




# TEST REPORT

<b>Eurofins KCTL Co.,Ltd.</b> 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-70-5008-1021 FAX: 82-505-299-8311 www.kctl.co.kr	Report No.: <b>KR23-SRF254</b> Page (1) of (213)	   <b>KCTL</b>
<b>1. Client</b>		
<ul style="list-style-type: none"> <li>◦ Name : Samsung Electronics Co., Ltd.</li> <li>◦ Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea</li> <li>◦ Date of Receipt : 2023-09-05</li> </ul>		
<b>2. Use of Report</b> : Certification		
<b>3. Name of Product / Model</b> : Tablet PC / SM-X308U		
<b>4. Manufacturer / Country of Origin</b> : Samsung Electronics Co., Ltd. / Vietnam		
<b>5. FCC ID</b> : A3LSMX308U		
<b>6. IC Certificate No.</b> : 649E-SMX308U		
<b>7. Date of Test</b> : 2023-09-19 to 2023-11-22		
<b>8. Location of Test</b> : <input checked="" type="checkbox"/> Permanent Testing Lab <input type="checkbox"/> On Site Testing (Address:65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)		
<b>9. Test method used</b> : FCC Part 15 Subpart E, 15.407 RSS-247 Issue 3 August 2023 RSS-Gen Issue 5 February 2021		
<b>10. Test Result</b> : Refer to the test result in the test report		
Affirmation	Tested by  Name : Kwonse Kim (Signature)	Technical Manager  Name : Seungyong Kim (Signature)
<div style="text-align: right;">2023-11-24</div>		
<div style="text-align: center;"><b>Eurofins KCTL Co.,Ltd.</b></div>		
As a test result of the sample which was submitted from the client, this report does not guarantee the whole product quality. This test report should not be used and copied without a written agreement by Eurofins KCTL Co.,Ltd.		

**REPORT REVISION HISTORY**

Date	Revision	Page No
2023-11-24	Originally issued	-

*This report shall not be reproduced except in full, without the written approval of Eurofins KCTL Co.,Ltd. This document may be altered or revised by Eurofins KCTL Co.,Ltd. personnel only, and shall be noted in the revision section of the document. Any alteration of this document not carried out by Eurofins KCTL Co.,Ltd. will constitute fraud and shall nullify the document. This test report is a general report that does not use the KOLAS accreditation mark and is not related to KS Q ISO/IEC 17025 and KOLAS accreditation.*

**General remarks for test reports**

**Statement concerning the uncertainty of the measurement systems used for the tests**

(may be required by the product standard or client)

Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:

**Procedure number, issue date and title:**

Calculations leading to the reported values are on file with the testing laboratory that conducted the testing.

Statement not required by the standard or client used for type testing

## CONTENTS

1.	General information .....	4
2.	Device information .....	4
2.1.	Frequency/channel operations.....	5
2.2.	Simultaneous Tx Condition .....	6
2.3.	Duty Cycle Factor .....	6
3.	Antenna requirement .....	9
3.1	Antenna information.....	10
3.2	Directional Gain Calculations.....	11
4.	Summary of tests.....	12
5.	Measurement uncertainty .....	13
6.	Measurement results explanation example .....	14
7.	Test results .....	15
7.1.	Maximum conducted output power .....	15
7.2.	Maximum Power Spectral Density .....	38
7.3.	26 dB Bandwidth & 99% Bandwidth.....	53
7.4.	6 dB Bandwidth & 99% Bandwidth.....	78
7.5.	Straddle channel.....	84
7.6.	Spurious Emission, Band Edge and Restricted bands.....	102
7.7.	AC Conducted emission .....	211
8.	Measurement equipment .....	213

## 1. General information

Client : Samsung Electronics Co., Ltd.  
 Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea  
 Manufacturer : Samsung Electronics Co., Ltd.  
 Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea  
 Factory : Samsung Electronics Vietnam Thai Nguyen Co., Ltd  
 Address : Yen Binh Industrial Park, Dong Tien Ward, Pho Yen Town, Thai Nguyen Province, Vietnam  
 Laboratory : Eurofins KCTL Co.,Ltd.  
 Address : 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea  
 Accreditations : FCC Site Designation No: KR0040, FCC Site Registration No: 687132  
 VCCI Registration No. : R-20080, G-20078, C-20059, T-20056  
 CAB Identifier: KR0040  
 ISED Number: 8035A  
 KOLAS No.: KT231

## 2. Device information

Equipment under test : Tablet PC  
 Model : SM-X308U  
 Modulation technique : WIFI(802.11a/n/ac/ax) : OFDM, OFDMA  
 Number of channels : UNII-1 : 4 ch (20 MHz), 2 ch (40 MHz), 1 ch (80 MHz)  
 UNII-2A : 4 ch (20 MHz), 2 ch (40 MHz), 1 ch (80 MHz)  
 UNII-2C : 12 ch (20 MHz), 6 ch (40 MHz), 3 ch (80 MHz)  
 UNII-3 : 5 ch (20 MHz), 2 ch (40 MHz), 1 ch (80 MHz)  
 Power source : DC 3.85 V  
 Antenna specification : Antenna 1 : LDS Antenna  
 Antenna 2 : LDS Antenna  
 Antenna gain :  

	Antenna 1	Antenna 2
UNII-1	: -4.50 dBi	UNII-1 : -4.00 dBi
UNII-2A	: -4.70 dBi	UNII-2A : -4.40 dBi
UNII-2C	: -4.50 dBi	UNII-2C : -5.00 dBi
UNII-3	: -5.80 dBi	UNII-3 : -4.40 dBi

 Frequency range : UNII-1 : 5 180 MHz ~ 5 240 MHz (802.11a/n/ac/ax\_HT20/VHT20/HE20)  
 UNII-1 : 5 190 MHz ~ 5 230 MHz (802.11n/ac/ax\_HT40/VHT40/HE40)  
 UNII-1 : 5 210 MHz (802.11ac/ax\_VHT80/HE80)  
 UNII-2A : 5 260 MHz ~ 5 320 MHz (802.11a/n/ac/ax\_HT20/VHT20/HE20)  
 UNII-2A : 5 270 MHz ~ 5 310 MHz (802.11n/ac/ax\_HT40/VHT40/HE40)  
 UNII-2A : 5 290 MHz (802.11ac/ax\_VHT80/HE80)  
 UNII-2C : 5 500 MHz ~ 5 720 MHz (802.11a/n/ac/ax\_HT20/VHT20/HE20)  
 UNII-2C : 5 510 MHz ~ 5 710 MHz (802.11n/ac/ax\_HT40/VHT40/HE40)  
 UNII-2C : 5 530 MHz ~ 5 690 MHz (802.11ac/ax\_VHT80/HE80)  
 UNII-3 : 5 745 MHz ~ 5 825 MHz (802.11a/n/ac/ax\_HT20/VHT20/HE20)  
 UNII-3 : 5 755 MHz ~ 5 795 MHz (802.11n/ac/ax\_HT40/VHT40/HE40)  
 UNII-3 : 5 775 MHz (802.11ac/ax\_VHT80/HE80)  
 Software version : X308U.001  
 Hardware version : REV1.0  
 Test device serial No. : Conducted : R32W900216P  
 Radiated : R32W9001ZZX  
 Operation temperature : 0 °C ~ 35 °C

## 2.1. Frequency/channel operations

This device contains the following capabilities:

WLAN (11a/b/g/n/ac/ax), Bluetooth (BDR/EDR/BLE), NFC, Digitizer, WCDMA 850/1700/1900,

LTE B2/4/5/7/12/13/14/25/26/30/40/41(PC2/PC3)/48/66/71, ULCA 41C(PC2/PC3)/48C

NR n2/5/12/25/30/41(PC2/PC3)/48/66/71/77(PC2/PC3)/78(PC3), SRS n48/n77(PC2/PC3)/n78(PC3)

### UNII-1

Ch.	Frequency (MHz)
36	5 180
40	5 200
48	5 240

### UNII-2A

Ch.	Frequency (MHz)
52	5 260
56	5 280
64	5 320

### UNII-2C

Ch.	Frequency (MHz)
100	5 500
120	5 600
140	5 700
144	5 720

### UNII-3

Ch.	Frequency (MHz)
149	5 745
157	5 785
165	5 825

Table 2.1-1. 802.11a/n/ac HT20/VHT20 mode

### UNII-1

Ch.	Frequency (MHz)
38	5 190
46	5 230

### UNII-2A

Ch.	Frequency (MHz)
54	5 270
62	5 310

### UNII-2C

Ch.	Frequency (MHz)
102	5 510
118	5 590
134	5 670
142	5 710

### UNII-3

Ch.	Frequency (MHz)
151	5 755
159	5 795

Table 2.1-2. 802.11n/ac HT40/VHT40 mode

### UNII-1

Ch.	Frequency (MHz)
42	5 210

### UNII-2A

Ch.	Frequency (MHz)
58	5 290

### UNII-2C

Ch.	Frequency (MHz)
106	5 530
122	5 610
138	5 690

### UNII-3

Ch.	Frequency (MHz)
155	5 775

Table 2.1-3. 802.11ac VHT80 mode

## 2.2. Simultaneous Tx Condition

The device supports simultaneous transmission operation, which allows for two channels to operate independent of one another in the Bluetooth, 5 GHz bands simultaneously on each antenna.

Simultaneous Tx condition – not RSDB

Mode	# of TX	WLAN 5 GHz		WLAN 2.4 GHz		Bluetooth	Report
		ANT 1	ANT 2	ANT 1	ANT 2	ANT 1	
Bluetooth + WLAN	1	-	0	-	-	0	√

### Notes.

1. Simultaneous condition was performed as a worst case which is configured as a combination of lowest margin for each mode during radiated spurious emission.
2. For simultaneous spurious emission test result, please refer to 15.407\_ax test report.

## 2.3. Duty Cycle Factor

### SISO

Test mode	Period (ms)	T <sub>on</sub> time (ms)	Duty cycle		Duty cycle factor (dB)
			(Linear)	(%)	
802.11a	1.527 4	1.428 0	0.934 9	93.49	0.29
802.11n_HT20	1.435 8	1.336 2	0.930 6	93.06	0.31
802.11n_HT40	0.763 6	0.664 0	0.869 6	86.96	0.61
802.11ac_VHT20	1.443 6	1.344 0	0.931 0	93.10	0.31
802.11ac_VHT40	0.776 4	0.668 0	0.860 4	86.04	0.65
802.11ac_VHT80	0.431 4	0.332 0	0.769 6	76.96	1.14

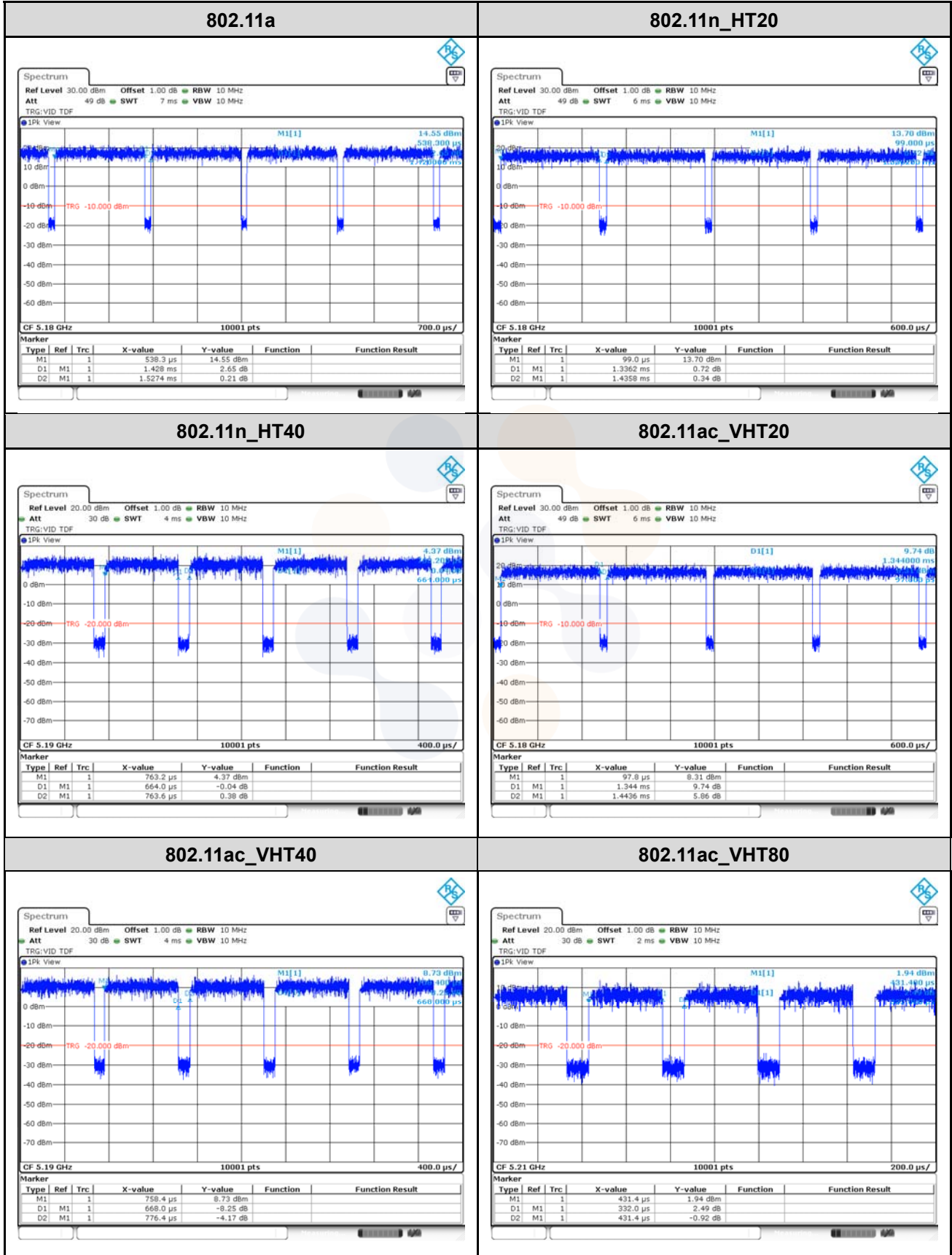
### MIMO

Test mode	Period (ms)	T <sub>on</sub> time (ms)	Duty cycle		Duty cycle factor (dB)
			(Linear)	(%)	
802.11a	1.518 3	1.428 0	0.940 5	94.05	0.27
802.11n_HT20	0.791 6	0.692 0	0.874 2	87.42	0.58
802.11n_HT40	0.455 6	0.356 0	0.781 4	78.14	1.07
802.11ac_VHT20	0.795 6	0.696 0	0.874 8	87.48	0.58
802.11ac_VHT40	0.450 6	0.360 0	0.798 9	79.89	0.97
802.11ac_VHT80	0.291 8	0.191 8	0.657 3	65.73	1.82

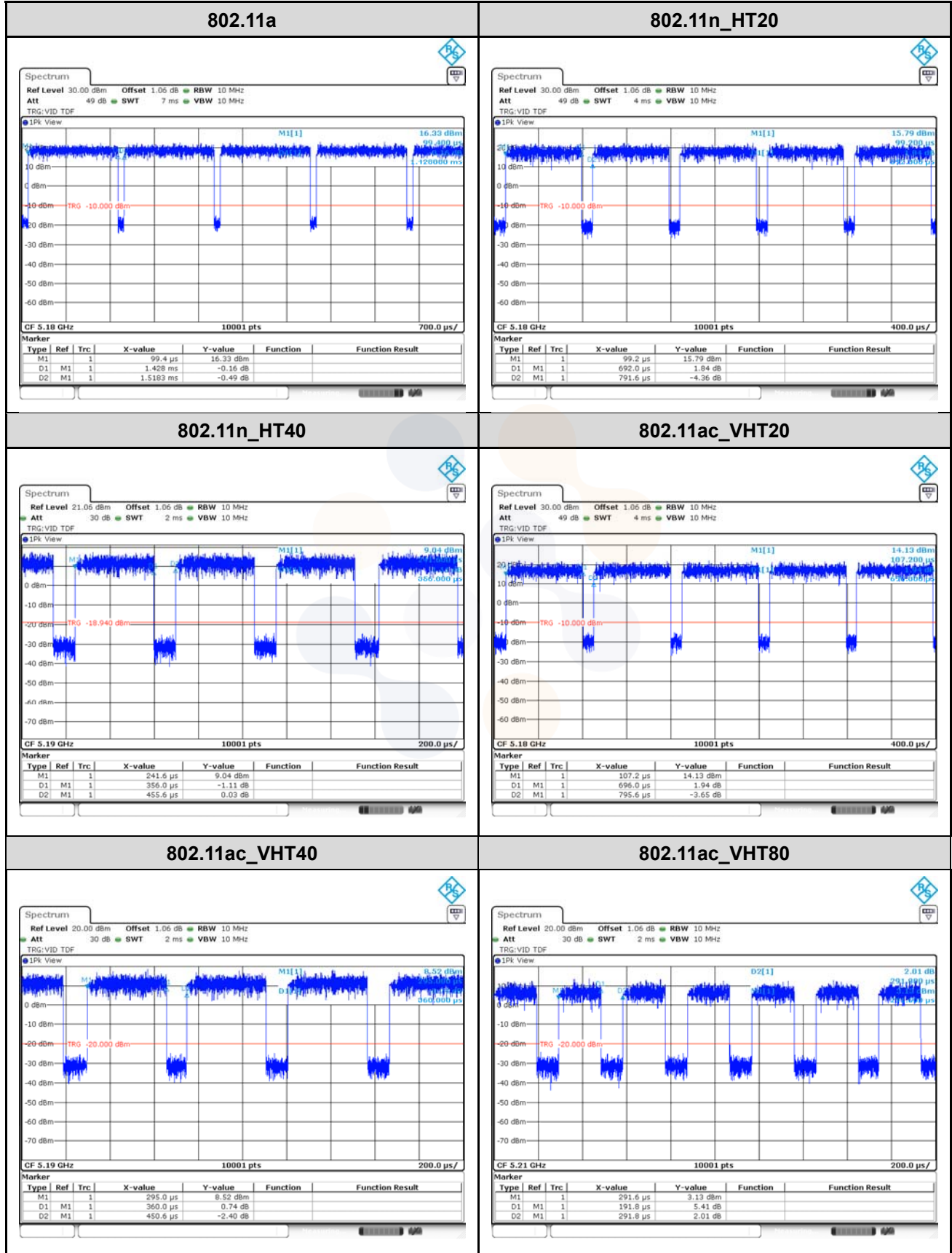
### Notes.

1. Duty cycle (Linear) = T<sub>on</sub> time / Period
2. DCF(Duty cycle factor) = 10log(1/duty cycle)
3. DCF is not compensated to average result if duty cycle is more than 98%



**SISO**



**MIMO**





<p><b>Eurofins KCTL Co.,Ltd.</b> 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-70-5008-1021 FAX: 82-505-299-8311 <a href="http://www.kctl.co.kr">www.kctl.co.kr</a></p>	<p>Report No.: KR23-SRF0254 Page (9) of (213)</p>	<p>   </p>
--	---	--

### **3. Antenna requirement**

#### **Requirement of FCC part section 15.203**

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

#### **Requirement of RSS-Gen Section 6.8:**

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

- The transmitter has permanently attached LDS Antenna (Internal antenna) on board.
- The E.U.T Complies with the requirement of §15.203, §15.247, §15.407.

### 3.1 Antenna information

Mode	SISO		CDD	SDM
	ANT 1	ANT 2	ANT 1 + 2	ANT 1 + 2
802.11a	X	√	√	X
802.11n HT20	X	√	X	√
802.11n HT40	X	√	X	√
802.11ac VHT20	X	√	X	√
802.11ac VHT40	X	√	X	√
802.11ac VHT80	X	√	X	√

√ = Support, X = Not support



### 3.2 Directional Gain Calculations

According to clause F), 2), d), (i) and (ii) of KDB 662911 D01 Multiple Transmitter Output, Directional gain may be calculated by using the formulas as below.

#### Directional Antenna Gain

Band	ANT 1 Gain (dBi)	ANT 2 Gain (dBi)	Power Directional Gain (dBi)
UNII 1	-4.50	-4.00	-1.24
UNII 2A	-4.70	-4.40	-1.54
UNII 2C	-4.50	-5.00	-1.74
UNII 3	-5.80	-4.40	-2.06

**Correlated\_CDD**

Band	ANT 1 Gain (dBi)	ANT 2 Gain (dBi)	Power Directional Gain (dBi)
UNII 1	-4.50	-4.00	-4.24
UNII 2A	-4.70	-4.40	-4.55
UNII 2C	-4.50	-5.00	-4.74
UNII 3	-5.80	-4.40	-5.04

**Uncorrelated\_SDM**

**Note.**

**1. Correlated\_CDD**

Unequal antenna gains, with equal transmit powers. For antenna gains given by  $G_1, G_2, \dots, G_N$  dBi  
 Directional gain =  $10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2 / N_{ANT}]$  dB i

**Sample calculation**

In case of UNII 1, directional gain =  $10 \log[(10^{-4.50/20} + 10^{-4.00/20})^2 / 2] = -1.24$  dB i

**2. Uncorrelated\_SDM**

Unequal antenna gains, with equal transmit powers. For antenna gains given by  $G_1, G_2, \dots, G_N$  dBi  
 Directional gain =  $10 \log[(10^{G_1/10} + 10^{G_2/10} + \dots + 10^{G_N/10}) / N_{ANT}]$  dB i

**Sample calculation**

In case of UNII 1, directional gain =  $10 \log[(10^{-4.50/10} + 10^{-4.00/10}) / 2] = -4.24$  dB i

#### 4. Summary of tests

FCC Part section(s)	IC Rule Reference	Parameter	Test Condition	Test results
15.407(a)	RSS-247 Issue 2, 6.2	Maximum conducted output power	Conducted	Pass
15.407(a)	RSS-247 Issue 2, 6.2	Maximum power spectral density		Pass
15.407(a)	RSS-Gen Issue 5, 6.7	26 dB Channel Bandwidth		Pass
15.407(e)	RSS-247 Issue 2, 6.2.4	6 dB Channel Bandwidth		Pass
-	RSS-Gen Issue 5, 6.7	Occupied Bandwidth		Pass
15.207(a)	RSS-Gen Issue 5, 8.8	AC Conducted Emissions		Pass
15.407(b), 15.205(a), 15.209(a)	RSS-Gen Issue 5, 8.9, 8.10	Spurious emission	Radiated	Pass
	RSS-247 Issue 2, 6.2	Band-edge, restricted band		Pass

**Notes:**

1. All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
2. According to exploratory test no any obvious emission were detected from 9 kHz to 30 MHz. Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30 m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.
3. EUT was investigated in three orthogonal orientations X, Y and Z. it was determined that X orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in X orientation.
4. All configurations have been performed (Stand-alone, Stand-alone with TA, With accessories).  
Worst case: Stand-alone with TA
5. The test procedure(s) in this report were performed in accordance as following.
  - ANSI C63.10-2013
  - KDB 662911 D01 v02r01
  - KDB 789033 D02 v02r01
6. Based on the baseline scan, the worst-case data rates were:
  - 802.11a mode: 6Mbps
  - 802.11n HT20 mode: MCS8
  - 802.11n HT40 mode: MCS8
  - 802.11ac VHT20 mode: MCS0
  - 802.11ac VHT40 mode: MCS0
  - 802.11ac VHT80 mode: MCS0

## 5. Measurement uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of  $k=2$  to indicated a 95 % level of confidence. The measurement data shown herein meets or exceeds the  $U_{CISPR}$  measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded uncertainty ( $\pm$ )	
Conducted RF power	0.9 dB	
Conducted spurious emissions	1.3 dB	
Radiated spurious emissions	Below 30 MHz:	2.3 dB
	30 MHz ~ 1 000 MHz	2.5 dB
	1 000 MHz ~ 18 000 MHz	4.7 dB
	Above 18 000 MHz	4.8 dB
Conducted emissions	9 kHz ~ 150 kHz	2.7 dB
	150 kHz ~ 30 MHz	2.7 dB

## 6. Measurement results explanation example

The offset level is set in the spectrum analyzer to compensate the RF cable loss factor between EUT conducted output port and spectrum analyzer.

