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Report On

Application for Grant of Equipment Authorization of the
Lantronix, Inc.

Wireless Print Solutions Adapter; xPrintServer Wi-Fi
Professional and xPrintServer Wi-Fi Essential Ethernet to
Wireless Print Server

FCC Part 15 Subpart E §15.407
IC RSS-210 Issue 8 December 2010

Report No. SD72105305-0415E

May 2015



REPORT ON	Radio Testing of the Lantronix, Inc. Ethernet to Wireless Print Server
TEST REPORT NUMBER	SD72105305-0415E
PREPARED FOR	Lantronix, Inc. 7535 Irvine Center Drive, Suite 100 Irvine, CA
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PREPARED BY	 Ferdinand S. Custodio Name Authorized Signatory Title: EMC/Senior Wireless Test Engineer
APPROVED BY	 Chip R. Fleury Name Authorized Signatory Title: West Coast EMC Manager
DATED	July 26, 2015



Revision History

SD72105305-0415E Lantronix, Inc. Wireless Print Solutions Adapter; xPrintServer Wi-Fi Professional and xPrintServer Wi-Fi Essential Ethernet to Wireless Print Server					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
07/26/2015	Initial Release				Chip R. Fleury

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SECTION 1

REPORT SUMMARY

Radio Testing of the
Lantronix, Inc.
Ethernet to Wireless Print Server

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Lantronix, Inc. Ethernet to Wireless Print Server to the requirements of FCC Part 15 Subpart E §15.407 and IC RSS-210 Issue 8 December 2010.

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	Lantronix, Inc.
Model Number(s)	WPSA-100 (Xerox); XPS2140201S (Lantronix) and XPS2140101S (Lantronix)
FCC ID Number	R68XPSWF
IC Number	3867A-XPSWF
Serial Number(s)	N/A
Number of Samples Tested	2
Test Specification/Issue/Date	• FCC Part 15 Subpart E §15.407 (October 1, 2014). • RSS-210 - Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment (Issue 8, December 2010). • RSS-Gen - General Requirements for Compliance of Radio Apparatus (Issue 4, November 2014). • 789033 D02 General UNII Test Procedures New Rules v01 (Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E) June 06, 2014.
Start of Test	May 18, 2015
Finish of Test	May 27, 2015
Name of Engineer(s)	Ferdinand Custodio Nikolay Shtin
Related Document(s)	• Continuous TX test instructions.rtf • Supporting documents for EUT certification are separate exhibits.

1.2 BRIEF SUMMARY OF RESULTS

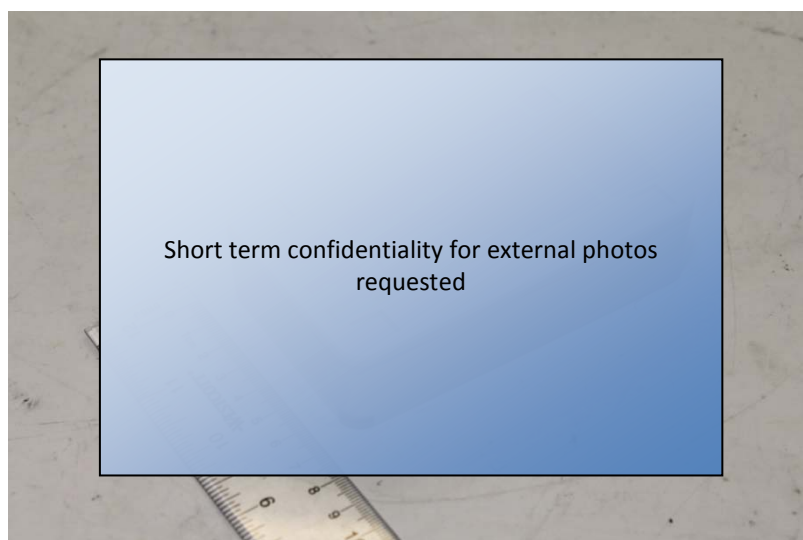
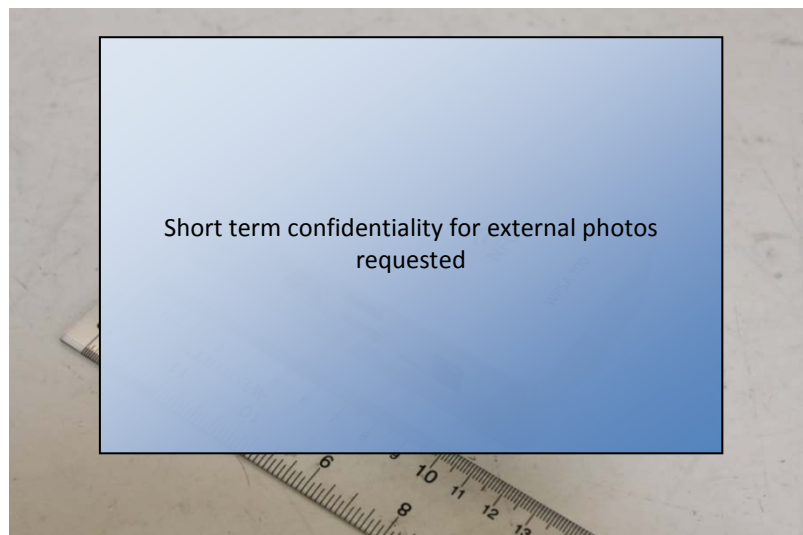
A brief summary of the tests carried out in accordance with FCC Part 15 Subpart E §15.407 with cross-reference to the corresponding IC RSS standard is shown below.

Operation in U-NII 1, U-NII 2A/2C and U-NII 3 Bands (New Rules)					
Section	Spec Clause	RSS	Test Description	Result	Comments/ Base Standard
2.1	§15.407(b)(6)	RSS-Gen 8.8	Conducted Emissions	Compliant	
2.2	§15.403(i)		26 dB Bandwidth	As Reported	
2.3		RSS-Gen 6.6	99% Emission Bandwidth	As Reported	
2.4	§15.407(e)	RSS-210 A8.2(a)	Minimum 6dB Bandwidth	Compliant	
2.5	§15.407(a)(1)(IV) and §15.407(a)(3)	RSS-210 A9.2(1) and (4)	Maximum Conducted Output Power	Compliant	
2.6	§15.407(a)(1)(IV) and §15.407(a)(3)	RSS-210 A9.2(1) and (4)	Maximum Power Spectral Density (PSD)	Compliant	
2.7	§15.407(b)(1),(4) and (7) / 15.209	RSS-210 A9.2(1) and (4)	Unwanted Emissions Measurement	Compliant	
2.8	§15.407(b)(1),(4) and (7)	RSS-210 A9.2(1) and (4)	Band-Edge Measurements	Compliant	
2.9	§15.407(g)	RSS-Gen 6.11	Frequency Stability	Compliant	
2.10		RSS-210 A9.4(6)(i)	Indoor Operation Only	Client Declaration	

1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) was a Lantronix, Inc. Wireless Print Solutions Adapter; xPrintServer Wi-Fi Professional and xPrintServer Wi-Fi Essential Ethernet to Wireless Print Server as shown in the photograph below. The EUT is a device intended to support Ethernet to Wi-Fi bridging in mobile printing applications. The device is intended to be connected to a printer over the Ethernet and/or Wireless networks. The device includes an NFC interface to allow tap to print transactions between a tablet or cell phone device. The NFC would provide the network configuration to the phone and the Ethernet and Wi-Fi would provide the high band width channel for print jobs. The Wireless Print Solutions Adaptor version will be marketed by Xerox. The XPrintServer2 product with dual Type A USB host connector will be directly sold and marketed by Lantronix. The only difference between the "Professional" and "Essential" is the software app. Lantronix controls the manufacturing for both versions. Lantronix controls the manufacturing for both versions. The 802.11 n and AC (5GHz) functions of the EUT were verified in this test report.



Equipment Under Test



1.3.2 EUT General Description

EUT Description	Ethernet to Wireless Print Server
Model Name	Wireless Print Solutions Adapter; xPrintServer Wi-Fi Professional and xPrintServer Wi-Fi Essential
Model Number(s)	WPSA-100 (Xerox); XPS2140201S (Lantronix) and XPS2140101S (Lantronix)
Rated Voltage	5VDC via AC Adapter (TOP Switching Power Supply P/N W050010GPX1 L1 Input: 100-240VAV 50/60Hz @0.2A Output: 5VDC @ 1.0A).
Mode Verified	802.11 n/ac WLAN (U-NII),
Capability	802.11 b/g/n/ac WLAN (DTS/U-NII), NFC (passive tag) and Bluetooth 4.0+EDR
Primary Unit (EUT)	☐ Production ☒ Pre-Production ☐ Engineering
Antenna Type	Savvi™ Embedded Ceramic WLAN 802.11 a/b/g Antenna 2.4 to 2.5 and 4.9 to 5.8 GHz (P/N M830510)
Antenna Gain	1.1 dBi (2.4GHz) 3.2 dBi (5GHz)
Number of Operating Frequencies	22 (4 in U-NII 1, 4 in U-NII 2A, 9 in U-NII 2C and 5 in U-NII 3)

1.3.3 Channel Table

5150-5250 MHz band (U-NII 1)				
Mode	Channel	Frequency (MHz)	Bandwidth (MHz)	Modulation Technology
802.11 n/ac	36	5180	20	OFDM
802.11 n/ac	40	5200	20	OFDM
802.11 n/ac	44	5220	20	OFDM
802.11 n/ac	48	5240	20	OFDM
802.11 n/ac	38	5190	40	OFDM
802.11 n/ac	46	5230	40	OFDM
802.11 ac	42	5210	80	OFDM

Channel 38, 46 and 42 were tested to verify 40MHz and 80 MHz BW capability of the EUT but reported as not being used by the EUT (as per Channel Listing Exhibit submitted by the manufacturer).

5260-5320 MHz band (U-NII 2A)				
Mode	Channel	Frequency (MHz)	Bandwidth (MHz)	Modulation Technology
802.11 n/ac	52	5260	20	OFDM
802.11 n/ac	56	5280	20	OFDM
802.11 n/ac	60	5300	20	OFDM
802.11 n/ac	64	5320	20	OFDM
<i>802.11 n/ac</i>	<i>54</i>	<i>5280</i>	<i>40</i>	<i>OFDM</i>
<i>802.11 n/ac</i>	<i>62</i>	<i>5300</i>	<i>40</i>	<i>OFDM</i>
<i>802.11 ac</i>	<i>58</i>	<i>5290</i>	<i>80</i>	<i>OFDM</i>

Channel 54,62 and 58 were tested to verify 40MHz and 80 MHz BW capability of the EUT but reported as not being used by the EUT (as per Channel Listing Exhibit submitted by the manufacturer).

5500-5720 MHz band (U-NII 2C)				
Mode	Channel	Frequency (MHz)	Bandwidth (MHz)	Modulation Technology
802.11 n/ac	100	5500	20	OFDM
802.11 n/ac	104	5520	20	OFDM
802.11 n/ac	108	5540	20	OFDM
802.11 n/ac	112	5560	20	OFDM
802.11 n/ac	116	5580	20	OFDM
<i>802.11 n/ac</i>	<i>120</i>	<i>5600</i>	<i>20</i>	<i>OFDM</i>
<i>802.11 n/ac</i>	<i>124</i>	<i>5620</i>	<i>20</i>	<i>OFDM</i>
<i>802.11 n/ac</i>	<i>128</i>	<i>5640</i>	<i>20</i>	<i>OFDM</i>
802.11 n/ac	132	5660	20	OFDM
802.11 n/ac	136	5680	20	OFDM
802.11 n/ac	140	5700	20	OFDM
802.11 n/ac	144	5720	20	OFDM
<i>802.11 n/ac</i>	<i>102</i>	<i>5510</i>	<i>40</i>	<i>OFDM</i>
<i>802.11 n/ac</i>	<i>110</i>	<i>5550</i>	<i>40</i>	<i>OFDM</i>
<i>802.11 n/ac</i>	<i>118</i>	<i>5590</i>	<i>40</i>	<i>OFDM</i>
<i>802.11 n/ac</i>	<i>126</i>	<i>5630</i>	<i>40</i>	<i>OFDM</i>
<i>802.11 n/ac</i>	<i>134</i>	<i>5670</i>	<i>40</i>	<i>OFDM</i>



802.11 n/ac	142	5710	40	OFDM
802.11 ac	106	5530	80	OFDM
802.11 ac	122	5610	80	OFDM
802.11 ac	138	5690	80	OFDM

Channel 102, 110, 134, 142, 106 and 138 were tested to verify 40MHz and 80 MHz BW capability of the EUT but reported as not being used by the EUT (as per Channel Listing Exhibit submitted by the manufacturer) together with 120, 124 and 128 (restricted channels in Canada).

5725-5850 MHz band (U-NII 3)				
Mode	Channel	Frequency (MHz)	Bandwidth (MHz)	Modulation Technology
802.11 n/ac	149	5745	20	OFDM
802.11 n/ac	153	5765	20	OFDM
802.11 n/ac	157	5785	20	OFDM
802.11 n/ac	161	5805	20	OFDM
802.11 n/ac	165	5825	20	OFDM
802.11 n/ac	151	5755	40	OFDM
802.11 n/ac	159	5795	40	OFDM
802.11 ac	155	5775	80	OFDM

Channel 151, 159 and 155 were tested to verify 40MHz and 80 MHz BW capability of the EUT but reported as not being used by the EUT (as per Channel Listing Exhibit submitted by the manufacturer).

1.3.4 Maximum Conducted Output Power

Mode	Frequency Range (MHz)	Output Power (dBm)	Output Power (mW)
802.11n (U-NII 1)	5180-5240	15.21	33.19
802.11n (U-NII 2A)	5260-5320	14.03	25.29
802.11n (U-NII 2C)	5500-5720	13.62	23.01
802.11n (U-NII 3)	5745-5825	15.33	34.12
802.11ac (U-NII 1)	5180-5240	15.50	35.48
802.11ac (U-NII 2A)	5260-5320	14.03	25.29
802.11ac (U-NII 2C)	5500-5720	13.62	23.01
802.11ac (U-NII 3)	5745-5825	15.52	35.65

1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
A	Antenna conducted port test configuration. A modified sample was provided for this setup. The integral antenna was removed and an on-board U.FL SMT surface mount connector was installed on the main PCB. RF configurations of the EUT were modified using Tera Term via Ethernet connection. Manufacturer provided instructions (Continuous TX test instructions.rtf) to configure WLAN mode, channel, modulation and power.
B	Radiated emissions test configuration. Identical programming procedure as Test Configuration A. EUT transmitting through the integral antenna.

1.4.2 EUT Exercise Software

EUT is configured via TCP/IP (Ethernet). IP assigned address is first determined on the support laptop via tftpd32. This IP address will be used to connect to the EUT via Tera Term. Once connected, corresponding instructions were issued using vi (visual editor) as referenced in the instructions provided.

1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
Topmicro.com	EUT AC Adapter (Switching Power Supply)	P/N W050010GPX1 L1 (5VDC @ 1A)
HP	Support Laptop (NC6220)	P/N PZ064UA#ABA S/N CNU62315QR
HP	Support Laptop AC Adapter	P/N 380467-003 S/N 592C60AYMSO26N
Pan International	Patch Cord (Ethernet EUT to Laptop)	1.5 meters, unshielded CAT5 patch cord

1.4.4 Worst Case Configuration

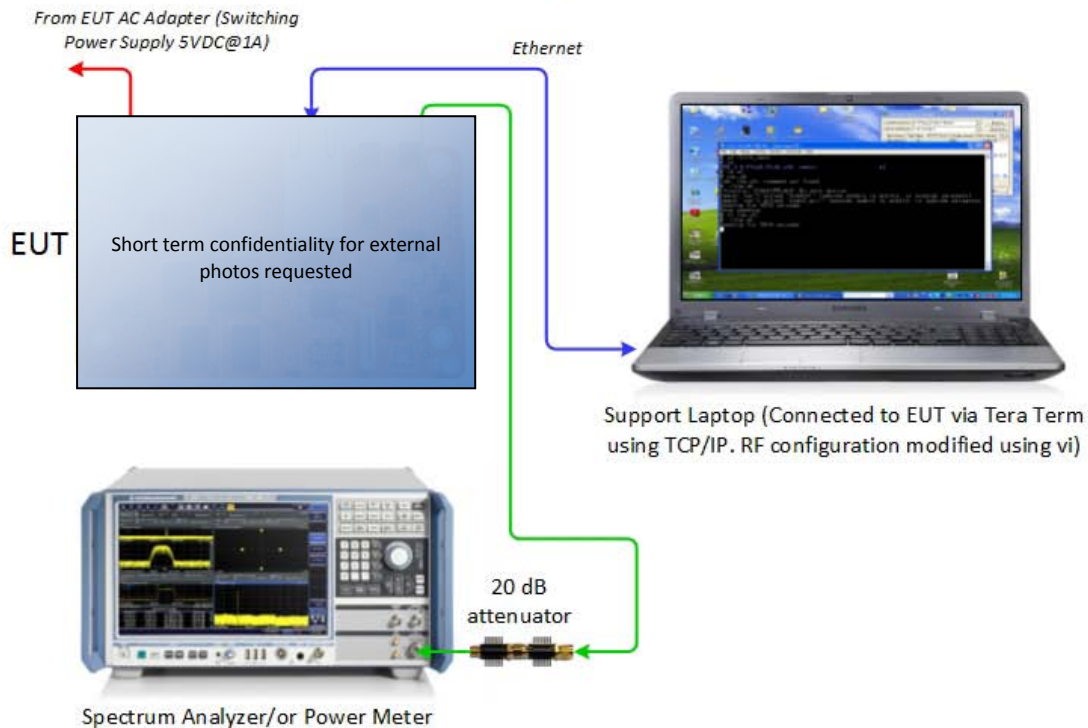
Worst-case configuration used in this test report based from Peak Output Power measurements:

Mode	Channel	BW	Data Rate
802.11n (U-NII 1)	38 (Low Channel)	40 MHz	MCS 6 (135 Mbps)
802.11n (U-NII 2A)	52 (Low Channel)	20 MHz	MCS 1 (14.4 Mbps)
802.11n (U-NII 2C)	144 (High Channel)	20 MHz	MCS 4 (43.3 Mbps)
802.11n (U-NII 3)	165 (High Channel)	20 MHz	MCS 6 (65 Mbps)
802.11ac (U-NII 1)	42 (Mid Channel)	80 MHz	MCS 3 (130 Mbps)
802.11ac (U-NII 2A)	52 (Low Channel)	20 MHz	MCS 1 (14.4 Mbps)
802.11ac (U-NII 2C)	144 (High Channel)	20 MHz	MCS 4 (43.3 Mbps)
802.11ac (U-NII 3)	165 (High Channel)	20 MHz	MCS 8 (86.7 Mbps)

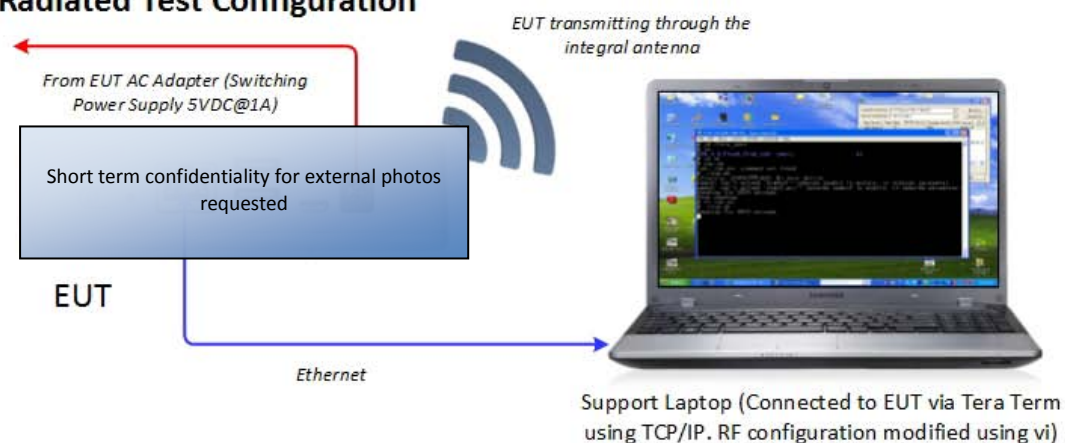
EUT is a mobile device. For radiated measurements, the EUT was verified representing typical usage (horizontal placement).

