

Emissions Test Report

EUT Name: Wi-Fi Router
Model No.: NVG5X8AC
CFR 47 Part 15.407 2018 and RSS 247: 2017

Prepared for:

ARRIS International plc
2500 Walsh Avenue
Santa Clara, CA 95051 U.S.A.
Tel: 1 (408) 235-5500
Fax:

Prepared by:

TUV Rheinland of North America, Inc.
1279 Quarry Lane
Pleasanton, CA 94566
Tel: (925) 249-9123
Fax: (925) 249-9124
<http://www.tuv.com/>

Report/Issue Date: September 12, 2019
Job # 0000163940
Report Number: 31964172.001

Revisions

Revision No.	Date MM/DD/YYYY	Reason for Change	Author
0	09/12/2019	Original Document	

Note: Latest revision report will replace all previous reports.

Statement of Compliance

Applicant: ARRIS International plc
2500 Walsh Avenue
Santa Clara, CA 95051
1 (408) 235-5500

Requester / Applicant: Wilson Wang

Name of Equipment: Wi-Fi Router
Model No. NVG5X8AC
Type of Equipment: Intentional Radiator
Application of Regulations: CFR 47 Part 15.407 2018 and RSS 247: 2017
Test Dates: Apr 15, 2019 to Jul 12, 2019

Guidance Documents:

Emissions: ANSI C63.10-2013, KDB 789033 D02 General UNII Test Procedures v02r01, KDB 662911 D01 Multiple Transmitter Output v02r01

Test Methods:

Emissions: ANSI C63.10-2013, KDB 789033 D02 General UNII Test Procedures v02r01

The electromagnetic compatibility test and documented data described in this report has been performed and recorded by TUV Rheinland, in accordance with the standards and procedures listed herein. As the responsible authorized agent of the EMC laboratory, I hereby declare that the equipment described above has been shown to be compliant with the EMC requirements of the stated regulations and standards based on these results. If any special accessories and/or modifications were required for compliance, they are listed in the Executive Summary of this report.

This report must not be used to claim product endorsement by A2LA or any agency of the U.S. Government. This report contains data that are not covered by A2LA accreditation. This report shall not be reproduced except in full, without the written authorization of TUV Rheinland of North America.



Colton Aliff,
Kerwinn Corpuz

Test Engineer

Date September 12, 2019

Richard Decker

A2LA Signatory

Date September 12, 2019



Testing Cert #3331.02



US1131



Industry
Canada

2932M

Table of Contents

1	Executive Summary	7
1.1	Scope	7
1.2	Purpose	7
1.3	Summary of Test Results	8
1.4	Special Accessories	8
1.5	Equipment Modifications	8
2	Laboratory Information	9
2.1	Accreditations & Endorsements	9
2.1.1	US Federal Communications Commission	9
2.1.2	NIST / A2LA	9
2.1.3	Canada – Industry Canada	9
2.1.4	Japan – VCCI	9
2.1.5	Acceptance by Mutual Recognition Arrangement	10
2.2	Test Facilities	10
2.2.1	Emission Test Facility	10
2.2.2	Immunity Test Facility	10
2.3	Measurement Uncertainty	10
2.3.1	Sample Calculation – radiated & conducted emissions	11
2.3.2	Measurement Uncertainty	11
2.3.3	Measurement Uncertainty Immunity	12
2.4	Calibration Traceability	12
3	Product Information	13
3.1	Product Description	13
3.2	Equipment Configuration	13
3.3	Operating Mode	13
3.4	Unique Antenna Connector	14
3.4.1	Results	14
3.5	Duty Cycle	15
3.5.1	Result	15
4	Emissions	18
4.1	Output Power Requirements	18
4.1.1	Test Method	18
4.1.2	Results	19
4.2	Occupied Bandwidth	60
4.2.1	Test Method	60
4.2.2	Results	60
4.3	Peak Power Spectral Density	71
4.3.1	Test Method	71
4.3.2	Results	71
4.4	Transmitter Spurious Emissions	86

Table of Contents

4.4.1	Test Methodology	86
4.4.2	Transmitter Spurious Emission Limit	87
4.4.3	Results	88
4.5	AC Conducted Emissions	173
4.5.1	Test Methodology	173
4.5.2	Test Results	173
4.6	Frequency Stability	178
4.6.1	Test Methodology	178
4.6.2	Manufacturer Declaration	178
5	Test Equipment List	179
5.1	Equipment List	179
6	EMC Test Plan	180
6.1	Introduction	180
6.2	Customer	180
6.3	Equipment Under Test (EUT)	181
6.4	Test Specifications	185

Index of Tables

Table 1: Summary of Test Results	8
Table 2: RF Output Power at the Antenna Port Test Results – Non Beamforming Mode	19
Table 3: RF Output Power at the Antenna Port Test Results – Straddle Channels	21
Table 4: RF Output Power at the Antenna Port Test Results – Beamforming Mode.....	22
Table 5: RF Output Power at the Antenna Port Test Results – Straddle Channels	23
Table 6: Occupied Bandwidth (U-NII-2A) – Test Results.....	61
Table 7: Occupied Bandwidth (U-NII-2C) – Test Results	62
Table 8: Peak Power Spectral Density – Test Results – Non Beamforming	72
Table 9: Peak Power Spectral Density – Test Results – Straddle Channels	74
Table 10: Peak Power Spectral Density – Test Results – Beamforming	75
Table 11: Peak Power Spectral Density – Test Results – Straddle Channels	76
Table 12: Transmit Spurious Emission at Band-Edge Requirements.....	88
Table 13: AC Conducted Emissions – Test Results.....	173
Table 14: Customer Information	180
Table 15: Technical Contact Information	180
Table 16: EUT Specifications	181
Table 18: EUT Channel Power Specifications	183
Table 19: Interface Specifications	184
Table 20: Supported Equipment	184
Table 21: Description of Sample used for Testing.....	184
Table 22: Description of Test Configuration used for Radiated Measurement.....	184
Table 23: Test Specifications.....	185

1 Executive Summary

1.1 Scope

This report is intended to document the status of conformance with the requirements of the CFR 47 Part 15.407 2018 and RSS 247: 2017 based on the results of testing performed on Apr 15, 2019 to Jul 12, 2019 on the Wi-Fi Router Model NVG5X8AC manufactured by ARRIS International plc. This report only applies to the specific samples tested under the stated test conditions. It is the responsibility of the manufacturer to assure that additional production units of this model are manufactured with identical or EMI equivalent electrical and mechanical components. This report is further intended to document changes and modifications to the EUT throughout its life cycle. All documentation will be included as a supplement.

1.2 Purpose

Testing was performed to evaluate the EMC performance of the EUT in accordance with the applicable requirements, procedures, and criteria defined in the application of regulations and application of standards listed in this report. This report will document the result for operating frequency bands 5250 to 5350 MHz and 5470 MHz to 5725 MHz with additional band-crossing signal into 5725 MHz to 5825 MHz band.

Note: Per RSS-247, 5600 MHz – 5650 MHz band shall not be capable of transmitting.

1.3 Summary of Test Results

Table 1: Summary of Test Results

Test	Test Method ANSI C63.10	Test Parameters (Measured)	Result
Spurious Emission in Transmitted Mode	CFR47 15.209, CFR47 15.407 (b), 2.1053, 2.1057, RSS-GEN Sect.8.9, RSS 247 Sect. 6.2.2.2, Sect 6.2.3.2	Class B	Complied
Restricted Bands of Operation	CFR47 15.205, RSS GEN Sect.8.10	Class B	Complied
AC Power Conducted Emission	CFR47 15.207, RSS-GEN Sect.8.8	Class B	Complied
Occupied Bandwidth	CFR47 15.407 (a), 2.1049, RSS GEN Sect.6.7	See plots	Complied
Maximum Output Power	CFR47 15.407 (a), 2.1046 RSS 247 Sect 6.2.2.1 & Sect.6.2.3.1 [see note 2]	22.07 dBm (11a) 21.80 dBm (HT 20) 21.50 dBm (HT 40) 18.40 dBm (VHT80)	Complied
Peak Power Spectral Density	CFR47 15.407 (a)	< 11 dBm/MHz	Complied
Peak Power Spectral Density	RSS 247 Sect.6.2.2.1 & 6.2.3.1	< 11 dBm/MHz	Complied
Conducted Emission – Antenna Port	CFR47 15.407 (b), 2.1051, 2.1057, RSS 247 Sect.6.2.2.2 & Sect 6.2.3.2	30 MHz - 40 GHz < -27 dBm/MHz	Complied
Frequency Stability	CFR47 15.407 (g), 2.1055, RSS GEN Sect. 6.11	±20 ppm	Complied
RF Exposure	CFR47 15.407 (f), 2.1091 RSS-102 Issue 5	General Population	Complied

Note: 1. This test report covers band 5250MHz to 5725MHz with band-crossing signals into > 5725MHz.
 2. Measurements are conducted for 4x4 MIMO total power non-beamforming.
 3. Per RSS-247, 5600 MHz – 5650 MHz band shall not be capable of transmitting.

1.4 Special Accessories

No special accessories were necessary in order to achieve compliance.

1.5 Equipment Modifications

None

2 Laboratory Information

2.1 Accreditations & Endorsements

2.1.1 US Federal Communications Commission



TUV Rheinland of North America at 1279 Quarry Ln, Pleasanton, CA 94566 is recognized by the commission for performing testing services for the general public on a fee basis. These laboratory test facilities have been fully described in reports submitted to and accepted by the FCC (US1131). The laboratory scope of accreditation includes: Title 47 CFR Parts 15, 18, and 90. The accreditation is updated every 3 years.

2.1.2 NIST / A2LA



TUV Rheinland of North America is accredited by the National Voluntary Laboratory Accreditation Program, which is administered under the auspices of the National Institute of Standards and Technology. The laboratory has been assessed and accredited in accordance with ISO Guide 17025:1999 and ISO 9002 (Lab Code Testing Cert #3331.02). The scope of laboratory accreditation includes emission and immunity testing. The accreditation is updated annually.

2.1.3 Canada – Industry Canada



TUV Rheinland of North America at the 1279 Quarry Ln, Pleasanton, CA 94566 address is accredited by Industry Canada for performing testing services for the general public on a fee basis. This laboratory test facilities have been fully described in reports submitted to and accepted by Industry Canada (File Number 2932M). This reference number is the indication to the Industry Canada Certification Officers that the site meets the requirements of RSS 212, Issue 1 (Provisional). The accreditation is updated every 3 years.

2.1.4 Japan – VCCI



The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) is a group that consists of Information Technology Equipment (ITE) manufacturers and EMC test laboratories. The purpose of the Council is to take voluntary control measures against electromagnetic interference from Information Technology Equipment, and thereby contribute to the development of a socially beneficial and responsible state of affairs in the realm of Information Technology Equipment in Japan. TUV Rheinland of North America at 1279 Quarry Ln, Pleasanton, CA 94566 has been assessed and approved in accordance with the Regulations for Voluntary Control Measures.

VCCI Registration No. for Pleasanton: A-0261

2.1.5 Acceptance by Mutual Recognition Arrangement



The United States has an established agreement with specific countries under the Asia Pacific Laboratory Accreditation Corporation (APLAC) Mutual Recognition Arrangement. Under this agreement, all TUV Rheinland at 1279 Quarry Ln, Pleasanton, CA 94566 test results and test reports within the scope of the laboratory NIST / A2LA accreditation will be accepted by each member

country.

2.2 Test Facilities

All of the test facilities are located at 1279 Quarry Lane, Pleasanton, California 94566, USA. The 2305 Mission College, Santa Clara, 95054, USA location is considered a Pleasanton annex.

2.2.1 Emission Test Facility

The Semi-Anechoic chamber and AC Line Conducted measurement facility used to collect the radiated and conducted data has been constructed in accordance with ANSI C63.7:1992. The site has been measured in accordance with and verified to comply with the theoretical normalized site attenuation requirements of ANSI C63.4-2014, at a test distance of 3 and 5 meters. The site is listed with the FCC and accredited by A2LA (Lab Code Testing Cert #3331.02). The 3/5-meter semi-anechoic chamber used to collect the radiated data has been verified to comply with the theoretical normalized site attenuation requirements of ANSI C63.4-2014, at a test distance of 3 meter and 5 meters. A report detailing this site can be obtained from TUV Rheinland of North America.

2.2.2 Immunity Test Facility

ESD, EFT, Surge, PQF: These tests are performed in an environmentally controlled room with a 3.7 m x 4.8 m x 3.175 mm thick aluminum floor connected to PE ground.

For ESD testing, tabletop equipment is placed on an insulated mat with a surface resistivity of 10^9 Ohms/square on a 1.6 m x 0.8 m x 0.8 m high non-conductive table with a 3.175 mm aluminum top (Horizontal Coupling Plane). The HCP is connected to the main ground plane via a low impedance ground strap through two 470-k Ω resistors. The Vertical Coupling Plane consists of an aluminum plate 50 cm x 50 cm x 3.175 mm thick. The VCP is connected to the main ground plane via a low impedance ground strap through two 470-k Ω resistors.

For EFT, Surge, PQF, the HCP and VCP are removed.

RF Field Immunity testing is performed in a 7.3m x 4.3m x 4.1m anechoic chamber.

RF Conducted and Magnetic Field Immunity testing is performed on a 4.8m x 3.7m x 3.175mm thick aluminum ground plane.

All test areas allow a minimum distance of 1 meter from the EUT to walls or conducting objects.

2.3 Measurement Uncertainty

Two types of measurement uncertainty are expressed in this report, per *ISO Guide To The Expression Of Uncertainty In Measurement*, 1st Edition, 1995.

The *Combined Standard Uncertainty* is the standard uncertainty of the result of a measurement when that result is obtained from the values of a number of other quantities; it is equal to the positive square root of the sum of the variances or co-variances of these other quantities, weighted according to how the measurement result varies with changes in these quantities. The term *standard uncertainty* is the result of a measurement expressed as a standard deviation.

2.3.1 Sample Calculation – radiated & conducted emissions

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

$$\text{Field Strength (dB}\mu\text{V/m)} = \text{RAW} - \text{AMP} + \text{CBL} + \text{ACF}$$

Where: RAW = Measured level before correction (dBμV)

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

$$\mu\text{V/m} = 10^{\frac{\text{dB}\mu\text{V/m}}{20}}$$

Sample radiated emissions calculation @ 30 MHz

Measurement +Antenna Factor–Amplifier Gain+Cable loss=Radiated Emissions (dBuV/m)

$$25 \text{ dBuV/m} + 17.5 \text{ dB} - 20 \text{ dB} + 1.0 \text{ dB} = 23.5 \text{ dBuV/m}$$

2.3.2 Measurement Uncertainty

Per CISPR 16-4-2	U _{lab}	U _{cispr}
Radiated Disturbance @ 10 meters		
30 – 1,000 MHz	2.25 dB	4.51 dB
Radiated Disturbance @ 3 meters		
30 – 1,000 MHz	2.26 dB	4.52 dB
1 – 6 GHz	2.12 dB	4.25 dB
6 – 18 GHz	2.47 dB	4.93 dB
Conducted Disturbance @ Mains Terminals		
150 kHz – 30 MHz	1.09 dB	2.18 dB
Disturbance Power		
30 MHz – 300 MHz	3.92 dB	4.3 dB

Voltech PM6000A

The estimated combined standard uncertainty for harmonic current and flicker measurements is $\pm 5.0\%$.	Per CISPR 16-4-2 Methods
--	--------------------------

2.3.3 Measurement Uncertainty Immunity

The estimated combined standard uncertainty for ESD immunity measurements is $\pm 8.2\%$.	Per IEC 61000-4-2
The estimated combined standard uncertainty for radiated immunity measurements is ± 4.10 dB.	Per IEC 61000-4-3
The estimated combined standard uncertainty for conducted immunity measurements with CDN is ± 3.66 dB	Per IEC 61000-4-6
The estimated combined standard uncertainty for power frequency magnetic field immunity is $\pm 2.9\%$.	Per IEC 61000-4-8

Thermo KeyTek EMC Pro

The estimated combined standard uncertainty for EFT fast transient immunity measurements is $\pm 2.6\%$.
The estimated combined standard uncertainty for surge immunity measurements is $\pm 2.6\%$.
The estimated combined standard uncertainty for voltage variation and interruption measurements is $\pm 1.74\%$.

The expanded uncertainty at a level of 95% confidence is obtained by multiplying the combined standard uncertainty by a coverage factor of 2. Compliance criteria are not based on measurement uncertainty.

2.4 Calibration Traceability

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Measurement method complies with ANSI/NCSL Z540-1-1994 and ISO Standard 17025:2005. Equipment calibration records are kept on file at the test facility.

3 Product Information

3.1 Product Description

The Model NVG5X8AC, Wi-Fi Router, is a Wi-Fi Router for the home capable of operating in the 2.4 GHz and 5 GHz frequency bands over 20 MHz, 40 MHz and 80 MHz channels.

3.2 Equipment Configuration

A description of the equipment configuration is given in the Test Plan Section. The EUT was tested as called for in the test standard and was configured and operated in a manner consistent with its intended use. The EUT was connected to rated power and allowed to reach intended operating conditions. The placement of the EUT system components was guided by the test standard and selected to represent typical installation conditions.

In the case of an EUT that can operate in more than one configuration, preliminary testing was performed to determine the configuration that produced maximum radiation.

The final configuration was selected to produce the worst case radiation for emissions testing and to place the EUT in the most susceptible state for immunity testing.

3.3 Operating Mode

A description of the operation mode is given in the Test Plan Section. In the case of an EUT that can operate in more than one state, preliminary testing was performed to determine the operating mode that produced maximum radiation.

The final operating mode was selected to produce the worst case radiation for emissions testing and to place the EUT in the most susceptible state for immunity testing.

3.4 Unique Antenna Connector

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. This requirement does not apply to carrier current devices or to devices operated under the provisions of CFR47 Parts 15.211, 15.213, 15.217, 15.219, or 15.221.

3.4.1 Results

The Wi-Fi Router has 8 PCB antennas for both 2.4GHz and 5GHz ranges. The 5250 – 5350 MHz and 5470 – 5725 MHz bands uses four 5-GHz band Printed Circuit Board (PCB) dipole antennas; connecting to the module via U.FL connectors. The antenna gains are listed below;

Antenna Peak Gain for 5-GHz WiFi Antennas				
Frequency (MHz)	Ant 1 (dBi)	Ant 2 (dBi)	Ant 3 (dBi)	Ant 4 (dBi)
5150	4.8	4.6	4.0	4.0
5200	4.8	4.3	4.1	4.4
5300	4.8	4.4	4.3	4.7
5400	4.3	4.0	4.7	4.3
5500	4.1	4.0	4.8	4.7
5600	4.4	4.7	5.0	4.9
5700	4.6	4.9	5.6	5.0
5800	3.9	4.8	5.3	4.9
5850	4.4	4.7	4.9	5.2

Correlated Composite Peak Gain: 5-GHz WiFi Antennas			
Frequency (MHz)	Correlated Total Gain (dBi)	Correlated Phi Gain (dBi)	Correlated Theta Gain (dBi)
5150	8.1	4.8	6.5
5200	8.1	5.0	6.4
5300	8.3	5.2	6.8
5400	7.9	5.2	6.2
5500	7.8	5.0	6.1
5600	8.0	5.0	6.2
5700	8.6	4.7	6.9
5800	8.5	5.3	7.1
5850	8.8	5.6	7.3

3.5 Duty Cycle

The WiFi Router was measured for the duty cycle.

Calculation of transmit duty cycle. The duty cycle (%) = (ON time / Period) * 100%

3.5.1 Result

Mode	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Factor (dB)
802.11a	2.055	2.085	98.60	0.00
802.11n HT20/ VHT20	1.925	1.950	98.70	0.00
802.11n HT40/ VHT40	0.933	0.972	96.00	0.18
802.11ac VHT80	0.4355	0.4799	90.70	0.42

Notes: EUT configured and measured for duty cycle. Duty factor will be used toward RF measurement offset.



Figure 1: Duty Cycle for 802.11a at 5260MHz



Figure 2: Duty Cycle for 802.11n HT20 and 802.11ac VHT20 at 5260MHz



Figure 3: Duty Cycle for 802.11n HT40 and 802.11ac VHT40 at 5270MHz



Figure 4: Duty Cycle for 802.11ac VHT80 at 5290MHz

4 Emissions

Testing was performed in accordance with CFR 47 Part 15.407: 2018 and RSS 247: 2017. These test methods are listed under the laboratory's A2LA Scope of Accreditation. This test measures the levels emanating from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices. Procedures described in section 8 of the standard were used.

4.1 Output Power Requirements

The maximum output power requirement is the maximum equivalent isotropic radiated power delivering at the transmitting antenna under specified conditions of measurements in the presence of modulation.

The maximum output power and harmonics shall not exceed CFR47 Part 15.407 (a) and RSS 247 Sect. 6.2.

Part 15.407(a)(2); RSS-247 Section 6.2.2.1(a) and Section 6.2.3.1 – Band 5250-5350 MHz and 5470-5725 MHz (conducted output power) : 250 mW or 11 dBm + 10 log B.

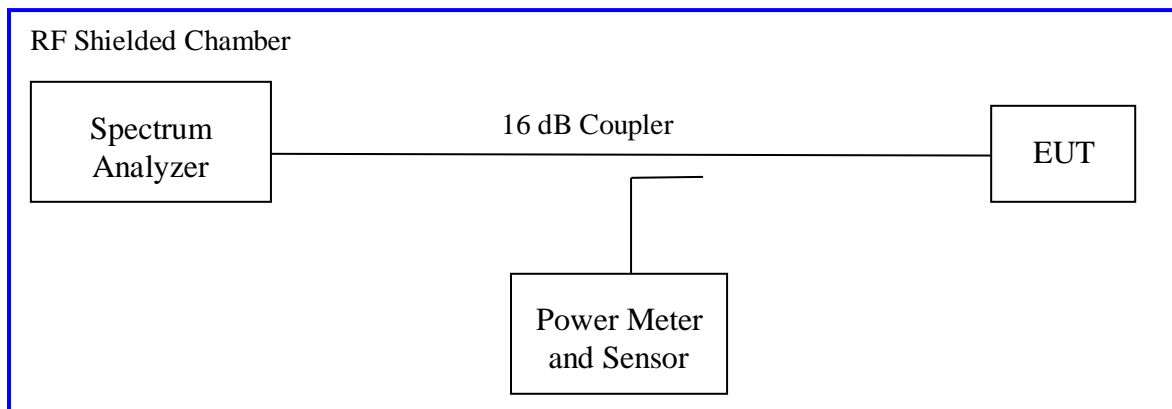
Where B is 26 dB Bandwidth.

Per RSS-247 Section 6.2.3, 5600 MHz – 5650 MHz band shall not be capable of transmitting.

4.1.1 Test Method

The ANSIC63.10-2013 Section 12.3.2.2 conducted method was used to measure the channel power output. The preliminary investigation was performed at different data rate/ chain to determine the highest power output for each mode. The worst findings were conducted on 2 or 3 channels in each operating range per CFR47 Part 15.407(a) and RSS 247 Sect. 6.2; 5250 MHz to 5725 MHz. The worst mode results indicated below.

Test Setup:



Method SA-2 of “KDB 789033 D02 – Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices” were used.

Each chain was measured individually and applied the measure-and-sum approach per KDB662911.

The total directional gain was calculated by summing 4 antennas.

4.1.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 2: RF Output Power at the Antenna Port Test Results – Non Beamforming Mode

Test Date: July 09, 2019				Test By: James Borrott				
Test Method: Conducted Measurements				Power Setting: See test plan				
Antenna Type: PCB				Max. Antenna Gain: 4.8 dBi (5.3GHz) & 5.6 dBi (5.7GHz)				
Operating Mode: Non Beamforming & Uncorrelated				Signal State: Modulated				
Ambient Temp.: 23 °C				Relative Humidity: 45%				
Remark: Highlighted data, its plots are placed in the report.								
802.11a, 1x4								
Freq. (MHz)	Limit [dBm]	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	RMS Power [dBm]	Margin [dB]
5260	24.00	20.36	21.04	21.06	21.43	0.00	21.43	-2.57
5300	24.00	20.79	21.37	21.40	21.69	0.00	21.69	-2.31
5320	24.00	17.08	17.55	17.96	18.19	0.00	18.19	-5.81
5500	24.00	16.50	16.95	16.89	16.91	0.00	16.95	-7.05
5600	24.00	21.40	21.97	22.07	21.14	0.00	22.07	-1.93
5700	24.00	15.84	16.50	16.51	15.62	0.00	16.51	-7.49
Note: The highest output power observed at 802.11a, 6Mbps, 1 Data Stream, 98.6% duty cycle.								
802.11n HT20, 1x4								
Freq. (MHz)	Limit [dBm]	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	RMS Power [dBm]	Margin [dB]
5260	24.00	20.43	20.91	20.95	21.39	0.00	21.39	-2.61
5300	24.00	20.83	21.26	21.51	21.77	0.00	21.77	-2.23
5320	24.00	17.70	18.02	18.19	18.59	0.00	18.59	-5.41
5500	24.00	16.74	17.25	17.21	17.13	0.00	17.25	-6.75
5600	24.00	21.40	21.73	21.80	20.95	0.00	21.80	-2.20
5700	24.00	16.23	16.81	16.83	15.98	0.00	16.83	-7.17
Note: The highest output power observed at MCS0, 1 Data Stream, 98.7% duty cycle.								

802.11n HT40, 1x4								
Freq. (MHz)	Limit [dBm]	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	RMS Power [dBm]	Margin [dB]
5270	24.00	19.57	20.40	19.72	20.01	0.18	20.40	-3.60
5310	24.00	15.61	16.52	16.11	16.11	0.18	16.52	-7.48
5510	24.00	14.49	15.66	14.86	14.81	0.18	15.66	-8.34
5590	24.00	20.53	21.50	21.22	20.75	0.18	21.50	-2.50
5670	24.00	16.30	16.91	16.14	15.88	0.18	16.91	-7.09
Note: The highest output power observed at MCS0, 1 Data Stream, 96.0% duty cycle.								
802.11ac VHT80, 1x4								
Freq. (MHz)	Limit [dBm]	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	RMS Power [dBm]	Margin [dB]
5290	24.00	15.03	17.12	15.71	16.03	0.42	17.12	-6.88
5530	24.00	11.67	14.31	12.94	13.05	0.42	14.31	-9.69
5610	24.00	17.59	18.40	18.30	17.10	0.42	18.40	-5.60
Note: The highest output power observed at MCS0, 1 Data Stream, 90.7% duty cycle.								

Table 3: RF Output Power at the Antenna Port Test Results – Straddle Channels

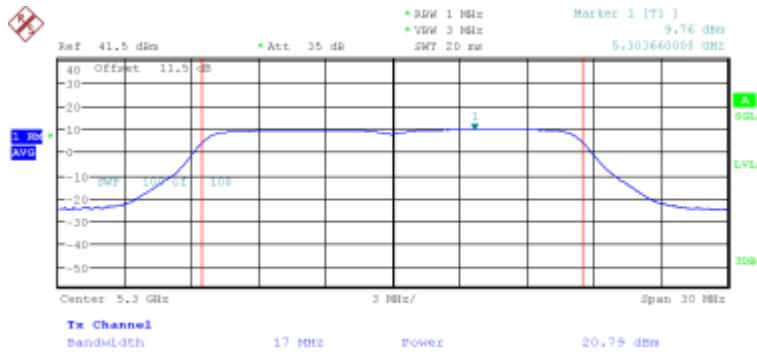
Test Date: July 12, 2019					Test By: James Borrott			
Test Method: Conducted Measurements					Power Setting: See test plan			
Antenna Type: PCB					Max. Antenna Gain: 5.6 dBi (UNII2C) & 4.6 dBi (UNII3)			
Operating Mode: Non Beamforming & Uncorrelated					Signal State: Modulated			
Ambient Temp.: 23 °C					Relative Humidity: 43%			
Remark: 1. Limit = 11 dBm + 10 log B, where B is 26 dB EBW, or 24 dBm, (whichever is lesser). 2. Highlighted data, its plots are placed in the report.								
802.11a (5720 MHz), 1x4								
Operating Band	Limit [dBm]	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	RMS Power [dBm]	Margin [dB]
U-NII-2C	23.02	20.12	20.98	21.12	21.11	0.00	21.12	-1.90
U-NII-3	15.81	13.89	14.47	14.62	14.58	0.00	14.62	-1.19
Note: The highest output power observed at 6Mbps, 1 Data Stream, 98.6% duty cycle.								
802.11n HT20 (5720 MHz), 1x4								
Operating Band	Limit [dBm]	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	RMS Power [dBm]	Margin [dB]
U-NII-2C	23.19	20.31	21.29	21.1	20.06	0.00	21.29	-1.90
U-NII-3	16.77	14.52	15.61	15.33	14.33	0.00	15.61	-1.16
Note: The highest output power observed at MCS0, 1 Data Stream, 98.7% duty cycle.								
802.11n HT40 (5710 MHz), 1x4								
Operating Band	Limit [dBm]	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	RMS Power [dBm]	Margin [dB]
U-NII-2C	24.00	21.01	21.68	20.97	20.72	0.18	21.86	-2.14
U-NII-3	16.00	10.67	11.44	10.63	10.46	0.18	11.62	-4.38
Note: The highest output power observed at MCS0, 1 Data Stream, 96.0% duty cycle.								
802.11ac VHT80 (5690 MHz), 1x4								
Operating Band	Limit [dBm]	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	RMS Power [dBm]	Margin [dB]
U-NII-2C	24.00	17.68	19.06	18.84	17.65	0.42	19.48	-4.52
U-NII-3	15.96	4.319	5.82	5.33	4.32	0.42	6.24	-9.72
Note: The highest output power observed at MCS0, 1 Data Stream, 90.7% duty cycle.								

Table 4: RF Output Power at the Antenna Port Test Results – Beamforming Mode

Test Date: July 11, 2019					Test By: James Borrott			
Test Method: Conducted Measurements					Power Setting: See test plan			
Antenna Type: PCB					Total Antenna Gain: 8.3 dBi (5.3GHz) & 8.6 dBi (5.7GHz)			
Operating Mode: Beamforming & Correlated					Signal State: Modulated			
Ambient Temp.: 23 °C					Relative Humidity: 47%			
Remark: 1. If antenna exceeds 6dBi, apply: POut = PLimit – (GTx – 6) 2. The limit is calculated with 6dBi exceeded antenna gain 3. 802.11a does not support beamforming mode or correlated 4. Highlighted data, its plots are placed in the report.								
802.11n HT20, 4x4								
Freq. (MHz)	Limit [dBm]	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Total RMS Power [dBm]	Margin [dB]
5260	21.7	12.84	13.75	13.61	14.03	0.00	19.60	-2.10
5300	21.7	13.13	13.48	13.73	13.99	0.00	19.61	-2.09
5320	21.7	12.91	13.80	13.93	14.15	0.00	19.74	-1.96
5500	21.4	13.20	13.71	13.45	12.88	0.00	19.34	-2.06
5600	21.4	13.16	13.84	13.80	12.77	0.00	19.44	-1.96
5700	21.4	12.85	13.78	13.47	12.67	0.00	19.24	-2.16
Note: 1. The highest output power observed at MCS0, 4 Data Streams, 98.7% duty cycle. 2. 802.11a does not support beamforming mode or correlated.								
802.11n HT40, 4x4								
Freq. (MHz)	Limit [dBm]	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Total RMS Power [dBm]	Margin [dB]
5270	21.7	14.74	15.75	15.03	15.46	0.18	21.28	-0.42
5310	21.7	14.98	16.07	15.45	15.74	0.18	21.60	-0.10
5510	21.4	14.49	15.66	14.86	14.81	0.18	21.00	-0.40
5590	21.4	14.81	15.97	15.29	15.26	0.18	21.37	-0.03
5670	21.4	15.05	15.65	15.21	14.75	0.18	21.20	-0.20
Note: The highest output power observed at MCS0, 4 Data Streams, 98.7% duty cycle.								
802.11ac VHT80, 4x4								
Freq. (MHz)	Limit [dBm]	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Total RMS Power [dBm]	Margin [dB]
5290	21.7	13.98	16.12	14.83	14.98	0.42	21.07	-0.63
5530	21.4	11.67	14.31	12.94	13.05	0.42	19.11	-2.29
5610	21.4	14.52	15.50	15.30	14.50	0.42	21.00	-0.40
Note: The highest output power observed at MCS0, 4 Data Streams, 90.7% duty cycle.								

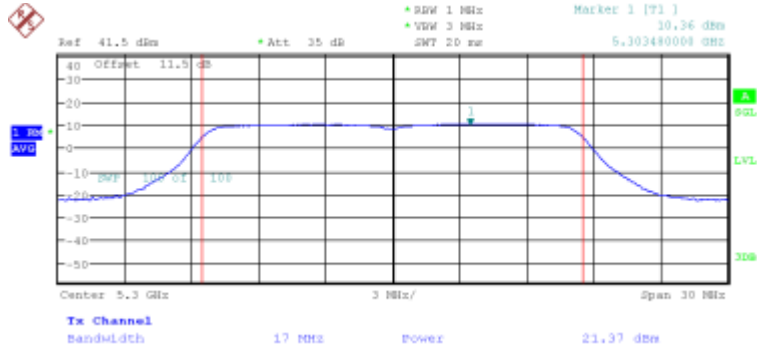
Table 5: RF Output Power at the Antenna Port Test Results – Straddle Channels

Test Date: July 12, 2019					Test By: James Borrott			
Test Method: Conducted Measurements					Power Setting: See test plan			
Antenna Type: PCB					Total Antenna Gain: 8.6 dBi (UNII2C) & 8.8 dBi (UNII3)			
Operating Mode: Beamforming & Correlated					Signal State: Modulated			
Ambient Temp.: 23 °C					Relative Humidity: 43%			
Remark: 1. Limit = 11 dBm + 10 log B, where B is 26 dB EBW, or 24 dBm, (whichever is lesser). 2. If antenna exceeds 6dBi, apply: POut = PLimit – (GTx – 6) 3. The limit is calculated with 6dBi exceeded antenna gain 4. 802.11a does not support beamforming mode or correlated 5. Highlighted data, its plots are placed in the report.								
802.11n HT20, 4x4								
Operating Band	Limit [dBm]	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Total RMS Power [dBm]	Margin [dB]
U-NII-2C	20.59	12.47	13.29	13.09	12.41	0.00	18.85	-1.74
U-NII-3	13.97	6.34	7.52	7.15	6.56	0.00	12.94	-1.04
Note: The highest output power observed at MCS0, 4 Data Streams, 98.7% duty cycle.								
802.11n HT40, 4x4								
Operating Band	Limit [dBm]	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Total RMS Power [dBm]	Margin [dB]
U-NII-2C	23.92	14.91	15.8	15.1	14.93	0.18	21.40	-2.52
U-NII-3	13.20	4.31	5.37	4.62	4.58	0.18	10.94	-2.26
Note: The highest output power observed at MCS0, 4 Data Streams, 98.7% duty cycle.								
802.11ac VHT80, 4x4								
Operating Band	Limit [dBm]	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Total RMS Power [dBm]	Margin [dB]
U-NII-2C	21.40	14.52	15	15.44	14.7	0.42	21.37	-0.03
U-NII-3	13.16	0.97	2.33	1.95	1.29	0.42	8.11	-5.05
Note: The highest output power observed at MCS0, 4 Data Streams, 90.7% duty cycle.								



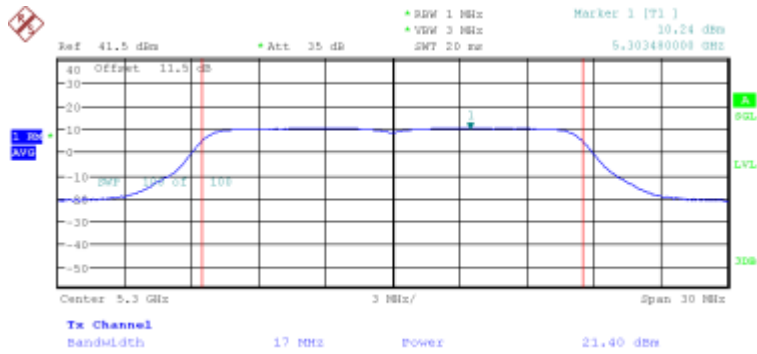
Date: 9.JUL.2019 14:48:58

Figure 5: RMS Max Power-802.11a-5300MHz-1x4-q96-Ch0



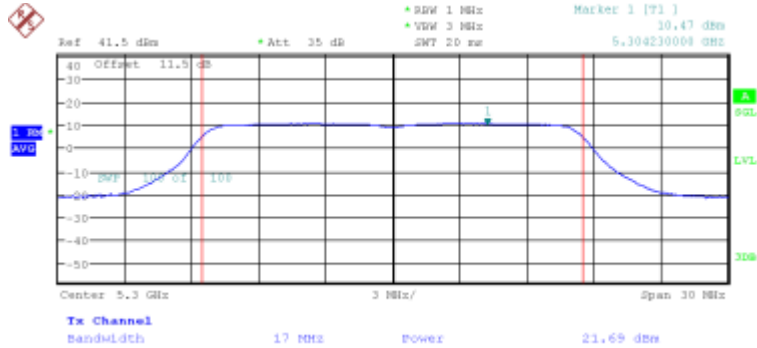
Date: 9.JUL.2019 14:50:51

Figure 6: RMS Max Power-802.11a-5300MHz-1x4-q96-Ch1



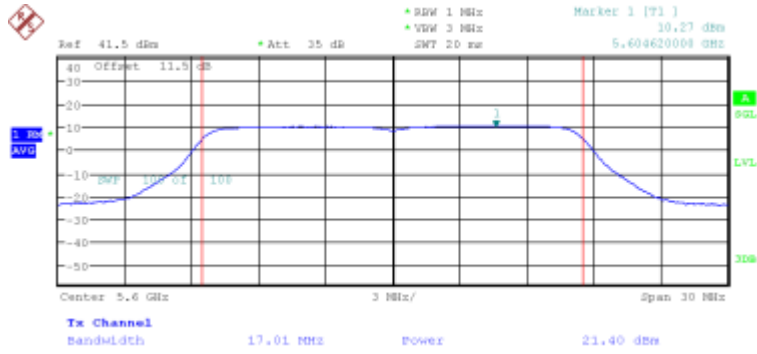
Date: 9.JUL.2019 14:51:35

Figure 7: RMS Max Power-802.11a-5300MHz-1x4-q96-Ch2



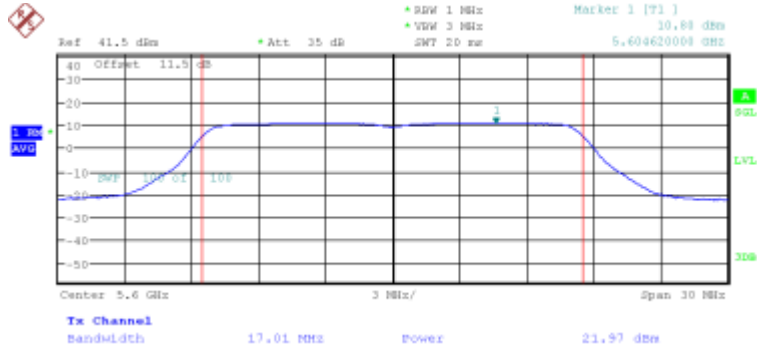
Date: 9.JUL.2019 14:52:56

Figure 8: RMS Max Power-802.11a-5300MHz-1x4-q96-Ch3



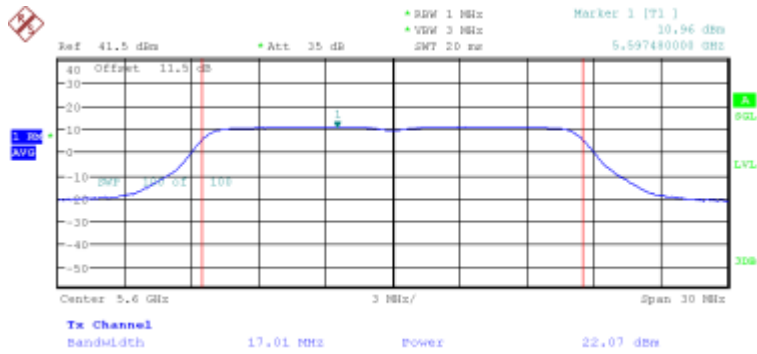
Date: 9.JUL.2019 15:07:33

Figure 9: RMS Max Power-802.11a-5600MHz-1x4-q96-Ch0



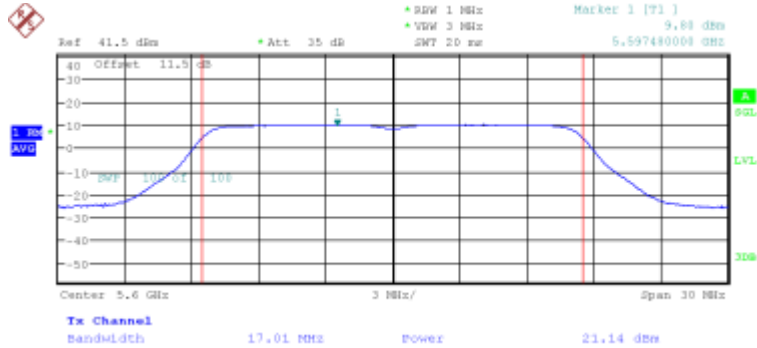
Date: 9.JUL.2019 15:08:25

Figure 10: RMS Max Power-802.11a-5600MHz-1x4-q96-Ch1



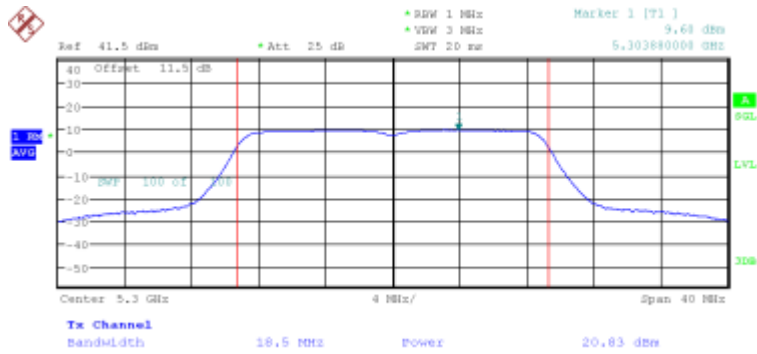
Date: 9.JUL.2019 19:12:32

Figure 11: RMS Max Power-802.11a-5600MHz-1x4-q96-Ch2



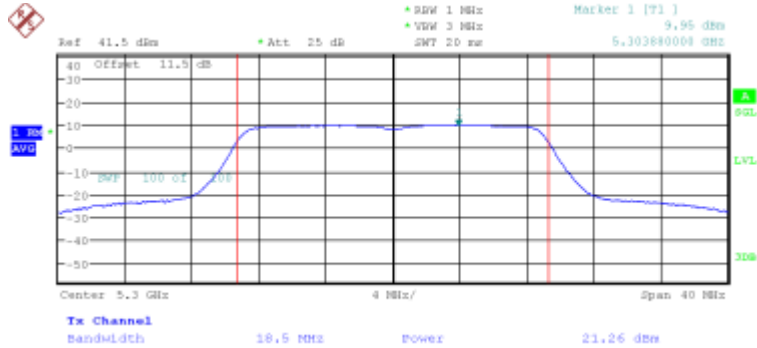
Date: 9.JUL.2019 19:13:15

Figure 12: RMS Max Power-802.11a-5600MHz-1x4-q96-Ch3



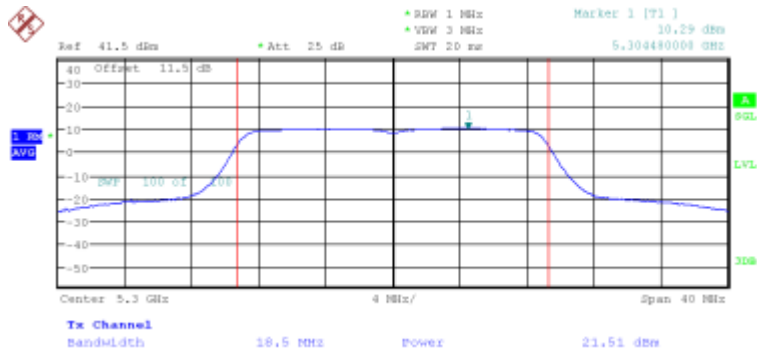
Date: 10.JUL.2019 07:54:10

Figure 13: RMS Max Power-802.11n (HT20)-5300MHz-1x4-q95-Ch0



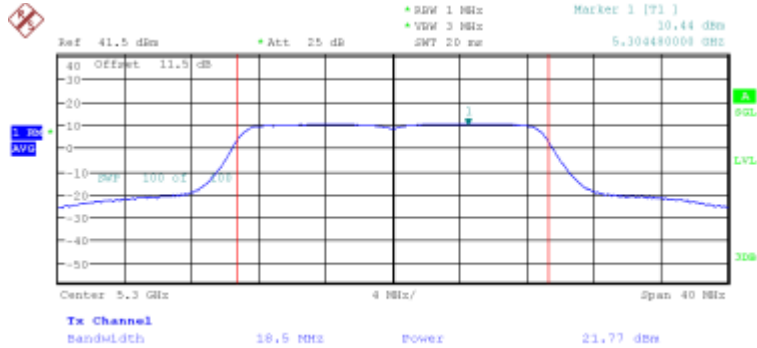
Date: 10.JUL.2019 07:55:00

Figure 14: RMS Max Power-802.11n (HT20)-5300MHz-1x4-q95-Ch1



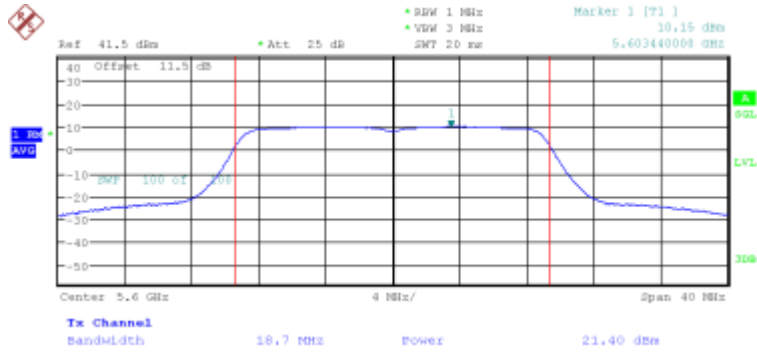
Date: 10.JUL.2019 07:56:36

Figure 15: RMS Max Power-802.11n (HT20)-5300MHz-1x4-q95-Ch2



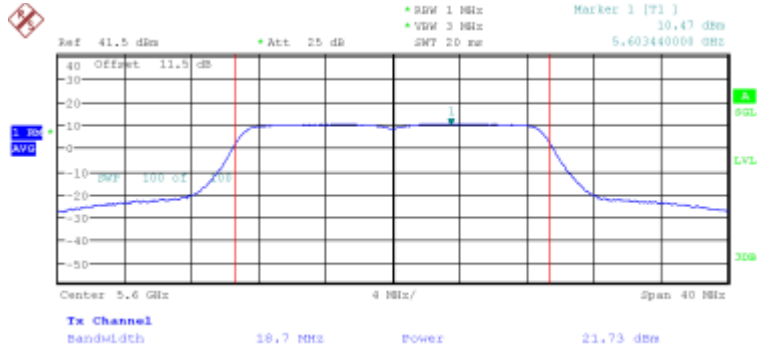
Date: 10.JUL.2019 07:57:21

Figure 16: RMS Max Power-802.11n (HT20)-5300MHz-1x4-q95-Ch3



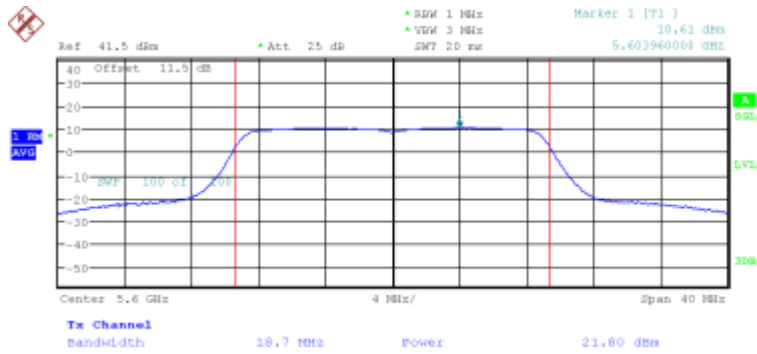
Date: 10.JUL.2019 09:52:00

Figure 17: RMS Max Power-802.11n (HT20)-5600MHz-1x4-q95-Ch0



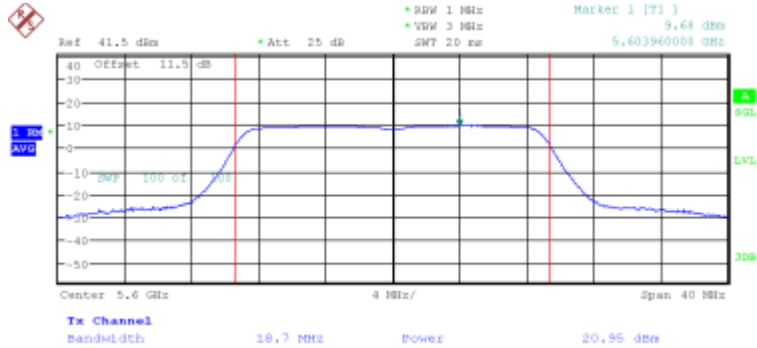
Date: 10.JUL.2019 09:52:40

Figure 18: RMS Max Power-802.11n (HT20)-5600MHz-1x4-q95-Ch1



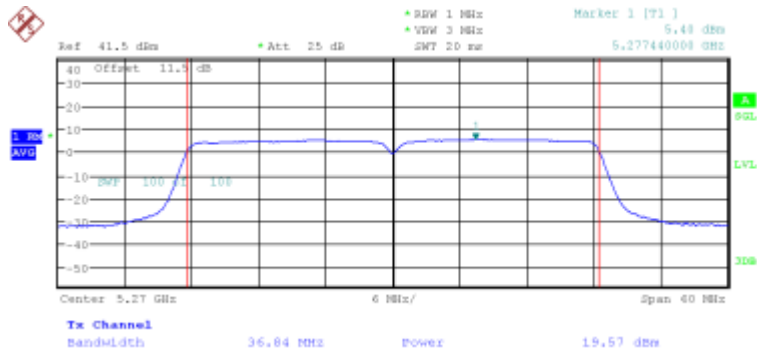
Date: 10.JUL.2019 09:54:26

Figure 19: RMS Max Power-802.11n (HT20)-5600MHz-1x4-q95-Ch2



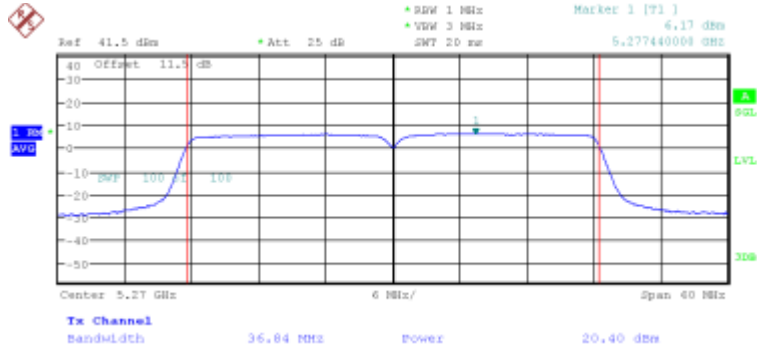
Date: 10.JUL.2019 09:55:20

Figure 20: RMS Max Power-802.11n (HT20)-5600MHz-1x4-q95-Ch3



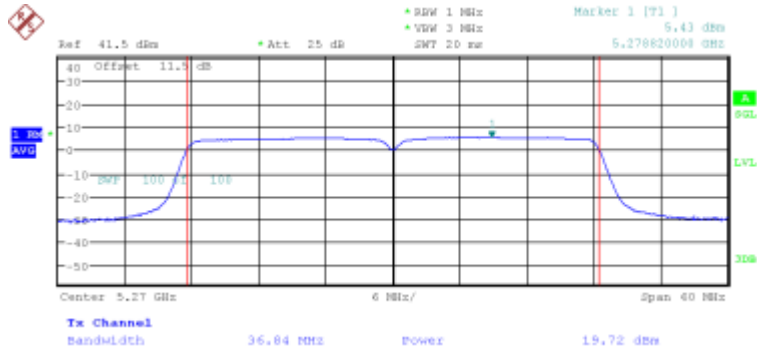
Date: 10.JUL.2019 11:20:26

Figure 21: RMS Max Power-802.11n (HT40)-5270MHz-q96-1x4-Ch0



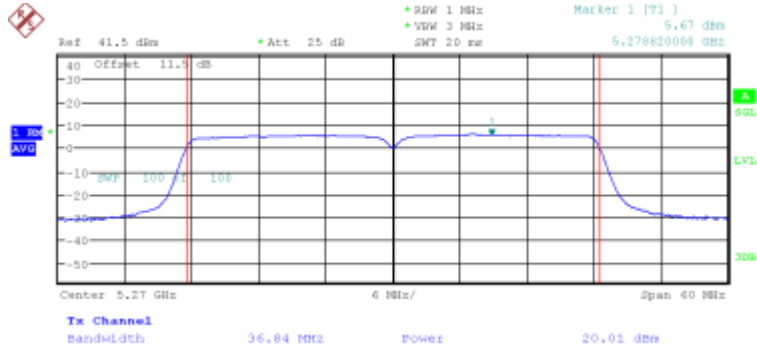
Date: 10.JUL.2019 11:21:11

Figure 22: RMS Max Power-802.11n (HT40)-5270MHz-q96-1x4-Ch1



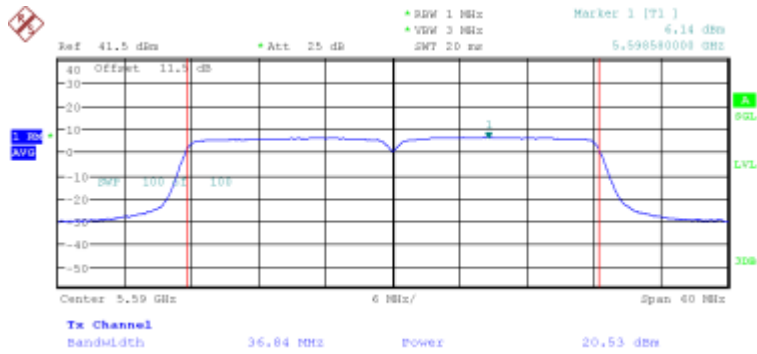
Date: 10.JUL.2019 11:22:45

Figure 23: RMS Max Power-802.11n (HT40)-5270MHz-q96-1x4-Ch2



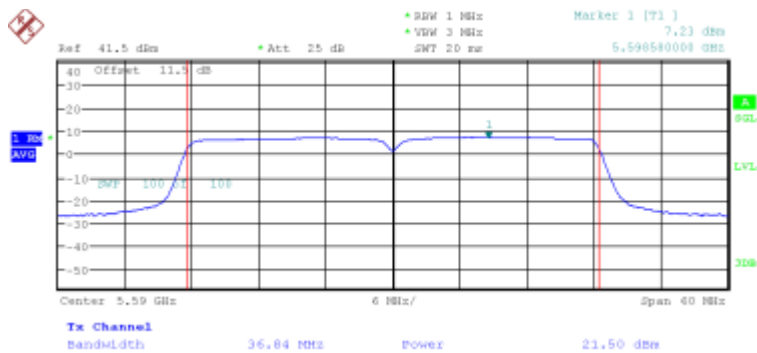
Date: 10.JUL.2019 11:23:31

Figure 24: RMS Max Power-802.11n (HT40)-5270MHz-q96-1x4-Ch3



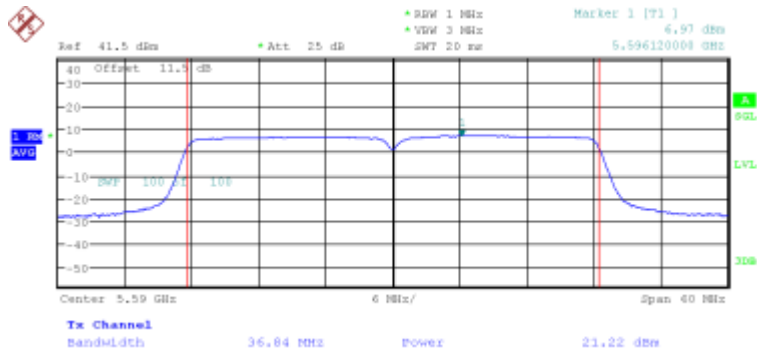
Date: 10.JUL.2019 13:40:09

Figure 25: RMS Max Power-802.11n (HT40)-5590MHz-q96-1x4-Ch0



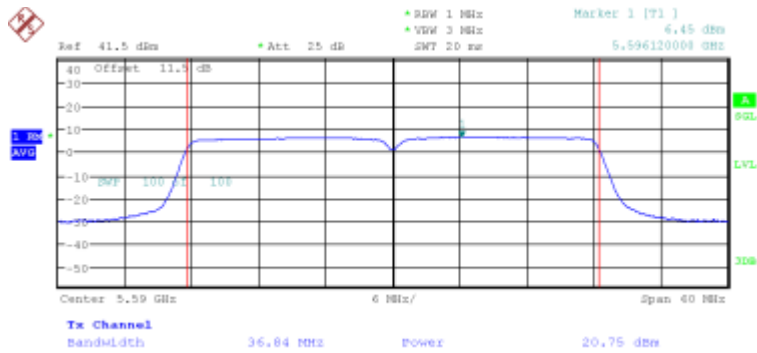
Date: 10.JUL.2019 13:41:11

Figure 26: RMS Max Power-802.11n (HT40)-5590MHz-q96-1x4-Ch1



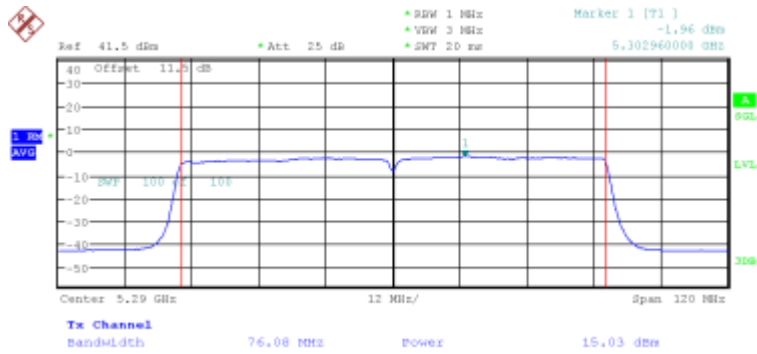
Date: 10.JUL.2019 13:42:39

Figure 27: RMS Max Power-802.11n (HT40)-5590MHz-q96-1x4-Ch2



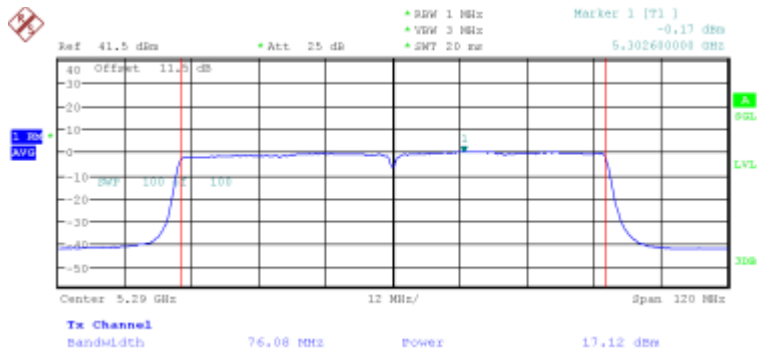
Date: 10.JUL.2019 13:43:17

Figure 28: RMS Max Power-802.11n (HT40)-5590MHz-q96-1x4-Ch3



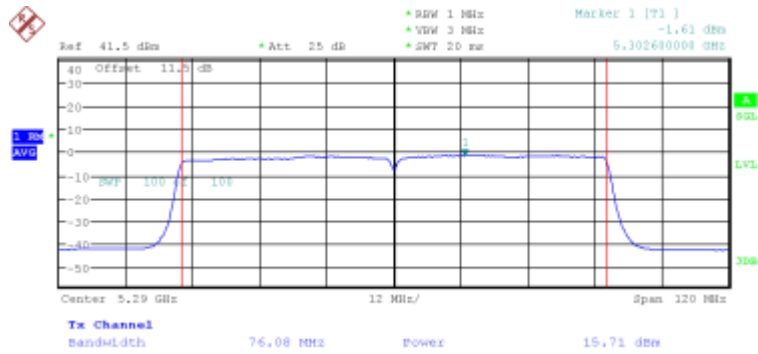
Date: 10.JUL.2019 15:01:47

Figure 29: RMS Max Power-802.11ac (VHT80)-5290MHz-q88-1x4-Ch0



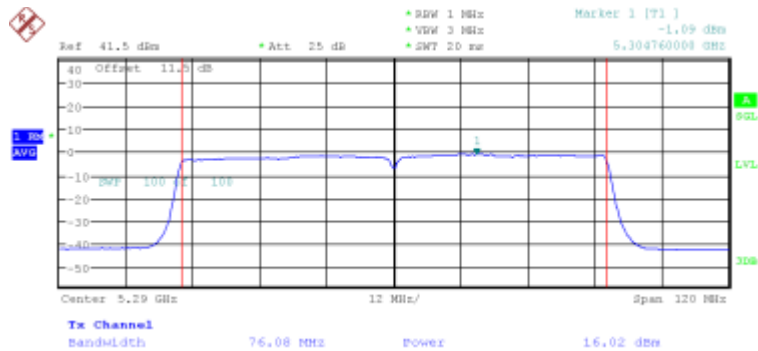
Date: 10.JUL.2019 15:03:48

Figure 30: RMS Max Power-802.11ac (VHT80)-5290MHz-q88-1x4-Ch1



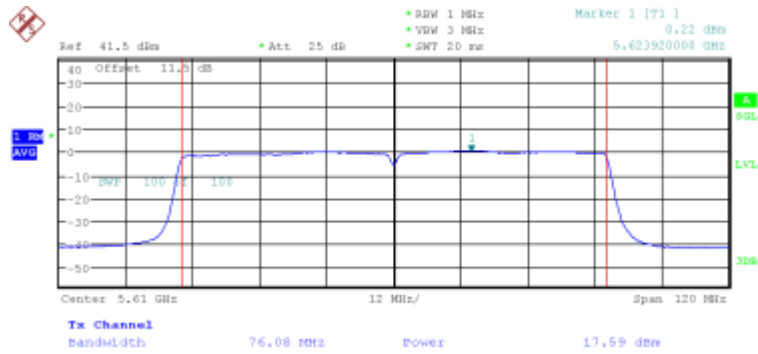
Date: 10.JUL.2019 15:04:40

Figure 31: RMS Max Power-802.11ac (VHT80)-5290MHz-q88-1x4-Ch2



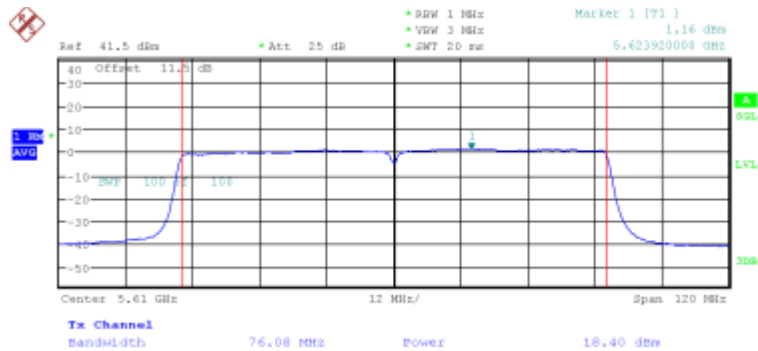
Date: 10.JUL.2019 15:06:23

Figure 32: RMS Max Power-802.11ac (VHT80)-5290MHz-q88-1x4-Ch3



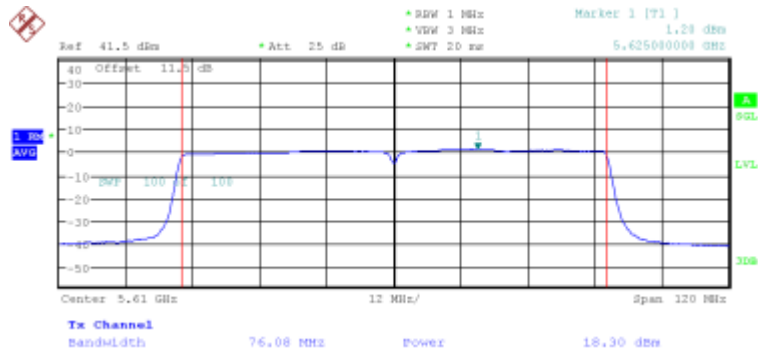
Date: 10.JUL.2019 15:40:10

Figure 33: RMS Max Power-802.11ac (VHT80)-5610MHz-q94-1x4-Ch0



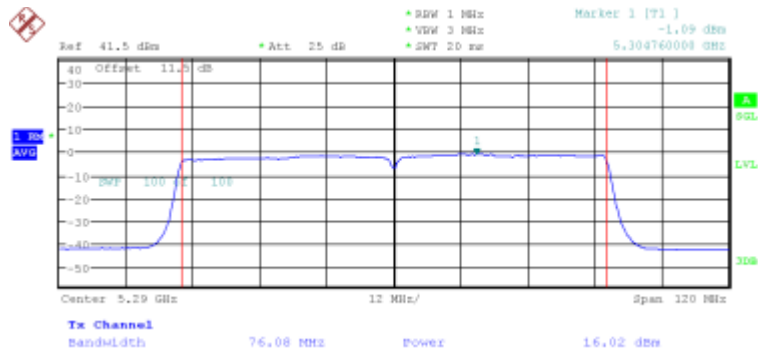
Date: 10.JUL.2019 15:41:03

Figure 34: RMS Max Power-802.11ac (VHT80)-5610MHz-q94-1x4-Ch1



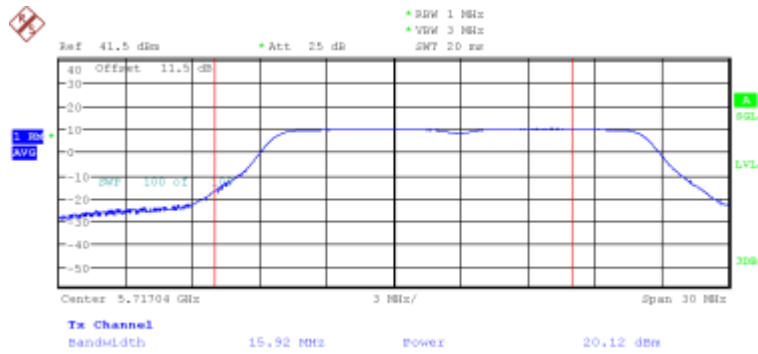
Date: 10.JUL.2019 15:42:41

Figure 35: RMS Max Power-802.11ac (VHT80)-5610MHz-q94-1x4-Ch2



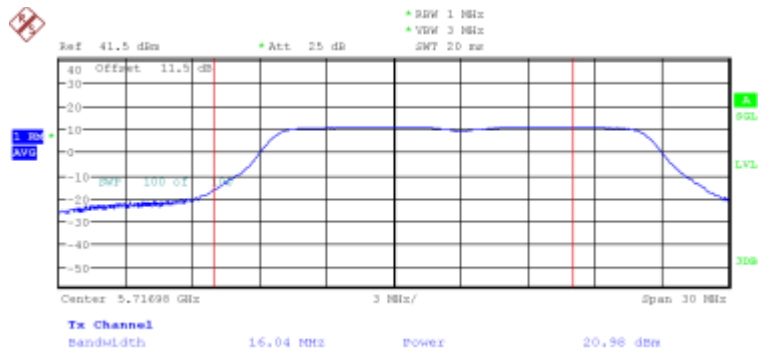
Date: 10.JUL.2019 15:06:23

Figure 36: RMS Max Power-802.11ac (VHT80)-5610MHz-q94-1x4-Ch3



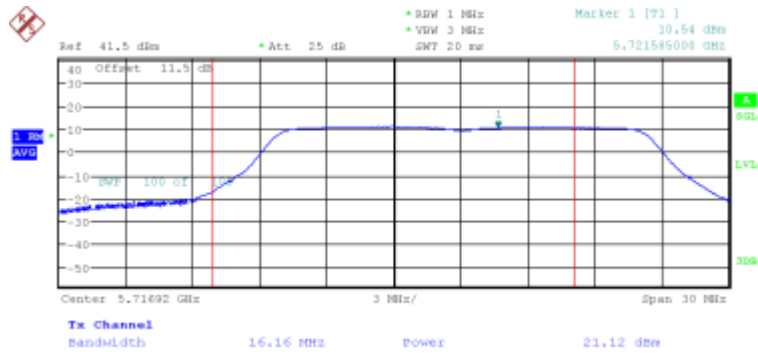
Date: 11.JUL.2019 15:28:30

Figure 37: RMS Max Power-802.11a-5720MHz-q94-1x4-Ch0 (Straddle Channel in UNII2C)



