



TEST REPORT

<p>KCTL KCTL Inc. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-31-285-0894 FAX: 82-505-299-8311 www.kctl.co.kr</p>	<p>Report No.: KR20-SRF0210 Page (1) of (198)</p>	
---	---	---

1. Client

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
- Date of Receipt : 2020-07-01

2. Use of Report : Certification

3. Name of Product / Model : Tablet PC / SM-T575

4. Manufacturer / Country of Origin : Samsung Electronics Co., Ltd. / Vietnam

5. FCC ID : A3LSMT575

6. Date of Test : 2020-07-14 to 2020-08-19

7. Location of Test : Permanent Testing Lab On Site Testing (Address: Address of testing location)

8. Test method used : FCC Part 15 Subpart E, 15.407

9. Test Results : Refer to the test result in the test report

Affirmation	Tested by	Technical Manager
	Name : Taeyoung Kim 	Name : Seungyong Kim 

2020-08-26

KCTL Inc.

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 KCTL Inc.

REPORT REVISION HISTORY

Date	Revision	Page No
2020-08-26	Originally issued	-

This report shall not be reproduced except in full, without the written approval of KCTL Inc. This document may be altered or revised by KCTL Inc. personnel only, and shall be noted in the revision section of the document. Any alteration of this document not carried out by KCTL Inc. 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

Nothing significant to report.

KCTL

CONTENTS

1.	General information	4
2.	Device information	4
2.1.	Accessory information	6
2.2.	Frequency/channel operations.....	6
2.3.	Simultaneous Tx Condition	7
2.4.	Duty Cycle Factor	7
3.	Antenna requirement	10
3.1	Antenna information.....	10
3.2	Directional Gain Calculations.....	10
4.	Summary of tests.....	11
5.	Measurement uncertainty	12
6.	Measurement results explanation example	13
7.	Test results	14
7.1.	Maximum conducted output power	14
7.2.	Maximum Power Spectral Density	21
7.3.	26 dB Bandwidth & 99% Bandwidth.....	37
7.4.	6 dB Bandwidth.....	47
7.5.	Straddle channel.....	50
7.6.	Spurious Emission, Band Edge and Restricted bands.....	61
7.7.	AC Conducted emission	196
8.	Measurement equipment	198

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 (SEVT)
Address : Yen binh Industrial Park, Dong Tien Ward, Pho Yen Town Thai Nguyen
Province, Vietnam
Laboratory : KCTL Inc.
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
Industry Canada Registration No. : 8035A
KOLAS No.: KT231

2. Device information

Equipment under test : Tablet PC
Model : SM-T575
Derivative model : SM-T577
Modulation technique : Bluetooth(BDR/EDR)_GFSK, $\pi/4$ DQPSK, 8DPSK
Bluetooth(BLE)_GFSK
WIFI(802.11a/b/g/n/ac/ax)_DSSS, OFDM, OFDMA
NFC_ASK
LTE_QPSK, 16QAM, 64QAM
WCDMA_QPSK
GSM_GMSK, 8-PSK
Number of channels : Bluetooth(BDR/EDR)_79 ch / Bluetooth(BLE)_40 ch
802.11b/g/n/ac/ax_HT20/VHT20/HE20 : 13 ch
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)
NFC: 1 ch
Power source : DC 3.85 V
Antenna specification : LTE/WCDMA_LDS carrier Antenna
WIFI/Bluetooth(BDR/EDR/BLE)_LDS carrier Antenna
NFC_FPCB Antenna

Antenna gain	: WIFI/Bluetooth(BDR/EDR/BLE): ANT 1: -2.50 dBi, ANT 2: -2.50 dBi UNII-1 ANT 1: -3.20 dBi, ANT 2: -3.70 dBi UNII-2A ANT 1: -3.20 dBi, ANT 2: -3.80 dBi UNII-2C ANT 1: -6.20 dBi, ANT 2: -6.70 dBi UNII-3 ANT 1: -6.50 dBi, ANT 2: -6.40 dBi
Frequency range	: Bluetooth(BDR/EDR/BLE)_2 402 MHz ~ 2 480 MHz 2 412 MHz ~ 2 472 MHz (802.11b/g/n/ac/ax_HT20/VHT20/HE20) 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) LTE Band 2_1 850.7 MHz ~ 1 909.3 MHz LTE Band 4_1 710.7 MHz ~ 1 754.3 MHz LTE Band 5_824.7 MHz ~ 848.3 MHz LTE Band 12_699.7 MHz ~ 715.3 MHz LTE Band 13_779.5 MHz ~ 784.5 MHz LTE Band 17_706.5 MHz ~ 713.5 MHz LTE Band 41_2 498.5 MHz ~ 2 687.5 MHz LTE Band 66_1 710.7 MHz ~ 1 779.3 MHz GSM 850_824.2 MHz ~ 848.8 MHz GSM 1900_1 850.2 MHz ~ 1 909.8 MHz WCDMA 850_826.4 MHz ~ 846.6 MHz WCDMA 1700_1 712.4 MHz ~ 1 752.6 MHz WCDMA 1900_1 852.4 MHz ~ 1 907.6 MHz NFC_13.56 MHz
Software version	: T575.001(SM-T575), T577.001(SM-T577)
Hardware version	: REV1.0
Test device serial No.	: Conducted(R32N800373B, R32N400L04T, 2c57b421cb496110) Radiated(R32N6011AEK,2cf1a3f3cabbe910,2c907e7dc049f110)
Operation temperature	: -30 °C ~ 50 °C

Note. The Product equality letter includes detailed information about the differences between basic and derivative model.

2.1. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source	FCC ID
Travel Adapter	SOLU-M	EP-TA200	R37M12L1AC1HM3	Input : 100-240V, 50-60Hz (0.5A) Output : 9.0V, 1.67A or 5.0V, 2.0A	-
Data Cable	RFTECH	EP-DT725BBE	-	-	-
External Earphone	ALMUS	EHS64AVFBE	-	-	-
Protective Cover	WILLTECH VINA	GH98-45810A	-	-	-
S-Pen	WACOM	CP-913W-00B	-	-	-

2.2. Frequency/channel operations

This device contains the following capabilities:

WiFi (802.11a/b/g/n/ac/ax), Bluetooth (BDR/EDR/BLE), NFC,
LTE Band 2, LTE Band 4, LTE Band 5, LTE Band 12, LTE Band 13, LTE Band 17, LTE Band 41,
LTE Band 66, GSM 850, GSM 1900, WCDMA 850, WCDMA 1700, WCDMA 1900

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	5 580
140	5 700
144	5 720

UNII-3

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

Table 2.2-1. 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 2.2-2. 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 2.2-3. 802.11ac_VHT80 mode

2.3. Simultaneous Tx Condition

For Simultaneous mode (Bluetooth, WLAN), please refer to

Test report #KR20-SRF0215_03436_Samsung Electronics_SM-T575_WiFi (P15.407)_ax.

2.4. Duty Cycle Factor

SISO

Test mode	Period (ms)	T _{on} time (ms)	Duty cycle		Duty cycle factor (dB)
			(Linear)	(%)	
802.11a	1.526	1.428	0.935 8	93.58	0.29
802.11n_HT20	1.435	1.336	0.931 0	93.10	0.31
802.11n_HT40	0.763	0.664	0.870 2	87.02	0.60
802.11ac_VHT20	1.443	1.343	0.930 7	93.07	0.31
802.11ac_VHT40	0.767	0.668	0.870 9	87.09	0.60
802.11ac_VHT80	0.431	0.332	0.770 3	77.03	1.13

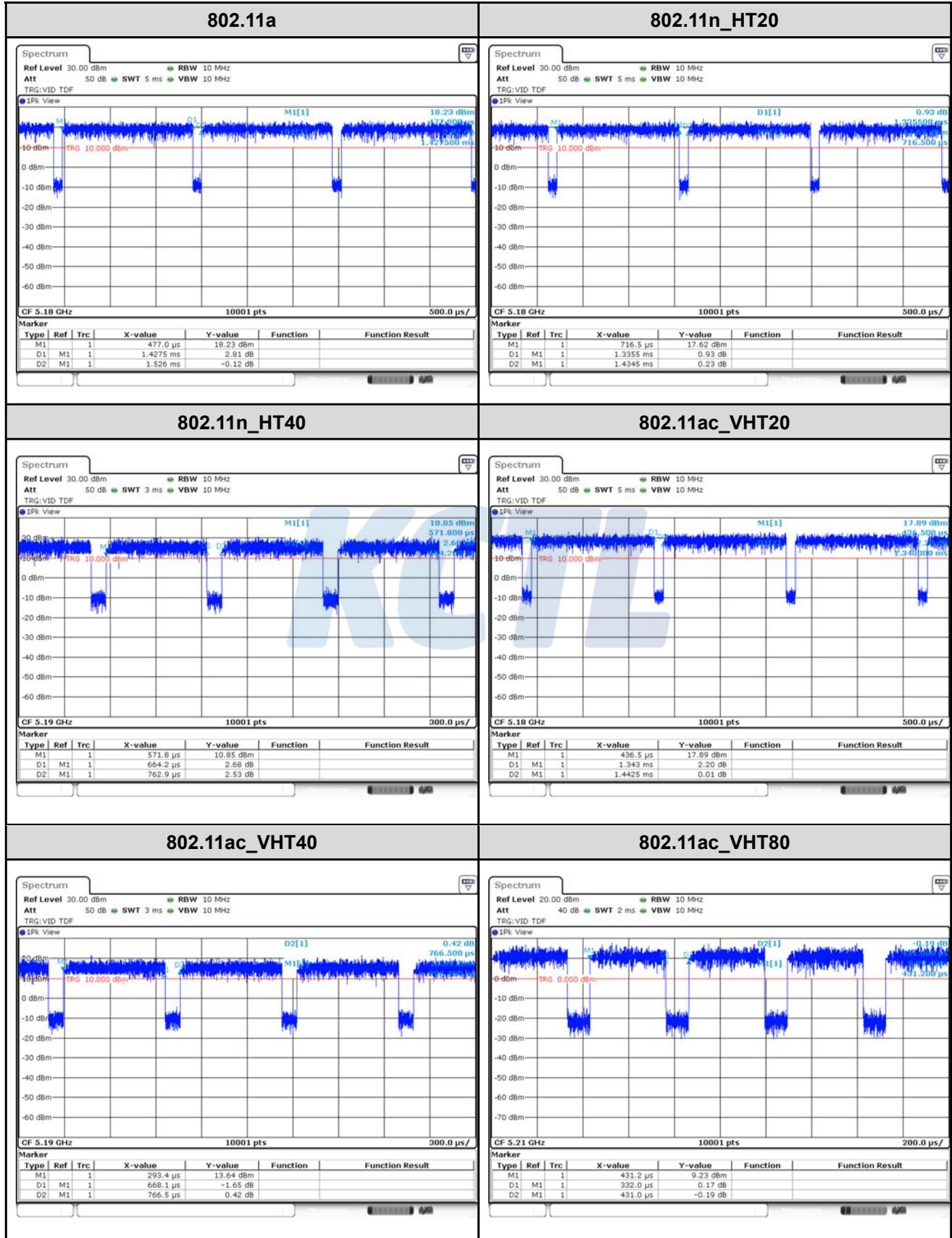
MIMO

Test mode	Period (ms)	T _{on} time (ms)	Duty cycle		Duty cycle factor (dB)
			(Linear)	(%)	
802.11a	1.527	1.428	0.935 2	93.52	0.29
802.11n_HT20	1.434	1.336	0.931 7	93.17	0.31
802.11n_HT40	0.763	0.664	0.870 2	87.02	0.60
802.11ac_VHT20	1.435	1.336	0.931 0	93.10	0.31
802.11ac_VHT40	0.459	0.360	0.784 3	78.43	1.06
802.11ac_VHT80	0.291	0.192	0.659 8	65.98	1.81

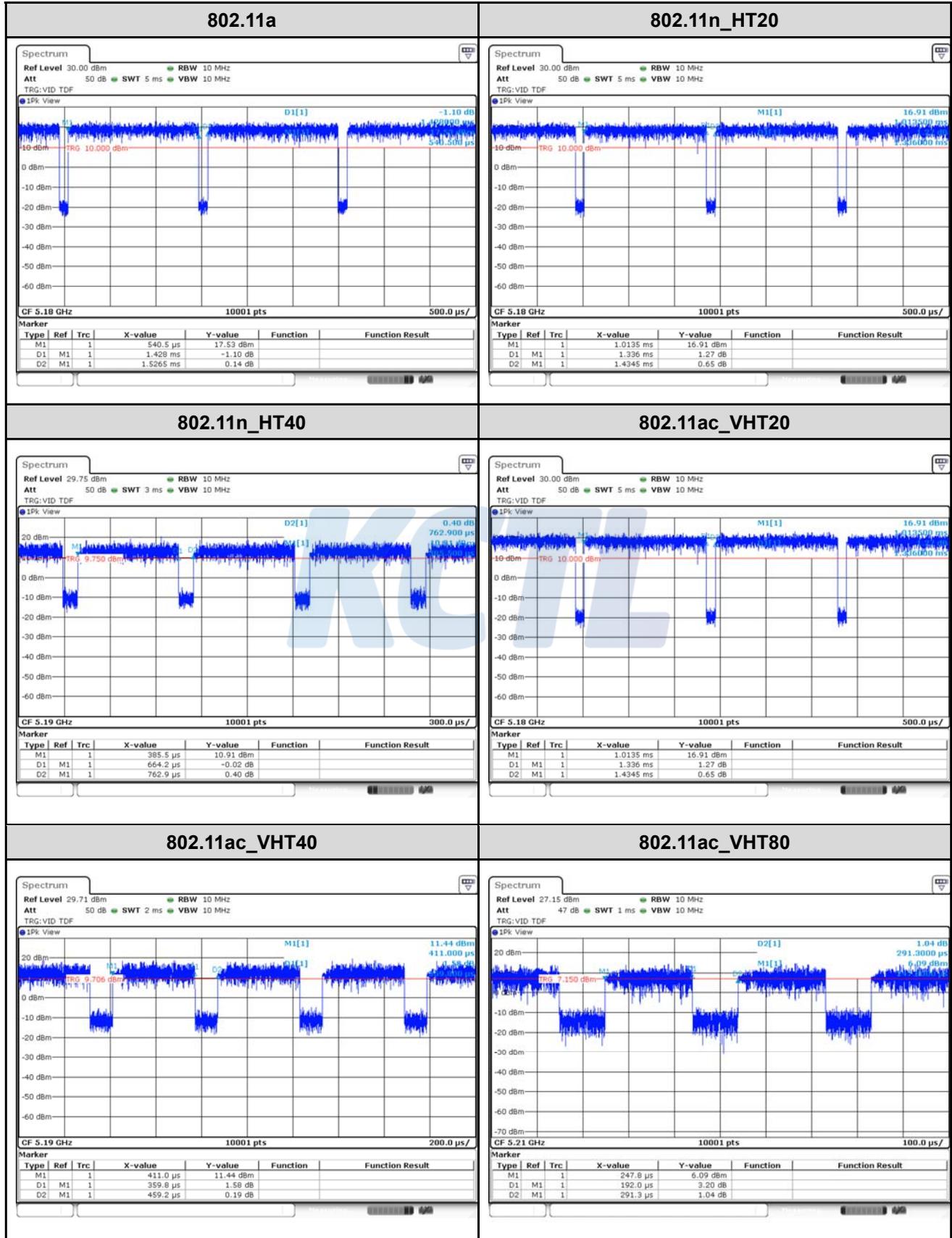
Notes.

1. Duty cycle (Linear) = T_{on} 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



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.

- The transmitter has permanently attached LDS carrier Antenna (Internal antenna) on board.

3.1 Antenna information

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

√ = Support, X = Not support

3.2 Directional Gain Calculations

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

3.2.1. Directional Antenna Gain

Band	ANT 1 Gain (dBi)	ANT 2 Gain (dBi)	Power Directional Gain (dBi)
UNII 1	-3.20	-3.70	-0.44
UNII 2A	-3.20	-3.80	-0.48
UNII 2C	-6.20	-6.70	-3.44
UNII 3	-6.50	-6.40	-3.44

Note.

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

4. Summary of tests

FCC Part section(s)	Parameter	Test Condition	Test results
15.407(a)	Maximum conducted output power	Conducted	Pass
15.407(a)	Maximum power spectral density		Pass
15.407(a)	26 dB Channel Bandwidth		Pass
15.407(e)	6 dB Channel Bandwidth		Pass
15.207(a)	Conducted Emissions		Pass
15.407(b), 15.205(a), 15.209(a)	Spurious emission	Radiated	Pass
	Band-edge, restricted band		Pass

Notes:

- All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 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.
- The fundamental of the 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.
- All the radiated tests have been performed several case.
(Stand-alone, with accessories (earphone, cover, TA etc.))
Worst case: stand-alone
- 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
- Based on the baseline scan, the worst-case data rates were:
 - 802.11a mode: 6Mbps
 - 802.11n HT20 mode: MCS0
 - 802.11n HT40 mode: MCS0
 - 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 indicate 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	1.3 dB	
Conducted spurious emissions	1.3 dB	
Radiated spurious emissions	9 kHz ~ 30 MHz:	2.3 dB
	30 MHz ~ 300 MHz	5.4 dB
	300 MHz ~ 1 000 MHz	5.5 dB
	Above 1 GHz	6.7 dB
Conducted emissions	9 kHz ~ 150 kHz	3.7 dB
	150 kHz ~ 30 MHz	3.3 dB

KCTL

6. Measurement results explanation example

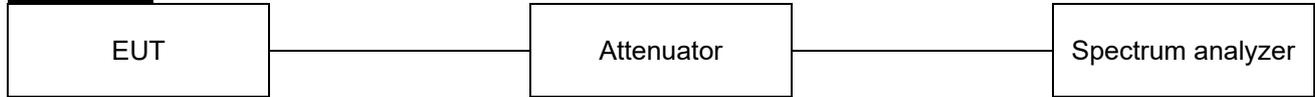
The offset level is set in the spectrum analyzer to compensate the RF cable loss factor between EUT conducted output port and spectrum analyzer.

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	9.29	9 000	12.34
50	9.36	10 000	12.61
100	9.43	11 000	12.79
200	9.55	12 000	12.81
300	9.64	13 000	12.85
400	9.73	14 000	12.99
500	9.80	15 000	13.10
600	9.85	16 000	13.52
700	9.89	17 000	13.55
800	9.94	18 000	13.74
900	10.03	19 000	13.77
1 000	10.09	20 000	13.82
2 000	10.93	21 000	14.14
3 000	11.21	22 000	14.44
4 000	11.54	23 000	14.64
5 000	11.89	24 000	14.71
6 000	12.17	25 000	15.01
7 000	12.05	26 000	15.06
8 000	12.26	26 500	15.10

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),

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 ¹⁾
UNII-2C		√	250 mW or 11 dBm + 10logB ¹⁾
UNII-3		√	1 W (30 dBm)

Note:

1) Conducted output power limit B is the 26 dB emission bandwidth.

Test procedureANSI C63.10-2013-Section 12.3.3.2 and 14.2
KDB 789033 D02 v02r01 - Section E.2.d) or e)
KDB 662911 D01 v02r01 - Section E).1)

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 $10 \log(1/0.25) = 6$ dB if the duty cycle is 25%.

Section E.2.e)**Method SA-2 Alternative (power averaging(rms) detection with slow sweep with each spectrum bin 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) Manually set sweep time $\geq 10 \times (\text{number of points in sweep}) \times (\text{total on/off period of the transmitted signal})$.
- (vii) Set detector = power averaging (rms)
- (viii) Perform a single sweep.
- (ix) 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 spectrum.

- (x) 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 $10 \log (1/0.25) = 6$ dB if the duty cycle is 25%.

Section E.3.a)

Method PM (Measurement using an RF average power meter):

- (xi) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied.
- The EUT is configured to transmit continuously or to transmit with a constant duty cycle.
 - At all times when the EUT is transmitting, it must be transmitting at its maximum power control level.
 - The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five
- (xii) If the transmitter does not transmit continuously, measure the duty cycle, x , of the transmitter output signal as described in II
- (xiii) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
- (xiv) Adjust the measurement in dBm by adding $10 \log (1/x)$ where x is the duty cycle (e.g., $10 \log (1/0.25)$ if the duty cycle is 25%).

Section E.3.b)

Method PM-G (Measurement using a gated RF average power meter):

Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

Test results

SISO

Test mode	Band	Frequency (MHz)	Measured output power					Limit (dBm)
			Reading (dBm)		DCF (dB)	Result (dBm)		
			ANT1	ANT2		ANT1	ANT2	
802.11a	UNII 1	5 180	14.19	13.82	0.29	14.48	14.11	24.00
		5 200	14.44	13.86	0.29	14.73	14.15	
		5 240	14.55	13.93	0.29	14.84	14.22	
	UNII 2A	5 260	14.66	14.02	0.29	14.95	14.31	24.00
		5 280	14.49	13.93	0.29	14.78	14.22	
		5 320	14.11	13.49	0.29	14.40	13.78	
	UNII 2C	5 500	13.97	14.15	0.29	14.26	14.44	24.00
		5 580	14.07	14.05	0.29	14.36	14.34	
		5 700	14.08	14.12	0.29	14.37	14.41	
	UNII 3	5 745	14.03	14.20	0.29	14.32	14.49	30.00
		5 785	14.30	14.47	0.29	14.59	14.76	
		5 825	14.28	14.47	0.29	14.57	14.76	
802.11n HT20	UNII 1	5 180	14.34	13.77	0.31	14.65	14.08	24.00
		5 200	14.31	13.82	0.31	14.62	14.13	
		5 240	14.43	14.10	0.31	14.74	14.41	
	UNII 2A	5 260	14.60	13.99	0.31	14.91	14.30	24.00
		5 280	14.49	14.01	0.31	14.80	14.32	
		5 320	14.16	13.66	0.31	14.47	13.97	
	UNII 2C	5 500	14.04	14.22	0.31	14.35	14.53	24.00
		5 580	14.22	14.27	0.31	14.53	14.58	
		5 700	13.85	14.01	0.31	14.16	14.32	
	UNII 3	5 745	13.93	14.13	0.31	14.24	14.44	30.00
		5 785	14.20	14.49	0.31	14.51	14.80	
		5 825	14.34	14.45	0.31	14.65	14.76	
802.11n HT40	UNII 1	5 190	13.01	12.44	0.60	13.61	13.04	24.00
		5 230	13.27	12.66	0.60	13.87	13.26	
	UNII 2A	5 270	13.29	12.65	0.60	13.89	13.25	24.00
		5 310	13.16	12.64	0.60	13.76	13.24	
	UNII 2C	5 510	13.01	13.15	0.60	13.61	13.75	24.00
		5 590	12.86	12.94	0.60	13.46	13.54	
		5 670	12.62	12.77	0.60	13.22	13.37	
	UNII 3	5 755	13.10	13.17	0.60	13.70	13.77	30.00
		5 795	13.36	13.31	0.60	13.96	13.91	

Test mode	Band	Frequency (MHz)	Measured output power					Limit (dBm)
			Reading (dBm)		DCF (dB)	Result (dBm)		
			ANT1	ANT2		ANT1	ANT2	
802.11ac VHT20	UNII 1	5 180	14.27	13.75	0.31	14.58	14.06	24.00
		5 200	14.24	13.97	0.31	14.55	14.28	
		5 240	14.43	14.10	0.31	14.74	14.41	
	UNII 2A	5 260	14.47	14.03	0.31	14.78	14.34	24.00
		5 280	14.44	13.93	0.31	14.75	14.24	
		5 320	14.12	13.62	0.31	14.43	13.93	
	UNII 2C	5 500	14.16	14.09	0.31	14.47	14.40	24.00
		5 580	14.07	14.22	0.31	14.38	14.53	
		5 700	14.04	14.11	0.31	14.35	14.42	
	UNII 3	5 745	13.93	14.18	0.31	14.24	14.49	30.00
		5 785	14.03	14.53	0.31	14.34	14.84	
		5 825	14.47	14.42	0.31	14.78	14.73	
802.11ac VHT40	UNII 1	5 190	13.08	12.41	0.60	13.68	13.01	24.00
		5 230	13.24	12.72	0.60	13.84	13.32	
	UNII 2A	5 270	13.34	12.80	0.60	13.94	13.40	24.00
		5 310	13.23	12.64	0.60	13.83	13.24	
	UNII 2C	5 510	12.79	13.09	0.60	13.39	13.69	24.00
		5 590	12.87	12.99	0.60	13.47	13.59	
		5 670	12.58	12.95	0.60	13.18	13.55	
	UNII 3	5 755	13.15	13.33	0.60	13.75	13.93	30.00
		5 795	13.10	13.32	0.60	13.70	13.92	
	802.11ac VHT80	UNII 1	5 210	11.65	10.91	1.13	12.78	12.04
UNII 2A		5 290	11.56	10.96	1.13	12.69	12.09	24.00
UNII 2C		5 530	11.19	11.26	1.13	12.32	12.39	24.00
		5 610	11.10	11.08	1.13	12.23	12.21	
UNII 3		5 775	11.49	11.47	1.13	12.62	12.60	30.00

Note.

