




# TEST REPORT

<b>KCTL Inc.</b> 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-31-285-0894 FAX: 82-505-299-8311 <a href="http://www.kctl.co.kr">www.kctl.co.kr</a>	Report No.: KR22-SRF0062-B Page (1) of (255)	   <b>KCTL</b>
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## 1. Client

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
- Date of Receipt : 2022-03-11

2. Use of Report : Certification

3. Name of Product / Model : Tablet PC / SM-P613

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

5. FCC ID : A3LSMP613



6. IC Certificate No. : 649E-SMP613

7. Date of Test : 2022-03-11 to 2022-04-29

8. Location of Test :  Permanent Testing Lab  On Site Testing  
 (Address:65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)  
 FCC Part 15 Subpart E, 15.407

9. Test method used : RSS-247 Issue 2 February 2017  
 RSS GEN Issue 5 April 2018

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

Affirmation	Tested by  Name : Kwonse Kim (Signature) 	Technical Manager  Name : Seungyong Kim (Signature) 
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2022-05-04

## 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
2022-05-02	Originally issued	-
2022-05-03	Updated	12, 15, 16, 21, 22, 23
2022-05-04	Updated	17, 18, 21, 22

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Note. The report No. KR22-SRF0062-A is superseded by the report No. KR22-SRF0062-B.

## 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 Thai Nguyen Co., Ltd  
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  
CAB Identifier: KR0040  
ISED Number: 8035A  
KOLAS No.: KT231

## 2. Device information

Equipment under test : Tablet PC  
Model : SM-P613  
Modulation technique : Bluetooth(BDR/EDR) : GFSK,  $\pi/4$ DQPSK, 8DPSK  
Bluetooth(BLE) : GFSK  
WIFI(802.11a/b/g/n/ac) : DSSS, OFDM  
Number of channels : Bluetooth : 79 ch  
BLE : 40 ch  
802.11b/g/n\_HT20 : 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)  
Power source : DC 3.85 V  
Antenna specification : WLAN(2.4G)/Bluetooth/BLE : Metal Antenna  
WLAN(5G) : Metal Antenna  
Antenna gain :  
Antenna 1  
2.4 GHz Band : -7.20 dBi  
UNII-1 : -5.80 dBi  
UNII-2A : -5.80 dBi  
UNII-2C : -6.30 dBi  
UNII-3 : -6.80 dBi  
Antenna 2  
2.4 GHz Band : -7.30 dBi  
UNII-1 : -8.40 dBi  
UNII-2A : -8.40 dBi  
UNII-2C : -8.10 dBi  
UNII-3 : -7.00 dBi

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Frequency range	:	Bluetooth	:	2 402 MHz ~ 2 480 MHz	(BDR/EDR/BLE)
		2.4 GHz WALN	:	2 412 MHz ~ 2 472 MHz	(802.11b/g/n_HT20)
		UNII-1	:	5 180 MHz ~ 5 240 MHz	(802.11a/n/acHT20/VHT20)
		UNII-1	:	5 190 MHz ~ 5 230 MHz	(802.11n/ac_HT40/VHT40)
		UNII-1	:	5 210 MHz	(802.11ac_VHT80)
		UNII-2A	:	5 260 MHz ~ 5 320 MHz	(802.11a/n/ac_HT20/VHT20)
		UNII-2A	:	5 270 MHz ~ 5 310 MHz	(802.11n/ac_HT40/VHT40)
		UNII-2A	:	5 290 MHz	(802.11ac_VHT80)
		UNII-2C	:	5 500 MHz ~ 5 720 MHz	(802.11a/n/ac_HT20/VHT20)
		UNII-2C	:	5 510 MHz ~ 5 710 MHz	(802.11n/ac_HT40/VHT40)
		UNII-2C	:	5 530 MHz ~ 5 690 MHz	(802.11ac_VHT80)
		UNII-3	:	5 745 MHz ~ 5 825 MHz	(802.11a/n/ac_HT20/VHT20)
		UNII-3	:	5 755 MHz ~ 5 795 MHz	(802.11n/ac_HT40/VHT40)
		UNII-3	:	5 775 MHz	(802.11ac_VHT80)
Software version	:	P613.001			
Hardware version	:	REV1.0			
Test device serial No.	:	Conducted	:	R32T40076CA	
		Radiated	:	R32T40077BY	
Operation temperature	:	-30 °C ~ 50 °C			

**2.1. Frequency/channel operations**

This device contains the following capabilities:

WLAN (11a/b/g/n/ac – 2TX MIMO), Bluetooth (BDR/EDR/BLE)

**UNII-1**

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

**UNII-2A**

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

**UNII-2C**

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

**UNII-3**

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

Table 2.1-1. 802.11a/n/ac\_HT20/VHT20 mode

**UNII-1**

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

**UNII-2A**

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

**UNII-2C**

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

**UNII-3**

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

Table 2.1-2. 802.11n/ac\_HT40/VHT40 mode

**UNII-1**

Ch.	Frequency (MHz)
42	5 210

**UNII-2A**

Ch.	Frequency (MHz)
58	5 290

**UNII-2C**

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

**UNII-3**

Ch.	Frequency (MHz)
155	5 775

Table 2.1-3. 802.11ac\_VHT80 mode

**2.2. Simultaneous Tx Condition**

Mode	Bluetooth	WLAN 5 GHz
WLAN 5 GHz + Bluetooth	O	O

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**2.3. Duty Cycle Factor****SISO**

Test mode	Period (ms)	T <sub>on</sub> time (ms)	Duty cycle		Duty cycle factor (dB)
			(Linear)	(%)	
802.11a	1.470	1.432	0.974 1	97.41	0.11
802.11n_HT20	1.377	1.339	0.972 4	97.24	0.12
802.11n_HT40	0.700	0.664	0.948 6	94.86	0.23
802.11ac_VHT20	1.386	1.348	0.972 6	97.26	0.12
802.11ac_VHT40	0.710	0.672	0.946 5	94.65	0.24
802.11ac_VHT80	0.368	0.332	0.902 2	90.22	0.45

**MIMO**

Test mode	Period (ms)	T <sub>on</sub> time (ms)	Duty cycle		Duty cycle factor (dB)
			(Linear)	(%)	
802.11a	1.469	1.432	0.974 8	97.48	0.11
802.11n_HT20	0.729	0.692	0.949 2	94.92	0.23
802.11n_HT40	0.392	0.356	0.908 2	90.82	0.42
802.11ac_VHT20	0.737	0.700	0.949 8	94.98	0.22
802.11ac_VHT40	0.396	0.360	0.909 1	90.91	0.41
802.11ac_VHT80	0.228	0.192	0.842 1	84.21	0.75

**Notes.**

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

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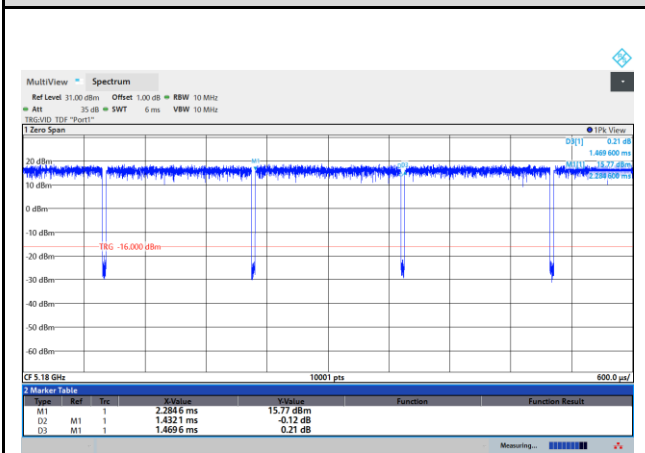
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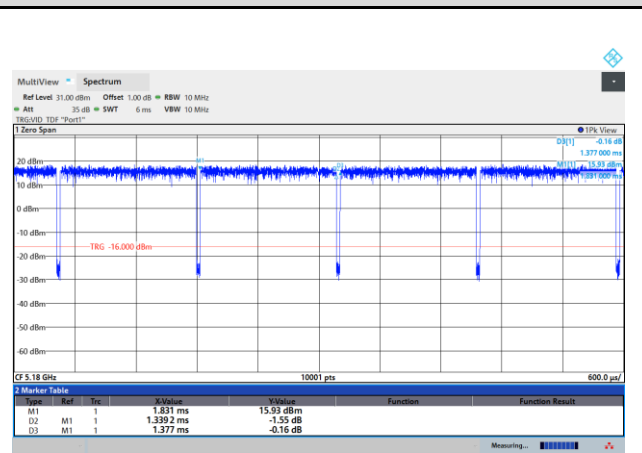