1.4.5 Simplified Test Configuration Diagram

Antenna Conducted Port Test Configuration



Radiated Test Configuration



For illustration purpose only and not to scale
 Image presented may not represent the actual EUT or support equipment

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 N/A		
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 C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz and KDB 789033 D02 General UNII Test Procedures New Rules v01 (Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E) June 06, 2014.

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 C63.4-2009. 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)

Sony Electronics Inc., Building #8 16530 Via Esprillo, San Diego, CA 92127-1708 (33.018644,-117.092409). Phone: 858 942 5542 FAX: 858-546 0364

1.9 TEST FACILITY REGISTRATION

1.9.1 FCC – Registration 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 Registration is US1146.



1.9.2 Industry Canada (IC) Registration No.: 3067A

The 10m Semi-anechoic chamber of TUV SUD America Inc. (San Diego) has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No. 3067A.



SECTION 2

TEST DETAILS

Radio Testing of the
Lantronix, Inc.
Ethernet to Wireless Print Server

2.1 CONDUCTED EMISSIONS

2.1.1 Specification Reference

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: N/A /Test Configuration B

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

May 01, 2015/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 performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature	24.8 °C
Relative Humidity	57.1 %
ATM Pressure	99.1 kPa

2.1.7 Additional Observations

- The EUT was verified using the supplied AC Adapter.
- Verification performed while the WLAN function of the EUT is active. No significant difference observed when the EUT is on different WLAN modes, only the worst case mode presented.
- 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 2.1.8 for sample computation.

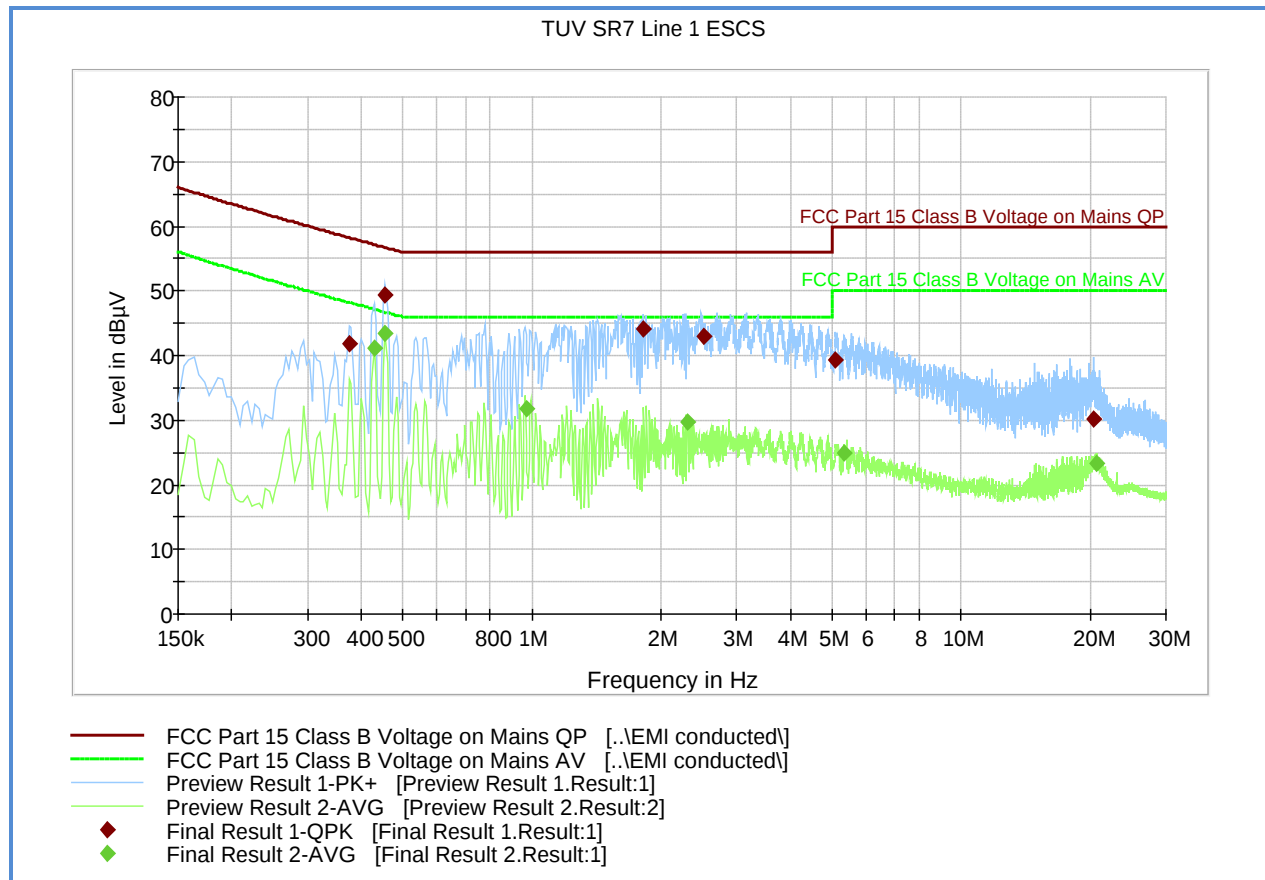
2.1.8 Sample Computation (Conducted Emission – Quasi Peak)

Measuring equipment raw measurement (dbμV) @ 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# 7567 (LISN)	0.30	
Reported QuasiPeak Final Measurement (dbμV) @ 150kHz			26.2

2.1.9 Test Results

Compliant. See attached plots and tables.

2.1.10 FCC Conducted Emissions Line 1 - Hot



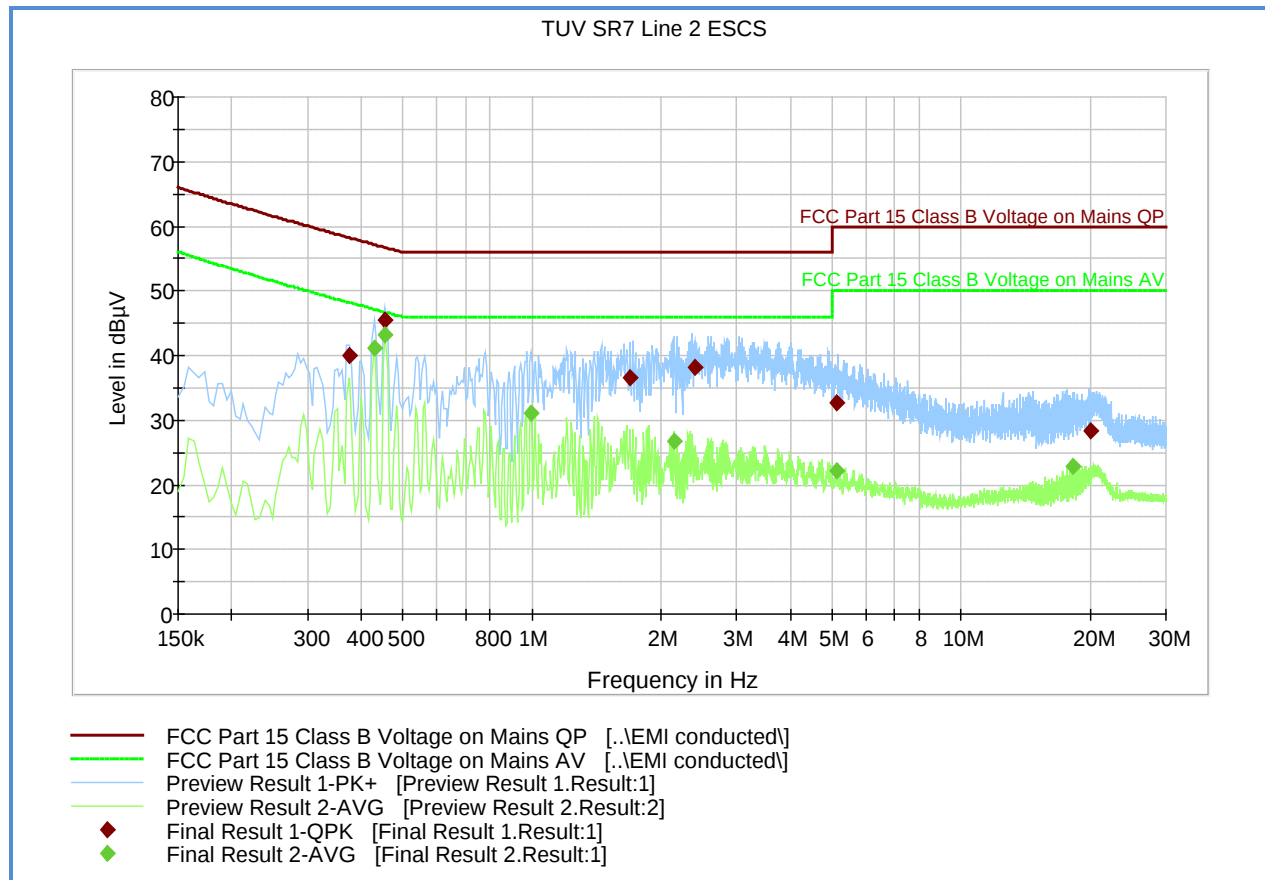
Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.375000	41.8	1000.0	9.000	Off	L1	20.2	16.5	58.2
0.456000	49.4	1000.0	9.000	Off	L1	20.2	7.3	56.7
1.819500	44.0	1000.0	9.000	Off	L1	20.2	12.0	56.0
2.508000	43.0	1000.0	9.000	Off	L1	20.5	13.0	56.0
5.100000	39.4	1000.0	9.000	Off	L1	20.6	20.6	60.0
20.377500	30.3	1000.0	9.000	Off	L1	21.0	29.7	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.429000	41.2	1000.0	9.000	Off	L1	20.2	6.0	47.2
0.456000	43.5	1000.0	9.000	Off	L1	20.2	3.2	46.7
0.969000	31.8	1000.0	9.000	Off	L1	20.1	14.2	46.0
2.305500	29.8	1000.0	9.000	Off	L1	20.5	16.2	46.0
5.325000	25.0	1000.0	9.000	Off	L1	20.6	25.0	50.0
20.724000	23.3	1000.0	9.000	Off	L1	21.0	26.7	50.0

2.1.1 FCC Conducted Emissions Line 2 – Neutral



Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.375000	40.0	1000.0	9.000	Off	N	20.2	18.3	58.2
0.456000	45.5	1000.0	9.000	Off	N	20.1	11.2	56.7
1.689000	36.5	1000.0	9.000	Off	N	20.2	19.5	56.0
2.400000	38.2	1000.0	9.000	Off	N	20.4	17.8	56.0
5.136000	32.7	1000.0	9.000	Off	N	20.6	27.3	60.0
19.959000	28.3	1000.0	9.000	Off	N	20.9	31.7	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.429000	41.1	1000.0	9.000	Off	N	20.1	6.0	47.2
0.456000	43.3	1000.0	9.000	Off	N	20.1	3.4	46.7
0.996000	31.0	1000.0	9.000	Off	N	20.2	15.0	46.0
2.152500	26.7	1000.0	9.000	Off	N	20.4	19.3	46.0
5.145000	22.2	1000.0	9.000	Off	N	20.6	27.8	50.0
18.163500	22.8	1000.0	9.000	Off	N	20.9	27.2	50.0



2.2 26 dB BANDWIDTH

2.2.1 Specification Reference

Part 15 Subpart E §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 New Rules v01.

2.2.4 Equipment Under Test and Modification State

Serial No: N/A / Test Configuration A

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

May 25, 2015 and July 1, 2015/FSC and NS

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	24.2°C
Relative Humidity	49.7%
ATM Pressure	99.9 kPa

2.2.8 Additional Observations

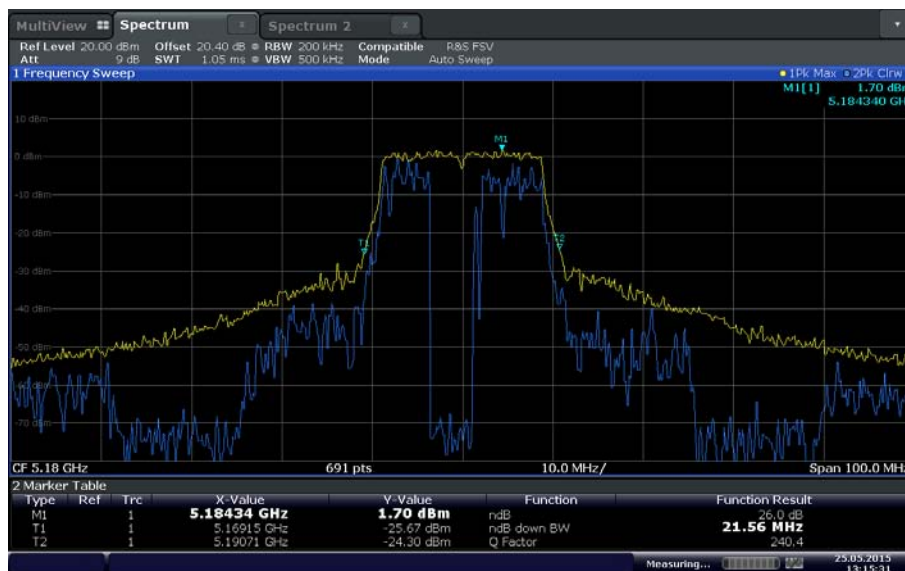
- This is a conducted test.
- Test methodology is per Section II (C) (1) of 789033 D02 General UNII Test Procedures New Rules v01. All conditions under this Section were satisfied.
- Span is wide enough to capture the channel transmission.
- RBW is 1% initially set approx. to 1% of anticipated EBW.
- VBW > RBW.
- Trace is max hold.
- Detector is peak.

- Sweep time is set to Auto.
- “n dB down” (26dB) marker function of the spectrum analyzer was used for this test.
- RBW adjusted until RBW/EBW ratio is approximately 1% or as the SA setting permits (i.e next setting after 300kHz RBW is limited to 500kHz).

2.2.9 Summary Test Results (as reported)

26 dB Bandwidth 802.11n			
WiFi Mode	Low Channel (Channel No./ BW in MHz)	Mid Channel (Channel No./ BW in MHz)	High Channel (Channel No./ BW in MHz)
U-NII 1 20 MHz BW	36 / 21.56 MHz	40 / 21.56 MHz	48 / 21.71 MHz
U-NII 2A 20 MHz BW	52 / 21.85 MHz	56 / 21.56 MHz	64 / 21.85 MHz
U-NII 2C 20 MHz BW	100 / 21.71 MHz	116 / 21.85 MHz	144 / 21.71 MHz
U-NII 3 20 MHz BW	149 / 21.56 MHz	157 / 21.42 MHz	165 / 21.56 MHz
U-NII 1 40 MHz BW	38 / 41.39 MHz		46 / 40.38 MHz
U-NII 2A 40 MHz BW	54 / 41.24 MHz		62 / 40.23 MHz
U-NII 2C 40 MHz BW	102/ 40.23 MHz	110/ 40.09 MHz	142/ 40.09 MHz
U-NII 3 40 MHz BW	151 / 40.23 MHz		159 / 40.38 MHz
26 dB Bandwidth 802.11 ac			
WiFi Mode	Low Channel (Channel No./ BW in MHz)	Mid Channel (Channel No./ BW in MHz)	High Channel (Channel No./ BW in MHz)
U-NII 1 20 MHz BW	36 / 21.42 MHz	40 / 21.56 MHz	48 / 21.42 MHz
U-NII 2A 20 MHz BW	52 / 21.85 MHz	56 / 21.56 MHz	64 / 21.85 MHz
U-NII 2C 20 MHz BW	100 / 21.71 MHz	116 / 21.85 MHz	144 / 21.71 MHz
U-NII 3 20 MHz BW	149 / 21.56 MHz	157 / 21.42 MHz	165 / 21.56 MHz
U-NII 1 40 MHz BW	38 / 41.39 MHz		46 / 40.38 MHz
U-NII 2A 40 MHz BW	54 / 41.24 MHz		62 / 40.23 MHz
U-NII 2C 40 MHz BW	102 / 40.23 MHz	110 / 40.09 MHz	142 / 40.09 MHz
U-NII 3 40 MHz BW	151 / 40.23 MHz		159 / 40.38 MHz
U-NII 1 80 MHz BW		42 / 82.34 MHz	
U-NII 2A 80 MHz BW		58/ 82.34 MHz	
U-NII 2C 80 MHz BW	106 / 81.91		138 / 82.05
U-NII 3 80 MHz BW		155 / 81.91 MHz	

