

FCC PART 15E TEST REPORT FOR CERTIFICATION
On Behalf of

Hui Zhou Gaoshengda Technology Co.,LTD

WIFI+BT Module

Model Number: WKXT01M2501

FCC ID: 2AC23-WKXT01

Applicant :	Hui Zhou Gaoshengda Technology Co.,LTD
Address:	NO.75 Zhongkai Development Area, Huizhou, Guangdong, China
Prepared By:	EST Technology Co., Ltd.
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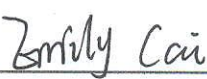
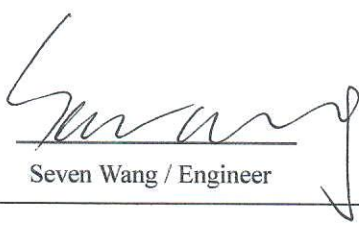
Report Number:	ESTE-R2201222
Date of Test:	Dec. 17, 2021~Jan. 18, 2022
Date of Report:	Jan. 20, 2022

TABLE OF CONTENTS

Description	Page
TEST REPORT VERIFICATION.....	3
1. GENERAL INFORMATION.....	5
1.1. Description of Device (EUT).....	5
1.2. The antenna information for EUT.....	7
1.3. Information of RF Cable.....	7
2. SUMMARY OF TEST.....	8
2.1. Summary of test result.....	8
2.2. Test Facilities.....	9
2.3. Measurement uncertainty for EST Technology Co., Ltd.....	10
2.4. Assistant equipment used for test.....	10
2.5. Block Diagram.....	10
2.6. Test Mode.....	11
2.7. Channel List.....	14
2.8. Power Setting of Test Software.....	15
2.9. Duty Cycle of Test Signal.....	16
2.10. Test Equipment List.....	22
3. 6DB BANDWIDTH & 26DB BANDWIDTH & 99% OCCUPIED BANDWIDTH.....	24
3.1. Limit.....	24
3.2. Test Setup.....	24
3.3. Spectrum Analyzer Setting.....	24
3.4. Test Procedure.....	25
3.5. Test Result.....	26
3.6. Test Result.....	30
4. MAXIMUM CONDUCTED OUTPUT POWER.....	60
4.1. Limit.....	60
4.2. Test Setup.....	60
4.3. Test Procedure.....	60
4.4. Test Result.....	61
5. PEAK POWER SPECTRAL DENSITY.....	65
5.1. Limit.....	65
5.2. Test Setup.....	65
5.3. Spectrum Analyzer Setting.....	65
5.4. Test Procedure.....	65
5.5. Test Result.....	66
6. UNWANTED EMISSIONS AND BAND EDGE.....	103
6.1. Limit.....	103
6.2. Test Setup.....	104
6.3. Spectrum Analyzer Setting.....	105
6.4. Test Procedure.....	106
6.5. Test Result.....	107
7. FREQUENCY STABILITY.....	160
7.1. Limit.....	160
7.2. Test Setup.....	160
7.3. Spectrum Analyzer Setting.....	160

7.4.	Test Procedure	161
7.5.	Test Result	162
8.	AC POWER LINE CONDUCTED EMISSIONS	166
8.1.	Limit	166
8.2.	Test Setup	166
8.3.	Spectrum Analyzer Setting	166
8.4.	Test Procedure	166
8.5.	Test Result	167
9.	ANTENNA REQUIREMENTS	171
9.1.	Limit	171
9.2.	Test Result	171
10.	TEST SETUP PHOTO	172
11.	EUT PHOTO	174

EST Technology Co., Ltd.

Applicant:	Hui Zhou Gaoshengda Technology Co.,LTD		
Address:	NO.75 Zhongkai Development Area, Huizhou, Guangdong, China		
Manufacturer:	Hui Zhou Gaoshengda Technology Co.,LTD		
Address:	NO.75 Zhongkai Development Area, Huizhou, Guangdong, China		
Factory:	Hui Zhou Gaoshengda Technology Co., Ltd		
Address:	No. 2, Jin-da Road, Huinan High-tech Industrial Park, Hui-ao Avenue, Huizhou City, Guangdong, China		
E.U.T:	WIFI+BT Module		
Model Number:	WKXT01M2501		
Power Supply:	DC 3.3V From PC		
Trade Name:	GSD	Serial No.:	-----
Date of Receipt:	Dec. 17, 2021	Date of Test:	Dec. 17, 2021~Jan. 18, 2022
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: Jan. 20, 2022		
Prepared by:	Reviewed by:	Approved by:	
 Emily Cai/ Assistant	 Seven Wang / Engineer	  Iceman Hu / Manager	
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	:	2AC23-WKXT01
Product Name	:	WIFI+BT Module
Model Number	:	WKXT01M2501
Software Version	:	V01
Hardware Version	:	V01
Operation frequency	:	U-NII-1: 5150 MHz~5250 MHz U-NII-2A: 5250 MHz~5350 MHz U-NII-2C: 5470 MHz~5725 MHz U-NII-3: 5725 MHz~5850 MHz
Number of channel	:	U-NII-1: IEEE 802.11a / n HT20 / ac VHT20 / ax HE20: 4 Channels; IEEE 802.11n HT40 / ac VHT40 /ax HE40: 2 Channels; IEEE 802.11ac VHT80/ ax HE80: 1 Channel. U-NII-2A: IEEE 802.11a / n HT20 / ac VHT20 / ax HE20: 4 Channels; IEEE 802.11n HT40 / ac VHT40 /ax HE40: 2 Channels; IEEE 802.11ac VHT80/ ax HE80: 1 Channel. U-NII-2C: IEEE 802.11a / n HT20 / ac VHT20 / ax HE20: 11 Channels; IEEE 802.11n HT40 / ac VHT40 /ax HE40: 5 Channels; IEEE 802.11ac VHT80/ ax HE80: 2 Channel. U-NII-3: IEEE 802.11a / n HT20 / ac VHT20 / ax HE20: 5 Channels; IEEE 802.11n HT40 / ac VHT40 /ax HE40: 2 Channels; IEEE 802.11ac VHT80/ ax HE80: 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 to 300Mbps; IEEE 802.11ac: up to 866Mbps; IEEE 802.11ax: up to 1200Mbps;
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; IEEE 802.11ax HE20: 20MHz; IEEE 802.11ax HE40: 40MHz; IEEE 802.11ax HE80: 80MHz

Transmit Power	:	U-NII-1	IEEE 802.11a: 14.284dBm IEEE 802.11n HT20: 10.752dBm IEEE 802.11n HT40: 12.447dBm IEEE 802.11ac VHT20: 10.742dBm IEEE 802.11ac VHT40: 12.906dBm IEEE 802.11ac VHT80: 13.563dBm IEEE 802.11ax HE20: 9.634dBm IEEE 802.11ax HE40: 11.970dBm IEEE 802.11ax HE80: 12.598dBm
		U-NII-2A	IEEE 802.11a: 15.663dBm IEEE 802.11n HT20: 15.003dBm IEEE 802.11n HT40: 13.920dBm IEEE 802.11ac VHT20: 12.537dBm IEEE 802.11ac VHT40: 13.871dBm IEEE 802.11ac VHT80: 12.236dBm IEEE 802.11ax HE20: 12.955dBm IEEE 802.11ax HE40: 12.278dBm IEEE 802.11ax HE80: 11.356dBm
		U-NII-2C	IEEE 802.11a: 16.510dBm IEEE 802.11n HT20: 16.363dBm IEEE 802.11n HT40: 15.201dBm IEEE 802.11ac VHT20: 13.912dBm IEEE 802.11ac VHT40: 15.128dBm IEEE 802.11ac VHT80: 13.154dBm IEEE 802.11ax HE20: 14.282dBm IEEE 802.11ax HE40: 13.522dBm IEEE 802.11ax HE80: 12.350dBm
		U-NII-3	IEEE 802.11a: 15.946dBm IEEE 802.11n HT20: 16.127dBm IEEE 802.11n HT40: 15.638dBm IEEE 802.11ac VHT20: 14.127dBm IEEE 802.11ac VHT40: 15.577dBm IEEE 802.11ac VHT80: 13.861dBm IEEE 802.11ax HE20: 14.695dBm IEEE 802.11ax HE40: 14.010dBm IEEE 802.11ax HE80: 13.046dBm
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	-	-	PCB	-	4.8
2	-	-	PCB	-	4.8

Remark:

- (1) The EUT can work as CDD mode in IEEE 802.11n and IEEE 802.11ac, and can operate with one spatial stream.
- (2) According to ANSI C63.10:2013 14.4.3.2.5 a):
 $\text{Directional gain} = 4.8\text{dBi} + 10 \times \log(2/1)\text{dB} = 7.81\text{dBi} > 6\text{dBi}$
 So, the output power limit and power spectral density should be reduced.
 For output Power:
 U-NII-1 Limit is $23.98\text{dBm} - (7.81\text{dBi} - 6\text{dBi}) = 22.17\text{dBm}$
 U-NII-2A&U-NII-2C Limit is $23.98\text{dBm} - (7.81\text{dBi} - 6\text{dBi}) = 22.17\text{dBm}$
 U-NII-3 Limit is $30\text{dBm} - (7.81\text{dBi} - 6\text{dBi}) = 28.19\text{dBm}$
 For power spectral density:
 U-NII-1 Limit is $11\text{dBm/MHz} - (7.81\text{dBi} - 6\text{dBi}) = 9.19\text{dBm/MHz}$
 U-NII-2A&U-NII-2C Limit is $11\text{dBm/MHz} - (7.81\text{dBi} - 6\text{dBi}) = 9.19\text{dBm/MHz}$
 U-NII-3 Limit is $30\text{dBm/500KHz} - (7.81\text{dBi} - 6\text{dBi}) = 28.19\text{dBm/500KHz}$
- (3) After pre-test all antenna configurations, the worst case configuration as list below.
- (4) This information is provided by the applicant.

TX Mode \ ANT No.	SISO Configuration	MIMO Configuration
IEEE 802.11a	ANT 1 and ANT2	/
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
IEEE 802.11ax HE20	/	ANT1+ANT2
IEEE 802.11ax HE40	/	ANT1+ANT2
IEEE 802.11ax HE80	/	ANT1+ANT2

1.3. Information of RF Cable

Cable Loss(dB)	Provided by
1.0	Hui Zhou Gaoshengda Technology Co.,LTD
Note: 1.The customer declared the loss value of the RF Cable, and the test results of this report only apply to the sample as received. 2. This information is provided by the applicant.	

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.
A	Notebook	-	Thinkpad X280	-	-

Item	Shielded Type	Ferrite Core	Length	Note
-	-	-	-	-

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.



DC 3.3V From PC
(EUT: WIFI+BT Module)

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 802.11ax HE20	149/157/165	OFDM	MCS0
	IEEE 802.11n HT40	151/159	OFDM	MCS0
	IEEE 802.11ax HE40	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
	IEEE 802.11ax HE80	155	OFDM	MCS0
26dB Bandwidth	IEEE 802.11a	36/40/48	OFDM	6Mbps
	IEEE 802.11n HT20	36/40/48	OFDM	MCS0
	IEEE 802.11ax HE20	36/40/48	OFDM	MCS0
	IEEE 802.11n HT40	38/46	OFDM	MCS0
	IEEE 802.11ax HE40	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
	IEEE 802.11ax HE80	42	OFDM	MCS0

Test Item	Test Mode	Channel	Modulation	Data rate
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 802.11ax HE20	36/40/48/149/157/165	OFDM	MCS0
	IEEE 802.11n HT40	38/46/151/159	OFDM	MCS0
	IEEE 802.11ax HE40	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	155	OFDM	MCS0
	IEEE 802.11ax HE80	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 802.11ax HE20	36/40/48/149/157/165	OFDM	MCS0
	IEEE 802.11n HT40	38/46/151/159	OFDM	MCS0
	IEEE 802.11ax HE40	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	155	OFDM	MCS0
	IEEE 802.11ax HE80	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 802.11ax HE20	36/40/48/149/157/165	OFDM	MCS0
	IEEE 802.11n HT40	38/46/151/159	OFDM	MCS0
	IEEE 802.11ax HE40	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	155	OFDM	MCS0
	IEEE 802.11ax HE80	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 802.11ax HE20	36/40/48/149/157/165	OFDM	MCS0
	IEEE 802.11n HT40	38/46/151/159	OFDM	MCS0
	IEEE 802.11ax HE40	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	155	OFDM	MCS0
	IEEE 802.11ax HE80	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 & IEEE 802.11ax HE20	36	5180
		40	5200
		44	5220
		48	5240
	IEEE 802.11n HT40 & ac VHT40 & IEEE 802.11ax HE40	38	5190
		46	5230
	IEEE 802.11ac VHT80 & IEEE 802.11ax HE80	42	5210
U-NII-2A	IEEE 802.11a & n HT20 & ac VHT20 & IEEE 802.11ax HE20	52	5260
		56	5280
		60	5300
		64	5320
	IEEE 802.11n HT40 & ac VHT40 & IEEE 802.11ax HE40	54	5270
		62	5310
	IEEE 802.11ac VHT80 & IEEE 802.11ax HE80	58	5290
U-NII-2C	IEEE 802.11a & n HT20 & ac VHT20 & IEEE 802.11ax HE20	100	5500
		104	5520
		108	5540
		112	5560
		116	5580
		120	5600
		124	5620
		128	5640
		132	5660
		136	5680
		140	5700
	IEEE 802.11n HT40 & ac VHT40 & IEEE 802.11ax HE40	102	5510
		110	5550
		118	5590
		126	5630
		134	5670
	IEEE 802.11ac VHT80 & IEEE 802.11ax HE80	106	5530
		122	5610
U-NII-3	IEEE 802.11a & n HT20 & ac VHT20 & IEEE 802.11ax HE20	149	5745
		153	5765
		157	5785
		161	5805
		165	5825
	IEEE 802.11n HT40 & ac VHT40 & IEEE 802.11ax HE40	151	5755
		159	5795
	IEEE 802.11ac VHT80 & IEEE 802.11ax HE80	155	5775

2.8. Power Setting of Test Software

Software Name	QATool_Dbg.exe		
U-NII-1			
Frequency(MHz)	5180	5200	5240
IEEE 802.11a Setting	14.5	14.5	14.5
IEEE 802.11n HT20 Setting	12	12	12
IEEE 802.11ac VHT20 Setting	12	12	12
IEEE 802.11ax HE20 Setting	12.5	12.5	12.5
Frequency(MHz)	5190	5230	
IEEE 802.11n HT40 Setting	13.5	13.5	
IEEE 802.11ac VHT40 Setting	14	14	
IEEE 802.11ax HE40 Setting	15	15	
Frequency(MHz)	5210		
IEEE 802.11ac VHT80 Setting	16		
IEEE 802.11ax HE80 Setting	18.5		
U-NII-2A			
Frequency(MHz)	5260	5300	5320
IEEE 802.11a Setting	17.5	17.5	17.5
IEEE 802.11n HT20 Setting	16	16	16
IEEE 802.11ac VHT20 Setting	16.5	16.5	16.5
IEEE 802.11ax HE20 Setting	17	17	17
Frequency(MHz)	5270	5310	
IEEE 802.11n HT40 Setting	18.5	19	
IEEE 802.11ac VHT40 Setting	18.5	18.5	
IEEE 802.11ax HE40 Setting	19	19	
Frequency(MHz)	5290		
IEEE 802.11ac VHT80 Setting	19		
IEEE 802.11ax HE80 Setting	19		
U-NII-2C			
Frequency(MHz)	5500	5580	5700
IEEE 802.11a Setting	18	18	17.5
IEEE 802.11n HT20 Setting	17.5	17	17
IEEE 802.11ac VHT20 Setting	17.5	17.5	17
IEEE 802.11ax HE20 Setting	18	18	17.5
Frequency(MHz)	5510	5590	5670
IEEE 802.11n HT40 Setting	19	19	19
IEEE 802.11ac VHT40 Setting	19	19	19
IEEE 802.11ax HE40 Setting	19	19	19
Frequency(MHz)	5530	5610	
IEEE 802.11ac VHT80 Setting	19	19	
IEEE 802.11ax HE80 Setting	19	19	

U-NII-3			
Frequency(MHz)	5745	5785	5825
IEEE 802.11a Setting	19	19	19
IEEE 802.11n HT20 Setting	19	19	19
IEEE 802.11ac VHT20 Setting	19	19	19
IEEE 802.11ax HE20 Setting	19	19	19
Frequency(MHz)	5755	5795	
IEEE 802.11n HT40 Setting	19	19	
IEEE 802.11ac VHT40 Setting	19	19	
IEEE 802.11ax HE40 Setting	19	19	
Frequency(MHz)	5775		
IEEE 802.11ac VHT80 Setting	19		
IEEE 802.11ax HE80 Setting	19		

Note: This information is provided by the applicant.

