FCC PART 15.407

TEST REPORT

For

Mimosa Networks, Inc.

469 El Camino Real, Suite 100,

Santa Clara, CA 95050, USA

FCC ID: 2ABZJ-100-00085

Report Type:	**Product Type:**
Class II Permissive Change	Point to Point Wireless Device

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Report Number:	R18062717-407 CIIPC
Report Date:	2018-10-17
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R18062717-407 CIIPC	Original	2018-10-17

1 General Description

1.1 Product Description for Equipment under Test (EUT)

This test and measurement report was prepared on behalf of *Mimosa Networks*, and their product model: *C5x,* FCC ID: 2ABZJ-100-00085, or the "EUT" as referred to in this report. The product is a point to point/Point to multipoint wireless device.

1.2 Objective

This report is prepared on behalf of Mimosa Networks in accordance with FCC CFR47 §15.407.

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

This project is a Permissive Change II submission for the purpose of adding U-NII-2A and U-NII-2C band.

1.3 Related Submittal(s)/Grant(s)

None.

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

2.2 EUT Exercise Software

The test software used was Putty provided by *Mimosa Networks.* The software is compliant with the standard requirements being tested against.

EUT supports point-to-multipoint client mode and fixed point-to-point Master mode. The EUT supports 5 MHz channel spacing. Please refer to the following table for the test channel selection and corresponding power setting.

8 dBi Antenna:

Modulation	Band	Channel	Frequency (MHz)	Power Setting
802.11ac20 mode	U-NII-2A	Low	5260	18
		Middle	5280	18
		High	5310	18
	U-NII-2C	Low	5510	18
		Middle	5590	16
		High	5695	16
802.11ac40 mode	U-NII-2A	Low	5270	18
		Middle	5285	18
		High	5300	18
	U-NII-2C	Low	5520	17
		Middle	5580	15
		High	5685	15
802.11ac80 mode	U-NII-2C	Low	5540	17
		Middle	5560	15
		High	5665	15

25 dBi Antenna:

Modulation	Band	Channel	Frequency (MHz)	Power Setting
802.11ac20 mode	U-NII-2A	Low	5260	-6
		Middle	5280	-6
		High	5310	-6
	U-NII-2C	Low	5510	-6
		Middle	5590	-6
		High	5695	-6
802.11ac40 mode	U-NII-2A	Low	5270	-6
		Middle	5285	-6
		High	5300	-6
	U-NII-2C	Low	5520	-6
		Middle	5580	-6
		High	5685	-6
802.11ac80 mode	U-NII-2C	Low	5540	-6
		Middle	5560	-6
		High	5665	-6

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.

Antenna Port	Radio Mode	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
ANT 1	802.11ac20	2.5	2.6	96.15	0.17
	802.11ac40	1.192	1.283	92.91	0.32
	802.11ac80	0.595	0.635	93.70	0.28
ANT 2	802.11ac20	2.5	2.6	96.15	0.17
	802.11ac40	1.192	1.283	92.91	0.32
	802.11ac80	0.595	0.660	90.15	0.45

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

2.4 Equipment Modifications

There are two RF cables, one for each antenna port, coming out of the EUT to connect the antenna ports to the power spectrum analyzer.

2.5 Local Support Equipment

Manufacturer	Description	Model
Dell	Laptop	Latitude E6410

2.6 Support Equipment

Manufacturer	Description	Model
Lenovo	Laptop	P50s
Mimosa Networks	POE injector	G0566-500-120

2.7 Interface Ports and Cabling

Cable Description	Length (m)	To	From
Cat5e	~1	EUT	POE Injector
Cat5e	~1	POE Injector	Laptop

3 Summary of Test Results

FCC Rules	Description of Test	Result
FCC §2.1091, §15.407(f),	RF Exposure	Compliant
FCC §15.203	Antenna Requirement	Compliant
FCC §15.207	AC Power Line Conducted Emissions	Compliant
FCC §2.1053, §15.205, §15.209, 15.407(b)	Spurious Radiated Emissions	Compliant
FCC §15.407(e)	Emission Bandwidth	Compliant
FCC §407(a)	Output Power	Compliant
FCC §15.407(a)	Power Spectral Density	Compliant
FCC §15.407(h)	Dynamic Frequency Selection (DFS)	Compliant[1]

Note[1]: Pleaser refer to R18062717-DFS report

4 FCC §2.1091 & §15.407(f) - 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

4.2 MPE Prediction

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

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

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

4.3 MPE Results

8 dBi Antenna

5.3 GHz band:

Maximum average output power at antenna input terminal (dBm):	21.253
Maximum average output power at antenna input terminal (mW):	133.444
Prediction distance (cm):	20
Prediction frequency (MHz):	5270
Maximum Antenna Gain, typical (dBi):	8
Maximum Antenna Gain (numeric):	6.310
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.1675
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

5.6 GHz band:

Maximum average output power at antenna input terminal (dBm):	20.36
Maximum average output power at antenna input terminal (mW):	108.643
Prediction distance (cm):	20
Prediction frequency (MHz):	5510
Maximum Antenna Gain, typical (dBi):	8
Maximum Antenna Gain (numeric):	6.310
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.1364
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

25 dBi Antenna

5.3 GHz band:

Maximum average output power at antenna input terminal (dBm):	-13.345
Maximum average output power at antenna input terminal (mW):	0.0463
Prediction distance (cm):	20
Prediction frequency (MHz):	5260
Maximum Antenna Gain, typical (dBi):	25
Maximum Antenna Gain (numeric):	316.23
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.0029
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

5.6 GHz band:

Maximum average output power at antenna input terminal (dBm):	-9.677
Maximum average output power at antenna input terminal (mW):	0.108
Prediction distance (cm):	20
Prediction frequency (MHz):	5510
Maximum Antenna Gain, typical (dBi):	25
Maximum Antenna Gain (numeric):	316.23
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.0068
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	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.

5 FCC §15.203 - Antenna Requirements

5.1 Applicable Standards

According to FCC §15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

And according to FCC §15.247 (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.

5.2 Antenna List

The antennas used by the EUT are permanent attached antennas or of an antenna that uses a unique coupling to the intentional radiator.

Frequency Range (MHz)	External/Internal/Integral	Maximum Antenna Gain (dBi)	Antenna Tpye/Pattern
4900 - 5900	Integral	8	Panel
4900 - 5900	External (screw on)	25	Cassegrain

6 FCC §15.207 - AC Power Line Conducted Emissions

6.1 Applicable Standards

As per FCC §15.207

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

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

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

6.2 Test Setup

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

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

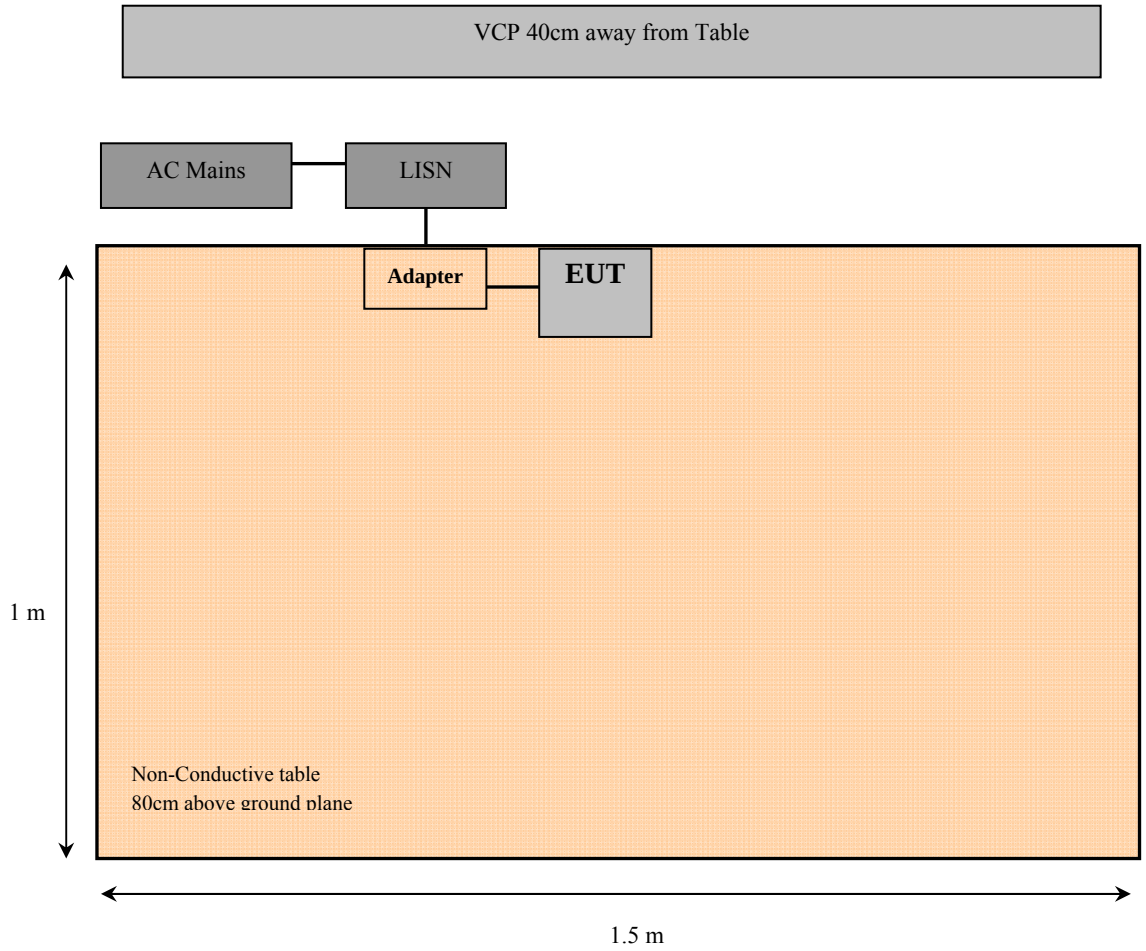
6.3 Test Procedure

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

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

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

6.4 Test Setup Block Diagram



6.5 Corrected Amplitude and Margin Calculation

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

CA = Ai + CL + Atten

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

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

Margin = Corrected Amplitude - Limit

6.6 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde and Schwarz	Receiver, EMI Test	ESCI 1166.5950K03	100338	2018-07-05	2 years
Rohde and Schwarz	Impulse Limiter	ESH3-Z2	101964	2018-07-27	1 year
Solar Electronics Company	High Pass Filter	Type 7930-100	7930150203	2018-02-28	1 year
Suirong	30 ft conductive emission cable	LMR 400	-	Note[1]	N/A
FCC	LISN	FCC-LISN-50-25-2-10-CISPR16	160129	2018-04-04	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".*

6.7 Test Environmental Conditions

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

The testing was performed by Frank Wang on 2018-10-05 in the Conducted Test Site.

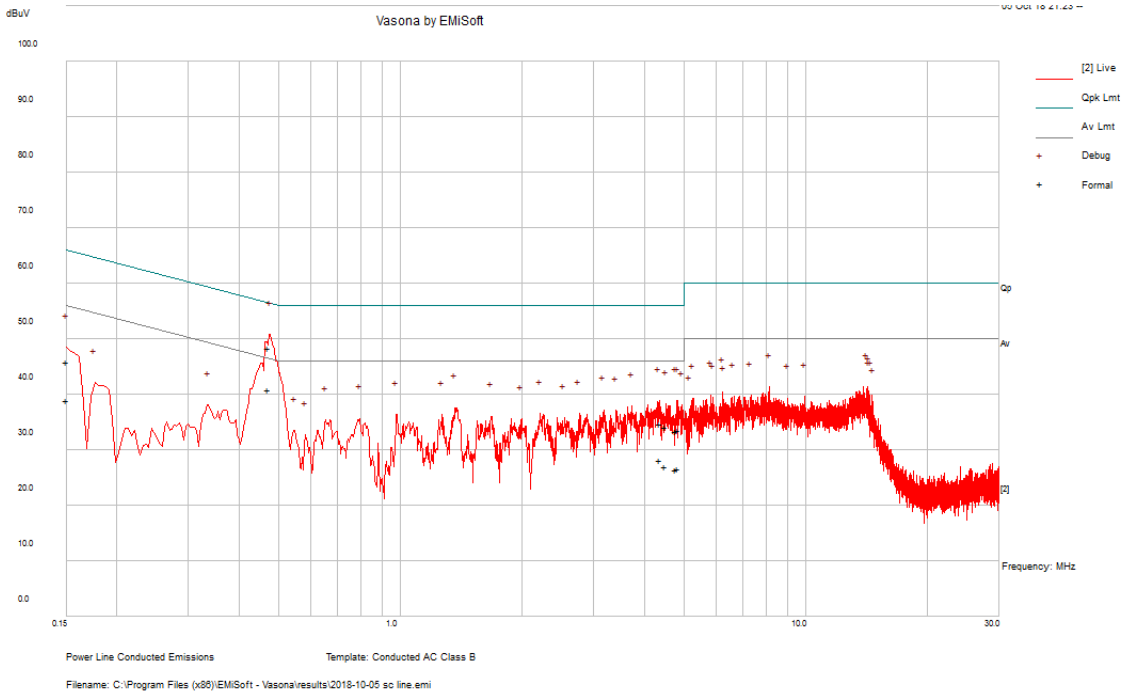
6.8 Summary of Test Results

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)**
-5.01	0.477339	Neutral	0.15-30

6.9 Conducted Emissions Test Plots and Data

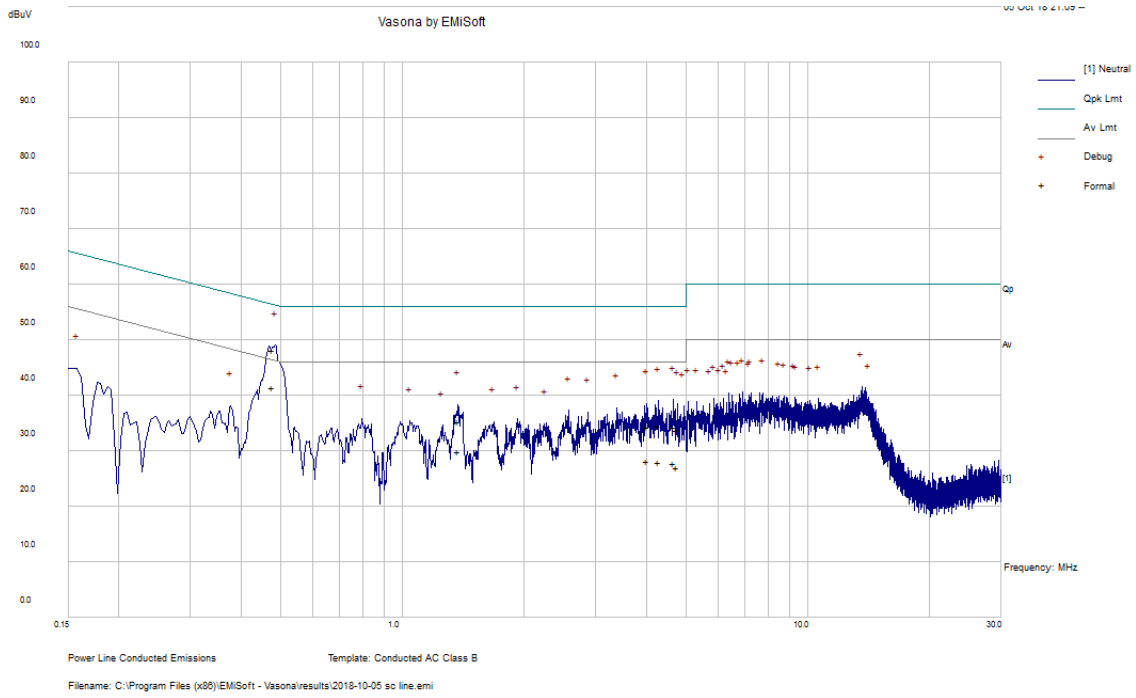
120 V, 60 Hz – Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.47353	48.38	Line	56.45	-8.07	QP
4.3601	34.68	Line	56	-21.32	QP
4.830759	33.57	Line	56	-22.43	QP
4.781618	33.48	Line	56	-22.52	QP
0.150267	45.91	Line	65.99	-20.07	QP
4.513731	34.18	Line	56	-21.82	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.47353	40.97	Line	46.45	-5.48	Ave.
4.3601	28.27	Line	46	-17.73	Ave.
4.830759	26.67	Line	46	-19.33	Ave.
4.781618	26.57	Line	46	-19.43	Ave.
0.150267	38.92	Line	55.99	-17.06	Ave.
4.513731	27.07	Line	46	-18.93	Ave.

120 V, 60 Hz – Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.477339	48.16	Neutral	56.39	-8.23	QP
4.658887	34.33	Neutral	56	-21.67	QP
4.286765	34.52	Neutral	56	-21.48	QP
4.004616	34.42	Neutral	56	-21.58	QP
4.759427	33.86	Neutral	56	-22.14	QP
1.369535	35.38	Neutral	56	-20.62	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.477339	41.38	Neutral	46.39	-5.01	Ave.
4.658887	27.9	Neutral	46	-18.1	Ave.
4.286765	28	Neutral	46	-18	Ave.
4.004616	28.3	Neutral	46	-17.7	Ave.
4.759427	27.1	Neutral	46	-18.9	Ave.
1.369535	29.98	Neutral	46	-16.02	Ave.

Note: testing was performed at worst case.

7 FCC §15.205, §15.209 &§15.407(b) - Spurious Radiated Emissions

7.1 Applicable Standard

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

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

As per FCC §15.209: The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table

Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100 Note 1	3
88 - 216	150 Note 1	3
216 - 960	200 Note 1	3
Above 960	500	3

Note 1: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

As per FCC Part 15.407 (b)

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

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

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

(4) 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.

(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.

(8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

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.

The spacing between the peripherals was 10 centimeters.

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

7.3 Test Procedure

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

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

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

The spectrum analyzer or receiver is set as:

Below 1000 MHz:

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

Above 1000 MHz:

(1) Peak: RBW = 1MHz / VBW = 3MHz / Sweep = 100ms
(2) Average: RBW = 1MHz / VBW = 10Hz or 1/T / 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 (+23.5 dB/m) + 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 & Schwarz	Receiver, EMI Test	ESCI 1166.5950K03	100337	2017-07-15	2 years
Agilent	Analyzer, Spectrum	E4446A	US44300386	2018-06-01	1 year
Sunol Sciences	System Controller	SC99V	011003-1	N/R	N/A
Sunol Sciences	Antenna, Biconi-Log	JB1	A013105-3	2018-02-26	2 years
Agilent	Amplifier, Pre	8447D	2944A10187	2018-04-02	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	2018-02-02	1 year
A.H. Systems	Pre-Amplifer	PAM 1840V	170	2018-09-10	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
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 Jin Yang from 2018-09-20 to 2018-10-03 in 5m chamber 3.