2.2.10 Test Plots



Date: 25 MAY 2015 13:15:31

U-NII 1 Low Channel 20MHz BW



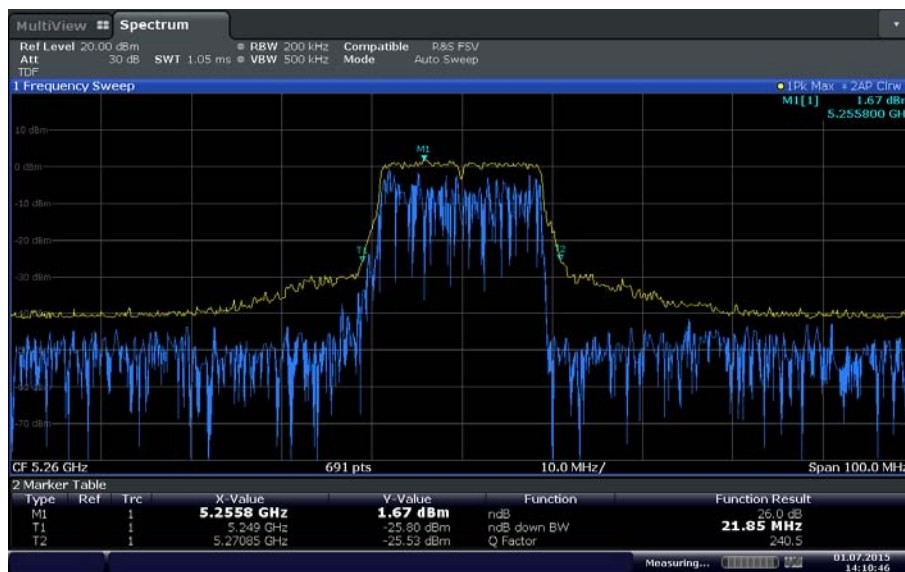
Date: 25 MAY 2015 13:29:22

U-NII 1 Mid Channel 20MHz BW



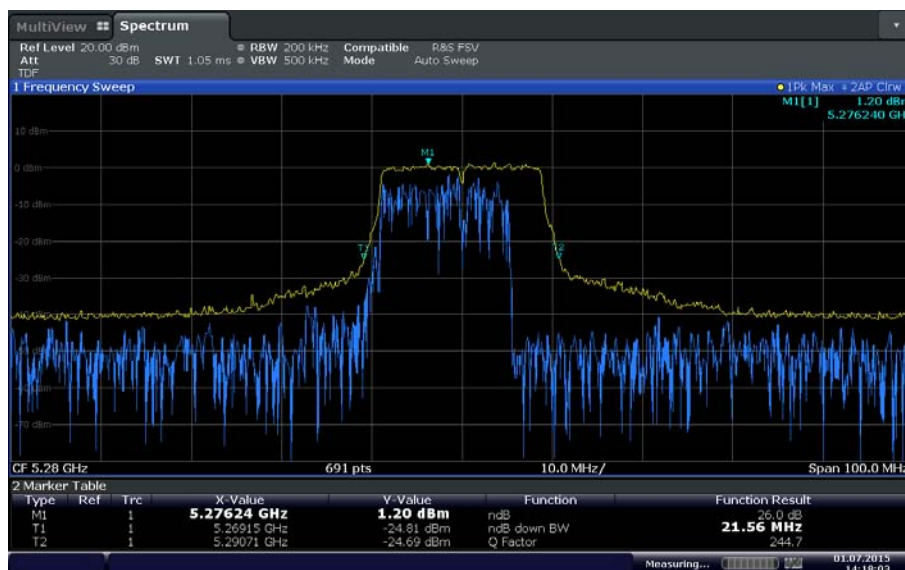
Date: 25 MAY 2015 13:31:53

U-NII 1 High Channel 20MHz BW



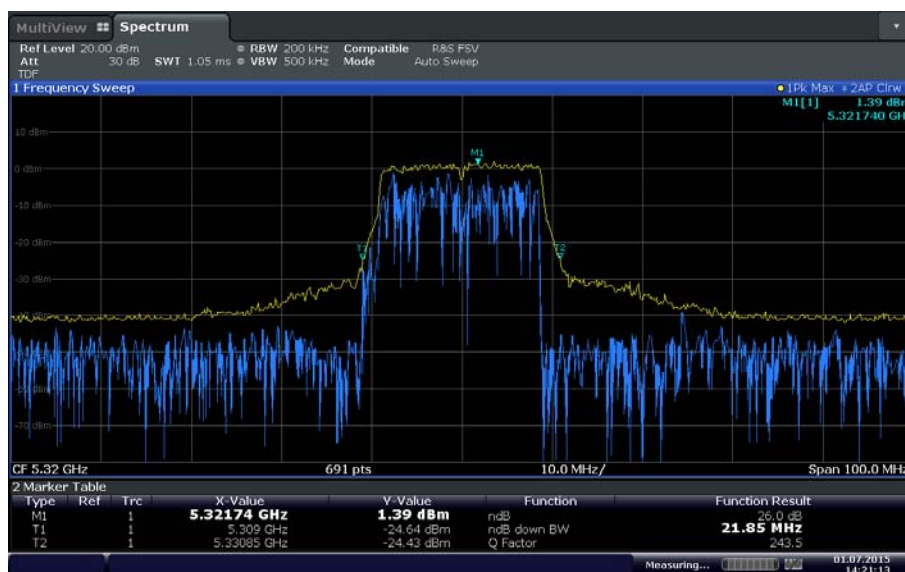
Date: 1 JUL 2015 14:10:46

U-NII 2A Low Channel 20MHz BW



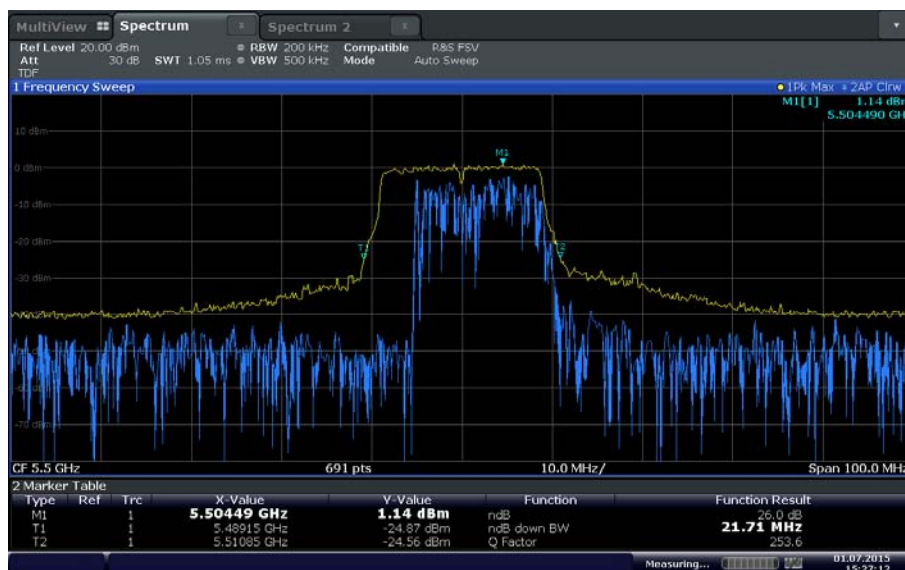
Date: 1 JUL 2015 14:18:03

U-NII 2A Mid Channel 20MHz BW



Date: 1 JUL 2015 14:21:13

U-NII 2A High Channel 20MHz BW



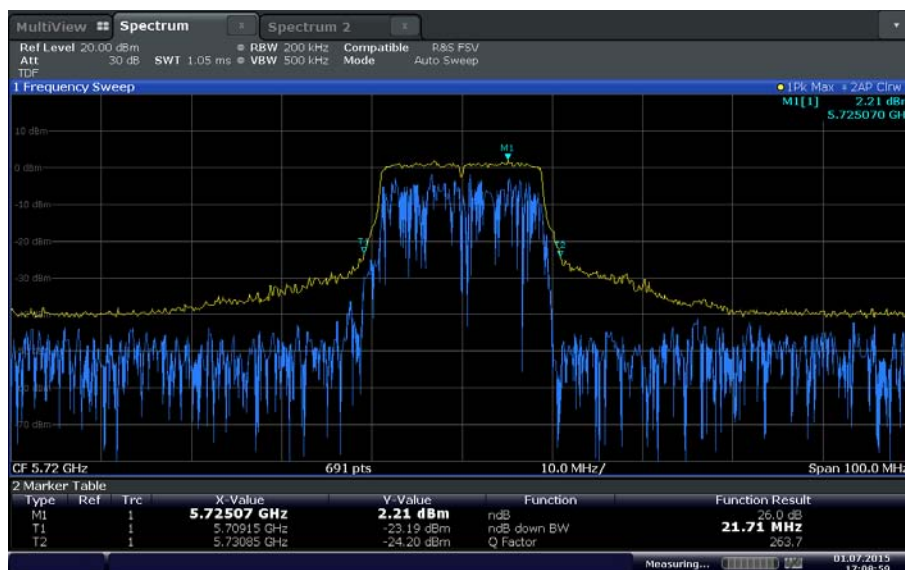
Date: 1 JUL 2015 15:27:13

U-NII 2C Low Channel 20MHz BW



Date: 16 JUL 2015 11:48:06

U-NII 2C Mid Channel 20MHz BW



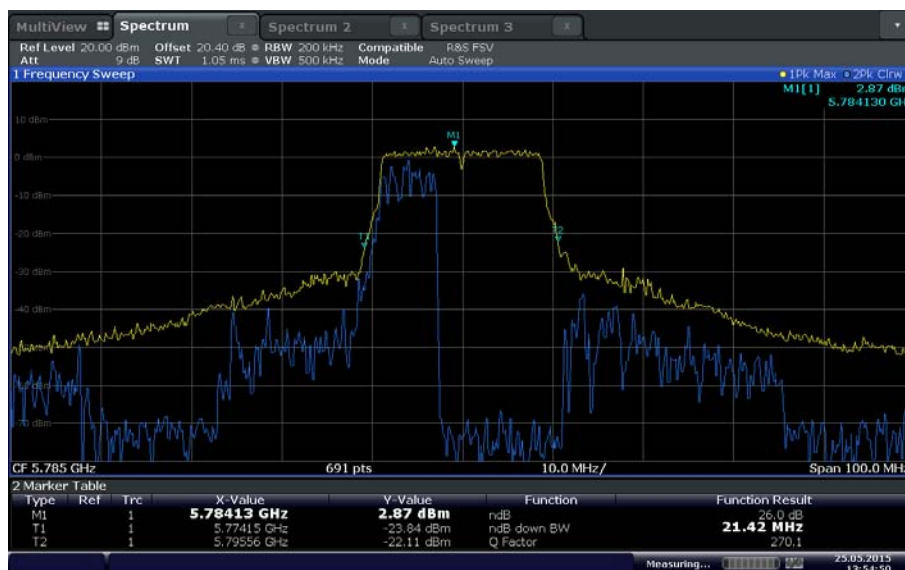
Date: 1 JUL 2015 17:09:00

U-NII 2C High Channel 20MHz BW



Date: 25 MAY 2015 13:34:30

U-NII 3 Low Channel 20MHz BW



Date: 25 MAY 2015 13:54:51

U-NII 3 Mid Channel 20MHz BW



Date: 25 MAY 2015 14:00:03

U-NII 3 High Channel 20MHz BW



Date: 25 MAY 2015 14:07:03

U-NII 1 Low Channel 40MHz BW



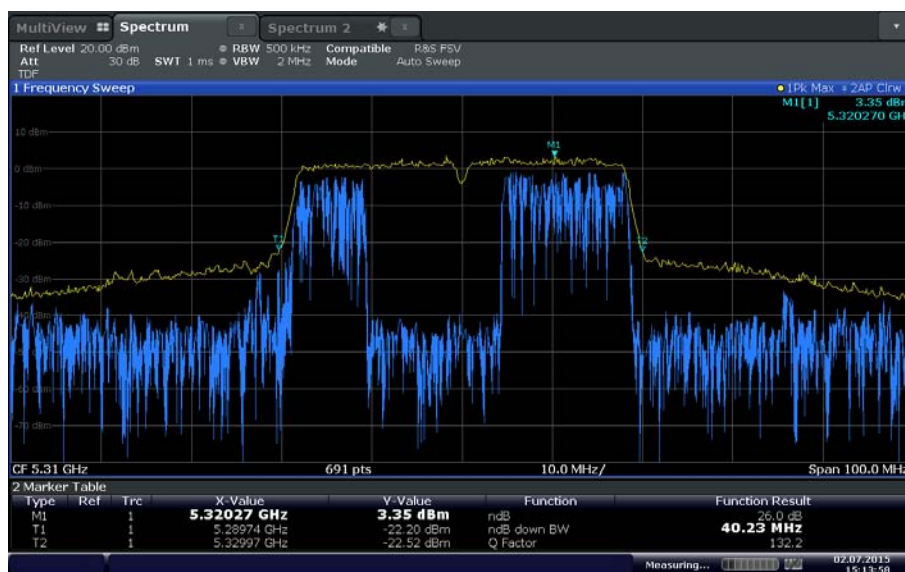
Date: 25 MAY 2015 14:10:32

U-NII 1 High Channel 40MHz BW



Date: 2 JUL 2015 15:16:45

U-NII 2A Low Channel 40MHz BW



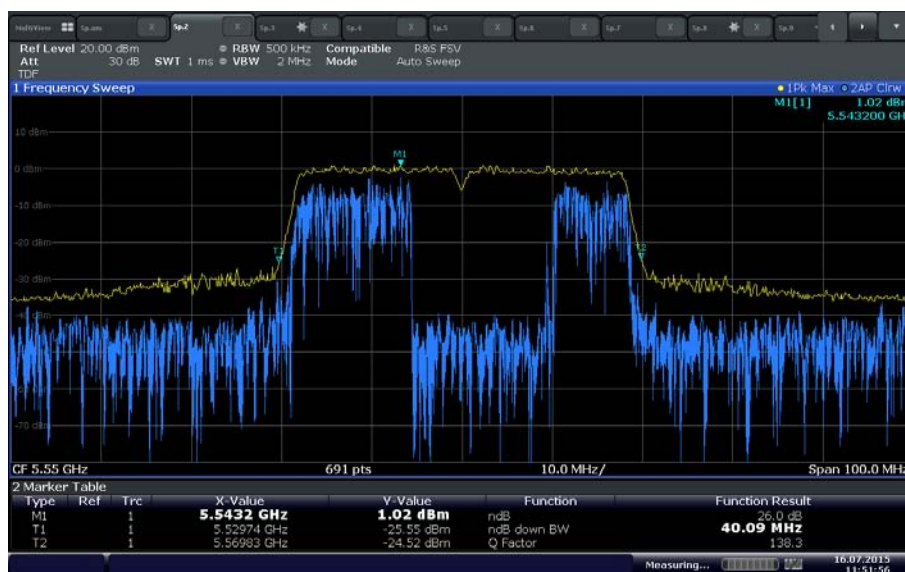
Date: 2 JUL 2015 15:13:58

U-NII 2A High Channel 40MHz BW



Date: 2 JUL 2015 15:10:44

U-NII 2C Low Channel 40MHz BW



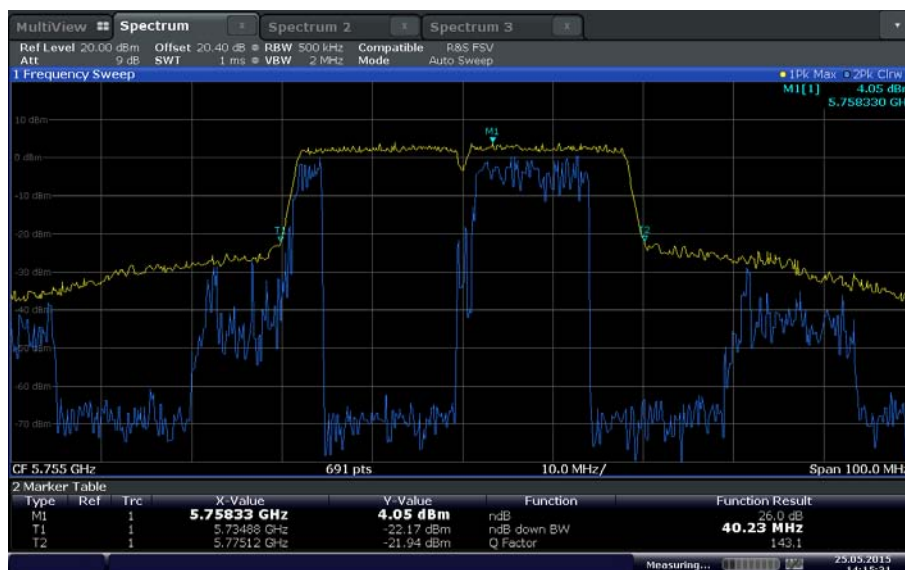
Date: 16 JUL 2015 11:51:57

U-NII 2C Mid Channel 40MHz BW



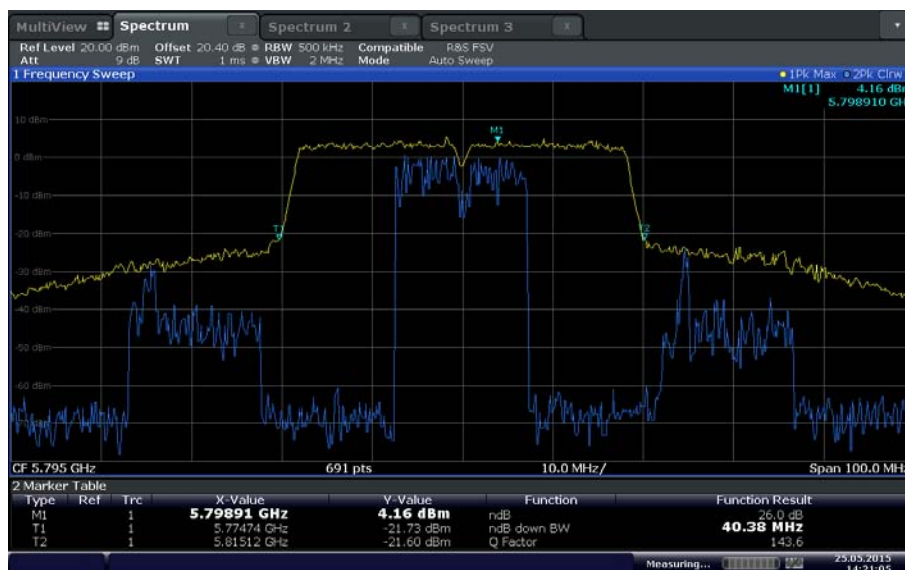
Date: 2 JUL 2015 15:03:17

U-NII 2C High Channel 40MHz BW



Date: 25 MAY 2015 14:15:31

U-NII 3 Low Channel 40MHz BW



Date: 25 MAY 2015 14:21:06

U-NII 3 High Channel 40MHz BW



Date: 25 MAY 2015 14:29:27

U-NII 1 Mid Channel 80MHz BW



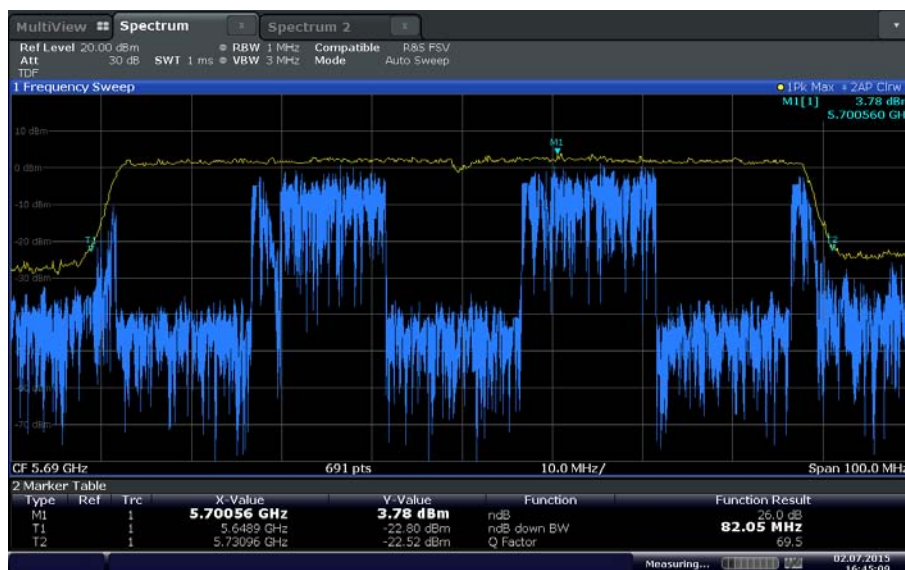
Date: 2 JUL 2015 15:34:19

U-NII 2A Mid Channel 80MHz BW



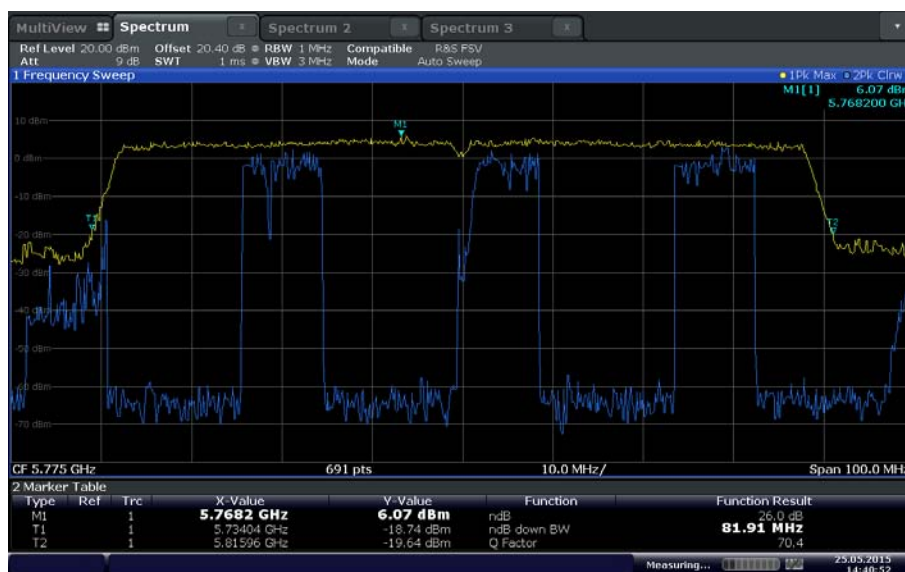
Date: 2 JUL 2015 15:41:39

U-NII 2C Low Channel 80MHz BW



Date: 2 JUL 2015 16:45:09

U-NII 2C High Channel 80MHz BW



Date: 25 MAY 2015 14:40:52

U-NII 3 Mid Channel 80MHz BW

2.3 99% EMISSION BANDWIDTH

2.3.1 Specification Reference

RSS-Gen Section 6.6

2.3.2 Standard Applicable

The emission bandwidth (x dB) is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated x dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth.