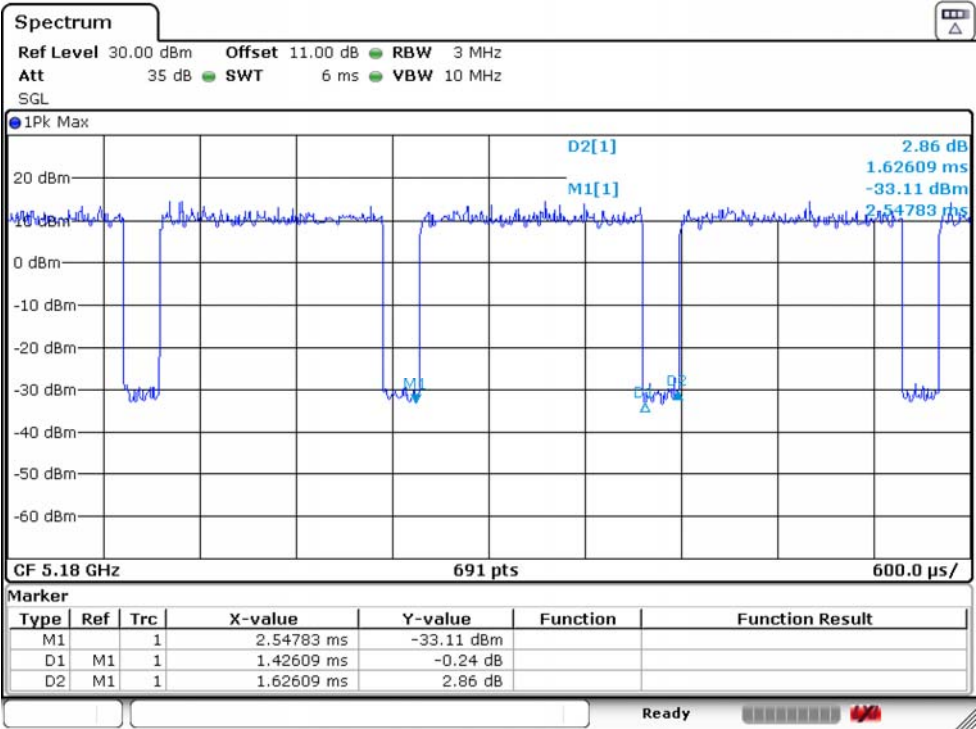
2.9. Duty Cycle of Test Signal

Temperature	23.6℃	Relative Humidity		56%	Test Voltage		DC 3.3V
Mode	Frequency (MHz)	On time (ms)	Total Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T (Hz)	
IEEE 802.11a	5180	1.42609	1.62609	87.70	0.57	701	
IEEE 802.11n HT20	5180	1.32174	1.50435	87.86	0.56	757	
IEEE 802.11ac VHT20	5180	0.70435	0.90435	77.88	1.09	1420	
IEEE 802.11n HT40	5190	0.66957	0.86957	77.00	1.14	1493	
IEEE 802.11ac VHT40	5190	0.37391	0.56522	66.15	1.79	2674	
IEEE 802.11ac VHT80	5210	0.21739	0.42609	51.02	2.92	4600	
IEEE 802.11ax HE20	5180	0.22174	0.40870	54.25	2.66	4510	
IEEE 802.11ax HE40	5190	0.21304	0.40870	52.13	2.83	4694	
IEEE 802.11ax HE80	5210	0.20870	0.42174	49.49	3.06	4792	

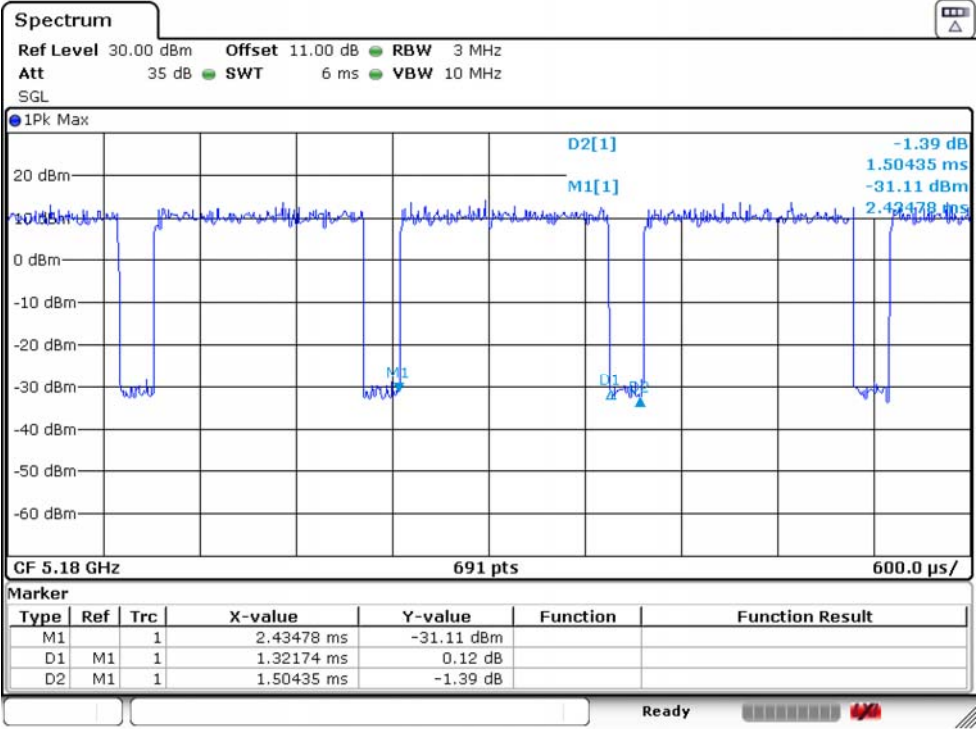
Note:

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.

