TEST REPORT

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1. Client

- Name : KAON Media Co.,Ltd.
- Address : Kaonmedia Building, 884-3, Seongnam-daero, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea
- Date of Receipt : 2019-11-11

2. Use of Report : Certification

3. Name of Product and Model : AP Router / AR2146

4. Manufacturer and Country of Origin : KAON Media Co.,Ltd. / Korea

5. FCC ID : WQT-AP5000

6. Date of Test : 2019-12-04 to 2020-02-26

7. Test Standards : FCC Part 15 Subpart C, 15.247

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

Affirmation	Tested by Name : Euijung Kim (Signature)	Technical Manager Name : Bobae Lee (Signature)

2020-02-26

KCTL Inc.

Report revision history

Date	Revision	Page No
2020-02-03	Initial report	-
2020-02-10	Updated	24, 38
2020-02-26	Updated	8, 21~23, 155 25, 32~35

Note. The report No. KR20-SRF0029-A is superseded by the report No. KR20-SRF0029-B.

CONTENTS

1. General information

Client	:	KAON Media Co.,Ltd.
Address	:	Kaonmedia Building, 884-3, Seongnam-daero, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea
Manufacturer	:	KAON Media Co.,Ltd.
Address	:	Kaonmedia Building, 884-3, Seongnam-daero, Bundang-gu, Seongnam-si, Gyeonggi-do, 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	:	AP Router
Model	:	AR2146
Derivative model	:	EVO5000AP
Frequency range	:	2 412 ㎒ ~ 2 462 ㎒ (802.11b/g/n_HT20) 2 422 ㎒ ~ 2 452 ㎒ (802.11n_HT40) UNII-1: 5 180 ㎒ ~ 5 240 ㎒ (11a/n_HT20/ac_VHT20) UNII-1: 5 190 ㎒ ~ 5 230 ㎒ (11n_HT40/ac_VHT40) UNII-1: 5 210 ㎒ (11ac_VHT80) UNII-2A: 5 260 ㎒ ~ 5 320 ㎒ (11a/n_HT20/ac_VHT20) UNII-2A: 5 270 ㎒ ~ 5 310 ㎒ (11n_HT40/ac_VHT40) UNII-2A: 5 290 ㎒ (11ac_VHT80) UNII-2C: 5 500 ㎒ ~ 5 720 ㎒ (11a/n_HT20/ac_VHT20) UNII-2C: 5 510 ㎒ ~ 5 710 ㎒ (11n_HT40/ac_VHT40) UNII-2C: 5 530 ㎒ ~ 5 690 ㎒ (11ac_VHT80) UNII-3: 5 745 ㎒ ~ 5 825 ㎒ (11a/n_HT20/ac_VHT20) UNII-3: 5 755 ㎒ ~ 5 795 ㎒ (11n_HT40/ac_VHT40) UNII-3: 5 775 ㎒ (11ac_VHT80)
Modulation technique	:	DSSS (802.11b) OFDM (802.11a/g/n_HT20/ HT40/ac_VHT20/ VHT40/ VHT80)
Number of channels	:	11 ch (802.11b/g/n_HT20)_2.4 ㎓ Band 9 ch (802.11n_HT40)_2.4 ㎓ Band 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 ㎒)
Power source	:	DC 12 V
Antenna specification	:	PCB Antenna 2.4G 1.88 dBi UNII-1 1.98 dBi UNII-2A 1.97 dBi

		UNII-2C	1.94 dBi
		UNII-3	1.86 dBi
Software version	:	1.0.22	
Hardware version	:	1.0	
Operation temperature	:	22 ℃	

2.1. Accessory information

Equipment	Manufacturer	Model	Serial No.	FCC ID
AC Adapter	Chenzhou Frecom Electronics Co.,Ltd	F24L9-120200SPAU	N/A	N/A

2.2. Information about derivative model

The difference between basic model and derivative models is:

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

2.3. Frequency/channel operations

This device contains the following capabilities:
2.4 ㎓ WIFI: WLAN 802.11b/g/n(HT20,HT40)
5 ㎓ WIFI: WLAN 802.11a/g/n(HT20,HT40)/ac(VHT20,VHT40,VHT80)

