TEST REPORT

Eurofins KCTL Co.,Ltd. 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	Report No.: KR22-SRF0170-A Page (1)of(185)	eurofins | KCTL

1. Client

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
- Date of Receipt : 2022-09-05

2. Use of Report : Certification

3. Name of Product / Model : Notebook PC / NP345XNA

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

5. FCC ID : A3LNP345XNA

6. Date of Test : 2022-09-15 to 2022-10-26

7. Location of Test : ■ Permanent Testing Lab ☐ On Site Testing
(Address:65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)

8. Test method used : FCC Part 15 Subpart E, 15.407
RSS-247 Issue 2 February 2017
RSS-Gen Issue 5 February 2021

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

	Tested by	Technical Manager
Affirmation	Name : Kwonse Kim (Signature)	Name : Seungyong Kim (Signature)

2022-12-01

Eurofins KCTL Co.,Ltd.

REPORT REVISION HISTORY

Date	Revision	Page No
2022-10-28	Originally issued	-
2022-12-01	Added test plots of output power	24 ~ 30

Note. The report No. KR22-SRF0170 is superseded by the report No. KR22-SRF0170-A.

General remarks for test reports

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

(may be required by the product standard or client)

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

Procedure number, issue date and title:

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

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

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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 CO.,LTD.(SEV)
Address	:	Khu Cong nghiep Ten Phong 1, Yen Trung, Yen Phong, Bac Ning, 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 CAB Identifier: KR0040 ISED Number: 8035A KOLAS No.: KT231

2. Device information

Equipment under test	:	Notebook PC				
Model	:	NP345XNA				
Modulation technique		WIFI(802.11a/b/g/n/ac/ax)	:	OFDM, OFDMA		
Number of channels		UNII-1	:	4 ch (20 ㎒), 2 ch (40 ㎒), 1 ch (80 ㎒), 1 ch (160 ㎒)		
		UNII-2A	:	4 ch (20 ㎒), 2 ch (40 ㎒), 1 ch (80 ㎒)		
		UNII-2C	:	12 ch (20 ㎒), 6 ch (40 ㎒), 3 ch (80 ㎒), 1 ch (160 ㎒)		
		UNII-3	:	5 ch (20 ㎒), 2 ch (40 ㎒), 1 ch (80 ㎒), 1 ch (160 ㎒)		
		UNII-4	:	3 ch (20 ㎒), 2 ch (40 ㎒), 1 ch (80 ㎒), 1 ch (160 ㎒)		
Power source	:	DC 7.72 V				
Antenna specification		Antenna 1	:	FPCB Antenna		
		Antenna 2	:	FPCB Antenna		
Antenna gain	:		Antenna 1			Antenna 2
		UNII-1	:	-7.46 dBi	UNII-1	: -6.79 dBi
		UNII-2A	:	-7.52 dBi	UNII-2A	: -7.11 dBi
		UNII-2C	:	-7.16 dBi	UNII-2C	: -6.99 dBi
		UNII-3	:	-7.16 dBi	UNII-3	: -6.89 dBi
		UNII-4	:	-7.45 dBi	UNII-4	: -7.13 dBi
Frequency range		UNII-1	:	5 180 ㎒ ~ 5 240 ㎒		(802.11a/n/ac/ax_HT20/VHT20)
		UNII-1	:	5 190 ㎒ ~ 5 230 ㎒		(802.11n/ac/ax_HT40/VHT40/HE40)
		UNII-1	:	5 210 ㎒		(802.11ac/ax_VHT80/HE80)
		UNII-1	:	5 250 ㎒		(802.11ac/ax_VHT160/HE160)
		UNII-2A	:	5 260 ㎒ ~ 5 320 ㎒		(802.11a/n/ac/ax_HT20/VHT20/HE20)
		UNII-2A	:	5 270 ㎒ ~ 5 310 ㎒		(802.11n/ac/ax_HT40/VHT40/HE40)
		UNII-2A	:	5 290 ㎒		(802.11ac/ax_VHT80/HE80)
		UNII-2C	:	5 500 ㎒ ~ 5 720 ㎒		(802.11a/n/ac/ax_HT20/VHT20/HE20)
		UNII-2C	:	5 510 ㎒ ~ 5 710 ㎒		(802.11n/ac/ax_HT40/VHT40/HE40)
		UNII-2C	:	5 530 ㎒ ~ 5 690 ㎒		(802.11ac/ax_VHT80/HE80)
		UNII-2C	:	5 570 ㎒		(802.11ac/ax_VHT160/HE160)
		UNII-3	:	5 745 ㎒ ~ 5 825 ㎒		(802.11a/n/ac/ax_HT20/VHT20/HE20)
		UNII-3	:	5 755 ㎒ ~ 5 795 ㎒		(802.11n/ac/ax_HT40/VHT40/HE40)
		UNII-3	:	5 775 ㎒		(802.11ac/ax_VHT80/HE80)
		UNII-4	:	5 845 ㎒ ~ 5 885 ㎒		(802.11a/n/ac/ax_HT20/VHT20/HE20)
		UNII-4	:	5 835 ㎒ ~ 5 875 ㎒		(802.11n/ac/ax_HT40/VHT40/HE40)
		UNII-4	:	5 855 ㎒		(802.11ac/ax_VHT80/HE80)
		UNII-4	:	5 815 ㎒		(802.11ac/ax_VHT160/HE160)
Software version	:	NP345XNA.001				
Hardware version	:	REV0.3				
Test device serial No.	:	Conducted	:	KCUQ930T9006402		
		Radiated	:	KCUQ930T900637M		
Operation temperature	:	-20 ℃ ~ 60 ℃				

2.1. Frequency/channel operations

This device contains the following capabilities:
WLAN (11a/b/g/n/ac/ax, Bluetooth (BDR/EDR/BLE), NR N5/66, LTE B2/4/5/12/13/17/26/41/66, WCDMA 850/1700/1900

UNII-1		UNII-2A		UNII-2C		UNII-3		UNII-4	
Ch.	Frequency (㎒)	Ch.	Frequency (㎒)	Ch.	Frequency (㎒)	Ch.	Frequency (㎒)	Ch.	Frequency (㎒)
36	5 180	52	5 260	100	5 500	149	5 745	169	5 845
40	5 200	56	5 280	120	5 600	157	5 785	173	5 865
48	5 240	64	5 320	140	5 700	165	5 825	177	5 885
				144	5 720				

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

UNII-1		UNII-2A		UNII-2C		UNII-3		UNII-4	
Ch.	Frequency (㎒)	Ch.	Frequency (㎒)	Ch.	Frequency (㎒)	Ch.	Frequency (㎒)	Ch.	Frequency (㎒)
38	5 190	54	5 270	102	5 510	151	5 755	167	5 835
46	5 230	62	5 310	118	5 590	159	5 795	175	5 875
				134	5 670				
				142	5 710				

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

UNII-1		UNII-2A		UNII-2C		UNII-3		UNII-4	
Ch.	Frequency (㎒)	Ch.	Frequency (㎒)	Ch.	Frequency (㎒)	Ch.	Frequency (㎒)	Ch.	Frequency (㎒)
42	5 210	58	5 290	106	5 530	155	5 775	171	5 855
				122	5 610				
				138	5 690				

Table 2.1-3. 802.11ac VHT80 mode

UNII-1,2A		UNII-2C		UNII-3,4	
Ch.	Frequency (㎒)	Ch.	Frequency (㎒)	Ch.	Frequency (㎒)
50	5 250	114	5 570	163	5 815

Table 2.1-4. 802.11ac VHT160 mode

2.2. Simultaneous Tx Condition

The device supports simultaneous transmission operation, which allows for two channels to operate independent of one another in the Bluetooth, 2.4 ㎓, 5 ㎓, or 6 ㎓ bands simultaneously on each antenna.

Simultaneous Tx condition – not RSDB

Mode	# of TX	WLAN 6 ㎓		WLAN 5 ㎓		WLAN 2.4 ㎓		Bluetooth	Report
		ANT 1	ANT 2	ANT 1	ANT 2	ANT 1	ANT 2	ANT 1	
Bluetooth + WLAN	3	O	O	-	-	-	-	O	
	3	-	-	O	O	-	-	O	√
	2	-	-	-	-	-	O	O	

Notes.

Simultaneous condition was performed as a worst case which is configured as a combination of lowest margin for each mode during radiated spurious emission.

2.3. Duty Cycle Factor

SISO

Test mode	Period (ms)	T_{on} time (ms)	Duty cycle		Duty cycle factor (dB)
			(Linear)	(%)	
802.11a	1.555	1.457	0.937 0	93.70	0.28

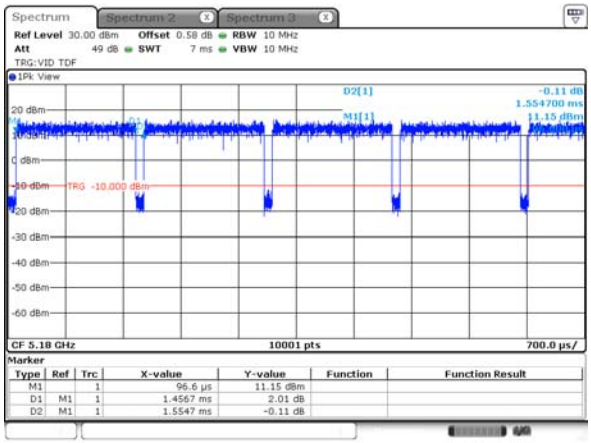
MIMO

Test mode	Period (ms)	T_{on} time (ms)	Duty cycle		Duty cycle factor (dB)
			(Linear)	(%)	
802.11a	1.555	1.456	0.936 3	93.63	0.29
802.11n_HT20	0.746	0.648	0.868 6	86.86	0.61
802.11n_HT40	0.429	0.331	0.771 6	77.16	1.13
802.11ac_VHT20	0.750	0.652	0.869 3	86.93	0.61
802.11ac_VHT40	0.433	0.336	0.776 0	77.60	1.10
802.11ac_VHT80	0.276	0.180	0.652 2	65.22	1.86
802.11ac_VHT160	0.272	0.176	0.647 1	64.71	1.89

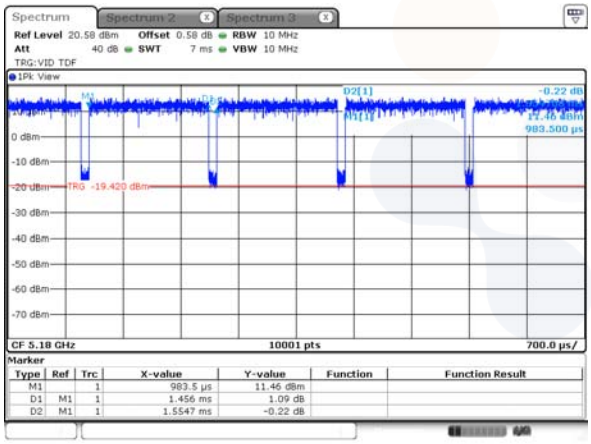
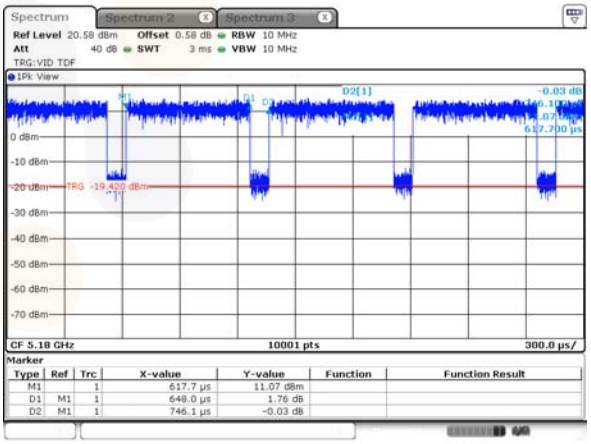
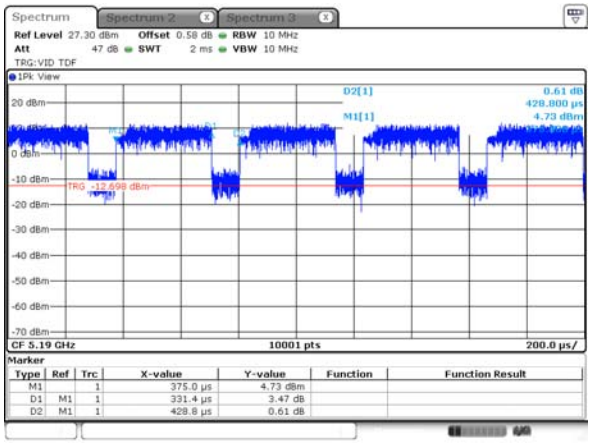
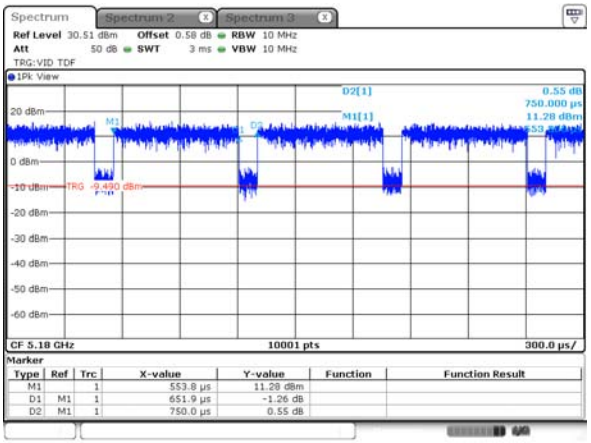
Notes.

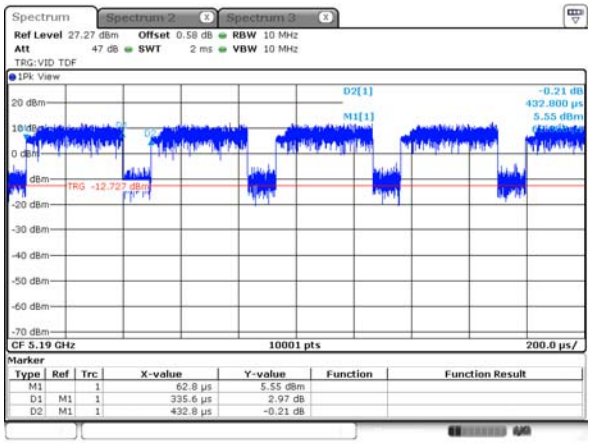
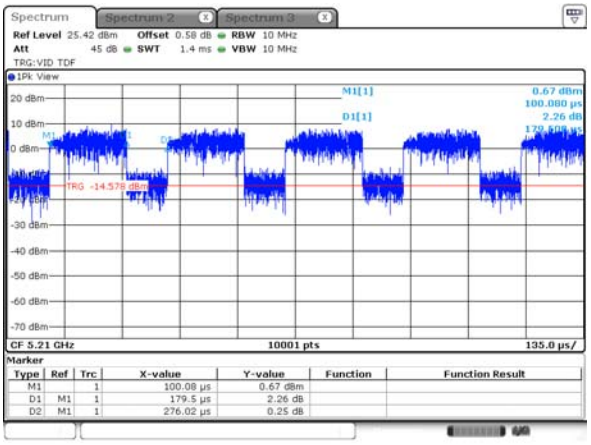
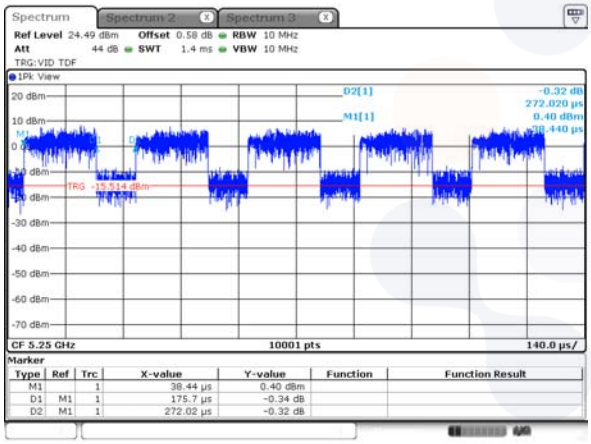
1. Duty cycle (Linear) = T_{on} time / Period
2. DCF(Duty cycle factor) = 10log(1/duty cycle)
3. DCF is not compensated to average result if duty cycle is more than 98%

SISO

802.11a	
	Blank

MIMO

802.11a	802.11n_HT20
	
802.11n_HT40	**802.11ac_VHT20**
	

802.11ac_VHT40	802.11ac_VHT80
	
802.11ac_VHT160	
	Blank

3. Antenna requirement

Requirement of FCC part section 15.203

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

Requirement of RSS-Gen Section 6.8:

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

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

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

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

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

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

3.1 Antenna information

Mode	SISO		CDD	MIMO
	ANT 1	ANT 2	ANT 1 + 2	ANT 1 + 2
802.11a	√	X	√	√
802.11n HT20	X	X	√	√
802.11n HT40	X	X	√	√
802.11ac VHT20	X	X	√	√
802.11ac VHT40	X	X	√	√
802.11ac VHT80	X	X	√	√
802.11ac VHT160	X	X	√	√

√ = 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.

Directional Antenna Gain

Band	ANT 1 Gain (dBi)	ANT 2 Gain (dBi)	Power Directional Gain (dBi)
UNII 1	-7.46	-6.79	-4.11
UNII 2A	-7.52	-7.11	-4.30
UNII 2C	-7.16	-6.99	-4.06
UNII 3	-7.16	-6.89	-4.01
UNII4	-7.45	-7.13	-4.28

Note.

Unequal antenna gains, with equal transmit powers. For antenna gains given by G_1, G_2, …, G_N dBi

Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2 / N_{ANT}]$ dBi

Sample calculation

In case of UNII 1, directional gain = $10 \log[(10^{-7.46/20} + 10^{-6.79/20})^2 / 2] = -4.11$ dBi

4. Summary of tests

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

Notes:

1. All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
2. According to exploratory test no any obvious emission were detected from 9 ㎑ to 30 ㎒. Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30 m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.
3. The orthogonal plan is configured as x-axis because the device operates as desktop device in standard laptop mode. Therefore, all final radiated testing was performed with the EUT in X orientation.
4. All the radiated tests have been performed several case. (Stand-alone, with accessories (TA etc.)) Worst case: stand-alone
5. The test procedure(s) in this report were performed in accordance as following.
   - ANSI C63.10-2013
   - KDB 662911 D01 v02r01
   - KDB 789033 D02 v02r01
   - KDB 291074 D02 v01
6. Based on the baseline scan, the worst-case data rates were:
   802.11a mode: 6Mbps
   802.11n HT20 mode: MCS8
   802.11n HT40 mode: MCS8
   802.11ac VHT20 mode: MCS0
   802.11ac VHT40 mode: MCS0
   802.11ac VHT80 mode: MCS0
   802.11ac VHT160 mode: MCS0

5. Measurement uncertainty

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

All measurement uncertainty values are shown with a coverage factor of k=2 to indicated a 95 % level of confidence. The measurement data shown herein meets of 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 (±)	
Conducted RF power	0.9 dB	
Conducted spurious emissions	1.1 dB	
Radiated spurious emissions	Below 30 ㎒:	2.4 dB
	30 ㎒ ~ 1 000 ㎒	2.3 dB
	1 000 ㎒ ~ 18 000 ㎒	5.6 dB
	Above 18 000 ㎒	5.7 dB
Conducted emissions	9 ㎑ ~ 150 ㎑	1.6 dB
	150 ㎑ ~ 30 ㎒	1.7 dB

6. Measurement results explanation example

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

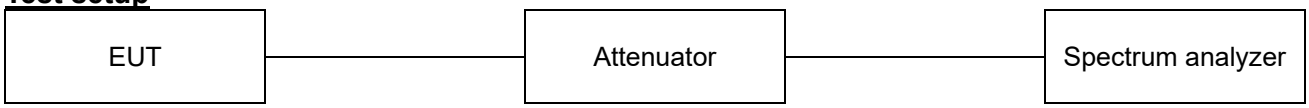
Frequency (㎒)	Factor(㏈)	Frequency (㎒)	Factor(㏈)
30	10.16	9 000	12.00
50	10.28	10 000	12.26
100	10.43	11 000	11.97
200	10.53	12 000	12.47
300	10.64	13 000	12.43
400	10.77	14 000	12.58
500	10.93	15 000	12.73
600	11.04	16 000	12.77
700	11.11	17 000	13.34
800	11.06	18 000	12.9
900	11.08	19 000	13.23
1 000	11.09	20 000	13.14
2 000	11.43	21 000	13.73
3 000	11.85	22 000	14.18
4 000	11.96	23 000	13.58
5 000	12.55	24 000	13.88
6 000	12.64	25 000	13.89
7 000	11.63	26 000	14.04
8 000	11.94	26 500	13.95

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

7. Test results

7.1. Maximum conducted output power

Test setup



Limit

According to §15.407(a), RSS-247(6.2)

FCC

Band	EUT category		Conducted output power limit
UNII-1		Outdoor access point	1 W (30 dBm)
		Indoor access point	
		Fixed point-to-point access point	
	√	Client device	250 ㎽ (23.98 dBm)
UNII-2A	√		250 ㎽ or 11 dBm + 10logB[1)]
UNII-2C	√		250 ㎽ or 11 dBm + 10logB[1)]
UNII-3	√		1 W (30 dBm)
UNII-4	√		EIRP 30 dBm

IC

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

Note:

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

Test procedure

ANSI C63.10-2013-Section 12.3.2.4 or 12.3.3.1, 14.2
KDB 789033 D02 v02r01 - Section E.2.d) or E.3.a)
KDB 662911 D01 v02r01 – Section E).1) and Section F)

Test settings

Used test method is Section E.2.d)

◆ **KDB 789033 D02 v02r01**

Section E.2.d)

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

(i) Measure the duty cycle, x, of the transmitter output signal as described in II.B..