1. Result(dBm) = Reading Power + D.C.F

MIMO

Test mode	Band	Frequency (MHz)	Measured output power				Limit (dBm)
			Reading (dBm)		DCF (dB)	Result (dBm)	
			ANT1	ANT2			
802.11a	UNII 1	5 180	13.61	13.28	0.29	16.75	24.00
		5 200	13.78	13.52	0.29	16.95	
		5 240	13.98	13.74	0.29	17.16	
	UNII 2A	5 260	13.84	13.43	0.29	16.94	24.00
		5 280	14.03	13.48	0.29	17.06	
		5 320	13.74	13.10	0.29	16.73	
	UNII 2C	5 500	13.54	13.66	0.29	16.90	24.00
		5 580	13.49	13.86	0.29	16.98	
		5 700	13.45	13.49	0.29	16.77	
	UNII 3	5 745	13.52	13.79	0.29	16.96	30.00
		5 785	13.80	14.00	0.29	17.20	
		5 825	13.83	14.03	0.29	17.23	
802.11n HT20	UNII 1	5 180	13.65	13.35	0.31	16.82	24.00
		5 200	13.60	13.31	0.31	16.78	
		5 240	14.02	13.64	0.31	17.15	
	UNII 2A	5 260	14.06	13.37	0.31	17.05	24.00
		5 280	14.03	13.37	0.31	17.03	
		5 320	13.61	13.01	0.31	16.64	
	UNII 2C	5 500	13.58	13.74	0.31	16.98	24.00
		5 580	13.70	13.73	0.31	17.04	
		5 700	13.56	13.61	0.31	16.91	
	UNII 3	5 745	13.57	13.97	0.31	17.09	30.00
		5 785	13.91	13.88	0.31	17.22	
		5 825	13.85	14.01	0.31	17.25	
802.11n HT40	UNII 1	5 190	12.57	11.97	0.60	15.89	24.00
		5 230	12.70	12.18	0.60	16.06	
	UNII 2A	5 270	12.63	12.14	0.60	16.00	24.00
		5 310	12.51	12.03	0.60	15.89	
	UNII 2C	5 510	12.27	12.64	0.60	16.07	24.00
		5 590	12.40	12.62	0.60	16.12	
		5 670	11.98	12.52	0.60	15.87	
	UNII 3	5 755	12.54	12.59	0.60	16.18	30.00
5 795		12.82	12.84	0.60	16.44		

Test mode	Band	Frequency (MHz)	Measured output power				Limit (dBm)
			Reading (dBm)		DCF (dB)	Result (dBm)	
			ANT1	ANT2			
802.11ac VHT20	UNII 1	5 180	14.17	13.80	0.31	17.00	24.00
		5 200	14.21	13.95	0.31	17.09	
		5 240	14.38	14.20	0.31	17.30	
	UNII 2A	5 260	14.54	14.37	0.31	17.47	24.00
		5 280	14.64	14.37	0.31	17.52	
		5 320	14.27	13.80	0.31	17.05	
	UNII 2C	5 500	14.35	14.29	0.31	17.33	24.00
		5 580	14.28	14.37	0.31	17.34	
		5 700	14.30	14.09	0.31	17.21	
	UNII 3	5 745	13.27	13.53	0.31	16.41	30.00
		5 785	13.7	13.68	0.31	16.70	
		5 825	13.71	13.67	0.31	16.70	
802.11ac VHT40	UNII 1	5 190	12.22	11.48	1.06	15.94	24.00
		5 230	12.30	11.71	1.06	16.09	
	UNII 2A	5 270	12.29	11.79	1.06	16.12	24.00
		5 310	12.18	11.69	1.06	16.01	
	UNII 2C	5 510	11.93	12.12	1.06	16.10	24.00
		5 590	11.86	12.15	1.06	16.08	
		5 670	11.78	11.87	1.06	15.90	
	UNII 3	5 755	12.17	12.21	1.06	16.26	30.00
		5 795	12.15	12.42	1.06	16.36	
	802.11ac VHT80	UNII 1	5 210	10.25	9.78	1.81	14.84
UNII 2A		5 290	10.46	9.97	1.81	15.04	24.00
UNII 2C		5 530	10.04	10.39	1.81	15.04	24.00
		5 610	9.83	10.06	1.81	14.77	
UNII 3		5 775	10.38	10.32	1.81	15.17	30.00

Note.

1. Result(dBm) = 10log(10^(ANT 1/10) + 10^(ANT 2/10)) + D.C.F

7.2. Maximum Power Spectral Density

Test setup



Limit

According to §15.407(a)

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

Notes:

If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain if the antenna exceed 6 dBi

Test procedure

ANSI C63.10-2013 Section 12.3.2.2, 14.3.2.2
 KDB 789033 D02 v02r01 - Section F
 KDB 662911 D01 v02r01 - Section E). 2)

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

This test report shall not be reproduced, except in full, without the written approval

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., 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 kHz is available on nearly all spectrum analyzers.

Test results

SISO

Test mode	Band	Frequency (MHz)	Measured PSD (dBm/MHz)		DCF (dB)	Maximum PSD (dB m/MHz)		Limit (dBm/MHz)
			ANT1	ANT2		ANT1	ANT2	
802.11a	UNII 1	5 180	3.05	3.06	0.29	3.34	3.35	11
		5 200	3.37	3.08	0.29	3.66	3.37	
		5 240	3.56	3.13	0.29	3.85	3.42	
	UNII 2A	5 260	3.30	2.97	0.29	3.59	3.26	11
		5 280	3.41	2.86	0.29	3.70	3.15	
		5 320	3.14	2.61	0.29	3.43	2.90	
	UNII 2C	5 500	3.01	3.18	0.29	3.30	3.47	11
		5 580	2.97	3.12	0.29	3.26	3.41	
		5 700	3.10	3.06	0.29	3.39	3.35	
802.11n HT20	UNII 1	5 180	2.91	2.31	0.31	3.22	2.62	11
		5 200	2.85	2.55	0.31	3.16	2.86	
		5 240	3.30	2.69	0.31	3.61	3.00	
	UNII 2A	5 260	3.19	2.44	0.31	3.50	2.75	11
		5 280	3.23	2.48	0.31	3.54	2.79	
		5 320	2.92	2.33	0.31	3.23	2.64	
	UNII 2C	5 500	2.80	2.82	0.31	3.11	3.13	11
		5 580	2.73	2.74	0.31	3.04	3.05	
		5 700	2.50	2.76	0.31	2.81	3.07	
802.11n HT40	UNII 1	5 190	-1.33	-1.65	0.60	-0.73	-1.05	11
		5 230	-1.09	-1.37	0.60	-0.49	-0.77	
	UNII 2A	5 270	-1.09	-1.44	0.60	-0.49	-0.84	11
		5 310	-1.06	-1.55	0.60	-0.46	-0.95	
	UNII 2C	5 510	-1.40	-1.07	0.60	-0.80	-0.47	11
		5 590	-1.33	-1.11	0.60	-0.73	-0.51	
5 670	-1.39	-1.42	0.60	-0.79	-0.82			
802.11ac VHT20	UNII 1	5 180	2.95	2.56	0.31	3.26	2.87	11
		5 200	3.03	2.60	0.31	3.34	2.91	
		5 240	3.07	2.93	0.31	3.38	3.24	
	UNII 2A	5 260	3.10	2.75	0.31	3.41	3.06	11
		5 280	3.44	2.75	0.31	3.75	3.06	
		5 320	2.64	2.42	0.31	2.95	2.73	
	UNII 2C	5 500	2.66	2.83	0.31	2.97	3.14	11
		5 580	2.74	2.77	0.31	3.05	3.08	
		5 700	2.71	3.04	0.31	3.02	3.35	

Test mode	Band	Frequency (MHz)	Measured PSD (dBm/MHz)		DCF (dB)	Maximum PSD (dBm/MHz)		Limit (dBm/MHz)
			ANT1	ANT2		ANT1	ANT2	
802.11ac VHT40	UNII 1	5 190	-0.93	-1.87	0.60	-0.33	-1.27	11
		5 230	-1.06	-1.48	0.60	-0.46	-0.88	
	UNII 2A	5 270	-0.94	-1.51	0.60	-0.34	-0.91	11
		5 310	-0.91	-1.48	0.60	-0.31	-0.88	
	UNII 2C	5 510	-1.32	-0.94	0.60	-0.72	-0.34	11
		5 590	-1.57	-0.97	0.60	-0.97	-0.37	
	5 670	-1.59	-1.44	0.60	-0.99	-0.84		
802.11ac VHT80	UNII 1	5 210	-5.17	-5.94	1.13	-4.04	-4.81	11
	UNII 2A	5 290	-5.64	-5.71	1.13	-4.51	-4.58	11
	UNII 2C	5 530	-5.97	-5.91	1.13	-4.84	-4.78	11
		5 610	-5.92	-5.77	1.13	-4.79	-4.64	

Test mode	Band	Frequency (MHz)	Measured PSD (dBm/MHz)		DCF (dB)	Maximum PSD (dBm /500 kHz)		Limit (dBm /500 kHz)
			ANT1	ANT2		ANT1	ANT2	
802.11a	UNII 3	5 745	0.22	0.36	0.29	0.51	0.65	30
		5 785	0.49	0.57	0.29	0.78	0.86	
		5 825	0.63	0.70	0.29	0.92	0.99	
802.11n HT20		5 745	-0.12	-0.02	0.31	0.19	0.29	
		5 785	0.37	0.46	0.31	0.68	0.77	
		5 825	0.15	0.73	0.31	0.46	1.04	
802.11n HT40		5 755	-4.02	-3.76	0.60	-3.42	-3.16	
		5 795	-3.62	-3.75	0.60	-3.02	-3.15	
802.11ac VHT20		5 745	-0.03	0.24	0.31	0.28	0.55	
		5 785	0.16	0.42	0.31	0.47	0.73	
	5 825	0.41	0.44	0.31	0.72	0.75		
802.11ac VHT40	5 755	-3.55	-3.84	0.60	-2.95	-3.24		
	5 795	-3.76	-3.92	0.60	-3.16	-3.32		
802.11ac VHT80	5 775	-8.65	-8.60	1.13	-7.52	-7.47		

Notes:

- Maximum PSD calculation
- Maximum PSD = Measured PSD + D.C.F

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	2.68	2.96	0.29	6.12	11
		5 200	2.80	2.36	0.29	5.89	
		5 240	2.95	2.58	0.29	6.07	
	UNII 2A	5 260	2.78	2.55	0.29	5.97	11
		5 280	3.04	2.58	0.29	6.12	
		5 320	2.57	2.29	0.29	5.73	
	UNII 2C	5 500	2.35	2.79	0.29	5.88	11
		5 580	2.40	2.60	0.29	5.80	
		5 700	2.40	2.60	0.29	5.80	
802.11n HT20	UNII 1	5 180	2.41	1.81	0.31	5.44	11
		5 200	2.22	2.10	0.31	5.48	
		5 240	2.66	2.47	0.31	5.89	
	UNII 2A	5 260	2.64	2.09	0.31	5.69	11
		5 280	2.82	2.33	0.31	5.90	
		5 320	2.42	1.80	0.31	5.44	
	UNII 2C	5 500	2.07	2.39	0.31	5.55	11
		5 580	2.41	2.24	0.31	5.65	
		5 700	2.07	2.20	0.31	5.46	
802.11n HT40	UNII 1	5 190	-1.48	-2.17	0.60	1.80	11
		5 230	-1.57	-1.82	0.60	1.92	
	UNII 2A	5 270	-1.60	-1.82	0.60	1.90	11
		5 310	-1.30	-2.26	0.60	1.86	
	UNII 2C	5 510	-1.93	-1.71	0.60	1.79	11
		5 590	-2.03	-1.66	0.60	1.77	
802.11ac VHT20	UNII 1	5 180	2.68	2.23	0.31	5.78	11
		5 200	2.67	2.84	0.31	6.08	
		5 240	3.09	2.75	0.31	6.24	
	UNII 2A	5 260	3.58	3.56	0.31	6.89	11
		5 280	3.32	3.25	0.31	6.61	
		5 320	3.07	2.59	0.31	6.16	
	UNII 2C	5 500	3.22	2.92	0.31	6.39	11
		5 580	2.95	3.17	0.31	6.38	
		5 700	2.97	2.83	0.31	6.22	

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	-1.90	-2.82	1.06	1.73	11
		5 230	-1.65	-2.57	1.06	1.98	
	UNII 2A	5 270	-2.04	-2.35	1.06	1.88	11
		5 310	-2.01	-2.41	1.06	1.86	
	UNII 2C	5 510	-1.96	-2.15	1.06	2.02	11
		5 590	-1.99	-1.96	1.06	2.10	
5 670	-2.31	-2.52	1.06	1.66			
802.11ac VHT80	UNII 1	5 210	-6.63	-7.11	1.81	-2.04	11
	UNII 2A	5 290	-6.50	-6.90	1.81	-1.88	11
	UNII 2C	5 530	-6.89	-5.96	1.81	-1.58	11
		5 610	-7.14	-6.82	1.81	-2.16	

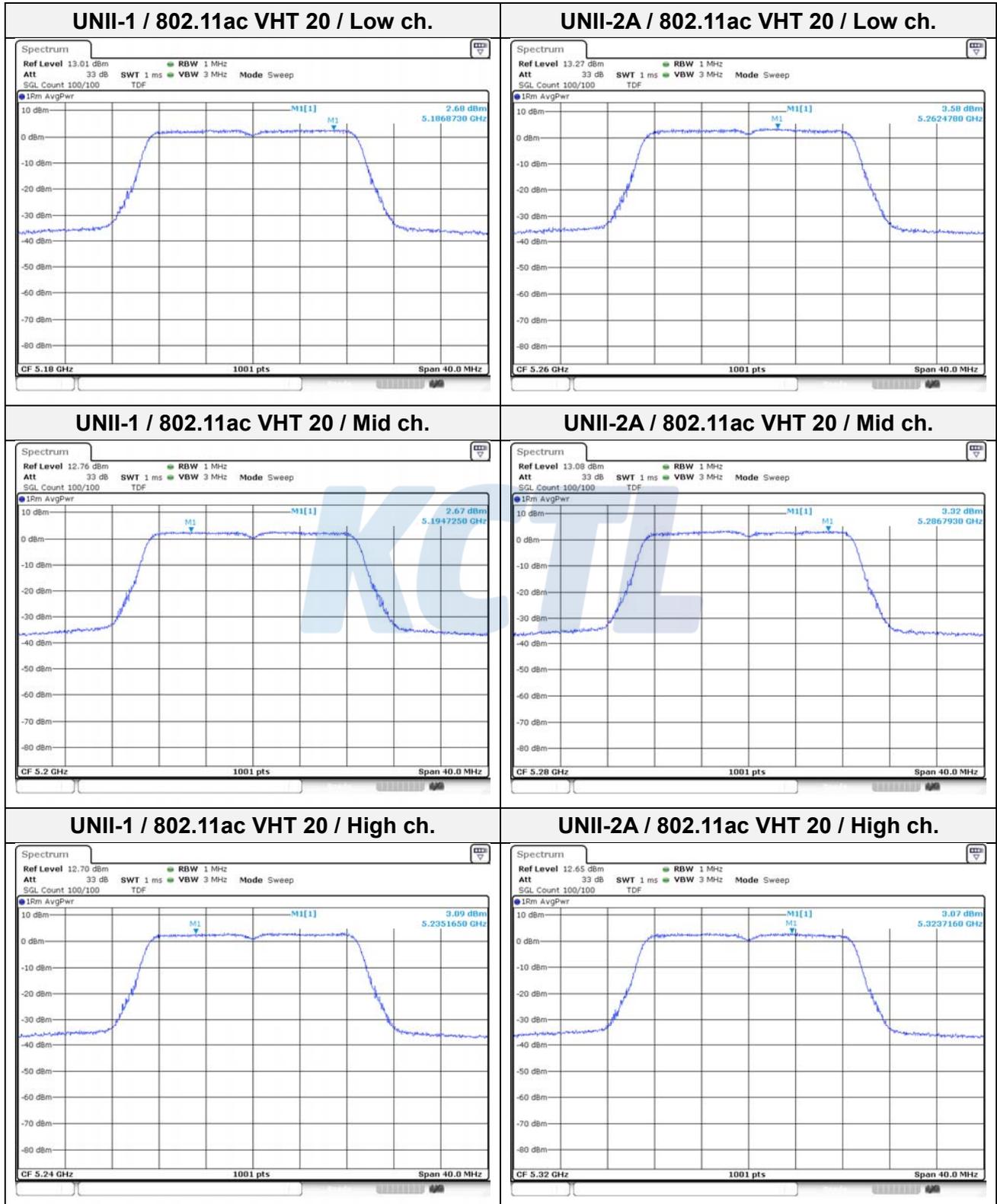
Test mode	Band	Frequency (MHz)	Measured PSD (dBm/MHz)		DCF (dB)	Maximum PSD (dBm /500 kHz)	Limit (dBm /500 kHz)
			ANT1	ANT2			
802.11a	UNII 3	5 745	-0.12	-0.06	0.29	3.21	30
		5 785	0.12	0.42	0.29	3.57	
		5 825	-0.03	0.40	0.29	3.49	
802.11n HT20		5 745	-0.48	0.11	0.31	3.15	
		5 785	-0.19	0.06	0.31	3.26	
		5 825	-0.01	0.14	0.31	3.39	
802.11n HT40		5 755	-4.60	-4.02	0.60	-0.69	
		5 795	-4.36	-4.25	0.60	-0.69	
802.11ac VHT20		5 745	-0.79	-0.48	0.31	2.69	
		5 785	-0.33	-0.32	0.31	3.00	
	5 825	-0.54	-0.19	0.31	2.96		
802.11ac VHT40	5 755	-5.03	-4.70	1.06	-0.79		
	5 795	-4.40	-4.54	1.06	-0.40		
802.11ac VHT80	5 775	-9.17	-9.32	1.81	-4.42		

Notes:

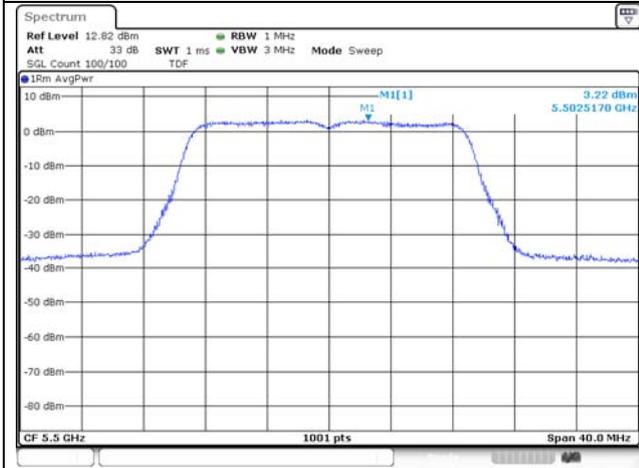
1. Maximum PSD calculation

- Maximum PSD = Measured $10\log(10^{(ANT\ 1/10)} + 10^{(ANT\ 2/10)}) + D.C.F$

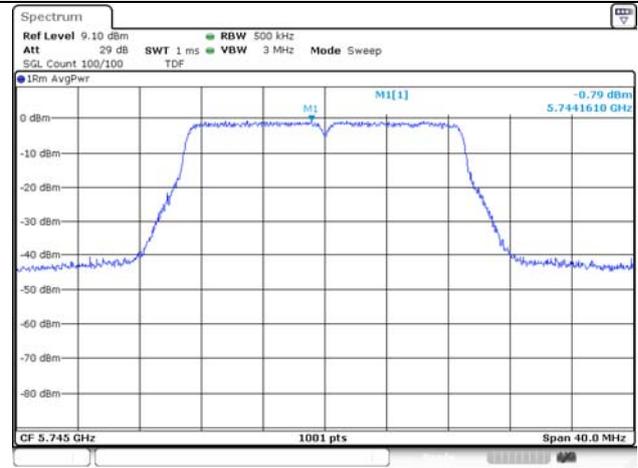
In order to simplify the report, attached plots were only MIMO (Worst bandwidth)
MIMO ANT 1



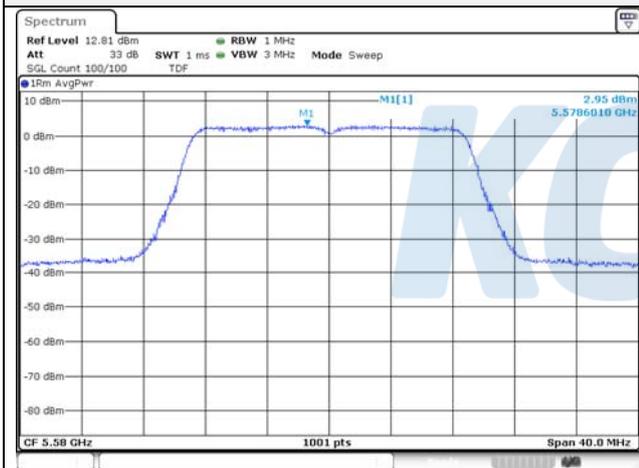
UNII-2C / 802.11ac VHT 20 / Low ch.



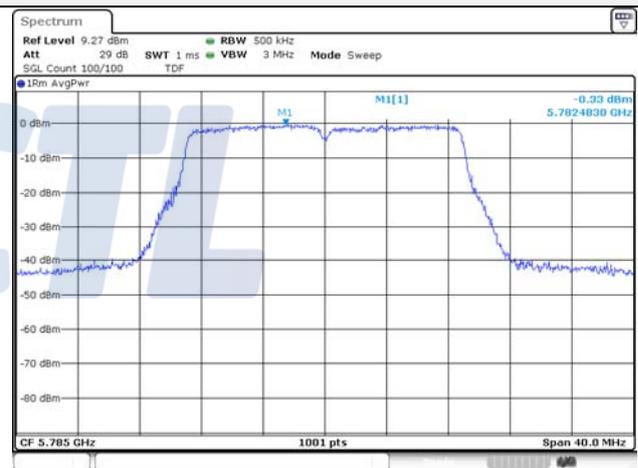
UNII-3 / 802.11ac VHT 20 / Low ch.



UNII-2C / 802.11ac VHT 20 / Mid ch.



UNII-3 / 802.11ac VHT 20 / Mid ch.



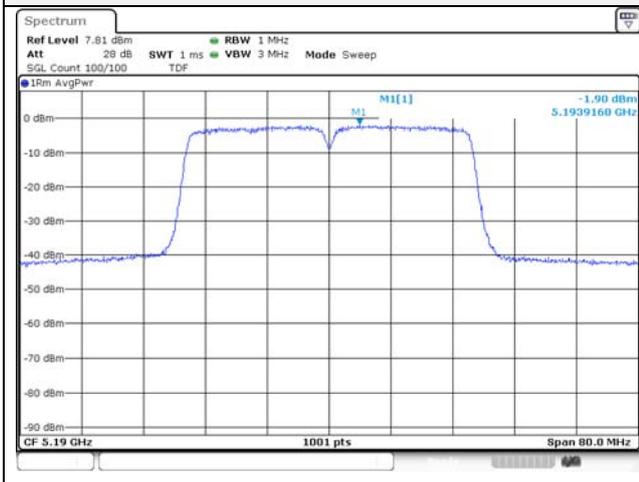
UNII-2C / 802.11ac VHT 20 / High ch.



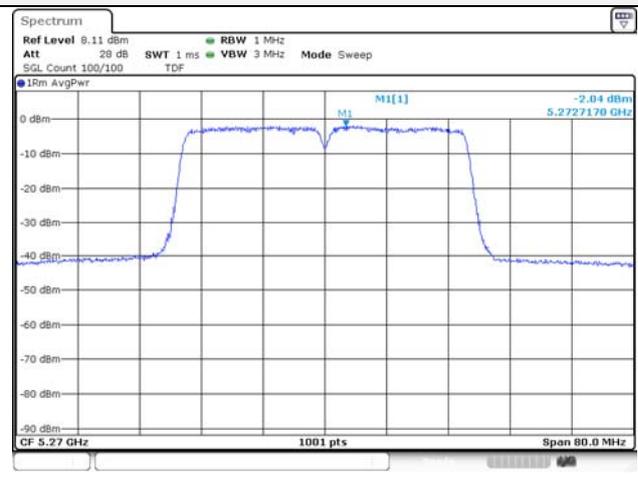
UNII-3 / 802.11ac VHT 20 / High ch.



