

Test Report

Part 15.247 & RSS-247 (Issue 2)

Equipment under test Flat Panel Digital X-ray Detector

Model name EVS 4343W

Derivative Model EVS 3643W, EVS 4343WP,
EVS 3643WP

FCC ID RNH-EVS4343W

IC ID 29808-EVS4343W

Applicant DRTECH Corporation

Manufacturer DRTECH Corporation

Date of test(s) 2022.09.01 ~ 2022.09.30

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Issued to

DRTECH Corporation

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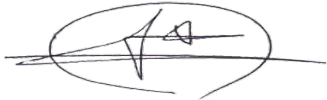
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This test report is not related to KS Q ISO/IEC 17025 and KOLAS

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Revision history

Revision	Date of issue	Test report No.	Description
-	2023.01.09	KES-RF-23T0009	Initial

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1. General information

Applicant: DRTECH Corporation
Applicant address: Suite No.1, 1Floor / Suite No.2, 3Floor, 29, Dunchon-daero 541 beon-gil,
Jungwon-gu, Seongnam-si, Gyeonggi-do, Republic of Korea
Test site: KES Co., Ltd.
Test site address: ☐ 3701, 40, Simin-daero 365beon-gil, Dongan-gu, Anyang-si,
Gyeonggi-do, 14057, Korea
☒ 473-21, Gayeo-ro, Yeoju-si, Gyeonggi-do, Korea
Test Facility: FCC Accreditation Designation No.: KR0100, Registration No.: 444148
ISED Registration No.: 23298
FCC, IC rule part(s): FCC : 15.247 / IC : RSS-247
FCC ID: RNH-EVS4343W
IC ID: 29808-EVS4343W
Test device serial No.: ☒ Production ☐ Pre-production ☐ Engineering

1.1. EUT description

Equipment under test: Flat Panel Digital X-ray Detector
Frequency range: 2 412 Mhz ~ 2 462 Mhz (11b/g/n_HT20)
2 422 Mhz ~ 2 452 Mhz (11n_HT40)
UNII-1 5 180 Mhz ~ 5 240 Mhz (11a/an_VHT20/ac_VHT20)
5 190 Mhz ~ 5 230 Mhz (11an_VHT40/ac_VHT40)
5 210 Mhz (11ac_VHT80)
UNII-2A 5 260 Mhz ~ 5 320 Mhz (11a/an_VHT20/ac_VHT20)
5 270 Mhz ~ 5 310 Mhz (11an_VHT40/ac_VHT40)
5 290 Mhz (11ac_VHT80)
UNII-2C 5 500 Mhz ~ 5 700 Mhz (11a/an_VHT20/ac_VHT20)
5 510 Mhz ~ 5 670 Mhz (11an_VHT40/ac_VHT40)
5 530 Mhz ~ 5 610 Mhz (11ac_VHT80)
UNII-3 5 745 Mhz ~ 5 825 Mhz (11a/an_VHT20/ac_VHT20)
5 755 Mhz ~ 5 795 Mhz (11an_VHT40/ac_VHT40)
5 775 Mhz (11ac_VHT80)
Model: EVS 4343W
Modulation technique: OFDM

Number of channels	2 412 MHz ~ 2 462 MHz (11b/g/n_HT20) : 11ch 2 422 MHz ~ 2 452 MHz (11n_HT40) : 7ch
UNII-1	5 180 MHz ~ 5 240 MHz (11a/an_VHT20/ac_VHT20) : 4ch 5 190 MHz ~ 5 230 MHz (11an_VHT40/ac_VHT40) : 2ch 5 210 MHz (11ac_VHT80) : 1ch
UNII-2A	5 260 MHz ~ 5 320 MHz (11a/an_VHT20/ac_VHT20) : 4ch 5 270 MHz ~ 5 310 MHz (11an_VHT40/ac_VHT40) : 2ch 5 290 MHz (11ac_VHT80) : 1ch
UNII-2C	5 500 MHz ~ 5 700 MHz (11a/an_VHT20/ac_VHT20) : 11ch 5 510 MHz ~ 5 670 MHz (11an_VHT40/ac_VHT40) : 5ch 5 530 MHz ~ 5 610 MHz (11ac_VHT80) : 2ch
UNII-3	5 745 MHz ~ 5 825 MHz (11a/an_VHT20/ac_VHT20) : 5ch 5 755 MHz ~ 5 795 MHz (11an_VHT40/ac_VHT40) : 2ch 5 775 MHz (11ac_VHT80) : 1ch
Antenna specification	ANT 1 / 2 : PCB Antenna
Antenna Gain(SISO)	2.4 GHz band : -5.6 dBi 5 GHz band : UNII-1 ,UNII-2A : 0.7 dBi / UNII-2C, UNII-3 : 0.5 dBi
Antenna Gain(MIMO)	2.4 GHz band : -2.6 dBi 5 GHz band : UNII-1 ,UNII-2A : 3.7 dBi / UNII-2C, UNII-3 : 3.5 dBi
Power source	DC 7 V (Battery)
H/W version	0.3
S/W version	2207292b

1.2. Test configuration

The **DRTECH Corporation // Flat Panel Digital X-ray Detector // EVS 4343 W //**

FCC ID: RNH-EVS4343W // IC ID:29808-EVS4343W was tested according to the specification of EUT, the EUT must comply with following standards and KDB documents.

FCC Part 15.247
ISED RSS-247 Issue 2 and RSS-Gen Issue 5
KDB 558074 D01 v05 r02
ANSI C63.10-2013

1.3. Information about derivative model

Model name	Remark
EVS3643W	There is no difference in circuitry between the basic model and the multi-model. Addition of variant models for marketing purposes only.
EVS 4343WP	
EVS 3643WP	

1.4. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source
Battery Charger	DRETECH Corporation	EVS-BCS	HH220401935	DC 8.4 V
AC Adpater	XP Power	AHM85PS12	V21290190	AC 120 V

1.6. Maximum average output power

Refer to the average output power

Note.

1. Radiated emission were performed with the EUT set to transmit at the channel with highest output Power as worst-case scenario.
2. Worst-case data rates as provided by the client were:
ANT1 - 802.11b : **1Mbps** ,802.11g : **6Mbps**, 802.11n_HT20/40 : **MCS0**
ANT2 - 802.11b : **1Mbps** ,802.11g : **6Mbps**, 802.11n_HT20/40 : **MCS0**
ANT1+2 - 802.11n_HT20/40 : **MCS8**

1.7. Sample calculation

Where relevant, the following sample calculation is provided
For all conducted test items :

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator 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.

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 0.72 + 10 = 10.72 \text{ (dB)}\end{aligned}$$

For Radiation test :

Field strength level (dB μ V/m) = Measured level (dB μ V) + Antenna factor (dB) + Cable loss (dB) – Amplifier gain (dB)

1.8. Measurement Uncertainty

Test Item		Uncertainty
Uncertainty for Conduction emission test		2.38 dB (SHIELD ROOM #6)
Uncertainty for Radiation emission test (include Fundamental emission)	Below 1 GHz	4.50 dB (SAC #6)
	Above 1 GHz	4.90 dB (SAC #5)
Note. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.		

1.9. Application for Testing

Application Name	Version
REALTEK 11n 8188EUS USB WLAN NIC Massproduction kit	0.28.119.2010

1.10. Frequency/channel operations

Ch.	Frequency (MHz)	Mode
1	2 412	802.11b/g/n_HT20
⋮	⋮	⋮
6	2 437	802.11b/g/n_HT20
⋮	⋮	⋮
11	2 462	802.11b/g/n_HT20

Ch.	Frequency (MHz)	Mode
3	2 422	802.11n_HT40
⋮	⋮	⋮
6	2 437	802.11n_HT40
⋮	⋮	⋮
9	2 452	802.11n_HT40

UNII-1

Ch.	Frequency (MHz)
36	5 180
44	5 220
48	5 240

UNII-2A

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

UNII-2C

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

UNII-3

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

802.11a/an_VHT20/ac_VHT20 mode

UNII-1

Ch.	Frequency (MHz)
38	5 190
46	5 230

UNII-2A

Ch.	Frequency (MHz)
54	5 270
62	5 310

UNII-2C

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

UNII-3

Ch.	Frequency (MHz)
151	5 755
159	5 795

802.11an_VHT40/ac_VHT40 mode

UNII-1

Ch.	Frequency (MHz)
42	5 210

UNII-2A

Ch.	Frequency (MHz)
58	5 290

UNII-2C

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

UNII-3

Ch.	Frequency (MHz)
155	5 775

802.11ac_VHT80 mode

2. Summary of tests

Section in FCC Part 15	Section in RSS-247 & Gen	Parameter	Test results
-	RSS-Gen 6.7	99% Occupied bandwidth	Pass
15.247(a)(2)	RSS-247 5.2(a)	6 dB bandwidth	Pass
15.247(b)(3)	RSS-247 5.4(d)	Output power	Pass
15.247(e)	RSS-247 5.2(b)	Power spectral density	Pass
15.205, 15.209	RSS-247 5.5 RSS-Gen 8.9, 8.10	Radiated restricted band and emission	Pass
15.247(d)	RSS-247 5.5	Conducted spurious emission and band edge	Pass
15.207(a)	RSS-Gen 8.8	AC Conducted emissions	Pass
15.203	-	Antenna Requirement	Pass

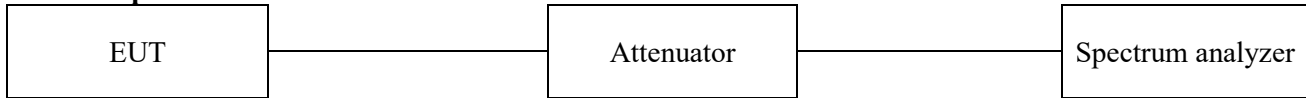
3. Test results

3.1. 99% Occupied Bandwidth

Test procedure

ANSI C63.10-2013 clause 6.9.2 and 6.9.3

Test setup



Test setting

1. Span = The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
2. RBW = The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW 3.
VBW = shall be approximately three times the RBW
4. Sweep = auto
5. Detector function = Peak
6. Trace = Max hold

Limit

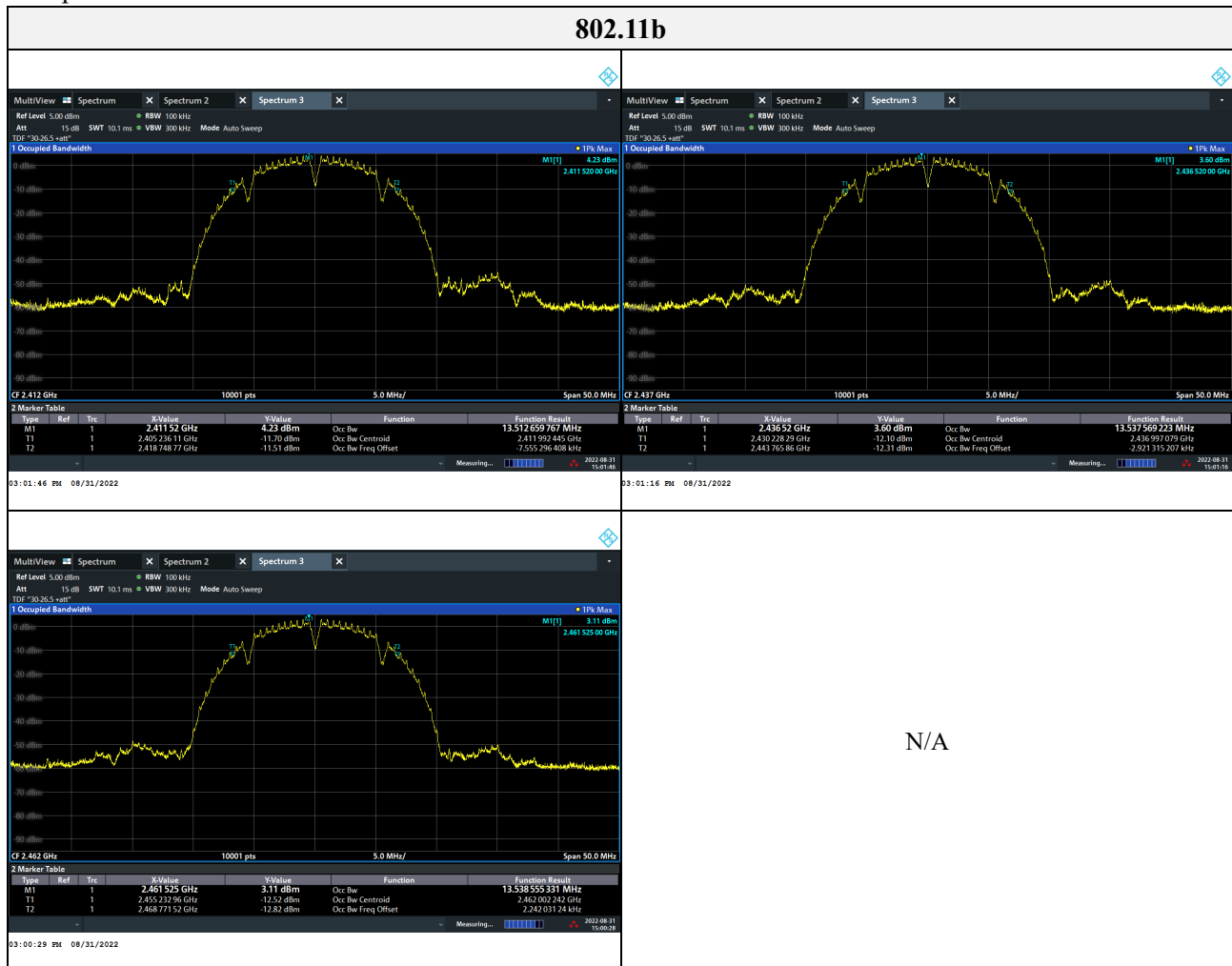
None for reporting purpose only.