7.7 Summary of Test Results

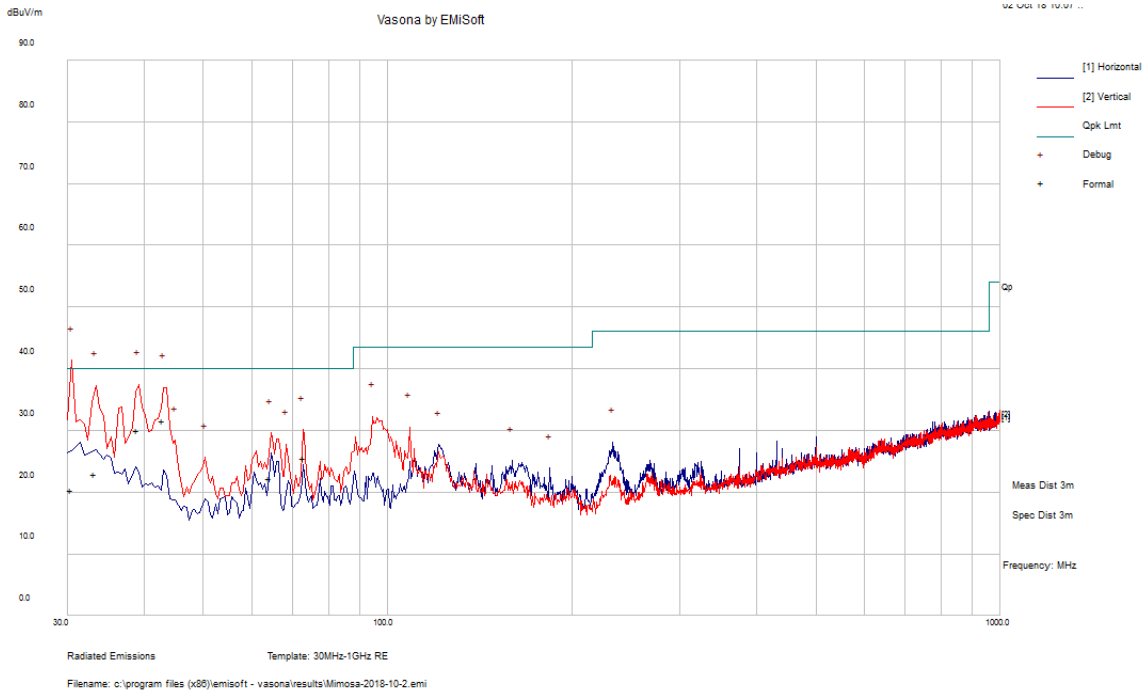
According to the data hereinafter, the EUT complied with the FCC Part 15.407 standards' radiated emissions limits, and had the worst margin of:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Mode, Channel**
-0.13	5350	Vertical	ac40 mode, 5300MHz

7.8 Radiated Emissions Test Result Data

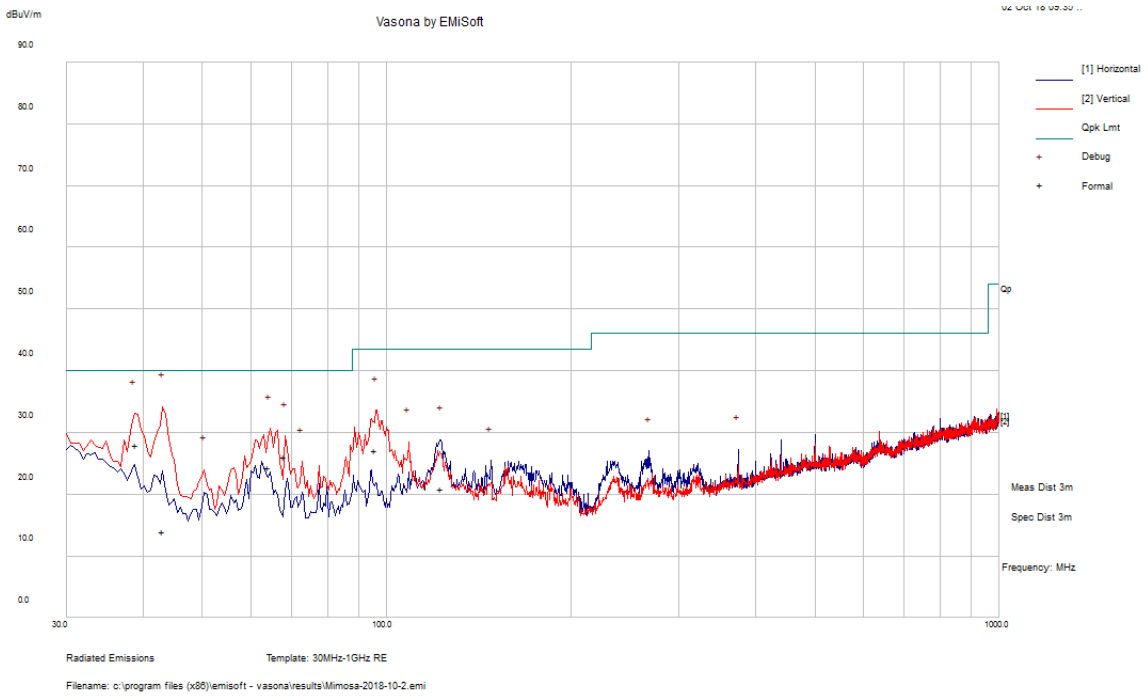
1) 30 MHz – 1 GHz

8 dBi Antenna



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.)
30.41025	20.41	283	V	120	40	-19.59	QP
38.97225	30.05	109	V	26	40	-9.95	QP
33.14925	22.88	100	V	319	40	-17.12	QP
42.936	31.62	118	V	82	40	-8.38	QP
72.9165	25.65	127	V	207	40	-14.35	QP
64.20725	22.25	201	V	36	40	-17.75	QP

25 dBi Antenna



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.)
43.1285	14.06	187	V	93	40	-25.94	QP
38.95825	27.94	100	V	3	40	-12.06	QP
64.19275	24.43	182	V	124	40	-15.57	QP
95.80175	27.06	105	V	295	43.5	-16.44	QP
68.217	26.15	211	V	89	40	-13.85	QP
122.7248	20.94	251	H	298	43.5	-22.56	QP

2) 1–40 GHz

U-NII-2A

8 dBi Antenna

802.11ac20 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5260 MHz ac20 mode											
5260	72.33	0	229	H	33.62	8.61	0.00	114.56	-	-	PK
5260	63.52	0	229	H	33.62	8.61	0.00	105.75	-	-	AV
5260	71.36	0	254	V	33.62	8.61	0.00	113.59	-	-	PK
5260	63.05	0	254	V	33.62	8.61	0.00	105.28	-	-	AV
10520	43.75	15	238	H	38.26	14.59	32.88	63.72	74.00	-10.28	PK
10520	31.55	15	238	H	38.26	14.59	32.88	51.52	54.00	-2.48	AV
Middle Channel 5280 MHz ac20 mode											
5280	72.09	0	230	H	33.78	8.61	0.00	114.48	-	-	PK
5280	63.43	0	230	H	33.78	8.61	0.00	105.82	-	-	AV
5280	71.09	0	248	V	33.78	8.61	0.00	113.48	-	-	PK
5280	62.86	0	248	V	33.78	8.61	0.00	105.25	-	-	AV
10560	43.79	16	236	H	38.29	14.64	32.88	63.84	74.00	-10.16	PK
10560	31.82	16	236	H	38.29	14.64	32.88	51.87	54.00	-2.13	AV
High Channel 5310 MHz ac20 mode											
5310	71.60	0	258	H	33.78	8.61	0.00	113.99	-	-	PK
5310	63.57	0	258	H	33.78	8.61	0.00	105.96	-	-	AV
5310	70.84	0	266	V	33.78	8.61	0.00	113.23	-	-	PK
5310	62.76	0	266	V	33.78	8.61	0.00	105.15	-	-	AV
5350	61.32	0	258	H	33.76	9.81	33.22	71.66	74.00	-2.34	PK
5350	41.38	0	258	H	33.76	9.81	33.22	51.72	54.00	-2.28	AV
5350	61.01	0	266	V	33.76	9.81	33.22	71.35	74.00	-2.65	PK
5350	40.72	0	266	V	33.76	9.81	33.22	51.06	54.00	-2.94	AV
10620	43.66	18	235	H	38.28	14.64	32.88	63.70	74.00	-10.30	PK
10620	31.53	18	235	H	38.28	14.64	32.88	51.57	54.00	-2.43	AV

802.11ac40 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5270 MHz ac40 mode											
5270	68.16	0	228	H	33.62	8.61	0.00	110.39	-	-	PK
5270	58.89	0	228	H	33.62	8.61	0.00	101.12	-	-	AV
5270	67.36	0	247	V	33.62	8.61	0.00	109.59	-	-	PK
5270	57.41	0	247	V	33.62	8.61	0.00	99.64	-	-	AV
10540	43.37	12	259	H	38.26	14.59	32.88	63.34	74.00	-10.66	PK
10540	31.45	12	259	H	38.26	14.59	32.88	51.42	54.00	-2.58	AV
Middle Channel 5285 MHz ac40 mode											
5285	70.55	0	232	H	33.62	8.61	0.00	112.78	-	-	PK
5285	64.42	0	232	H	33.62	8.61	0.00	106.65	-	-	AV
5285	69.67	0	251	V	33.62	8.61	0.00	111.90	-	-	PK
5285	63.29	0	251	V	33.62	8.61	0.00	105.52	-	-	AV
10570	42.69	10	255	H	38.26	14.59	32.88	62.66	74.00	-11.34	PK
10570	30.36	10	255	H	38.26	14.59	32.88	50.33	54.00	-3.67	AV
High Channel 5300 MHz ac40 mode											
5300	69.88	0	246	H	33.78	8.61	0.00	112.27	-	-	PK
5300	60.72	0	246	H	33.78	8.61	0.00	103.11	-	-	AV
5300	68.68	0	235	V	33.78	8.61	0.00	111.07	-	-	PK
5300	60.41	0	235	V	33.78	8.61	0.00	102.80	-	-	AV
5350	59.49	0	246	H	33.76	9.81	33.22	69.83	74.00	-4.17	PK
5350	40.66	0	246	H	33.76	9.81	33.22	51.00	54.00	-3.00	AV
5350	58.64	0	235	V	33.76	9.81	33.22	68.98	74.00	-5.02	PK
5350	40.12	0	235	V	33.76	9.81	33.22	50.46	54.00	-3.54	AV
10600	42.23	6	251	H	38.28	14.64	32.88	62.27	74.00	-11.73	PK
10600	30.09	6	251	H	38.28	14.64	32.88	50.13	54.00	-3.87	AV

25 dBi Antenna

802.11ac20 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5260 MHz ac20 mode											
5260	59.45	0	205	H	33.62	8.61	0.00	101.68	-	-	PK
5260	51.66	0	205	H	33.62	8.61	0.00	93.89	-	-	AV
5260	59.05	0	199	V	33.62	8.61	0.00	101.28	-	-	PK
5260	50.37	0	199	V	33.62	8.61	0.00	92.60	-	-	AV
10520	44.15	0	100	H	38.26	14.59	32.88	64.12	74.00	-9.88	PK
10520	31.79	0	100	H	38.26	14.59	32.88	51.76	54.00	-2.24	AV
Middle Channel 5280 MHz ac20 mode											
5280	59.71	0	201	H	33.78	8.61	0.00	102.10	-	-	PK
5280	51.34	0	201	H	33.78	8.61	0.00	93.73	-	-	AV
5280	59.51	0	200	V	33.78	8.61	0.00	101.90	-	-	PK
5280	50.22	0	200	V	33.78	8.61	0.00	92.61	-	-	AV
10560	44.37	0	100	H	38.29	14.64	32.88	64.42	74.00	-9.58	PK
10560	31.69	0	100	H	38.29	14.64	32.88	51.74	54.00	-2.26	AV
High Channel 5310 MHz ac20 mode											
5310	59.80	0	198	H	33.78	8.61	0.00	102.19	-	-	PK
5310	51.78	0	198	H	33.78	8.61	0.00	94.17	-	-	AV
5310	59.82	0	197	V	33.78	8.61	0.00	102.21	-	-	PK
5310	50.48	0	197	V	33.78	8.61	0.00	92.87	-	-	AV
5350	53.23	0	188	H	33.76	9.81	33.22	63.57	74.00	-10.43	PK
5350	43.20	0	188	H	33.76	9.81	33.22	53.54	54.00	-0.46	AV
5350	54.41	0	194	V	33.76	9.81	33.22	64.75	74.00	-9.25	PK
5350	43.22	0	194	V	33.76	9.81	33.22	53.56	54.00	-0.44	AV
10620	44.26	0	100	H	38.28	14.64	32.88	64.30	74.00	-9.70	PK
10620	31.30	0	100	H	38.28	14.64	32.88	51.34	54.00	-2.66	AV

802.11ac40 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5270 MHz ac40 mode											
5270	56.83	0	198	H	33.62	8.61	0.00	99.06	-	-	PK
5270	48.61	0	198	H	33.62	8.61	0.00	90.84	-	-	AV
5270	56.55	0	197	V	33.62	8.61	0.00	98.78	-	-	PK
5270	47.12	0	197	V	33.62	8.61	0.00	89.35	-	-	AV
10540	44.36	0	100	H	38.26	14.59	32.88	64.33	74.00	-9.67	PK
10540	32.05	0	100	H	38.26	14.59	32.88	52.02	54.00	-1.98	AV
Middle Channel 5285 MHz ac40 mode											
5285	68.35	0	200	H	33.62	8.61	0.00	110.58	-	-	PK
5285	59.87	0	200	H	33.62	8.61	0.00	102.10	-	-	AV
5285	68.15	0	200	V	33.62	8.61	0.00	110.38	-	-	PK
5285	59.36	0	200	V	33.62	8.61	0.00	101.59	-	-	AV
10570	43.65	0	100	H	38.26	14.59	32.88	63.62	74.00	-10.38	PK
10570	31.97	0	100	H	38.26	14.59	32.88	51.94	54.00	-2.06	AV
High Channel 5300 MHz ac40 mode											
5300	68.60	0	198	H	33.78	8.61	0.00	110.99	-	-	PK
5300	60.00	0	198	H	33.78	8.61	0.00	102.39	-	-	AV
5300	68.62	0	197	V	33.78	8.61	0.00	111.01	-	-	PK
5300	60.04	0	197	V	33.78	8.61	0.00	102.43	-	-	AV
5350	54.34	0	195	H	33.76	9.81	33.22	64.68	74.00	-9.32	PK
5350	43.29	0	195	H	33.76	9.81	33.22	53.63	54.00	-0.37	AV
5350	54.85	0	195	V	33.76	9.81	33.22	65.19	74.00	-8.81	PK
5350	43.53	0	195	V	33.76	9.81	33.22	53.87	54.00	-0.13	AV
10600	43.44	0	100	H	38.28	14.64	32.88	63.48	74.00	-10.52	PK
10600	31.61	0	100	H	38.28	14.64	32.88	51.65	54.00	-2.35	AV

U-NII-2C

8 dBi Antenna

802.11ac20 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5510 MHz ac20 mode											
5510	72.76	0	220	H	34.06	8.80	0.00	115.62	-	-	PK
5510	64.10	0	220	H	34.06	8.80	0.00	106.96	-	-	AV
5510	72.16	0	225	V	34.06	8.80	0.00	115.02	-	-	PK
5510	63.24	0	225	V	34.06	8.80	0.00	106.10	-	-	AV
5470	56.03	0	220	H	33.78	9.99	33.22	66.58	74.00	-7.42	PK
5470	42.66	0	220	H	33.78	9.99	33.22	53.21	54.00	-0.79	AV
5470	57.83	0	225	V	33.78	9.99	33.22	68.38	74.00	-5.62	PK
5470	42.29	0	225	V	33.78	9.99	33.22	52.84	54.00	-1.16	AV
11020	45.46	0	100	H	38.45	15.24	32.79	66.36	74.00	-7.64	PK
11020	32.23	0	100	H	38.45	15.24	32.79	53.13	54.00	-0.87	AV
Middle Channel 5590 MHz ac20 mode											
5590	70.89	0	216	H	34.08	8.91	0.00	113.88	-	-	PK
5590	62.56	0	216	H	34.08	8.91	0.00	105.55	-	-	AV
5590	69.77	0	228	V	34.08	8.91	0.00	112.76	-	-	PK
5590	61.35	0	228	V	34.08	8.91	0.00	104.34	-	-	AV
11180	45.23	0	100	H	38.49	15.64	32.79	66.57	74.00	-7.43	PK
11180	32.05	0	100	H	38.49	15.64	32.79	53.39	54.00	-0.61	AV
High Channel 5695 MHz ac20 mode											
5695	70.75	0	214	H	34.02	9.00	0.00	113.77	-	-	PK
5695	62.40	0	214	H	34.02	9.00	0.00	105.42	-	-	AV
5695	69.68	0	226	V	34.02	9.00	0.00	112.70	-	-	PK
5695	61.03	0	226	V	34.02	9.00	0.00	104.05	-	-	AV
5725	56.78	0	214	H	34.07	10.22	33.22	67.85	68.26	-0.41	PK
5725	56.01	0	226	V	34.07	10.22	33.22	67.08	68.26	-1.18	PK
11390	45.46	0	100	H	38.41	15.79	32.75	66.91	74.00	-7.09	PK
11390	32.23	0	100	H	38.41	15.79	32.75	53.68	54.00	-0.32	AV

802.11ac40 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5520 MHz ac40 mode											
5520	69.42	0	231	H	34.06	8.80	0.00	112.28	-	-	PK
5520	60.88	0	231	H	34.06	8.80	0.00	103.74	-	-	AV
5520	68.74	0	239	V	34.06	8.80	0.00	111.60	-	-	PK
5520	59.69	0	239	V	34.06	8.80	0.00	102.55	-	-	AV
5470	55.68	0	231	H	33.78	9.99	33.22	66.23	74.00	-7.77	PK
5470	41.87	0	231	H	33.78	9.99	33.22	52.42	54.00	-1.58	AV
5470	56.89	0	239	V	33.78	9.99	33.22	67.44	74.00	-6.56	PK
5470	41.65	0	239	V	33.78	9.99	33.22	52.20	54.00	-1.80	AV
11040	44.33	0	100	H	38.45	15.24	32.79	65.23	74.00	-8.77	PK
11040	31.97	0	100	H	38.45	15.24	32.79	52.87	54.00	-1.13	AV
Mid Channel 5580 MHz ac40 mode											
5580	67.53	0	218	H	33.62	8.61	0.00	109.76	-	-	PK
5580	59.01	0	218	H	33.62	8.61	0.00	101.24	-	-	AV
5580	67.15	0	225	V	33.62	8.61	0.00	109.38	-	-	PK
5580	58.22	0	225	V	33.62	8.61	0.00	100.45	-	-	AV
11160	44.57	0	100	H	38.26	14.59	32.88	64.54	74.00	-9.46	PK
11160	31.89	0	100	H	38.26	14.59	32.88	51.86	54.00	-2.14	AV
High Channel 5685 MHz ac40 mode											
5685	67.38	0	214	H	34.02	9.00	0.00	110.40	-	-	PK
5685	58.90	0	214	H	34.02	9.00	0.00	101.92	-	-	AV
5685	66.89	0	222	V	34.02	9.00	0.00	109.91	-	-	PK
5685	57.83	0	222	V	34.02	9.00	0.00	100.85	-	-	AV
5725	55.41	0	214	H	34.07	10.22	33.22	66.48	68.26	-1.78	PK
5725	55.02	0	222	V	34.07	10.22	33.22	66.09	68.26	-2.17	PK
11390	44.76	0	100	H	38.41	15.79	32.75	66.21	74.00	-7.79	PK
11390	32.02	0	100	H	38.41	15.79	32.75	53.47	54.00	-0.53	AV

802.11ac80 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5540 MHz ac80 mode											
5540	66.96	0	224	H	34.06	8.80	0.00	109.82	-	-	PK
5540	58.23	0	224	H	34.06	8.80	0.00	101.09	-	-	AV
5540	66.20	0	236	V	34.06	8.80	0.00	109.06	-	-	PK
5540	57.35	0	236	V	34.06	8.80	0.00	100.21	-	-	AV
5470	56.16	0	224	H	33.78	9.99	33.22	66.71	74.00	-7.29	PK
5470	42.31	0	224	H	33.78	9.99	33.22	52.86	54.00	-1.14	AV
5470	55.41	0	236	V	33.78	9.99	33.22	65.96	74.00	-8.04	PK
5470	41.66	0	236	V	33.78	9.99	33.22	52.21	54.00	-1.79	AV
11080	43.56	0	100	H	38.45	15.24	32.79	64.46	74.00	-9.54	PK
11080	32.18	0	100	H	38.45	15.24	32.79	53.08	54.00	-0.92	AV
Middle Channel 5560 MHz ac80 mode											
5560	64.70	0	215	H	33.62	8.61	0.00	106.93	-	-	PK
5560	56.33	0	215	H	33.62	8.61	0.00	98.56	-	-	AV
5560	63.98	0	223	V	33.62	8.61	0.00	106.21	-	-	PK
5560	54.79	0	223	V	33.62	8.61	0.00	97.02	-	-	AV
11120	43.22	0	100	H	38.26	14.59	32.88	63.19	74.00	-10.81	PK
11120	31.74	0	100	H	38.26	14.59	32.88	51.71	54.00	-2.29	AV
High Channel 5665 MHz ac80 mode											
5665	64.79	0	221	H	34.02	9.00	0.00	107.81	-	-	PK
5665	56.02	0	221	H	34.02	9.00	0.00	99.04	-	-	AV
5665	64.15	0	225	V	34.02	9.00	0.00	107.17	-	-	PK
5665	55.39	0	225	V	34.02	9.00	0.00	98.41	-	-	AV
5725	56.46	0	221	H	34.07	10.22	33.22	67.53	68.26	-0.73	PK
5725	55.75	0	225	V	34.07	10.22	33.22	66.82	68.26	-1.44	PK
11330	43.12	0	100	H	38.41	15.79	32.75	64.57	74.00	-9.43	PK
11330	31.66	0	100	H	38.41	15.79	32.75	53.11	54.00	-0.89	AV

25 dBi Antenna

802.11ac20 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5510 MHz ac20 mode											
5510	58.81	0	201	H	34.06	8.80	0.00	101.67	-	-	PK
5510	50.69	0	201	H	34.06	8.80	0.00	93.55	-	-	AV
5510	58.64	0	200	V	34.06	8.80	0.00	101.50	-	-	PK
5510	50.12	0	200	V	34.06	8.80	0.00	92.98	-	-	AV
5470	50.43	0	198	H	33.78	9.99	33.22	60.98	74.00	-13.02	PK
5470	36.65	0	198	H	33.78	9.99	33.22	47.20	54.00	-6.80	AV
5470	49.65	0	191	V	33.78	9.99	33.22	60.20	74.00	-13.80	PK
5470	35.95	0	191	V	33.78	9.99	33.22	46.50	54.00	-7.50	AV
11020	44.32	0	100	H	38.45	15.24	32.79	65.22	74.00	-8.78	PK
11020	31.97	0	100	H	38.45	15.24	32.79	52.87	54.00	-1.13	AV
Middle Channel 5590 MHz ac20 mode											
5590	58.64	0	200	H	34.08	8.91	0.00	101.63	-	-	PK
5590	50.33	0	200	H	34.08	8.91	0.00	93.32	-	-	AV
5590	58.12	0	200	V	34.08	8.91	0.00	101.11	-	-	PK
5590	49.97	0	200	V	34.08	8.91	0.00	92.96	-	-	AV
11180	44.21	0	100	H	38.49	15.64	32.79	65.55	74.00	-8.45	PK
11180	31.87	0	100	H	38.49	15.64	32.79	53.21	54.00	-0.79	AV
High Channel 5695 MHz ac20 mode											
5695	66.13	0	199	H	34.02	9.00	0.00	109.15	-	-	PK
5695	57.45	0	199	H	34.02	9.00	0.00	100.47	-	-	AV
5695	65.75	0	200	V	34.02	9.00	0.00	108.77	-	-	PK
5695	57.03	0	200	V	34.02	9.00	0.00	100.05	-	-	AV
5725	55.83	0	195	H	34.07	10.22	33.22	66.90	68.26	-1.36	PK
5725	55.81	0	193	V	34.07	10.22	33.22	66.88	68.26	-1.38	PK
11390	44.06	0	100	H	38.41	15.79	32.75	65.51	74.00	-8.49	PK
11390	32.11	0	100	H	38.41	15.79	32.75	53.56	54.00	-0.44	AV

