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	Report No.: KR22-SRF0019 Page (1) of (107)	eurofins | KCTL

1. Client

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
- Date of Receipt : 2021-12-30

2. Use of Report : Certification

3. Name of Product / Model : Mobile Phone / SM-A235M/DS

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

5. FCC ID : A3LSMA235M

6. Date of Test : 2022-01-10 to 2022-02-14

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

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

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

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

2022-02-16

KCTL Inc.

REPORT REVISION HISTORY

Date	Revision	Page No
2022-02-16	Originally issued	-

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

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	:	Mobile Phone
Model	:	SM-A235M/DS
Derivative model	:	SM-A235M
Modulation technique	:	Bluetooth(BDR/EDR)_GFSK, π/4DQPSK, 8DPSK Bluetooth(BLE)_GFSK WIFI(802.11a/b/g/n/ac)_DSSS, OFDM LTE_QPSK, 16QAM, 64QAM WCDMA_QPSK GSM_GMSK, 8-PSK NFC_ASK
Number of channels	:	Bluetooth(BDR/EDR)_79 ch / Bluetooth(BLE)_40 ch 802.11b/g/n_HT20 : 13 ch UNII-1: 4 ch (20 ㎒), 2 ch (40 ㎒), 1 ch (80 ㎒) UNII-2A: 4 ch (20 ㎒), 2 ch (40 ㎒), 1 ch (80 ㎒) UNII-2C: 12 ch (20 ㎒), 6 ch (40 ㎒), 3 ch (80 ㎒) UNII-3: 5 ch (20 ㎒), 2 ch (40 ㎒), 1 ch (80 ㎒) NFC: 1 ch
Power source	:	DC 3.88 Ⅴ
Antenna specification	:	LTE/WCDMA/GSM_MFA Antenna WIFI/Bluetooth(BDR/EDR/BLE)_MFA Antenna NFC_FPCB Antenna

Antenna gain	:	WIFI/Bluetooth(BDR/EDR/BLE)_-4.0 dBi UNII-1 : -4.3 dBi UNII-2A : -4.5 dBi UNII-2C : -4.3 dBi UNII-3 : -3.5 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/ac_HT20/VHT20) UNII-1: 5 190 ㎒ ~ 5 230 ㎒ (802.11n/ac_HT40/VHT40) UNII-1: 5 210 ㎒ (802.11ac_VHT80) UNII-2A: 5 260 ㎒ ~ 5 320 ㎒ (802.11a/n/ac_HT20/VHT20) UNII-2A: 5 270 ㎒ ~ 5 310 ㎒ (802.11n/ac_HT40/VHT40) UNII-2A: 5 290 ㎒ (802.11ac_VHT80) UNII-2C: 5 500 ㎒ ~ 5 720 ㎒ (802.11a/n/ac_HT20/VHT20) UNII-2C: 5 510 ㎒ ~ 5 710 ㎒ (802.11n/ac_HT40/VHT40) UNII-2C: 5 530 ㎒ ~ 5 690 ㎒ (802.11ac_VHT80) UNII-3: 5 745 ㎒ ~ 5 825 ㎒ (802.11a/n/ac_HT20/VHT20) UNII-3: 5 755 ㎒ ~ 5 795 ㎒ (802.11n/ac_HT40/VHT40) UNII-3: 5 775 ㎒ (802.11ac_VHT80) 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 17_706.5 ㎒ ~ 713.5 ㎒ LTE Band 13_779.5 ㎒ ~ 784.5 ㎒ LTE Band 26_824.7 ㎒ ~ 848.3 ㎒, 814.7 ㎒ ~ 823.3 ㎒ LTE Band 41_2 498.5 ㎒ ~ 2 687.5 ㎒ LTE Band 66_1 710.7 ㎒ ~ 1 779.3 ㎒ GSM 850_824.2 ㎒ ~ 848.8 ㎒ GSM 1900_1 850.2 ㎒ ~ 1 909.8 ㎒ WCDMA 850_826.4 ㎒ ~ 846.6 ㎒ WCDMA 1700_1 712.4 ㎒ ~ 1 752.6 ㎒ WCDMA 1900_1 852.4 ㎒ ~ 1 907.6 ㎒ NFC_13.56 ㎒
Software version	:	A235M.001
Hardware version	:	REV0.3
Test device serial No.	:	Conducted(R38RC00V7AD, R38RC00WR1A) Radiated(R38RC00VADR)
Operation temperature	:	-20 ℃ ~ 50 ℃

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

2.1. Frequency/channel operations

This device contains the following capabilities:
WiFi (802.11a/b/g/n/ac), Bluetooth (BDR/EDR/BLE), NFC
LTE Band 2, LTE Band 4, LTE Band 5, LTE Band 12, LTE Band 13, LTE Band 17, LTE Band 26, LTE Band 41, LTE Band 66, GSM 850, GSM 1900, WCDMA 850, WCDMA 1700, WCDMA 1900

UNII-1

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

UNII-2A

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

UNII-2C

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

UNII-3

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

Table 2.1-1. 802.11a/n/ac_HT20/VHT20 mode

UNII-1

Ch.	Frequency (㎒)
38	5 190
46	5 230

UNII-2A

Ch.	Frequency (㎒)
54	5 270
62	5 310

UNII-2C

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

UNII-3

Ch.	Frequency (㎒)
151	5 755
159	5 795

Table 2.1-2. 802.11n/ac_HT40/VHT40 mode

UNII-1

Ch.	Frequency (㎒)
42	5 210

UNII-2A

Ch.	Frequency (㎒)
58	5 290

UNII-2C

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

UNII-3

Ch.	Frequency (㎒)
155	5 775

Table 2.1-3. 802.11ac_VHT80 mode

2.2. Simultaneous Tx Condition

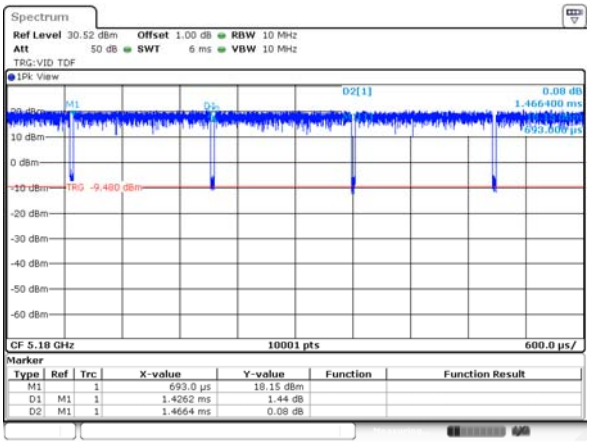
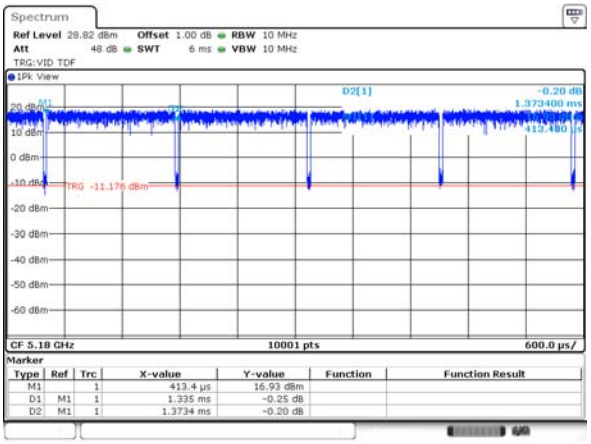
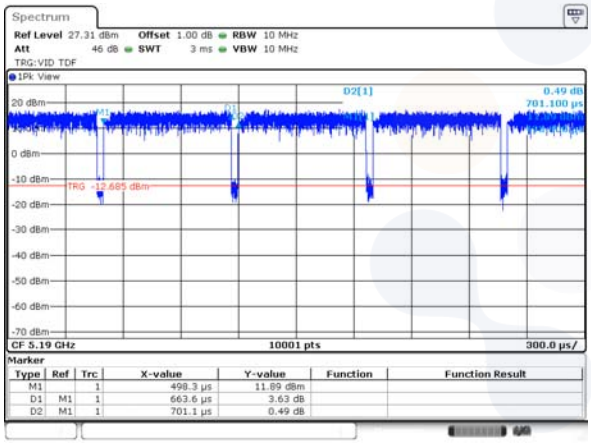
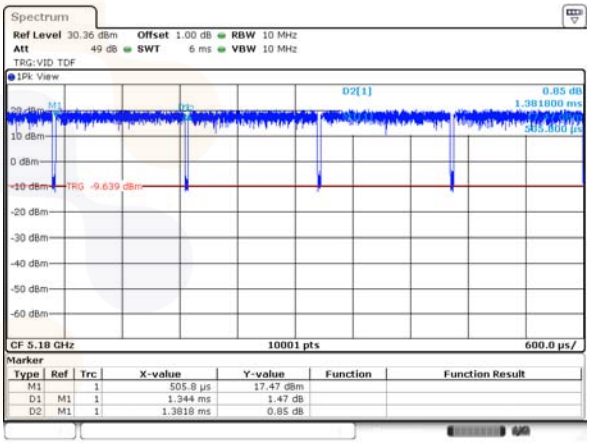
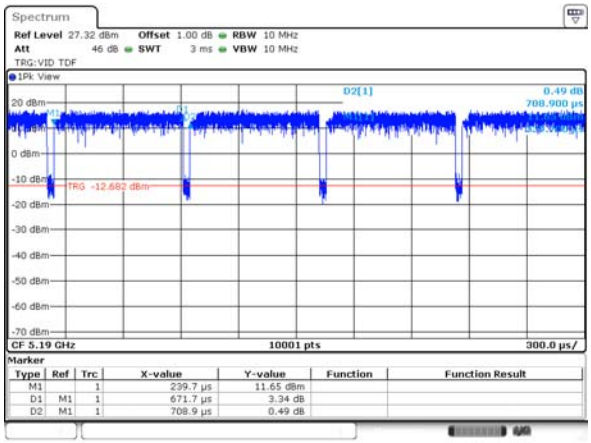
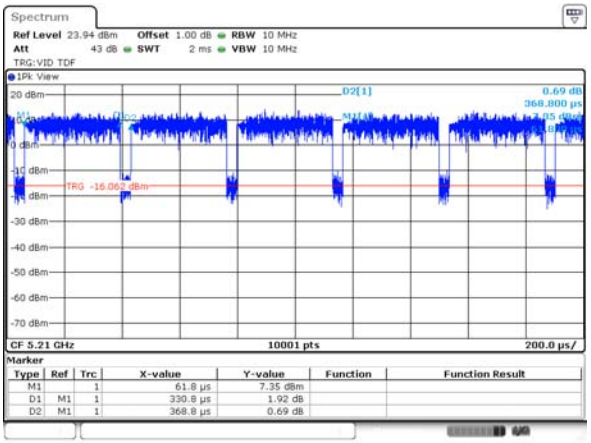
Mode	Bluetooth	WLAN 5 ㎓
WLAN 5 ㎓ + Bluetooth	O	O

2.3. Duty Cycle Factor

Test mode	Period (ms)	T_{on} time (ms)	Duty cycle		Duty cycle factor (dB)
			(Linear)	(%)	
802.11a	1.466 4	1.426 2	0.972 6	97.26	0.12
802.11n_HT20	1.373 4	1.335 0	0.972 0	97.20	0.12
802.11n_HT40	0.701 1	0.663 6	0.946 5	94.65	0.24
802.11ac_VHT20	1.381 8	1.344 0	0.972 6	97.26	0.12
802.11ac_VHT40	0.708 9	0.671 7	0.947 5	94.75	0.23
802.11ac_VHT80	0.368 8	0.330 8	0.897 0	89.70	0.47

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
	
802.11n_HT40	**802.11ac_VHT20**
	
802.11ac_VHT40	**802.11ac_VHT80**
	

3. Antenna requirement

Requirement of FCC part section 15.203

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

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

4. Summary of tests

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

Notes:

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

5. Measurement uncertainty

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

All measurement uncertainty values are shown with a coverage factor of k=2 to 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	9 kHz ~ 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.

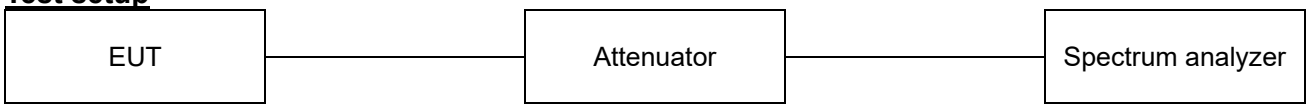
Frequency (㎒)	Factor(㏈)	Frequency (㎒)	Factor(㏈)
30	10.21	9000	13.05
50	10.25	10000	13.08
100	10.34	11000	13.16
200	10.44	12000	13.32
300	10.57	13000	13.35
400	10.59	14000	13.42
500	10.69	15000	13.52
600	10.72	16000	13.56
700	10.79	17000	13.67
800	10.90	18000	13.71
900	10.91	19000	13.95
1000	10.95	20000	13.97
2000	11.89	21000	14.00
3000	11.95	22000	14.06
4000	12.24	23000	14.14
5000	12.33	24000	14.20
6000	12.48	25000	14.51
7000	12.65	26000	14.56
8000	13.02	26500	15.08

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

7. Test results

7.1. Maximum conducted output power

Test setup



Limit

According to §15.407(a),

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

Note:

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

Test procedure

ANSI C63.10-2013-Section 12.3.3.2 and 14.2
KDB 789033 D02 v02r01 - Section E.2.d) or e)

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×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.2.e)
Method SA-2 Alternative (power averaging(rms) detection with slow sweep with each spectrum bin averaging across on and off times of the EUT transmissions, followed by duty cycle correction):

(i) Measure the duty cycle, x, of the transmitter output signal as described in II.B..
(ii) Set span to encompass the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.
(iii) Set RBW = 1 ㎒
(iv) Set RBW ≥ 3 ㎒
(v) Number of points in sweep ≥ 2×span/RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
(vi) Manually set sweep time ≥ 10 × (number of points in sweep) × (total on/off period of the transmitted signal).
(vii) Set detector = power averaging (rms)
(viii) Perform a single sweep.
(ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument’s band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If

the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 ㎒ intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the spectrum.

(x) Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission). For example, add 10 log(1/0,25) = 6 ㏈ if the duty cycle is 25%.

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

(xi) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied.

- The EUT is configured to transmit continuously or to transmit with a constant duty cycle.
- At all times when the EUT is transmitting, it must be transmitting at its maximum power control level.
- The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five

(xii) If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in Ⅱ

(xiii) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.

(xiv) Adjust the measurement in ㏈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%).

Section E.3.b)
Method PM-G (Measurement using a gated RF average power meter):
Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

Test results

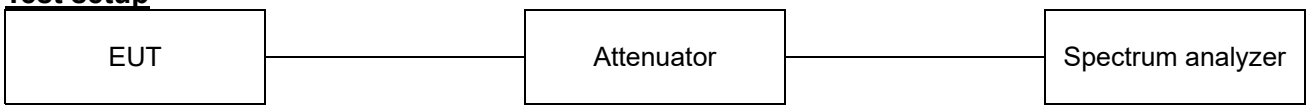
Test mode	Band	Frequency (㎒)	Measured output power			Limit (dBm)
			Reading (dBm)	DCF (dB)	Result (dBm)	
802.11a	UNII 1	5 180	16.08	0.12	16.20	23.98
		5 200	16.27	0.12	16.39	
		5 240	16.08	0.12	16.20	
	UNII 2A	5 260	16.37	0.12	16.49	23.98
		5 280	16.59	0.12	16.71	
		5 320	16.59	0.12	16.71	
	UNII 2C	5 500	16.37	0.12	16.49	23.98
		5 600	16.47	0.12	16.59	
		5 700	16.39	0.12	16.51	
	UNII 3	5 745	16.72	0.12	16.84	30.00
		5 785	16.06	0.12	16.18	
		5 825	16.17	0.12	16.29	
802.11n HT20	UNII 1	5 180	15.58	0.12	15.70	23.98
		5 200	15.66	0.12	15.78	
		5 240	15.68	0.12	15.80	
	UNII 2A	5 260	15.79	0.12	15.91	23.98
		5 280	15.68	0.12	15.80	
		5 320	15.51	0.12	15.63	
	UNII 2C	5 500	15.14	0.12	15.26	23.98
		5 600	15.30	0.12	15.42	
		5 700	15.19	0.12	15.31	
	UNII 3	5 745	15.67	0.12	15.79	30.00
		5 785	15.39	0.12	15.51	
		5 825	15.72	0.12	15.84	
802.11n HT40	UNII 1	5 190	14.11	0.24	14.35	23.98
		5 230	14.26	0.24	14.50	
	UNII 2A	5 270	14.44	0.24	14.68	23.98
		5 310	14.50	0.24	14.74	
	UNII 2C	5 510	14.15	0.24	14.39	23.98
		5 590	14.63	0.24	14.87	
		5 670	14.31	0.24	14.55	
	UNII 3	5 755	14.48	0.24	14.72	30.00
		5 795	14.33	0.24	14.57	

Test mode	Band	Frequency (㎒)	Measured output power			Limit (dBm)
			Reading (dBm)	DCF (dB)	Result (dBm)	
802.11ac VHT20	UNII 1	5 180	15.55	0.12	15.67	23.98
		5 200	15.67	0.12	15.79	
		5 240	15.75	0.12	15.87	
	UNII 2A	5 260	15.65	0.12	15.77	23.98
		5 280	15.74	0.12	15.86	
		5 320	15.59	0.12	15.71	
	UNII 2C	5 500	15.15	0.12	15.27	23.98
		5 600	15.33	0.12	15.45	
		5 700	15.24	0.12	15.36	
	UNII 3	5 745	15.01	0.12	15.13	30.00
		5 785	15.68	0.12	15.80	
		5 825	15.60	0.12	15.72	
802.11ac VHT40	UNII 1	5 190	14.02	0.23	14.25	23.98
		5 230	14.34	0.23	14.57	
	UNII 2A	5 270	14.43	0.23	14.66	23.98
		5 310	14.44	0.23	14.67	
	UNII 2C	5 510	14.16	0.23	14.39	23.98
		5 590	14.66	0.23	14.89	
		5 670	14.29	0.23	14.52	
	UNII 3	5 755	14.57	0.23	14.80	30.00
		5 795	14.36	0.23	14.59	
802.11ac VHT80	UNII 1	5 210	12.33	0.47	12.80	23.98
	UNII 2A	5 290	12.23	0.47	12.70	23.98
	UNII 2C	5 530	11.77	0.47	12.24	23.98
		5 610	11.68	0.47	12.15	
	UNII 3	5 775	11.76	0.47	12.23	30.00

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

7.2. Maximum Power Spectral Density

Test setup



Limit

According to §15.407(a)

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

Notes:

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

Test procedure

ANSI C63.10-2013 Section 12.3.2.2, 14.3.2.2
KDB 789033 D02 v02r01 - Section F

Test settings

Section F

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

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

   a) If Method SA-2 or SA-2 Alternative was used, add 10 log (1/x), where x is the duty cycle, to the peak of the spectrum.
   b) If Method SA-3 Alternative was used and the linear mode was used in II.E.2.g) (viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.
4. The result is the Maximum PSD over 1 MHz 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	7.67	0.12	7.79	11
		5 200	7.15	0.12	7.27	
		5 240	6.73	0.12	6.85	
	UNII 2A	5 260	7.70	0.12	7.82	11
		5 280	7.99	0.12	8.11	
		5 320	9.36	0.12	9.48	
	UNII 2C	5 500	7.78	0.12	7.90	11
		5 600	7.74	0.12	7.86	
		5 700	7.75	0.12	7.87	
802.11n HT20	UNII 1	5 180	6.62	0.12	6.74	11
		5 200	6.82	0.12	6.94	
		5 240	6.98	0.12	7.10	
	UNII 2A	5 260	7.02	0.12	7.14	11
		5 280	7.22	0.12	7.34	
		5 320	6.60	0.12	6.72	
	UNII 2C	5 500	6.15	0.12	6.27	11
		5 600	6.55	0.12	6.67	
		5 700	6.25	0.12	6.37	
802.11n HT40	UNII 1	5 190	2.36	0.24	2.60	11
		5 230	2.43	0.24	2.67	
	UNII 2A	5 270	3.10	0.24	3.34	11
		5 310	2.58	0.24	2.82	
	UNII 2C	5 510	2.38	0.24	2.62	11
		5 590	3.17	0.24	3.41	
		5 670	2.26	0.24	2.50	
802.11ac VHT20	UNII 1	5 180	6.83	0.12	6.95	11
		5 200	6.63	0.12	6.75	
		5 240	7.19	0.12	7.31	
	UNII 2A	5 260	6.95	0.12	7.07	11
		5 280	7.11	0.12	7.23	
		5 320	6.76	0.12	6.88	
	UNII 2C	5 500	6.27	0.12	6.39	11
		5 600	6.19	0.12	6.31	
		5 700	6.35	0.12	6.47	

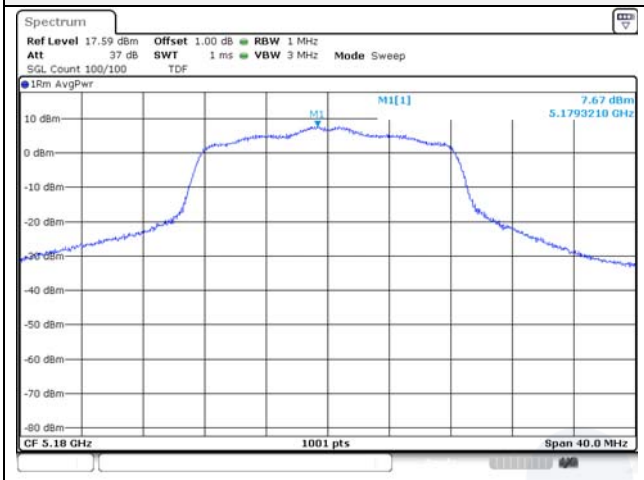
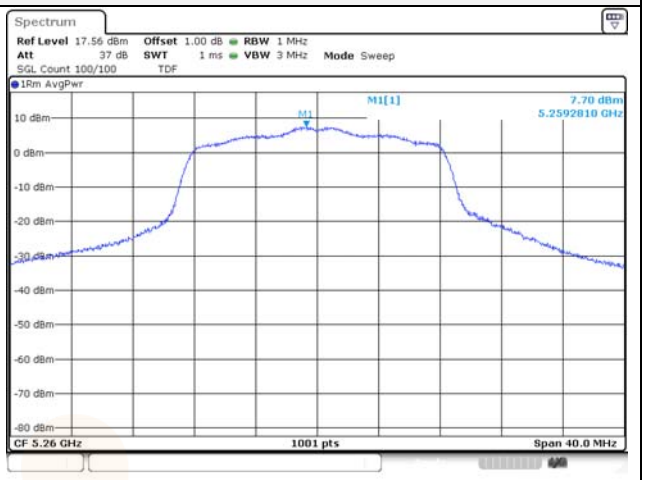
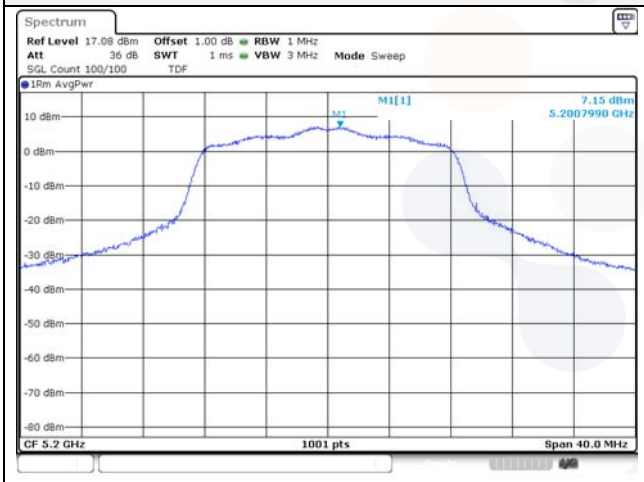
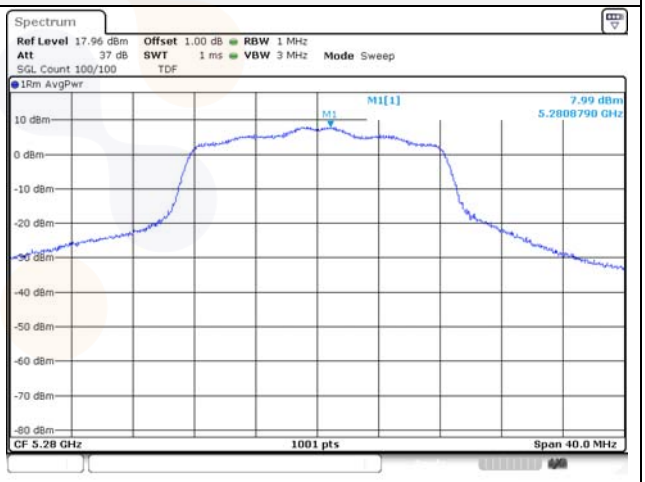
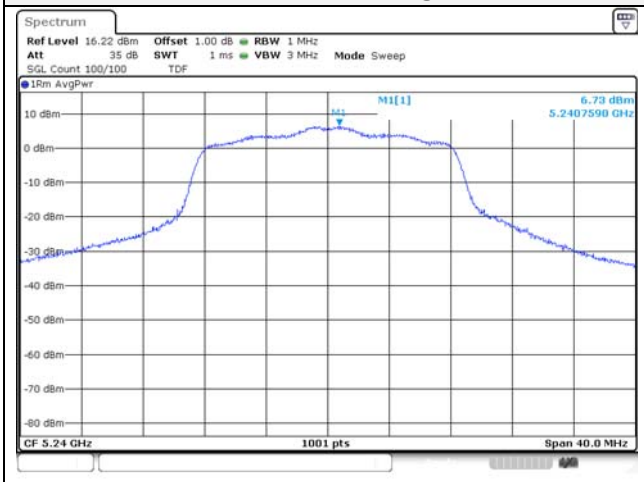
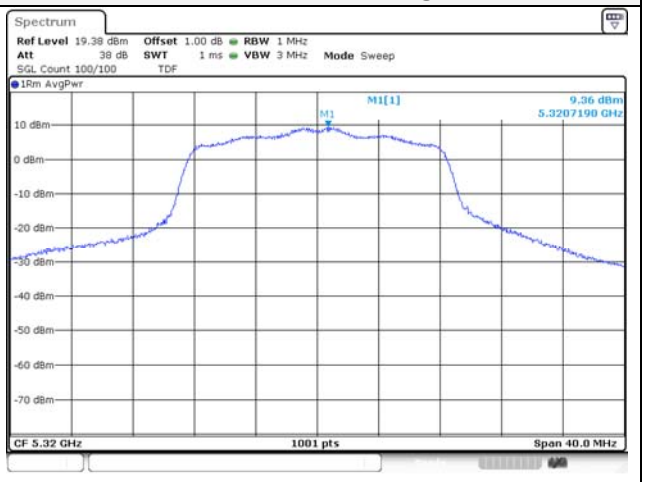
Test mode	Band	Frequency (㎒)	Measured PSD (dBm/㎒)	DCF (dB)	Maximum PSD (dBm/㎒)	Limit (dBm/㎒)
802.11ac VHT40	UNII 1	5 190	2.37	0.23	2.60	11
		5 230	2.48	0.23	2.71	
	UNII 2A	5 270	3.44	0.23	3.67	11
		5 310	2.59	0.23	2.82	
	UNII 2C	5 510	2.57	0.23	2.80	11
		5 590	3.42	0.23	3.65	
		5 670	2.32	0.23	2.55	
802.11ac VHT80	UNII 1	5 210	-2.17	0.47	-1.70	11
	UNII 2A	5 290	-2.67	0.47	-2.20	11
	UNII 2C	5 530	-2.64	0.47	-2.17	11
		5 610	-2.79	0.47	-2.32	

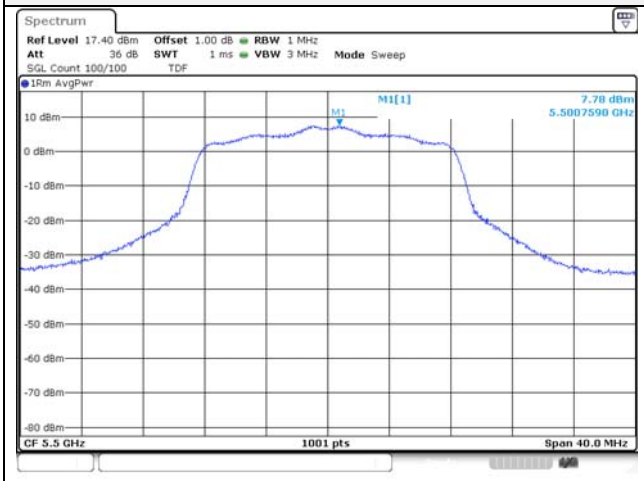
Test mode	Band	Frequency (㎒)	Measured PSD (dBm /500 ㎑)	DCF (dB)	Maximum PSD (dBm /500 ㎑)	Limit (dBm /500 ㎑)
802.11a	UNII 3	5 745	5.31	0.12	5.43	30
		5 785	5.12	0.12	5.24	
		5 825	5.31	0.12	5.43	
802.11n HT20		5 745	4.70	0.12	4.82	
		5 785	4.56	0.12	4.68	
		5 825	4.57	0.12	4.69	
802.11n HT40		5 755	0.54	0.24	0.78	
		5 795	-0.14	0.24	0.10	
802.11ac VHT20		5 745	4.84	0.12	4.96	
		5 785	4.21	0.12	4.33	
		5 825	4.88	0.12	5.00	
802.11ac VHT40		5 755	0.07	0.23	0.30	
		5 795	-0.01	0.23	0.22	
802.11ac VHT80		5 775	-4.43	0.47	-3.96	

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.
	
