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TEST REPORT

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

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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 : 2022-04-06

2. Use of Report : Certification

3. Name of Product / Model : Smart Wearable / SM-R925U (Alt. SM-R925F)

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

5. FCC ID (Model) : A3LSMR925 (SM-R925U, SM-R925F)

6. IC Certificate No. (Model) : 649E-SMR925 (SM-R925F)

7. Date of Test : 2022-04-18 to 2022-05-23

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

9. Test method used : FCC Part 15 Subpart E, 15.407
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 : Taeyoung Kim (Signature)	Technical Manager Name : Seungyong Kim (Signature)

2022-06-15

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
2022-05-31	Originally issued	-
2022-06-02	Updated	6
2022-06-15	Added FCC variant model (SM-R925F)	1, 4

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Note. The report No. KR22-SRF0092-A is superseded by the report No. KR22-SRF0092-B.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**

CONTENTS

1. General information 4
2. Device information 4
2.1. Accessory information 6
2.2. Frequency/channel operations 6
2.3. Simultaneous Tx Condition 7
2.4. Duty Cycle Factor 7
3. Antenna requirement 8
4. Summary of tests 9
5. Measurement uncertainty 10
6. Measurement results explanation example 11
7. Test results 12
7.1. Maximum conducted output power 12
7.2. Maximum Power Spectral Density 15
7.3. 26 dB Bandwidth & 99% Bandwidth 20
7.4. 6 dB Bandwidth 26
7.5. Straddle channel 29
7.6. Spurious Emission, Band Edge and Restricted bands 33
7.7. AC Conducted emission 66
8. Measurement equipment 68

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	:	AG TECH CO.,LTD
Address	:	Lot G3, Que Vo Industrial Park(Expanded Area), Nam son Ward, Bac Ninh 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	:	Smart Wearable
Model	:	SM-R925U
Derivative model	:	SM-R925F
Modulation technique	:	Bluetooth(BDR/EDR)_GFSK, π/4DQPSK, 8DPSK
		Bluetooth(BLE)_GFSK
		WIFI(802.11a/b/g/n)_DSSS, OFDM
		LTE_QPSK, 16QAM
		WCDMA_QPSK
Number of channels	:	Bluetooth(BDR/EDR)_79 ch / Bluetooth(BLE)_40 ch
		802.11b/g/n_HT20 : 13 ch
		UNII-1: 4 ch (20 MHz)
		UNII-2A: 4 ch (20 MHz)
		UNII-2C: 12 ch (20 MHz)
		UNII-3: 5 ch (20 MHz)
Power source	:	DC 3.88 V
Antenna specification	:	LTE/WCDMA_PIFA (Housing metal) Antenna
		WIFI/Bluetooth(BDR/EDR/BLE)_LDS Antenna
Antenna gain	:	WIFI/Bluetooth(BDR/EDR/BLE) : -8.30 dBi
		UNII-1 : -8.10 dBi
		UNII-2A : -6.90 dBi
		UNII-2C : -3.00 dBi
		UNII-3 : -6.70 dBi

Frequency range	:	Bluetooth(BDR/EDR/BLE)_2 402 ㎒ ~ 2 480 ㎒
		2 412 ㎒ ~ 2 472 ㎒ (802.11b/g/n_HT20)
		UNII-1: 5 180 ㎒ ~ 5 240 ㎒ (802.11a/n_HT20)
		UNII-2A: 5 260 ㎒ ~ 5 320 ㎒ (802.11a/n_HT20)
		UNII-2C: 5 500 ㎒ ~ 5 720 ㎒ (802.11a/n_HT20)
		UNII-3: 5 745 ㎒ ~ 5 825 ㎒ (802.11a/n_HT20)
		LTE Band 2_1 850.7 ㎒ ~ 1 909.3 ㎒
		LTE Band 4_1 710.7 ㎒ ~ 1 754.3 ㎒
		LTE Band 5_824.7 ㎒ ~ 848.3 ㎒
		LTE Band 12_699.7 ㎒ ~ 715.3 ㎒
		LTE Band 13_779.5 ㎒ ~ 784.5 ㎒
		LTE Band 25_1 850.7 ㎒ ~ 1 914.3 ㎒
		LTE Band 26_824.7 ㎒ ~ 848.3 ㎒, 814.7 ㎒ ~ 823.3 ㎒
		LTE Band 66_1 710.7 ㎒ ~ 1 779.3 ㎒
		LTE Band 71_665.5 ㎒ ~ 695.5 ㎒
		WCDMA 850_826.4 ㎒ ~ 846.6 ㎒
		WCDMA 1700_1 712.4 ㎒ ~ 1 752.6 ㎒
		WCDMA 1900_1 852.4 ㎒ ~ 1 907.6 ㎒
Software version	:	SM-R925U_R925U.001, SM-R925F_R925F.001
Hardware version	:	REV1.0
Test device serial No.	:	Conducted(R3AT401JW7J) Radiated(R3AT501YC0W, R3AT501YBNP)
Operation temperature	:	-30 ℃ ~ 50 ℃

Note.

1. Due to marketing purpose, the model SM-R925F will be filed for ISED approval and the test reports remain valid for Model SM-R925F ISED submission.
2. The product equality letter includes detailed information about the differences between SM-R925U and SM-R925F model.

2.1. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source	FCC ID & IC
Wireless Charger	Samsung Electronics Co., Ltd.	EP-OR900	-	5.0 V, 2.0 A	FCC ID : A3LEPOR900 IC ID : 649E-EPOR900

2.2. Frequency/channel operations

This device contains the following capabilities:
WiFi (802.11a/b/g/n), Bluetooth (BDR/EDR/BLE), LTE Band 2, LTE Band 4, LTE Band 5, LTE Band 12, LTE Band 13, LTE Band 25, LTE Band 26, LTE Band 66, LTE Band 71, WCDMA 850, WCDMA 1700, WCDMA 1900

UNII-1

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

UNII-2A

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

UNII-2C

Ch.	Frequency (MHz)
100	5 500
120	5 600
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_HT20 mode

2.3. Simultaneous Tx Condition

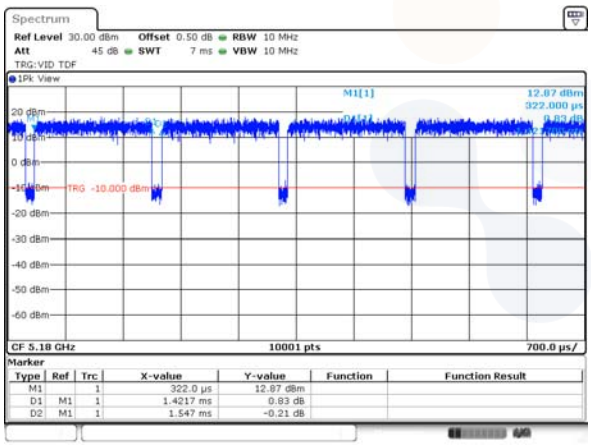
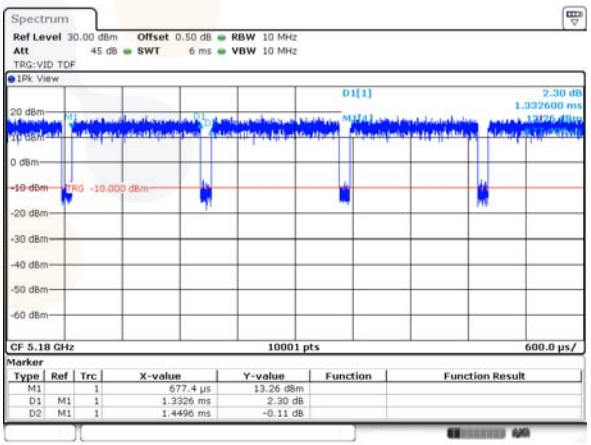
Mode	Bluetooth	WLAN 5 GHz
WLAN 5 GHz + Bluetooth	O	O

2.4. Duty Cycle Factor

Test mode	Period (ms)	T_{on} time (ms)	Duty cycle		Duty cycle factor (dB)
			(Linear)	(%)	
802.11a	1.547 0	1.421 7	0.919 0	91.90	0.37
802.11n_HT20	1.449 6	1.332 6	0.919 3	91.93	0.37

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%

802.11a	802.11n_HT20
	

3. Antenna requirement

Requirement of FCC part section 15.203

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

Requirement of RSS-Gen Section 6.8:

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

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

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

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

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

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

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

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. All the radiated tests have been performed four modes (with strap (with charger / without charger) and without strap (with charger / without charger)) and the fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z.
   - with strap

	with charger			without charger		
	X-axis	Y-axis	Z-axis	X-axis	Y-axis	Z-axis
Band-edge	√					
Spurious				√		

4. The test procedure(s) in this report were performed in accordance as following.
   - ANSI C63.10-2013
   - KDB 789033 D02 v02r01
5. Based on the baseline scan, the worst-case data rates were:
   802.11a mode: 6Mbps
   802.11n HT20 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 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.

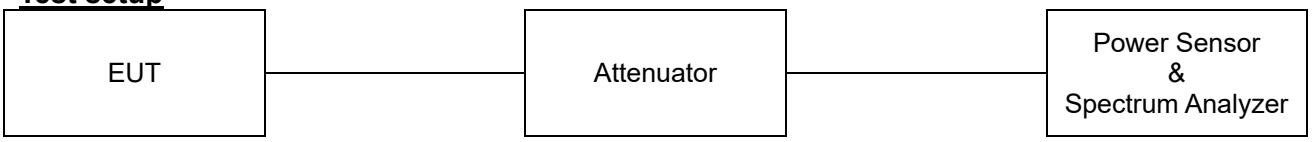
Frequency (MHz)	Factor(dB)	Frequency (MHz)	Factor(dB)
30	9.70	9 000	12.06
50	9.73	10 000	12.79
100	9.78	11 000	12.95
200	9.93	12 000	12.83
300	10.03	13 000	13.19
400	10.07	14 000	13.37
500	10.21	15 000	13.50
600	10.22	16 000	13.79
700	10.29	17 000	13.82
800	10.33	18 000	14.00
900	10.37	19 000	12.77
1 000	10.43	20 000	14.45
2 000	10.77	21 000	13.54
3 000	11.07	22 000	14.73
4 000	11.38	23 000	14.79
5 000	11.58	24 000	14.73
6 000	11.98	25 000	14.84
7 000	11.81	26 000	15.47
8 000	11.41	26 500	15.15

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

IC

Band	Maximum e.i.r.p. limit
UNII-1	200 mW or 10 + 10 log10B[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
KDB 789033 D02 v02r01 - Section E.2.d) or E.3.a)

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%.

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 ㏈m 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%).

Test results

Test mode	Band	Frequency (㎒)	Measured output power				
			Conducted output power (dBm)	Limit (dBm)	ANT Gain (dBi)	Max.e.i.r.p (dBm)	Max e.i.r.p Limit (dBm)
802.11a	UNII 1	5 180	17.54	23.98	-8.10	9.44	22.27
		5 200	17.30			9.20	
		5 240	17.33			9.23	
	UNII 2A	5 260	17.39	23.98	-6.90	10.49	29.26
		5 280	17.30			10.40	
		5 320	17.23			10.33	
	UNII 2C	5 500	17.50	23.98	-3.00	14.50	29.30
		5 600	17.44			14.44	
		5 700	17.07			14.07	
	UNII 3	5 745	17.14	30.00	-6.70	10.44	30.00
		5 785	17.19			10.49	
		5 825	16.54			9.84	
802.11n HT20	UNII 1	5 180	17.40	23.98	-8.10	9.30	22.56
		5 200	17.20			9.10	
		5 240	17.24			9.14	
	UNII 2A	5 260	17.24	23.98	-6.90	10.34	29.56
		5 280	17.18			10.28	
		5 320	17.13			10.23	
	UNII 2C	5 500	17.62	23.98	-3.00	14.62	29.59
		5 600	17.20			14.20	
		5 700	17.00			14.00	
	UNII 3	5 745	17.34	30.00	-6.70	10.64	30.00
		5 785	16.86			10.16	
		5 825	16.61			9.91	

Notes:
1. Conducted output power(Average) = reading value of average power + D.C.F
2. e.i.r.p. Calculation: e.i.r.p. (㏈ m) = Conducted output power (㏈ m) + Antenna gain (㏈ i)

7.2. Maximum Power Spectral Density

Test setup

EUT — Attenuator — Spectrum analyzer

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

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≥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

Test mode	Band	Frequency (㎒)	Measured PSD (dBm/㎒)	DCF (dB)	Maximum PSD (dB m/㎒)	Limit (dBm/㎒)
802.11a	UNII 1	5 180	4.72	0.37	5.09	11.00
		5 200	4.67		5.04	
		5 240	4.95		5.32	
	UNII 2A	5 260	4.53		4.90	11.00
		5 280	4.54		4.91	
		5 320	4.46		4.83	
	UNII 2C	5 500	5.47		5.84	11.00
		5 600	4.59		4.96	
		5 700	4.23		4.60	
802.11n HT20	UNII 1	5 180	4.84	0.37	5.21	11.00
		5 200	4.44		4.81	
		5 240	4.44		4.81	
	UNII 2A	5 260	4.38		4.75	11.00
		5 280	4.36		4.73	
		5 320	4.40		4.77	
	UNII 2C	5 500	4.99		5.36	11.00
		5 600	4.24		4.61	
		5 700	3.52		3.89	

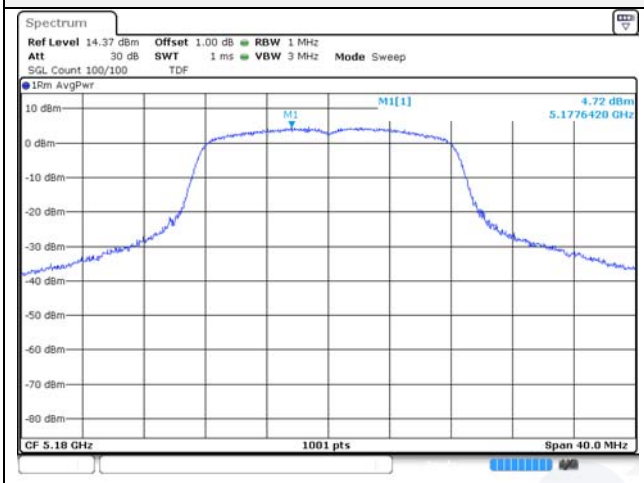
Test mode	Band	Frequency (㎒)	Measured PSD (dBm /500 ㎑)	DCF (dB)	Maximum PSD (dBm /500 ㎑)	Limit (dBm /500 ㎑)
802.11a	UNII 3	5 745	0.80	0.37	1.17	30.00
		5 785	1.69		2.06	
		5 825	1.03		1.40	
802.11n HT20		5 745	1.08	0.37	1.45	
		5 785	1.27		1.64	
		5 825	0.69		1.06	

Notes:
1. Maximum PSD calculation
- Maximum PSD = Measured PSD + D.C.F

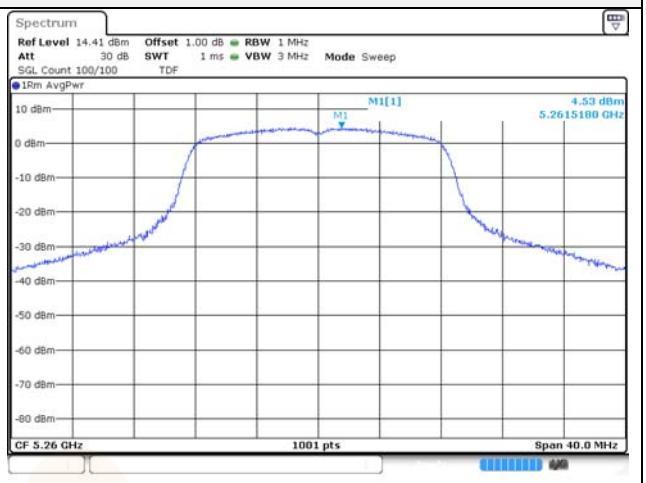
Power Spectral Density

In order to simplify the report, attached plots were only the Worst Case per bandwidth.

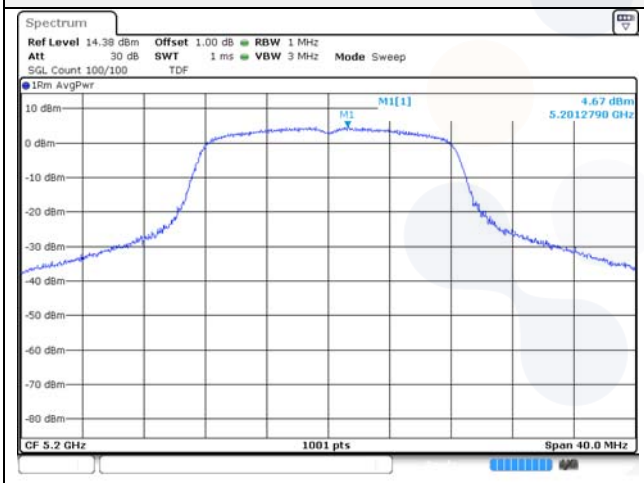
UNII-1 / 802.11a / Low ch.



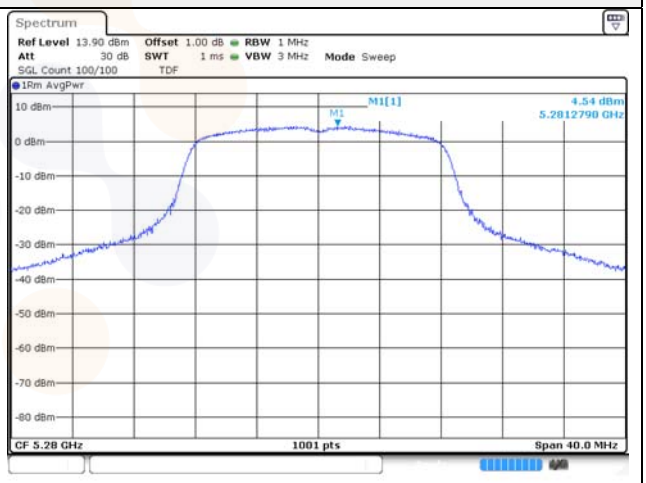
UNII-2A / 802.11a / Low ch.



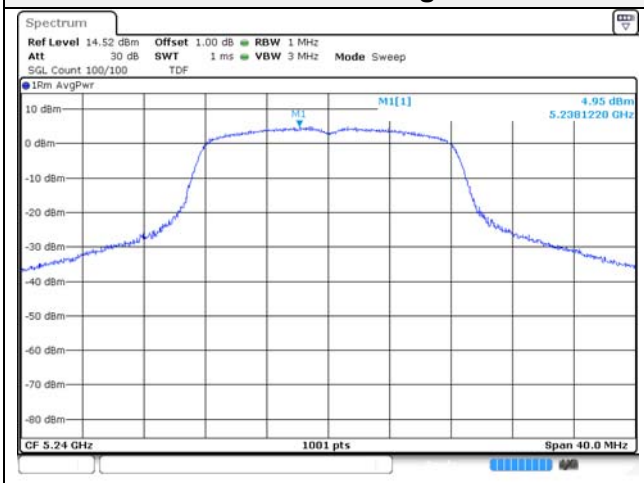
UNII-1 / 802.11a / Mid ch.