ANT1

Mode : 802.11b

Frequency(MHz)	99% occupied bandwidth(MHz)	Limit(MHz)
2 412	13.51	-
2 437	13.54	
2 462	13.54	

Test plots



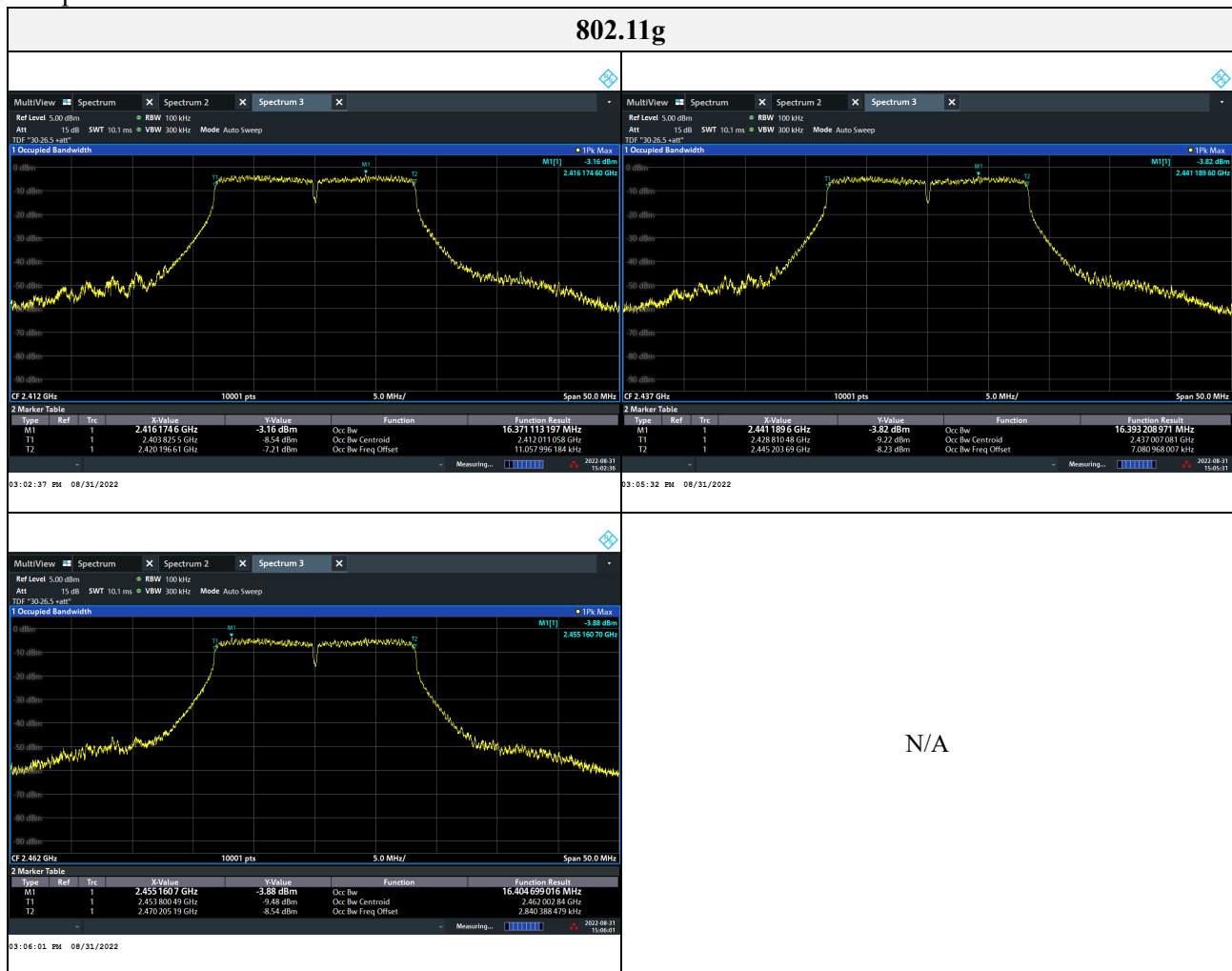
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Mode : 802.11g

Frequency(MHz)	99% occupied bandwidth(MHz)	Limit(MHz)
2 412	16.37	-
2 437	16.39	
2 462	16.40	

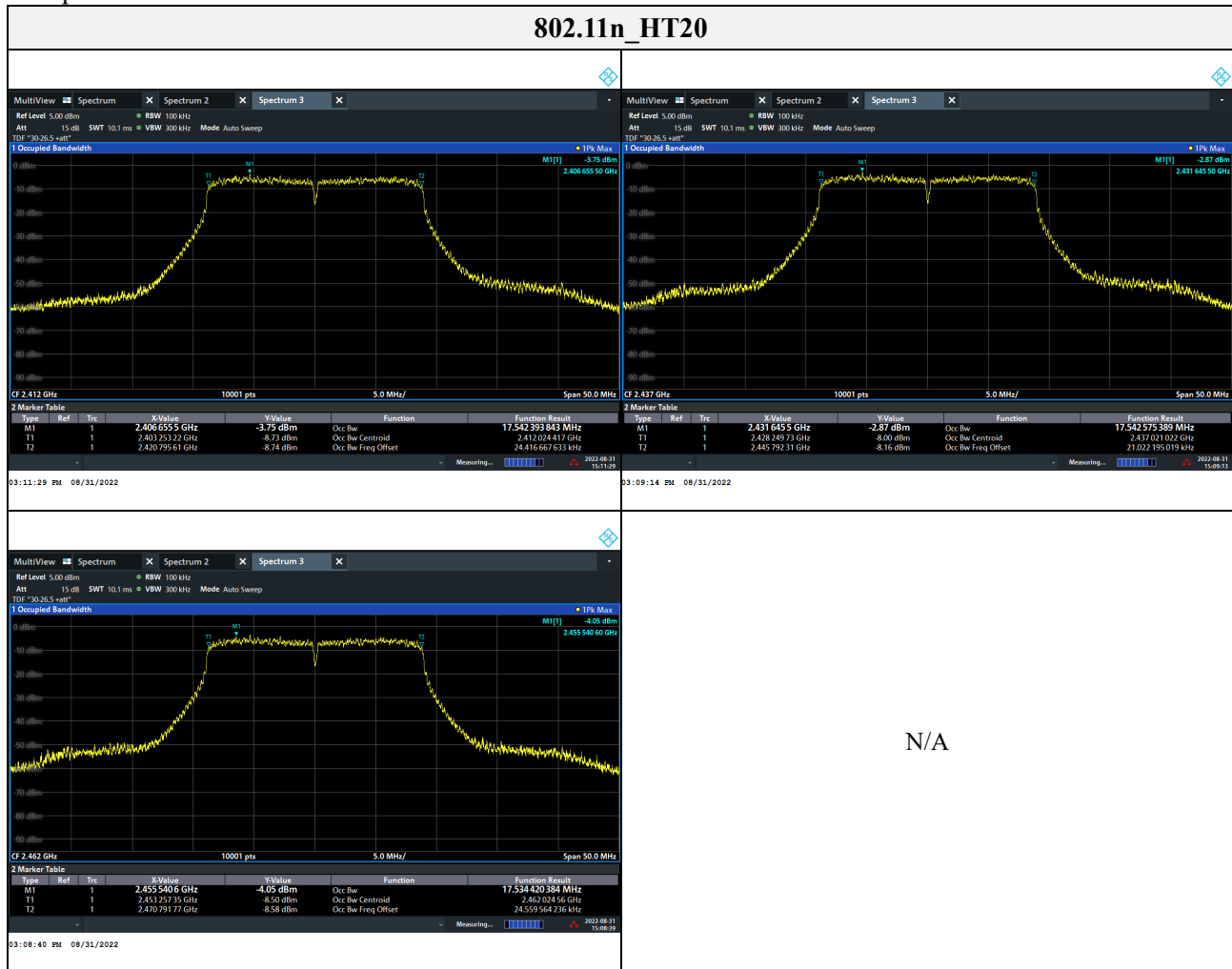
Test plots



Mode : 802.11n HT20

Frequency(MHz)	99% occupied bandwidth(MHz)	Limit(MHz)
2 412	17.54	-
2 437	17.54	
2 462	17.53	

Test plots

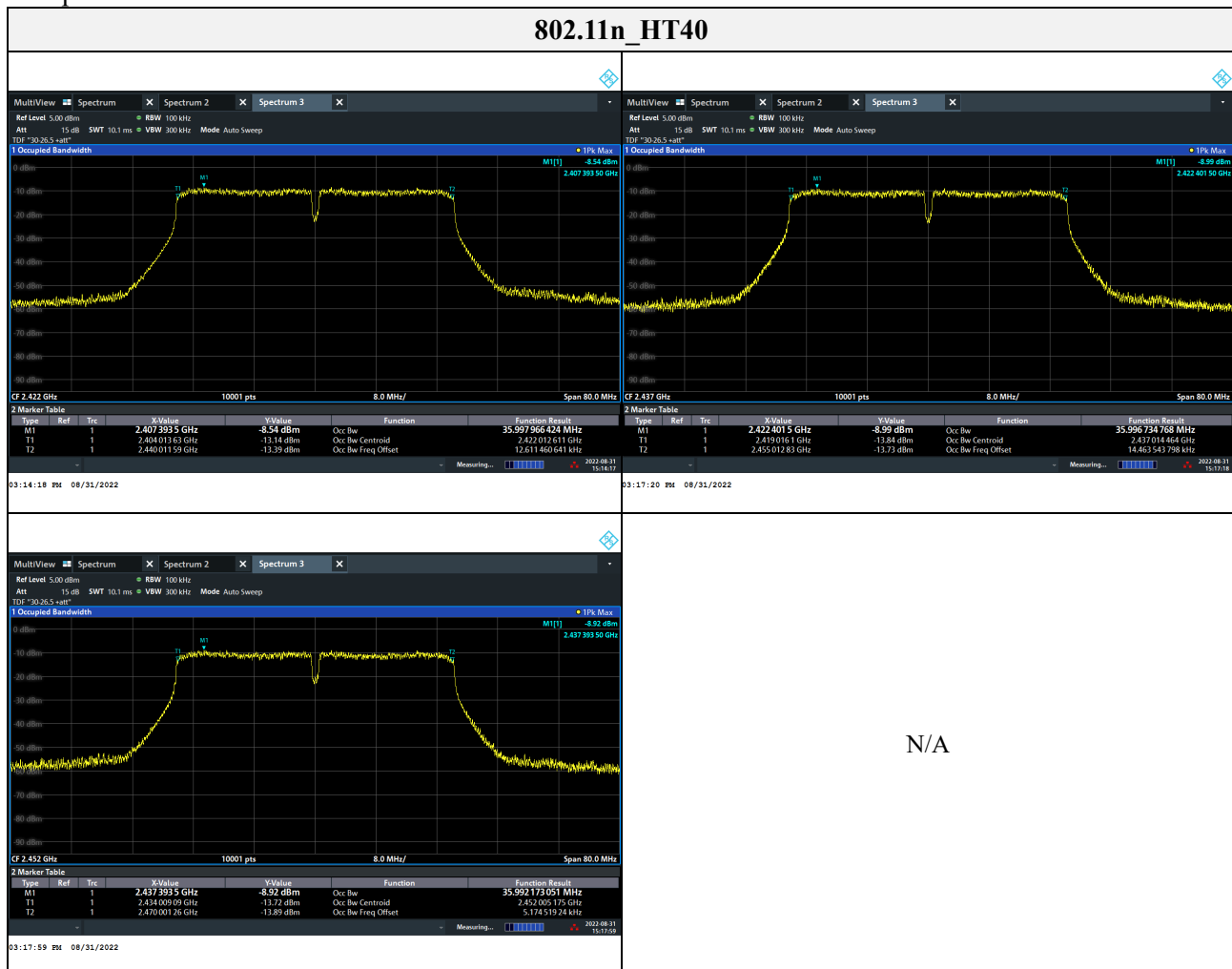


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Mode : 802.11n HT40

Frequency(MHz)	99% occupied bandwidth(MHz)	Limit(MHz)
2 422	36.00	-
2 437	36.00	
2 452	35.99	