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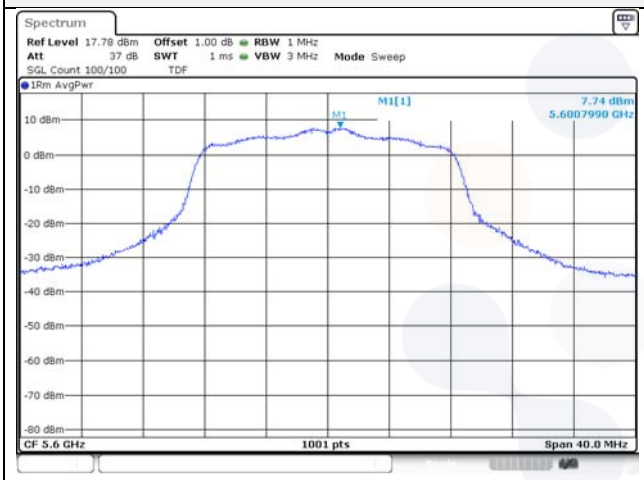	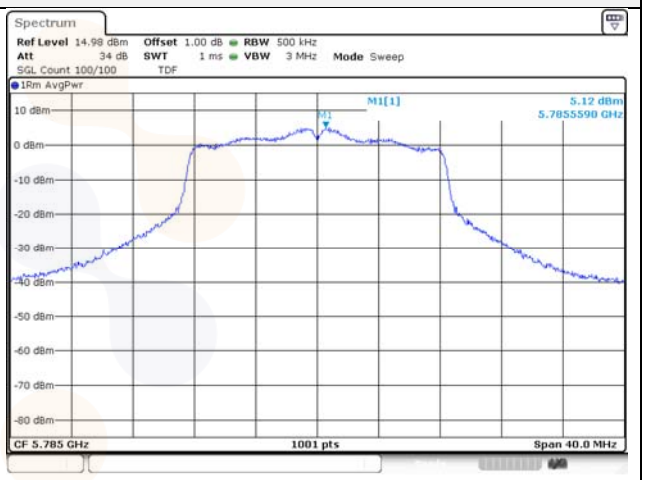
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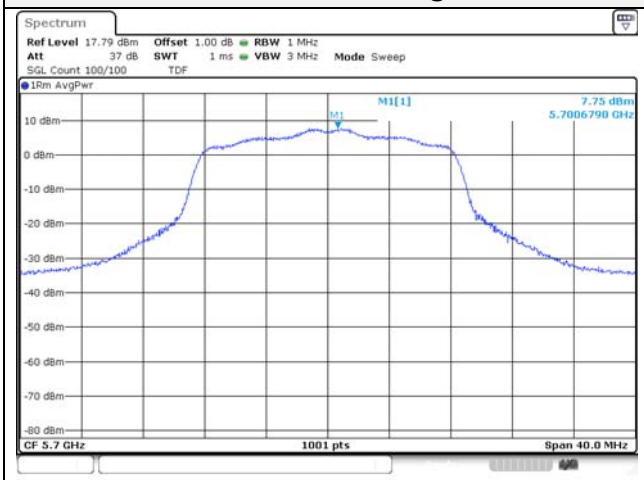	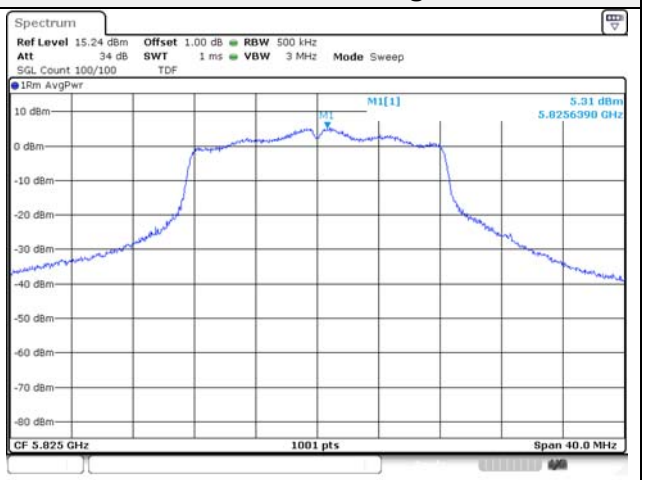

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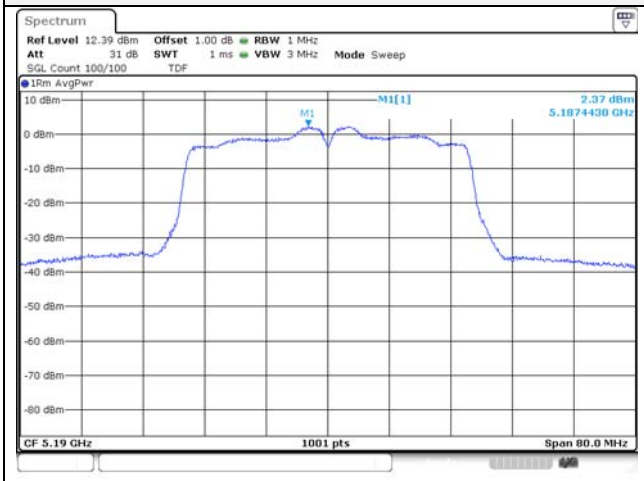
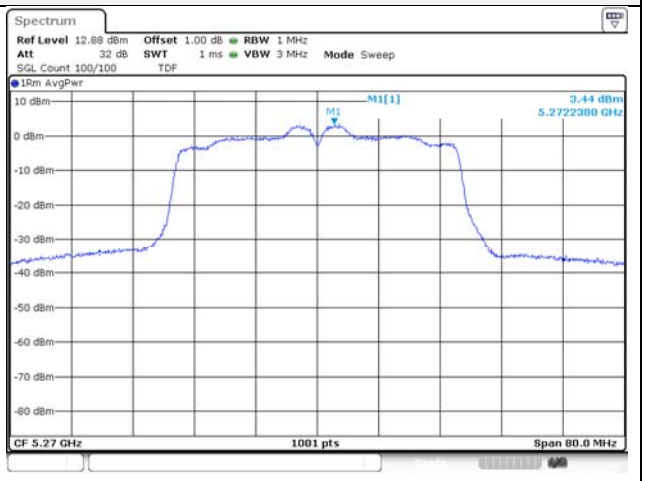
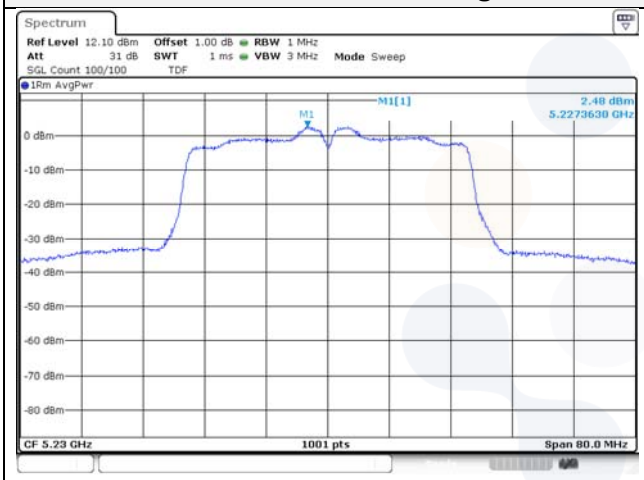
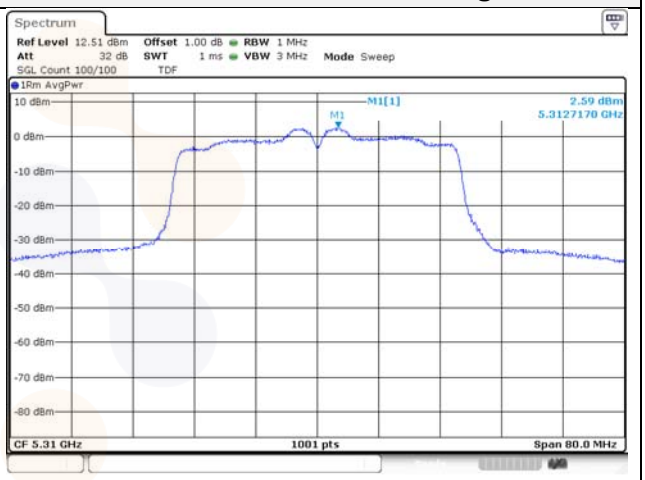
	
UNII-1 / 802.11ac VHT40 / High ch.	**UNII-2A / 802.11ac VHT40 / High ch.**
	

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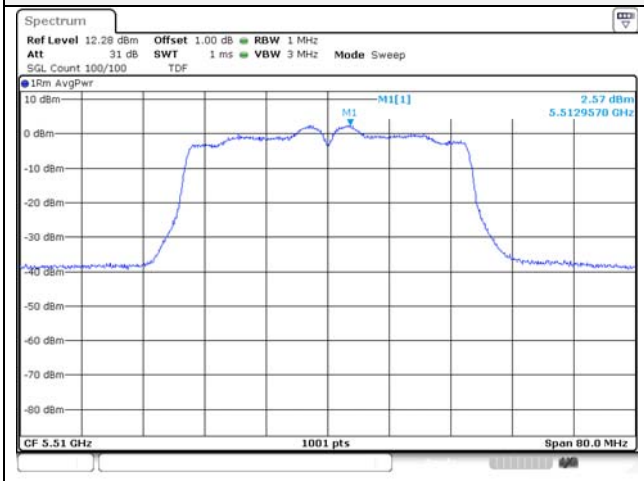	
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	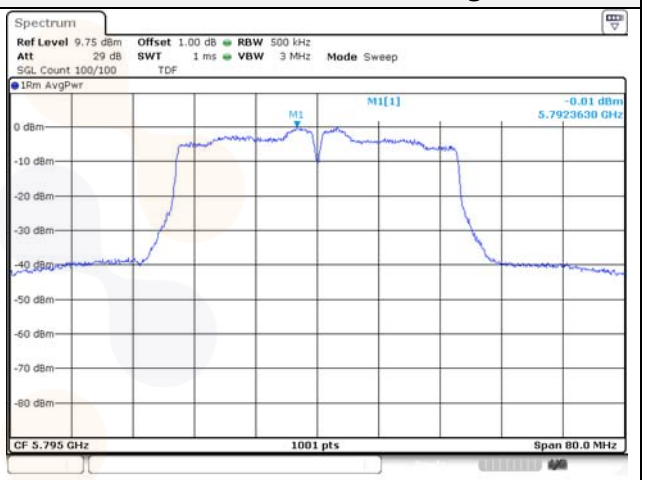
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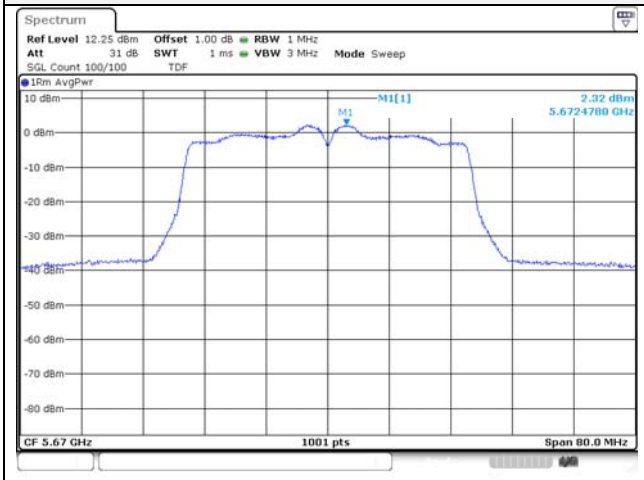
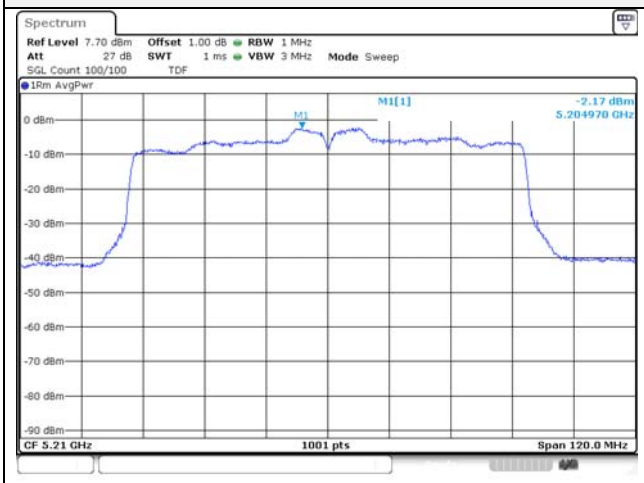
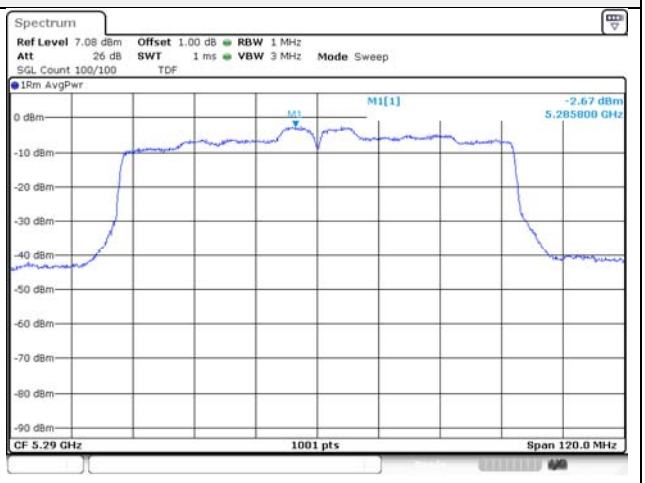
	Blank

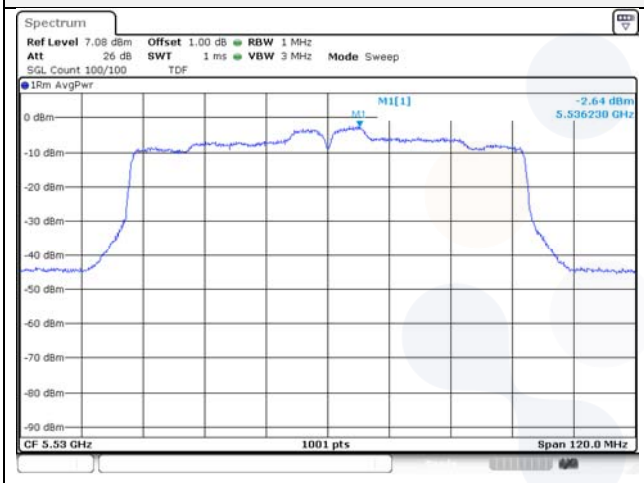
UNII-1 / 802.11ac VHT80 / Low ch.



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



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



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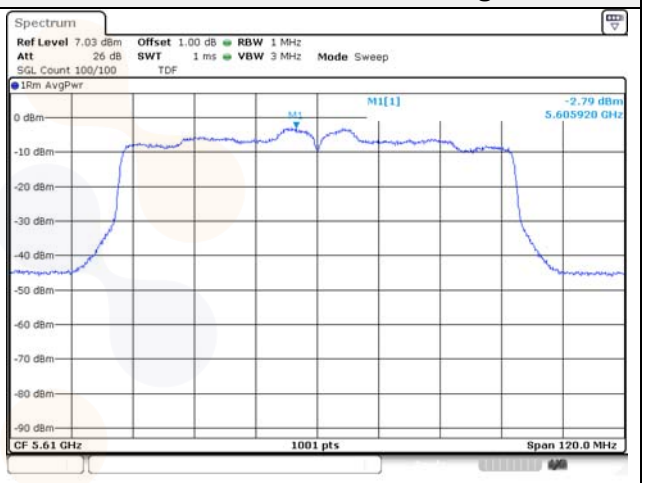

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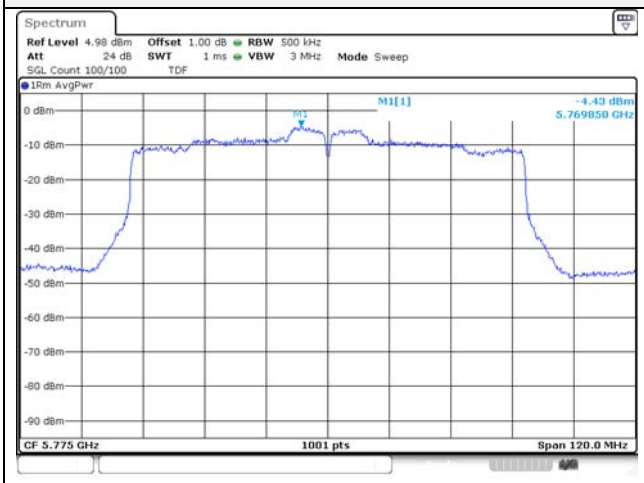

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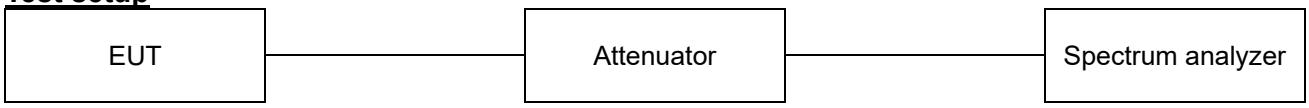
7.3. 26 dB Bandwidth & 99% Bandwidth

Test setup



Limit

N/A

Test procedure

ANSI C63.10-2013 Section 12.4
KDB 789033 D02 v02r01 - Section C.1 (26dB bandwidth)
KDB 789033 D02 v02r01 - Section D (99% bandwidth)

Test settings

1. 26 dB Bandwidth

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

2. 99% Occupied Bandwidth

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

Test results

26 dB bandwidth

Test mode	Band	Frequency(㎒)	Measured Bandwidth (㎒)
802.11a	UNII-1	5 180	21.03
		5 200	20.93
		5 240	20.83
	UNII-2A	5 260	21.23
		5 280	20.68
		5 320	20.98
	UNII-2C	5 500	20.03
		5 600	20.23
		5 700	20.43
802.11n HT20	UNII-1	5 180	21.48
		5 200	20.73
		5 240	21.83
	UNII-2A	5 260	21.68
		5 280	21.73
		5 320	21.13
	UNII-2C	5 500	21.23
		5 600	20.83
		5 700	20.43
802.11n HT40	UNII-1	5 190	40.86
		5 230	40.76
	UNII-2A	5 270	40.36
		5 310	40.96
	UNII-2C	5 510	41.76
		5 590	40.76
		5 670	40.86

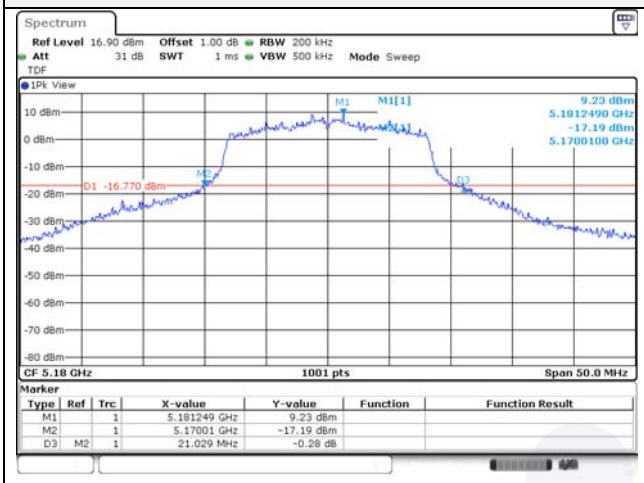
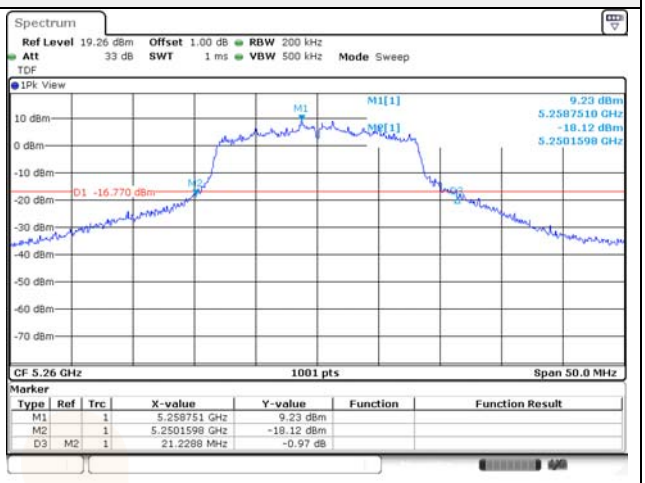
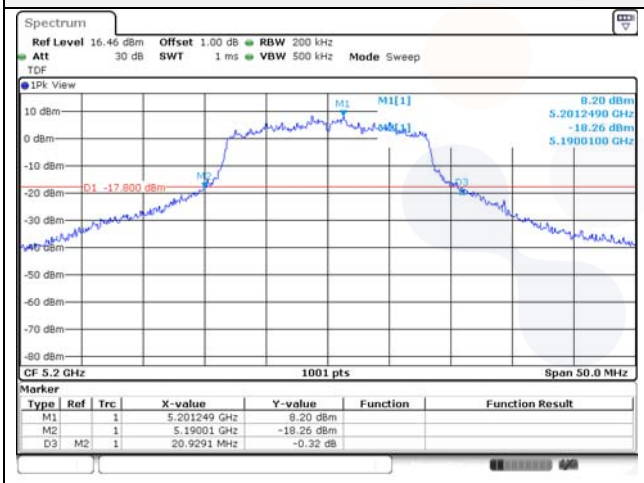
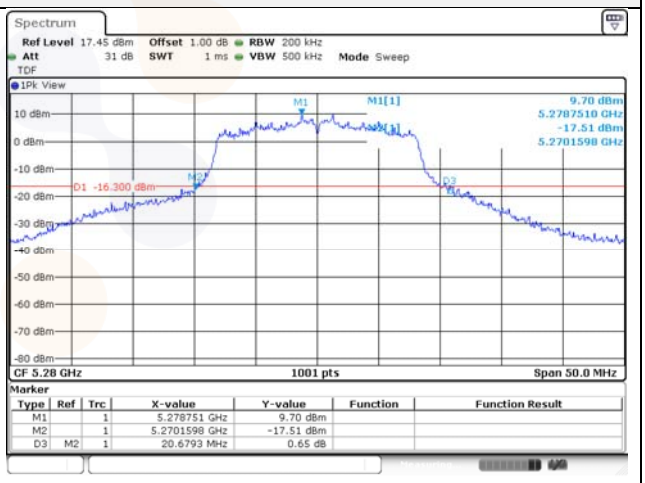
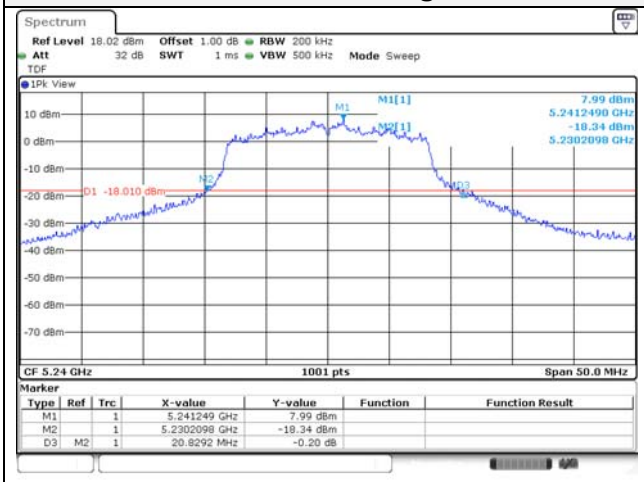
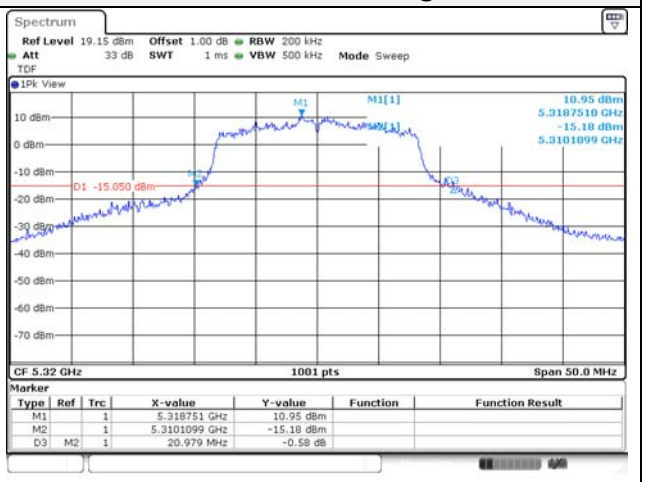
Test mode	Band	Frequency(㎒)	Measured Bandwidth (㎒)
802.11ac VHT20	UNII-1	5 180	21.58
		5 200	21.43
		5 240	22.08
	UNII-2A	5 260	21.83
		5 280	21.68
		5 320	21.78
	UNII-2C	5 500	22.13
		5 600	21.53
		5 700	21.78
802.11ac VHT40	UNII-1	5 190	40.46
		5 230	40.76
	UNII-2A	5 270	40.36
		5 310	40.86
	UNII-2C	5 510	40.96
		5 590	40.86
		5 670	41.36
802.11ac VHT80	UNII-1	5 210	83.32
	UNII-2A	5 290	82.96
	UNII-2C	5 530	83.32
		5 610	82.84

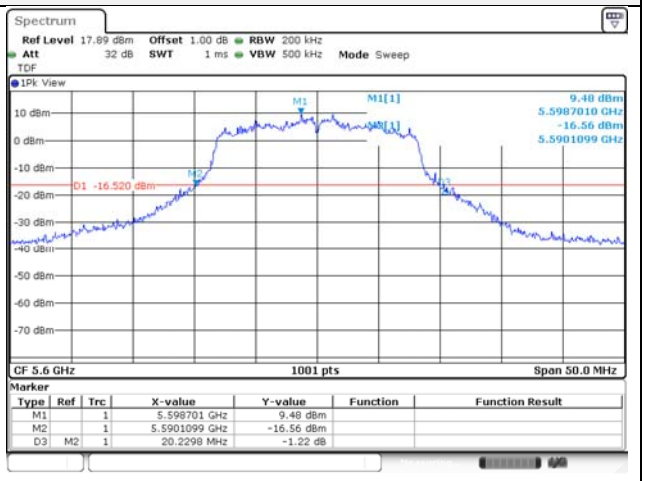
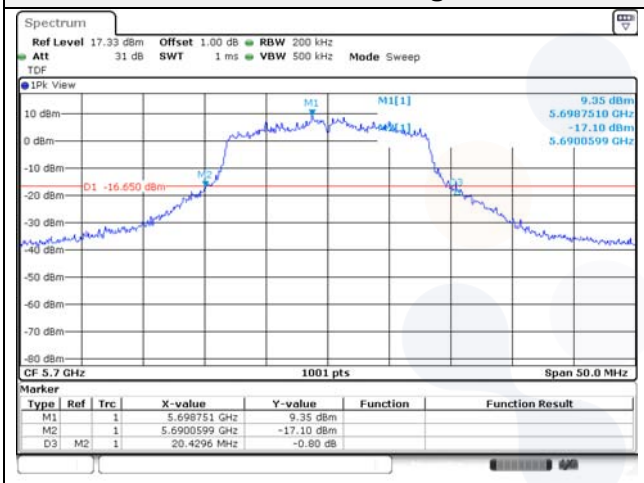
99% bandwidth

Test mode	Band	Frequency(㎒)	Measured Bandwidth (㎒)
802.11a	UNII-1	5 240	16.48
	UNII-2A	5 260	16.48
802.11n HT20	UNII-1	5 240	17.68
	UNII-2A	5 260	17.58
802.11n HT40	UNII-1	5 230	36.16
	UNII-2A	5 270	36.16
802.11ac VHT20	UNII-1	5 240	17.68
	UNII-2A	5 260	17.58
802.11ac VHT40	UNII-1	5 230	36.16
	UNII-2A	5 270	35.96
802.11ac VHT80	UNII-1	5 210	75.16
	UNII-2A	5 290	75.16

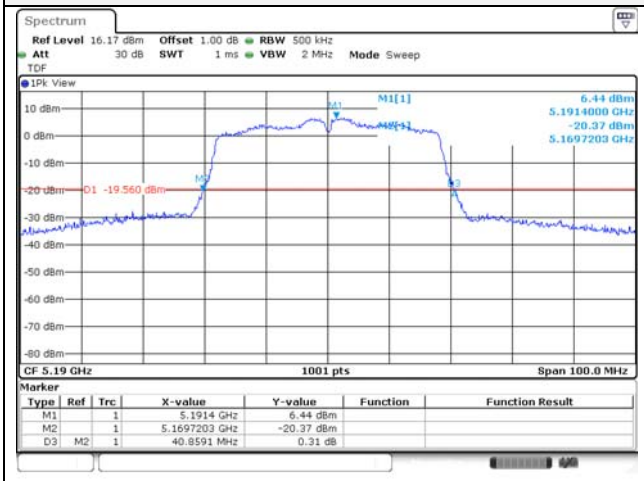
26 dB bandwidth

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

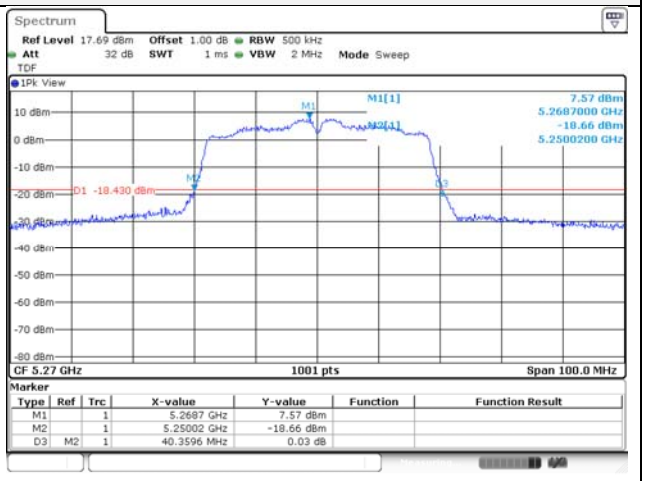
UNII-1 / 802.11a / Low ch.	UNII-2A / 802.11a / Low ch.
	