(ii) Set span to encompass the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.

(iii) Set RBW = 1 ㎒

(iv) Set RBW ≥ 3 ㎒

(v) Number of points in sweep ≥ 2 x span/RBW. (This ensures that bin-to-bin spacing is ≤ 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 ㎒ 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 ㏈ if the duty cycle is 25%.

Test results

SISO Conducted Output Power

Test mode	Band	Frequency (㎒)	Measured output power			FCC Limit (dBm)	IC Limit (dBm)
			Reading (dBm)	DCF (dB)	Result (dBm)		
			ANT1		ANT1		
802.11a	UNII 1	5 180	13.73	0.28	14.01	23.98	22.17
		5 200	13.74		14.02		
		5 240	13.21		13.49		
	UNII 2A	5 260	13.61		13.89	23.98	29.17
		5 280	13.74		14.02		
		5 320	13.65		13.93		
	UNII 2C	5 500	13.04		13.32	23.98	29.17
		5 600	13.52		13.80		
		5 700	12.78		13.06		
	UNII 3	5 745	12.65		12.93	30.00	30.00
		5 785	13.37		13.65		
		5 825	12.48		12.76		
	UNII 4	5 845	12.27		12.55	30.00	N/A
		5 865	13.16		13.44		
		5 885	12.23		12.51		

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

SISO e.i.r.p.

Test mode	Band	Frequency (㎒)	Measured output power			MAX e.i.r.p Limit (dBm)
			Conducted output power (dBm)	ANT gain (dBi)	MAX e.i.r.p (dBm)	
			ANT1	ANT1	ANT1	
802.11a	UNII 1	5 180	14.01	-7.46	6.55	22.17
		5 200	14.02		6.56	
		5 240	13.49		6.03	
	UNII 2A	5 260	13.89	-7.52	6.37	29.17
		5 280	14.02		6.50	
		5 320	13.93		6.41	
	UNII 2C	5 500	13.32	-7.16	6.16	29.17
		5 600	13.80		6.64	
		5 700	13.06		5.90	
	UNII 3	5 745	12.93	-7.30	5.77	30.00
		5 785	13.65		6.49	
		5 825	12.76		5.60	
	UNII 4	5 845	12.55	-7.45	5.10	30.00
		5 865	13.44		5.99	
		5 885	12.51		5.06	

Notes:

1. e.i.r.p. Calculation: e.i.r.p. (dBm) = Conducted output power (dBm) + Antenna gain (dBi)

MIMO Conducted Output Power

Test mode	Band	Frequency (㎒)	Measured output power				FCC Limit (dBm)	IC Limit (dBm)
			Reading (dBm)		DCF (dB)	Result (dBm)		
			ANT1	ANT2				
802.11a	UNII 1	5 180	13.09	12.70	0.29	16.20	23.98	22.17
		5 200	13.18	12.43		16.12		
		5 240	12.91	12.21		15.87		
	UNII 2A	5 260	13.26	12.69		16.28	23.98	29.17
		5 280	13.43	12.74		16.40		
		5 320	13.27	13.03		16.45		
	UNII 2C	5 500	13.59	13.10		16.65	23.98	29.16
		5 600	12.97	12.31		15.95		
		5 700	13.38	13.23		16.61		
	UNII 3	5 745	13.12	12.87		16.30	30.00	30.00
		5 785	13.68	12.67		16.50		
		5 825	13.00	12.20		15.92		
	UNII 4	5 845	12.90	12.05		15.80	30.00	N/A
		5 865	12.57	14.18		16.75		
		5 885	12.78	14.42		16.98		
802.11n HT20	UNII 1	5 180	13.40	12.74	0.61	16.70	23.98	22.47
		5 200	13.48	12.64		16.70		
		5 240	12.85	12.51		16.30		
	UNII 2A	5 260	12.62	12.09		15.98	23.98	29.46
		5 280	12.81	12.24		16.15		
		5 320	12.70	12.61		16.28		
	UNII 2C	5 500	13.16	12.48		16.45	23.98	29.45
		5 600	12.43	11.67		15.69		
		5 700	12.76	12.54		16.27		
	UNII 3	5 745	12.47	12.19		15.95	30.00	30.00
		5 785	12.87	12.04		16.10		
		5 825	12.91	13.04		16.60		
	UNII 4	5 845	13.31	12.77		16.67	30.00	N/A
		5 865	11.73	13.51		16.33		
		5 885	11.92	13.74		16.54		

Test mode	Band	Frequency (㎒)	Measured output power				FCC Limit (dBm)	IC Limit (dBm)
			Reading (dBm)		DCF (dB)	Result (dBm)		
			ANT1	ANT2				
802.11n HT40	UNII 1	5 190	11.45	11.50	1.13	15.62	23.98	23.01
		5 230	12.15	11.17		15.83		
	UNII 2A	5 270	12.55	11.62		16.25	23.98	30.00
		5 310	12.46	11.88		16.32		
	UNII 2C	5 510	12.72	11.92		16.48	23.98	30.00
		5 590	12.35	11.00		15.87		
		5 670	12.73	11.73		16.40		
	UNII 3	5 755	12.41	11.74		16.23	30.00	30.00
		5 795	12.89	11.73		16.49		
	UNII 4	5 835	12.45	11.80		16.28	30.00	N/A
		5 875	11.91	13.13		16.70		
802.11ac VHT20	UNII 1	5 180	13.41	12.72	0.61	16.70	23.98	22.47
		5 200	13.44	12.64		16.68		
		5 240	12.83	12.51		16.29		
	UNII 2A	5 260	12.54	12.09		15.94	23.98	29.47
		5 280	12.77	12.15		16.09		
		5 320	12.63	12.52		16.20		
	UNII 2C	5 500	13.05	12.45		16.38	23.98	29.46
		5 600	12.40	11.64		15.66		
		5 700	12.75	12.58		16.29		
	UNII 3	5 745	12.36	12.18		15.89	30.00	30.00
		5 785	13.00	12.09		16.19		
		5 825	12.96	12.90		16.55		
	UNII 4	5 845	13.26	12.74		16.63	30.00	N/A
		5 865	11.76	13.51		16.34		
		5 885	11.99	13.77		16.59		

Test mode	Band	Frequency (㎒)	Measured output power				FCC Limit (dBm)	IC Limit (dBm)
			Reading (dBm)		DCF (dB)	Result (dBm)		
			ANT1	ANT2				
802.11ac VHT40	UNII 1	5 190	12.57	11.32	1.10	16.10	23.98	23.01
		5 230	12.15	11.04		15.74		
	UNII 2A	5 270	12.56	11.67		16.25	23.98	30.00
		5 310	12.47	11.92		16.31		
	UNII 2C	5 510	12.72	11.94		16.46	23.98	30.00
		5 590	12.36	11.02		15.85		
		5 670	12.72	11.73		16.36		
	UNII 3	5 755	12.39	11.79		16.21	30.00	30.00
		5 795	12.90	11.67		16.44		
	UNII 4	5 835	11.99	11.81		16.01	30.00	N/A
		5 875	11.89	13.10		16.65		
802.11ac VHT80	UNII 1	5 210	10.32	10.24	1.86	15.15	23.98	23.01
	UNII 2A	5 290	11.11	10.49		15.68	23.98	30.00
	UNII 2C	5 530	11.87	11.43		16.53	23.98	30.00
		5 610	10.80	10.44		15.49		
	UNII 3	5 775	11.81	10.93		16.26	30.00	30.00
	UNII 4	5 855	10.06	11.85		15.92	30.00	N/A
802.11ac VHT160	UNII 1	5 250	7.98	11.85	1.89	15.23	23.98	23.01
	UNII 2C	5 575	9.13	11.20		15.19	23.98	30.00
	UNII 4	5 815	10.45	11.19		15.74	30.00	N/A

Note.
1. Result(dBm) = 10log($10^{(ANT\ 1/10)}$ + $10^{(ANT\ 2/10)}$) + D.C.F

MIMO e.i.r.p.

Test mode	Band	Frequency (㎒)	Measured output power			MAX e.i.r.p Limit (dBm)
			Conducted output Power (dBm)	ANT gain (dBi)	MAX e.i.r.p (dBm)	
802.11a	UNII 1	5 180	16.20	-4.11	12.09	22.17
		5 200	16.12		12.01	
		5 240	15.87		11.76	
	UNII 2A	5 260	16.28	-4.30	11.98	29.17
		5 280	16.40		12.10	
		5 320	16.45		12.15	
	UNII 2C	5 500	16.65	-4.06	12.59	29.16
		5 600	15.95		11.89	
		5 700	16.61		12.55	
	UNII 3	5 745	16.30	-4.01	12.29	30.00
		5 785	16.50		12.49	
		5 825	15.92		11.91	
	UNII 4	5 845	15.80	-4.28	11.52	30.00
		5 865	16.75		12.47	
		5 885	16.98		12.70	
802.11n HT20	UNII 1	5 180	16.70	-4.11	12.59	22.47
		5 200	16.70		12.59	
		5 240	16.30		12.19	
	UNII 2A	5 260	15.98	-4.30	11.68	29.46
		5 280	16.15		11.85	
		5 320	16.28		11.98	
	UNII 2C	5 500	16.45	-4.06	12.39	29.45
		5 600	15.69		11.63	
		5 700	16.27		12.21	
	UNII 3	5 745	15.95	-4.01	11.94	30.00
		5 785	16.10		12.09	
		5 825	16.60		12.59	
	UNII 4	5 845	16.67	-4.28	12.39	30.00
		5 865	16.33		12.05	
		5 885	16.54		12.27	

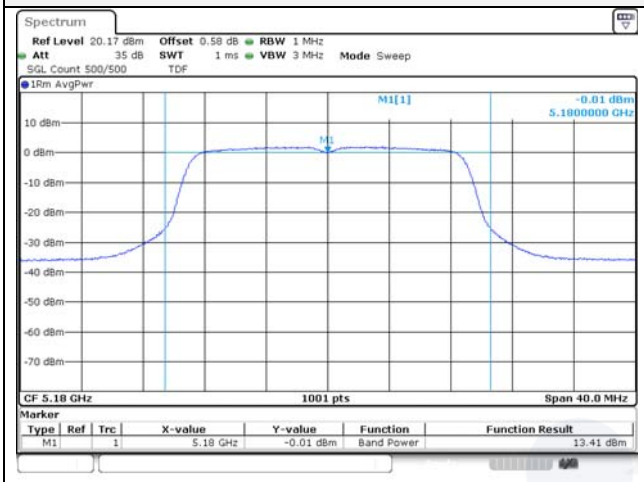
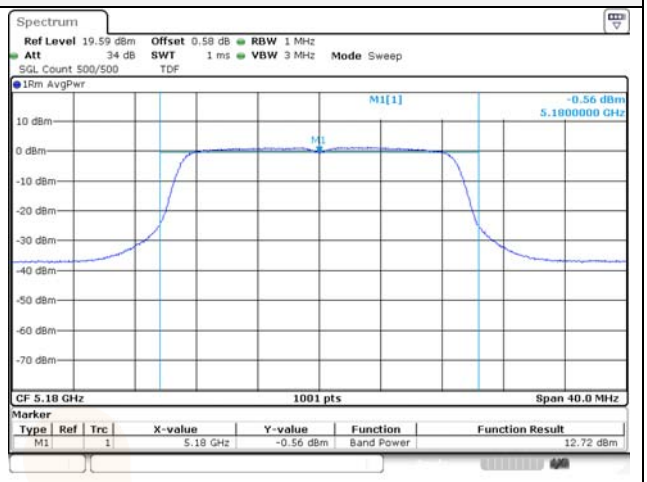
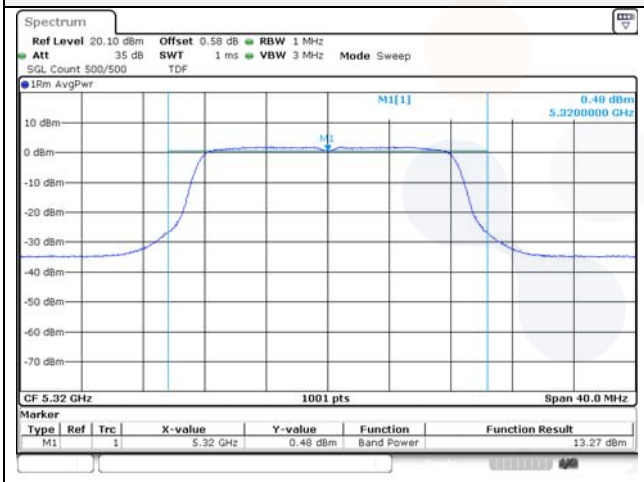
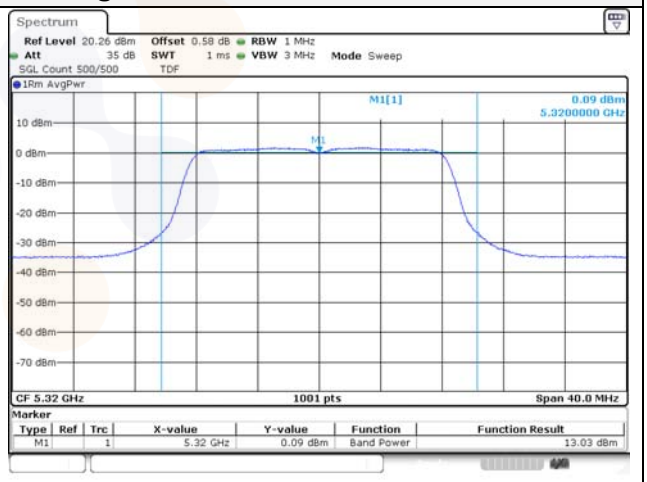
Test mode	Band	Frequency (㎒)	Measured output power			MAX e.i.r.p Limit (dBm)
			Conducted output Power (dBm)	ANT gain (dBi)	MAX e.i.r.p (dBm)	
802.11n HT40	UNII 1	5 190	15.62	-4.11	11.51	23.01
		5 230	15.83		11.72	
	UNII 2A	5 270	16.25	-4.30	11.95	30.00
		5 310	16.32		12.02	
	UNII 2C	5 510	16.48	-4.06	12.42	30.00
		5 590	15.87		11.81	
		5 670	16.40		12.34	
	UNII 3	5 755	16.23	-4.01	12.22	30.00
		5 795	16.49		12.48	
	UNII 4	5 835	16.28	-4.28	12.00	30.00
		5 875	16.70		12.42	
802.11ac VHT20	UNII 1	5 180	16.70	-4.11	12.59	22.47
		5 200	16.68		12.57	
		5 240	16.29		12.18	
	UNII 2A	5 260	15.94	-4.30	11.64	29.47
		5 280	16.09		11.79	
		5 320	16.20		11.90	
	UNII 2C	5 500	16.38	-4.06	12.32	29.46
		5 600	15.66		11.60	
		5 700	16.29		12.23	
	UNII 3	5 745	15.89	-4.01	11.88	30.00
		5 785	16.19		12.18	
		5 825	16.55		12.54	
	UNII 4	5 845	16.63	-4.28	12.35	30.00
		5 865	16.34		12.06	
		5 885	16.59		12.31	

Test mode	Band	Frequency (㎒)	Measured output power			MAX e.i.r.p Limit (dBm)
			Conducted output Power (dBm)	ANT gain (dBi)	MAX e.i.r.p (dBm)	
802.11ac VHT40	UNII 1	5 190	16.10	-4.11	11.99	23.01
		5 230	15.74		11.63	
	UNII 2A	5 270	16.25	-4.30	11.95	30.00
		5 310	16.31		12.01	
	UNII 2C	5 510	16.46	-4.06	12.40	30.00
		5 590	15.85		11.79	
		5 670	16.36		12.30	
	UNII 3	5 755	16.21	-4.01	12.20	30.00
		5 795	16.44		12.43	
	UNII 4	5 835	16.01	-4.28	11.73	30.00
		5 875	16.65		12.37	
802.11ac VHT80	UNII 1	5 210	15.15	-4.11	11.04	23.01
	UNII 2A	5 290	15.68	-4.30	11.38	30.00
	UNII 2C	5 530	16.53	-4.06	12.47	30.00
		5 610	15.49		11.43	
	UNII 3	5 775	16.26	-4.01	12.25	30.00
	UNII 4	5 855	15.92	-4.28	11.64	30.00
802.11ac VHT160	UNII 1	5 250	15.23	-4.11	11.12	23.01
	UNII 2C	5 575	15.19	-4.06	11.13	30.00
	UNII 4	5 815	15.74	-4.28	11.46	30.00

Notes:

1. e.i.r.p. Calculation: e.i.r.p. (dBm) = Conducted output power (dBm) + Antenna gain (dBi)

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

MIMO_ANT 1	MIMO_ANT 2
UNII-1 / 802.11ac VHT20 / Low ch.	
	
UNII-2A / 802.11a / High ch.	
	
