TEST REPORT

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1. Client

- Name : HYUNDAI MOBIS CO., LTD.
- Address : 203, Teheran-ro, Gangnam-gu, Seoul, 06141, Korea
- Date of Receipt : 2019-07-26

2. Use of Report : -

3. Name of Product and Model : DISPLAY CAR SYSTEM
FCC: ADB20THAN / IC: ADB20THKN

4. Manufacturer and Country of Origin : HYUNDAI MOBIS CO., LTD. / Korea

5. FCC ID : TQ8-ADB20THAN

6. IC Certification : 5074A-ADB20THKN

7. Date of Test : 2019-08-12 to 2019-11-27

8. Test Standards : FCC Part 15 Subpart E, 15.407
RSS-247 Issue 2 February 2017
RSS-Gen Issue 5 March 2019

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

Affirmation	Tested by Name : Myeongjun Kwon (Signature)	Technical Manager Name : Jaehyong Lee (Signature)

2019-11-27

KCTL Inc.

Report revision history

Date	Revision	Page No
2019-11-15	Initial report	-
2019-11-21	Updated	13, 16
2019-11-27	Updated	60, 68, 80, 86, 104, 108

CONTENTS

1. General information

Client	:	HYUNDAI MOBIS CO., LTD.
Address	:	203, Teheran-ro, Gangnam-gu, Seoul, 06141, Korea
Manufacturer	:	HYUNDAI MOBIS CO., LTD.Hyundai Mobis Co., Ltd.
Address	:	95, Sayang 2-Gil, Munbaek-Myeon, Jincheon-Gun, Chungcheongbuk-Do 27862 Korea
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	:	DISPLAY CAR SYSTEM
Model	:	FCC: ADB20THAN / IC: ADB20THKN
Derivative model	:	FCC: ADB20THKN
Frequency range	:	2 402 ㎒ ~ 2 480 ㎒ : Bluetooth(BDR/EDR)
		UNII-1: 5 180 ㎒ ~ 5 240 ㎒ (802.11a/n_HT20/ac_VHT20)
		UNII-1: 5 190 ㎒ ~ 5 230 ㎒ (802.11n_HT40/ac_VHT40)
		UNII-1: 5 210 ㎒ (802.11ac_VHT80)
		UNII-3: 5 745 ㎒ ~ 5 825 ㎒ (802.11a/n_HT20/ac_VHT20)
		UNII-3: 5 755 ㎒ ~ 5 795 ㎒ (802.11n_HT40/ac_VHT40)
		UNII-3: 5 775 ㎒ (802.11ac_VHT80)
Modulation technique	:	Bluetooth(BDR/EDR)_ GFSK, π/4DQPSK, 8DPSK
		WIFI(802.11a/n20/n40/ac20/ac40/ac80)_OFDM
Number of channels	:	Bluetooth(BDR/EDR)_79ch
		UNII-1: 4 ch (20 ㎒), 2 ch (40 ㎒), 1 ch (80 ㎒)
		UNII-3: 5 ch (20 ㎒), 2 ch (40 ㎒), 1 ch (80 ㎒)
Power source	:	DC 14.4 V
Antenna specification	:	WIFI/Bluetooth(BDR/EDR)_Pattern Antenna
Antenna gain	:	Bluetooth(BDR/EDR) : -0.18 ㏈i
		UNII-1 : -0.61 ㏈i,, UNII-3 : -0.18 ㏈i
Software version	:	SP2.CAN.0000.076.000.190715
Hardware version	:	SP2.CAN.D-AUDIO_G2V.000.003
Test device serial No.	:	N/A
Operation temperature	:	-20 ℃ ~ 70 ℃

2.1. Information about derivative model

The basic and derivative model are electrically identical.
The derivative models is only for the simplified derivation based on buyer's model name.

2.2. Simultaneously transmission condition

Technology	Modulation	Test mode	Tested Chanel.
WLAN 5 ㎓ (802.11 n HT20)	OFDM	802.11n HT20 / UNII-3	165
Bluetooth	GFSK	BDR	78

2.3. Frequency/channel operations

This device contains the following capabilities:
Bluetooth(BDR/EDR), 5 ㎓ band 802.11a/n(HT20/HT40)/ac(VHT/20/40/80)),

UNII-1

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

UNII-3

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

Table 2.3-1. 802.11a/n/ac_HT20/VHT20 mode

UNII-1

Ch.	Frequency (㎒)
38	5 190
46	5 230

UNII-3

Ch.	Frequency (㎒)
151	5 755
159	5 795

Table 2.3-2. 802.11n/ac_HT40/VHT40 mode

UNII-1

Ch.	Frequency (㎒)
42	5 210

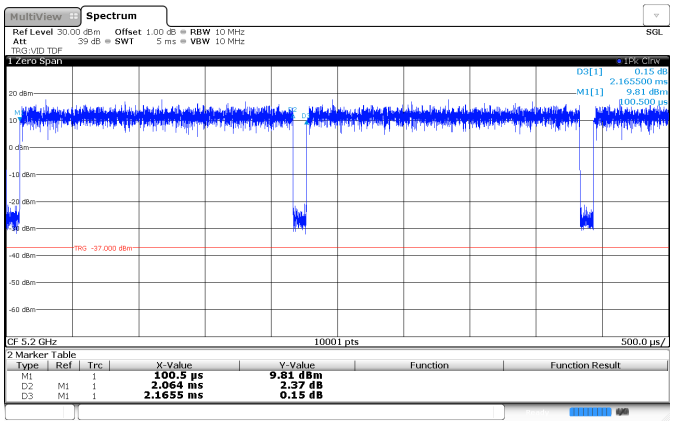
UNII-3

Ch.	Frequency (㎒)
155	5 775

Table 2.3-3 802.11ac_VHT80 mode

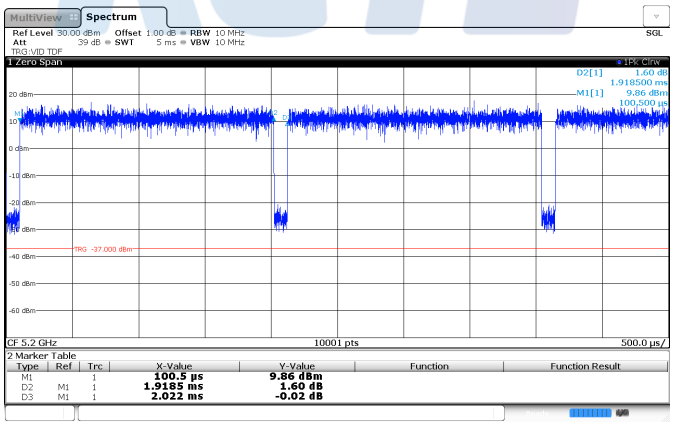
2.4. Duty Cycle Correction Factor

- 802.11a



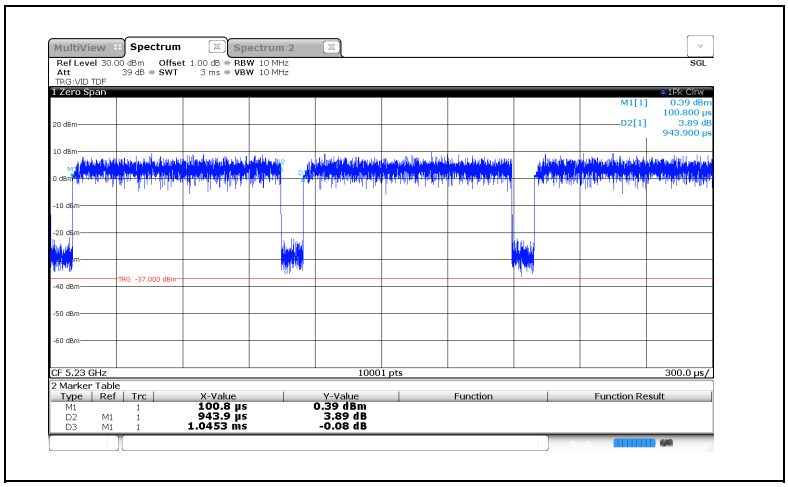
Note1) : Period : 2.165 5 ms, On time : 2.064 ms
Note2) : DCCF = 10log(1/x) = 10log(1/0.953) = 0.208 dB, x = 2.064/2.165 5 = 0.953
Note3) : 802.11a is a non-continuous transmission (duty cycle < 98%)

- 802.11n HT20



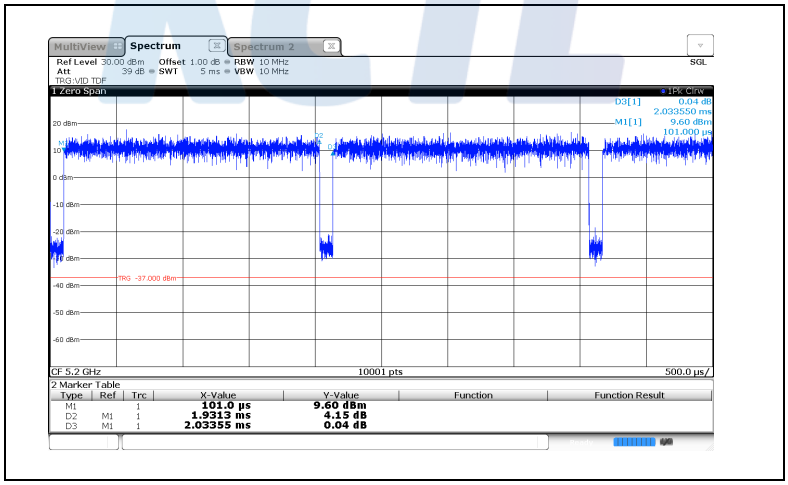
Note1) : Period : 2.022 ms, On time : 1.918 5 ms
Note2) : DCCF = 10log(1/x) = 10log(1/0.949) = 0.228 dB, x = 1.918 5/2.022 = 0.949
Note3) : 802.11 n HT20 is non-continuous transmission (duty cycle < 98%)

- 802.11n HT40



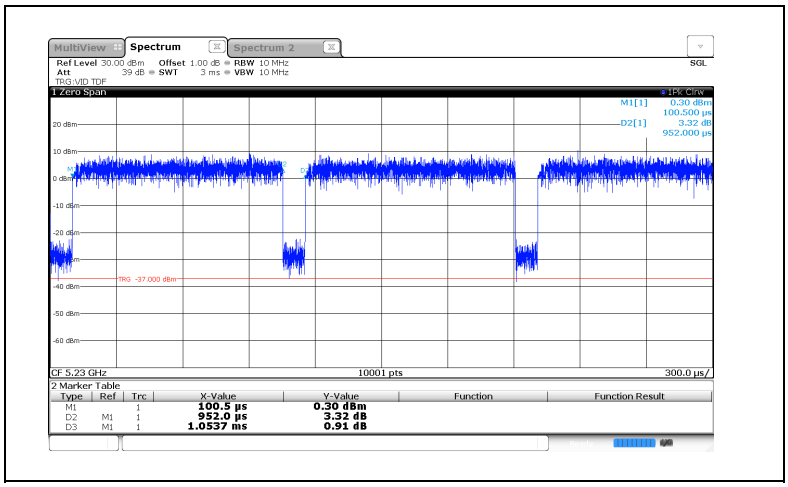
Note1) : Period : 1.045 3 ms, On time : 0.943 9 ms
Note2) : DCCF = 10log(1/x) = 10log(1/0.903) = 0.443 dB, x = 0.943 9/1.045 3 = 0.903
Note3) : 802.11n HT40 is a non-continuous transmission (duty cycle < 98%)

- 802.11ac VHT20



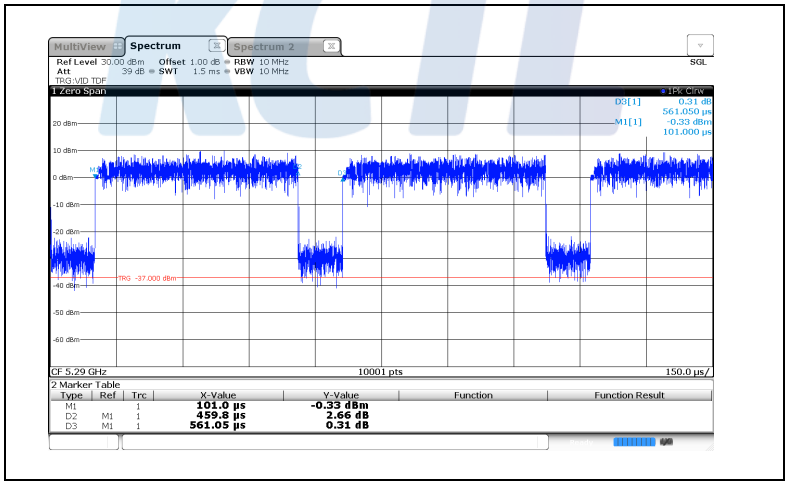
Note1) : Period : 2.033 55 ms, On time : 1.931 3 ms
Note2) : DCCF = 10log(1/x) = 10log(1/0.950) = 0.224 dB, x = 1.931 3/2.033 55 = 0.950
Note3) : 802.11ac VHT20 is a non-continuous transmission (duty cycle < 98%)

- 802.11ac VHT40



Note1) : Period : 1.053 7 ms, On time : 0.952 ms
Note2) : DCCF = 10log(1/x) = 10log(1/0.903) = 0.441 dB, x = 0.952/1.053 7 = 0.903
Note3) : 802.11ac VHT40 is a continuous transmission (duty cycle <= 98%)

- 802.11ac VHT80



Note1) : Period : 0.561 05 ms, On time : 0.459 8 ms
Note2) : DCCF = 10log(1/x) = 10log(1/0.820) = 0.864 dB, x = 0.459 8/0.561 05 = 0.820
Note3) : 802.11ac VHT80 is a continuous transmission (duty cycle <= 98%)

3. Antenna requirement

Requirement of FCC part section 15.203, 15.407:
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

Requirement of RSS-GEN Section 6.8:
The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.
For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).
When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.
Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

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

4. Summary of tests

FCC Part section(s)	IC Rule Referene	Parameter	Test results
15.407(a)	RSS-247(6.2)	Maximum conducted output power	Pass
15.407(a)	RSS-247(6.2)	Maximum power spectral density	Pass
15.407(a)	RSS-247(6.7)	26 dB Channel Bandwidth	Pass
15.407(e)	RSS-247 (6.2.4)	6 dB Channel Bandwidth	Pass
-	RSS-Gen (6.7)	Occupied Bandwidth	Pass
15.407(b), 15.205(a), 15.209(a)	RSS-247 (6.2), RSS-Gen (8.9), (8.10)	Spurious emission	Pass
		Band-edge, restricted band	Pass
15.207(a)	RSS-Gen (8.8)	Conducted Emissions	N/A(Note1)

Notes:

1. This test is not applicable because the EUT falls into the automotive device and it's not to be connected to the public utility(AC) power line.
2. All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
3. 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.
4. The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that X orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in X orientation
5. The test procedure(s) in this report were performed in accordance as following.
   - ANSI C63.10-2013
   - KDB 789033 D02 v02r01
6. The EUT supports only SISO modes.
7. The EUT does not support TDWR band.
8. The worst-case data rates were:
   SISO Antenna: 802.11a mode : 1Mbps
   802.11n HT20 mode : MCS0
   802.11n HT40 mode : MCS0
   802.11n VHT20 mode : MCS0
   802.11n VHT40 mode : MCS0
   802.11n 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	1.76 dB	
Conducted spurious emissions	4.03 dB	
Radiated spurious emissions	9 kHz ~ 30 MHz:	2.28 dB
	30 MHz ~ 300 MHz	4.98 dB
	300 MHz ~ 1 000 MHz	5.14 dB
	1 GHz ~ 6 GHz	6.70 dB
	Above 6 GHz	6.60 dB
Conducted emissions	9 kHz ~ 150 kHz	3.66 dB
	150 kHz ~ 30 MHz	3.26 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.