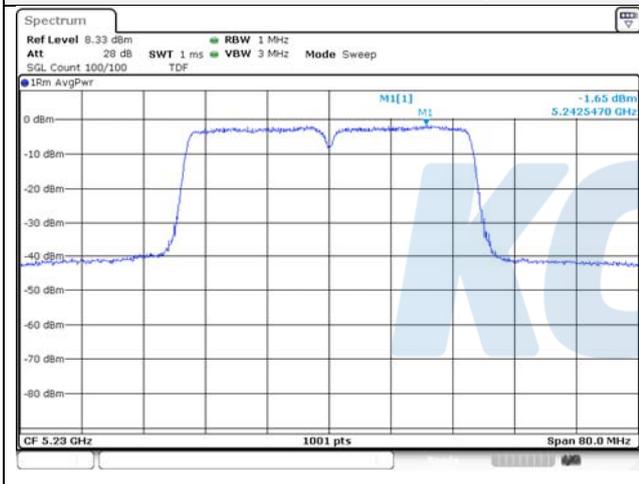
UNII-1 / 802.11ac VHT40 / Low ch.



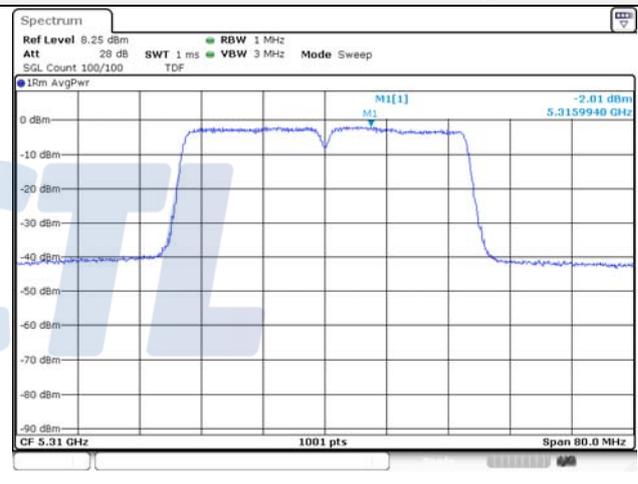
UNII-2A / 802.11ac VHT40 / Low ch.



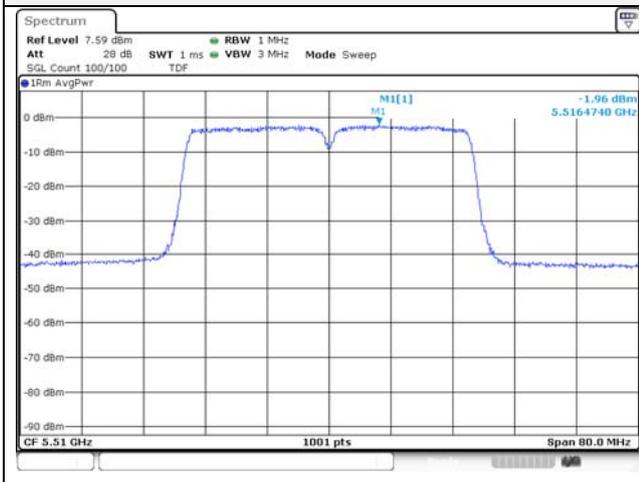
UNII-1 / 802.11ac VHT40 / High ch.



UNII-2A 802.11ac VHT40 / High ch.



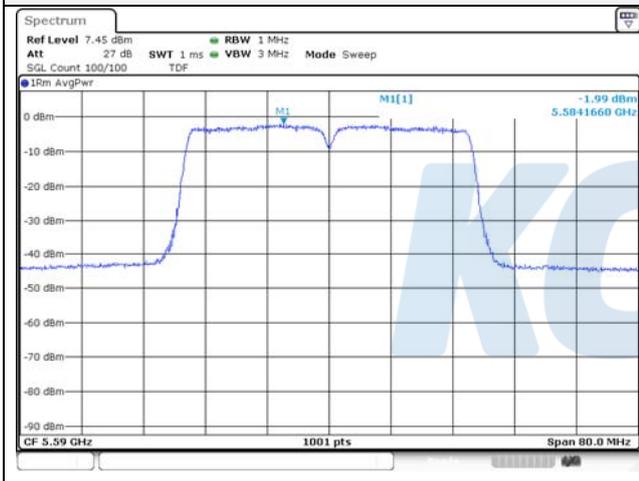
UNII-2C / 802.11ac VHT40 / Low ch.



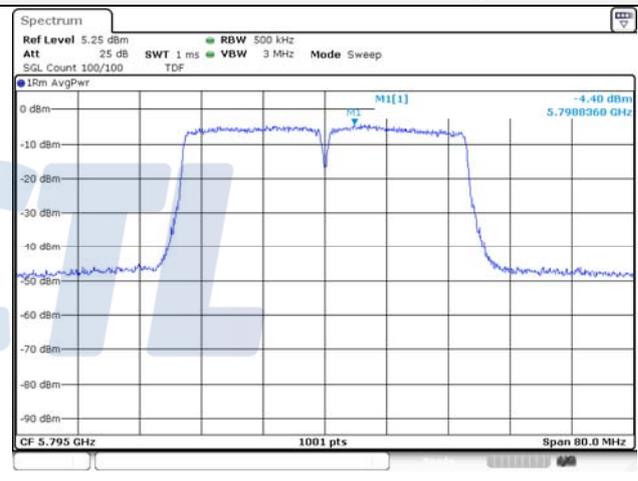
UNII-3 / 802.11ac VHT40 / Low ch.



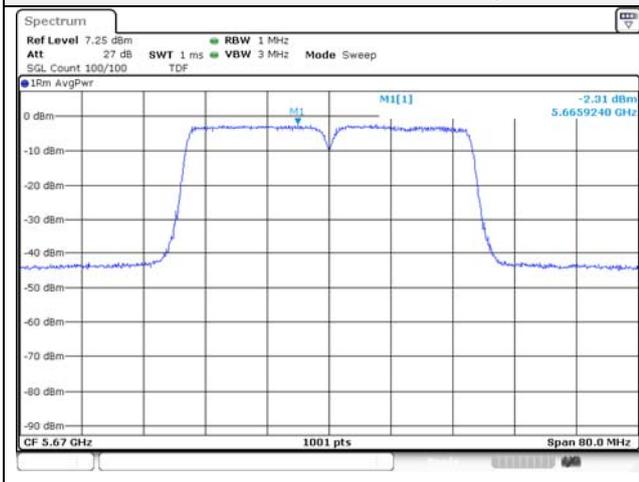
UNII-2C / 802.11ac VHT40 / Mid ch.



UNII-3 / 802.11ac VHT40 / High ch.

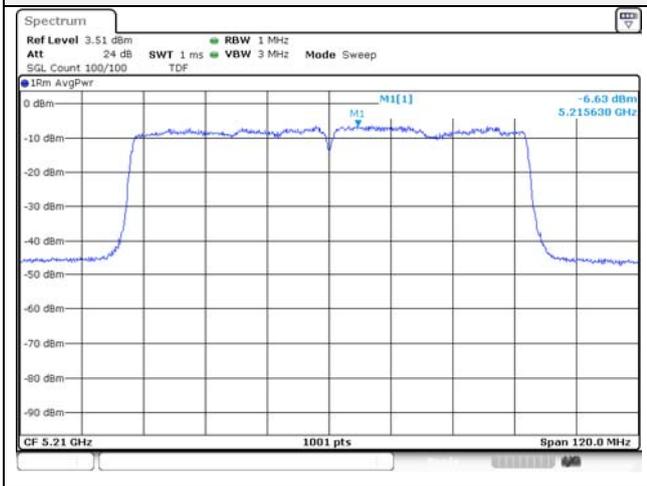


UNII-2C / 802.11ac VHT40 / High ch.

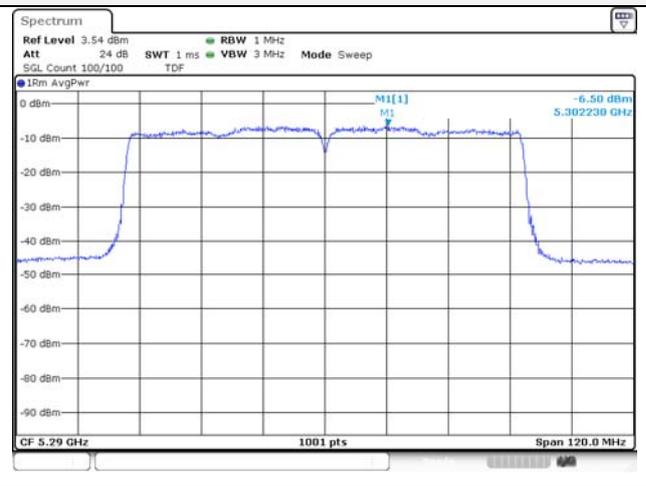


Blank

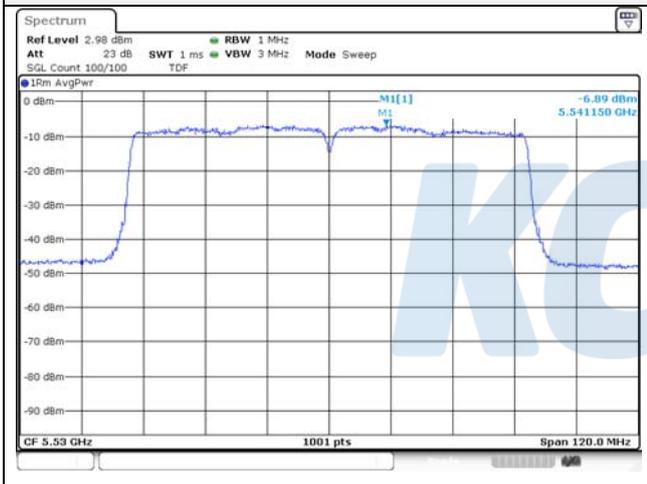
UNII-1 / 802.11ac VHT80 / Low ch.



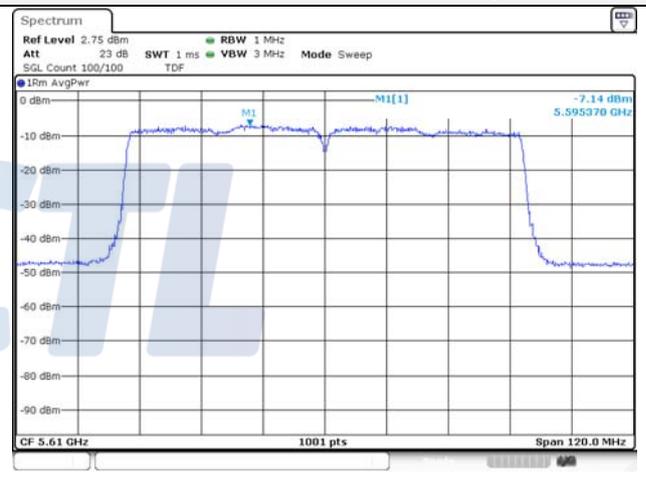
UNII-2A / 802.11ac VHT80 / Low ch.



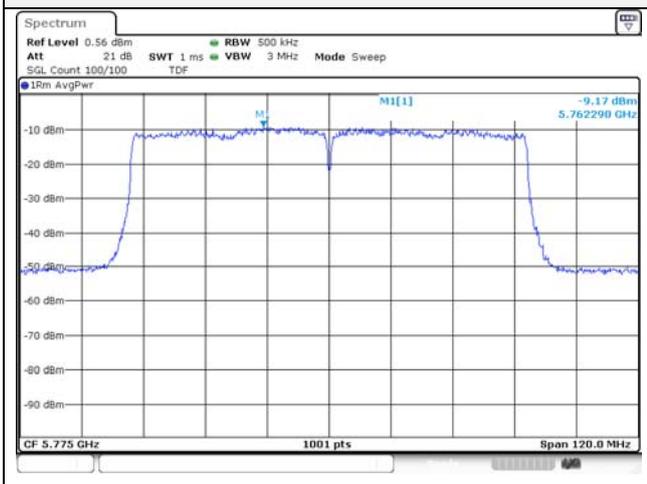
UNII-2C / 802.11ac VHT80 / Low ch.



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



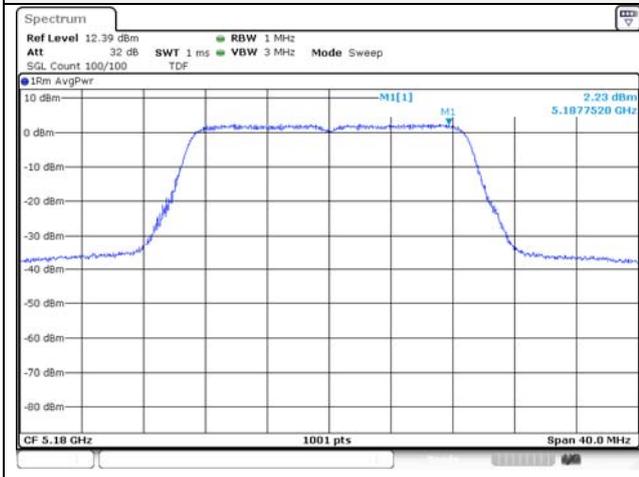
UNII-3 / 802.11ac VHT80 / Low ch.



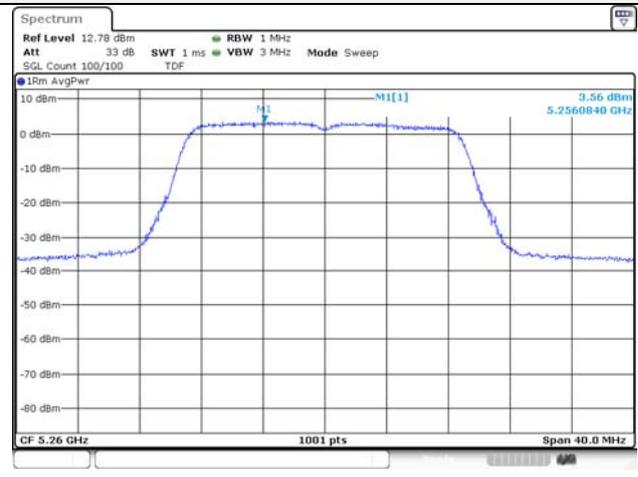
Blank

MIMO ANT 2

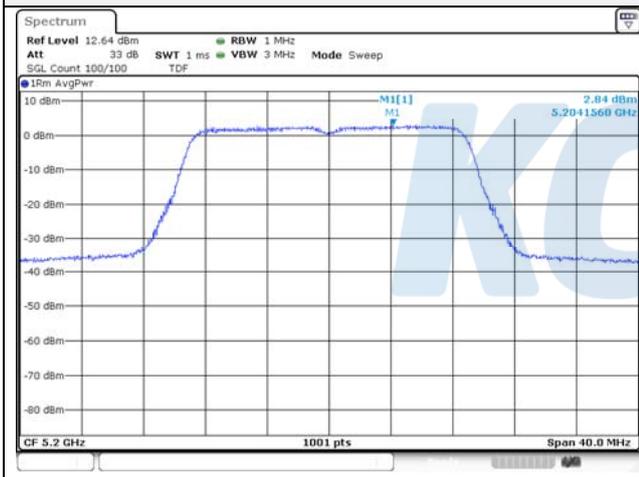
UNII-1 / 802.11ac VHT 20 / Low ch.



UNII-2A / 802.11ac VHT 20 / Low ch.



UNII-1 / 802.11ac VHT 20 / Mid ch.



UNII-2A / 802.11ac VHT 20 / Mid ch.



UNII-1 / 802.11ac VHT 20 / High ch.



UNII-2A / 802.11ac VHT 20 / High ch.



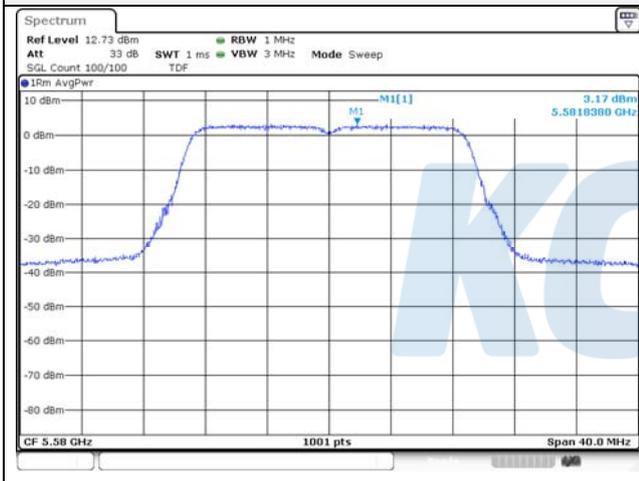
UNII-2C / 802.11ac VHT 20 / Low ch.



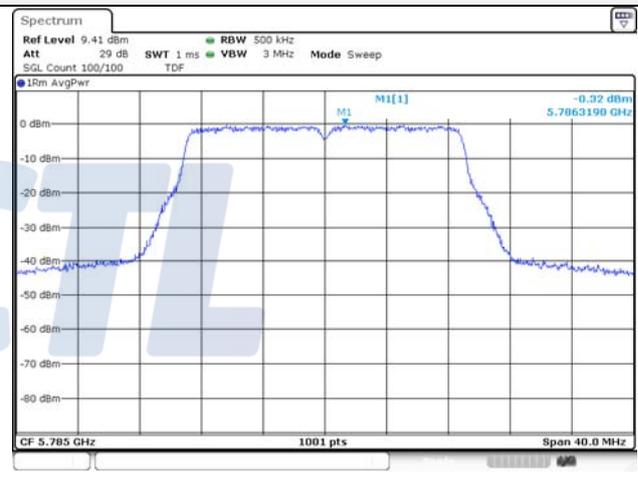
UNII-3 / 802.11ac VHT 20 / Low ch.



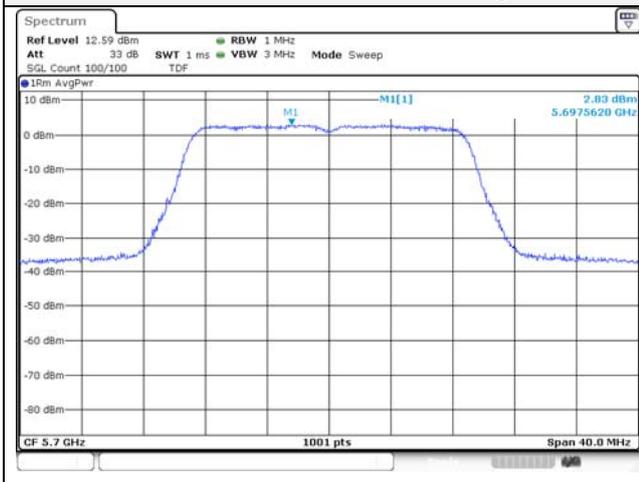
UNII-2C / 802.11ac VHT 20 / Mid ch.



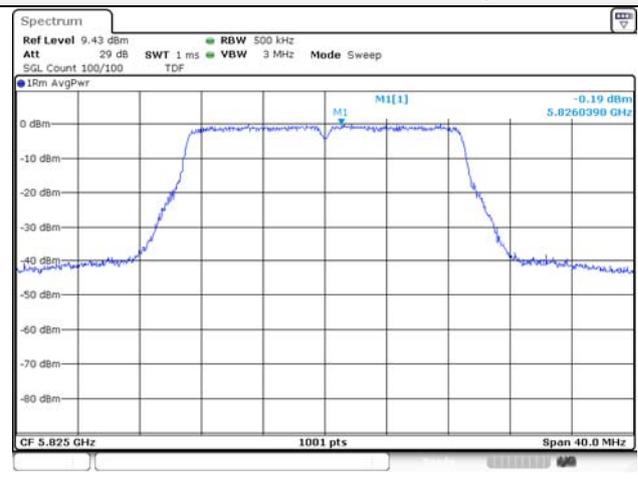
UNII-3 / 802.11ac VHT 20 / Mid ch.



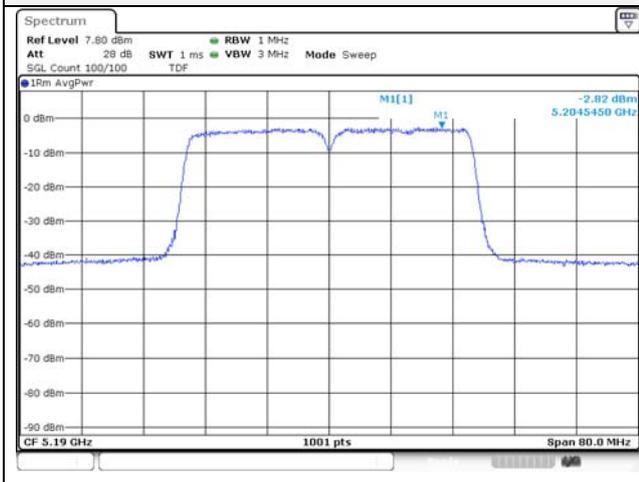
UNII-2C / 802.11ac VHT 20 / High ch.



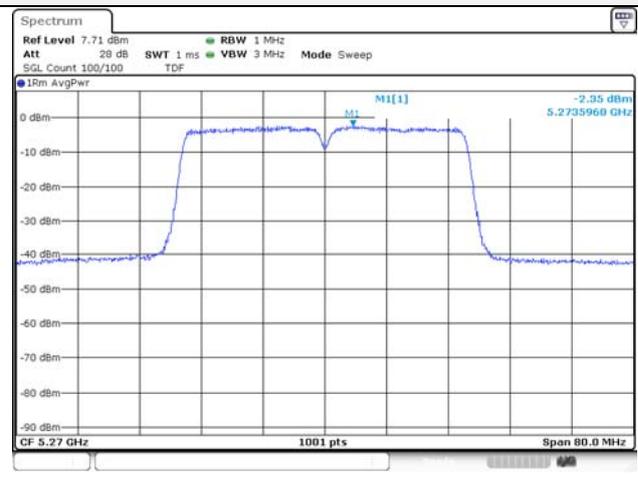
UNII-3 / 802.11ac VHT 20 / High ch.



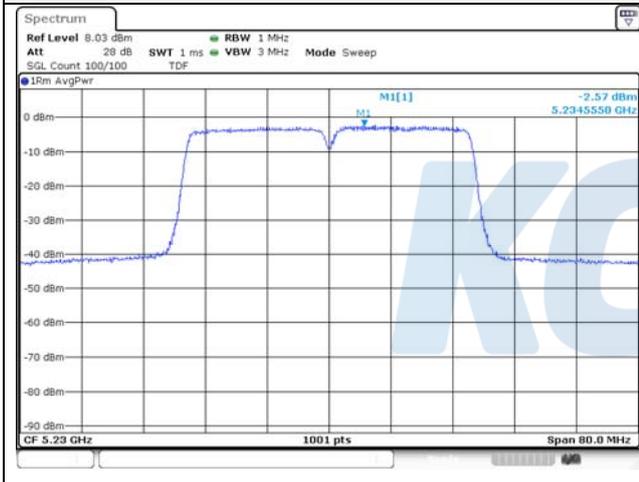
UNII-1 / 802.11ac VHT40 / Low ch.



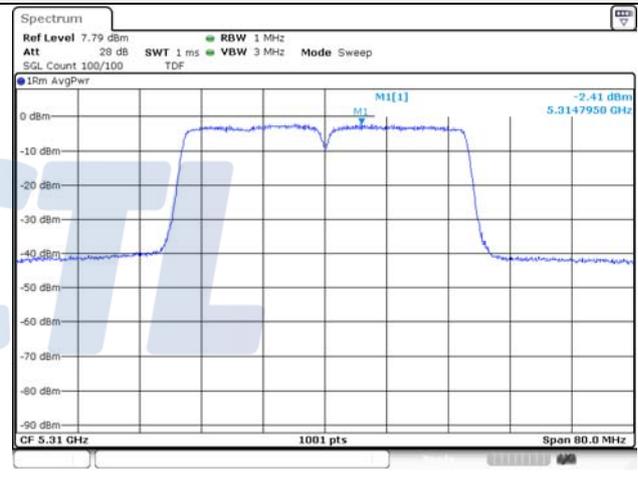
UNII-2A / 802.11ac VHT40 / Low ch.



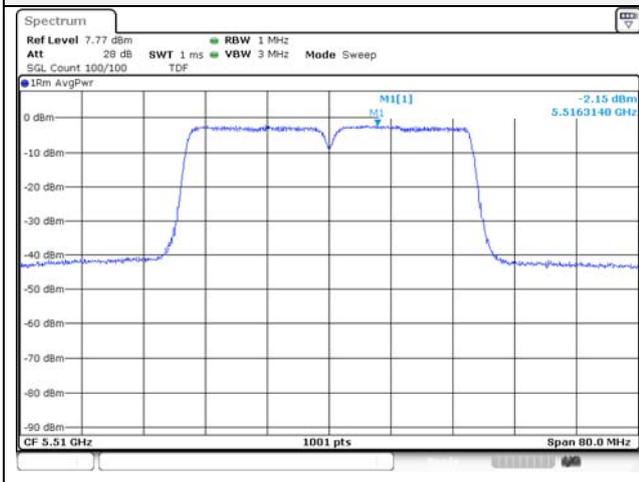
UNII-1 / 802.11ac VHT40 / High ch.