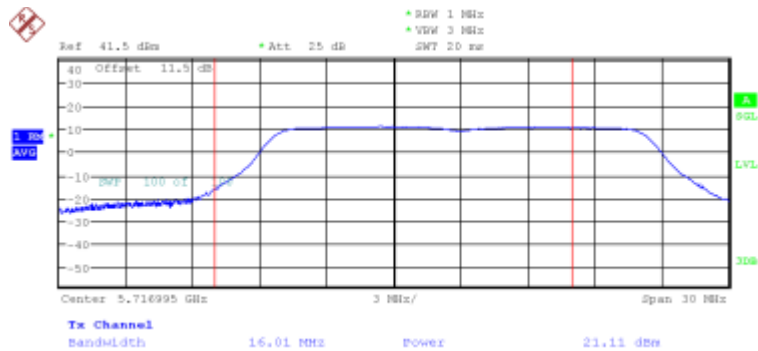
Date: 11.JUL.2019 15:30:20

Figure 38: RMS Max Power-802.11a-5720MHz-q94-1x4-Ch1 (Straddle Channel in UNII2C)



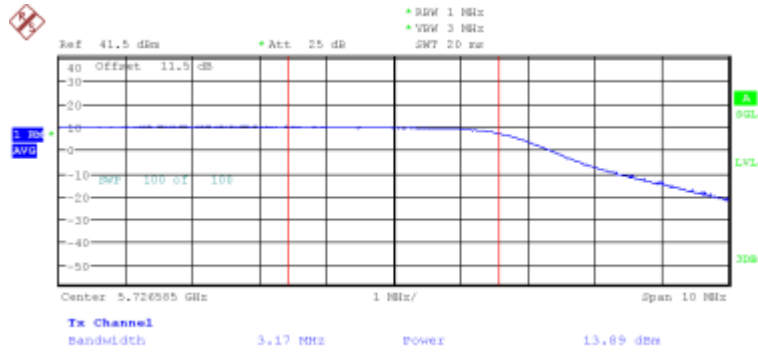
Date: 11.JUL.2019 15:36:02

Figure 39: RMS Max Power-802.11a-5720MHz-q94-1x4-Ch2 (Straddle Channel in UNII2C)



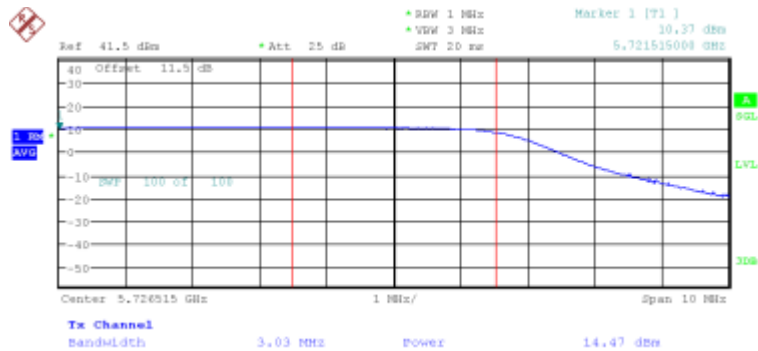
Date: 11.JUL.2019 15:38:02

Figure 40: RMS Max Power-802.11a-5720MHz-q94-1x4-Ch3 (Straddle Channel in UNII2C)



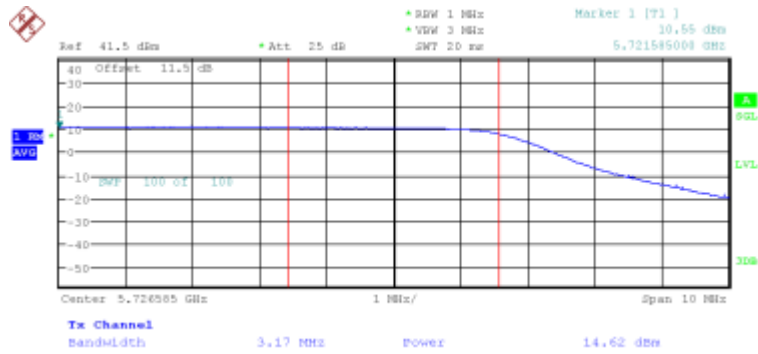
Date: 11.JUL.2019 15:22:16

Figure 41: RMS Max Power-802.11a-5720MHz-q94-1x4-Ch0 (Straddle Channel in UNII3)



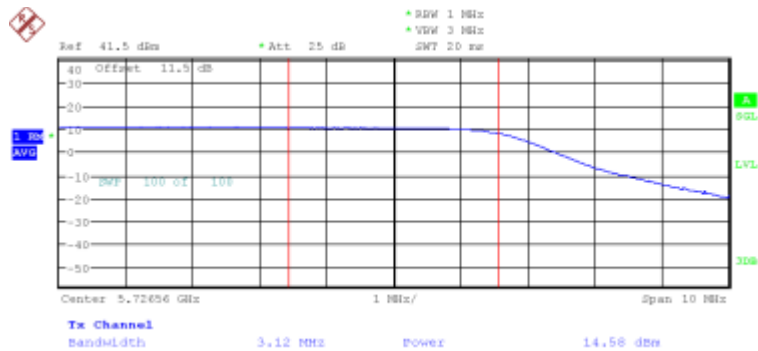
Date: 11.JUL.2019 15:32:32

Figure 42: RMS Max Power-802.11a-5720MHz-q94-1x4-Ch1 (Straddle Channel in UNII3)



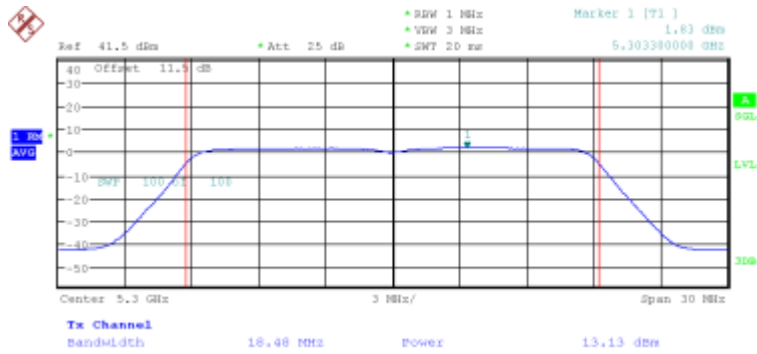
Date: 11.JUL.2019 15:34:35

Figure 43: RMS Max Power-802.11a-5720MHz-q94-1x4-Ch2 (Straddle Channel in UNII3)



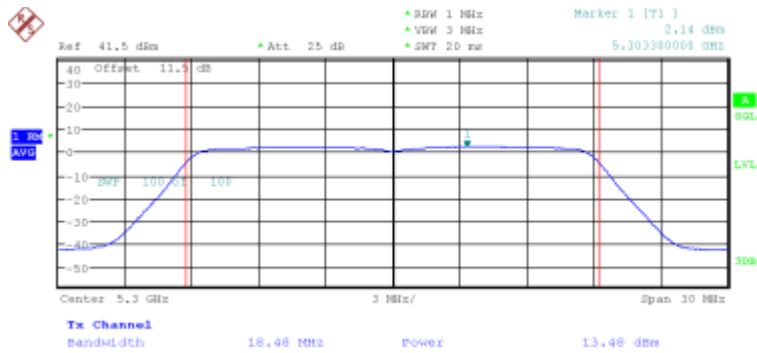
Date: 11.JUL.2019 15:39:33

Figure 44: RMS Max Power-802.11a-5720MHz-q94-1x4-Ch3 (Straddle Channel in UNII3)



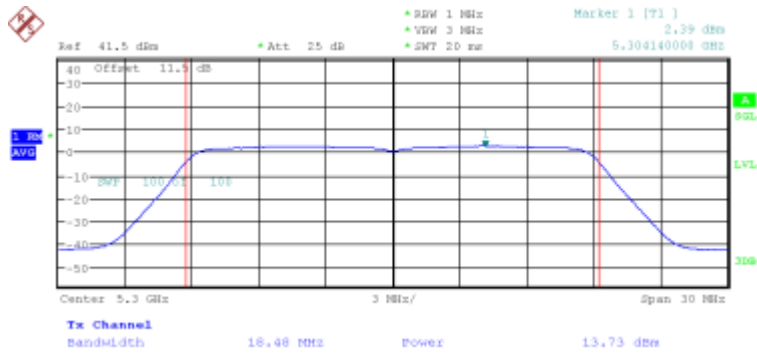
Date: 11.JUL.2019 09:22:04

Figure 45: RMS Max Power-802.11n (HT20)-5300MHz-q63-4x4-Ch0



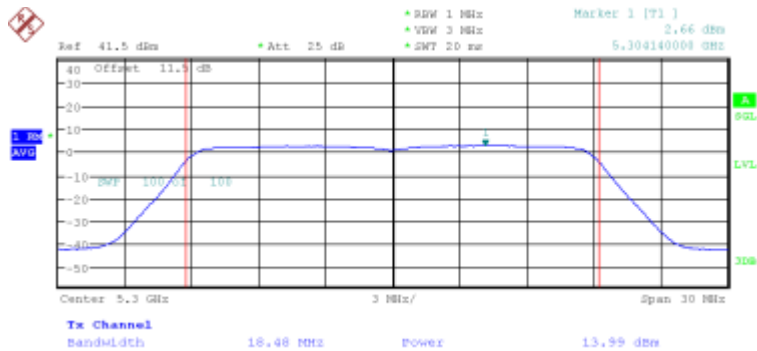
Date: 11.JUL.2019 09:23:05

Figure 46: RMS Max Power-802.11n (HT20)-5300MHz-q63-4x4-Ch1



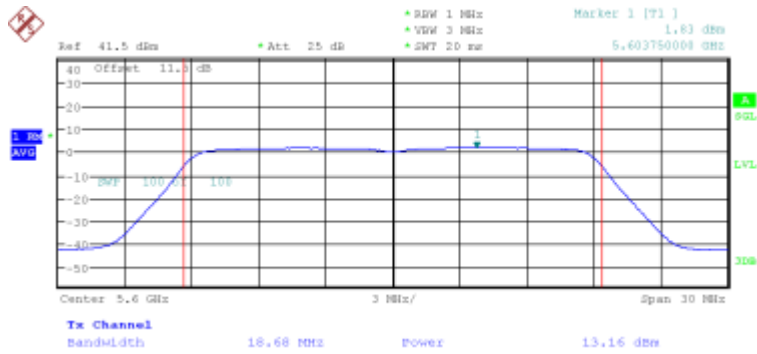
Date: 11.JUL.2019 09:24:53

Figure 47: RMS Max Power-802.11n (HT20)-5300MHz-q63-4x4-Ch2



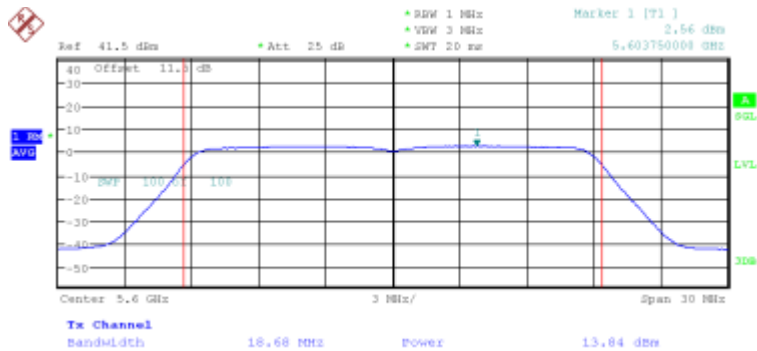
Date: 11.JUL.2019 09:25:46

Figure 48: RMS Max Power-802.11n (HT20)-5300MHz-q63-4x4-Ch3



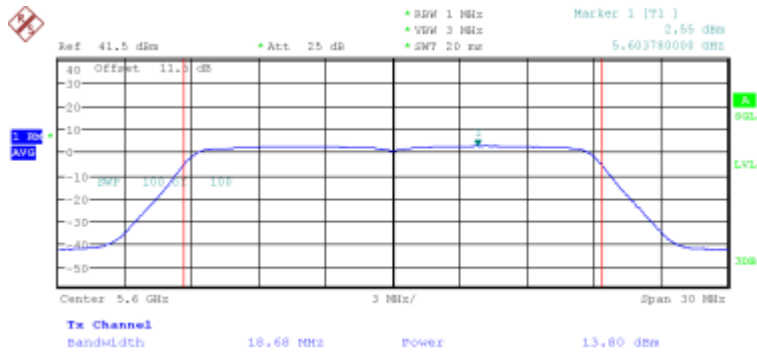
Date: 11.JUL.2019 09:51:38

Figure 49: RMS Max Power-802.11n (HT20)-5600MHz-q63-4x4-Ch0



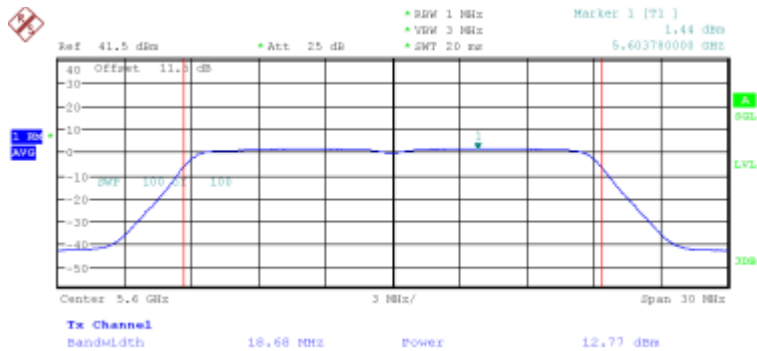
Date: 11.JUL.2019 09:50:52

Figure 50: RMS Max Power-802.11n (HT20)-5600MHz-q63-4x4-Ch1



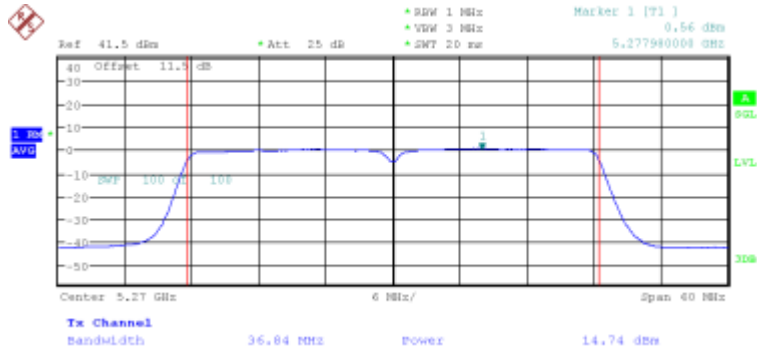
Date: 11.JUL.2019 09:49:22

Figure 51: RMS Max Power-802.11n (HT20)-5600MHz-q63-4x4-Ch2



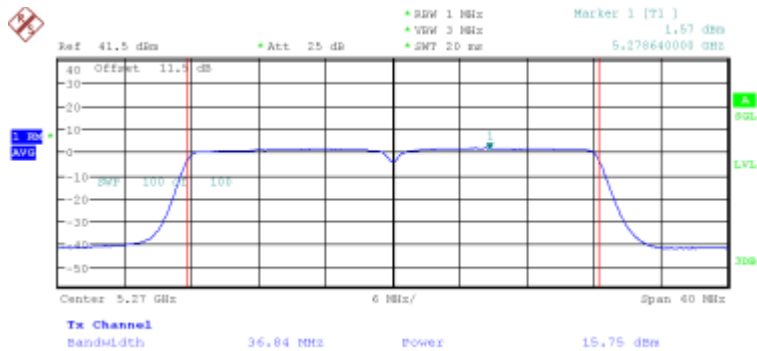
Date: 11.JUL.2019 09:48:26

Figure 52: RMS Max Power-802.11n (HT20)-5600MHz-q63-4x4-Ch3



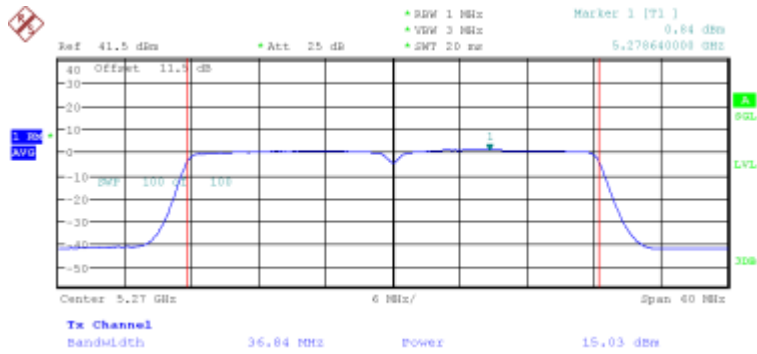
Date: 11.JUL.2019 10:52:14

Figure 53: RMS Max Power-802.11n (HT40)-5270MHz-q76-4x4-Ch0



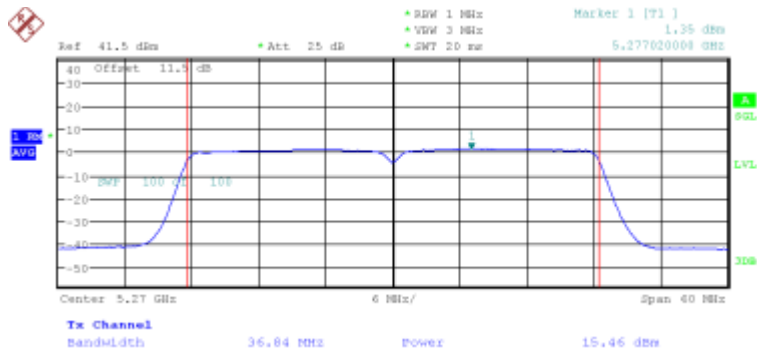
Date: 11.JUL.2019 10:54:03

Figure 54: RMS Max Power-802.11n (HT40)-5270MHz-q76-4x4-Ch1



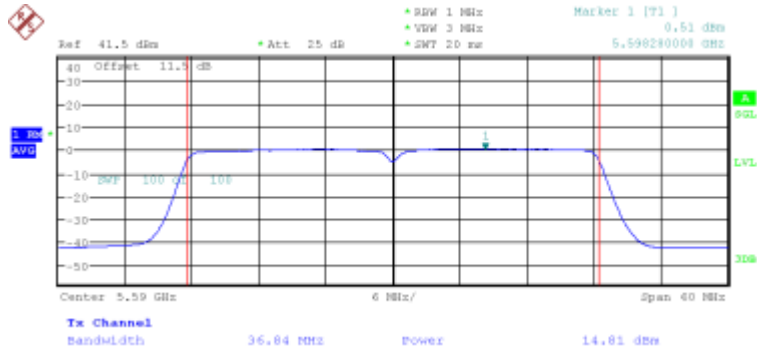
Date: 11.JUL.2019 10:54:53

Figure 55: RMS Max Power-802.11n (HT40)-5270MHz-q76-4x4-Ch2



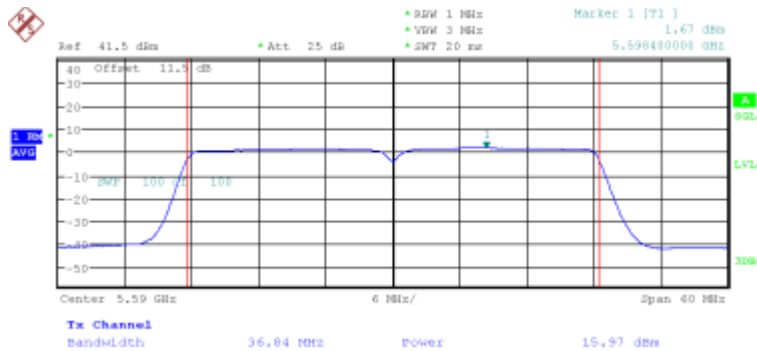
Date: 11.JUL.2019 10:56:21

Figure 56: RMS Max Power-802.11n (HT40)-5270MHz-q76-4x4-Ch3



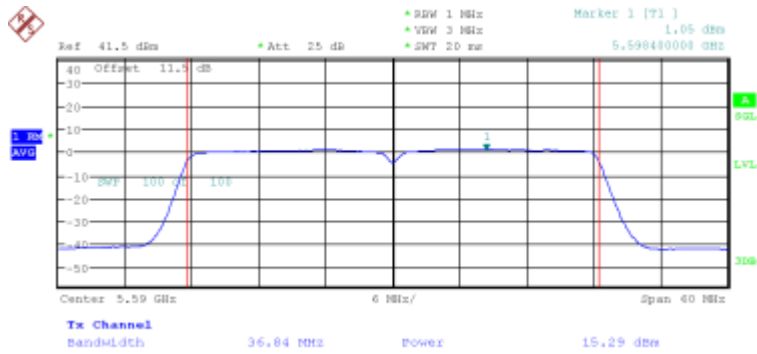
Date: 11.JUL.2019 11:37:00

Figure 57: RMS Max Power-802.11n (HT40)-5590MHz-q75-4x4-Ch0



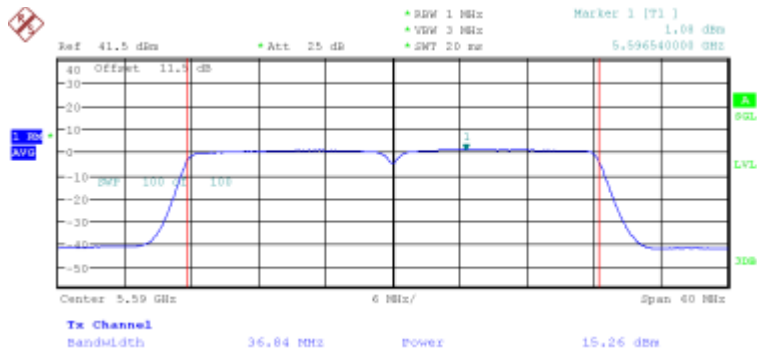
Date: 11.JUL.2019 11:35:18

Figure 58: RMS Max Power-802.11n (HT40)-5590MHz-q75-4x4-Ch1



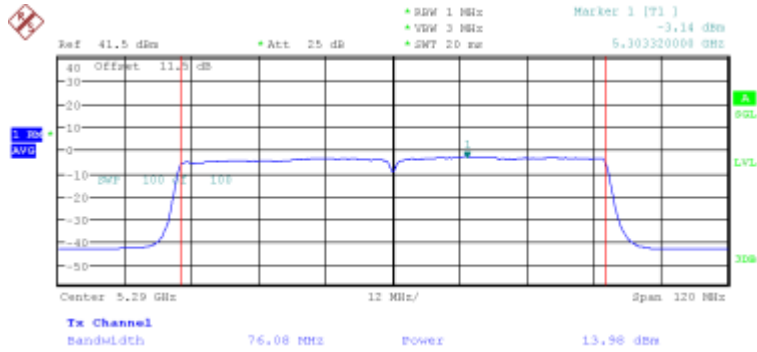
Date: 11.JUL.2019 11:34:21

Figure 59: RMS Max Power-802.11n (HT40)-5590MHz-q75-4x4-Ch2



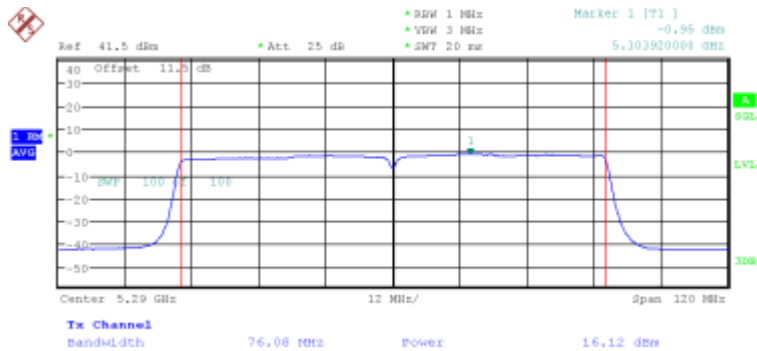
Date: 11.JUL.2019 11:32:46

Figure 60: RMS Max Power-802.11n (HT40)-5590MHz-q75-4x4-Ch3



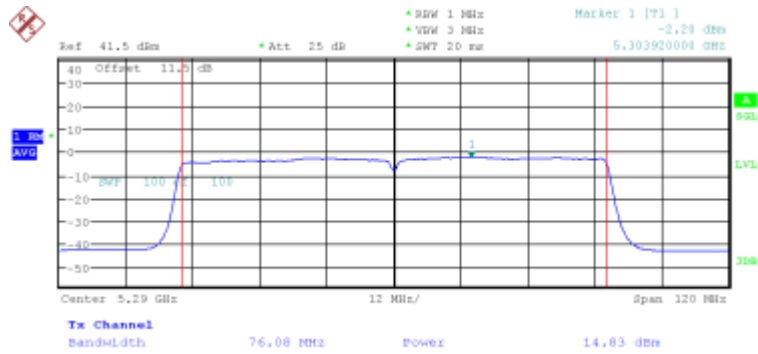
Date: 11.JUL.2019 13:32:56

Figure 61: RMS Max Power-802.11ac (VHT80)-5290MHz-q84-4x4-Ch0



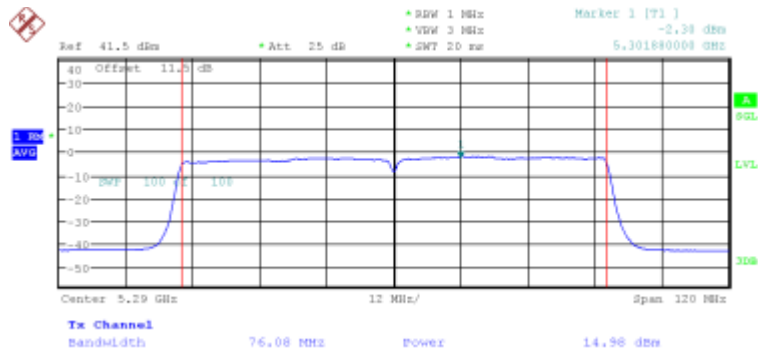
Date: 11.JUL.2019 13:35:14

Figure 62: RMS Max Power-802.11ac (VHT80)-5290MHz-q84-4x4-Ch1



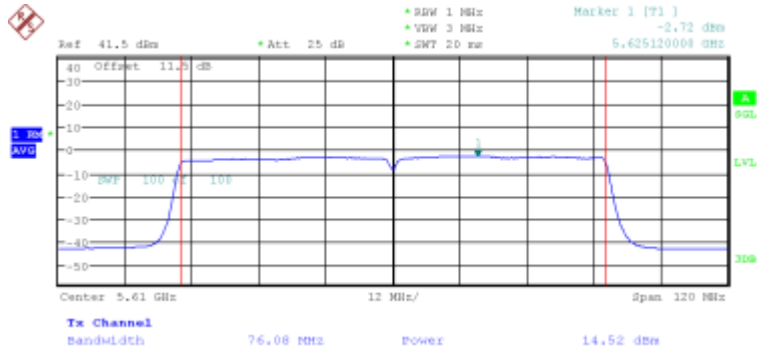
Date: 11.JUL.2019 13:36:47

Figure 63: RMS Max Power-802.11ac (VHT80)-5290MHz-q84-4x4-Ch2



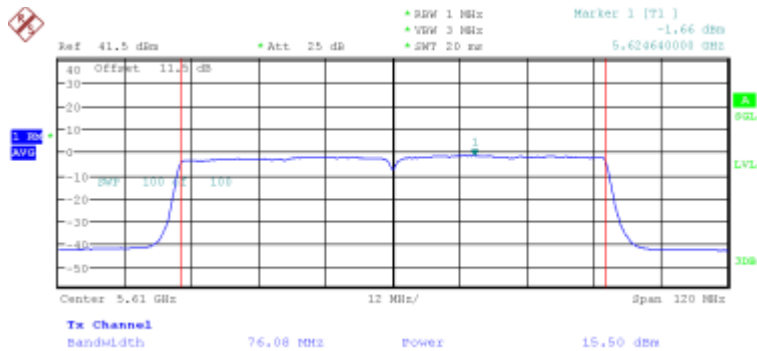
Date: 11.JUL.2019 13:39:08

Figure 64: RMS Max Power-802.11ac (VHT80)-5290MHz-q84-4x4-Ch3



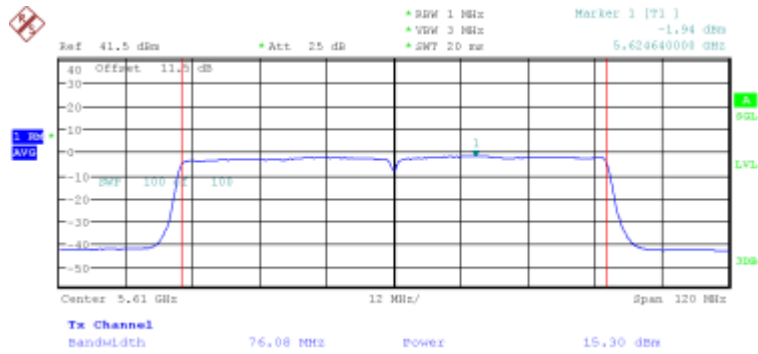
Date: 11.JUL.2019 13:47:17

Figure 65: RMS Max Power-802.11ac (VHT80)-5610MHz-q84-4x4-Ch0



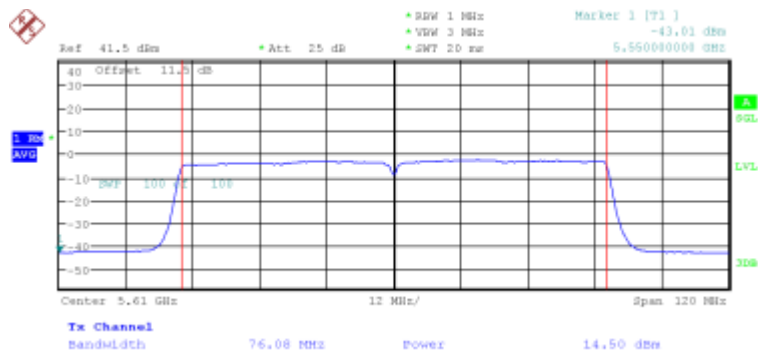
Date: 11.JUL.2019 13:45:34

Figure 66: RMS Max Power-802.11ac (VHT80)-5610MHz-q84-4x4-Ch1



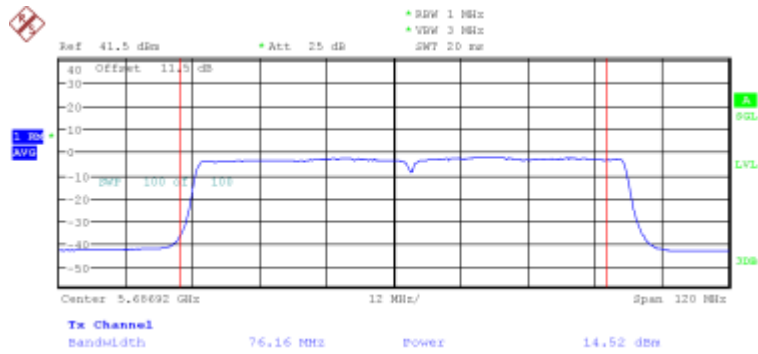
Date: 11.JUL.2019 13:44:43

Figure 67: RMS Max Power-802.11ac (VHT80)-5610MHz-q84-4x4-Ch2



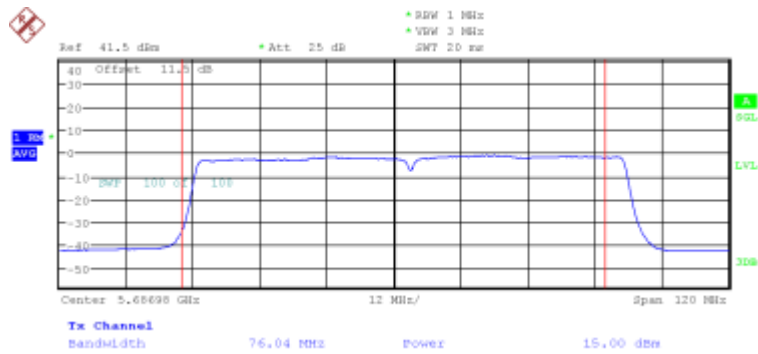
Date: 11.JUL.2019 13:42:27

Figure 68: RMS Max Power-802.11ac (VHT80)-5610MHz-q84-4x4-Ch3



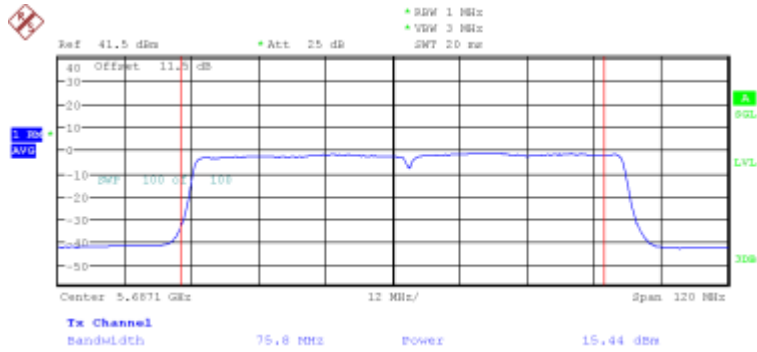
Date: 12.JUL.2019 11:49:56

Figure 69: RMS Max Power-VHT80-5690MHz-q85-4x4-Ch0 (Straddle Channel in UNII2C)



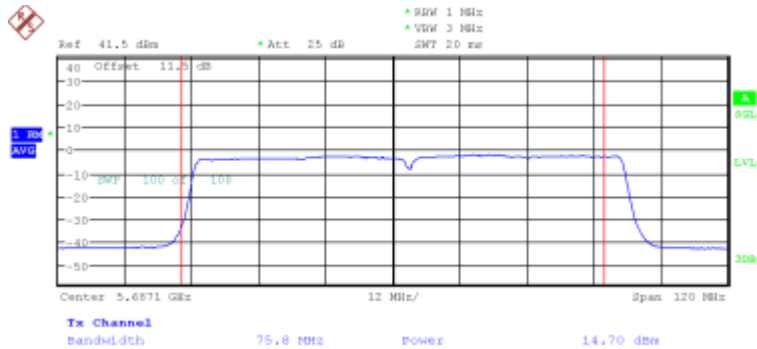
Date: 12.JUL.2019 11:51:22

Figure 70: RMS Max Power-VHT80-5690MHz-q85-4x4-Ch1 (Straddle Channel in UNII2C)



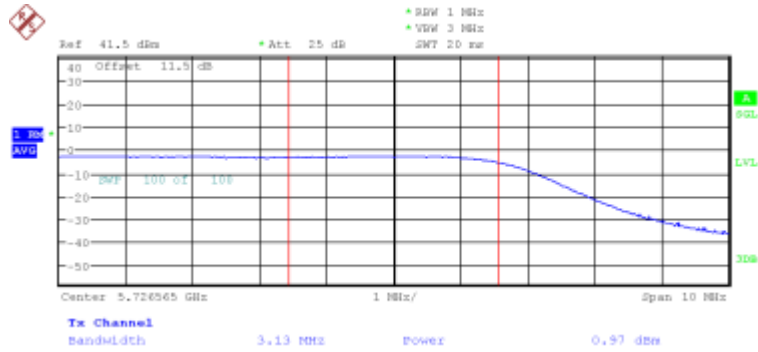
Date: 12.JUL.2019 11:53:09

Figure 71: RMS Max Power-VHT80-5690MHz-q85-4x4-Ch2 (Straddle Channel in UNII2C)



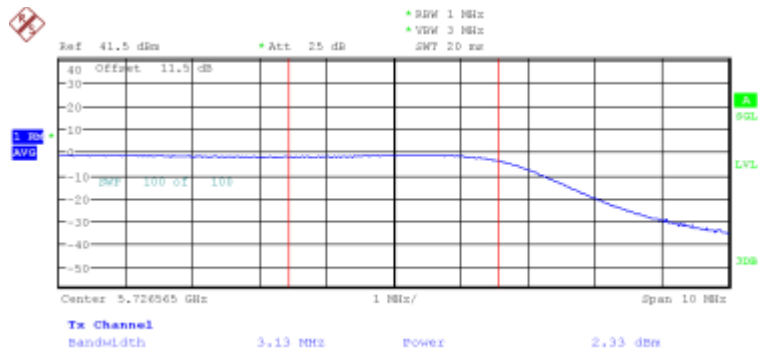
Date: 12.JUL.2019 11:54:03

Figure 72: RMS Max Power-VHT80-5690MHz-q85-4x4-Ch3 (Straddle Channel in UNII2C)



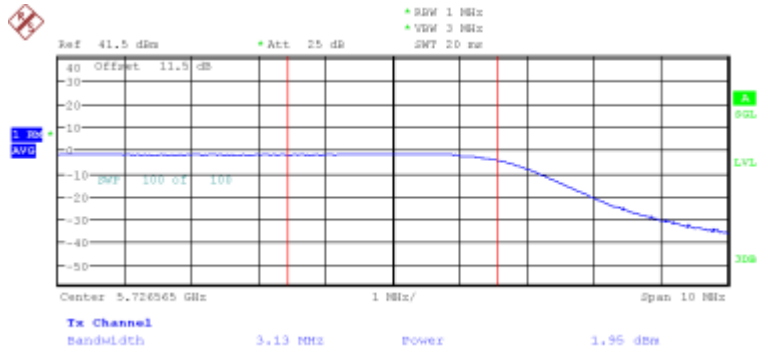
Date: 12.JUL.2019 12:11:12

Figure 73: RMS Max Power-VHT80-5690MHz-q85-4x4-Ch0 (Straddle Channel in UNII3)



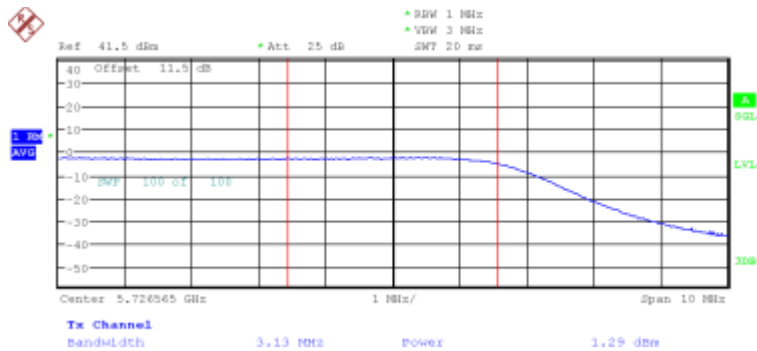
Date: 12.JUL.2019 12:12:10

Figure 74: RMS Max Power-VHT80-5690MHz-q85-4x4-Ch1 (Straddle Channel in UNII3)



Date: 12.JUL.2019 12:12:53

Figure 75: RMS Max Power-VHT80-5690MHz-q85-4x4-Ch2 (Straddle Channel in UNII3)



Date: 12.JUL.2019 12:21:40

Figure 76: RMS Max Power-VHT80-5690MHz-q85-4x4-Ch3 (Straddle Channel in UNII3)

4.2 Occupied Bandwidth

The occupied bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency.

The 99% bandwidth is the bandwidth in which 99% of the transmitted power occupied.

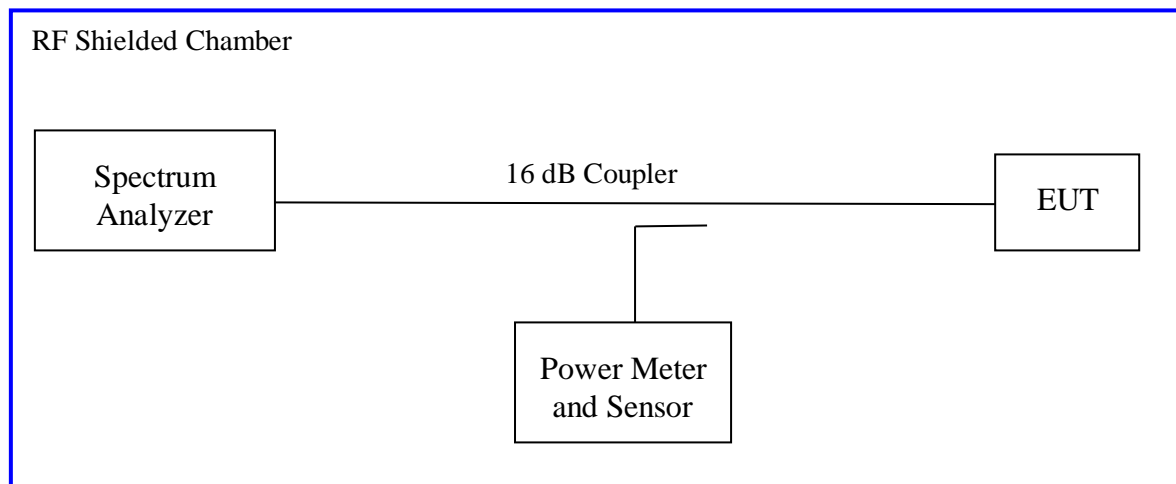
The 26 dB bandwidth is defined the bandwidth of 26 dB from highest transmitted level of the fundamental frequency.

There is no restriction limits for the bandwidth. The 26 dB bandwidth was used to determine the limit for maximum conducted output power per CFR47 Part 15.407(a).

4.2.1 Test Method

The conducted method was used to measure the occupied bandwidth. The measurement was performed with modulation per CFR47 15.407(a) and RSS Gen Sect.6.6. The preliminary investigation was performed to find the narrowest 26 dB bandwidth for each operational mode at different data rates. This worst finding was performed on 2 or 3 channels in each operating frequency range; 5250 MHz to 5350 MHz and 5470 MHz to 5725 MHz. The worst results indicated below.

Test Setup:



4.2.2 Results

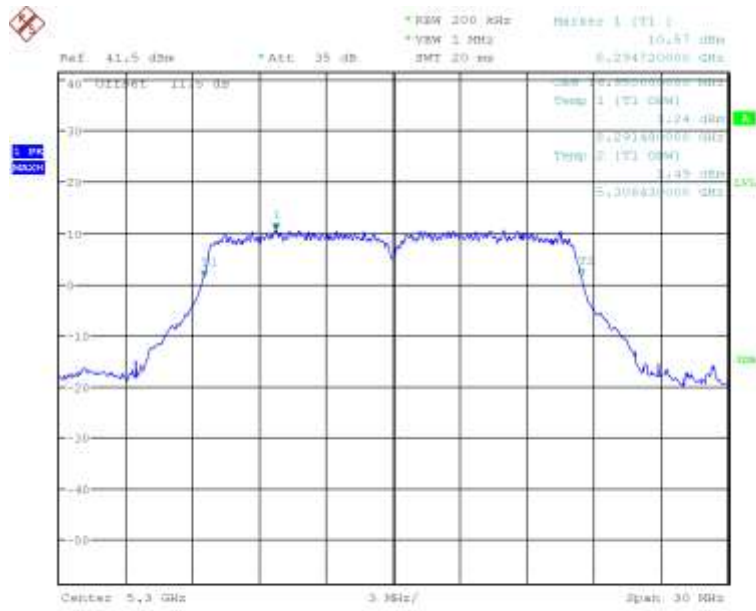
These occupied bandwidth measurements were taken for references only.

Table 6: Occupied Bandwidth (U-NII-2A) – Test Results

Test Date: July 09, 2019					Test By: James Borrott			
Test Method: Conducted Measurements					Power Setting: See test plan			
Antenna Type: PCB					Max. Antenna Gain: 4.8 dBi (5.3GHz)			
Operating Mode: Non Beamforming & Uncorrelated					Signal State: Modulated			
Ambient Temp.: 23 °C					Relative Humidity: 45%			
Remark: Highlighted data, its plots are placed in the report.								
Bandwidth for 802.11a								
Freq. (MHz)	99% Bandwidth (MHz)				26dB Bandwidth (MHz)			
	Ch0	Ch1	Ch2	Ch3	Ch0	Ch1	Ch2	Ch3
5260	16.98	17.01	17.01	17.07	21.87	21.87	22.17	22.32
5300	16.92	16.95	16.86	16.95	21.54	21.60	21.87	21.90
5320	16.89	16.89	16.77	16.83	21.39	21.39	21.45	21.51
Note: The bandwidths measured at 6Mbps for 802.11a mode.								
Bandwidth for 802.11n HT20								
Freq. (MHz)	99% Bandwidth (MHz)				26dB Bandwidth (MHz)			
	Ch0	Ch1	Ch2	Ch3	Ch0	Ch1	Ch2	Ch3
5260	18.32	18.40	18.32	18.32	22.68	23.08	24.28	24.12
5300	18.36	18.40	18.48	18.40	23.72	24.32	26.24	25.80
5320	18.00	18.00	18.00	18.00	21.72	21.64	21.68	21.56
Note: The bandwidths measured at 802.11n HT20, MCS0.								
Bandwidth for 802.11n HT40								
Freq. (MHz)	99% Bandwidth (MHz)				26dB Bandwidth (MHz)			
	Ch0	Ch1	Ch2	Ch3	Ch0	Ch1	Ch2	Ch3
5270	36.84	36.54	36.60	36.48	42.06	43.14	42.30	41.34
5310	36.66	36.42	36.42	36.36	40.62	40.08	40.26	40.20
Note: The bandwidths measured at 802.11n HT40 mode, MCS0.								
Bandwidth for 802.11ac VHT80								
Freq. (MHz)	99% Bandwidth (MHz)				26dB Bandwidth (MHz)			
	Ch0	Ch1	Ch2	Ch3	Ch0	Ch1	Ch2	Ch3
5290	76.08	75.96	75.84	76.08	82.56	82.32	81.72	81.72
Note: The bandwidth was measured at 802.11ac VHT80, MCS0.								

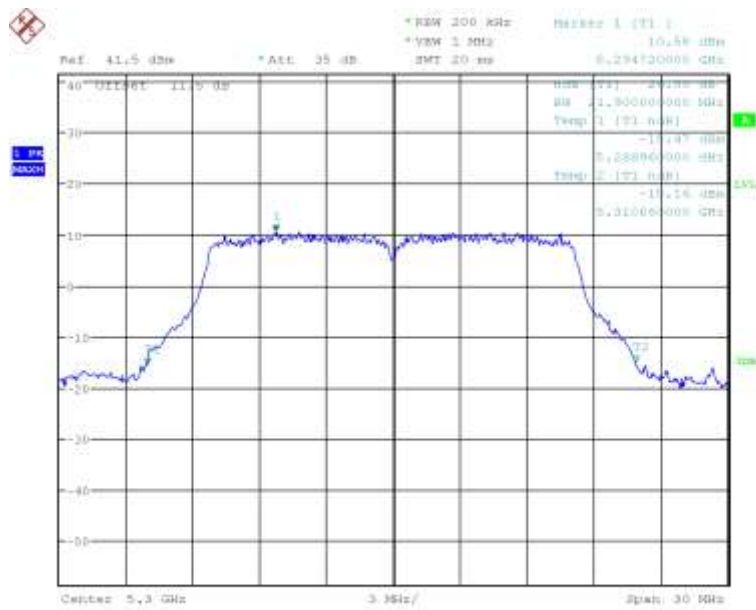
Table 7: Occupied Bandwidth (U-NII-2C) – Test Results

Test Date: July 09, 2019					Test By: James Borrott			
Test Method: Conducted Measurements					Power Setting: See test plan			
Antenna Type: PCB					Max. Antenna Gain: 5.6 dBi (5.7GHz)			
Operating Mode: Non Beamforming & Uncorrelated					Signal State: Modulated			
Ambient Temp.: 23 °C					Relative Humidity: 45%			
Remark: Highlighted data, its plots are placed in the report.								
Bandwidth for 802.11a								
Freq. (MHz)	99% Bandwidth (MHz)				26dB Bandwidth (MHz)			
	Ch0	Ch1	Ch2	Ch3	Ch0	Ch1	Ch2	Ch3
5500	16.86	16.86	16.74	16.80	21.51	21.42	21.39	21.39
5600	17.01	17.01	16.98	16.98	21.99	21.93	22.41	21.87
5700	16.89	16.86	16.74	16.80	21.45	21.42	21.45	21.39
Note: The bandwidths measured at 6Mbps for 802.11a mode.								
Bandwidth for 802.11n HT20								
Freq. (MHz)	99% Bandwidth (MHz)				26dB Bandwidth (MHz)			
	Ch0	Ch1	Ch2	Ch3	Ch0	Ch1	Ch2	Ch3
5500	18.00	17.96	17.96	17.96	21.80	21.48	21.60	21.52
5600	18.52	18.32	18.68	18.12	22.96	22.80	24.00	22.20
5700	18.04	17.88	17.92	17.96	21.80	21.44	21.64	21.48
Note: The bandwidths measured at 802.11n HT20, MCS0.								
Bandwidth for 802.11n HT40								
Freq. (MHz)	99% Bandwidth (MHz)				26dB Bandwidth (MHz)			
	Ch0	Ch1	Ch2	Ch3	Ch0	Ch1	Ch2	Ch3
5510	36.60	36.42	36.42	36.36	40.62	40.08	40.20	40.14
5590	36.84	36.60	36.60	36.48	42.60	42.00	42.00	40.92
5670	36.60	36.42	36.42	36.36	40.50	40.14	40.08	40.02
Note: The bandwidths measured at 802.11n HT40 mode, MCS0.								
Bandwidth for 802.11ac VHT80								
Freq. (MHz)	99% Bandwidth (MHz)				26dB Bandwidth (MHz)			
	Ch0	Ch1	Ch2	Ch3	Ch0	Ch1	Ch2	Ch3
5530	76.32	75.96	75.96	76.08	82.68	82.32	82.08	82.20
5610	76.08	76.08	75.96	75.96	82.56	82.32	81.84	81.84
5690	76.32	76.08	76.08	76.08	82.68	82.56	81.84	81.96
Note: The bandwidth was measured at 802.11ac VHT80, MCS0.								