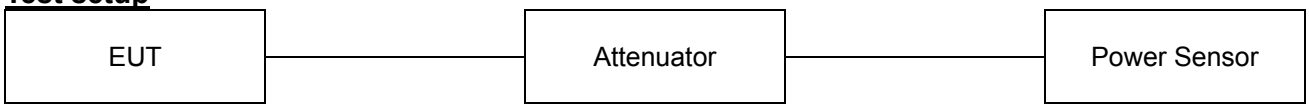
Frequency (㎒)	Factor(㏈)	Frequency (㎒)	Factor(㏈)
30	9.80	16 000	12.61
50	9.83	17 000	12.60
100	9.89	18 000	13.00
200	9.95	19 000	13.08
300	10.07	20 000	12.92
400	10.08	21 000	12.83
500	10.14	22 000	13.32
600	10.17	23 000	13.60
700	10.25	24 000	13.29
800	10.28	25 000	13.66
900	10.34	26 000	13.76
1 000	10.41	26 500	13.56
2 000	10.65	27 000	13.88
3 000	10.86	28 000	13.93
4 000	11.06	29 000	13.56
5 000	11.30	30 000	13.8
6 000	11.42	31 000	14.09
7 000	11.50	32 000	13.94
8 000	11.78	33 000	14.01
9 000	11.92	34 000	14.48
10 000	12.16	35 000	14.51
11 000	12.16	36 000	14.61
12 000	12.34	37 000	15.19
13 000	12.50	38 000	15.23
14 000	12.92	39 000	15.24
15 000	12.72	40 000	15.47

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

7. Test results

7.1. Maximum conducted output power

Test setup



Limit

According to §15.407(a), RSS-247(6.2)

FCC

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

Note:

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

IC

Band	Maximum e.i.r.p. limit
UNII-1	30 ㎽ or 1.76 + 10 log10B[2)], dBm
UNII-2A	1 W or 17 dBm + 10logB[2)]
UNII-2C	1 W or 17 dBm + 10logB[2)]
UNII-3	1 W (30 dBm)

Note:

1) Maximum e.i.r.p. limit B is the 99% emission bandwidth

2) For OEM devices installed in vehicles, the maximum e.i.r.p. shall not exceed 30 ㎽ or 1.76 + 10 log10B, dBm, whichever is less. Devices shall implement transmitter power control (TPC) in order to have the capability to operate at least 3 dB below the maximum permitted e.i.r.p. of 30 ㎽.

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	Freq (㎒)	Measured power (dBm)	DCCF (dB)	Conducted output power (dBm)	Conducted Power Limit (dBm)	Ant. Gain (dB i)	Max. e.i.r.p. (dB m)	Max. e.i.r.p. Limit (dBm)
802.11a	UNII-1	5 180	8.24	0.21	8.45	23.98	-0.61	7.84	13.98
		5 200	8.44	0.21	8.65		-0.61	8.04	13.97
		5 240	8.01	0.21	8.22		-0.61	7.61	13.99
	UNII-3	5 745	8.38	0.21	8.59	30.00	-0.18	8.41	-
		5 785	8.30	0.21	8.51		-0.18	8.33	
		5 825	8.44	0.21	8.65		-0.18	8.47	
802.11n HT20	UNII-1	5 180	8.27	0.23	8.50	23.98	-0.61	7.89	14.25
		5 200	8.48	0.23	8.71		-0.61	8.10	14.25
		5 240	8.09	0.23	8.32		-0.61	7.71	14.24
	UNII-3	5 745	8.13	0.23	8.36	30.00	-0.18	8.18	-
		5 785	8.12	0.23	8.35		-0.18	8.17	
		5 825	8.59	0.23	8.82		-0.18	8.64	
802.11n HT40	UNII-1	5 190	3.75	0.44	4.19	23.98	-0.61	3.58	14.77
		5 230	3.78	0.44	4.22		-0.61	3.61	14.77
	UNII-3	5 755	6.56	0.44	7.00	30.00	-0.18	6.82	-
		5 795	6.91	0.44	7.35		-0.18	7.17	
802.11ac VHT20	UNII-1	5 180	8.18	0.22	8.40	23.98	-0.61	7.79	14.26
		5 200	8.35	0.22	8.57		-0.61	7.96	14.22
		5 240	8.31	0.22	8.53		-0.61	7.92	14.25
	UNII-3	5 745	7.97	0.22	8.19	30.00	-0.18	8.01	-
		5 785	8.09	0.22	8.31		-0.18	8.13	
		5 825	8.31	0.22	8.53		-0.18	8.35	
802.11ac VHT40	UNII-1	5 190	4.04	0.44	4.48	23.98	-0.61	3.87	14.77
		5 230	3.64	0.44	4.08		-0.61	3.47	14.77
	UNII-3	5 755	6.47	0.44	6.91	30.00	-0.18	6.73	-
		5 795	6.77	0.44	7.21		-0.18	7.03	
802.11ac VHT80	UNII-1	5 210	4.62	0.86	5.48	23.98	-0.61	4.87	14.77
	UNII-3	5 775	5.65	0.86	6.51	30.00	-0.18	6.33	-

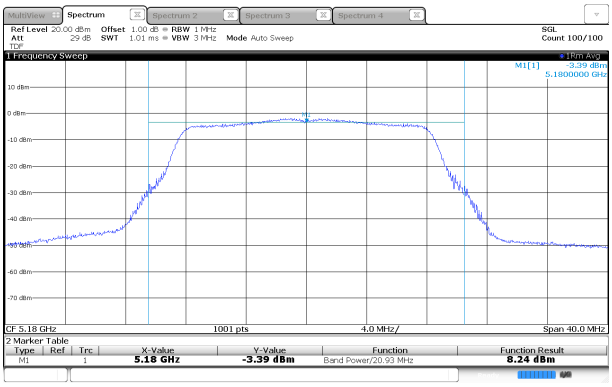
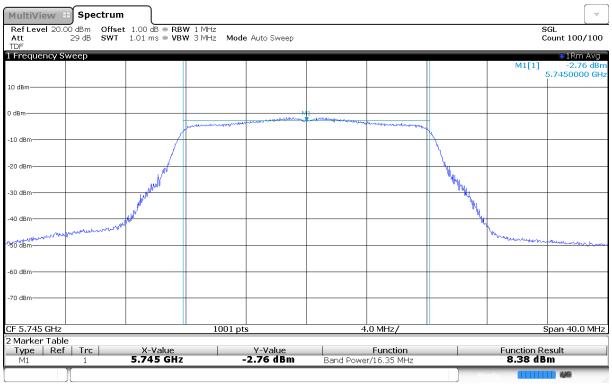
Note:

1. Conducted Output power Calculation:

Conducted Output power = Measured power(㏈ m) + DCCF (㏈)

2. e.i.r.p. Calculation:

e.i.r.p. (㏈ m) = Conducted output power (㏈ m) + Antenna gain (㏈ i)

UNII-1 / 802.11a / Low ch.	UNII-3 / 802.11a / Low ch.
	
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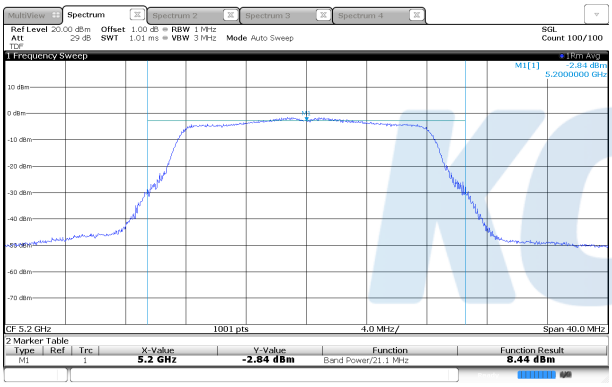	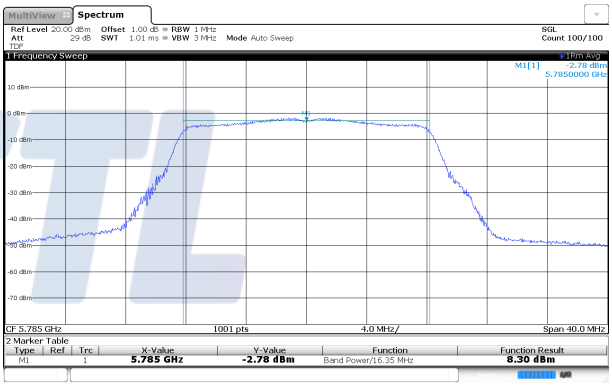
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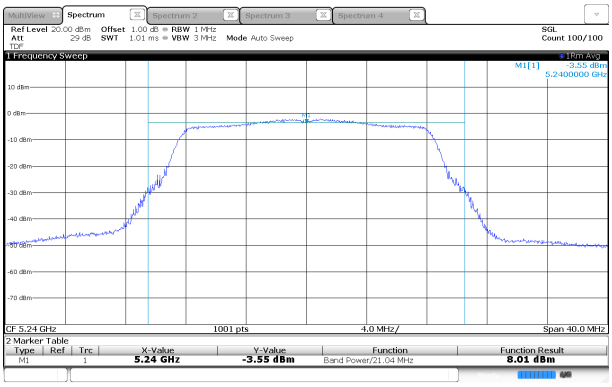	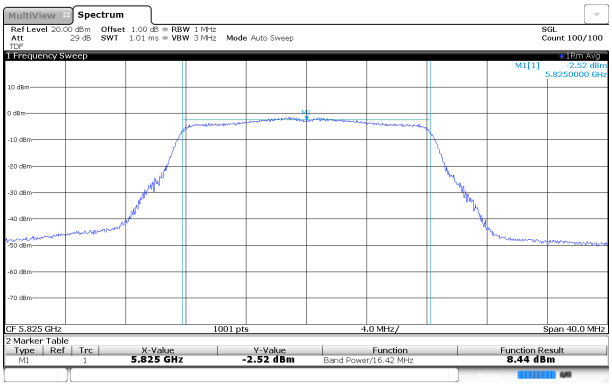

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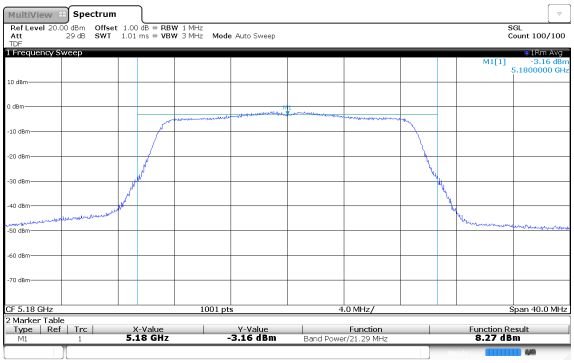	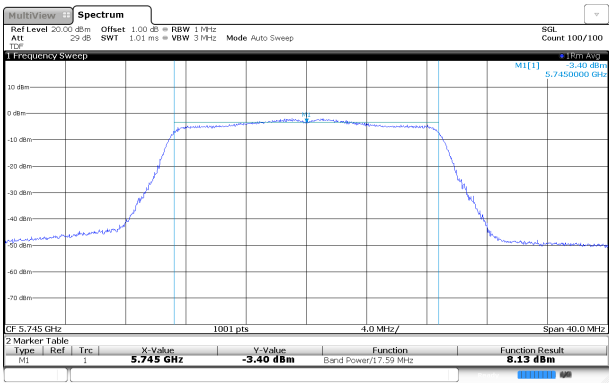
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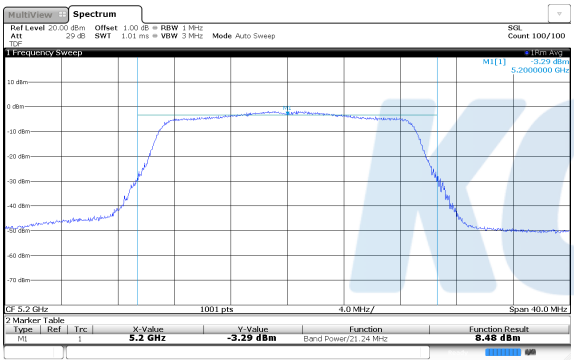	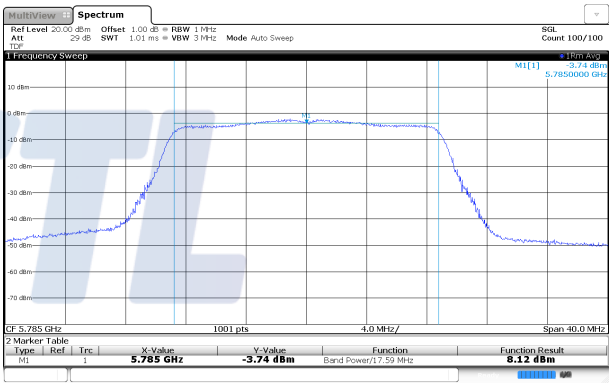
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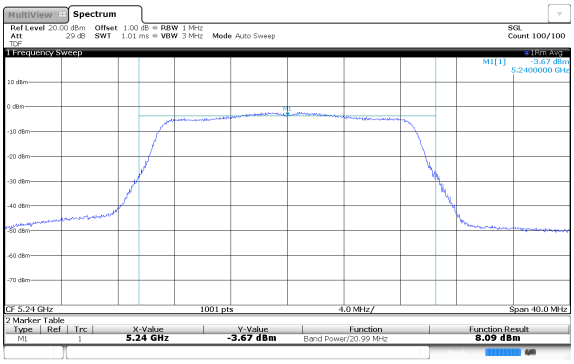	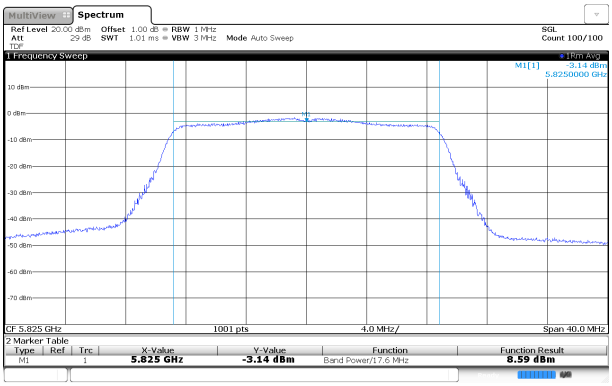

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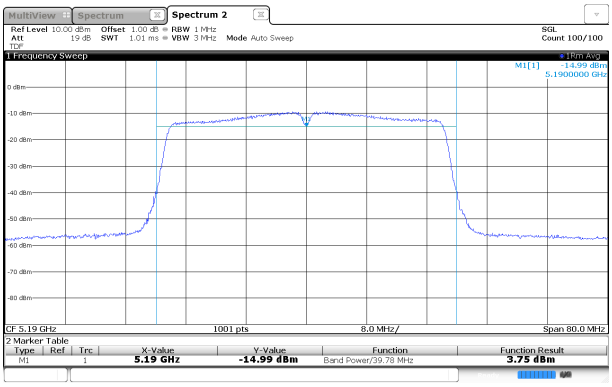	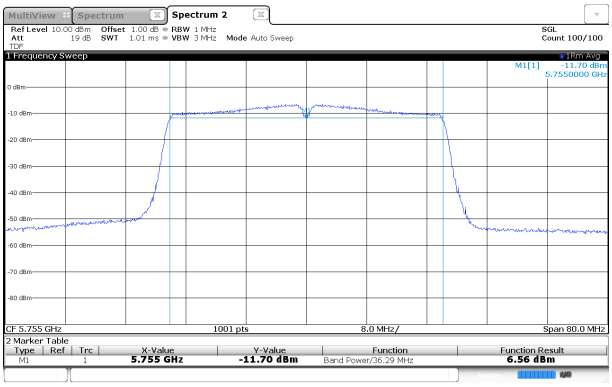
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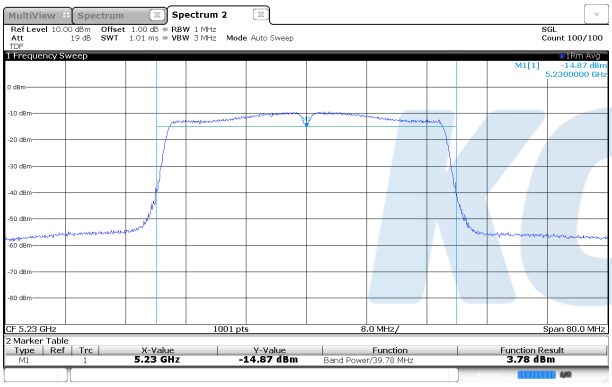	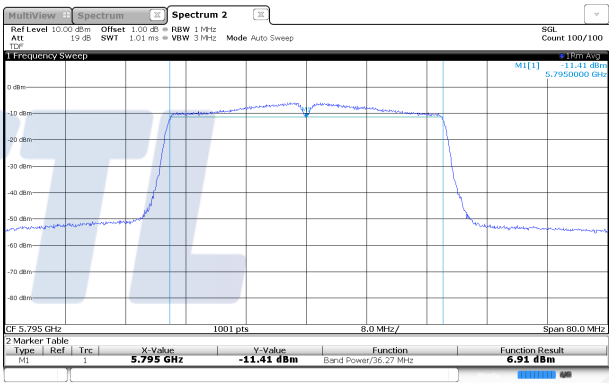