With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Frequency (MHz)	Factor(dB)	Frequency (MHz)	Factor(dB)
30	10.12	9 000	12.03
50	10.27	10 000	12.12
100	10.33	11 000	12.13
200	10.42	12 000	12.36
300	10.51	13 000	12.45
400	10.56	14 000	12.60
500	10.61	15 000	13.01
600	10.66	16 000	12.92
700	10.70	17 000	13.28
800	10.73	18 000	13.16
900	10.75	19 000	13.48
1 000	10.76	20 000	13.39
2 000	10.93	21 000	13.64
3 000	11.12	22 000	13.75
4 000	11.24	23 000	13.87
5 000	11.36	24 000	13.90
6 000	11.56	25 000	14.06
7 000	11.59	26 000	14.25
8 000	11.71	26 500	14.07

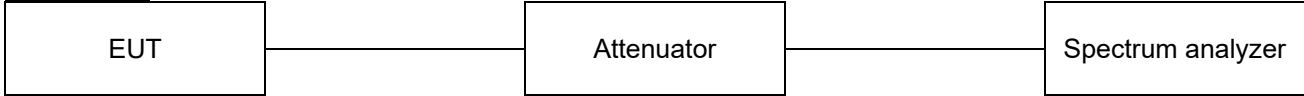
**Notes:**

Offset(dB) = RF cable loss(dB) + Attenuator(dB)

## 7. Test results

### 7.1. Maximum conducted output power

#### Test setup



#### Limit

According to §15.407(a), RSS-247(6.2)

#### FCC

Band	EUT category	Conducted output power limit
UNII-1	Outdoor access point	1 W (30 dBm)
	Indoor access point	
	Fixed point-to-point access point	
	√ Client device	250 mW (23.98 dBm)
UNII-2A	√	250 mW or 11 dBm + 10logB <sup>1)</sup>
UNII-2C	√	250 mW or 11 dBm + 10logB <sup>1)</sup>
UNII-3	√	1 W (30 dBm)

#### IC

Band	Maximum e.i.r.p. limit
UNII-1	200 mW or 10 + 10 logB <sup>2)</sup> , dBm
UNII-2A	1 W or 17 dBm + 10logB <sup>2)</sup>
UNII-2C	1 W or 17 dBm + 10logB <sup>2)</sup>
UNII-3	1 W (30 dBm)

#### Note:

- 1) Conducted output power limit B is the 26 dB emission bandwidth.
- 2) Maximum e.i.r.p. limit B is the 99% emission bandwidth.

#### Test procedure

ANSI C63.10-2013-Section 12.3.2.4 or 12.3.3.1, 14.2

KDB 789033 D02 v02r01 - Section E.2.d) or E.3.a)

KDB 662911 D01 v02r01 – Section E).1) and Section F)

### **Test settings**

**Used test method is Section E.2.d)**

#### **◆ KDB 789033 D02 v02r01**

### **Section E.2.d)**

**Method SA-2 (trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction):**

- (i) Measure the duty cycle,  $x$ , of the transmitter output signal as described in II.B..
- (ii) Set span to encompass the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.
- (iii) Set RBW = 1 MHz
- (iv) Set RBW  $\geq$  3 MHz
- (v) Number of points in sweep  $\geq 2 \times \text{span} / \text{RBW}$ . (This ensures that bin-to-bin spacing is  $\leq \text{RBW} / 2$ , so that narrowband signals are not lost between frequency bins.)
- (vi) Sweep time = auto.
- (vii) Detector = power averaging (rms), if available. Otherwise use sample detector mode.
- (viii) Do not use sweep triggering. Allow the sweep to “free run.”
- (ix) Trace average at least 100 traces in power averaging (rms) mode; however, the number of traces to be averaged shall be increased above 100 as needed to ensure that the average accurately represents the true average over the on and off periods of the transmitter.
- (x) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument’s band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.
- (xi) Add  $10 \log (1/x)$ , where  $x$  is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission). For example, add  $10 \log (1/0,25) = 6 \text{ dB}$  if the duty cycle is 25%.



**Test results**  
**Conducted Output Power**

**SISO**

Test mode	Band	Frequency (MHz)	Measured output power			FCC Limit (dBm)	IC Limit (dBm)
			Reading (dBm)	DCF (dB)	Result (dBm)		
			ANT2		ANT2		
802.11a	UNII 1	5 180	16.45	0.29	16.74	23.98	22.35
		5 200	16.17		16.46		
		5 240	15.98		16.27		
	UNII 2A	5 260	16.22		16.51	23.98	23.35
		5 280	15.93		16.22		
		5 320	15.66		15.95		
	UNII 2C	5 500	16.40		16.69	23.98	23.35
		5 600	16.37		16.66		
		5 700	10.82		11.11		
	UNII 3	5 745	14.59		14.88	30.00	30.00
		5 785	14.23		14.52		
		5 825	14.73		15.02		
802.11n HT20	UNII 1	5 180	15.23	0.31	15.54	23.98	22.63
		5 200	15.25		15.56		
		5 240	15.22		15.53		
	UNII 2A	5 260	15.14		15.45	23.98	23.66
		5 280	15.24		15.55		
		5 320	15.13		15.44		
	UNII 2C	5 500	15.07		15.38	23.98	23.64
		5 600	15.46		15.77		
		5 700	10.04		10.35		
	UNII 3	5 745	13.46		13.77	30.00	30.00
		5 785	13.09		13.40		
		5 825	13.65		13.96		

Test mode	Band	Frequency (MHz)	Measured output power			FCC Limit (dBm)	IC Limit (dBm)
			Reading (dBm)	DCF (dB)	Result (dBm)		
			ANT2		ANT2		
802.11n HT40	UNII 1	5 190	12.36	0.61	12.97	23.98	23.01
		5 230	12.80		13.41		
	UNII 2A	5 270	12.73		13.34	23.98	23.98
		5 310	12.84		13.45		
	UNII 2C	5 510	11.97		12.58	23.98	23.98
		5 590	11.78		12.39		
		5 670	11.68		12.29		
	UNII 3	5 755	11.88		12.49	30.00	30.00
		5 795	10.99		11.60		
	802.11ac VHT20	UNII 1	5 180		15.40	0.31	15.71
5 200			15.45	15.76			
5 240			15.12	15.43			
UNII 2A		5 260	15.31	15.62	23.98		23.66
		5 280	14.92	15.23			
		5 320	15.03	15.34			
UNII 2C		5 500	14.95	15.26	23.98		23.66
		5 600	15.15	15.46			
		5 700	9.99	10.30			
UNII 3		5 745	13.74	14.05	30.00		30.00
		5 785	12.96	13.27			
		5 825	13.55	13.86			

Test mode	Band	Frequency (MHz)	Measured output power			FCC Limit (dBm)	IC Limit (dBm)
			Reading (dBm)	DCF (dB)	Result (dBm)		
			ANT2		ANT2		
802.11ac VHT40	UNII 1	5 190	12.16	0.65	12.81	23.98	23.01
		5 230	12.79		13.44		
	UNII 2A	5 270	12.42		13.07	23.98	23.98
		5 310	12.96		13.61		
	UNII 2C	5 510	12.18		12.83	23.98	23.98
		5 590	11.82		12.47		
		5 670	12.02		12.67		
	UNII 3	5 755	12.01		12.66	30.00	30.00
		5 795	10.99		11.64		
802.11ac VHT80	UNII 1	5 210	9.54	1.14	10.68	23.98	23.01
	UNII 2A	5 290	10.34		11.48	23.98	23.98
	UNII 2C	5 530	11.26		12.40	23.98	23.98
		5 610	10.65		11.79		
	UNII 3	5 775	9.70		10.84	30.00	30.00

**Note:**

1. Conducted Output power(dB m) = Average Reading (dB m) + DCF(dB)

**E.I.R.P.**

Test mode	Band	Frequency (MHz)	Measured output power			MAX e.i.r.p Limit (dBm)
			Conducted output power (dBm)	ANT gain (dBi)	MAX e.i.r.p (dBm)	
			ANT2	ANT2	ANT2	
802.11a	UNII 1	5 180	16.74	-4.00	12.74	22.35
		5 200	16.46		12.46	
		5 240	16.27		12.27	
	UNII 2A	5 260	16.51	-4.40	12.11	29.35
		5 280	16.22		11.82	
		5 320	15.95		11.55	
	UNII 2C	5 500	16.69	-5.00	11.69	29.35
		5 600	16.66		11.66	
		5 700	11.11		6.11	
	UNII 3	5 745	14.88	-4.40	10.48	30.00
		5 785	14.52		10.12	
		5 825	15.02		10.62	
802.11n HT20	UNII 1	5 180	15.54	-4.00	11.54	22.63
		5 200	15.56		11.56	
		5 240	15.53		11.53	
	UNII 2A	5 260	15.45	-4.40	11.05	29.66
		5 280	15.55		11.15	
		5 320	15.44		11.04	
	UNII 2C	5 500	15.38	-5.00	10.38	29.64
		5 600	15.77		10.77	
		5 700	10.35		5.35	
	UNII 3	5 745	13.77	-4.40	9.37	30.00
		5 785	13.40		9.00	
		5 825	13.96		9.56	

Test mode	Band	Frequency (MHz)	Measured output power			MAX e.i.r.p Limit (dBm)
			Conducted output power (dBm)	ANT gain (dBi)	MAX e.i.r.p (dBm)	
			ANT2	ANT2	ANT2	
802.11n HT40	UNII 1	5 190	12.97	-4.00	8.97	23.01
		5 230	13.41		9.41	
	UNII 2A	5 270	13.34	-4.40	8.94	30.00
		5 310	13.45		9.05	
	UNII 2C	5 510	12.58	-5.00	7.58	30.00
		5 590	12.39		7.39	
		5 670	12.29		7.29	
	UNII 3	5 755	12.49	-4.40	8.09	30.00
		5 795	11.60		7.20	
	802.11ac VHT20	UNII 1	5 180	15.71	-4.00	11.71
5 200			15.76	11.76		
5 240			15.43	11.43		
UNII 2A		5 260	15.62	-4.40	11.22	29.66
		5 280	15.23		10.83	
		5 320	15.34		10.94	
UNII 2C		5 500	15.26	-5.00	10.26	29.66
		5 600	15.46		10.46	
		5 700	10.30		5.30	
UNII 3		5 745	14.05	-4.40	9.65	30.00
		5 785	13.27		8.87	
		5 825	13.86		9.46	

Test mode	Band	Frequency (MHz)	Measured output power			MAX e.i.r.p Limit (dBm)
			Conducted output power (dBm)	ANT gain (dBi)	MAX e.i.r.p (dBm)	
			ANT2	ANT2	ANT2	
802.11ac VHT40	UNII 1	5 190	12.81	-4.00	8.81	23.01
		5 230	13.44		9.04	
	UNII 2A	5 270	13.07	-4.40	8.67	30.00
		5 310	13.61		9.21	
	UNII 2C	5 510	12.83	-5.00	7.83	30.00
		5 590	12.47		7.47	
		5 670	12.67		7.67	
	UNII 3	5 755	12.66	-4.40	8.26	30.00
		5 795	11.64		7.24	
	802.11ac VHT80	UNII 1	5 210	10.68	-4.00	6.68
UNII 2A		5 290	11.48	-4.40	7.08	30.00
UNII 2C		5 530	12.40	-5.00	7.40	30.00
		5 610	11.79		6.79	
UNII 3		5 775	10.84	-4.40	6.44	30.00

**Notes:**

1. E.I.R.P. Calculation: E.I.R.P. (dBm) = Conducted output power (dBm) + Antenna gain (dBi)

**MIMO**

Test mode	Band	Frequency (MHz)	Measured output power			FCC Limit (dBm)	IC Limit (dBm)	
			Reading (dBm)		DCF (dB)			Result (dBm)
			ANT1	ANT2				
802.11a	UNII 1	5 180	15.45	15.66	0.27	18.84	23.98	22.31
		5 200	15.70	16.53		19.42		
		5 240	16.13	15.98		19.34		
	UNII 2A	5 260	15.36	16.03		18.99	23.98	23.31
		5 280	16.12	15.72		19.20		
		5 320	16.28	15.90		19.37		
	UNII 2C	5 500	14.99	15.00		18.28	23.98	23.29
		5 600	15.07	15.38		18.51		
		5 700	10.02	11.27		13.97		
	UNII 3	5 745	14.01	14.36		17.47	30.00	30.00
		5 785	13.78	14.26		17.31		
		5 825	14.73	14.67		17.98		
802.11n HT20	UNII 1	5 180	14.35	15.27	0.58	18.42	23.98	22.56
		5 200	14.28	15.08		18.29		
		5 240	14.55	14.79		18.26		
	UNII 2A	5 260	14.21	14.86		18.14	23.98	23.56
		5 280	14.66	14.71		18.28		
		5 320	15.08	14.88		18.57		
	UNII 2C	5 500	13.73	14.29		17.61	23.98	23.57
		5 600	13.69	14.42		17.66		
		5 700	8.84	10.71		13.47		
	UNII 3	5 745	13.03	13.62		16.93	30.00	30.00
		5 785	12.31	13.29		16.42		
		5 825	13.61	13.33		17.06		

Test mode	Band	Frequency (MHz)	Measured output power			FCC Limit (dBm)	IC Limit (dBm)	
			Reading (dBm)		DCF (dB)			Result (dBm)
			ANT1	ANT2				
802.11n HT40	UNII 1	5 190	11.51	11.03	1.07	15.36	23.98	23.01
		5 230	11.93	12.08		16.09		
	UNII 2A	5 270	12.28	12.11		16.28	23.98	23.98
		5 310	12.66	12.46		16.64		
	UNII 2C	5 510	12.07	11.11		15.70	23.98	23.98
		5 590	11.75	10.36		15.19		
		5 670	11.80	10.57		15.31		
	UNII 3	5 755	12.22	10.52		15.53	30.00	30.00
		5 795	11.96	9.72		15.06		
	802.11ac VHT20	UNII 1	5 180	14.83		15.26	0.58	18.64
5 200			14.61	15.10	18.45			
5 240			14.53	14.72	18.22			
UNII 2A		5 260	14.49	14.73	18.20	23.98		23.56
		5 280	14.77	14.40	18.18			
		5 320	15.19	14.81	18.59			
UNII 2C		5 500	13.60	14.08	17.44	23.98		23.56
		5 600	13.64	14.53	17.70			
		5 700	8.87	10.75	13.50			
UNII 3		5 745	13.08	13.68	16.98	30.00		30.00
		5 785	12.36	13.47	16.54			
		5 825	13.64	13.34	17.08			



Test mode	Band	Frequency (MHz)	Measured output power			FCC Limit (dBm)	IC Limit (dBm)	
			Reading (dBm)		DCF (dB)			Result (dBm)
			ANT1	ANT2				
802.11ac VHT40	UNII 1	5 190	11.45	11.18	0.97	15.30	23.98	23.01
		5 230	12.16	12.06		16.09		
	UNII 2A	5 270	12.48	11.95		16.20	23.98	23.98
		5 310	12.85	12.46		16.64		
	UNII 2C	5 510	12.05	11.04		15.55	23.98	23.98
		5 590	11.83	10.29		15.11		
		5 670	11.89	10.23		15.12		
	UNII 3	5 755	12.36	10.31		15.44	30.00	30.00
		5 795	12.65	9.51		15.34		
	802.11ac VHT80	UNII 1	5 210	7.56		9.13	1.82	13.25
UNII 2A		5 290	10.66	10.51	15.42	23.98		23.98
UNII 2C		5 530	8.79	10.66	14.66	23.98		23.98
		5 610	9.86	9.58	14.55			
UNII 3		5 775	10.54	7.98	14.28	30.00		30.00

**Note:**

1. Conducted Output power(dB m) =  $10\log(10^{(ANT\ 1/10)} + 10^{(ANT\ 2/10)})$  (dB m/MHz) + DCF(dB)

**E.I.R.P.**

Test mode	Band	Frequency (MHz)	Measured output power			MAX e.i.r.p Limit (dBm)
			Conducted output Power (dBm)	ANT gain (dBi)	MAX e.i.r.p (dBm)	
802.11a	UNII 1	5 180	18.84	-1.24	17.60	22.30
		5 200	19.42		18.18	
		5 240	19.34		18.10	
	UNII 2A	5 260	18.99	-1.54	17.45	29.31
		5 280	19.20		17.66	
		5 320	19.37		17.83	
	UNII 2C	5 500	18.28	-1.74	16.54	29.30
		5 600	18.51		16.77	
		5 700	13.97		12.23	
	UNII 3	5 745	17.47	-2.06	15.41	30.00
		5 785	17.31		15.25	
		5 825	17.98		15.92	
802.11n HT20	UNII 1	5 180	18.42	-4.24	14.18	22.56
		5 200	18.29		14.05	
		5 240	18.26		14.02	
	UNII 2A	5 260	18.14	-4.55	13.59	29.56
		5 280	18.28		13.73	
		5 320	18.57		14.02	
	UNII 2C	5 500	17.61	-4.74	12.87	29.57
		5 600	17.66		12.92	
		5 700	13.47		8.73	
	UNII 3	5 745	16.93	-5.04	11.89	30.00
		5 785	16.42		11.38	
		5 825	17.06		12.02	

Test mode	Band	Frequency (MHz)	Measured output power			MAX e.i.r.p Limit (dBm)
			Conducted output Power (dBm)	ANT gain (dBi)	MAX e.i.r.p (dBm)	
802.11n HT40	UNII 1	5 190	15.36	-4.24	11.12	23.01
		5 230	16.09		11.85	
	UNII 2A	5 270	16.28	-4.55	11.73	30.00
		5 310	16.64		12.09	
	UNII 2C	5 510	15.70	-4.74	10.96	30.00
		5 590	15.19		10.45	
		5 670	15.31		10.57	
	UNII 3	5 755	15.53	-5.04	10.49	30.00
		5 795	15.06		10.02	
	802.11ac VHT20	UNII 1	5 180	18.64	-4.24	14.40
5 200			18.45	14.21		
5 240			18.22	13.98		
UNII 2A		5 260	18.20	-4.55	13.65	29.56
		5 280	18.18		13.63	
		5 320	18.59		14.04	
UNII 2C		5 500	17.44	-4.74	12.70	29.56
		5 600	17.70		12.96	
		5 700	13.50		8.76	
UNII 3		5 745	16.98	-5.04	11.94	30.00
		5 785	16.54		11.50	
		5 825	17.08		12.04	

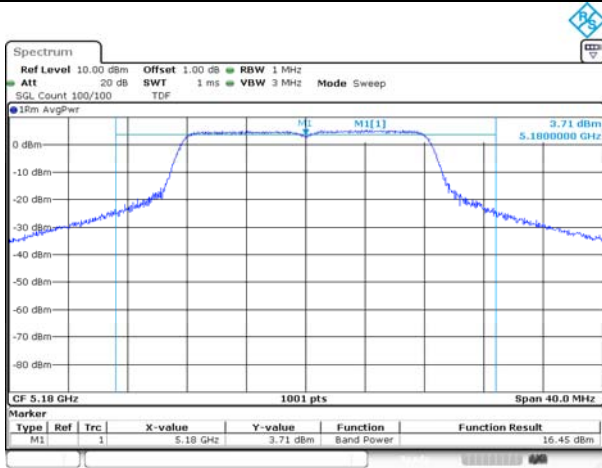
Test mode	Band	Frequency (MHz)	Measured output power			MAX e.i.r.p Limit (dBm)
			Conducted output Power (dBm)	ANT gain (dBi)	MAX e.i.r.p (dBm)	
802.11ac VHT40	UNII 1	5 190	15.30	-4.24	11.06	23.01
		5 230	16.09		11.85	
	UNII 2A	5 270	16.20	-4.55	11.65	30.00
		5 310	16.64		12.09	
	UNII 2C	5 510	15.55	-4.74	10.81	30.00
		5 590	15.11		10.37	
		5 670	15.12		10.38	
	UNII 3	5 755	15.44	-5.04	10.40	30.00
		5 795	15.34		10.30	
	802.11ac VHT80	UNII 1	5 210	13.25	-4.24	9.01
UNII 2A		5 290	15.42	-4.55	10.87	30.00
UNII 2C		5 530	14.66	-4.74	9.92	30.00
		5 610	14.55		9.81	
UNII 3		5 775	14.28	-5.04	9.24	30.00

**Notes:**

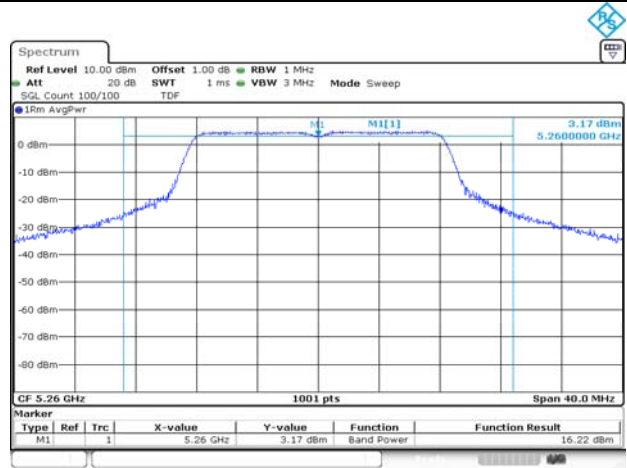
1. E.I.R.P. Calculation: E.I.R.P. (dBm) = Conducted output power (dBm) + Antenna gain (dBi)
2. The max e.i.r.p. limit has reported Ant1 or Ant2, whichever is less

In order to simplify the report, attached plots were the worst case per bandwidth  
 SISO