802.11ac40 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5520 MHz ac40 mode											
5520	59.28	0	202	H	34.06	8.80	0.00	102.14	-	-	PK
5520	50.31	0	202	H	34.06	8.80	0.00	93.17	-	-	AV
5520	59.03	0	221	V	34.06	8.80	0.00	101.89	-	-	PK
5520	49.92	0	221	V	34.06	8.80	0.00	92.78	-	-	AV
5470	49.33	0	199	H	33.78	9.99	35.40	57.70	74.00	-16.30	PK
5470	36.88	0	199	H	33.78	9.99	35.40	45.25	54.00	-8.75	AV
5470	49.21	0	192	V	33.78	9.99	35.40	57.58	74.00	-16.42	PK
5470	36.43	0	192	V	33.78	9.99	35.40	44.80	54.00	-9.20	AV
11040	42.19	0	100	H	38.45	15.24	34.67	61.21	74.00	-12.79	PK
11040	32.11	0	100	H	38.45	15.24	34.67	51.13	54.00	-2.87	AV
Mid Channel 5580 MHz ac40 mode											
5580	59.16	0	208	H	33.62	8.61	0.00	101.39	-	-	PK
5580	49.88	0	208	H	33.62	8.61	0.00	92.11	-	-	AV
5580	58.52	0	216	V	33.62	8.61	0.00	100.75	-	-	PK
5580	49.28	0	216	V	33.62	8.61	0.00	91.51	-	-	AV
11160	42.41	0	100	H	38.26	14.59	34.36	60.90	74.00	-13.10	PK
11160	32.22	0	100	H	38.26	14.59	34.36	50.71	54.00	-3.29	AV
High Channel 5685 MHz ac40 mode											
5685	59.34	0	215	H	34.02	9.00	0.00	102.36	-	-	PK
5685	50.13	0	215	H	34.02	9.00	0.00	93.15	-	-	AV
5685	58.69	0	203	V	34.02	9.00	0.00	101.71	-	-	PK
5685	49.84	0	203	V	34.02	9.00	0.00	92.86	-	-	AV
5725	58.55	0	192	H	34.07	10.22	35.41	67.43	68.26	-0.83	PK
5725	58.34	0	192	V	34.07	10.22	35.41	67.22	68.26	-1.04	PK
11390	42.40	0	100	H	38.41	15.79	34.30	62.30	74.00	-11.70	PK
11390	32.26	0	100	H	38.41	15.79	34.30	52.16	54.00	-1.84	AV

802.11ac80 mode

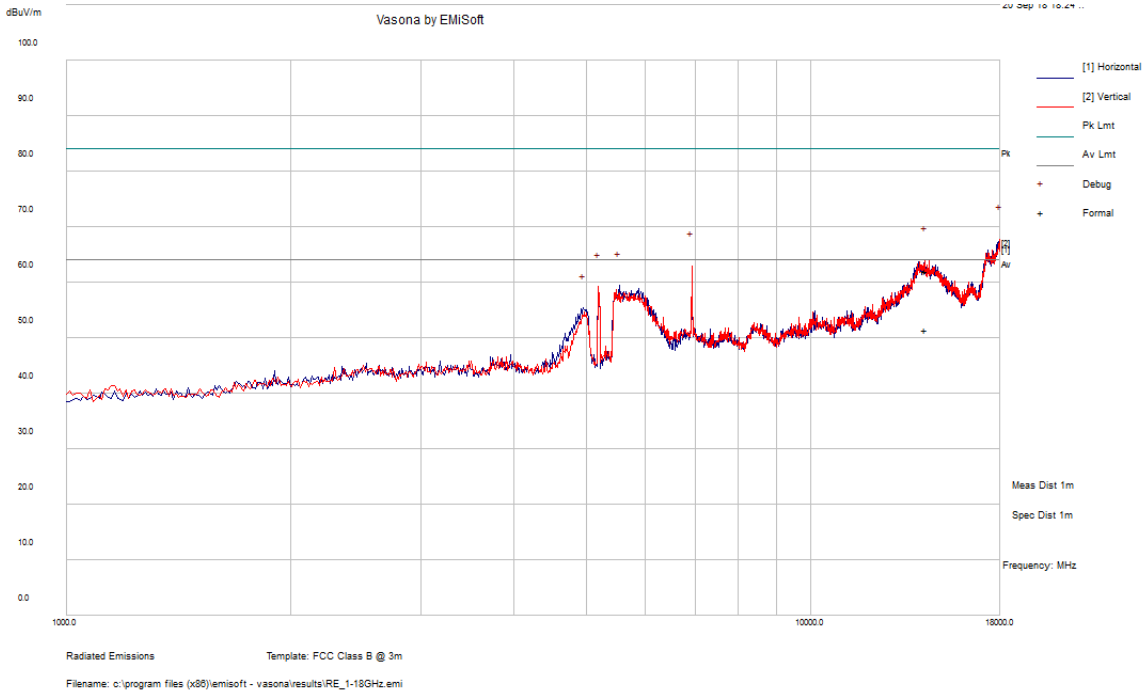
Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5540 MHz ac80 mode											
5540	56.64	0	206	H	34.06	8.80	0.00	99.50	-	-	PK
5540	47.42	0	206	H	34.06	8.80	0.00	90.28	-	-	AV
5540	56.51	0	217	V	34.06	8.80	0.00	99.37	-	-	PK
5540	47.66	0	217	V	34.06	8.80	0.00	90.52	-	-	AV
5470	49.46	0	198	H	33.78	9.99	35.40	57.83	74.00	-16.17	PK
5470	37.83	0	198	H	33.78	9.99	35.40	46.20	54.00	-7.80	AV
5470	49.32	0	195	V	33.78	9.99	35.40	57.69	74.00	-16.31	PK
5470	37.66	0	195	V	33.78	9.99	35.40	46.03	54.00	-7.97	AV
11080	42.35	0	100	H	38.45	15.24	34.67	61.37	74.00	-12.63	PK
11080	32.43	0	100	H	38.45	15.24	34.67	51.45	54.00	-2.55	AV
Middle Channel 5560 MHz ac80 mode											
5560	56.83	0	210	H	33.62	8.61	0.00	99.06	-	-	PK
5560	47.76	0	210	H	33.62	8.61	0.00	89.99	-	-	AV
5560	56.54	0	211	V	33.62	8.61	0.00	98.77	-	-	PK
5560	47.51	0	211	V	33.62	8.61	0.00	89.74	-	-	AV
11120	42.21	0	100	H	38.26	14.59	34.52	60.54	74.00	-13.46	PK
11120	32.28	0	100	H	38.26	14.59	34.52	50.61	54.00	-3.39	AV
High Channel 5665 MHz ac80 mode											
5665	56.80	0	218	H	34.02	9.00	0.00	99.82	-	-	PK
5665	47.62	0	218	H	34.02	9.00	0.00	90.64	-	-	AV
5665	56.15	0	205	V	34.02	9.00	0.00	99.17	-	-	PK
5665	47.45	0	205	V	34.02	9.00	0.00	90.47	-	-	AV
5725	59.02	0	195	H	34.07	10.22	35.41	67.90	68.26	-0.36	PK
5725	58.78	0	195	V	34.07	10.22	35.41	67.66	68.26	-0.60	PK
11330	42.16	0	100	H	38.41	15.79	34.30	62.06	74.00	-11.94	PK
11330	32.19	0	100	H	38.41	15.79	34.30	52.09	54.00	-1.91	AV

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

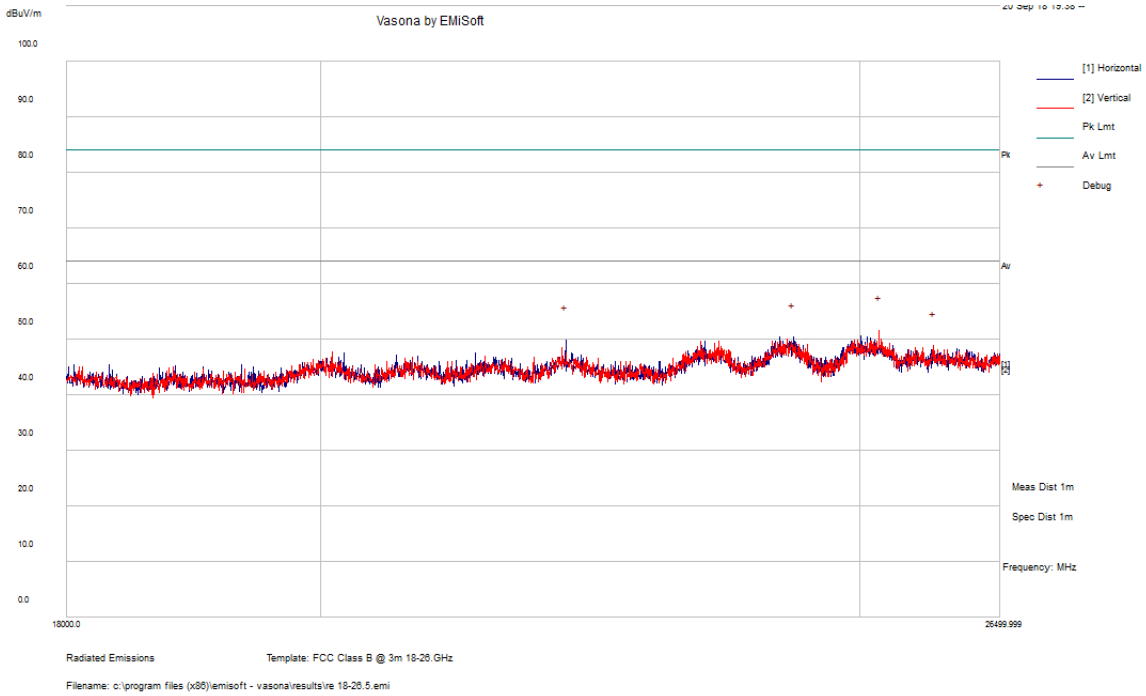
The worst case scan plots have been listed below.

8 dBi Antenna

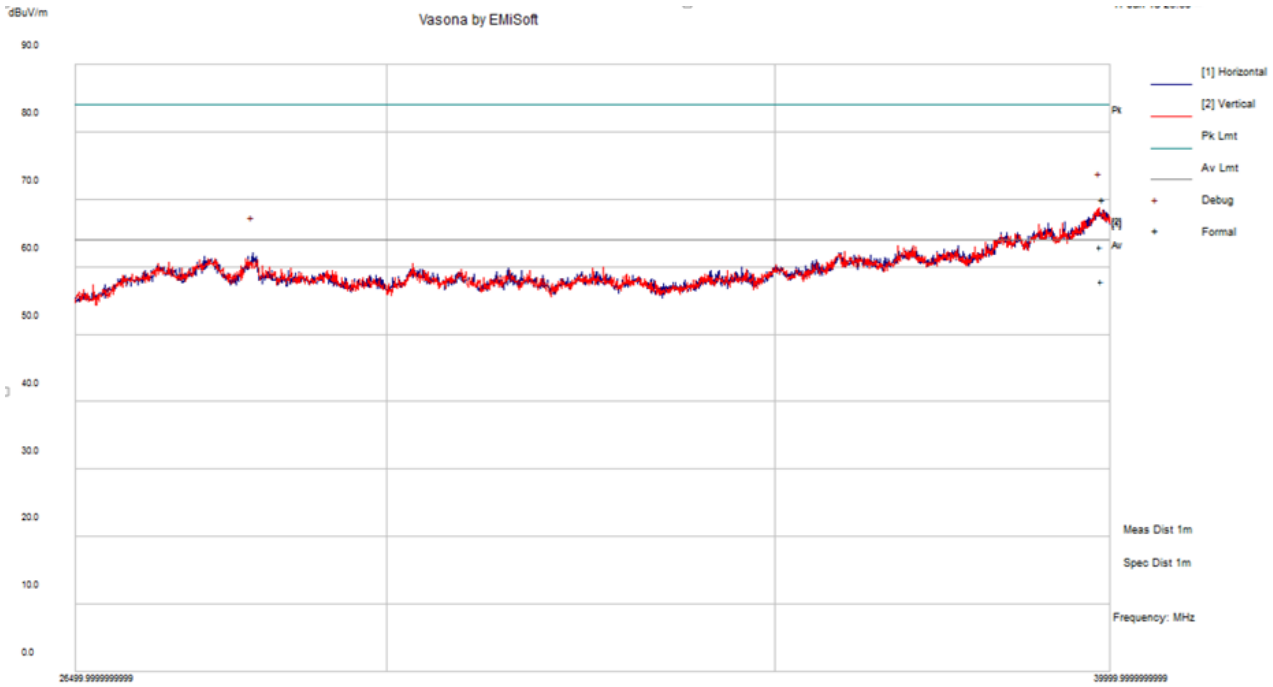
1 GHz – 18 GHz



18 GHz – 26.5 GHz

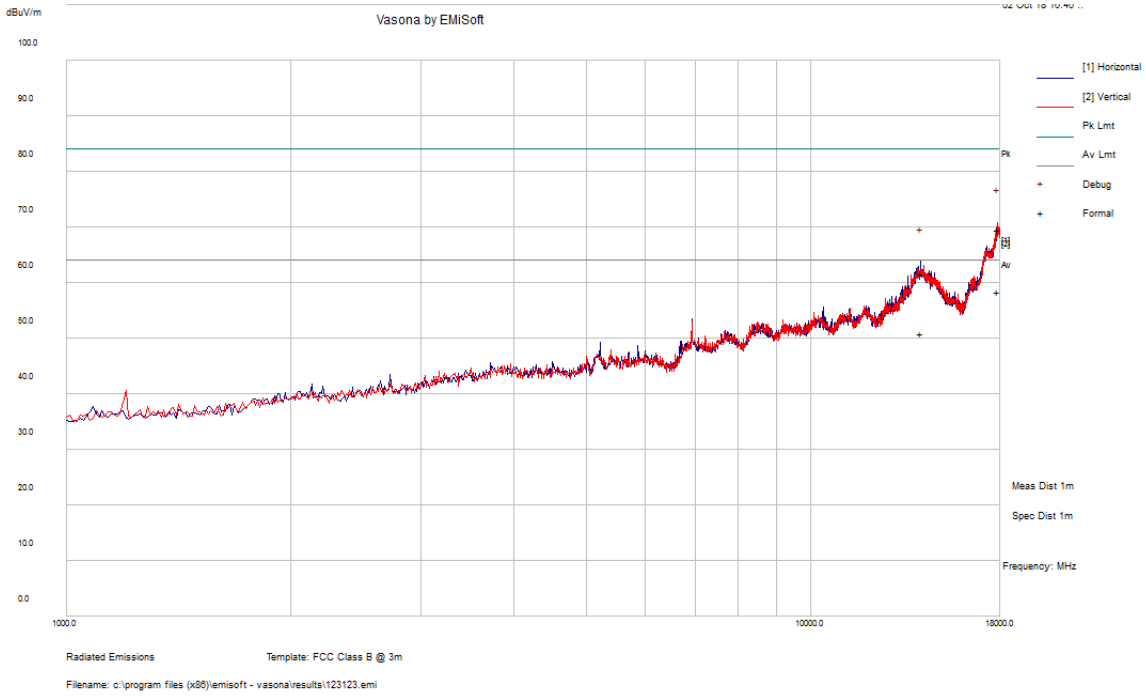


26.5 GHz – 40 GHz

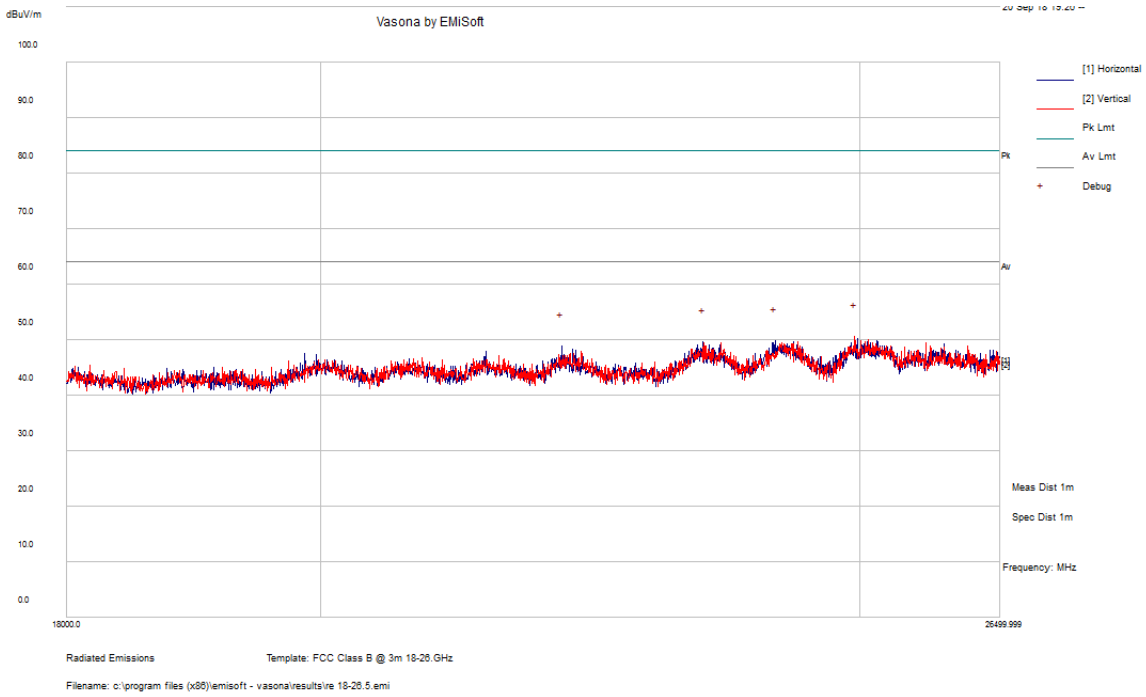


25 dBi Antenna

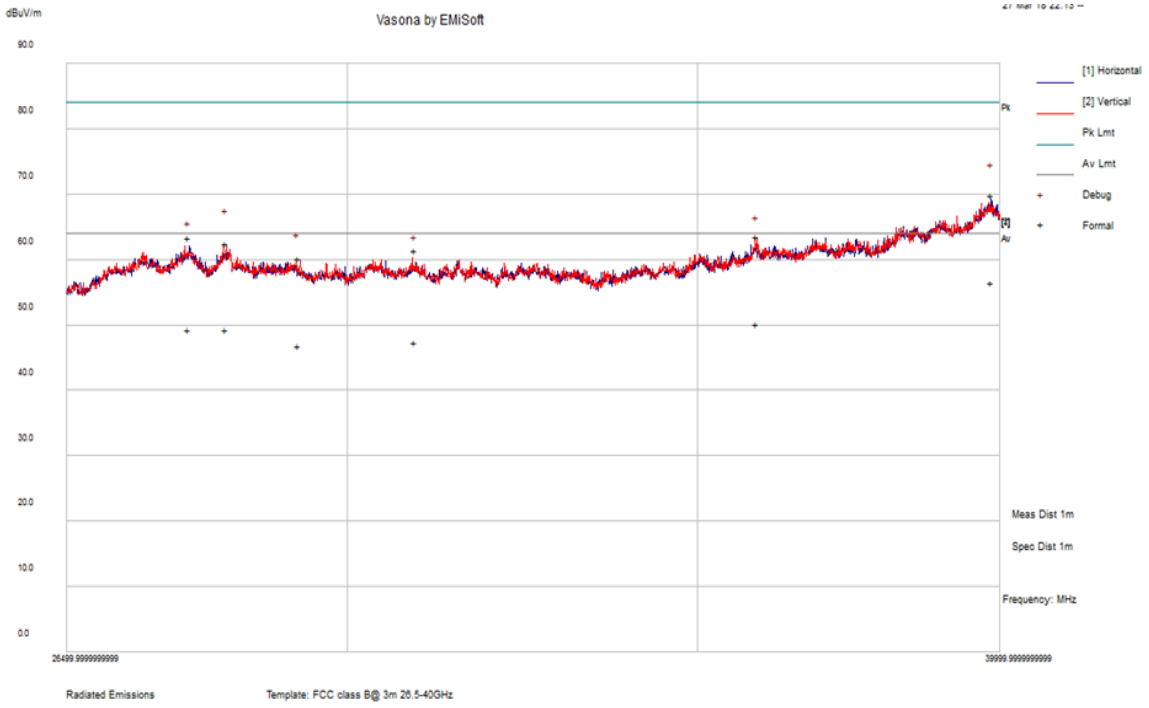
1 GHz – 18 GHz



18 GHz – 26.5 GHz



26.5 GHz – 40 GHz



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

8.1 Applicable Standards

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

8.2 Measurement Procedure

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

8.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4446A	MY48250238	2018-05-08	1 year
-	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 Vincent Licata on 2018-09-13 and Chin Ming Lui on 2018-10-04 at RF site.

8.5 Test Results

Please refer to the following tables and plots.