Date: 5 JUL 2019 13:18:26

Figure 77: 99% Occupied Bandwidth-802.11a-5300MHz-q90-1x4-Ch3



Date: 5 JUL 2019 13:19:04

Figure 78: 26dB Occupied Bandwidth-802.11a-5300MHz-q90-1x4-Ch3

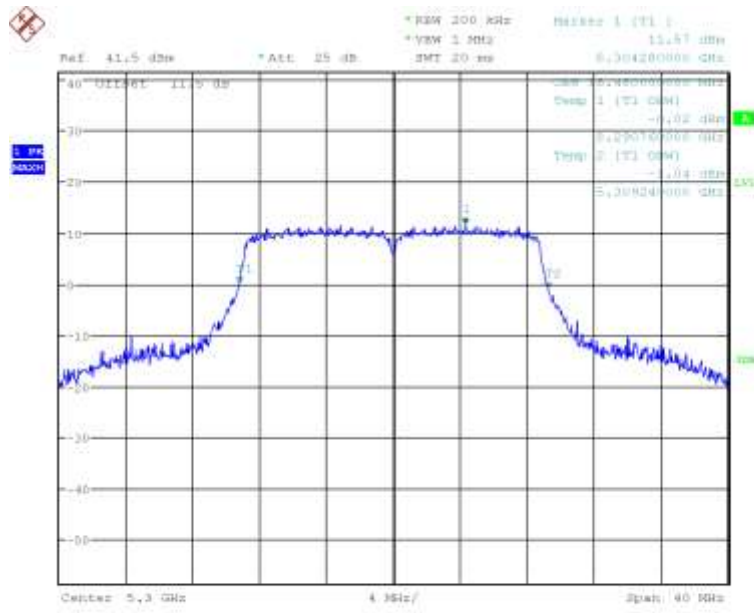


Figure 79: 99% Occupied Bandwidth-802.11n HT20-5300MHz-q95-1x4-Ch2

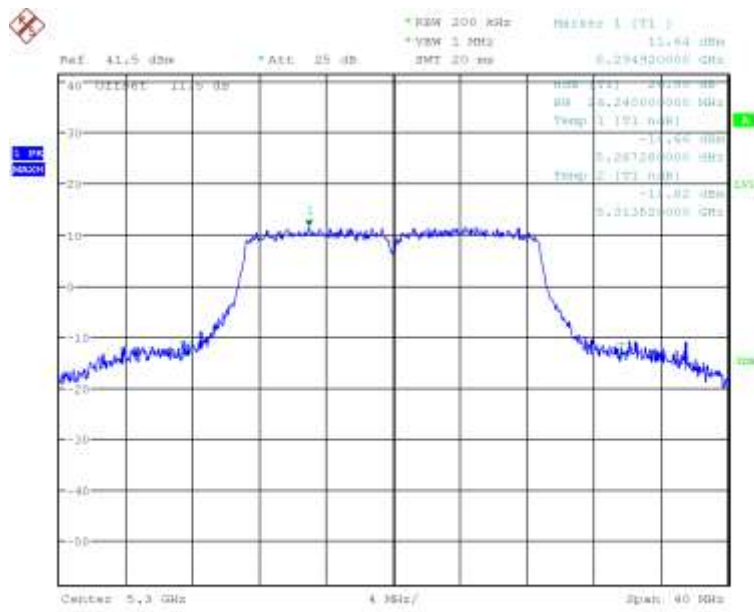
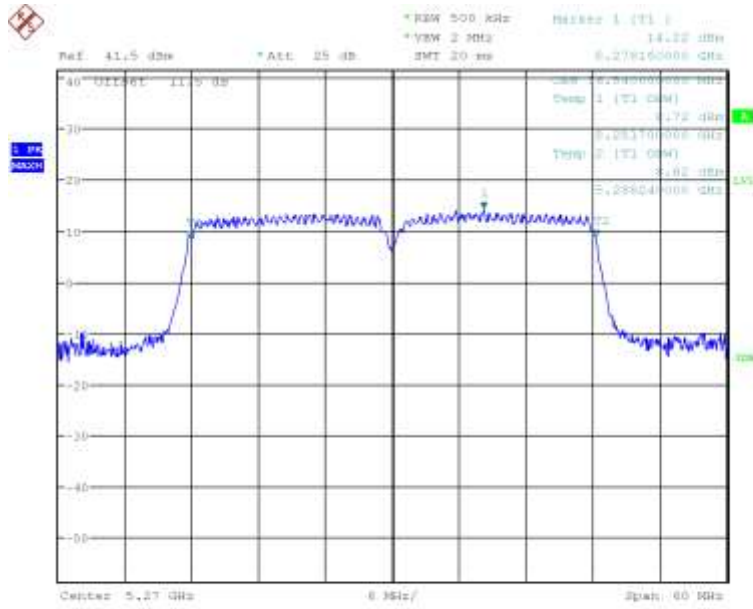
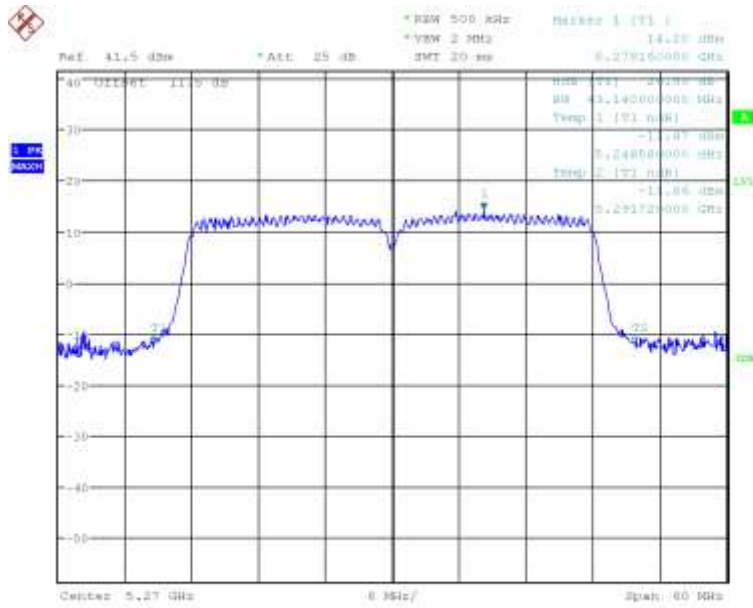


Figure 80: 26dB Occupied Bandwidth-802.11n HT20-5300MHz-q95-1x4-Ch2



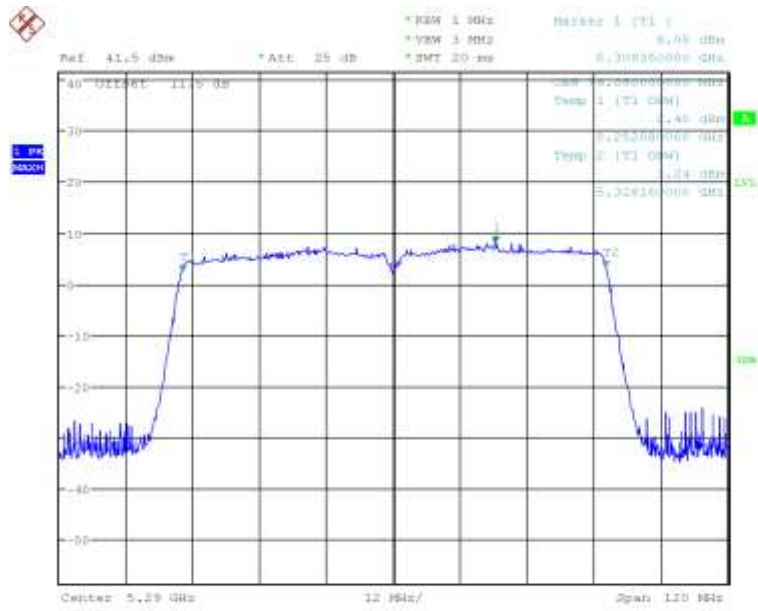
Date: 10.JUL.2019 11:15:12

Figure 81: 99% Occupied Bandwidth-802.11n HT40-5270MHz-q96-1x4-Ch1



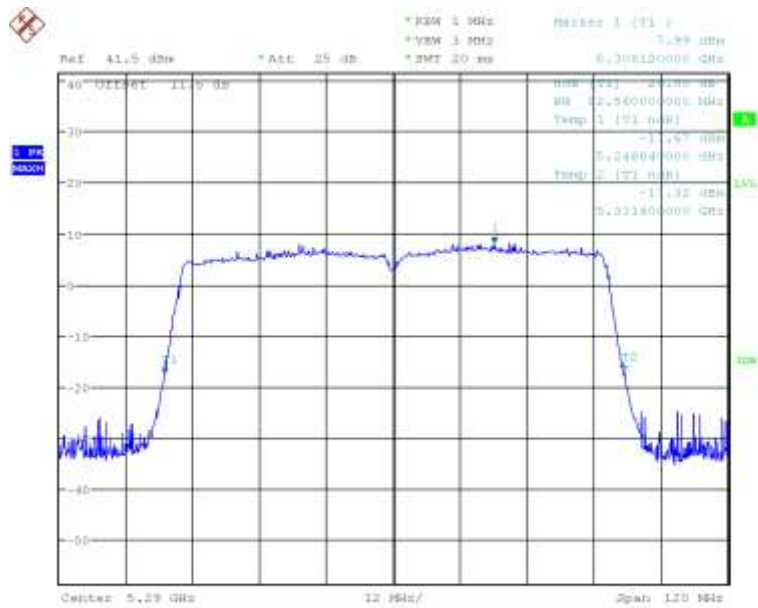
Date: 10.JUL.2019 11:13:58

Figure 82: 26dB Occupied Bandwidth-802.11n HT40-5270MHz-q96-1x4-Ch1



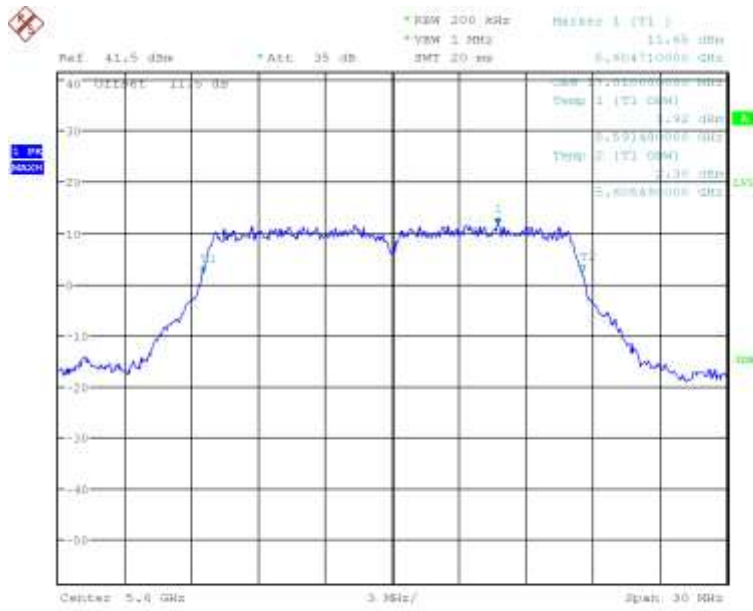
Date: 10.JUL.2019 15:00:08

Figure 83: 99% Occupied Bandwidth-802.11ac VHT80-5290MHz-q88-1x4-Ch0



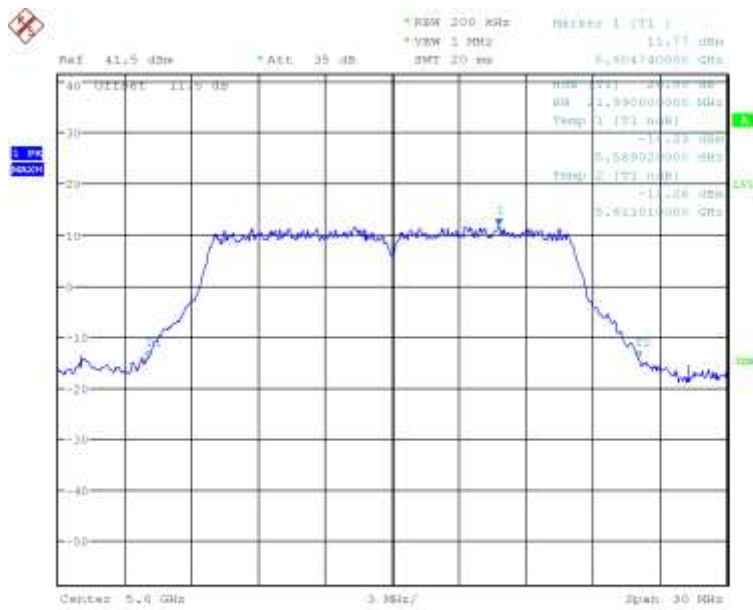
Date: 10.JUL.2019 14:59:32

Figure 84: 26dB Occupied Bandwidth-802.11ac VHT80-5290MHz-q88-1x4-Ch0



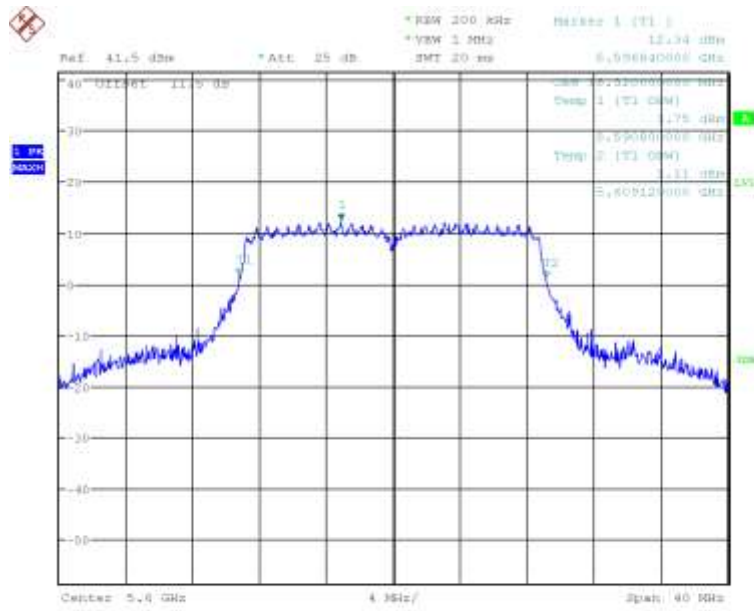
Date: 5-JUL-2019 15:04:03

Figure 85: 99% Occupied Bandwidth-802.11a-5600MHz-q96-1x4-Ch0



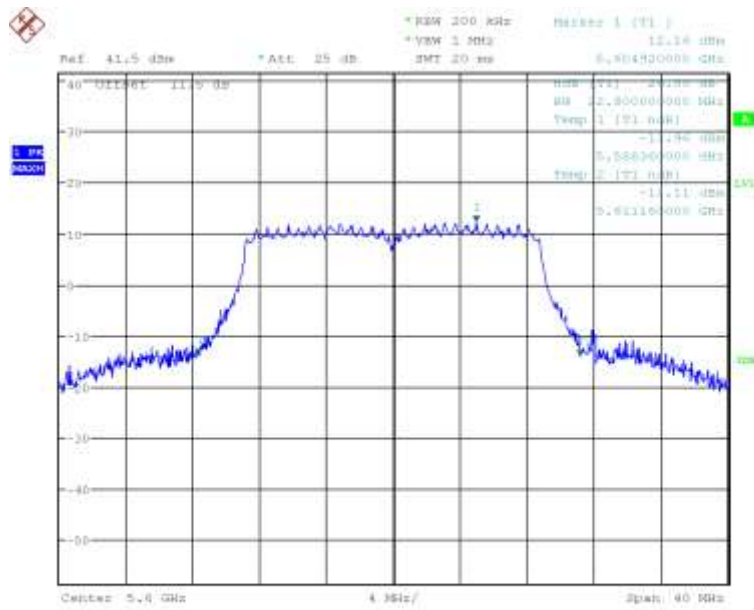
Date: 5-JUL-2019 15:04:17

Figure 86: 26dB Occupied Bandwidth-802.11a-5600MHz-q96-1x4-Ch0



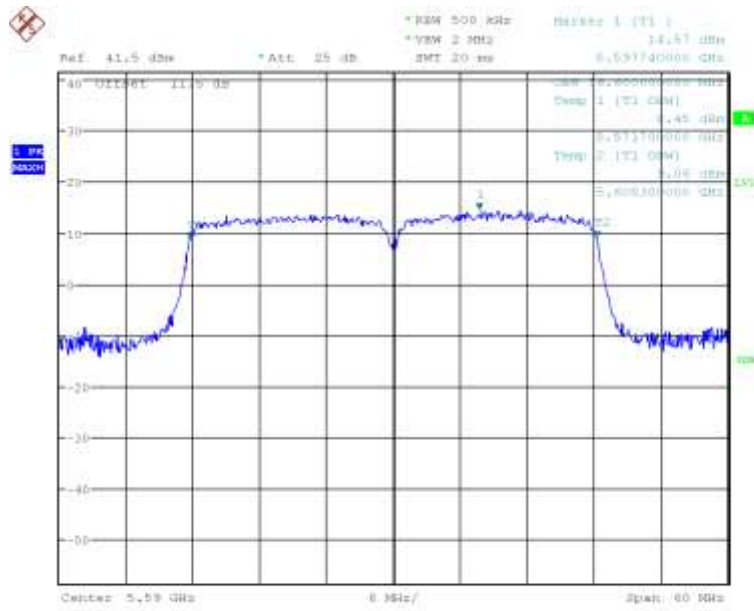
Date: 10.JUL.2019 09:32:26

Figure 87: 99% Occupied Bandwidth-802.11n HT20-5600MHz-q95-1x4-Ch1



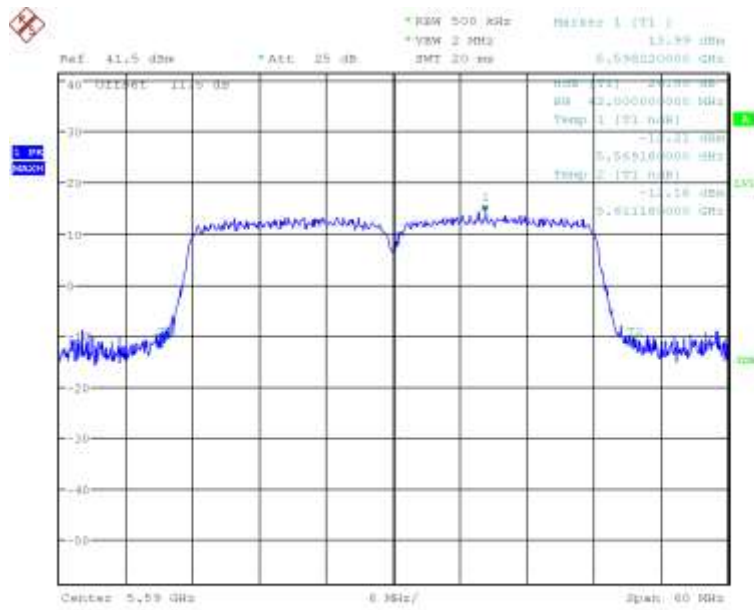
Date: 10.JUL.2019 09:31:25

Figure 88: 26dB Occupied Bandwidth-802.11n HT20-5600MHz-q95-1x4-Ch1



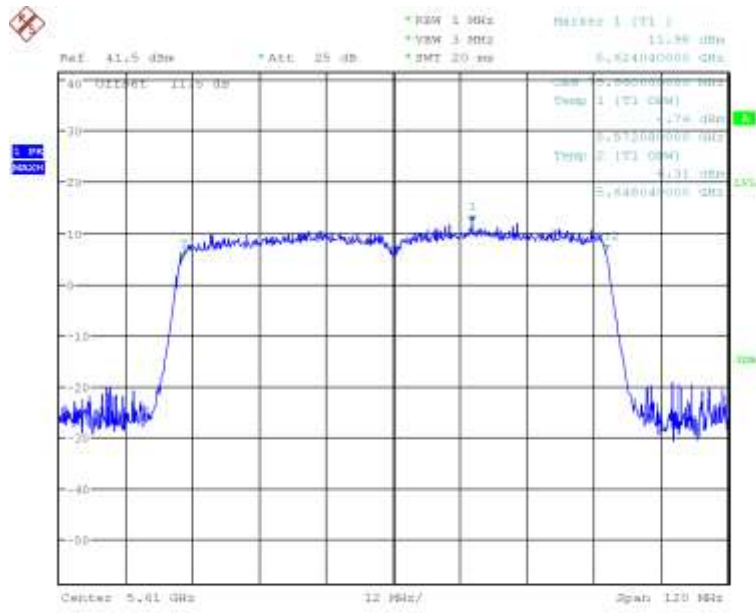
Date: 10.JUL.2019 13:30:35

Figure 89: 99% Occupied Bandwidth-802.11n HT40-5590MHz-q96-1x4-Ch2



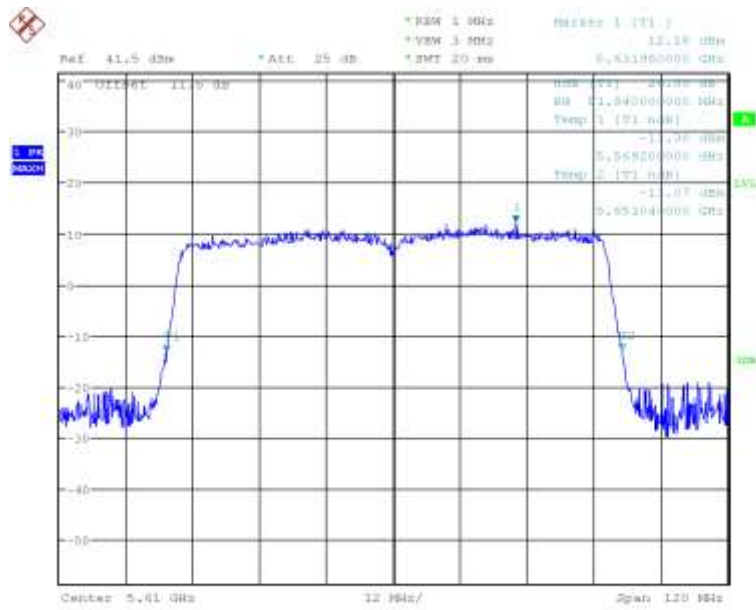
Date: 10.JUL.2019 13:32:13

Figure 90: 26dB Occupied Bandwidth-802.11n HT40-5590MHz-q96-1x4-Ch2



Date: 10.JUL.2019 15:33:40

Figure 91: 99% Occupied Bandwidth-802.11ac VHT80-5610MHz-q94-1x4-Ch3



Date: 10.JUL.2019 15:32:50

Figure 92: 26dB Occupied Bandwidth-802.11ac VHT80-5610MHz-q94-1x4-Ch3

4.3 Peak Power Spectral Density

According to the CFR47 Part 15.407 (a) and RSS 247 Sect. 6.2, the spectral power density output of the antenna port shall be as followed listed below during any time interval of continuous transmission.

The maximum power spectral density are:

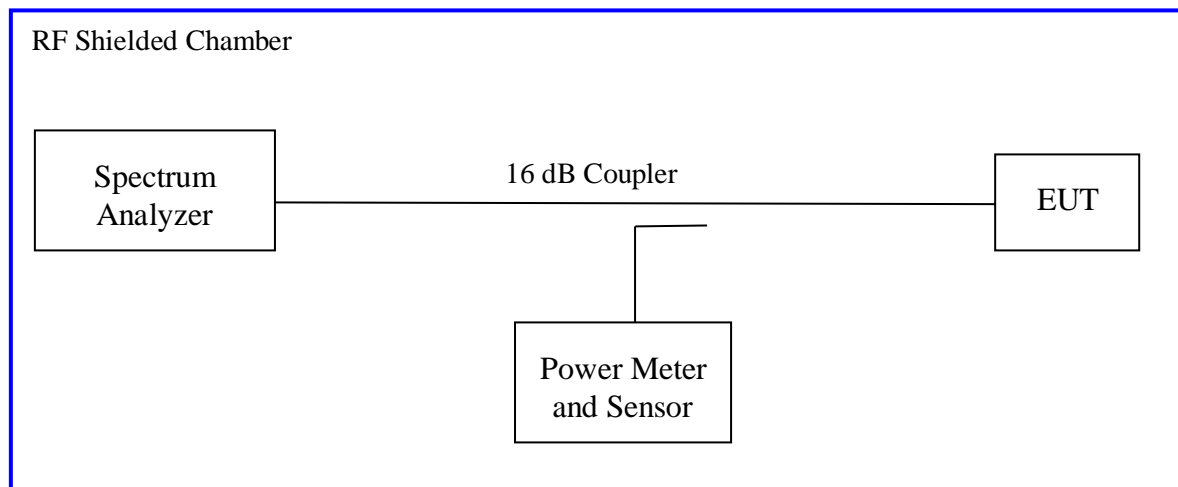
Part 15.407(a)(2) – Band 5250-5350 MHz and 5470-5725 MHz (conducted output power) : 11 dBm in any 1 MHz.

RSS 247 Section 6.2.2.1 – Band 5250-5350 MHz and Section 6.2.3.1 – Band 5740-5725 MHz (conducted output power): 11 dBm in any 1 MHz.

4.3.1 Test Method

The conducted method was used to measure the channel power output per ANSI C63.10-2013 Section 12.3.2.2. The measurement was performed with modulation per CFR47 Part 15.407 (a) and RSS 247 Sect. 6.2. The pre-evaluation was performed to find the worst modes. The worst findings were conducted on 2 or 3 channels in each operating frequency range of 5250 MHz to 5725 MHz. The worst sample result indicated below.

Test Setup:



4.3.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 8: Peak Power Spectral Density – Test Results – Non Beamforming

Test Date: July 11, 2019					Test By: James Borrott			
Test Method: Conducted Measurements					Power Setting: See test plan			
Antenna Type: PCB					Max. Antenna Gain: 4.8 dBi (5.3GHz) & 5.6 dBi (5.7GHz)			
Operating Mode: Non Beamforming & Uncorrelated					Signal State: Modulated			
Ambient Temp.: 23 °C					Relative Humidity: 48%			
Remark: Highlighted data, its plots are placed in the report.								
802.11a, 1x4								
Freq. (MHz)	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Max. RMS PSD [dBm]	Limit [dBm]	Margin [dB]
5260	9.48	10.01	10.02	10.59	0.00	10.59	11.00	-0.41
5300	9.91	10.36	10.33	10.80	0.00	10.80	11.00	-0.20
5320	6.19	6.57	6.93	7.20	0.00	7.20	11.00	-3.80
5500	5.41	5.91	5.92	5.85	0.00	5.92	11.00	-5.08
5600	10.31	10.89	10.98	10.08	0.00	10.98	11.00	-0.02
5700	4.87	5.48	5.51	4.68	0.00	5.51	11.00	-5.49
Note: The highest output power was observed at 6Mbps, 1 Data Stream , 98.6% duty cycle.								
802.11n HT20, 1x4								
Freq. (MHz)	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Max. RMS PSD [dBm]	Limit [dBm]	Margin [dB]
5260	9.24	9.70	9.80	10.96	0.00	10.96	11.00	-0.04
5300	9.63	10.06	10.37	10.66	0.00	10.66	11.00	-0.34
5320	6.57	6.88	7.15	7.41	0.00	7.41	11.00	-3.59
5500	5.58	6.04	6.04	5.91	0.00	6.04	11.00	-4.96
5600	10.14	10.47	10.60	9.66	0.00	10.60	11.00	-0.40
5700	5.04	5.57	5.62	4.78	0.00	5.62	11.00	-5.38
Note: The highest output power was observed at HT20 MCS0, 1 Data Stream, 98.7% duty cycle.								

802.11n HT40, 1x4								
Freq. (MHz)	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Max. RMS PSD [dBm]	Limit [dBm]	Margin [dB]
5270	5.51	6.32	5.52	5.92	0.18	6.32	11.00	-4.50
5310	1.53	2.42	1.99	2.13	0.18	2.42	11.00	-8.40
5510	0.29	1.55	0.63	0.63	0.18	1.55	11.00	-9.27
5590	6.38	7.36	7.09	6.63	0.18	7.36	11.00	-3.46
5670	2.12	2.85	1.97	1.80	0.18	2.85	11.00	-7.97
Note: The highest output power was observed at HT40 MCS0, 1 Data Stream, 96.0% duty cycle.								
802.11ac VHT80, 1x4								
Freq. (MHz)	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Max. RMS PSD [dBm]	Limit [dBm]	Margin [dB]
5290	-1.95	0.08	-1.28	-1.02	0.42	0.08	11.00	-10.50
5530	-5.47	-2.84	-4.18	-4.05	0.42	-2.84	11.00	-13.42
5610	0.46	1.34	1.23	0.06	0.42	1.34	11.00	-9.24
Note: The highest output power was observed at VHT80 MCS0, 1 Data Stream, 90.7% duty cycle.								

Table 9: Peak Power Spectral Density – Test Results – Straddle Channels

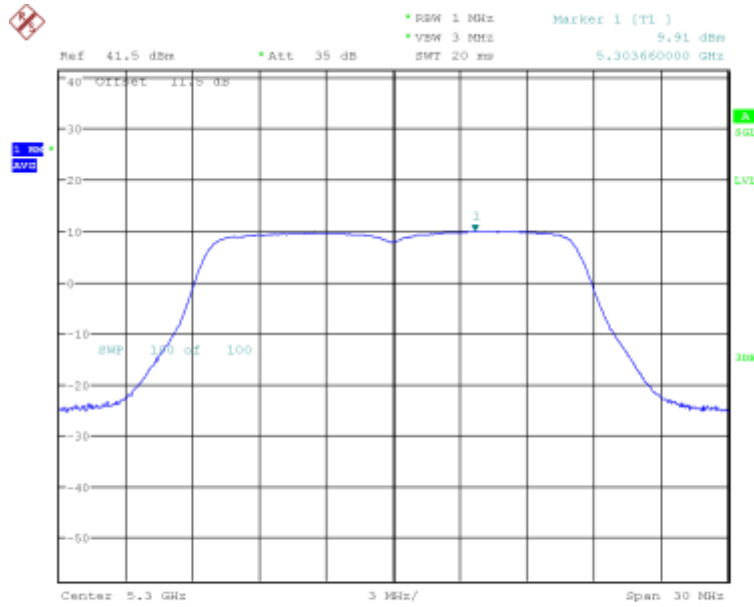
Test Date: July 12, 2019					Test By: James Borrott				
Test Method: Conducted Measurements					Power Setting: See test plan				
Antenna Type: PCB					Max. Antenna Gain: 5.6 dBi (UNII2C) & 4.6 dBi (UNII3)				
Operating Mode: Non Beamforming & Uncorrelated					Signal State: Modulated				
Ambient Temp.: 23 °C					Relative Humidity: 43%				
Remark: Highlighted data, its plots are placed in the report.									
802.11a (5720 MHz), 1x4									
Operating Band	Limit [dBm]	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Max. RMS PSD [dBm]	Margin [dB]	
U-NII-2C	11.00	9.95	10.67	10.61	9.64	0.00	10.67	-0.33	
U-NII-3	30.00	6.69	7.59	7.65	6.93	0.00	7.65	-22.35	
Note: The highest output power observed at 6Mbps, 1 Data Stream, 98.6% duty cycle.									
802.11n HT20 (5720 MHz), 1x4									
Operating Band	Limit [dBm]	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Max. RMS PSD [dBm]	Margin [dB]	
U-NII-2C	11.00	9.96	10.89	10.84	9.95	0.00	10.89	-0.11	
U-NII-3	30.00	7.69	8.26	8.14	7.21	0.00	8.26	-21.74	
Note: The highest output power observed at MCS0, 1 Data Stream, 98.7% duty cycle.									
802.11n HT40 (5710 MHz), 1x4									
Operating Band	Limit [dBm]	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Max. RMS PSD [dBm]	Margin [dB]	
U-NII-2C	11.00	7.33	8.03	7.24	7.12	0.18	8.21	-2.79	
U-NII-3	30.00	3.57	4.56	3.76	3.51	0.18	4.74	-25.26	
Note: The highest output power observed at MCS0, 1 Data Stream, 96.0% duty cycle.									
802.11ac VHT80 (5690 MHz), 1x4									
Operating Band	Limit [dBm]	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Max. RMS PSD [dBm]	Margin [dB]	
U-NII-2C	11.00	0.87	1.96	1.95	1.11	0.42	2.38	-8.62	
U-NII-3	30.00	-2.76	-1.05	-1.65	-2.52	0.42	-0.63	-30.63	
Note: The highest output power observed at MCS0, 1 Data Stream, 90.7% duty cycle.									

Table 10: Peak Power Spectral Density – Test Results – Beamforming

Test Date: July 11, 2019					Test By: James Borrott			
Test Method: Conducted Measurements					Power Setting: See test plan			
Antenna Type: PCB					Total Antenna Gain: 8.3 dBi (5.3GHz) & 8.6 dBi (5.7GHz)			
Operating Mode: Beamforming & Correlated					Signal State: Modulated			
Ambient Temp.: 23 °C					Relative Humidity: 47%			
Remark: 1. If antenna exceeds 6dBi, apply: POut = PLimit – (GTx – 6) 2. The limit is calculated with 6dBi exceeded antenna gain 3. 802.11a does not support beamforming mode or correlated 4. Highlighted data, its plots are placed in the report.								
802.11n HT20, 4x4								
Freq. (MHz)	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Max. RMS PSD [dBm]	Limit [dBm]	Margin [dB]
5260	1.66	2.59	2.60	2.80	0.00	8.45	8.70	-0.25
5300	1.84	2.37	2.64	2.77	0.00	8.44	8.70	-0.26
5320	1.87	2.67	2.81	2.91	0.00	8.60	8.70	-0.10
5500	2.00	2.54	2.30	1.75	0.00	8.18	8.40	-0.22
5600	1.95	2.63	2.65	1.52	0.00	8.23	8.40	-0.17
5700	1.77	2.57	2.36	1.53	0.00	8.10	8.40	-0.30
Note: The highest output power was observed at HT20 MCS0, 4 Data Streams, 98.7% duty cycle.								
802.11n HT40, 4x4								
Freq. (MHz)	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Max. RMS PSD [dBm]	Limit [dBm]	Margin [dB]
5270	0.70	1.64	0.92	1.47	0.18	7.22	8.70	-1.30
5310	0.96	1.97	1.33	1.74	0.18	7.54	8.70	-0.98
5510	0.29	1.55	0.63	0.63	0.18	6.82	8.40	-1.40
5590	0.69	1.92	1.14	1.15	0.18	7.27	8.40	-0.95
5670	0.88	1.63	1.13	0.67	0.18	7.11	8.40	-1.11
Note: The highest output power was observed at HT40 MCS0, 4 Data Stream , 96.0% duty cycle.								
802.11ac VHT80, 4x4								
Freq. (MHz)	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Max. RMS PSD [dBm]	Limit [dBm]	Margin [dB]
5290	-2.96	-0.82	-2.09	-2.05	0.42	4.11	8.70	-4.17
5530	-5.47	-2.84	-4.18	-4.05	0.42	1.98	8.40	-6.00
5610	-2.64	-1.52	-1.73	-2.55	0.42	3.94	8.40	-4.04
Note: The highest output power was observed at VHT80 MCS0, 4 Data Stream, 90.7% duty cycle.								

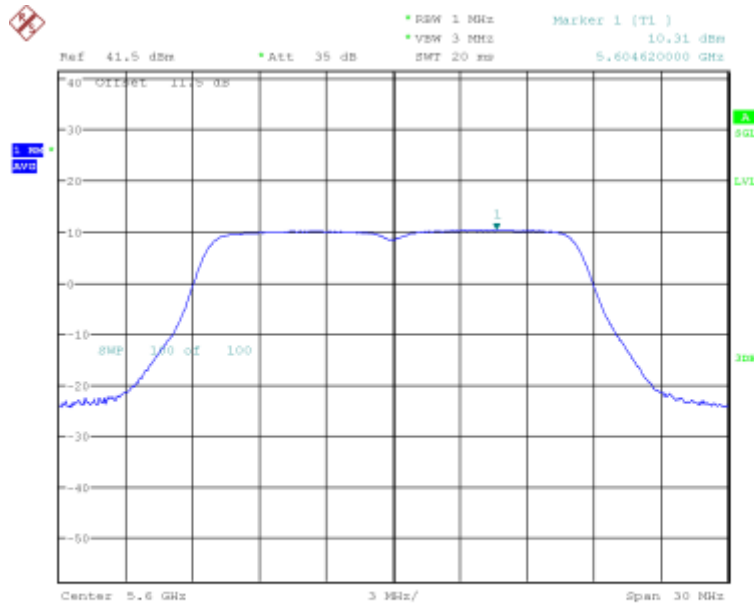
Table 11: Peak Power Spectral Density – Test Results – Straddle Channels

Test Date: July 12, 2019					Test By: James Borrott			
Test Method: Conducted Measurements					Power Setting: See test plan			
Antenna Type: PCB					Max. Antenna Gain: 8.6 dBi (UNII2C) & 8.8 dBi (UNII3)			
Operating Mode: Beamforming & Correlated					Signal State: Modulated			
Ambient Temp.: 23 °C					Relative Humidity: 43%			
Remark: 1. If antenna exceeds 6dBi, apply: POut = PLimit – (GTx – 6) 2. The limit is calculated with 6dBi exceeded antenna gain 3. 802.11a does not support beamforming mode or correlated 4. Highlighted data, its plots are placed in the report.								
802.11n HT20, 5720MHz, 4x4								
Operating Band	Limit [dBm]	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Total RMS Power [dBm]	Margin [dB]
U-NII-2C	8.40	2.35	2.72	2.32	1.69	0.00	8.31	-0.09
U-NII-3	27.20	-1.17	0.02	-0.15	-0.96	0.00	5.49	-21.71
Note: The highest output power observed at MCS0, 4 Data Streams, 98.7% duty cycle.								
802.11n HT40, 5710MHz, 4x4								
Operating Band	Limit [dBm]	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Total RMS Power [dBm]	Margin [dB]
U-NII-2C	8.40	1.13	2.34	1.53	1.31	0.18	7.62	-0.60
U-NII-3	27.20	-2.32	-1.35	-2.31	-2.21	0.18	3.99	-23.03
Note: The highest output power observed at MCS0, 4 Data Streams, 98.7% duty cycle.								
802.11ac VHT80, 5690MHz, 4x4								
Operating Band	Limit [dBm]	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Total RMS Power [dBm]	Margin [dB]
U-NII-2C	8.40	-2.96	-1.44	-1.79	-2.12	0.42	3.98	-4.00
U-NII-3	27.20	-5.91	-4.43	-4.70	-5.20	0.42	1.00	-25.78
Note: The highest output power observed at MCS0, 4 Data Streams, 90.7% duty cycle.								



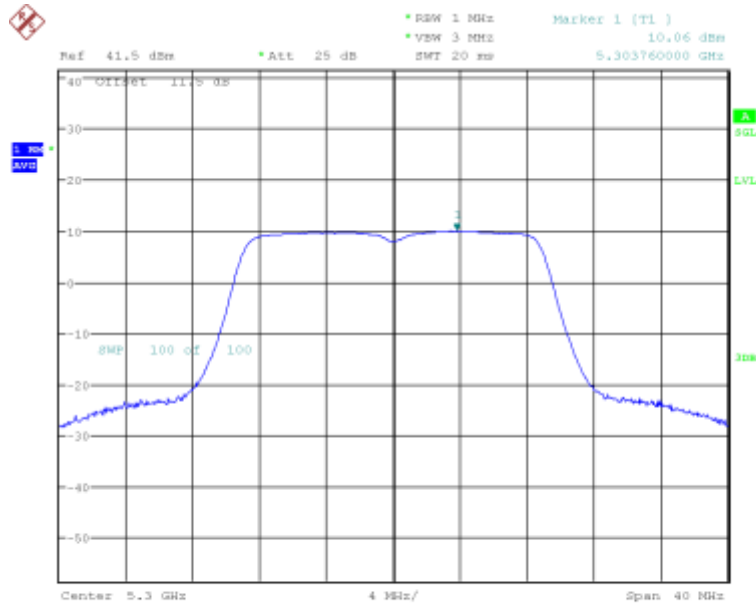
Date: 9-JUL-2019 14:48:23

Figure 93: PPSD-802.11a-5300MHz-q96-1x4-Ch0



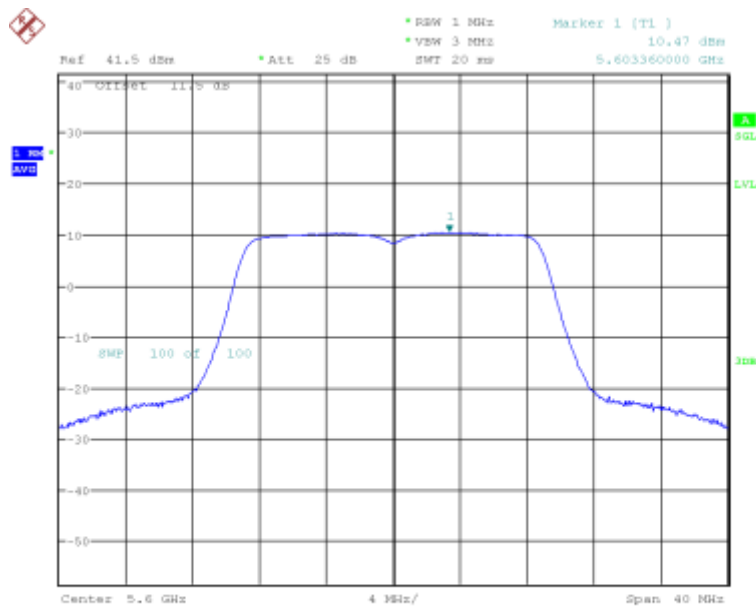
Date: 9-JUL-2019 15:06:45

Figure 94: PPSD-802.11a-5600MHz-q96-1x4-Ch0



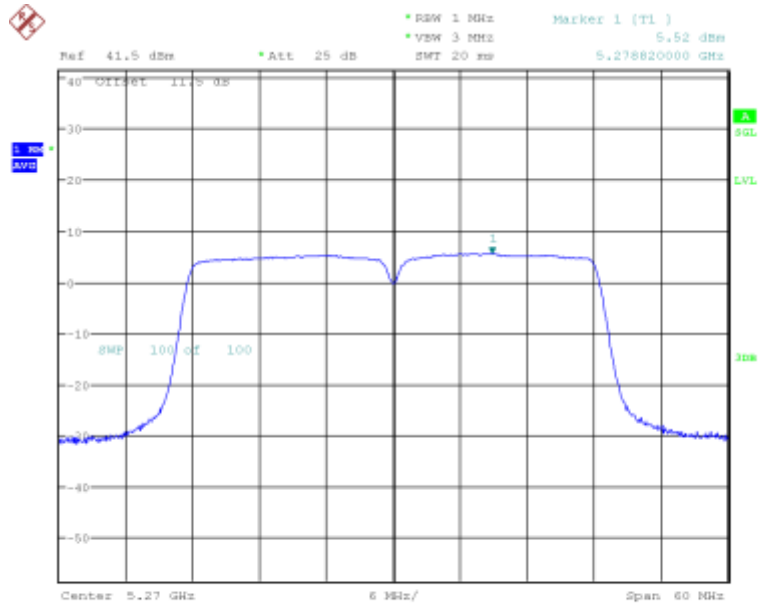
Date: 10.JUL.2019 07:55:27

Figure 95: PPSD-802.11n HT20-5300MHz-q95-1x4-Ch1



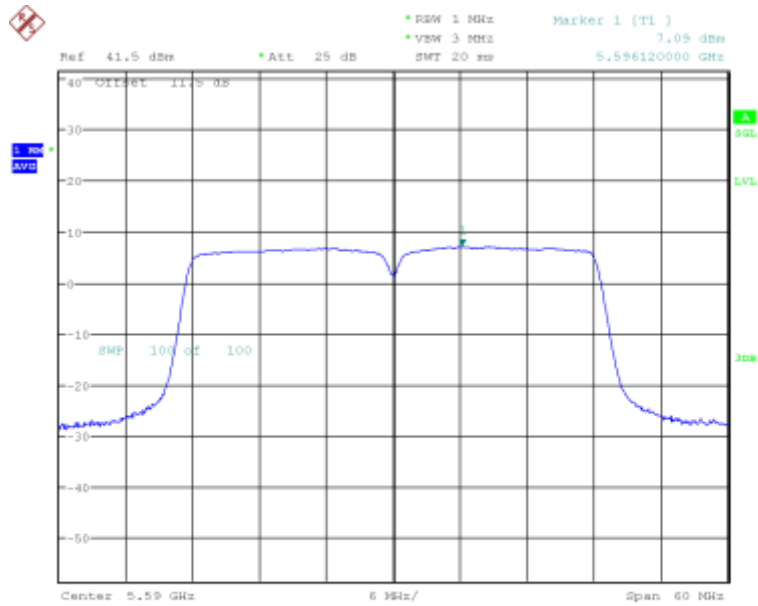
Date: 10.JUL.2019 09:53:14

Figure 96: PPSD-802.11n HT20-5600MHz-q95-1x4-Ch1



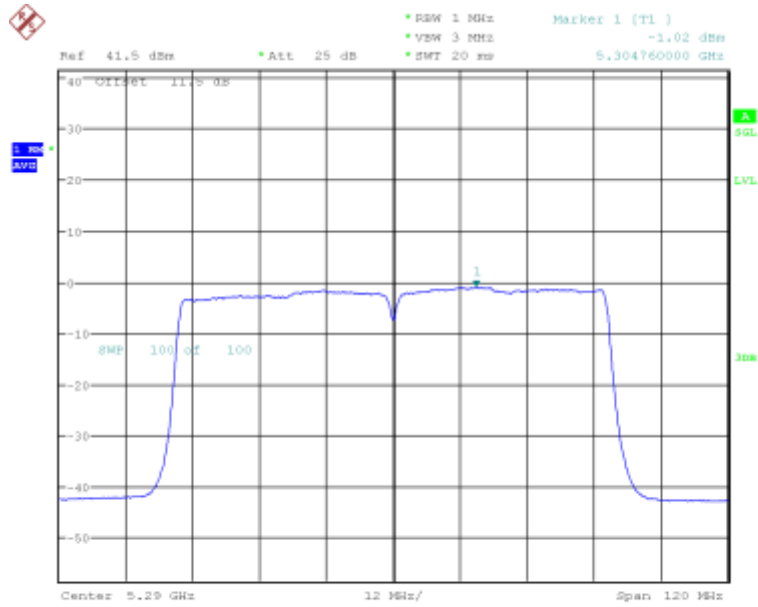
Date: 10.JUL.2019 11:22:25

Figure 97: PPSD-80211n HT40-5270MHz-q96-1x4-Ch2



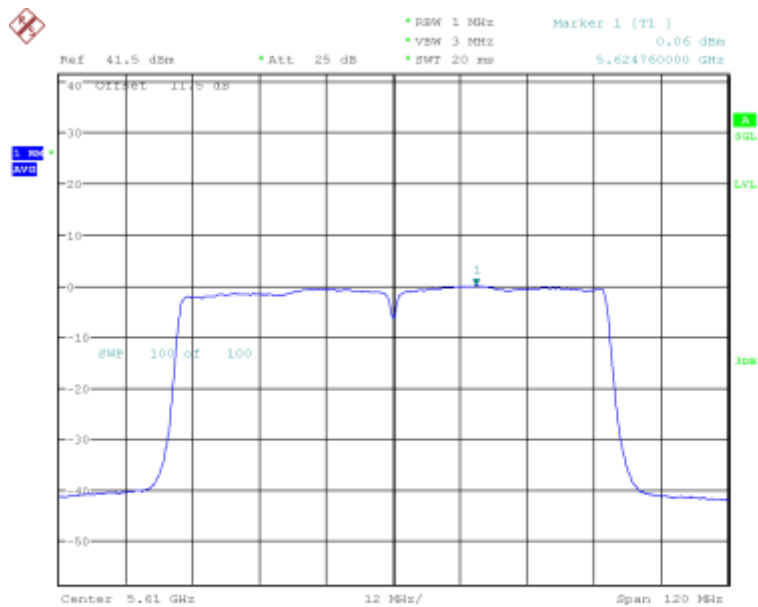
Date: 10.JUL.2019 13:42:15

Figure 98: PPSD-80211n HT40-5590MHz-q96-1x4-Ch2



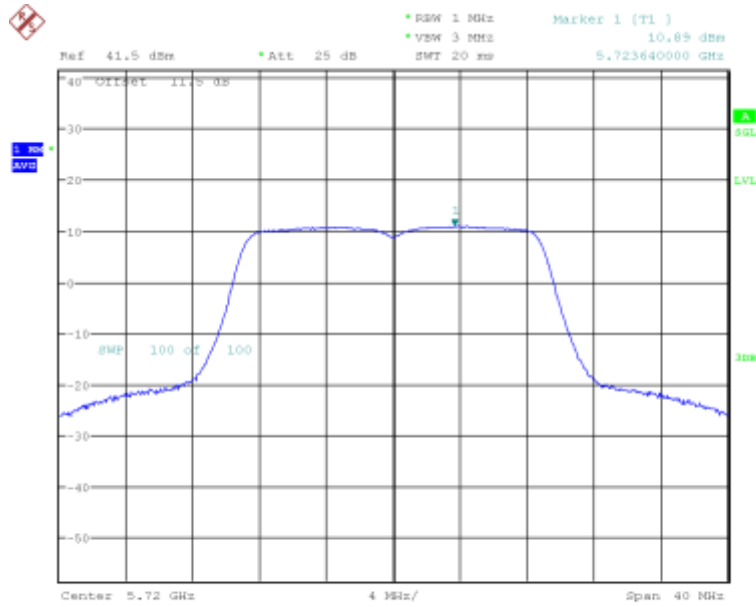
Date: 10.JUL.2019 15:05:38

Figure 99: PPSD-80211ac VHT80-5290MHz-q88-1x4-Ch3



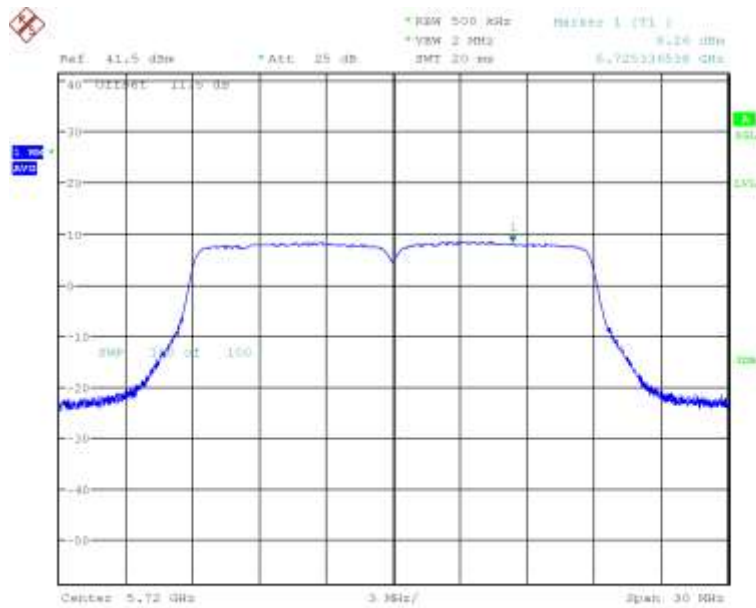
Date: 10.JUL.2019 15:43:51

Figure 100: PPSD-80211ac VHT80-5610MHz-q88-1x4-Ch3



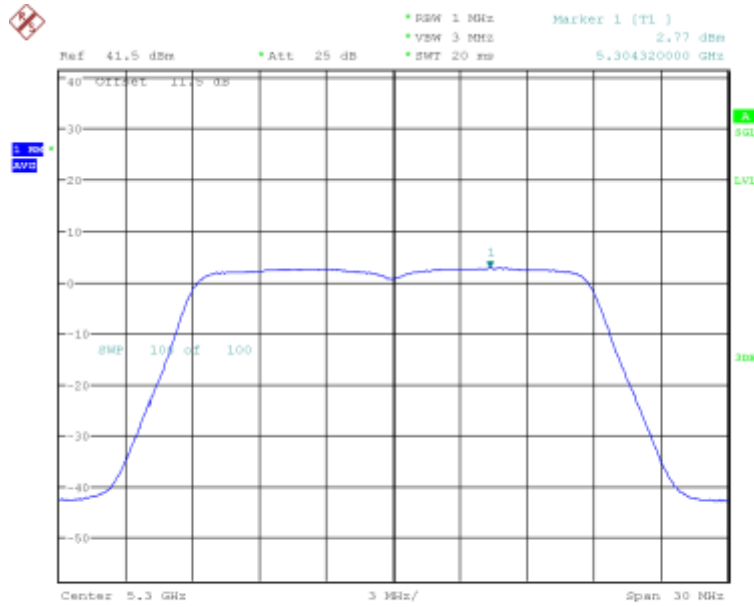
Date: 10.JUL.2019 10:58:11

Figure 101: PPSD-80211n HT20-5720MHz-q95-1x4-Ch1 (Straddle Channel in UNII2)



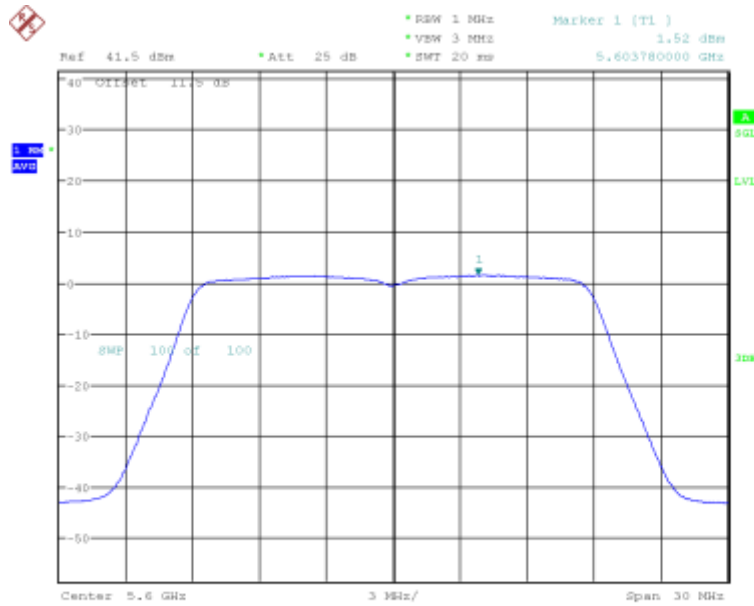
Date: 12.JUL.2019 07:45:45

Figure 102: PPSD-80211n HT20-5720MHz-q95-1x4-Ch1 (Straddle Channel in UNII3)



Date: 11.JUL.2019 09:26:13

Figure 103: PPSD-802.11n HT20-5300MHz-q63-4x4-Ch3



Date: 11.JUL.2019 09:47:47

Figure 104: PPSD-802.11n HT20-5600MHz-q63-4x4-Ch3

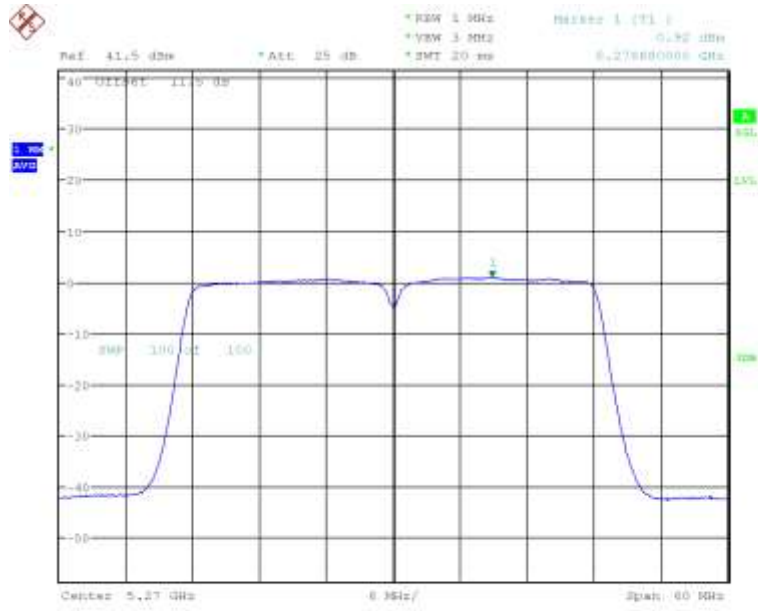


Figure 105: PPSD-802.11n HT40-5270MHz-q76-4x4-Ch2

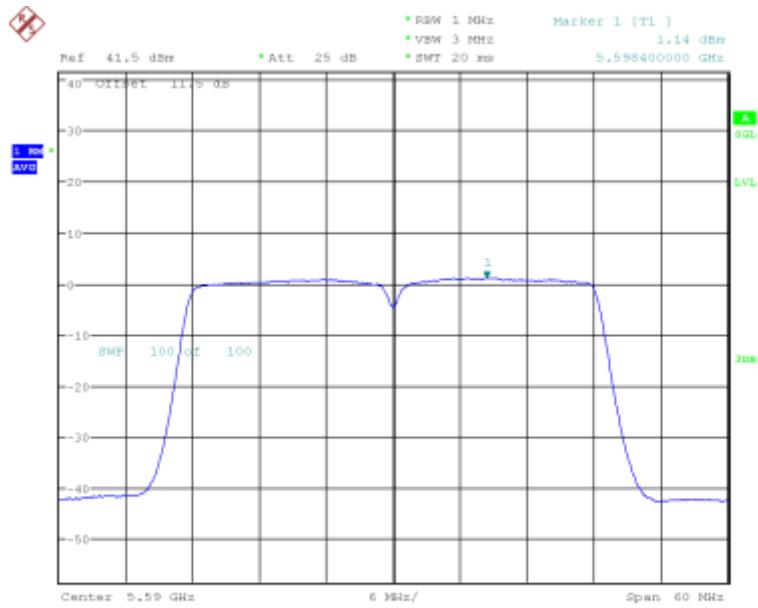
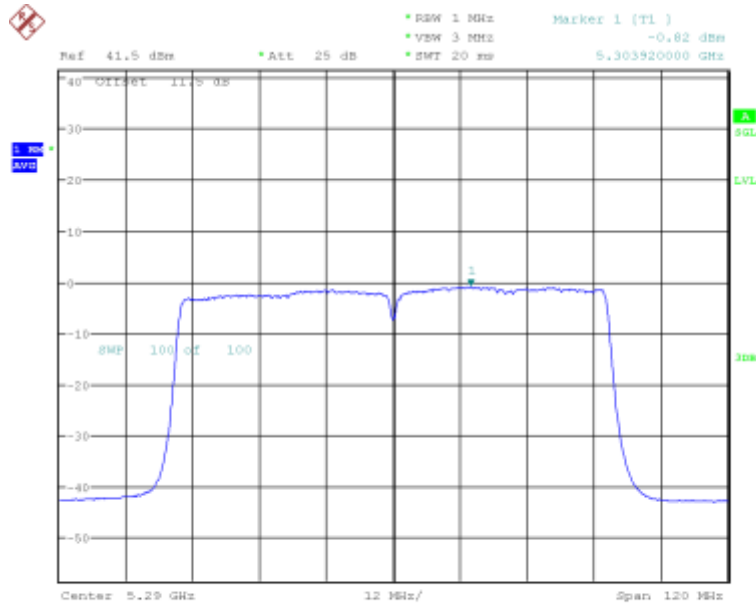
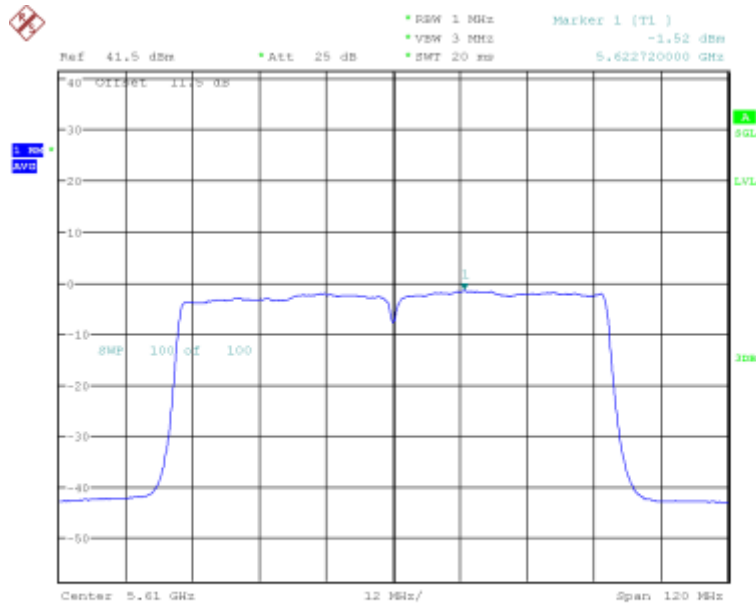


Figure 106: PPSD-802.11n HT40-5590MHz-q75-4x4-Ch2



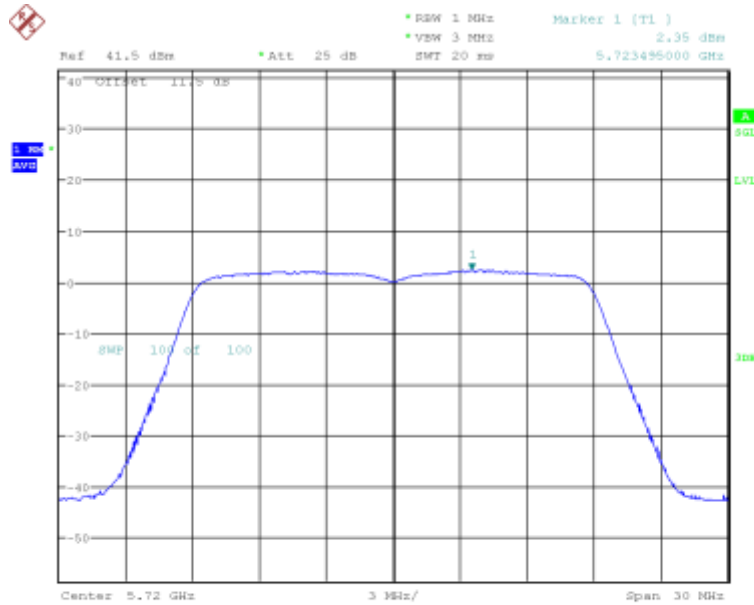
Date: 11.JUL.2019 13:34:26

Figure 107: PPSD-802.11ac VHT80-5290MHz-q84-4x4-Ch1



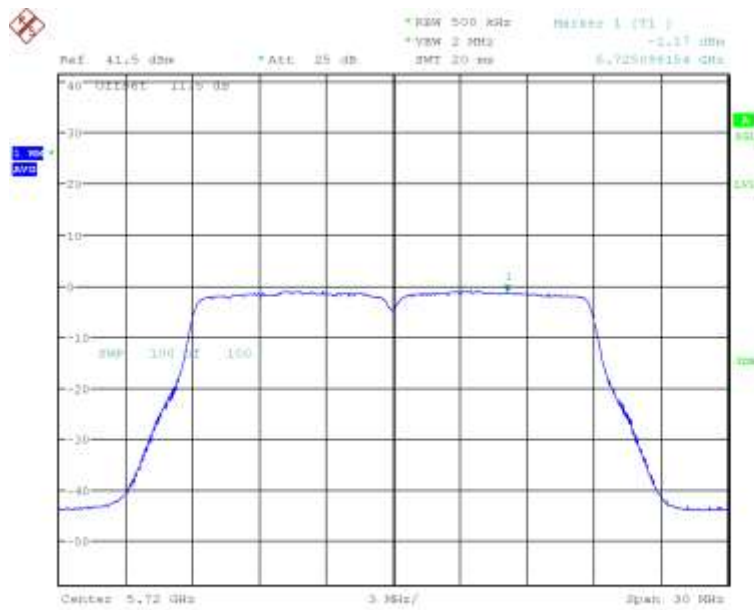
Date: 11.JUL.2019 13:46:06

Figure 108: PPSD-802.11ac VHT80-5610MHz-q84-4x4-Ch1



Date: 12.JUL.2019 10:40:48

Figure 109: PPSD-802.11n HT20-5720MHz-q62-4x4-Ch0 (Straddle Channel in UNII2)



Date: 12.JUL.2019 10:48:43

Figure 110: PPSD-802.11n HT20-5720MHz-q62-4x4-Ch0 (Straddle Channel in UNII3)

4.4 Transmitter Spurious Emissions

Transmitter spurious emissions are emissions outside the frequency range of the equipment when the equipment is in transmit mode; per requirement of CFR47 15.205, 15.209, 15.407(b), RSS 247 Sect. 6.2.2.2 and Sect. 6.2.3.2, RSS GEN Sect.8.9 and 8.10

4.4.1 Test Methodology

4.4.1.1 Preliminary Test

A test program that controls instrumentation and data logging was used to automate the preliminary RF emission test procedure. The frequency range of interest was divided into sub-ranges to yield a frequency resolution of approximately 120 kHz and provide a reading at each frequency for no more than 12° of turntable rotation. For each frequency sub-range the turntable was rotated 360° while peak emission data was recorded and plotted over the frequency range of interest in horizontal and vertical antenna polarization's.

