TEST REPORT

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Suwon-si, Gyeonggi-do, 16677, Korea
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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 : 2020-12-03

2. Use of Report : Certification

3. Name of Product / Model : Mobile phone / SM-G525F/DS

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

5. FCC ID : A3LSMG525F

6. Date of Test : 2020-12-11 to 2021-01-21

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

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

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

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

2021-01-22

KCTL Inc.

REPORT REVISION HISTORY

Date	Revision	Page No
2021-01-14	Originally issued	-
2021-01-22	Updated	3,28~32, 36,40~41, 44,~45,92~94, 100,104

Note. The report No. KR21-SRF0016 is superseded by the report No. KR21-SRF0016-A.

General remarks for test reports

Nothing significant to report.

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	:	KCN Yen Binh I, Pho Yen, Thai Nguyen, VNM, Thai Nguyen Thai Nguyen, VNM
Laboratory	:	KCTL Inc.
Address	:	65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea
Accreditations	:	FCC Site Designation No: KR0040, FCC Site Registration No: 687132 VCCI Registration No. : R-20080, G-20078, C-20059, T-20056 Industry Canada Registration No. : 8035A KOLAS No.: KT231

2. Device information

Equipment under test	:	Mobile Phone
Model	:	SM-G525F/DS
Derivative model	:	SM-G525F
Modulation technique	:	Bluetooth(BDR/EDR)_GFSK, π/4DQPSK, 8DPSK Bluetooth(BLE)_GFSK WIFI(802.11a/b/g/n/ac)_DSSS, OFDM LTE_QPSK, 16QAM 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 3.85 Ⅴ
Antenna specification	:	LTE/WCDMA/GSM_SCI Antenna WIFI/Bluetooth(BDR/EDR/BLE)_SCI Antenna NFC_FPCB Antenna

Antenna gain	:	WIFI/Bluetooth(BDR/EDR/BLE)_-4.00 dBi
		UNII-1 : -4.30 dBi
		UNII-2A : -4.50 dBi
		UNII-2C : -4.30 dBi
		UNII-3 : -4.70 dBi
Frequency range	:	Bluetooth(BDR/EDR/BLE)_2 402 ㎒ ~ 2 480 ㎒
		2 412 ㎒ ~ 2 472 ㎒ (802.11b/g/n_HT20)
		UNII-1: 5 180 ㎒ ~ 5 240 ㎒ (802.11a/n/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 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	:	G525F.001
Hardware version	:	REV0.1
Test device serial No.	:	Conducted(R38NB03HNYF. R38NB03HNBK)
		Radiated(R38NB03HNMW)
Operation temperature	:	-30 ℃ ~ 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 17, LTE Band 26, LTE Band 41, LTE Band 66, GSM 850, GSM 1900, WCDMA 850, WCDMA 1700, WCDMA 1900

UNII-1		UNII-2A		UNII-2C		UNII-3	
Ch.	Frequency (㎒)	Ch.	Frequency (㎒)	Ch.	Frequency (㎒)	Ch.	Frequency (㎒)
36	5 180	52	5 260	100	5 500	149	5 745
40	5 200	56	5 280	120	5 580	157	5 785
48	5 240	64	5 320	140	5 700	165	5 825
				144	5 720		

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

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

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

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

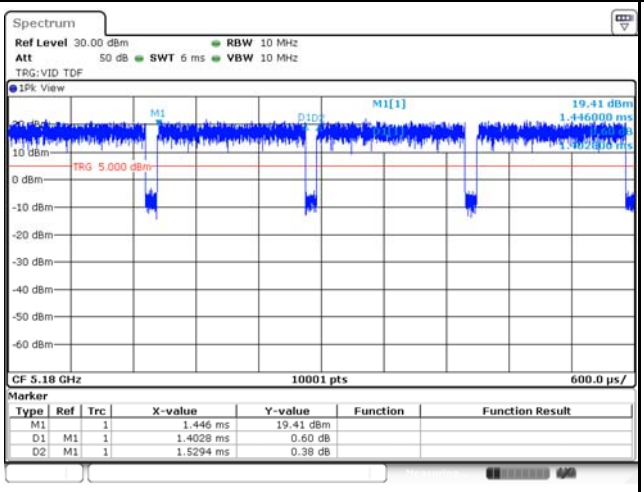
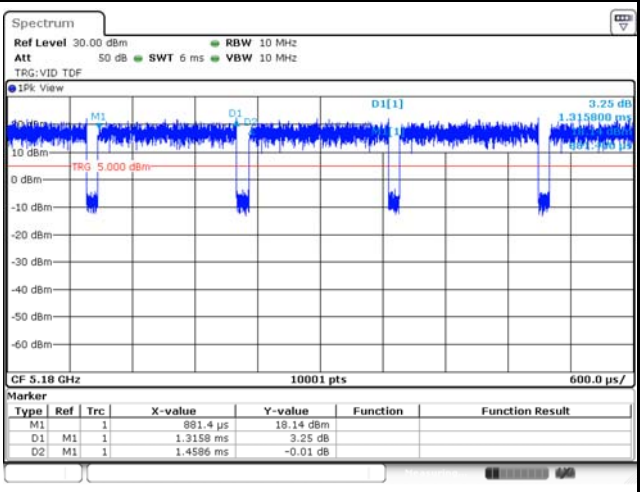
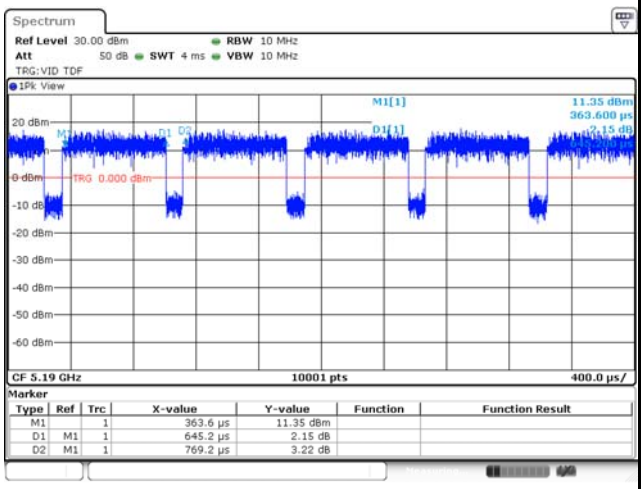
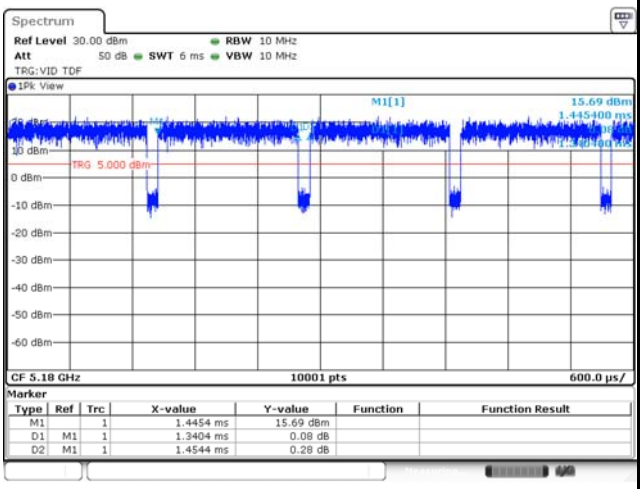
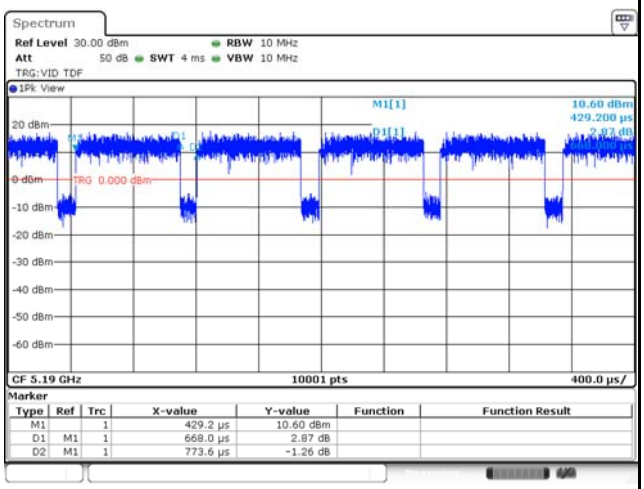
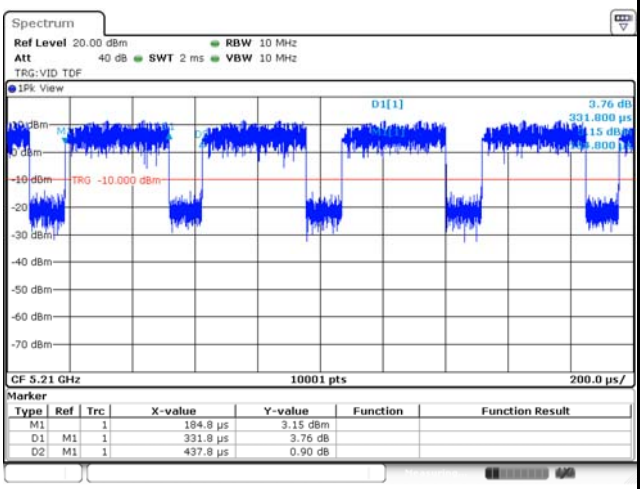
Table 2.1-3. 802.11ac_VHT80 mode

2.2. Duty Cycle Factor

Test mode	Period (ms)	T_{on} time (ms)	Duty cycle		Duty cycle factor (dB)
			(Linear)	(%)	
802.11a	1.529 4	1.402 8	0.917 2	91.72	0.38
802.11n_HT20	1.458 6	1.315 8	0.902 1	90.21	0.45
802.11n_HT40	0.769 2	0.645 2	0.838 8	83.88	0.76
802.11ac_VHT20	1.454 4	1.340 4	0.921 6	92.16	0.35
802.11ac_VHT40	0.773 6	0.668 0	0.863 5	86.35	0.64
802.11ac_VHT80	0.437 8	0.331 8	0.757 9	75.79	1.20

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 SCI 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 **Z** orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in **Z** orientation.
4. All the radiated tests have been performed several case.
   (Stand-alone, with TA, with Earphone)
   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	1.3 dB	
Conducted spurious emissions	1.3 dB	
Radiated spurious emissions	9 kHz ~ 30 MHz:	2.3 dB
	30 MHz ~ 300 MHz	5.4 dB
	300 MHz ~ 1 000 MHz	5.5 dB
	Above 1 GHz	6.7 dB
Conducted emissions	9 kHz ~ 150 kHz	3.7 dB
	150 kHz ~ 30 MHz	3.3 dB

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.

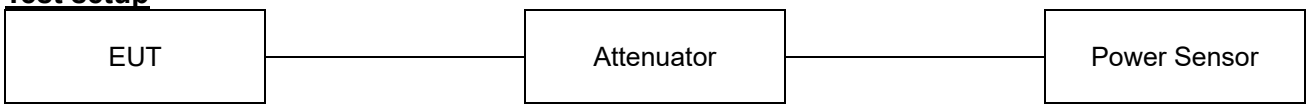
Frequency (㎒)	Factor(㏈)	Frequency (㎒)	Factor(㏈)
30	9.80	9 000	12.97
50	9.84	10 000	13.24
100	9.93	11 000	13.52
200	10.04	12 000	13.34
300	10.14	13 000	13.58
400	10.23	14 000	13.74
500	10.30	15 000	14.04
600	10.34	16 000	13.93
700	10.40	17 000	14.05
800	10.45	18 000	14.31
900	10.51	19 000	14.34
1 000	10.55	20 000	14.38
2 000	11.18	21 000	14.52
3 000	11.34	22 000	14.66
4 000	11.61	23 000	14.81
5 000	11.88	24 000	15.14
6 000	12.12	25 000	15.16
7 000	12.37	26 000	15.49
8 000	12.75	26 500	15.60

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

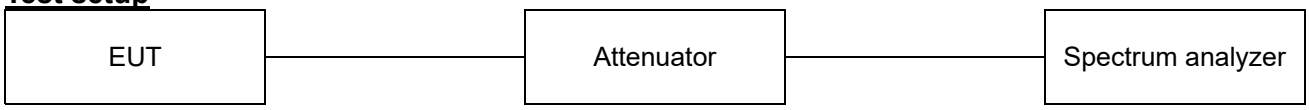
Test mode	Band	Frequency (㎒)	Measured output power			Limit (dBm)
			Reading (dBm)	DCF (dB)	Result (dBm)	
802.11a	UNII 1	5 180	13.98	0.38	14.36	24.00
		5 200	14.04	0.38	14.42	
		5 240	14.41	0.38	14.79	
	UNII 2A	5 260	14.33	0.38	14.71	24.00
		5 280	14.45	0.38	14.83	
		5 320	14.03	0.38	14.41	
	UNII 2C	5 500	14.25	0.38	14.63	24.00
		5 580	14.23	0.38	14.61	
		5 700	13.80	0.38	14.18	
	UNII 3	5 745	13.75	0.38	14.13	30.00
		5 785	14.04	0.38	14.42	
		5 825	14.42	0.38	14.80	
802.11n HT20	UNII 1	5 180	13.87	0.45	14.32	24.00
		5 200	13.88	0.45	14.33	
		5 240	14.22	0.45	14.67	
	UNII 2A	5 260	14.12	0.45	14.57	24.00
		5 280	14.40	0.45	14.85	
		5 320	14.47	0.45	14.92	
	UNII 2C	5 500	13.96	0.45	14.41	24.00
		5 580	14.30	0.45	14.75	
		5 700	13.71	0.45	14.16	
	UNII 3	5 745	13.66	0.45	14.11	30.00
		5 785	14.00	0.45	14.45	
		5 825	14.43	0.45	14.88	
802.11n HT40	UNII 1	5 190	10.01	0.76	10.77	24.00
		5 230	12.71	0.76	13.47	
	UNII 2A	5 270	12.72	0.76	13.48	24.00
		5 310	11.37	0.76	12.13	
	UNII 2C	5 510	11.46	0.76	12.22	24.00
		5 590	13.19	0.76	13.95	
		5 670	12.48	0.76	13.24	
	UNII 3	5 755	12.60	0.76	13.36	30.00
		5 795	12.90	0.76	13.66	

Test mode	Band	Frequency (㎒)	Measured output power			Limit (dBm)
			Reading (dBm)	DCF (dB)	Result (dBm)	
802.11ac VHT20	UNII 1	5 180	13.84	0.35	14.19	24.00
		5 200	13.78	0.35	14.13	
		5 240	14.15	0.35	14.50	
	UNII 2A	5 260	14.01	0.35	14.36	24.00
		5 280	14.52	0.35	14.87	
		5 320	13.74	0.35	14.09	
	UNII 2C	5 500	14.02	0.35	14.37	24.00
		5 580	14.39	0.35	14.74	
		5 700	13.72	0.35	14.07	
	UNII 3	5 745	13.70	0.35	14.05	30.00
		5 785	14.07	0.35	14.42	
		5 825	14.45	0.35	14.80	
802.11ac VHT40	UNII 1	5 190	9.92	0.64	10.56	24.00
		5 230	12.59	0.64	13.23	
	UNII 2A	5 270	12.77	0.64	13.41	24.00
		5 310	11.41	0.64	12.05	
	UNII 2C	5 510	11.64	0.64	12.28	24.00
		5 590	13.12	0.64	13.76	
		5 670	12.47	0.64	13.11	
	UNII 3	5 755	12.68	0.64	13.32	30.00
		5 795	12.60	0.64	13.24	
802.11ac VHT80	UNII 1	5 210	8.68	1.20	9.88	24.00
	UNII 2A	5 290	9.16	1.20	10.36	24.00
	UNII 2C	5 530	8.39	1.20	9.59	24.00
		5 610	8.70	1.20	9.90	
	UNII 3	5 775	8.92	1.20	10.12	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 ㎒ RBW to satisfy directly the 1 ㎒ reference bandwidth specified in Section 15.407(a)(5). For devices operating in the band 5.725-5.85 ㎓, the rules specify a measurement bandwidth of 500 ㎑. Many spectrum analyzers do not have 500 ㎑ RBW, thus a narrower RBW may need to be used. The rules permit the use of RBWs less than 1㎒, or 500 ㎑, "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 ㎒, or 500 ㎑). If measurements are performed using a reduced resolution bandwidth (< 1 ㎒, or < 500 ㎑) and integrated over 1 ㎒, or 500 ㎑ 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 ㎑, add 10 log (500 ㎑ /RBW) to the measured result, whereas RBW (<500 ㎑) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
d) If measurement bandwidth of Maximum PSD is specified in 1 ㎒, add 10 log (1㎒/RBW) to the measured result, whereas RBW (< 1 ㎒) 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 ㎑ for the II.F.5.c) and II.F.5.d), since RBW=100 ㎑ 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	3.15	0.38	3.53	11
		5 200	3.11	0.38	3.49	
		5 240	3.98	0.38	4.36	
	UNII 2A	5 260	3.56	0.38	3.94	11
		5 280	3.77	0.38	4.15	
		5 320	2.68	0.38	3.06	
	UNII 2C	5 500	3.34	0.38	3.72	11
		5 580	3.58	0.38	3.96	
		5 700	2.88	0.38	3.26	
802.11n HT20	UNII 1	5 180	2.96	0.45	3.41	11
		5 200	2.91	0.45	3.36	
		5 240	3.19	0.45	3.64	
	UNII 2A	5 260	3.22	0.45	3.67	11
		5 280	3.54	0.45	3.99	
		5 320	3.56	0.45	4.01	
	UNII 2C	5 500	3.32	0.45	3.77	11
		5 580	3.55	0.45	4.00	
		5 700	2.87	0.45	3.32	
802.11n HT40	UNII 1	5 190	-4.93	0.76	-4.17	11
		5 230	-1.24	0.76	-0.48	
	UNII 2A	5 270	-1.17	0.76	-0.41	11
		5 310	-3.09	0.76	-2.33	
	UNII 2C	5 510	-3.04	0.76	-2.28	11
		5 590	-0.90	0.76	-0.14	
		5 670	-1.59	0.76	-0.83	
802.11ac VHT20	UNII 1	5 180	2.97	0.35	3.32	11
		5 200	2.73	0.35	3.08	
		5 240	3.24	0.35	3.59	
	UNII 2A	5 260	3.31	0.35	3.66	11
		5 280	3.32	0.35	3.67	
		5 320	2.70	0.35	3.05	
	UNII 2C	5 500	2.93	0.35	3.28	11
		5 580	3.55	0.35	3.90	
		5 700	2.80	0.35	3.15	

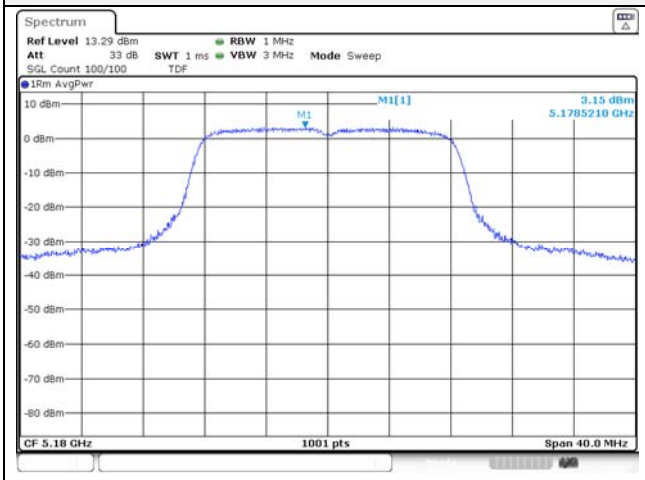
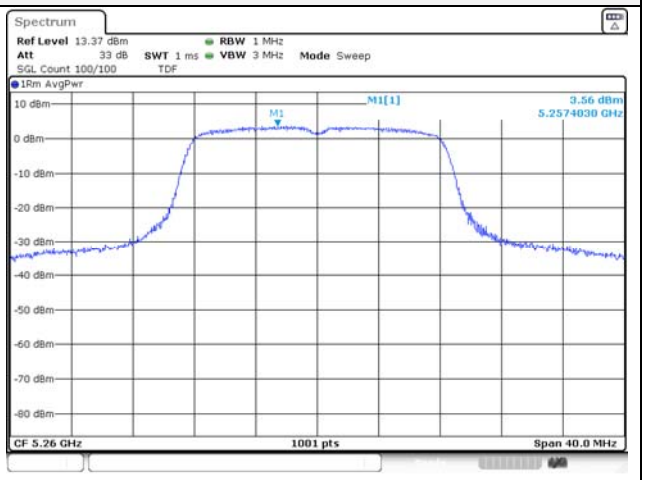
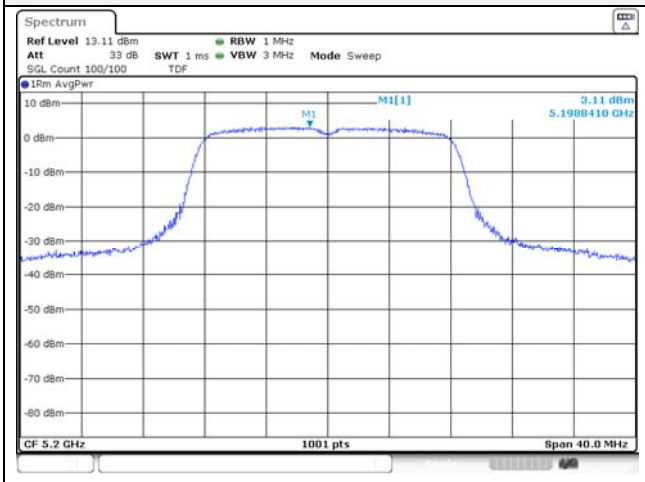
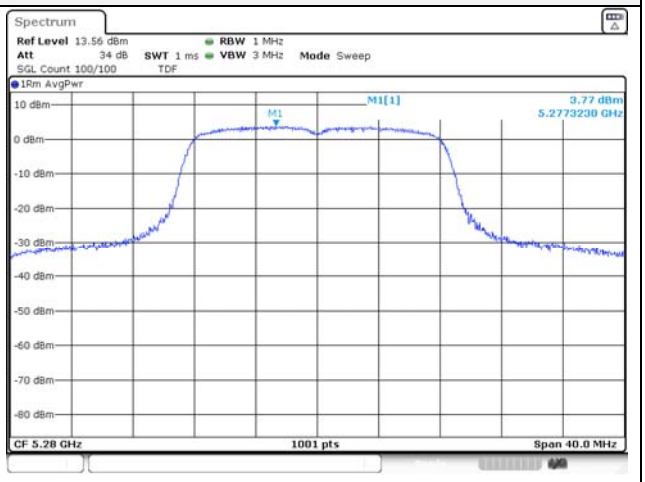
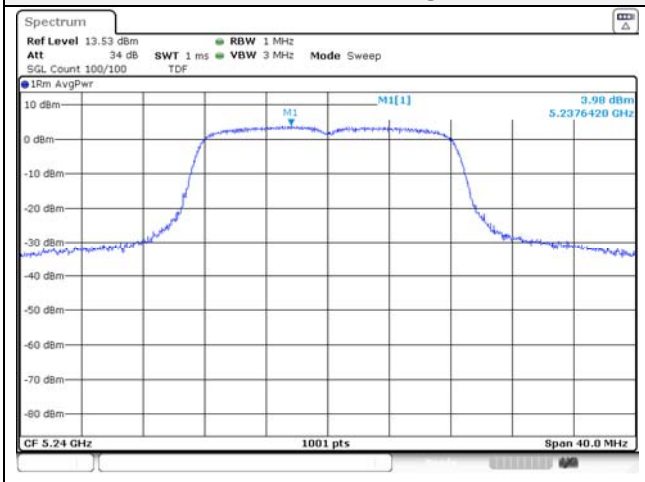
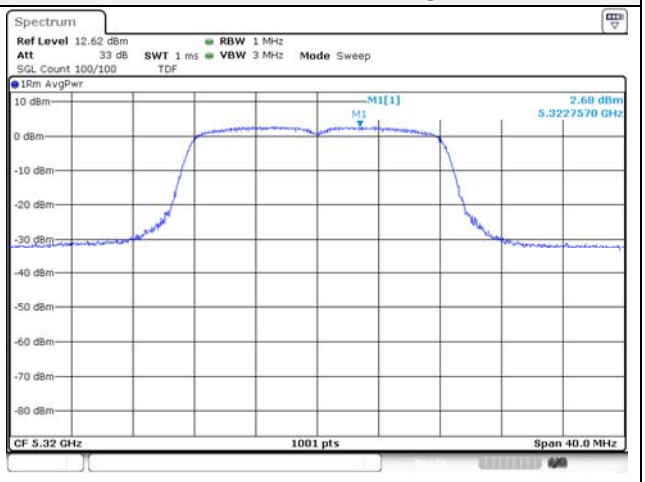
Test mode	Band	Frequency (㎒)	Measured PSD (dBm/㎒)	DCF (dB)	Maximum PSD (dBm/㎒)	Limit (dBm/㎒)
802.11ac VHT40	UNII 1	5 190	-4.76	0.64	-4.12	11
		5 230	-1.25	0.64	-0.61	
	UNII 2A	5 270	-1.06	0.64	-0.42	11
		5 310	-2.69	0.64	-2.05	
	UNII 2C	5 510	-2.90	0.64	-2.26	11
		5 590	-0.95	0.64	-0.31	
		5 670	-1.35	0.64	-0.71	
802.11ac VHT80	UNII 1	5 210	-8.71	1.20	-7.51	11
	UNII 2A	5 290	-7.94	1.20	-6.74	11
	UNII 2C	5 530	-10.40	1.20	-9.20	11
		5 610	-9.36	1.20	-8.16	

Test mode	Band	Frequency (㎒)	Measured PSD (dBm/㎒)	DCF (dB)	Maximum PSD (dBm /500 ㎑)	Limit (dBm /500 ㎑)
802.11a	UNII 3	5 745	0.21	0.38	0.59	30
		5 785	0.63	0.38	1.01	
		5 825	1.17	0.38	1.55	
802.11n HT20		5 745	0.20	0.45	0.65	
		5 785	0.55	0.45	1.00	
		5 825	0.85	0.45	1.30	
802.11n HT40		5 755	-4.13	0.76	-3.37	
		5 795	-4.14	0.76	-3.38	
802.11ac VHT20		5 745	0.03	0.35	0.38	
		5 785	0.42	0.35	0.77	
		5 825	0.94	0.35	1.29	
802.11ac VHT40		5 755	-3.99	0.64	-3.35	
		5 795	-4.31	0.64	-3.67	
802.11ac VHT80		5 775	-11.45	1.20	-10.25	