Test plots



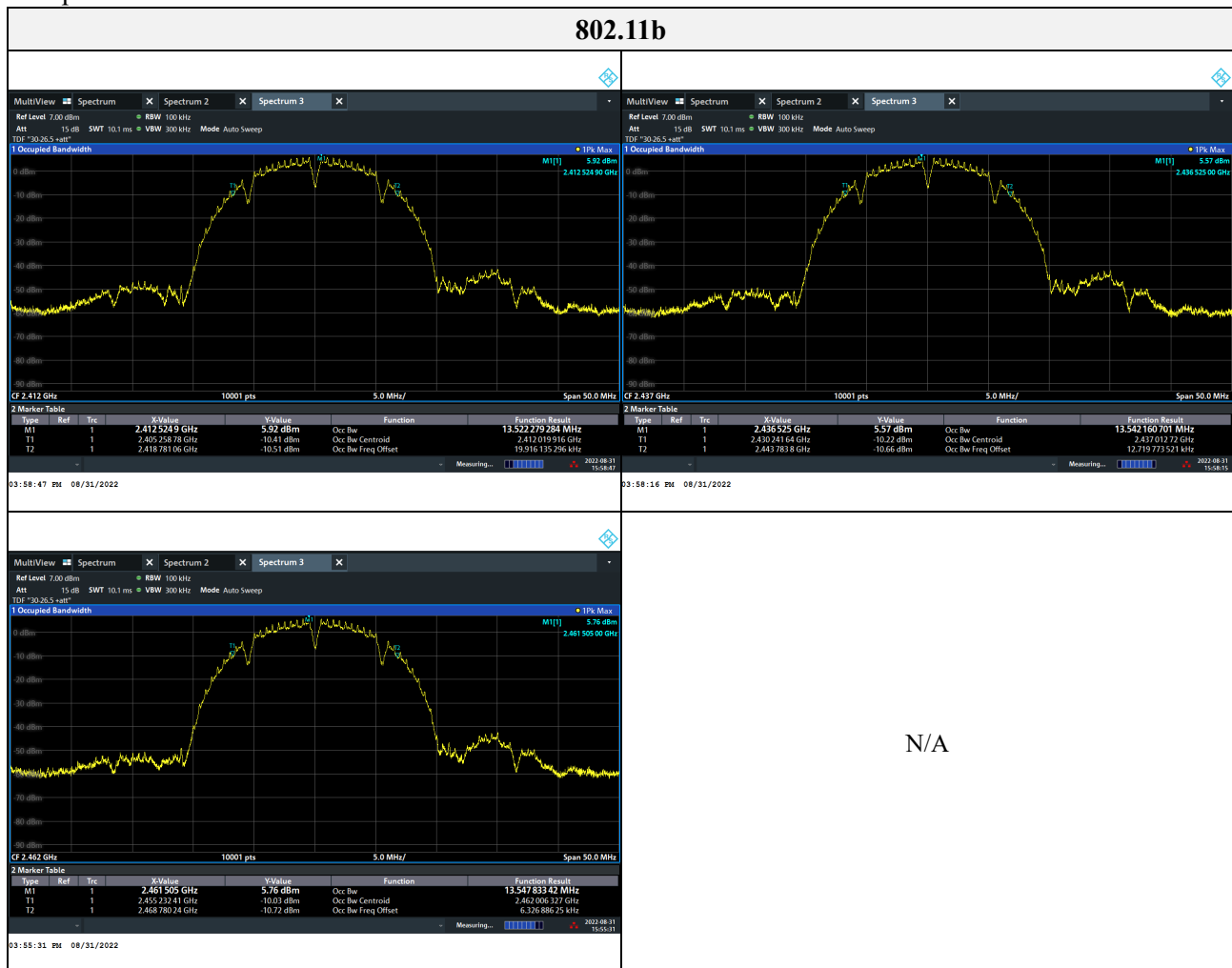


ANT2

Mode : 802.11b

Frequency(MHz)	99% occupied bandwidth(MHz)	Limit(MHz)
2 412	13.52	-
2 437	13.54	
2 462	13.55	

Test plots

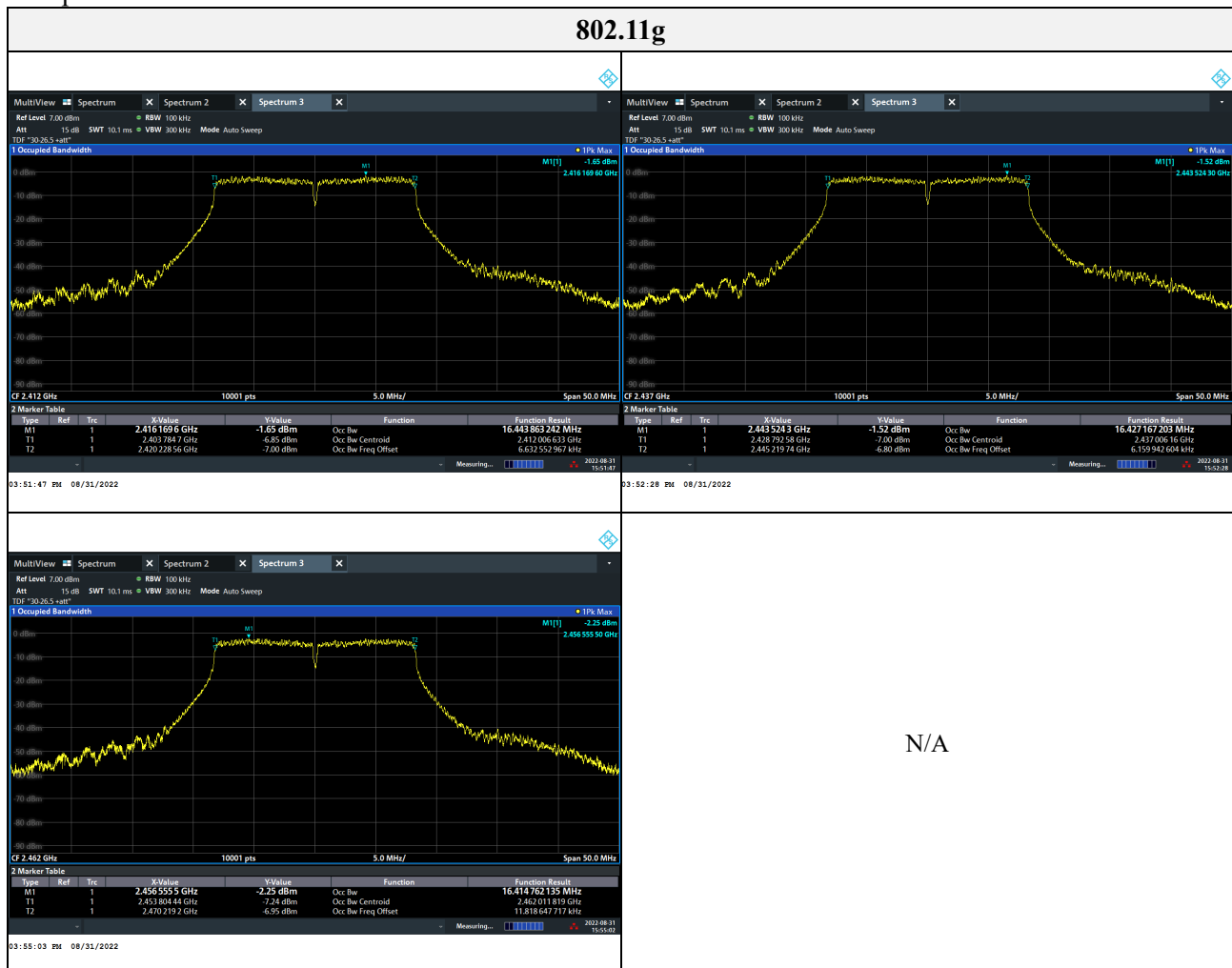


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Mode : 802.11g

Frequency(MHz)	99% occupied bandwidth(MHz)	Limit(MHz)
2 412	16.44	-
2 437	16.43	
2 462	16.41	

Test plots

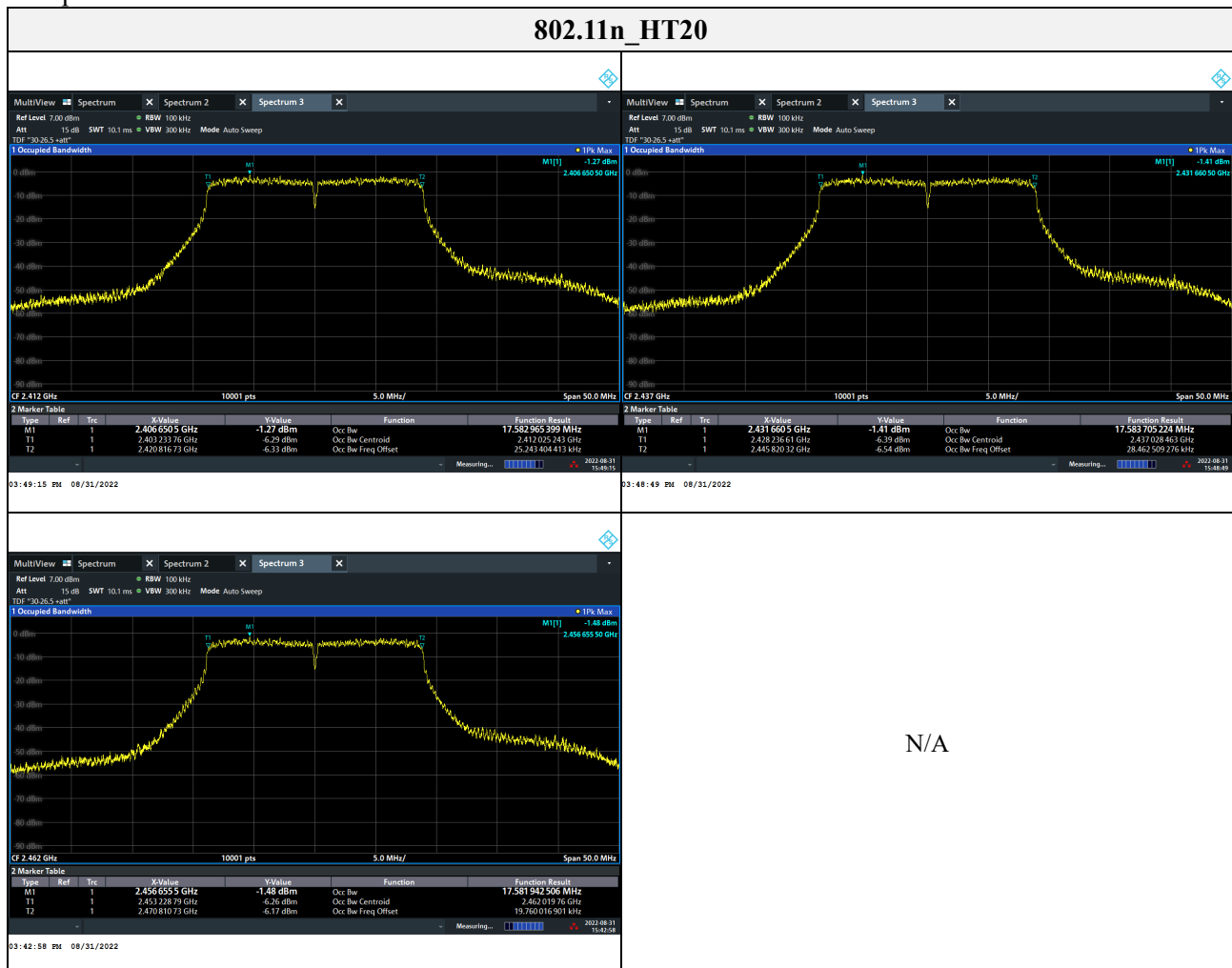


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Mode : 802.11n HT20

Frequency(MHz)	99% occupied bandwidth(MHz)	Limit(MHz)
2 412	17.58	-
2 437	17.58	
2 462	17.58	