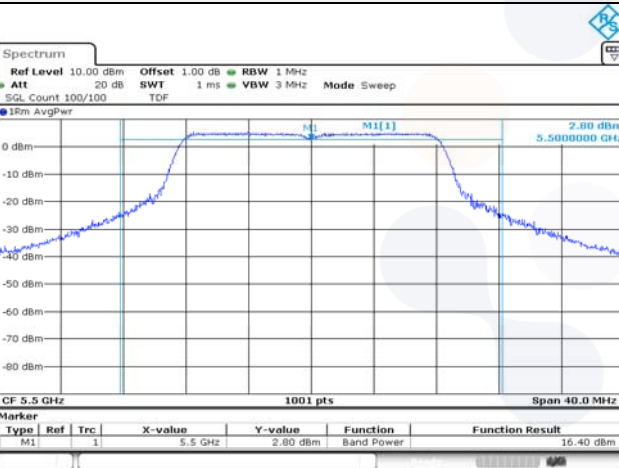
**UNII-1 / 802.11a / Low ch.**



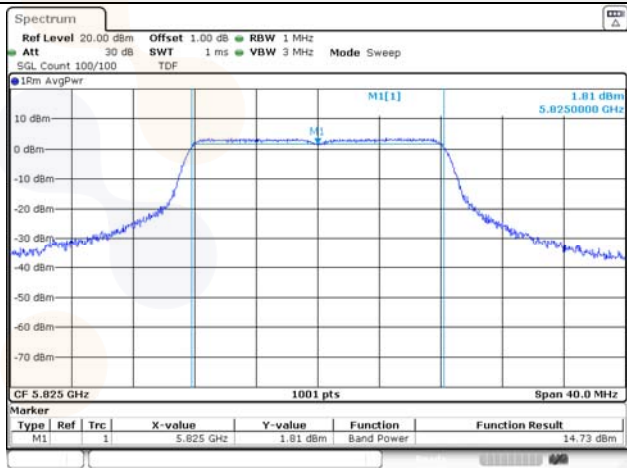
**UNII-2A / 802.11a / Low ch.**



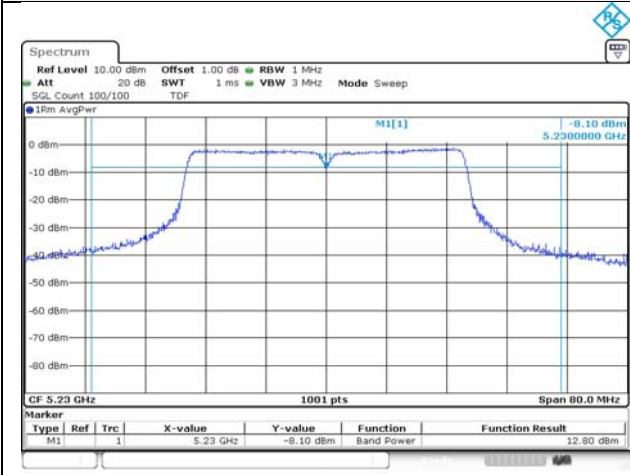
**UNII-2C / 802.11a / Low ch.**



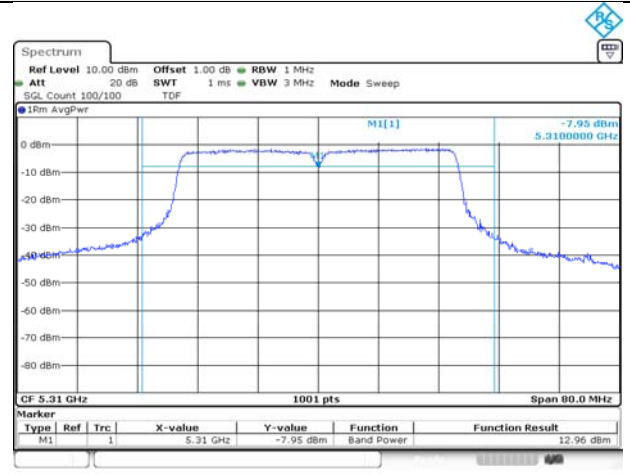
**UNII-3 / 802.11a / High ch.**



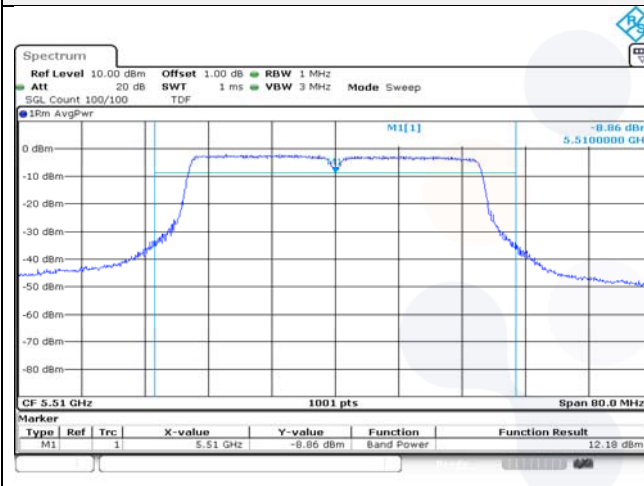
**UNII-1 / 802.11n HT40 / High ch.**



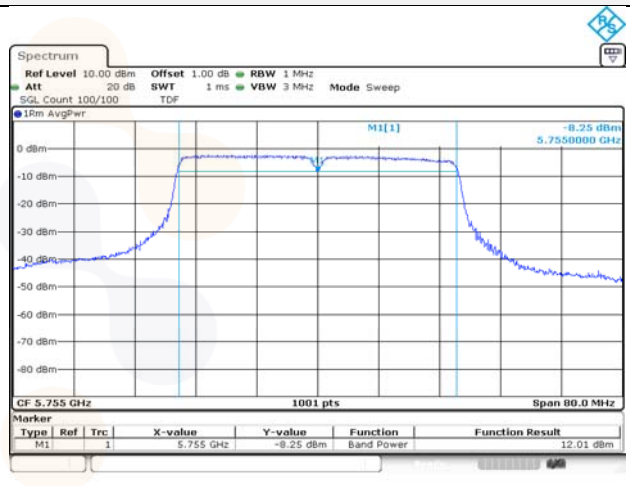
**UNII-2A / 802.11ac VHT40 / High ch.**



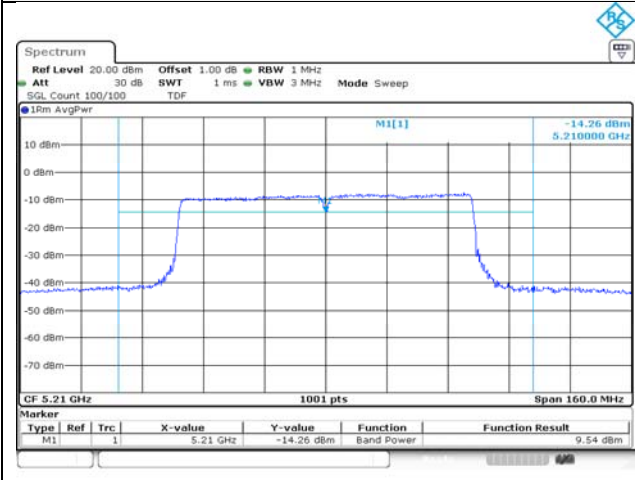
**UNII-2C / 802.11ac VHT40 / Low ch.**



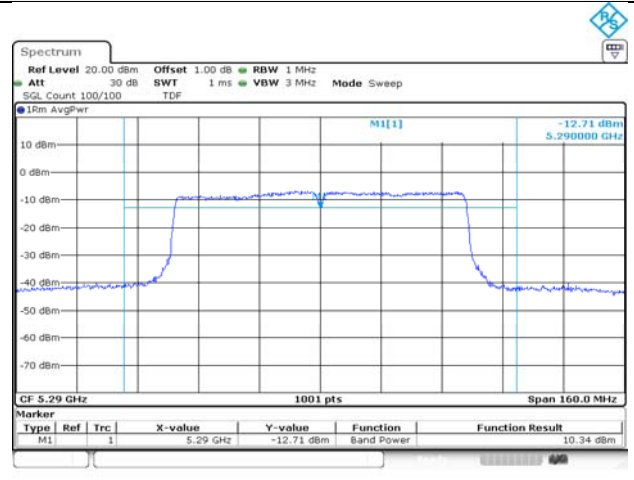
**UNII-3 / 802.11ac VHT40 / Low ch.**



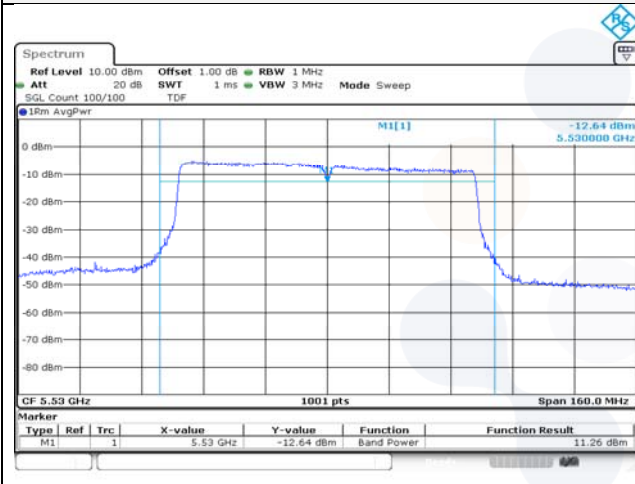
**UNII-1 / 802.11ac VHT80 / Mid ch.**



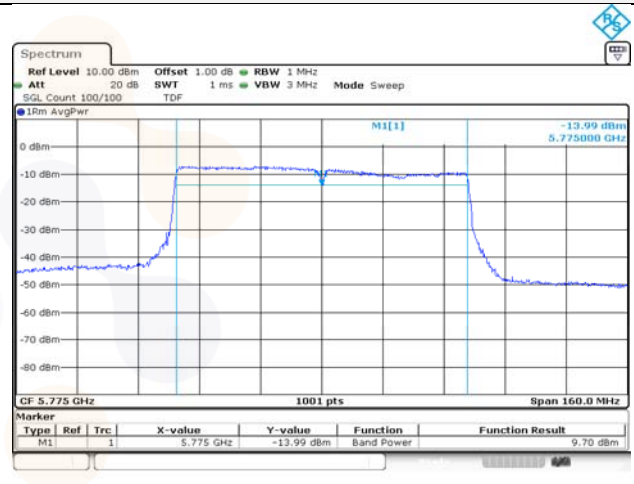
**UNII-2A / 802.11ac VHT80 / Mid ch.**



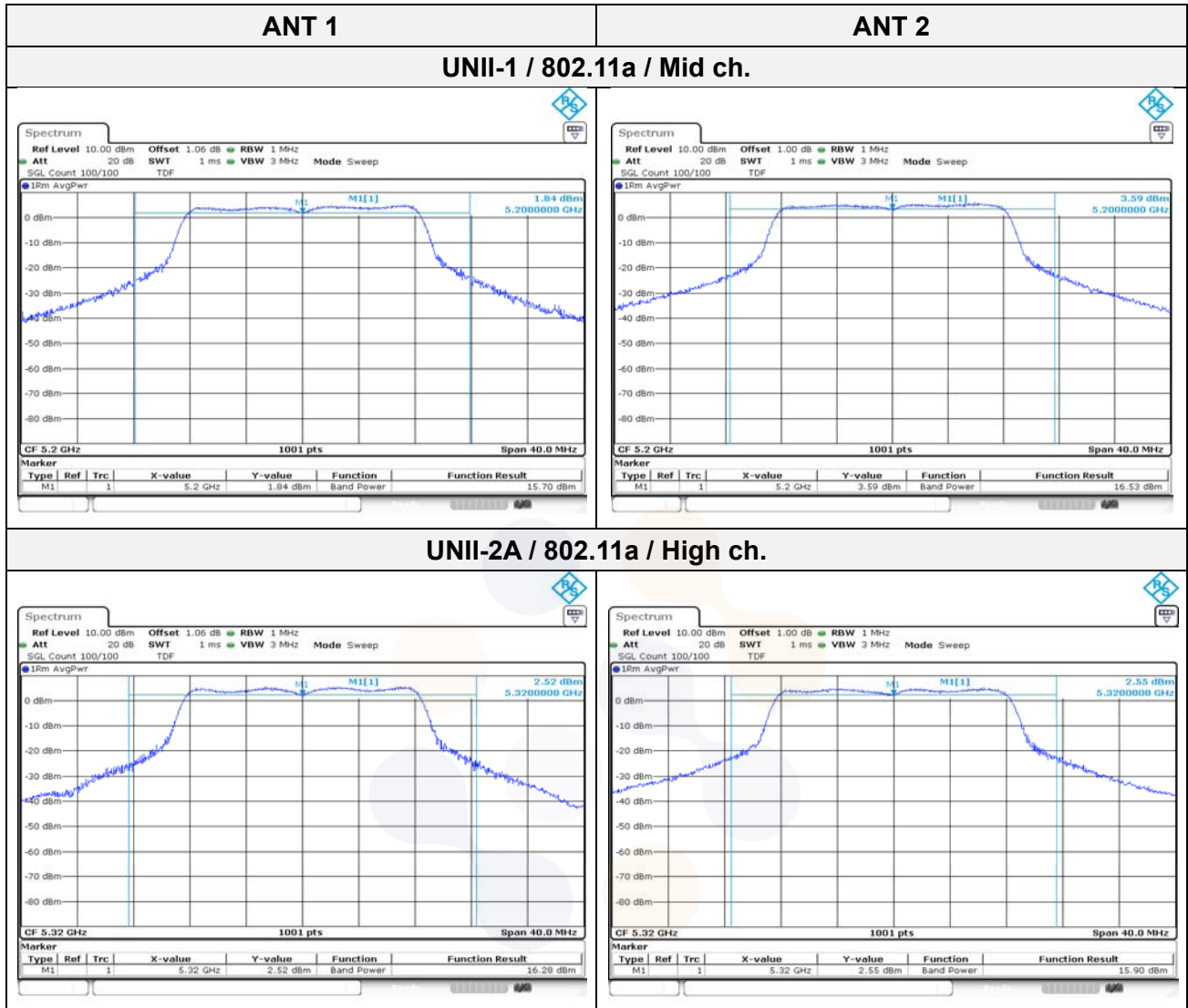
**UNII-2C / 802.11ac VHT80 / Low ch.**



**UNII-3 / 802.11ac VHT80 / Mid ch.**



**MIMO**

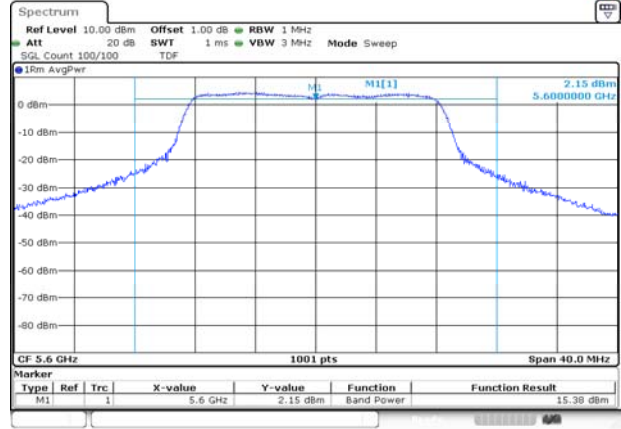
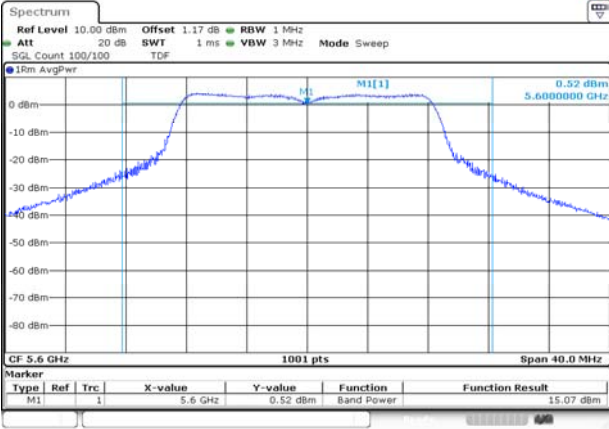




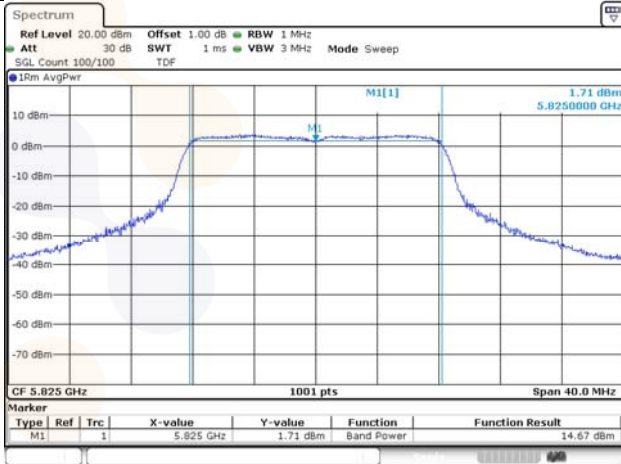
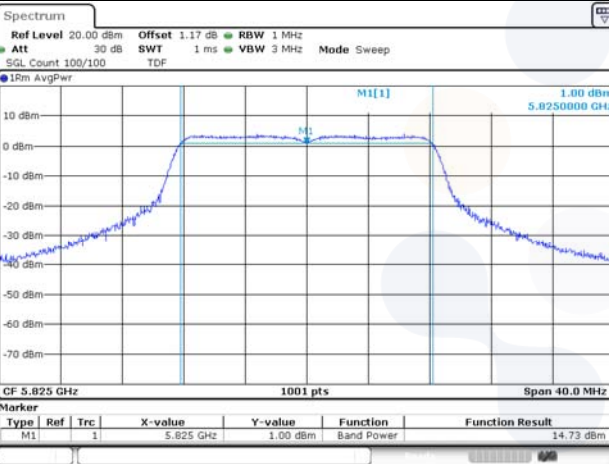
**ANT 1**

**ANT 2**

**UNII-2C / 802.11a / Mid ch.**



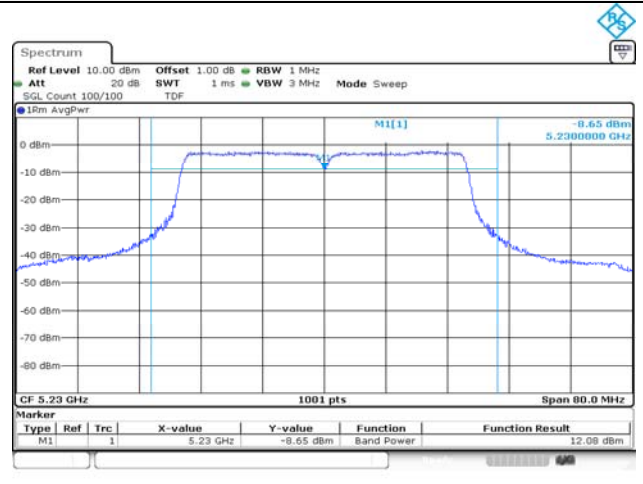
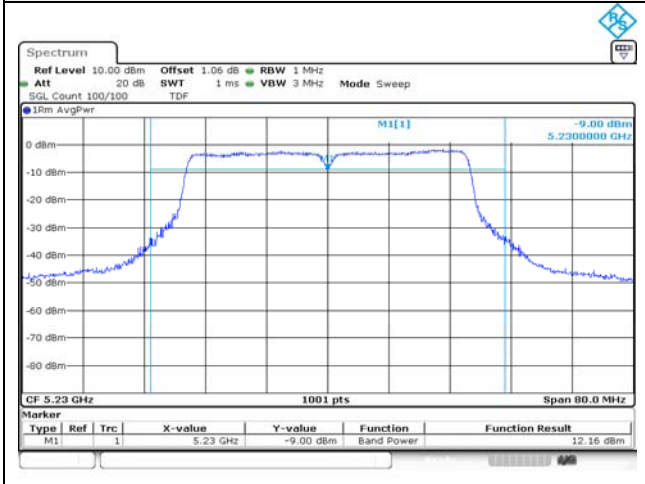
**UNII-3 / 802.11a / High ch.**



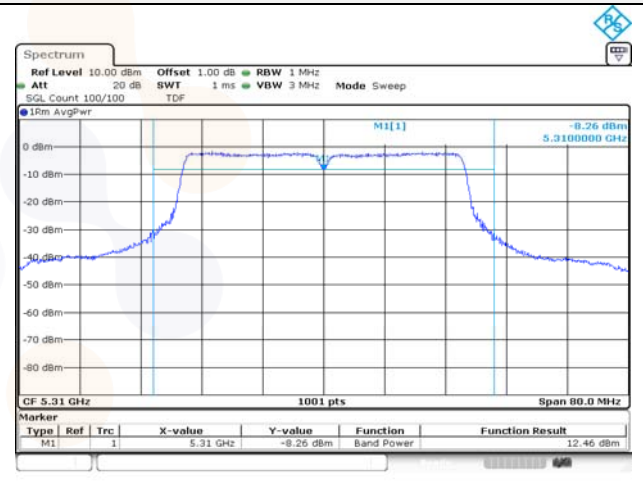
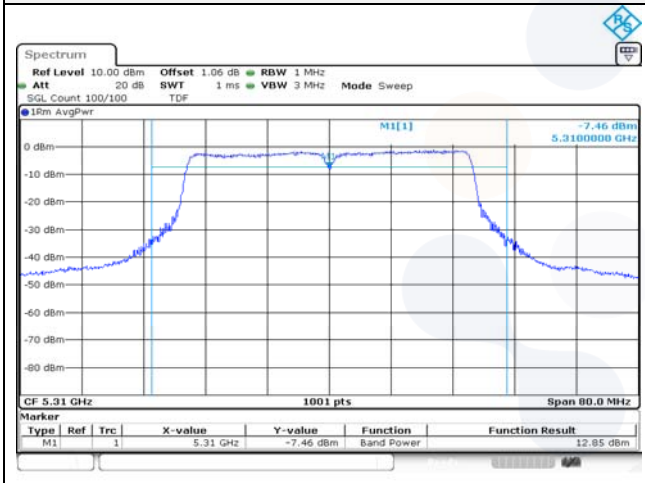
**ANT 1**

