

FCC PART 15E TEST REPORT FOR CERTIFICATION
On Behalf of

Audio Pro AB

MULTICONNECTED WIRELESS LOUDSPEAKER

Model Number: DRUMFIRE D-2

FCC ID: 2AGNC-D2

Prepared for:	Audio Pro AB
	Garnisonsgatan 52, 25466 Helsingborg, Sweden
Prepared By:	EST Technology Co., Ltd.
	Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China
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Report Number:	ESTE-R2108088
Date of Test:	Jul. 01~Aug. 05, 2021
Date of Report:	Aug. 09, 2021

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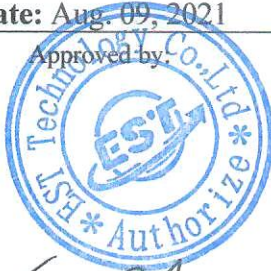
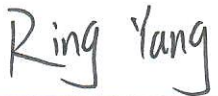
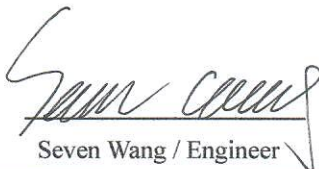
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EST Technology Co., Ltd.

Applicant:	Audio Pro AB		
Address:	Garnisonsgatan 52, 25466 Helsingborg, Sweden		
Manufacturer:	Audio Pro AB		
Address:	Garnisonsgatan 52, 25466 Helsingborg, Sweden		
E.U.T:	MULTICONNECTED WIRELESS LOUDSPEAKER		
Model Number:	DRUMFIRE D-2		
Power Supply:	AC 100~240V, 50/60Hz, 150W		
Trade Name:		Serial No.:	-----
Date of Receipt:	Jul. 01, 2021	Date of Test:	Jul. 01~Aug. 05, 2021
Test Specification:	FCC Part 15 Subpart E 15.407 ANSI C63.10:2013 FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01 FCC KDB 662911 D01 Multiple Transmitter Output v02r01		
Test Result:	The device described above is tested by EST Technology Co., Ltd. The measurement results were contained in this test report and EST Technology Co., Ltd. was assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliance with the FCC Rules and Regulations Part 15 Subpart E requirements. This report applies to above tested sample only and shall not be reproduced in part without written approval of EST Technology Co., Ltd. Date: Aug. 09, 2021		
Prepared by:	Reviewed by:	Approved by:   Iceman Hu / Manager	
 Ring Yang / Assistant	 Seven Wang / Engineer		
Other Aspects:	None.		
Abbreviations: OK/P=passed fail/F=failed n.a/N=not applicable E.U.T=equipment under tested			
This test report is based on a single evaluation of one sample of above mentioned products ,It is not permitted to be duplicated in extracts without written approval of EST Technology Co., Ltd.			

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

FCC ID	:	2AGNC-D2	
Product Name	:	MULTICONNECTED WIRELESS LOUDSPEAKER	
Model Number	:	DRUMFIRE D-2	
Software Version	:	V1.3	
Hardware Version	:	A1.2	
Operation frequency	:	U-NII-1: 5150 MHz~5250 MHz U-NII-3: 5725 MHz~5850 MHz	
Number of channel	:	U-NII-1: IEEE 802.11a / n HT20 / ac VHT20: 4 Channels; IEEE 802.11n HT40 / ac VHT40: 2 Channels; IEEE 802.11ac VHT80: 1 Channel. U-NII-3: IEEE 802.11a / n HT20 / ac VHT20: 5 Channels; IEEE 802.11n HT40 / ac VHT40: 2 Channels; IEEE 802.11ac VHT80: 1 Channel.	
Modulation	:	OFDM(QPSK, BPSK, 16-QAM, 64-QAM,256-QAM)	
Transmit Data Rate	:	IEEE 802.11a: 54, 48, 36, 24, 18, 12, 9, 6Mbps; IEEE 802.11n: up 300Mbps; IEEE 802.11ac: up to 866.6Mbps;	
Channels Spacing	:	IEEE 802.11a: 20MHz; IEEE 802.11n HT20: 20MHz; IEEE 802.11n HT40: 40MHz; IEEE 802.11ac VHT20: 20MHz; IEEE 802.11ac VHT40: 40MHz; IEEE 802.11ac VHT80: 80MHz;	
Transmit Power	:	U-NII-1	IEEE 802.11a: 15.54dBm IEEE 802.11n HT20: 17.19dBm IEEE 802.11n HT40: 17.33dBm IEEE 802.11ac VHT20: 18.24dBm IEEE 802.11ac VHT40: 15.32dBm IEEE 802.11ac VHT80: 16.51dBm
		U-NII-3	IEEE 802.11a: 14.61dBm IEEE 802.11n HT20:17.17dBm IEEE 802.11n HT40: 14.51dBm IEEE 802.11ac VHT20:17.19dBm IEEE 802.11ac VHT40:14.53dBm IEEE 802.11ac VHT80: 14.20dBm
Sample Type	:	Prototype production	

Note:

For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

1.2. The antenna information for EUT

Ant No.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	-	-	Internal antenna	-	2
2	-	-	Internal antenna	-	2

Remark:

- (1) The EUT can work as CDD mode in IEEE 802.11n and IEEE 802.11ac, and can operate with one spatial stream.

According to KDB 662911 F 2) f) (i):

$$\text{Directional gain} = 2\text{dBi} + 10 \times \log(2/1)\text{dB} = 5.01\text{dBi} < 6\text{dBi}$$

So, the output power limit and power spectral density do not need to be reduced.

- (2) After pre-test all antenna configurations, the worst case configuration is listed below.

TX Mode \ ANT No.	SISO Configuration	MIMO Configuration
IEEE 802.11a	ANT 1 and Ant 2	/
IEEE 802.11n HT20	/	ANT1+ANT2
IEEE 802.11n HT40	/	ANT1+ANT2
IEEE 802.11ac VHT20	/	ANT1+ANT2
IEEE 802.11ac VHT40	/	ANT1+ANT2
IEEE 802.11ac VHT80	/	ANT1+ANT2

2. SUMMARY OF TEST

2.1. Summary of test result

Report Section	Description of Test Item	FCC Standard Section	Results
3	6dB Bandwidth & 26dB Bandwidth & 99% Occupied Bandwidth	15.407(a) 15.407(e)	PASS
4	Maximum Conducted Output Power	15.407(a)	PASS
5	Peak Power Spectral Density	15.407(a)	PASS
6	Unwanted Emissions and Band Edge	15.205 15.209 15.407(b)	PASS
7	Frequency Stability	15.407(g)	PASS
8	AC Power Line Conducted Emissions	15.207 15.407(b)(9)	PASS
9	Antenna Requirement	15.203	PASS

Note:

(1) "N/A" denotes test is not applicable in this test report

2.2. Test Facilities

EMC Lab

: Certificated by CNAS, CHINA
Registration No.: L5288
This Certificate is valid until: November 12, 2023

Certificated by FCC, USA
Designation Number: CN1215
This Certificate is valid until: January 31, 2022

Certificated by A2LA, USA
Registration No.: 4366.01
This Certificate is valid until: January 31, 2022

Certificated by Industry Canada
CAB identifier No.: CN0035
This Certificate is valid until: January 31, 2022

Certificated by VCCI, Japan
Registration No.: C-14103; T-20073; R-13663;
R-20103; G-20097
Date of registration: Apr. 20, 2020
This Certificate is valid until: Apr. 19, 2023

Certificated by TUV Rheinland, Germany
Registration No.: UA 50413872 0001
Date of registration: July 31, 2018

Certificated by Intertek
Registration No.: 2011-RTL-L2-64
Date of registration: November 08, 2018

Name of Firm : EST Technology Co., Ltd.

Site Location : Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China

2.3. Measurement uncertainty for EST Technology Co., Ltd.

Test Item	Uncertainty
Uncertainty for Conduction emission test	2.54dB
Uncertainty for Radiation Emission test (30MHz-1GHz)	3.62
Uncertainty for Radiation Emission test (1GHz to 18GHz)	4.86
Uncertainty for spurious emissions test (18GHz to 40GHz)	4.67
Uncertainty for radio frequency	7×10^{-8}
Uncertainty for conducted RF Power	1.08dB
Uncertainty for Power density test	0.26dB
Temperature	$\pm 0.6^{\circ}\text{C}$
Humidity	$\pm 4.0\%$
Volatage DC	$\pm 1.0\%$
Volatage (AC, <10KHz)	$\pm 1.5\%$

Note:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

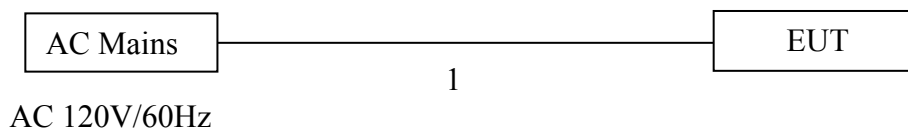
2.4. Assistant equipment used for test

Item	Equipment	Brand	Model Name/Type No.	FCC ID	Series No.
-	-	-	-	-	-

Item	Shielded Type	Ferrite Core	Length	Note
1	NO	NO	1.8m	AC Cable

2.5. Block Diagram

For radiated emissions test: EUT was placed on a turn table, which is 0.8 (or 1.5) meter high above ground.



(EUT: MULTICONNECTED WIRELESS LOUDSPEAKER)

2.6. Test Mode

Pre-scan has been combined all possible modulations and data rates to determine the worst case test mode, the worst case test mode was selected for the final test as listed below.

Test Item	Test Mode	Channel	Modulation	Data rate
6dB Bandwidth	IEEE 802.11a	149/157/165	OFDM	6Mbps
	IEEE 802.11n HT20	149/157/165	OFDM	MCS0
	IEEE 802.11n HT40	151/159	OFDM	MCS0
	IEEE 802.11ac VHT20	149/157/165	OFDM	MCS0
	IEEE 802.11ac VHT40	151/159	OFDM	MCS0
	IEEE 802.11ac VHT80	155	OFDM	MCS0
26dB Bandwidth	IEEE 802.11a	36/40/48	OFDM	6Mbps
	IEEE 802.11n HT20	36/40/48	OFDM	MCS0
	IEEE 802.11n HT40	38/46	OFDM	MCS0
	IEEE 802.11ac VHT20	36/40/48	OFDM	MCS0
	IEEE 802.11ac VHT40	38/46	OFDM	MCS0
	IEEE 802.11ac VHT80	42	OFDM	MCS0
99% Occupied Bandwidth	IEEE 802.11a	36/40/48/149/157/165	OFDM	6Mbps
	IEEE 802.11n HT20	36/40/48/149/157/165	OFDM	MCS0
	IEEE 802.11n HT40	38/46/151/159	OFDM	MCS0
	IEEE 802.11ac VHT20	36/40/48/149/157/165	OFDM	MCS0
	IEEE 802.11ac VHT40	38/46/151/159	OFDM	MCS0
	IEEE 802.11ac VHT80	42/155	OFDM	MCS0
Maximum Conducted Output Power	IEEE 802.11a	36/40/48/149/157/165	OFDM	6Mbps
	IEEE 802.11n HT20	36/40/48/149/157/165	OFDM	MCS0
	IEEE 802.11n HT40	38/46/151/159	OFDM	MCS0
	IEEE 802.11ac VHT20	36/40/48/149/157/165	OFDM	MCS0
	IEEE 802.11ac VHT40	38/46/151/159	OFDM	MCS0
	IEEE 802.11ac VHT80	42/155	OFDM	MCS0

Peak Power Spectral Density	IEEE 802.11a	36/40/48/149/157/165	OFDM	6Mbps
	IEEE 802.11n HT20	36/40/48/149/157/165	OFDM	MCS0
	IEEE 802.11n HT40	38/46/151/159	OFDM	MCS0
	IEEE 802.11ac VHT20	36/40/48/149/157/165	OFDM	MCS0
	IEEE 802.11ac VHT40	38/46/151/159	OFDM	MCS0
	IEEE 802.11ac VHT80	42/155	OFDM	MCS0
Unwanted Emissions and Band Edge(Above 1GHz)	IEEE 802.11a	36/40/48/149/157/165	OFDM	6Mbps
	IEEE 802.11n HT20	36/40/48/149/157/165	OFDM	MCS0
	IEEE 802.11n HT40	38/46/151/159	OFDM	MCS0
	IEEE 802.11ac VHT20	36/40/48/149/157/165	OFDM	MCS0
	IEEE 802.11ac VHT40	38/46/151/159	OFDM	MCS0
	IEEE 802.11ac VHT80	42/155	OFDM	MCS0
Unwanted Emissions Below 1GHz	IEEE 802.11a	36	OFDM	6Mbps
Frequency Stability	Unmodulation	36/149	N/A	N/A
AC Power Line Conducted Emissions	IEEE 802.11a	36	OFDM	6Mbps

Note:

1. In radiated measurement, the EUT had been pre-scan on the positioned of each 3 axis(X,Y,Z), the worst case was found when positioned on **X-plane**.

2.7. Channel List

Band	Mode	Channel	Frequency (MHz)
U-NII-1	IEEE 802.11a & n HT20 & ac VHT20	36	5180
		40	5200
		44	5220
		48	5240
	IEEE 802.11n HT40 & ac VHT40	38	5190
		46	5230
	IEEE 802.11ac VHT80	42	5210
U-NII-3	IEEE 802.11a & n HT20 & ac VHT20	149	5745
		153	5765
		157	5785
		161	5805
		165	5825
	IEEE 802.11n HT40 & ac VHT40	151	5755
		159	5795
	IEEE 802.11ac VHT80	155	5775

2.8. Power Setting of Test Software

Software Name	ADB		
U-NII-1			
Frequency(MHz)	5180	5200	5240
IEEE 802.11a Setting	21	21	21
IEEE 802.11n HT20 Setting	21	21	21
IEEE 802.11ac VHT20 Setting	21	21	21
Frequency(MHz)	5190	5230	
IEEE 802.11n HT40 Setting	20	20	
IEEE 802.11ac VHT40 Setting	20	20	
Frequency(MHz)	5210		
IEEE 802.11ac VHT80 Setting	22		
U-NII-3			
Frequency(MHz)	5745	5785	5825
IEEE 802.11a Setting	21	21	21
IEEE 802.11n HT20 Setting	21	21	21
IEEE 802.11ac VHT20 Setting	21	21	21
Frequency(MHz)	5755	5795	
IEEE 802.11n HT40 Setting	20	20	
IEEE 802.11ac VHT40 Setting	20	20	
Frequency(MHz)	5775		
IEEE 802.11ac VHT80 Setting	22		

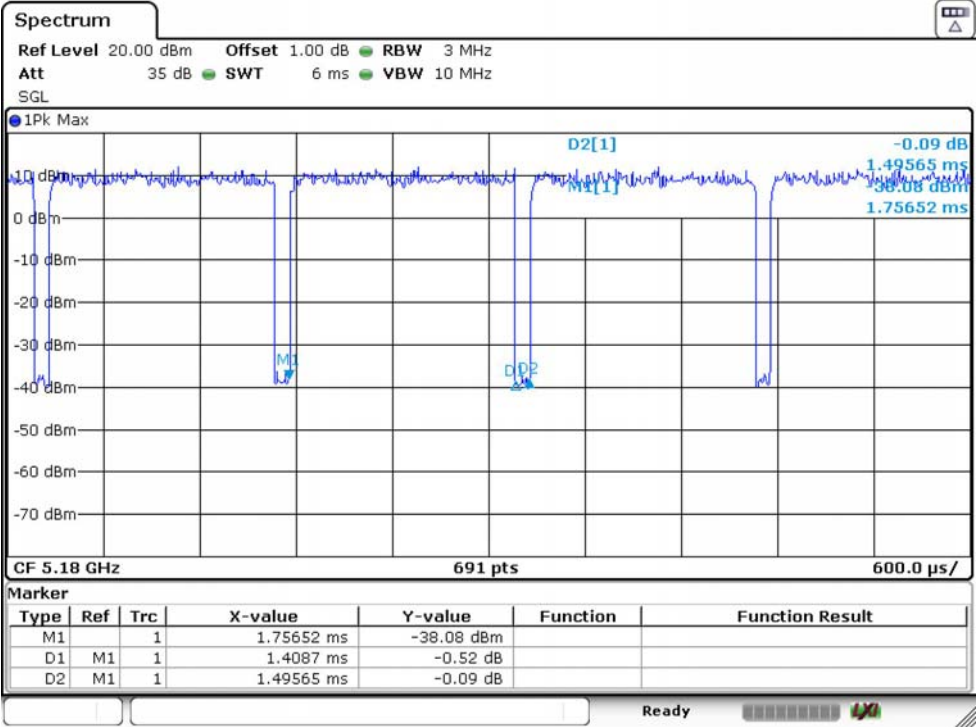
2.9. Duty Cycle of Test Signal

Temperature	26.2℃	Relative Humidity		56%	Test Voltage		AC 120V/60Hz
Mode	Frequency (MHz)	On time (ms)	Total Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T (Hz)	VBW Setting (dB)
IEEE 802.11a	5180	1.40870	1.49565	94.19	0.26	710	1.40870
IEEE 802.11n HT20	5180	1.33043	1.40870	94.44	0.25	752	1.33043
IEEE 802.11ac VHT20	5190	1.33913	1.42609	93.90	0.27	747	1.33913
IEEE 802.11n HT40	5180	0.66087	0.74783	88.37	0.54	1513	0.66087
IEEE 802.11ac VHT40	5190	0.67826	0.76522	88.64	0.52	1474	0.67826
IEEE 802.11ac VHT80	5210	0.33913	0.43043	78.79	1.04	2949	0.33913