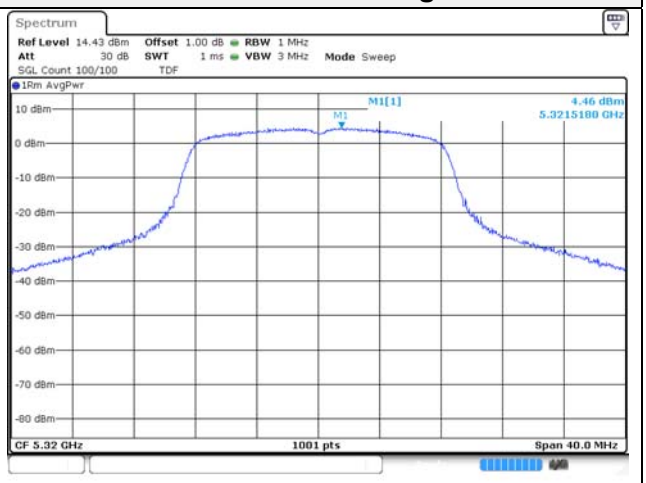
UNII-2A / 802.11a / Mid ch.



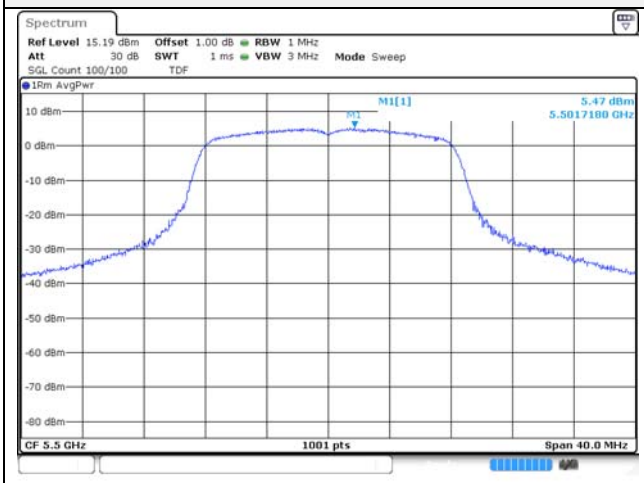
UNII-1 / 802.11a / High ch.



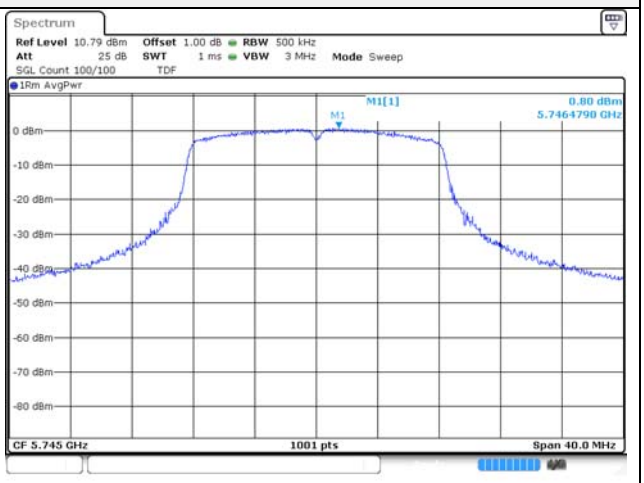
UNII-2A / 802.11a / High ch.



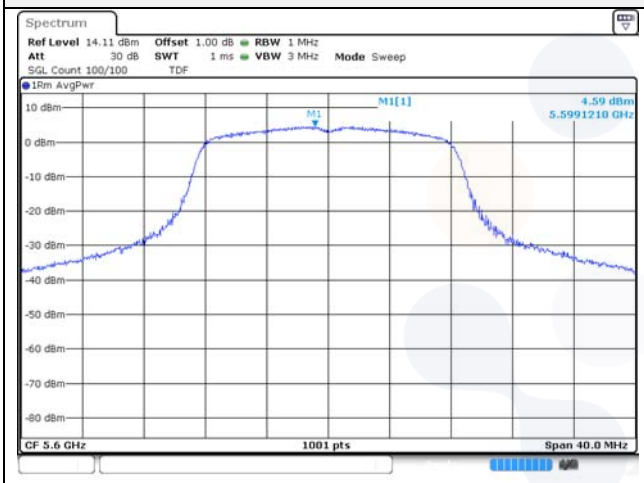
UNII-2C / 802.11a / Low ch.



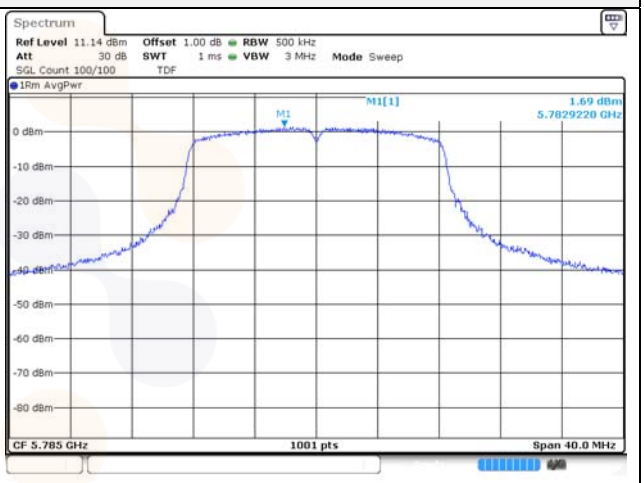
UNII-3 / 802.11a / Low ch.



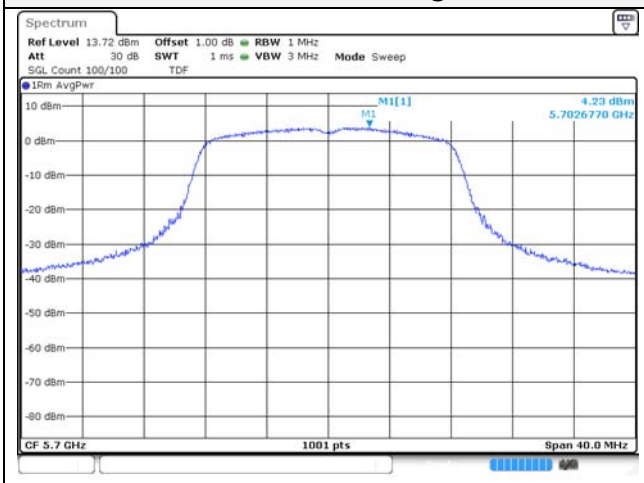
UNII-2C / 802.11a / Mid ch.



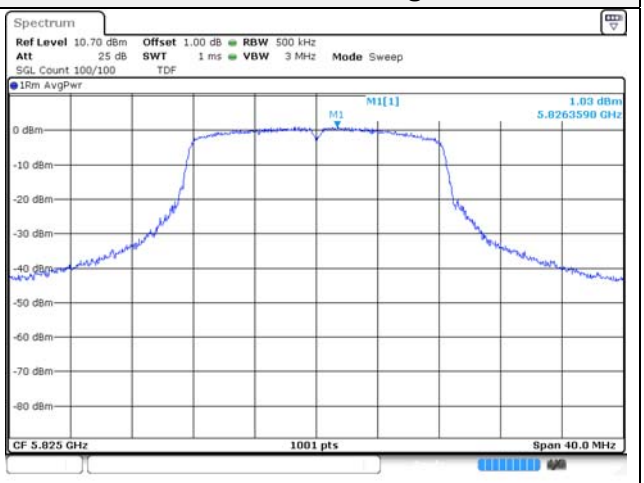
UNII-3 / 802.11a / Mid ch.



UNII-2C / 802.11a / High ch.



UNII-3 / 802.11a / High ch.



7.3. 26 dB Bandwidth & 99% Bandwidth

Test setup

EUT	—	Attenuator	—	Spectrum analyzer

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.

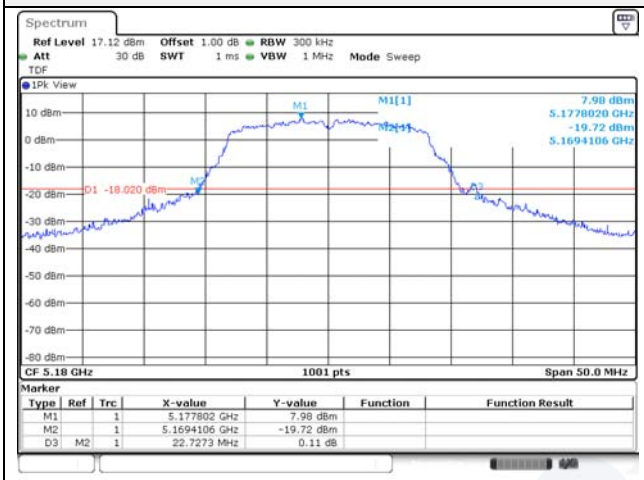
Test results

Test mode	Band	Frequency(㎒)	26 ㏈ bandwidth (㎒)	99% bandwidth (㎒)
802.11a	UNII-1	5 180	22.73	17.28
		5 200	22.78	17.23
		5 240	22.98	17.43
	UNII-2A	5 260	22.88	17.43
		5 280	22.83	17.43
		5 320	22.78	17.33
	UNII-2C	5 500	22.68	17.23
		5 600	22.83	17.23
		5 700	21.53	17.03
802.11n HT20	UNII-1	5 180	26.07	18.93
		5 200	26.22	18.83
		5 240	26.22	18.98
	UNII-2A	5 260	25.67	18.93
		5 280	25.97	18.93
		5 320	25.22	18.88
	UNII-2C	5 500	25.62	18.83
		5 600	26.17	18.98
		5 700	24.93	18.73

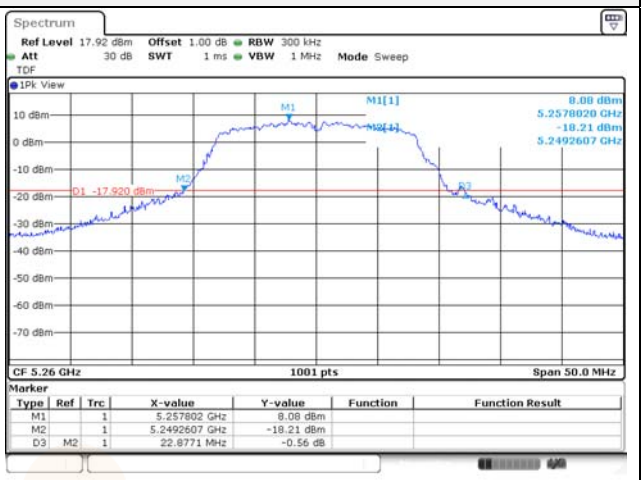
26dB Bandwidth

In order to simplify the report, attached plots were only the Worst Case per bandwidth.

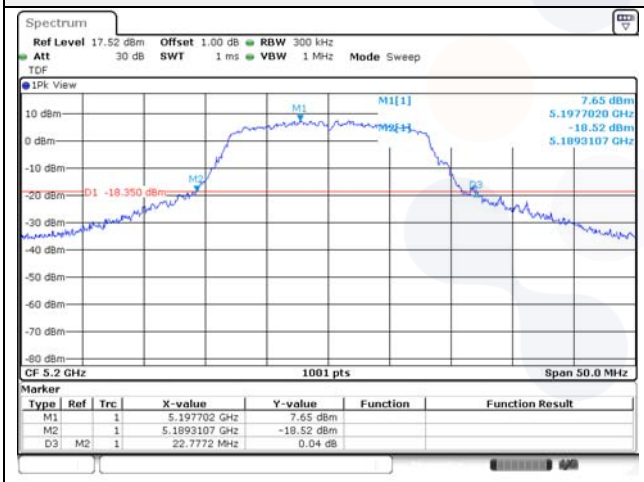
UNII-1 / 802.11a / Low ch.



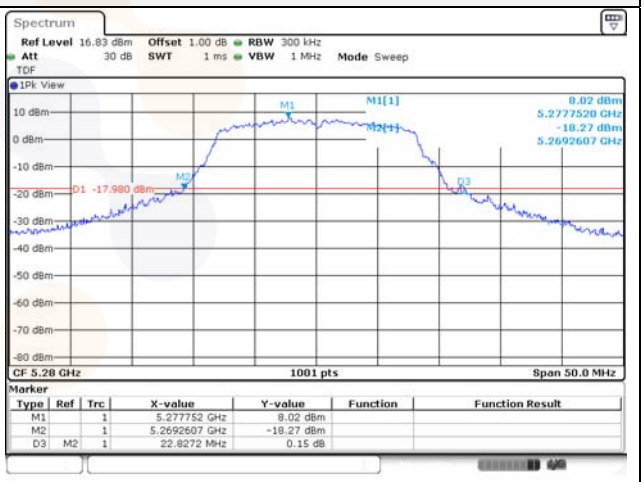
UNII-2A / 802.11a / Low ch.



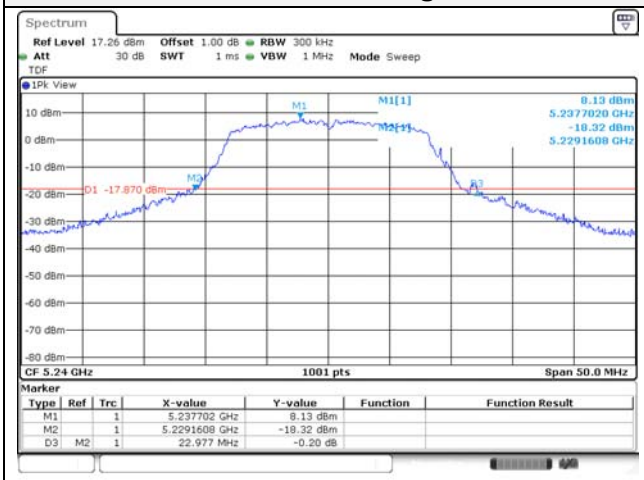
UNII-1 / 802.11a / Mid ch.



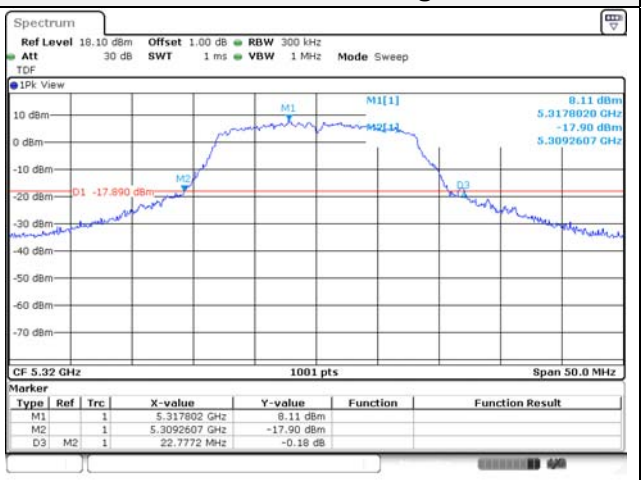
UNII-2A / 802.11a / Mid ch.



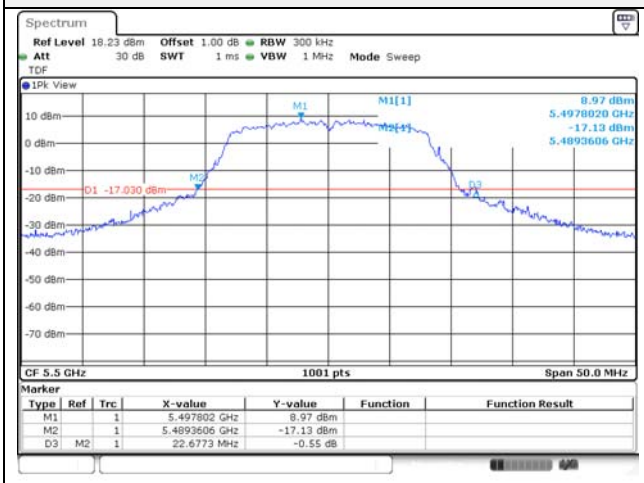
UNII-1 / 802.11a / High ch.



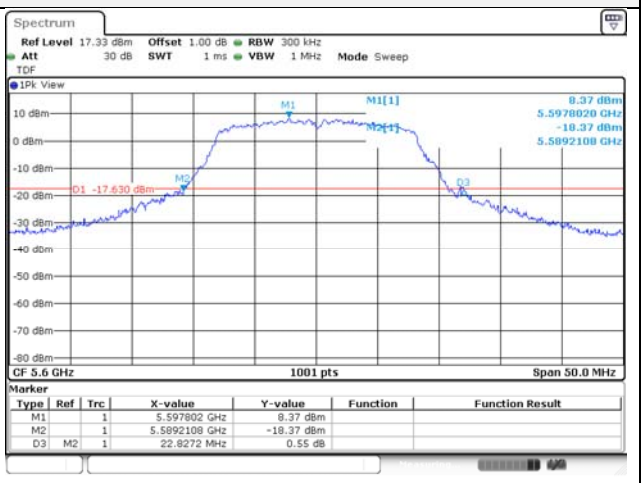
UNII-2A / 802.11a / High ch.



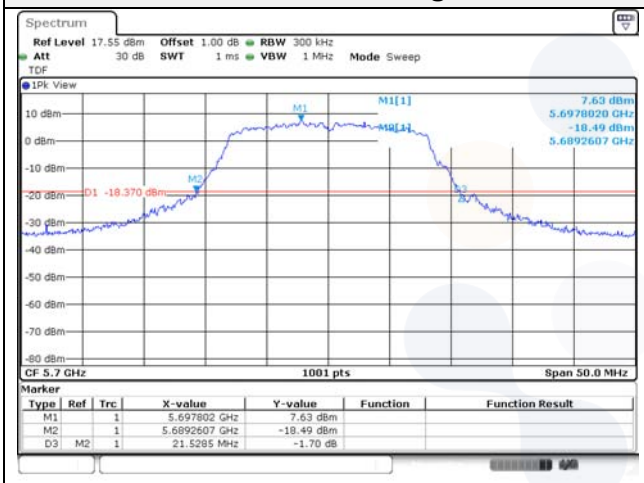
UNII-2C / 802.11a / Low ch.



UNII-2C / 802.11a / Mid ch.



UNII-2C / 802.11a / High ch.

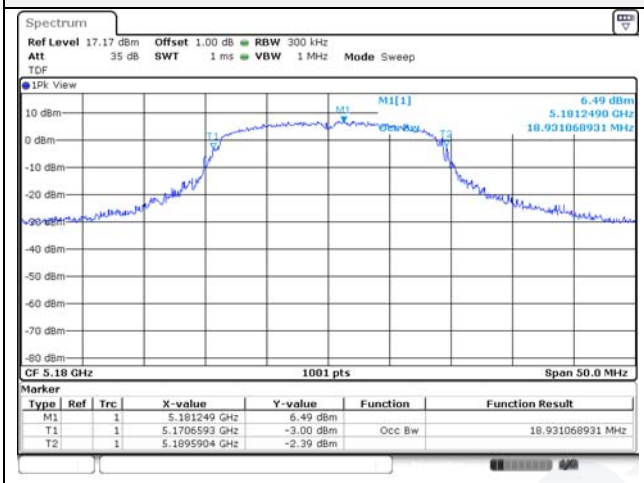


Blank

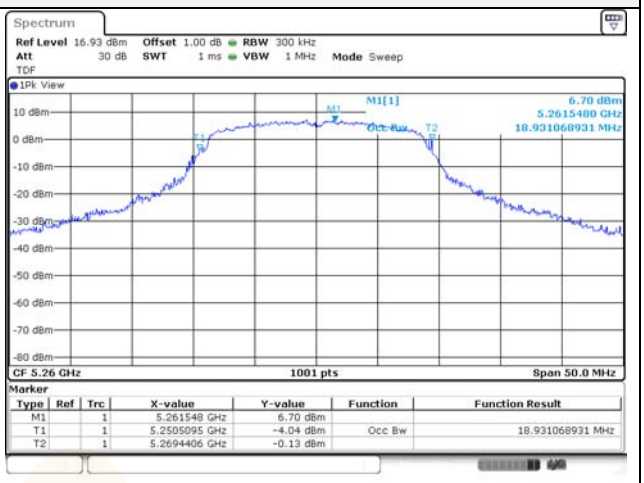
99% Bandwidth

In order to simplify the report, attached plots were only the Worst Case per bandwidth.

