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Report On

Application for Grant of Equipment Authorization of the
Inseego Corp.

M1000 Wireless Hotspot Modem

FCC CFR 47 Part 15 Subpart E §15.407

RSS-247 Issue 2: 2017

Report No. 72146272D

May 2019



REPORT ON	Radio Testing of the Inseego Corp. M1000 Wireless Hotspot Modem
TEST REPORT NUMBER	72146272D
PREPARED FOR	Inseego Corp. 9605 Scranton Road, Suite 300 San Diego, CA 92121 USA
CONTACT PERSON	Roman Olmos Senior Regulatory Engineer (858) 812-0606 roman.olmos@inseego.com
PREPARED BY	 Ferdinand S. Custodio Name Authorized Signatory Title: Senior EMC Test Engineer/Wireless Team Lead
APPROVED BY	 Alex Chang Name Authorized Signatory Title: Senior EMC/RF Wireless Test Engineer
DATED	May 10, 2019



Revision History

72146272D Inseego Corp. M1000 Wireless Hotspot Modem					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
05/10/2019	Initial Release				Alex Chang



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SECTION 1

REPORT SUMMARY

Radio Testing of the
Inseego Corp.
M1000 Wireless Hotspot Modem



1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Inseego Corp. Wireless Hotspot Modem to the requirements of FCC CFR 47 Part 15 Subpart E §15.407: 2017 and RSS-247 Issue 2: 2017.

Objective	To perform Radio Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Inseego Corp.
Product Trademark/Brand	Inseego
Product Marketing Name	5G MiFi 1000
Model Number(s)	M1000
FCC ID Number	PKRISGM1000
IC Number	3229A-M1000
Serial Number(s)	FF130219B00305 and FF130219B00294
Number of Samples Tested	2
Test Specification/Issue/Date	• FCC CFR 47 Part 15 Subpart E §15.407 (October 1, 2018). • RSS-247 Issue 2: 2017 - Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices. • RSS-Gen Issue 5 April 2018 - General Requirements for Compliance of Radio Apparatus. • 789033 D02 General UNII Test Procedures New Rules v02r01 (Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E) December 14, 2017. • ANSI C63.10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices • SAR Test Report Number SAR.20190423. Issued by RF Exposure Lab 802 N. Twin Oaks Valley Road, Suite 105, San Marcos, CA 92069 USA
Start of Test	March 11, 2019
Finish of Test	March 17, 2019
Name of Engineer(s)	Ferdinand Custodio
Related Document(s)	Supporting documents for EUT certification are separate exhibits.



1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 15 Subpart E §15.407 with cross-reference to the corresponding ISSED RSS standard is shown below.

Operation in the U-NII 1 and U-NII 3 Bands					
Section	FCC Part Sections(s)	ISED Sections	Test Description	Result	Comments/ Base Standard
2.1	§15.207(a)	RSS-Gen 8.8	Conducted Emissions	Compliant	-
2.2	§15.403(i)	-	26 dB Bandwidth	For reporting purpose only	
2.3		RSS-Gen 6.7	99% Emission Bandwidth	For reporting purpose only	
2.4	§15.407(e)	RSS-247 6.2.4.1	Minimum 6dB Bandwidth	Compliant	-
2.5	15.407(a)(1)(ii) and 15.407(a)(3)	RSS-247 6.2.1.1 and 6.2.4.1	Maximum Conducted Output Power	Compliant	-
2.6	15.407(a)(1)(ii) and 15.407(a)(3)	RSS-247 6.2.1.1 and 6.2.4.1	Maximum Power Spectral Density (PSD)	Compliant	-
2.7	§15.407(b)(1),(4) (i) and (7) / 15.209	RSS-247 6.2.1(2) and 6.2.4 (2)	Unwanted Emissions Measurement	Compliant	-
2.8	§15.407(b)(1),(4) (i) and (7) §15.209	RSS-247 6.2.1.2 and 6.2.4.2	Band-Edge Measurements	Compliant	-
2.9	§15.407(g)	RSS-Gen 6.11	Frequency Stability	Client Declaration	
-	-	RSS-247 6.2.2.2	Indoor Operation Only	Refer to the Label or User Manual	



1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) was a Inseego Corp. M1000 Wireless Hotspot Modem. The EUT is a Wireless Hotspot Modem supporting 3G/4G/5G/WLAN Technologies. The EUT is also equipped with a USB Port and AC Wall Power Adaptor.

1.3.2 EUT General Description

EUT Description	Wireless Hotspot Modem								
Product Marketing Name	5G MiFi 1000								
Model Number(s)	M1000								
Rated Voltage	3.8V, 4400mAh (Rechargeable Li-Ion battery pack) Input 100-240VAC, Output 5V (External AC-DC Power Adapter)								
Mode Verified	802.11a, 802.11n and 802.11ac in U-NII 1 and U-NII 3 bands								
Capability	WCDMA Band 2, 4, 5, LTE Band 2, 4, 5, 13, 66, 5G Band n261, and 802.11 a/b/g/n/ac								
Primary Unit (EUT)	☐ Production ☒ Pre-Production ☐ Engineering								
Antenna Gain	<table border="1"> <tr> <td>5170 MHz to 5250 MHz (Tx 0)</td><td>3.0 dBi</td></tr> <tr> <td>5170 MHz to 5250 MHz (Tx 1)</td><td>3.0 dBi</td></tr> <tr> <td>5735 MHz to 5835 MHz (Tx 0)</td><td>4.5 dBi</td></tr> <tr> <td>5735 MHz to 5835 MHz (Tx 1)</td><td>3.0 dBi</td></tr> </table>	5170 MHz to 5250 MHz (Tx 0)	3.0 dBi	5170 MHz to 5250 MHz (Tx 1)	3.0 dBi	5735 MHz to 5835 MHz (Tx 0)	4.5 dBi	5735 MHz to 5835 MHz (Tx 1)	3.0 dBi
5170 MHz to 5250 MHz (Tx 0)	3.0 dBi								
5170 MHz to 5250 MHz (Tx 1)	3.0 dBi								
5735 MHz to 5835 MHz (Tx 0)	4.5 dBi								
5735 MHz to 5835 MHz (Tx 1)	3.0 dBi								

1.3.3 Maximum Conducted Output Power

Mode	Frequency Range (MHz)	MIMO Mode		
		Output Power (dBm)	Output Power (mW)	EIRP Output Power (mW)
802.11a (U-NII 1)	5180-5240	16.9	48.98	97.7
802.11n (U-NII 1)	5180-5240	17.0	50.12	100
802.11ac (U-NII 1)	5180-5240	17.0	50.12	100
802.11a (U-NII 3)	5745-5825	16.9	48.98	138
802.11n (U-NII 3)	5745-5825	16.9	48.98	138
802.11ac (U-NII 3)	5745-5825	16.9	48.98	138



1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
A	Antenna Conducted Port Test Setup. Antenna ports (Tx 0 and Tx 1) connected directly to the TS8997 Test System.
B	Radiated Test Setup (Cabinet Spurious Emissions). Antenna port terminated with 50Ω load.
C	AC Conducted Emissions Test Setup. EUT transmitting via integral antenna. Normal configuration while in transmit mode.

1.4.2 EUT Exercise Software

The EUT is connected to the support laptop via USB running Qualcomm Radio Control Tool Version 4.0.00113. The software allows RF configuration of the EUT such as mode, modulation, channel, bandwidth, antenna designation and recommended TX power level.

1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
DELL	Support Laptop	LATITUDE E6440, Inseego property No. 00455
Inseego Corp.	USB Cable	Type A to Type C USB Cable. M/N: NOV7000USB
Inseego Corp.	External AC-DC Power Adapter	Model: SSW-2783, PN: 40123126.01 Input: 100-240VAC, 50/60Hz, 0.5A Output: 5VDC, max. 2A

1.4.4 Worst Case Configuration

Worst-case configuration used in this test report based from Maximum Conducted Output Power measurements:

U-NII-1 (5.15GHz to 5.25GHz)							
Band	Data Rate Setting	Mode	Channel Setting	Frequency	Antenna Setting	Tune Up (Max)	TX Setting
802.11a	54 Mbps	OFDM	36	5180	Tx0	14 dBm	8
			44	5220			8
			48	5240			8
			36	5180	Tx1	14 dBm	8
			44	5220			8
			48	5240			8

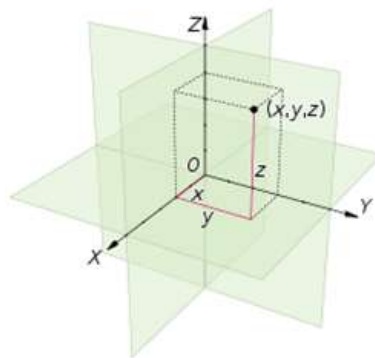


802.11n HT20	72.2 Mbps	MCS7	36	5180	Tx0	14 dBm	8
			44	5220			8
			48	5240			8
			36	5180	Tx1	14 dBm	8
			44	5220			8
			48	5240			8
802.11 ac20	21.7 Mbps	MCS2	36	5180	Tx0	14 dBm	10
			44	5220			10
			48	5240			10
			36	5180	Tx1	14 dBm	10
			44	5220			10
			48	5240			10
802.11n HT40	150 Mbps	MCS7	38(36)	5190	Tx0	14 dBm	6
			46(44)	5230			6
			38(36)	5190	Tx1	14 dBm	6
			46(44)	5230			6
802.11 ac40	200 Mbps	MCS9	38(36)	5190	Tx0	14 dBm	6
			46(44)	5230			6
			38(36)	5190	Tx1	14 dBm	6
			46(44)	5230			6
802.11 ac80	390 Mbps	MCS8	42(36)	5210	Tx0	14 dBm	8
			42(36)	5210	Tx1	14 dBm	8

U-NII-3 (5.725GHz to 5.85GHz)							
Band	Data Rate Setting	Mode	Channel Setting	Frequency	Antenna Setting	Tune Up (Max)	TX Setting
802.11a	9 Mbps	OFDM	149	5745	Tx0	14 dBm	12
			157	5785			12
			165	5825			12
			149	5745	Tx1	14 dBm	12
			157	5785			12
			165	5825			12
802.11n HT20	21.7 Mbps	MCS2	149	5745	Tx0	14 dBm	10
			157	5785			10
			165	5825			10
			149	5745	Tx1	14 dBm	10
			157	5785			10
			165	5825			10

802.11 ac20	21.7 Mbps	MCS2	149	5745	Tx0	14 dBm	10
			157	5785			10
			165	5825			10
			149	5745	Tx1	14 dBm	10
			157	5785			10
			165	5825			10
802.11n HT40	45 Mbps	MCS2	151(149)	5755	Tx0	14 dBm	9
			159(157)	5795			9
			151(149)	5755	Tx1	14 dBm	9
			159(157)	5795			9
802.11 ac40	135 Mbps	MCS6	151(149)	5755	Tx0	14 dBm	6
			159(157)	5795			6
			151(149)	5755	Tx1	14 dBm	6
			159(157)	5795			6
802.11 ac80	130 Mbps	MCS3	155(149)	5775	Tx0	14 dBm	10
			155(149)	5775	Tx1	14 dBm	10

The EUT is a portable device. For radiated measurements, X, Y and Z orientations were verified during initial prescan to verify the worst axis. No major variation in emissions observed between the three (3) orientations for cabinet spurious emissions. Verifications performed using "Y" configuration (flat on the table as designed).

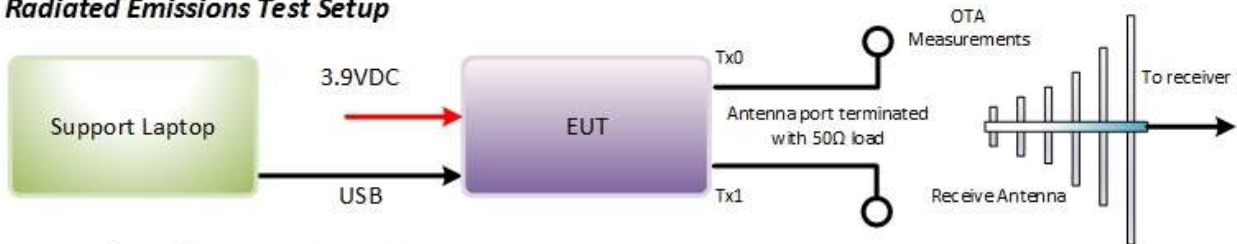


1.4.5 Simplified Test Configuration Diagram

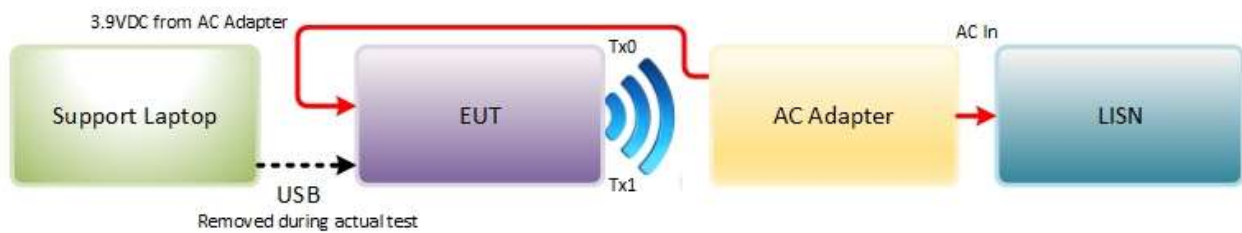
Antenna Port Conducted Test Setup



Radiated Emissions Test Setup



AC Conducted Emissions Test Setup





1.5 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.6 MODIFICATION RECORD

Description of Modification	Modification Fitted By	Date Modification Fitted
Serial Number FF130219B00305 and FF130219B00294		
N/A		

The table above details modifications made to the EUT during the test programme. The modifications incorporated during each test (if relevant) are recorded on the appropriate test pages.

1.7 TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

For conducted and radiated emissions the equipment under test (EUT) was configured to measure its highest possible emission level. This level was based on the maximized cable configuration from exploratory testing per ANSI C63.4-2014. The test modes were adapted according to the Operating Instructions provided by the manufacturer/client.

1.8 TEST FACILITY LOCATION

1.8.1 TÜV SÜD America Inc. (Mira Mesa)

10040 Mesa Rim Road, San Diego, CA 92121-2912 (32.901268,-117.177681). Phone: 858 678 1400 FAX: 858 546 0364

1.8.2 TÜV SÜD America Inc. (Rancho Bernardo)

16936 Via Del Campo, San Diego, CA 92127-1708 (33.018644,-117.092409). Phone: (858) 678-1400 Fax: (858) 546-0364.

1.9 TEST FACILITY REGISTRATION

1.9.1 FCC – Designation No.: US1146

TUV SUD America Inc. (San Diego), is an accredited test facility with the site description report on file and has met all the requirements specified in §2.948 of the FCC rules. The acceptance letter from the FCC is maintained in our files and the Designation is US1146.



1.9.2 Innovation, Science and Economic Development Canada (IC) Registration No.: 3067A-1 & 22806-1

The 10m Semi-anechoic chamber of TUV SUD America Inc. (San Diego Rancho Bernardo) has been registered by Certification and Engineering Bureau of Innovation, Science and Economic Development Canada for radio equipment testing with Registration No. 3067A-1.

The 3m Semi-anechoic chamber of TUV SUD America Inc. (San Diego Mira Mesa) has been registered by Certification and Engineering Bureau of Innovation, Science and Economic Development Canada for radio equipment testing with Registration No. 22806-1.

1.9.3 BSMI – Laboratory Code: SL2-IN-E-028R (US0102)

TUV Product Service Inc. (San Diego) is a recognized EMC testing laboratory by the BSMI under the MRA (Mutual Recognition Arrangement) with the United States. Accreditation includes CNS 13438 up to 6GHz.

1.9.4 NCC (National Communications Commission - US0102)

TUV SUD America Inc. (San Diego) is listed as a Foreign Recognized Telecommunication Equipment Testing Laboratory and is accredited to ISO/IEC 17025 (A2LA Certificate No.2955.13) which under APEC TEL MRA Phase 1 was designated as a Conformity Assessment Body competent to perform testing of equipment subject to the Technical Regulations covered under its scope of accreditation including RTTE01, PLMN01 and PLMN08 for TTE type of testing and LP002 for Low-Power RF Device type of testing.

1.9.5 VCCI – Registration No. A-0280 and A-0281

TUV SUD America Inc. (San Diego) is a VCCI registered measurement facility which includes radiated field strength measurement, radiated field strength measurement above 1GHz, mains port interference measurement and telecommunication port interference measurement.

1.9.6 RRA – Identification No. US0102

TUV SUD America Inc. (San Diego) is National Radio Research Agency (RRA) recognized laboratory under Phase I of the APEC Tel MRA.

1.9.7 OFCA – U.S. Identification No. US0102

TUV SUD America Inc. (San Diego) is recognized by Office of the Communications Authority (OFCA) under Appendix B, Phase I of the APEC Tel MRA.



SECTION 2

TEST DETAILS

Radio Testing of the
Inseego Corp.
M1000 Wireless Hotspot Modem

2.1 CONDUCTED EMISSIONS

2.1.1 Specification Reference

FCC CFR 47 Part 15, Clause 15.207(a)
RSS-Gen, Section 8.8

2.1.2 Standard Applicable

An intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN).

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

**Decreases with the logarithm of the frequency.*

2.1.3 Equipment Under Test and Modification State

Serial No: FF130219B00294/Test Configuration C

2.1.4 Date of Test/Initial of test personnel who performed the test

March 19, 2019 / FSC

2.1.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	23.0 °C
Relative Humidity	46.5 %
ATM Pressure	99.0 kPa

2.1.7 Additional Observations

- Only worst-case mode presented.
- Measurement was done using EMC32 V8.53 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.1.8 for sample computation.



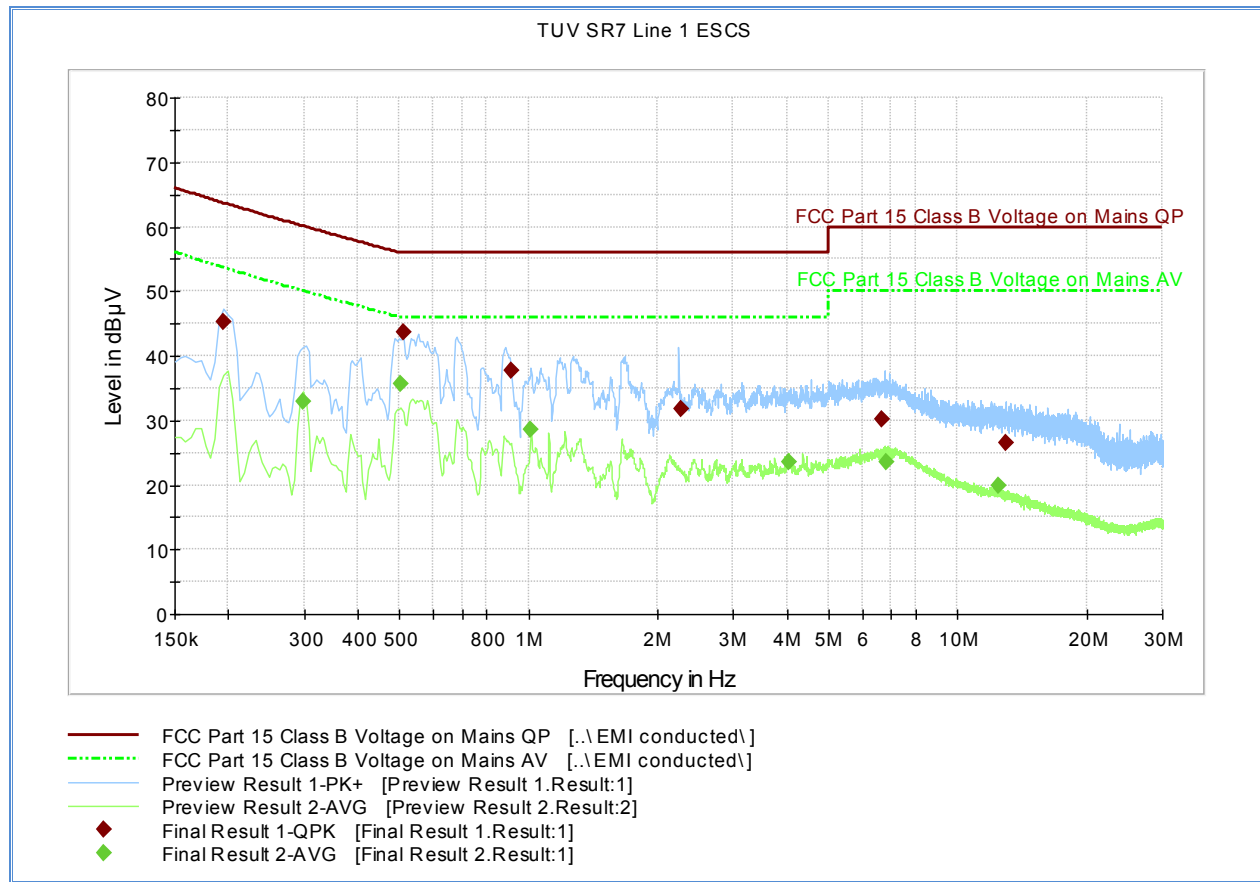
2.1.8 Sample Computation (Conducted Emission – Quasi Peak)

Measuring equipment raw measurement (db μ V) @ 150kHz			5.5
Correction Factor (dB)	Asset# 8607 (20 dB attenuator)	19.9	20.7
	Asset# 1177 (cable)	0.15	
	Asset# 1176 (cable)	0.35	
	Asset# 7568 (LISN)	0.30	
Reported QuasiPeak Final Measurement (db μ V) @ 150kHz			26.2

2.1.9 Test Results

Compliant. See attached plots and tables.

2.1.10 M1000 120VAC 60Hz (Line 1)



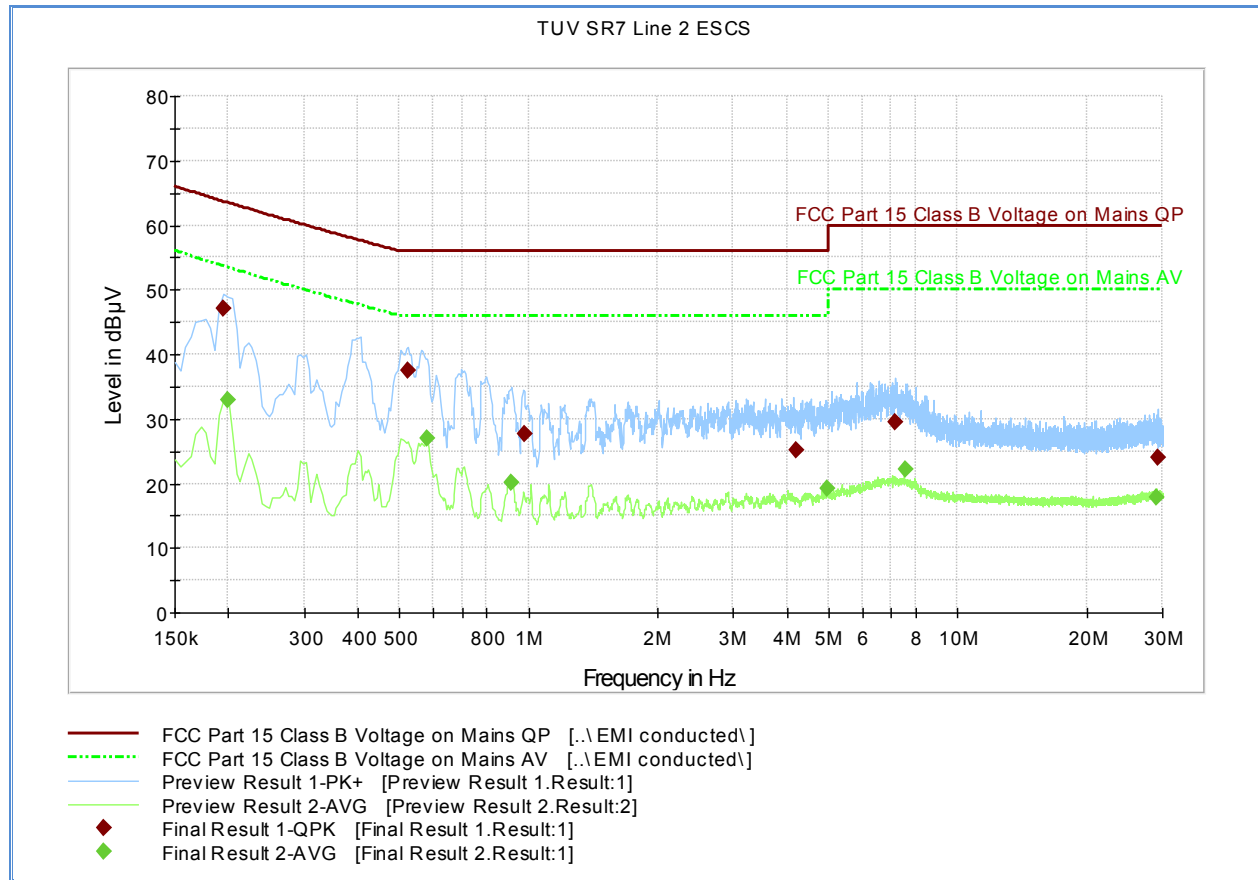
Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.195000	45.2	1000.0	9.000	Off	L1	20.2	18.4	63.7
0.510000	43.7	1000.0	9.000	Off	L1	20.1	12.3	56.0
0.915000	37.8	1000.0	9.000	Off	L1	20.2	18.2	56.0
2.260500	31.8	1000.0	9.000	Off	L1	20.6	24.2	56.0
6.688500	30.2	1000.0	9.000	Off	L1	20.5	29.8	60.0
13.002000	26.5	1000.0	9.000	Off	L1	20.7	33.5	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.298500	32.8	1000.0	9.000	Off	L1	20.2	17.2	50.0
0.505500	35.7	1000.0	9.000	Off	L1	20.1	10.3	46.0
1.014000	28.5	1000.0	9.000	Off	L1	20.1	17.5	46.0
4.056000	23.5	1000.0	9.000	Off	L1	20.5	22.5	46.0
6.846000	23.5	1000.0	9.000	Off	L1	20.5	26.5	50.0
12.502500	20.0	1000.0	9.000	Off	L1	20.7	30.0	50.0

2.1.11 M1000 120VAC 60Hz (Line 2)



Quasi Peak

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBμV)
0.195000	47.1	1000.0	9.000	Off	N	20.2	16.6	63.7
0.523500	37.4	1000.0	9.000	Off	N	20.1	18.6	56.0
0.982500	27.7	1000.0	9.000	Off	N	20.2	28.3	56.0
4.200000	25.0	1000.0	9.000	Off	N	20.4	31.0	56.0
7.143000	29.4	1000.0	9.000	Off	N	20.5	30.6	60.0
29.301000	24.1	1000.0	9.000	Off	N	20.7	35.9	60.0

Average

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBμV)
0.199500	33.0	1000.0	9.000	Off	N	20.2	20.5	53.5
0.582000	26.9	1000.0	9.000	Off	N	20.1	19.1	46.0
0.910500	20.1	1000.0	9.000	Off	N	20.1	25.9	46.0
4.960500	19.1	1000.0	9.000	Off	N	20.4	26.9	46.0
7.534500	22.1	1000.0	9.000	Off	N	20.5	27.9	50.0
28.981500	17.9	1000.0	9.000	Off	N	20.7	32.1	50.0



2.2 26 DB BANDWIDTH

2.2.1 Specification Reference

FCC CFR 47 Part 15, Clause 15.403(i)

2.2.2 Standard Applicable

(i) Emission bandwidth. For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement..

2.2.3 Test Methodology

Section II (C) (1) of 789033 D02 General UNII Test Procedures v02r01

2.2.4 Equipment Under Test and Modification State

Serial No: FF130219B00305 / Test Configuration A

2.2.5 Date of Test/Initial of test personnel who performed the test

March 14, 2019 / FSC

2.2.6 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.7 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	25.6 °C
Relative Humidity	46.7 %
ATM Pressure	98.7 kPa

2.2.8 Additional Observations

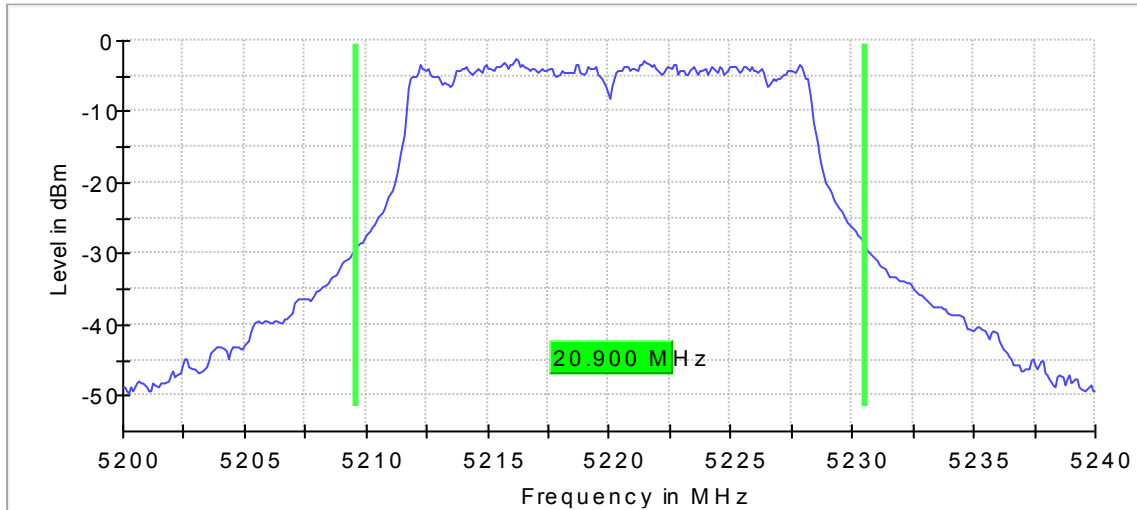
- This is a conducted test (Maximum conducted output power) using direct connection to TS8997 Test System. Path loss was programmed to the test system for both transmit chains.
- Test methodology is per FCC title 47 part 15 §15.407(a),(e), KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 D and ANSI C63.10-2013.



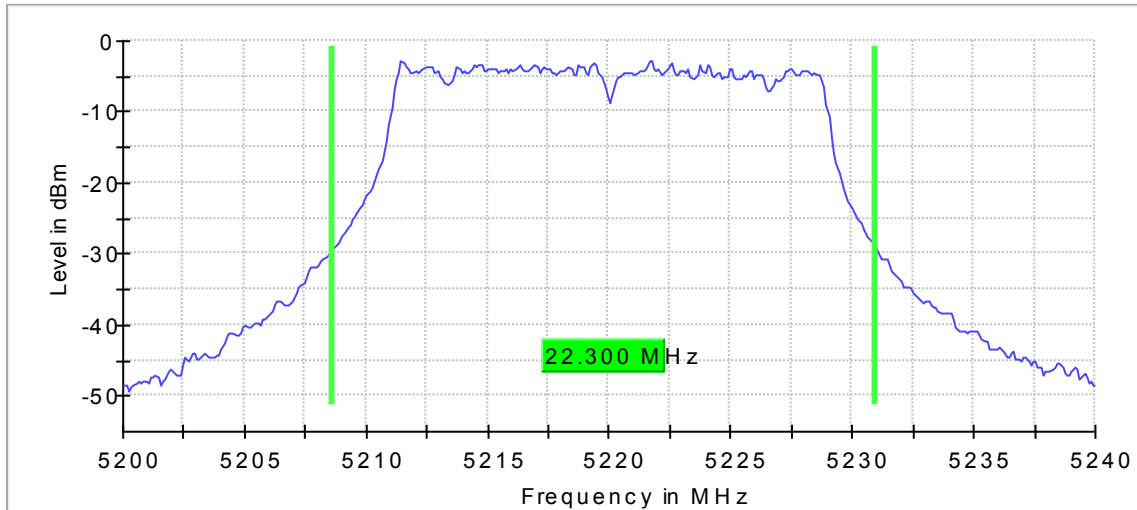
2.2.9 Summary Test Results (For reporting purpose only)

26 dB Bandwidth			
WiFi Mode	Low Channel	Middle Channel	High Channel
802.11a U-NII 1	21.80 MHz	20.90 MHz	20.70 MHz
802.11n U-NII 1 (20 MHz)	22.00 MHz	22.30 MHz	22.00 MHz
802.11n U-NII 1 (40 MHz)	43.83 MHz	-	43.23 MHz
802.11ac U-NII 1 (20 MHz)	21.30 MHz	21.40 MHz	21.10 MHz
802.11ac U-NII 1 (40 MHz)	44.43 MHz	-	42.48 MHz
802.11ac U-NII 1 (80 MHz)	-	94.00 MHz	-
802.11a U-NII 3	23.00 MHz	23.70 MHz	23.30 MHz
802.11n U-NII 3 (20 MHz)	21.30 MHz	21.90 MHz	21.80 MHz
802.11n U-NII 3 (40 MHz)	40.53 MHz	-	40.23 MHz
802.11ac U-NII 3 (20 MHz)	21.70 MHz	21.90 MHz	22.00 MHz
802.11ac U-NII 3 (40 MHz)	42.63 MHz	-	42.48 MHz
802.11ac U-NII 3 (80 MHz)	-	85.50 MHz	-

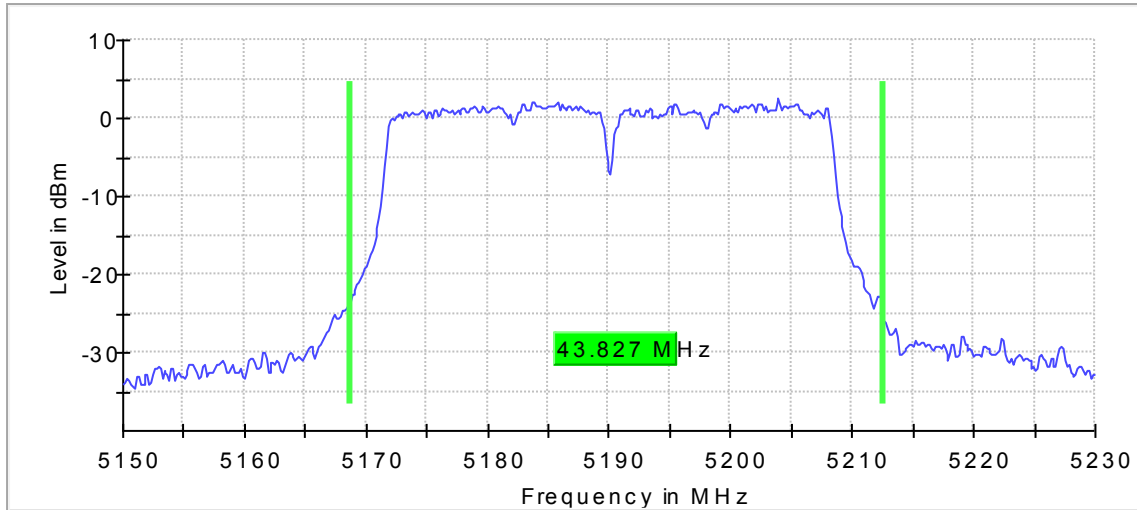
2.2.10 Sample Test Plots



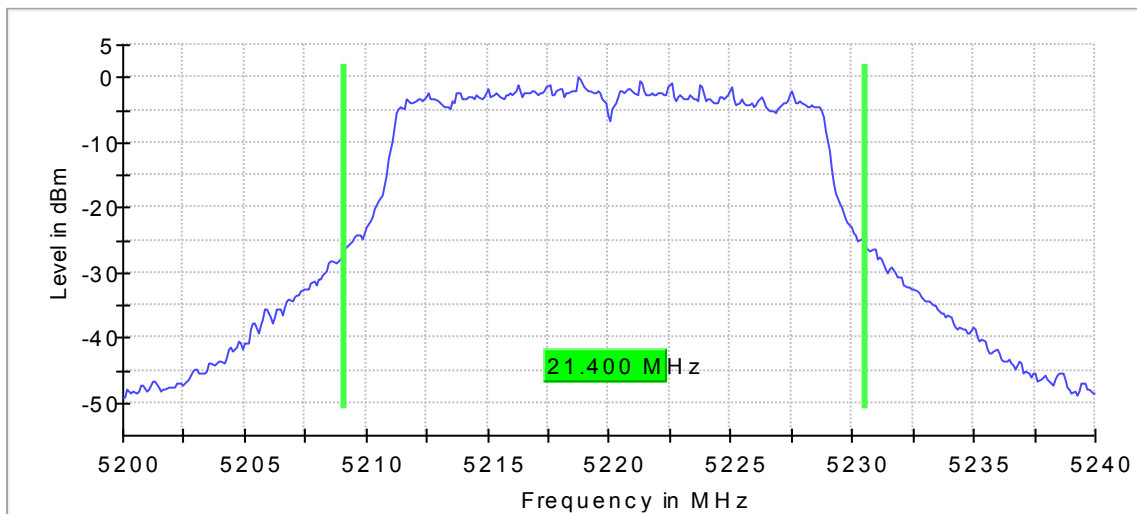
802.11a U-NII 1 Middle Channel



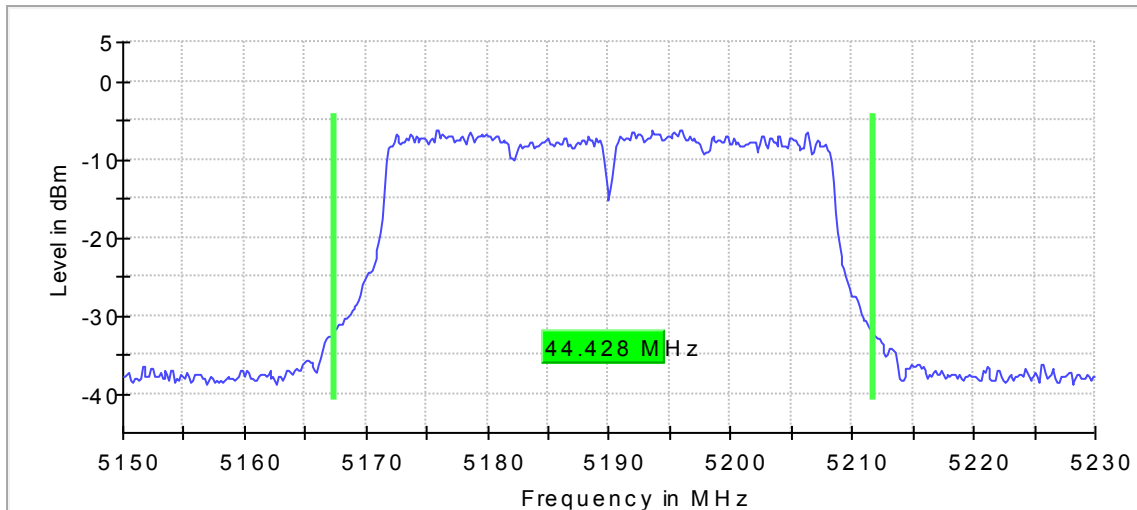
802.11n (20 MHz BW) U-NII 1 Middle Channel