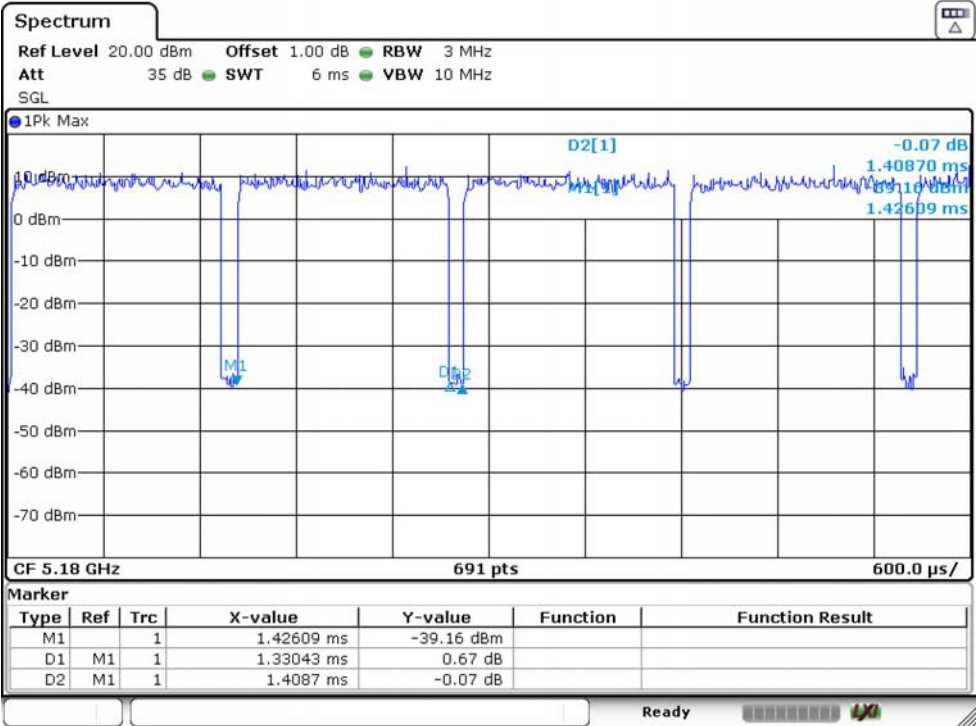
Note:

1. Duty Cycle=On Time/Total Time×100%.
2. Duty Factor=10×Log(1/Duty Cycle).
3. If duty cycle <98 %, the conducted average output power and average power spectral density should be add duty factor.
4. If duty cycle ≥98 %,the EUT is consider to be transmitting continuously,the conducted average output power and average power spectral density no need to add duty factor.
5. The on-time time is transmission duration(T).
6. The VBW Setting is use for RMS measurement in unwanted emissions and band edge(Above 1GHz) test.

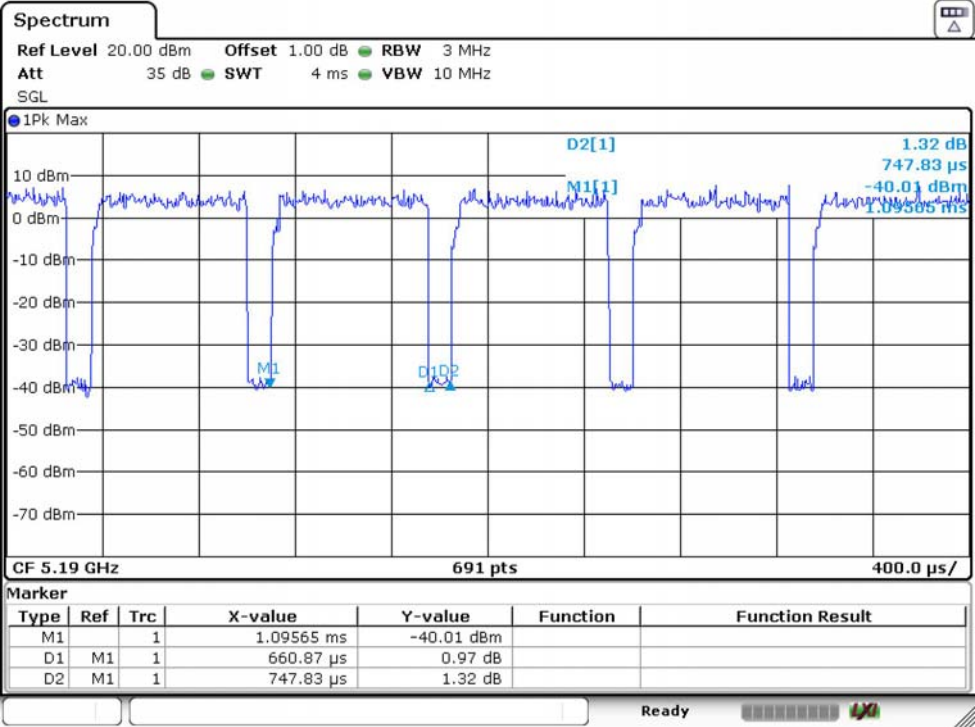
IEEE 802.11a 5180MHz



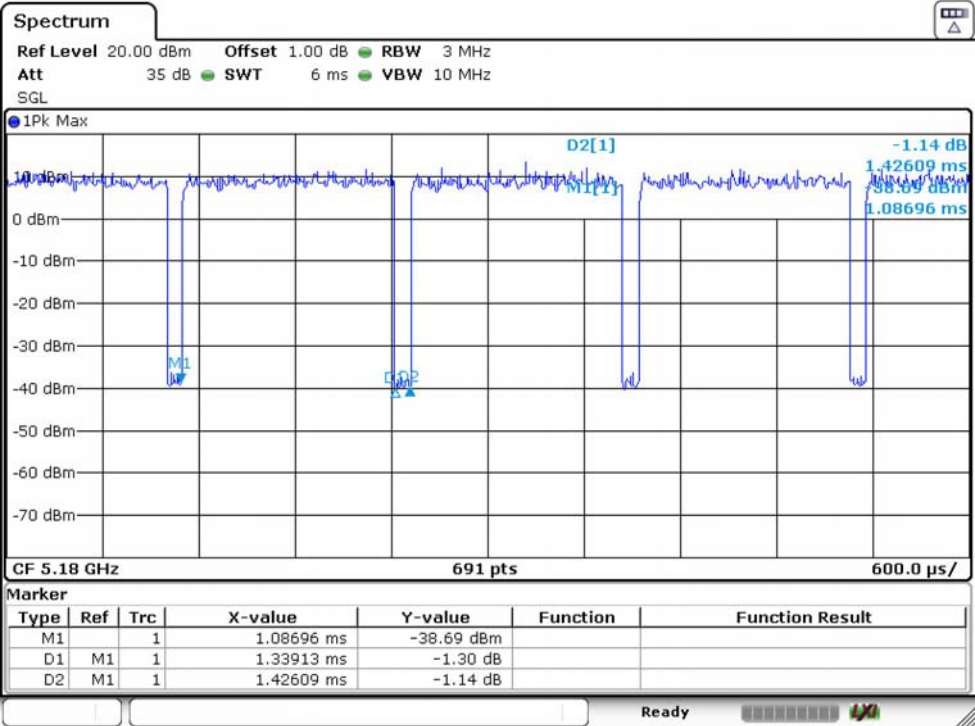
IEEE 802.11n HT20 5180MHz



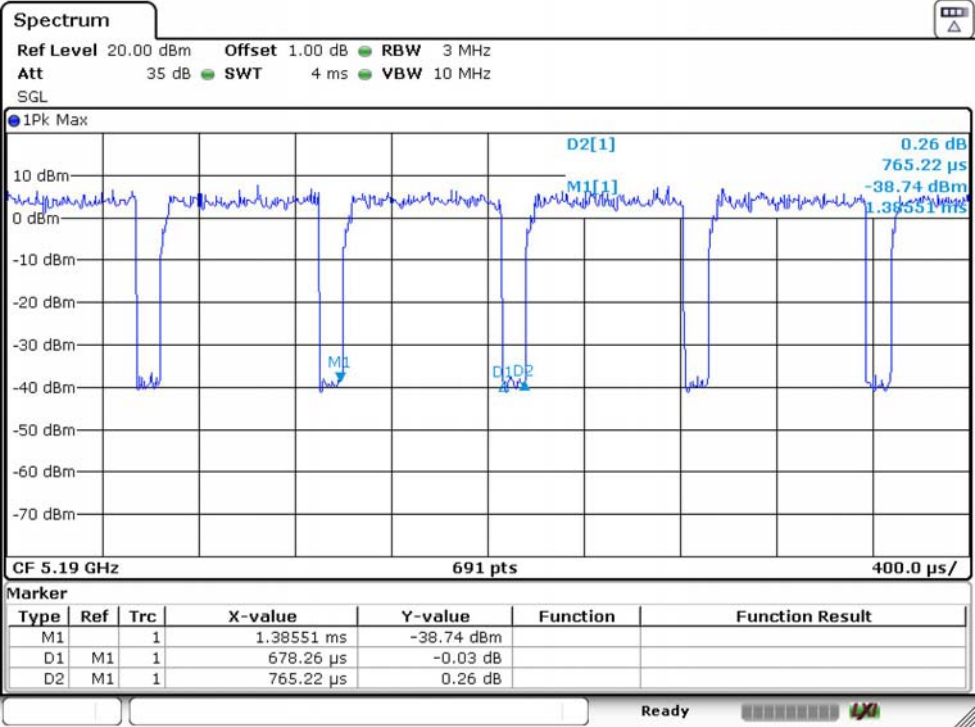
IEEE 802.11n HT40 5190MHz



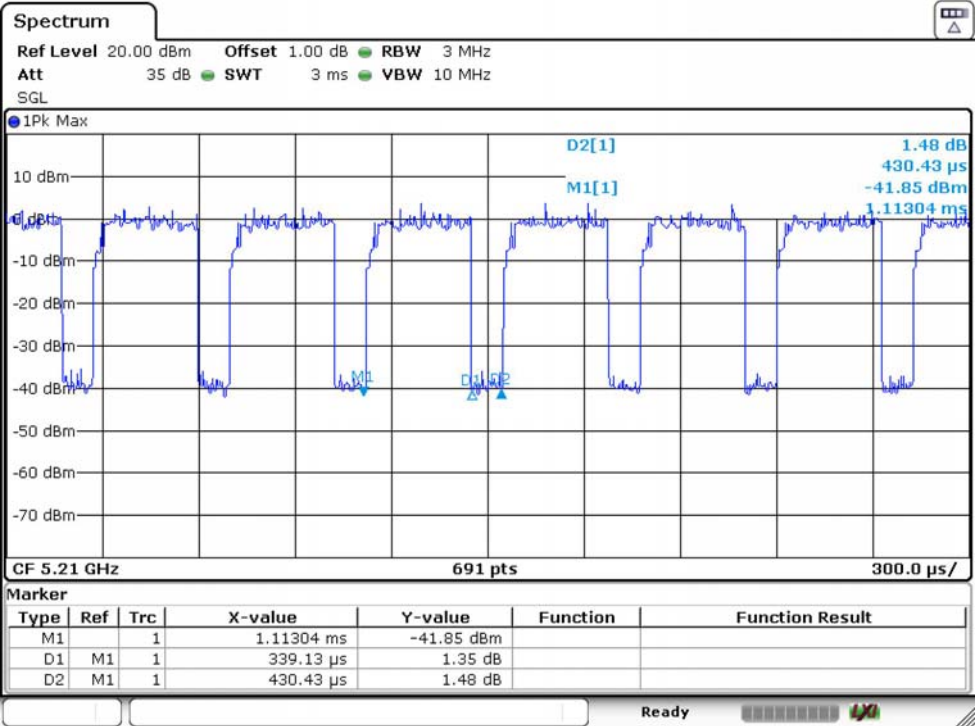
IEEE 802.11ac VHT20 5180MHz



IEEE 802.11ac VHT40 5190MHz



IEEE 802.11ac VHT80 5210MHz



2.10. Test Equipment List

For AC power conducted emissions test						
Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESHS30	EST-E001	LISAI	June 13,21	1 Year
Artificial Mains Network	Rohde & Schwarz	ENV216	EST-E002	LISAI	June 13,21	1 Year
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	EST-E078	LISAI	June 13,21	1 Year
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A	N/A

For radiated emissions test(9KHz-30MHz)						
Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESR7	EST-E047	LISAI	June 13,21	1 Year
Active Loop Antenna	SCHWARZB ECK	FMZB 1519B	EST-E054	LISAI	June 13,21	1 Year
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A	N/A
9kHz-30MHz Cable	N/A	EST-001	N/A	N/A	N/A	N/A

For radiated emissions test(30MHz-1000MHz)						
Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESR7	EST-E047	LISAI	June 13,21	1 Year
Bilog Antenna	Teseq	CBL 6111D	EST-E034	LISAI	June 13,21	1 Year
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A	N/A
30-1000MHz Cable	N/A	EST-002	N/A	N/A	N/A	N/A

For radiated emissions test(Above 1000MHz)						
Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
Horn Antenna	SCHWARZB ECK	BBHA 9120 D	EST-E031	LISAI	June 13,21	1 Year
Horn Antenna	SCHWARZB ECK	BBHA9170	N/A	LISAI	June 13,21	1 Year
Signal Amplifier	SCHWARZB ECK	BBV9718	EST-E032	LISAI	June 13,21	1 Year
Spectrum Analyzer	Rohde & Schwarz	FSV40	EST-E069	LISAI	July 19,21	1 Year
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A	N/A
Above 1GHz Cable	N/A	EST-003	N/A	N/A	N/A	N/A

For connect EUT antenna terminal test						
Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
TS 8997	Rohde & Schwarz	/	/	/	/	/
Open Switch and Control Unit	Rohde & Schwarz	OSP-B157WB	EST-E036	LISAI	June 13,21	1 Year
Signal and Spectrum Analyzer	Rohde & Schwarz	FSV	EST-E037	LISAI	June 13,21	1 Year
Signal Generator	Rohde & Schwarz	SMB100A	EST-E038	LISAI	June 13,21	1 Year
Vector Signal Generator	Rohde & Schwarz	SMBV100A	EST-E039	LISAI	June 13,21	1 Year
Test Software	Rohde & Schwarz	WMS32	V10.50.00	N/A	N/A	N/A
Temperature controller	Terchy	MHQ	EST-E101	LISAI	June 13,21	1 Year

3. 6dB BANDWIDTH & 26dB BANDWIDTH & 99% OCCUPIED BANDWIDTH

3.1. Limit

Band	Frequency (MHz)	Test Item	Limit
U-NII-1	5150-5250	26dB Bandwidth&99% Occupied Bandwidth	N/A
U-NII-2A	5250-5350	26dB Bandwidth&99% Occupied Bandwidth	N/A
U-NII-2C	5470-5725	26dB Bandwidth&99% Occupied Bandwidth	N/A
U-NII-3	5725-5850	6dB Bandwidth&99% Occupied Bandwidth	6dB Bandwidth $\geq$ 500KHz

3.2. Test Setup



3.3. Spectrum Analyzer Setting

6dB Bandwidth	
Spectrum Parameters	Setting
RBW	100KHz
VBW	300KHz
Span	40MHz(20MHz Bandwidth mode) 60MHz(40MHz Bandwidth mode) 120MHz(80MHz Bandwidth mode)
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

26dB Bandwidth	
Spectrum Parameters	Setting
RBW	approximately 1% of the emission bandwidth
VBW	>RBW
Span	40MHz(20MHz Bandwidth mode) 60MHz(40MHz Bandwidth mode) 120MHz(80MHz Bandwidth mode)
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

99% Occupied Bandwidth	
Spectrum Parameters	Setting
RBW	1% to 5% of the OBW
VBW	approximately three times the RBW
Span	between 1.5 times and 5.0 times the OBW
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

3.4. Test Procedure

For 26dB Bandwidth Measurement :

- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with section 3.3.
- Set the EUT transmit continuously with maximum output power.
- Allow trace to stabilize, measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the instrument. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
- Repeat above procedures until all modes and channels were measured.
- Record the results in the test report.

For 6dB Bandwidth Measurement :

- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with section 3.3.
- Set the EUT transmit continuously with maximum output power.
- Allow trace to stabilize, measure the maximum width of the emission that is constrained by the frequencies associated with 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.
- Repeat above procedures until all modes and channels were measured.
- Record the results in the test report.

For 99% Occupied Bandwidth Measurement :

- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with section 3.3.
- Set the EUT transmit continuously with maximum output power.
- Allow trace to stabilize, use the 99% power bandwidth function to measure bandwidth.
- Repeat above procedures until all modes and channels were measured.
- Record the results in the test report.