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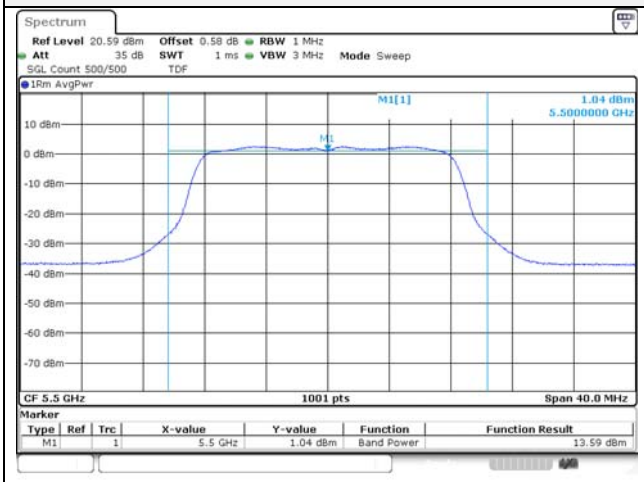
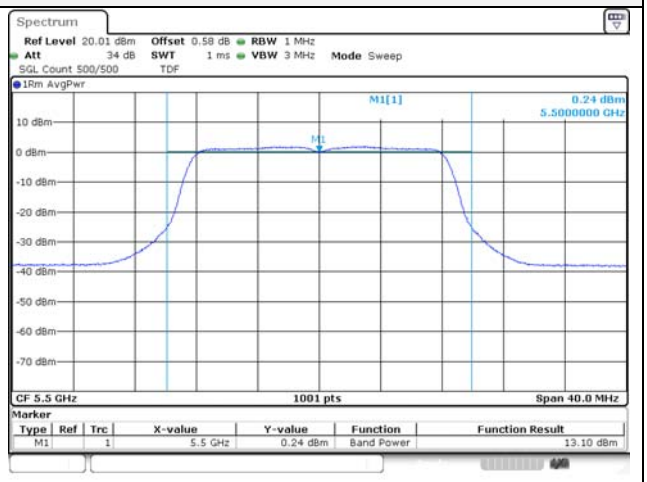
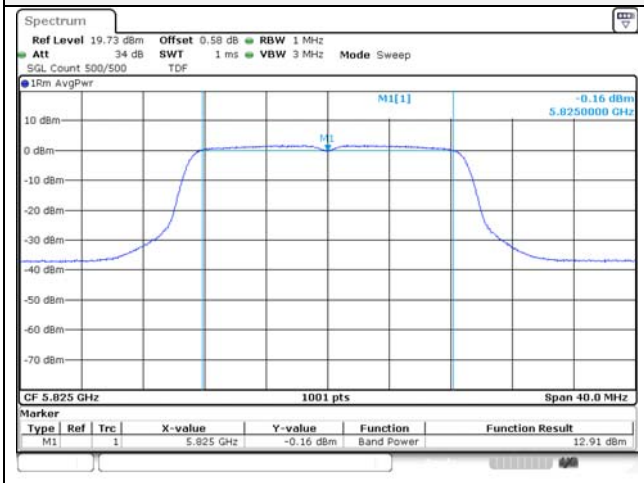
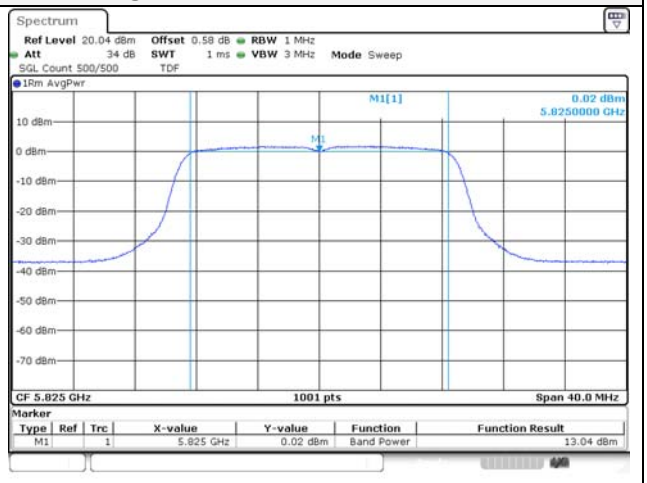
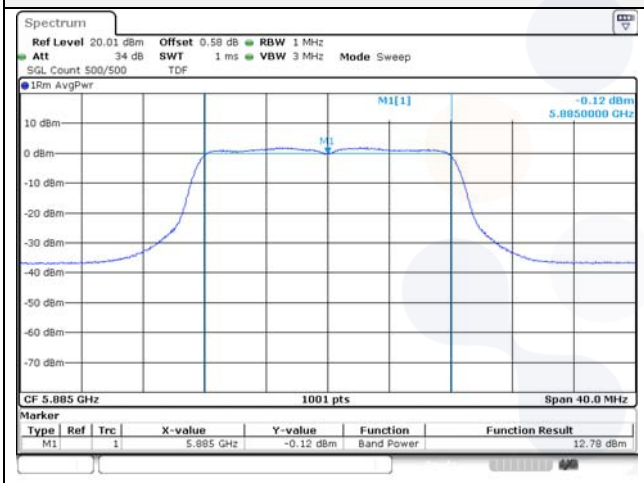
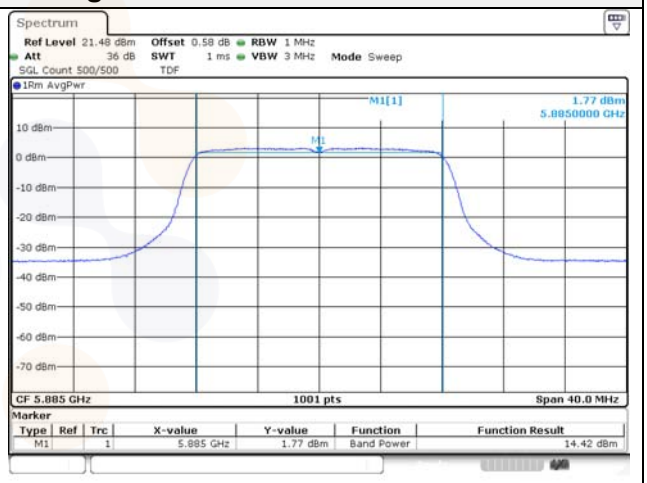
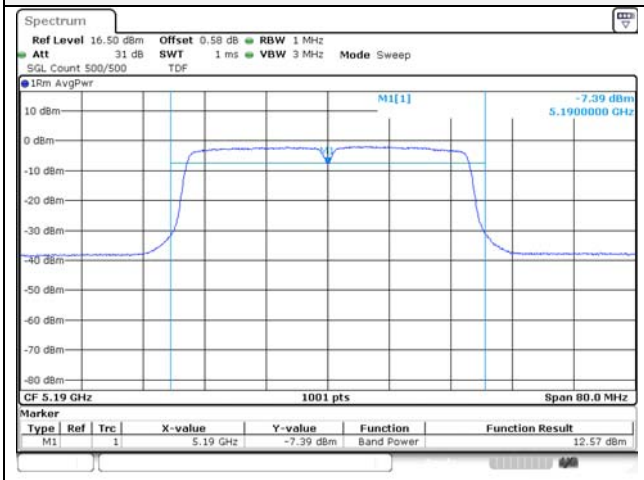
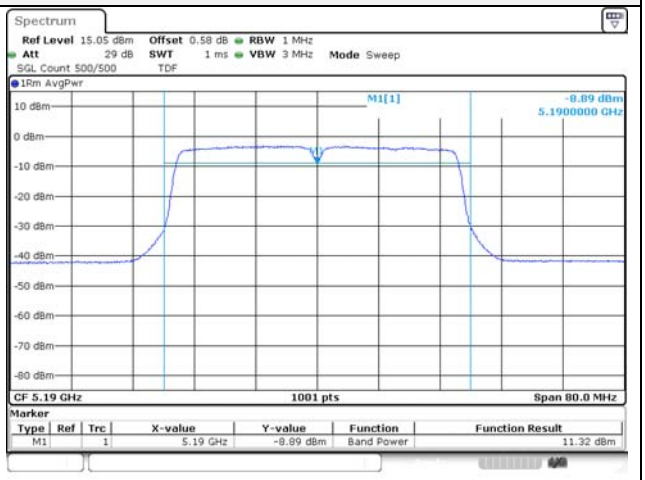
	

MIMO_ANT 1	MIMO_ANT 2
UNII-3 / 802.11n HT20 / High ch.	
	
UNII-4 / 802.11a / High ch.	
	

MIMO_ANT 1	MIMO_ANT 2
UNII-1 / 802.11ac VHT40 / Low ch.	
	
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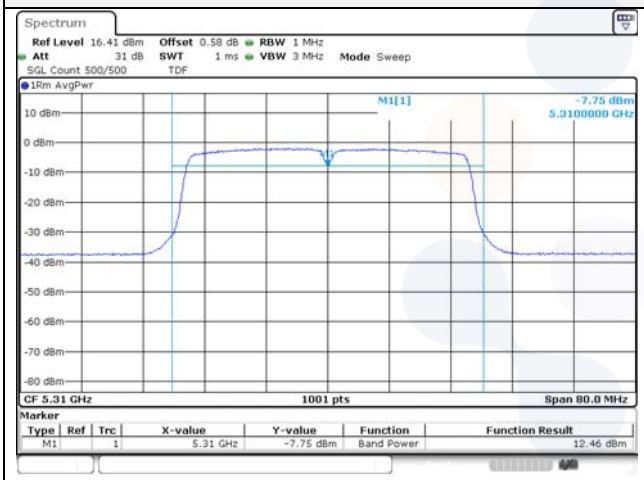
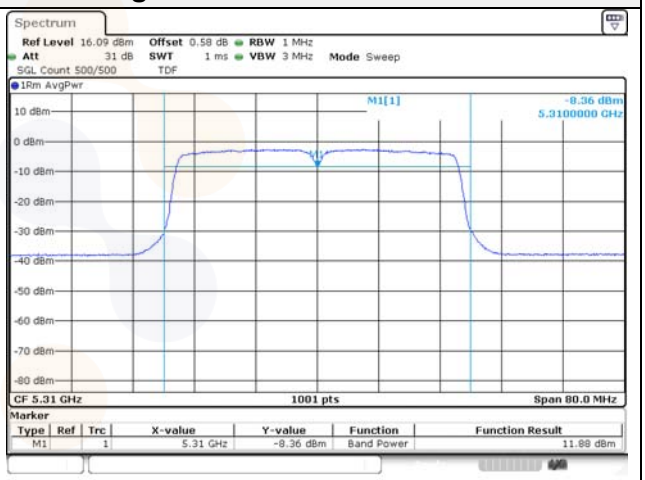
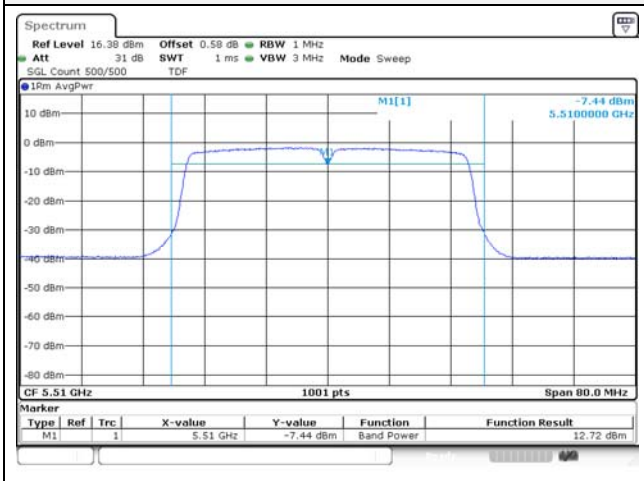
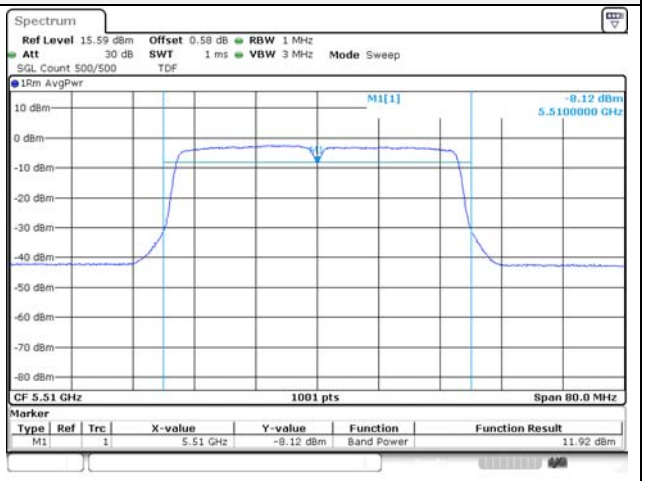
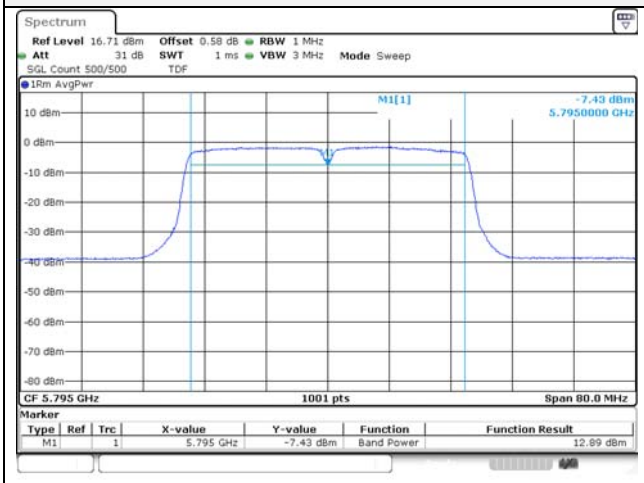
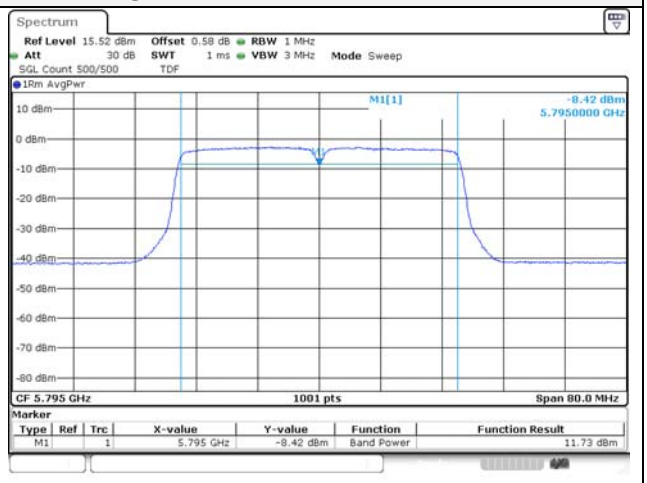
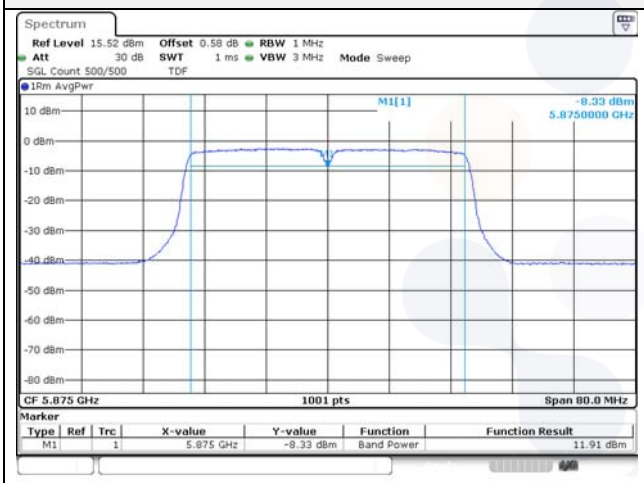
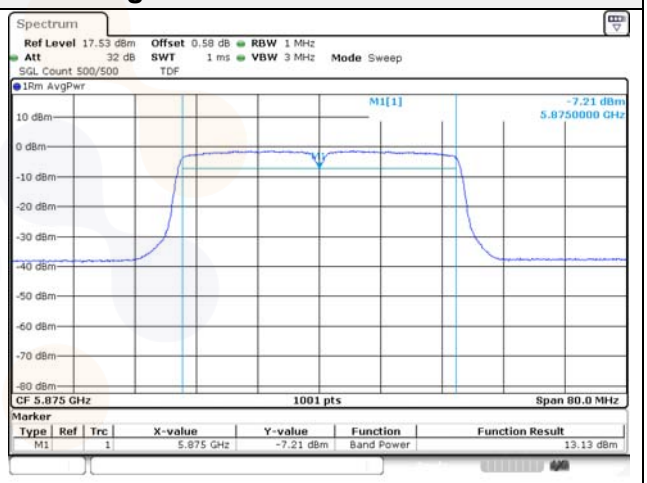
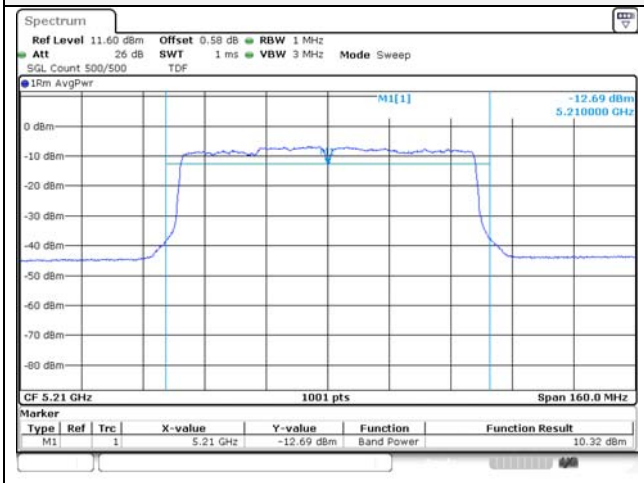
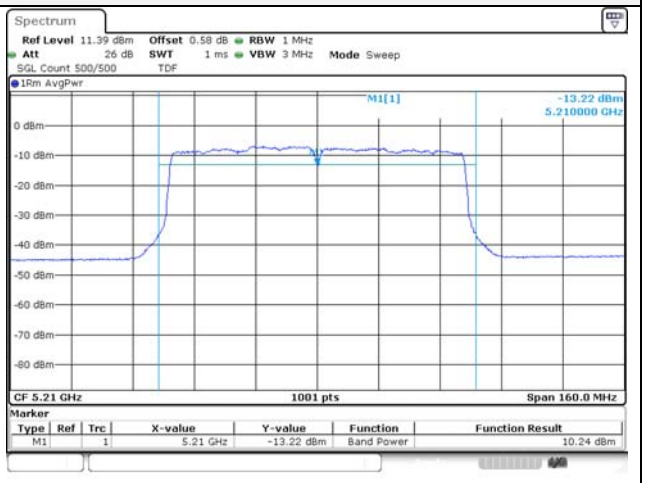
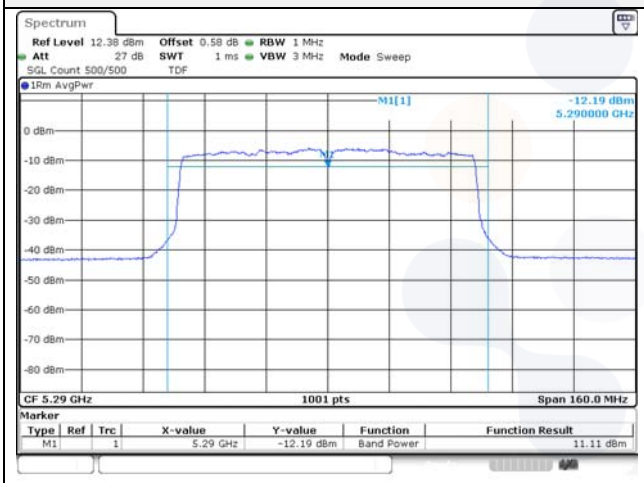
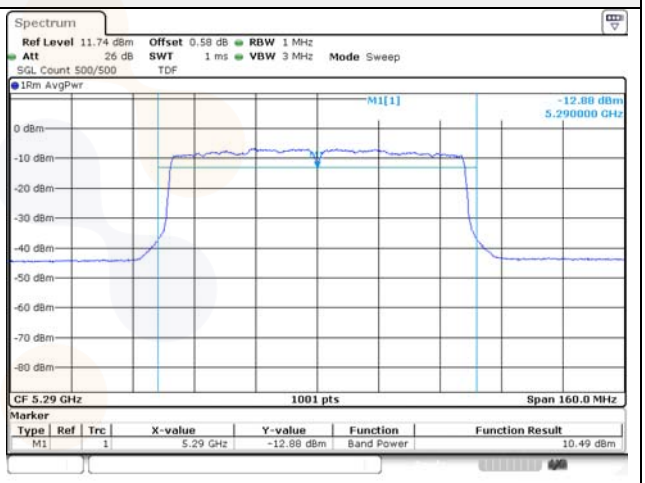
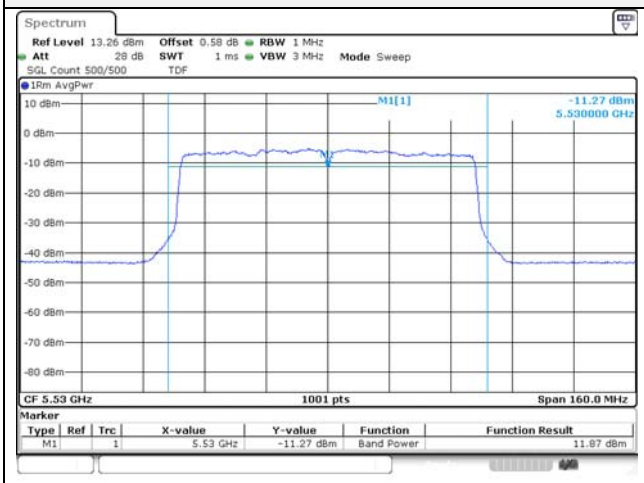
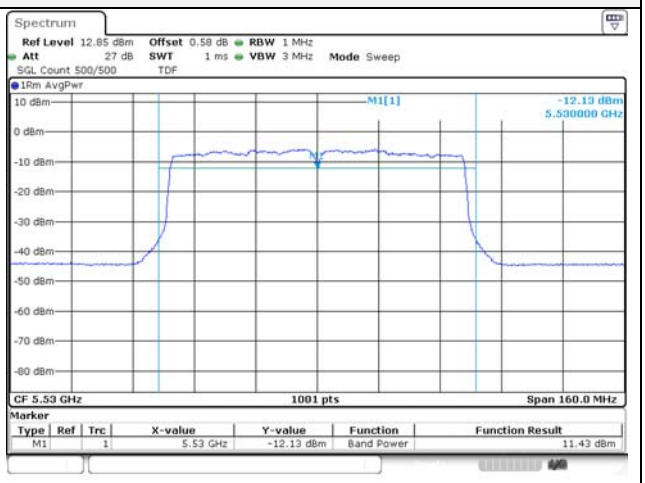
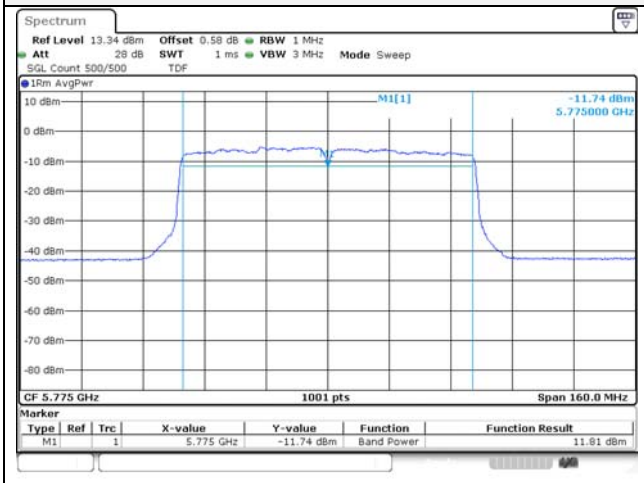
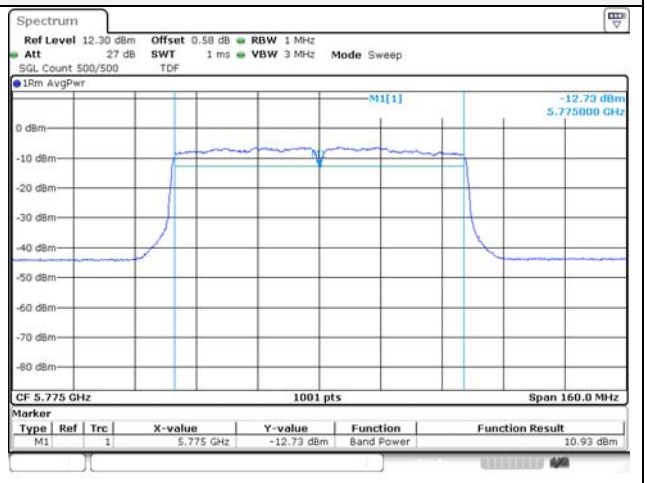
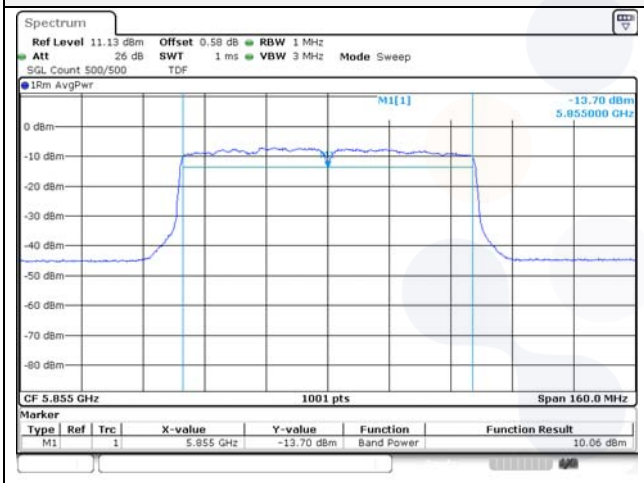
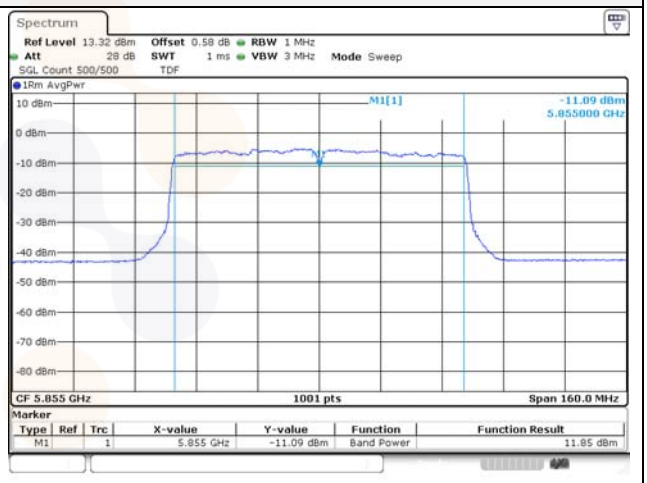
	
UNII-2C / 802.11n HT40 / Low ch.	
	