## SISO

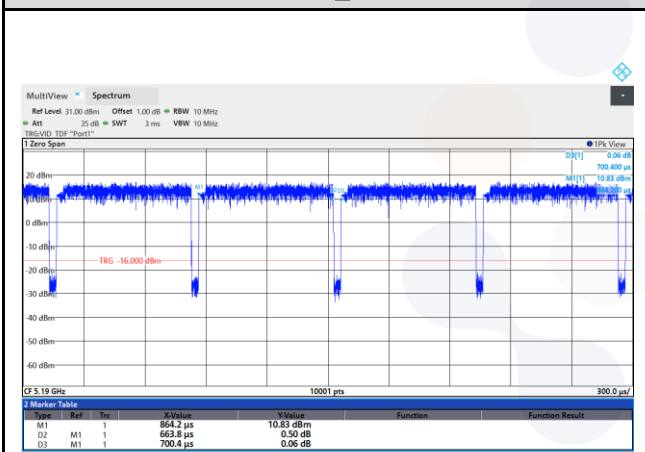
### 802.11a



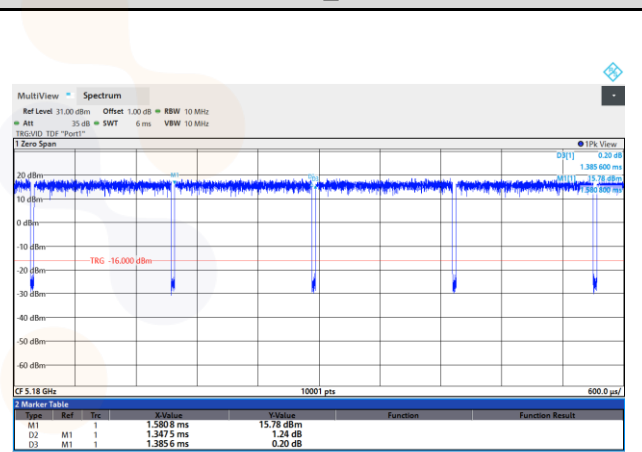
### 802.11n\_HT20



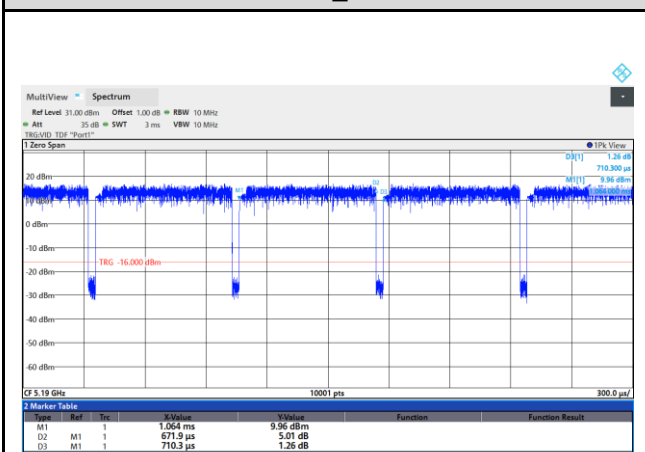
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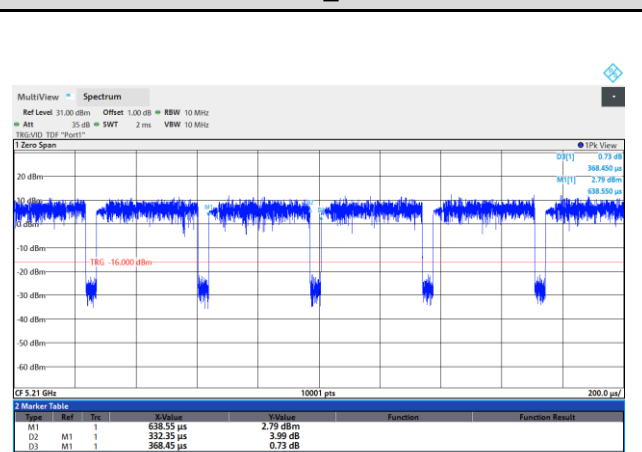
### 802.11ac\_VHT20



### 802.11ac\_VHT40



### 802.11ac\_VHT80





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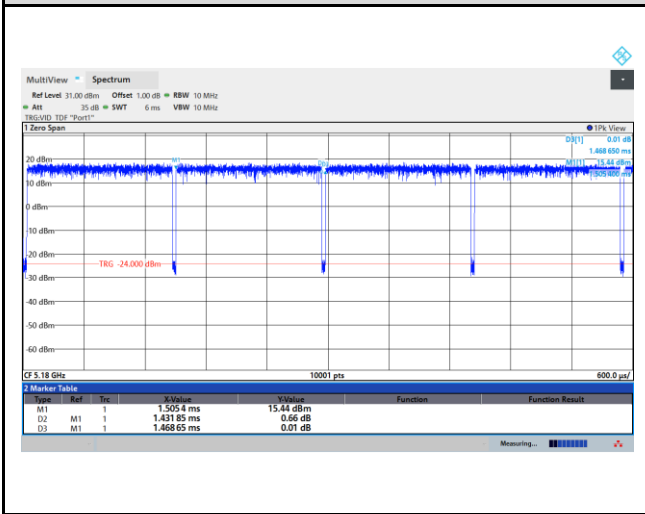
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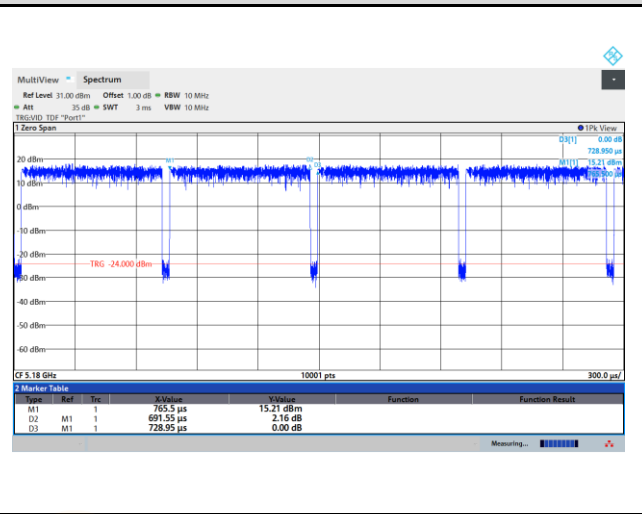


## MIMO

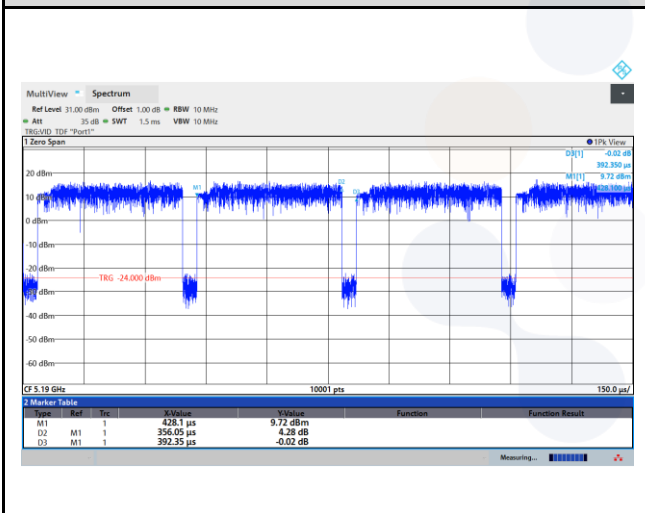
### 802.11a



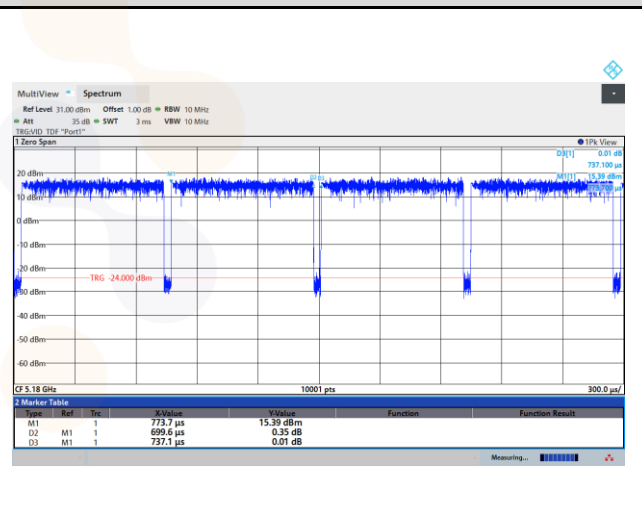
### 802.11n\_HT20



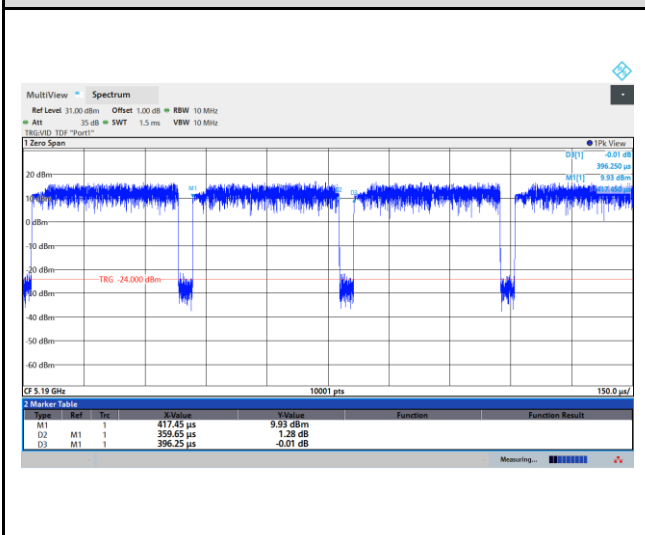
### 802.11n\_HT40



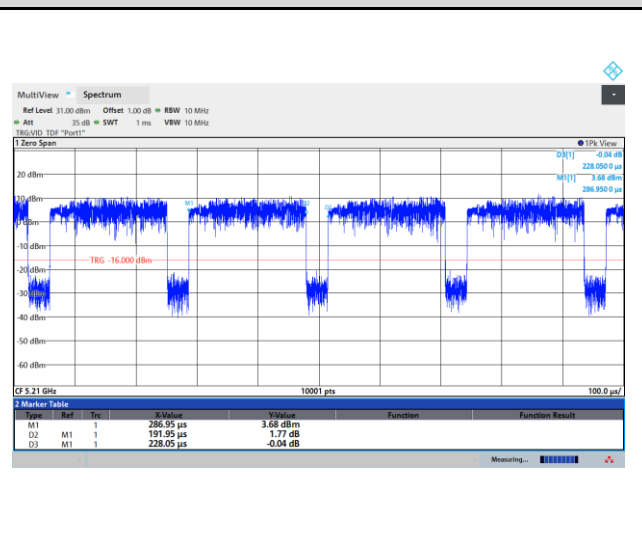
### 802.11ac\_VHT20



### 802.11ac\_VHT40



### 802.11ac\_VHT80



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### **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 Metal Antenna (Internal antenna) on board.
- The E.U.T Complies with the requirement of §15.203, §15.247, §15.407.