Ch.	Frequency (㎒)
01	2 412
. .	. .
06	2 437
. .	. .
11	2 462

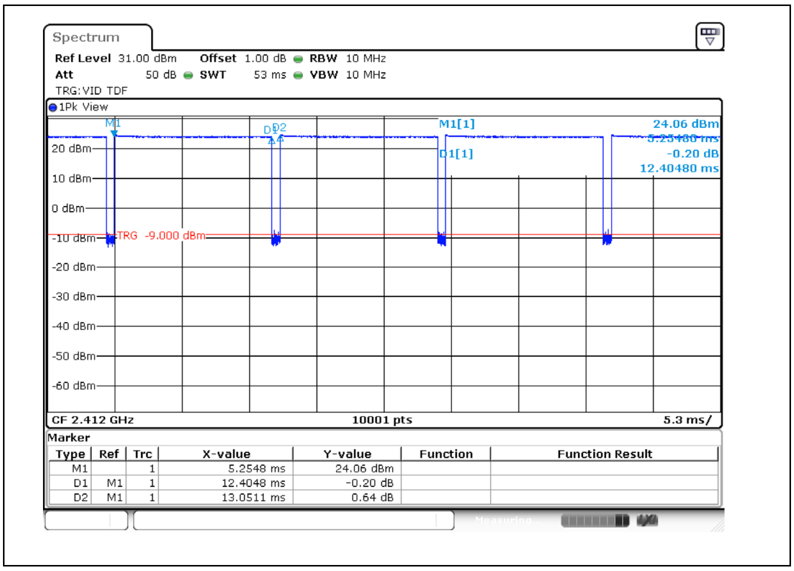
Table 2.3.1. 802.11b/g/n(HT20) mode

Ch.	Frequency (㎒)
03	2 422
. .	. .
06	2 437
. .	. .
09	2 452

Table 2.3.2. 802.11n(HT40) mode

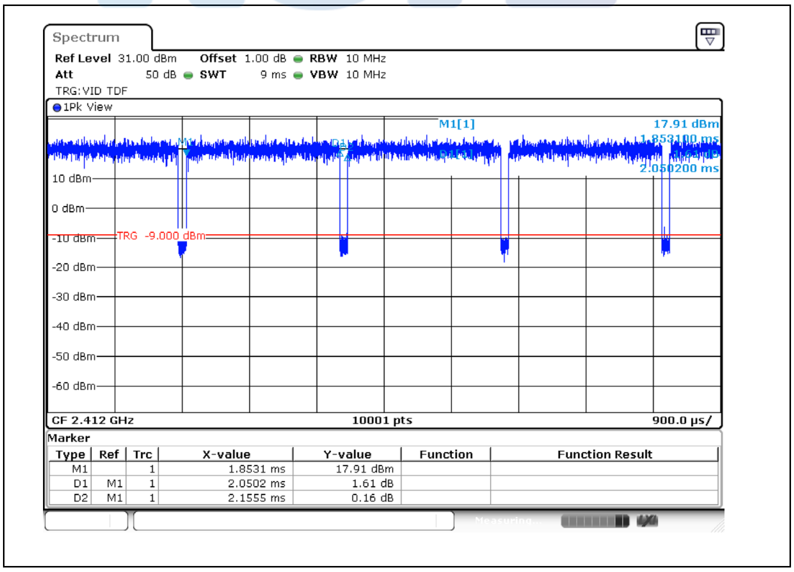
2.4. Duty Cycle Correction Factor

- 802.11b



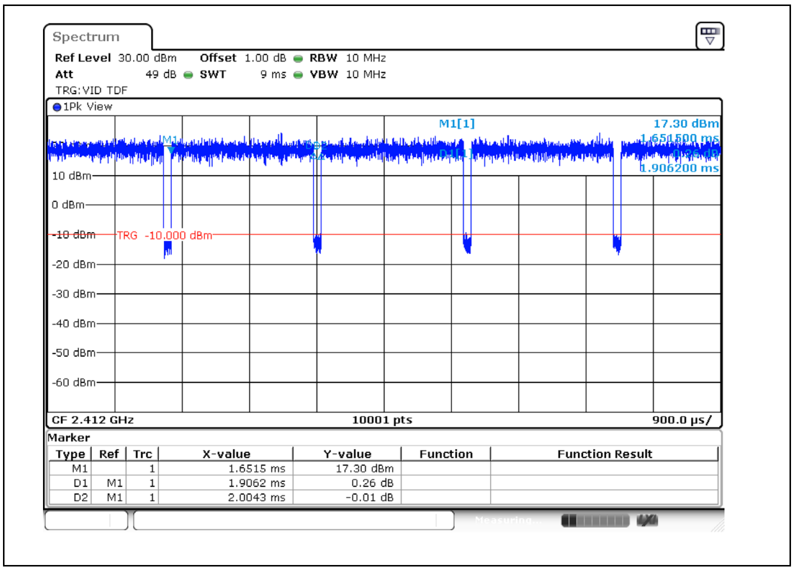
Note1) : Period : 13.051 ㎳, On time : 12.405 ㎳
Note2) : DCCF = 10 log(1 / x) = 10 log(1/0.950) = 0.22 ㏈, x = 12.405/13.051 = 0.950 (95.0%)
Note3) : 802.11b is a non-continuous transmission (duty cycle < 98 %)

- 802.11g



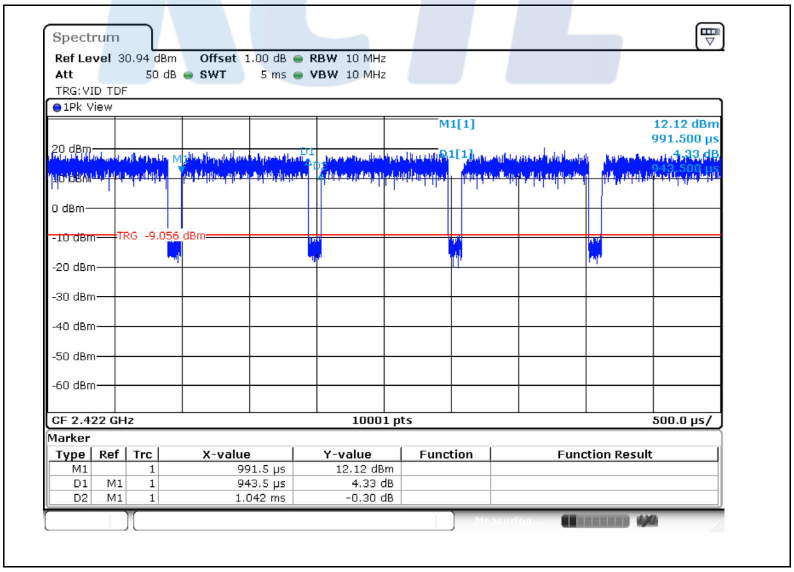
Note1) : Period : 2.156 ㎳, On time : 2.050 ㎳
Note2) : DCCF = 10 log(1 / x) = 10 log(1/0.951) = 0.22 ㏈, x = 2.050/2.156 = 0.951 (95.1%)
Note3) : 802.11g is a non-continuous transmission (duty cycle < 98 %)

- 802.11n HT20



Note1) : Period : 2.004 ㎳, On time : 1.906 ㎳
Note2) : DCCF = 10 log(1 / x) = 10 log(1/0.951) = 0.22 ㏈, x = 1.906/2.004 = 0.951 (95.1%)
Note3) : 802.11n HT20 is a non-continuous transmission (duty cycle < 98 %)

- 802.11n HT40



Note1) : Period : 1.042 ㎳, On time : 0.944 ㎳
Note2) : DCCF = 10 log(1 / x) = 10 log(1/0.905) = 0.43 ㏈, x = 0.944/1.042 = 0.905 (90.5%)
Note3) : 802.11n HT40 is a non-continuous transmission (duty cycle < 98 %)

2.5. Power level setup in software

Power level setup in software					
Test Mode	Channel	Sortware Setup			
		ANT 0	ANT 1	ANT 2	3TX MIMO
802.11b	2 412 ㎒	88	89	89	81
	2 437 ㎒	92	92	89	83
	2 462 ㎒	88	88	89	82
802.11g	2 412 ㎒	72	68	70	68
	2 437 ㎒	88	88	88	70
	2 462 ㎒	72	69	73	70
802.11n HT20	2 412 ㎒	70	67	69	67
	2 437 ㎒	88	88	88	70
	2 462 ㎒	68	68	71	67
802.11n HT40	2 422 ㎒	64	58	60	58
	2 437 ㎒	88	88	88	70
	2 452 ㎒	60	61	62	58

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 PCB Antenna (internal antenna) on board.
- The E.U.T Complies with the requirement of §15.203, §15.247.

3.1 Antenna information

Mode	SISO			CDD	MIMO
	ANT 0	ANT 1	ANT 2	ANT 0 + 1 + 2	ANT 0 + 1 + 2
802.11b	√	√	√	√	X
802.11g	√	√	√	√	X
802.11n HT20	√	√	√	√	√
802.11n HT40	√	√	√	√	√

√ = Support, X = Not support
Note.
1. This device employs SISO and CDD, MIMO technology output power as ANT 0 and ANT 1 and ANT 2.

3.2 Directional Gain Calculations

According to clause F), 2), d), (ii) of KDB 662911 D01 Multiple Transmitter Output, Directional gain may be calculated by using the formulas as below.

3.2.1. Directional Antenna Gain with equal gain

ANT 0 Gain (dBi)	ANT 1 Gain (dBi)	ANT 2 Gain (dBi)	Combined Gain (dBi)
1.88	1.88	1.88	1.88

Note.
1. If all transmit signals are completely uncorrelated, then

Directional gain = $10 \log [(10^{G1/10} + 10^{G2/10} + \ldots + 10^{GN/10})/N_{ANT}]$ dBi

4. Summary of tests

FCC Part section(s)	Parameter	Test results
15.247(b)(3)	Maximum peak output power	Pass
15.247(e)	Peak power spectral density	Pass
15.247(a)(2)	6 dB channel bandwidth	Pass
15.247(d), 15.205(a), 15.209(a)	Spurious emission	Pass
	Band-edge, restricted band	Pass
15.207(a)	Conducted emissions	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 kHz to 30 MHz. Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30 m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field site based on KDB 414788.
3. The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that X orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in X orientation
4. The test procedure(s) in this report were performed in accordance as following.
   - ANSI C63.10-2013
   - KDB 558074 D01 v05r02
   - KDB 662911 D01 v02r01
5. The worst-case data rate were:
   802.11b mode : 1Mbps
   802.11g mode : 6Mbps
   802.11n HT20 mode : MCS0
   802.11n HT40 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 ㏈	
Conducted spurious emissions	4.03 ㏈	
Radiated spurious emissions	9 ㎑ ~ 30 ㎒:	2.28 ㏈
	30 ㎒ ~ 300 ㎒	4.98 ㏈
	300 ㎒ ~ 1 000 ㎒	5.14 ㏈
	1 ㎓ ~ 6 ㎓	6.70 ㏈
	Above 6 ㎓	6.60 ㏈
Conducted emissions	9 ㎑ ~ 150 ㎑	3.66 ㏈
	150 ㎑ ~ 30 ㎒	3.26 ㏈

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	9.78	9 000	12.06
100	10.05	10 000	12.15
200	10.15	11 000	12.27
300	10.23	12 000	12.24
400	10.30	13 000	12.43
500	10.35	14 000	12.68
600	10.39	15 000	12.81
700	10.44	16 000	12.70
800	10.49	17 000	12.71
900	10.54	18 000	12.94
1 000	10.55	19 000	13.43
2 000	10.86	20 000	13.09
3 000	11.07	21 000	13.18
4 000	11.24	22 000	13.72
5 000	11.48	23 000	13.54
6 000	11.66	24 000	13.47
7 000	11.78	25 000	13.64
8 000	12.05	26 000	13.80

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

7. Test results

7.1. 6 dB Bandwidth(DTS Channel Bandwidth)

Test setup

EUT — Attenuator — Spectrum analyzer

Limit
According to §15.247(a)(2) Systems using digital modulation techniques may operate in the 902–928 ㎒, 2 400–2 483.5 ㎒, and 5 725–5 850 ㎒ bands. The minimum 6 ㏈ bandwidth shall be at least 500 ㎑.