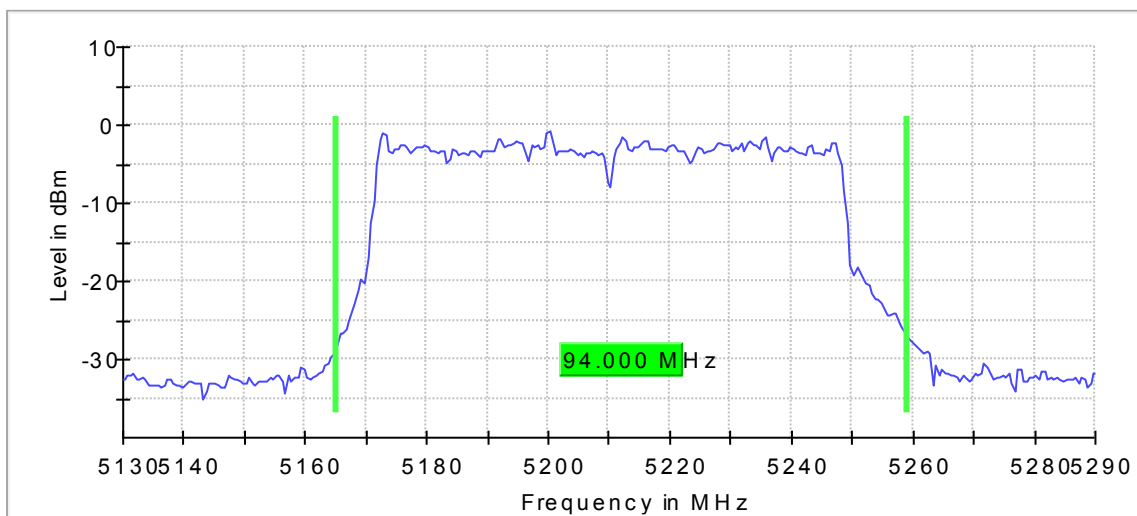
802.11n (40 MHz BW) U-NII 1 Low Channel



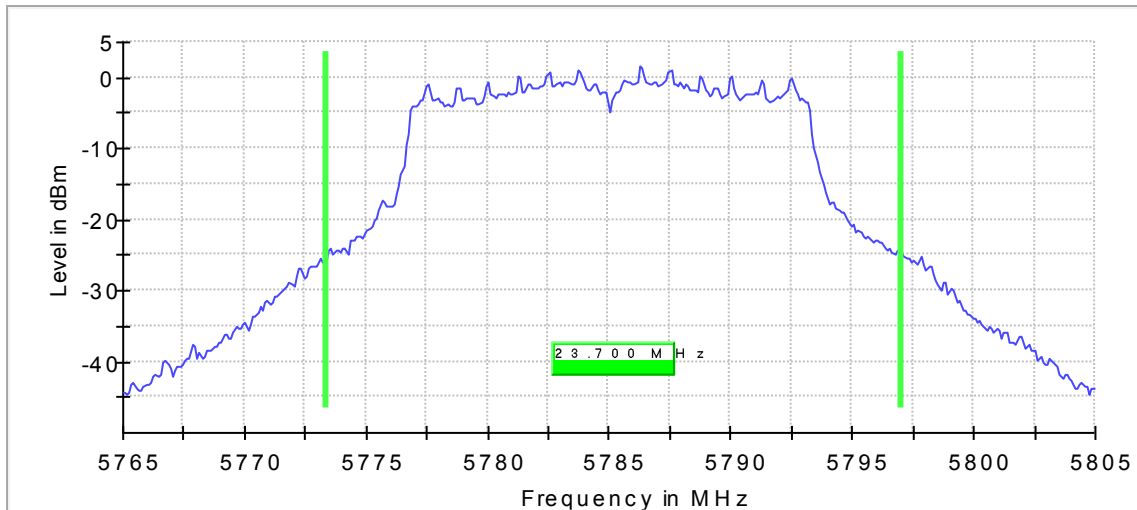
802.11ac (20 MHz BW) U-NII 1 Middle Channel



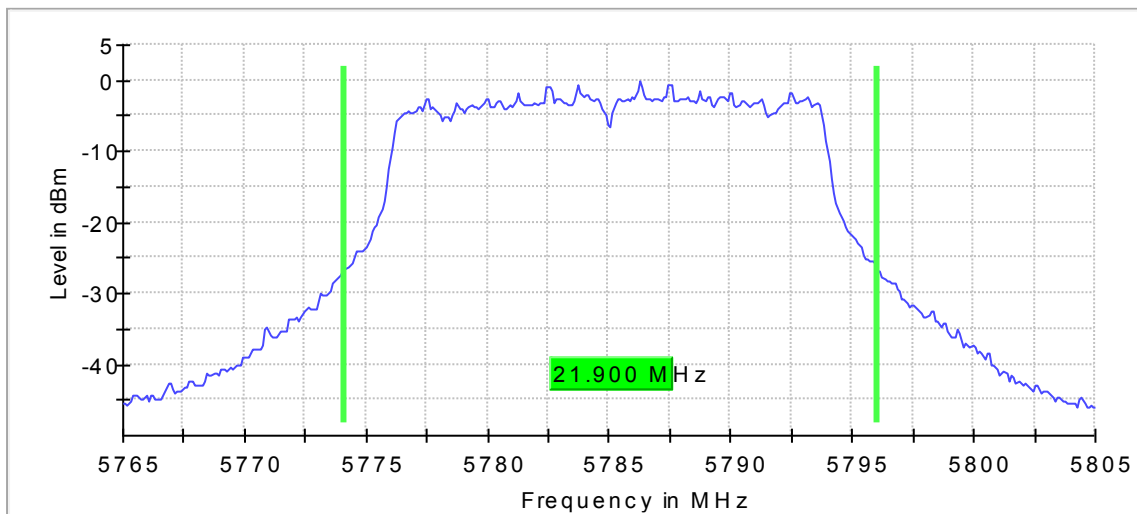
802.11ac (40 MHz BW) U-NII 1 Low Channel



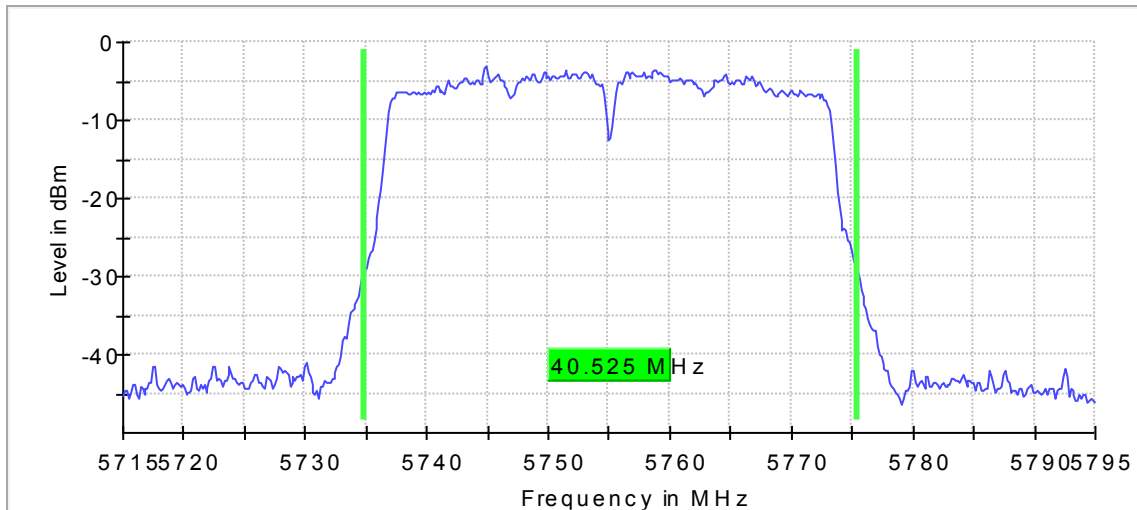
802.11ac (80 MHz BW) U-NII 1 Middle Channel



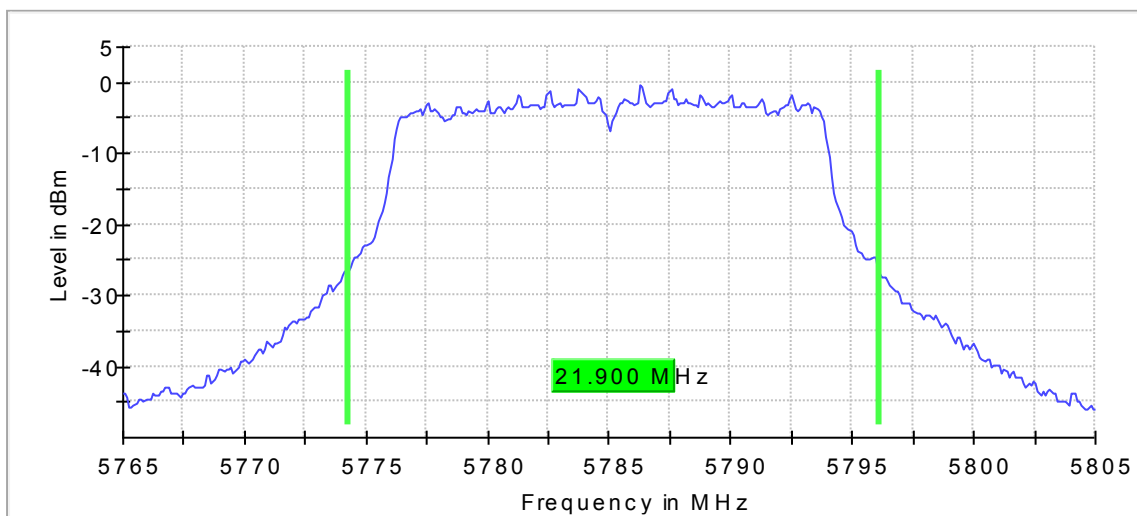
802.11a U-NII 3 Middle Channel



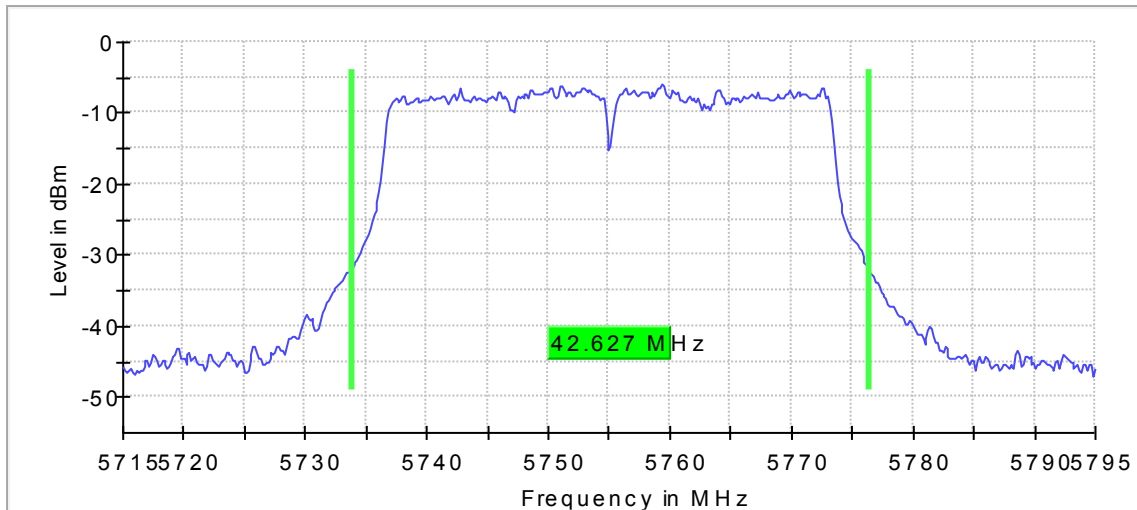
802.11n (20 MHz BW) U-NII 3 Middle Channel



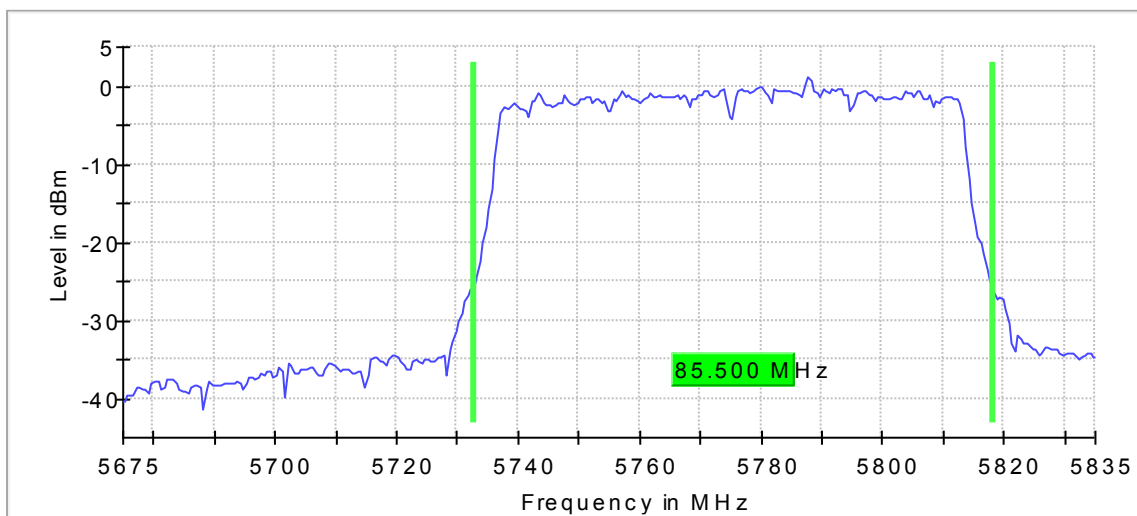
802.11n (40 MHz BW) U-NII 3 Low Channel



802.11ac (20 MHz BW) U-NII 3 Middle Channel



802.11ac (40 MHz BW) U-NII 3 Low Channel



802.11ac (80 MHz BW) U-NII 3 Middle Channel



2.3 99% EMISSION BANDWIDTH

2.3.1 Specification Reference

RSS-Gen, Section 6.7

2.3.2 Standard Applicable

The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

2.3.3 Test Methodology

Section II (D) of 789033 D02 General UNII Test Procedures v02r01

2.3.4 Equipment Under Test and Modification State

Serial No: FF130219B00305 / Test Configuration A

2.3.5 Date of Test/Initial of test personnel who performed the test

March 14, 2019 / FSC

2.3.6 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.7 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	25.6 °C
Relative Humidity	46.7 %
ATM Pressure	98.7 kPa

2.3.8 Additional Observations

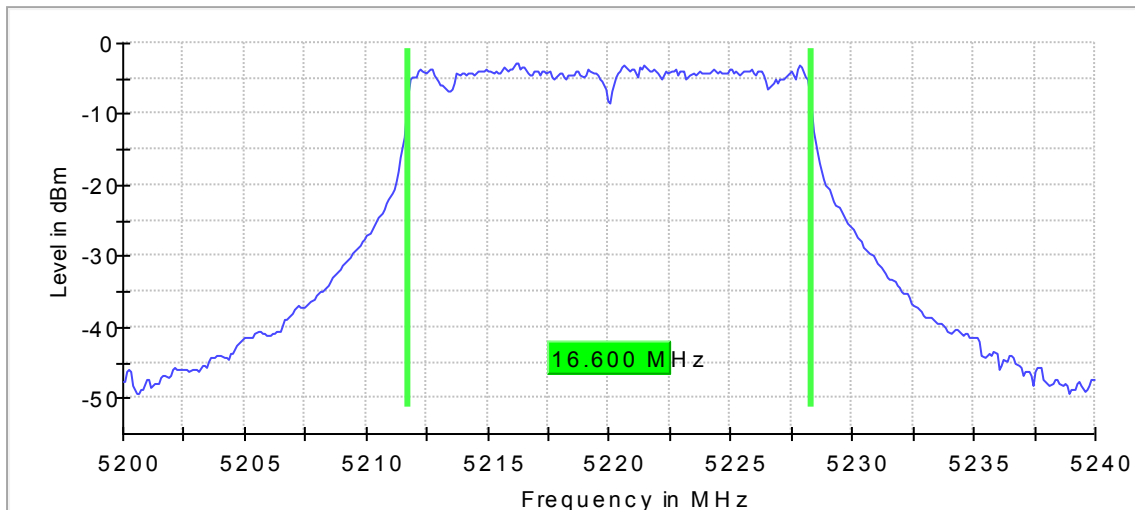
- This is a conducted test (Maximum conducted output power) using direct connection to TS8997 Test System. Path loss was programmed to the test system for both transmit chains.
- Test methodology is per FCC title 47 part 15 §15.407(a),(e), KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 D and ANSI C63.10-2013.



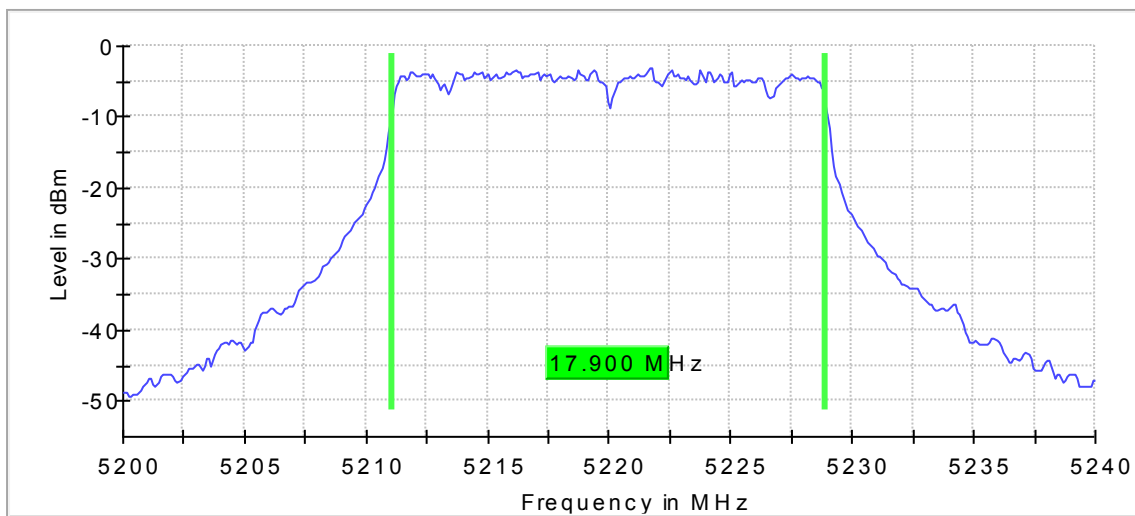
2.3.9 Summary Test Results (For reporting purpose only)

99% Bandwidth			
WiFi Mode	Low Channel	Middle Channel	High Channel
802.11a U-NII 1	16.60 MHz	16.60 MHz	16.60 MHz
802.11n U-NII 1 (20 MHz)	17.80 MHz	17.90 MHz	17.90MHz
802.11n U-NII 1 (40 MHz)	36.75 MHz	-	36.75 MHz
802.11ac U-NII 1 (20 MHz)	17.70 MHz	17.70 MHz	17.60 MHz
802.11ac U-NII 1 (40 MHz)	36.75 MHz	-	36.75 MHz
802.11ac U-NII 1 (80 MHz)	-	76.50 MHz	-
802.11a U-NII 3	17.80 MHz	17.80 MHz	17.80 MHz
802.11n U-NII 3 (20 MHz)	17.60 MHz	17.80 MHz	17.80 MHz
802.11n U-NII 3 (40 MHz)	36.25 MHz	-	36.25 MHz
802.11ac U-NII 3 (20 MHz)	17.80 MHz	17.80 MHz	17.80 MHz
802.11ac U-NII 3 (40 MHz)	36.75 MHz	-	36.50 MHz
802.11ac U-NII 3 (80 MHz)	-	76.00 MHz	-

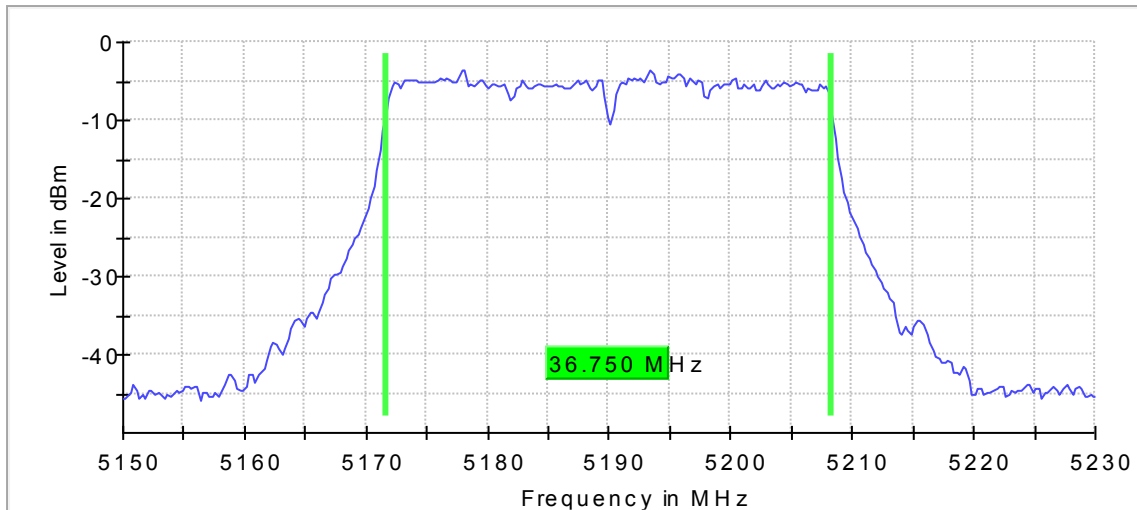
2.3.10 Test Plots



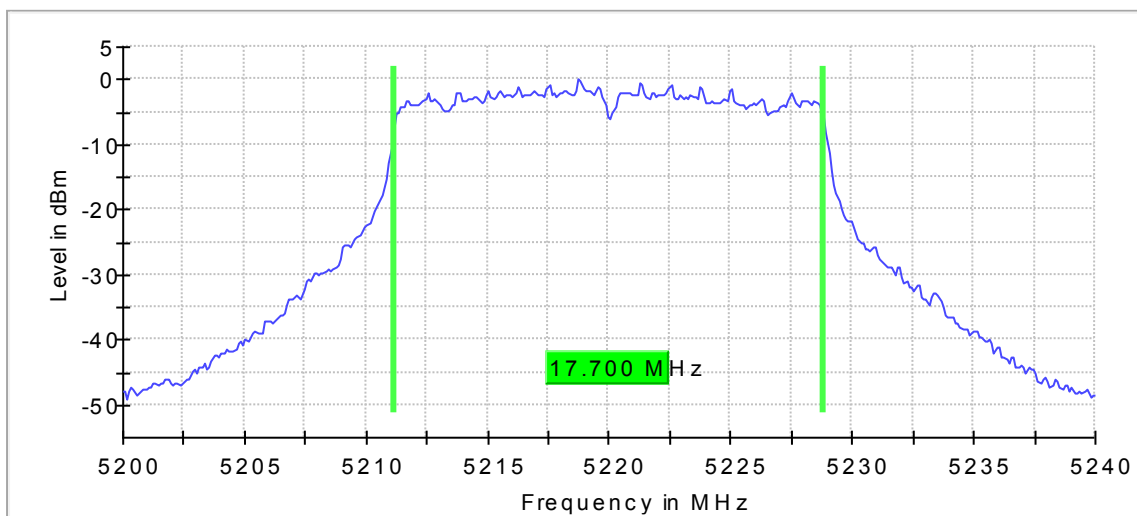
802.11a U-NII 1 Middle Channel



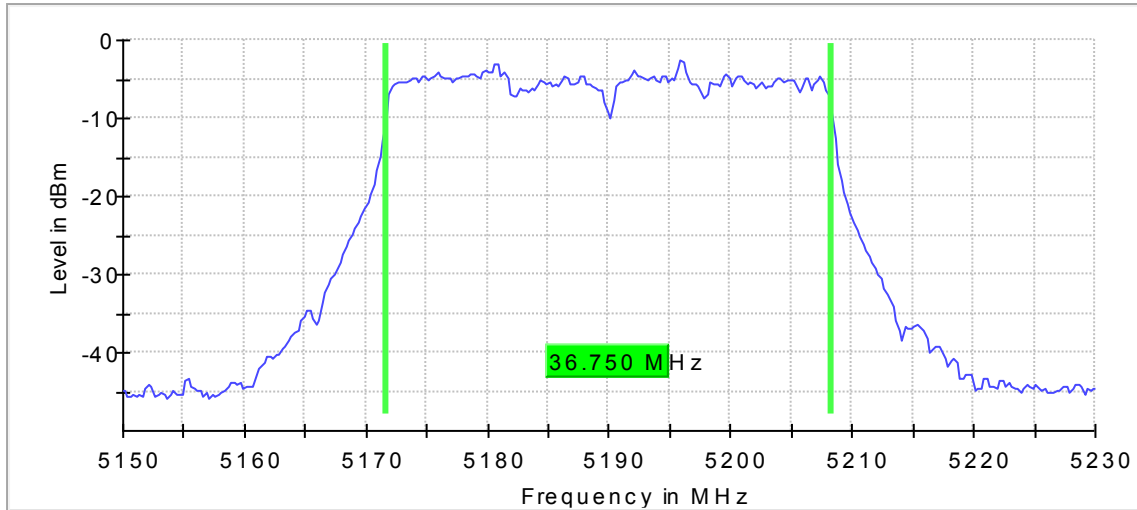
802.11n (20 MHz BW) U-NII 1 Middle Channel



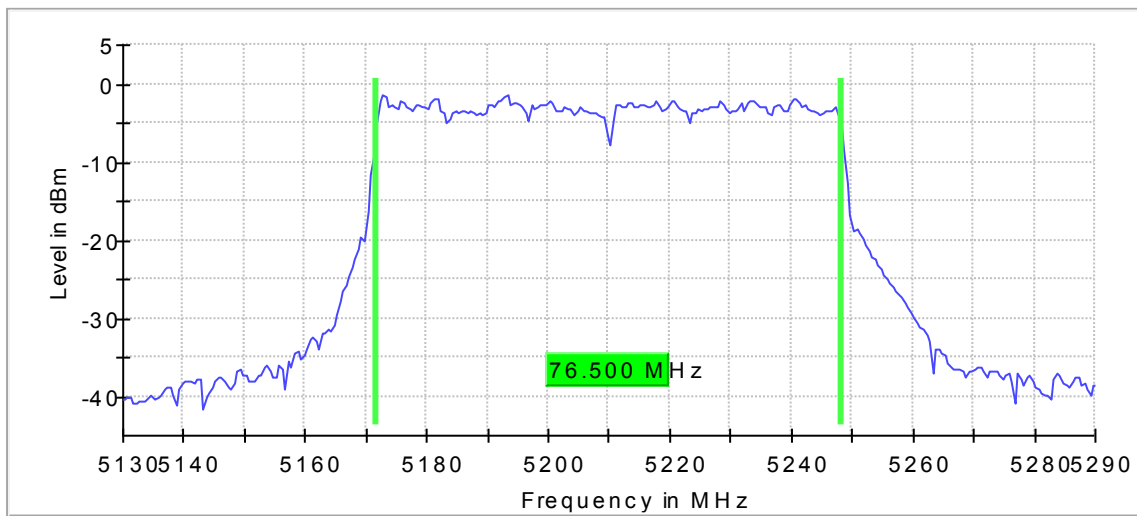
802.11n (40 MHz BW) U-NII 1 Low Channel



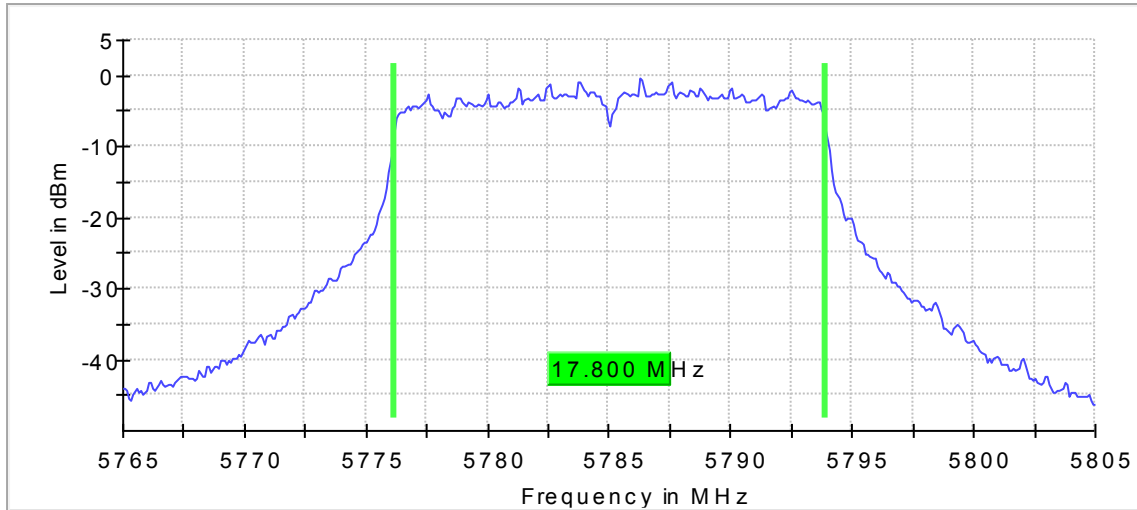
802.11ac (20 MHz BW) U-NII 1 Middle Channel



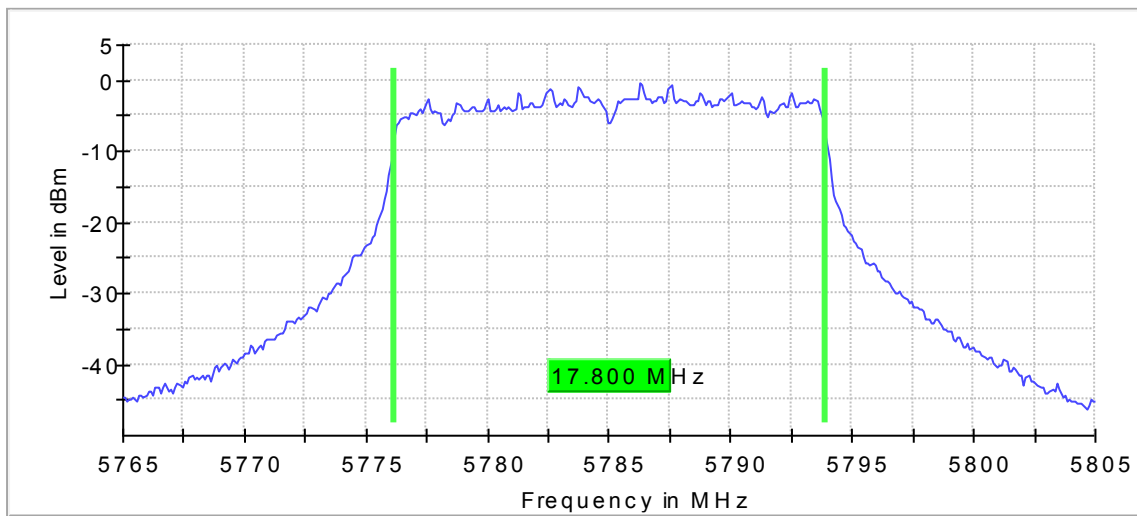
802.11ac (40 MHz BW) U-NII 1 Low Channel



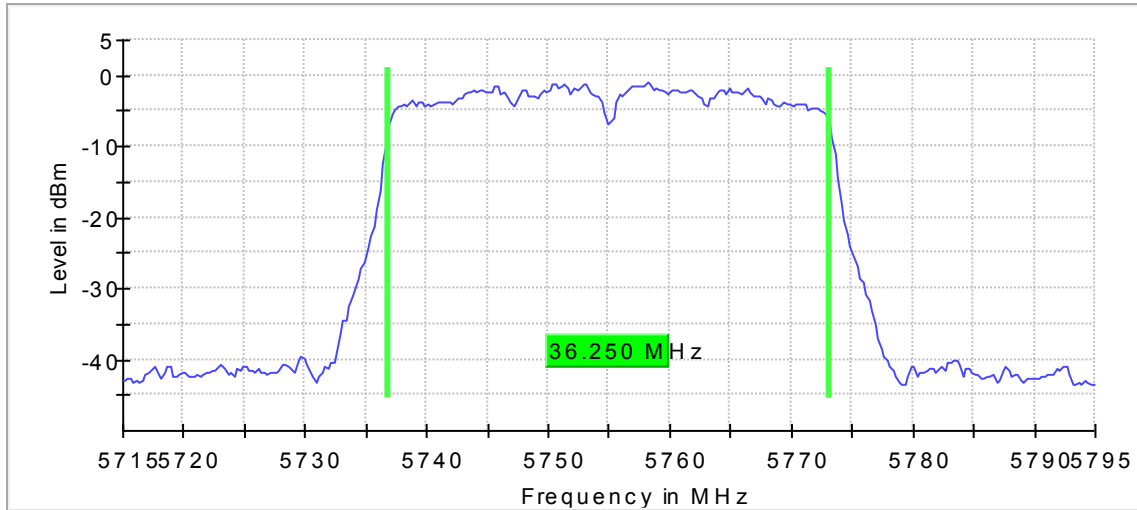
802.11ac (80 MHz BW) U-NII 1 Middle Channel



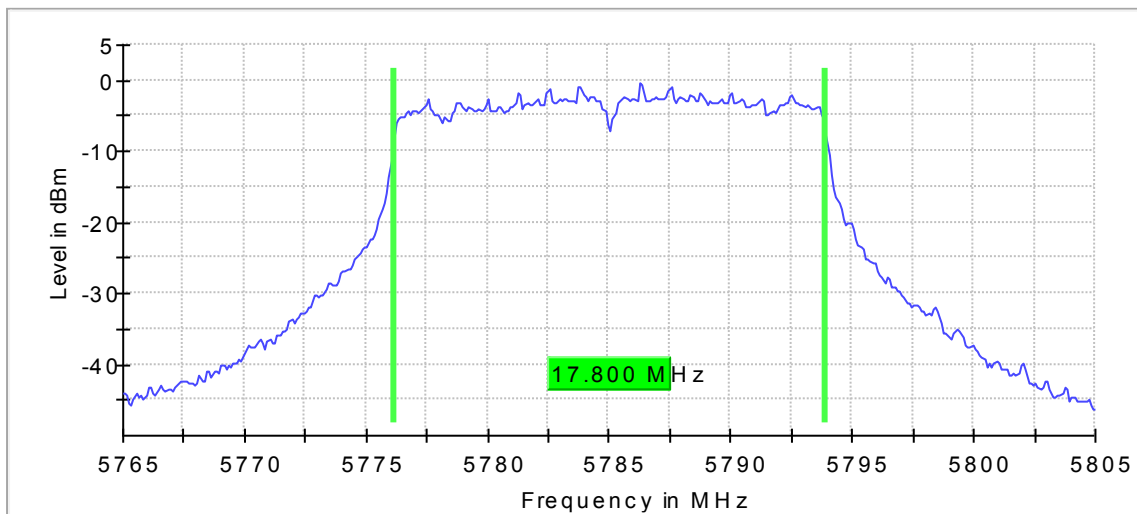
802.11a U-NII 3 Middle Channel



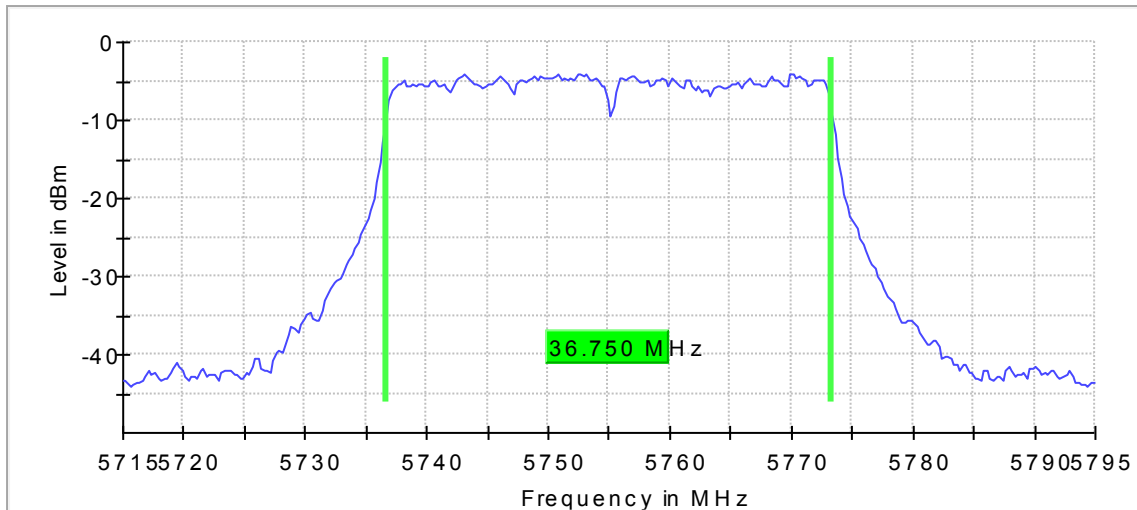
802.11n (20 MHz BW) U-NII 3 Middle Channel



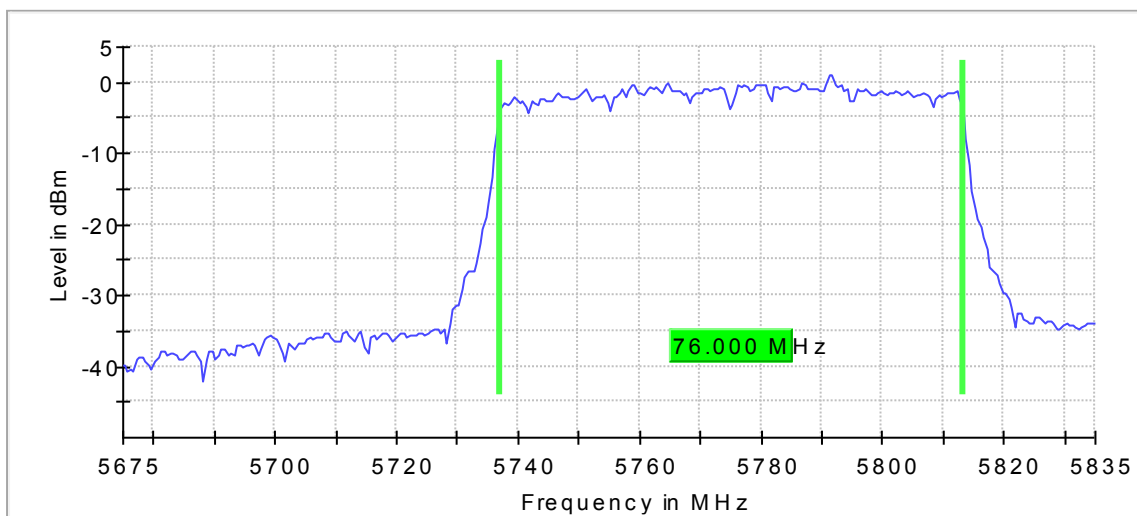
802.11n (40 MHz BW) U-NII 3 Low Channel



802.11ac (20 MHz BW) U-NII 3 Middle Channel



802.11ac (40 MHz BW) U-NII 3 Low Channel



802.11ac (80 MHz BW) U-NII 3 Middle Channel



2.4 MINIMUM 6DB BANDWIDTH

2.4.1 Specification Reference

FCC CFR 47 Part 15, Clause 15.407(e)
RSS-247, Section 6.2.4.1

2.4.2 Standard Applicable

FCC CFR 47 Part 15, Clause 15.407:

(e) Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

RSS-247, Section 6.2.4.1:

For equipment operating in the band 5725-5850 MHz, the minimum 6 dB bandwidth shall be at least 500 kHz.