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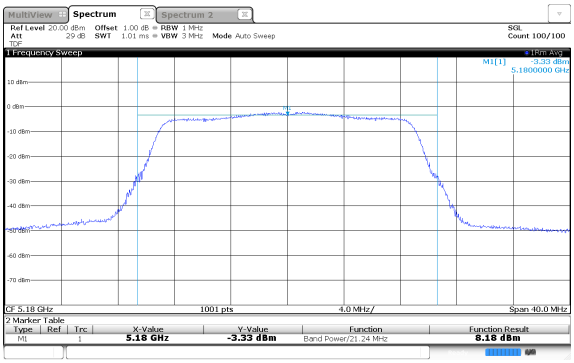	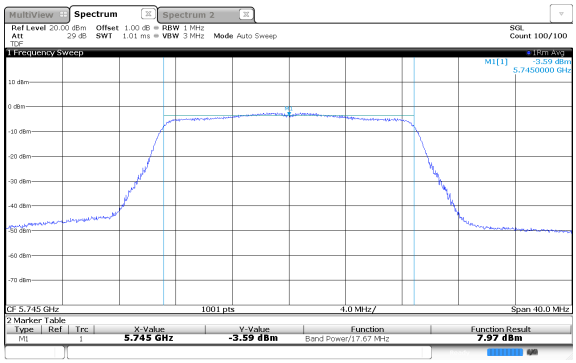
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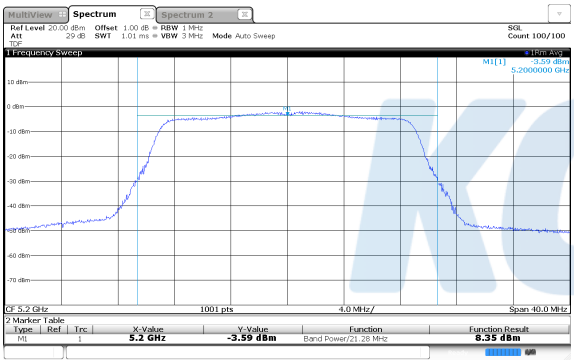	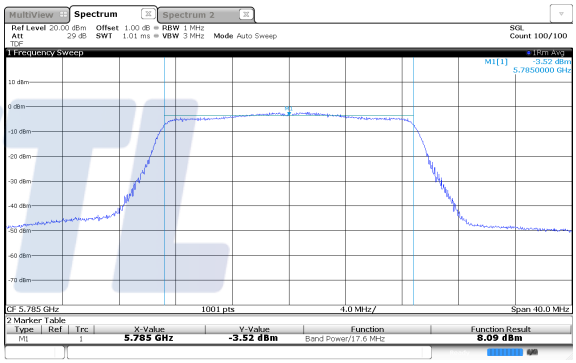
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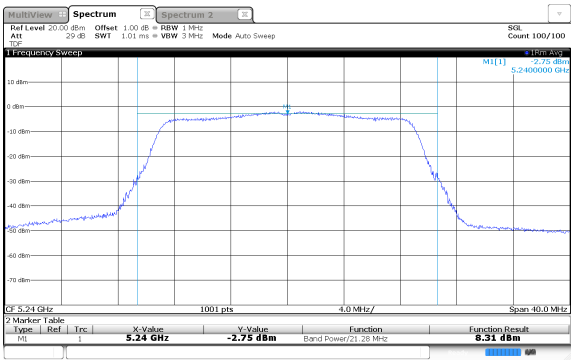	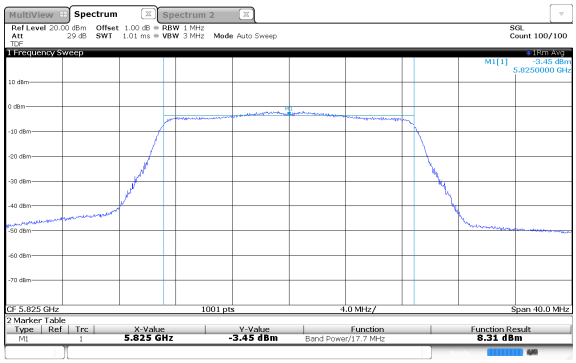

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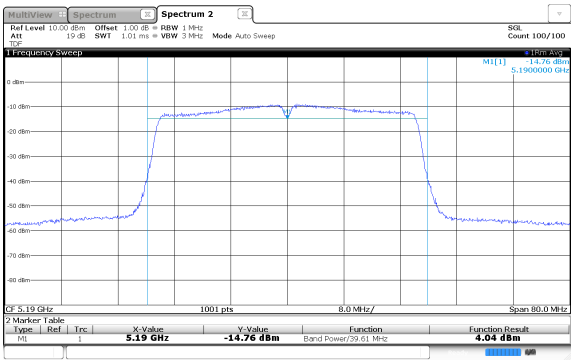	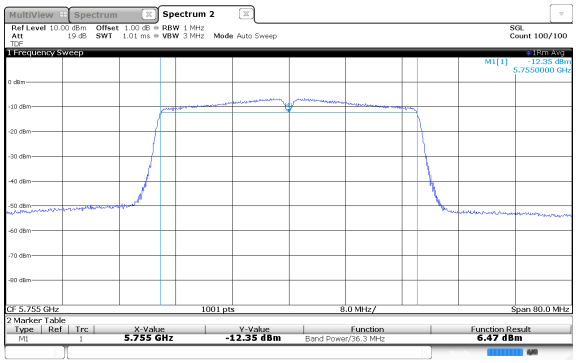
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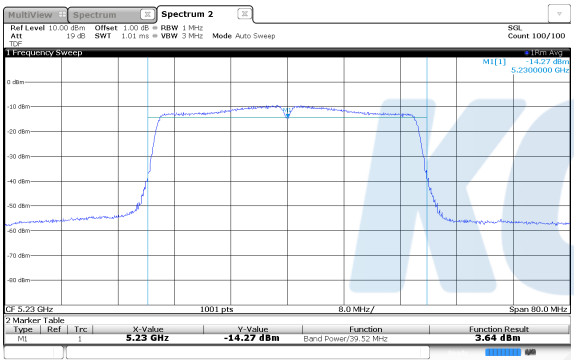	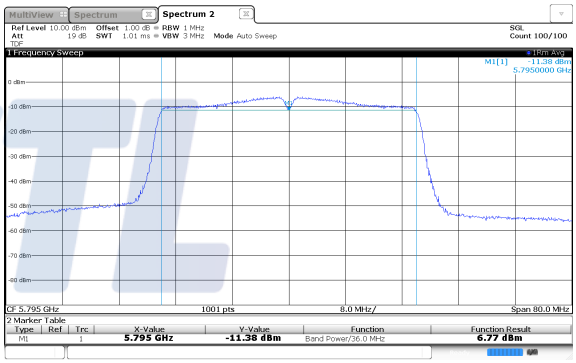
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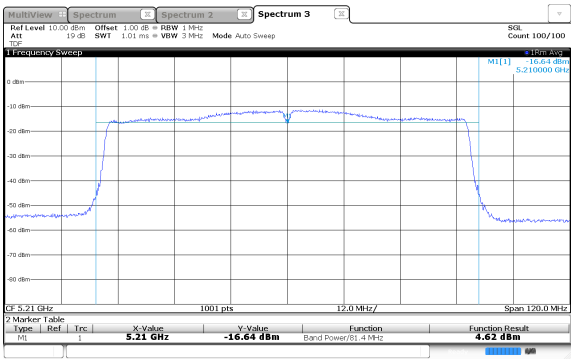
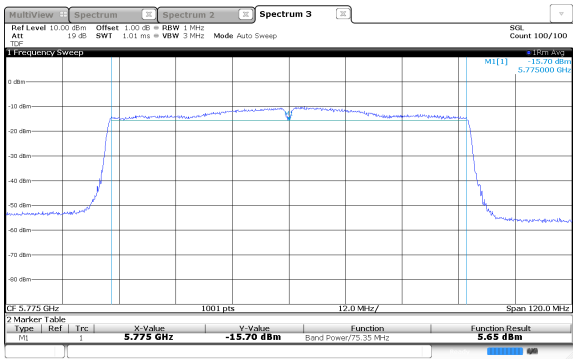
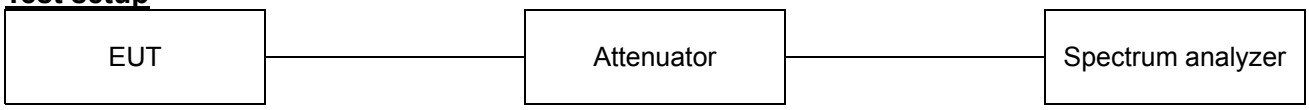
	

7.2. Maximum Power Spectral Density

Test setup



Limit

According to §15.407(a), RSS-247(6.2)

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

Notes:

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

Test procedure

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

Test settings

Section F

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

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

   a) If Method SA-2 or SA-2 Alternative was used, add 10 log (1/x), where x is the duty cycle, to the peak of the spectrum.
   b) If Method SA-3 Alternative was used and the linear mode was used in II.E.2.g) (viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.
4. The result is the Maximum PSD over 1 MHz reference bandwidth
5. For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the preceding procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference

bandwidth specified in Section 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of RBWs less than 1MHz, or 500 kHz, "provided that the measured power is integrated over the full reference bandwidth" to show the total power over the specified measurement bandwidth(i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:

a) Set RBW≥1/T, where T is defined in II.B.I.a).
b) Set VBW≥3 RBW.
c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10 log (500 kHz /RBW) to the measured result, whereas RBW (<500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10 log (1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

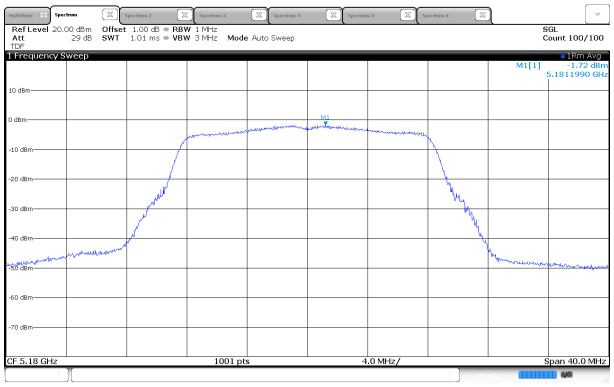
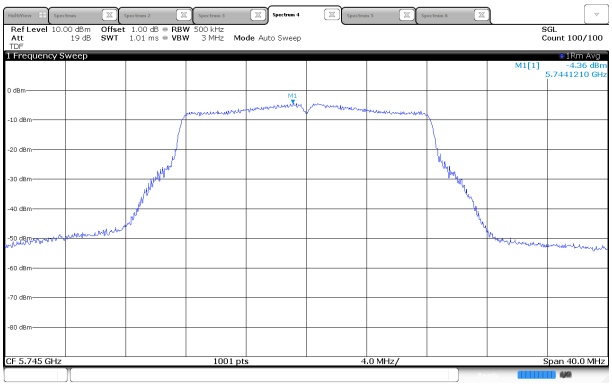
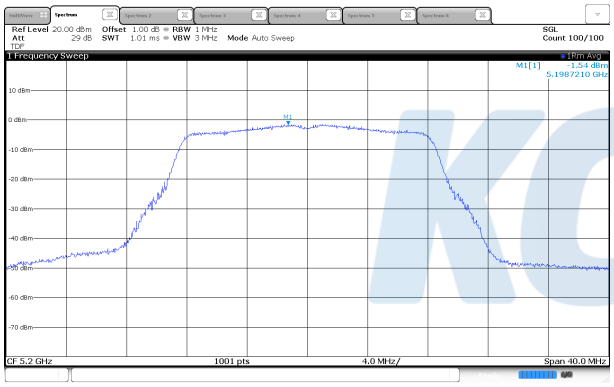
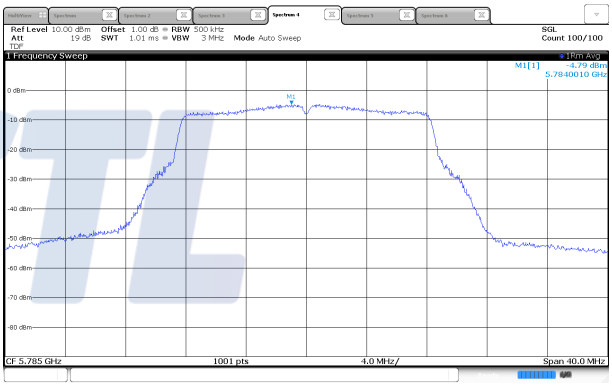
Note: As a practical matter, it is recommended to use reduced RBW of 100 kHz for the II.F.5.c) and II.F.5.d), since RBW=100 kHz is available on nearly all spectrum analyzers.

Test results

Test mode	Band	Frequency (㎒)	Measured PSD (dB m/㎒)	DCCF (dB)	Maximum PSD (dB m/㎒)	Limit (dB m/㎒)
802.11a	UNII-1	5 180	-1.72	0.21	-1.51	11
		5 200	-1.54	0.21	-1.33	
		5 240	-1.63	0.21	-1.42	
802.11n HT20	UNII-1	5 180	-2.06	0.23	-1.83	11
		5 200	-1.96	0.23	-1.73	
		5 240	-2.16	0.23	-1.93	
802.11n HT40	UNII-1	5 190	-9.19	0.44	-8.75	11
		5 230	-9.18	0.44	-8.74	
802.11ac VHT20	UNII-1	5 180	-2.12	0.22	-1.90	11
		5 200	-1.84	0.22	-1.62	
		5 240	-2.43	0.22	-2.21	
802.11ac VHT40	UNII-1	5 190	-9.27	0.44	-8.83	11
		5 230	-9.36	0.44	-8.92	
802.11ac VHT80	UNII-1	5 210	-11.13	0.86	-10.27	11

Test mode	Band	Frequency (㎒)	Measured PSD (dBm/500 ㎑)	Duty Factor (dB)	Maximum PSD (dBm /500 ㎑)	Limit (dBm /500 ㎑)
802.11a	UNII-3	5 745	-4.36	0.21	-4.15	30
		5 785	-4.79	0.21	-4.58	
		5 825	-4.30	0.21	-4.09	
802.11n HT20		5 745	-4.76	0.23	-4.53	
		5 785	-4.69	0.23	-4.46	
		5 825	-4.73	0.23	-4.50	
802.11n HT40		5 755	-15.19	0.44	-14.75	
		5 795	-15.67	0.44	-15.23	
802.11ac VHT20		5 745	-4.61	0.22	-4.39	
		5 785	-5.23	0.22	-5.01	
		5 825	-4.56	0.22	-4.34	
802.11ac VHT40		5 755	-14.75	0.44	-14.31	
		5 795	-15.09	0.44	-14.65	
802.11ac VHT80		5 775	-13.64	0.86	-12.78	

Notes:
1. Maximum PSD calculation
- Maximum PSD = Measured PSD + DCCF

UNII-1 / 802.11a / Low ch.	UNII-3 / 802.11a / Low ch.
	