MIMO_ANT 1	MIMO_ANT 2
UNII-3 / 802.11n HT40 / High ch.	
	
UNII-4 / 802.11n HT40 / High ch.	
	

MIMO_ANT 1	MIMO_ANT 2
UNII-1 / 802.11ac VHT80 / Mid ch.	
	
UNII-2A / 802.11ac VHT80 / Mid ch.	
	
UNII-2C / 802.11ac VHT80 / Low ch.	
	

MIMO_ANT 1	MIMO_ANT 2
UNII-3 / 802.11ac VHT80 / Mid ch.	
	
UNII-4 / 802.11ac VHT80 / Mid ch.	
	

MIMO_ANT 1	MIMO_ANT 2
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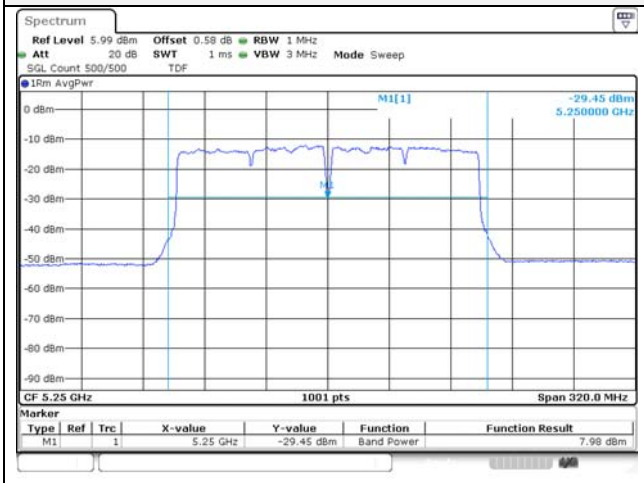	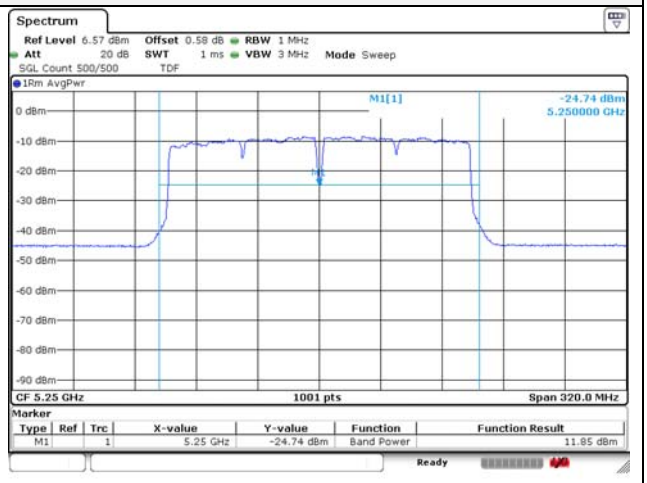
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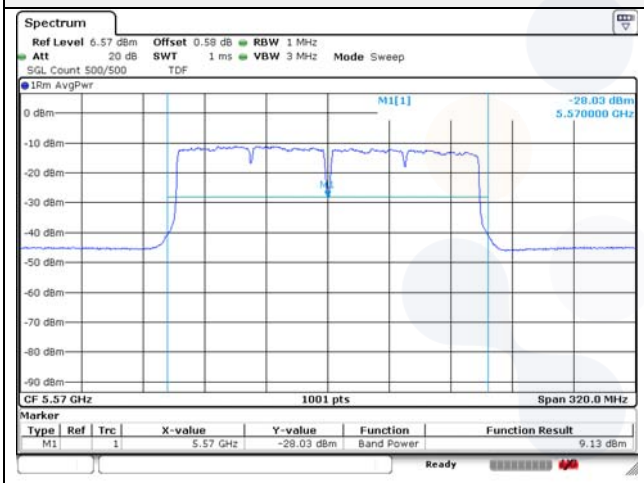
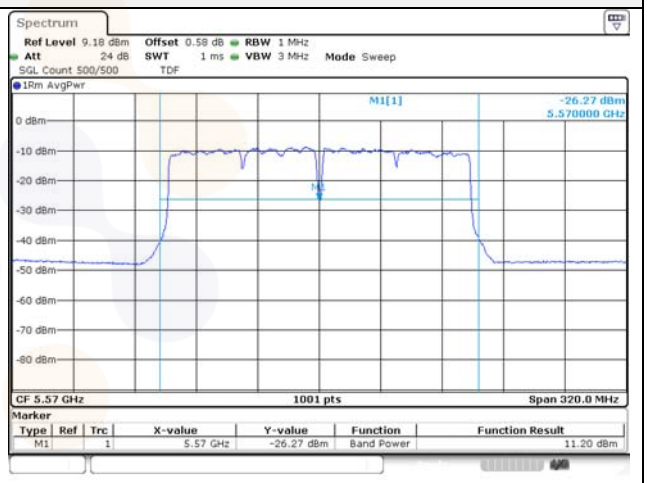
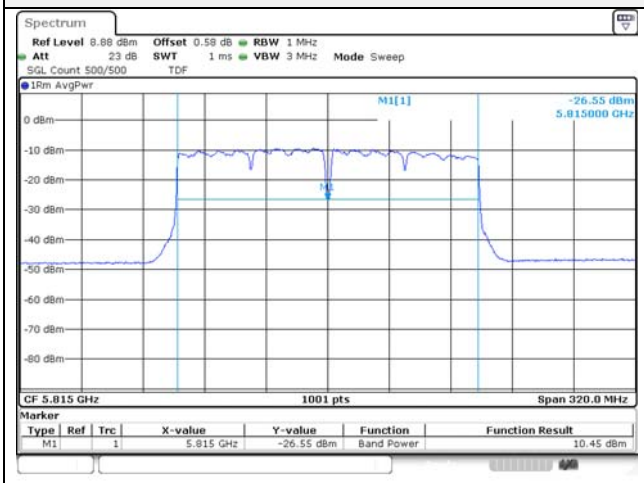
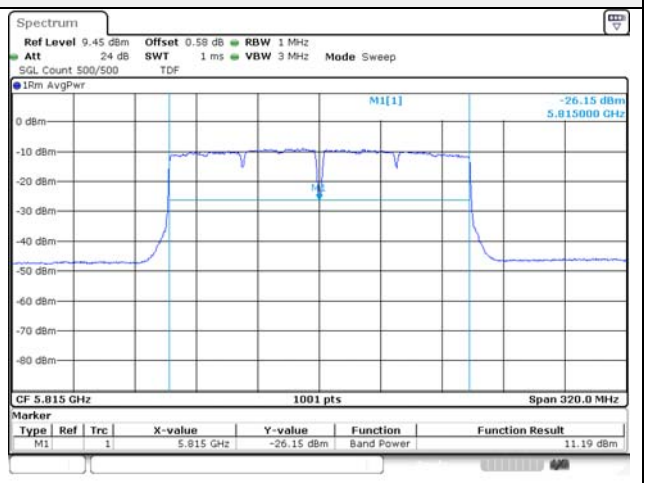
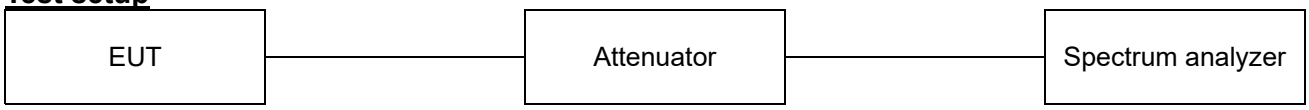
	
UNII-4 / 802.11ac VHT160 / Mid ch.	
	

7.2. Maximum Power Spectral Density

Test setup



Limit

According to §15.407(a), RSS-247(6.2)

Band	EUT category		Limit
UNII-1		Outdoor access point	17dBm/㎒
		Indoor access point	
		Fixed point-to-point access point	
	√	Client device	11 dBm /㎒
UNII-2A	√		11 dBm /㎒
UNII-2C	√		11 dBm /㎒
UNII-3	√		30 dBm /500 ㎑
UNII-4	√		14 dBm /㎒ (E.I.R.P.)

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) and Section F)

Test settings

Section F

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

1. Create an average power spectrum for the EUT operating mode being tested by following the instructions in II.E.2. for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled,
   “Compute power….” (This procedure is required even if the maximum conducted output power measurement was performed using a power meter, method PM.)
2. Search function on the instrument to find the peak of the spectrum and record its value.
3. Adjustments to the peak value of the spectrum, if applicable:

   a) If Method SA-2 or SA-2 Alternative was used, add 10 log (1/x), where x is the duty cycle, to the peak of the spectrum.
   b) If Method SA-3 Alternative was used and the linear mode was used in II.E.2.g) (viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.
4. The result is the Maximum PSD over 1㎒ reference bandwidth

5. For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the preceding procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in Section 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of RBWs less than 1MHz, or 500 kHz, "provided that the measured power is integrated over the full reference bandwidth" to show the total power over the specified measurement bandwidth(i.e., 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≥1/T, where T is defined in II.B.I.a).
   b) Set VBW≥3 RBW.
   c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10 log (500 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 (1MHz/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 (ANT1)

Test mode	Band	Frequency (㎒)	Measured PSD (dBm/㎒)	DCF (dB)	Maximum PSD (dB m/㎒)	Limit (dBm/㎒)
802.11a	UNII 1	5 180	2.44	0.28	2.72	11
		5 200	2.56		2.84	
		5 240	2.14		2.42	
	UNII 2A	5 260	2.38		2.66	11
		5 280	2.57		2.85	
		5 320	2.35		2.63	
	UNII 2C	5 500	1.68		1.96	11
		5 600	2.26		2.54	
		5 700	1.47		1.75	

Test mode	Band	Frequency (㎒)	Measured PSD (dBm/500 ㎑)	DCF (dB)	Maximum PSD (dB m/500 ㎑)	Limit (dBm/500 ㎑)
802.11a	UNII 3	5745	-1.48	0.28	-1.20	30
		5785	-0.67		-0.39	
		5825	-1.55		-1.27	

Test mode	Band	Frequency (㎒)	Measured PSD (dBm/㎒)	DCF (dB)	Maximum PSD (dB m/㎒)	ANT Gain (dB i)	E.I.R.P PSD (dB m/㎒)	Limit (dBm/㎒)
802.11a	UNII 3&4	5845	-1.70	0.28	-1.42	-	-	30 (500㎑)
		5845	0.76		1.04	-7.45	-6.41	14 (EIRP)
	UNII 4	5865	1.88		2.16	-7.45	-5.29	14 (EIRP)
		5885	1.12		1.40	-7.45	-6.05	14 (EIRP)

Notes:

1. Maximum PSD calculation
- Maximum PSD = Measured PSD + D.C.F
2. E.I.R.P Calculation
- E.I.R.P (dB m/㎒) = Maximum PSD (dB m/㎒) + Antenna gain (dB i)

MIMO (ANT1+ANT2)

Test mode	Band	Frequency (㎒)	Measured PSD (dBm/㎒)		DCF (dB)	Maximum PSD (dB m/㎒)	Limit (dBm/㎒)
			ANT1	ANT2			
802.11a	UNII 1	5 180	1.87	1.92	0.29	5.19	11
		5 200	1.95	1.63		5.09	
		5 240	1.57	1.14		4.66	
	UNII 2A	5 260	1.93	1.63		5.08	11
		5 280	2.12	1.75		5.23	
		5 320	1.99	2.04		5.31	
	UNII 2C	5 500	2.58	2.04		5.61	11
		5 600	1.96	1.25		4.92	
		5 700	2.46	1.96		5.51	
802.11n HT20	UNII 1	5 180	2.06	1.22	0.61	5.28	11
		5 200	1.97	1.16		5.21	
		5 240	1.40	1.12		4.88	
	UNII 2A	5 260	1.30	0.53		4.55	11
		5 280	1.31	0.63		4.61	
		5 320	1.30	1.05		4.80	
	UNII 2C	5 500	1.60	1.11		4.98	11
		5 600	0.90	0.23		4.20	
		5 700	1.47	1.13		4.93	
802.11n HT40	UNII 1	5 190	-1.90	-3.24	1.13	1.62	11
		5 230	-2.63	-3.34		1.17	
	UNII 2A	5 270	-1.90	-2.94		1.75	11
		5 310	-1.97	-2.55		1.89	
	UNII 2C	5 510	-1.73	-2.73		1.94	11
		5 590	-2.46	-3.59		1.15	
		5 670	-1.80	-2.88		1.83	
802.11ac VHT20	UNII 1	5 180	1.96	1.20	0.61	5.22	11
		5 200	1.96	1.10		5.17	
		5 240	1.34	1.14		4.86	
	UNII 2A	5 260	1.19	0.57		4.51	11
		5 280	1.25	0.72		4.61	
		5 320	1.23	0.98		4.73	
	UNII 2C	5 500	1.55	0.86		4.84	11
		5 600	0.91	0.19		4.18	
		5 700	1.39	1.34		4.98	

Test mode	Band	Frequency (㎒)	Measured PSD (dBm/㎒)		DCF (dB)	Maximum PSD (dB m/㎒)	Limit (dBm/㎒)
			ANT1	ANT2			
802.11ac VHT40	UNII 1	5 190	-1.95	-3.14	1.10	1.61	11
		5 230	-2.57	-3.53		1.09	
	UNII 2A	5 270	-1.92	-3.05		1.66	11
		5 310	-2.11	-2.58		1.77	
	UNII 2C	5 510	-1.70	-2.73		1.93	11
		5 590	-2.47	-3.57		1.13	
		5 670	-1.81	-2.85		1.81	
802.11ac VHT80	UNII 1	5 210	-6.92	-6.86	1.86	-2.02	11
	UNII 2A	5 290	-6.16	-6.66		-1.54	11
	UNII 2C	5 530	-5.31	-5.69		-0.63	11
		5 610	-6.43	-6.82		-1.75	
802.11ac VHT160	UNII 1	5 250	-10.33	-10.54	1.89	-5.57	11
	UNII 2C	5 570	-8.77	-8.86		-3.95	11

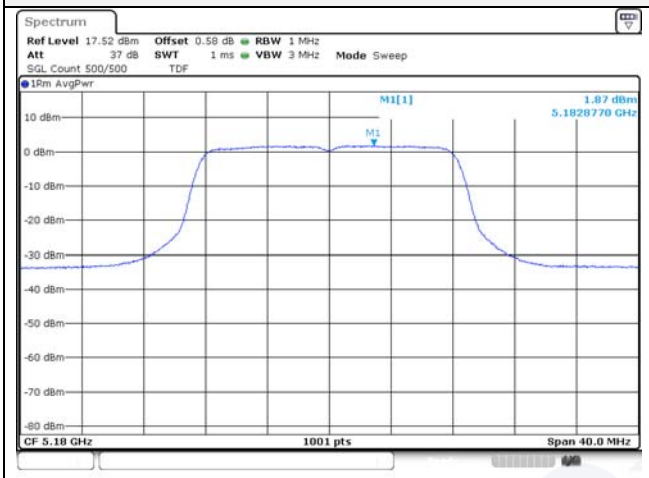
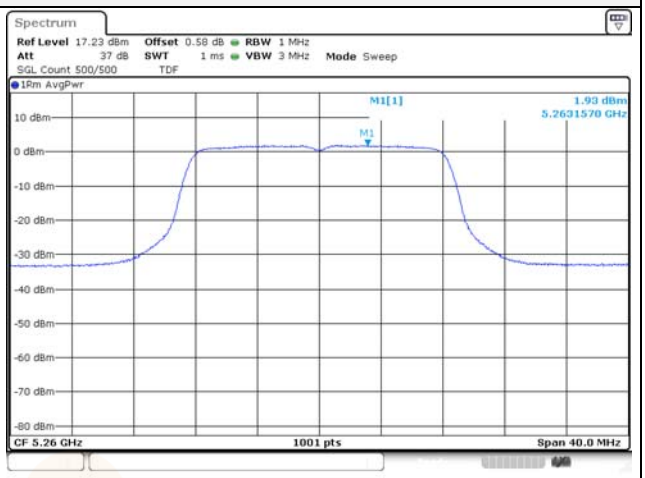
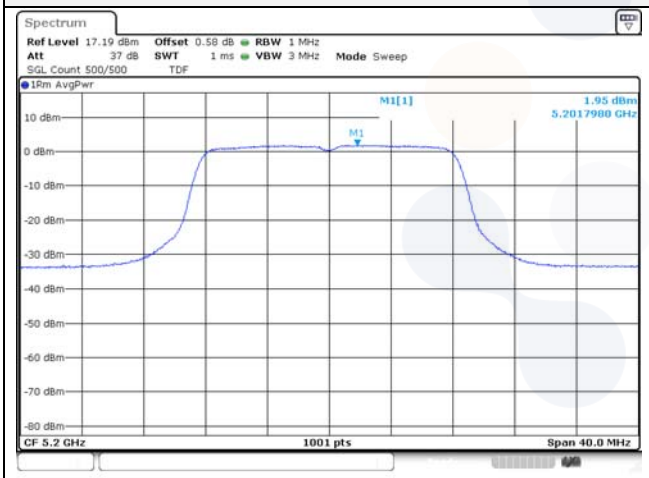
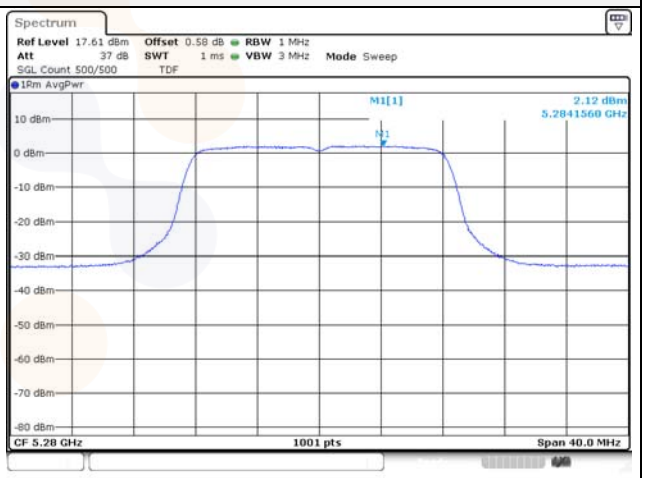
Test mode	Band	Frequency (㎒)	Measured PSD (dBm/500 ㎑)		DCF (dB)	Maximum PSD (dBm /500 ㎑)	Limit (dBm /500 ㎑)
			ANT1	ANT2			
802.11a	UNII 3	5 745	-0.50	-1.00	0.29	2.55	30
		5 785	-0.08	-1.23		2.68	
		5 825	-0.91	-1.78		1.97	
802.11n HT20		5 745	-1.73	-2.00	0.61	1.76	
		5 785	-1.09	-2.08		2.07	
		5 825	-1.26	-1.28		2.35	
802.11n HT40		5 755	1.76	1.76	1.13	-0.95	
		5 795	2.07	2.07		-0.69	
802.11ac VHT20		5 745	-1.64	-1.99	0.61	1.81	
		5 785	-0.91	-1.97		2.21	
		5 825	-1.17	-1.32		2.37	
802.11ac VHT40		5 755	-4.59	-5.58	1.10	-0.95	
		5 795	-4.07	-5.74		-0.71	
802.11ac VHT80		5 775	-7.86	-8.67	1.86	-3.38	