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### 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	-5.80	-8.40	-3.99
UNII 2A	-5.80	-8.40	-3.99
UNII 2C	-6.30	-8.10	-4.14
UNII 3	-6.80	-7.00	-3.89

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

**Notes:**

- 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 **Z** orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in **Z** orientation.
- All the radiated tests have been performed several case.  
(Stand-alone, with accessories (TA, S-pen, Earphone 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 (SISO): MCS0
  - 802.11n HT20 mode (MIMO): MCS8
  - 802.11n HT40 mode (SISO): MCS0
  - 802.11n HT40 mode (MIMO): MCS8
  - 802.11ac VHT20 mode (SISO/MIMO): MCS0
  - 802.11ac VHT40 mode (SISO/MIMO): MCS0
  - 802.11ac VHT80 mode (SISO/MIMO): MCS0

## 5. Measurement uncertainty

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

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

Parameter	Expanded uncertainty ( $\pm$ )	
Conducted RF power	0.9 dB	
Conducted spurious emissions	1.1 dB	
Radiated spurious emissions	Below 30 MHz:	2.4 dB
	30 MHz ~ 1 000 MHz	2.3 dB
	1 000 MHz ~ 18 000 MHz	5.6 dB
	Above 18 000 MHz	5.7 dB
Conducted emissions	9 kHz ~ 150 kHz	1.6 dB
	150 kHz ~ 30 MHz	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 (MHz)	Factor(dB)	Frequency (MHz)	Factor(dB)
30	10.09	9 000	12.71
50	10.09	10 000	12.43
100	10.14	11 000	13.22
200	10.31	12 000	13.34
300	10.39	13 000	13.55
400	10.46	14 000	13.69
500	10.54	15 000	14.39
600	10.58	16 000	14.63
700	10.63	17 000	14.75
800	10.68	18 000	14.60
900	10.73	19 000	14.05
1 000	10.71	20 000	14.80
2 000	11.03	21 000	14.90
3 000	11.37	22 000	13.94
4 000	11.40	23 000	14.39
5 000	11.83	24 000	14.95
6 000	11.87	25 000	14.67
7 000	12.10	26 000	14.81
8 000	12.50	26 500	14.80

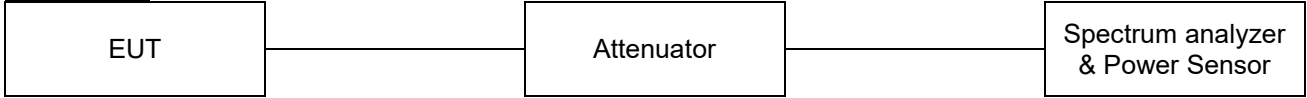
**Notes:**

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

## 7. Test results

### 7.1. Maximum conducted output power

#### Test setup



#### Limit

According to §15.407(a), RSS-247(6.2)

#### FCC

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

#### IC

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

#### Note:

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

#### Test procedure

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

**Test settings****Used test method is Section E.2.d) and E.3.a)**◆ **KDB 789033 D02 v02r01****Section E.2.d)****Method SA-2 (trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction):**

- (i) Measure the duty cycle,  $x$ , of the transmitter output signal as described in II.B..
- (ii) Set span to encompass the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.
- (iii) Set RBW = 1 MHz
- (iv) Set RBW  $\geq$  3 MHz
- (v) Number of points in sweep  $\geq 2 \times \text{span} / \text{RBW}$ . (This ensures that bin-to-bin spacing is  $\leq \text{RBW} / 2$ , so that narrowband signals are not lost between frequency bins.)
- (vi) Sweep time = auto.
- (vii) Detector = power averaging (rms), if available. Otherwise use sample detector mode.
- (viii) Do not use sweep triggering. Allow the sweep to “free run.”
- (ix) Trace average at least 100 traces in power averaging (rms) mode; however, the number of traces to be averaged shall be increased above 100 as needed to ensure that the average accurately represents the true average over the on and off periods of the transmitter.
- (x) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument’s band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.
- (xi) Add  $10 \log (1/x)$ , where  $x$  is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission). For example, add  $10 \log (1/0.25) = 6 \text{ dB}$  if the duty cycle is 25%.

**Section E.3.a)****Method PM (Measurement using an RF average power meter):**

- (i) 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
- (ii) If the transmitter does not transmit continuously, measure the duty cycle,  $x$ , of the transmitter output signal as described in II
- (iii) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
- (iv) 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%).



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

Test mode	Band	Frequency (MHz)	Measured output power					FCC Limit (dBm)	IC Limit (dBm)
			Reading (dBm)		DCF (dB)	Result (dBm)			
			ANT1	ANT2		ANT1	ANT2		
802.11a	UNII 1	5 180	15.66	15.50	0.11	15.77	15.61	23.98	22.26
		5 200	15.54	15.11	0.11	15.65	15.22		
		5 240	15.60	15.04	0.11	15.71	15.15		
	UNII 2A	5 260	15.39	15.57	0.11	15.50	15.68	23.98	23.26
		5 280	15.28	15.56	0.11	15.39	15.67		
		5 320	15.38	15.49	0.11	15.49	15.60		
	UNII 2C	5 500	15.00	15.73	0.11	15.11	15.84	23.98	23.27
		5 600	14.50	15.53	0.11	14.61	15.64		
		5 700	15.65	14.97	0.11	15.76	15.08		
	UNII 3	5 745	13.24	13.39	0.11	13.35	13.50	30.00	30.00
		5 785	13.59	13.66	0.11	13.70	13.77		
		5 825	13.66	13.12	0.11	13.77	13.23		
802.11n HT20	UNII 1	5 180	15.59	15.29	0.12	15.71	15.41	23.98	22.55
		5 200	15.54	14.96	0.12	15.66	15.08		
		5 240	15.48	14.90	0.12	15.60	15.02		
	UNII 2A	5 260	15.09	15.41	0.12	15.21	15.53	23.98	23.55
		5 280	15.23	15.51	0.12	15.35	15.63		
		5 320	15.34	15.36	0.12	15.46	15.48		
	UNII 2C	5 500	14.80	15.51	0.12	14.92	15.63	23.98	23.55
		5 600	14.35	15.39	0.12	14.47	15.51		
		5 700	15.63	15.03	0.12	15.75	15.15		
	UNII 3	5 745	13.42	13.15	0.12	13.54	13.27	30.00	30.00
		5 785	13.76	13.31	0.12	13.88	13.43		
		5 825	13.40	13.56	0.12	13.52	13.68		
802.11n HT40	UNII 1	5 190	9.48	9.37	0.23	9.71	9.60	23.98	23.01
		5 230	13.43	13.13	0.23	13.66	13.36		
	UNII 2A	5 270	13.09	13.59	0.23	13.32	13.82	23.98	23.98
		5 310	9.17	9.28	0.23	9.40	9.51		
	UNII 2C	5 510	10.63	11.48	0.23	10.86	11.71	23.98	23.98
		5 590	13.28	13.23	0.23	13.51	13.46		
	UNII 3	5 670	12.98	13.65	0.23	13.21	13.88	30.00	30.00
		5 755	13.65	13.45	0.23	13.88	13.68		
			5 795	13.67	13.28	0.23	13.90	13.51	

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Test mode	Band	Frequency (MHz)	Measured output power					FCC Limit (dBm)	IC Limit (dBm)
			Reading (dBm)		DCF (dB)	Result (dBm)			
			ANT1	ANT2		ANT1	ANT2		
802.11ac VHT20	UNII 1	5 180	15.50	15.22	0.12	15.62	15.34	23.98	22.56
		5 200	15.57	14.83	0.12	15.69	14.95		
		5 240	15.54	14.88	0.12	15.66	15.00		
	UNII 2A	5 260	15.07	15.26	0.12	15.19	15.38	23.98	23.55
		5 280	15.15	15.43	0.12	15.27	15.55		
		5 320	15.38	15.32	0.12	15.50	15.44		
	UNII 2C	5 500	14.77	15.41	0.12	14.89	15.53	23.98	23.55
		5 600	14.28	15.36	0.12	14.40	15.48		
		5 700	15.52	15.07	0.12	15.64	15.19		
	UNII 3	5 745	13.45	13.11	0.12	13.57	13.23	30.00	30.00
		5 785	13.64	13.27	0.12	13.76	13.39		
		5 825	13.37	13.58	0.12	13.49	13.70		
802.11ac VHT40	UNII 1	5 190	9.52	9.45	0.24	9.76	9.69	23.98	23.01
		5 230	13.38	13.10	0.24	13.62	13.34		
	UNII 2A	5 270	13.03	13.60	0.24	13.27	13.84	23.98	23.98
		5 310	9.21	9.27	0.24	9.45	9.51		
	UNII 2C	5 510	10.64	11.46	0.24	10.88	11.70	23.98	23.98
		5 590	13.27	13.20	0.24	13.51	13.44		
		5 670	13.02	13.66	0.24	13.26	13.90		
	UNII 3	5 755	13.72	13.36	0.24	13.96	13.60	30.00	30.00
		5 795	13.61	13.32	0.24	13.85	13.56		
	802.11ac VHT80	UNII 1	5 210	8.30	8.20	0.45	8.75	8.65	23.98
UNII 2A		5 290	8.14	8.01	0.45	8.59	8.46	23.98	23.98
UNII 2C		5 530	7.76	8.25	0.45	8.21	8.70	23.98	23.98
		5 610	12.21	11.97	0.45	12.66	12.42		
UNII 3		5 775	12.02	12.24	0.45	12.47	12.69	30.00	30.00