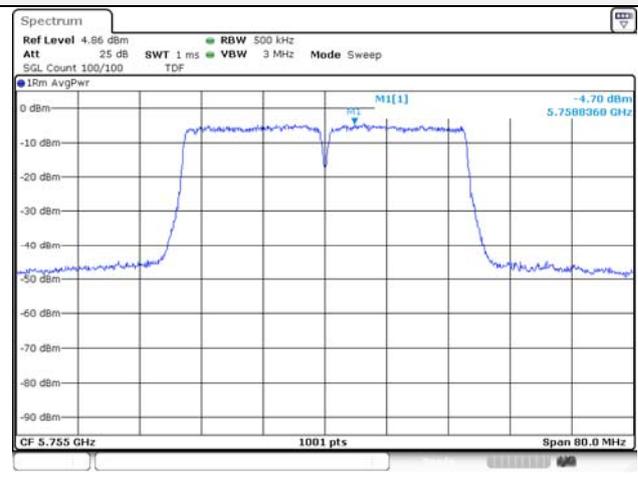
UNII-2A / 802.11ac VHT40 / High ch.



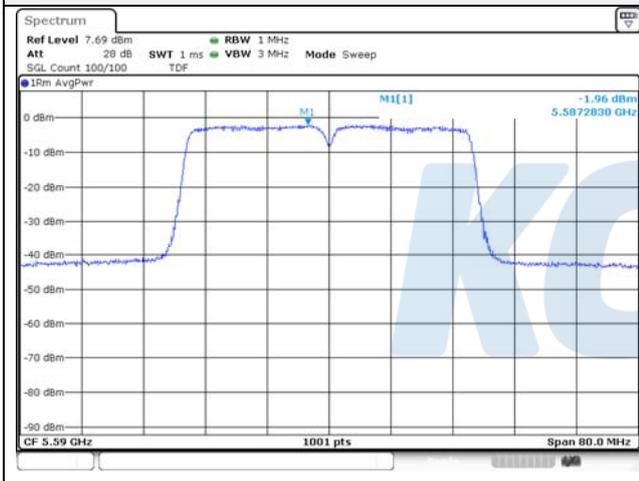
UNII-2C / 802.11ac VHT40 / Low ch.



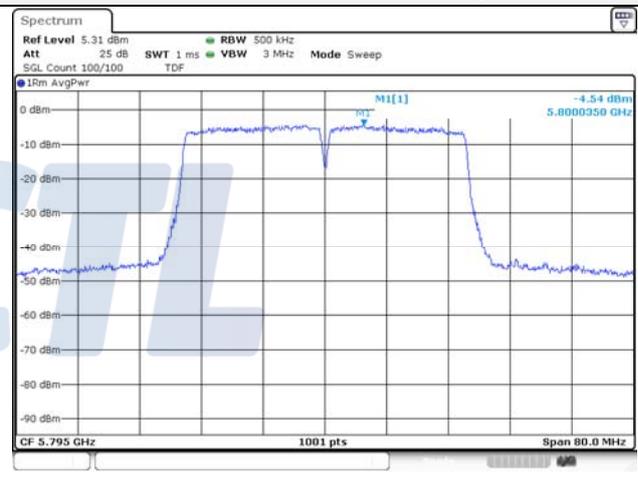
UNII-3 / 802.11ac VHT40 / Low ch.



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



UNII-3 / 802.11ac VHT40 / High ch.

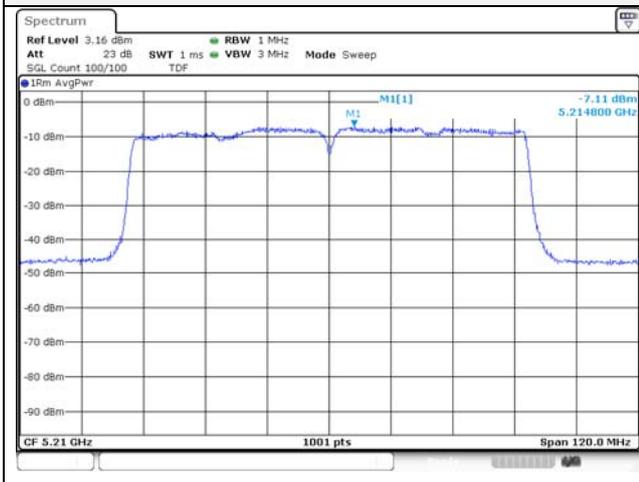


UNII-2C / 802.11ac VHT40 / High ch.

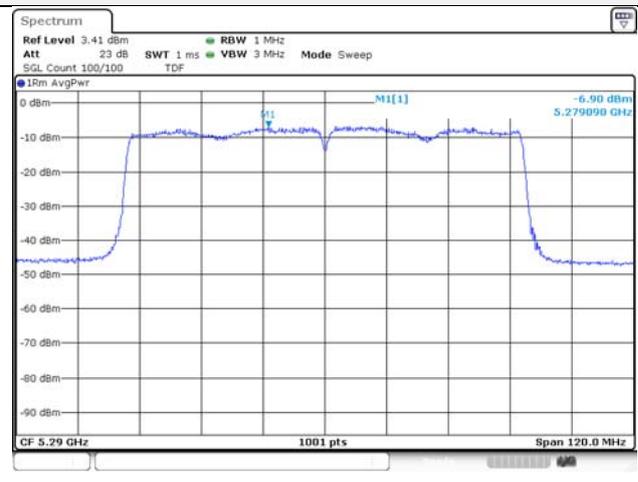


Blank

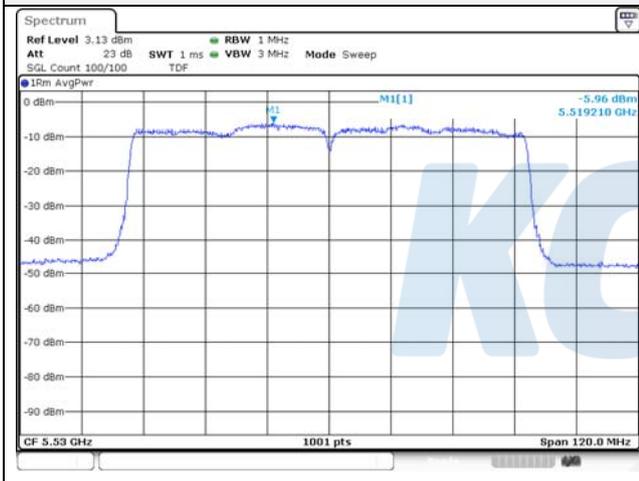
UNII-1 / 802.11ac VHT80 / Low ch.



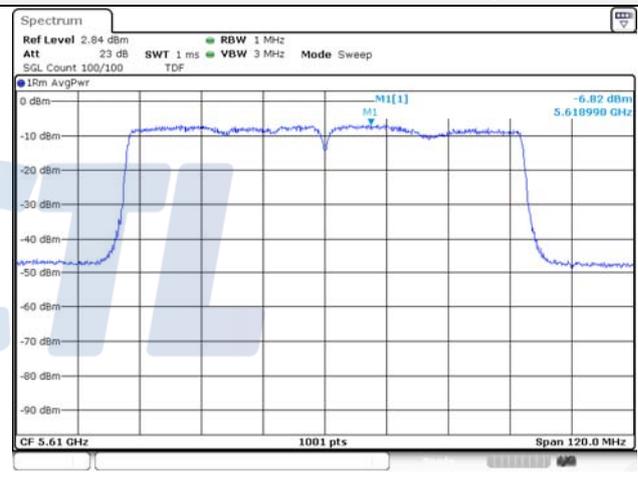
UNII-2A / 802.11ac VHT80 / Low ch.



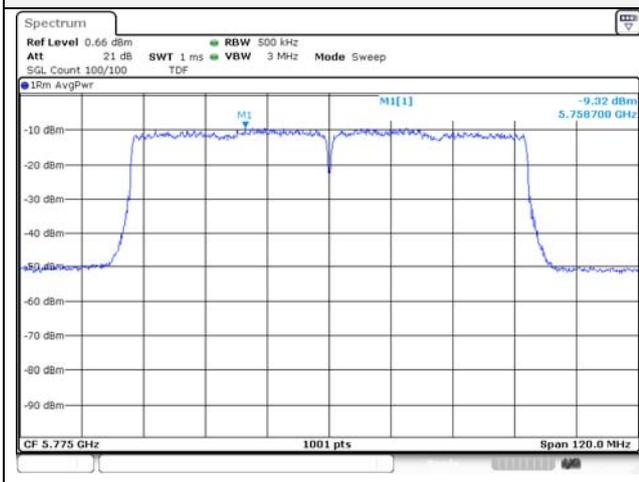
UNII-2C / 802.11ac VHT80 / Low ch.



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



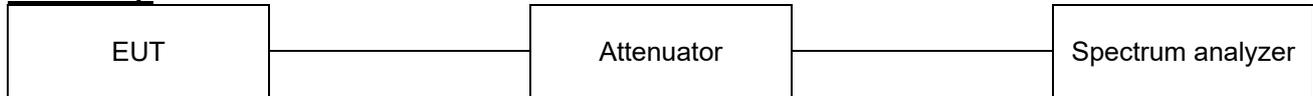
UNII-3 / 802.11ac VHT80 / Low ch.



Blank

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**26 dB bandwidth**

Test mode	Band	Frequency(MHz)	Measured Bandwidth (MHz)	
			ANT1	ANT2
802.11a	UNII-1	5 180	21.43	21.43
		5 200	21.58	21.38
		5 240	21.53	21.33
	UNII-2A	5 260	21.23	21.38
		5 280	21.18	21.18
		5 320	21.43	21.18
	UNII-2C	5 500	21.33	21.23
		5 580	21.33	21.23
		5 700	21.38	21.28
802.11n HT20	UNII-1	5 180	21.38	21.53
		5 200	21.68	21.43
		5 240	21.83	21.58
	UNII-2A	5 260	21.78	21.43
		5 280	21.43	21.33
		5 320	21.58	21.53
	UNII-2C	5 500	21.63	21.38
		5 580	21.48	21.43
		5 700	21.63	21.53
802.11n HT40	UNII-1	5 190	40.46	39.86
		5 230	40.06	39.86
	UNII-2A	5 270	40.56	39.96
		5 310	40.26	40.06
	UNII-2C	5 510	40.46	39.86
		5 590	40.36	39.86
		5 670	40.36	39.86

Test mode	Band	Frequency(MHz)	Measured Bandwidth (MHz)	
			ANT1	ANT2
802.11ac VHT20	UNII-1	5 180	21.88	21.68
		5 200	21.63	21.63
		5 240	21.98	21.83
	UNII-2A	5 260	21.58	21.68
		5 280	21.68	21.68
		5 320	21.58	21.53
	UNII-2C	5 500	21.43	21.63
		5 580	21.53	21.58
		5 700	21.58	21.68
802.11ac VHT40	UNII-1	5 190	40.36	39.96
		5 230	40.36	39.96
	UNII-2A	5 270	40.56	39.76
		5 310	40.26	40.16
	UNII-2C	5 510	40.46	39.86
		5 590	40.36	39.86
		5 670	40.76	39.96
802.11ac VHT80	UNII-1	5 210	82.12	81.76
	UNII-2A	5 290	82.24	81.88
	UNII-2C	5 530	82.48	82.12
		5 610	82.36	82.12

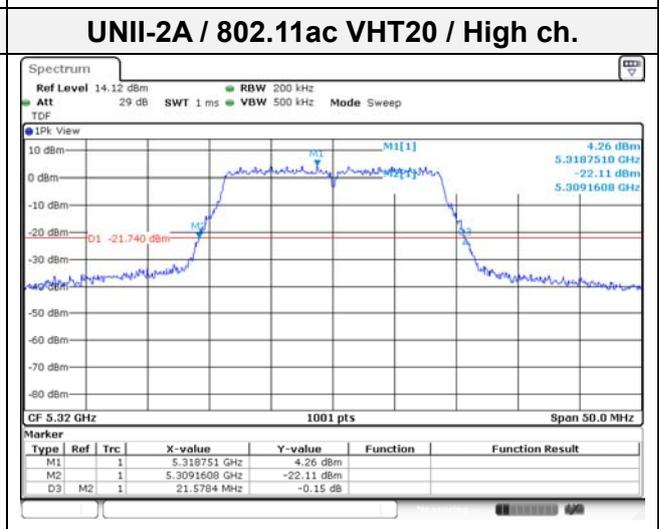
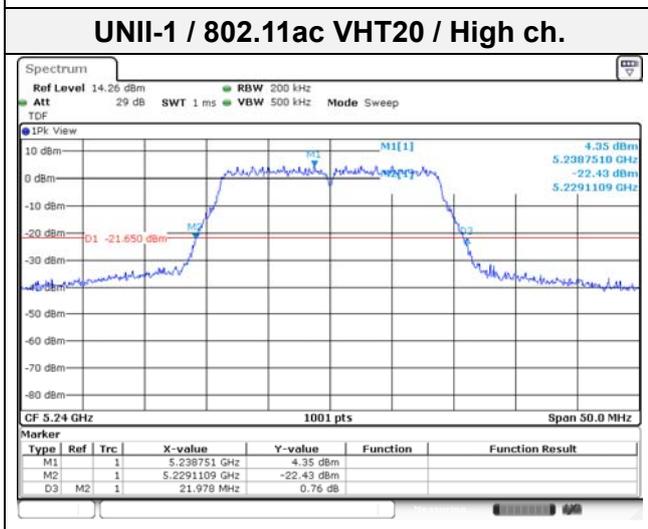
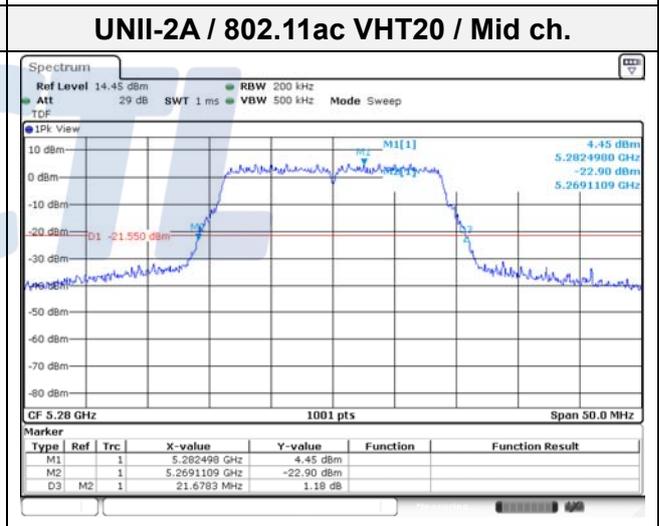
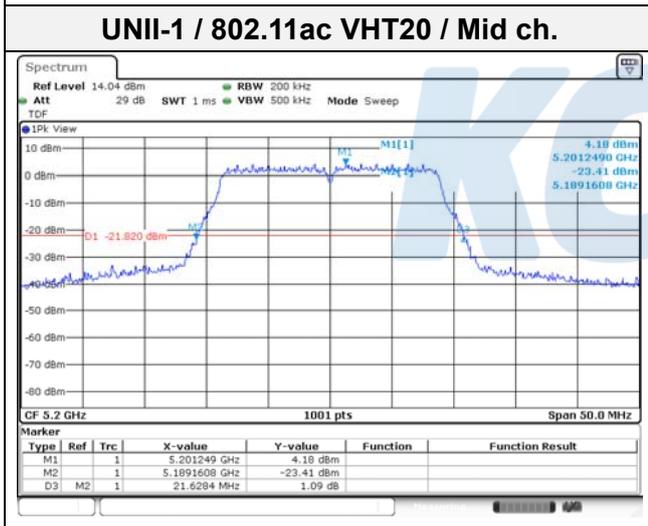
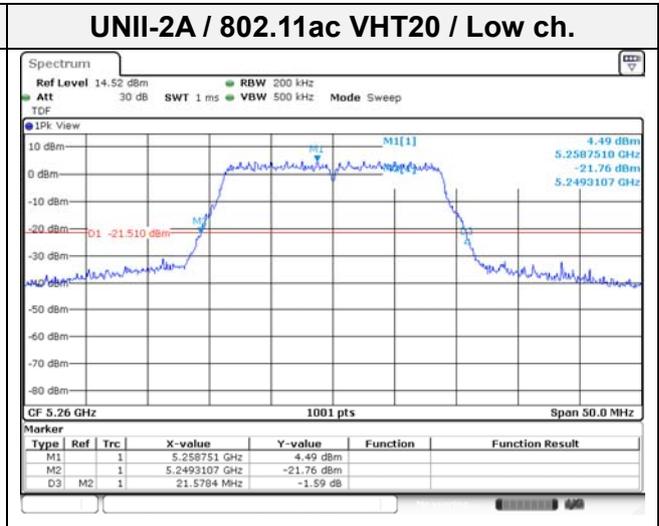
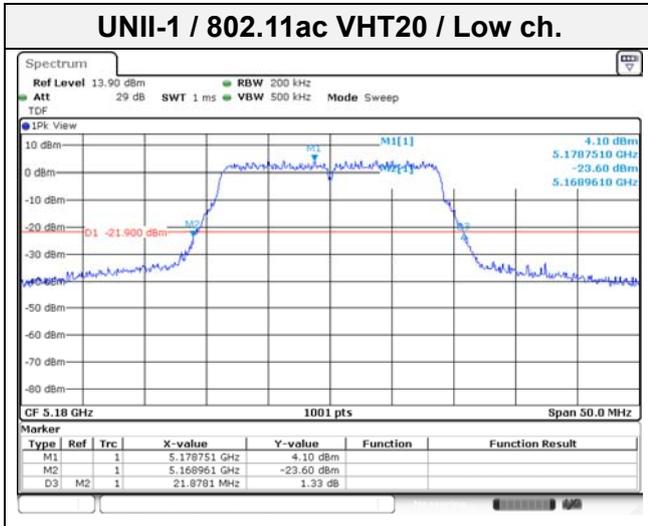
99% bandwidth

Test mode	Band	Frequency(MHz)	Measured Bandwidth (MHz)	
			ANT1	ANT2
802.11a	UNII-1	5 240	16.78	16.68
	UNII-2A	5 260	16.78	16.68
802.11n HT20	UNII-1	5 240	17.88	17.88
	UNII-2A	5 260	17.93	17.78
802.11n HT40	UNII-1	5 230	36.46	36.26
	UNII-2A	5 270	36.46	36.36
802.11ac VHT20	UNII-1	5 240	17.98	17.88
	UNII-2A	5 260	17.88	17.93
802.11ac VHT40	UNII-1	5 230	36.46	36.26
	UNII-2A	5 270	36.46	36.26
802.11ac VHT80	UNII-1	5 210	75.64	75.76
	UNII-2A	5 290	75.64	75.64

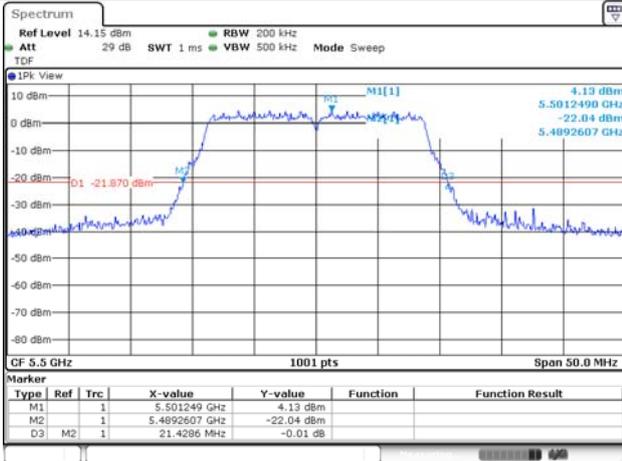
KCTL

In order to simplify the report, attached plots were only MIMO ANT 1

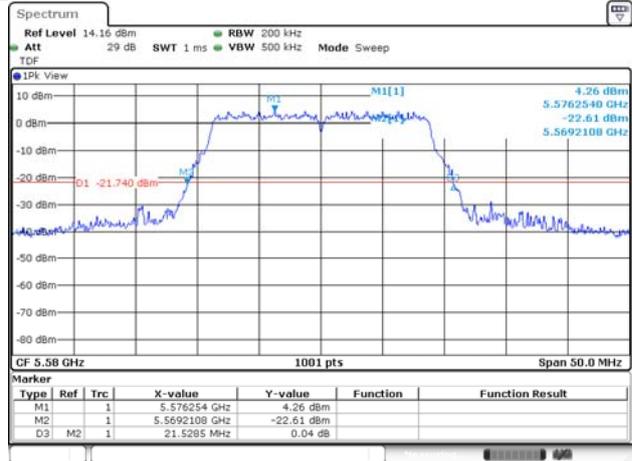
26 dB bandwidth



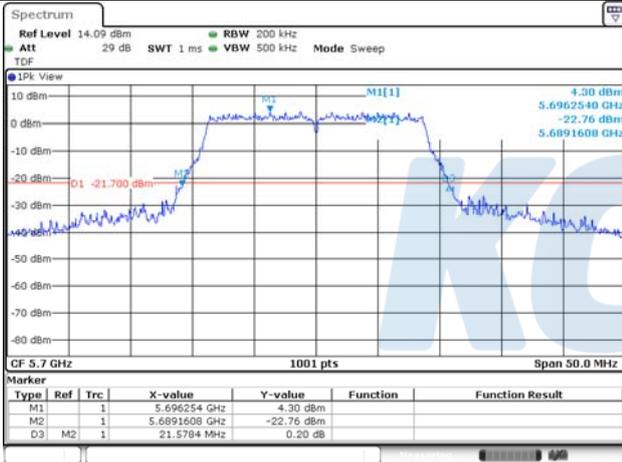
UNII-2C / 802.11ac VHT20 / Low ch.



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

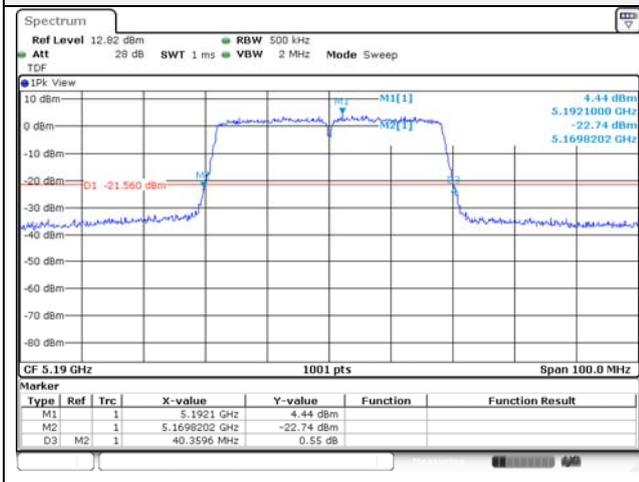


UNII-2C / 802.11ac VHT20 / High ch.

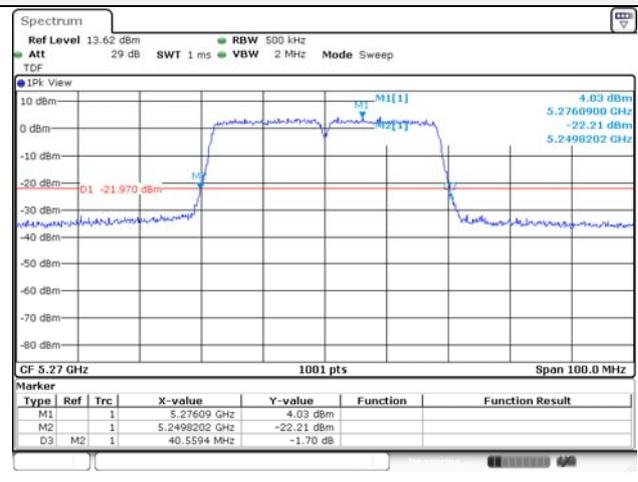


Blank

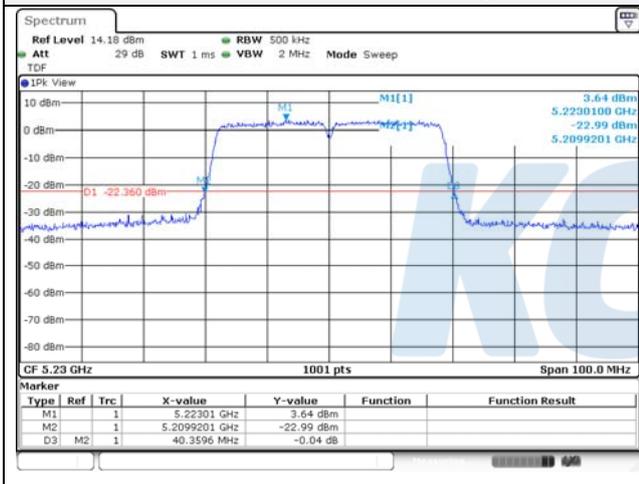
UNII-1 / 802.11ac VHT40 / Low ch.