UNII-1 / 802.11a / Mid ch.	**UNII-2A / 802.11a / Mid ch.**
	
UNII-1 / 802.11a / High ch.	**UNII-2A / 802.11a / High ch.**
	

UNII-2C / 802.11a / Low ch.	UNII-2C / 802.11a / Mid ch.
	
UNII-2C / 802.11a / High ch.	
	Blank

UNII-1 / 802.11n HT40 / Low ch.

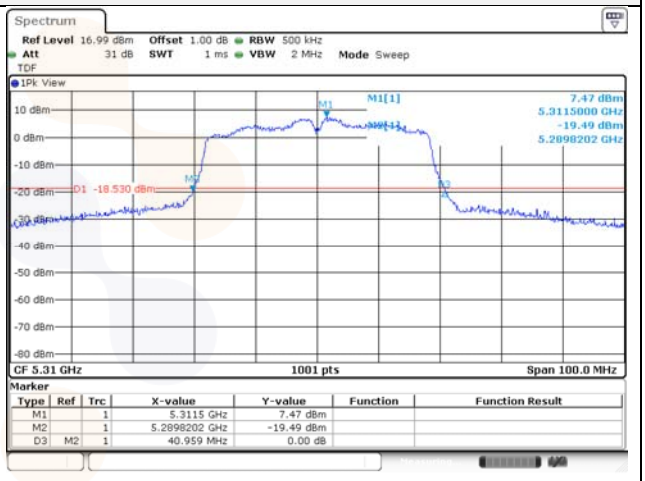


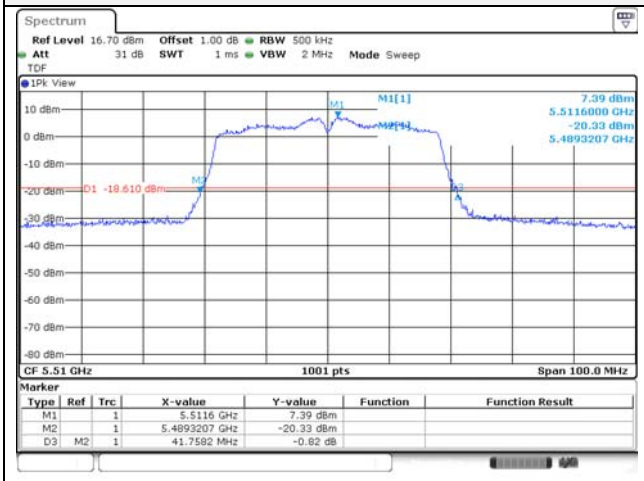
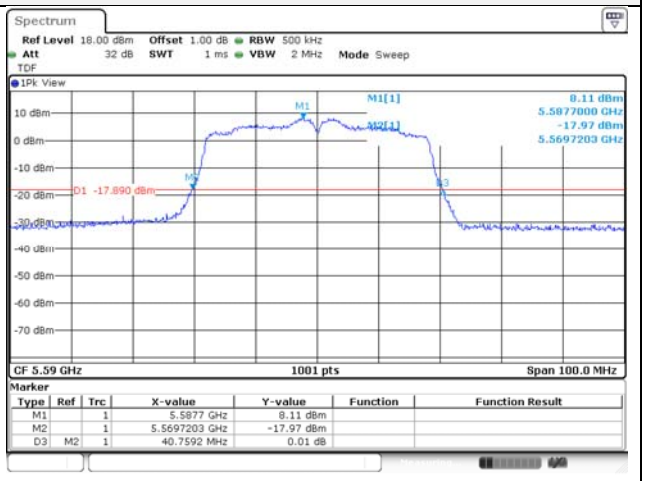
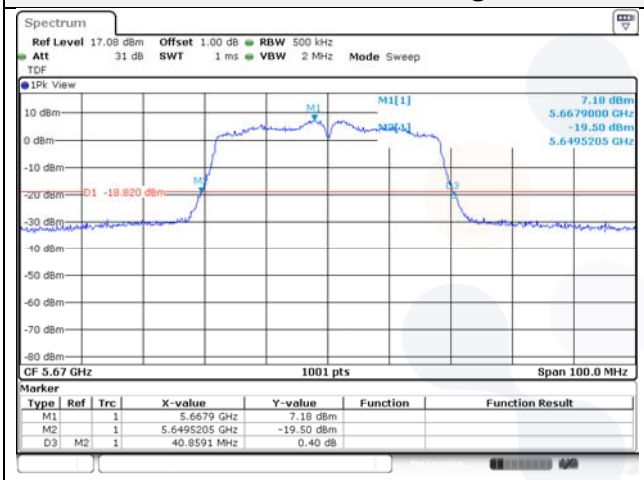
UNII-2A / 802.11n HT40 / Low ch.

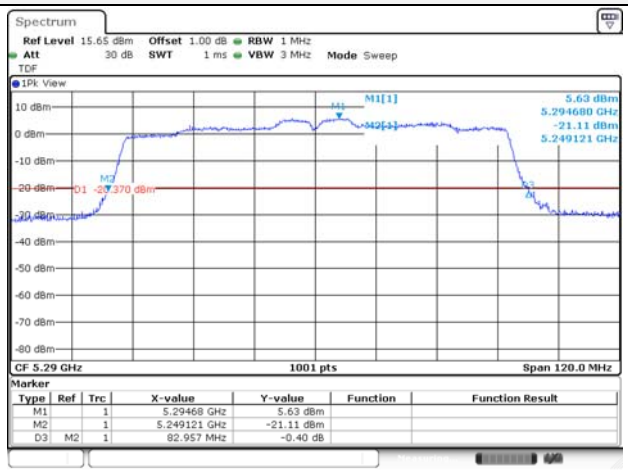
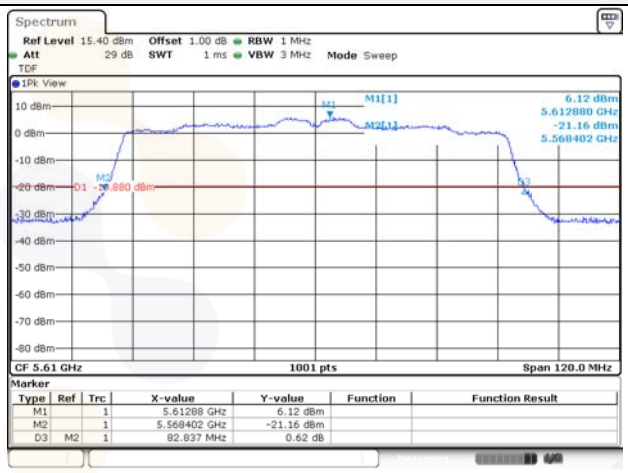


UNII-1 / 802.11n HT40 / High ch.

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



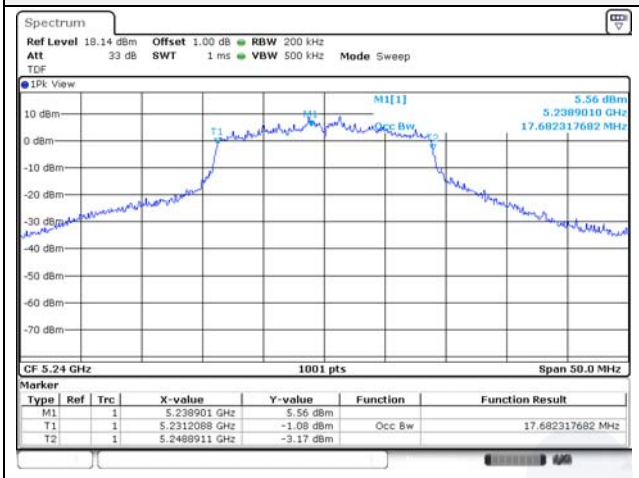
UNII-2C / 802.11n HT40 / Low ch.	UNII-2C / 802.11n HT40 / Mid ch.
	
UNII-2C / 802.11n HT40 / High ch.	
	Blank

UNII-1 / 802.11ac VHT80 / Low ch.	UNII-2A / 802.11ac VHT80 / Low ch.
	
UNII-2C / 802.11ac VHT80 / Low ch.	**UNII-2C / 802.11ac VHT80 / High ch.**
	

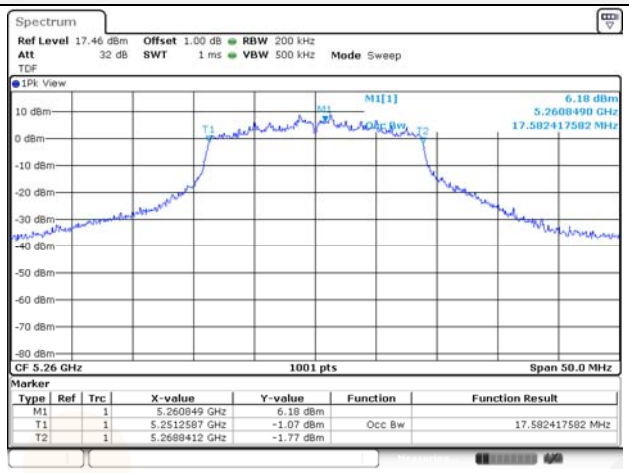
99% bandwidth

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

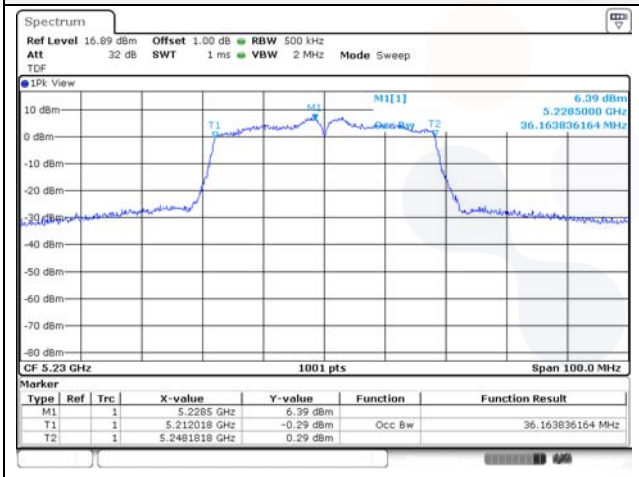
UNII-1 / 802.11n HT20 / 5 240 ㎒



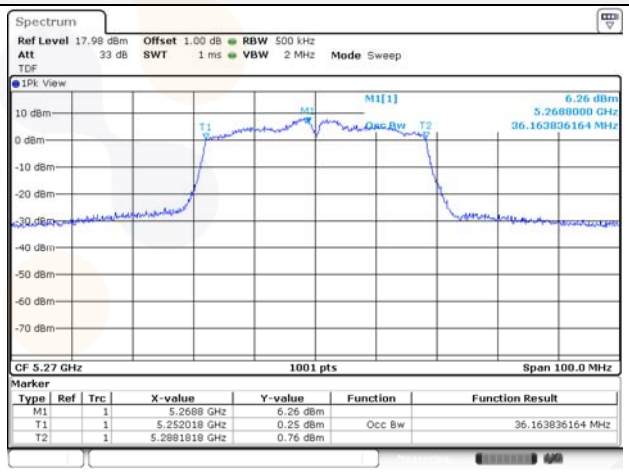
UNII-2A / 802.11n HT20 / 5 260 ㎒



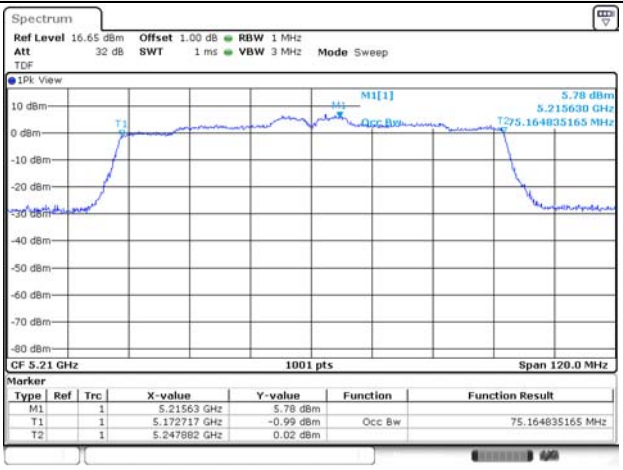
UNII-1 / 802.11n HT40 / 5 230 ㎒



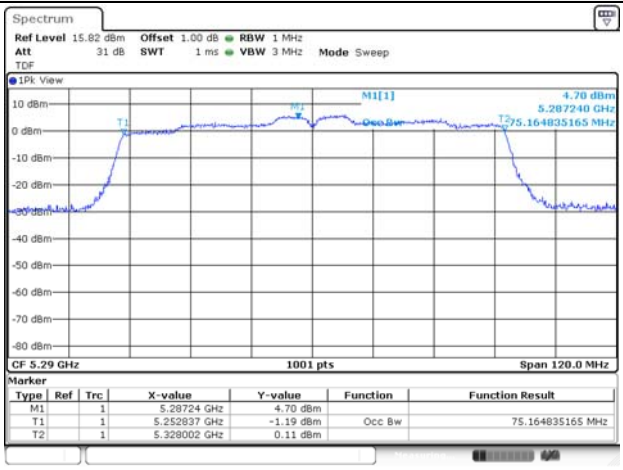
UNII-2A / 802.11n HT40 / 5 270 ㎒



UNII-1 / 802.11ac VHT80 / 5 210 ㎒

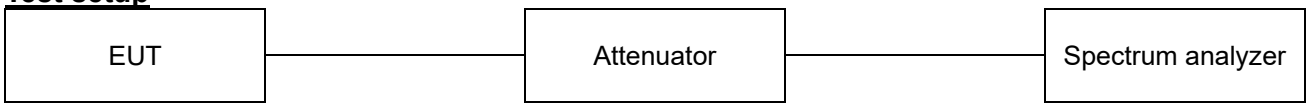


UNII-2A / 802.11ac VHT80 / 5 290 ㎒



7.4. 6 dB Bandwidth

Test setup



Limit

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

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 ㎓

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

1. Set RBW = 100 ㎑.
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 ㏈ relative to the maximum level measured in the fundamental emission.

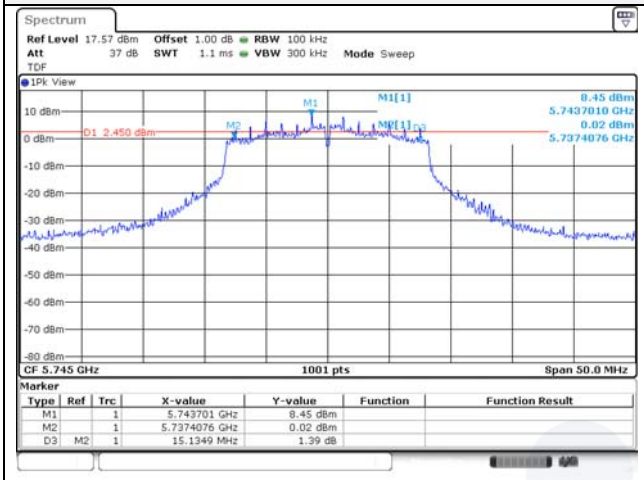
Test results

Test mode	Band	Frequency (㎒)	Measured Bandwidth (㎒)	Limit (㎒)
802.11a	UNII-3	5 745	15.13	0.50
		5 785	11.99	0.50
		5 825	15.18	0.50
802.11n HT20	UNII-3	5 745	11.44	0.50
		5 785	12.64	0.50
		5 825	13.94	0.50
802.11n HT40	UNII-3	5 755	33.97	0.50
		5 795	35.16	0.50
802.11ac VHT20	UNII-3	5 745	15.13	0.50
		5 785	15.13	0.50
		5 825	13.94	0.50
802.11ac VHT40	UNII-3	5 755	33.97	0.50
		5 795	35.16	0.50
802.11ac VHT80	UNII-3	5 775	60.30	0.50

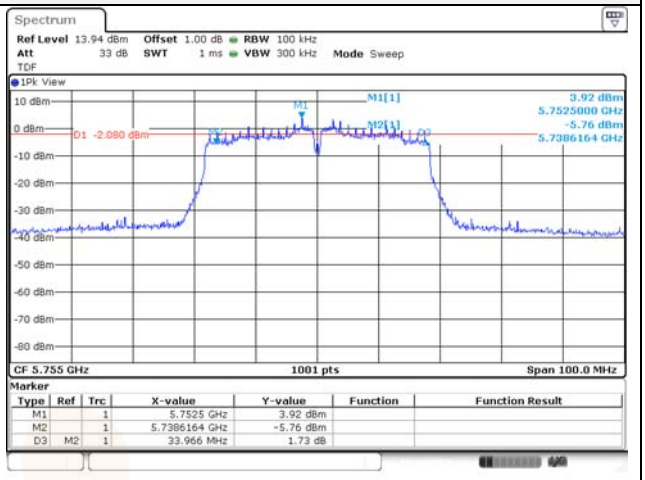
6 dB bandwidth

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

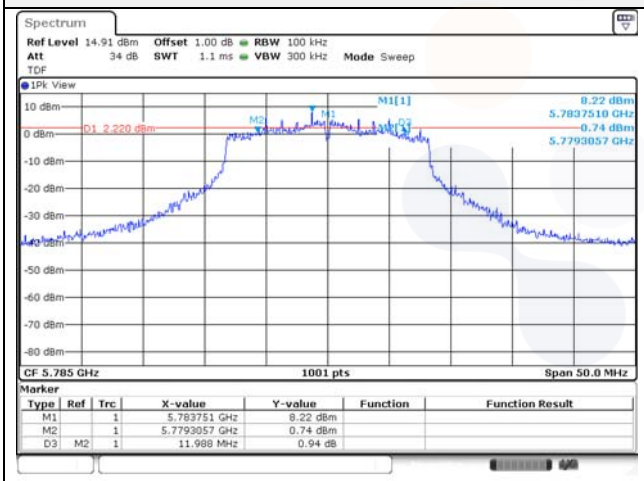
UNII-3 / 802.11a / Low ch.



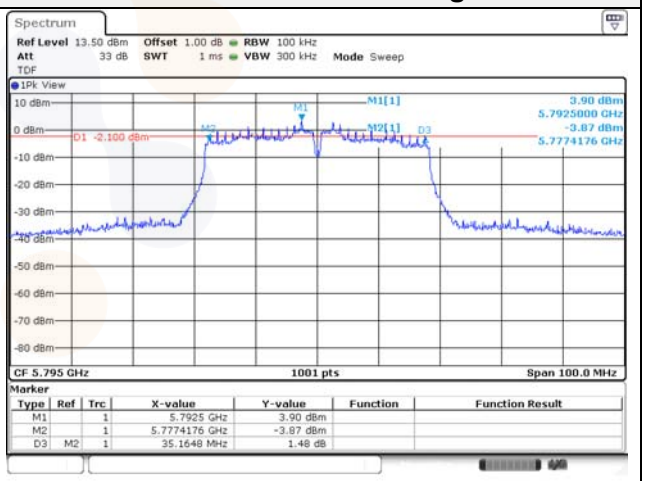
UNII-3 / 802.11n HT40 / Low ch.



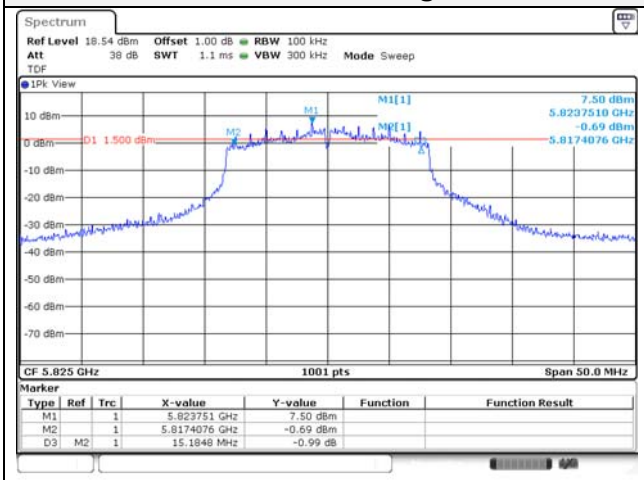
UNII-3 / 802.11a / Mid ch.



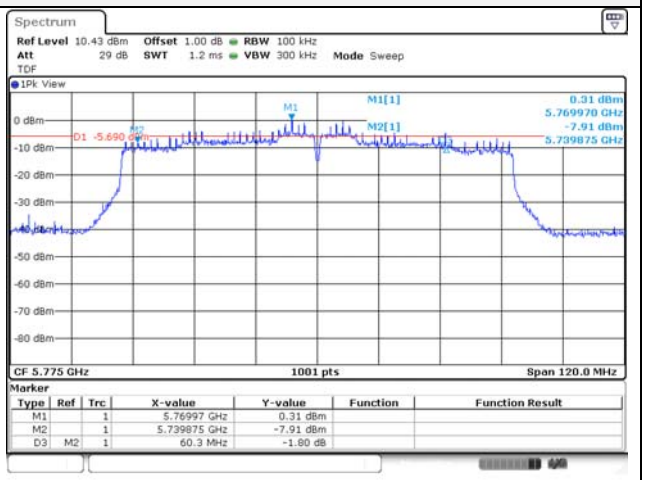
UNII-3 / 802.11n HT40 / High ch.



UNII-3 / 802.11a / High ch.



UNII-3 / 802.11ac VHT80 / Low ch.