**Note.**

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

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**SISO e.i.r.p.**

Test mode	Band	Frequency (MHz)	Measured output power						MAX e.i.r.p Limit (dBm)
			Conducted output power (dBm)		ANT gain (dBi)		MAX e.i.r.p (dBm)		
			ANT1	ANT2	ANT1	ANT2	ANT1	ANT2	
802.11a	UNII 1	5 180	15.77	15.61	-5.80	-8.40	9.97	7.21	22.26
		5 200	15.65	15.22			9.85	6.82	
		5 240	15.71	15.15			9.91	6.75	
	UNII 2A	5 260	15.50	15.68	-5.80	-8.40	9.70	7.28	29.26
		5 280	15.39	15.67			9.59	7.27	
		5 320	15.49	15.60			9.69	7.20	
	UNII 2C	5 500	15.11	15.84	-6.30	-8.10	8.81	7.74	29.27
		5 600	14.61	15.64			8.31	7.54	
		5 700	15.76	15.08			9.46	6.98	
	UNII 3	5 745	13.35	13.50	-6.80	-7.00	6.55	6.50	30.00
		5 785	13.70	13.77			6.90	6.77	
		5 825	13.77	13.23			6.97	6.23	
802.11n HT20	UNII 1	5 180	15.71	15.41	-5.80	-8.40	9.91	7.01	22.55
		5 200	15.66	15.08			9.86	6.68	
		5 240	15.60	15.02			9.80	6.62	
	UNII 2A	5 260	15.21	15.53	-5.80	-8.40	9.41	7.13	29.55
		5 280	15.35	15.63			9.55	7.23	
		5 320	15.46	15.48			9.66	7.08	
	UNII 2C	5 500	14.92	15.63	-6.30	-8.10	8.62	7.53	29.55
		5 600	14.47	15.51			8.17	7.41	
		5 700	15.75	15.15			9.45	7.05	
	UNII 3	5 745	13.54	13.27	-6.80	-7.00	6.74	6.27	30.00
		5 785	13.88	13.43			7.08	6.43	
		5 825	13.52	13.68			6.72	6.68	
802.11n HT40	UNII 1	5 190	9.71	9.60	-5.80	-8.40	3.91	1.20	23.01
		5 230	13.66	13.36			7.86	4.96	
	UNII 2A	5 270	13.32	13.82	-5.80	-8.40	7.52	5.42	30.00
		5 310	9.40	9.51			3.60	1.11	
	UNII 2C	5 510	10.86	11.71	-6.30	-8.10	4.56	3.61	30.00
		5 590	13.51	13.46			7.21	5.36	
		5 670	13.21	13.88			6.91	5.78	
	UNII 3	5 755	13.88	13.68	-6.80	-7.00	7.08	6.68	30.00
		5 795	13.90	13.51			7.10	6.51	

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Test mode	Band	Frequency (MHz)	Measured output power						MAX e.i.r.p Limit (dBm)
			Reading (dBm)		ANT gain (dBi)		MAX e.i.r.p (dBm)		
			ANT1	ANT1	ANT1	ANT2	ANT1	ANT2	
802.11ac VHT20	UNII 1	5 180	15.62	15.34	-5.80	-8.40	9.82	6.94	22.56
		5 200	15.69	14.95			9.89	6.55	
		5 240	15.66	15.00			9.86	6.60	
	UNII 2A	5 260	15.19	15.38	-5.80	-8.40	9.39	6.98	29.55
		5 280	15.27	15.55			9.47	7.15	
		5 320	15.50	15.44			9.70	7.04	
	UNII 2C	5 500	14.89	15.53	-6.30	-8.10	8.59	7.43	29.55
		5 600	14.40	15.48			8.10	7.38	
		5 700	15.64	15.19			9.34	7.09	
	UNII 3	5 745	13.57	13.23	-6.80	-7.00	6.77	6.23	30.00
		5 785	13.76	13.39			6.96	6.39	
		5 825	13.49	13.70			6.69	6.70	
802.11ac VHT40	UNII 1	5 190	9.76	9.69	-5.80	-8.40	3.96	1.29	23.01
		5 230	13.62	13.34			7.82	4.94	
	UNII 2A	5 270	13.27	13.84	-5.80	-8.40	7.47	5.44	30.00
		5 310	9.45	9.51			3.65	1.11	
	UNII 2C	5 510	10.88	11.70	-6.30	-8.10	4.58	3.60	30.00
		5 590	13.51	13.44			7.21	5.34	
		5 670	13.26	13.90			6.96	5.80	
	UNII 3	5 755	13.96	13.60	-6.80	-7.00	7.16	6.60	30.00
		5 795	13.85	13.56			7.05	6.56	
802.11ac VHT80	UNII 1	5 210	8.75	8.65	-5.80	-8.40	2.95	0.25	23.01
	UNII 2A	5 290	8.59	8.46	-5.80	-8.40	2.79	0.06	30.00
	UNII 2C	5 530	8.21	8.70	-6.30	-8.10	1.91	0.60	30.00
		5 610	12.66	12.42			6.36	4.32	
	UNII 3	5 775	12.47	12.69	-6.80	-7.00	5.67	5.69	30.00

**Notes:**

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

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**MIMO Conducted Output Power**

Test mode	Band	Frequency (MHz)	Measured output power				FCC Limit (dBm)	IC Limit (dBm)
			Reading (dBm)		DCF (dB)	Result (dBm)		
			ANT1	ANT2				
802.11a	UNII 1	5 180	15.18	15.07	0.11	18.25	23.98	22.27
		5 200	15.34	14.99	0.11	18.29		
		5 240	15.66	14.86	0.11	18.40		
	UNII 2A	5 260	15.28	14.71	0.11	18.12	23.98	23.26
		5 280	15.35	14.41	0.11	18.03		
		5 320	15.43	14.56	0.11	18.14		
	UNII 2C	5 500	15.84	15.20	0.11	18.65	23.98	23.24
		5 600	15.40	14.13	0.11	17.93		
		5 700	15.46	15.04	0.11	18.38		
	UNII 3	5 745	13.76	12.60	0.11	16.34	30.00	30.00
		5 785	13.59	12.84	0.11	16.35		
		5 825	12.81	12.34	0.11	15.70		
802.11n HT20	UNII 1	5 180	14.90	15.12	0.23	18.25	23.98	22.54
		5 200	15.05	14.88	0.23	18.21		
		5 240	15.42	14.80	0.23	18.36		
	UNII 2A	5 260	15.15	14.44	0.23	18.05	23.98	23.53
		5 280	15.03	14.40	0.23	17.97		
		5 320	15.18	14.26	0.23	17.98		
	UNII 2C	5 500	15.53	15.33	0.23	18.67	23.98	23.52
		5 600	15.21	14.24	0.23	17.99		
		5 700	15.37	14.98	0.23	18.42		
	UNII 3	5 745	13.39	12.51	0.23	16.21	30.00	30.00
		5 785	13.46	13.09	0.23	16.52		
		5 825	12.50	12.02	0.23	15.51		
802.11n HT40	UNII 1	5 190	9.15	9.38	0.42	12.70	23.98	23.01
		5 230	13.20	12.41	0.42	16.25		
	UNII 2A	5 270	12.98	12.49	0.42	16.17	23.98	23.98
		5 310	9.21	8.43	0.42	12.27		
	UNII 2C	5 510	11.23	11.26	0.42	14.68	23.98	23.98
		5 590	13.14	12.12	0.42	16.09		
		5 670	13.43	12.29	0.42	16.33		
	UNII 3	5 755	13.02	12.04	0.42	15.99	30.00	30.00
		5 795	12.61	12.42	0.42	15.95		

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Test mode	Band	Frequency (MHz)	Measured output power				FCC Limit (dBm)	IC Limit (dBm)
			Reading (dBm)		DCF (dB)	Result (dBm)		
			ANT1	ANT2				
802.11ac VHT20	UNII 1	5 180	15.03	15.34	0.22	18.42	23.98	22.54
		5 200	15.05	14.82	0.22	18.17		
		5 240	15.35	14.72	0.22	18.28		
	UNII 2A	5 260	15.06	14.43	0.22	17.99	23.98	23.53
		5 280	15.07	14.59	0.22	18.07		
		5 320	15.15	14.32	0.22	17.99		
	UNII 2C	5 500	15.56	15.29	0.22	18.66	23.98	23.53
		5 600	15.25	14.17	0.22	17.97		
		5 700	15.34	14.78	0.22	18.30		
	UNII 3	5 745	13.29	12.54	0.22	16.16	30.00	30.00
		5 785	13.24	13.03	0.22	16.37		
		5 825	12.22	12.02	0.22	15.35		
802.11ac VHT40	UNII 1	5 190	9.15	9.41	0.41	12.70	23.98	23.01
		5 230	13.21	12.68	0.41	16.37		
	UNII 2A	5 270	12.87	12.32	0.41	16.02	23.98	23.98
		5 310	9.27	8.36	0.41	12.26		
	UNII 2C	5 510	11.11	11.24	0.41	14.60	23.98	23.98
		5 590	13.11	12.12	0.41	16.06		
		5 670	13.41	12.39	0.41	16.35		
	UNII 3	5 755	13.03	11.80	0.41	15.88	30.00	30.00
		5 795	13.05	12.41	0.41	16.16		
	802.11ac VHT80	UNII 1	5 210	8.24	8.11	0.75	11.94	23.98
UNII 2A		5 290	8.03	7.78	0.75	11.67	23.98	23.98
UNII 2C		5 530	8.11	7.98	0.75	11.81	23.98	23.98
		5 610	11.94	11.66	0.75	15.56		
UNII 3		5 775	11.86	11.61	0.75	15.50	30.00	30.00

**Note.**

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

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**MIMO e.i.r.p.**

Test mode	Band	Frequency (MHz)	Measured output power			MAX e.i.r.p Limit (dBm)
			Conducted output Power (dBm)	ANT gain (dBi)	MAX e.i.r.p (dBm)	
802.11a	UNII 1	5 180	18.25	-3.99	14.26	22.27
		5 200	18.29		14.30	
		5 240	18.40		14.41	
	UNII 2A	5 260	18.12	-3.99	14.13	29.26
		5 280	18.03		14.04	
		5 320	18.14		14.15	
	UNII 2C	5 500	18.65	-4.14	14.51	29.24
		5 600	17.93		13.79	
		5 700	18.38		14.24	
	UNII 3	5 745	16.34	-3.89	12.45	30.00
		5 785	16.35		12.46	
		5 825	15.70		11.81	
802.11n HT20	UNII 1	5 180	18.25	-3.99	14.26	22.54
		5 200	18.21		14.22	
		5 240	18.36		14.37	
	UNII 2A	5 260	18.05	-3.99	14.06	29.53
		5 280	17.97		13.98	
		5 320	17.98		13.99	
	UNII 2C	5 500	18.67	-4.14	14.53	29.52
		5 600	17.99		13.85	
		5 700	18.42		14.28	
	UNII 3	5 745	16.21	-3.89	12.32	30.00
		5 785	16.52		12.63	
		5 825	15.51		11.62	
802.11n HT40	UNII 1	5 190	12.70	-3.99	8.71	23.01
		5 230	16.25		12.26	
	UNII 2A	5 270	16.17	-3.99	12.18	30.00
		5 310	12.27		8.28	
	UNII 2C	5 510	14.68	-4.14	10.54	30.00
		5 590	16.09		11.95	
		5 670	16.33		12.19	
	UNII 3	5 755	15.99	-3.89	12.10	30.00
		5 795	15.95		12.06	