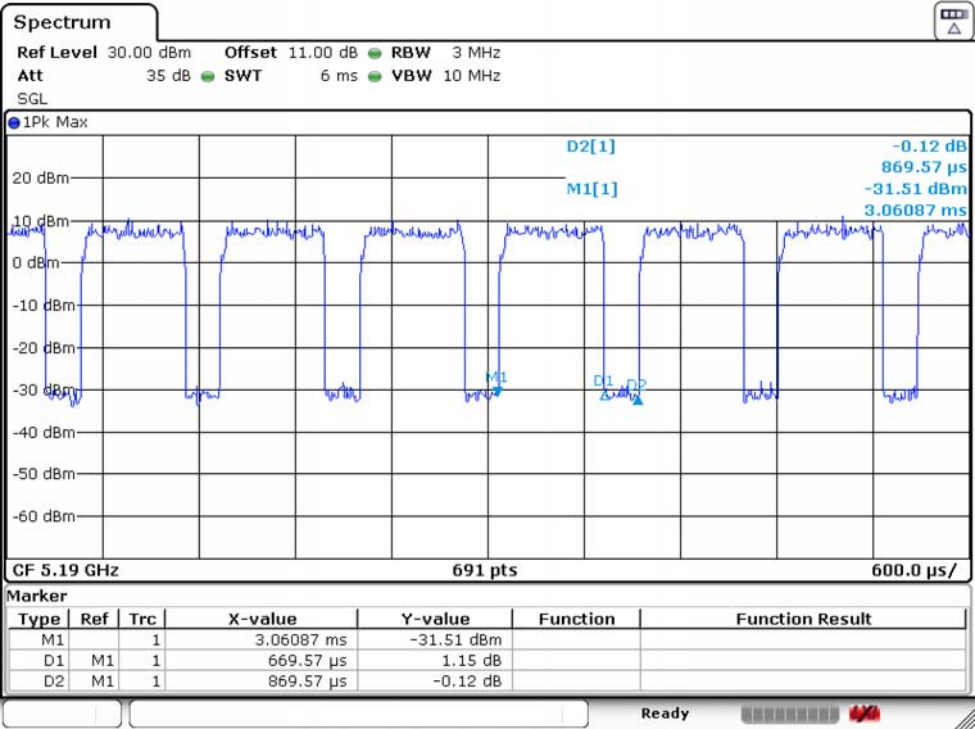
IEEE 802.11a 5180MHz



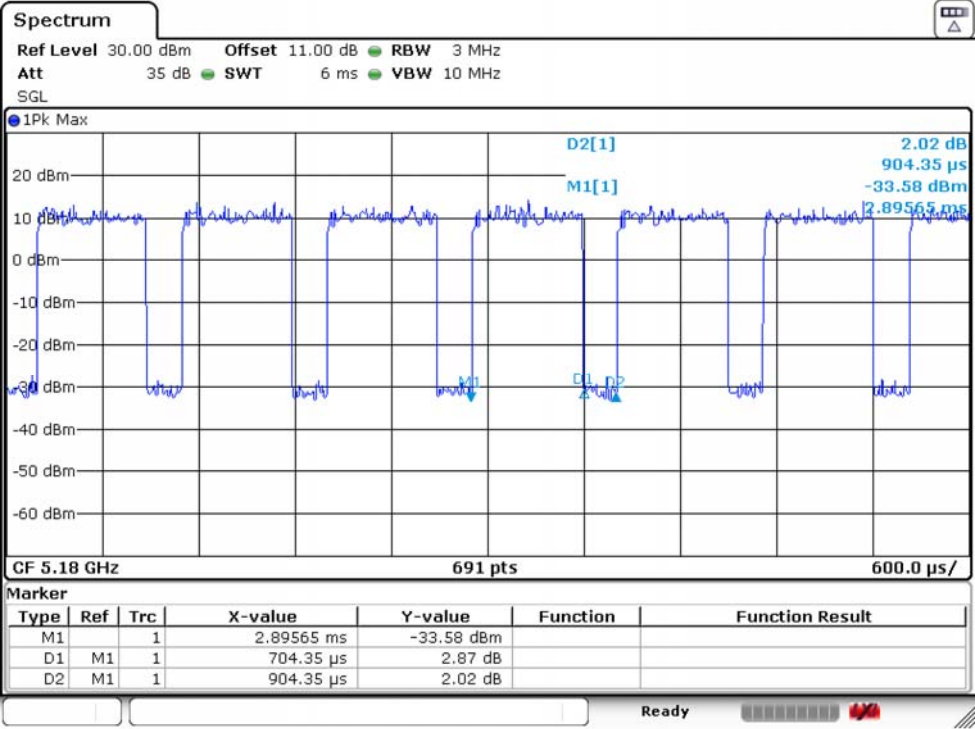
IEEE 802.11n HT20 5180MHz



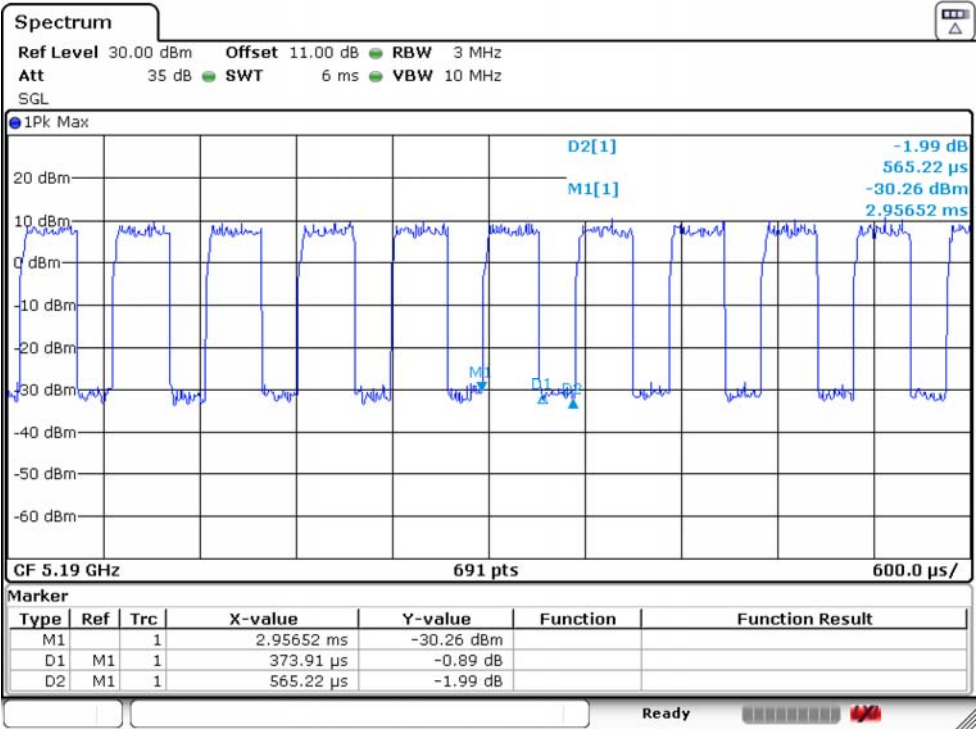
IEEE 802.11n HT40 5190MHz



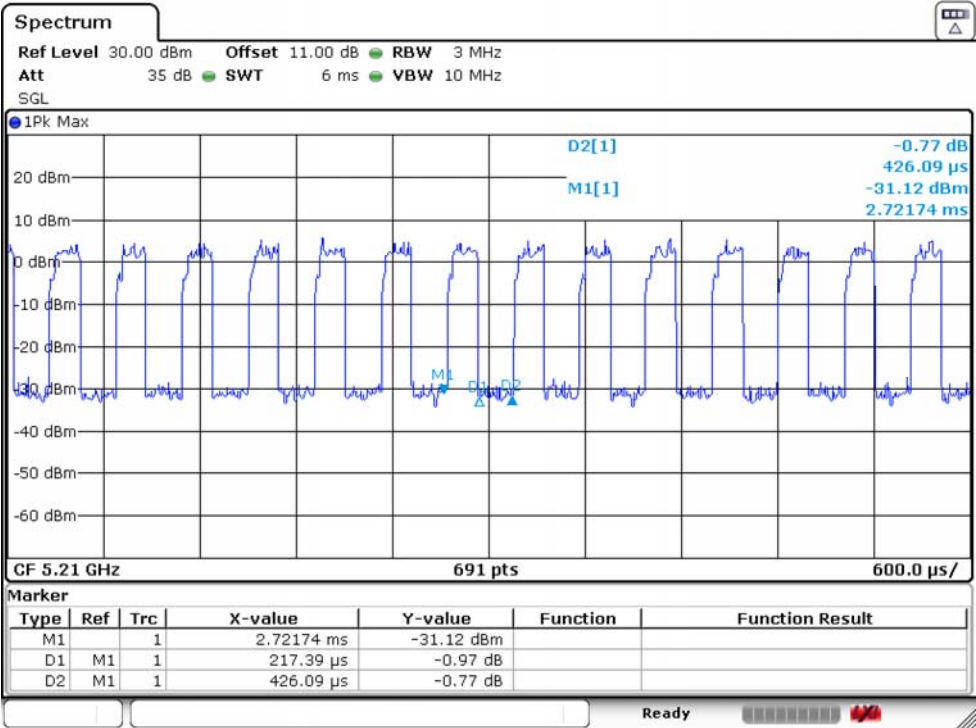
IEEE 802.11ac VHT20 5180MHz



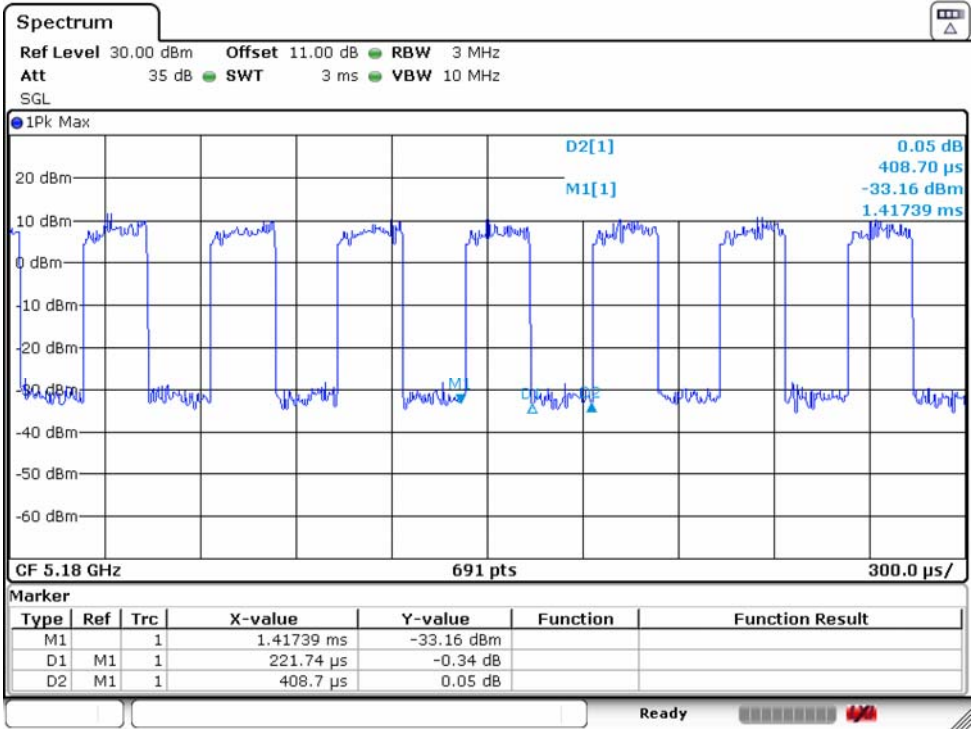
IEEE 802.11ac VHT40 5190MHz



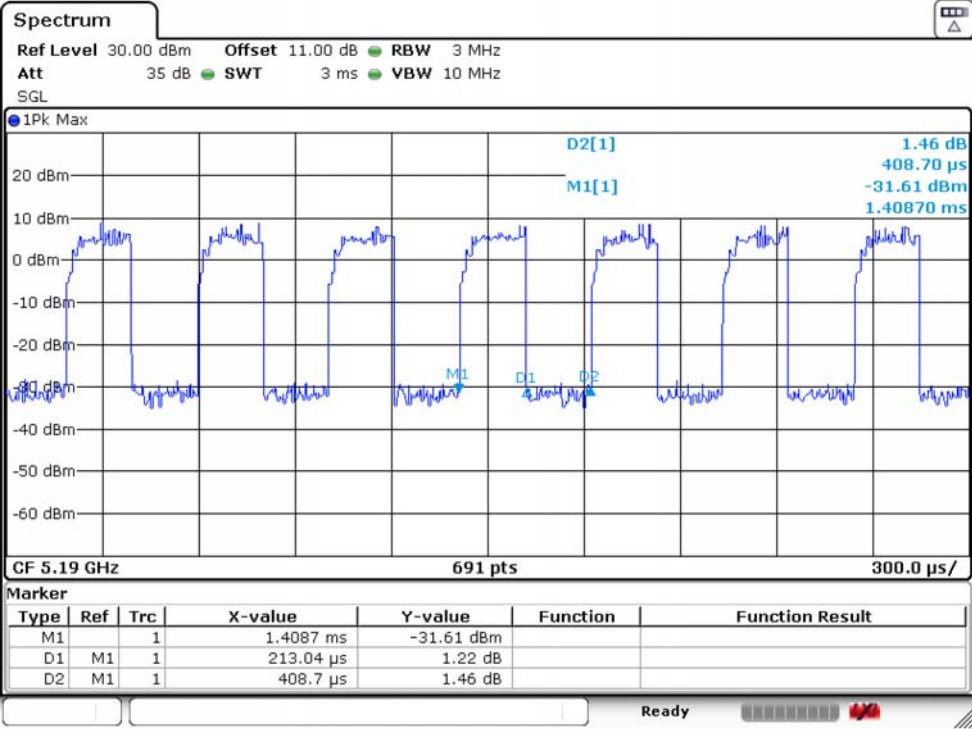
IEEE 802.11ac VHT80 5210MHz

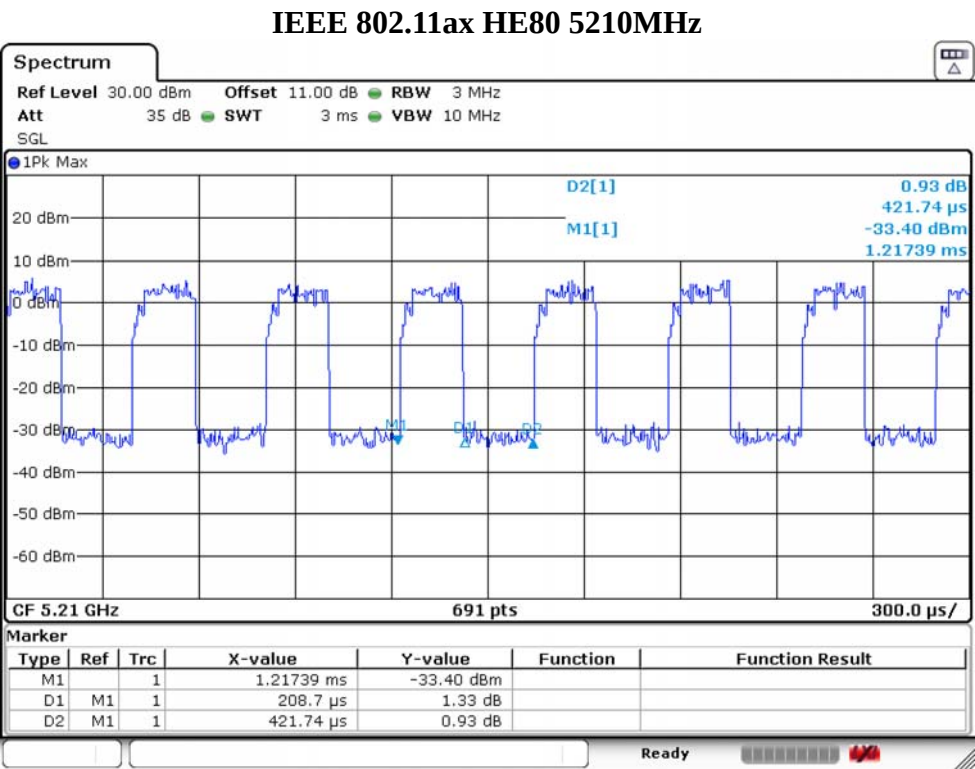


IEEE 802.11ax HE20 5180MHz



IEEE 802.11ax HE40 5190MHz





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
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

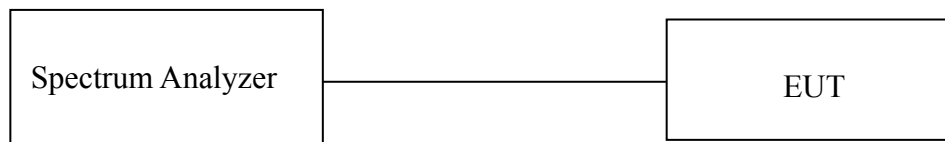
For connect EUT antenna terminal test						
Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
TS 8997	Rohde & Schwarz	/	/	/	/	/
Open Switch and Control Unit	Rohde & Schwarz	OSP-B157WB	EST-E036	LISAI	June 13,21	1 Year
Signal and Spectrum Analyzer	Rohde & Schwarz	FSV	EST-E037	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	23.6℃	Relative Humidity		56%	Test Voltage	DC 3.3V
26dB Bandwidth&99% Occupied Bandwidth						
AND	Test Mode	Fre (MHz)	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Output Power Limit (W)	Output Power Limit (dBm)
			Ant 1	Ant 1	Ant 1	Ant 1
U-NII-1	IEEE 802.11a	5180	24.428	17.582	0.2500	23.98
		5200	25.007	17.023	0.2500	23.98
		5240	24.255	17.142	0.2500	23.98
	IEEE 802.11n HT20	5180	24.776	18.541	0.2500	23.98
		5200	24.891	18.262	0.2500	23.98
		5240	24.776	18.542	0.2500	23.98
	IEEE 802.11ac VHT20	5180	24.197	18.003	0.2500	23.98
		5200	24.834	18.466	0.2500	23.98
		5240	25.239	18.061	0.2500	23.98
	IEEE 802.11n HT40	5190	40.060	36.469	0.2500	23.98
		5230	39.710	36.122	0.2500	23.98
	IEEE 802.11ac VHT40	5190	40.060	36.006	0.2500	23.98
		5230	39.710	36.122	0.2500	23.98
	IEEE 802.11ac VHT80	5210	79.880	75.022	0.2500	23.98
	IEEE 802.11ax HE20	5180	22.171	19.103	0.2500	23.98
		5200	22.113	19.160	0.2500	23.98
		5240	22.634	19.045	0.2500	23.98
	IEEE 802.11ax HE40	5190	39.590	37.627	0.2500	23.98
		5230	39.590	37.627	0.2500	23.98
	IEEE 802.11ax HE80	5210	80.350	76.643	0.2500	23.98

Temperature	23.6℃	Relative Humidity		56%	Test Voltage	DC 3.3V
26dB Bandwidth&99% Occupied Bandwidth						
AND	Test Mode	Fre (MHz)	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Output Power Limit (W)	Output Power Limit (dBm)
			Ant 1	Ant 1	Ant 1	Ant 1
U-NII-2A	IEEE 802.11a	5260	22.634	17.103	0.2500	23.98
		5300	25.065	17.063	0.2500	23.98
		5320	24.428	17.263	0.2500	23.98
	IEEE 802.11n HT20	5260	24.660	18.302	0.2500	23.98
		5300	25.528	18.382	0.2500	23.98
		5320	24.255	18.581	0.2500	23.98
	IEEE 802.11ac VHT20	5260	23.734	18.117	0.2500	23.98
		5300	23.965	18.061	0.2500	23.98
		5320	24.023	17.945	0.2500	23.98
	IEEE 802.11ax HE20	5260	21.766	19.045	0.2500	23.98
		5300	23.213	19.045	0.2500	23.98
		5320	21.939	19.045	0.2500	23.98
	IEEE 802.11n HT40	5270	39.830	36.237	0.2500	23.98
		5310	40.060	36.237	0.2500	23.98
	IEEE 802.11ac VHT40	5270	39.590	36.006	0.2500	23.98
		5310	40.060	36.006	0.2500	23.98
	IEEE 802.11ax HE40	5270	39.590	37.395	0.2500	23.98
		5310	39.710	37.627	0.2500	23.98
	IEEE 802.11ac VHT80	5290	79.650	74.790	0.2500	23.98
	IEEE 802.11ax HE80	5290	80.350	76.643	0.2500	23.98

BAND	Test Mode	Fre (MHz)	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Output Power Limit (W)	Output Power Limit (dBm)
			Ant 1	Ant 1	Ant 1	Ant 1
U-NII-2C	IEEE 802.11a	5500	23.039	17.263	0.2500	23.98
		5580	22.634	16.983	0.2500	23.98
		5700	24.660	17.063	0.2500	23.98
	IEEE 802.11n HT20	5500	25.239	18.541	0.2500	23.98
		5580	24.660	18.462	0.2500	23.98
		5700	25.470	18.581	0.2500	23.98
	IEEE 802.11ac VHT20	5500	23.560	18.003	0.2500	23.98
		5580	23.155	18.060	0.2500	23.98
		5700	25.297	17.887	0.2500	23.98
	IEEE 802.11n HT40	5510	39.940	36.122	0.2500	23.98
		5590	40.060	36.237	0.2500	23.98
		5670	39.710	36.237	0.2500	23.98
	IEEE 802.11ac VHT40	5510	40.060	36.006	0.2500	23.98
		5590	39.480	36.006	0.2500	23.98
		5670	39.940	36.122	0.2500	23.98
	IEEE 802.11ac VHT80	5530	79.650	74.790	0.2500	23.98
		5610	79.420	74.790	0.2500	23.98
	IEEE 802.11ax HE20	5500	23.560	19.219	0.2500	23.98
		5580	23.155	19.161	0.2500	23.98
		5700	25.297	19.103	0.2500	23.98
	IEEE 802.11ax HE40	5510	39.590	37.742	0.2500	23.98
		5590	39.590	37.511	0.2500	23.98
		5670	39.830	37.627	0.2500	23.98
	IEEE 802.11ax HE80	5530	80.120	76.179	0.2500	23.98
		5610	80.580	76.643	0.2500	23.98

Temperature	23.6℃	Relative Humidity		56%	Test Voltage	DC 3.3V
6dB Bandwidth&99% Occupied Bandwidth						
BAND	Test Mode	Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	6dB BW Min Limit (MHz)	Result
			Ant 1	Ant 1		
U-NII-3	IEEE 802.11a	5745	16.304	17.343	0.5	PASS
		5785	16.304	17.343	0.5	PASS
		5825	16.304	17.622	0.5	PASS
	IEEE 802.11n HT20	5745	17.343	18.262	0.5	PASS
		5785	17.343	18.142	0.5	PASS
		5825	17.502	18.262	0.5	PASS
	IEEE 802.11ac VHT20	5745	17.582	18.234	0.5	PASS
		5785	17.343	17.945	0.5	PASS
		5825	17.263	18.292	0.5	PASS
	IEEE 802.11n HT40	5755	35.005	36.122	0.5	PASS
		5795	35.165	36.237	0.5	PASS
	IEEE 802.11ac VHT40	5755	35.005	36.006	0.5	PASS
		5795	35.005	36.122	0.5	PASS
	IEEE 802.11ac VHT80	5775	75.120	74.790	0.5	PASS
	IEEE 802.11ax HE20	5745	18.901	18.987	0.5	PASS
		5785	18.741	19.045	0.5	PASS
		5825	18.861	19.045	0.5	PASS
	IEEE 802.11ax HE40	5755	35.724	37.627	0.5	PASS
		5795	35.165	37.511	0.5	PASS
	IEEE 802.11ax HE80	5775	75.120	76.874	0.5	PASS

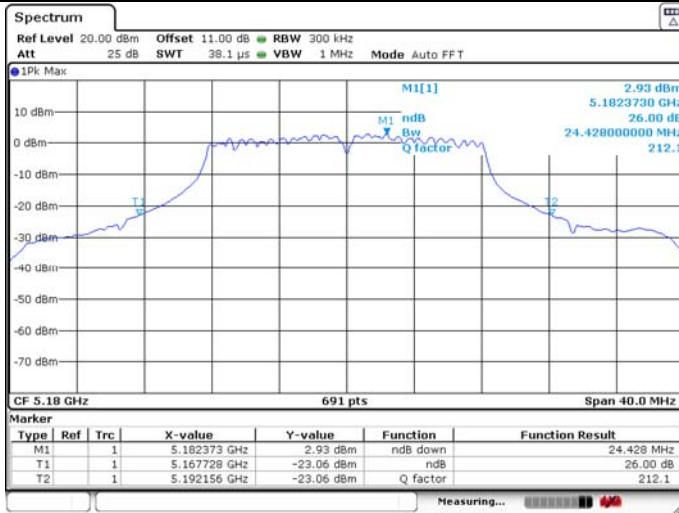
Note :