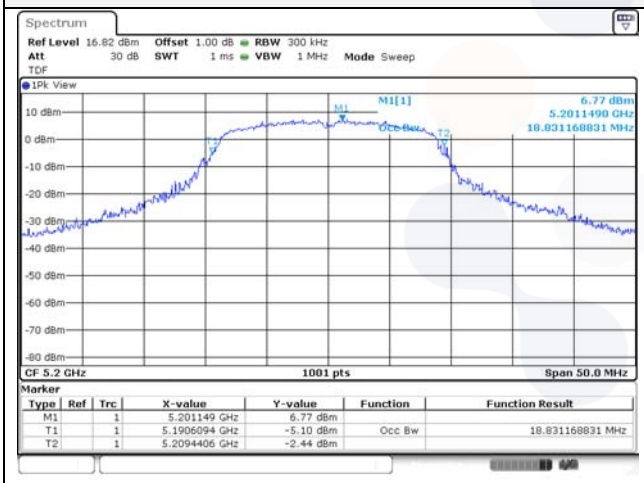
UNII-1 / 802.11n HT20 / Low ch.



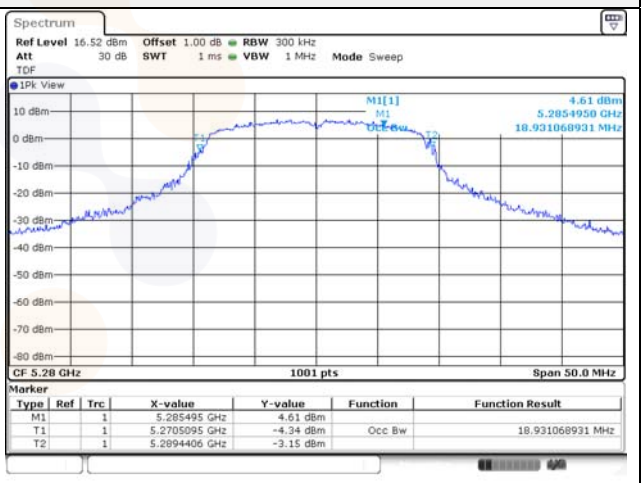
UNII-2A / 802.11n HT20 / Low ch.



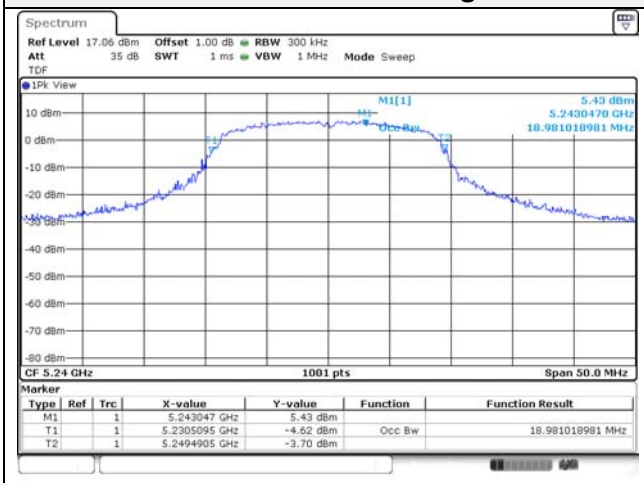
UNII-1 / 802.11n HT20 / Mid ch.



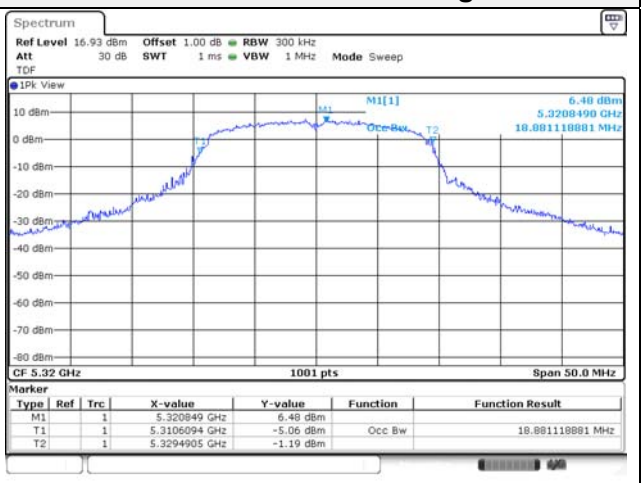
UNII-2A / 802.11n HT20 / Mid ch.



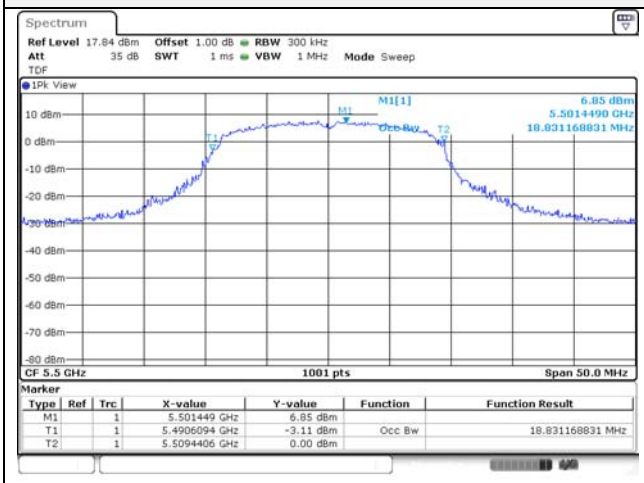
UNII-1 / 802.11n HT20 / High ch.



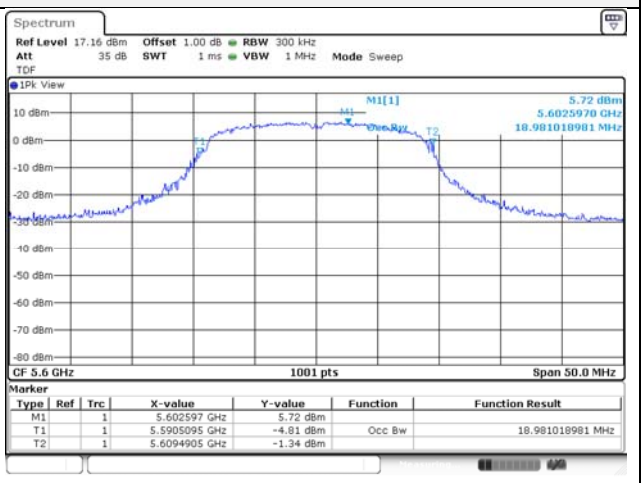
UNII-2A / 802.11n HT20 / High ch.



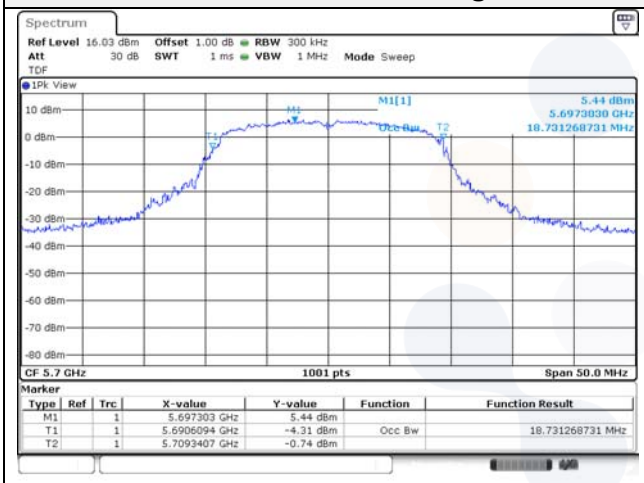
UNII-2C / 802.11n HT20 / Low ch.



UNII-2C / 802.11n HT20 / Mid ch.



UNII-2C / 802.11n HT20 / High ch.



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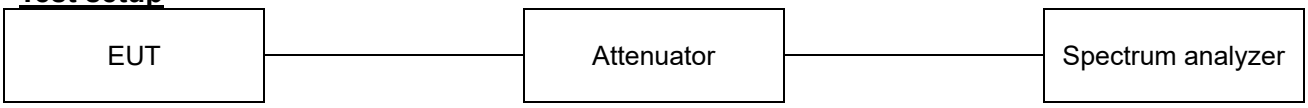
7.4. 6 dB Bandwidth

Test setup



Limit

According to §15.407(e), RSS-247(6.2.4) Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth if U-NII devices shall be at least 500kHz

Test procedure

ANSI C63.10-2013 Section 6.9.2
KDB 789033 D02 v02r01 - Section C.2

Test settings

Minimum Emission Bandwidth for the band 5.725−5.85 GHz

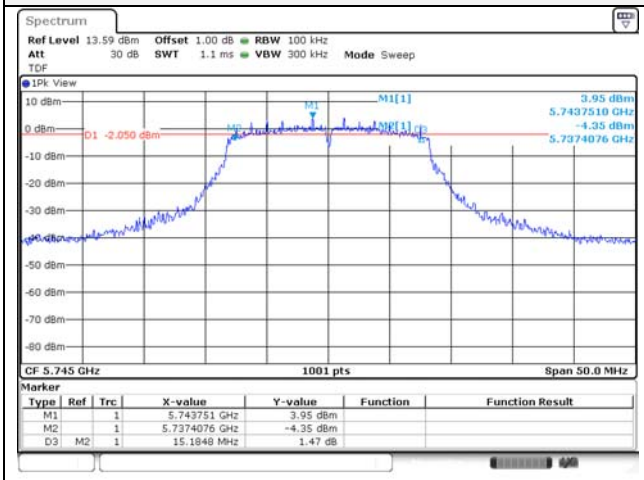
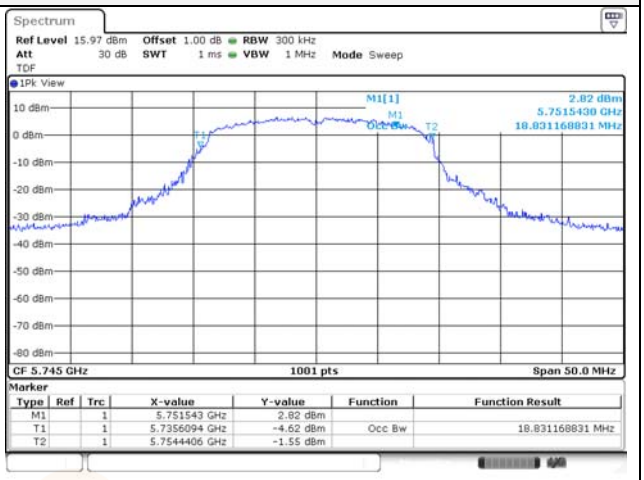
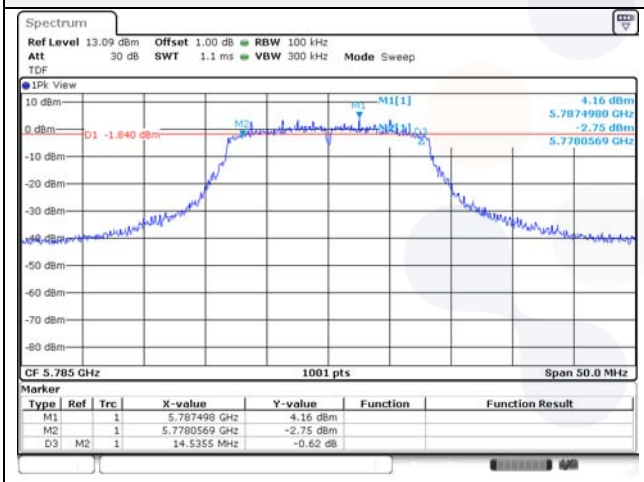
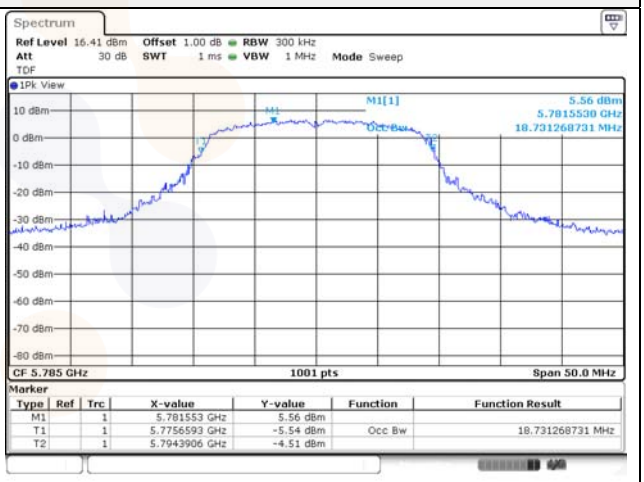
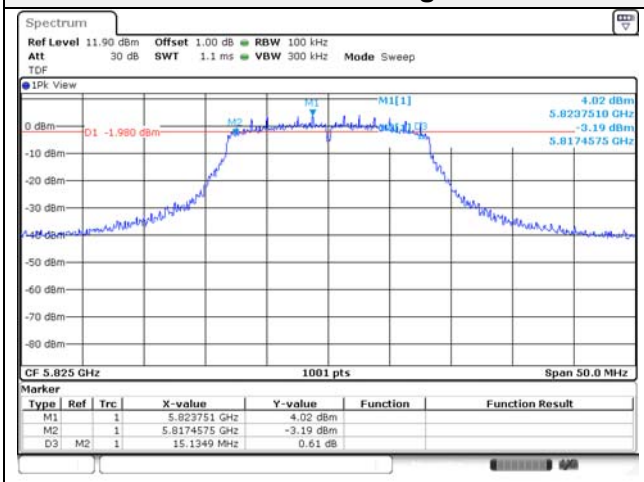
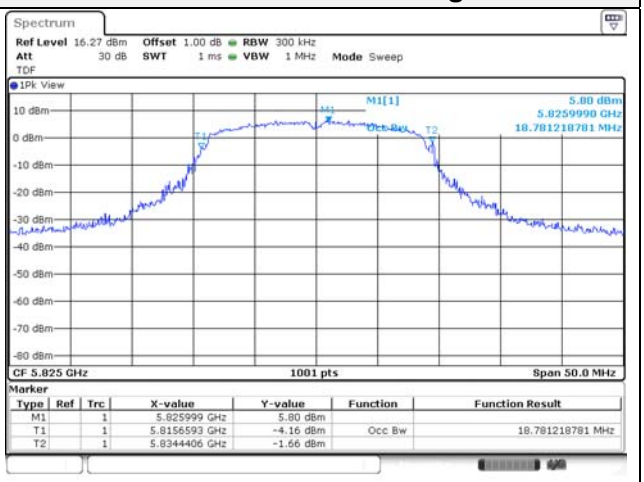
Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 kHz for the band 5.725−5.85 GHz. The following procedure shall be used for measuring this bandwidth:

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Test results

Test mode	Band	Frequency (MHz)	6dB bandwidth (MHz)	Limit (MHz)	99% bandwidth (MHz)
802.11a	UNII-3	5 745	15.18	0.50	17.03
		5 785	14.54	0.50	17.18
		5 825	15.13	0.50	16.98
802.11n HT20	UNII-3	5 745	15.18	0.50	18.83
		5 785	15.18	0.50	18.73
		5 825	15.18	0.50	18.78

In order to simplify the report, attached plots were only the Worst Case per bandwidth.

6 dB bandwidth	99% bandwidth
UNII-3 / 802.11a / Low ch.	**UNII-3 / 802.11n HT20 / Low ch.**
	
UNII-3 / 802.11a / Mid ch.	**UNII-3 / 802.11n HT20 / Mid ch.**
	
UNII-3 / 802.11a / High ch.	**UNII-3 / 802.11n HT20 / High ch.**
	

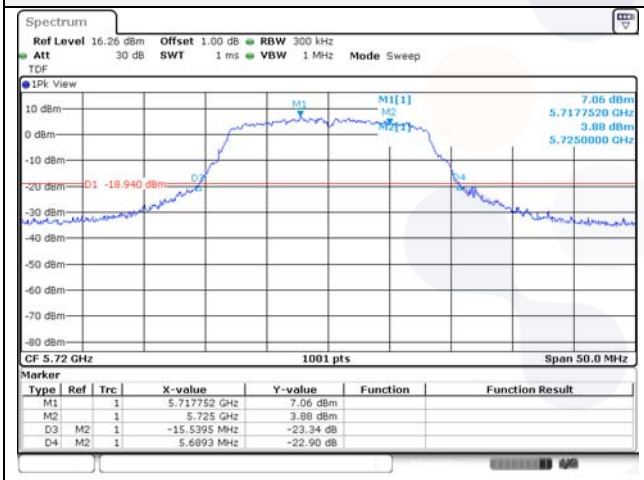
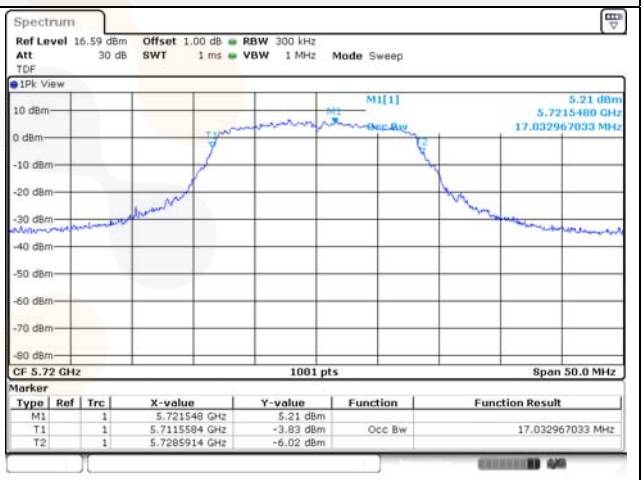
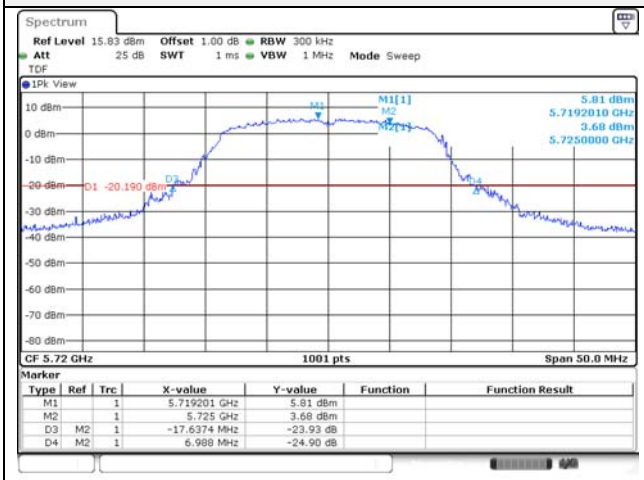
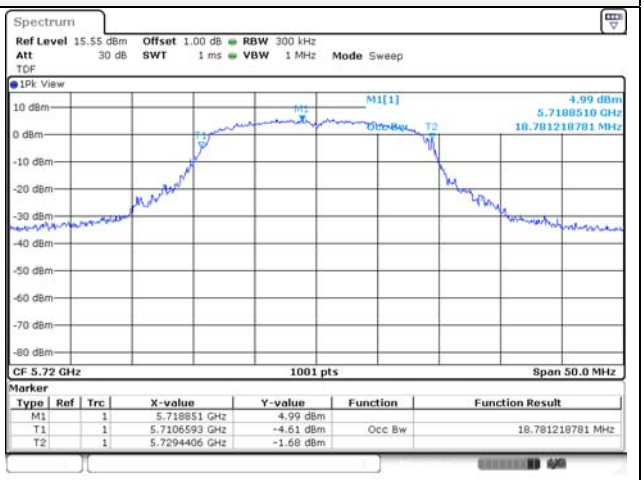
7.5. Straddle channel