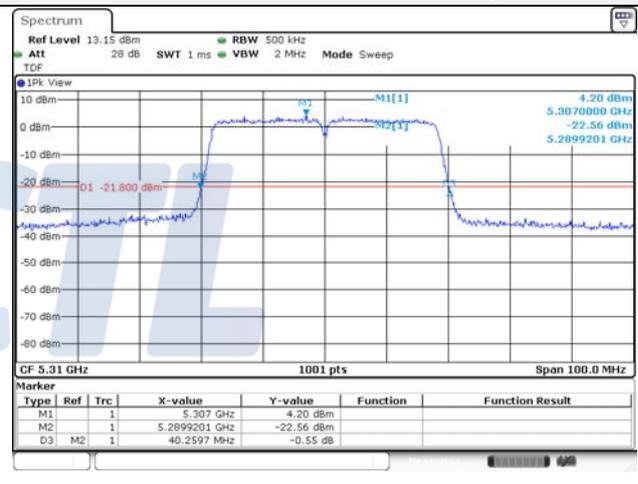
UNII-2A / 802.11ac VHT40 / Low ch.



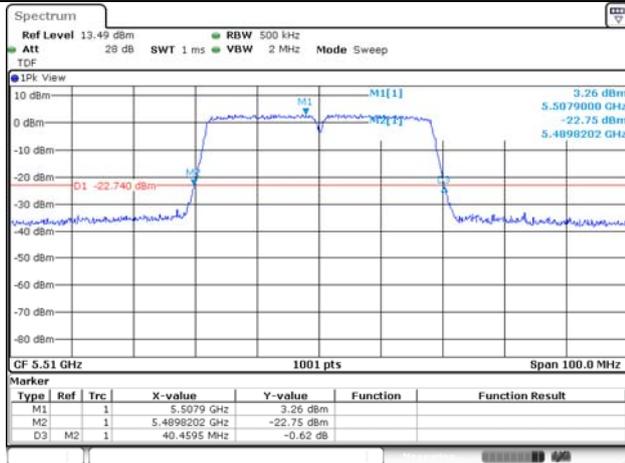
UNII-1 / 802.11ac VHT40 / High ch.



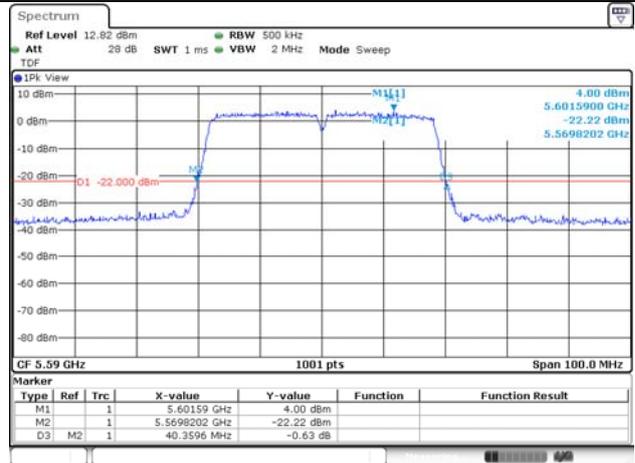
UNII-2A / 802.11ac VHT40 / High ch.



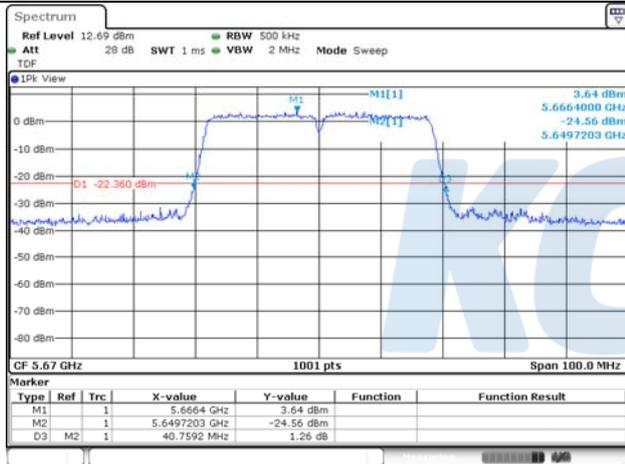
UNII-2C / 802.11ac VHT40 / Low ch.



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

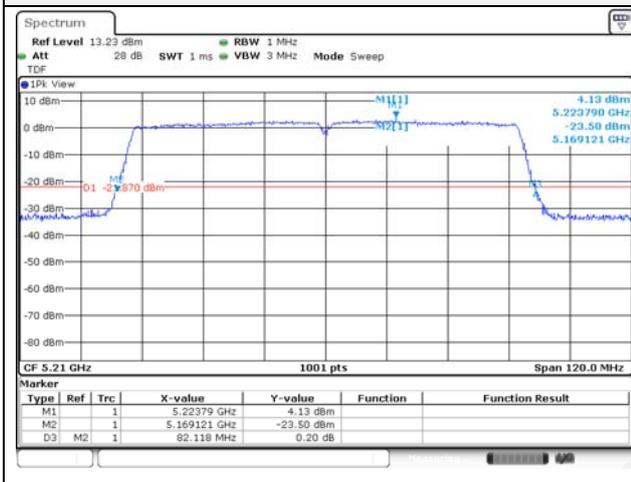


UNII-2C / 802.11ac VHT40 / High ch.

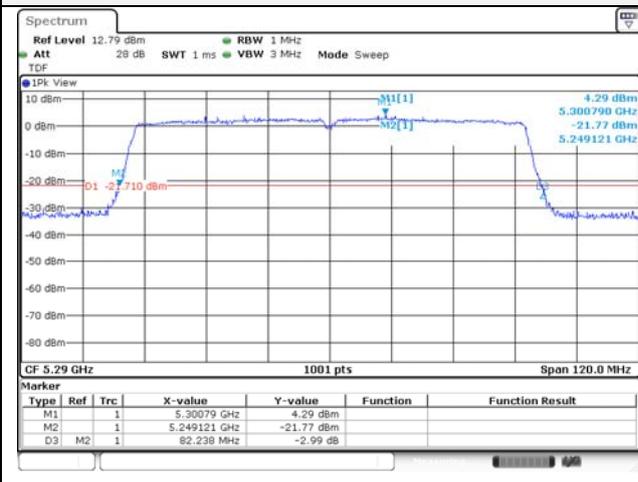


Blank

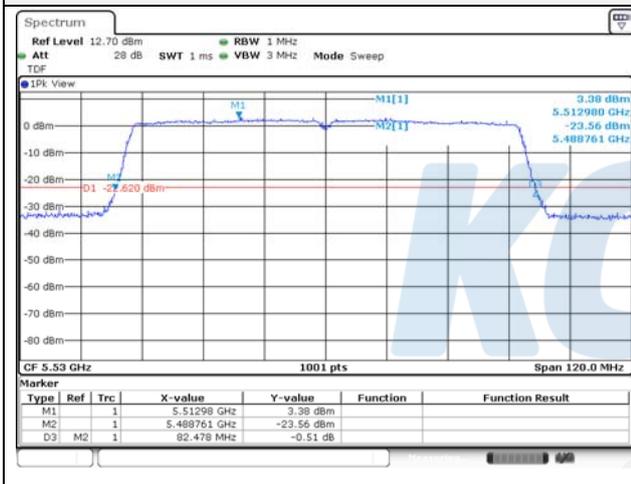
UNII-1 / 802.11ac VHT80 / Low ch.



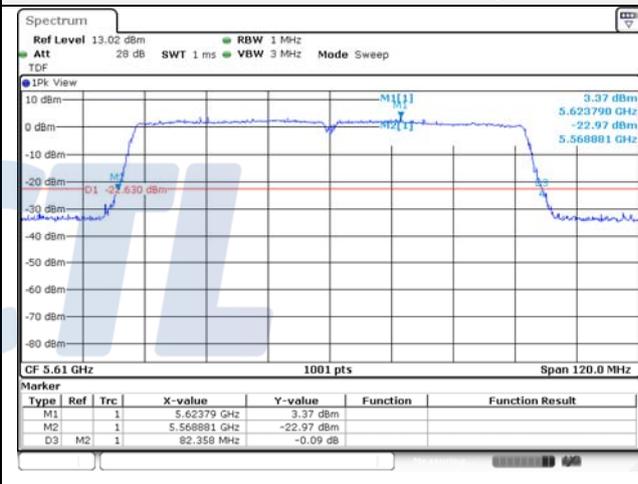
UNII-2A / 802.11ac VHT80 / Low ch.



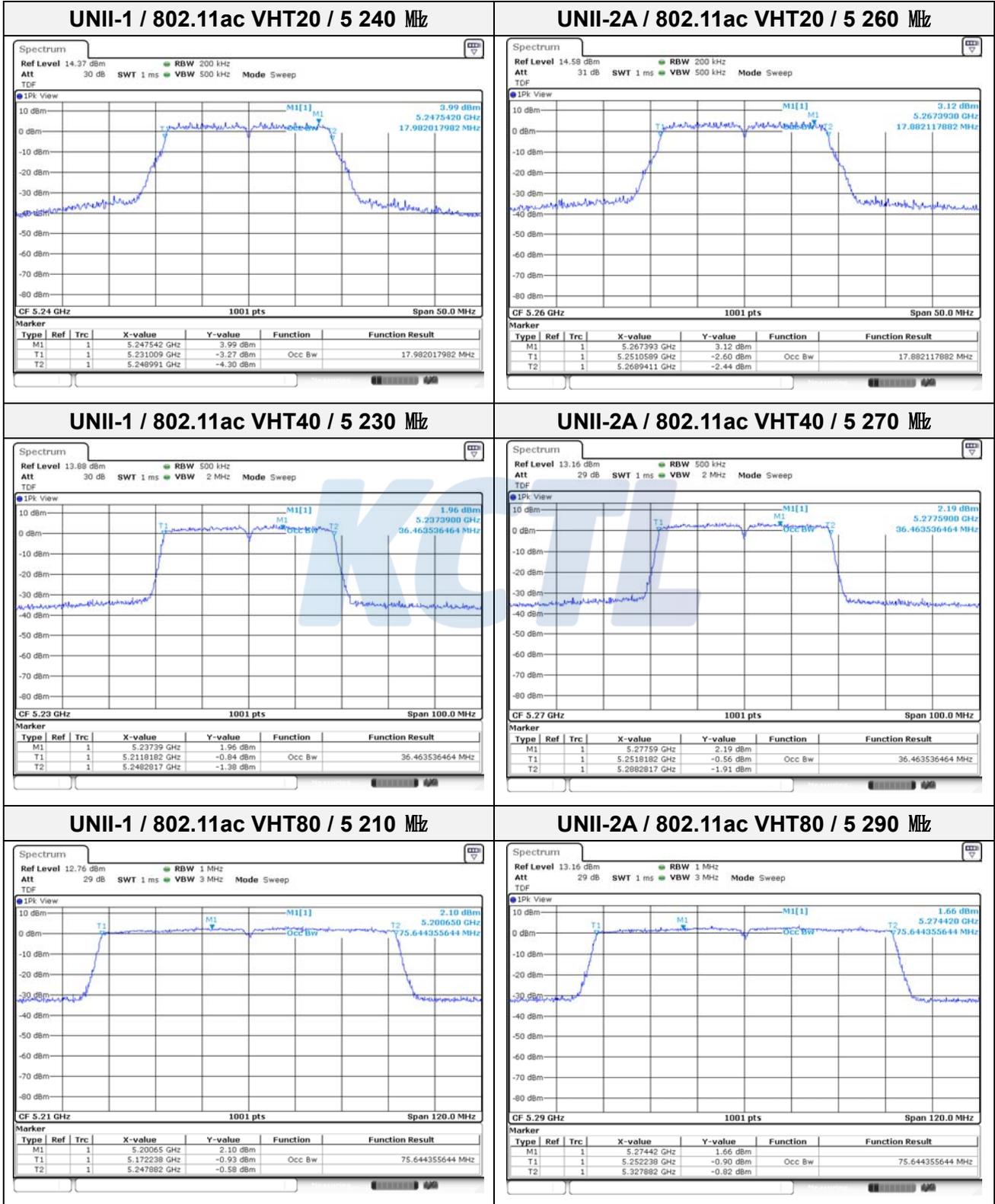
UNII-2C / 802.11ac VHT80 / Low ch.



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

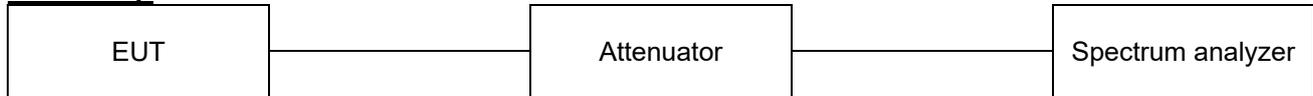


In order to simplify the report, attached plots were only MIMO ANT 1
99% bandwidth



7.4. 6 dB Bandwidth

Test setup



Limit

According to §15.407(e)

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth if U-NII devices shall be at least 500kHz

Test procedure

ANSI C63.10-2013 Section 6.9.2

KDB 789033 D02 v02r01 - Section C.2

Test settings

Minimum Emission Bandwidth for the band 5.725–5.85 GHz

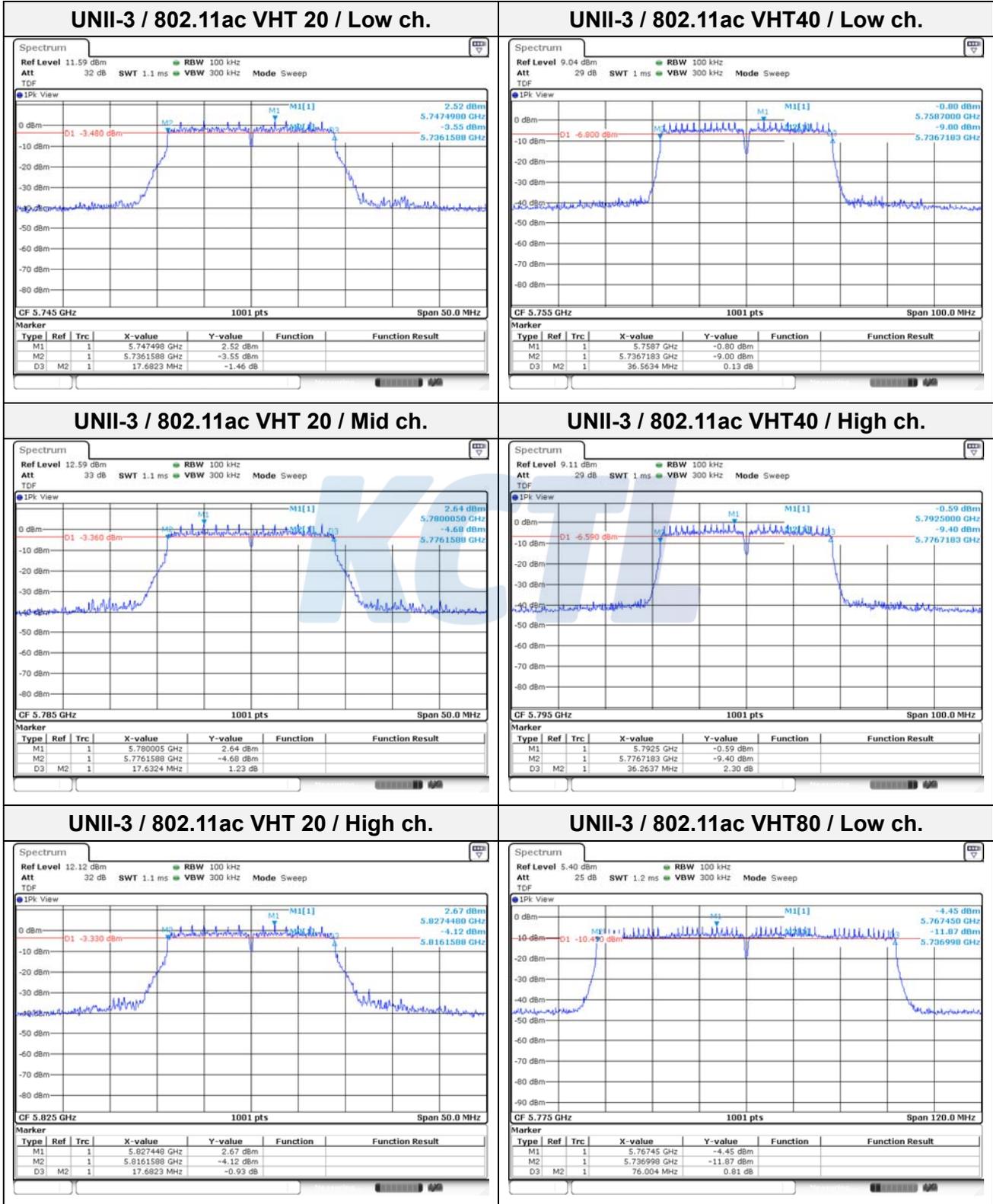
Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 kHz for the band 5.725–5.85 GHz. The following procedure shall be used for measuring this bandwidth:

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. 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.

Test results

Test mode	Band	Frequency (MHz)	Measured Bandwidth (MHz)		Limit (MHz)
			ANT1	ANT2	
802.11a	UNII-3	5 745	16.43	16.43	0.50
		5 785	16.43	16.43	0.50
		5 825	16.48	16.48	0.50
802.11n HT20	UNII-3	5 745	17.68	17.68	0.50
		5 785	17.68	17.68	0.50
		5 825	17.68	17.68	0.50
802.11n HT40	UNII-3	5 755	36.56	36.56	0.50
		5 795	36.46	36.56	0.50
802.11ac VHT20	UNII-3	5 745	17.68	17.68	0.50
		5 785	17.63	17.63	0.50
		5 825	17.68	17.63	0.50
802.11ac VHT40	UNII-3	5 755	36.56	36.56	0.50
		5 795	36.26	36.56	0.50
802.11ac VHT80	UNII-3	5 775	76.00	76.48	0.50

In order to simplify the report, attached plots were only MIMO ANT 1
6 dB bandwidth



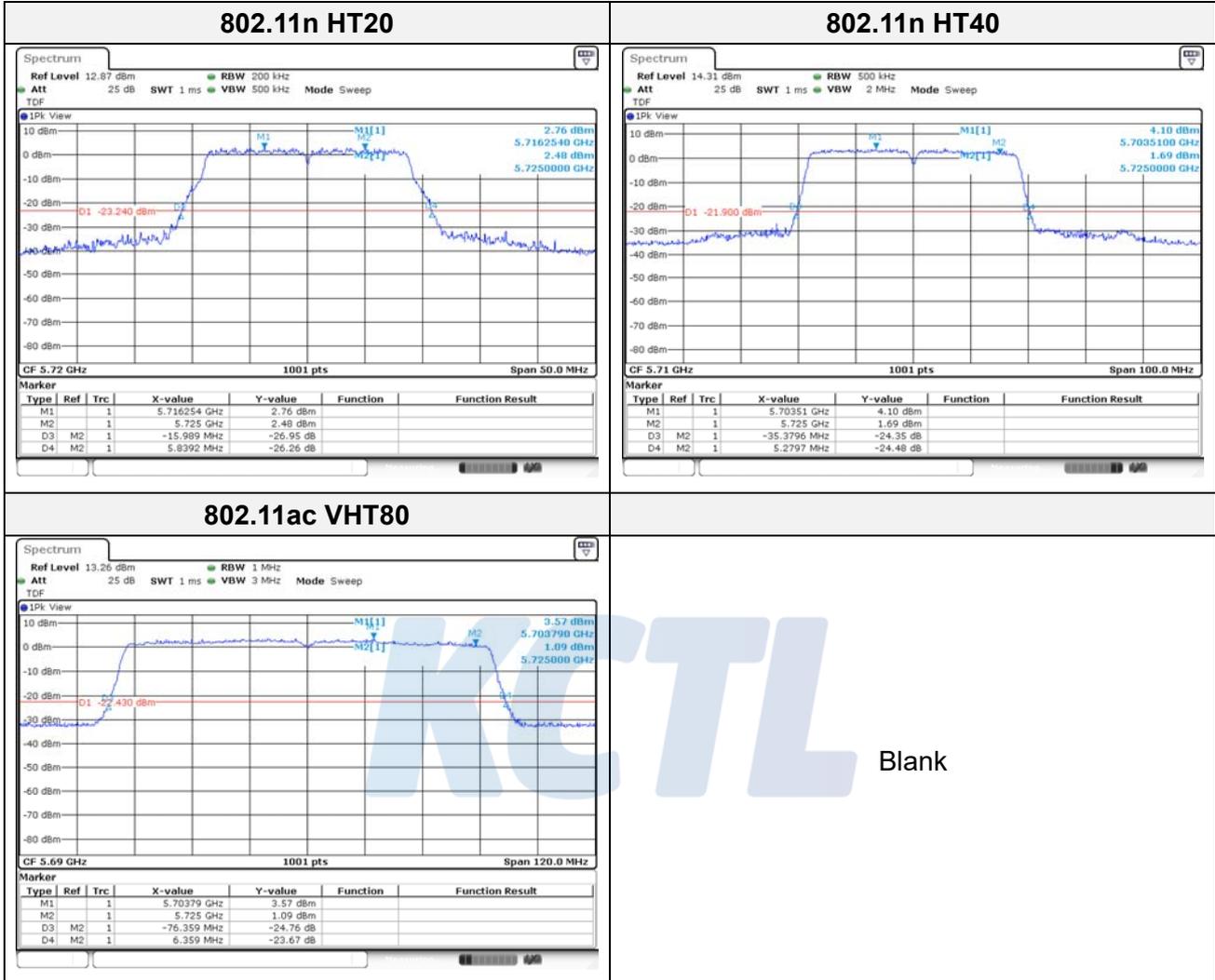
7.5. Straddle channel**26dB bandwidth**

Test mode	Band	Frequency (MHz)	26dB Bandwidth (MHz)	
			ANT1	ANT2
802.11a	UNII-2C	5 720	15.69	15.69
802.11n HT20			15.99	15.84
802.11ac VHT20			15.84	15.79
802.11a	UNII-3	5 720	5.74	5.74
802.11n HT20			5.84	5.79
802.11ac VHT20			5.79	5.74
802.11n HT40	UNII-2C	5 710	35.38	34.98
802.11ac VHT40			35.28	34.98
802.11n HT40	UNII-3	5 710	5.28	4.98
802.11ac VHT40			5.48	4.98
802.11ac VHT80	UNII-2C	5 690	76.36	76.12
	UNII-3	5 690	6.36	6.12

Notes:

1. [UNII-C] 26dB Bandwidth = 5 725MHz – Measured Frequency[MHz]
2. [UNII-3] 26dB Bandwidth = Measured Frequency[MHz] – 5 725MHz