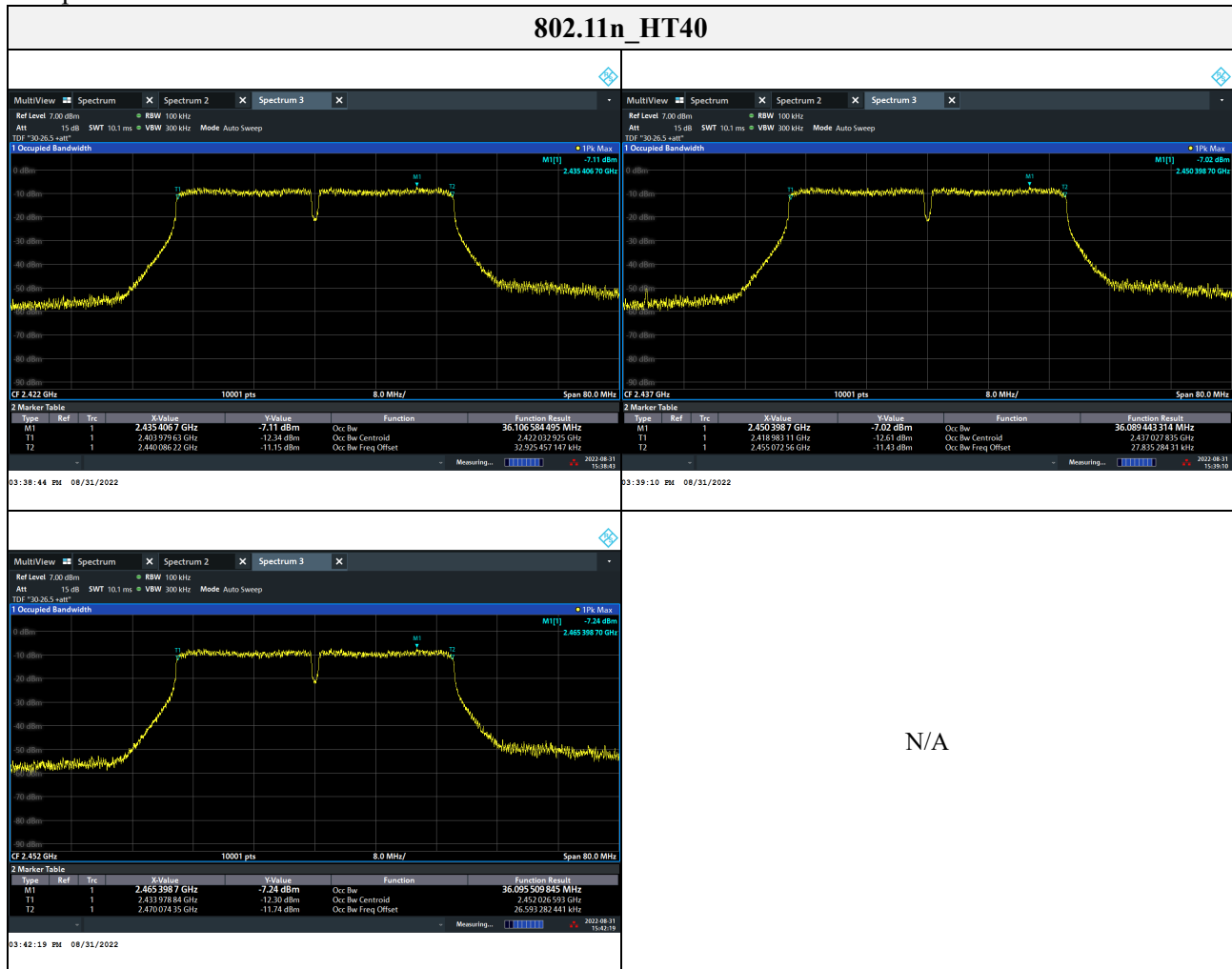
Test plots



Mode : 802.11n HT40

Frequency(MHz)	99% occupied bandwidth(MHz)	Limit(MHz)
2 422	36.11	-
2 437	36.09	
2 452	36.10	

Test plots



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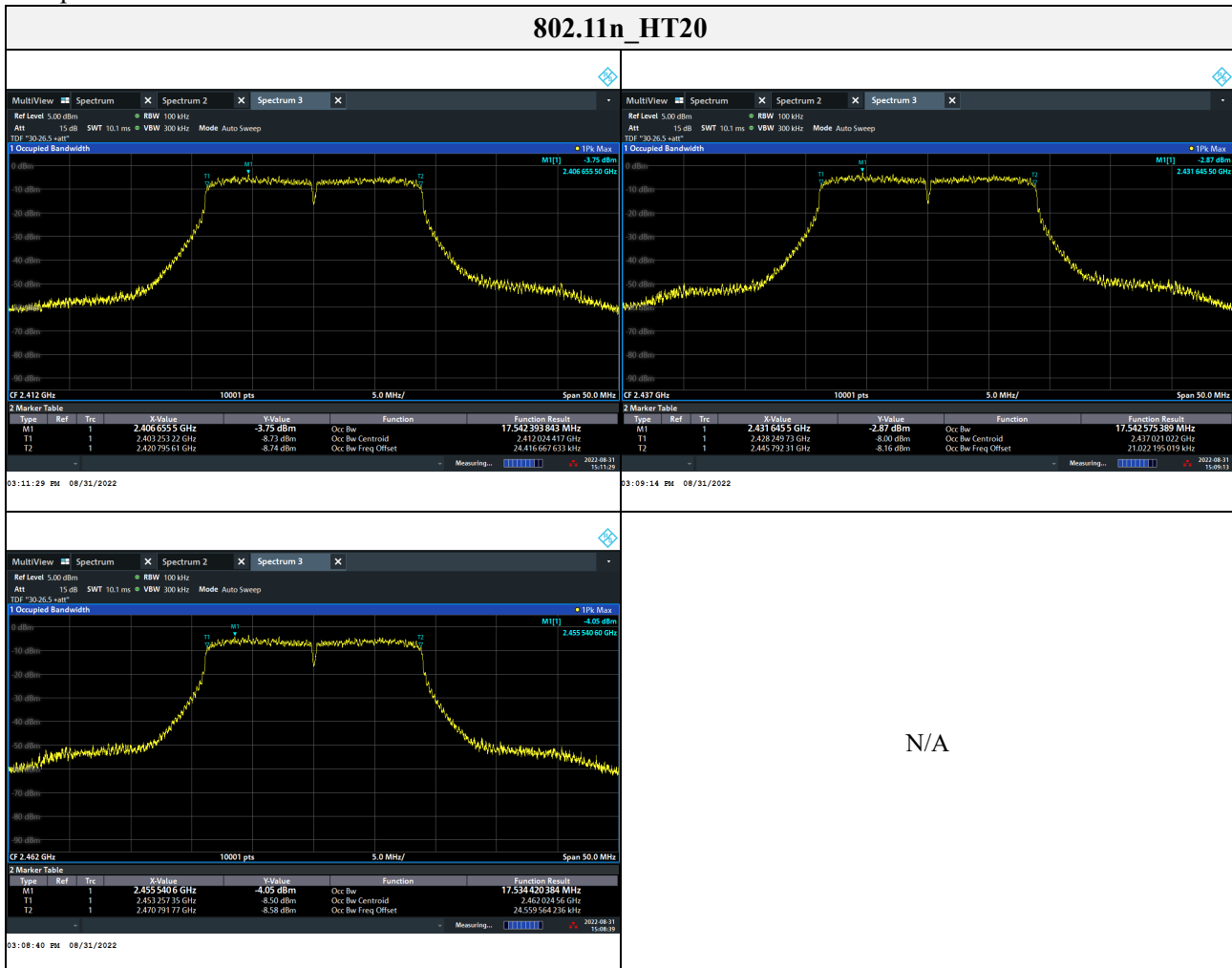


MIMO ANT1

Mode : 802.11n HT20

Frequency(MHz)	99% occupied bandwidth(MHz)	Limit(MHz)
2 412	17.54	-
2 437	17.54	
2 462	17.53	

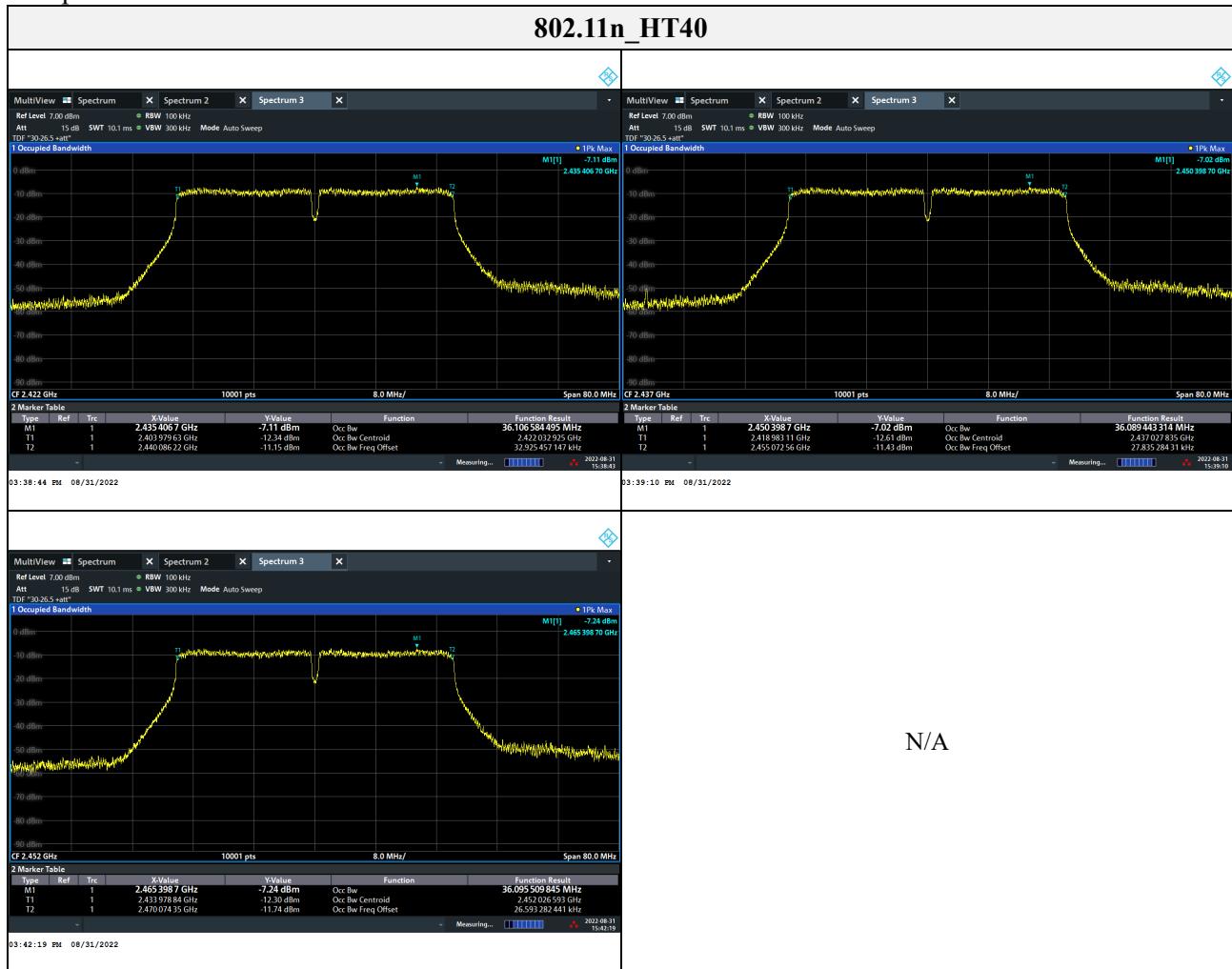
Test plots



Mode : 802.11n HT40

Frequency(MHz)	99% occupied bandwidth(MHz)	Limit(MHz)
2 422	36.11	-
2 437	36.09	
2 452	36.10	