26dB bandwidth & 99% Bandwidth

Test mode	Band	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
802.11a	UNII-2C	5 720	15.54	13.44
802.11n HT20			17.64	14.34
802.11a	UNII-3	5 720	5.69	3.59
802.11n HT20			6.99	4.44

Notes:

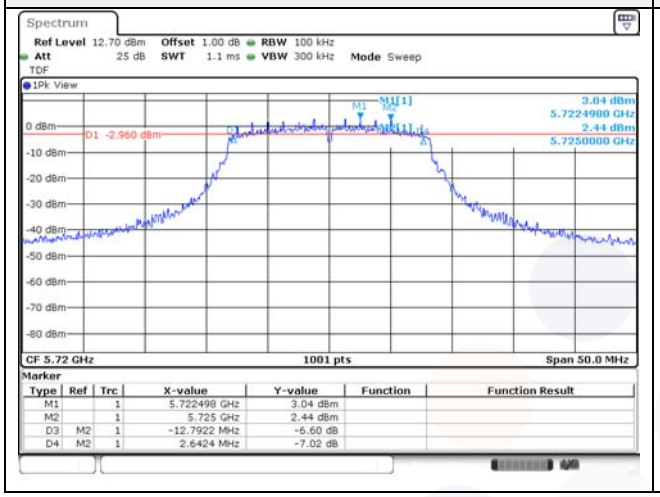
1. For 99% Bandwidth, measured 99% occupied bandwidth is separated as below
   - For UNII band 2C = 5725 MHz – T1(measured frequency on the marker table)
   - For UNII band 3 = T2(measured frequency on the marker table) – 5725 MHz

26 dB bandwidth	99% bandwidth
802.11a	**802.11a**
	
802.11n HT20	**802.11n HT20**
	

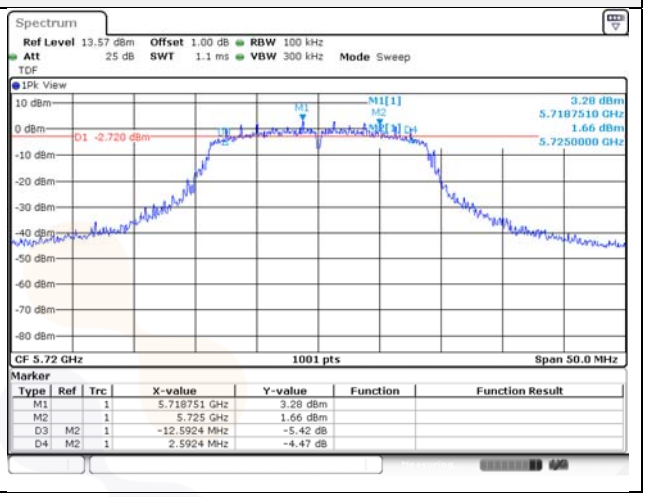
6dB bandwidth

Test mode	Band	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
802.11a	UNII-3	5 720	2.64	0.50
802.11n HT20			2.59	0.50

802.11a



802.11n HT20



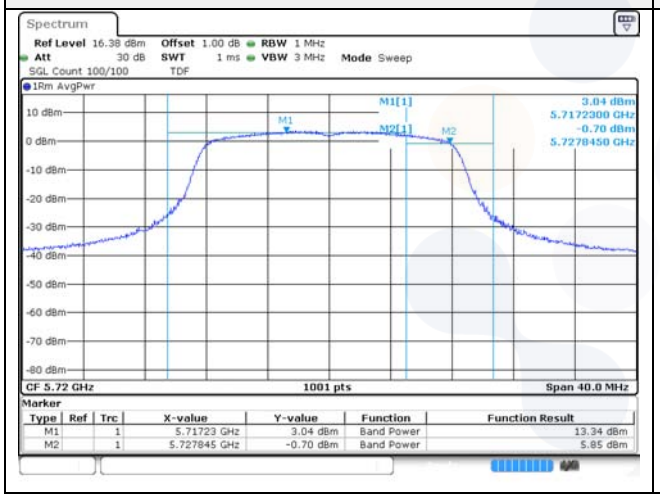
Output Power

Test mode	Band	Frequency (MHz)	Measured output power				
			Conducted output power (dBm)	Limit (dBm)	ANT Gain (dBi)	Max.e.i.r.p (dBm)	Max e.i.r.p Limit (dBm)
802.11a	UNII-2C	5 720	13.71	22.88	-3.00	10.71	29.30
802.11n HT20			13.53	23.47	-3.00	10.53	29.59
802.11a	UNII-3	5 720	6.22	30.00	-6.70	3.22	30.00
802.11n HT20			6.36	30.00	-6.70	3.36	30.00

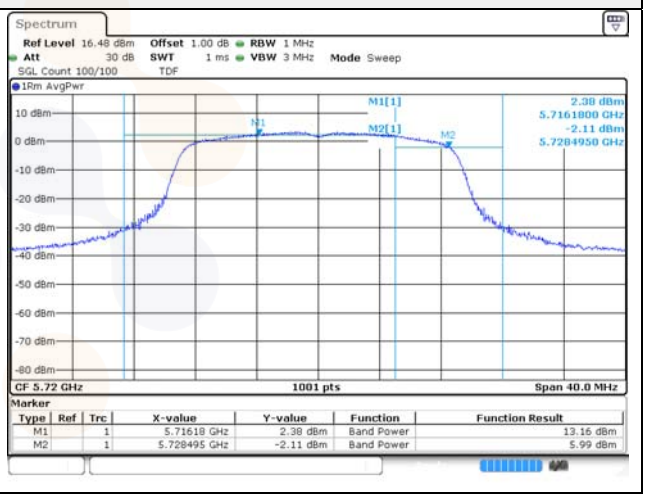
Notes:

1. Conducted output power(Average) = reading value of average power + D.C.F
2. e.i.r.p. Calculation: e.i.r.p. (dBm) = Conducted output power (dBm) + Antenna gain (dBi)

802.11a



802.11n HT20



Power Spectral Density

Test mode	Band	Frequency (MHz)	Measured PSD (dBm/MHz)	DCF (dB)	Maximum PSD (dB m/MHz)	Limit (dBm/MHz)
802.11a	UNII-2C	5 720	3.12	0.37	3.49	11.00
802.11n HT20			2.98	0.37	3.35	

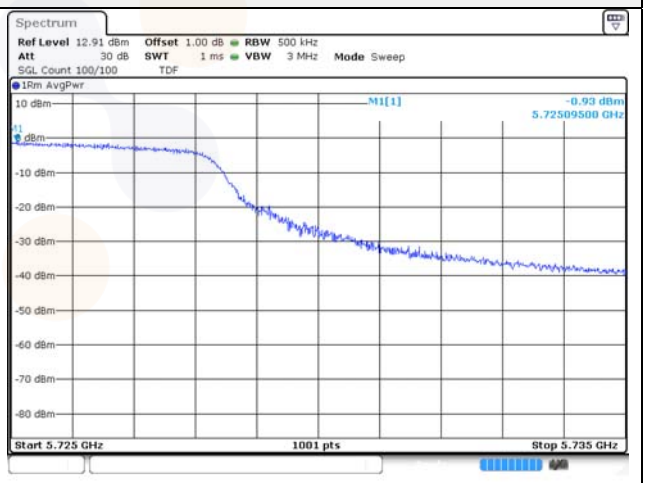
Test mode	Band	Frequency (MHz)	Measured PSD (dBm/ 500 kHz)	DCF (dB)	Maximum PSD (dBm/ 500 kHz)	Limit (dBm /500 kHz)
802.11a	UNII-3	5 720	-0.93	0.37	-0.56	30.00
802.11n HT20			-1.43	0.37	-1.06	

Notes:

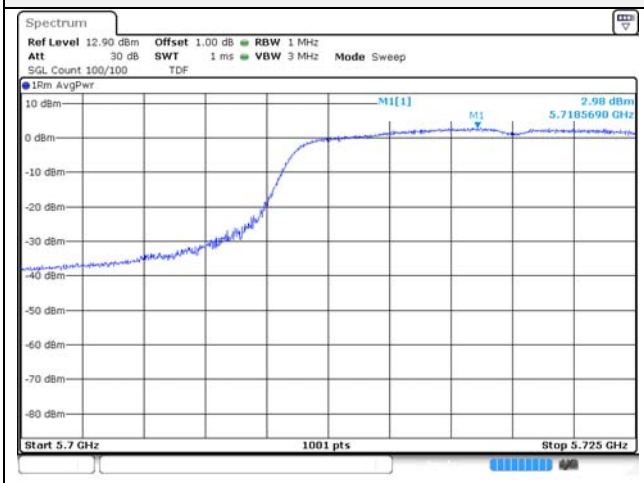
1. Maximum PSD calculation
- Maximum PSD = Measured PSD + D.C.F

UNII-2C / 802.11a

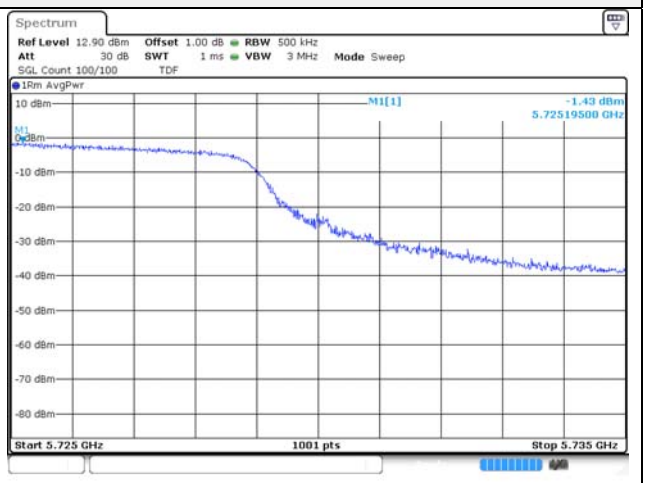
UNII-3 / 802.11a



UNII-2C / 802.11n HT20



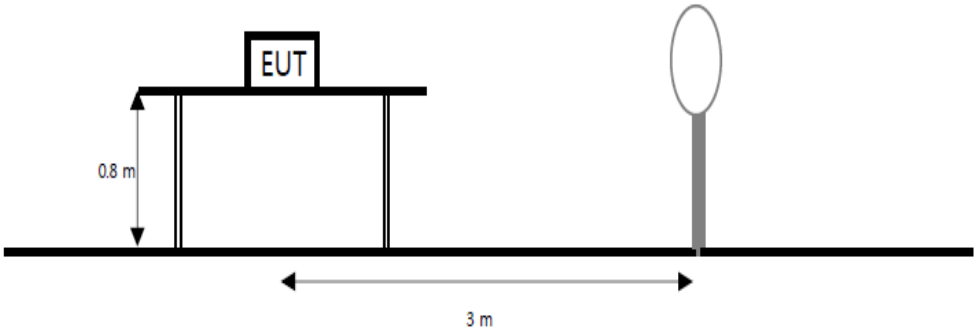
UNII-3 / 802.11n HT20



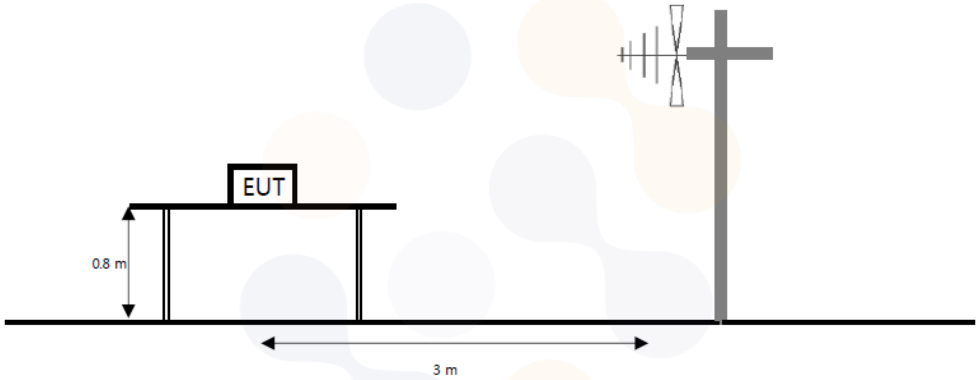
7.6. Spurious Emission, Band Edge and Restricted bands

Test setup

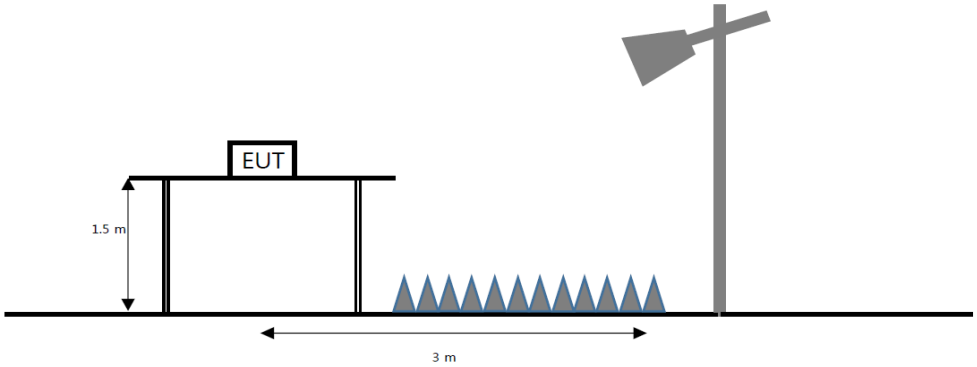
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 ㎑ to 30 ㎒ Emissions



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



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



Limit

FCC

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

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

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54–72 ㎒, 76–88 ㎒, 174–216 ㎒ or 470–806 ㎒. However, operation within these frequency bands is permitted under other sections of this part, e.g., Section15.231 and 15.241.

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

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

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

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

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

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

IC

According to RSS-247(5.5), In any 100 ㎑ bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 ㏈ below that in the 100 ㎑ bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 ㏈ instead of 20 ㏈. Attenuation below the general field strength limits specified in RSS-Gen is not required.

According to RSS-Gen(8.9), Except where otherwise indicated in the applicable RSS, radiated emissions shall comply with the field strength limits shown in table 5 and table 6. Additionally, the level of any transmitter unwanted emission shall not exceed the level of the transmitter's fundamental emission.

Table 5- General field strength limits at frequencies above 30 ㎒

Frequency(㎒)	Field strength (㎶/m at 3 m)
30 to 88	100
88 to 216	150
216 to 960	200
Above 960	500

Table 6- General field strength limits at frequencies below 30 ㎒

Frequency	Magnetic field strength (H-Field) (㎂/m)	Measurement distance(m)
9 – 490 ㎑ 1)	6.37/F (F in ㎑)	300
490 – 1705 ㎑	63.7/F (F in ㎑)	30
1.705 - 30 ㎒	0.08	30

According to RSS-Gen(8.10), Restricted frequency bands, identified in table 7, are designated primarily for safety-of-life services (distress calling and certain aeronautical activities), certain satellite downlinks, radio astronomy and some government uses. Except where otherwise indicated, the following conditions related to the restricted frequency bands apply:

(a) The transmit frequency, including fundamental components of modulation, of licence-exempt radio apparatus shall not fall within the restricted frequency bands listed in table 7 except for apparatus compliant with RSS-287, Emergency Position Indicating Radio Beacons (EPIRB), Emergency Locator Transmitters (ELT), Personal Locator Beacons (PLB), and Maritime Survivor Locator Devices (MSLD).
(b) Unwanted emissions that fall into restricted frequency bands listed in table 7 shall comply with the limits specified in table 5 and table 6.
(c) Unwanted emissions that do not fall within the restricted frequency bands listed in table 7 shall comply either with the limits specified in the applicable RSS or with those specified in table 5 and table 6.

Table 7- Restricted frequency bands*

MHz	MHz	GHz
0.090 - 0.110	149.9 - 150.05	9.0 - 9.2
0.495 - 0.505	156.52475 - 156.52525	9.3 - 9.5
2.1735 - 2.1905	156.7 - 156.9	10.6 - 12.7
3.020 - 3.026	162.0125 - 167.17	13.25 - 13.4
4.125 - 4.128	167.72 - 173.2	14.47 - 14.5
4.17725 - 4.17775	240 - 285	15.35 - 16.2
4.20725 - 4.20775	322 - 335.4	17.7 - 21.4
5.677 - 5.683	399.9 - 410	22.01 - 23.12
6.215 - 6.218	608 - 614	23.6 - 24.0
6.26775 - 6.26825	960 - 1427	31.2 - 31.8
6.31175 - 6.31225	1435 - 1626.5	36.43 - 36.5
8.291 - 8.294	1645.5 - 1646.5	Above 38.6
8.362 - 8.366	1660 - 1710	
8.37625 - 8.38675	1718.8 - 1722.2	
8.41425 - 8.41475	2200 - 2300	
12.29 - 12.293	2310 - 2390	
12.51975 - 12.52025	2483.5 - 2500	
12.57675 - 12.57725	2655 - 2900	
13.36 - 13.41	3260 - 3267	
16.42 - 16.423	3332 - 3339	
16.69475 - 16.69525	3345.8 - 3358	
16.80425 - 16.80475	3500 - 4400	
25.5 - 25.67	4500 - 5150	
37.5 - 38.25	5350 - 5460	
73 - 74.6	7250 - 7750	
74.8 - 75.2	8025 - 8500	
108 - 138	--	

* Certain frequency bands listed in table 7 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

Test procedure
ANSI C63.10-2013 Section 12.7.7.2, 12.7.5, 12.7.6
KDB 789033 D02 v02r01 – Section G

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

Table. RBW as a function of frequency

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

Average field strength measurements

Trace averaging with continuous EUT transmission at full power

If the EUT can be configured or modified to transmit continuously (D ≥ 98%), then the average emission levels shall be measured using the following method (with EUT transmitting continuously):
1. RBW = 1 ㎒ (unless otherwise specified).
2. VBW ≥ (3×RBW).
3. Detector = RMS (power averaging), if [span / (# of points in sweep)] ≤ (RBW / 2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.
4. Averaging type = power (i.e., rms):
   1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
   2) Some instruments require linear display mode to use linear voltage averaging. Log or ㏈ averaging shall not be used.
5. Sweep time = auto.
6. Perform a trace average of at least 100 traces.