3.5. Test Result

Temperature	26.2℃	Relative Humidity			56%	Test Voltage		AC 120V/60Hz
26dB Bandwidth&99% Occupied Bandwidth								
AND	Test Mode	Fre (MHz)	26dB Bandwidth (MHz)		99% Occupied Bandwidth (MHz)		Calcul ate Power Limit (W)	Calculate Power Limit (dBm)
			Ant 1	Ant 2	Ant 1	Ant 2		
U-NII-1	IEEE 802.11a	5180	21.650	21.650	17.077	17.135		
		5200	21.534	21.534	16.845	17.019		
		5240	21.476	21.650	17.077	17.019		
	IEEE 802.11n HT20	5180	21.823	21.708	18.234	17.945		
		5200	21.476	21.245	17.829	17.771		
		5240	21.418	21.708	17.945	17.945		
	IEEE 802.11ac VHT20	5180	21.997	21.708	17.887	18.119		
		5200	21.650	21.650	18.061	18.119		
		5240	21.592	21.766	18.003	18.119		
	IEEE 802.11n HT40	5190	40.289	39.682	36.469	36.585		
		5230	40.116	39.942	36.700	36.585		
	IEEE 802.11ac VHT40	5190	39.682	39.855	36.685	36.700		
		5230	39.942	40.203	36.585	36.469		
	IEEE 802.11ac VHT80	5210	80.580	81.100	75.543	75.369		

Temperature	26.2℃	Relative Humidity		56%	Test Voltage		AC 120V/60Hz	
6dB Bandwidth&99% Occupied Bandwidth								
BAND	Test Mode	Fre (MHz)	6dB Bandwidth (MHz)		99% Occupied Bandwidth (MHz)		6dB BW Min Limit (MHz)	Result
			Ant 1	Ant 2	Ant 1	Ant 2		
U-NII-3	IEEE 802.11a	5745	16.314	16.318	16.961	16.903	0.5	PASS
		5785	16.306	16.302	17.019	17.019	0.5	PASS
		5825	16.318	16.310	16.903	17.019	0.5	PASS
	IEEE 802.11n HT20	5745	17.554	17.550	18.177	18.119	0.5	PASS
		5785	17.526	17.550	18.234	18.177	0.5	PASS
		5825	17.562	17.558	18.061	18.061	0.5	PASS
	IEEE 802.11ac VHT20	5745	17.558	17.558	18.003	18.061	0.5	PASS
		5785	17.530	17.538	17.945	18.003	0.5	PASS
		5825	17.562	17.554	18.061	17.887	0.5	PASS
	IEEE 802.11n HT40	5755	36.266	36.272	36.585	36.585	0.5	PASS
		5795	36.038	36.044	36.700	36.353	0.5	PASS
	IEEE 802.11ac VHT40	5755	36.272	36.260	36.585	36.353	0.5	PASS
		5795	36.032	36.026	36.469	36.237	0.5	PASS
	IEEE 802.11ac VHT80	5775	75.460	75.340	75.369	75.369	0.5	PASS

Note :

For Band U-NII-2A and U-NII-2C,the maximum conducted output power limit is 250mw or $11+10 \times \log B$, which is lesser,where B is the 26dB Bandwidth in MHz.So in this section,the maximum conducted output power limit can calculate with 26dB Bandwidth.

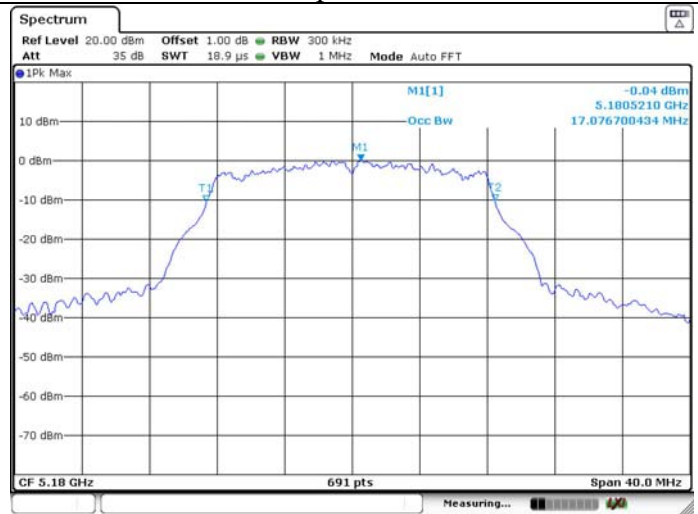
3.6. Test Result

U-NII-1 IEEE 802.11a 5180MHz_Ant 1

26dB Bandwidth

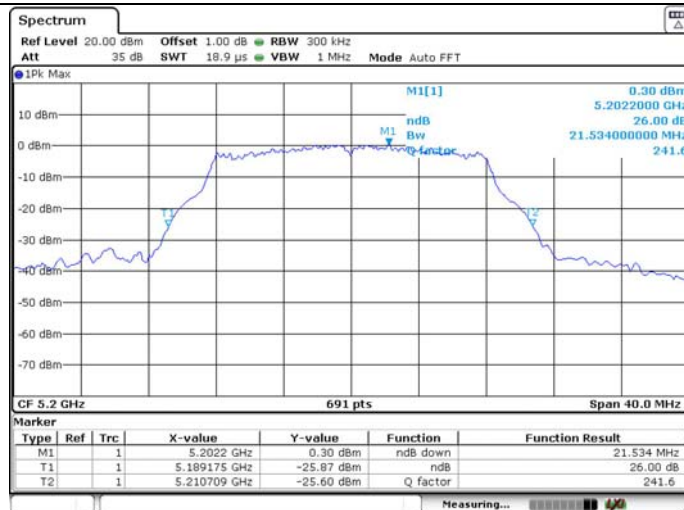


99% Occupied Bandwidth



U-NII-1 IEEE 802.11a 5200MHz_Ant 1

26dB Bandwidth

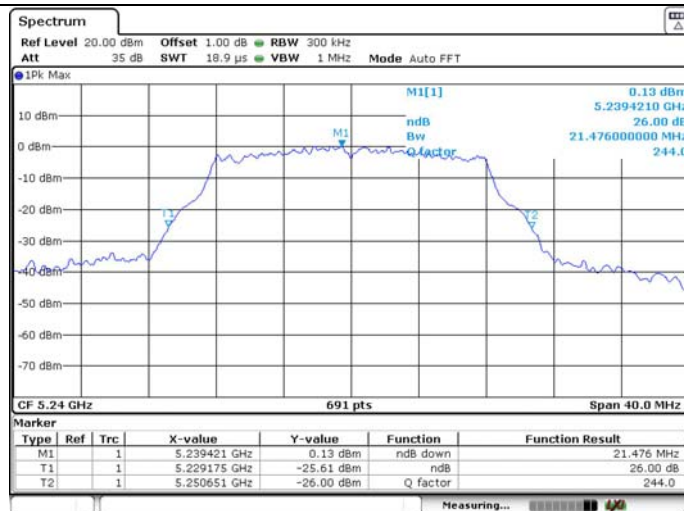


99% Occupied Bandwidth



U-NII-1 IEEE 802.11a 5240MHz_Ant 1

26dB Bandwidth

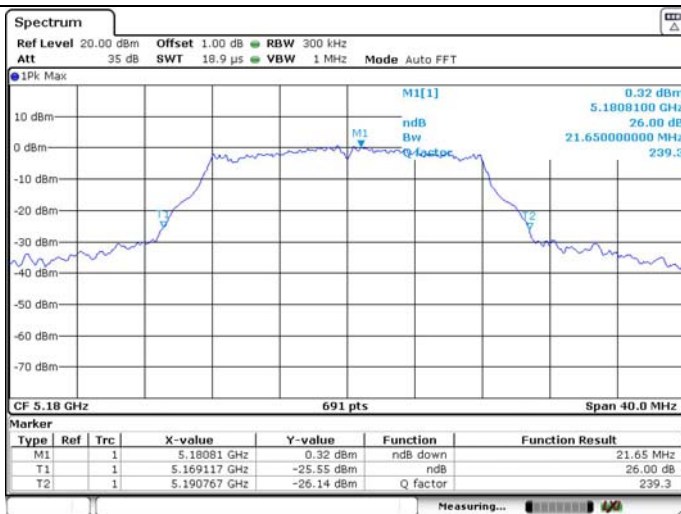


99% Occupied Bandwidth

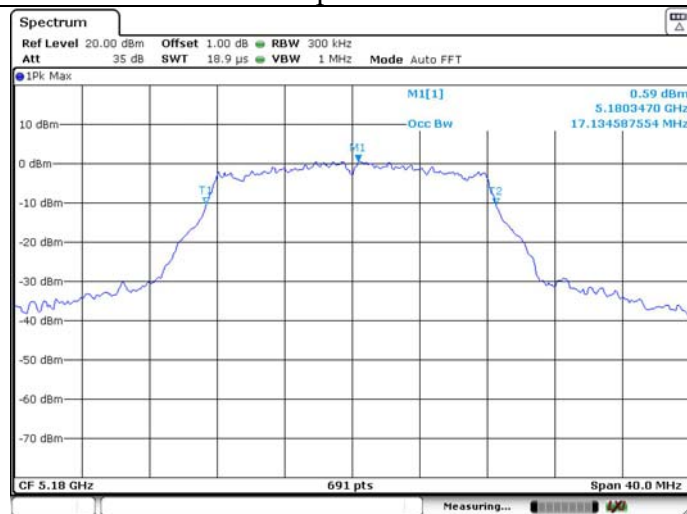


U-NII-1 IEEE 802.11a 5180MHz_Ant 2

26dB Bandwidth

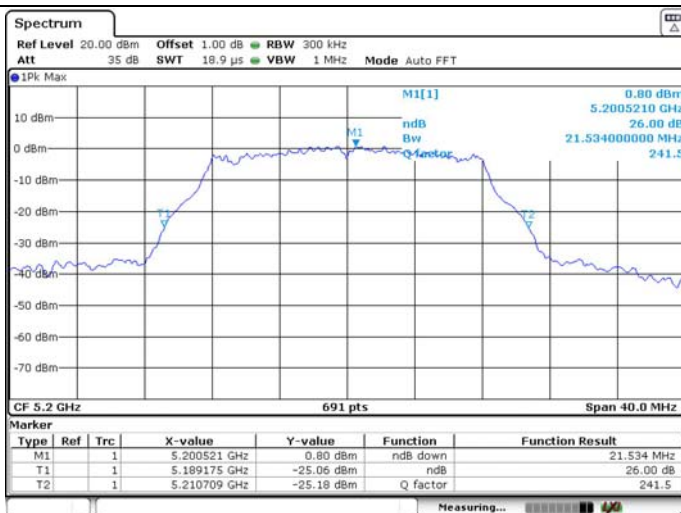


99% Occupied Bandwidth

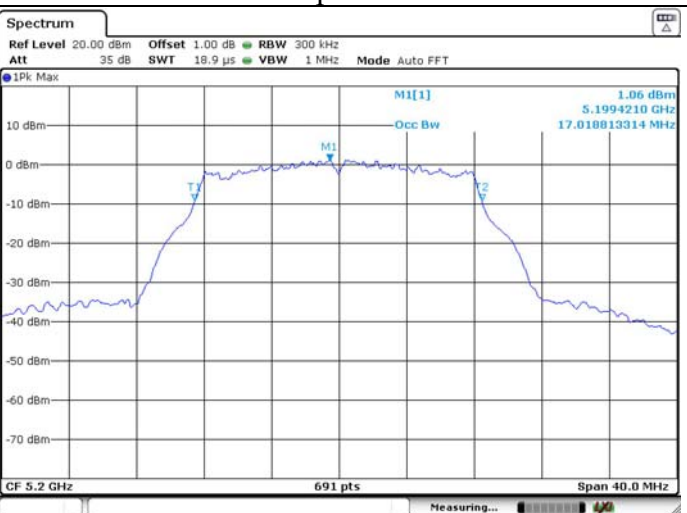


U-NII-1 IEEE 802.11a 5200MHz_Ant 2

26dB Bandwidth

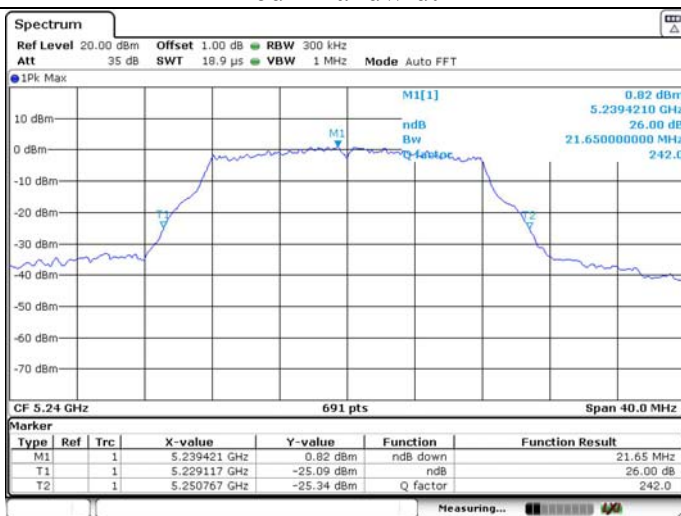


99% Occupied Bandwidth

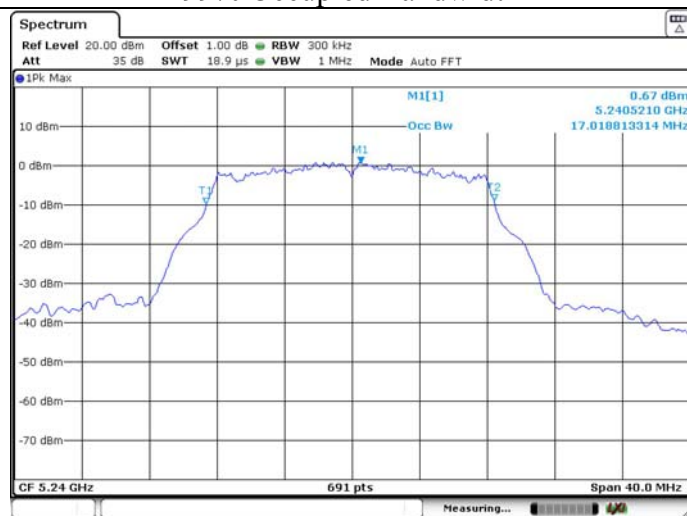


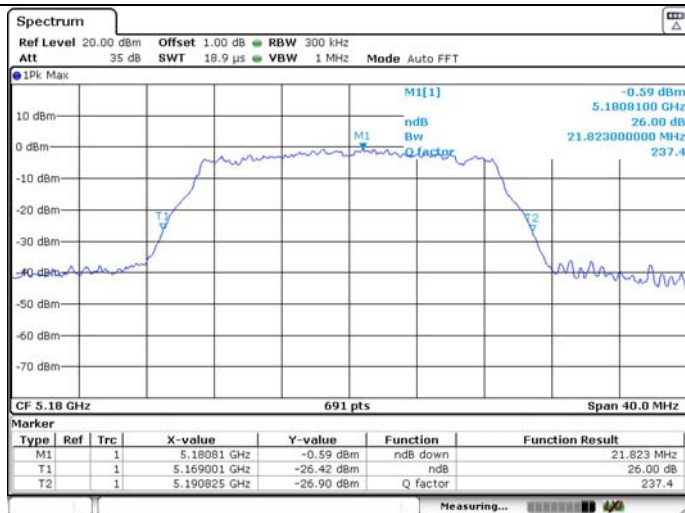
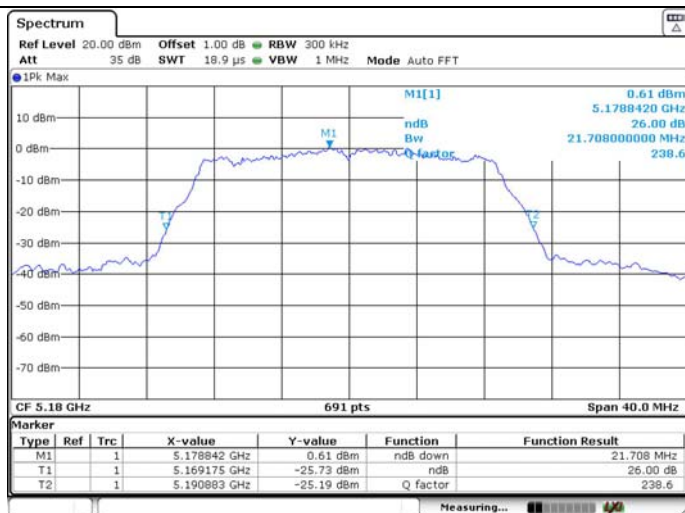
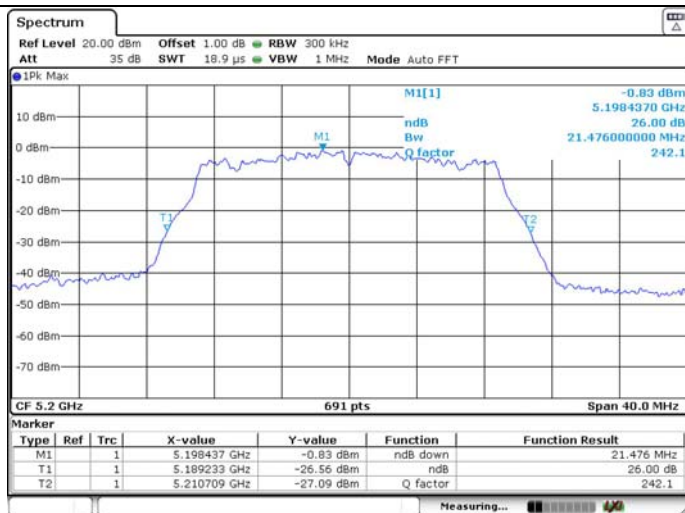
U-NII-1 IEEE 802.11a 5240MHz_Ant 2

