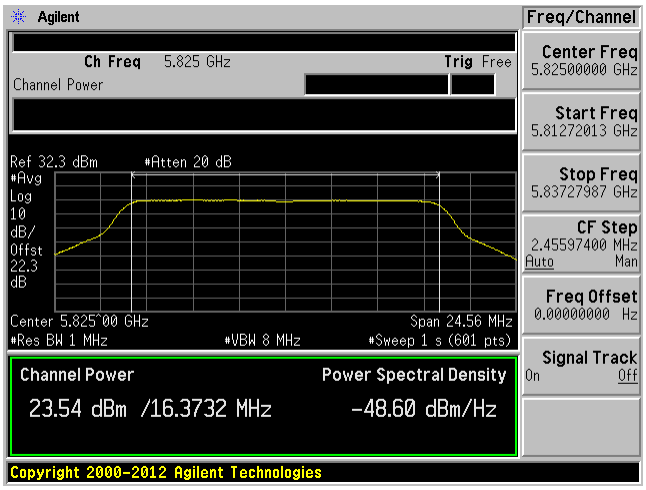
Low Channel ANT 3



Mid Channel ANT 3

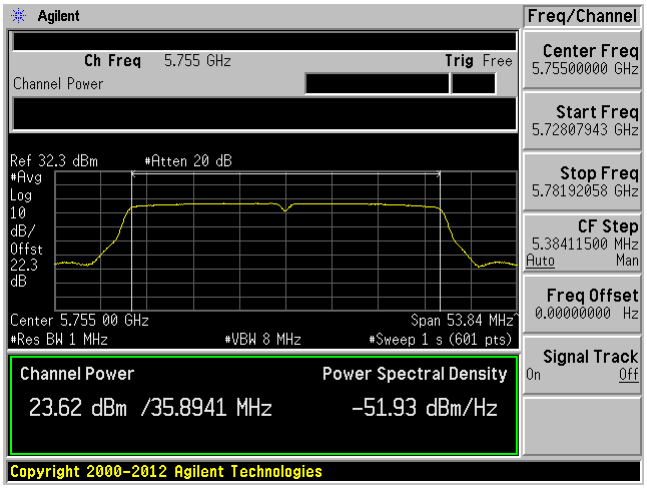


High Channel ANT 3

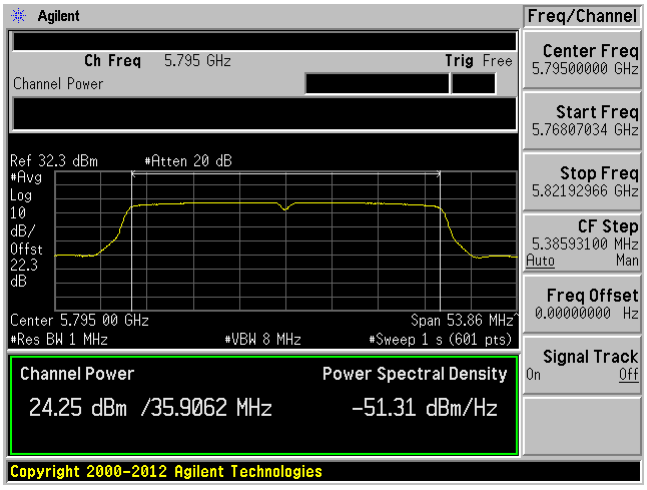


802.11VHT 40 Mode

Low Channel ANT 1



High Channel ANT 1



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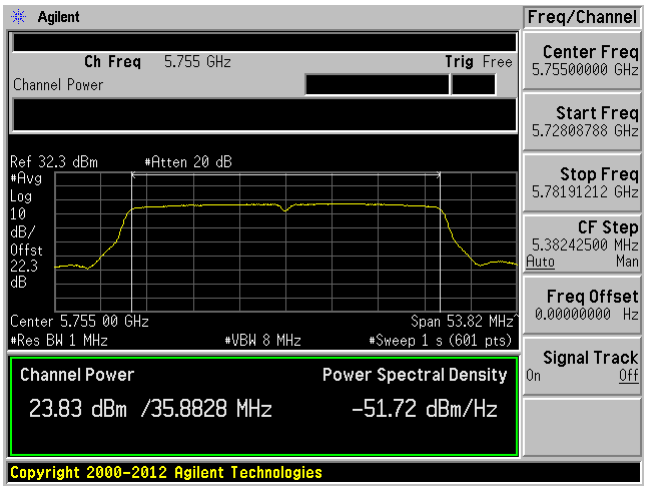
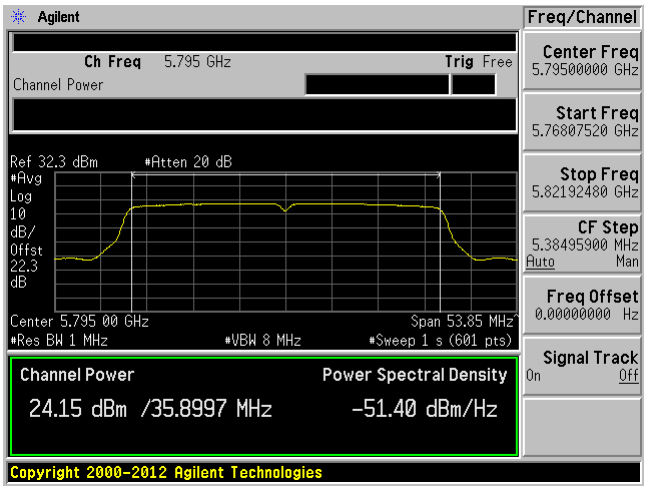
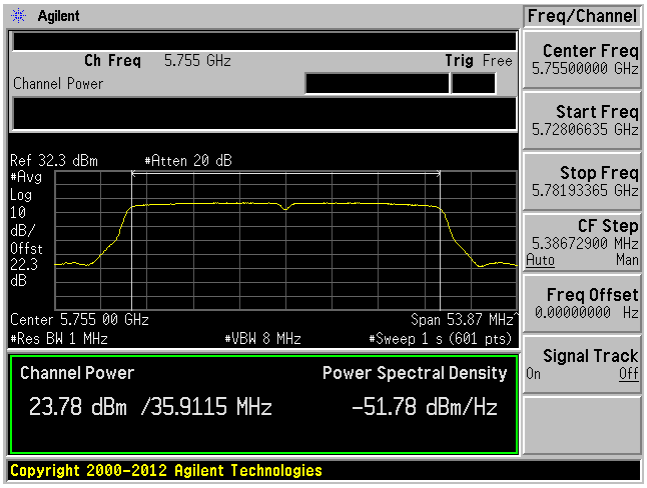


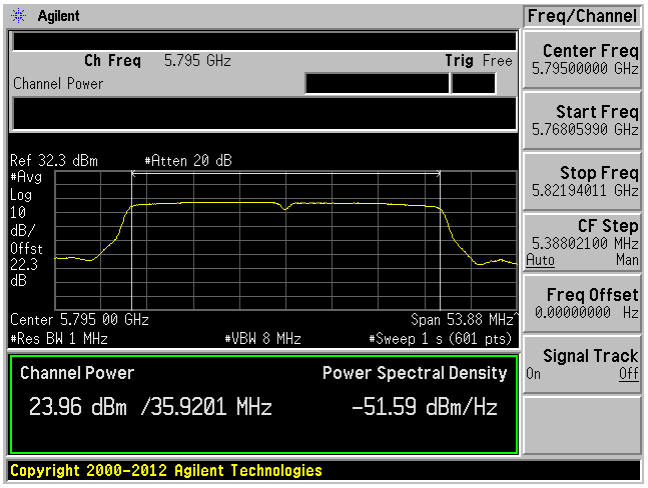
High Channel ANT 2



Low Channel ANT 3



High Channel ANT 3



10 FCC §15.407(a) & ISEDC RSS-247 §6.2- Power Spectral Density

10.1 Applicable Standards

According to FCC §15.407(a):

For an outdoor 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. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

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.

According to ISEDC RSS-247 §6.2.4 for frequency band 5725-5850 MHz:

The maximum conducted output power shall not exceed 1 W. The 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 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 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.

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	Spectrum Analyzer	E4446A	MY48250238	2019-06-26	18 Months
-	RF cable	-	-	Each time[1]	N/A
-	20 dB attenuator	-	-	Each time[1]	N/A

Note[1]: cable and attenuator included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all 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 the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

10.4 Test Environmental Conditions

Temperature:	22-24 ºC
Relative Humidity:	41 %
ATM Pressure:	102.7 kPa

The testing was performed by Zhao Zhao on 2020-09-09 at RF site.

10.5 Test Results

5150 - 5250 MHz (FCC only)

Channel	Frequency (MHz)	PSD (dBm/MHz)			Corrected PSD (dBm/MHz)			Total PSD (dBm/MHz)	FCC Limit (dBm/MHz)
		ANT 1	Ant 2	ANT 3	ANT 1	Ant 2	ANT 3		
802.11Non-HT mode									
Low	5180	10.761	10.710	10.575	10.89	10.84	10.71	-	16.1
Middle	5220	10.912	10.976	10.484	11.04	11.11	10.61	-	16.1
High	5240	10.064	10.928	10.613	10.19	11.06	10.74	-	16.1
802.11VHT20 mode									
Low	5180	9.144	9.785	9.882	9.14	9.79	9.88	14.39	16.1
Middle	5220	10.092	10.071	10.168	10.09	10.07	10.17	14.88	16.1
High	5240	9.681	10.380	10.496	9.68	10.38	10.50	14.97	16.1
802.11VHT40 mode									
Low	5190	8.461	6.014	6.081	8.60	6.15	6.22	11.92	16.1
High	5230	8.728	8.063	8.551	8.87	8.20	8.69	13.37	16.1

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

Note: Declared by the applicant, this radio module only supports STBC mode in 802.11n and 802.11ac modes. Therefore, the directional antenna gain is 6.9 dBi.

When the directional gain is greater than 6dBi, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Hence, the limit of the output power is 30dBm – (6.9-6) dbi = 29.1 dBm.

Note: The manufacturer declares the antenna gain at elevation angle above 30 degrees is -7 dBi.

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

5745 - 5825 MHz

Channel	Frequency (MHz)	PSD (dBm/100 kHz)			Corrected PSD (dBm/500 kHz)			Total PSD (dBm/500 kHz)			FCC Limit (dBm/500 kHz)
		ANT 1	ANT 2	Ant 3	ANT 1	ANT 2	ANT 3	ANT 1	ANT 2	ANT 3	
802.11Non-HT mode											
Low	5745	3.403	4.141	3.685	10.39	11.13	10.67	-	-	-	29.1
Middle	5785	4.052	3.841	4.138	11.04	10.83	11.13	-	-	-	29.1
High	5825	4.358	3.425	3.628	11.35	10.41	10.62	-	-	-	29.1
802.11VHT20 mode											
Low	5745	2.835	3.484	3.306	9.82	10.47	10.30	14.98			29.1
Middle	5785	3.135	3.521	3.578	10.12	10.51	10.57	15.18			29.1
High	5825	3.322	2.960	2.924	10.31	9.95	9.91	14.83			29.1
802.11VHT40 mode											
Low	5755	0.178	0.490	0.501	7.17	7.48	7.49	12.15			29.1
High	5795	0.964	0.625	0.558	7.95	7.61	7.55	12.48			29.1

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

Note: Declared by the applicant, this radio module only supports STBC mode in 802.11n and 802.11ac modes. Therefore, the directional antenna gain is 6.9 dBi.

When the directional gain is greater than 6dBi, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Hence, the limit of the output power is 30dBm – (6.9-6) dbi = 29.1 dBm.

Note: The manufacturer declares the antenna gain at elevation angle above 30 degrees is -7 dBi.

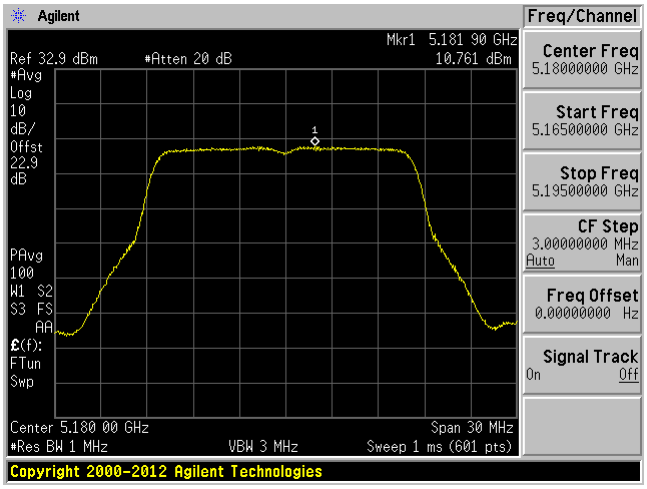
Note: Duty cycle correction factor has already been added to the measurements.

Please refer to the following plots.