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

26dB Bandwidth



99% Occupied Bandwidth

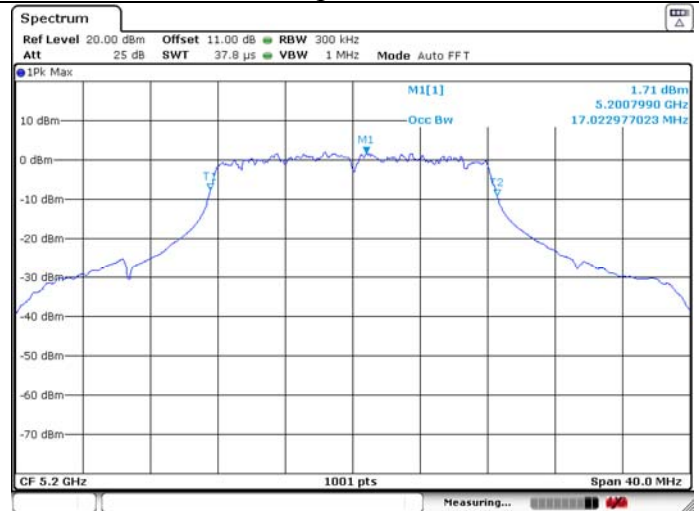


U-NII-1 IEEE 802.11a 5200MHz

26dB Bandwidth



99% Occupied Bandwidth

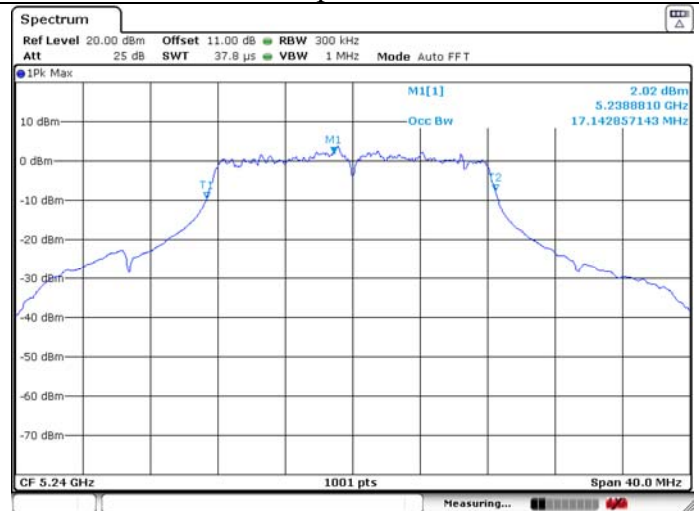


U-NII-1 IEEE 802.11a 5240MHz

26dB Bandwidth

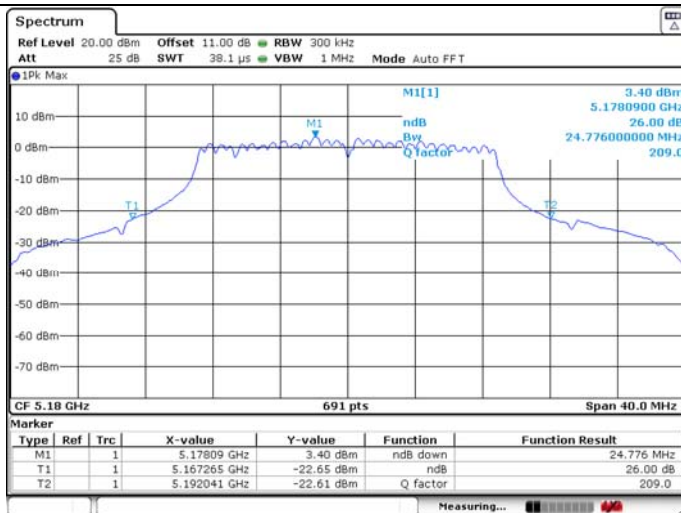


99% Occupied Bandwidth



U-NII-1 IEEE 802.11n HT20 5180MHz

26dB Bandwidth

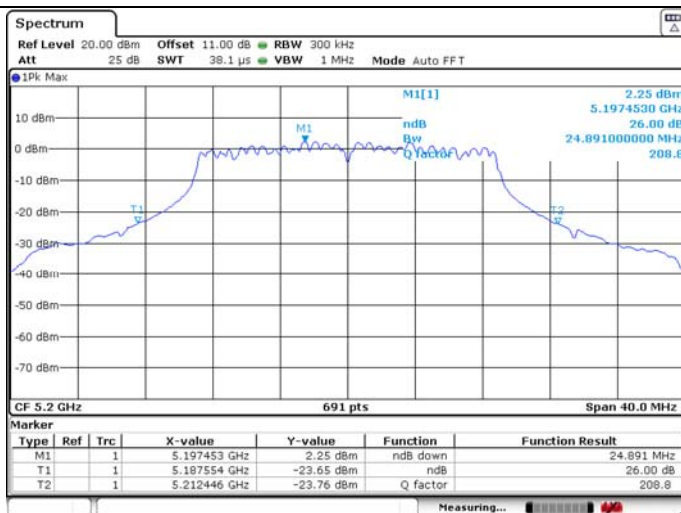


99% Occupied Bandwidth

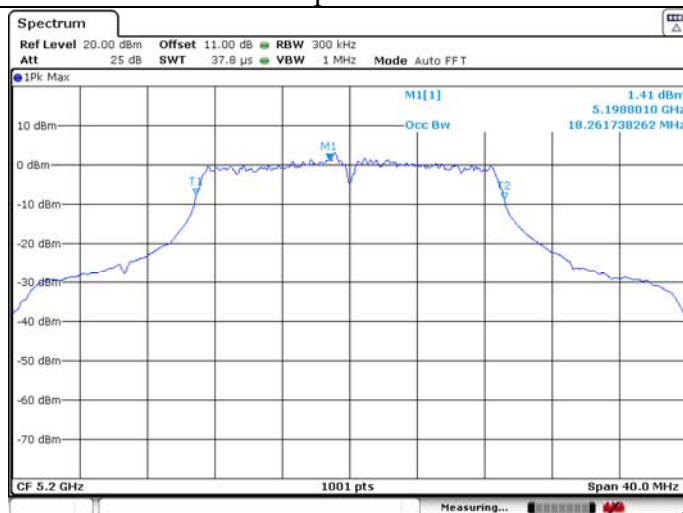


U-NII-1 IEEE 802.11n HT20 5200MHz

26dB Bandwidth

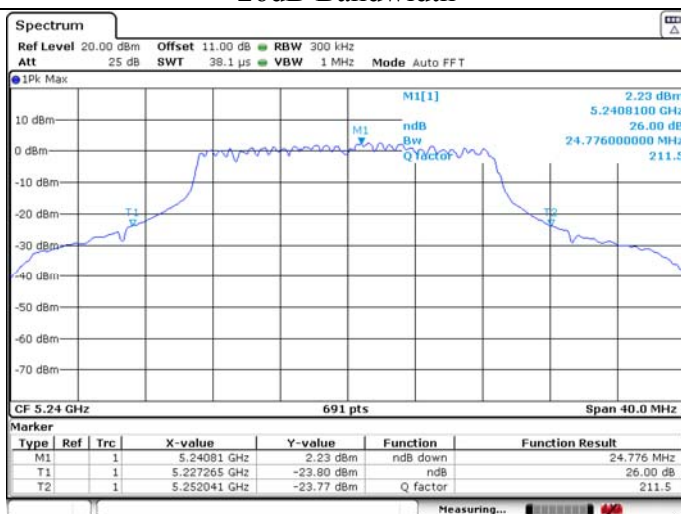


99% Occupied Bandwidth



U-NII-1 IEEE 802.11n HT20 5240MHz

26dB Bandwidth



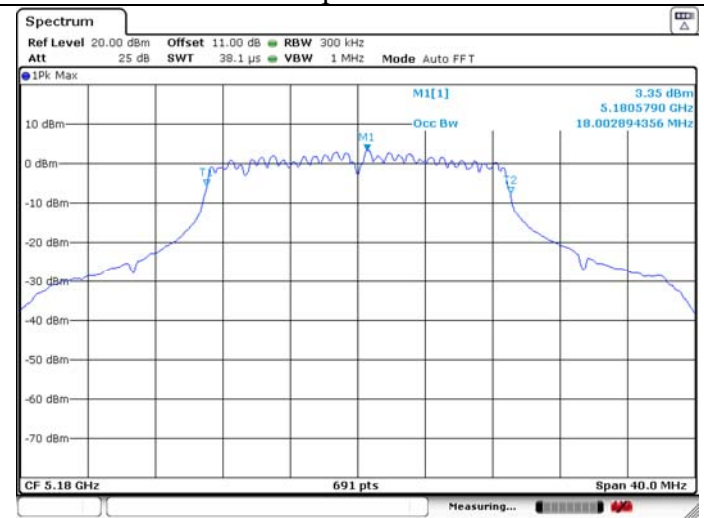
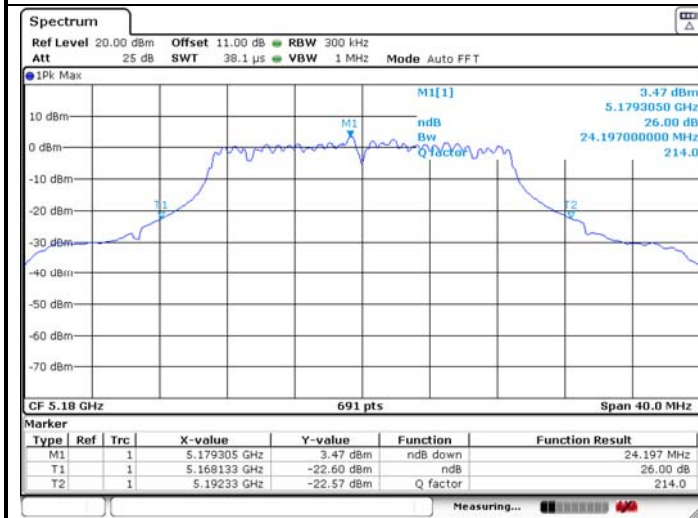
99% Occupied Bandwidth



U-NII-1 IEEE 802.11ac VHT20 5180MHz

26dB Bandwidth

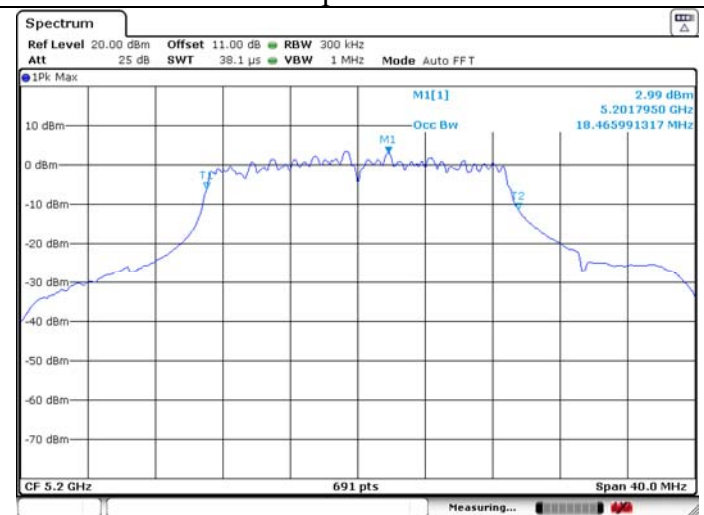
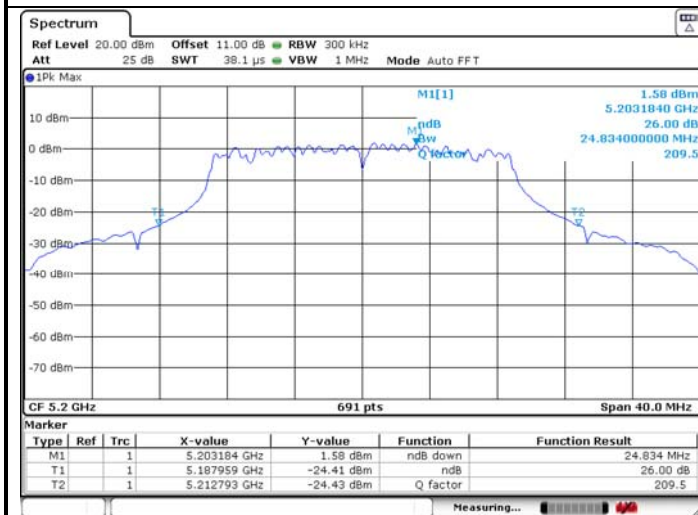
99% Occupied Bandwidth



U-NII-1 IEEE 802.11ac VHT20 5200MHz

26dB Bandwidth

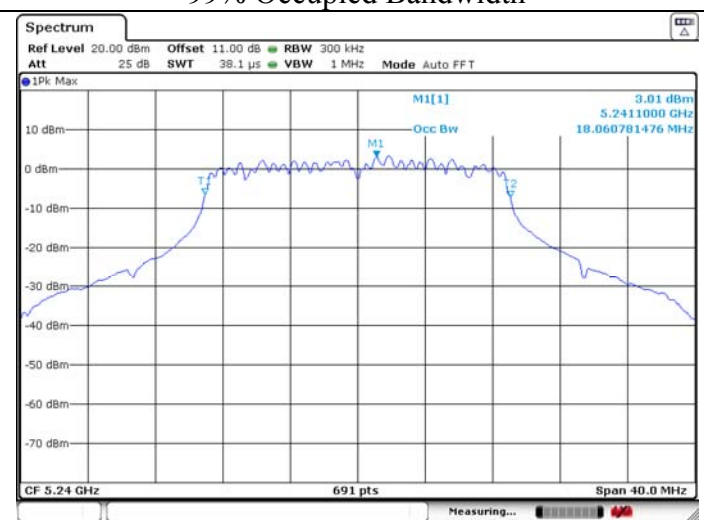
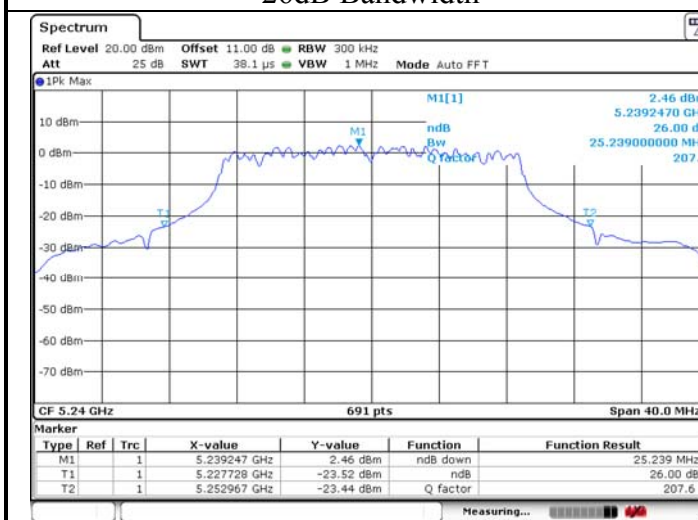
99% Occupied Bandwidth

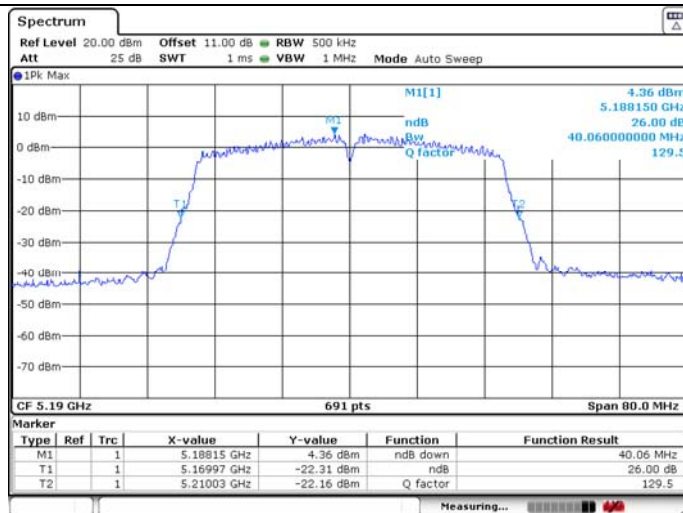
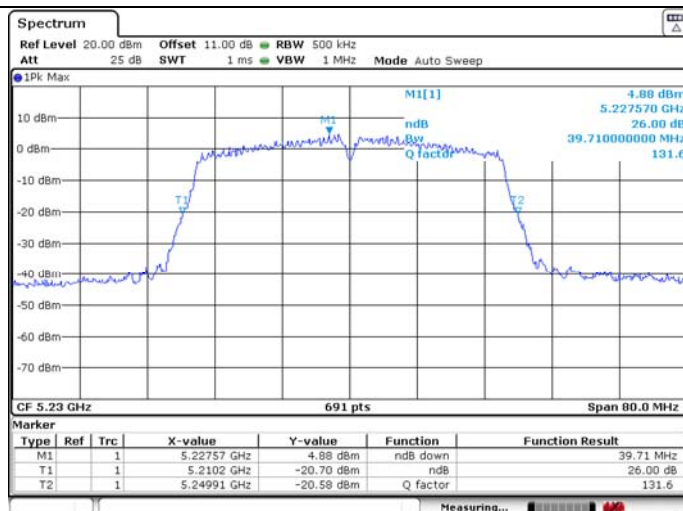
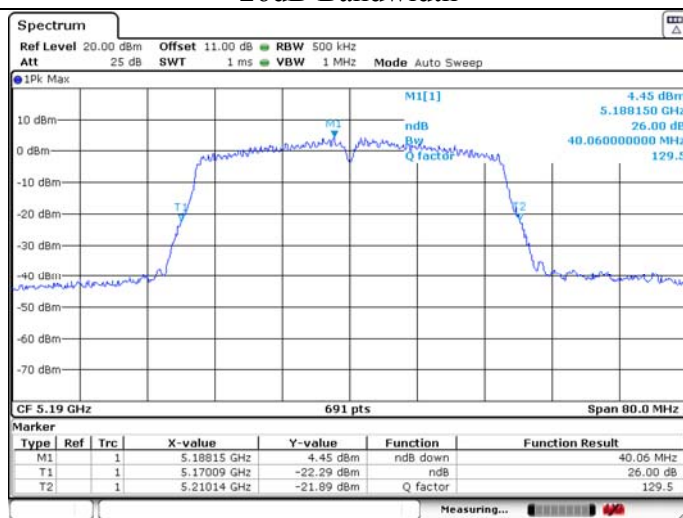


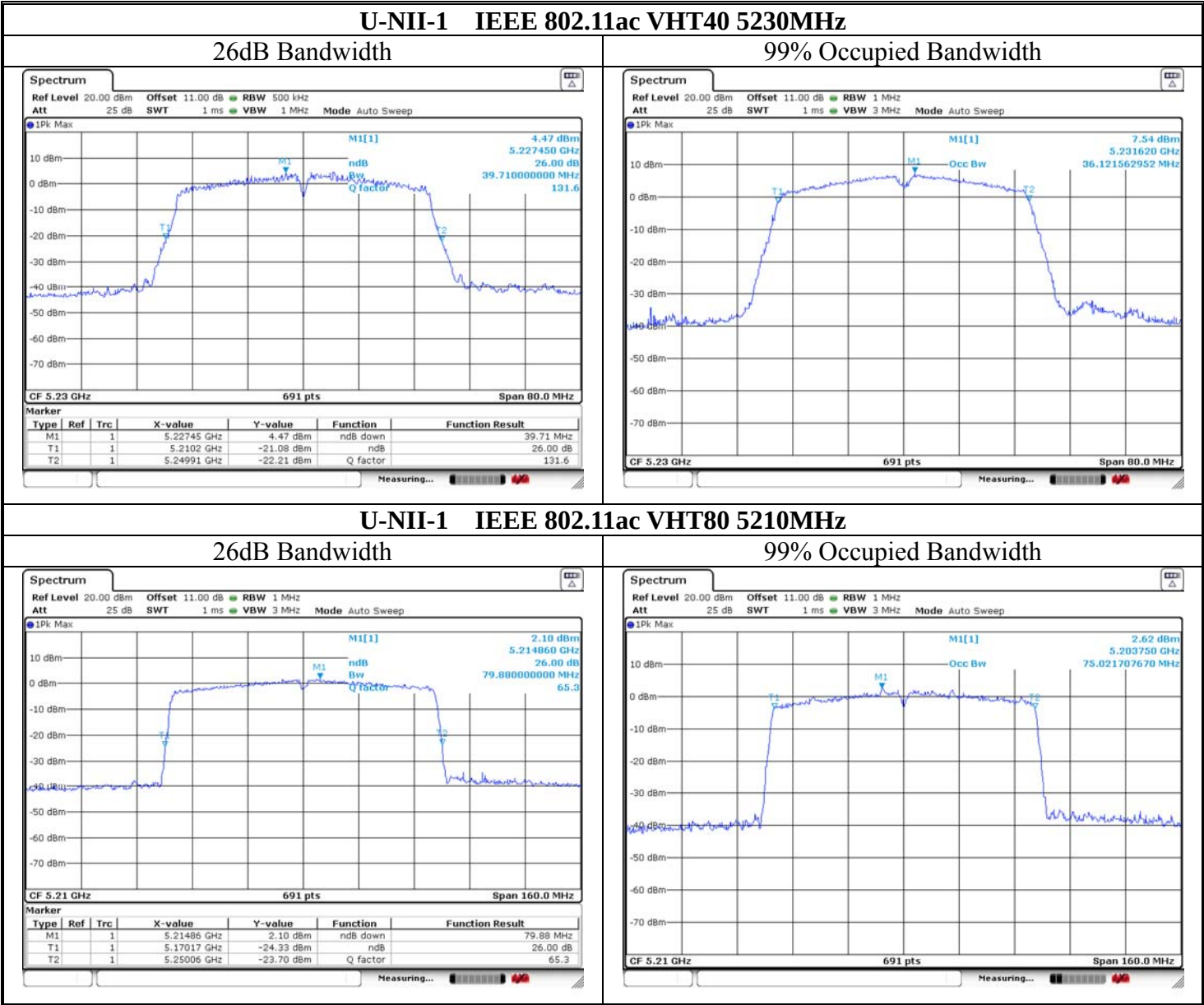
U-NII-1 IEEE 802.11ac VHT20 5240MHz

26dB Bandwidth

99% Occupied Bandwidth

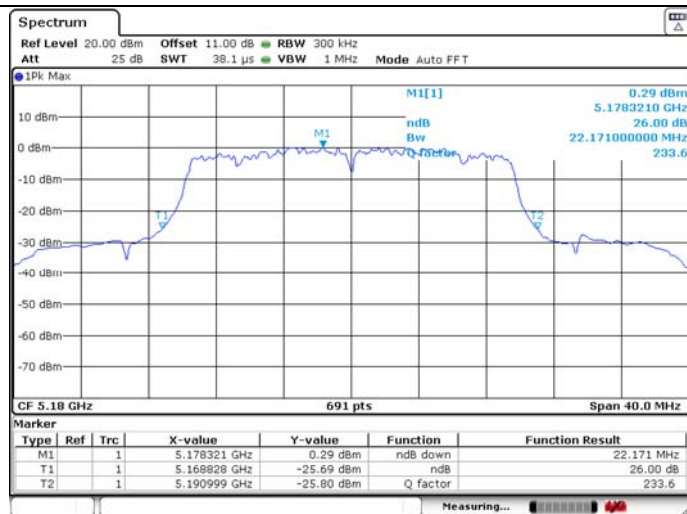


U-NII-1 IEEE 802.11n HT40 5190MHz**26dB Bandwidth****99% Occupied Bandwidth****U-NII-1 IEEE 802.11n HT40 5230MHz****26dB Bandwidth****99% Occupied Bandwidth****U-NII-1 IEEE 802.11ac VHT40 5190MHz****26dB Bandwidth****99% Occupied Bandwidth**