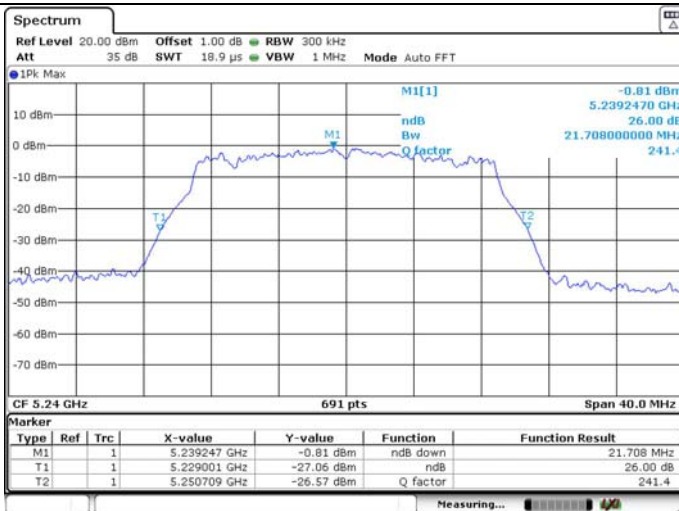
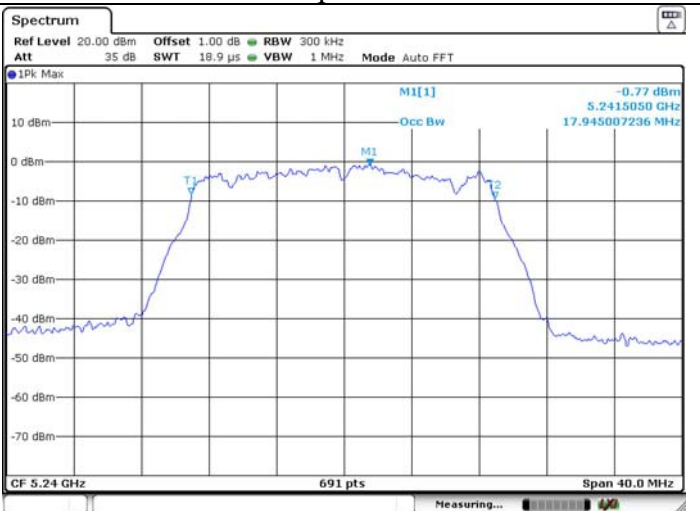
26dB Bandwidth

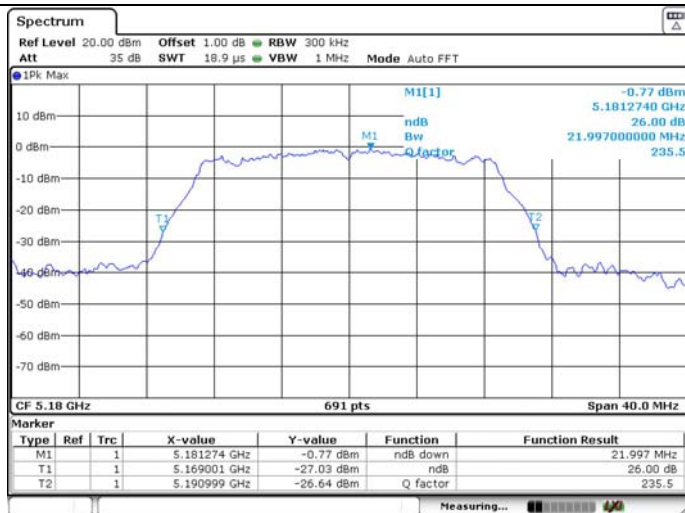
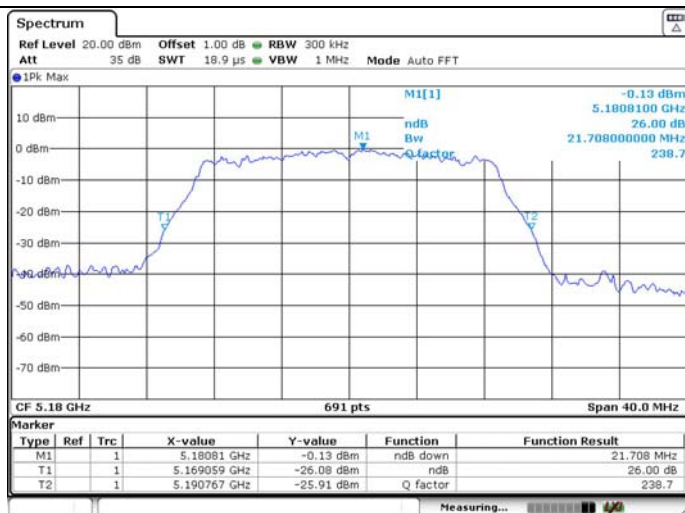
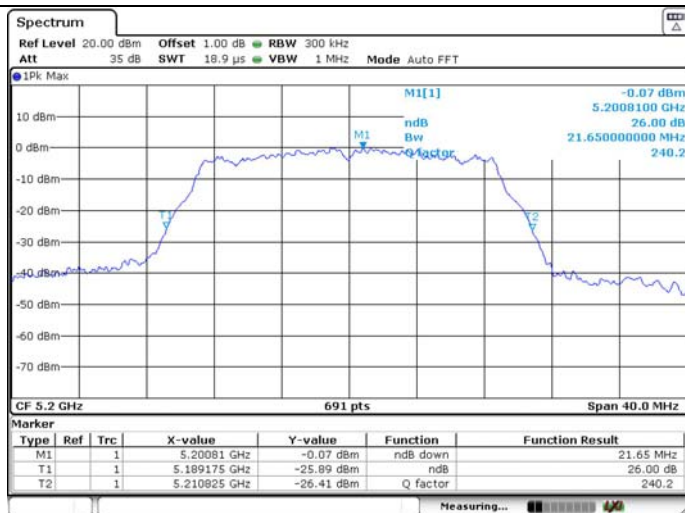


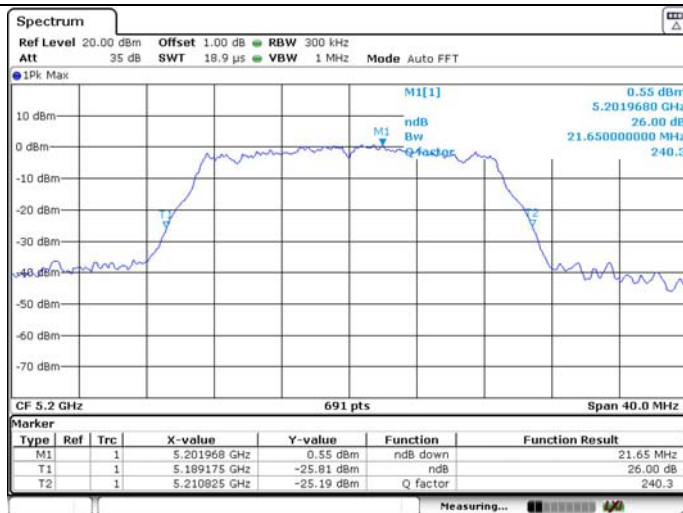
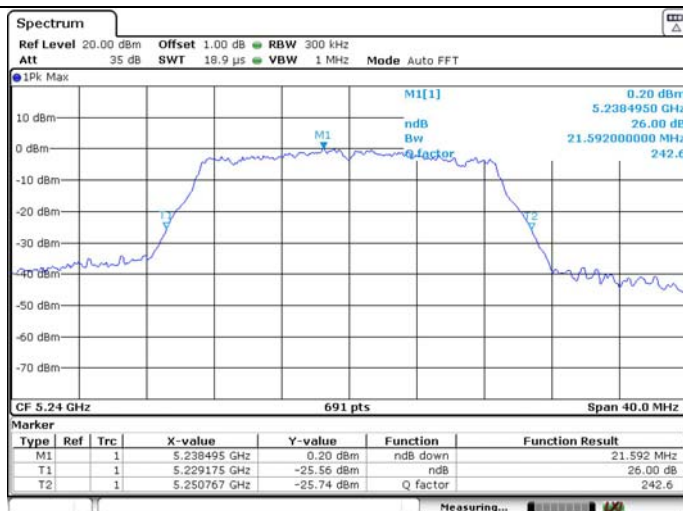
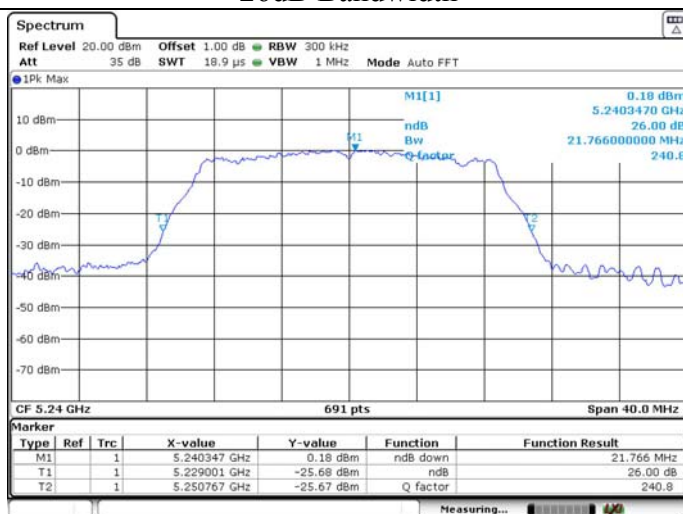
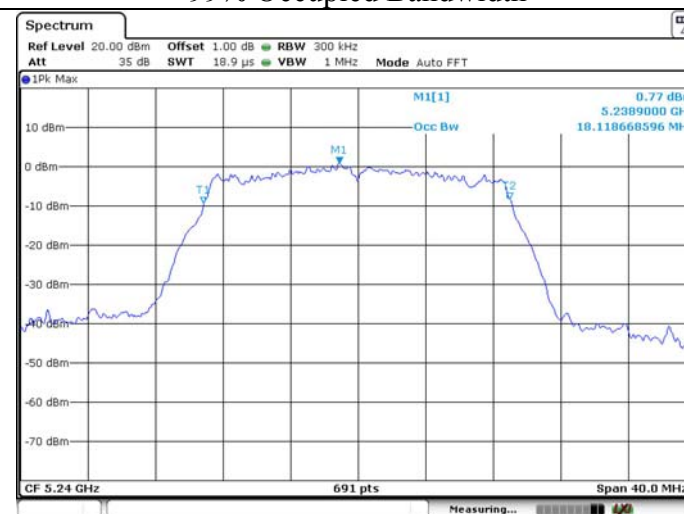
99% Occupied Bandwidth

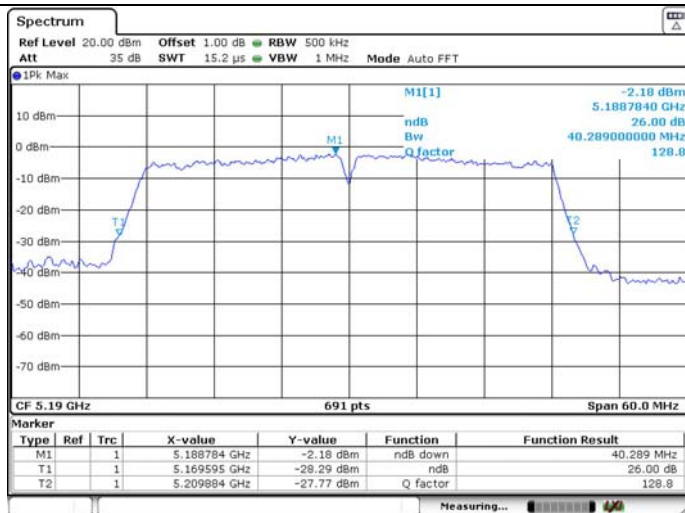
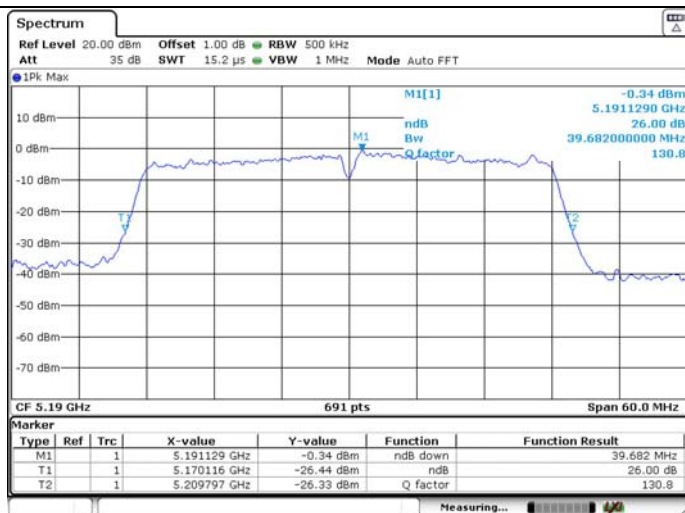
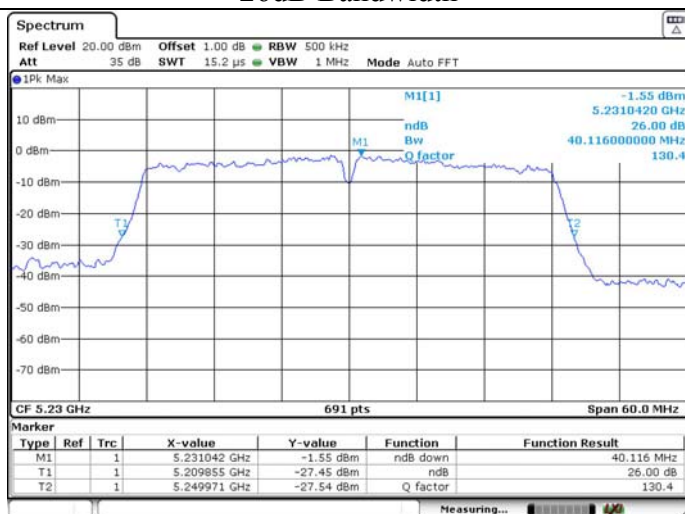


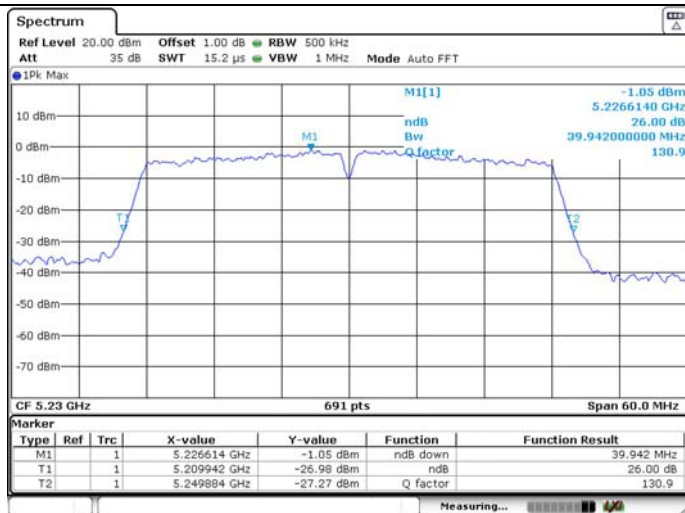
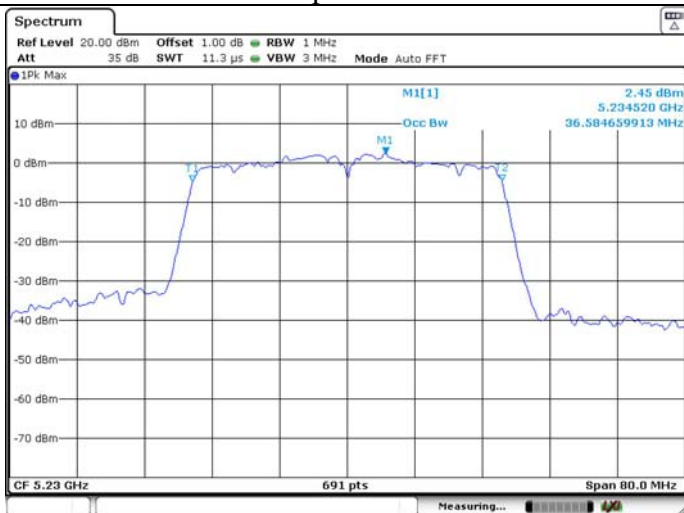
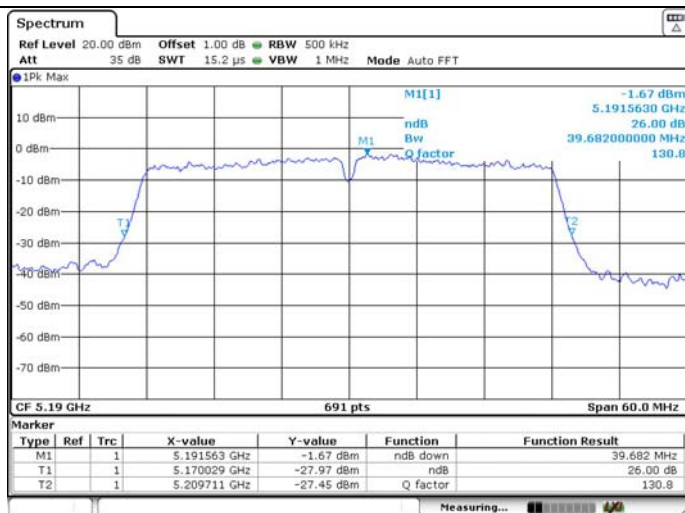
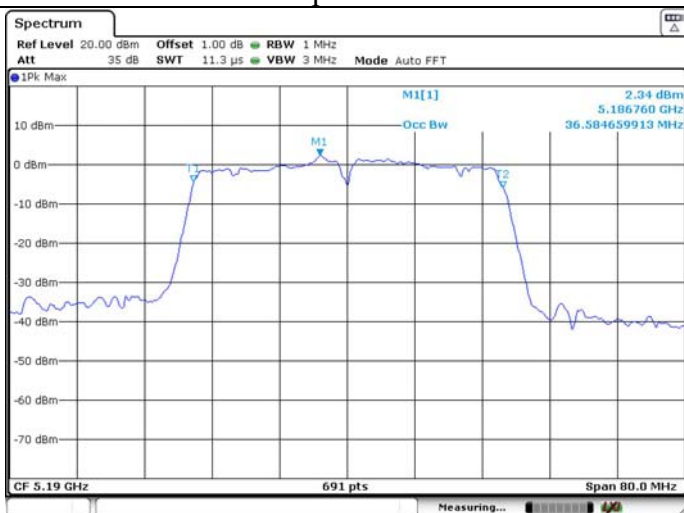
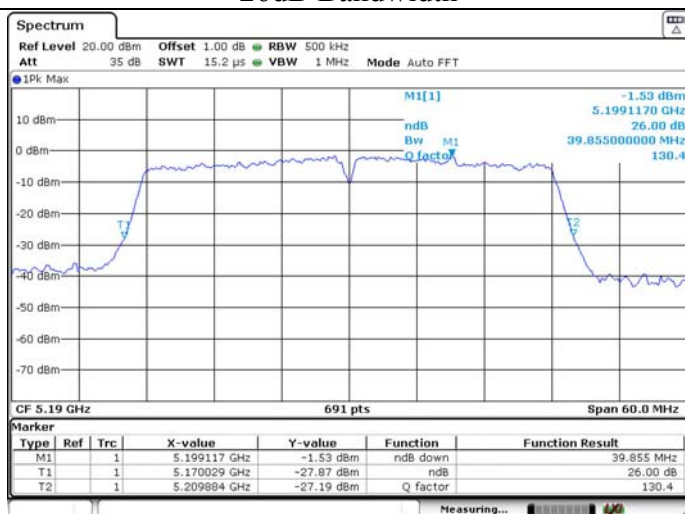
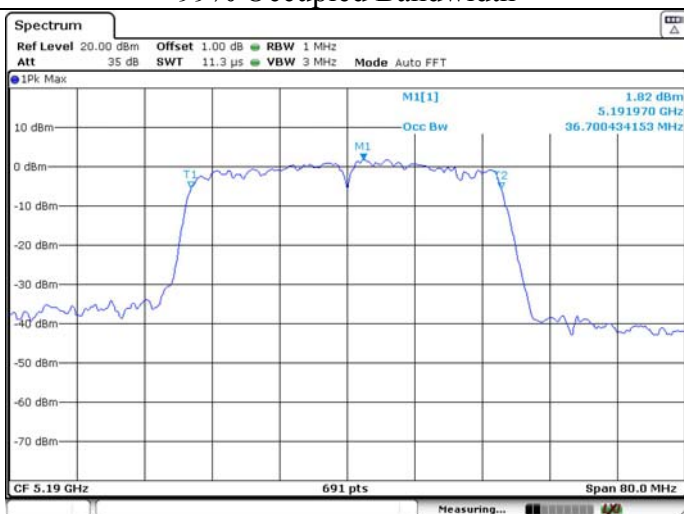
U-NII-1 IEEE 802.11n HT20 5180MHz_Ant 1**26dB Bandwidth****99% Occupied Bandwidth****U-NII-1 IEEE 802.11n HT20 5180MHz_Ant 2****26dB Bandwidth****99% Occupied Bandwidth****U-NII-1 IEEE 802.11n HT20 5200MHz_Ant 1****26dB Bandwidth****99% Occupied Bandwidth**