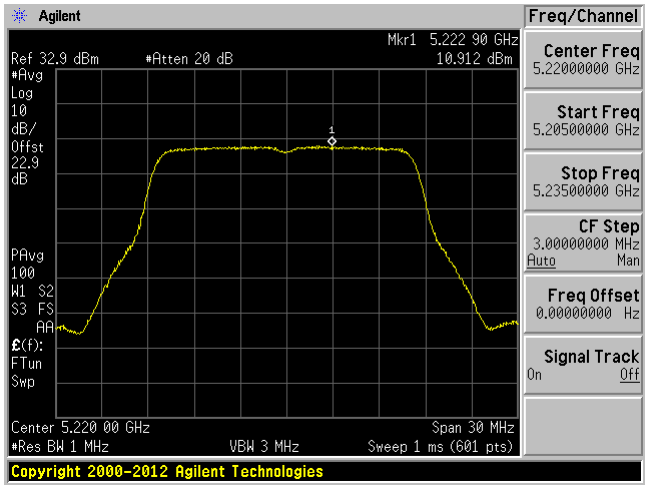
5150 - 5250 MHz

802.11Non-HT Mode

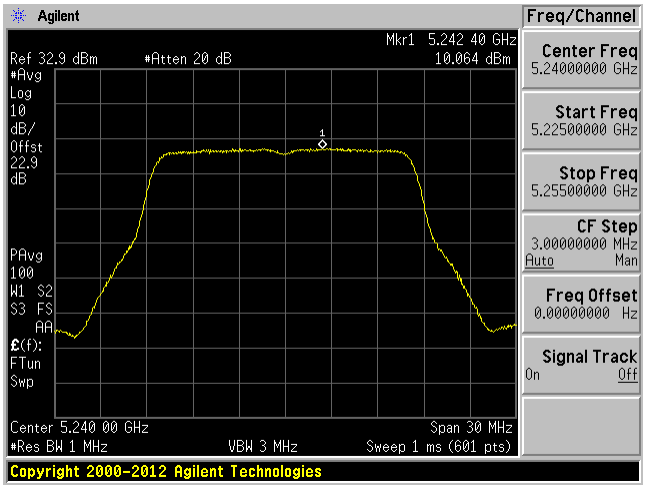
Low Channel ANT 1



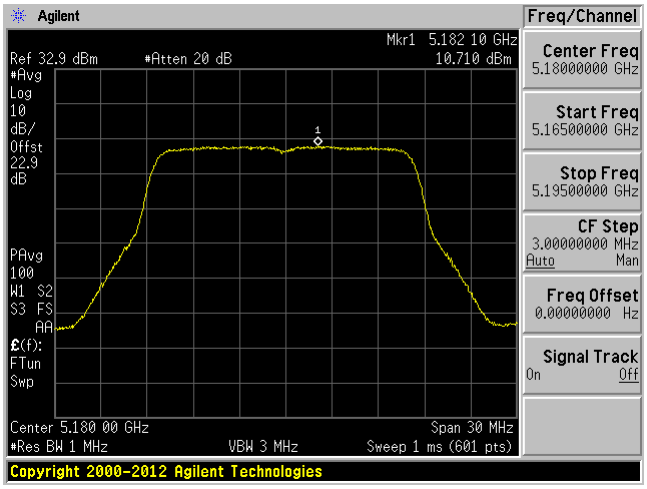
Mid Channel ANT 1



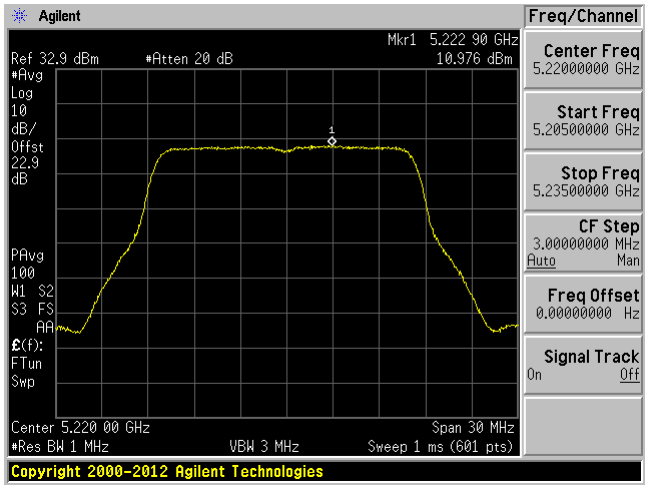
High Channel ANT 1



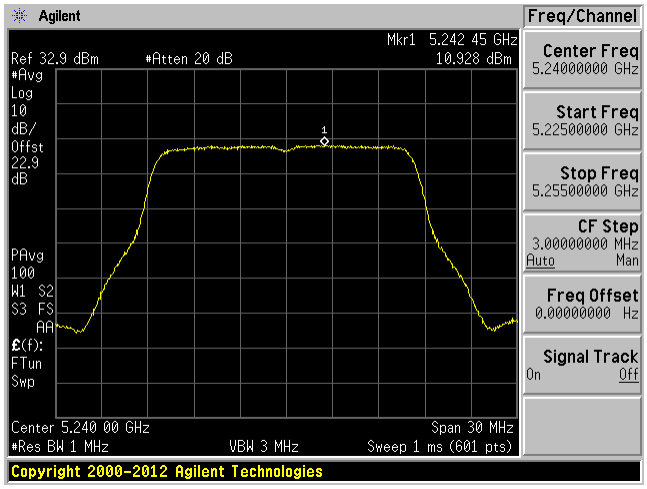
Low Channel ANT 2



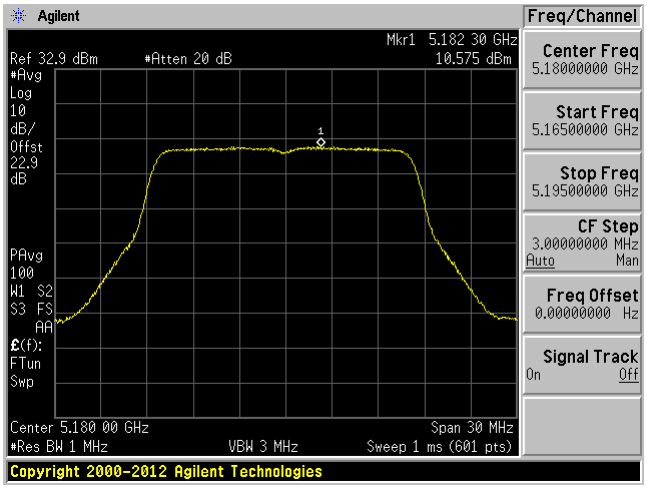
Mid Channel ANT 2



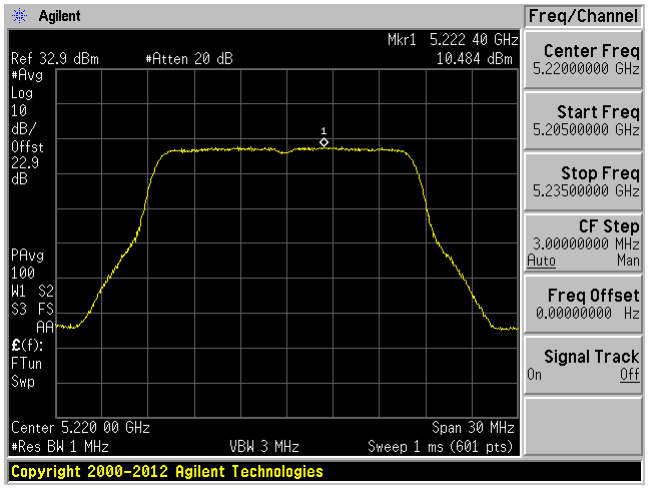
High Channel ANT 2



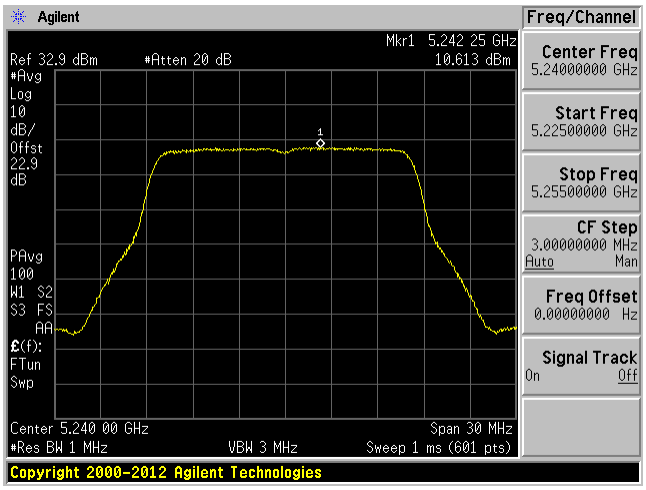
Low Channel ANT 3



Mid Channel ANT 3

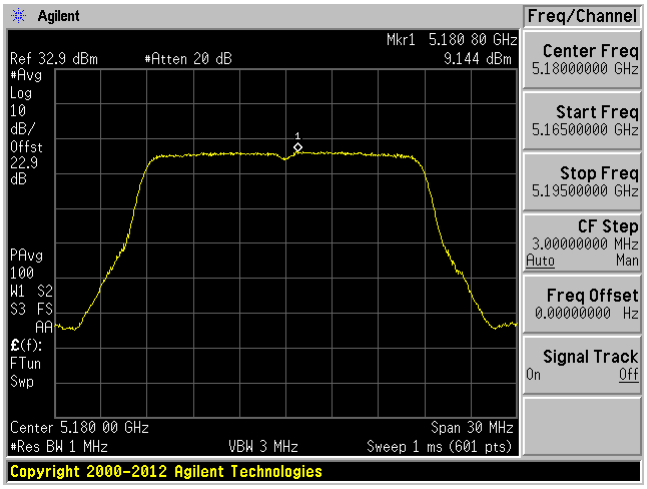


High Channel ANT 3

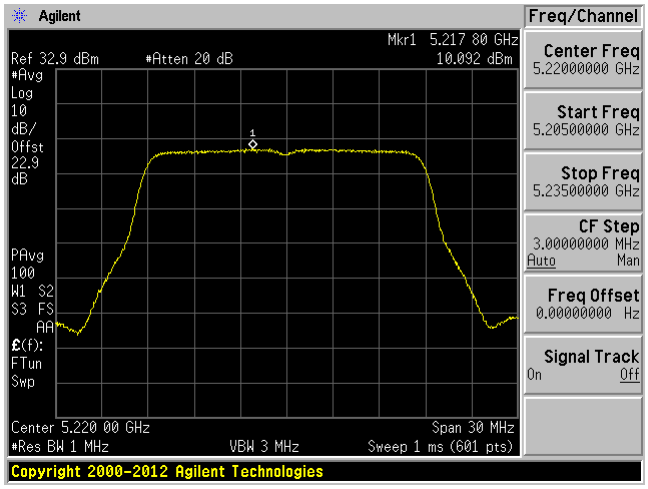


802.11VHT 20 Mode

Low Channel ANT 1



Mid Channel ANT 1



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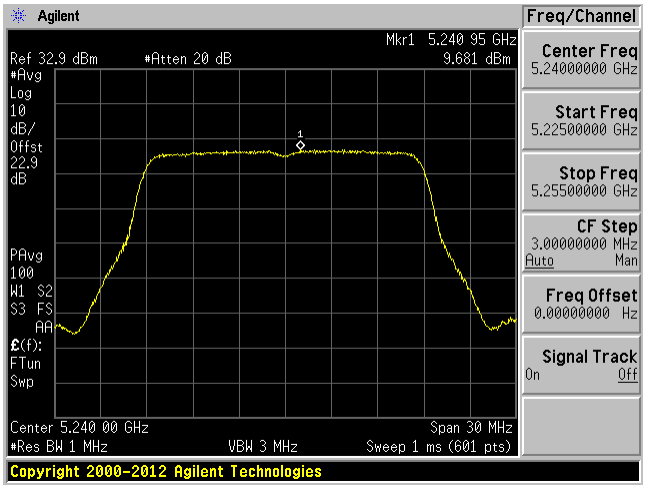
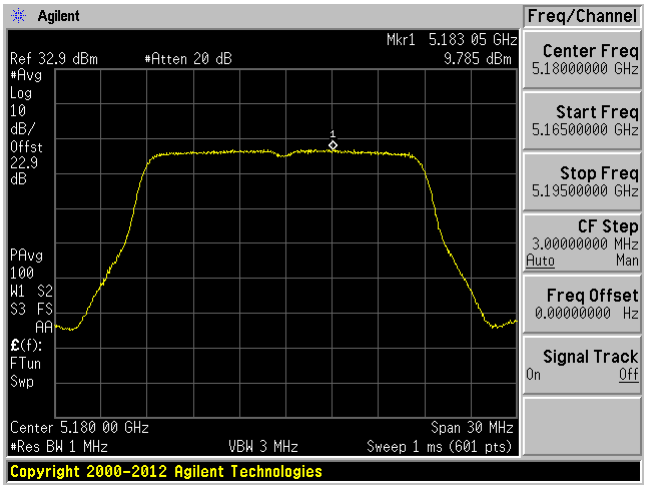
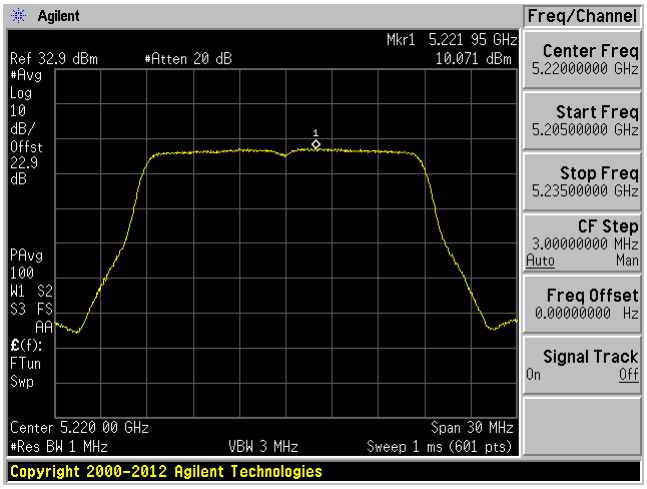


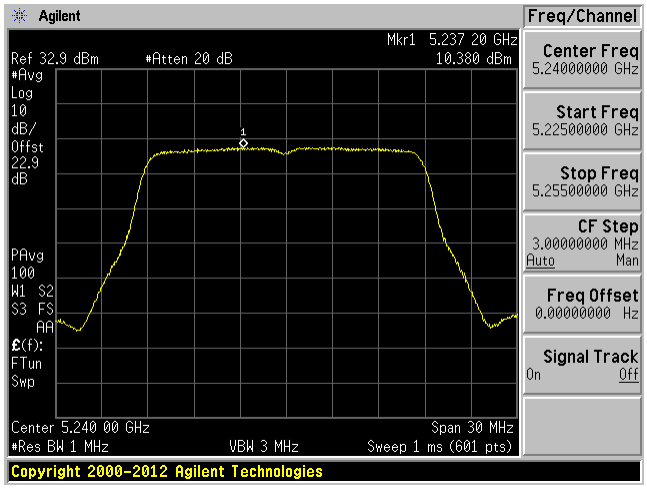
Low Channel ANT 2



Mid Channel ANT 2



High Channel ANT 2



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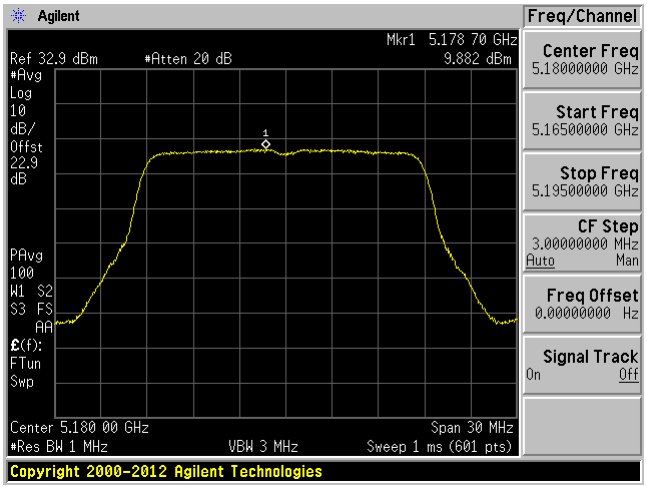
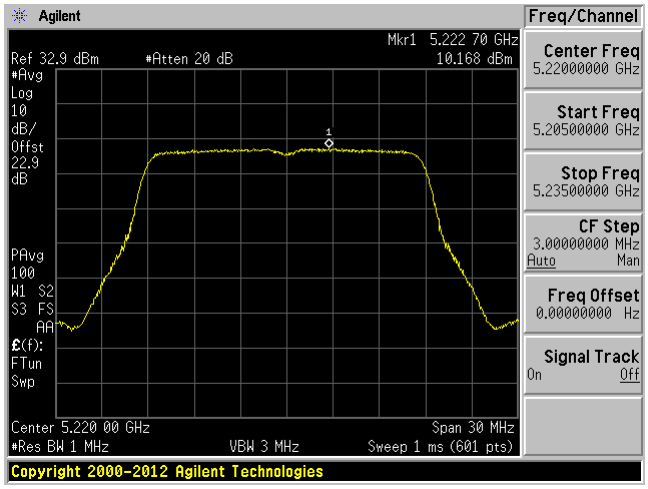
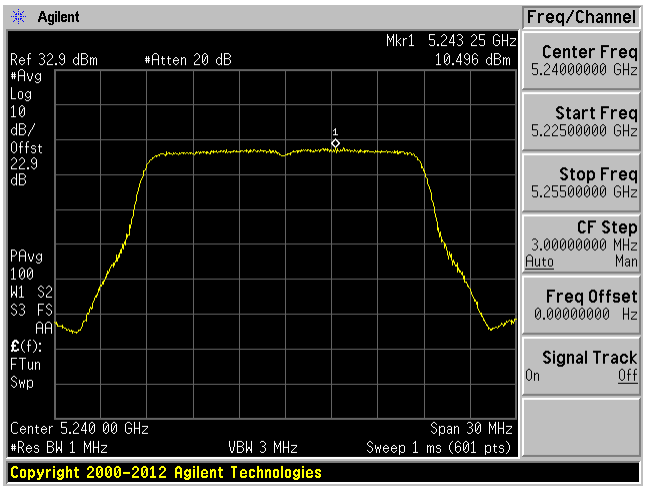


Mid Channel ANT 3

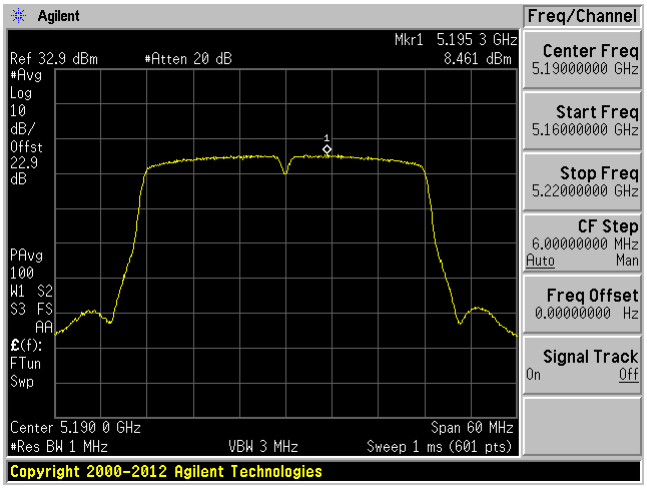


High Channel ANT 3

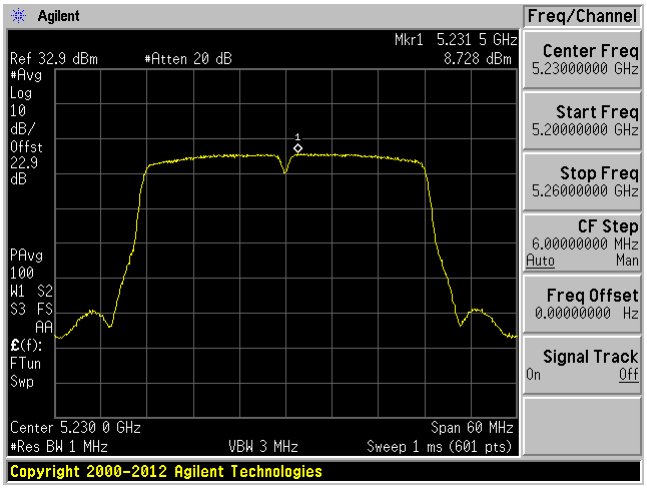


802.11VHT 40 Mode

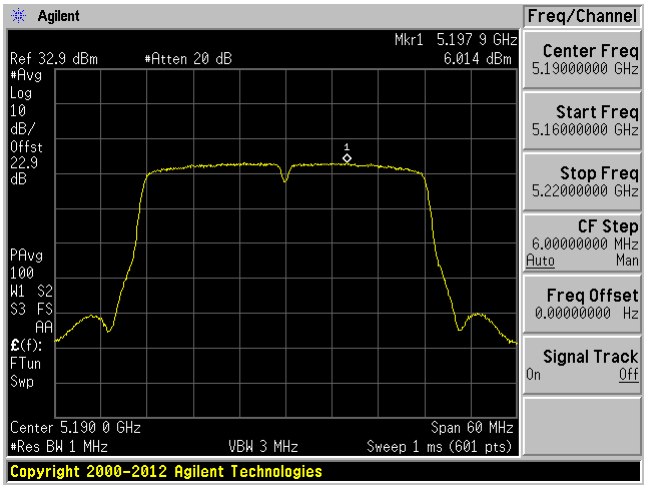
Low Channel ANT 1



High Channel ANT 1



Low Channel ANT 2



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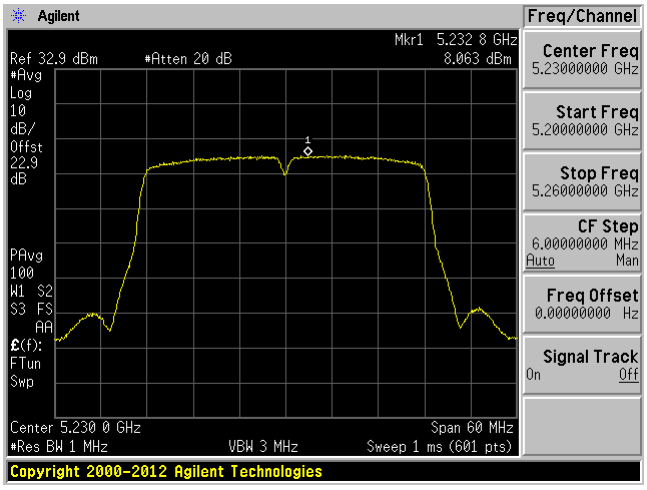

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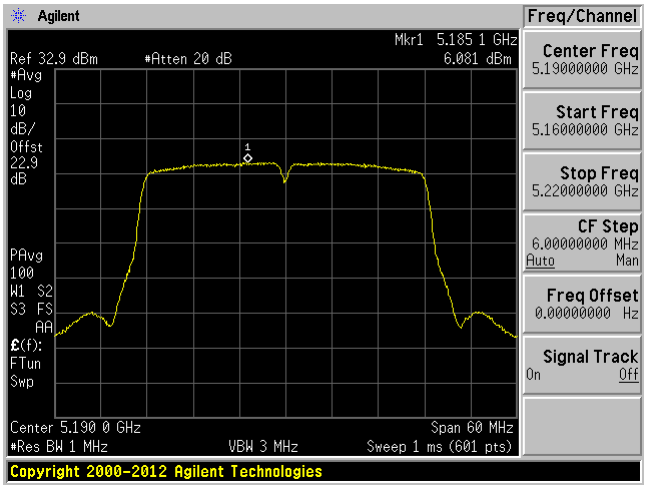
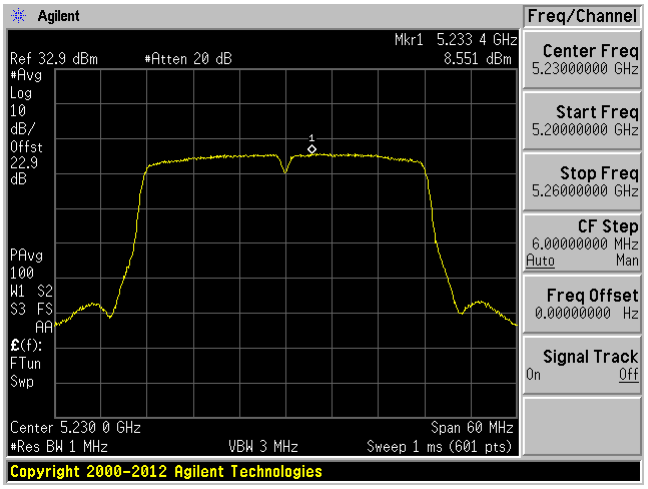