2.4.3 Test Methodology

Section II (C) (2) of 789033 D02 General UNII Test Procedures v02r01

2.4.4 Equipment Under Test and Modification State

Serial No: FF130219B00305 / Test Configuration A

2.4.5 Date of Test/Initial of test personnel who performed the test

March 14, 2019 / FSC

2.4.6 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.7 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	25.6 °C
Relative Humidity	46.7 %
ATM Pressure	98.7 kPa

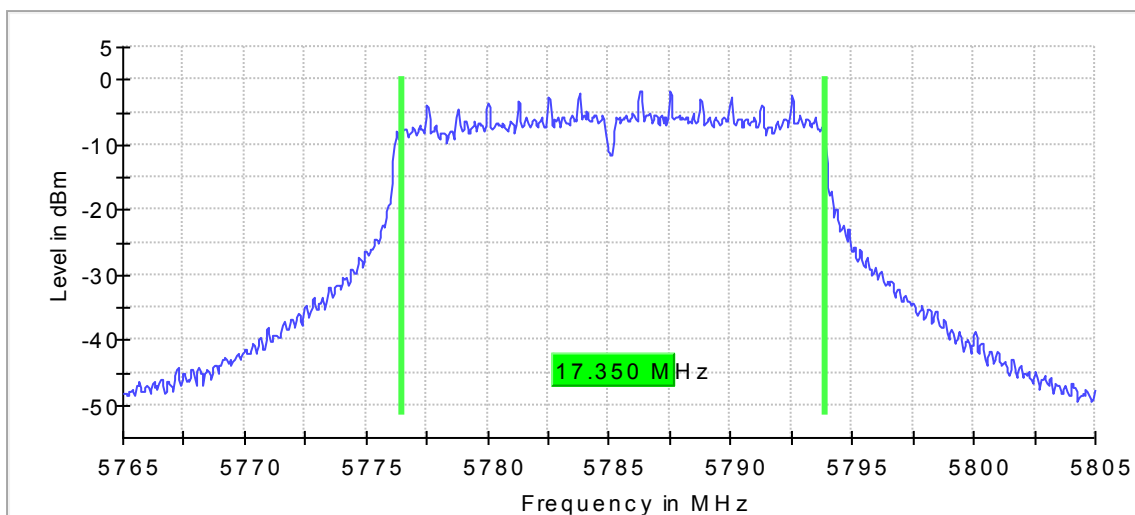
2.4.8 Additional Observations

- This is a conducted test (Maximum conducted output power) using direct connection to TS8997 Test System. Path loss was programmed to the test system for both transmit chains.
- Test methodology is per FCC title 47 part 15 §15.407(a),(e), KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 D and ANSI C63.10-2013.

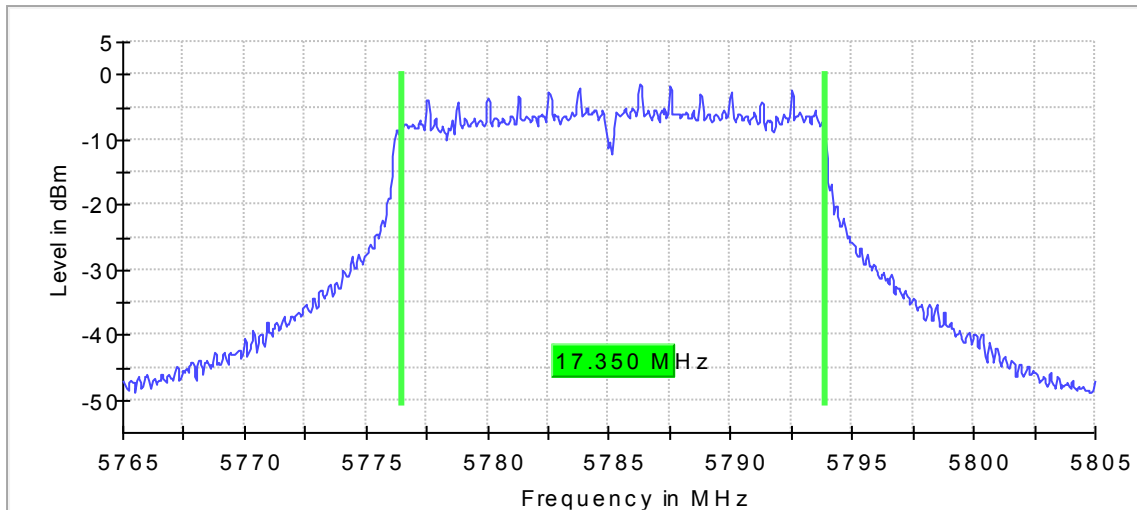
2.4.9 Summary Test Results

Minimum 6dB Bandwidth (>500kHz)			
WiFi Mode	Low Channel	Middle Channel	High Channel
802.11a U-NII 3	17.350 MHz	17.350 MHz	17.150 MHz
802.11n U-NII 3 (20 MHz)	16.650 MHz	17.350 MHz	17.400 MHz
802.11n U-NII 3 (40 MHz)	35.250 MHz	-	35.500 MHz
802.11ac U-NII 3 (20 MHz)	17.350 MHz	17.350MHz	17.150 MHz
802.11ac U-NII 3 (40 MHz)	36.500 MHz	-	36.500 MHz
802.11ac U-NII 3 (80 MHz)	-	76.450 MHz	-

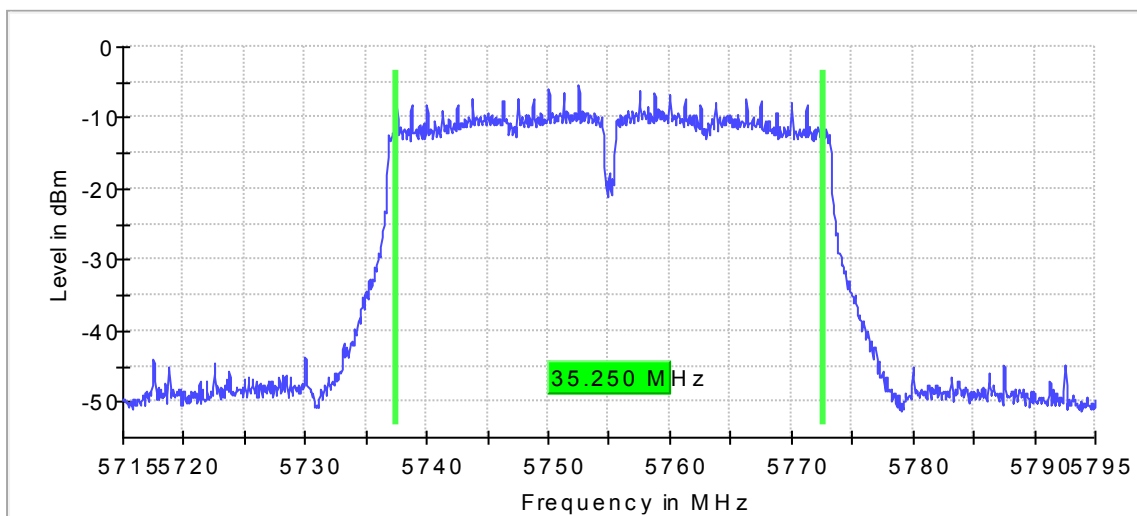
2.4.10 Sample Test Plots



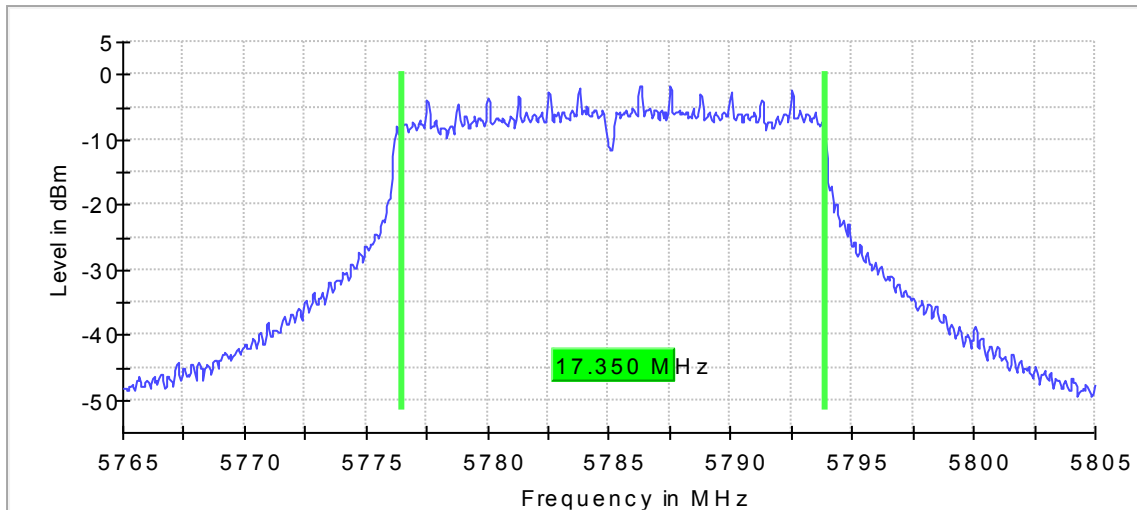
802.11a U-NII 3 Middle Channel



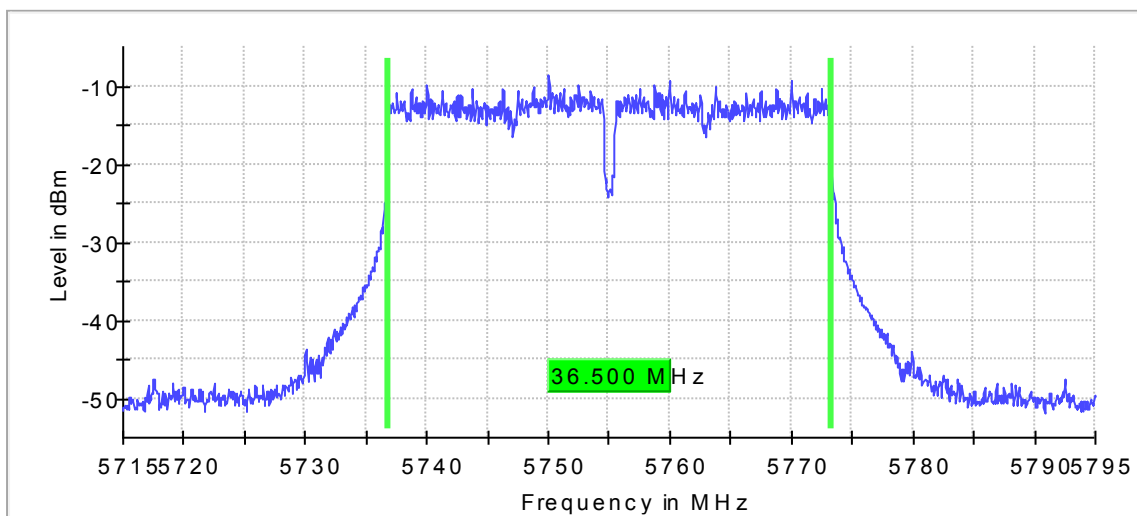
802.11n (20 MHz BW) U-NII 3 Middle Channel



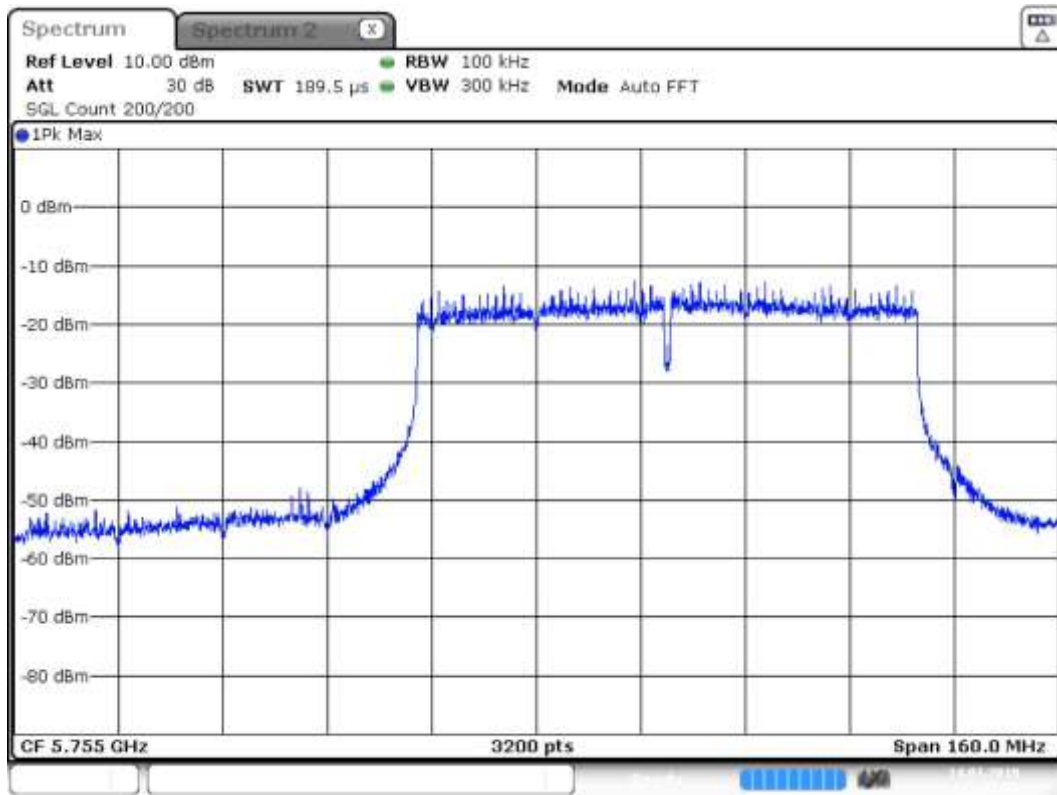
802.11n (40 MHz BW) U-NII 3 Low Channel



802.11ac (20 MHz BW) BW U-NII 3 Middle Channel



802.11ac (40 MHz BW) U-NII 3 Low Channel



Date: 14 MAR 2019 17:32:51

802.11ac (80 MHz BW) U-NII 3 Middle Channel



2.5 MAXIMUM CONDUCTED OUTPUT POWER

2.5.1 Specification Reference

FCC CFR 47 Part 15, Clause 15.407(a)(1)(ii) and (a)(3)
RSS-247, Section 6.2.1.1 and 6.2.4.1

2.5.2 Standard Applicable

FCC CFR 47 Part 15, Clause 15.407 (a)(1) :

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

FCC CFR 47 Part 15, Clause 15.407 (a):

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

RSS-247, Section 6.2.1.1:

The maximum e.i.r.p. (5150 – 5250 MHz) shall not exceed 200 mW or $10 + 10 \log_{10} B$, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

RSS-247, Section 6.2.4.1:

The maximum conducted output power (5725 – 5850 MHz) shall not exceed 1 W. The power spectral density shall not exceed 30 dBm in any 500 kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications and multiple collocated transmitters transmitting the same information.

2.5.3 Equipment Under Test and Modification State

Serial No: FF130219B00305 / Test Configuration A



2.5.4 Date of Test/Initial of test personnel who performed the test

March 15, 2019/FSC

2.5.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature 24.4 °C
 Relative Humidity 45.3 %
 ATM Pressure 98.9 kPa

2.5.7 Additional Observations

- This is a conducted test (Maximum conducted output power) using direct connection to TS8997 Test System. Path loss was programmed to the test system for both transmit chains.
- Test results presented is from SAR test report SAR.20190423, manufacturer provided a tune up procedure (14 dBm max). Power were adjusted until it correlates with SAR power levels with recommended TX settings.
- Test methodology is per FCC title 47 part 15 §15.407(a), KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 II.E and ANSI C63.10-2013.

2.5.8 Test Results

Band	Data Rate Setting	Mode	Channel Setting	Frequency (MHz)	Antenna Setting	Tune Up (Max)	Tx Setting	Measured Power (dBm)
5200 MHz a mode	6 Mbps	OFDM	36	5180	Tx0	14 dBm	12	13.8
			40	5200			12	13.7
			44	5220			12	13.7
			48	5240			12	13.5
			36	5180	Tx1		12	13.7
			40	5200			12	13.7
			44	5220			12	13.6
			48	5240			12	13.5
	9 Mbps		36	5180	Tx0		12	13.5
			40	5200			12	13.6
			44	5220			12	13.6
			48	5240			12	13.6
			36	5180	Tx1		12	13.4
			40	5200			12	13.5
			44	5220			12	13.5
			48	5240			12	13.4



5200 MHz a mode	12 Mbps	OFDM	36	5180	Tx0	14 dBm	12	13.5
			40	5200			12	13.5
			44	5220			12	13.4
			48	5240			12	13.5
			36	5180	Tx1		12	13.6
			40	5200			12	13.5
			44	5220			12	13.6
			48	5240			12	13.5
	18 Mbps		36	5180	Tx0		10	13.8
			40	5200			10	13.8
			44	5220			10	13.8
			48	5240			10	13.7
			36	5180	Tx1		10	13.8
			40	5200			10	13.8
			44	5220			10	13.7
			48	5240			10	13.7
	24 Mbps		36	5180	Tx0		10	13.8
			40	5200			10	13.8
			44	5220			10	13.8
			48	5240			10	13.8
			36	5180	Tx1		10	13.7
			40	5200			10	13.7
			44	5220			10	13.8
			48	5240			10	13.7
	36 Mbps		36	5180	Tx0		8	13.9
			40	5200			8	13.8
			44	5220			8	13.5
			48	5240			8	13.9
			36	5180	Tx1		8	13.6
			40	5200			8	13.8
			44	5220			8	13.8
			48	5240			8	13.5
	48 Mbps		36	5180	Tx0		8	13.6
			40	5200			8	13.9
			44	5220			8	13.5
			48	5240			8	13.8
			36	5180	Tx1		8	13.5
			40	5200			8	13.7
			44	5220			8	13.5
			48	5240			8	13.6



5200 MHz a mode	54 Mbps	OFDM	36	5180	Tx0	14 dBm	8	13.7
			40	5200			8	13.6
			44	5220			8	13.6
			48	5240			8	13.8
			36	5180	Tx1		8	13.7
			40	5200			8	13.9
			44	5220			8	13.4
			48	5240			8	13.7
5200 MHz n20	7.2 Mbps	MCS0	36	5180	Tx0	14 dBm	12	13.5
			40	5200			12	13.5
			44	5220			12	13.5
			48	5240			12	13.7
			36	5180	Tx1		12	13.6
			40	5200			12	13.5
			44	5220			12	13.5
			48	5240			12	13.7
	14.4 Mbps	MCS1	36	5180	Tx0		12	13.5
			40	5200			12	13.6
			44	5220			12	13.5
			48	5240			12	13.5
			36	5180	Tx1		12	13.5
			40	5200			12	13.5
			44	5220			12	13.6
			48	5240			12	13.6
	21.7 Mbps	MCS2	36	5180	Tx0		10	13.8
			40	5200			10	13.7
			44	5220			10	13.8
			48	5240			10	13.7
			36	5180	Tx1		10	13.6
			40	5200			10	13.5
			44	5220			10	13.7
			48	5240			10	13.6
	28.9 Mbps	MCS3	36	5180	Tx0		10	13.8
			40	5200			10	13.7
			44	5220			10	13.6
			48	5240			10	13.9
			36	5180	Tx1		10	13.8
			40	5200			10	13.9
			44	5220			10	13.7
			48	5240			10	13.7



5200 MHz n20	43.3 Mbps	MCS4	36	5180	Tx0	14 dBm	8	13.5
			40	5200			8	13.7
			44	5220			8	13.9
			48	5240			8	13.5
			36	5180	Tx1		8	13.8
			40	5200			8	13.7
			44	5220			8	13.6
			48	5240			8	13.6
	57.8 Mbps	MCS5	36	5180	Tx0		8	13.3
			40	5200			8	13.5
			44	5220			8	13.7
			48	5240			8	13.8
			36	5180	Tx1		8	13.2
			40	5200			8	13.6
			44	5220			8	13.7
			48	5240			8	13.5
	65.0 Mbps	MCS6	36	5180	Tx0		8	13.9
			40	5200			8	13.8
			44	5220			8	13.8
			48	5240			8	13.7
			36	5180	Tx1		8	13.7
			40	5200			8	13.7
			44	5220			8	13.5
			48	5240			8	13.6
	72.2 Mbps	MCS7	36	5180	Tx0		8	13.9
			40	5200			8	13.9
			44	5220			8	13.7
			48	5240			8	13.9
			36	5180	Tx1		8	13.9
			40	5200			8	13.7
			44	5220			8	13.6
			48	5240			8	13.9
5200 MHz n40	15.0 Mbps	MCS0	38 (36)	5190	Tx0	14 dBm	10	13.8
			46 (44)	5230			10	13.8
			38 (36)	5190	Tx1		10	13.8
			46 (44)	5230			10	13.7
	30.0 Mbps	MCS1	38 (36)	5190	Tx0		10	13.6
			46 (44)	5230			10	13.7
			38 (36)	5190	Tx1		10	13.7
			46 (44)	5230			10	13.8



5200 MHz n40	45.0 Mbps	MCS2	38 (36)	5190	Tx0	14 dBm	9	13.7
			46 (44)	5230			9	13.8
			38 (36)	5190	Tx1		9	13.7
			46 (44)	5230			9	13.9
	60.0 Mbps	MCS3	38 (36)	5190	Tx0		9	13.8
			46 (44)	5230			9	14.0
			38 (36)	5190	Tx1		9	13.8
			46 (44)	5230			9	13.7
	90.0 Mbps	MCS4	38 (36)	5190	Tx0		6	13.7
			46 (44)	5230			6	13.5
			38 (36)	5190	Tx1		6	13.8
			46 (44)	5230			6	13.8
	120.0 Mbps	MCS5	38 (36)	5190	Tx0		6	14.0
			46 (44)	5230			6	13.8
			38 (36)	5190	Tx1		6	13.8
			46 (44)	5230			6	13.8
	135.0 Mbps	MCS6	38 (36)	5190	Tx0		6	13.8
			46 (44)	5230			6	13.7
			38 (36)	5190	Tx1		6	13.9
			46 (44)	5230			6	13.7
	150.0 Mbps	MCS7	38 (36)	5190	Tx0		6	13.7
			46 (44)	5230			6	13.8
			38 (36)	5190	Tx1		6	14.0
			46 (44)	5230			6	13.6
5200 MHz ac20	7.2 Mbps	MCS0	36	5180	Tx0	14 dBm	12	13.5
			40	5200			12	13.6
			44	5220			12	13.7
			48	5240			12	13.6
			36	5180	Tx1		12	13.7
			40	5200			12	13.7
			44	5220			12	13.7
			48	5240			12	13.7
	14.4 Mbps	MCS1	36	5180	Tx0		12	13.7
			40	5200			12	13.7
			44	5220			12	13.7
			48	5240			12	13.7
			36	5180	Tx1		12	13.7
			40	5200			12	13.8
			44	5220			12	13.6
			48	5240			12	13.7



5200 MHz ac20	21.7 Mbps	MCS2	36	5180	Tx0	14 dBm	10	13.7
			40	5200			10	13.9
			44	5220			10	13.8
			48	5240			10	13.8
			36	5180	Tx1		10	13.9
			40	5200			10	13.9
			44	5220			10	13.9
			48	5240			10	14.0
	28.9 Mbps	MCS3	36	5180	Tx0		10	13.9
			40	5200			10	13.9
			44	5220			10	13.9
			48	5240			10	13.7
			36	5180	Tx1		10	13.7
			40	5200			10	13.8
			44	5220			10	13.8
			48	5240			10	13.7
	43.3 Mbps	MCS4	36	5180	Tx0		8	13.9
			40	5200			8	13.7
			44	5220			8	13.6
			48	5240			8	13.7
			36	5180	Tx1		8	13.8
			40	5200			8	13.9
			44	5220			8	13.5
			48	5240			8	13.7
	57.8 Mbps	MCS5	36	5180	Tx0		6	13.6
			40	5200			6	13.7
			44	5220			6	13.8
			48	5240			6	13.5
			36	5180	Tx1		6	13.6
			40	5200			6	13.7
			44	5220			6	13.8
			48	5240			6	13.8
	65.0 Mbps	MCS6	36	5180	Tx0		6	13.9
			40	5200			6	13.8
			44	5220			6	13.8
			48	5240			6	13.8
			36	5180	Tx1		6	13.7
			40	5200			6	13.7
			44	5220			6	13.8
			48	5240			6	13.8



5200 MHz ac20	72.2 Mbps	MCS7	36	5180	Tx0	14 dBm	6	13.8
			40	5200			6	13.8
			44	5220			6	13.8
			48	5240			6	13.7
			36	5180	Tx1		6	13.8
			40	5200			6	13.8
			44	5220			6	13.8
			48	5240			6	13.7
	86.7 Mbps	MCS8	36	5180	Tx0		12	13.8
			40	5200			12	13.7
			44	5220			12	13.7
			48	5240			12	13.8
			36	5180	Tx1		12	13.7
			40	5200			12	13.6
			44	5220			12	13.6
			48	5240			12	13.8
5200 MHz ac40	15.0 Mbps	MCS0	38 (36)	5190	Tx0	14 dBm	10	13.7
			46 (44)	5230			10	13.8
			38 (36)	5190	Tx1		10	13.8
			46 (44)	5230			10	13.8
	30.0 Mbps	MCS1	38 (36)	5190	Tx0		10	13.8
			46 (44)	5230			10	13.9
			38 (36)	5190	Tx1		10	13.8
			46 (44)	5230			10	13.8
	45.0 Mbps	MCS2	38 (36)	5190	Tx0		9	13.9
			46 (44)	5230			9	13.8
			38 (36)	5190	Tx1		9	13.8
			46 (44)	5230			9	13.9
	60.0 Mbps	MCS3	38 (36)	5190	Tx0		9	13.7
			46 (44)	5230			9	13.8
			38 (36)	5190	Tx1		9	13.9
			46 (44)	5230			9	13.7
	90.0 Mbps	MCS4	38 (36)	5190	Tx0		6	13.7
			46 (44)	5230			6	13.8
			38 (36)	5190	Tx1		6	13.8
			46 (44)	5230			6	13.8
	120.0 Mbps	MCS5	38 (36)	5190	Tx0		6	13.9
			46 (44)	5230			6	13.9
			38 (36)	5190	Tx1		6	13.8
			46 (44)	5230			6	13.8



5200 MHz ac40	135.0 Mbps	MCS6	38 (36)	5190	Tx0	14 dBm	6	13.9
			46 (44)	5230			6	13.9
			38 (36)	5190	Tx1		6	13.8
			46 (44)	5230			6	13.7
	150.0 Mbps	MCS7	38 (36)	5190	Tx0		6	13.8
			46 (44)	5230			6	13.9
			38 (36)	5190	Tx1		6	13.9
			46 (44)	5230			6	13.7
	180.0 Mbps	MCS8	38 (36)	5190	Tx0		6	13.8
			46 (44)	5230			6	13.8
			38 (36)	5190	Tx1		6	13.9
			46 (44)	5230			6	13.9
	200.0 Mbps	MCS9	38 (36)	5190	Tx0		6	14.0
			46 (44)	5230			6	14.0
			38 (36)	5190	Tx1		6	13.8
			46 (44)	5230			6	13.8
5200 MHz ac80	32.5 Mbps	MCS0	42 (36)	5210	Tx0	12 dBm	11	13.9
			42 (36)	5210	Tx1	10 dBm	11	13.9
	65.0 Mbps	MCS1	42 (36)	5210	Tx0	12 dBm	11	13.8
			42 (36)	5210	Tx1	10 dBm	11	14.0
	97.5 Mbps	MCS2	42 (36)	5210	Tx0	12 dBm	10	13.8
			42 (36)	5210	Tx1	10 dBm	10	13.9
	130 Mbps	MCS3	42 (36)	5210	Tx0	12 dBm	10	13.8
			42 (36)	5210	Tx1	10 dBm	10	13.7
	195 Mbps	MCS4	42 (36)	5210	Tx0	12 dBm	8	13.7
			42 (36)	5210	Tx1	10 dBm	8	13.7
	260 Mbps	MCS5	42 (36)	5210	Tx0	12 dBm	8	13.9
			42 (36)	5210	Tx1	10 dBm	8	13.9
	292.5 Mbps	MCS6	42 (36)	5210	Tx0	12 dBm	8	13.9
			42 (36)	5210	Tx1	10 dBm	8	13.7
	325.0 Mbps	MCS7	42 (36)	5210	Tx0	12 dBm	8	13.7
			42 (36)	5210	Tx1	10 dBm	8	13.7
	390.0 Mbps	MCS8	42 (36)	5210	Tx0	12 dBm	8	13.9
			42 (36)	5210	Tx1	10 dBm	8	14.0
433.3 Mbps	MCS9	42 (36)	5210	Tx0	12 dBm	7	13.8	
		42 (36)	5210	Tx1	10 dBm	7	13.9	
5800 MHz a mode	6 Mbps	OFDM	149	5745	Tx0	14 dBm	12	13.9
			153	5765			12	13.7
			157	5785			12	13.7
			161	5805			12	13.7
			165	5825			12	13.7



5800 MHz a mode	6 Mbps	OFDM	149	5745	Tx1	14 dBm	12	13.7
			153	5765			12	13.8
			157	5785			12	13.8
			161	5805			12	13.7
			165	5825			12	13.8
	9 Mbps	OFDM	149	5745	Tx0		12	13.8
			153	5765			12	13.7
			157	5785			12	13.8
			161	5805			12	13.7
			165	5825			12	13.6
			149	5745	Tx1		12	13.8
			153	5765			12	13.7
			157	5785			12	13.9
			161	5805			12	13.7
			165	5825			12	13.8
	12 Mbps	OFDM	149	5745	Tx0		12	13.7
			153	5765			12	13.9
			157	5785			12	13.8
			161	5805			12	13.6
			165	5825			12	13.7
			149	5745	Tx1		12	13.8
			153	5765			12	13.8
			157	5785			12	13.8
			161	5805			12	13.7
			165	5825			12	13.8
	18 Mbps	OFDM	149	5745	Tx0		10	13.7
			153	5765			10	13.8
			157	5785			10	13.7
			161	5805			10	13.8
			165	5825			10	13.7
			149	5745	Tx1		10	13.8
			153	5765			10	13.8
			157	5785			10	13.7
			161	5805			10	13.7
			165	5825			10	13.8
	24 Mbps	OFDM	149	5745	Tx0		10	13.9
			153	5765			10	13.8
			157	5785			10	13.8
			161	5805			10	13.7
			165	5825			10	13.6



5800 MHz a mode	24 Mbps	OFDM	149	5745	Tx1	14 dBm	10	13.8
			153	5765			10	13.6
			157	5785			10	13.7
			161	5805			10	13.8
			165	5825			10	13.8
	36 Mbps	OFDM	149	5745	Tx0		8	13.8
			153	5765			8	13.6
			157	5785			8	13.9
			161	5805			8	13.6
			165	5825			8	13.7
			149	5745	Tx1		8	13.7
			153	5765			8	13.7
			157	5785			8	13.7
			161	5805			8	13.7
			165	5825			8	13.6
	48 Mbps	OFDM	149	5745	Tx0		8	13.7
			153	5765			8	13.7
			157	5785			8	13.9
			161	5805			8	13.6
			165	5825			8	13.8
			149	5745	Tx1		8	13.8
			153	5765			8	13.7
			157	5785			8	13.8
			161	5805			8	13.9
			165	5825			8	13.6
	54 Mbps	OFDM	149	5745	Tx0		8	13.6
			153	5765			8	13.6
			157	5785			8	13.7
			161	5805			8	13.8
			165	5825			8	13.8
			149	5745	Tx1		8	13.7
			153	5765			8	13.9
			157	5785			8	13.7
			161	5805			8	13.9
			165	5825			8	13.8
5800 MHz n20	7.2 Mbps	MCS0	149	5745	Tx0	14 dBm	12	13.9
			153	5765			12	13.9
			157	5785			12	13.6
			161	5805			12	13.7
			165	5825			12	13.7



5800 MHz n20	7.2 Mbps	MCS0	149	5745	Tx1	14 dBm	12	13.8
			153	5765			12	13.8
			157	5785			12	13.7
			161	5805			12	13.9
			165	5825			12	13.6
	14.4 Mbps	MCS1	149	5745	Tx0		12	13.9
			153	5765			12	13.9
			157	5785			12	13.8
			161	5805			12	13.8
			165	5825			12	13.7
			149	5745	Tx1		12	13.6
			153	5765			12	13.8
			157	5785			12	13.8
			161	5805			12	13.7
			165	5825			12	13.8
	21.7 Mbps	MCS2	149	5745	Tx0		10	13.8
			153	5765			10	13.7
			157	5785			10	13.7
			161	5805			10	13.7
			165	5825			10	13.7
			149	5745	Tx1		10	13.8
			153	5765			10	13.8
			157	5785			10	13.6
			161	5805			10	13.7
			165	5825			10	13.8
	28.9 Mbps	MCS3	149	5745	Tx0		10	13.8
			153	5765			10	13.6
			157	5785			10	13.7
			161	5805			10	13.8
			165	5825			10	13.6
			149	5745	Tx1		10	13.7
			153	5765			10	13.8
			157	5785			10	13.7
			161	5805			10	13.8
			165	5825			10	13.7
	43.3 Mbps	MCS4	149	5745	Tx0		8	13.7
			153	5765			8	13.9
			157	5785			8	13.8
			161	5805			8	13.9
			165	5825			8	13.7



5800 MHz n40	15.0 Mbps	MCS0	151 (149)	5755	Tx0	14 dBm	10	13.8
			159 (157)	5795			10	13.9
			151 (149)	5755	Tx1		10	13.7
			159 (157)	5795			10	13.7
	30.0 Mbps	MCS1	151 (149)	5755	Tx0		10	13.7
			159 (157)	5795			10	13.6
			151 (149)	5755	Tx1		10	13.8
			159 (157)	5795			10	13.7
	45.0 Mbps	MCS2	151 (149)	5755	Tx0		9	13.7
			159 (157)	5795			9	13.7
			151 (149)	5755	Tx1		9	13.7
			159 (157)	5795			9	13.7
	60.0 Mbps	MCS3	151 (149)	5755	Tx0		9	13.6
			159 (157)	5795			9	13.7
			151 (149)	5755	Tx1		9	13.6
			159 (157)	5795			9	13.8
	90.0 Mbps	MCS4	151 (149)	5755	Tx0		6	13.8
			159 (157)	5795			6	13.6
			151 (149)	5755	Tx1		6	13.8
			159 (157)	5795			6	13.7
	120.0 Mbps	MCS5	151 (149)	5755	Tx0		6	13.7
			159 (157)	5795			6	13.7
			151 (149)	5755	Tx1		6	13.6
			159 (157)	5795			6	13.9
	135.0 Mbps	MCS6	151 (149)	5755	Tx0		6	13.8
			159 (157)	5795			6	13.8
			151 (149)	5755	Tx1		6	13.7
			159 (157)	5795			6	13.7
	150.0 Mbps	MCS7	151 (149)	5755	Tx0		6	13.7
			159 (157)	5795			6	13.6
			151 (149)	5755	Tx1		6	13.8
			159 (157)	5795			6	13.6
5800 MHz ac20	7.2 Mbps	MCS0	149	5745	Tx0	14 dBm	12	13.8
			153	5765			12	13.6
			157	5785			12	13.8
			161	5805			12	13.6
			165	5825			12	13.9



5800 MHz ac20	7.2 Mbps	MCS0	149	5745	Tx1	14 dBm	12	13.8
			153	5765			12	13.7
			157	5785			12	13.6
			161	5805			12	13.9
			165	5825			12	13.8
	14.4 Mbps	MCS1	149	5745	Tx0		12	13.9
			153	5765			12	13.7
			157	5785			12	13.7
			161	5805			12	13.8
			165	5825			12	13.7
			149	5745	Tx1		12	13.9
			153	5765			12	13.8
			157	5785			12	13.7
			161	5805			12	13.8
			165	5825			12	13.9
	21.7 Mbps	MCS2	149	5745	Tx0		10	13.6
			153	5765			10	13.8
			157	5785			10	13.8
			161	5805			10	13.7
			165	5825			10	13.8
			149	5745	Tx1		10	13.8
			153	5765			10	13.7
			157	5785			10	13.9
			161	5805			10	13.8
			165	5825			10	13.8
	28.9 Mbps	MCS3	149	5745	Tx0		10	13.6
			153	5765			10	13.8
			157	5785			10	13.8
			161	5805			10	13.6
			165	5825			10	13.8
			149	5745	Tx1		10	13.6
			153	5765			10	13.8
			157	5785			10	13.8
			161	5805			10	13.8
			165	5825			10	13.8
	43.3 Mbps	MCS4	149	5745	Tx0		8	13.7
			153	5765			8	13.6
			157	5785			8	13.7
			161	5805			8	13.9
			165	5825			8	13.6



5800 MHz ac20	43.3 Mbps	MCS4	149	5745	Tx1	14 dBm	8	13.8
			153	5765			8	13.7
			157	5785			8	13.7
			161	5805			8	13.7
			165	5825			8	13.7
	57.8 Mbps	MCS5	149	5745	Tx0		6	13.9
			153	5765			6	13.8
			157	5785			6	13.8
			161	5805			6	13.6
			165	5825			6	13.7
			149	5745	Tx1		6	13.8
			153	5765			6	13.6
			157	5785			6	13.8
			161	5805			6	13.7
			165	5825			6	13.8
	65.0 Mbps	MCS6	149	5745	Tx0		6	13.7
			153	5765			6	13.7
			157	5785			6	13.7
			161	5805			6	13.9
			165	5825			6	13.9
			149	5745	Tx1		6	13.8
			153	5765			6	13.6
			157	5785			6	13.7
			161	5805			6	13.6
			165	5825			6	13.7
	72.2 Mbps	MCS7	149	5745	Tx0		6	13.7
			153	5765			6	13.7
			157	5785			6	13.7
			161	5805			6	13.9
			165	5825			6	13.8
			149	5745	Tx1		6	13.8
			153	5765			6	13.7
			157	5785			6	13.9
			161	5805			6	13.6
			165	5825			6	13.9
	86.7 Mbps	MCS8	149	5745	Tx0		12	13.8
			153	5765			12	13.6
			157	5785			12	13.8
			161	5805			12	13.6
			165	5825			12	13.9