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

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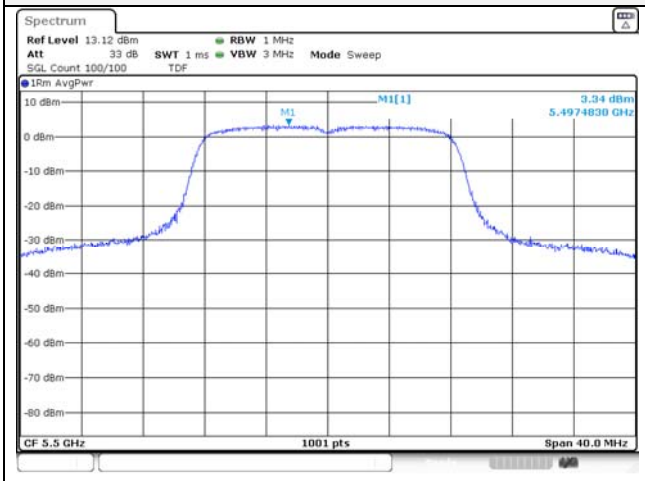
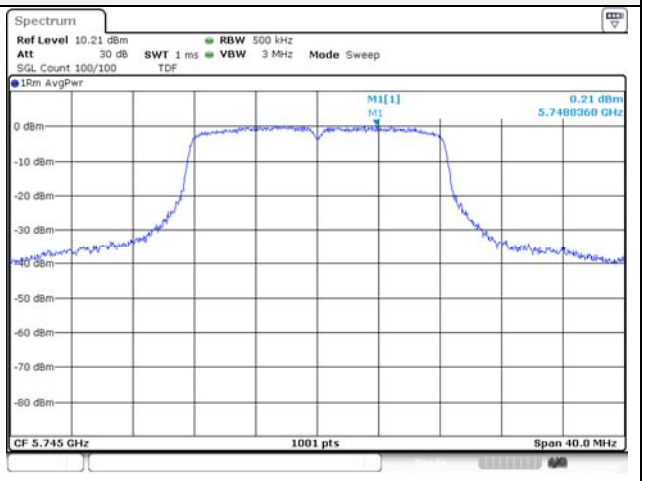
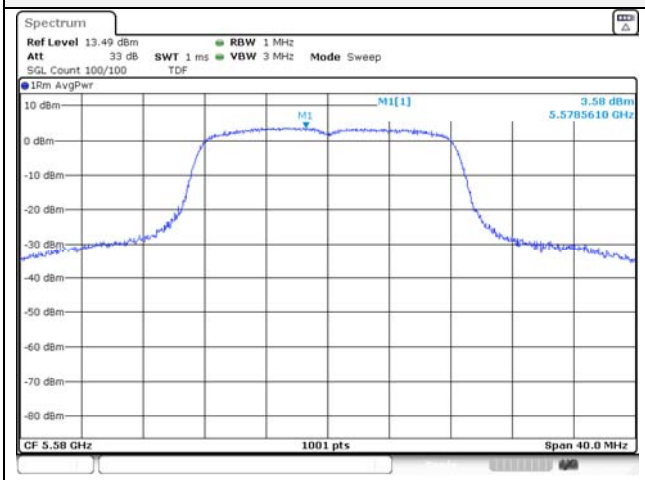
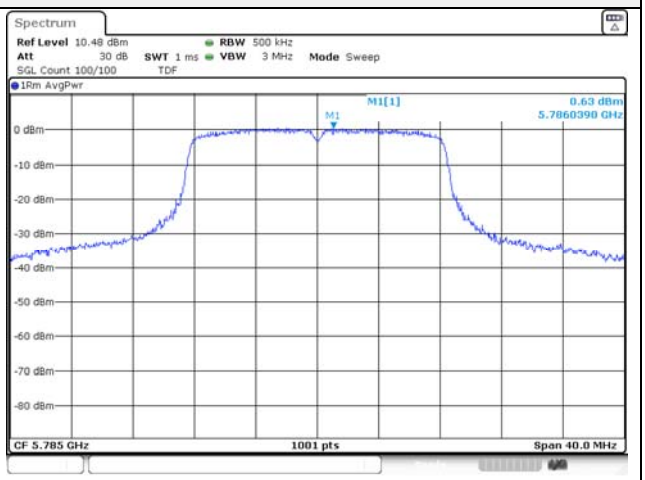
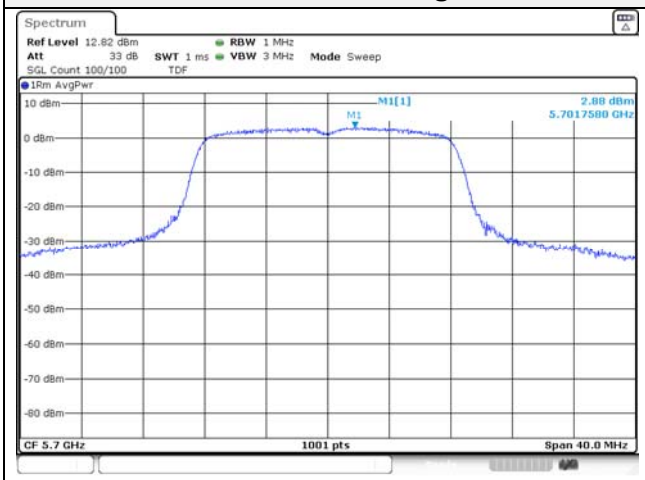
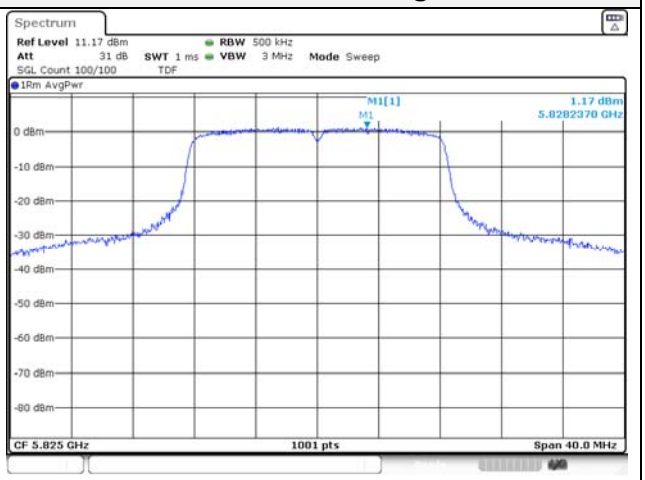
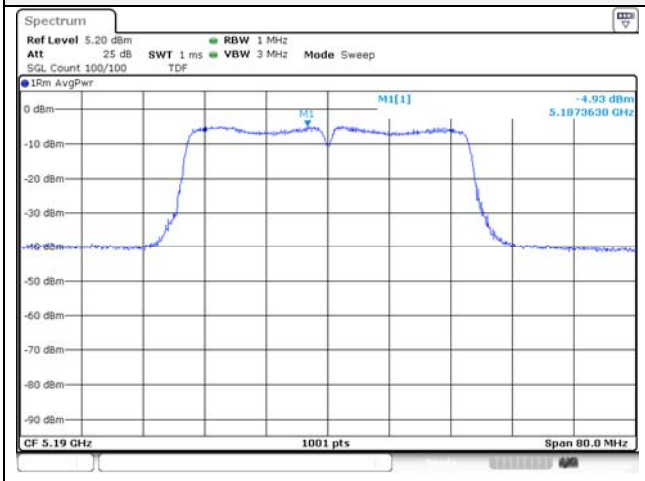
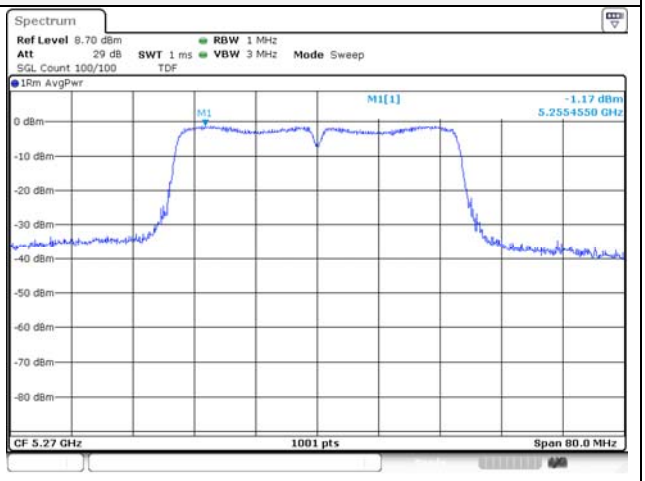
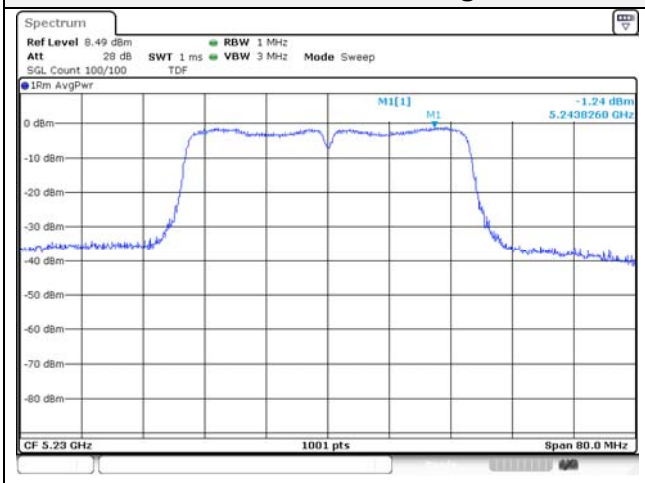
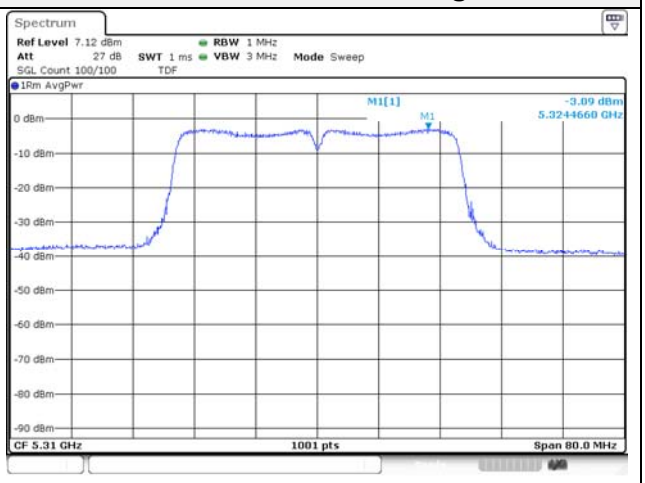
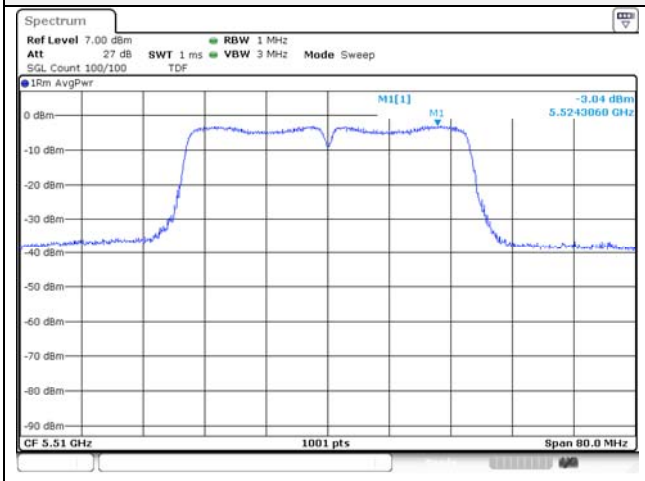
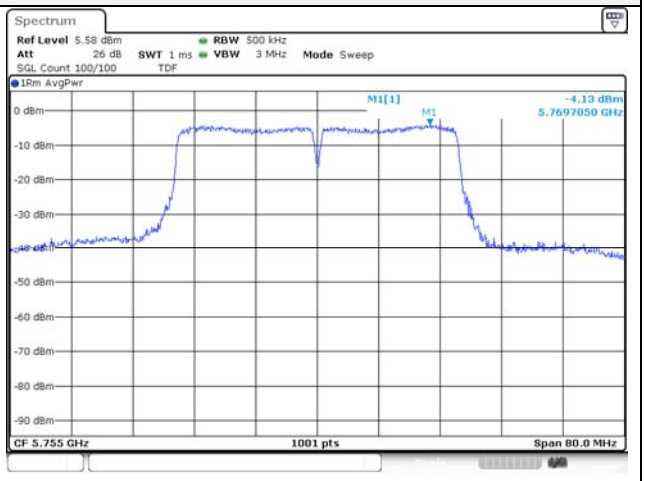
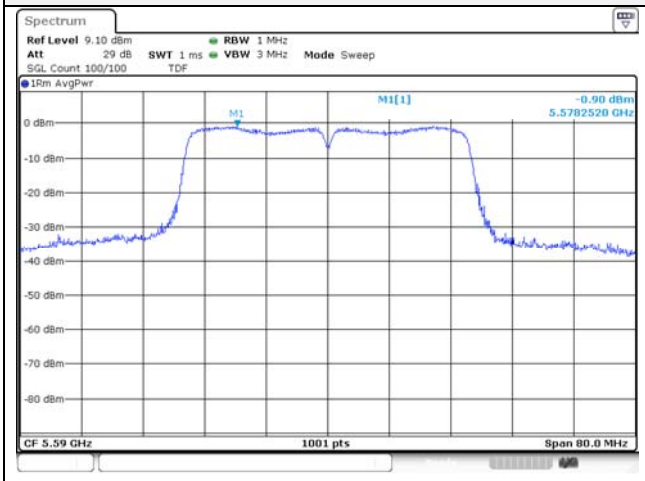
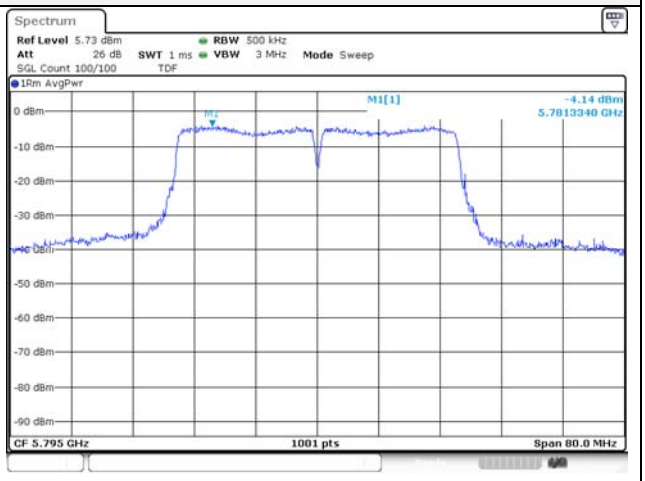
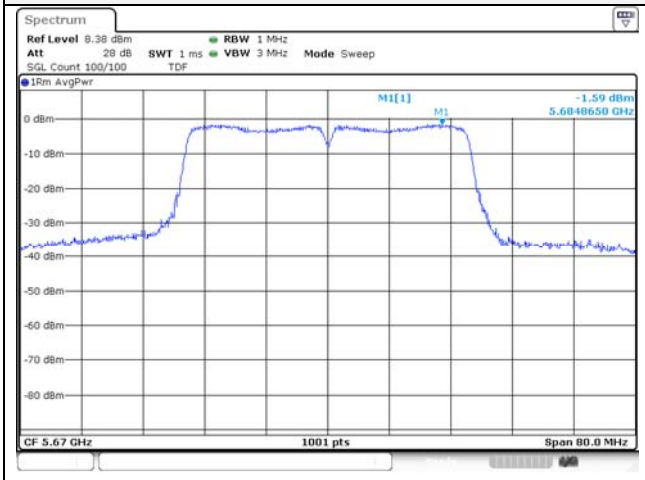
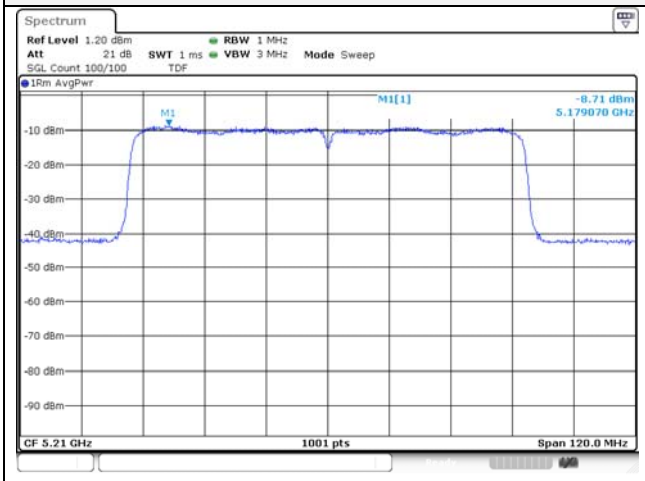
	
UNII-2C / 802.11 a / Mid ch.	**UNII-3 / 802.11 a / Mid ch.**
	
UNII-2C / 802.11 a / High ch.	**UNII-3 / 802.11 a / High ch.**
	

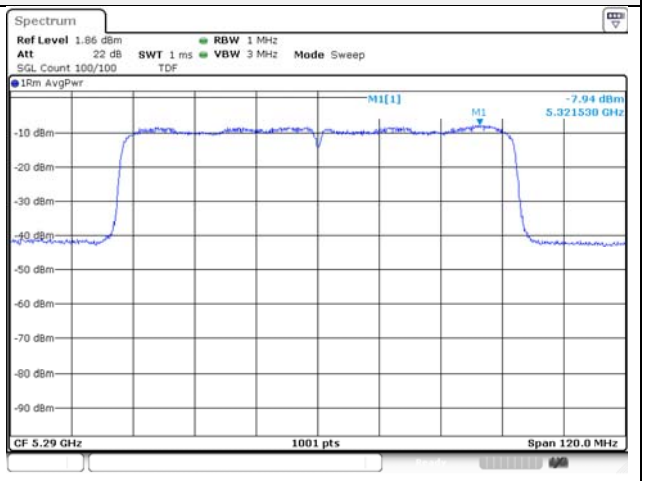
UNII-1 / 802.11n HT40 / Low ch.	UNII-2A / 802.11n HT40 / Low ch.
	
UNII-1 / 802.11n HT40 / High ch.	**UNII-2A 802.11n HT40 / High ch.**
	

UNII-2C / 802.11n HT40 / Low ch.	UNII-3 / 802.11n HT40 / Low ch.
	
UNII-2C / 802.11n HT40 / Mid ch.	**UNII-3 / 802.11n HT40 / High ch.**
	
UNII-2C / 802.11n HT40 / High ch.	
	Blank

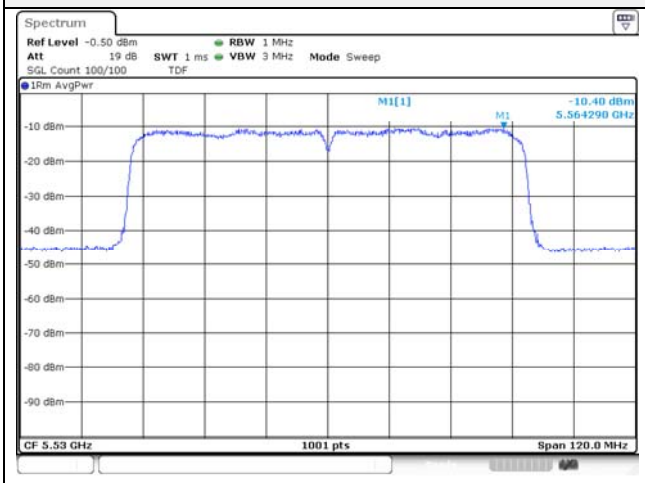
UNII-1 / 802.11ac VHT80 / Low ch.



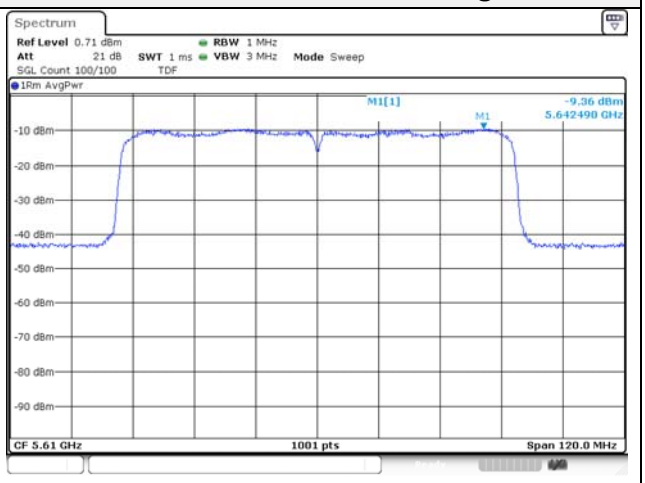
UNII-2A / 802.11ac VHT80 / Low ch.



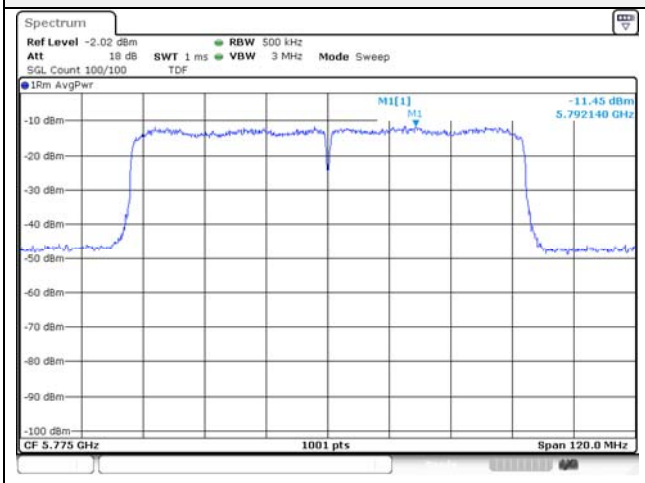
UNII-2C / 802.11ac VHT80 / Low ch.



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



UNII-3 / 802.11ac VHT80 / Low ch.



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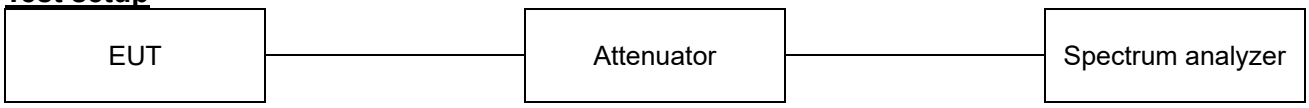
7.3. 26 dB Bandwidth & 99% Bandwidth

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	20.63
		5 200	20.78
		5 240	20.83
	UNII-2A	5 260	20.53
		5 280	20.83
		5 320	20.48
	UNII-2C	5 500	21.23
		5 580	21.33
		5 700	20.58
802.11n HT20	UNII-1	5 180	21.08
		5 200	21.38
		5 240	20.83
	UNII-2A	5 260	21.33
		5 280	21.58
		5 320	21.43
	UNII-2C	5 500	21.98
		5 580	22.13
		5 700	21.43
802.11n HT40	UNII-1	5 190	60.20
		5 230	73.33
	UNII-2A	5 270	72.73
		5 310	43.71
	UNII-2C	5 510	46.02
		5 590	73.43
		5 670	73.03

Note.
If 26dB Bandwidth across Band 2A or Band 1 but 99% test results are within the band no addition DFS test is needed on band 1

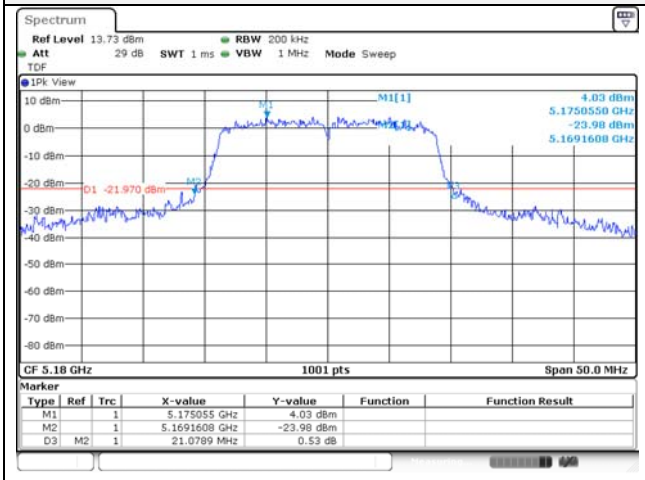
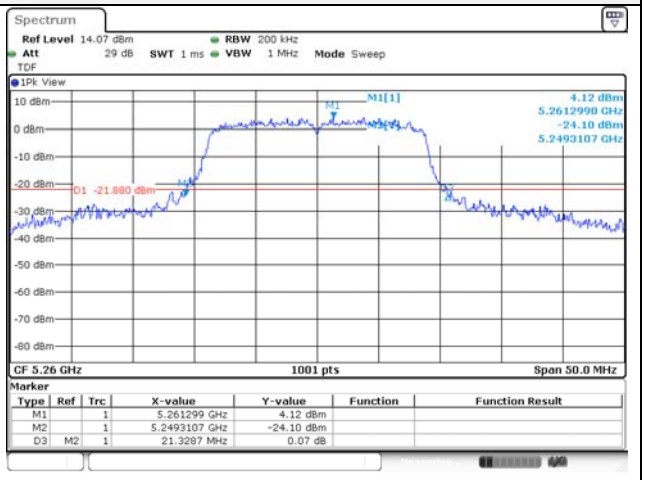
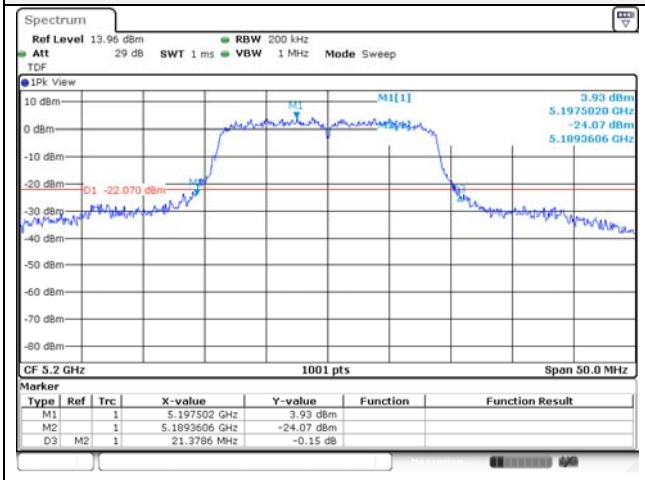
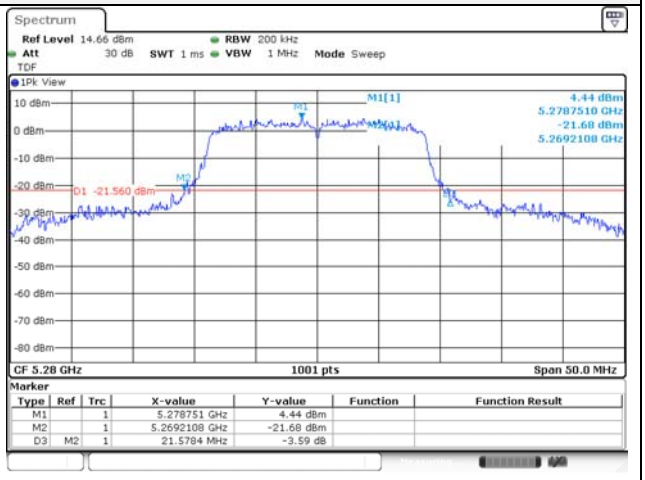
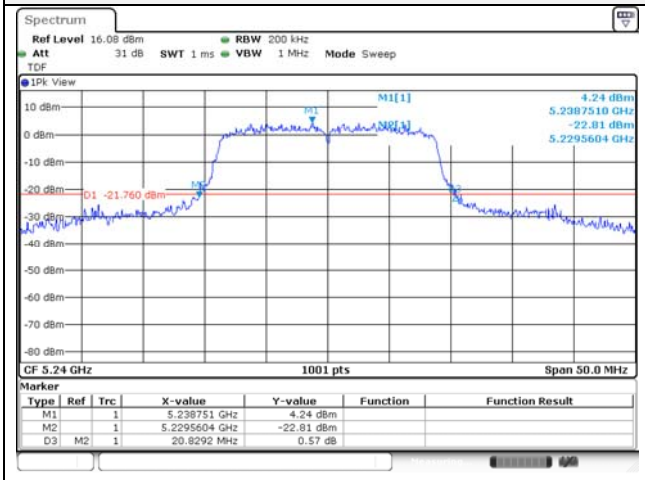
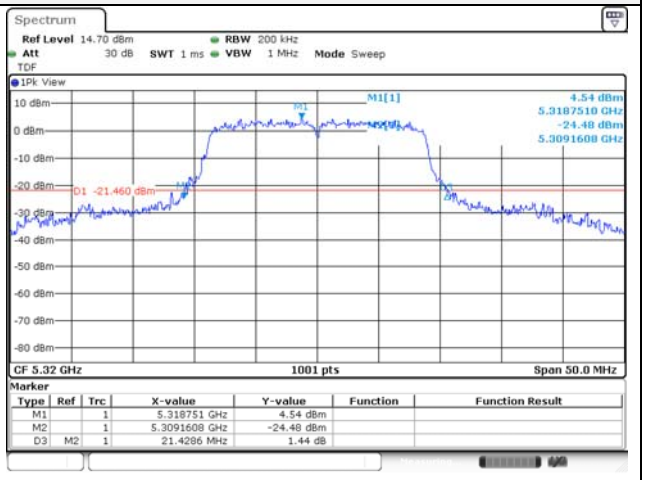
Test mode	Band	Frequency(㎒)	Measured Bandwidth (㎒)
802.11ac VHT20	UNII-1	5 180	21.18
		5 200	21.33
		5 240	21.33
	UNII-2A	5 260	21.38
		5 280	21.83
		5 320	20.93
	UNII-2C	5 500	22.03
		5 580	21.93
		5 700	21.53
802.11ac VHT40	UNII-1	5 190	43.27
		5 230	45.95
	UNII-2A	5 270	47.55
		5 310	43.42
	UNII-2C	5 510	43.56
		5 590	48.95
		5 670	47.65
802.11ac VHT80	UNII-1	5 210	80.58
	UNII-2A	5 290	80.75
	UNII-2C	5 530	81.10
		5 610	81.16