When the occupied bandwidth limit is not stated in the applicable RSS or reference measurement method, the transmitted signal bandwidth shall be reported as the 99% emission bandwidth, as calculated or measured.

- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- • The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
- • The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.

Note: Video averaging is not permitted.

A peak, or peak hold, may be used in place of the sampling detector as this may produce a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold may be necessary to determine the occupied bandwidth if the device is not transmitting continuously.

The trace data points are recovered and are directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded.

The difference between the two recorded frequencies is the 99% occupied bandwidth.

2.3.3 Equipment Under Test and Modification State

Serial No: N/A / Test Configuration A

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

May 25, 2015 and July 8,10,16, 2015/FSC and NS

2.3.5 Test Equipment Used

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

2.3.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature 24.2°C
 Relative Humidity 49.7%
 ATM Pressure 99.9 kPa

2.3.7 Additional Observations

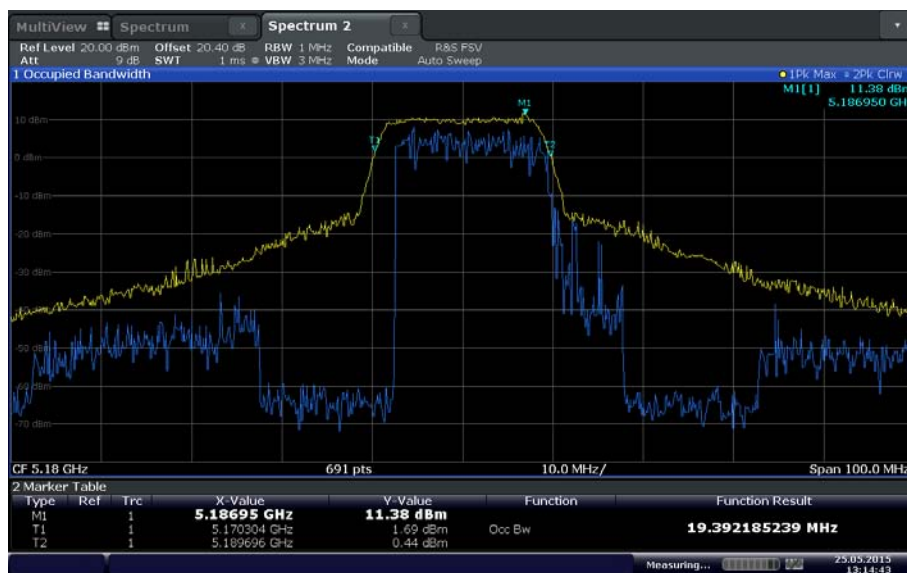
- This is a conducted test.
- An offset of 20.4dB was added to compensate for the external attenuator and cable used.
- Span is wide enough to capture the channel transmission.
- RBW is 1% of the span.
- VBW is 3X RBW.
- Sweep is auto.
- Detector is peak.
- The % Power Bandwidth setting in the spectrum analyzer was set to 99% (default).
- The Channel Bandwidth measurement function of the spectrum analyzer was used for this test.

2.3.8 Summary Test Results (as reported)

99% Emission Bandwidth 802.11n			
WiFi Mode	Low Channel (Channel No./ BW in MHz)	Mid Channel (Channel No./ BW in MHz)	High Channel (Channel No./ BW in MHz)
U-NII 1 20 MHz BW	36 / 19.39 MHz	40 / 19.25 MHz	48 / 19.25 MHz
U-NII 2A 20 MHz BW	52/ 19.68 MHz	56/ 19.39 MHz	64/ 19.53 MHz
U-NII 2C 20 MHz BW	100/ 19.53 MHz	116/ 19.53 MHz	144/ 19.82 MHz
U-NII 3 20 MHz BW	149 / 19.39 MHz	157 / 19.25 MHz	165 / 19.39 MHz
U-NII 1 40 MHz BW	38 / 37.05 MHz		46 / 36.90 MHz
U-NII 2A 40 MHz BW	54/ 37.05 MHz		62/ 37.19 MHz
U-NII 2C 40 MHz BW	102/ 37.48 MHz	110/ 36.90 MHz	142/ 37.05 MHz
U-NII 3 40 MHz BW	151 / 36.90 MHz		159 / 37.04 MHz
99% Emission Bandwidth 802.11 ac			
WiFi Mode	Low Channel (Channel No./ BW in MHz)	Mid Channel (Channel No./ BW in MHz)	High Channel (Channel No./ BW in MHz)
U-NII 1 20 MHz BW	36 / 19.39 MHz	40 / 19.25 MHz	48 / 19.25 MHz
U-NII 2A 20 MHz BW	52/ 19.68 MHz	56/ 19.39 MHz	64/ 19.53 MHz
U-NII 2C 20 MHz BW	100/ 19.53 MHz	116/ 19.53 MHz	144/ 19.82 MHz
U-NII 3 20 MHz BW	149 / 19.39 MHz	157 / 19.25 MHz	165 / 19.39 MHz
U-NII 1 40 MHz BW	38 / 37.05 MHz		46 / 36.90 MHz

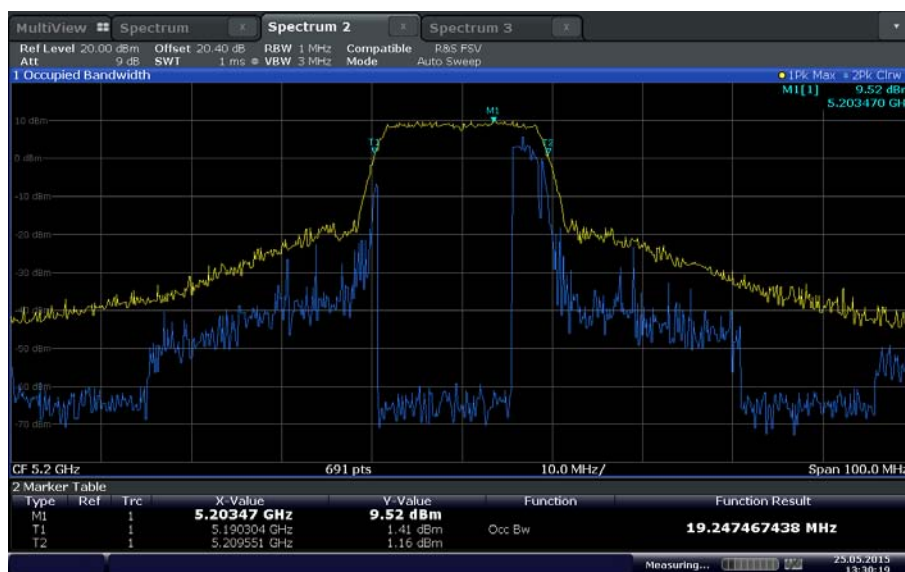
U-NII 2A 40 MHz BW	54/ 37.05 MHz		62/ 37.19 MHz
U-NII 2C 40 MHz BW	102/ 37.48 MHz	110/ 36.90 MHz	142/ 37.05 MHz
U-NII 3 40 MHz BW	151 / 36.90 MHz		159 / 37.04 MHz
U-NII 1 80 MHz BW		42 / 75.98 MHz	
U-NII 2A 80 MHz BW		58/ 76.12 MHz	
U-NII 2C 80 MHz BW	106/ 75.54 MHz		138/ 76.12 MHz
U-NII 3 80 MHz BW		155 / 75.98 MHz	