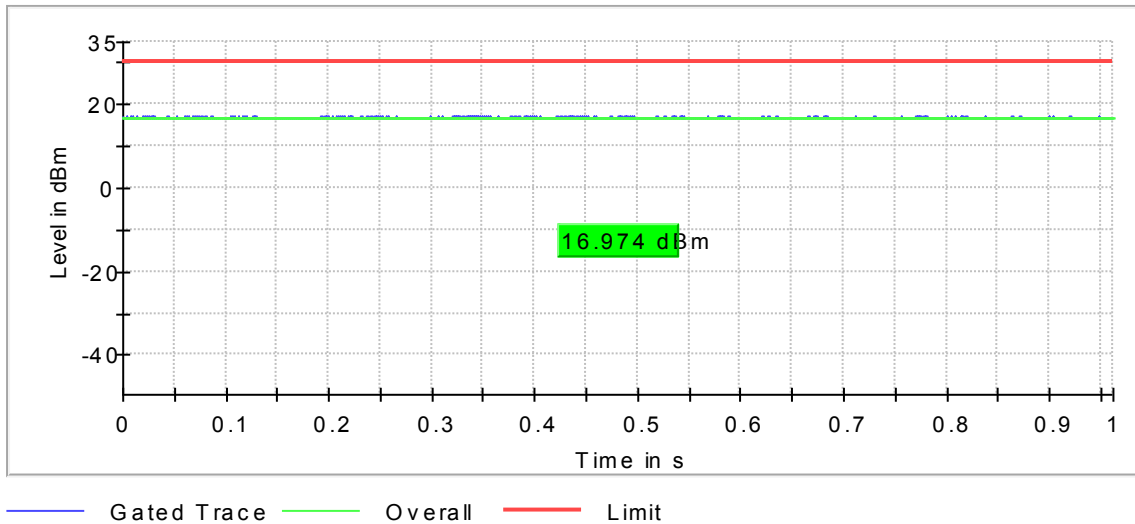


5800 MHz ac20	86.7 Mbps	MCS8	149	5745	Tx0	14 dBm	12	13.8
			153	5765			12	13.9
			157	5785			12	13.8
			161	5805			12	13.8
			165	5825			12	13.6
5800 MHz ac40	15.0 Mbps	MCS0	151 (149)	5755	Tx0	14 dBm	10	13.9
			159 (157)	5795			10	13.6
			151 (149)	5755	Tx1		10	13.9
			159 (157)	5795			10	13.7
	30.0 Mbps	MCS1	151 (149)	5755	Tx0		10	13.9
			159 (157)	5795			10	13.8
			151 (149)	5755	Tx1		10	13.8
			159 (157)	5795			10	13.7
	45.0 Mbps	MCS2	151 (149)	5755	Tx0		9	13.6
			159 (157)	5795			9	13.8
			151 (149)	5755	Tx1		9	13.8
			159 (157)	5795			9	13.9
	60.0 Mbps	MCS3	151 (149)	5755	Tx0		9	13.7
			159 (157)	5795			9	13.7
			151 (149)	5755	Tx1		9	13.8
			159 (157)	5795			9	13.7
	90.0 Mbps	MCS4	151 (149)	5755	Tx0		6	13.7
			159 (157)	5795			6	13.8
			151 (149)	5755	Tx1		6	13.7
			159 (157)	5795			6	13.8
	120.0 Mbps	MCS5	151 (149)	5755	Tx0		6	13.9
			159 (157)	5795			6	13.6
			151 (149)	5755	Tx1		6	13.6
			159 (157)	5795			6	13.9
	135.0 Mbps	MCS6	151 (149)	5755	Tx0		6	13.8
			159 (157)	5795			6	13.9
			151 (149)	5755	Tx1		6	13.6
			159 (157)	5795			6	13.9
	150.0 Mbps	MCS7	151 (149)	5755	Tx0		6	13.8
			159 (157)	5795			6	13.7
			151 (149)	5755	Tx1		6	13.6
			159 (157)	5795			6	13.7
	180.0 Mbps	MCS8	151 (149)	5755	Tx0		6	13.7
			159 (157)	5795			6	13.9
			151 (149)	5755	Tx1		6	13.8
			159 (157)	5795			6	13.7

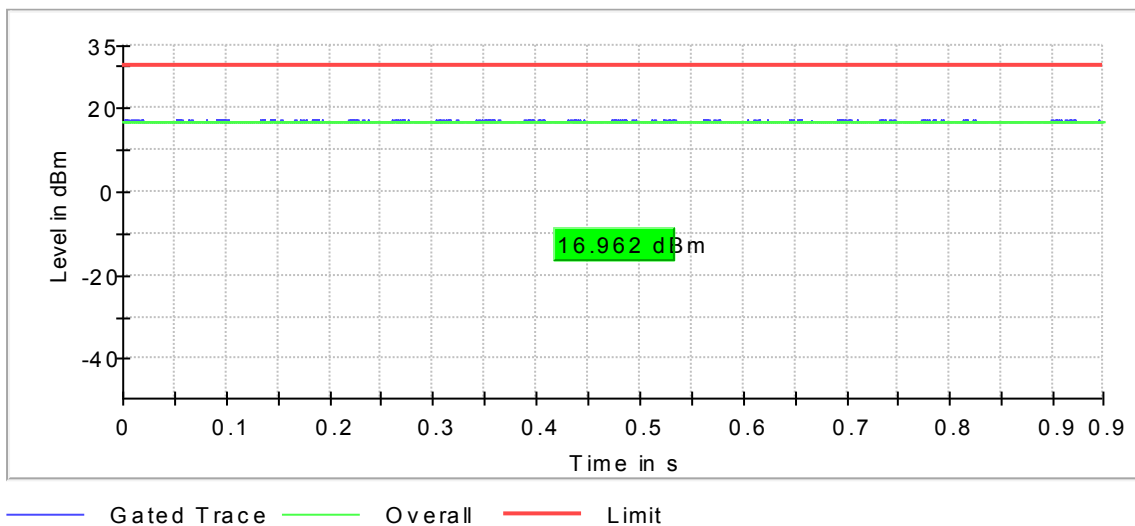


5800 MHz ac40	200.0 Mbps	MCS8	151 (149)	5755	Tx0	14 dBm	6	13.9
			159 (157)	5795			6	13.9
			151 (149)	5755	Tx1		6	13.7
			159 (157)	5795			6	13.8
5200 MHz ac80	32.5 Mbps	MCS0	155 (149)	5775	Tx0	14 dBm	11	13.7
			155 (149)	5775	Tx1		11	13.8
	65.0 Mbps	MCS1	155 (149)	5775	Tx0		11	13.6
			155 (149)	5775	Tx1		11	13.7
	97.5 Mbps	MCS2	155 (149)	5775	Tx0		10	13.8
			155 (149)	5775	Tx1		10	13.8
	130 Mbps	MCS3	155 (149)	5775	Tx0		10	13.7
			155 (149)	5775	Tx1		10	13.8
	195 Mbps	MCS4	155 (149)	5775	Tx0		8	13.7
			155 (149)	5775	Tx1		8	13.7
	260 Mbps	MCS5	155 (149)	5775	Tx0		8	13.6
			155 (149)	5775	Tx1		8	13.8
	292.5 Mbps	MCS6	155 (149)	5775	Tx0		8	13.8
			155 (149)	5775	Tx1		8	13.9
	325.0 Mbps	MCS7	155 (149)	5775	Tx0		8	13.7
			155 (149)	5775	Tx1		8	13.9
	390.0 Mbps	MCS8	155 (149)	5775	Tx0		8	13.6
			155 (149)	5775	Tx1		8	13.9
	433.3 Mbps	MCS9	155 (149)	5775	Tx0		7	13.8
			155 (149)	5775	Tx1		7	13.9

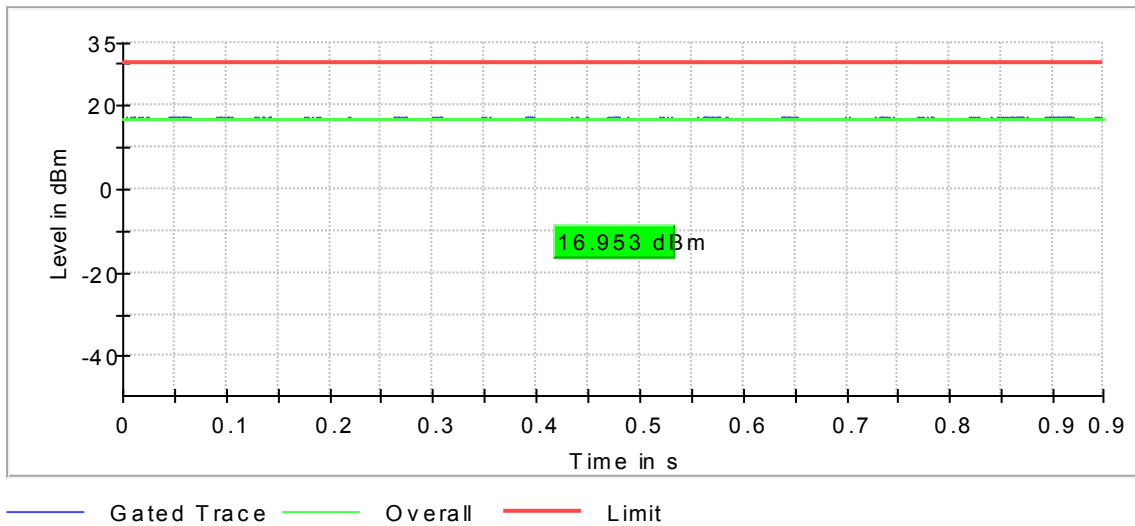
2.5.9 Sample Test Plots



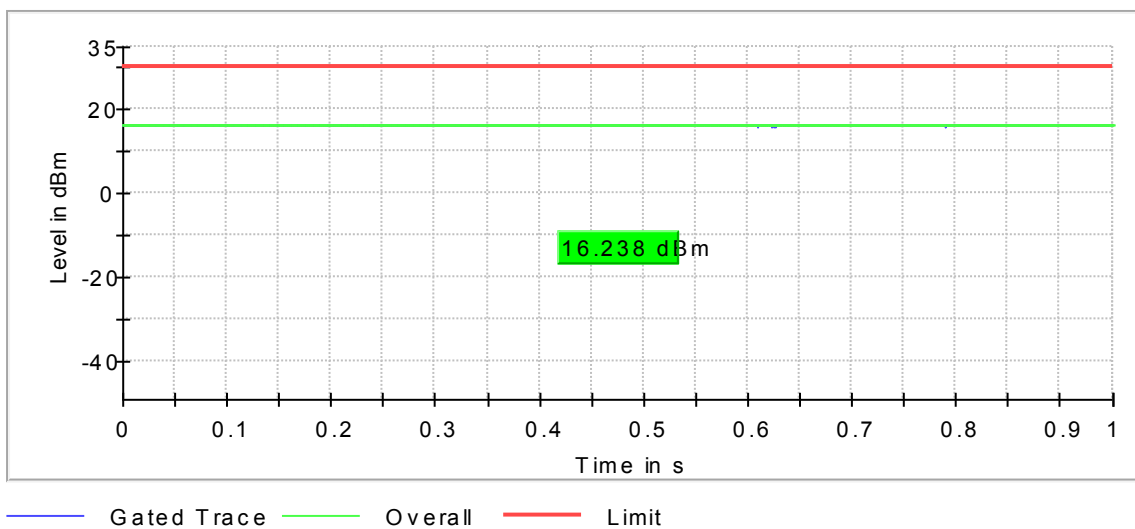
802.11a U-NII 1 MIMO



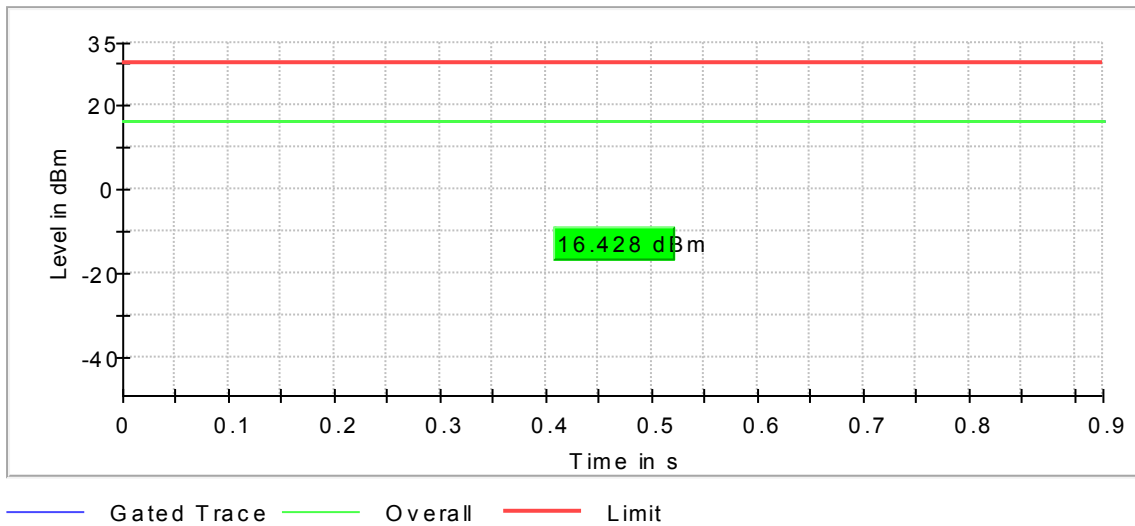
802.11n U-NII 1 MIMO



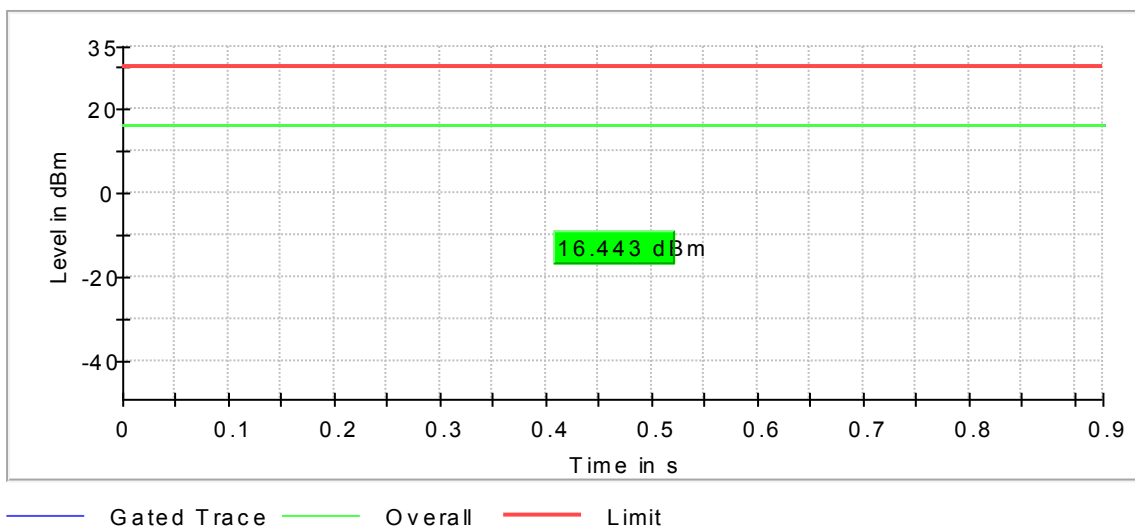
802.11ac U-NII 1 MIMO



802.11a U-NII 3 MIMO



802.11n U-NII 3 MIMO



802.11ac U-NII 3 MIMO



2.6 MAXIMUM POWER SPECTRAL DENSITY (PSD)

2.6.1 Specification Reference

FCC CFR 47 Part 15, Clause 15.407(a)(1)(ii) and (a)(3)
RSS-247, Section 6.2.1.1 and 6.2.4.1

2.6.2 Standard Applicable

FCC CFR 47 Part 15, Clause 15.407 (a)(1):

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

FCC CFR 47 Part 15, Clause 15.407 (a):

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

RSS-247, Section 6.2.1.1:

The maximum e.i.r.p. (5150 – 5250 MHz) shall not exceed 200 mW or $10 + 10 \log_{10} B$, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

RSS-247, Section 6.2.4.1:

The maximum conducted output power (5725 – 5850 MHz) shall not exceed 1 W. The power spectral density shall not exceed 30 dBm in any 500 kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications and multiple collocated transmitters transmitting the same information.



2.6.3 Test Methodology

Section II (F) PSD of 789033 D02 General UNII Test Procedures v02r01

2.6.4 Equipment Under Test and Modification State

Serial No: FF130219B00305 / Test Configuration A

2.6.5 Date of Test/Initial of test personnel who performed the test

March 13 and 14, 2019/FSC

2.6.6 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.7 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.3 °C
Relative Humidity	44.4 %
ATM Pressure	99.5 kPa

2.6.8 Additional Observations

- This is a conducted test using direct connection to TS8997 Test System. Path loss was programmed to the test system for both transmit chains.
- Only the worst-case configuration per technology presented.
- Sample test plots presented are either from Port 1 or Port 2 and may not represent worse case data presented on the summary results table.
- Test methodology is per FCC title 47 part 15 §15.407(a), KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 II.F and ANSI C63.10-2013.

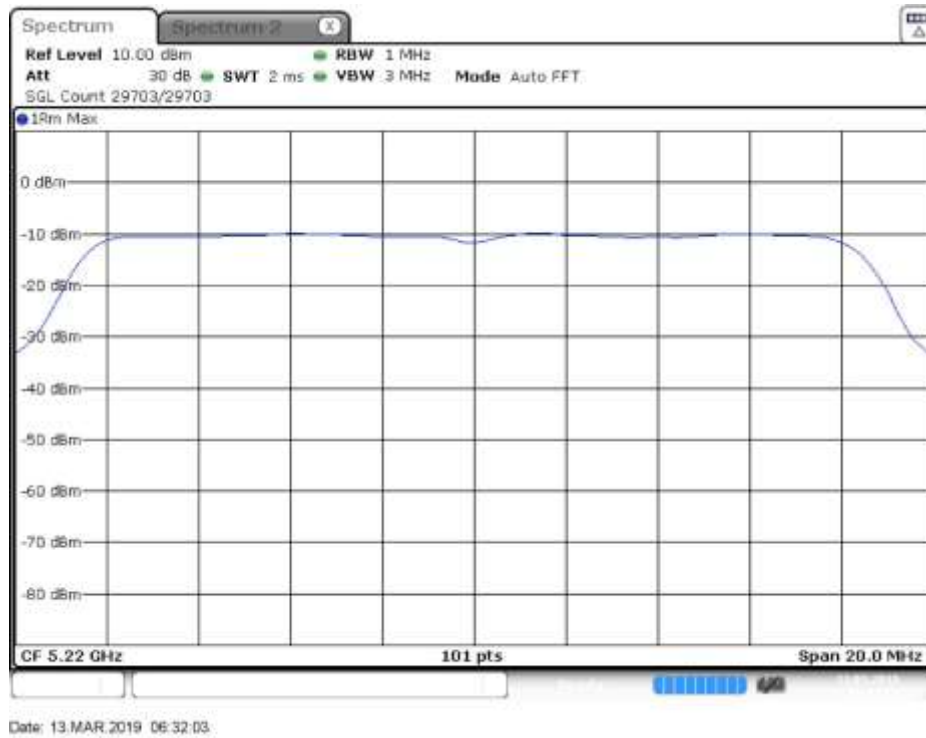


2.6.9 Test Results

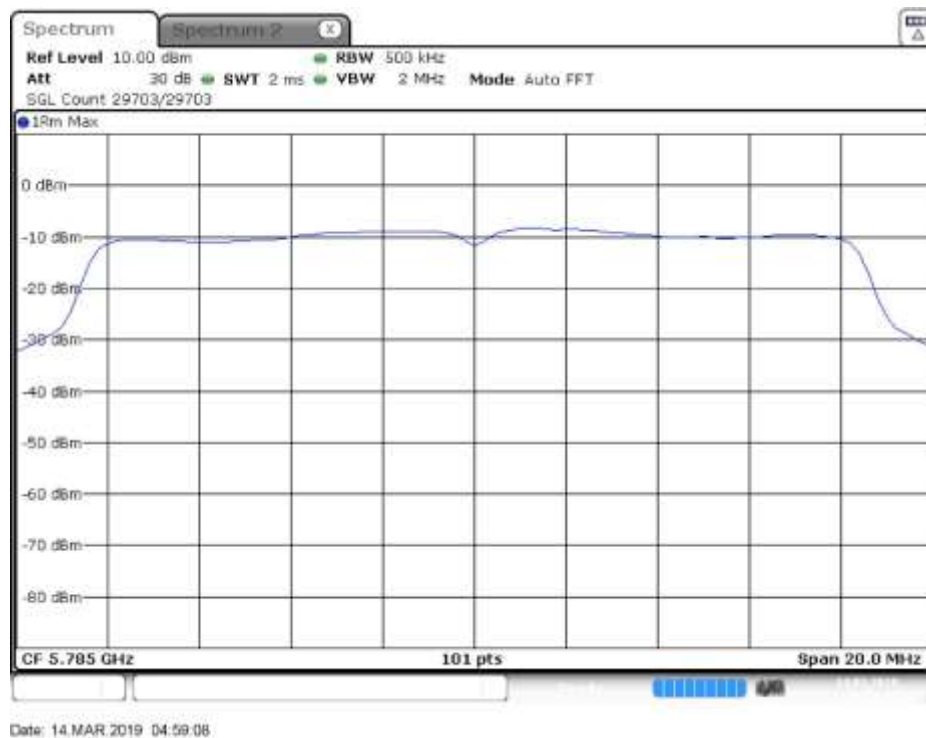
WLAN Mode	Channel	Power Spectral Density (dBm/MHz)	Antenna Gain (dBi)	Calculated EIRP PSD (dBm/MHz)	Limit (dBm)
802.11a U-NII 1	36 (5180 MHz)	-1.710	3.0	1.290	17 dBm/MHz and 10 dBm/MHz EIRP
	44 (5220 MHz)	-2.032		0.968	
	48 (5240 MHz)	-2.057		0.943	
802.11n U-NII 1 20 MHz BW	36 (5180 MHz)	-1.940	3.0	1.060	17 dBm/MHz and 10 dBm/MHz EIRP
	44 (5220 MHz)	-2.491		0.509	
	48 (5240 MHz)	-2.584		0.416	
802.11n U-NII 1 40 MHz BW	38 (5190 MHz)	-7.767	3.0	-4.767	17 dBm/MHz and 10 dBm/MHz EIRP
	46 (5230 MHz)	-7.789		-4.789	
802.11ac U-NII 1 20 MHz BW	36 (5180 MHz)	1.093	3.0	4.093	17 dBm/MHz and 10 dBm/MHz EIRP
	44 (5220 MHz)	0.659		3.659	
	48 (5240 MHz)	0.976		3.976	
802.11ac U-NII 1 40 MHz BW	38 (5190 MHz)	-7.915	3.0	-4.915	17 dBm/MHz and 10 dBm/MHz EIRP
	46 (5230 MHz)	-7.853		-4.853	
802.11ac U-NII 1 80 MHz BW	42 (5210 MHz)	-6.069	3.0	-3.069	17 dBm/MHz and 10 dBm/MHz EIRP

WLAN Mode	Channel	Power Spectral Density (dBm/500kHz)	Limit (dBm)
802.11a U-NII 3	149 (5745 MHz)	-0.745	30 dBm/500 kHz
	157 (5785 MHz)	0.568	
	165 (5825 MHz)	0.402	
802.11n U-NII 3 20 MHz BW	149 (5745 MHz)	-2.003	30 dBm/500 kHz
	157 (5785 MHz)	-1.300	
	165 (5825 MHz)	-1.719	
802.11n U-NII 3 40 MHz BW	151 (5755 MHz)	-10.231	30 dBm/500 kHz
	159 (5795 MHz)	-9.105	
802.11ac U-NII 3 20 MHz BW	149 (5745 MHz)	-2.981	30 dBm/500 kHz
	157 (5785 MHz)	-1.796	
	165 (5825 MHz)	-1.743	
802.11ac U-NII 3 40 MHz BW	151 (5755 MHz)	-6.638	30 dBm/500 kHz
	159 (5795 MHz)	-5.471	
802.11ac U-NII 3 80 MHz BW	155 (5775 MHz)	-4.978	30 dBm/500 kHz

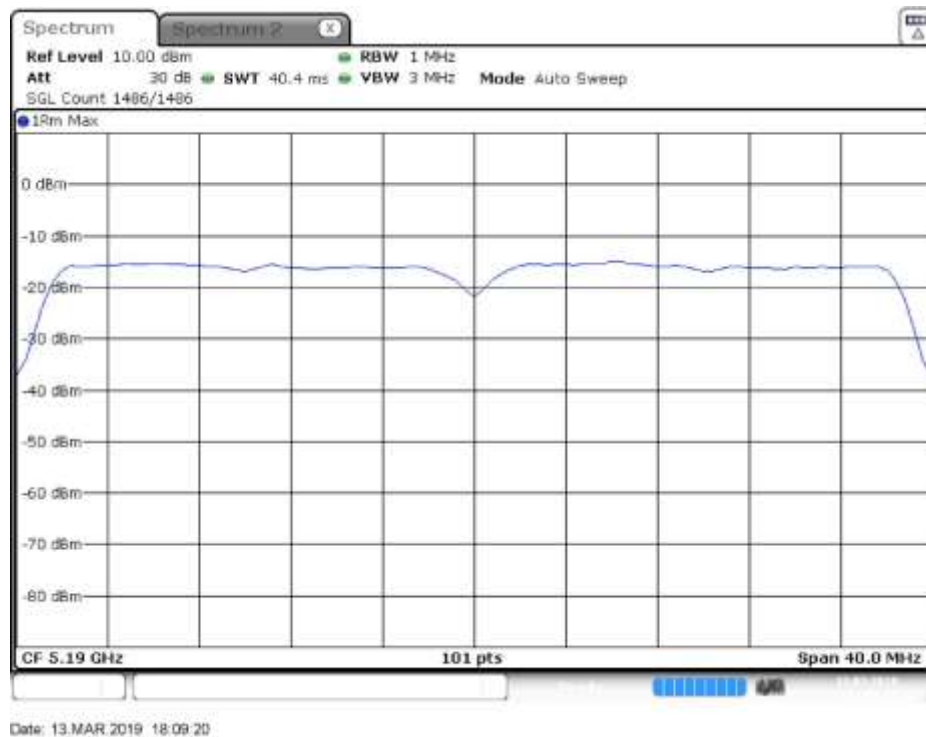
2.6.10 Sample Test Plots



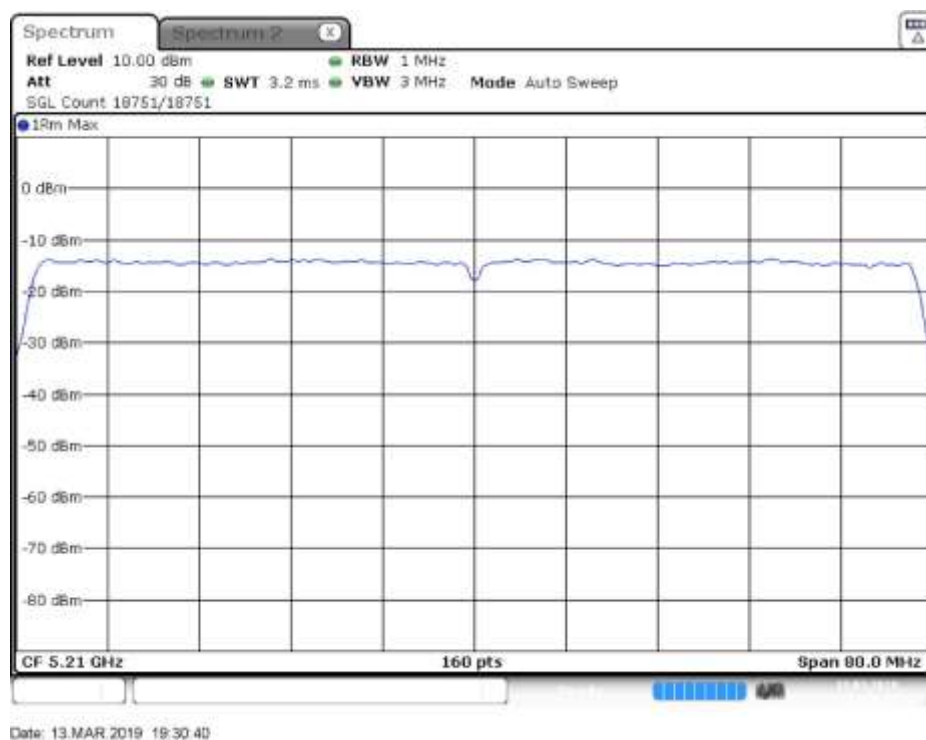
802.11a U-NII 1 Middle Channel



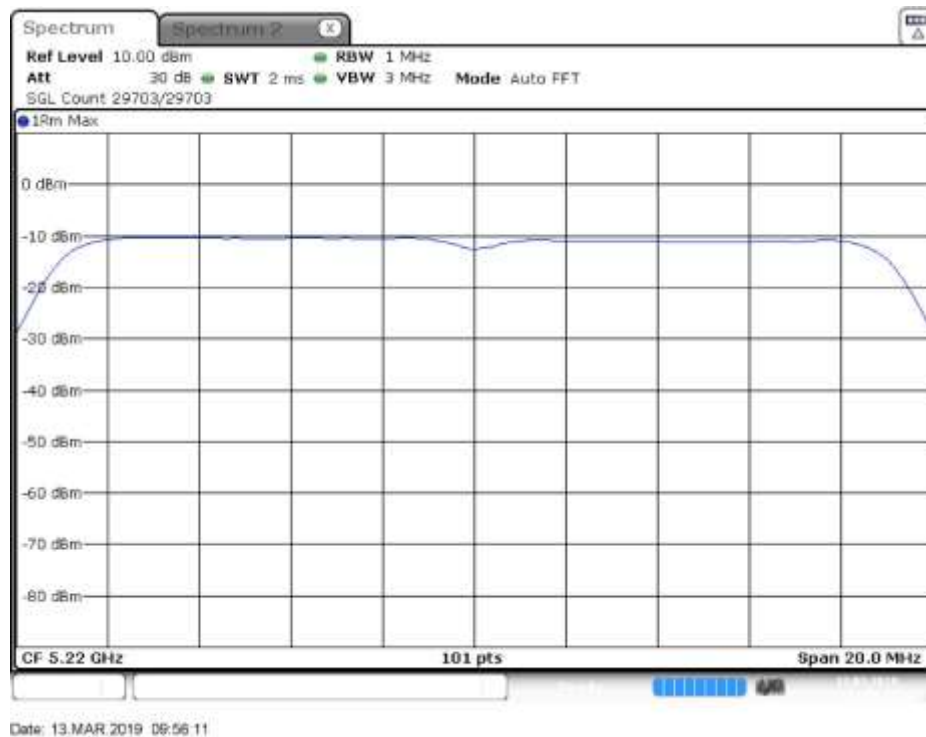
802.11a U-NII 3 Middle Channel



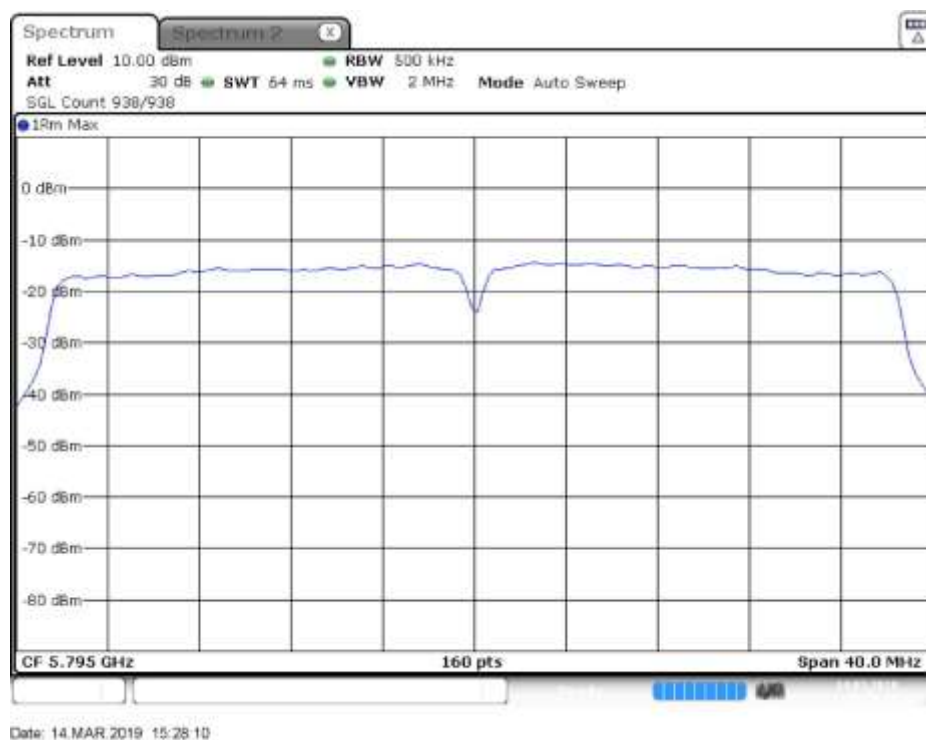
802.11ac U-NII 1 Low Channel 40MHz BW



802.11ac U-NII 1 80MHz BW



802.11n U-NII 1 Middle Channel



802.11n U-NII 3 High Channel 40MHz BW



2.7 UNWANTED EMISSIONS MEASUREMENT

2.7.1 Specification Reference

FCC CFR 47 Part 15, Clause 15.407(b)(1), (4)(i) and (7)
FCC CFR 47 Part 15, Clause 15.209
RSS-247, Section 6.2.1.2 and 6.2.4.2

2.7.2 Standard Applicable

FCC CFR 47 Part 15, Clause 15.407:

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

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

(4) For transmitters operating in the 5.725-5.85 GHz band

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

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

RSS-247, Section 6.2.1.2:

For transmitters with operating frequencies in the band 5150-5250 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p. Any unwanted emissions that fall into the band 5250-5350 MHz shall be attenuated below the channel power by at least 26 dB, when measured using a resolution bandwidth between 1 and 5% of the occupied bandwidth (i.e. 99% bandwidth), above 5250 MHz. The 26 dB bandwidth may fall into the 5250-5350 MHz band; however, if the occupied bandwidth also falls within the 5250-5350 MHz band, the transmission is considered as intentional and the devices shall comply with all requirements in the band 5250-5350 MHz including implementing dynamic frequency selection (DFS) and TPC, on the portion of the emission that resides in the 5250-5350 MHz band.

RSS-247, Section 6.2.4.2:

Devices operating in the band 5725-5850 MHz shall have e.i.r.p. of unwanted emissions comply with the following:

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

2.7.3 Test Methodology

Section II (G) Unwanted Emission Measurement of 789033 D02 General UNII Test Procedures v02r01



2.7.4 Equipment Under Test and Modification State

Serial No: FF130219B00305 and FF130219B00294 / Test Configuration A and B

2.7.5 Date of Test/Initial of test personnel who performed the test

March 15 and 17, 2019/FSC

2.7.6 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.7.7 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.3 °C
Relative Humidity	44.4 %
ATM Pressure	99.5 kPa

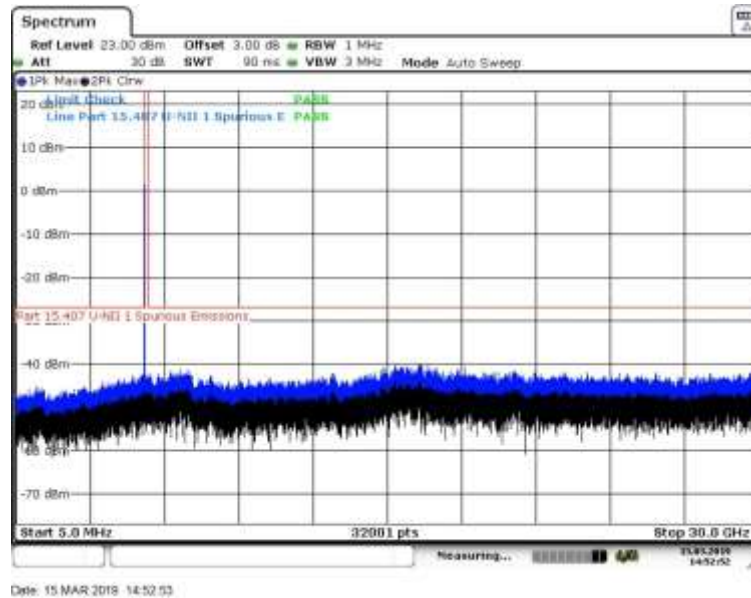
2.7.8 Additional Observations

- This is an antenna-port conducted measurement test plus radiated cabinet spurious emissions measurements.
- For conducted measurement, only the worst-case data rate/modulation presented.
- Sweep time is set to auto.
- Transducer Factor (TDF) was added to compensate for the external attenuator and cable used.
- Antenna gain was added and additional 3dB offset was added for MIMO mode (verification performed on worst case antenna port).
- When measuring conducted cabinet spurious emissions, the field strength limit of 15.209 is first converted to dBm (EIRP) using the formula under Section G(2)d)(ii) of 789033 D02 General UNII Test Procedures v02r01 for below 1GHz measurements, otherwise §15.407 limits applies. If Peak complies with the limit, no Average evaluation will be performed (above 1GHz measurements).
- Only worst-case configuration (channel, data rate or MCS and BW) used for radiated cabinet spurious emissions test.
- Radiated measurement was done using EMC32 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.7.9 for sample computation.