U-NII-2A

Antenna Port	Channel	Frequency (MHz)	99% OBW (kHz)	26 dB OBW (kHz)
802.11ac20 mode				
ANT 1	Low	5260	17957.0	23591
	Middle	5280	17952.3	23831
	High	5310	17690.6	23845
ANT 2	Low	5260	17825.3	23852
	Middle	5280	17808.2	23122
	High	5310	17808.3	23316
802.11ac40 mode				
ANT 1	Low	5270	36473.0	42610
	Middle	5285	36451.5	42516
	High	5300	36443.8	42520
ANT 2	Low	5270	36279.6	41743
	Middle	5285	36266.5	41715
	High	5300	36265.5	41684

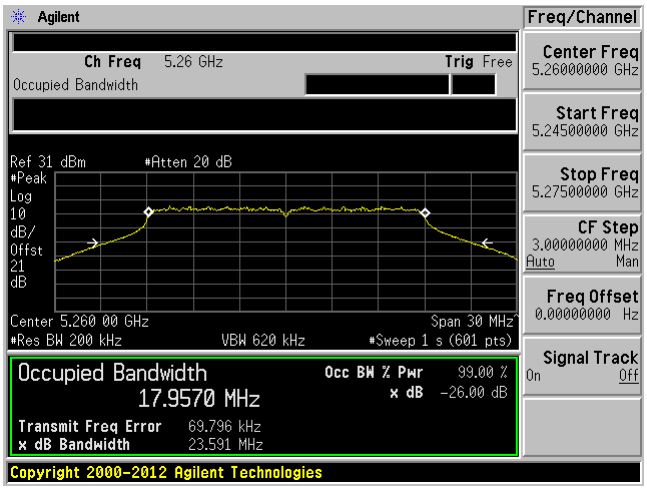
U-NII-2C

Antenna Port	Channel	Frequency (MHz)	99% OBW (kHz)	26 dB OBW (kHz)
802.11ac20 mode				
ANT 1	Low	5510	17952.6	23820
	Middle	5590	17951.8	23753
	High	5695	17955.8	23792
ANT 2	Low	5510	17801.4	23370
	Middle	5590	17814.5	23520
	High	5695	17801.7	23389
802.11ac40 mode				
ANT 1	Low	5520	36458.5	42575
	Middle	5580	36458.2	42607
	High	5685	36451.9	42542
ANT 2	Low	5520	36266.9	41783
	Middle	5580	36259.1	41696
	High	5685	36282.7	41772
802.11ac80 mode				
ANT 1	Low	5540	75325.7	83949
	Middle	5560	75313.4	83947
	High	5665	75300.3	83806
ANT 2	Low	5540	75293.8	82586
	Middle	5560	75286.2	82324
	High	5665	75296.0	82572