2.3.9 Test Plots



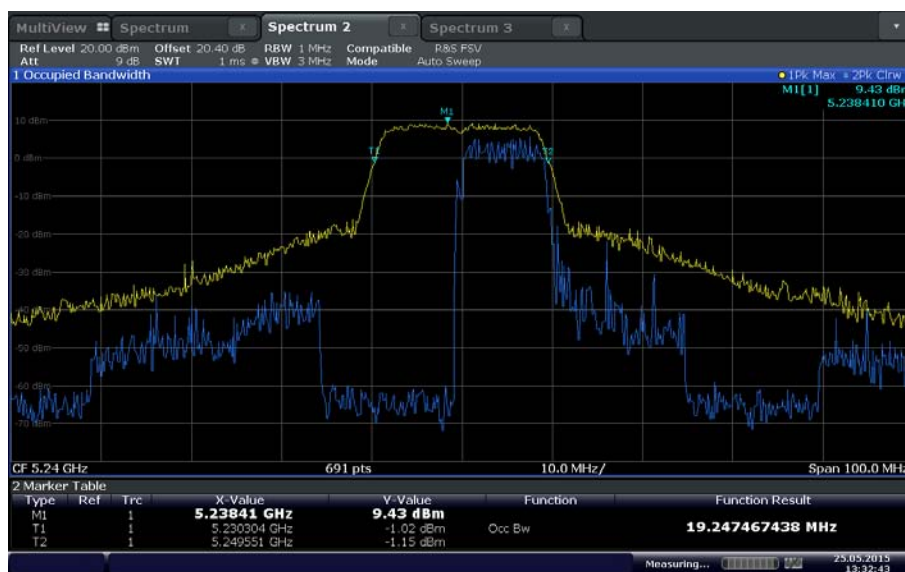
Date: 25 MAY 2015 13:14:43

U-NII 1 Low Channel 20MHz BW



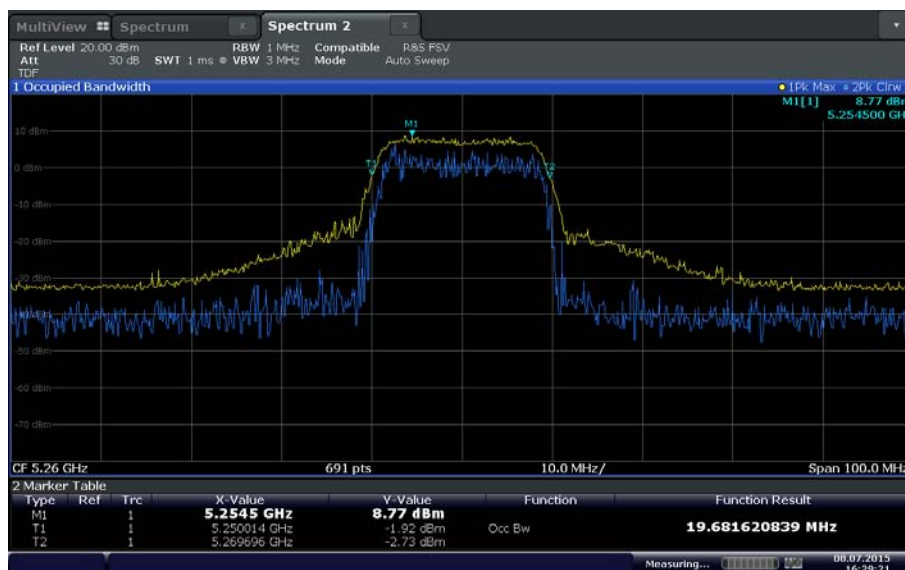
Date: 25 MAY 2015 13:30:19

U-NII 1 Mid Channel 20MHz BW



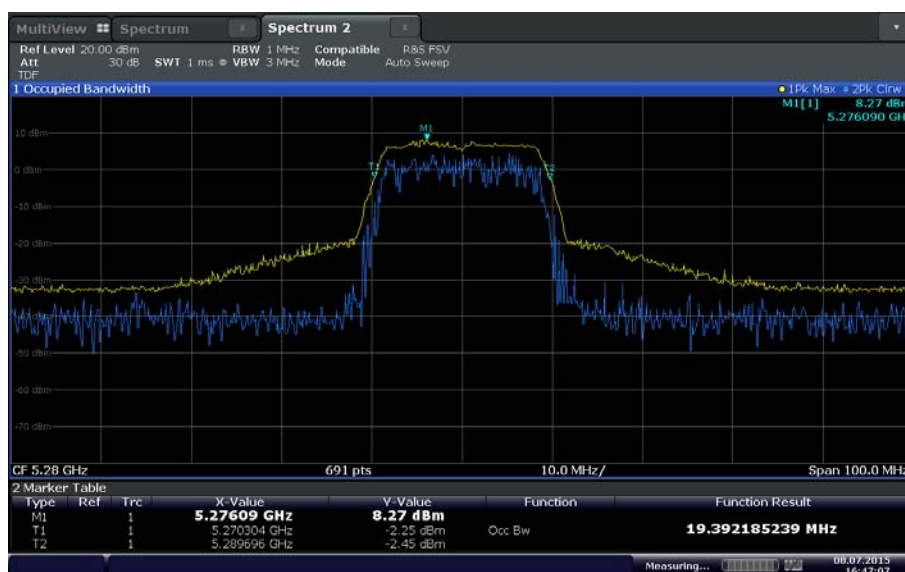
Date: 25 MAY 2015 13:32:43

U-NII 1 High Channel 20MHz BW



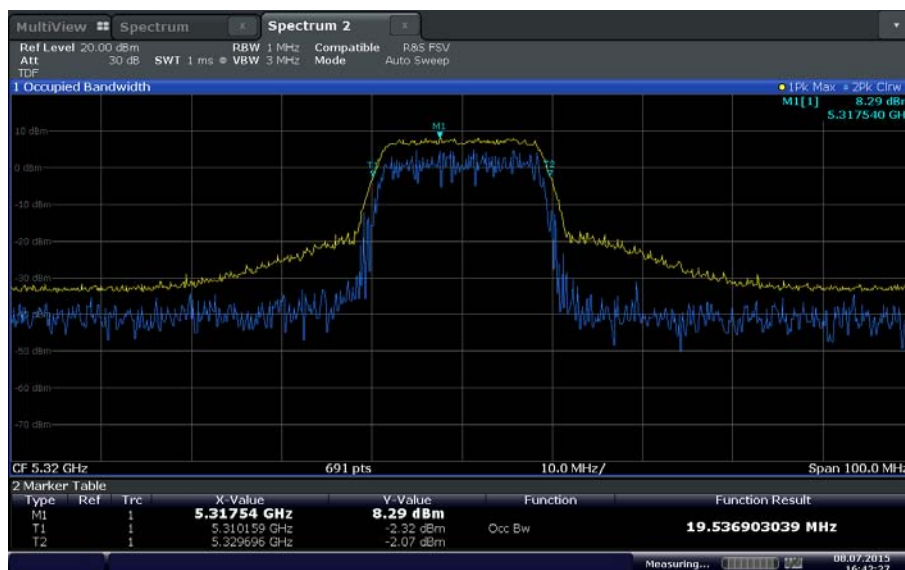
Date: 8 JUL 2015 16:29:22

U-NII 2A Low Channel 20MHz BW



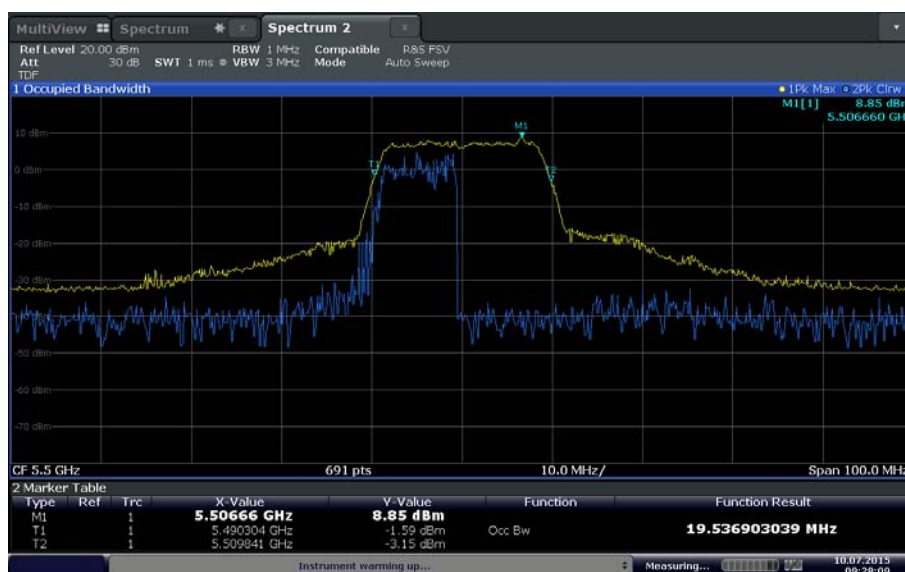
Date: 8 JUL 2015 16:47:07

U-NII 2A Mid Channel 20MHz BW



Date: 8 JUL 2015 16:42:28

U-NII 2A High Channel 20MHz BW



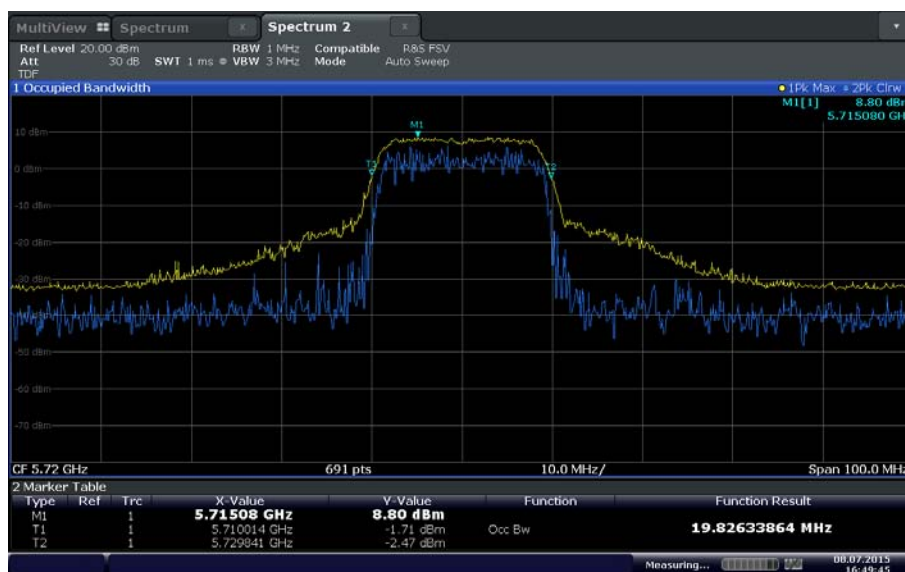
Date: 10 JUL 2015 09:28:09

U-NII 2C Low Channel 20MHz BW



Date: 16 JUL 2015 12:06:23

U-NII 2C Mid Channel 20MHz BW



Date: 8 JUL 2015 16:49:46

U-NII 2C High Channel 20MHz BW



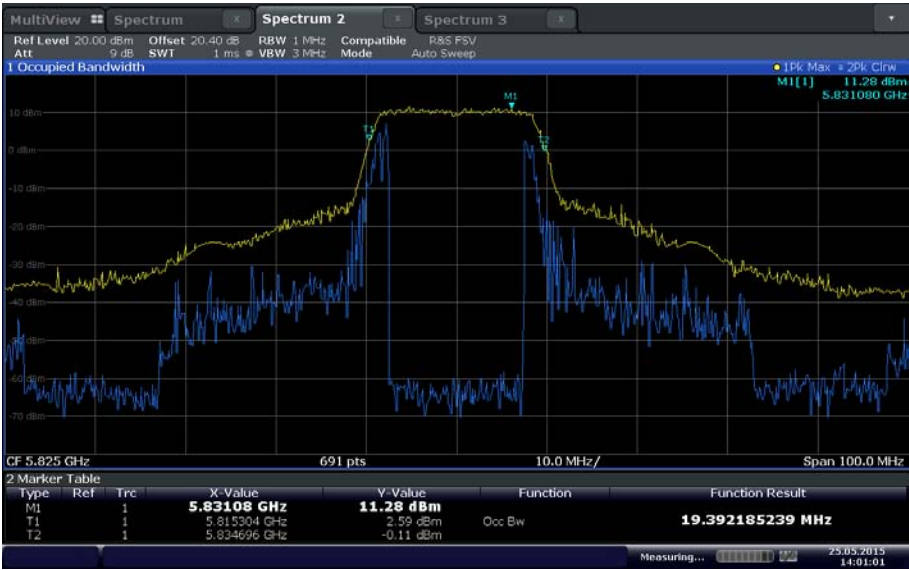
Date: 25 MAY 2015 13:35:52

U-NII 3 Low Channel 20MHz BW



Date: 25 MAY 2015 13:55:46

U-NII 3 Mid Channel 20MHz BW



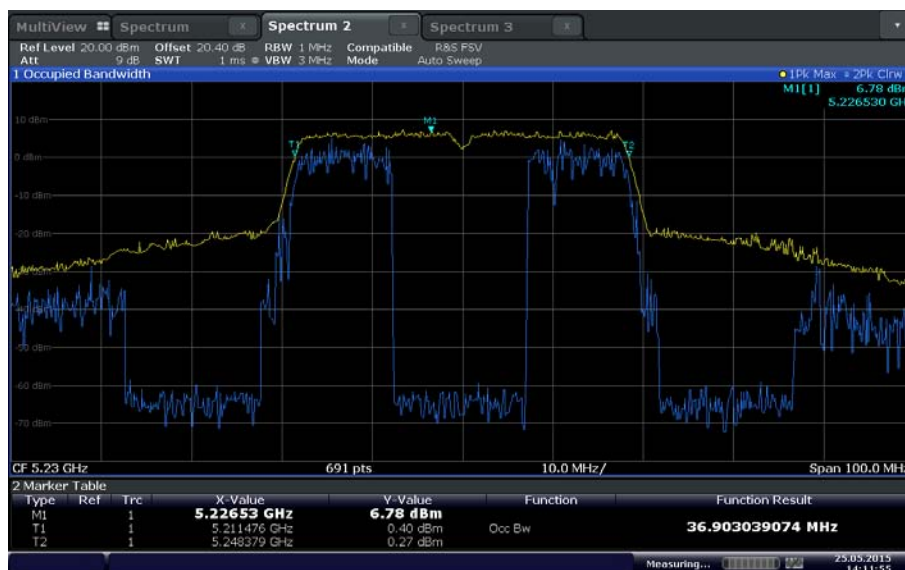
Date: 25 MAY 2015 14:01:00

U-NII 3 High Channel 20MHz BW



Date: 25 MAY 2015 14:08:24

U-NII 1 Low Channel 40MHz BW



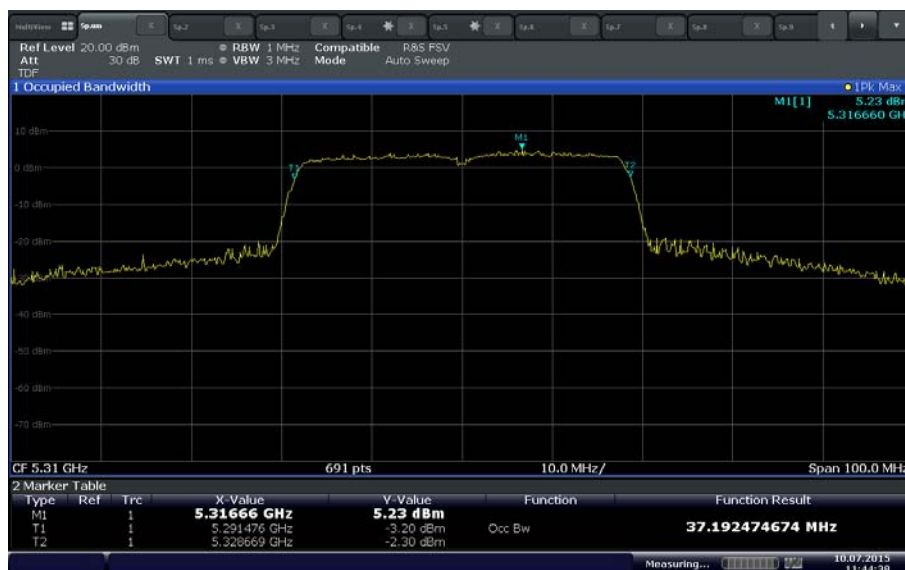
Date: 25 MAY 2015 14:11:55

U-NII 1 High Channel 40MHz BW



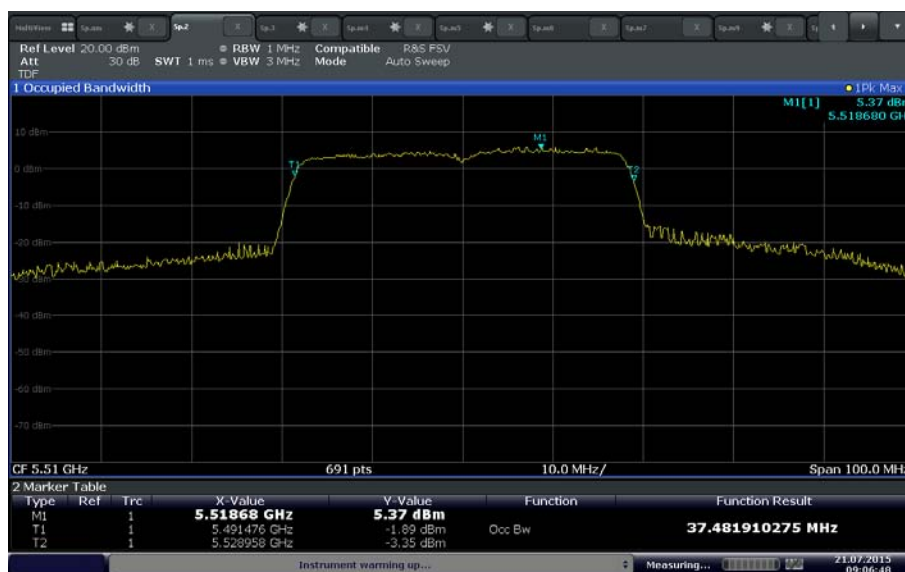
Date: 10 JUL 2015 11:40:19

U-NII 2A Low Channel 40MHz BW



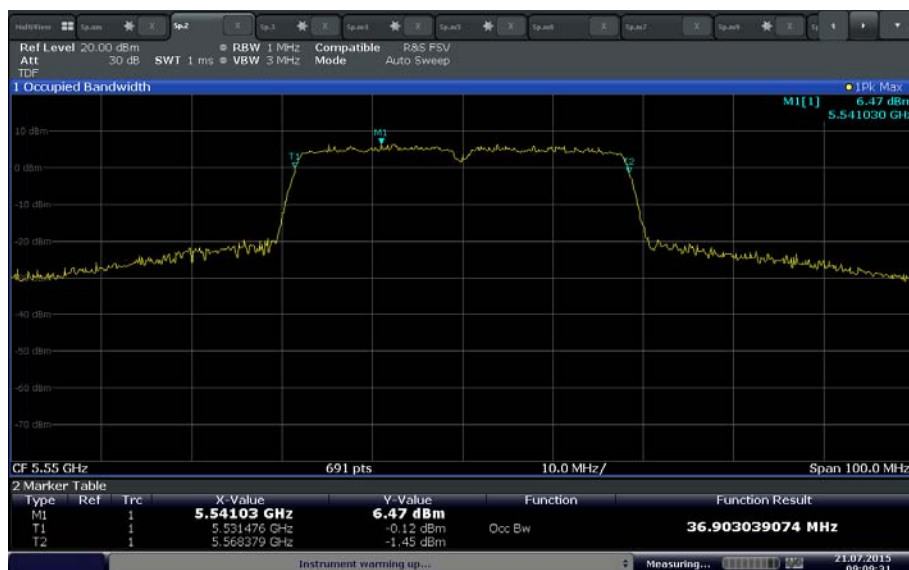
Date: 10 JUL 2015 11:44:38

U-NII 2A High Channel 40MHz BW



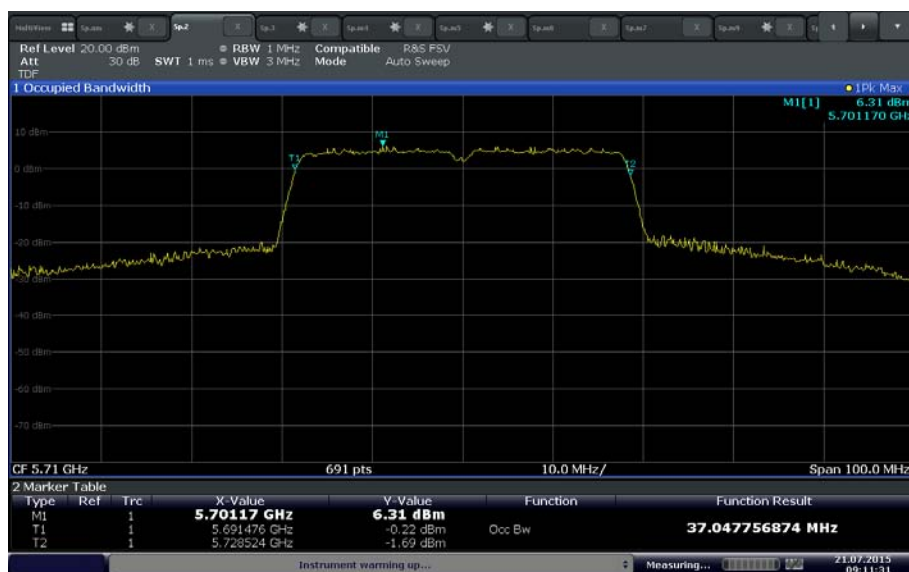
Date: 21 JUL 2015 09:06:48

U-NII 2C Low Channel 40MHz BW



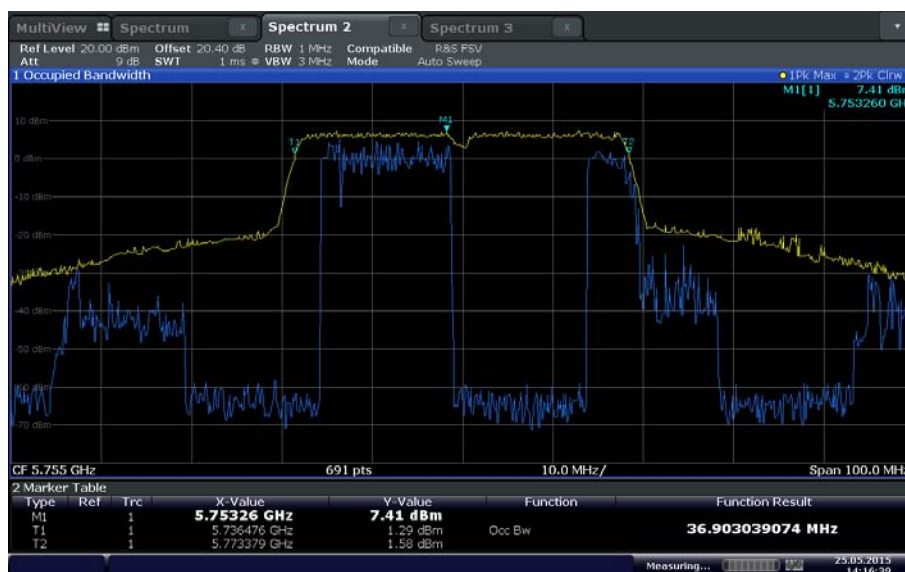
Date: 21 JUL 2015 09:09:32

U-NII 2C Mid Channel 40MHz BW



Date: 21 JUL 2015 09:11:31

U-NII 2C High Channel 40MHz BW



Date: 25 MAY 2015 14:16:39

U-NII 3 Low Channel 40MHz BW



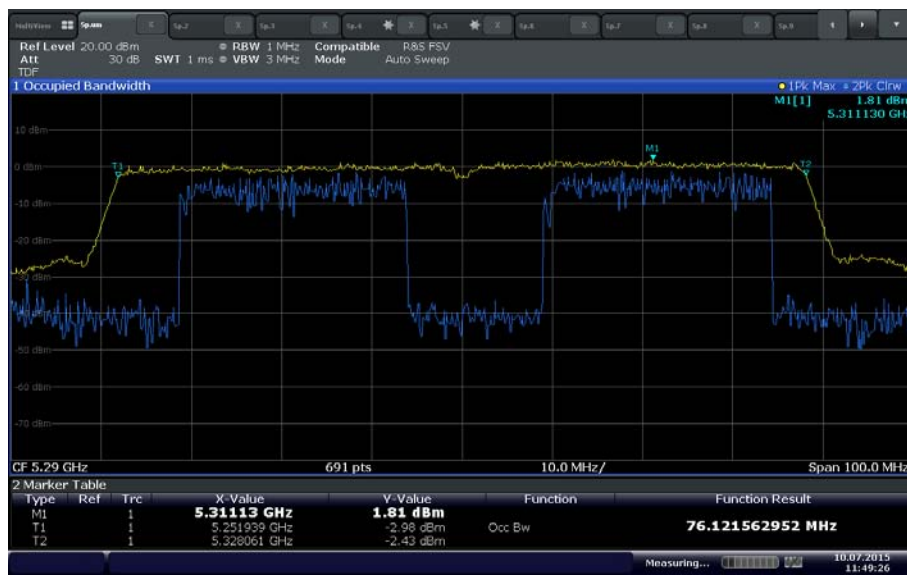
Date: 25 MAY 2015 14:22:37

U-NII 3 High Channel 40MHz BW



Date: 25 MAY 2015 14:30:46

U-NII 1 Mid Channel 80MHz BW



Date: 10 JUL 2015 11:49:26

U-NII 2A Mid Channel 80MHz BW



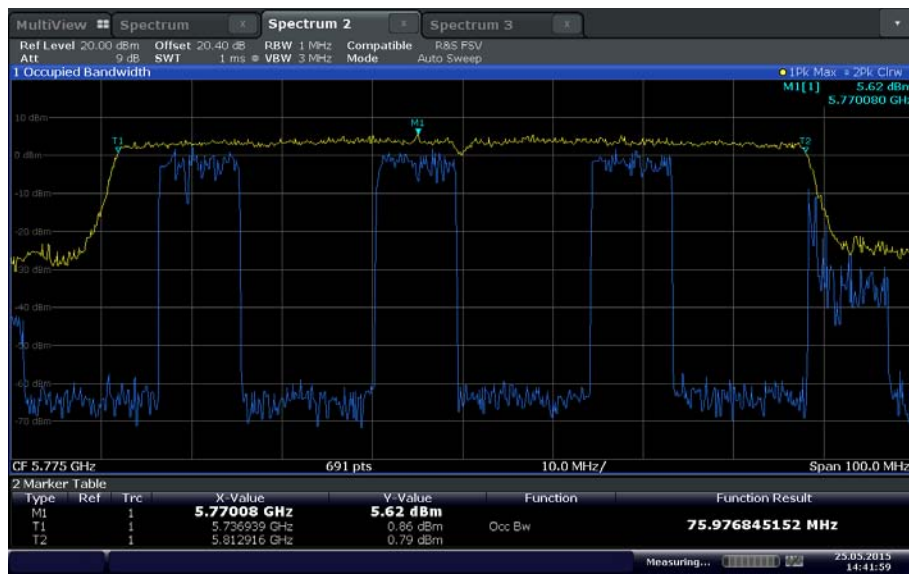
Date: 16 JUL 2015 12:14:55

U-NII 2C Low Channel 80MHz BW



Date: 16 JUL 2015 13:30:43

U-NII 2C High Channel 80MHz BW



Date: 25 MAY 2015 14:41:58

U-NII 3 Mid Channel 80MHz BW



2.4 MINIMUM 6DB BANDWIDTH

2.4.1 Specification Reference

Part 15 Subpart E §15.407(e) and RSS-210 A8.2(a)

2.4.2 Standard Applicable

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

2.4.3 Test Methodology

Section II (C) (2) of 789033 D02 General UNII Test Procedures New Rules v01.

2.4.4 Equipment Under Test and Modification State

Serial No: N/A / Test Configuration A

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

May 25, 2015/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	24.2°C
Relative Humidity	49.7%
ATM Pressure	99.9 kPa

2.4.8 Additional Observations

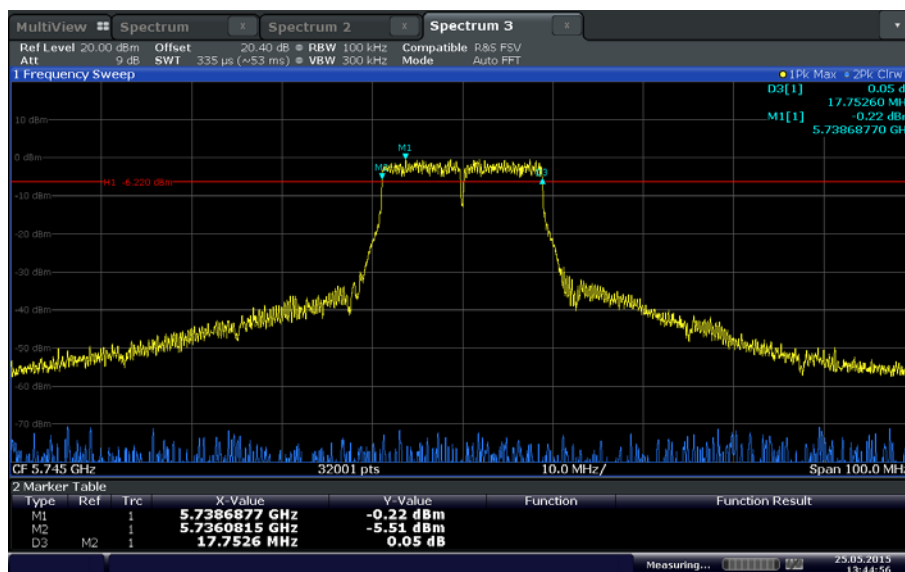
- This is a conducted test.
- An offset of 22.5dB was added to compensate for the external attenuator and cable used.
- Span is wide enough to capture the channel transmission.
- RBW is 100kHz.
- VBW is 3X RBW.
- Sweep is auto.
- Detector is Peak.
- Trace mode is Max Hold
- The two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission were measured by drawing a horizontal line and using marker delta function of the spectrum analyzer.