UNII-1 / 802.11a / Mid ch.	**UNII-3 / 802.11a / Mid ch.**
	
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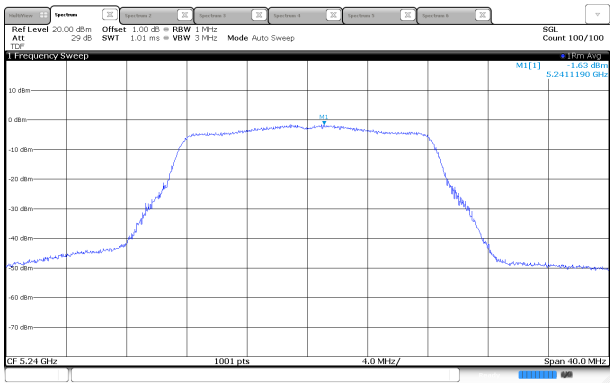	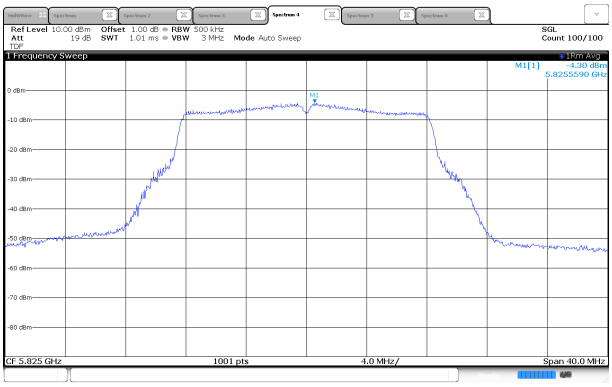

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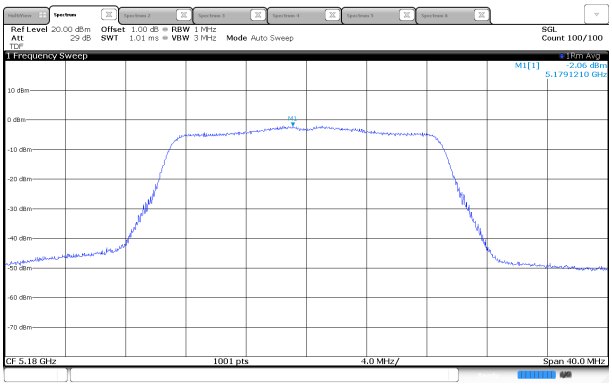	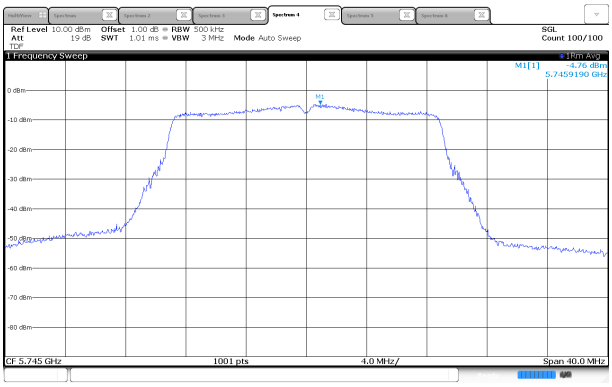
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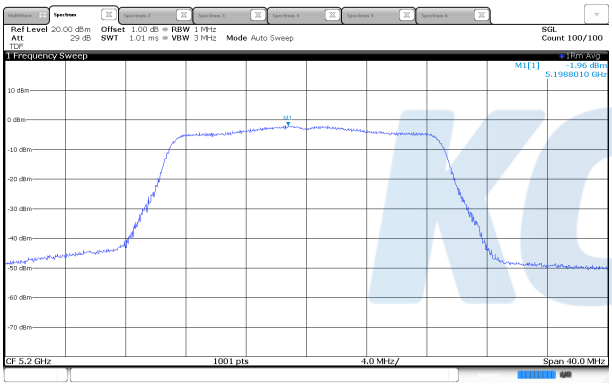	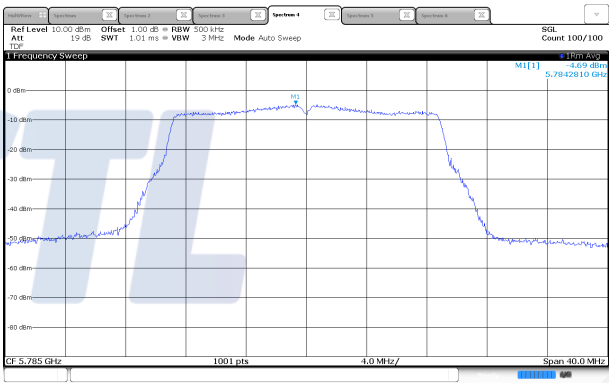
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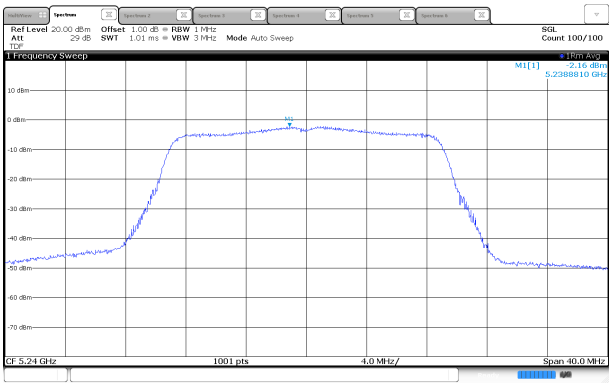	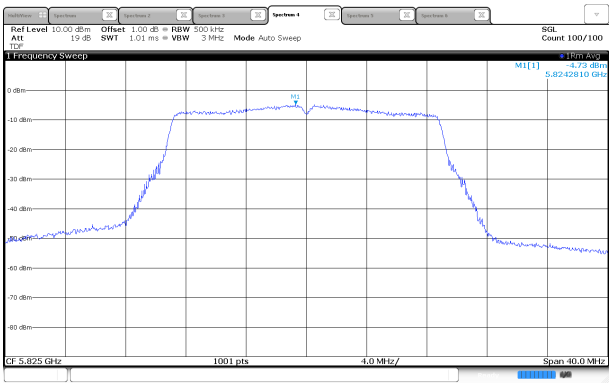

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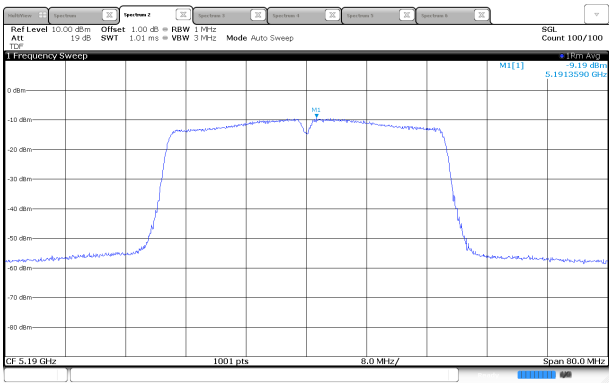
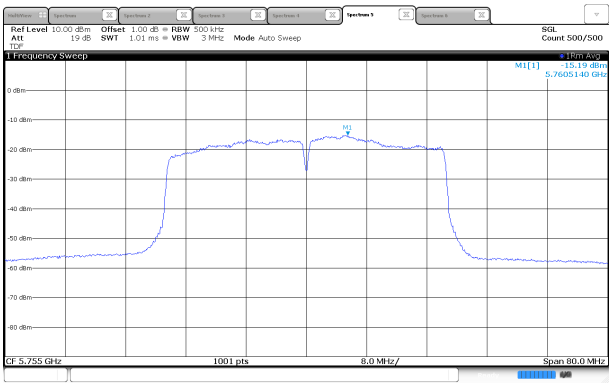
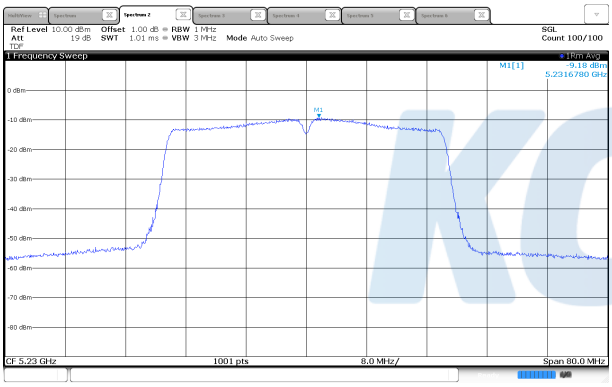
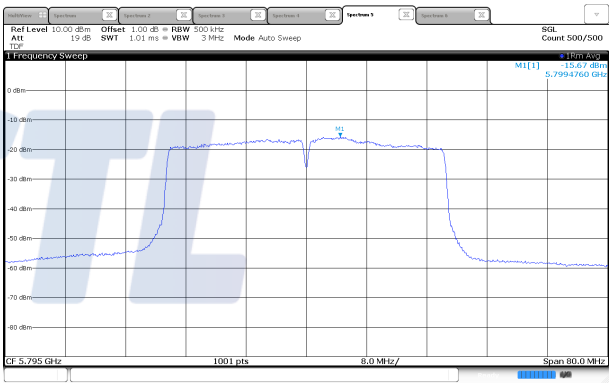
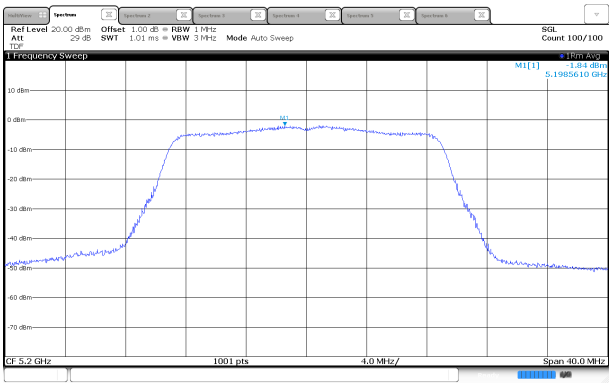
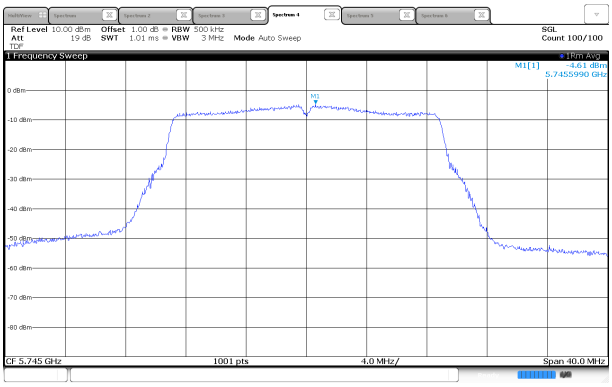
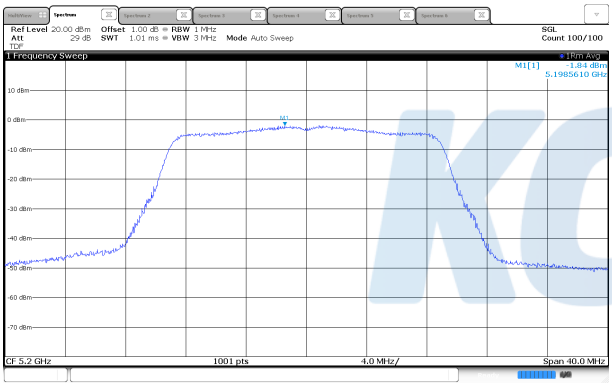
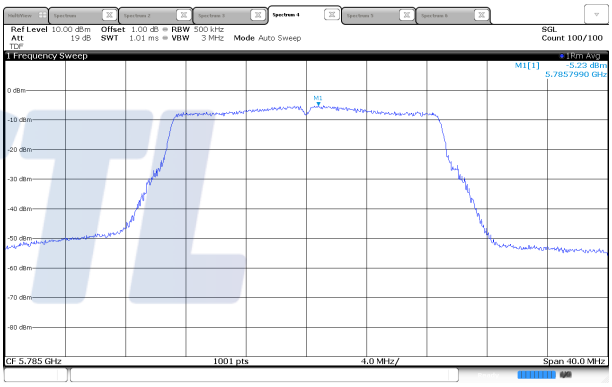
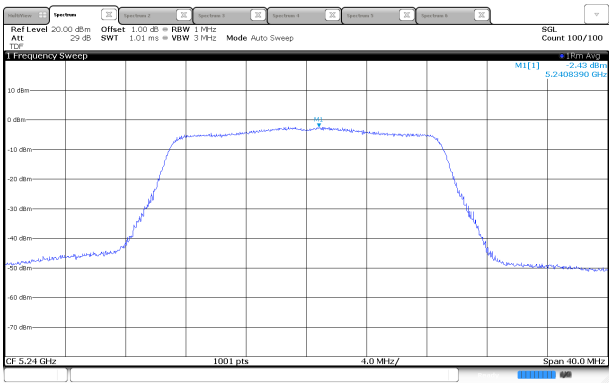
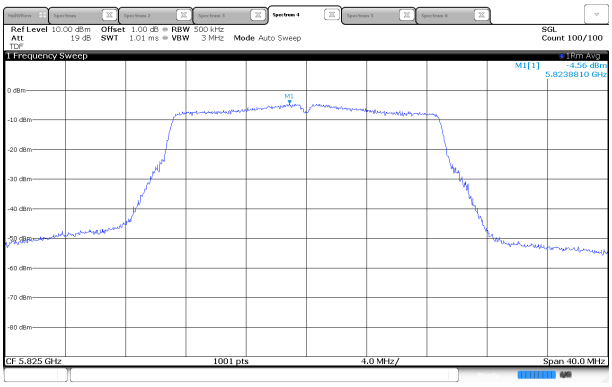
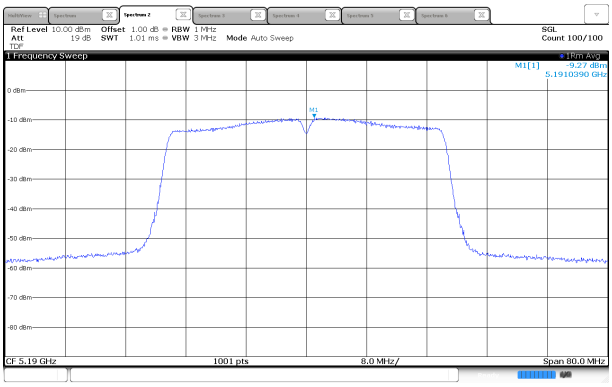
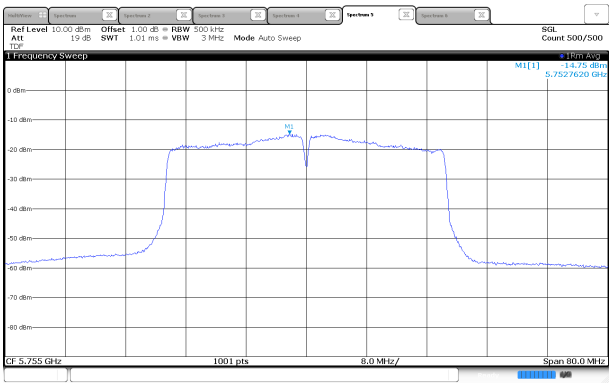
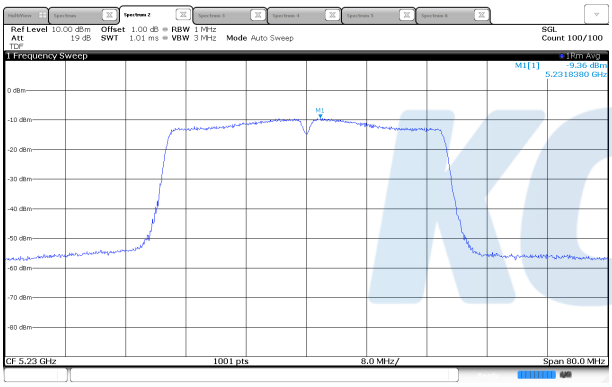
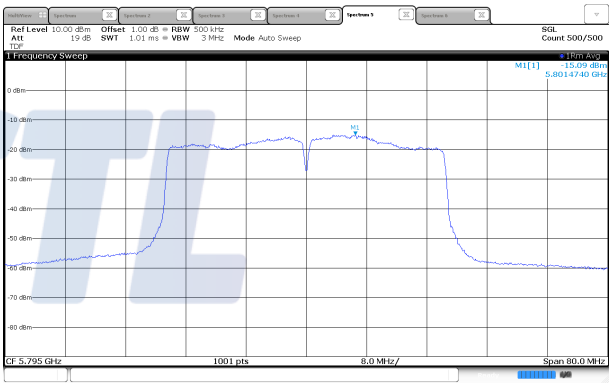
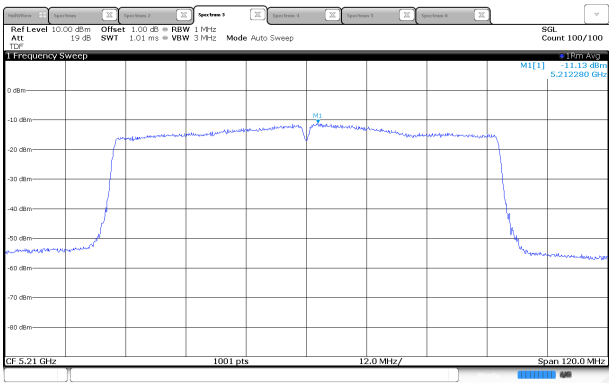
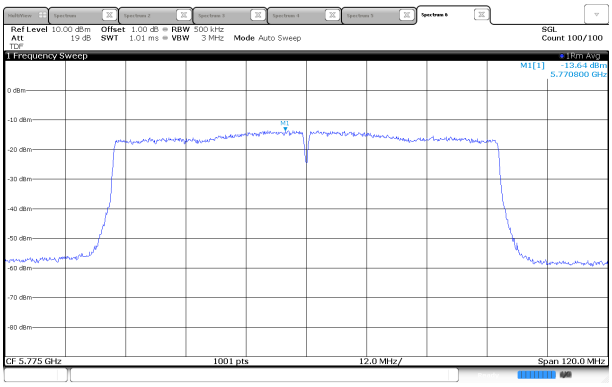
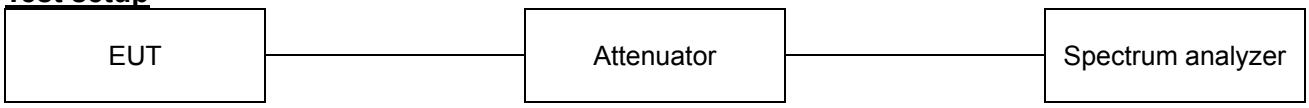
	
UNII-1 / 802.11n HT40 / High ch.	**UNII-3 / 802.11n HT40 / High ch.**
	

UNII-1 / 802.11ac VHT20 / Low ch.	UNII-3 / 802.11ac VHT20 / Low ch.
	