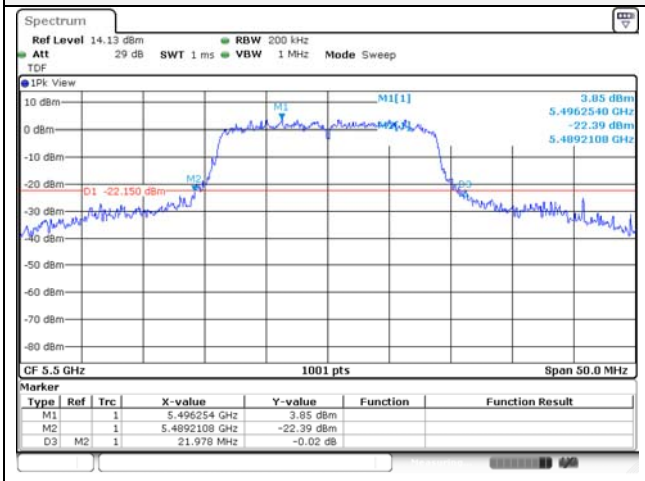
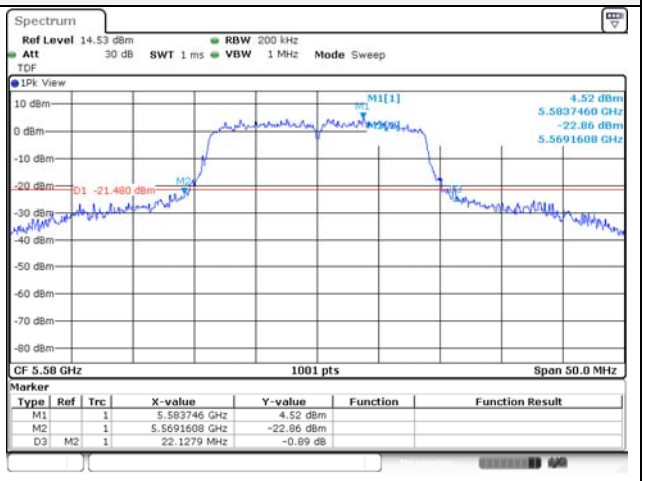
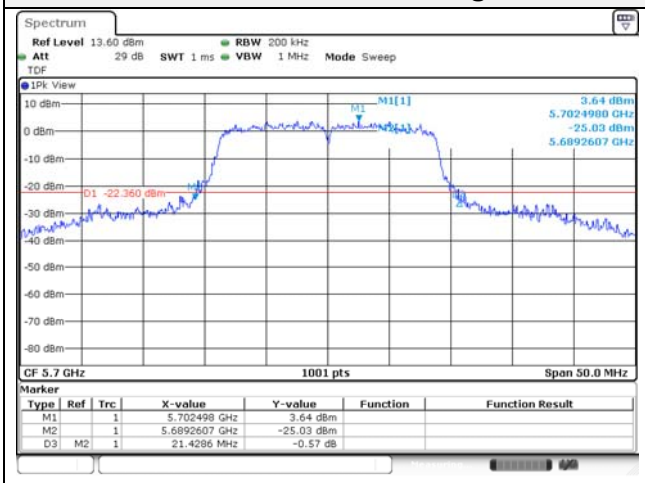
99% bandwidth

Test mode	Band	Frequency(㎒)	Measured Bandwidth (㎒)
802.11a	UNII-1	5 240	16.53
	UNII-2A	5 260	16.58
802.11n HT20	UNII-1	5 240	17.58
	UNII-2A	5 260	17.58
802.11n HT40	UNII-1	5 230	38.36
	UNII-2A	5 270	38.36
802.11ac VHT20	UNII-1	5 240	17.63
	UNII-2A	5 260	17.63
802.11ac VHT40	UNII-1	5 230	37.86
	UNII-2A	5 270	37.76
802.11ac VHT80	UNII-1	5 210	75.40
	UNII-2A	5 290	75.40

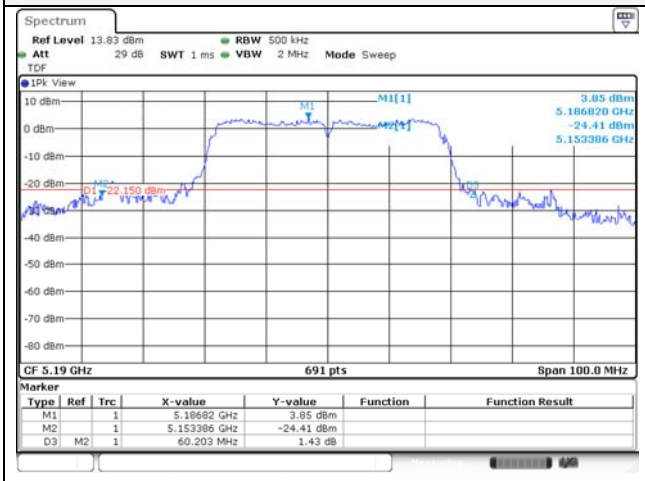
26 dB bandwidth

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

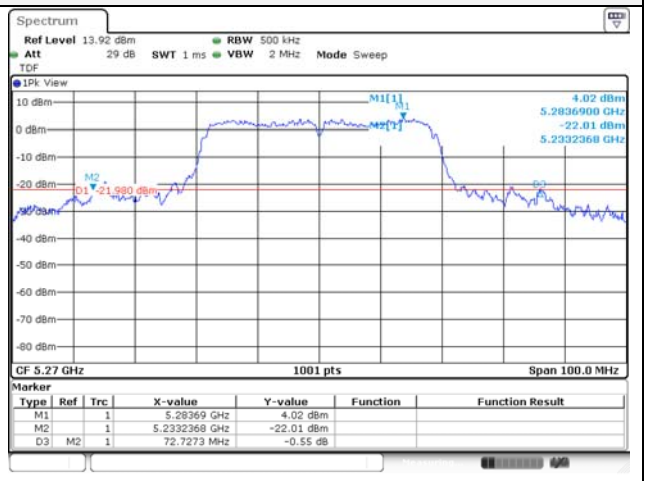
UNII-1 / 802.11n HT20 / Low ch.	UNII-2A / 802.11n HT20 / Low ch.
	
UNII-1 / 802.11n HT20 / Mid ch.	**UNII-2A / 802.11n HT20 / Mid ch.**
	
UNII-1 / 802.11n HT20 / High ch.	**UNII-2A / 802.11n HT20 / High ch.**
	

UNII-2C / 802.11n HT20 / Low ch.	UNII-2C / 802.11n HT20 / Mid ch.
	
UNII-2C / 802.11n HT20 / High ch.	
	Blank

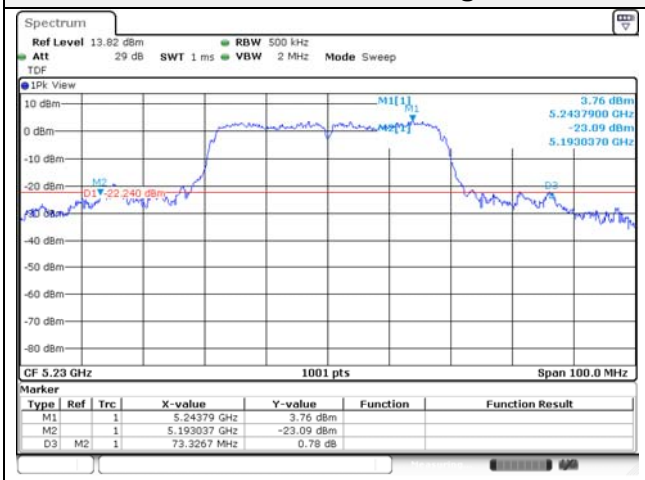
UNII-1 / 802.11n HT40 / Low ch.



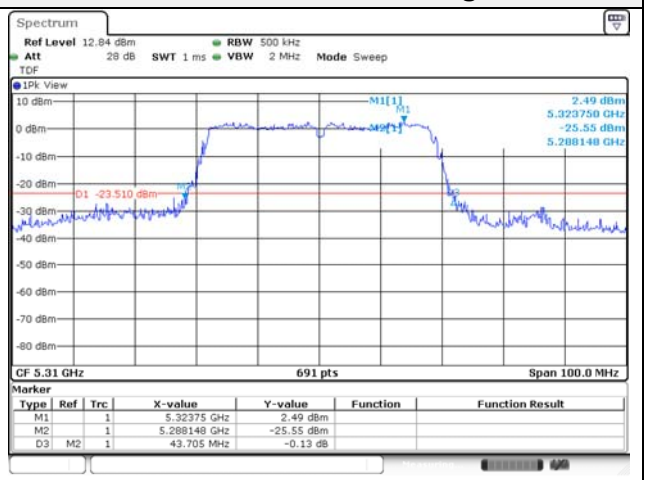
UNII-2A / 802.11n HT40 / Low ch.

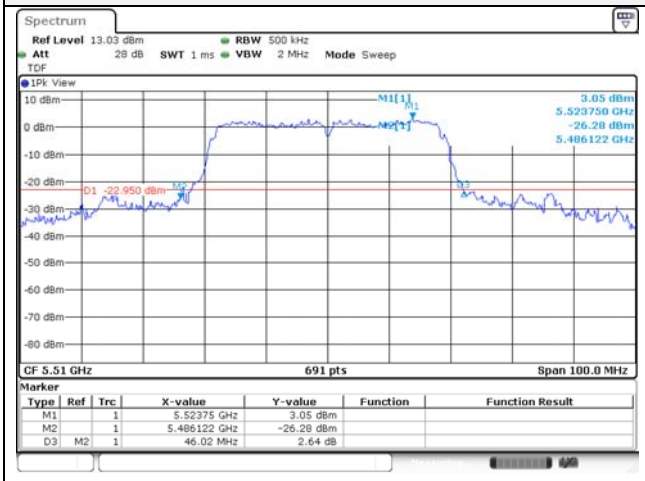
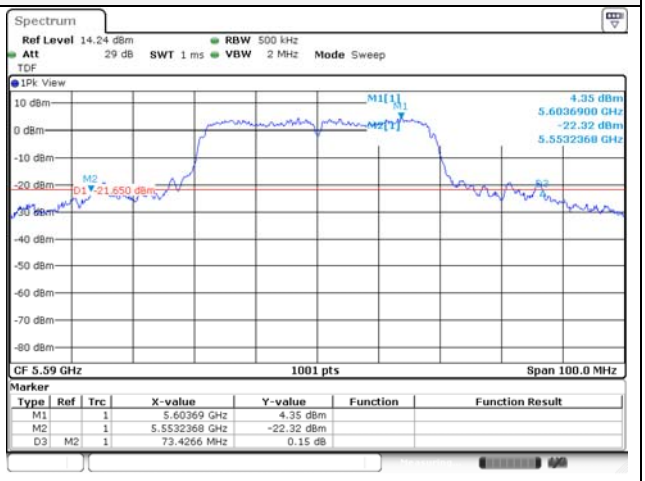
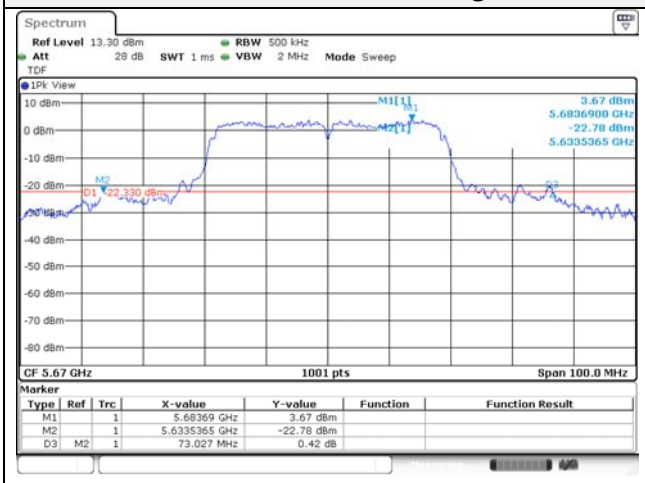


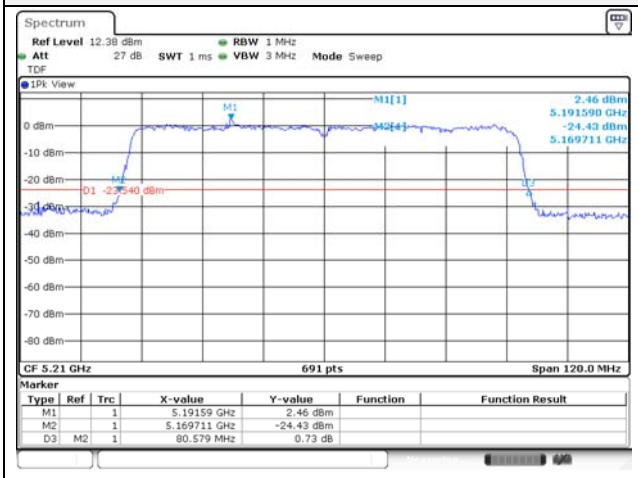
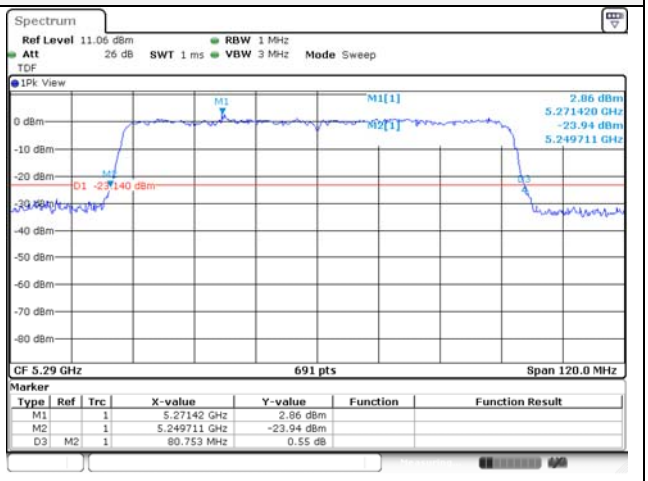
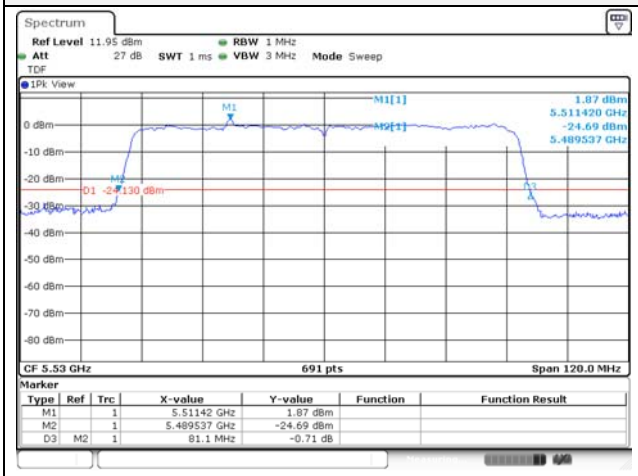
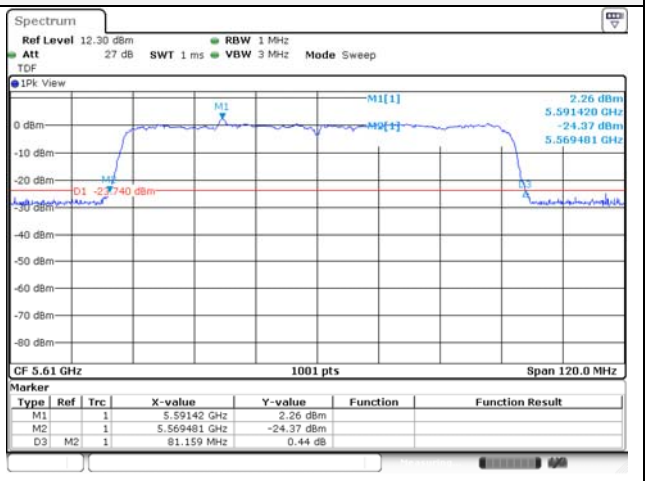
UNII-1 / 802.11n HT40 / High ch.



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



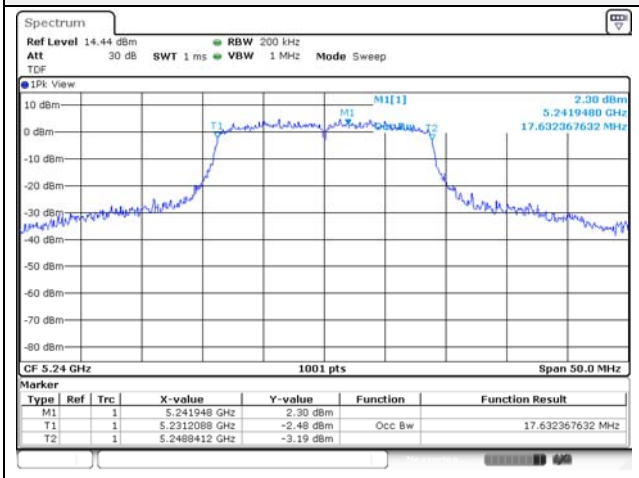
UNII-2C / 802.11n HT40 / Low ch.	UNII-2C / 802.11n HT40 / Mid ch.
	
UNII-2C / 802.11n HT40 / High ch.	
	Blank

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.**
	

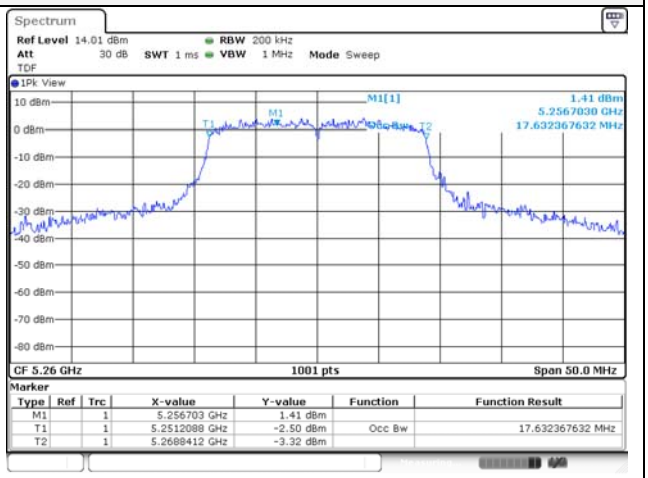
99% bandwidth

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

UNII-1 / 802.11ac VHT20 / 5 240 ㎒

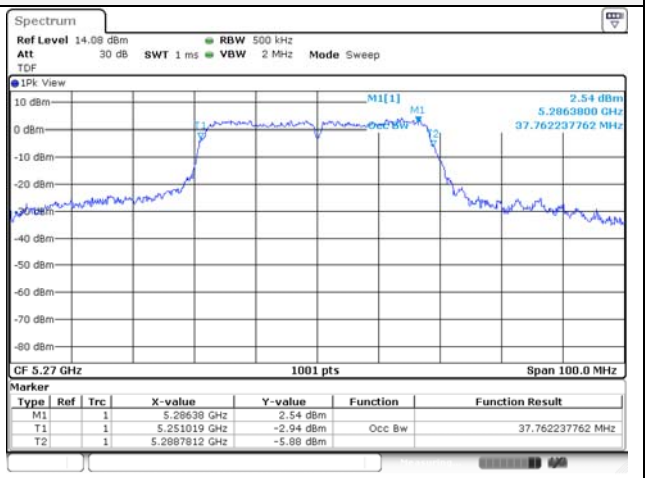


UNII-2A / 802.11ac VHT20 / 5 260 ㎒

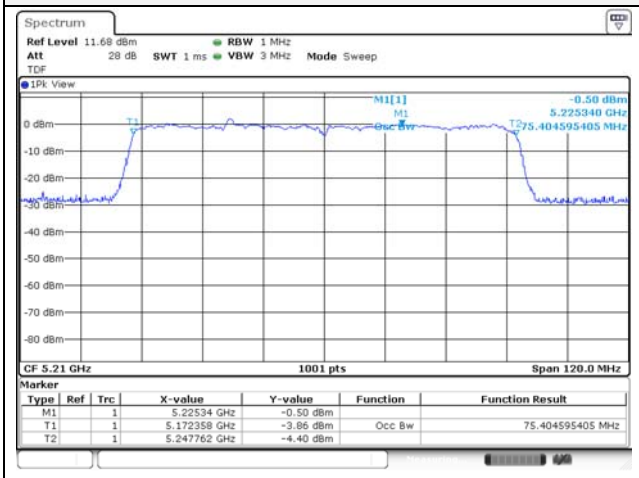


UNII-1 / 802.11ac VHT40 / 5 230 ㎒

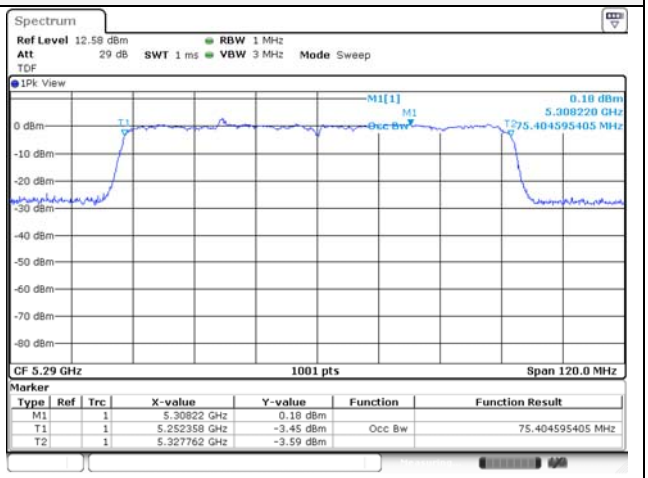
UNII-2A / 802.11ac VHT40 / 5 270 ㎒



UNII-1 / 802.11ac VHT80 / 5 210 ㎒

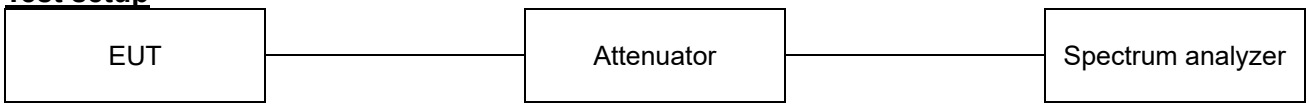


UNII-2A / 802.11ac VHT80 / 5 290 ㎒



7.4. 6 dB Bandwidth

Test setup



Limit

According to §15.407(e)
Within the 5.725-5.85 ㎓ band, the minimum 6 dB 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 dB 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 dB relative to the maximum level measured in the fundamental emission.