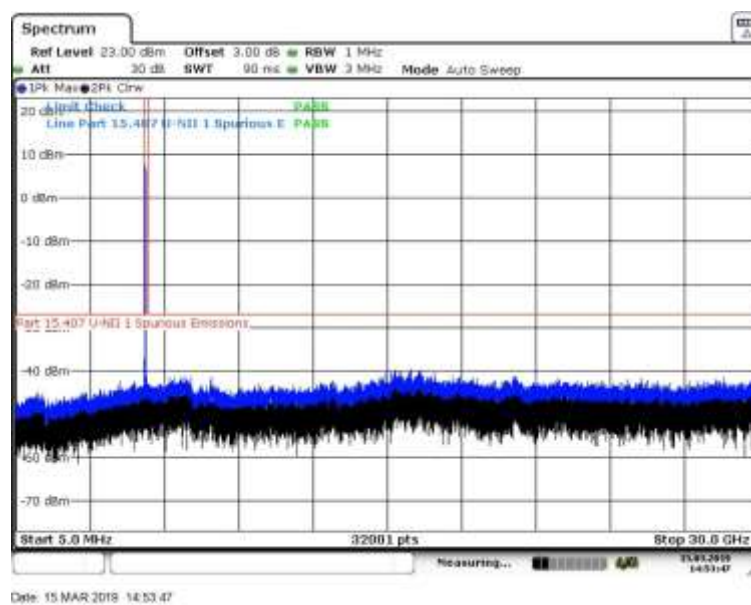
2.7.9 Sample Computation (Radiated Emission)

Measuring equipment raw measurement (dbμV) @ 30 MHz			24.4
Correction Factor (dB)	Asset# 1066 (cable)	0.3	-12.6
	Asset# 1172 (cable)	0.3	
	Asset# 1016 (preamplifier)	-30.7	
	Asset# 1175(cable)	0.3	
	Asset# 1002 (antenna)	17.2	
Reported QuasiPeak Final Measurement (dbμV/m) @ 30MHz			11.8

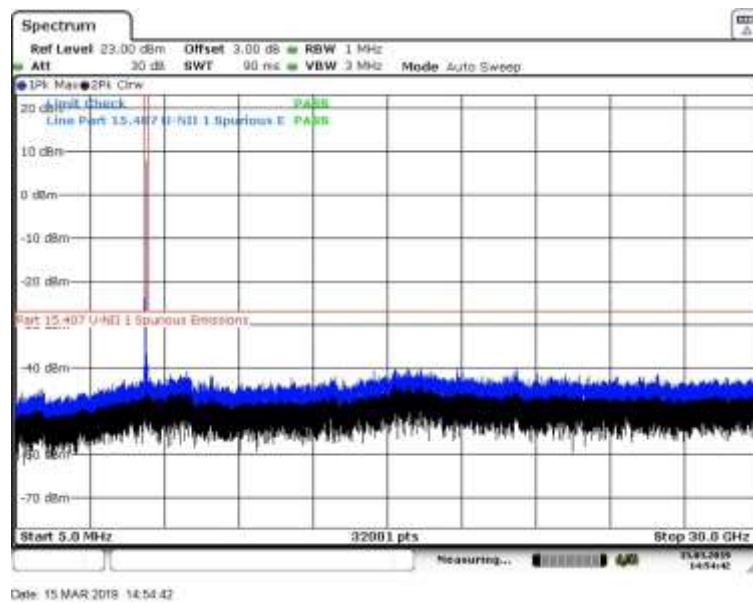
2.7.10 Test Plots



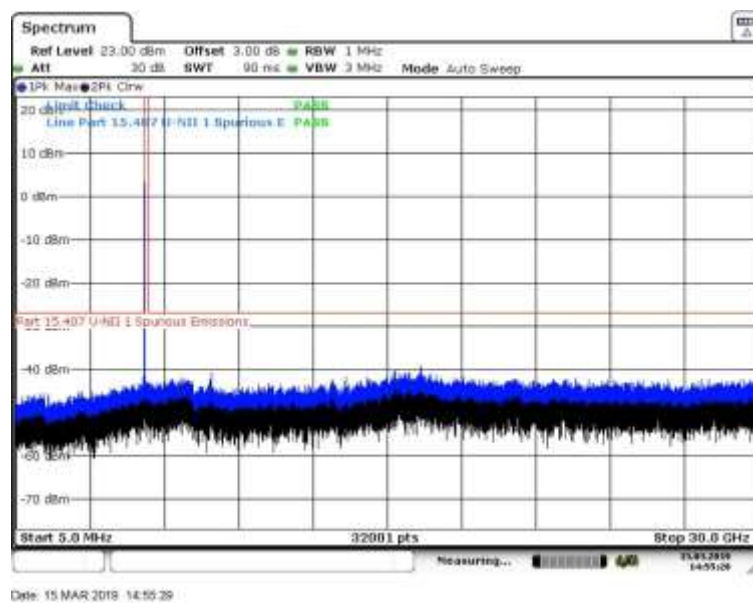
802.11 a U-NII 1 Low Channel



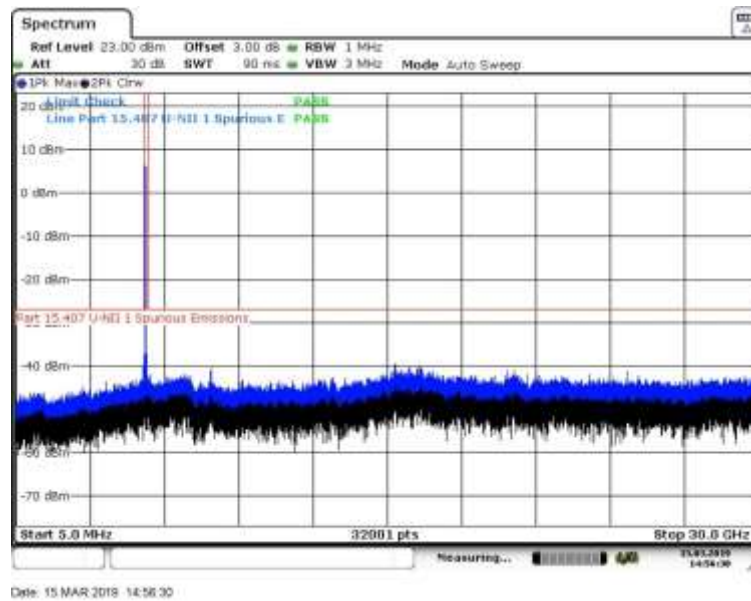
802.11 a U-NII 1 Mid Channel



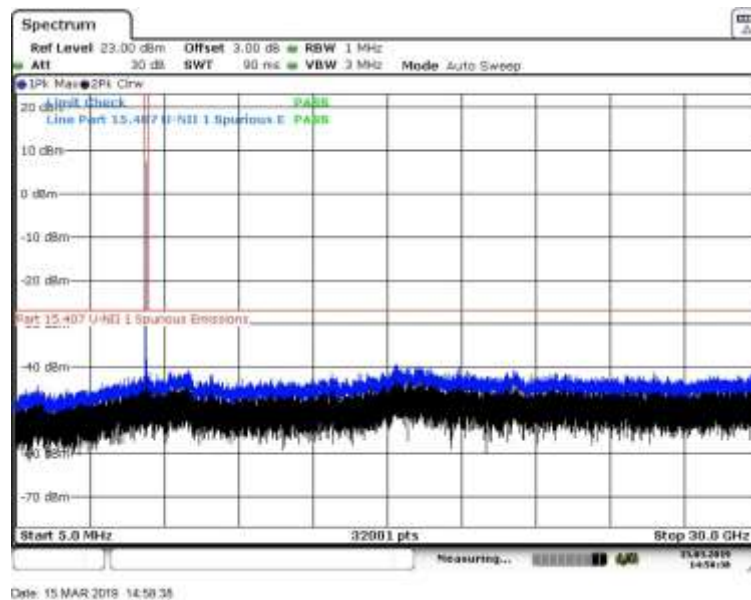
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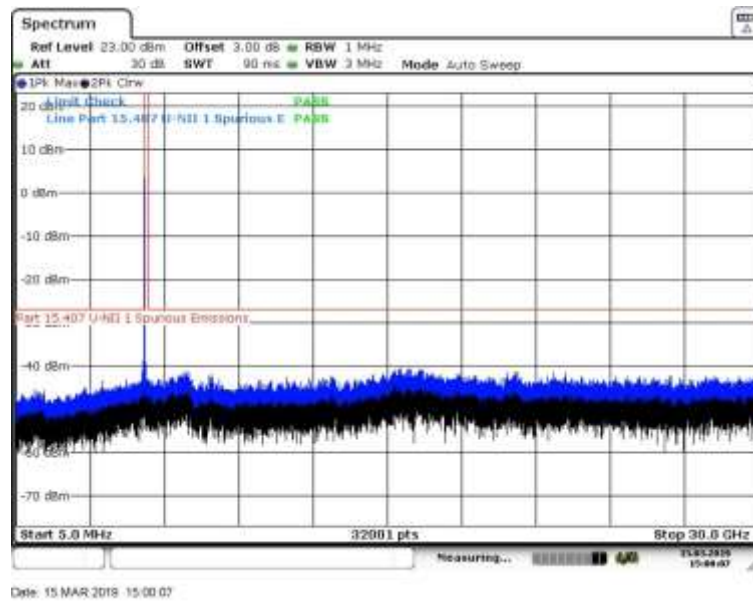
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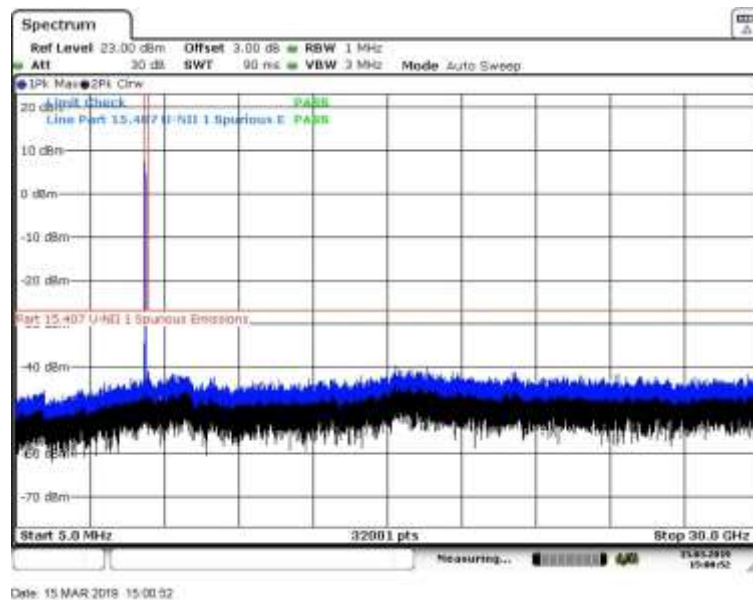
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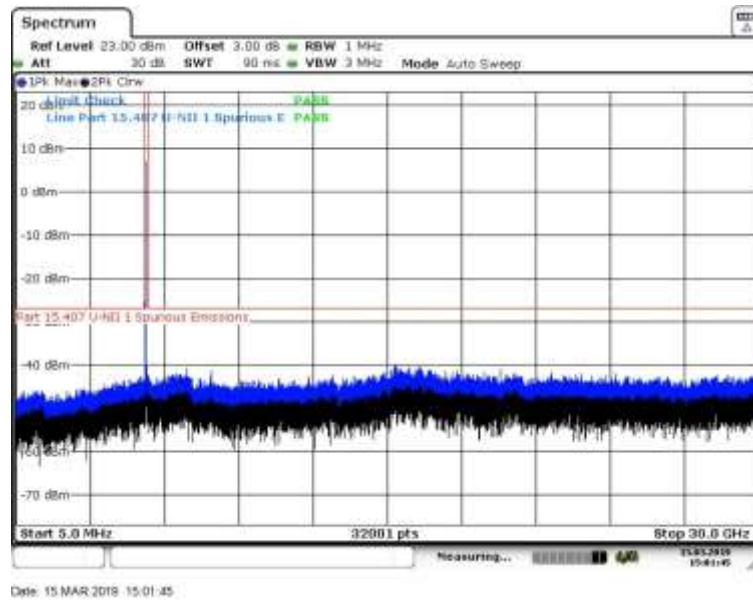
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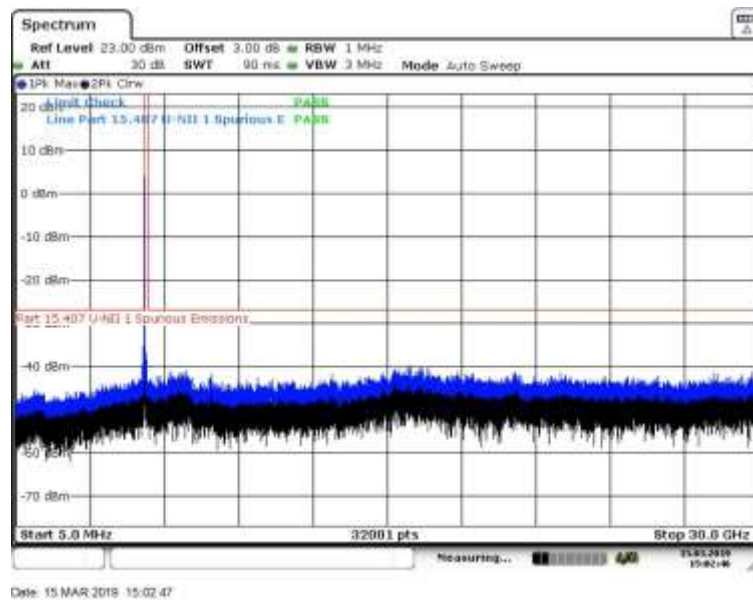
802.11 ac U-NII 1 Low Channel



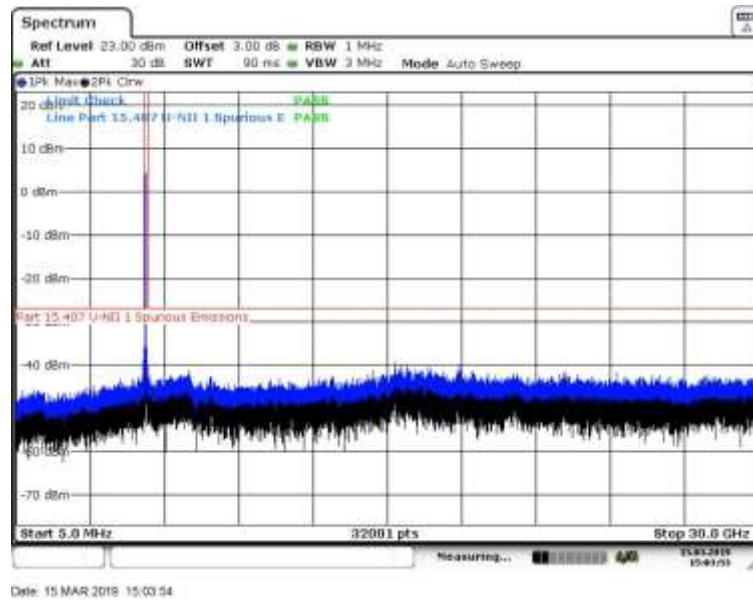
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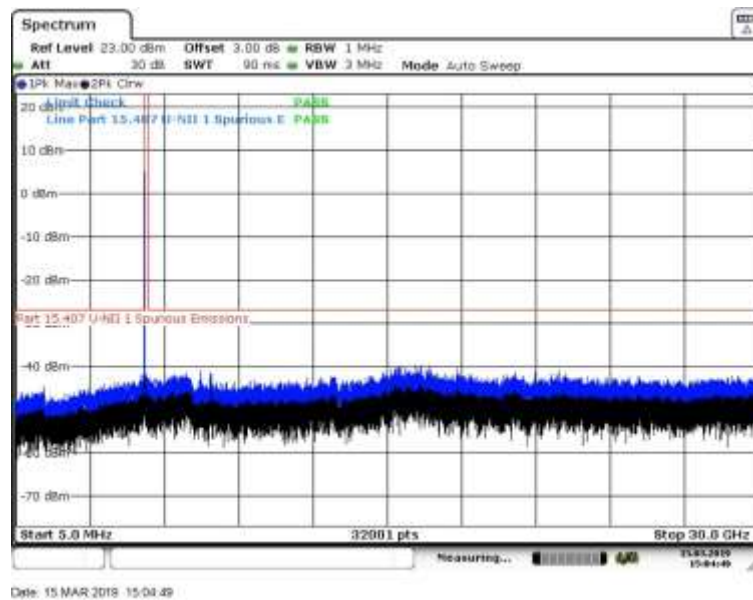
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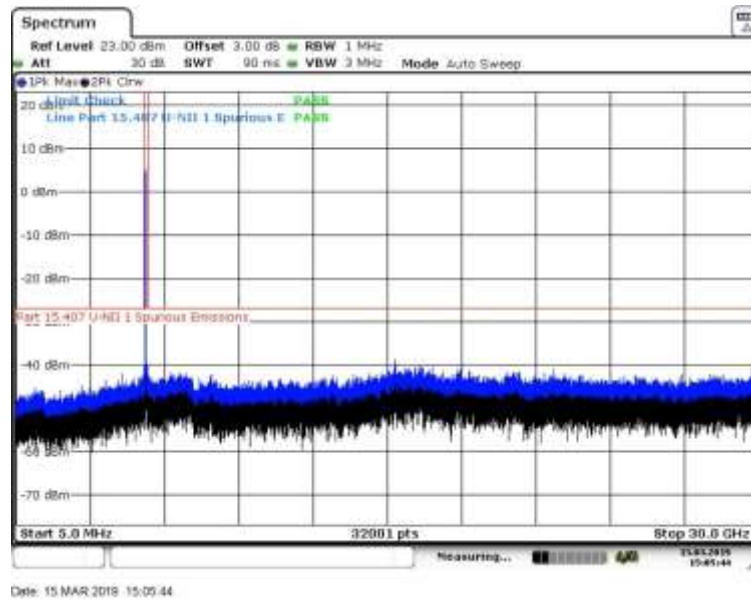
802.11 n U-NII 1 Low Channel 40MHz BW



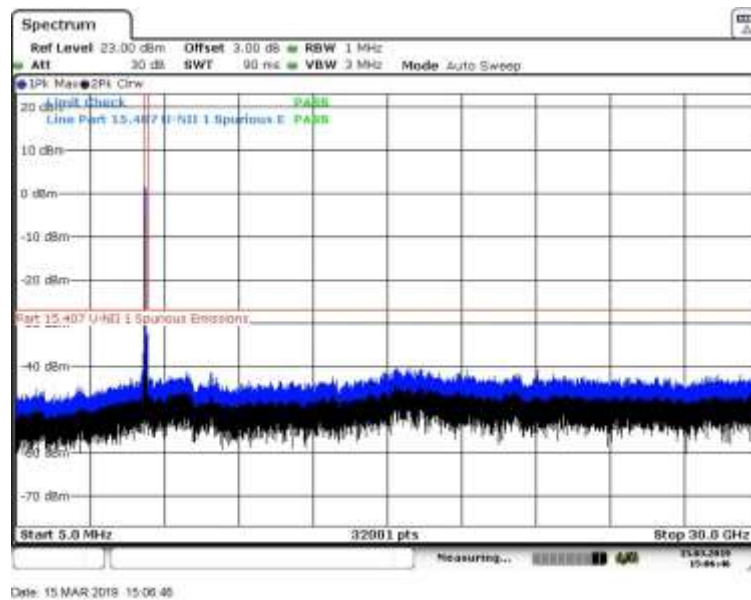
802.11 n U-NII 1 High Channel 40MHz BW



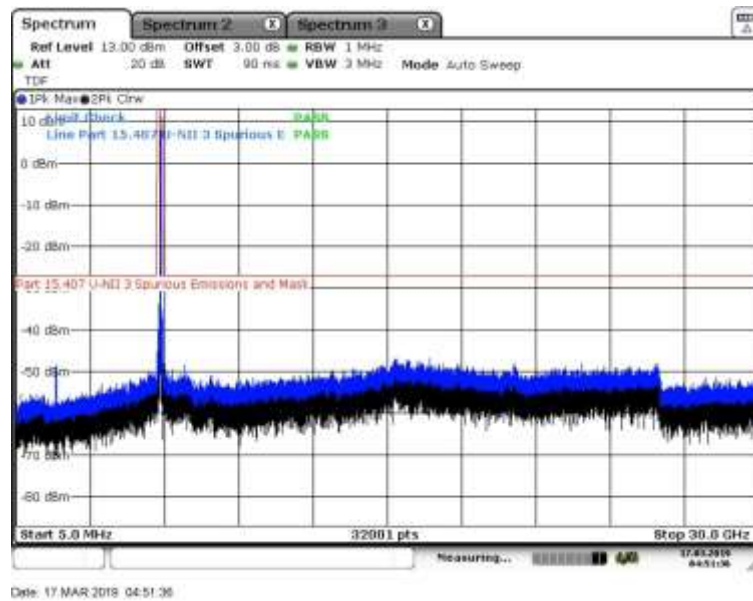
802.11 ac U-NII 1 Low Channel 40MHz BW



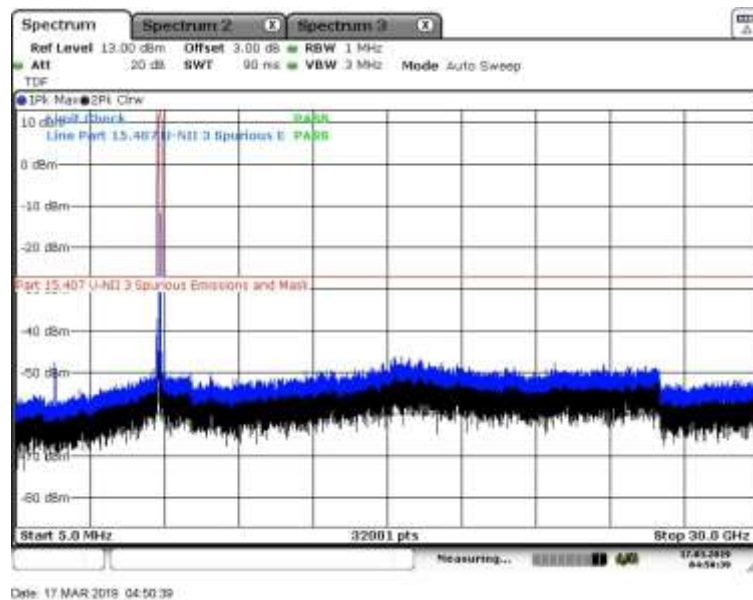
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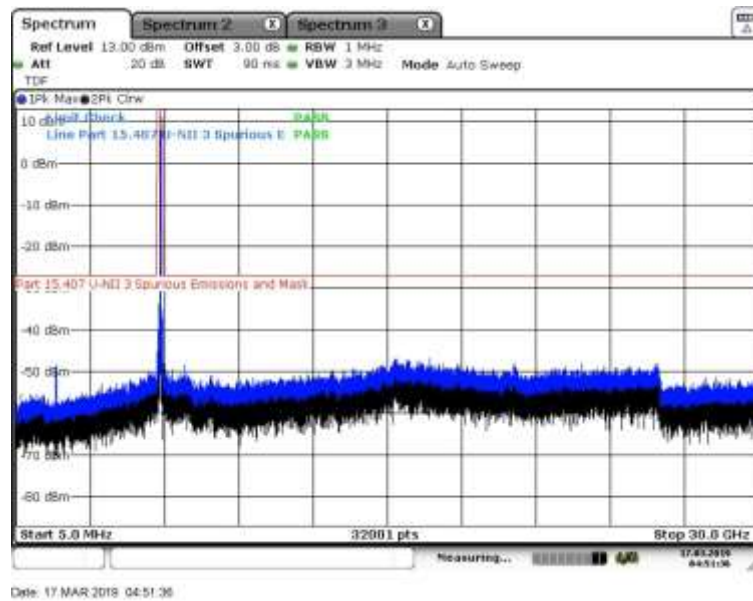
802.11 ac U-NII 1 80MHz BW



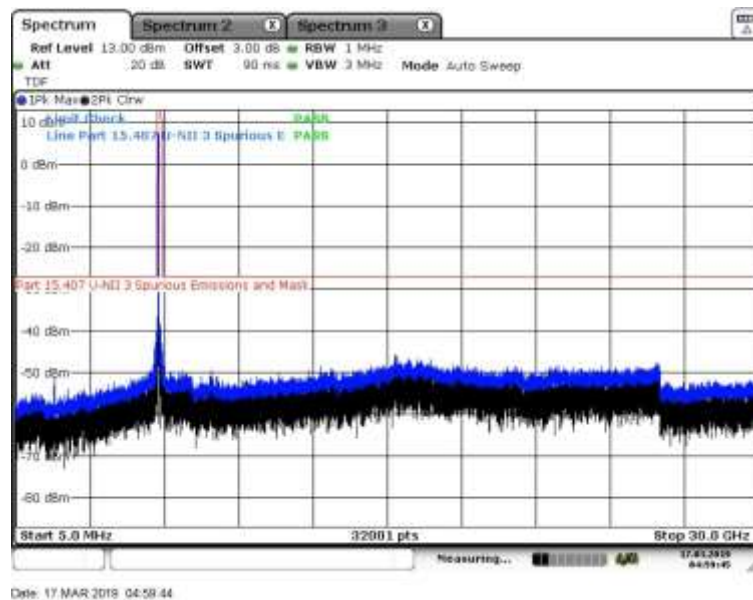
802.11 a U-NII 3 Low Channel



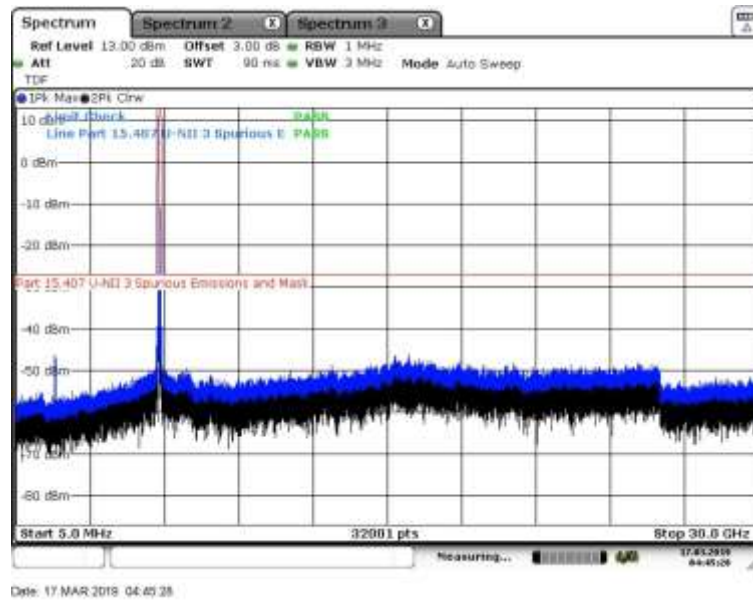
802.11 a U-NII 3 Mid Channel



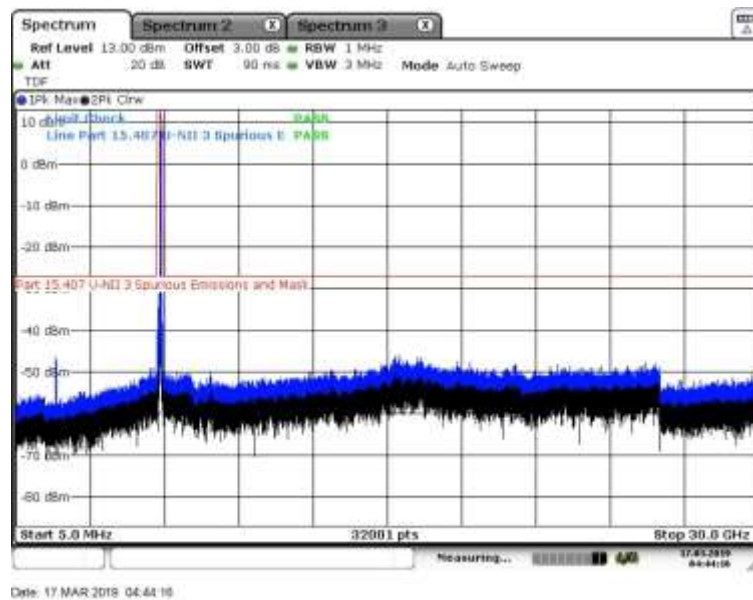
802.11 a U-NII 3 High Channel



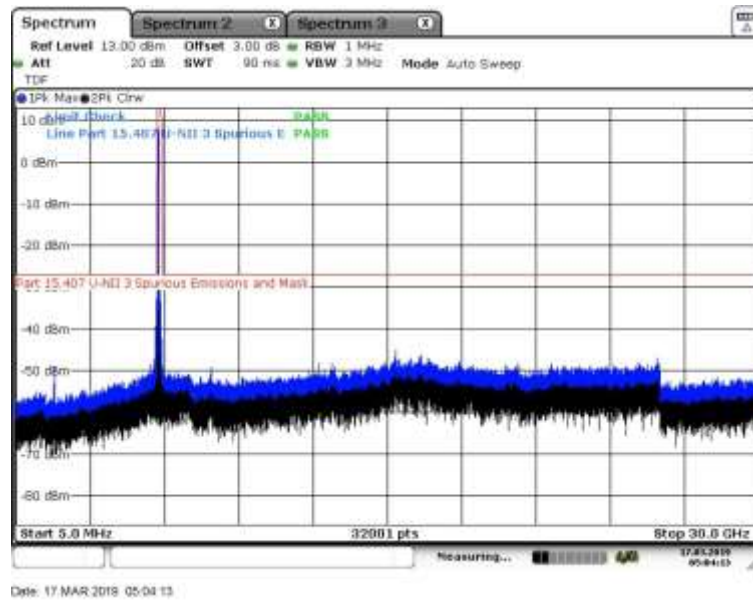
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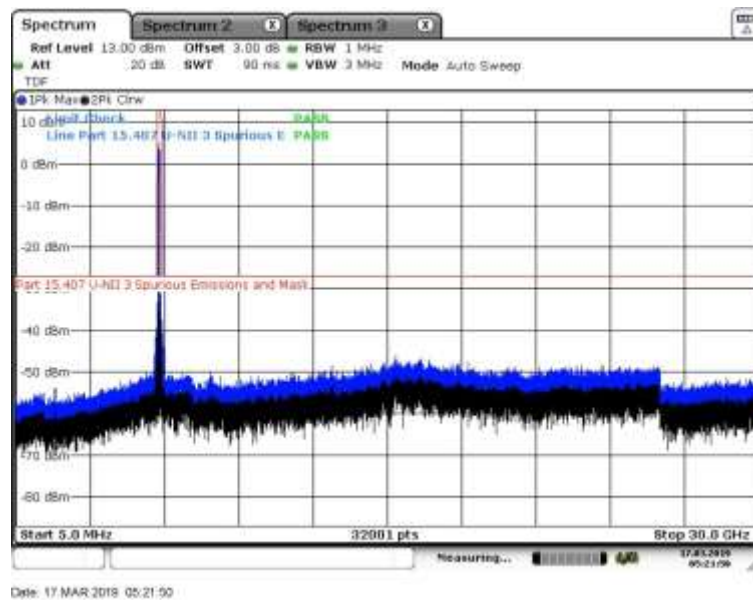
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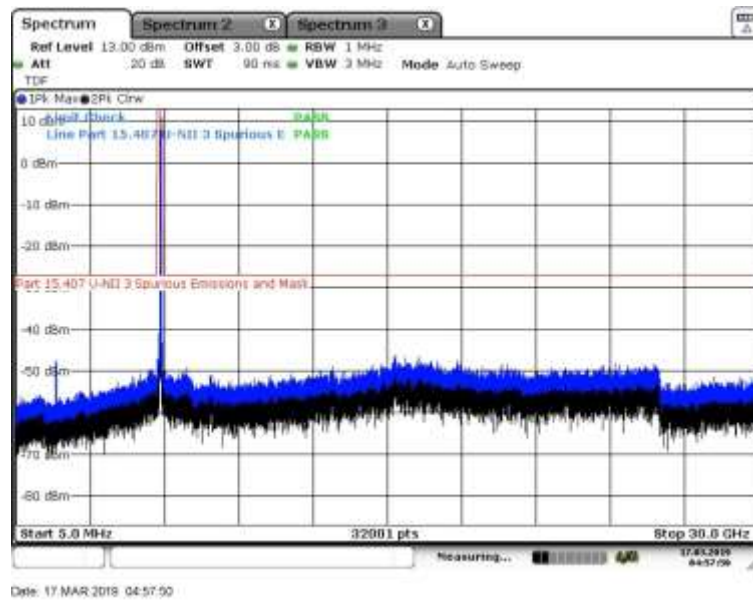
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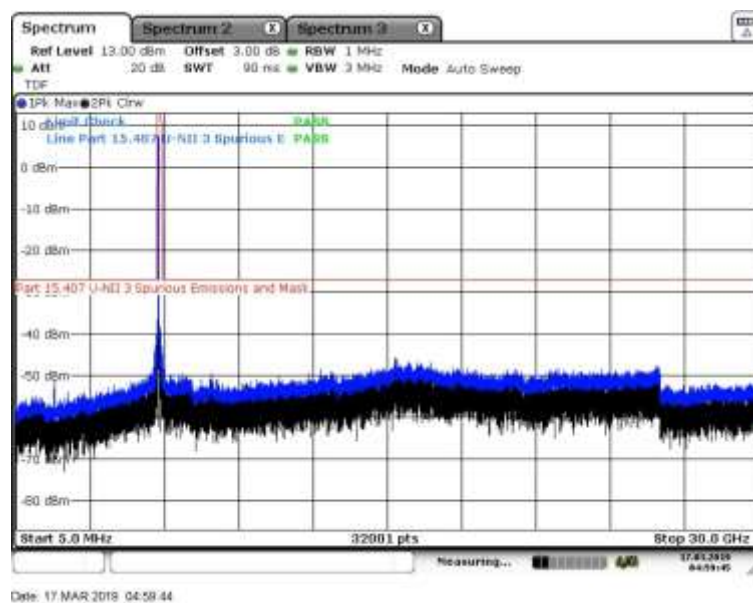
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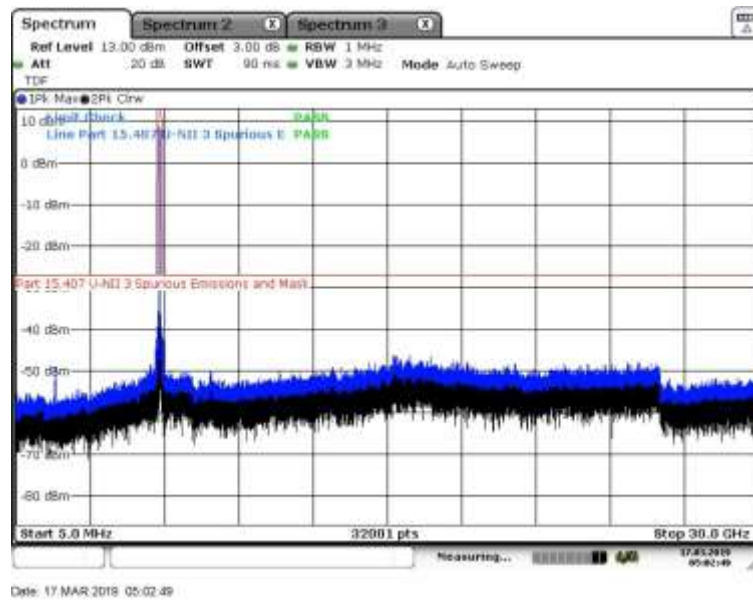
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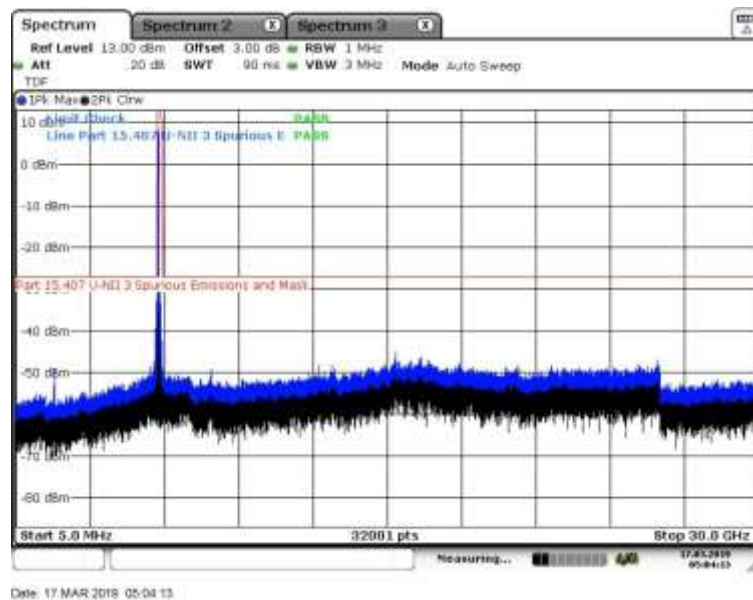
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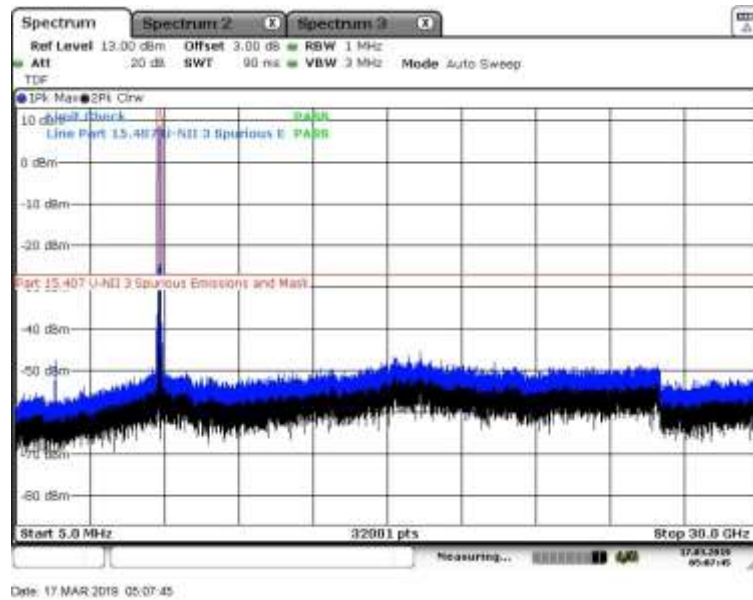
802.11 n U-NII 3 Low Channel 40MHz BW



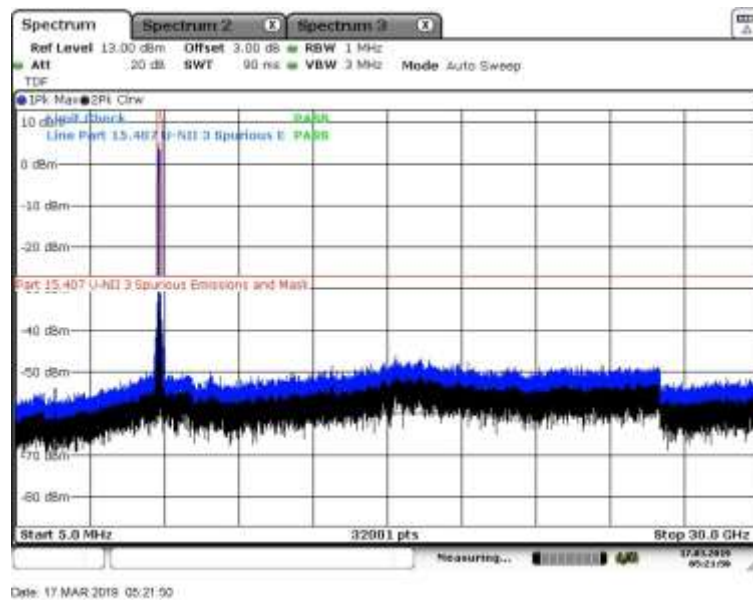
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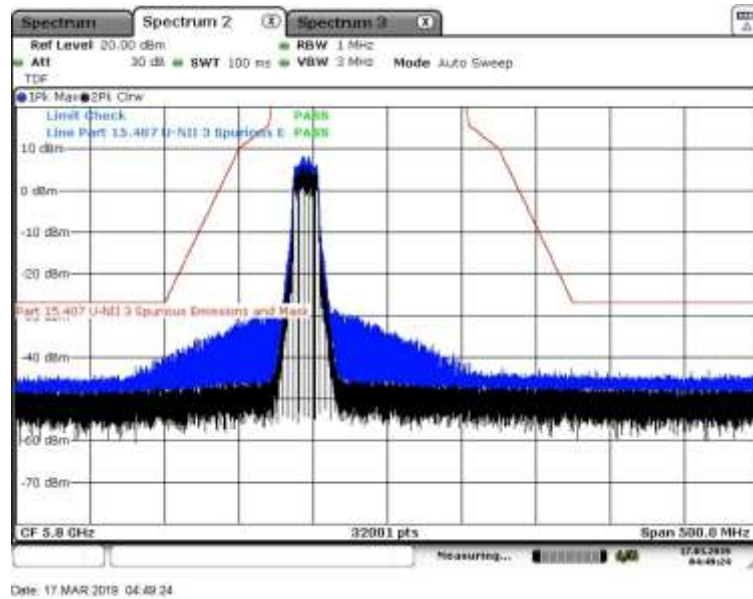
802.11 ac U-NII 3 Low Channel 40MHz BW