U-NII-1 IEEE 802.11n HT20 5200MHz_Ant 2**26dB Bandwidth****99% Occupied Bandwidth****U-NII-1 IEEE 802.11n HT20 5240MHz_Ant 1****26dB Bandwidth****99% Occupied Bandwidth****U-NII-1 IEEE 802.11n HT20 5240MHz_Ant 2****26dB Bandwidth****99% Occupied Bandwidth**

U-NII-1 IEEE 802.11ac VHT20 5180MHz_Ant 1**26dB Bandwidth****99% Occupied Bandwidth****U-NII-1 IEEE 802.11ac VHT20 5180MHz_Ant 2****26dB Bandwidth****99% Occupied Bandwidth****U-NII-1 IEEE 802.11ac VHT20 5200MHz_Ant 1****26dB Bandwidth****99% Occupied Bandwidth**

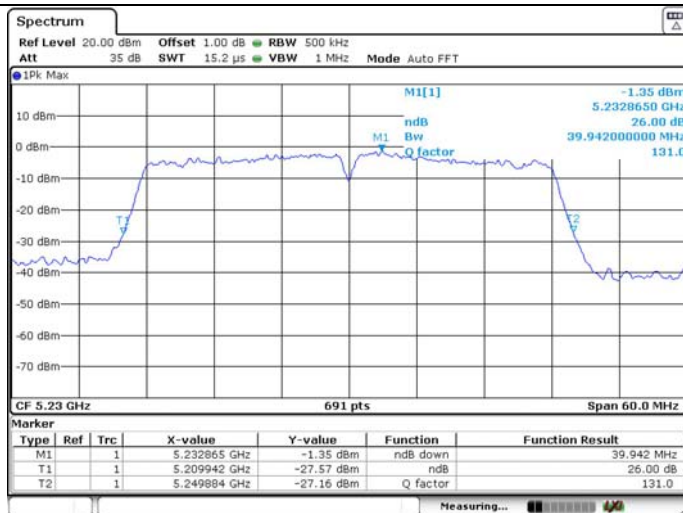
U-NII-1 IEEE 802.11ac VHT20 5200MHz_Ant 2**26dB Bandwidth****99% Occupied Bandwidth****U-NII-1 IEEE 802.11ac VHT20 5240MHz_Ant 1****26dB Bandwidth****99% Occupied Bandwidth****U-NII-1 IEEE 802.11ac VHT20 5240MHz_Ant 2****26dB Bandwidth****99% Occupied Bandwidth**

U-NII-1 IEEE 802.11n HT40 5190MHz_Ant 1**26dB Bandwidth****99% Occupied Bandwidth****U-NII-1 IEEE 802.11n HT40 5190MHz_Ant 2****26dB Bandwidth****99% Occupied Bandwidth****U-NII-1 IEEE 802.11n HT40 5230MHz_Ant 1****26dB Bandwidth****99% Occupied Bandwidth**

U-NII-1 IEEE 802.11n HT40 5230MHz_Ant 2**26dB Bandwidth****99% Occupied Bandwidth****U-NII-1 IEEE 802.11ac VHT40 5190MHz_Ant 1****26dB Bandwidth****99% Occupied Bandwidth****U-NII-1 IEEE 802.11ac VHT40 5190MHz_Ant 2****26dB Bandwidth****99% Occupied Bandwidth**

U-NII-1 IEEE 802.11ac VHT40 5230MHz_Ant 1

26dB Bandwidth

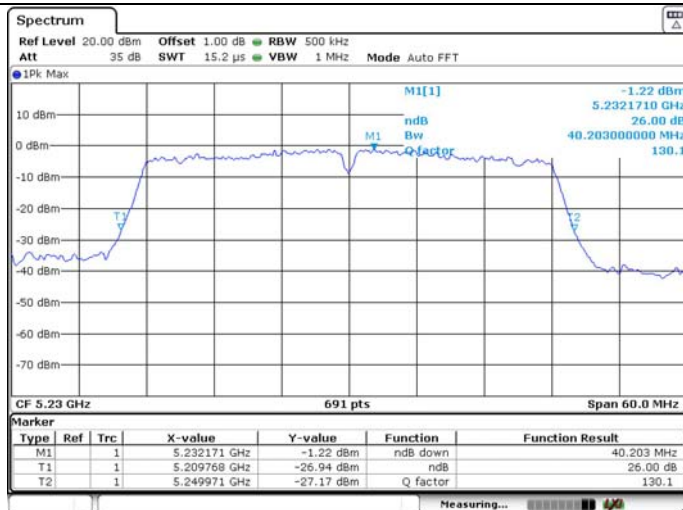


99% Occupied Bandwidth

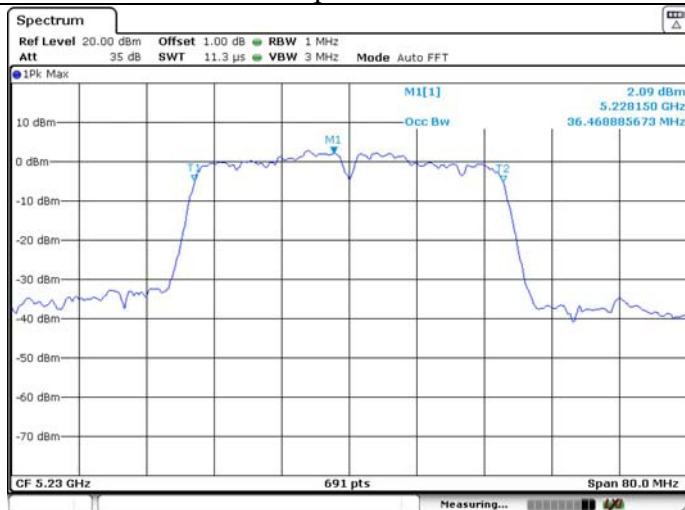


U-NII-1 IEEE 802.11ac VHT40 5230MHz_Ant 2

26dB Bandwidth

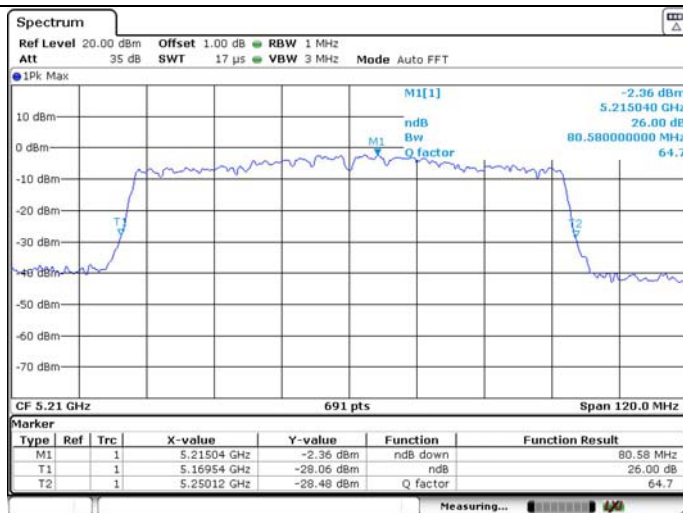


99% Occupied Bandwidth

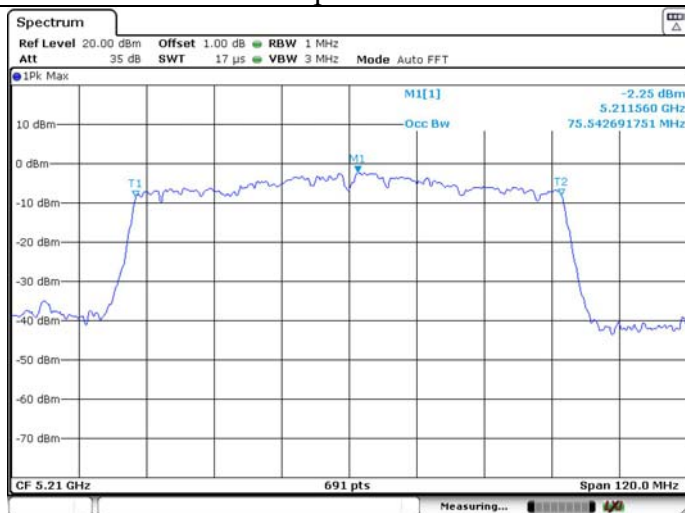


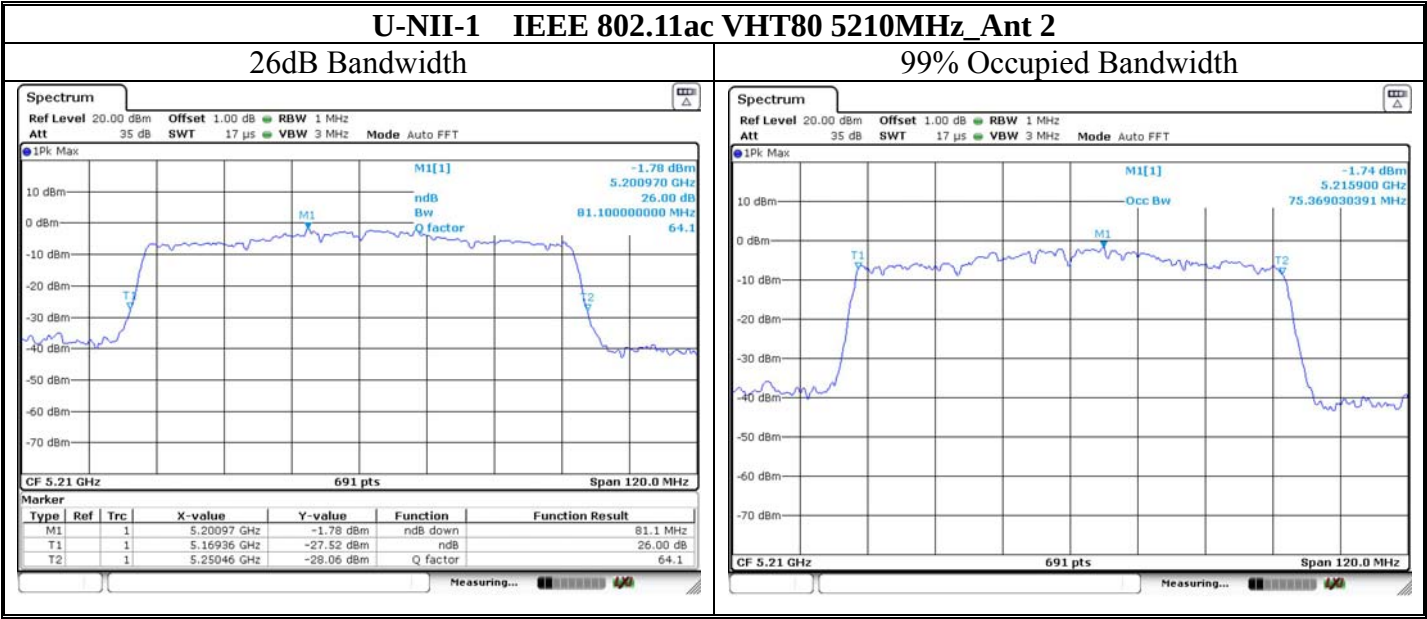
U-NII-1 IEEE 802.11ac VHT80 5210MHz_Ant 1