Test procedure
ANSI C63.10-2013 - Section 11.8

Test settings

DTS bandwidth

One of the following procedures may be used to determine the modulated DTS bandwidth.

Option 1

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

Option 2

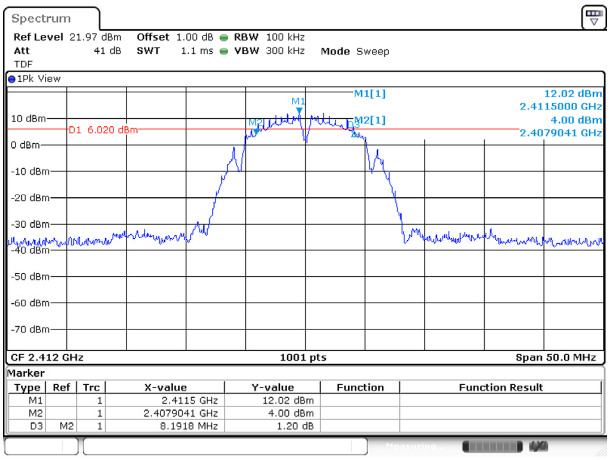
The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 ㏈, if the functionality described in 11.8.1 (i.e., RBW = 100 ㎑, VBW ≥ 3 × RBW, and peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥6 ㏈.

Test results

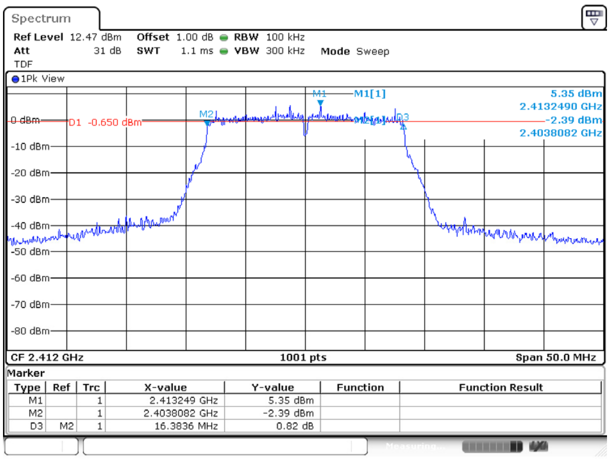
Test mode	Frequency(㎒)	6 ㏈ bandwidth(㎒)		
		ANT 0	ANT 1	ANT 2
802.11b	2 412	8.19	8.64	8.18
	2 437	8.64	9.19	8.64
	2 462	7.69	8.59	8.76
802.11g	2 412	16.38	16.21	16.43
	2 437	16.38	16.50	16.43
	2 462	15.98	15.85	16.50
802.11n HT20	2 412	17.08	17.44	17.44
	2 437	17.38	17.66	17.66
	2 462	16.68	16.43	17.00
802.11n HT40	2 422	35.86	35.60	35.75
	2 437	36.46	36.61	36.61
	2 452	35.86	36.03	36.03