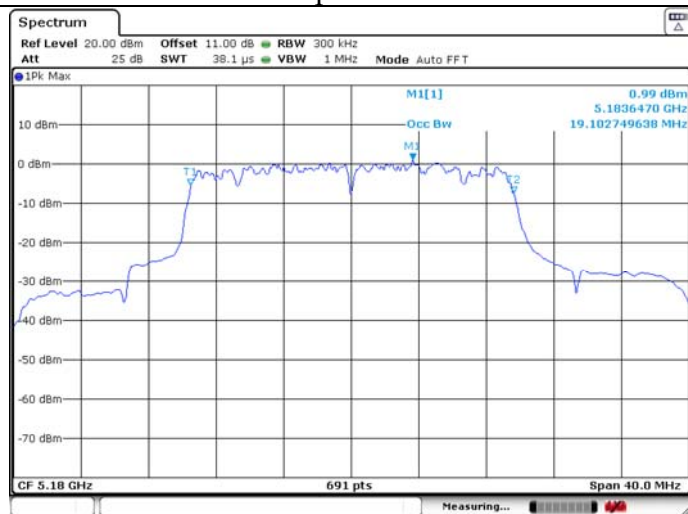


U-NII-1 IEEE 802.11ax HE20 5180MHz_Ant 1

26dB Bandwidth

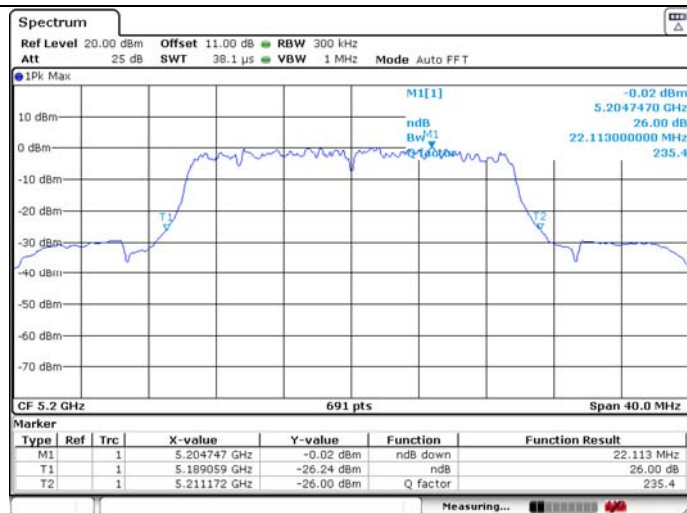


99% Occupied Bandwidth



U-NII-1 IEEE 802.11ax HE20 5200MHz_Ant 1

26dB Bandwidth



99% Occupied Bandwidth



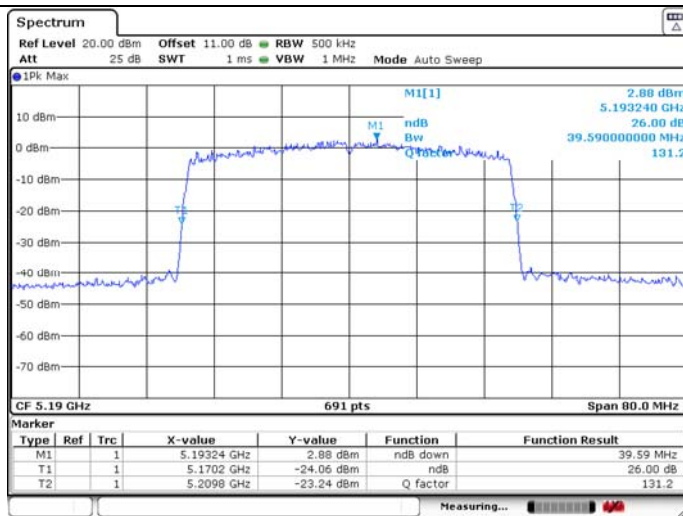
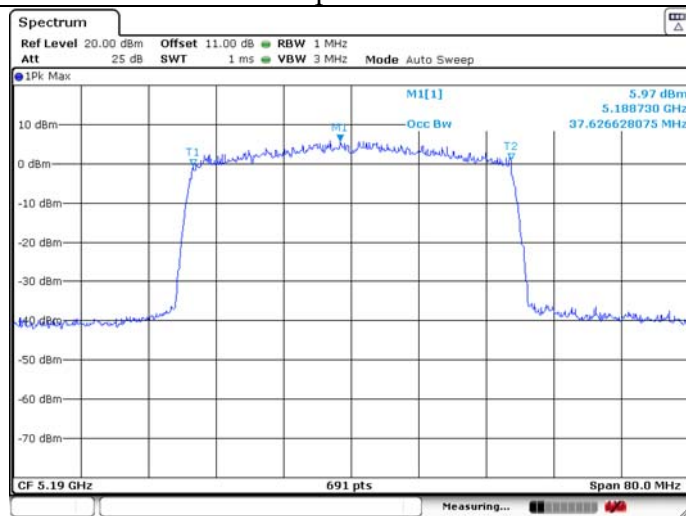
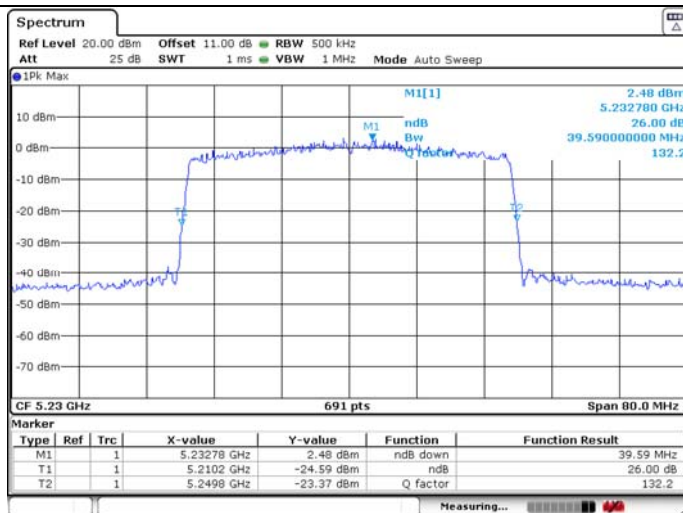
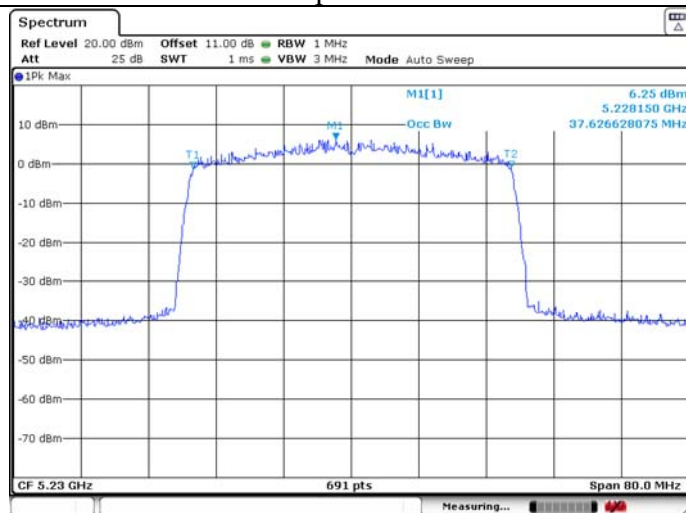
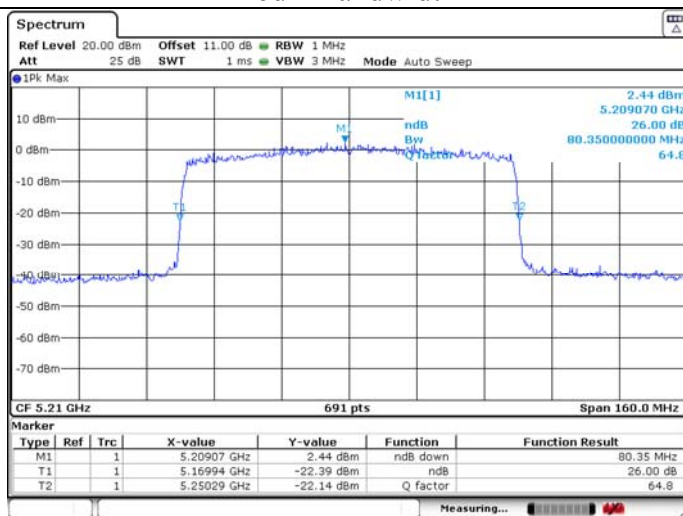
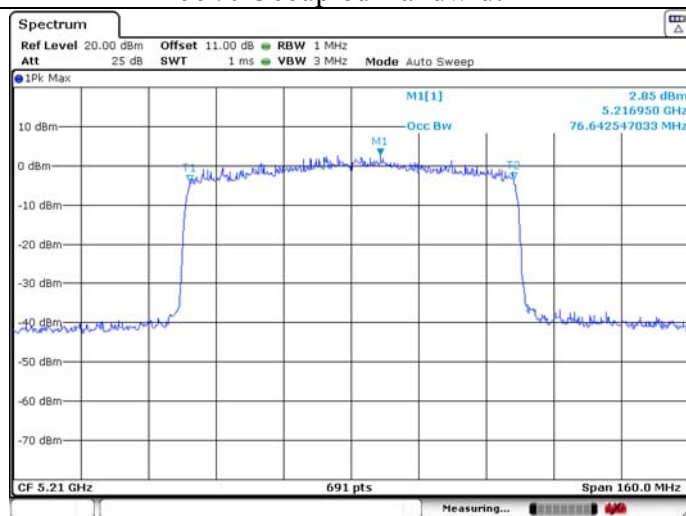
U-NII-1 IEEE 802.11ax HE20 5240MHz_Ant 1

26dB Bandwidth



99% Occupied Bandwidth



U-NII-1 IEEE 802.11ax HE40 5190MHz_Ant 1**26dB Bandwidth****99% Occupied Bandwidth****U-NII-1 IEEE 802.11ax HE40 5230MHz_Ant 1****26dB Bandwidth****99% Occupied Bandwidth****U-NII-1 IEEE 802.11ax HE80 5210MHz_Ant 1****26dB Bandwidth****99% Occupied Bandwidth**

U-NII-2A IEEE 802.11a 5260MHz

26dB Bandwidth

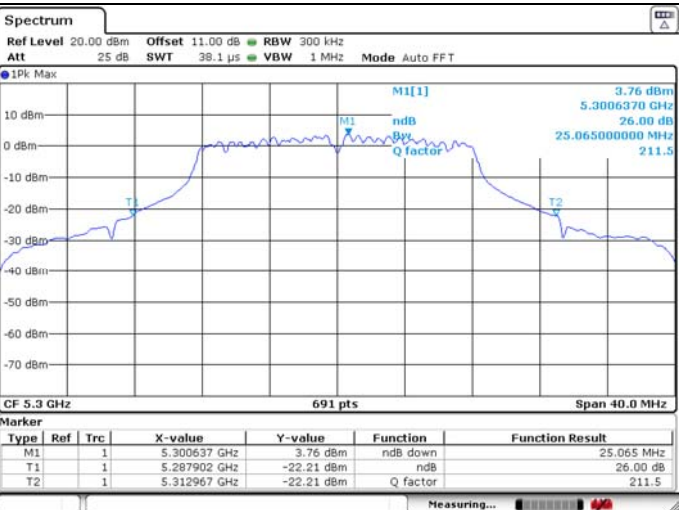


99% Occupied Bandwidth



U-NII-2A IEEE 802.11a 5300MHz

26dB Bandwidth

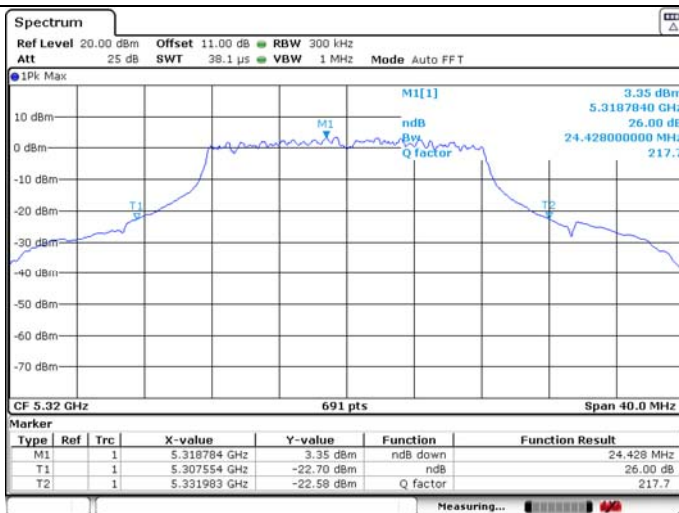


99% Occupied Bandwidth

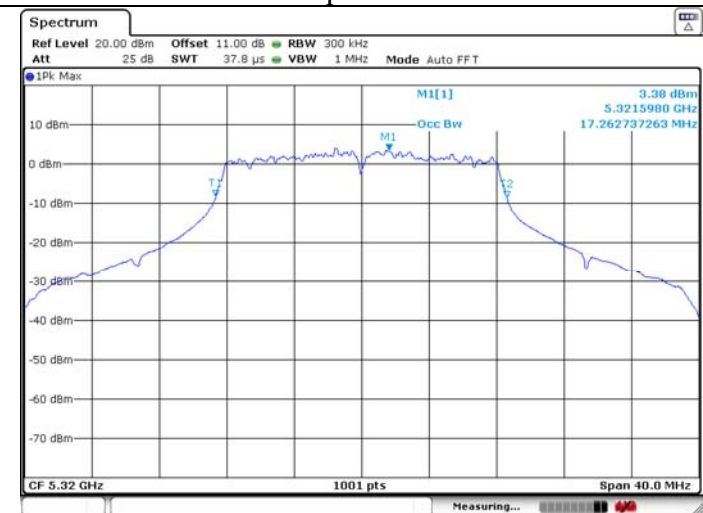


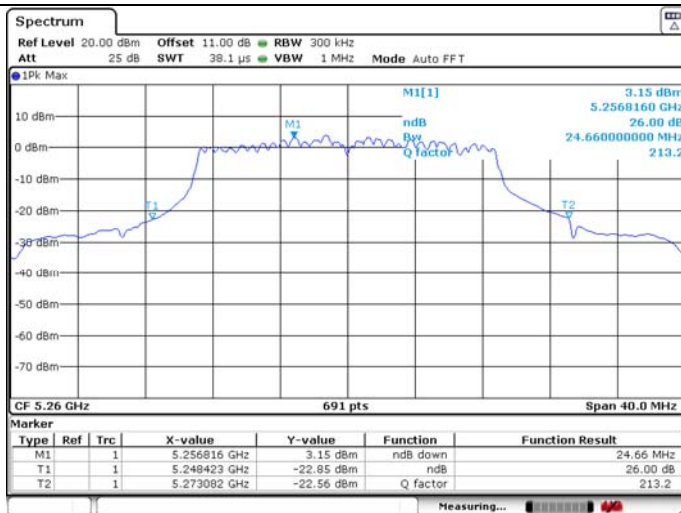
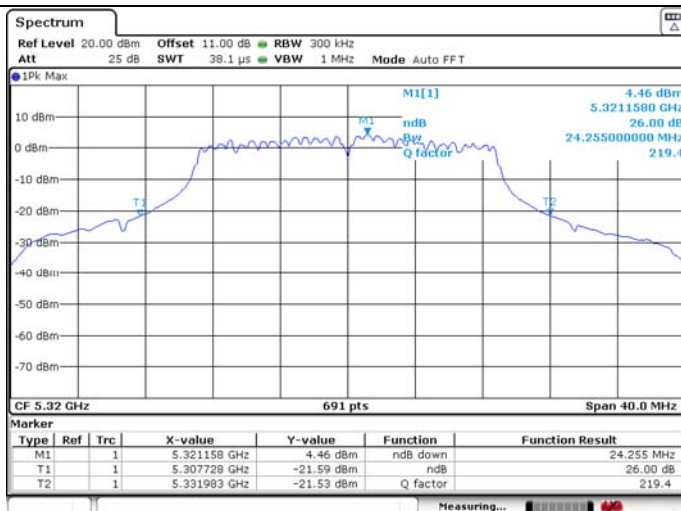
U-NII-2A IEEE 802.11a 5320MHz

26dB Bandwidth



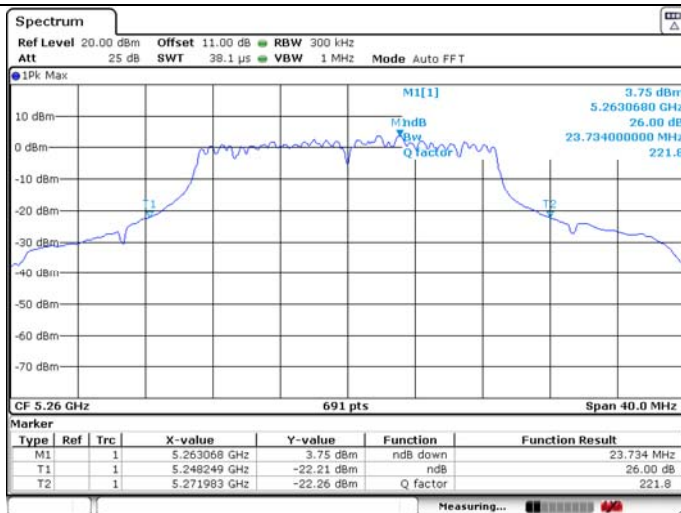
99% Occupied Bandwidth



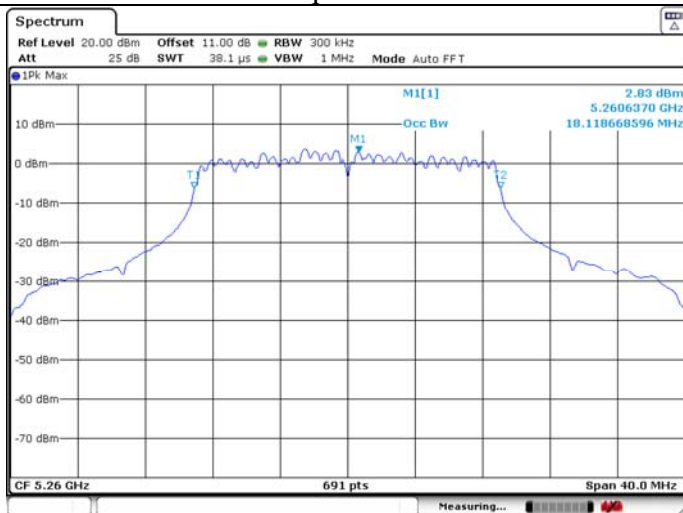
U-NII-2A IEEE 802.11n HT20 5260MHz**26dB Bandwidth****99% Occupied Bandwidth****U-NII-2A IEEE 802.11n HT20 5300MHz****26dB Bandwidth****99% Occupied Bandwidth****U-NII-2A IEEE 802.11n HT20 5320MHz****26dB Bandwidth****99% Occupied Bandwidth**