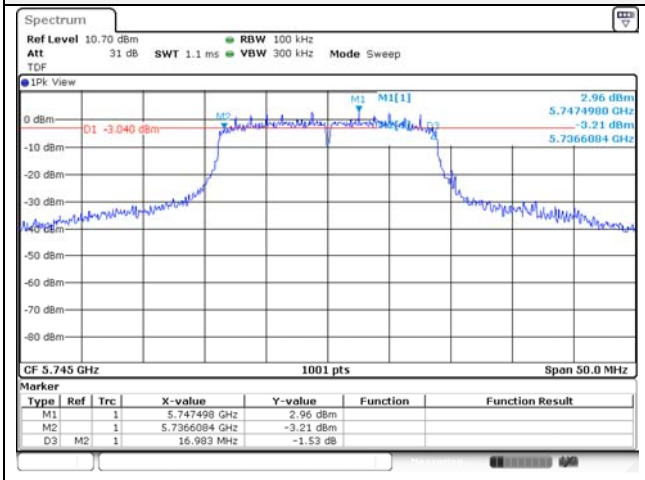
Test results

Test mode	Band	Frequency (㎒)	Measured Bandwidth (㎒)	Limit (㎒)
802.11a	UNII-3	5 745	16.38	0.50
		5 785	16.13	0.50
		5 825	16.13	0.50
802.11n HT20	UNII-3	5 745	16.38	0.50
		5 785	16.38	0.50
		5 825	16.38	0.50
802.11n HT40	UNII-3	5 755	35.76	0.50
		5 795	35.76	0.50
802.11ac VHT20	UNII-3	5 745	16.98	0.50
		5 785	16.53	0.50
		5 825	16.53	0.50
802.11ac VHT40	UNII-3	5 755	35.66	0.50
		5 795	35.66	0.50
802.11ac VHT80	UNII-3	5 775	75.41	0.50

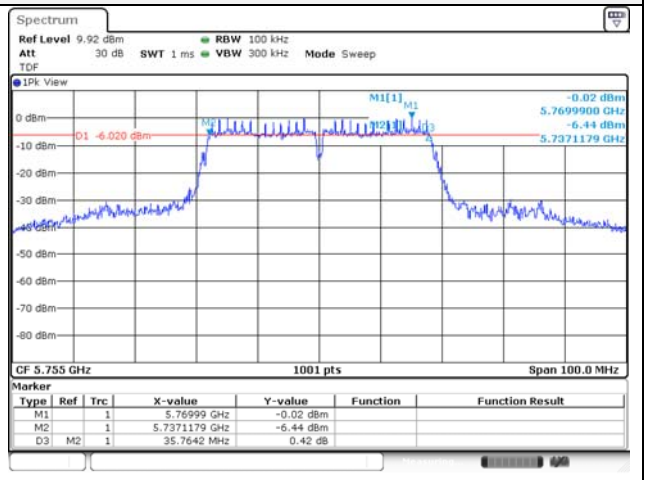
6 dB bandwidth

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

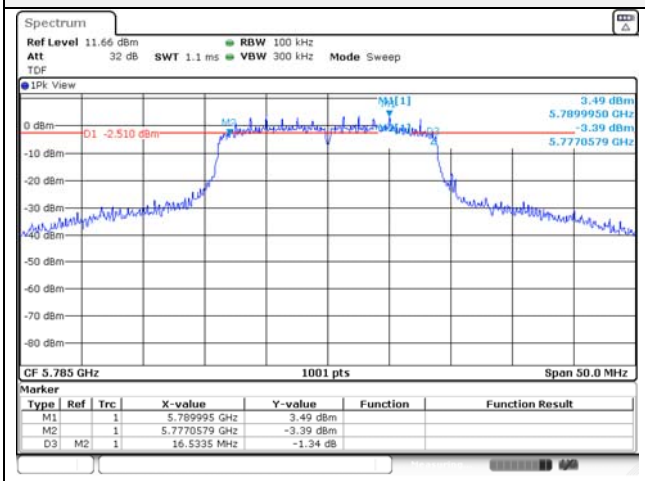
UNII-3 / 802.11ac VHT 20 / Low ch.



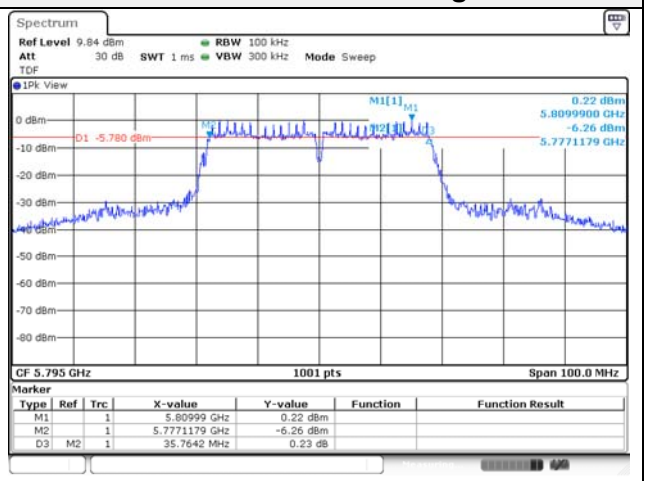
UNII-3 / 802.11n HT40 / Low ch.



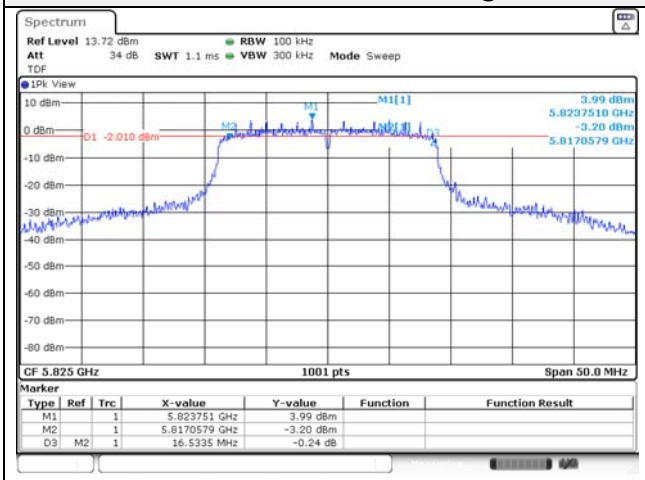
UNII-3 / 802.11ac VHT 20 / Mid ch.



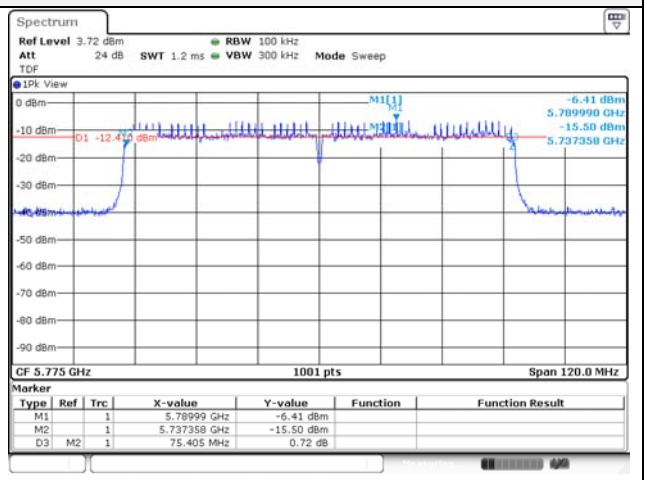
UNII-3 / 802.11n HT40 / High ch.



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



UNII-3 / 802.11ac VHT80 / Low ch.



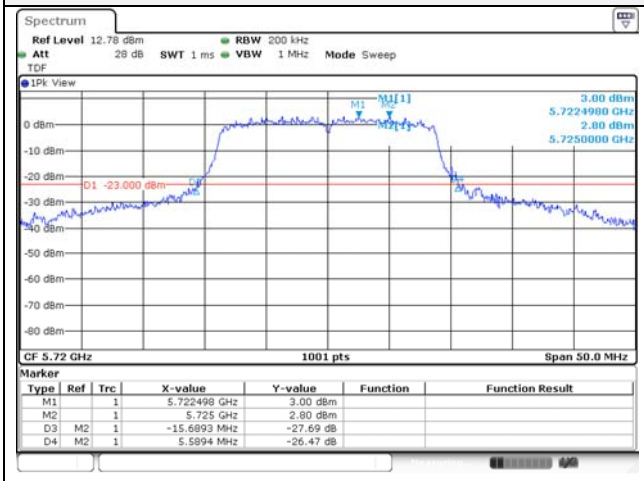
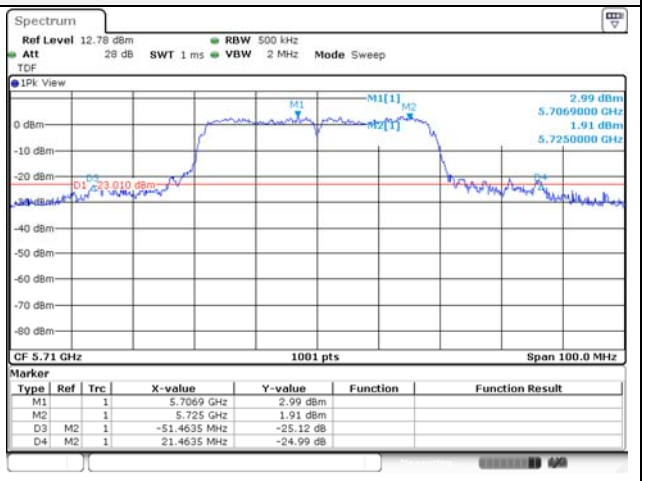
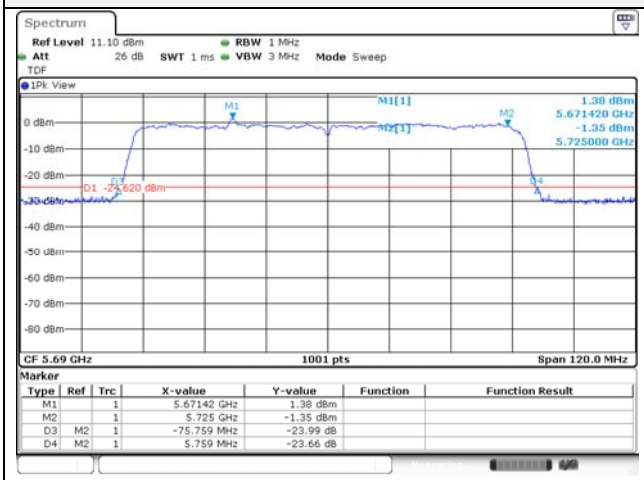
7.5. Straddle channel

26dB bandwidth

Test mode	Band	Frequency (MHz)	26dB Bandwidth (MHz)
802.11a	UNII-2C	5 720	15.34
802.11n HT20			15.59
802.11ac VHT20			15.69
802.11a	UNII-3	5 720	5.89
802.11n HT20			5.39
802.11ac VHT20			5.59
802.11n HT40	UNII-2C	5 710	51.46
802.11ac VHT40			36.68
802.11n HT40	UNII-3	5 710	21.46
802.11ac VHT40			6.88
802.11ac VHT80	UNII-2C	5 690	75.76
	UNII-3	5 690	5.76

Notes:

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

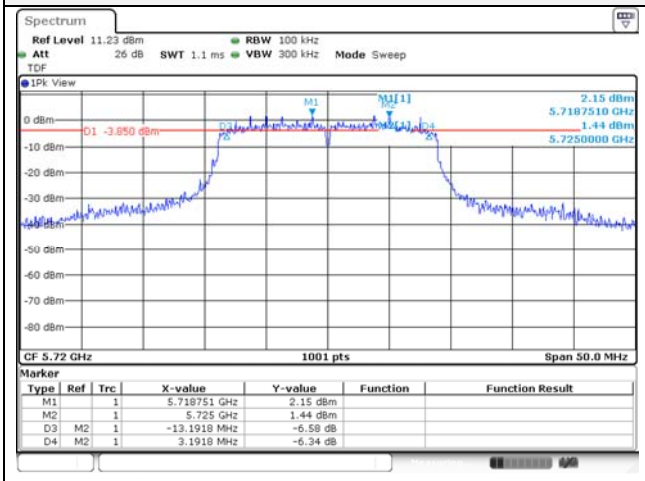
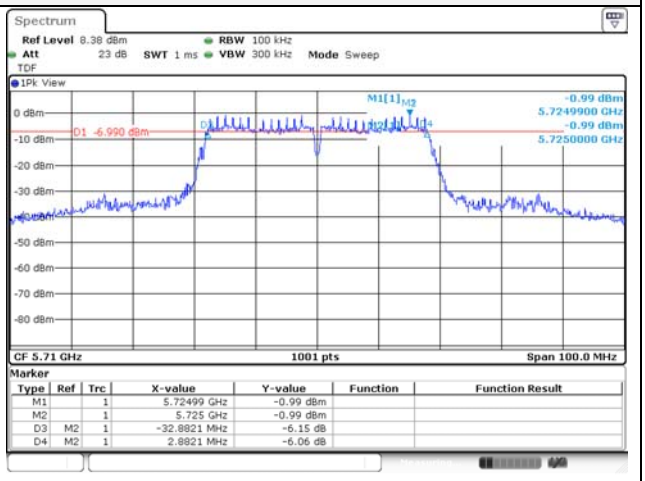
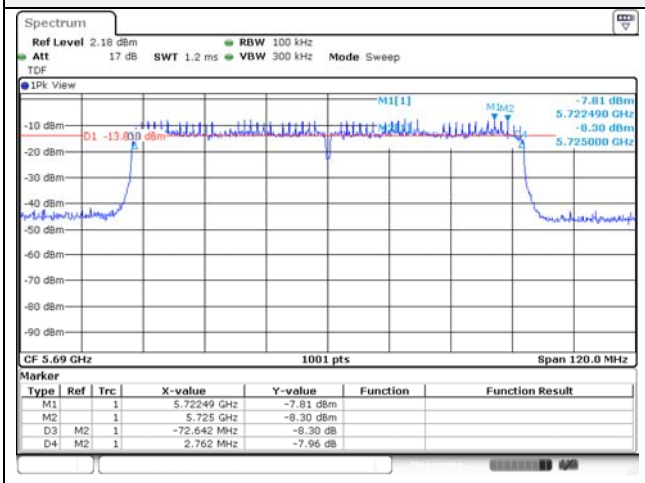
802.11ac VHT20	802.11n HT40
	
802.11ac VHT80	
	Blank

6dB bandwidth

Test mode	Band	Frequency (㎒)	6dB Bandwidth (㎒)	Limit (㎒)
802.11a	UNII-3	5 720	3.19	0.50
802.11n HT20			3.19	0.50
802.11ac VHT20			2.94	0.50
802.11n HT40	UNII-3	5 710	2.88	0.50
802.11ac VHT40			2.88	0.50
802.11ac VHT80	UNII-3	5 690	2.76	0.50

Notes:

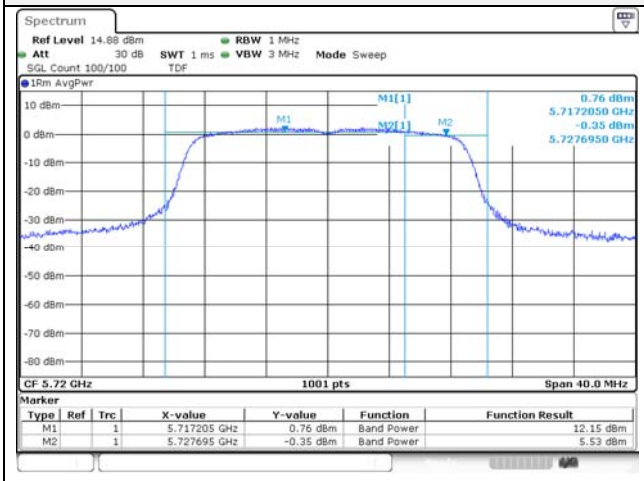
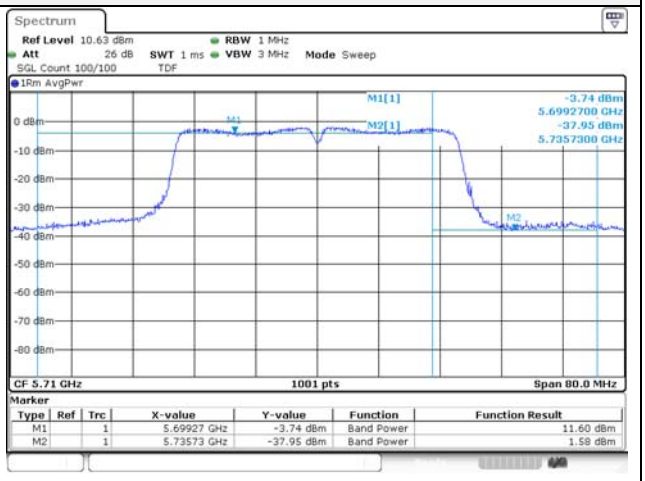
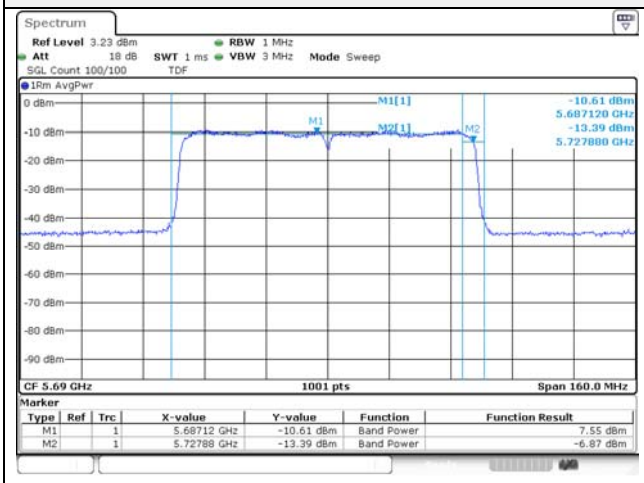
1. 6dB Bandwidth = Measured Frequency[㎒] – 5 725㎒

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	12.14	0.38	12.52	22.86
802.11n HT20			12.15	0.45	12.60	22.93
802.11ac VHT20			12.24	0.35	12.59	22.96
802.11a	UNII-3	5 720	5.37	0.38	5.75	30.00
802.11n HT20			5.53	0.45	5.98	
802.11ac VHT20			5.68	0.35	6.03	
802.11n HT40	UNII-2C	5 710	11.60	0.76	12.36	24.00
802.11ac VHT40			11.52	0.64	12.16	
802.11n HT40	UNII-3	5 710	1.58	0.76	2.34	30.00
802.11ac VHT40			1.69	0.64	2.33	
802.11ac VHT80	UNII-2C	5 690	7.55	1.20	8.75	24.00
	UNII-3	5 690	-6.87	1.20	-5.67	30.00

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

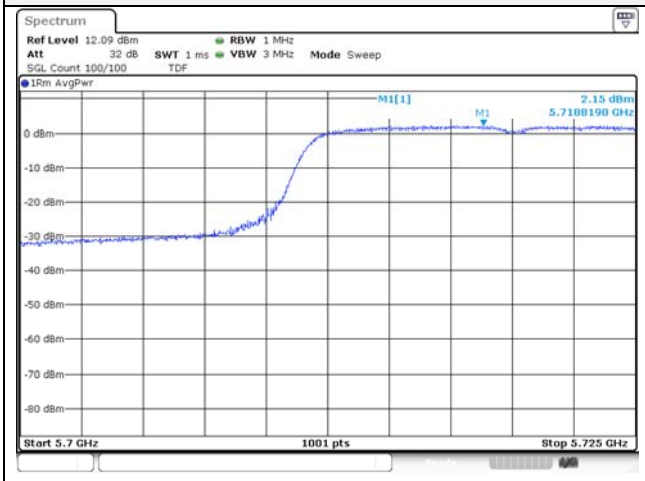
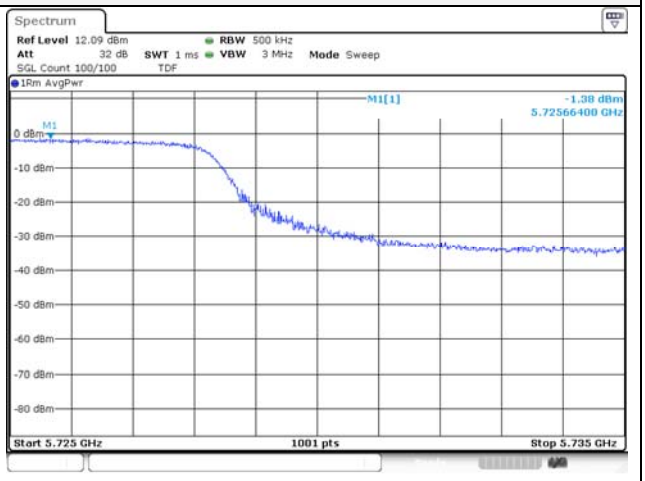
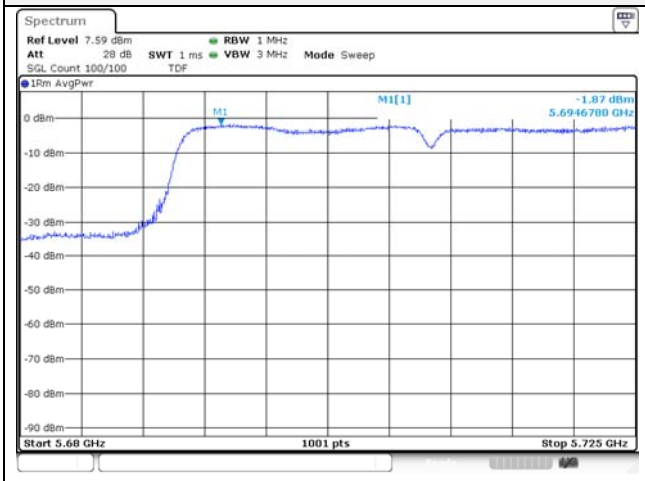
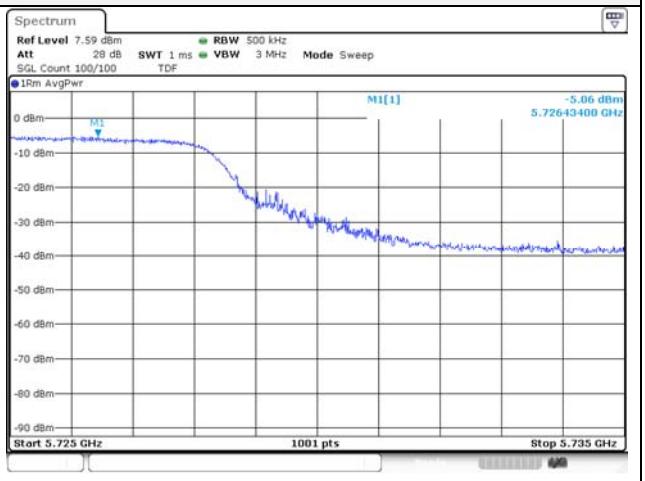
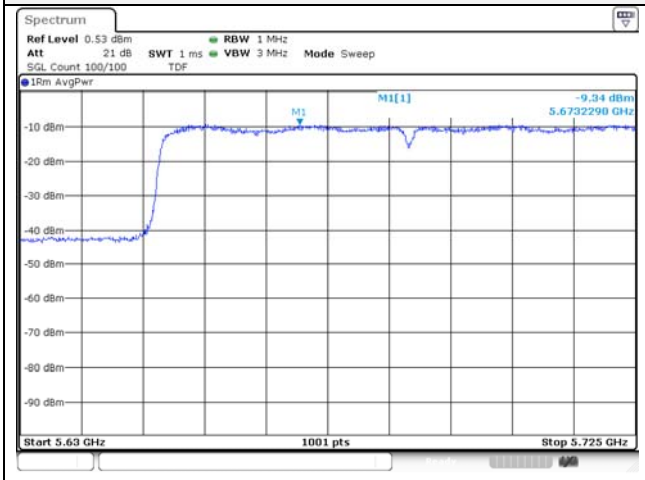
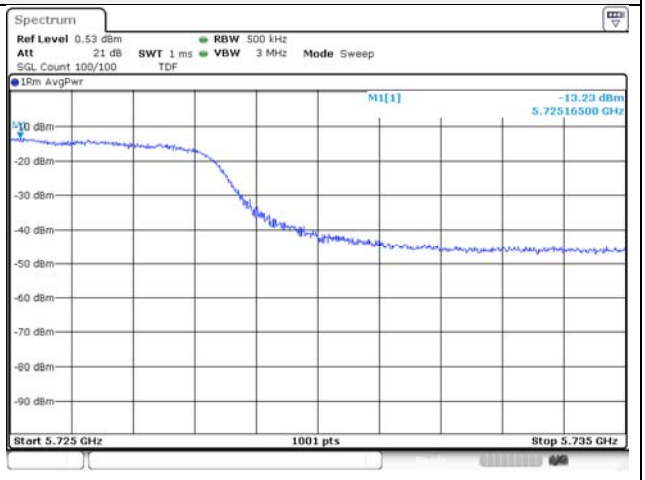
802.11n HT20	802.11n HT40
	
802.11ac VHT80	
	Blank

Power Spectral Density

Test mode	Band	Frequency (㎒)	Measured PSD (dBm/㎒)	DCF (dB)	Maximum PSD (dB m/㎒)	Limit (dBm/㎒)
802.11a	UNII-2C	5 720	2.15	0.38	2.53	11.00
802.11n HT20			2.04	0.45	2.49	
802.11ac VHT20			1.95	0.35	2.30	
802.11n HT40	UNII-2C	5 710	-1.87	0.76	-1.11	
802.11ac VHT40			-1.98	0.64	-1.34	
802.11ac VHT80	UNII-2C	5 690	-9.34	1.20	-8.14	

Test mode	Band	Frequency (㎒)	Measured PSD (dBm/ 500 ㎑)	DCF (dB)	Maximum PSD (dBm/ 500 ㎑)	Limit (dBm /500 ㎑)
802.11a	UNII-3	5 720	-1.38	0.38	-1.00	30.00
802.11n HT20			-1.62	0.45	-1.17	
802.11ac VHT20			-1.23	0.35	-0.88	
802.11n HT40		5 710	-5.06	0.76	-4.30	
802.11ac VHT40			-5.27	0.64	-4.63	
802.11ac VHT80		5 690	-13.23	1.20	-12.03	

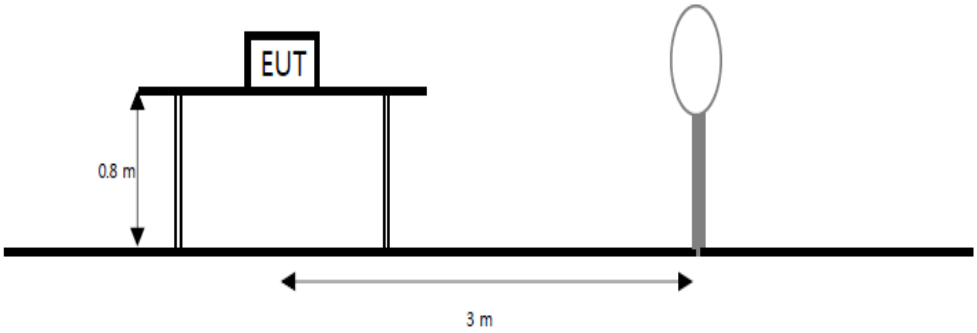
Notes:
1. Maximum PSD calculation
- Maximum PSD = Measured PSD + D.C.F

UNII-2C / 802.11a	UNII-3 / 802.11a
	
UNII-2C / 802.11n HT40	**UNII-3 / 802.11n HT40**
	
UNII-2C / 802.11ac VHT80	**UNII-3 / 802.11ac VHT80**
	

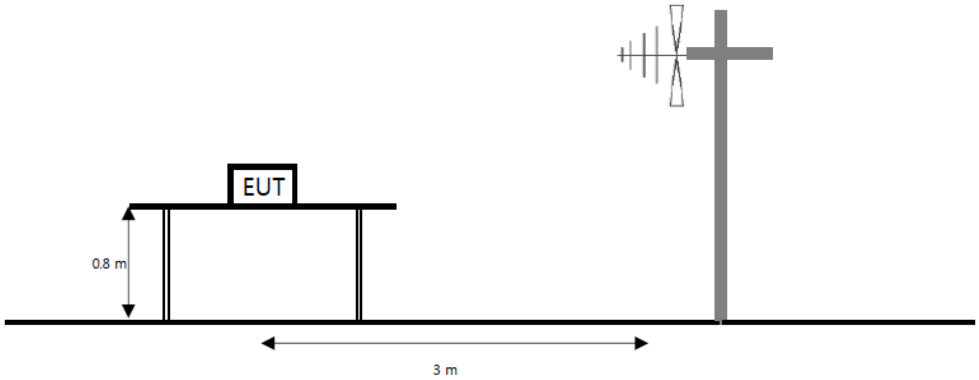
7.6. Spurious Emission, Band Edge and Restricted bands

Test setup

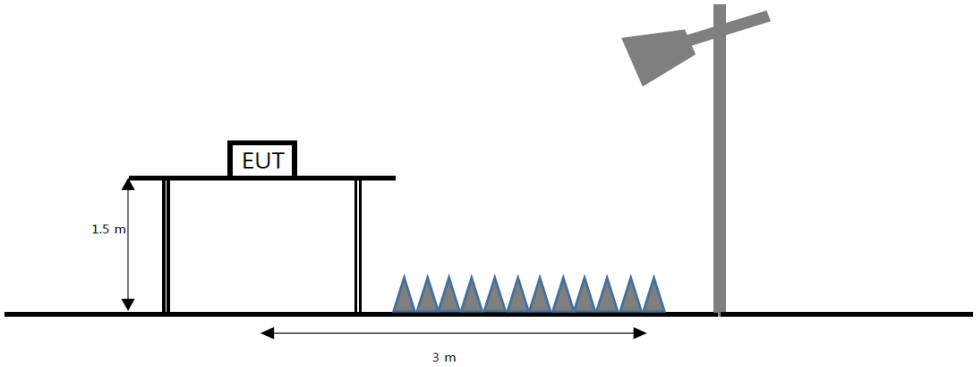
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 ㎑ to 30 ㎒ Emissions



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

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

MHz	MHz	MHz	GHz
0.009 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505	16.694 75 - 16.695 25	608 - 614	5.35 - 5.46
2.173 5 - 2.190 5	16.804 25 - 16.804 75	960 – 1 240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1 300 – 1 427	8.025 - 8.5
4.177 25 - 4.177 75	37.5 - 38.25	1 435 – 1 626.5	9.0 - 9.2
4.207 25 - 4.207 75	73 - 74.6	1 645.5 – 1 646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1 660 – 1 710	10.6 - 12.7
6.267 75 - 6.268 25	108 - 121.94	1 718.8 – 1 722.2	13.25 - 13.4
6.311 75 - 6.312 25	123 - 138	2 200 – 2 300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2 310 – 2 390	15.35 - 16.2
8.362 - 8.366	156.524 75 - 156.525 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 MHz, compliance with the limits in section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1 000 MHz, compliance with the emission limits in section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in section 15.35 apply to these measurements.