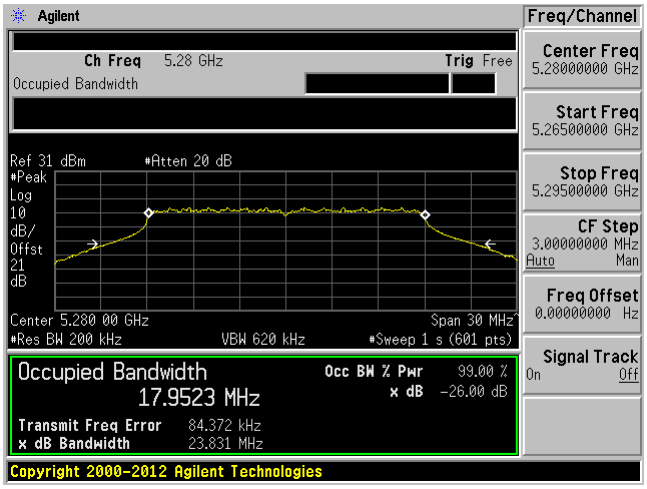
U-NII-2A

Antenna Port 1-802.11ac20 mode

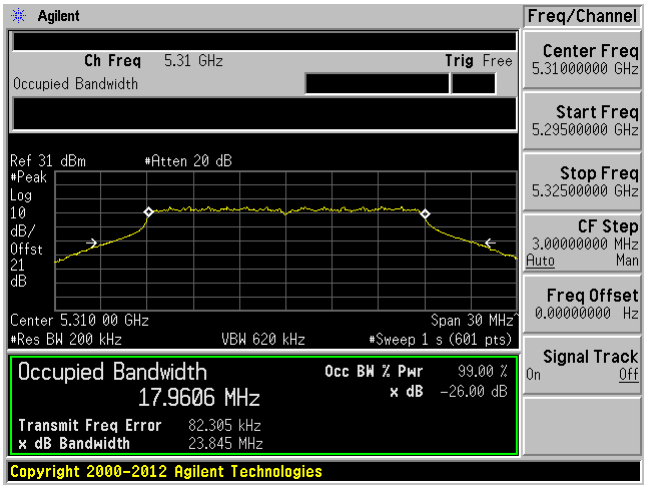
5260 MHz



5280 MHz

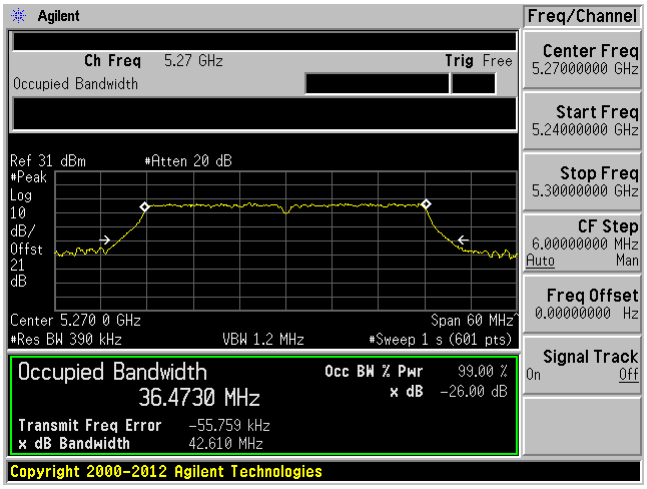


5310 MHz

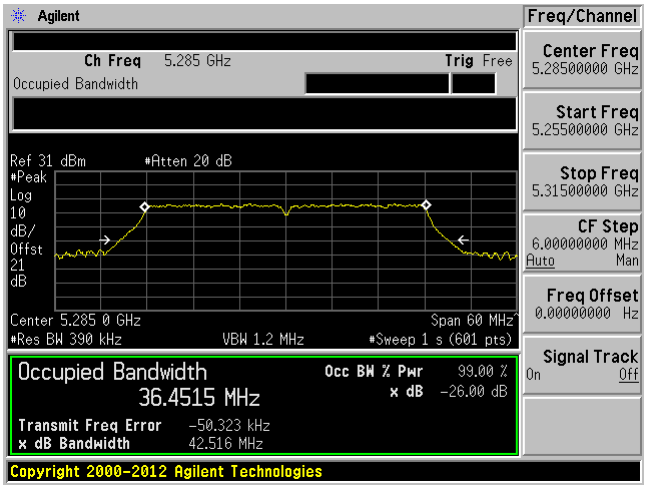


Antenna Port 1-802.11ac40 mode

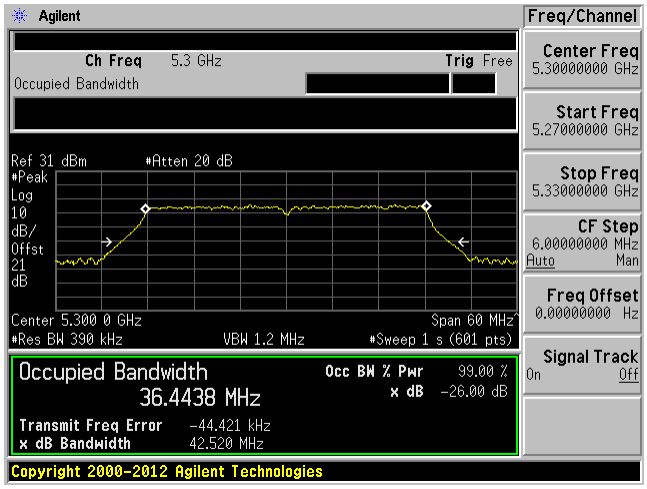
5270 MHz



5285 MHz

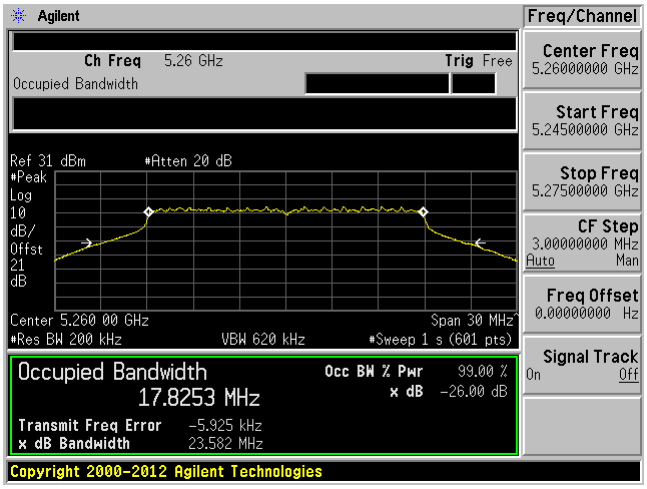


5300 MHz

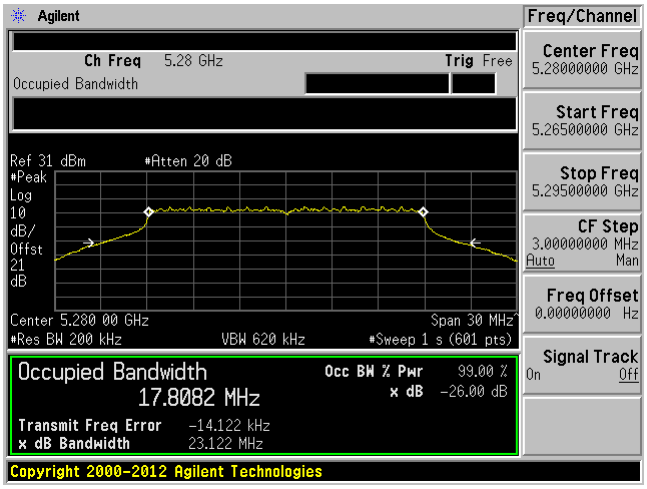


Antenna Port 2-802.11ac20 mode

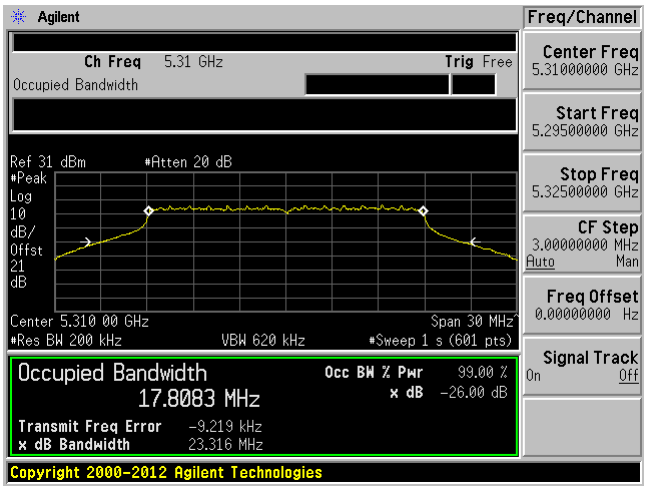
5260 MHz



5280 MHz

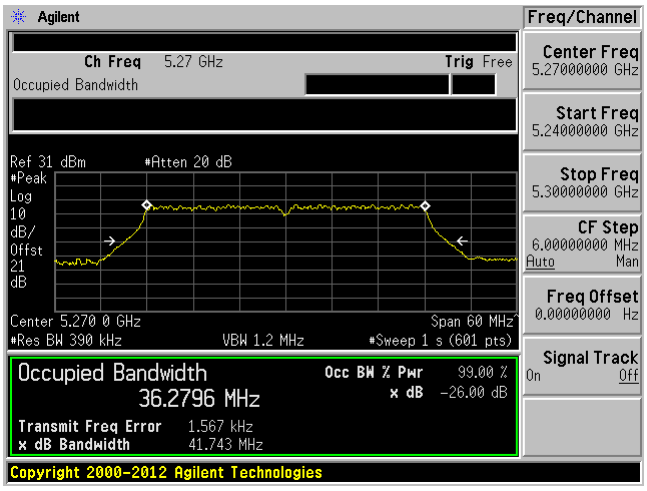


5310 MHz

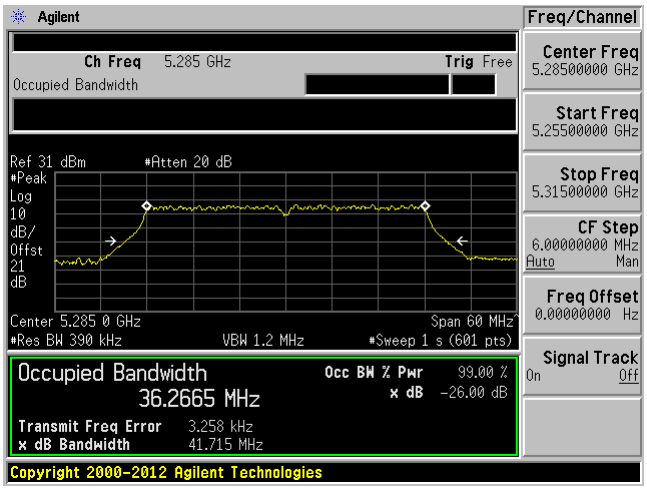


Antenna Port 2-802.11ac40 mode

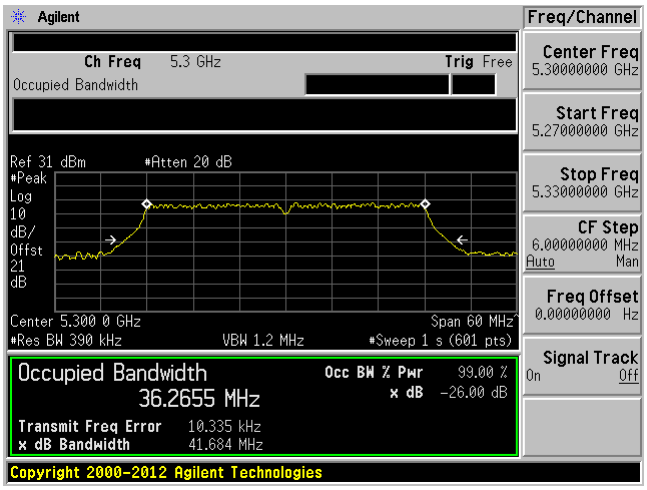
5270 MHz



5285 MHz



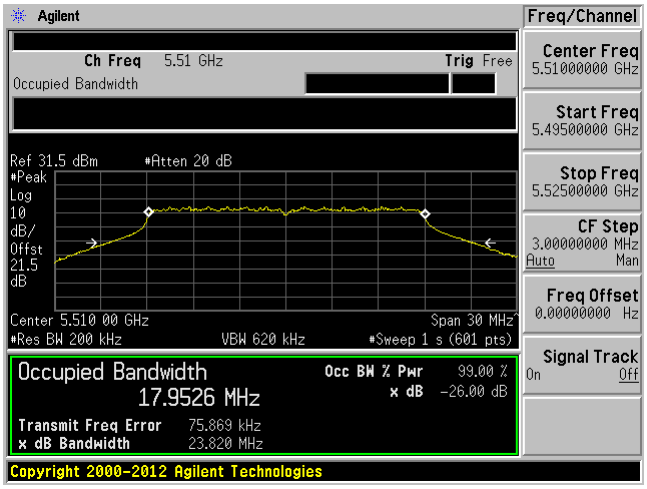
5300 MHz



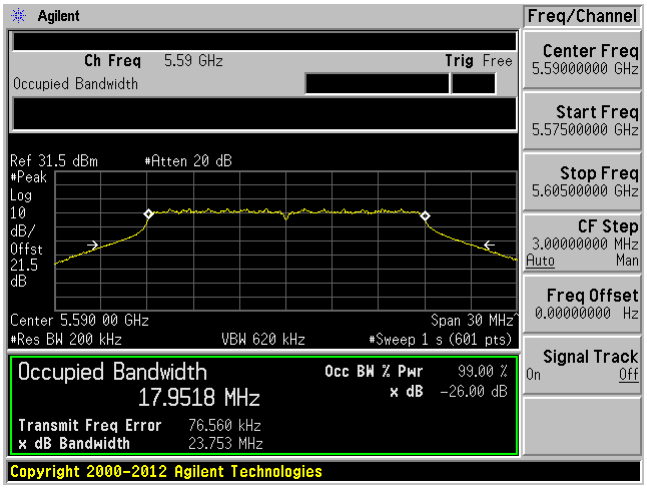
U-NII-2C

Antenna Port 1-802.11ac20 mode

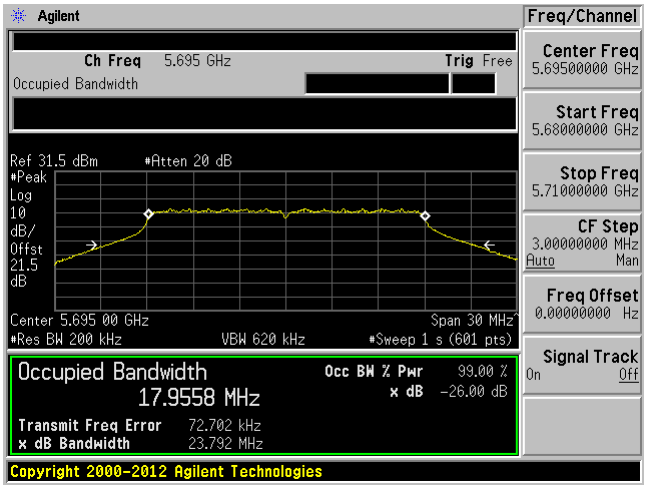
5510 MHz



5590 MHz

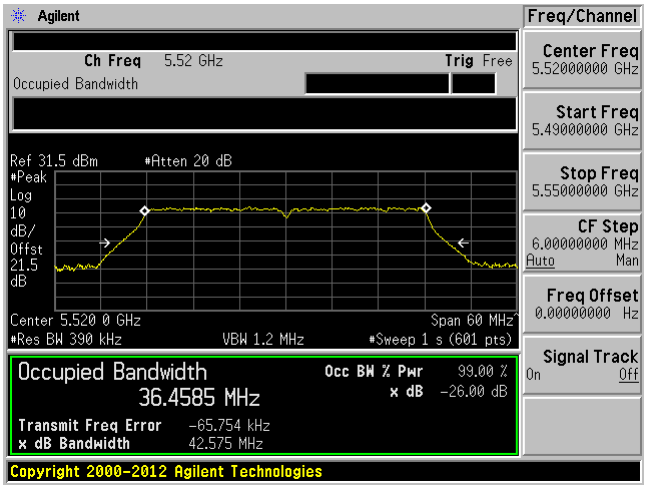


5695 MHz

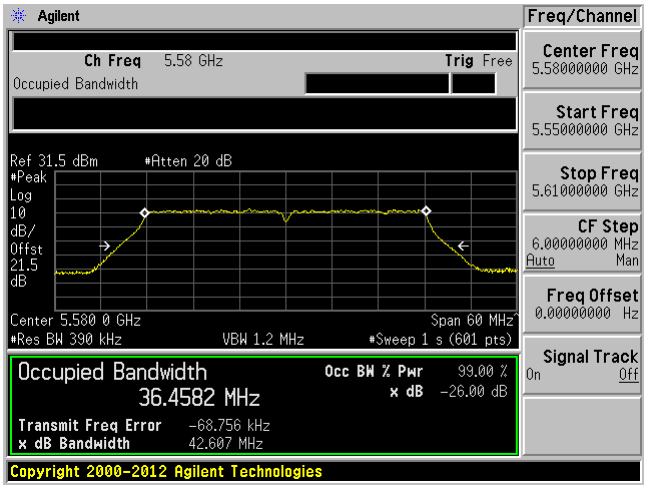


Antenna Port 1-802.11ac40 mode

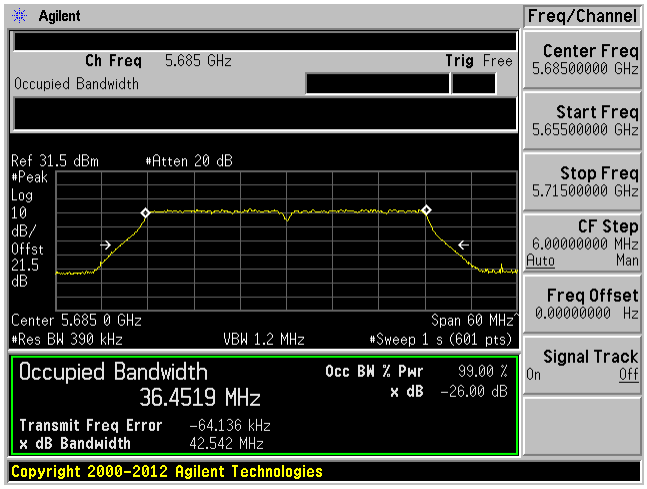
5520 MHz



5580 MHz

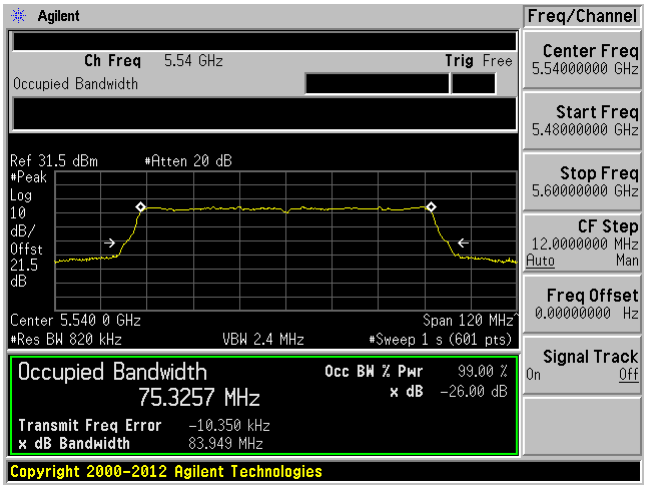


5685 MHz

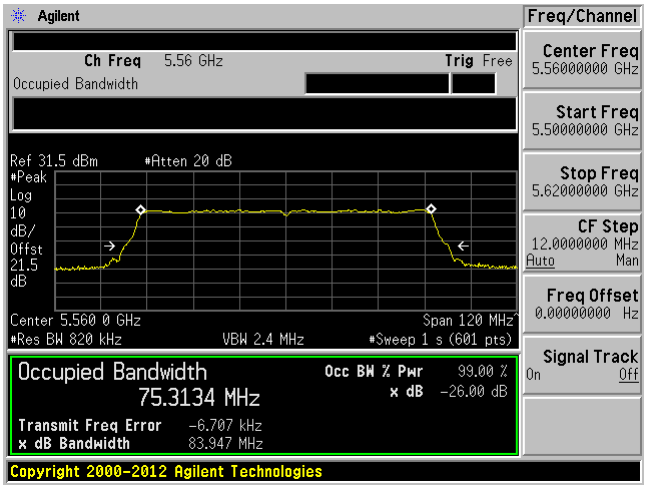


Antenna Port 1-802.11ac80 mode

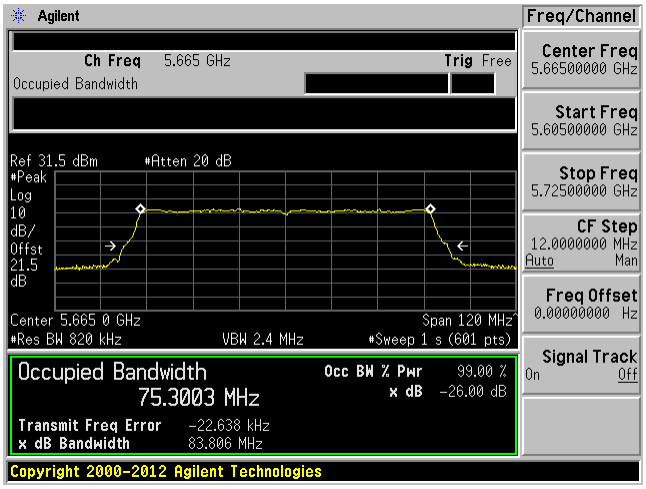
5540 MHz



5560 MHz

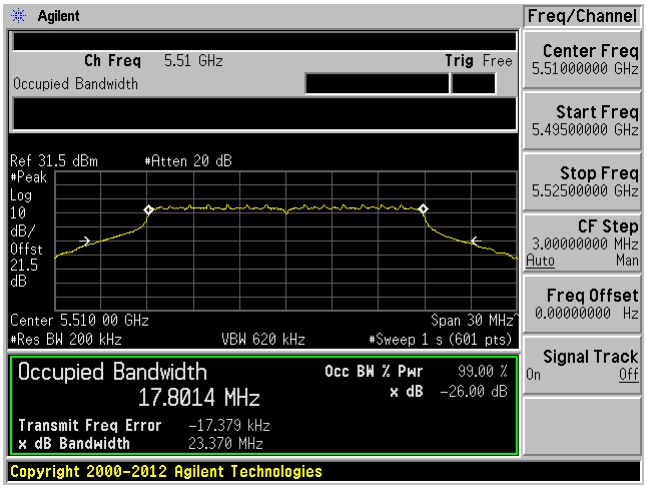


5665 MHz

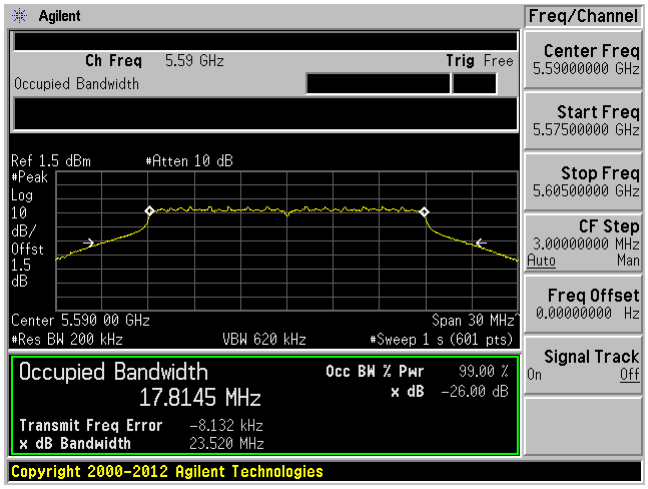


Antenna Port 2-802.11ac20 mode

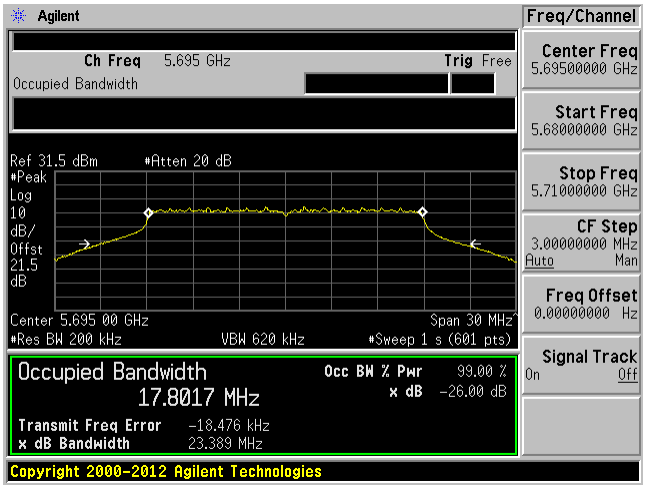
5510 MHz



5590 MHz

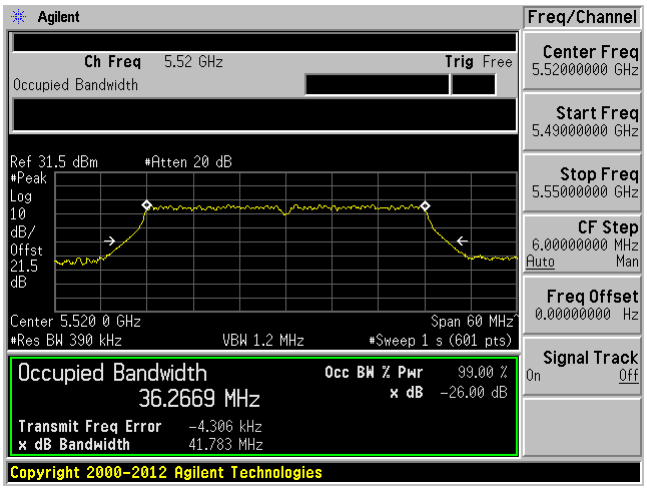


5695 MHz

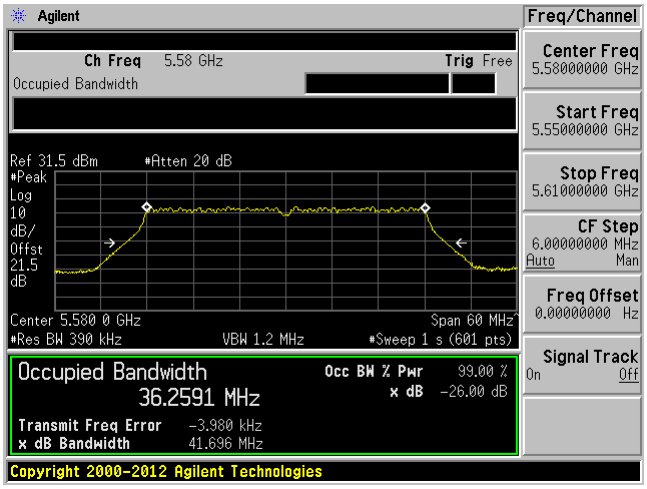


Antenna Port 2-802.11ac40 mode

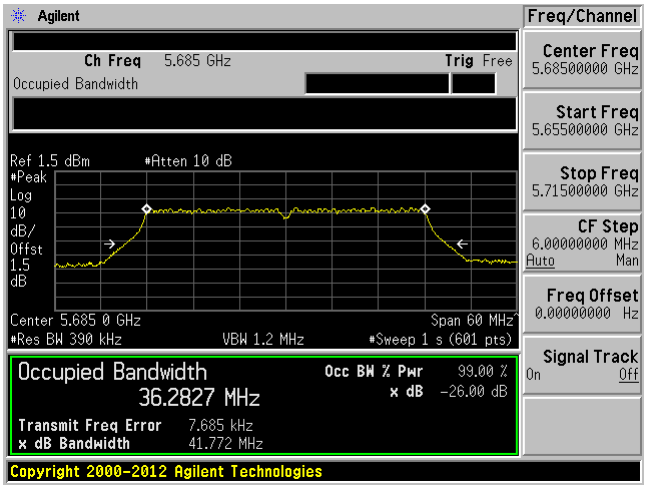
5520 MHz



5580 MHz

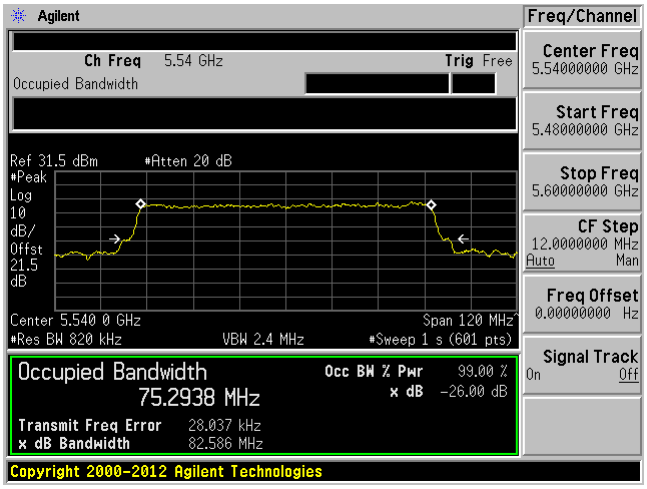


5685 MHz

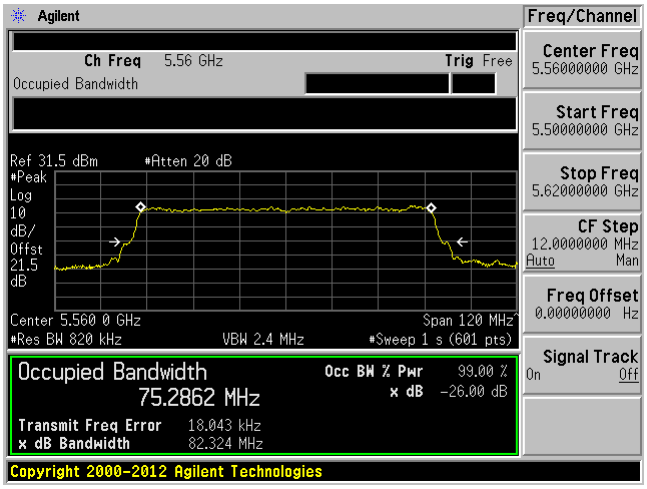


Antenna Port 2-802.11ac80 mode

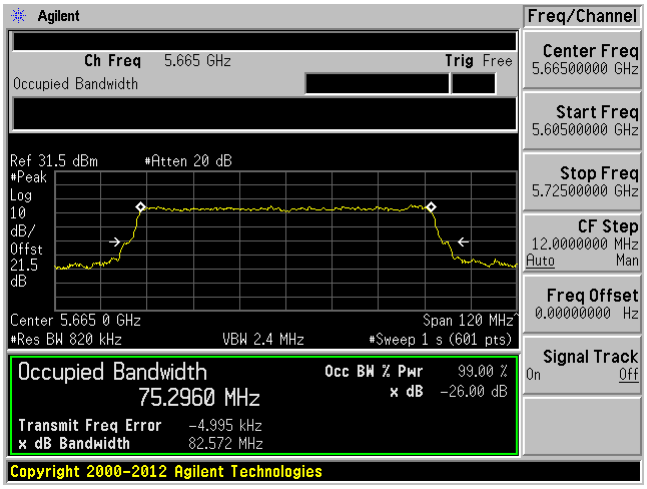
5540 MHz



5560 MHz



5665 MHz



9 FCC §407(a) - Output Power

9.1 Applicable Standards

According to FCC §15.407(a):

(1) For the band 5.15-5.25 GHz.

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

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

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. 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.

(iv) For 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.

(2) 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.

(3) 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.

Note to paragraph (a)(3): The Commission strongly recommends that parties employing U-NII devices to provide critical communications services should determine if there are any nearby Government radar systems that could affect their operation.

(4) The maximum conducted output power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.

(5) The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band are made over a reference bandwidth of 500 kHz or the 26 dB emission bandwidth of the device, whichever is less. Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

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 spectrum analyzer.

9.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4446A	MY48250238	2018-05-08	1 year
-	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 Vincent Licata on 2018-09-13 and Chin Ming Lui on 2018-10-04 in RF site.

9.5 Test Results

U-NII-2A

8 dBi Antenna

Frequency (MHz)	Conducted Average Power (dBm)				FCC Limit (dBm)
	ANT 1	ANT 2	Total	Corrected Power Total	
802.11ac20 mode					
5260	16.82	15.76	19.333	19.503	22
5280	15.27	15.97	18.644	18.814	22
5310	15.93	17.52	19.808	19.978	22
802.11ac40 mode					
5270	18.49	17.27	20.933	21.253	22
5285	18.12	17.03	20.619	20.939	22
5300	17.08	18.38	20.789	21.109	22

25 dBi Antenna

Frequency (MHz)	Conducted Average Power (dBm)				FCC Limit (dBm)
	ANT 1	ANT 2	Total	Corrected Power Total	
802.11ac20 mode					
5260	-15.92	-17.23	-13.515	-13.345	5
5280	-16.19	-17.17	-13.642	-13.472	5
5310	-16.08	-17.3	-13.637	-13.467	5
802.11ac40 mode					
5270	-16.7	-18.25	-14.396	-14.076	5
5285	-16.38	-18.28	-14.217	-13.897	5
5300	-16.8	-17.32	-14.042	-13.722	5

U-NII-2C

8 dBi Antenna

Frequency (MHz)	Conducted Average Power (dBm)				FCC Limit (dBm)
	ANT 1	ANT 2	Total	Corrected Power Total	
802.11ac20 mode					
5510	16.47	17.79	20.190	20.360	22
5590	14.92	15.67	18.321	18.491	22
5695	15.28	15.84	18.579	18.749	22
802.11ac40 mode					
5520	16.22	17.64	19.998	20.318	22
5580	14.63	15.43	18.059	18.379	22
5685	14.78	15.55	18.192	18.512	22
802.11ac80 mode					
5540	15.96	17.32	19.703	20.153	22
5560	14.09	14.86	17.502	17.952	22
5665	14.38	15.18	17.809	18.259	22

25 dBi Antenna

Frequency (MHz)	Conducted Average Power (dBm)				FCC Limit (dBm)
	ANT 1	ANT 2	Total	Corrected Power Total	
802.11ac20 mode					
5510	-13.62	-13.21	-10.400	-10.230	5
5590	-13.14	-13.56	-10.335	-10.165	5
5695	-13.47	-12.32	-9.847	-9.677	5
802.11ac40 mode					
5520	-13.46	-14.26	-10.831	-10.511	5
5580	-13.46	-15.16	-11.217	-10.897	5
5685	-14.01	-15.19	-11.550	-11.230	5
802.11ac80 mode					
5540	-13.48	-13.45	-10.455	-10.005	5
5560	-14.43	-13.38	-10.863	-10.413	5
5665	-14.22	-13.15	-10.642	-10.192	5

Note 1: Required Limit = Originial Power limit - (Antenna Gain-6dBi)
Note 2: EUT does not support any channel fall into 5600-5650MHz band in Canada.

10 FCC §15.407(a) - Power Spectral Density

10.1 Applicable Standards

According to FCC §15.407(a):

For the band 5.15-5.25 GHz.

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

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

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. 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.

(iv) For 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.

10.2 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4446A	MY48250238	2018-05-08	1 year
-	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".*

10.3 Test Environmental Conditions

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

The testing was performed by Vincent Licata on 2018-09-13 and Chin Ming Lui on 2018-10-04 at RF site.

10.4 Test Results

U-NII-2A

8 dBi Antenna

Channel	Frequency (MHz)	ANT 1 (dBm/MHz)	ANT 2 (dBm/MHz)	Total (dBm/MHz)	Corrected PSD Total (dBm/MHz)	Limit (dBm/MHz)
802.11ac20 mode						
Low	5260	5.029	4.122	7.609	7.779	9
Middle	5280	3.564	4.247	6.929	7.099	9
High	5310	4.479	5.888	8.251	8.421	9
802.11ac40 mode						
Low	5270	3.778	2.573	6.227	6.547	9
Middle	5285	3.379	2.242	5.858	6.178	9
High	5300	2.519	3.853	6.247	6.567	9

25 dBi Antenna

Channel	Frequency (MHz)	ANT 1 (dBm/MHz)	ANT 2 (dBm/MHz)	Total (dBm/MHz)	Corrected PSD Total (dBm/MHz)	Limit (dBm/MHz)
802.11ac20 mode						
Low	5260	-27.641	-28.884	-25.208	-25.038	-8
Middle	5280	-27.858	-28.902	-25.338	-25.168	-8
High	5310	-27.83	-28.855	-25.302	-25.132	-8
802.11ac40 mode						
Low	5270	-31.338	-32.951	-29.060	-28.740	-8
Middle	5285	-31.099	-33.053	-28.957	-28.637	-8
High	5300	-31.524	-31.97	-28.731	-28.411	-8

U-NII-2C

8 dBi Antenna

Channel	Frequency (MHz)	ANT 1 (dBm/MHz)	ANT 2 (dBm/MHz)	Total (dBm/MHz)	Corrected PSD Total (dBm/MHz)	Limit (dBm/MHz)
802.11ac20 mode						
Low	5510	4.776	6.092	8.494	8.664	9
Middle	5590	3.162	3.961	6.590	6.760	9
High	5695	3.513	4.186	6.873	7.043	9
802.11ac40 mode						
Low	5520	1.658	2.934	5.353	5.673	9
Middle	5580	-0.052	0.867	3.442	3.762	9
High	5685	0.14	0.706	3.443	3.763	9
802.11ac80 mode						
Low	5540	-1.072	0.639	2.878	3.328	9
Middle	5560	-3.322	-2.326	0.215	0.665	9
High	5665	-2.889	-1.797	0.702	1.152	9

25 dBi Antenna

Channel	Frequency (MHz)	ANT 1 (dBm/MHz)	ANT 2 (dBm/MHz)	Total (dBm/MHz)	Corrected PSD Total (dBm/MHz)	Limit (dBm/MHz)
802.11ac20 mode						
Low	5510	-25.285	-24.72	-21.983	-21.813	-8
Middle	5590	-24.736	-25.274	-21.986	-21.816	-8
High	5695	-25.17	-23.836	-21.442	-21.272	-8
802.11ac40 mode						
Low	5520	-28.131	-28.949	-25.510	-25.190	-8
Middle	5580	-28.076	-29.896	-25.881	-25.561	-8
High	5685	-28.574	-29.927	-26.188	-25.868	-8
802.11ac80 mode						
Low	5540	-30.644	-30.654	-27.639	-27.189	-8
Middle	5560	-31.783	-30.485	-28.075	-27.625	-8
High	5665	-31.334	-29.961	-27.583	-27.133	-8

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

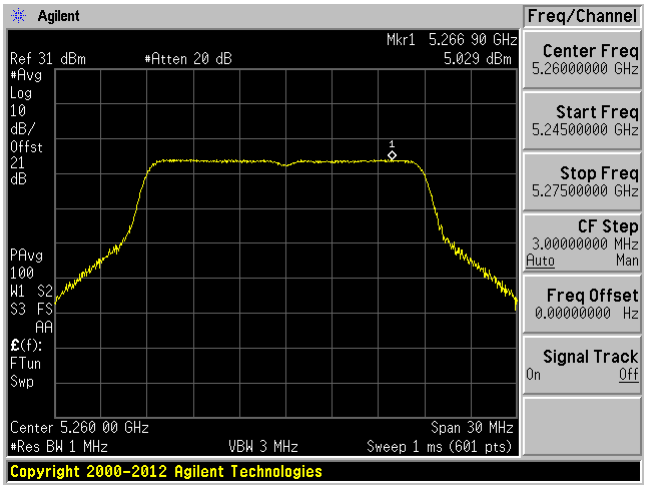
Please refer to the following plots.