UNII-1 / 802. 11ac VHT20 / Mid ch.	**UNII-3 / 802.11ac VHT20 / Mid ch.**
	
UNII-1 / 802. 11ac VHT20 / High ch.	**UNII-3 / 802.11ac VHT20 / High ch.**
	

UNII-1 / 802.11ac VHT40 / Low ch.	UNII-3 / 802.11ac VHT40 / Low ch.
	
UNII-1 / 802.11ac VHT40 / High ch.	**UNII-3 / 802.11ac VHT40 / High ch.**
	
UNII-1 / 802.11ac VHT80 / Low ch.	**UNII-3 / 802.11ac VHT80 / Low ch.**
	

7.3. 26 dB Bandwidth & 99% Occupied 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.

Notes:

1. [1)] means Band-crossing channels.

Test results

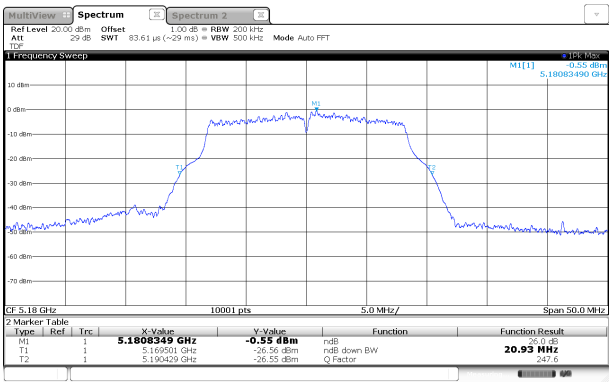
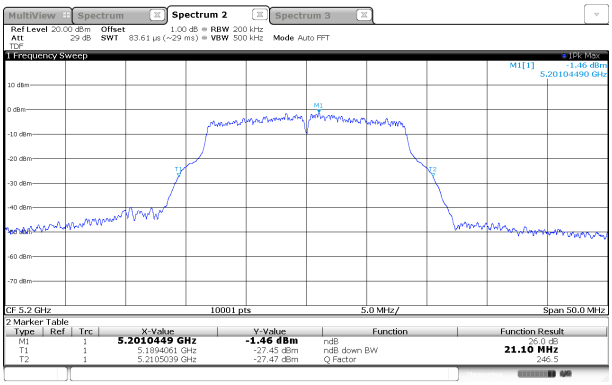
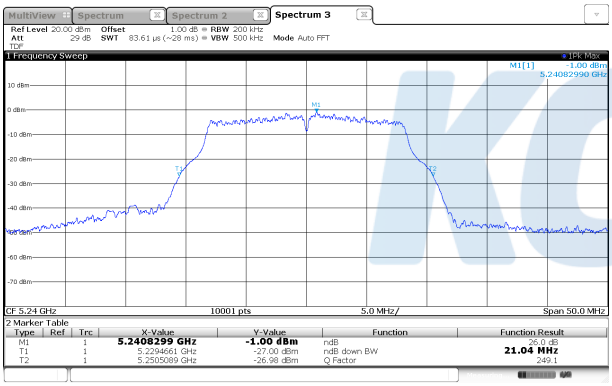
26 dB bandwidth

Test mode	Band	Frequency(㎒)	Measured Bandwidth (㎒)
802.11a	UNII-1	5 180	20.93
		5 200	21.10
		5 240	21.04
802.11n HT20	UNII-1	5 180	21.29
		5 200	21.24
		5 240	20.99
802.11n HT40	UNII-1	5 190	39.78
		5 230	39.78
802.11ac VHT20	UNII-1	5 180	21.24
		5 200	21.28
		5 240	21.13
802.11ac VHT40	UNII-1	5 190	39.61
		5 230	39.52
802.11ac VHT80	UNII-1	5 210	81.40

99% bandwidth

Test mode	Band	Frequency(㎒)	Measured Bandwidth (㎒)
802.11a	UNII-1	5 180	16.72
		5 200	16.62
		5 240	16.71
	UNII-3	5 745	16.62
		5 785	16.67
		5 825	16.79
802.11n HT20	UNII-1	5 180	17.75
		5 200	17.75
		5 240	17.71
	UNII-3	5 745	17.70
		5 785	17.72
		5 825	17.82
802.11n HT40	UNII-1	5 190	36.22
		5 230	36.23
	UNII-3	5 755	36.20
		5 795	36.19
802.11ac VHT20	UNII-1	5 180	17.77
		5 200	17.64
		5 240	17.72
	UNII-3	5 745	17.68
		5 785	17.73
		5 825	17.88
802.11ac VHT40	UNII-1	5 190	36.19
		5 230	36.23
	UNII-3	5 755	36.22
		5 795	36.18
802.11ac VHT80	UNII-1	5 210	74.40
	UNII-3	5 775	75.41

26 dB bandwidth

UNII-1 / 802.11a / Low ch.	UNII-1 / 802.11a / Mid ch.
	
UNII-1 / 802.11a / High ch.	
	Blank

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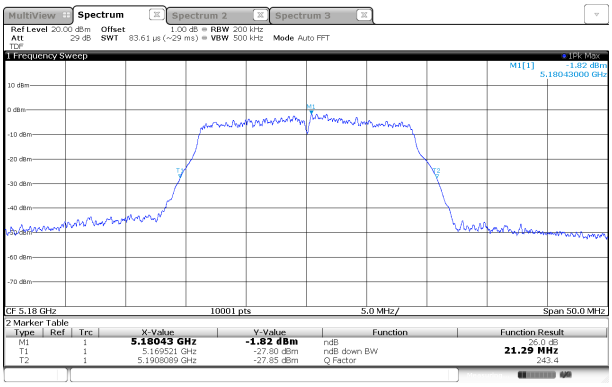
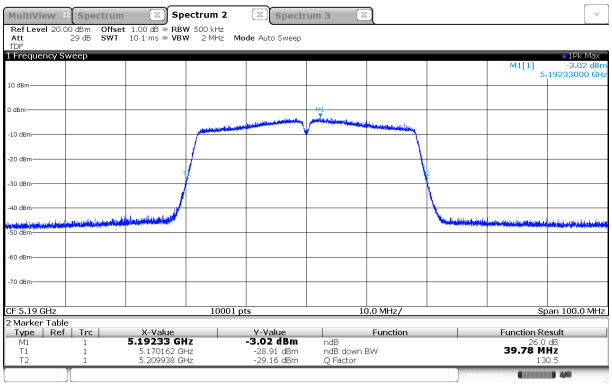
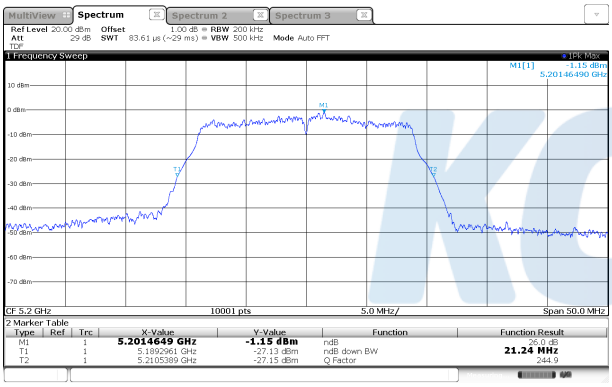


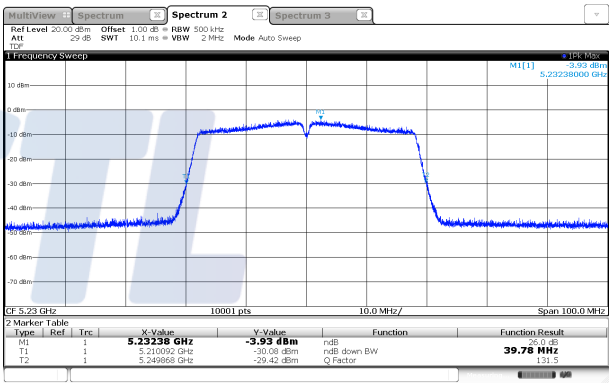
UNII-1 / 802.11n HT40 / Low ch.



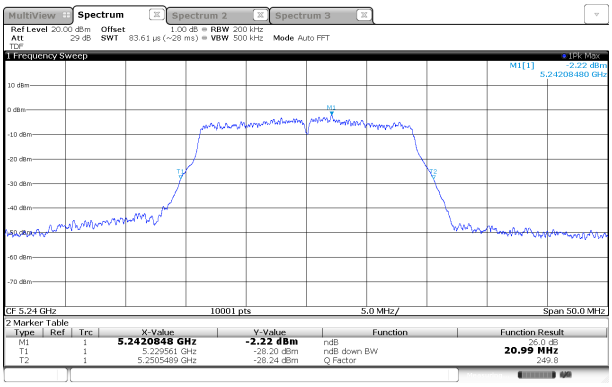
UNII-1 / 802.11n HT20 / Mid ch.



UNII-1 / 802.11n HT40 / High ch.



UNII-1 / 802.11n HT20 / High ch.



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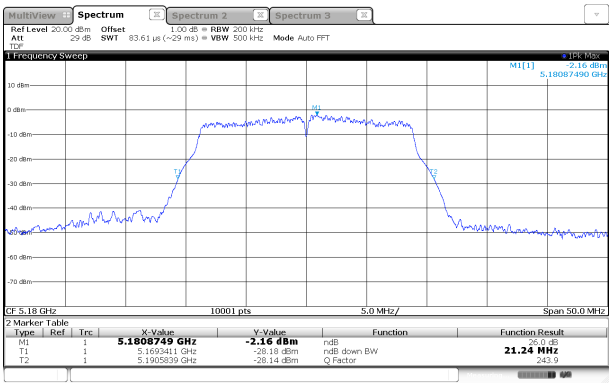
UNII-1 / 802.11ac VHT20 / Low ch.



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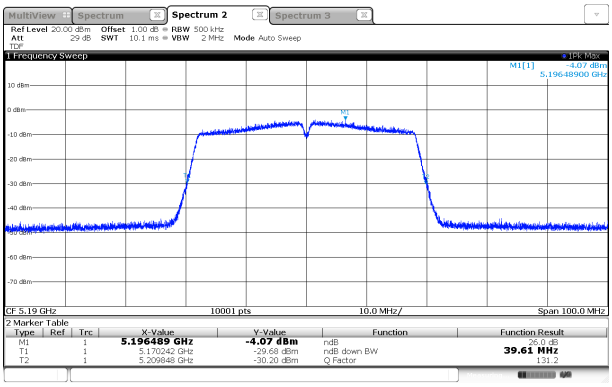
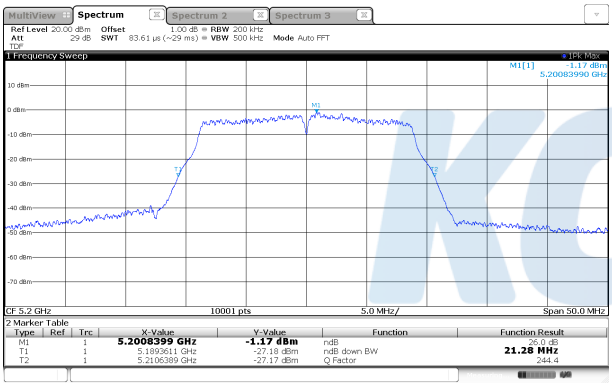
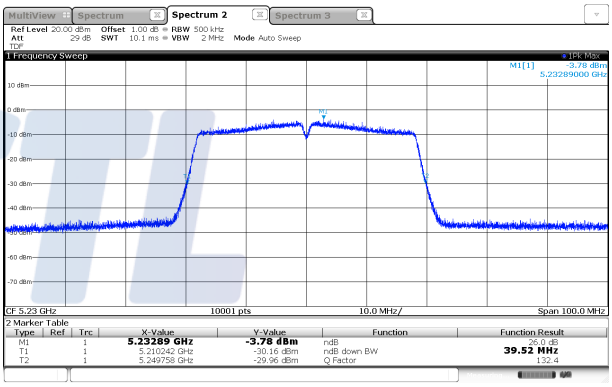


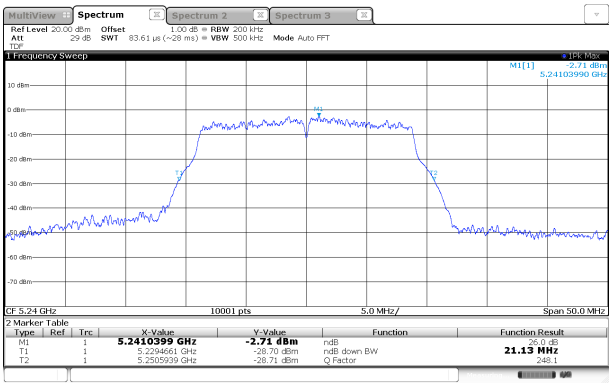
UNII-1 / 802. 11ac VHT20 / Mid ch.



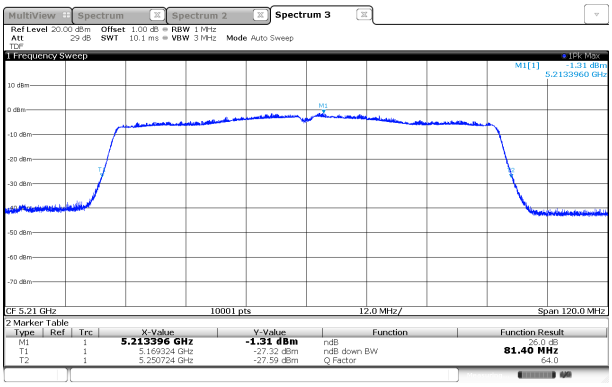
UNII-1 / 802.11ac VHT40 / High ch.