26dB Bandwidth



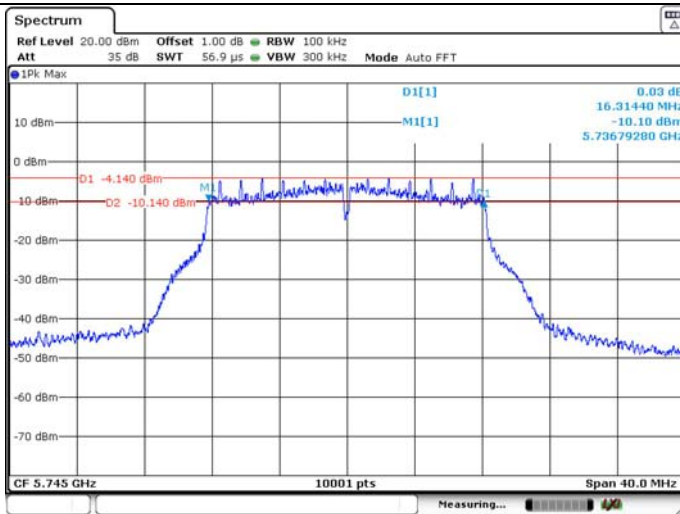
99% Occupied Bandwidth





U-NII-3 IEEE 802.11a 5745MHz_Ant 1

6dB Bandwidth

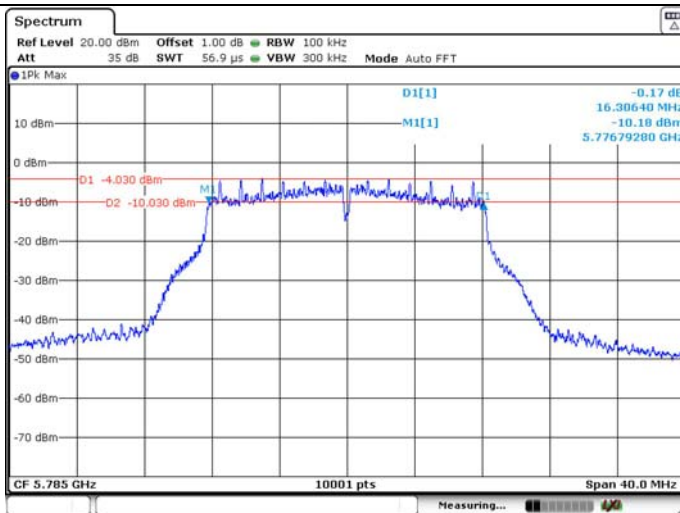


99% Occupied Bandwidth



U-NII-3 IEEE 802.11a 5785MHz_Ant 1

6dB Bandwidth

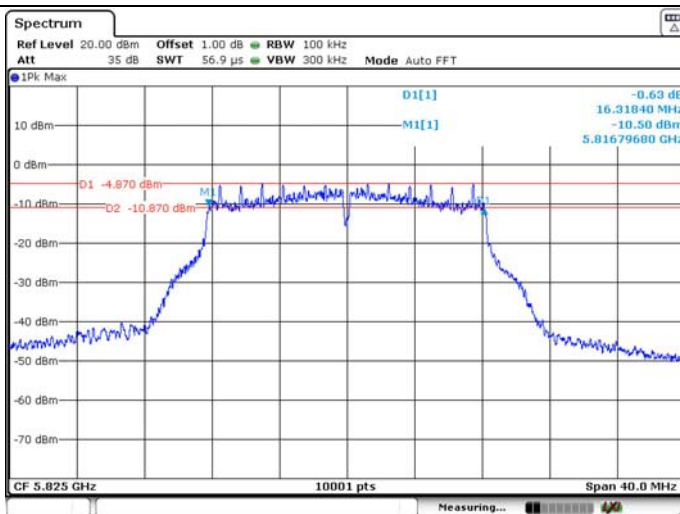


99% Occupied Bandwidth



U-NII-3 IEEE 802.11a 5825MHz_Ant 1

6dB Bandwidth

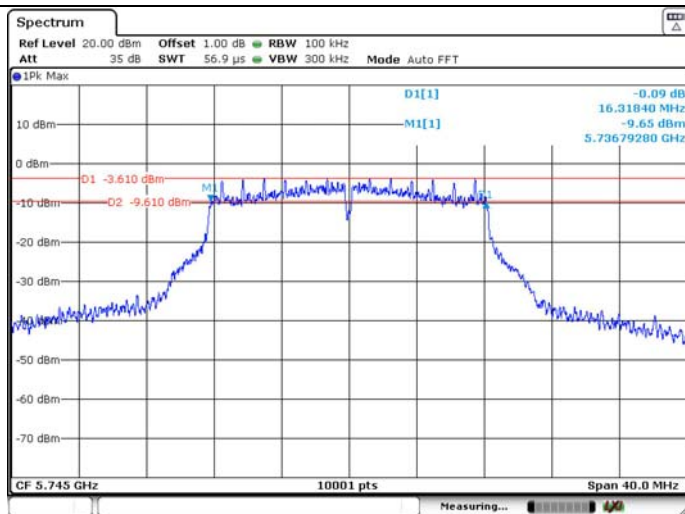


99% Occupied Bandwidth



U-NII-3 IEEE 802.11a 5745MHz_Ant 2

6dB Bandwidth

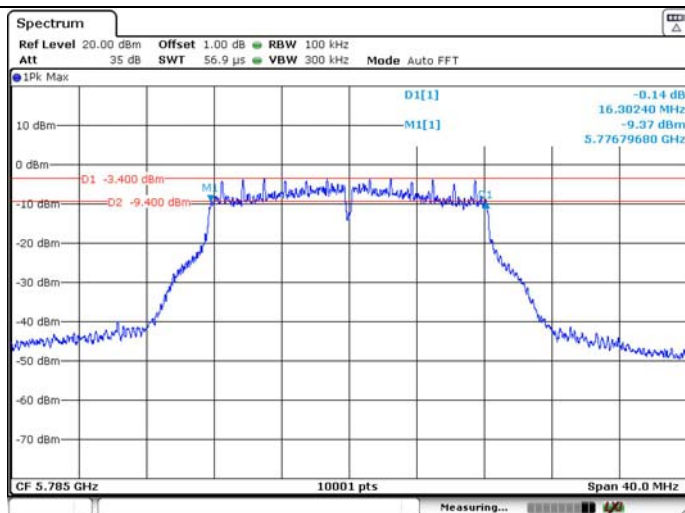


99% Occupied Bandwidth



U-NII-3 IEEE 802.11a 5785MHz_Ant 2

6dB Bandwidth

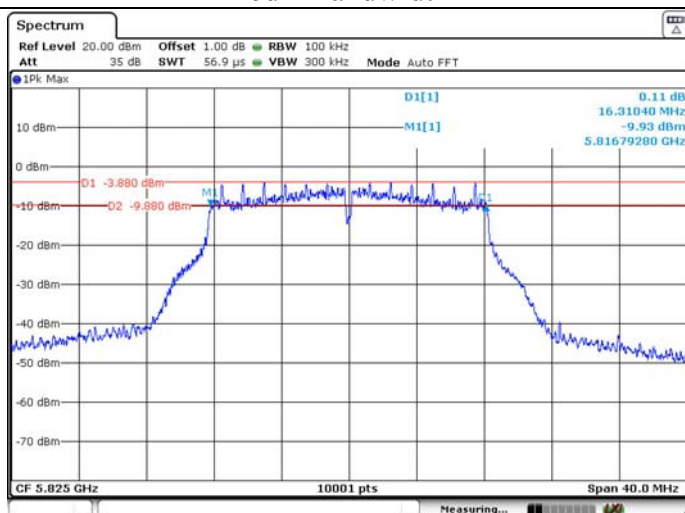


99% Occupied Bandwidth

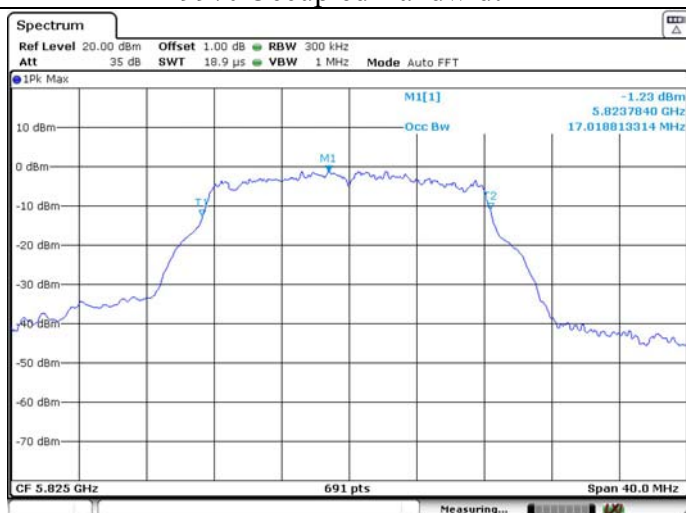


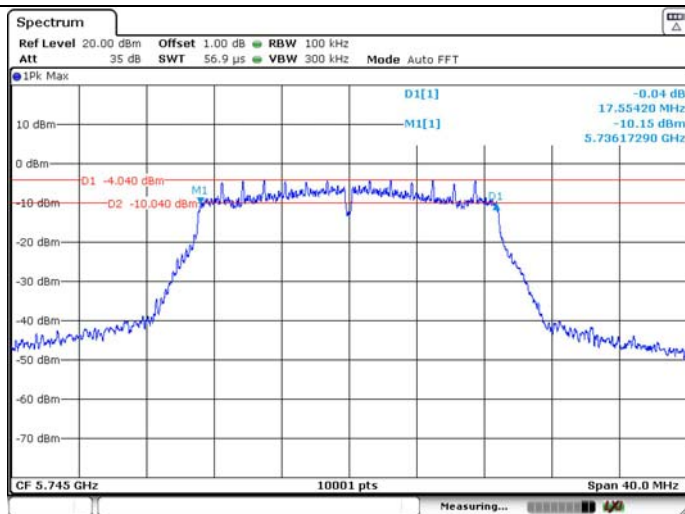
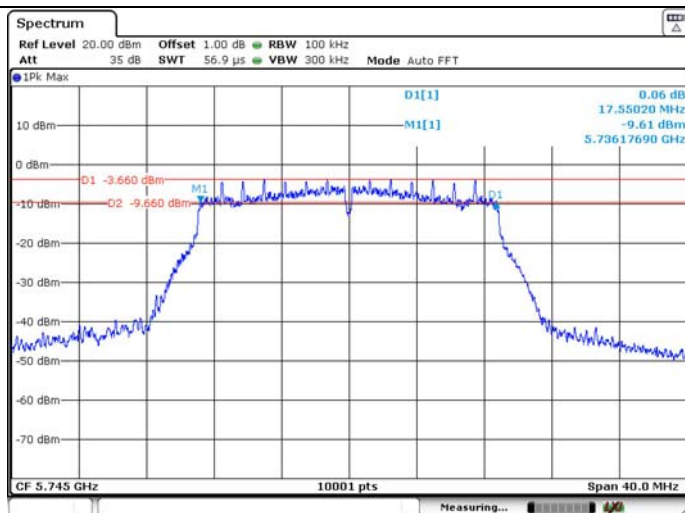
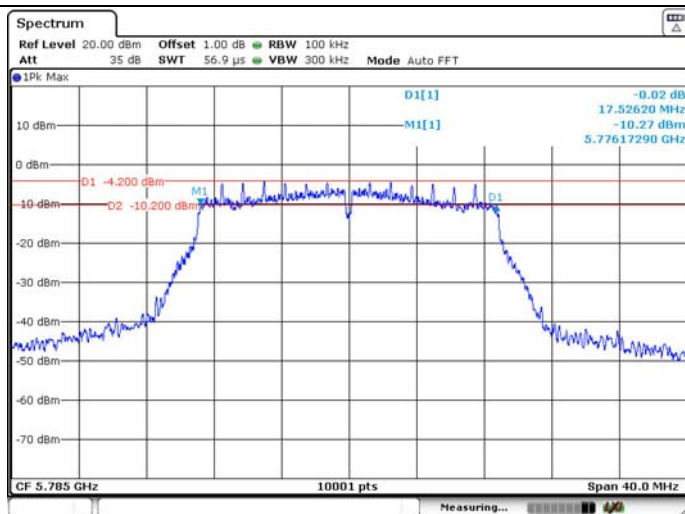
U-NII-3 IEEE 802.11a 5825MHz_Ant 2

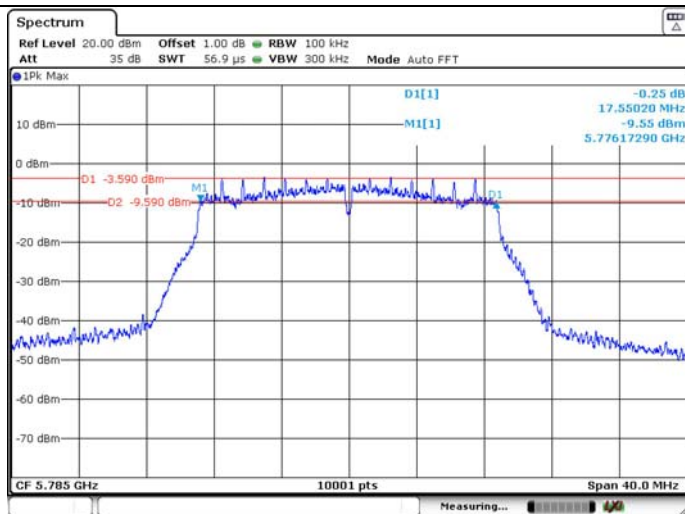
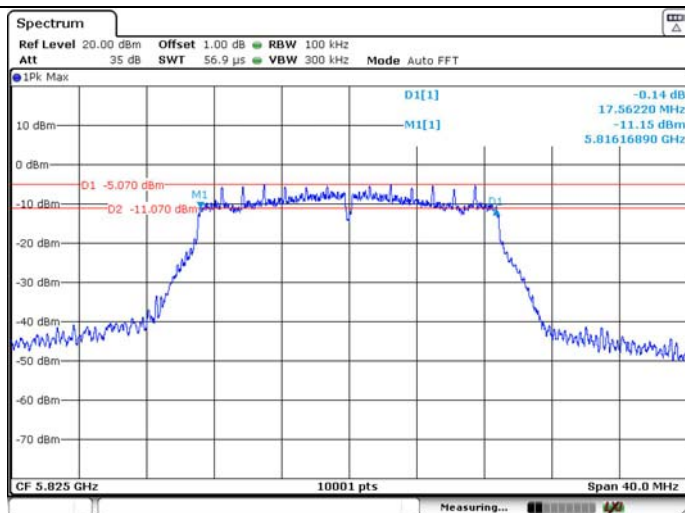
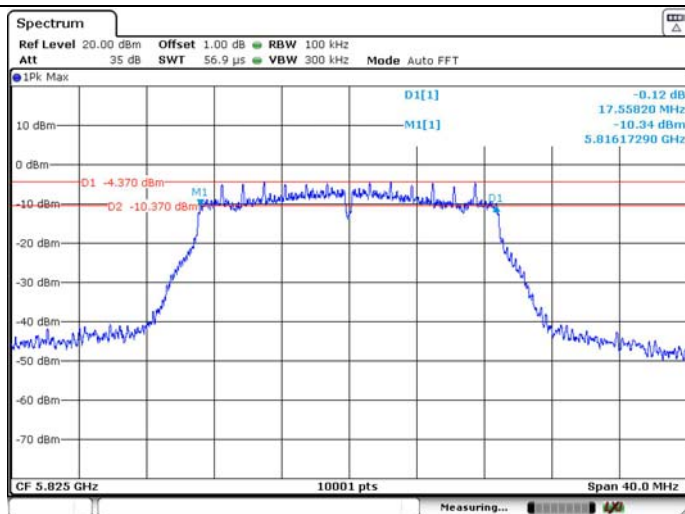
6dB Bandwidth

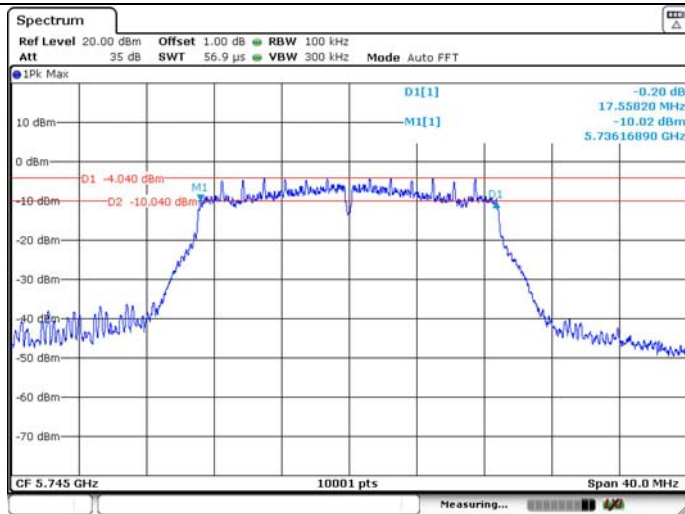
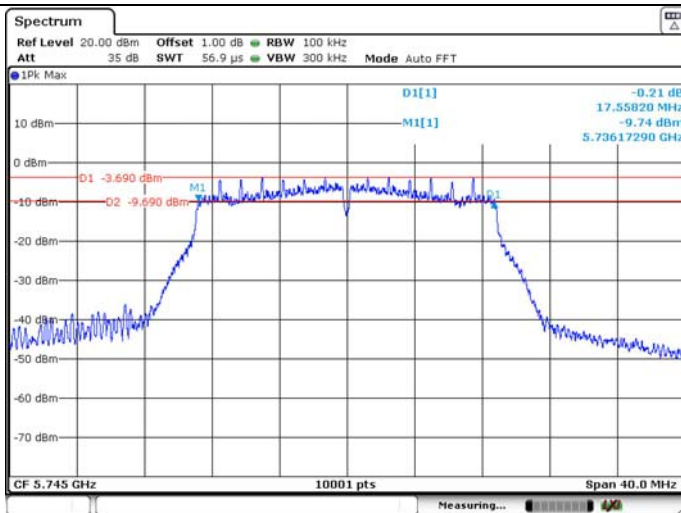
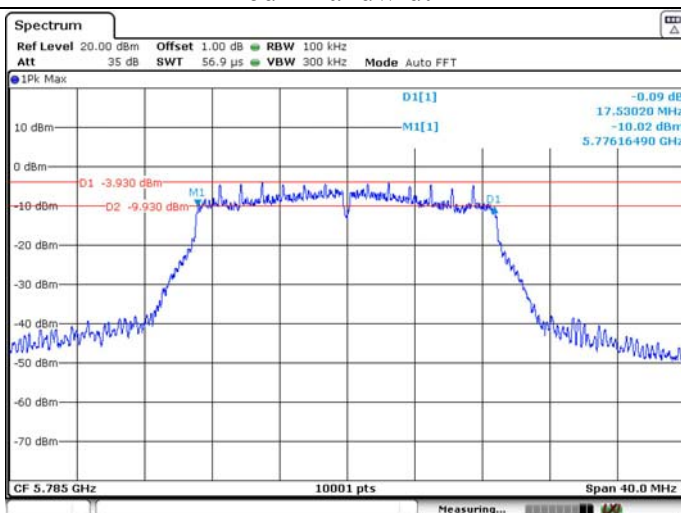


