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

TEST REPORT

For

Wi2Wi, Inc.

2107 N 1st Street, Suite 680,

San Jose, CA 95131, USA

FCC ID: U9RWM828CC6
IC: 7089A-WM828CC6

Report Type:	**Product Type:**
Original Report	Wi-Fi & Bluetooth Module

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Report Number:	R1710231-407
Report Date:	2018-09-17
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1710231-407	Original Report	2018-09-17

1 General Description

1.1 Product Description for Equipment under Test (EUT)

This test and measurement report was prepared on behalf of *Wi2Wi, Inc.*, and their product model: *WM828CC6,* FCC ID: U9RWM828CC6, IC: 7089A-WM828CC6 or the "EUT" as referred to in this report. The product is a Wi-Fi and Bluetooth Module.

1.2 Objective

This report is prepared on behalf of *Wi2Wi, Inc.* in accordance with FCC CFR47 §15.407 and ISEDC RSS-247 Issue 2, February 2017.

The objective is 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.

1.3 Related Submittal(s)/Grant(s)

FCC Part 15, Subpart C, Equipment DSS with FCC ID: U9RWM828CC6, IC: 7089A-WM828CC6
FCC Part 15, Subpart C, Equipment DTS with FCC ID: U9RWM828CC6, IC: 7089A-WM828CC6

1.4 Test Methodology

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

1.5 Measurement Uncertainty

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

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

1.6 Test Facility Registrations

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

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

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

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

1.7 Test Facility Accreditations

Bay Area Compliance Laboratories Corp. (BACL) is:

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

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

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

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

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

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

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

- for Commercial Refrigerators and Freezers

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

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

5 Other
- For Water Coolers (ver. 3.0)

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

- Australia: ACMA (Australian Communication and Media Authority) – APEC Tel MRA -Phase I;
- Canada: (Innovation, Science and Economic development Canada - ISEDC) Foreign Certification Body – FCB – APEC Tel MRA -Phase I & Phase II;
- Chinese Taipei (Republic of China – Taiwan):
  - BSMI (Bureau of Standards, Metrology and Inspection) APEC Tel MRA -Phase I;
  - NCC (National Communications Commission) APEC Tel MRA -Phase I;
- European Union:
  - EMC Directive 2014/30/EU US-EU EMC & Telecom MRA CAB (NB)
  - Radio Equipment (RE) Directive 2014/53/EU US-EU EMC & Telecom MRA CAB (NB)
  - Low Voltage Directive (LVD) 2014/35/EU
- Hong Kong Special Administrative Region: (Office of the Telecommunications Authority – OFTA) APEC Tel MRA -Phase I & Phase II
- Israel – US-Israel MRA Phase I
- Republic of Korea (Ministry of Communications - Radio Research Laboratory) APEC Tel MRA -Phase I
- Singapore: (Infocomm Media Development Authority - IMDA) APEC Tel MRA -Phase I & Phase II;
- Japan: VCCI - Voluntary Control Council for Interference US-Japan Telecom Treaty VCCI Side Letter-
- USA:
  - ENERGY STAR Recognized Test Laboratory – US EPA
  - Telecommunications Certification Body (TCB) – US FCC;
  - Nationally Recognized Test Laboratory (NRTL) – US OSHA

Vietnam: APEC Tel MRA -Phase I;

2 EUT Test Configuration

2.1 Justification

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

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

The worst-case data rates are determined by measuring the average power, peak power and PPSD across all data rates bandwidths, and modulations.

2.2 EUT Exercise Software

The test firmware used was Marvell's 88W8887 Labtool Version 2.0.0.89 provided by *Wi2Wi, Inc.* The software is compliant with the standard requirements being tested against.

Please refer to the following power setting table.

Modulation	Channel	Frequency (MHz)	Power Setting
802.11a mode	36	5180	16
	40	5200	19
	48	5240	19
	149	5745	19
	157	5785	19
	165	5825	19
802.11n20 mode	36	5180	16
	40	5200	19
	48	5240	19
	149	5745	19
	157	5785	19
	165	5825	19
802.11n40 mode	38	5190	15
	46	5230	19
	151	5755	19
	159	5795	19

Modulation	Channel	Frequency (MHz)	Power Setting
802.11ac20 mode	36	5180	16
	40	5200	16
	48	5240	16
	149	5745	17
	157	5785	17
	165	5825	17
802.11ac40 mode	38	5190	14
	46	5230	17
	151	5755	17
	159	5795	17
802.11ac80 mode	42	5210	8
	155	5775	12

*Data rates tested: 802.11a mode: 6Mbps
802.11n HT20: MCS0
802.11n HT40: MCS0
802.11ac VHT20: VHT_SS2_MCS0
802.11ac VHT40: VHT_SS2_MCS0
802.11ac VHT80: VHT_SS2_MCS0

2.3 Duty Cycle Correction Factor

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

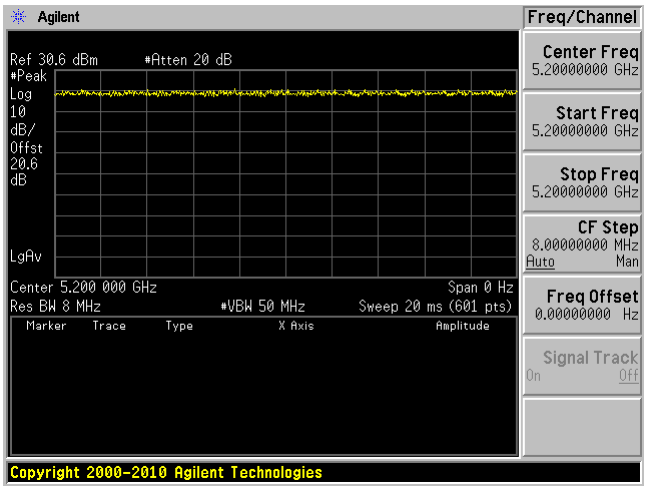
All measurements are to be performed with the EUT transmitting at 100% duty cycle at its maximum power control level; however, if 100% duty cycle cannot be achieved, measurements of duty cycle, x, and maximum-power transmission duration, T, are required for each tested mode of operation.

Radio Mode	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
802.11a	-	-	100	0
802.11n20	-	-	100	0
802.11n40	-	-	100	0
802.11ac20	-	-	100	0
802.11ac40	-	-	100	0
802.11ac80	-	-	100	0

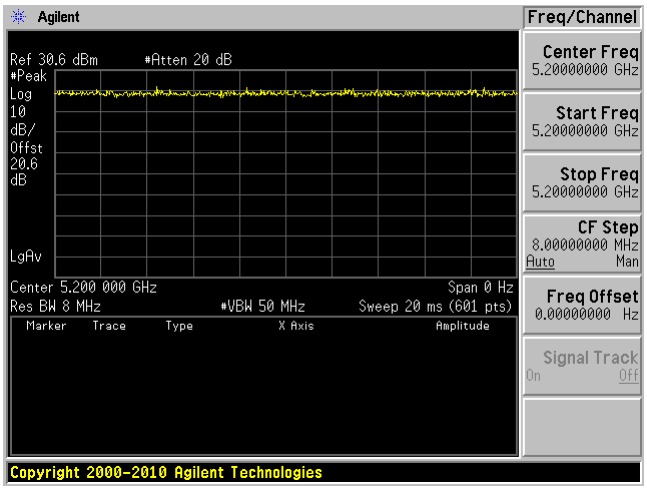
Note: Duty Cycle Correction Factor = 10*log(1/duty cycle)

Please refer to the following plots.

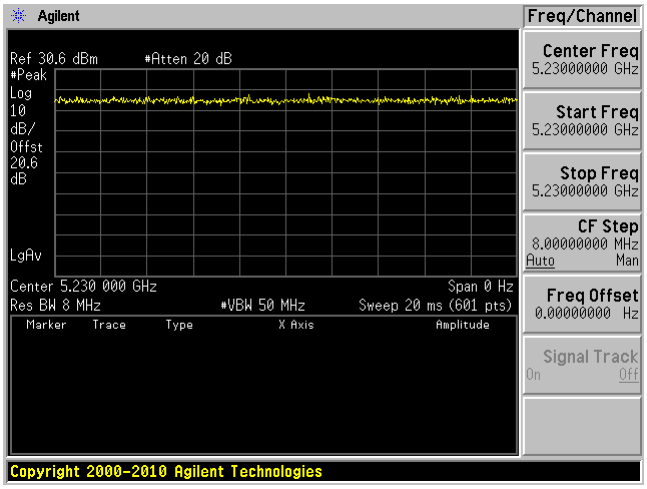
802.11a mode



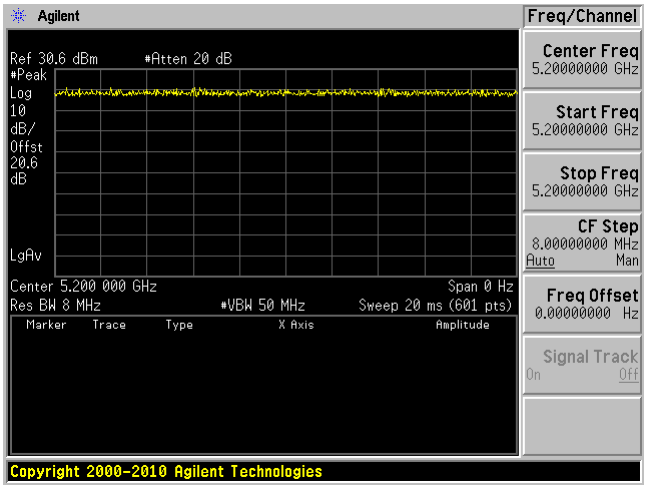
802.11n20 mode



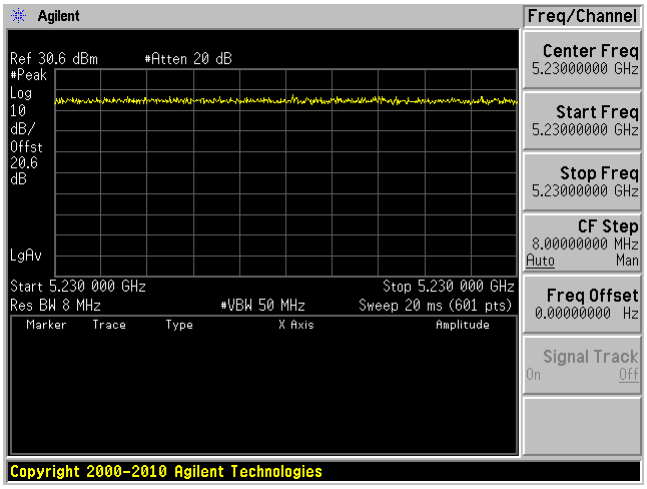
802.11n40 mode



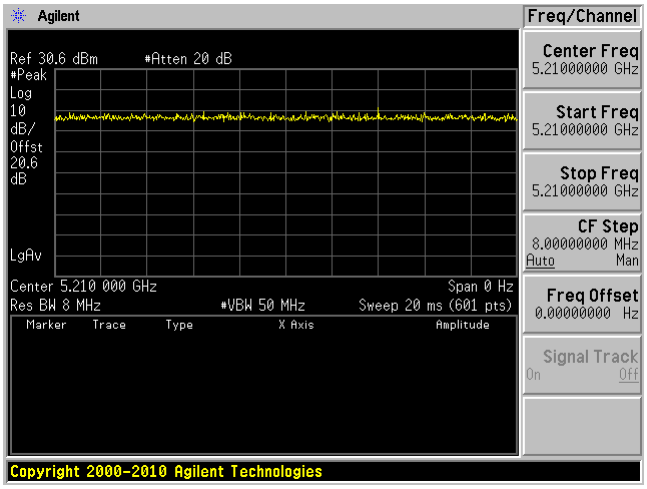
802.11ac20 mode



802.11ac40 mode



802.11ac80 mode



2.4 Equipment Modifications

No modifications were made to the EUT.

2.5 Local Support Equipment

Manufacturer	Description	Model
Dell	Laptop	Latitude E6410

2.6 Support Equipment

Manufacturer	Description	Model
IBM ThinkPad / Lenovo	Laptop	X60
HP	Laptop	EliteBook 8460p

2.7 Interface Ports and Cabling

Cable Description	Length (m)	To	From
USB to Ethernet Bridge	< 1	Windows Laptop running Labtool (IBM)	Linux Laptop with DUT (HP)
Antenna Connector Cable	0.1	PSA	EUT

3 Summary of Test Results

FCC and IC Rules	Description of Test	Result
FCC §2.1093, §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
FCC §15.407(h) ISEDC RSS-247 §6.3	Dynamic Frequency Selection (DFS)	N/A[1]

Note[1]: EUT does not support DFS bands.

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

4.1 Applicable Standards

According to FCC §15.247(i), §15.407(f) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for General Population/Uncontrolled Exposure

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

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

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

According to ISED RSS-102 Issue 5:

2.5.2 Exemption Limits for Routine Evaluation – RF Exposure Evaluation

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

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

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

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 FCC MPE Results

5.2GHz band:

Maximum average output power at antenna input terminal (dBm):	14.49
Maximum average output power at antenna input terminal (mW):	28.12
Prediction distance (cm):	20
Prediction frequency (MHz):	5200
Maximum Antenna Gain, typical (dBi):	3
Maximum Antenna Gain (numeric):	1.995
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.0112
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

5.8GHz band:

Maximum average output power at antenna input terminal (dBm):	13.23
Maximum average output power at antenna input terminal (mW):	21.04
Prediction distance (cm):	20
Prediction frequency (MHz):	5825
Maximum Antenna Gain, typical (dBi):	3
Maximum Antenna Gain (numeric):	1.995
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.0084
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

2.4GHz Bluetooth/BLE:

Maximum average output power at antenna input terminal (dBm):	10.52
Maximum average output power at antenna input terminal (mW):	11.272
Prediction distance (cm):	20
Prediction frequency (MHz):	2402
Maximum Antenna Gain, typical (dBi):	2
Maximum Antenna Gain (numeric):	1.585
Power density of prediction frequency at 40 cm (mW/cm^2):	0.0036
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

Multi Transmitter MPE Evaluation

0.0112/1.0+0.0036/1.0 = 0.0148 ≤ 1.0

Conclusion

The device is compliant with the requirement MPE limit for uncontrolled exposure. All transceiver modules must be installed with a separation distance of no less than **20** cm from all persons.

4.4 RF exposure evaluation exemption for IC

5.2 GHz band: 14.49 + 3 dBi = 17.49 dBm < $1.31\times10^{-2}f^{0.6834}$ = 4.537 W = 36.57 dBm

5.8 GHz band: 13.23 + 3 dBi = 16.23 dBm < $1.31\times10^{-2}f^{0.6834}$ = 4.903 W = 36.90 dBm

2.4 GHz Bluetooth/BLE: 10.52 + 2 dBi = 12.52 dBm < $1.31\times10^{-2}f^{0.6834}$ = 2.676 W = 34.27 dBm

Multi Transmitter MPE Evaluation

0.056W(17.49 dBm) + 0.018W(12.52 dBm) = 0.074 W < 2.676 W

Conclusion

Therefore the RF exposure is not required. All transceiver modules must be installed with a separation distance of no less than **20** cm from all persons.

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 Rubber-Duck, Dual-Band (2.4/5 GHz) Dipole Antenna with Integrated MHF4 IPEX Female Connector.

Antenna usage	Frequency Range (MHz)	Maximum Antenna Gain (dBi)
Wi-Fi/Bluetooth	2400-2500	2
Wi-Fi	5150-5250	3
Wi-Fi	5725-5850	3

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 limits and and ISEDC RSS GEN §8.8.

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

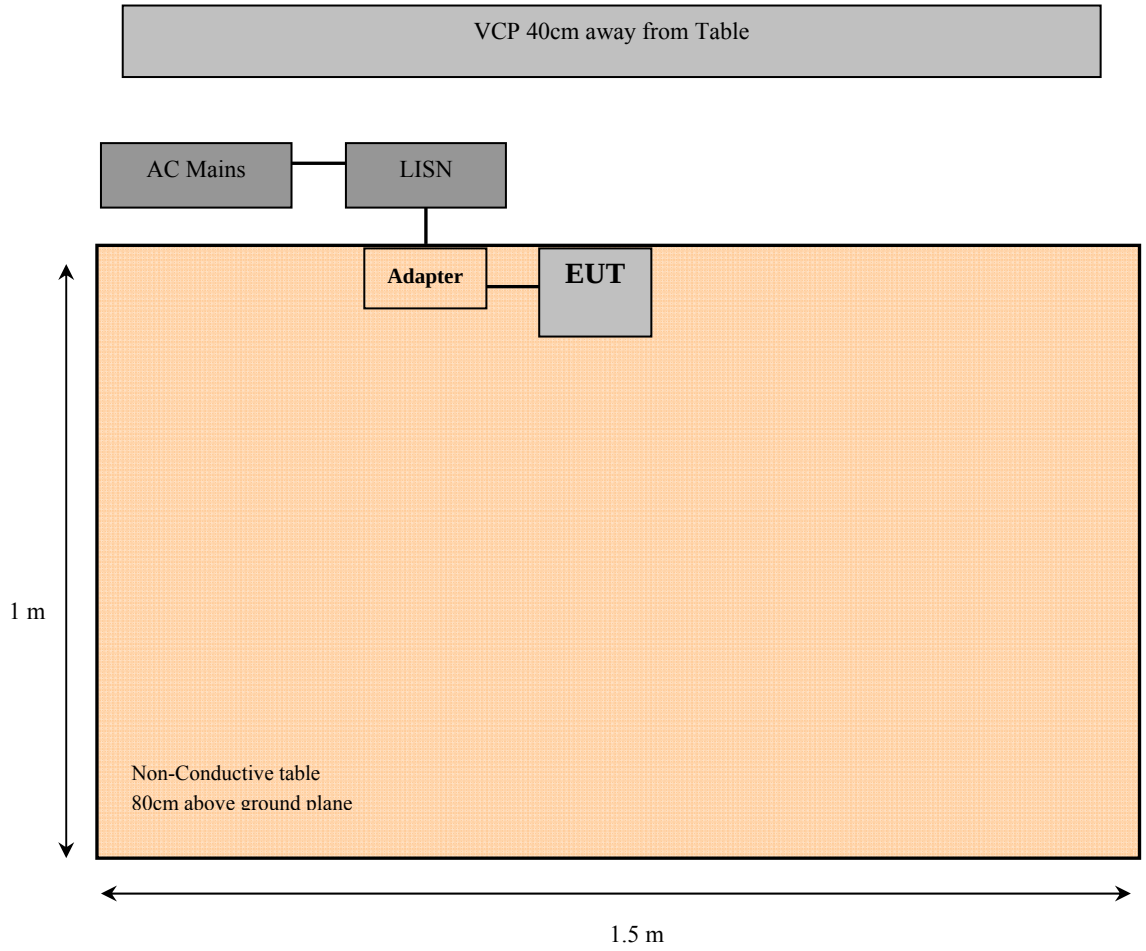
6.3 Test Procedure

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

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

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

6.4 Test Setup Block Diagram



6.5 Corrected Amplitude and Margin Calculation

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

CA = Ai + CL + Atten

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

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

Margin = Corrected Amplitude - Limit

6.6 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde and Schwarz	Receiver, EMI Test	ESCI 1166.5950K03	100338	2016-02-04	2 years
Rohde and Schwarz	Impulse Limiter	ESH3-Z2	101964	2017-07-24	1 year
Solar Electronics Company	High Pass Filter	Type 7930-100	7930150203	2017-03-13	1 year
Suirong	30 ft conductive emission cable	LMR 400	-	N/R	N/A
FCC	LISN	FCC-LISN-50-25-2-10-CISPR16	160130	2017-04-24	1 year
Vasona	Test software	V6.0 build 11	10400213	N/R	N/R

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

6.7 Test Environmental Conditions

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

The testing was performed by Harry Zhao on 2018-01-19 in the Conducted Test Site.

6.8 Summary of Test Results

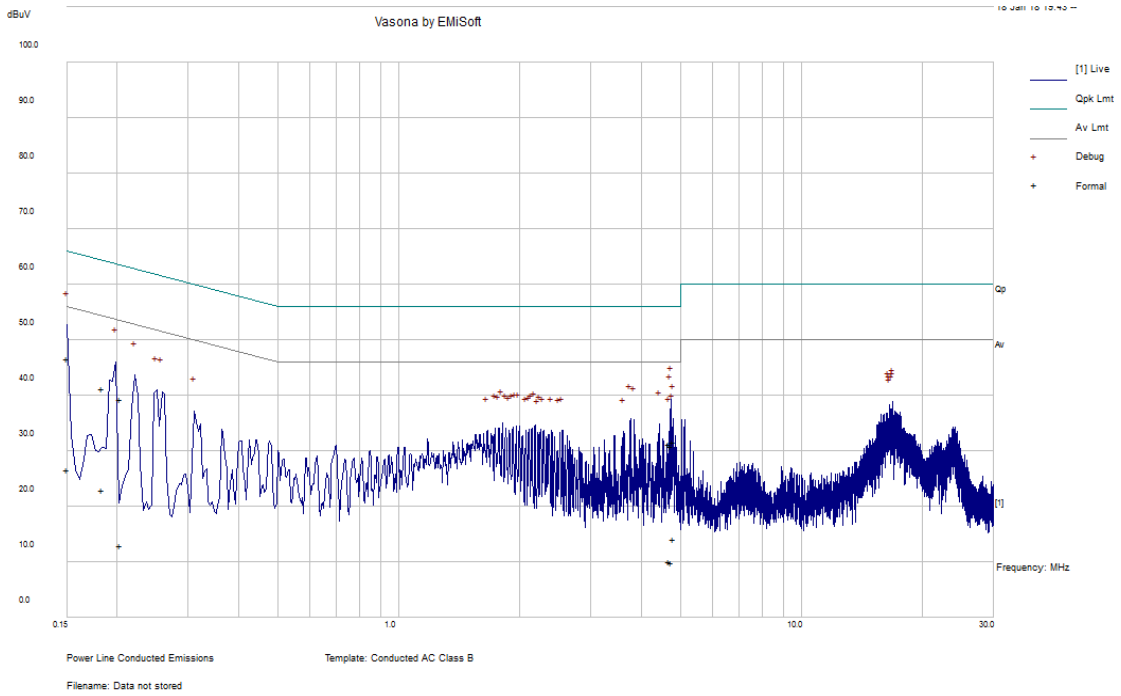
According to the recorded data in following table, the EUT complied with the FCC Part 15 and RSS-Gen standards' conducted emissions limits, with the margin reading of:

Connection: AC/DC adapter connected to 120 V/60 Hz, AC			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Line/Neutral)**	**Range (MHz)**
-19.37	0.150372	Line	0.15-30

Note: testing was performed under worst case co-location 5 GHz Wi-Fi and Bluetooth/BLE

6.9 Conducted Emissions Test Plots and Data

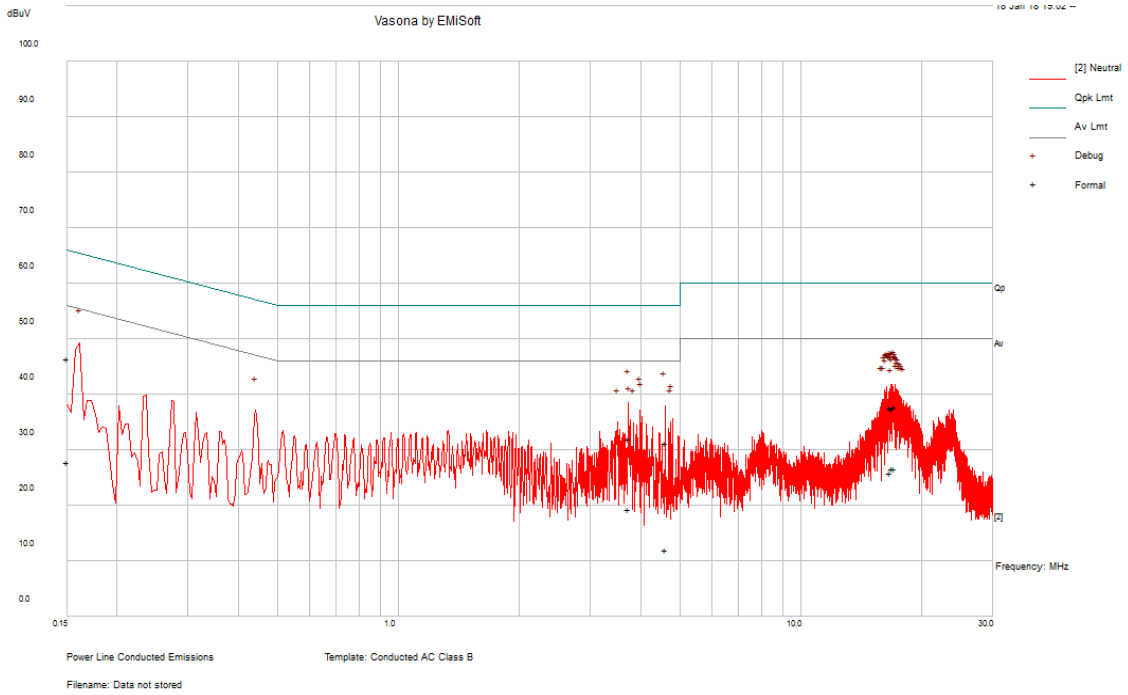
120 V, 60 Hz – Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.150372	46.61	Line	65.98	-19.37	QP
4.747934	30.9	Line	56	-25.1	QP
0.183138	41.31	Line	64.34	-23.03	QP
4.701511	31.24	Line	56	-24.76	QP
0.202899	39.28	Line	63.49	-24.21	QP
4.804669	31.69	Line	56	-24.31	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.150372	26.65	Line	55.98	-29.33	Ave.
4.747934	9.87	Line	46	-36.13	Ave.
0.183138	23.02	Line	54.34	-31.32	Ave.
4.701511	10.22	Line	46	-35.78	Ave.
0.202899	13.11	Line	53.49	-40.39	Ave.
4.804669	14.27	Line	46	-31.73	Ave.

120 V, 60 Hz – Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.150179	46.48	Neutral	65.99	-19.51	QP
3.726007	31.97	Neutral	56	-24.03	QP
4.608635	31.29	Neutral	56	-24.71	QP
17.09465	37.77	Neutral	60	-22.23	QP
16.8857	37.43	Neutral	60	-22.57	QP
16.6817	37.67	Neutral	60	-22.33	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.150179	27.83	Neutral	55.99	-28.16	Ave.
3.726007	19.41	Neutral	46	-26.59	Ave.
4.608635	12.1	Neutral	46	-33.9	Ave.
17.09465	26.62	Neutral	50	-23.38	Ave.
16.8857	26.58	Neutral	50	-23.42	Ave.
16.6817	25.84	Neutral	50	-24.16	Ave.

Note: testing was prefromed at worst case.

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.

As per ISEDC RSS-247 §6.2

For transmitters operating in the band 5150-5250 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p. However, any unwanted emissions that fall into the band 5250- 5350 MHz must be 26 dBc, when measured using a resolution bandwidth between 1 and 5% of the occupied bandwidth, above 5.25 GHz. Otherwise, the transmission is considered as intentional and the devices shall implement dynamic frequency selection (DFS) and transmitter power control (TPC) as per the requirements for the band 5250-5350 MHz

For devices with both operating frequencies and channel bandwidths contained within the band 5250-5350 MHz, the device shall comply with the following:

1. All emissions outside the band 5250-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p. if the equipment is intended for outdoor use; or
2. All emissions outside the band 5150-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p. and any emissions within the band 5150-5250 MHz shall meet the power spectral density limits of Section 6.2.1. The device shall be labelled “for indoor use only.”

For devices with operating frequencies in the band 5250-5350 MHz but having a channel bandwidth that overlaps the band 5150-5250 MHz, the devices’ unwanted emission shall not exceed -27 dBm/MHz e.i.r.p. outside the band 5150-5350 MHz and its power shall comply with the spectral power density for operation within the band 5150-5250 MHz. The device shall be labelled “for indoor use only.”

For transmitters operating in the band 5470-5725 MHz, emissions outside the band shall not exceed -27 dBm/MHz e.i.r.p.

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 Setup

The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.10-2013. The specification used was the FCC 15.407 and ISEDC RSS-247 limits.

The spacing between the peripherals was 10 centimeters.

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

7.3 Test Procedure

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

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

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

The spectrum analyzer or receiver is set as:

Below 1000 MHz:

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

Above 1000 MHz:

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

7.4 Corrected Amplitude and Margin Calculation

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

CA = Ai + AF + CL + Atten – Ga

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

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

Margin = Corrected Amplitude - Limit

7.5 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde and Schwarz	Receiver, EMI Test	ESCI 1166.5950K03	100338	2016-02-04	2 years
Agilent	Analyzer, Spectrum	E4440A	US45303156	2017-02-24	1 year
Sunol Sciences	System Controller	SC99V	011003-1	N/R	N/A
Sunol Sciences	Antenna, Biconi-Log	JB1	A013105-3	2015-07-11	31 Months
Agilent	Amplifier, Pre	8447D	2944A07030	2017-05-17	1 year
IW	AOBOR Hi frequency Co AX Cable	DC 1531	KPS-1501A3960KPS	2018-01-04	1 year
-	Hi frequency Co AX Cable	-	-	Each time[1]	N/A
-	SMA cable	-	C00011	Each time[1]	N/A
Agilent	Pre-Amplifier	8449B	3147A00400	2017-06-15	1 year
Sunol Sciences	Antenna, Horn	DRH-118	A052704	2017-03-27	2 years
Wisewave	Antenna, Horn	ARH-4223-02	10555-01	2018-02-14	2 years
Wisewave	Antenna, Horn	ARH-2823-02	10555-02	2017-12-15	2 years
A.H. Systems	Pre-Amplifer	PAM 1840V	170	2018-09-10	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 A2LA Policy P102 (dated 09 June 2016) "A2LA Policy on Metrological Traceability".*

7.6 Test Environmental Conditions

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

The testing was performed by Chin Ming Lui from 2018-01-22 to 2018-09-13 in 5m chamber 3.