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Test mode	Band	Frequency (MHz)	Measured output power			MAX e.i.r.p Limit (dBm)
			Conducted output Power (dBm)	ANT gain (dBi)	MAX e.i.r.p (dBm)	
802.11ac VHT20	UNII 1	5 180	18.42	-3.99	14.43	22.54
		5 200	18.17		14.18	
		5 240	18.28		14.29	
	UNII 2A	5 260	17.99	-3.99	14.00	29.53
		5 280	18.07		14.08	
		5 320	17.99		14.00	
	UNII 2C	5 500	18.66	-4.14	14.52	29.53
		5 600	17.97		13.83	
		5 700	18.30		14.16	
	UNII 3	5 745	16.16	-3.89	12.27	30.00
		5 785	16.37		12.48	
		5 825	15.35		11.46	
802.11ac VHT40	UNII 1	5 190	12.70	-3.99	8.71	23.01
		5 230	16.37		12.38	
	UNII 2A	5 270	16.02	-3.99	12.03	30.00
		5 310	12.26		8.27	
	UNII 2C	5 510	14.60	-4.14	10.46	30.00
		5 590	16.06		11.92	
		5 670	16.35		12.21	
	UNII 3	5 755	15.88	-3.89	11.99	30.00
		5 795	16.16		12.27	
	802.11ac VHT80	UNII 1	5 210	11.94	-3.99	7.95
UNII 2A		5 290	11.67	-3.99	7.68	30.00
UNII 2C		5 530	11.81	-4.14	7.67	30.00
		5 610	15.56		11.42	
UNII 3		5 775	15.50	-3.89	11.61	30.00

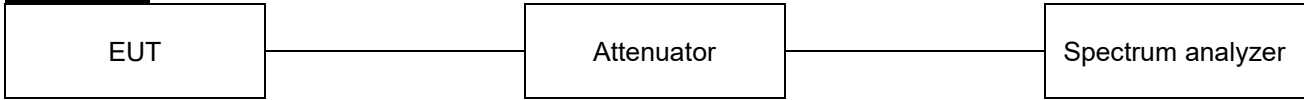
**Notes:**

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



## 7.2. Maximum Power Spectral Density

### Test setup



### Limit

According to §15.407(a), RSS-247(6.2)

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

### 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

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.

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**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	5.19	4.77	0.11	5.30	4.88	11
		5 200	5.09	4.56	0.11	5.20	4.67	
		5 240	5.13	4.20	0.11	5.24	4.31	
	UNII 2A	5 260	4.51	4.88	0.11	4.62	4.99	11
		5 280	4.93	5.04	0.11	5.04	5.15	
		5 320	4.79	4.67	0.11	4.90	4.78	
	UNII 2C	5 500	4.35	4.92	0.11	4.46	5.03	11
		5 600	3.90	4.68	0.11	4.01	4.79	
		5 700	5.21	4.67	0.11	5.32	4.78	
802.11n HT20	UNII 1	5 180	4.85	4.37	0.12	4.97	4.49	11
		5 200	4.70	4.16	0.12	4.82	4.28	
		5 240	4.62	4.05	0.12	4.74	4.17	
	UNII 2A	5 260	4.36	4.57	0.12	4.48	4.69	11
		5 280	4.40	4.87	0.12	4.52	4.99	
		5 320	4.53	4.27	0.12	4.65	4.39	
	UNII 2C	5 500	4.02	4.57	0.12	4.14	4.69	11
		5 600	3.53	4.50	0.12	3.65	4.62	
		5 700	5.01	4.12	0.12	5.13	4.24	
802.11n HT40	UNII 1	5 190	-4.16	-4.27	0.23	-3.93	-4.04	11
		5 230	-0.14	-0.52	0.23	0.09	-0.29	
	UNII 2A	5 270	-0.62	-0.05	0.23	-0.39	0.18	11
		5 310	-4.62	-4.50	0.23	-4.39	-4.27	
	UNII 2C	5 510	-3.29	-2.44	0.23	-3.06	-2.21	11
		5 590	-0.23	-0.47	0.23	0.00	-0.24	
5 670	-0.58	0.23	0.23	-0.35	0.46			
802.11ac VHT20	UNII 1	5 180	4.75	4.49	0.12	4.87	4.61	11
		5 200	4.63	3.96	0.12	4.75	4.08	
		5 240	4.65	3.83	0.12	4.77	3.95	
	UNII 2A	5 260	4.55	4.54	0.12	4.67	4.66	11
		5 280	4.42	4.48	0.12	4.54	4.60	
		5 320	4.74	4.62	0.12	4.86	4.74	
	UNII 2C	5 500	3.75	4.69	0.12	3.87	4.81	11
		5 600	3.35	4.40	0.12	3.47	4.52	
		5 700	4.70	3.84	0.12	4.82	3.96	

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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	-4.04	-4.27	0.24	-3.80	-4.03	11
		5 230	-0.26	-0.33	0.24	-0.02	-0.09	
	UNII 2A	5 270	-0.53	-0.08	0.24	-0.29	0.16	11
		5 310	-4.45	-4.31	0.24	-4.21	-4.07	
	UNII 2C	5 510	-3.00	-2.15	0.24	-2.76	-1.91	11
		5 590	-0.34	-0.05	0.24	-0.10	0.19	
5 670	-0.47	-0.03	0.24	-0.23	0.21			
802.11ac VHT80	UNII 1	5 210	-8.47	-8.60	0.45	-8.02	-8.15	11
	UNII 2A	5 290	-8.55	-8.57	0.45	-8.10	-8.12	11
	UNII 2C	5 530	-8.98	-8.23	0.45	-8.53	-7.78	11
		5 610	-4.62	-4.49	0.45	-4.17	-4.04	

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	0.54	0.38	0.11	0.65	0.49	30
		5 785	0.58	0.48	0.11	0.69	0.59	
		5 825	0.54	0.06	0.11	0.65	0.17	
802.11n HT20		5 745	0.39	0.07	0.12	0.51	0.19	
		5 785	0.48	0.33	0.12	0.60	0.45	
		5 825	0.33	0.28	0.12	0.45	0.40	
802.11n HT40		5 755	-2.50	-3.09	0.23	-2.27	-2.86	
		5 795	-2.77	-3.30	0.23	-2.54	-3.07	
802.11ac VHT20		5 745	0.47	0.00	0.12	0.59	0.12	
		5 785	0.58	0.30	0.12	0.70	0.42	
	5 825	0.44	0.48	0.12	0.56	0.60		
802.11ac VHT40	5 755	-2.54	-3.19	0.24	-2.30	-2.95		
	5 795	-2.54	-2.84	0.24	-2.30	-2.60		
802.11ac VHT80	5 775	-7.50	-6.85	0.45	-7.05	-6.40		

**Notes:**

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

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**MIMO**

Test mode	Band	Frequency (MHz)	Measured PSD (dBm/MHz)		DCF (dB)	Maximum PSD (dB m/MHz)	Limit (dBm/MHz)
			ANT1	ANT2			
802.11a	UNII 1	5 180	4.67	4.23	0.11	7.58	11
		5 200	4.66	4.39	0.11	7.65	
		5 240	4.94	4.53	0.11	7.86	
	UNII 2A	5 260	4.75	3.68	0.11	7.37	11
		5 280	4.87	3.64	0.11	7.42	
		5 320	4.94	3.86	0.11	7.55	
	UNII 2C	5 500	5.09	4.20	0.11	7.79	11
		5 600	4.92	2.70	0.11	7.07	
		5 700	5.06	4.14	0.11	7.75	
802.11n HT20	UNII 1	5 180	4.14	3.78	0.23	7.20	11
		5 200	4.36	4.16	0.23	7.50	
		5 240	4.66	3.66	0.23	7.43	
	UNII 2A	5 260	4.50	3.54	0.23	7.28	11
		5 280	4.37	3.35	0.23	7.13	
		5 320	4.37	3.42	0.23	7.16	
	UNII 2C	5 500	4.89	4.09	0.23	7.74	11
		5 600	4.35	3.43	0.23	7.15	
		5 700	4.59	3.86	0.23	7.48	
802.11n HT40	UNII 1	5 190	-4.43	-4.25	0.42	-0.91	11
		5 230	-0.06	-0.76	0.42	3.03	
	UNII 2A	5 270	-0.52	-1.08	0.42	2.64	11
		5 310	-4.45	-5.10	0.42	-1.33	
	UNII 2C	5 510	-2.57	-2.95	0.42	0.67	11
		5 590	-0.24	-1.44	0.42	2.63	
		5 670	-0.17	-1.05	0.42	2.84	
802.11ac VHT20	UNII 1	5 180	4.04	4.18	0.22	7.34	11
		5 200	4.44	3.63	0.22	7.29	
		5 240	4.88	3.97	0.22	7.68	
	UNII 2A	5 260	4.35	3.18	0.22	7.04	11
		5 280	4.31	3.22	0.22	7.03	
		5 320	4.20	3.49	0.22	7.09	
	UNII 2C	5 500	4.84	4.33	0.22	7.83	11
		5 600	4.50	3.16	0.22	7.12	
		5 700	4.68	3.76	0.22	7.48	