ANT 0

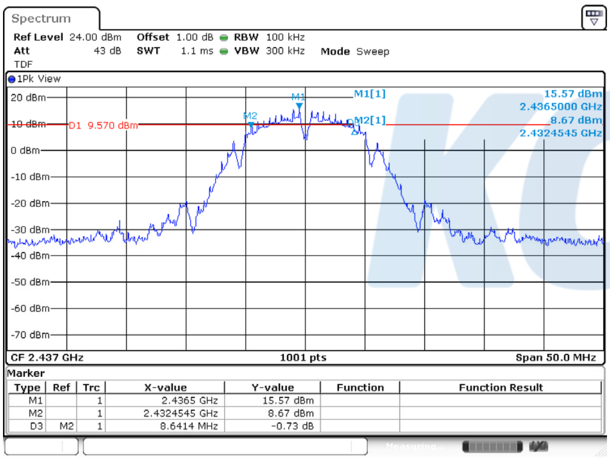
802.11b / 2 412 ㎒



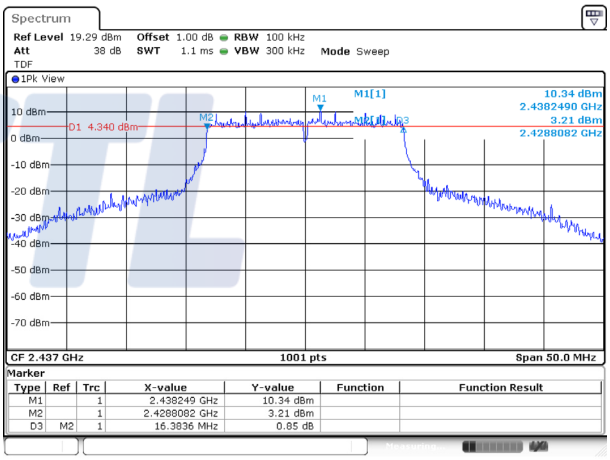
802.11g / 2 412 ㎒



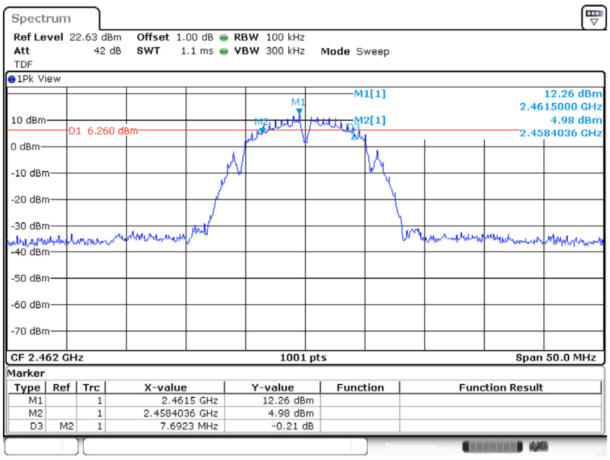
802.11b / 2 437 ㎒



802.11g / 2 437 ㎒



802.11b / 2 462 ㎒



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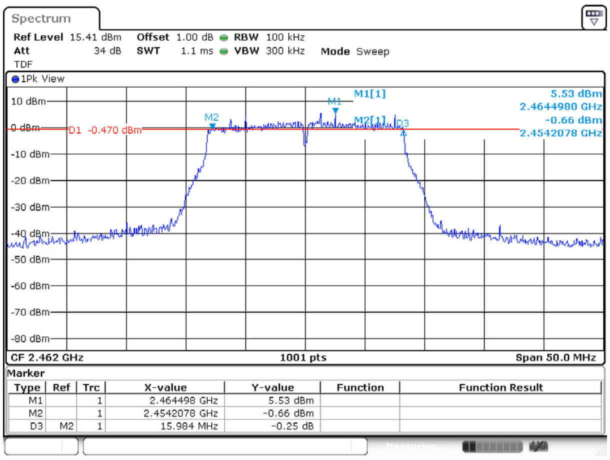
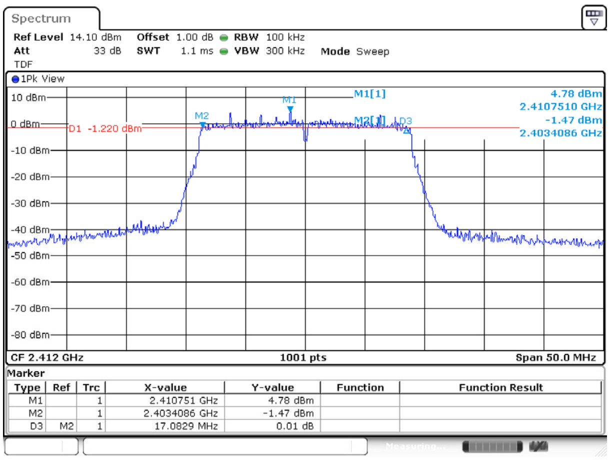
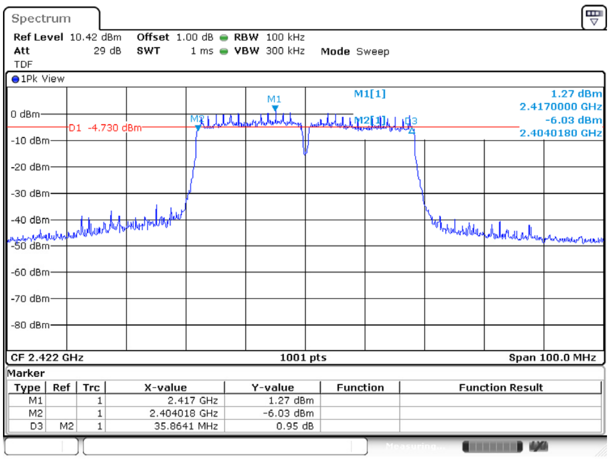


802.11n HT20 / 2 412 ㎒	802.11n HT40 / 2 422 ㎒
	

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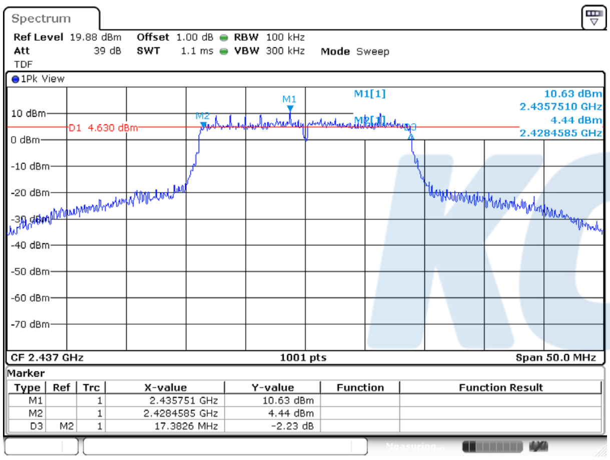	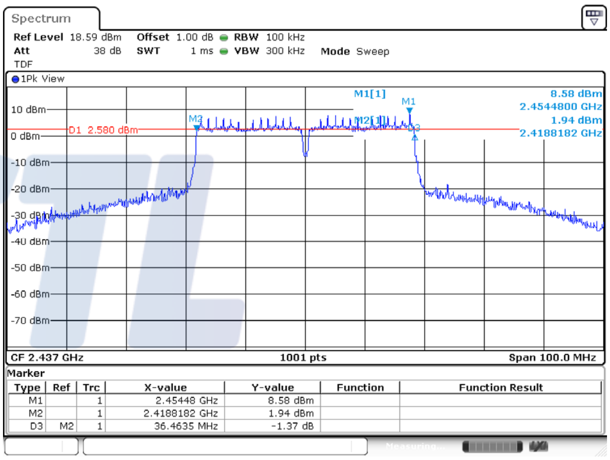

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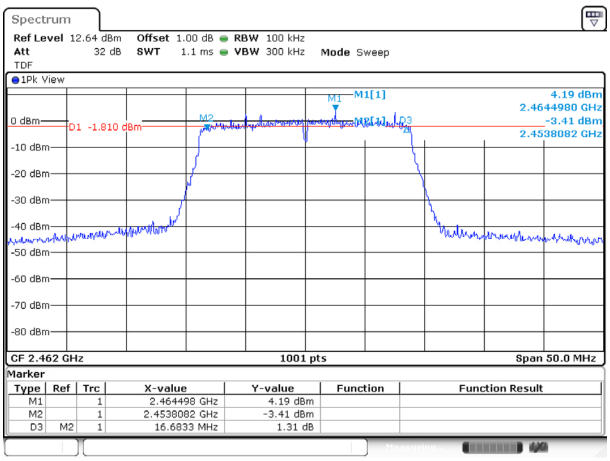
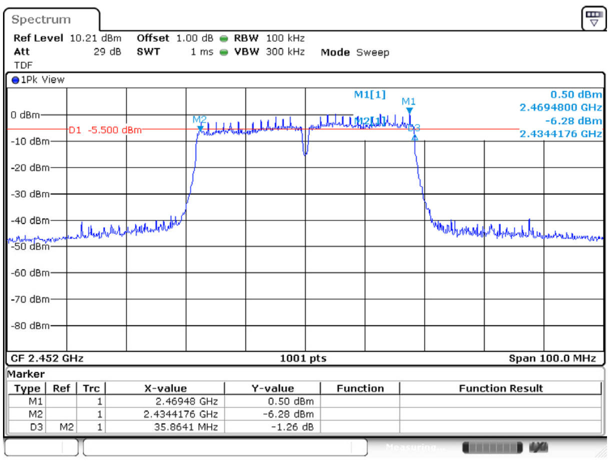
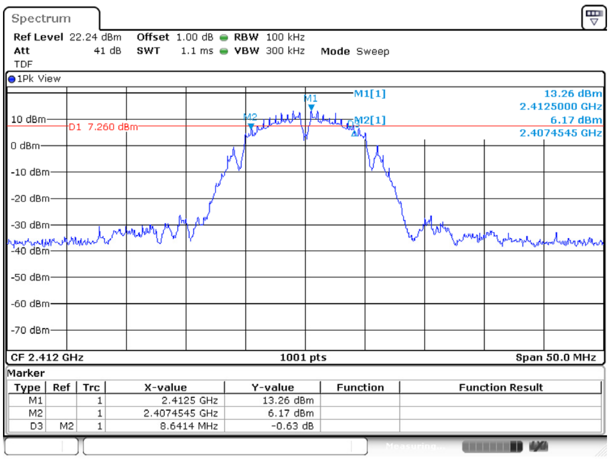
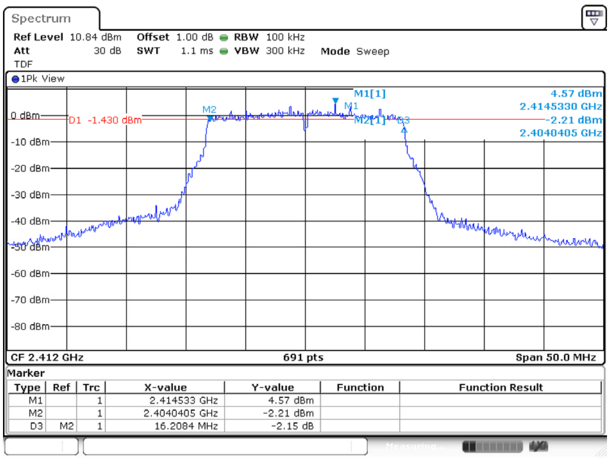
	