In order to simplify the report, attached plots were only MIMO ANT 1



6dB bandwidth

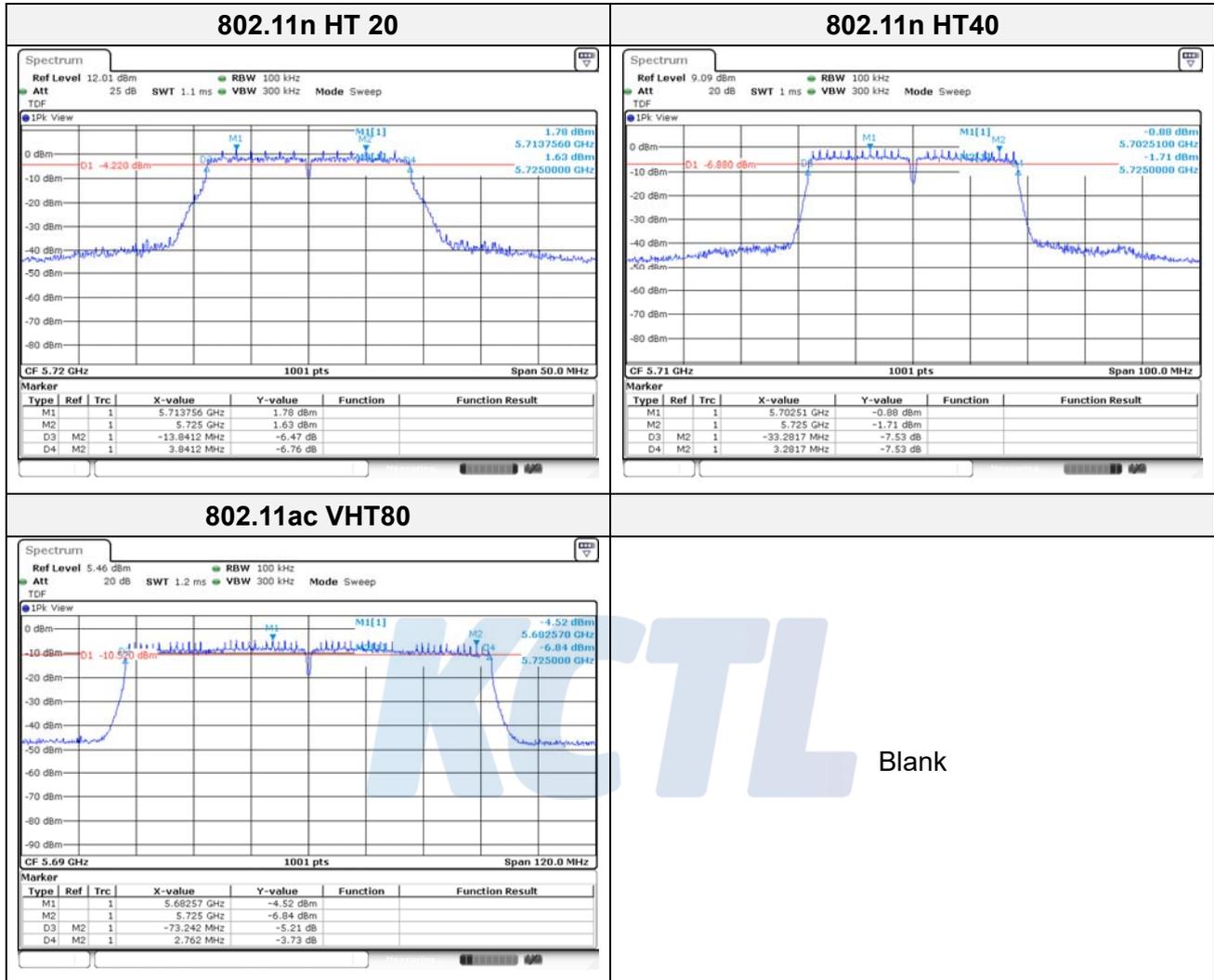
Test mode	Band	Frequency (MHz)	6dB Bandwidth (MHz)		Limit (MHz)
			ANT1	ANT2	
802.11a	UNII-3	5 720	3.24	3.24	0.5
802.11n HT20			3.84	3.84	0.5
802.11ac VHT20			3.84	3.84	0.5
802.11n HT40	UNII-3	5 710	3.28	3.28	0.5
802.11ac VHT40			3.28	3.28	0.5
802.11ac VHT80	UNII-3	5 690	2.76	3.24	0.5

Notes:

1. 6dB Bandwidth = Measured Frequency[MHz] – 5 725MHz

KCTL

In order to simplify the report, attached plots were only MIMO ANT 1



Output Power
-SISO

Test mode	Band	Frequency (MHz)	Measured output power					Limit (dBm)
			Reading (dBm)		DCF (dB)	Result (dBm)		
			ANT1	ANT2		ANT1	ANT2	
802.11a	UNII-2C	5 720	12.60	12.79	0.29	12.89	13.08	24.00
802.11n HT20			12.50	12.65	0.31	12.81	12.96	
802.11ac VHT20			12.09	12.65	0.31	12.40	12.96	
802.11a	UNII-3	5 720	6.46	6.67	0.29	6.75	6.96	30.00
802.11n HT20			6.89	7.05	0.31	7.20	7.36	
802.11ac VHT20			6.49	7.02	0.31	6.80	7.33	
802.11n HT40	UNII-2C	5 710	11.79	12.16	0.60	12.39	12.76	24.00
802.11ac VHT40			11.81	12.13	0.60	12.41	12.73	
802.11n HT40	UNII-3	5 710	1.20	1.62	0.60	1.80	2.22	30.00
802.11ac VHT40			1.18	1.59	0.60	1.78	2.19	
802.11ac VHT80	UNII-2C	5 690	10.64	10.93	1.13	11.77	12.06	24.00
	UNII-3	5 690	-4.28	-3.74	1.13	-3.15	-2.61	30.00

Note.

1. Result(dB m) = Reading Power + D.C.F

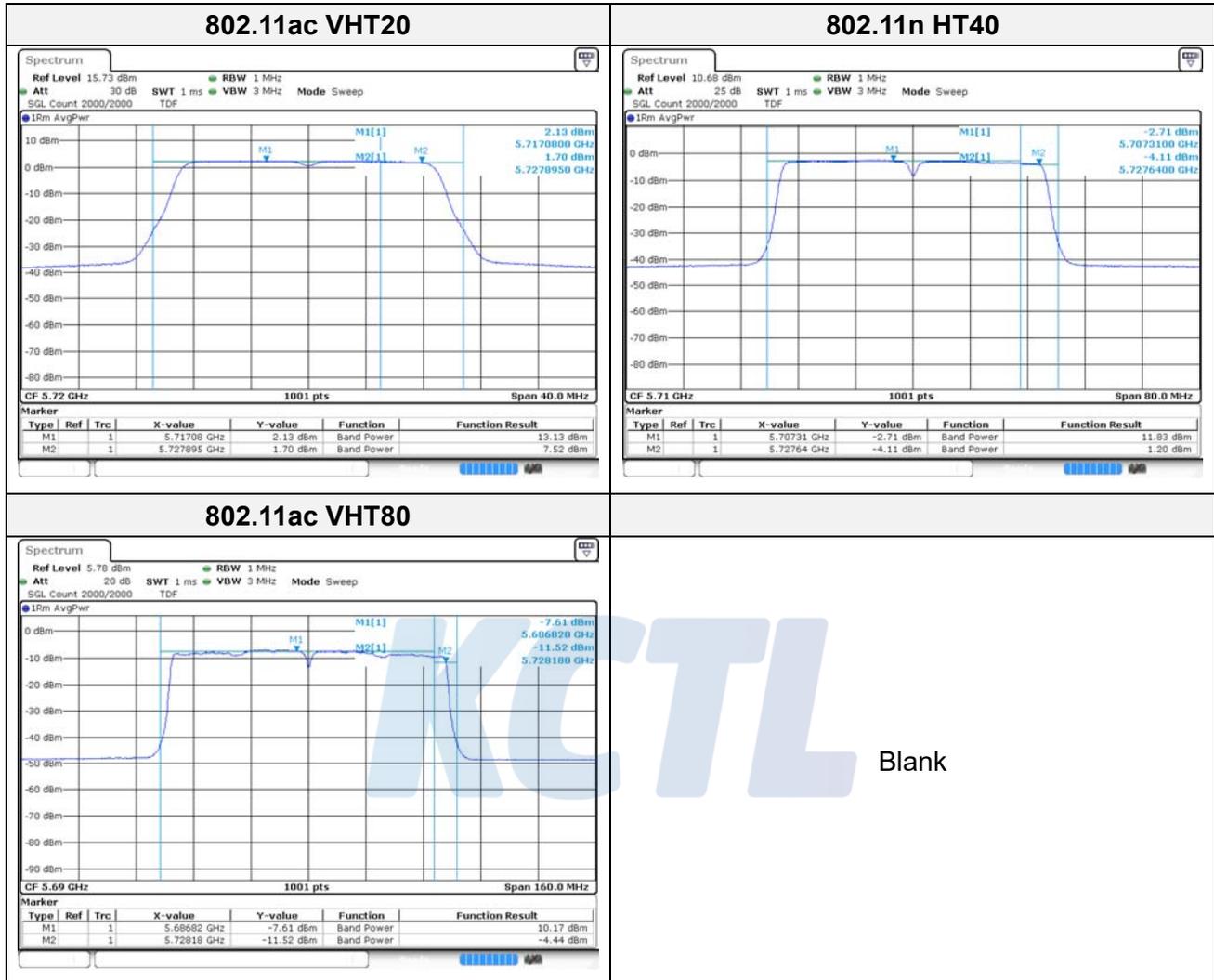
-MIMO

Test mode	Band	Frequency (MHz)	Measured output power				Limit (dBm)
			Reading (dBm)		DCF (dB)	Result (dBm)	
			ANT1	ANT2			
802.11a	UNII-2C	5 720	12.54	12.80	0.29	15.97	24.00
802.11n HT20			12.03	12.65	0.31	15.67	
802.11ac VHT20			13.13	12.31	0.31	16.06	
802.11a	UNII-3	5 720	6.37	6.66	0.29	9.82	30.00
802.11n HT20			6.41	7.07	0.31	10.07	
802.11ac VHT20			7.52	6.68	0.31	10.44	
802.11n HT40	UNII-2C	5 710	11.83	11.96	0.60	15.51	24.00
802.11ac VHT40			11.40	11.56	1.06	15.55	
802.11n HT40	UNII-3	5 710	1.20	1.41	0.60	4.92	30.00
802.11ac VHT40			0.81	1.02	1.06	4.99	
802.11ac VHT80	UNII-2C	5 690	10.17	10.18	1.81	15.00	24.00
	UNII-3	5 690	-4.44	-4.32	1.81	0.44	30.00

Note.

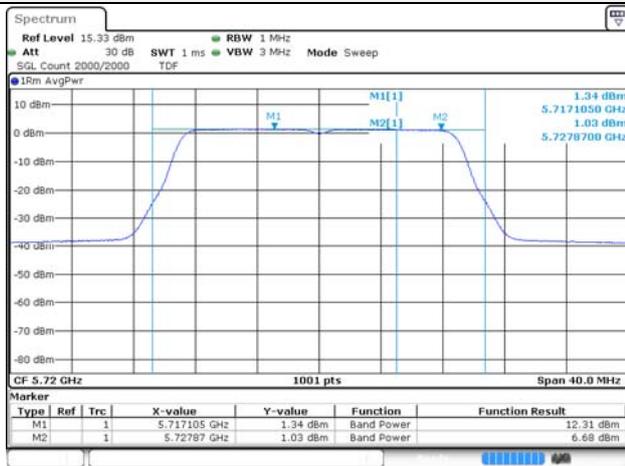
1. Result(dB m) = 10log(10^(ANT 1/10) + 10^(ANT 2/10)) + D.C.F

In order to simplify the report, attached plots were only MIMO
ANT 1

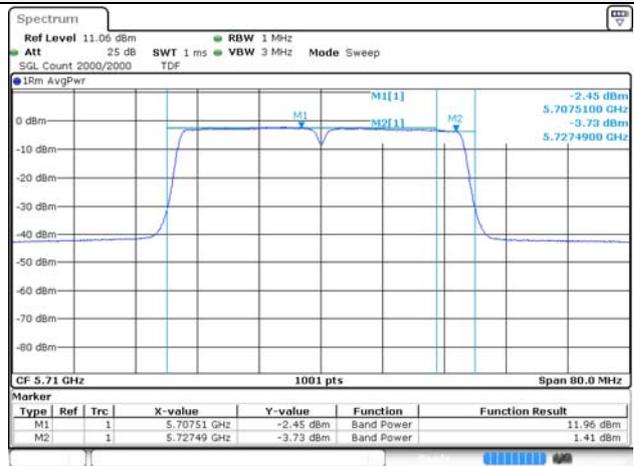


ANT2

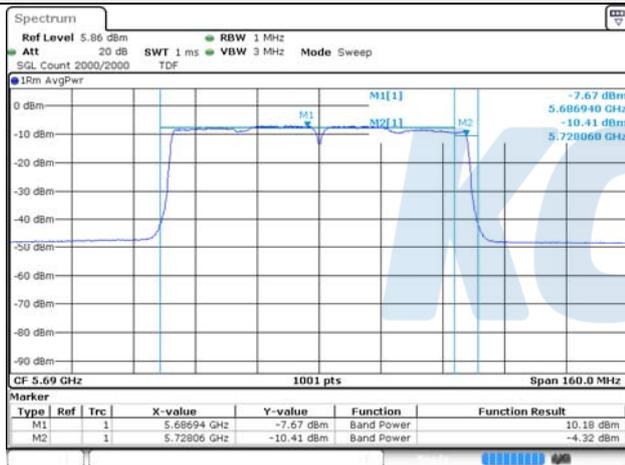
802.11ac VHT20



802.11n HT40



802.11ac VHT80



Blank

Power Spectral Density
-SISO

Test mode	Band	Frequency (MHz)	Measured PSD (dBm/MHz)		DCF (dB)	Maximum PSD (dB m/MHz)		Limit (dBm/MHz)
			ANT1	ANT2		ANT1	ANT2	
802.11a	UNII-2C	5 720	1.94	2.18	0.29	2.23	2.47	11.00
802.11n HT20			1.70	1.75	0.31	2.01	2.06	
802.11ac VHT20			1.56	1.80	0.31	1.87	2.11	
802.11n HT40	UNII-2C	5 710	-2.53	-2.17	0.60	-1.93	-1.57	
802.11ac VHT40			-2.54	-2.13	0.60	-1.94	-1.53	
802.11ac VHT80	UNII-2C	5 690	-6.70	-6.56	1.13	-5.57	-5.43	

Test mode	Band	Frequency (MHz)	Measured PSD (dBm/ 500 kHz)		DCF (dB)	Maximum PSD (dBm/ 500 kHz)		Limit (dBm /500 kHz)
			ANT1	ANT2		ANT1	ANT2	
802.11a	UNII-3	5 720	-1.23	-1.05	0.29	-0.94	-0.76	30.00
802.11n HT20			-1.51	-1.39	0.31	-1.20	-1.08	
802.11ac VHT20			-1.54	-1.37	0.31	-1.23	-1.06	
802.11n HT40		5 710	-6.42	-5.97	0.60	-5.82	-5.37	
802.11ac VHT40			-6.35	-5.98	0.60	-5.75	-5.38	
802.11ac VHT40		5 690	-11.64	-11.20	1.13	-10.51	-10.07	

Notes:

- Maximum PSD calculation
- Maximum PSD = Measured PSD + D.C.F

-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-2C	5 720	1.86	2.30	0.29	5.39	11.00
802.11n HT20			1.53	1.82	0.31	5.00	
802.11ac VHT20			2.26	1.51	0.31	5.22	
802.11n HT40	UNII-2C	5 710	-2.54	-2.38	0.60	1.15	
802.11ac VHT40			-2.98	-2.53	1.06	1.32	
802.11ac VHT80	UNII-2C	5 690	-7.08	-7.00	1.81	-2.22	

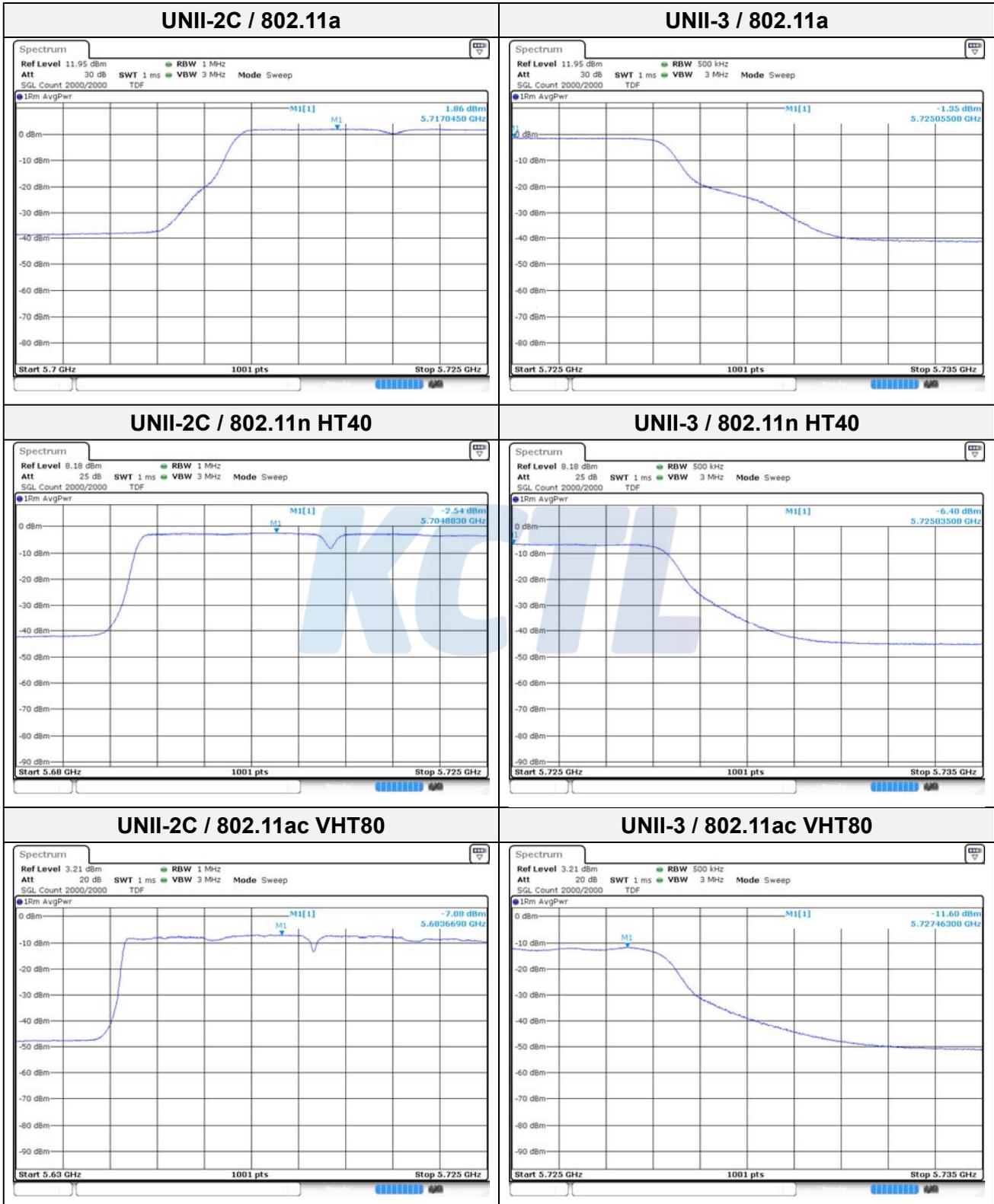
Test mode	Band	Frequency (MHz)	Measured PSD (dBm/ 500 kHz)		DCF (dB)	Maximum PSD (dBm / 500 kHz)	Limit (dBm / 500 kHz)
			ANT1	ANT2			
802.11a	UNII-3	5 720	-1.35	-0.92	0.29	2.17	30.00
802.11n HT20			-1.68	-1.27	0.31	1.85	
802.11ac VHT20			-0.89	-1.58	0.31	2.10	
802.11n HT40		5 710	-6.40	-5.99	0.60	-2.58	
802.11ac VHT40			-6.74	-6.43	1.06	-2.51	
802.11ac VHT80		5 690	-11.60	-11.45	1.81	-6.70	

Notes:

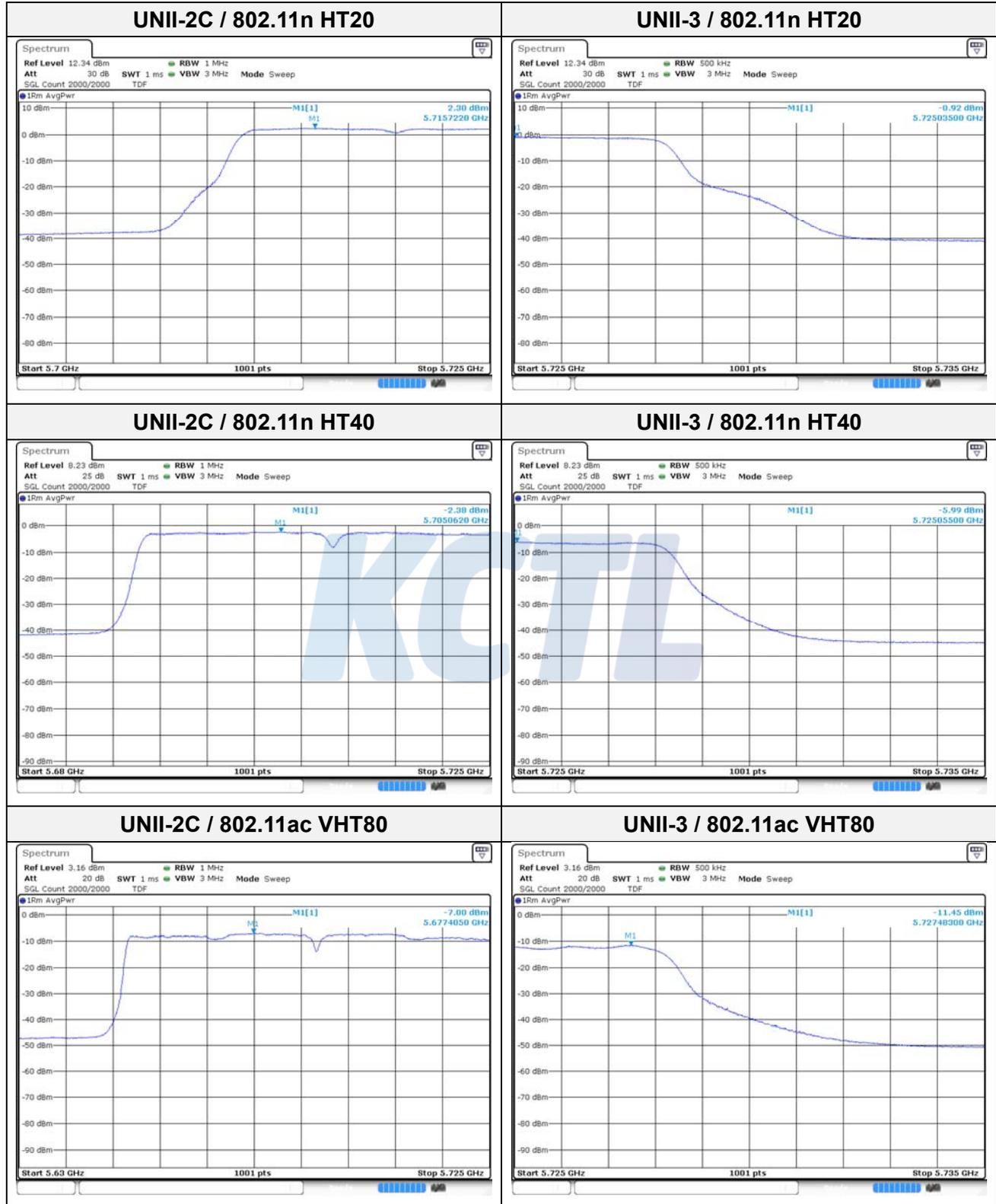
1. Maximum PSD calculation

- Maximum PSD = Measured $10\log(10^{(\text{ANT } 1/10)} + 10^{(\text{ANT } 2/10)}) + \text{D.C.F}$

In order to simplify the report, attached plots were only MIMO
ANT1



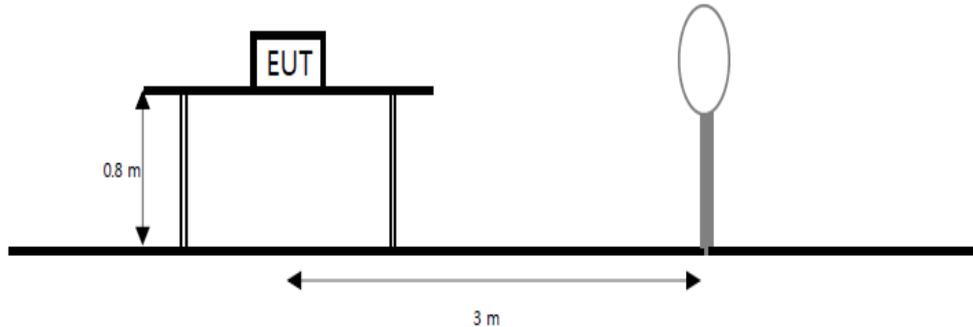
MIMO ANT2



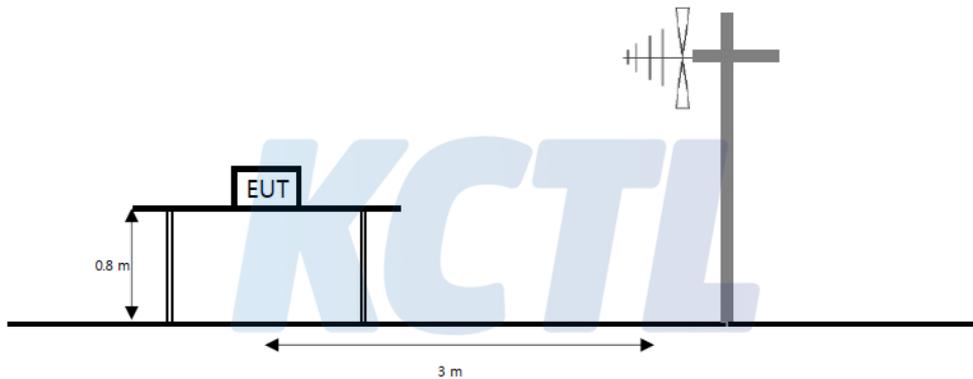
7.6. Spurious Emission, Band Edge and Restricted bands

Test setup

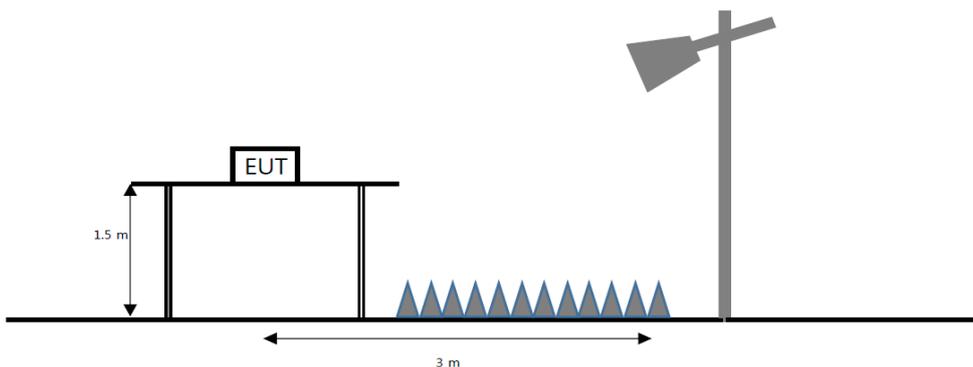
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz Emissions



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz emissions, whichever is lower.