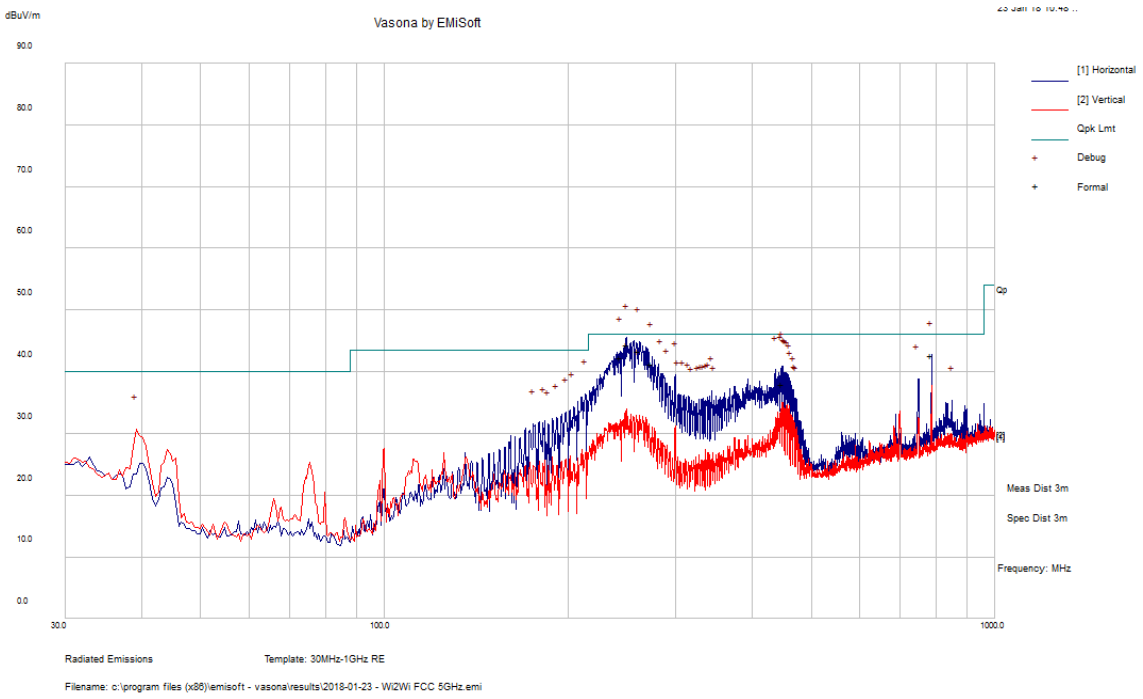
7.7 Summary of Test Results

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**
-0.27	5150	Horizontal	802.11ac80 mode, 5210 MHz

7.8 Radiated Emissions Test Result Data

1) 30 MHz – 1 GHz



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comments (PK/QP/Ave.)
249.874	44.4	140	H	180	46	-1.6	QP
261.4168	43.34	131	H	192	46	-2.66	QP
243.6313	42.33	144	H	188	46	-3.67	QP
786.458	42.6	100	H	284	46	-3.4	QP
273.8833	41.3	119	H	190	46	-4.7	QP
448.1343	38.01	207	H	286	46	-7.99	QP

Note: The clock frequency of the module was configured to and is compliant at 3 MHz
Note: testing was performed under worst case co-location 5 GHz Wi-Fi and Bluetooth/BLE

2) 1–40 GHz

5150 - 5250 MHz

802.11a mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5180 MHz											
5180	69.65	87	148	H	33.59	5.26	0.00	108.50	-	-	PK
5180	61.99	87	148	H	33.59	5.26	0.00	100.84	-	-	AV
5180	62.97	174	280	V	33.58	8.53	0.00	105.08	-	-	PK
5180	54.65	174	280	V	33.58	8.53	0.00	96.76	-	-	AV
5150	63.92	84	151	H	33.53	9.82	36.19	73.08	74.00	-2.92	PK
5150	46.66	84	151	H	33.53	9.82	36.19	53.82	54.00	-0.18	AV
5150	57.12	175	282	V	33.42	9.82	36.19	64.17	74.00	-9.83	PK
5150	41.02	175	282	V	33.42	9.82	36.19	48.07	54.00	-5.93	AV
10360	44.65	73	100	H	38.15	12.07	35.51	59.36	74.00	-14.64	PK
10360	31.82	73	100	H	38.15	12.07	35.51	46.53	54.00	-7.47	AV
10360	44.83	0	100	V	38.09	14.62	35.51	62.04	74.00	-11.97	PK
10360	32.66	0	100	V	38.09	14.62	35.51	49.87	54.00	-4.14	AV
Middle Channel 5200 MHz											
5200	66.75	90	300	H	33.59	8.53	0.00	108.87	-	-	PK
5200	58.52	90	300	H	33.59	8.53	0.00	100.64	-	-	AV
5200	64.84	175	277	V	33.58	8.53	0.00	106.95	-	-	PK
5200	56.42	175	277	V	33.58	8.53	0.00	98.53	-	-	AV
10400	44.74	0	100	H	38.20	14.62	35.51	62.05	74.00	-11.95	PK
10400	32.44	0	100	H	38.20	14.62	35.51	49.75	54.00	-4.25	AV
10400	44.67	0	100	V	38.12	14.62	35.51	61.90	74.00	-12.10	PK
10400	32.79	0	100	V	38.12	14.62	35.51	50.02	54.00	-3.98	AV
High Channel 5240 MHz											
5240	66.66	88	294	H	33.62	8.53	0.00	108.81	-	-	PK
5240	58.35	88	294	H	33.62	8.53	0.00	100.50	-	-	AV
5240	64.30	175	289	V	33.56	8.53	0.00	106.39	-	-	PK
5240	55.74	175	289	V	33.56	8.53	0.00	97.83	-	-	AV
10480	44.91	0	100	H	38.26	14.71	35.44	62.44	74.00	-11.57	PK
10480	32.75	0	100	H	38.26	14.71	35.44	50.28	54.00	-3.72	AV
10480	44.52	0	100	V	38.19	14.71	35.44	61.98	74.00	-12.02	PK
10480	32.85	0	100	V	38.19	14.71	35.44	50.31	54.00	-3.69	AV

802.11n20 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5180 MHz											
5180	65.41	87	263	H	33.59	8.53	0.00	107.53	-	-	PK
5180	57.29	87	263	H	33.59	8.53	0.00	99.41	-	-	AV
5180	63.86	184	300	V	33.58	8.53	0.00	105.97	-	-	PK
5180	55.46	184	300	V	33.58	8.53	0.00	97.57	-	-	AV
5150	68.87	84	151	H	33.53	6.55	36.19	72.76	74.00	-1.24	PK
5150	48.99	84	151	H	33.53	6.55	36.19	52.88	54.00	-1.12	AV
5150	60.09	163	300	V	33.42	9.82	36.19	67.14	74.00	-6.86	PK
5150	41.83	163	300	V	33.42	9.82	36.19	48.88	54.00	-5.12	AV
10360	45.09	0	100	H	38.15	14.62	35.51	62.35	74.00	-11.65	PK
10360	32.54	0	100	H	38.15	14.62	35.51	49.80	54.00	-4.20	AV
10360	44.70	0	100	V	38.09	14.62	35.51	61.91	74.00	-12.10	PK
10360	32.67	0	100	V	38.09	14.62	35.51	49.88	54.00	-4.12	AV
Middle Channel 5200 MHz											
5200	64.76	296	265	H	33.59	8.53	0.00	106.88	-	-	PK
5200	56.03	296	265	H	33.59	8.53	0.00	98.15	-	-	AV
5200	62.76	184	274	V	33.58	8.53	0.00	104.87	-	-	PK
5200	53.87	184	274	V	33.58	8.53	0.00	95.98	-	-	AV
10400	45.06	0	100	H	38.20	14.62	35.51	62.37	74.00	-11.63	PK
10400	32.41	0	100	H	38.20	14.62	35.51	49.72	54.00	-4.28	AV
10400	44.65	0	100	V	38.12	14.62	35.51	61.88	74.00	-12.12	PK
10400	32.94	0	100	V	38.12	14.62	35.51	50.17	54.00	-3.83	AV
High Channel 5240 MHz											
5240	67.02	88	296	H	33.62	8.53	0.00	109.17	-	-	PK
5240	58.36	88	296	H	33.62	8.53	0.00	100.51	-	-	AV
5240	63.91	188	269	V	33.56	8.53	0.00	106.00	-	-	PK
5240	55.08	188	269	V	33.56	8.53	0.00	97.17	-	-	AV
10480	45.60	0	100	H	38.26	14.71	35.44	63.13	74.00	-10.88	PK
10480	32.35	0	100	H	38.26	14.71	35.44	49.88	54.00	-4.13	AV
10480	45.31	0	100	V	38.19	14.71	35.44	62.77	74.00	-11.23	PK
10480	32.62	0	100	V	38.19	14.71	35.44	50.08	54.00	-3.92	AV

802.11n40 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5190 MHz											
5190	61.41	88	262	H	33.59	8.53	0.00	103.53	-	-	PK
5190	53.10	88	262	H	33.59	8.53	0.00	95.22	-	-	AV
5190	54.63	276	100	V	33.58	8.53	0.00	96.74	-	-	PK
5190	45.95	276	100	V	33.58	8.53	0.00	88.06	-	-	AV
5150	67.55	84	151	H	33.53	6.55	36.19	71.44	74.00	-2.56	PK
5150	48.03	84	151	H	33.53	6.55	36.19	51.92	54.00	-2.08	AV
5150	60.32	275	100	V	33.42	9.82	36.19	67.37	74.00	-6.63	PK
5150	42.88	275	100	V	33.42	9.82	36.19	49.93	54.00	-4.07	AV
10380	44.17	0	100	H	38.20	14.60	35.51	61.45	74.00	-12.55	PK
10380	32.13	0	100	H	38.20	14.60	35.51	49.41	54.00	-4.59	AV
10380	44.30	0	100	V	38.12	14.60	35.51	61.51	74.00	-12.50	PK
10380	32.16	0	100	V	38.12	14.60	35.51	49.37	54.00	-4.64	AV
High Channel 5230 MHz											
5230	62.05	95	300	H	33.62	8.53	0.00	104.20	-	-	PK
5230	54.85	95	300	H	33.62	8.53	0.00	97.00	-	-	AV
5230	57.53	276	280	V	33.56	8.53	0.00	99.62	-	-	PK
5230	49.22	276	280	V	33.56	8.53	0.00	91.31	-	-	AV
10460	44.61	0	100	H	38.22	14.79	35.44	62.18	74.00	-11.82	PK
10460	32.08	0	100	H	38.22	14.79	35.44	49.65	54.00	-4.35	AV
10460	43.90	0	100	V	38.16	14.79	35.44	61.41	74.00	-12.59	PK
10460	32.19	0	100	V	38.16	14.79	35.44	49.70	54.00	-4.30	AV

802.11ac20 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5180 MHz											
5180	67.61	93	291	H	33.59	8.53	0.00	109.73	-	-	PK
5180	58.21	93	291	H	33.59	8.53	0.00	100.33	-	-	AV
5180	64.61	183	300	V	33.58	8.53	0.00	106.72	-	-	PK
5180	55.38	183	300	V	33.58	8.53	0.00	97.49	-	-	AV
5150	64.48	84	151	H	33.53	6.55	36.19	68.37	74.00	-5.63	PK
5150	47.14	84	151	H	33.53	6.55	36.19	51.03	54.00	-2.97	AV
5150	62.83	275	100	V	33.42	9.82	36.19	69.88	74.00	-4.12	PK
5150	40.80	275	100	V	33.42	9.82	36.19	47.85	54.00	-6.15	AV
10360	44.46	0	100	H	38.15	14.62	35.51	61.72	74.00	-12.28	PK
10360	32.41	0	100	H	38.15	14.62	35.51	49.67	54.00	-4.33	AV
10360	44.74	0	100	V	38.09	14.62	35.51	61.95	74.00	-12.06	PK
10360	32.72	0	100	V	38.09	14.62	35.51	49.93	54.00	-4.08	AV
Middle Channel 5200 MHz											
5200	67.43	89	287	H	33.59	8.53	0.00	109.55	-	-	PK
5200	58.52	89	287	H	33.59	8.53	0.00	100.64	-	-	AV
5200	64.42	173	295	V	33.58	8.53	0.00	106.53	-	-	PK
5200	55.36	173	295	V	33.58	8.53	0.00	97.47	-	-	AV
10400	44.19	0	100	H	38.20	14.62	35.51	61.50	74.00	-12.50	PK
10400	32.32	0	100	H	38.20	14.62	35.51	49.63	54.00	-4.37	AV
10400	44.83	0	100	V	38.12	14.62	35.51	62.06	74.00	-11.94	PK
10400	32.54	0	100	V	38.12	14.62	35.51	49.77	54.00	-4.23	AV
High Channel 5240 MHz											
5240	66.83	85	300	H	33.62	8.53	0.00	108.98	-	-	PK
5240	57.72	85	300	H	33.62	8.53	0.00	99.87	-	-	AV
5240	65.10	176	290	V	33.56	8.53	0.00	107.19	-	-	PK
5240	56.00	176	290	V	33.56	8.53	0.00	98.09	-	-	AV
10480	43.88	0	100	H	38.26	14.71	35.44	61.41	74.00	-12.60	PK
10480	32.14	0	100	H	38.26	14.71	35.44	49.67	54.00	-4.34	AV
10480	45.12	0	100	V	38.19	14.71	35.44	62.58	74.00	-11.42	PK
10480	32.12	0	100	V	38.19	14.71	35.44	49.58	54.00	-4.42	AV

802.11 ac40 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5190 MHz											
5190	61.33	96	287	H	33.59	8.53	0.00	103.45	-	-	PK
5190	53.15	96	287	H	33.59	8.53	0.00	95.27	-	-	AV
5190	55.82	278	100	V	33.58	8.53	0.00	97.93	-	-	PK
5190	46.57	278	100	V	33.58	8.53	0.00	88.68	-	-	AV
5150	67.44	84	151	H	33.53	6.55	36.19	71.33	74.00	-2.67	PK
5150	48.29	84	151	H	33.53	6.55	36.19	52.18	54.00	-1.82	AV
5150	57.99	275	100	V	33.42	9.82	36.19	65.04	74.00	-8.96	PK
5150	40.29	275	100	V	33.42	9.82	36.19	47.34	54.00	-6.66	AV
10380	44.49	0	100	H	38.20	14.60	35.51	61.77	74.00	-12.23	PK
10380	31.91	0	100	H	38.20	14.60	35.51	49.19	54.00	-4.81	AV
10380	44.84	0	100	V	38.12	14.60	35.51	62.05	74.00	-11.96	PK
10380	32.15	0	100	V	38.12	14.60	35.51	49.36	54.00	-4.65	AV
High Channel 5230 MHz											
5230	63.65	93	300	H	33.62	8.53	0.00	105.80	-	-	PK
5230	54.52	93	300	H	33.62	8.53	0.00	96.67	-	-	AV
5230	57.74	278	261	V	33.56	8.53	0.00	99.83	-	-	PK
5230	48.72	278	261	V	33.56	8.53	0.00	90.81	-	-	AV
10460	44.52	0	100	H	38.22	14.79	35.44	62.09	74.00	-11.91	PK
10460	32.29	0	100	H	38.22	14.79	35.44	49.86	54.00	-4.14	AV
10460	44.65	0	100	V	38.16	14.79	35.44	62.16	74.00	-11.84	PK
10460	32.60	0	100	V	38.16	14.79	35.44	50.11	54.00	-3.89	AV

802.11ac80 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
5210 MHz											
5210	54.63	90	288	H	33.59	8.53	0.00	96.75	-	-	PK
5210	46.45	90	288	H	33.59	8.53	0.00	88.57	-	-	AV
5210	49.31	278	265	V	33.58	8.53	0.00	91.42	-	-	PK
5210	40.43	278	265	V	33.58	8.53	0.00	82.54	-	-	AV
5150	65.23	84	151	H	33.53	6.55	36.19	69.12	74.00	-4.88	PK
5150	49.84	84	151	H	33.53	6.55	36.19	53.73	54.00	-0.27	AV
5150	55.75	273	100	V	33.42	9.82	36.19	62.80	74.00	-11.20	PK
5150	42.17	273	100	V	33.42	9.82	36.19	49.22	54.00	-4.78	AV
10420	44.91	0	100	H	38.20	14.60	35.51	62.19	74.00	-11.81	PK
10420	32.25	0	100	H	38.20	14.60	35.51	49.53	54.00	-4.47	AV
10420	43.93	0	100	V	38.12	14.60	35.51	61.14	74.00	-12.87	PK
10420	32.17	0	100	V	38.12	14.60	35.51	49.38	54.00	-4.62	AV

5725 - 5850 MHz

802.11a mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5745 MHz											
5745	66.15	258	271	H	34.07	9.00	0.00	109.22	-	-	PK
5745	58.16	258	271	H	34.07	9.00	0.00	101.23	-	-	AV
5745	63.11	171	300	V	33.97	9.00	0.00	106.08	-	-	PK
5745	54.58	171	300	V	33.97	9.00	0.00	97.55	-	-	AV
5700	54.40	106	300	H	34.02	10.31	36.16	62.57	105.20	-42.63	PK
5700	53.10	183	270	V	33.93	10.31	36.16	61.18	105.20	-44.02	PK
5720	66.37	107	300	H	34.02	10.31	36.16	74.54	110.80	-36.26	PK
5720	64.94	184	254	V	33.93	10.31	36.16	73.02	110.80	-37.78	PK
5725	70.25	105	300	H	34.07	10.31	36.16	78.46	122.20	-43.74	PK
5725	67.67	184	254	V	33.97	10.31	36.16	75.79	122.20	-46.41	PK
11490	43.48	0	100	H	38.45	12.88	35.09	59.72	74.00	-14.28	PK
11490	31.62	0	100	H	38.45	12.88	35.09	47.86	54.00	-6.14	AV
11490	43.85	0	100	V	38.38	12.88	35.09	60.01	74.00	-13.99	PK
11490	31.52	0	100	V	38.38	12.88	35.09	47.68	54.00	-6.32	AV
Middle Channel 5785 MHz											
5785	65.09	106	295	H	34.17	9.10	0.00	108.36	-	-	PK
5785	57.86	106	295	H	34.17	9.10	0.00	101.13	-	-	AV
5785	63.38	181	300	V	34.04	9.10	0.00	106.52	-	-	PK
5785	55.15	181	300	V	34.04	9.10	0.00	98.29	-	-	AV
11570	43.57	0	100	H	38.46	11.34	35.14	58.23	74.00	-15.77	PK
11570	31.70	0	100	H	38.46	11.34	35.14	46.36	54.00	-7.64	AV
11570	43.64	0	100	V	38.38	11.34	35.14	58.21	74.00	-15.79	PK
11570	31.74	0	100	V	38.38	11.34	35.14	46.31	54.00	-7.69	AV
High Channel 5825 MHz											
5825	66.24	104	293	H	34.24	9.10	0.00	109.58	-	-	PK
5825	58.18	104	293	H	34.24	9.10	0.00	101.52	-	-	AV
5825	64.55	184	273	V	34.14	9.10	0.00	107.79	-	-	PK
5825	56.34	184	273	V	34.14	9.10	0.00	99.58	-	-	AV
5850	68.81	106	290	H	34.24	10.00	36.24	76.80	122.20	-45.40	PK
5850	67.05	189	295	V	34.14	10.00	36.24	74.94	122.20	-47.26	PK
5855	67.11	105	286	H	34.24	10.00	36.24	75.10	110.80	-35.70	PK
5855	64.70	192	300	V	34.14	10.00	36.24	72.59	110.80	-38.21	PK
5875	56.19	90	300	H	34.31	10.00	36.24	64.26	105.20	-40.94	PK
5875	53.97	185	300	V	34.24	10.00	36.24	61.96	105.20	-43.24	PK
11650	43.37	0	100	H	38.60	11.19	35.16	58.00	74.00	-16.00	PK
11650	31.55	0	100	H	38.60	11.19	35.16	46.18	54.00	-7.82	AV
11650	44.00	0	100	V	38.55	11.19	35.16	58.58	74.00	-15.42	PK
11650	31.54	0	100	V	38.55	11.19	35.16	46.12	54.00	-7.88	AV

802.11n20 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5745 MHz											
5745	63.22	92	284	H	34.07	9.00	0.00	106.29	-	-	PK
5745	53.20	92	284	H	34.07	9.00	0.00	96.27	-	-	AV
5745	59.13	166	279	V	33.97	9.00	0.00	102.10	-	-	PK
5745	50.10	166	279	V	33.97	9.00	0.00	93.07	-	-	AV
5700	60.25	260	300	H	34.02	10.31	36.16	68.42	105.20	-36.78	PK
5700	57.38	175	266	V	33.93	10.31	36.16	65.46	105.20	-39.74	PK
5720	72.85	101	300	H	34.02	10.31	36.16	81.02	110.80	-29.78	PK
5720	64.92	164	280	V	33.93	10.31	36.16	73.00	110.80	-37.80	PK
5725	77.21	102	300	H	34.07	10.31	36.16	85.42	122.20	-36.78	PK
5725	71.19	165	300	V	33.97	10.31	36.16	79.31	122.20	-42.89	PK
11490	43.44	0	100	H	38.45	12.88	35.09	59.68	74.00	-14.32	PK
11490	31.83	0	100	H	38.45	12.88	35.09	48.07	54.00	-5.93	AV
11490	43.71	0	100	V	38.38	12.88	35.09	59.87	74.00	-14.13	PK
11490	31.74	0	100	V	38.38	12.88	35.09	47.90	54.00	-6.10	AV
Middle Channel 5785 MHz											
5785	66.44	276	300	H	34.17	9.10	0.00	109.71	-	-	PK
5785	57.65	276	300	H	34.17	9.10	0.00	100.92	-	-	AV
5785	62.70	180	300	V	34.04	9.10	0.00	105.84	-	-	PK
5785	53.96	180	300	V	34.04	9.10	0.00	97.10	-	-	AV
11570	44.19	0	100	H	38.46	11.34	35.14	58.85	74.00	-15.15	PK
11570	31.45	0	100	H	38.46	11.34	35.14	46.11	54.00	-7.89	AV
11570	44.23	0	100	V	38.38	11.34	35.14	58.80	74.00	-15.20	PK
11570	31.57	0	100	V	38.38	11.34	35.14	46.14	54.00	-7.86	AV
High Channel 5825 MHz											
5825	66.21	92	292	H	34.24	9.10	0.00	109.55	-	-	PK
5825	57.95	92	292	H	34.24	9.10	0.00	101.29	-	-	AV
5825	63.37	170	300	V	34.14	9.10	0.00	106.61	-	-	PK
5825	54.56	170	300	V	34.14	9.10	0.00	97.80	-	-	AV
5850	71.75	94	300	H	34.24	10.00	36.24	79.74	122.20	-42.46	PK
5850	68.74	160	300	V	34.14	10.00	36.24	76.63	122.20	-45.57	PK
5855	70.51	95	300	H	34.24	10.00	36.24	78.50	110.80	-32.30	PK
5855	66.59	166	285	V	34.14	10.00	36.24	74.48	110.80	-36.32	PK
5875	63.36	94	300	H	34.31	10.00	36.24	71.43	105.20	-33.77	PK
5875	58.11	165	281	V	34.24	10.00	36.24	66.10	105.20	-39.10	PK
11650	43.39	0	100	H	38.60	11.19	35.16	58.02	74.00	-15.98	PK
11650	31.25	0	100	H	38.60	11.19	35.16	45.88	54.00	-8.12	AV
11650	43.65	0	100	V	38.55	11.19	35.16	58.23	74.00	-15.77	PK
11650	31.20	0	100	V	38.55	11.19	35.16	45.78	54.00	-8.22	AV

802.11n40 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5755 MHz											
5755	63.00	91	300	H	34.07	9.10	0.00	106.17	-	-	PK
5755	54.06	91	300	H	34.07	9.10	0.00	97.23	-	-	AV
5755	60.04	162	268	V	33.97	9.10	0.00	103.11	-	-	PK
5755	51.34	162	268	V	33.97	9.10	0.00	94.41	-	-	AV
5700	60.89	260	300	H	34.02	10.31	36.16	69.06	105.20	-36.14	PK
5700	58.12	169	300	V	33.93	10.31	36.16	66.20	105.20	-39.00	PK
5720	72.95	255	300	H	34.02	10.31	36.16	81.12	110.80	-29.68	PK
5720	68.78	165	300	V	33.93	10.31	36.16	76.86	110.80	-33.94	PK
5725	72.77	260	300	H	34.07	10.31	36.16	80.98	122.20	-41.22	PK
5725	68.74	166	300	V	33.97	10.31	36.16	76.86	122.20	-45.34	PK
11510	43.96	0	100	H	38.45	13.06	35.09	60.38	74.00	-13.62	PK
11510	31.96	0	100	H	38.45	13.06	35.09	48.38	54.00	-5.62	AV
11510	43.81	0	100	V	38.38	13.06	35.09	60.16	74.00	-13.84	PK
11510	32.05	0	100	V	38.38	13.06	35.09	48.40	54.00	-5.60	AV
High Channel 5795 MHz											
5795	62.58	275	300	H	33.86	9.10	0.00	105.54	-	-	PK
5795	53.95	275	300	H	33.86	9.10	0.00	96.91	-	-	AV
5795	60.21	169	300	V	33.86	9.10	0.00	103.17	-	-	PK
5795	51.41	169	300	V	33.86	9.10	0.00	94.37	-	-	AV
5850	66.61	289	278	H	34.24	10.00	36.24	74.60	122.20	-47.60	PK
5850	65.40	166	300	V	34.14	10.00	36.24	73.29	122.20	-48.91	PK
5855	66.31	274	290	H	34.24	10.00	36.24	74.30	110.80	-36.50	PK
5855	64.30	160	300	V	34.14	10.00	36.24	72.19	110.80	-38.61	PK
5875	62.92	290	278	H	34.31	10.00	36.24	70.99	105.20	-34.21	PK
5875	60.19	166	280	V	34.24	10.00	36.24	68.18	105.20	-37.02	PK
11590	43.96	0	100	H	38.53	13.05	35.14	60.40	74.00	-13.60	PK
11590	31.32	0	100	H	38.53	13.05	35.14	47.76	54.00	-6.24	AV
11590	43.57	0	100	V	38.46	13.05	35.14	59.94	74.00	-14.06	PK
11590	31.74	0	100	V	38.46	13.05	35.14	48.11	54.00	-5.89	AV

802.11ac20 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5745 MHz											
5745	65.18	92	300	H	34.07	9.00	0.00	108.25	-	-	PK
5745	56.05	92	300	H	34.07	9.00	0.00	99.12	-	-	AV
5745	62.63	169	280	V	33.97	9.00	0.00	105.60	-	-	PK
5745	53.53	169	280	V	33.97	9.00	0.00	96.50	-	-	AV
5700	52.76	266	297	H	34.02	10.31	36.16	60.93	105.20	-44.27	PK
5700	49.68	170	283	V	33.93	10.31	36.16	57.76	105.20	-47.44	PK
5720	69.17	268	300	H	34.02	10.31	36.16	77.34	110.80	-33.46	PK
5720	66.15	179	300	V	33.93	10.31	36.16	74.23	110.80	-36.57	PK
5725	77.19	280	300	H	34.07	10.31	36.16	85.40	122.20	-36.80	PK
5725	74.55	180	297	V	33.97	10.31	36.16	82.67	122.20	-39.53	PK
11490	44.10	0	100	H	38.45	12.88	35.09	60.34	74.00	-13.66	PK
11490	31.30	0	100	H	38.45	12.88	35.09	47.54	54.00	-6.46	AV
11490	44.96	0	100	V	38.38	12.88	35.09	61.12	74.00	-12.88	PK
11490	32.28	0	100	V	38.38	12.88	35.09	48.44	54.00	-5.56	AV
Middle Channel 5785 MHz											
5785	66.37	291	300	H	34.17	9.10	0.00	109.64	-	-	PK
5785	57.49	291	300	H	34.17	9.10	0.00	100.76	-	-	AV
5785	63.90	174	252	V	34.04	9.10	0.00	107.04	-	-	PK
5785	54.84	174	252	V	34.04	9.10	0.00	97.98	-	-	AV
11570	43.46	0	100	H	38.46	11.34	35.14	58.12	74.00	-15.88	PK
11570	31.28	0	100	H	38.46	11.34	35.14	45.94	54.00	-8.06	AV
11570	43.92	0	100	V	38.38	11.34	35.14	58.49	74.00	-15.51	PK
11570	31.67	0	100	V	38.38	11.34	35.14	46.24	54.00	-7.76	AV
High Channel 5825 MHz											
5825	67.52	289	297	H	34.24	9.10	0.00	110.86	-	-	PK
5825	58.56	289	297	H	34.24	9.10	0.00	101.90	-	-	AV
5825	66.06	179	300	V	34.14	9.10	0.00	109.30	-	-	PK
5825	57.03	179	300	V	34.14	9.10	0.00	100.27	-	-	AV
5850	71.70	93	300	H	34.24	10.00	36.24	79.69	122.20	-42.51	PK
5850	69.61	179	296	V	34.14	10.00	36.24	77.50	122.20	-44.70	PK
5855	70.28	93	300	H	34.24	10.00	36.24	78.27	110.80	-32.53	PK
5855	68.45	170	300	V	34.14	10.00	36.24	76.34	110.80	-34.46	PK
5875	53.52	93	300	H	34.31	10.00	36.24	61.59	105.20	-43.61	PK
5875	50.67	186	300	V	34.24	10.00	36.24	58.66	105.20	-46.54	PK
11650	43.22	0	100	H	38.60	11.19	35.16	57.85	74.00	-16.15	PK
11650	31.23	0	100	H	38.60	11.19	35.16	45.86	54.00	-8.14	AV
11650	43.94	0	100	V	38.55	11.19	35.16	58.52	74.00	-15.48	PK
11650	31.47	0	100	V	38.55	11.19	35.16	46.05	54.00	-7.95	AV