Test plots



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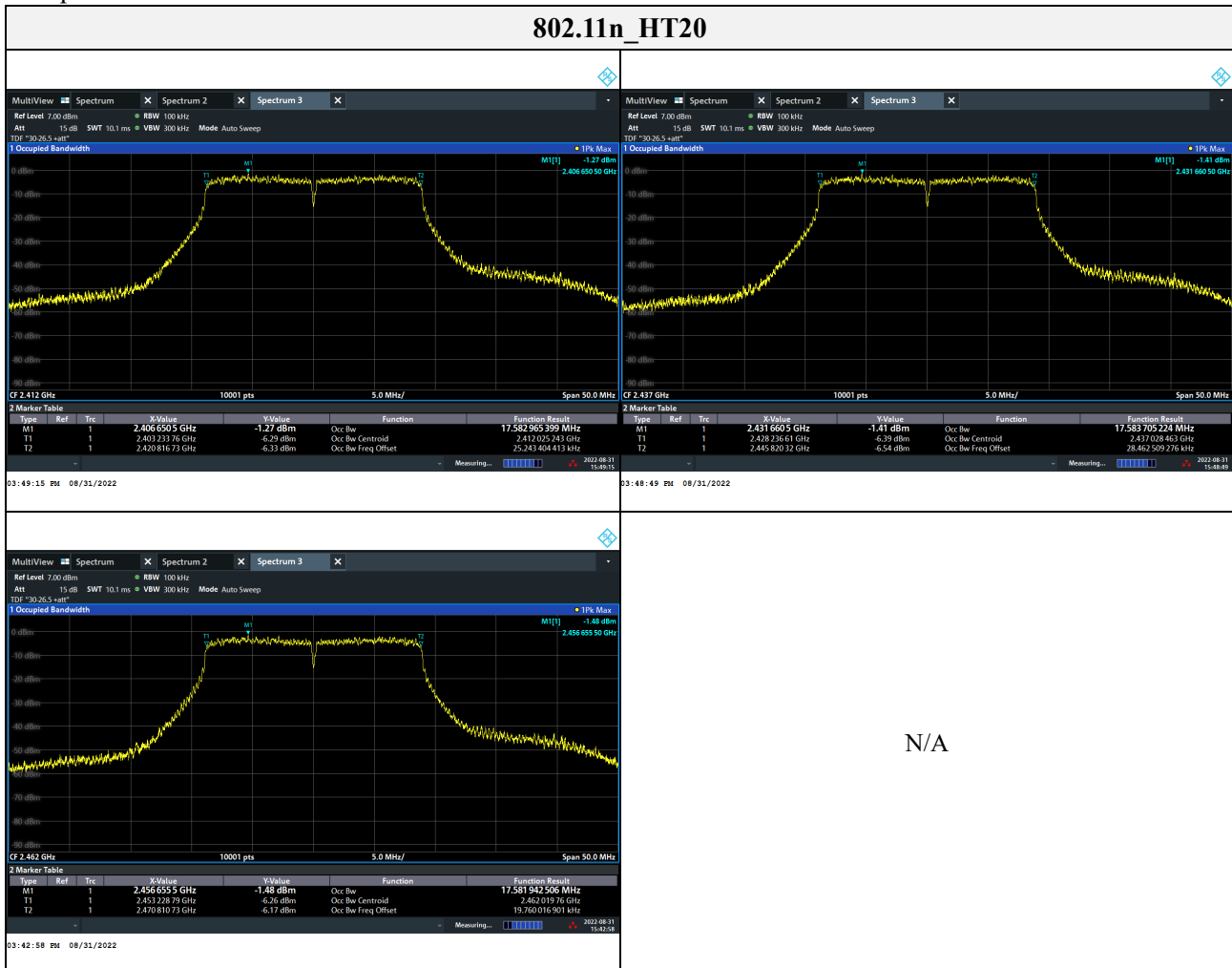


MIMO ANT2

Mode : 802.11n HT20

Frequency(MHz)	99% occupied bandwidth(MHz)	Limit(MHz)
2 412	17.58	-
2 437	17.58	
2 462	17.58	

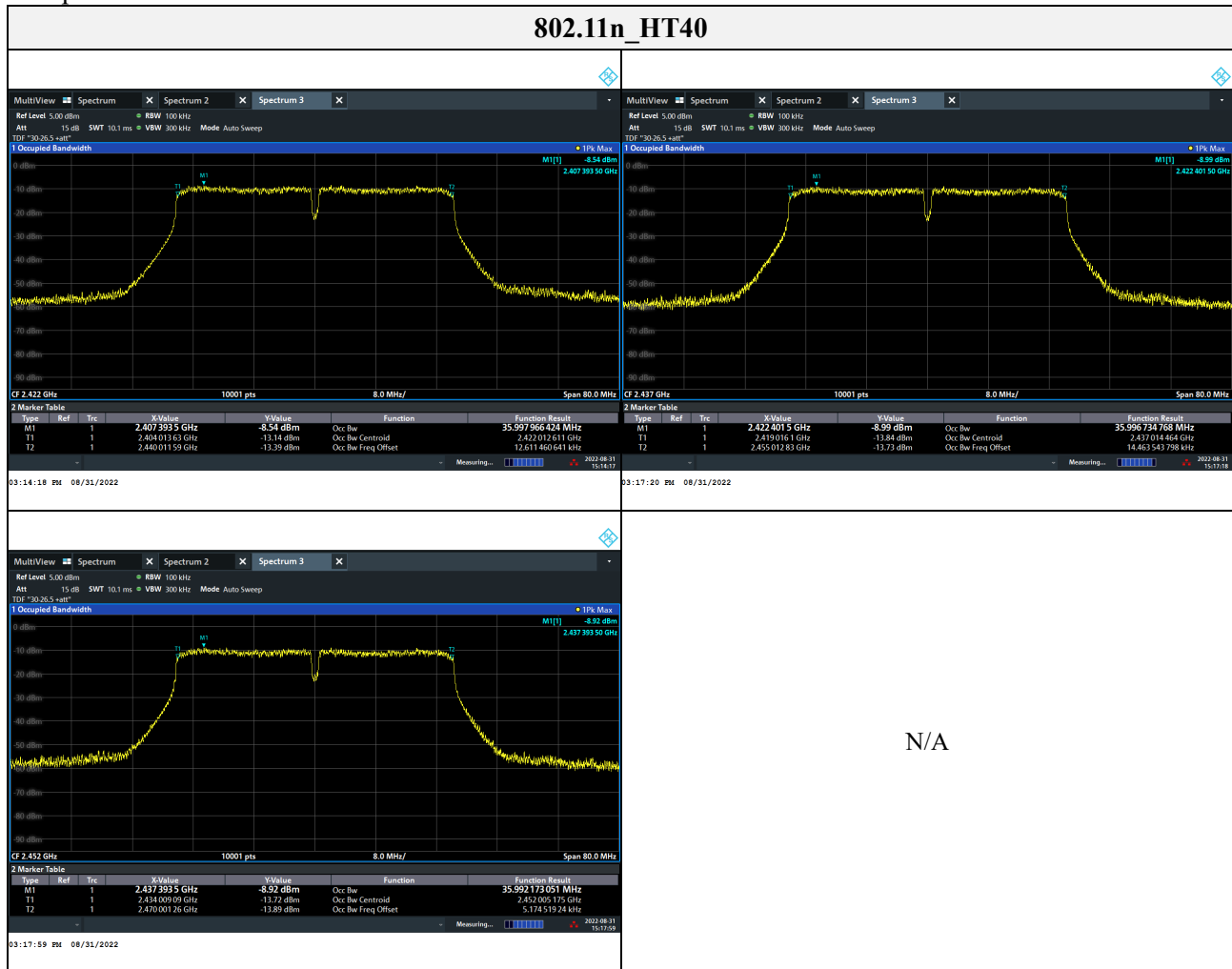
Test plots



Mode : 802.11n HT40

Frequency(MHz)	99% occupied bandwidth(MHz)	Limit(MHz)
2 422	36.00	-
2 437	36.00	
2 452	35.99	

Test plots

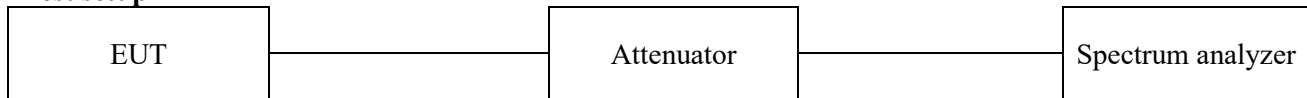


3.2. 6 dB bandwidth

Test procedure

ANSI C63.10-2013 - Section 11.8.2

Test setup



ANSI C63.10-2013 - Section 11.8.2

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW $\geq 3 \times$ RBW, 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 dB.

Limit

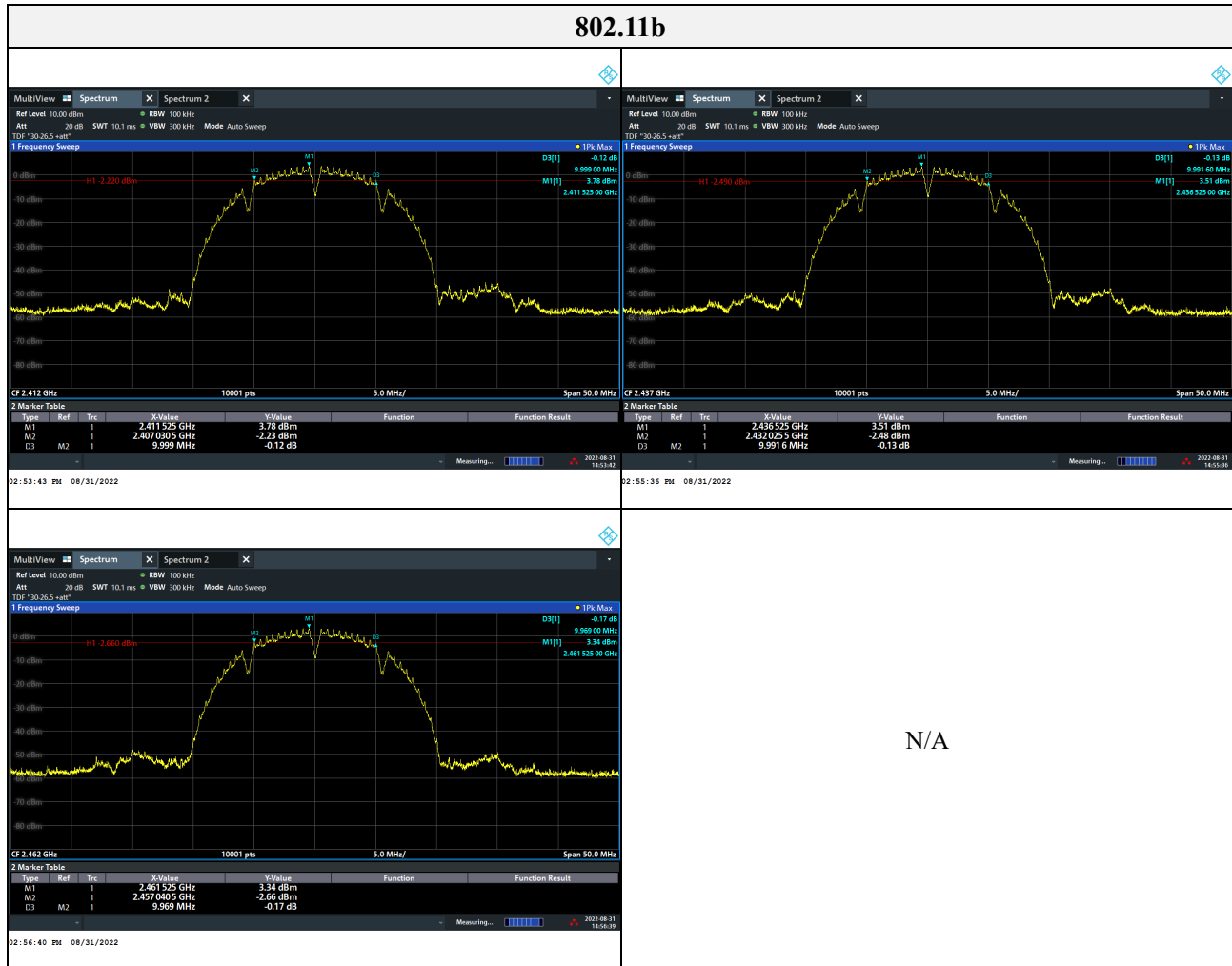
According to §15.247(a)(2), systems using digital modulation techniques may operate 902 ~ 928 MHz, 2 400 ~ 2 483.5 MHz, and 5 725 ~ 5 850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Limit

According to RSS-247 5.2(a), The minimum 6 dB bandwidth shall be 500 kHz.