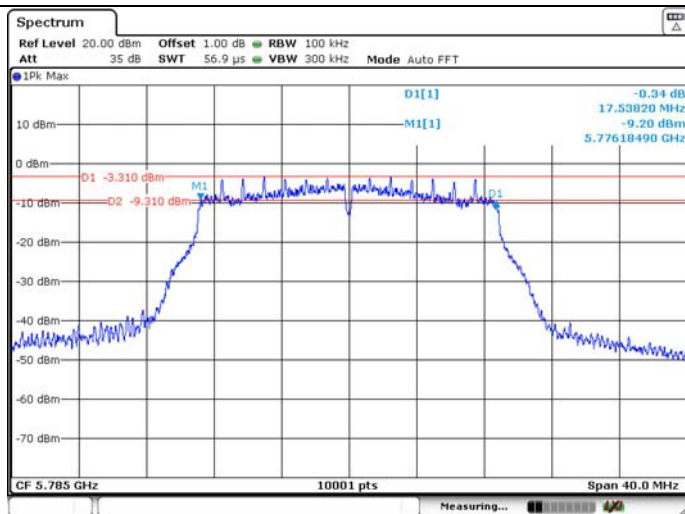
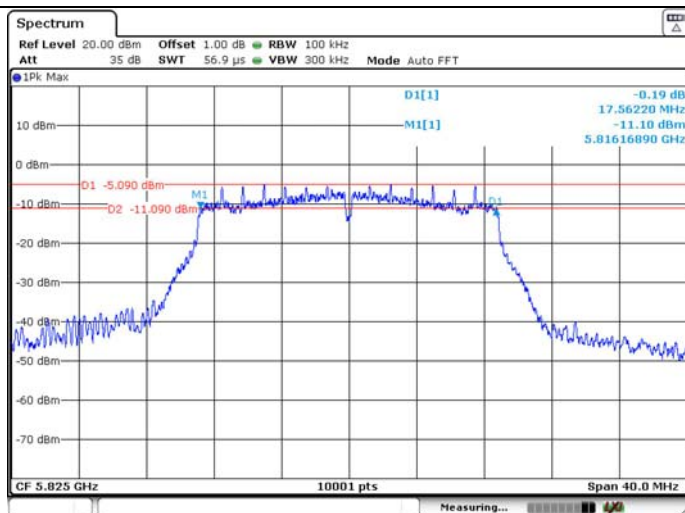
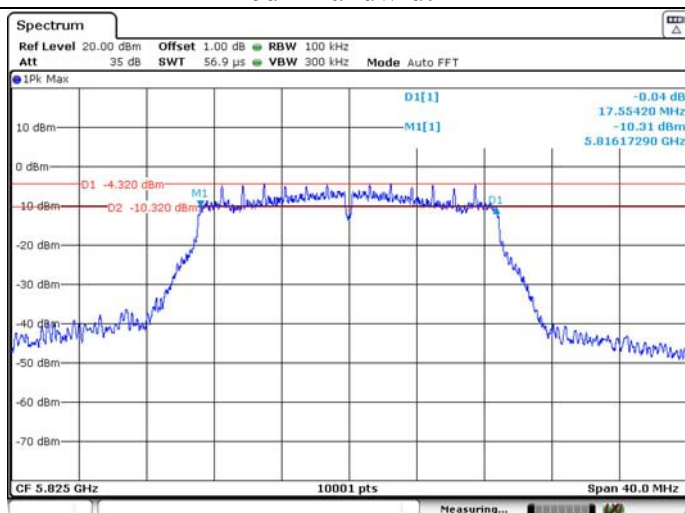
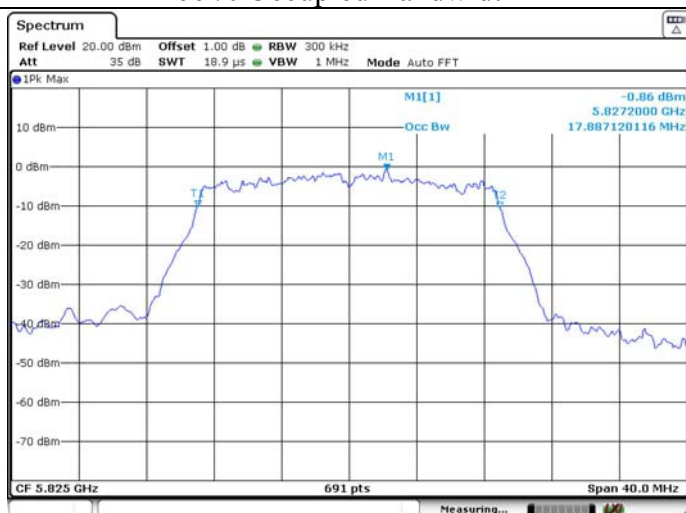
99% Occupied Bandwidth

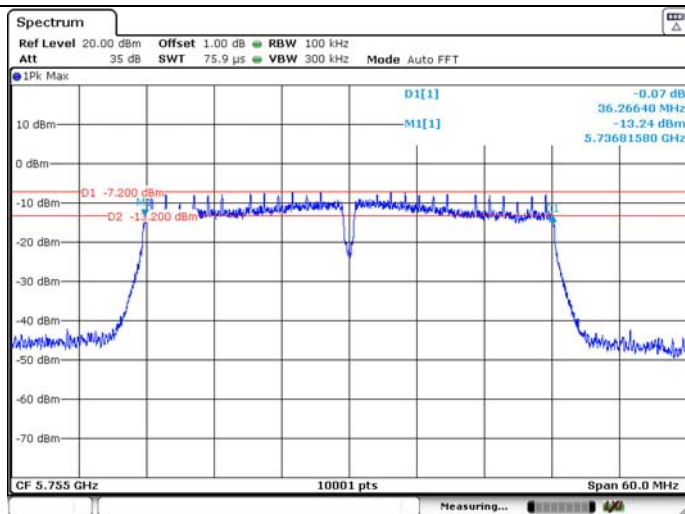
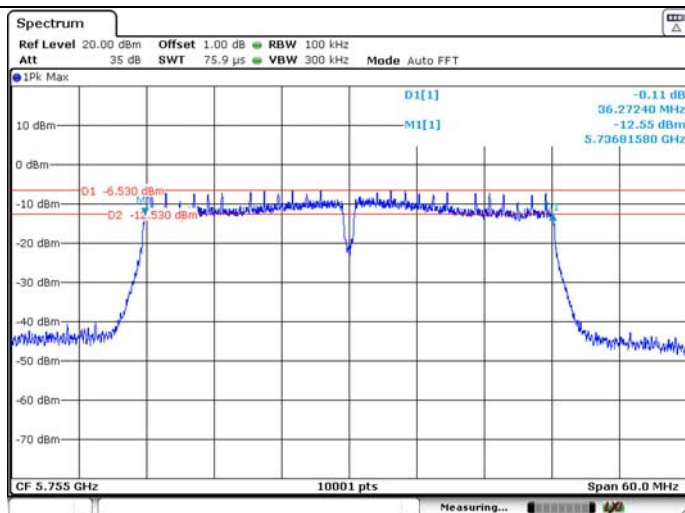
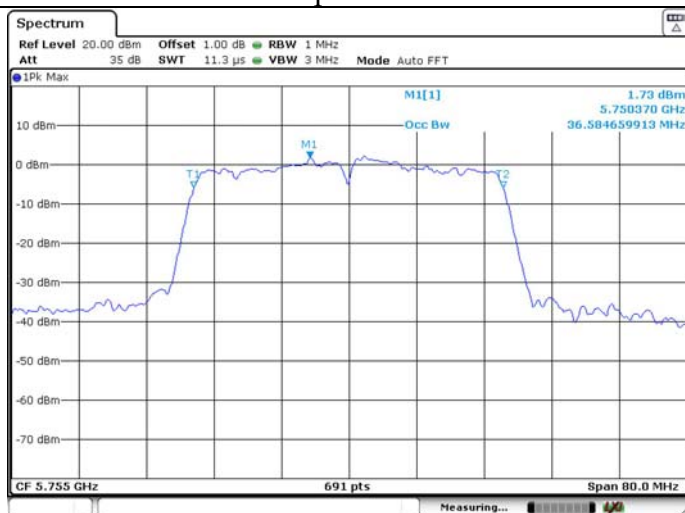
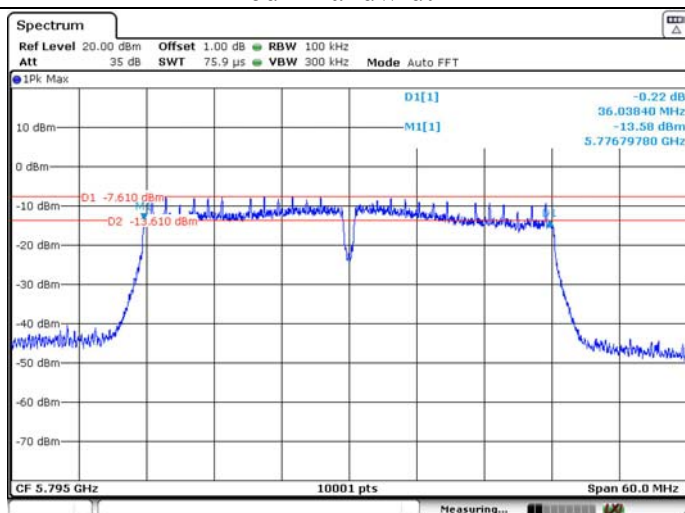


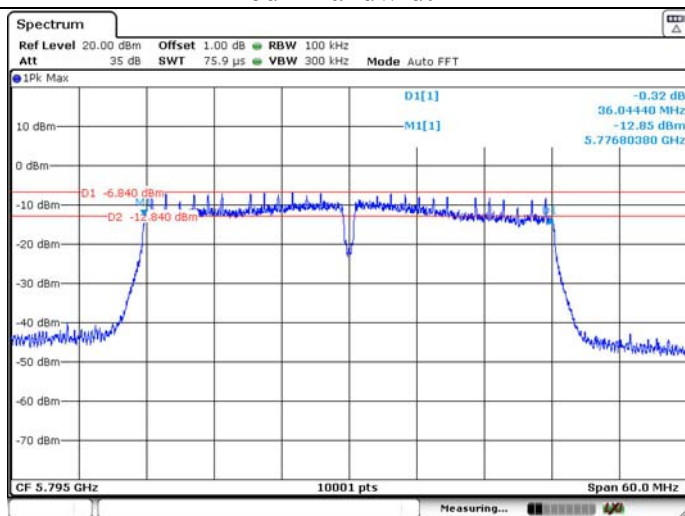
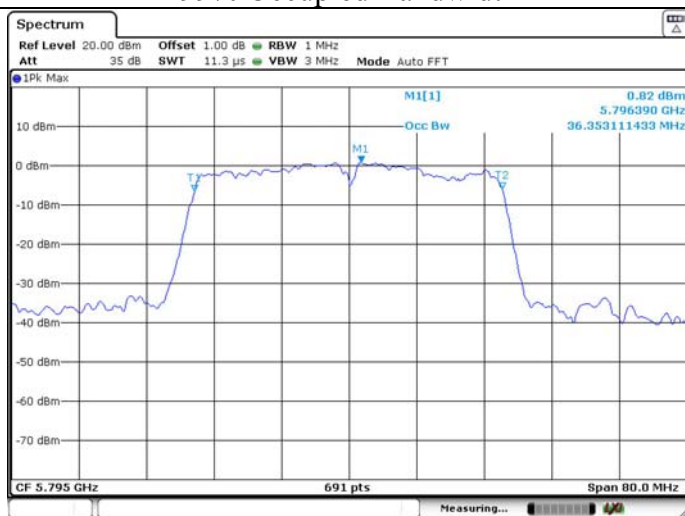
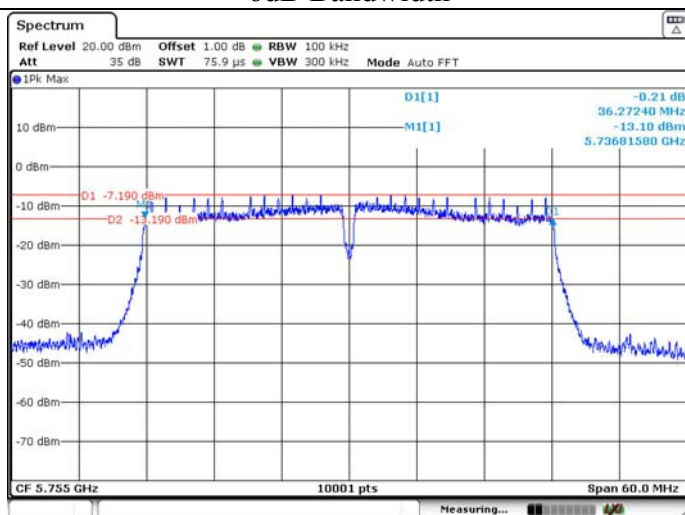
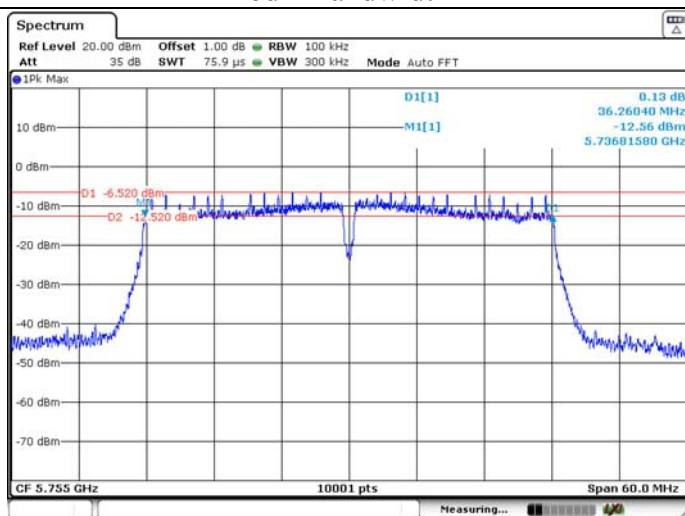
U-NII-3 IEEE 802.11n HT20 5745MHz_Ant 1**6dB Bandwidth****99% Occupied Bandwidth****U-NII-3 IEEE 802.11n HT20 5745MHz_Ant 2****6dB Bandwidth****99% Occupied Bandwidth****U-NII-3 IEEE 802.11n HT20 5785MHz_Ant 1****6dB Bandwidth****99% Occupied Bandwidth**

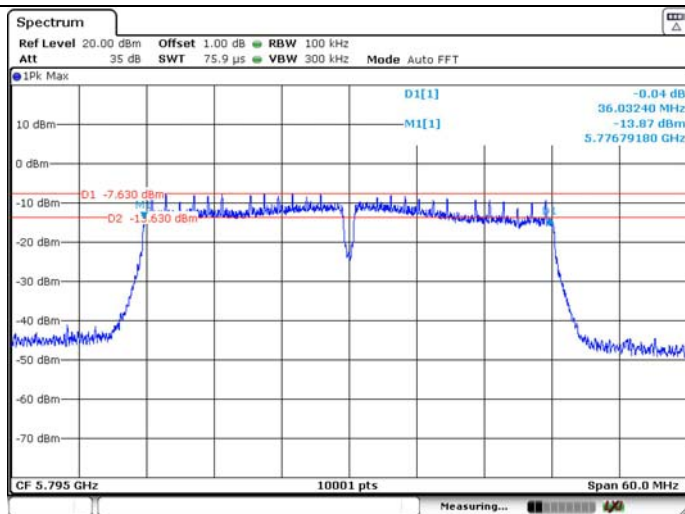
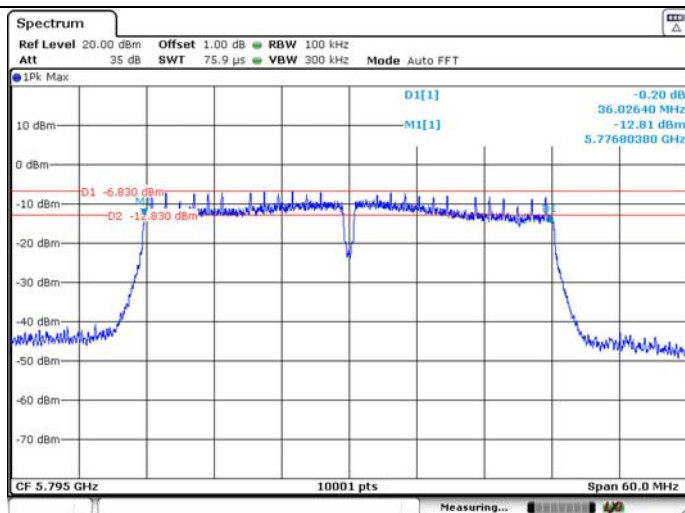
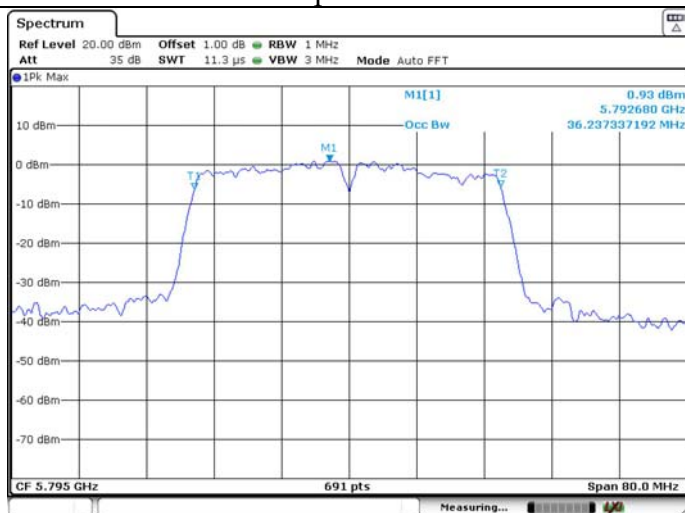
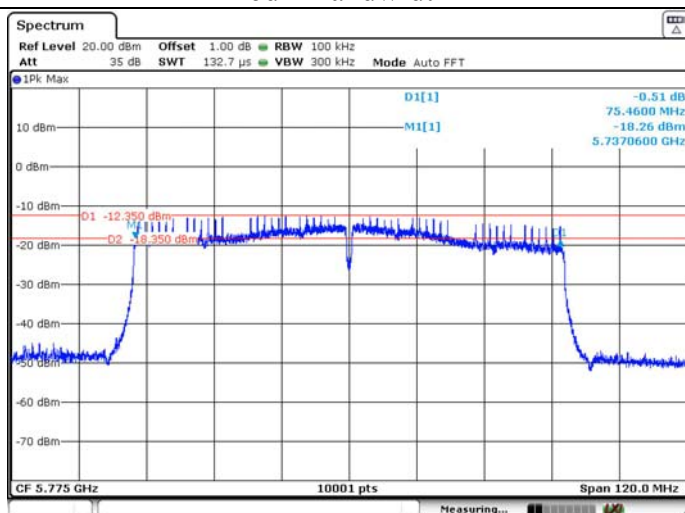
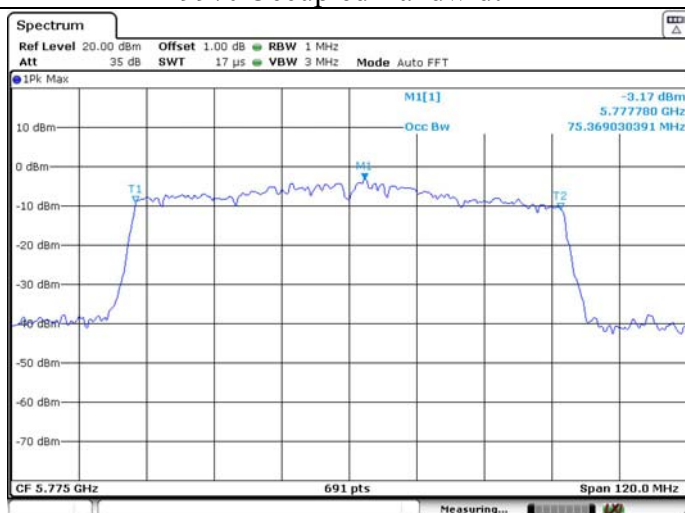
U-NII-3 IEEE 802.11n HT20 5785MHz_Ant 2**6dB Bandwidth****99% Occupied Bandwidth****U-NII-3 IEEE 802.11n HT20 5825MHz_Ant 1****6dB Bandwidth****99% Occupied Bandwidth****U-NII-3 IEEE 802.11n HT20 5825MHz_Ant 2****6dB Bandwidth****99% Occupied Bandwidth**