Preliminary emission profile testing was performed inside the anechoic chamber. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm (<1 GHz) and 150cm (>1 GHz) above the floor. The EUT was positioned as shown in the setup photographs. The receiving antenna was placed at a distance of 3m. Measurement equipment was located outside of the chamber. A video camera was placed inside the chamber to view the EUT.

Pres-scans were performed to determine the worst, data rate/ chains for 802.11a, 802.11n (HT20 and HT40), 802.11ac (VHT20, VHT40 and VHT80).

4.4.1.2 Final Test

For each frequency measured, the peak emission was maximized by manipulating the receiving antenna from 1 to 4 meters above the ground plane and placing it at the position that produced the maximum signal strength reading. The turntable was then rotated through 360° while observing the peak signal and placing the EUT at the position that produced maximum radiation. The six highest emissions relative to the limit were measured unless such emissions were more than 20 dB below the limit. If less than six emissions are within 20 dB of the limit, than the noise level of the receiver is measured at frequencies where emissions are expected. Multiples of all oscillator and microprocessor frequencies were also checked.

Final testing was performed on an NSA compliant test site. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm (<1 GHz) and 150cm (>1 GHz) above the ground plane. The placement of EUT and cables were the same as for preliminary testing and is shown in the setup photographs.

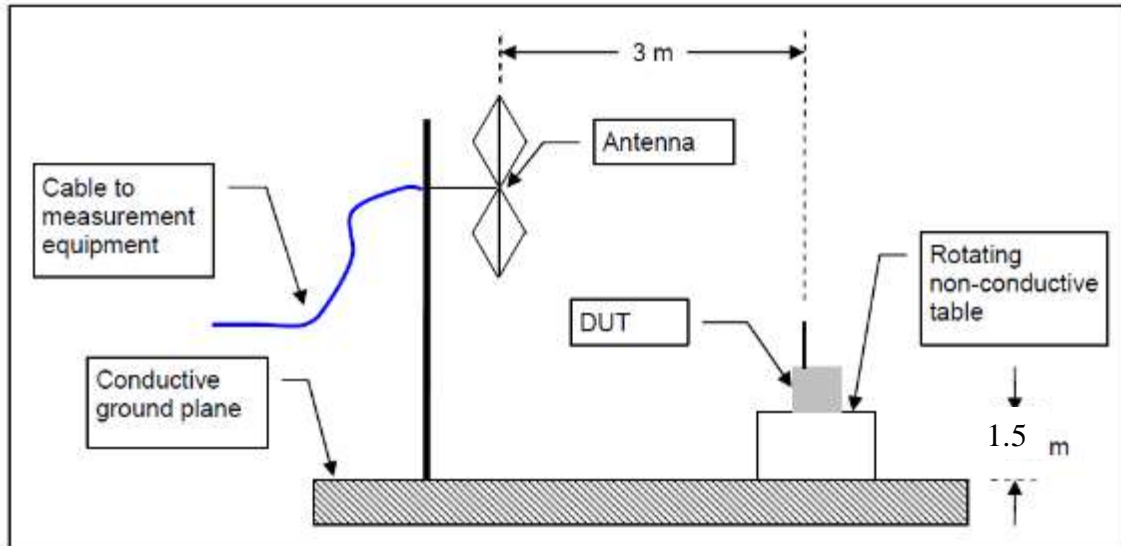
Final results are:

1. 802.11a at 6Mbps with 1 Chain – Nonbeamforming
2. 802.11n HT20 at 6.5Mbps with 1 Chain – Nonbeamforming (covering VHT20)
3. 802.11n HT40 at MCS0 with 1 Chain – Nonbeamforming (covering VHT40)
4. 802.11ac VHT80 at MCS0 with 1 Chain – Nonbeamforming
5. 802.11a at 6Mbps with 4 Chains – Beamforming
6. 802.11n HT20 at 6.5Mbps with 4 Chains – Beamforming (covering VHT20)
7. 802.11n HT40 at MCS0 with 4 Chains – Beamforming (covering VHT40)
8. 802.11ac VHT80 at MCS0 with 4 Chains – Nonbeamforming

4.4.1.3 Deviations

None.

Test Setup:



4.4.2 Transmitter Spurious Emission Limit

The spurious emissions of the transmitter shall not exceed the values in CFR47 Part 15.205, 15.209, RSS 247 Sect. 6, RSS GEN Sect. 8.9 and 8.10

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F (kHz)	300
0.490-1.705	24000/F (kHz)	30
1.705-30.0	30	30
30-88	100 **	3
88-216	150 **	3
216-960	200 **	3
Above 960	500	3

According to CFR47 15.407 (b) and RSS 247 Sect. 6, all harmonics and spurious emissions which are outside the 5150 MHz - 5250 MHz, 5250 MHz - 5350 MHz, or 5470 MHz - 5725 MHz shall not exceed -27 dBm/MHz. This is equivalent to 68.2 dBuV/m at 3 meter distance.

4.4.3 Results

The final measurement data was taken under the worst case operating modes, configurations, and/or cable positions. It also reflects the results including any modifications and/or special accessories listed in Sections 1.4 and test plan.

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 12: Transmit Spurious Emission at Band-Edge Requirements

Test Date: April 18-26, 2019				Test By: Kerwinn Corpuz				
Test Method: Radiated Measurements				Power Setting: See test plan				
Antenna Type: PCB				Signal State: Modulated				
Directional Antenna Gain: + 8.8 dBi				Max Antenna Gain: + 5.6 dBi				
Ambient Temp.: 22-23 °C				Relative Humidity: 44-48%				
Band-Edge Results (5250-5350 MHz)								
Freq. (MHz)	Level (dBuV/m)	Pol. (H/V)	Limit (dBuV/m)	Margin (dB)	Det.	Table Deg.	Tower (cm)	Note
5350.9	69.76	V	74.00	-4.24	Pk	224	148	Fig 111: 11a-6Mbps-5320MHz-q80-Ch0,1,2,3
5398.4	53.99	V	54.00	-0.01	Ave	224	148	Fig 112: 11a-6Mbps-5320MHz-q80- Ch0,1,2,3
5354.0	67.16	H	74.00	-6.84	Pk	96	186	Fig 113: 11a-6Mbps-5320MHz-q80- Ch0,1,2,3
5398.2	53.57	H	54.00	-0.43	Ave	96	186	Fig 114: 11a-6Mbps-5320MHz-q80- Ch0,1,2,3
5351.6	69.46	V	74.00	-4.54	Pk	220	150	Fig 115: HT20-MCS0-5320MHz-q8- Ch0,1,2,3
5397.8	53.96	V	54.00	-0.04	Ave	220	150	Fig 116: HT20-MCS0-5320MHz-q8- Ch0,1,2,3
5356.4	68.31	H	74.00	-5.69	Pk	39	178	Fig 117: HT20-MCS0-5320MHz-q8- Ch0,1,2,3
5353.1	52.54	H	54.00	-1.46	Ave	39	178	Fig 118: HT20-MCS0-5320MHz-q8- Ch0,1,2,3
5350.7	73.39	V	74.00	-0.61	Pk	218	149	Fig 119: HT40-MCS0-5310MHz-q79- Ch0,1,2,3
5353.9	53.93	V	54.00	-0.07	Ave	218	149	Fig 120: HT40-MCS0-5310MHz-q79-Ch0, 1, 2, 3
5353.6	72.85	H	74.00	-1.15	Pk	68	189	Fig 121: HT40-MCS0-5310MHz-q79-Ch0, 1, 2, 3
5354.3	52.79	H	54.00	-1.21	Ave	68	189	Fig 122: HT40-MCS0-5310MHz-q79-Ch0, 1, 2, 3
5352.6	73.46	V	74.00	-0.54	Pk	217	154	Fig 123: VHT80-MCS0-5290MHz-q88-Ch0, 1, 2, 3
5353.7	53.97	V	54.00	-0.03	Ave	217	154	Fig 124: VHT80-MCS0-5290MHz-q88-Ch0, 1, 2, 3
5353.4	70.64	H	74.00	-3.36	Pk	65	188	Fig 125: VHT80-MCS0-5290MHz-q88-Ch0, 1, 2, 3
5353.0	52.99	H	54.00	-1.01	Ave	65	188	Fig 126: VHT80-MCS0-5290MHz-q88-Ch0, 1, 2, 3
<p>Note: 1. Band-edge frequencies were taken at 5350 MHz since 5150-5250 MHz band is not a restricted band. 2. All the band-edge measurements met the restricted band requirements of CFR47 15.205. 3. Power level is the same for both HT20 & VHT20 and HT40 & VHT40. HT20 and HT40 found as worst case, therefore VHT20 and VHT40 are covered for band-edge measurements.</p>								

Test Date: April 18-26, 2019					Test By: Kerwinn Corpuz			
Test Method: Radiated Measurements					Power Setting: See test plan			
Antenna Type: PCB					Signal State: Modulated			
Directional Antenna Gain: + 8.8 dBi					Max Antenna Gain: + 5.6 dBi			
Ambient Temp.: 22-23 °C					Relative Humidity: 44-48%			
Band-Edge Results (5470-5850 MHz)								
Freq. (MHz)	Level (dBuV/m)	Pol. (H/V)	Limit (dBuV/m)	Margin (dB)	Det.	Table Deg.	Tower (cm)	Note
5469.8	68.62	V	74.00	-5.38	Pk	221	148	Fig 127: 11a-6Mbps-5500MHz-q76-Ch0,1,2,3
5470.0	53.72	V	54.00	-0.28	Ave	221	148	Fig 128: 11a-6Mbps-5500MHz-q76-Ch0,1,2,3
5469.3	69.04	H	74.00	-4.96	Pk	85	123	Fig 129: 11a-6Mbps-5500MHz-q76-Ch0,1,2,3
5470.0	53.62	H	54.00	-0.38	Ave	85	123	Fig 130: 11a-6Mbps-5500MHz-q76-Ch0,1,2,3
5468.6	69.68	V	74.00	-4.32	Pk	220	151	Fig 131: HT20-MCS0-5500MHz-q77-Ch0,1,2,3
5470.0	53.95	V	54.00	-0.05	Ave	220	151	Fig 132: HT20-MCS0-5500MHz-q77-Ch0,1,2,3
5470.0	72.12	H	74.00	-1.88	Pk	88	126	Fig 133: HT20-MCS0-5500MHz-q77-Ch0,1,2,3
5470.0	53.89	H	54.00	-0.11	Ave	88	126	Fig 134: HT20-MCS0-5500MHz-q77-Ch0,1,2,3
5468.0	68.47	V	74.00	-5.53	Pk	214	150	Fig 135: HT40-MCS0-5510MHz-q74-Ch0,1,2,3
5467.8	53.99	V	54.00	-0.01	Ave	214	150	Fig 136: HT40-MCS0-5510MHz-q74-Ch0,1,2,3
5469.3	70.64	H	74.00	-3.36	Pk	91	127	Fig 137: HT40-MCS0-5510MHz-q74-Ch0,1,2,3
5469.3	53.95	H	54.00	-0.05	Ave	91	127	Fig 138: HT40-MCS0-5510MHz-q74-Ch0,1,2,3
5466.8	67.73	V	74.00	-6.27	Pk	217	154	Fig 139: VHT80-MCS0-5530MHz-q77-Ch0,1,2,3
5467.7	53.96	V	54.00	-0.04	Ave	217	154	Fig 140: VHT80-MCS0-5530MHz-q77-Ch0,1,2,3
5468.6	67.93	H	74.00	-6.07	Pk	89	138	Fig 141: VHT80-MCS0-5530MHz-q77-Ch0,1,2,3
5469.2	53.60	H	54.00	-0.40	Ave	89	138	Fig 142: VHT80-MCS0-5530MHz-q77-Ch0,1,2,3
5931.5	67.99	V	68.23	-0.24	PK	196	148	Fig 143: 11a-6Mbps-5720MHz-q96-Ch0,1,2,3
5930.8	67.63	H	68.23	-0.60	PK	83	191	Fig 144: 11a-6Mbps-5720MHz-q96-Ch0,1,2,3
5932.4	67.61	V	68.23	-0.62	PK	212	156	Fig 145: HT20-MCS0-5720MHz-q96-Ch0,1,2,3
5928.0	67.45	H	68.23	-0.78	PK	79	190	Fig 146: HT20-MCS0-5720MHz-q96-Ch0,1,2,3
5931.4	67.84	V	68.23	-0.39	PK	179	165	Fig 147: HT40-MCS0-5710MHz-q96-Ch0,1,2,3
5932.1	67.65	H	68.23	-0.58	PK	86	203	Fig 148: HT40-MCS0-5710MHz-q96-Ch0,1,2,3
5940.3	67.71	V	68.23	-0.52	PK	188	149	Fig 149: VHT80-MCS0-5690MHz-q96-Ch0,1,2,3
5940.8	68.01	H	68.23	-0.22	PK	84	207	Fig 150: VHT80-MCS0-5690MHz-q96-Ch0,1,2,3

-
- Note:** 1. Band-edge frequencies were taken at 5470 MHz (restricted band) and 5850 MHz for Straddle Channels (non-restricted band).
2. All the band-edge measurements met the restricted band requirements of CFR47 15.205.
3. Power level is the same for both HT20 & VHT20 and HT40 & VHT40. HT20 and HT40 found as worst case, therefore VHT20 and VHT40 are covered for band-edge measurements.