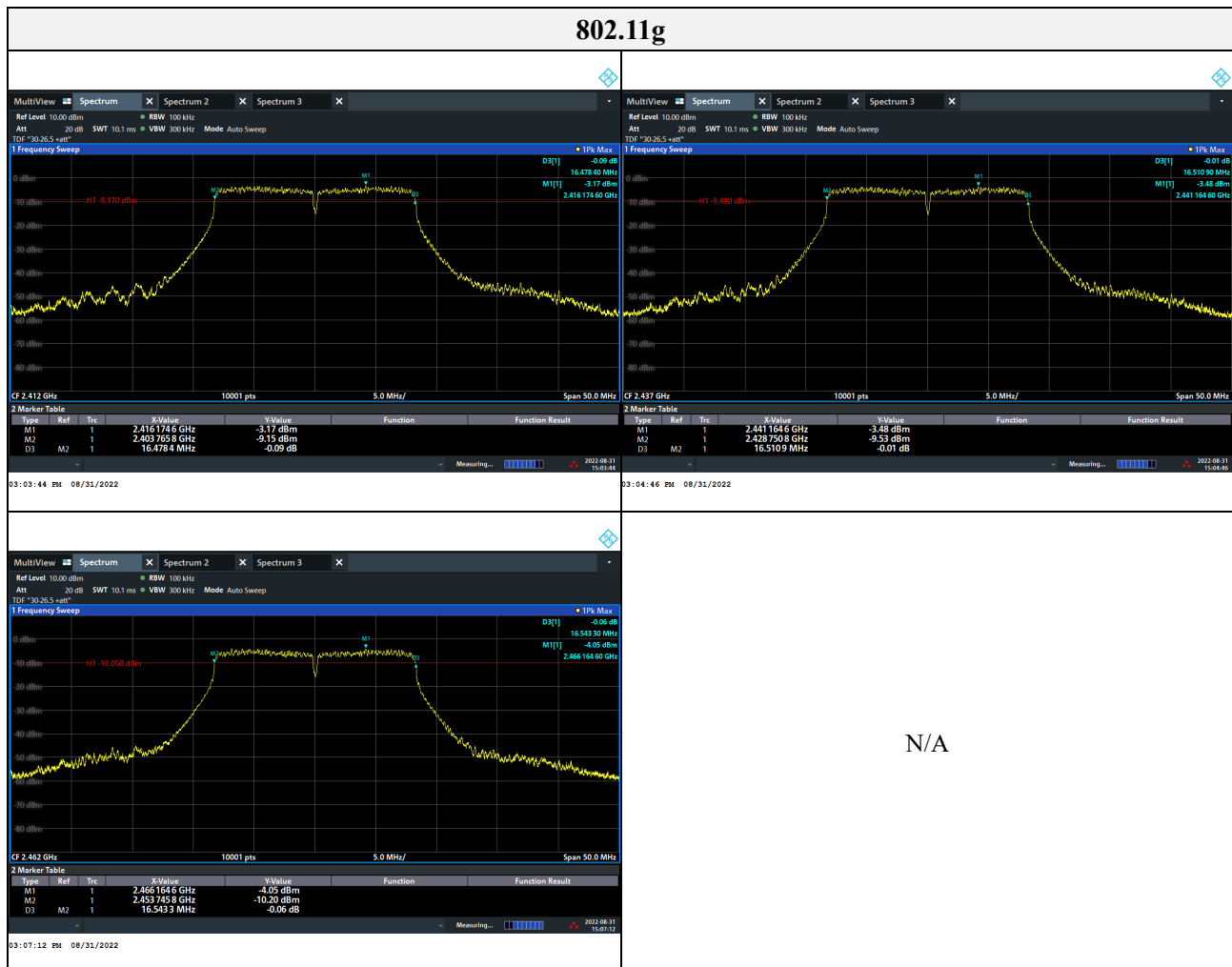
Test results
ANT1
Mode : 802.11b

Frequency(MHz)	6 dB bandwidth(MHz)	Limit(MHz)
2 412	10.00	≥ 0.500
2 437	9.99	
2 462	9.97	



Mode : 802.11g

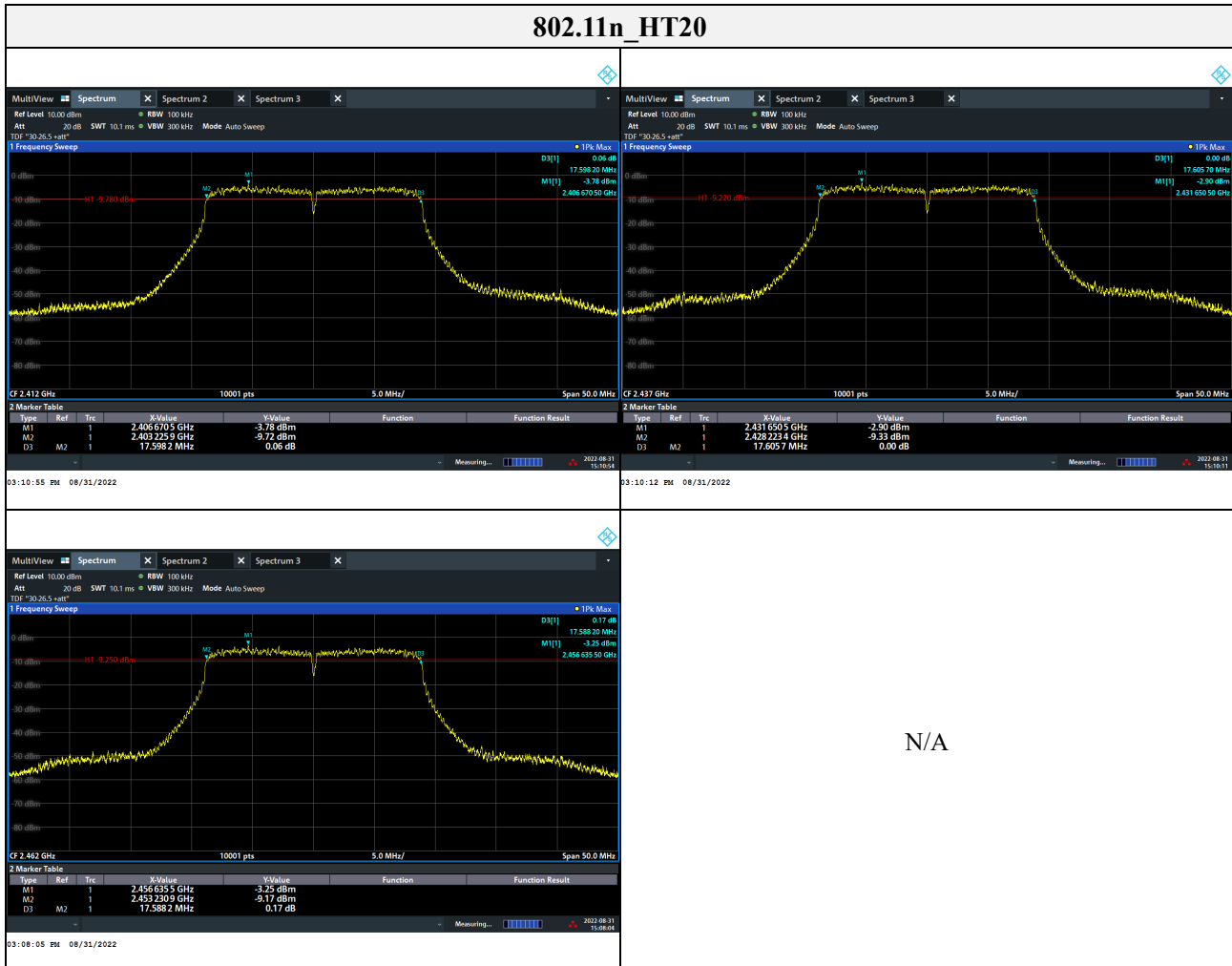
Frequency(MHz)	6 dB bandwidth(MHz)	Limit(MHz)
2 412	16.48	≥ 0.500
2 437	16.51	
2 462	16.54	





Mode : 802.11n HT20

Frequency(MHz)	6 dB bandwidth(MHz)	Limit(MHz)
2 412	17.60	≥ 0.500
2 437	17.61	
2 462	17.59	

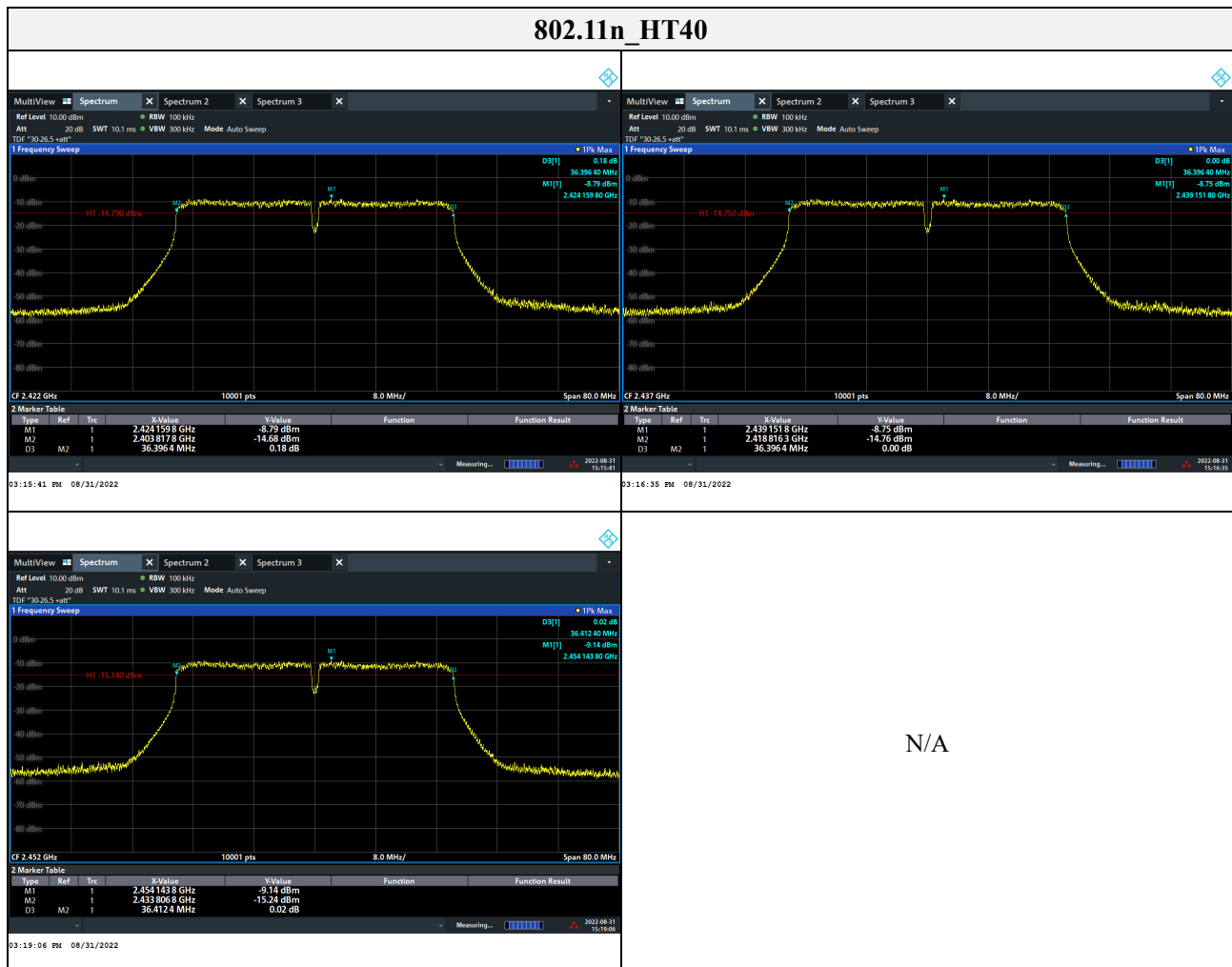


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Mode : 802.11n HT40

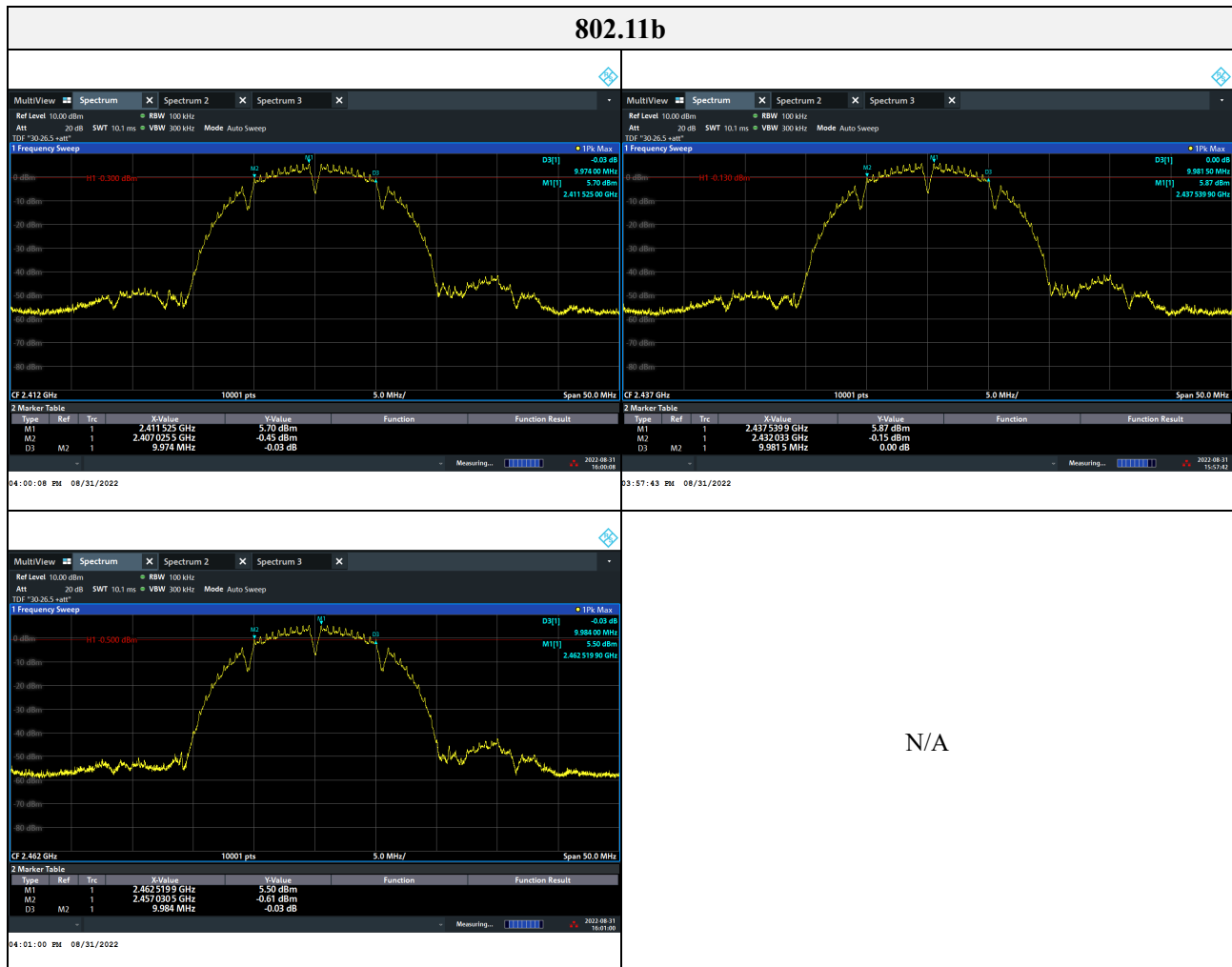
Frequency(MHz)	6 dB bandwidth(MHz)	Limit(MHz)
2 422	36.40	≥ 0.500
2 437	36.40	
2 452	36.41	