U-NII-2A IEEE 802.11ac VHT20 5260MHz

26dB Bandwidth

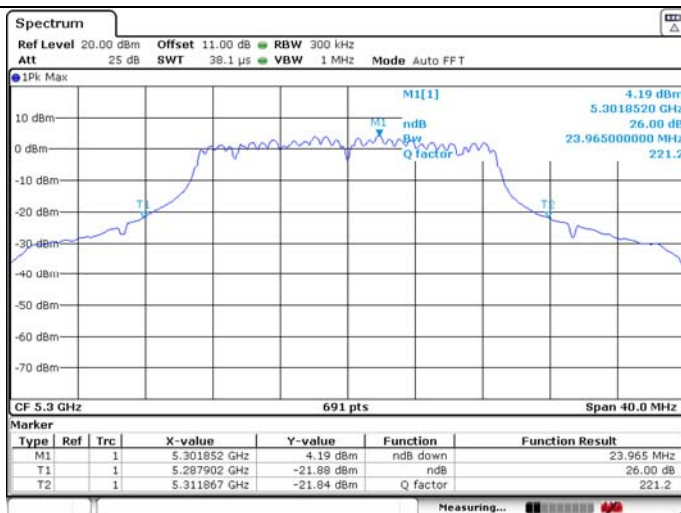


99% Occupied Bandwidth

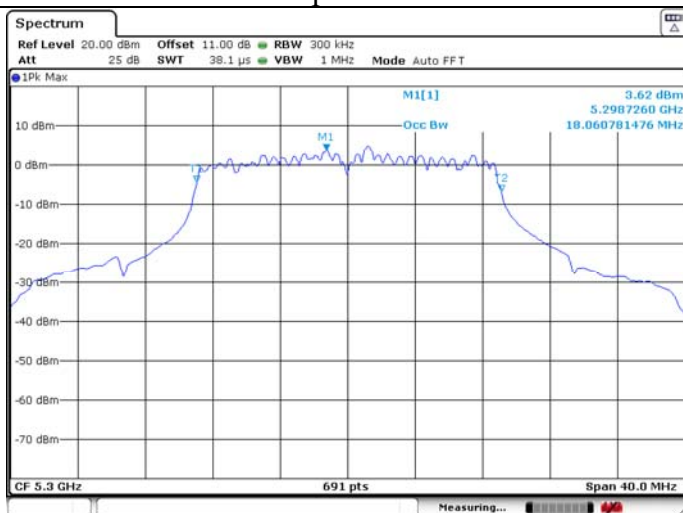


U-NII-2A IEEE 802.11ac VHT20 5300MHz

26dB Bandwidth

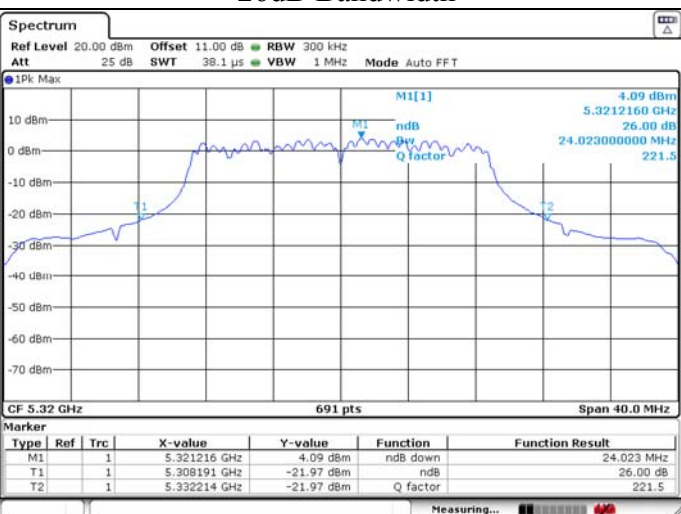


99% Occupied Bandwidth



U-NII-2A IEEE 802.11ac VHT20 5320MHz

26dB Bandwidth

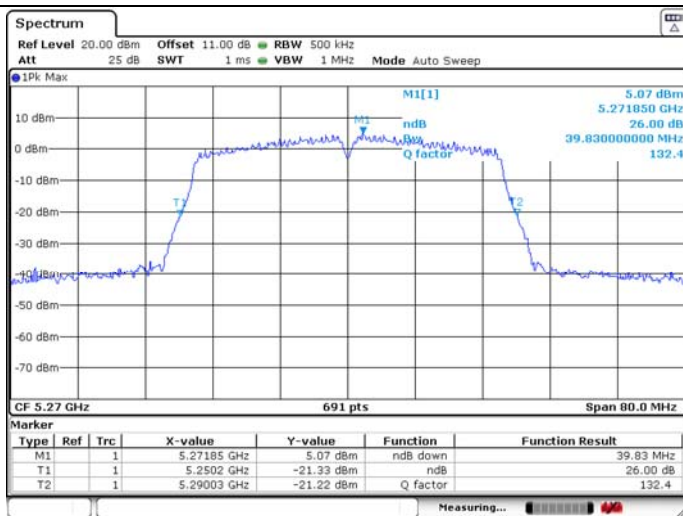


99% Occupied Bandwidth



U-NII-2A IEEE 802.11n HT40 5270MHz

26dB Bandwidth

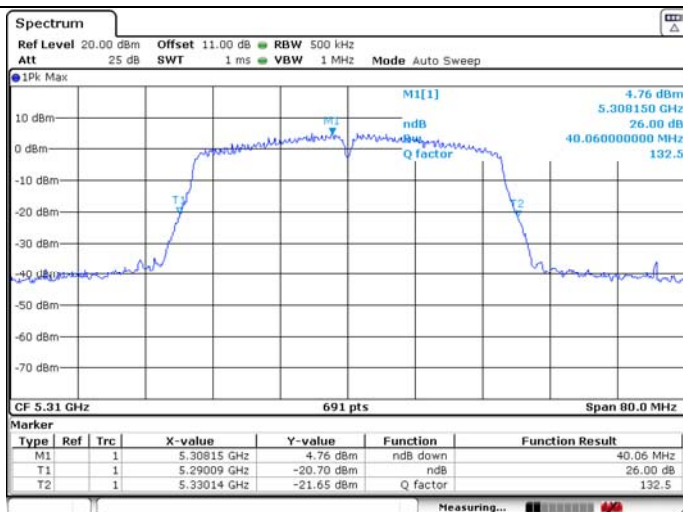


99% Occupied Bandwidth



U-NII-2A IEEE 802.11n HT40 5310MHz

26dB Bandwidth

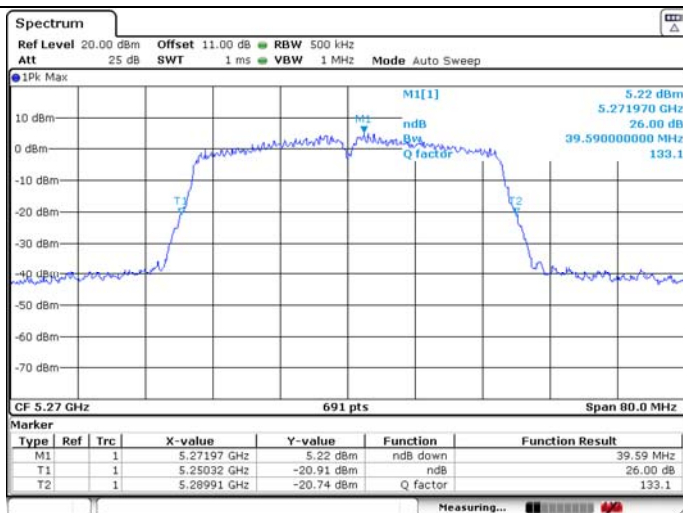


99% Occupied Bandwidth



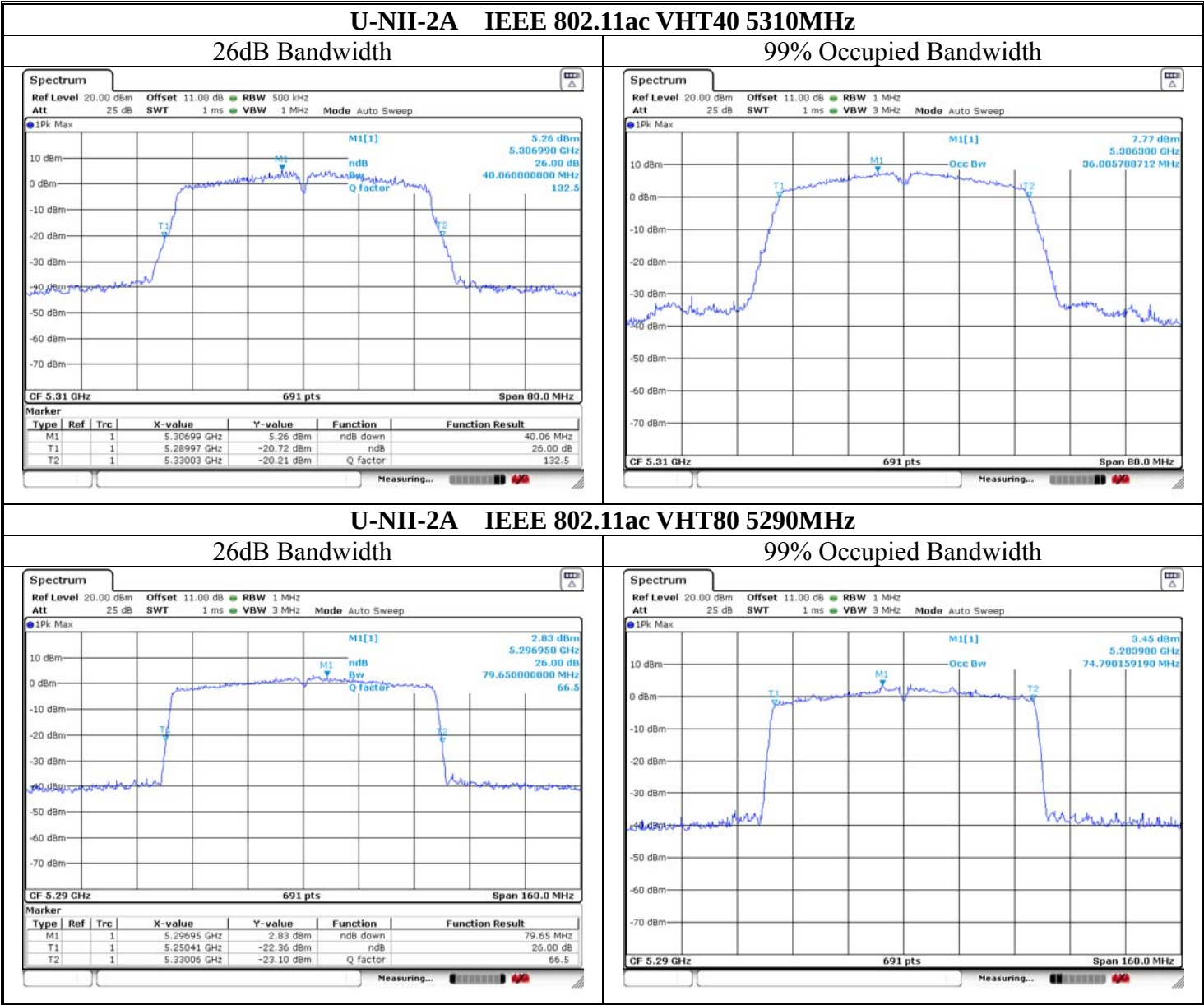
U-NII-2A IEEE 802.11ac VHT40 5270MHz

26dB Bandwidth



99% Occupied Bandwidth





U-NII-2A IEEE 802.11ax HE20 5260MHz_Ant 1

26dB Bandwidth

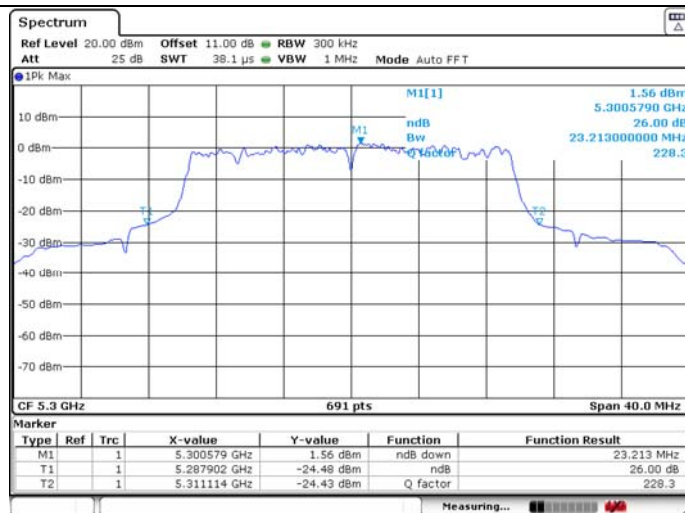


99% Occupied Bandwidth



U-NII-2A IEEE 802.11ax HE20 5300MHz_Ant 1

26dB Bandwidth

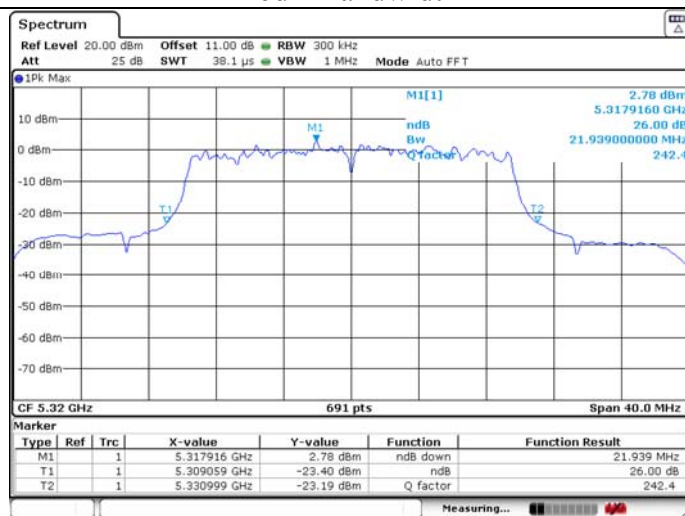


99% Occupied Bandwidth



U-NII-2A IEEE 802.11ax HE20 5320MHz_Ant 1

26dB Bandwidth

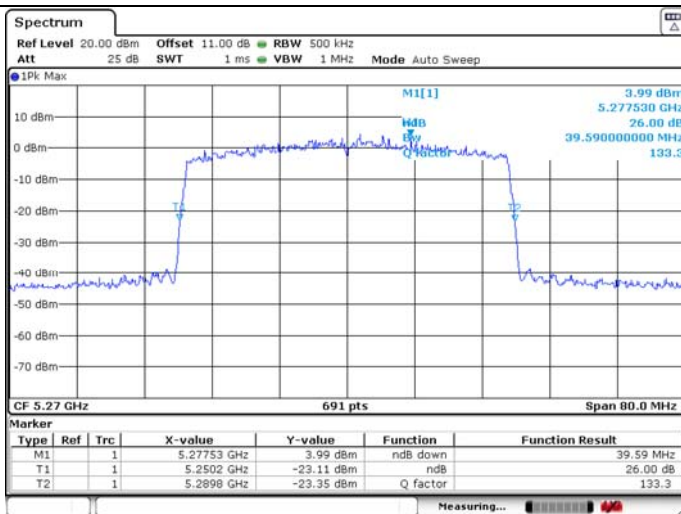


99% Occupied Bandwidth

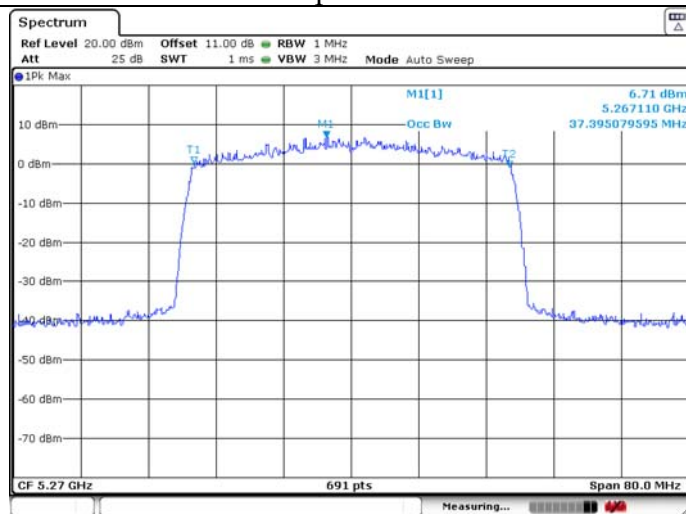


U-NII-2A IEEE 802.11ax HE40 5270MHz_Ant 1

26dB Bandwidth

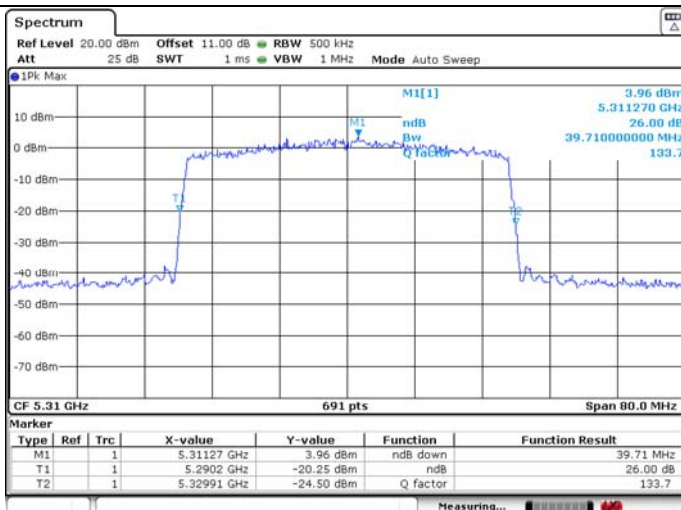


99% Occupied Bandwidth

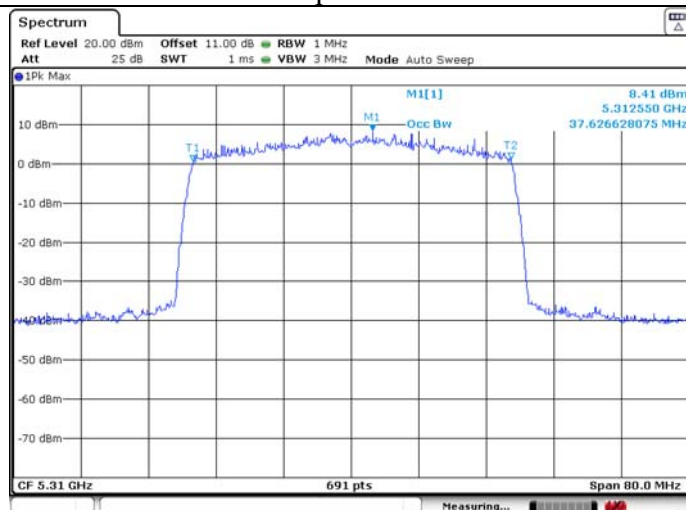


U-NII-2A IEEE 802.11ax HE40 5310MHz_Ant 1

26dB Bandwidth