7.5. Straddle channel

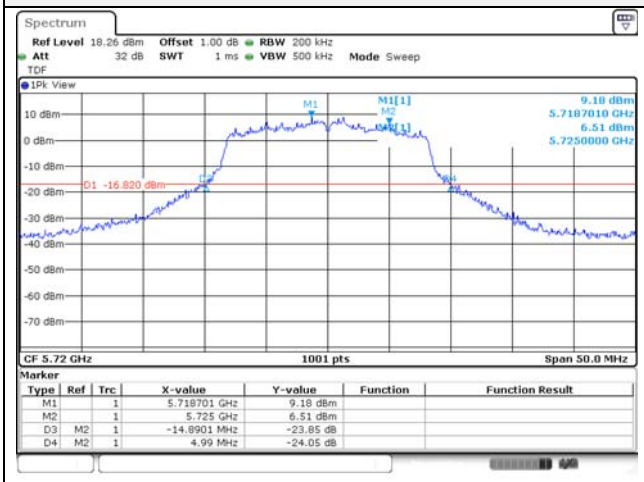
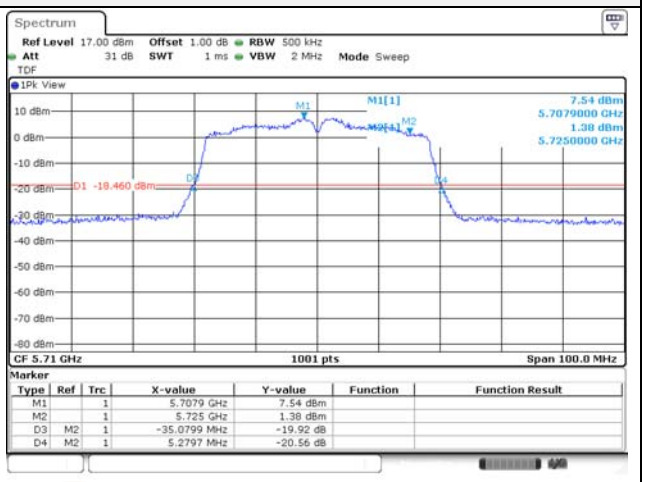
26dB bandwidth

Test mode	Band	Frequency (㎒)	26dB Bandwidth (㎒)
802.11a	UNII-2C	5 720	14.89
802.11n HT20			15.59
802.11ac VHT20			15.54
802.11a	UNII-3	5 720	4.99
802.11n HT20			5.39
802.11ac VHT20			5.44
802.11n HT40	UNII-2C	5 710	35.18
802.11ac VHT40			35.08
802.11n HT40	UNII-3	5 710	5.38
802.11ac VHT40			5.28
802.11ac VHT80	UNII-2C	5 690	76.48
	UNII-3	5 690	5.88

Notes:

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

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

802.11a	802.11ac VHT40
	
802.11ac VHT80	
	Blank

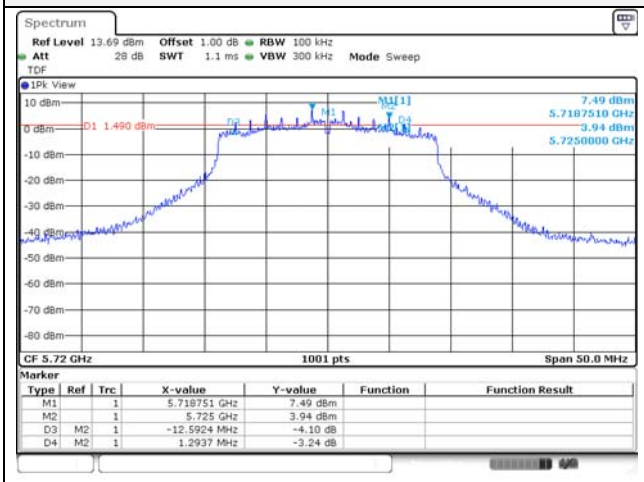
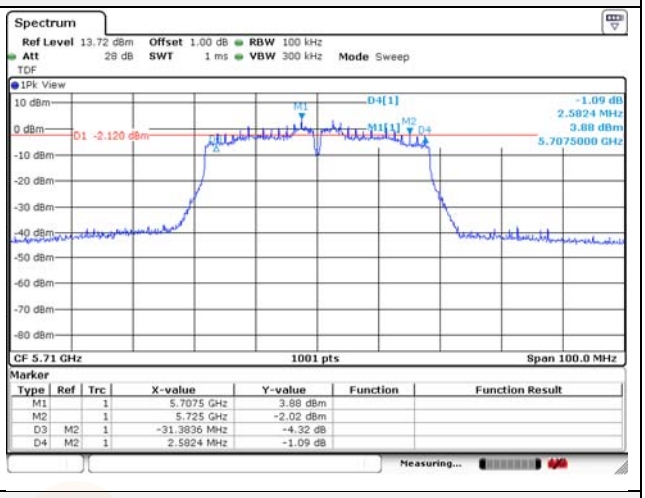
6dB bandwidth

Test mode	Band	Frequency (㎒)	6dB Bandwidth (㎒z)	Limit (㎒)
802.11a	UNII-3	5 720	2.54	0.50
802.11n HT20			1.29	0.50
802.11ac VHT20			2.54	0.50
802.11n HT40	UNII-3	5 710	2.58	0.50
802.11ac VHT40			2.58	0.50
802.11ac VHT80	UNII-3	5 690	2.52	0.50

Notes:

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

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

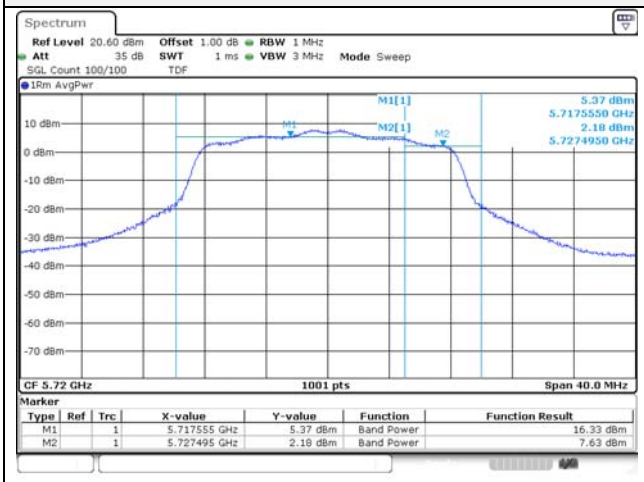
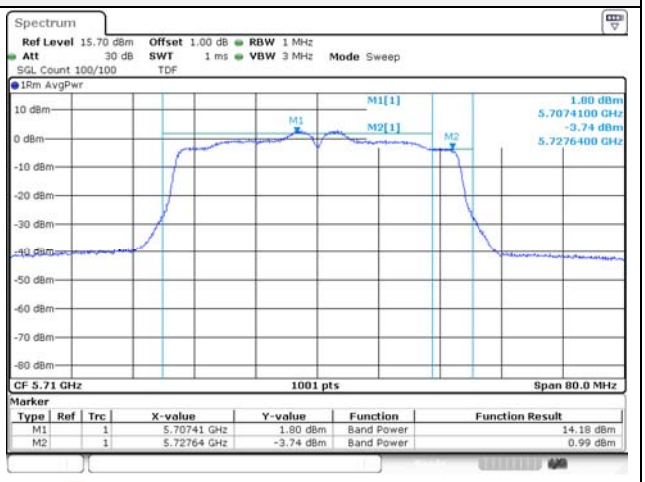
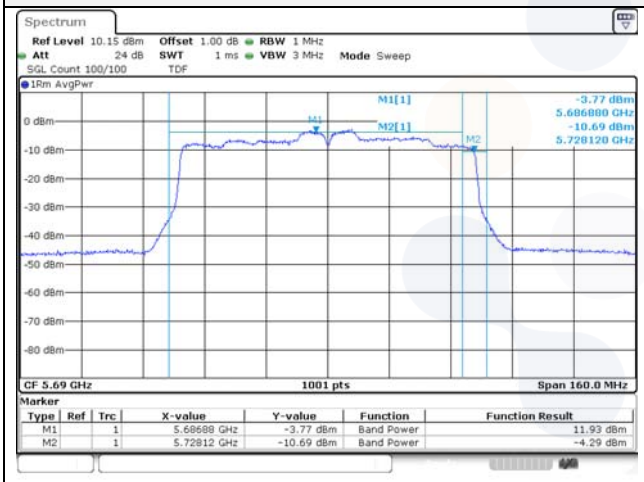
802.11n HT20	802.11n HT40
	
802.11ac VHT80	
	Blank

Output Power

Test mode	Band	Frequency (㎒)	Measured output power			Limit (dBm)
			Reading (dBm)	DCF (dB)	Result (dBm)	
802.11a	UNII-2C	5 720	16.33	0.12	16.45	22.73
802.11n HT20			14.90	0.12	15.02	22.93
802.11ac VHT20			14.91	0.12	15.03	22.91
802.11a	UNII-3	5 720	7.63	0.12	7.75	30.00
802.11n HT20			6.71	0.12	6.83	
802.11ac VHT20			6.75	0.12	6.87	
802.11n HT40	UNII-2C	5 710	14.17	0.24	14.41	23.98
802.11ac VHT40			14.18	0.23	14.41	
802.11n HT40	UNII-3	5 710	0.97	0.24	1.21	30.00
802.11ac VHT40			0.99	0.23	1.22	
802.11ac VHT80	UNII-2C	5 690	11.93	0.47	12.40	23.98
	UNII-3	5 690	-4.29	0.47	-3.82	30.00

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

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

802.11a	802.11ac VHT40
	
802.11ac VHT80	
	Blank

Power Spectral Density

Test mode	Band	Frequency (㎒)	Measured PSD (dBm/㎒)	DCF (dB)	Maximum PSD (dB m/㎒)	Limit (dBm/㎒)
802.11a	UNII-2C	5 720	7.89	0.12	8.01	11.00
802.11n HT20			6.41	0.12	6.53	
802.11ac VHT20			6.46	0.12	6.58	
802.11n HT40		5 710	2.39	0.24	2.63	
802.11ac VHT40			2.82	0.23	3.05	
802.11ac VHT80		5 690	-2.95	0.47	-2.48	

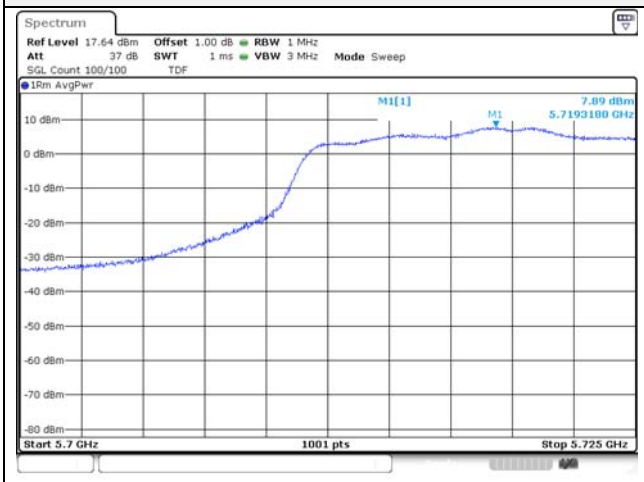
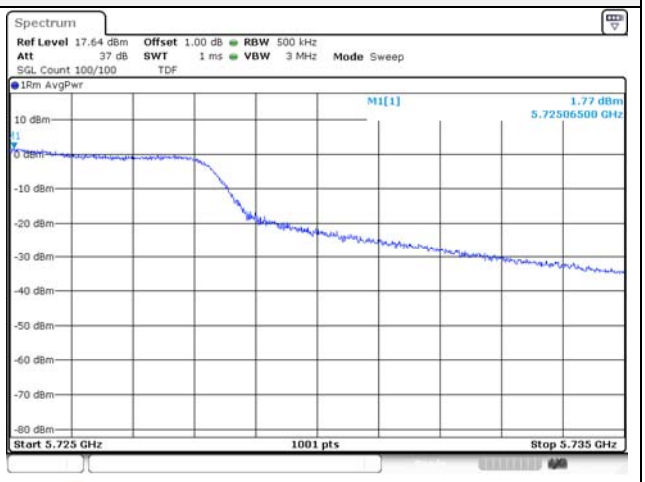
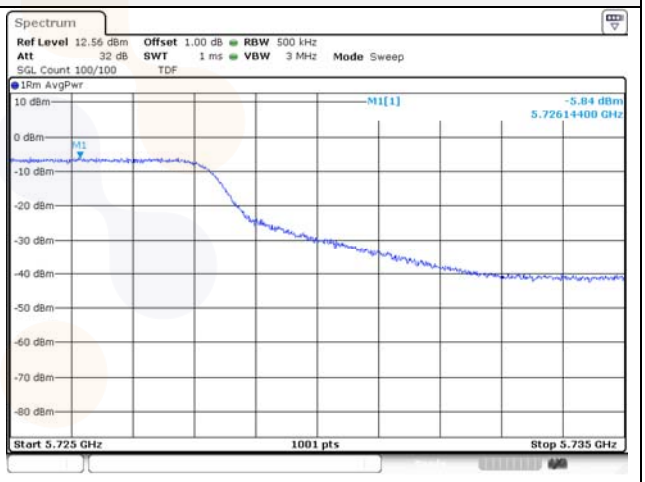
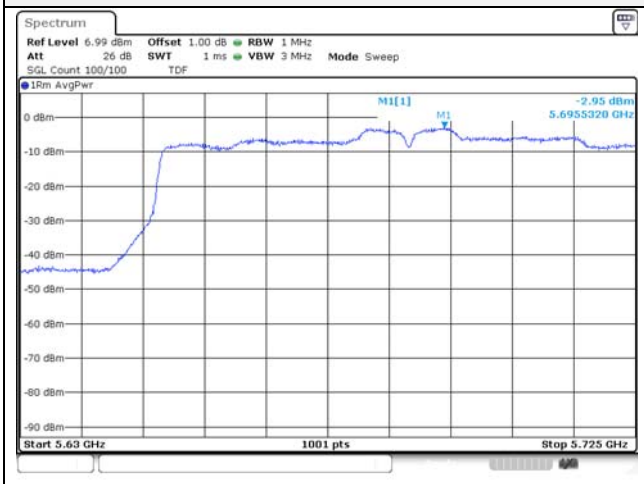
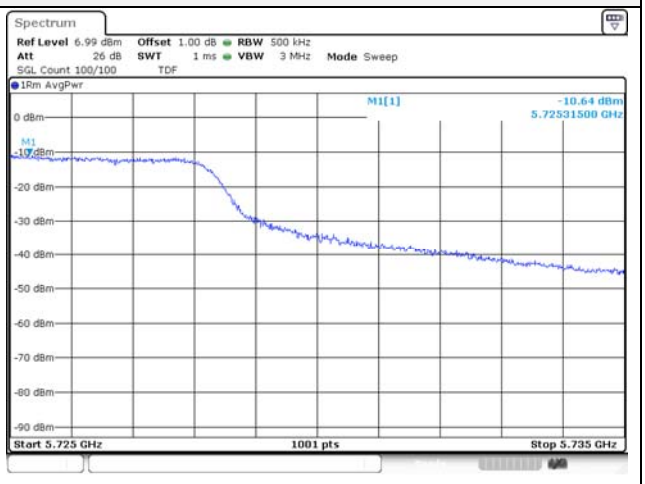
Test mode	Band	Frequency (㎒)	Measured PSD (dBm/ 500 ㎑)	DCF (dB)	Maximum PSD (dBm/ 500 ㎑)	Limit (dBm /500 ㎑)
802.11a	UNII-3	5 720	1.77	0.12	1.89	30.00
802.11n HT20			0.62	0.12	0.74	
802.11ac VHT20			0.28	0.12	0.40	
802.11n HT40		5 710	-5.73	0.24	-5.49	
802.11ac VHT40			-5.84	0.23	-5.61	
802.11ac VHT80		5 690	-10.64	0.47	-10.17	

Notes:

1. Maximum PSD calculation

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

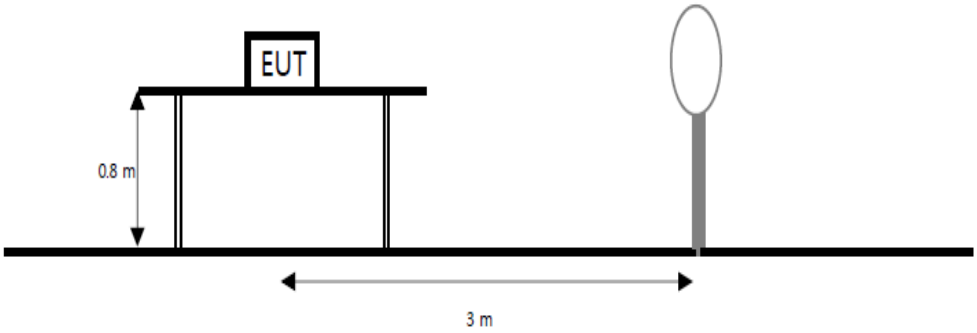
In order to simplify the report, attached plots were only the Worst Case per bandwidth.

UNII-2C / 802.11a	UNII-3 / 802.11a
	
UNII-2C / 802.11ac VHT40	**UNII-3 / 802.11ac VHT40**
	
UNII-2C / 802.11ac VHT80	**UNII-3 / 802.11ac VHT80**
	

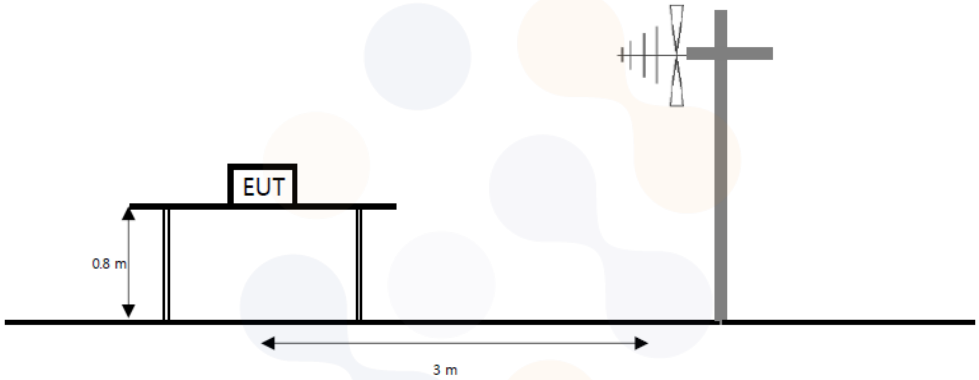
7.6. Spurious Emission, Band Edge and Restricted bands

Test setup

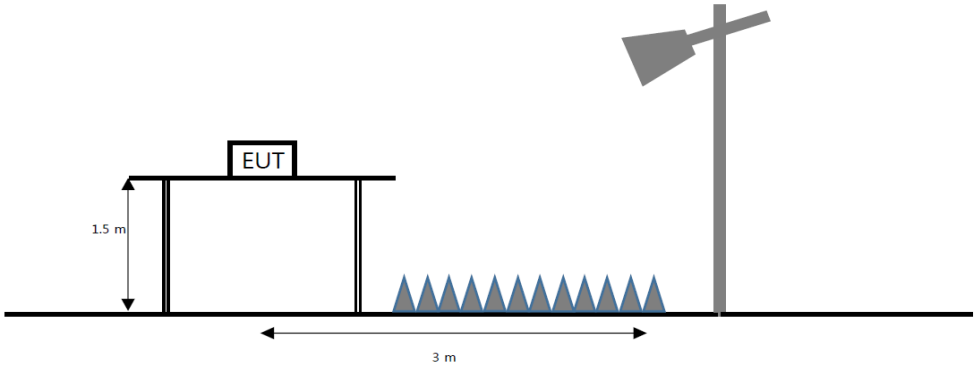
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 ㎑ to 30 ㎒ Emissions



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

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.

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.

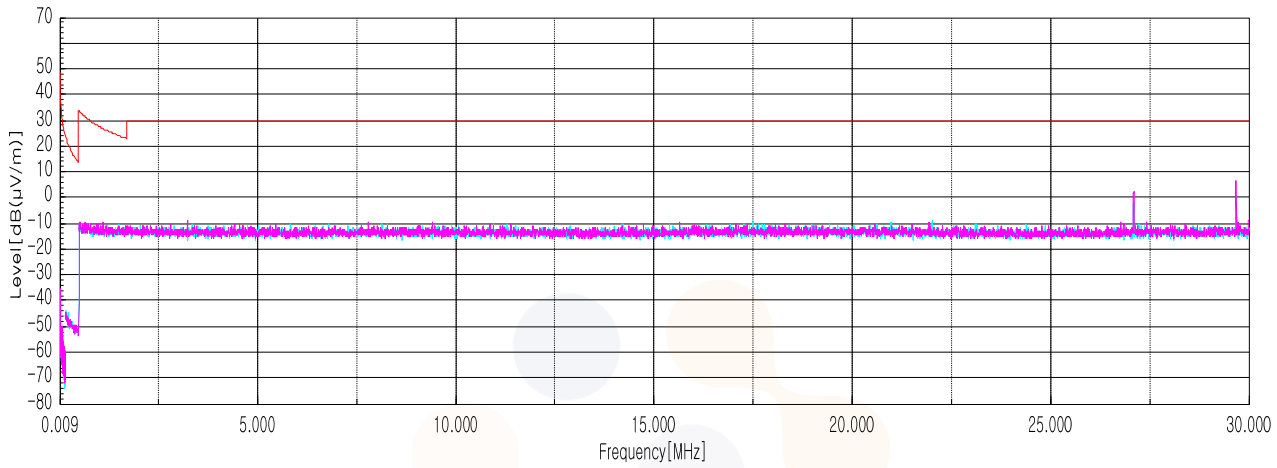
Notes:

1. *f* <30 ㎒, extrapolation factor of 40 dB/decade of distance. $F_d = 40\log(D_m/Ds)$
   f ≥30 ㎒, extrapolation factor of 20 dB/decade of distance. $F_d = 20\log(D_m/Ds)$
   Where:
   F_d= Distance factor in dB
   D_m= Measurement distance in meters
   D_s= Specification distance in meters
2. Factors(dB) = Antenna factor(dB/m) + Cable loss(dB) + or Amp. gain(dB) + or F_d(dB)
3. The worst-case emissions are reported however emissions whose levels were not within 20 dB of respective limits were not reported.
4. Average test would be performed if the peak result were greater than the average limit.
5. 1) means restricted band.
6. According to part 15.31(f)(2), an extrapolation factor of 40 dB/decade is applied because measured distance of radiated emission is 3 m.
7. Below 30 ㎒ 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 ㎓ pre-scan to detect harmonic and spurious emissions, the resolution bandwidth is set to 1 ㎒; the video bandwidth is set to 30 ㎑ for peak measurements.

Test results (Below 30 ㎒) – Worst case: 802.11a / UNII-2A 5 320 ㎒

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

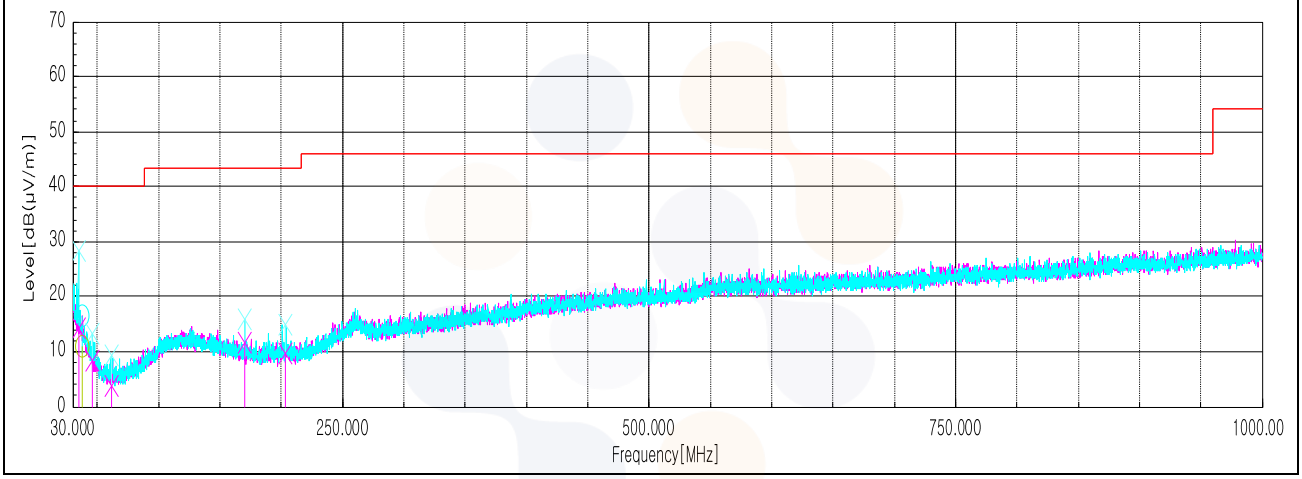
Horizontal/Vertical



Test results (Below 1 000 ㎒) – Worst case: 802.11a / UNII-2A 5 320 ㎒

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								
34.73	V	22.50	21.92	-30.33	-	14.09	40.00	25.91
38.25[1)]	H	21.10	20.05	-30.18	-	10.97	40.00	29.03
46.37	V	22.80	15.52	-30.09	-	8.23	40.00	31.77
61.40	V	21.40	12.20	-29.66	-	3.94	40.00	36.06
170.04[1)]	V	23.60	15.50	-27.54	-	11.56	43.50	31.94
203.87	V	21.50	15.28	-27.11	-	9.67	43.50	33.83

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								
5 149.66[1)]	V	45.02	33.90	-24.77	-	54.15	74.00	19.85
10 438.03	V	59.22	37.26	-49.75	-	46.73	68.20	21.47
15 503.06[1)]	H	55.23	40.50	-45.52	-	50.21	74.00	23.79
Average Data								
5 149.66[1)]	V	35.74	33.90	-24.77	0.12	44.99	54.00	9.01

Middle Channel (5 200 ㎒)

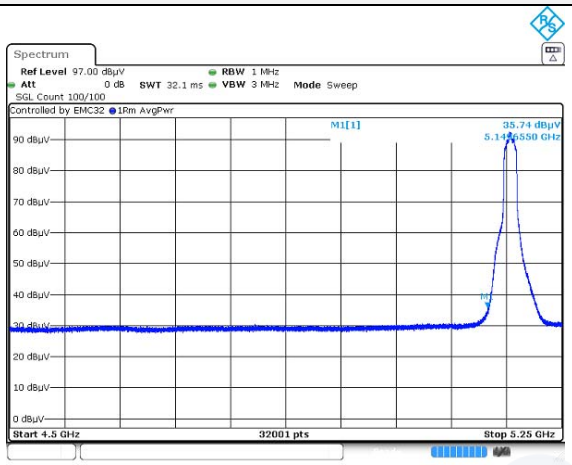
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 402.81	V	59.25	37.24	-49.73	-	46.76	68.20	21.44
15 532.17[1)]	V	54.80	40.53	-45.54	-	49.79	74.00	24.21
Average Data								
No spurious emissions were detected within 20 dB of the limit								

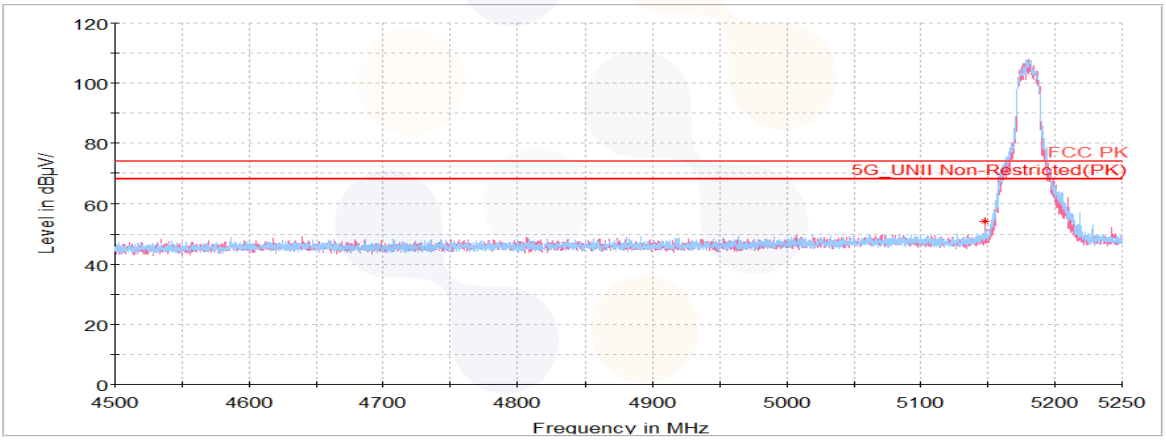
Highest Channel (5 240 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 035.92[1)]	H	68.39	27.79	-48.09	-	48.09	74.00	25.91
10 448.09	V	59.20	37.27	-49.76	-	46.71	68.20	21.49
15 775.11[1)]	H	54.85	40.72	-45.71	-	49.86	74.00	24.14
Average Data								
No spurious emissions were detected within 20 dB 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								
5 149.87[1)]	V	42.44	33.90	-24.77	-	51.57	74.00	22.43
10 614.13[1)]	V	60.90	37.39	-49.64	-	48.65	74.00	25.35
15 507.02[1)]	H	54.56	40.51	-45.52	-	49.55	74.00	24.45
Average Data								
5 149.87[1)]	V	33.94	33.90	-24.77	0.12	43.19	54.00	10.81

Middle Channel (5 200 ㎒)

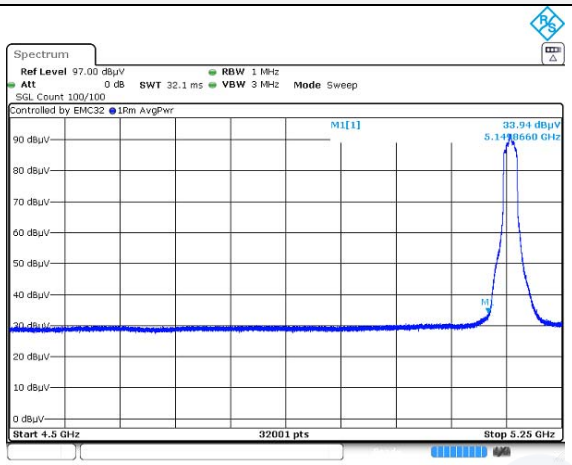
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 388.44	V	58.92	37.23	-49.73	-	46.42	68.20	21.78
15 584.28[1)]	H	55.09	40.57	-45.57	-	50.09	74.00	23.91
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit								

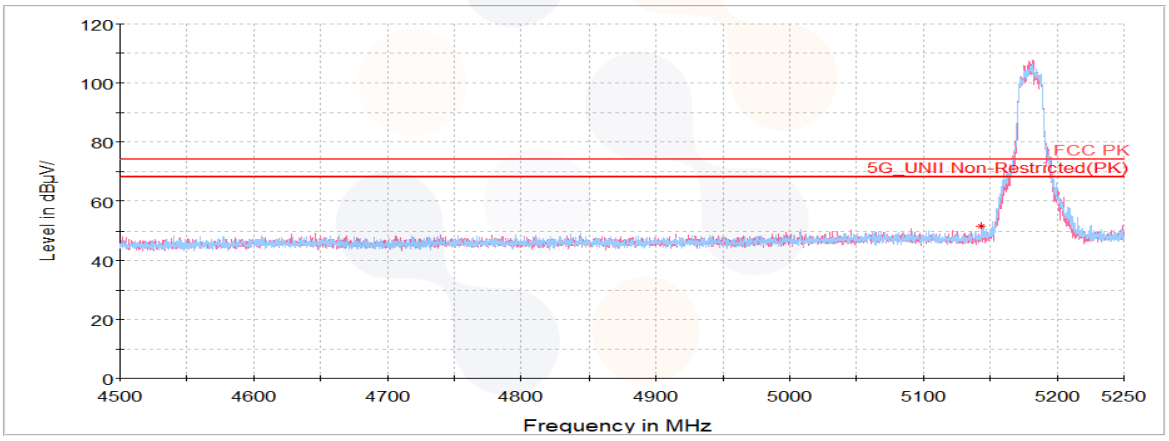
Highest Channel (5 240 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 034.55[1)]	V	70.29	27.79	-48.09	-	49.99	74.00	24.01
10 454.56	H	59.45	37.27	-49.76	-	46.96	68.20	21.24
15 715.45[1)]	H	54.56	40.67	-45.67	-	49.56	74.00	24.44
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