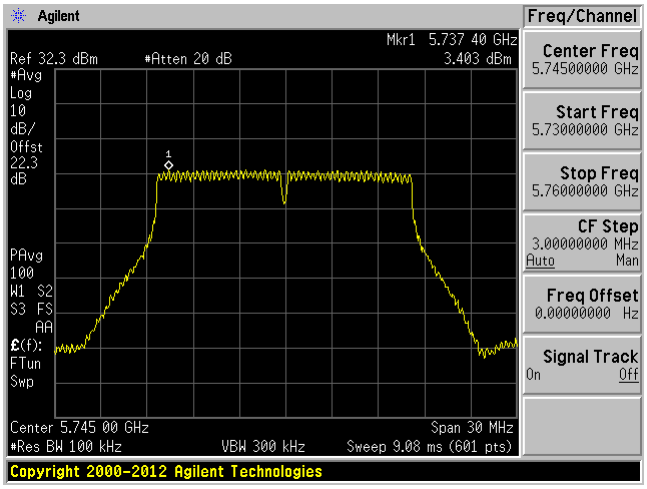
High Channel ANT 3



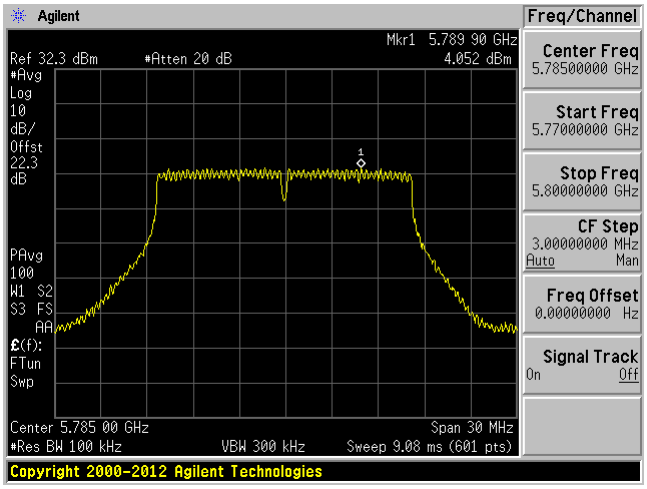
5745 - 5825 MHz

802.11Non-HT Mode

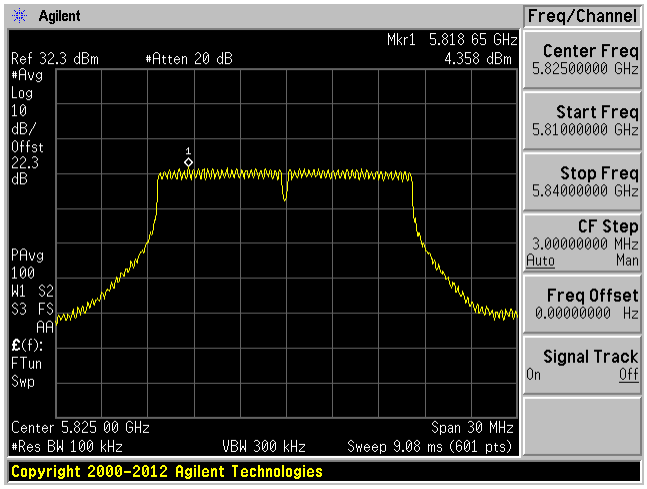
Low Channel ANT 1



Mid Channel ANT 1



High Channel ANT 1



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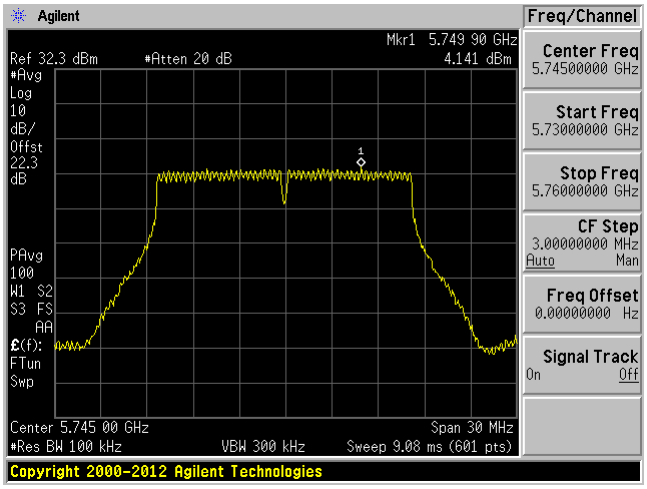
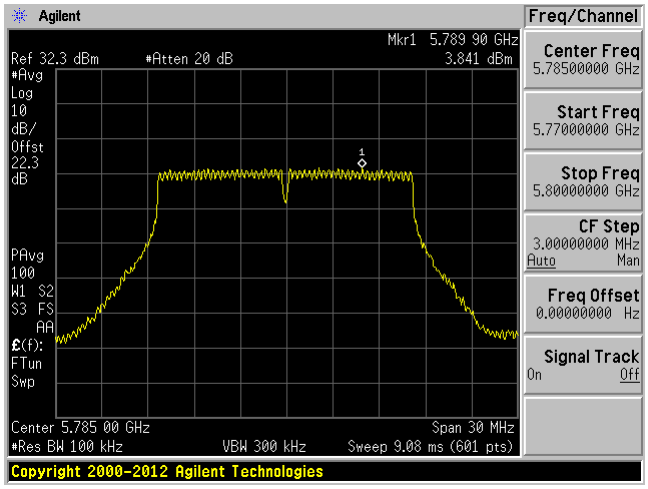
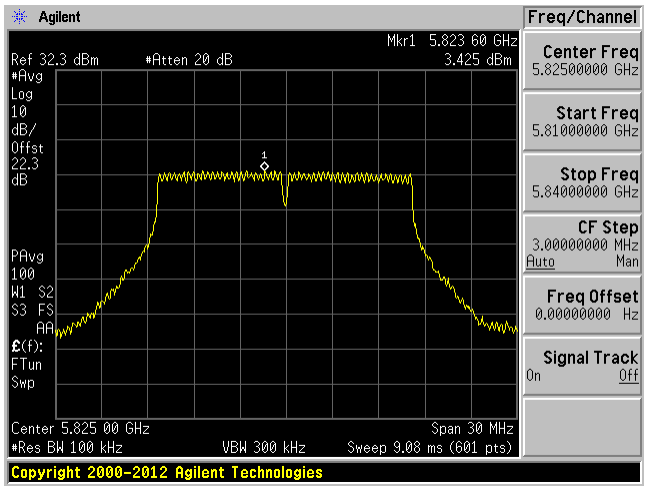


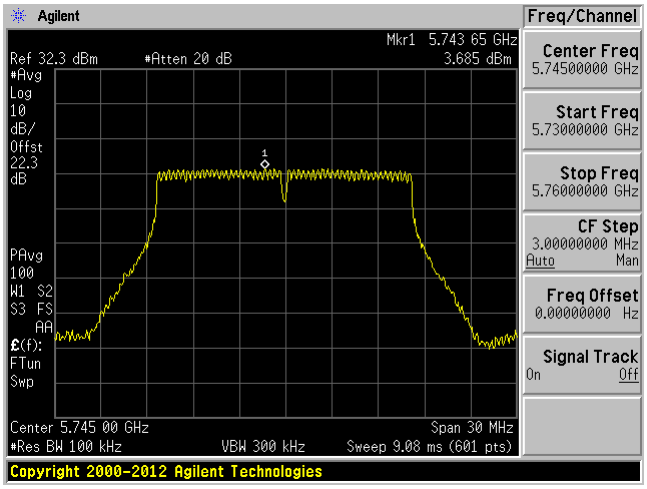
Mid Channel ANT 2



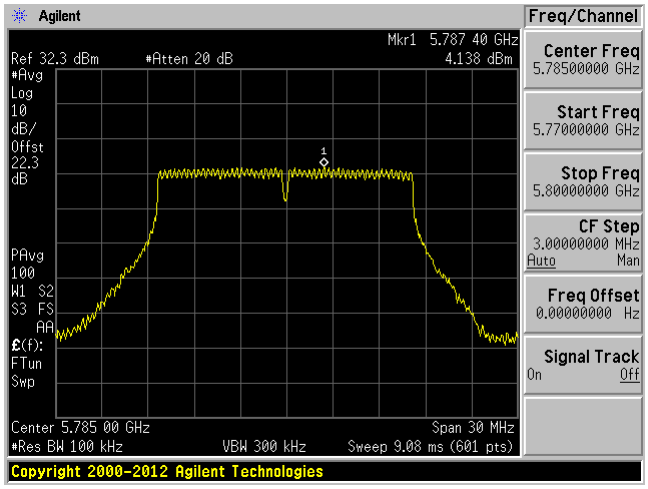
High Channel ANT 2



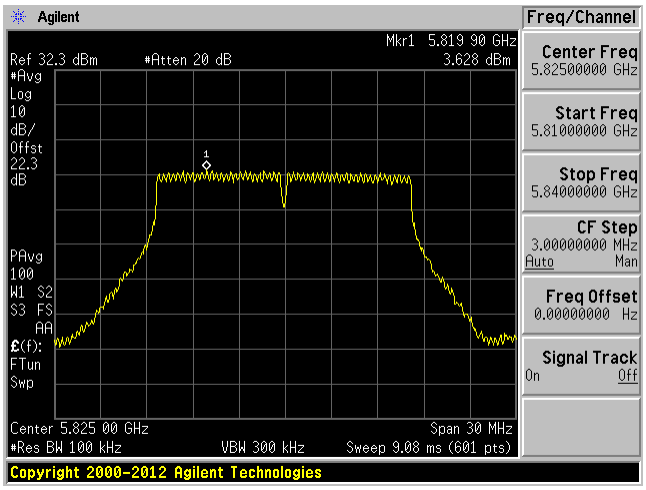
Low Channel ANT 3



Mid Channel ANT 3

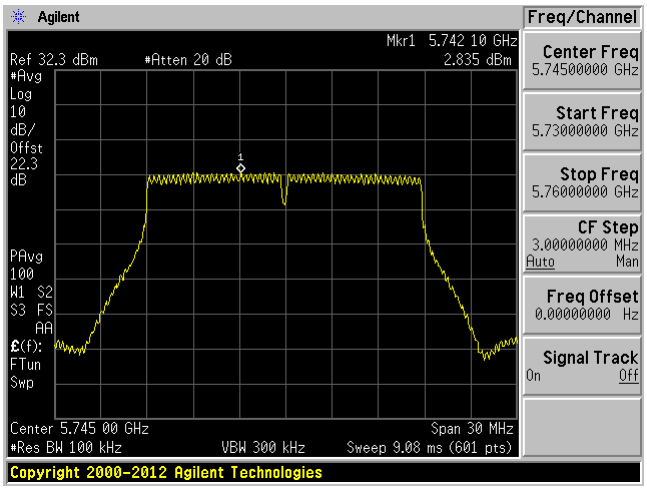


High Channel ANT 3

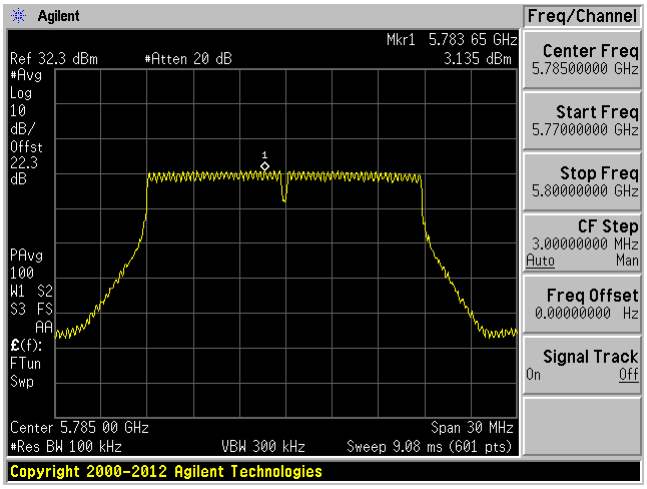


802.11VHT 20 Mode

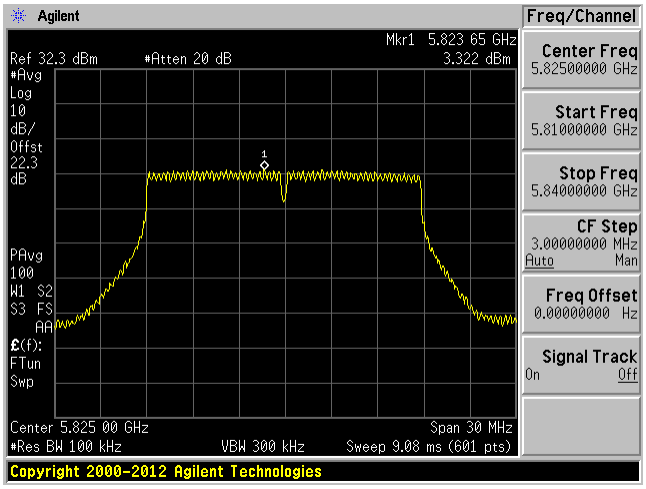
Low Channel ANT 1



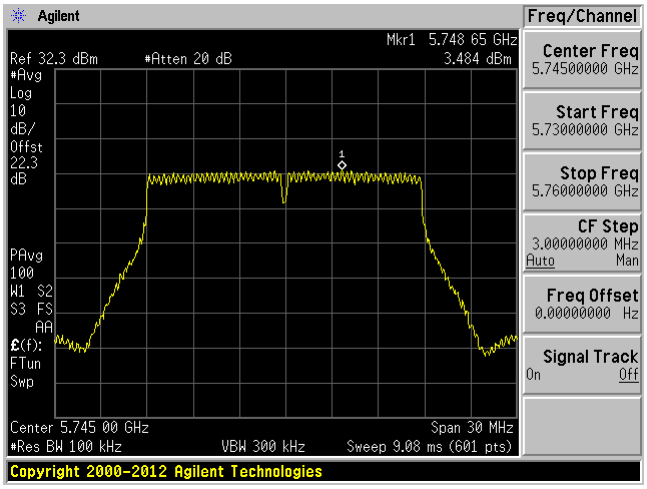
Mid Channel ANT 1



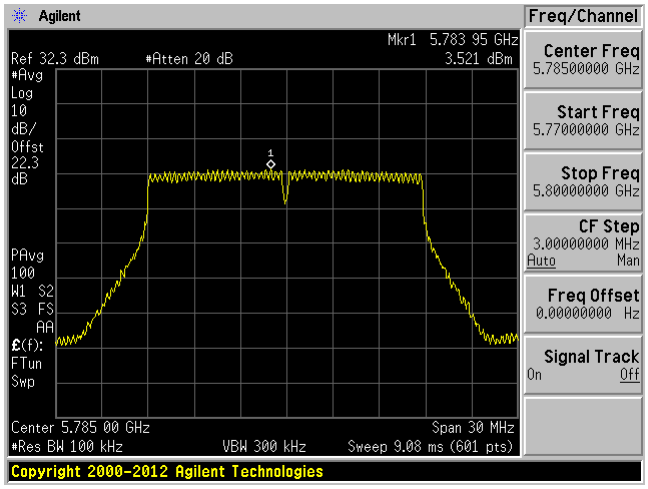
High Channel ANT 1



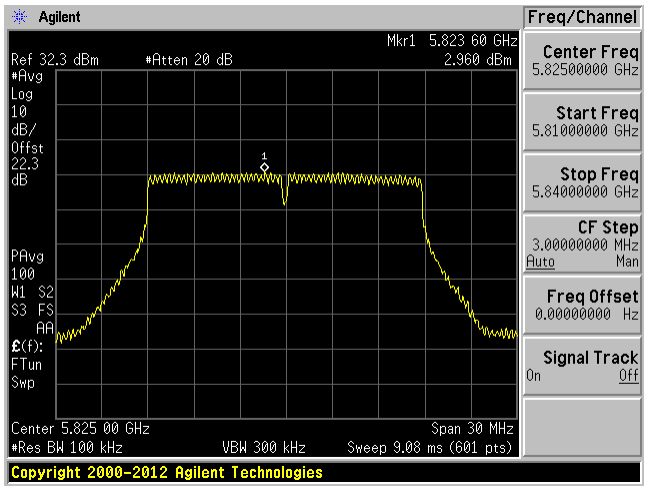
Low Channel ANT 2



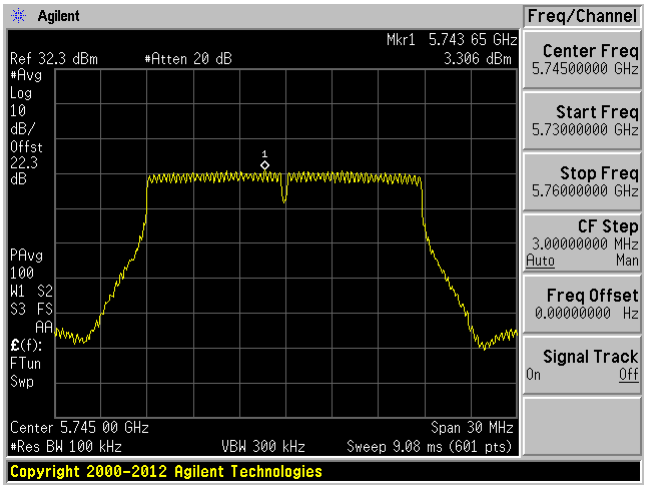
Mid Channel ANT 2



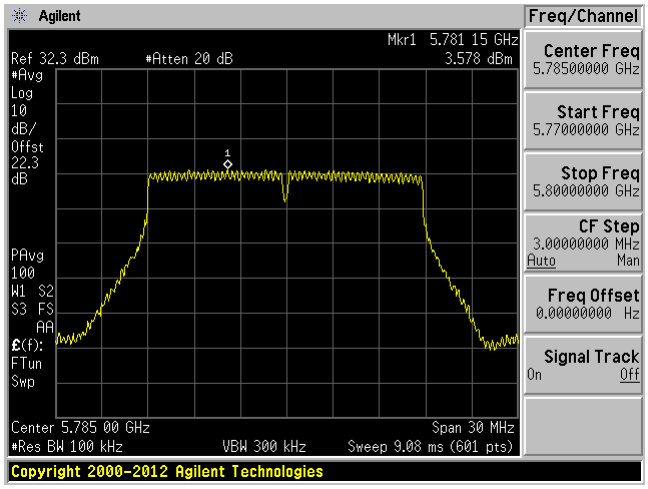
High Channel ANT 2



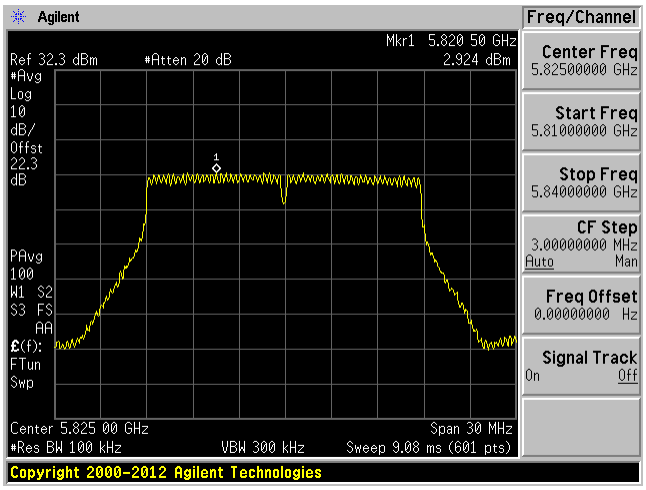
Low Channel ANT 3



Mid Channel ANT 3

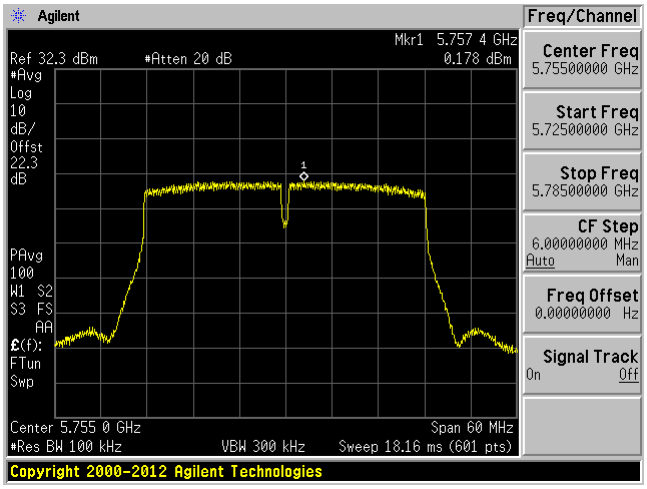


High Channel ANT 3

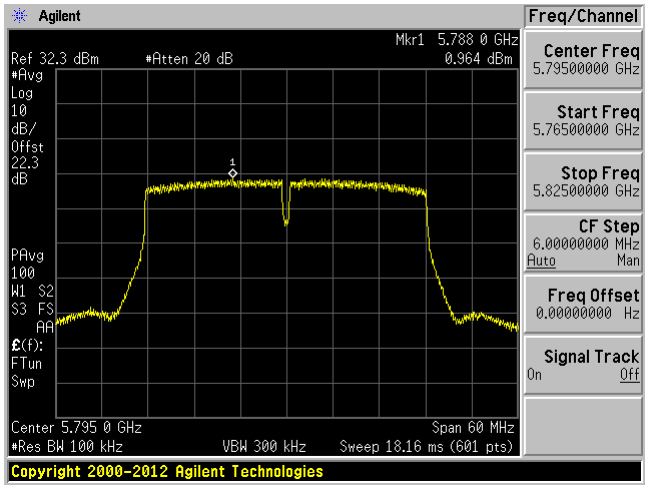


802.11VHT 40 Mode

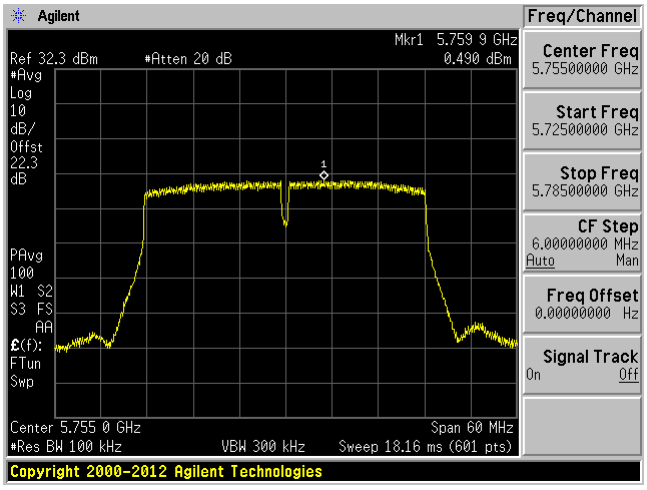
Low Channel ANT 1



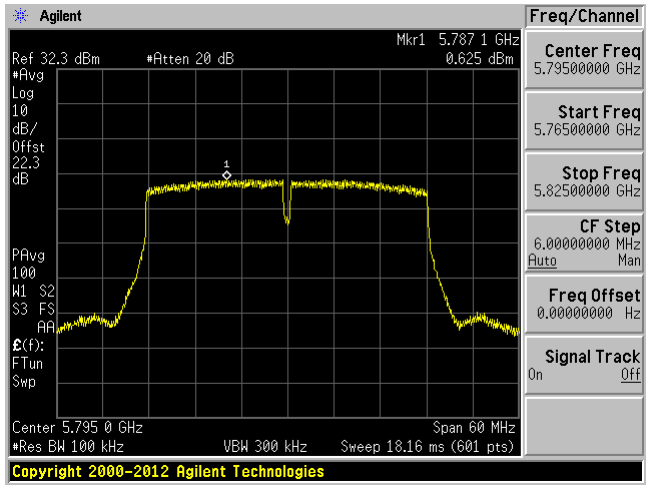
High Channel ANT 1



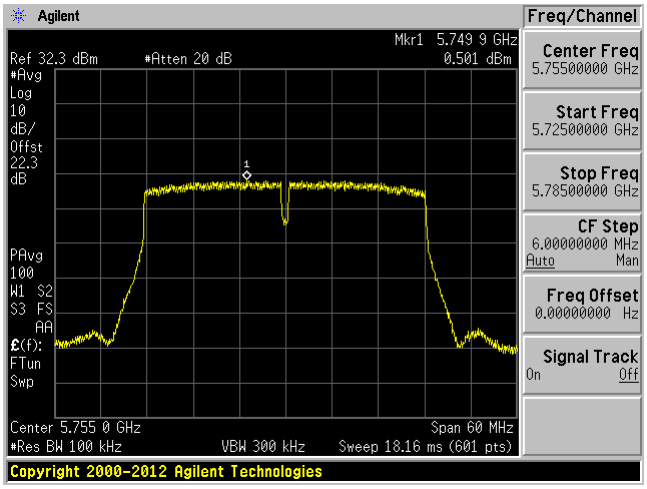
Low Channel ANT 2



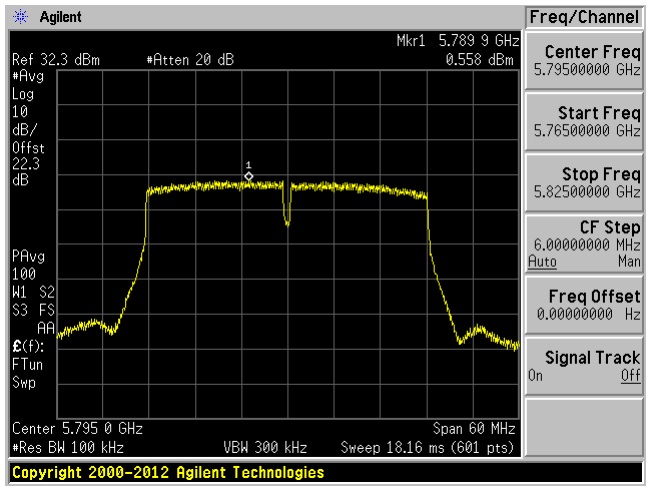
High Channel ANT 2



Low Channel ANT 3



High Channel ANT 3



11 FCC §15.407(b) & ISEDC RSS-247 §6.2 - Out of Band Emissions

11.1 Applicable Standards

According to FCC §15.407(b):

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.