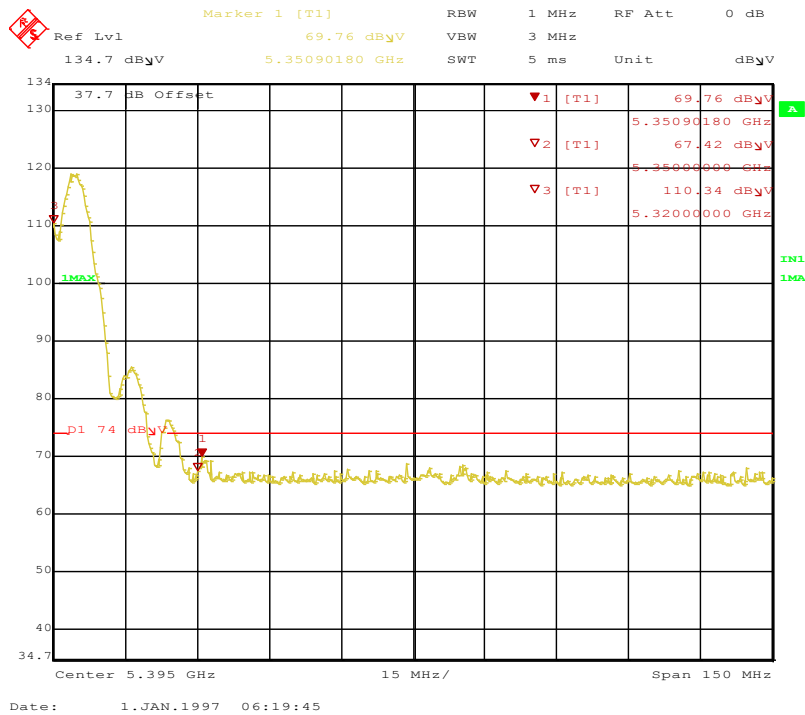


Figure 111: 11a-6Mbps-5320MHz-q80-Peak-Vert-Ch-0-1-2-3

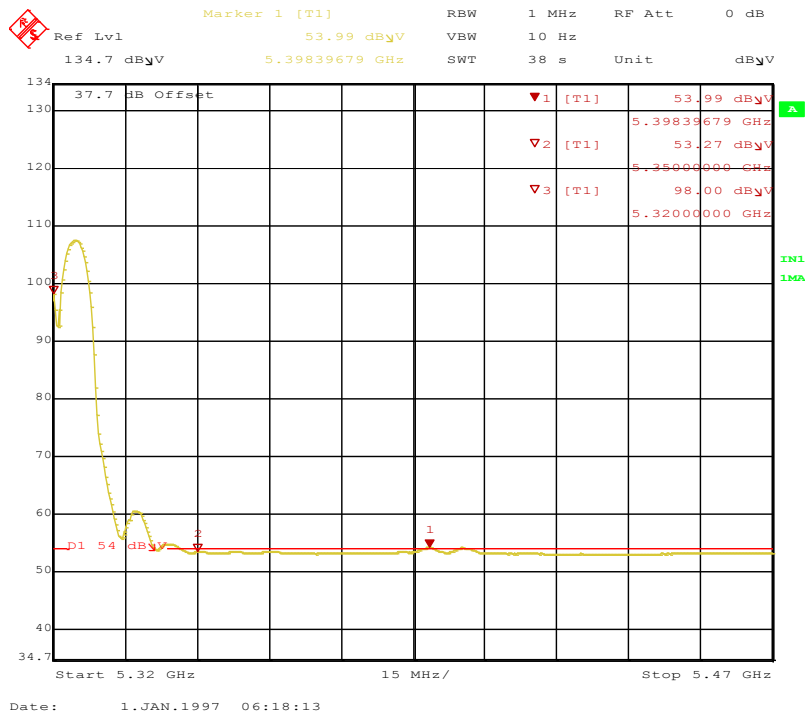


Figure 112: 11a-6Mbps-5320MHz-q80-Average-Vert-Ch-0-1-2-3

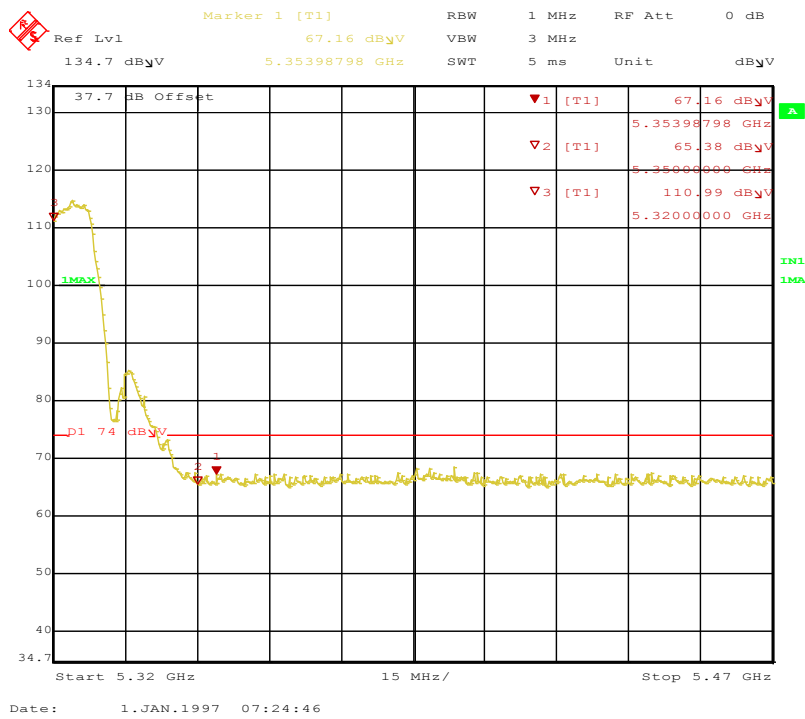


Figure 113: 11a-6Mbps-5320MHz-q80-Peak-Horiz-Ch0-1-2-3

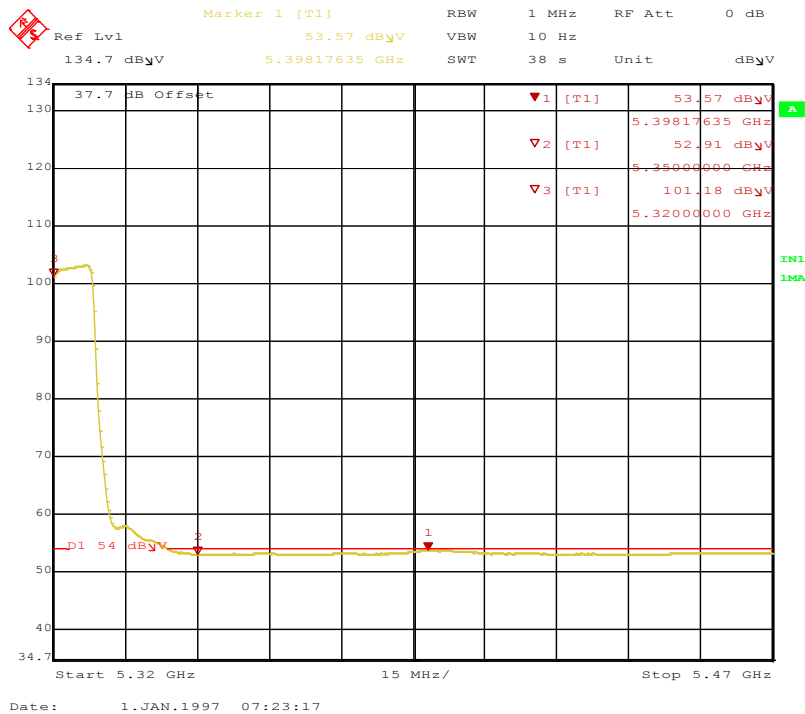


Figure 114: 11a-6Mbps-5320MHz-q80-Average-Horiz-Ch0-1-2-3

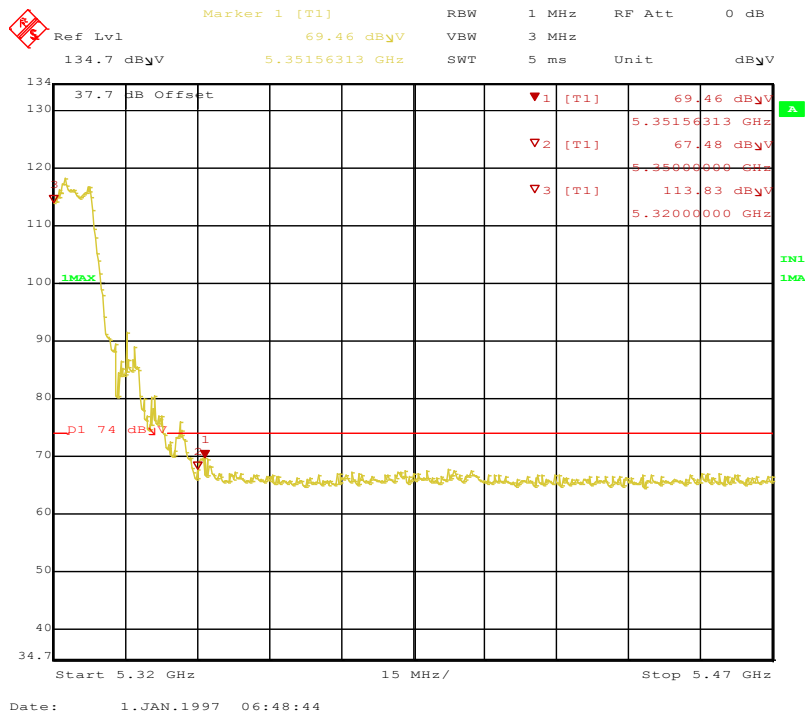


Figure 115: HT20-MCS0-5320MHz-q81-Peak-Vert-Ch0-1-2-3

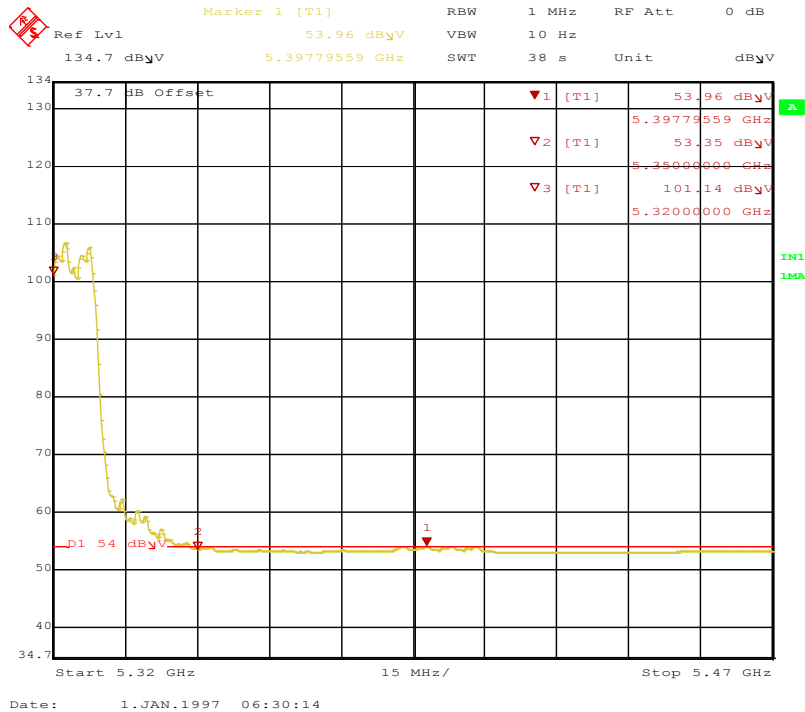


Figure 116: HT20-MCS0-5320MHz-q81-Average-Vert-Ch0-1-2-3

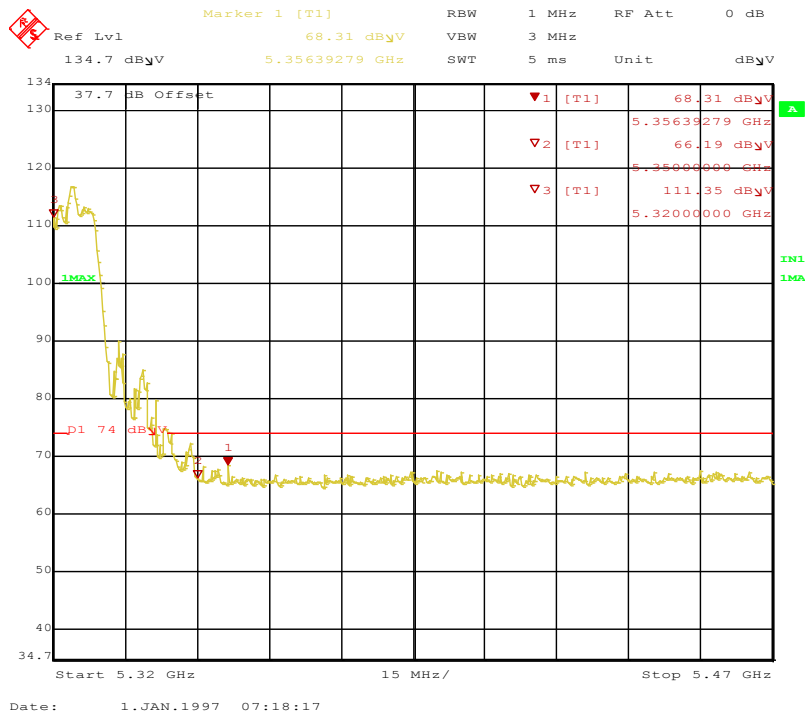


Figure 117: HT20-MCS0-5320MHz-q81-Peak-Horiz-Ch0-1-2-3

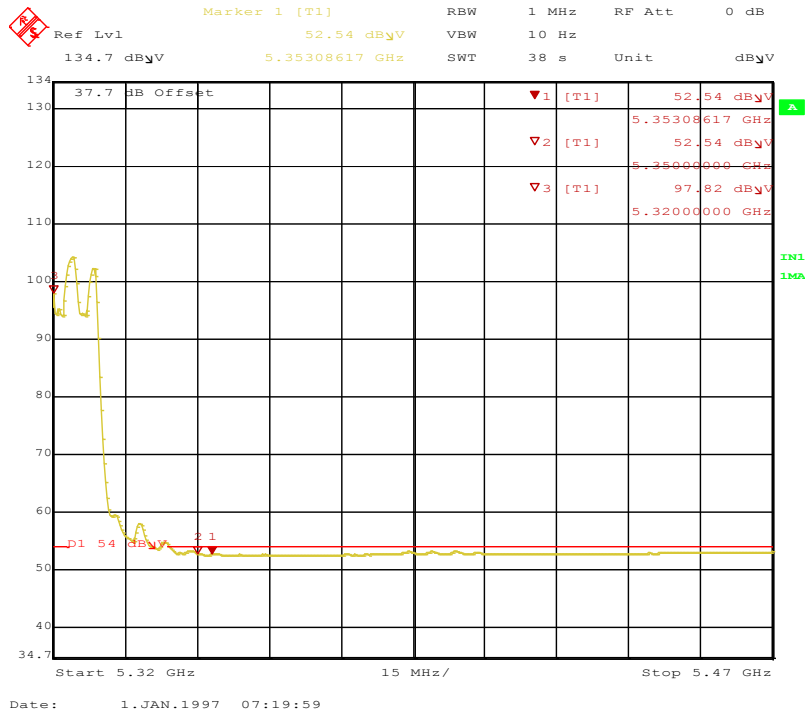


Figure 118: HT20-MCS0-5320MHz-q81-Average-Horiz-Ch0-1-2-3

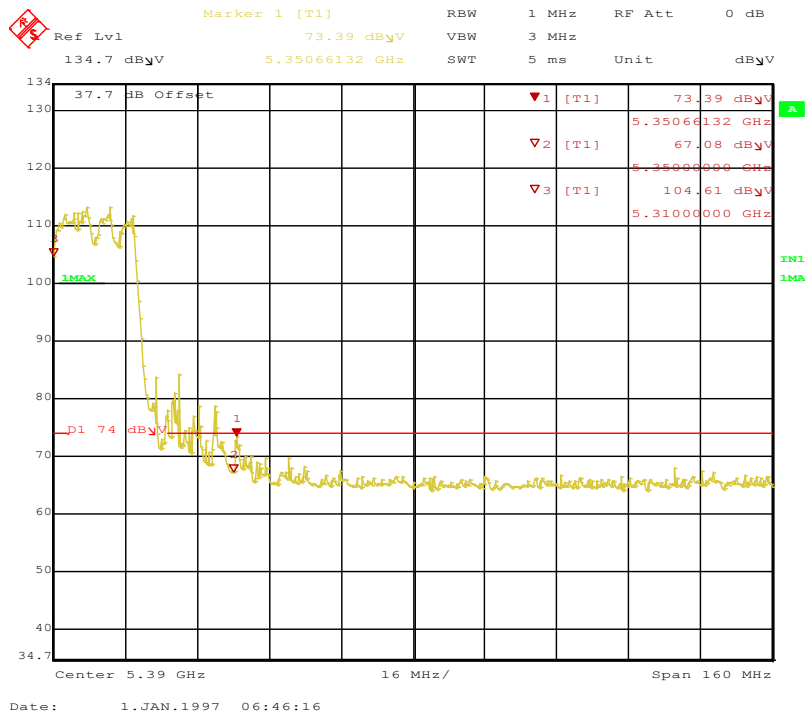


Figure 119: HT40-MCS0-5310MHz-q79-Peak-Vert-Ch0-1-2-3

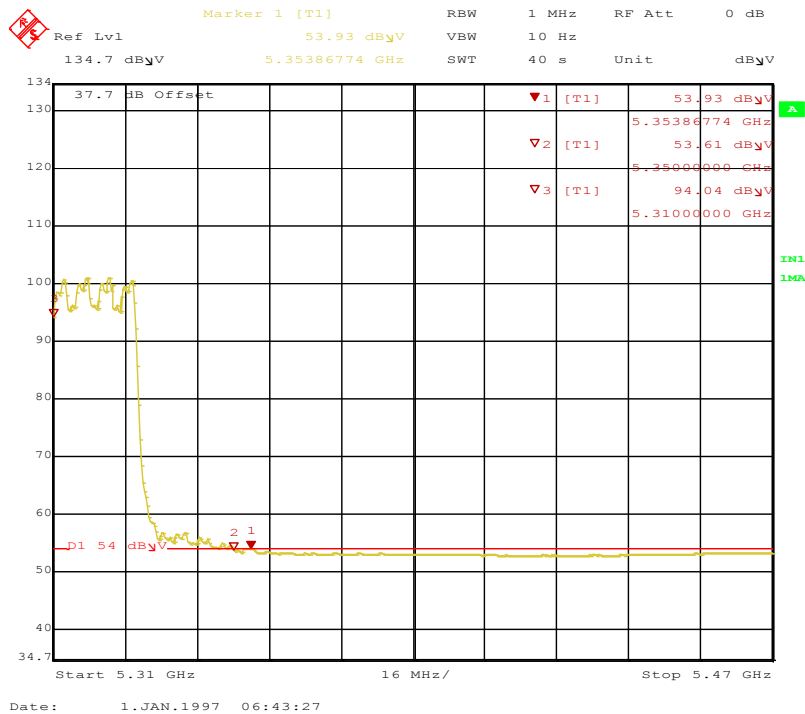


Figure 120: HT40-MCS0-5310MHz-q79-Average-Vert-Ch0-1-2-3

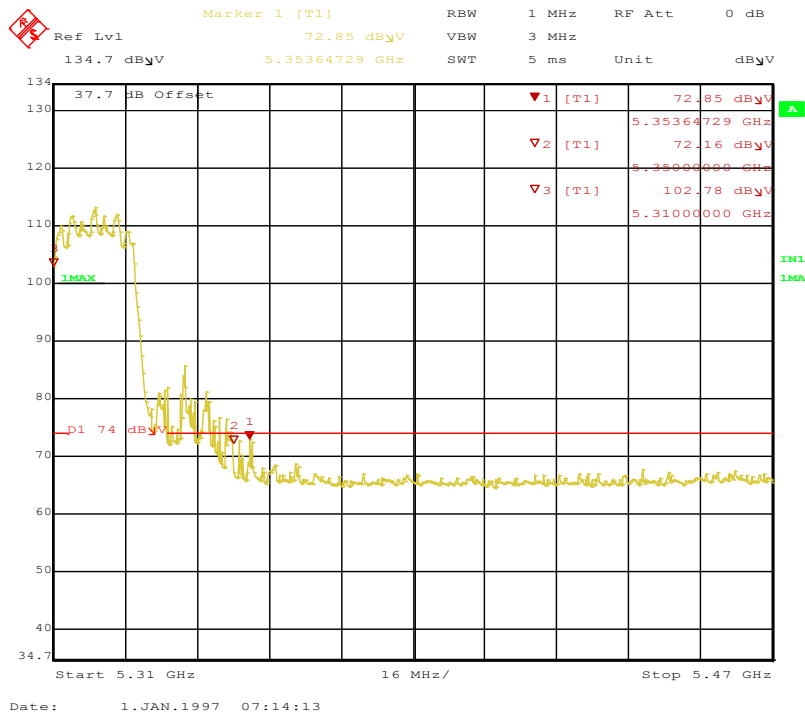


Figure 121: HT40-MCS0-5310MHz-q79-Peak-Horiz-Ch0-1-2-3

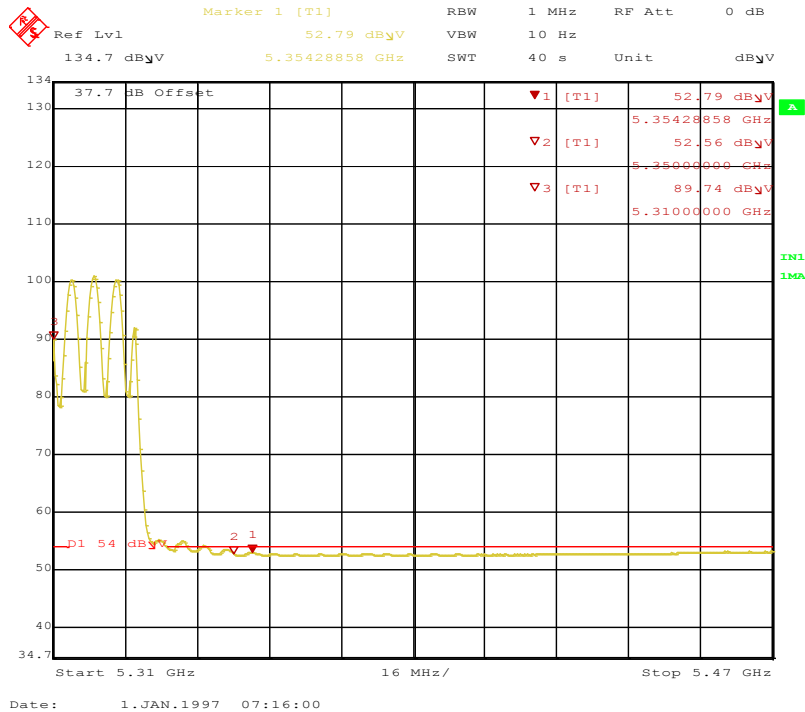


Figure 122: HT40-MCS0-5310MHz-q79-Average-Horiz-Ch0-1-2-3

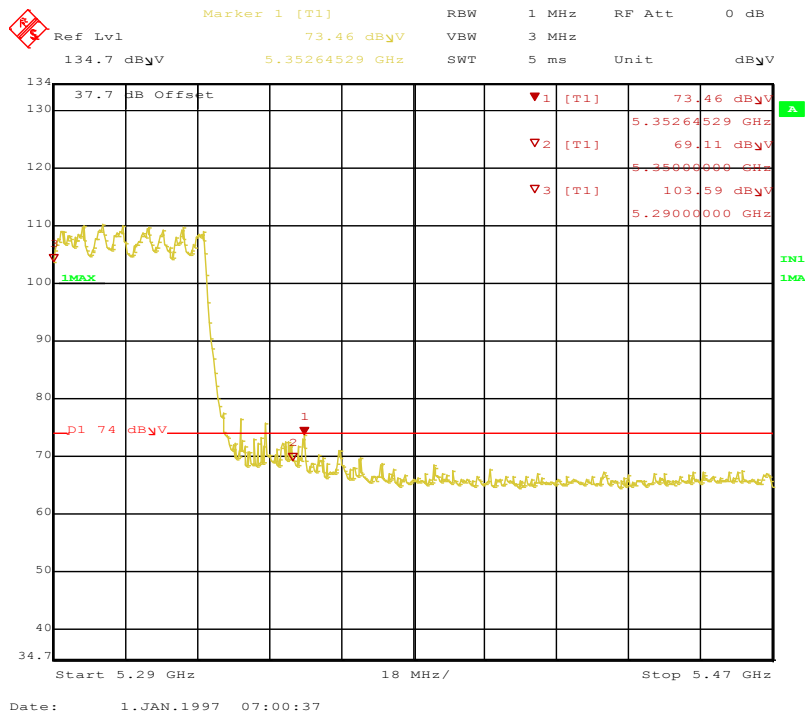


Figure 123: VHT80-MCS0-5290MHz-q88-Peak-Vert-Ch0-1-2-3

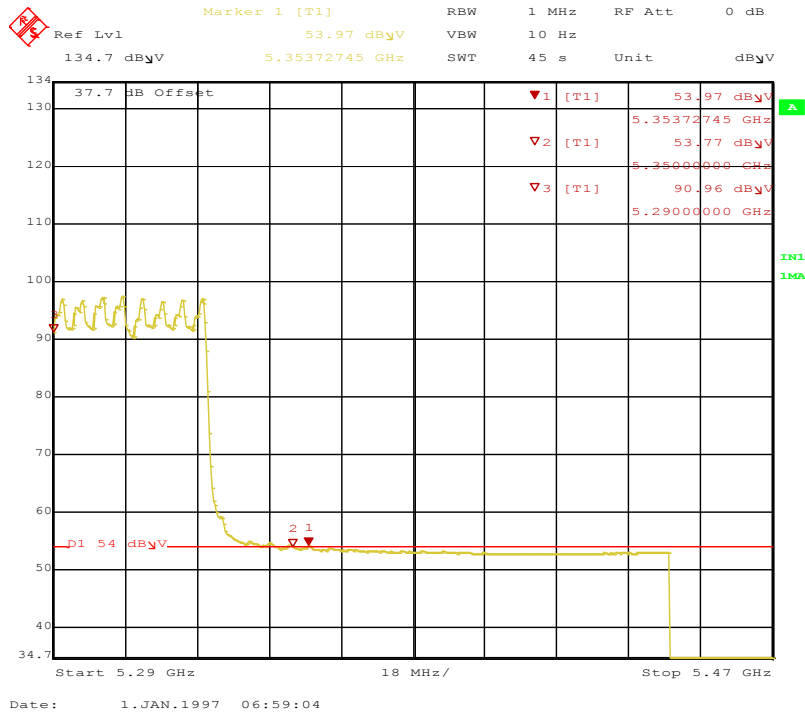


Figure 124: VHT80-MCS0-5290MHz-q88-Average-Vert-Ch0-1-2-3

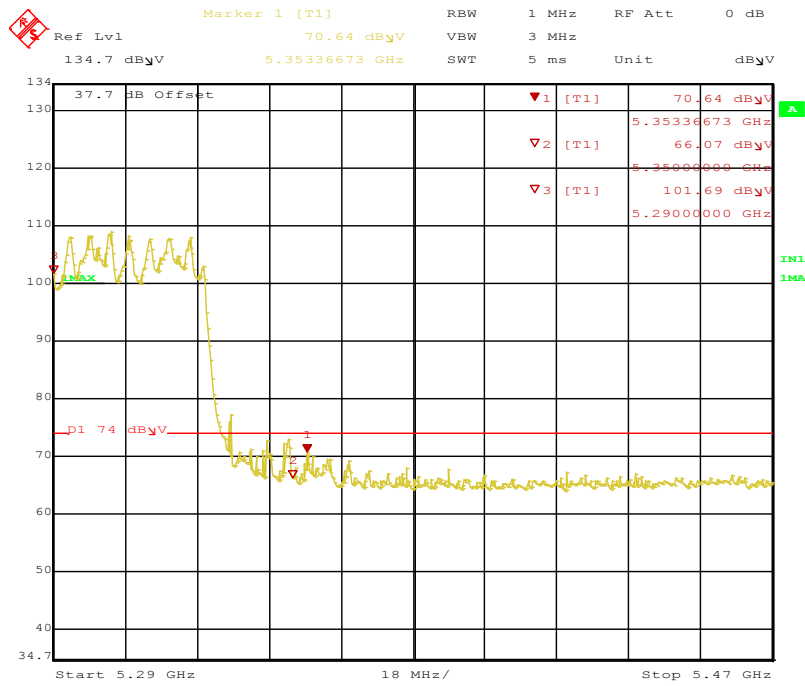


Figure 125: VHT80-MCS0-5290MHz-q88-Peak-Horiz-Ch0-1-2-3

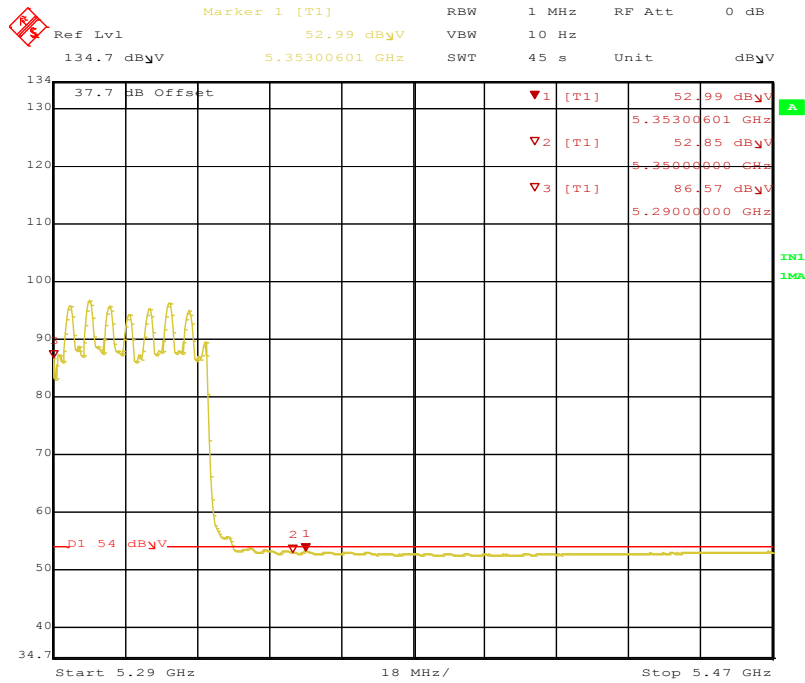


Figure 126: VHT80-MCS0-5290MHz-q88-Average-Horiz-Ch0-1-2-3

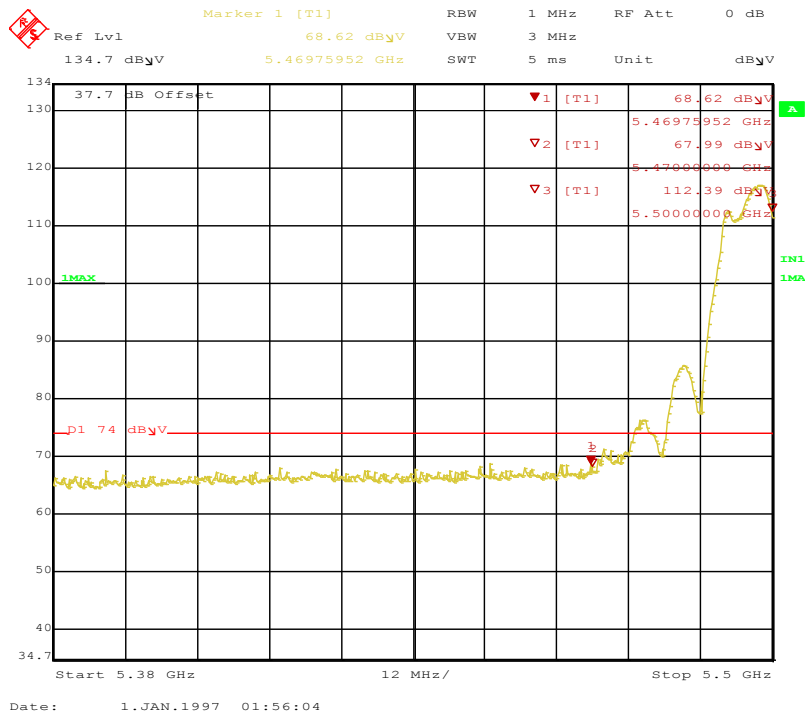


Figure 127: 11a-6Mbps-5500MHz-q76-Peak-Vert-Ch0-1-2-3

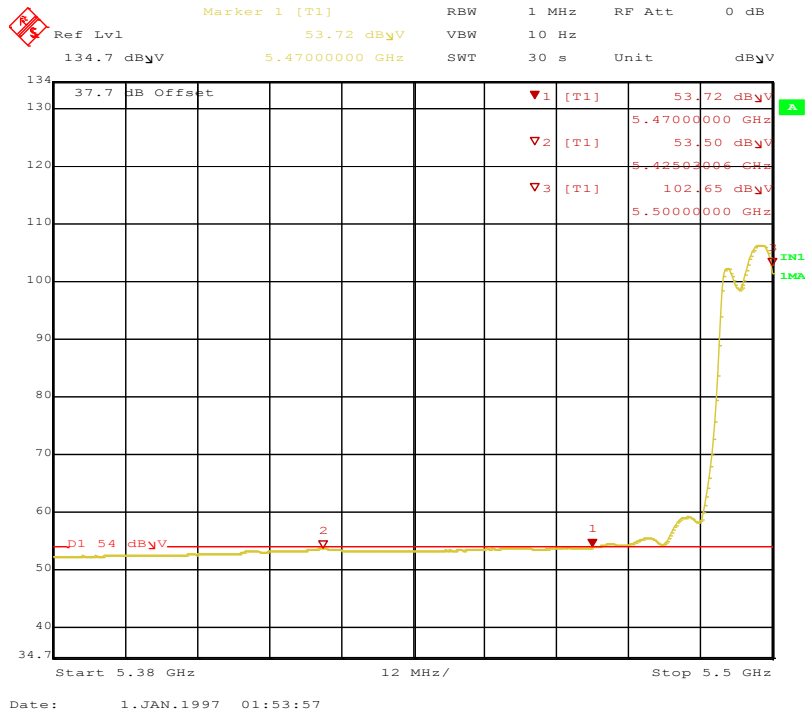


Figure 128: 11a-6Mbps-5500MHz-q76-Average-Vert-Ch0-1-2-3

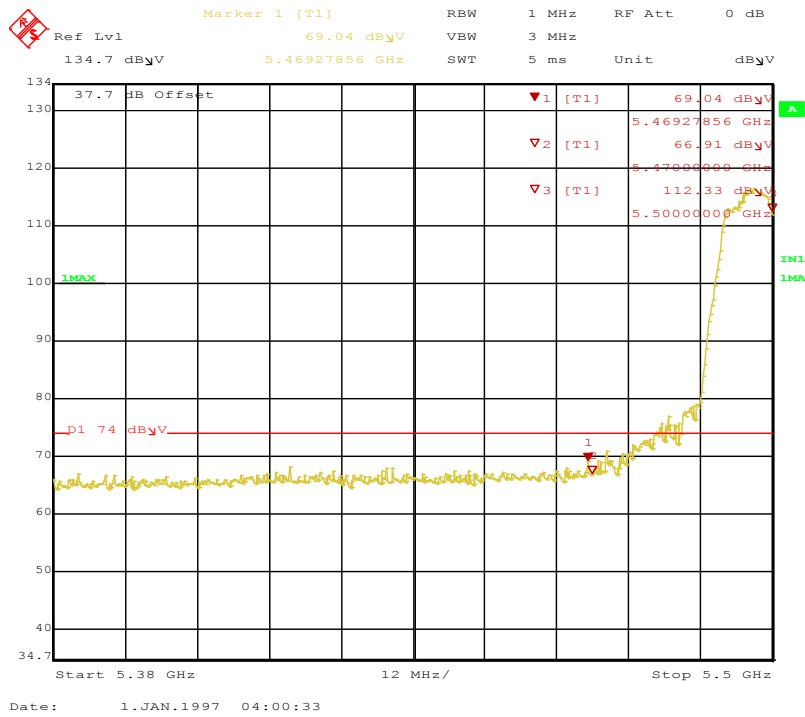


Figure 129: 11a-6Mbps-5500MHz-q76-Peak-Horiz-Ch0-1-2-3

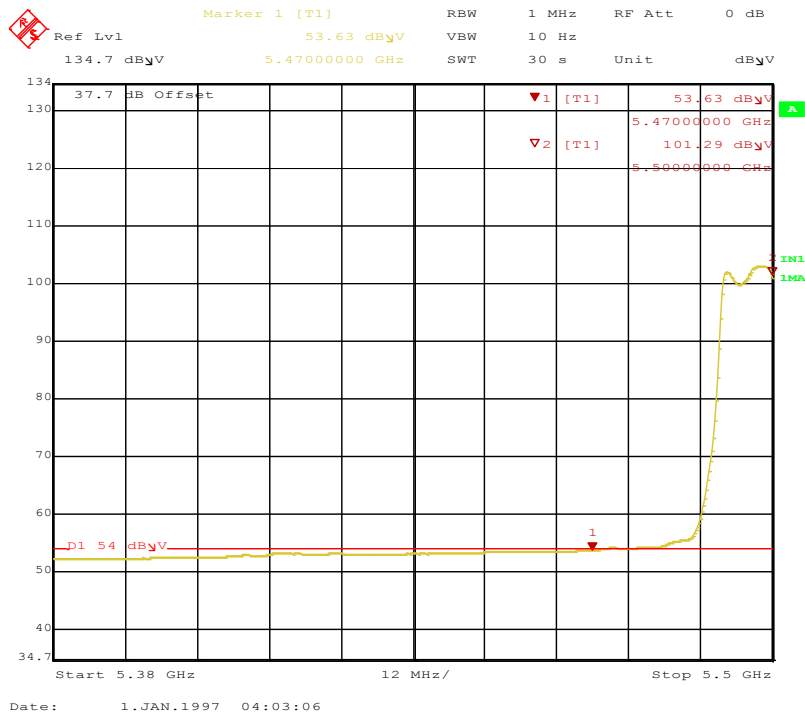


Figure 130: 11a-6Mbps-5500MHz-q76-Average-Horiz-Ch0-1-2-3

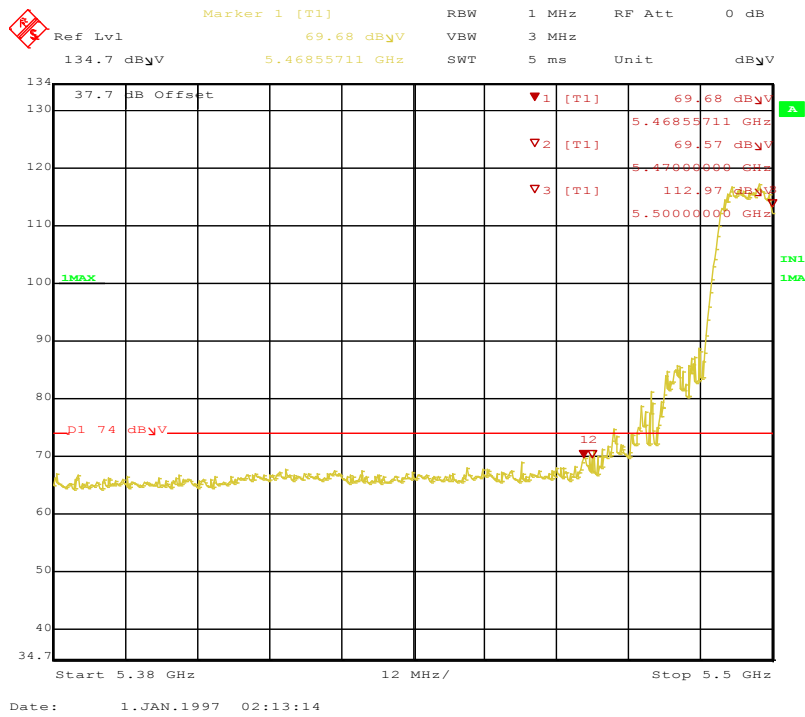


Figure 131: HT20-MCS0-5500MHz-q77-Peak-Vert-Ch0-1-2-3

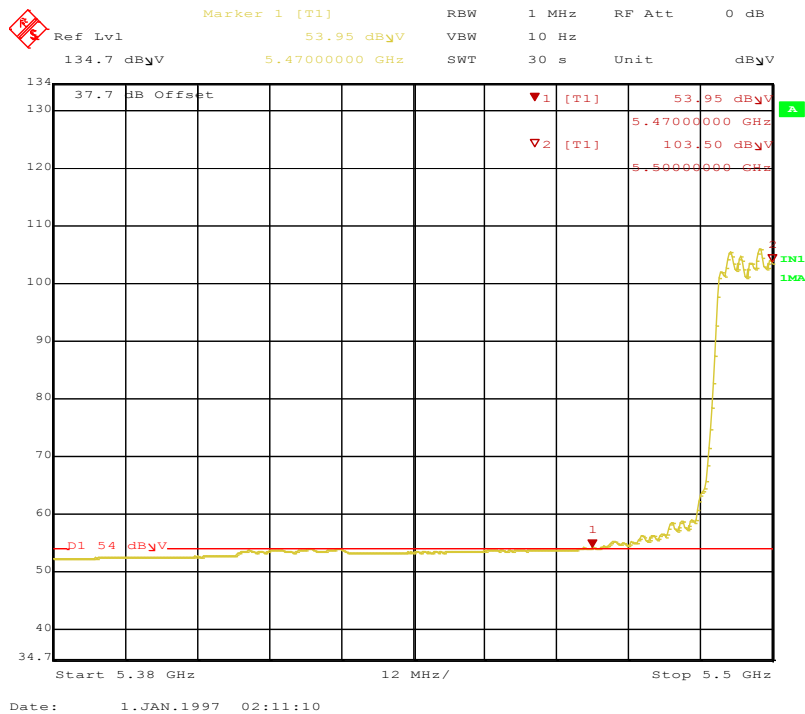


Figure 132: HT20-MCS0-5500MHz-q77-Average-Vert-Ch0-1-2-3

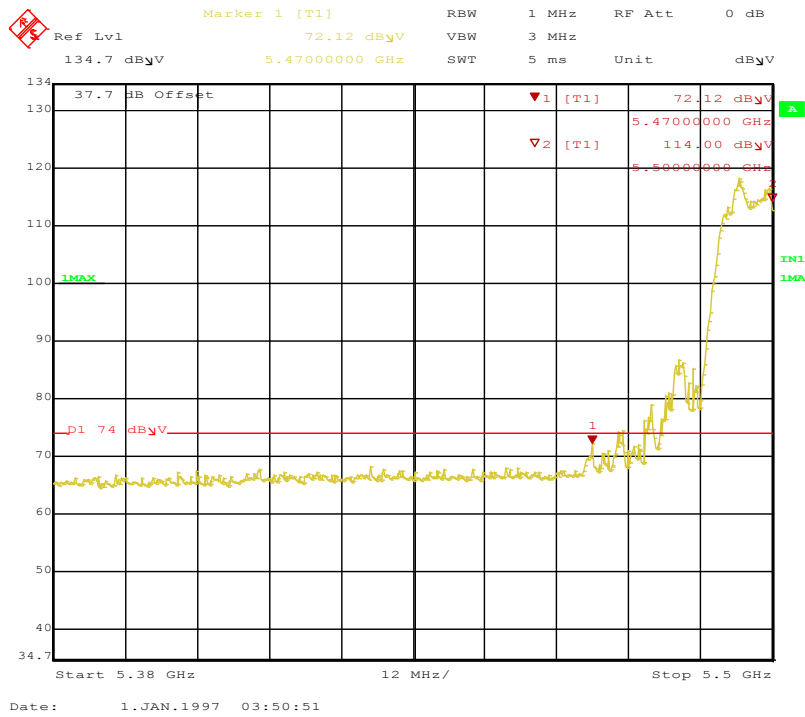


Figure 133: HT20-MCS0-5500MHz-q77-Peak-Horiz-Ch0-1-2-3

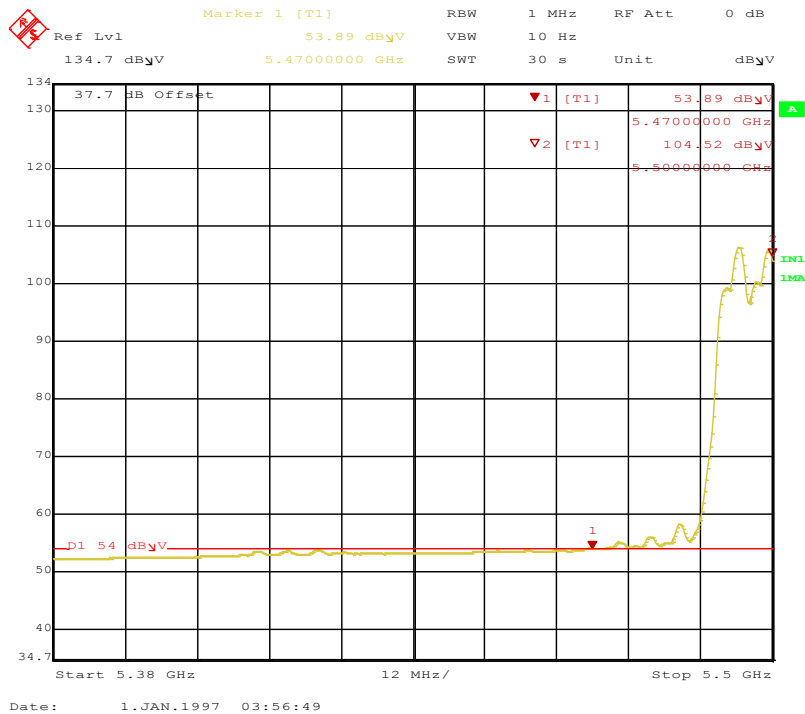


Figure 134: HT20-MCS0-5500MHz-q77-Average-Horiz-Ch0-1-2-3

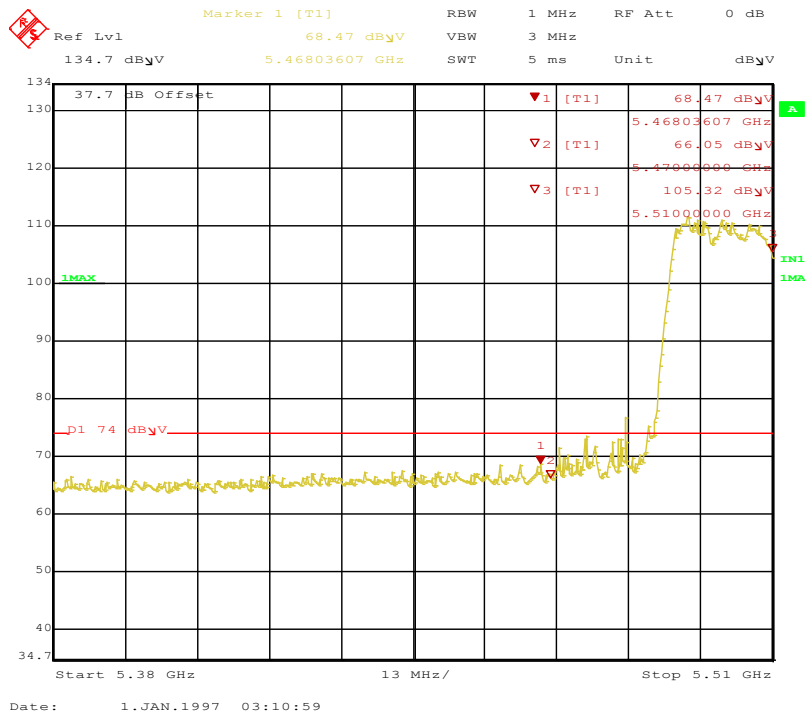


Figure 135: HT40-MCS0-5510MHz-q74-Peak-Vert-Ch0-1-2-3

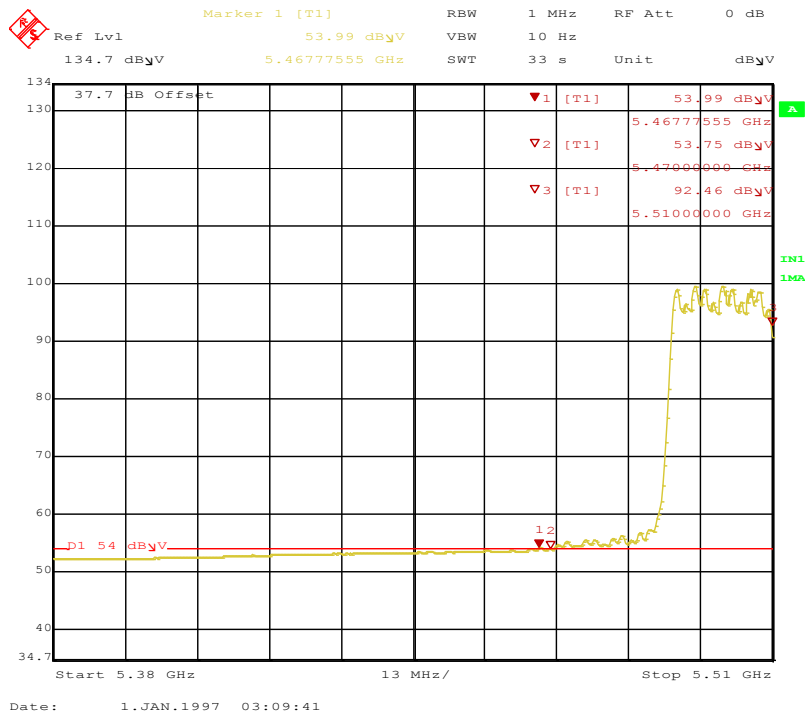


Figure 136: HT40-MCS0-5510MHz-q74-Average-Vert-Ch0-1-2-3

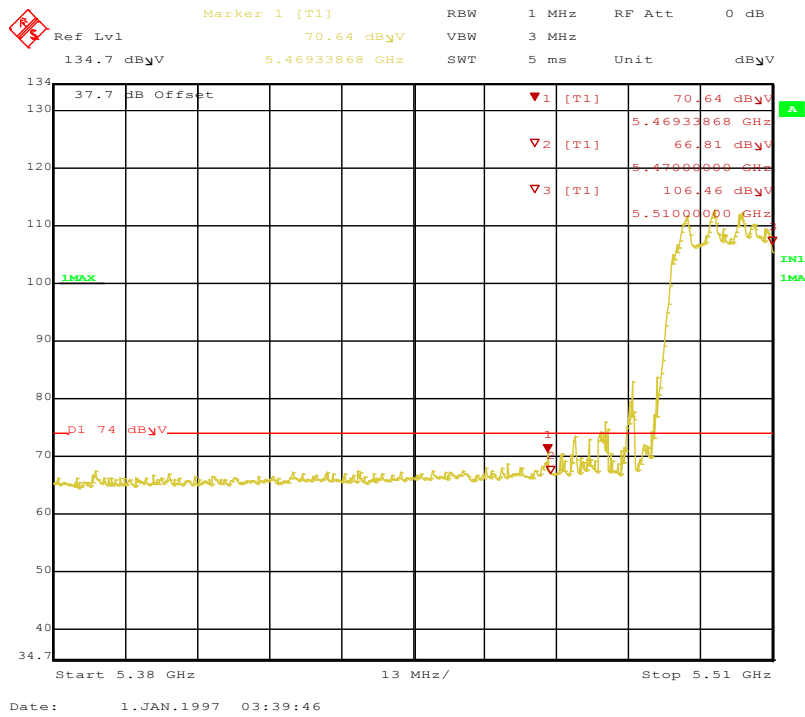


Figure 137: HT40-MCS0-5510MHz-q74-Peak-Horiz-Ch0-1-2-3

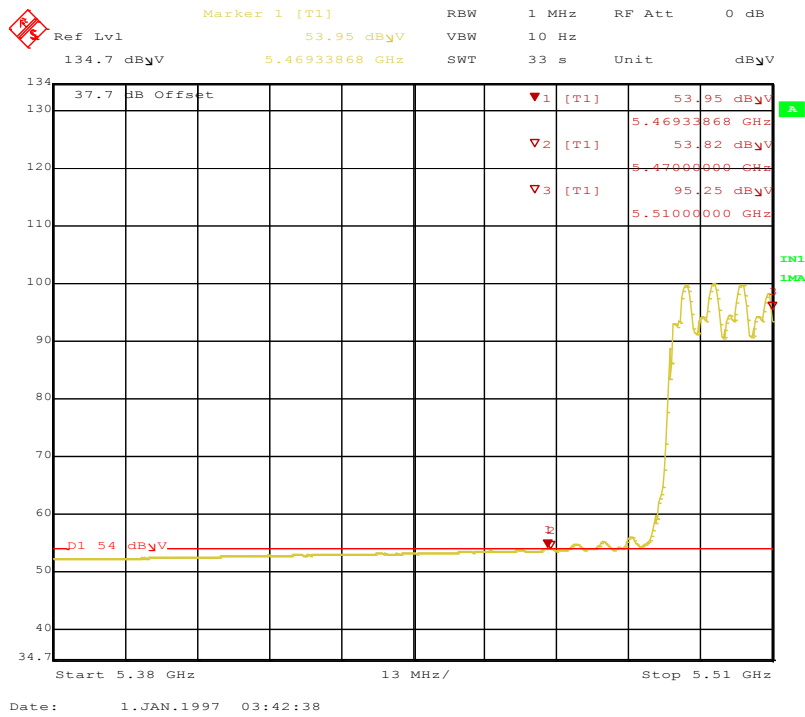


Figure 138: HT40-MCS0-5510MHz-q74-Average-Horiz-Ch0-1-2-3

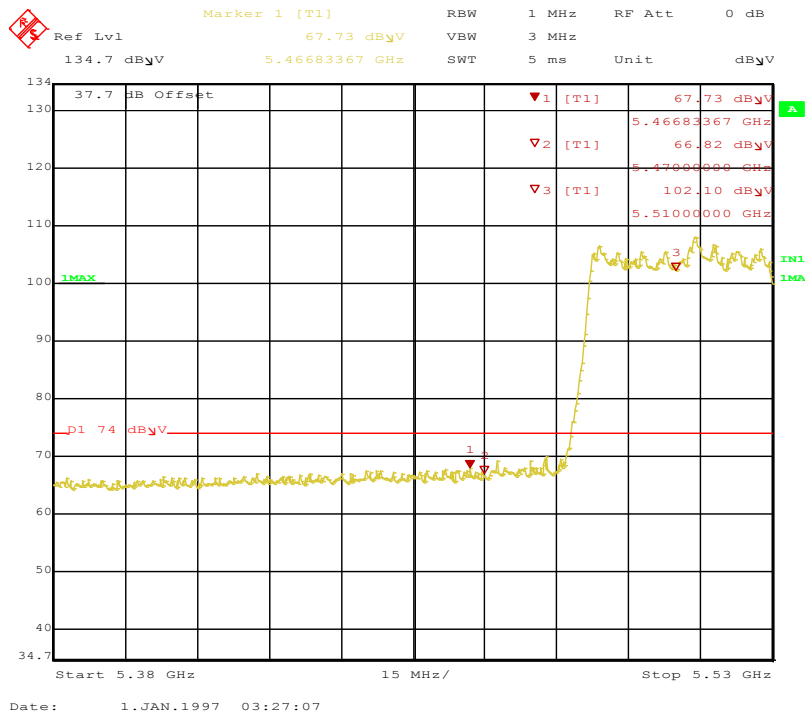


Figure 139: VHT80-MCS0-5530MHz-q77-Peak-Vert-Ch0-1-2-3

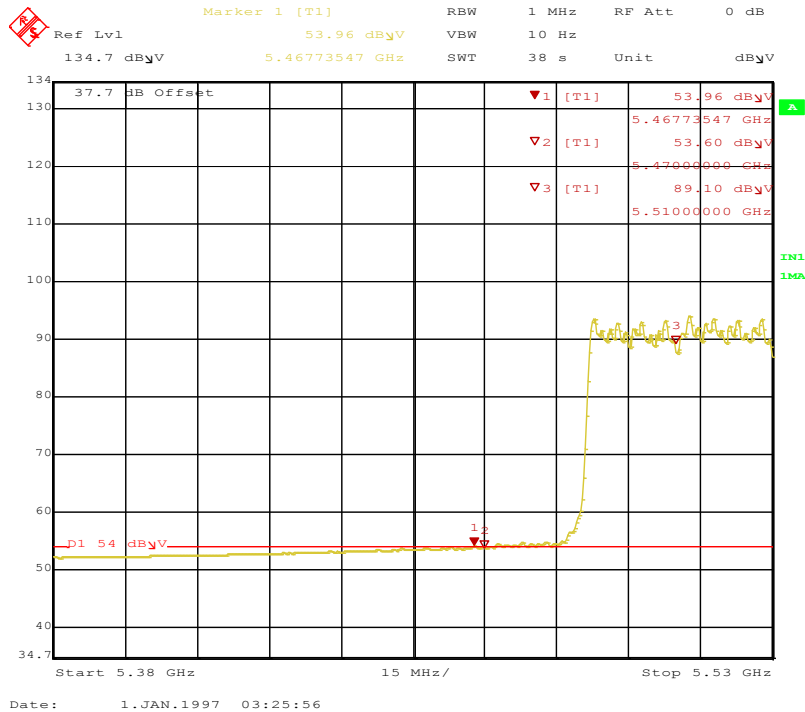
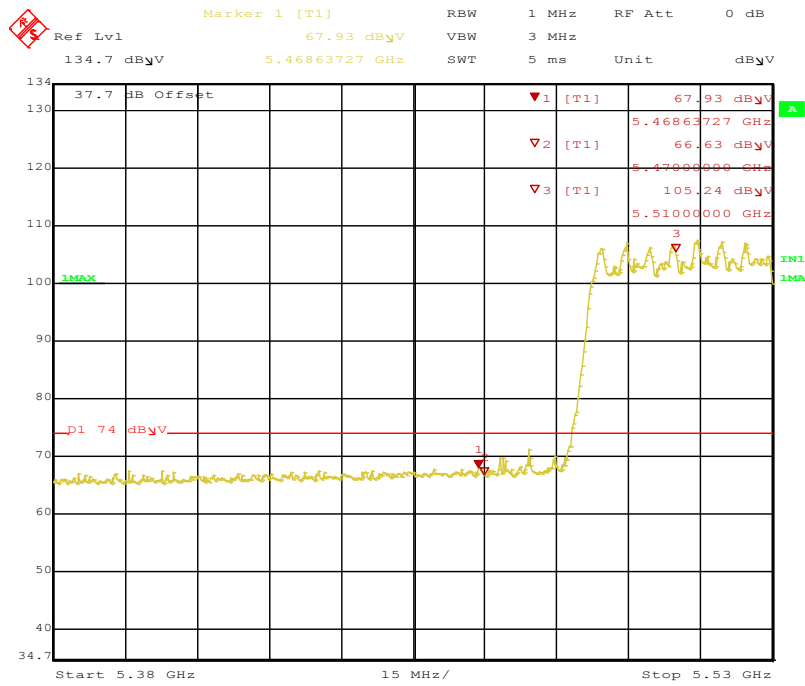
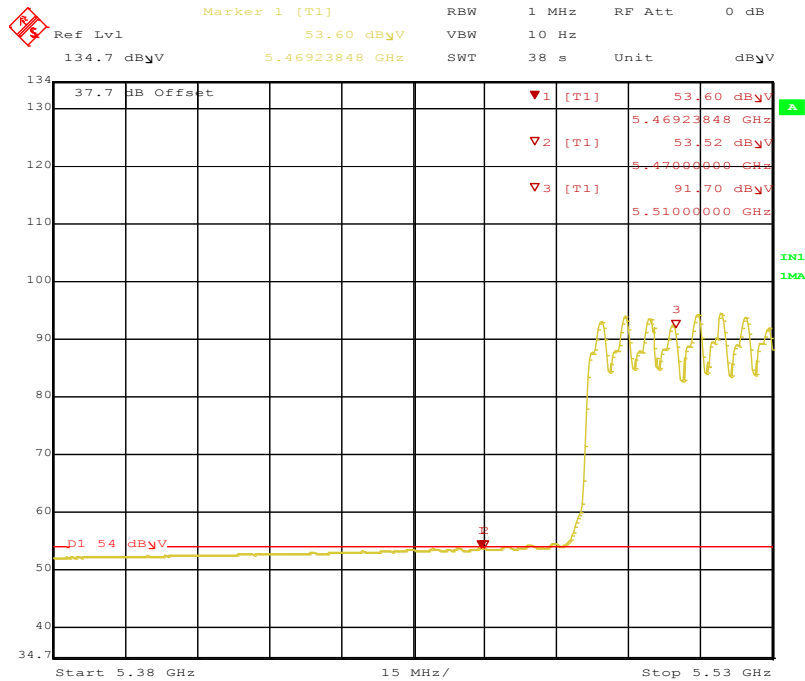


Figure 140: VHT80-MCS0-5530MHz-q77-Average-Vert-Ch0-1-2-3



Date: 1.JAN.1997 03:33:51

Figure 141: VHT80-MCS0-5530MHz-q77-Peak-Horiz-Ch0-1-2-3



Date: 1.JAN.1997 03:35:11

Figure 142: VHT80-MCS0-5530MHz-q77-Average-Horiz-Ch0-1-2-3

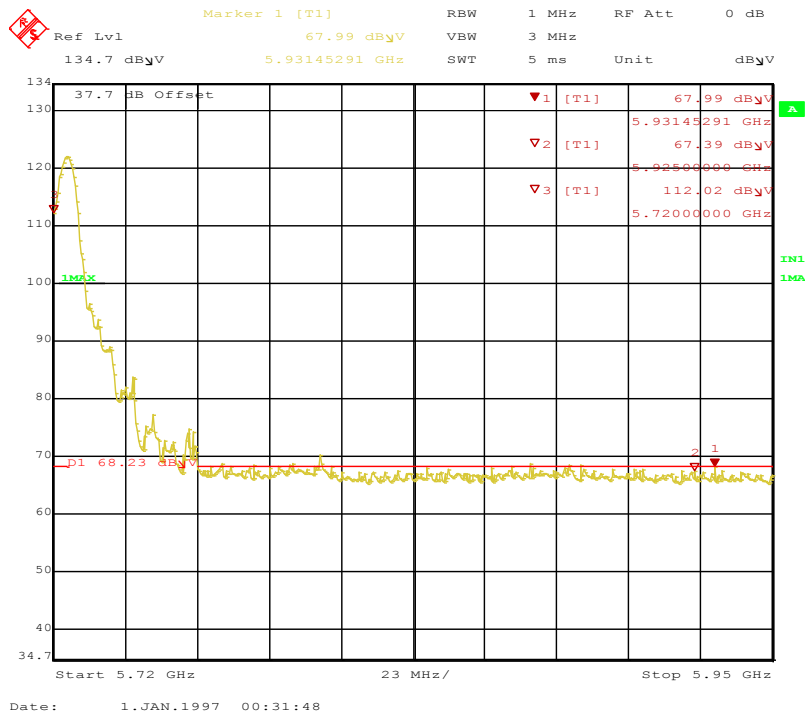


Figure 143: 11a-6Mbps-5720MHz-q96-Peak-Vert-Ch0-1-2-3

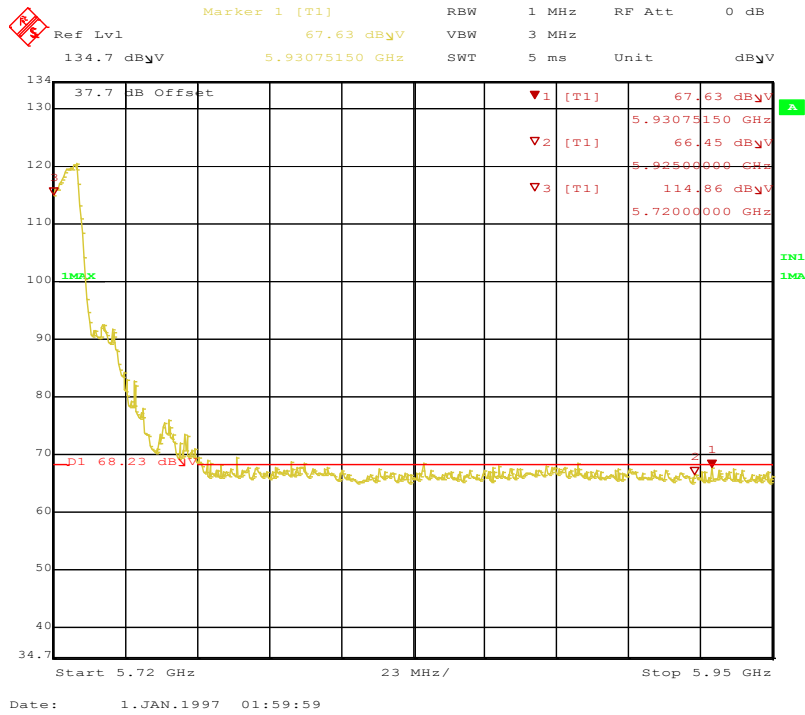


Figure 144: 11a-6Mbps-5720MHz-q96-Peak-Horiz-Ch0-1-2-3

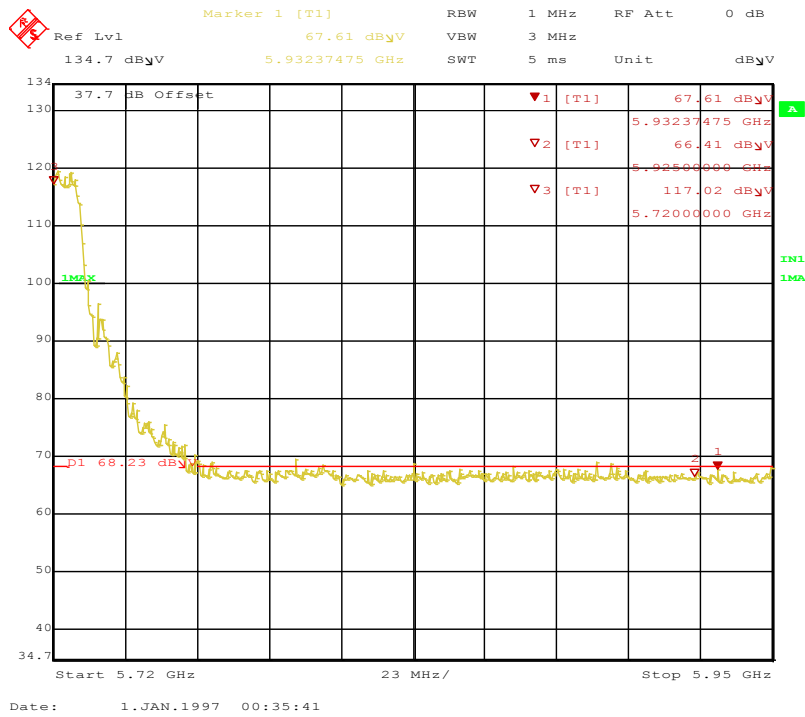


Figure 145: HT20-MCS0-5720MHz-q96-Peak-Vert-Ch0-1-2-3

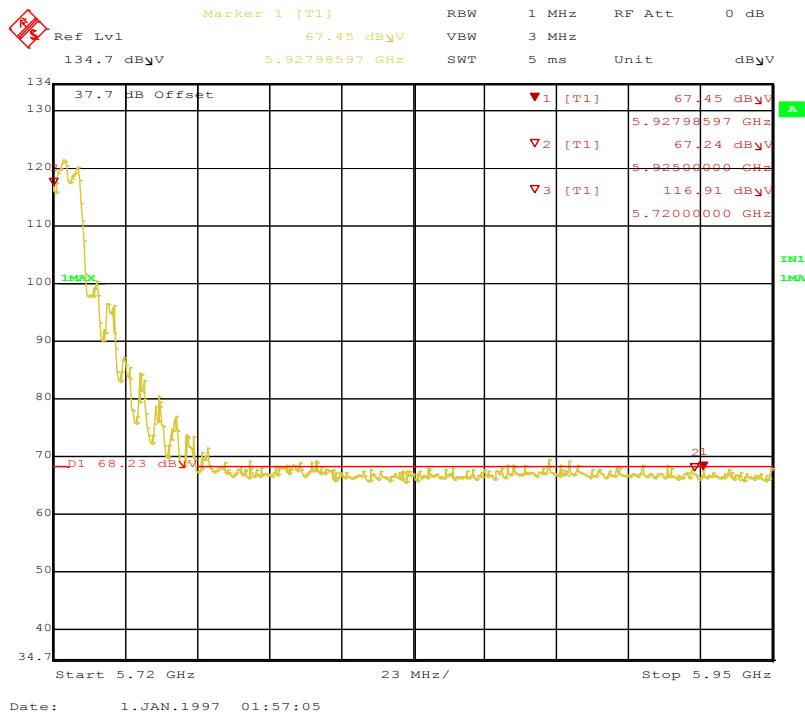


Figure 146: HT20-MCS0-5720MHz-q96-Peak-Horiz-Ch0-1-2-3

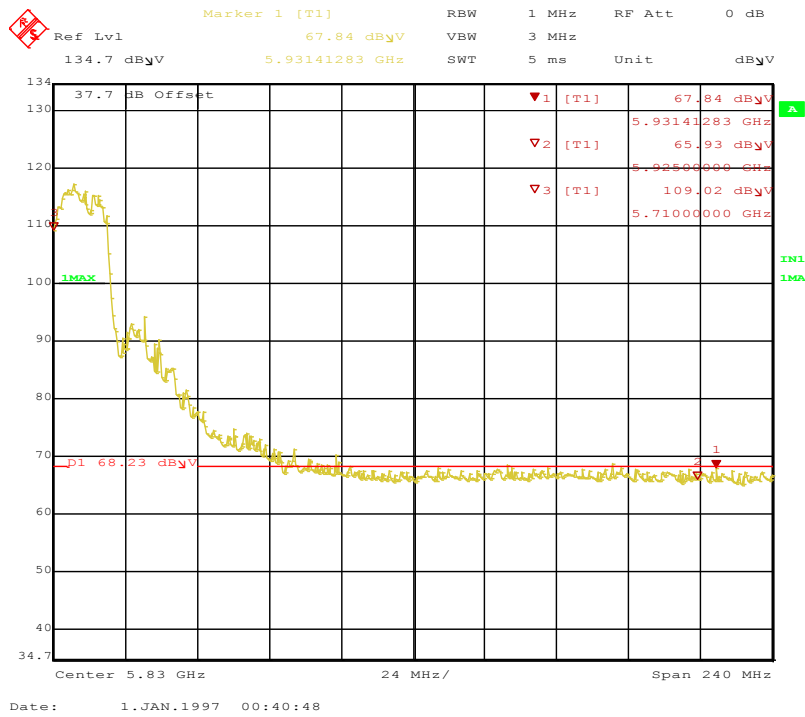


Figure 147: HT40-MCS0-5710MHz-q96-Peak-Vert-Ch0-1-2-3

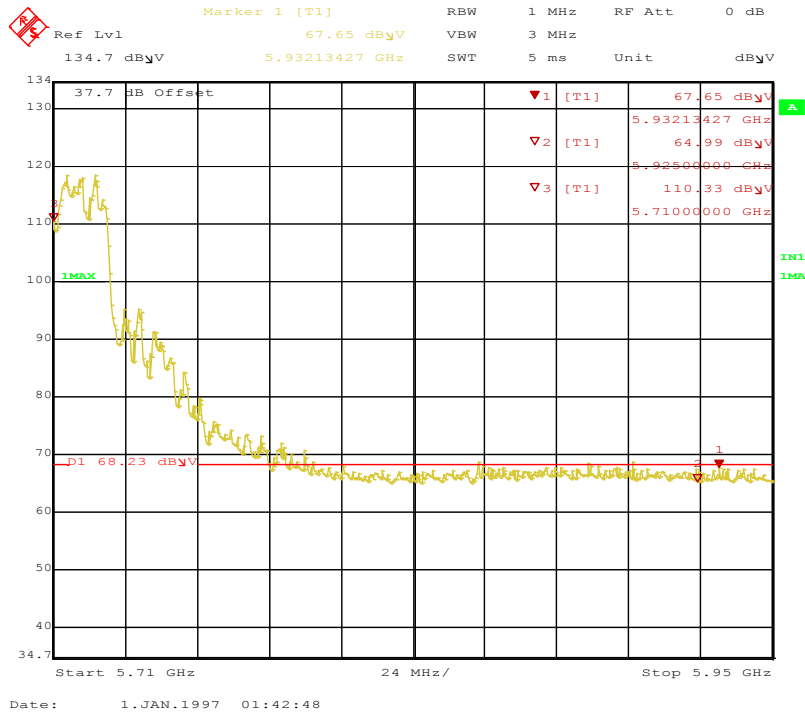


Figure 148: HT40-MCS0-5710MHz-q96-Peak-Horiz-Ch0-1-2-3

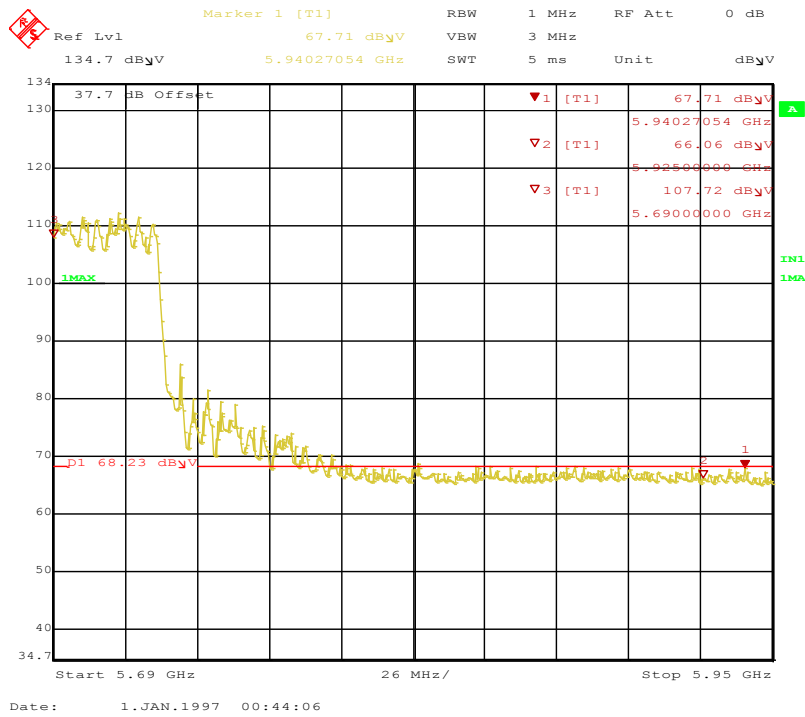


Figure 149: VHT80-MCS0-5690MHz-q96-Peak-Vert-Ch0-1-2-3

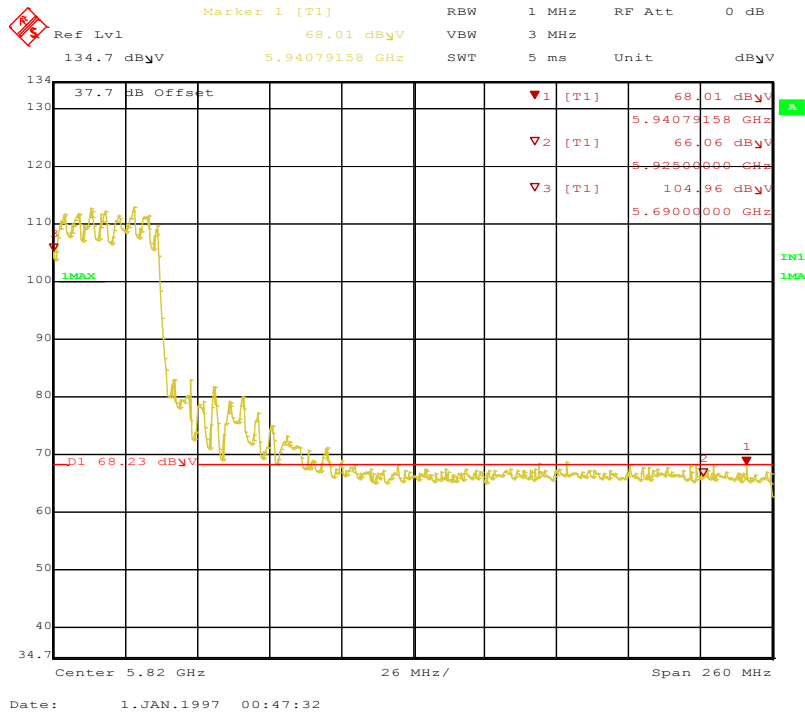
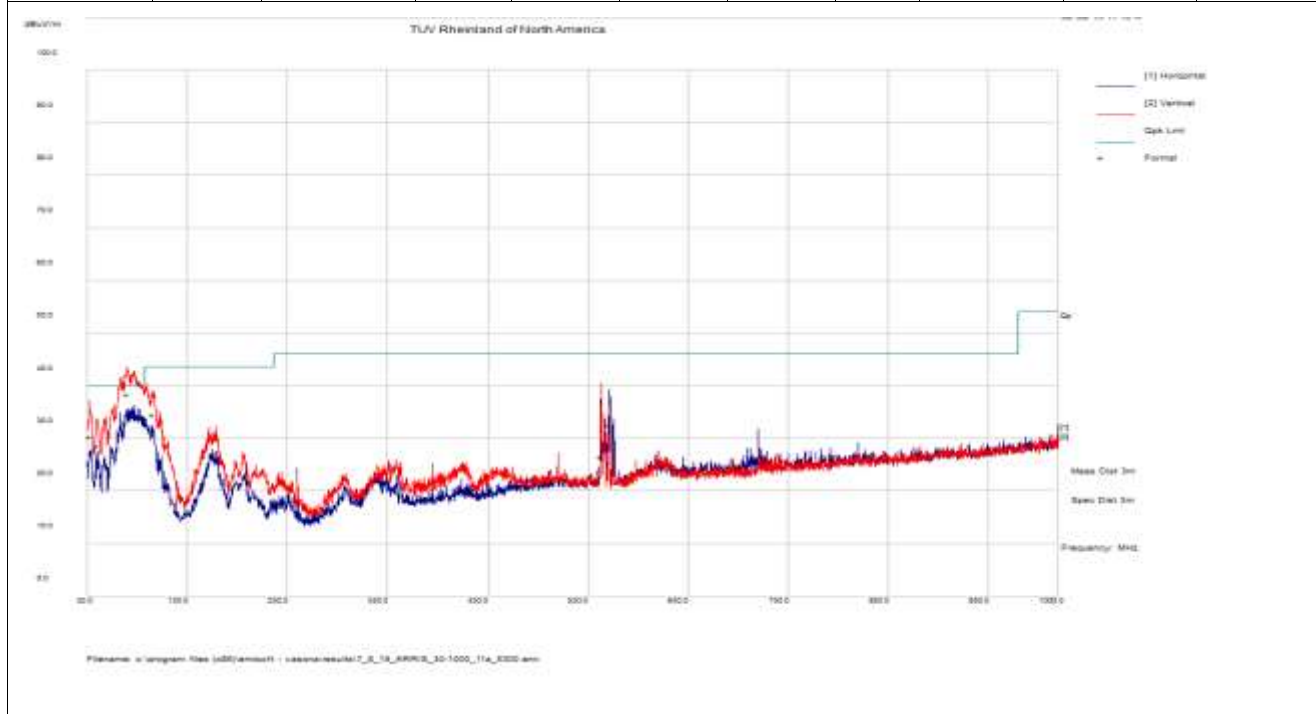


Figure 150: VHT80-MCS0-5690MHz-q96-Peak-Horiz-Ch0-1-2-3

SOP 1 Radiated Emissions		Tracking # 31964172.001 Page 1 of 62	
EUT Name	Wi-Fi Router	Date	Jul 8, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23° C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11a at 6Mbps / All chains	Line AC / Freq	120 Vac / 60 Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	120 kHz/ 300 kHz
Dist/Ant Used	3m – JB3	Performed by	Colton Aliff

30 MHz – 1 GHz Transmit at 5300 MHz – UNII2A

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
70.12	57.63	0.74	-19.99	38.39	QP	V	143	280	40.00	-1.62
32.43	37.76	0.49	-8.02	30.22	QP	V	177	194	40.00	-9.78
95.33	52.96	0.85	-19.36	34.45	QP	V	119	0	43.50	-9.05
543.43	33.56	2.23	-9.40	26.39	QP	V	159	122	46.00	-19.61
40.12	42.24	0.56	-14.19	28.61	QP	V	179	334	40.00	-11.39
551.45	39.46	2.25	-9.30	32.41	QP	H	197	343	46.00	-13.59



Spec Margin = E-Field QP - Limit, E-Field QP = FIM QP+ Total CF ± Uncertainty

Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

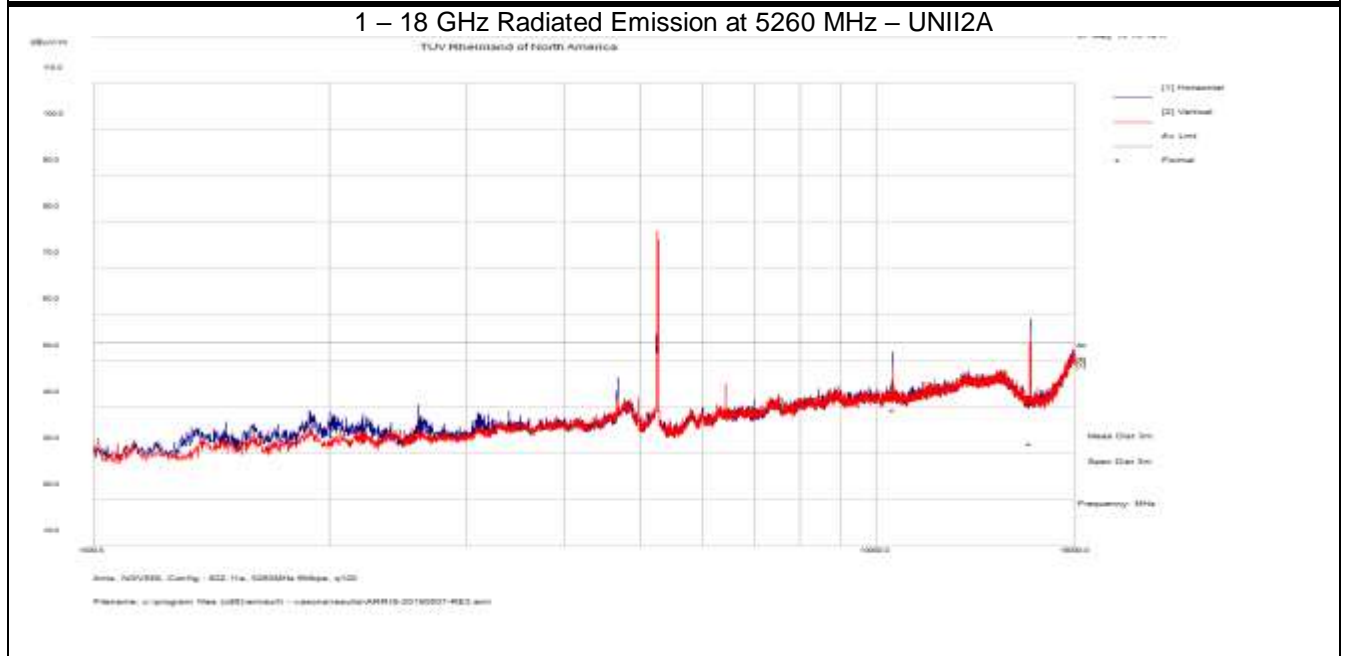
Note: 1. Worst case was observed at mid channel of 802.11a 6Mbps.

2. No significant emission were observed below 30MHz.

3. To reduce complexity and bulkiness of the report worst case plots are placed in the report.

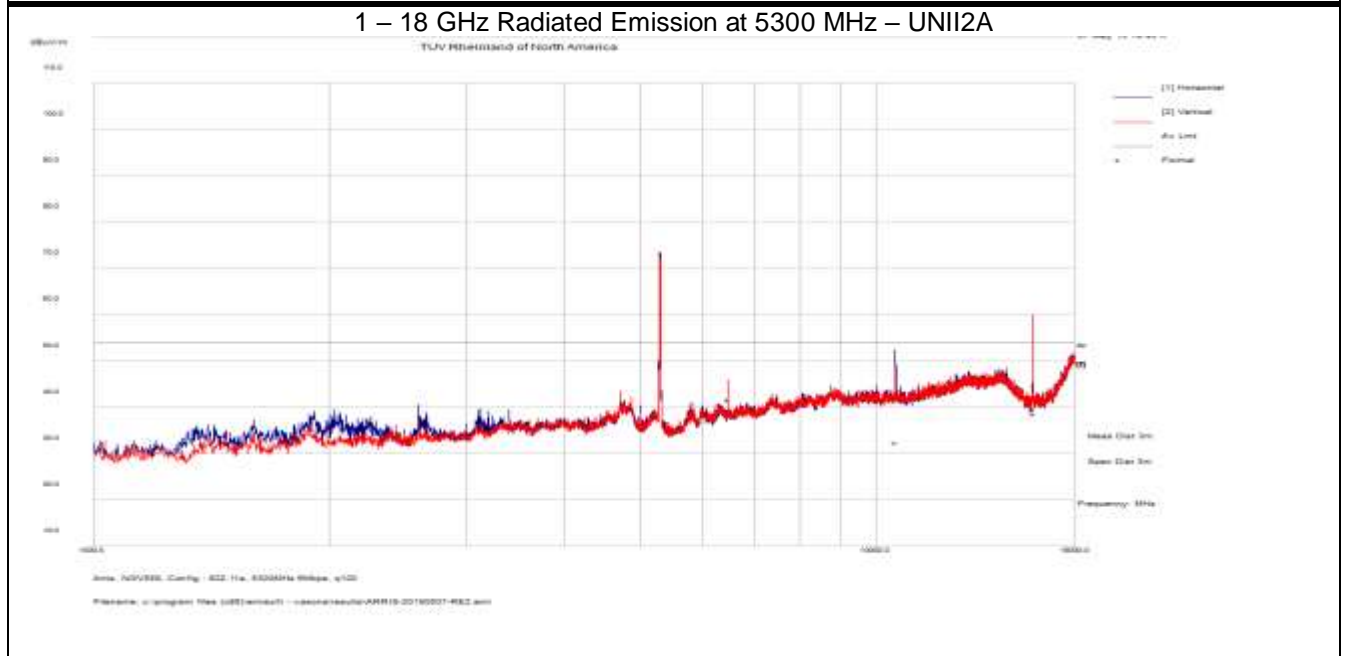
SOP 1 Radiated Emissions											Tracking # 31964172.001 Page 2 of 62	
EUT Name		Wi-Fi Router					Date		May 7, 2019			
EUT Model		NVG5X8AC					Temp / Hum in		23°C / 40%rh			
EUT Serial		M11839QW0022					Temp / Hum out		N/A			
EUT Config.		802.11a at 6Mbps / All chains					Line AC		120 VAC / 60Hz			
Standard		CFR47 Part 15 Subpart E, RSS-247, RSS-GEN					RBW / VBW		1 MHz / 3 MHz			
Dist/Ant Used		3m – EMCO 3115					Performed by		Kerwinn Corpuz			
Freq.	Raw	Cbl	AF	Level	Det.	Pol.	Hght.	Azt	Limit	Margin	Result	
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
1 – 18 GHz Radiated Emission at 5260 MHz – UNII2A												
10525.56	53.27	5.25	-19.13	39.39	Ave	H	150	140	54.00	-14.61	Pass	
15782.18	45.10	6.47	-19.40	32.17	Ave	H	160	118	54.00	-21.83	Pass	
15787.63	53.66	6.45	-19.39	40.73	Ave	H	101	162	54.00	-13.27	Pass	
1 – 18 GHz Radiated Emission at 5300 MHz – UNII2A												
10613.84	45.98	5.30	-19.00	32.28	Ave	H	134	0	54.00	-21.72	Pass	
6477.88	60.16	4.00	-22.53	41.63	Ave	V	143	174	54.00	-12.37	Pass	
15891.67	52.49	6.42	-19.51	39.40	Ave	V	189	72	54.00	-14.60	Pass	
15905.10	52.84	6.41	-19.53	39.72	Ave	V	220	84	54.00	-14.28	Pass	
1 – 18 GHz Radiated Emission at 5320 MHz – UNII2A												
4729.09	58.45	3.50	-23.87	38.08	Ave	H	200	250	54.00	-15.92	Pass	
10640.49	45.36	5.30	-18.97	31.69	Ave	H	121	174	54.00	-22.31	Pass	
15961.01	43.52	6.50	-19.47	30.55	Ave	H	177	327	54.00	-23.46	Pass	
6502.00	55.36	4.00	-22.44	36.92	Ave	V	194	250	54.00	-17.08	Pass	
17920.41	41.29	6.88	-8.06	40.11	Ave	V	172	206	54.00	-13.89	Pass	
Spec Margin = Level – Limit, Level = Raw + Cable + AF ± Uncertainty												
AF= Amp Gain + ANT Factor												
Combined Standard Uncertainty $u_c(y) = \pm 4.52$ dB Expanded Uncertainty $U = k u_c(y)$ $k = 2$ for 95% confidence												
Note: All emissions met restricted band limits.												

SOP 1 Radiated Emissions		Tracking # 31964172.001 Page 3 of 62	
EUT Name	Wi-Fi Router	Date	May 7, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 40%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11a at 6Mbps / All chains	Line AC	120 VAC/60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO 3115	Performed by	Kerwinn Corpuz



Notes: 1. All emissions met restricted band limits.
 2. Emission over the limit is the fundamental and exempt from the limit.

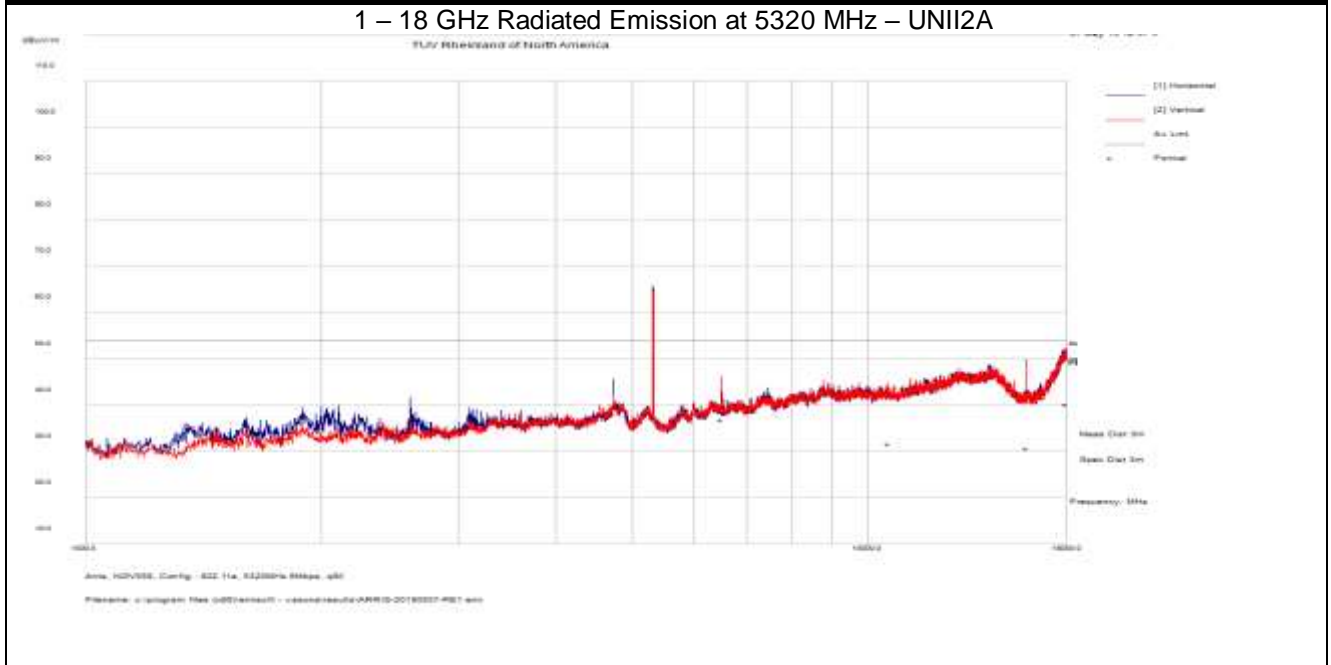
SOP 1 Radiated Emissions		Tracking # 31964172.001 Page 4 of 62	
EUT Name	Wi-Fi Router	Date	May 7, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 40%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11a at 6Mbps / All chains	Line AC	120 VAC/60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO 3115	Performed by	Kerwinn Corpuz



Notes: 1. All emissions met restricted band limits.
 2. Emission over the limit is the fundamental and exempt from the limit.

SOP 1 Radiated Emissions Tracking # 31964172.001 Page 5 of 62

EUT Name	Wi-Fi Router	Date	May 7, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 40%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11a at 6Mbps / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO 3115	Performed by	Kerwinn Corpuz

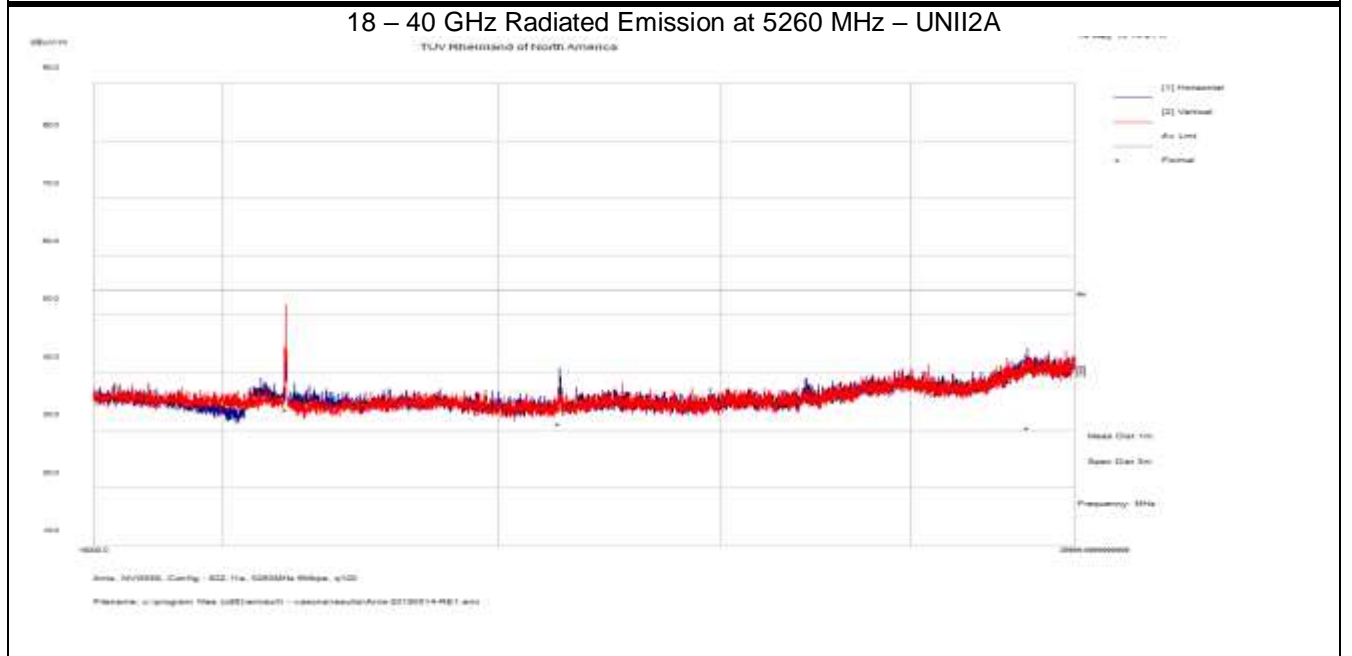


Notes: 1. All emissions met restricted band limits.
 2. Emission over the limit is the fundamental and exempt from the limit.

SOP 1 Radiated Emissions							Tracking # 31964172.001 Page 6 of 62					
EUT Name	Wi-Fi Router						Date	May 14, 2019				
EUT Model	NVG5X8AC						Temp / Hum in	23°C / 42%rh				
EUT Serial	M11839QW0022						Temp / Hum out	N/A				
EUT Config.	802.11a at 6Mbps / All chains						Line AC	120 VAC / 60Hz				
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN						RBW / VBW	1 MHz / 3 MHz				
Dist/Ant Used	1m – ComPower AHA-840						Performed by	Kerwinn Corpuz				
Freq.	Raw	Cbl	AF	Level	Det.	Pol.	Hght.	Azt	Limit	Margin	Result	
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
18 – 40 GHz Radiated Emission at 5260 MHz – UNII2A												
21041.94	35.30	7.60	-9.30	33.60	Ave	H	164	133	54.00	-20.40	Pass	
26289.49	36.10	8.20	-13.10	31.20	Ave	H	154	118	54.00	-22.80	Pass	
38478.69	31.90	10.3	-11.90	30.40	Ave	H	157	0	54.00	-23.60	Pass	
18 – 40 GHz Radiated Emission at 5300 MHz – UNII2A												
26488.29	36.40	8.30	-13.30	31.40	Ave	H	161	133	54.00	-22.60	Pass	
21209.11	38.60	7.60	-9.40	36.80	Ave	V	162	120	54.00	-17.20	Pass	
18 – 40 GHz Radiated Emission at 5320 MHz – UNII2A												
26608.86	41.20	8.4	-13.50	36.10	Ave	H	150	120	54.00	-17.90	Pass	
38539.85	31.00	10.4	-12.00	29.40	Ave	H	108	148	54.00	-24.60	Pass	
21282.32	47.30	7.60	-9.40	45.50	Ave	V	166	134	54.00	-8.50	Pass	
Spec Margin = Level – Limit, Level = Raw + Cable + AF ± Uncertainty												
AF= Amp Gain + ANT Factor												
Combined Standard Uncertainty $u_c(y) = \pm 4.52$ dB Expanded Uncertainty $U = k u_c(y)$ $k = 2$ for 95% confidence												
Note: All emissions met restricted band limits.												

SOP 1 Radiated Emissions Tracking # 31964172.001 Page 7 of 62

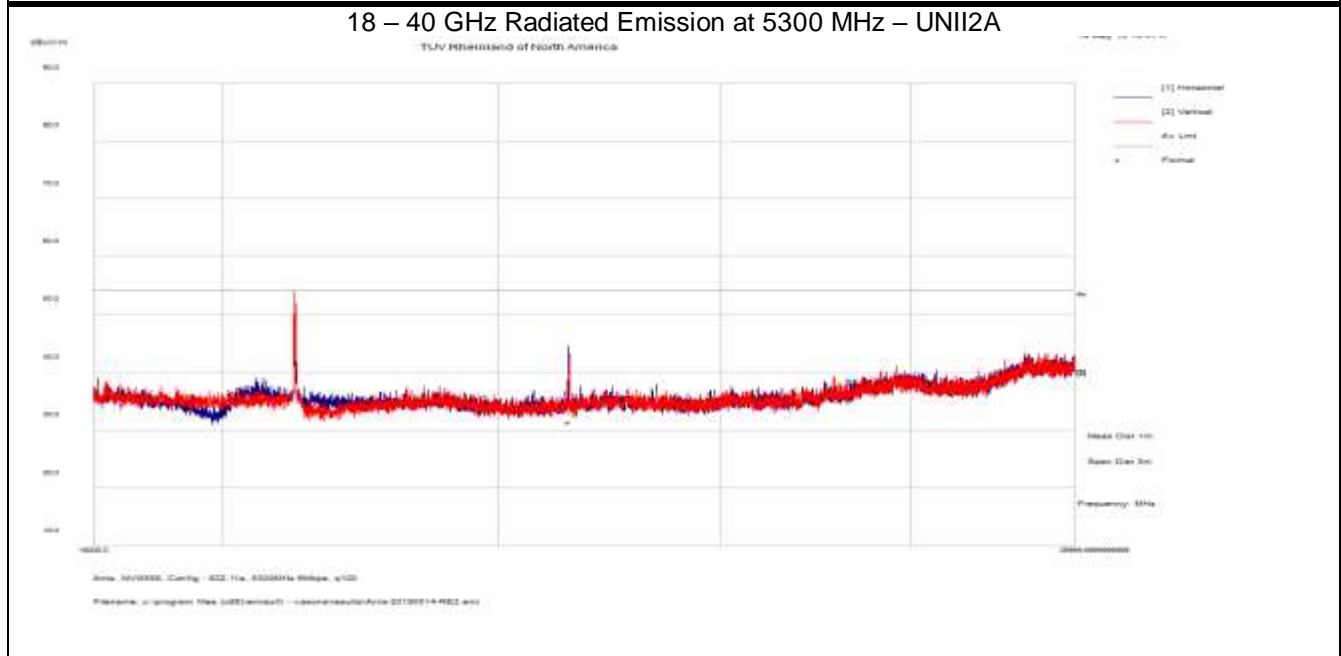
EUT Name	Wi-Fi Router	Date	May 14, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 42%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11a at 6Mbps / All chains	Line AC	120 VAC/60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	1m – ComPower AHA-840	Performed by	Kerwin Corpuz



Notes: All emissions met restricted band limits.

SOP 1 Radiated Emissions Tracking # 31964172.001 Page 8 of 62

EUT Name	Wi-Fi Router	Date	May 14, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 42%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11a at 6Mbps / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	1m – ComPower AHA-840	Performed by	Kerwin Corpuz

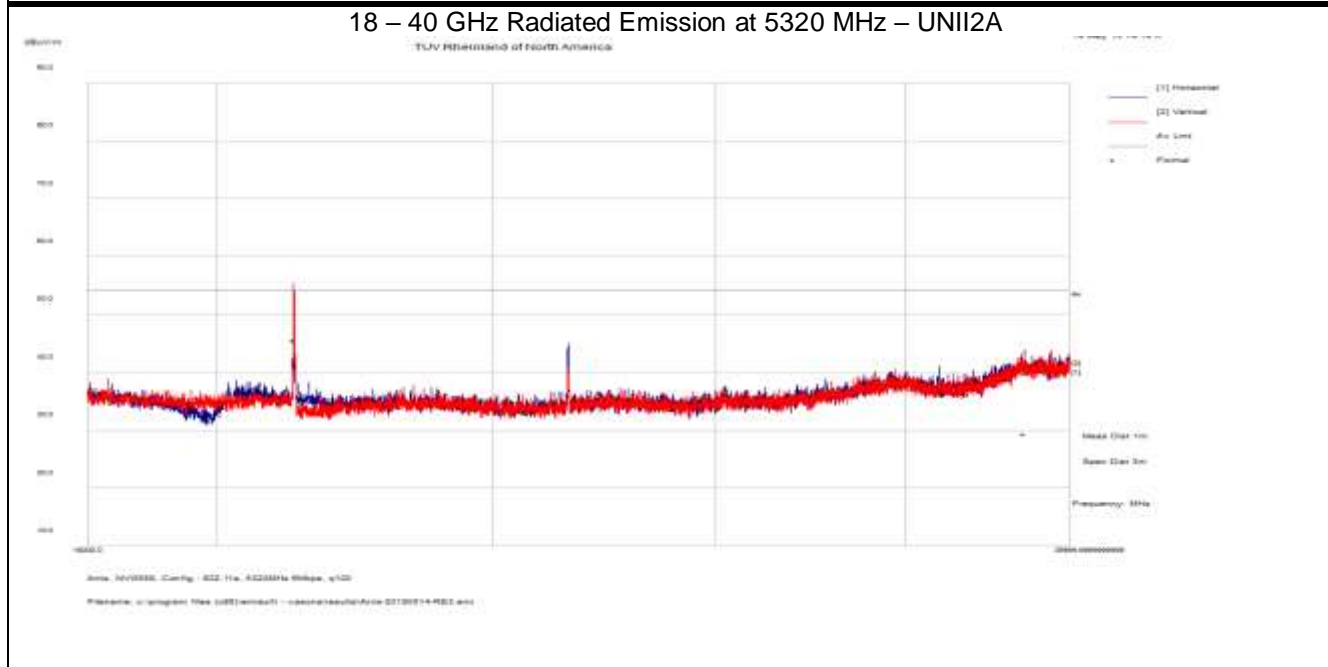


Notes: All emissions met restricted band limits.

SOP 1 Radiated Emissions

Tracking # 31964172.001 Page 9 of 62

EUT Name	Wi-Fi Router	Date	May 14, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 42%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11a at 6Mbps / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	1m – ComPower AHA-840	Performed by	Kerwinn Corpuz

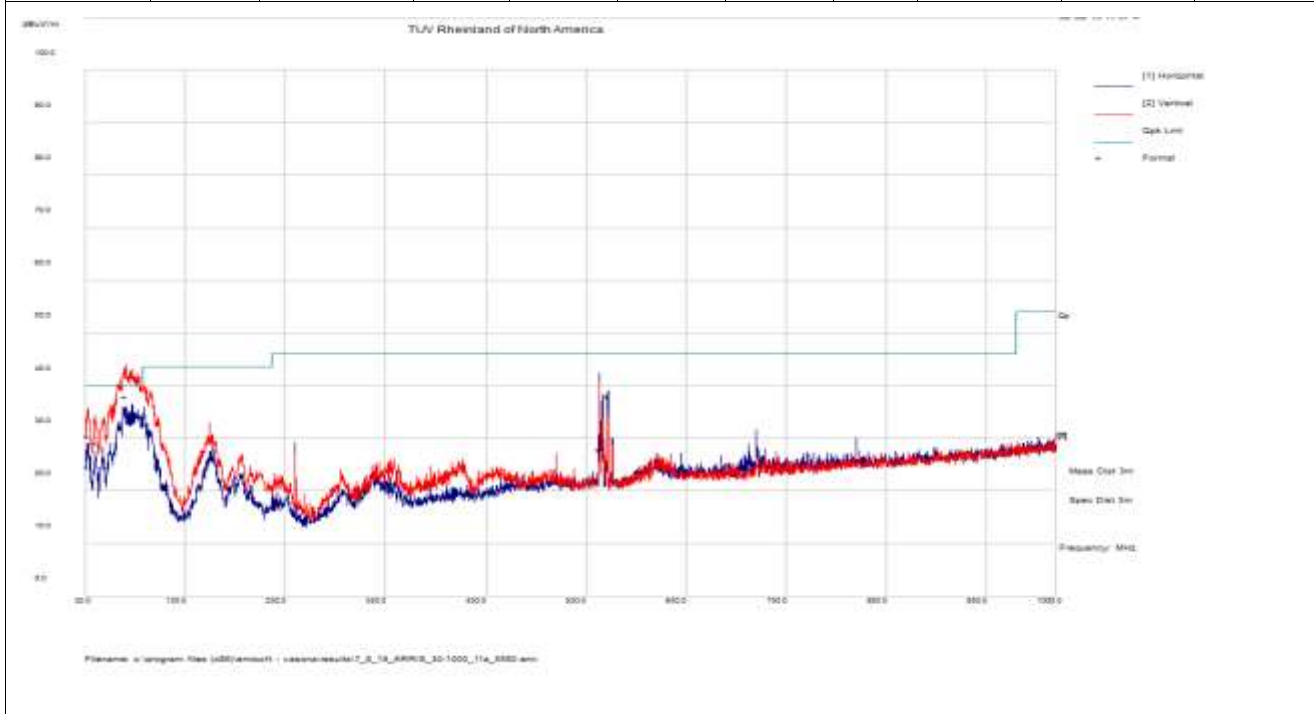


Notes: All emissions met restricted band limits.

SOP 1 Radiated Emissions		Tracking # 31964172.001 Page 10 of 62	
EUT Name	Wi-Fi Router	Date	Jul 8, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23° C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11a at 6Mbps / All chains	Line AC / Freq	120 Vac / 60 Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	120 kHz/ 300 kHz
Dist/Ant Used	3m – JB3	Performed by	Colton Aliff

30 MHz – 1 GHz Transmit at 5580 MHz – UNII2C

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
70.50	57.21	0.75	-19.99	37.98	QP	V	143	320	40.00	-2.02
543.26	35.05	2.23	-9.40	27.88	QP	H	117	190	46.00	-18.12
32.82	38.22	0.49	-8.29	30.42	QP	V	127	256	40.00	-9.58
92.09	51.96	0.83	-20.14	32.65	QP	V	118	0	43.50	-10.85
39.85	42.58	0.56	-14.00	29.15	QP	V	170	208	40.00	-10.85
551.76	45.03	2.25	-9.30	37.98	QP	H	133	94	46.00	-8.02



Spec Margin = E-Field QP - Limit, E-Field QP = FIM QP+ Total CF ± Uncertainty

Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: 1. Worst case was observed at mid channel of 802.11a 6Mbps.