Test mode	Band	Frequency (㎒)	Measured PSD (dBm/㎒)		DCF (dB)	Maximum PSD (dBm/㎒)	ANT Gain (dBi)	E.I.R.P. PSD (dBm/㎒)	Limit (dBm/㎒)
			ANT1	ANT2					
802.11a	UNII 3&4	5 845	-1.23	-0.39	0.29	2.51	-	-	30.00 (500㎑)
		5 845	0.79	2.19		4.84	-4.28	0.56	14.00 (EIRP)
	UNII 4	5 865	1.63	2.93		5.62	-4.28	1.34	14.00 (EIRP)
		5 885	1.78	3.20		5.84	-4.28	1.56	14.00 (EIRP)
802.11n HT20	UNII 3&4	5 845	-1.20	-0.22	0.61	2.94	-	-	30.00 (500㎑)
		5 845	1.19	2.39		5.13	-4.28	0.85	14.00 (EIRP)
	UNII 4	5 865	0.49	2.21		5.06	-4.28	0.78	14.00 (EIRP)
		5 885	0.87	2.55		5.41	-4.28	1.13	14.00 (EIRP)
802.11n HT40	UNII 3&4	5 835	-4.70	-4.32	1.13	-0.37	-	-	30.00 (500㎑)
		5 835	-2.98	-2.45		1.43	-4.28	-2.85	14.00 (EIRP)
	UNII 4	5 875	-2.94	-1.22		2.14	-4.28	-2.14	14.00 (EIRP)
802.11ac VHT20	UNII 3&4	5 845	-1.30	-0.22	0.61	2.89	-	-	30.00 (500㎑)
		5 845	1.16	2.45		5.99	-4.28	1.71	14.00 (EIRP)
	UNII 4	5 865	0.46	2.15		5.01	-4.28	0.73	14.00 (EIRP)
		5 885	0.68	2.53		5.32	-4.28	1.04	14.00 (EIRP)
802.11ac VHT40	UNII 3&4	5 835	-5.38	-4.14	1.10	-0.60	-	-	30.00 (500㎑)
		5 835	-3.75	-2.32		1.14	-4.28	-3.14	14.00 (EIRP)
	UNII 4	5 875	-2.75	-1.30		2.15	-4.28	-2.13	14.00 (EIRP)
802.11ac VHT80	UNII 3&4	5 855	-10.10	-7.59	1.86	-3.80	-	-	30.00 (500㎑)
		5 855	-7.68	-5.13		-1.35	-4.28	-5.63	14.00 (EIRP)
802.11ac VHT160	UNII 3&4	5 815	-8.77	-7.97	1.89	-3.48	-	-	30.00 (500㎑)
		5 815	-7.24	-5.76		-1.57	-4.28	-5.85	14.00 (EIRP)

Notes:

1. Maximum PSD calculation
- Maximum PSD = Measured $10\log(10^{(ANT\ 1/10)} + 10^{(ANT\ 2/10)})$ + D.C.F
2. E.I.R.P Calculation
- E.I.R.P (㏈ m/㎒) = Maximum PSD (㏈ m/㎒) + Antenna gain (㏈ i)

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

UNII-1 / 802.11a / Low ch.	UNII-2A / 802.11a / Low ch.
	
UNII-1 / 802.11a / Mid ch.	**UNII-2A / 802.11a / Mid ch.**
	
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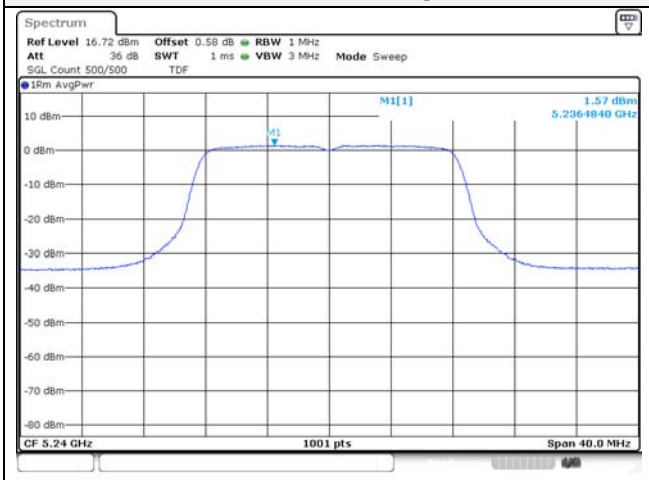
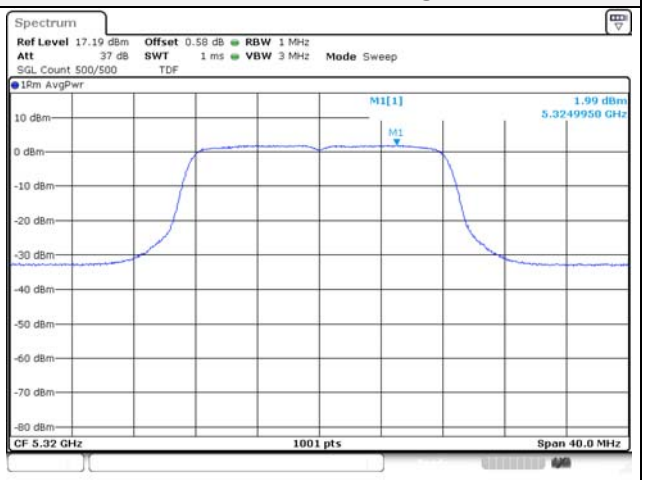
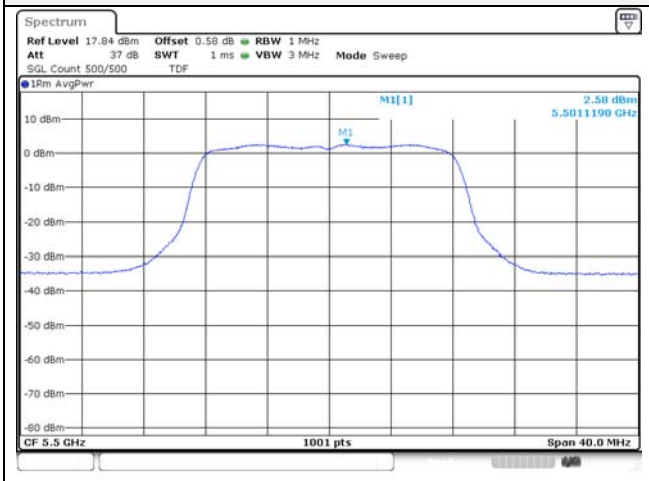
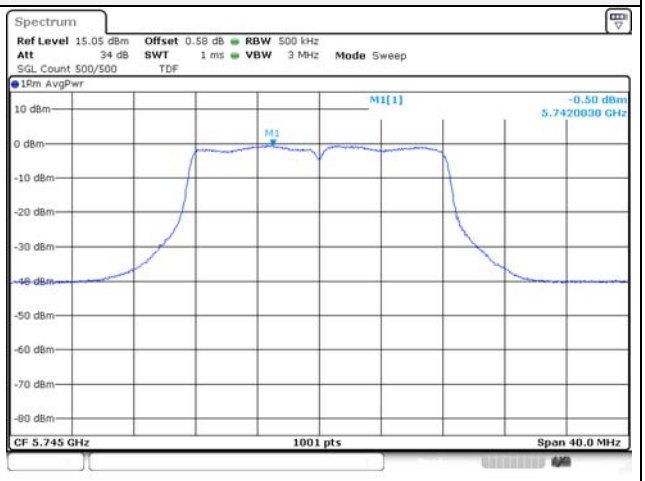
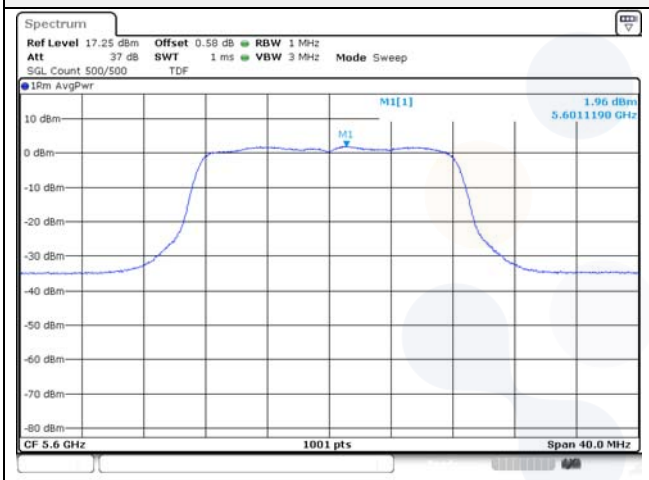
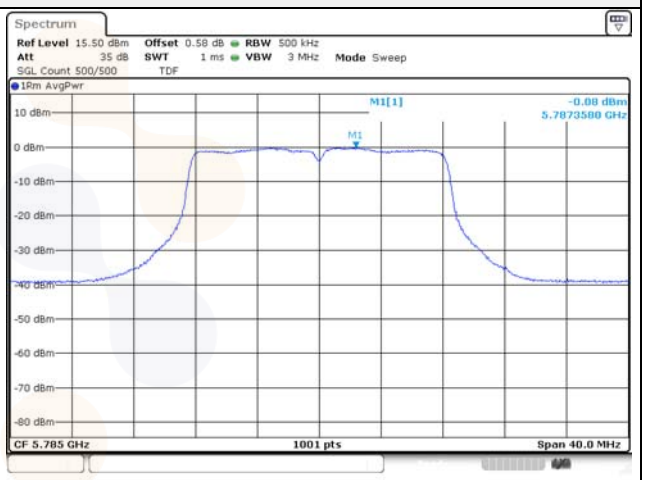
	

UNII-2C / 802.11a / Low ch.	UNII-3 / 802.11a / Low ch.
	
UNII-2C / 802.11a / Mid ch.	**UNII-3 / 802.11a / Mid ch.**
	
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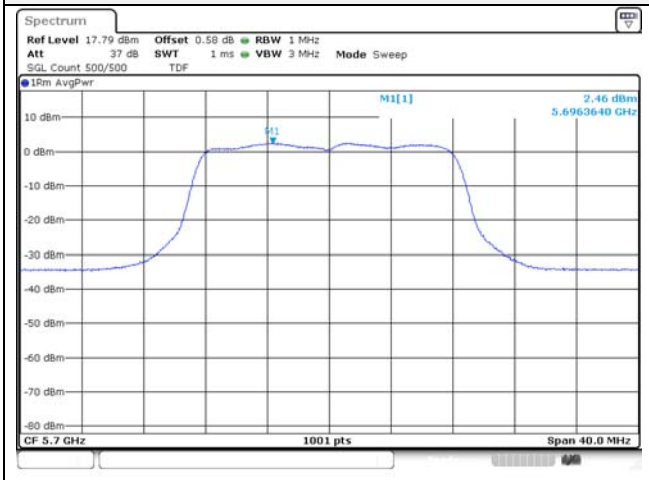	

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	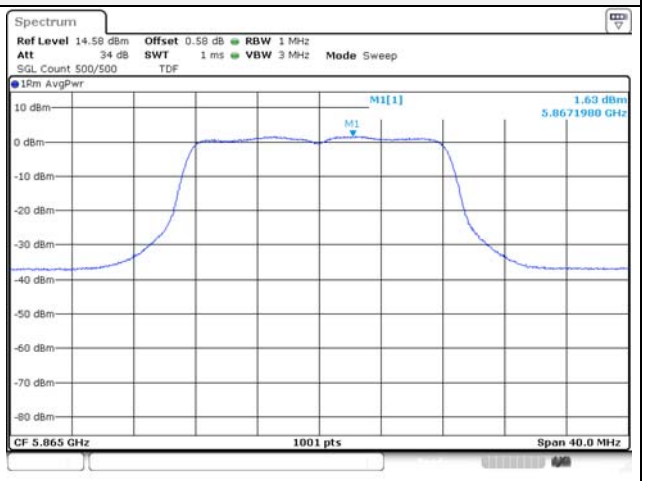
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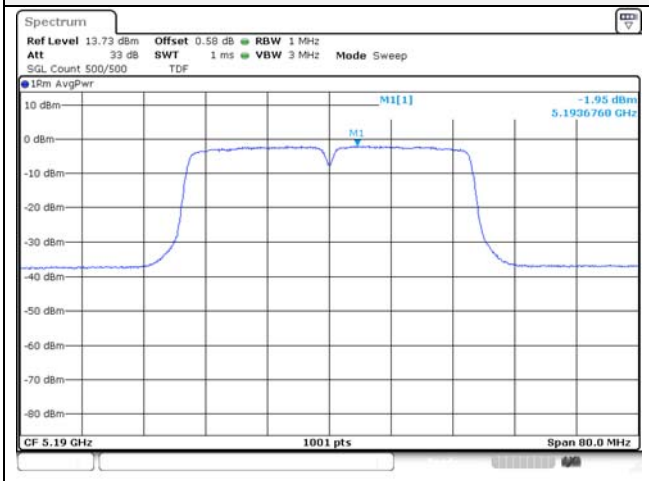
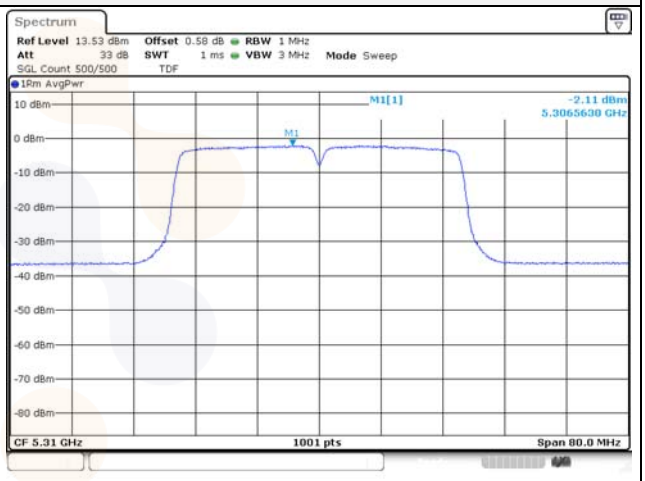
	
UNII-1 / 802.11 ac VHT40 / High ch.	**UNII-2A / 802.11 ac VHT40 / High ch.**
	

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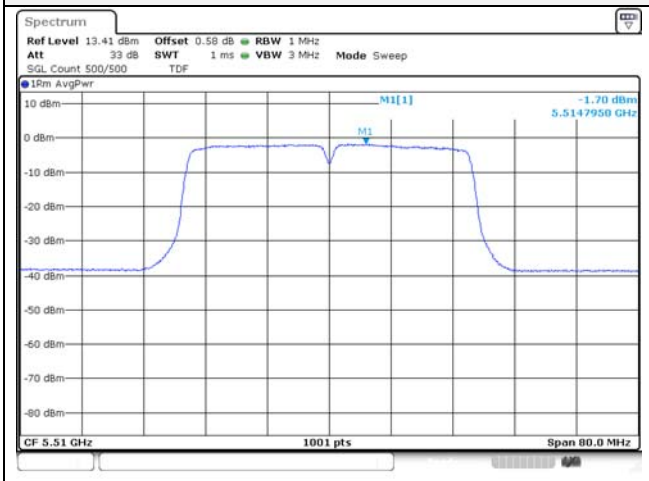	
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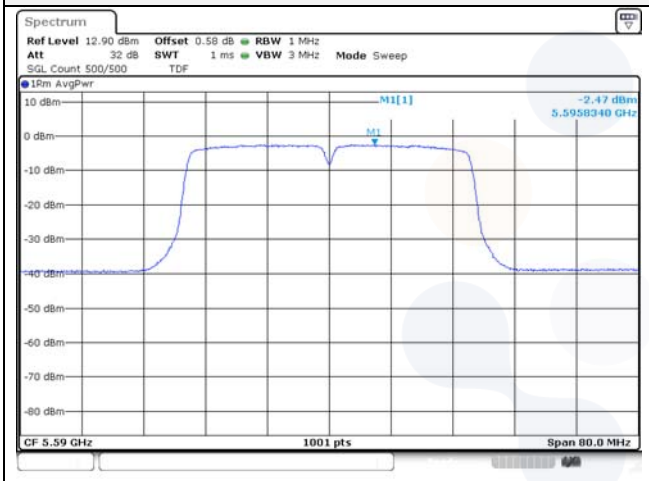	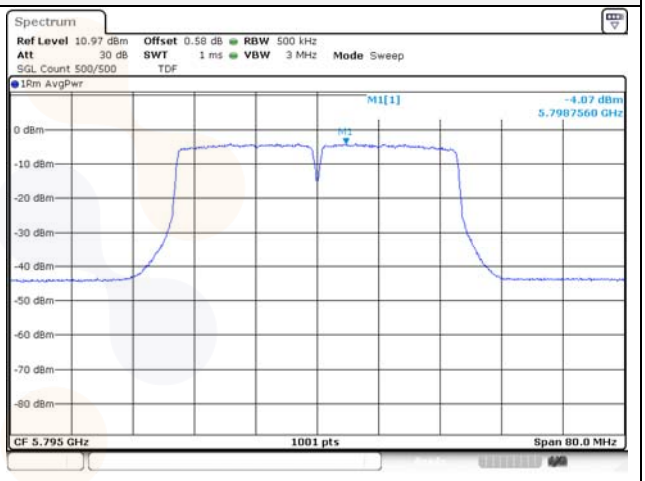
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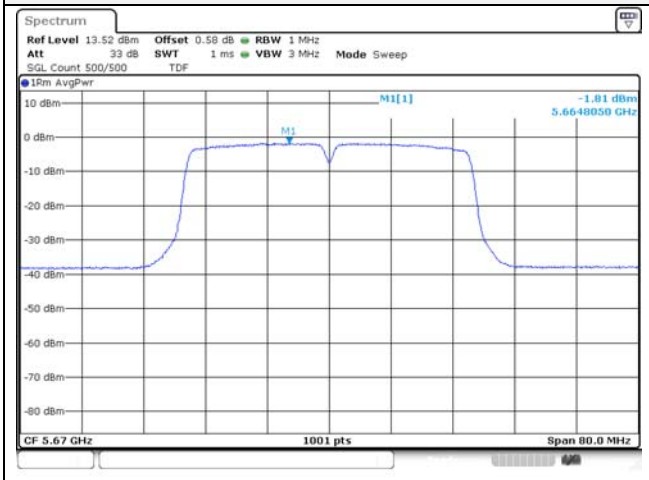
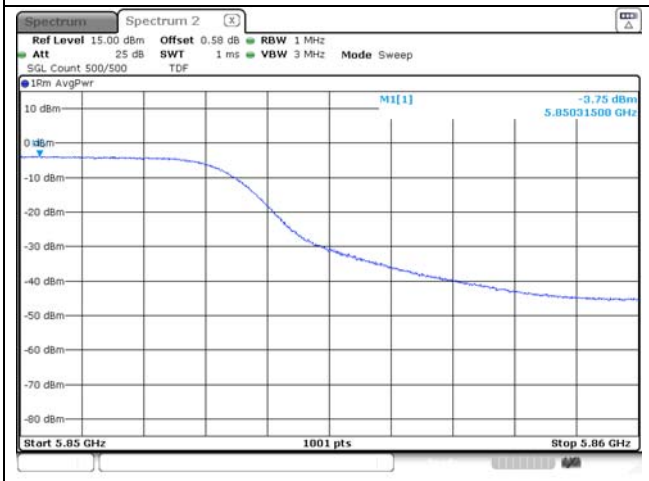
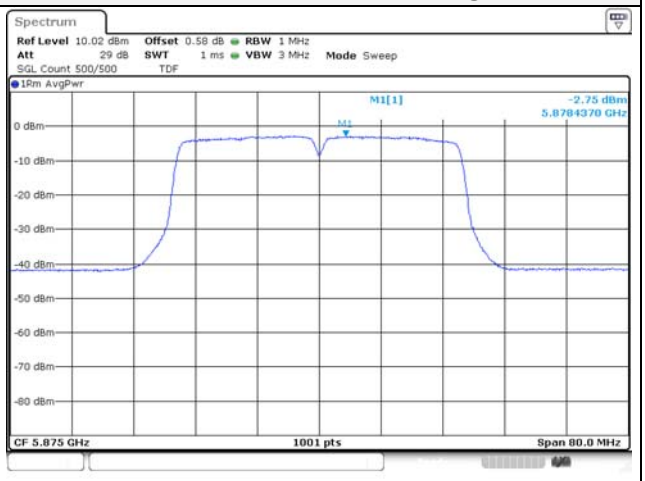
	Blank

UNII-4 / 802.11ac VHT40 / Low ch.	UNII-4 / 802.11ac VHT40 / High ch.
	