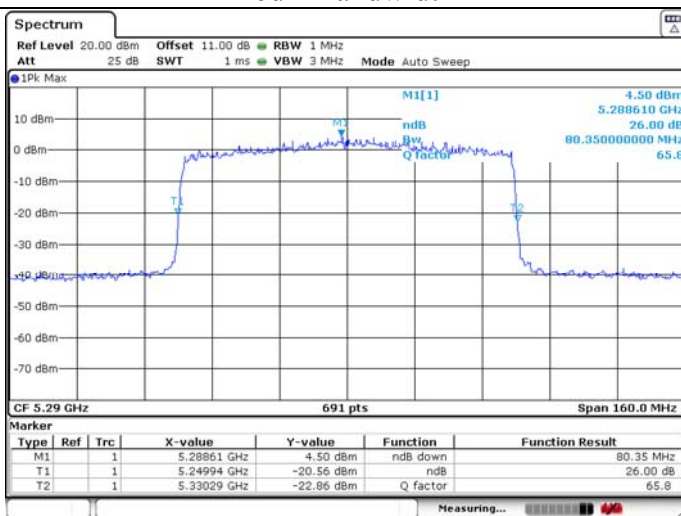


99% Occupied Bandwidth

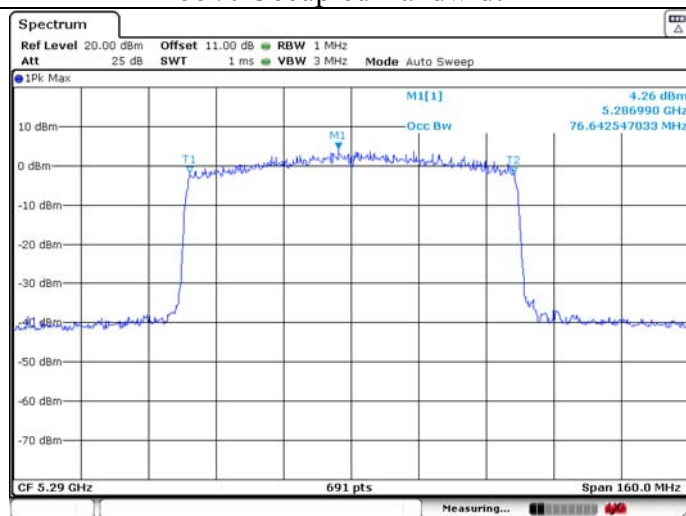


U-NII-2A IEEE 802.11ax HE80 5290MHz_Ant 1

26dB Bandwidth



99% Occupied Bandwidth



U-NII-2C IEEE 802.11a 5500MHz

26dB Bandwidth

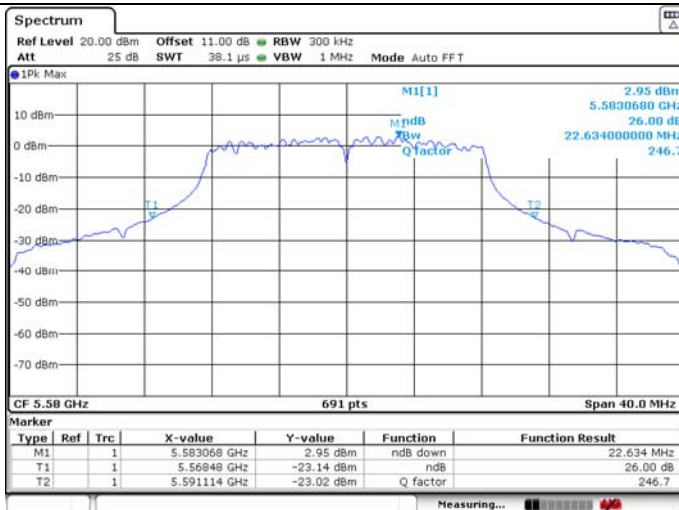


99% Occupied Bandwidth



U-NII-2C IEEE 802.11a 5580MHz

26dB Bandwidth

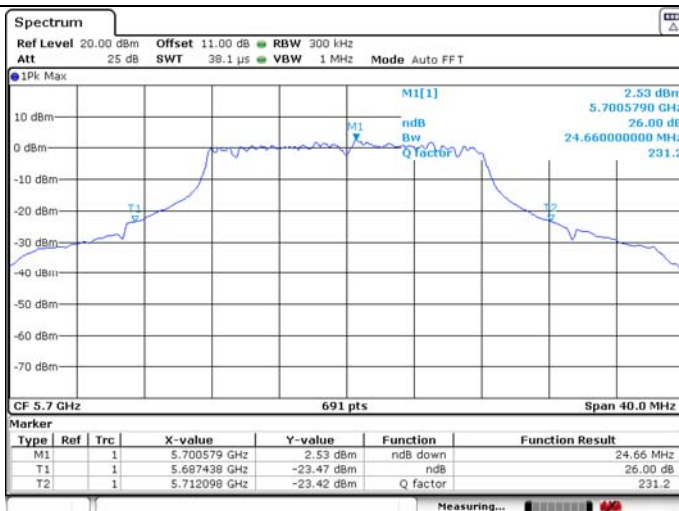


99% Occupied Bandwidth

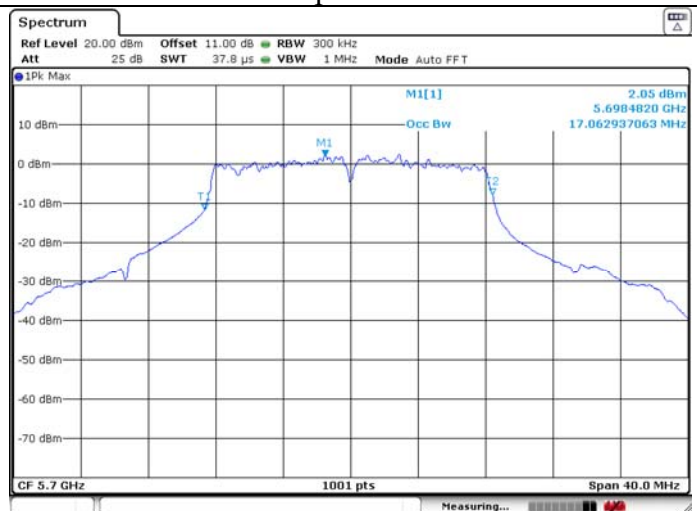


U-NII-2C IEEE 802.11a 5700MHz

26dB Bandwidth



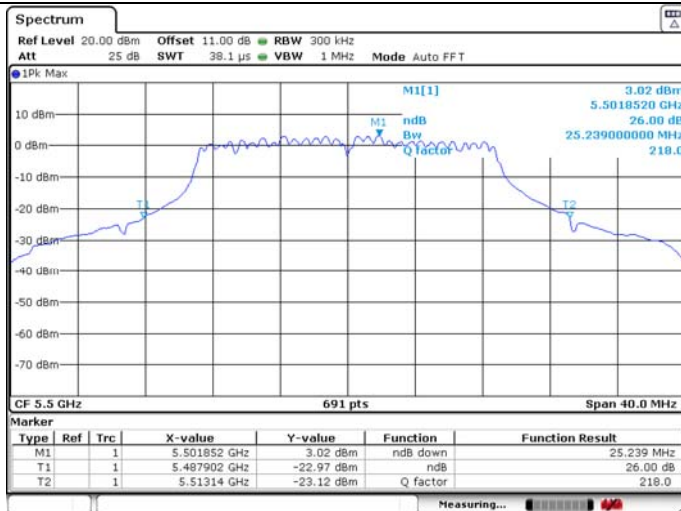
99% Occupied Bandwidth



U-NII-2C IEEE 802.11n HT20 5500MHz

26dB Bandwidth

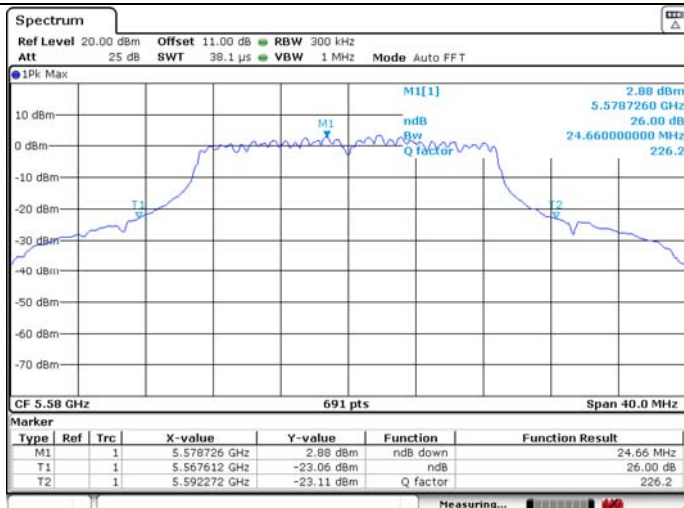
99% Occupied Bandwidth



U-NII-2C IEEE 802.11n HT20 5580MHz

26dB Bandwidth

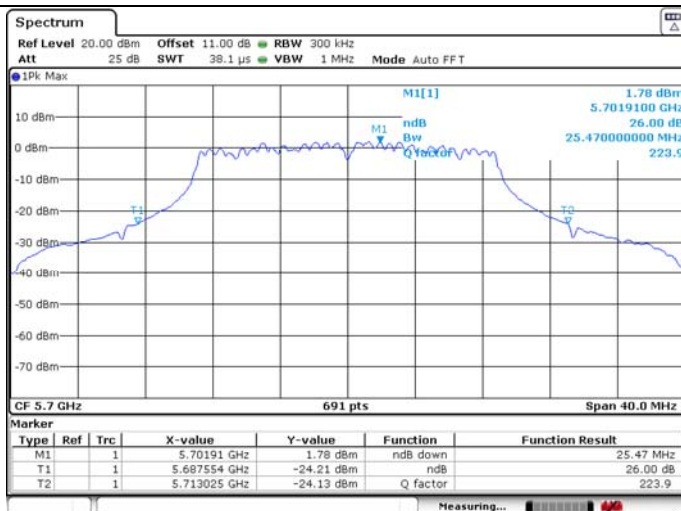
99% Occupied Bandwidth



U-NII-2C IEEE 802.11n HT20 5700MHz

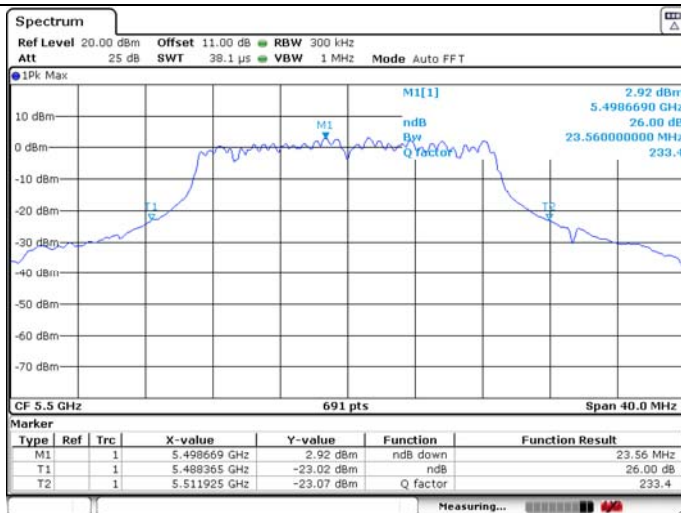
26dB Bandwidth

99% Occupied Bandwidth

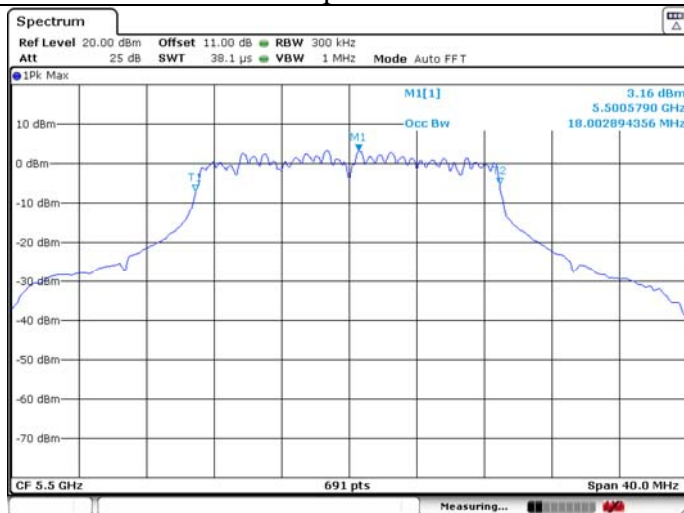


U-NII-2C IEEE 802.11ac VHT20 5500MHz

26dB Bandwidth

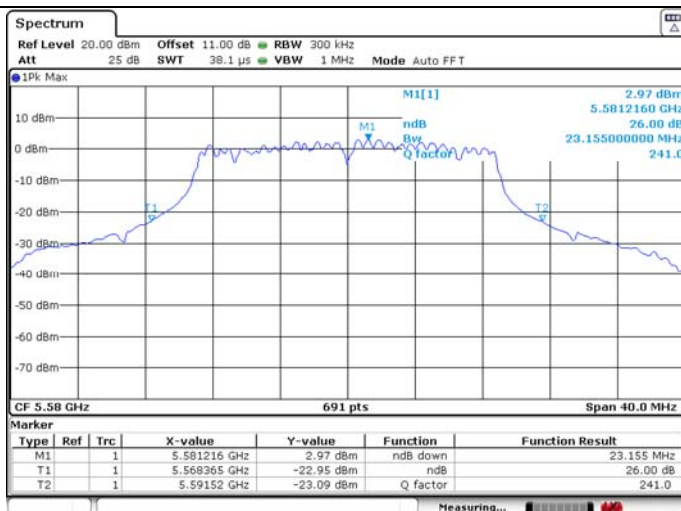


99% Occupied Bandwidth

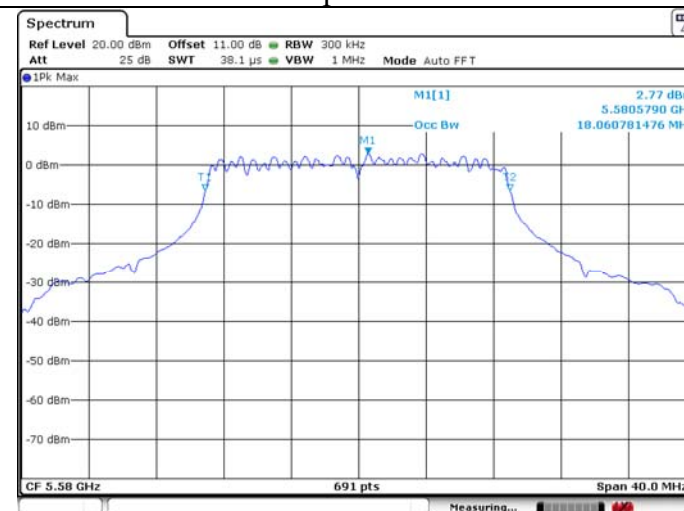


U-NII-2C IEEE 802.11ac VHT20 5580MHz

26dB Bandwidth

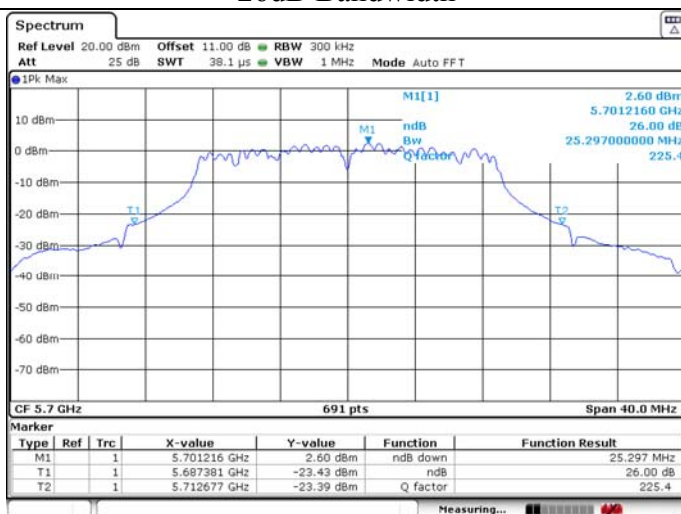


99% Occupied Bandwidth

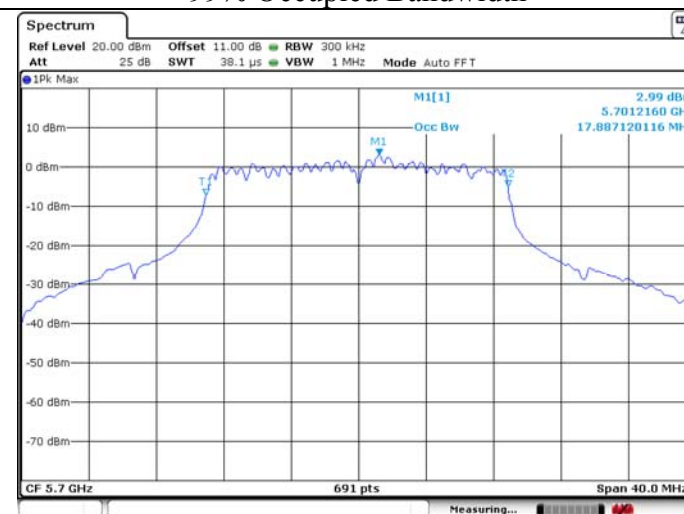


U-NII-2C IEEE 802.11ac VHT20 5700MHz

26dB Bandwidth

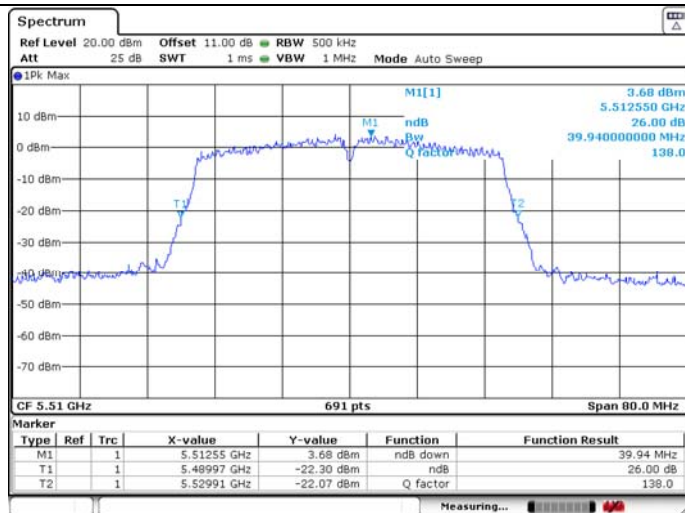