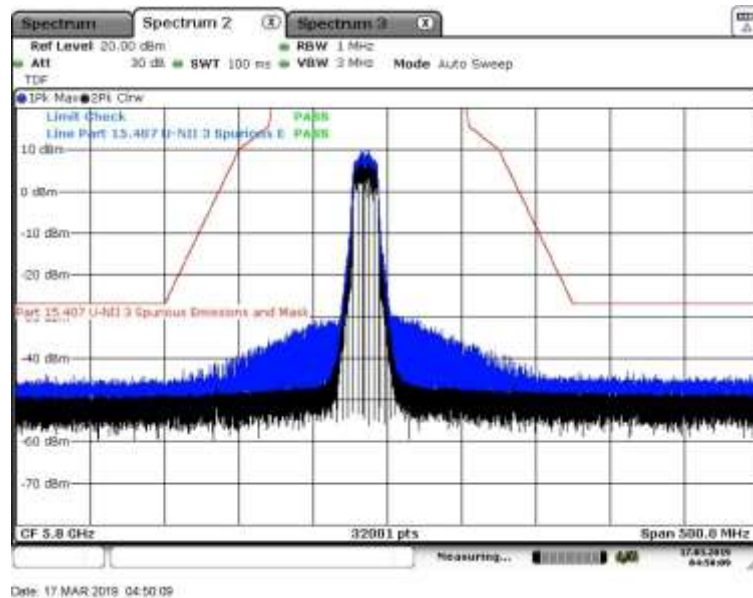
802.11 ac U-NII 3 High Channel 40MHz BW



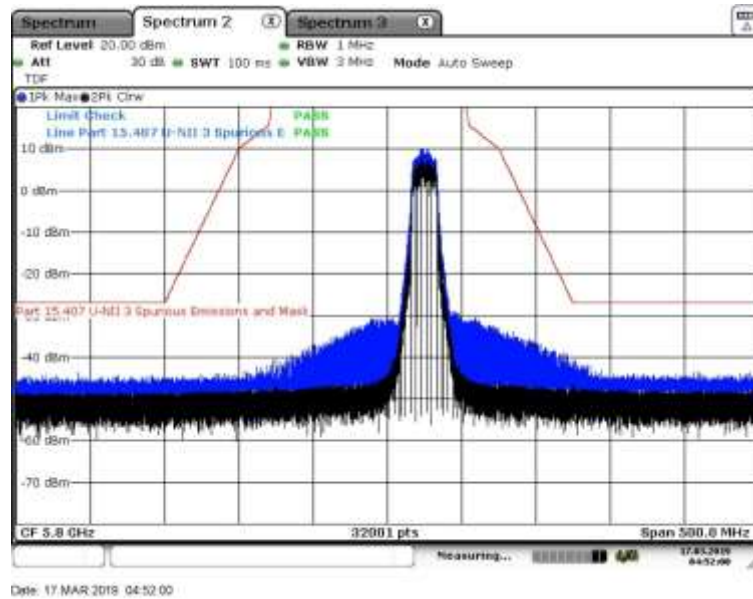
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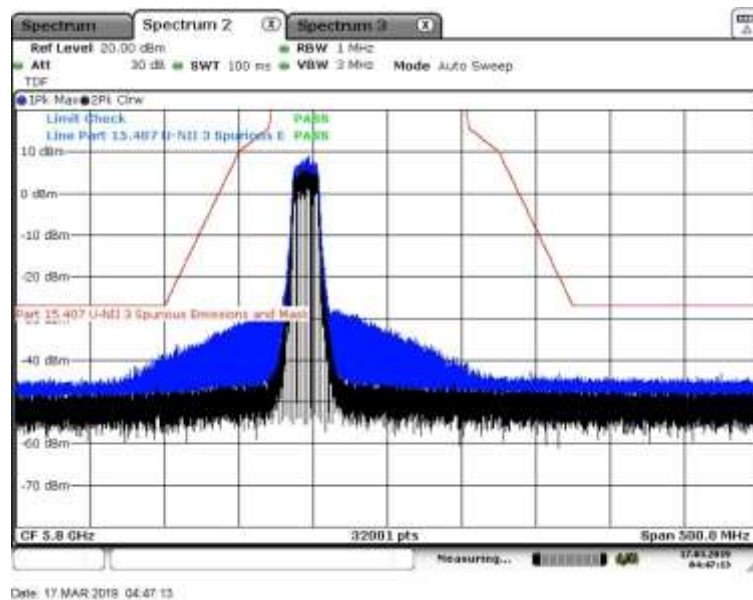
802.11 a U-NII 3 Low Channel



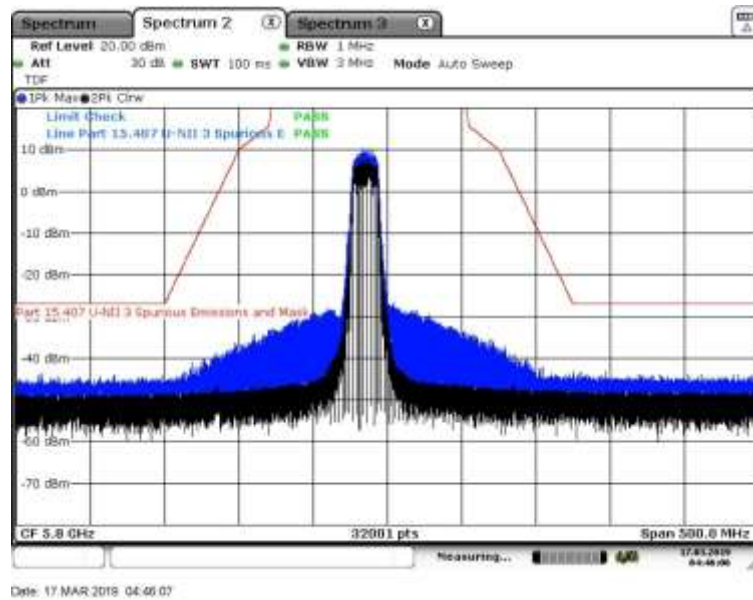
802.11 a U-NII 3 Mid Channel



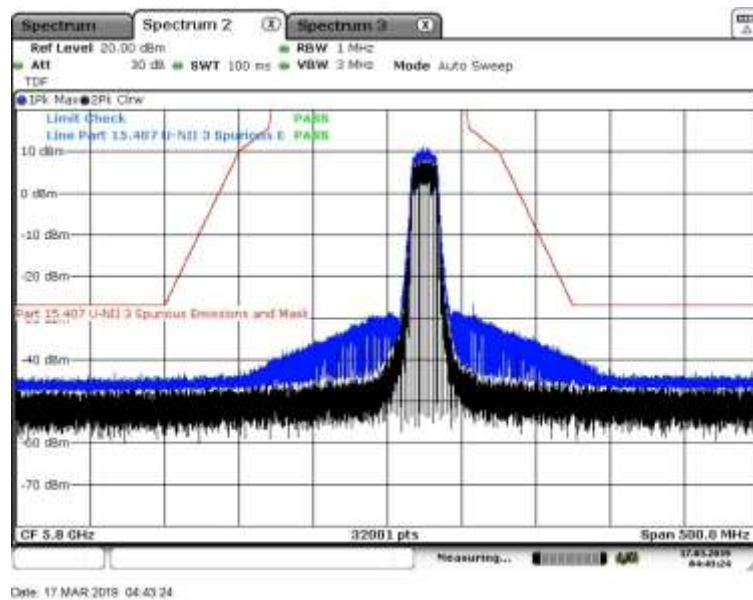
802.11 a U-NII 3 High Channel



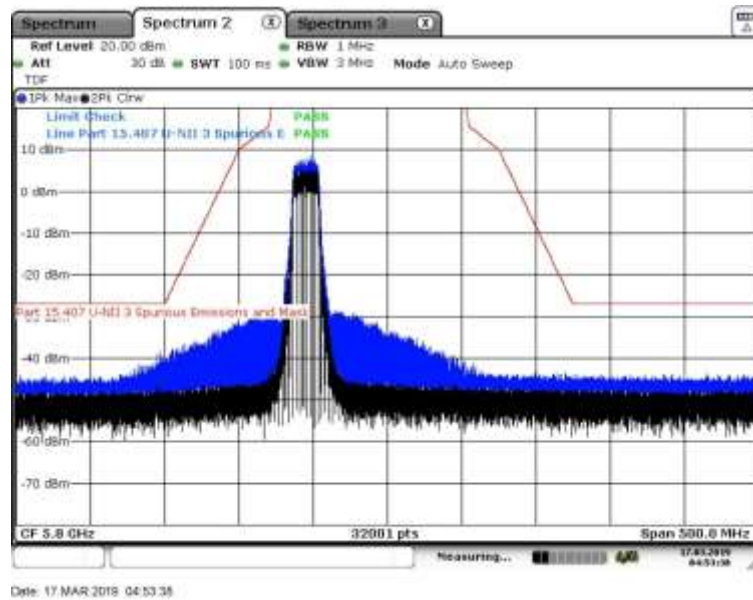
802.11 n U-NII 3 Low Channel



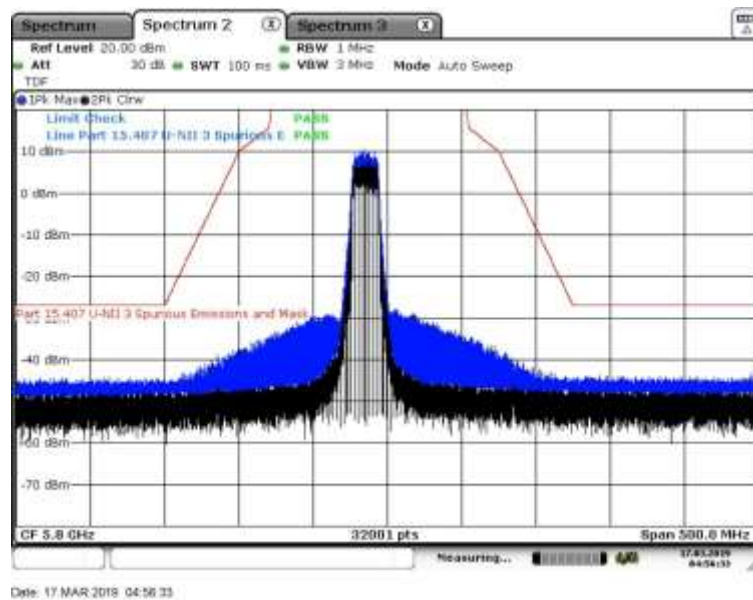
802.11 n U-NII 3 Mid Channel



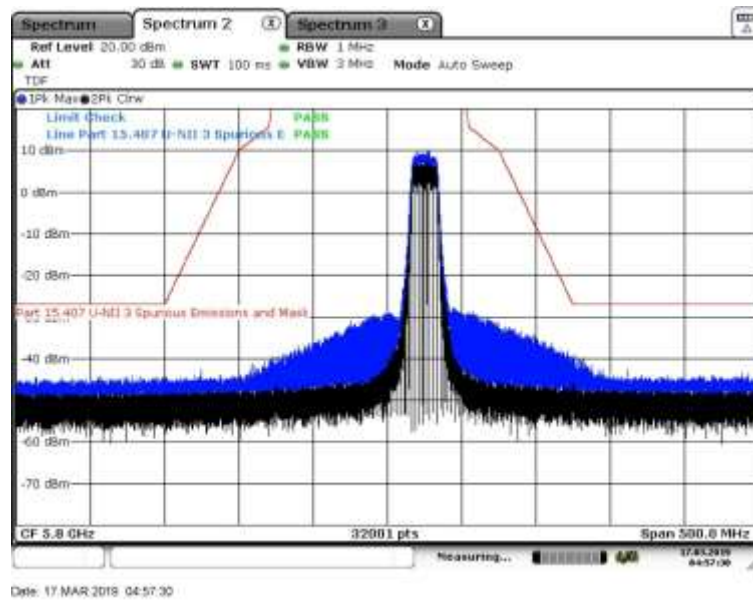
802.11 n U-NII 3 High Channel



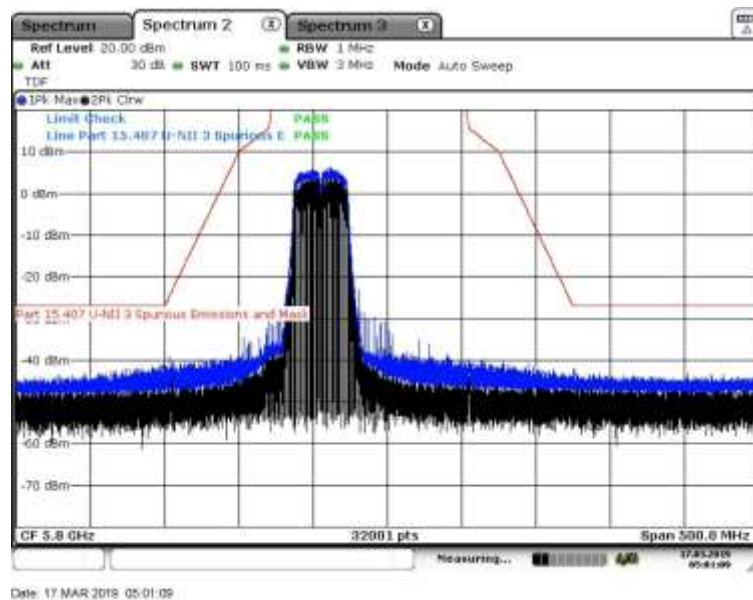
802.11 ac U-NII 3 Low Channel



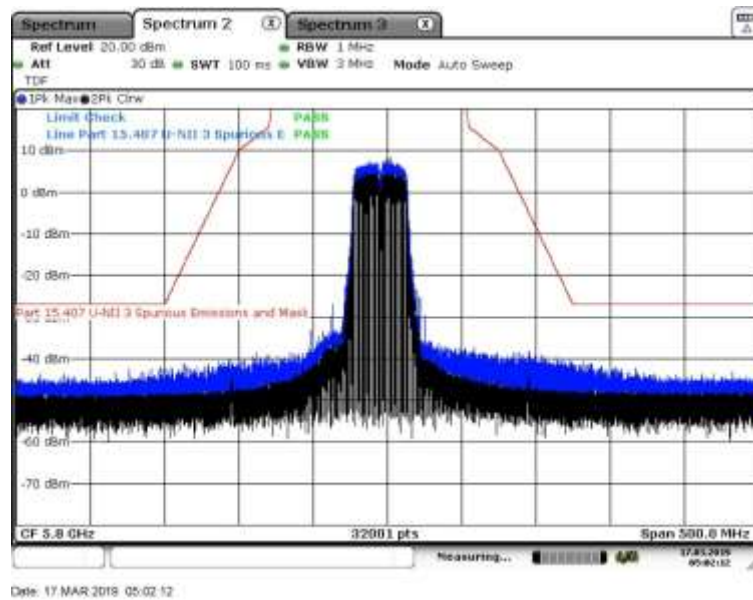
802.11 ac U-NII 3 Mid Channel



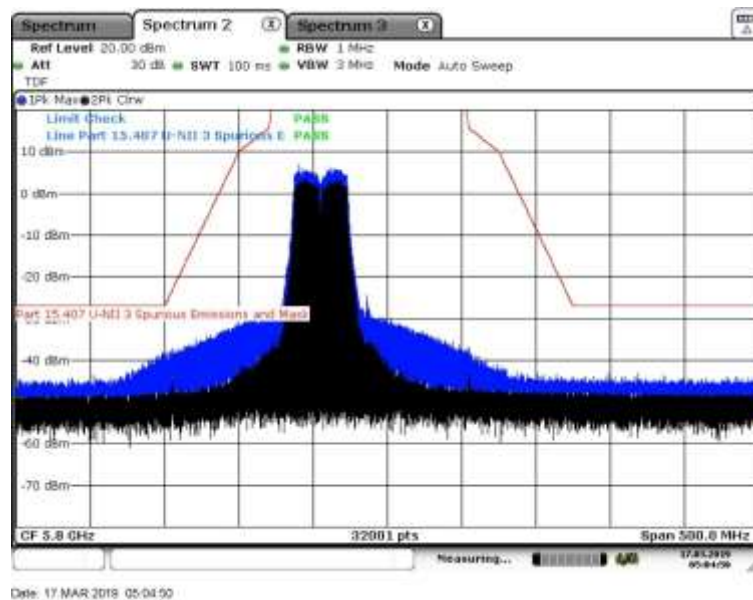
802.11 ac U-NII 3 High Channel



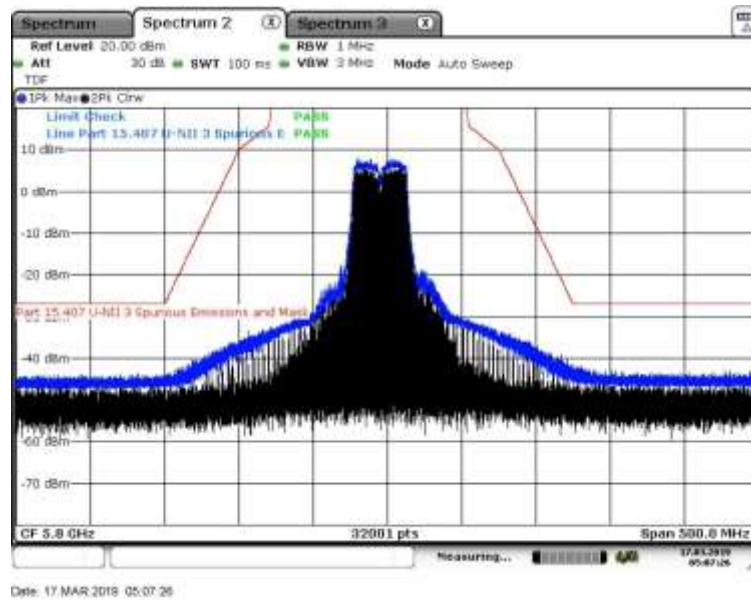
802.11 n U-NII 3 Low Channel 40MHz BW



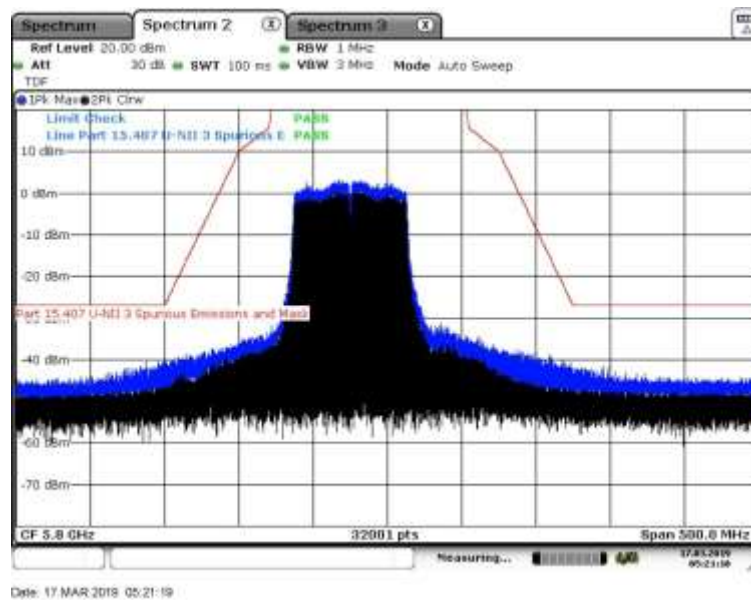
802.11 n U-NII 3 High Channel 40MHz BW



802.11 ac U-NII 3 Low Channel 40MHz BW

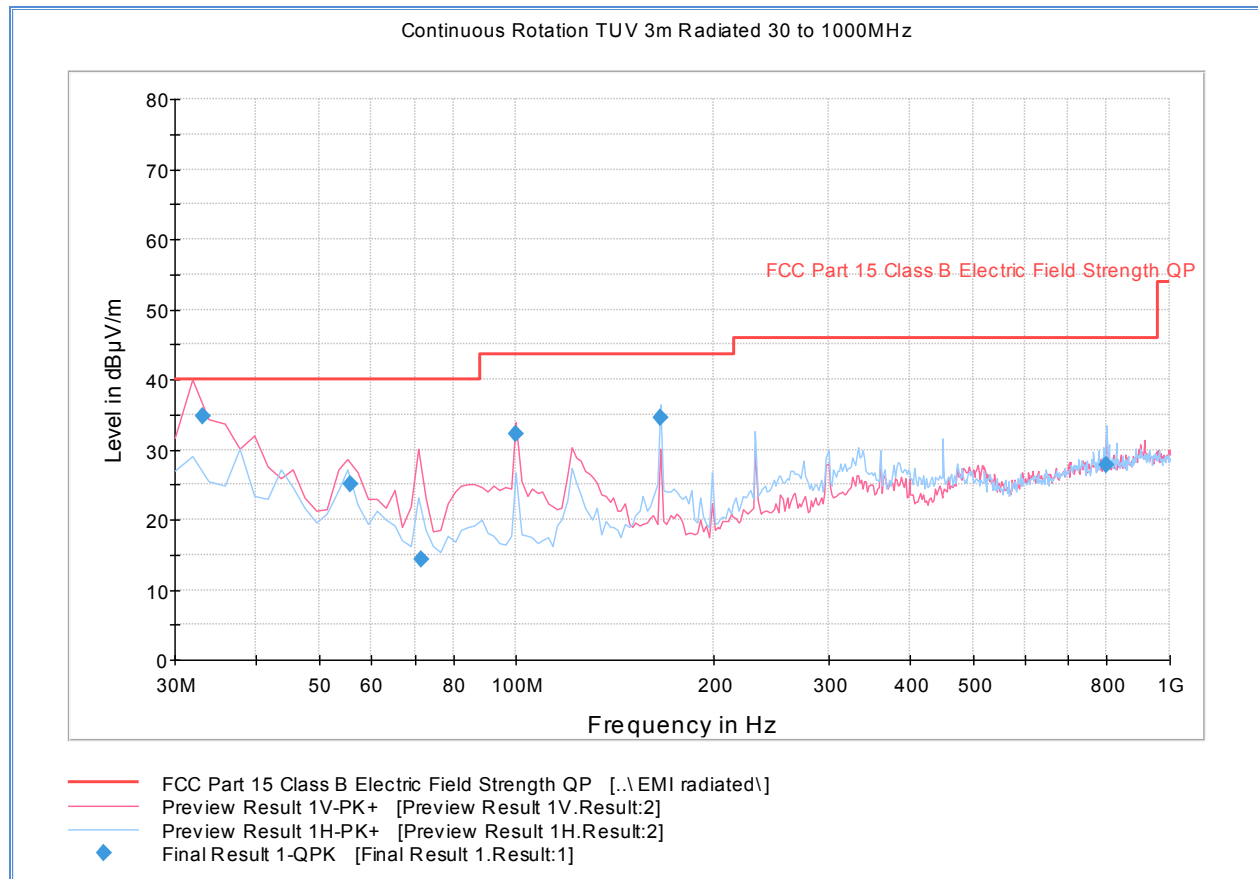


802.11 ac U-NII 3 High Channel 40MHz BW



802.11 ac U-NII 3 80MHz BW

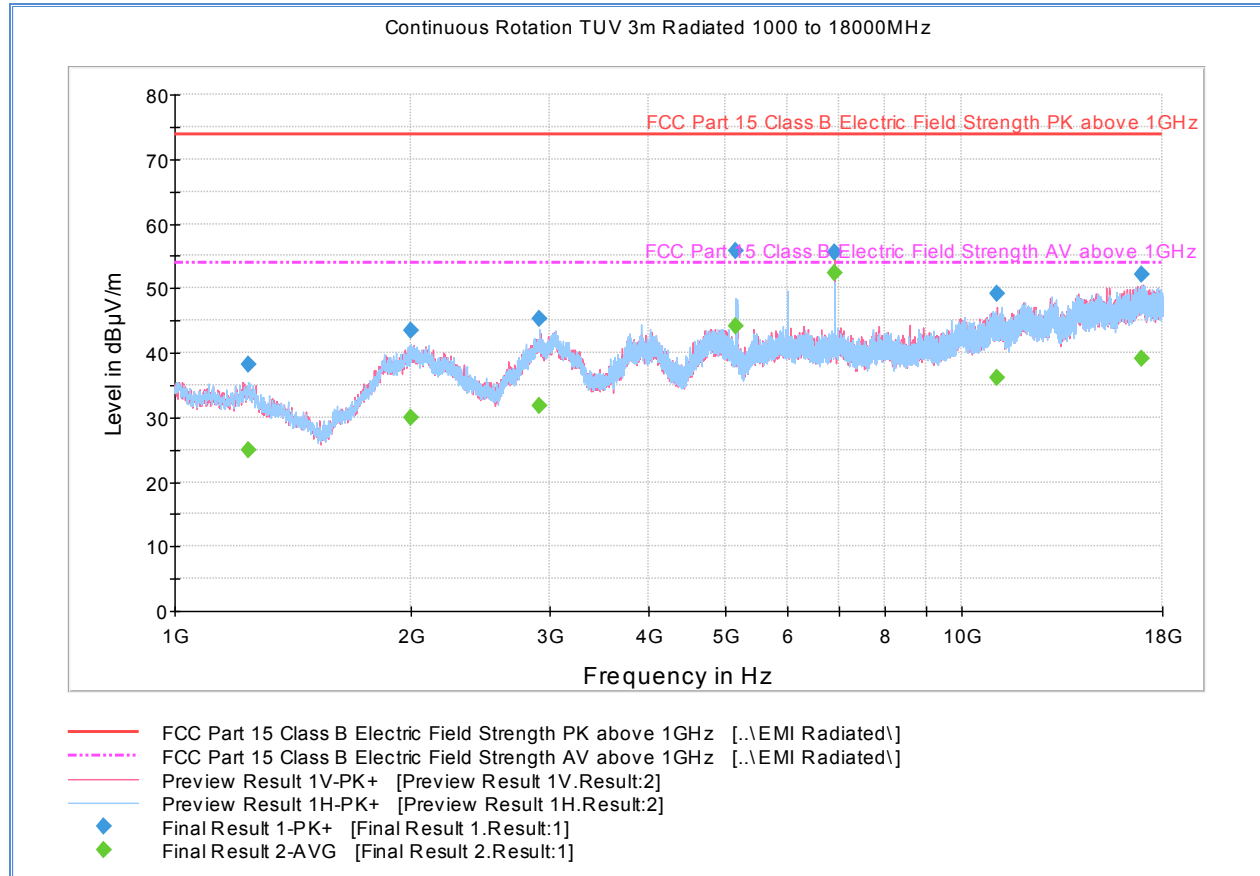
2.7.11 Test Results Below 1GHz Worst Case Configuration 802.11n U-NII 1 cabinet spurious



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
33.200000	34.8	1000.0	120.000	132.0	V	263.0	-9.2	5.2	40.0
55.750541	25.1	1000.0	120.000	100.0	V	251.0	-15.9	14.9	40.0
71.581643	14.2	1000.0	120.000	123.0	V	19.0	-17.0	25.8	40.0
99.939960	32.2	1000.0	120.000	100.0	V	271.0	-13.2	11.3	43.5
165.992144	34.6	1000.0	120.000	195.0	H	229.0	-11.8	8.9	43.5
799.699559	27.7	1000.0	120.000	194.0	H	177.0	3.6	18.3	46.0

2.7.12 Test Results Above 1GHz Worst Case Configuration 802.11n U-NII 1 cabinet spurious



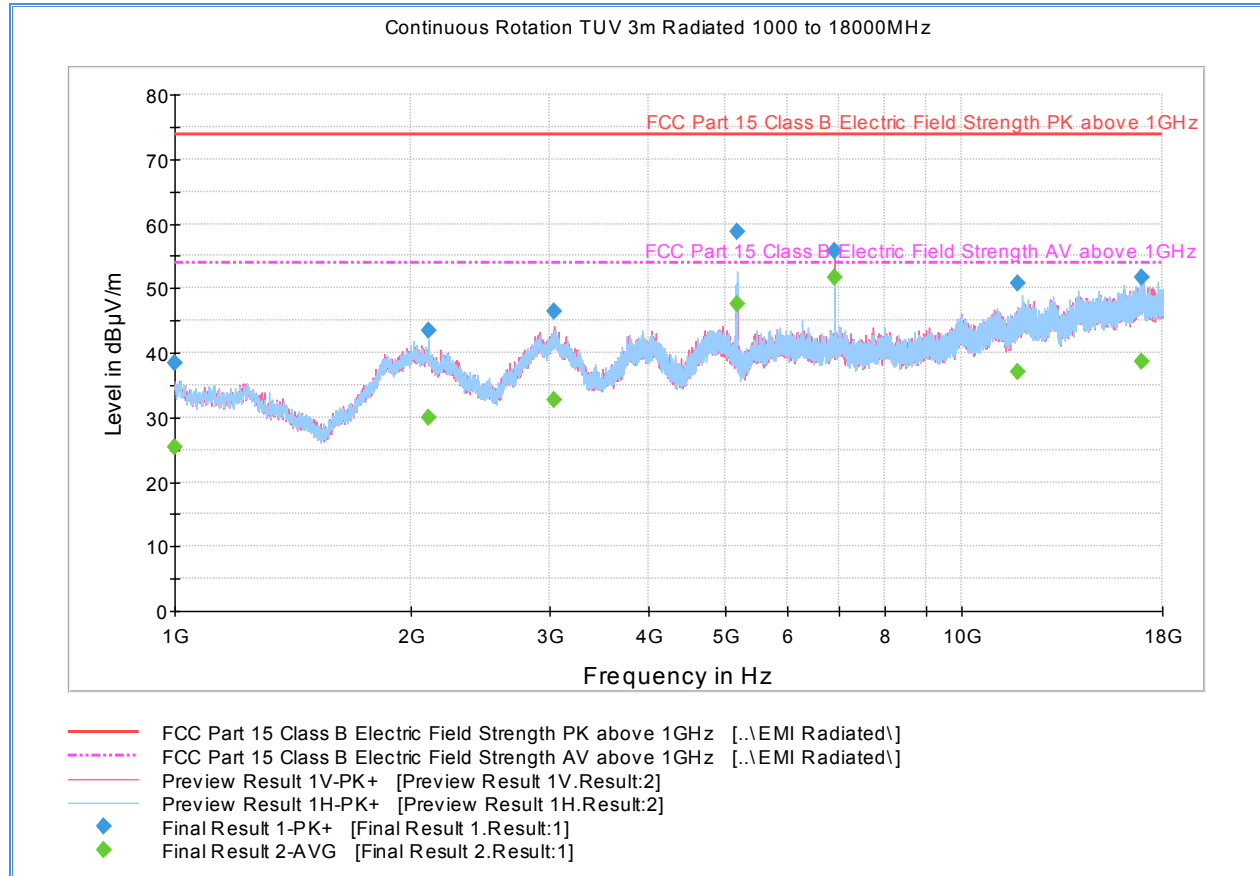
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1241.066667	38.1	1000.0	1000.000	134.7	H	114.0	-5.7	35.8	73.9
1993.233333	43.5	1000.0	1000.000	235.4	H	90.0	-2.2	30.4	73.9
2903.633333	45.3	1000.0	1000.000	137.7	H	89.0	0.3	28.6	73.9
5173.166667	55.8	1000.0	1000.000	127.7	H	83.0	4.2	18.1	73.9
6906.766667	55.7	1000.0	1000.000	152.2	V	273.0	6.8	18.2	73.9
11105.733333	49.1	1000.0	1000.000	198.5	V	139.0	12.2	24.8	73.9
16969.10000	52.1	1000.0	1000.000	250.5	H	248.0	17.9	21.8	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1241.066667	24.9	1000.0	1000.000	134.7	H	114.0	-5.7	29.0	53.9
1993.233333	29.8	1000.0	1000.000	235.4	H	90.0	-2.2	24.1	53.9
2903.633333	31.7	1000.0	1000.000	137.7	H	89.0	0.3	22.2	53.9
5173.166667	44.1	1000.0	1000.000	127.7	H	83.0	4.2	9.8	53.9
6906.766667	52.3	1000.0	1000.000	152.2	V	273.0	6.8	1.6	53.9
11105.733333	36.2	1000.0	1000.000	198.5	V	139.0	12.2	17.7	53.9
16969.10000	39.0	1000.0	1000.000	250.5	H	248.0	17.9	14.9	53.9

2.7.13 Test Results Above 1GHz Worst Case Configuration 802.11a U-NII 1 cabinet spurious



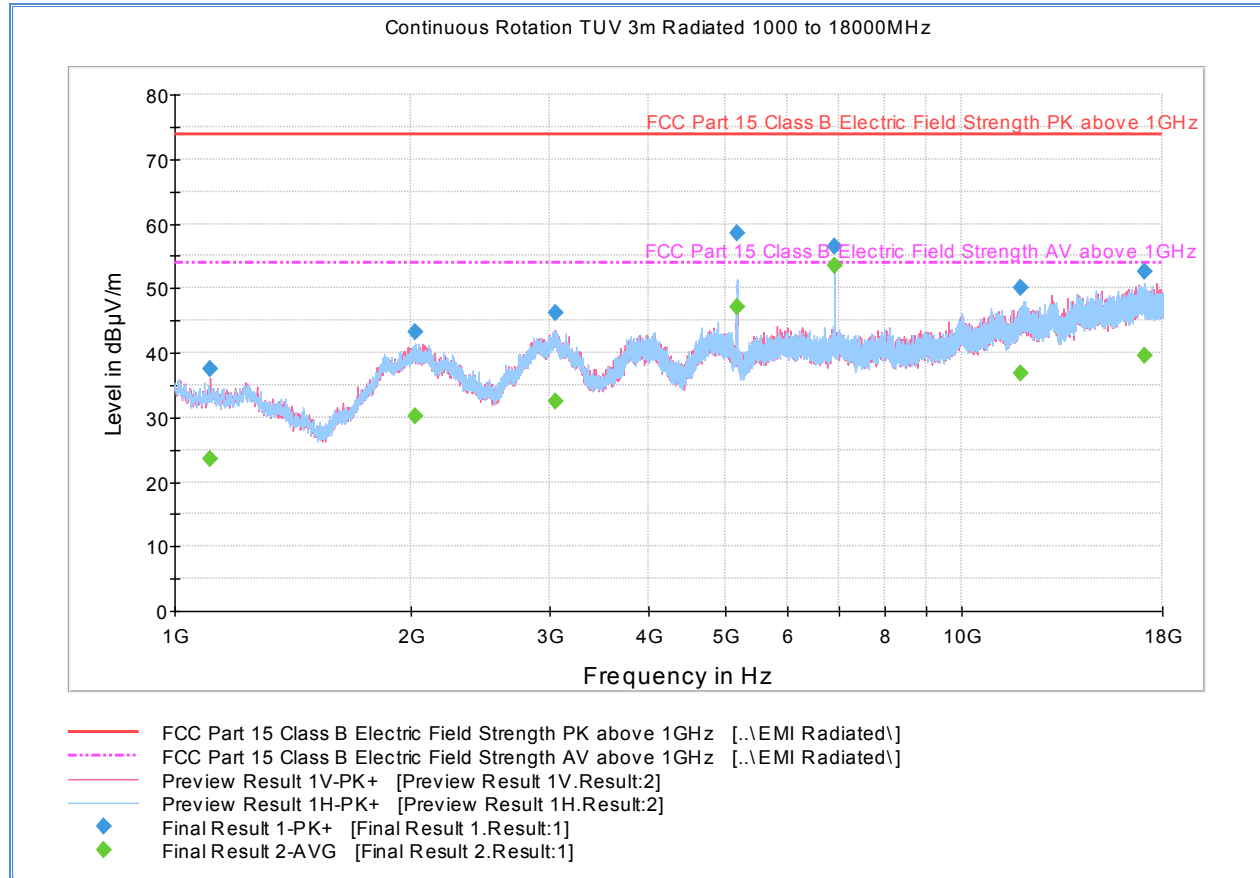
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.800000	38.5	1000.0	1000.000	120.7	V	311.0	-6.9	35.4	73.9
2103.300000	43.5	1000.0	1000.000	217.4	H	5.0	-2.1	30.4	73.9
3041.500000	46.4	1000.0	1000.000	151.6	V	206.0	0.9	27.5	73.9
5179.366667	58.8	1000.0	1000.000	165.6	H	160.0	4.3	15.1	73.9
6906.733333	55.7	1000.0	1000.000	139.7	V	274.0	6.8	18.2	73.9
11804.10000	50.8	1000.0	1000.000	135.7	H	303.0	13.2	23.1	73.9
16941.60000	51.8	1000.0	1000.000	111.7	H	87.0	18.0	22.1	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.800000	25.3	1000.0	1000.000	120.7	V	311.0	-6.9	28.6	53.9
2103.300000	30.0	1000.0	1000.000	217.4	H	5.0	-2.1	23.9	53.9
3041.500000	32.7	1000.0	1000.000	151.6	V	206.0	0.9	21.2	53.9
5179.366667	47.6	1000.0	1000.000	165.6	H	160.0	4.3	6.3	53.9
6906.733333	51.7	1000.0	1000.000	139.7	V	274.0	6.8	2.2	53.9
11804.10000	36.9	1000.0	1000.000	135.7	H	303.0	13.2	17.0	53.9
16941.60000	38.6	1000.0	1000.000	111.7	H	87.0	18.0	15.3	53.9