- Only 802.11ac presented. 802.11n data rates are identical to 802.11ac on both 20MHz and 40MHz bandwidth.

2.4.9 Summary Test Results

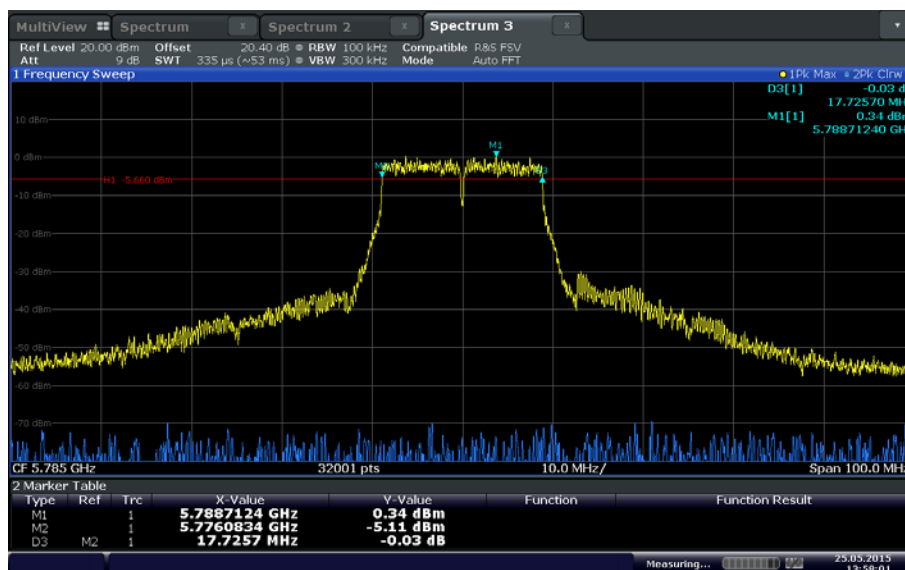
6 dB Bandwidth 802.11 ac			
WiFi Mode	Low Channel (Channel No./ BW in MHz)	Mid Channel (Channel No./ BW in MHz)	High Channel (Channel No./ BW in MHz)
U-NII 3 20 MHz BW	149 / 17.75 MHz	157 / 17.73 MHz	165 / 17.75 MHz
U-NII 3 40 MHz BW	151 / 36.51 MHz		159 / 36.38 MHz
U-NII 3 80 MHz BW		155 / 76.37 MHz	

2.4.10 Test Plots



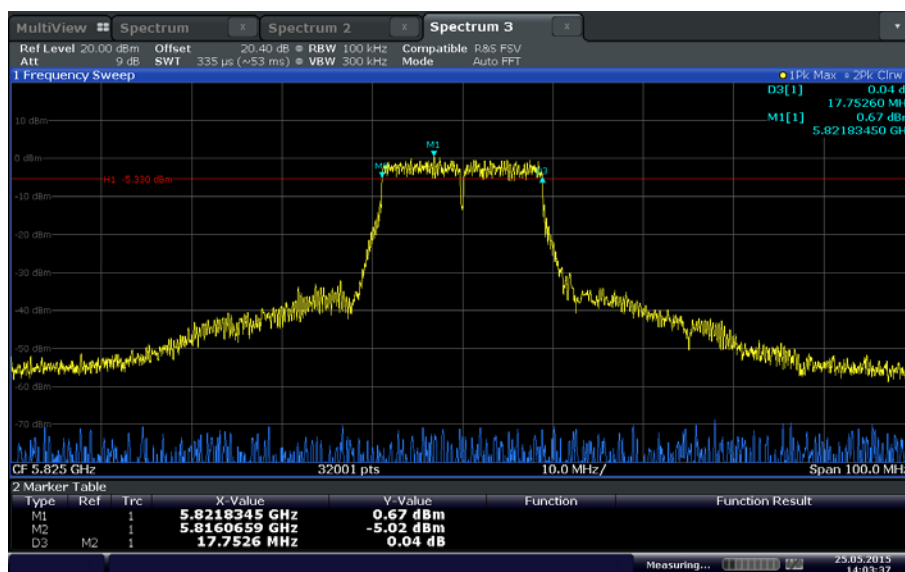
Date: 25 MAY 2015 13:44:57

U-NII 3 Low Channel 20MHz BW



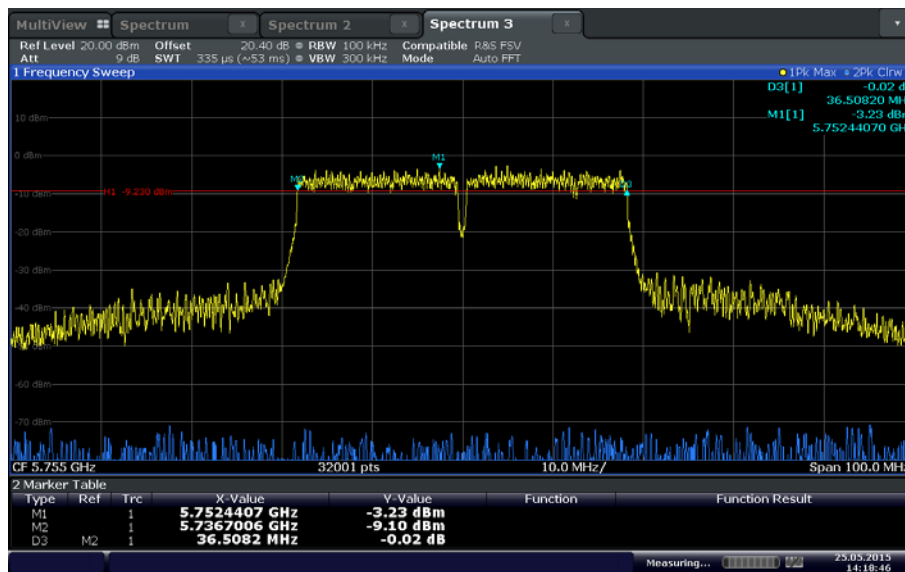
Date: 25 MAY 2015 13:58:01

U-NII 3 Mid Channel 20MHz BW



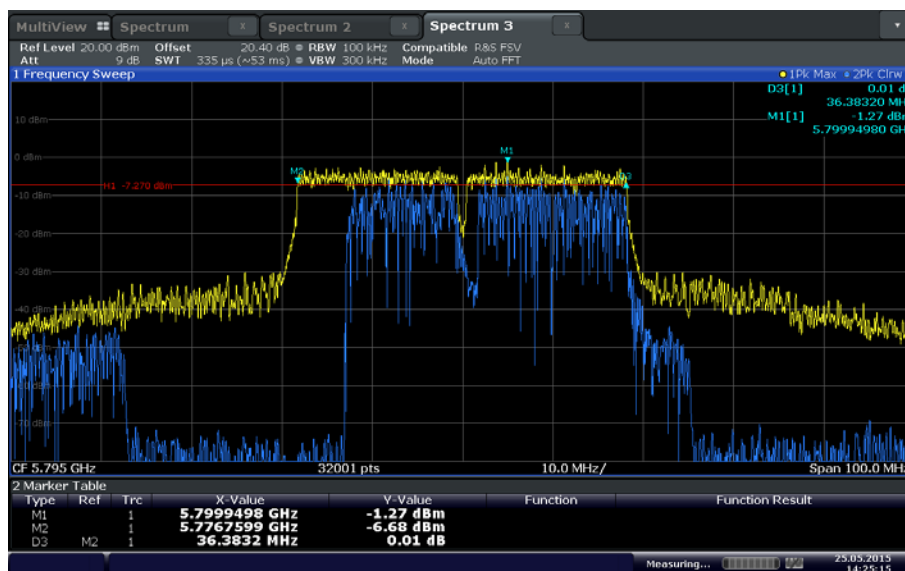
Date: 25 MAY 2015 14:03:37

U-NII 3 High Channel 20MHz BW



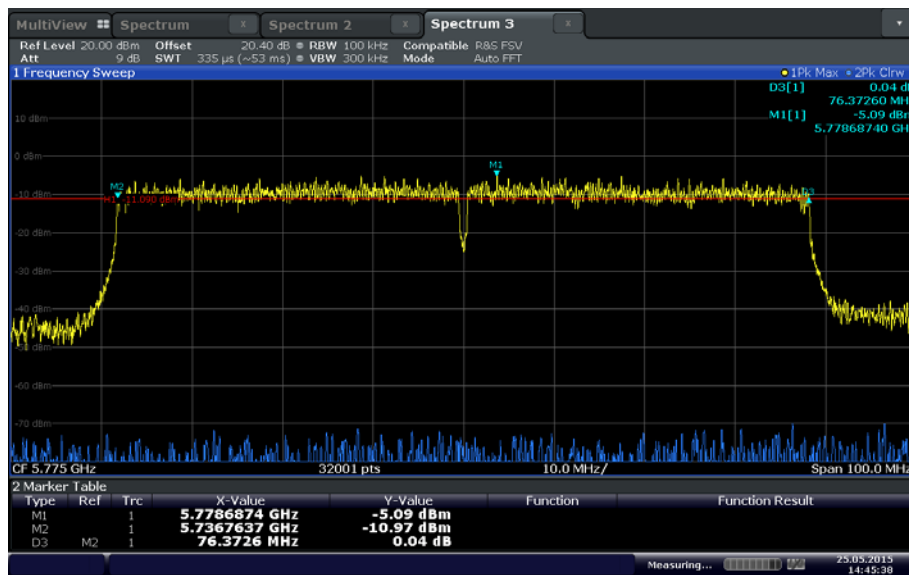
Date: 25 MAY 2015 14:18:46

U-NII 3 Low Channel 40MHz BW



Date: 25 MAY 2015 14:25:14

U-NII 3 High Channel 40MHz BW



Date: 25 MAY 2015 14:45:37

U-NII 3 Mid Channel 80MHz BW

2.5 **MAXIMUM CONDUCTED OUTPUT POWER**

2.5.1 **Specification Reference**

Part 15 Subpart E §15.407(a)(1)(IV) and §15.407(a)(3) and RSS-210 A9.2(1) and (4)

2.5.2 **Standard Applicable**

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

(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.

2.5.3 **Test Methodology**

Section II (E)(3)(a) Method PM (Measurement using an RF average power meter) of 789033 D02 General UNII Test Procedures New Rules v01.

2.5.4 **Equipment Under Test and Modification State**

Serial No: N/A / Test Configuration A

2.5.1 **Date of Test/Initial of test personnel who performed the test**

May 22, 2015 and July 14, 2015/ FSC and NS

2.5.2 **Test Equipment Used**

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

2.5.3 **Environmental Conditions**

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature 24.8°C
Relative Humidity 48.6%
ATM Pressure 99.2 kPa

2.5.4 Additional Observations

- This is a conducted test.
- Test methodology is per Section II (E)(3)(a) Method PM (Measurement using an RF average power meter) of 789033 D02 General UNII Test Procedures New Rules v01. All conditions under this Section were satisfied.
- Duty Cycle was measured and calculated according to Section II(B)(2)(b) of 789033 D02 General UNII Test Procedures New Rules v01.
- An offset of 21.0dB was added to compensate for the external attenuator and cable used.
- Calculated Average Power is the sum of the measured average power and the corresponding duty cycle correction factor.

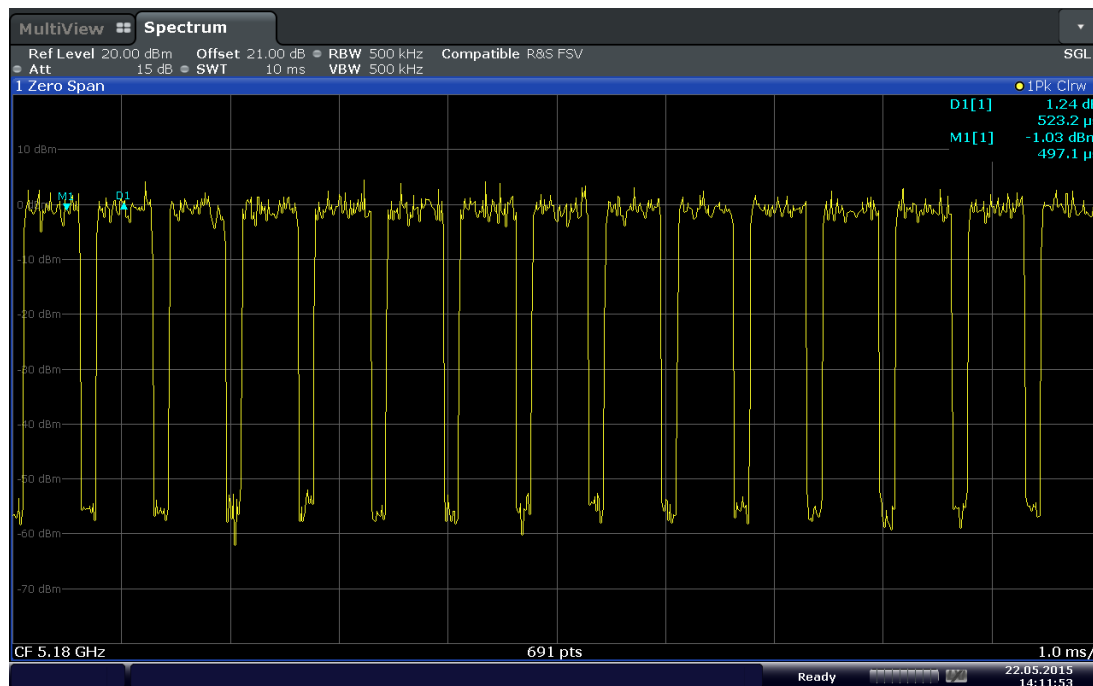
2.5.5 Duty Cycle Calculations

Duty Cycle Calculations					
Bandwidth	MCS	No. of transmissions/10 ms	Length of each packet (μs)	Total transmission time/100 ms (ms)	Duty Cycle Correction Factor (dB)
20 MHz	0	4.80	1929.0	92.59	0.33
	1	8.75	994.20	87.00	0.60
	2	12.0	675.36	81.04	0.91
	3	15.0	523.19	78.48	1.05
	4	19.5	360.87	70.37	1.53
	5	23.0	284.06	65.33	1.85
	6	25.0	256.52	64.13	1.93
	7	26.0	237.68	61.79	2.09
	8	28.5	204.35	58.24	2.35
40 MHz	0	9.00	956.52	86.09	0.65
	1	15.5	502.90	77.95	1.08
	2	20.0	347.83	69.57	1.58
	3	24.0	272.46	65.39	1.84
	4	29.0	195.65	56.74	2.46
	5	33.0	160.87	53.09	2.75
	6	34.0	147.83	50.26	3.00
	7	35.0	136.23	47.68	3.22
	8	37.0	120.29	44.51	3.52
	9	38.0	115.94	44.10	3.56



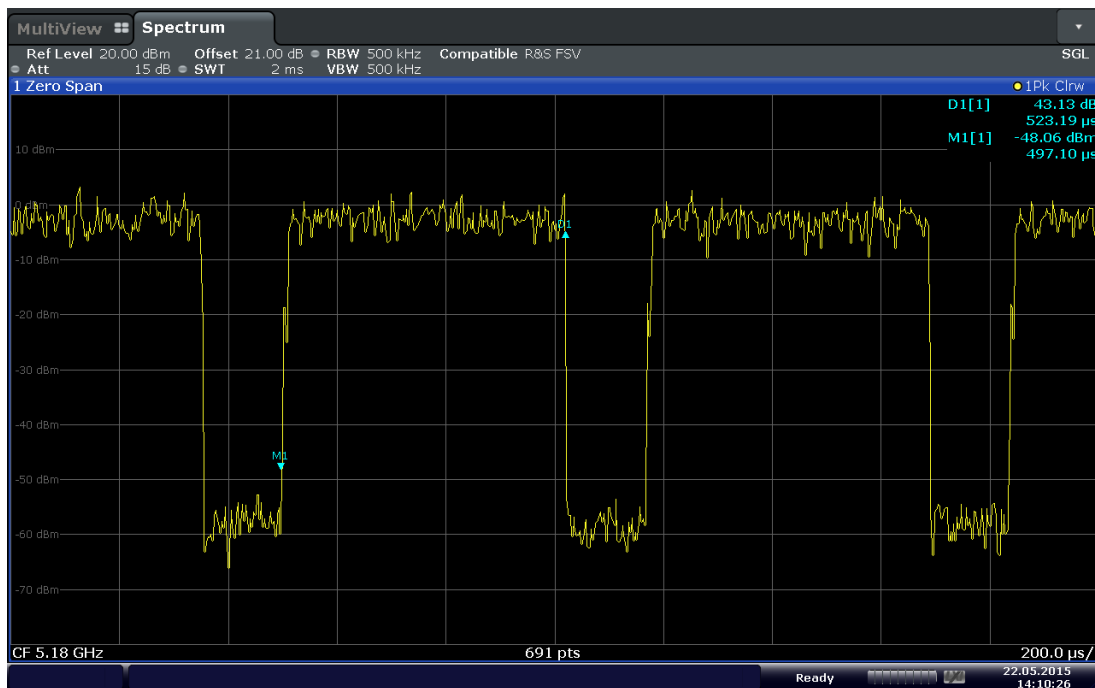
80 MHz	0	16.4	463.77	76.06	America 1.19
	1	25.0	252.17	63.04	2.00
	2	30.0	184.06	55.22	2.58
	3	33.0	152.17	50.22	3.00
	4	38.0	117.39	44.61	3.51
	5	40.0	101.45	40.58	3.92
	6	42.0	92.750	38.96	4.10
	7	43.0	88.410	38.02	4.20
	8	44.0	79.710	35.07	4.55
	9	45.0	76.810	34.56	4.61