**ANT 2**

**UNII-1 / 802.11ac VHT40 / High ch.**



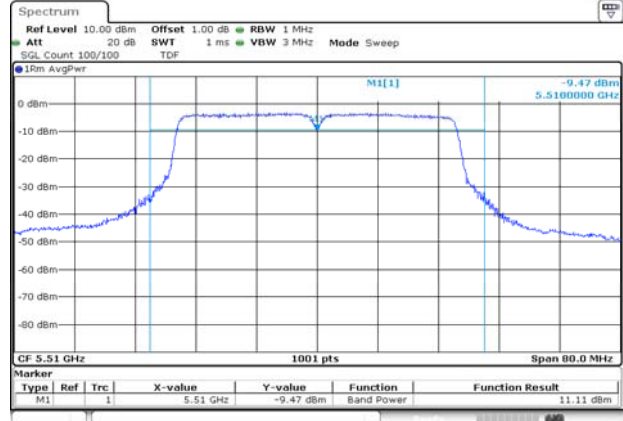
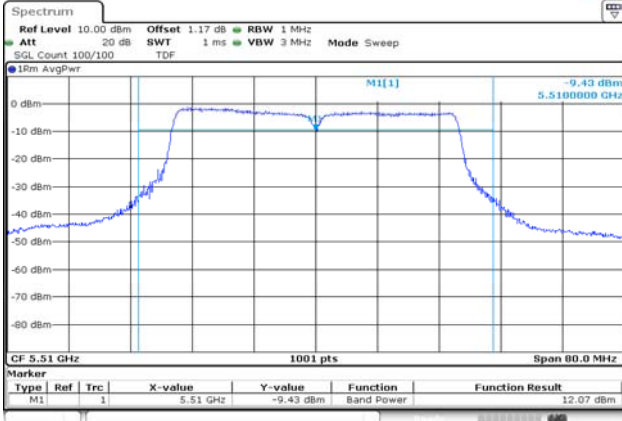
**UNII-2A / 802.11ac VHT40 / High ch.**



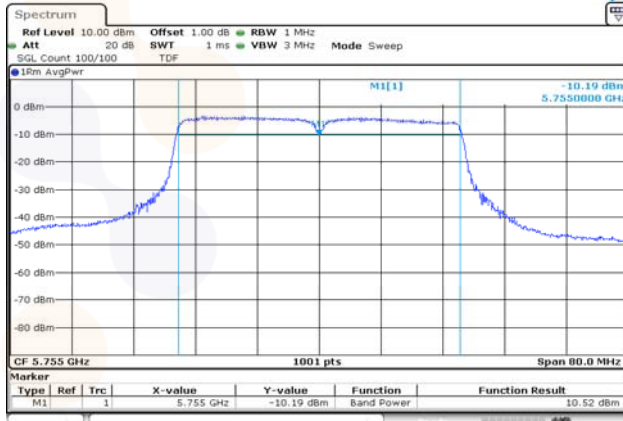
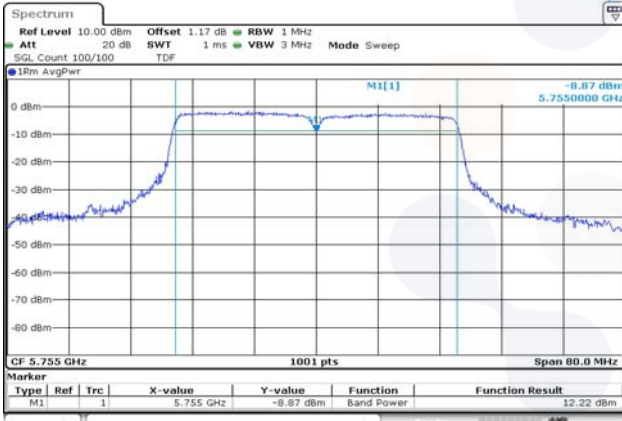
**ANT 1**

**ANT 2**

**UNII-2C / 802.11n HT40 / Low ch.**



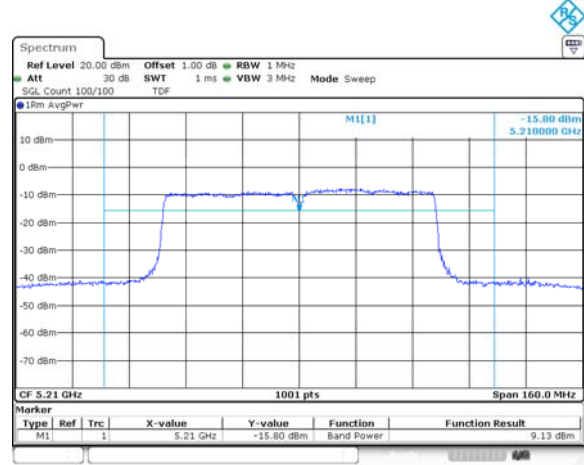
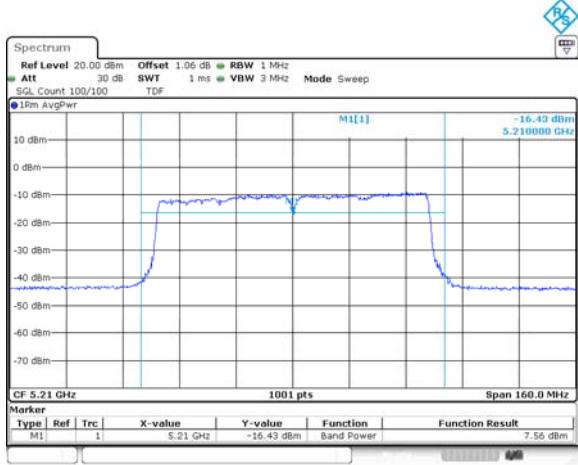
**UNII-3 / 802.11n HT40 / Low ch.**



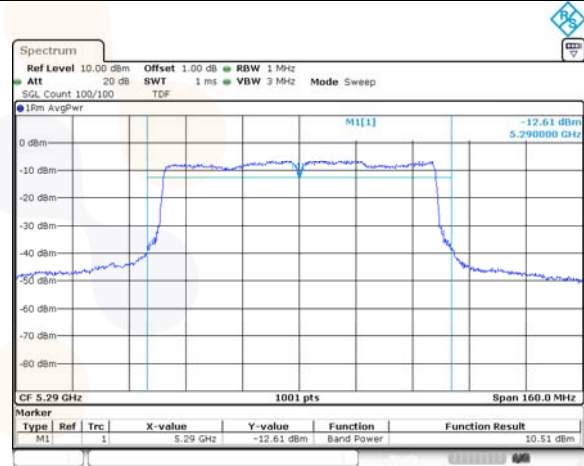
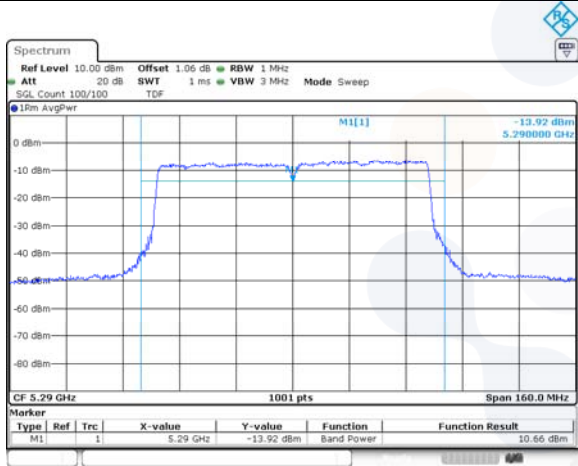
**ANT 1**

**ANT 2**

**UNII-1 / 802.11ac VHT80 / Mid ch.**



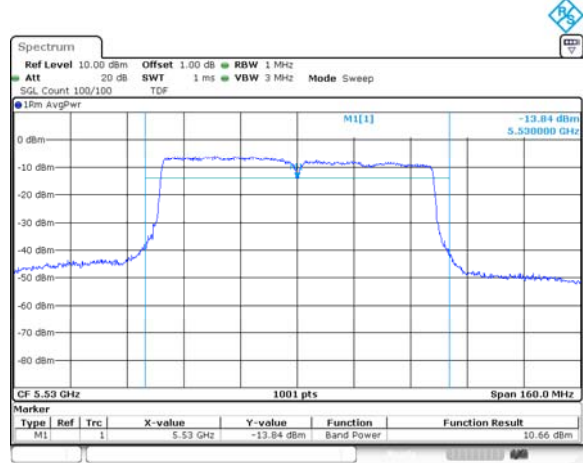
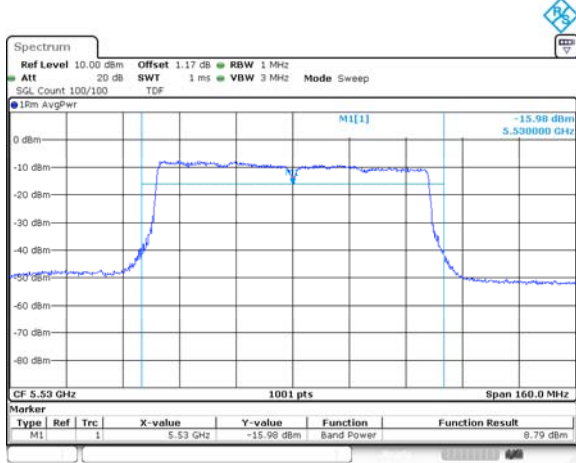
**UNII-2A / 802.11ac VHT80 / Mid ch.**



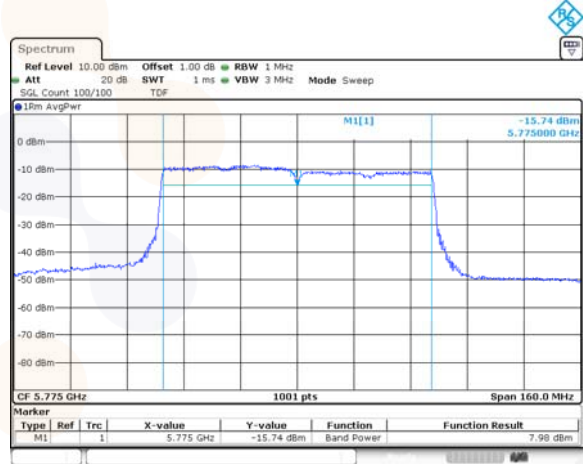
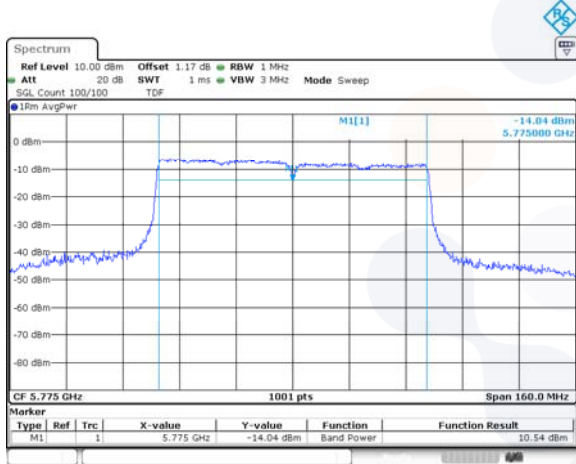
**ANT 1**

**ANT 2**

**UNII-2C / 802.11ac VHT80 / Low ch.**

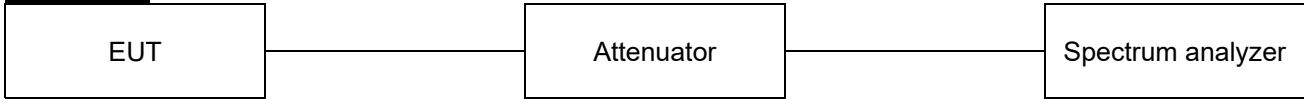


**UNII-3 / 802.11ac VHT80 / Mid ch.**



## 7.2. Maximum Power Spectral Density

### Test setup



### Limit

According to §15.407(a), RSS-247(6.2)

Band	EUT category		Limit
UNII-1		Outdoor access point	17dBm/MHz
		Indoor access point	
		Fixed point-to-point access point	
	√	Client device	11 dBm /MHz
UNII-2A		√	11 dBm /MHz
UNII-2C		√	11 dBm /MHz
UNII-3		√	30 dBm /500 kHz

### Test procedure

ANSI C63.10-2013 Section 12.3.2.2, 14.3.2.2

KDB 789033 D02 v02r01 – Section E and F


KDB 662911 D01 v02r01 - Section E). 2) and Section F)

### Test settings

#### Section F

The rules requires “maximum power spectral density” measurements where the intent is to measure the maximum value of the time average of the power spectral density measured during a period of continuous transmission. Refer to III.A for additional guidance for devices that use channel aggregation.

1. Create an average power spectrum for the EUT operating mode being tested by following the instructions in II.E.2. for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, “Compute power...” (This procedure is required even if the maximum conducted output power measurement was performed using a power meter, method PM.)
2. Search function on the instrument to find the peak of the spectrum and record its value.
3. Adjustments to the peak value of the spectrum, if applicable:
  - a) If Method SA-2 or SA-2 Alternative was used, add  $10 \log(1/x)$ , where  $x$  is the duty cycle, to the peak of the spectrum.
  - b) If Method SA-3 Alternative was used and the linear mode was used in II.E.2.g) (viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.
4. The result is the Maximum PSD over 1MHz reference bandwidth
5. For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the preceding procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in Section 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of RBWs less than 1MHz, or 500 kHz, “provided that the measured power is integrated over the full reference bandwidth” to show the total power over the specified measurement bandwidth(i.e.,

<p><b>Eurofins KCTL Co.,Ltd.</b>  65, Sinwon-ro, Yeongtong-gu,  Suwon-si, Gyeonggi-do, 16677, Korea  TEL: 82-70-5008-1021 FAX: 82-505-299-8311  <a href="http://www.kctl.co.kr">www.kctl.co.kr</a></p>	<p>Report No.:  KR23-SRF0254  Page (39) of (213)</p>	
--	--	---

1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:

- a) Set  $RBW \geq 1/T$ , where T is defined in II.B.1.a).
- b) Set  $VBW \geq 3 RBW$ .
- c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add  $10 \log (500 \text{ kHz} / RBW)$  to the measured result, whereas RBW (<500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
- d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add  $10 \log (1\text{MHz}/RBW)$  to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
- e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

**Note:**

- As a practical matter, it is recommended to use reduced RBW of 100 kHz for the II.F.5.c) and II.F.5.d), since  $RBW=100 \text{ kHz}$  is available on nearly all spectrum analyzers.
- Method SA-2 is used.



**Test results**

**SISO**

Test mode	Band	Frequency (MHz)	Measured PSD (dBm/MHz)	DCF (dB)	Maximum PSD (dB m/MHz)	Limit (dBm/MHz)
			ANT2			
802.11a	UNII 1	5 180	5.27	0.29	5.56	11
		5 200	5.27		5.56	
		5 240	5.12		5.41	
	UNII 2A	5 260	5.12		5.41	11
		5 280	4.93		5.22	
		5 320	5.03		5.32	
	UNII 2C	5 500	5.64		5.93	11
		5 600	6.15		6.44	
		5 700	0.36		0.65	
802.11n HT20	UNII 1	5 180	4.03	0.31	4.34	11
		5 200	4.11		4.42	
		5 240	3.98		4.29	
	UNII 2A	5 260	4.17		4.48	11
		5 280	3.46		3.77	
		5 320	3.82		4.13	
	UNII 2C	5 500	4.10		4.41	11
		5 600	4.43		4.74	
		5 700	-1.03		-0.72	
802.11n HT40	UNII 1	5 190	-1.75	0.61	-1.14	11
		5 230	-1.00		-0.39	
	UNII 2A	5 270	-1.30		-0.69	11
		5 310	-1.51		-0.90	
	UNII 2C	5 510	-0.90		-0.29	11
		5 590	-1.48		-0.87	
5 670	-1.89	-1.28				
802.11ac VHT20	UNII 1	5 180	4.19	0.31	4.50	11
		5 200	4.25		4.56	
		5 240	4.07		4.38	
	UNII 2A	5 260	4.61		4.92	11
		5 280	3.68		3.99	
		5 320	4.20		4.51	
	UNII 2C	5 500	4.15		4.46	11
		5 600	4.49		4.80	
		5 700	-0.94		-0.63	



Test mode	Band	Frequency (MHz)	Measured PSD (dBm/MHz)	DCF (dB)	Maximum PSD (dB m/MHz)	Limit (dBm/MHz)
			ANT2			
802.11ac VHT40	UNII 1	5 190	-1.46	0.65	-0.81	11
		5 230	-0.91		-0.26	
	UNII 2A	5 270	-1.05		-0.40	11
		5 310	-1.14		-0.49	
	UNII 2C	5 510	-1.64		-0.99	11
		5 590	-1.32		-0.67	
5 670	-1.54	-0.89				
802.11ac VHT80	UNII 1	5 210	-7.35	1.14	-6.21	11
	UNII 2A	5 290	-6.69		-5.55	11
	UNII 2C	5 530	-5.12		3.98	11
		5 610	-4.49		-3.35	

Test mode	Band	Frequency (MHz)	Measured PSD (dBm/500 kHz)	DCF (dB)	Maximum PSD (dBm /500 kHz)	Limit (dBm /500 kHz)
			ANT2			
802.11a	UNII 3	5 745	0.84	0.29	1.13	30
		5 785	0.36		0.65	
		5 825	0.86		1.15	
802.11n HT20		5 745	-0.29	0.31	0.02	
		5 785	-0.89		-0.58	
		5 825	-0.52		-0.21	
802.11n HT40		5 755	-4.41	0.61	-3.80	
		5 795	-5.17		-4.56	
802.11ac VHT20		5 745	-0.41	0.31	-0.10	
	5 785	-0.62	-0.31			
	5 825	-0.37	-0.06			
802.11ac VHT40	5 755	-3.76	0.65	-3.11		
	5 795	-4.75		-4.10		
802.11ac VHT80	5 775	-9.15	1.14	-8.01		

**Note:**

1. Maximum PSD(dB m/MHz) = Reading (dB m/MHz) + DCF(dB)
2. The Unit of UNII-2C is (dB m / MHz) and Unit of UNII-3 is (dB m / 500kHz)

**MIMO**

Test mode	Band	Frequency (MHz)	Measured PSD (dBm/MHz)		DCF (dB)	Maximum PSD (dB m/MHz)	Limit (dBm/MHz)
			ANT1	ANT2			
802.11a	UNII 1	5 180	4.57	5.14	0.27	8.14	11
		5 200	5.00	5.65		8.62	
		5 240	5.32	5.56		8.72	
	UNII 2A	5 260	5.62	5.81		9.00	11
		5 280	5.74	5.67		8.99	
		5 320	6.61	5.73		9.47	
	UNII 2C	5 500	4.94	5.23		8.37	11
		5 600	5.03	5.28		8.44	
		5 700	-0.75	0.95		3.46	
802.11n HT20	UNII 1	5 180	3.82	4.18	0.58	7.59	11
		5 200	3.30	2.77		6.63	
		5 240	3.68	3.77		7.32	
	UNII 2A	5 260	3.16	4.00		7.19	11
		5 280	3.67	3.60		7.23	
		5 320	4.16	3.73		7.54	
	UNII 2C	5 500	3.49	3.45		7.06	11
		5 600	3.10	4.30		7.33	
		5 700	-2.02	-0.38		2.47	
802.11n HT40	UNII 1	5 190	-3.12	-2.61	1.07	1.22	11
		5 230	-2.03	-1.61		2.27	
	UNII 2A	5 270	-1.38	-0.76		3.02	11
		5 310	-0.43	-0.85		3.45	
	UNII 2C	5 510	-0.42	-2.05		2.92	11
		5 590	-0.71	-2.47		2.58	
5 670	-1.08	-2.98	2.15				
802.11ac VHT20	UNII 1	5 180	3.55	3.93	0.58	7.33	11
		5 200	3.21	3.87		7.14	
		5 240	3.46	3.77		7.21	
	UNII 2A	5 260	3.68	3.98		7.42	11
		5 280	4.08	3.60		7.44	
		5 320	4.55	3.64		7.71	
	UNII 2C	5 500	3.02	3.34		6.77	11
		5 600	3.04	3.71		6.98	
		5 700	-2.04	-0.61		2.32	

Test mode	Band	Frequency (MHz)	Measured PSD (dBm/MHz)		DCF (dB)	Maximum PSD (dB m/MHz)	Limit (dBm/MHz)
			ANT1	ANT2			
802.11ac VHT40	UNII 1	5 190	-3.12	-2.77	0.97	1.04	11
		5 230	-1.51	-1.96		2.25	
	UNII 2A	5 270	-1.19	-1.78		2.51	11
		5 310	-0.82	-1.10		3.02	
	UNII 2C	5 510	-0.58	-2.47		2.56	11
		5 590	-1.07	-2.94		2.08	
5 670	-1.21	-3.01	1.96				
802.11ac VHT80	UNII 1	5 210	-9.15	-7.73	1.82	-3.55	11
	UNII 2A	5 290	-5.63	-8.38		-1.96	11
	UNII 2C	5 530	-6.54	-5.62		-1.23	11
		5 610	-5.65	-5.73		-0.86	

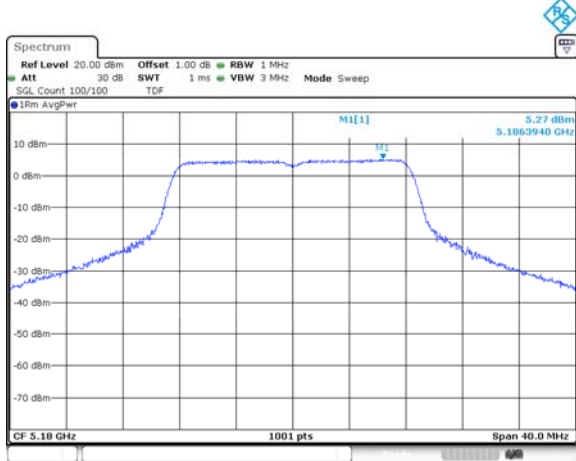
Test mode	Band	Frequency (MHz)	Measured PSD (dBm/500 kHz)		DCF (dB)	Maximum PSD (dBm /500 kHz)	Limit (dBm /500 kHz)
			ANT1	ANT2			
802.11a	UNII 3	5 745	0.41	1.00	0.27	4.00	30
		5 785	-0.09	1.13		3.84	
		5 825	1.56	0.64		4.40	
802.11n HT20		5 745	-1.01	-0.53	0.58	2.83	
		5 785	-1.41	-0.64		2.58	
		5 825	-0.46	-0.66		3.03	
802.11n HT40		5 755	-4.53	-5.77	1.07	-1.03	
		5 795	-4.68	-7.05		-1.62	
802.11ac VHT20		5 745	-0.98	-0.35	0.58	2.94	
	5 785	-0.99	-0.63	2.78			
	5 825	-0.37	-0.58	3.12			
802.11ac VHT40	5 755	-4.49	-5.79	0.97	-1.11		
	5 795	-4.62	-6.54		-1.49		
802.11ac VHT80	5 775	-9.34	-9.96	1.82	-4.81		