802.11ac40 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5755 MHz											
5755	63.58	90	300	H	34.07	9.10	0.00	106.75	-	-	PK
5755	54.25	90	300	H	34.07	9.10	0.00	97.42	-	-	AV
5755	58.82	156	296	V	33.97	9.10	0.00	101.89	-	-	PK
5755	50.20	156	296	V	33.97	9.10	0.00	93.27	-	-	AV
5700	59.72	257	300	H	34.02	10.31	36.16	67.89	105.20	-37.31	PK
5700	56.72	169	300	V	33.93	10.31	36.16	64.80	105.20	-40.40	PK
5720	74.73	259	300	H	34.02	10.31	36.16	82.90	110.80	-27.90	PK
5720	70.20	166	300	V	33.93	10.31	36.16	78.28	110.80	-32.52	PK
5725	76.83	261	300	H	34.07	10.31	36.16	85.04	122.20	-37.16	PK
5725	72.19	170	296	V	33.97	10.31	36.16	80.31	122.20	-41.89	PK
11510	43.93	0	100	H	38.45	13.06	35.09	60.35	74.00	-13.65	PK
11510	31.83	0	100	H	38.45	13.06	35.09	48.25	54.00	-5.75	AV
11510	43.76	0	100	V	38.38	13.06	35.09	60.11	74.00	-13.89	PK
11510	31.61	0	100	V	38.38	13.06	35.09	47.96	54.00	-6.04	AV
High Channel 5795 MHz											
5795	63.93	90	300	H	33.86	9.10	0.00	106.89	-	-	PK
5795	55.32	90	300	H	33.86	9.10	0.00	98.28	-	-	AV
5795	61.09	170	300	V	33.86	9.10	0.00	104.05	-	-	PK
5795	51.68	170	300	V	33.86	9.10	0.00	94.64	-	-	AV
5850	66.37	86	284	H	34.24	10.00	36.24	74.36	122.20	-47.84	PK
5850	62.11	165	269	V	34.14	10.00	36.24	70.00	122.20	-52.20	PK
5855	63.23	92	289	H	34.24	10.00	36.24	71.22	110.80	-39.58	PK
5855	59.12	170	266	V	34.14	10.00	36.24	67.01	110.80	-43.79	PK
5875	57.18	90	300	H	34.31	10.00	36.24	65.25	105.20	-39.95	PK
5875	51.14	165	282	V	34.24	10.00	36.24	59.13	105.20	-46.07	PK
11590	43.02	0	100	H	38.53	13.05	35.14	59.46	74.00	-14.54	PK
11590	31.23	0	100	H	38.53	13.05	35.14	47.67	54.00	-6.33	AV
11590	44.17	0	100	V	38.46	13.05	35.14	60.54	74.00	-13.46	PK
11590	31.89	0	100	V	38.46	13.05	35.14	48.26	54.00	-5.74	AV

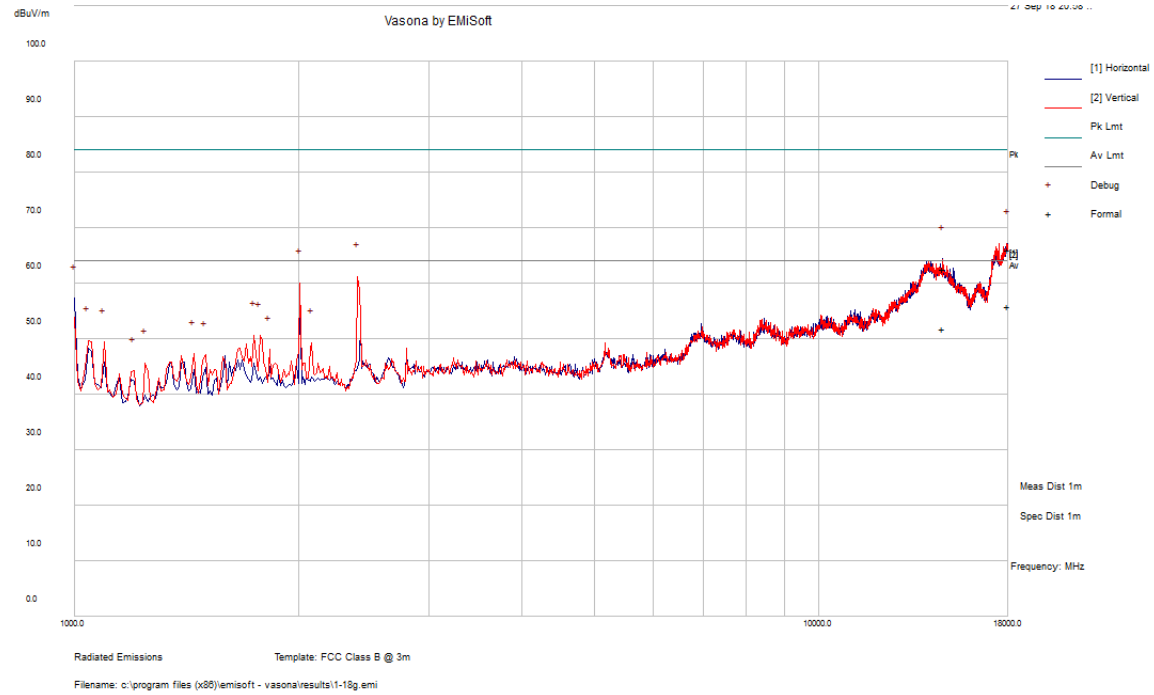
802.11ac80 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
5775 MHz											
5775	58.18	93	289	H	34.17	9.10	0.00	101.45	-	-	PK
5775	49.54	93	289	H	34.17	9.10	0.00	92.81	-	-	AV
5775	56.02	180	248	V	34.04	9.10	0.00	99.16	-	-	PK
5775	47.44	180	248	V	34.04	9.10	0.00	90.58	-	-	AV
5700	70.52	270	300	H	34.24	10.00	36.24	78.51	105.20	-26.69	PK
5700	66.58	184	300	V	34.14	10.00	36.24	74.47	105.20	-30.73	PK
5720	74.33	270	300	H	34.24	10.00	36.24	82.32	110.80	-28.48	PK
5720	71.73	181	300	V	34.14	10.00	36.24	79.62	110.80	-31.18	PK
5725	73.65	270	300	H	34.31	10.00	36.24	81.72	122.20	-40.48	PK
5725	71.48	181	300	V	34.24	10.00	36.24	79.47	122.20	-42.73	PK
11550	43.23	0	100	H	38.46	13.05	35.14	59.60	74.00	-14.40	PK
11550	31.25	0	100	H	38.46	13.05	35.14	47.62	54.00	-6.38	AV
11550	44.57	0	100	V	38.38	13.05	35.14	60.85	74.00	-13.15	PK
11550	31.85	0	100	V	38.38	13.05	35.14	48.13	54.00	-5.87	AV

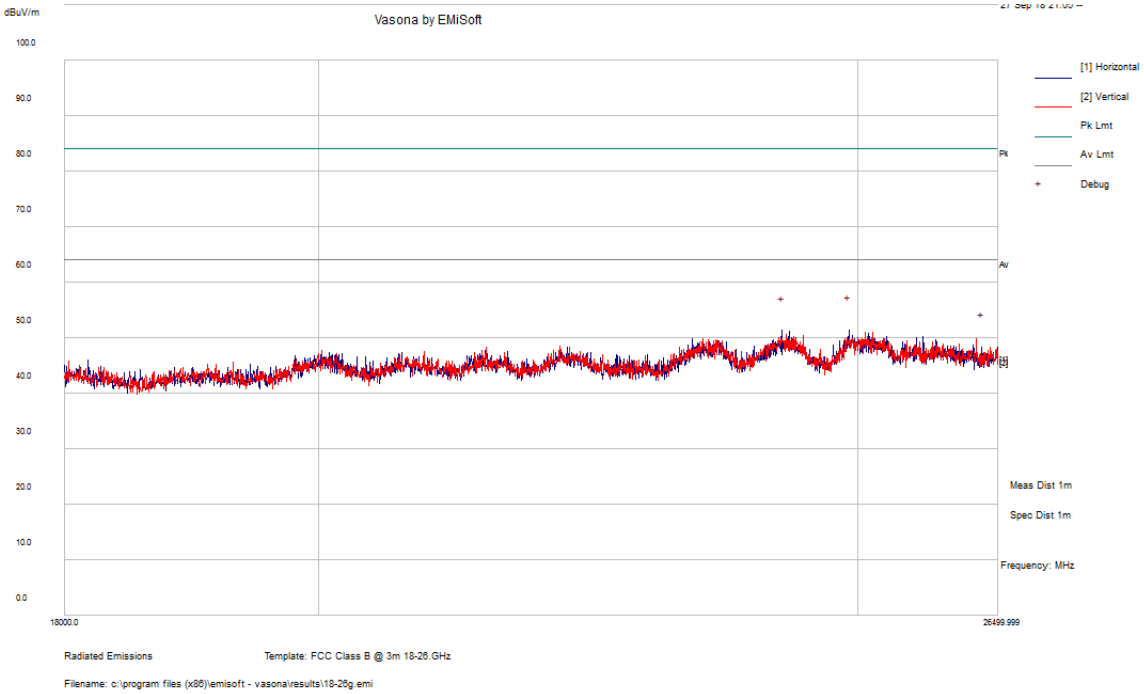
Note 1: Any emissions above 12 GHz are emissions from the noise floor.

Worst Case Colocation, 5 GHz Wi-Fi n20 mode (5200 MHz) and 2.4 GHz Classic Bluetooth GFSK (2402 MHz)

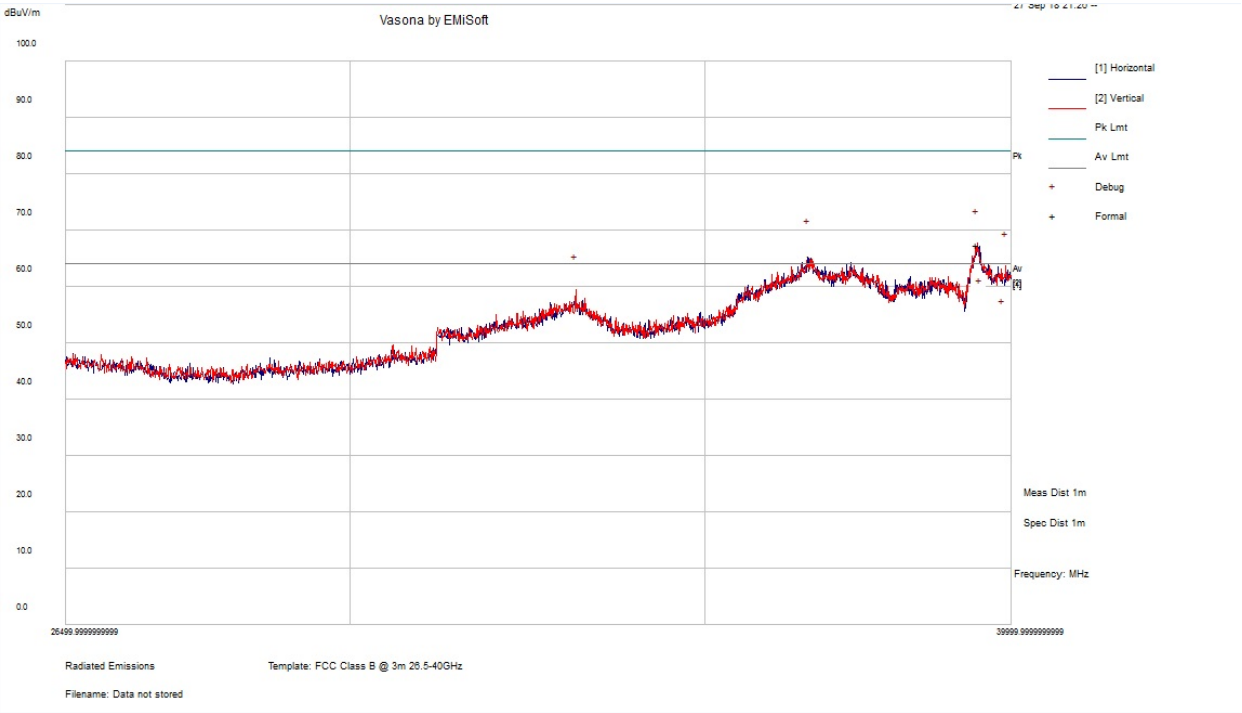
1-18 GHz



18-26.5 GHz



26.5-40 GHz


dBuV/m
Vasona by EMiSoft
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
[1] Horizontal
[2] Vertical
Pk Lmt
Av Lmt
Debug
Formal
Pk
Av
[2]
Meas Dist 1m
Spec Dist 1m
Frequency: MHz
26499.9999999999
39999.9999999999
Radiated Emissions
Template: FCC Class B @ 3m 26.5-40GHz
Filename: Data not stored

8 FCC §15.407(e) & ISEDC RSS-247 §6.2 - 6 dB, 26 dB, and 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	Analyzer, Spectrum	E4446A	US44300386	2017-04-20	12 months
-	RF cable	-	-	Each time[1]	N/A
-	20dB 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 A2LA Policy P102 (dated 09 June 2016) "A2LA Policy on Metrological Traceability".*

8.4 Test Environmental Conditions

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

The testing was performed by Chin Ming Lui on 2018-01-03 at RF site.

8.5 Test Results

Please refer to the following tables and plots.

5150 - 5250 MHz

Channel	Frequency (MHz)	99% OBW (kHz)	26 dB OBW (kHz)
802.11 a mode			
36	5180	16495.4	19786
40	5200	16597.4	21000
48	5240	16563.9	25828
802.11n20 mode			
36	5180	17635.5	25139
40	5200	17669.1	26263
48	5240	17694.2	28285
802.11n40 mode			
38	5190	36014.2	39843
46	5230	36111.9	52947
802.11ac20 mode			
36	5180	19542.5	30000
40	5200	19481.7	30000
48	5240	19349.0	30000
802.11ac40 mode			
38	5190	35874.5	38405
46	5230	36211.0	59278
802.11ac80 mode			
42	5210	75885.0	99164

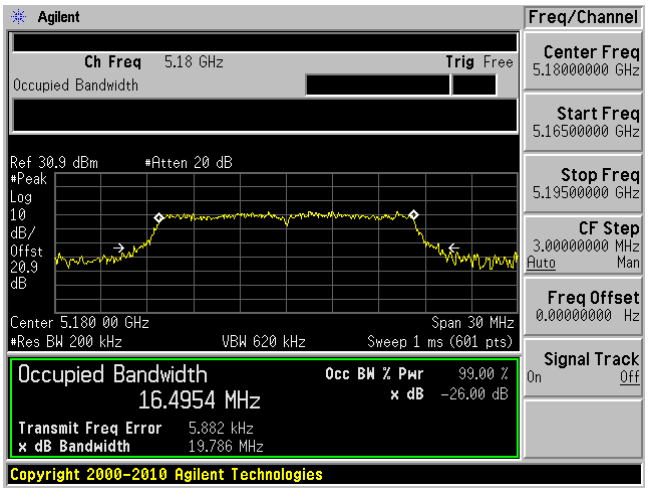
5725 - 5850 MHz

Channel	Frequency (MHz)	99% OBW (kHz)	6 dB BW (kHz)	6 dB OBW Limit (kHz)	26 dB OBW (kHz)
802.11 a mode					
149	5745	16463.3	16514	500	28791
157	5785	16498.7	16527	500	28471
165	5825	16515.5	16553	500	29152
802.11n20 mode					
149	5745	17630.1	17696	500	28890
157	5785	17638.4	17711	500	29933
165	5825	17662.1	17721	500	29064
802.11n40 mode					
151	5755	36031.2	36426	500	60000
159	5795	36181.3	36490	500	59560
802.11ac20 mode					
149	5745	21222.5	17703	500	30000
157	5785	21525.9	17716	500	30000
165	5825	21506.6	17737	500	30000
802.11ac40 mode					
151	5755	36300.8	36323	500	60000
159	5795	36371.9	36356	500	60000
802.11ac80 mode					
155	5775	79564.6	76639	500	120000