Limit

According to section 15.209(a) except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength ($\mu\text{V}/\text{m}$)	Measurement distance (m)
0.009 - 0.490	2 400/F(kHz)	300
0.490 - 1.705	24 000/F(kHz)	30
1.705 - 30	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54–72 MHz, 76–88 MHz, 174–216 MHz or 470–806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., Section 15.231 and 15.241.

According to section 15.205(a) and (b) only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.009 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505	16.694 75 - 16.695 25	608 - 614	5.35 - 5.46
2.173 5 - 2.190 5	16.804 25 - 16.804 75	960 - 1 240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1 300 - 1 427	8.025 - 8.5
4.177 25 - 4.177 75	37.5 - 38.25	1 435 - 1 626.5	9.0 - 9.2
4.207 25 - 4.207 75	73 - 74.6	1 645.5 - 1 646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1 660 - 1 710	10.6 - 12.7
6.267 75 - 6.268 25	108 - 121.94	1 718.8 - 1 722.2	13.25 - 13.4
6.311 75 - 6.312 25	123 - 138	2 200 - 2 300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2 310 - 2 390	15.35 - 16.2
8.362 - 8.366	156.524 75 - 156.525	2 483.5 - 2 500	17.7 - 21.4
8.376 25 - 8.386 75	25	2 690 - 2 900	22.01 - 23.12
8.414 25 - 8.414 75	156.7 - 156.9	3 260 - 3 267	23.6 - 24.0
12.29 - 12.293	162.012 5 - 167.17	3 332 - 3 339	31.2 - 31.8
12.519 75 - 12.520 25	167.72 - 173.2	3 345.8 - 3 358	36.43 - 36.5
12.576 75 - 12.577 25	240 - 285	3 600 - 4 400	Above 38.6
13.36 - 13.41	322 - 335.4		

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in section 15.209. At frequencies equal to or less than 1 000 MHz, compliance with the limits in section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1 000 MHz, compliance with the emission limits in section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in section 15.35 apply to these measurements.

According to section 15.407(b), undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

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

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

For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

KCTL

Test procedureANSI C63.10-2013 Section 12.7.7.2, 12.7.5, 12.7.6
KDB 789033 D02 v02r01 – Section G**Test settings****Peak field strength measurements**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = as specified in table
3. VBW \geq (3 \times RBW)
4. Detector = peak
5. Sweep time = auto
6. Trace mode = max hold
7. Allow sweeps to continue until the trace stabilizes

Table. RBW as a function of frequency

Frequency	RBW
9 kHz to 150 kHz	200 Hz to 300 Hz
0.15 MHz to 30 MHz	9 kHz to 10 kHz
30 MHz to 1 000 MHz	100 kHz to 120 kHz
> 1 000 MHz	1 MHz

Average field strength measurements**Trace averaging with continuous EUT transmission at full power**

If the EUT can be configured or modified to transmit continuously (D \geq 98%), then the average emission levels shall be measured using the following method (with EUT transmitting continuously):

1. RBW = 1 MHz (unless otherwise specified).
2. VBW \geq (3 \times RBW).
3. Detector = RMS (power averaging), if [span / (# of points in sweep)] \leq (RBW / 2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.
4. Averaging type = power (i.e., rms):
 - 1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
 - 2) Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.
5. Sweep time = auto.
6. Perform a trace average of at least 100 traces.

Trace averaging across ON and OFF times of the EUT transmissions followed by duty cycle correction

If continuous transmission of the EUT (D \geq 98%) cannot be achieved and the duty cycle is constant (duty cycle variations are less than $\pm 2\%$), then the following procedure shall be used:

1. The EUT shall be configured to operate at the maximum achievable duty cycle.
2. Measure the duty cycle D of the transmitter output signal as described in 11.6.
3. RBW = 1 MHz (unless otherwise specified).
4. VBW \geq [3 \times RBW].
5. Detector = RMS (power averaging), if [span / (# of points in sweep)] \leq (RBW / 2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this

condition cannot be satisfied, then the detector mode shall be set to peak.

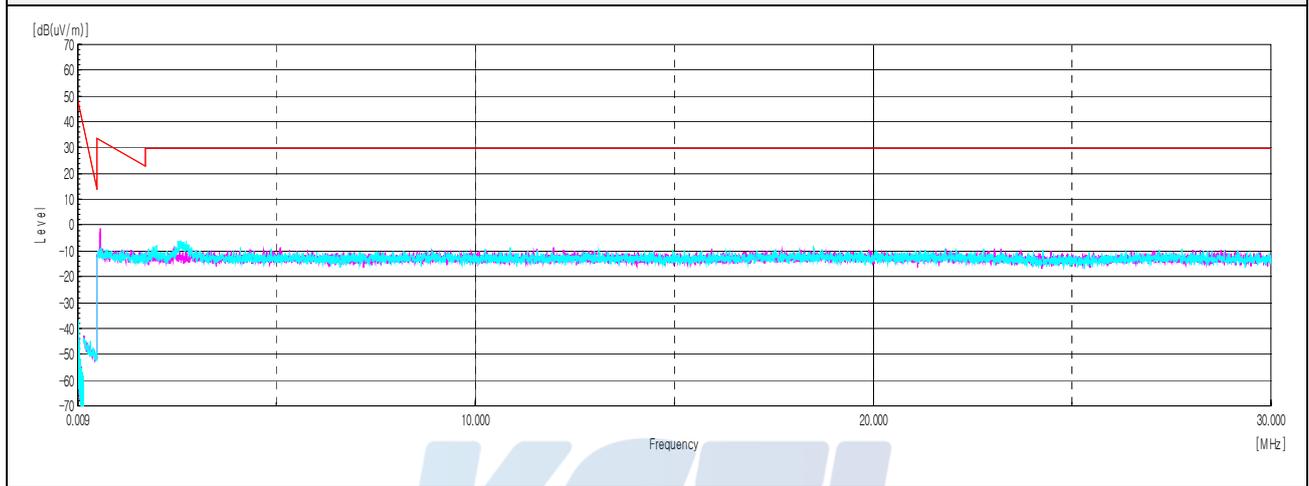
6. Averaging type = power (i.e., rms):
 - 1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
 - 2) Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.
7. Sweep time = auto.
8. Perform a trace average of at least 100 traces.
9. A correction factor shall be added to the measurement results prior to comparing with the emission limit to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:
 - 1) If power averaging (rms) mode was used in step f), then the applicable correction factor is $[10 \log (1 / D)]$, where D is the duty cycle.
 - 2) If linear voltage averaging mode was used in step f), then the applicable correction factor is $[20 \log (1 / D)]$, where D is the duty cycle.
 - 3) If a specific emission is demonstrated to be continuous ($D \geq 98\%$) rather than turning ON and OFF with with the transmit cycle, then no duty cycle correction is required for that emission.

Notes:

1. $f < 30$ MHz, extrapolation factor of 40 dB/decade of distance. $F_d = 40 \log(D_m/D_s)$
 $f \geq 30$ MHz, extrapolation factor of 20 dB/decade of distance. $F_d = 20 \log(D_m/D_s)$
Where:
 F_d = Distance factor in dB
 D_m = Measurement distance in meters
 D_s = Specification distance in meters
2. Factors(dB) = Antenna factor(dB/m) + Cable loss(dB) + or Amp. gain(dB) + or F_d (dB)
3. The worst-case emissions are reported however emissions whose levels were not within 20 dB of respective limits were not reported.
4. Average test would be performed if the peak result were greater than the average limit.
5. ¹⁾ means restricted band.
6. According to part 15.31(f)(2), an extrapolation factor of 40 dB/decade is applied because measured distance of radiated emission is 3 m.
7. Below 30 MHz frequency range, In order to search for the worst result, all orientations about parallel, perpendicular, and ground-parallel were investigated then reported. when the emission level was higher than 20 dB of the limit, then the following statement shall be made: "No spurious emissions were detected within 20 dB of the limit."

Test results (Below 30 MHz) – Worst case: 802.11ac VHT 20 2TX MIMO / UNII-2A 2 441 MHz

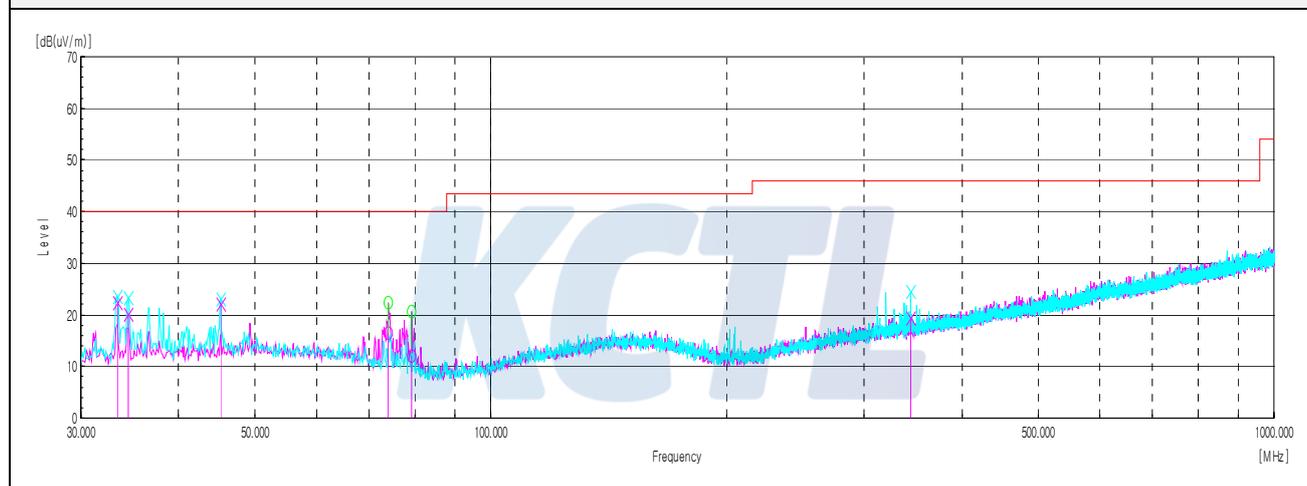
Frequency	Pol.	Reading	Ant. Factor	Amp. +Cable	Distance Factor	DCF	Result	Limit	Margin
[MHz]	[V/H]	[dB(μ V)]	[dB]	[dB]	[dB]	[dB]	[dB(μ V/m)]	[dB(μ V/m)]	[dB]
No spurious emissions were detected within 20 dB of the limit.									

Horizontal/Vertical**KCTL**

Test results (Below 1 000 MHz) – Worst case: 802.11ac VHT 20 2TX MIMO / UNII-2A 2 441 MHz

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Quasi peak data								
33.40	V	35.50	23.20	-30.55	-	28.15	40.00	11.85
34.49	V	33.10	22.66	-30.52	-	25.24	40.00	14.76
45.28	V	34.20	16.76	-30.25	-	20.71	40.00	19.29
74.14 ¹⁾	H	30.70	12.77	-29.63	-	13.84	40.00	26.16
79.35	H	27.40	13.23	-29.55	-	11.08	40.00	28.92
344.04 ¹⁾	V	25.60	20.36	-26.33	-	19.63	46.00	26.37

Horizontal/Vertical



Test results (Above 1 000 MHz)**802.11a UNII-1 ANT1****Lowest Channel (5 180 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
5 149.26 ¹⁾	V	50.79	34.24	-27.11	-	57.92	74.00	16.08
10 362.56	V	60.45	37.26	-51.97	-	45.74	68.20	22.46
16 546.33	H	57.10	41.55	-45.31	-	53.34	68.20	14.86
Average Data								
5 149.26 ¹⁾	V	34.38	34.24	-27.11	0.29	41.80	54.00	12.20

Middle Channel (5 200 MHz)

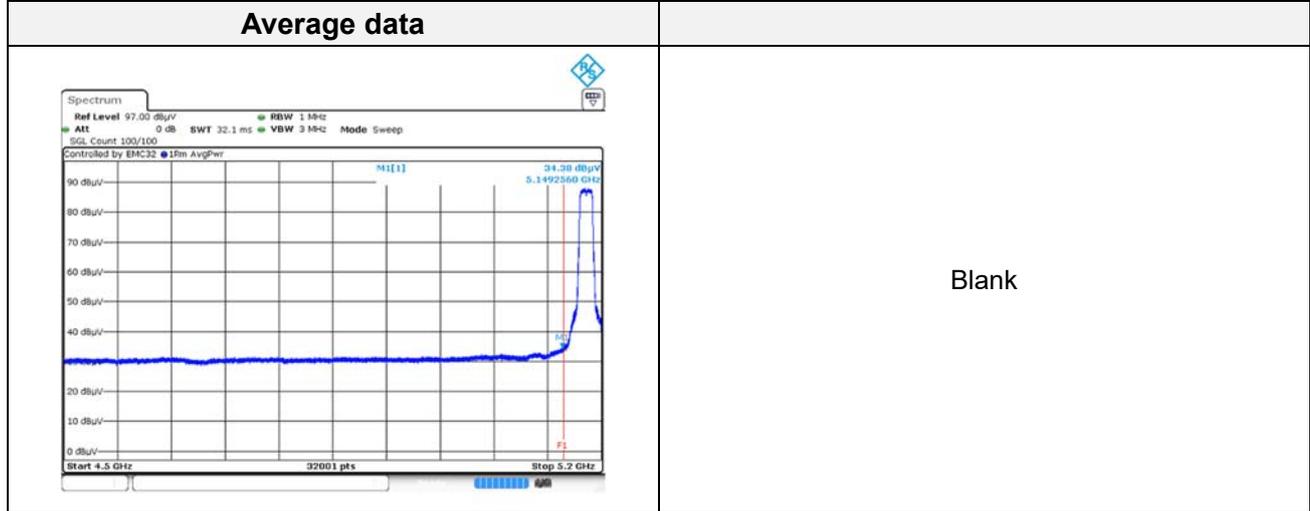
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
10 401.02	V	62.40	37.30	-51.89	-	47.81	68.20	20.39
16 552.44	V	57.21	41.55	-45.33	-	53.43	68.20	14.77
Average Data								
No spurious emissions were detected within 20 dB of the limit								

Highest Channel (5 240 MHz)

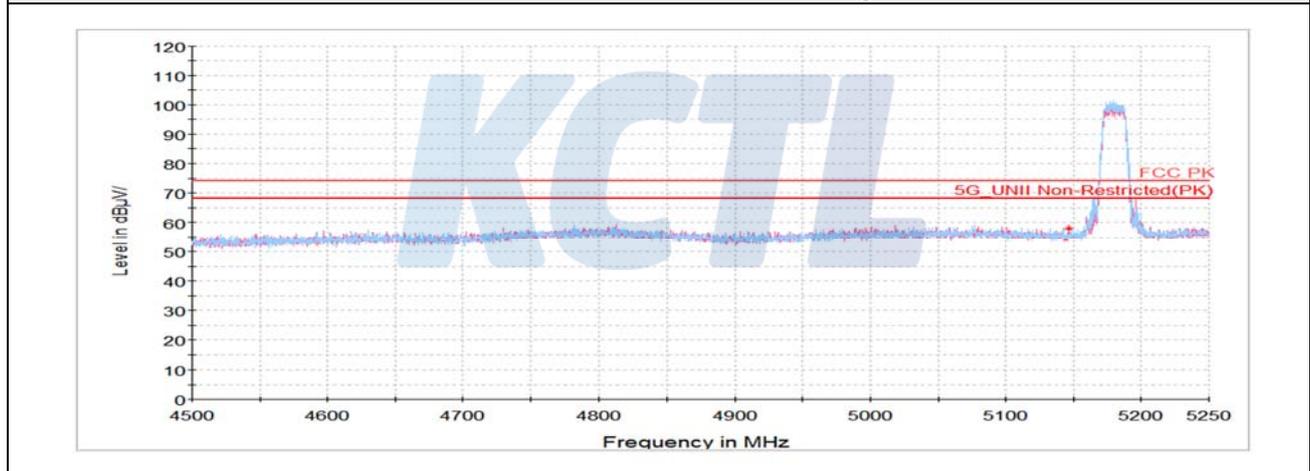
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
10 479.72	V	62.56	37.38	-51.71	-	48.23	68.20	19.97
16 563.58	H	56.93	41.56	-45.37	-	53.12	68.20	15.08
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

802.11a UNII-1 ANT1

Lowest Channel (5 180 MHz)



Horizontal/Vertical for Band-edge



802.11a UNII-1 ANT2**Lowest Channel (5 180 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
5 149.81 ¹⁾	H	50.17	34.24	-27.12	-	57.29	74.00	16.71
10 357.53	V	64.41	37.26	-51.99	-	49.68	68.20	18.52
16 533.75	H	56.58	41.53	-45.26	-	52.85	68.20	15.35
Average Data								
5 149.81 ¹⁾	H	34.35	34.24	-27.12	0.29	41.76	54.00	12.24

Middle Channel (5 200 MHz)

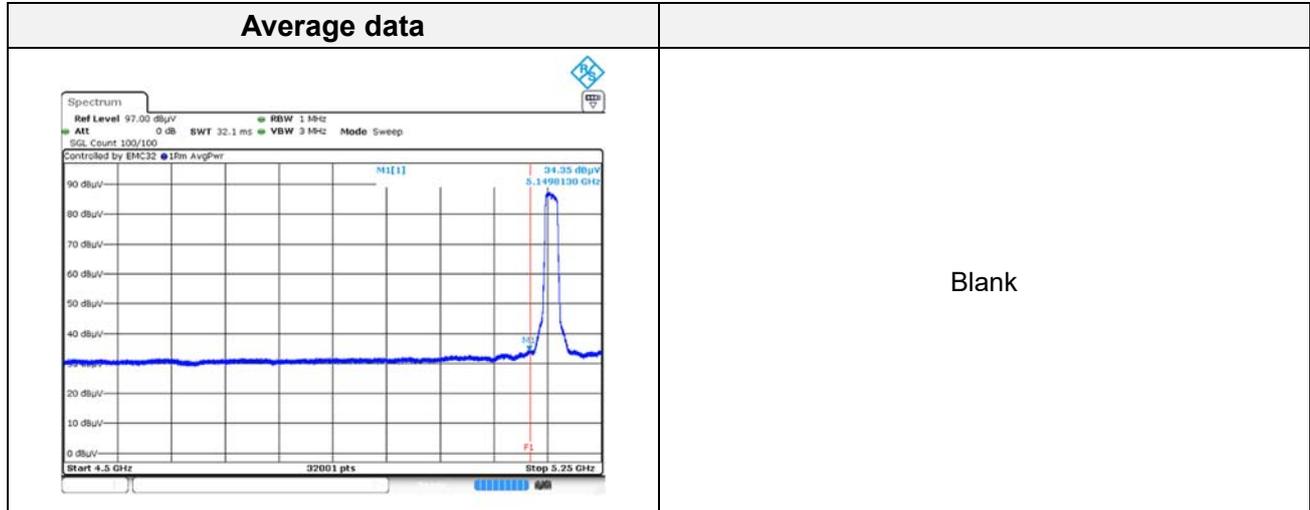
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
10 408.56	V	65.59	37.31	-51.87	-	51.03	68.20	17.17
16 552.44	H	56.44	41.55	-45.33	-	52.66	68.20	15.54
Average Data								
No spurious emissions were detected within 20 dB of the limit								

Highest Channel (5 240 MHz)

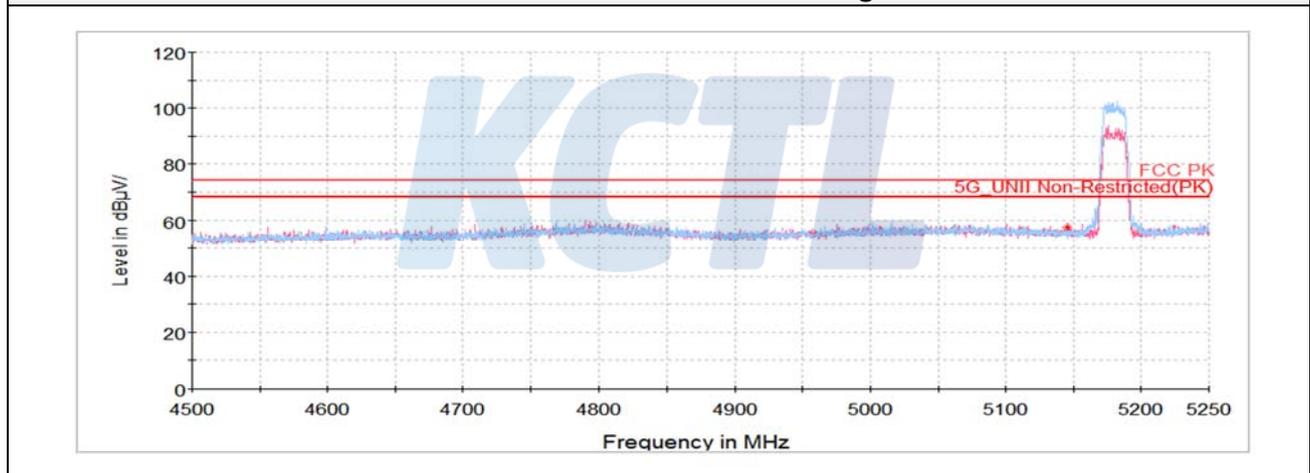
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
10 479.00	V	68.42	37.38	-51.71	-	54.09	68.20	14.11
16 558.19	H	56.53	41.56	-45.35	-	52.74	68.20	15.46
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

802.11a UNII-1 ANT2

Lowest Channel (5 180 MHz)



Horizontal/Vertical for Band-edge



802.11a UNII-1 2TX MIMO**Lowest Channel (5 180 MHz)**

Frequency (MHz)	Pol. (V/H)	Reading (dB(μ V))	Ant. Factor (dB)	Amp.+Cable (dB)	DCF (dB)	Result (dB(μ V/m))	Limit (dB(μ V/m))	Margin (dB)
Peak data								
5 149.39 ¹⁾	V	49.83	34.24	-27.11	-	56.96	74.00	17.04
10 359.33	V	66.25	37.26	-51.98	-	51.53	68.20	16.67
15 540.80 ¹⁾	V	54.00	40.01	-49.45	-	44.56	74.00	29.44
Average Data								
5 149.39 ¹⁾	V	34.94	34.24	-27.11	0.29	42.36	54.00	11.64

Middle Channel (5 200 MHz)

Frequency (MHz)	Pol. (V/H)	Reading (dB(μ V))	Ant. Factor (dB)	Amp.+Cable (dB)	DCF (dB)	Result (dB(μ V/m))	Limit (dB(μ V/m))	Margin (dB)
Peak data								
10 403.89	V	68.34	37.30	-51.88	-	53.76	68.20	14.44
15 599.38 ¹⁾	V	54.41	40.02	-49.30	-	45.13	74.00	28.87
Average Data								
No spurious emissions were detected within 20 dB of the limit								