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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	-4.41	-4.10	0.41	-0.83	11
		5 230	-0.26	-0.68	0.41	2.96	
	UNII 2A	5 270	-0.86	-0.89	0.41	2.55	11
		5 310	-4.24	-5.18	0.41	-1.26	
	UNII 2C	5 510	-2.69	-2.87	0.41	0.65	11
		5 590	-0.67	-1.25	0.41	2.47	
5 670	-0.11	-1.01	0.41	2.89			
802.11ac VHT80	UNII 1	5 210	-8.35	-8.63	0.75	-4.73	11
	UNII 2A	5 290	-8.46	-8.95	0.75	-4.94	11
	UNII 2C	5 530	-8.27	-8.53	0.75	-4.64	11
		5 610	-4.20	-4.75	0.75	-0.71	

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	0.74	-0.63	0.11	3.23	30
		5 785	0.16	-0.12	0.11	3.14	
		5 825	-0.32	-0.85	0.11	2.54	
802.11n HT20		5 745	0.35	-0.71	0.23	3.09	
		5 785	0.41	-0.02	0.23	3.44	
		5 825	-0.61	-1.05	0.23	2.41	
802.11n HT40		5 755	-3.26	-4.30	0.42	-0.32	
		5 795	-4.02	-3.82	0.42	-0.49	
802.11ac VHT20		5 745	0.25	-0.76	0.22	3.01	
		5 785	0.79	-0.31	0.22	3.51	
	5 825	-0.65	-1.17	0.22	2.33		
802.11ac VHT40	5 755	-3.17	-4.57	0.41	-0.39		
	5 795	-3.13	-4.01	0.41	-0.12		
802.11ac VHT80	5 775	-7.14	-7.67	0.75	-3.64		

**Notes:**

1. Maximum PSD calculation

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

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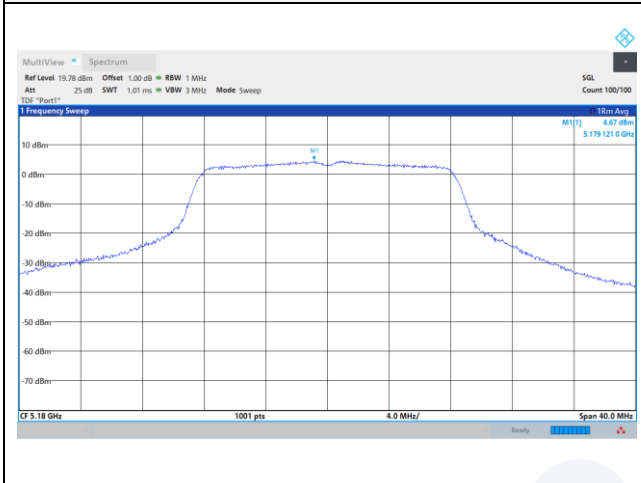
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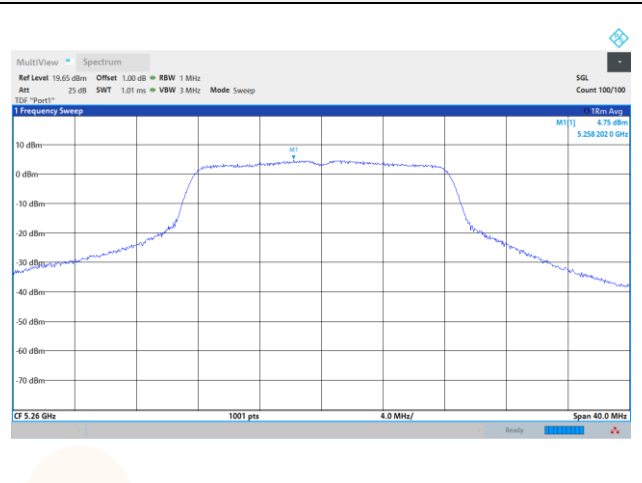


In order to simplify the report, attached plots were only MIMO (Worst bandwidth)  
**MIMO ANT 1**

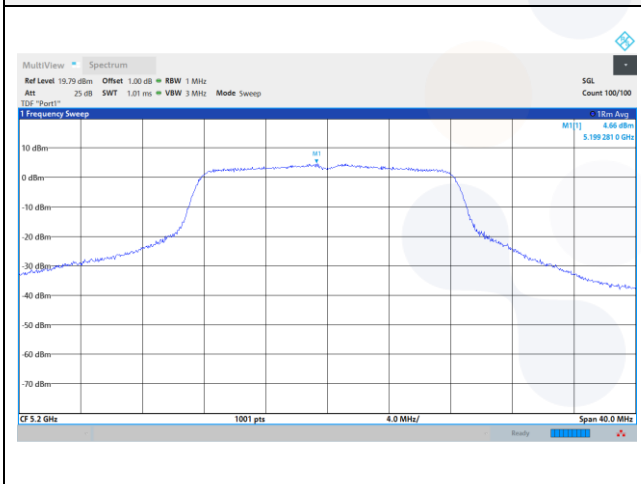
UNII-1 / 802.11a / Low ch.



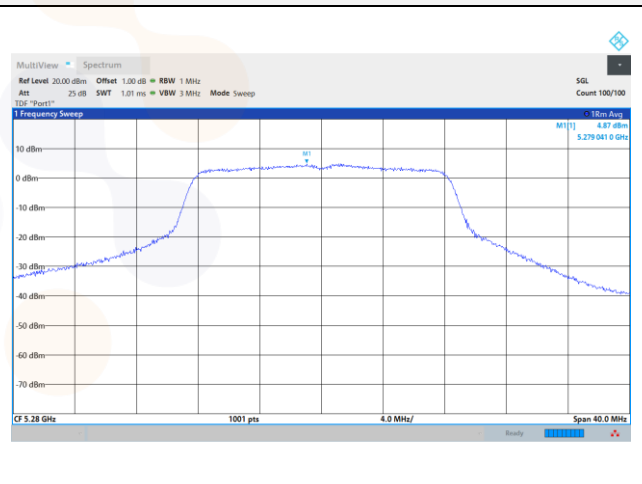
UNII-2A / 802.11a / Low ch.



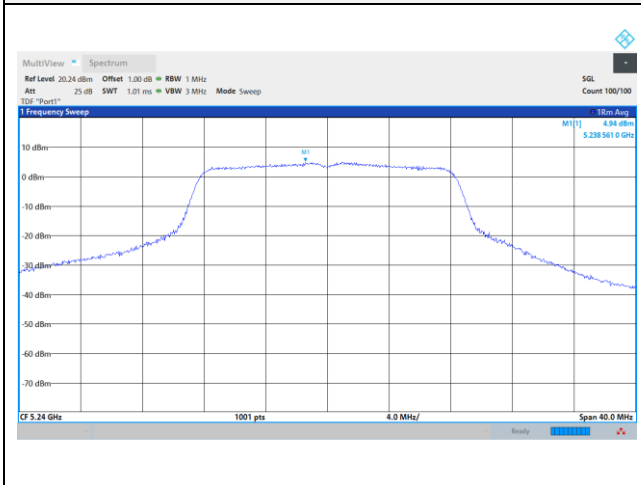
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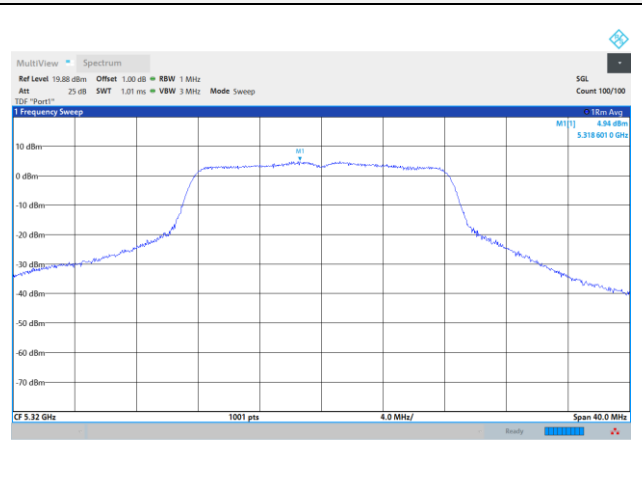
UNII-2A / 802.11a / Mid ch.



UNII-1 / 802.11a / High ch.



UNII-2A / 802.11a / High ch.



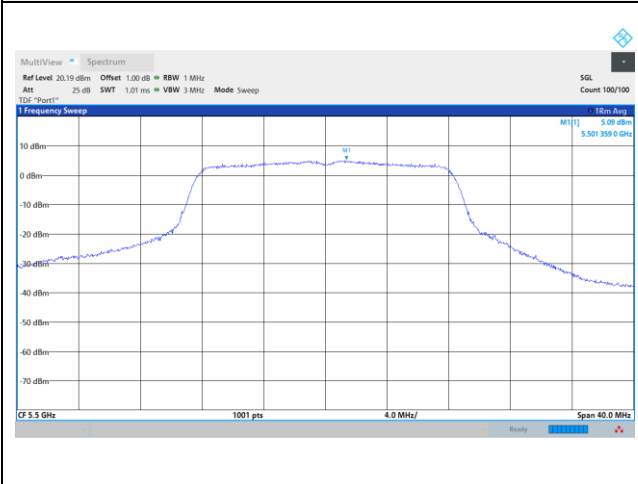
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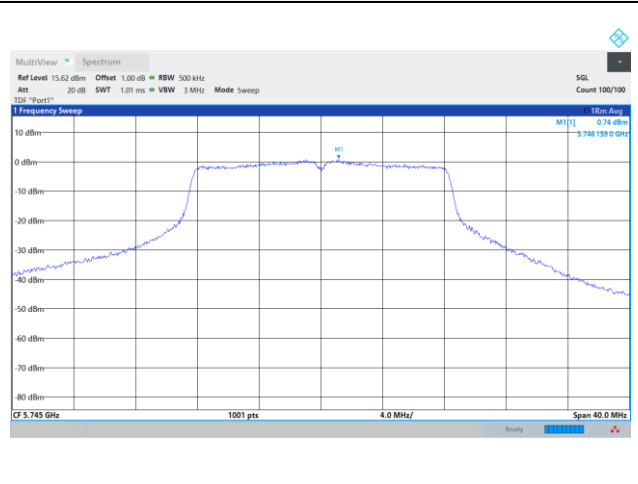
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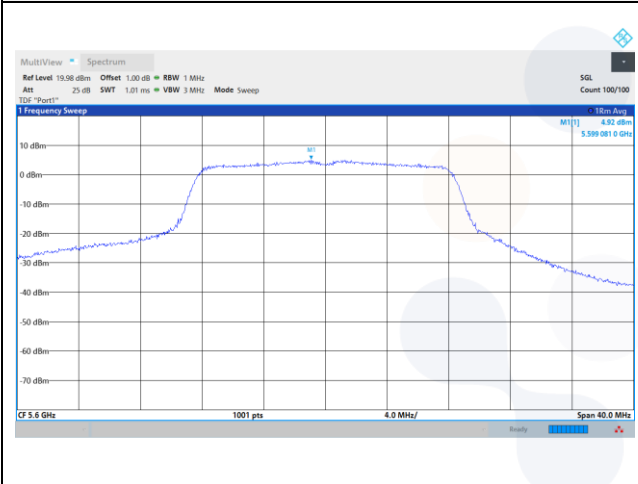
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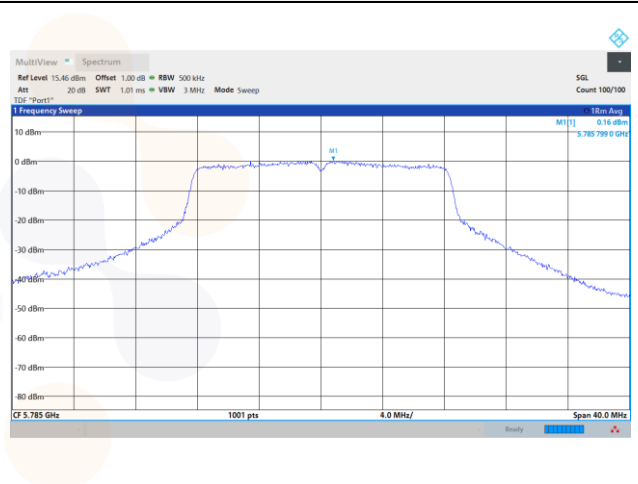
## UNII-3 / 802.11a / Low ch.