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

For transmitters operating in the 5.15-5.25 ㎓ 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.

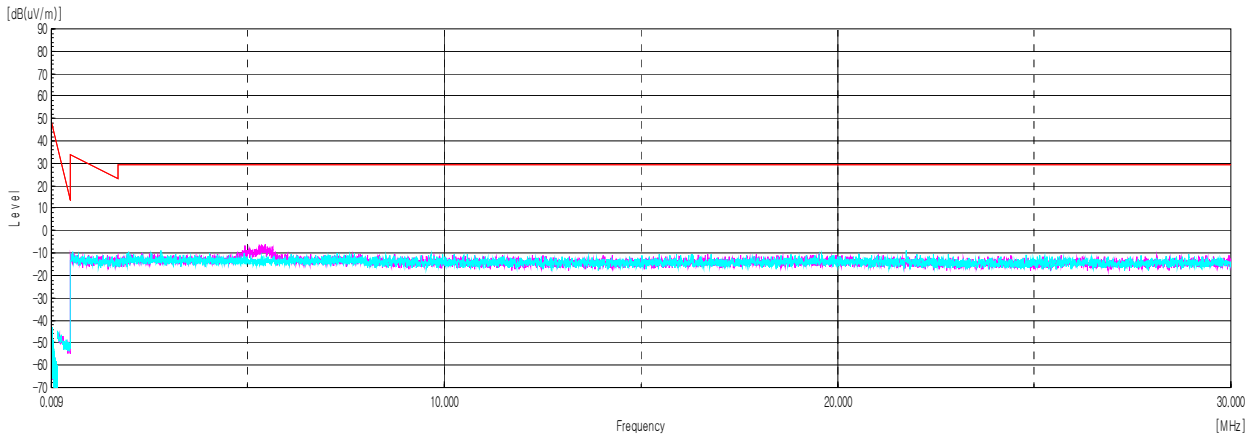
Notes:

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.”

Test results (Below 30 ㎒) – Worst case: 802.11n HT20 / 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.									

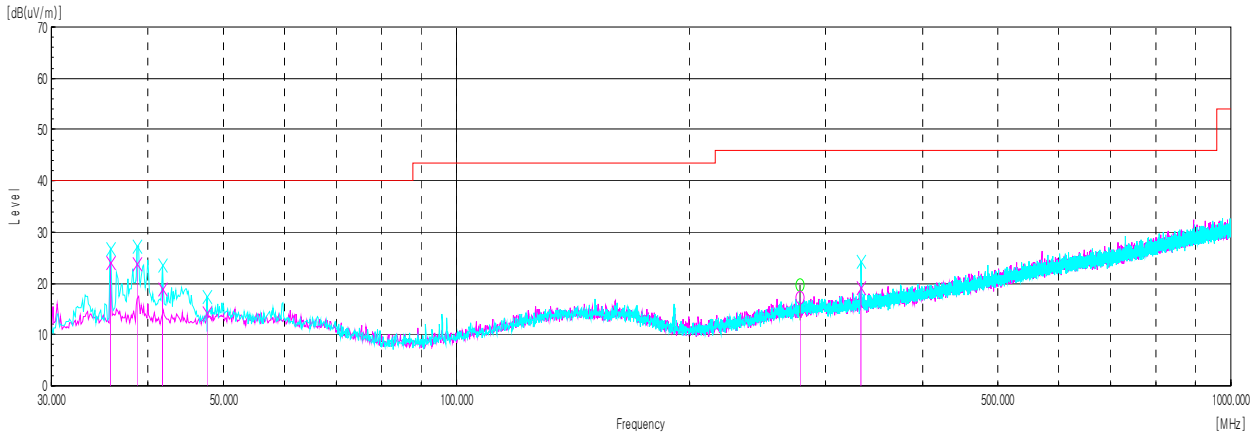
Horizontal/Vertical



Test results (Below 1 000 ㎒) – Worst case: 802.11n HT20 / 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								
35.82	V	37.10	17.58	-30.66	-	24.02	40.00	15.98
38.73	V	36.80	17.53	-30.53	-	23.80	40.00	16.20
41.76	V	31.70	17.78	-30.45	-	19.03	40.00	20.97
47.70	V	26.20	18.35	-30.35	-	14.20	40.00	25.80
277.84[1)]	H	25.40	18.59	-27.09	-	16.90	46.00	29.10
333.37[1)]	V	25.60	20.03	-26.54	-	19.09	46.00	26.91

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								
5 149.91[1)]	V	51.28	34.17	-24.73	-	60.72	74.00	13.28
10 280.63	V	59.31	37.48	-50.16	-	46.63	68.20	21.57
15 455.27[1)]	H	55.71	40.11	-46.64	-	49.18	74.00	24.82
Average Data								
5 149.91[1)]	V	42.02	34.17	-24.73	0.38	51.84	54.00	2.16

Middle Channel (5 200 ㎒)

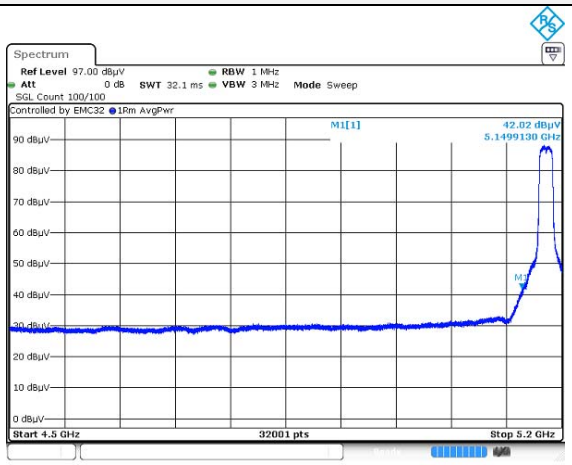
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 400.30	H	57.70	37.60	-49.97	-	45.33	68.20	22.87
17 003.09	V	57.22	40.70	-46.81	-	51.11	68.20	17.09
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit								

Highest Channel (5 240 ㎒)

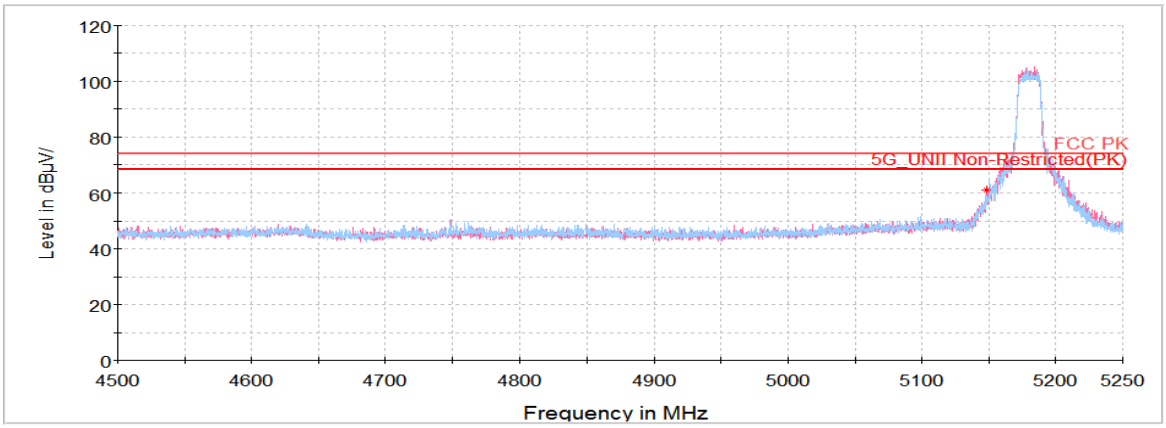
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 504.88	V	57.21	37.70	-49.80	-	45.11	68.20	23.09
15 731.27[1)]	V	55.94	39.91	-46.86	-	48.99	74.00	25.01
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11a_UNII-1

Lowest Channel (5 180 ㎒)

Average data	
	Blank

Horizontal/Vertical for Band-edge



802.11n HT20 UNII-1

Lowest Channel (5 180 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 149.21[1)]	V	53.98	34.17	-24.73	-	63.42	74.00	10.58
10 316.56	H	57.24	37.52	-50.11	-	44.65	68.20	23.55
15 530.73[1)]	V	54.10	39.99	-46.84	-	47.25	74.00	26.75
Average Data								
5 149.21[1)]	V	41.85	34.17	-24.73	0.45	51.74	54.00	2.26

Middle Channel (5 200 ㎒)

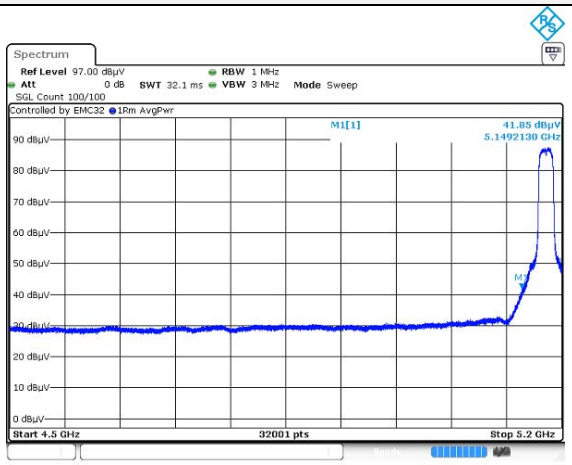
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 398.86	H	57.66	37.60	-49.98	-	45.28	68.20	22.92
15 587.52[1)]	H	54.36	39.96	-46.85	-	47.47	74.00	26.53
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit								

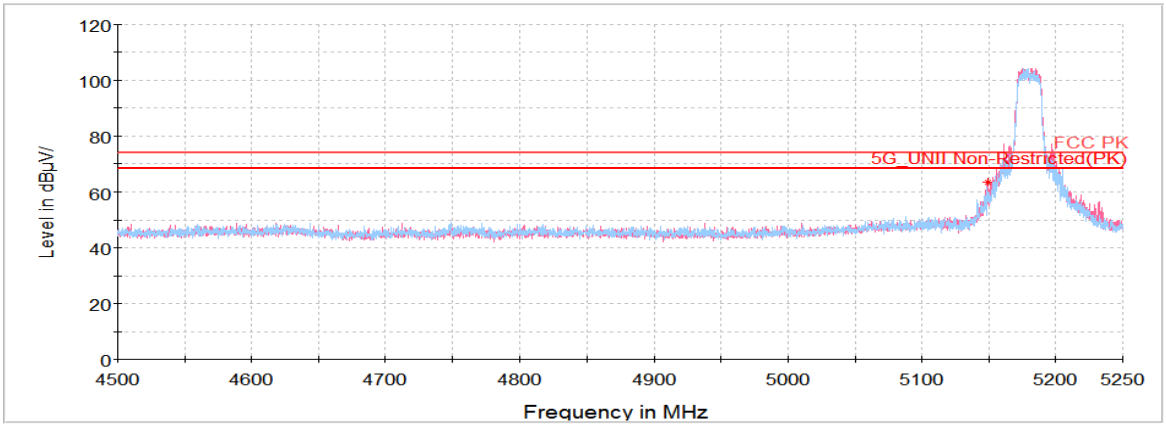
Highest Channel (5 240 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 456.72	H	57.80	37.66	-49.88	-	45.58	68.20	22.62
15 732.34[1)]	V	55.09	39.91	-46.86	-	48.14	74.00	25.86
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 ㎒)

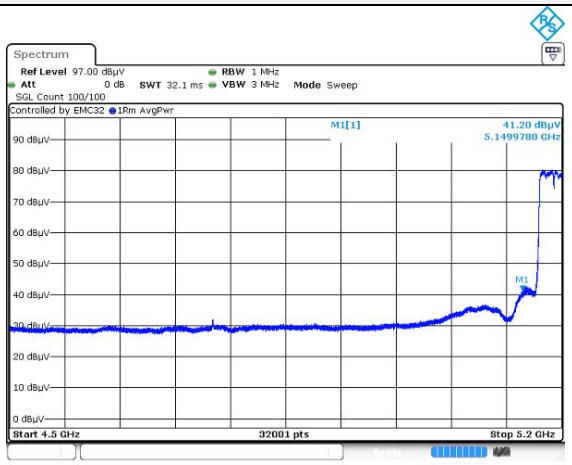
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 149.98[1)]	H	49.41	34.17	-24.73	-	58.85	74.00	15.15
10 328.06	H	57.74	37.53	-50.09	-	45.18	68.20	23.02
15 584.28[1)]	H	54.39	39.97	-46.85	-	47.51	74.00	26.49
Average Data								
5 149.98[1)]	V	41.20	34.17	-24.73	0.76	51.40	54.00	2.60

Highest Channel (5 230 ㎒)

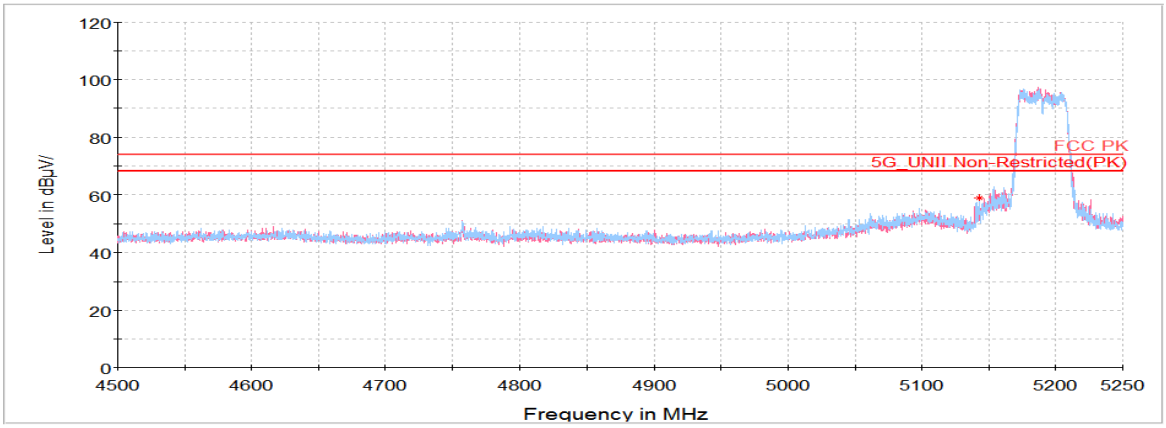
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 455.28	V	57.87	37.66	-49.89	-	45.64	68.20	22.56
15 718.69[1)]	V	55.32	39.91	-46.86	-	48.37	74.00	25.63
Average Data								
No spurious emissions were detected within 20 ㏈ 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								
5 149.67[1)]	V	51.23	34.17	-24.73	-	60.67	74.00	13.33
10 360.05	H	58.12	37.56	-50.04	-	45.64	68.20	22.56
15 579.97[1)]	H	55.59	39.97	-46.85	-	48.71	74.00	25.29
Average Data								
5 149.67[1)]	V	40.81	34.17	-24.73	0.35	50.60	54.00	3.40

Middle Channel (5 200 ㎒)

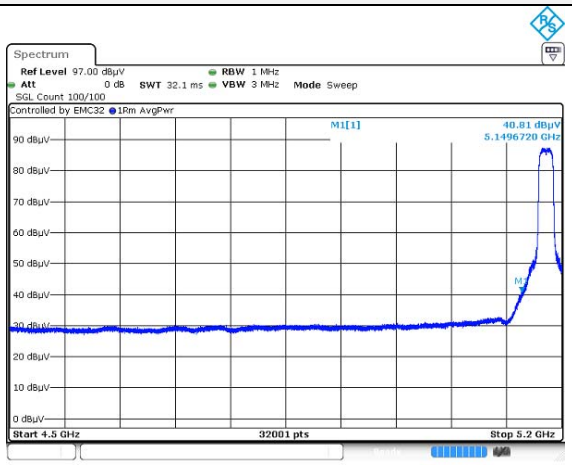
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 400.30	V	56.85	37.60	-49.97	-	44.48	68.20	23.72
15 589.67[1)]	V	54.44	39.96	-46.85	-	47.55	74.00	26.45
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit								

Highest Channel (5 240 ㎒)

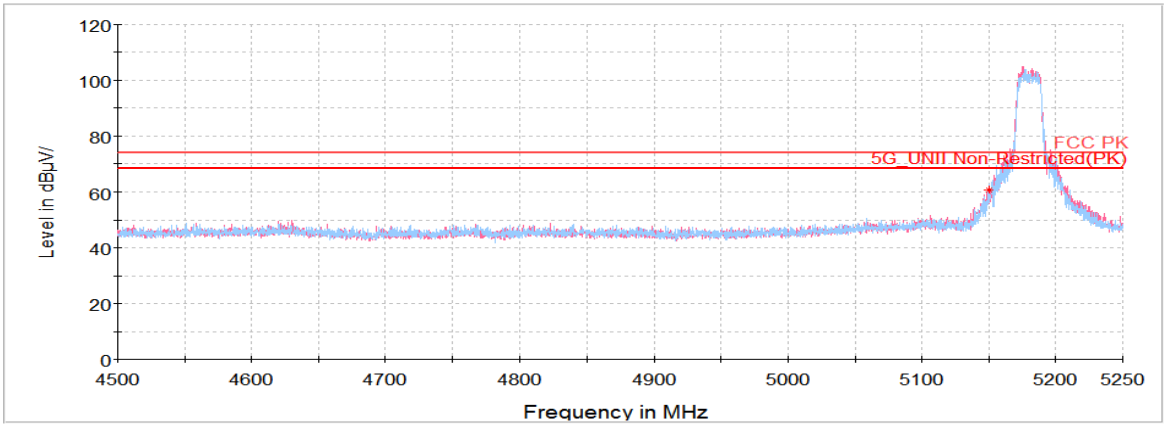
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 481.88	H	57.18	37.68	-49.84	-	45.02	68.20	23.18
15 751.03[1)]	H	55.01	39.90	-46.86	-	48.05	74.00	25.95
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11ac VHT20 UNII-1

Lowest Channel (5 180 ㎒)

Average data	
	Blank

Horizontal/Vertical for Band-edge



802.11ac VHT40_UNII-1

Lowest Channel (5 190 ㎒)

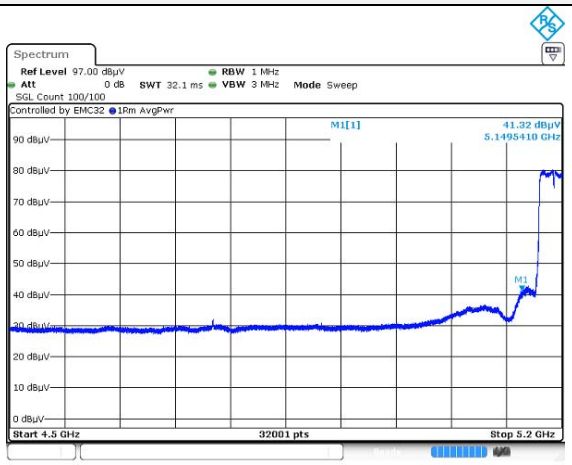
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 149.54[1)]	H	52.47	34.17	-24.73	-	61.91	74.00	12.09
10 320.16	H	58.11	37.52	-50.10	-	45.53	68.20	22.67
15 580.69[1)]	V	53.81	39.97	-46.85	-	46.93	74.00	27.07
Average Data								
5 149.54[1)]	H	41.32	34.17	-24.73	0.64	51.40	54.00	2.60

Highest Channel (5 230 ㎒)

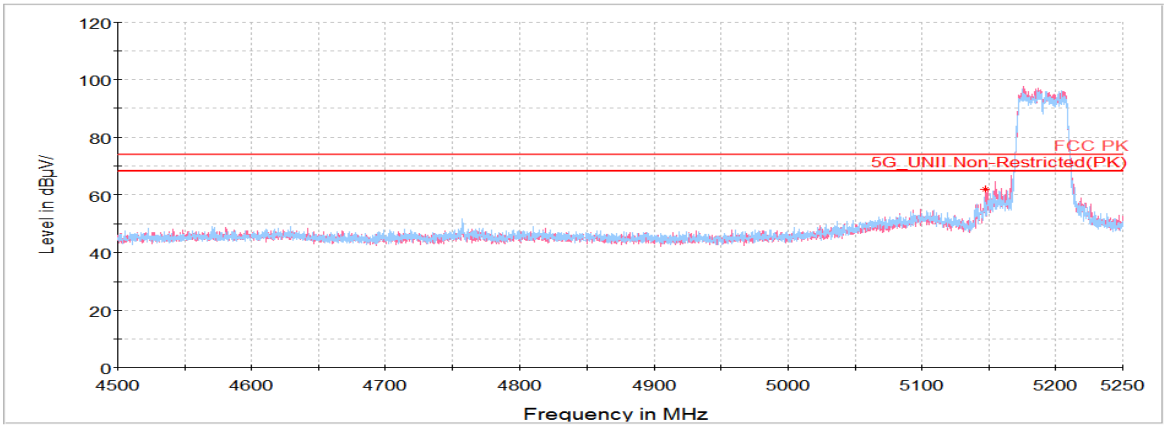
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 459.95	V	59.06	37.66	-49.88	-	46.84	68.20	21.36
15 666.22[1)]	V	54.04	39.93	-46.85	-	47.12	74.00	26.88
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

802.11ac VHT40_UNII-1

Lowest Channel (5 190 ㎒)

Average data	
	Blank

Horizontal/Vertical for Band-edge

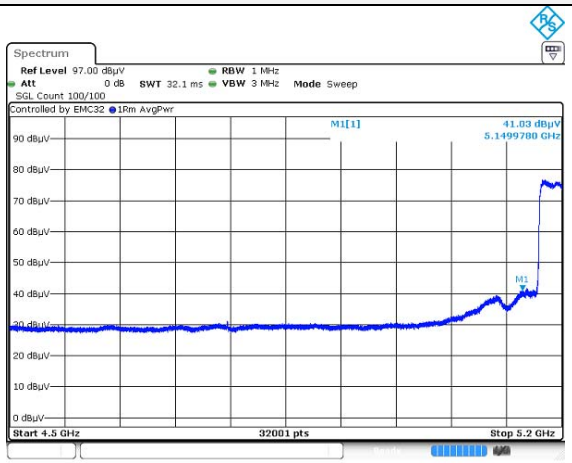


802.11ac VHT80_UNII-1

Lowest Channel (5 210 ㎒)

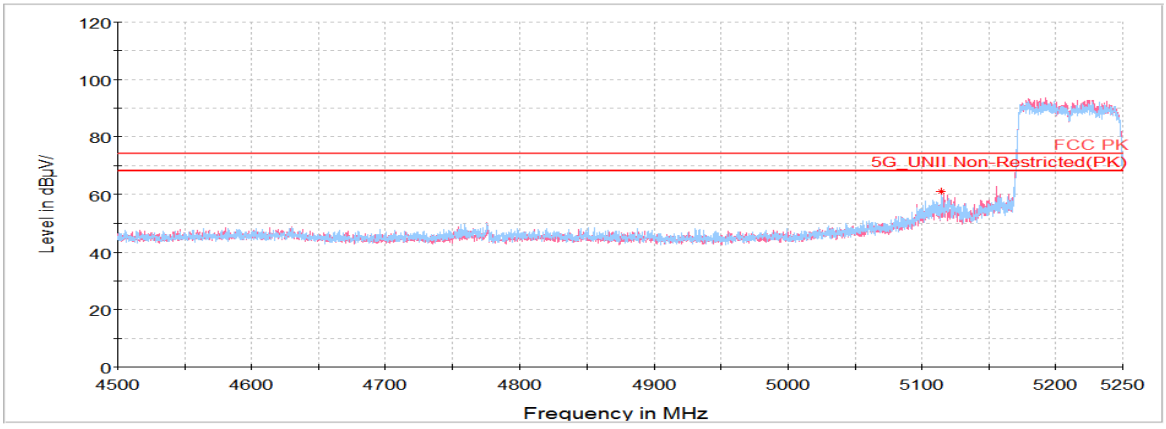
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 149.98[1)]	H	51.46	34.17	-24.73	-	60.90	74.00	13.10
10 421.50	H	56.69	37.62	-49.94	-	44.37	68.20	23.83
15 665.86[1)]	H	54.34	39.93	-46.85	-	47.42	74.00	26.58
Average Data								
5 149.98[1)]	V	41.03	34.17	-24.73	1.20	51.67	54.00	2.33