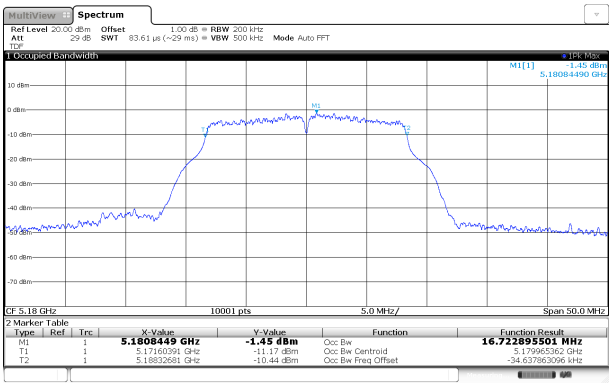
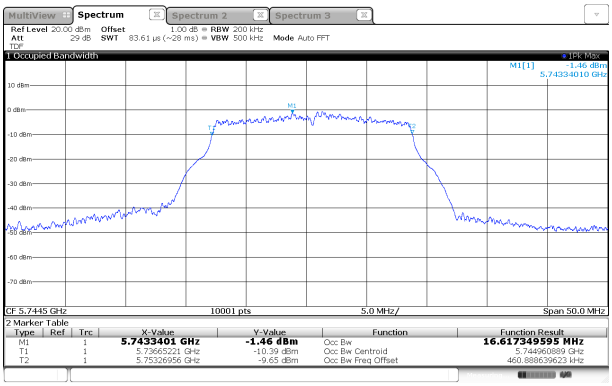
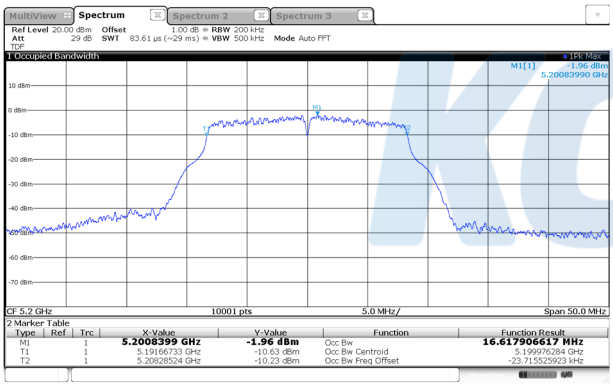
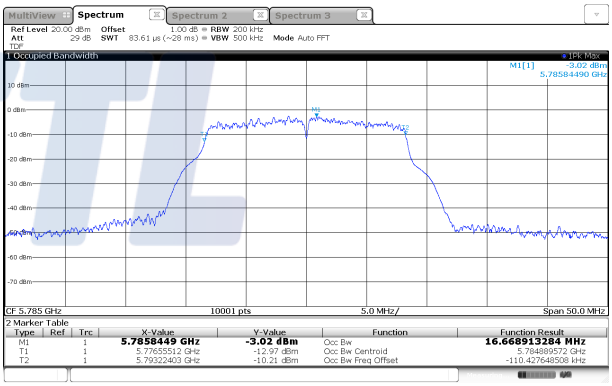
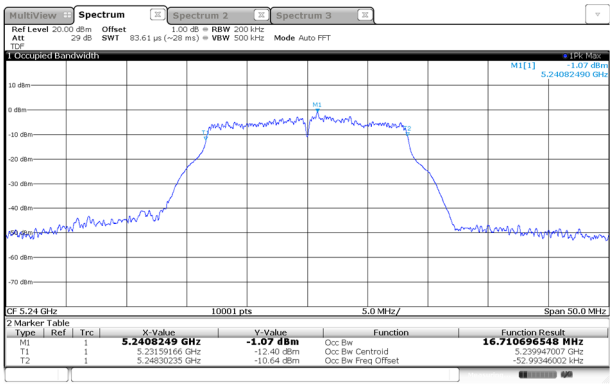
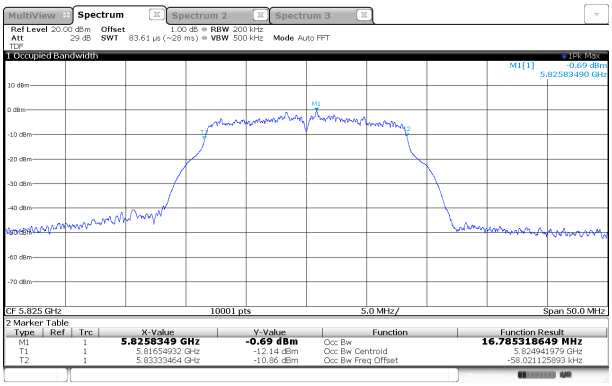
UNII-1 / 802. 11ac VHT20 / High ch.



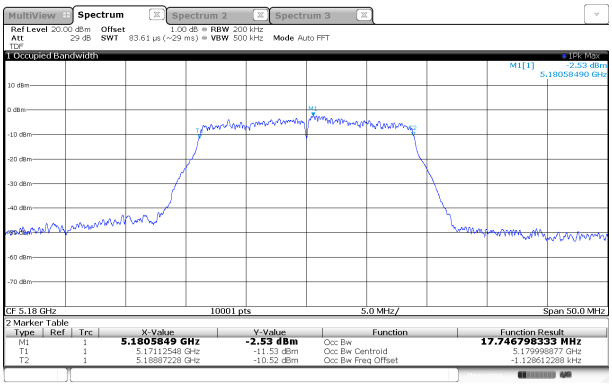
UNII-1 / 802.11ac VHT80 / Low ch.



99 % bandwidth

UNII-1 / 802.11a / Low ch.	UNII-3 / 802.11a / Low ch.
	
UNII-1 / 802.11a / Mid ch.	**UNII-3 / 802.11a / Mid ch.**
	
UNII-1 / 802.11a / High ch.	**UNII-3 / 802.11a / High ch.**
	

UNII-1 / 802.11n HT20 / Low ch.



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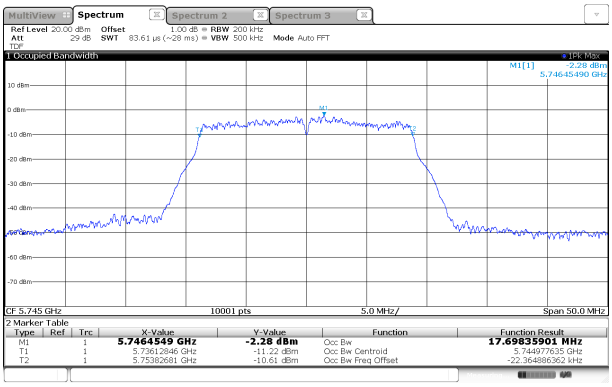
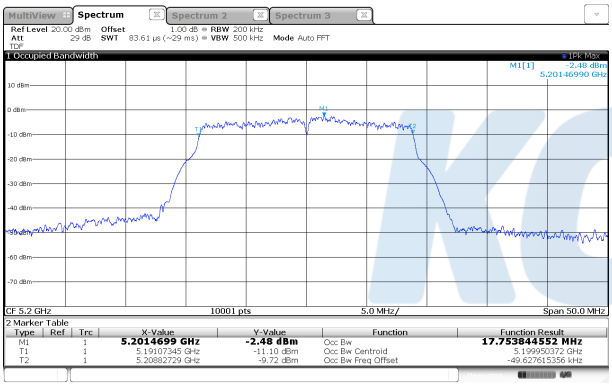


UNII-1 / 802.11n HT20 / Mid ch.



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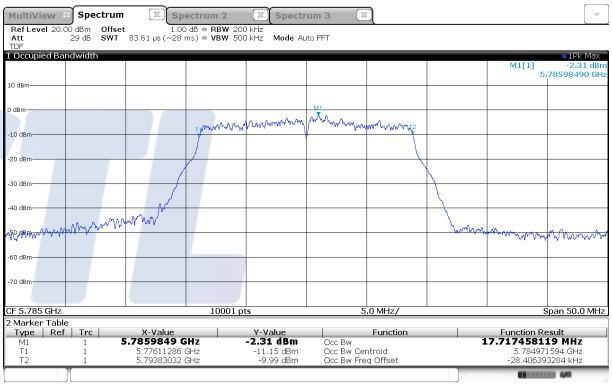
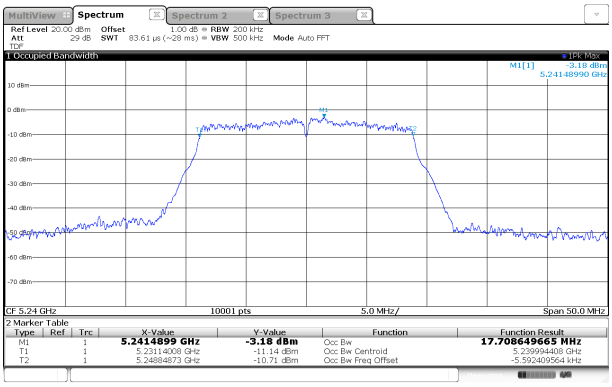


UNII-1 / 802.11n HT20 / High ch.



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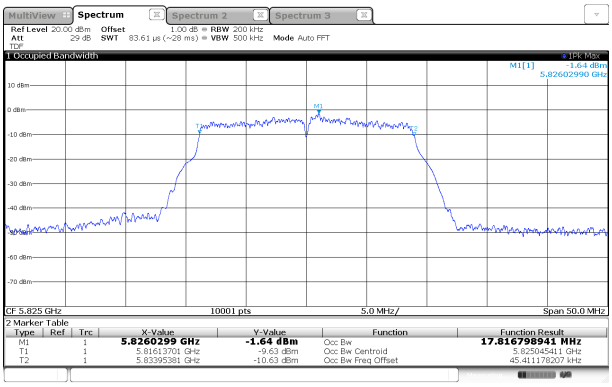
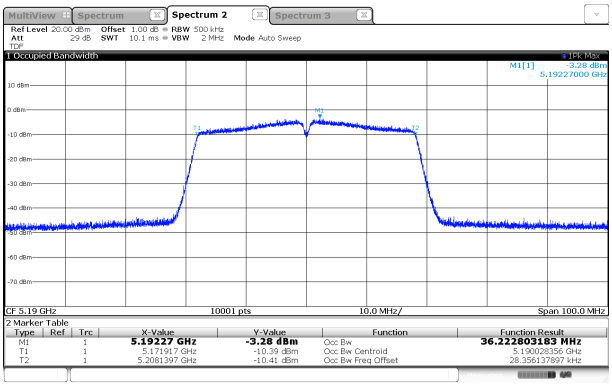
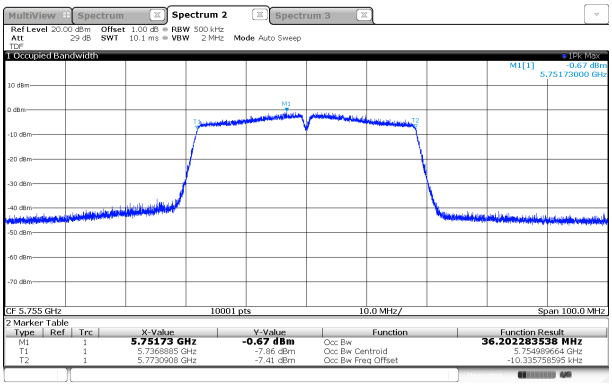


UNII-1 / 802.11n HT40 / Low ch.	UNII-3 / 802.11n HT40 / Low ch.
	
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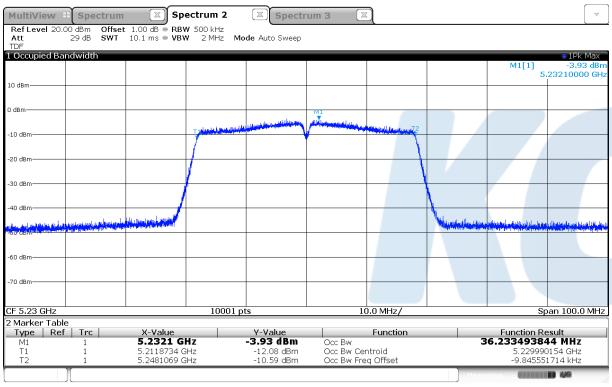
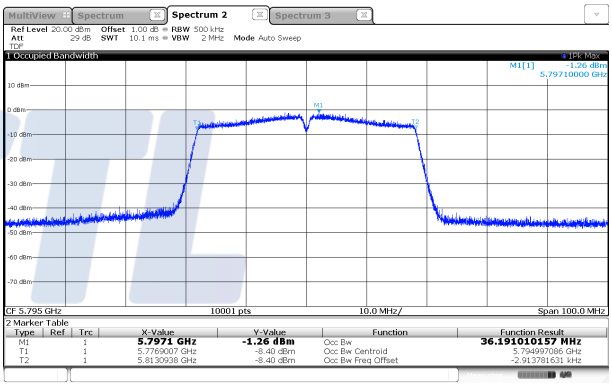
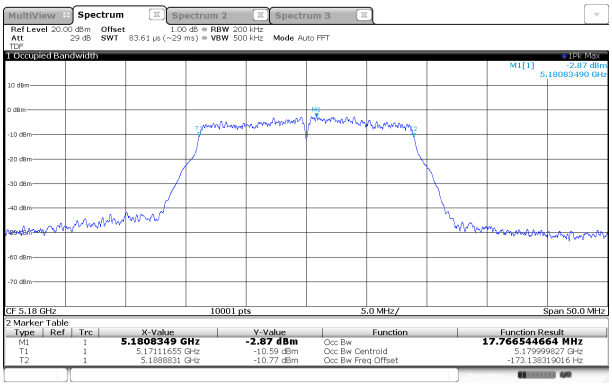
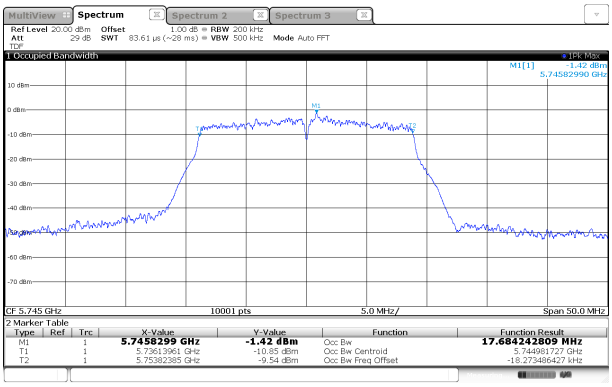
	

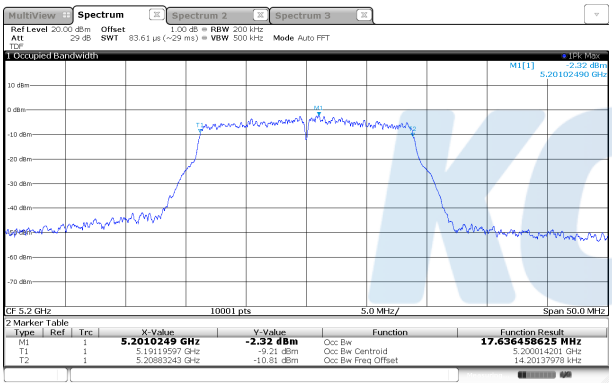
UNII-1 / 802.11ac VHT20 / Low ch.



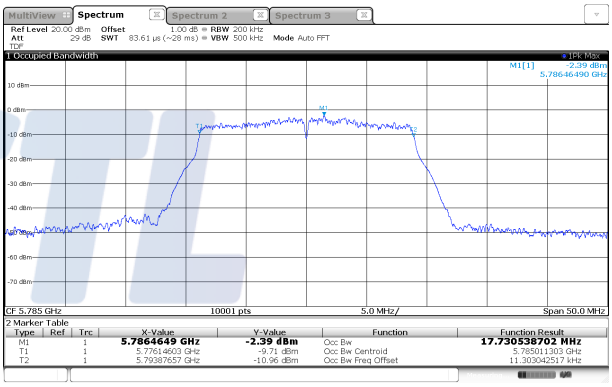
UNII-3 / 802.11ac VHT20 / Low ch.



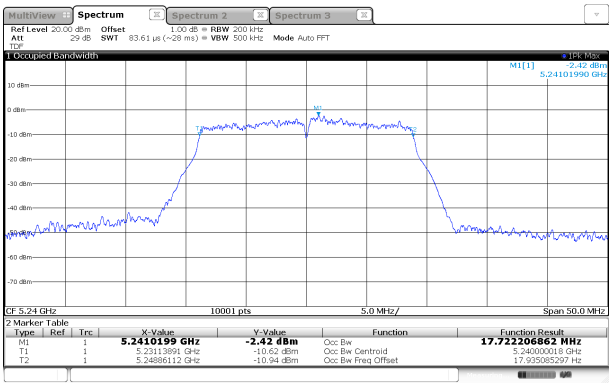
UNII-1 / 802. 11ac VHT20 / Mid ch.



UNII-3 / 802.11ac VHT20 / Mid ch.



UNII-1 / 802. 11ac VHT20 / High ch.