802.11n HT40_UNII-1

Lowest Channel (5 190 ㎒)

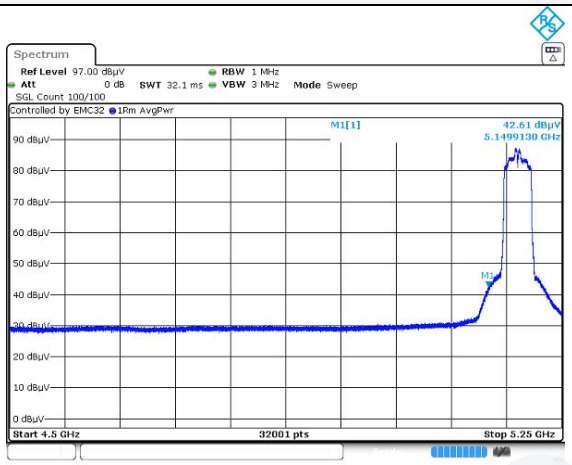
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 149.91[1)]	V	50.11	33.90	-24.77	-	59.24	74.00	14.76
10 368.67	H	58.31	37.22	-49.72	-	45.81	68.20	22.39
15 682.03[1)]	V	54.73	40.65	-45.64	-	49.74	74.00	24.26
Average Data								
5 149.91[1)]	V	42.61	33.90	-24.77	0.24	51.98	54.00	2.02

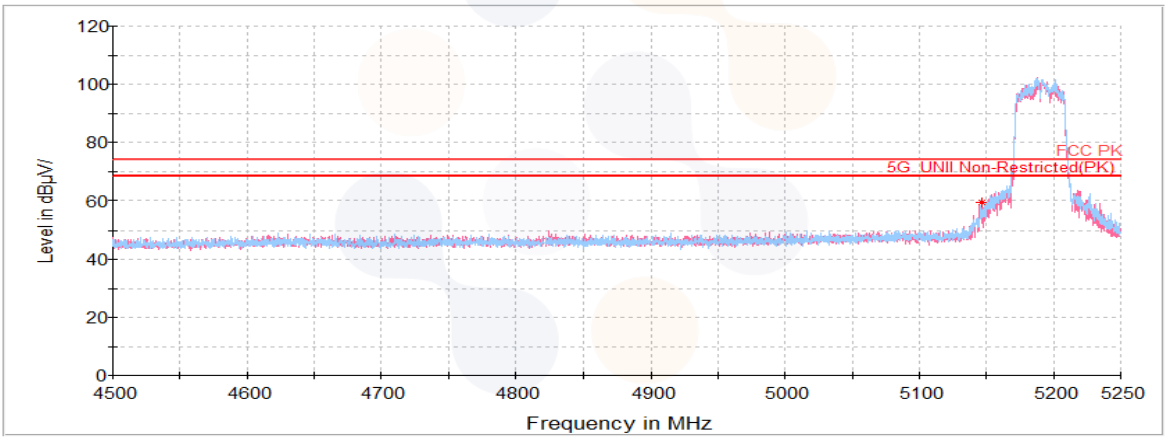
Highest Channel (5 230 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 467.50	H	58.93	37.28	-49.77	-	46.44	68.20	21.76
15 712.94[1)]	V	54.07	40.67	-45.67	-	49.07	74.00	24.93
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

802.11n HT40_UNII-1

Lowest Channel (5 190 ㎒)

Average data	
	Blank

Horizontal/Vertical for Band-edge


802.11ac VHT20 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								
5 133.08[1)]	H	41.48	33.87	-24.76	-	50.59	74.00	23.41
10 328.42	H	59.02	37.20	-49.69	-	46.53	68.20	21.67
15 469.64[1)]	V	55.64	40.57	-45.25	-	50.96	74.00	23.04
Average Data								
No spurious emissions were detected within 20 dB of the limit								

Middle Channel (5 200 ㎒)

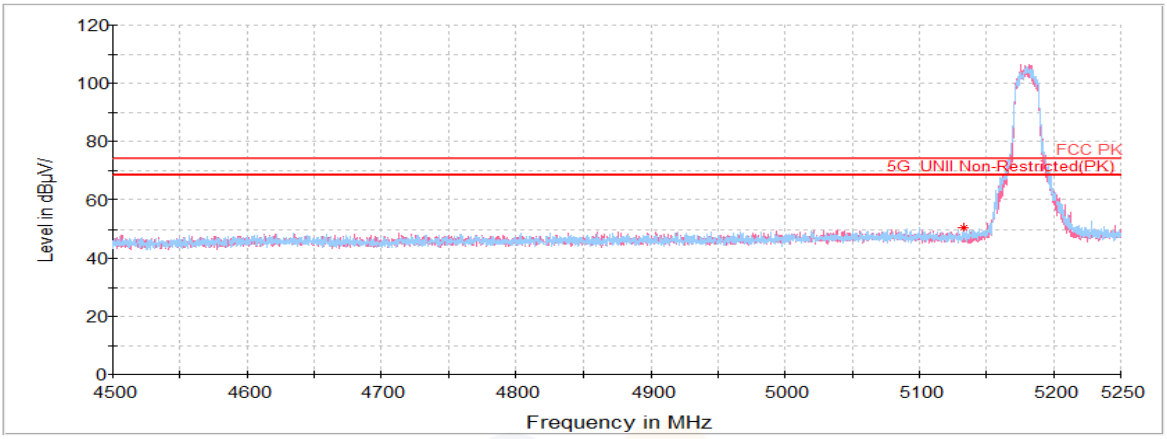
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 384.84	H	59.36	37.23	-49.72	-	46.87	68.20	21.33
15 542.23[1)]	H	55.49	40.53	-45.54	-	50.48	74.00	23.52
Average Data								
No spurious emissions were detected within 20 dB 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								
1 036.27[1)]	H	70.72	27.79	-48.09	-	50.42	74.00	23.58
10 538.66	H	58.90	37.33	-49.74	-	46.49	68.20	21.71
15 728.39[1)]	H	54.03	40.68	-45.68	-	49.03	74.00	24.97
Average Data								
No spurious emissions were detected within 20 dB of the limit								

802.11ac VHT20 UNII-1

Lowest Channel (5 180 ㎒)

Horizontal/Vertical for Band-edge


802.11ac VHT40_UNII-1

Lowest Channel (5 190 ㎒)

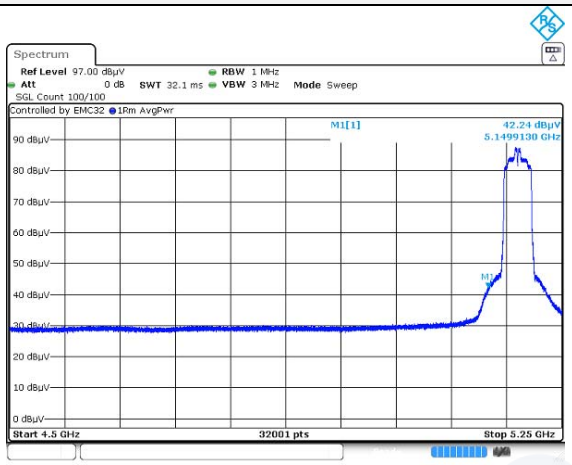
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 149.91[1)]	V	51.49	33.90	-24.77	-	60.62	74.00	13.38
10 394.55	V	58.79	37.24	-49.73	-	46.30	68.20	21.90
15 557.33[1)]	H	54.49	40.55	-45.55	-	49.49	74.00	24.51
Average Data								
5 149.91[1)]	V	42.24	33.90	-24.77	0.23	51.60	54.00	2.40

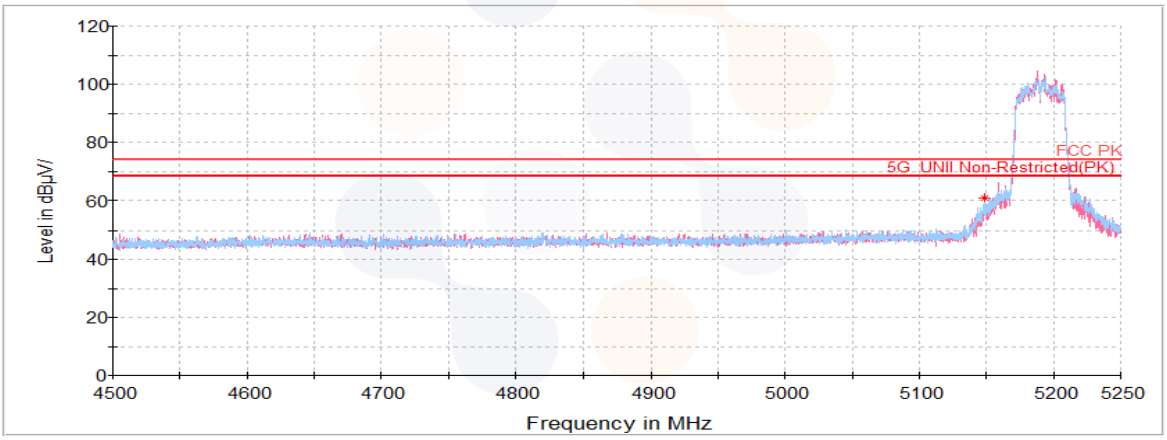
Highest Channel (5 230 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 543.33	H	59.13	37.33	-49.73	-	46.73	68.20	21.47
15 669.45[1)]	V	53.92	40.64	-45.64	-	48.92	74.00	25.08
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11ac VHT40_UNII-1

Lowest Channel (5 190 ㎒)

Average data	
	Blank

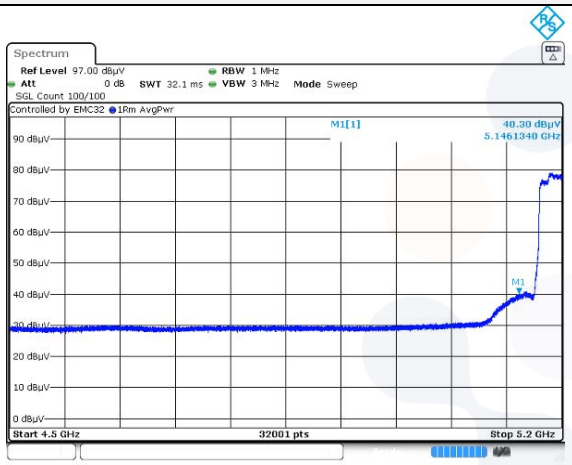
Horizontal/Vertical for Band-edge


802.11ac VHT80_UNII-1

Lowest Channel (5 210 ㎒)

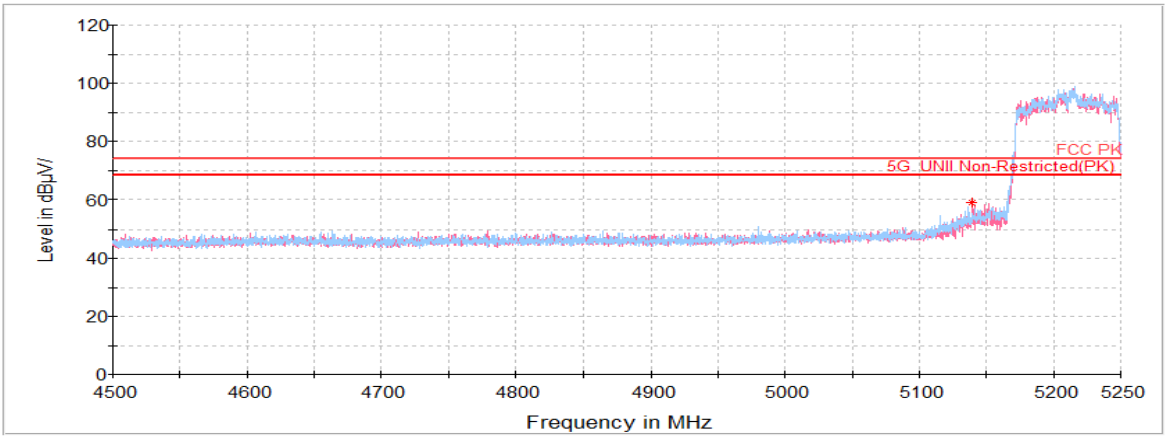
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 146.13[1)]	V	49.79	33.89	-24.77	-	58.91	74.00	15.09
10 462.47	V	59.28	37.28	-49.76	-	46.80	68.20	21.40
15 388.06[1)]	V	53.12	40.49	-44.55	-	49.06	74.00	24.94
Average Data								
5 146.13[1)]	V	40.30	33.89	-24.77	0.47	49.89	54.00	4.11

Average data



Blank

Horizontal/Vertical for Band-edge

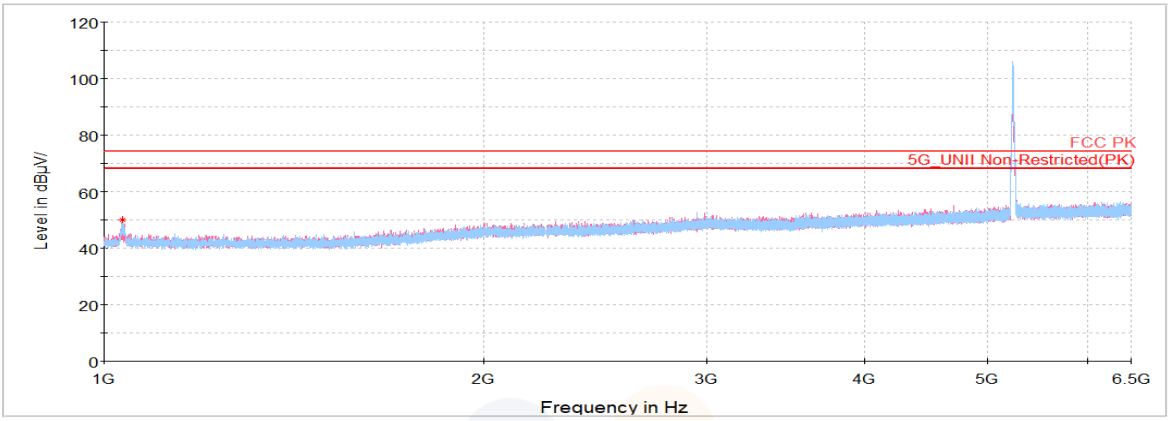


Plot of Harmonics and Spurious Emissions

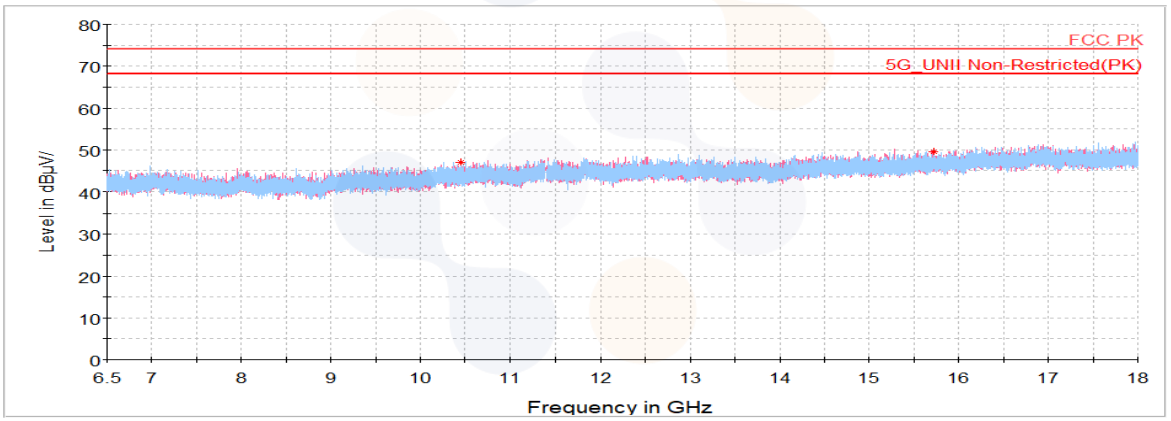
In order to simplify the report, attached plots were only the lowest margin condition

802.11n HT20_UNII-1_Highest Channel (5 240 ㎒)

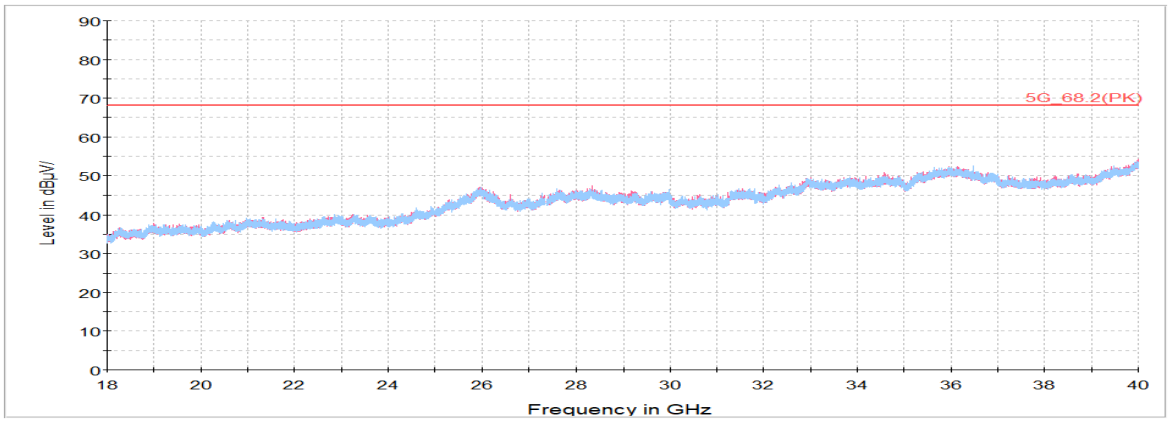
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



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								
1 054.48[1)]	H	68.50	27.79	-48.07	-	48.22	74.00	25.78
10 543.33	V	58.68	37.33	-49.73	-	46.28	68.20	21.92
15 922.09[1)]	V	55.15	40.84	-45.82	-	50.17	74.00	23.83
Average Data								
No spurious emissions were detected within 20 dB of the limit								

Middle Channel (5 280 ㎒)

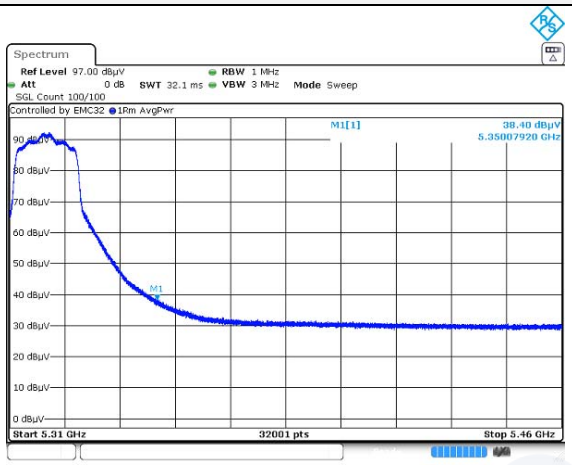
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 075.80[1)]	H	70.38	27.78	-48.04	-	50.12	74.00	23.88
10 562.02	H	59.94	37.35	-49.71	-	47.58	68.20	20.62
15 893.34[1)]	H	54.89	40.81	-45.80	-	49.90	74.00	24.10
Average Data								
No spurious emissions were detected within 20 dB of the limit								

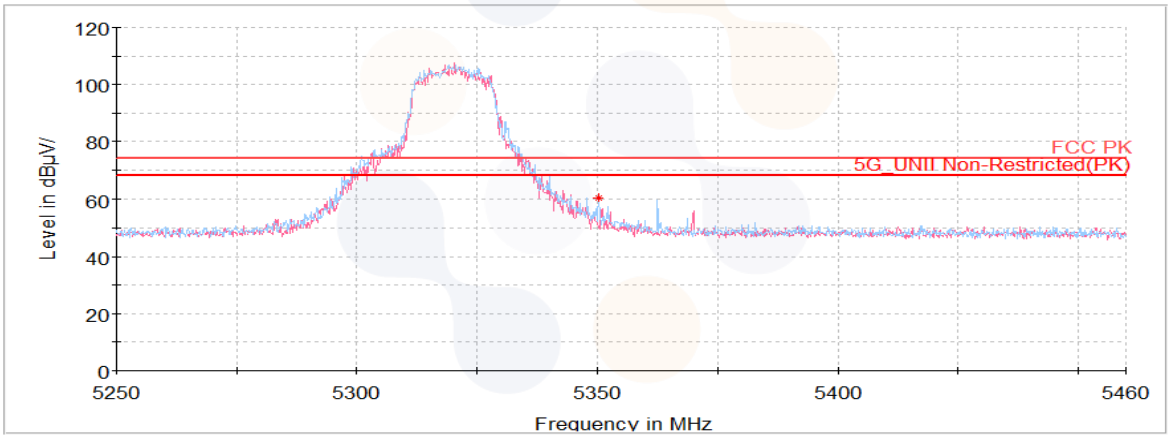
Highest Channel (5 320 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 116.19[1)]	V	69.54	27.78	-48.00	-	49.32	74.00	24.68
5 350.08[1)]	V	50.63	34.30	-24.66	-	60.27	74.00	13.73
10 711.16[1)]	H	60.18	37.47	-49.52	-	48.13	74.00	25.87
15 882.20[1)]	H	54.12	40.81	-45.79	-	49.14	74.00	24.86
Average Data								
5 350.08[1)]	V	38.40	34.30	-24.66	0.12	48.16	54.00	5.84

802.11a UNII-2A

Highest Channel (5 320 ㎒)

Average data	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								
1 055.00[1)]	V	68.66	27.79	-48.07	-	48.38	74.00	25.62
10 572.80	H	60.05	37.36	-49.69	-	47.72	68.20	20.48
15 780.86[1)]	V	54.15	40.72	-45.72	-	49.15	74.00	24.85
Average Data								
No spurious emissions were detected within 20 dB of the limit								

Middle Channel (5 280 ㎒)

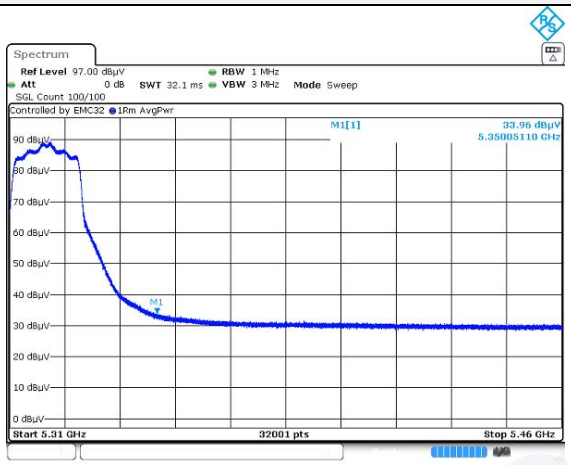
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 076.31[1)]	V	69.13	27.78	-48.04	-	48.87	74.00	25.13
10 564.89	V	59.66	37.35	-49.70	-	47.31	68.20	20.89
15 799.19[1)]	V	54.35	40.74	-45.73	-	49.36	74.00	24.64
Average Data								
No spurious emissions were detected within 20 dB of the limit								

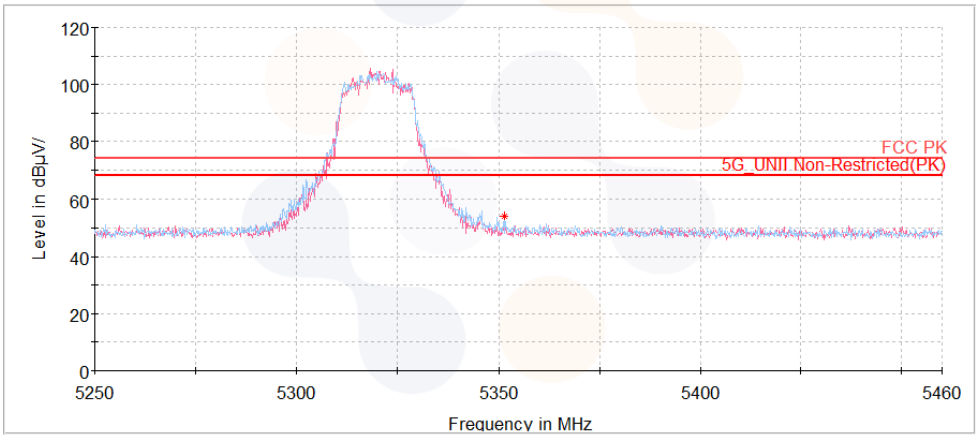
Highest Channel (5 320 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 118.08[1)]	H	67.88	27.78	-48.00	-	47.66	74.00	26.34
5 350.05[1)]	V	44.53	34.30	-24.66	-	54.17	74.00	19.83
10 682.77[1)]	H	58.89	37.45	-49.56	-	46.78	74.00	27.22
15 886.16[1)]	H	55.46	40.81	-45.79	-	50.48	74.00	23.52
Average Data								
5 350.05[1)]	V	33.96	34.30	-24.66	0.12	43.72	54.00	10.28

802.11n HT20 UNII-2A

Highest Channel (5 320 ㎒)

Average data	
	Blank

Horizontal/Vertical for Band-edge


802.11n HT40_UNII-2A

Lowest Channel (5 270 ㎒)

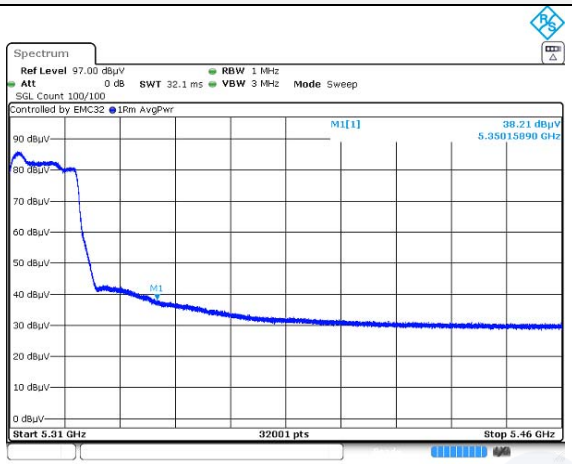
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 565.61	V	60.50	37.35	-49.70	-	48.15	68.20	20.05
15 936.47[1)]	V	54.69	40.85	-45.83	-	49.71	74.00	24.29
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

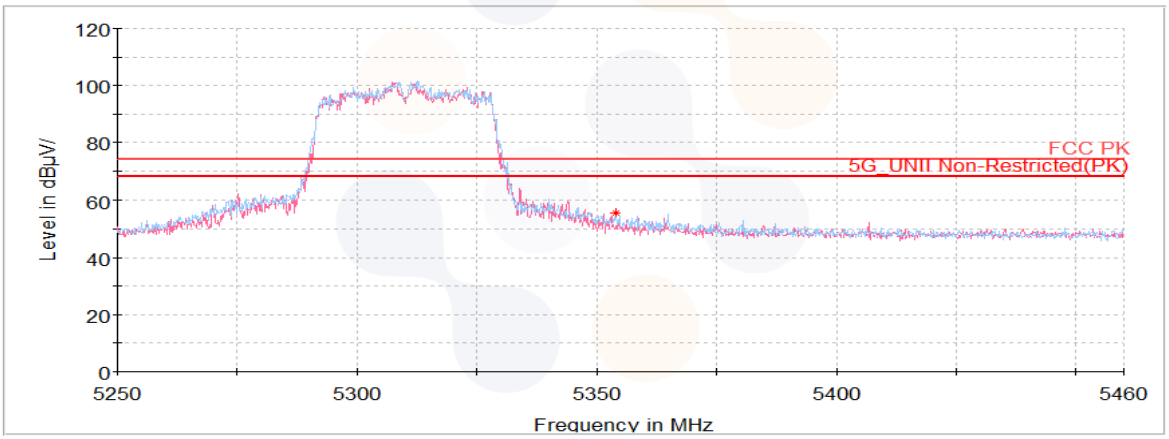
Highest Channel (5 310 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 350.16[1)]	V	45.95	34.30	-24.66	-	55.59	74.00	18.41
10 781.23[1)]	V	59.38	37.52	-49.44	-	47.46	74.00	26.54
15 931.80[1)]	H	55.48	40.85	-45.83	-	50.50	74.00	23.50
Average Data								
5 350.16[1)]	V	38.21	34.30	-24.66	0.24	48.09	54.00	5.91