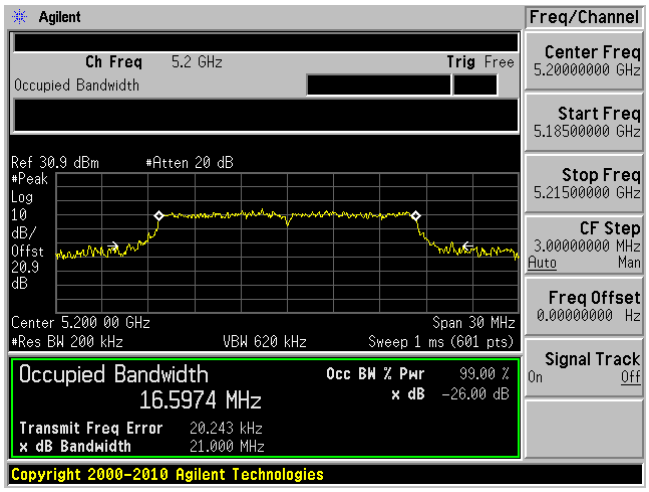
5150 – 5250 MHz

802.11a mode

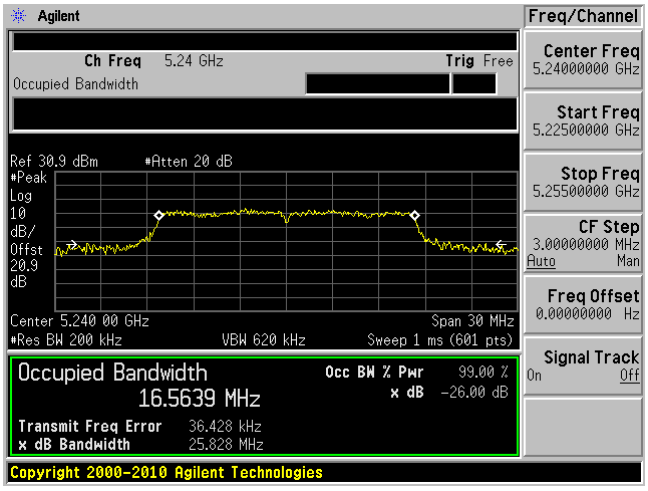
5180 MHz



5200 MHz

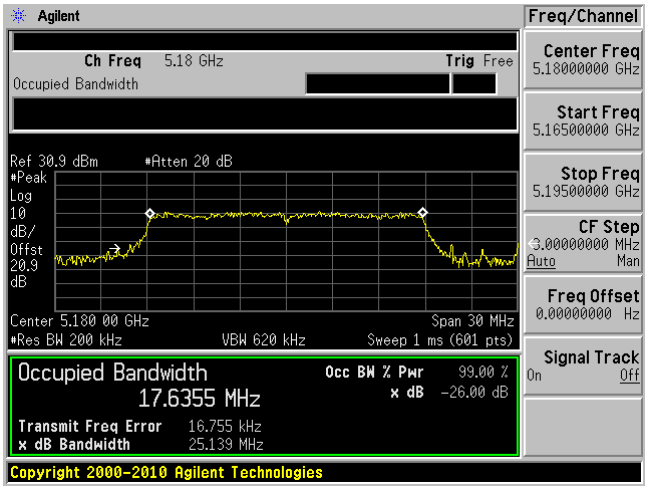


5240 MHz

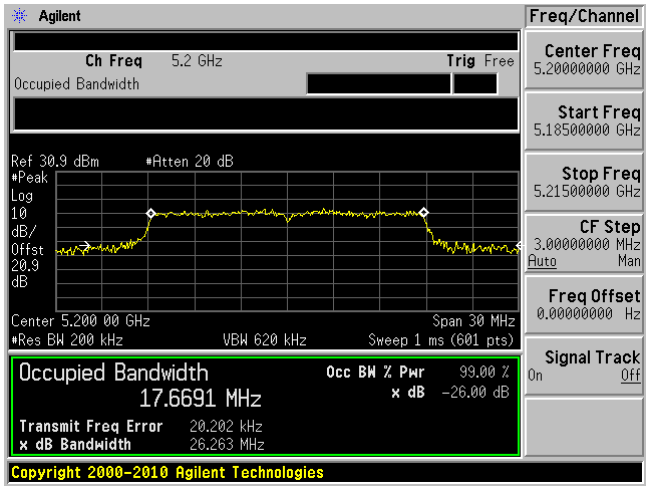


802.11n20 mode

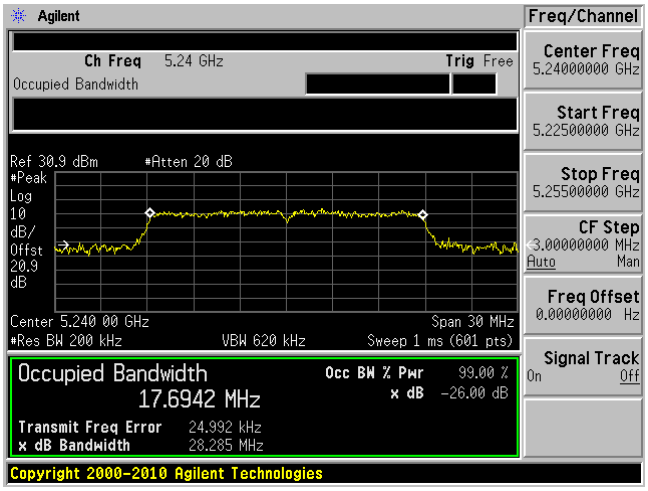
5180 MHz



5200 MHz

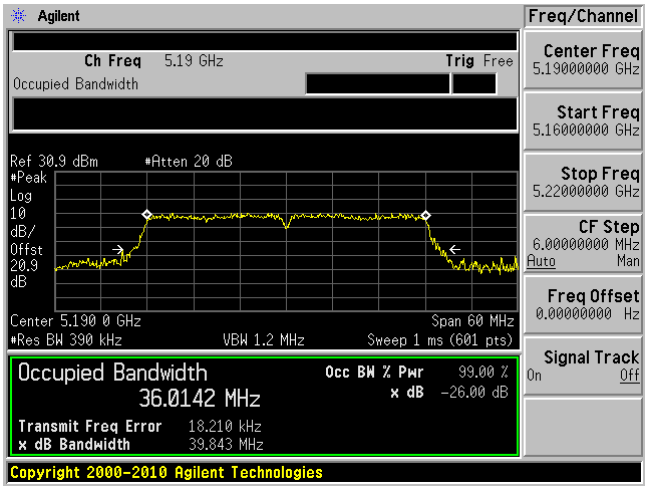


5240 MHz

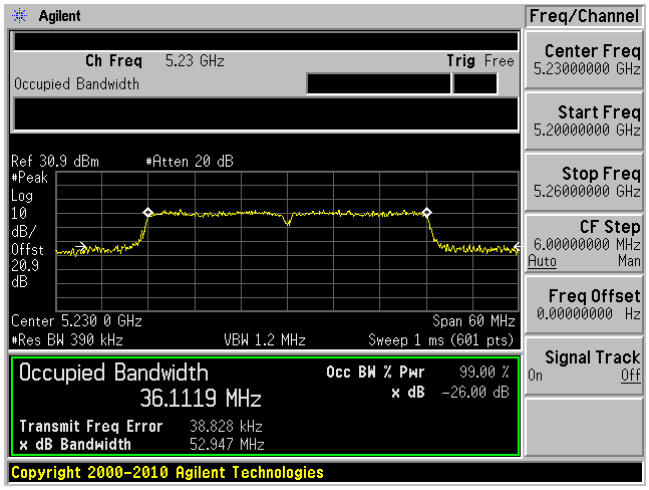


802.11n40 mode

5190 MHz

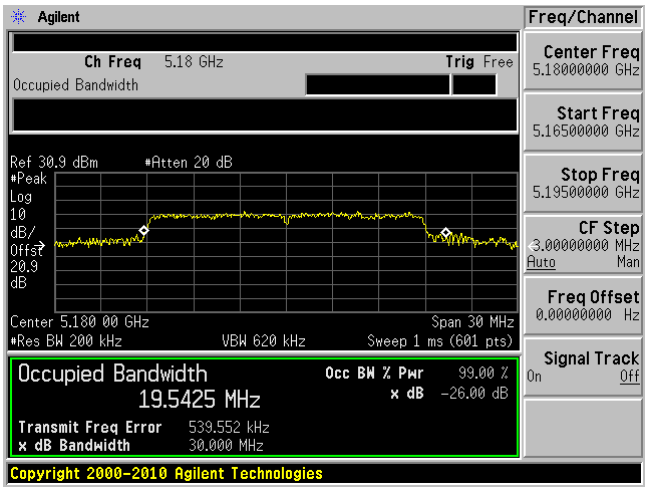


5230 MHz

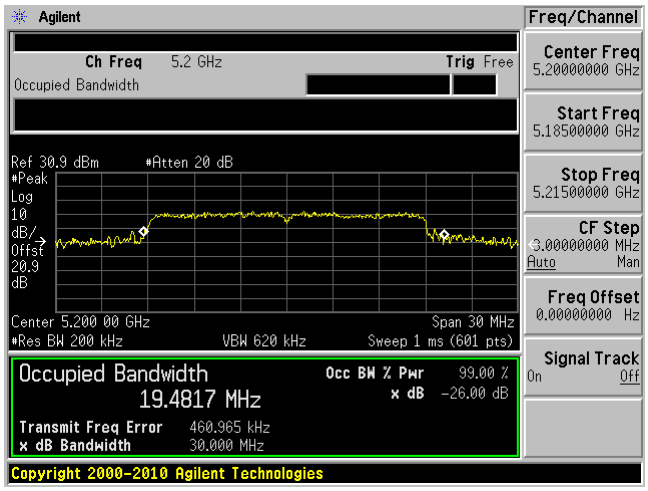


802.11ac20 mode

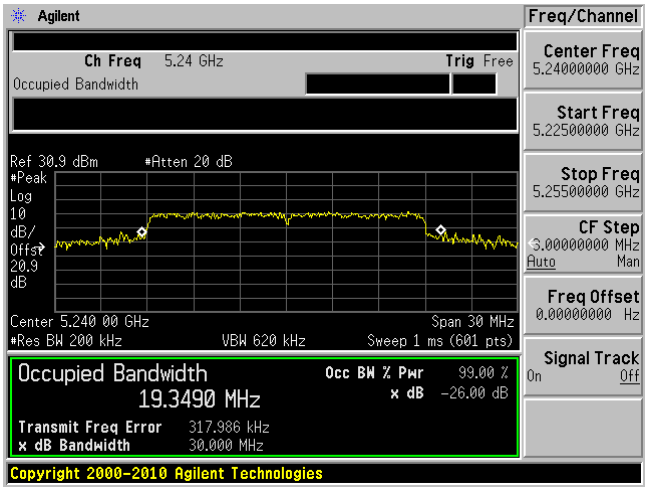
5180 MHz



5200 MHz

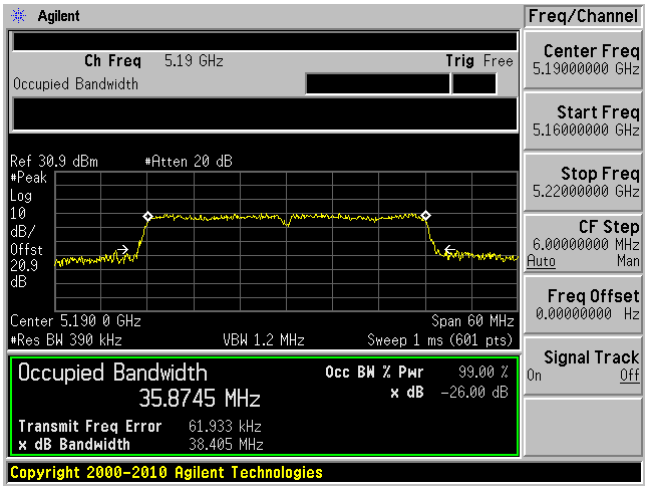


5240 MHz

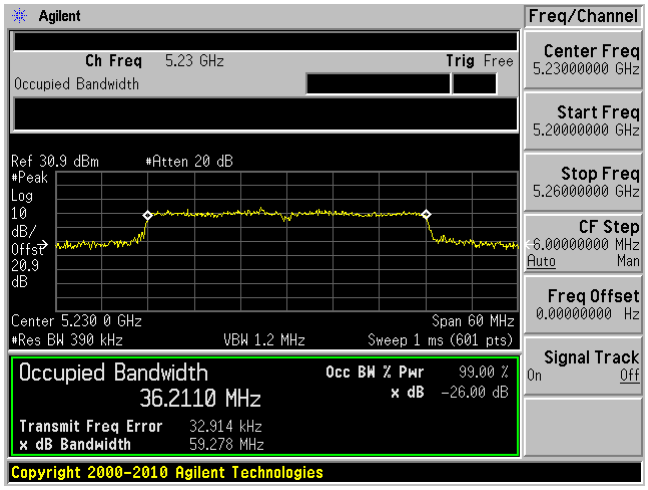


802.11ac40 mode

5190 MHz

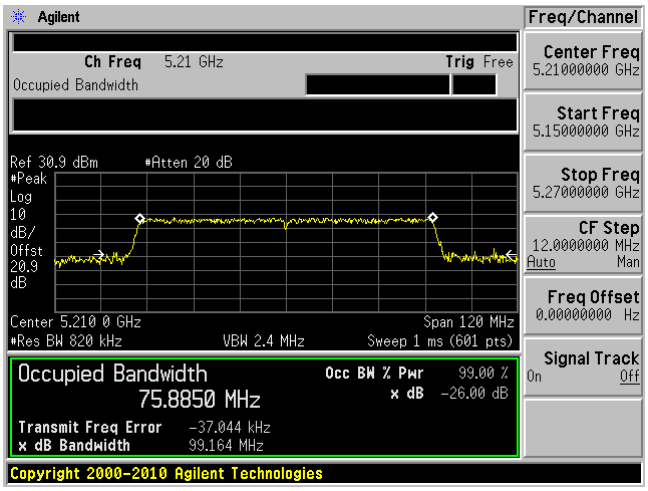


5230 MHz



802.11ac80 mode

5210 MHz

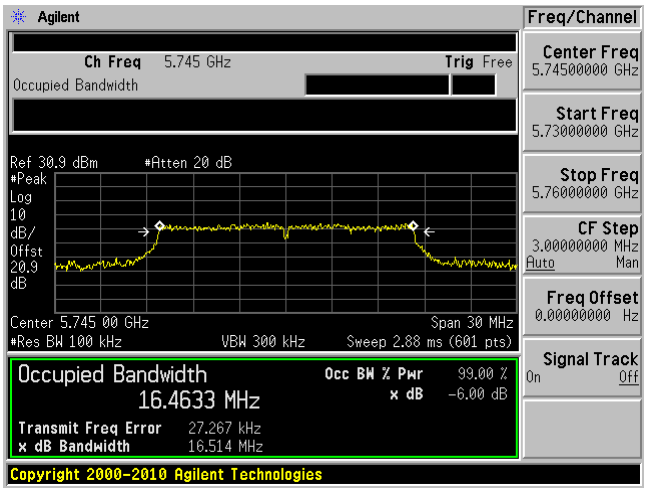


5725 – 5850 MHz

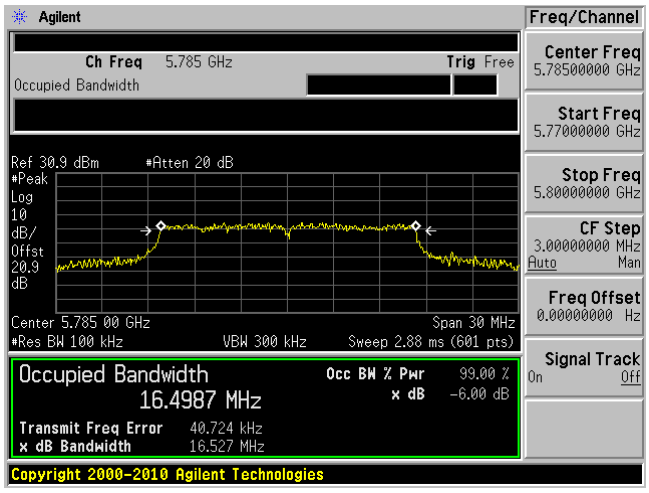
6 dB Bandwidth

802.11a mode

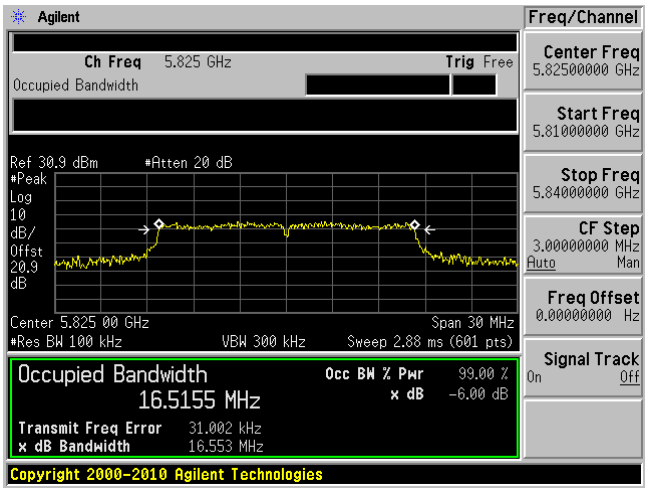
5745 MHz



5785 MHz

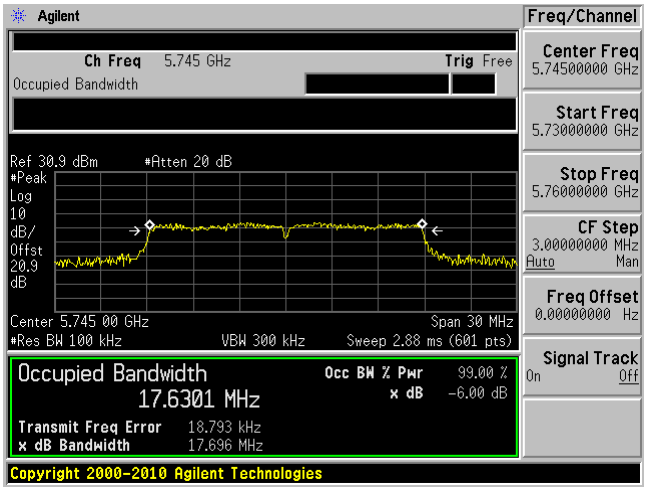


5825 MHz

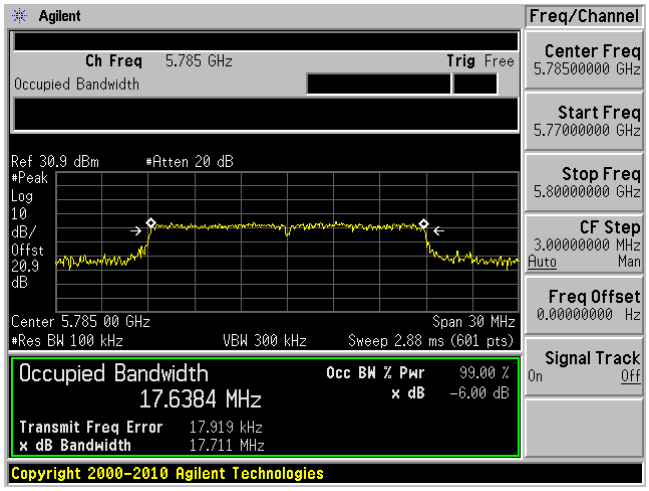


802.11n20 mode

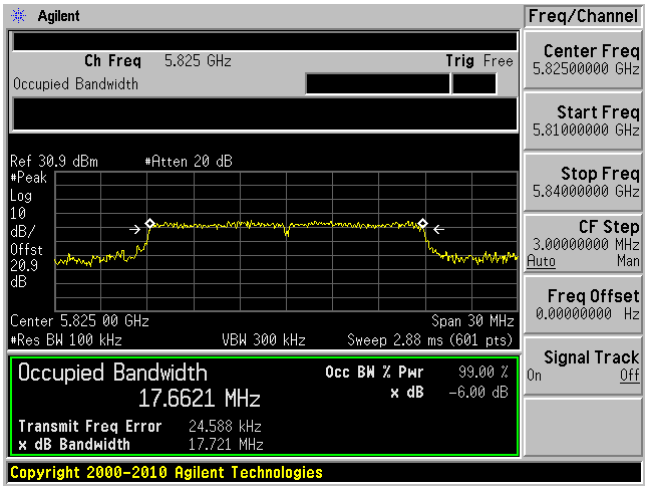
5745 MHz



5785 MHz

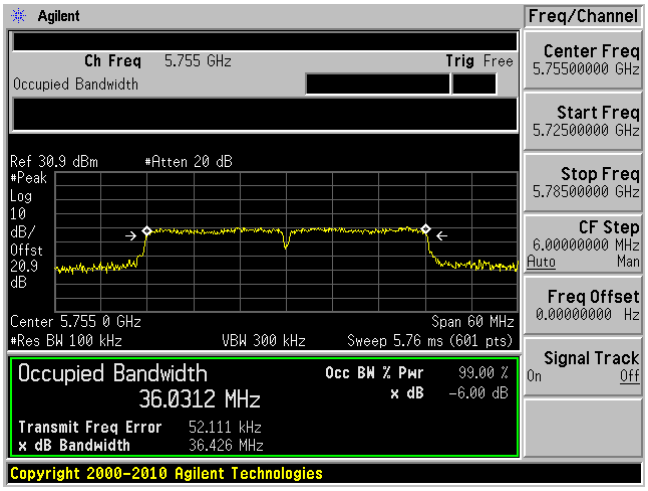


5825 MHz

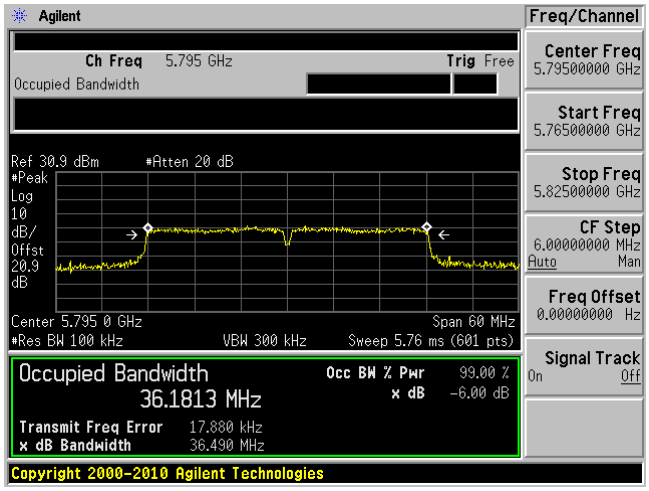


802.11n40 mode

5755 MHz

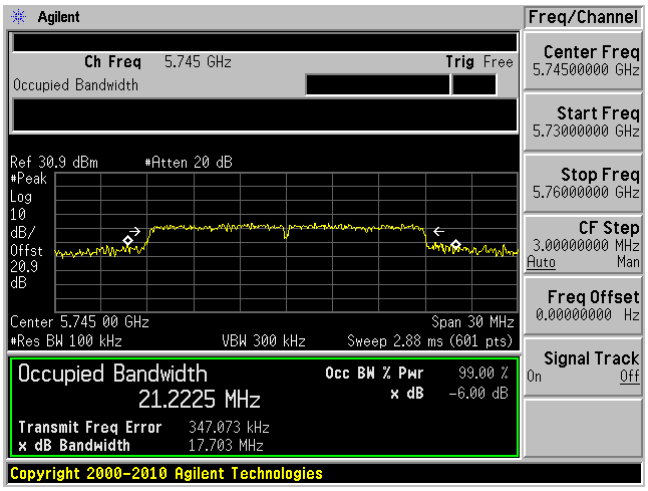


5795 MHz

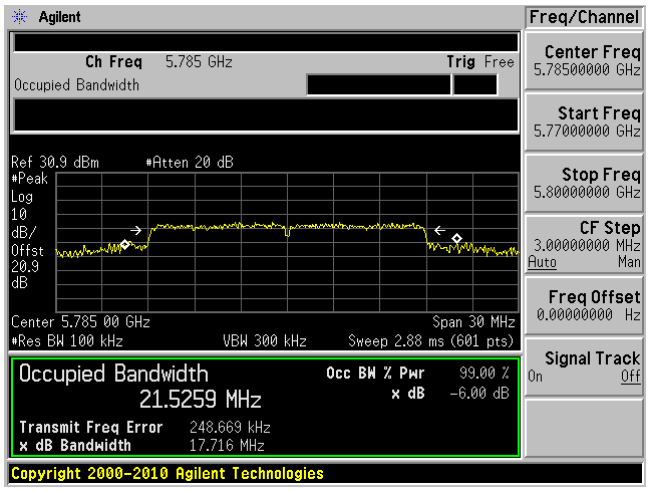


802.11ac20 mode

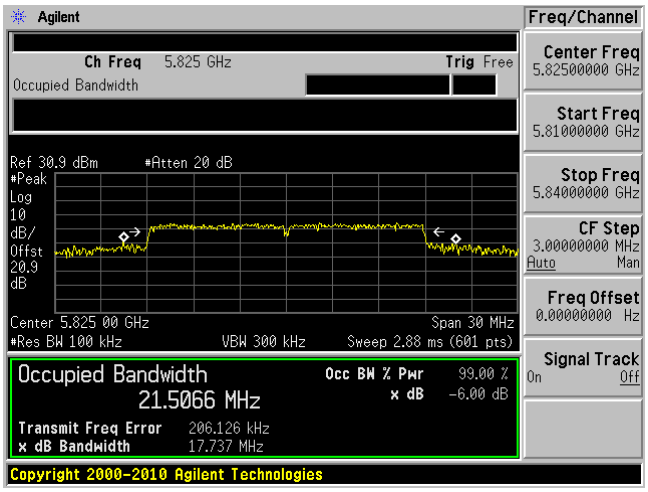
5745 MHz



5785 MHz

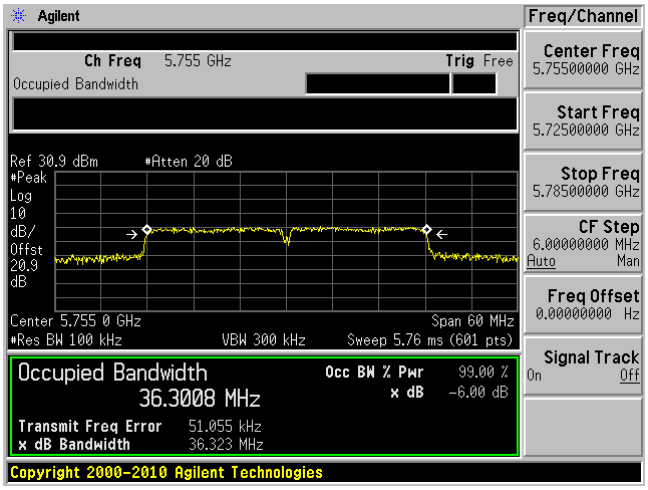


5825 MHz

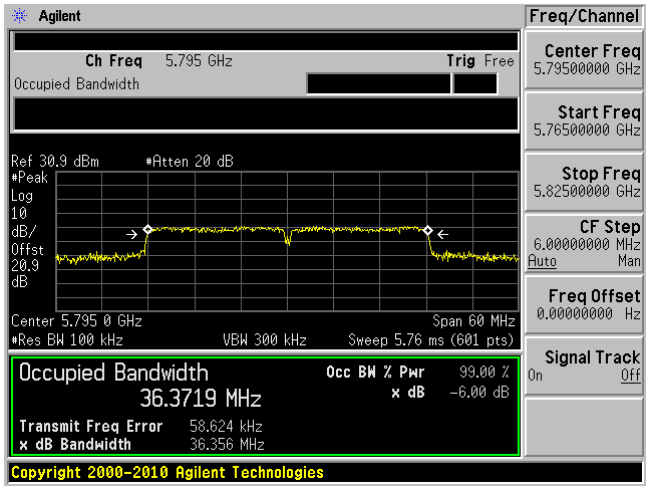


802.11ac40 mode

5755 MHz

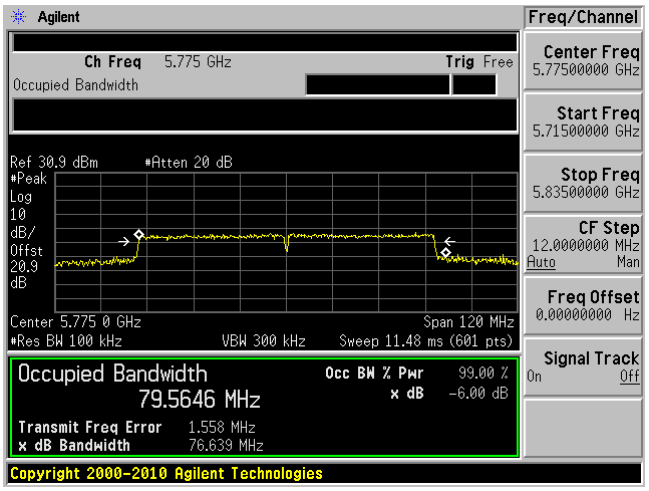


5795 MHz



802.11ac80 mode

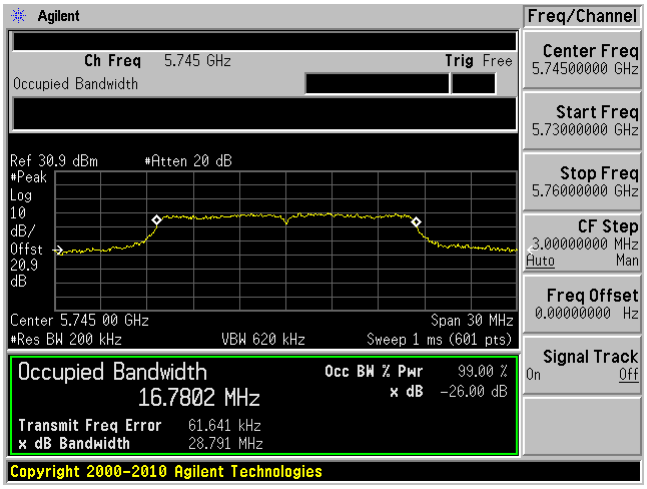
5775 MHz



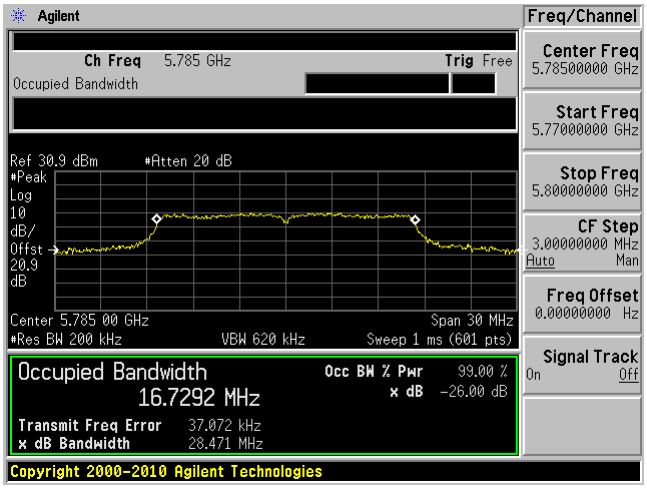
26 dB Bandwidth

802.11a mode

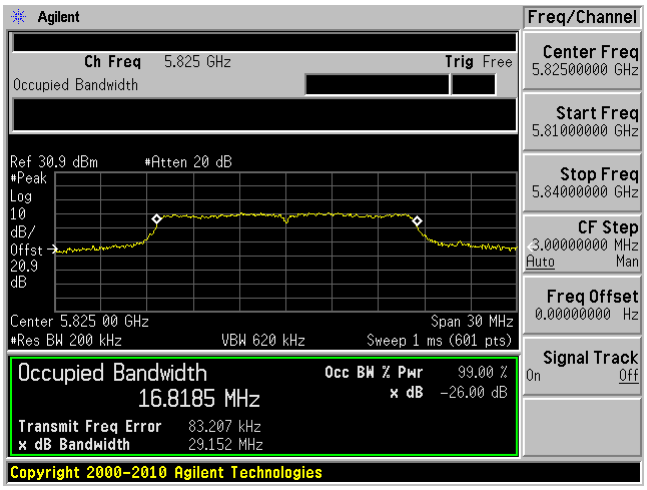
5745 MHz



5785 MHz

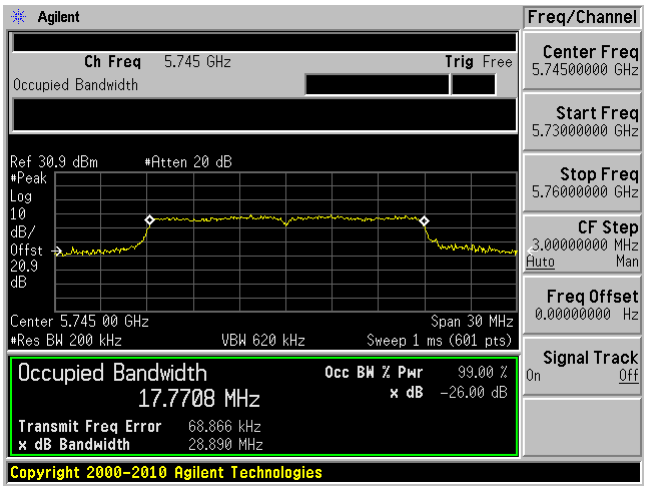


5825 MHz

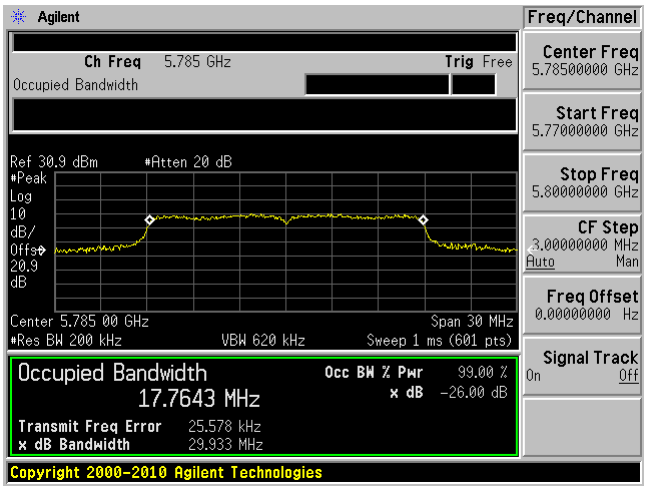


802.11n20 mode

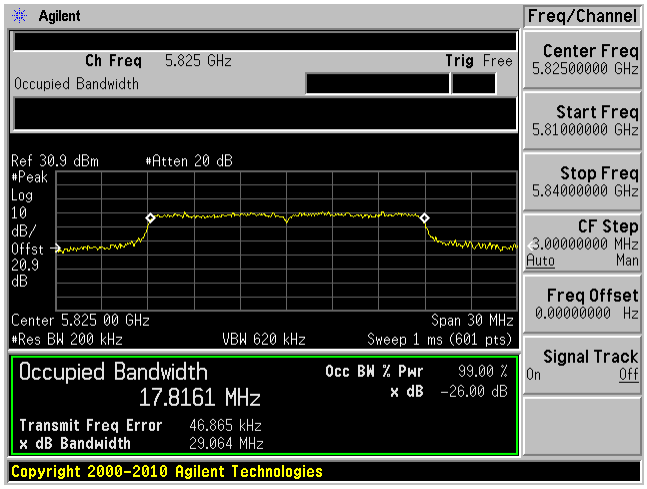
5745 MHz



5785 MHz

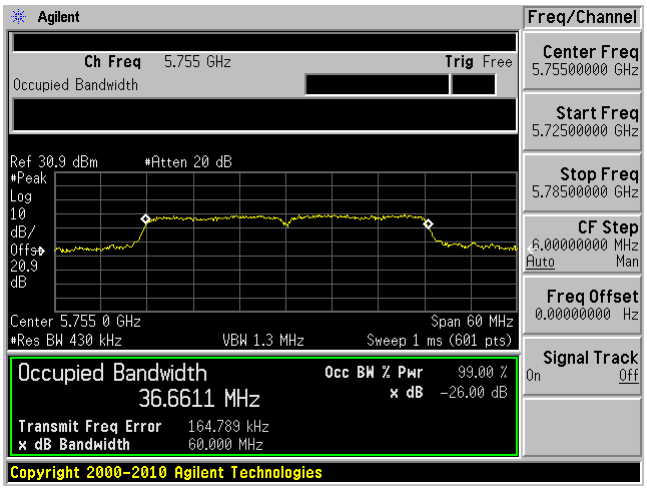


5825 MHz

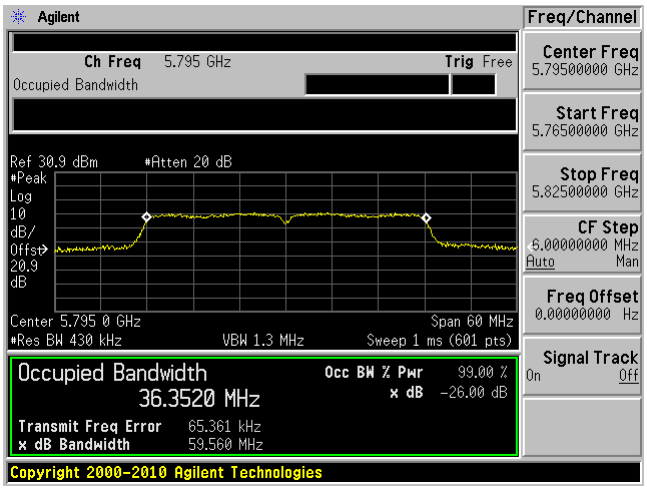


802.11n40 mode

5755 MHz

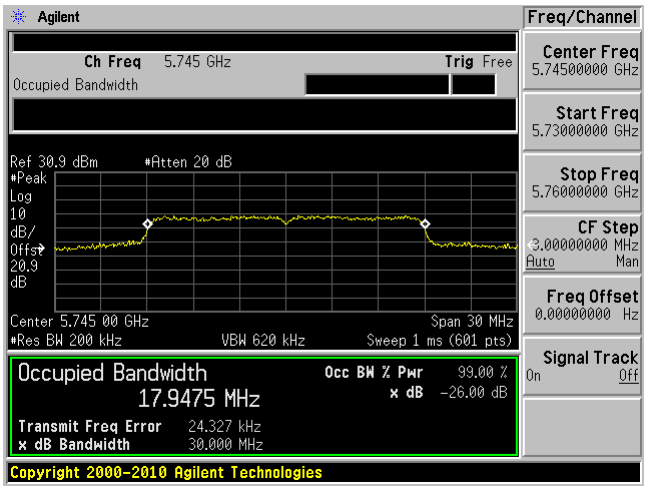


5795 MHz

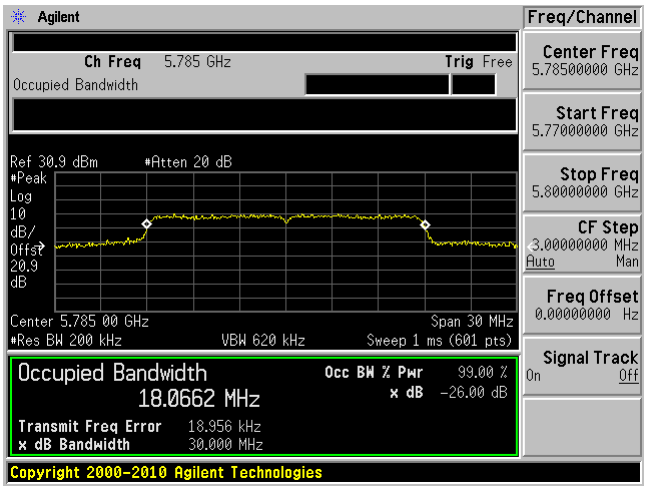


802.11ac20 mode

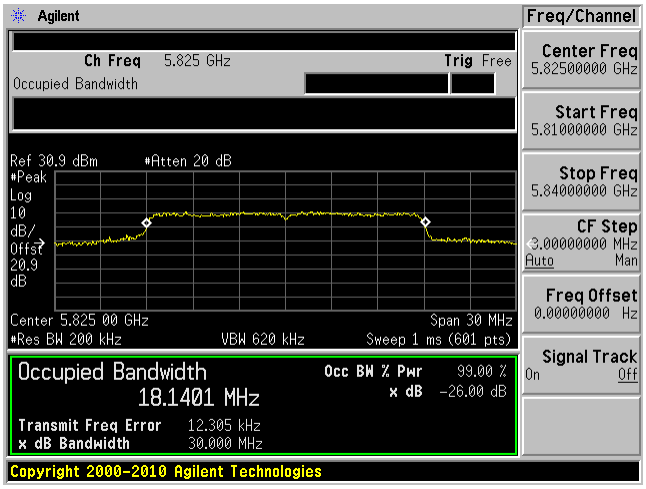
5745 MHz



5785 MHz

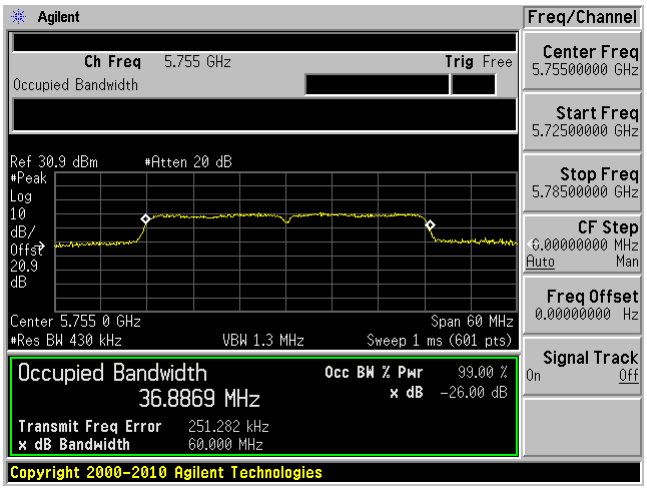


5825 MHz

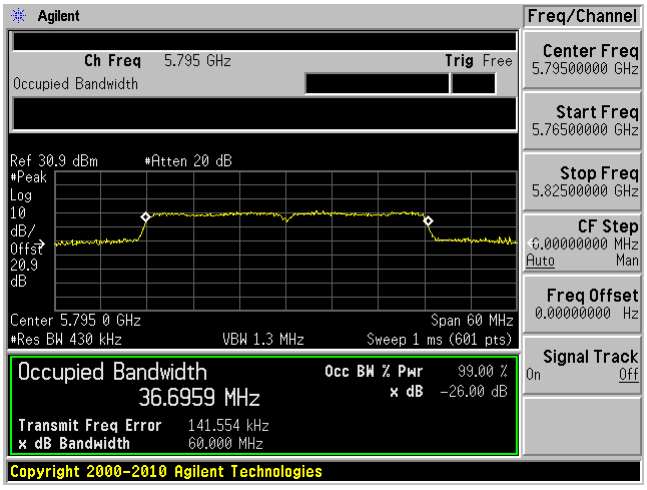


802.11ac40 mode

5755 MHz

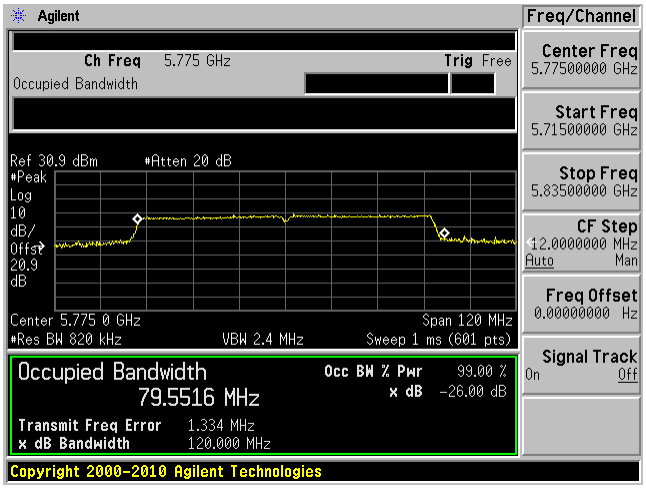


5795 MHz



802.11ac80 mode

5775 MHz



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

9.1 Applicable Standards

According to FCC §15.407(a):

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

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

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

According to ISEDC RSS-247 §6.2.1 for frequency band 5150-5250 MHz:

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10B, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

According to ISEDC RSS-247 §6.2.2 for frequency band 5250-5350 MHz:

The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

According to ISEDC RSS-247 §6.2.3 for frequency band 5470-5600 MHz and 5650-5725 MHz:

The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

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.