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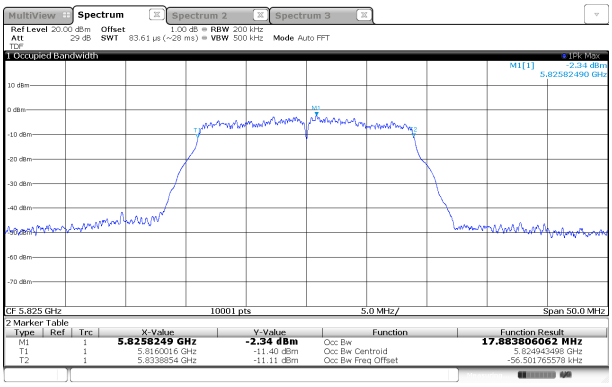
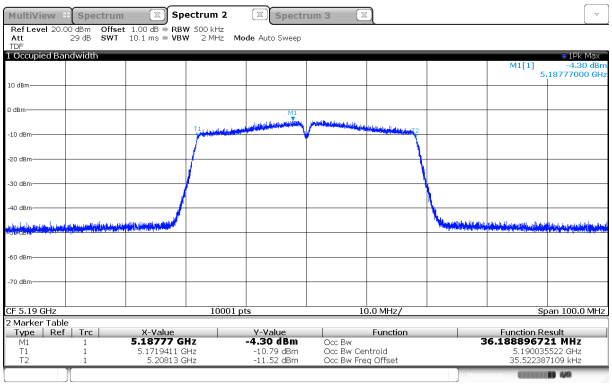


UNII-1 / 802.11ac VHT40 / Low ch.



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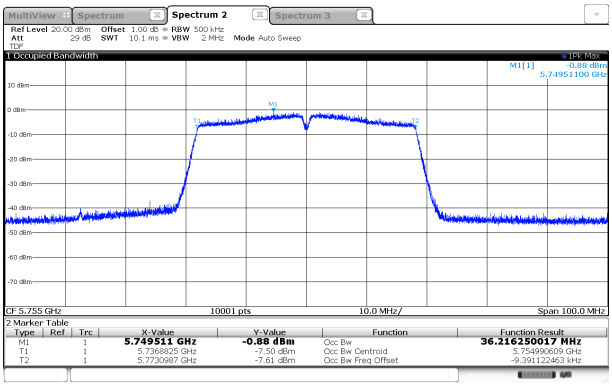

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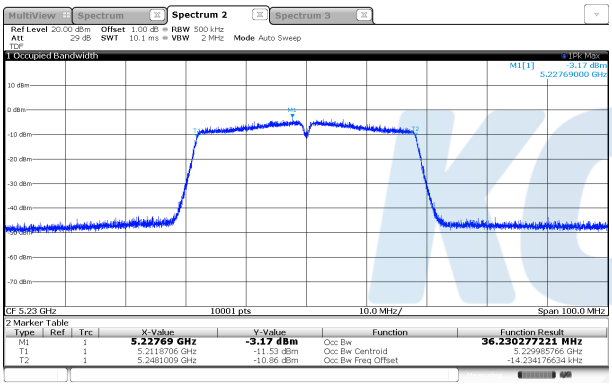

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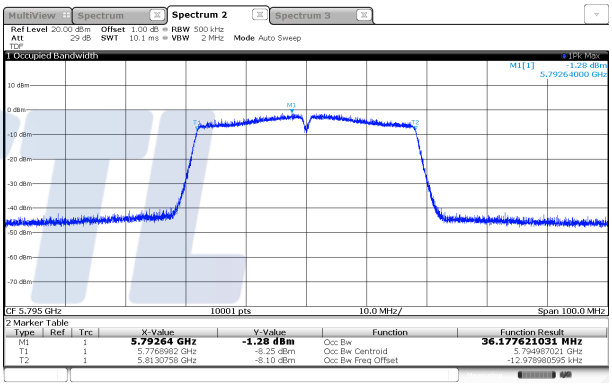
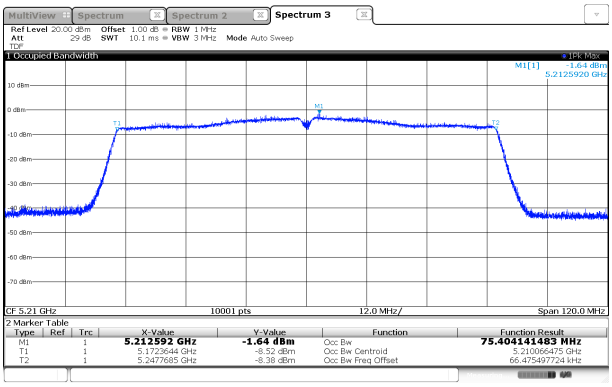
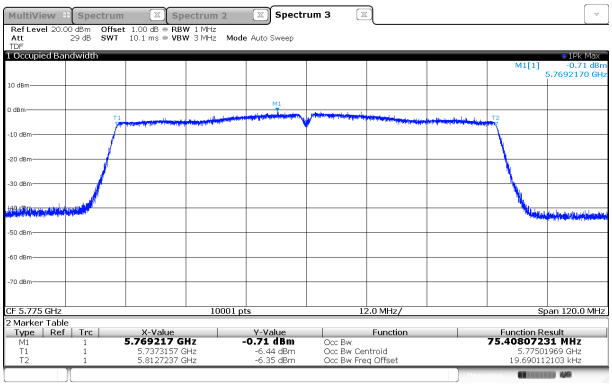


UNII-1 / 802.11ac VHT80 / Low ch.

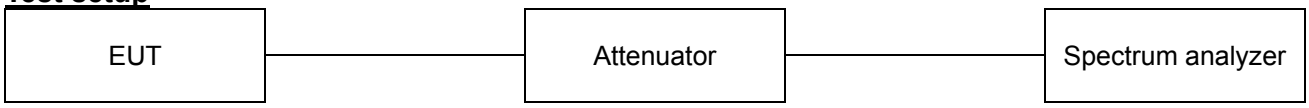


UNII-3 / 802.11ac VHT80 / Low ch.



7.4. 6 dB Bandwidth

Test setup



Limit

According to §15.407(e), RSS-247(6.2.4)
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 ㎓

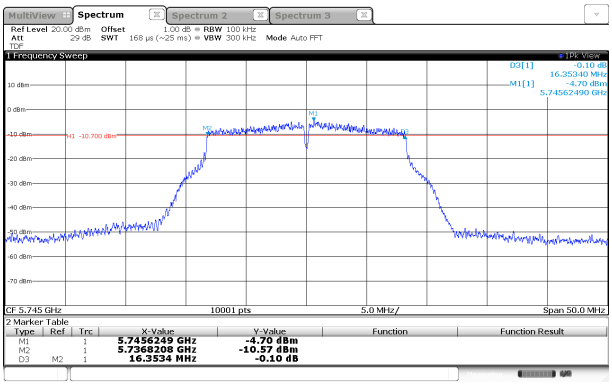
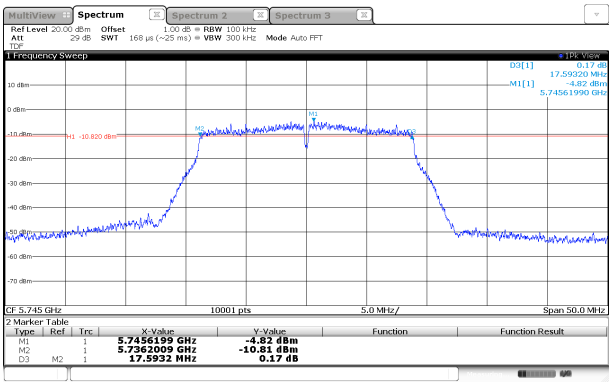
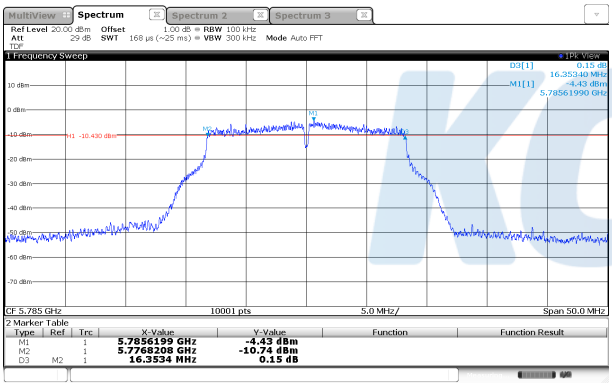
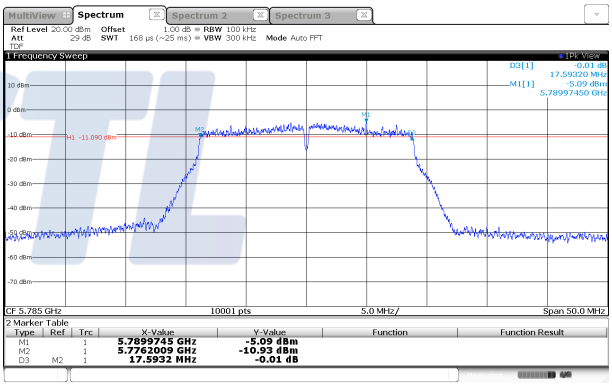
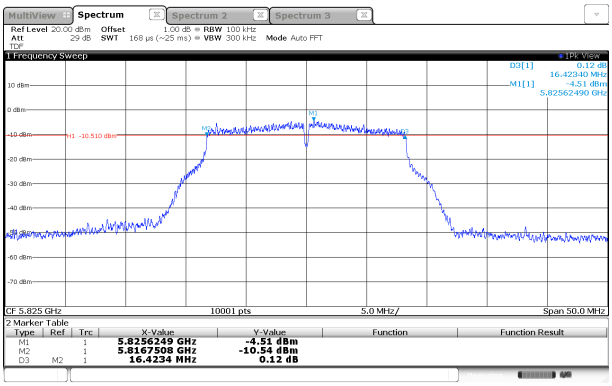
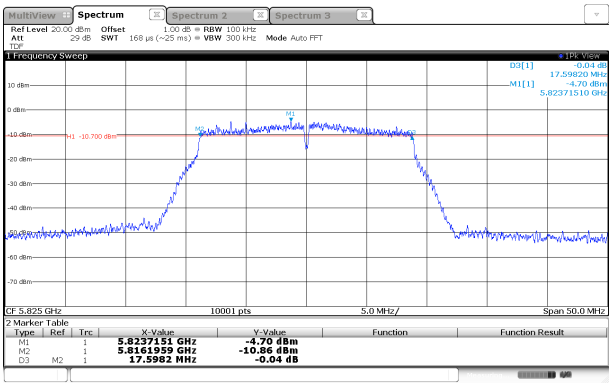
Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 ㎑ for the band 5.725−5.85 ㎓. The following procedure shall be used for measuring this bandwidth:

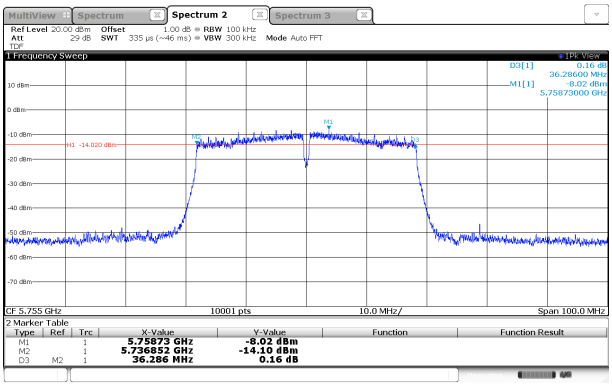
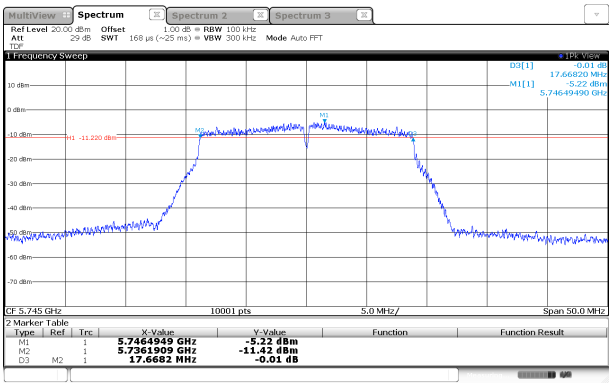
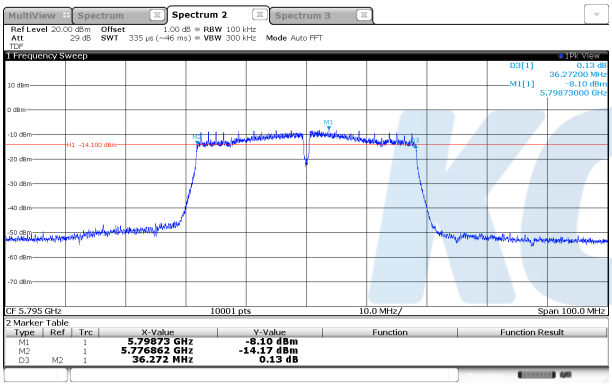
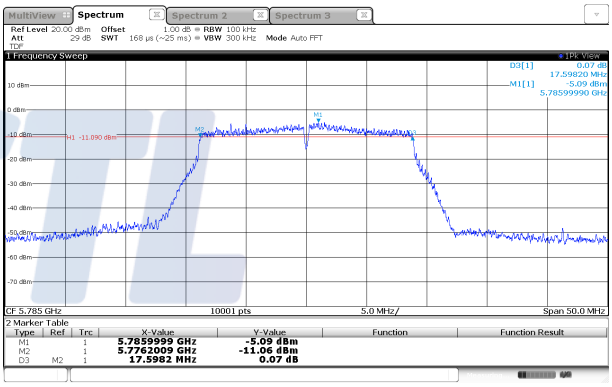
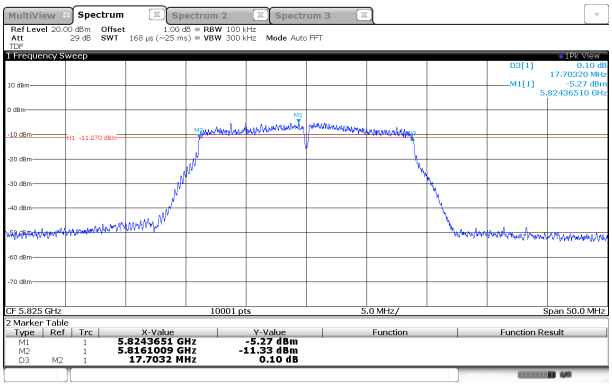
1. Set RBW = 100 ㎑.
2. Set the video bandwidth (VBW) ≥ 3 RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper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

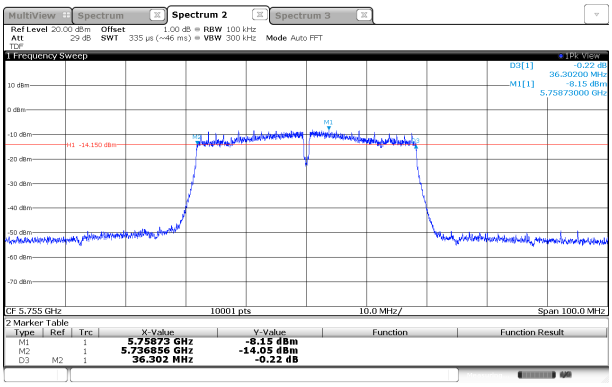
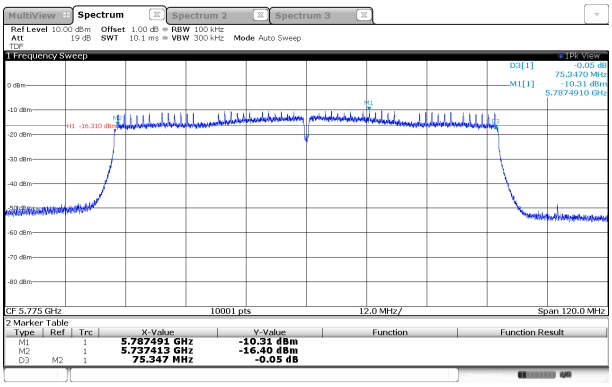
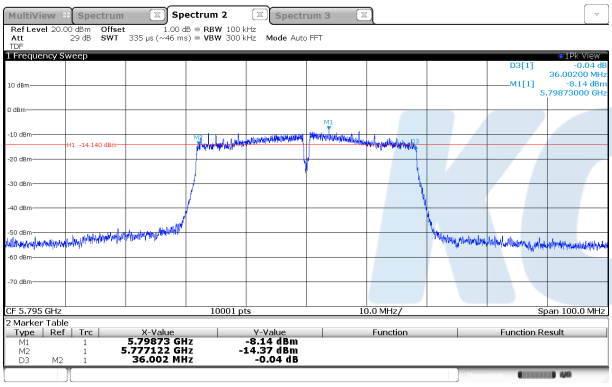
Test results

Test mode	Band	Frequency (㎒)	Measured Bandwidth (㎒)	Minimum Bandwidth (㎒)
802.11a	UNII-3	5 745	16.35	0.50
		5 785	16.35	0.50
		5 825	16.42	0.50
802.11n HT20	UNII-3	5 745	17.59	0.50
		5 785	17.59	0.50
		5 825	17.60	0.50
802.11n HT40	UNII-3	5 755	36.29	0.50
		5 795	36.27	0.50
802.11ac VHT20	UNII-3	5 745	17.67	0.50
		5 785	17.60	0.50
		5 825	17.70	0.50
802.11ac VHT40	UNII-3	5 755	36.30	0.50
		5 795	36.00	0.50
802.11ac VHT80	UNII-3	5 775	75.35	0.50

6 dB bandwidth

UNII-3 / 802.11a / Low ch.	UNII-3 / 802.11n HT20 / Low ch.
	