ANT 1

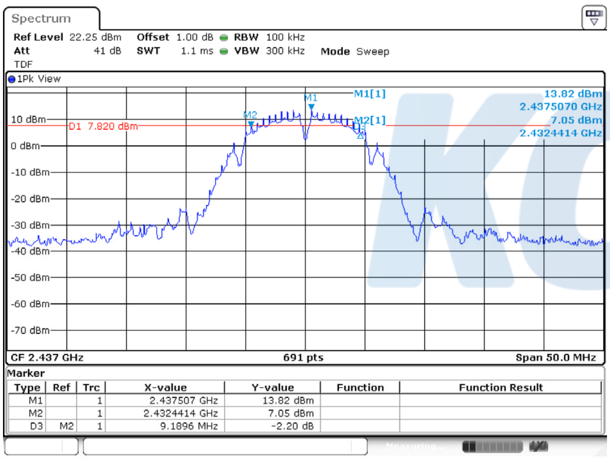
802.11b / 2 412 ㎒



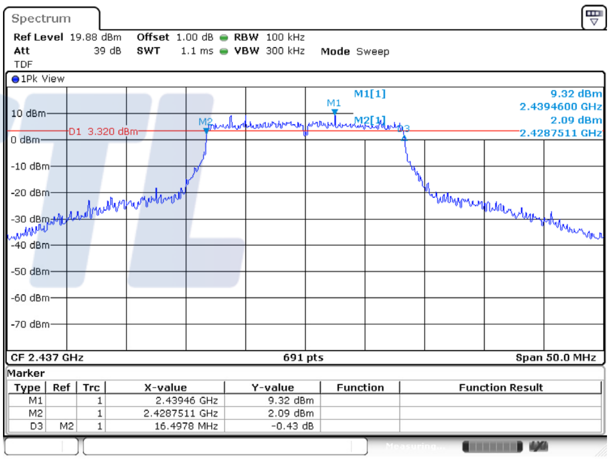
802.11g / 2 412 ㎒



802.11b / 2 437 ㎒



802.11g / 2 437 ㎒



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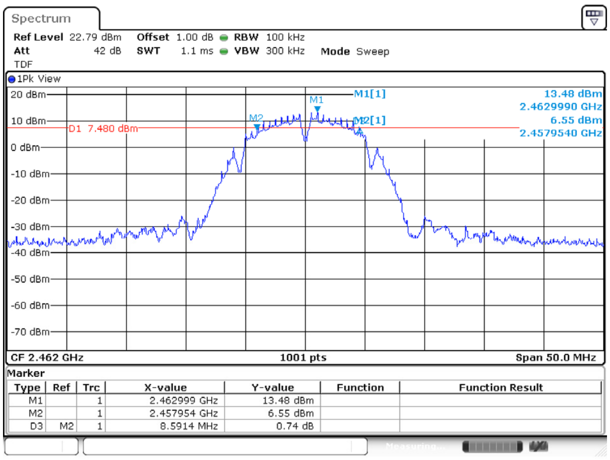

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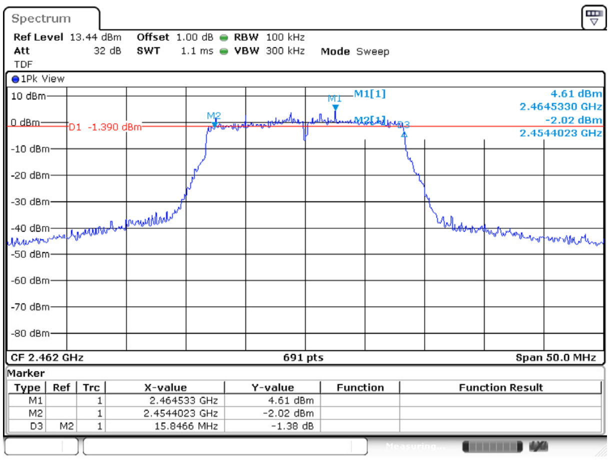
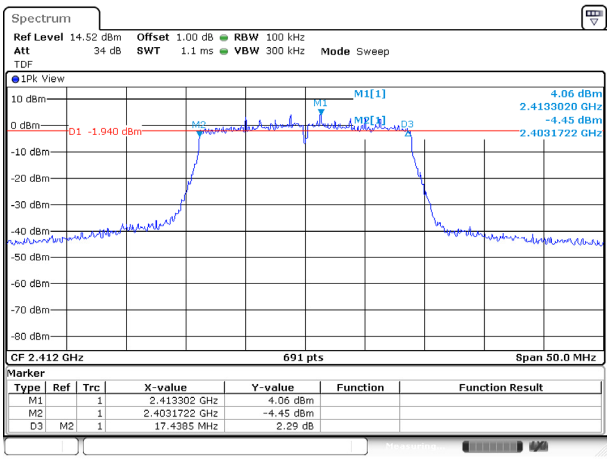
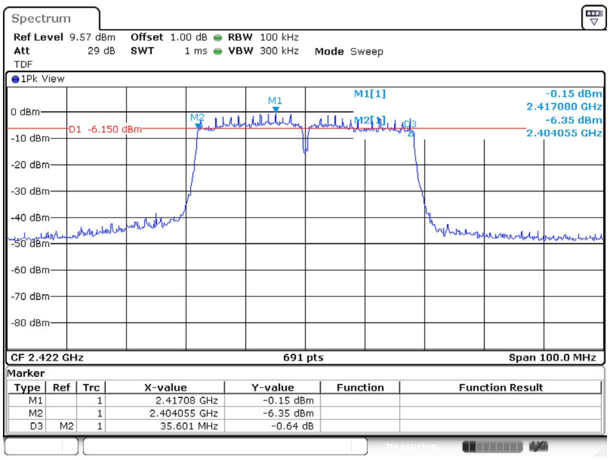


802.11n HT20 / 2 412 ㎒



802.11n HT40 / 2 422 ㎒



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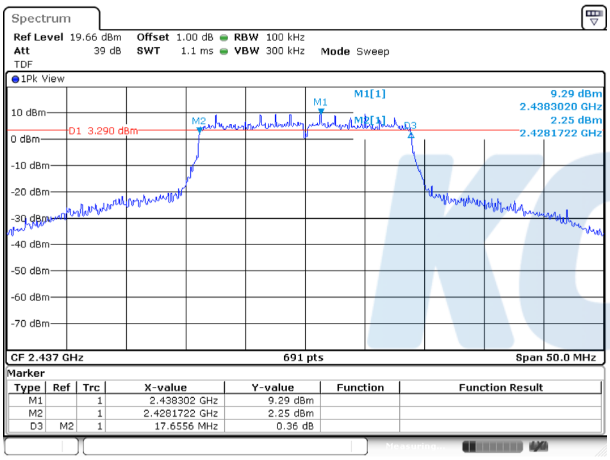

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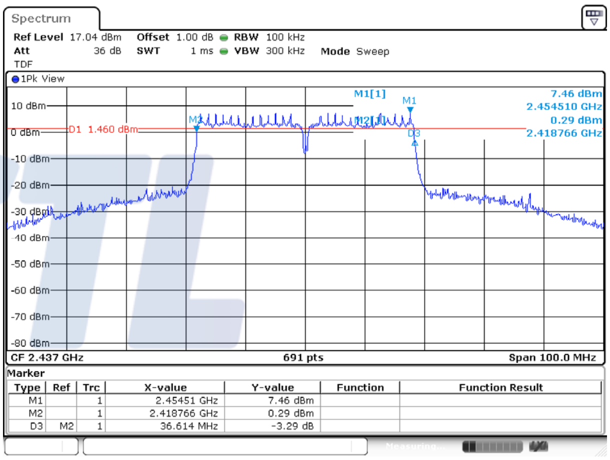