**Note:**

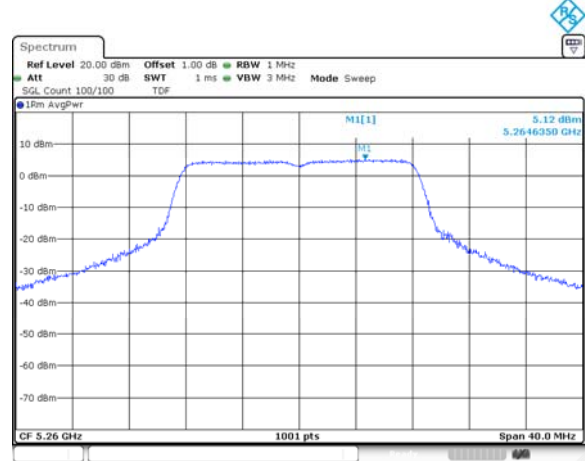
- Maximum PSD(dB m/MHz) =  $10\log(10^{(ANT\ 1/10)} + 10^{(ANT\ 2/10)})$  (dB m/MHz) + DCF(dB)
- The Unit of UNII-2C is (dB m / MHz) and Unit of UNII-3 is (dB m / 500kHz)

In order to simplify the report, attached plots were the worst case per bandwidth SISO

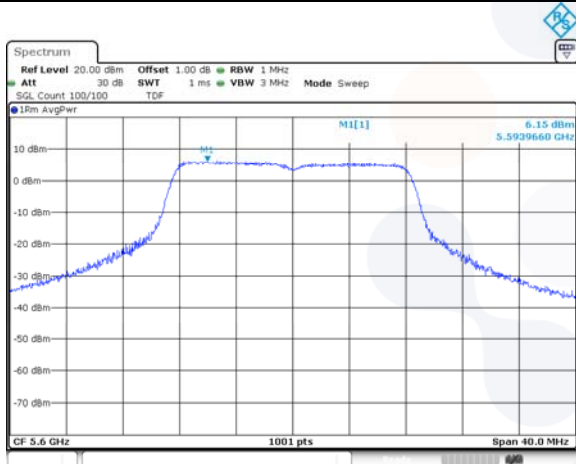
**UNII-1 / 802.11a / Low ch.**



**UNII-2A / 802.11a / Low ch.**



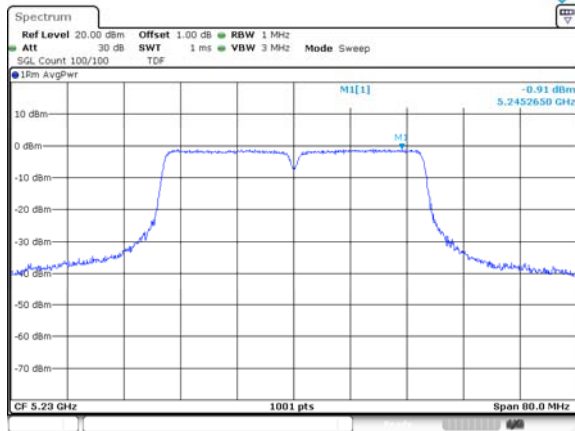
**UNII-2C / 802.11a / Mid ch.**



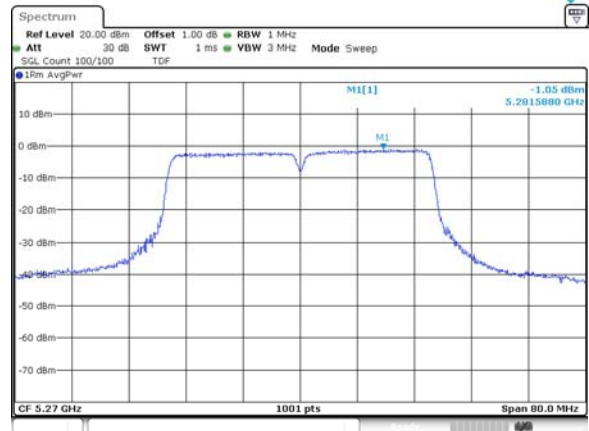
**UNII-3 / 802.11a / High ch.**



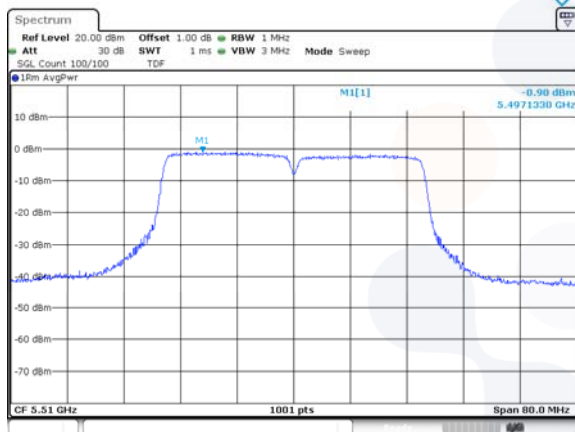
**UNII-1 / 802.11ac VHT40 / High ch.**



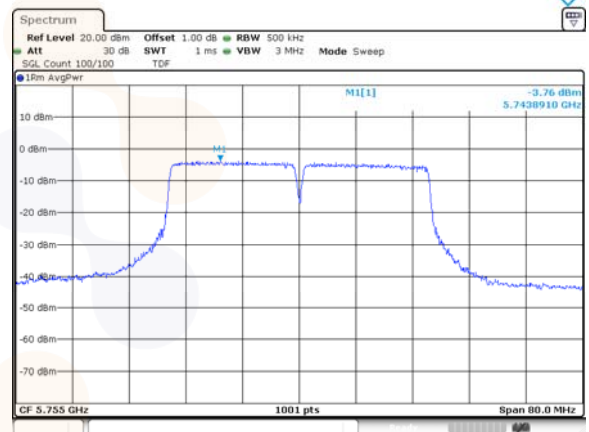
**UNII-2A / 802.11ac VHT40 / Low ch.**



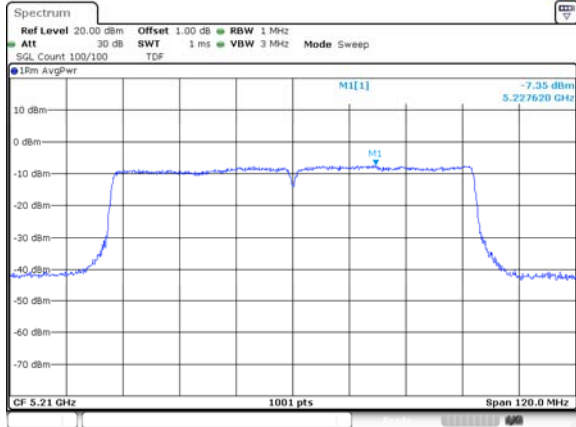
**UNII-2C / 802.11n HT40 / Low ch.**



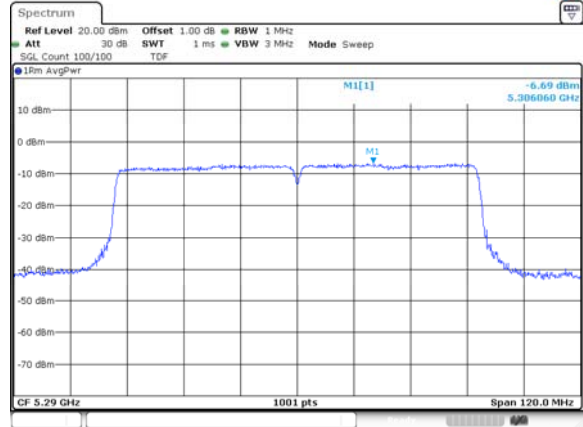
**UNII-3 / 802.11ac VHT40 / Low ch.**



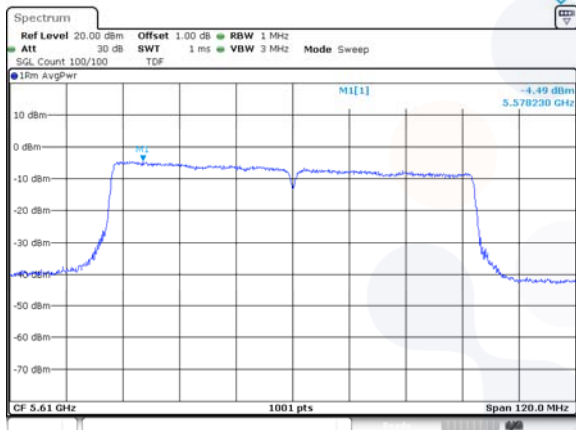
**UNII-1 / 802.11ac VHT80 / Mid ch.**



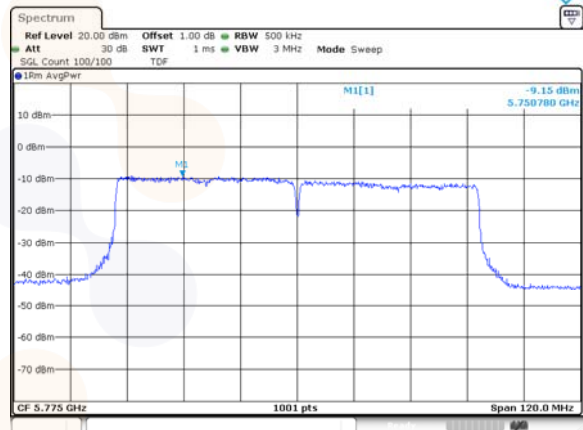
**UNII-2A / 802.11ac VHT80 / Mid ch.**



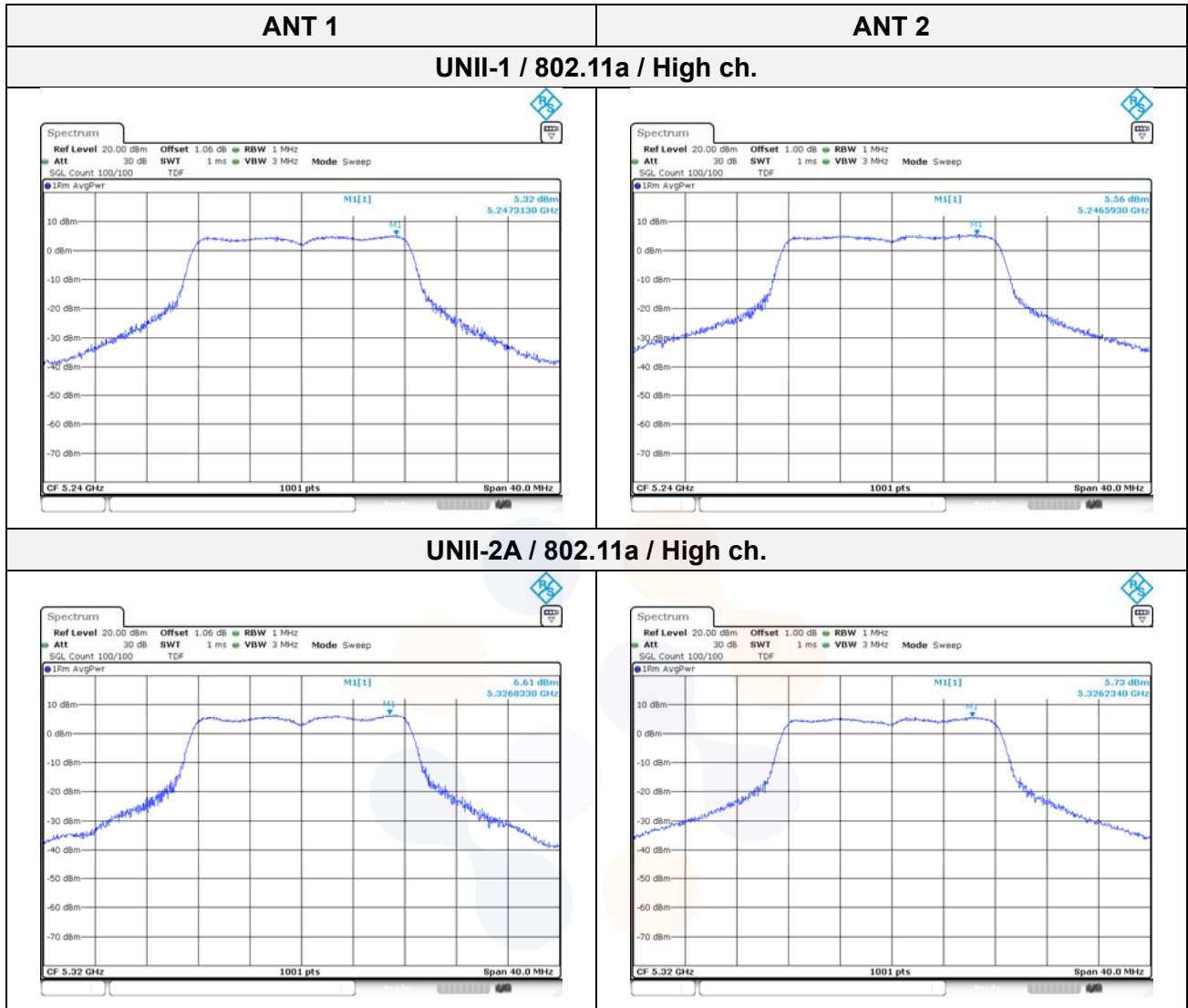
**UNII-2C / 802.11ac VHT80 / High ch.**



**UNII-3 / 802.11ac VHT80 / Mid ch.**



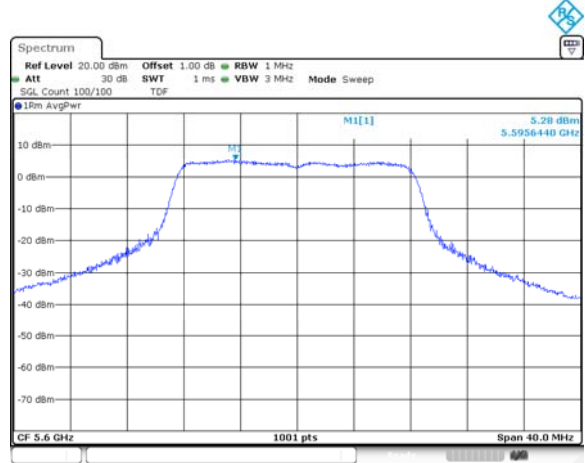
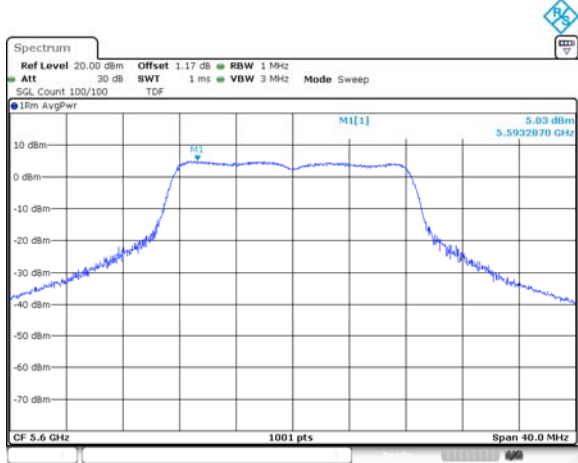
**MIMO**



**ANT 1**

**ANT 2**

**UNII-2C / 802.11a / Mid ch.**



**UNII-3 / 802.11a / High ch.**

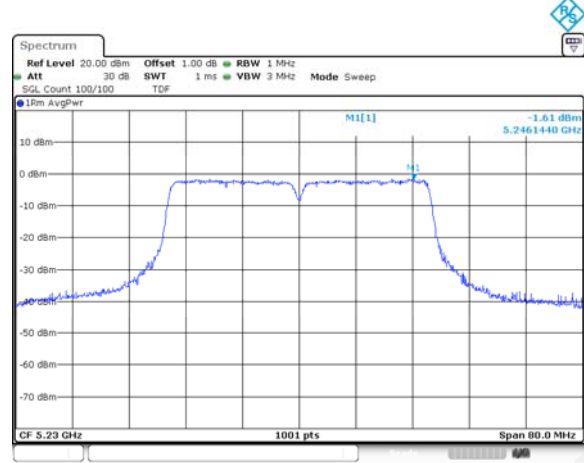
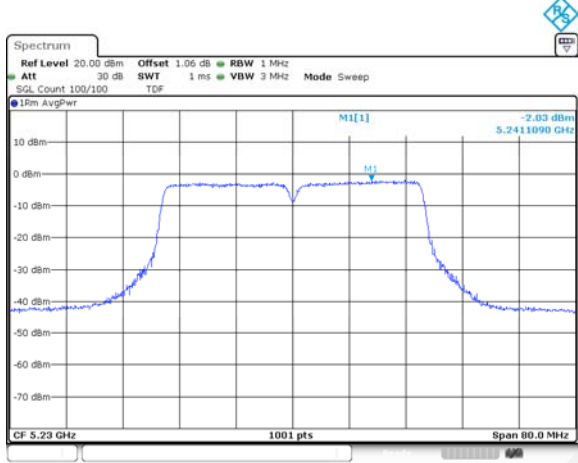




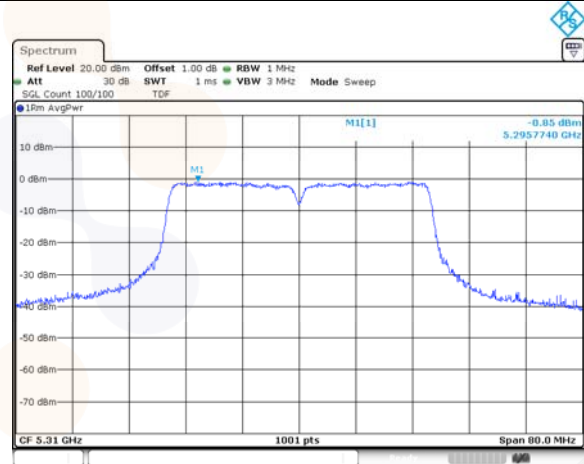
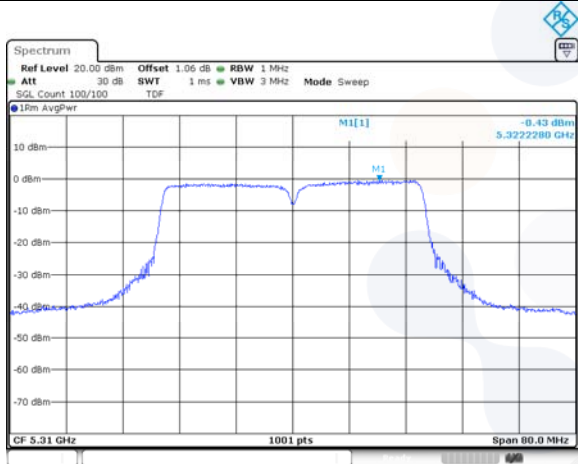
**ANT 1**

**ANT 2**

**UNII-1 / 802.11n HT40 / High ch.**



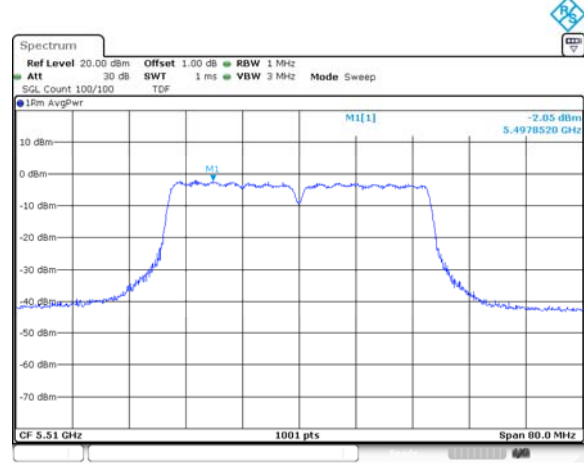
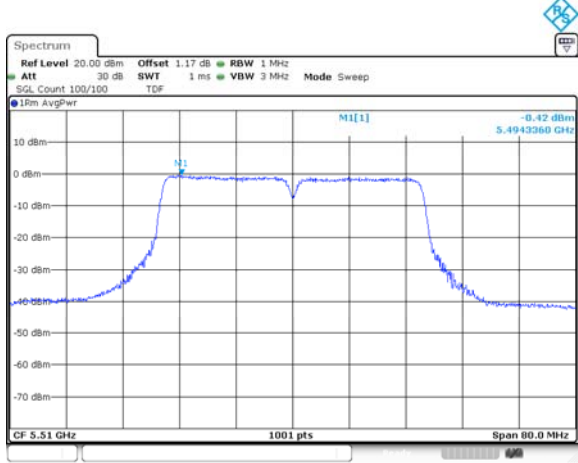
**UNII-2A / 802.11n HT40 / High ch.**



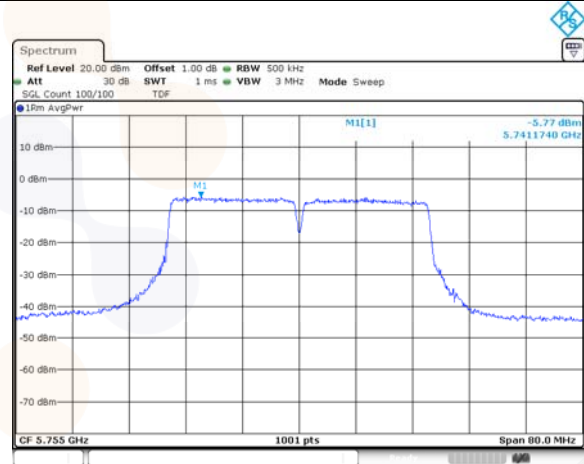
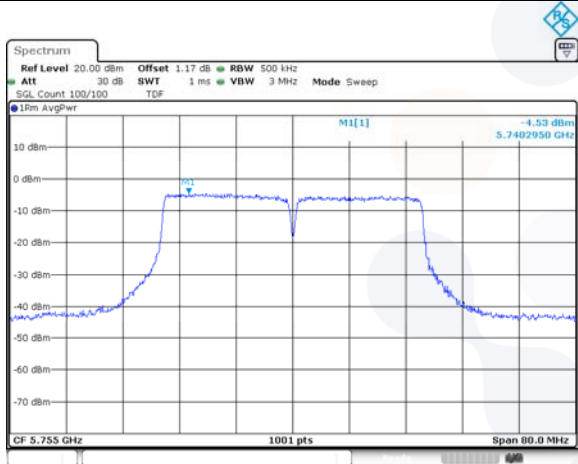
**ANT 1**