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 a power meter.

9.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4446A	US44300386	2017-04-20	12 months
Agilent	P-Series Power Meter	N1921A	MY5000448	2016-12-05	1 years
Agilent	Wideband Power Sensor	N1921A	MY51250036	2016-12-05	1 years
-	RF cable	-	-	Each time[1]	N/A
-	20dB 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 A2LA Policy P102 (dated 09 June 2016) "A2LA Policy on Metrological Traceability".*

9.4 Test Environmental Conditions

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

The testing was performed by Chin Ming Lui on 2017-11-22 in RF site.

9.5 Test Results

5150 - 5250 MHz

FCC Results

Frequency (MHz)	Conducted Average Power (dBm)	Conducted Peak Power (dBm)	FCC Limit (dBm)
802.11a mode			
5180	13.78	20.36	24
5200	14.44	21.14	24
5240	14.14	21.87	24
802.11n20 mode			
5180	13.82	21.67	24
5200	14.49	21.75	24
5240	14.25	21.76	24
802.11n40 mode			
5190	12.31	20.28	24
5230	14.38	21.53	24
802.11ac20 mode			
5180	14.09	21.84	24
5200	14.12	21.92	24
5240	14.07	21.66	24
802.11ac40 mode			
5190	12.06	18.97	24
5230	14.34	21.09	24
802.11ac80 mode			
5210	9.23	16.59	24

ISED Results

Modulation	Frequency (MHz)	Conducted Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	ISEDC Limit (dBm)
802.11a	5180	13.78	3	16.78	22.1
	5200	14.44	3	17.44	22.1
	5240	14.14	3	17.14	22.1
802.11n20	5180	13.82	3	16.82	22.4
	5200	14.49	3	17.49	22.4
	5240	14.25	3	17.25	22.4
802.11n40	5190	12.31	3	15.31	23
	5230	14.38	3	17.38	23
802.11ac20	5180	14.09	3	17.09	22.4
	5200	14.12	3	17.12	22.4
	5240	14.07	3	17.07	22.4
802.11ac40	5190	12.06	3	15.06	23
	5230	14.34	3	17.34	23
802.11ac80	5210	9.23	3	12.23	23

5725 - 5850 MHz

Frequency (MHz)	Conducted Average Power (dBm)	Conducted Peak Power (dBm)	FCC/ISEDC Limit (dBm)
802.11a mode			
5745	12.42	20.06	30
5785	12.84	20.17	30
5825	13.15	20.03	30
802.11n20 mode			
5745	12.48	21.53	30
5785	12.88	20.47	30
5825	13.23	20.59	30
802.11n40 mode			
5755	12.03	20.19	30
5795	12.49	20.94	30
802.11ac20 mode			
5745	12.34	20.03	30
5785	12.58	20.17	30
5825	12.73	20.69	30
802.11ac40 mode			
5755	12.26	20.81	30
5795	12.46	20.13	30
802.11ac80 mode			
5775	10.91	19.75	30

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

10.1 Applicable Standards

According to FCC §15.407(a):

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

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

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

According to ISEDC RSS-247 §6.2.1 for frequency band 5150-5250 MHz:

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10B, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

According to ISEDC RSS-247 §6.2.2 for frequency band 5250-5350 MHz:

The maximum conducted output power shall not exceed 250 mW or 11 + 10 $\log_{10}$B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 $\log_{10}$B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

According to ISEDC RSS-247 §6.2.3 for frequency band 5470-5600 MHz and 5650-5725 MHz:

The maximum conducted output power shall not exceed 250 mW or 11 + 10 $\log_{10}$B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 $\log_{10}$B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

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	Analyzer, Spectrum	E4446A	US44300386	2017-04-20	12 months
-	RF cable	-	-	Each time[1]	N/A
-	20dB 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 A2LA Policy P102 (dated 09 June 2016) "A2LA Policy on Metrological Traceability".*

10.4 Test Environmental Conditions

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

The testing was performed by Chin Ming Lui on 2018-01-03 at RF site.

10.5 Test Results

5150 – 5250 MHz

FCC Results:

Frequency (MHz)	Measured PSD (dBm/MHz)	Corrected PSD (dBm/MHz)	FCC Limit (dBm/MHz)
802.11a mode			
5180	3.322	3.322	11
5200	4.383	4.383	11
5240	4.468	4.468	11
802.11n20 mode			
5180	3.111	3.111	11
5200	4.176	4.176	11
5240	4.368	4.368	11
802.11n40 mode			
5190	-1.254	-1.254	11
5230	0.951	0.951	11
802.11ac20 mode			
5180	3.502	3.502	11
5200	3.410	3.410	11
5240	3.439	3.439	11
802.11ac40 mode			
5190	-1.791	-1.791	11
5230	0.785	0.785	11
802.11ac80 mode			
5210	-7.888	-7.888	11

ISEDC Results:

Frequency (MHz)	PSD (dBm/MHz)	Corrected PSD (dBm/MHz)	EIRP PSD (dBm/MHz)	ISED Limit (dBm/MHz)
802.11a mode				
5180	3.322	3.322	6.322	10
5200	4.383	4.383	7.383	10
5240	4.468	4.468	7.468	10
802.11n20 mode				
5180	3.111	3.111	6.111	10
5200	4.176	4.176	7.176	10
5240	4.368	4.368	7.368	10
802.11n40 mode				
5190	-1.254	-1.254	1.746	10
5230	0.951	0.951	3.951	10
802.11ac20 mode				
5180	3.502	3.502	6.502	10
5200	3.410	3.410	7.410	10
5240	3.439	3.439	7.439	10
802.11ac40 mode				
5190	-1.791	-1.791	1.209	10
5230	0.785	0.785	3.785	10
802.11ac80 mode				
5210	-7.888	-7.888	-4.888	10

5725 - 5850 MHz

Frequency (MHz)	Measured PSD (dBm/100 kHz)	Corrected PSD (dBm/500 kHz)	FCC/ ISED Limit (dBm/500 kHz)
802.11a mode			
5745	-11.148	-4.158	30
5785	-10.590	-3.600	30
5825	-10.248	-3.258	30
802.11n20 mode			
5745	-11.277	-4.287	30
5785	-10.580	-3.590	30
5825	-10.309	-3.319	30
802.11n40 mode			
5755	-14.795	-7.805	30
5795	-14.552	-7.562	30
802.11ac20 mode			
5745	-11.323	-4.333	30
5785	-10.867	-3.877	30
5825	-10.481	-3.491	30
802.11ac40 mode			
5755	-14.425	-7.435	30
5795	-13.972	-6.982	30
802.11ac80 mode			
5775	-19.699	-12.709	30

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

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

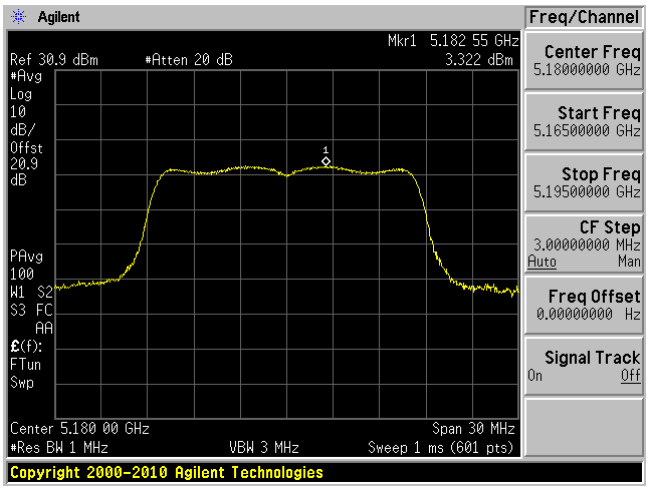
Correct PSD (dBm/500 kHz) = PSD (dBm/100 kHz) + Duty Cycle Correction (dB) + 10*log(500 kHz/100 kHz)

Please refer to the following plots.