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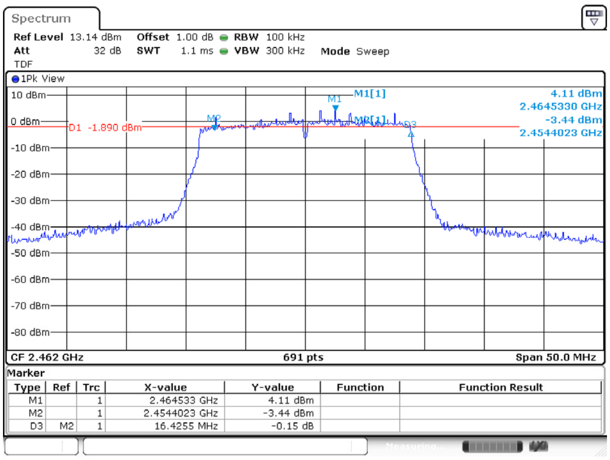

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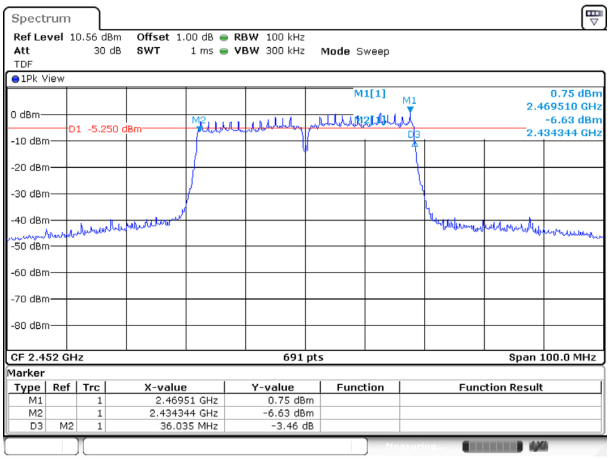
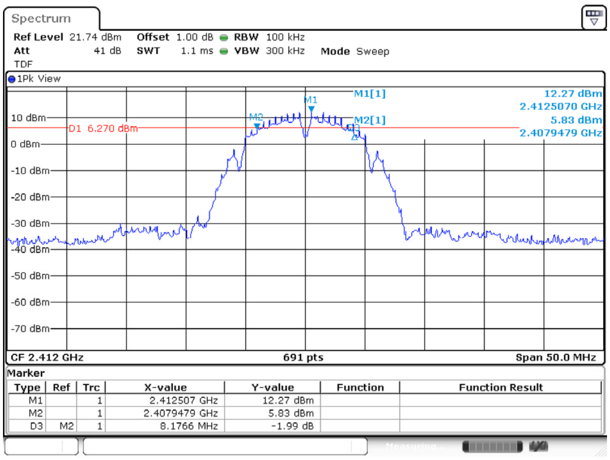
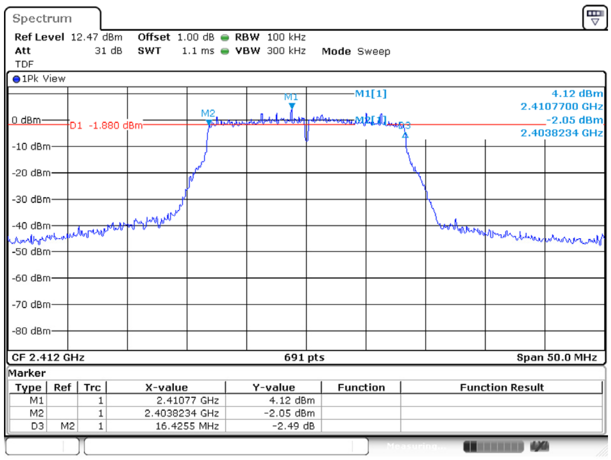