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.

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

For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

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.

The provisions of §15.205 apply to intentional radiators operating under this section.

According to ISEDC RSS-247 §6.2.4 for devices operatinging in the frequency band 5725-5850 MHz:
For the band 5725-5850 MHz, emissions at frequencies from the band edges to 10 MHz above or below the band edges shall not exceed -17 dBm/MHz e.i.r.p.
For emissions at frequencies more than 10 MHz above or below the band edges, the emissions power shall not exceed -27 dBm/MHz.

11.2 Measurement Procedure

Add a correction factor (antenna gain+ Attenuator loss+cable loss) to the offset of the spectrum analyzer.

Unwanted Emission Measurement:

Maximum emission levels are measured by setting the analyzer as follows:

i. RBW = 1 MHz
ii. VBW ≥ 3 MHz
iii. Detector = Peak
iv. Sweep time = auto
v. Trace mode = max hold

Integration Method:

1. For peak emissions measurements, follow the procedures described in section H)5), "Procedures for Peak Unwanted Emissions Measurements above 1000 MHz", except for the following changes:

- Set RBW = 100 kHz
- Set VBW = 3RBW
- Perform a band-power integration across the 1 MHz bandwidth in which the band-edge emission level is to be measured. CAUTION: You must ensure that the spectrum analyzer or EMI receiver is set for peak-detection and max-hold for this measurement.

2. For average emissions measurements, follow the procedures described in section H)6), "Procedures for Average Unwanted Emissions Measurements above 1000 MHz", except for the following changes:

- Set RBW = 100 kHz
- Set VBW = 3RBW
- Perform a band-power integration across the 1 MHz bandwidth in which the band-edge emission level is to be measured.

11.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	MY48250238	2019-06-26	18 Months
Rohde & Schwarz	Spectrum Analyzer	FSV40	1321.3008K39-101203-UW	2019-08-06	18 Months
-	RF cable	-	-	Each time[1]	N/A
-	10 dB attenuator	-	-	Each time[1]	N/A

Note[1]: cable and attenuator included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all 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 the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

11.4 Test Environmental Conditions

Temperature:	22-24º C
Relative Humidity:	33-41 %
ATM Pressure:	101.2-102.7 kPa

The testing was performed by Zhao Zhao from 2020-09-09 and 2020-10-08 at RF site.

11.5 Test Results

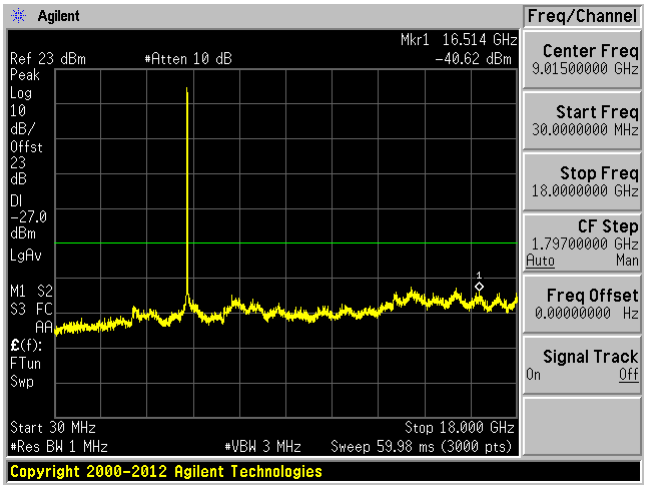
Please refer to the following plots

FCC:

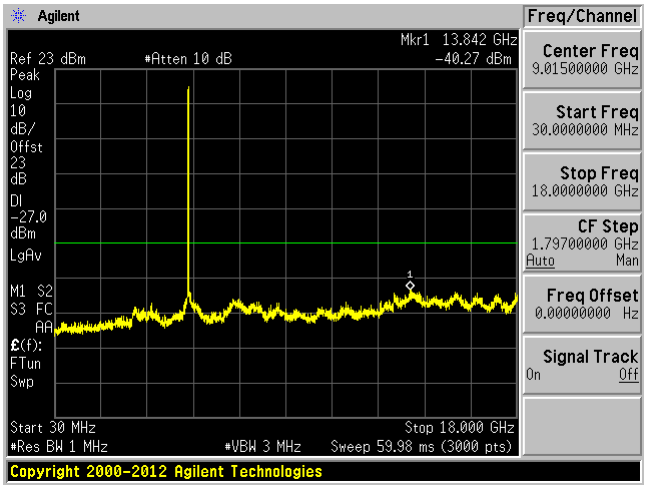
Spurious Emissions:

5150 - 5250 MHz, 802.11Non-HT Mode, ANT 1

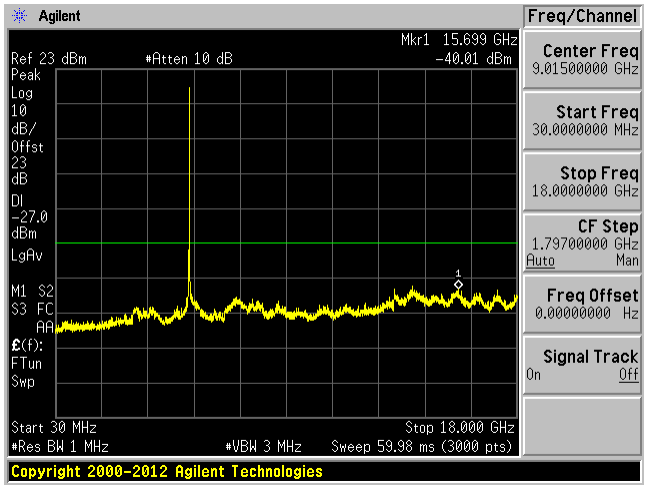
Low Channel 5180 MHz, 30MHz – 18GHz



Mid Channel 5220 MHz, 30MHz – 18GHz

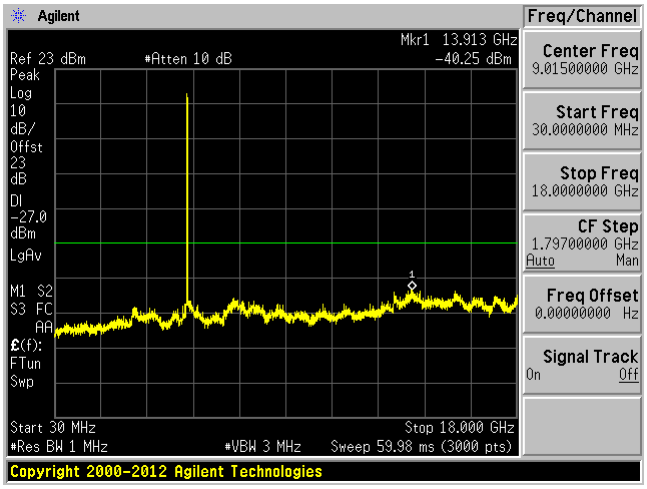


High Channel 5240 MHz, 30MHz – 18GHz

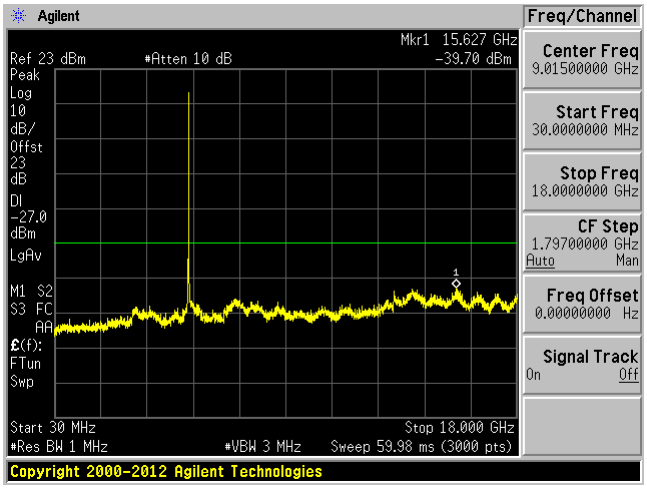


5150 - 5250 MHz, 802.11Non-HT Mode, ANT 2

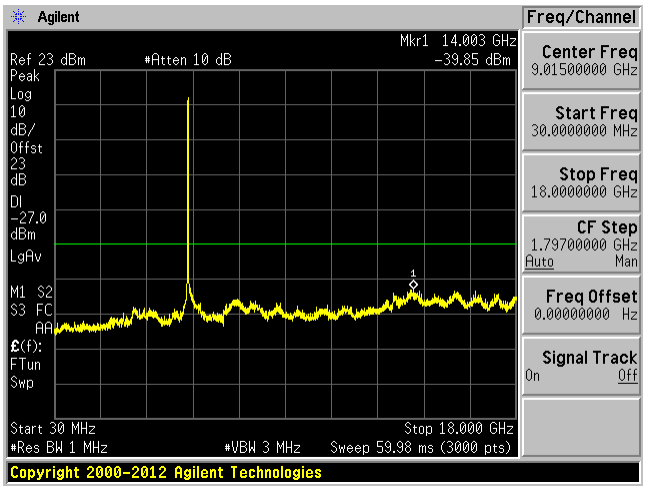
Low Channel 5180 MHz, 30MHz – 18GHz



Mid Channel 5220 MHz, 30MHz – 18GHz

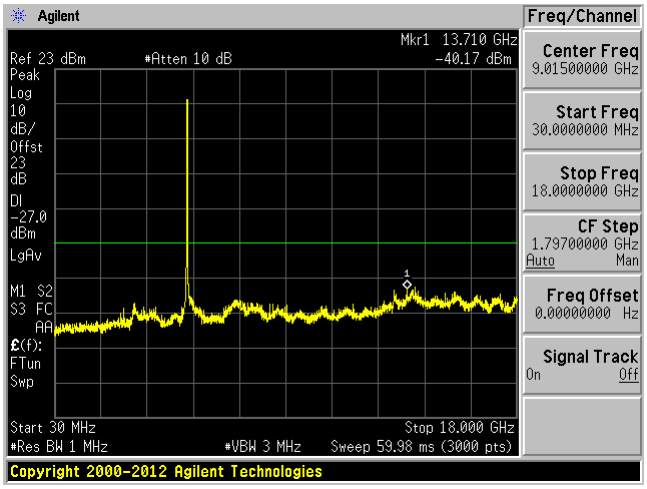


High Channel 5240 MHz, 30MHz – 18GHz

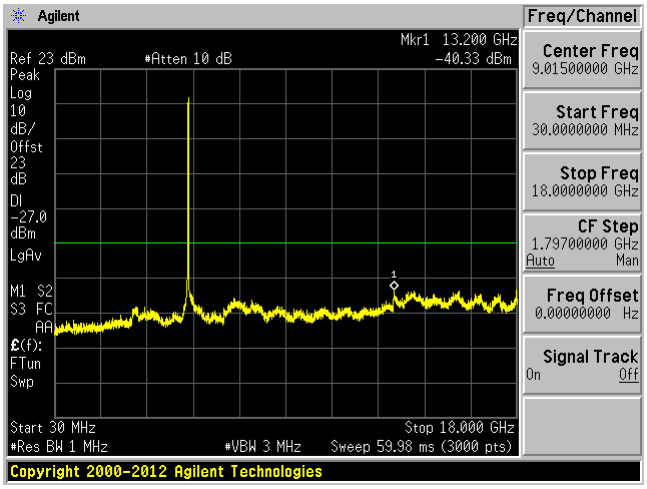


5150 - 5250 MHz, 802.11Non-HT Mode, ANT 3

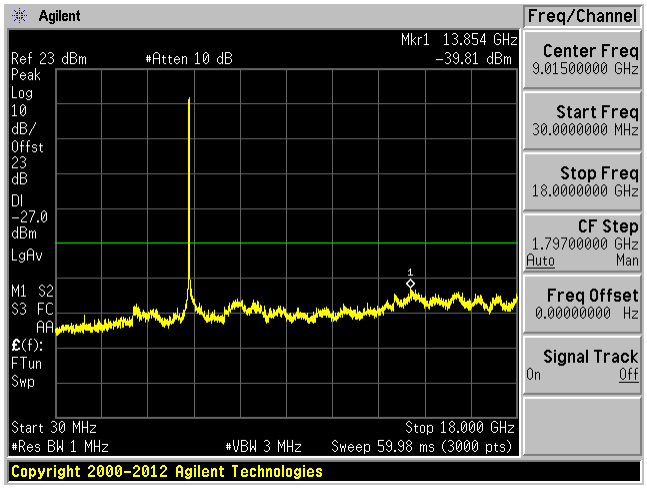
Low Channel 5180 MHz, 30MHz – 18GHz



Mid Channel 5220 MHz, 30MHz – 18GHz

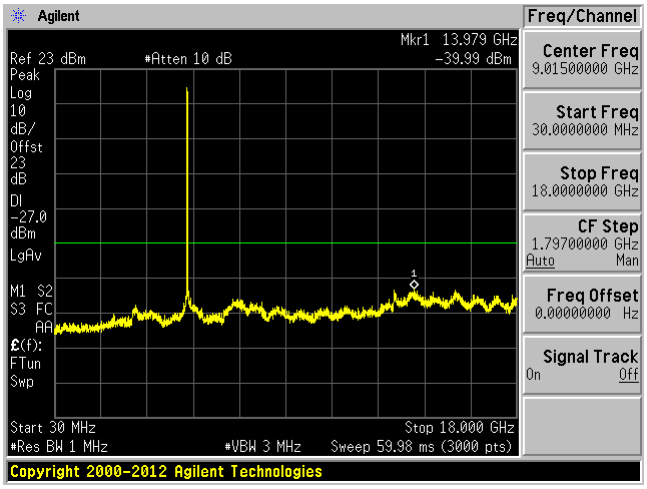


High Channel 5240 MHz, 30MHz – 18GHz

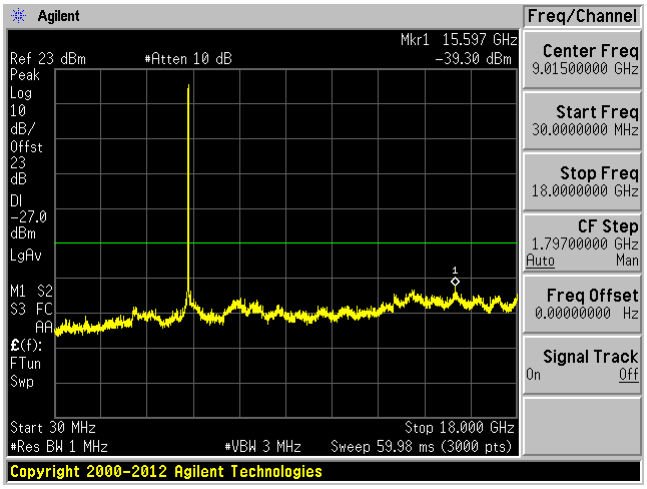


5150 - 5250 MHz, 802.11 VHT20 Mode, ANT 1

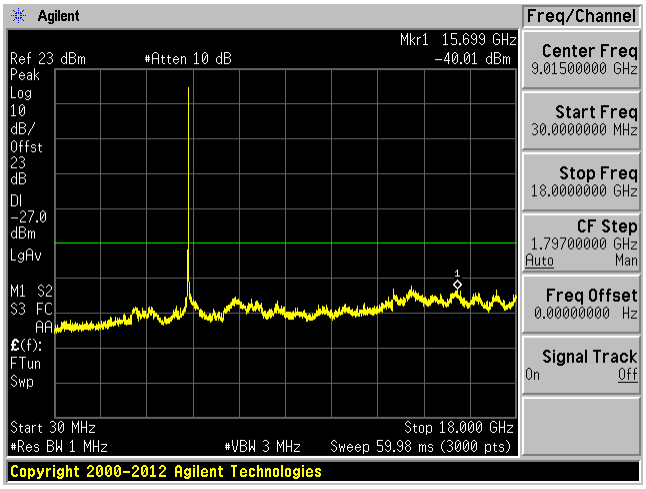
Low Channel 5180 MHz, 30MHz – 18GHz



Mid Channel 5220 MHz, 30MHz – 18GHz

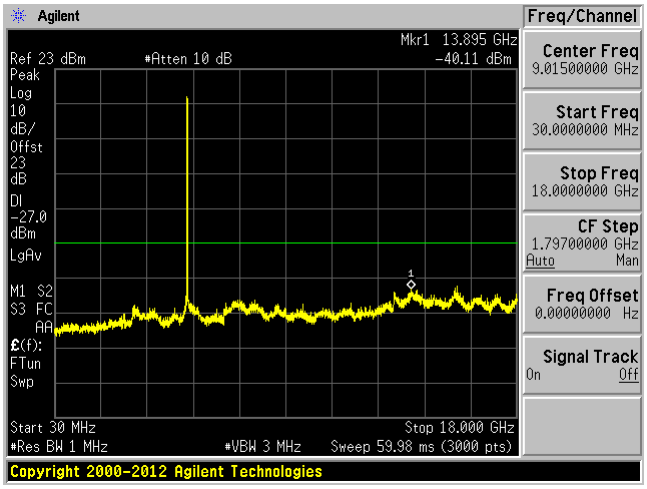


High Channel 5240 MHz, 30MHz – 18GHz

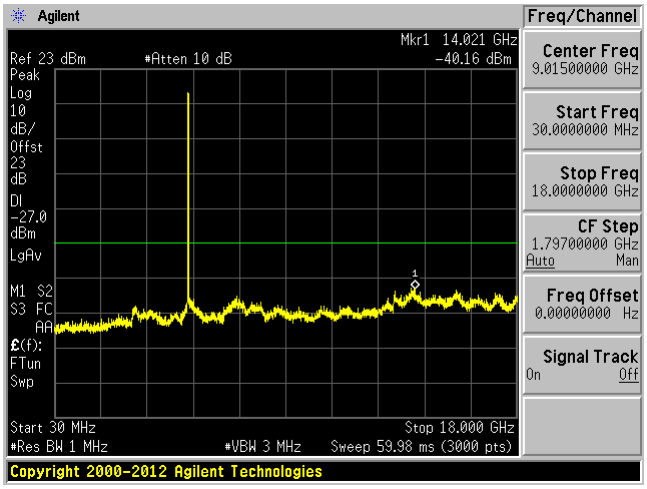


5150 - 5250 MHz, 802.11 VHT20 Mode, ANT 2

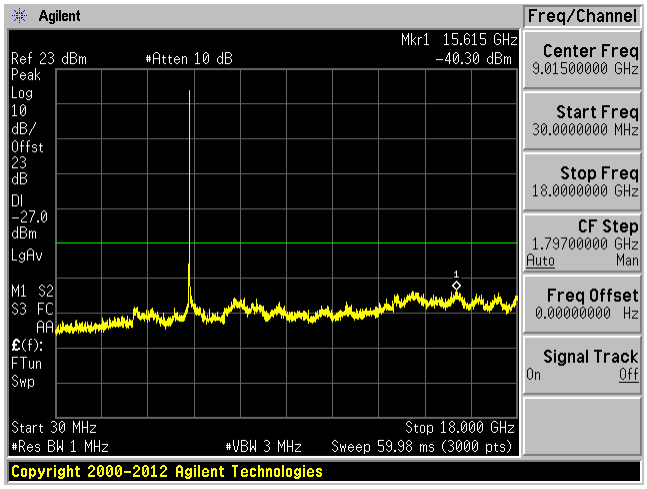
Low Channel 5180 MHz, 30MHz – 18GHz



Mid Channel 5220 MHz, 30MHz – 18GHz

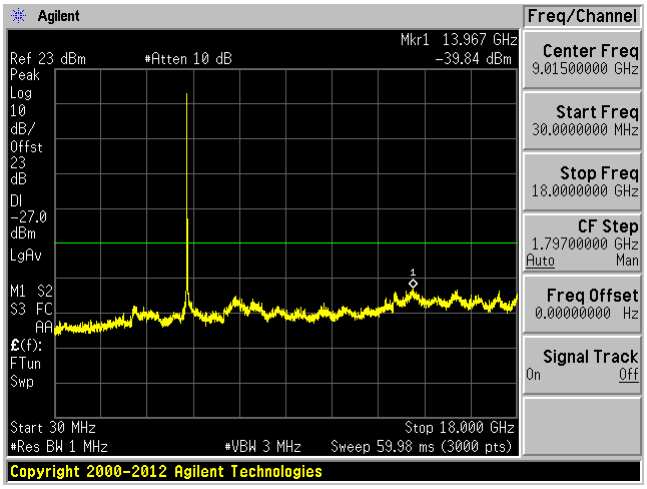


High Channel 5240 MHz, 30MHz – 18GHz

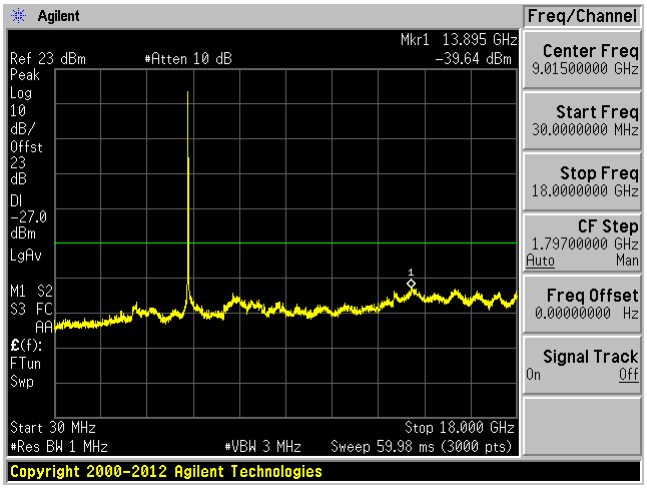


5150 - 5250 MHz, 802.11 VHT20 Mode, ANT 3

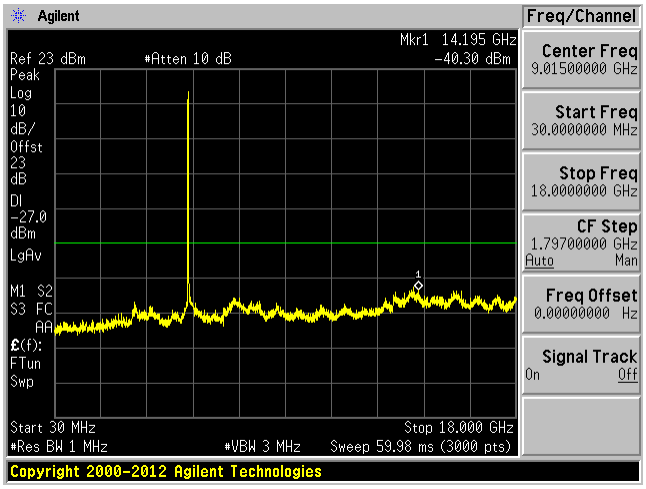
Low Channel 5180 MHz, 30MHz – 18GHz



Mid Channel 5220 MHz, 30MHz – 18GHz

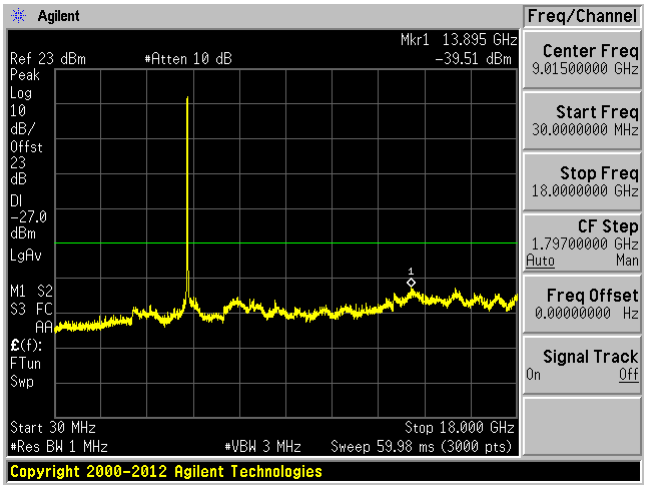


High Channel 5240 MHz, 30MHz – 18GHz

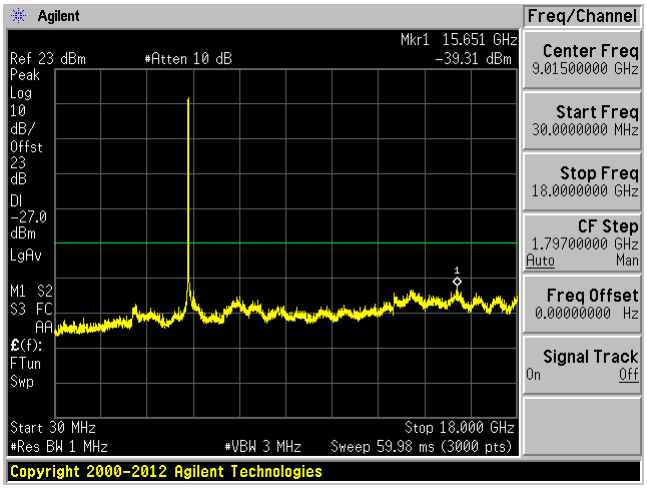


5150 - 5250 MHz, 802.11 VHT40 Mode, ANT 1

Low Channel 5190 MHz, 30MHz – 18GHz

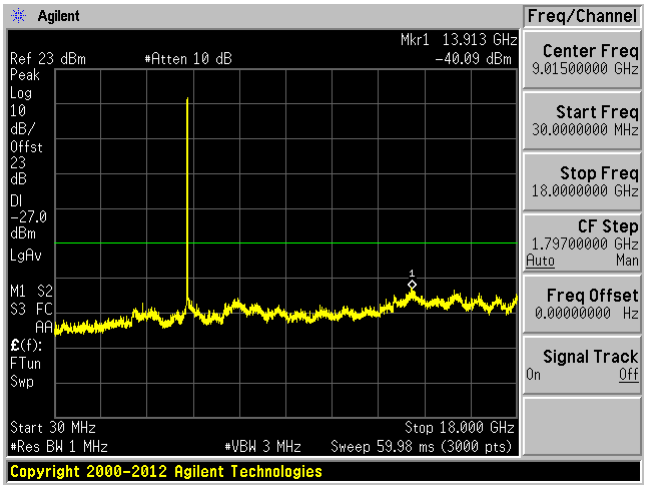


High Channel 5230 MHz, 30MHz -18GHz

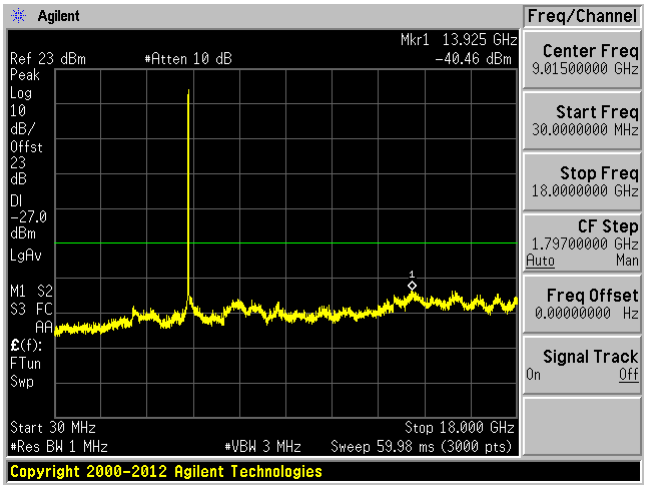


5150 - 5250 MHz, 802.11 VHT40 Mode, ANT 2

Low Channel 5190 MHz, 30MHz – 18GHz

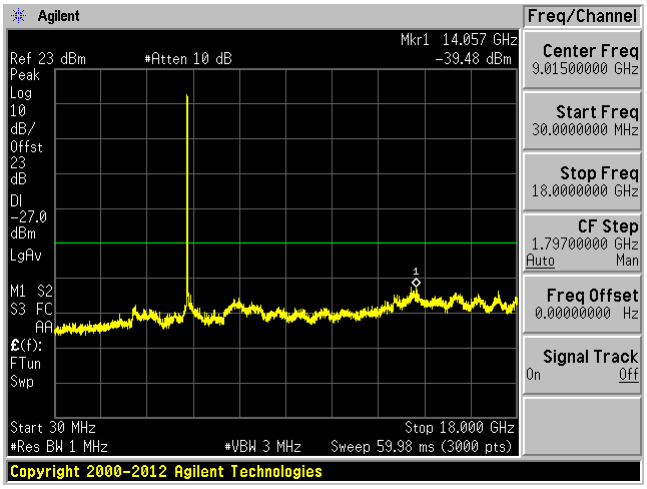


High Channel 5230 MHz, 30MHz -18GHz

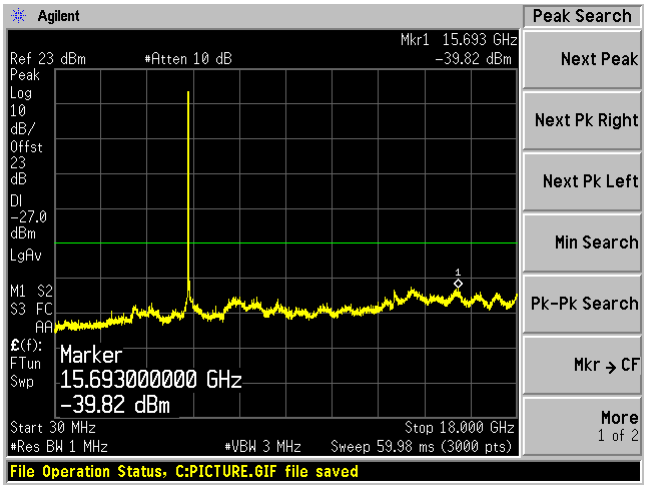


5150 - 5250 MHz, 802.11 VHT40 Mode, ANT 3

Low Channel 5190 MHz, 30MHz – 18GHz



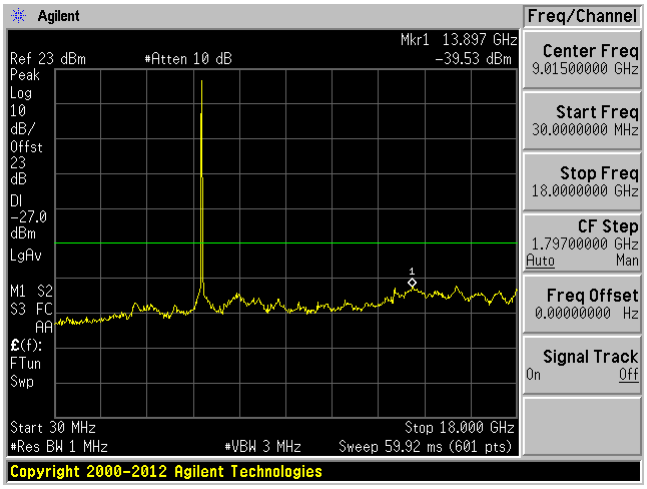
High Channel 5230 MHz, 30MHz -18GHz



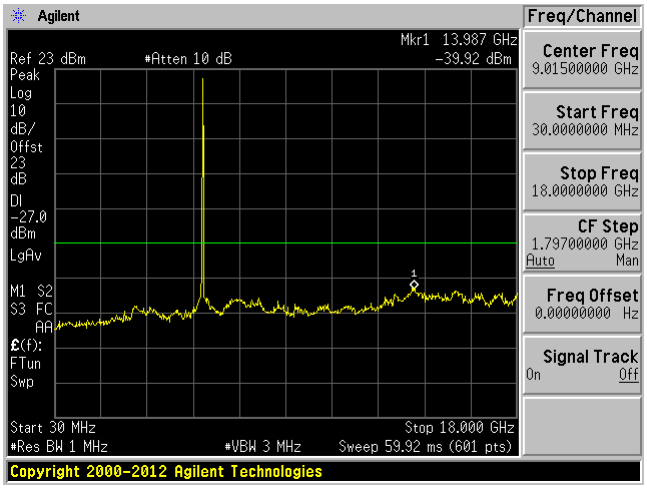
FCC & IC:

5725 - 5850 MHz, 802.11Non-HT Mode, ANT 1

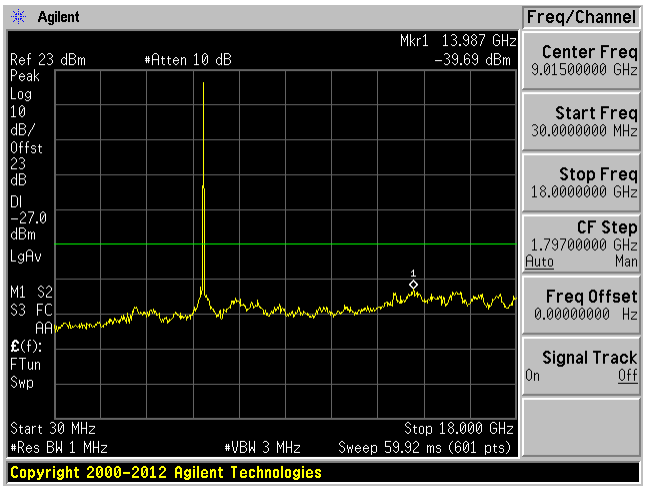
Low Channel 5745 MHz, 30MHz – 18GHz



Mid Channel 5785 MHz, 30MHz – 18GHz

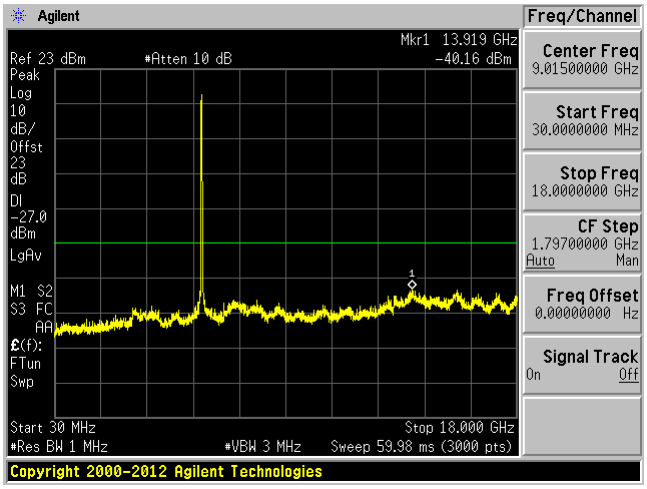


High Channel 5825 MHz, 30MHz – 18GHz

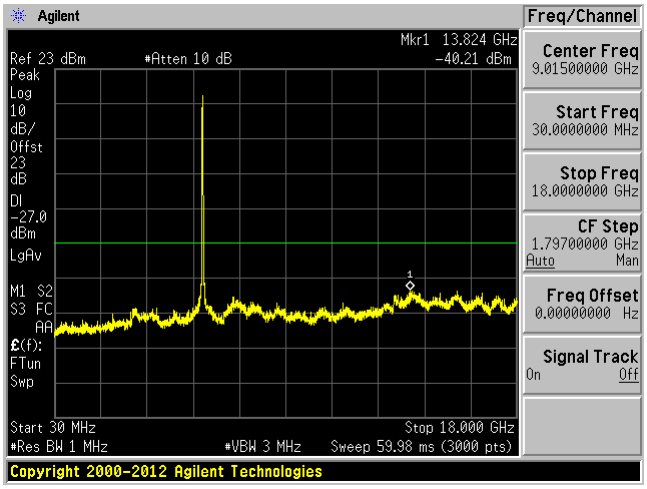


5725 - 5850 MHz, 802.11Non-HT Mode, ANT 2

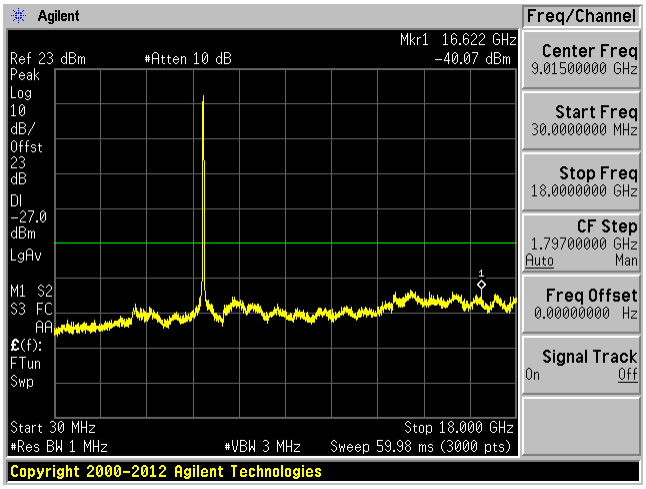
Low Channel 5745 MHz, 30MHz – 18GHz



Mid Channel 5785 MHz, 30MHz – 18GHz

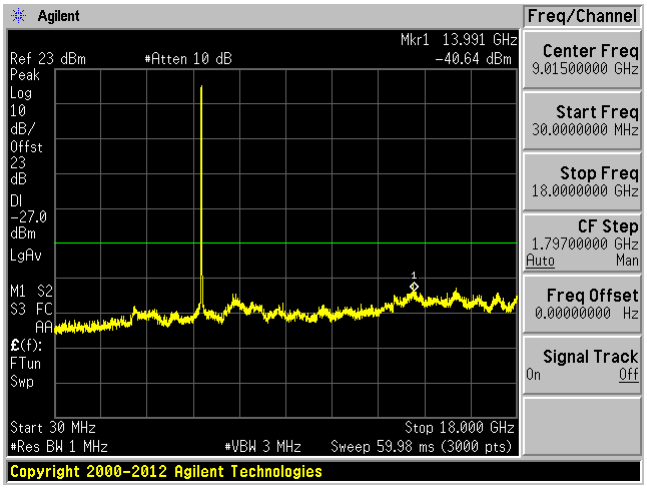


High Channel 5825 MHz, 30MHz – 18GHz

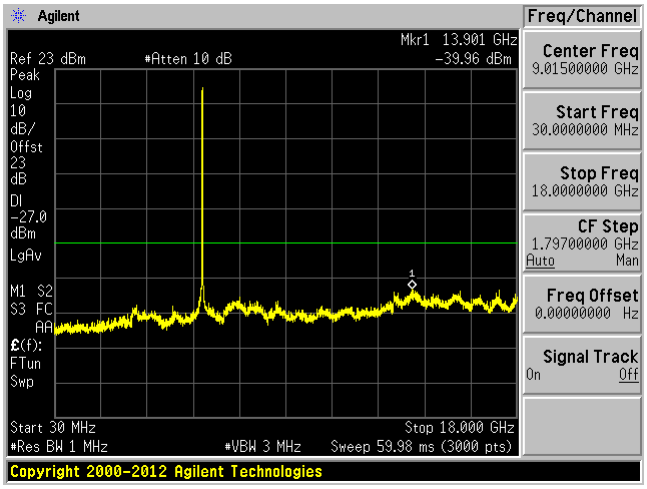


5725 - 5850 MHz, 802.11Non-HT Mode, ANT 3

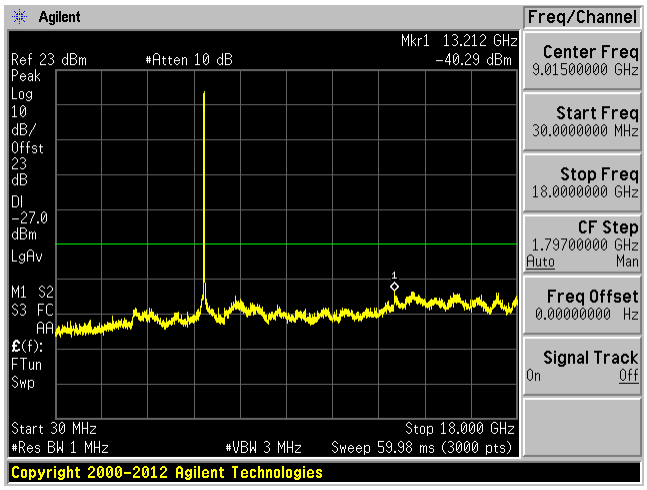
Low Channel 5745 MHz, 30MHz – 18GHz



Mid Channel 5785 MHz, 30MHz – 18GHz

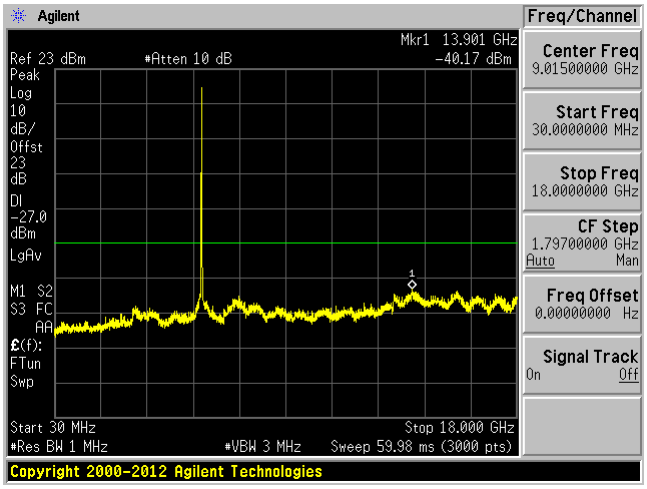


High Channel 5825 MHz, 30MHz – 18GHz

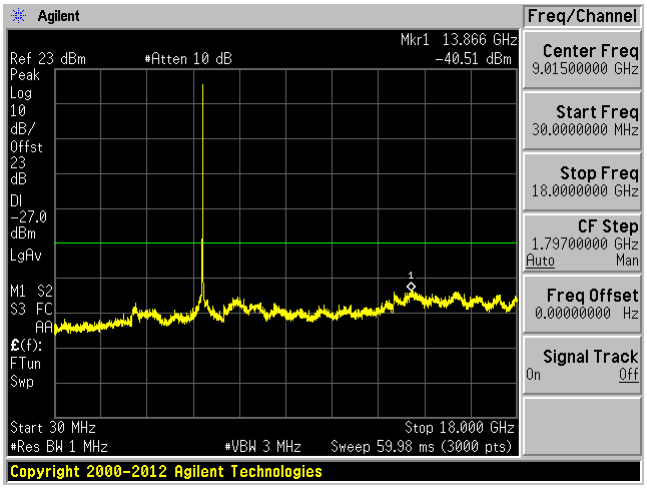


5725 - 5850 MHz, 802.11 VHT20 Mode, ANT 1

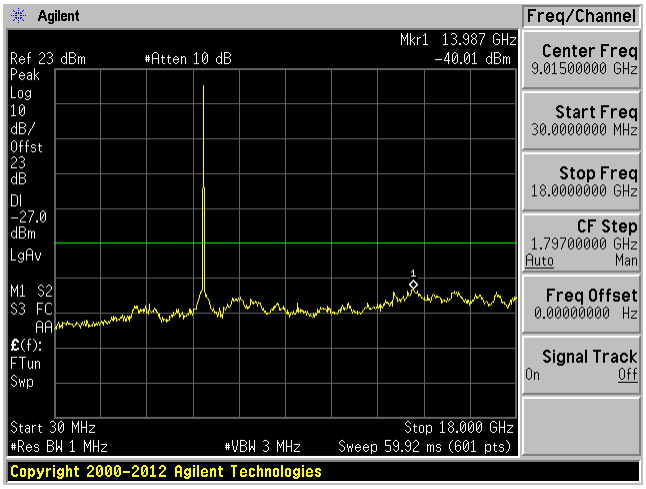
Low Channel 5745 MHz, 30MHz – 18GHz



Mid Channel 5785 MHz, 30MHz – 18GHz

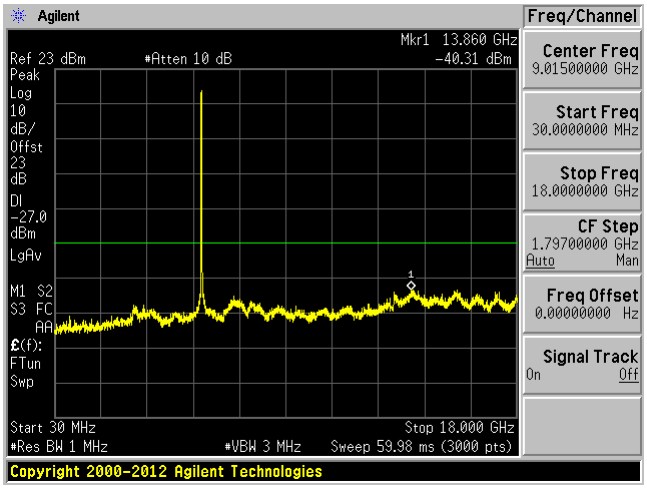


High Channel 5825 MHz, 30MHz – 18GHz

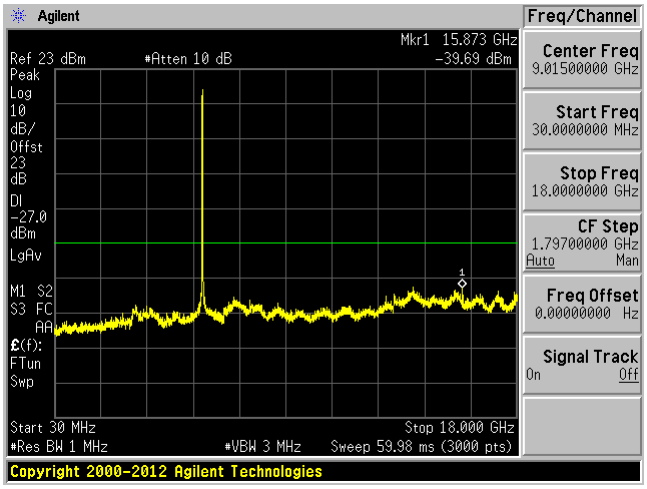


5725 - 5850 MHz, 802.11 VHT20 Mode, ANT 2

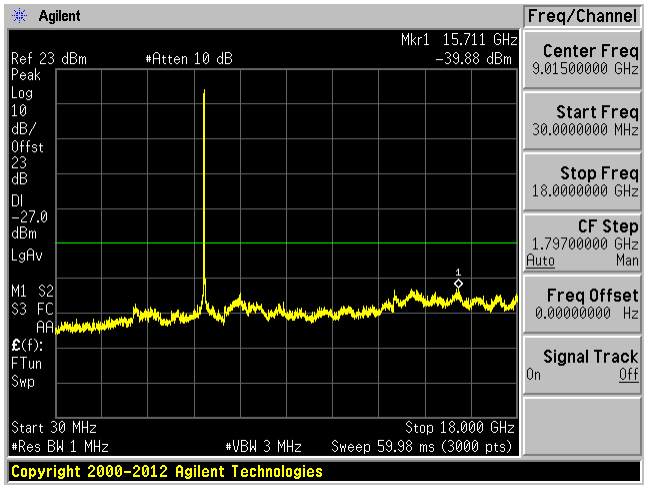
Low Channel 5745 MHz, 30MHz – 18GHz



Mid Channel 5785 MHz, 30MHz – 18GHz

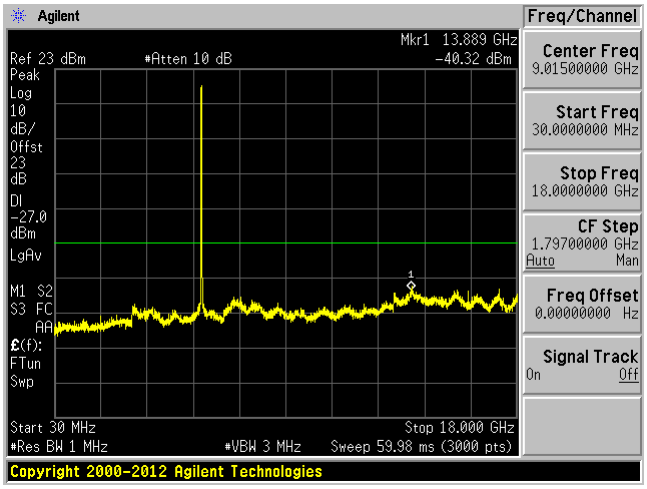


High Channel 5825 MHz, 30MHz – 18GHz

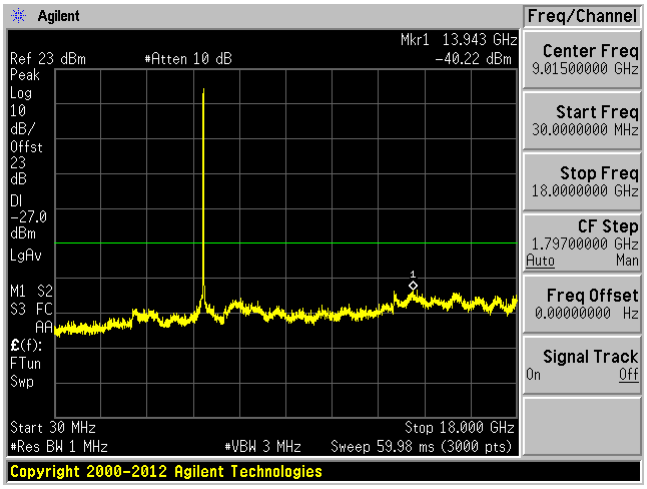


5725 - 5850 MHz, 802.11 VHT20 Mode, ANT 3

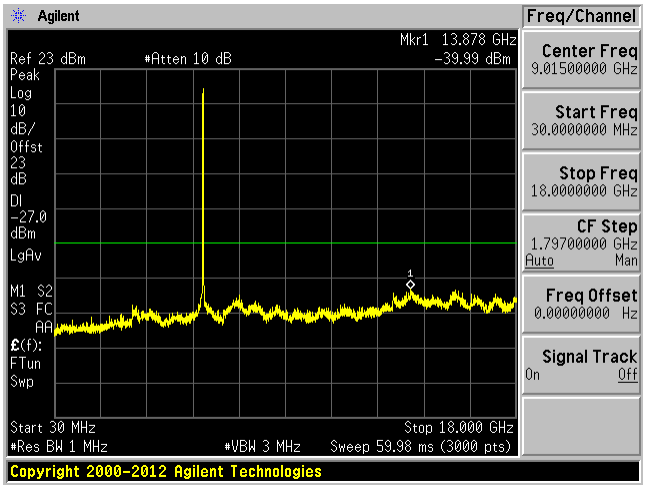
Low Channel 5745 MHz, 30MHz – 18GHz



Mid Channel 5785 MHz, 30MHz – 18GHz

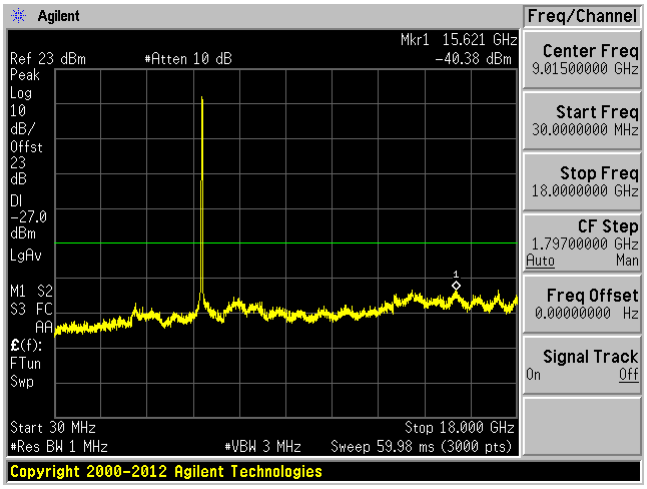


High Channel 5825 MHz, 30MHz – 18GHz

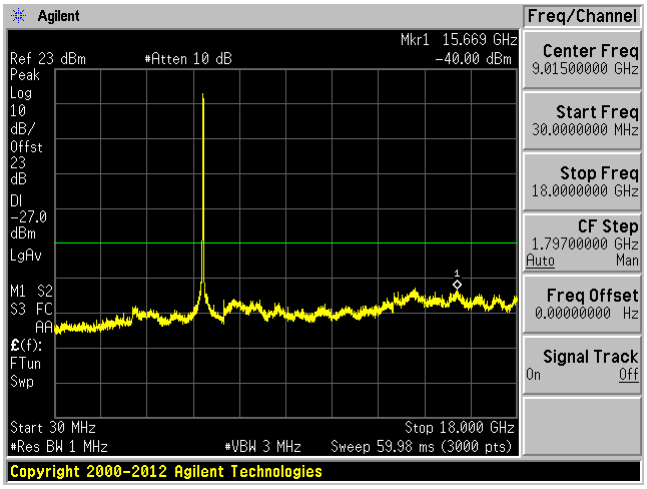


5725 - 5850 MHz, 802.11 VHT40 Mode, ANT 1

Low Channel 5755 MHz, 30MHz – 18GHz

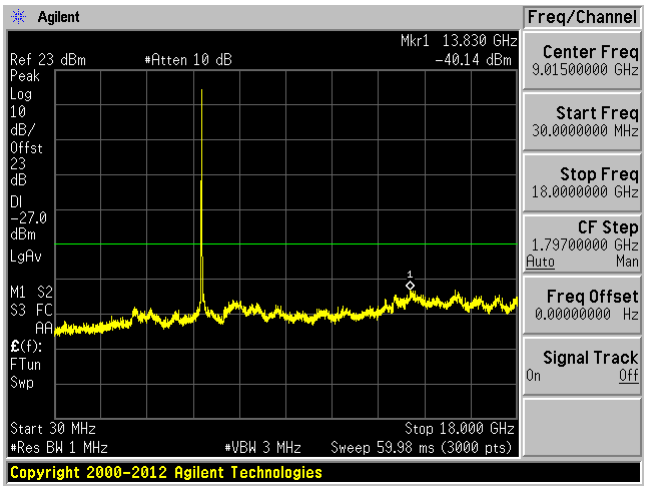


High Channel 5795 MHz, 30MHz – 18GHz

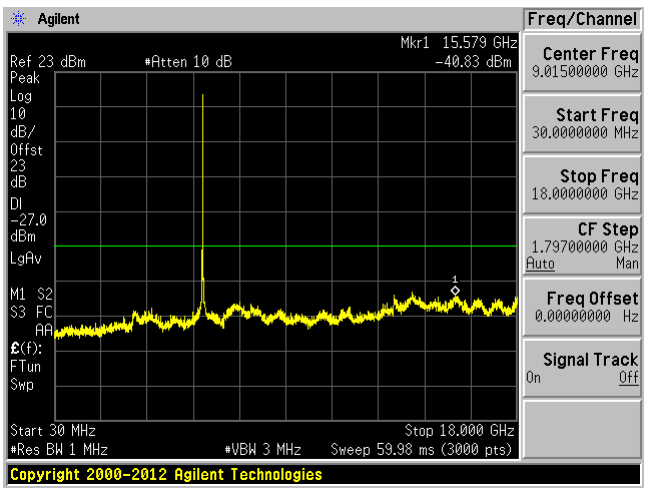


5725 - 5850 MHz, 802.11 VHT40 Mode, ANT 2

Low Channel 5755 MHz, 30MHz – 18GHz

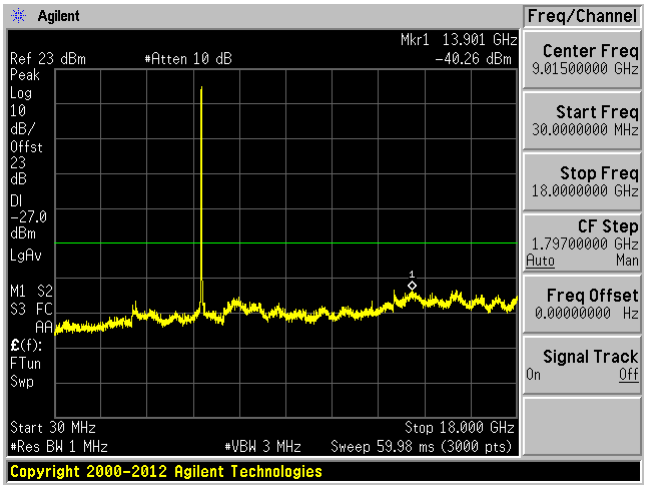


High Channel 5795 MHz, 30MHz – 18GHz

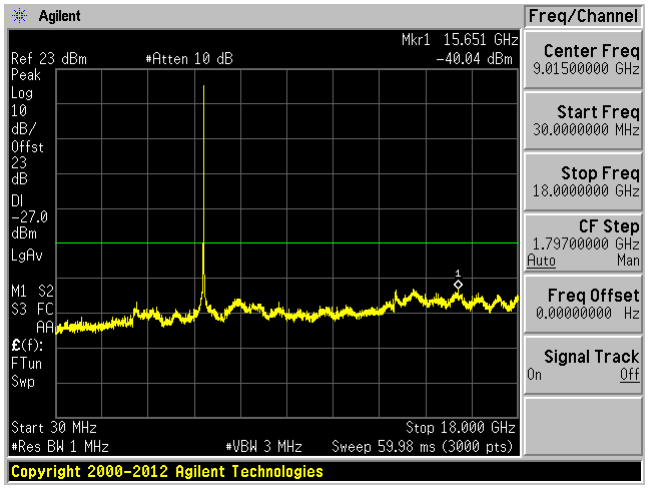


5725 - 5850 MHz, 802.11 VHT40 Mode, ANT 3

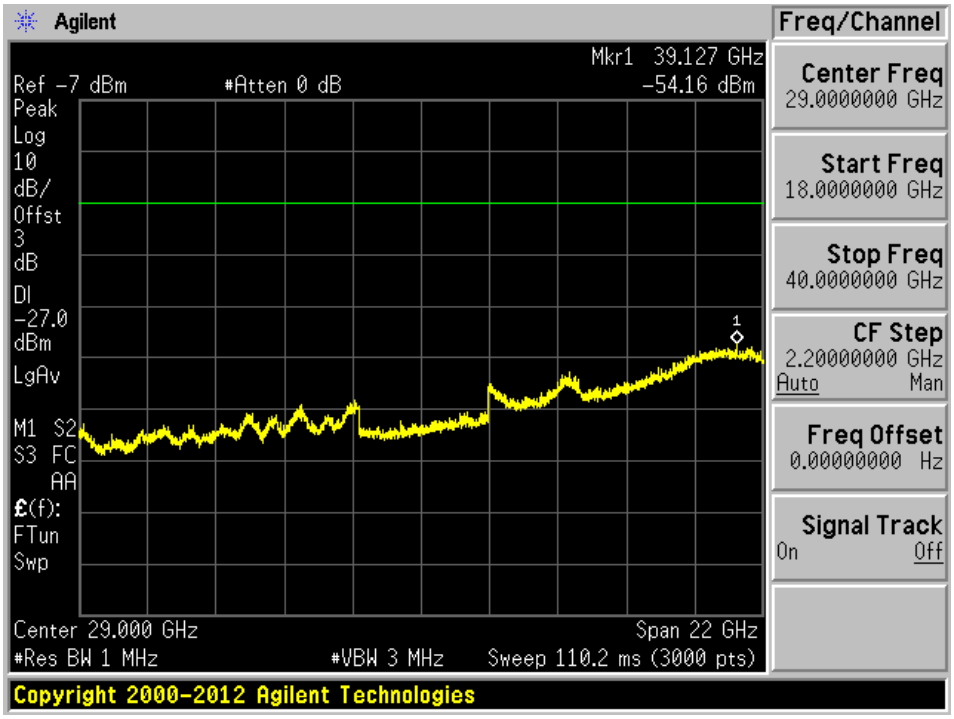
Low Channel 5755 MHz, 30MHz – 18GHz



High Channel 5795 MHz, 30MHz – 18GHz



Worst Case 18GHz – 40GHZ



Note: No emission found above 18GHz

Note: The directional gain is 6.9dBi, the total power for 3 antennas correction factor is 10*log 3 = 4.77 dB. Therefore, any emissions from single antenna port that's lower than -38.67 dBm/MHz (-27 dBm/MHz – 6.9 dBi – 4.77 dB) shows compliance.