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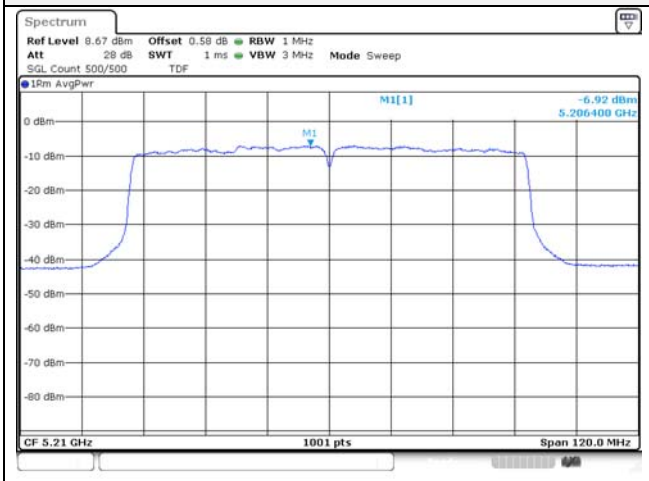	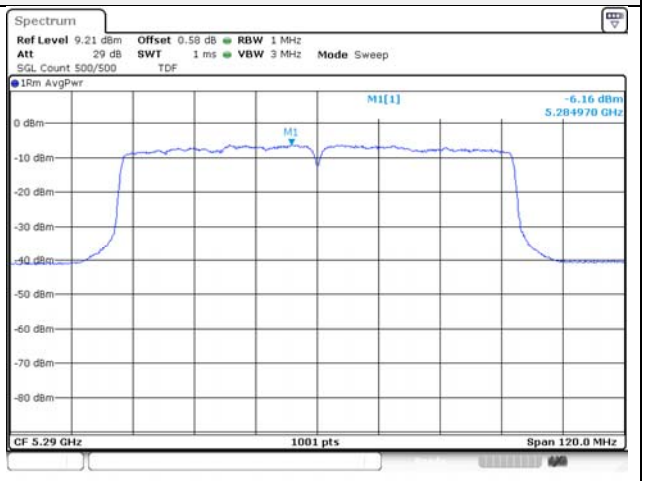
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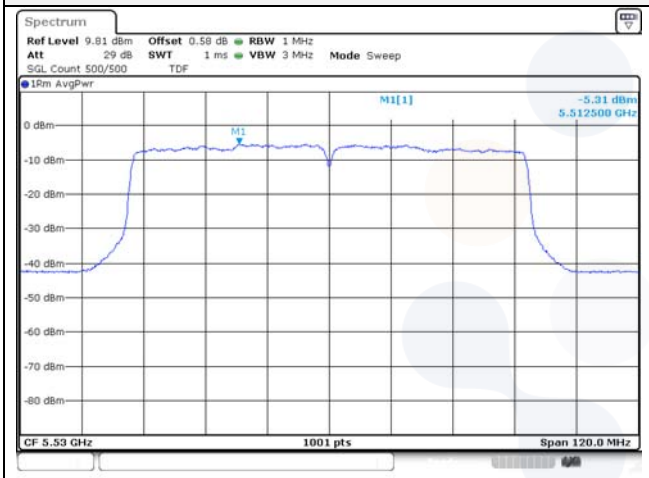	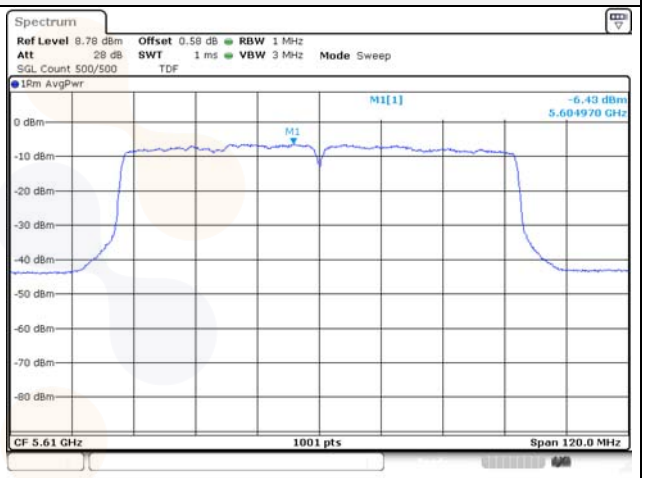
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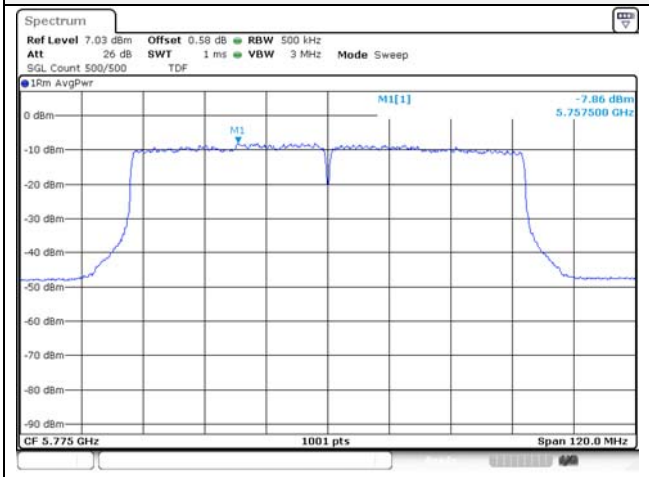
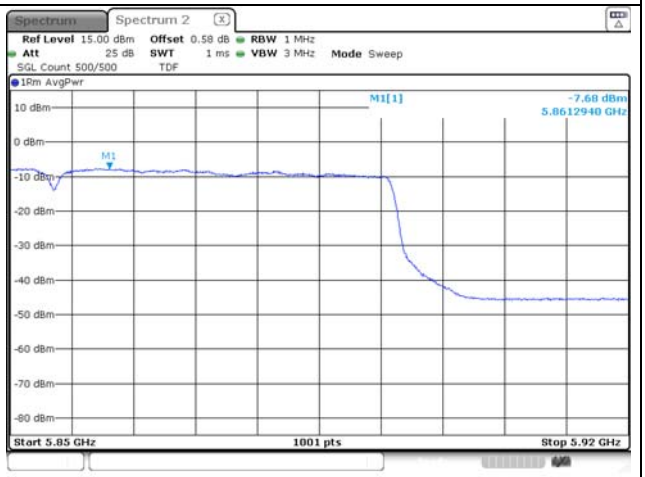
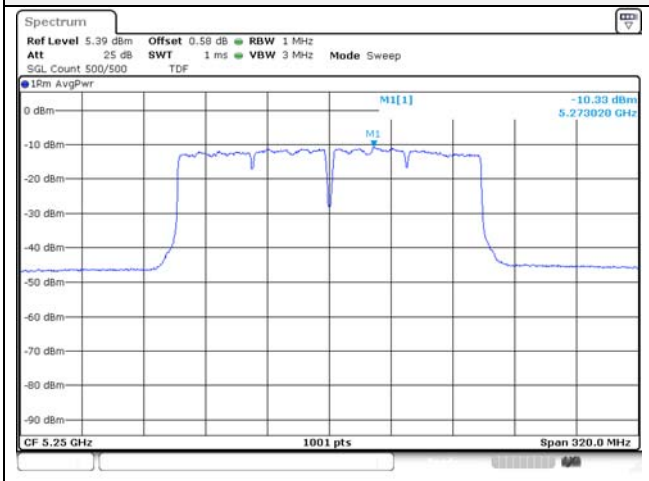
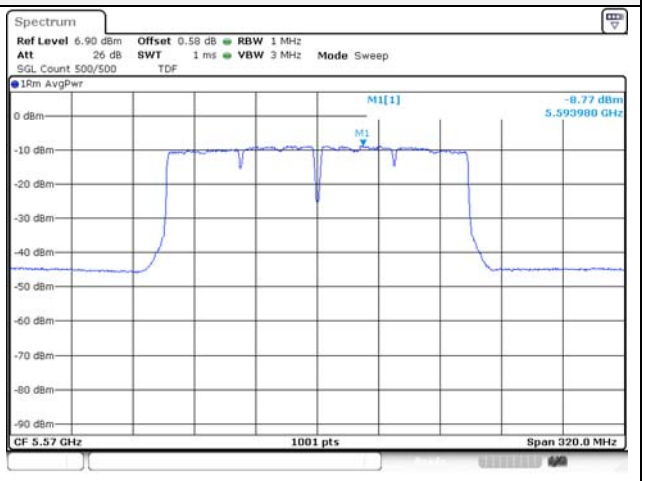
	

UNII-1 / 802.11ac VHT160 / Mid ch.	UNII-2C / 802.11ac VHT160 / Mid ch.
	
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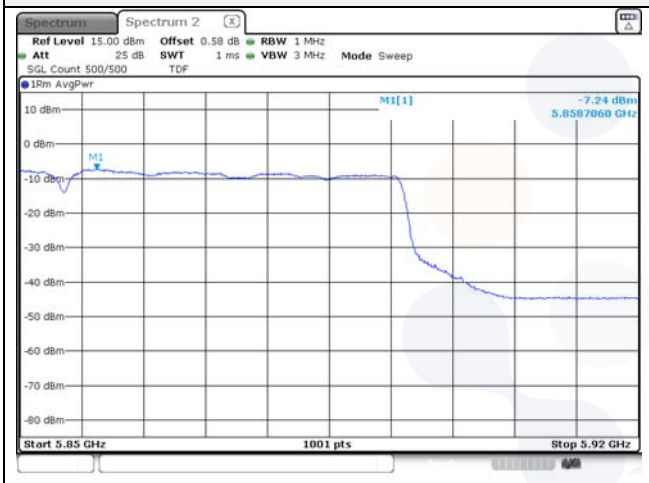
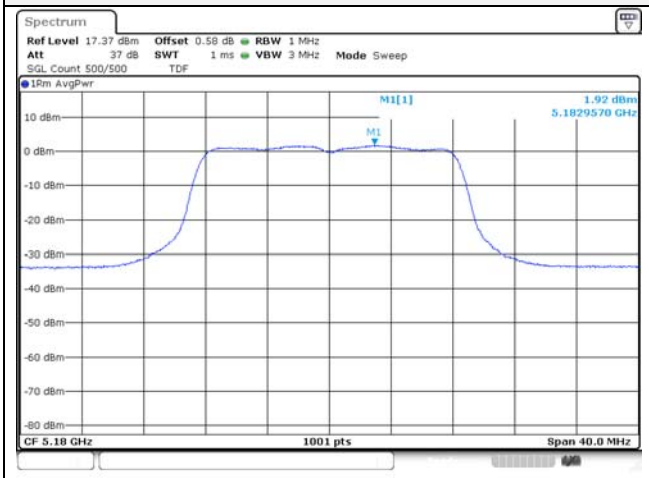
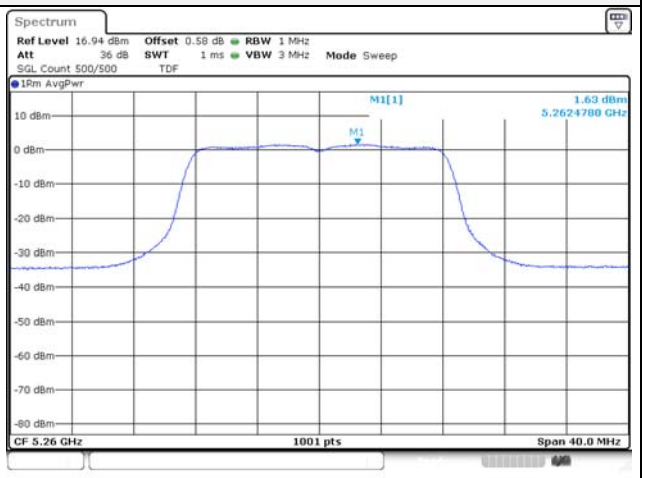
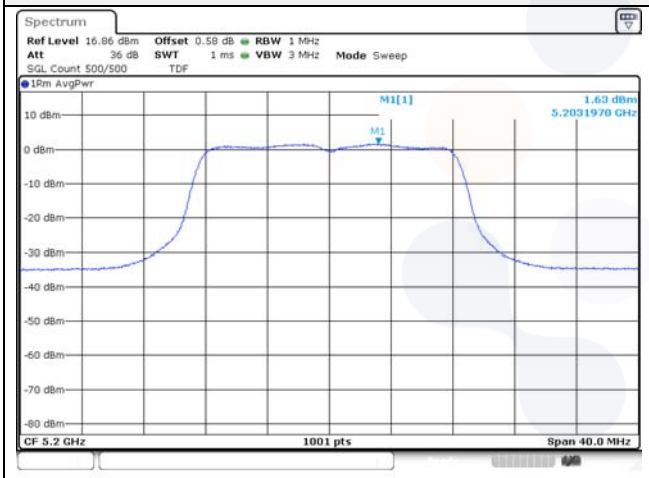
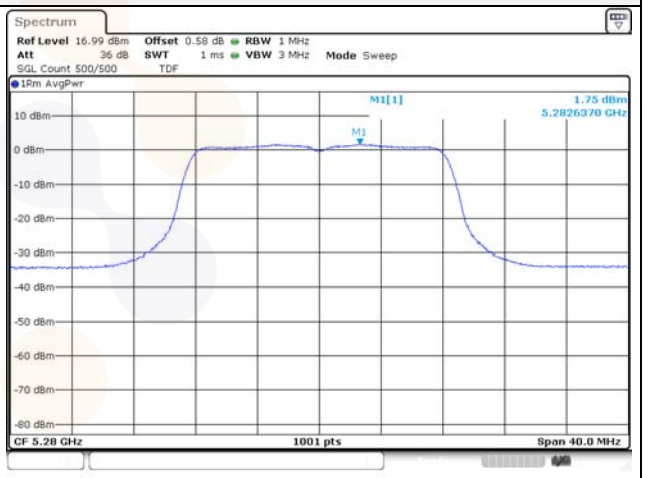
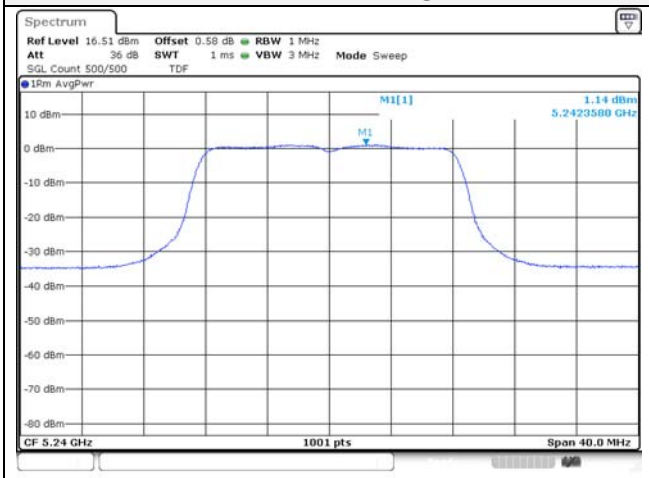
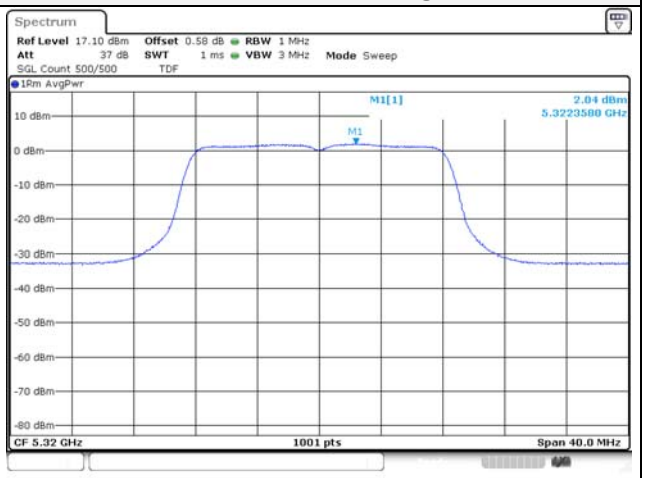
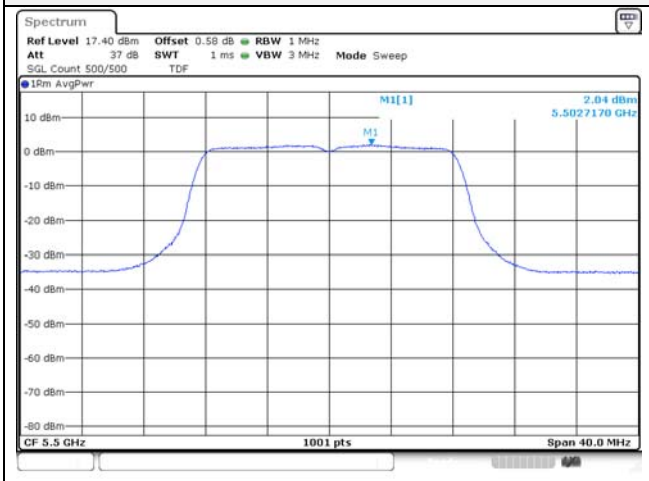
	Blank

MIMO ANT 2

UNII-1 / 802.11a / Low ch.	UNII-2A / 802.11a / Low ch.
	
UNII-1 / 802.11a / Mid ch.	**UNII-2A / 802.11a / Mid ch.**
	
UNII-1 / 802.11a / High ch.	**UNII-2A / 802.11a / High ch.**
	

UNII-2C / 802.11a / Low ch.	UNII-3 / 802.11a / Low ch.
	
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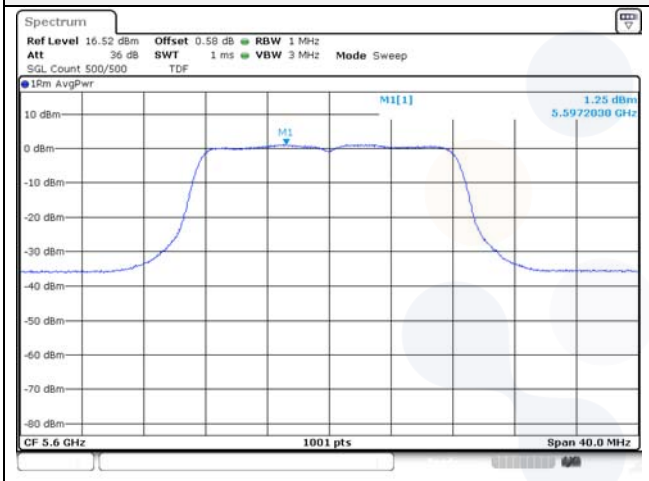
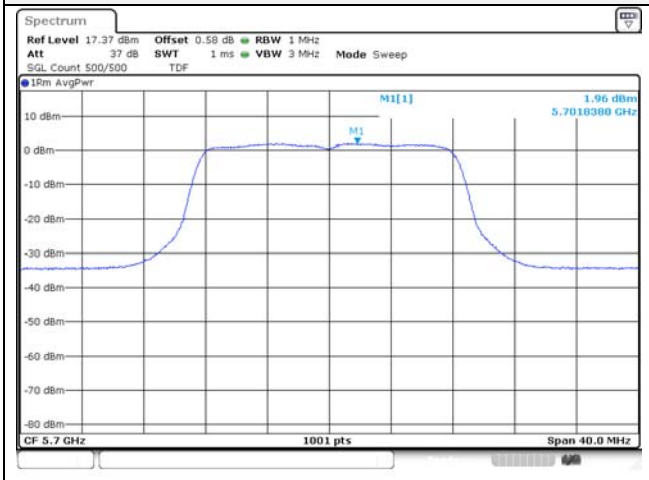
	
UNII-2C / 802.11a / High ch.	**UNII-3 / 802.11a / High ch.**
	

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	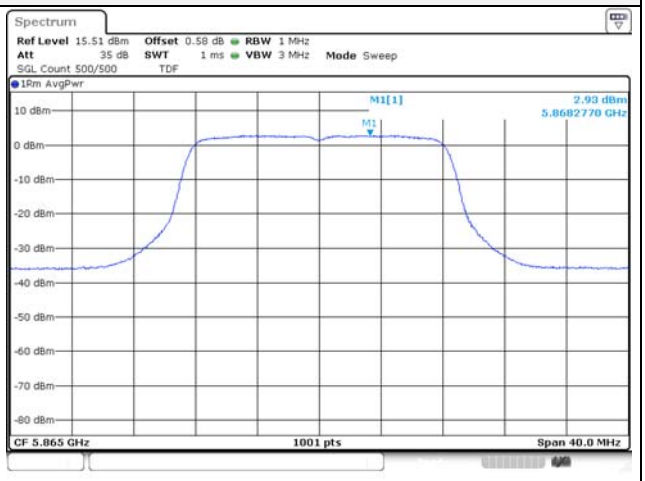
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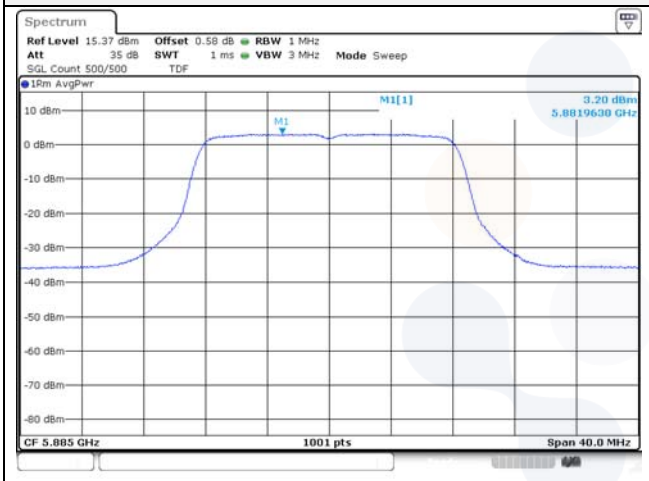	Blank