802.11n HT40_UNII-2A

Highest Channel (5 310 ㎒)

Average data	
	Blank

Horizontal/Vertical for Band-edge


802.11ac VHT20_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								
1 055.69[1)]	H	67.81	27.79	-48.07	-	47.53	74.00	26.47
10 536.50	H	59.25	37.33	-49.74	-	46.84	68.20	21.36
15 658.67[1)]	H	54.42	40.63	-45.63	-	49.42	74.00	24.58
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Middle Channel (5 280 ㎒)

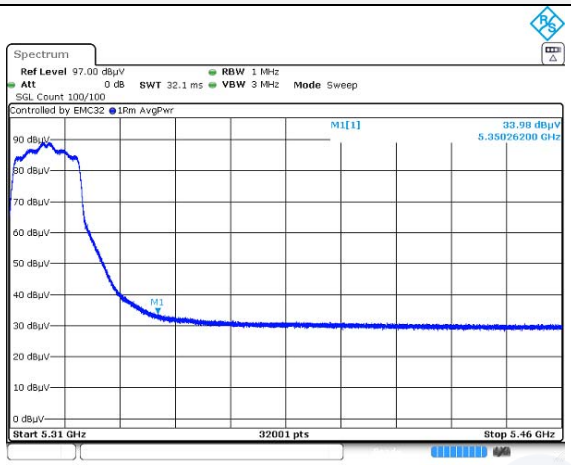
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 074.08[1)]	H	69.98	27.79	-48.05	-	49.72	74.00	24.28
10 540.81	H	60.01	37.33	-49.73	-	47.61	68.20	20.59
15 801.70[1)]	H	54.81	40.74	-45.73	-	49.82	74.00	24.18
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

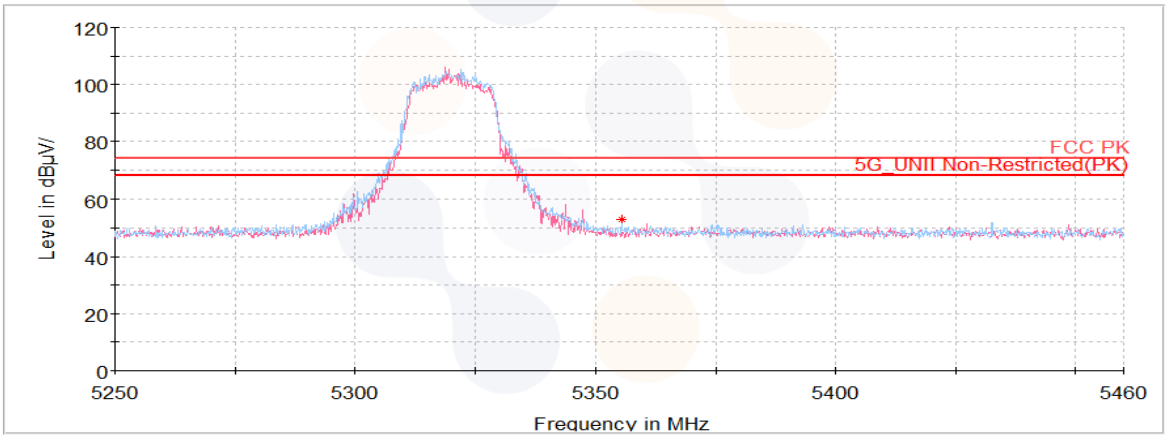
Highest Channel (5 320 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 120.31[1)]	H	67.29	27.78	-48.00	-	47.07	74.00	26.93
5 350.26[1)]	V	43.35	34.30	-24.66	-	52.99	74.00	21.01
10 558.78	V	59.76	37.35	-49.71	-	47.40	68.20	20.80
13 116.09	H	58.19	38.31	-46.12	-	50.38	68.20	17.82
15 974.92[1)]	V	55.60	40.88	-45.86	-	50.62	74.00	23.38
Average Data								
5 350.26[1)]	V	33.98	34.30	-24.66	0.12	43.74	54.00	10.26

802.11ac VHT20 UNII-2A

Highest Channel (5 320 ㎒)

Average data	Average data
	Blank

Horizontal/Vertical for Band-edge


802.11ac VHT40_UNII-2A

Lowest Channel (5 270 ㎒)

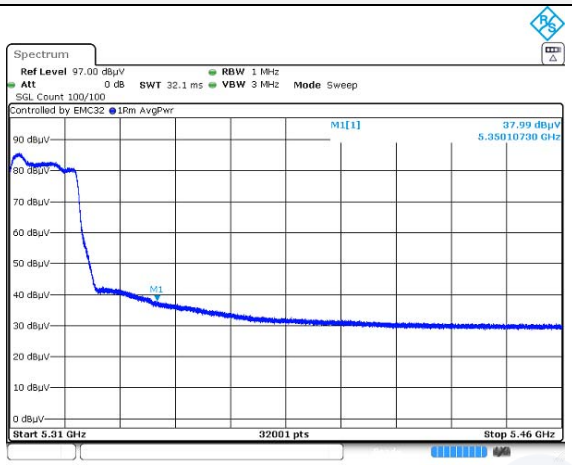
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 780.88[1)]	V	59.31	37.52	-49.44	-	47.39	74.00	26.61
11 602.05[1)]	H	60.66	38.26	-49.39	-	49.53	74.00	24.47
15 756.78[1)]	H	54.67	40.71	-45.70	-	49.68	74.00	24.32
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

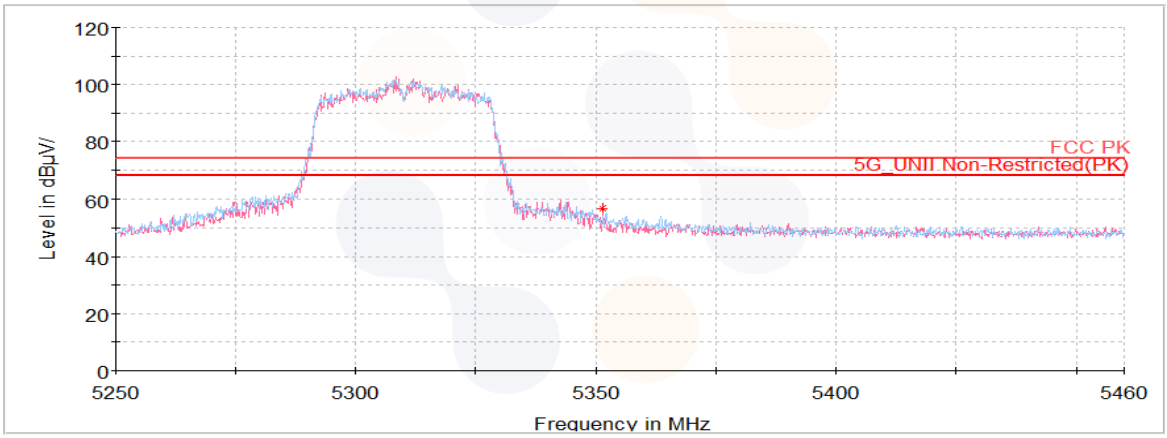
Highest Channel (5 310 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 350.11[1)]	V	47.34	34.30	-24.66	-	56.98	74.00	17.02
10 587.17	V	59.43	37.37	-49.68	-	47.12	68.20	21.08
15 922.45[1)]	H	55.55	40.84	-45.82	-	50.57	74.00	23.43
Average Data								
5 350.11[1)]	V	37.99	34.30	-24.66	0.23	47.86	54.00	6.14

802.11ac VHT40_UNII-2A

Highest Channel (5 310 ㎒)

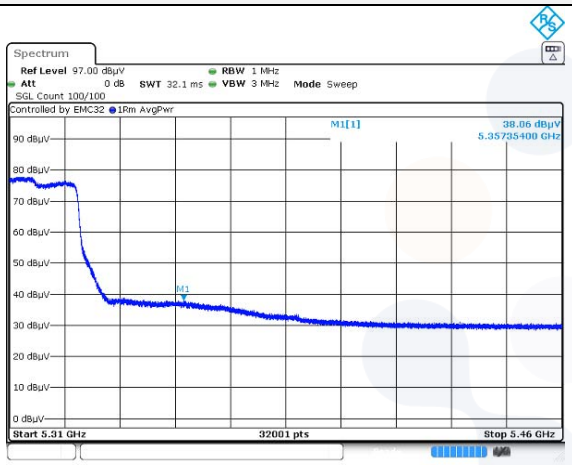
Average data	
	Blank

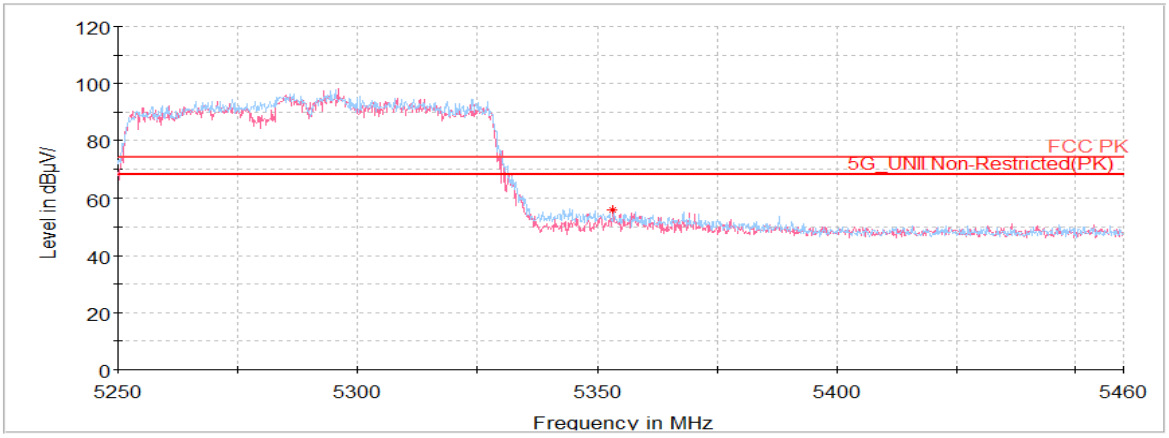
Horizontal/Vertical for Band-edge


802.11ac VHT80_UNII-2A

Lowest Channel (5 290 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 357.35[1)]	V	46.56	34.31	-24.66	-	56.21	74.00	17.79
10 598.31	H	58.84	37.38	-49.66	-	46.56	68.20	21.64
15 896.94[1)]	H	54.38	40.82	-45.80	-	49.40	74.00	24.60
Average Data								
5 357.35[1)]	V	38.06	34.31	-24.66	0.47	48.18	54.00	5.82

Average data	
	Blank

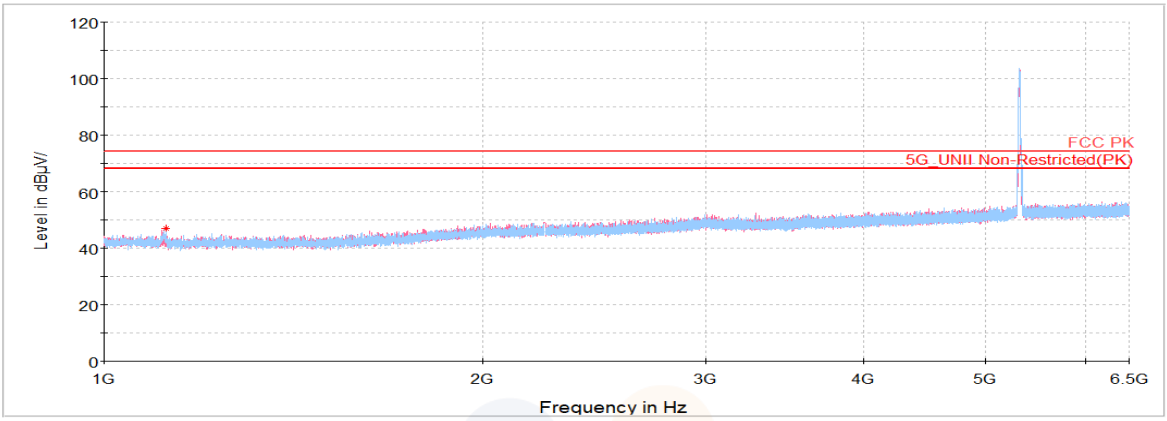
Horizontal/Vertical for Band-edge


Plot of Harmonics and Spurious Emissions

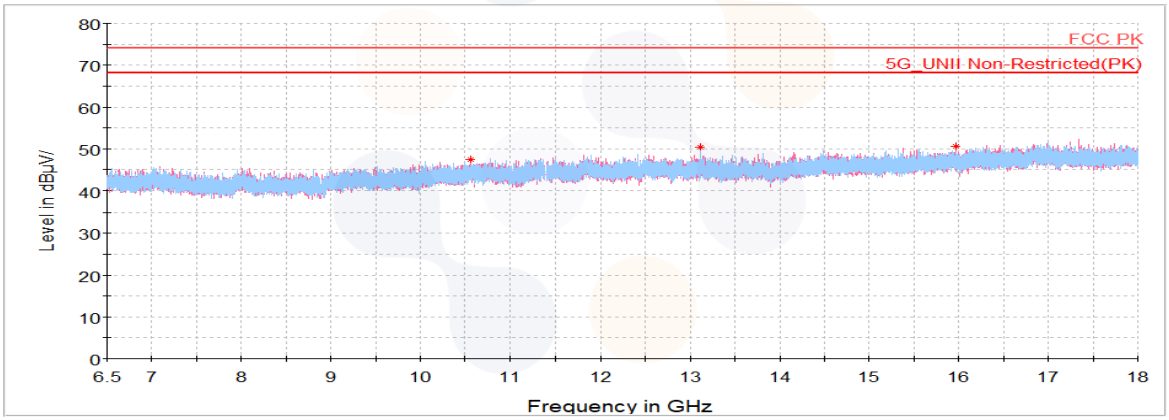
In order to simplify the report, attached plots were only the lowest margin condition

802.11ac VHT20_UNII-2A_Highest Channel (5 320 ㎒)

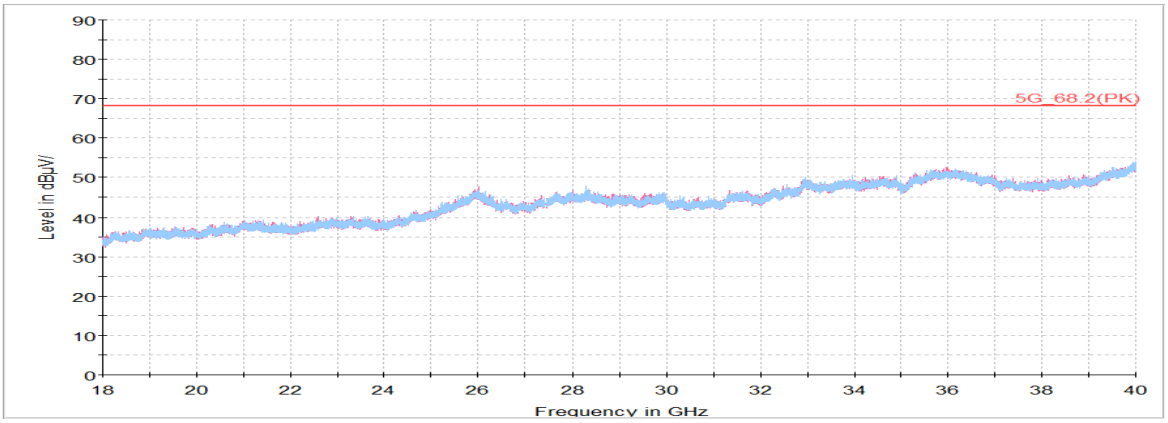
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



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								
1 293.56	H	68.68	27.74	-47.71	-	48.71	68.20	19.49
5 458.62[1)]	V	41.42	34.52	-24.49	-	51.45	74.00	22.55
10 998.66[1)]	H	58.56	37.70	-49.17	-	47.09	74.00	26.91
16 402.22	V	54.85	42.85	-47.07	-	50.63	68.20	17.57
Average Data								
5 458.62[1)]	V	32.57	34.52	-24.49	0.12	42.72	54.00	11.28

Middle Channel (5 600 ㎒)

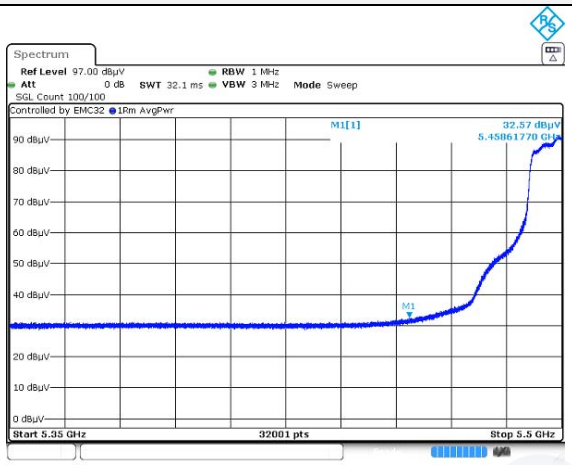
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 395.31[1)]	H	70.29	27.72	-47.38	-	50.63	74.00	23.37
11 206.38[1)]	H	58.06	37.87	-49.22	-	46.71	74.00	27.29
16 786.03	V	54.93	43.06	-46.96	-	51.03	68.20	17.17
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Highest Channel (5 700 ㎒)

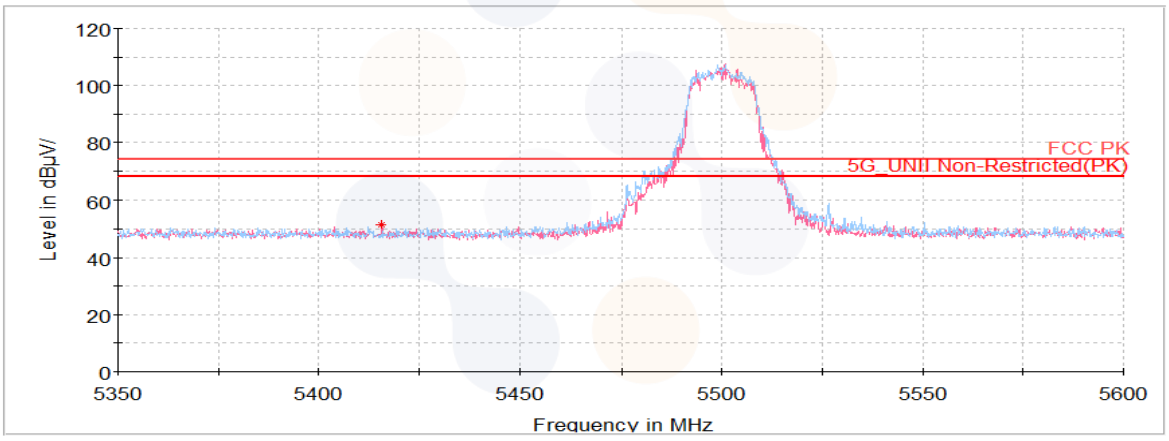
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 495.86[1)]	H	65.53	27.70	-47.15	-	46.08	74.00	27.92
5 735.33	H	45.33	34.88	-24.25	-	55.96	68.20	12.24
11 379.23[1)]	V	59.51	38.00	-49.27	-	48.24	74.00	25.76
17 032.20	H	56.61	41.64	-46.67	-	51.58	68.20	16.62
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

802.11a_UNII-2C

Lowest Channel (5 500 ㎒)

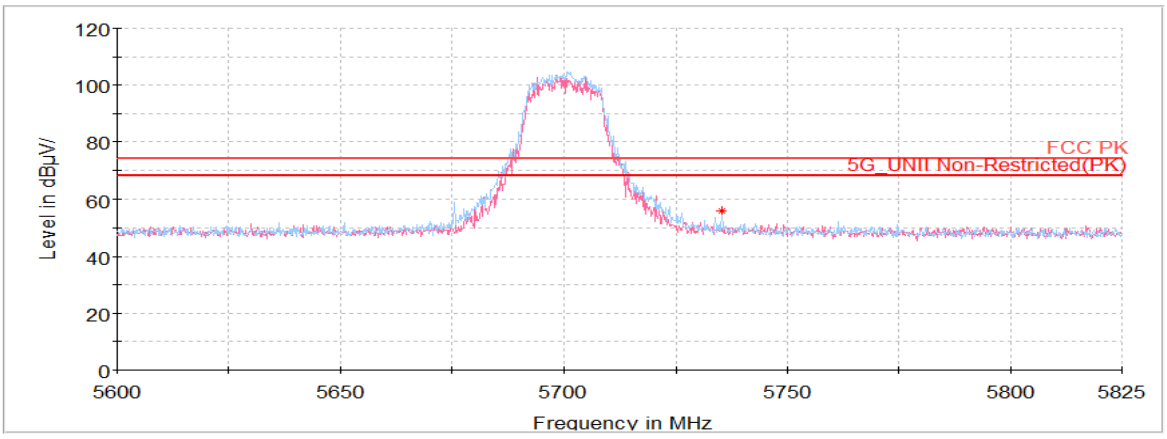
Average data	
	Blank

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								
1 295.80	H	68.49	27.74	-47.70	-	48.53	68.20	19.67
5 459.84[1)]	V	41.21	34.52	-24.48	-	51.25	74.00	22.75
11 088.86[1)]	V	58.43	37.77	-49.19	-	47.01	74.00	26.99
16 446.42	V	54.86	42.96	-47.20	-	50.62	68.20	17.58
Average Data								
5 459.84[1)]	V	32.11	34.52	-24.48	0.12	42.27	54.00	11.73

Middle Channel (5 600 ㎒)

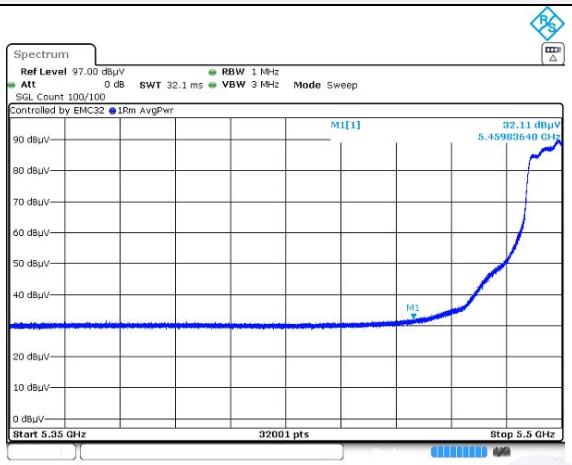
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 393.25[1)]	H	66.42	27.72	-47.38	-	46.76	74.00	27.24
11 333.23[1)]	V	59.06	37.97	-49.26	-	47.77	74.00	26.23
16 845.69	H	55.54	43.15	-46.88	-	51.81	68.20	16.39
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Highest Channel (5 700 ㎒)

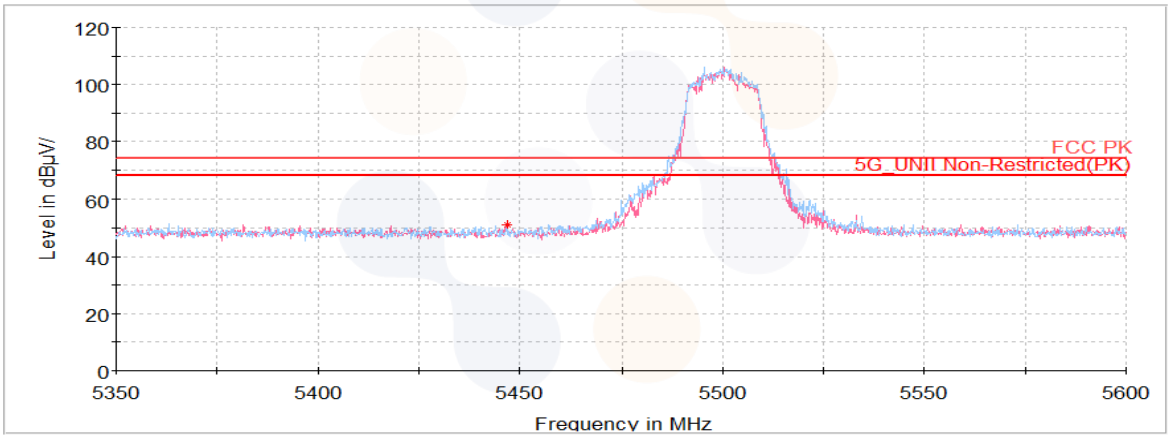
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 725.53	V	42.75	34.87	-24.25	-	53.37	68.20	14.83
11 590.55[1)]	V	58.76	38.24	-49.38	-	47.62	74.00	26.38
17 189.97	V	56.46	41.36	-46.71	-	51.11	68.20	17.09
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11n HT20_UNII-2C

Lowest Channel (5 500 ㎒)

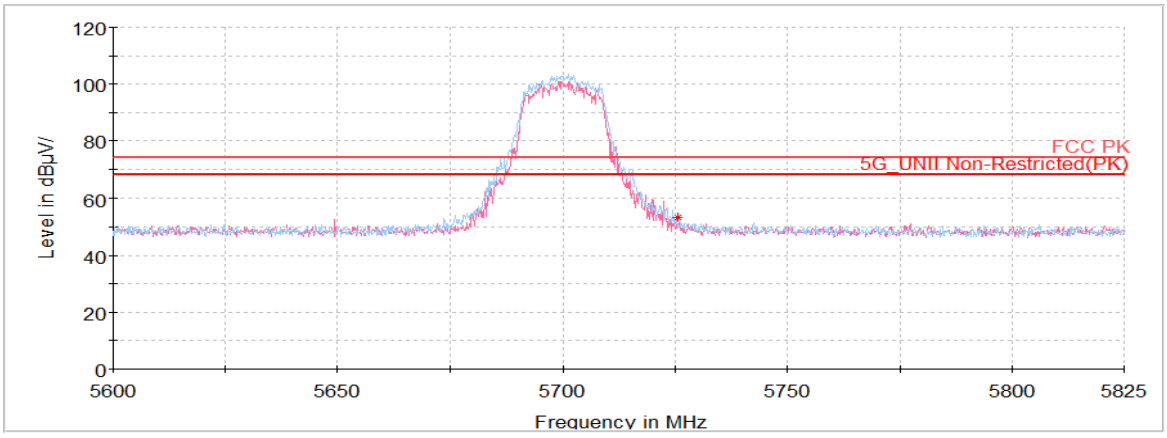
Average data	
	Blank

Horizontal/Vertical for Band-edge



Highest Channel (5 700 ㎒)

Horizontal/Vertical for Band-edge



802.11n HT40_UNII-2C

Lowest Channel (5 510 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 459.86[1)]	V	43.08	34.52	-24.48	-	53.12	74.00	20.88
11 031.00[1)]	V	59.04	37.72	-49.17	-	47.59	74.00	26.41
16 655.58	H	55.42	42.85	-47.14	-	51.13	68.20	17.07
Average Data								
5 459.86[1)]	V	35.54	34.52	-24.48	0.24	45.82	54.00	8.18

Middle Channel (5 590 ㎒)

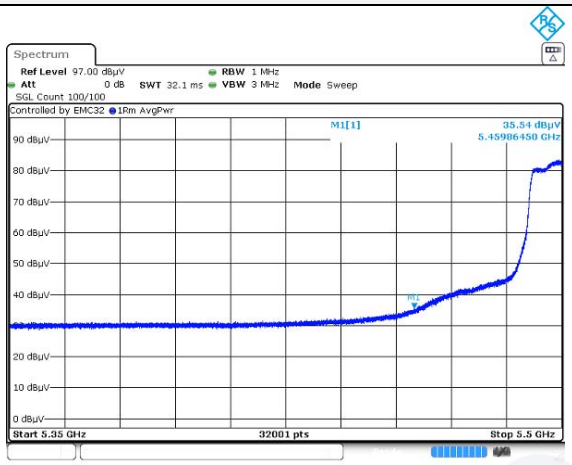
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 956.61[1)]	H	58.90	37.67	-49.22	-	47.35	74.00	26.65
16 834.19	H	54.72	43.13	-46.89	-	50.96	68.20	17.24
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Highest Channel (5 670 ㎒)