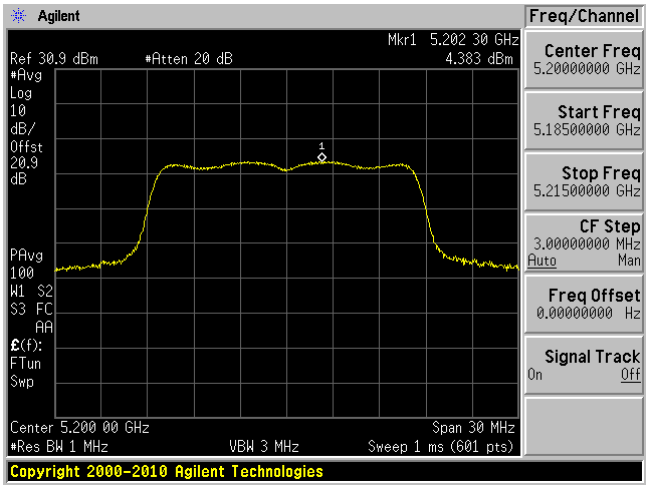
5150 – 5250 MHz

802.11a mode

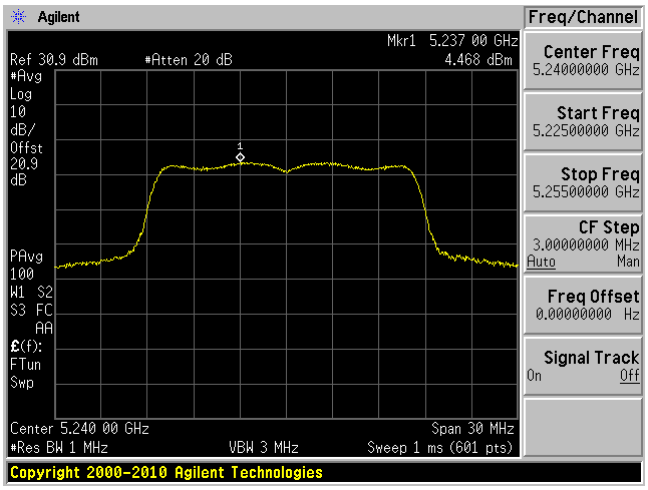
5180 MHz



5200 MHz

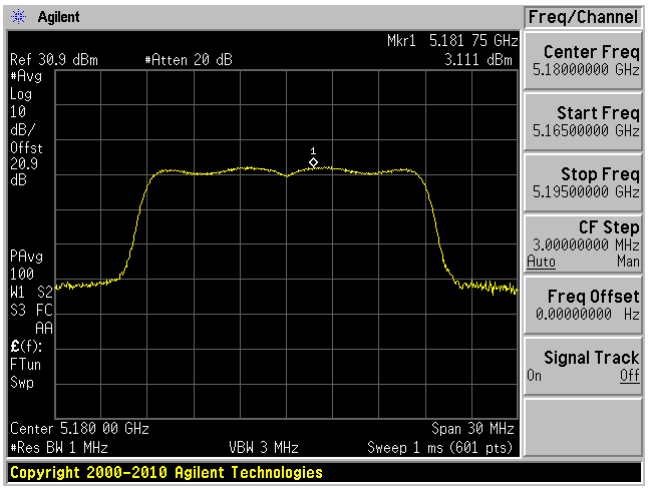


5240 MHz

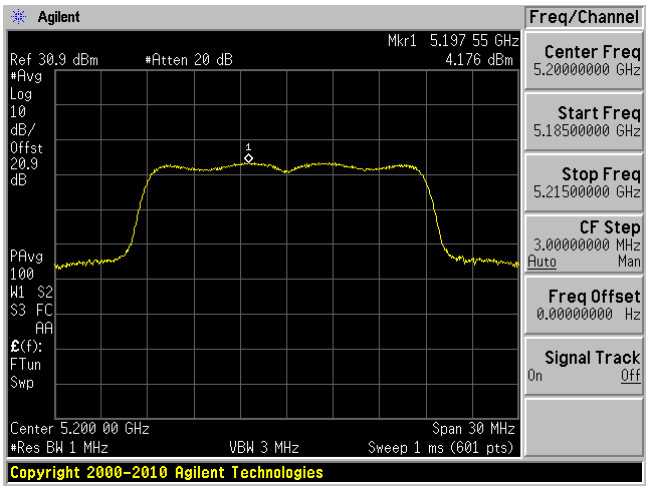


802.11n20 mode

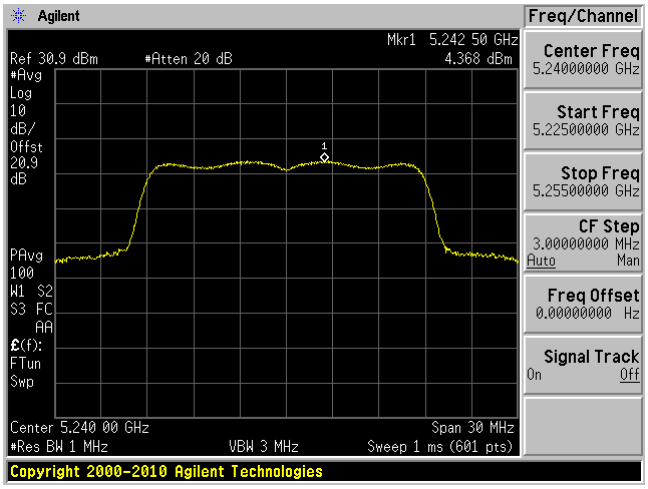
5180 MHz



5200 MHz

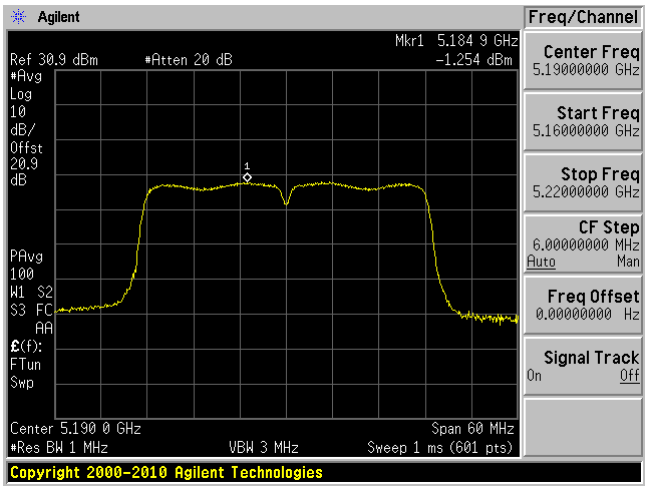


5240 MHz

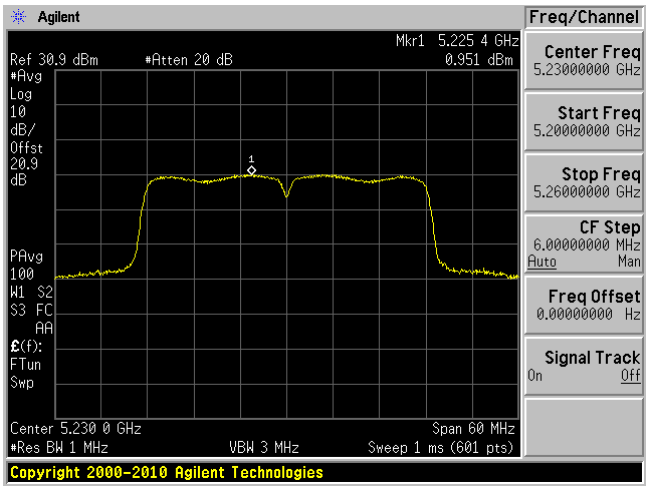


802.11n40 mode

5190 MHz

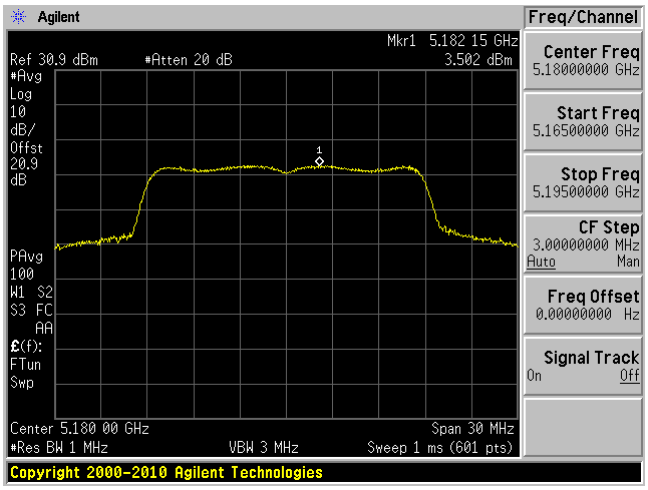


5230 MHz

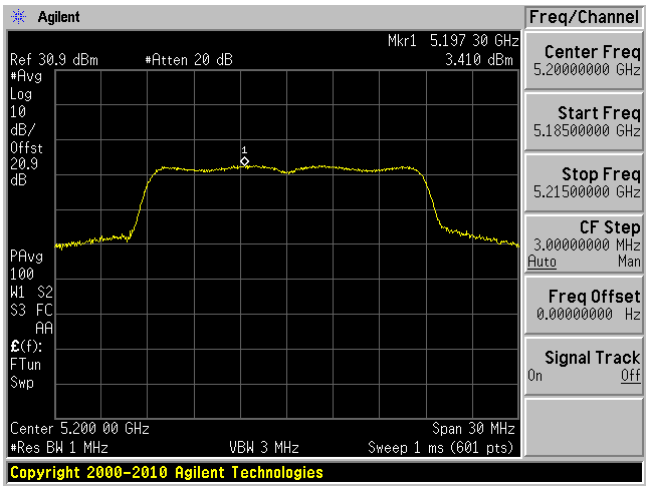


802.11ac20 mode

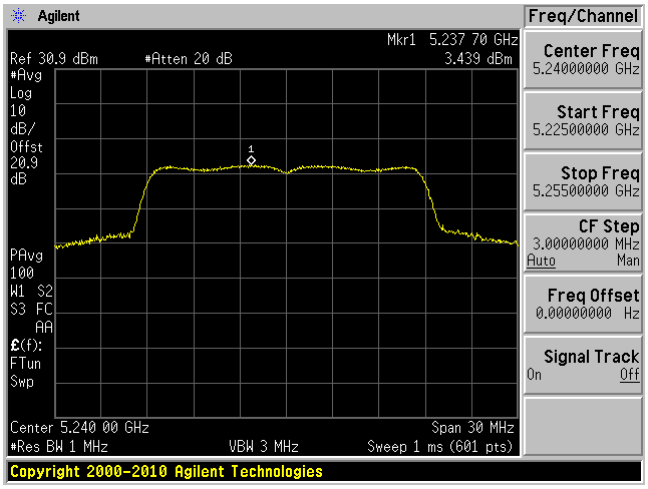
5180 MHz



5200 MHz

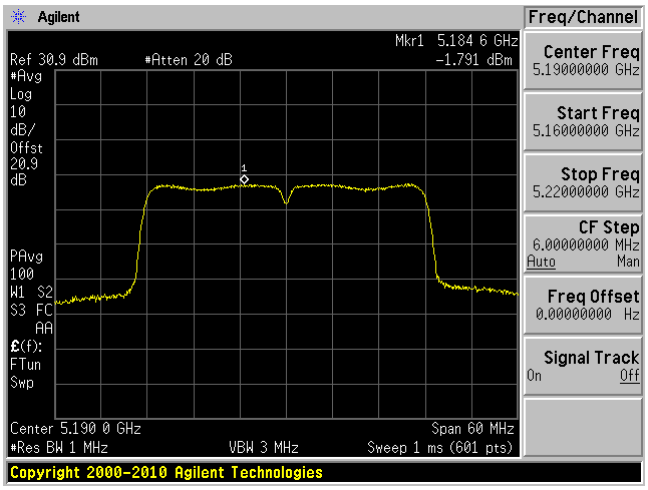


5240 MHz

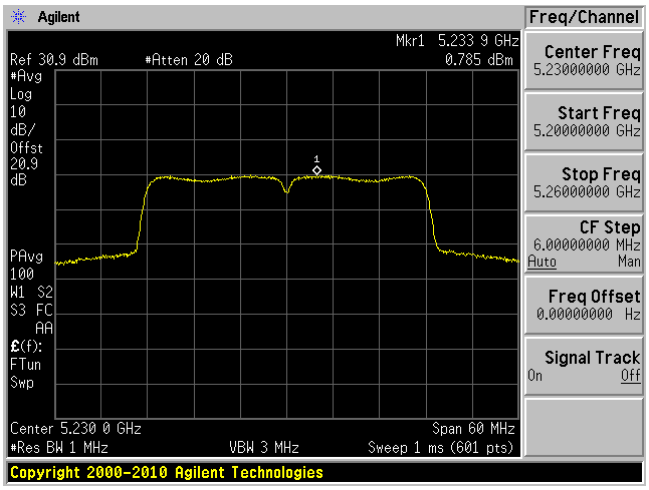


802.11ac40 mode

5190 MHz

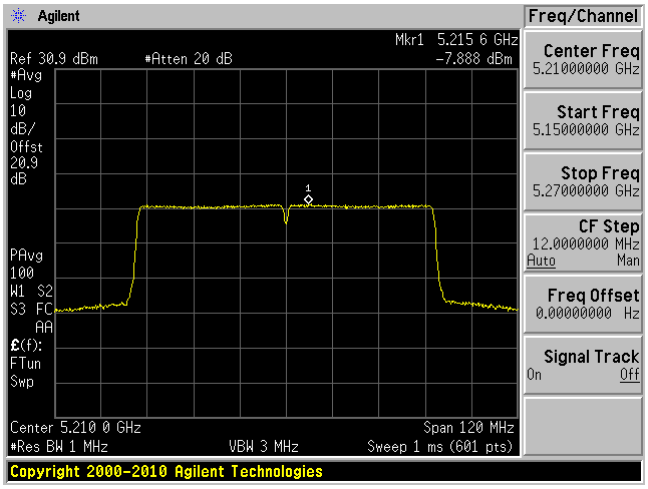


5230 MHz



802.11ac80 mode

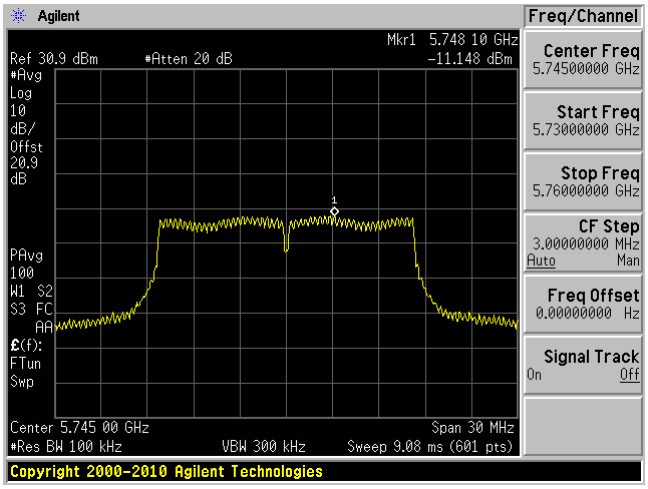
5210 MHz



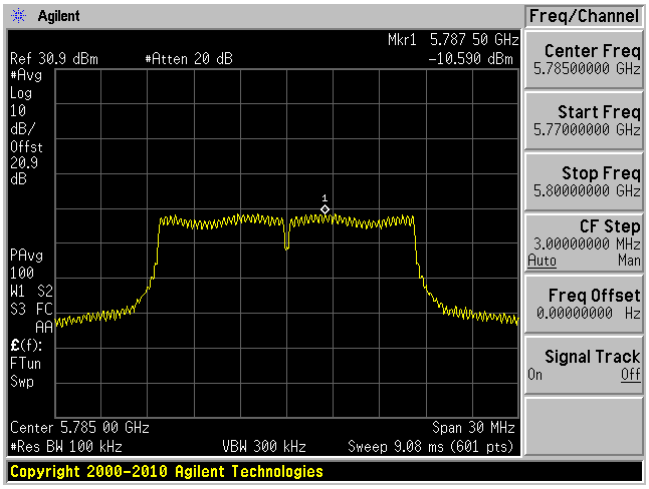
5725 – 5850 MHz

802.11a mode

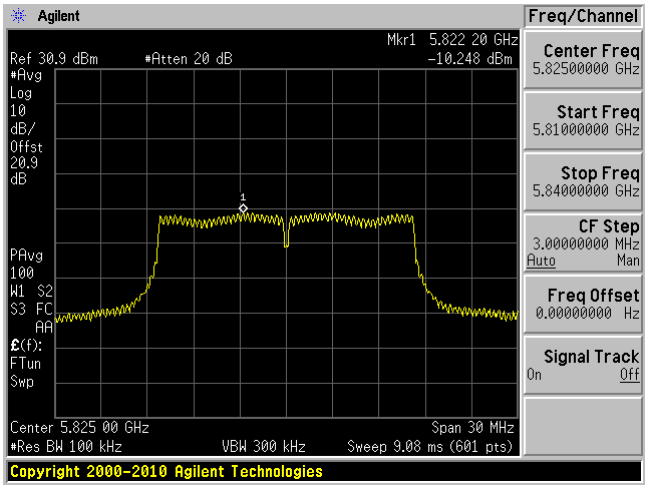
5745 MHz



5785 MHz

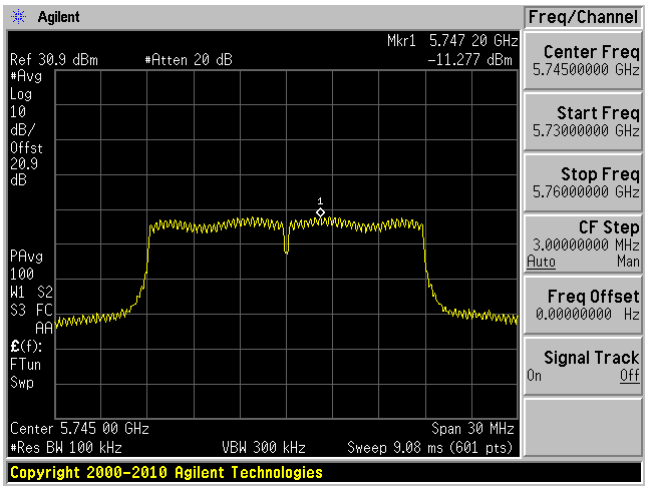


5825 MHz

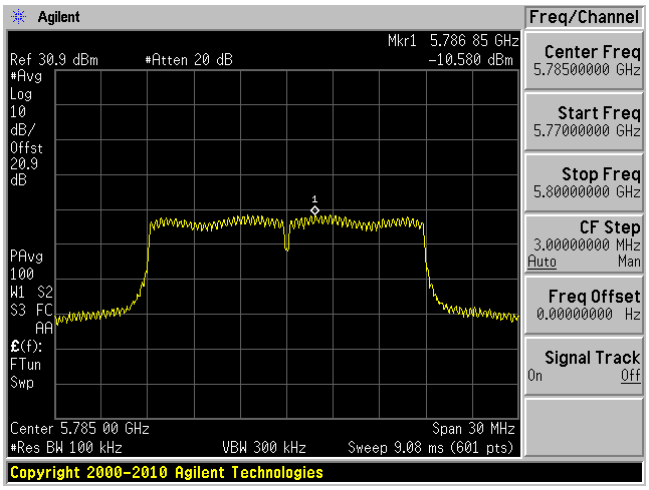


802.11n20 mode

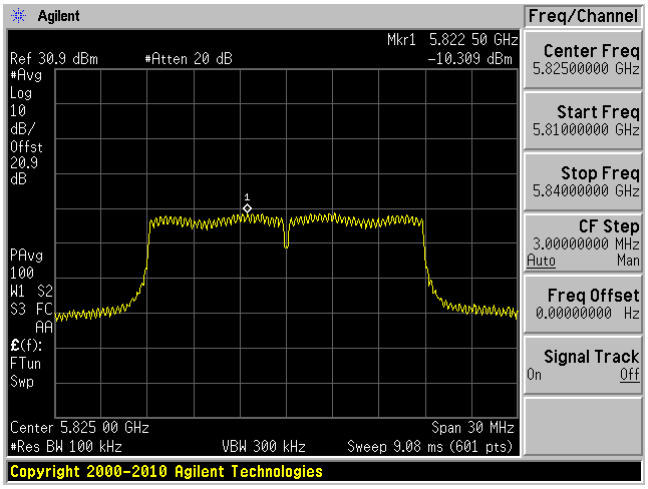
5745 MHz



5785 MHz

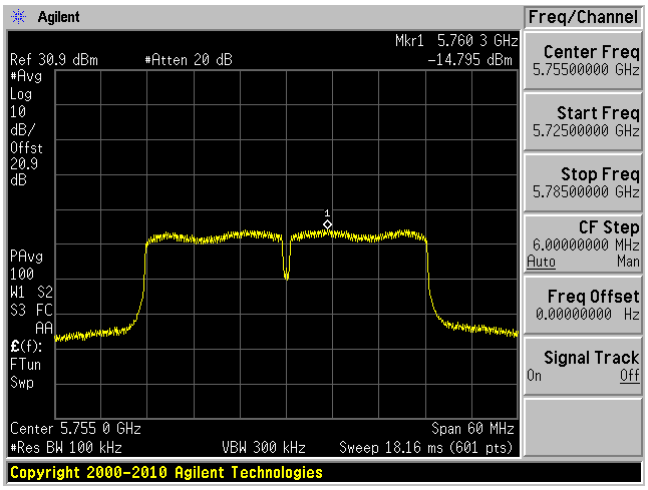


5825 MHz

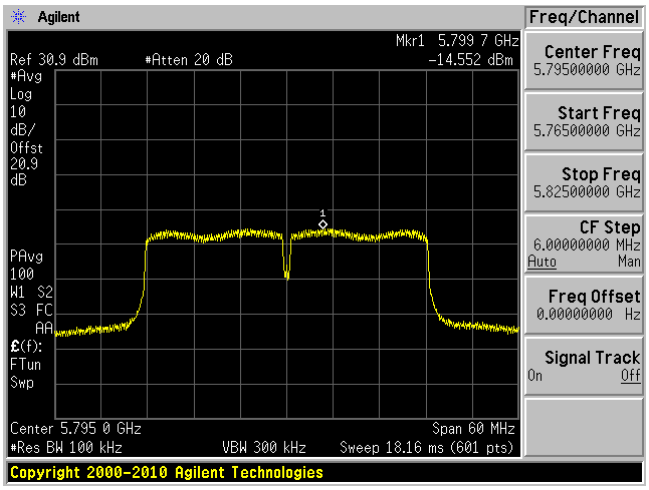


802.11n40 mode

5755 MHz

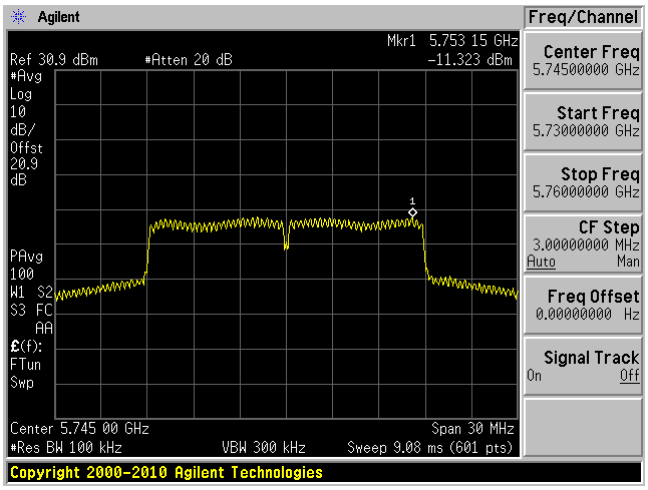


5795 MHz

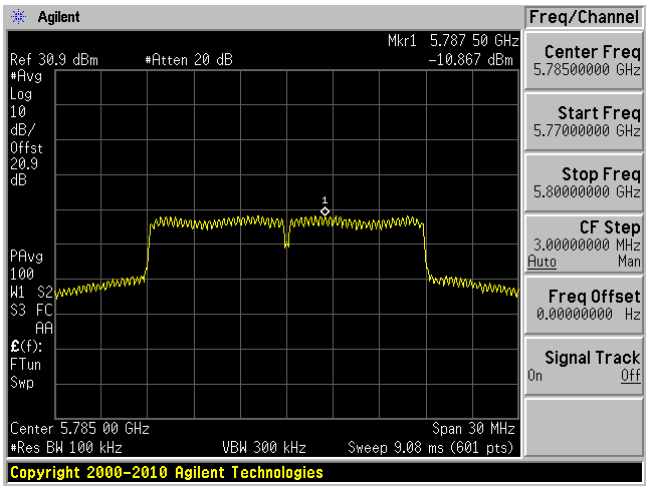


802.11ac20 mode

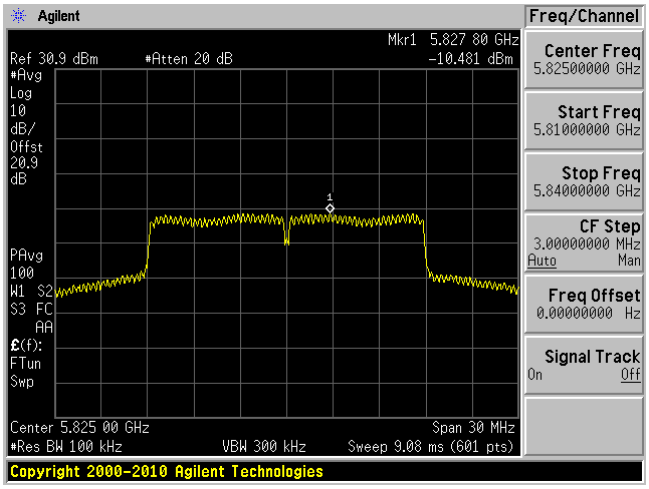
5745 MHz



5785 MHz

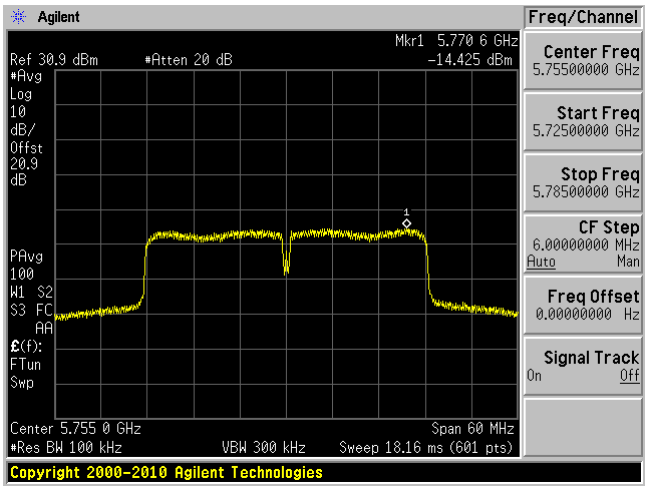


5825 MHz

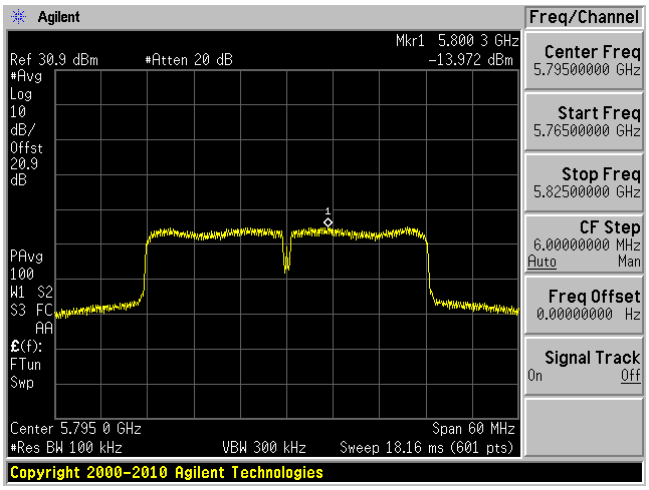


802.11ac40 mode

5755 MHz

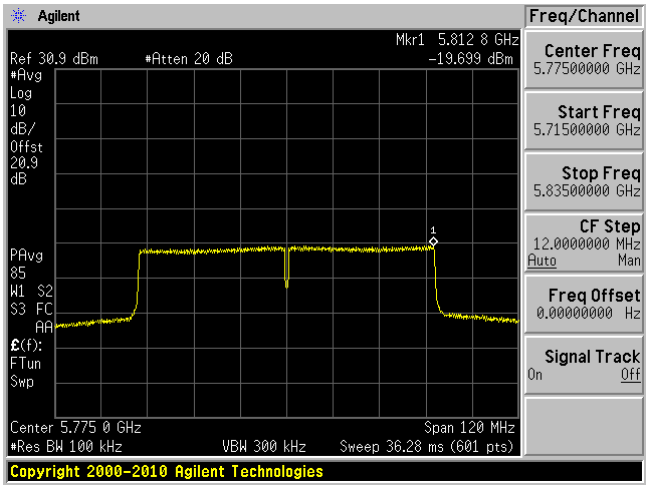


5795 MHz



802.11ac80 mode

5775 MHz



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 5.725-5.85 GHz band:

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

(ii) Devices certified before March 2, 2017 with antenna gain greater than 10 dBi may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.

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

According to ISEDC RSS-247 §6.2.1 for devices operatinging in the frequency band 5150-5250 MHz:

For transmitters operating in the band 5150-5250 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p. However, any unwanted emissions that fall into the band 5250-5350 MHz must be 26 dBc, when measured using a resolution bandwidth between 1 and 5% of the occupied bandwidth, above 5.25 GHz. Otherwise, the transmission is considered as intentional and the devices shall implement dynamic frequency selection (DFS) and transmitter power control (TPC) as per the requirements for the band 5250-5350 MHz.

According to ISEDC RSS-247 §6.2.4 for devices operatinging in the frequency band 5725-5850 MHz:

a. 27 dBm/MHz at frequencies from the band edges decreasing linearly to 15.6 Bm/MHz at 5 MHz above or below the band edges;
b. 15.6 dBm/MHz at 5 MHz above or below the band edges decreasing linearly to 10 dBm/MHz at 25 MHz above or below the band edges;
c. 10 dBm/MHz at 25 MHz above or below the band edges decreasing linearly to -27 dBm/MHz at 75 MHz above or below the band edges; and
d. -27 dBm/MHz at frequencies more than 75 MHz above or below the band edges.

11.2 Measurement Procedure

Add a correction factor (antenna gain+ Attenuator loss+cable loss) to the offset of the spectrum analyzer.
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	Analyzer, Spectrum	E4446A	US44300386	2017-04-20	12 months
-	RF cable	-	-	Each time[1]	N/A
-	20dB 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 A2LA Policy P102 (dated 09 June 2016) "A2LA Policy on Metrological Traceability".*

11.4 Test Environmental Conditions

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

The testing was performed by Chin Ming Lui on 2018-01-03 at RF site.

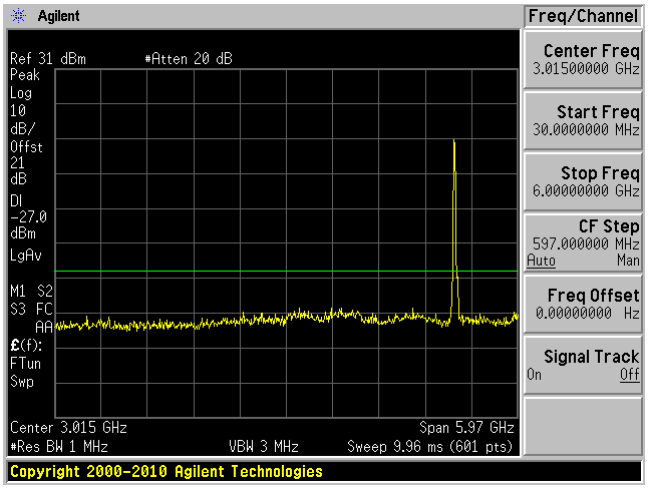
11.5 Test Results

Please refer to the following plots

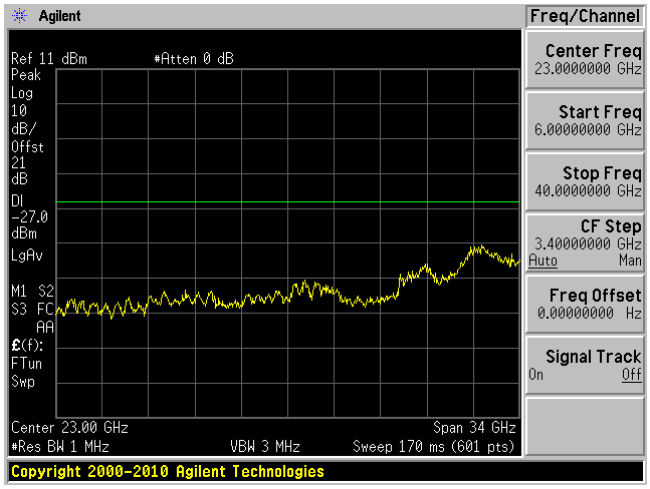
5150 - 5250 MHz

802.11a mode

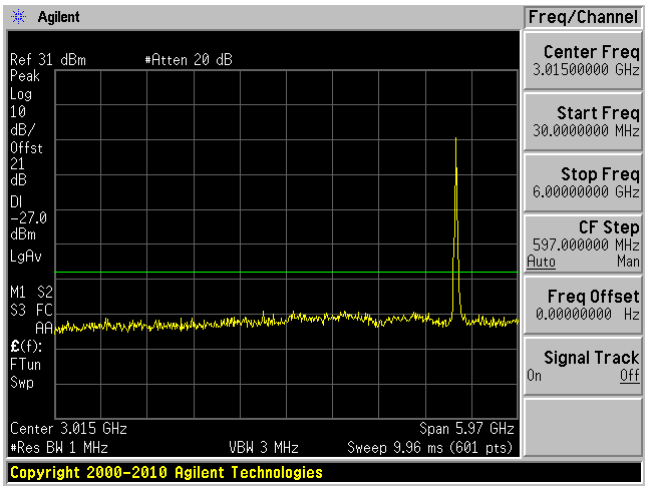
Low Channel 5180MHz (30MHz-6GHz)



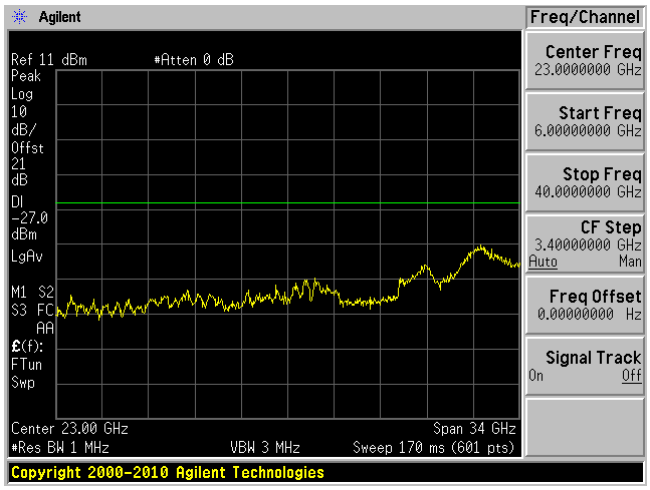
Low Channel 5180 MHz (6-40GHz)



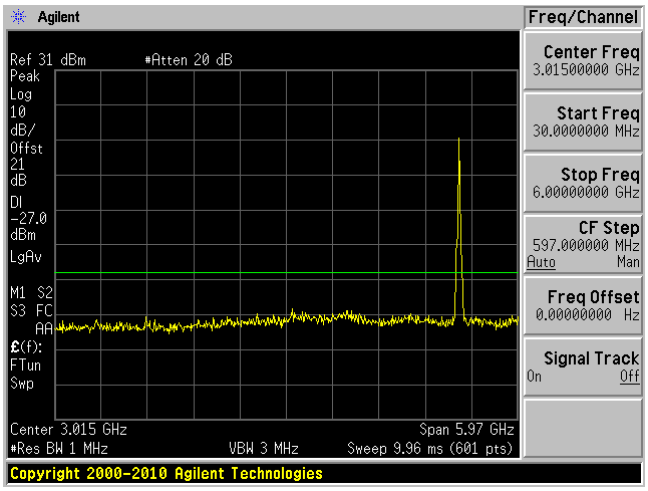
Middle Channel 5200MHz (30MHz-6GHz)



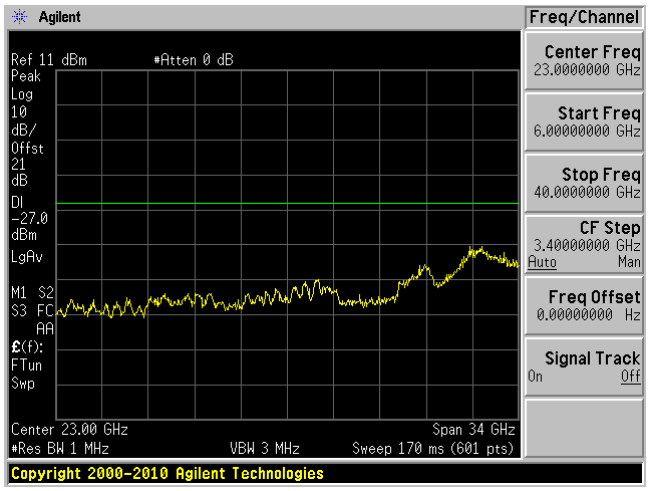
Middle Channel 5200 MHz (6-40GHz)



High Channel 5240MHz (30MHz-6GHz)

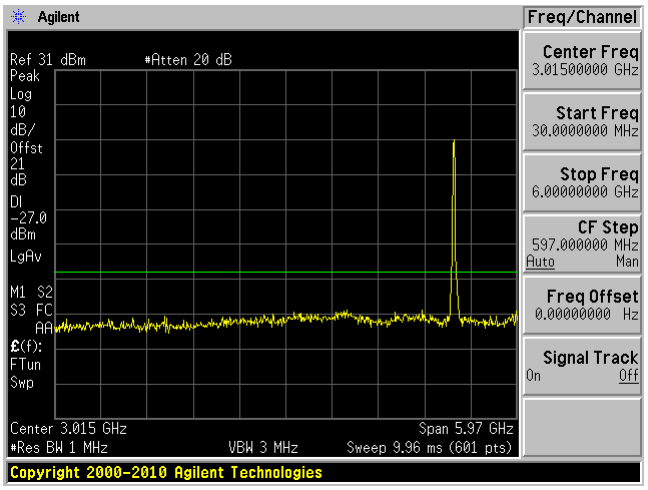


High Channel 5240 MHz (6-40GHz)

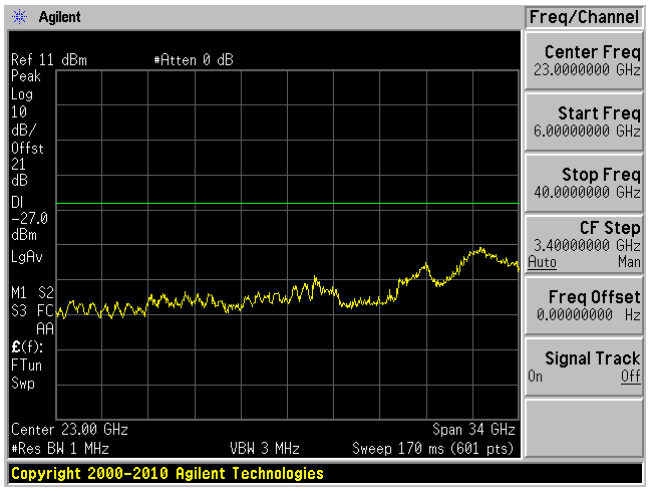


802.11n20 mode

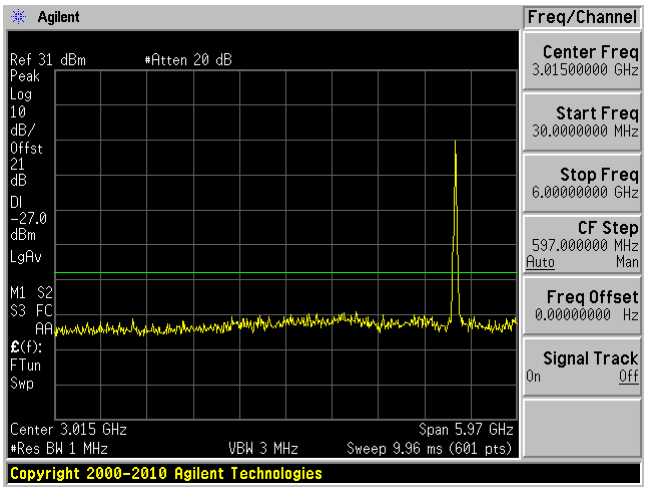
Low Channel 5180MHz (30MHz-6GHz)



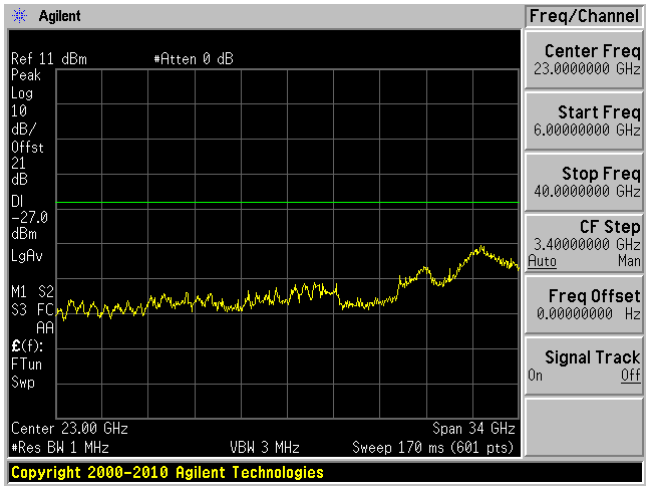
Low Channel 5180 MHz (6-40GHz)



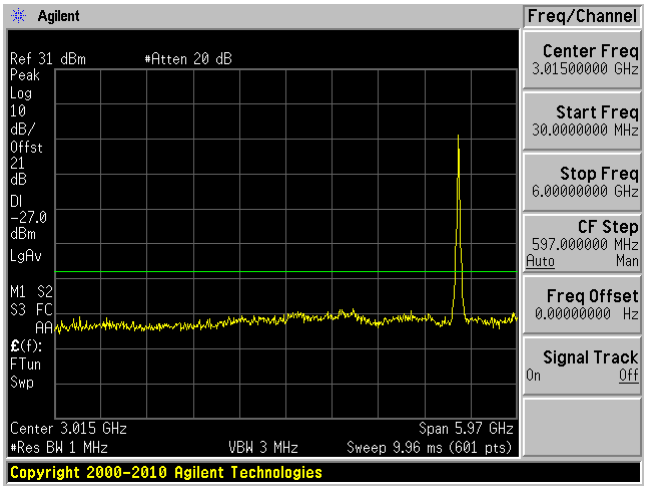
Middle Channel 5200MHz (30MHz-6GHz)



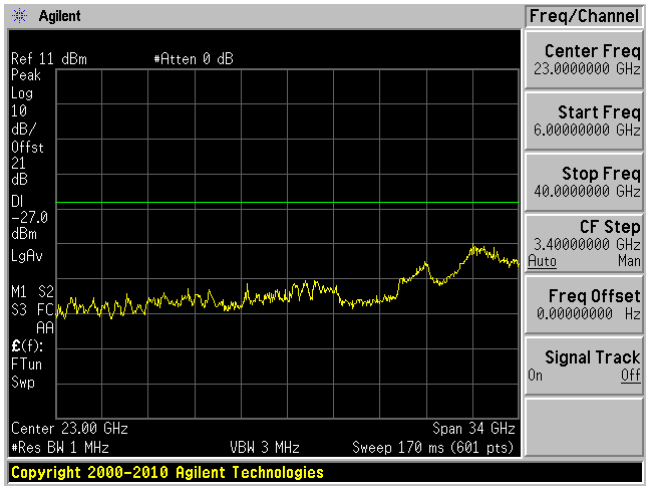
Middle Channel 5200 MHz (6-40GHz)



High Channel 5240MHz (30MHz-6GHz)

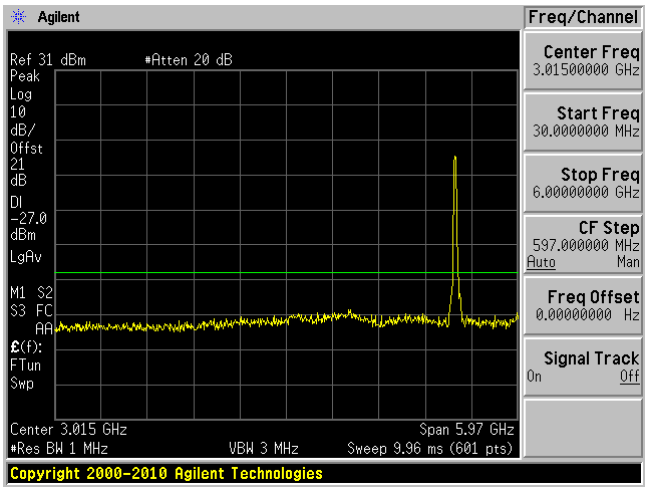


High Channel 5240 MHz (6-40GHz)

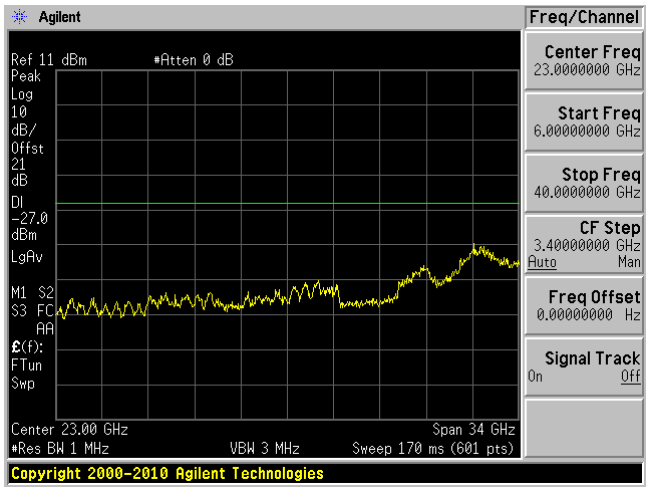


802.11n40 mode

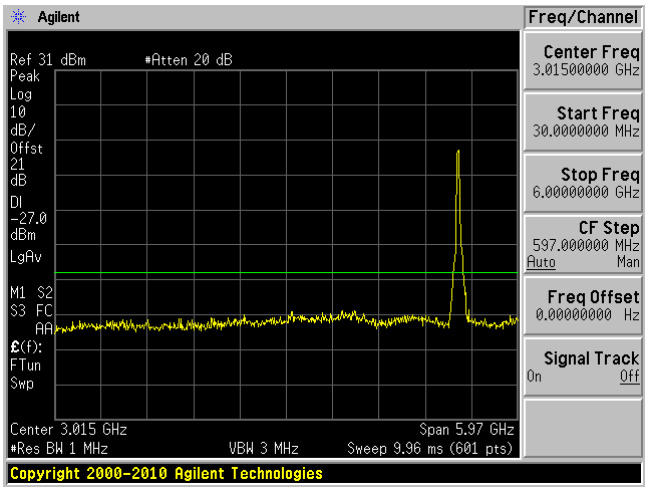
Low Channel 5190MHz (30MHz-6GHz)



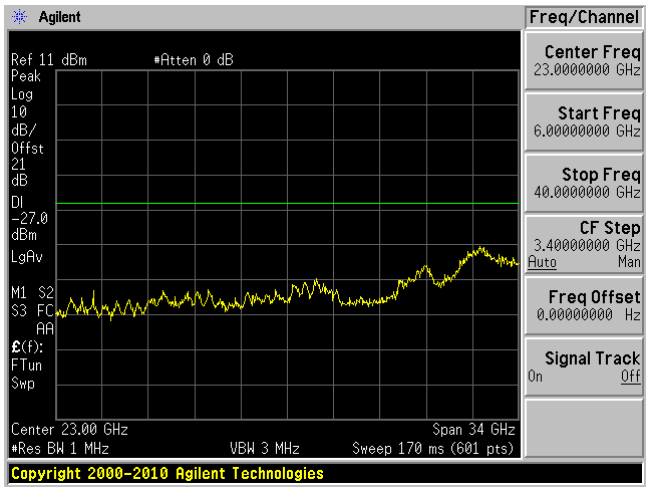
Low Channel 5190 MHz (6-40GHz)



High Channel 5230MHz (30MHz-6GHz)

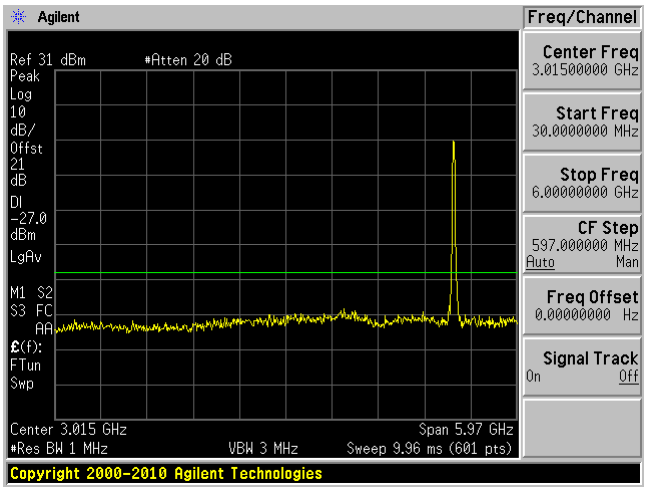


High Channel 5230 MHz (6-40GHz)