FCC Band Edge Emissions

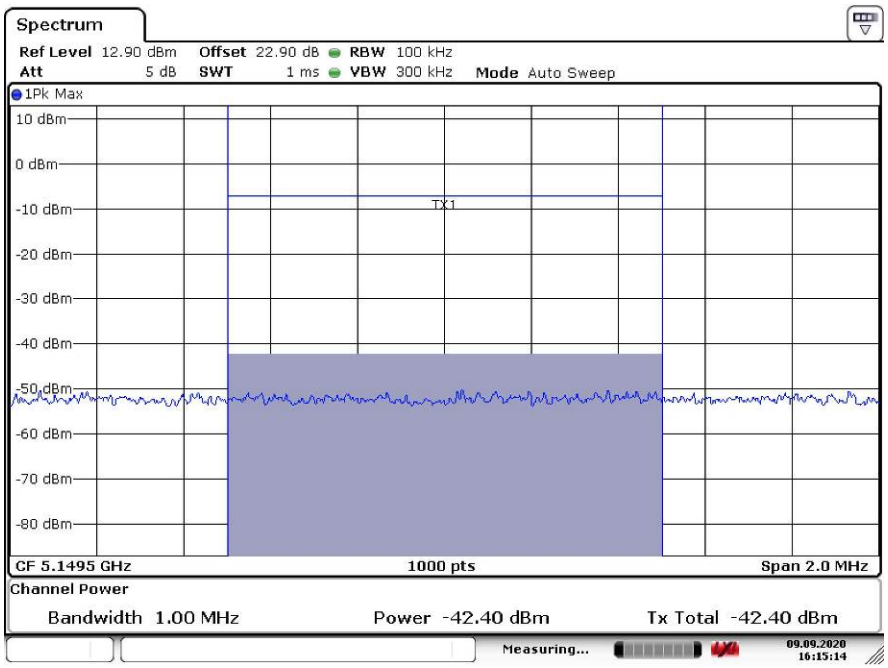
5150-5250MHz

Channel	Frequency (MHz)	OOB Emission (dBm/MHz)			OOB Emission e.i.r.p (dBm/MHz)			Total (dBm/MHz)	FCC Limit (dBm/MHz)
		ANT 1	Ant 2	ANT 3	ANT 1	Ant 2	ANT 3		
802.11Non-HT Mode									
Low	5180	-42.40	-41.96	-42.38	-35.5	-35.06	-35.48	-	-27
802.11VHT20 mode									
Low	5180	-42.22	-42.11	-42.42	-35.32	-35.21	-35.52	-30.58	-27
802.11VHT40 mode									
Low	5190	-38.98	-38.62	-39.49	-32.08	-31.72	-32.59	-27.34	-27

Please refer to the plot below for details.