99% Occupied Bandwidth



U-NII-2C IEEE 802.11n HT40 5510MHz

26dB Bandwidth

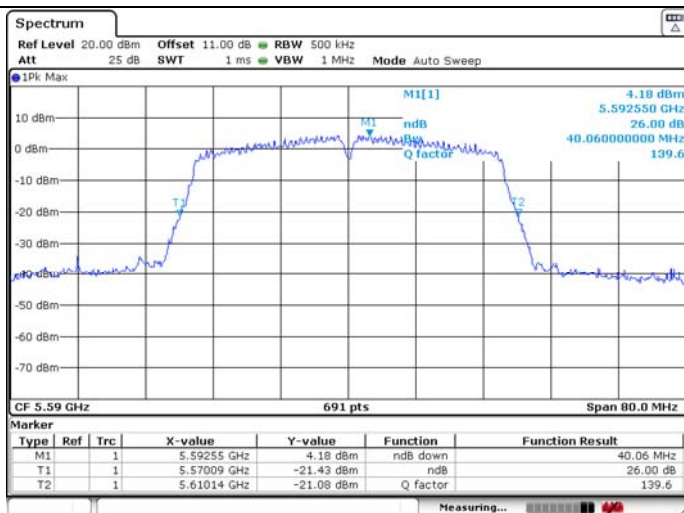


99% Occupied Bandwidth



U-NII-2C IEEE 802.11n HT40 5590MHz

26dB Bandwidth

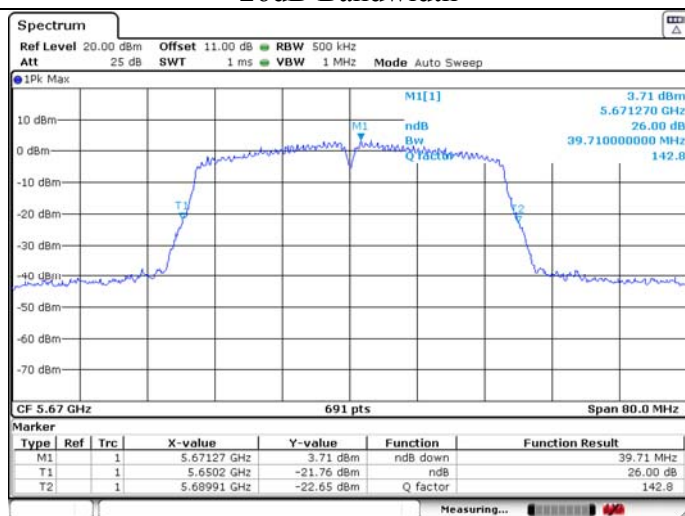


99% Occupied Bandwidth

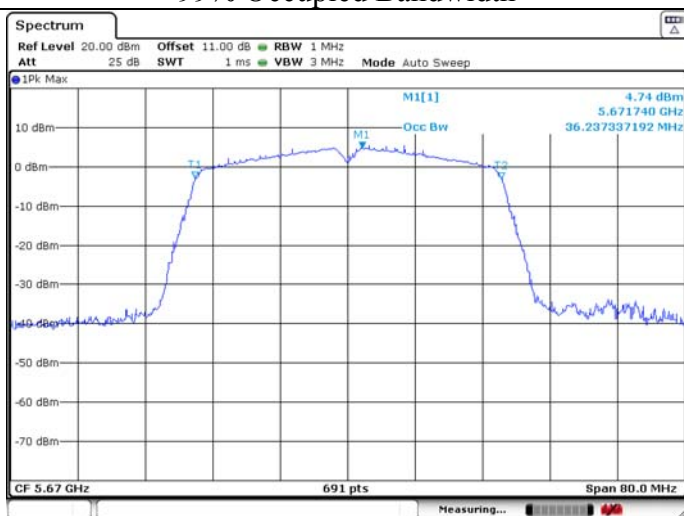


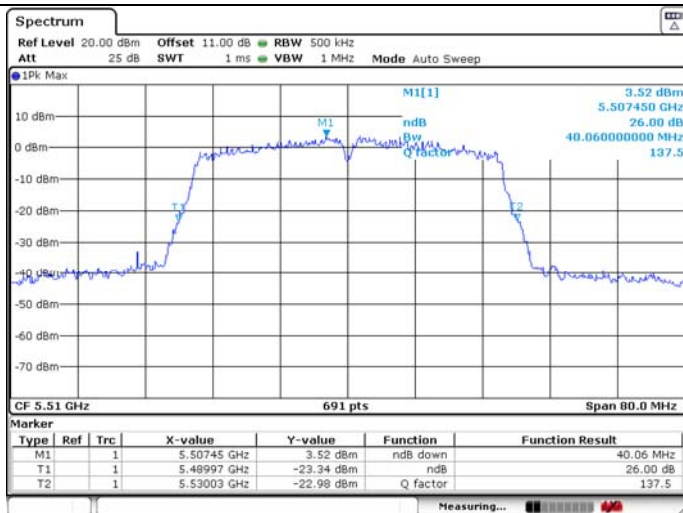
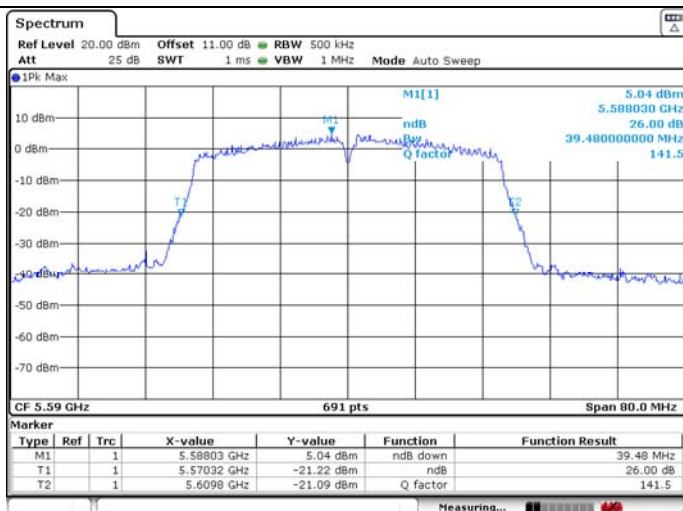
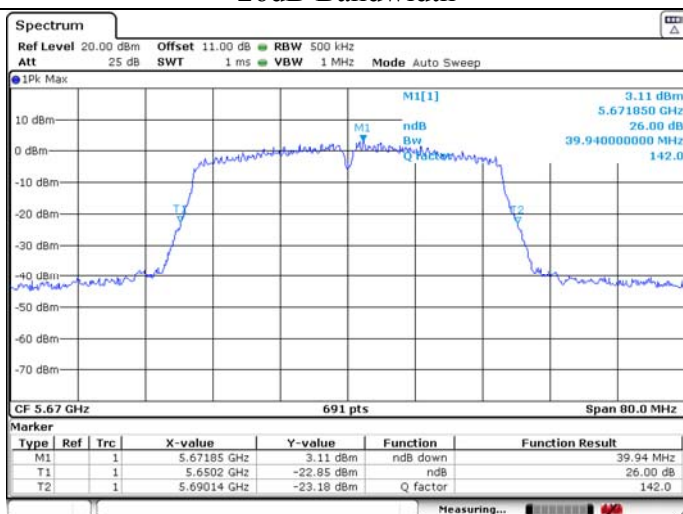
U-NII-2C IEEE 802.11n HT40 5670MHz

26dB Bandwidth



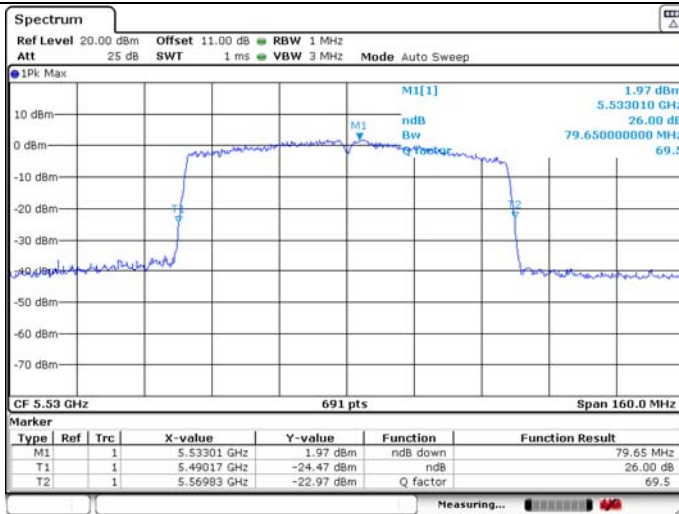
99% Occupied Bandwidth



U-NII-2C IEEE 802.11ac VHT40 5510MHz**26dB Bandwidth****99% Occupied Bandwidth****U-NII-2C IEEE 802.11ac VHT40 5590MHz****26dB Bandwidth****99% Occupied Bandwidth****U-NII-2C IEEE 802.11ac VHT40 5670MHz****26dB Bandwidth****99% Occupied Bandwidth**

U-NII-2C IEEE 802.11ac VHT80 5530MHz

26dB Bandwidth

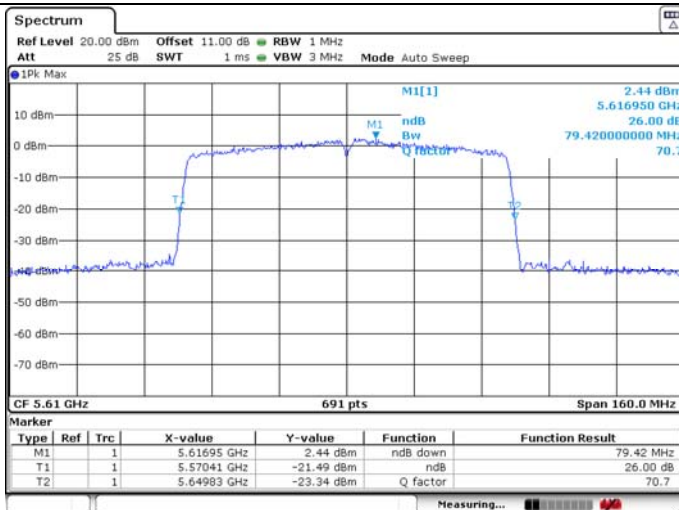


99% Occupied Bandwidth

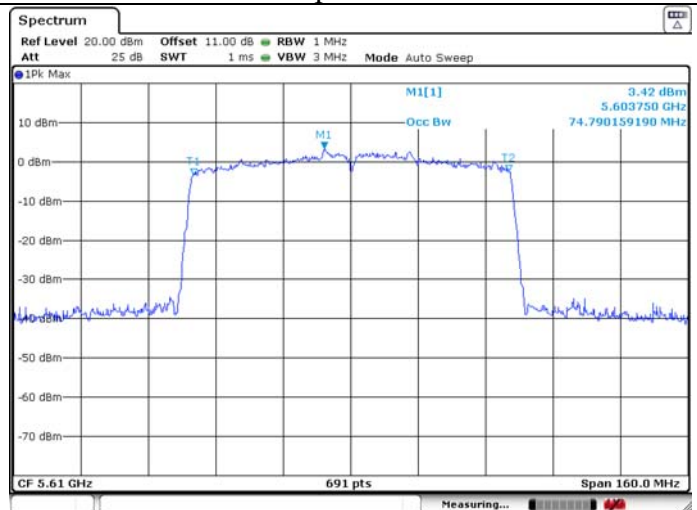


U-NII-2C IEEE 802.11ac VHT80 5610MHz

26dB Bandwidth

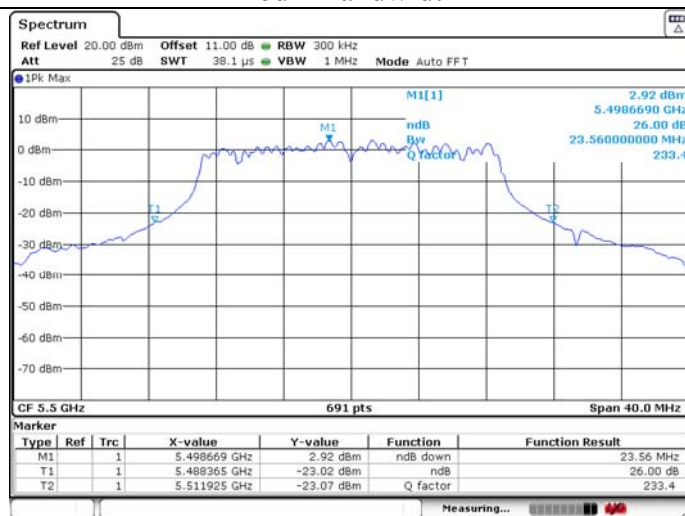


99% Occupied Bandwidth



U-NII-2C IEEE 802.11ax HE20 5500MHz_Ant 1

26dB Bandwidth

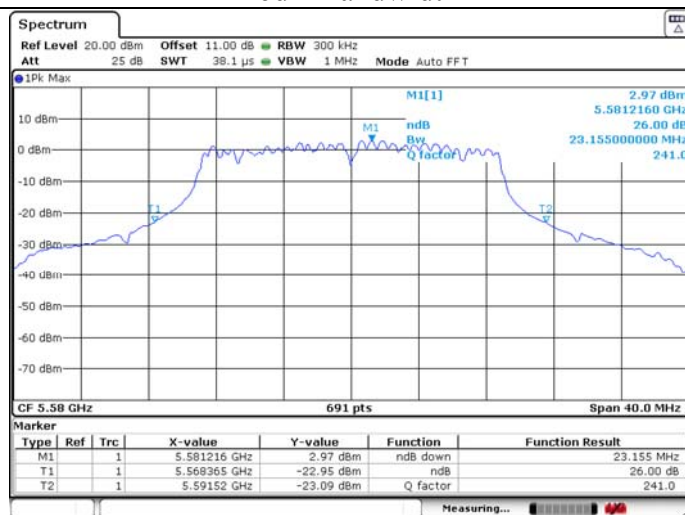


99% Occupied Bandwidth



U-NII-2C IEEE 802.11ax HE20 5580MHz_Ant 1

26dB Bandwidth

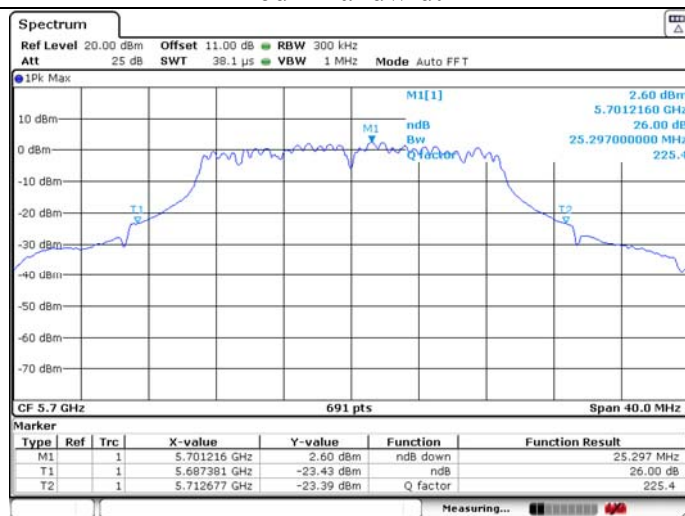


99% Occupied Bandwidth



U-NII-2C IEEE 802.11ax HE20 5700MHz_Ant 1

26dB Bandwidth



99% Occupied Bandwidth