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

If continuous transmission of the EUT (D ≥ 98%) cannot be achieved and the duty cycle is constant (duty cycle variations are less than ±2%), then the following procedure shall be used:
1. The EUT shall be configured to operate at the maximum achievable duty cycle.
2. Measure the duty cycle D of the transmitter output signal as described in 11.6.
3. RBW = 1 ㎒ (unless otherwise specified).
4. VBW ≥ [3 × RBW].
5. Detector = RMS (power averaging), if [span / (# of points in sweep)] ≤ (RBW / 2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span.
   If this condition cannot be satisfied, then the detector mode shall be set to peak.

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

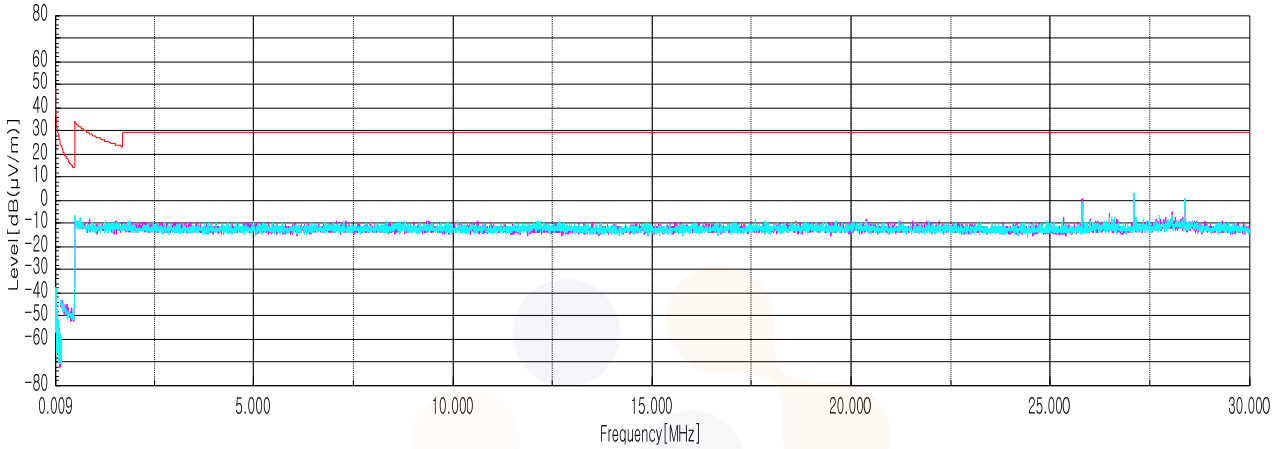
Notes:

1. f <30 MHz, extrapolation factor of 40 dB/decade of distance. $F_d = 40\log(D_m/D_s)$
   f ≥30 MHz, extrapolation factor of 20 dB/decade of distance. $F_d = 20\log(D_m/D_s)$
   Where:
   F_d= Distance factor in dB
   D_m= Measurement distance in meters
   D_s= Specification distance in meters
2. Factors(dB) = Antenna factor(dB/m) + Cable loss(dB) + or Amp. gain(dB) + or F_d(dB)
3. The worst-case emissions are reported however emissions whose levels were not within 20 dB of respective limits were not reported.
4. Average test would be performed if the peak result were greater than the average limit.
5. 1) means restricted band.
6. According to part 15.31(f)(2), an extrapolation factor of 40 dB/decade is applied because measured distance of radiated emission is 3m
7. Below 30 MHz frequency range, In order to search for the worst result, all orientations about parallel, perpendicular, and ground-parallel were investigated then reported. when the emission level was higher than 20 dB of the limit, then the following statement shall be made: “No spurious emissions were detected within 20 dB of the limit.”
8. For above 1 GHz pre-scan to detect harmonic and spurious emissions, the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 kHz for peak measurements.
9. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X kHz resulted in a level of Y dBμV/m, which is equivalent to Y - 51.5 = Z dBμA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to be 15.209(a) limit.

Test results (Below 30 ㎒) – Worst case: 802.11n HT20 / UNII-2C 5 500 ㎒

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

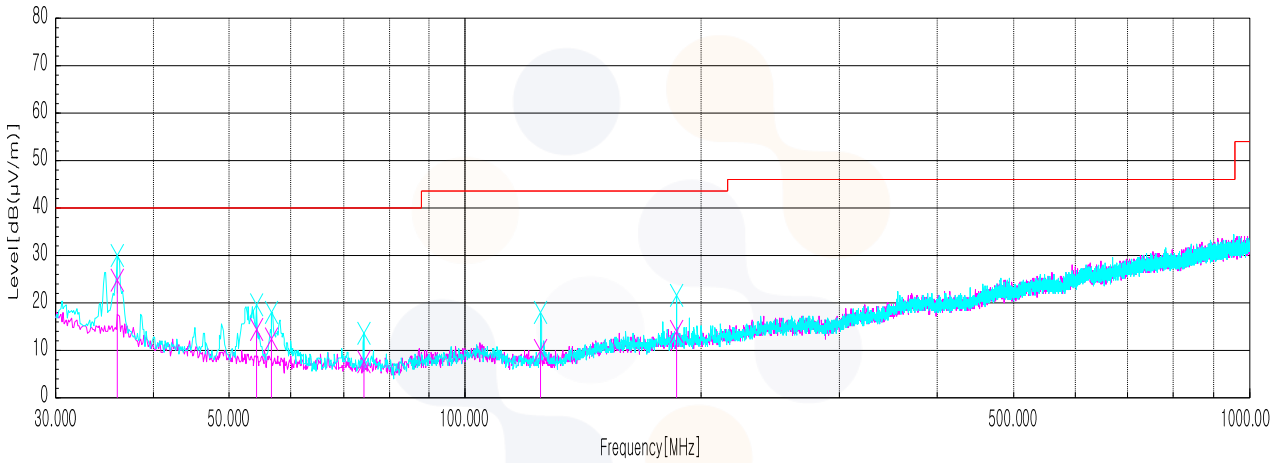
Horizontal/Vertical



Test results (Below 1 000 ㎒) – Worst case: 802.11n HT20 / UNII-2C 5 500 ㎒

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data								
36.06	V	35.20	19.67	-30.28	-	24.59	40.00	15.41
54.13	V	30.40	13.67	-29.81	-	14.26	40.00	25.74
56.68	V	28.50	13.43	-29.71	-	12.22	40.00	27.78
74.26[1)]	V	24.30	12.25	-29.41	-	7.14	40.00	32.86
124.94[1)]	V	25.10	12.80	-28.24	-	9.66	43.50	33.84
186.17	V	24.80	16.30	-27.28	-	13.82	43.50	29.68

Horizontal/Vertical



Test results (Above 1 000 ㎒)

802.11a_UNII-1

Lowest Channel (5 180 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 088.45[1)]	V	42.98	33.78	-24.56	-	52.20	74.00	21.80
10 397.42	V	56.38	37.24	-48.31	-	45.31	68.20	22.89
15 567.75[1)]	H	52.81	40.55	-44.28	-	49.08	74.00	24.92
Average Data								
5 088.45[1)]	V	32.08	33.78	-24.56	0.37	41.67	54.00	12.33

Middle Channel (5 200 ㎒)

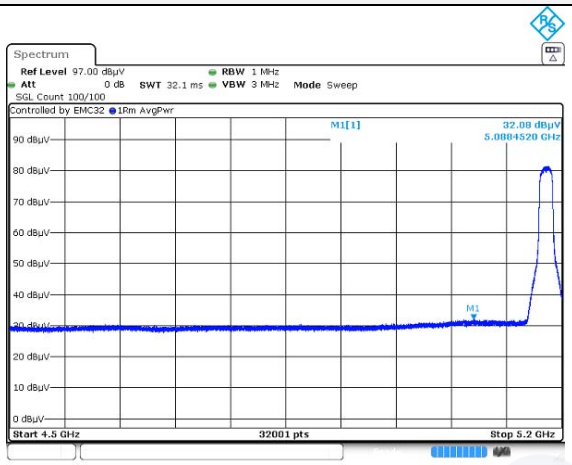
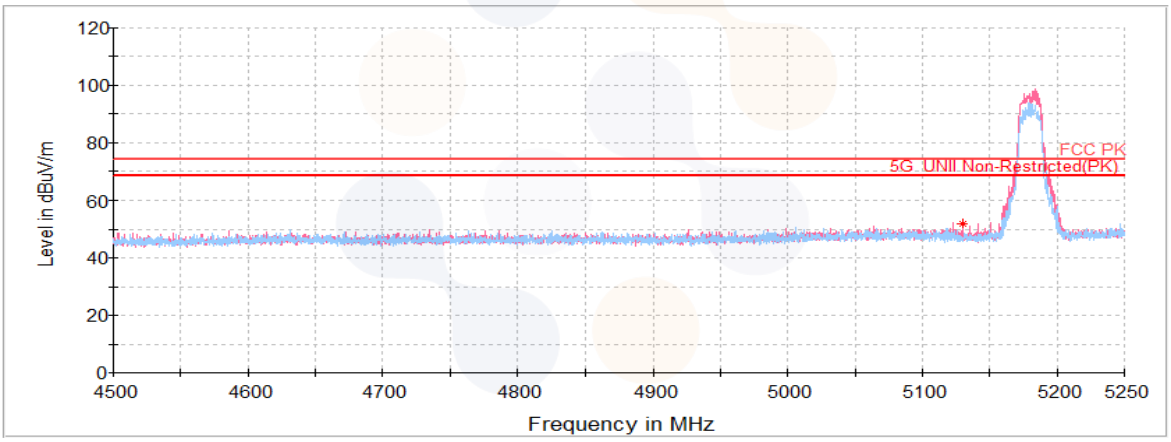
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 361.13	H	56.62	37.22	-48.29	-	45.55	68.20	22.65
15 513.13[1)]	V	53.12	40.51	-44.22	-	49.41	74.00	24.59
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit								

Highest Channel (5 240 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 407.13	H	57.45	37.24	-48.31	-	46.38	68.20	21.82
15 618.06[1)]	V	53.33	40.59	-44.33	-	49.59	74.00	24.41
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11a_UNII-1

Lowest Channel (5 180 ㎒)

Average data	
	Blank
Horizontal/Vertical for Band-edge	
	

802.11n HT20 UNII-1

Lowest Channel (5 180 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 076.25[1)]	V	42.67	33.75	-24.60	-	51.82	74.00	22.18
10 371.19	V	56.82	37.22	-48.29	-	45.75	68.20	22.45
15 536.84[1)]	H	52.60	40.53	-44.25	-	48.88	74.00	25.12
Average Data								
5 076.25[1)]	V	32.18	33.75	-24.60	0.37	41.70	54.00	12.30

Middle Channel (5 200 ㎒)

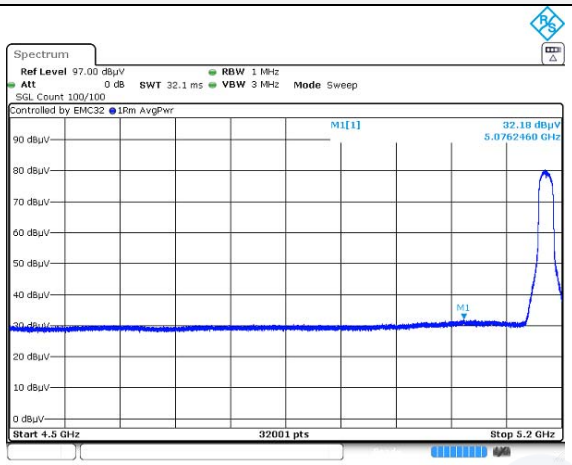
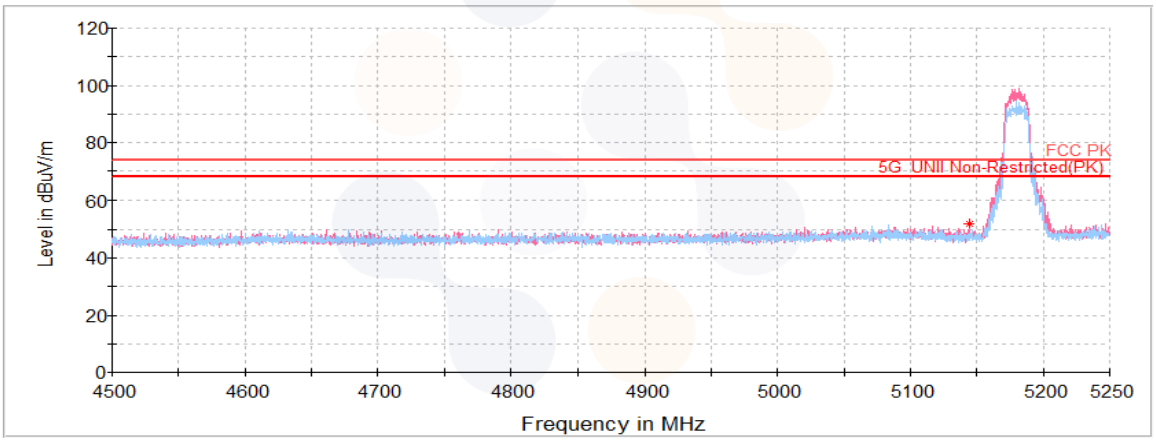
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 547.28	V	56.99	37.34	-48.35	-	45.98	68.20	22.22
15 510.25[1)]	V	53.28	40.51	-44.22	-	49.57	74.00	24.43
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit								

Highest Channel (5 240 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 409.64	V	56.62	37.25	-48.32	-	45.55	68.20	22.65
15 764.69[1)]	V	53.39	40.71	-44.47	-	49.63	74.00	24.37
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11n HT20 UNII-1

Lowest Channel (5 180 ㎒)

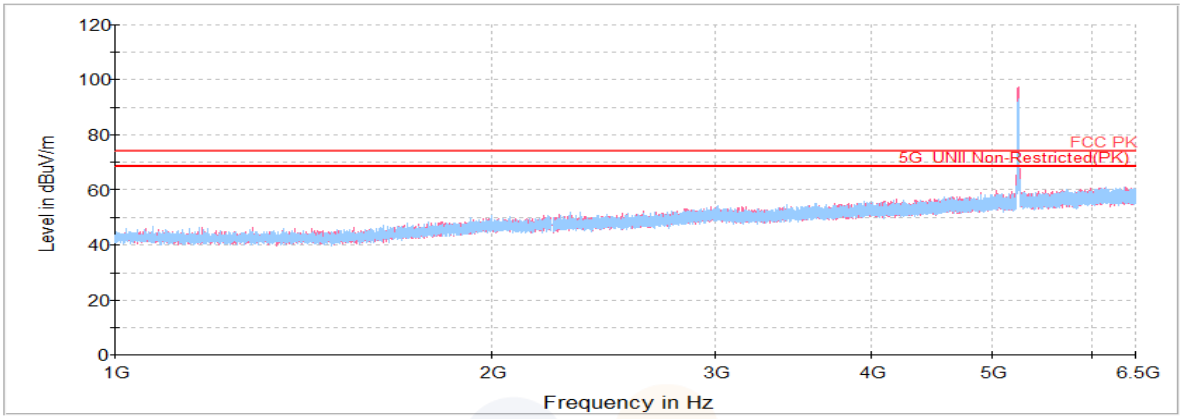
Average data	
	Blank
Horizontal/Vertical for Band-edge	
	

Plot of Harmonics and Spurious Emissions

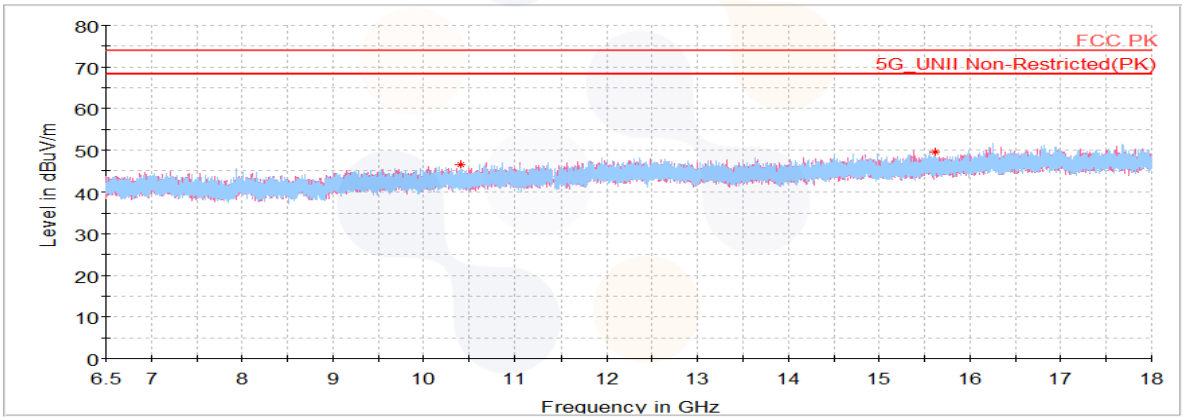
In order to simplify the report, attached plots were only the lowest margin condition

802.11a UNII-1_Lowest Channel (5 240 ㎒)

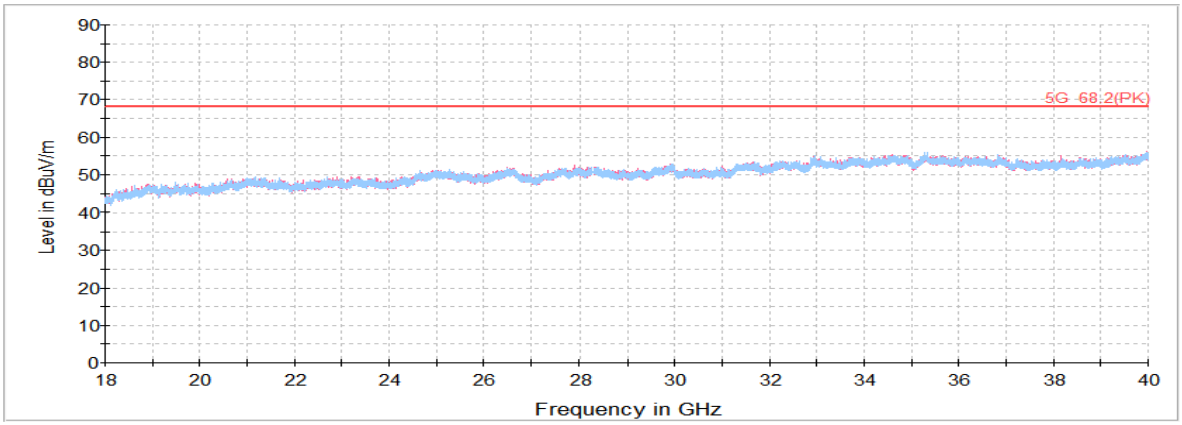
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓



Horizontal/Vertical for 18 ㎓ ~ 40 ㎓



802.11a UNII-2A

Lowest Channel (5 260 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 558.06	H	57.53	37.35	-48.34	-	46.54	68.20	21.66
15 799.19[1)]	H	52.67	40.74	-44.50	-	48.91	74.00	25.09
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Middle Channel (5 280 ㎒)