U-NII-2A

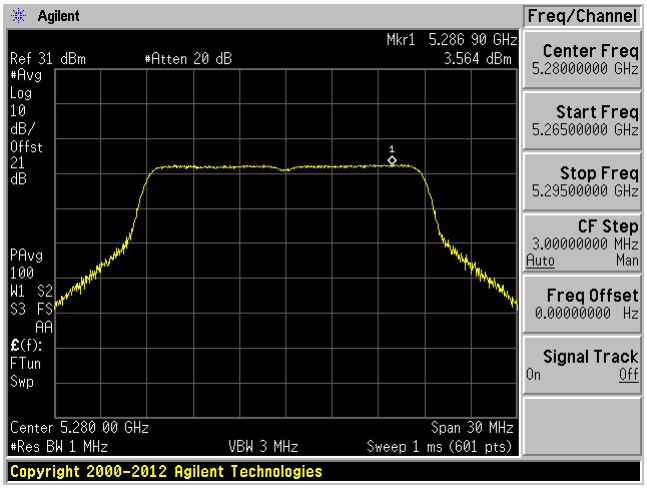
8 dBi Antenna

Antenna Port 1-802.11ac20 mode

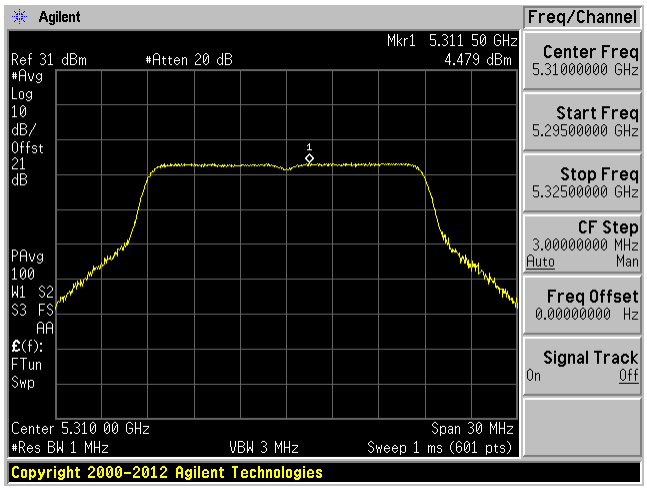
5260 MHz



5280 MHz

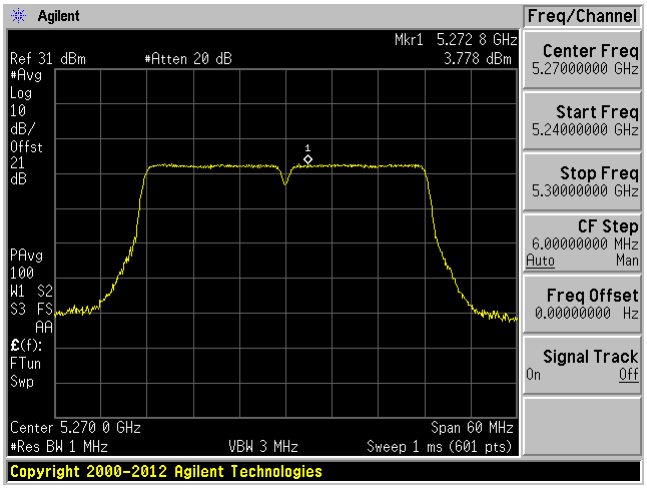


5310 MHz

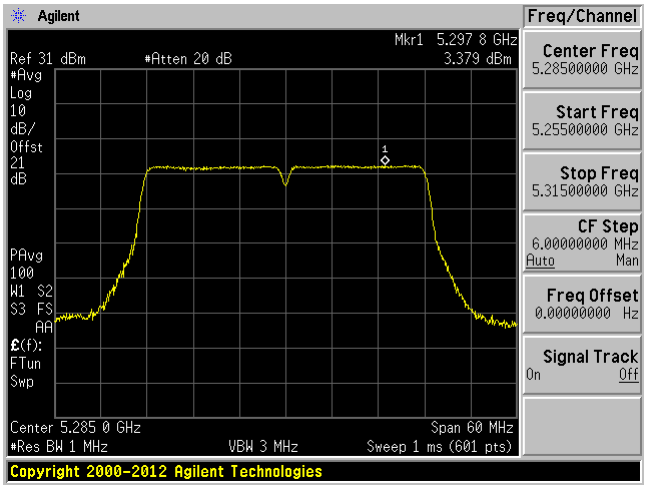


Antenna Port 1-802.11ac40 mode

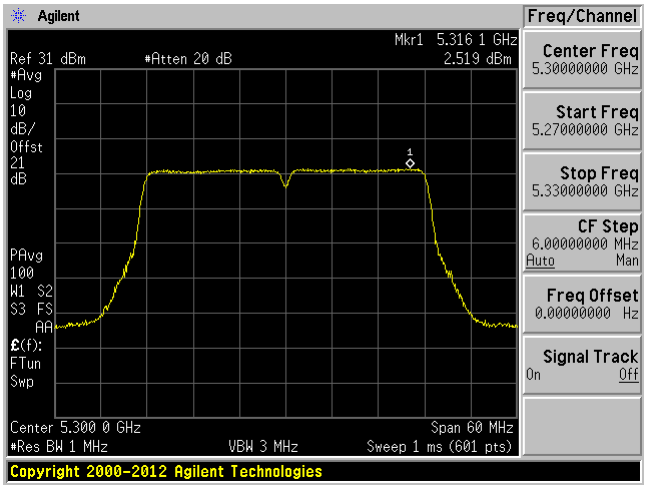
5270 MHz



5285 MHz

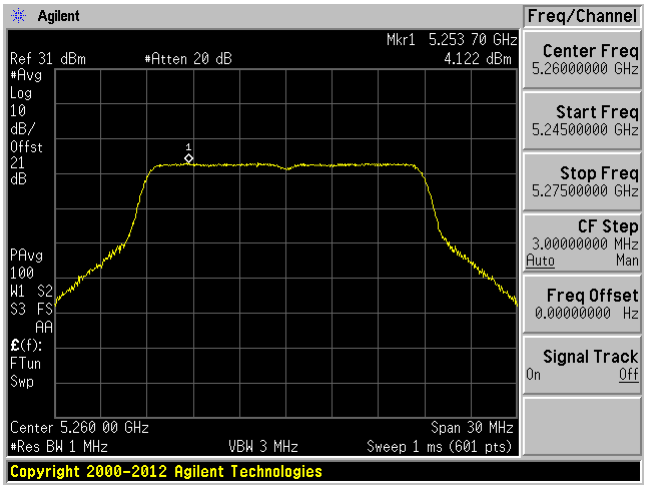


5300 MHz

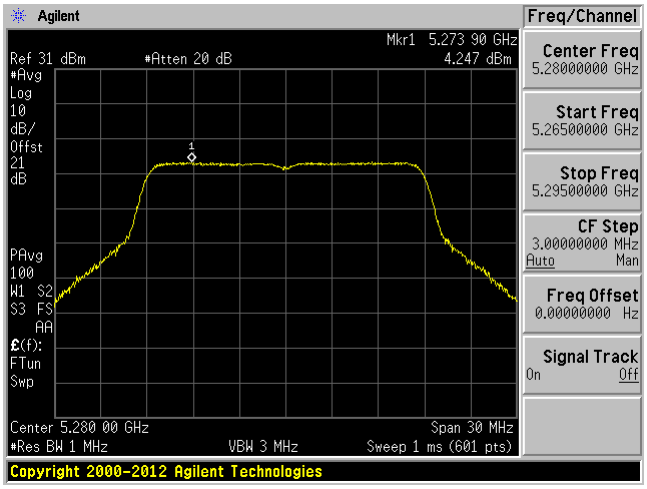


Antenna Port 2-802.11ac20 mode

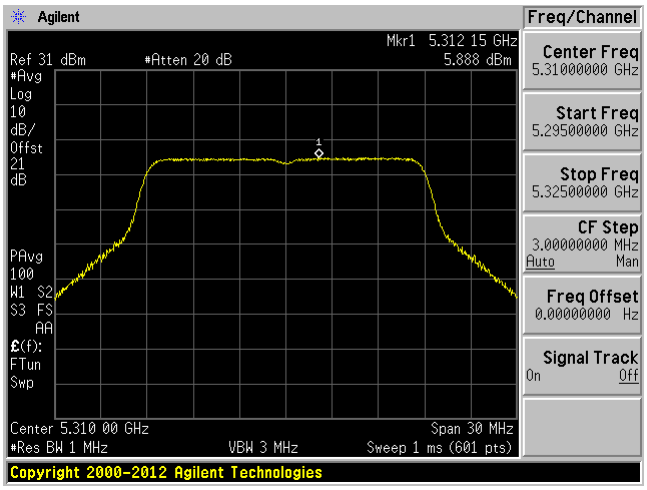
5260 MHz



5280 MHz

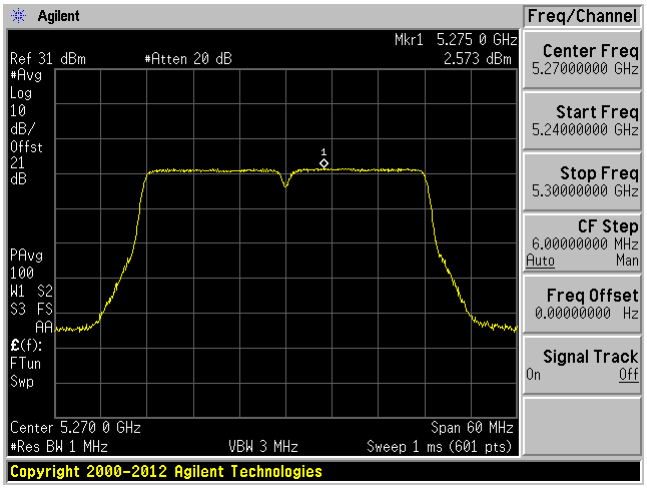


5310 MHz

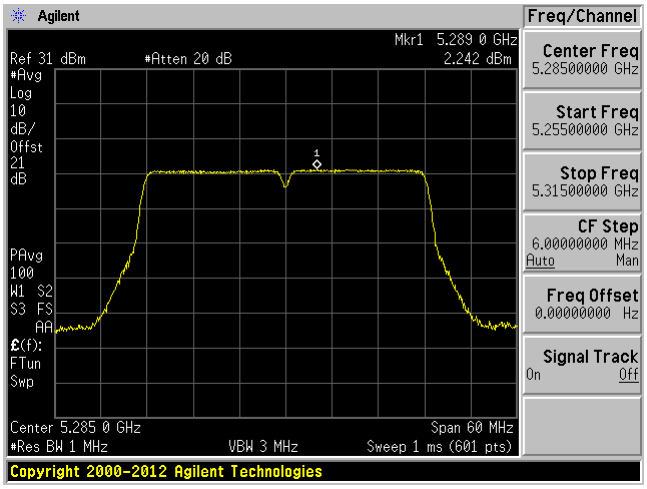


Antenna Port 2-802.11ac40 mode

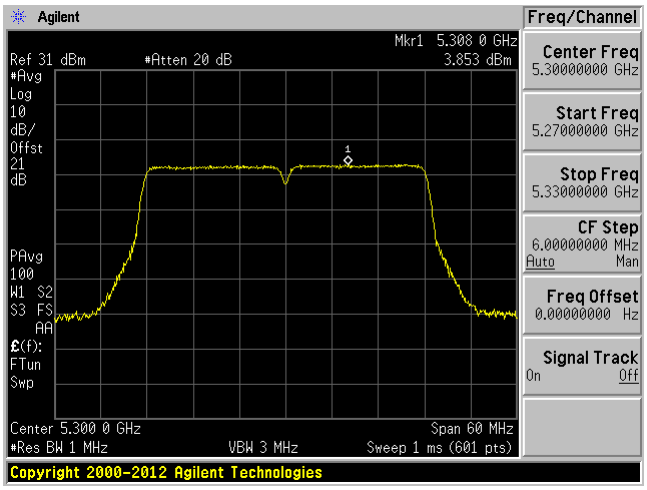
5270 MHz



5285 MHz



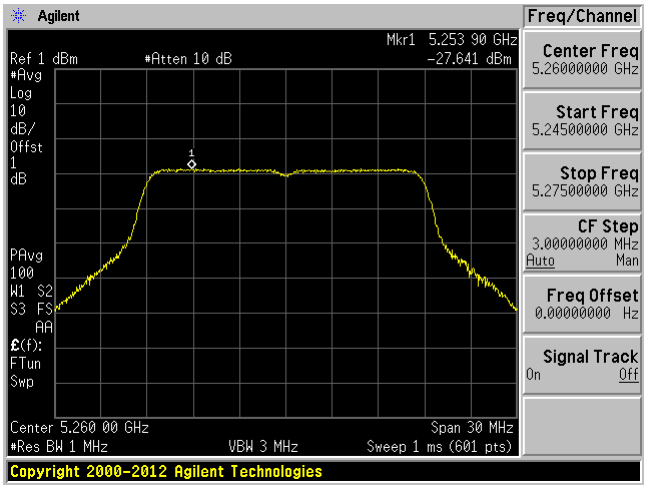
5300 MHz



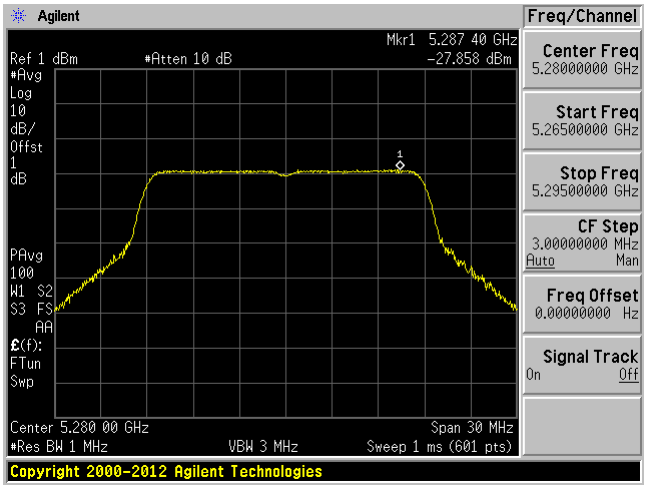
25 dBi Antenna

Antenna Port 1-802.11ac20 mode

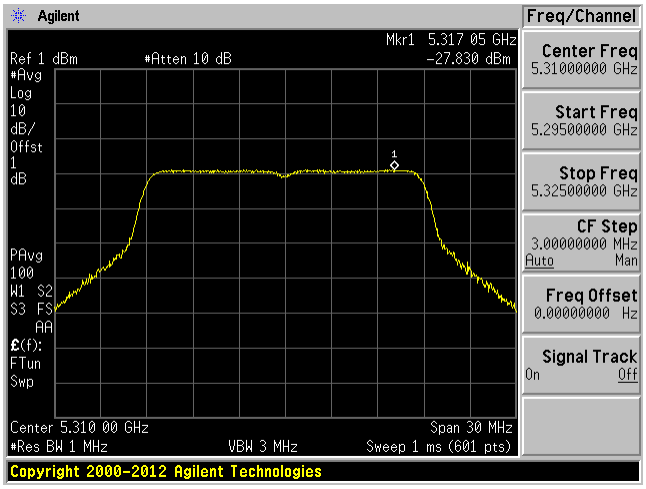
5260 MHz



5280 MHz

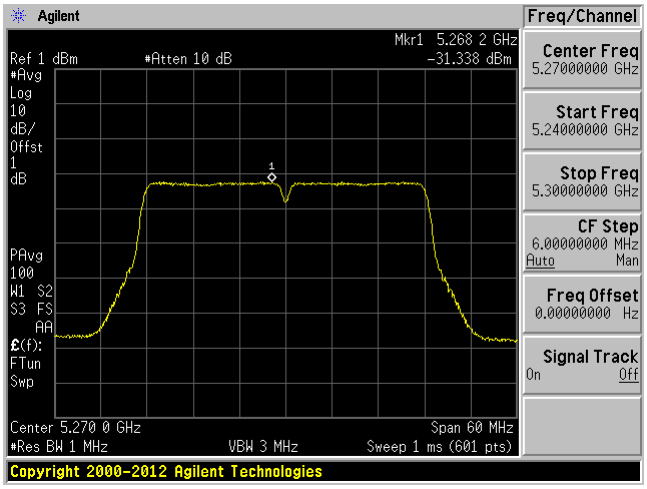


5310 MHz

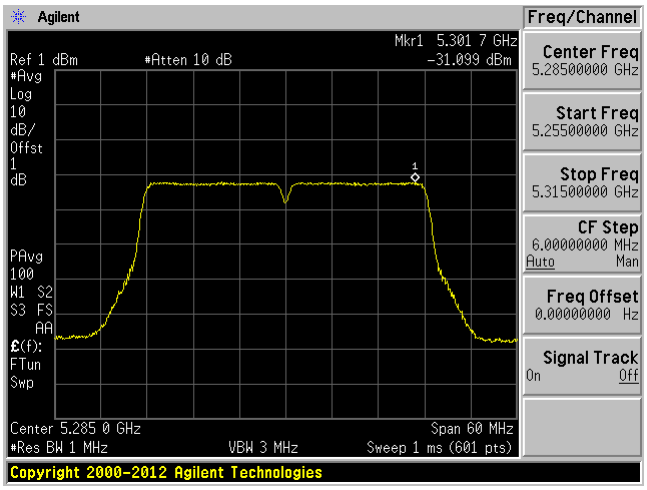


Antenna Port 1-802.11ac40 mode

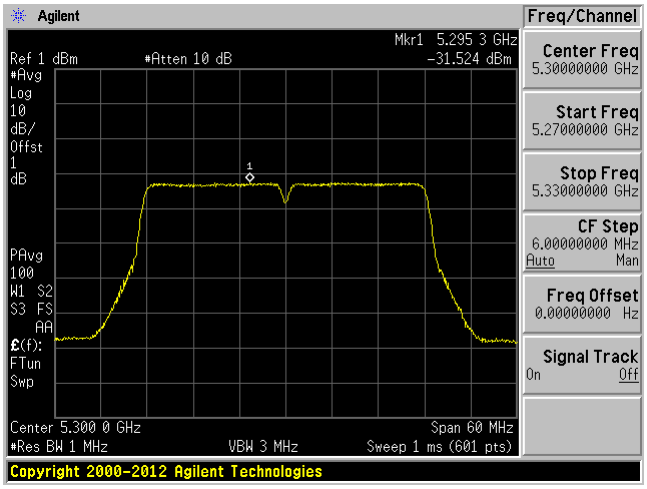
5270 MHz



5285 MHz

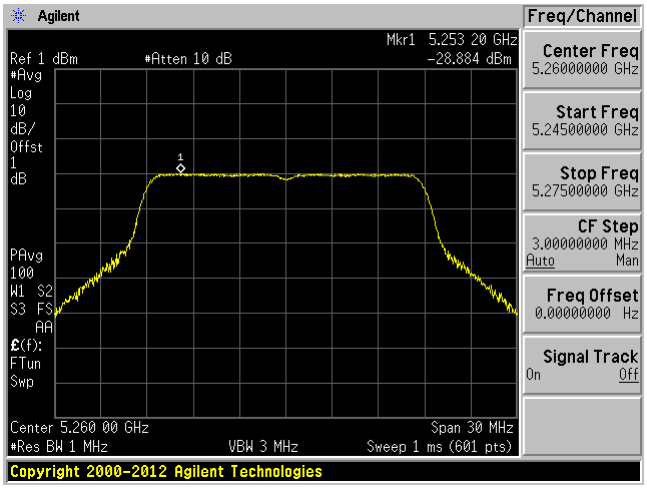


5300 MHz

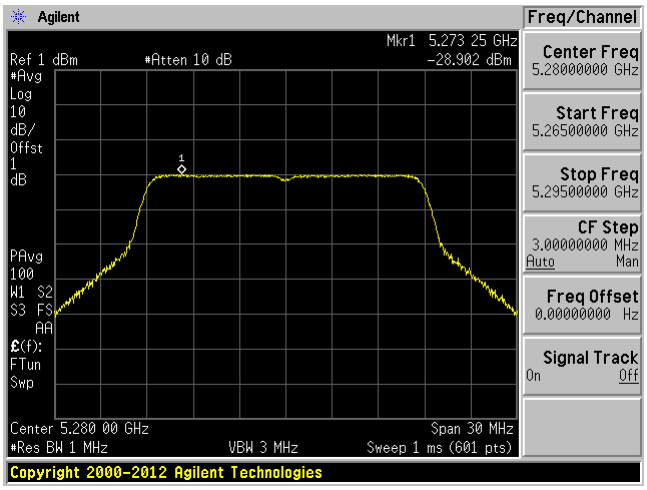


Antenna Port 2-802.11ac20 mode

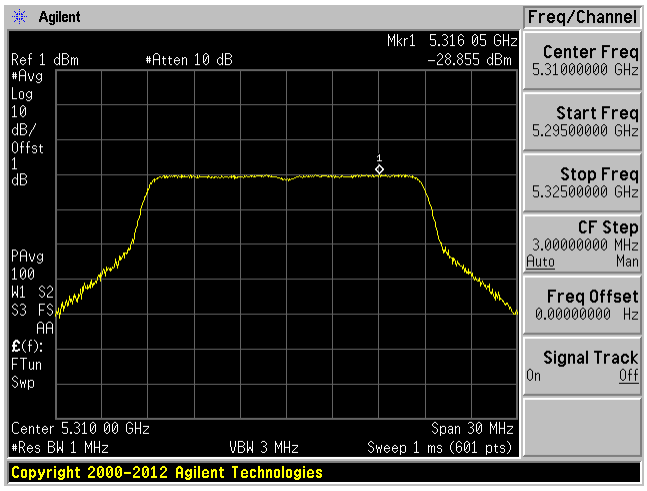
5260 MHz



5280 MHz

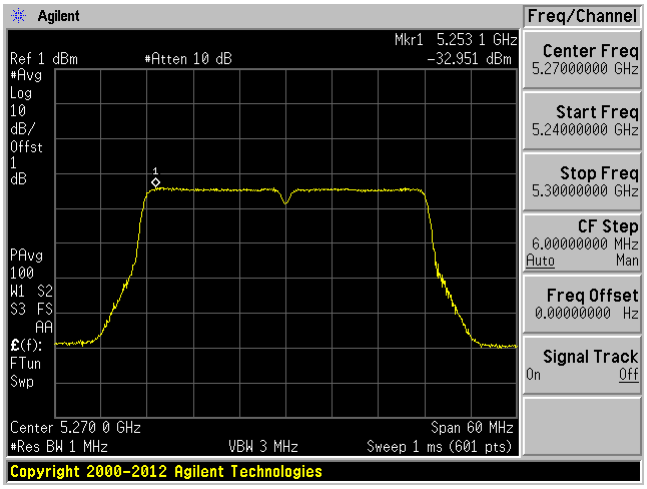


5310 MHz

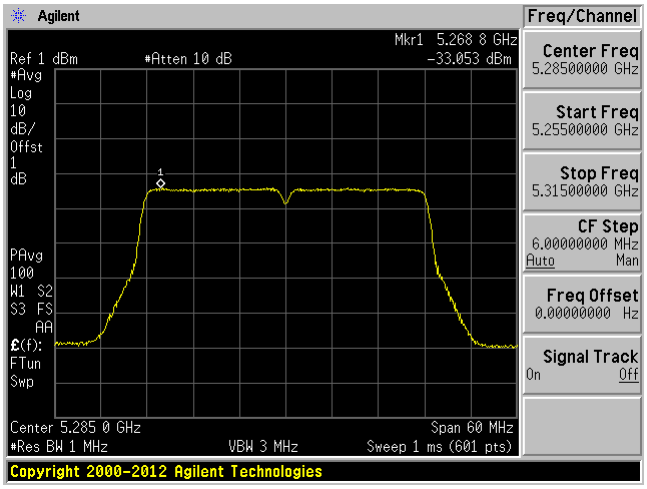


Antenna Port 2-802.11ac40 mode

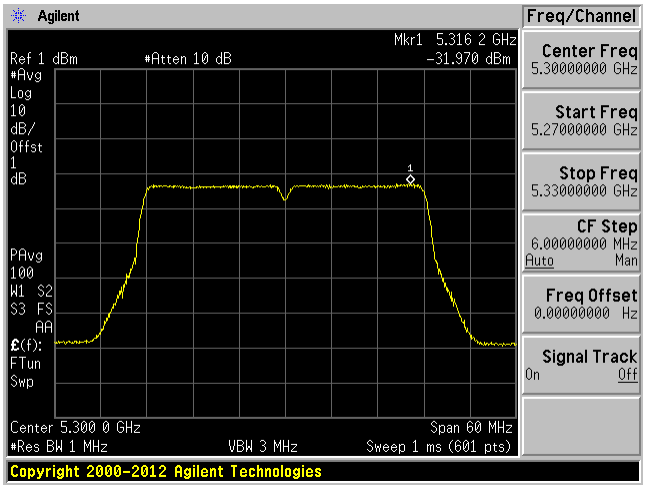
5270 MHz



5285 MHz



5300 MHz

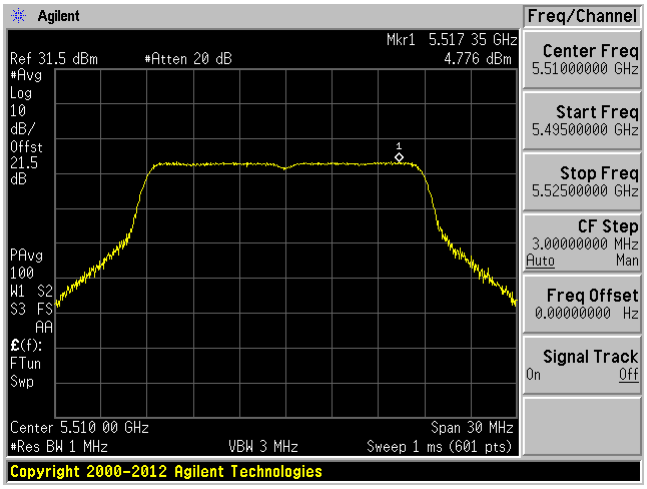


U-NII-2C

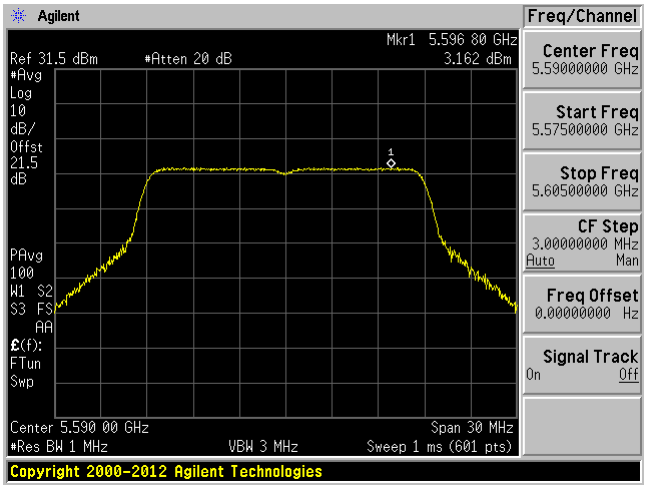
8 dBi Antenna

Antenna Port 1-802.11ac20 mode

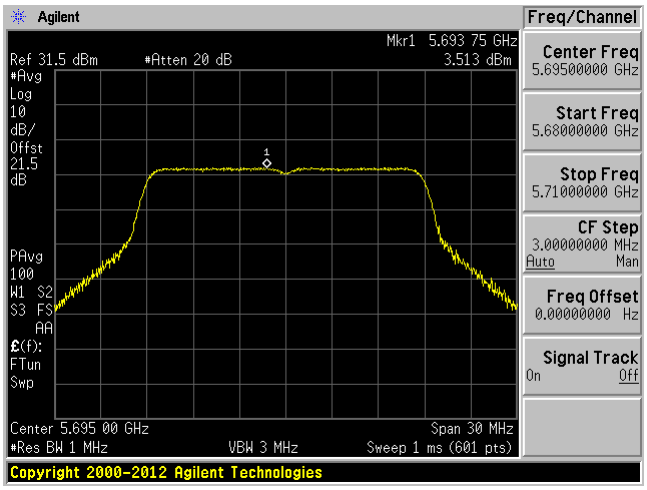
5510 MHz



5590 MHz