ANT 2

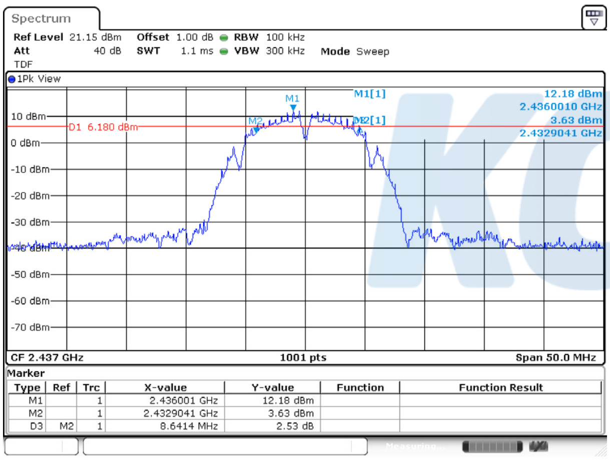
802.11b / 2 412 ㎒



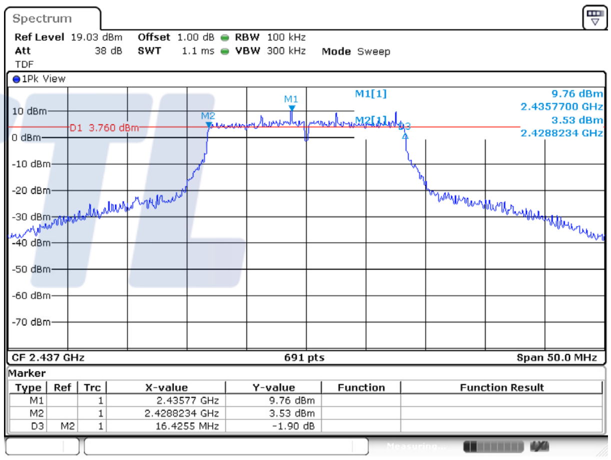
802.11g / 2 412 ㎒



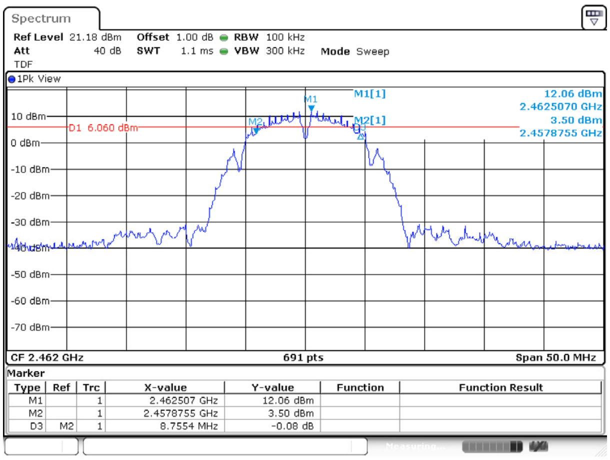
802.11b / 2 437 ㎒



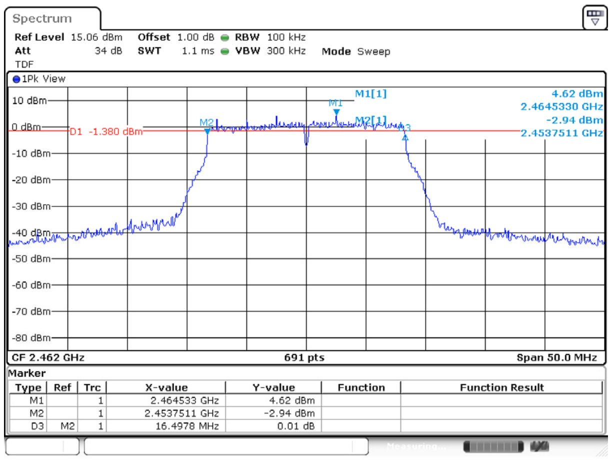
802.11g / 2 437 ㎒



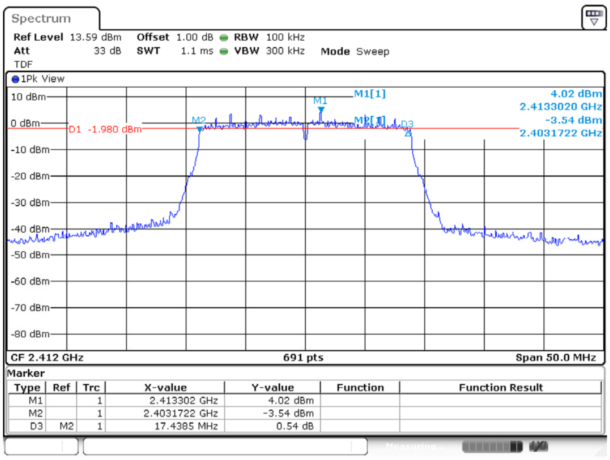
802.11b / 2 462 ㎒



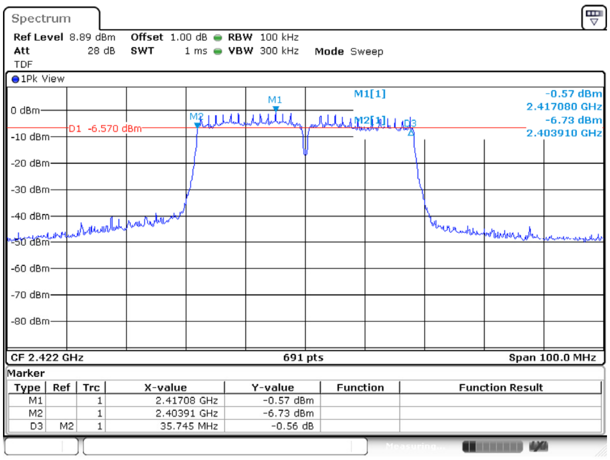
802.11g / 2 462 ㎒



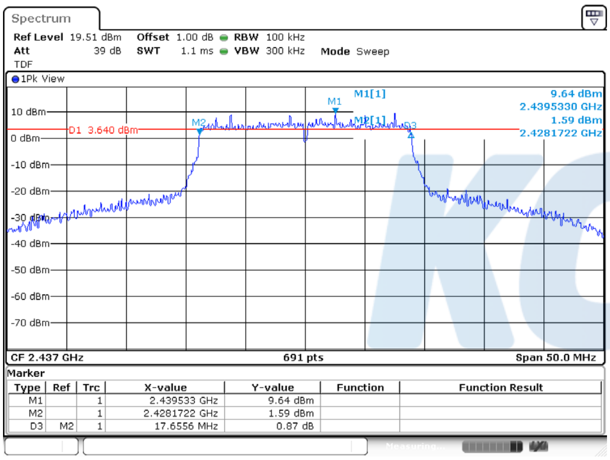
802.11n HT20 / 2 412 ㎒



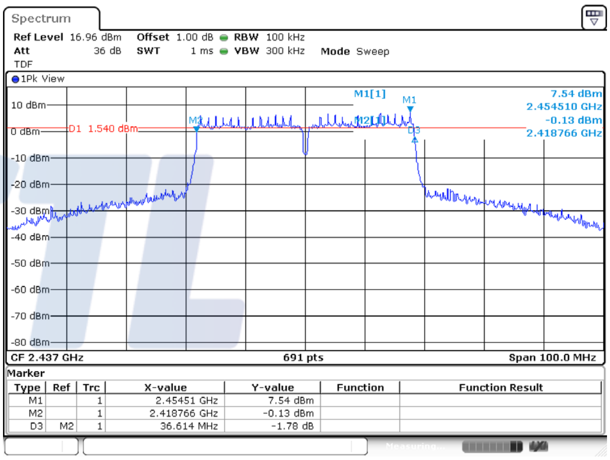
802.11n HT40 / 2 422 ㎒



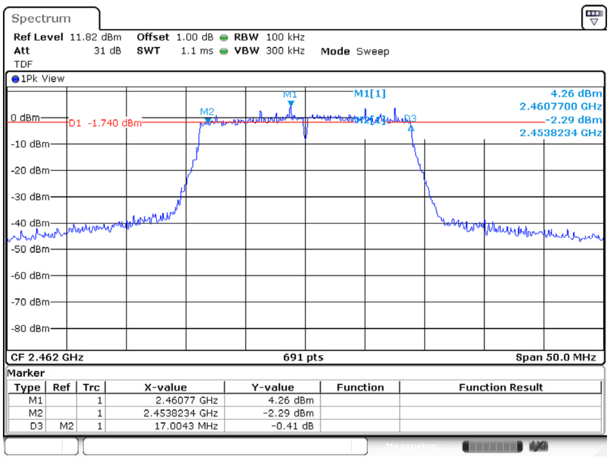
802.11n HT20 / 2 437 ㎒



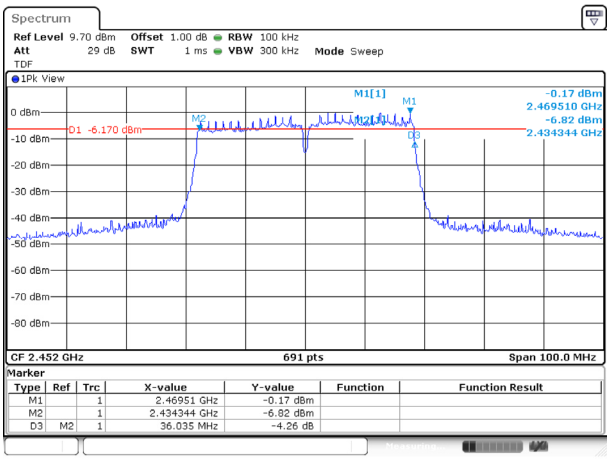
802.11n HT40 / 2 437 ㎒



802.11n HT20 / 2 462 ㎒



802.11n HT40 / 2 452 ㎒



7.2. Maximum peak output power

Test setup

Limit

According to §15.247(b)(3), RSS-247(5.4) For systems using digital modulation in the 902-928 ㎒, 2 400-2 483.5 ㎒, and 5 725-5 850 ㎒ bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

According to §15.247(b)(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to RSS-247 5.4(d), For DTSs employing digital modulation techniques operating in the bands 902-928 ㎒ and 2400-2483.5 ㎒, the maximum peak conducted output power shall not exceed 1 W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e).

Test procedure

ANSI C63.10-2013 - Section 11.9 and 14.2

Test settings

General

Section 15.247 permits the maximum conducted (average) output power to be measured as an alternative to the maximum peak conducted output power for demonstrating compliance to the limit. When this option is exercised, the measured power is to be referenced to the OBW rather than the DTS bandwidth (see ANSI C63.10 for measurement guidance).

When using a spectrum analyzer or EMI receiver to perform these measurements, it shall be capable of utilizing a number of measurement points in each sweep that is greater than or equal to twice the span/RBW to set a bin-to-bin spacing of ≤ RBW/2 so that narrowband signals are not lost between frequency bins.

If possible, configure or modify the operation of the EUT so that it transmits continuously at its maximum power control level. The intent is to test at 100 % duty cycle; however a small reduction in duty cycle (to no lower than 98 %) is permitted, if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.

If continuous transmission (or at least 98 % duty cycle) cannot be achieved due to hardware limitations (e.g., overheating), the EUT shall be operated at its maximum power control level, with the transmit duration as long as possible, and the duty cycle as high as possible during which sweep triggering/signal gating techniques may be used to perform the measurement over the transmission duration.

Maximum peak conducted output power
One of the following procedures may be used to determine the maximum peak conducted output power of a DTS EUT.