2. No significant emission were observed below 30MHz.

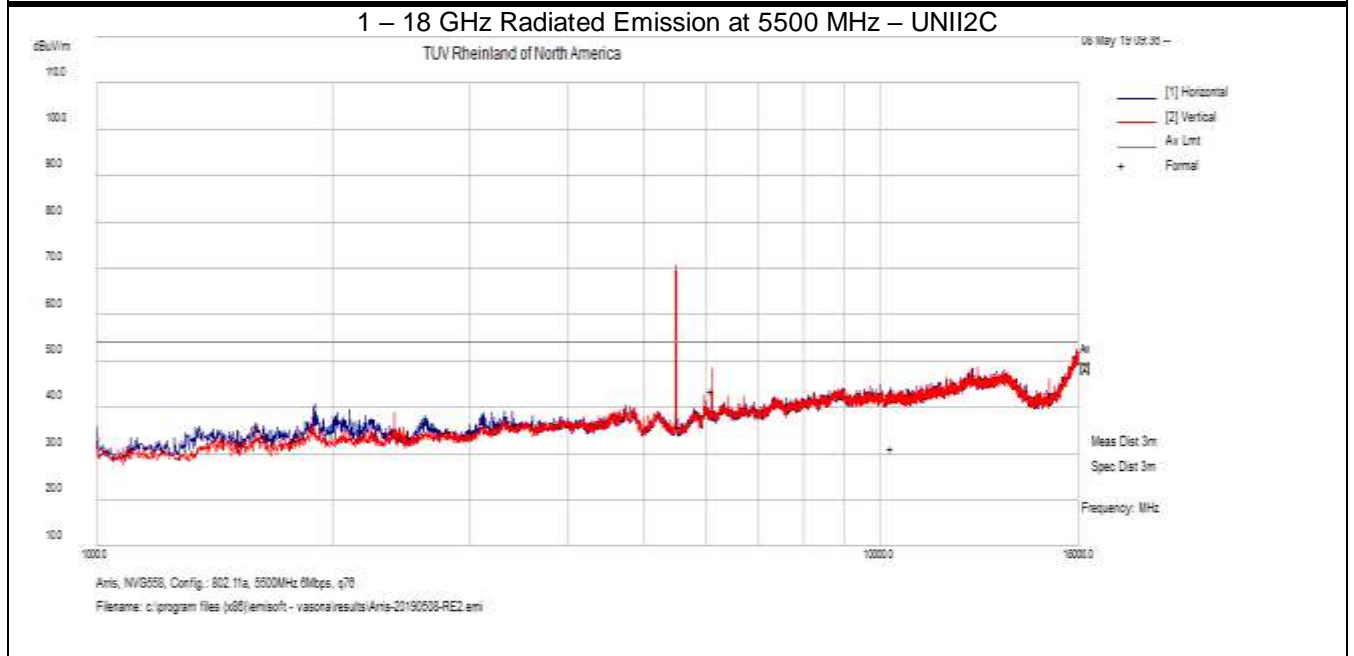
3. To reduce complexity and bulkiness of the report worst case plots are placed in the report.

SOP 1 Radiated Emissions						Tracking # 31964172.001 Page 11 of 62					
EUT Name Wi-Fi Router			Date May 8, 2019								
EUT Model NVG5X8AC			Temp / Hum in 23°C / 41%rh								
EUT Serial M11839QW0022			Temp / Hum out N/A								
EUT Config. 802.11a at 6Mbps / All chains			Line AC 120 VAC / 60Hz								
Standard CFR47 Part 15 Subpart E, RSS-247, RSS-GEN			RBW / VBW 1 MHz / 3 MHz								
Dist/Ant Used 3m – EMCO 3115			Performed by Kerwinn Corpuz								

Freq.	Raw	Cbl	AF	Level	Det.	Pol.	Hght.	Azt	Limit	Margin	Result
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB	
1 – 18 GHz Radiated Emission at 5500 MHz – UNII2C											
10346.49	44.91	5.20	-18.91	31.19	Ave	H	130	260	54.00	-22.81	Pass
6111.14	62.14	3.90	-22.50	43.53	Ave	V	125	42	54.00	-10.47	Pass
1 – 18 GHz Radiated Emission at 5580 MHz – UNII2C											
6048.70	54.09	3.90	-22.53	35.46	Ave	H	186	76	54.00	-18.54	Pass
11161.34	50.94	5.40	-18.66	37.68	Ave	H	133	134	54.00	-16.32	Pass
16741.77	45.61	6.60	-17.07	35.15	Ave	H	224	314	54.00	-18.85	Pass
6200.01	55.16	4.00	-22.33	36.83	Ave	V	120	242	54.00	-17.17	Pass
1 – 18 GHz Radiated Emission at 5720 MHz – UNII2C											
6006.06	58.03	3.90	-22.70	39.24	Ave	H	179	100	54.00	-14.77	Pass
6322.21	69.90	4.00	-22.43	51.47	Ave	H	234	64	54.00	-2.53	Pass
11401.18	47.02	5.30	-18.21	34.12	Ave	H	101	136	54.00	-19.89	Pass
17925.20	41.13	6.90	-8.10	39.93	Ave	H	153	193	54.00	-14.07	Pass
Spec Margin = Level – Limit, Level = Raw + Cable + AF ± Uncertainty											
AF= Amp Gain + ANT Factor											
Combined Standard Uncertainty $u_c(y) = \pm 4.52$ dB Expanded Uncertainty $U = k u_c(y)$ $k = 2$ for 95% confidence											
Note: All emissions met restricted band limits.											

SOP 1 Radiated Emissions Tracking # 31964172.001 Page 12 of 62

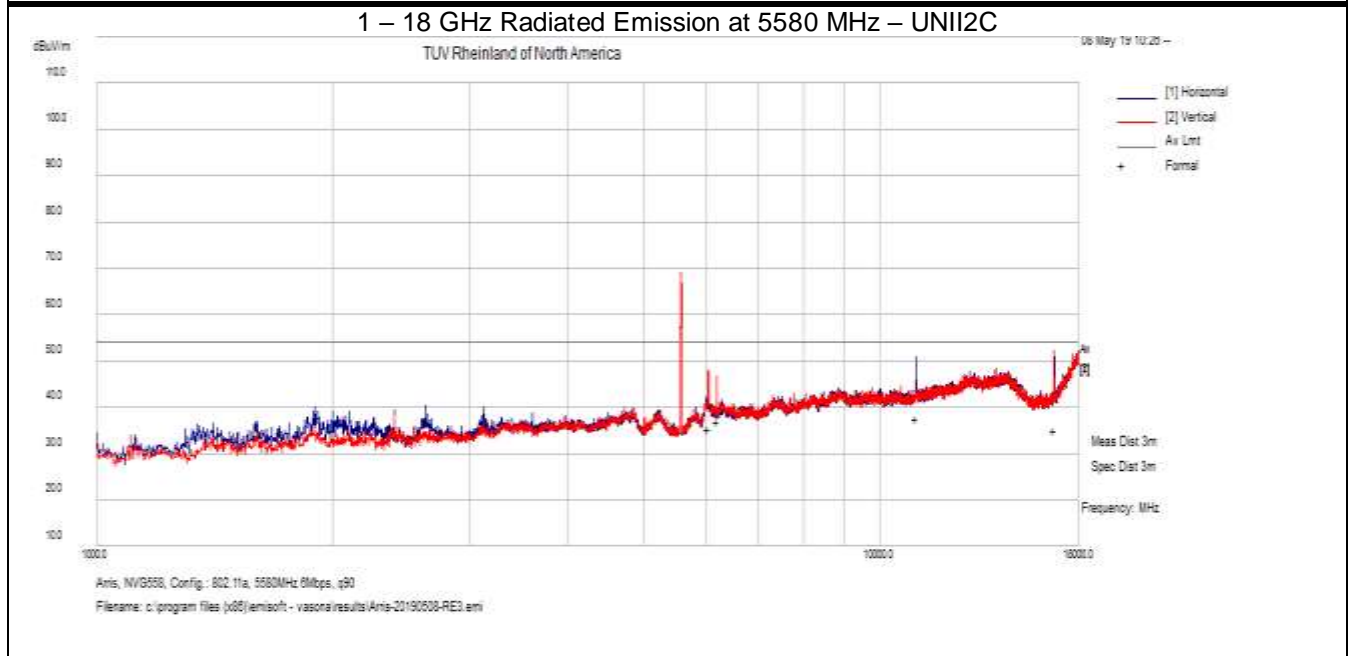
EUT Name	Wi-Fi Router	Date	May 8, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11a at 6Mbps / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO 3115	Performed by	Kerwinn Corpuz



Notes: 1. All emissions met restricted band limits.
 2. Emission over the limit is the fundamental and exempt from the limit.

SOP 1 Radiated Emissions Tracking # 31964172.001 Page 13 of 62

EUT Name	Wi-Fi Router	Date	May 8, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11a at 6Mbps / All chains	Line AC	120 VAC/60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO 3115	Performed by	Kerwinn Corpuz

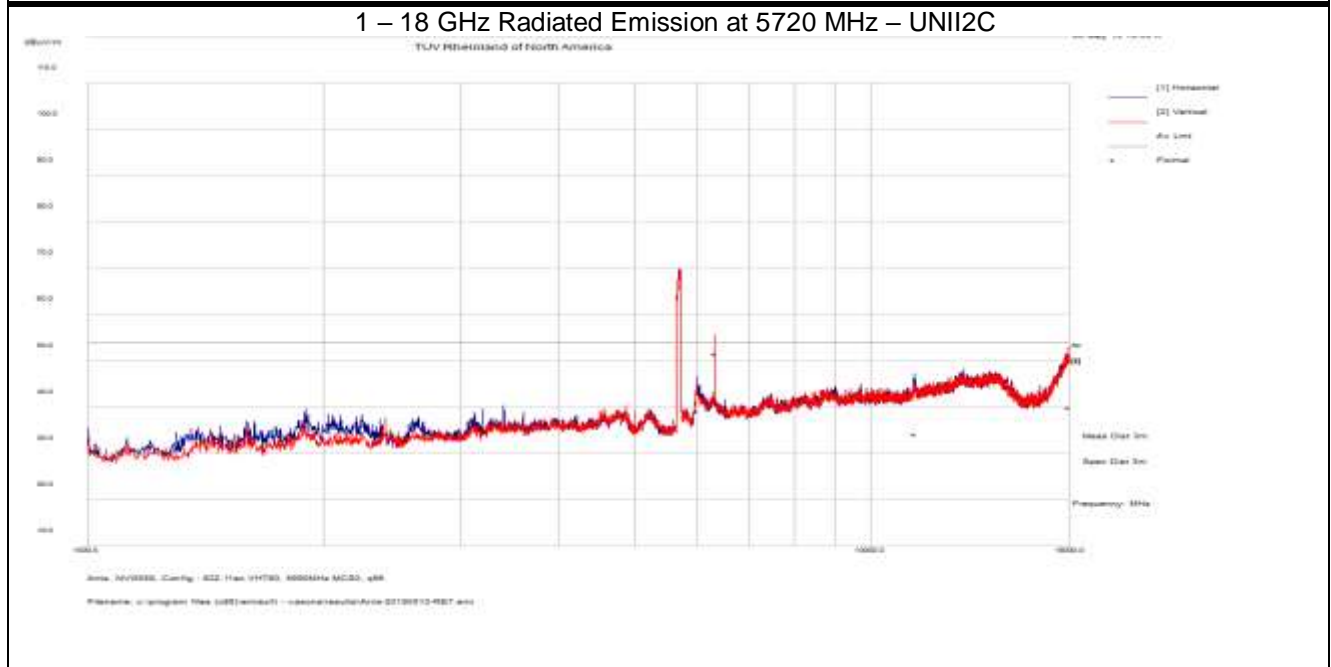


Notes: 1. All emissions met restricted band limits.
 2. Emission over the limit is the fundamental and exempt from the limit.

SOP 1 Radiated Emissions

Tracking # 31964172.001 Page 14 of 62

EUT Name	Wi-Fi Router	Date	May 8, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11a at 6Mbps / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO 3115	Performed by	Kerwinn Corpuz



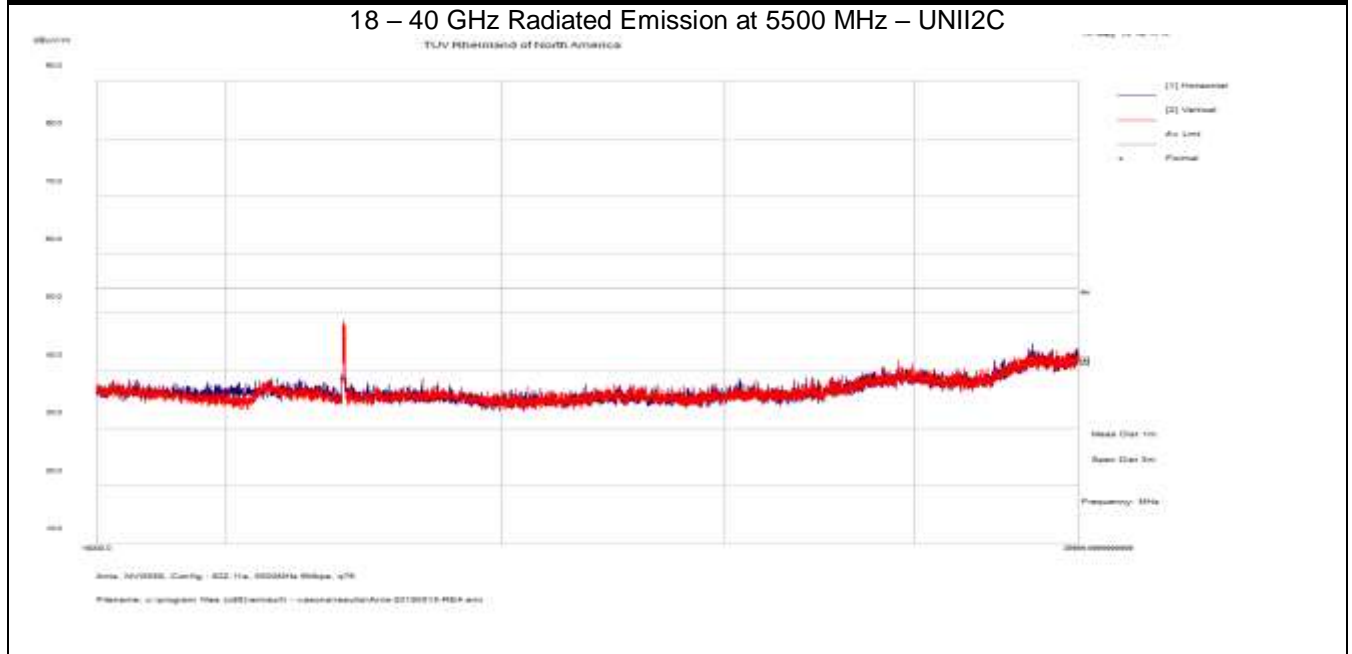
Notes: 1. All emissions met restricted band limits.
 2. Emission over the limit is the fundamental and exempt from the limit.

SOP 1 Radiated Emissions											Tracking # 31964172.001 Page 15 of 62	
EUT Name Wi-Fi Router						Date May 15, 2019						
EUT Model NVG5X8AC						Temp / Hum in 23°C / 41%rh						
EUT Serial M11839QW0022						Temp / Hum out N/A						
EUT Config. 802.11a at 6Mbps / All chains						Line AC 120 VAC / 60Hz						
Standard CFR47 Part 15 Subpart E, RSS-247, RSS-GEN						RBW / VBW 1 MHz / 3 MHz						
Dist/Ant Used 1m – ComPower AHA-840						Performed by Kerwinn Corpuz						
Freq.	Raw	Cbl	AF	Level	Det.	Pol.	Hght.	Azt	Limit	Margin	Result	
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
18 – 40 GHz Radiated Emission at 5500 MHz – UNII2C												
22009.71	41.10	7.70	-10.20	38.60	Ave	V	157	130	54.00	-15.40	Pass	
18 – 40 GHz Radiated Emission at 5580 MHz – UNII2C												
27894.63	43.70	8.60	-14.20	38.10	Ave	H	153	22	54.00	-15.90	Pass	
22323.92	50.70	7.70	-10.40	48.00	Ave	V	168	130	54.00	-6.00	Pass	
22341.85	43.90	7.70	-10.40	41.20	Ave	V	169	125	54.00	-12.80	Pass	
18 – 40 GHz Radiated Emission at 5720 MHz – UNII2C												
22865.65	53.10	7.70	-10.80	49.90	Ave	H	198	324	54.00	-4.10	Pass	
Spec Margin = Level – Limit, Level = Raw + Cable + AF ± Uncertainty												
AF= Amp Gain + ANT Factor												
Combined Standard Uncertainty $u_c(y) = \pm 4.52$ dB Expanded Uncertainty $U = k u_c(y)$ $k = 2$ for 95% confidence												
Note: All emissions met restricted band limits.												

SOP 1 Radiated Emissions

Tracking # 31964172.001 Page 16 of 62

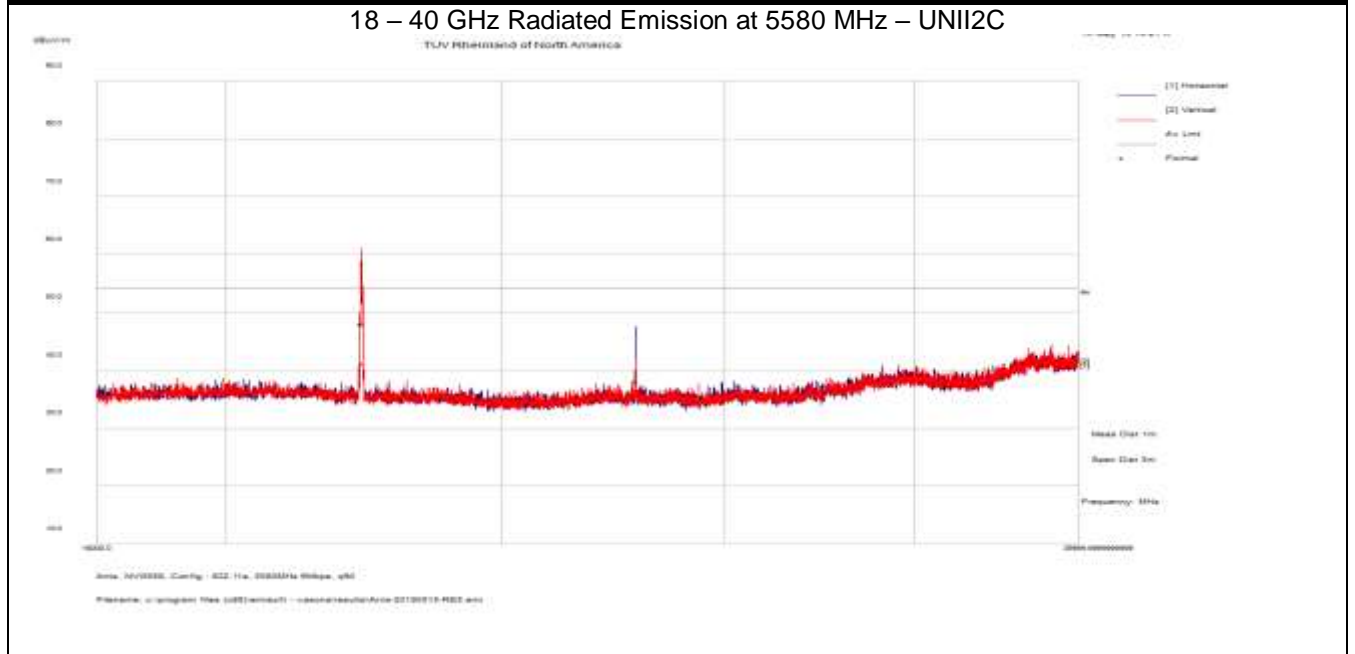
EUT Name	Wi-Fi Router	Date	May 15, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11a at 6Mbps / All chains	Line AC	120 VAC/60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	1m – ComPower AHA-840	Performed by	Kerwin Corpuz



Notes: All emissions met restricted band limits.

SOP 1 Radiated Emissions Tracking # 31964172.001 Page 17 of 62

EUT Name	Wi-Fi Router	Date	May 15, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11a at 6Mbps / All chains	Line AC	120 VAC/60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	1m – ComPower AHA-840	Performed by	Kerwin Corpuz

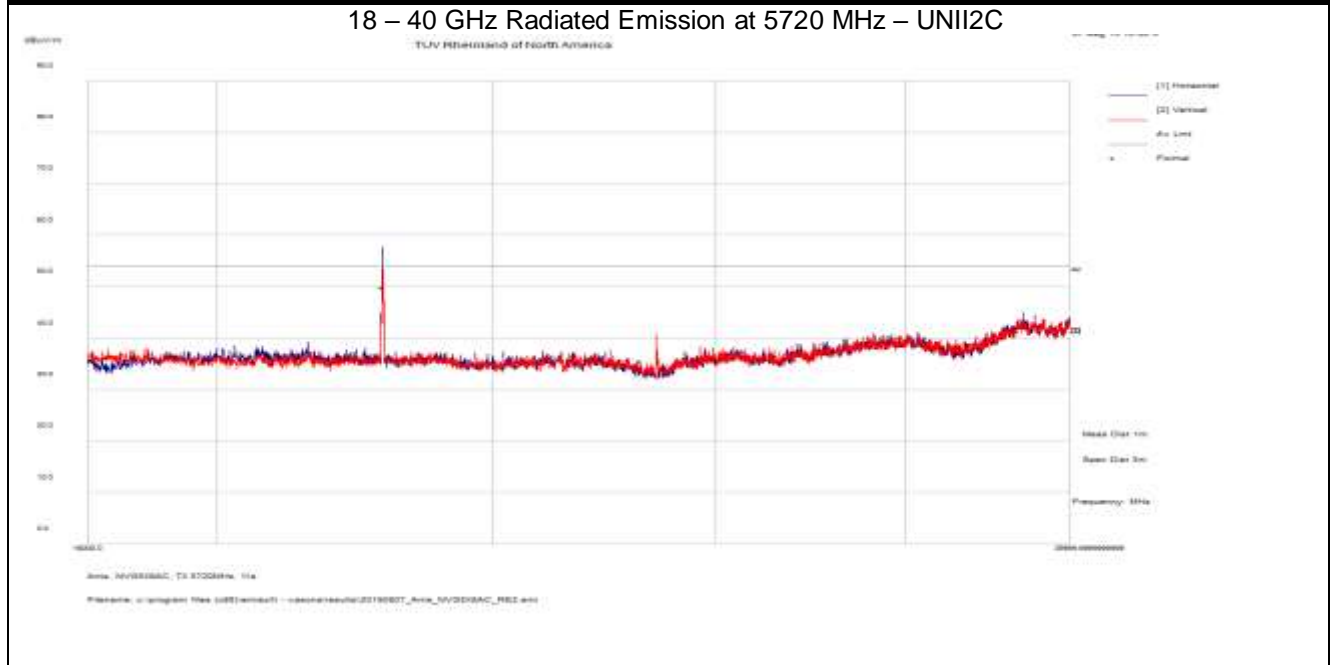


Notes: All emissions met restricted band limits.

SOP 1 Radiated Emissions

Tracking # 31964172.001 Page 18 of 62

EUT Name	Wi-Fi Router	Date	May 15, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11a at 6Mbps / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	1m – ComPower AHA-840	Performed by	Kerwinn Corpuz

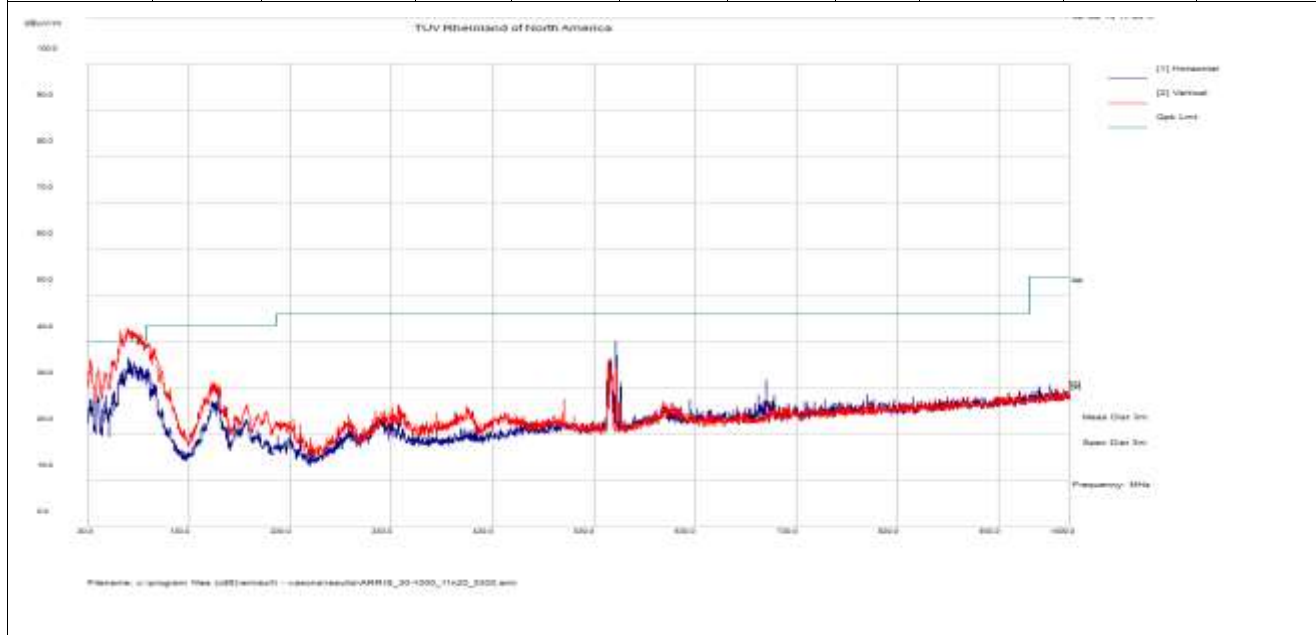


Notes: All emissions met restricted band limits.

SOP 1 Radiated Emissions		Tracking # 31964172.001 Page 19 of 62	
EUT Name	Wi-Fi Router	Date	Jul 8, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23° C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT20 at MCS0 / All chains	Line AC / Freq	120 Vac / 60 Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	120 kHz/ 300 kHz
Dist/Ant Used	3m – JB3	Performed by	Colton Aliff

30 MHz – 1 GHz Transmit at 5300 MHz – UNII2A

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
69.09	56.01	0.74	-19.98	36.77	QP	V	140	90	40.00	-3.23
32.73	38.11	0.49	-8.23	30.37	QP	V	176	242	40.00	-9.63
96.09	52.22	0.86	-19.12	33.95	QP	V	169	282	43.50	-9.55
551.79	44.08	2.25	-9.30	37.03	QP	H	153	96	46.00	-8.97
40.21	43.14	0.56	-14.26	29.45	QP	V	175	216	40.00	-10.55
102.31	44.30	0.89	-17.19	28.00	QP	V	141	327	43.50	-15.50



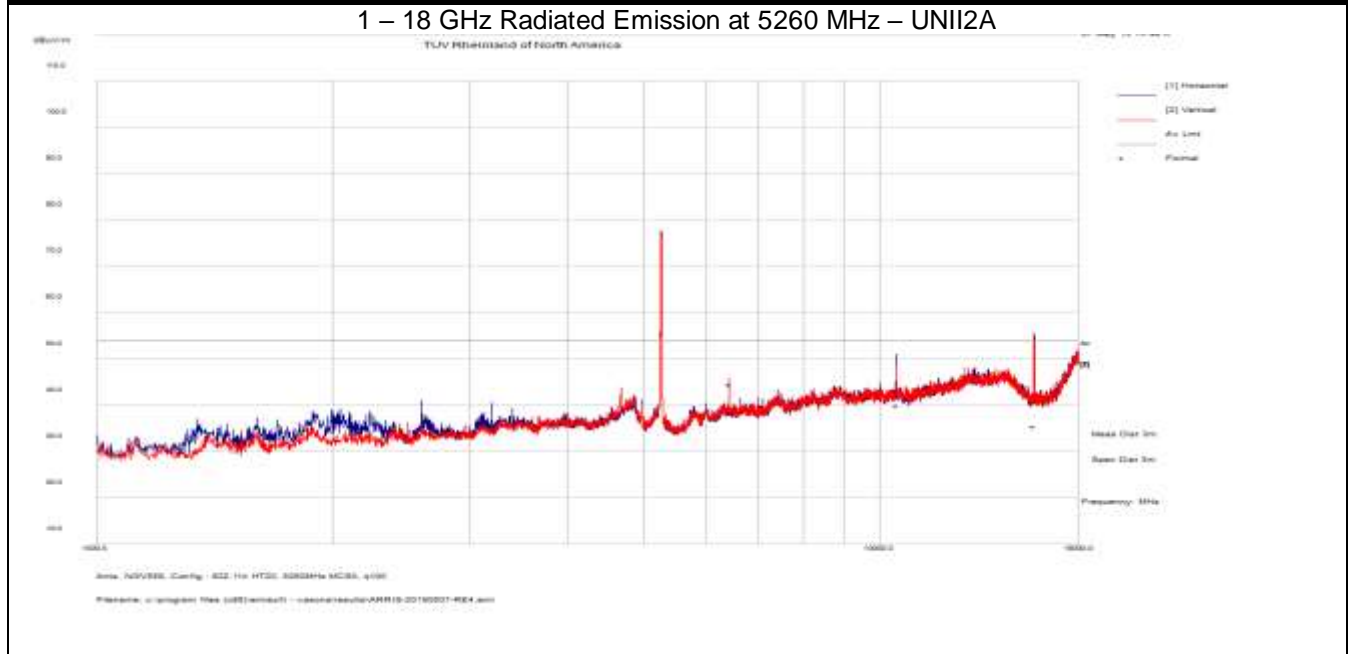
Spec Margin = E-Field QP - Limit, E-Field QP = FIM QP+ Total CF ± Uncertainty
 Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

- Note: 1. Worst case was observed at mid channel of 802.11n HT20, MCS0.
 2. No significant emission were observed below 30MHz.
 3. To reduce complexity and bulkiness of the report worst case plots are placed in the report.

SOP 1 Radiated Emissions											Tracking # 31964172.001 Page 20 of 62	
EUT Name		Wi-Fi Router					Date		May 7, 2019			
EUT Model		NVG5X8AC					Temp / Hum in		23°C / 40%rh			
EUT Serial		M11839QW0022					Temp / Hum out		N/A			
EUT Config.		802.11n HT20 at MCS0 / All chains					Line AC		120 VAC / 60Hz			
Standard		CFR47 Part 15 Subpart E, RSS-247, RSS-GEN					RBW / VBW		1 MHz / 3 MHz			
Dist/Ant Used		3m – EMCO 3115					Performed by		Kerwinn Corpuz			
Freq.	Raw	Cbl	AF	Level	Det.	Pol.	Hght.	Azt	Limit	Margin	Result	
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
1 – 18 GHz Radiated Emission at 5260 MHz – UNII2A												
10518.45	53.90	5.26	-19.13	40.04	Ave	H	146	142	54.00	-13.97	Pass	
15773.50	48.27	6.51	-19.40	35.38	Ave	H	163	119	54.00	-18.62	Pass	
6428.84	62.82	4.00	-22.37	44.46	Ave	V	241	216	54.00	-9.54	Pass	
1 – 18 GHz Radiated Emission at 5300 MHz – UNII2A												
4711.05	58.52	3.50	-23.86	38.16	Ave	H	118	267	54.00	-15.84	Pass	
10603.84	54.03	5.30	-18.99	40.34	Ave	H	101	158	54.00	-13.66	Pass	
6477.66	63.63	4.00	-22.53	45.11	Ave	V	202	204	54.00	-8.90	Pass	
15913.88	55.10	6.43	-19.55	41.98	Ave	V	143	84	54.00	-12.02	Pass	
1 – 18 GHz Radiated Emission at 5320 MHz – UNII2A												
10638.83	46.84	5.30	-18.98	33.16	Ave	H	215	126	54.00	-20.84	Pass	
15961.59	44.17	6.50	-19.47	31.21	Ave	H	150	0	54.00	-22.80	Pass	
6502.11	58.62	4.00	-22.44	40.18	Ave	V	188	245	54.00	-13.82	Pass	
Spec Margin = Level – Limit, Level = Raw + Cable + AF ± Uncertainty												
AF= Amp Gain + ANT Factor												
Combined Standard Uncertainty $u_c(y) = \pm 4.52$ dB Expanded Uncertainty $U = k u_c(y)$ $k = 2$ for 95% confidence												
Note: All emissions met restricted band limits.												

SOP 1 Radiated Emissions Tracking # 31964172.001 Page 21 of 62

EUT Name	Wi-Fi Router	Date	May 7, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 40%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT20 at MCS0 / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO 3115	Performed by	Kerwin Corpuz

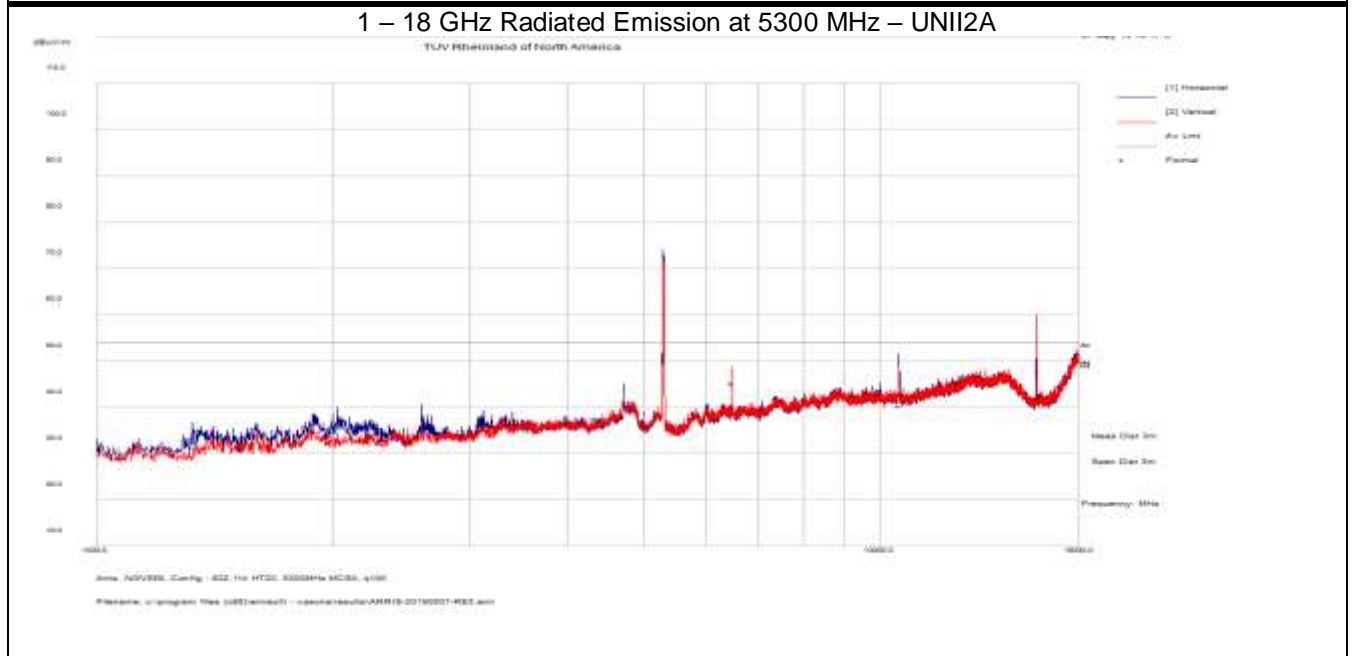


Notes: 1. All emissions met restricted band limits.
 2. Emission over the limit is the fundamental and exempt from the limit.

SOP 1 Radiated Emissions

Tracking # 31964172.001 Page 22 of 62

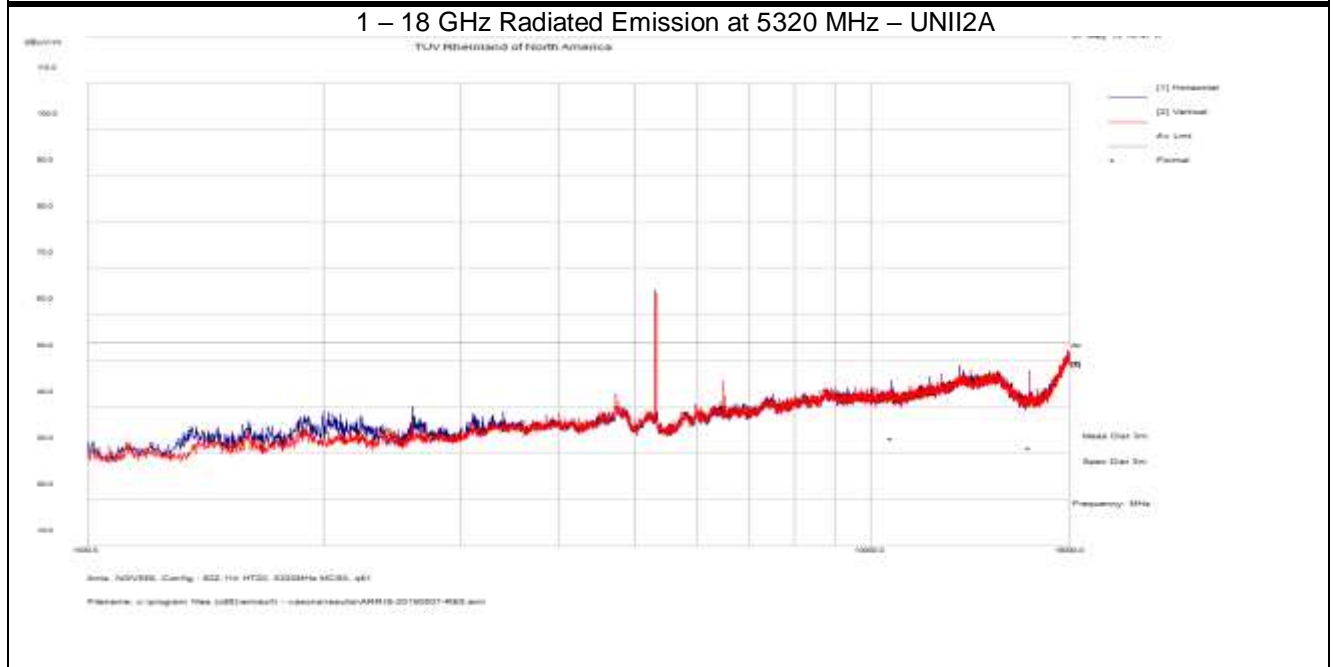
EUT Name	Wi-Fi Router	Date	May 7, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 40%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT20 at MCS0 / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO 3115	Performed by	Kerwin Corpuz



- Notes: 1. All emissions met restricted band limits.
 2. Emission over the limit is the fundamental and exempt from the limit.

SOP 1 Radiated Emissions Tracking # 31964172.001 Page 23 of 62

EUT Name	Wi-Fi Router	Date	May 7, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 40%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT20 at MCS0 / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO 3115	Performed by	Kerwinn Corpuz

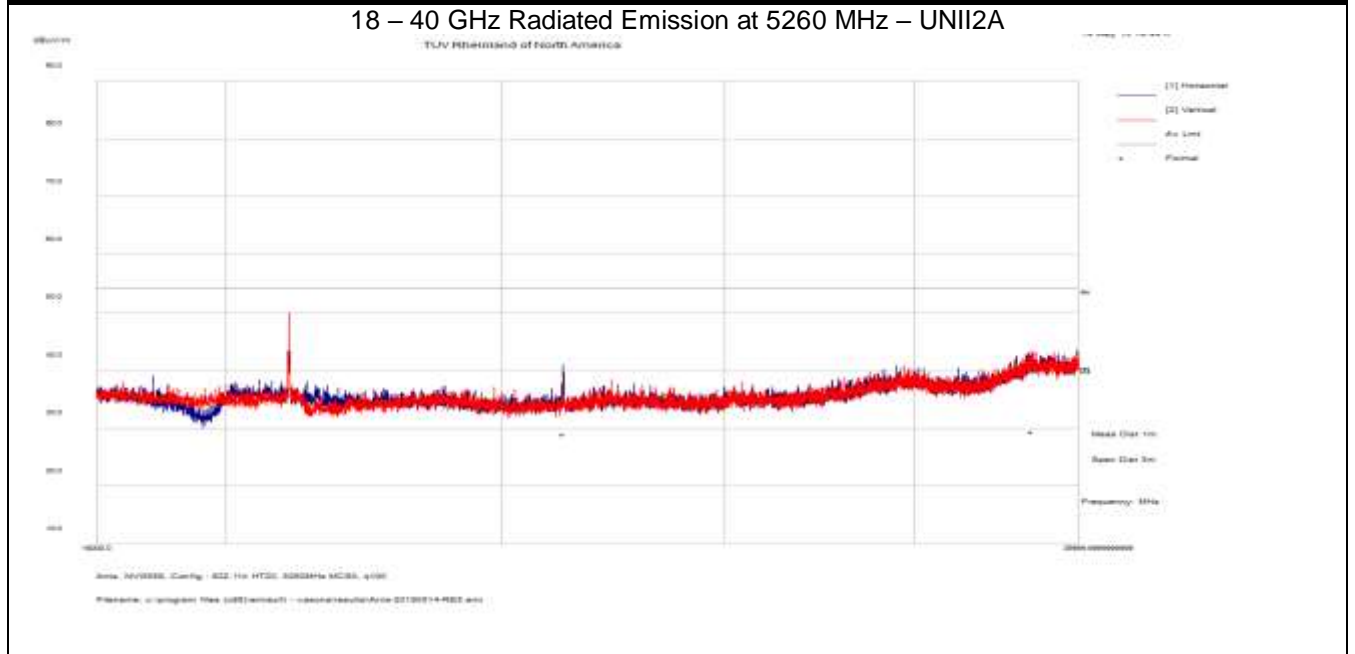


Notes: 1. All emissions met restricted band limits.
 2. Emission over the limit is the fundamental and exempt from the limit.

SOP 1 Radiated Emissions											Tracking # 31964172.001 Page 24 of 62	
EUT Name		Wi-Fi Router					Date		May 14, 2019			
EUT Model		NVG5X8AC					Temp / Hum in		23°C / 42%rh			
EUT Serial		M11839QW0022					Temp / Hum out		N/A			
EUT Comfit.		802.11n HT20 at MCS0 / All chains					Line AC		120 VAC / 60Hz			
Standard		CFR47 Part 15 Subpart E, RSS-247, RSS-GEN					RBW / VBW		1 MHz / 3 MHz			
Dist/Ant Used		1m – ComPower AHA-840					Performed by		Kerwinn Corpuz			
Freq.	Raw	Cbl	AF	Level	Det.	Pol.	Hght.	Azt	Limit	Margin	Result	
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
18 – 40 GHz Radiated Emission at 5260 MHz – UNII2A												
26305.00	33.80	8.20	-13.10	28.90	Ave	H	151	142	54.00	-25.10	Pass	
21045.88	38.50	7.60	-9.30	36.80	Ave	V	143	127	54.00	-17.20	Pass	
38487.50	31.00	10.3	-11.90	29.40	Ave	V	172	253	54.00	-24.60	Pass	
18 – 40 GHz Radiated Emission at 5300 MHz – UNII2A												
26503.99	37.60	8.40	-13.50	32.50	Ave	H	161	124	54.00	-21.50	Pass	
38472.26	30.40	10.3	-11.90	28.90	Ave	H	106	14	54.00	-25.10	Pass	
21205.91	40.10	7.60	-9.40	38.30	Ave	V	186	119	54.00	-15.70	Pass	
18 – 40 GHz Radiated Emission at 5320 MHz – UNII2A												
21291.56	38.10	7.60	-9.40	36.30	Ave	H	129	350	54.00	-17.70	Pass	
26609.42	38.60	8.40	-13.50	33.50	Ave	H	152	86	54.00	-20.50	Pass	
39193.68	35.70	10.7	-13.10	33.30	Ave	H	119	124	54.00	-20.70	Pass	
Spec Margin = Level – Limit, Level = Raw + Cable + AF ± Uncertainty												
AF= Amp Gain + ANT Factor												
Combined Standard Uncertainty $u_c(y) = \pm 4.52$ dB Expanded Uncertainty $U = k u_c(y)$ $k = 2$ for 95% confidence												
Note: All emissions met restricted band limits.												

SOP 1 Radiated Emissions Tracking # 31964172.001 Page 25 of 62

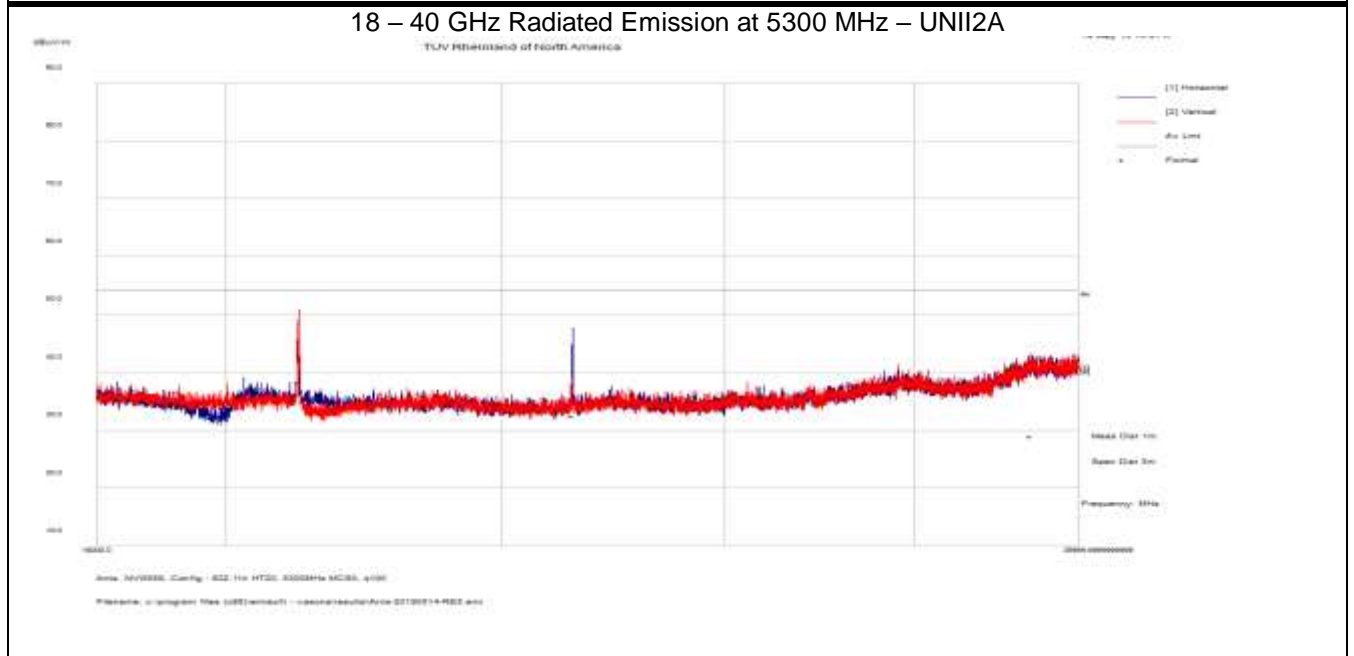
EUT Name	Wi-Fi Router	Date	May 14, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 42%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT20 at MCS0 / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	1m – ComPower AHA-840	Performed by	Kerwinn Corpuz



Notes: All emissions met restricted band limits.

SOP 1 Radiated Emissions Tracking # 31964172.001 Page 26 of 62

EUT Name	Wi-Fi Router	Date	May 14, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 42%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT20 at MCS0 / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	1m – ComPower AHA-840	Performed by	Kerwinn Corpuz

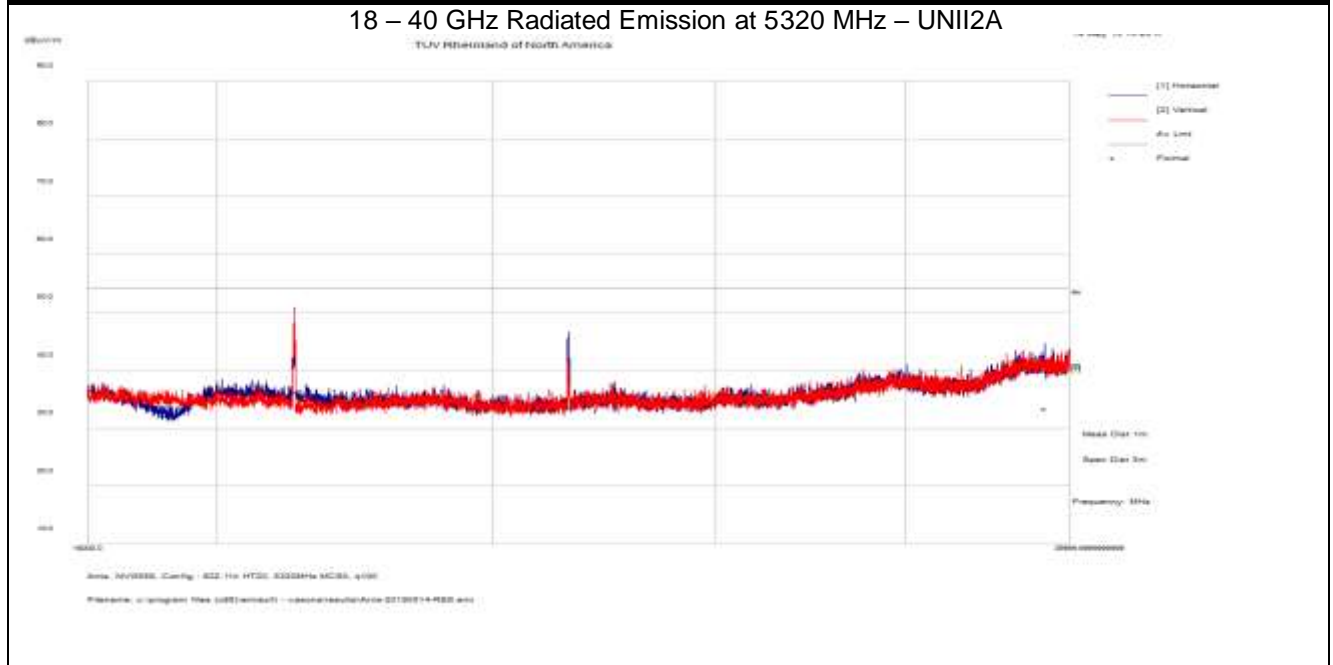


Notes: All emissions met restricted band limits.

SOP 1 Radiated Emissions

Tracking # 31964172.001 Page 27 of 62

EUT Name	Wi-Fi Router	Date	May 14, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 42%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT20 at MCS0 / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	1m – ComPower AHA-840	Performed by	Kerwinn Corpuz

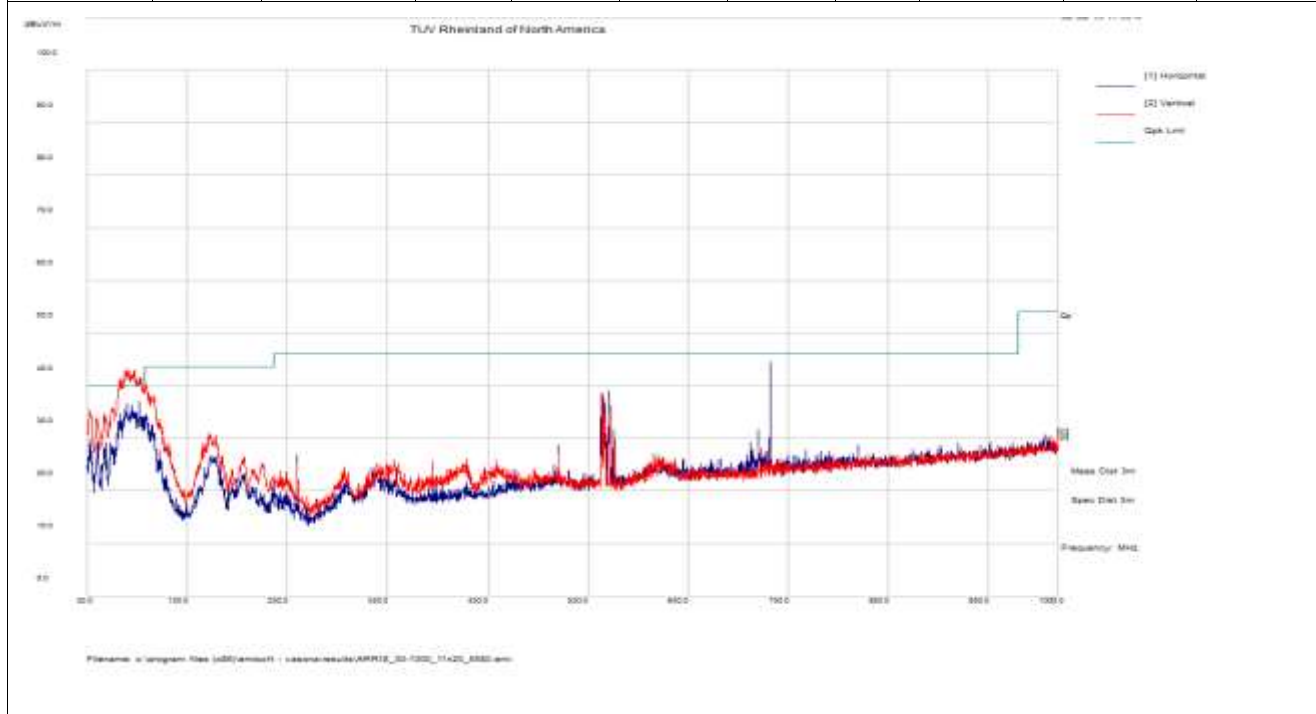


Notes: All emissions met restricted band limits.

SOP 1 Radiated Emissions		Tracking # 31964172.001 Page 28 of 62	
EUT Name	Wi-Fi Router	Date	Jul 8, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23° C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT20 at MCS0 / All chains	Line AC / Freq	120 Vac / 60 Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	120 kHz/ 300 kHz
Dist/Ant Used	3m – JB3	Performed by	Colton Aliff

30 MHz – 1 GHz Transmit at 5580 MHz – UNII2C

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
69.48	57.26	0.74	-19.98	38.01	QP	V	133	330	40.00	-1.99
712.18	22.75	2.60	-7.09	18.26	QP	H	140	356	46.00	-27.74
32.52	37.55	0.49	-8.08	29.96	QP	V	160	260	40.00	-10.04
91.44	53.40	0.84	-20.28	33.95	QP	V	111	36	43.50	-9.55
39.25	41.62	0.55	-13.51	28.65	QP	V	108	60	40.00	-11.35
551.18	43.35	2.24	-9.30	36.29	QP	H	123	86	46.00	-9.71



Spec Margin = E-Field QP - Limit, E-Field QP = FIM QP+ Total CF ± Uncertainty

Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: 1. Worst case was observed at mid channel of 802.11n HT20, MCS0.

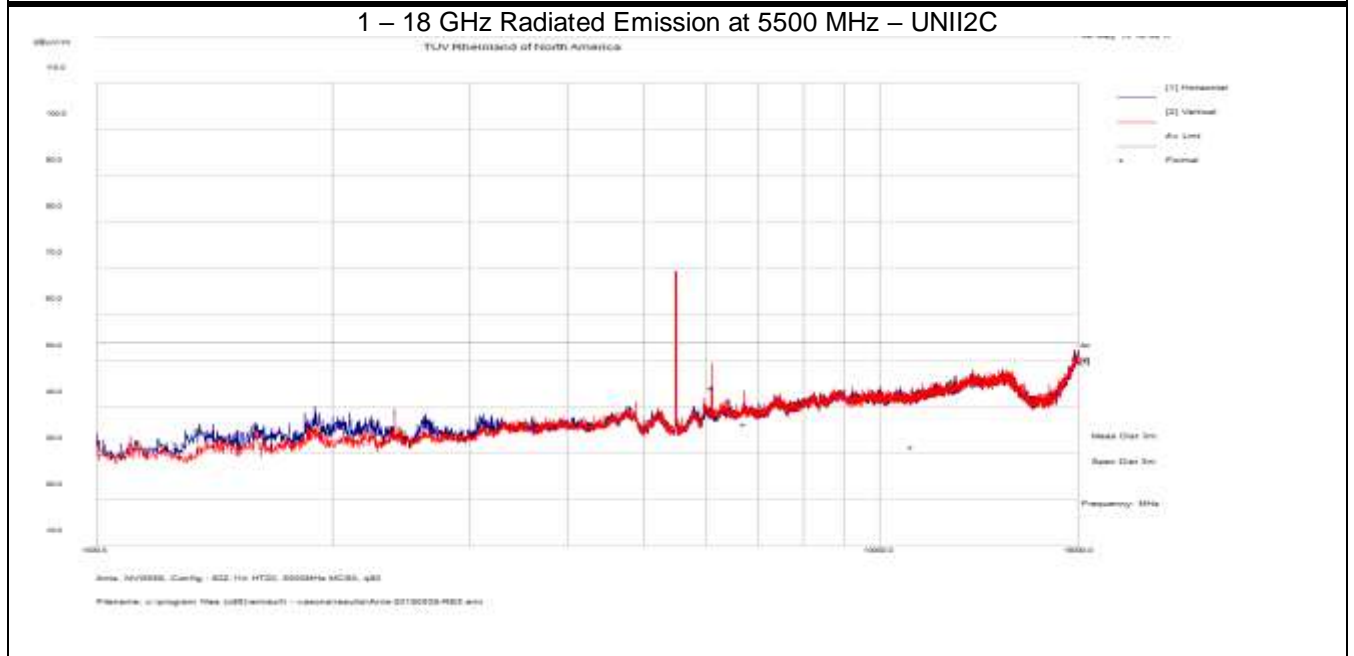
2. No significant emission were observed below 30MHz.

3. To reduce complexity and bulkiness of the report worst case plots are placed in the report.

SOP 1 Radiated Emissions											Tracking # 31964172.001 Page 29 of 62	
EUT Name		Wi-Fi Router					Date		May 8, 2019			
EUT Model		NVG5X8AC					Temp / Hum in		23°C / 41%rh			
EUT Serial		M11839QW0022					Temp / Hum out		N/A			
EUT Config.		802.11n HT20 at MCS0 / All chains					Line AC		120 VAC / 60Hz			
Standard		CFR47 Part 15 Subpart E, RSS-247, RSS-GEN					RBW / VBW		1 MHz / 3 MHz			
Dist/Ant Used		3m – EMCO 3115					Performed by		Kerwinn Corpuz			
Freq.	Raw	Cbl	AF	Level	Det.	Pol.	Hght.	Azt	Limit	Margin	Result	
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
1 – 18 GHz Radiated Emission at 5500 MHz – UNII2C												
6111.03	62.65	3.90	-22.50	44.04	Ave	V	163	36	54.00	-9.96	Pass	
6722.12	53.89	4.10	-21.78	36.21	Ave	V	179	202	54.00	-17.79	Pass	
11001.07	45.01	5.40	-19.04	31.37	Ave	V	145	30	54.00	-22.63	Pass	
1 – 18 GHz Radiated Emission at 5580 MHz – UNII2C												
11162.10	55.53	5.40	-18.65	42.28	Ave	H	143	148	54.00	-11.72	Pass	
6052.40	57.41	3.90	-22.53	38.78	Ave	V	175	59	54.00	-15.22	Pass	
6199.99	63.75	4.00	-22.33	45.41	Ave	V	135	205	54.00	-8.59	Pass	
16747.41	44.85	6.60	-17.02	34.43	Ave	V	131	65	54.00	-19.57	Pass	
1 – 18 GHz Radiated Emission at 5720 MHz – UNII2C												
5994.31	53.30	3.90	-22.76	34.43	Ave	H	177	104	54.00	-19.57	Pass	
11439.78	58.41	5.46	-18.34	45.53	Ave	H	126	144	54.00	-8.47	Pass	
17155.39	44.38	6.79	-13.84	37.33	Ave	H	156	194	54.00	-16.67	Pass	
17172.38	45.48	6.76	-13.71	38.53	Ave	H	242	93	54.00	-15.47	Pass	
5966.37	60.03	3.90	-22.78	41.16	Ave	V	148	56	54.00	-12.84	Pass	
6205.18	54.83	4.00	-22.36	36.47	Ave	V	188	201	54.00	-17.53	Pass	
6355.55	69.02	4.00	-22.46	50.57	Ave	V	227	218	54.00	-3.44	Pass	
Spec Margin = Level – Limit, Level = Raw + Cable + AF ± Uncertainty												
AF= Amp Gain + ANT Factor												
Combined Standard Uncertainty $u_c(y) = \pm 4.52$ dB Expanded Uncertainty $U = k u_c(y)$ $k = 2$ for 95% confidence												
Note: All emissions met restricted band limits.												