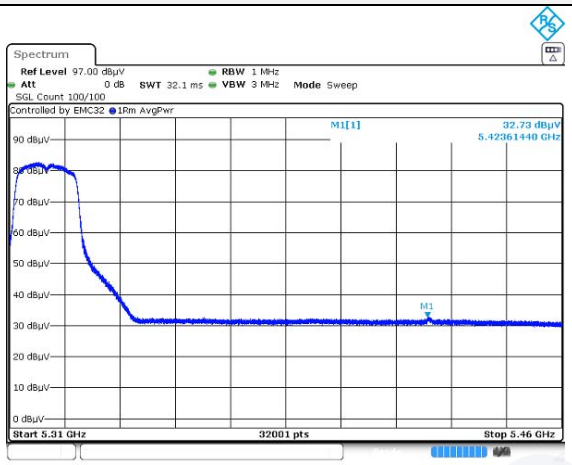
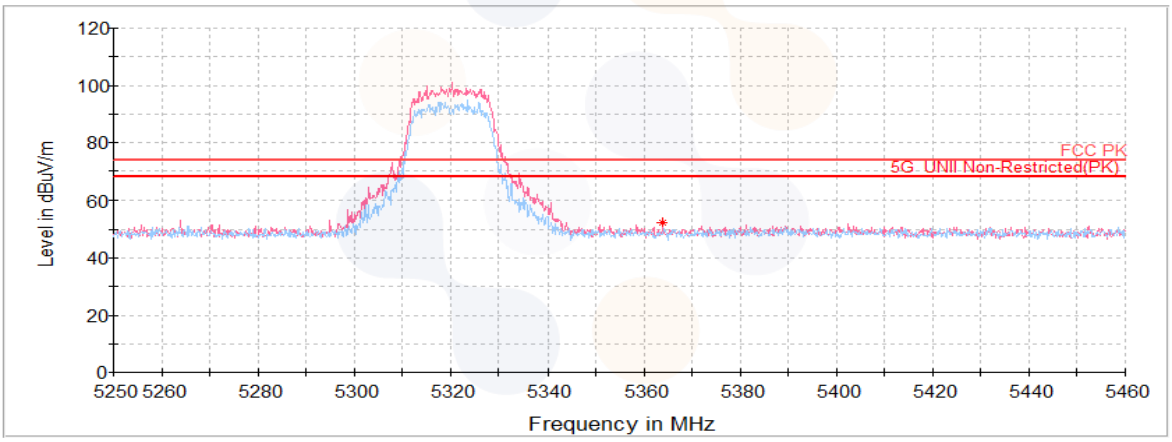
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 672.34[1)]	H	57.67	37.44	-48.28	-	46.83	74.00	27.17
15 942.22[1)]	V	54.23	40.85	-44.64	-	50.44	74.00	23.56
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Highest Channel (5 320 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 423.61[1)]	V	42.25	34.45	-24.42	-	52.28	74.00	21.72
10 608.38[1)]	V	57.40	37.39	-48.31	-	46.48	74.00	27.52
16 028.11[1)]	H	51.80	41.87	-44.69	-	48.98	74.00	25.02
Average Data								
5 423.61[1)]	V	32.73	34.45	-24.42	0.37	43.13	54.00	10.87

802.11a UNII-2A

Highest Channel (5 320 ㎒)

Average data	
	Blank
Horizontal/Vertical for Band-edge	
	

802.11n HT20_UNII-2A

Lowest Channel (5 260 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 558.06	H	57.53	37.35	-48.34	-	46.54	68.20	21.66
15 799.19[1)]	H	52.67	40.74	-44.50	-	48.91	74.00	25.09
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Middle Channel (5 280 ㎒)

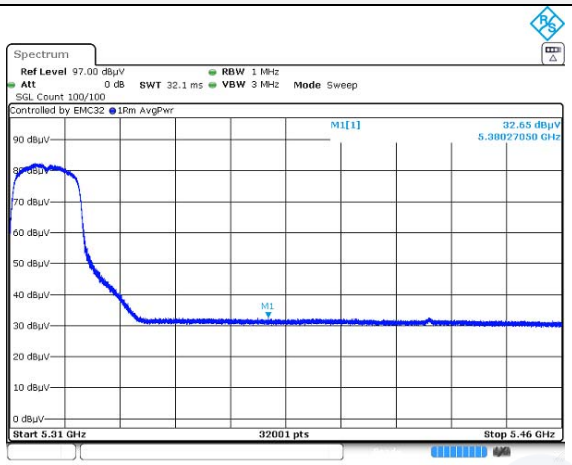
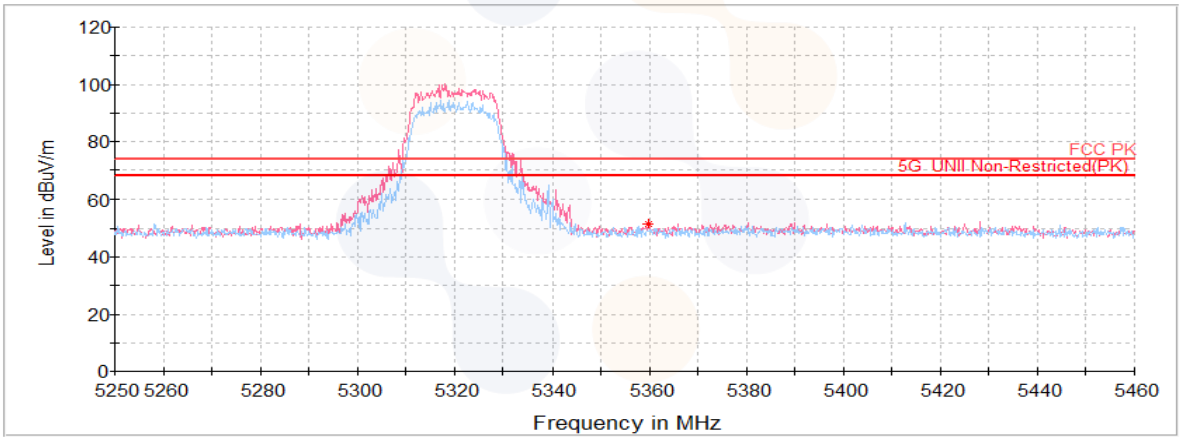
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 619.88[1)]	V	57.61	37.40	-48.31	-	46.70	74.00	27.30
14 153.25	H	56.11	38.96	-45.05	-	50.02	68.20	18.18
15 741.69[1)]	V	53.72	40.69	-44.45	-	49.96	74.00	24.04
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Highest Channel (5 320 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 380.27[1)]	V	41.84	34.36	-24.50	-	51.70	74.00	22.30
10 684.92[1)]	V	57.79	37.45	-48.27	-	46.97	74.00	27.03
15 963.06[1)]	H	53.65	40.87	-44.66	-	49.86	74.00	24.14
Average Data								
5 380.27[1)]	V	32.65	34.36	-24.50	0.37	42.88	54.00	11.12

802.11n HT20_UNII-2A

Highest Channel (5 320 ㎒)

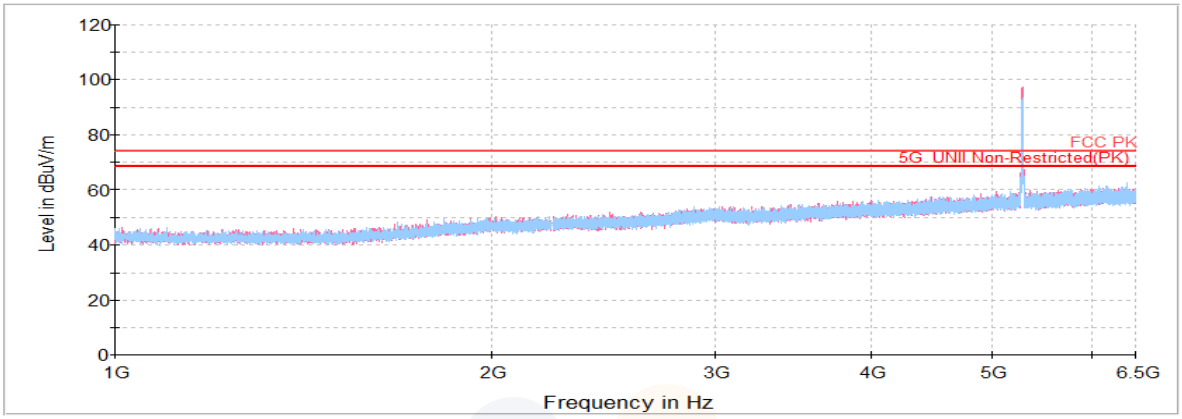
Average data	
	Blank
Horizontal/Vertical for Band-edge	
	

Plot of Harmonics and Spurious Emissions

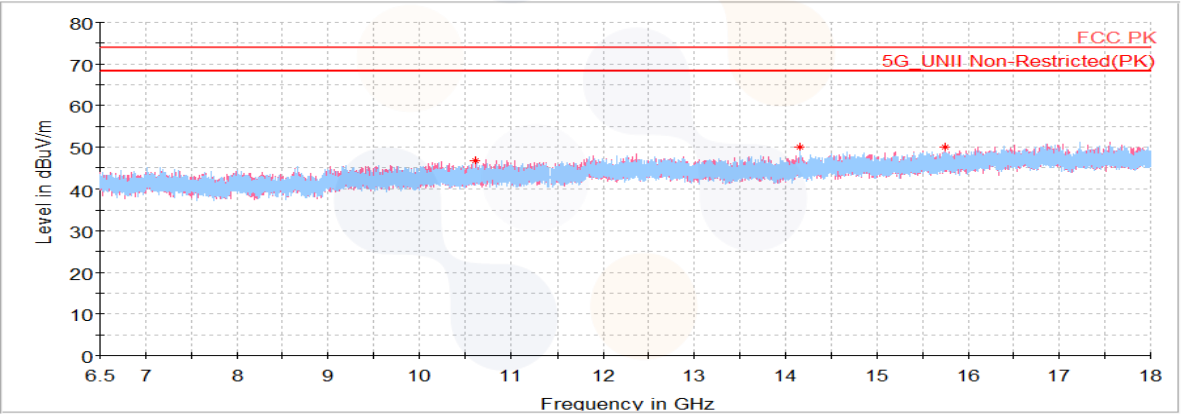
In order to simplify the report, attached plots were only the lowest margin condition

802.11n HT20 UNII-2A_Highest Channel (5 280 ㎒)

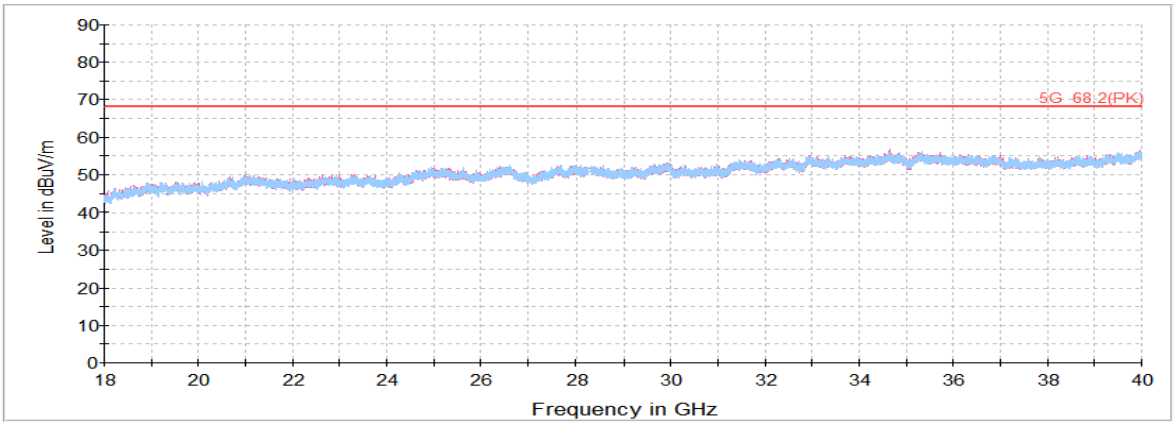
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓



Horizontal/Vertical for 18 ㎓ ~ 40 ㎓



802.11a_UNII-2C

Lowest Channel (5 500 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 395.99[1)]	V	42.20	34.39	-24.44	-	52.15	74.00	21.85
10 978.53[1)]	H	57.77	37.68	-48.11	-	47.34	74.00	26.66
16 572.56	V	52.33	42.72	-44.59	-	50.46	68.20	17.74
Average Data								
5 395.99[1)]	V	33.38	34.39	-24.44	0.37	43.70	54.00	10.30

Middle Channel (5 600 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
11 194.88[1)]	H	56.86	37.86	-48.07	-	46.65	74.00	27.35
16 847.13	V	52.96	43.16	-44.61	-	51.51	68.20	16.69
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

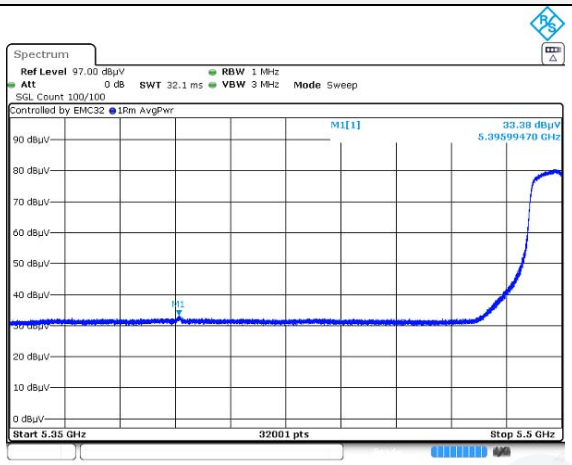
Highest Channel (5 700 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 733.09	V	40.78	34.88	-24.09	-	51.57	68.20	16.63
11 336.47[1)]	V	56.36	37.97	-48.05	-	46.28	74.00	27.72
17 191.77	V	53.48	41.35	-44.64	-	50.19	68.20	18.01
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11a_UNII-2C

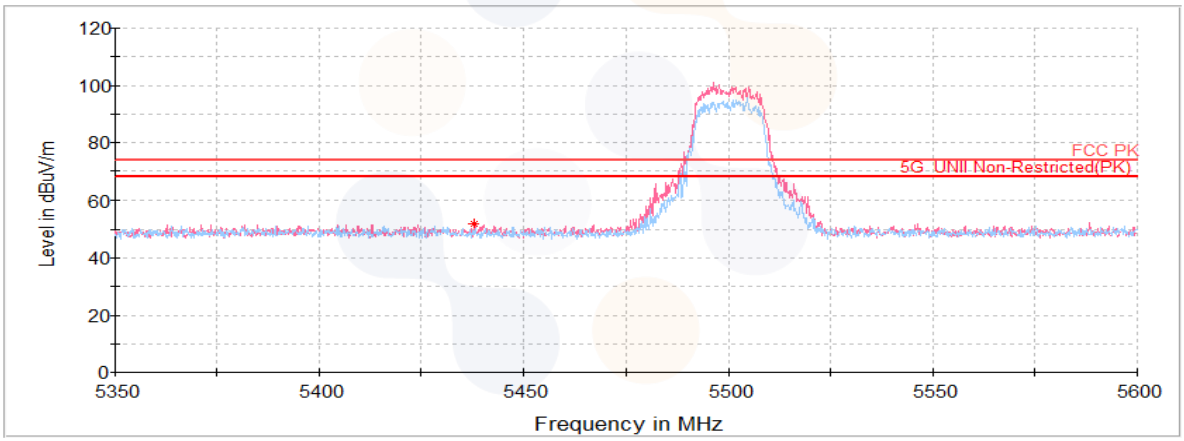
Lowest Channel (5 500 ㎒)

Average data



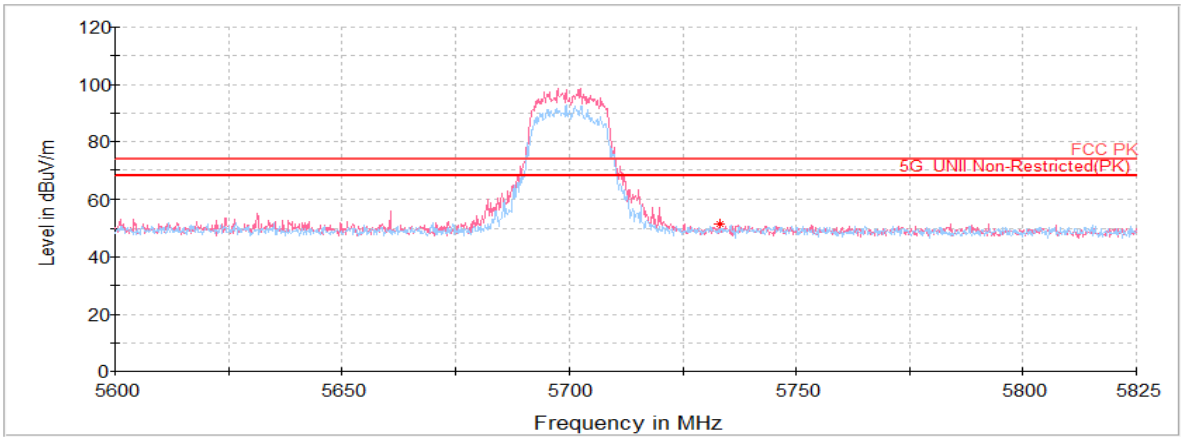
Blank

Horizontal/Vertical for Band-edge



Highest Channel (5 700 ㎒)

Horizontal/Vertical for Band-edge



802.11n HT20_UNII-2C

Lowest Channel (5 500 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 395.95[1)]	V	46.24	34.39	-24.44	-	56.19	74.00	17.81
10 978.17[1)]	V	57.53	37.68	-48.11	-	47.10	74.00	26.90
16 391.80	H	52.06	42.82	-44.61	-	50.27	68.20	17.93
Average Data								
5 395.95[1)]	V	33.59	34.39	-24.44	0.37	43.91	54.00	10.09

Middle Channel (5 600 ㎒)

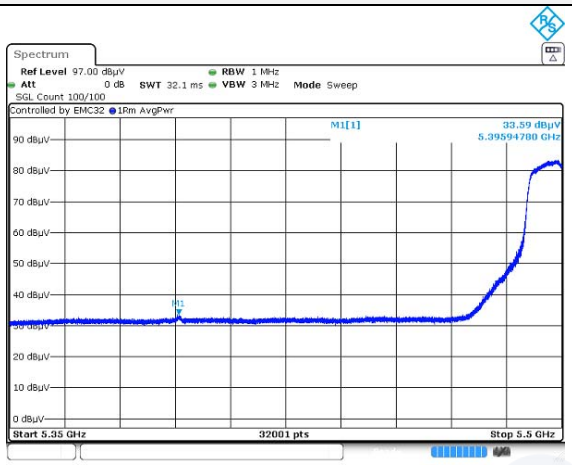
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
11 037.11[1)]	V	56.66	37.73	-48.10	-	46.29	74.00	27.71
16 516.14	V	51.89	42.63	-44.59	-	49.93	68.20	18.27
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Highest Channel (5 700 ㎒)