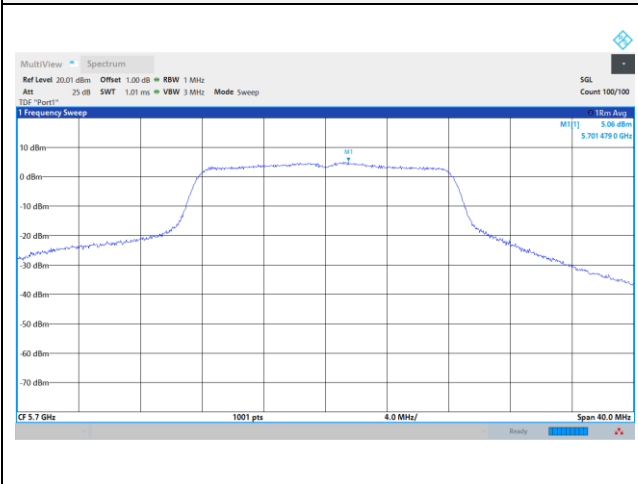
## UNII-2C / 802.11a / Mid ch.



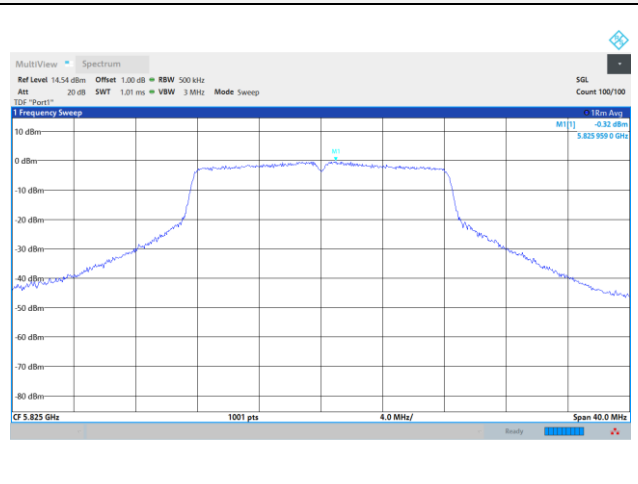
## UNII-3 / 802.11a / Mid ch.



## UNII-2C / 802.11a / High ch.



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





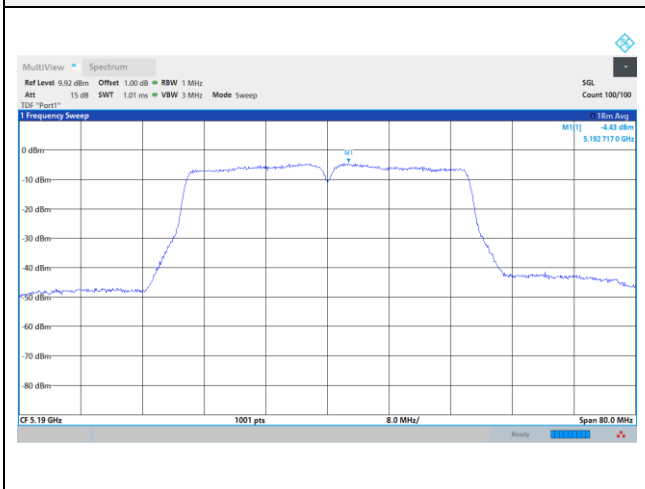
# KCTL Inc.

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](http://www.kctl.co.kr)

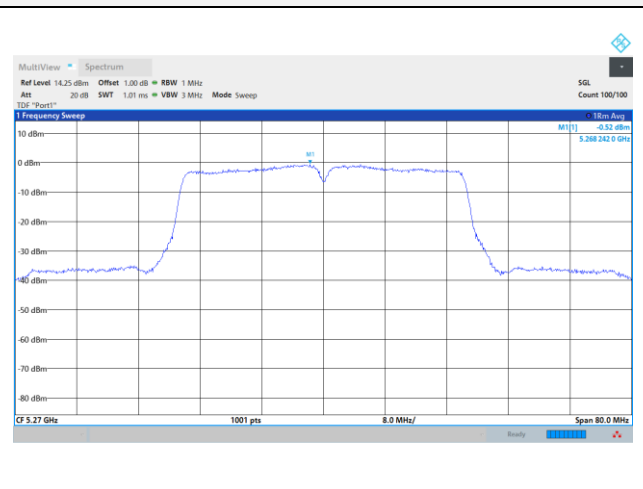
Report No.:  
KR22-SRF0062-B  
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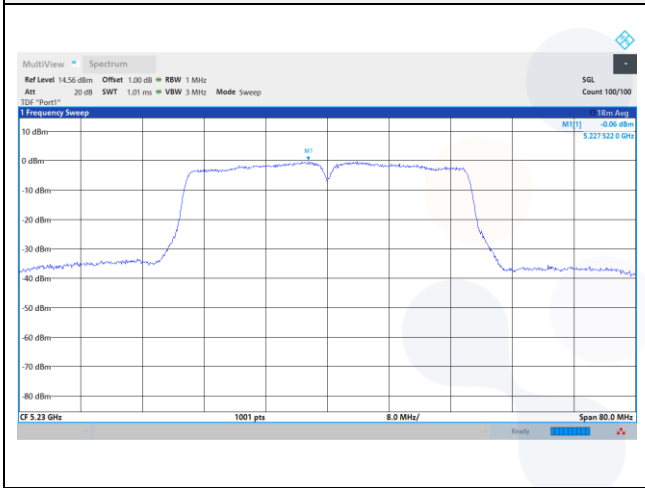
## UNII-1 / 802.11n HT40 / Low ch.



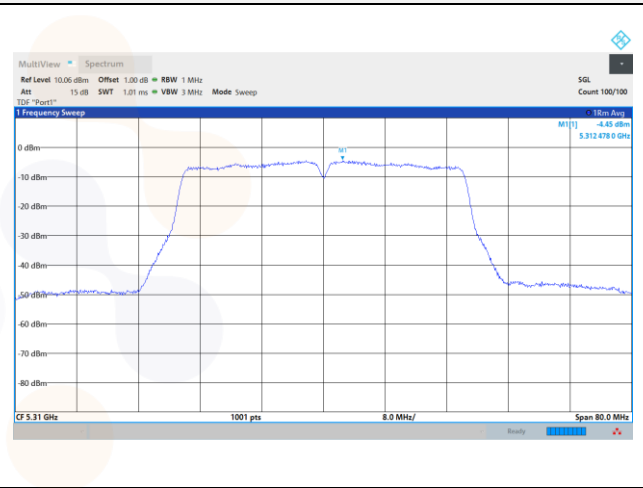
## UNII-2A / 802.11n HT40 / Low ch.



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



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



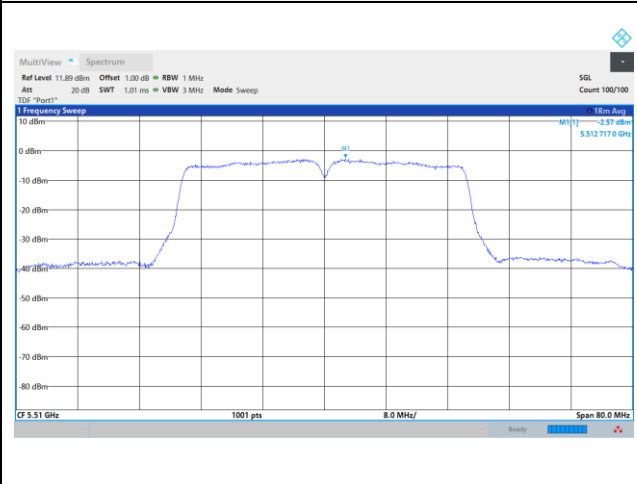
# KCTL Inc.