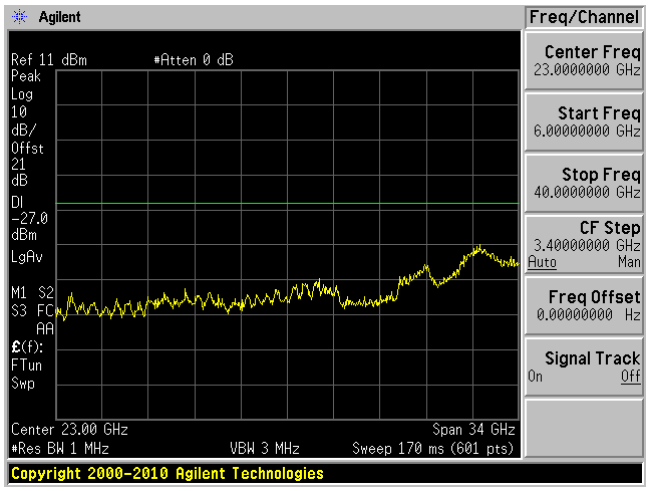


802.11ac20 mode

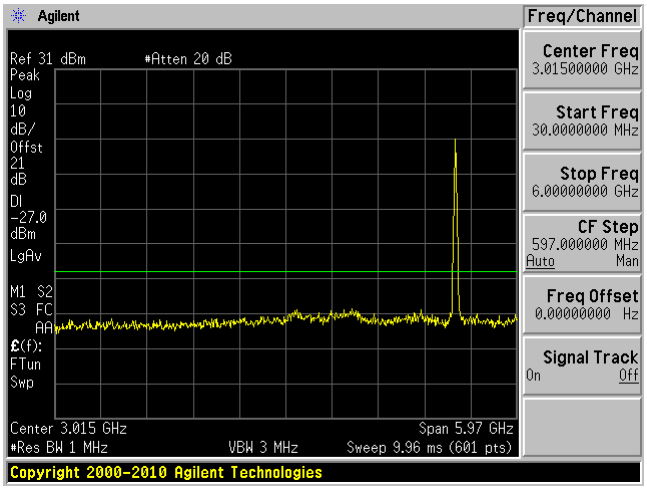
Low Channel 5180MHz (30MHz-6GHz)



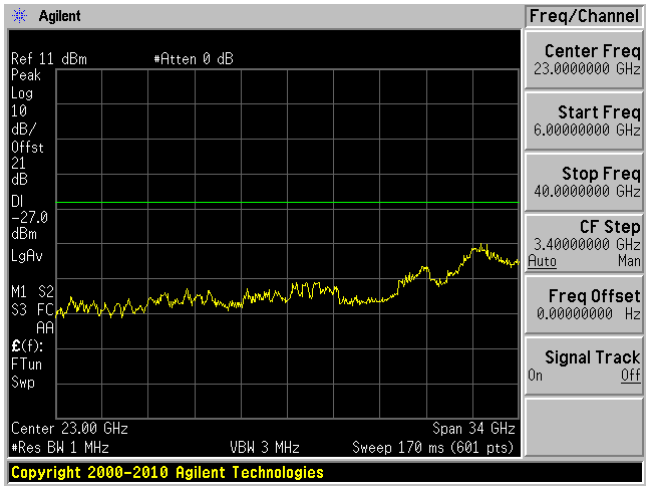
Low Channel 5180 MHz (6-40GHz)



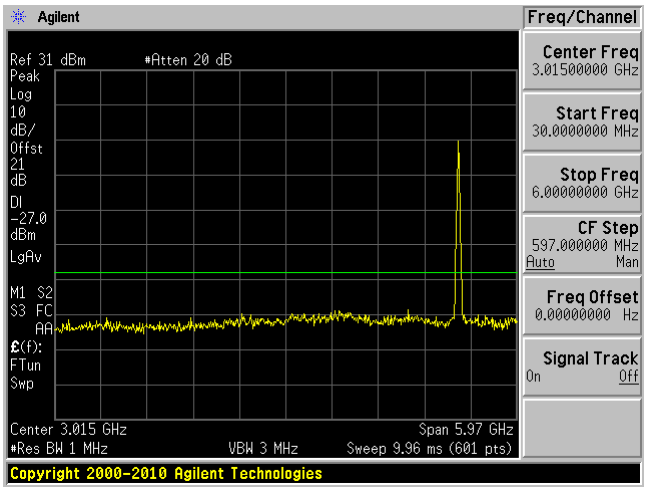
Middle Channel 5200MHz (30MHz-6GHz)



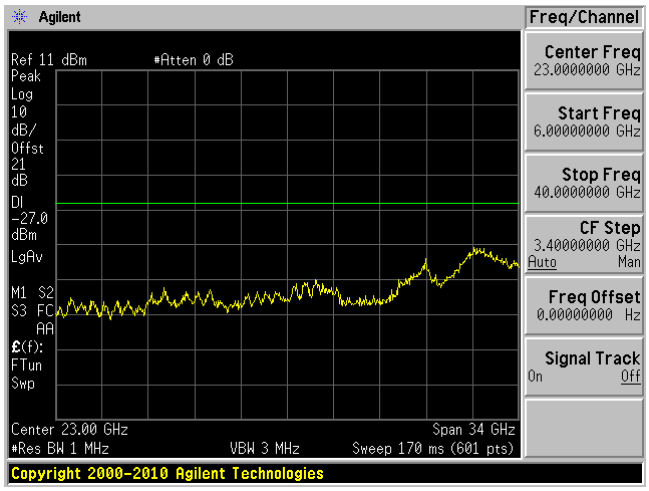
Middle Channel 5200 MHz (6GHz – 40GHz)



High Channel 5240MHz (30MHz-6GHz)

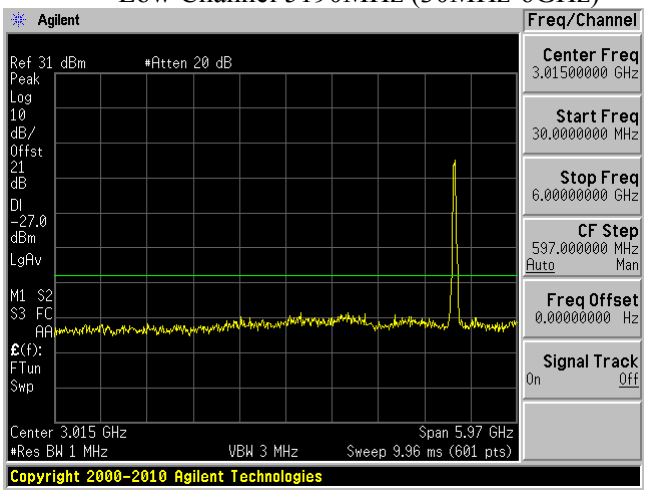


High Channel 5240 MHz (6GHz – 40GHz)

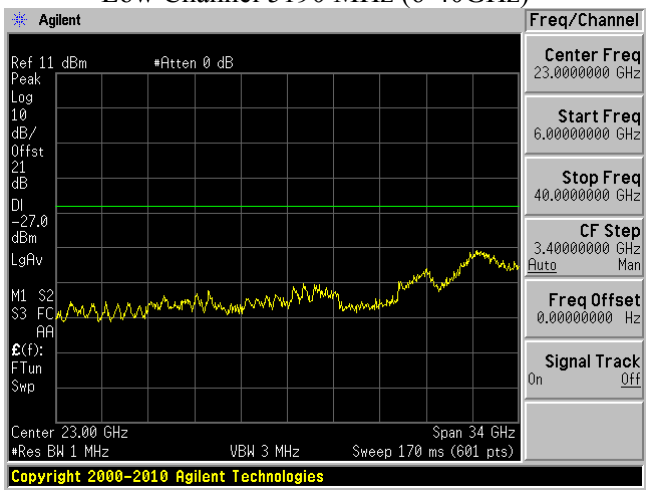


802.11ac40 mode

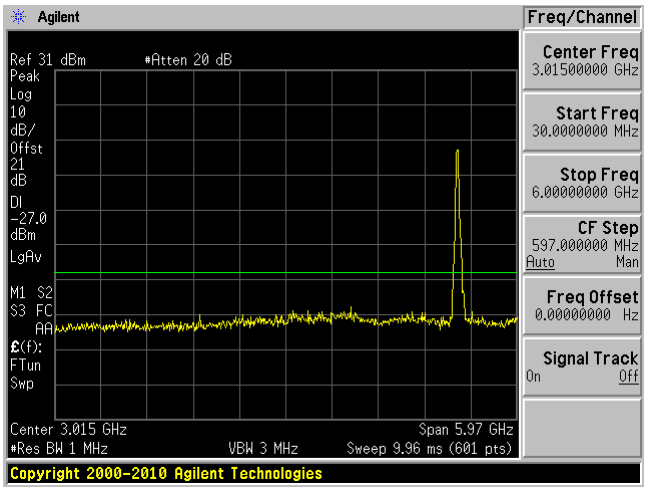
Low Channel 5190MHz (30MHz-6GHz)



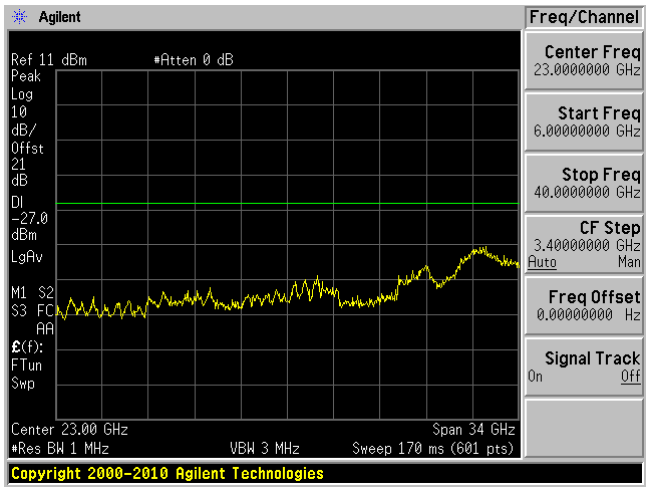
Low Channel 5190 MHz (6-40GHz)



High Channel 5230MHz (30MHz-6GHz)

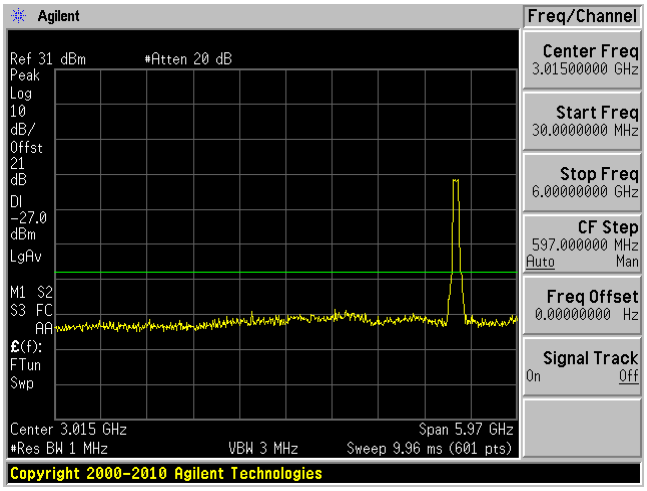


High Channel 5230 MHz (6GHz – 40GHz)

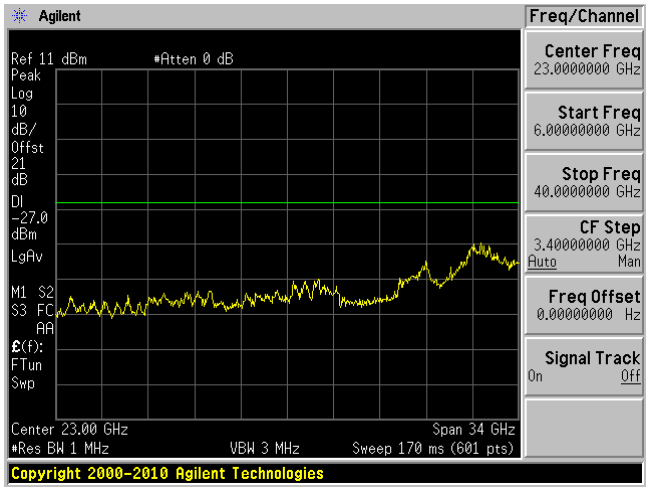


802.11ac80 mode

5210 MHz (30MHz-6GHz)



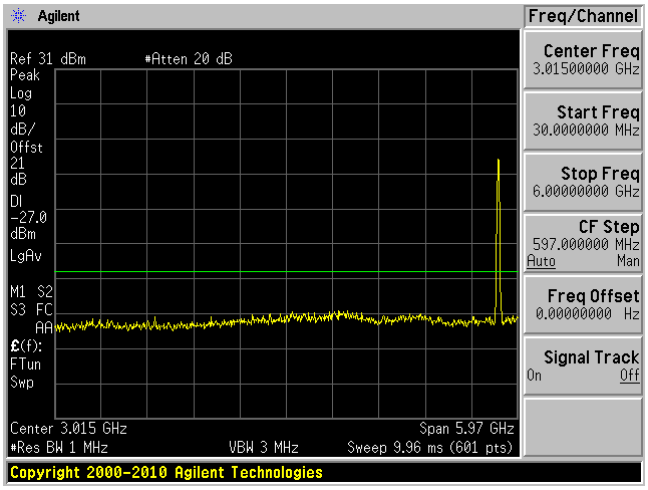
5210 MHz (6GHz – 40GHz)



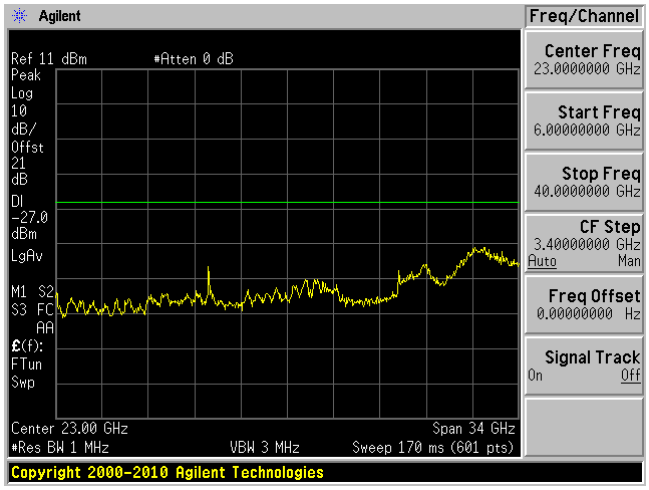
5725 – 5850 MHz

802.11a

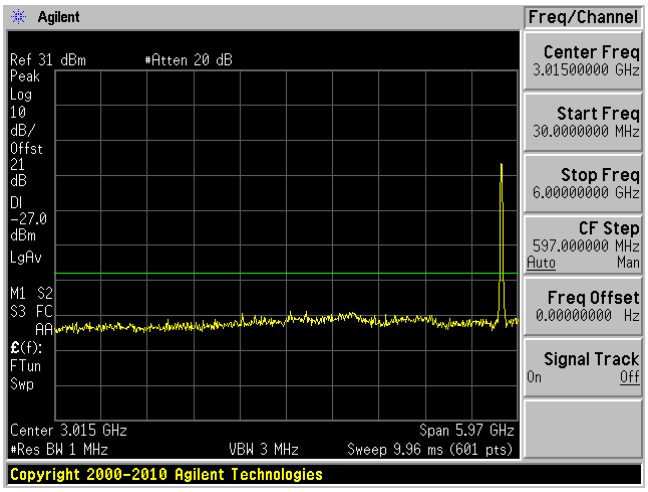
Low Channel 5745 MHz (30MHz-6GHz)



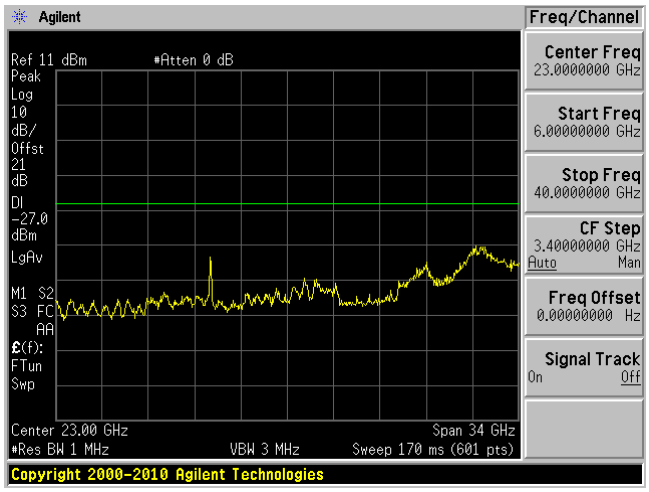
Low Channel 5745 MHz (6-40GHz)



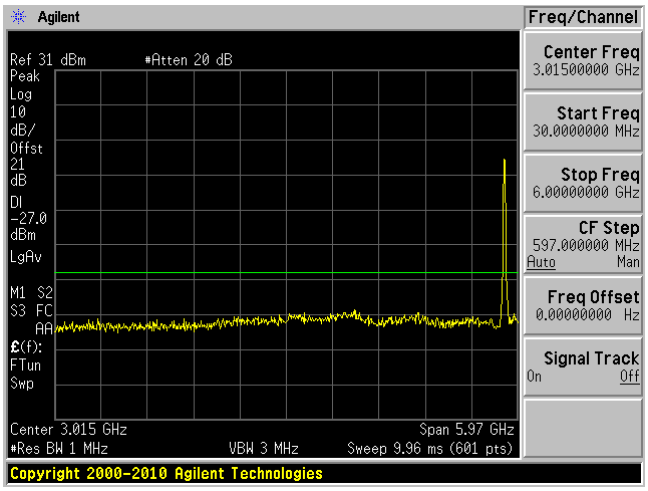
Middle Channel 5785 MHz (30MHz-6GHz)



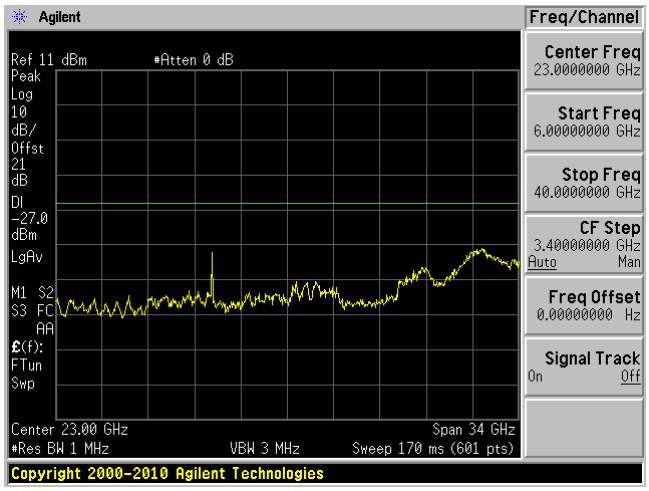
Middle Channel 5785 MHz (6-40GHz)



High Channel 5825 MHz (30MHz-6GHz)

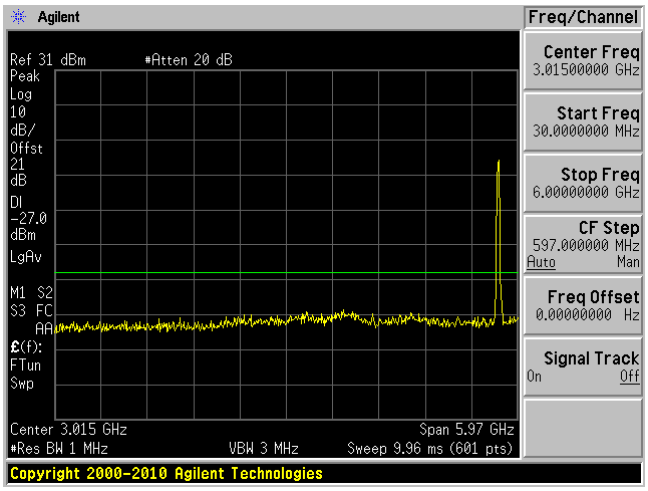


High Channel 5825 MHz (6-40GHz)

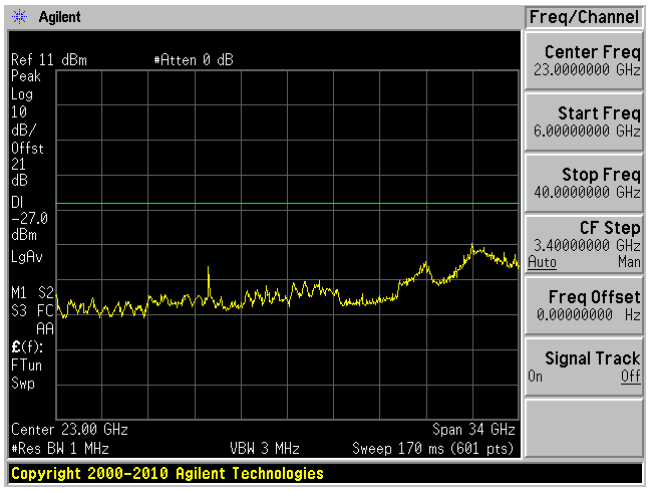


802.11n20 mode

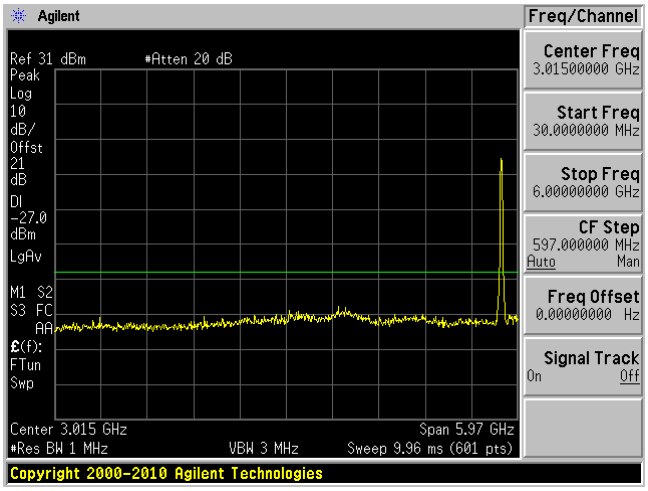
Low Channel 5745 MHz (30MHz-6GHz)



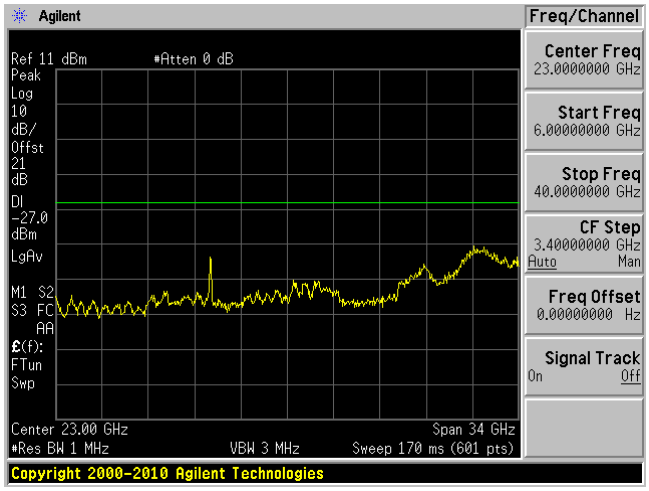
Low Channel 5745 MHz (6-40GHz)



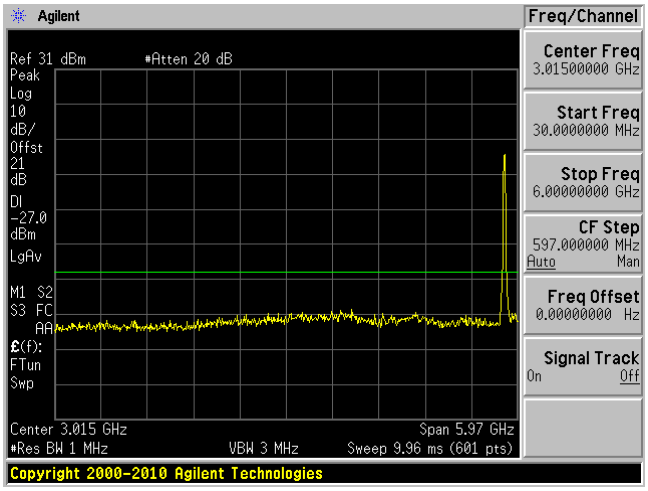
Middle Channel 5785 MHz (30MHz-6GHz)



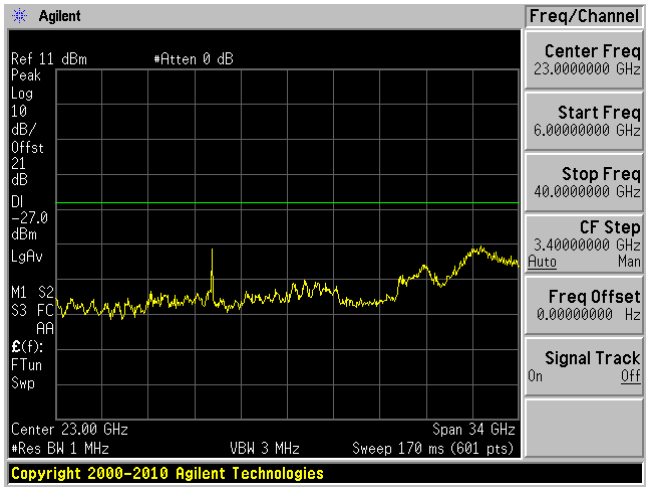
Middle Channel 5785 MHz (6-40GHz)



High Channel 5825 MHz (30MHz-6GHz)

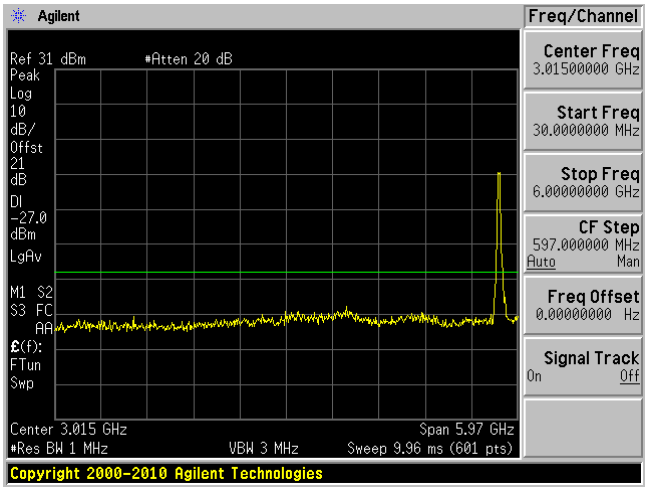


High Channel 5825 MHz (6-40GHz)

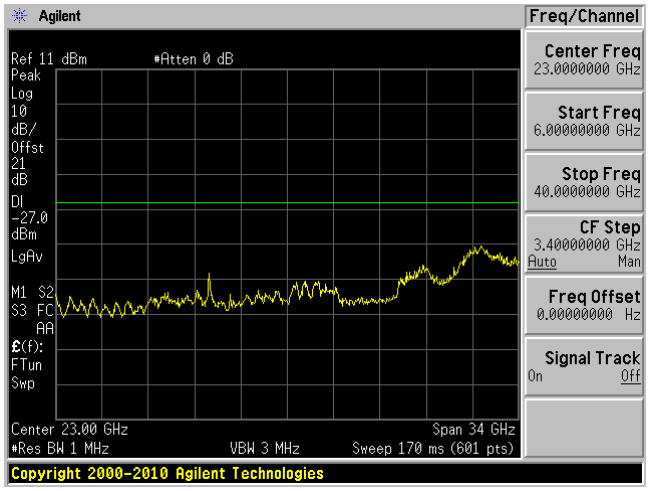


802.11n40 mode

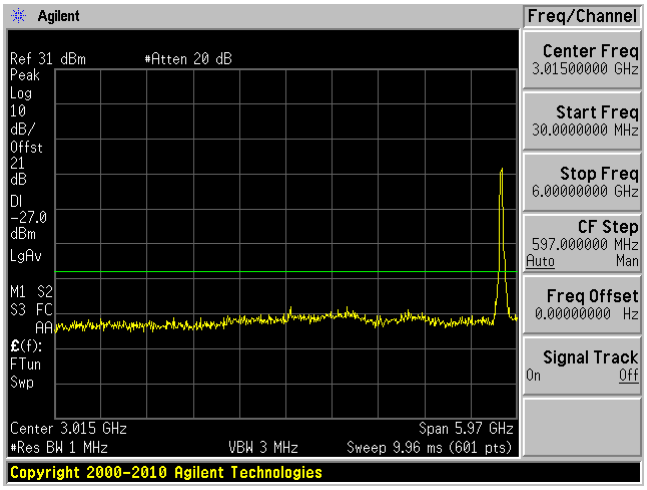
Low Channel 5755 MHz (30MHz-6GHz)