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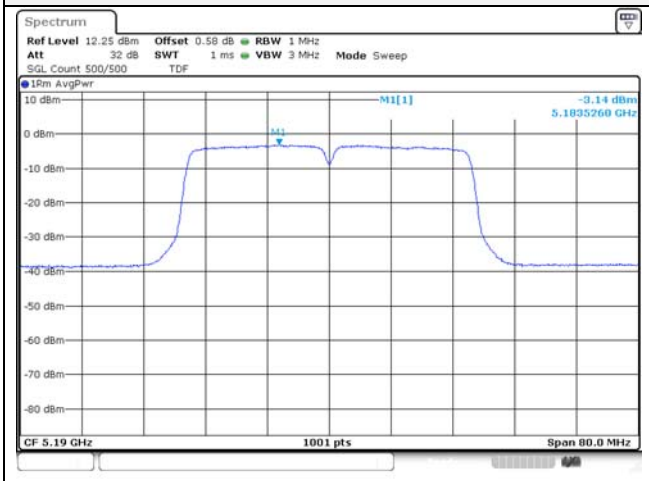
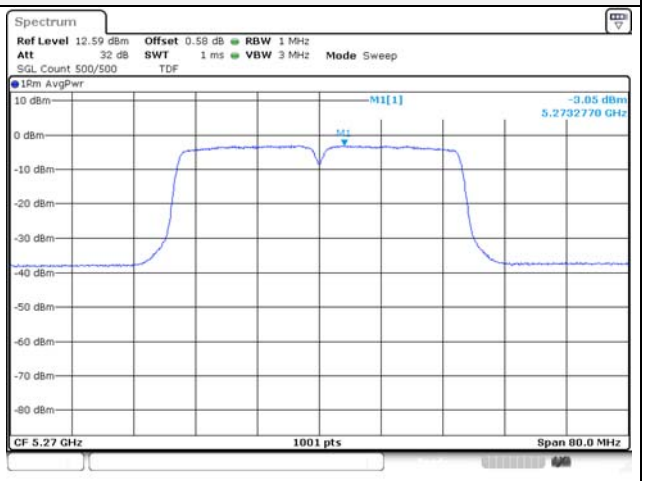
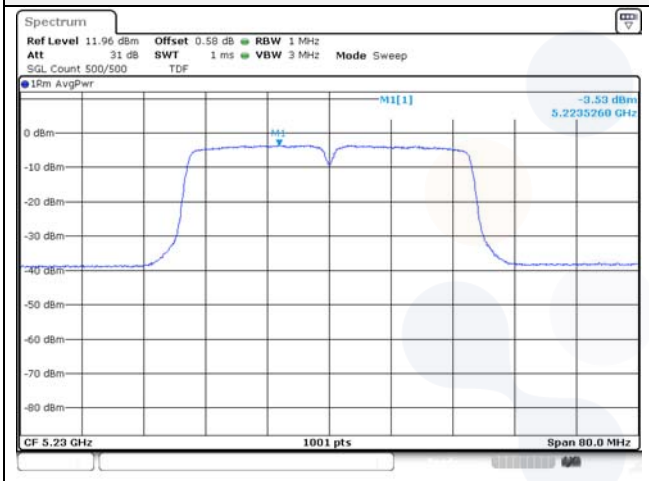
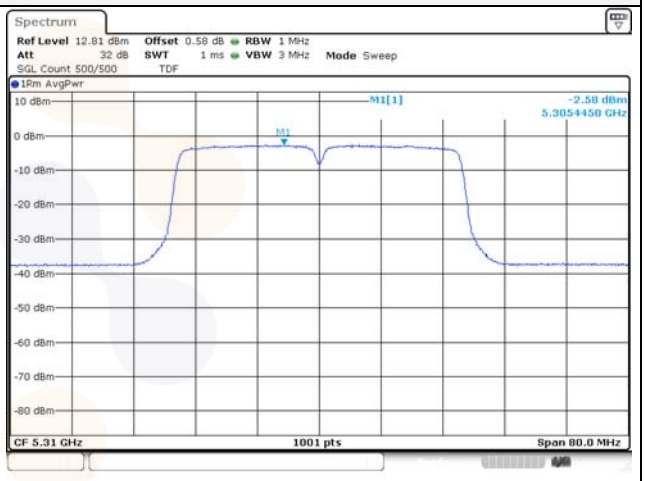
	
UNII-1 / 802.11 ac VHT40 / High ch.	**UNII-2A / 802.11 ac VHT40 / High ch.**
	

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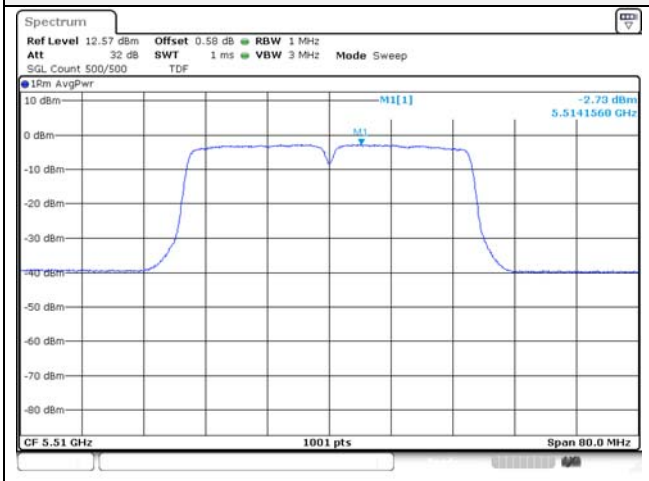
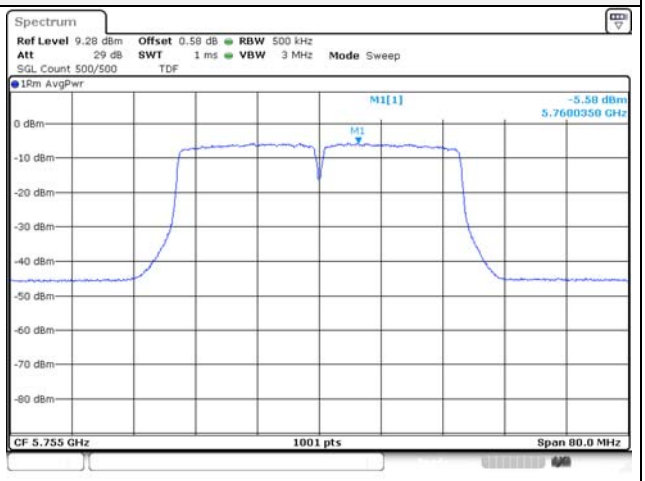
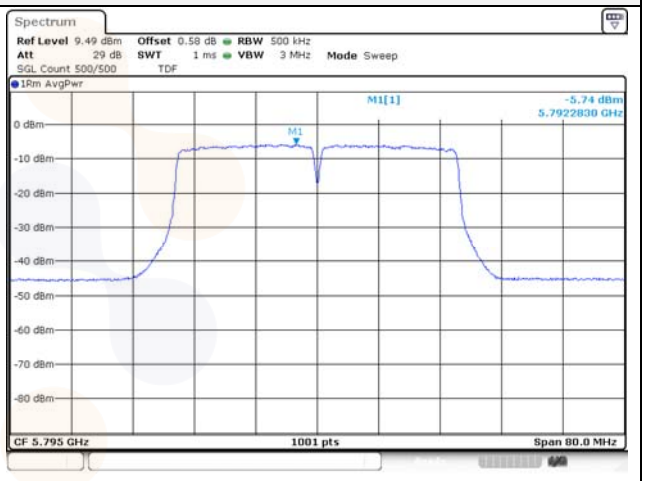
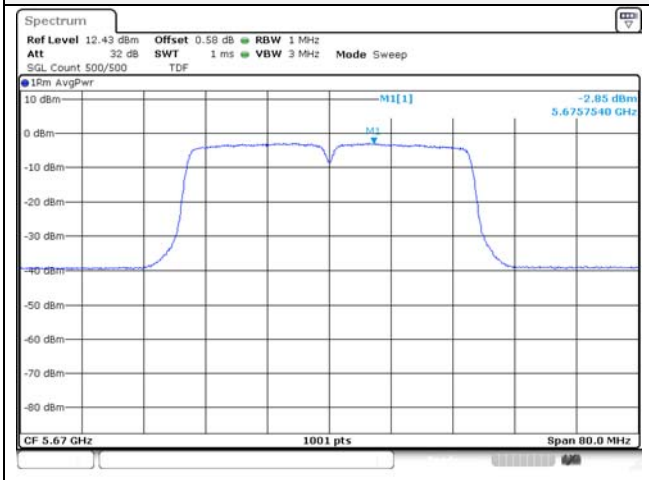
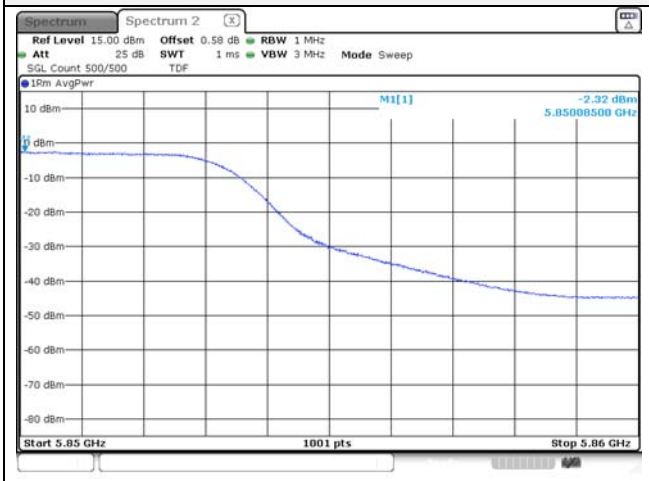
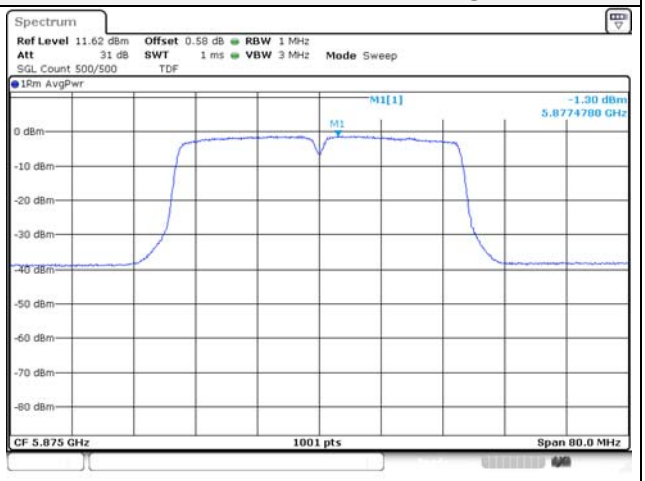
	
UNII-2C / 802.11ac VHT40 / Mid ch.	**UNII-3 / 802.11ac VHT40 / High ch.**
	
UNII-2C / 802.11ac VHT40 / High ch.	
	Blank

UNII-4 / 802.11ac VHT40 / Low ch.	UNII-4 / 802.11ac VHT40 / High ch.
	

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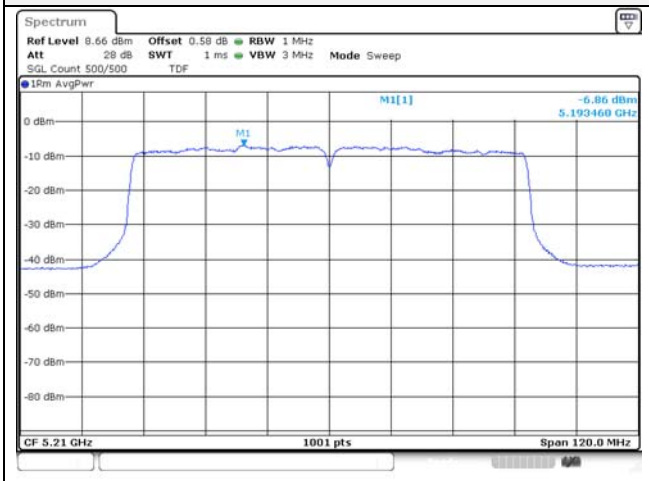	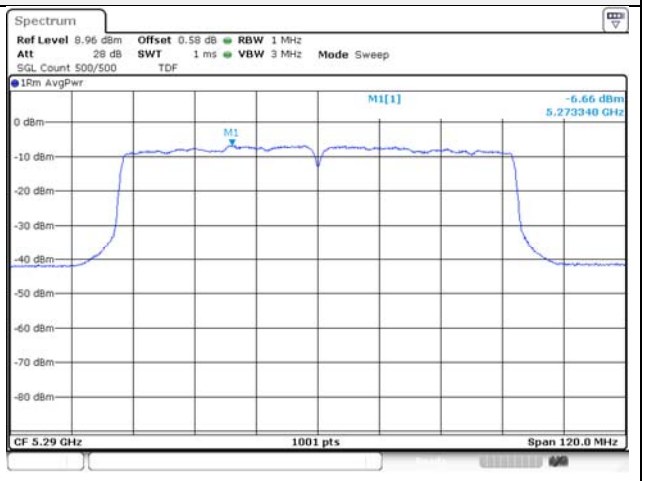
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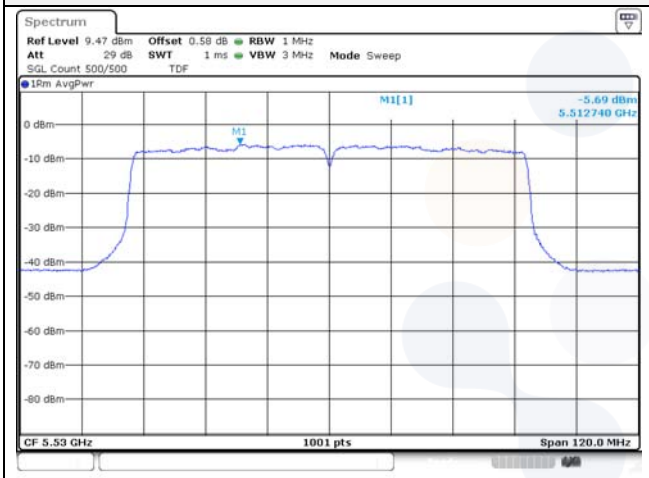	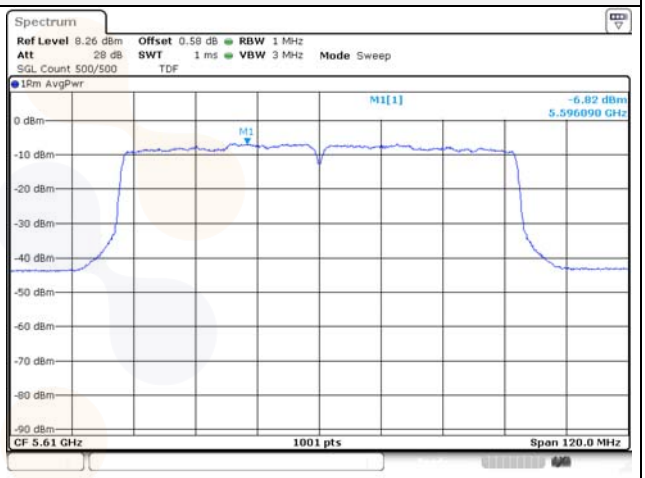
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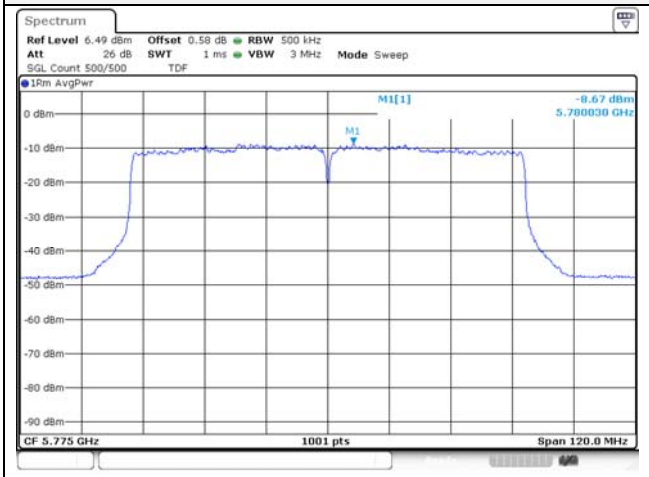
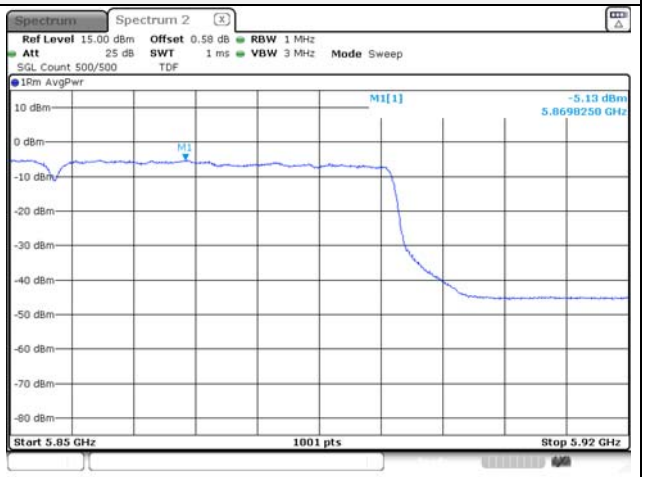
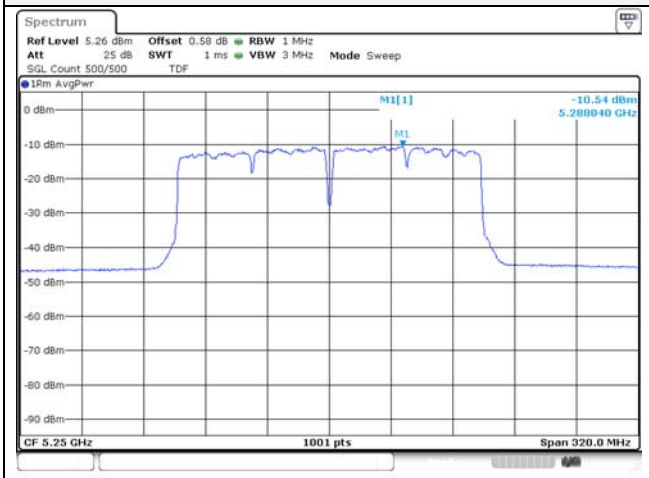
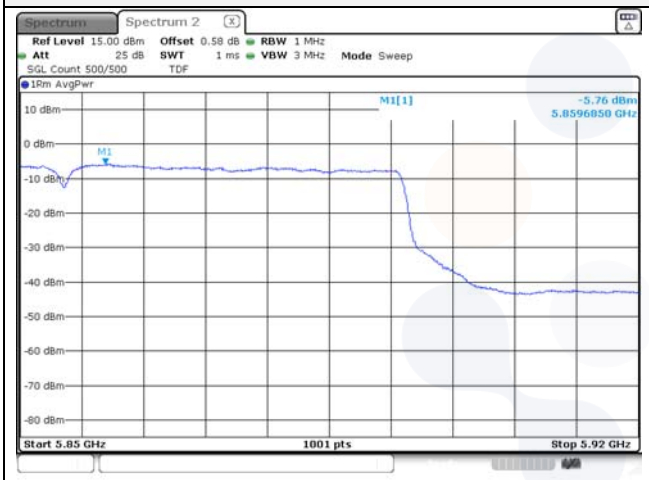
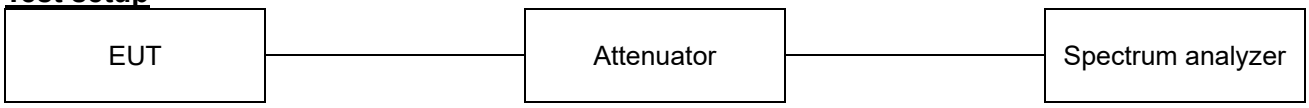
	

UNII-1 / 802.11ac VHT160 / Mid ch.	UNII-2C / 802.11ac VHT160 / Mid ch.
	