SOP 1 Radiated Emissions Tracking # 31964172.001 Page 30 of 62

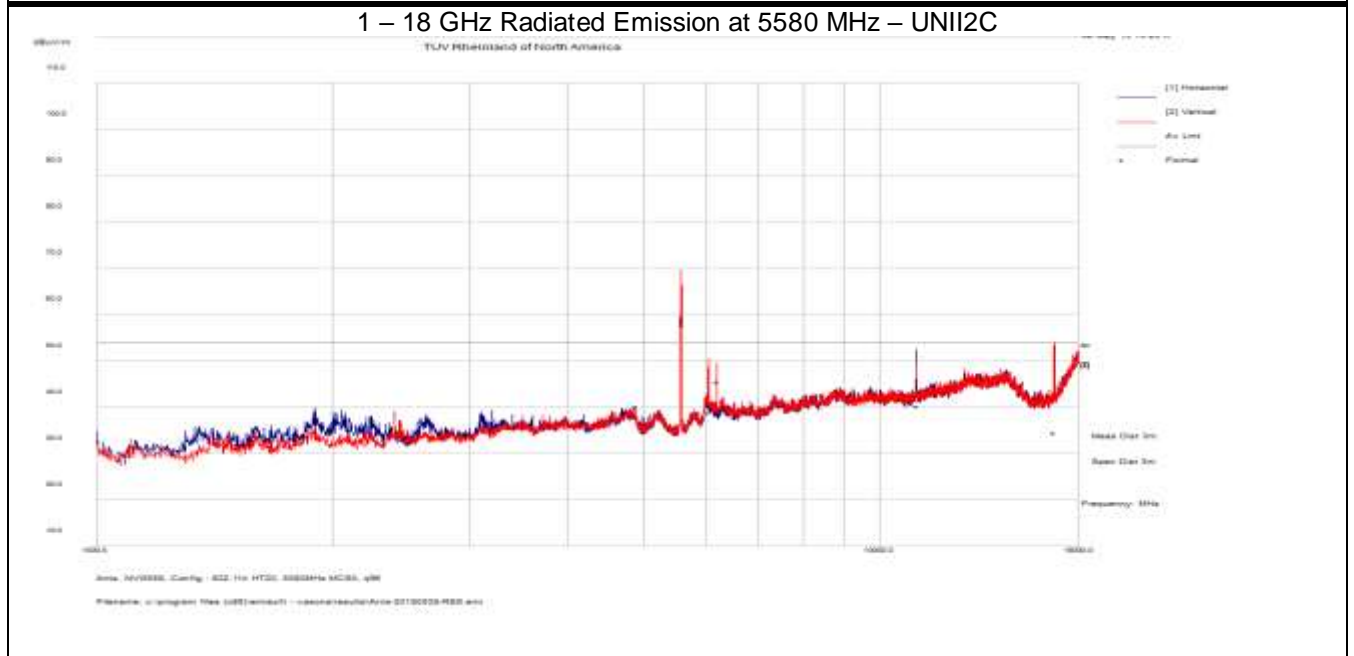
EUT Name	Wi-Fi Router	Date	May 8, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT20 at MCS0 / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO 3115	Performed by	Kerwinn Corpuz



Notes: 1. All emissions met restricted band limits.
 2. Emission over the limit is the fundamental and exempt from the limit.

SOP 1 Radiated Emissions Tracking # 31964172.001 Page 31 of 62

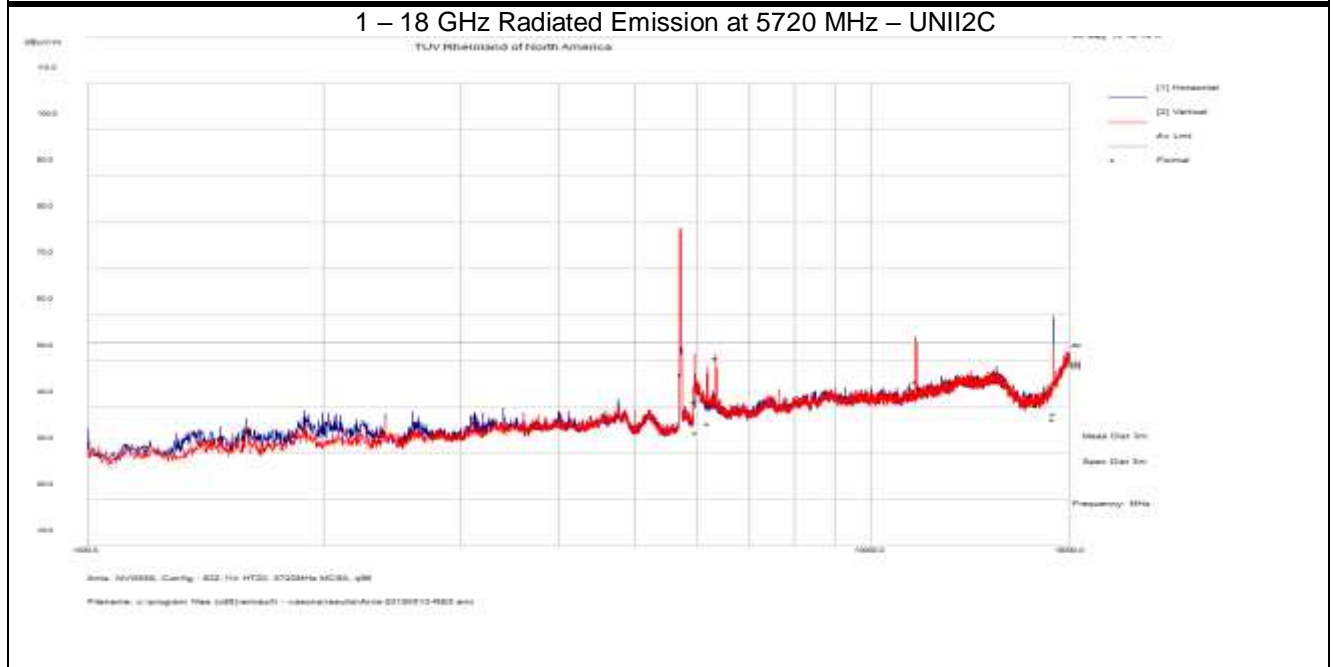
EUT Name	Wi-Fi Router	Date	May 8, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT20 at MCS0 / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO 3115	Performed by	Kerwinn Corpuz



Notes: 1. All emissions met restricted band limits.
 2. Emission over the limit is the fundamental and exempt from the limit.

SOP 1 Radiated Emissions Tracking # 31964172.001 Page 32 of 62

EUT Name	Wi-Fi Router	Date	May 8, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT20 at MCS0 / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO 3115	Performed by	Kerwinn Corpuz

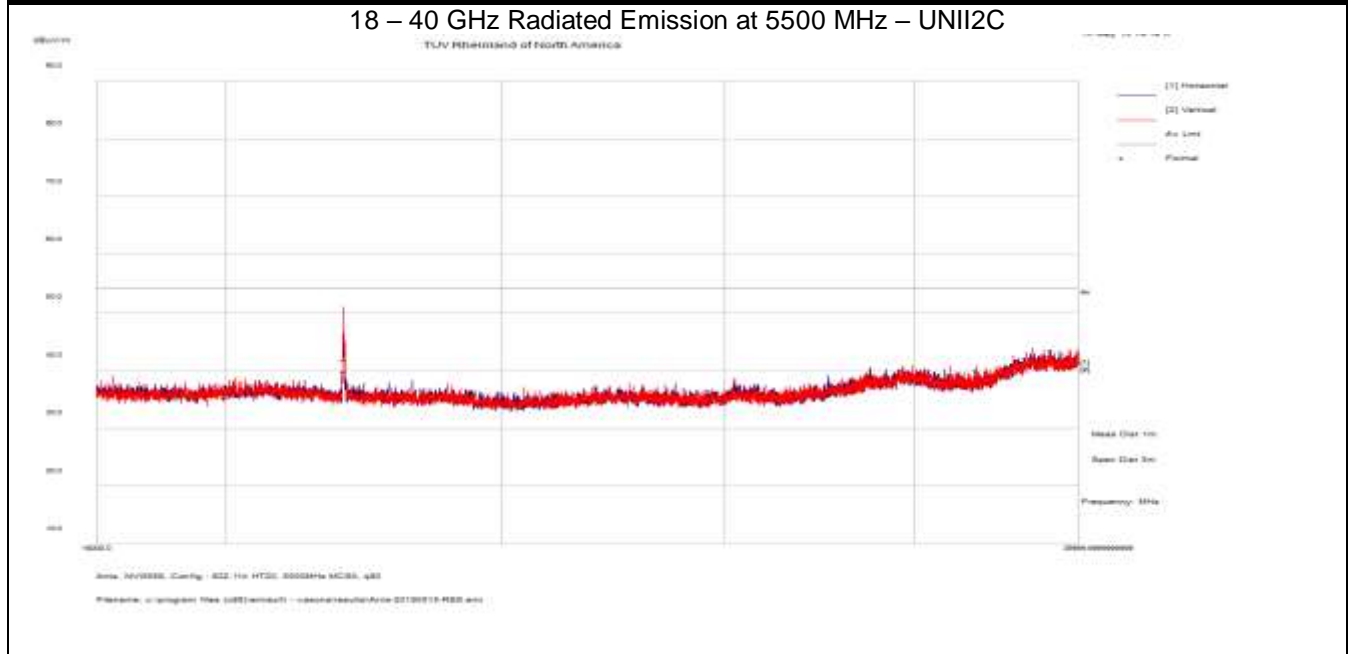


Notes: 1. All emissions met restricted band limits.
 2. Emission over the limit is the fundamental and exempt from the limit.

SOP 1 Radiated Emissions											Tracking # 31964172.001 Page 33 of 62	
EUT Name		Wi-Fi Router					Date		May 15, 2019			
EUT Model		NVG5X8AC					Temp / Hum in		23°C / 41%rh			
EUT Serial		M11839QW0022					Temp / Hum out		N/A			
EUT Config.		802.11n HT20 at MCS0 / All chains					Line AC		120 VAC / 60Hz			
Standard		CFR47 Part 15 Subpart E, RSS-247, RSS-GEN					RBW / VBW		1 MHz / 3 MHz			
Dist/Ant Used		1m – ComPower AHA-840					Performed by		Kerwinn Corpuz			
Freq.	Raw	Cbl	AF	Level	Det.	Pol.	Hght.	Azt	Limit	Margin	Result	
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
18 – 40 GHz Radiated Emission at 5500 MHz – UNII2C												
22011.53	44.40	7.70	-10.20	41.90	Ave	V	164	137	54.00	-12.10	Pass	
18 – 40 GHz Radiated Emission at 5580 MHz – UNII2C												
22324.38	68.97	7.70	-10.42	67.26	Pk	H	175	149	68.23	-0.97	Pass	
27912.74	44.40	8.60	-14.20	38.80	Ave	V	166	352	54.00	-15.20	Pass	
33484.73	39.70	9.60	-13.10	36.20	Ave	V	158	144	54.00	-17.80	Pass	
18 – 40 GHz Radiated Emission at 5720 MHz – UNII2C												
22888.42	49.40	7.70	-10.90	46.20	Ave	V	239	278	54.00	-7.80	Pass	
Spec Margin = Level – Limit, Level = Raw + Cable + AF ± Uncertainty												
AF= Amp Gain + ANT Factor												
Combined Standard Uncertainty $u_c(y) = \pm 4.52$ dB Expanded Uncertainty $U = k u_c(y)$ $k = 2$ for 95% confidence												
Note: All emissions met limits.												

SOP 1 Radiated Emissions Tracking # 31964172.001 Page 34 of 62

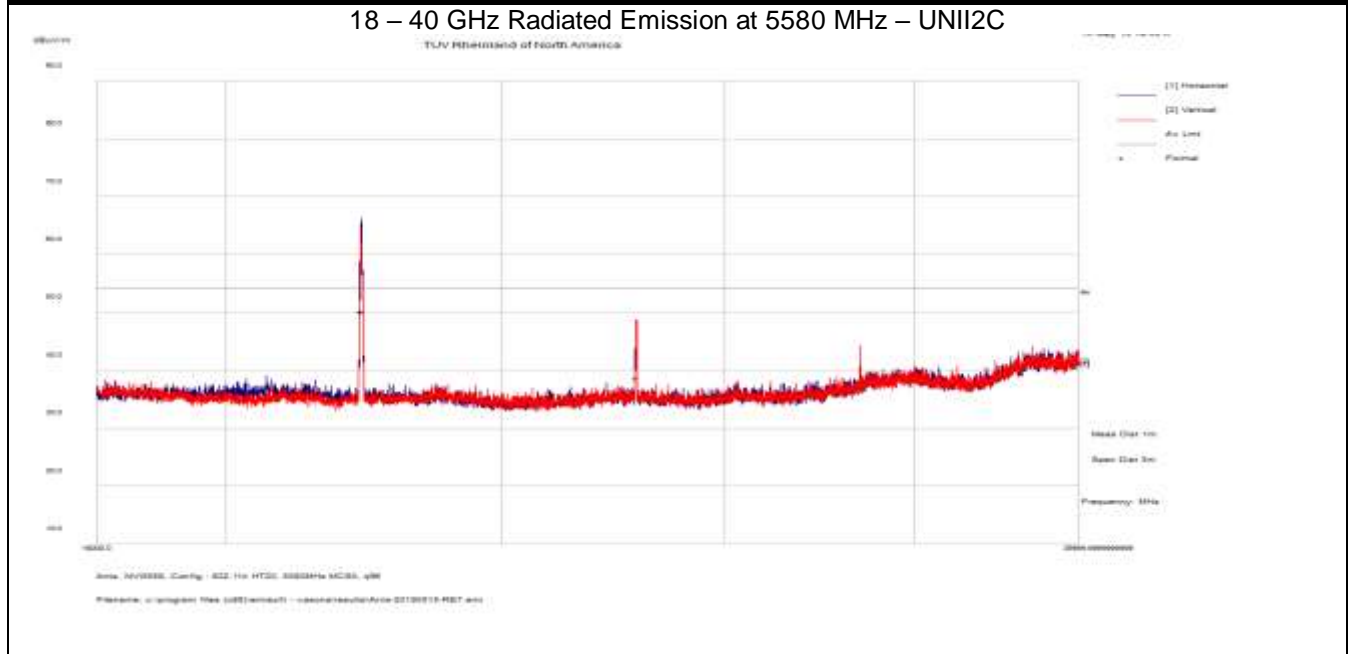
EUT Name	Wi-Fi Router	Date	May 15, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT20 at MCS0 / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	1m – ComPower AHA-840	Performed by	Kerwin Corpuz



Notes: All emissions met restricted band limits.

SOP 1 Radiated Emissions Tracking # 31964172.001 Page 35 of 62

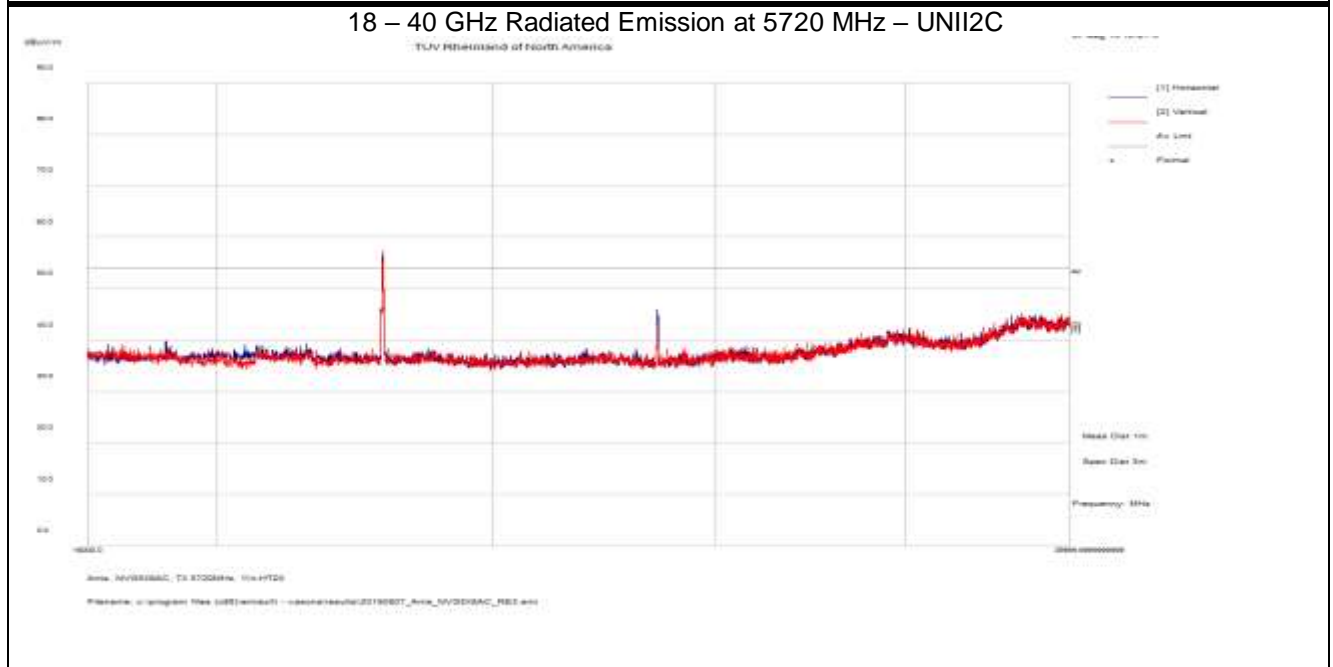
EUT Name	Wi-Fi Router	Date	May 15, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT20 at MCS0 / All chains	Line AC	120 VAC/60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	1m – ComPower AHA-840	Performed by	Kerwin Corpuz



Notes: All emissions met limits.

SOP 1 Radiated Emissions Tracking # 31964172.001 Page 36 of 62

EUT Name	Wi-Fi Router	Date	May 15, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT20 at MCS0 / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	1m – ComPower AHA-840	Performed by	Kerwinn Corpuz

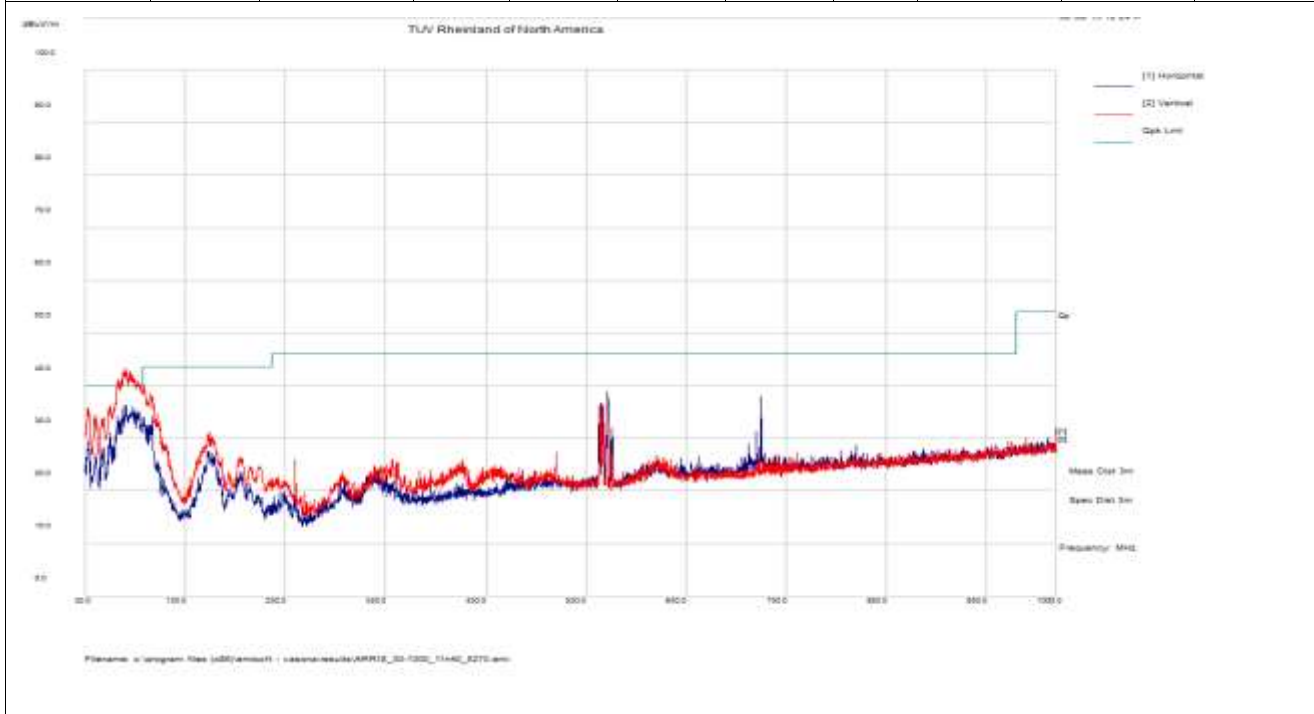


Notes: All emissions met restricted band limits.

SOP 1 Radiated Emissions		Tracking # 31964172.001 Page 37 of 62	
EUT Name	Wi-Fi Router	Date	Jul 8, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23° C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT40 at MCS0 / All chains	Line AC / Freq	120 Vac / 60 Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	120 kHz/ 300 kHz
Dist/Ant Used	3m – JB3	Performed by	Colton Aliff

30 MHz – 1 GHz Transmit at 5300 MHz – UNII2A

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
70.46	57.72	0.75	-19.99	38.48	QP	V	148	174	40.00	-1.52
32.93	39.38	0.49	-8.37	31.50	QP	V	112	230	40.00	-8.50
95.97	52.78	0.86	-19.17	34.48	QP	V	128	272	43.50	-9.03
40.27	43.68	0.57	-14.30	29.94	QP	V	102	52	40.00	-10.06
551.45	37.60	2.25	-9.30	30.55	QP	H	158	148	46.00	-15.45
704.67	27.03	2.58	-7.20	22.41	QP	H	197	152	46.00	-23.59



Spec Margin = E-Field QP - Limit, E-Field QP = FIM QP+ Total CF ± Uncertainty

Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: 1. Worst case was observed at channel of 802.11n HT40, MCS0.

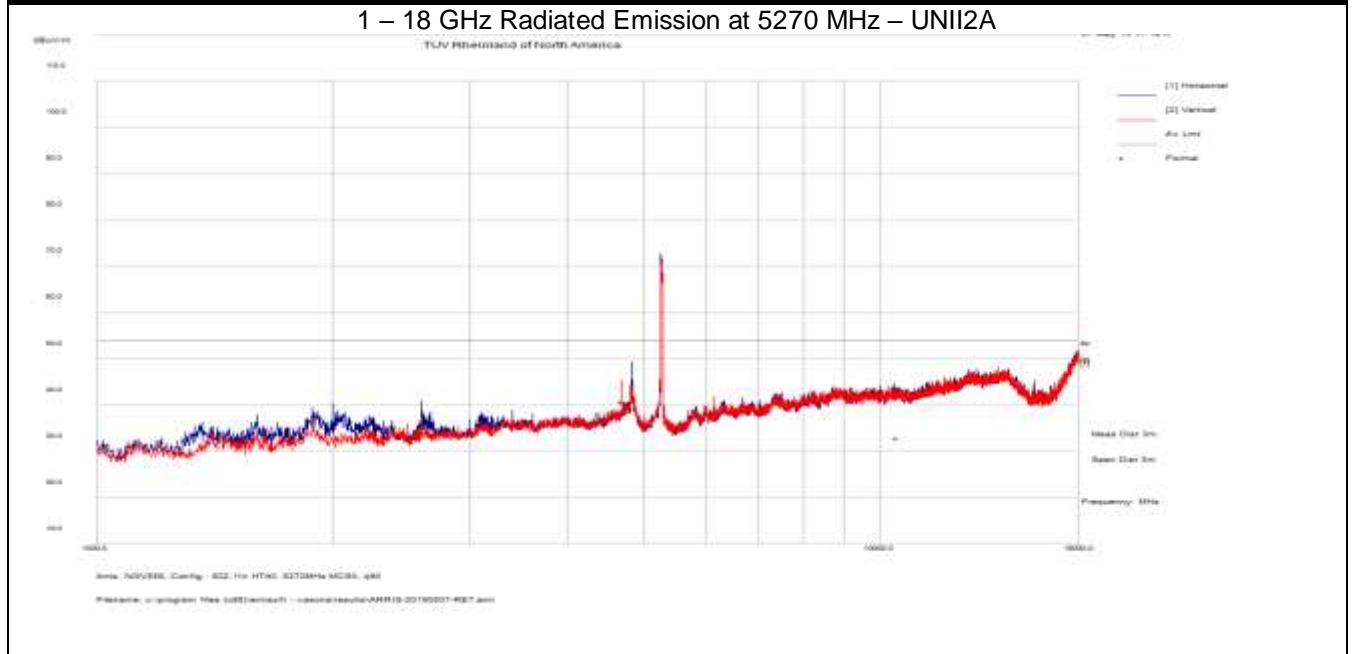
2. No significant emission were observed below 30MHz.

3. To reduce complexity and bulkiness of the report worst case plots are placed in the report.

SOP 1 Radiated Emissions											Tracking # 31964172.001 Page 38 of 62	
EUT Name Wi-Fi Router						Date May 7, 2019						
EUT Model NVG5X8AC						Temp / Hum in 23°C / 40%rh						
EUT Serial M11839QW0022						Temp / Hum out N/A						
EUT Config. 802.11n HT40 at MCS0 / All chains						Line AC 120 VAC / 60Hz						
Standard CFR47 Part 15 Subpart E, RSS-247, RSS-GEN						RBW / VBW 1 MHz / 3 MHz						
Dist/Ant Used 3m – EMCO 3115						Performed by Kerwinn Corpuz						
Freq.	Raw	Cbl	AF	Level	Det.	Pol.	Hght.	Azt	Limit	Margin	Result	
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
1 – 18 GHz Radiated Emission at 5270 MHz – UNII2A												
4830.92	59.35	3.50	-23.70	39.16	Ave	H	136	243	54.00	-14.84	Pass	
10543.14	46.75	5.21	-19.11	32.85	Ave	H	136	144	54.00	-21.15	Pass	
4684.31	61.02	3.50	-23.84	40.68	Ave	V	211	254	54.00	-13.32	Pass	
1 – 18 GHz Radiated Emission at 5310 MHz – UNII2A												
4720.07	63.11	3.50	-23.87	42.75	Ave	H	194	248	54.00	-11.25	Pass	
4867.58	64.77	3.50	-23.52	44.75	Ave	H	218	234	54.00	-9.25	Pass	
Spec Margin = Level – Limit, Level = Raw + Cable + AF ± Uncertainty												
AF= Amp Gain + ANT Factor												
Combined Standard Uncertainty $u_c(y) = \pm 4.52$ dB Expanded Uncertainty $U = k u_c(y)$ $k = 2$ for 95% confidence												
Note: All emissions met restricted band limits.												

SOP 1 Radiated Emissions Tracking # 31964172.001 Page 39 of 62

EUT Name	Wi-Fi Router	Date	May 7, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 40%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT40 at MCS0 / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO 3115	Performed by	Kerwinn Corpuz



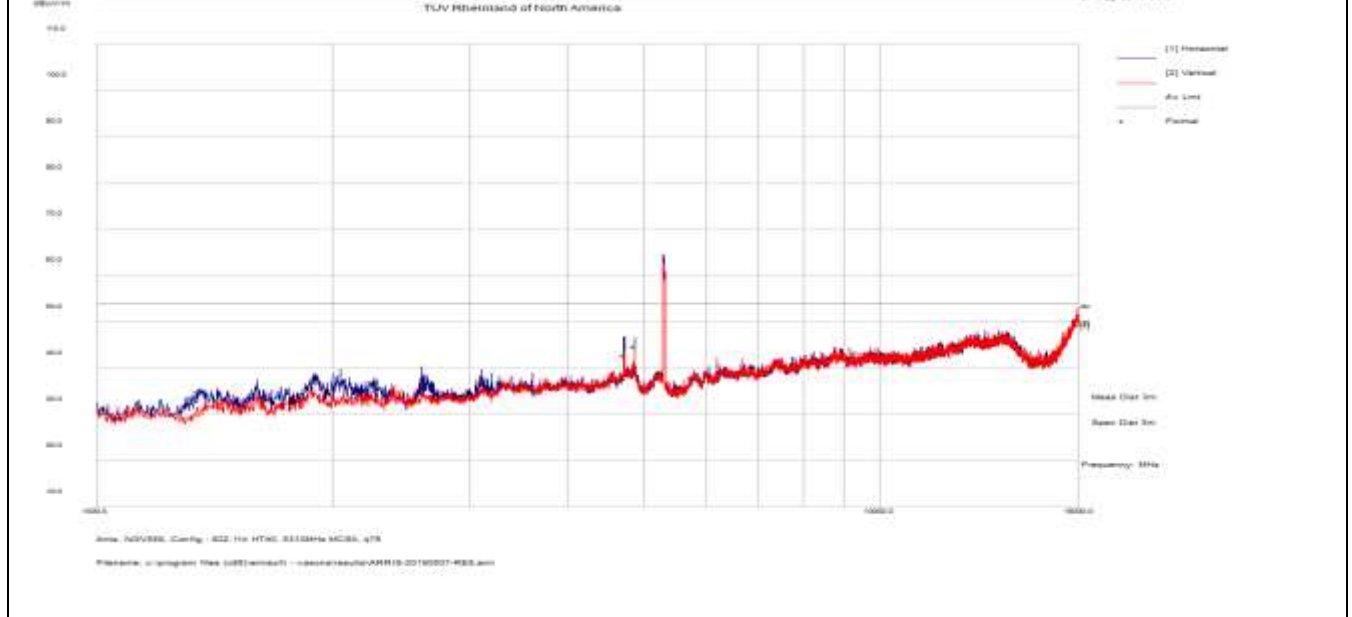
Notes: 1. All emissions met restricted band limits.
 2. Emission over the limit is the fundamental and exempt from the limit.

SOP 1 Radiated Emissions

Tracking # 31964172.001 Page 40 of 62

EUT Name	Wi-Fi Router	Date	May 7, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 40%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT40 at MCS0 / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO 3115	Performed by	Kerwinn Corpuz

1 – 18 GHz Radiated Emission at 5310 MHz – UNII2A

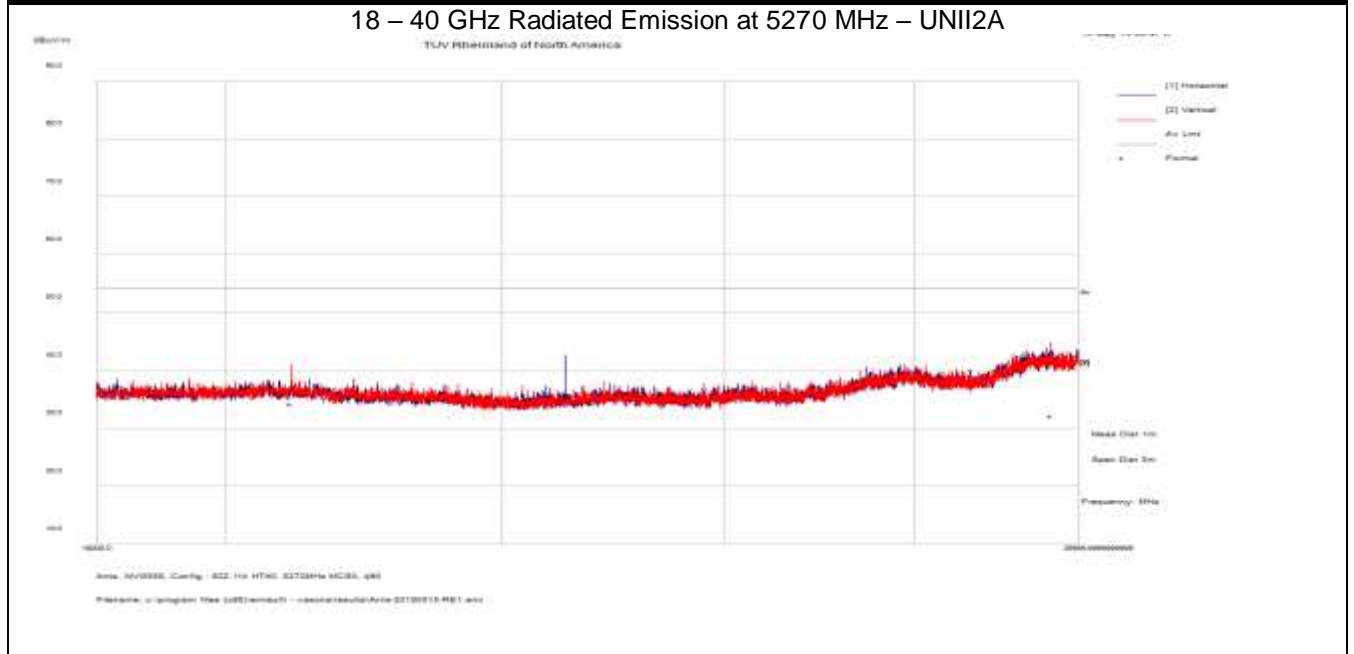


- Notes: 1. All emissions met restricted band limits.
 2. Emission over the limit is the fundamental and exempt from the limit.

SOP 1 Radiated Emissions											Tracking # 31964172.001 Page 41 of 62	
EUT Name Wi-Fi Router						Date May 14, 2019						
EUT Model NVG5X8AC						Temp / Hum in 23°C / 42%rh						
EUT Serial M11839QW0022						Temp / Hum out N/A						
EUT Comfit. 802.11n HT40 at MCS0 / All chains						Line AC 120 VAC / 60Hz						
Standard CFR47 Part 15 Subpart E, RSS-247, RSS-GEN						RBW / VBW 1 MHz / 3 MHz						
Dist/Ant Used 1m – ComPower AHA-840						Performed by Kerwinn Corpuz						
Freq.	Raw	Cbl	AF	Level	Det.	Pol.	Hght.	Azt	Limit	Margin	Result	
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
18 – 40 GHz Radiated Emission at 5270 MHz – UNII2A												
26340.84	40.20	8.30	-13.20	35.30	Ave	H	199	178	54.00	-18.70	Pass	
21075.74	35.90	7.60	-9.30	34.20	Ave	V	170	109	54.00	-19.80	Pass	
39091.35	34.40	10.7	-12.90	32.10	Ave	V	188	274	54.00	-21.90	Pass	
18 – 40 GHz Radiated Emission at 5310 MHz – UNII2A												
21242.11	35.40	7.60	-9.40	33.60	Ave	V	160	105	54.00	-20.40	Pass	
38897.28	36.90	10.6	-12.60	35.00	Ave	V	140	42	54.00	-19.00	Pass	
Spec Margin = Level – Limit, Level = Raw + Cable + AF ± Uncertainty												
AF= Amp Gain + ANT Factor												
Combined Standard Uncertainty $u_c(y) = \pm 4.52$ dB Expanded Uncertainty $U = k u_c(y)$ $k = 2$ for 95% confidence												
Note: All emissions met restricted band limits.												

SOP 1 Radiated Emissions Tracking # 31964172.001 Page 42 of 62

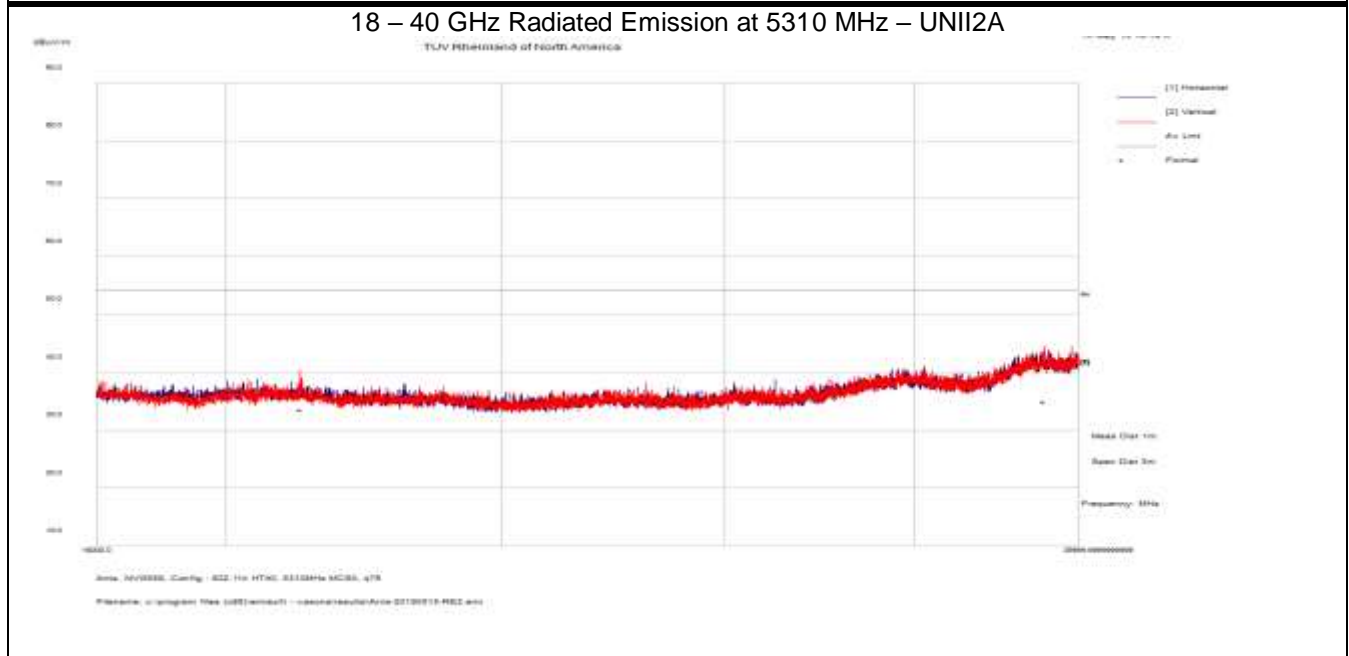
EUT Name	Wi-Fi Router	Date	May 14, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 42%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT40 at MCS0 / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	1m – ComPower AHA-840	Performed by	Kerwinn Corpuz



Notes: All emissions met restricted band limits.

SOP 1 Radiated Emissions Tracking # 31964172.001 Page 43 of 62

EUT Name	Wi-Fi Router	Date	May 14, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 42%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT80 at MCS0 / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	1m – ComPower AHA-840	Performed by	Kerwinn Corpuz

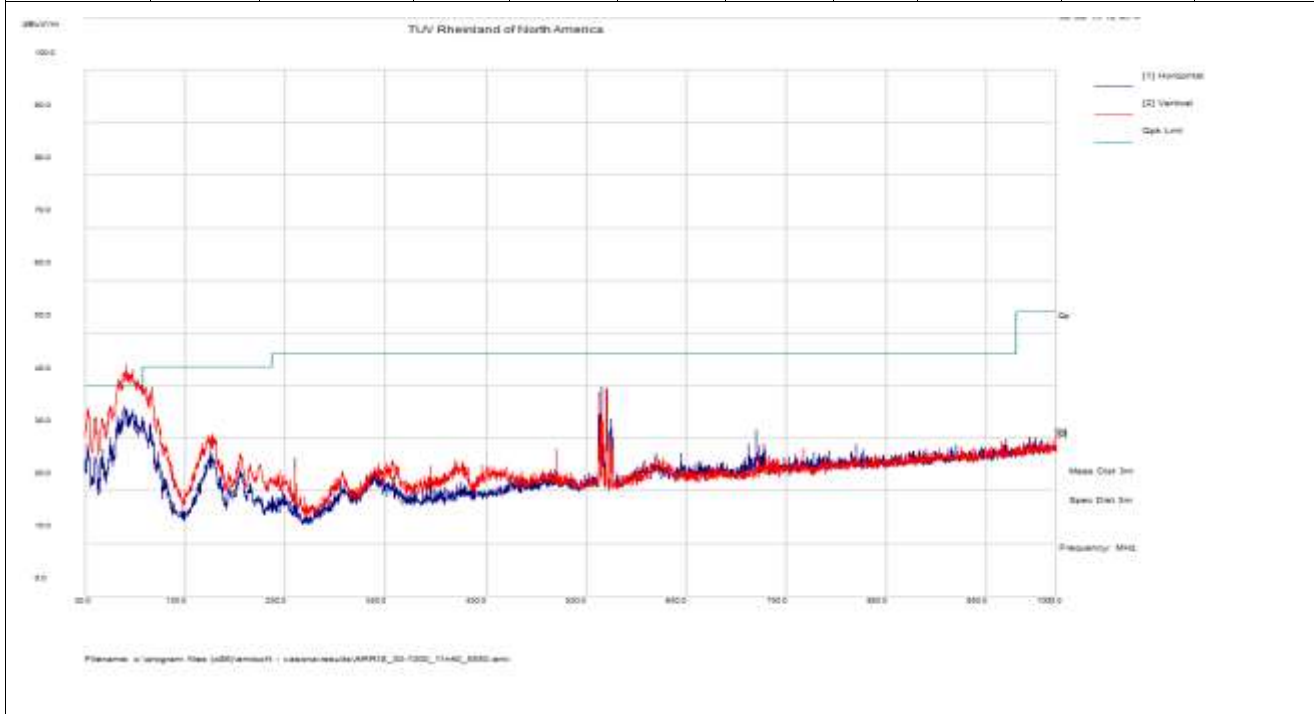


Notes: All emissions met restricted band limits.

SOP 1 Radiated Emissions		Tracking # 31964172.001 Page 44 of 62	
EUT Name	Wi-Fi Router	Date	Jul 8, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23° C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT40 at MCS0 / All chains	Line AC / Freq	120 Vac / 60 Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	120 kHz/ 300 kHz
Dist/Ant Used	3m – JB3	Performed by	Colton Aliff

30 MHz – 1 GHz Transmit at 5550 MHz – UNII2C

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
70.70	57.74	0.75	-19.98	38.52	QP	V	104	332	40.00	-1.48
95.85	52.81	0.86	-19.20	34.46	QP	V	130	360	43.50	-9.04
33.06	38.69	0.49	-8.47	30.71	QP	V	132	198	40.00	-9.29
40.49	42.91	0.57	-14.46	29.02	QP	V	113	272	40.00	-10.98
546.14	43.92	2.24	-9.40	36.76	QP	H	187	94	46.00	-9.24
550.97	25.87	2.24	-9.30	18.82	QP	V	120	46	46.00	-27.19



Spec Margin = E-Field QP - Limit, E-Field QP = FIM QP+ Total CF ± Uncertainty
 Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

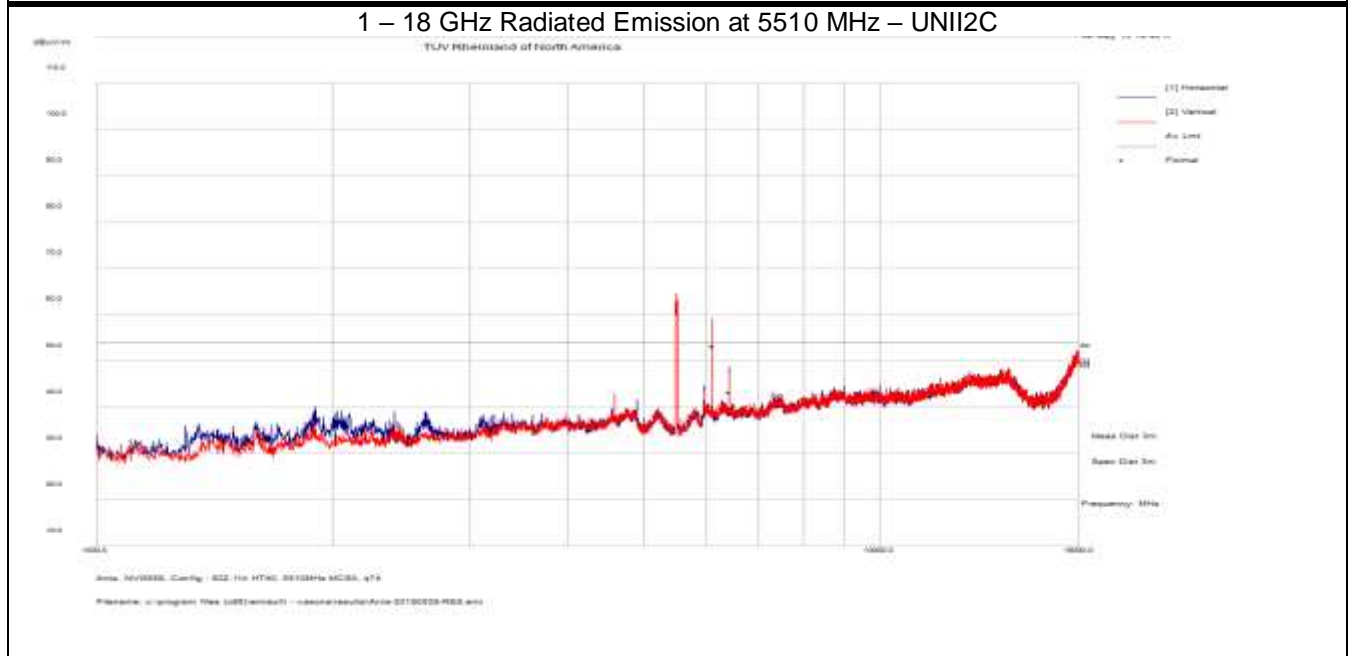
- Note: 1. Worst case was observed at mid channel of 802.11n HT40, MCS0.
 2. No significant emission were observed below 30MHz.
 3. To reduce complexity and bulkiness of the report worst case plots are placed in the report.

SOP 1 Radiated Emissions												Tracking # 31964172.001 Page 45 of 62	
EUT Name Wi-Fi Router						Date May 8, 2019							
EUT Model NVG5X8AC						Temp / Hum in 23°C / 41%rh							
EUT Serial M11839QW0022						Temp / Hum out N/A							
EUT Config. 802.11n HT40 at MCS0 / All chains						Line AC 120 VAC / 60Hz							
Standard CFR47 Part 15 Subpart E, RSS-247, RSS-GEN						RBW / VBW 1 MHz / 3 MHz							
Dist/Ant Used 3m – EMCO 3115						Performed by Kerwinn Corpuz							
Freq.	Raw	Cbl	AF	Level	Det.	Pol.	Hght.	Azt	Limit	Margin	Result		
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB			
1 – 18 GHz Radiated Emission at 5510 MHz – UNII2C													
6428.21	61.48	4.00	-22.37	43.11	Ave	H	247	65	54.00	-10.89	Pass		
6122.22	71.83	3.90	-22.49	53.24	Ave	V	192	244	54.00	-0.76	Pass		
1 – 18 GHz Radiated Emission at 5550 MHz – UNII2C													
6012.35	61.10	3.90	-22.66	42.35	Ave	H	148	82	54.00	-11.65	Pass		
6166.64	70.77	3.93	-22.30	52.41	Ave	H	160	66	54.00	-1.59	Pass		
6474.91	56.20	4.00	-22.52	37.68	Ave	V	247	240	54.00	-16.32	Pass		
14572.55	45.00	6.21	-15.87	35.34	Ave	V	208	283	54.00	-18.66	Pass		
1 – 18 GHz Radiated Emission at 5710 MHz – UNII2C													
11419.97	55.86	5.38	-18.35	42.89	Ave	H	114	128	54.00	-11.11	Pass		
6344.38	77.70	4.00	-22.46	59.25	Pk	V	150	245	68.23	-8.98	Pass		
17121.59	45.20	6.80	-14.13	37.87	Ave	H	147	325	54.00	-16.13	Pass		
17142.28	47.98	6.80	-13.93	40.85	Ave	H	150	30	54.00	-13.15	Pass		
6000.46	52.73	3.90	-22.73	33.90	Ave	V	140	188	54.00	-20.10	Pass		
Spec Margin = Level – Limit, Level = Raw + Cable + AF ± Uncertainty													
AF= Amp Gain + ANT Factor													
Combined Standard Uncertainty $u_c(y) = \pm 4.52$ dB Expanded Uncertainty $U = k u_c(y)$ $k = 2$ for 95% confidence													
Note: All emissions met limits.													

SOP 1 Radiated Emissions

Tracking # 31964172.001 Page 46 of 62

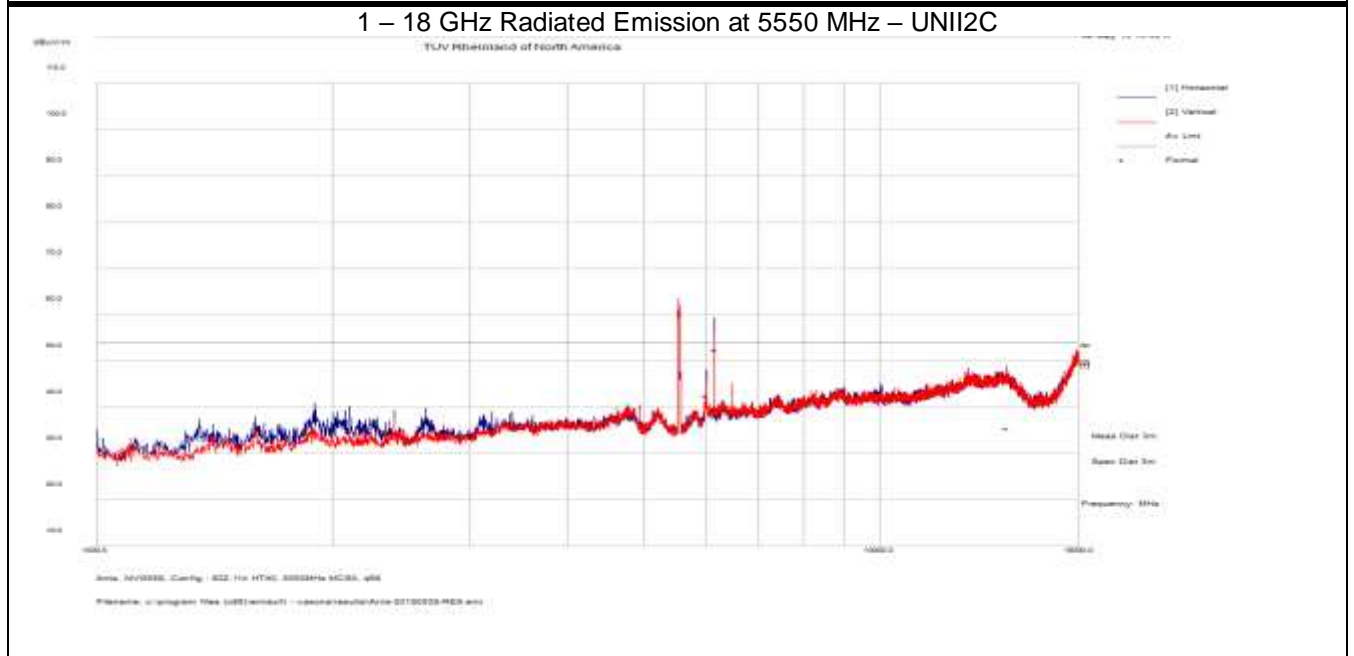
EUT Name	Wi-Fi Router	Date	May 8, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT40 at MCS0 / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO 3115	Performed by	Kerwinn Corpuz



Notes: 1. All emissions met restricted band limits.
 2. Emission over the limit is the fundamental and exempt from the limit.

SOP 1 Radiated Emissions Tracking # 31964172.001 Page 47 of 62

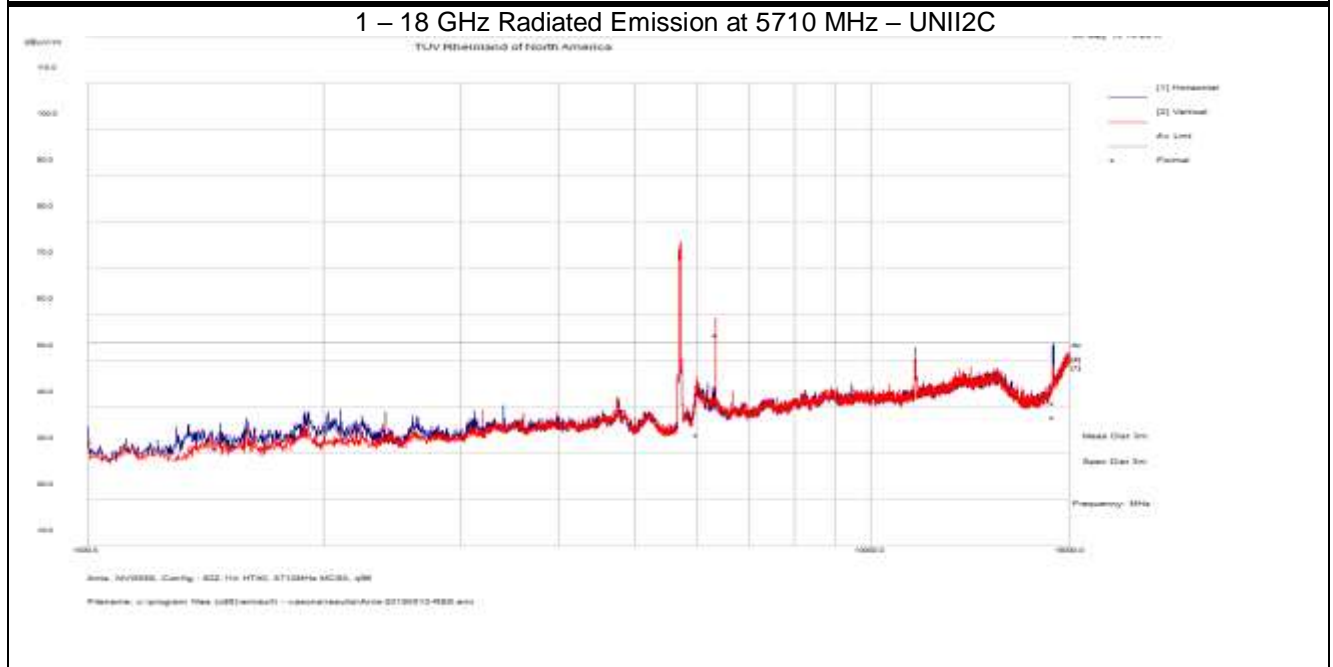
EUT Name	Wi-Fi Router	Date	May 8, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT40 at MCS0 / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO 3115	Performed by	Kerwinn Corpuz



Notes: 1. All emissions met restricted band limits.
 2. Emission over the limit is the fundamental and exempt from the limit.

SOP 1 Radiated Emissions Tracking # 31964172.001 Page 48 of 62

EUT Name	Wi-Fi Router	Date	May 8, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT40 at MCS0 / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO 3115	Performed by	Kerwinn Corpuz

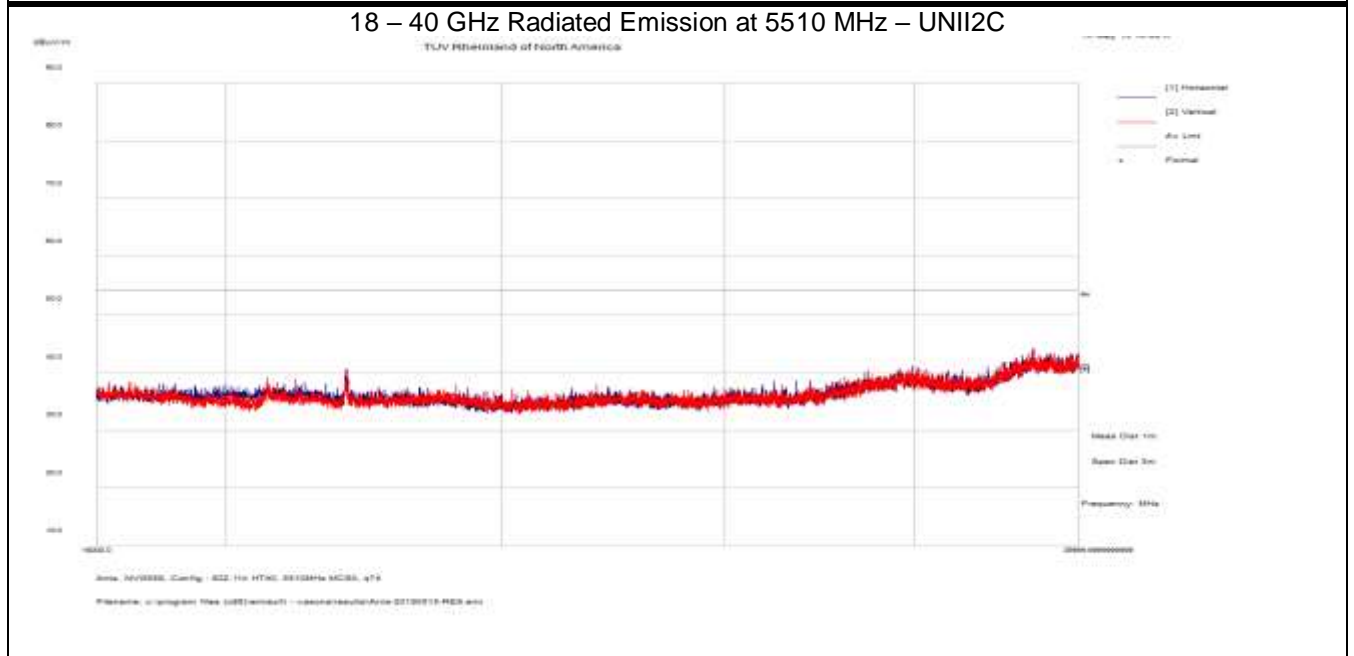


Notes: 1. All emissions met limits.
 2. Emission over the limit is the fundamental and exempt from the limit.

SOP 1 Radiated Emissions											Tracking # 31964172.001 Page 49 of 62	
EUT Name		Wi-Fi Router					Date		May 15, 2019			
EUT Model		NVG5X8AC					Temp / Hum in		23°C / 41%rh			
EUT Serial		M11839QW0022					Temp / Hum out		N/A			
EUT Config.		802.11n HT40 at MCS0 / All chains					Line AC		120 VAC / 60Hz			
Standard		CFR47 Part 15 Subpart E, RSS-247, RSS-GEN					RBW / VBW		1 MHz / 3 MHz			
Dist/Ant Used		1m – ComPower AHA-840					Performed by		Kerwinn Corpuz			
Freq.	Raw	Cbl	AF	Level	Det.	Pol.	Hght.	Azt	Limit	Margin	Result	
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
18 – 40 GHz Radiated Emission at 5510 MHz – UNII2C												
22016.86	37.20	7.70	-10.20	34.70	Ave	V	162	118	54.00	-19.30	Pass	
18 – 40 GHz Radiated Emission at 5550 MHz – UNII2C												
22176.11	47.10	7.60	-10.30	44.40	Ave	H	175	114	54.00	-9.60	Pass	
22199.12	51.60	7.60	-10.30	48.90	Ave	H	180	112	54.00	-5.10	Pass	
22227.89	44.20	7.60	-10.30	41.50	Ave	V	149	128	54.00	-12.50	Pass	
18 – 40 GHz Radiated Emission at 5710 MHz – UNII2C												
22881.25	65.39	7.67	-10.85	62.21	Pk	V	200	28	74.00	-11.79	Pass	
22879.72	53.90	7.70	-10.90	50.70	Ave	V	196	100	54.00	-3.30	Pass	
Spec Margin = Level – Limit, Level = Raw + Cable + AF ± Uncertainty												
AF= Amp Gain + ANT Factor												
Combined Standard Uncertainty $u_c(y) = \pm 4.52$ dB Expanded Uncertainty $U = ku_c(y)$ $k = 2$ for 95% confidence												
Note: All emissions met restricted band limits.												

SOP 1 Radiated Emissions Tracking # 31964172.001 Page 50 of 62

EUT Name	Wi-Fi Router	Date	May 15, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT40 at MCS0 / All chains	Line AC	120 VAC/60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	1m – ComPower AHA-840	Performed by	Kerwin Corpuz

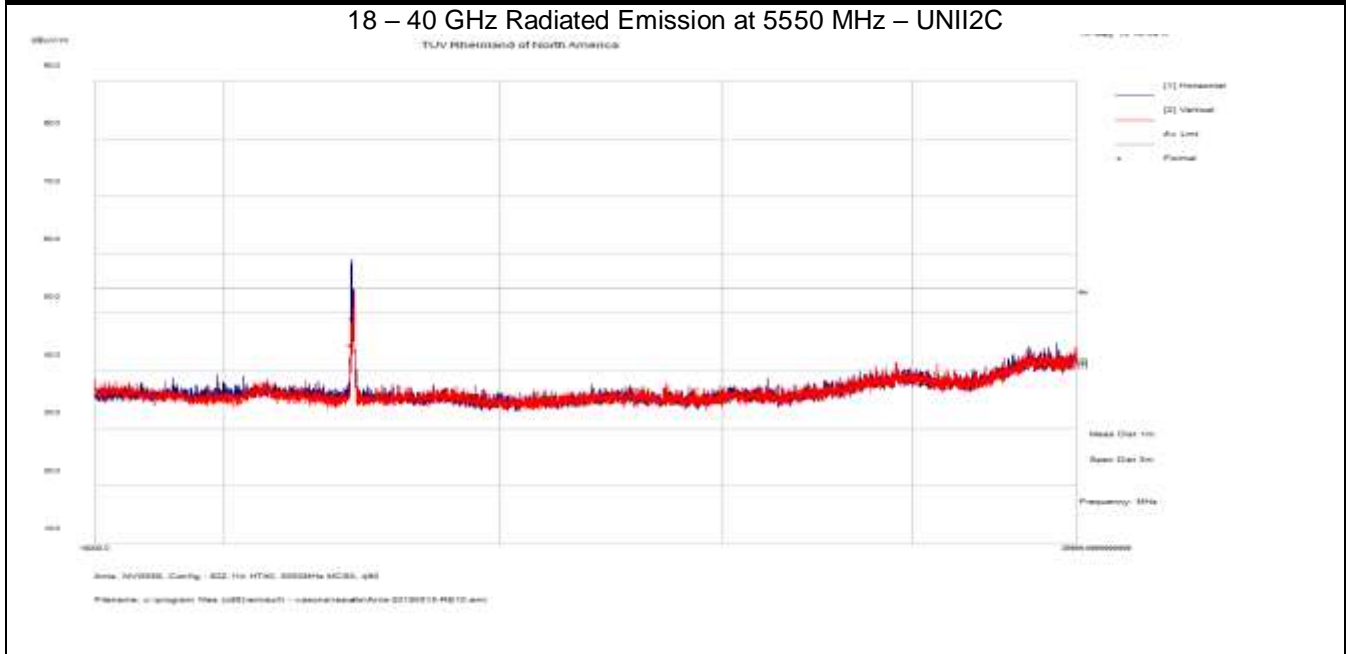


Notes: All emissions met restricted band limits.