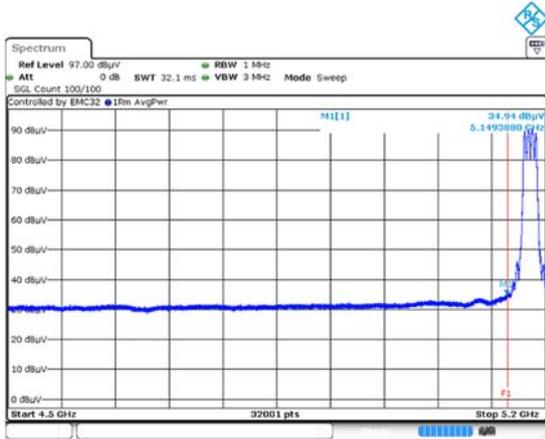
Highest Channel (5 240 MHz)

Frequency (MHz)	Pol. (V/H)	Reading (dB(μ V))	Ant. Factor (dB)	Amp.+Cable (dB)	DCF (dB)	Result (dB(μ V/m))	Limit (dB(μ V/m))	Margin (dB)
Peak data								
10 484.75	V	68.94	37.38	-51.70	-	54.62	68.20	13.58
15 720.48 ¹⁾	V	53.85	40.04	-48.98	-	44.91	74.00	29.09
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

802.11a UNII-1 2TX MIMO

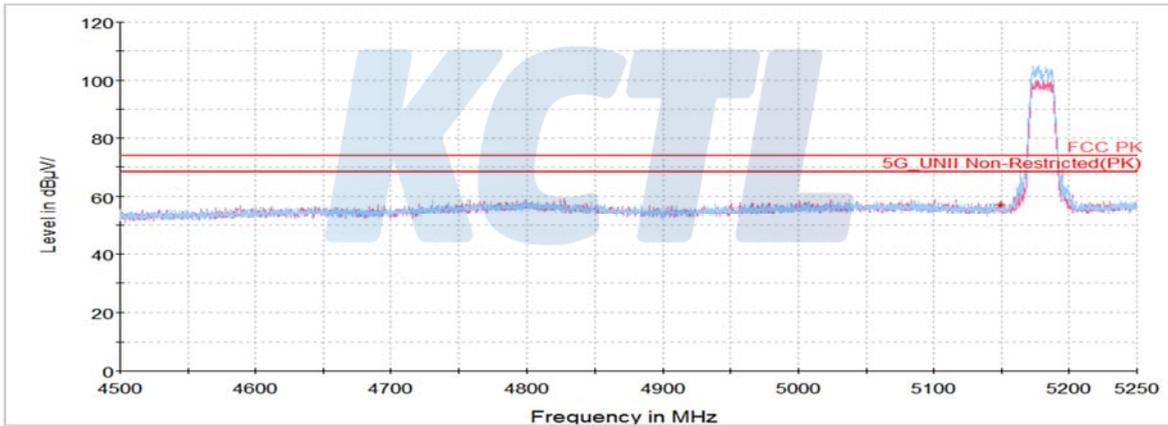
Lowest Channel (5 180 MHz)

Average data



Blank

Horizontal/Vertical for Band-edge



802.11 HT20 UNII-1 ANT1**Lowest Channel (5 180 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
5 149.91 ¹⁾	V	50.81	34.24	-27.12	-	57.93	74.00	16.07
10 352.14	V	61.77	37.25	-52.00	-	47.02	68.20	21.18
16 548.48	H	57.32	41.55	-45.32	-	53.55	68.20	14.65
Average Data								
5 149.91 ¹⁾	V	34.71	34.24	-27.12	0.31	42.14	54.00	11.86

Middle Channel (5 200 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz) ¹⁾	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
10 410.36	V	62.19	37.31	-51.87	-	47.63	68.20	20.57
16 365.56	H	57.09	41.73	-45.98	-	52.84	68.20	15.36
Average Data								
No spurious emissions were detected within 20 dB of the limit								

Highest Channel (5 240 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
10 484.03	V	61.82	37.38	-51.70	-	47.50	68.20	20.70
16 574.00	V	56.74	41.57	-45.41	-	52.90	68.20	15.30
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

802.11 HT20 UNII-1 ANT2**Lowest Channel (5 180 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
5 149.67 ¹⁾	H	50.32	34.24	-27.12	-	57.44	74.00	16.56
10 359.69	V	63.36	37.26	-51.98	-	48.64	68.20	19.56
16 552.44	H	56.06	41.55	-45.33	-	52.28	68.20	15.92
Average Data								
5 149.67 ¹⁾	H	34.00	34.24	-27.12	0.31	41.43	54.00	12.57

Middle Channel (5 200 MHz)

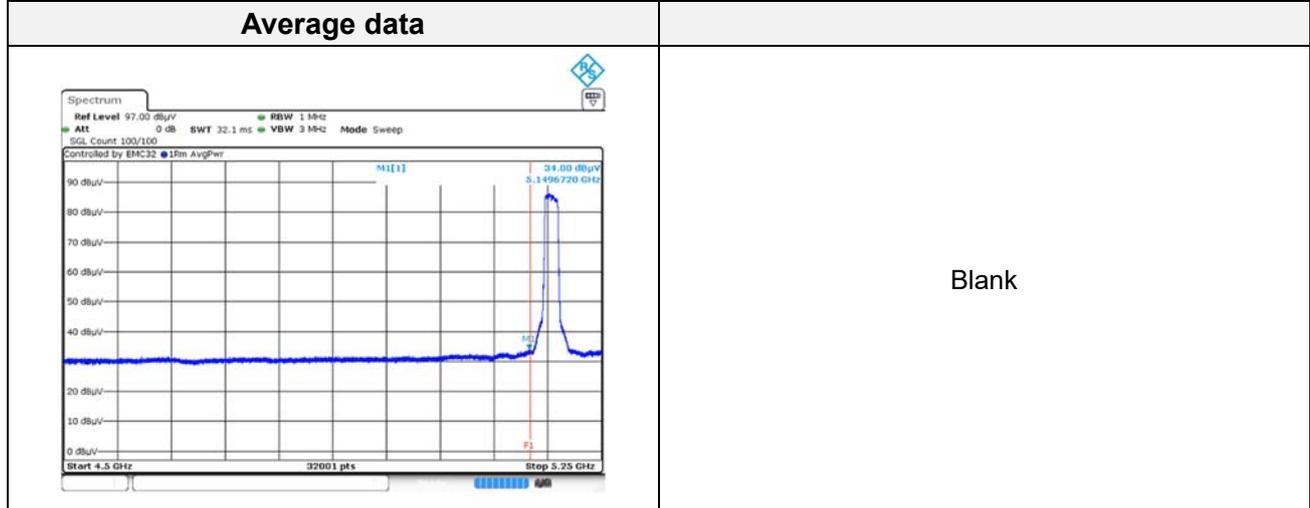
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
10 401.38	V	64.97	37.30	-51.89	-	50.38	68.20	17.82
16 542.02	V	56.49	41.54	-45.29	-	52.74	68.20	15.46
Average Data								
No spurious emissions were detected within 20 dB of the limit								

Highest Channel (5 240 MHz)

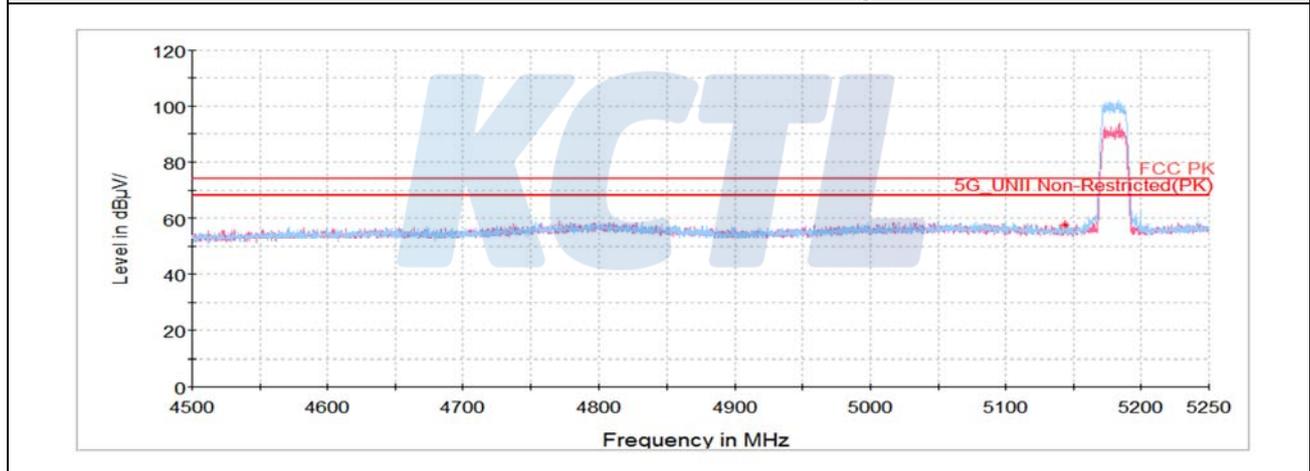
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
10 482.23	V	65.83	37.38	-51.71	-	51.50	68.20	16.70
16 557.83	V	57.53	41.56	-45.35	-	53.74	68.20	14.46
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

802.11 HT20 UNII-1 ANT2

Lowest Channel (5 180 MHz)



Horizontal/Vertical for Band-edge



802.11 HT20 UNII-1 2TX MIMO**Lowest Channel (5 180 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB($\mu V/m$))	(dB($\mu V/m$))	(dB)
Peak data								
5 148.63 ¹⁾	H	50.35	34.24	-27.11	-	57.48	74.00	16.52
10 360.05	V	66.42	37.26	-51.98	-	51.70	68.20	16.50
15 540.80 ¹⁾	V	54.13	40.01	-49.45	-	44.69	74.00	29.31
Average Data								
5 148.63 ¹⁾	H	35.10	34.24	-27.11	0.31	42.54	54.00	11.46

Middle Channel (5 200 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB($\mu V/m$))	(dB($\mu V/m$))	(dB)
Peak data								
10 399.94	V	67.74	37.30	-51.89	-	53.15	68.20	15.05
15 600.81 ¹⁾	V	55.09	40.02	-49.29	-	45.82	74.00	28.18
Average Data								
No spurious emissions were detected within 20 dB of the limit								

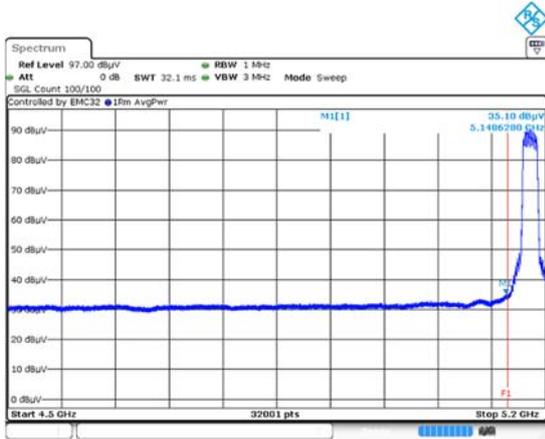
Highest Channel (5 240 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB($\mu V/m$))	(dB($\mu V/m$))	(dB)
Peak data								
10 477.56	V	67.88	37.38	-51.72	-	53.54	68.20	14.66
15 721.20 ¹⁾	H	54.64	40.04	-48.98	-	45.70	74.00	28.30
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

802.11 HT20 UNII-1 2TX MIMO

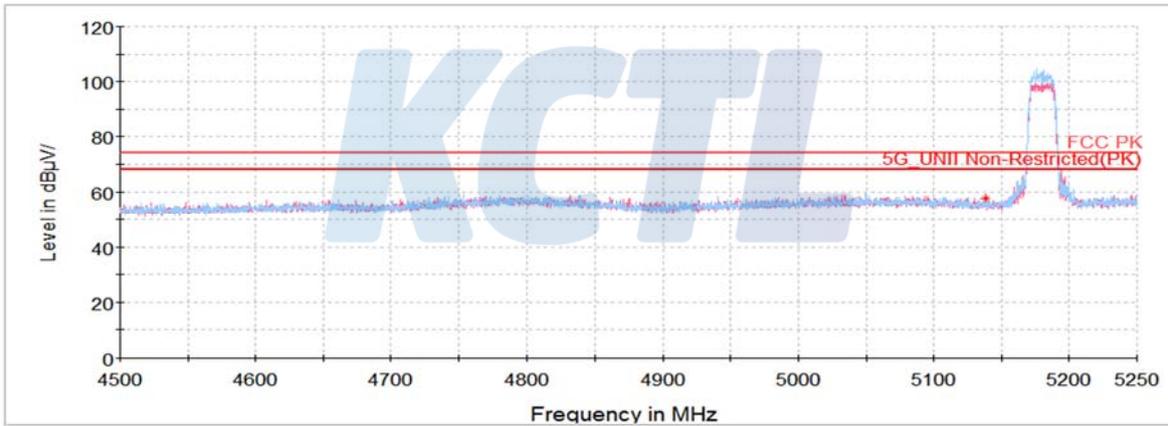
Lowest Channel (5 180 MHz)

Average data



Blank

Horizontal/Vertical for Band-edge



802.11 HT40 UNII-1 ANT1**Lowest Channel (5 190 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
2 410.75	V	72.11	31.92	-49.10	-	54.93	68.20	13.27
5 149.98 ¹⁾	H	51.71	34.24	-27.12	-	58.83	74.00	15.17
10 406.77	V	59.64	37.31	-51.88	-	45.07	68.20	23.13
16 533.75	V	57.02	41.53	-45.26	-	53.29	68.20	14.91
Average Data								
5 149.98 ¹⁾	H	35.39	34.24	-27.12	0.60	43.11	54.00	10.89

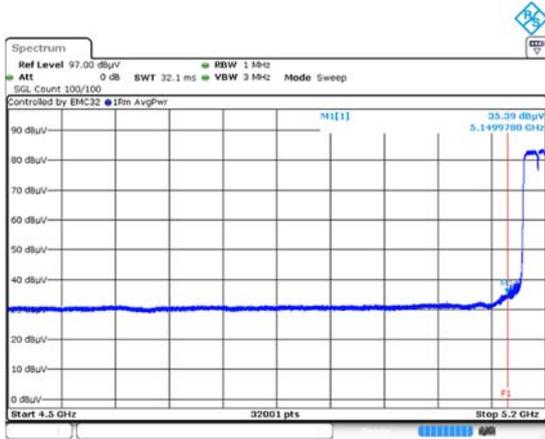
Highest Channel (5 230 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
10 482.95	V	59.93	37.38	-51.70	-	45.61	68.20	22.59
16 555.67	V	57.31	41.56	-45.34	-	53.53	68.20	14.67
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

802.11 HT40 UNII-1 ANT1

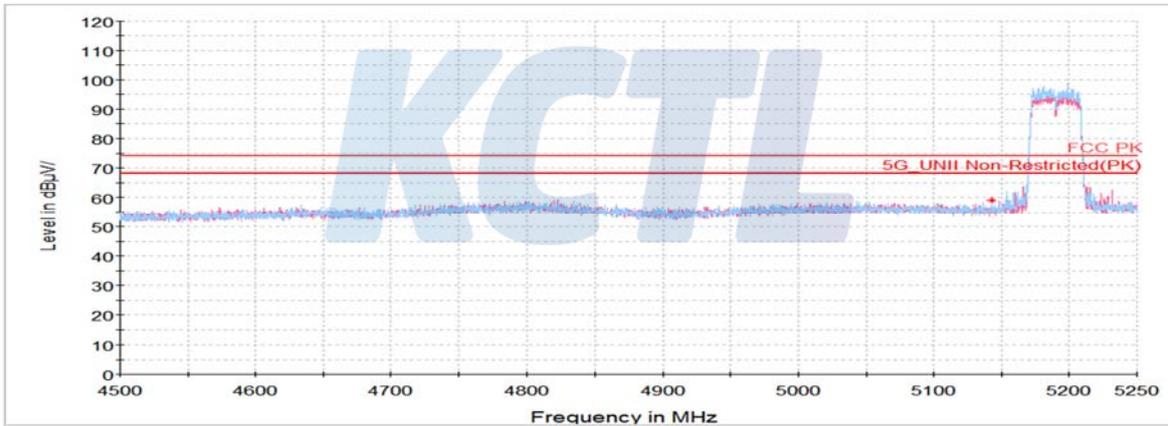
Lowest Channel (5 190 MHz)

Average data



Blank

Horizontal/Vertical for Band-edge



802.11 HT40 UNII-1 ANT2**Lowest Channel (5 190 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
5 149.98 ¹⁾	H	50.35	34.24	-27.12	-	57.47	74.00	16.53
10 396.70	V	61.36	37.30	-51.90	-	46.76	68.20	21.44
16 685.05	V	56.73	41.69	-45.82	-	52.60	68.20	15.60
Average Data								
5 149.98 ¹⁾	H	36.18	34.24	-27.12	0.60	43.90	54.00	10.10

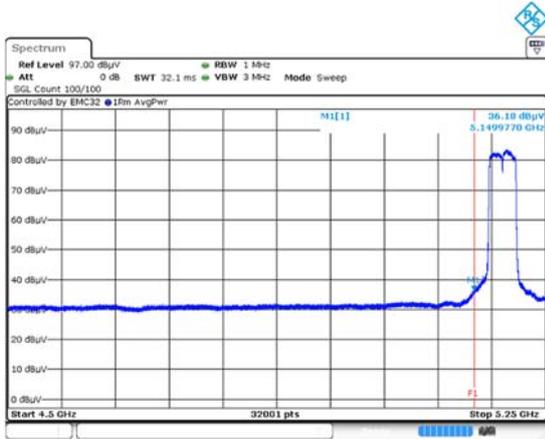
Highest Channel (5 230 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
10 452.41	V	61.45	37.35	-51.77	-	47.03	68.20	21.17
16 575.08	H	56.24	41.58	-45.41	-	52.41	68.20	15.79
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

802.11 HT40 UNII-1 ANT2

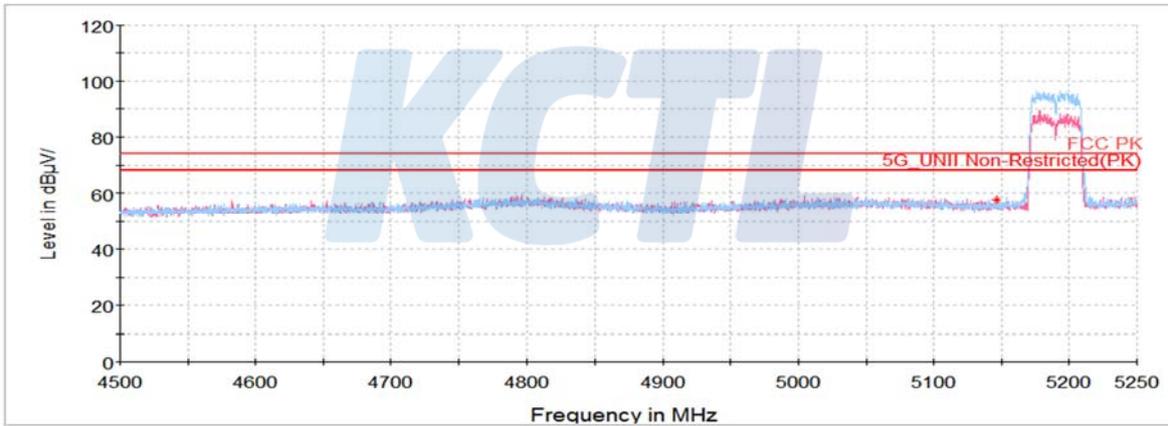
Lowest Channel (5 190 MHz)

Average data



Blank

Horizontal/Vertical for Band-edge



802.11 HT40 UNII-1 2TX MIMO**Lowest Channel (5 190 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
5 148.73 ¹⁾	H	52.64	34.24	-27.11	-	59.77	74.00	14.23
10 378.02	V	61.09	37.28	-51.94	-	46.43	68.20	21.77
15 570.27 ¹⁾	V	53.85	40.01	-49.37	-	44.49	74.00	29.51
Average Data								
5 148.73 ¹⁾	H	37.78	34.24	-27.11	0.60	45.51	54.00	8.49

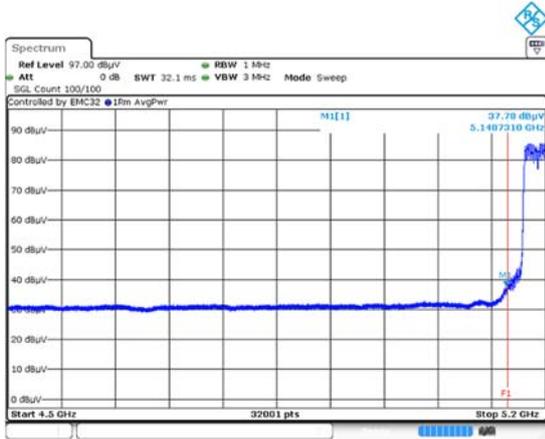
Highest Channel (5 230 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
10 468.22	V	63.06	37.37	-51.74	-	48.69	68.20	19.51
15 690.30 ¹⁾	H	55.07	40.04	-49.06	-	46.05	74.00	27.95
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

802.11 HT40 UNII-1 2TX MIMO

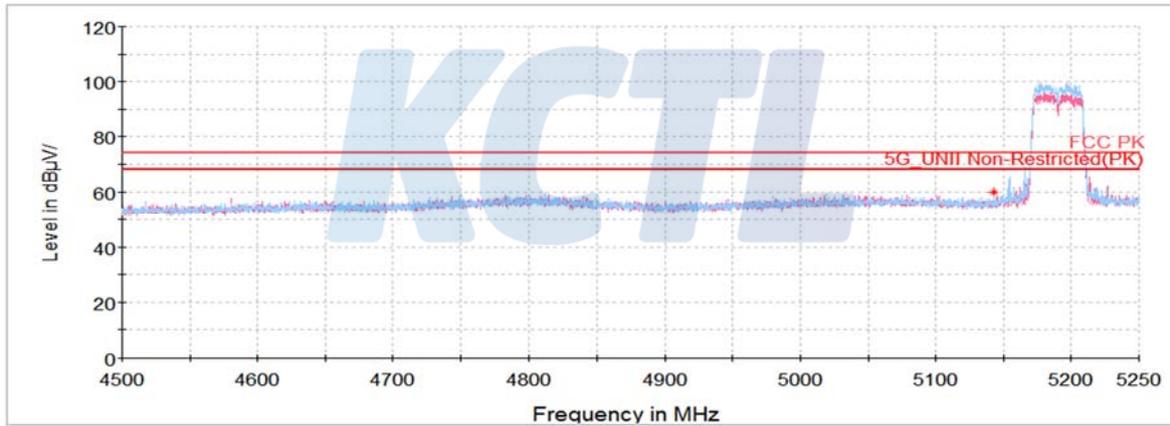
Lowest Channel (5 190 MHz)

Average data



Blank

Horizontal/Vertical for Band-edge



802.11ac VHT20 UNII-1 ANT1**Lowest Channel (5 180 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
5 149.85 ¹⁾	H	49.91	34.24	-27.12	-	57.03	74.00	16.97
10 360.05	V	60.27	37.26	-51.98	-	45.55	68.20	22.65
12 029.34 ¹⁾	H	61.43	38.64	-50.53	-	49.54	74.00	24.46
Average Data								
5 149.85 ¹⁾	H	34.60	34.24	-27.12	0.31	42.03	54.00	11.97

Middle Channel (5 200 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
10 396.34	V	61.64	37.30	-51.90	-	47.04	68.20	21.16
16 578.31	V	57.32	41.58	-45.42	-	53.48	68.20	14.72
Average Data								
No spurious emissions were detected within 20 dB of the limit								

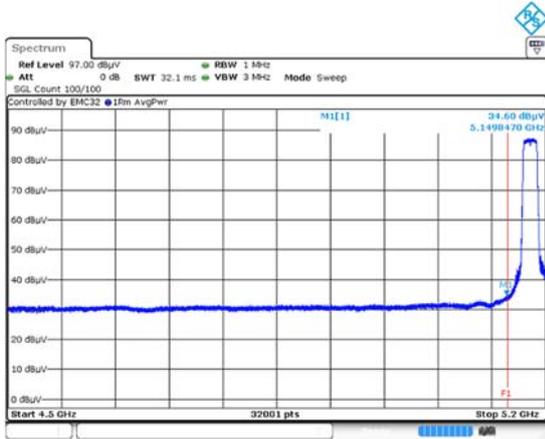
Highest Channel (5 240 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
10 476.84	V	61.30	37.38	-51.72	-	46.96	68.20	21.24
16 551.00	H	57.65	41.55	-45.32	-	53.88	68.20	14.32
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

802.11ac VHT20 UNII-1 ANT1

Lowest Channel (5 180 MHz)

Average data



Blank

Horizontal/Vertical for Band-edge