2.7.14 Test Results Above 1GHz Worst Case Configuration 802.11ac U-NII 1 cabinet spurious



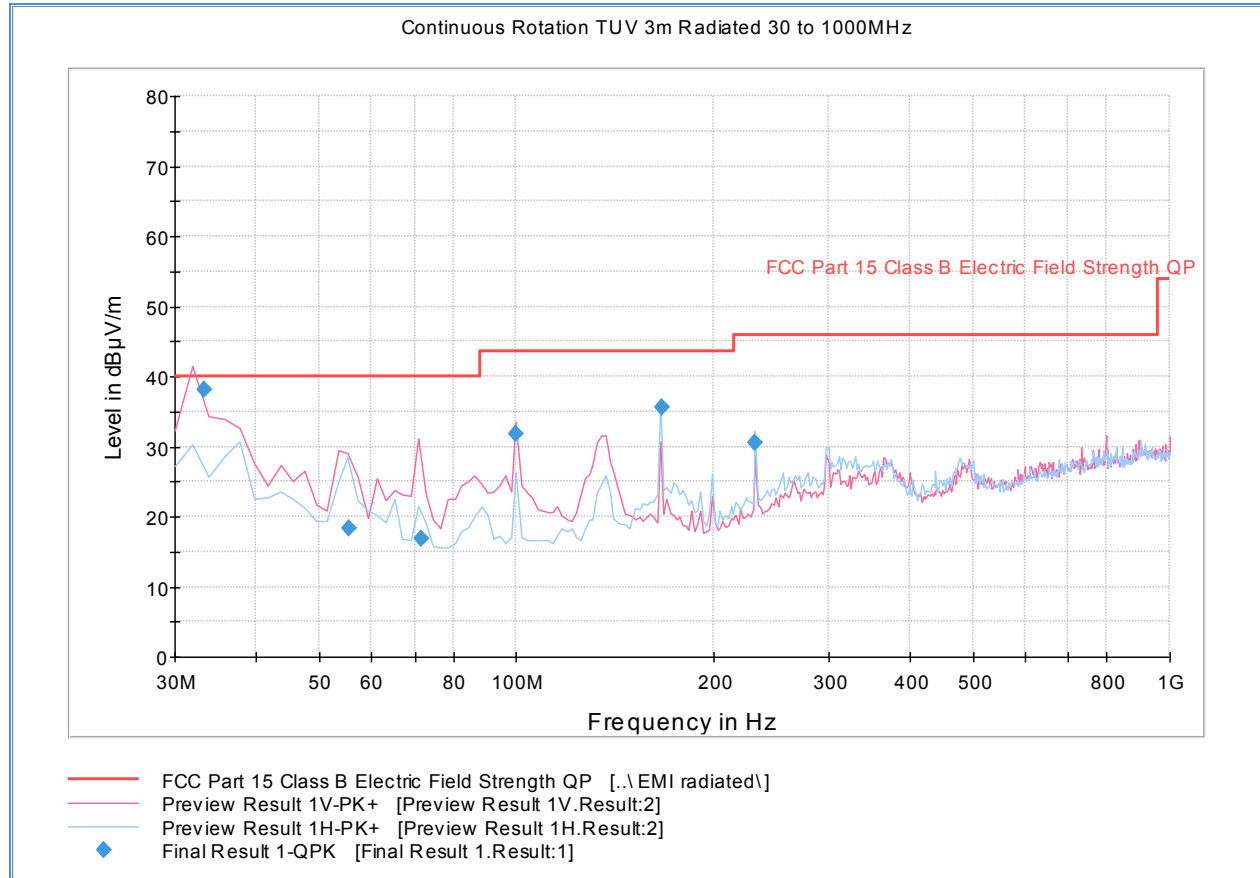
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1109.733333	37.4	1000.0	1000.000	235.4	V	-7.0	-6.9	36.5	73.9
2022.266667	43.3	1000.0	1000.000	182.6	V	24.0	-2.0	30.6	73.9
3050.433333	46.1	1000.0	1000.000	198.5	V	209.0	1.0	27.8	73.9
5178.800000	58.6	1000.0	1000.000	182.6	H	135.0	4.3	15.3	73.9
6906.733333	56.4	1000.0	1000.000	116.7	V	73.0	6.8	17.5	73.9
11884.666666	50.1	1000.0	1000.000	152.2	H	8.0	13.5	23.8	73.9
17059.700000	52.6	1000.0	1000.000	120.7	H	325.0	17.7	21.3	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1109.733333	23.6	1000.0	1000.000	235.4	V	-7.0	-6.9	30.3	53.9
2022.266667	30.2	1000.0	1000.000	182.6	V	24.0	-2.0	23.7	53.9
3050.433333	32.4	1000.0	1000.000	198.5	V	209.0	1.0	21.5	53.9
5178.800000	47.0	1000.0	1000.000	182.6	H	135.0	4.3	6.9	53.9
6906.733333	53.5	1000.0	1000.000	116.7	V	73.0	6.8	0.4	53.9
11884.666666	36.8	1000.0	1000.000	152.2	H	8.0	13.5	17.1	53.9
17059.700000	39.5	1000.0	1000.000	120.7	H	325.0	17.7	14.4	53.9

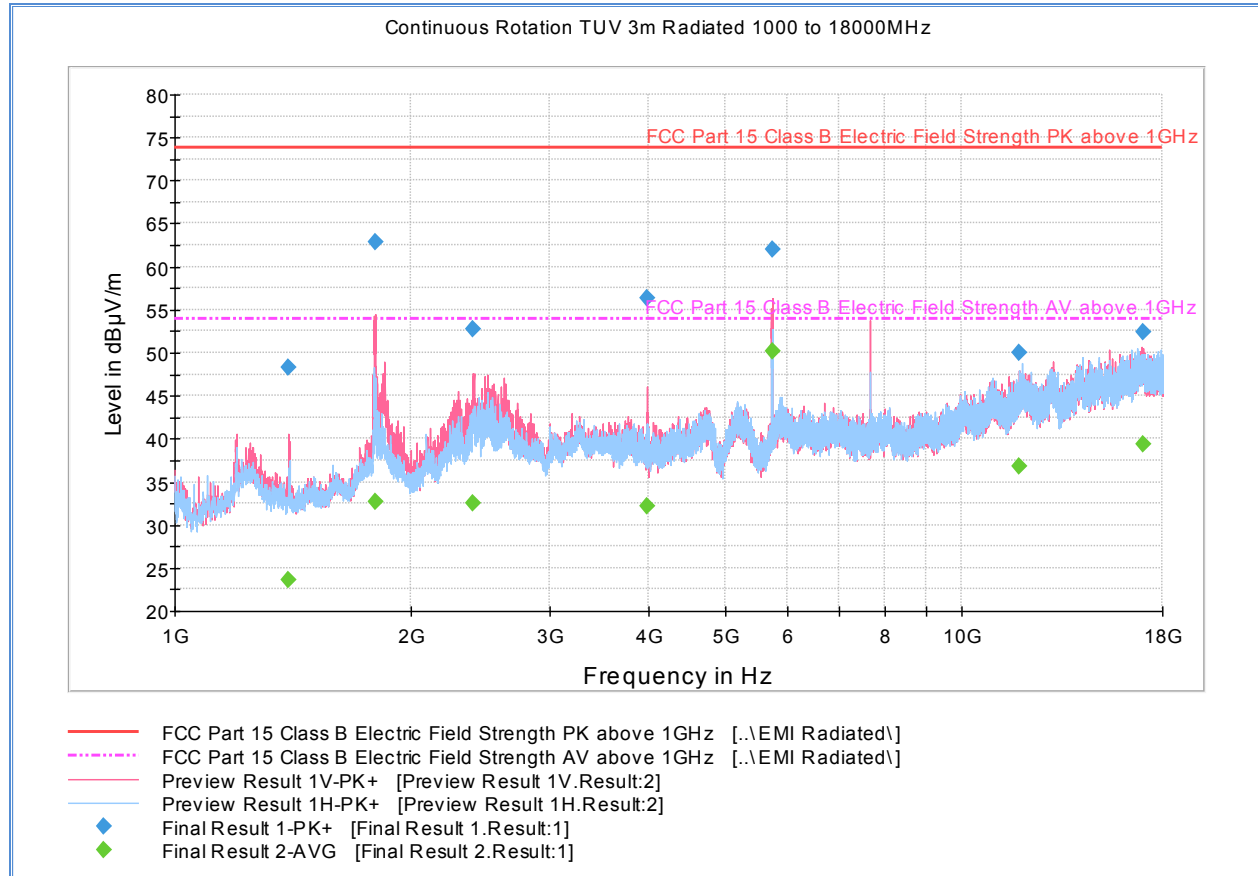
2.7.15 Test Results Below 1GHz Worst Case Configuration 802.11ac U-NII 3 cabinet spurious



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
33.240000	38.2	1000.0	120.000	128.0	V	265.0	-9.2	1.8	40.0
55.326653	18.4	1000.0	120.000	122.0	V	206.0	-15.8	21.6	40.0
71.581643	16.8	1000.0	120.000	123.0	V	13.0	-17.0	23.2	40.0
99.619960	31.7	1000.0	120.000	100.0	V	243.0	-13.2	11.8	43.5
166.592144	35.6	1000.0	120.000	105.0	H	218.0	-11.8	7.9	43.5
232.364329	30.5	1000.0	120.000	105.0	H	249.0	-9.2	15.5	46.0

2.7.16 Test Results Above 1GHz Worst Case Configuration 802.11a U-NII 3 cabinet spurious



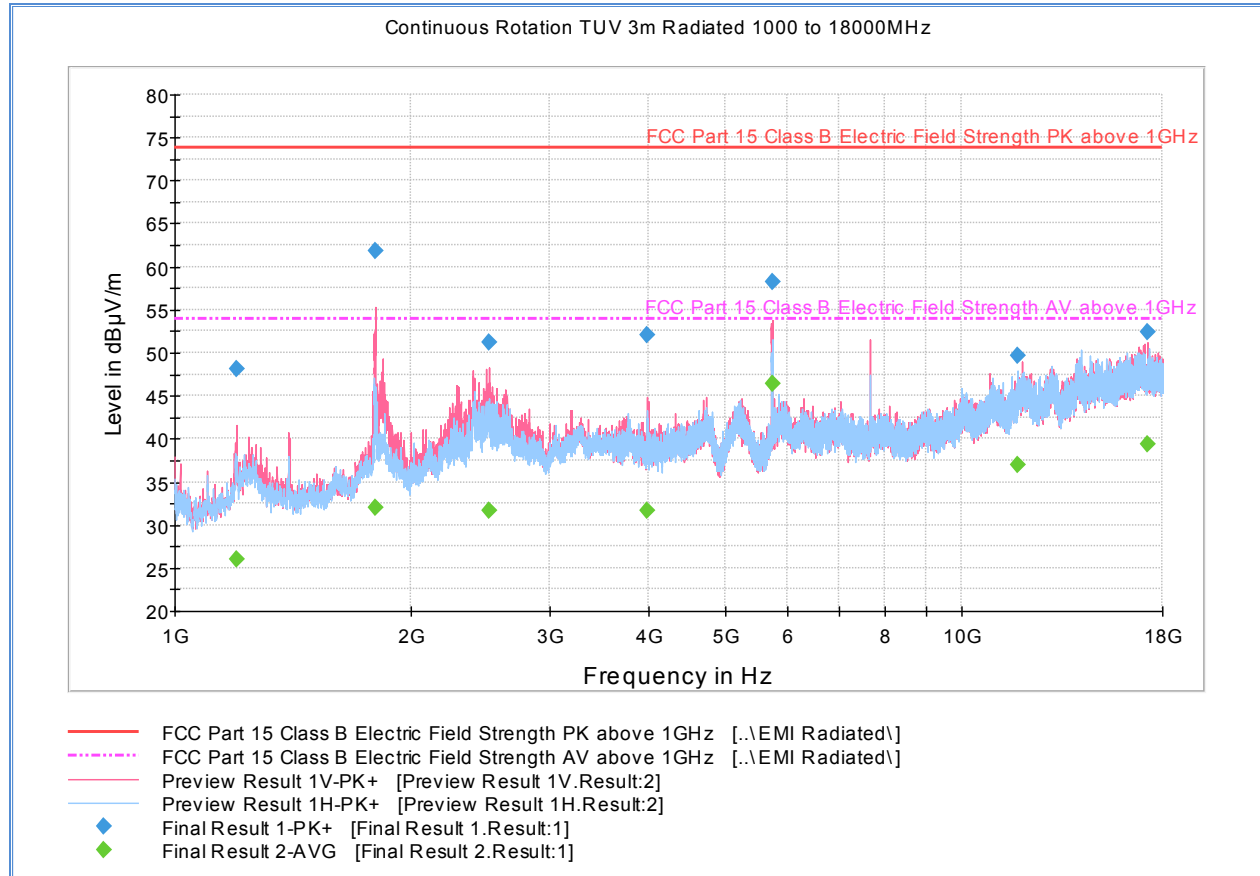
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1394.966667	48.2	1000.0	1000.000	139.7	V	158.0	-5.6	25.7	73.9
1799.200000	62.9	1000.0	1000.000	202.5	V	164.0	-3.4	11.0	73.9
2396.633333	52.8	1000.0	1000.000	250.5	V	185.0	-1.1	21.1	73.9
3992.000000	56.4	1000.0	1000.000	232.4	V	185.0	2.5	17.5	73.9
5746.766667	62.0	1000.0	1000.000	199.5	V	147.0	5.3	11.9	73.9
11855.20000	50.0	1000.0	1000.000	127.7	H	320.0	13.4	23.9	73.9
16980.40000	52.5	1000.0	1000.000	128.7	V	270.0	17.9	21.4	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1394.966667	23.7	1000.0	1000.000	139.7	V	158.0	-5.6	30.2	53.9
1799.200000	32.6	1000.0	1000.000	202.5	V	164.0	-3.4	21.3	53.9
2396.633333	32.4	1000.0	1000.000	250.5	V	185.0	-1.1	21.5	53.9
3992.000000	32.2	1000.0	1000.000	232.4	V	185.0	2.5	21.7	53.9
5746.766667	50.2	1000.0	1000.000	199.5	V	147.0	5.3	3.7	53.9
11855.20000	36.8	1000.0	1000.000	127.7	H	320.0	13.4	17.1	53.9
16980.40000	39.4	1000.0	1000.000	128.7	V	270.0	17.9	14.5	53.9

2.7.17 Test Results Above 1GHz Worst Case Configuration 802.11n U-NII 3 cabinet spurious



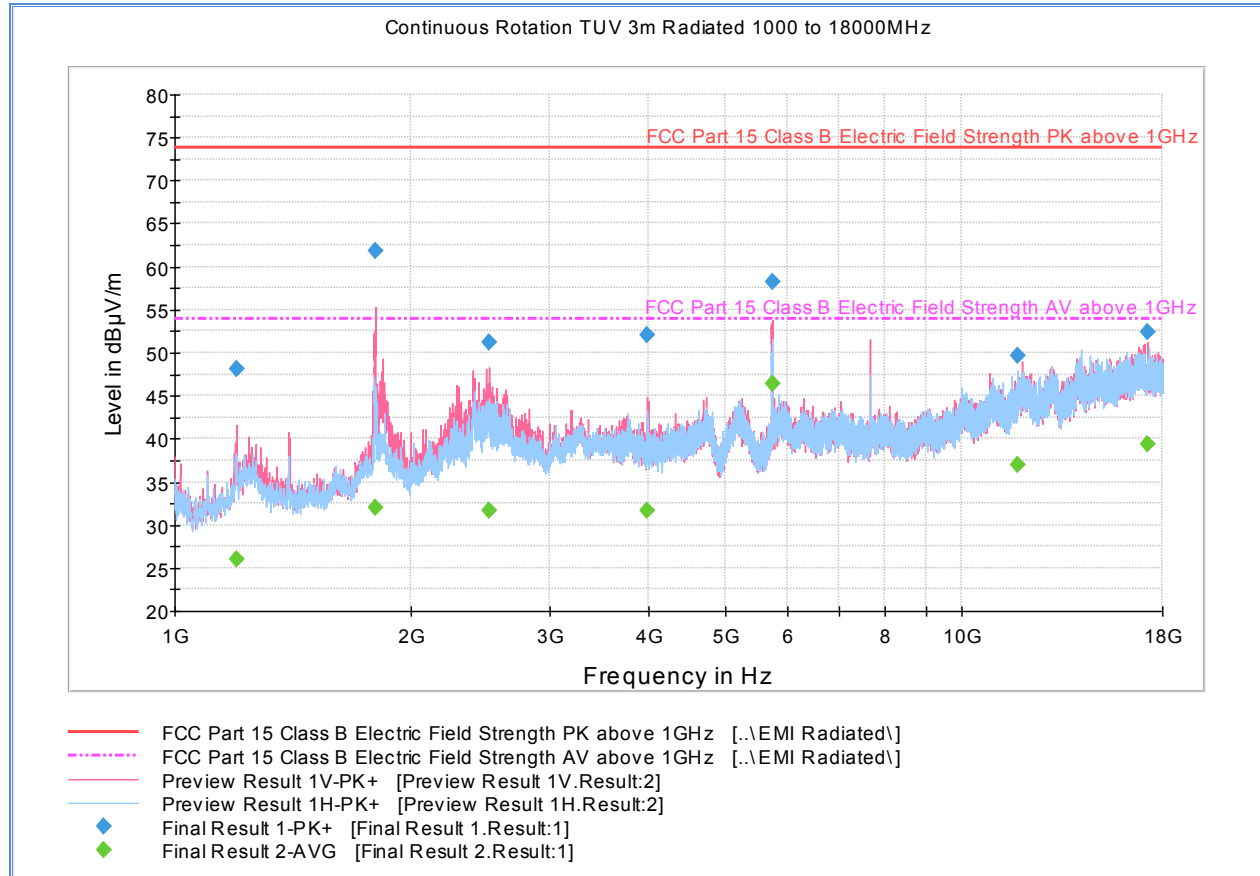
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1198.133333	48.0	1000.0	1000.000	140.7	V	257.0	-6.4	25.9	73.9
1799.033333	61.8	1000.0	1000.000	194.5	V	172.0	-3.4	12.1	73.9
2513.766667	51.2	1000.0	1000.000	182.6	V	287.0	-0.3	22.7	73.9
3989.166667	52.1	1000.0	1000.000	102.8	V	4.0	2.4	21.8	73.9
5752.066667	58.3	1000.0	1000.000	143.7	V	160.0	5.3	15.6	73.9
11761.966666	49.7	1000.0	1000.000	111.7	H	200.0	13.0	24.2	73.9
17227.033333	52.4	1000.0	1000.000	112.7	V	345.0	17.5	21.5	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1198.133333	26.0	1000.0	1000.000	140.7	V	257.0	-6.4	27.9	53.9
1799.033333	31.9	1000.0	1000.000	194.5	V	172.0	-3.4	22.0	53.9
2513.766667	31.6	1000.0	1000.000	182.6	V	287.0	-0.3	22.3	53.9
3989.166667	31.7	1000.0	1000.000	102.8	V	4.0	2.4	22.2	53.9
5752.066667	46.3	1000.0	1000.000	143.7	V	160.0	5.3	7.6	53.9
11761.966666	36.9	1000.0	1000.000	111.7	H	200.0	13.0	17.0	53.9
17227.033333	39.4	1000.0	1000.000	112.7	V	345.0	17.5	14.5	53.9

2.7.18 Test Results Above 1GHz Worst Case Configuration 802.11n U-NII 3 cabinet spurious



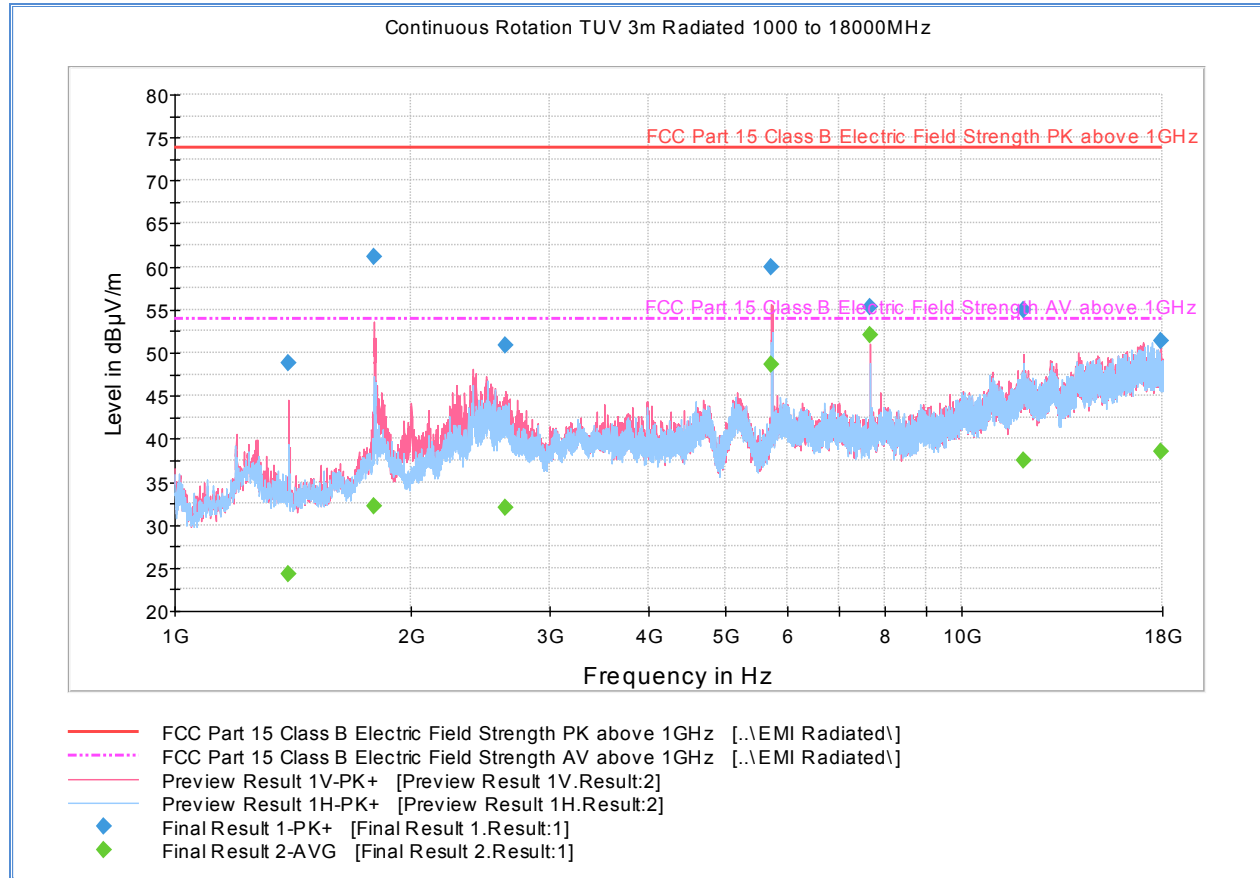
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1198.133333	48.0	1000.0	1000.000	140.7	V	257.0	-6.4	25.9	73.9
1799.033333	61.8	1000.0	1000.000	194.5	V	172.0	-3.4	12.1	73.9
2513.766667	51.2	1000.0	1000.000	182.6	V	287.0	-0.3	22.7	73.9
3989.166667	52.1	1000.0	1000.000	102.8	V	4.0	2.4	21.8	73.9
5752.066667	58.3	1000.0	1000.000	143.7	V	160.0	5.3	15.6	73.9
11761.966666	49.7	1000.0	1000.000	111.7	H	200.0	13.0	24.2	73.9
17227.033333	52.4	1000.0	1000.000	112.7	V	345.0	17.5	21.5	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1198.133333	26.0	1000.0	1000.000	140.7	V	257.0	-6.4	27.9	53.9
1799.033333	31.9	1000.0	1000.000	194.5	V	172.0	-3.4	22.0	53.9
2513.766667	31.6	1000.0	1000.000	182.6	V	287.0	-0.3	22.3	53.9
3989.166667	31.7	1000.0	1000.000	102.8	V	4.0	2.4	22.2	53.9
5752.066667	46.3	1000.0	1000.000	143.7	V	160.0	5.3	7.6	53.9
11761.966666	36.9	1000.0	1000.000	111.7	H	200.0	13.0	17.0	53.9
17227.033333	39.4	1000.0	1000.000	112.7	V	345.0	17.5	14.5	53.9

2.7.19 Test Results Above 1GHz Worst Case Configuration 802.11ac U-NII 3 cabinet spurious



Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1394.400000	48.8	1000.0	1000.000	152.2	V	151.0	-5.6	25.1	73.9
1794.866667	61.1	1000.0	1000.000	207.5	V	164.0	-3.4	12.8	73.9
2634.466667	50.8	1000.0	1000.000	169.6	V	136.0	-0.3	23.1	73.9
5738.333333	59.9	1000.0	1000.000	202.5	V	207.0	5.4	14.0	73.9
7660.233333	55.3	1000.0	1000.000	102.8	V	85.0	7.0	18.6	73.9
12000.33333	55.0	1000.0	1000.000	116.7	V	301.0	13.5	18.9	73.9
17924.83333	51.4	1000.0	1000.000	142.7	V	25.0	17.8	22.5	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1394.400000	24.3	1000.0	1000.000	152.2	V	151.0	-5.6	29.6	53.9
1794.866667	32.2	1000.0	1000.000	207.5	V	164.0	-3.4	21.7	53.9
2634.466667	32.0	1000.0	1000.000	169.6	V	136.0	-0.3	21.9	53.9
5738.333333	48.6	1000.0	1000.000	202.5	V	207.0	5.4	5.3	53.9
7660.233333	52.0	1000.0	1000.000	102.8	V	85.0	7.0	1.9	53.9
12000.33333	37.6	1000.0	1000.000	116.7	V	301.0	13.5	16.3	53.9
17924.83333	38.5	1000.0	1000.000	142.7	V	25.0	17.8	15.4	53.9



2.8 BAND-EDGE MEASUREMENTS

2.8.1 Specification Reference

FCC CFR 47 Part 15, Clause 15.407(b)(1), (4)(i) and (7); (h)(2)
FCC CFR 47 Part 15, Clause 15.209
RSS-247, Section 6.2.1.2 and 6.2.4.2

2.8.2 Standard Applicable

FCC CFR 47 Part 15, Clause 15.407:

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

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

(4) For transmitters operating in the 5.725-5.85 GHz band

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

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

(h) Transmit Power Control (TPC) and Dynamic Frequency Selection (DFS)

(2) U-NII devices operating with any part of its 26 dB emission bandwidth in the 5.25–5.35 GHz and 5.47–5.725 GHz bands shall employ a DFS radar detection mechanism to detect the presence of radar systems and to avoid co-channel operation with radar systems.

RSS-247, Section 6.2.1.2:

For transmitters with operating frequencies in the band 5150-5250 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p. Any unwanted emissions that fall into the band 5250-5350 MHz shall be attenuated below the channel power by at least 26 dB, when measured using a resolution bandwidth between 1 and 5% of the occupied bandwidth (i.e. 99% bandwidth), above 5250 MHz. The 26 dB bandwidth may fall into the 5250-5350 MHz band; however, if the occupied bandwidth also falls within the 5250-5350 MHz band, the transmission is considered as intentional and the devices shall comply with all requirements in the band 5250-5350 MHz including implementing dynamic frequency selection (DFS) and TPC, on the portion of the emission that resides in the 5250-5350 MHz band.

RSS-247, Section 6.2.4.2:

Devices operating in the band 5725-5850 MHz shall have e.i.r.p. of unwanted emissions comply with the following:

- e) 27 dBm/MHz at frequencies from the band edges decreasing linearly to 15.6 dBm/MHz at 5 MHz above or below the band edges;
- f) 15.6 dBm/MHz at 5 MHz above or below the band edges decreasing linearly to 10 dBm/MHz at 25 MHz above or below the band edges;
- g) 10 dBm/MHz at 25 MHz above or below the band edges decreasing linearly to -27 dBm/MHz at 75 MHz above or below the band edges; and
- h) -27 dBm/MHz at frequencies more than 75 MHz above or below the band edges.



2.8.3 Test Methodology

KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 II.G.3.d ii and ANSI C63.10-2013

2.8.4 Equipment Under Test and Modification State

Serial No: FF130219B00305 / Test Configuration A

2.8.5 Date of Test/Initial of test personnel who performed the test

March 13 and 14, 2019/FSC

2.8.6 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.8.7 Environmental Conditions

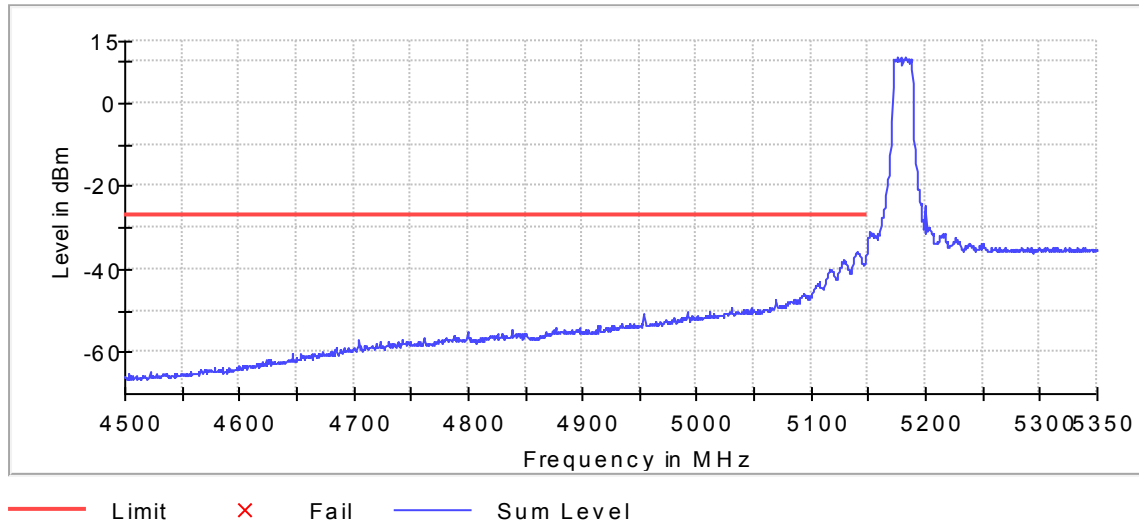
Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.3 °C
Relative Humidity	44.4 %
ATM Pressure	99.5 kPa

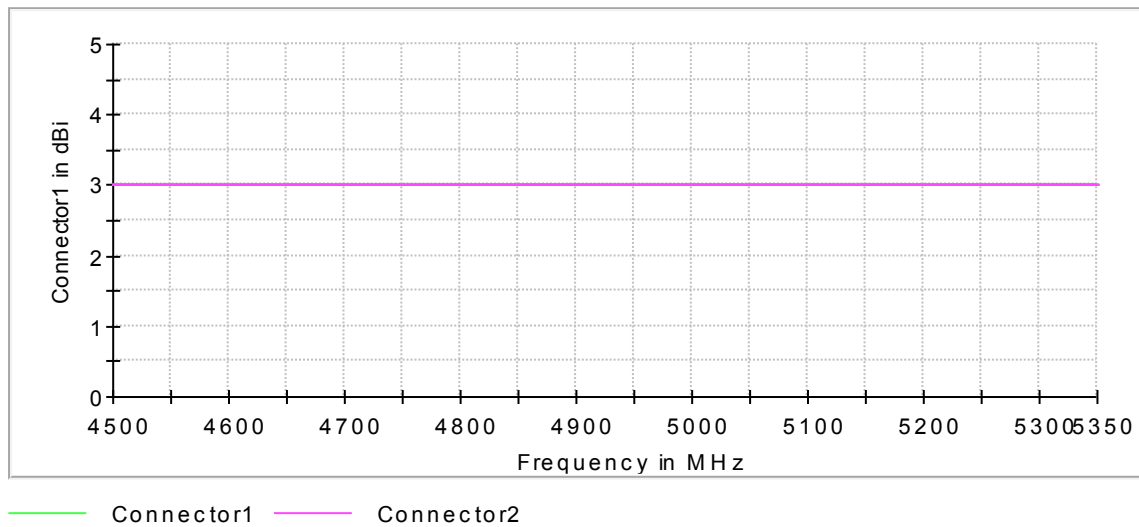
2.8.8 Additional Observations

- This is a conducted test using direct connection to TS8997 Test System. Path loss was programmed to the test system for both transmit chains.
- Only the worst-case configuration (modulation and BW) per technology presented.
- Sample test plots presented are either from Port 1 or Port 2 and may not represent worse case data presented on the summary results table.
- Test methodology is per FCC title 47 part 15 §15.407(b), KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 II.G.3.d ii and ANSI C63.10-2013.
- Channel filter is used for doing integration in the measurement device.

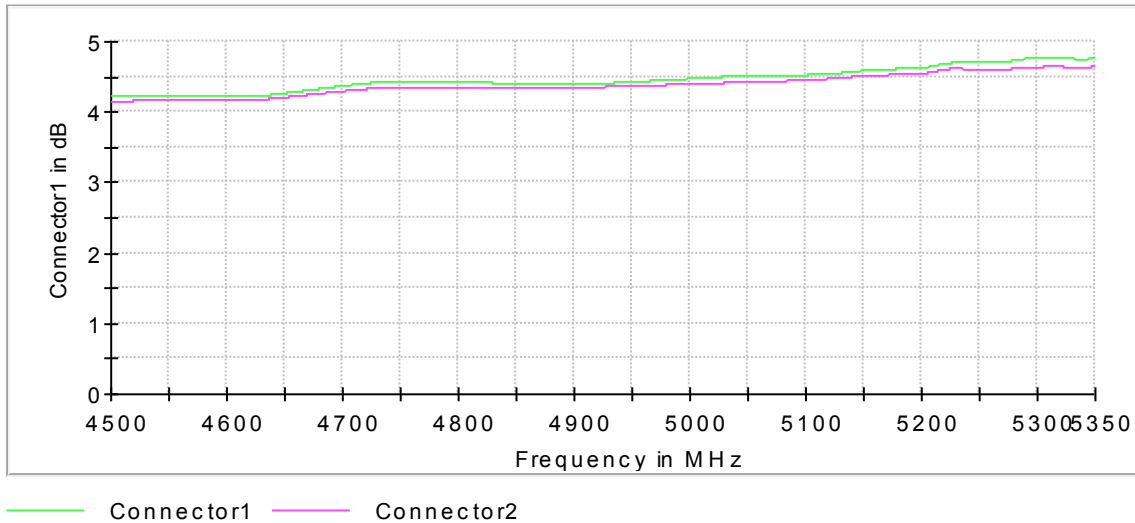
2.8.9 Sample Test Plots



802.11a Low Channel U-NII 1 Lower Band Edge

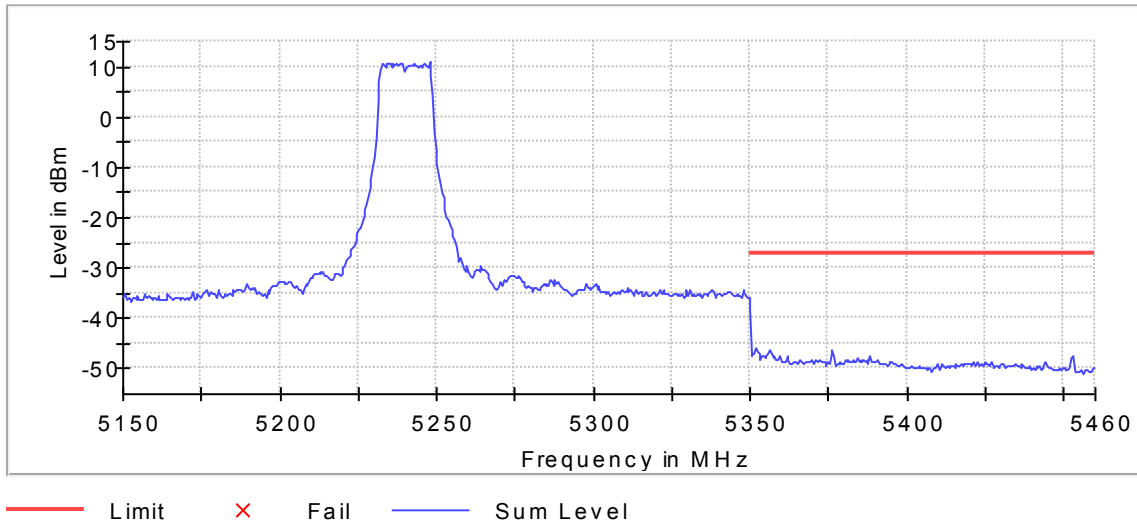


Antenna Gain

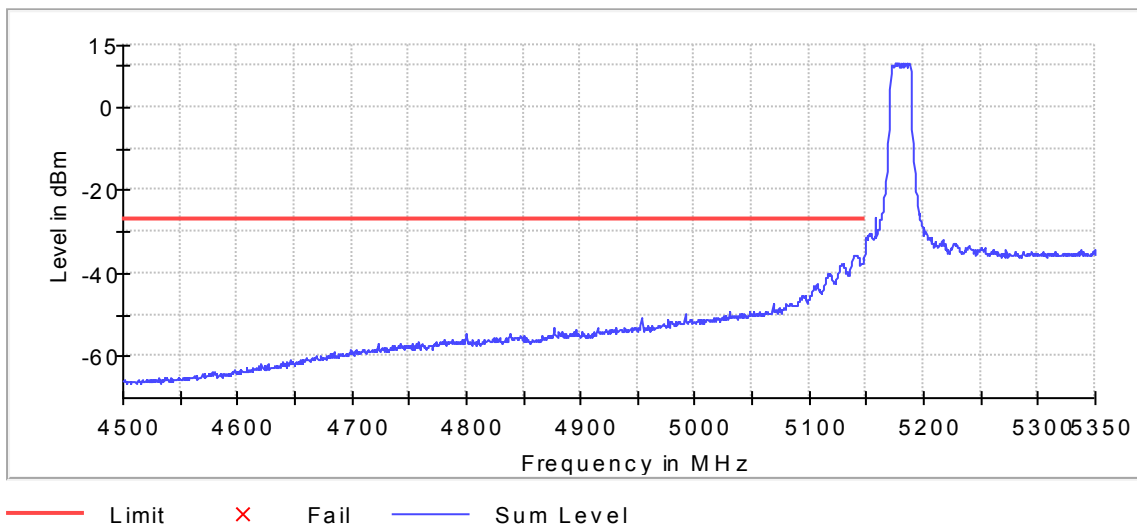


Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
5149.750000	-34.7	7.7	-27.0	PASS
5149.250000	-35.4	8.4	-27.0	PASS
5140.250000	-35.7	8.7	-27.0	PASS
5139.750000	-35.9	8.9	-27.0	PASS
5140.750000	-35.9	8.9	-27.0	PASS
5139.250000	-36.0	9.0	-27.0	PASS
5141.250000	-36.1	9.1	-27.0	PASS
5141.750000	-36.2	9.2	-27.0	PASS
5148.750000	-36.2	9.2	-27.0	PASS
5142.250000	-36.3	9.3	-27.0	PASS
5138.750000	-36.4	9.4	-27.0	PASS
5142.750000	-36.7	9.7	-27.0	PASS
5138.250000	-36.7	9.7	-27.0	PASS
5148.250000	-36.9	9.9	-27.0	PASS
5137.750000	-37.1	10.1	-27.0	PASS