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ANT2
Mode : 802.11b

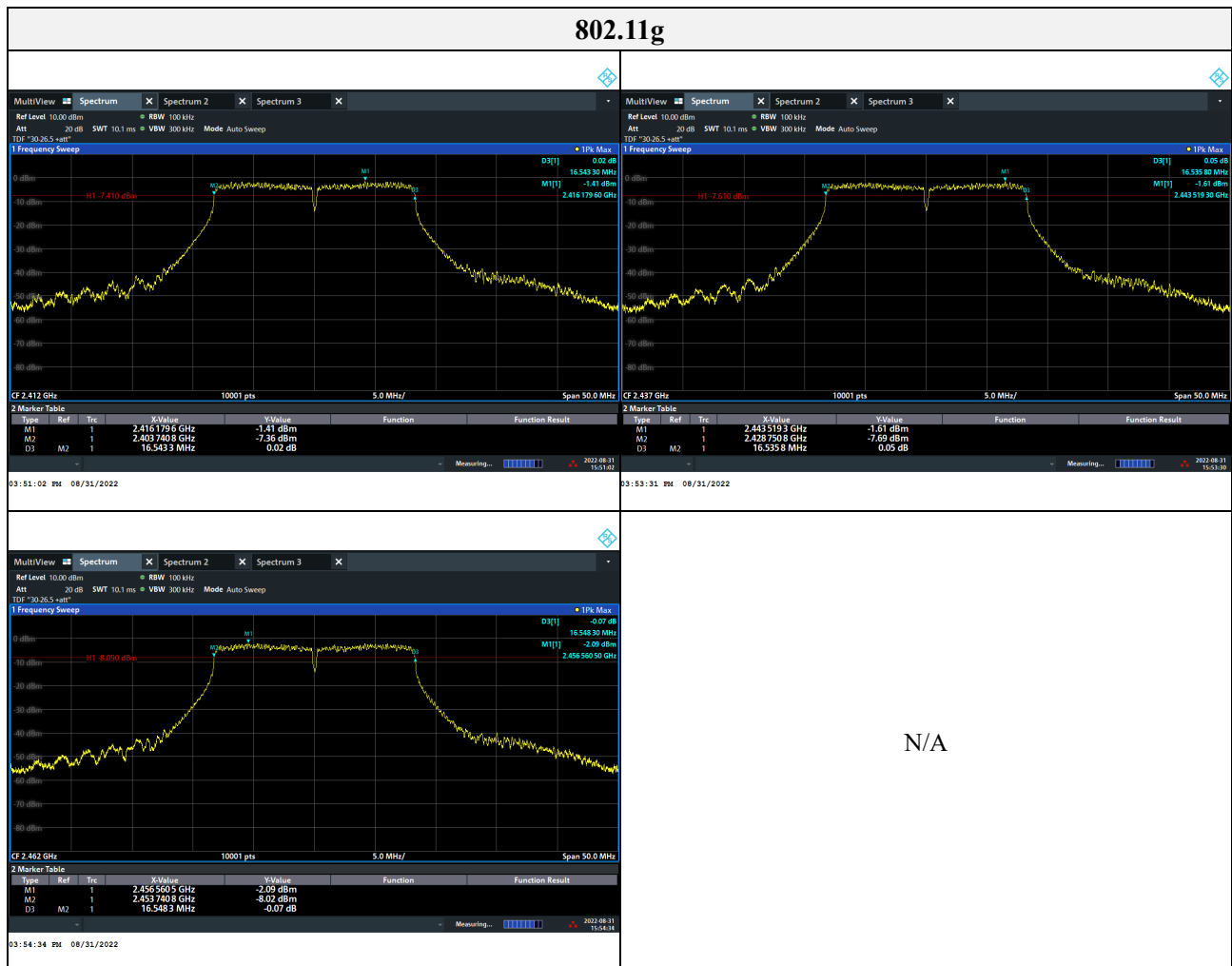
Frequency(MHz)	6 dB bandwidth(MHz)	Limit(MHz)
2 412	9.97	≥ 0.500
2 437	9.98	
2 462	9.98	





Mode : 802.11g

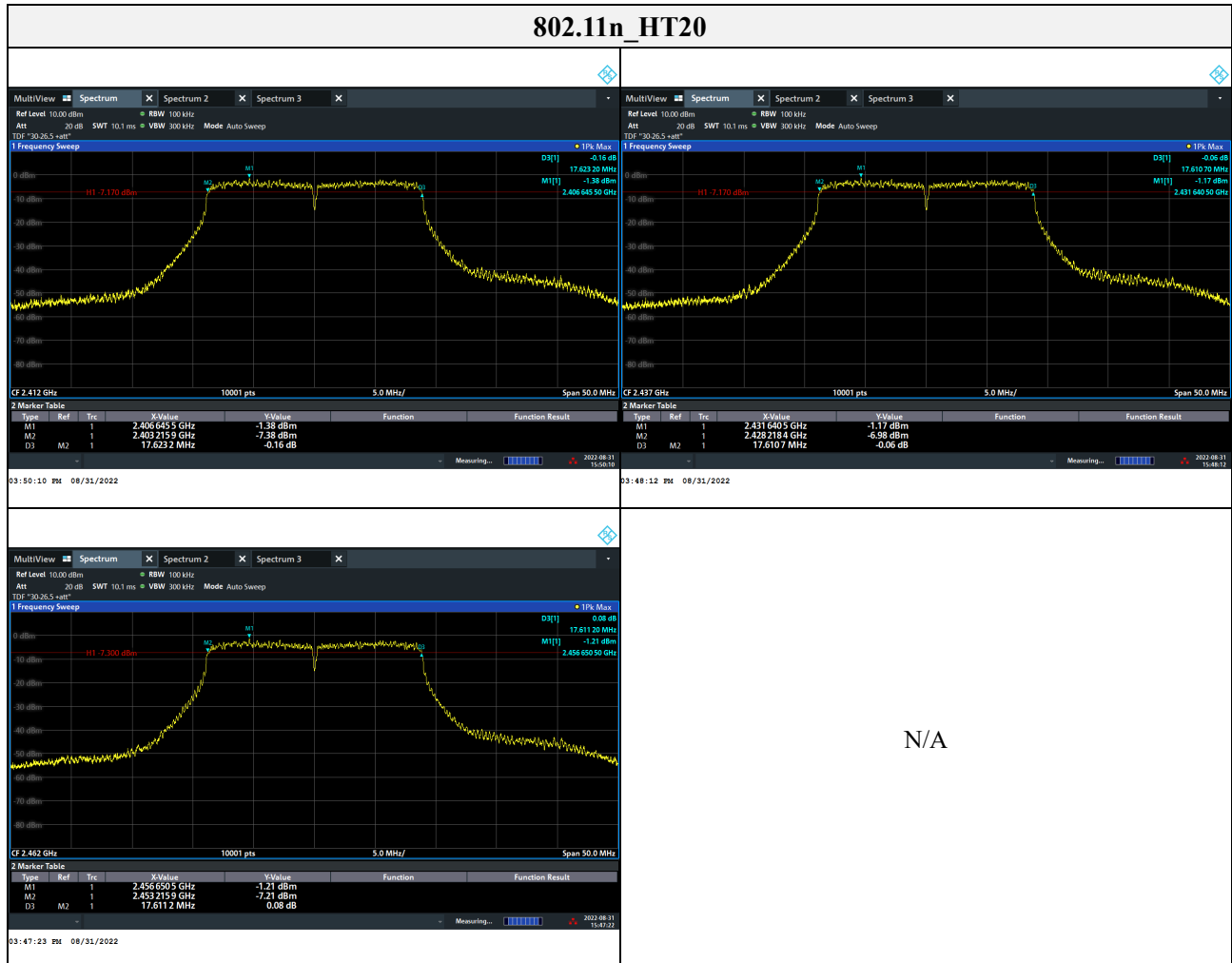
Frequency(MHz)	6 dB bandwidth(MHz)	Limit(MHz)
2 412	16.54	≥ 0.500
2 437	16.54	
2 462	16.55	





Mode : 802.11n HT20

Frequency(MHz)	6 dB bandwidth(MHz)	Limit(MHz)
2 412	17.62	≥ 0.500
2 437	17.61	
2 462	17.61	

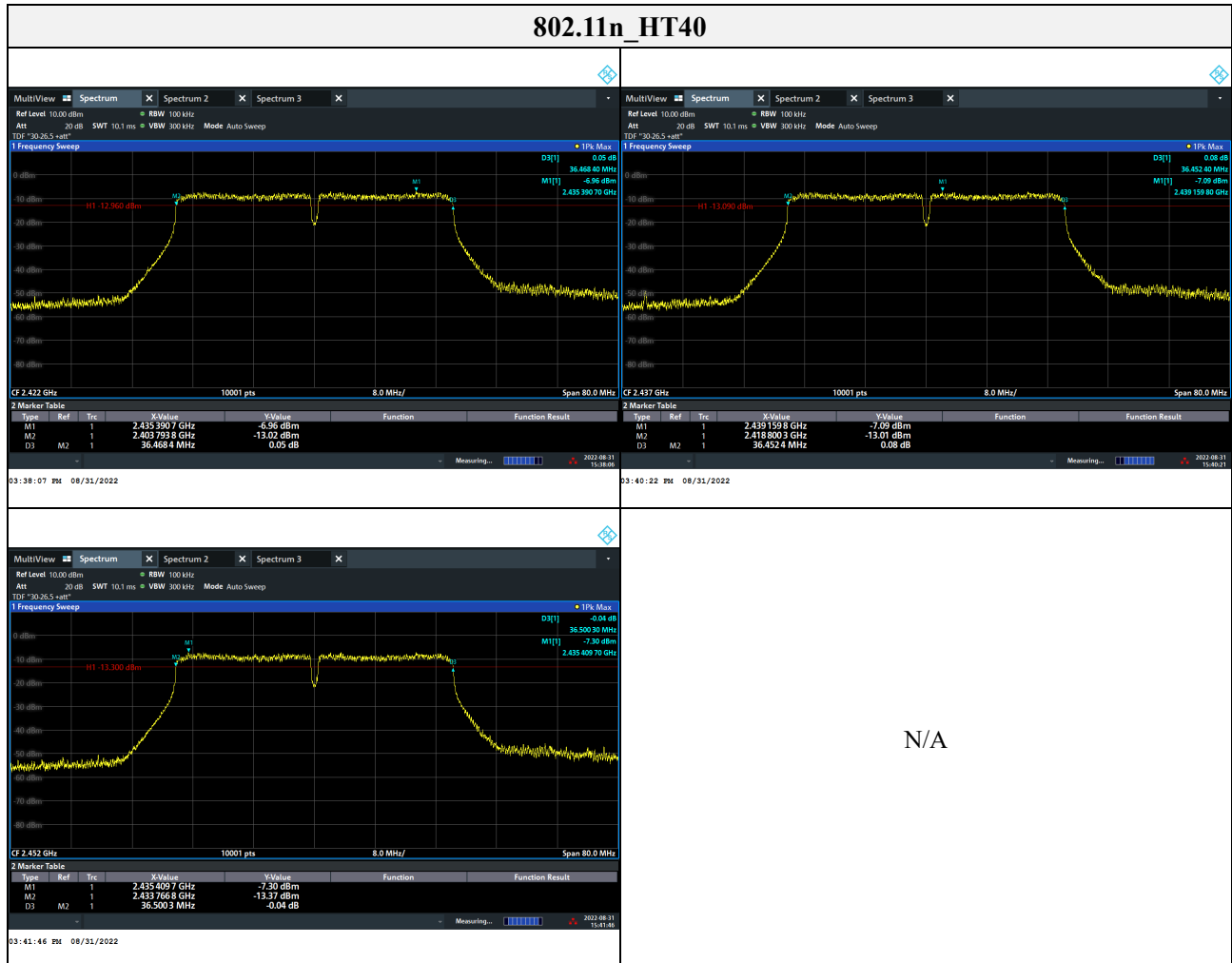


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Mode : 802.11n HT40

Frequency(MHz)	6 dB bandwidth(MHz)	Limit(MHz)
2 422	36.47	≥ 0.500
2 437	36.45	
2 452	36.50	