65, Sinwon-ro, Yeongtong-gu,  
Suwon-si, Gyeonggi-do, 16677, Korea  
TEL: 82-31-285-0894 FAX: 82-505-299-8311  
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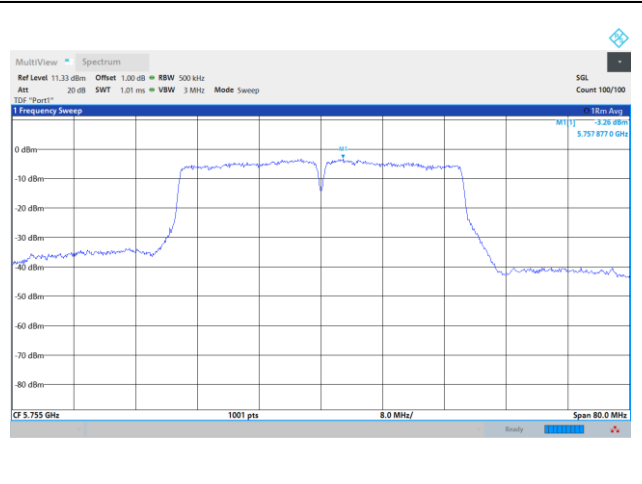
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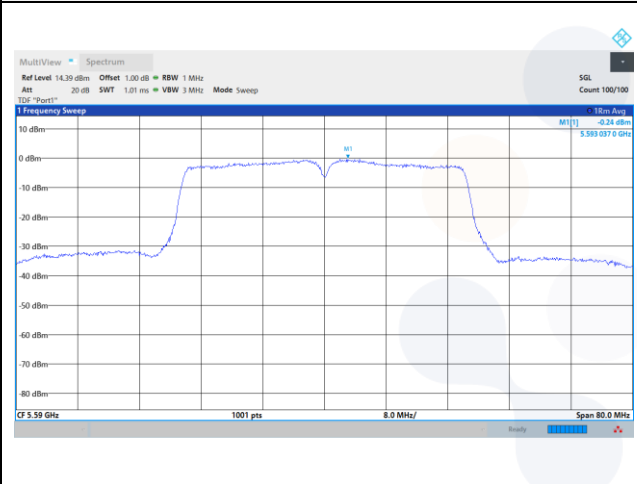
## UNII-2C / 802.11n HT40 / Low ch.



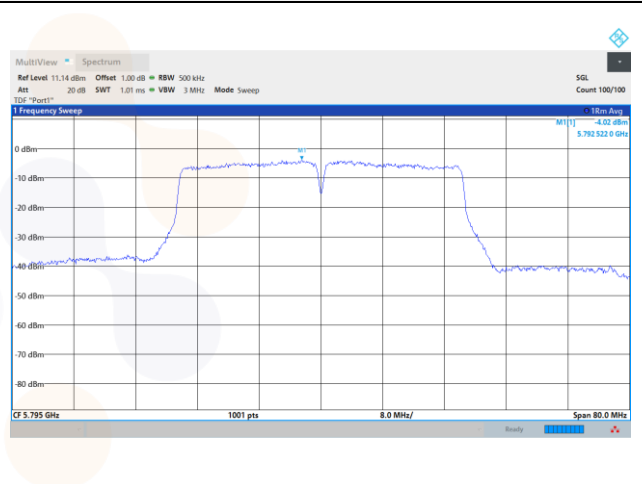
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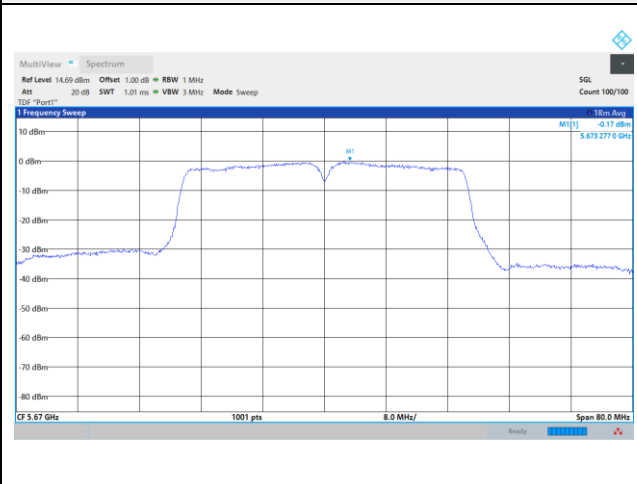
## UNII-2C / 802.11n HT40 / Mid ch.



## UNII-3 / 802.11n HT40 / High ch.



## UNII-2C / 802.11n HT40 / High ch.



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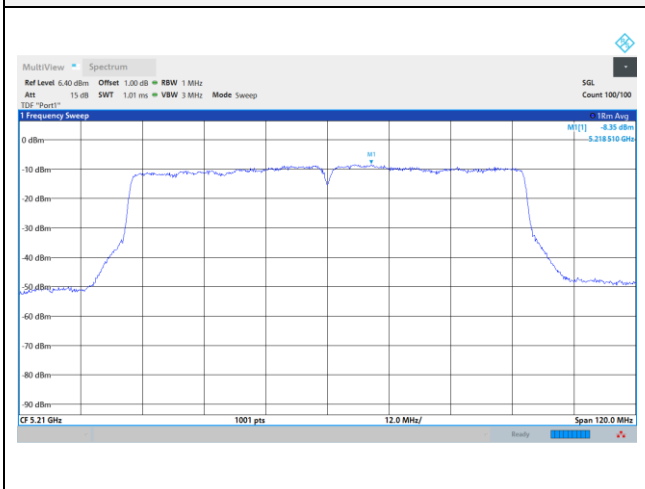
# KCTL Inc.

65, Sinwon-ro, Yeongtong-gu,  
Suwon-si, Gyeonggi-do, 16677, Korea  
TEL: 82-31-285-0894 FAX: 82-505-299-8311  
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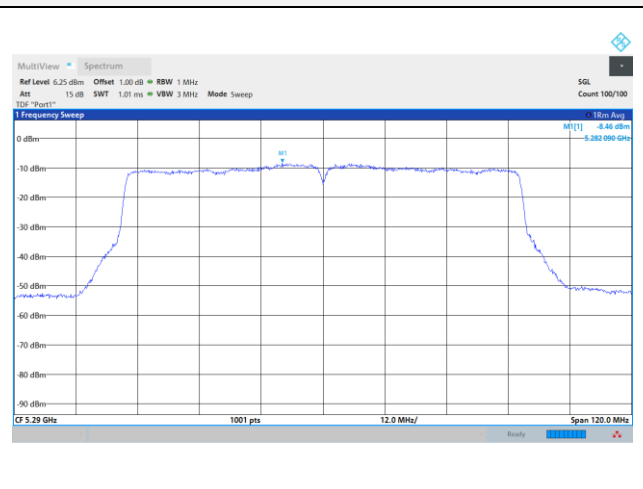
Report No.:  
KR22-SRF0062-B  
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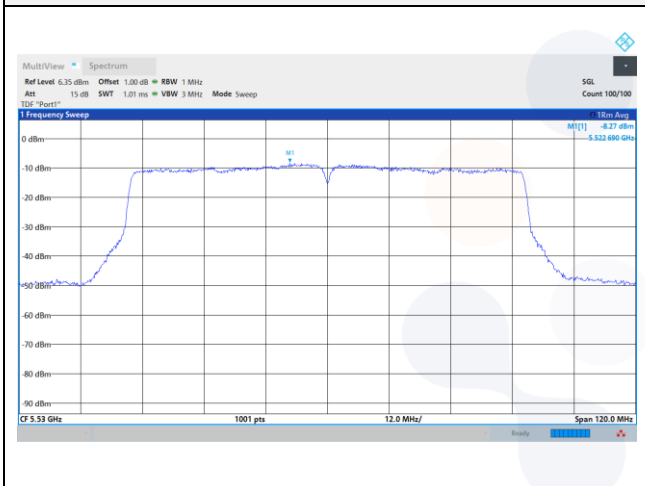
## UNII-1 / 802.11ac VHT80 / Low ch.



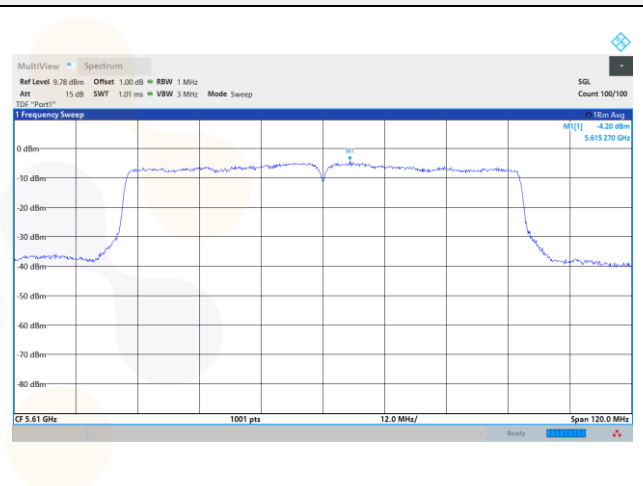
## UNII-2A / 802.11ac VHT80 / Low ch.



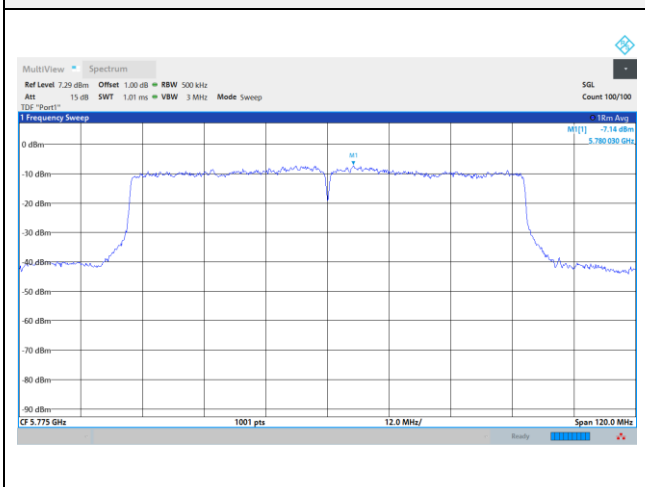
## UNII-2C / 802.11ac VHT80 / Low ch.



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



## UNII-3 / 802.11ac VHT80 / Low ch.



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