UNII-4 / 802.11ac VHT160 / Mid ch.	
	Blank

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 ≥ 3 x RBW
e. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
f. Use the 99% power bandwidth function of the instrument (if available).
g. If the instrument does not have a 99% power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

Test results

SISO

Test mode	Band	Frequency(㎒)	26 dB bandwidth (㎒)	99% bandwidth (㎒)
			ANT1	ANT1
802.11a	UNII-1	5 180	20.63	16.48
		5 200	20.53	16.48
		5 240	20.73	16.48
	UNII-2A	5 260	20.63	16.48
		5 280	20.58	16.48
		5 320	20.73	16.48
	UNII-2C	5 500	20.43	16.48
		5 600	20.13	16.48
		5 700	20.38	16.48

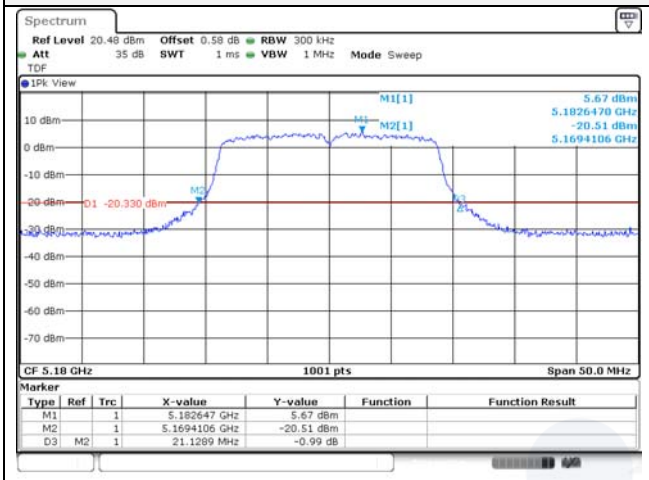
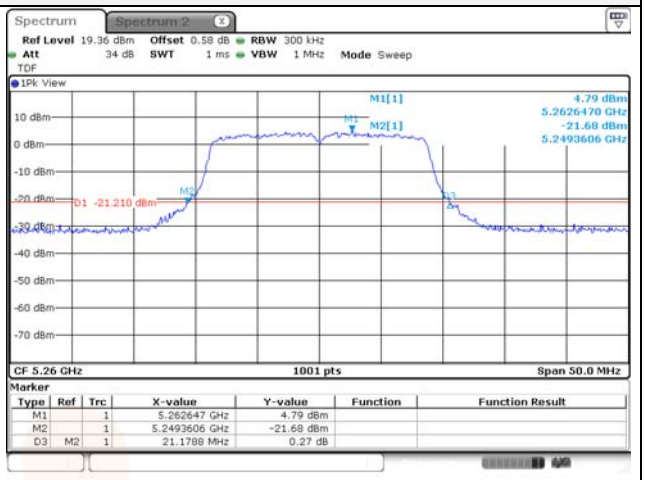
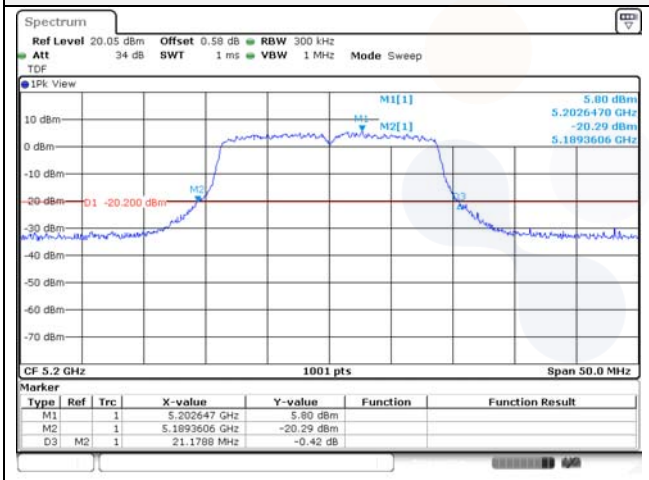
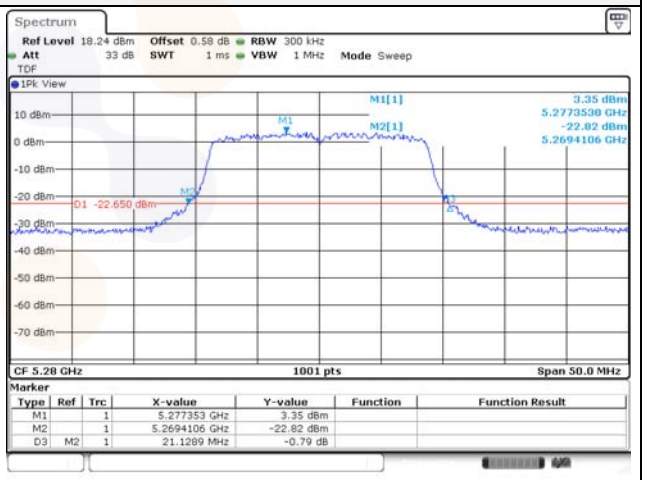
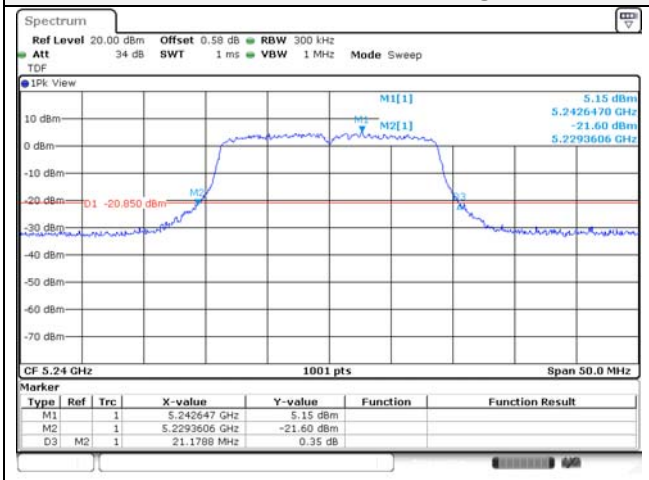
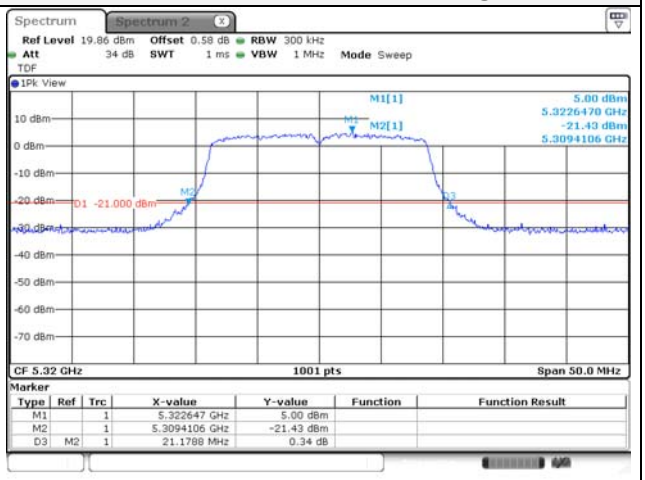
MIMO

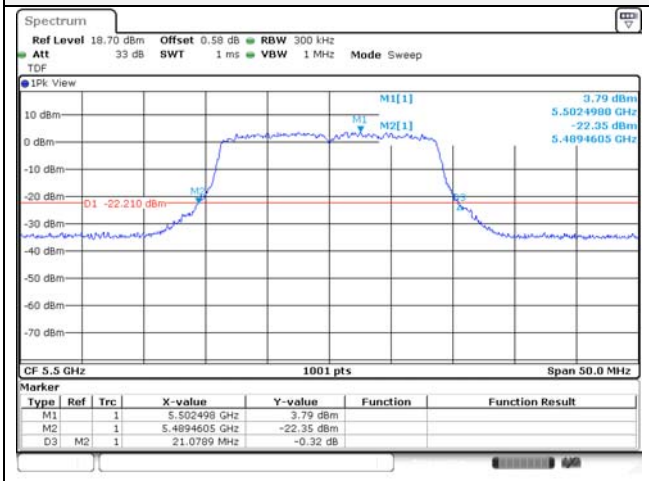
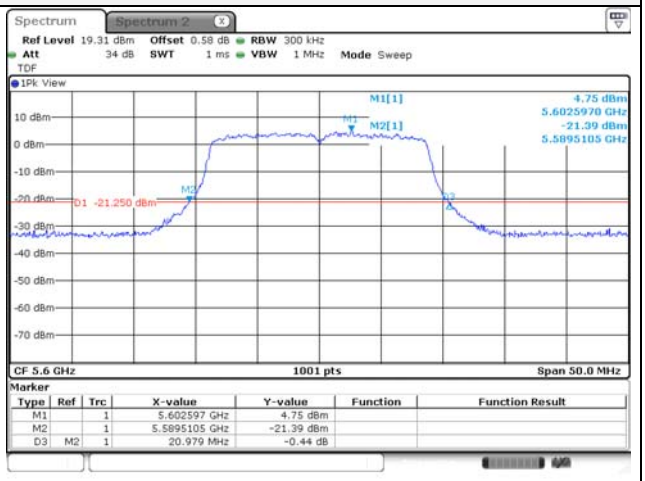
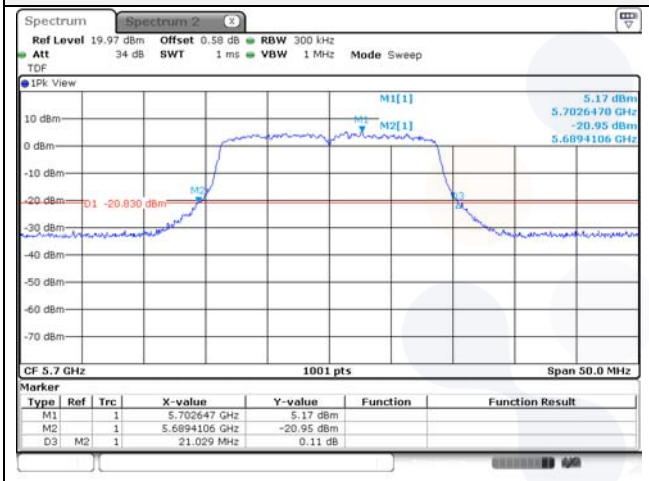
Test mode	Band	Frequency(㎒)	26 ㏈ bandwidth (㎒)		99% bandwidth (㎒)	
			ANT1	ANT2	ANT1	ANT2
802.11a	UNII-1	5 180	20.63	20.43	16.48	16.48
		5 200	20.53	20.43	16.48	16.48
		5 240	20.68	20.58	16.48	16.48
	UNII-2A	5 260	20.63	20.43	16.48	16.48
		5 280	20.63	20.53	16.48	16.48
		5 320	20.73	20.53	16.48	16.48
	UNII-2C	5 500	20.78	19.83	16.43	16.48
		5 600	20.58	20.03	16.43	16.48
		5 700	20.73	20.38	16.43	16.43
802.11n HT20	UNII-1	5 180	21.33	20.88	17.68	17.68
		5 200	21.38	20.73	17.68	17.68
		5 240	21.63	21.03	17.68	17.68
	UNII-2A	5 260	21.23	20.83	17.68	17.68
		5 280	21.33	20.88	17.68	17.68
		5 320	21.63	21.23	17.63	17.68
	UNII-2C	5 500	21.13	20.83	17.63	17.63
		5 600	21.18	20.88	17.63	17.58
		5 700	21.03	20.83	17.63	17.63
802.11n HT40	UNII-1	5 190	40.66	40.66	36.16	36.16
		5 230	40.56	40.06	36.16	36.16
	UNII-2A	5 270	41.06	40.06	36.26	36.16
		5 310	40.56	39.96	36.16	36.16
	UNII-2C	5 510	40.66	40.06	36.16	36.16
		5 590	40.66	40.26	36.16	36.16
		5 670	40.76	40.06	36.16	36.16

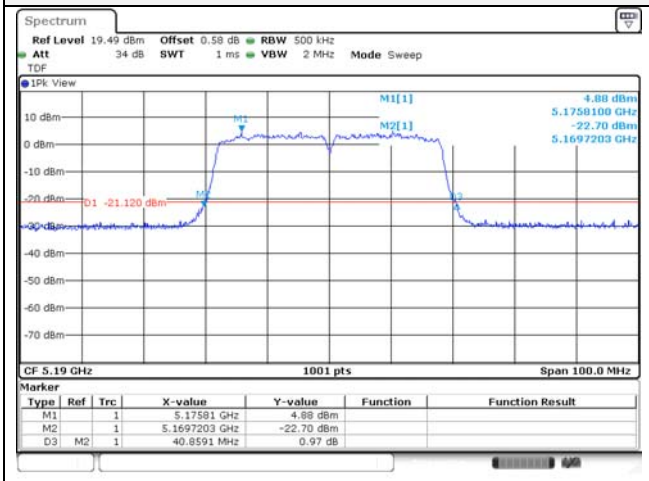
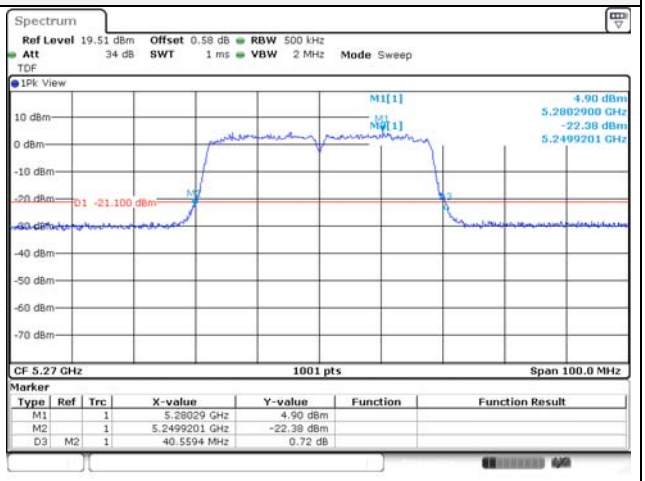
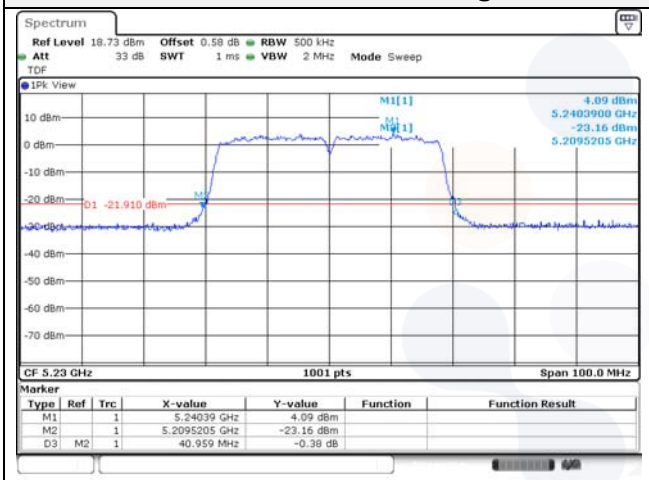
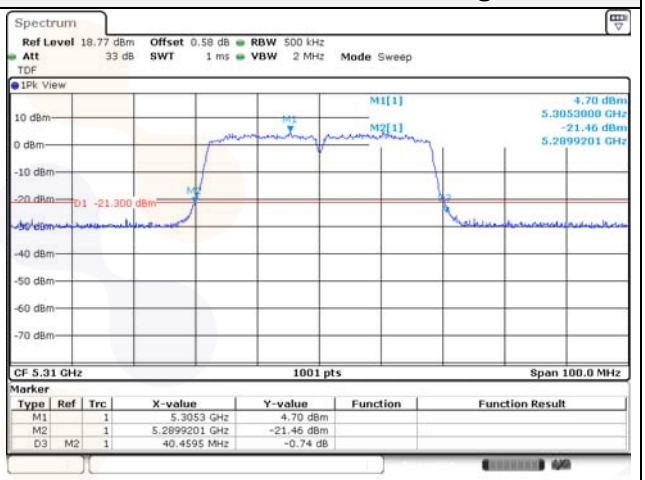
Test mode	Band	Frequency(㎒)	26 dB bandwidth (㎒)		99% bandwidth (㎒)	
			ANT1	ANT2	ANT1	ANT2
802.11ac VHT20	UNII-1	5 180	21.13	20.78	17.68	17.68
		5 200	21.18	21.08	17.68	17.68
		5 240	21.18	20.88	17.68	17.68
	UNII-2A	5 260	21.18	21.13	17.68	17.68
		5 280	21.13	21.08	17.68	17.68
		5 320	21.18	21.28	17.68	17.68
	UNII-2C	5 500	21.08	21.03	17.63	17.63
		5 600	20.98	20.93	17.63	17.68
		5 700	21.03	20.78	17.63	17.63
802.11ac VHT40	UNII-1	5 190	40.86	39.96	36.06	36.16
		5 230	40.96	40.06	36.16	36.16
	UNII-2A	5 270	40.56	40.06	36.16	36.16
		5 310	40.46	39.96	36.16	36.16
	UNII-2C	5 510	40.66	40.16	36.16	36.16
		5 590	40.56	40.16	36.16	36.16
		5 670	40.46	39.96	36.16	36.16
802.11ac VHT80	UNII-1	5 210	84.28	82.72	75.40	75.52
	UNII-2A	5 290	83.32	82.96	75.52	75.40
	UNII-2C	5 530	83.20	82.48	75.52	75.40
		5 610	83.44	82.60	75.40	75.40
802.11ac VHT160	UNII 1	5 250	166.23	166.87	154.09	154.73
	UNII 2C	5 575	166.55	166.23	154.41	154.73

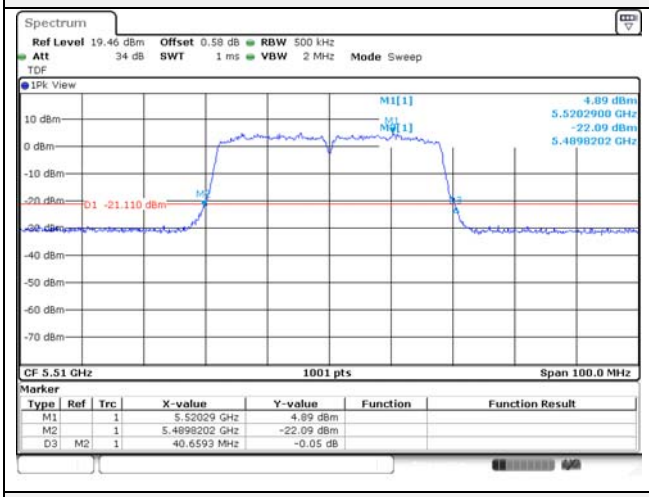
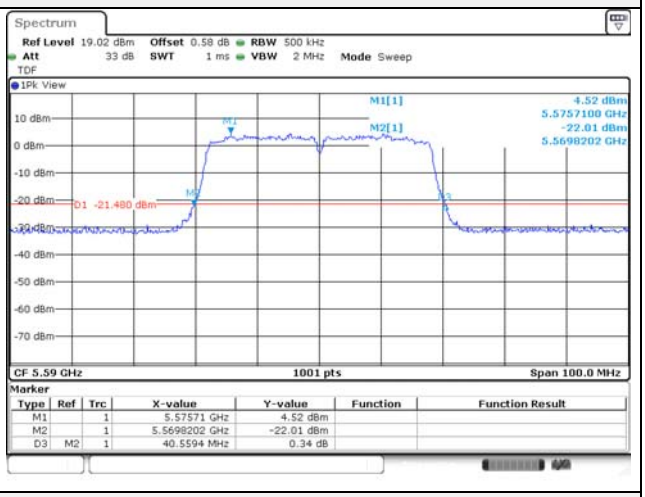
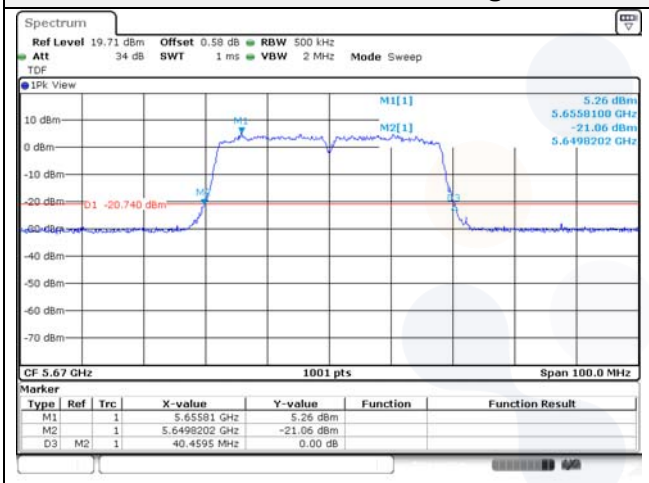
In order to simplify the report, attached plots were only MIMO ANT 1

26 dB bandwidth

UNII-1 / 802.11ac VHT20 / Low ch.	UNII-2A / 802.11ac VHT20 / Low ch.
	
UNII-1 / 802.11ac VHT20 / Mid ch.	**UNII-2A / 802.11ac VHT20 / Mid ch.**
	
UNII-1 / 802.11ac VHT20 / High ch.	**UNII-2A / 802.11ac VHT20 / High ch.**
	

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