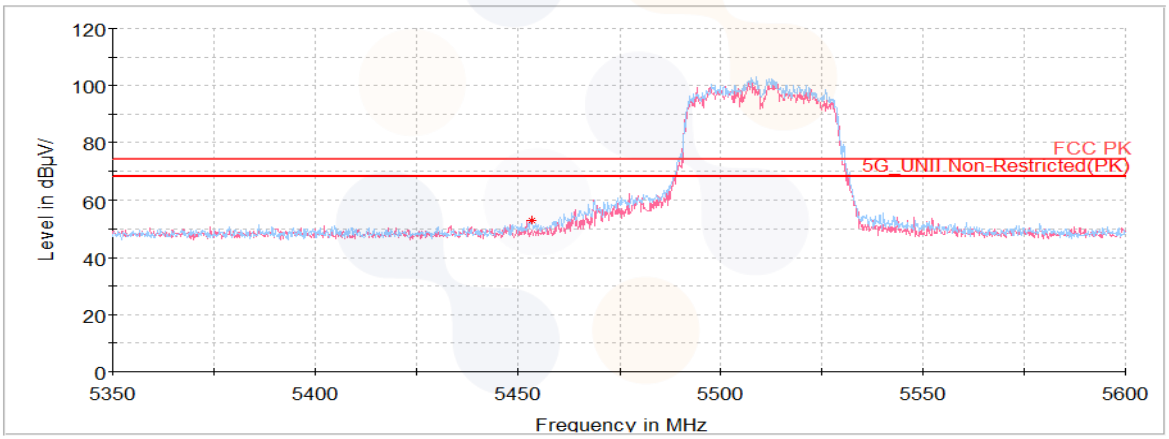
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 727.42	H	40.72	34.87	-24.25	-	51.34	68.20	16.86
11 529.81[1)]	H	59.82	38.15	-49.33	-	48.64	74.00	25.36
16 945.59	H	55.44	43.31	-46.74	-	52.01	68.20	16.19
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11n HT40_UNII-2C

Lowest Channel (5 510 ㎒)

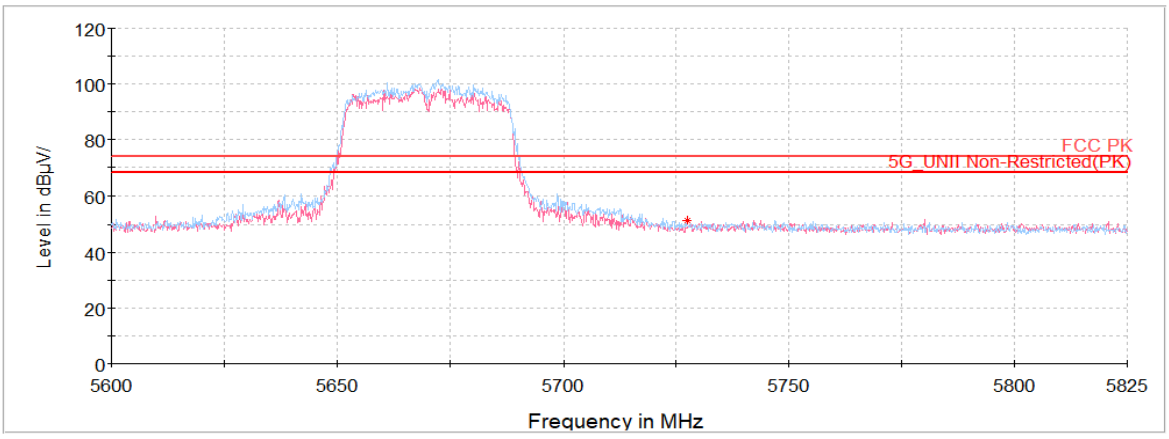
Average data	
	Blank

Horizontal/Vertical for Band-edge



Highest Channel (5 670 ㎒)

Horizontal/Vertical for Band-edge



802.11ac VHT20_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								
1 295.28	V	66.87	27.74	-47.70	-	46.91	68.20	21.29
5 459.86[1)]	V	41.76	34.52	-24.48	-	51.80	74.00	22.20
10 973.50[1)]	V	59.38	37.68	-49.20	-	47.86	74.00	26.14
16 389.64	V	55.51	42.81	-47.03	-	51.29	68.20	16.91
Average Data								
5 459.86[1)]	V	32.44	34.52	-24.48	0.12	42.60	54.00	11.40

Middle Channel (5 600 ㎒)

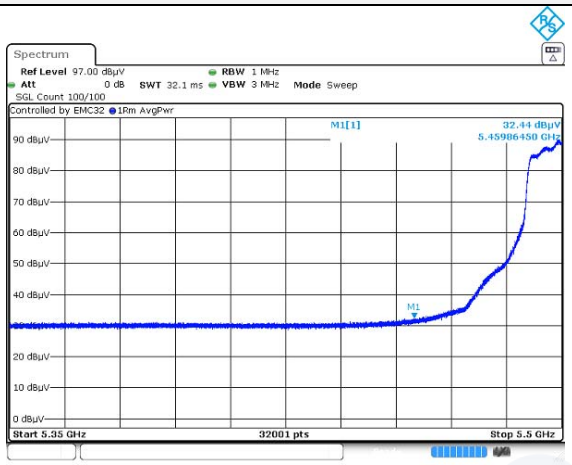
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 397.03[1)]	H	68.38	27.72	-47.37	-	48.73	74.00	25.27
11 477.34[1)]	V	60.16	38.08	-49.30	-	48.94	74.00	25.06
16 870.48	V	54.46	43.19	-46.84	-	50.81	68.20	17.39
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Highest Channel (5 700 ㎒)

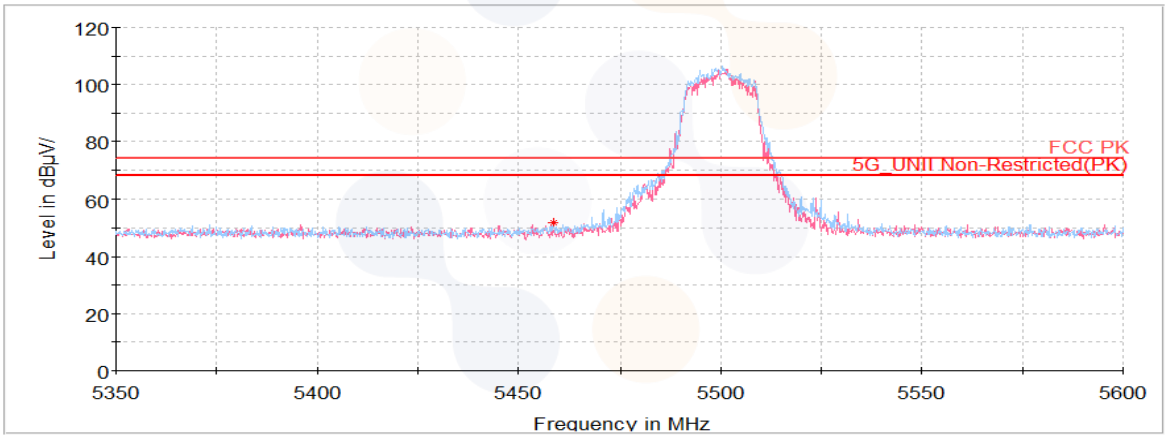
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 496.55[1)]	H	64.70	27.70	-47.15	-	45.25	74.00	28.75
5 725.19	H	42.30	34.87	-24.25	-	52.92	68.20	15.28
11 361.98[1)]	H	58.90	37.99	-49.27	-	47.62	74.00	26.38
17 183.50	V	57.61	41.37	-46.71	-	52.27	68.20	15.93
Average Data								

802.11ac VHT20_UNII-2C

Lowest Channel (5 500 ㎒)

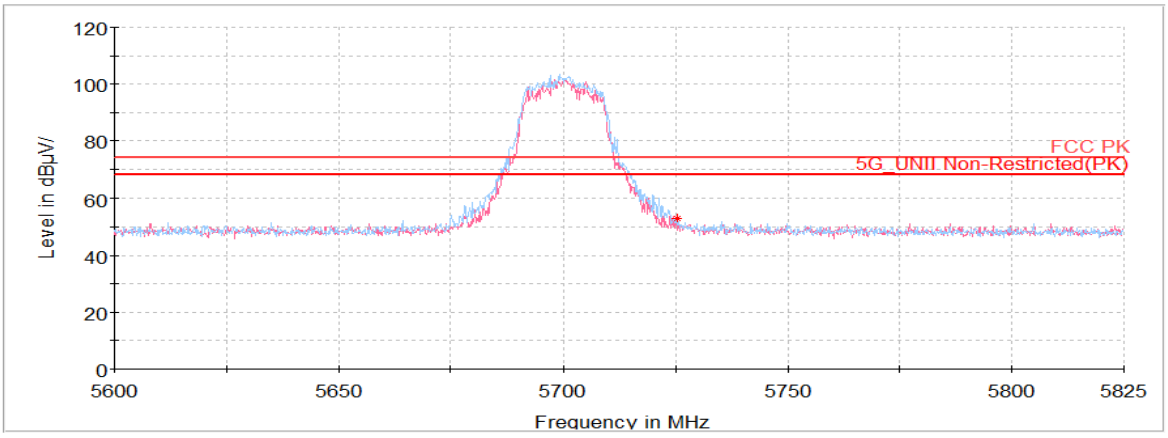
Average data	
	Blank

Horizontal/Vertical for Band-edge



Highest Channel (5 700 ㎒)

Horizontal/Vertical for Band-edge



802.11ac VHT40_UNII-2C

Lowest Channel (5 510 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 459.82[1)]	V	43.06	34.52	-24.48	-	53.10	74.00	20.90
9 738.69	V	60.06	36.69	-48.19	-	48.56	68.20	19.64
11 132.70[1)]	H	60.04	37.81	-49.20	-	48.65	74.00	25.35
16 515.06	V	56.05	42.62	-47.34	-	51.33	68.20	16.87
Average Data								
5 459.82[1)]	V	35.34	34.52	-24.48	0.23	45.61	54.00	8.39

Middle Channel (5 590 ㎒)

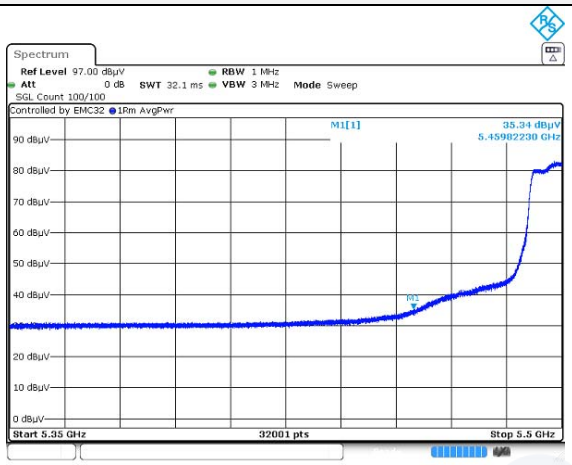
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
11 821.98[1)]	V	60.53	38.62	-49.56	-	49.59	74.00	24.41
16 634.38	H	55.92	42.82	-47.17	-	51.57	68.20	16.63
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Highest Channel (5 670 ㎒)

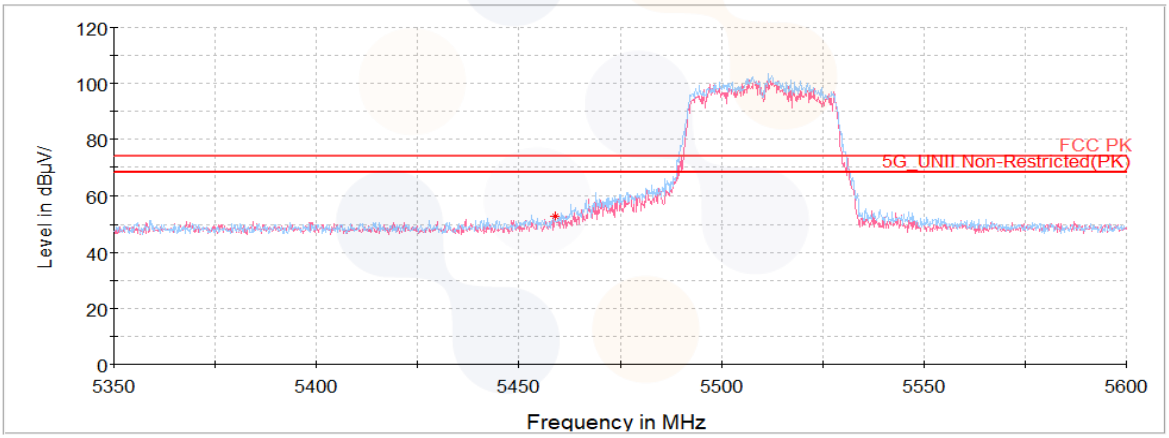
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 736.19	H	41.00	34.88	-24.25	-	51.63	68.20	16.57
11 431.70[1)]	V	59.58	38.05	-49.29	-	48.34	74.00	25.66
17 184.22	V	56.62	41.37	-46.71	-	51.28	68.20	16.92
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11ac VHT40_UNII-2C

Lowest Channel (5 510 ㎒)

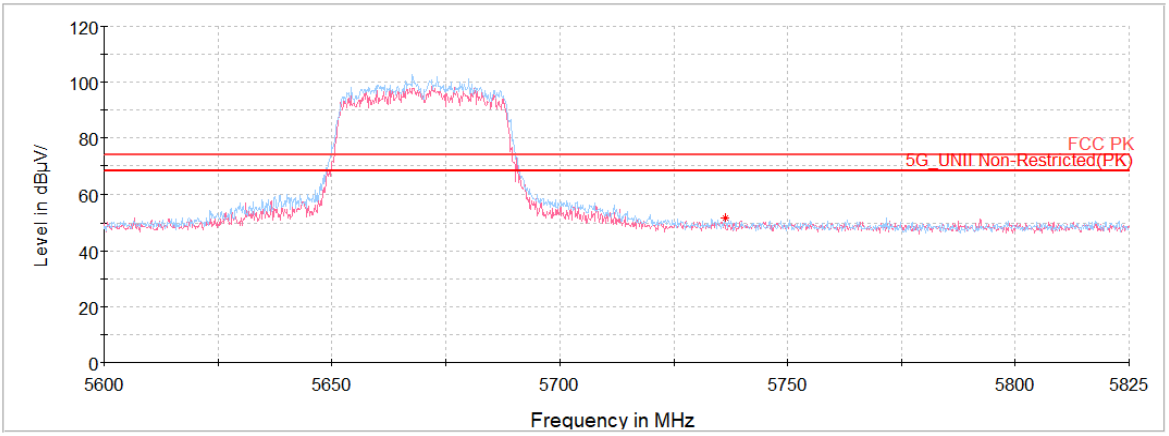
Average data	
	Blank

Horizontal/Vertical for Band-edge



Highest Channel (5 670 ㎒)

Horizontal/Vertical for Band-edge



802.11ac VHT80_UNII-2C

Lowest Channel (5 530 ㎒)

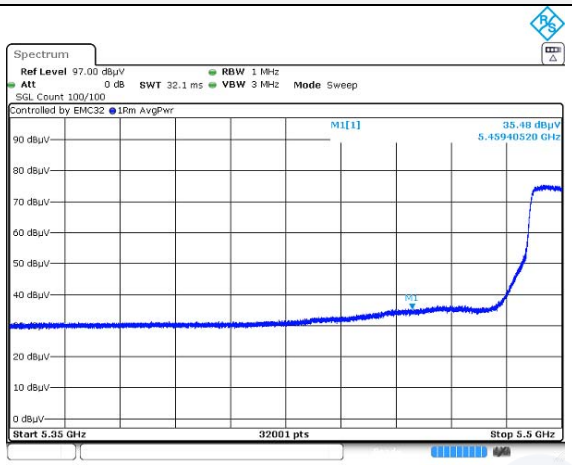
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 459.41[1)]	V	45.21	34.52	-24.48	-	55.25	74.00	18.75
11 200.27[1)]	H	58.52	37.86	-49.22	-	47.16	74.00	26.84
16 639.41	H	55.21	42.82	-47.17	-	50.86	68.20	17.34
Average Data								
5 459.41[1)]	V	35.48	34.52	-24.48	0.47	45.99	54.00	8.01

Highest Channel (5 610 ㎒)

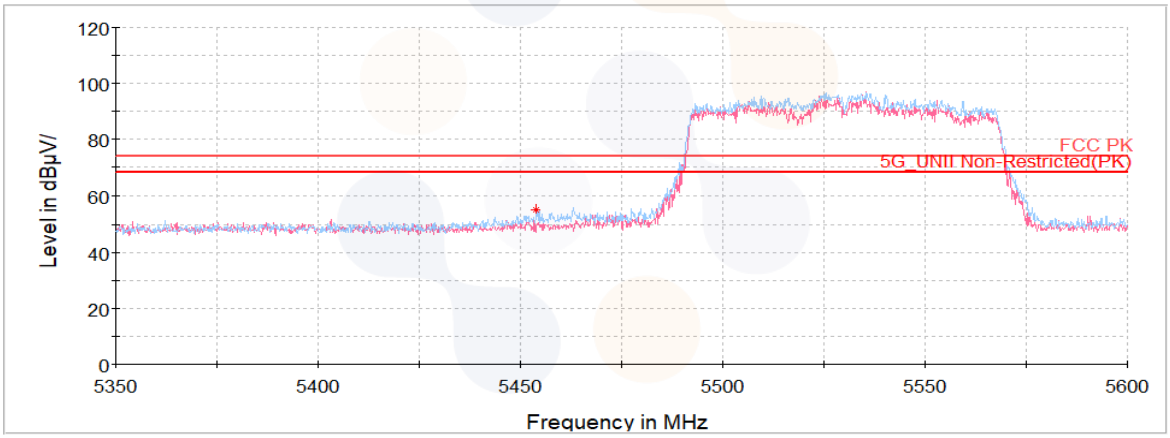
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 729.83	V	40.00	34.88	-24.25	-	50.63	68.20	17.57
11 228.30[1)]	V	58.55	37.88	-49.23	-	47.20	74.00	26.80
16 815.14	H	54.91	43.10	-46.92	-	51.09	68.20	17.11
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11ac VHT80_UNII-2C

Lowest Channel (5 530 ㎒)

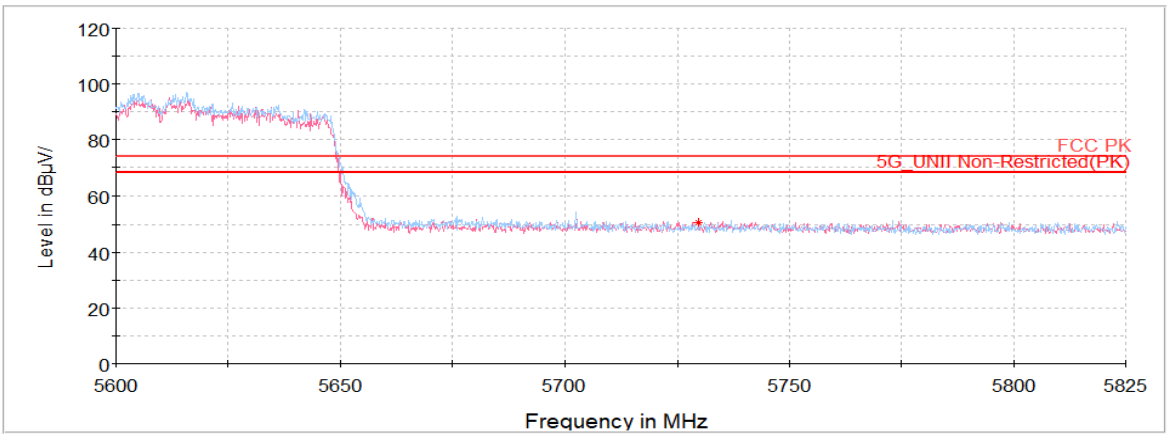
Average data	
	Blank

Horizontal/Vertical for Band-edge



Highest Channel (5 610 ㎒)

Horizontal/Vertical for Band-edge

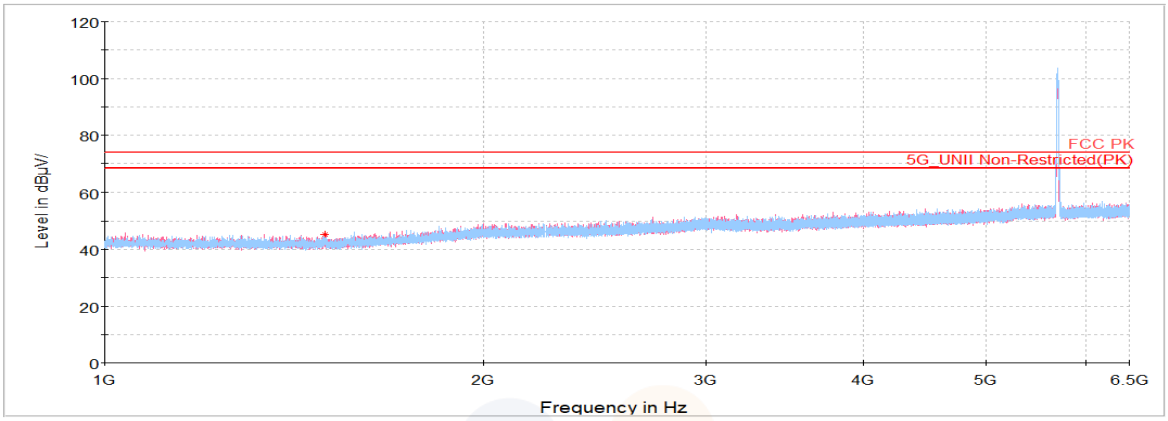


Plot of Harmonics and Spurious Emissions

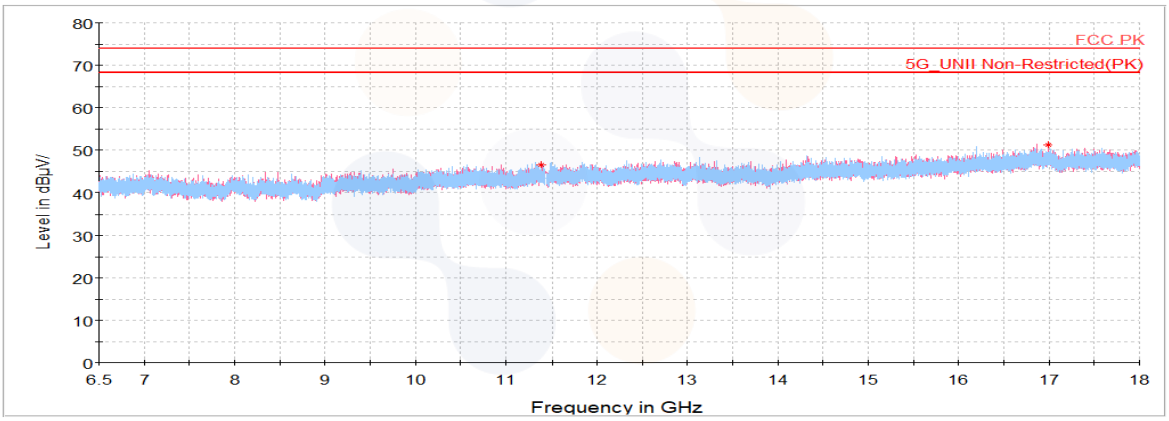
In order to simplify the report, attached plots were only the lowest margin condition

802.11ac VHT20_UNII-2C_Highest Channel (5 700 ㎒)

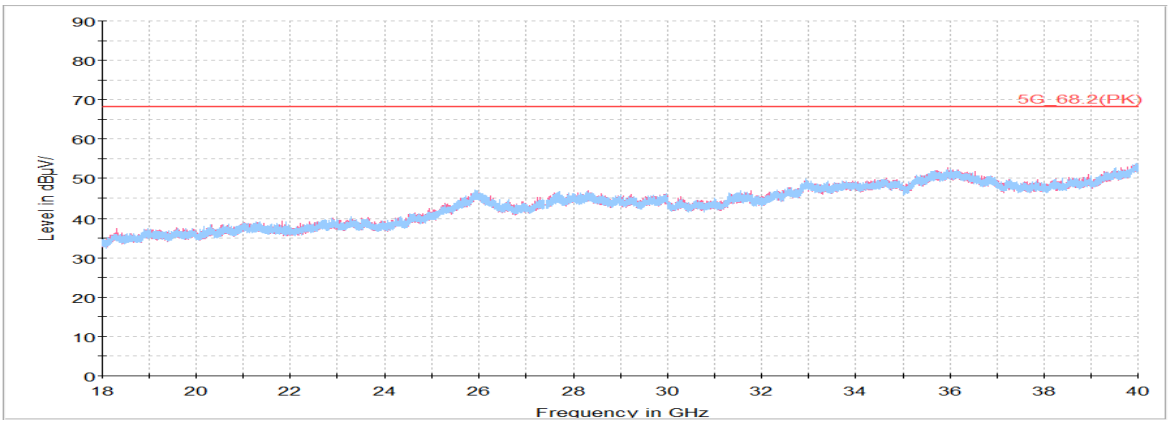
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



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								
11 364.14[1)]	H	60.30	37.99	-49.27	-	49.02	74.00	24.98
17 040.47	V	56.00	41.63	-46.67	-	50.96	68.20	17.24
Average Data								
No spurious emissions were detected within 20 dB 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								
1 394.28[1)]	H	67.85	27.72	-47.38	-	48.19	74.00	25.81
11 591.98[1)]	H	59.06	38.25	-49.38	-	47.93	74.00	26.07
17 059.52	H	57.81	41.59	-46.68	-	52.72	68.20	15.48
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

802.11n HT40 (5 710 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
11 522.98[1)]	H	59.56	38.14	-49.32	-	48.38	74.00	25.62
17 177.75	H	56.21	41.38	-46.71	-	50.88	68.20	17.32
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

802.11ac VHT20 (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								
11 304.48[1)]	H	59.17	37.94	-49.25	-	47.86	74.00	26.14
17 164.81	V	56.14	41.40	-46.71	-	50.83	68.20	17.37
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

802.11ac VHT40 (5 710 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
11 487.77[1)]	V	58.70	38.09	-49.30	-	47.49	74.00	26.51
17 142.89	V	56.10	41.44	-46.70	-	50.84	68.20	17.36
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11ac VHT80 (5 690 ㎒)

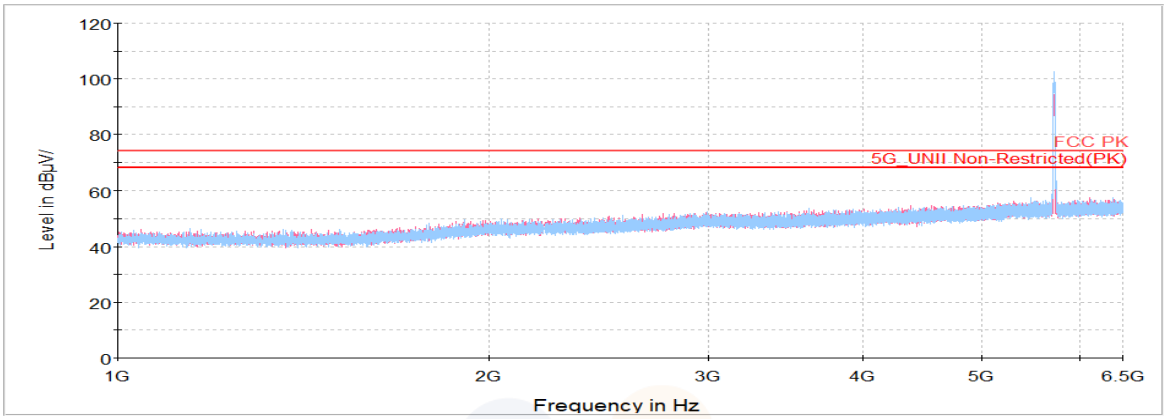
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
11 365.94[1)]	H	59.36	37.99	-49.27	-	48.08	74.00	25.92
17 189.61	V	56.66	41.36	-46.71	-	51.31	68.20	16.89
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Plot of Harmonics and Spurious Emissions