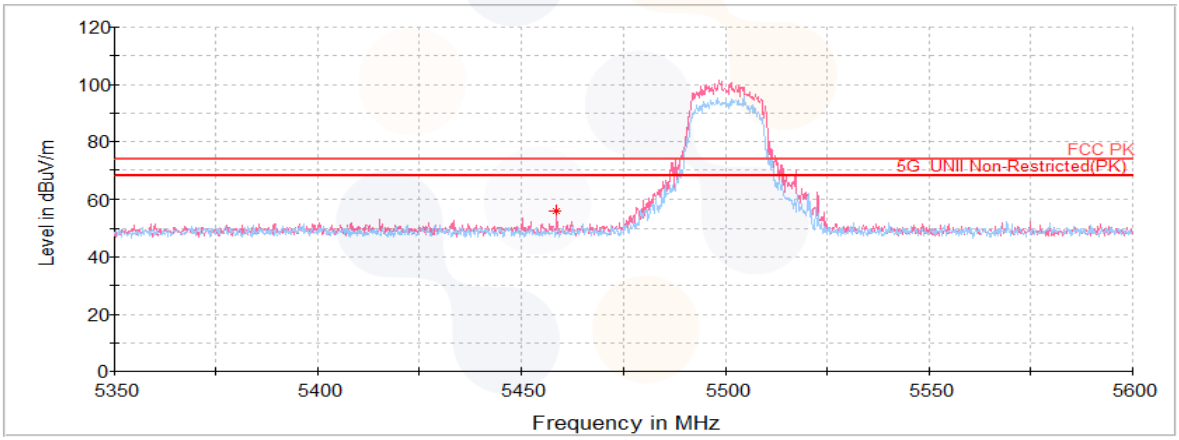
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 738.59	V	40.95	34.89	-24.08	-	51.76	68.20	16.44
11 355.52[1)]	V	57.41	37.98	-48.05	-	47.34	74.00	26.66
17 190.69	H	53.82	41.36	-44.64	-	50.54	68.20	17.66
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11n HT20_UNII-2C

Lowest Channel (5 500 ㎒)

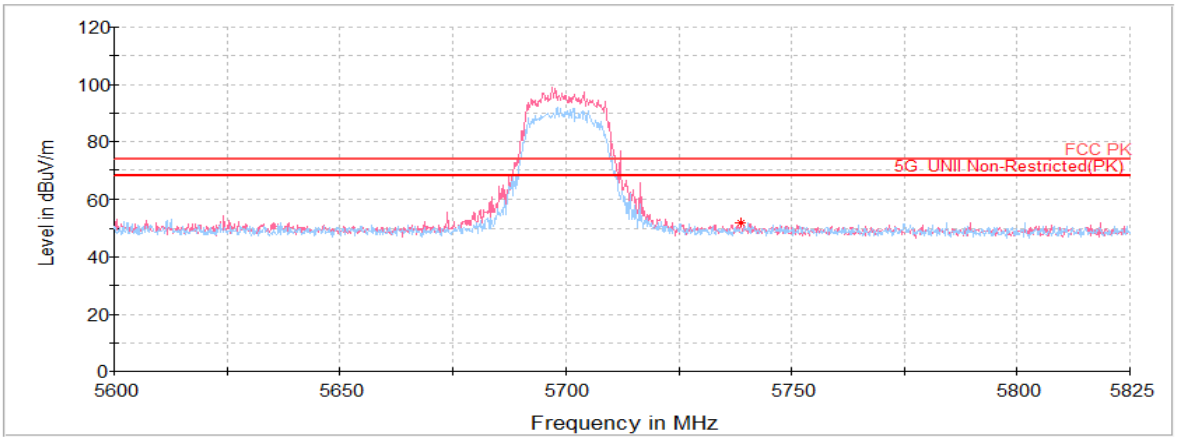
Average data	
	Blank

Horizontal/Vertical for Band-edge



Highest Channel (5 700 ㎒)

Horizontal/Vertical for Band-edge (5 700 ㎒)

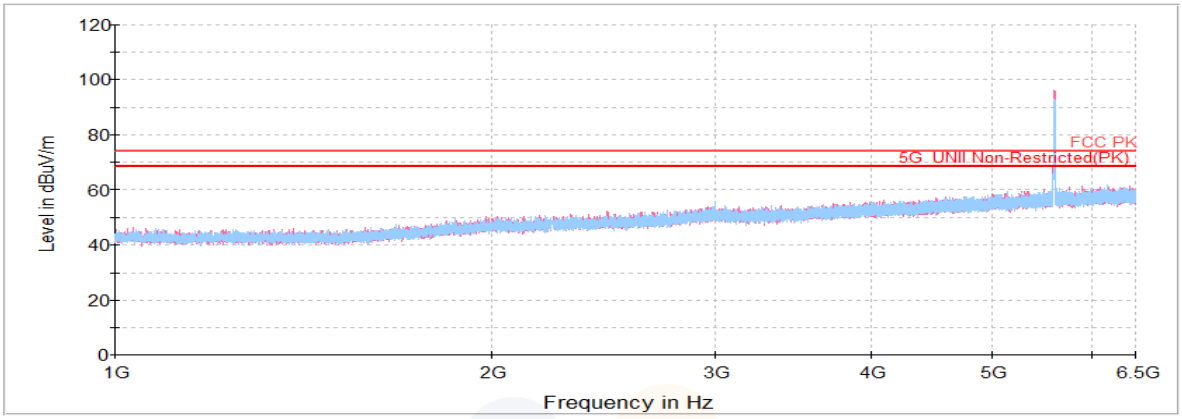


Plot of Harmonics and Spurious Emissions

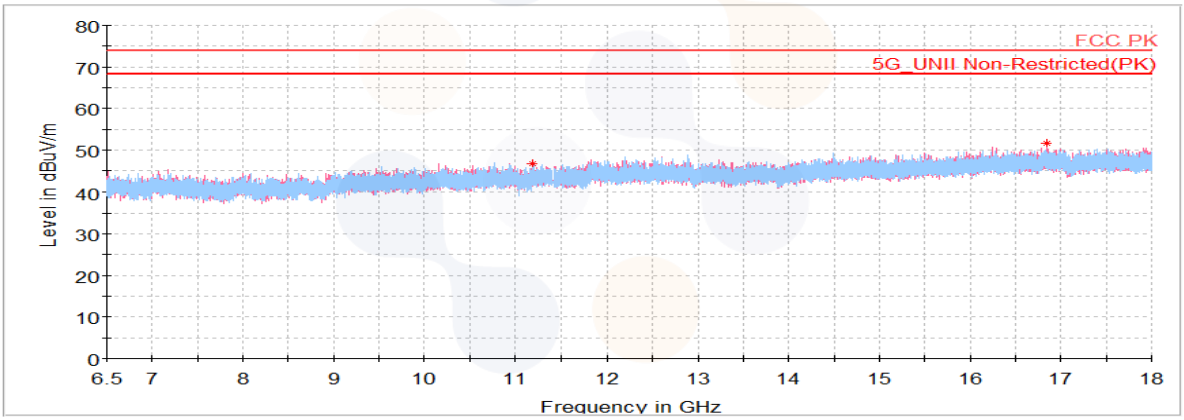
In order to simplify the report, attached plots were only the lowest margin condition

802.11a_UNII-2C_Lowest Channel (5 600 ㎒)

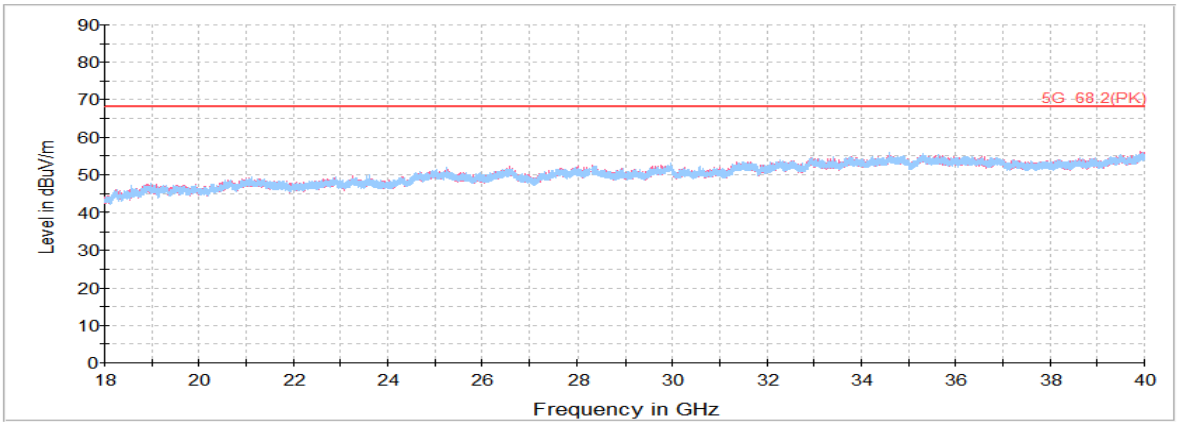
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓



Horizontal/Vertical for 18 ㎓ ~ 40 ㎓



Straddle Channel

802.11a (5 720 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
11 251.30[1)]	V	56.55	37.90	-48.06	-	46.39	74.00	27.61
17 238.13	H	53.45	41.27	-44.64	-	50.08	68.20	18.12
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11n HT20 (5 720 ㎒)

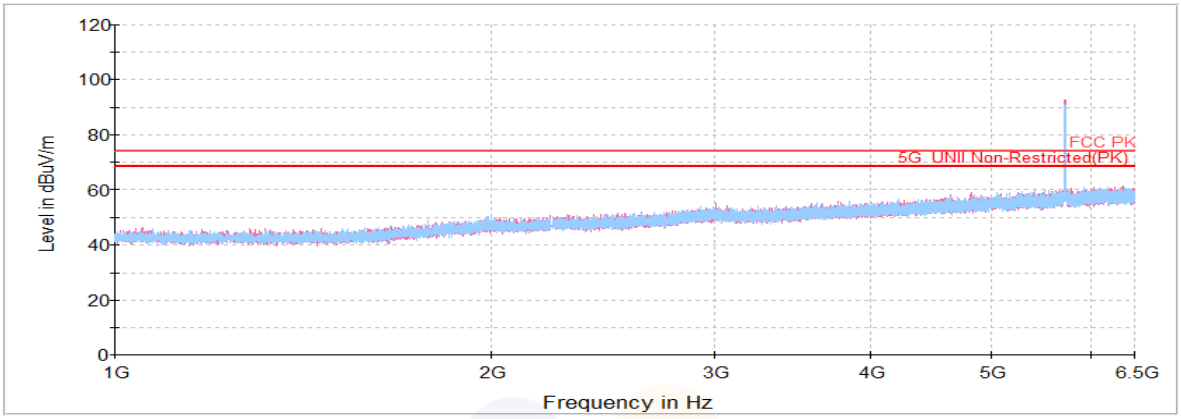
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
11 357.31[1)]	H	57.22	37.99	-48.05	-	47.16	74.00	26.84
17 175.59	V	52.54	41.38	-44.63	-	49.29	68.20	18.91
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Plot of Harmonics and Spurious Emissions

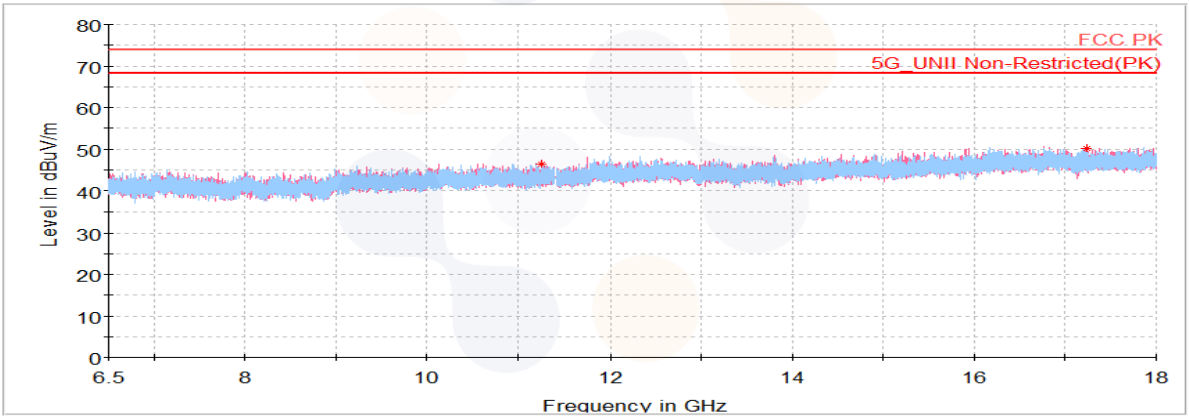
In order to simplify the report, attached plots were only the lowest margin condition

802.11a_Straddle Channel (5 720 ㎒)

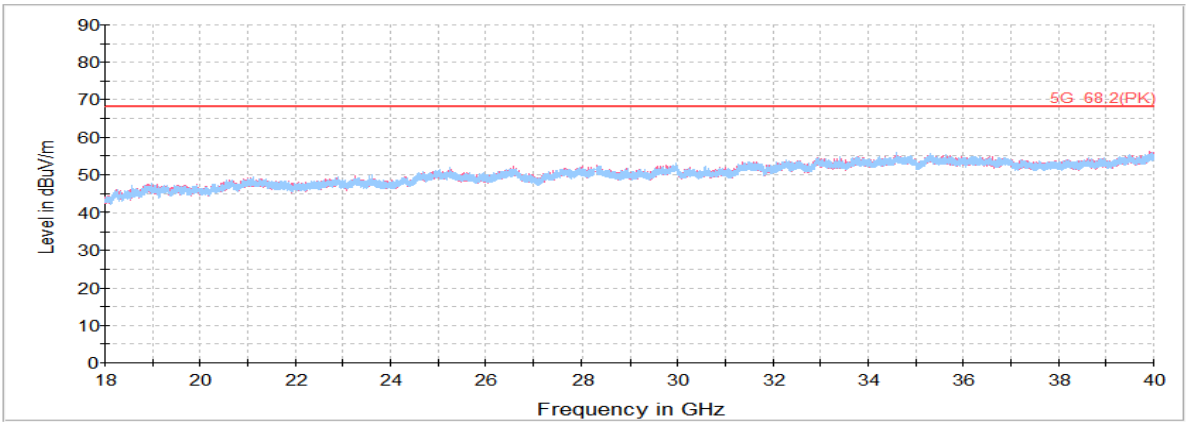
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓



Horizontal/Vertical for 18 ㎓ ~ 40 ㎓



802.11a_UNII-3

Lowest Channel (5 745 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 715.73	V	43.67	34.86	-24.12	-	54.41	109.61	55.20
11 382.11[1)]	H	56.50	38.01	-48.05	-	46.46	74.00	27.54
17 354.56	V	53.92	41.06	-44.65	-	50.33	68.20	17.87
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Middle Channel (5 785 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
11 475.91[1)]	H	56.50	38.08	-48.03	-	46.55	74.00	27.45
17 356.36	V	54.00	41.06	-44.65	-	50.41	68.20	17.79
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Highest Channel (5 825 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 862.86	V	40.44	35.04	-23.60	-	51.88	108.60	56.72
11 666.02[1)]	H	57.20	38.37	-47.76	-	47.81	74.00	26.19
17 390.14	H	54.24	41.00	-44.66	-	50.58	68.20	17.62
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11n HT20_UNII-3

Lowest Channel (5 745 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 721.58	V	43.32	34.87	-24.11	-	54.08	114.40	60.31
11 497.47[1)]	V	56.54	38.10	-48.03	-	46.61	74.00	27.39
17 237.77	H	53.40	41.27	-44.64	-	50.03	68.20	18.17
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Middle Channel (5 785 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
11 590.91[1)]	V	55.88	38.25	-47.88	-	46.25	74.00	27.75
17 380.44	V	54.09	41.02	-44.66	-	50.45	68.20	17.75
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

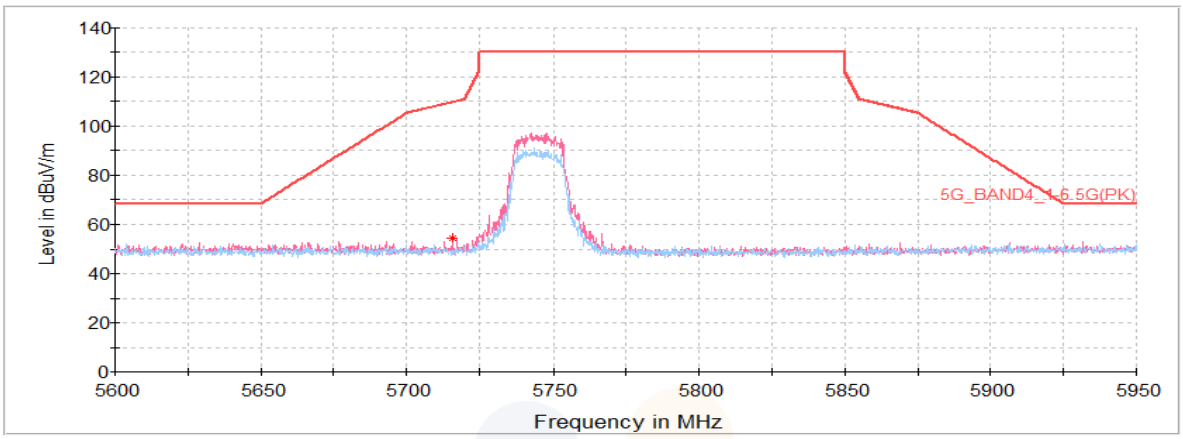
Highest Channel (5 825 ㎒)

Frequency	Pol.	Reading	Amp. + Cable	Antenna Factor	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 857.88	V	41.59	35.03	-23.63	-	52.99	110.00	57.01
11 647.33[1)]	H	56.41	38.34	-47.79	-	46.96	74.00	27.04
17 356.00	H	54.28	41.06	-44.65	-	50.69	68.20	17.51
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Plot of Band-edge, Harmonics and Spurious Emissions

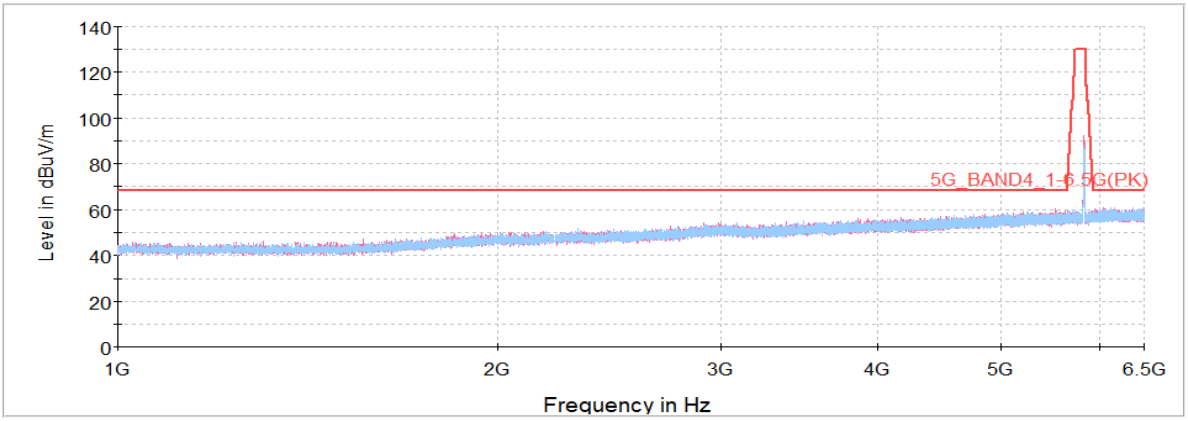
In order to simplify the report, attached plots were only the lowest margin condition

802.11a_UNII-3: Highest Channel (5 745 ㎒)