2.5.6 Sample Duty Cycle Claculations



Date: 22 MAY 2015 14:11:53

15 Transmissions in 10ms window (zero span) using MCS3 20MHz Bandwidth

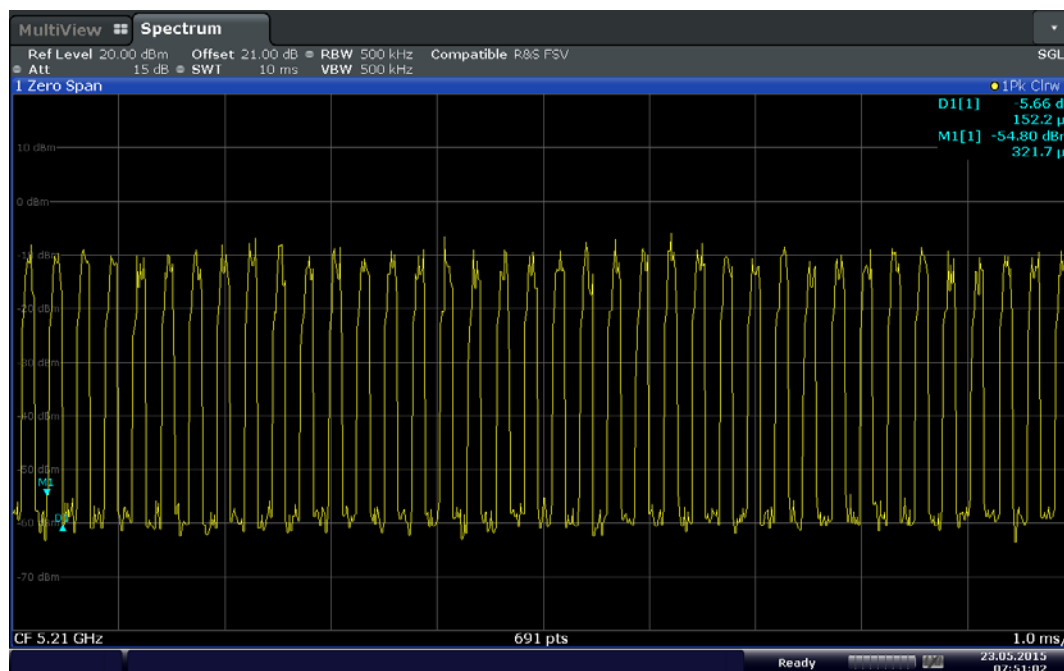


Date: 22 MAY 2015 14:10:26

523.19 μs per transmission (T, maximum transmission duration)

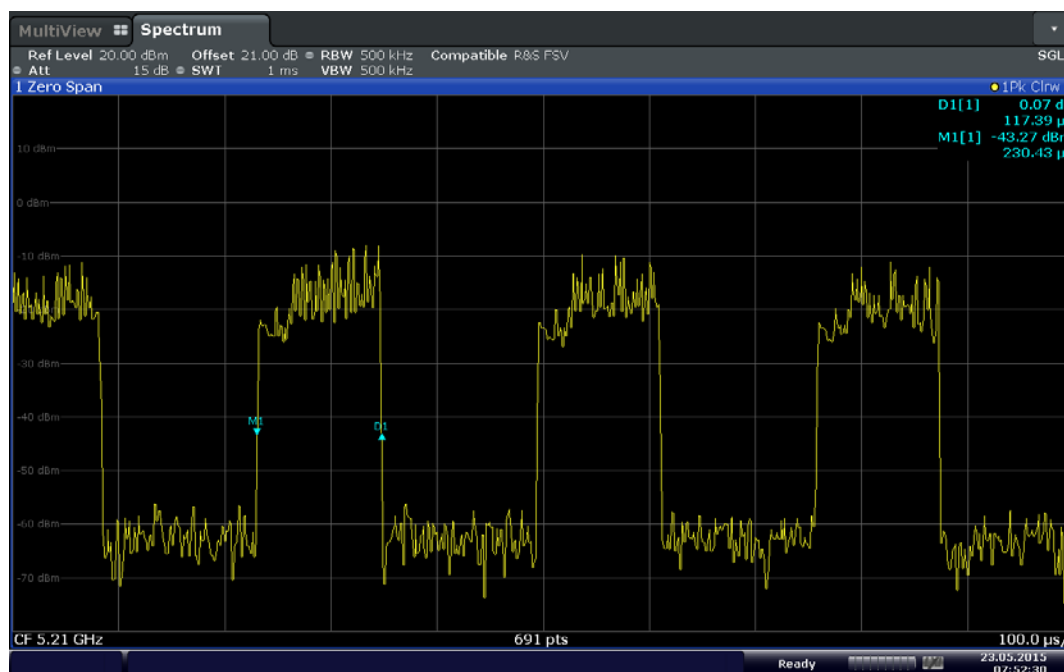
Calculated Duty Cycle (X)= 0.52319ms (15)(10)/100ms
 78.48 ms/100ms
 0.7848 or 78.48%

Duty Cycle Correction Factor= 10 log (1/X)
 10 log (1/0.7848)
 1.052 dB for MCS3 @ 20MHz BW



Date: 23 MAY 2015 07:51:01

38 Transmissions in 10ms window (zero span) using MCS4 80MHz Bandwidth



Date: 23 MAY 2015 07:52:30

117.39 μs per transmission (T, maximum transmission duration)

Calculated Duty Cycle (X)= 0.11739ms (38)(10)/100ms
44.6082 ms/100ms
0.4461or 44.61%

Duty Cycle Correction Factor= 10 log (1/X)
10 log (1/0.4461)
3.51 dB for MCS4 @ 80MHz BW

2.5.7 Test Results

802.11 n 20MHz BW HT20					
WLAN Mode	Channel	MCS	Measured Average Power (dBm)	Duty Cycle Correction Factor (dB)	Calculated Average Power (dBm)
802.11n U-NII 1 (5150 MHz to 5250 MHz). Limit is 24 dBm	36 (5180 MHz)	0	13.59	0.33	13.92
		1	13.27	0.60	13.87
		2	13.15	0.91	14.06
		3	12.97	1.05	14.02
		4	12.88	1.53	14.41
		5	12.58	1.85	14.43
		6	12.91	1.93	14.84
		7	12.36	2.09	14.45
	40 (5200 MHz)	0	13.27	0.33	13.60
		1	13.06	0.60	13.66
		2	13.00	0.91	13.91
		3	12.96	1.05	14.01
		4	12.60	1.53	14.13
		5	12.44	1.85	14.29
		6	12.34	1.93	14.27
		7	12.32	2.09	14.41
	48 (5240 MHz)	0	12.54	0.33	12.87
		1	12.44	0.60	13.04
		2	12.35	0.91	13.26
		3	12.31	1.05	13.36
		4	12.08	1.53	13.61
		5	11.95	1.85	13.80
		6	11.55	1.93	13.48
		7	11.01	2.09	13.10



802.11n U-NII 2A (5250 MHz to 5350 MHz). Limit is 24 dBm	52 (5260 MHz)	0	13.49	0.33	America 13.79
		1	13.43	0.60	14.03
		2	12.92	0.91	13.83
		3	12.63	1.05	13.68
		4	12.38	1.53	13.91
		5	12.03	1.85	13.88
		6	11.83	1.93	13.76
		7	11.60	2.09	13.69
	56 (5280 MHz)	0	12.88	0.33	13.21
		1	12.55	0.60	13.15
		2	12.36	0.91	13.27
		3	12.15	1.05	13.20
		4	11.91	1.53	13.44
		5	11.40	1.85	13.25
		6	11.35	1.93	13.28
		7	11.15	2.09	13.24
	64 (5320 MHz)	0	13.59	0.33	13.92
		1	13.30	0.60	13.90
		2	13.06	0.91	13.97
		3	12.71	1.05	13.76
		4	12.39	1.53	13.92
		5	12.04	1.85	13.89
		6	11.86	1.93	13.79
		7	11.62	2.09	13.71
802.11n U-NII 2C (5470 MHz to 5725 MHz). Limit is 24 dBm	100 (5500 MHz)	0	12.93	0.33	13.26
		1	12.59	0.60	13.19
		2	12.38	0.91	13.29
		3	11.96	1.05	13.01
		4	11.70	1.53	13.23
		5	11.39	1.85	13.24
		6	11.15	1.93	13.08
		7	11.03	2.09	13.12
	120 (5600 MHz)	0	12.24	0.33	12.57
		1	12.03	0.60	12.63
		2	11.94	0.91	12.85
		3	11.84	1.05	12.89
		4	12.09	1.53	13.62



		5	11.44	1.85	America 13.29
		6	11.38	1.93	13.31
		7	11.21	2.09	13.30
	144 (5720 MHz)	0	13.40	0.33	13.73
		1	13.30	0.60	13.90
		2	13.25	0.91	14.16
		3	13.10	1.05	14.15
		4	12.96	1.53	14.49
		5	12.35	1.85	14.20
		6	12.57	1.93	14.50
		7	12.18	2.09	14.27
	149 (5745 MHz)	0	13.40	0.33	13.73
		1	13.30	0.60	13.90
		2	13.25	0.91	14.16
		3	13.10	1.05	14.15
		4	12.96	1.53	14.49
		5	12.35	1.85	14.20
		6	12.57	1.93	14.50
		7	12.18	2.09	14.27
802.11n U-NII 3 (5725 MHz to 5850 MHz). Limit is 30 dBm	157 (5785 MHz)	0	13.88	0.33	14.21
		1	13.70	0.60	14.30
		2	13.64	0.91	14.55
		3	13.29	1.05	14.34
		4	13.26	1.53	14.79
		5	13.23	1.85	15.08
		6	12.92	1.93	14.85
		7	12.60	2.09	14.69
	165 (5825 MHz)	0	14.38	0.33	14.71
		1	14.33	0.60	14.93
		2	14.18	0.91	15.09
		3	14.03	1.05	15.08
		4	13.57	1.53	15.1
		5	13.28	1.85	15.13
		6	13.40	1.93	15.33
		7	13.05	2.09	15.14



802.11 n 40MHz BW HT40					
WLAN Mode	Channel	MCS	Measured Average Power (dBm)	Duty Cycle Correction Factor (dB)	Calculated Average Power (dBm)
802.11n U-NII 1 (5150 MHz to 5250 MHz). Limit is 24 dBm	38 (5190 MHz)	0	13.65	0.65	14.30
		1	13.48	1.08	14.56
		2	13.20	1.58	14.78
		3	12.90	1.84	14.74
		4	12.38	2.46	14.84
		5	12.27	2.75	15.02
		6	12.21	3.00	15.21
		7	11.78	3.22	15.00
802.11n U-NII 1 (5150 MHz to 5250 MHz). Limit is 24 dBm	46 (5230 MHz)	0	12.89	0.65	13.54
		1	12.70	1.08	13.78
		2	12.24	1.58	13.82
		3	12.05	1.84	13.89
		4	11.75	2.46	14.21
		5	11.39	2.75	14.14
		6	10.97	3.00	13.97
		7	10.59	3.22	13.81
802.11n U-NII 2A (5250 MHz to 5350 MHz). Limit is 24 dBm	54 (5270 MHz)	0	12.41	0.65	13.06
		1	11.93	1.08	13.01
		2	11.61	1.58	13.19
		3	11.15	1.84	12.99
		<u>4</u>	10.77	2.46	13.23
		5	10.26	2.75	13.01
		6	10.11	3.00	13.11
		7	9.73	3.22	12.95
	62 (5310 MHz)	0	12.61	0.65	13.26
		1	11.98	1.08	13.06
		2	11.62	1.58	13.20
		3	11.22	1.84	13.06
		4	10.59	2.46	13.05
		5	10.32	2.75	13.07
		6	10.11	3.00	13.11
		7	9.93	3.22	13.15



802.11n U-NII 2C (5470 MHz to 5725 MHz). Limit is 24 dBm	102 (5510 MHz)	0	12.49	0.65	13.14
		1	12.05	1.08	13.13
		2	11.41	1.58	12.99
		3	11.26	1.84	13.10
		4	10.43	2.46	12.89
		5	8.44	2.75	11.19
		6	8.31	3.00	11.31
		7	8.16	3.22	11.38
	118 (5590 MHz)	0	12.07	0.65	12.72
		1	11.52	1.08	12.60
		2	11.14	1.58	12.72
		3	11.01	1.84	12.85
		4	10.39	2.46	12.85
		5	9.74	2.75	12.49
		6	9.54	3.00	12.54
		7	9.22	3.22	12.44
	142 (5710 MHz)	0	11.38	0.65	12.03
		1	11.05	1.08	12.13
		2	10.46	1.58	12.04
		3	10.08	1.84	11.92
		4	9.92	2.46	12.38
		5	9.09	2.75	11.84
		6	8.87	3.00	11.87
		7	8.53	3.22	11.75
802.11n U-NII 3 (5725 MHz to 5850 MHz). Limit is 30 dBm	151 (5755 MHz)	0	13.40	0.65	14.05
		1	13.37	1.08	14.45
		2	12.90	1.58	14.48
		3	12.38	1.84	14.22
		4	11.66	2.46	14.12
		5	11.64	2.75	14.39
		6	11.72	3.00	14.72
		7	11.26	3.22	14.48
	159 (5795 MHz)	0	13.79	0.65	14.44
		1	13.75	1.08	14.83
		2	13.63	1.58	15.21
		3	12.97	1.84	14.81
		4	12.29	2.46	14.75



America

		5	12.11	2.75	14.86
		6	11.92	3.00	14.92
		7	11.75	3.22	14.97

802.11 ac 20MHz BW VHT20					
WLAN Mode	Channel	MCS	Measured Average Power (dBm)	Duty Cycle Correction Factor (dB)	Calculated Average Power (dBm)
802.11ac U-NII 1 (5150 MHz to 5250 MHz). Limit is 24 dBm	36 (5180 MHz)	0	13.59	0.33	13.92
		1	13.27	0.60	13.87
		2	13.15	0.91	14.06
		3	12.97	1.05	14.02
		4	12.88	1.53	14.41
		5	12.58	1.85	14.43
		6	12.91	1.93	14.84
		7	12.36	2.09	14.45
		8	12.36	2.35	14.71
802.11ac U-NII 1 (5150 MHz to 5250 MHz). Limit is 24 dBm	40 (5200 MHz)	0	13.27	0.33	13.60
		1	13.06	0.60	13.66
		2	13.00	0.91	13.91
		3	12.96	1.05	14.01
		4	12.60	1.53	14.13
		5	12.44	1.85	14.29
		6	12.34	1.93	14.27
		7	12.32	2.09	14.41
		8	12.35	2.35	14.70
	48 (5240 MHz)	0	12.54	0.33	12.87
		1	12.44	0.60	13.04
		2	12.35	0.91	13.26
		3	12.31	1.05	13.36
		4	12.08	1.53	13.61
		5	11.95	1.85	13.80
		6	11.55	1.93	13.48
		7	11.01	2.09	13.10
		8	11.55	2.35	13.90



802.11ac U-NII 2A (5250 MHz to 5350 MHz). Limit is 24 dBm	52 (5260 MHz)	0	13.49	0.33	13.79
		1	13.43	0.60	14.03
		2	12.92	0.91	13.83
		3	12.63	1.05	13.68
		4	12.38	1.53	13.91
		5	12.03	1.85	13.88
		6	11.83	1.93	13.76
		7	11.60	2.09	13.69
		8	11.37	2.35	13.72
	56 (5280 MHz)	0	12.88	0.33	13.21
		1	12.55	0.60	13.15
		2	12.36	0.91	13.27
		3	12.15	1.05	13.20
		4	11.91	1.53	13.44
		5	11.40	1.85	13.25
		6	11.35	1.93	13.28
		7	11.15	2.09	13.24
		8	10.88	2.35	13.23
	64 (5320 MHz)	0	13.59	0.33	13.92
		1	13.30	0.60	13.90
		2	13.06	0.91	13.97
		3	12.71	1.05	13.76
		4	12.39	1.53	13.92
		5	12.04	1.85	13.89
		6	11.86	1.93	13.79
		7	11.62	2.09	13.71
		8	11.42	2.35	13.77
802.11ac U-NII 2C (5470 MHz to 5725 MHz). Limit is 24 dBm	100 (5500 MHz)	0	12.74	0.33	13.07
		1	12.32	0.60	12.92
		2	12.24	0.91	13.15
		3	11.99	1.05	13.04
		4	11.65	1.53	13.18
		5	11.29	1.85	13.14
		6	11.06	1.93	12.99
		7	10.90	2.09	12.99
		8	10.86	2.35	13.21
	120 (5600 MHz)	0	12.93	0.33	13.26



		1	12.59	0.60	America 13.19
		2	12.38	0.91	13.29
		3	11.96	1.05	13.01
		4	11.70	1.53	13.23
		5	11.39	1.85	13.24
		6	11.15	1.93	13.08
		7	11.03	2.09	13.12
		8	10.76	2.35	13.11
	144 (5720 MHz)	0	12.24	0.33	12.57
		1	12.03	0.60	12.63
		2	11.94	0.91	12.85
		3	11.84	1.05	12.89
		4	12.09	1.53	13.62
		5	11.44	1.85	13.29
		6	11.38	1.93	13.31
		7	11.21	2.09	13.30
802.11ac U-NII 3 (5725 MHz to 5850 MHz). Limit is 30 dBm	149 (5745 MHz)	8	10.88	2.35	13.23
		0	13.40	0.33	13.73
		1	13.30	0.60	13.90
		2	13.25	0.91	14.16
		3	13.10	1.05	14.15
		4	12.96	1.53	14.49
		5	12.35	1.85	14.20
		6	12.57	1.93	14.50
	157 (5785 MHz)	7	12.18	2.09	14.27
		8	11.68	2.35	14.03
		0	13.88	0.33	14.21
		1	13.70	0.60	14.30
		2	13.64	0.91	14.55
		3	13.29	1.05	14.34
		4	13.26	1.53	14.79
		5	13.23	1.85	15.08
		6	12.92	1.93	14.85
		7	12.60	2.09	14.69
		8	12.71	2.35	15.06



802.11ac U-NII 3 (5725 MHz to 5850 MHz). Limit is 30 dBm	165 (5825 MHz)	0	14.38	0.33	14.71
		1	14.33	0.60	14.93
		2	14.18	0.91	15.09
		3	14.03	1.05	15.08
		4	13.57	1.53	15.10
		5	13.28	1.85	15.13
		6	13.40	1.93	15.33
		7	13.05	2.09	15.14
		8	13.17	2.35	15.52

802.11 ac 40MHz BW VHT40					
WLAN Mode	Channel	MCS	Measured Average Power (dBm)	Duty Cycle Correction Factor (dB)	Calculated Average Power (dBm)
802.11ac U-NII 1 (5150 MHz to 5250 MHz). Limit is 24 dBm	38 (5190 MHz)	0	13.65	0.65	14.30
		1	13.48	1.08	14.56
		2	13.20	1.58	14.78
		3	12.90	1.84	14.74
		4	12.38	2.46	14.84
		5	12.27	2.75	15.02
		6	12.21	3.00	15.21
		7	11.78	3.22	15.00
		8	11.28	3.52	14.80
		9	8.560	3.56	12.12
	46 (5230 MHz)	0	12.89	0.65	13.54
		1	12.70	1.08	13.78
		2	12.24	1.58	13.82
		3	12.05	1.84	13.89
		4	11.75	2.46	14.21
		5	11.39	2.75	14.14
		6	10.97	3.00	13.97
		7	10.59	3.22	13.81
		8	10.32	3.52	13.84
		9	7.700	3.56	11.26



802.11ac U-NII 2A (5250 MHz to 5350 MHz). Limit is 24 dBm	54 (5270 MHz)	0	12.41	0.65	13.06
		1	11.93	1.08	13.01
		2	11.61	1.58	13.19
		3	11.15	1.84	12.99
		4	10.77	2.46	13.23
		5	10.26	2.75	13.01
		6	10.11	3.00	13.11
		7	9.73	3.22	12.95
		8	9.37	3.52	12.89
		9	5.85	3.56	9.41
	62 (5310 MHz)	0	12.61	0.65	13.26
		1	11.98	1.08	13.06
		2	11.62	1.58	13.20
		3	11.22	1.84	13.06
		4	10.59	2.46	13.05
		5	10.32	2.75	13.07
		6	10.11	3.00	13.11
		7	9.93	3.22	13.15
		8	9.73	3.52	13.25
		9	5.89	3.56	9.45
802.11ac U-NII 2C (5470 MHz to 5725 MHz). Limit is 24 dBm	102 (5510 MHz)	0	12.49	0.65	13.14
		1	12.05	1.08	13.13
		2	11.41	1.58	12.99
		3	11.26	1.84	13.10
		4	10.43	2.46	12.89
		5	8.44	2.75	11.19
		6	8.31	3.00	11.31
		7	8.16	3.22	11.38
		8	7.51	3.52	11.03
		9	5.48	3.56	9.04
	110 (5550 MHz)	0	12.07	0.65	12.72
		1	11.52	1.08	12.60
		2	11.14	1.58	12.72
		3	11.01	1.84	12.85
		4	10.39	2.46	12.85
		5	9.74	2.75	12.49
		6	9.54	3.00	12.54