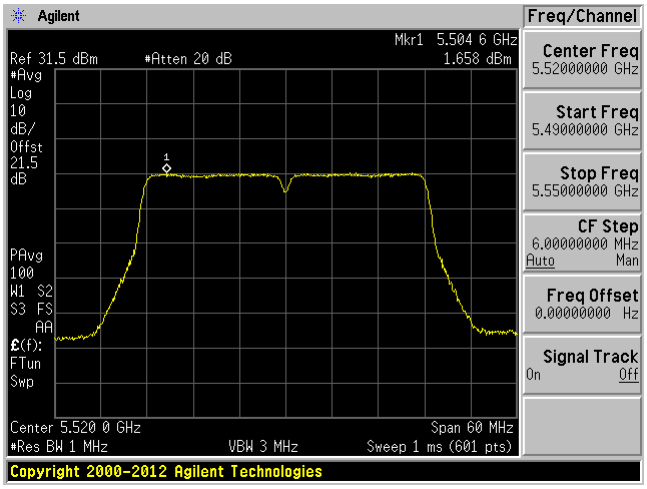


5695 MHz

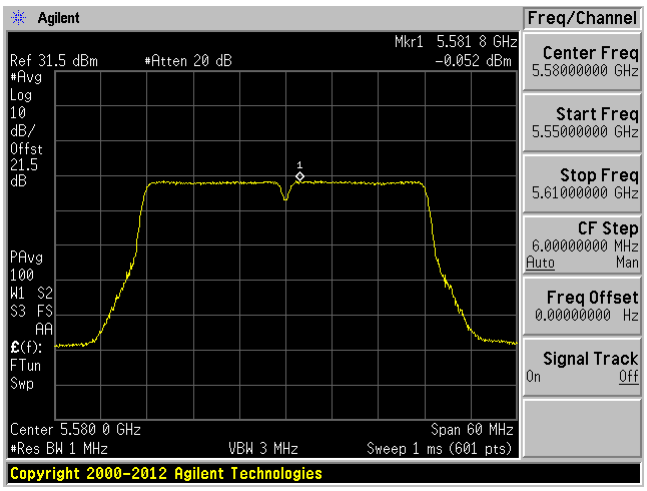


Antenna Port 1-802.11ac40 mode

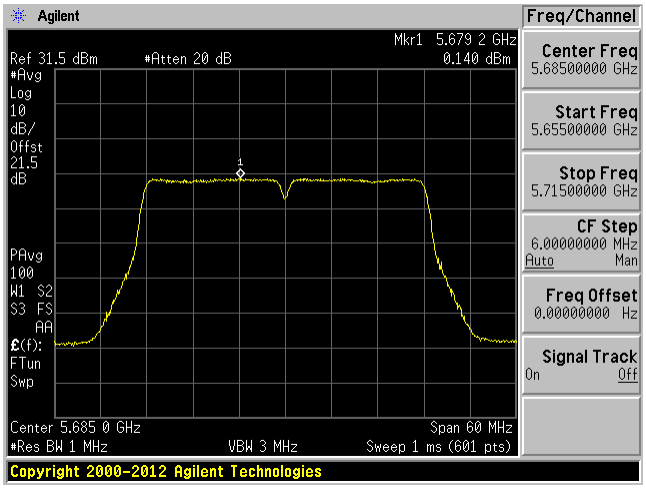
5520 MHz



5580 MHz

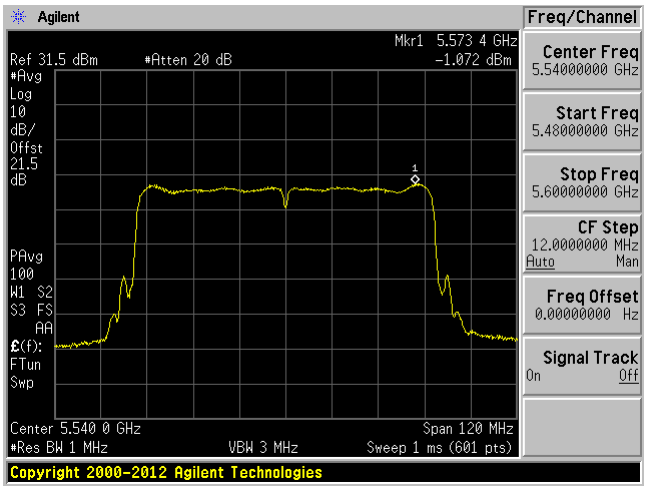


5685 MHz

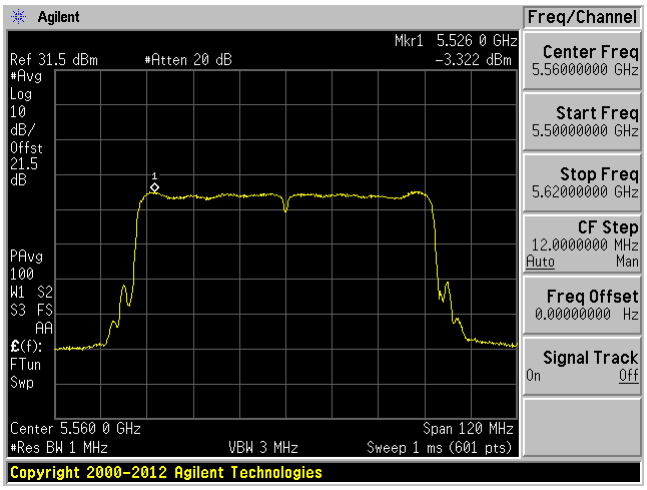


Antenna Port 1-802.11ac80 mode

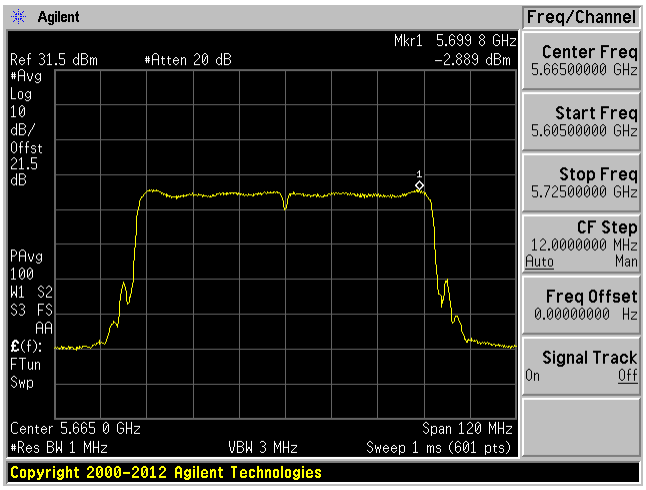
5540 MHz



5560 MHz

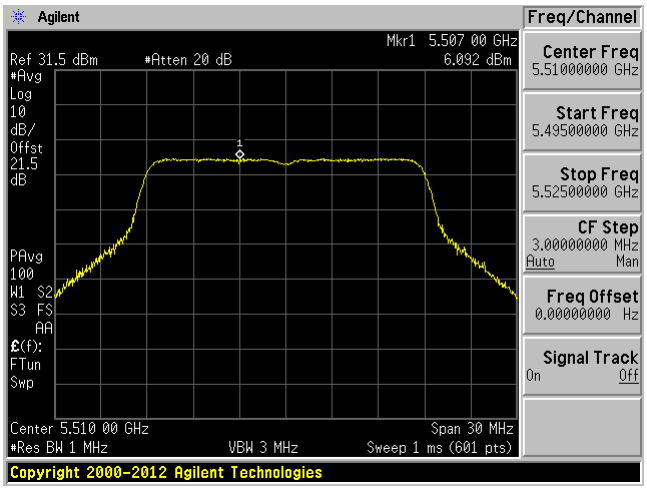


5665 MHz

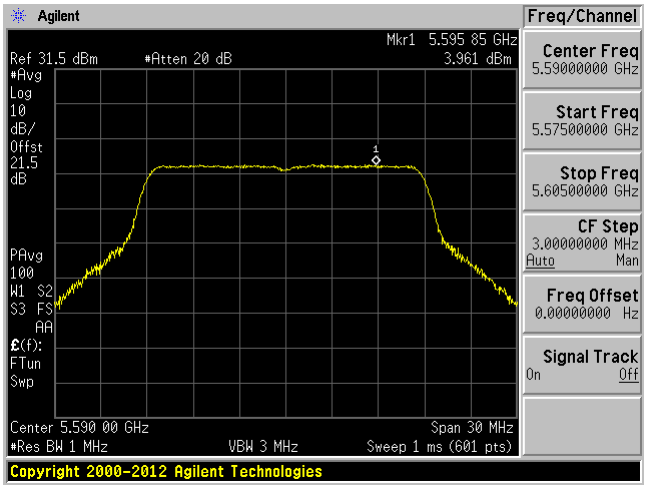


Antenna Port 2-802.11ac20 mode

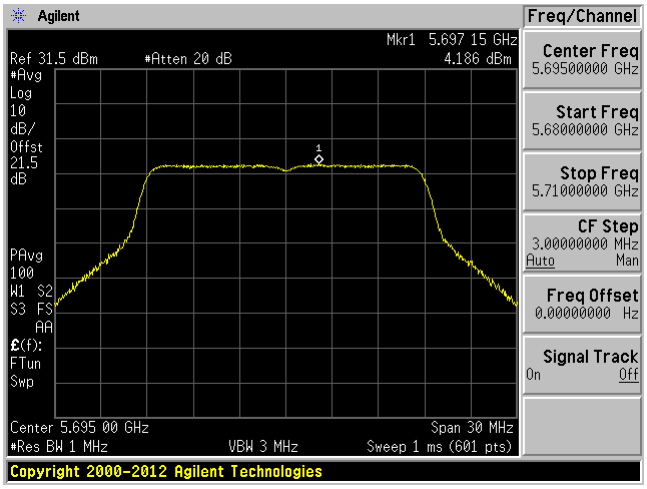
5510 MHz



5590 MHz

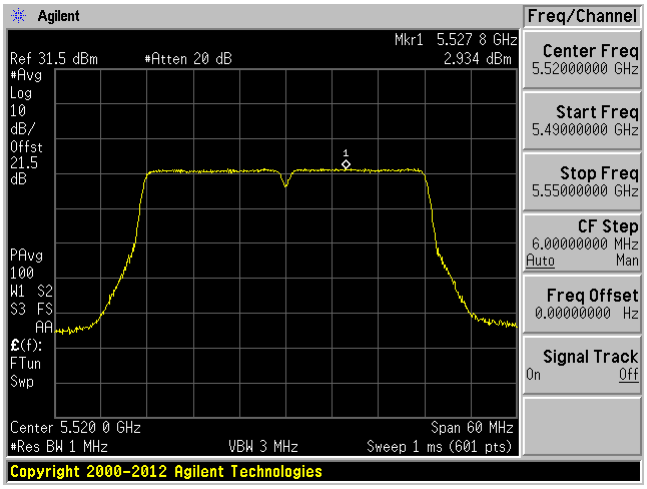


5695 MHz

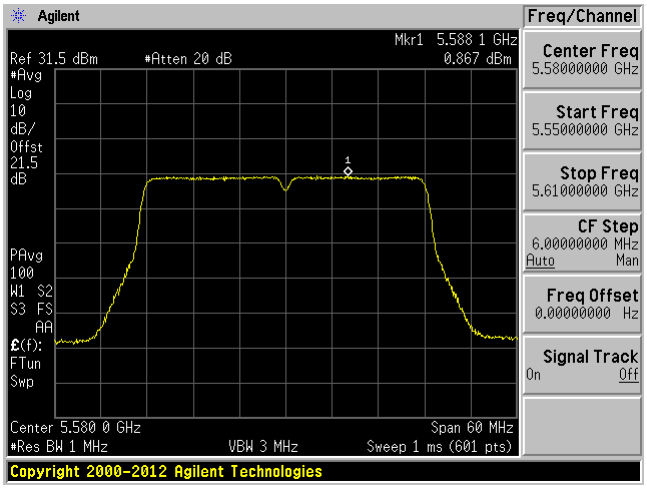


Antenna Port 2-802.11ac40 mode

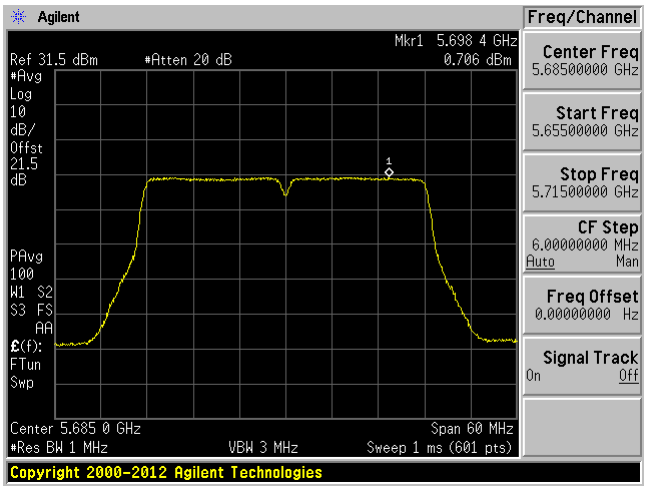
5520 MHz



5580 MHz

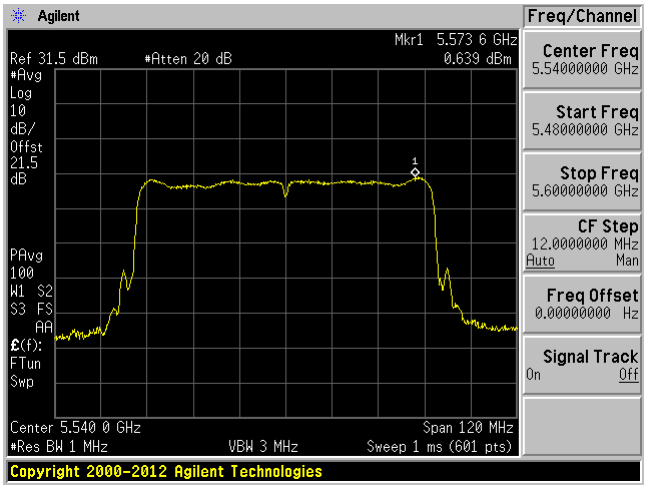


5685 MHz

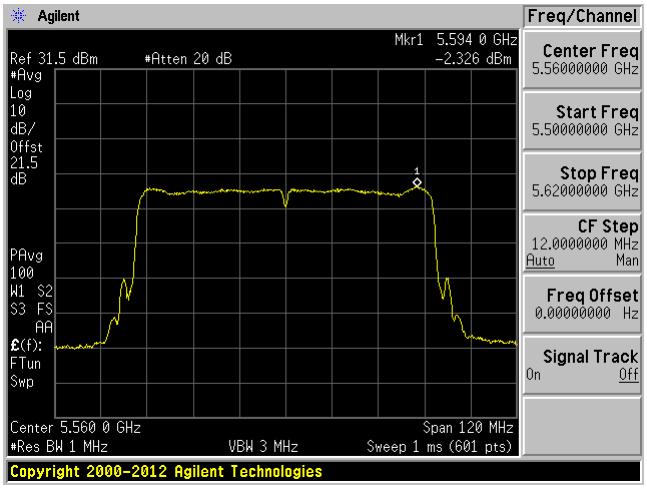


Antenna Port 2-802.11ac80 mode

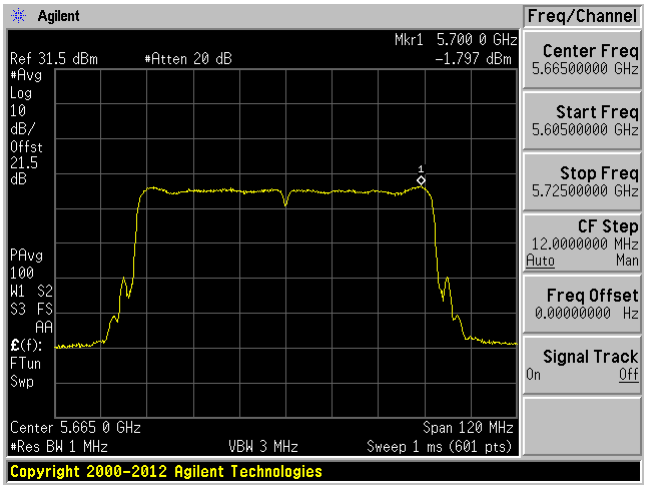
5540 MHz



5560 MHz



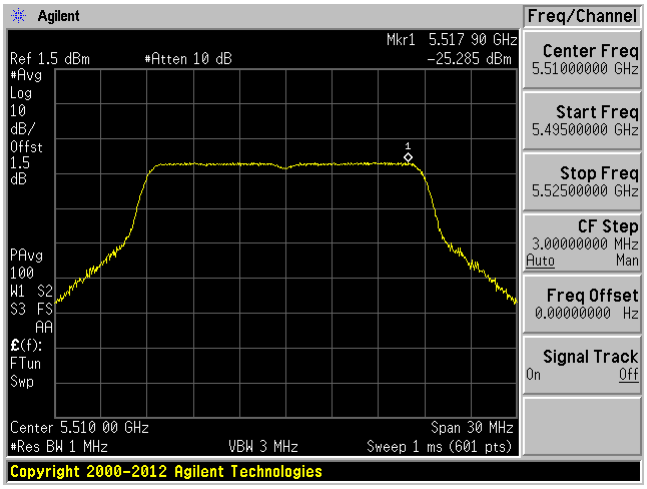
5665 MHz



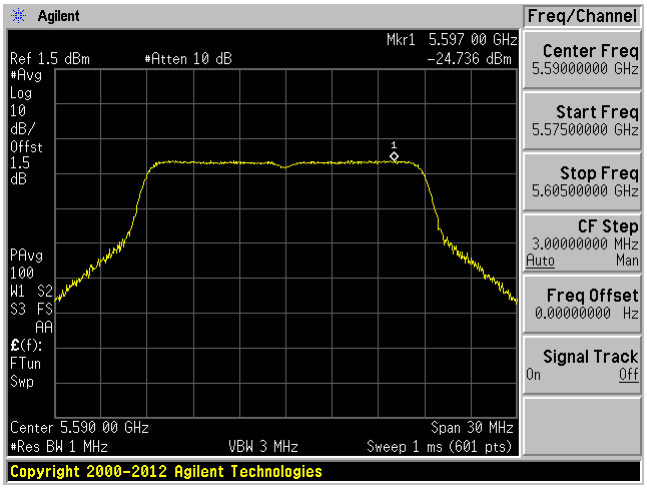
25 dBi Antenna

Antenna Port 1-802.11ac20 mode

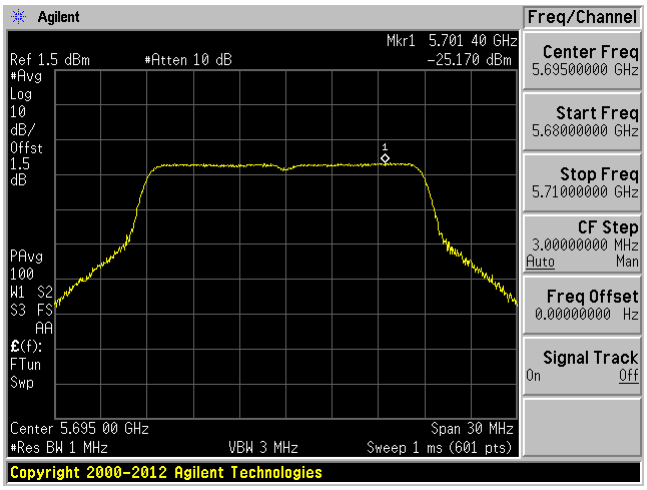
5510 MHz



5590 MHz

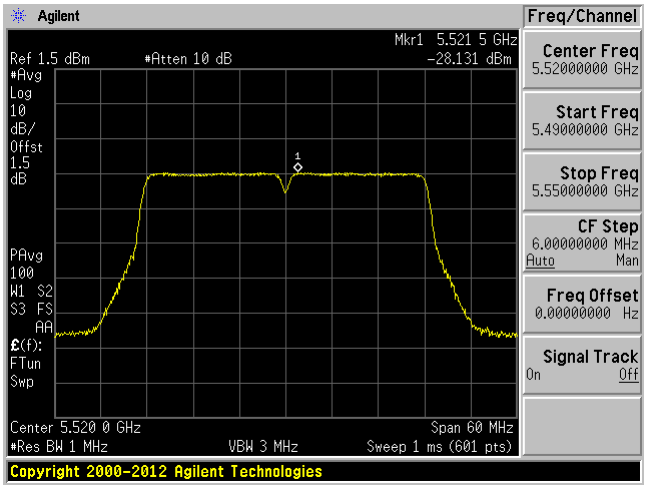


5695 MHz

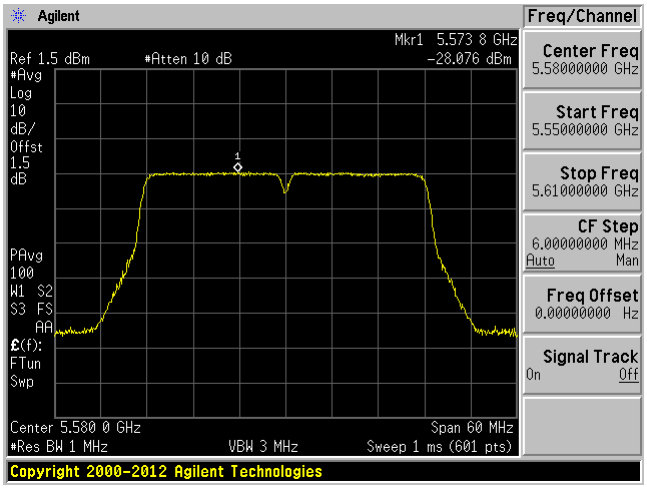


Antenna Port 1-802.11ac40 mode

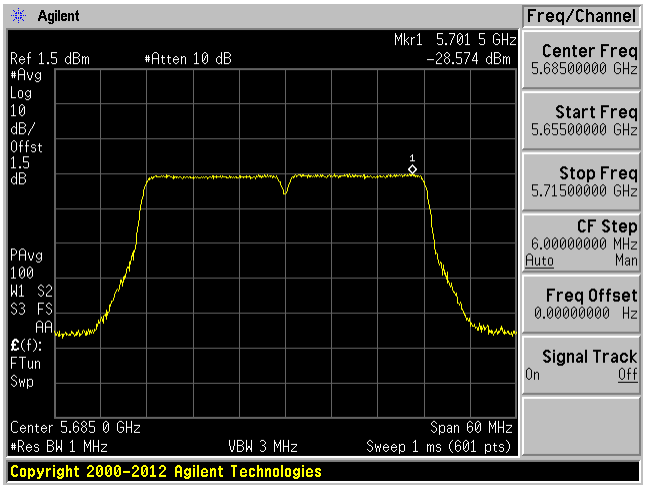
5520 MHz



5580 MHz

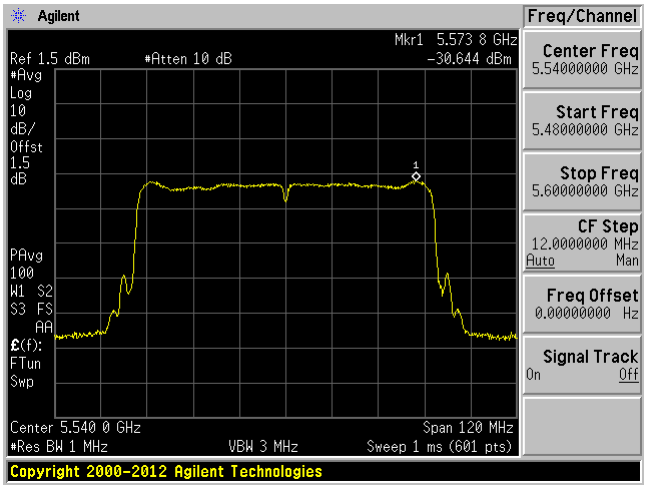


5685 MHz

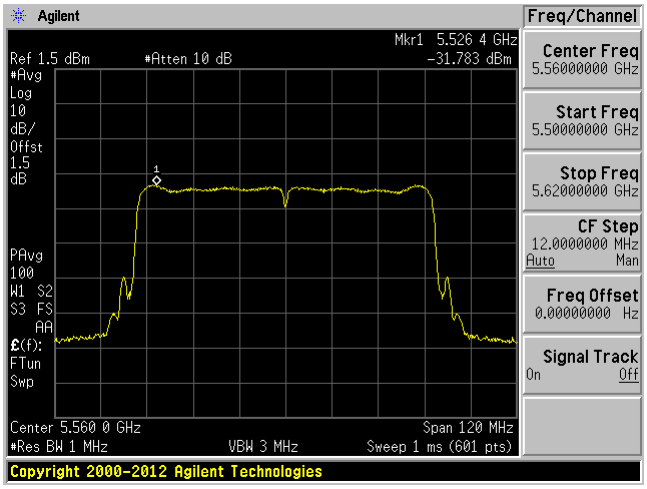


Antenna Port 1-802.11ac80 mode

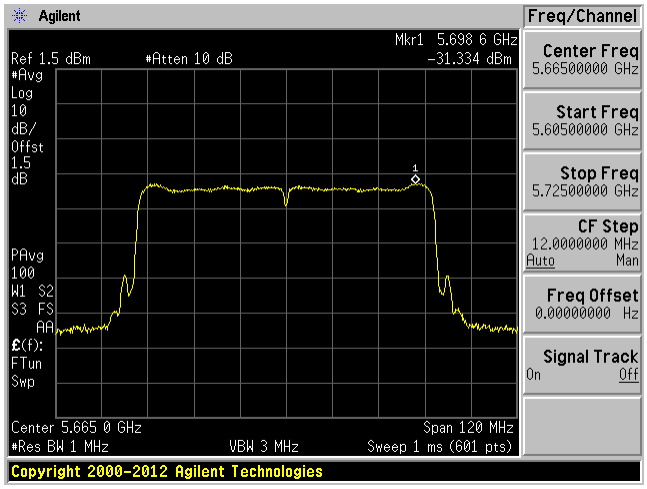
5540 MHz



5560 MHz

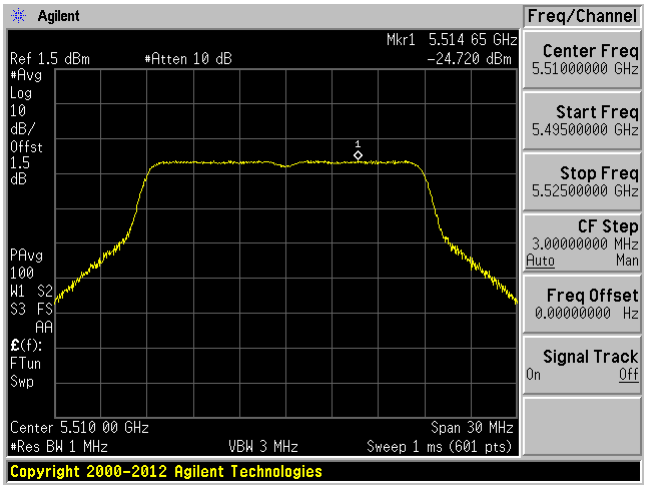


5665 MHz

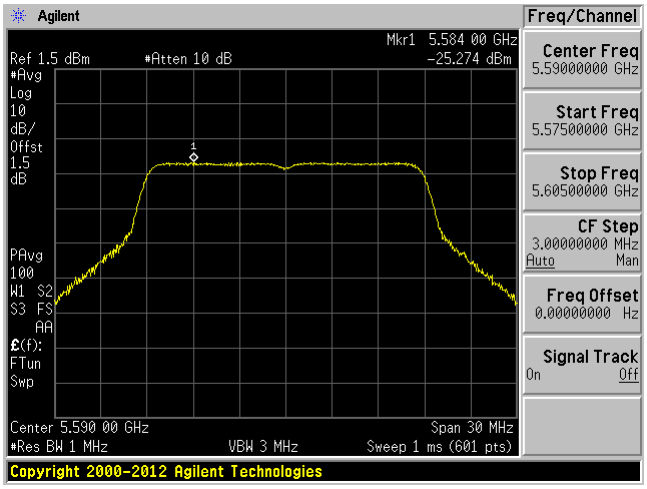


Antenna Port 2-802.11ac20 mode

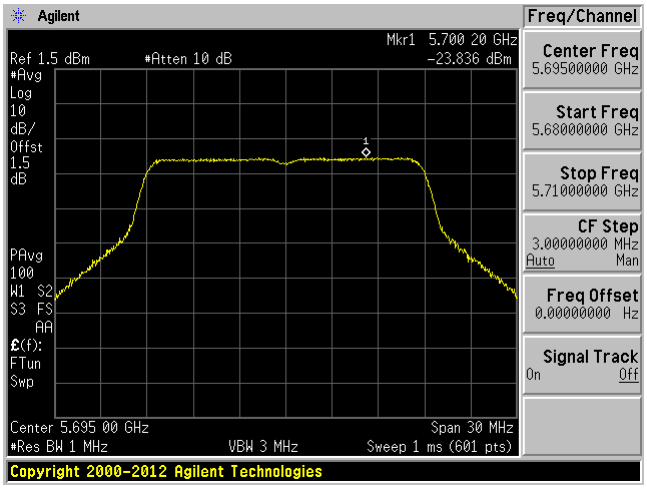
5510 MHz



5590 MHz