**ANT 2**

**UNII-2C / 802.11n HT40 / Low ch.**



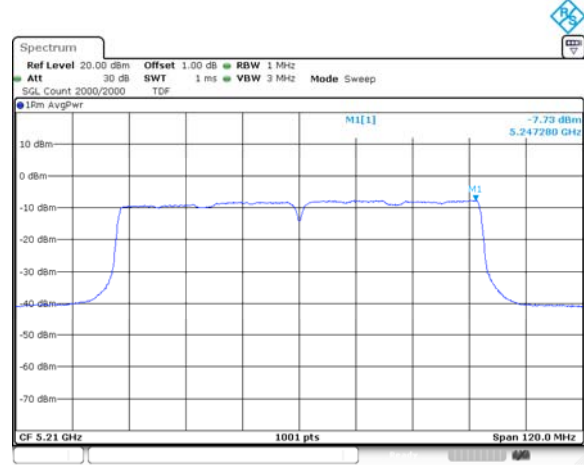
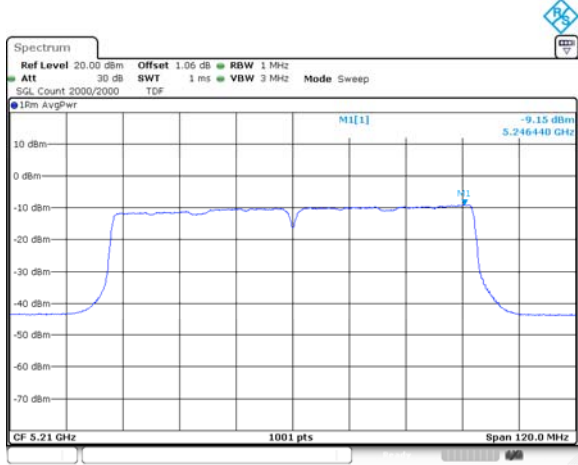
**UNII-3 / 802.11n HT40 / Low ch.**



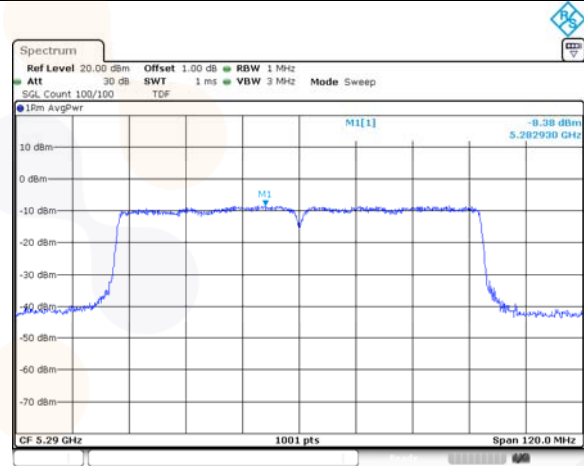
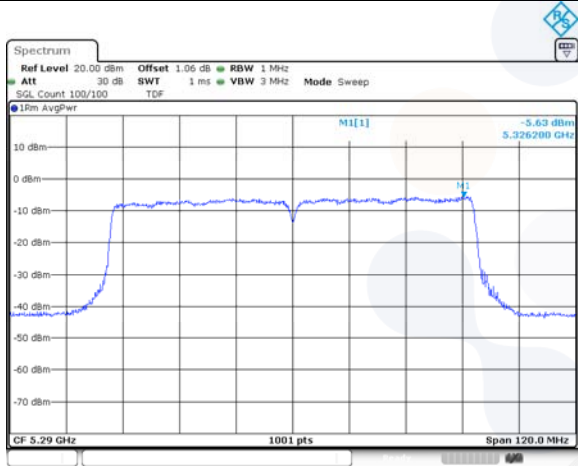
**ANT 1**

**ANT 2**

**UNII-1 / 802.11ac VHT80 / Mid ch.**



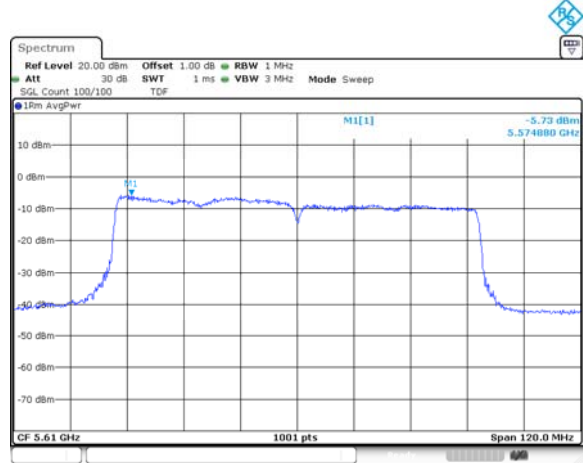
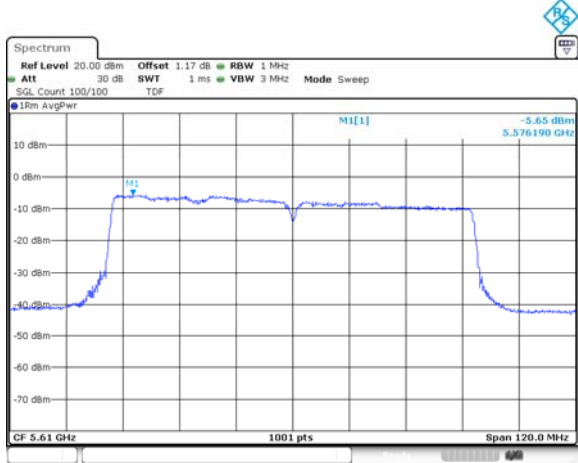
**UNII-2A / 802.11ac VHT80 / Mid ch.**



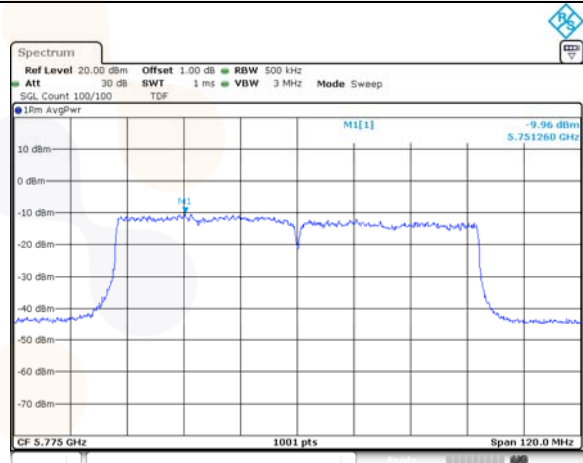
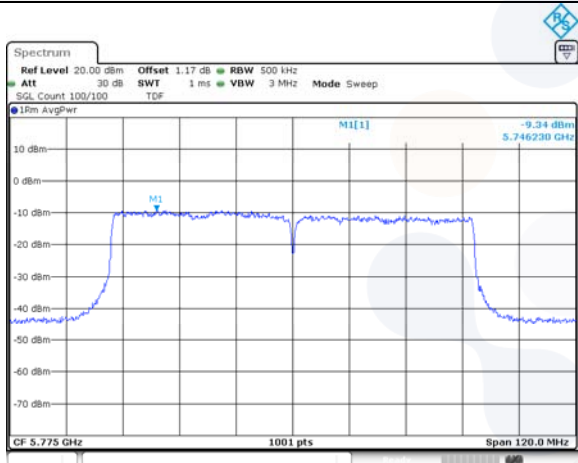
**ANT 1**

**ANT 2**

**UNII-2C / 802.11ac VHT80 / High ch.**

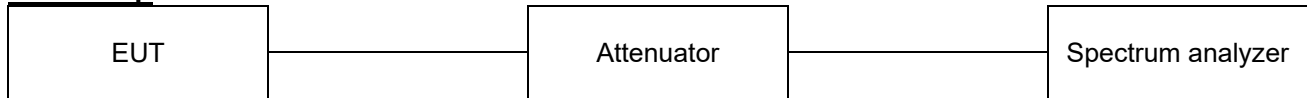


**UNII-3 / 802.11ac VHT80 / Mid ch.**



### 7.3. 26 dB Bandwidth & 99% Bandwidth

#### Test setup



#### Limit

N/A

#### Test procedure

ANSI C63.10-2013 Section 12.4

KDB 789033 D02 v02r01 - Section C.1 (26dB bandwidth)

KDB 789033 D02 v02r01 - Section D (99% bandwidth)

#### Test settings

##### 1. 26 dB Bandwidth

- a. Set RBW = approximately 1% of the emission bandwidth.
- b. Set the VBW > RBW.
- c. Detector = Peak.
- d. Trace mode = max hold.
- e. Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

##### 2. 99% Occupied Bandwidth

- a. Set center frequency to the nominal EUT channel center frequency.
- b. Set span = 1.5 times to 5.0 times the OBW.
- c. Set RBW = 1% to 5% of the OBW
- d. Set VBW  $\geq 3 \times$  RBW
- e. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
- f. Use the 99% power bandwidth function of the instrument (if available).
- g. If the instrument does not have a 99% power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

**Test results**

**SISO**

Test mode	Band	Frequency(MHz)	26 dB bandwidth (MHz)	99% bandwidth (MHz)
			ANT2	ANT2
802.11a	UNII-1	5 180	25.67	17.28
		5 200	25.47	17.18
		5 240	25.92	17.33
	UNII-2A	5 260	25.57	17.23
		5 280	25.22	17.18
		5 320	25.22	17.28
	UNII-2C	5 500	24.38	17.18
		5 600	25.12	17.18
		5 700	24.38	17.23
802.11n HT20	UNII-1	5 180	27.77	18.48
		5 200	26.27	18.33
		5 240	26.47	18.43
	UNII-2A	5 260	26.42	18.43
		5 280	26.17	18.53
		5 320	26.72	18.63
	UNII-2C	5 500	27.02	18.43
		5 600	26.57	18.48
		5 700	26.07	18.38
802.11n HT40	UNII-1	5 190	53.25	37.26
		5 230	62.34	37.16
	UNII-2A	5 270	52.25	37.06
		5 310	52.75	37.06
	UNII-2C	5 510	45.55	36.76
		5 590	45.65	36.96
		5 670	46.75	37.16

Test mode	Band	Frequency(MHz)	26 dB bandwidth (MHz)	99% bandwidth (MHz)
			ANT2	ANT2
802.11ac VHT20	UNII-1	5 180	29.02	18.48
		5 200	26.12	18.33
		5 240	26.42	18.38
	UNII-2A	5 260	26.72	18.43
		5 280	27.87	18.43
		5 320	26.17	18.58
	UNII-2C	5 500	26.42	18.43
		5 600	26.22	18.43
		5 700	25.97	18.43
802.11ac VHT40	UNII-1	5 190	46.65	37.06
		5 230	49.75	37.06
	UNII-2A	5 270	46.05	36.96
		5 310	46.75	37.16
	UNII-2C	5 510	45.55	36.86
		5 590	45.65	36.96
802.11ac VHT80	UNII-1	5 210	108.37	76.48
	UNII-2A	5 290	103.10	76.48
		5 530	86.79	76.36
	UNII-2C	5 610	97.10	76.48

**MIMO**

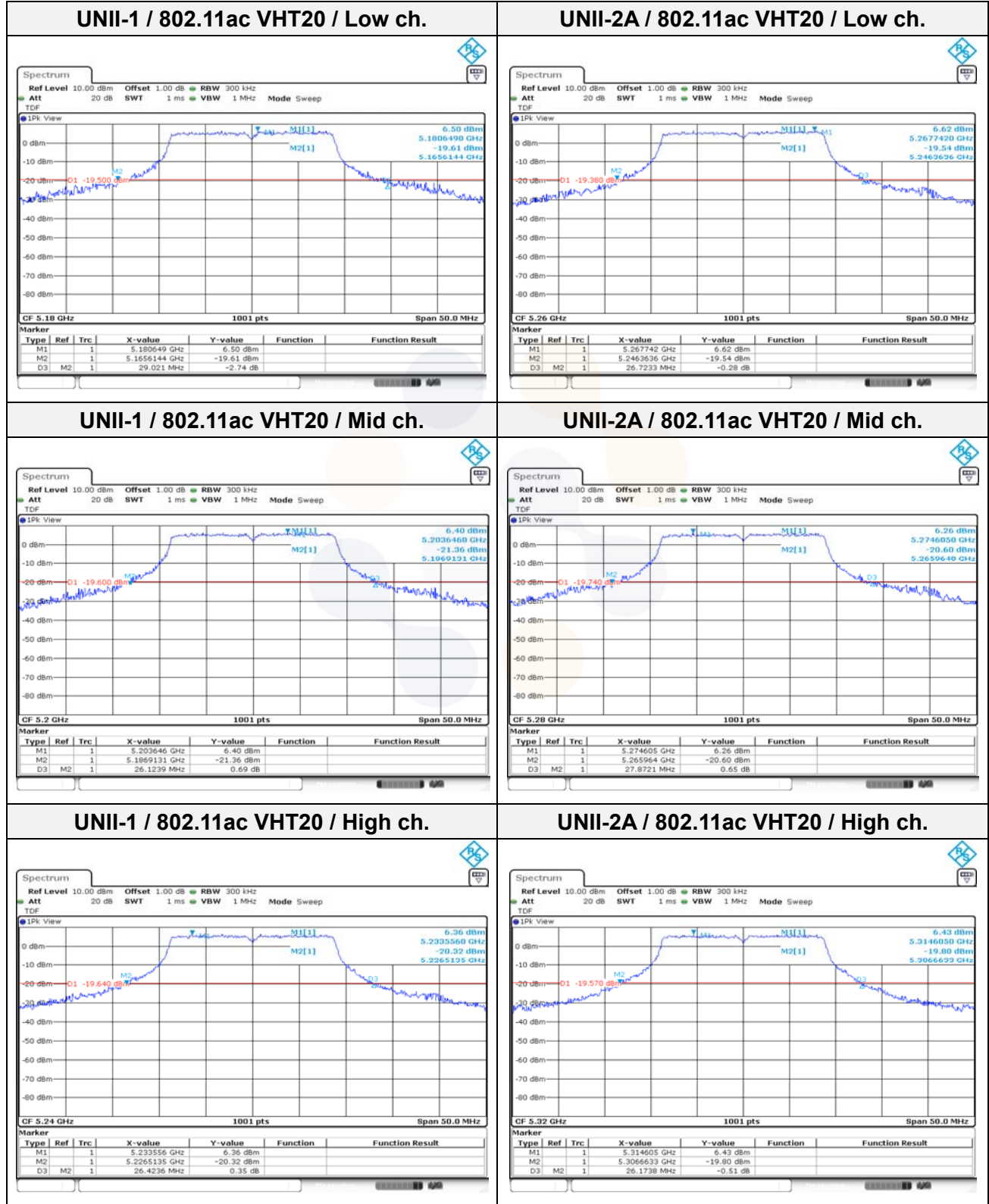
Test mode	Band	Frequency(MHz)	26 dB bandwidth (MHz)		99% bandwidth (MHz)	
			ANT1	ANT2	ANT1	ANT2
802.11a	UNII-1	5 180	25.82	24.28	17.28	16.98
		5 200	23.83	23.43	17.18	16.98
		5 240	24.43	24.28	17.23	17.13
	UNII-2A	5 260	24.38	23.68	17.18	17.08
		5 280	24.48	22.48	17.23	17.03
		5 320	24.73	23.13	17.23	17.08
	UNII-2C	5 500	24.23	23.38	17.23	16.93
		5 600	24.53	23.98	17.18	16.98
		5 700	24.53	28.12	17.18	16.93
802.11n HT20	UNII-1	5 180	27.42	24.88	18.38	18.03
		5 200	26.22	25.07	18.33	18.08
		5 240	25.97	25.97	18.33	18.08
	UNII-2A	5 260	26.02	25.72	18.28	18.08
		5 280	25.92	24.93	18.33	18.03
		5 320	25.82	25.32	18.38	18.03
	UNII-2C	5 500	25.92	26.07	18.33	18.08
		5 600	25.62	24.53	18.33	18.13
		5 700	25.87	24.68	18.38	18.18
802.11n HT40	UNII-1	5 190	45.45	44.06	36.86	36.56
		5 230	46.15	44.96	37.06	36.76
	UNII-2A	5 270	45.95	44.16	36.86	36.56
		5 310	46.25	44.76	36.96	36.76
	UNII-2C	5 510	45.95	44.06	36.96	36.56
		5 590	46.05	44.16	36.96	36.66
		5 670	46.75	43.96	36.96	36.76



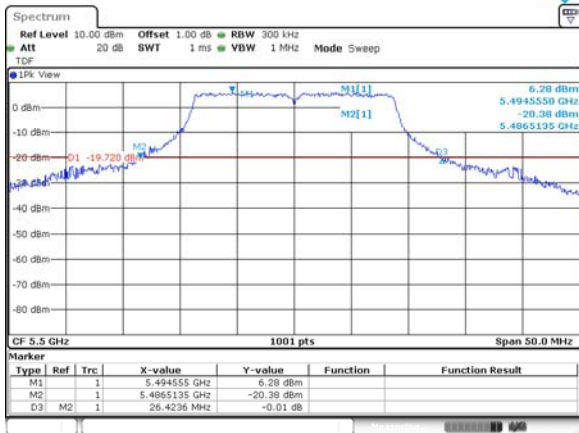
Test mode	Band	Frequency(MHz)	26 dB bandwidth (MHz)		99% bandwidth (MHz)	
			ANT1	ANT2	ANT1	ANT2
802.11ac VHT20	UNII-1	5 180	27.97	24.98	18.38	18.03
		5 200	26.07	24.53	18.28	18.08
		5 240	26.12	25.27	18.33	18.03
	UNII-2A	5 260	26.02	25.17	18.28	18.08
		5 280	25.52	24.98	18.33	18.03
		5 320	26.07	24.98	18.33	18.08
	UNII-2C	5 500	25.87	24.78	18.33	18.08
		5 600	25.57	24.73	18.28	18.08
		5 700	25.92	24.68	18.33	18.03
802.11ac VHT40	UNII-1	5 190	46.75	44.16	36.86	36.66
		5 230	46.35	44.46	37.06	36.66
	UNII-2A	5 270	46.25	44.86	36.96	36.56
		5 310	45.95	45.15	37.06	36.66
	UNII-2C	5 510	46.65	44.96	36.86	36.46
		5 590	46.25	43.76	36.96	36.46
		5 670	46.45	43.86	37.06	36.56
802.11ac VHT80	UNII-1	5 210	86.07	110.17	76.24	76.24
	UNII-2A	5 290	86.07	86.07	76.36	76.00
	UNII-2C	5 530	85.48	85.83	76.24	76.00
		5 610	85.24	85.24	76.12	76.12

In order to simplify the report, only ac mode test plots are attached.