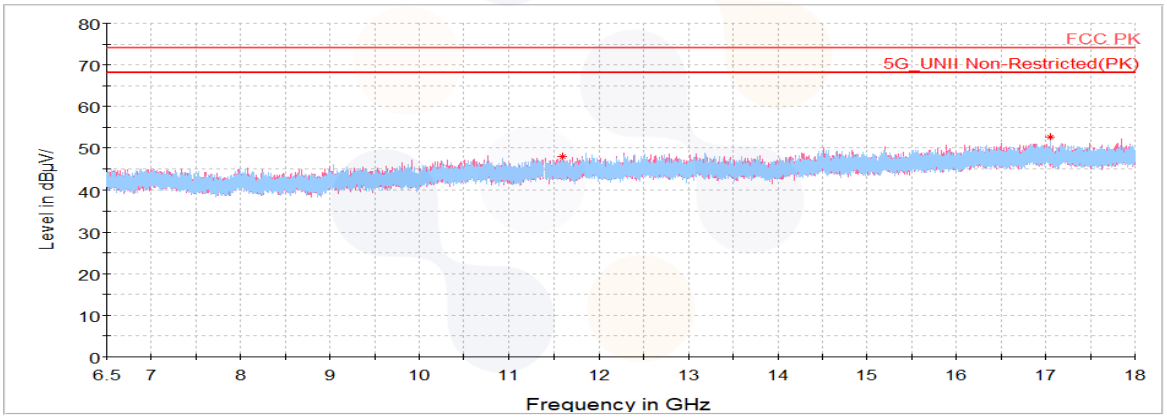
In order to simplify the report, attached plots were only the lowest margin condition

802.11n HT20_Straddle Channel (5 720 ㎒)

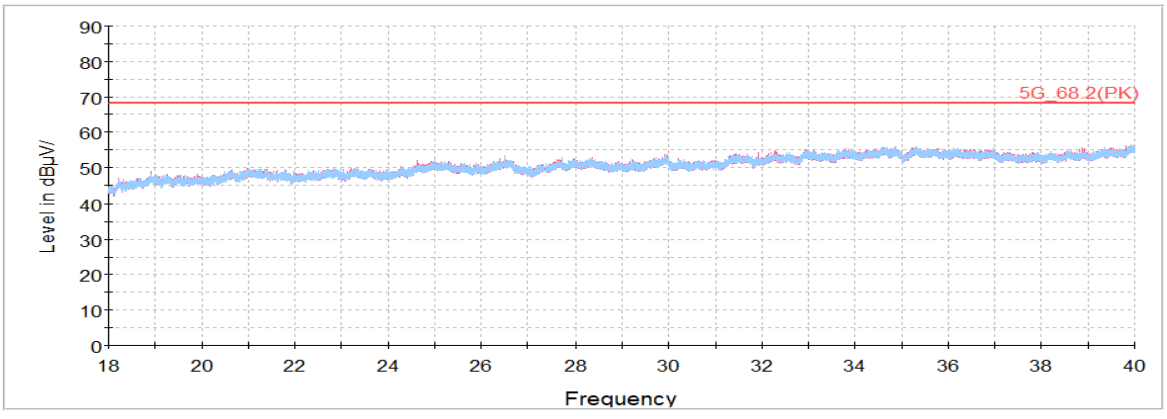
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



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								
5 720.89	H	42.79	34.87	-24.26	-	53.40	112.83	59.43
11 517.95[1)]	H	59.69	38.13	-49.32	-	48.50	74.00	25.50
17 203.98	V	56.44	41.33	-46.72	-	51.05	68.20	17.15
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								
11 588.03[1)]	H	59.03	38.24	-49.38	-	47.89	74.00	26.11
17 242.44	V	56.83	41.26	-46.73	-	51.36	68.20	16.84
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								
5 857.88	H	43.12	35.03	-23.92	-	54.23	110.00	55.77
11 665.66[1)]	V	58.04	38.37	-49.44	-	46.97	74.00	27.03
17 435.06	H	56.92	40.92	-46.78	-	51.06	68.20	17.14
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								
5 721.06	H	42.64	34.87	-24.26	-	53.25	113.22	59.97
11 523.34[1)]	H	58.56	38.14	-49.32	-	47.38	74.00	26.62
17 250.34	H	56.42	41.25	-46.73	-	50.94	68.20	17.26
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								
11 534.84[1)]	H	59.68	38.16	-49.33	-	48.51	74.00	25.49
17 191.05	H	57.21	41.36	-46.71	-	51.86	68.20	16.34
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								
5 855.64	H	43.69	35.03	-23.93	-	54.79	110.62	55.83
11 693.33[1)]	V	59.00	38.41	-49.46	-	47.95	74.00	26.05
17 435.06	V	56.61	40.92	-46.78	-	50.75	68.20	17.45
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11n HT40_UNII-3

Lowest Channel (5 755 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 717.63	V	45.70	34.86	-24.26	-	56.30	110.14	53.83
11 554.25[1)]	H	59.77	38.19	-49.35	-	48.61	74.00	25.39
17 311.08	H	57.11	41.14	-46.75	-	51.50	68.20	16.70
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Highest Channel (5 795 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 862.17	H	39.79	35.03	-23.90	-	50.92	108.79	57.87
11 532.69[1)]	H	58.72	38.15	-49.33	-	47.54	74.00	26.46
17 375.41	V	56.21	41.02	-46.76	-	50.47	68.20	17.73
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11ac VHT20_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								
5 716.59	H	47.02	34.86	-24.26	-	57.62	109.85	52.22
11 340.06[1)]	V	59.62	37.97	-49.26	-	48.33	74.00	25.67
17 232.73	V	56.17	41.28	-46.73	-	50.72	68.20	17.48
Average Data								
No spurious emissions were detected within 20 dB 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								
11 616.78[1)]	H	58.50	38.29	-49.40	-	47.39	74.00	26.61
17 320.06	H	56.21	41.12	-46.75	-	50.58	68.20	17.62
Average Data								
No spurious emissions were detected within 20 dB 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								
5 864.23	H	40.43	35.04	-23.89	-	51.58	108.21	56.64
11 611.75[1)]	V	58.72	38.28	-49.39	-	47.61	74.00	26.39
17 454.47	H	56.45	40.88	-46.78	-	50.55	68.20	17.65
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

802.11ac VHT40_UNII-3

Lowest Channel (5 755 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 719.00	H	45.83	34.86	-24.26	-	56.43	110.52	54.09
11 558.92[1)]	V	58.62	38.19	-49.35	-	47.46	74.00	26.54
17 341.27	V	55.72	41.09	-46.75	-	50.06	68.20	18.14
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Highest Channel (5 795 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 868.53	H	40.47	35.04	-23.87	-	51.64	107.01	55.37
11 599.53[1)]	H	58.56	38.26	-49.38	-	47.44	74.00	26.56
17 414.94	V	56.90	40.95	-46.77	-	51.08	68.20	17.12
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11ac VHT80_UNII-3

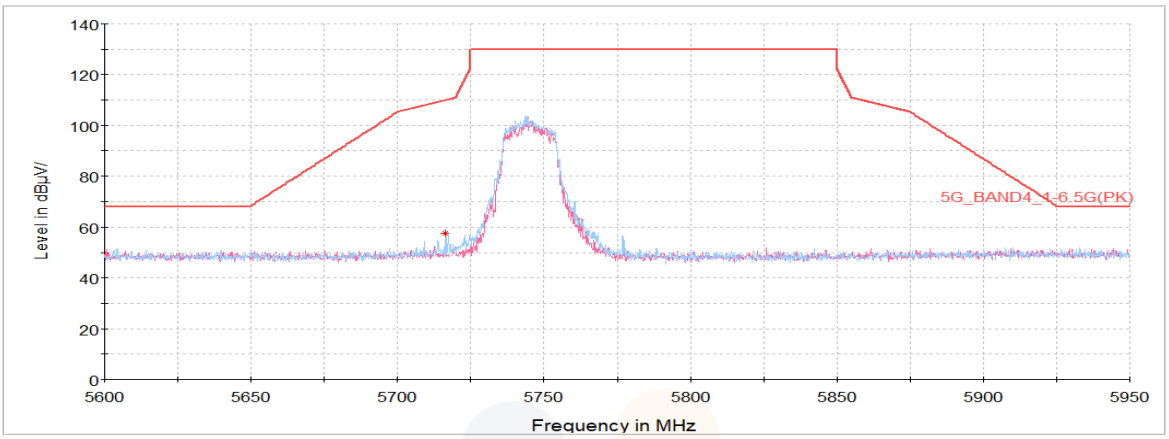
Lowest Channel (5 775 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 711.27	H	44.80	34.85	-24.26	-	55.39	108.35	52.96
5 865.44	H	40.07	35.04	-23.88	-	51.23	107.88	56.65
11 554.25[1)]	V	57.89	38.19	-49.35	-	46.73	74.00	27.27
17 384.39	V	55.93	41.01	-46.77	-	50.17	68.20	18.03
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Plot of Band-edge, Harmonics and Spurious Emissions

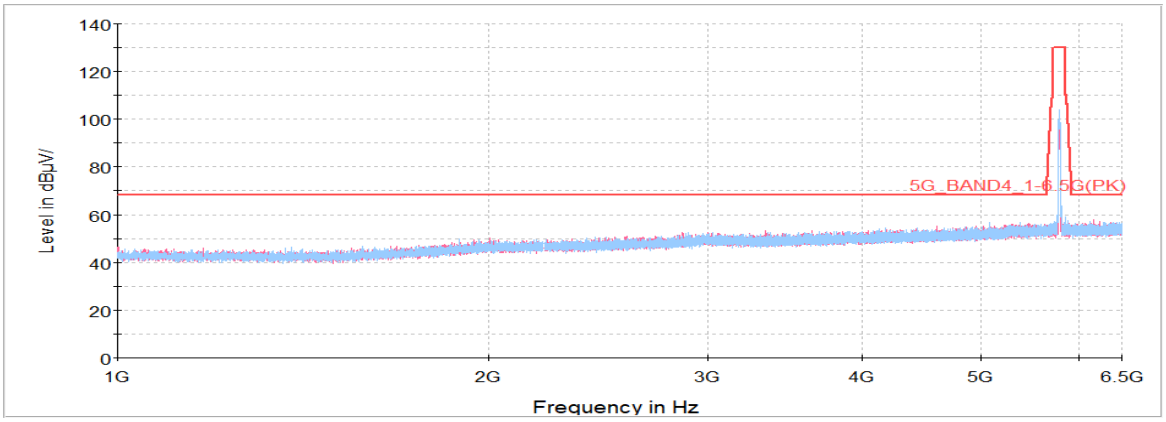
In order to simplify the report, attached plots were only the lowest margin condition

802.11ac VHT20_UNII-3_Lowest Channel (5 745 ㎒)

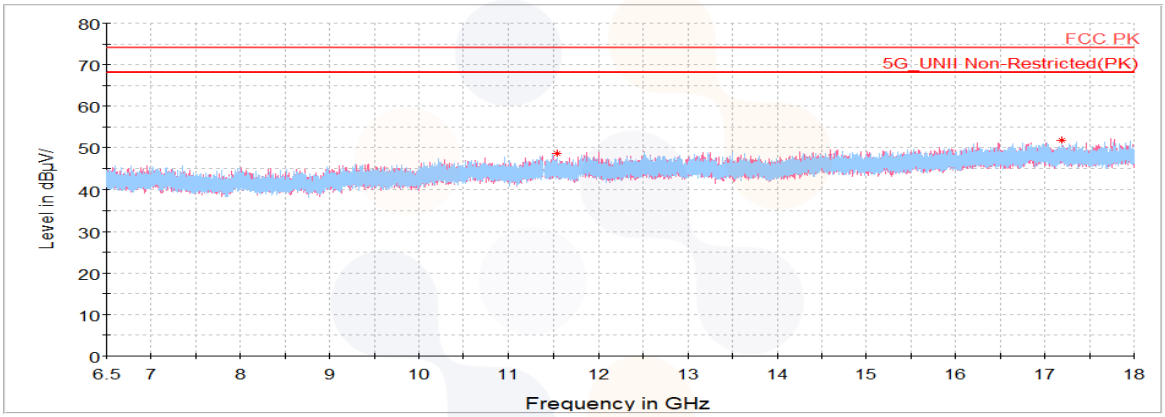
Horizontal/Vertical for Band-edge


802.11n HT20_UNII-3_Middle Channel (5 785 ㎒)

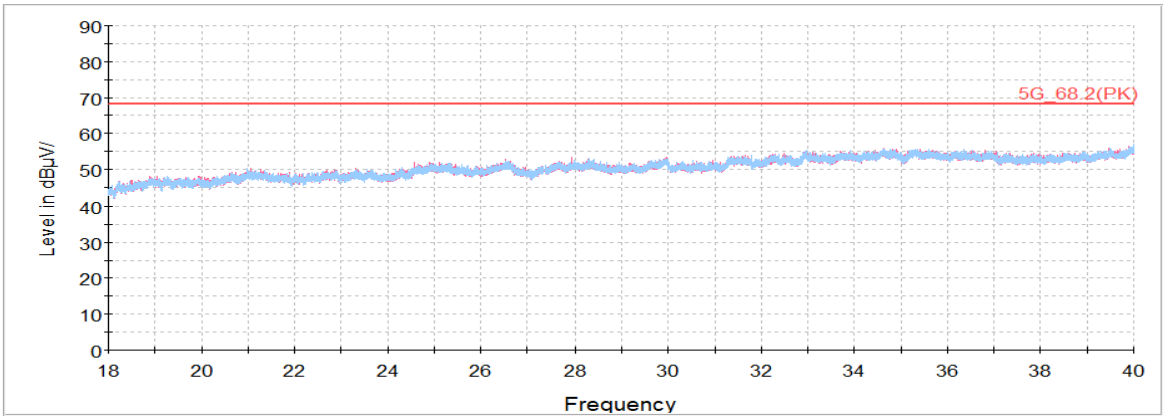
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓



Horizontal/Vertical for 18 ㎓ ~ 40 ㎓



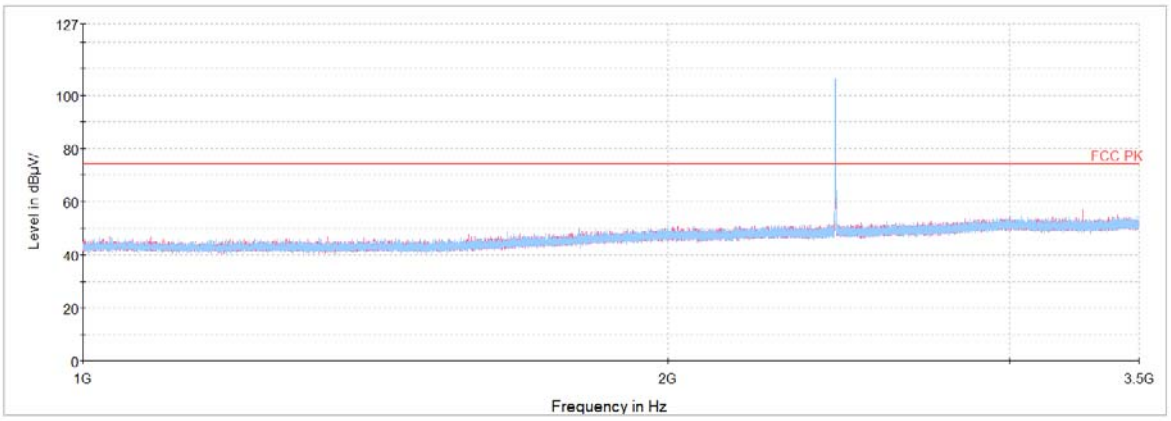
Spurious Emission for Simultaneous Tx Condition

Case	WLAN 5 ㎓	Bluetooth
Mode	802.11n HT20	BDR
Channel	144	39
Frequency	5 720	2 441
Data Rate	MCS0	DH-1

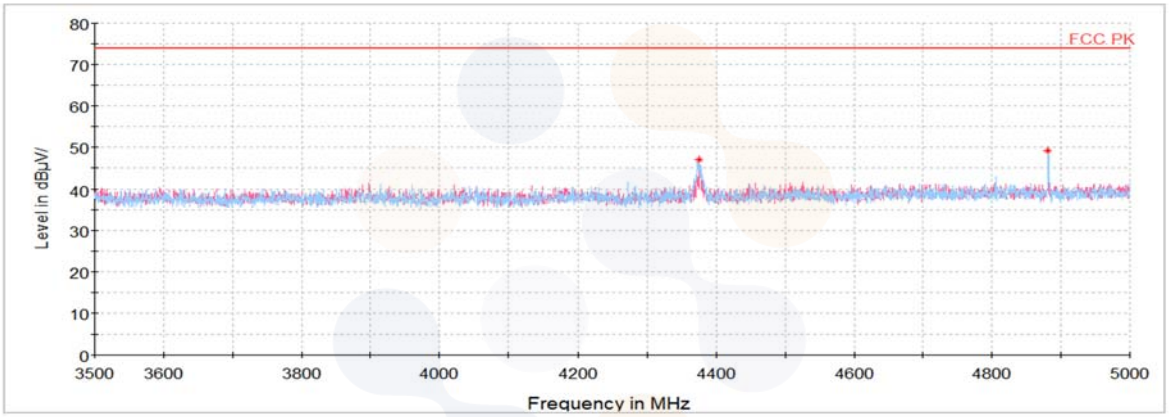
Notes.
The lowest margin condition among the channels and modes were selected for test.

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
4 375.44[1)]	H	65.67	33.63	-52.30	-	47.00	74.00	27.00
4 881.58[1)]	H	67.06	33.62	-51.54	-	49.14	74.00	24.86
7 241.03	V	60.14	35.40	-50.32	-	45.22	68.20	22.98
11 339.34[1)]	V	58.94	37.97	-49.26	-	47.65	74.00	26.35
17 172.00	H	55.40	41.39	-46.71	-	50.08	68.20	18.12
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

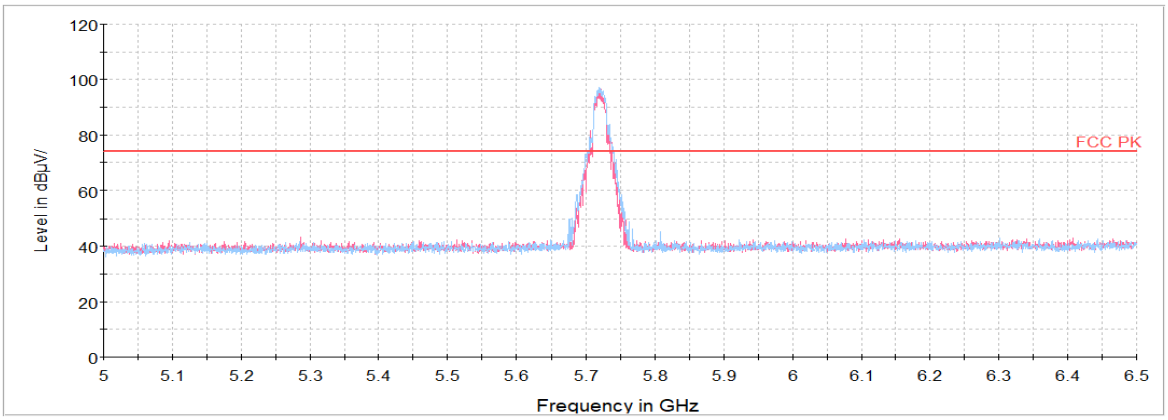
Horizontal/Vertical for 1 ㎓ ~ 3.5 ㎓



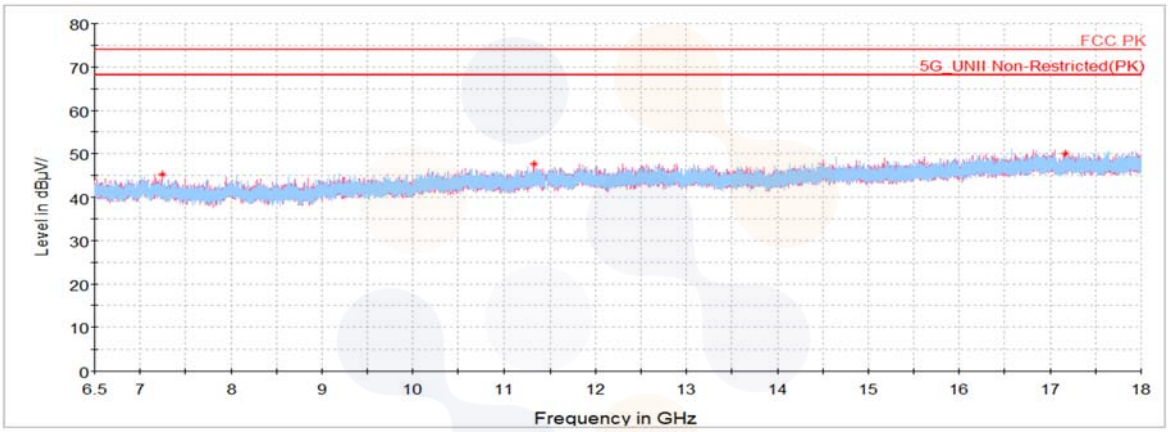
Horizontal/Vertical for 3.5 ㎓ ~ 5 ㎓



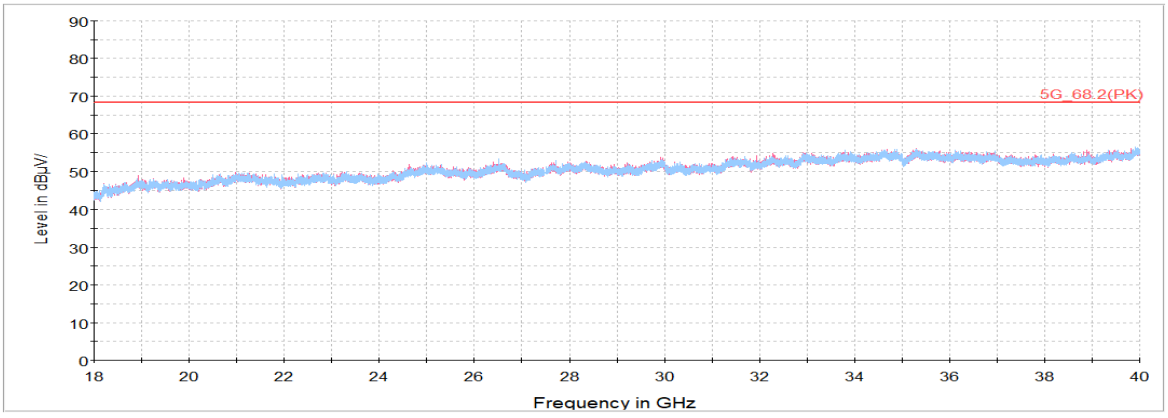
Horizontal/Vertical for 5 ㎓ ~ 6.5 ㎓



Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓

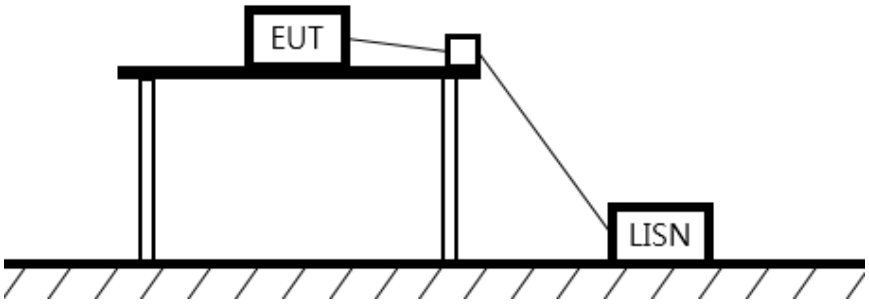


Horizontal/Vertical for 18 ㎓ ~ 40 ㎓



7.7. AC Conducted emission

Test setup



Limit

§15.407

According to 15.207(a), 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.

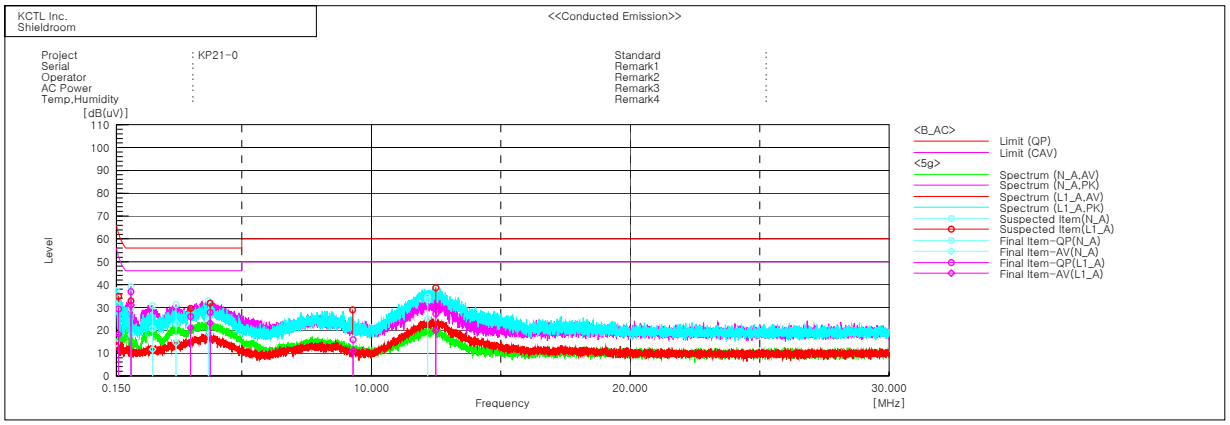
Frequency of Emission (㎒)	Conducted limit (dB㎶/m)	
	Quasi-peak	Average
0.15 – 0.50	66 - 56*	56 - 46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

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 ㅡ 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: 802.11a / UNII-2A 5 320 ㎒



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	0.15113	21.4	4.6	9.8	31.2	14.4	65.9	55.9	34.7	41.5
2	0.715	19.7	8.2	9.9	29.6	18.1	56.0	46.0	26.4	27.9
3	1.55505	10.9	1.8	9.8	20.7	11.6	56.0	46.0	35.3	34.4
4	2.45783	13.1	4.7	9.8	22.9	14.5	56.0	46.0	33.1	31.5
5	3.70363	15.7	8.8	9.9	25.6	18.7	56.0	46.0	30.4	27.3
6	12.17154	23.3	15.0	10.2	33.5	25.2	60.0	50.0	26.5	24.8

--- 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	0.23015	19.6	8.5	9.7	29.3	18.2	62.4	52.4	33.1	34.2
2	0.71299	27.0	21.0	9.9	36.9	30.9	56.0	46.0	19.1	15.1
3	3.01764	16.2	11.2	9.8	26.0	21.0	56.0	46.0	30.0	25.0
4	3.77947	18.0	13.3	9.9	27.9	23.2	56.0	46.0	28.1	22.8
5	9.28584	5.8	0.7	10.1	15.9	10.8	60.0	50.0	44.1	39.2
6	12.48577	17.1	9.6	10.2	27.3	19.8	60.0	50.0	32.7	30.2

8. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSV30	100914	22.09.17
Attenuator	API Inmet	40AH2W-10	13	22.05.11
Signal Generator	R&S	SMB100A	176206	23.01.19*
Vector Signal Generator	R&S	SMBV100A	257566	22.07.09
DC Power Supply	Agilent	E3632A	MY40008800	22.07.27
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	23.01.14
Amplifier	SONOMA INSTRUMENT	310N	284608	22.08.19
ATTENUATOR	KEYSIGHT	8491B-6dB	MY39271060	23.01.14*
Horn antenna	ETS.lindgren	3117	155787	22.10.05
Horn antenna	ETS.lindgren	3116	00086635	22.05.17
Attenuator	API Inmet	40AH2W-10	12	22.05.11
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	23.01.21*
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	22.05.10
TWO-LINE V - NETWORK	R&S	ENV216	101358	22.09.29
EMI TEST RECEIVER	R&S	ESCI3	100001	22.08.19
Cable Assembly	RadiAll	2301761768000PJ	1724.659	-
Cable Assembly	HUER+SUHNER	SUCOFLEX 102	804320/2	-
Cable Assembly	HUER+SUHNER	SUCOFLEX 102	804320/2	-

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

End of test report