Average data



Blank

Horizontal/Vertical for Band-edge

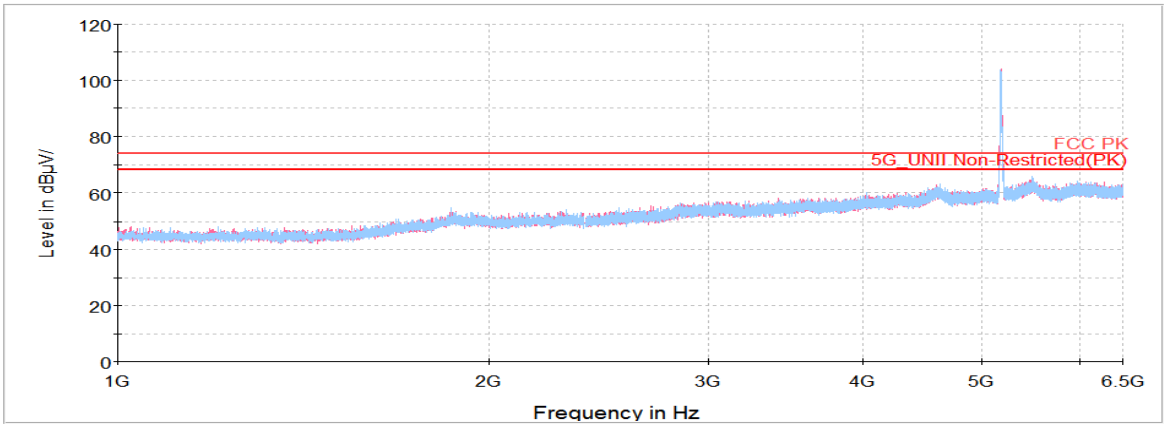


Plot of Harmonics and Spurious Emissions

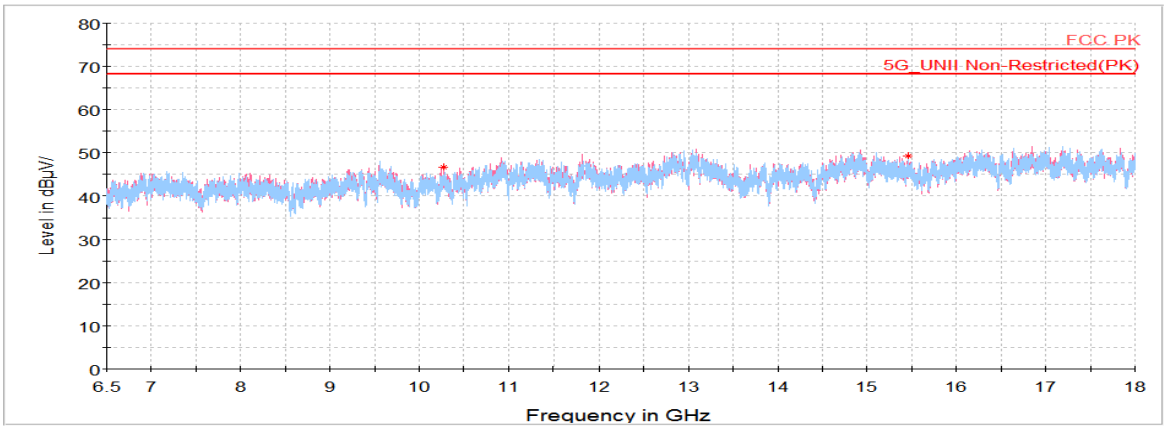
In order to simplify the report, attached plots were only the lowest margin condition

802.11a_UNII-1_Lowest Channel (5 180 ㎒)

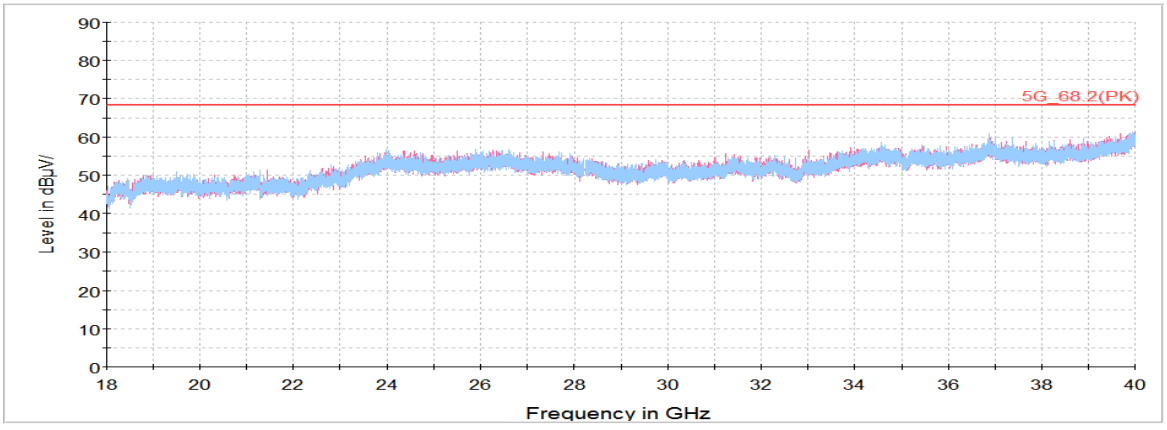
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓



Horizontal/Vertical for 18 ㎓ ~ 40 ㎓



802.11a UNII-2A

Lowest Channel (5 260 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 510.63	H	57.43	37.71	-49.78	-	45.36	68.20	22.84
15 758.58[1)]	V	55.77	39.90	-46.86	-	48.81	74.00	25.19
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Middle Channel (5 280 ㎒)

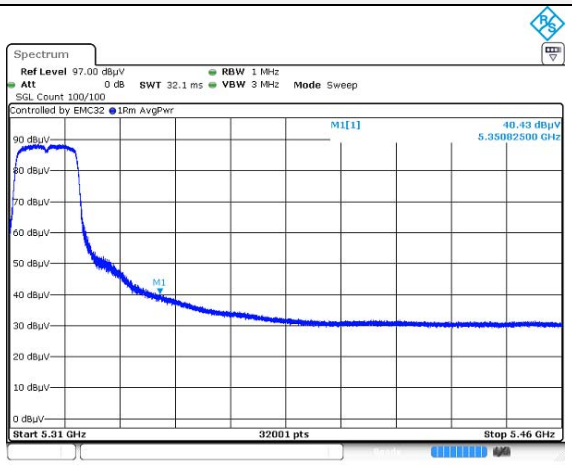
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 579.27	V	58.38	37.78	-49.53	-	46.63	68.20	21.57
15 841.59[1)]	V	56.70	39.86	-46.87	-	49.69	74.00	24.31
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

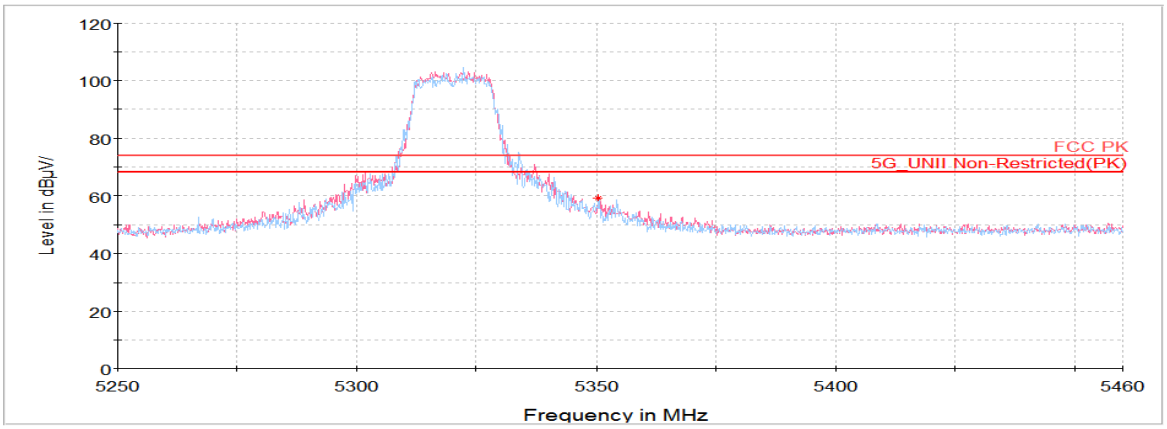
Highest Channel (5 320 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 350.83[1)]	V	50.36	34.53	-25.73	-	59.16	74.00	14.84
10 641.44[1)]	V	58.27	37.84	-49.31	-	46.80	74.00	27.20
15 948.69[1)]	H	56.64	39.82	-46.88	-	49.58	74.00	24.42
Average Data								
5 350.83[1)]	V	40.43	34.53	-25.73	0.38	49.61	54.00	4.39

802.11a UNII-2A

Highest Channel (5 320 ㎒)

Average data	
	Blank

Horizontal/Vertical for Band-edge


802.11n HT20_UNII-2A

Lowest Channel (5 260 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 519.97	H	57.76	37.72	-49.74	-	45.74	68.20	22.46
15 746.36[1)]	H	56.31	39.90	-46.86	-	49.35	74.00	24.65
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Middle Channel (5 280 ㎒)

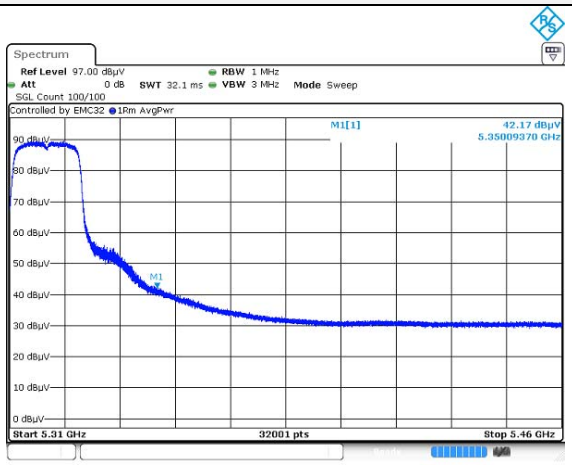
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 587.53	H	59.30	37.79	-49.50	-	47.59	68.20	20.61
15 834.05[1)]	H	56.25	39.87	-46.87	-	49.25	74.00	24.75
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

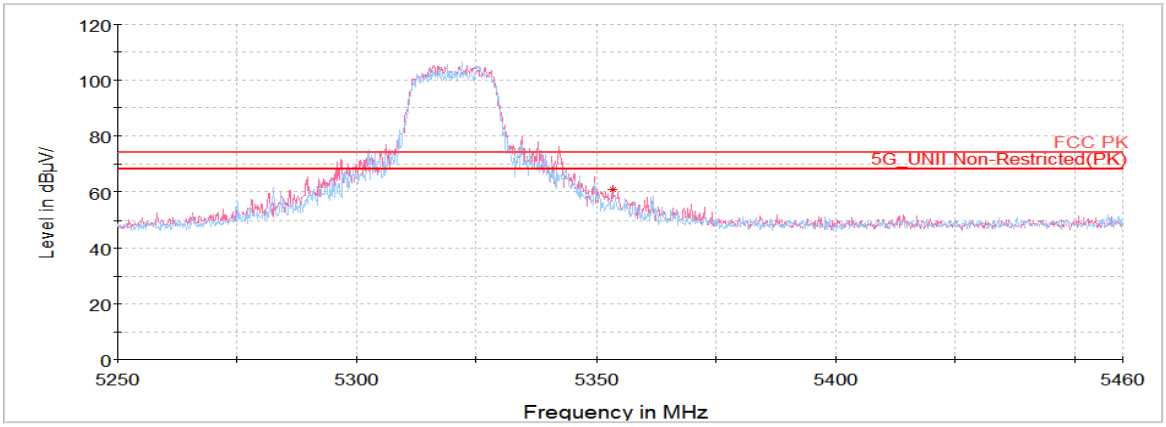
Highest Channel (5 320 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 350.10[1)]	V	51.81	34.53	-25.75	-	60.59	74.00	13.41
10 654.38[1)]	V	59.05	37.85	-49.27	-	47.63	74.00	26.37
15 945.81[1)]	V	56.30	39.82	-46.88	-	49.24	74.00	24.76
Average Data								
5 350.10[1)]	V	42.17	34.53	-25.75	0.45	51.40	54.00	2.60

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 ㎒)

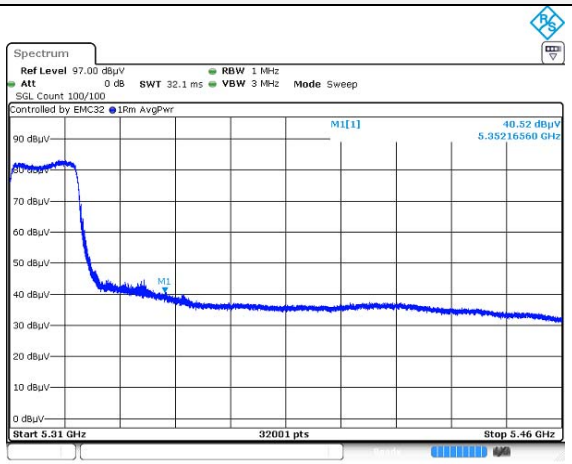
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 540.09	V	57.58	37.74	-49.67	-	45.65	68.20	22.55
15 827.22[1)]	H	56.27	39.87	-46.87	-	49.27	74.00	24.73
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

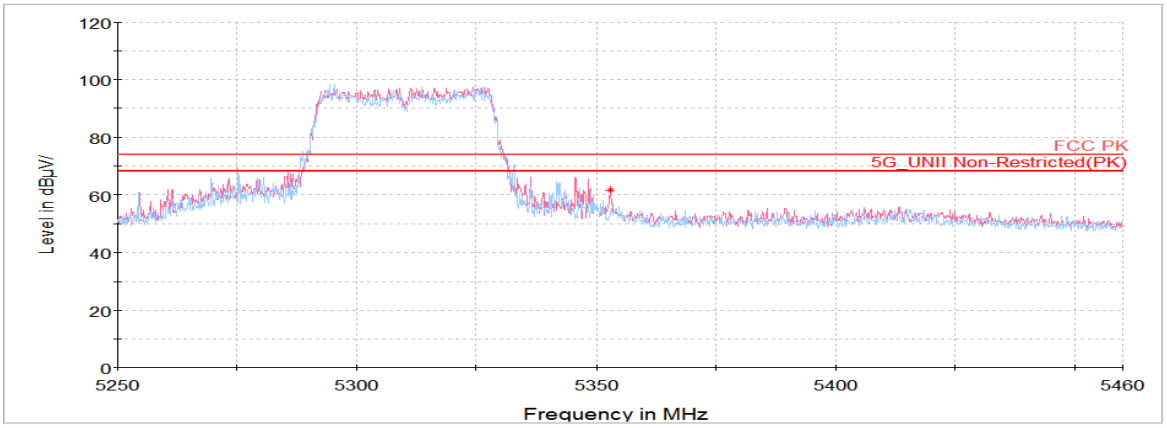
Highest Channel (5 310 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 352.17[1)]	V	52.82	34.53	-25.70	-	61.65	74.00	12.35
10 636.41[1)]	V	57.33	37.84	-49.33	-	45.84	74.00	28.16
15 949.77[1)]	H	56.52	39.82	-46.88	-	49.46	74.00	24.54
Average Data								
5 352.17[1)]	V	40.52	34.53	-25.70	0.76	50.11	54.00	3.89

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								
10 520.69	V	57.87	37.72	-49.74	-	45.85	68.20	22.35
15 765.05[1)]	V	56.17	39.89	-46.86	-	49.20	74.00	24.80
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Middle Channel (5 280 ㎒)

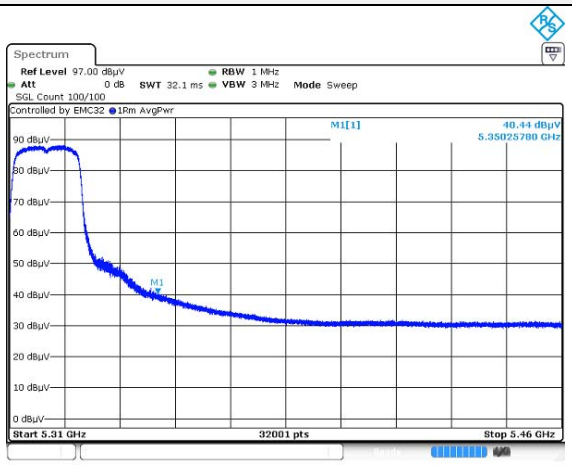
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 560.22	V	57.18	37.76	-49.60	-	45.34	68.20	22.86
15 857.05[1)]	V	55.00	39.86	-46.87	-	47.99	74.00	26.01
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

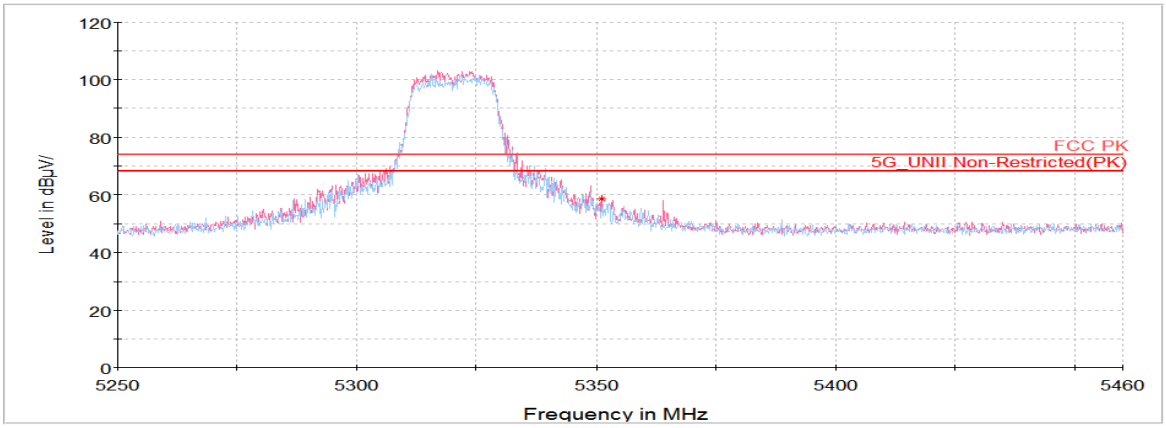
Highest Channel (5 320 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 350.26[1)]	V	49.61	34.53	-25.74	-	58.40	74.00	15.60
10 640.00[1)]	V	57.30	37.84	-49.32	-	45.82	74.00	28.18
15 950.48[1)]	V	56.13	39.82	-46.88	-	49.07	74.00	24.93
Average Data								
5 350.26[1)]	V	40.44	34.53	-25.74	0.35	49.58	54.00	4.42

802.11ac VHT20_UNII-2A

Highest Channel (5 320 ㎒)

Average data	
	Blank

Horizontal/Vertical for Band-edge


802.11ac VHT40_UNII-2A

Lowest Channel (5 270 ㎒)

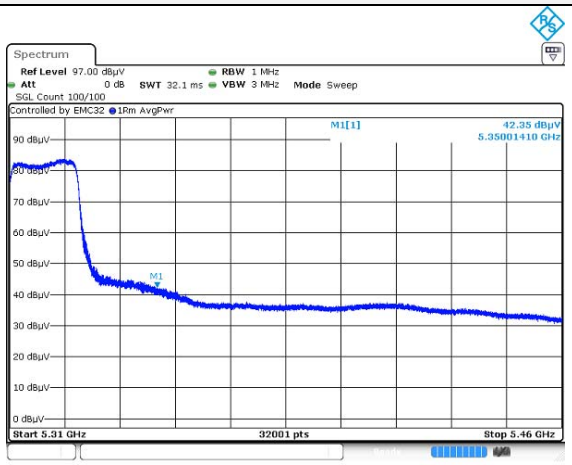
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 509.55	H	57.80	37.71	-49.78	-	45.73	68.20	22.47
15 818.95[1)]	H	55.39	39.87	-46.87	-	48.39	74.00	25.61
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

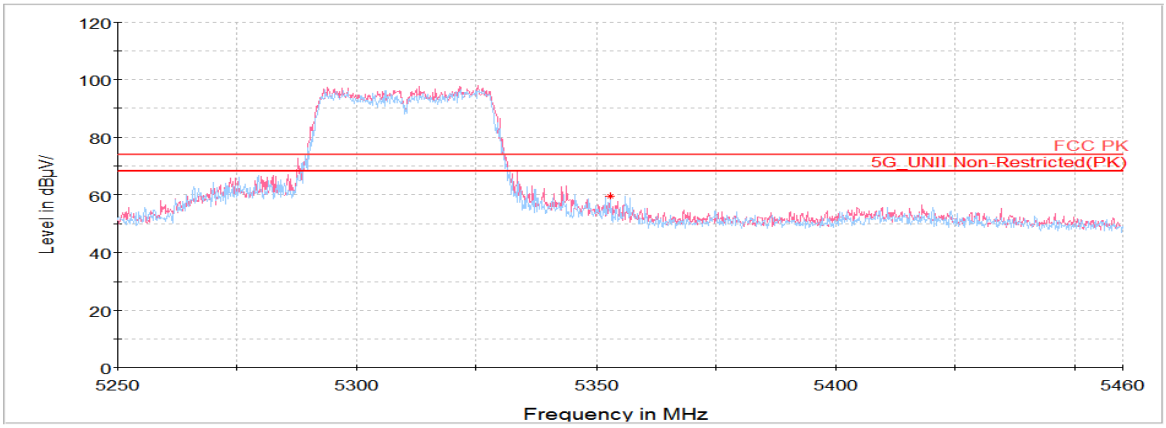
Highest Channel (5 310 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 350.28[1)]	V	50.53	34.53	-25.74	-	59.32	74.00	14.68
10 619.88[1)]	H	56.79	37.82	-49.39	-	45.22	74.00	28.78
15 921.38[1)]	H	55.85	39.83	-46.88	-	48.80	74.00	25.20
Average Data								
5 350.28[1)]	V	42.35	34.53	-25.74	0.64	51.78	54.00	2.22

802.11ac VHT40_UNII-2A

Highest Channel (5 310 ㎒)

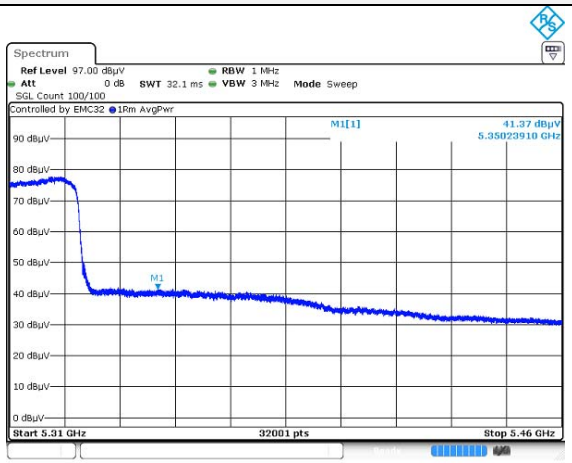
Average data	
	Blank

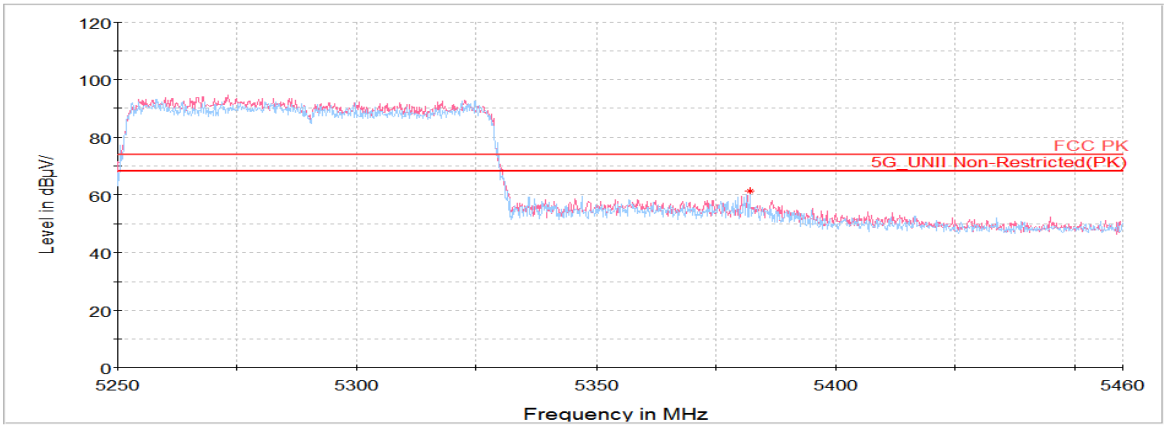
Horizontal/Vertical for Band-edge


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								
5 350.24[1)]	V	52.37	34.53	-25.74	-	61.16	74.00	12.84
10 585.38	H	58.38	37.79	-49.51	-	46.66	68.20	21.54
15 886.88[1)]	V	54.03	39.85	-46.88	-	47.00	74.00	27.00
Average Data								
5 350.24[1)]	V	41.37	34.53	-25.74	1.20	51.36	54.00	2.64