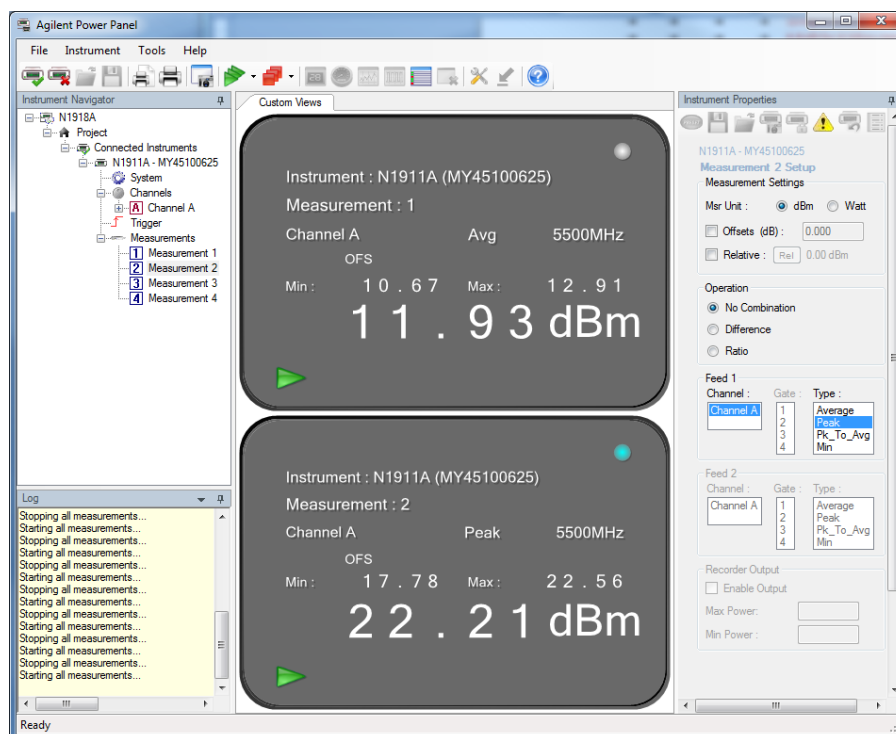


		7	9.22	3.22	America 12.44
		8	9.04	3.52	12.56
		9	7.18	3.56	10.74
	142 (5710 MHz)	0	11.38	0.65	12.03
		1	11.05	1.08	12.13
		2	10.46	1.58	12.04
		3	10.08	1.84	11.92
		4	9.92	2.46	12.38
		5	9.09	2.75	11.84
		6	8.87	3.00	11.87
		7	8.53	3.22	11.75
		8	8.23	3.52	11.75
		9	6.63	3.56	10.19
	151 (5755 MHz)	0	13.40	0.65	14.05
		1	13.37	1.08	14.45
		2	12.90	1.58	14.48
		3	12.38	1.84	14.22
		4	11.66	2.46	14.12
		5	11.64	2.75	14.39
		6	11.72	3.00	14.72
		7	11.26	3.22	14.48
		8	10.96	3.52	14.48
		9	8.260	3.56	11.82
802.11ac U-NII 3 (5725 MHz to 5850 MHz). Limit is 30 dBm	159 (5795 MHz)	0	13.79	0.65	14.44
		1	13.75	1.08	14.83
		2	13.63	1.58	15.21
		3	12.97	1.84	14.81
		4	12.29	2.46	14.75
		5	12.11	2.75	14.86
		6	11.92	3.00	14.92
		7	11.75	3.22	14.97
		8	11.25	3.52	14.77
		9	8.54	3.56	12.10

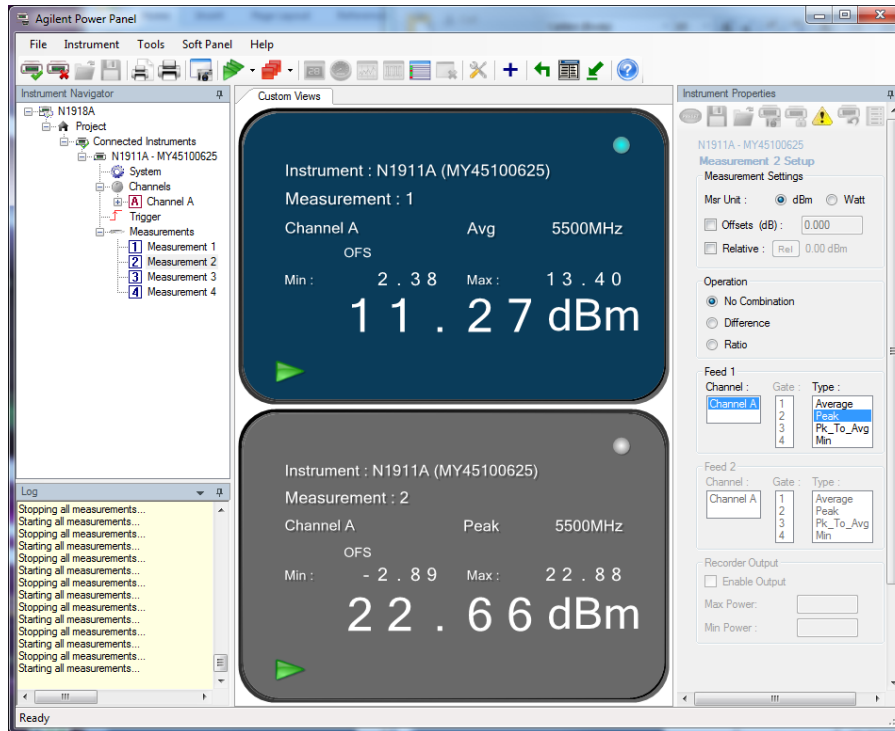
802.11 ac 80MHz BW VHT80					
WLAN Mode	Channel	MCS	Measured Average Power (dBm)	Duty Cycle Correction Factor (dB)	Calculated Average Power (dBm)
802.11ac U-NII 1 (5150 MHz to 5250 MHz). Limit is 24 dBm	42 (5210 MHz)	0	13.52	1.19	14.71
		1	12.82	2.00	14.82
		2	12.42	2.58	15.00
		3	12.50	3.00	15.50
		4	11.69	3.51	15.20
		5	10.83	3.92	14.75
		6	10.73	4.10	14.83
		7	9.950	4.20	14.15
		8	9.290	4.55	13.84
		9	7.650	4.61	12.26
802.11ac U-NII 2A (5250 MHz to 5350 MHz). Limit is 24 dBm	58 (5290 MHz)	0	11.87	1.19	13.06
		1	11.09	2.00	13.09
		2	10.31	2.58	12.89
		3	9.91	3.00	12.91
		4	9.38	3.51	12.89
		5	8.99	3.92	12.91
		6	8.67	4.10	12.77
		7	8.68	4.20	12.88
		8	8.26	4.55	12.81
		9	6.30	4.61	10.91
802.11ac U-NII 2C (5470 MHz to 5725 MHz). Limit is 24 dBm	106 (5530 MHz)	0	10.44	1.19	11.63
		1	10.12	2.00	12.12
		2	9.53	2.58	12.11
		3	8.62	3.00	11.62
		4	8.05	3.51	11.56
		5	7.47	3.92	11.39
		6	7.09	4.10	11.19
		7	7.23	4.20	11.43
		8	6.72	4.55	11.27
		9	4.46	4.61	9.07

802.11ac U-NII 3 (5725 MHz to 5850 MHz). Limit is 30 dBm	155 (5775 MHz)	0	13.52	1.19	14.71
		1	13.09	2.00	15.09
		2	12.19	2.58	14.77
		3	12.16	3.00	15.16
		4	11.32	3.51	14.83
		5	10.98	3.92	14.90
		6	10.79	4.10	14.89
		7	10.29	4.20	14.49
		8	9.660	4.55	14.21
		9	7.740	4.61	12.35

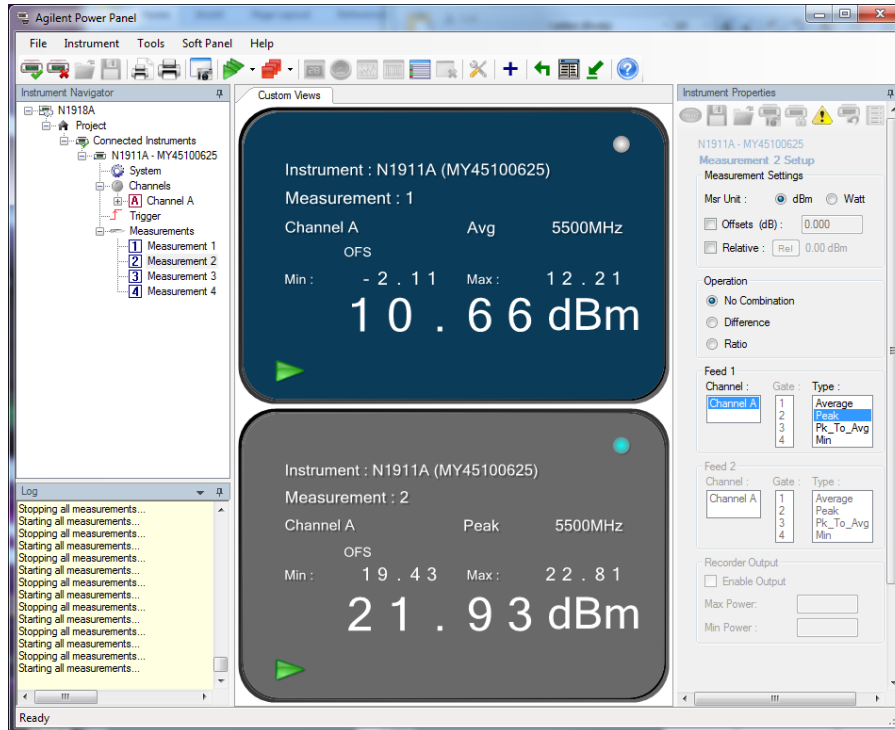
2.5.8 Sample Test Plots



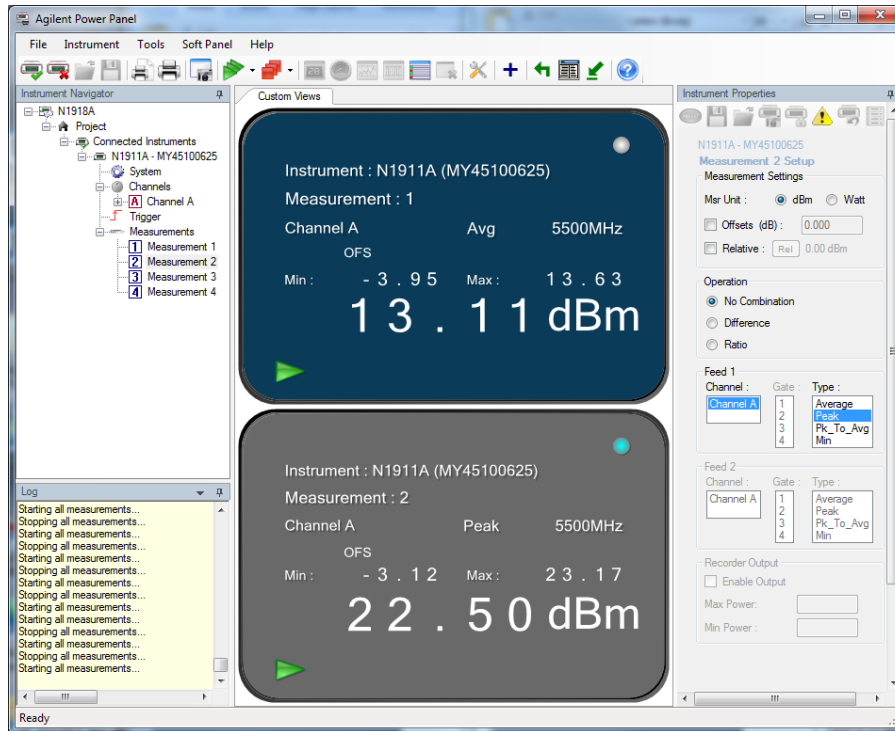
Low Channel U-NII 1 MCS 6 20MHz BW



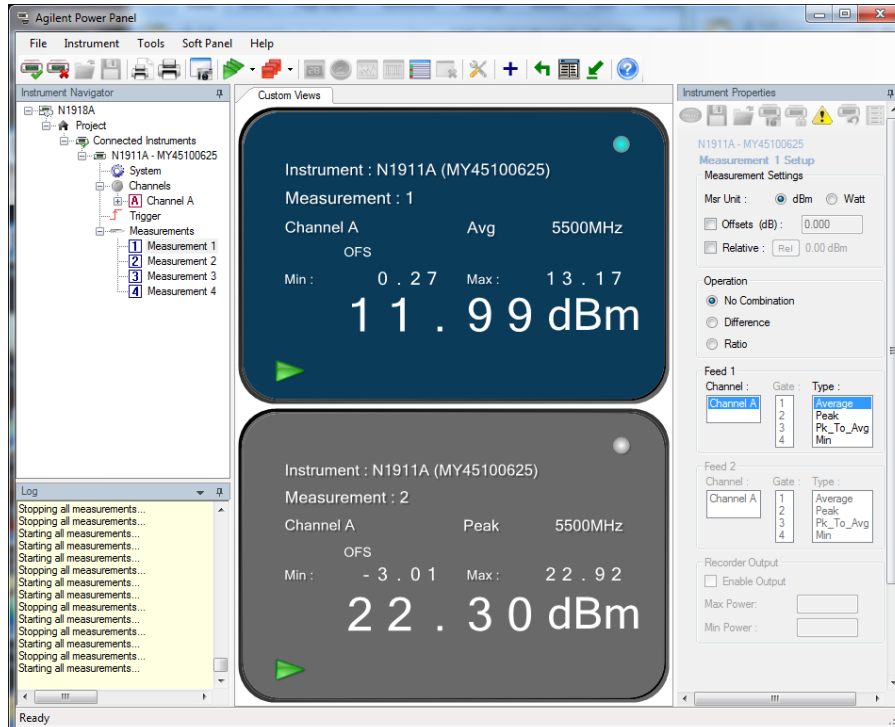
High Channel U-NII 3 MCS 6 20MHz BW



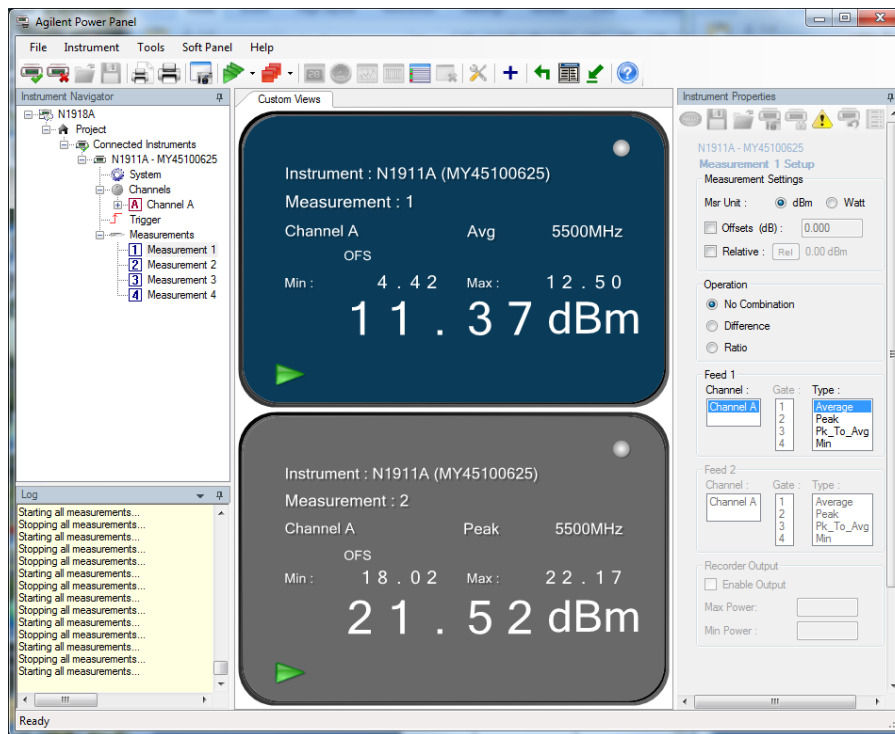
Low Channel U-NII 1 MCS 6 40MHz BW



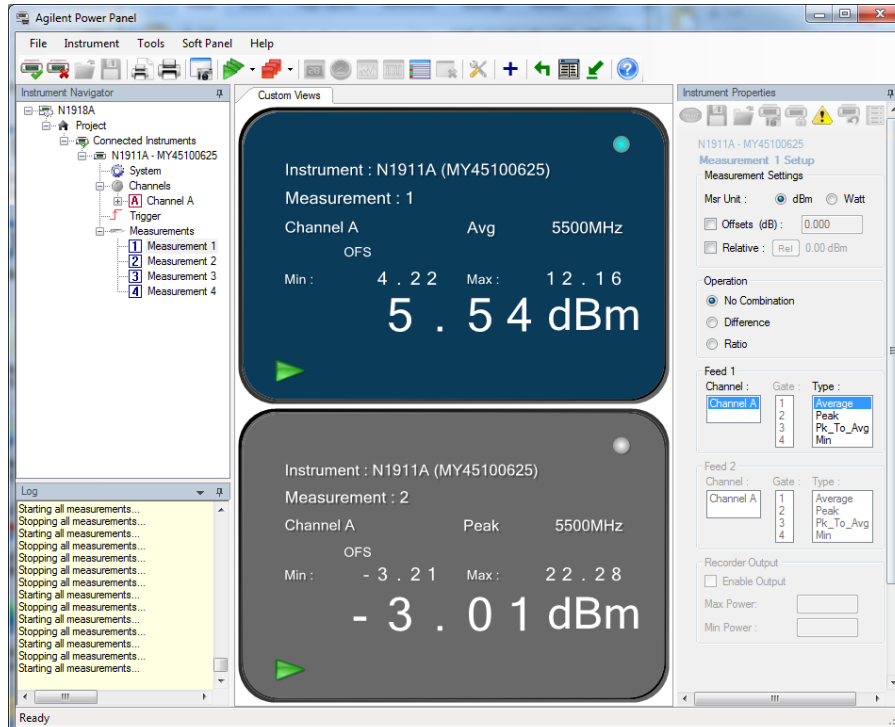
High Channel U-NII 3 MCS 2 40MHz BW



High Channel U-NII 3 MCS 8 20MHz BW



Mid Channel U-NII 1 MCS 3 80MHz BW



Mid Channel U-NII 3 MCS 3 80MHz BW