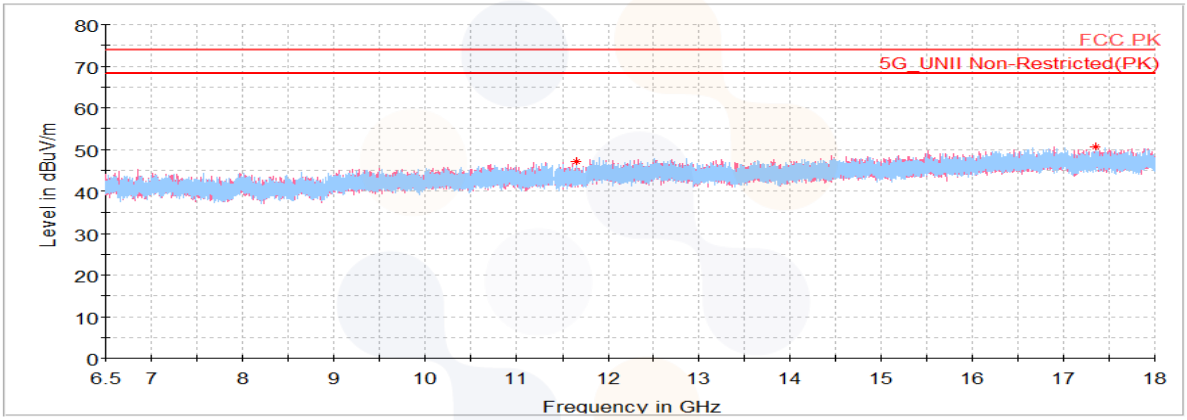
Horizontal/Vertical for Band-edge


802.11n HT20_UNII-3_Highest Channel (5 825 ㎒)

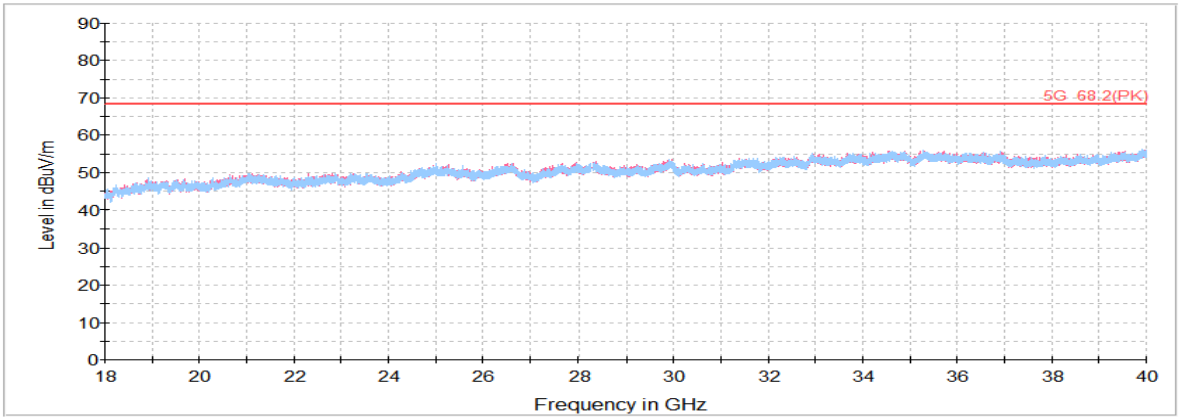
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓



Horizontal/Vertical for 18 ㎓ ~ 40 ㎓



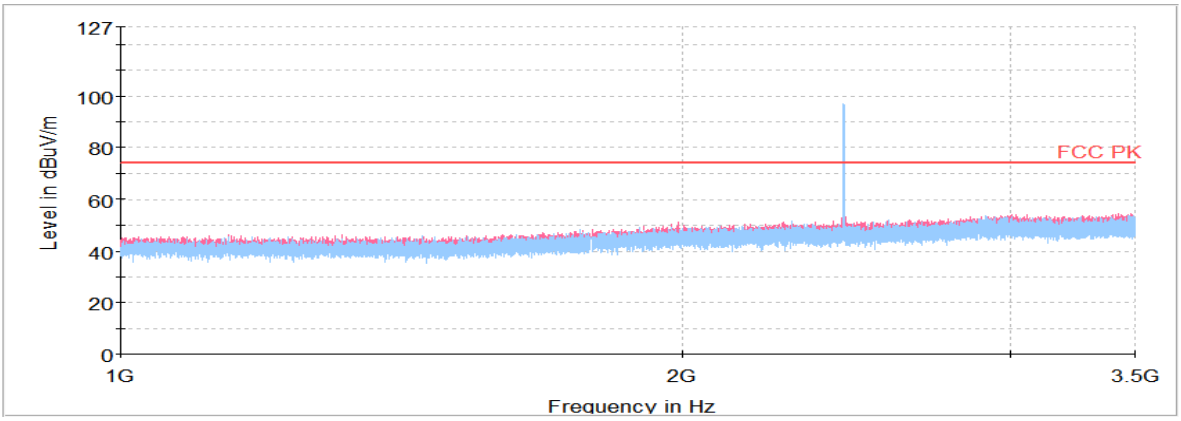
Spurious Emission for Simultaneous Tx Condition

Case	WLAN 5 GHz	Bluetooth
Mode	802.11a	BDR
Channel	120	39
Frequency	5 600	2 441
Data Rate	6	DH1

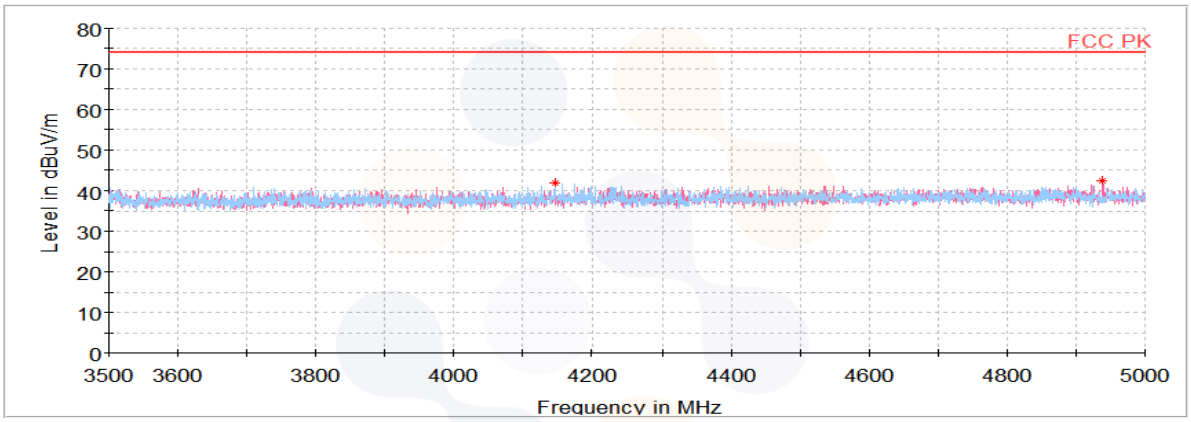
Notes.
The lowest margin condition among the channels and modes were selected for test.

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
4 146.16[1)]	H	60.73	33.49	-52.38	-	41.84	74.00	32.16
4 938.22[1)]	V	60.65	33.61	-51.92	-	42.34	74.00	31.66
11 263.16[1)]	V	56.13	37.91	-48.06	-	45.98	74.00	28.02
16 949.19	H	49.93	43.32	-44.61	-	48.64	74.00	25.36
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

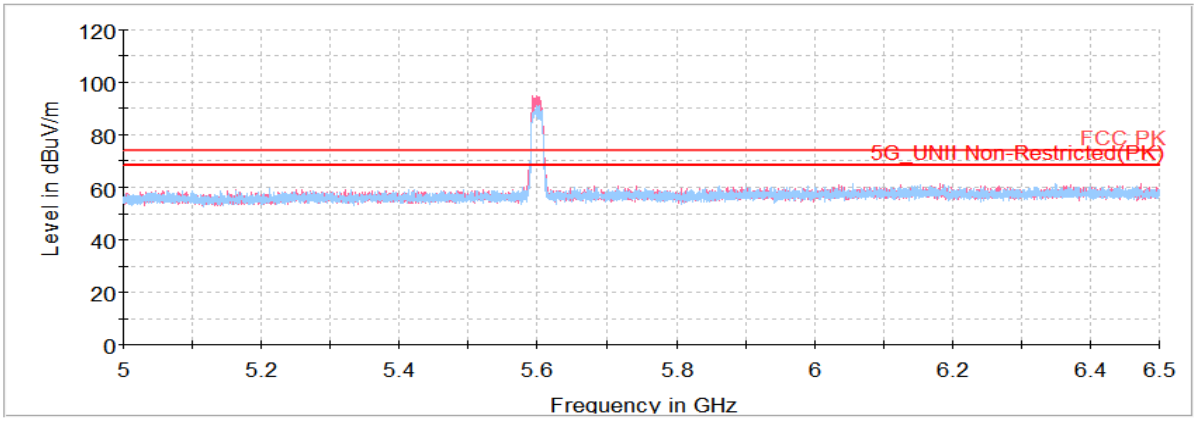
Horizontal/Vertical for 1 ㎓ ~ 3.5 ㎓



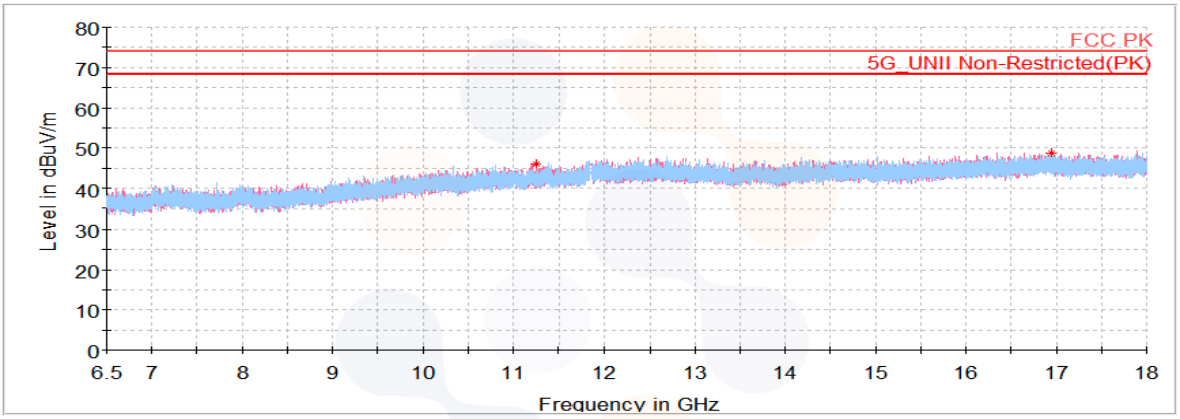
Horizontal/Vertical for 3.5 ㎓ ~ 5 ㎓



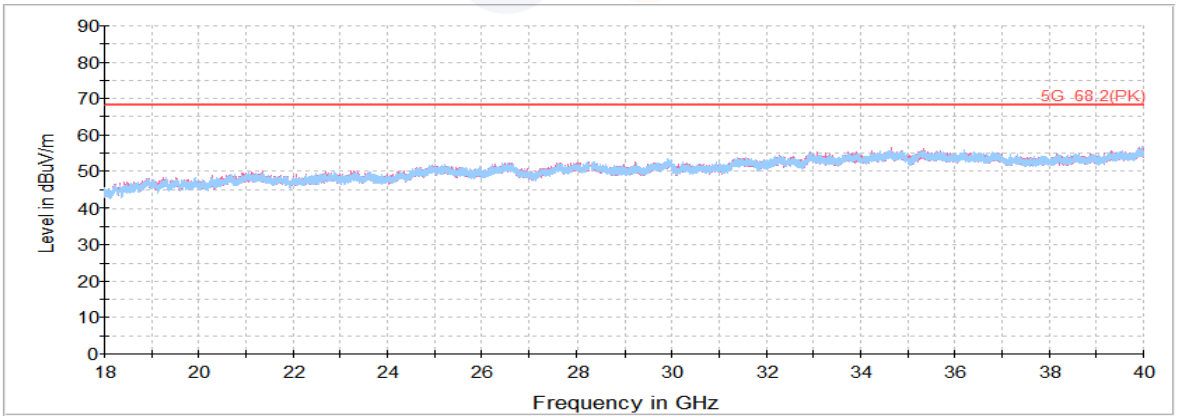
Horizontal/Vertical for 5 ㎓ ~ 6.5 ㎓



Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓

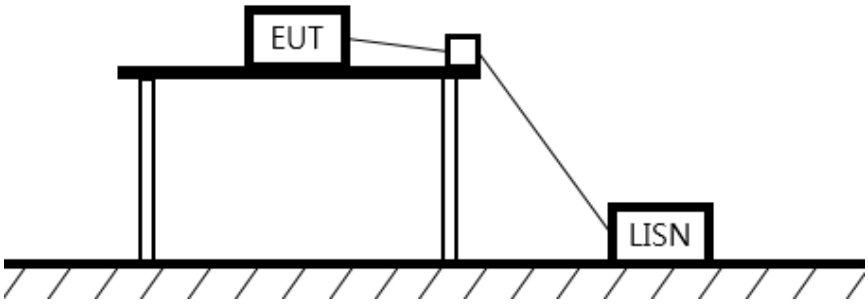


Horizontal/Vertical for 18 ㎓ ~ 40 ㎓



7.7. AC Conducted emission

Test setup



Limit

§15.407

According to 15.207(a) and RSS-Gen (8.8), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 ㎑ to 30 ㎒, shall not exceed the limits in the following table, as measured using a 50uH/50 ohm line impedance stabilization network (LISN). Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequencies ranges.

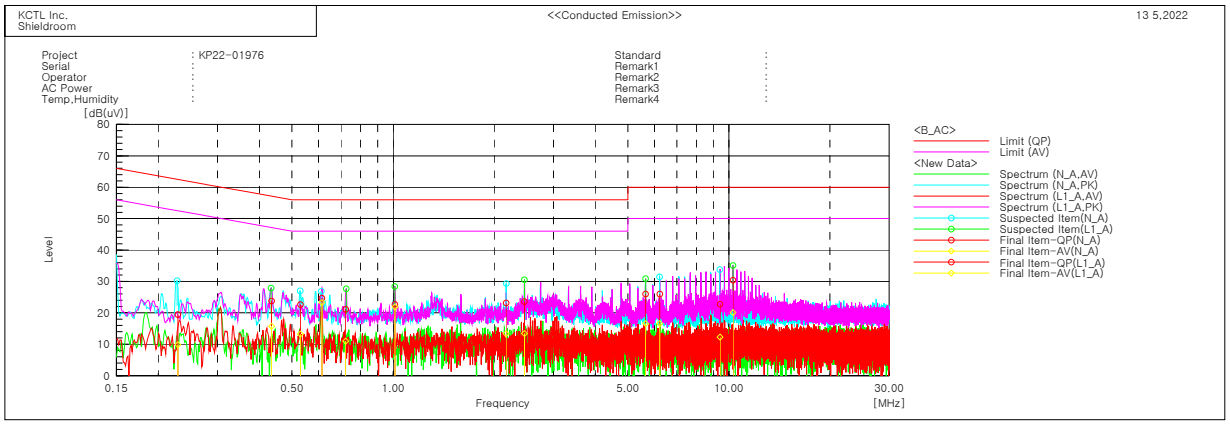
Frequency of Emission (㎒)	Conducted limit (dBμV/m)	
	Quasi-peak	Average
0.15 – 0.50	66 - 56*	56 - 46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

Measurement procedure

1. The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 ㎝ in which is located 40 ㎝ away from the vertical wall and 1.5m away from the side wall of the shielded room.
2. Each current-carrying conductor of the EUT power cord was individually connected through a 50Ω/50μH LISN, which is an input transducer to a spectrum analyzer or an EMI/Field Intensity Meter, to the input power source.
3. Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.
4. The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 ㎒ to 30 ㎒.
5. The measurements were made with the detector set to peak amplitude within a bandwidth of 10 ㎑ or to quasi-peak and average within a bandwidth of 9 ㎑. The EUT was in transmitting mode during the measurements.

Test results

Worst case: 802.11n HT20 / UNII-2C 5 500 ㎒



Final Result

--- N_A Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]
1	0.22859	9.8	0.1	9.7	19.5	9.8	62.5	52.5	43.0	42.7
2	0.53007	12.7	3.3	9.9	22.6	13.2	56.0	46.0	33.4	32.8
3	0.61357	14.8	13.3	9.9	24.7	23.2	56.0	46.0	31.3	22.8
4	2.17158	13.4	3.5	9.8	23.2	13.3	56.0	46.0	32.8	32.7
5	6.22615	16.1	6.7	9.9	26.0	16.6	60.0	50.0	34.0	33.4
6	9.40601	12.6	2.2	10.1	22.7	12.3	60.0	50.0	37.3	37.7

--- L1_A Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]
1	0.43511	13.9	5.8	9.9	23.8	15.7	57.2	47.2	33.4	31.5
2	0.72299	11.3	1.2	9.8	21.1	11.0	56.0	46.0	34.9	35.0
3	1.01238	12.9	12.0	9.8	22.7	21.8	56.0	46.0	33.3	24.2
4	2.4614	13.8	3.6	9.8	23.6	13.4	56.0	46.0	32.4	32.6
5	5.64754	16.1	6.7	9.9	26.0	16.6	60.0	50.0	34.0	33.4
6	10.27927	20.2	9.9	10.2	30.4	20.1	60.0	50.0	29.6	29.9

8. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSV30	101437	22.07.27
Attenuator	Weinschel ENGINEERING	56-10	51395	23.01.21
Signal Generator	R&S	SMB100A	176206	23.01.19
Vector Signal Generator	R&S	SMBV100A	257566	22.07.09
Power Sensor	R&S	NRP-Z81	1137.9009.02-106225-JM	23.05.03*
Attenuator	HP	8491A	29738	22.12.21
DC Power Supply	Agilent	E3632A	MY40018781	23.05.02*
Spectrum Analyzer	R&S	FSV40	100989	22.12.21
EMI TEST RECEIVER	R&S	ESCI7	100732	23.01.19
Bi-Log Antenna	TESEQ	CBL 6112D	55545	24.04.27*
Amplifier	SONOMA INSTRUMENT	310N	284608	22.08.19
ATTENUATOR	KEYSIGHT	8491B-6dB	MY39271060	24.04.27*
ISOLATION TRANSFORMER	ONETECH CO., LTD	OT-IT500VA	OTR1-16026	23.03.28
Horn antenna	ETS.lindgren	3117	155787	22.10.05
Horn antenna	ETS.lindgren	3116	00086635	23.05.04*
Attenuator	API Inmet	40AH2W-10	12	23.05.03*
Broadband PreAmplifier	SCHWARZBECK	BBV9718	216	22.07.27
AMPLIFIER	L-3 Narda-MITEQ	AMF-7D-01001800-22-10P	2003683	22.08.19
AMPLIFIER	L-3 Narda-MITEQ	JS44-18004000-33-8P	2000996	23.01.19
LOOP Antenna	R&S	HFH2-Z2	100355	22.08.21
Antenna Mast	Innco Systems	MA4640-XP-ET	-	-
Turn Table	Innco Systems	CO3000	1175/45850319/P	-
Antenna Mast	Innco Systems	MA4000-EP	303	-
Turn Table	Innco Systems	CO3000	1175/45850319/P	-
Highpass Filter	WT	WT-A1699-HS	WT160411002	23.05.03*
TWO-LINE V - NETWORK	R&S	ENV216	101358	22.09.29
EMI TEST RECEIVER	R&S	ESCI3	100001	22.08.19

* Tests related to this equipment were progressed after the calibration was completed.

End of test report