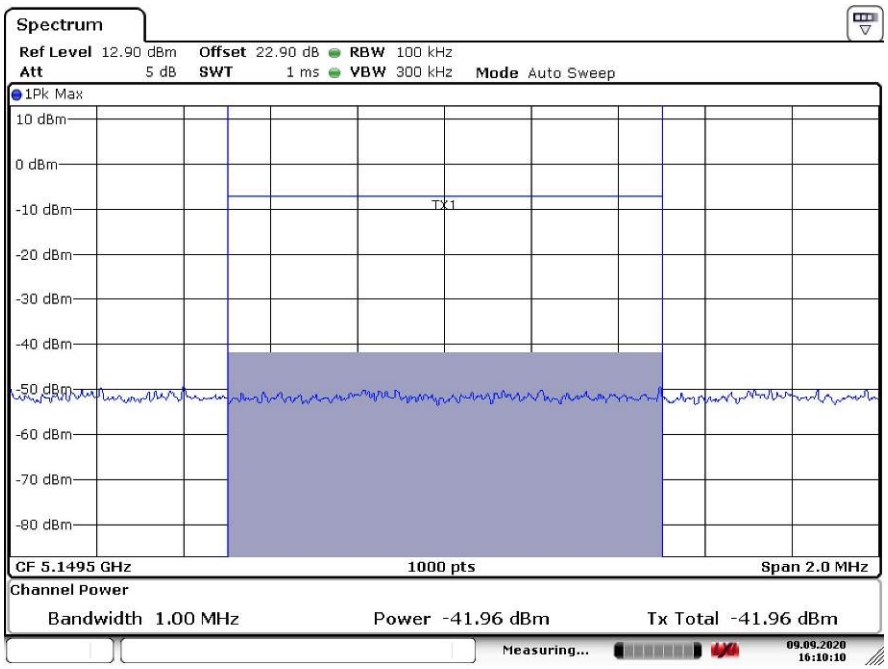
5150 - 5250 MHz, 802.11Non-HT Mode

Ant 1, Low Channel



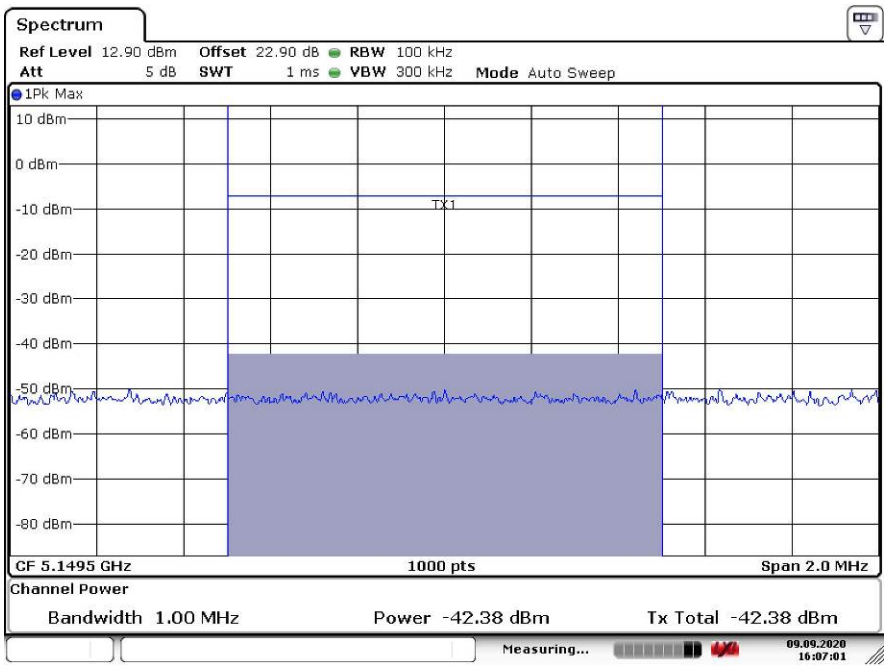
Date: 9.SEP.2020 16:15:15

Ant 2, Low Channel



Date: 9.SEP.2020 16:10:10

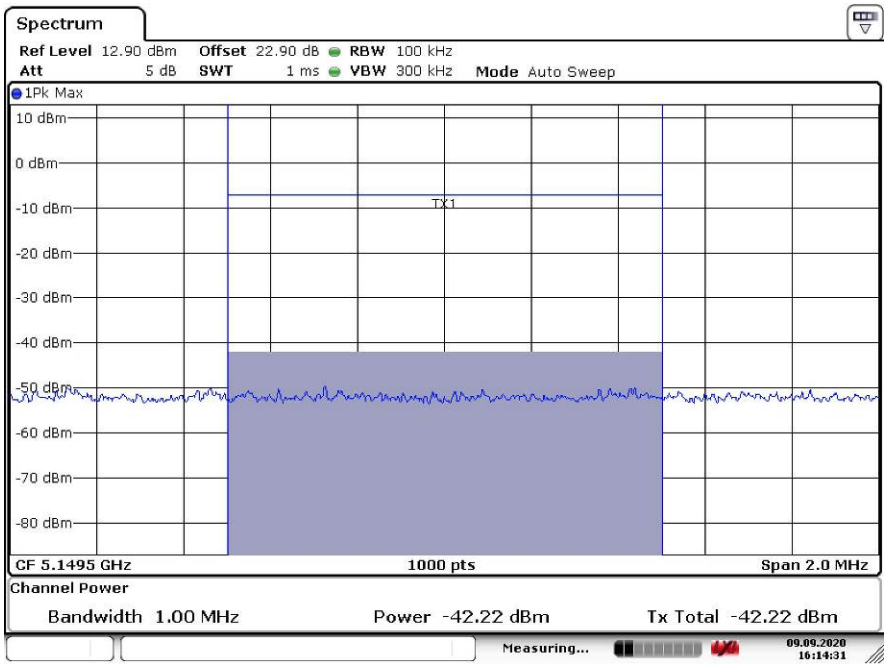
Ant 3, Low Channel



Date: 9.SEP.2020 16:07:01

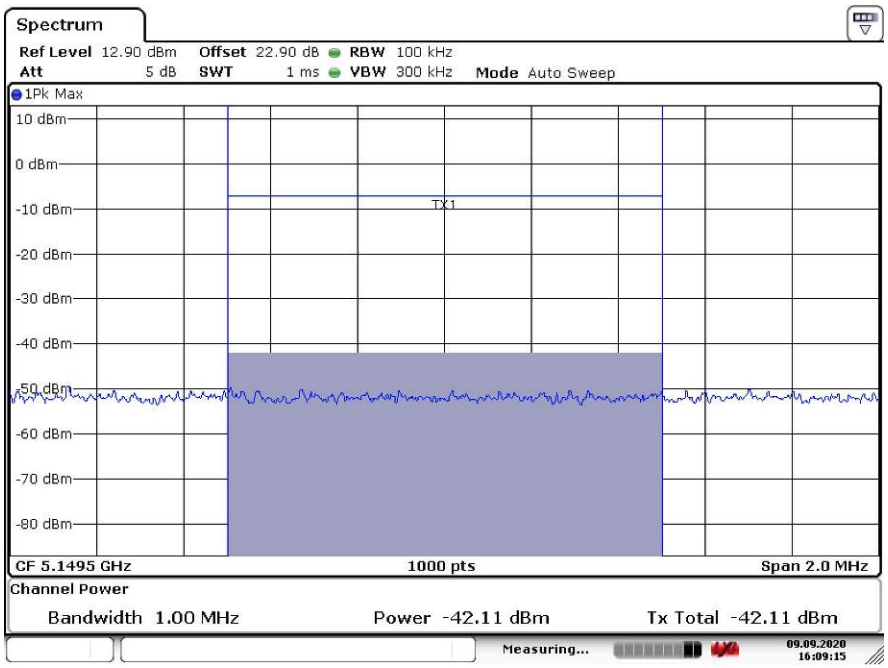
5150 - 5250 MHz, 802.11 VHT20 Mode

Ant 1, Low Channel



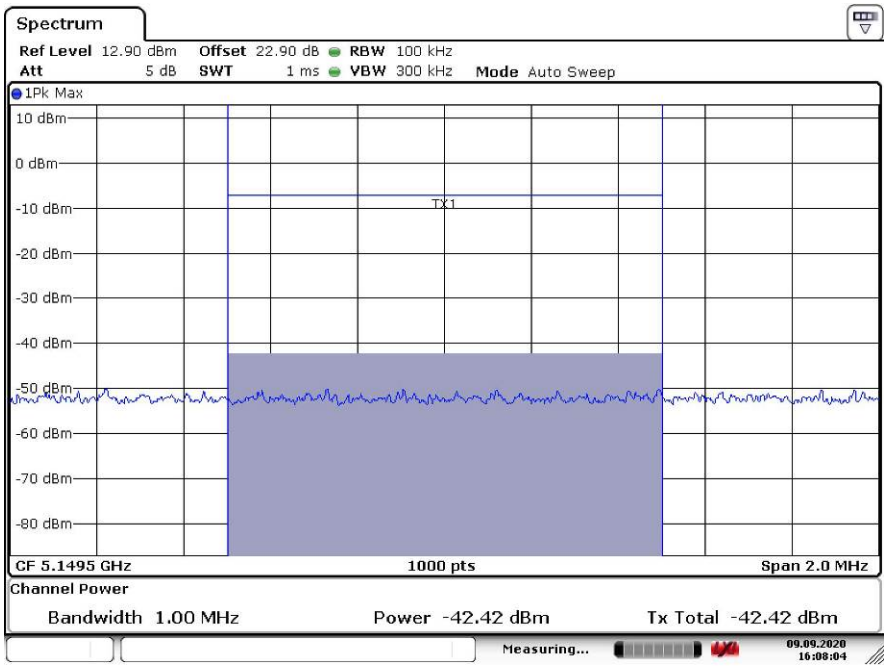
Date: 9.SEP.2020 16:14:31

Ant 2, Low Channel



Date: 9.SEP.2020 16:09:15

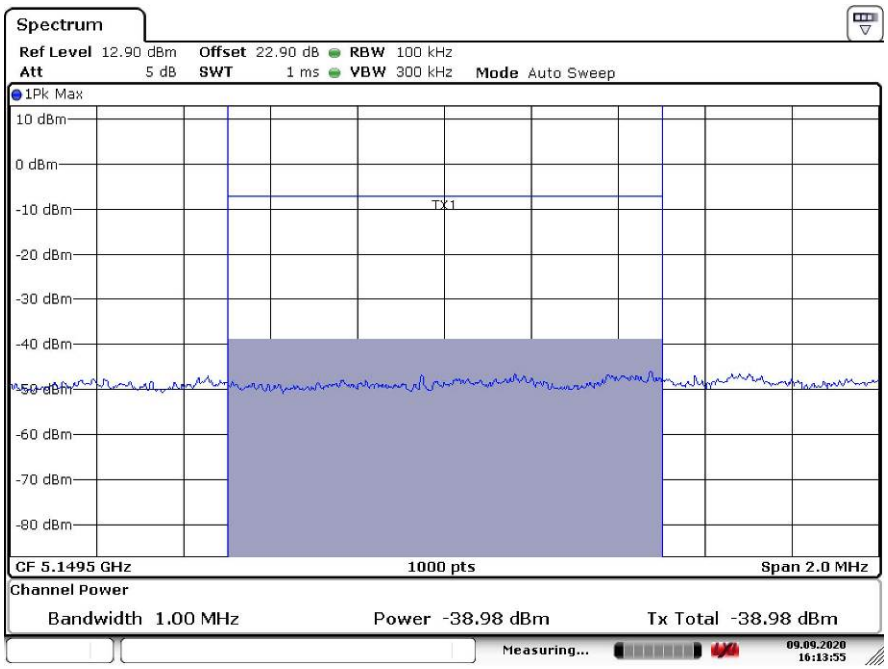
Ant 3, Low Channel



Date: 9.SEP.2020 16:08:04

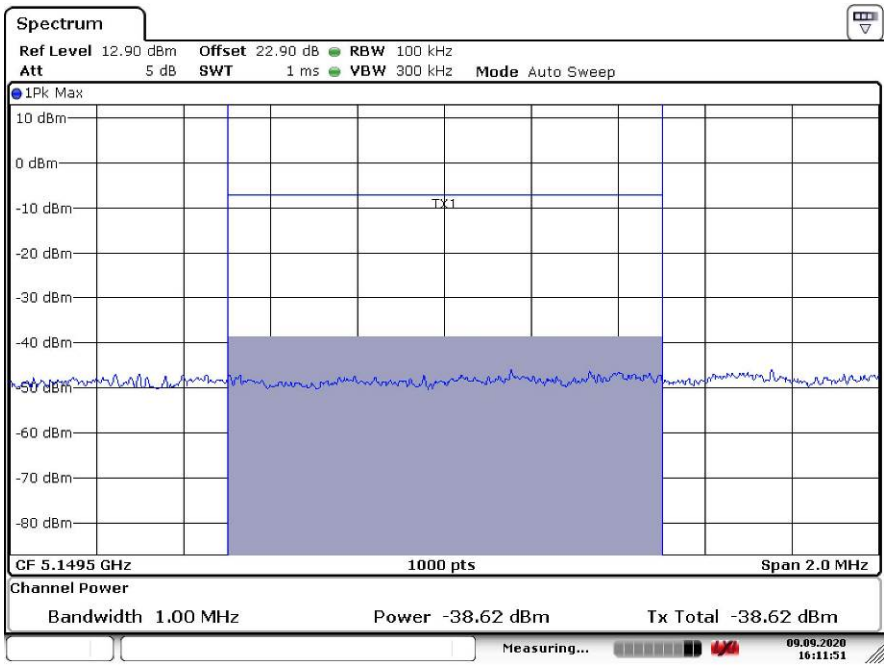
5150 - 5250 MHz, 802.11 VHT40 Mode

Ant 1, Low Channel



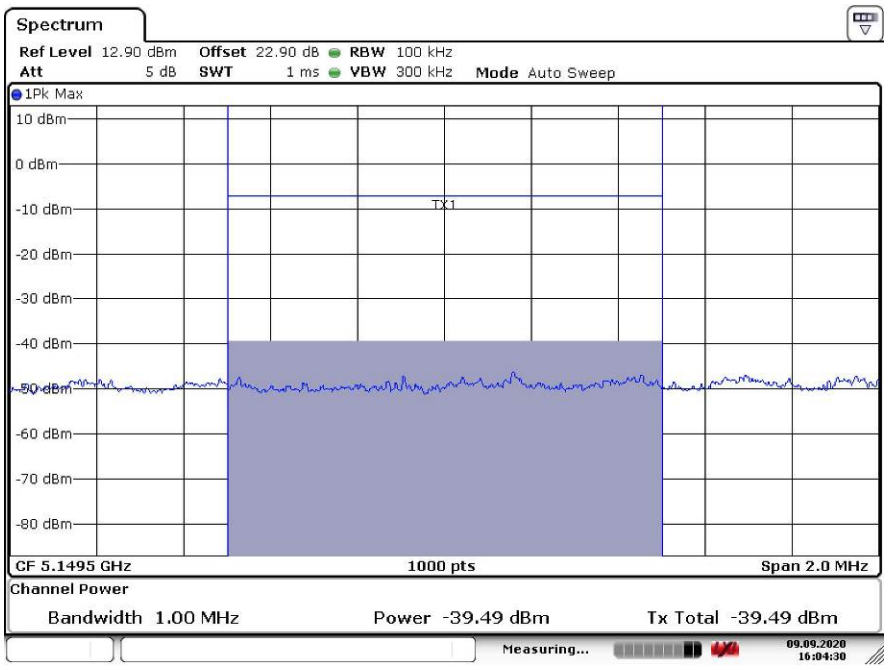
Date: 9.SEP.2020 16:13:55

Ant 2, Low Channel



Date: 9.SEP.2020 16:11:52

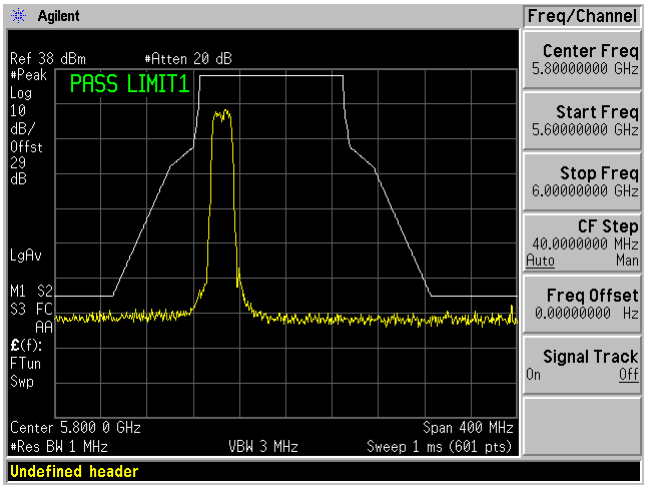
Ant 3, Low Channel



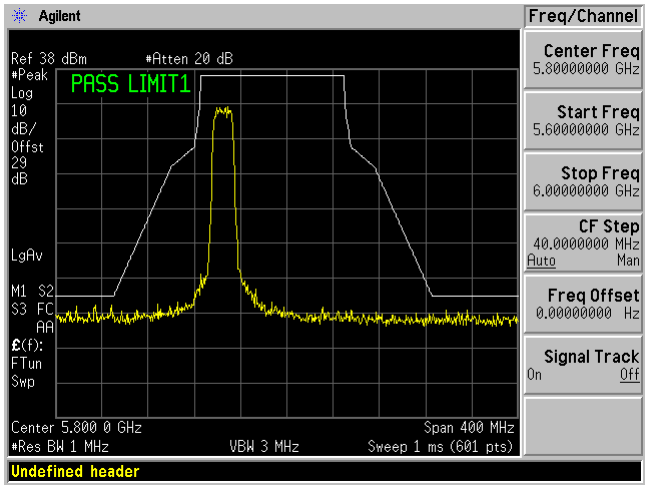
FCC & IC Emission Mask

5725 - 5850 MHz, 802.11Non-HT Mode

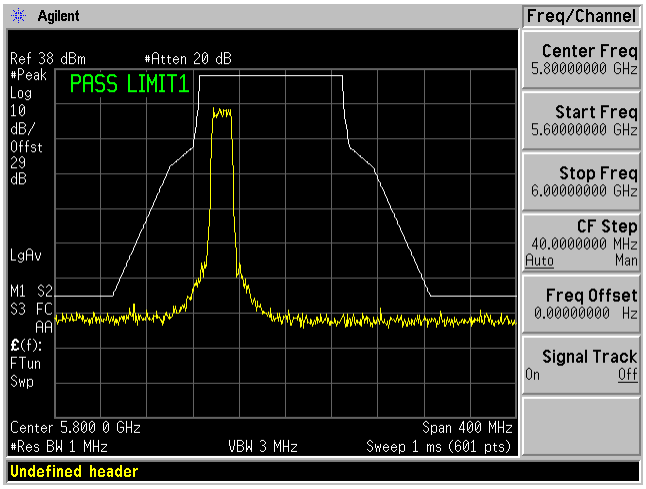
Low Channel ANT 1



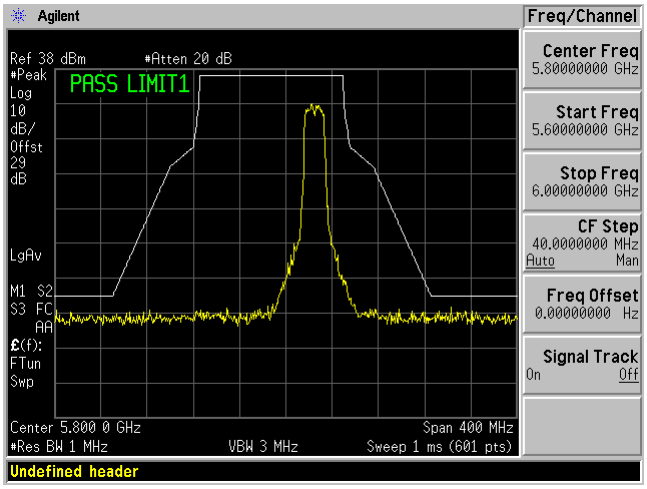
Low Channel ANT 2



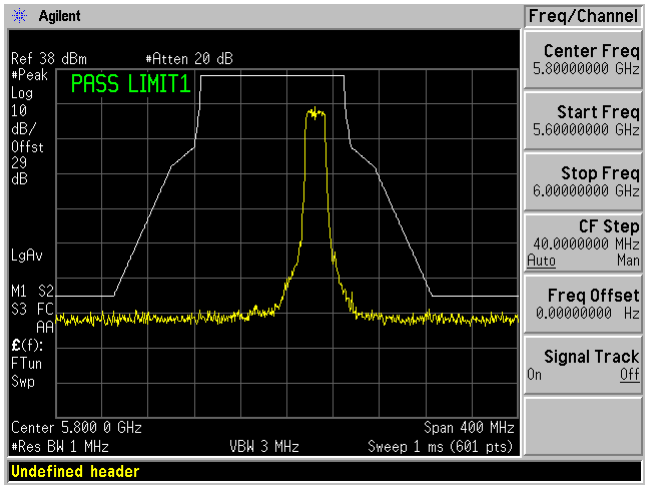
Low Channel ANT 3



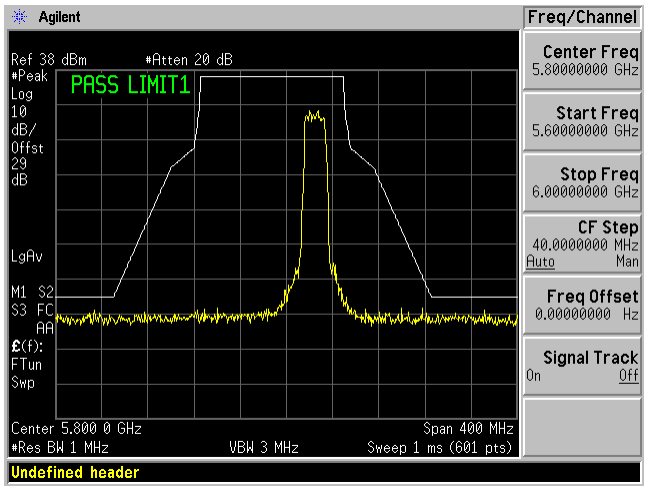
High Channel ANT 1



High Channel ANT 2

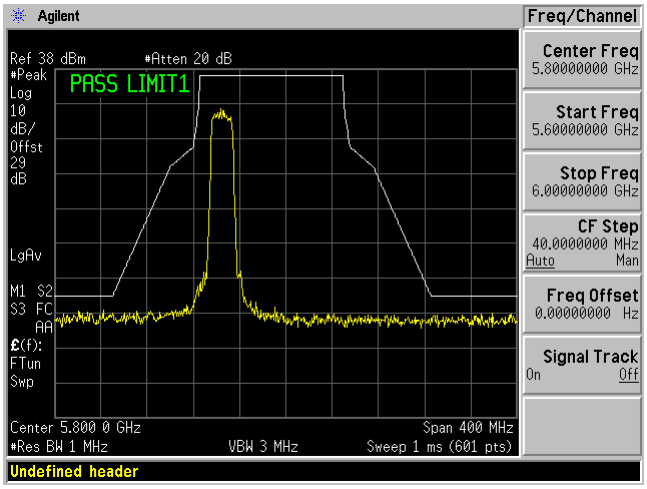


High Channel ANT 3

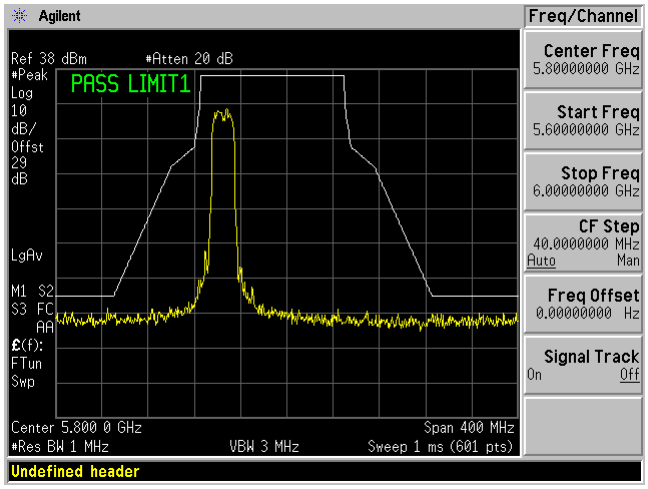


5725 - 5850 MHz, 802.11 VHT20 Mode

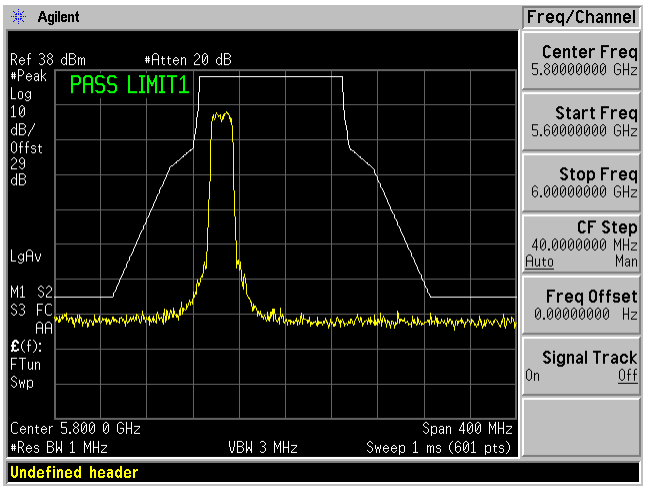
Low Channel ANT 1



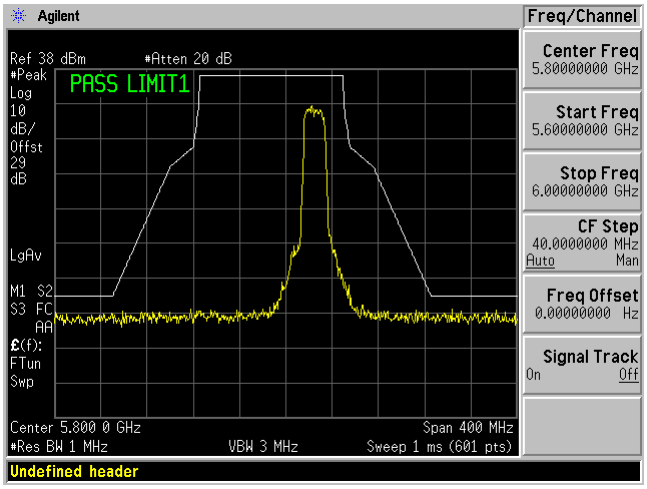
Low Channel ANT 2



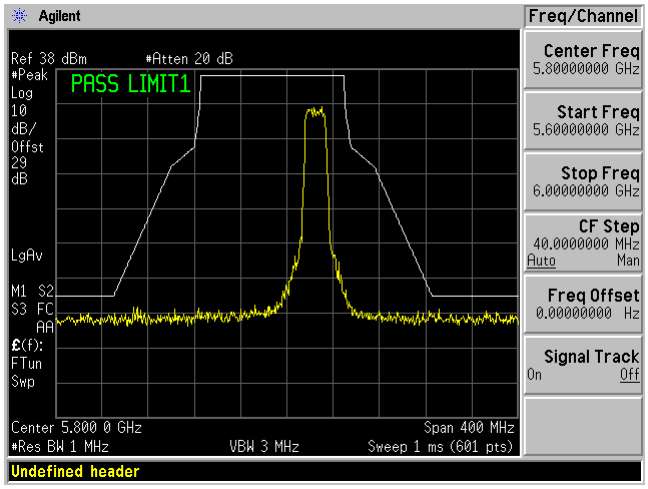
Low Channel ANT 3



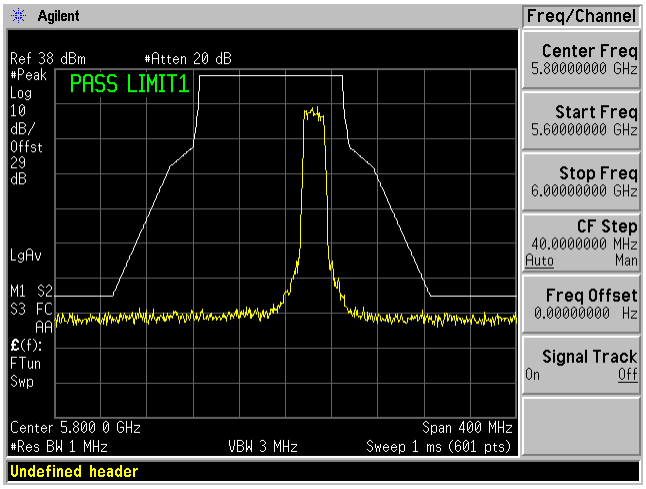
High Channel ANT 1



High Channel ANT 2

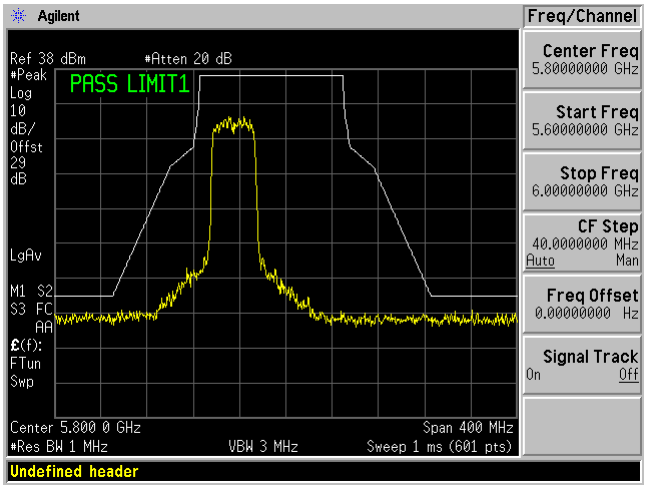


High Channel ANT 3

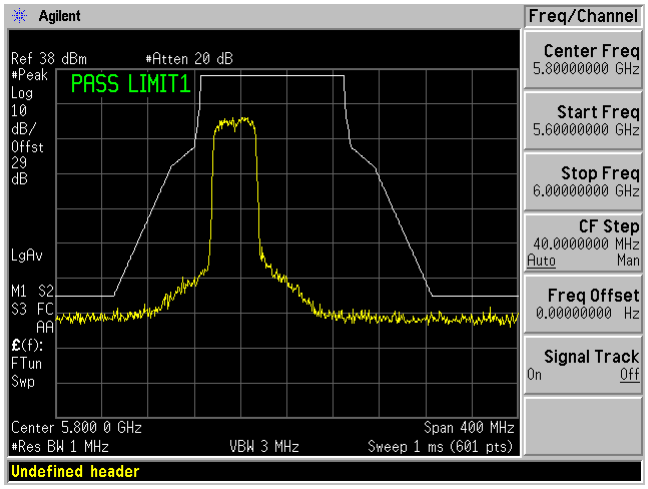


5725 - 5850 MHz, 802.11 VHT40 Mode

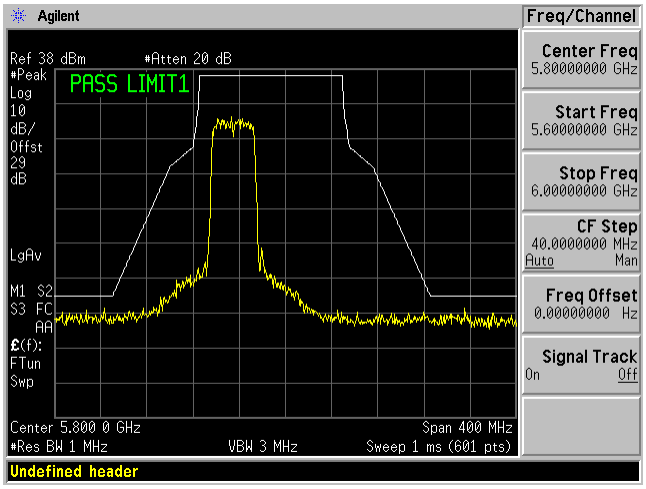
Low Channel ANT 1



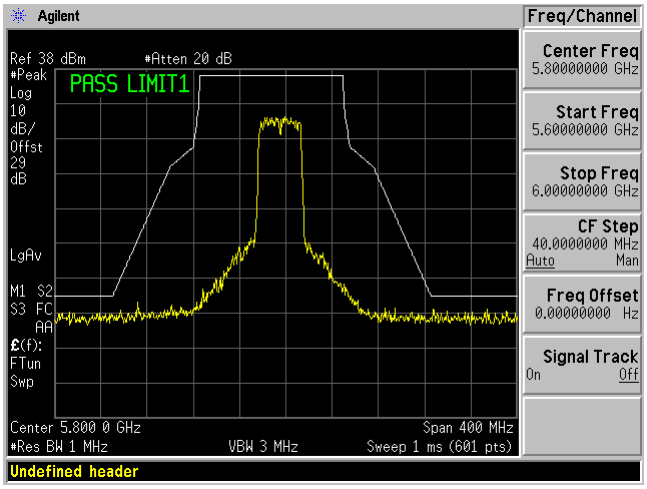
Low Channel ANT 2



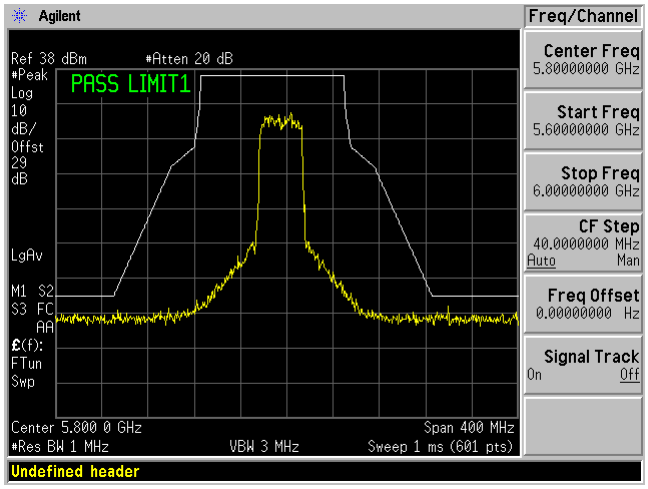
Low Channel ANT 3



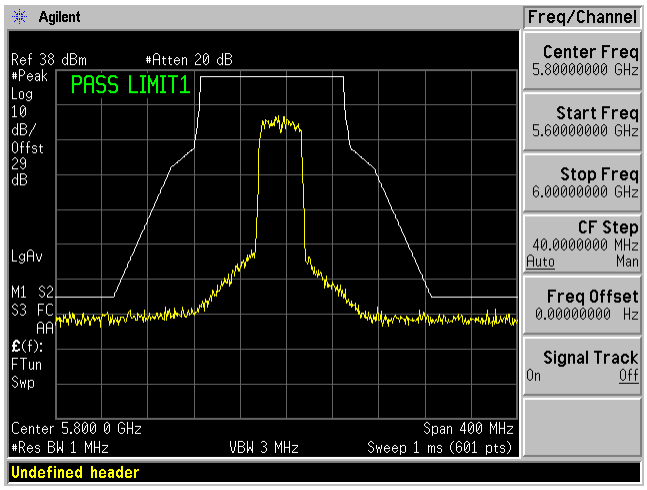
High Channel ANT 1



High Channel ANT 2



High Channel ANT 3



12 Annex A (Normative) – EUT Test Setup Photographs

Please refer to the attachment.

13 Annex B (Normative) – EUT External Photographs

Please refer to the attachment.

14 Annex C (Normative) – EUT Internal Photographs

Please refer to the attachment.

15 Annex D (Normative) - 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 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 April 2017*).

Presented this 2nd day of October 2018.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3297.02
Valid to November 30, 2020
Revised August 31, 2020

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

Please follow the web link below for a full ISO 17025 scope

https://www.a2la.org/scopepdf/3297-02.pdf

--- END OF REPORT ---