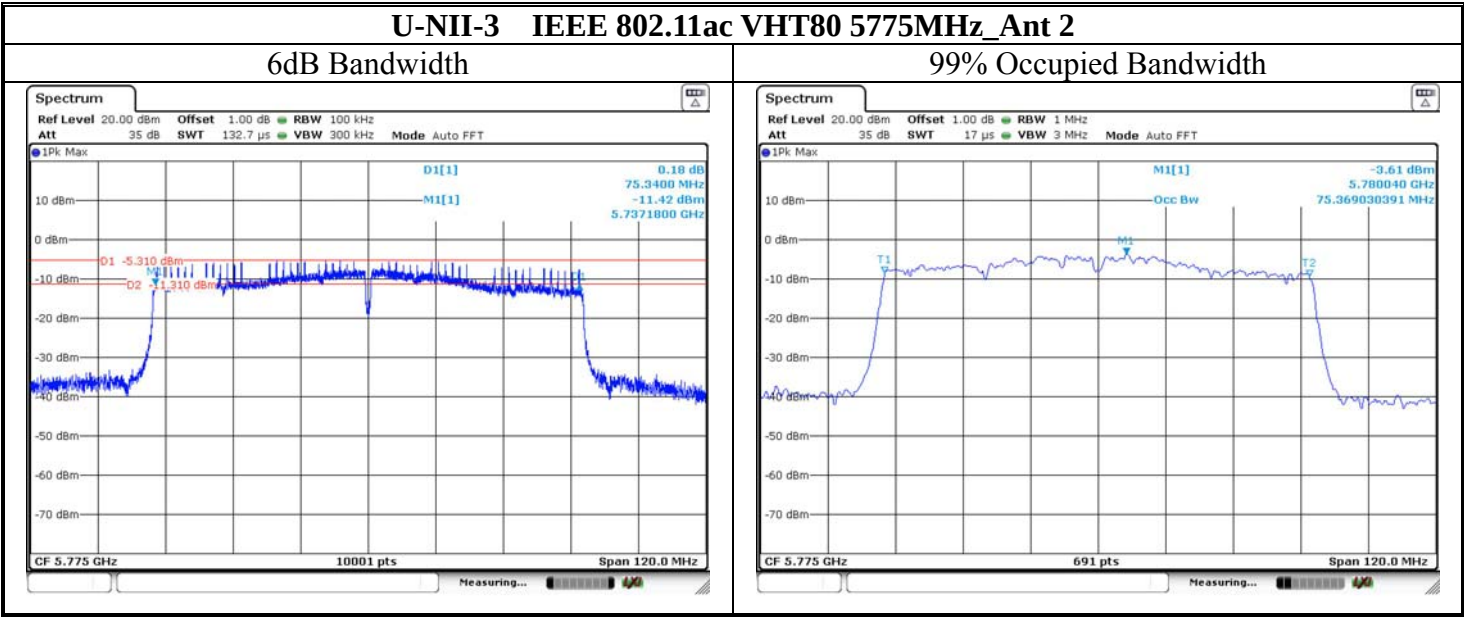
U-NII-3 IEEE 802.11ac VHT20 5745MHz_Ant 1**6dB Bandwidth****99% Occupied Bandwidth****U-NII-3 IEEE 802.11ac VHT20 5745MHz_Ant 2****6dB Bandwidth****99% Occupied Bandwidth****U-NII-3 IEEE 802.11ac VHT20 5785MHz_Ant 1****6dB Bandwidth****99% Occupied Bandwidth**

U-NII-3 IEEE 802.11ac VHT20 5785MHz_Ant 2**6dB Bandwidth****99% Occupied Bandwidth****U-NII-3 IEEE 802.11ac VHT20 5825MHz_Ant 1****6dB Bandwidth****99% Occupied Bandwidth****U-NII-3 IEEE 802.11ac VHT20 5825MHz_Ant 2****6dB Bandwidth****99% Occupied Bandwidth**

U-NII-3 IEEE 802.11n HT40 5755MHz_Ant 1**6dB Bandwidth****99% Occupied Bandwidth****U-NII-3 IEEE 802.11n HT40 5755MHz_Ant 2****6dB Bandwidth****99% Occupied Bandwidth****U-NII-3 IEEE 802.11n HT40 5795MHz_Ant 1****6dB Bandwidth****99% Occupied Bandwidth**

U-NII-3 IEEE 802.11n HT40 5795MHz_Ant 2**6dB Bandwidth****99% Occupied Bandwidth****U-NII-3 IEEE 802.11ac VHT40 5755MHz_Ant 1****6dB Bandwidth****99% Occupied Bandwidth****U-NII-3 IEEE 802.11ac VHT40 5755MHz_Ant 2****6dB Bandwidth****99% Occupied Bandwidth**

U-NII-3 IEEE 802.11ac VHT40 5795MHz_Ant 1**6dB Bandwidth****99% Occupied Bandwidth****U-NII-3 IEEE 802.11ac VHT40 5795MHz_Ant 2****6dB Bandwidth****99% Occupied Bandwidth****U-NII-3 IEEE 802.11ac VHT80 5775MHz_Ant 1****6dB Bandwidth****99% Occupied Bandwidth**



4. MAXIMUM CONDUCTED OUTPUT POWER

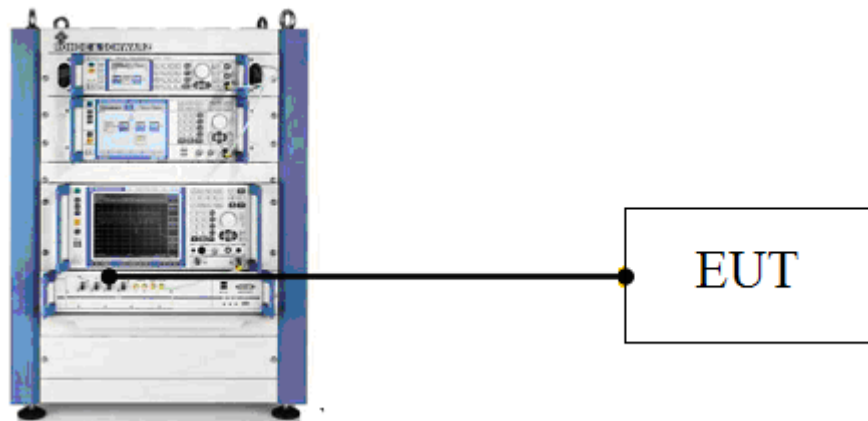
4.1. Limit

Band	EUT Type	Limit
U-NII-1	Outdoor Access Point	1W(30dBm) (Max. e.i.r.p $\leq 125\text{mW}$ at any elevation angle above 30 degrees as measured from the horizon)
	Indoor Access Point	1W(30dBm)
	Fixed point-to-point Access Point	1W(30dBm)
	Mobile and Portable Client Device	250mW(23.98dBm)
U-NII-2A	All Device	250mW(23.98dBm) or $11\text{dBm} + 10 \log B$, Which is lesser. (B is 26dB Bandwidth in MHz)
U-NII-2C	All Device	250mW(23.98dBm) or $11\text{dBm} + 10 \log B$, Which is lesser. (B is 26dB Bandwidth in MHz)
U-NII-3	All Device	1W(30dBm)

Note:

For the Band U-NII-2A and U-NII-2C, the maximum conducted output power limit calculate result refer to section 3.5.

4.2. Test Setup



4.3. Test Procedure

- Connect EUT antenna terminal to the OSP-B157WB with RF cable.
- Set the EUT transmit continuously with maximum output power.
- Through the test software in TS8897 to control a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Because the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.
- Repeat above procedures until all modes and channels were measured.
- Record the results in the test report.

4.4. Test Result

Temperature	26.2℃	Relative Humidity		56%	Test Voltage	AC 120V/60Hz		
BAND	Test Mode	Fre (MHz)	Conducted AVG Output Power (dBm)		Total Conducted Output Power (W)	Total Conducted Output Power (dBm)	Limit (dBm)	Result
			Ant 1	Ant 2				
U-NII-1	IEEE 802.11a	5180	14.47	14.54	0.0284	--	23.98	PASS
		5200	14.76	15.48	0.0353	--	23.98	PASS
		5240	15.54	12.54	0.0358	--	23.98	PASS
	IEEE 802.11n HT20	5180	13.98	14.37	0.05234	17.19	23.98	PASS
		5200	11.84	12.38	0.03257	15.13	23.98	PASS
		5240	12.49	12.73	0.03650	15.62	23.98	PASS
	IEEE 802.11ac VHT20	5180	13.98	14.46	0.05295	17.24	23.98	PASS
		5200	14.47	14.98	0.05948	17.74	23.98	PASS
		5240	15.02	15.42	0.06661	18.24	23.98	PASS
	IEEE 802.11n HT40	5190	11.14	11.95	0.02867	14.57	23.98	PASS
		5230	12.12	12.51	0.03411	15.33	23.98	PASS
	IEEE 802.11ac VHT40	5190	11.26	11.72	0.02823	14.51	23.98	PASS
		5230	12.14	12.49	0.03408	15.32	23.98	PASS
	IEEE 802.11ac VHT80	5210	12.93	14.00	0.04477	16.51	23.98	PASS

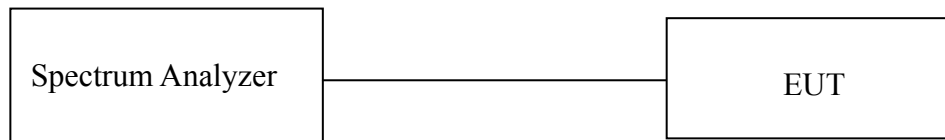
BAND	Test Mode	Fre (MHz)	Conducted AVG Output Power (dBm)		Total Conducted Output Power (W)	Total Conducted Output Power (dBm)	Limit (dBm)	Result
			Ant 1	Ant 2				
U-NII-3	IEEE 802.11a	5745	14.23	14.61	0.02892	--	30.00	PASS
		5785	13.23	14.12	0.02579	--	30.00	PASS
		5825	12.47	13.23	0.02103	--	30.00	PASS
	IEEE 802.11n HT20	5745	13.81	14.49	0.05215	17.17	30.00	PASS
		5785	12.88	13.82	0.04350	16.38	30.00	PASS
		5825	12.17	12.98	0.03637	15.61	30.00	PASS
	IEEE 802.11ac VHT20	5745	13.98	14.38	0.05241	17.19	30.00	PASS
		5785	13.00	13.79	0.04385	16.42	30.00	PASS
		5825	12.12	13.00	0.03622	15.59	30.00	PASS
	IEEE 802.11n HT40	5755	11.23	11.76	0.02827	14.51	30.00	PASS
		5795	10.02	10.96	0.02252	13.53	30.00	PASS
	IEEE 802.11ac VHT40	5755	11.23	11.78	0.02835	14.53	30.00	PASS
		5795	9.99	10.94	0.02239	13.50	30.00	PASS
	IEEE 802.11ac VHT80	5775	11.12	11.26	0.02629	14.20	30.00	PASS

5. PEAK POWER SPECTRAL DENSITY

5.1. Limit

Band	EUT Type	Limit
U-NII-1	Outdoor Access Point	17dBm/MHz
	Indoor Access Point	17dBm/MHz
	Fixed point-to-point Access Point	17dBm/MHz
	Mobile and Portable Client Device	11dBm/MHz
U-NII-2A	All Device	11dBm/MHz
U-NII-2C	All Device	11dBm/MHz
U-NII-3	All Device	30dBm/500KHz

5.2. Test Setup



5.3. Spectrum Analyzer Setting

Spectrum Parameters	Setting
RBW	1MHz(For U-NII-1&U-NII-2A&U-NII-2C) 500KHz(For U-NII-3)
VBW	3MHz(For U-NII-1&U-NII-2A&U-NII-2C) 2MHz(For U-NII-3)
Span	encompass the entire 26 dB EBW or 99% OBW of the signal
Sweep Time	Auto
Number of Sweep Point	$\geq 2 \times \text{SPAN/RBW}$
Detector	RMS(power averaging)
Trace Average	≥ 100 traces

5.4. Test Procedure

- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with section 5.3.
- Set the EUT transmit continuously with maximum output power.
- Allow trace to stabilize, use the marker-to-peak function to set the marker to the average of the emission.
- If the duty cycle of test signal $< 98\%$, the result = max measured value + $10 \times \log(1/\text{duty cycle})$;
If the duty cycle of test signal $\geq 98\%$, the result = max measured value.
- Repeat above procedures until all modes and channels were measured.
- Record the results in the test report.

5.5. Test Result

Temperature		26.2℃	Relative Humidity		56%	Test Voltage	AC 120V/60Hz	
BAND	Test Mode	Fre (MHz)	Power Density (dBm/MHz)		Duty Factor (dB)	Total Power Density (dBm/MHz)	Limit (dBm/MHz)	Result
			Ant 1	Ant 2				
U-NII-1	IEEE 802.11a	5180	6.18	6.52	0.26	--	11.00	PASS
		5200	6.27	6.54	0.26	--	11.00	PASS
		5240	6.49	6.89	0.26	--	11.00	PASS
	IEEE 802.11n HT20	5180	5.59	6.10	0.25	9.11	11.00	PASS
		5200	3.91	4.21	0.25	7.32	11.00	PASS
		5240	3.69	4.31	0.25	7.27	11.00	PASS
	IEEE 802.11ac VHT20	5180	5.64	6.01	0.27	9.11	11.00	PASS
		5200	5.79	6.07	0.27	9.22	11.00	PASS
		5240	5.95	6.17	0.27	9.34	11.00	PASS
	IEEE 802.11n HT40	5190	-0.13	0.54	0.54	3.77	11.00	PASS
		5230	-0.08	0.57	0.54	3.80	11.00	PASS
	IEEE 802.11ac VHT40	5190	-0.31	0.15	0.52	3.46	11.00	PASS
		5230	-0.10	0.41	0.52	3.70	11.00	PASS
	IEEE 802.11ac VHT80	5210	-1.56	-1.16	1.04	2.69	11.00	PASS

BAND	Test Mode	Fre (MHz)	Power Density (dBm/500KHz)		Duty Factor (dB)	Total Power Density (dBm/500KHz)	Limit (dBm/500KHz)	Result
			Ant 1	Ant 2				
U-NII-3	IEEE 802.11a	5745	2.55	3.17	0.26	--	30.00	PASS
		5785	1.70	2.49	0.26	--	30.00	PASS
		5825	1.40	2.31	0.26	--	30.00	PASS
	IEEE 802.11n HT20	5745	2.45	2.91	0.25	5.94	30.00	PASS
		5785	1.86	2.55	0.25	5.48	30.00	PASS
		5825	1.33	2.06	0.25	4.97	30.00	PASS
	IEEE 802.11ac VHT20	5745	2.49	2.98	0.27	6.03	30.00	PASS
		5785	1.62	2.43	0.27	5.33	30.00	PASS
		5825	1.43	2.16	0.27	5.09	30.00	PASS
	IEEE 802.11n HT40	5755	-3.78	-3.09	0.54	0.13	30.00	PASS
		5795	-4.43	-3.45	0.54	-0.37	30.00	PASS
	IEEE 802.11ac VHT40	5755	-3.81	-3.20	0.52	0.04	30.00	PASS
		5795	-4.17	-3.49	0.52	-0.28	30.00	PASS
	IEEE 802.11ac VHT80	5775	-6.13	-5.44	1.04	-1.73	30.00	PASS