RBW ≥ DTS bandwidth
The following procedure shall be used when an instrument with a resolution bandwidth that is greater than the DTS bandwidth is available to perform the measurement:

a) Set the RBW ≥ DTS bandwidth.
b) Set VBW ≥ [3 × RBW].
c) Set span ≥ [3 × RBW].
d) Sweep time = auto couple.
e) Detector = peak.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use peak marker function to determine the peak amplitude level.

PKPM1 Peak power meter method
The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall use a fast-responding diode detector.

Measurement using a power meter (PM)

Method AVGPM is a measurement using an RF average power meter, as follows:

a) As an alternative to spectrum analyzer or EMI receiver measurements, 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:
   1) The EUT is configured to transmit continuously, or to transmit with a constant duty cycle.
   2) At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
   3) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
b) If the transmitter does not transmit continuously, measure the duty cycle, D, of the transmitter output signal as described in 11.6.
c) Measure the average power of the transmitter. This measurement is an average over both the ON and OFF periods of the transmitter.
d) Adjust the measurement in dBm by adding [10 log(1/D)], where D is the duty cycle.

Notes:
A peak responding power sensor is used, where the power sensor system video bandwidth is greater than the occupied bandwidth of the EUT.

Test results

SISO

Test mode	Frequency (㎒)	Conducted output power (dBm)						Limit (dBm)
		ANT 0		ANT 1		ANT 2		
		Peak	Average	Peak	Average	Peak	Average	
802.11b	2 412	24.62	20.64	24.72	21.08	24.40	20.70	30
	2 437	26.67	23.17	26.10	22.69	23.96	20.27	
	2 462	24.45	20.39	23.79	20.08	23.86	20.04	
802.11g	2 412	26.40	16.55	25.37	15.63	25.82	15.53	
	2 437	28.59	21.33	28.46	20.88	27.96	20.55	
	2 462	25.57	16.00	24.81	15.18	25.47	15.96	
802.11n HT20	2 412	25.42	15.68	25.16	15.03	25.48	15.13	
	2 437	28.43	21.27	28.26	20.85	27.97	20.53	
	2 462	24.58	14.57	24.77	14.97	25.03	15.26	
802.11n HT40	2 422	24.32	14.03	23.31	12.64	23.79	12.90	
	2 437	28.43	21.12	28.41	20.69	28.25	20.44	
	2 452	23.36	12.87	23.51	13.18	23.42	13.00	

MIMO

Test mode	Frequency (㎒)	Conducted output power (dBm)								Limit (dBm)
		ANT 0		ANT 1		ANT 2		MIMO		
		Peak	Average	Peak	Average	Peak	Average	Peak	Average	
802.11b	2 412	22.15	18.06	21.67	17.82	21.51	17.52	26.56	22.58	30
	2 437	22.50	18.46	21.93	18.11	21.71	17.68	26.83	22.87	
	2 462	21.83	17.57	21.29	17.40	21.36	17.13	26.27	22.14	
802.11g	2 412	24.83	14.66	24.18	14.43	24.41	13.94	29.25	19.12	
	2 437	24.82	14.90	24.75	15.05	24.51	14.55	29.47	19.61	
	2 462	24.85	14.90	24.31	14.65	24.23	14.22	29.24	19.37	
802.11n HT20	2 412	24.16	14.15	24.31	14.13	24.39	14.24	29.06	18.94	
	2 437	24.93	15.07	24.52	14.86	23.96	14.30	29.26	19.53	
	2 462	23.52	13.69	23.30	13.63	23.50	13.35	28.21	18.33	
802.11n HT40	2 422	22.64	11.74	22.24	11.58	22.03	10.88	27.08	16.19	
	2 437	25.29	15.27	24.88	14.84	24.64	14.64	29.72	19.69	
	2 452	22.31	11.56	22.04	11.40	22.12	11.19	26.93	16.16	

Notes:

1. Average (dBm) = $10\log(10^{(ANT\ 0/10)} + 10^{(ANT\ 1/10)} + 10^{(ANT\ 2/10)})$ + Duty Factor (dB)

7.3. Peak Power Spectral Density

Test setup

EUT — Attenuator — Spectrum analyzer

Limit

According to §15.247(e), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 ㎑ band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test procedure

ANSI C63.10 - Section 11.10

Test settings

Method AVGPSD-2

Method AVGPSD-2 uses trace averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction.
The following procedure is applicable when the EUT cannot be configured to transmit continuously (i.e.,D < 98%), when sweep triggering/signal gating cannot be used to measure only when the EUT is transmitting at its maximum power control level, and when the transmission duty cycle is constant (i.e., duty cycle variations are less than ±2%):

1) Measure the duty cycle (D) of the transmitter output signal as described in 11.6.
2) Set instrument center frequency to DTS channel center frequency.
3) Set span to at least 1.5 times the OBW.
4) Set RBW to: 3 ㎑ ≤ RBW ≤ 100 ㎑.
5) Set VBW ≥ [3 × RBW].
6) Detector = power averaging (rms) or sample detector (when rms not available).
7) Ensure that the number of measurement points in the sweep ≥ [2 × span / RBW].
8) Sweep time = auto couple.
9) Do not use sweep triggering; allow sweep to “free run.”
10) Employ trace averaging (rms) mode over a minimum of 100 traces.
11) Use the peak marker function to determine the maximum amplitude level.
12) Add [10 log (1 / D)], where D is the duty cycle measured in step a), to the measured PSD to compute the average PSD during the actual transmission time.
13) If measured value exceeds requirement specified by regulatory agency, then reduce RBW (but no less than 3 ㎑) and repeat (note that this may require zooming in on the emission of interest and reducing the span to meet the minimum measurement point requirement as the RBW is reduced).

Test results

SISO

Test mode	Frequency (㎒)	Power Spectral Density Result (dBm/3 ㎑)			Limit (dBm/3 ㎑)
		ANT 0	ANT 1	ANT 2	
802.11b	2 412	-1.73	-1.48	-0.90	8
	2 437	1.58	0.27	-1.75	
	2 462	-1.21	0.35	-1.88	
802.11g	2 412	-8.22	-8.88	-9.90	
	2 437	-3.40	-3.32	-4.86	
	2 462	-8.94	-9.57	-8.29	
802.11n HT20	2 412	-8.41	-10.57	-10.64	
	2 437	-4.35	-3.47	-4.96	
	2 462	-10.40	-10.54	-10.64	
802.11n HT20	2 412	-14.08	-14.70	-15.86	
	2 437	-6.90	-5.35	-7.14	
	2 462	-15.47	-14.81	-13.95	

MIMO

Test mode	Frequency (㎒)	Power Spectral Density Result (dBm/3 ㎑)				Limit (dBm/3 ㎑)
		ANT 0	ANT 1	ANT 2	MIMO[1)]	
802.11b	2 412	-3.53	-4.24	-4.19	0.80	8
	2 437	-3.70	-4.21	-4.43	0.67	
	2 462	-3.73	-4.07	-4.09	0.81	
802.11g	2 412	-10.14	-10.47	-10.79	-5.69	
	2 437	-7.83	-8.05	-9.07	-3.51	
	2 462	-9.16	-9.07	-10.14	-4.66	
802.11n HT20	2 412	-10.90	-10.81	-11.49	-6.29	
	2 437	-6.27	-8.16	-9.33	-2.96	
	2 462	-10.24	-10.20	-11.29	-5.78	
802.11n HT20	2 412	-15.81	-17.28	-16.15	-11.60	
	2 437	-11.74	-9.81	-12.49	-6.42	
	2 462	-16.72	-15.21	-14.87	-10.76	

Notes:

1. MIMO Result Calculation:

$$\text{MIMO (dBm/ 3 kHz)} = 10\log(10^{(\text{ANT Green}/10)} + 10^{(\text{ANT Gray}/10)} + 10^{(\text{ANT Black}/10)})$$