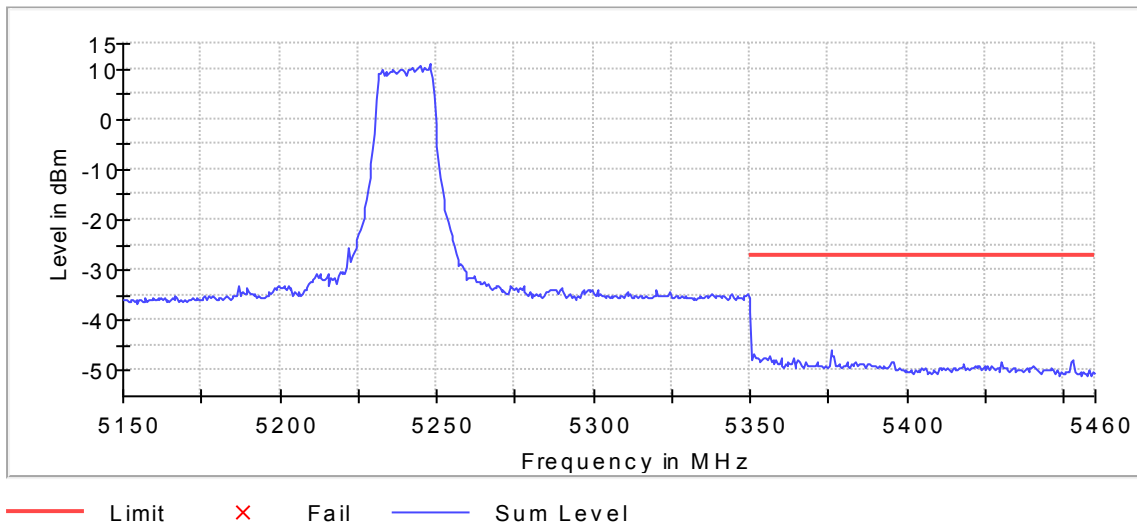
2.8.10 Test Results Plots



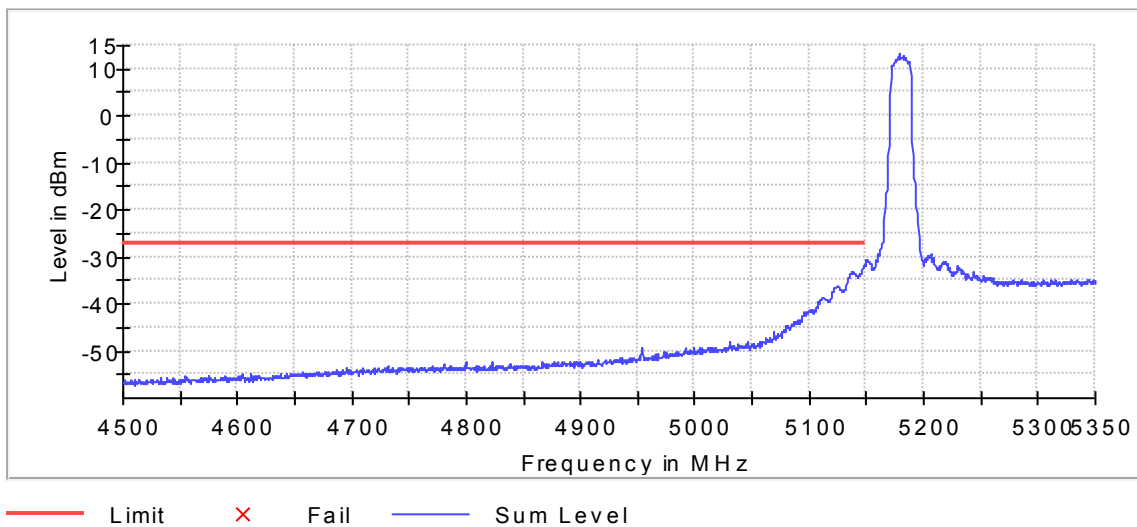
802.11a High Channel U-NII 1 Upper Band Edge



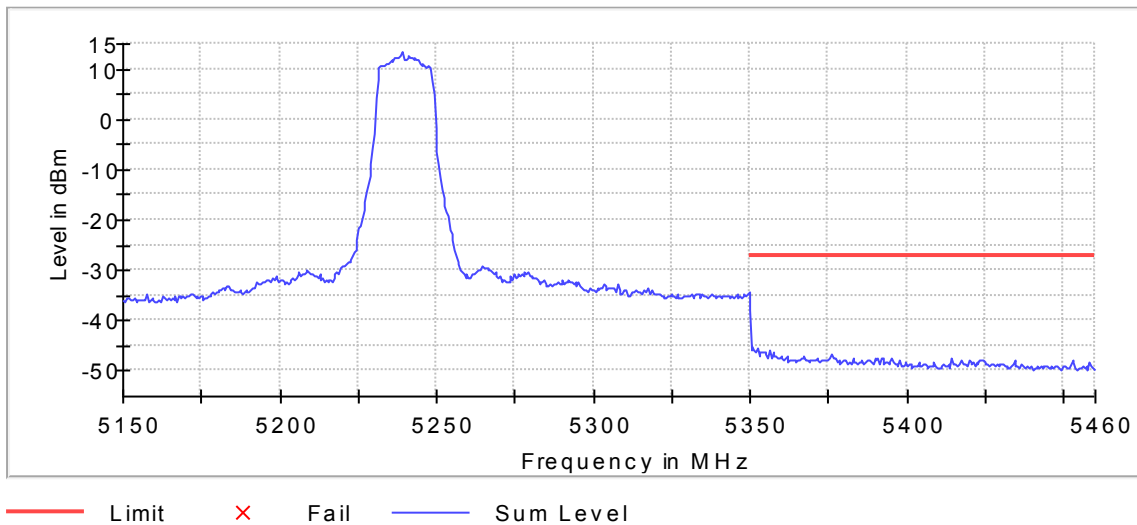
802.11n Low Channel U-NII 1 Lower Band Edge



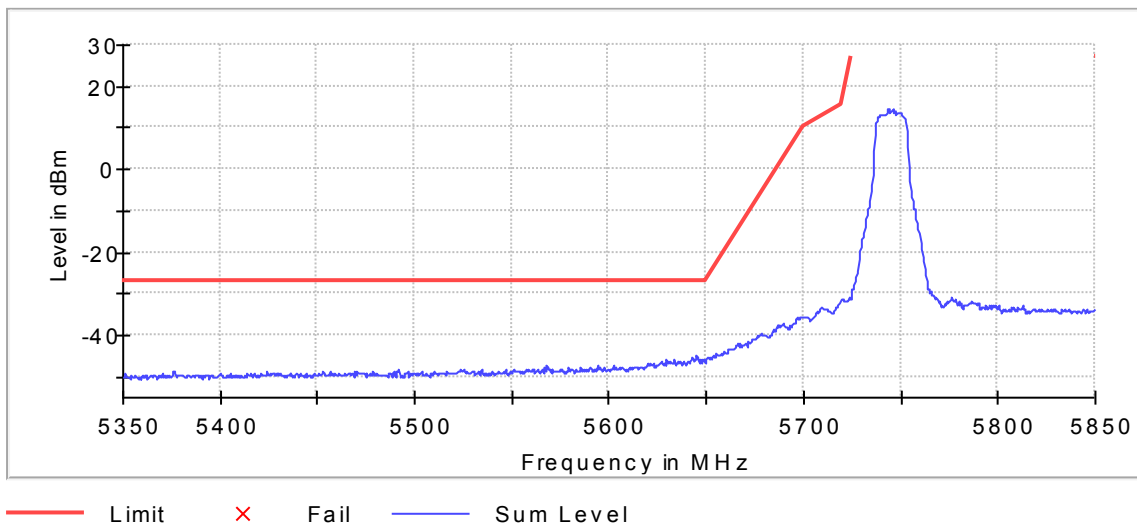
802.11n High Channel U-NII 1 Upper Band Edge



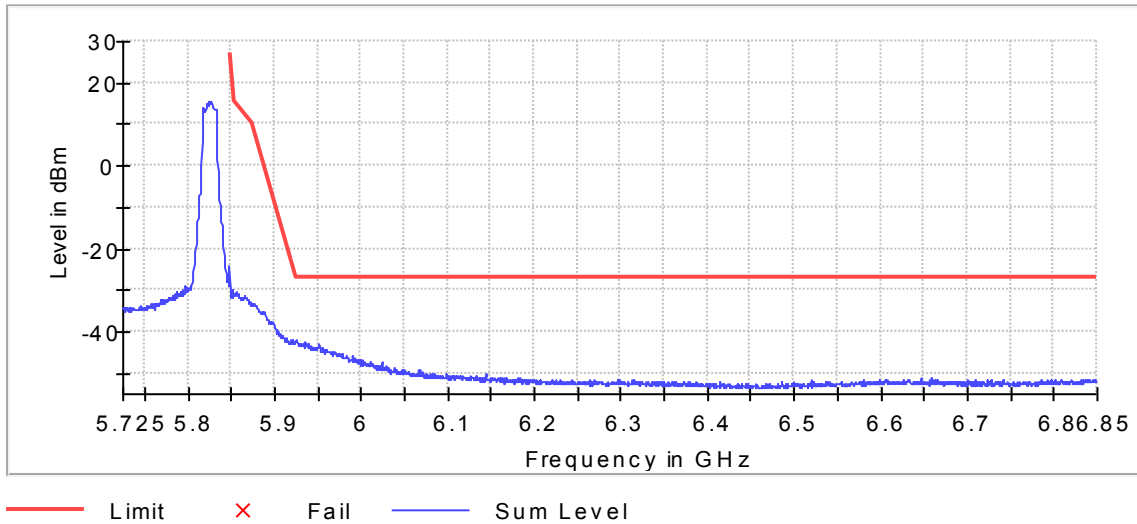
802.11ac Low Channel U-NII 1 Lower Band Edge



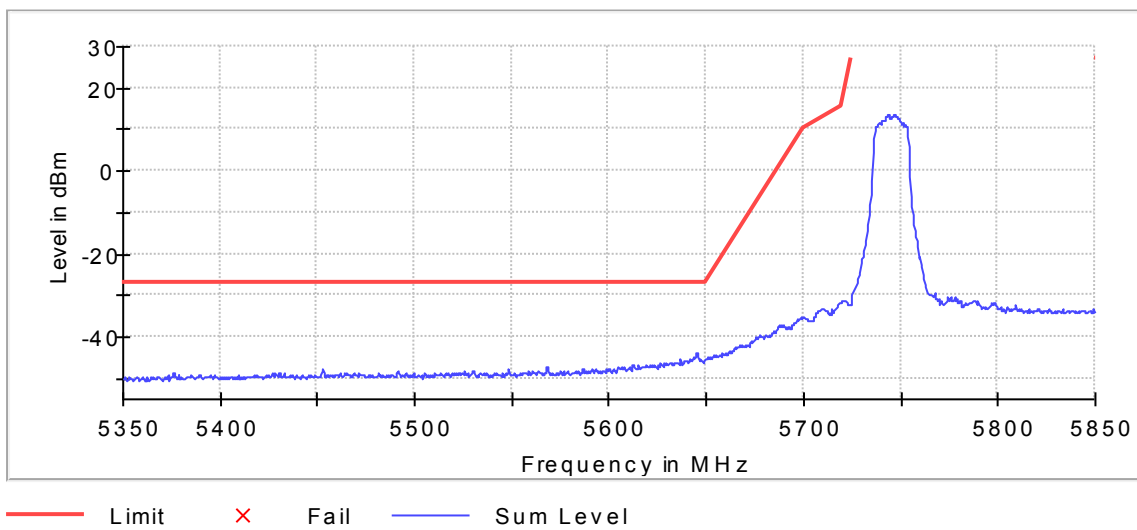
802.11ac High Channel U-NII 1 Upper Band Edge



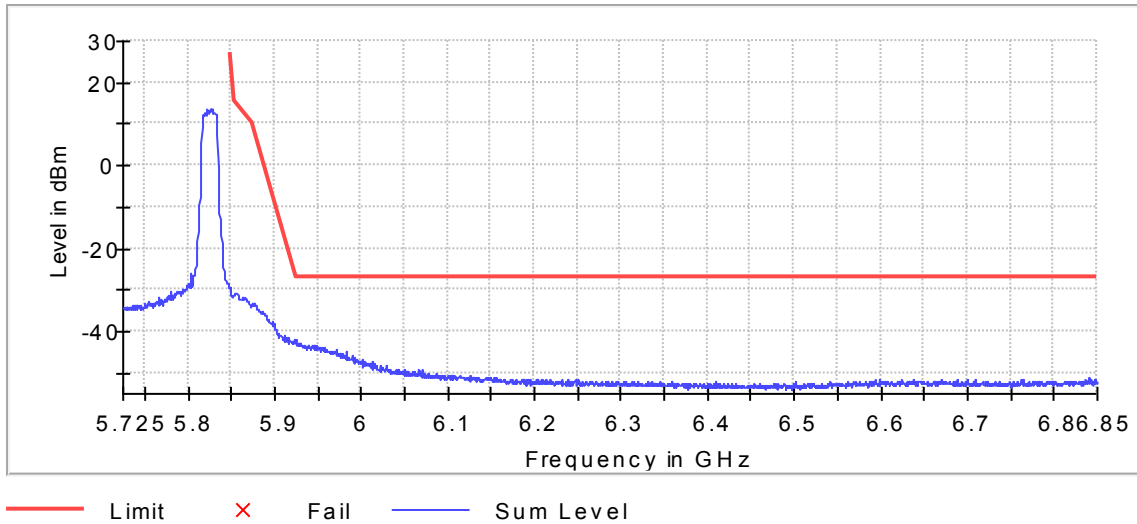
802.11a Low Channel U-NII 3 Lower Band Edge



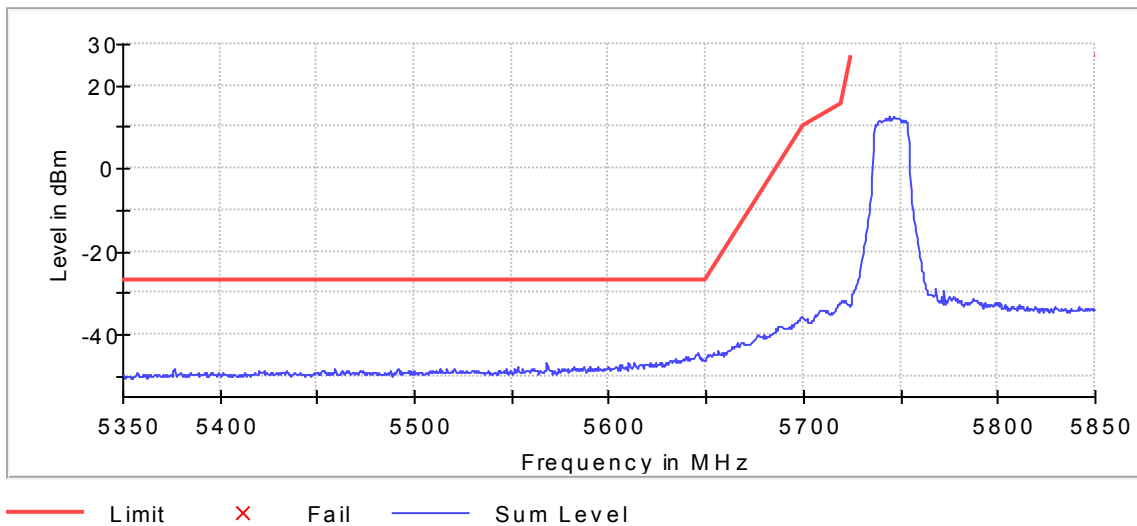
802.11a High Channel U-NII 3 Upper Band Edge



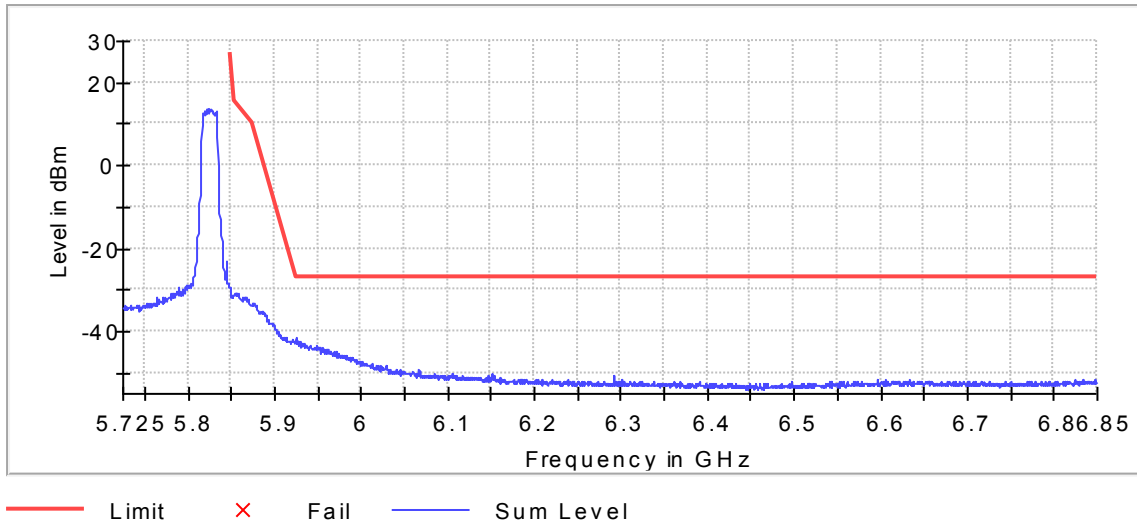
802.11n Low Channel U-NII 3 Lower Band Edge



802.11n High Channel U-NII 3 Upper Band Edge



802.11ac Low Channel U-NII 3 Lower Band Edge



802.11ac High Channel U-NII 3 Upper Band Edge



2.9 FREQUENCY STABILITY

2.9.1 Specification Reference

FCC CFR 47 Part 15, Clause 15.407(g)
RSS-GEN, Section 6.11

2.9.2 Standard Applicable

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

2.9.1 Manufacturer Declaration

inseego

Date: May 11, 2019

TUV SUD BABT TCB
Octagon House, Concorde Way
Segensworth Road,
Fareham,
Hampshire,
PO15 5RL

FCC ID: PKRISGM1000

Attestation for FCC Part 15.407 Declaration of Conformity

Pursuant to FCC CFR 47 Part 15.407(g), we, Inseego Corporation, declare that the frequency stability in the UNII Bands is ensured such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

Sincerely,

A handwritten signature in black ink, appearing to read 'Roman Olmos', written over a horizontal line.

Roman Olmos
Sr. Regulatory Engineer



SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

ID Number (SDGE/SDRB)	Test Equipment	Type	Serial Number	Manufacturer	Cal Date	Cal Due Date
Antenna Conducted Port Setup						
7643	Signal/Spectrum Analyzer	FSV30	1321.3008K30/ 103166	Rhode & Schwarz	04/11/18	04/11/19
7655	Vector Signal Generator	SMBV100A	260734	Rhode & Schwarz	11/19/18	11/19/19
7654	Signal Generator	SMB 100A	175750	Rhode & Schwarz	11/16/18	11/16/19
7656	OSP with B157	OSP120	101310	Rhode & Schwarz	01/23/19	01/23/20
8825	20dB Attenuator	46-20-34	BK5773	Weinschel Corp.	Verified by 7643 and 7654	
8832	20dB Attenuator	34-20-34	BP4150	MCE/Weinschel	Verified by 7643 and 7654	
AC Conducted Emissions Test Setup						
1024	EMI Test Receiver	ESCS30	847793/0001	Rhode & Schwarz	09/19/18	09/19/19
7567	LISN	FCC-LISN-50-25-2-10	120304	Fischer Custom Comm.	01/02/19	01/02/20
8822	20dB Attenuator	34-20-34	N/A	MCE / Weinschel	Verified by 7643 and 7655	
8824	20dB Attenuator	34-20-34	N/A	MCE / Weinschel	Verified by 7643 and 7655	
Radiated Test Setup						
1002	Bilog Antenna	3142C	00058717	ETS-Lindgren	11/20/17	11/20/19
8628	Pre-amplifier	QLJ 01182835-JO	8986002	QuinStar Technologies Inc.	03/07/19	03/07/20
1193	Pre-Amplifier	PAM-0202	185	PAM	04/11/18	04/11/19
1003	Signal Generator	SMR-40	1104.0002.40	Rhode & Schwarz	06/08/18	06/08/19
1040	EMI Test Receiver	ESIB40	100292	Rhode & Schwarz	10/15/18	10/15/19
1049	EMI Test Receiver	ESU40	100133	Rhode & Schwarz	07/13/18	07/13/19
7575	Double-ridged waveguide horn antenna	3117	00155511	EMCO	06/16/18	06/16/20
7631	Double-ridged waveguide horn antenna	3117	00205418	ETS-Lindgren	08/20/18	08/20/20
7611	Signal/Spectrum Analyzer	FSW26	102017	Rhode & Schwarz	05/09/18	05/09/19
7608	Vector Signal Generator	SMBV100A	259021	Rhode & Schwarz	09/19/17	09/19/19
7618	Horn antenna	3160-09	012054-004	ETS	08/18/17	08/18/19
n/a	Pre-amplifier (18-40 GHz)	SLKka-30-6	15G27	Spacek Labs	Verified by 7611 and 1003	
1153	High-frequency cable	SucoFlex 100 SX	N/A	Suhner	Verified by 7611 and 1003	
8821	5.5GHz High Pass Filter	HPM50105	048	Micro-Tronics	Verified by 7611 and 1003	
8818	5.0GHz Band Notch Filter	BRM50716	015	Micro-Tronics	Verified by 7611 and 1003	



<i>Miscellaneous</i>						
6708	Multimeter	34401A	US36086974	Hewlett Packard	07/18/18	07/18/19
7579	Temperature Chamber	115	151617	TestQuity	08/24/18	08/24/19
7554	Barometer/Temperature/Humidity Transmitter	iServer	400706	Omega	05/25/18	05/25/19
-	Test Software	EMC32	V8.53	Rhode & Schwarz	N/A	

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:

3.2.1 Conducted Antenna Port Measurement

	Input Quantity (Contribution) X_i	Value	Prob. Dist.	Divisor	$u_i(x)$	$u_i(x)^2$
1	Receiver reading	0.10 dB	Normal, k=1	1.000	0.10	0.01
2	Cable attenuation	1.00 dB	Normal, k=2	2.000	0.50	0.25
3	Receiver sinewave accuracy	0.08 dB	Normal, k=2	2.000	0.04	0.00
4	Receiver pulse amplitude	0.00 dB	Rectangular	1.732	0.00	0.00
5	Receiver pulse repetition rate	0.00 dB	Rectangular	1.732	0.00	0.00
6	Noise floor proximity	0.00 dB	Rectangular	1.732	0.00	0.00
7	Frequency interpolation	0.10 dB	Rectangular	1.732	0.06	0.00
8	Mismatch	0.07 dB	U-shaped	1.414	0.05	0.00
Combined standard uncertainty			Normal		0.52 dB	
Expanded uncertainty			Normal, k=2		1.03 dB	

3.2.2 Radiated Emission Measurements (Below 1GHz)

	Input Quantity (Contribution) X_i	Value	Prob. Dist.	Divisor	$u_i(x)$	$u_i(x)^2$
1	Receiver reading	0.10 dB	Normal, k=1	1.000	0.10	0.01
2	Attenuation: antenna-receiver	0.20 dB	Normal, k=2	2.000	0.10	0.01
3	Antenna factor AF	0.75 dB	Normal, k=2	2.000	0.38	0.14
4	Receiver sinewave accuracy	0.45 dB	Normal, k=2	2.000	0.23	0.05
5	Receiver pulse amplitude	1.50 dB	Rectangular	1.732	0.87	0.75
6	Receiver pulse repetition rate	1.50 dB	Rectangular	1.732	0.87	0.75
7	Noise floor proximity	0.50 dB	Rectangular	1.732	0.29	0.08
8	Mismatch: antenna-receiver	0.95 dB	U-shaped	1.414	0.67	0.45
9	AF frequency interpolation	0.30 dB	Rectangular	1.732	0.17	0.03
10	AF height deviations	0.10 dB	Rectangular	1.732	0.06	0.00
11	Directivity difference at 3 m	3.12 dB	Rectangular	1.732	1.80	3.24
12	Phase center location at 3 m	1.00 dB	Rectangular	1.732	0.58	0.33
13	Cross-polarisation	0.90 dB	Rectangular	1.732	0.52	0.27
14	Balance	0.00 dB	Rectangular	1.732	0.00	0.00
15	Site imperfections	3.76 dB	Triangular	2.449	1.54	2.36
16	Separation distance at 3 m	0.30 dB	Rectangular	1.732	0.17	0.03
17	Effect of setup table material	0.77 dB	Rectangular	1.732	0.44	0.20
18	Table height at 3 m	0.10 dB	Normal, k=2	2.000	0.05	0.00
19	Near-field effects	0.00 dB	Triangular	2.449	0.00	0.00
20	Effect of ambient noise on OATS	0.00 dB				0.00
Combined standard uncertainty			Normal		2.95 dB	
Expanded uncertainty			Normal, k=2		5.90 dB	

3.2.3 Radiated Emission Measurements (Above 1GHz)

	Input Quantity (Contribution) X_i	Value	Prob. Dist.	Divisor	$u_i(x)$	$u_i(x)^2$
1	Receiver reading	0.10 dB	Normal, k=1	1.000	0.10	0.01
2	Attenuation: antenna-receiver	0.20 dB	Normal, k=2	2.000	0.10	0.01
3	Antenna factor AF	0.75 dB	Normal, k=2	2.000	0.38	0.14
4	Receiver sinewave accuracy	0.45 dB	Normal, k=2	2.000	0.23	0.05
5	Receiver pulse amplitude	1.50 dB	Rectangular	1.732	0.87	0.75
6	Receiver pulse repetition rate	1.50 dB	Rectangular	1.732	0.87	0.75
7	Noise floor proximity	0.50 dB	Rectangular	1.732	0.29	0.08
8	Mismatch: antenna-receiver	0.95 dB	U-shaped	1.414	0.67	0.45
9	AF frequency interpolation	0.30 dB	Rectangular	1.732	0.17	0.03
10	AF height deviations	0.10 dB	Rectangular	1.732	0.06	0.00
11	Directivity difference at 3 m	3.12 dB	Rectangular	1.732	1.80	3.24
12	Phase center location at 3 m	1.00 dB	Rectangular	1.732	0.58	0.33
13	Cross-polarisation	0.90 dB	Rectangular	1.732	0.52	0.27
14	Balance	0.00 dB	Rectangular	1.732	0.00	0.00
15	Site imperfections	3.25 dB	Triangular	2.449	1.33	1.76
16	Separation distance at 3 m	0.30 dB	Rectangular	1.732	0.17	0.03
17	Effect of setup table material	0.77 dB	Rectangular	1.732	0.44	0.20
18	Table height at 3 m	0.10 dB	Normal, k=2	2.000	0.05	0.00
19	Near-field effects	0.00 dB	Triangular	2.449	0.00	0.00
20	Effect of ambient noise on OATS	0.00 dB				0.00
Combined standard uncertainty			Normal	2.85	dB	
Expanded uncertainty			Normal, k=2	5.70	dB	

3.2.4 Conducted Measurements

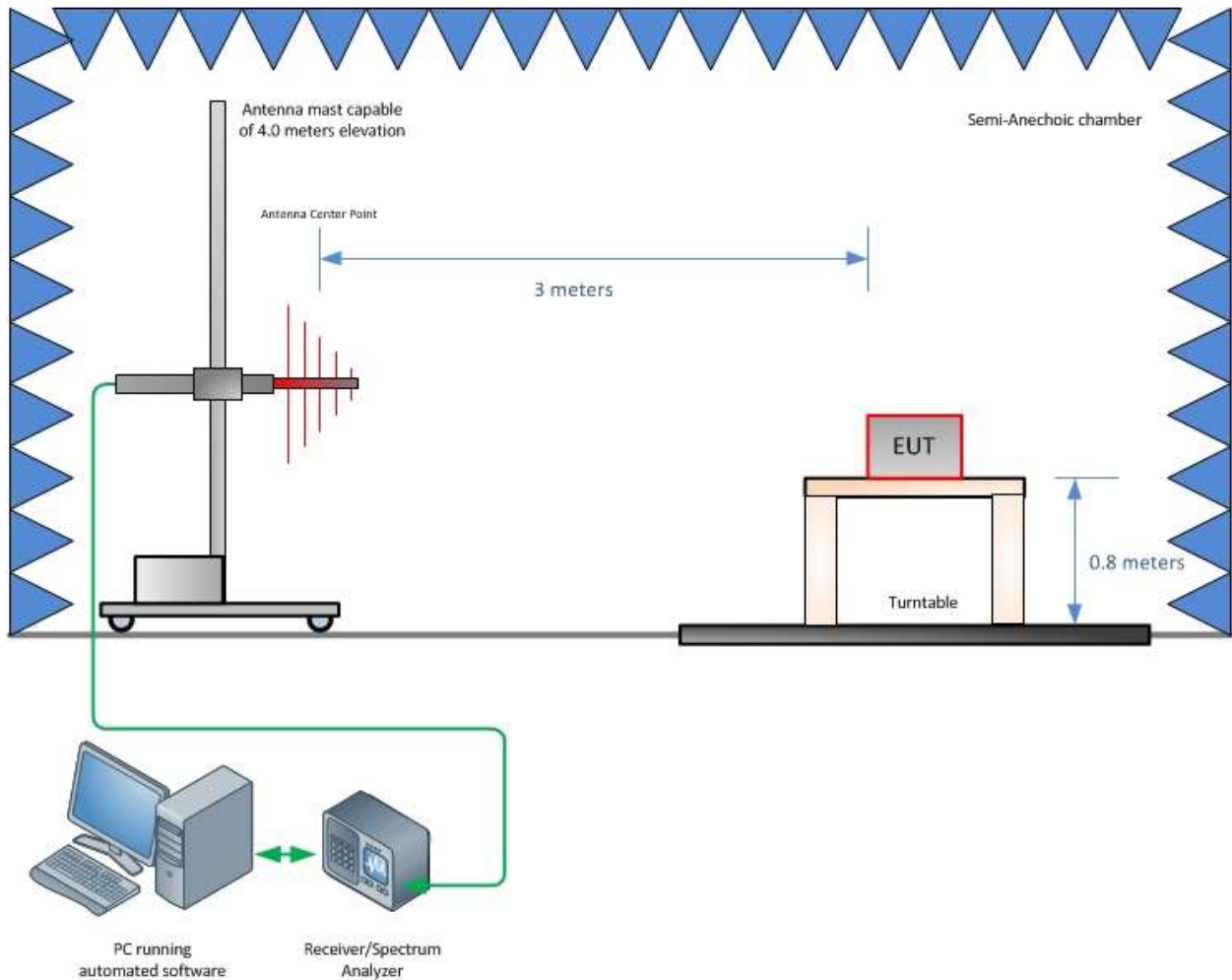
	Input Quantity (Contribution) X_i	Value	Prob. Dist.	Divisor	$u_i(x)$	$u_i(x)^2$
1	Receiver reading	0.10 dB	Normal, k=1	1.000	0.10	0.01
2	LISN-receiver attenuation	0.10 dB	Normal, k=2	2.000	0.05	0.00
3	LISN voltage division factor	0.30 dB	Normal, k=2	2.000	0.15	0.02
4	Receiver sinewave accuracy	0.36 dB	Normal, k=2	2.000	0.18	0.03
5	Receiver pulse amplitude	1.50 dB	Rectangular	1.732	0.87	0.75
6	Receiver pulse repetition rate	1.50 dB	Rectangular	1.732	0.87	0.75
7	Noise floor proximity	0.00 dB	Rectangular	1.732	0.00	0.00
8	AMN VDF frequency interpolation	0.10 dB	Rectangular	1.732	0.06	0.00
9	Mismatch	0.07 dB	U-shaped	1.414	0.05	0.00
10	LISN impedance	2.65 dB	Triangular	2.449	1.08	1.17
11	Effect of mains disturbance	0.00 dB			0.00	0.00
12	Effect of the environment					
Combined standard uncertainty			Normal	1.66	dB	
Expanded uncertainty			Normal, k=2	3.31	dB	



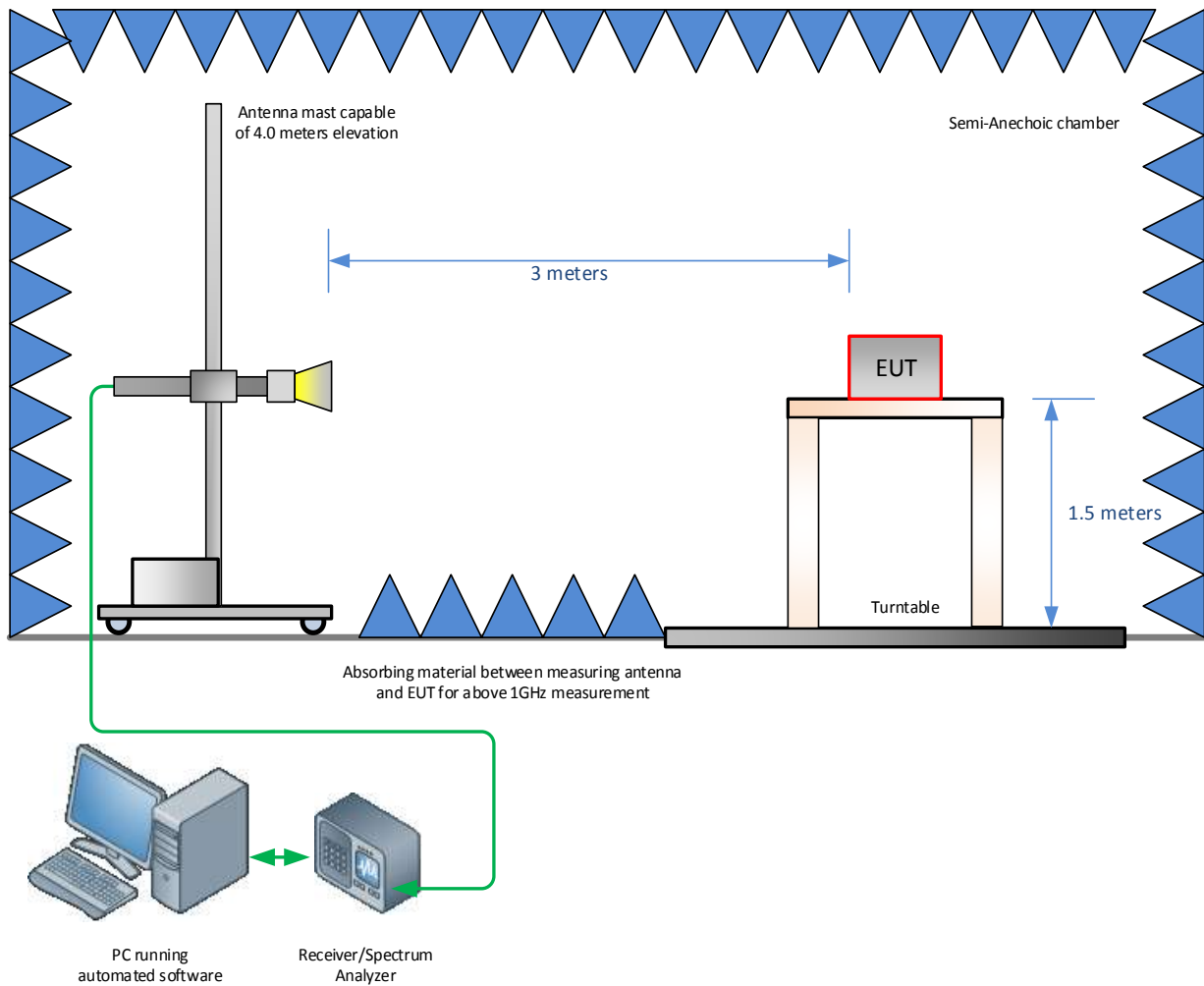
SECTION 4

DIAGRAM OF TEST SETUP

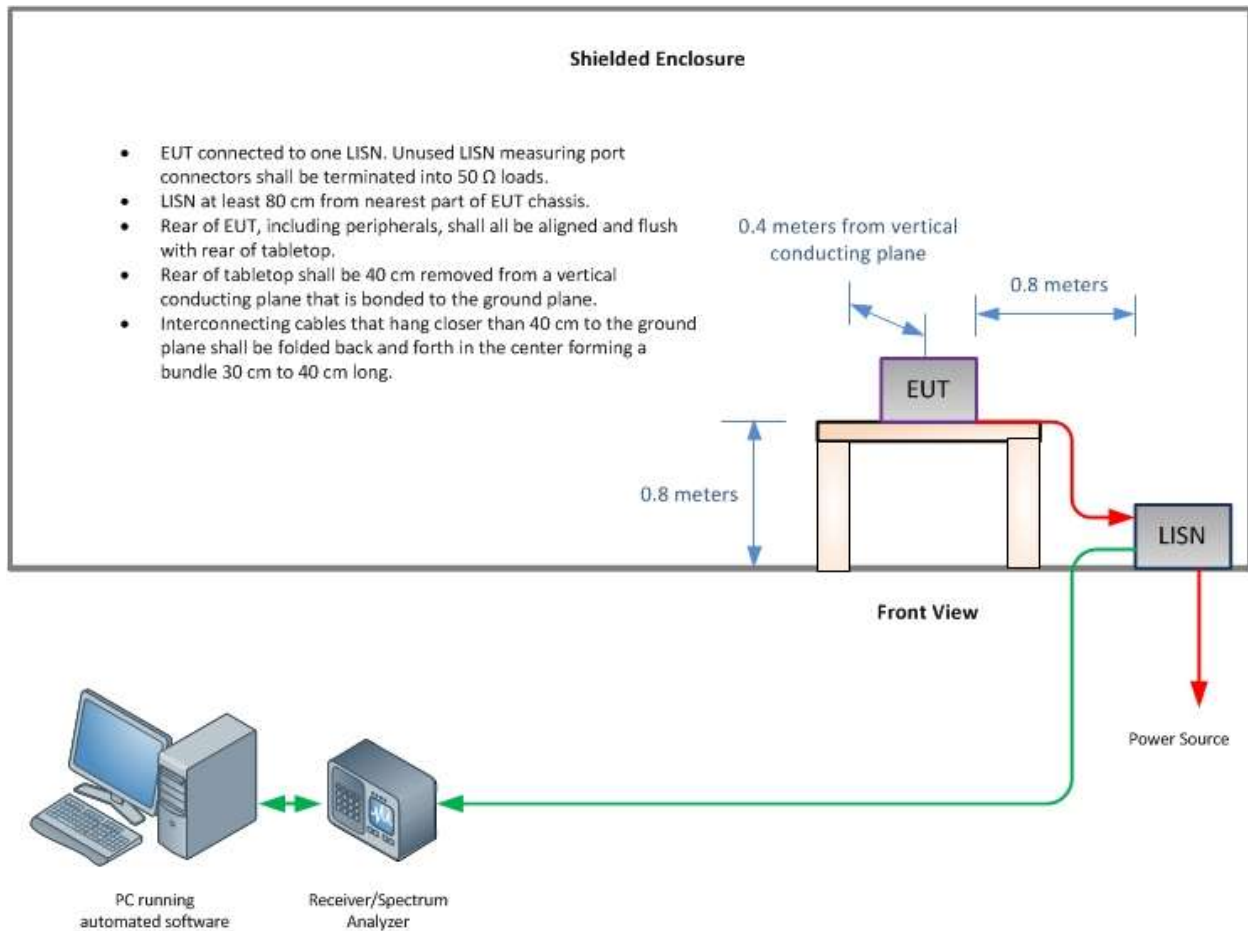
4.1 TEST SETUP DIAGRAM



Radiated Emission Test Setup (Below 1GHz)



Radiated Emission Test Setup (Above 1GHz)



Conducted Emission Test Setup



SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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