Average data	
	Blank

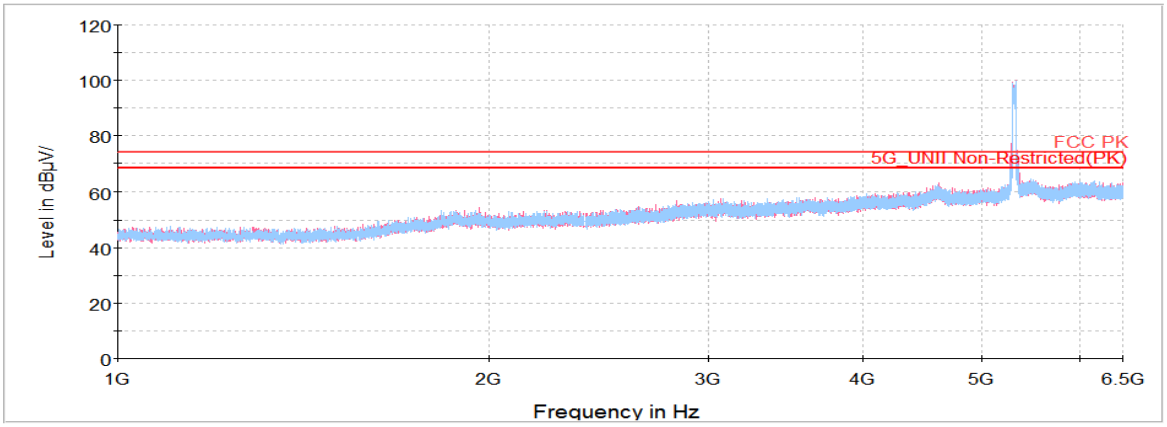
Horizontal/Vertical for Band-edge


Plot of Harmonics and Spurious Emissions

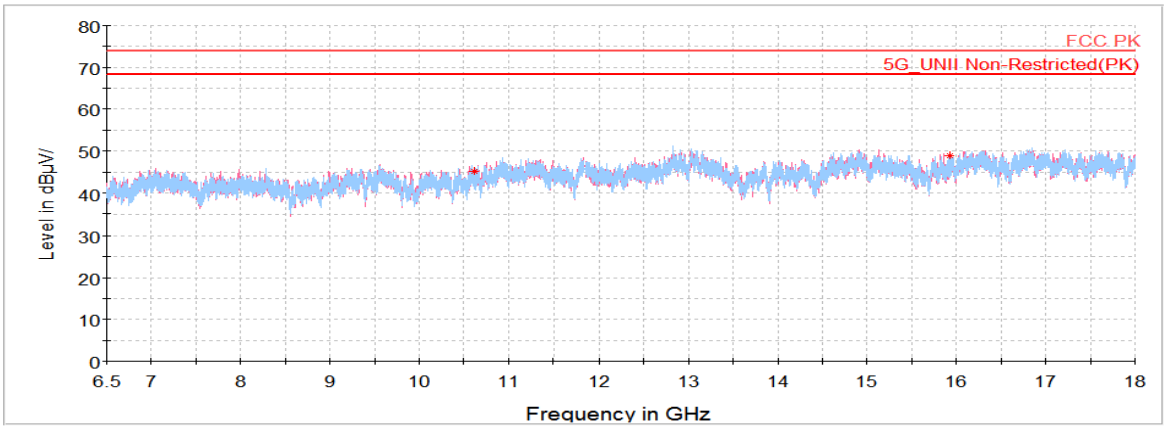
In order to simplify the report, attached plots were only the lowest margin condition

802.11ac VHT40_UNII-2A_Highest Channel (5 310 ㎒)

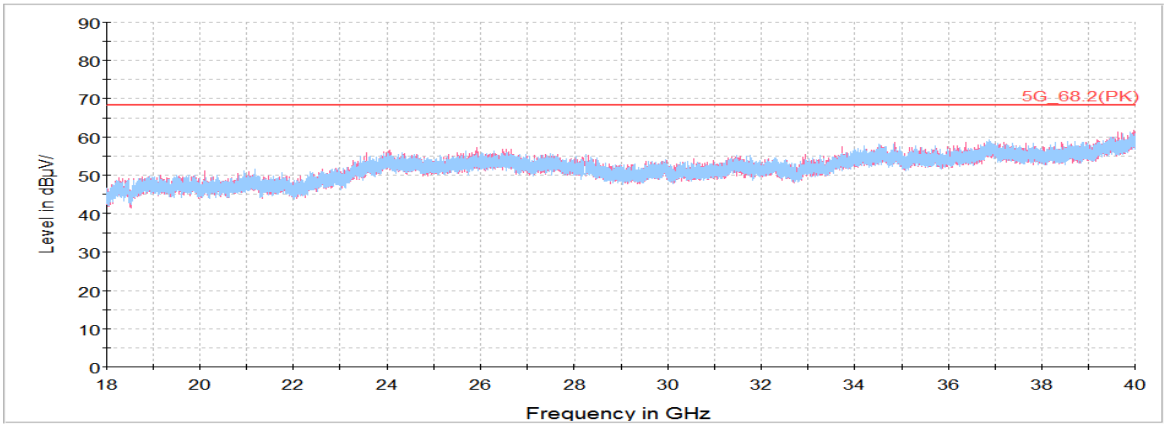
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓



Horizontal/Vertical for 18 ㎓ ~ 40 ㎓



802.11a UNII-2C

Lowest Channel (5 500 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 459.97[1)]	V	45.23	34.73	-24.10	-	55.86	74.00	18.14
10 933.25[1)]	V	60.12	38.13	-48.28	-	49.97	74.00	24.03
16 497.09	V	55.91	41.20	-47.17	-	49.94	68.20	18.26
Average Data								
5 459.97[1)]	V	36.17	34.73	-24.10	0.38	47.18	54.00	6.82

Middle Channel (5 580 ㎒)

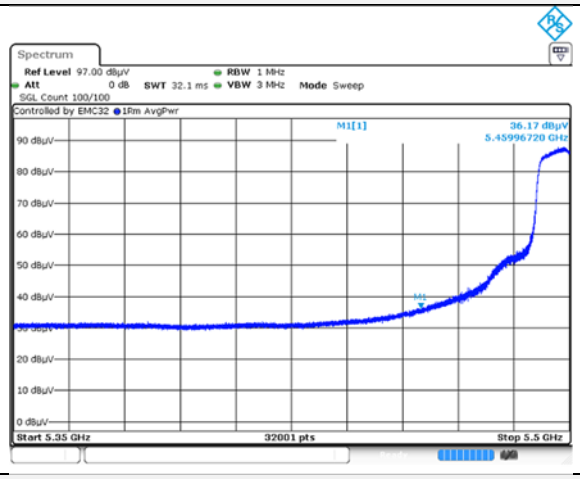
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
11 149.95[1)]	H	58.62	38.23	-48.33	-	48.52	74.00	25.48
16 648.03	V	57.83	41.12	-47.07	-	51.88	68.20	16.32
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Highest Channel (5 700 ㎒)

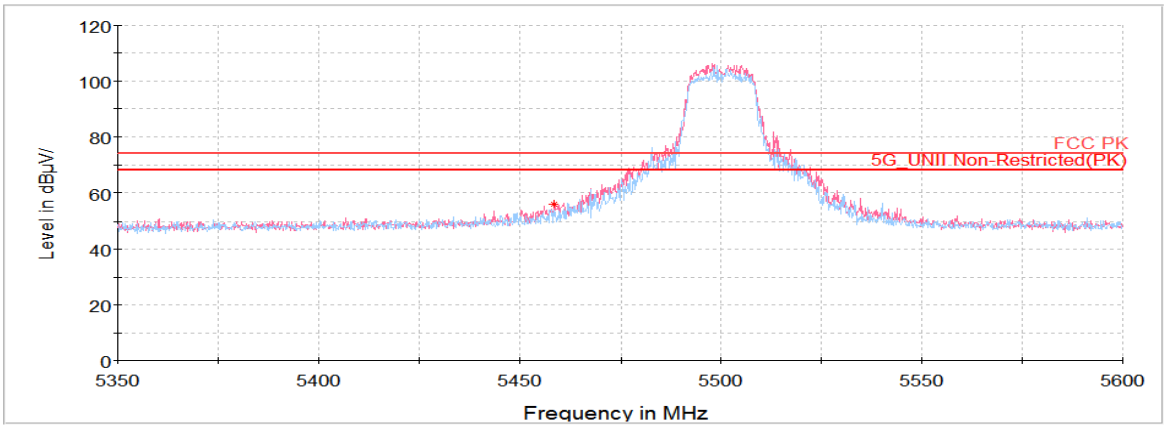
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 726.91	V	52.13	35.03	-26.20	-	60.96	68.20	7.24
11 392.53[1)]	V	58.65	38.28	-48.78	-	48.15	74.00	25.85
17 010.64	H	57.55	40.69	-46.82	-	51.42	68.20	16.78
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 (5 500 ㎒)



802.11n HT20_UNII-2C

Lowest Channel (5 500 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 459.93[1)]	V	48.79	34.73	-24.10	-	59.42	74.00	14.58
10 938.64[1)]	H	59.15	38.14	-48.26	-	49.03	74.00	24.97
16 511.11	H	56.65	41.01	-47.17	-	50.49	68.20	17.71
Average Data								
5 459.93[1)]	V	36.61	34.73	-24.10	0.45	47.69	54.00	6.31

Middle Channel (5 580 ㎒)

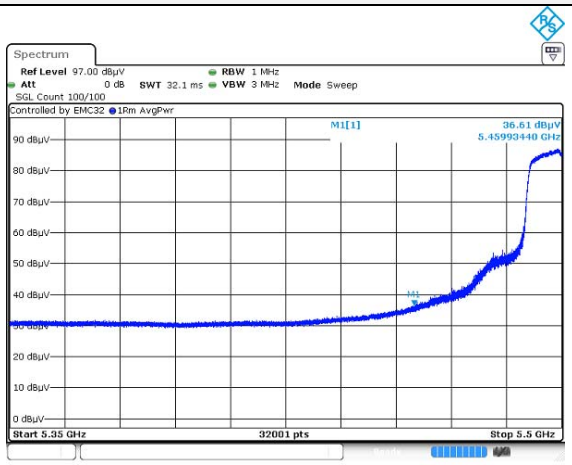
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
11 140.61[1)]	V	57.39	38.23	-48.31	-	47.31	74.00	26.69
16 769.86	V	57.20	41.22	-46.98	-	51.44	68.20	16.76
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Highest Channel (5 700 ㎒)

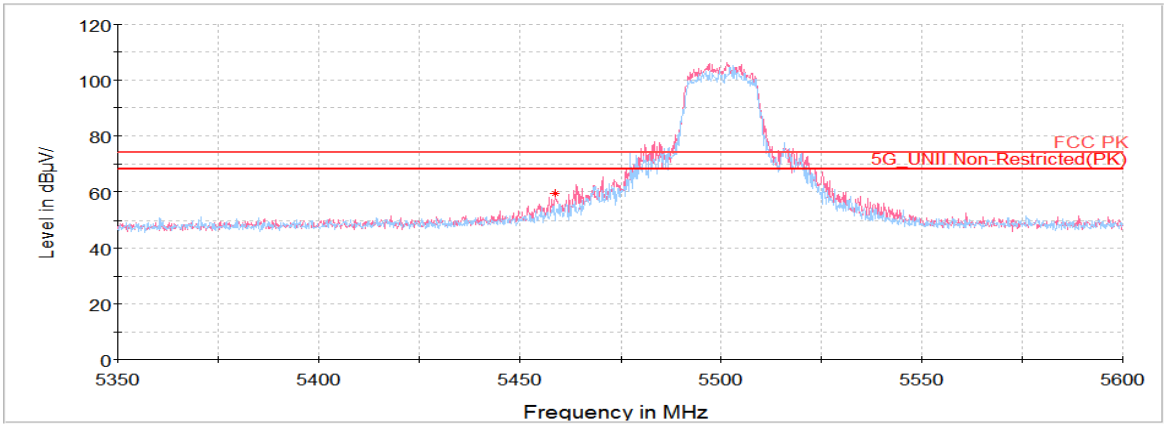
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 725.02	V	52.88	35.03	-26.21	-	61.70	68.20	6.50
11 395.41[1)]	V	58.72	38.28	-48.79	-	48.21	74.00	25.79
17 195.72	H	57.46	40.58	-47.08	-	50.96	68.20	17.24
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



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								
5 459.87[1)]	V	54.57	34.73	-24.10	-	65.20	74.00	8.80
11 025.61[1)]	H	58.56	38.21	-48.09	-	48.68	74.00	25.32
16 519.02	V	55.50	41.02	-47.16	-	49.36	68.20	18.84
Average Data								
5 459.87[1)]	V	40.38	34.73	-24.10	0.76	51.77	54.00	2.23

Middle Channel (5 590 ㎒)

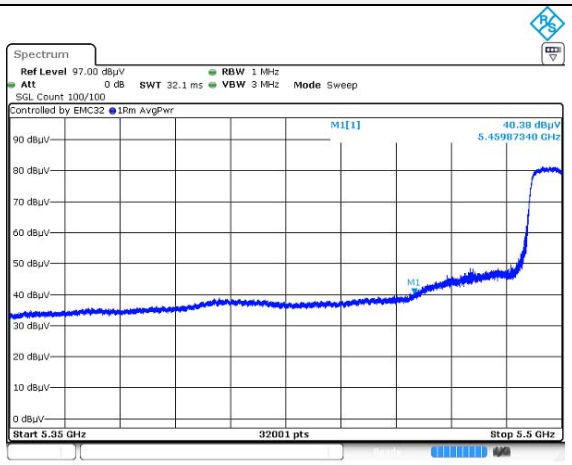
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
11 185.89[1)]	H	58.04	38.24	-48.39	-	47.89	74.00	26.11
16 756.20	V	56.80	41.20	-46.99	-	51.01	68.20	17.19
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

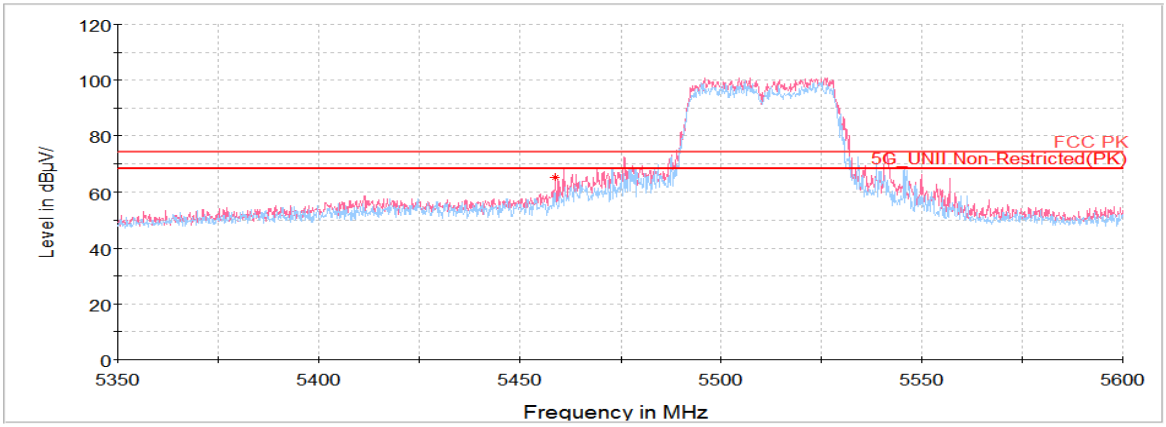
Highest Channel (5 670 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 726.05	V	45.90	35.03	-26.20	-	54.73	68.20	13.47
11 348.69[1)]	H	59.35	38.27	-48.70	-	48.92	74.00	25.08
17 016.03	H	57.12	40.69	-46.83	-	50.98	68.20	17.22
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

802.11n HT40_UNII-2C

Lowest Channel (5 510 ㎒)

Average data	
	Blank

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								
5 459.98[1)]	V	46.16	34.73	-24.10	-	56.79	74.00	17.21
11 016.63[1)]	V	58.06	38.20	-48.08	-	48.18	74.00	25.82
16 501.41	H	56.54	41.00	-47.17	-	50.37	68.20	17.83
Average Data								
5 459.98[1)]	V	36.41	34.73	-24.10	0.35	47.39	54.00	6.61

Middle Channel (5 580 ㎒)

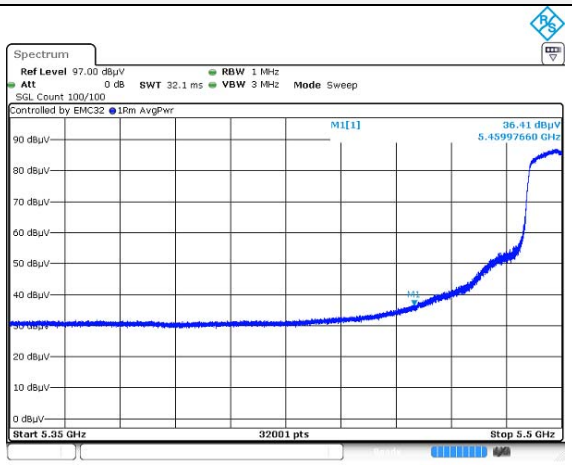
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
11 072.69[1)]	H	58.65	38.21	-48.18	-	48.68	74.00	25.32
16 783.88	V	56.63	41.23	-46.97	-	50.89	68.20	17.31
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

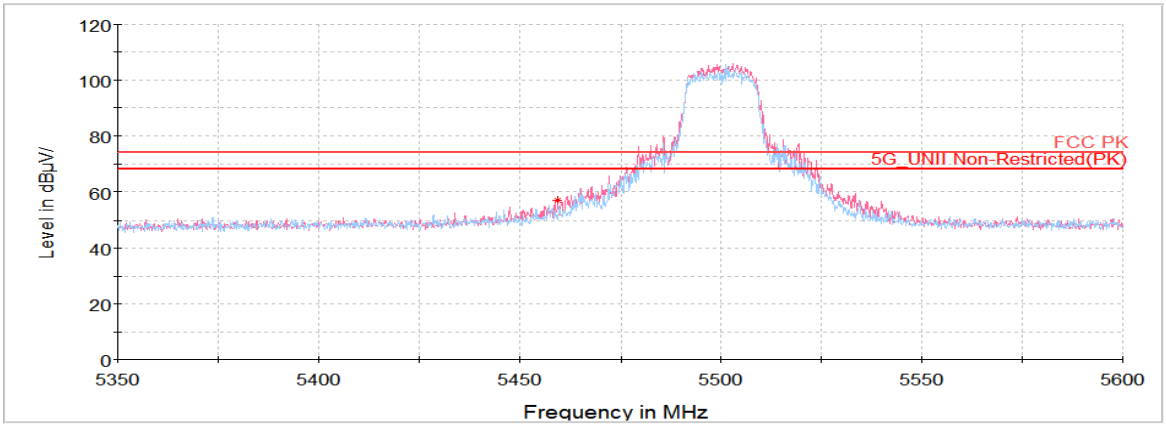
Highest Channel (5 700 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 725.19	V	49.69	35.03	-26.21	-	58.51	68.20	9.69
11 402.23[1)]	H	58.50	38.28	-48.80	-	47.98	74.00	26.02
17 102.64	H	55.65	40.64	-46.95	-	49.34	68.20	18.86
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11ac VHT20_UNII-2C

Lowest Channel (5 500 ㎒)

Average data	
	Blank

Horizontal/Vertical for Band-edge (5 500 ㎒)


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								
5 459.29[1)]	V	52.74	34.73	-24.11	-	63.36	74.00	10.64
11 018.42[1)]	V	57.96	38.20	-48.08	-	48.08	74.00	25.92
16 525.13	H	55.87	41.02	-47.16	-	49.73	68.20	18.47
Average Data								
5 459.29[1)]	V	39.41	34.73	-24.11	0.64	50.67	54.00	3.33

Middle Channel (5 590 ㎒)

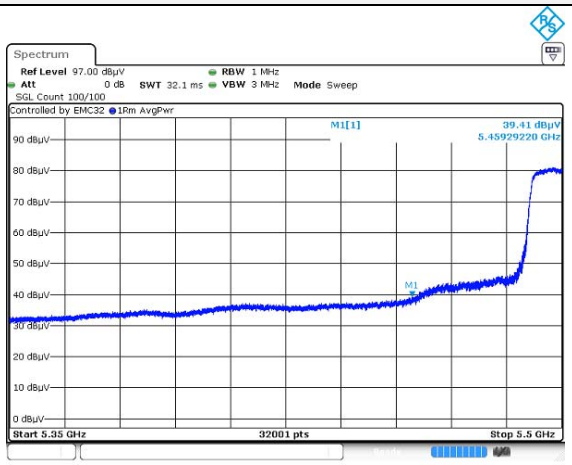
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
11 211.05[1)]	H	59.23	38.24	-48.44	-	49.03	74.00	24.97
16 774.53	H	57.04	41.22	-46.97	-	51.29	68.20	16.91
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

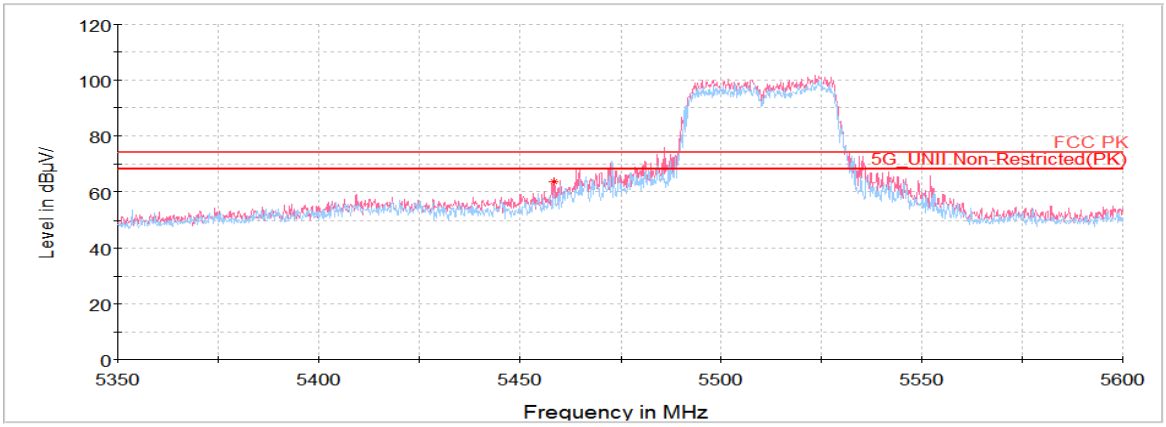
Highest Channel (5 670 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 728.80	V	46.07	35.03	-26.18	-	54.92	68.20	13.28
11 351.56[1)]	V	59.66	38.27	-48.71	-	49.22	74.00	24.78
17 015.31	H	57.37	40.69	-46.83	-	51.23	68.20	16.97
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

802.11ac VHT40_UNII-2C

Lowest Channel (5 510 ㎒)

Average data	
	Blank

Horizontal/Vertical for Band-edge


802.11ac VHT80_UNII-2C

Lowest Channel (5 530 ㎒)

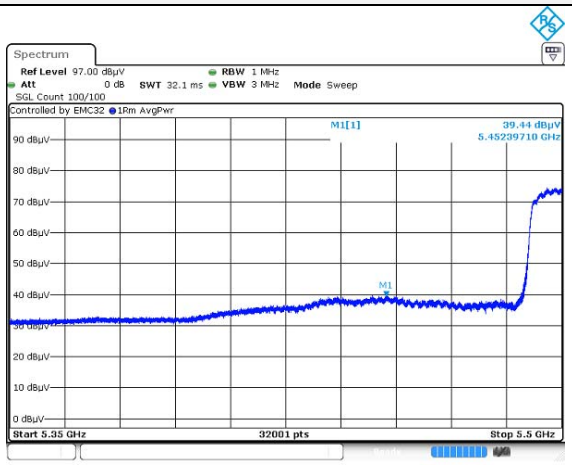
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 452.40[1)]	V	51.91	34.71	-24.18	-	62.44	74.00	11.56
11 074.84[1)]	V	58.67	38.21	-48.19	-	48.69	74.00	25.31
16 557.47	H	57.14	41.05	-47.13	-	51.06	68.20	17.14
Average Data								
5 452.40[1)]	V	39.44	34.71	-24.18	1.20	51.17	54.00	2.83

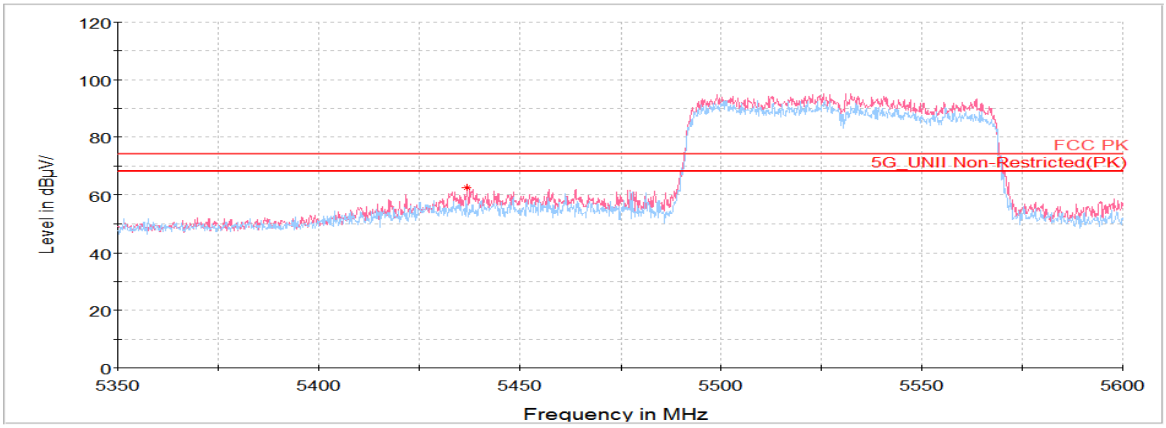
Highest Channel (5 610 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 734.30	V	46.15	35.03	-26.14	-	55.04	68.20	13.16
11 275.02[1)]	V	60.04	38.26	-48.56	-	49.74	74.00	24.26
16 838.14	V	56.85	41.27	-46.93	-	51.19	68.20	17.01
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11ac VHT80_UNII-2C

Lowest Channel (5 530 ㎒)

Average data	
	Blank

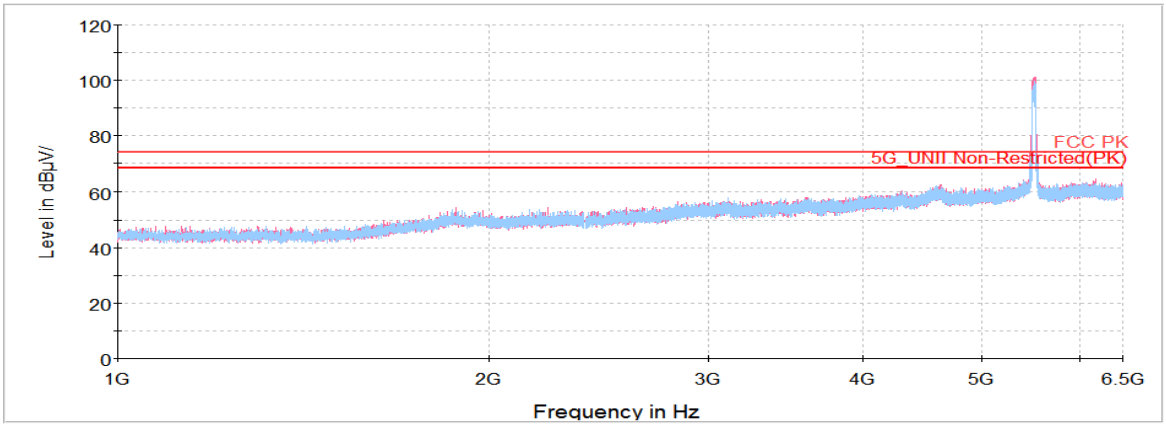
Horizontal/Vertical for Band-edge


Plot of Harmonics and Spurious Emissions

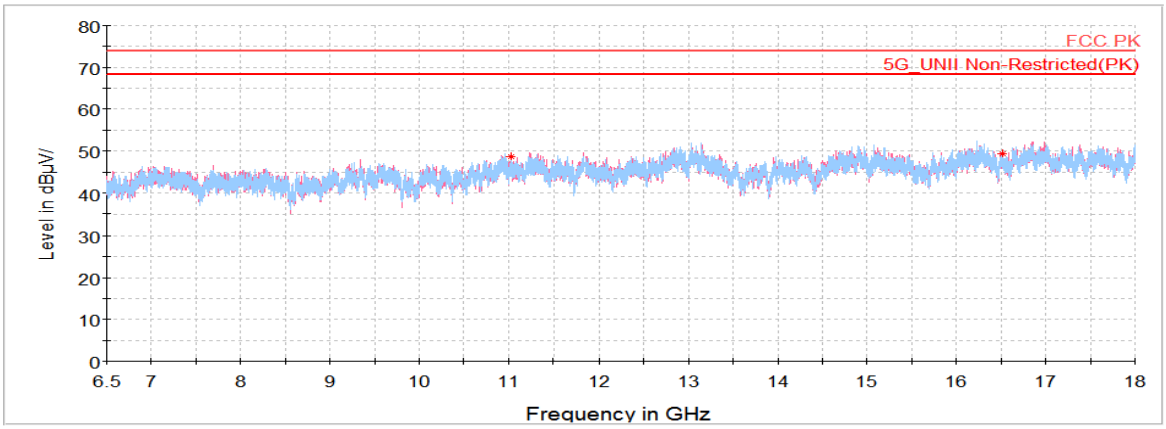
In order to simplify the report, attached plots were only the lowest margin condition