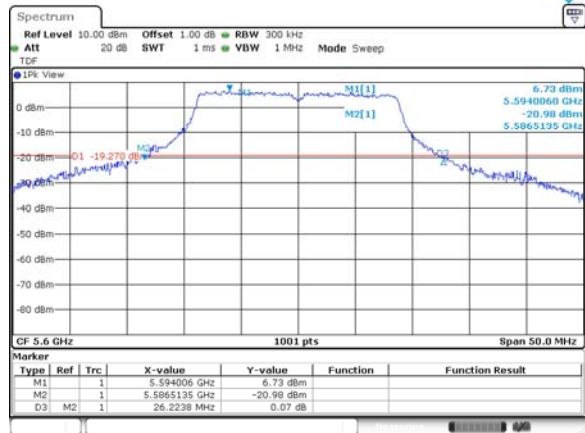
**26 dB bandwidth**  
**SISO**



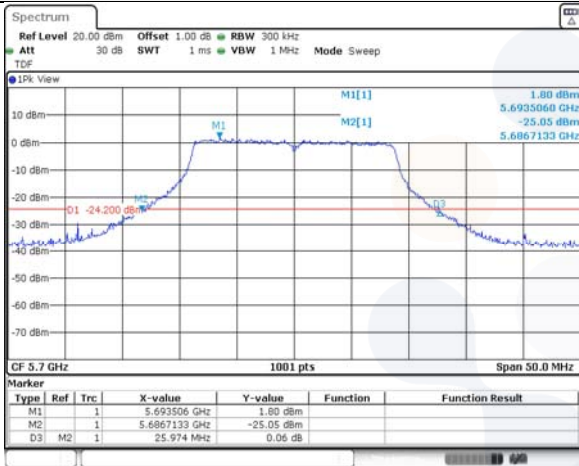
**UNII-2C / 802.11ac VHT20 / Low ch.**



**UNII-2C / 802.11ac VHT20 / Mid ch.**

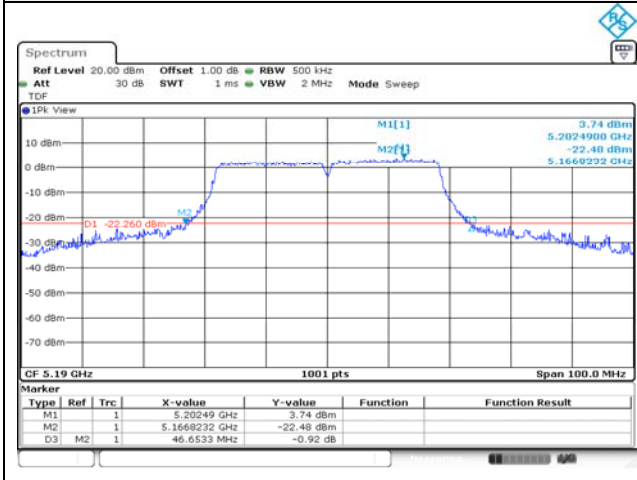


**UNII-2C / 802.11ac VHT20 / High ch.**

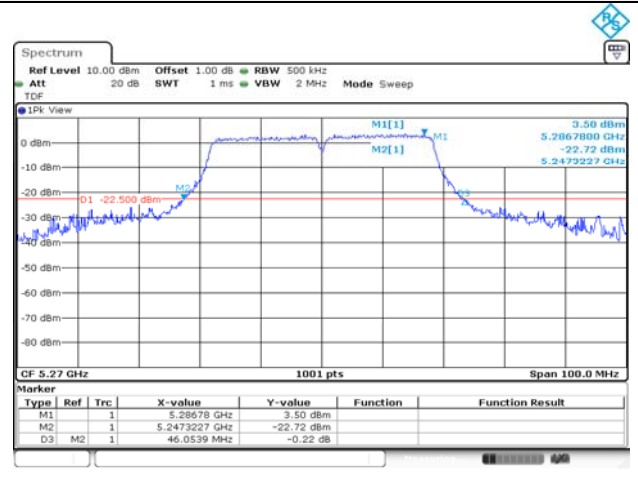


Blank

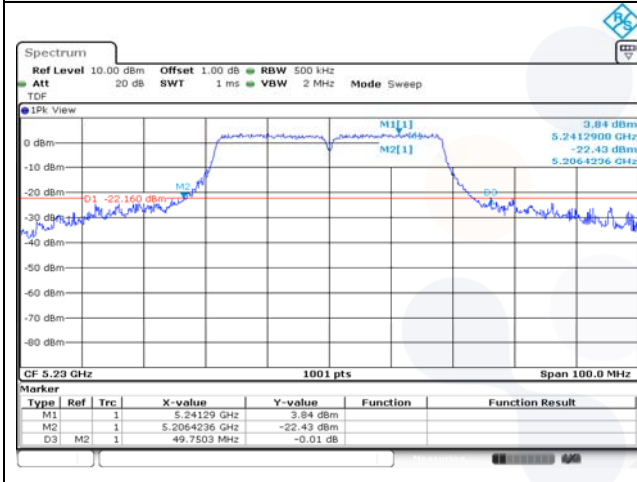
**UNII-1 / 802.11ac VHT40 / Low ch.**



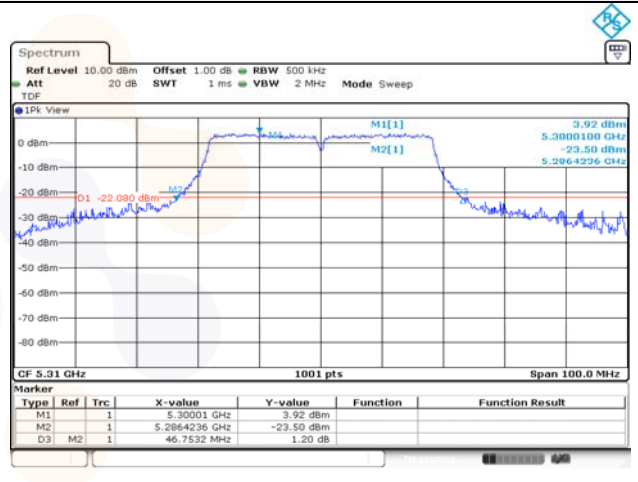
**UNII-2A / 802.11ac VHT40 / Low ch.**



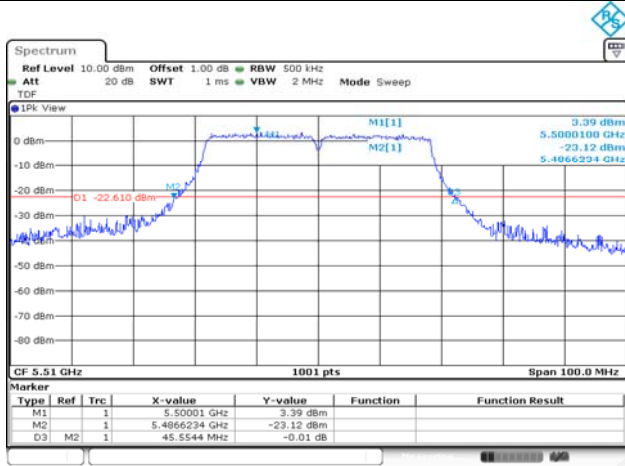
**UNII-1 / 802.11ac VHT40 / High ch.**



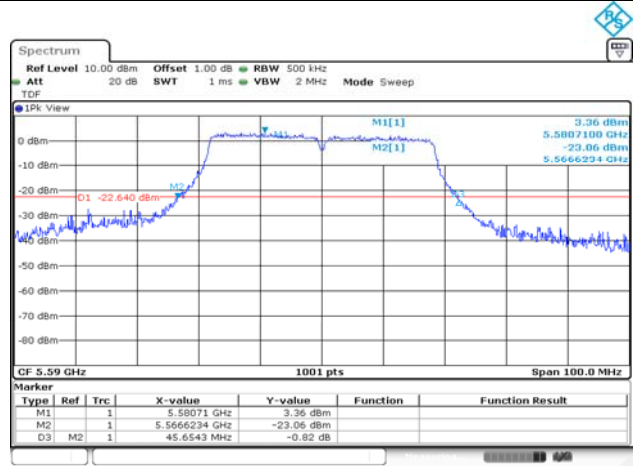
**UNII-2A / 802.11ac VHT40 / High ch.**



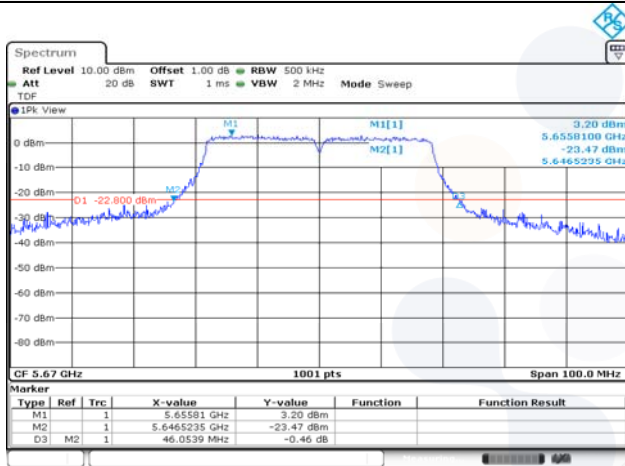
**UNII-2C / 802.11ac VHT40 / Low ch.**



**UNII-2C / 802.11ac VHT40 / Mid ch.**

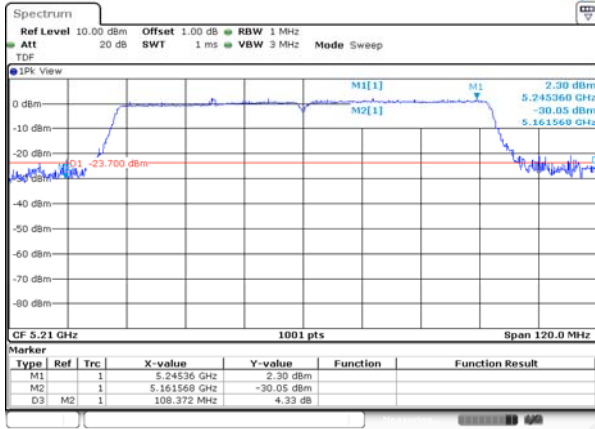


**UNII-2C / 802.11ac VHT40 / High ch.**

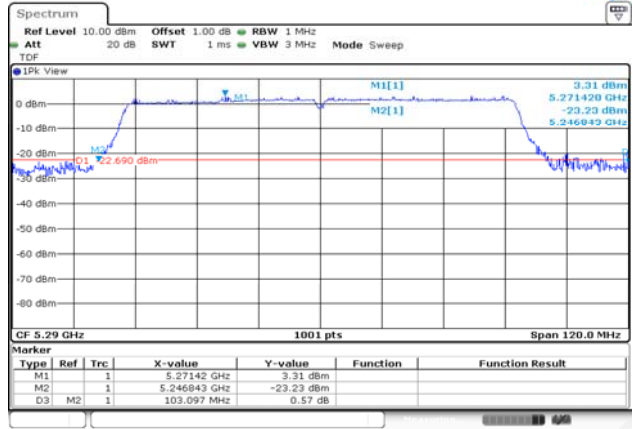


Blank

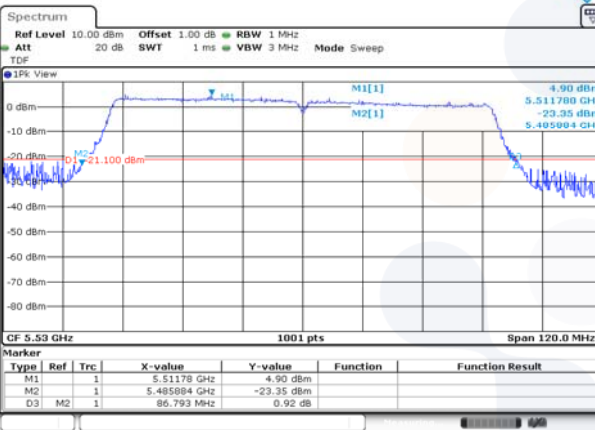
**UNII-1 / 802.11ac VHT80 / Mid ch.**



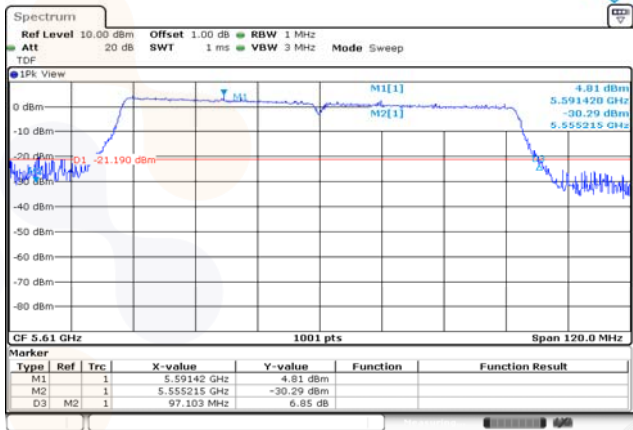
**UNII-2A / 802.11ac VHT80 / Mid ch.**



**UNII-2C / 802.11ac VHT80 / Low ch.**

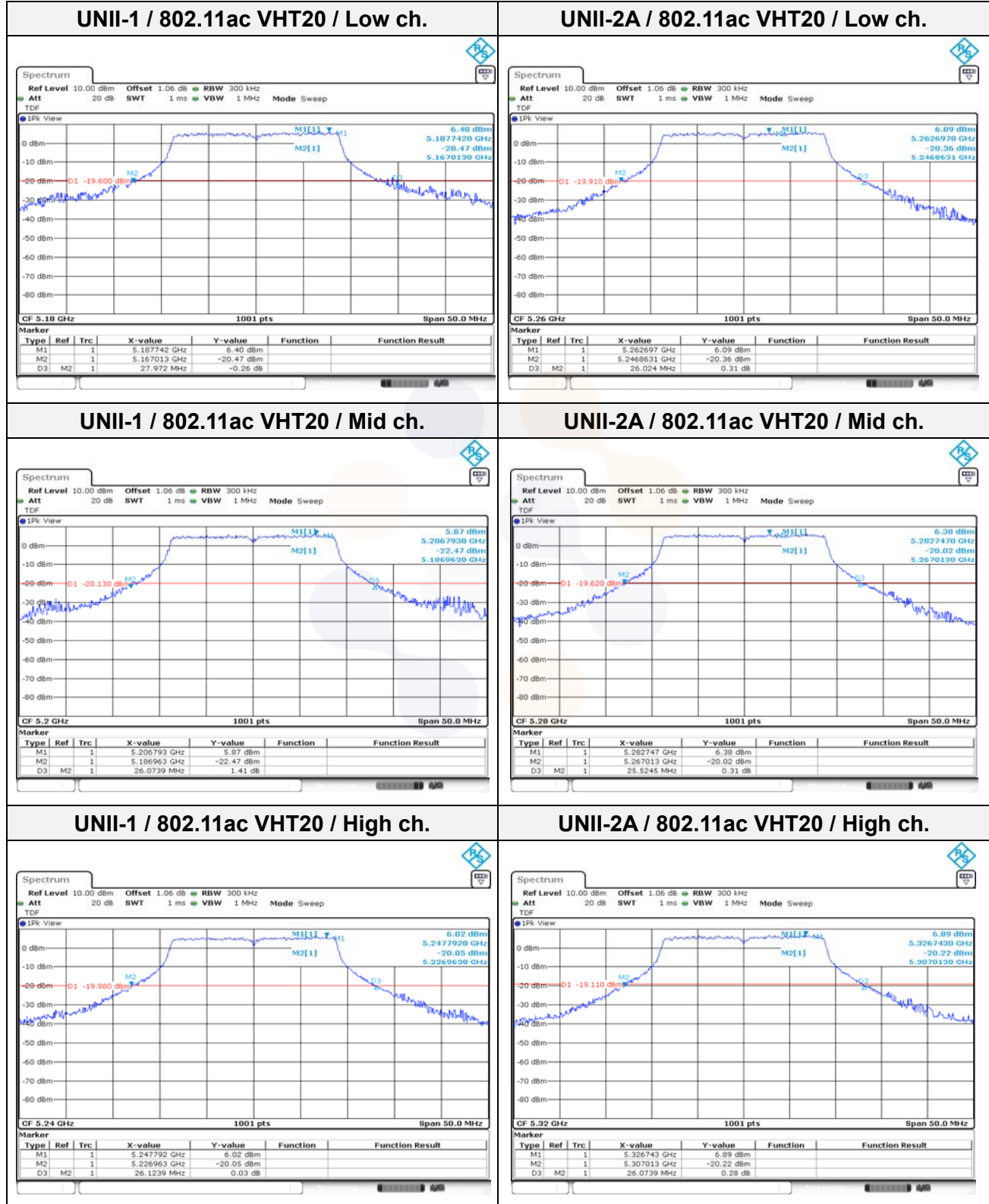


**UNII-2C / 802.11ac VHT80 / High ch.**

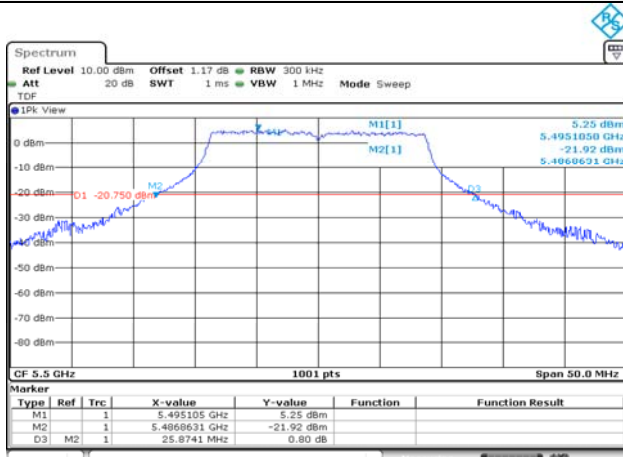


In order to simplify the report, only ANT 1 ac mode test plots are attached.

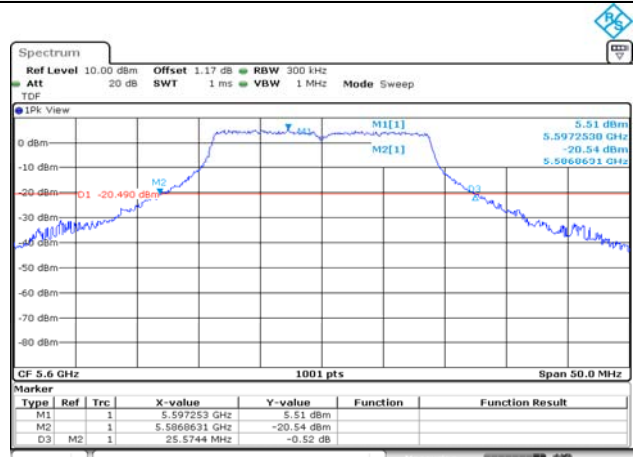
**MIMO**



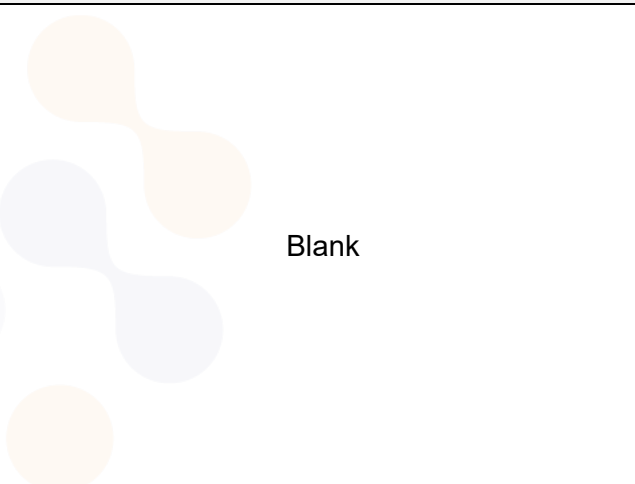
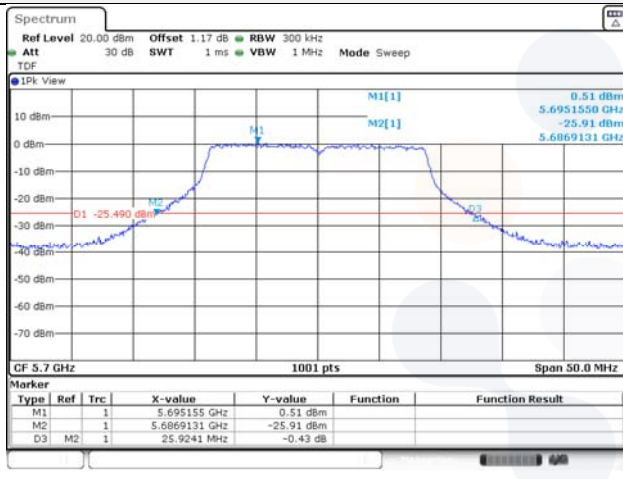
**UNII-2C / 802.11ac VHT20 / Low ch.**