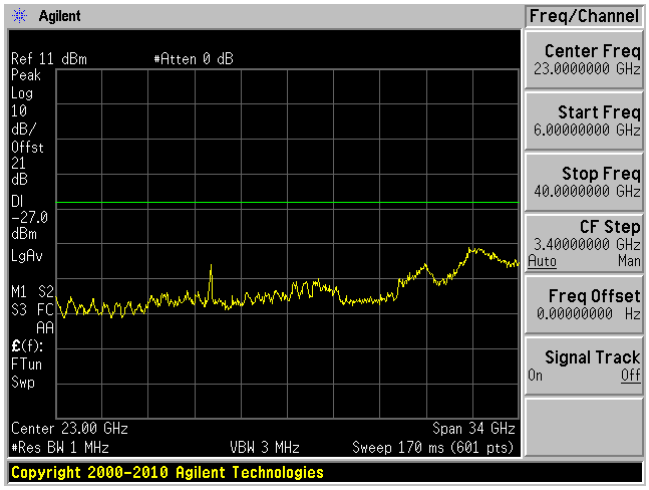
Low Channel 5755 MHz (6-40GHz)



High Channel 5795 MHz (30MHz-6GHz)

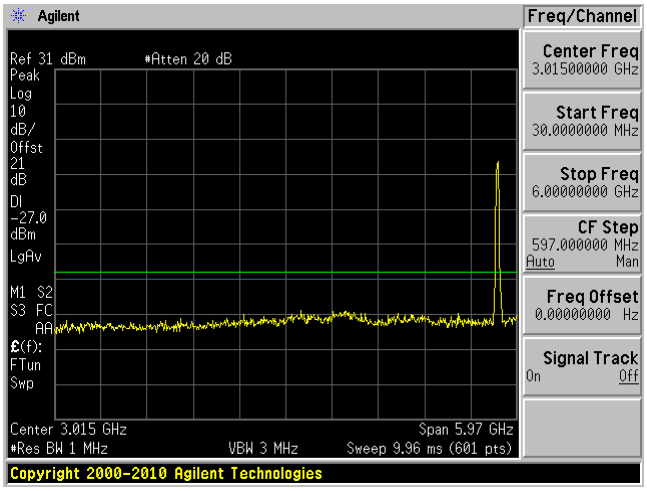


High Channel 5795 MHz (6-40GHz)

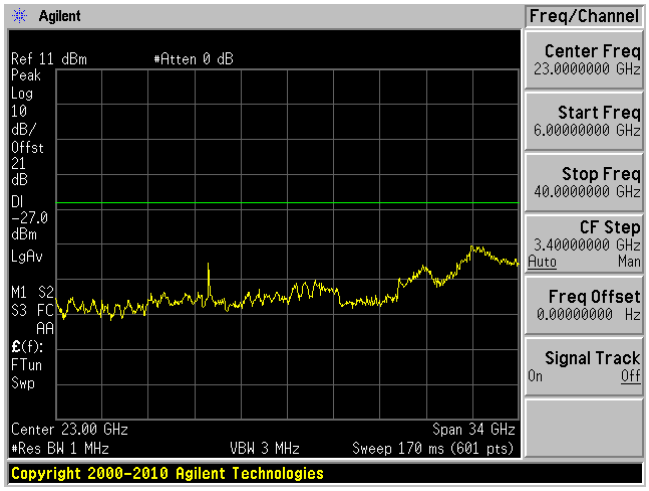


802.11ac20 mode

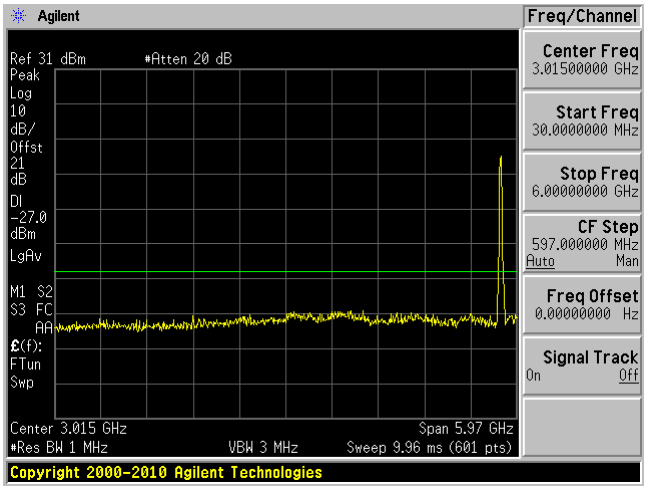
Low Channel 5745 MHz (30MHz-6GHz)



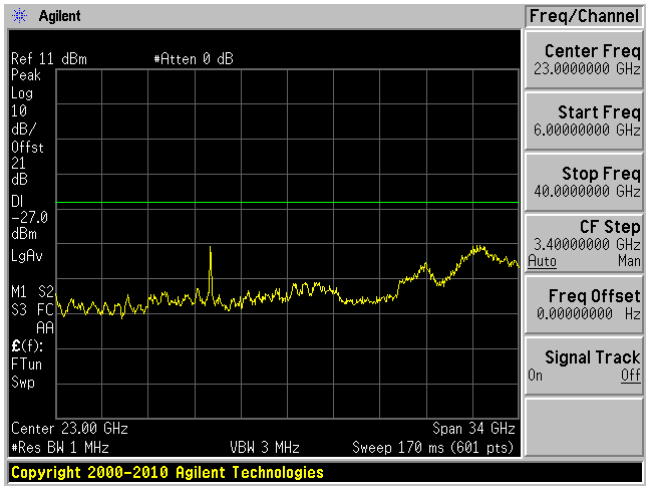
Low Channel 5745 MHz (6-40GHz)



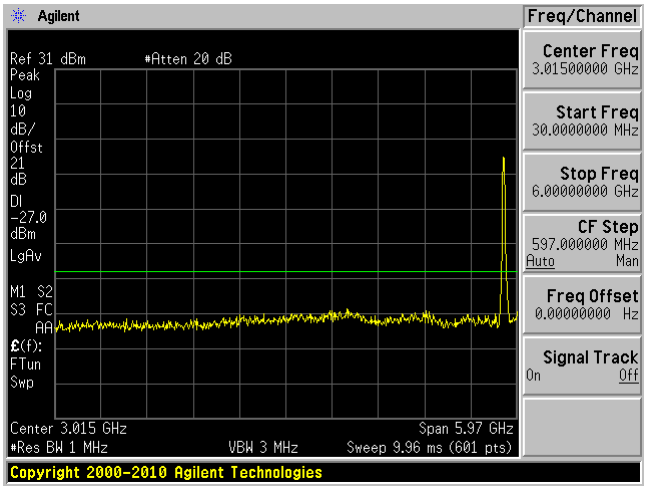
Middle Channel 5785 MHz (30MHz-6GHz)



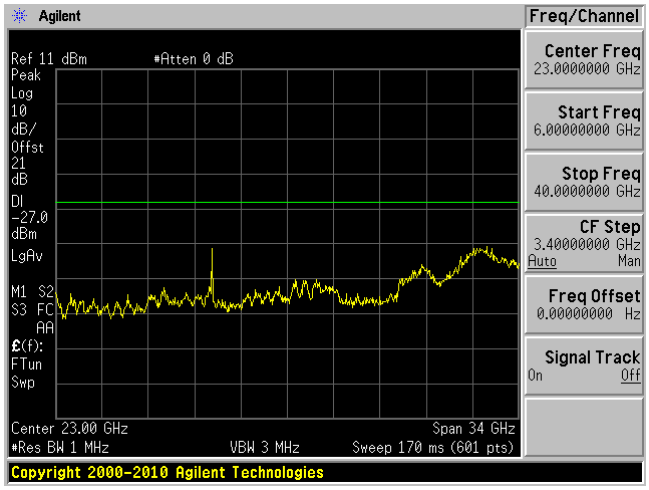
Middle Channel 5785 MHz (6-40GHz)



High Channel 5825 MHz (30MHz-6GHz)

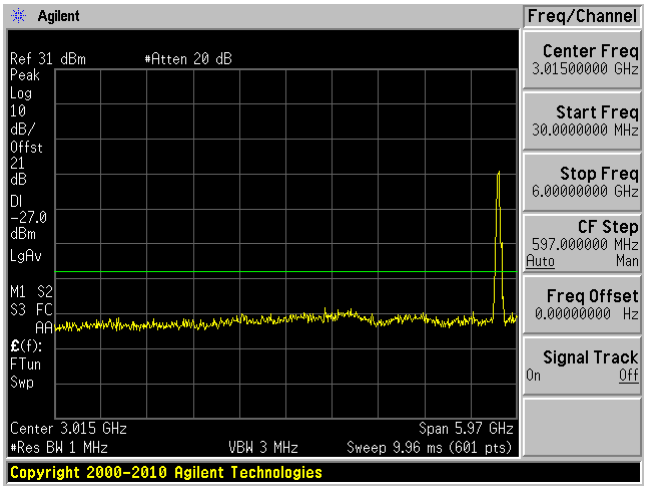


High Channel 5825 MHz (6-40GHz)

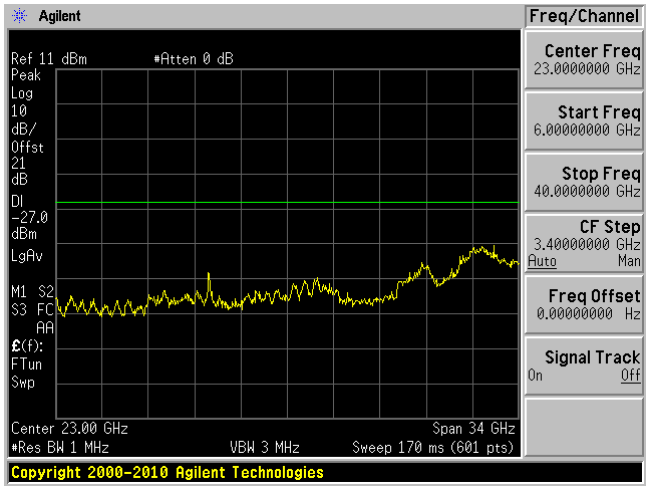


802.11ac40 mode

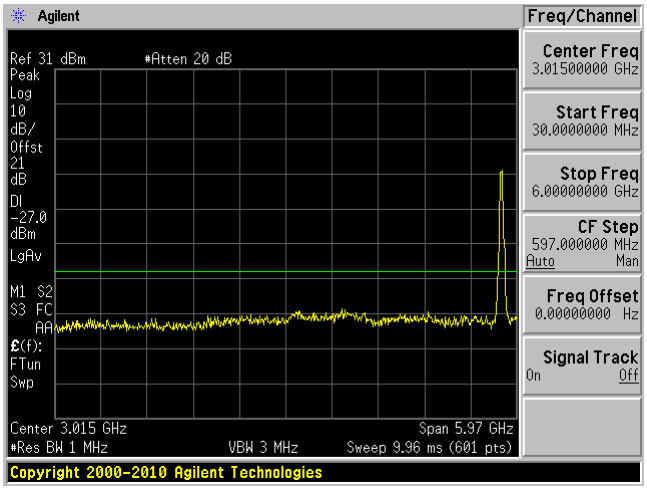
Low Channel 5755 MHz (30MHz-6GHz)



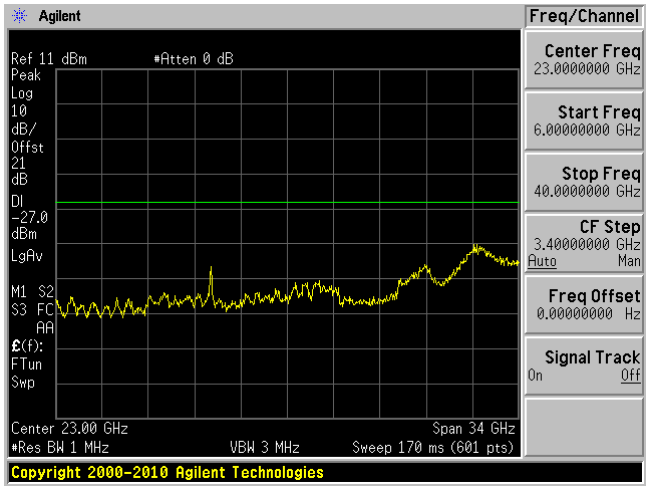
Low Channel 5755 MHz (6-40GHz)



High Channel 5795 MHz (30MHz-6GHz)

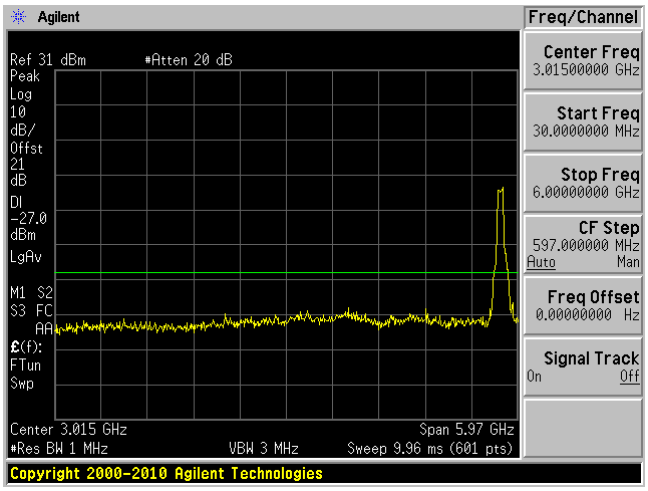


High Channel 5795 MHz (6-40GHz)

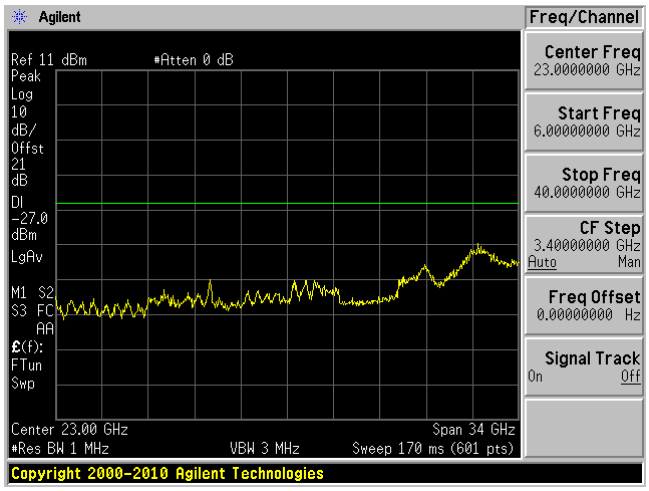


802.11ac80 mode

5755 MHz (30MHz-6GHz)



5755 MHz (6GHz – 40GHz)

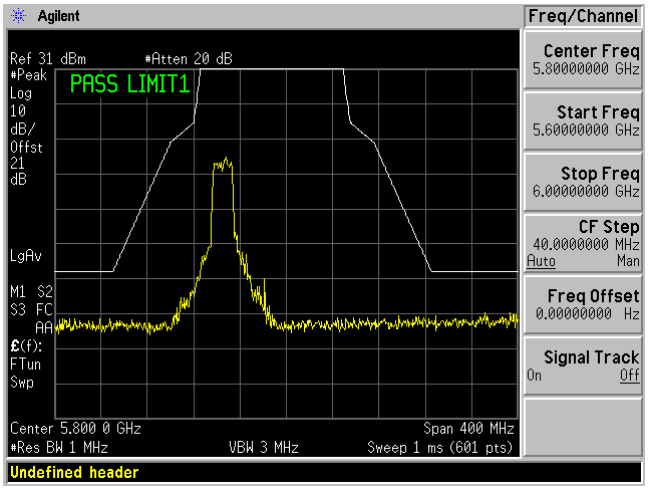


5725 – 5850 MHz

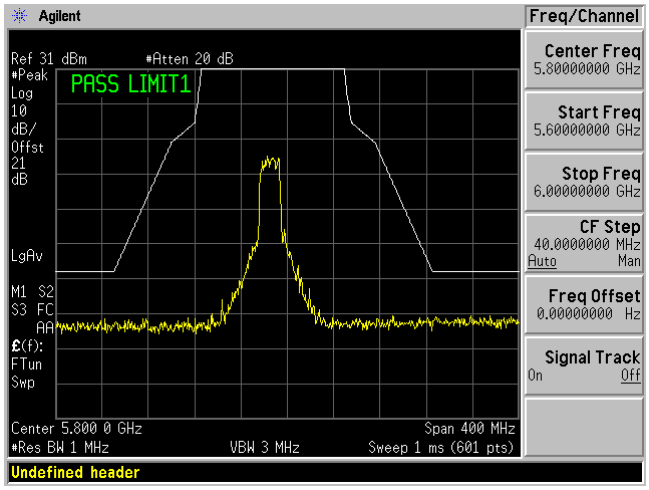
FCC Emission Mask

802.11a mode

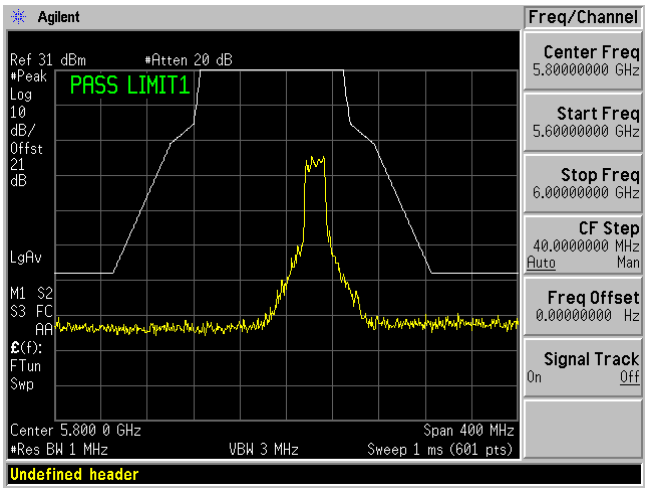
5745 MHz



5785 MHz

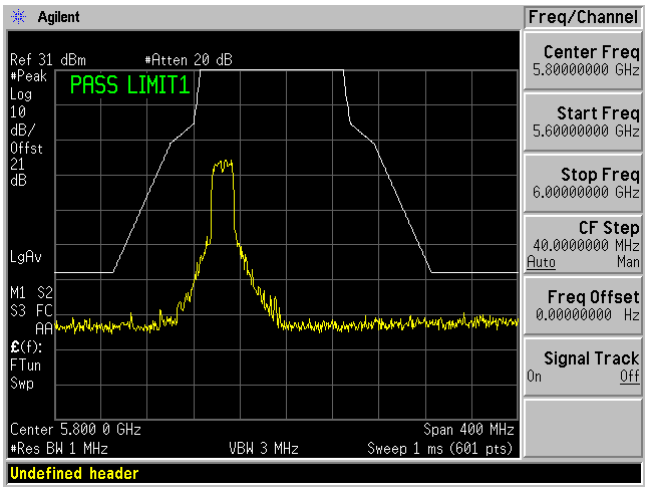


5825 MHz

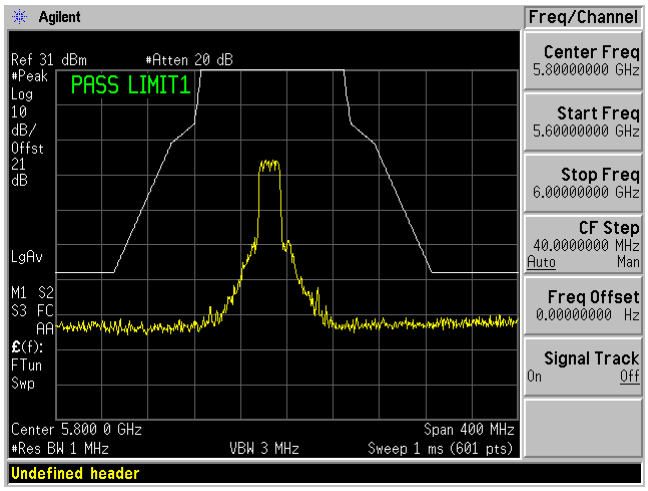


802.11n20 mode

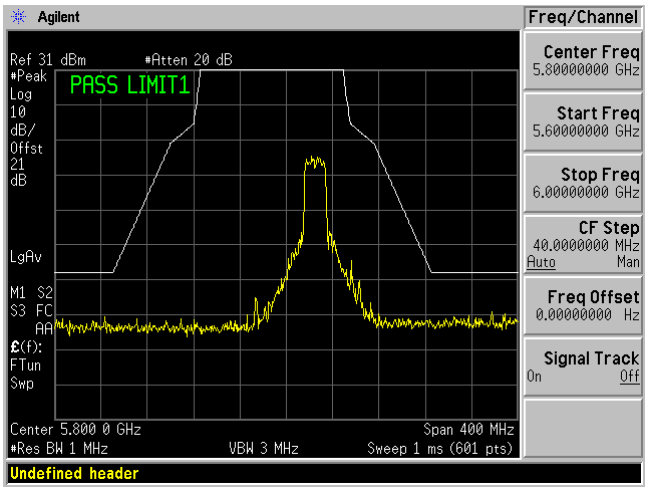
5745 MHz



5785 MHz

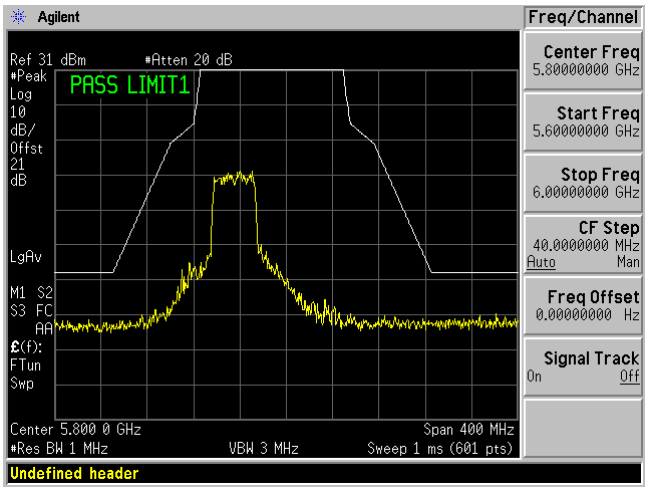


5825 MHz

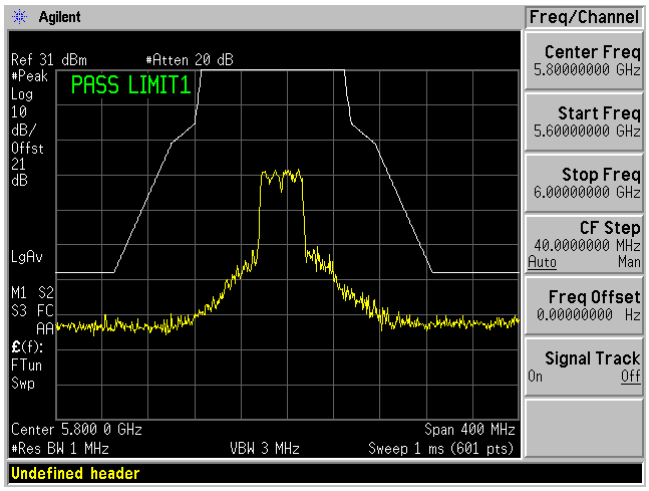


802.11n40 mode

5755 MHz

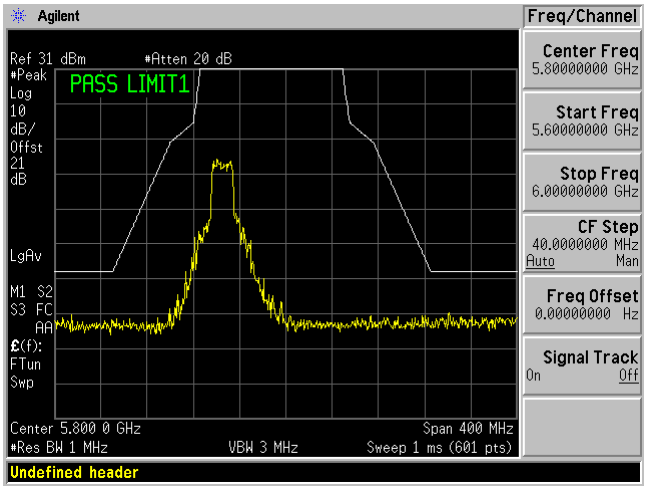


5795 MHz

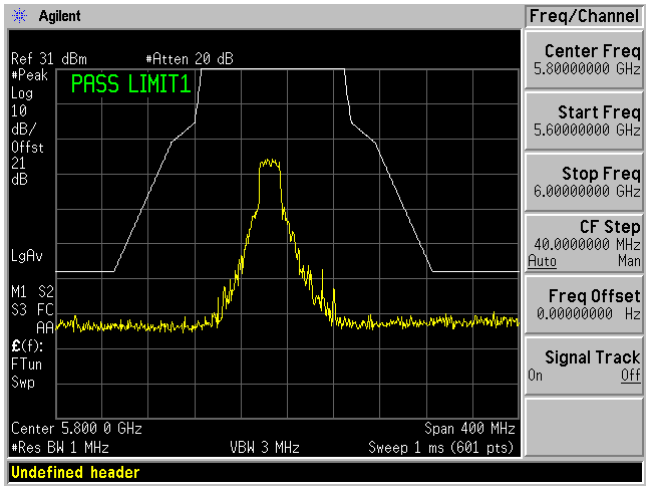


802.11ac20 mode

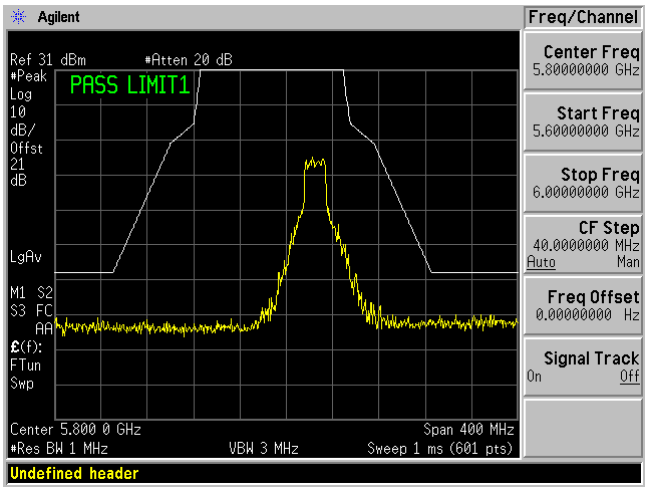
5745 MHz



5785 MHz

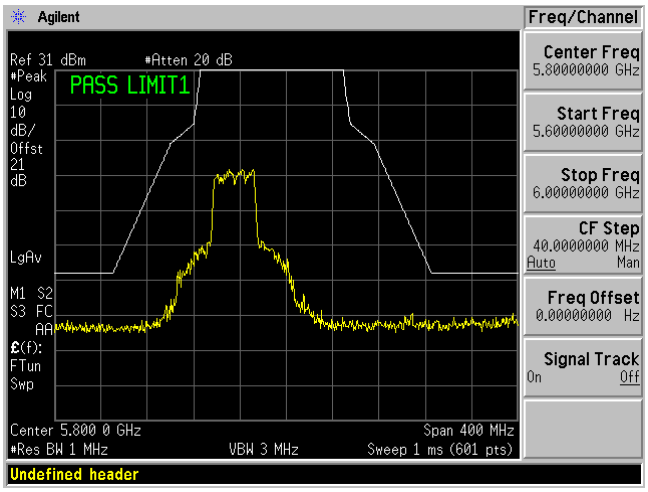


5825 MHz

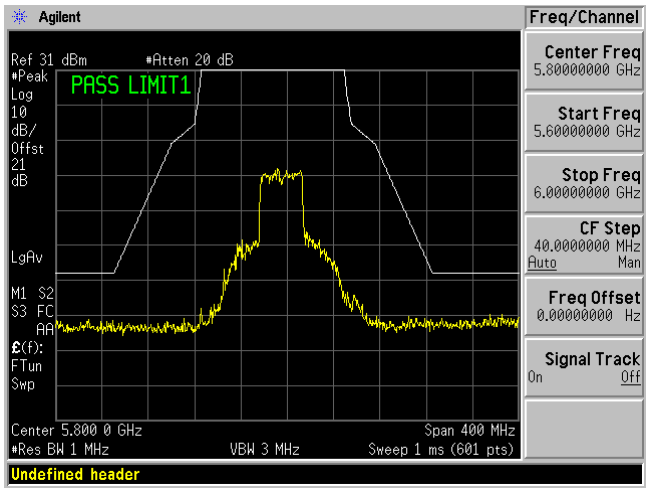


802.11ac40 mode

5755 MHz

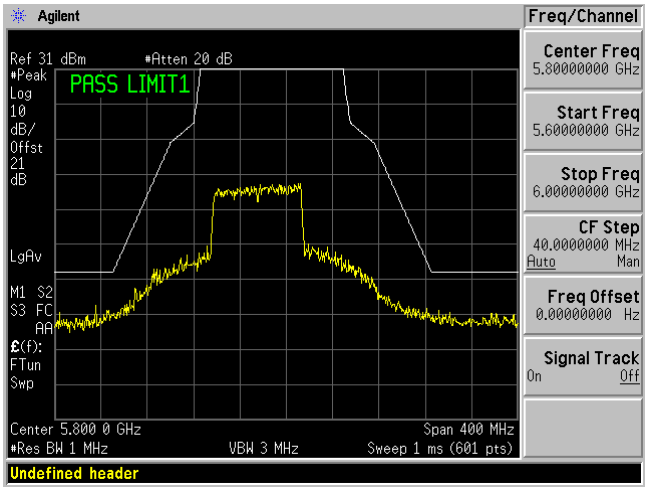


5795 MHz



802.11ac80 mode

5775 MHz



Note: the max antenna gain is 3.0dBi and the margin is enough to pass the limit line.

12 Appendix A - EUT Test SetupPhotographs

Please refer to the attachemnt

13 Appenxid B – EUT External Photograph

Please refer to the attachemnt

14 Appendix C – EUT Internal Photographs

Please refer to the attachemnt

15 Appendix 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.

President and CEO
For the Accreditation Council
Certificate Number 3297.02
Valid to September 30, 2020

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

--- END OF REPORT ---