SOP 1 Radiated Emissions

Tracking # 31964172.001 Page 51 of 62

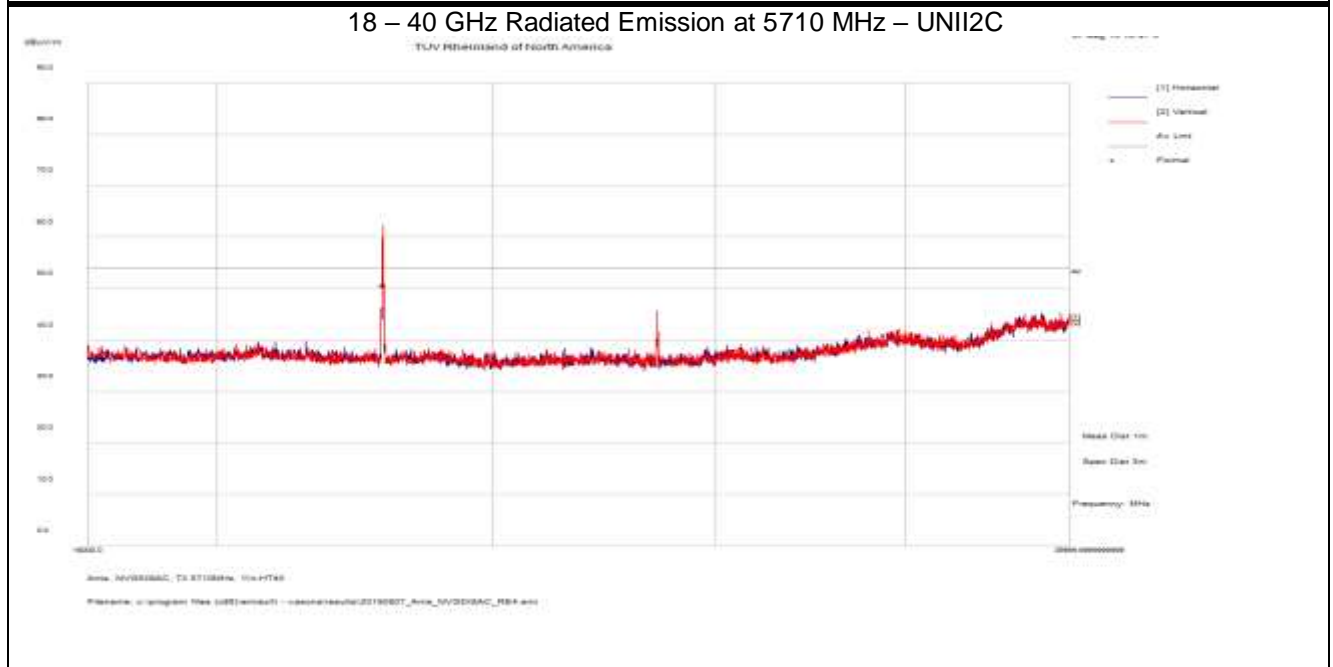
EUT Name	Wi-Fi Router	Date	May 15, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT40 at MCS0 / All chains	Line AC	120 VAC/60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	1m – ComPower AHA-840	Performed by	Kerwin Corpuz



Notes: All emissions met restricted band limits.

SOP 1 Radiated Emissions Tracking # 31964172.001 Page 52 of 62

EUT Name	Wi-Fi Router	Date	May 15, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT40 at MCS0 / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	1m – ComPower AHA-840	Performed by	Kerwinn Corpuz

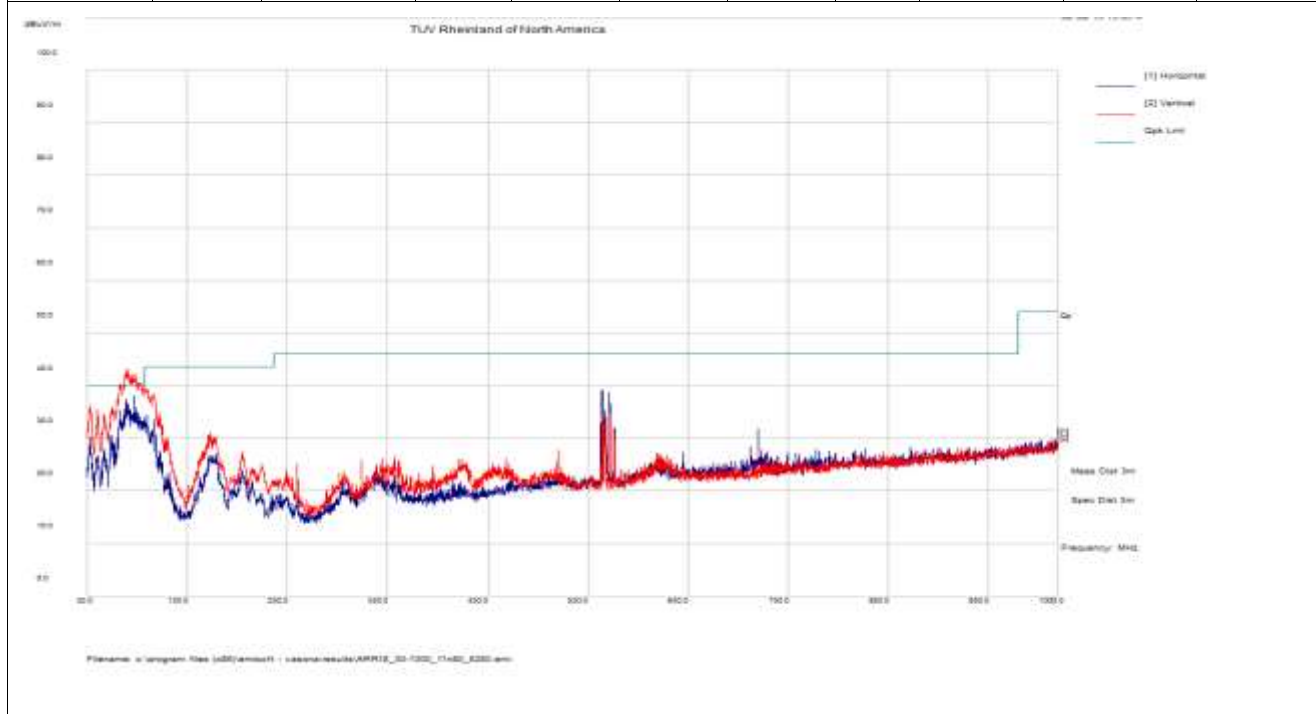


Notes: All emissions met restricted band limits.

SOP 1 Radiated Emissions		Tracking # 31964172.001 Page 53 of 62	
EUT Name	Wi-Fi Router	Date	Jul 8, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23° C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11ac VHT80 at MCS0 / All chains	Line AC / Freq	120 Vac / 60 Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	120 kHz/ 300 kHz
Dist/Ant Used	3m – JB3	Performed by	Colton Aliff

30 MHz – 1 GHz Transmit at 5290 MHz – UNII2A

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
70.63	58.29	0.75	-19.98	39.06	QP	V	105	272	40.00	-0.94
33.15	39.41	0.49	-8.54	31.36	QP	V	141	124	40.00	-8.64
40.37	43.34	0.57	-14.37	29.54	QP	V	108	58	40.00	-10.46
96.10	52.86	0.86	-19.12	34.60	QP	V	106	0	43.50	-8.90
544.38	26.07	2.24	-9.40	18.91	QP	H	134	220	46.00	-27.09
551.92	36.96	2.25	-9.30	29.91	QP	H	122	64	46.00	-16.09



Spec Margin = E-Field QP - Limit, E-Field QP = FIM QP+ Total CF ± Uncertainty

Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

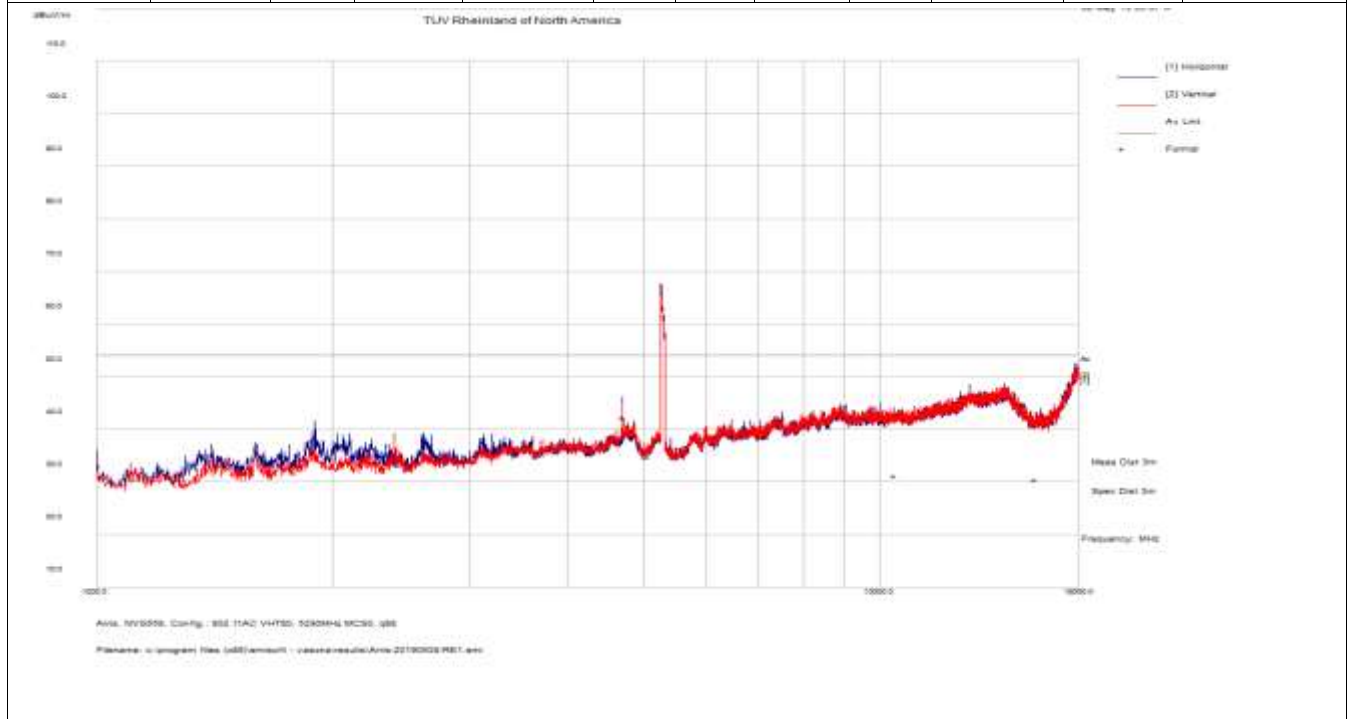
Note: 1. Worst case was observed at channel of 802.11ac VHT80, MCS0.

2. No significant emission were observed below 30MHz.

3. To reduce complexity and bulkiness of the report worst case plots are placed in the report.

SOP 1 Radiated Emissions						Tracking # 31964172.001 Page 54 of 62					
EUT Name			Wi-Fi Router			Date			May 7, 2019		
EUT Model			NVG5X8AC			Temp / Hum in			23°C / 40%rh		
EUT Serial			M11839QW0022			Temp / Hum out			N/A		
EUT Config.			802.11ac VHT80 at MCS0 / All chains			Line AC			120 VAC / 60Hz		
Standard			CFR47 Part 15 Subpart E, RSS-247, RSS-GEN			RBW / VBW			1 MHz / 3 MHz		
Dist/Ant Used			3m – EMCO 3115			Performed by			Kerwinn Corpuz		

Freq.	Raw	Cbl	AF	Level	Det.	Pol.	Hght.	Azt	Limit	Margin	Result
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB	
1 – 18 GHz Radiated Emission at 5290 MHz – UNII2A											
4702.12	62.67	3.50	-23.85	42.32	Ave	H	121	262	54.00	-11.68	Pass
15843.84	43.23	6.49	-19.32	30.40	Ave	H	108	115	54.00	-23.60	Pass
10458.06	45.00	5.30	-19.08	31.22	Ave	V	121	3	54.00	-22.78	Pass



Spec Margin = Level – Limit, Level = Raw + Cable + AF ± Uncertainty

AF= Amp Gain + ANT Factor

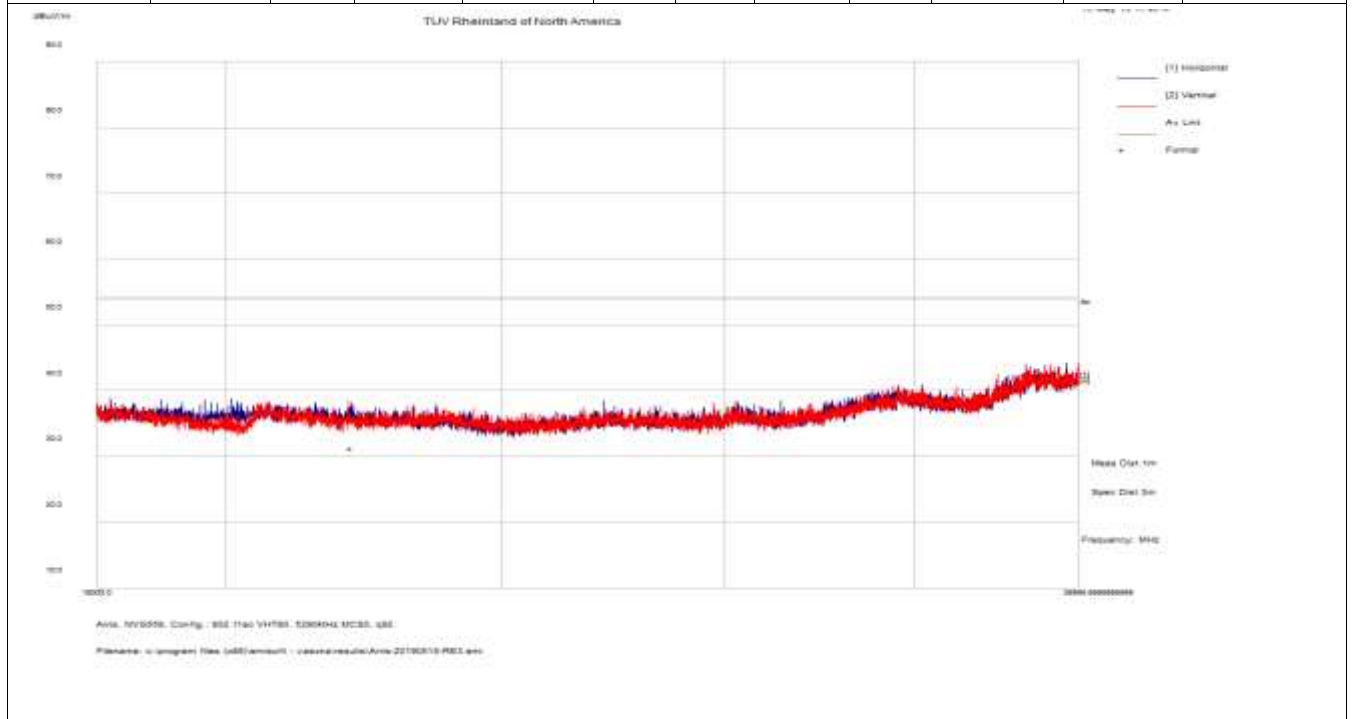
Combined Standard Uncertainty $u_c(y) = \pm 4.52$ dB Expanded Uncertainty $U = k u_c(y)$ $k = 2$ for 95% confidence

Note: 1. All emissions met restricted band limits.

2. Emission over the limit is the fundamental and exempt from the limit.

SOP 1 Radiated Emissions						Tracking # 31964172.001 Page 55 of 62					
EUT Name			Wi-Fi Router			Date			May 14, 2019		
EUT Model			NVG5X8AC			Temp / Hum in			23°C / 42%rh		
EUT Serial			M11839QW0022			Temp / Hum out			N/A		
EUT Comfit.			802.11ac VHT80 at MCS0 / All chains			Line AC			120 VAC / 60Hz		
Standard			CFR47 Part 15 Subpart E, RSS-247, RSS-GEN			RBW / VBW			1 MHz / 3 MHz		
Dist/Ant Used			1m – ComPower AHA-840			Performed by			Kerwinn Corpuz		

Freq.	Raw	Cbl	AF	Level	Det.	Pol.	Hght.	Azt	Limit	Margin	Result
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB	
18 – 40 GHz Radiated Emission at 5290 MHz – UNII2A											
22137.56	34.00	7.60	-10.30	31.30	Ave	V	116	180	54.00	-22.70	Pass

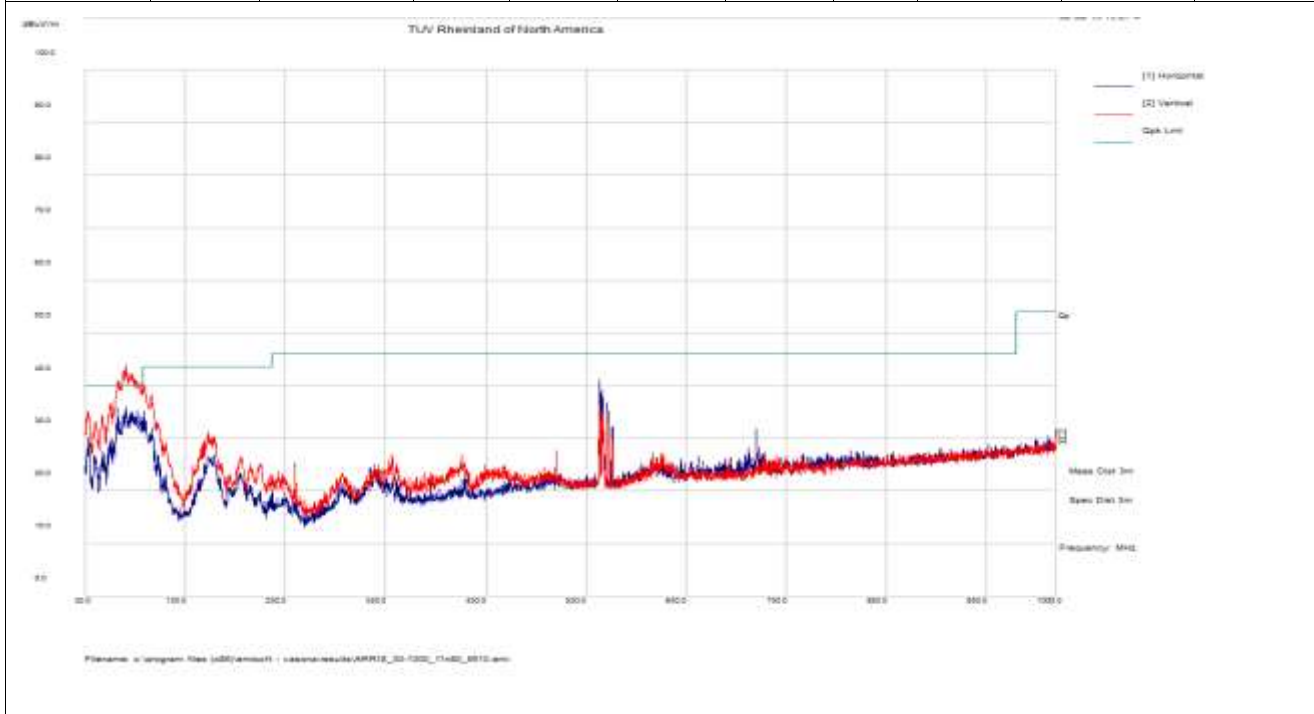


Spec Margin = Level – Limit, Level = Raw + Cable + AF ± Uncertainty
 AF= Amp Gain + ANT Factor
 Combined Standard Uncertainty $u_c(y) = \pm 4.52$ dB Expanded Uncertainty $U = k u_c(y)$ $k = 2$ for 95% confidence
 Note: All emissions met restricted band limits.

SOP 1 Radiated Emissions		Tracking # 31964172.001 Page 56 of 62	
EUT Name	Wi-Fi Router	Date	Jul 8, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23° C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11ac VHT80 at MCS0 / All chains	Line AC / Freq	120 Vac / 60 Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	120 kHz/ 300 kHz
Dist/Ant Used	3m – JB3	Performed by	Colton Aliff

30 MHz – 1 GHz Transmit at 5610 MHz – UNII2C

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
70.38	57.20	0.75	-19.99	37.96	QP	V	182	165	40.00	-2.04
32.44	38.49	0.49	-8.02	30.96	QP	V	110	154	40.00	-9.04
544.05	38.73	2.24	-9.40	31.57	QP	H	106	147	46.00	-14.43
96.65	51.79	0.86	-18.90	33.75	QP	V	113	246	43.50	-9.76
546.45	35.86	2.24	-9.40	28.70	QP	H	157	176	46.00	-17.30
551.70	37.34	2.25	-9.30	30.28	QP	H	114	56	46.00	-15.72

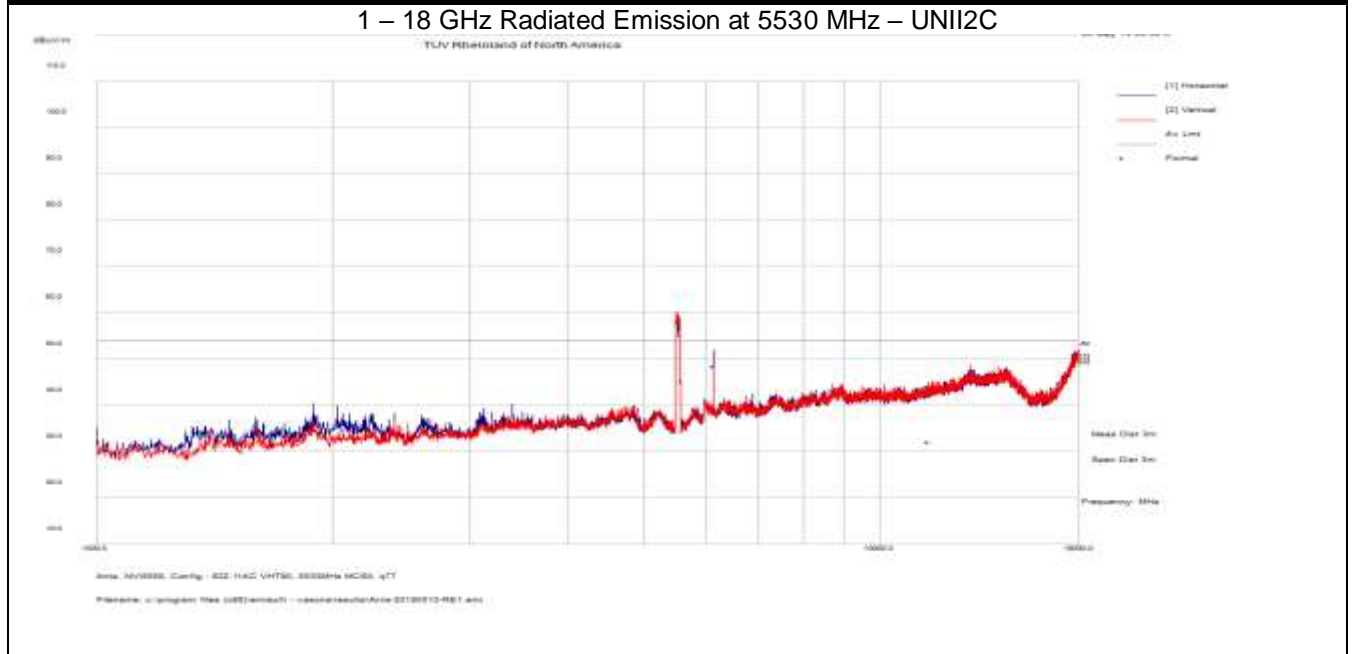


Spec Margin = E-Field QP - Limit, E-Field QP = FIM QP+ Total CF ± Uncertainty
 Total CF= AF+ Cable Loss AF= Antenna factor + Preamp
 Note: 1. Worst case was observed at mid channel of 802.11ac VHT80, MCS0.
 2. No significant emission were observed below 30MHz.
 3. To reduce complexity and bulkiness of the report worst case plots are placed in the report.

SOP 1 Radiated Emissions											Tracking # 31964172.001 Page 57 of 62	
EUT Name		Wi-Fi Router					Date		May 8, 2019			
EUT Model		NVG5X8AC					Temp / Hum in		23°C / 41%rh			
EUT Serial		M11839QW0022					Temp / Hum out		N/A			
EUT Config.		802.11ac VHT80 at MCS0 / All chains					Line AC		120 VAC / 60Hz			
Standard		CFR47 Part 15 Subpart E, RSS-247, RSS-GEN					RBW / VBW		1 MHz / 3 MHz			
Dist/Ant Used		3m – EMCO 3115					Performed by		Kerwinn Corpuz			
Freq.	Raw	Cbl	AF	Level	Det.	Pol.	Hght.	Azt	Limit	Margin	Result	
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
1 – 18 GHz Radiated Emission at 5530 MHz – UNII2C												
6144.41	66.84	3.90	-22.40	48.34	Ave	H	145	84	54.00	-5.66	Pass	
11547.19	44.43	5.50	-17.84	32.09	Ave	V	220	246	54.00	-21.91	Pass	
1 – 18 GHz Radiated Emission at 5610 MHz – UNII2C												
11222.99	44.59	5.45	-18.51	31.53	Ave	H	179	50	54.00	-22.47	Pass	
6013.37	49.95	3.90	-22.65	31.21	Ave	V	192	360	54.00	-22.80	Pass	
6233.26	66.10	4.00	-22.40	47.70	Ave	V	101	250	54.00	-6.30	Pass	
1 – 18 GHz Radiated Emission at 5690 MHz – UNII2C												
6006.06	58.03	3.90	-22.70	39.24	Ave	H	179	100	54.00	-14.77	Pass	
6322.21	69.90	4.00	-22.43	51.47	Ave	H	234	64	54.00	-2.53	Pass	
11401.18	47.02	5.30	-18.21	34.12	Ave	H	101	136	54.00	-19.89	Pass	
17925.20	41.13	6.90	-8.10	39.93	Ave	H	153	193	54.00	-14.07	Pass	
Spec Margin = Level – Limit, Level = Raw + Cable + AF ± Uncertainty												
AF= Amp Gain + ANT Factor												
Combined Standard Uncertainty $u_c(y) = \pm 4.52$ dB Expanded Uncertainty $U = k u_c(y)$ $k = 2$ for 95% confidence												
Note: All emissions met limits.												

SOP 1 Radiated Emissions Tracking # 31964172.001 Page 58 of 62

EUT Name	Wi-Fi Router	Date	May 8, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11ac VHT80 at MCS0 / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO 3115	Performed by	Kerwinn Corpuz

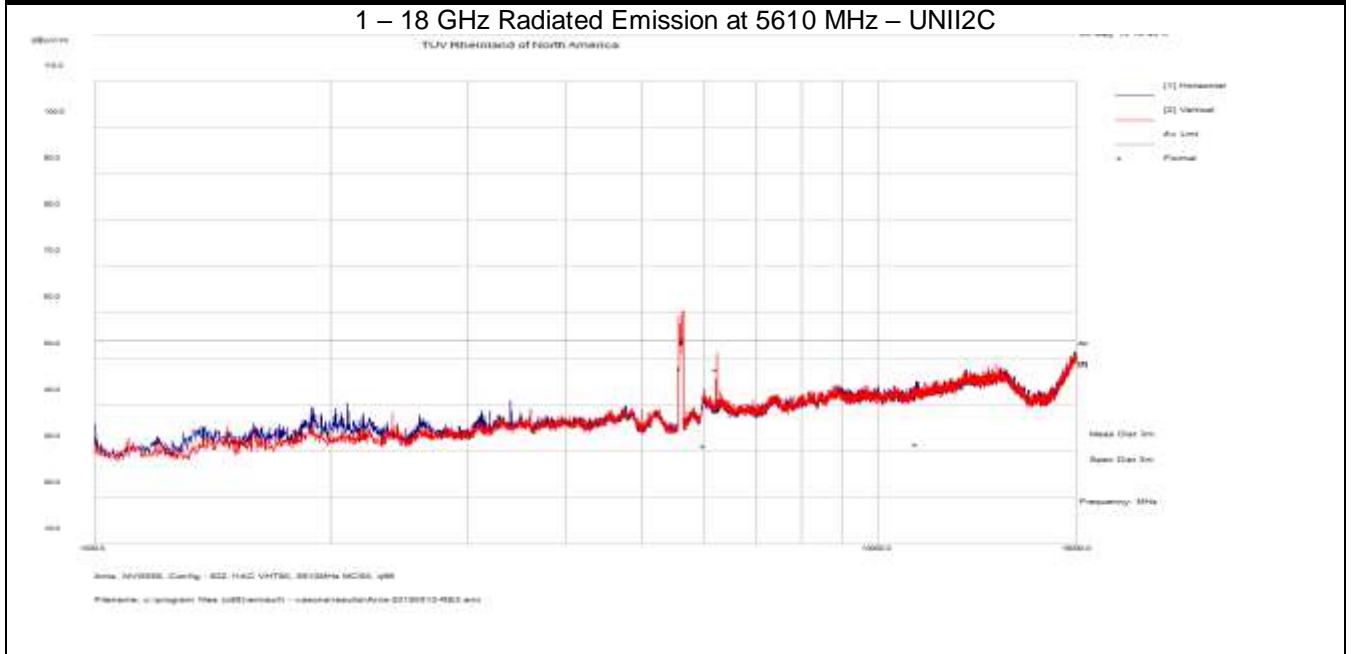


Notes: 1. All emissions met restricted band limits.
 2. Emission over the limit is the fundamental and exempt from the limit.

SOP 1 Radiated Emissions

Tracking # 31964172.001 Page 59 of 62

EUT Name	Wi-Fi Router	Date	May 8, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11ac VHT80 at MCS0 / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO 3115	Performed by	Kerwinn Corpuz

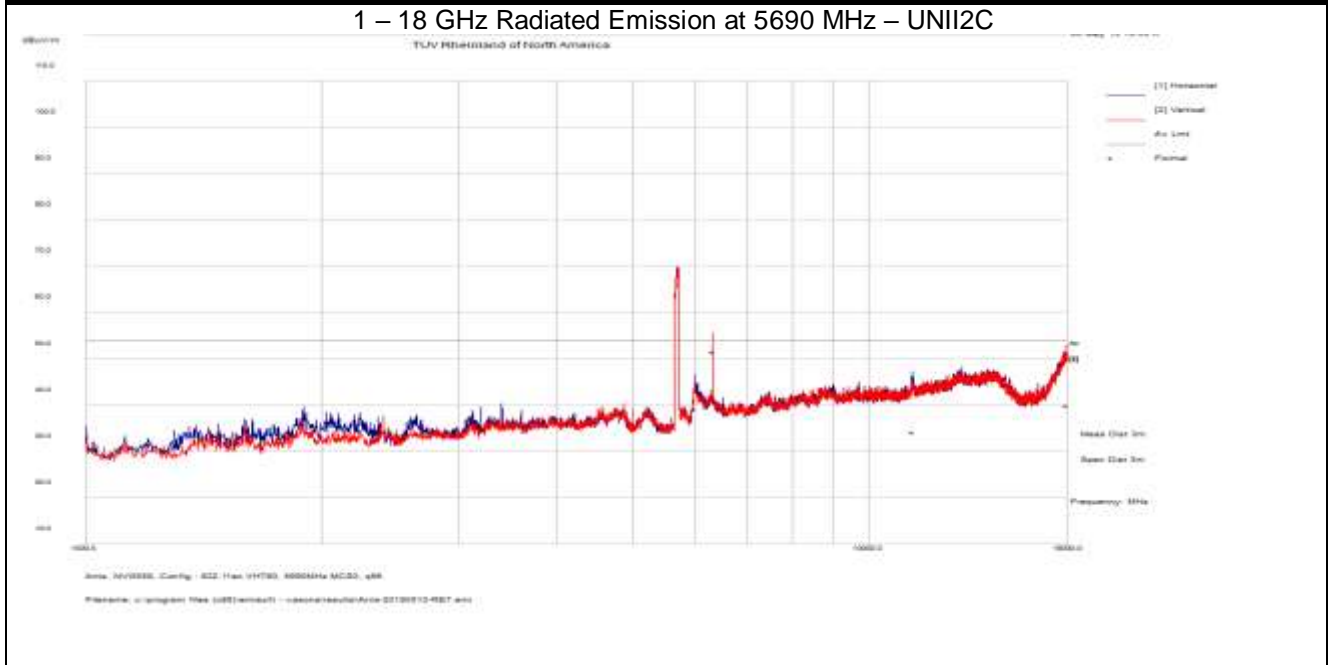


Notes: 1. All emissions met restricted band limits.
 2. Emission over the limit is the fundamental and exempt from the limit.

SOP 1 Radiated Emissions

Tracking # 31964172.001 Page 60 of 62

EUT Name	Wi-Fi Router	Date	May 8, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11ac VHT80 at MCS0 / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO 3115	Performed by	Kerwinn Corpuz

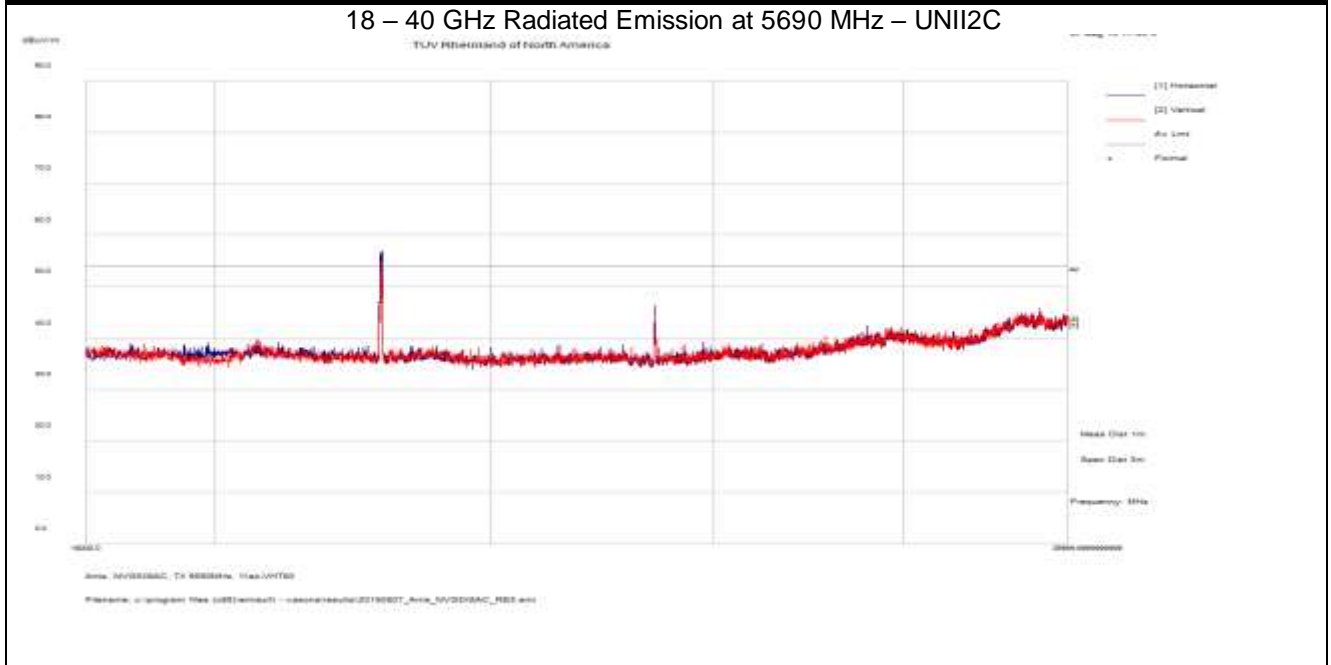


Notes: 1. All emissions met limits.
 2. Emission over the limit is the fundamental and exempt from the limit.

SOP 1 Radiated Emissions							Tracking # 31964172.001 Page 61 of 62					
EUT Name				Wi-Fi Router			Date		May 15, 2019			
EUT Model				NVG5X8AC			Temp / Hum in		23°C / 41%rh			
EUT Serial				M11839QW0022			Temp / Hum out		N/A			
EUT Config.				802.11ac VHT80 at MCS0 / All chains			Line AC		120 VAC / 60Hz			
Standard				CFR47 Part 15 Subpart E, RSS-247, RSS-GEN			RBW / VBW		1 MHz / 3 MHz			
Dist/Ant Used				1m – ComPower AHA-840			Performed by		Kerwinn Corpuz			
Freq.	Raw	Cbl	AF	Level	Det.	Pol.	Hght.	Azt	Limit	Margin	Result	
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
18 – 40 GHz Radiated Emission at 5690 MHz – UNII2C												
22901.41	50.30	7.70	-10.90	47.10	Ave	H	212	124	54.00	-6.90	Pass	
Spec Margin = Level – Limit, Level = Raw + Cable + AF ± Uncertainty												
AF= Amp Gain + ANT Factor												
Combined Standard Uncertainty $u_c(y) = \pm 4.52$ dB Expanded Uncertainty $U = ku_c(y)$ $k = 2$ for 95% confidence												
Note: All emissions met restricted band limits. High Channel (5690 MHz) found worse case emissions.												

SOP 1 Radiated Emissions Tracking # 31964172.001 Page 62 of 62

EUT Name	Wi-Fi Router	Date	May 15, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 41%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11ac VHT80 at MCS0 / All chains	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart E, RSS-247, RSS-GEN	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	1m – ComPower AHA-840	Performed by	Kerwinn Corpuz



Notes: All emissions met restricted band limits. High Channel (5690 MHz) found worse case emissions.

4.5 AC Conducted Emissions

Testing was performed in accordance with ANSI C63.4: 2014. These test methods are listed under the laboratory's A2LA Scope of Accreditation.

This test measures the levels emanating from the EUT's AC input port, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices.

The AC conducted emissions of equipment under test shall not exceed the values in CFR47 Part 15.207 and RSS GEN Sect. 8.8.

4.5.1 Test Methodology

A test program that controls instrumentation and data logging was used to automate the AC Power Line Conducted emission test procedure. The frequency range of interest was divided into sub-ranges such as to yield a frequency resolution of 9 kHz. Each phase and neutral of the AC power line were measured with respect to ground. Measurements were performed using a set of 50µH / 50Ω LISNs.

Testing is performed in Lab 5. The setup photographs clearly identify which site was used. The vertical ground plane used in the semi-anechoic chamber is a 2m x 2m solid aluminum frame and panel, and it is bonded to the horizontal ground plane.

In the case of tabletop equipment, the EUT is placed on a 1.0m x 1.5m non-conductive table 80cm above the ground plane and 40cm from a vertical ground reference plane. The rear of the EUT was positioned flush with the backside of the table and directly over the LISNs. The power and I/O cables were routed over the edge of the table and bundled approximately 40cm from the ground plane. Support equipment was powered from a separate LISN.

4.5.1.1 Deviations

There were no deviations from this test methodology.

4.5.2 Test Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

The EUT uses the same radio chip for all U-NII bands.

Test data were extracted from Report Number 31962243.001 (U-NII-1).

Table 13: AC Conducted Emissions – Test Results

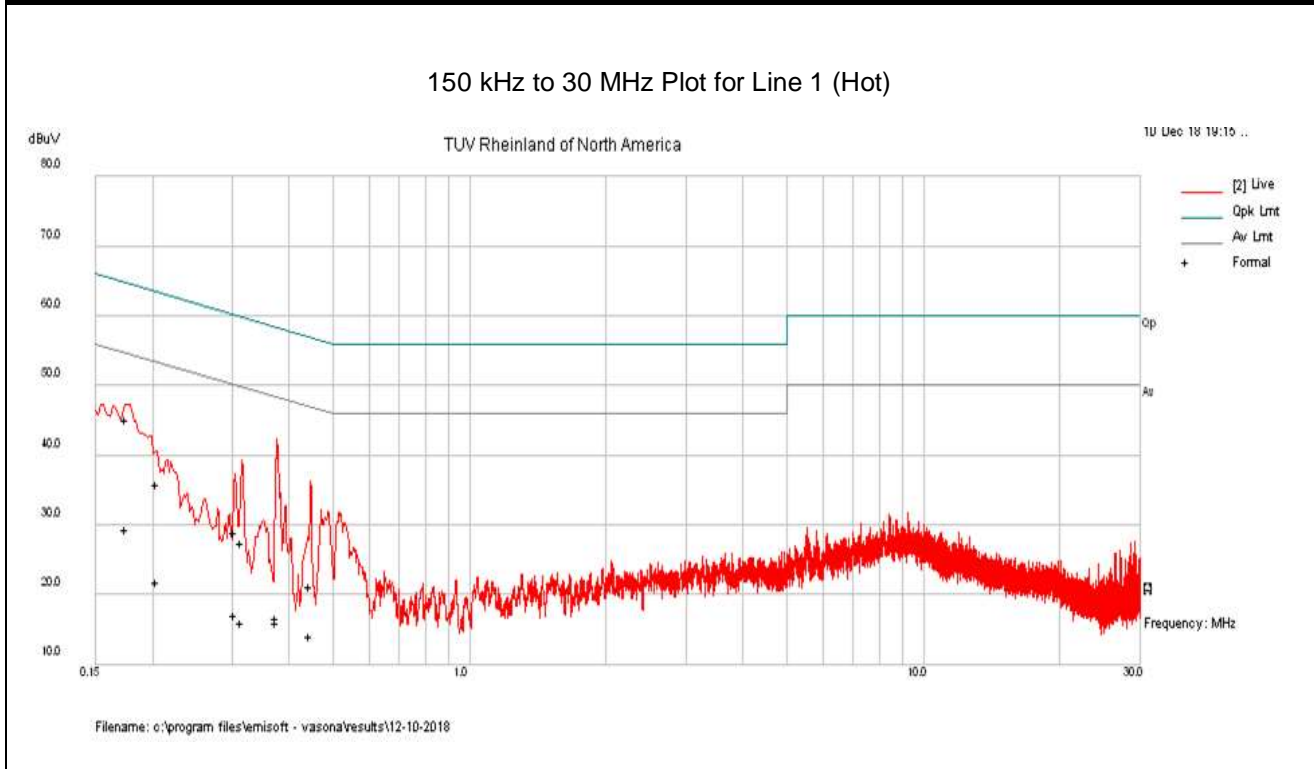
Test Date: December 10, 2018		Tested By: Abraham Avalos
Antenna Type: Patch		Power Level: See Test Plan
AC Power: 120 Vac/60 Hz		Configuration: Tabletop
Ambient Temperature: 22° C		Relative Humidity: 41% RH
Configuration	Frequency Range	Test Result
Line 1 (Hot)	0.15 to 30 MHz	Pass
Line 2 (Neutral)	0.15 to 30 MHz	Pass

SOP 2 Conducted Emissions						Tracking # 31964172.001 Page 1 of 4			
EUT Name		Wi-Fi Router			Date		December 10, 2018		
EUT Model		NVG5X8AC			Temp / Hum in		22° C / 41% rh		
EUT Serial		M11839QW0022			Temp / Hum out		N/A		
EUT Config.		802.11a TX			Line AC / Freq		120Vac/60Hz		
Standard		CFR47 Part 15.207 and RSS Gen			RBW / VBW		9 kHz / 30 kHz		
Lab/LISN		Lab #5 /Com-Power, Line 1			Performed by		Abraham Avalos		
Frequency	Raw	Limiter	Ins. Loss	Level	Detector	Line	Limit	Margin	Result
MHz	dBuV	dB	dB	dBuV			dBuV	dB	
0.174	35.21	9.82	0.05	45.08	QP	Live	64.75	-19.67	Pass
0.174	19.47	9.82	0.05	29.34	Ave	Live	54.75	-25.41	Pass
0.204	25.95	9.83	0.04	35.82	QP	Live	63.44	-27.62	Pass
0.204	11.97	9.83	0.04	21.84	Ave	Live	53.44	-31.60	Pass
0.303	19.03	9.83	0.03	28.89	QP	Live	60.15	-31.26	Pass
0.303	7.14	9.83	0.03	17.00	Ave	Live	50.15	-33.15	Pass
0.315	17.52	9.83	0.03	27.38	QP	Live	59.85	-32.47	Pass
0.315	6.07	9.83	0.03	15.93	Ave	Live	49.85	-33.92	Pass
0.376	6.06	9.84	0.03	15.93	QP	Live	58.36	-42.43	Pass
0.376	6.72	9.84	0.03	16.59	Ave	Live	48.36	-31.77	Pass
0.445	11.24	9.84	0.03	21.11	QP	Live	56.96	-35.85	Pass
0.445	4.29	9.84	0.03	14.16	Ave	Live	46.96	-32.80	Pass
Spec Margin = QP./Ave. - Limit, ± Uncertainty									
Combined Standard Uncertainty $u_c(y) = \pm 1.2$ dB Expanded Uncertainty $U = k u_c(y)$ $k = 2$ for 95% confidence									
Notes: The EUT was set as the tabletop equipment.									

SOP 2 Conducted Emissions

Tracking # 31964172.001 Page 2 of 4

EUT Name	Wi-Fi Router	Date	December 10, 2018
EUT Model	NVG5X8AC	Temp / Hum in	22° C / 41% rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11a TX	Line AC / Freq	120Vac/60Hz
Standard	CFR47 Part 15.207 and RSS Gen	RBW / VBW	9 kHz / 30 kHz
Lab/LISN	Lab #5 /Com-Power, Line 1	Performed by	Abraham Avalos



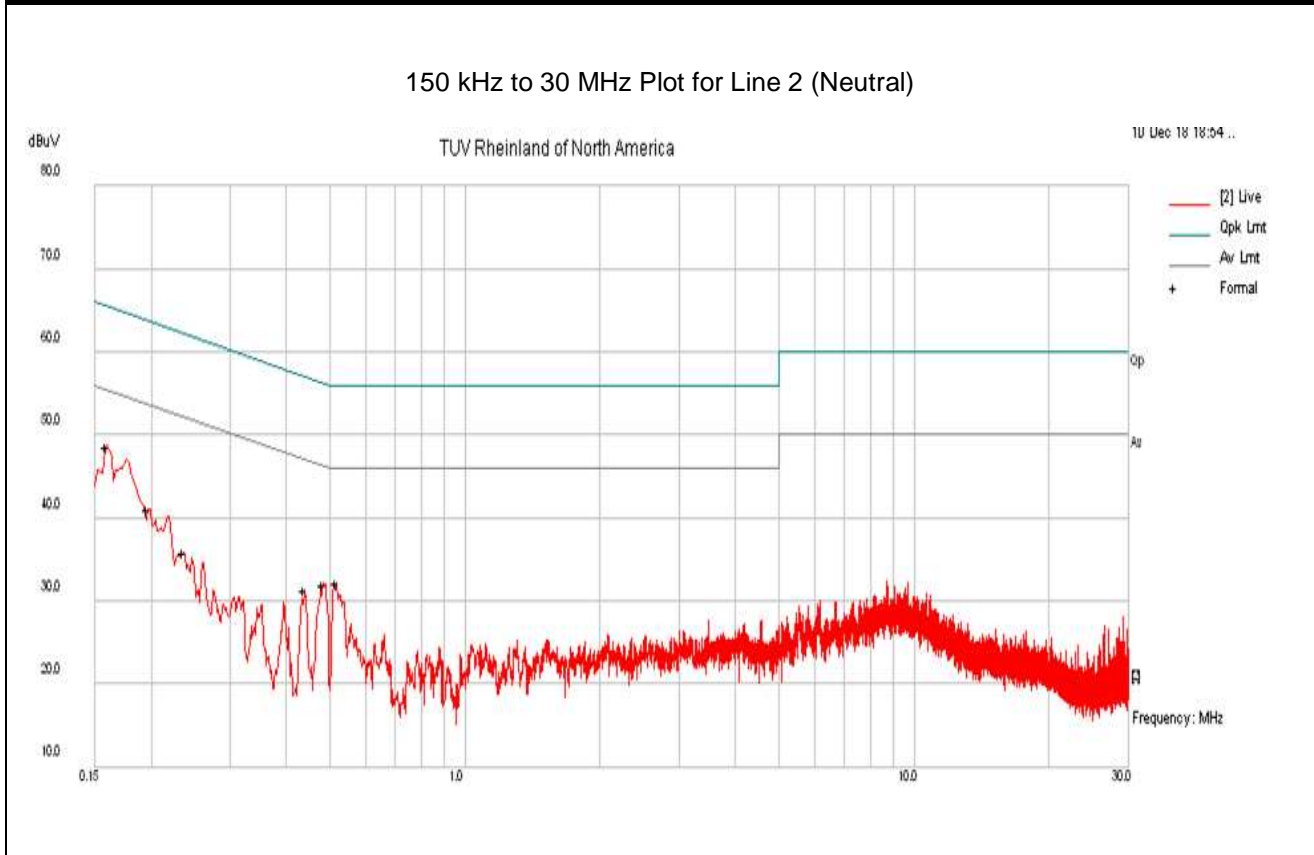
Note: Met FCC Class B limit.

SOP 2 Conducted Emissions						Tracking # 31964172.001 Page 3 of 4				
EUT Name	Wi-Fi Router					Date	December 10, 2018			
EUT Model	NVG5X8AC					Temp / Hum in	22° C / 41% rh			
EUT Serial	M11839QW0022					Temp / Hum out	N/A			
EUT Config.	802.11a TX					Line AC / Freq	120Vac/60Hz			
Standard	CFR47 Part 15.207 and RSS Gen					RBW / VBW	9 kHz / 30 kHz			
Lab/LISN	Lab #5 /Com-Power, Line 1					Performed by	Abraham Avalos			
Frequency	Raw	Limiter	Ins. Loss	Level	Detector	Line	Limit	Margin	Result	
MHz	dBuV	dB	dB	dBuV			dBuV	dB		
0.159	36.16	9.82	0.05	46.03	QP	Neutral	65.50	-19.47	Pass	
0.159	18.33	9.82	0.05	28.20	Ave	Neutral	55.50	-27.30	Pass	
0.197	29.74	9.83	0.04	39.60	QP	Neutral	63.75	-24.14	Pass	
0.197	17.45	9.83	0.04	27.32	Ave	Neutral	53.75	-26.43	Pass	
0.236	23.35	9.83	0.04	33.22	QP	Neutral	62.24	-29.02	Pass	
0.236	8.27	9.83	0.04	18.14	Ave	Neutral	52.24	-34.10	Pass	
0.440	18.71	9.84	0.03	28.58	QP	Neutral	57.07	-28.49	Pass	
0.440	10.72	9.84	0.03	20.59	Ave	Neutral	47.07	-26.47	Pass	
0.483	19.76	9.84	0.03	29.63	QP	Neutral	56.29	-26.66	Pass	
0.483	11.85	9.84	0.03	21.72	Ave	Neutral	46.29	-24.57	Pass	
0.518	20.13	9.84	0.03	30.00	QP	Neutral	56.00	-26.00	Pass	
0.518	13.74	9.84	0.03	23.61	Ave	Neutral	46.00	-22.39	Pass	
Spec Margin = QP./Ave. - Limit, ± Uncertainty										
Combined Standard Uncertainty $u_c(y) = \pm 1.2$ dB Expanded Uncertainty $U = k u_c(y)$ $k = 2$ for 95% confidence										
Notes: The EUT was set as the tabletop equipment.										

SOP 2 Conducted Emissions

Tracking # 31964172.001 Page 4 of 4

EUT Name	Wi-Fi Router	Date	December 10, 2018
EUT Model	NVG5X8AC	Temp / Hum in	22° C / 41% rh
EUT Serial	P M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11a TX	Line AC / Freq	120Vac/60Hz
Standard	CFR47 Part 15.207 and RSS Gen	RBW / VBW	9 kHz / 30 kHz
Lab/LISN	Lab #5 /Com-Power, Line 1	Performed by	Abraham Avalos



Note: Met FCC Class B Limit.

4.6 Frequency Stability

In accordance with 47 CFR Part 15.407(g) and RSS GEN Sect. 6.11 the frequency stability of U-NII devices must be such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

Per 47 CFR Part 15.31 (e) intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery

4.6.1 Test Methodology

The manufacturer of the equipment is responsible for ensuring that the frequency stability is such that emissions are always maintained within the band of operation under all conditions. This test performs according to ANSI C63.10-2013 Section 6.8

4.6.2 Manufacturer Declaration

Arris International declares that the NVG5X8AC WiFi Module is compliant to CFR47 Part 15.31(e), 15.407(g) and RSS GEN Sect. 6.11 requirements. The NVG5X8AC maintains the fundamental emission within the bands of operation under all conditions of normal operation as specified in the user's manual.

5 Test Equipment List

5.1 Equipment List

Equipment	Manufacturer	Model #	Serial/Inst #	Last Cal mm/dd/yyyy	Next Cal mm/dd/yyyy
Loop Antenna	EMCO	6502	9110-2683	07/20/2017	07/20/2019
Bilog Antenna	Sunol Sciences	JB3	A020502	03/27/2018	03/27/2020
Horn Antenna	Sunol Sciences	3115	9211-3969	06/20/2019	06/20/2021
Antenna (18-40 GHz)	Com-Power	AHA-840	105005	05/26/2019	10/26/2019
Spectrum Analyzer	Rohde & Schwarz	FSL6	100169	02/16/2019	02/16/2020
Receiver	Agilent	N9038A	MY52260210	01/16/2019	01/16/2020
Spectrum Analyzer	Agilent	N9030A	MY52350885	10/26/2018	10/26/2019
EMI Receiver	Rohde & Schwarz	ESIB40	100180	09/20/2018	09/20/2019
Amplifier	Sonoma Instruments	310	185516	01/15/2019	01/15/2020
Amplifier	Miteq	TTA1800-30-HG	184252	01/15/2019	01/15/2020
Power Meter	Agilent	E4418B	MY45103902	01/17/2019	01/17/2020
Power Sensor	Hewlett Packard	8482A	US37292296	01/16/2019	01/16/2020
High Pass Filter	Wainwright	WHJE5-915.4-995- 4000-6055	001	01/15/2019	01/15/2020
Notch Filter	Micro-Tronics	BRM50703	011	01/15/2019	01/15/2020
Notch Filter	Micro-Tronics	BRM50716	003	01/15/2019	01/15/2020
Signal Generator	Anritsu	MG3694A	42803	03/20/2018	03/20/2020
Signal Generator	Rohde & Schwarz	SMF100A	1167.0000K02	07/10/2018	07/10/2020
Signal Generator	Rohde & Schwarz	SMBV100A	1407.6004K02	07/10/2018	07/10/2020
Power Sensors	Rohde & Schwarz	OSP120	1520.9010.02	01/18/2018	01/18/2020

* Calibration of equipment past due for re-calibration will be performed expeditiously. If any equipment is found to be out of tolerance at that time, affected customers will be notified accordingly.

Note: Equipment is characterized before use.

6 EMC Test Plan

6.1 Introduction

This section provides a description of the Equipment Under Test (EUT), configurations, operating conditions, and performance acceptance criteria. It is an overview of information provided by the manufacturer so that the test laboratory may perform the requested testing.

6.2 Customer

Table 14: Customer Information

Company Name	ARRIS International plc
Address	2500 Walsh Avenue
City, State, Zip	Santa Clara, CA 95051
Country	USA
Phone	1 (408) 235-5500
Fax	

Table 15: Technical Contact Information

Name	Wilson Wang
E-mail	wilson.wang@commscope.com
Phone	1 (408) 235-5500
Fax	

6.3 Equipment Under Test (EUT)

Table 16: EUT Specifications

EUT Specifications	
Dimensions	W: 2.875in (73mm) x D: 4.750in (121mm) x H: 1.188in (30mm)
AC Input	100-240V AC, 50 – 60 Hz
Environment	Indoor
Operating Temperature Range:	0 to 35 degrees C
Multiple Feeds:	<input type="checkbox"/> Yes and how many <input checked="" type="checkbox"/> No
Product Marketing Name (PMN)	WiFi Module
Hardware Version Identification Number (HVIN)	NVG5X8AC
Firmware Version Identification Number (FVIN)	
802.11-radio module	
Operating Mode	802.11a, 802.11n (HT20, HT40), 802.11ac (VHT20, VHT40, VHT80)
Transmitter Frequency Band	5.250 GHz – 5.350 GHz and 5.470 – 5.725 GHz, U-NII-2 band
Max. Rated Power Output	See Channel Planning Table.
Power Setting @ Operating Channel	See Channel Planning Table.
Antenna Type	Qty 8. 4 PCB antennas at 5.25-5.35 GHz and 5.47-5.725GHz. See Section 3.4.1 for details
Antenna Gain	See Section 3.4.1
Modulation Type	<input type="checkbox"/> AM <input type="checkbox"/> FM <input checked="" type="checkbox"/> DSSS <input checked="" type="checkbox"/> OFDM <input type="checkbox"/> Other describe:
Data Rate	802.11a: 4 Spatial Streams: 6, 9,12, 18, 24, 36, 48, 54 Mbps 802.11n HT20: 4 Spatial Streams: 26, 52, 78, 104, 156, 208, 234, 260 Mbps 802.11n HT40: 4 Spatial Streams: 54, 108, 162, 216, 324, 432, 486, 540 Mbps 802.11ac VHT20: 4 Spatial Streams: 26, 52, 78, 104, 156, 208, 234, 260, 312 Mbps 802.11ac VHT40: 4 Spatial Streams: 54, 108, 162, 216, 324, 432, 486, 540, 648, 720 Mbps 802.11ac VHT80: 4 Spatial Streams: 117, 234, 351, 468, 702, 936, 1053, 1170, 1404, 1560 Mbps

EUT Specifications	
TX/RX Chain (s)	MIMO (4x4)
Directional Gain Type	<input checked="" type="checkbox"/> Correlated <input checked="" type="checkbox"/> Beam-Forming <input type="checkbox"/> Other describe:
Type of Equipment	<input checked="" type="checkbox"/> Table Top <input type="checkbox"/> Wall-mount <input type="checkbox"/> Floor standing cabinet <input type="checkbox"/> Other:
Note: 1. All four chains will be on / transmitted at all time. 2. This report only documents the radio characteristics for 5250 – 5350 MHz and 5470 – 5725 MHz; UNII2 band.	

Table 17: EUT Channel Power Specifications

No.	Freq. (MHz)	Target Power Value dBm										
		Non-Beamforming Mode						Beamforming Mode				
		802.11a	802.11n HT20	802.11n HT40	802.11ac VHT20	802.11ac VHT40	802.11ac VHT80	802.11n HT20	802.11n HT40	802.11ac VHT20	802.11ac VHT40	802.11ac VHT80
Power Setting (q)												
52	5260	96	96		96			64		64		
54	5270			96		96			76		76	
58	5290						88					84
60	5300	96	95		95			63		63		
62	5310			79		79			76		76	
64	5320	80	81		81			63		63		
100	5500	76	77		77			62		62		
102	5510			74		74			74		74	
106	5530						77					77
118	5590			96		96			75		75	
120	5600	96	95		95			63		63		
122	5610						94					84
138	5690						96					85
142	5710			96		96			74		74	
144	5720	94	95		95			62		62		

Note: The adjusted power target values are updated at the evaluated frequencies.

Table 18: Interface Specifications

Interface Type	Cabled with what type of cable?	Is the cable shielded?	Maximum potential length of the cable?	Metallic (M), Coax (C), Fiber (F), or Not Applicable?
Ethernet	RJ45	<input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> Metric: 2 m	<input type="checkbox"/> N/A

Table 19: Supported Equipment

Equipment	Manufacturer	Model	Serial	Used for
Laptop	Dell	Latitude	CN-0C4708-48643-62C-1856	Setup EUT operating channel
WiFi Router	Arris	NVG568	M91846P10031	Used as station for beamforming mode.
Note: None.				

Table 20: Description of Sample used for Testing

Device	Serial	RF Connection	CFR47 Part 15.407
Wi-Fi Module	M11839QW0022	PCB Antenna	TX Emission, Radiated Band-Edge Out-of-Band Emission AC Conducted Emission
	M11839QW0031	Direct Connection	Max. RMS Power, Power Spectral Density, Occupied Bandwidth Out-of-Band Emission

Table 21: Description of Test Configuration used for Radiated Measurement.

Device	Antenna	Mode	Setup Photo (X-Axis)	Setup Photo (Y-Axis)	Setup Photo (Z-Axis)
Wi-Fi Router	FPCB	Transmit	N/A	EUT standing up	N/A
Note: EUT designed to operate on the upright (Y-Axis) position.					

6.4 Test Specifications

Testing requirements

Table 22: Test Specifications

Emissions and Immunity	
Rules & Regulations / Standard	Requirement
CFR 47 Part 15.407: 2018	All
RSS 247 Issue 2, 2017	All

END OF REPORT