UNII-3 / 802.11a / Mid ch.	**UNII-3 / 802.11n HT20 / Mid ch.**
	
UNII-3 / 802.11a / High ch.	**UNII-3 / 802.11n HT20 / High ch.**
	

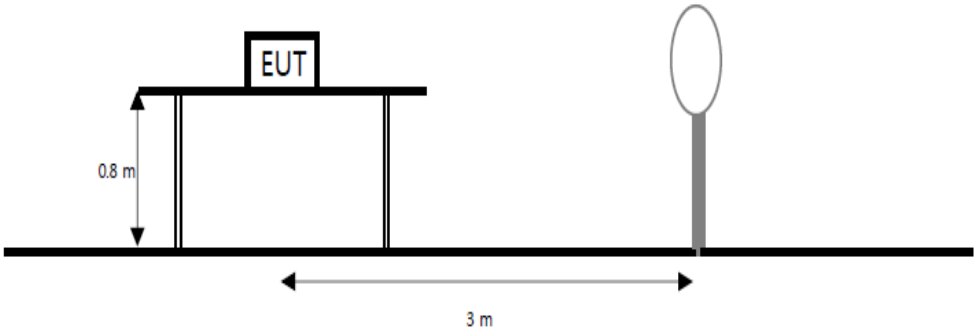
UNII-3 / 802.11n HT40 / Low ch.	UNII-3 / 802.11ac VHT20 / Low ch.
	
UNII-3 / 802. 11n HT40 / High ch.	**UNII-3 / 802.11ac VHT20 / Mid ch.**
	
	UNII-3 / 802.11ac VHT20 / High ch.
Blank	

UNII-3 / 802.11ac VHT40 / Low ch.	UNII-3 / 802.11ac VHT80 / Low ch.
	
UNII-3 / 802. 11ac VHT40 / High ch.	
	Blank

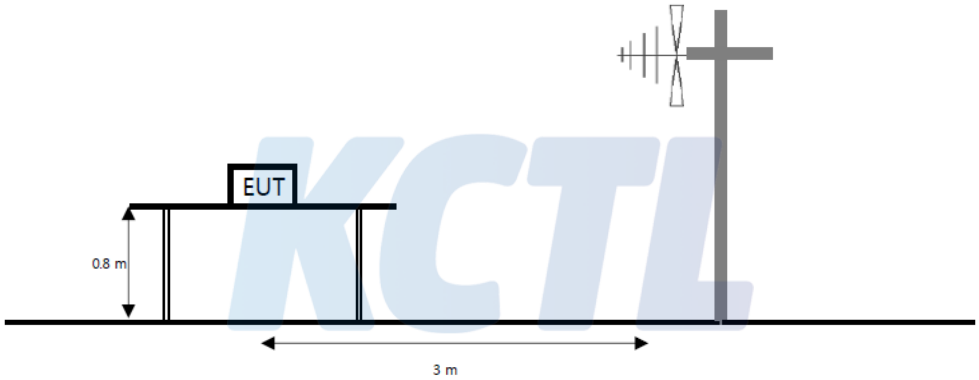
7.5. Spurious Emission, Band Edge and Restricted bands

Test setup

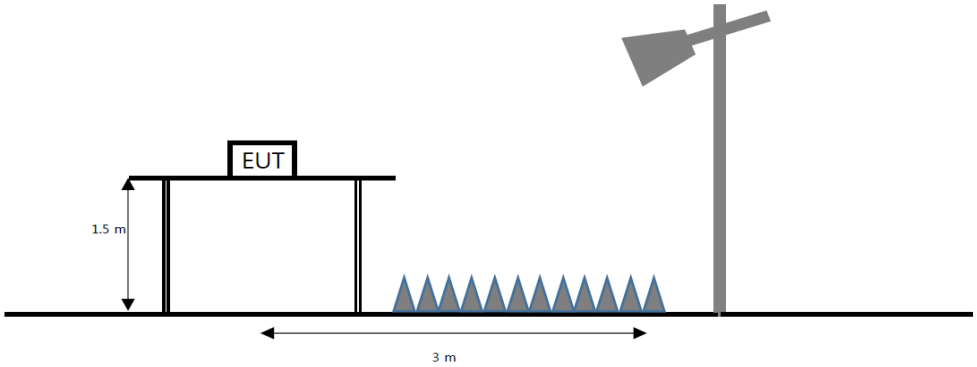
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 ㎑ to 30 ㎒ Emissions



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), RSS-Gen(8.9) except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

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

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

According to section 15.205(a) and (b), RSS-Gen(8.10) only spurious emissions are permitted in any of the frequency bands listed below:

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

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

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

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

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

Test procedure

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

Test settings

Peak field strength measurements

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

Table. RBW as a function of frequency

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

Average field strength measurements

Trace averaging with continuous EUT transmission at full power

If the EUT can be configured or modified to transmit continuously (D ≥ 98%), then the average emission levels shall be measured using the following method (with EUT transmitting continuously):

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

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

If continuous transmission of the EUT (D ≥ 98%) cannot be achieved and the duty cycle is constant (duty cycle variations are less than ±2%), then the following procedure shall be used:

1. The EUT shall be configured to operate at the maximum achievable duty cycle.
2. Measure the duty cycle D of the transmitter output signal as described in 11.6.
3. RBW = 1 ㎒ (unless otherwise specified).
4. VBW ≥ [3 × RBW].
5. Detector = RMS (power averaging), if [span / (# of points in sweep)] ≤ (RBW / 2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this

condition cannot be satisfied, then the detector mode shall be set to peak.

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

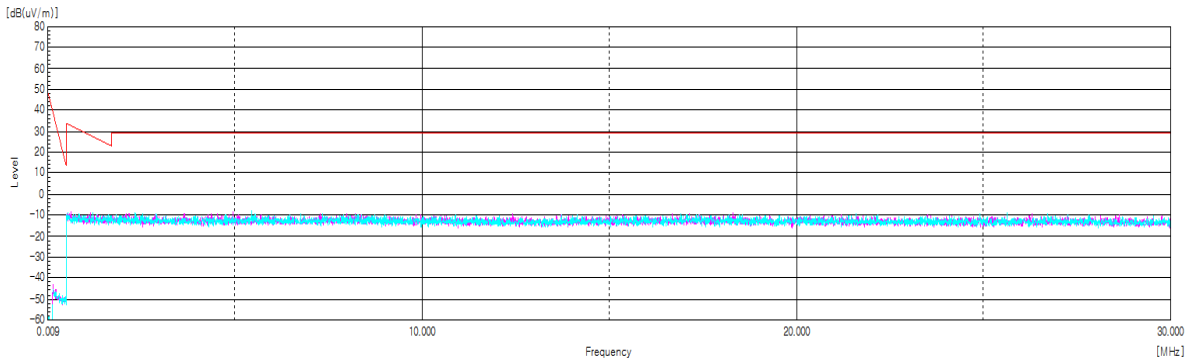
Notes:

2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 ㎒ for Peak detection and frequency above 1 ㎓. The resolution bandwidth of test receiver/spectrum analyzer is 1 ㎒ and the video bandwidth is 1 ㎑(≥1/T) for Average detection (AV) at frequency above 1 ㎓. (where T = pulse width)
3. *f* <30 ㎒, extrapolation factor of 40 dB/decade of distance. F_d = 40log(D_m/Ds)
   f ≥30 ㎒, extrapolation factor of 20 dB/decade of distance. F_d = 20log(D_m/Ds)
   Where:
   F_d= Distance factor in dB
   D_m= Measurement distance in meters
   D_s= Specification distance in meters
4. Factors(dB) = Antenna factor(dB/m) + Cable loss(dB) + or Amp. gain(dB) + or F_d(dB)
5. The worst-case emissions are reported however emissions whose levels were not within 20 dB of respective limits were not reported.
6. Average test would be performed if the peak result were greater than the average limit.
7. 1) means restricted band.
8. 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.
9. 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-3 High frequency

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

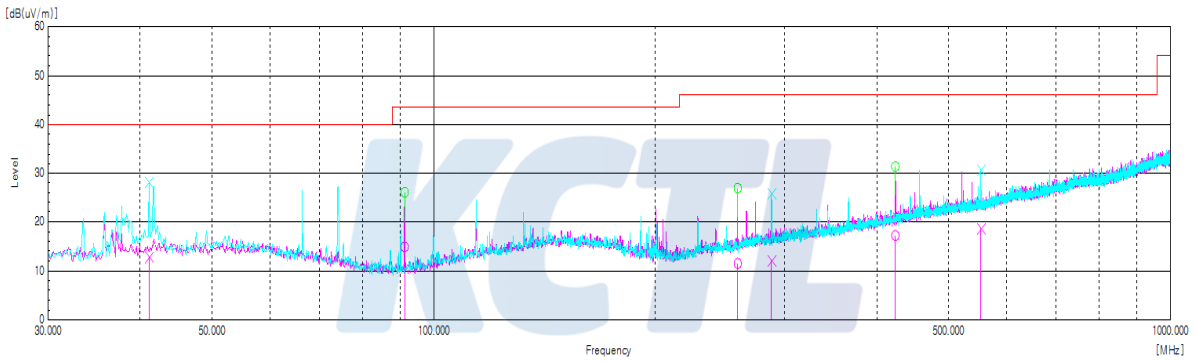
Horizontal/Vertical



Test results (Below 1 000 ㎒) – Worst case: 802.11n HT20 / UNII-3 High frequency

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data								
41.16	V	24.90	18.40	-30.80	-	12.50	40.00	27.50
91.35	H	30.60	13.86	-30.08	-	14.38	43.50	29.12
258.56	H	21.80	17.94	-28.51	-	11.23	46.00	34.77
287.66	V	21.10	19.05	-28.29	-	11.86	46.00	34.14
423.82	H	21.80	22.35	-27.39	-	16.76	46.00	29.24
553.44	V	20.40	24.43	-26.74	-	18.09	46.00	27.91

Horizontal/Vertical



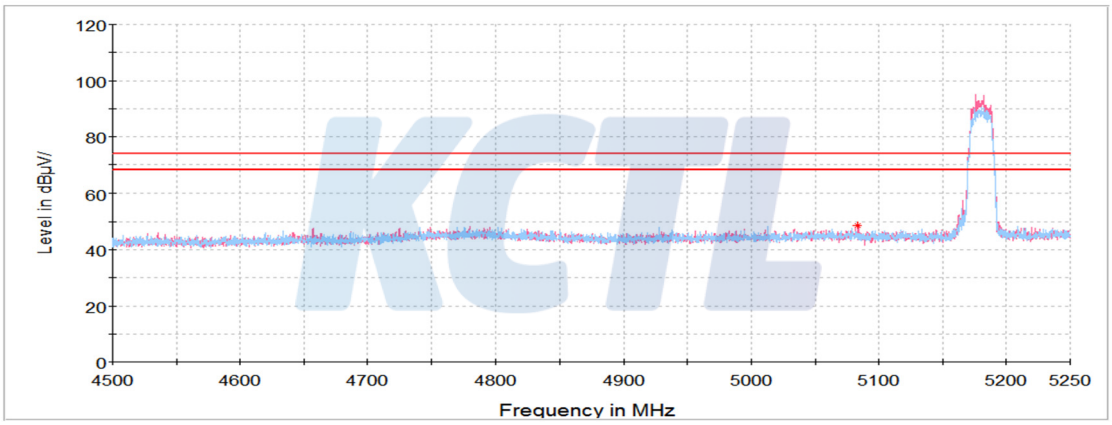
Test results (Above 1 000 ㎒)

802.11a_UNII-1

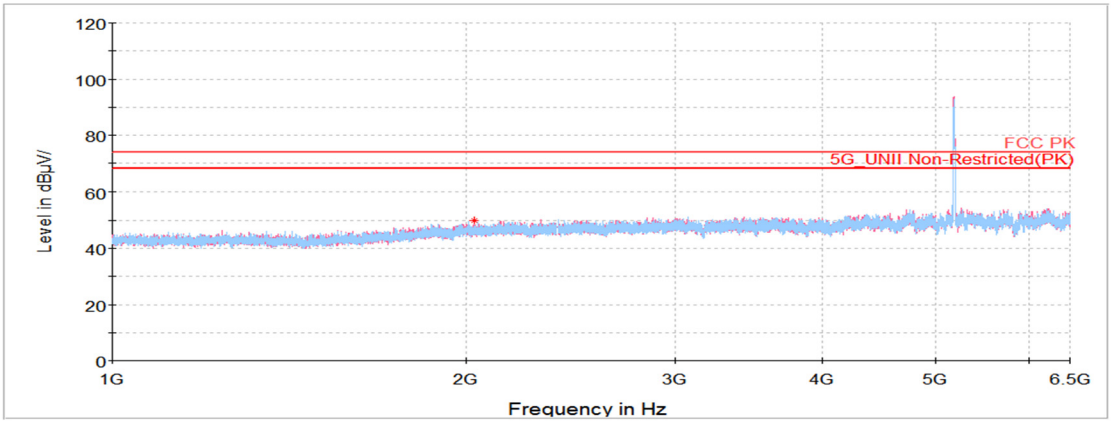
Lowest Channel (5 180 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
2 029.02	V	67.65	31.72	-49.40	-	49.97	68.20	18.23
5 083.75[1)]	V	41.29	34.00	-26.75	-	48.54	74.00	25.46
10 360.77	H	58.51	37.32	-48.87	-	46.96	68.20	21.24
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit								

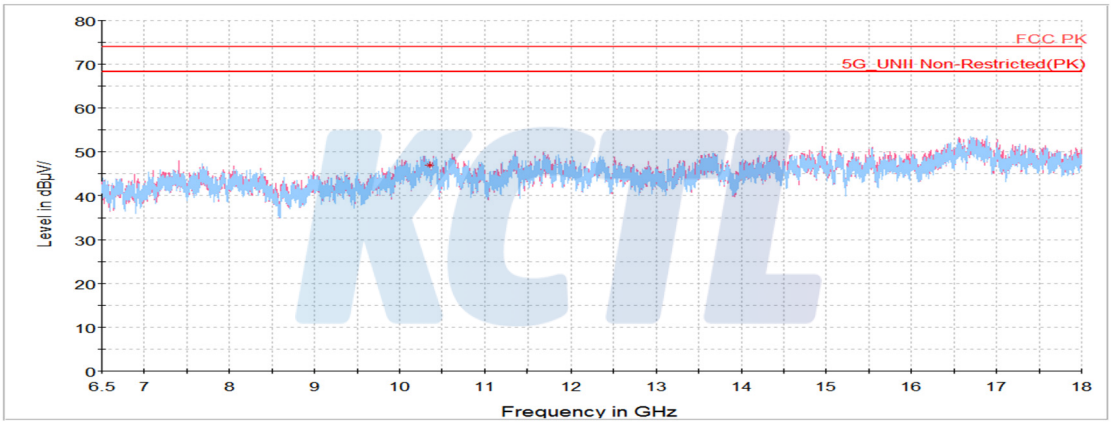
Horizontal/Vertical for Band-edge



Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓



Horizontal/Vertical for 18 ㎓ ~ 40 ㎓