802.11n HT40_UNII-2C_Lowest Channel (5 510 ㎒)

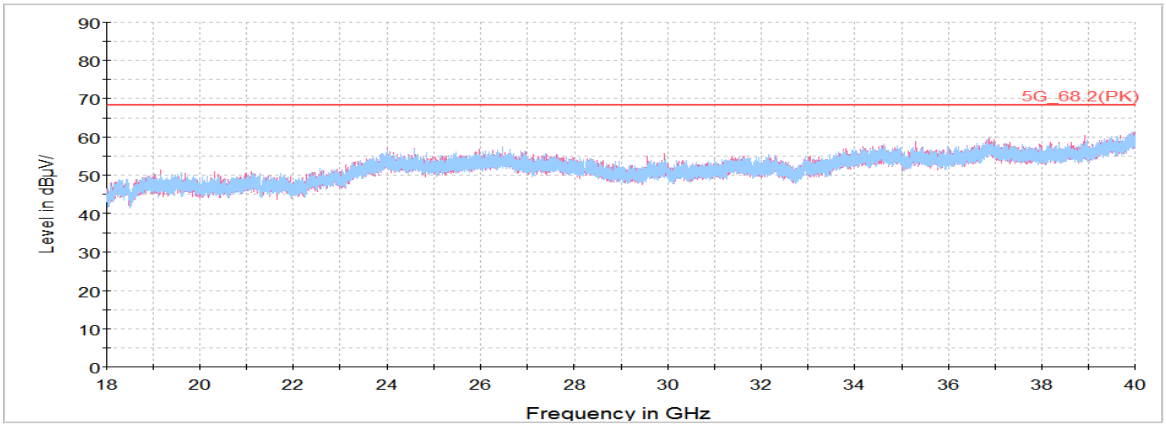
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



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								
11 477.70[1)]	V	58.08	38.30	-48.94	-	47.44	74.00	26.56
17 005.25	H	58.59	40.70	-46.82	-	52.47	68.20	15.73
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								
11 483.09[1)]	H	57.90	38.30	-48.95	-	47.25	74.00	26.75
17 170.56	V	57.05	40.60	-47.04	-	50.61	68.20	17.59
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								
11 395.05[1)]	H	58.07	38.28	-48.79	-	47.56	74.00	26.44
17 170.92	H	56.59	40.60	-47.04	-	50.15	68.20	18.05
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								
11 420.56[1)]	V	57.63	38.28	-48.83	-	47.08	74.00	26.92
17 186.73	H	57.81	40.59	-47.06	-	51.34	68.20	16.86
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								
11 479.86[1)]	H	57.98	38.30	-48.95	-	47.33	74.00	26.67
17 198.23	V	57.43	40.58	-47.08	-	50.93	68.20	17.27
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11ac VHT80 (5 690 ㎒)

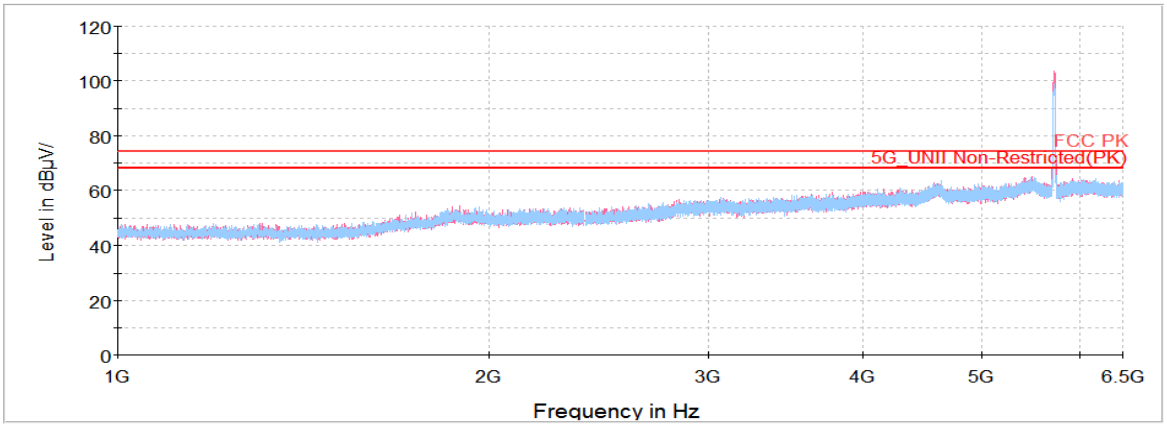
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
11 386.42[1)]	H	58.91	38.28	-48.77	-	48.42	74.00	25.58
17 102.28	V	55.82	40.64	-46.95	-	49.51	68.20	18.69
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Plot of Harmonics and Spurious Emissions

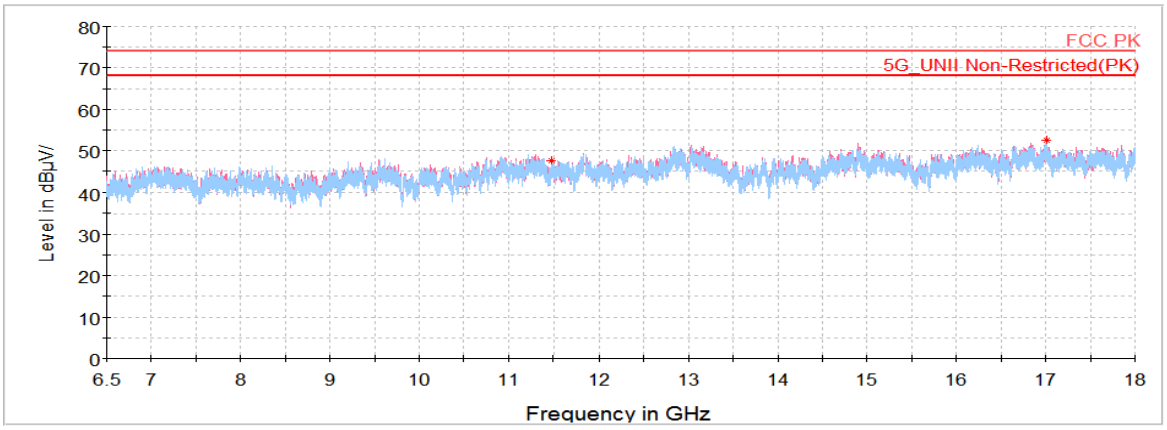
In order to simplify the report, attached plots were only the lowest margin condition

802.11a_Straddle Channel (5 720 ㎒)

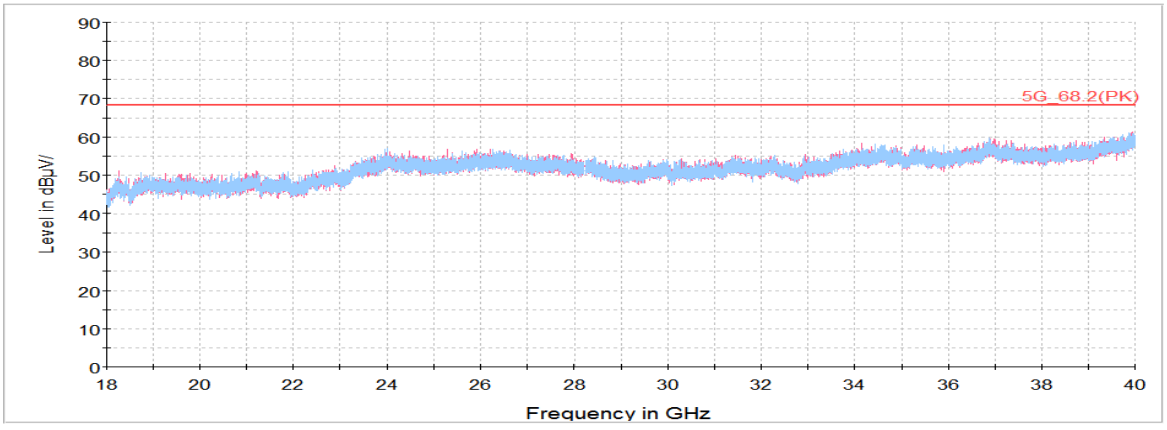
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓



Horizontal/Vertical for 18 ㎓ ~ 40 ㎓



802.11a UNII-3

Lowest Channel (5 745 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 724.50	V	56.42	35.02	-26.22	-	65.22	121.06	55.84
11 489.92[1)]	V	58.03	38.30	-48.97	-	47.36	74.00	26.64
17 196.08	V	57.41	40.58	-47.08	-	50.91	68.20	17.29
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								
11 564.31[1)]	V	58.44	38.35	-48.97	-	47.82	74.00	26.18
17 384.75	H	57.92	40.47	-47.33	-	51.06	68.20	17.14
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								
5 852.55	V	50.37	35.15	-25.18	-	60.34	116.39	56.05
11 654.52[1)]	H	57.35	38.42	-48.96	-	46.81	74.00	27.19
17 488.25	H	58.04	40.41	-47.47	-	50.98	68.20	17.22
Average Data								
No spurious emissions were detected within 20 dB 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								
5 724.16	V	57.87	35.02	-26.22	-	66.67	120.28	53.61
11 497.11[1)]	V	58.10	38.30	-48.98	-	47.42	74.00	26.58
17 267.23	H	56.72	40.54	-47.17	-	50.09	68.20	18.11
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								
11 592.70[1)]	H	59.58	38.37	-48.97	-	48.98	74.00	25.02
17 367.14	V	57.76	40.48	-47.31	-	50.93	68.20	17.27
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Highest Channel (5 825 ㎒)

Frequency	Pol.	Reading	Amp. + Cable	Antenna Factor	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 850.66	V	51.95	35.15	-25.19	-	61.91	120.70	58.79
11 649.48[1)]	H	60.12	38.42	-48.96	-	49.58	74.00	24.42
17 497.95	V	57.33	40.40	-47.49	-	50.24	68.20	17.96
Average Data								
No spurious emissions were detected within 20 dB 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								
5 720.89	V	63.03	35.02	-26.24	-	71.81	112.83	41.02
11 507.53[1)]	V	57.39	38.31	-48.98	-	46.72	74.00	27.28
17 291.31	H	56.49	40.53	-47.21	-	49.81	68.20	18.39
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								
5 856.67	V	49.28	35.16	-25.14	-	59.30	110.33	51.03
11 593.06[1)]	H	57.92	38.37	-48.97	-	47.32	74.00	26.68
17 377.56	V	57.24	40.47	-47.32	-	50.39	68.20	17.81
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								
5 723.30	V	60.00	35.02	-26.23	-	68.79	118.32	49.53
11 499.98[1)]	H	58.15	38.30	-48.98	-	47.47	74.00	26.53
17 242.08	V	56.71	40.55	-47.14	-	50.12	68.20	18.08
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								
11 558.20[1)]	V	58.52	38.35	-48.97	-	47.90	74.00	26.10
17 358.88	H	57.13	40.48	-47.30	-	50.31	68.20	17.89
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Highest Channel (5 825 ㎒)

Frequency	Pol.	Reading	Amp. + Cable	Antenna Factor	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 850.48	V	52.37	35.15	-25.20	-	62.32	121.10	58.77
11 649.48[1)]	V	58.08	38.42	-48.96	-	47.54	74.00	26.46
17 502.98	V	57.49	40.80	-47.49	-	50.80	68.20	17.40
Average Data								
No spurious emissions were detected within 20 ㏈ 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								
5 712.98	V	61.00	35.01	-26.31	-	69.70	108.84	39.14
11 531.61[1)]	H	58.32	38.33	-48.98	-	47.67	74.00	26.33
17 227.34	V	56.93	40.56	-47.12	-	50.37	68.20	17.83
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								
5 863.38	V	49.55	35.16	-25.09	-	59.62	108.46	48.84
11 584.44[1)]	H	58.01	38.37	-48.97	-	47.41	74.00	26.59
17 385.83	H	58.22	40.47	-47.33	-	51.36	68.20	16.84
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11ac VHT80_UNII-3

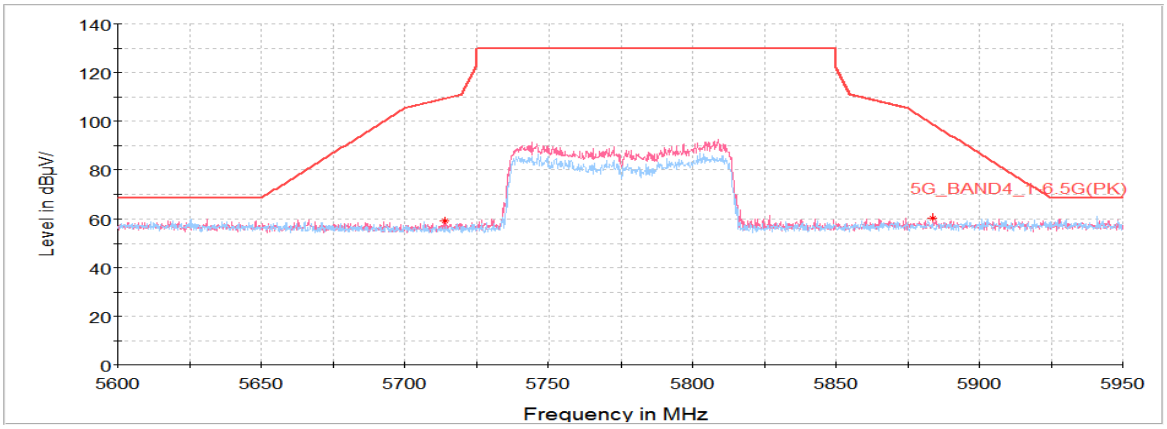
Lowest Channel (5 775 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 714.19	V	50.46	35.01	-26.30	-	59.17	109.17	50.00
5 883.83	V	50.17	35.18	-24.91	-	60.44	98.67	38.22
11 570.06[1)]	V	58.95	38.36	-48.97	-	48.34	74.00	25.66
17 342.70	H	56.52	40.49	-47.28	-	49.73	68.20	18.47
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Plot of Band-edge, Harmonics and Spurious Emissions

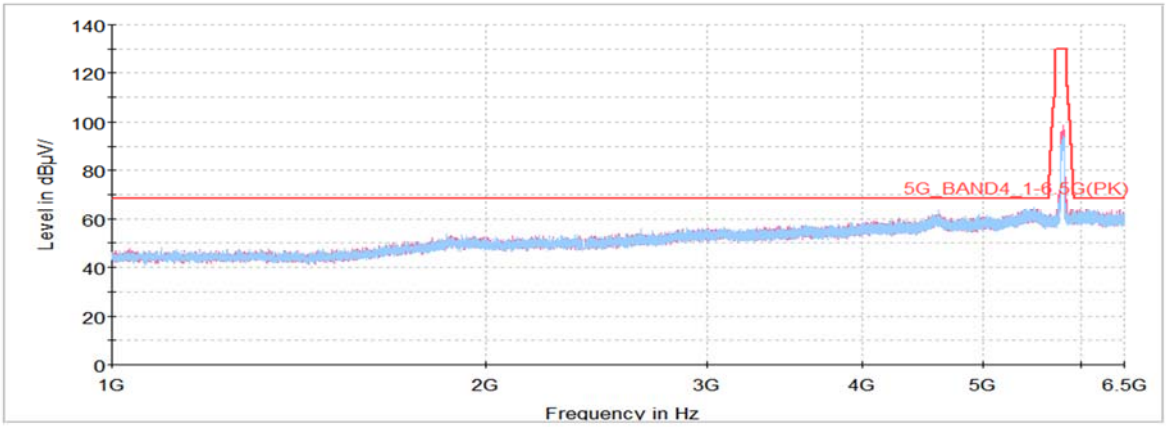
In order to simplify the report, attached plots were only the lowest margin condition

802.11ac VHT 80_UNII-3_Lowest Channel (5 775 ㎒)

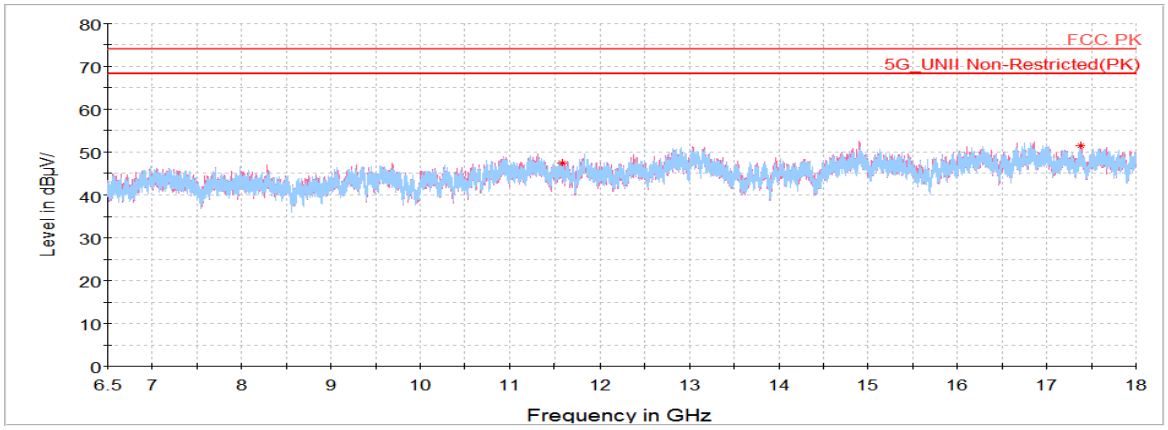
Horizontal/Vertical for Band-edge


802.11ac VHT 40_UNII-3_Highest Channel (5 795 ㎒)

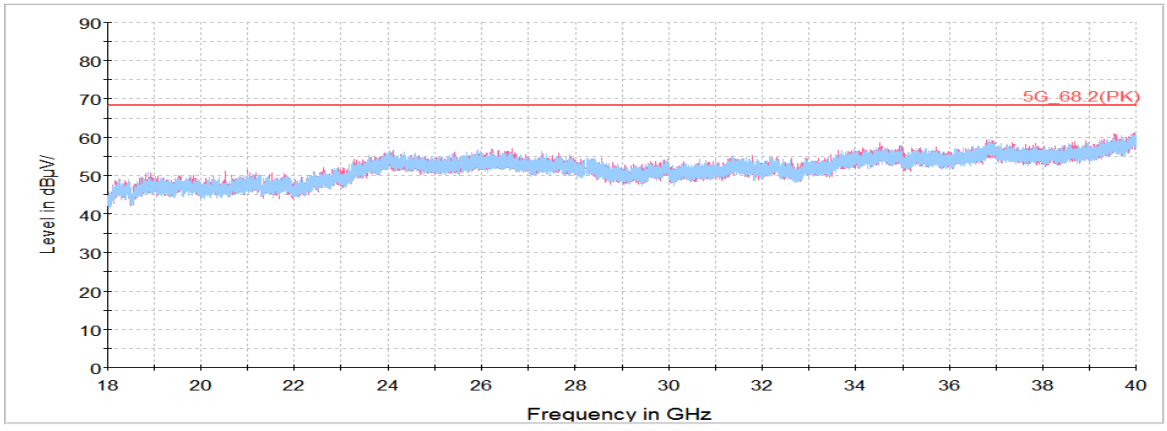
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓

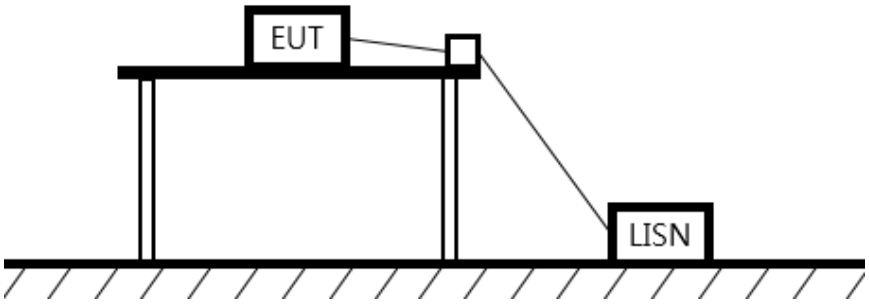


Horizontal/Vertical for 18 ㎓ ~ 40 ㎓



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.

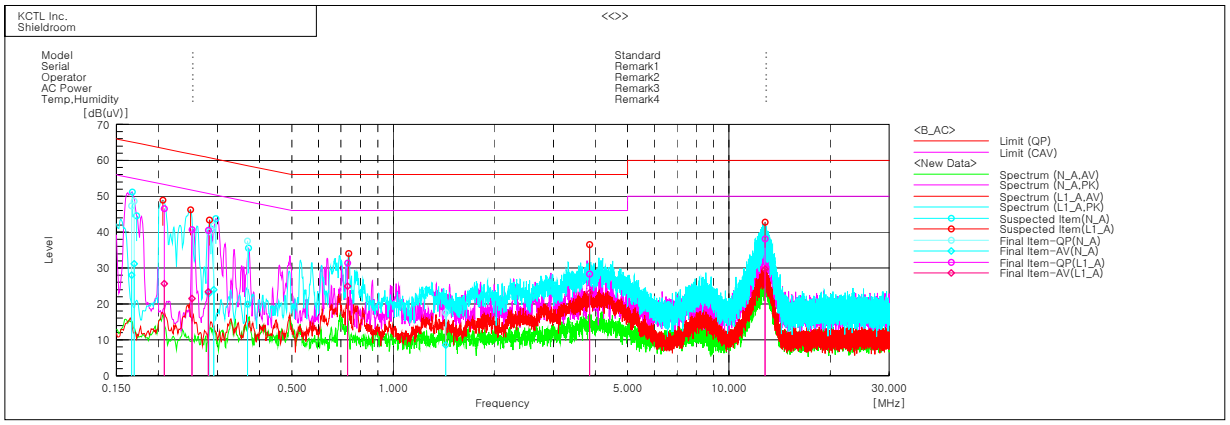
Frequency of Emission (㎒)	Conducted limit (dB㎶/m)	
	Quasi-peak	Average
0.15 – 0.50	66 - 56*	56 - 46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

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: 802.11n HT20 / 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	0.16651	37.1	17.8	10.2	47.3	28.0	65.1	55.1	17.8	27.1
2	0.16949	38.4	21.0	10.2	48.6	31.2	65.0	55.0	16.4	23.8
3	0.28276	30.3	13.1	9.8	40.1	22.9	60.7	50.7	20.6	27.8
4	0.2922	32.0	14.1	9.8	41.8	23.9	60.5	50.5	18.7	26.6
5	0.36866	27.6	10.0	9.9	37.5	19.9	58.5	48.5	21.0	28.6
6	1.43494	7.7	-1.4	9.9	17.6	8.5	56.0	46.0	38.4	37.5

--- 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	0.20835	36.6	15.7	10.0	46.6	25.7	63.3	53.3	16.7	27.6
2	0.25178	30.9	11.7	9.8	40.7	21.5	61.7	51.7	21.0	30.2
3	0.2818	30.7	13.6	9.8	40.5	23.4	60.8	50.8	20.3	27.4
4	0.73301	21.4	15.0	9.9	31.3	24.9	56.0	46.0	24.7	21.1
5	3.84698	18.4	13.1	9.9	28.3	23.0	56.0	46.0	27.7	23.0
6	12.83188	27.7	19.3	10.4	38.1	29.7	60.0	50.0	21.9	20.3

8. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSV30	100807	21.07.29
Attenuator	Weinschel ENGINEERING	56-10	51395	21.01.22
Signal Generator	R&S	SMB100A	176206	22.01.20**
Vector Signal Generator	R&S	SMBV100A	257566	21.07.13
DC Power Supply	AGILENT	E3632A	MY40001543	21.05.11
Spectrum Analyzer	R&S	FSV40	100989	21.12.31*
EMI TEST RECEIVER	R&S	ESCI7	100732	21.03.04
Bi-Log Antenna	SCHWARZBECK	VULB9168	583	22.04.23
Amplifier	SONOMA INSTRUMENT	310N	284608	21.08.20
COAXIAL FIXED ATTENUATOR	Agilent	8491B-003	2708A18758	21.04.23
Horn antenna	ETS.lindgren	3117	00155787	21.10.28
Horn antenna	ETS-lindgren	3117-PA	00161083	21.09.23
Horn antenna	ETS.lindgren	3116	00086632	21.02.17
Attenuator	API Inmet	40AH2W-10	12	21.05.12
Broadband PreAmplifier	SCHWARZBECK	BBV9718	216	21.07.28
AMPLIFIER	L-3 Narda-MITEQ	AMF-7D-01001800 -22-10P	2031196	21.02.12
AMPLIFIER	L-3 Narda-MITEQ	JS44-18004000-33-8P	2000996	21.01.22
LOOP Antenna	R&S	HFH2-Z2	100355	22.08.21
Antenna Mast	Innco Systems	MA4640-XP-ET	-	-
Turn Table	Innco Systems	DT2000	79	-
Antenna Mast	Innco Systems	MA4000-EP	303	-
Turn Table	Innco Systems	DT2000	79	-
High pass Filter	WT	WT-A1699-HS	WT160411002	21.05.11
TWO-LINE V - NETWORK	R&S	ENV216	101358	21.09.29
EMI TEST RECEIVER	R&S	ESCI	100001	21.08.20
Power Sensor	R&S	NRP-Z81	1137.9009.02-106225-JM	21.05.25
Attenuator	R&S	DNF Dämpfungsglied 10 dB in N-50 Ohm	31210	21.05.11

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

End of test report