**UNII-2C / 802.11ac VHT20 / Mid ch.**

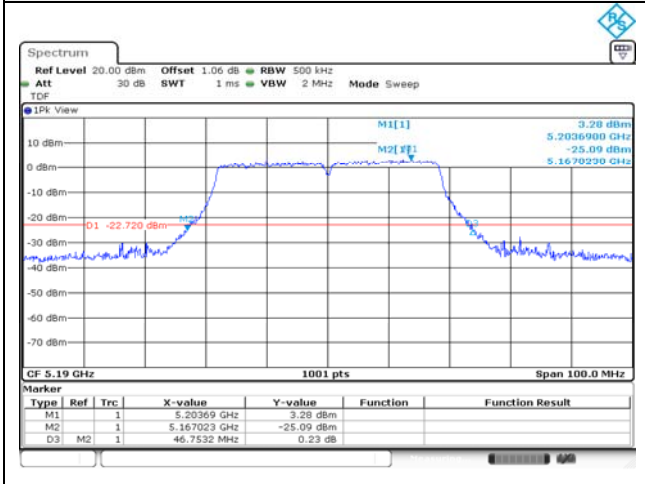


**UNII-2C / 802.11ac VHT20 / High ch.**

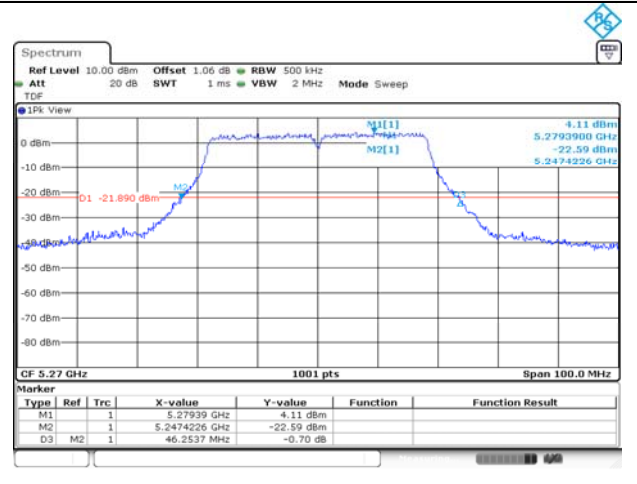




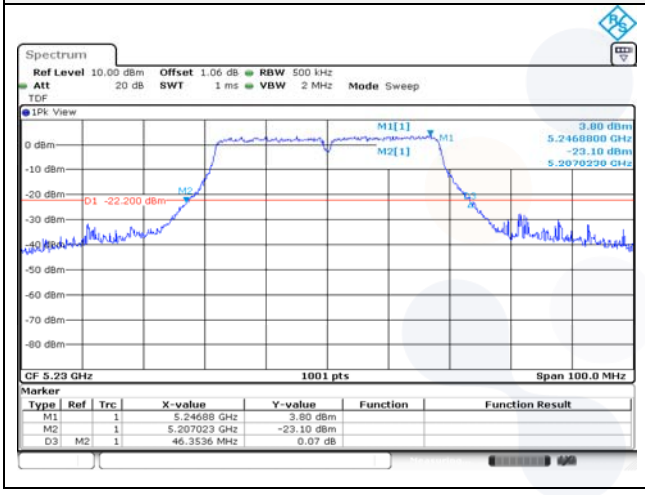
**UNII-1 / 802.11ac VHT40 / Low ch.**



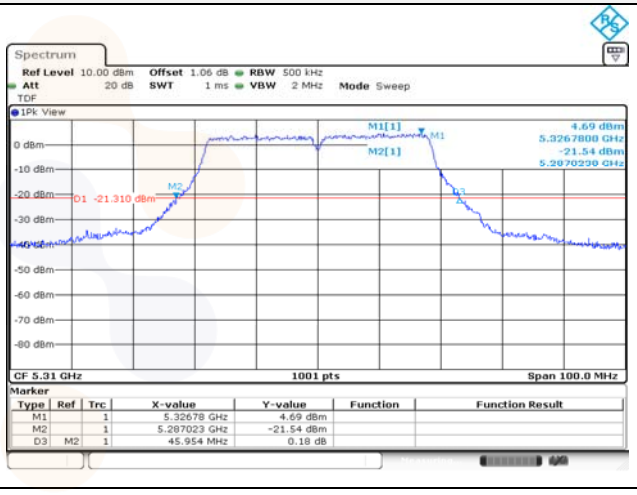
**UNII-2A / 802.11ac VHT40 / Low ch.**



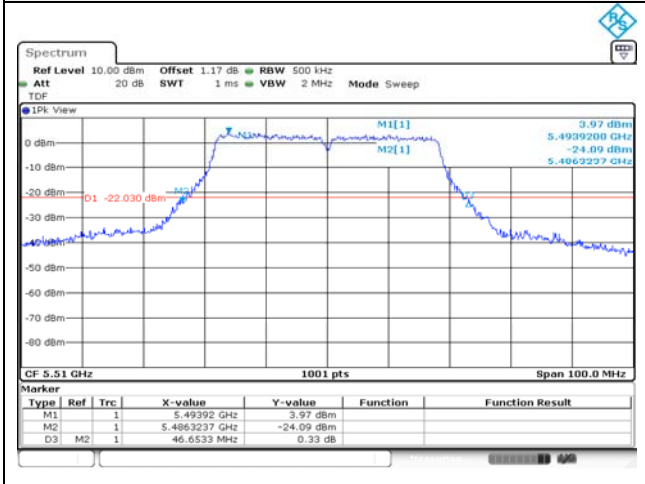
**UNII-1 / 802.11ac VHT40 / High ch.**



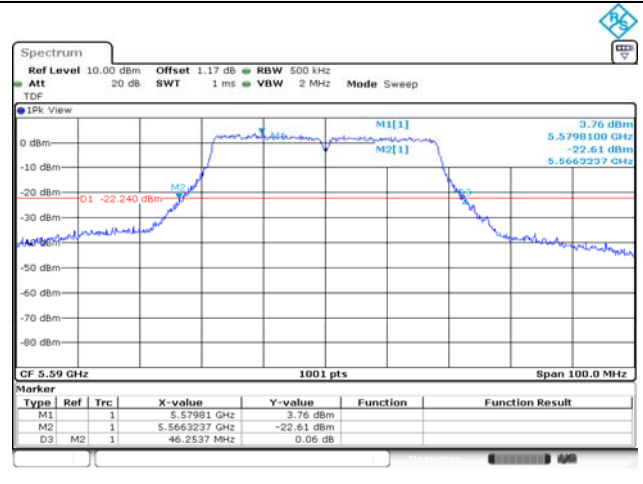
**UNII-2A / 802.11ac VHT40 / High ch.**



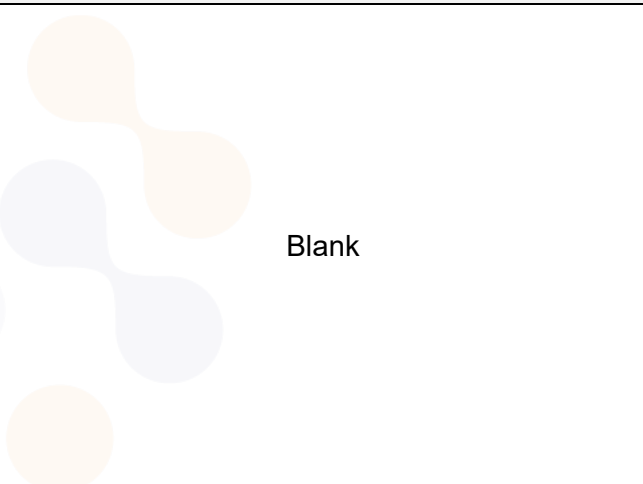
**UNII-2C / 802.11ac VHT40 / Low ch.**



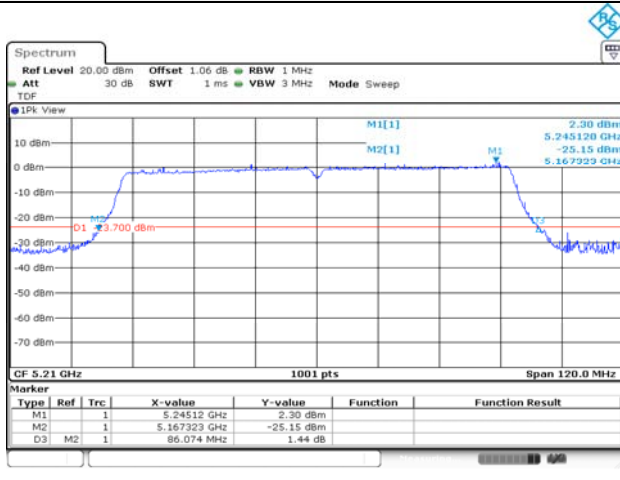
**UNII-2C / 802.11ac VHT40 / Mid ch.**



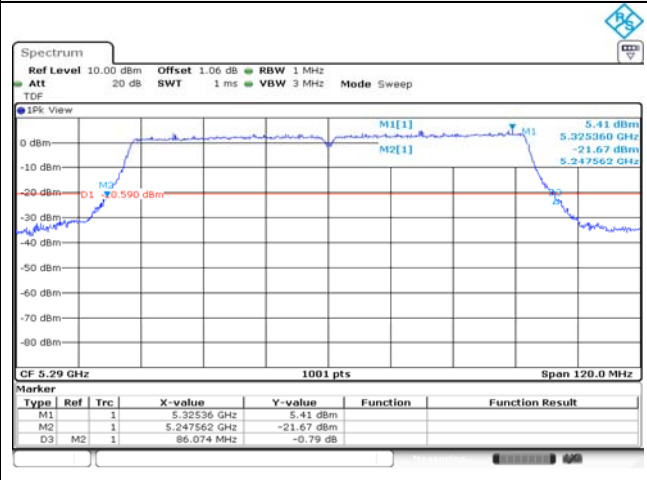
**UNII-2C / 802.11ac VHT40 / High ch.**



**UNII-1 / 802.11ac VHT80 / Mid ch.**



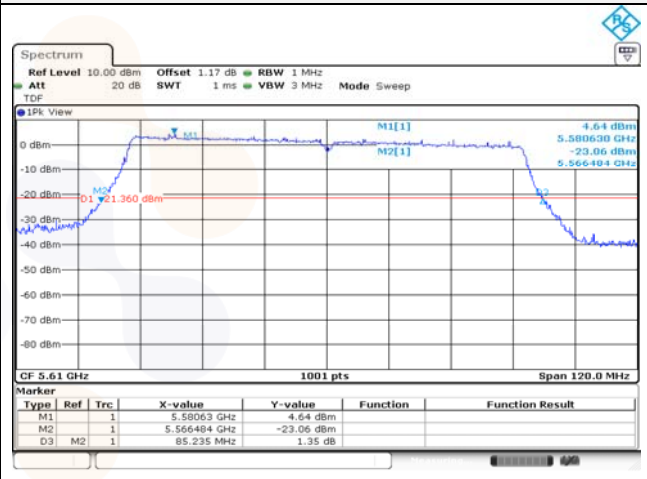
**UNII-2A / 802.11ac VHT80 / Mid ch.**



**UNII-2C / 802.11ac VHT80 / Low ch.**

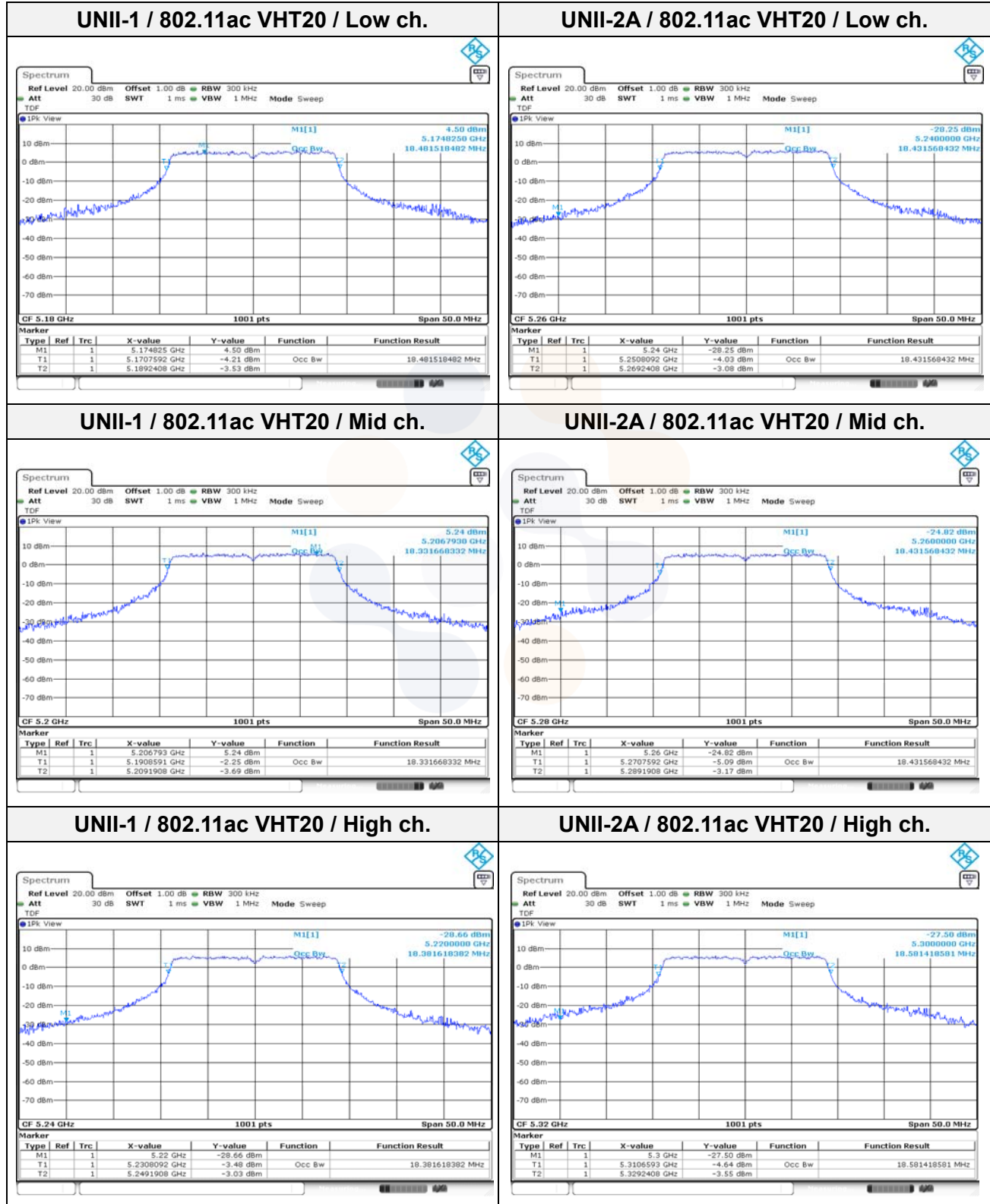


**UNII-2C / 802.11ac VHT80 / High ch.**

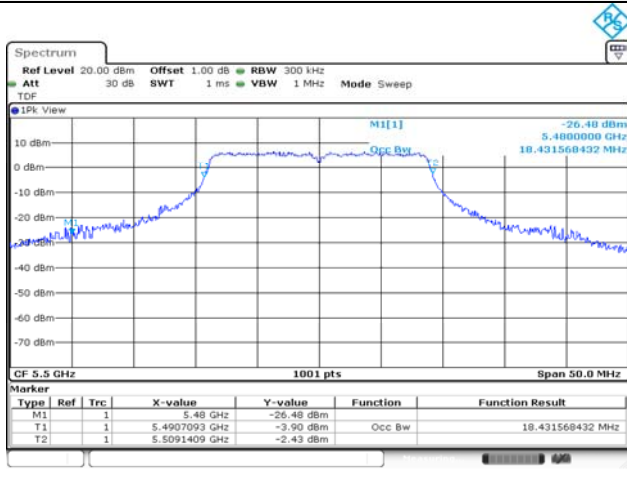


In order to simplify the report, only ac mode test plots are attached.

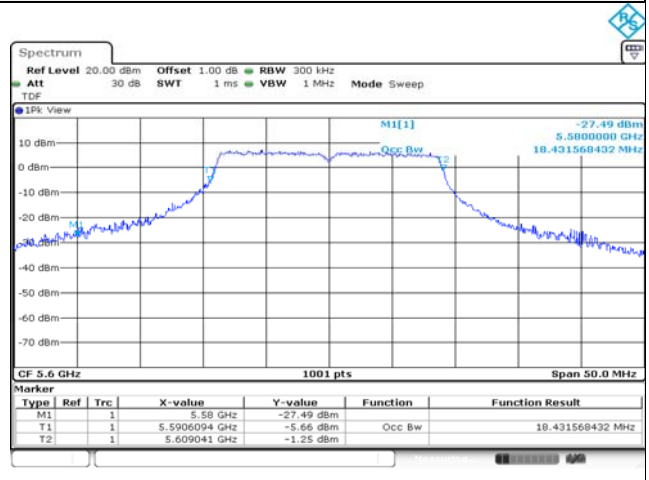
**99% bandwidth**  
**SISO**



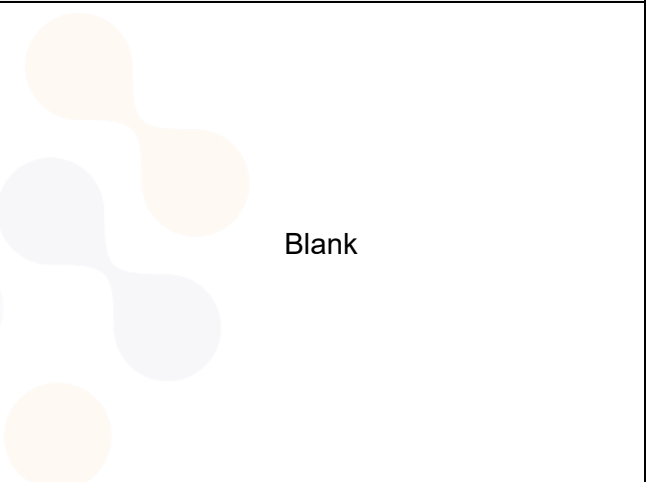
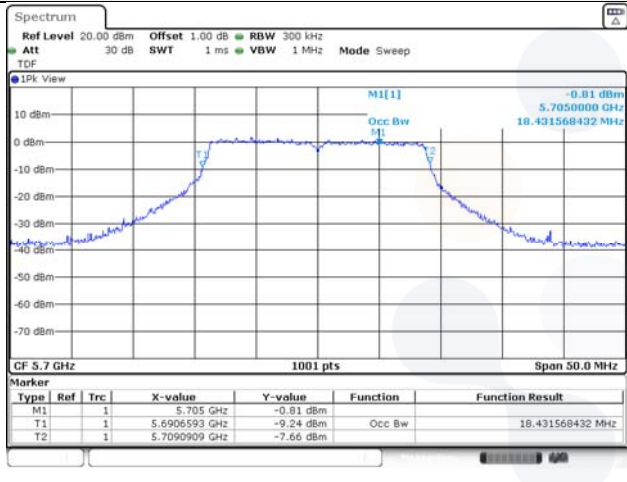
**UNII-2C / 802.11ac VHT20 / Low ch.**



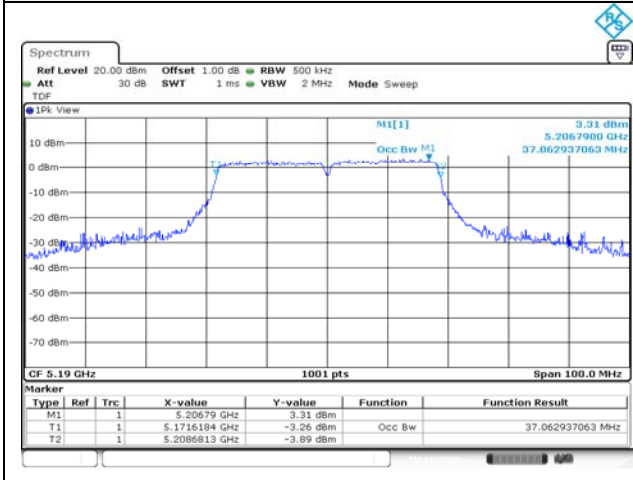
**UNII-2C / 802.11ac VHT20 / Mid ch.**



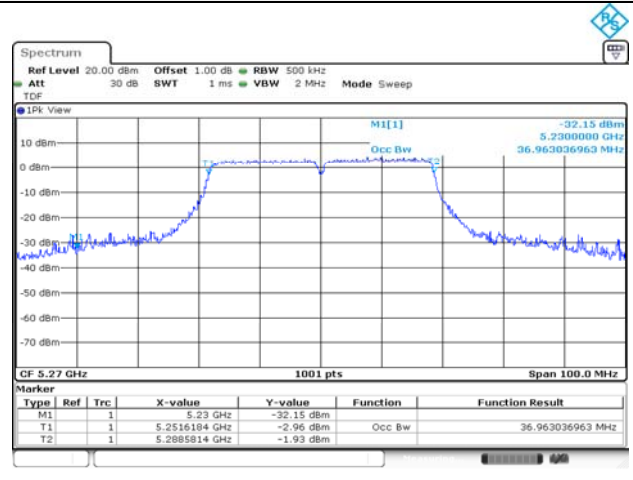
**UNII-2C / 802.11ac VHT20 / High ch.**



**UNII-1 / 802.11ac VHT40 / Low ch.**



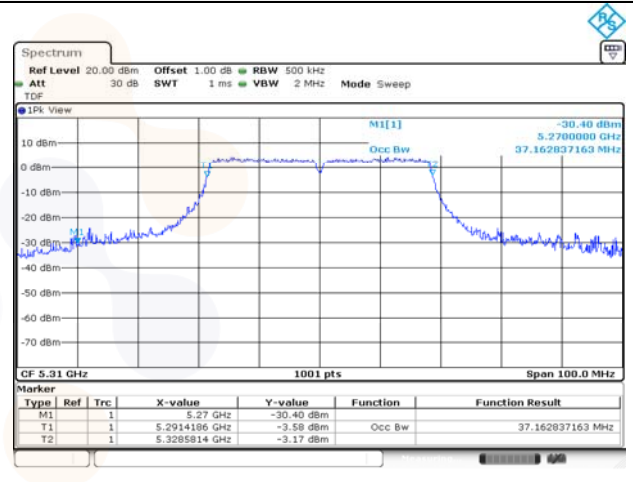
**UNII-2A / 802.11ac VHT40 / Low ch.**



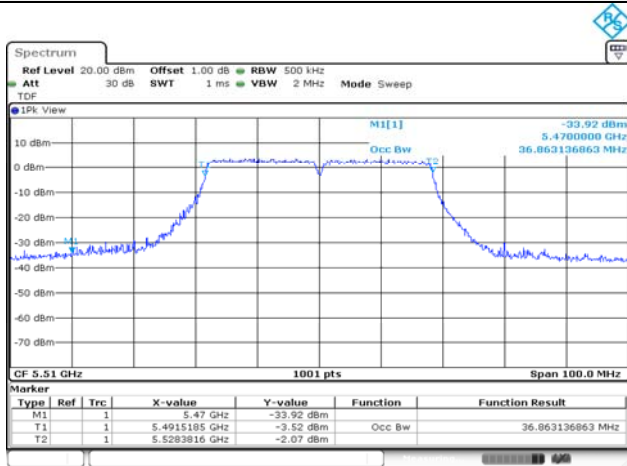
**UNII-1 / 802.11ac VHT40 / High ch.**



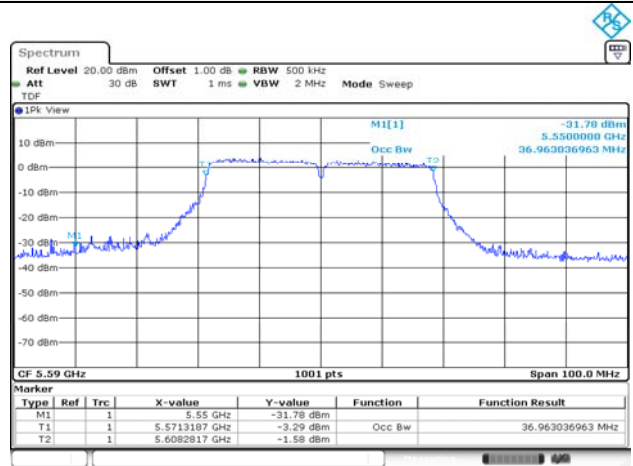
**UNII-2A / 802.11ac VHT40 / High ch.**



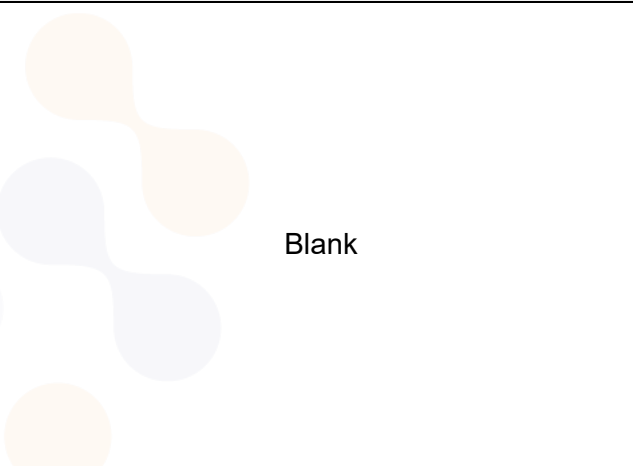
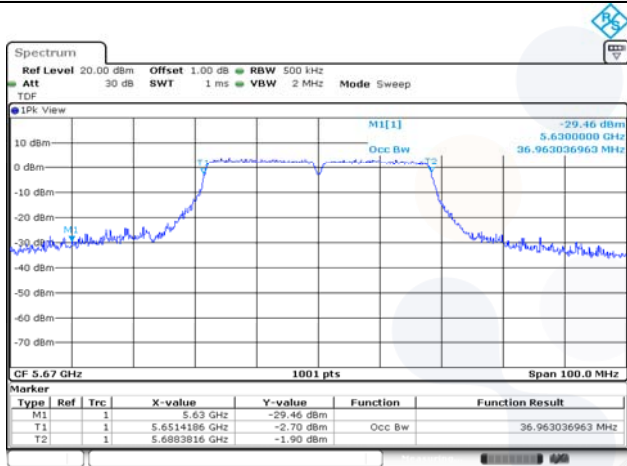
**UNII-2C / 802.11ac VHT40 / Low ch.**



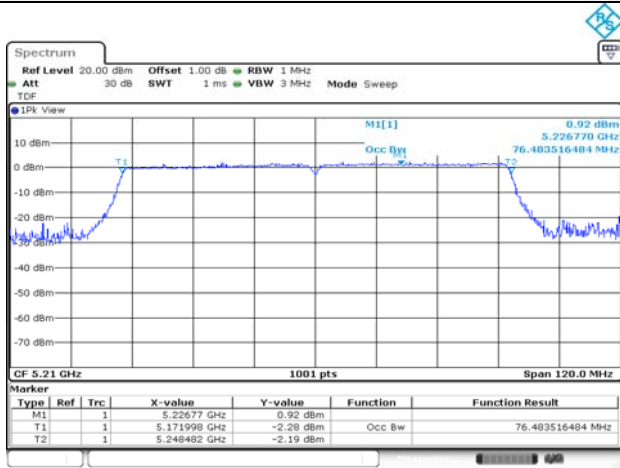
**UNII-2C / 802.11ac VHT40 / Mid ch.**



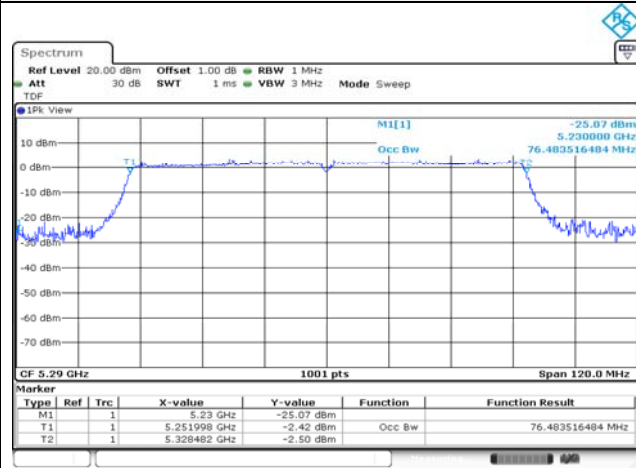
**UNII-2C / 802.11ac VHT40 / High ch.**



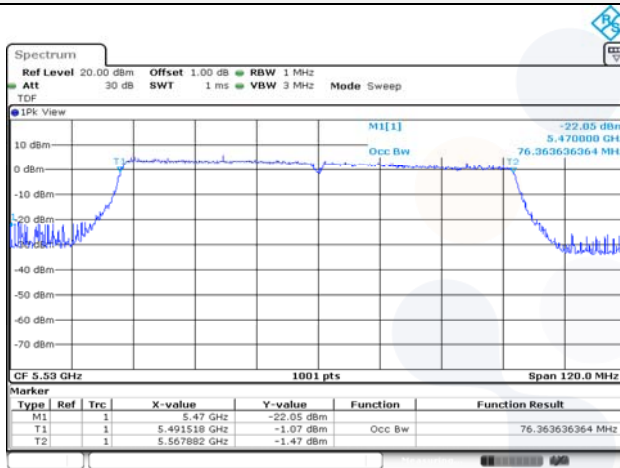
**UNII-1 / 802.11ac VHT80 / Mid ch.**



**UNII-2A / 802.11ac VHT80 / Mid ch.**



**UNII-2C / 802.11ac VHT80 / Low ch.**



**UNII-2C / 802.11ac VHT80 / High ch.**