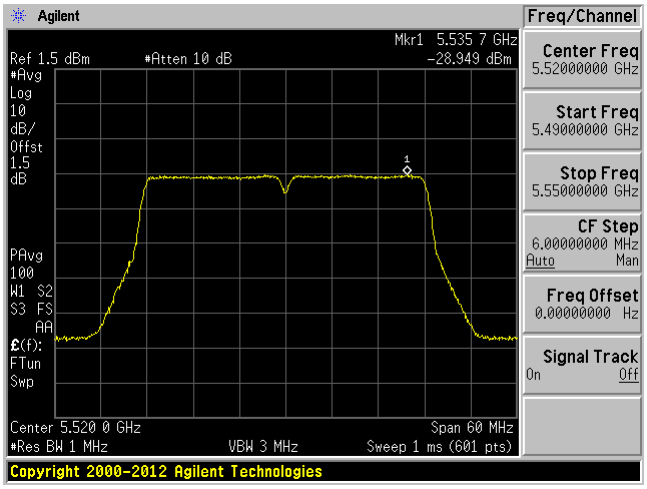


5695 MHz

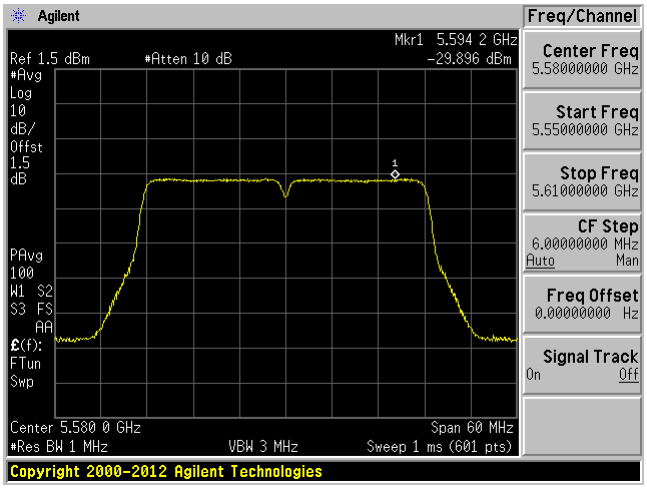


Antenna Port 2-802.11ac40 mode

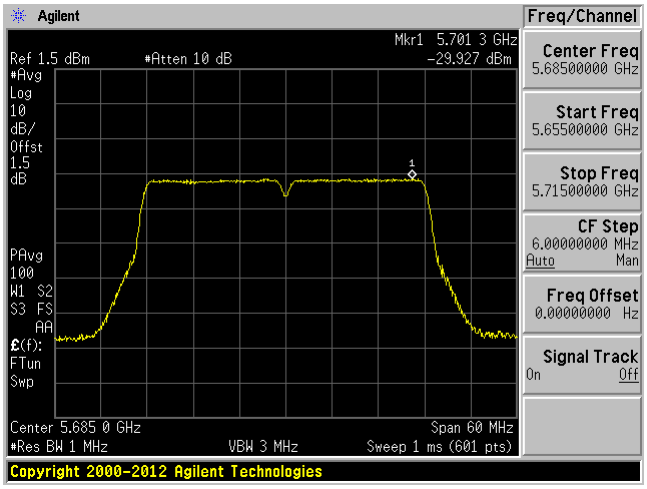
5520 MHz



5580 MHz

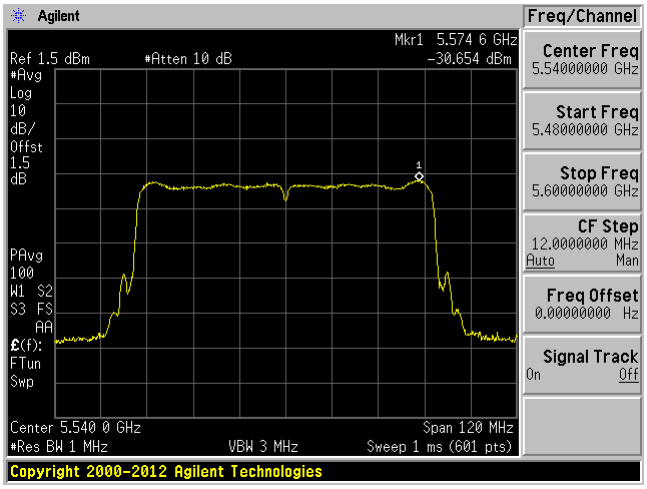


5685 MHz

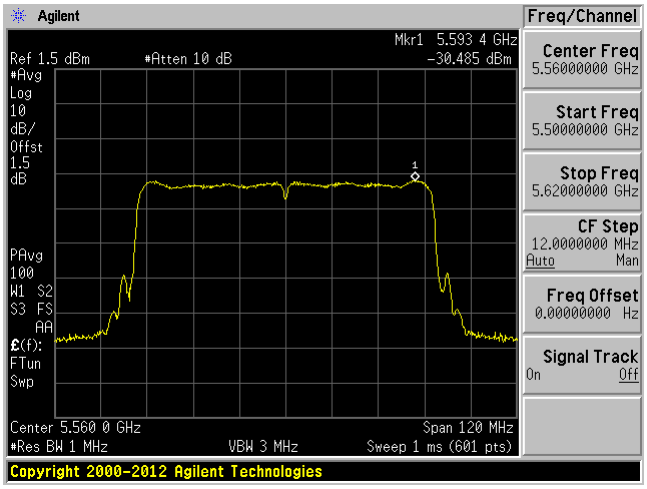


Antenna Port 2-802.11ac80 mode

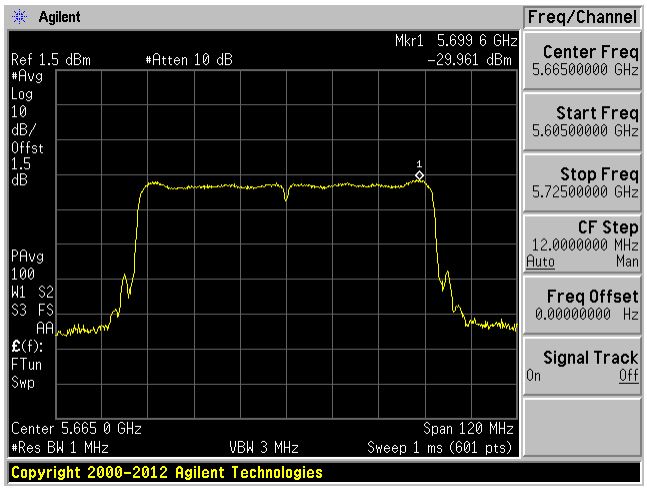
5540 MHz



5560 MHz



5665 MHz



11 Annex A (Normative) - FCC Labeling Requirements

11.1 FCC ID Label Requirement

Per FCC Part 2.925, (a) Each equipment covered in an application for equipment authorization shall bear a nameplate or label listing the following:

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

Example: FCC ID: XXX123

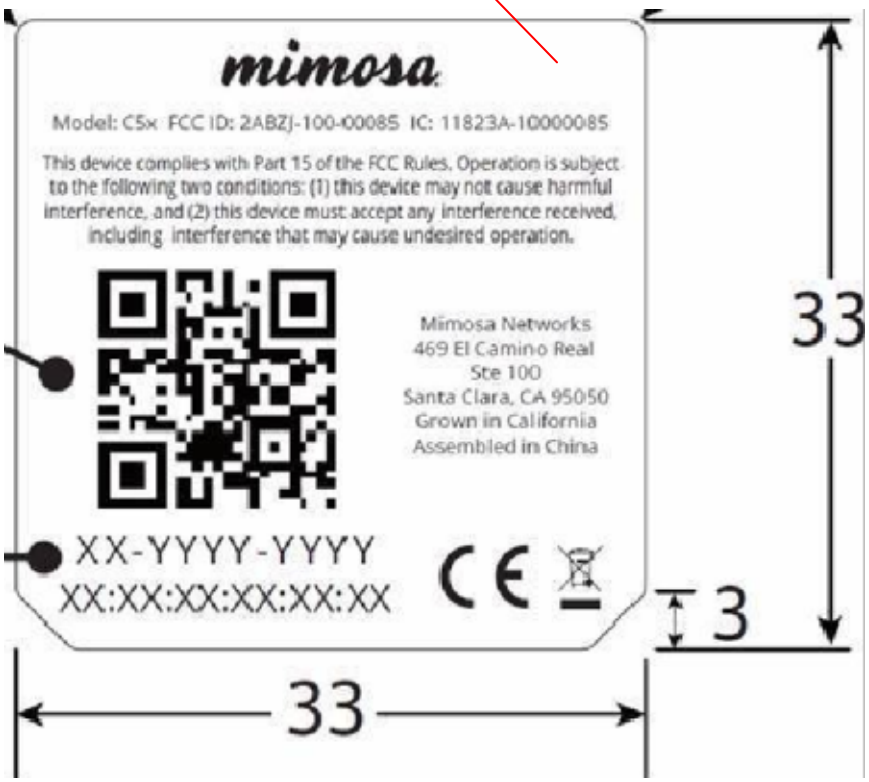
Where: XXX—Grantee Code, 123—Equipment Product Code

(b) The grantee code assigned pursuant to paragraph (c) of this section is assigned permanently to applicants/grantees and is valid only for the party specified as the applicant/grantee in the code assignment(s).

(c) A grantee code will have three characters consisting of Arabic numerals, capital letters, or combination thereof

(d) The equipment product code assigned by the grantee shall consist of a series of Arabic numerals, capital letters or a combination thereof, and may include the dash or hyphen (-). The total of Arabic numerals, capital letters and dashes or hyphens shall not exceed 14 and shall be one which has not been previously used in conjunction with:

11.2 FCC ID Label Contents and Location



12 Annex B (Normative) - EUT Photos

Please see attachments:

Exhibit – EUT Test Setup Photographs
Exhibit – EUT External Photographs
Exhibit – EUT Internal Photographs

13 Annex C (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 ---