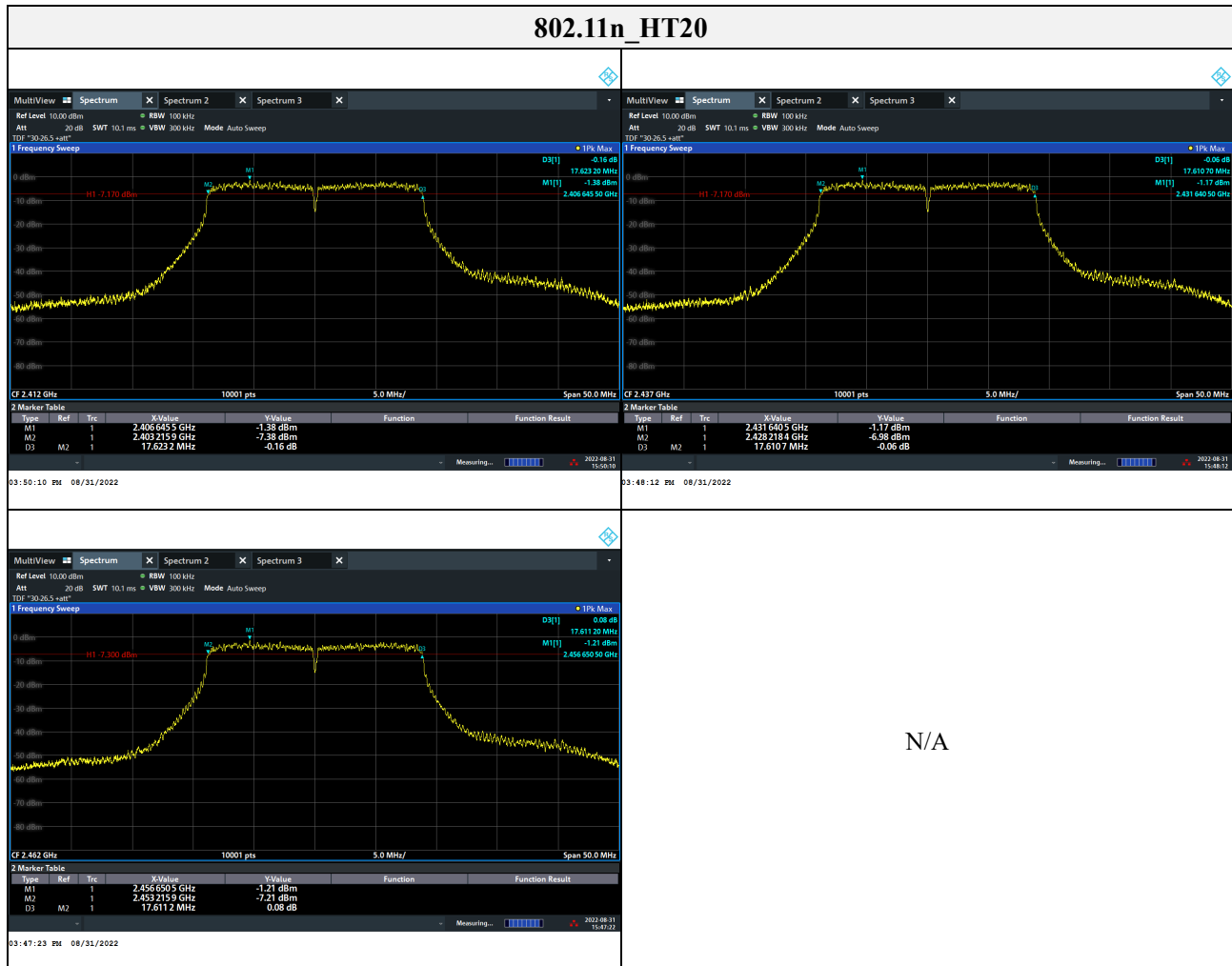
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MIMO ANT1

Mode : 802.11n HT20

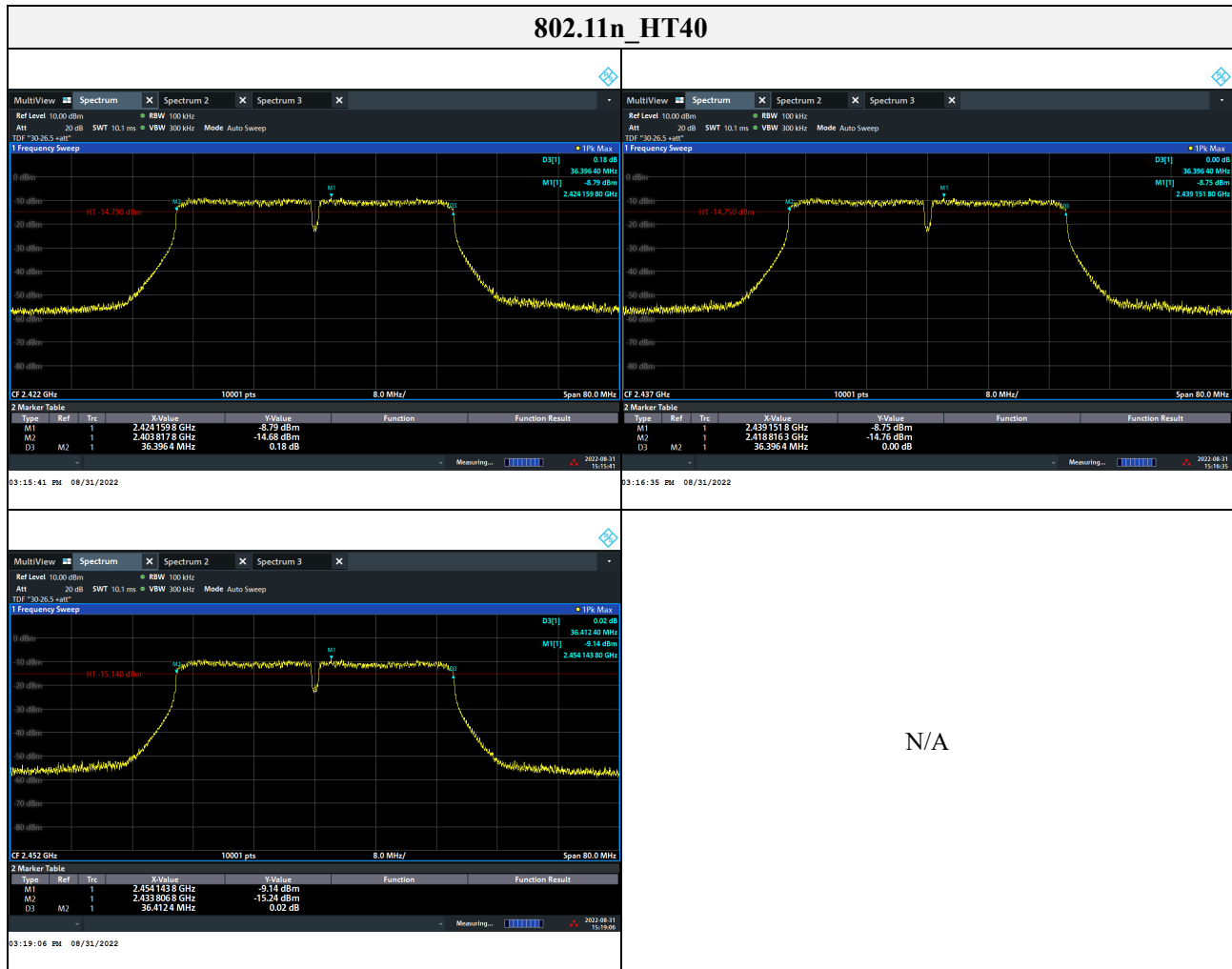
Frequency(MHz)	6 dB bandwidth(MHz)	Limit(MHz)
2 412	17.62	≥ 0.500
2 437	17.61	
2 462	17.61	



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Mode : 802.11n HT40

Frequency(MHz)	6 dB bandwidth(MHz)	Limit(MHz)
2 422	36.40	≥ 0.500
2 437	36.40	
2 452	36.41	

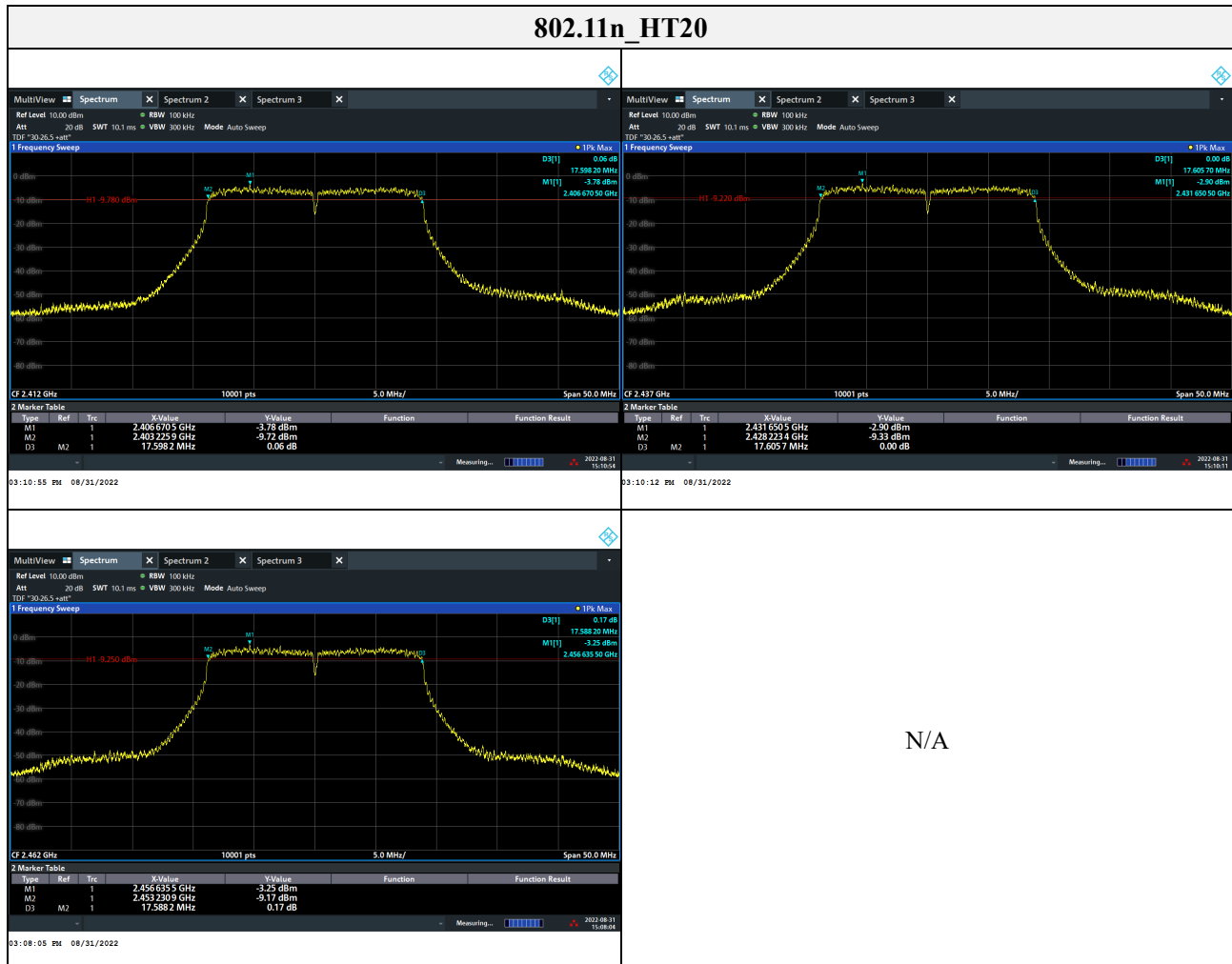


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MIMO ANT2

Mode : 802.11n HT20

Frequency(MHz)	6 dB bandwidth(MHz)	Limit(MHz)
2 412	17.60	≥ 0.500
2 437	17.61	
2 462	17.59	

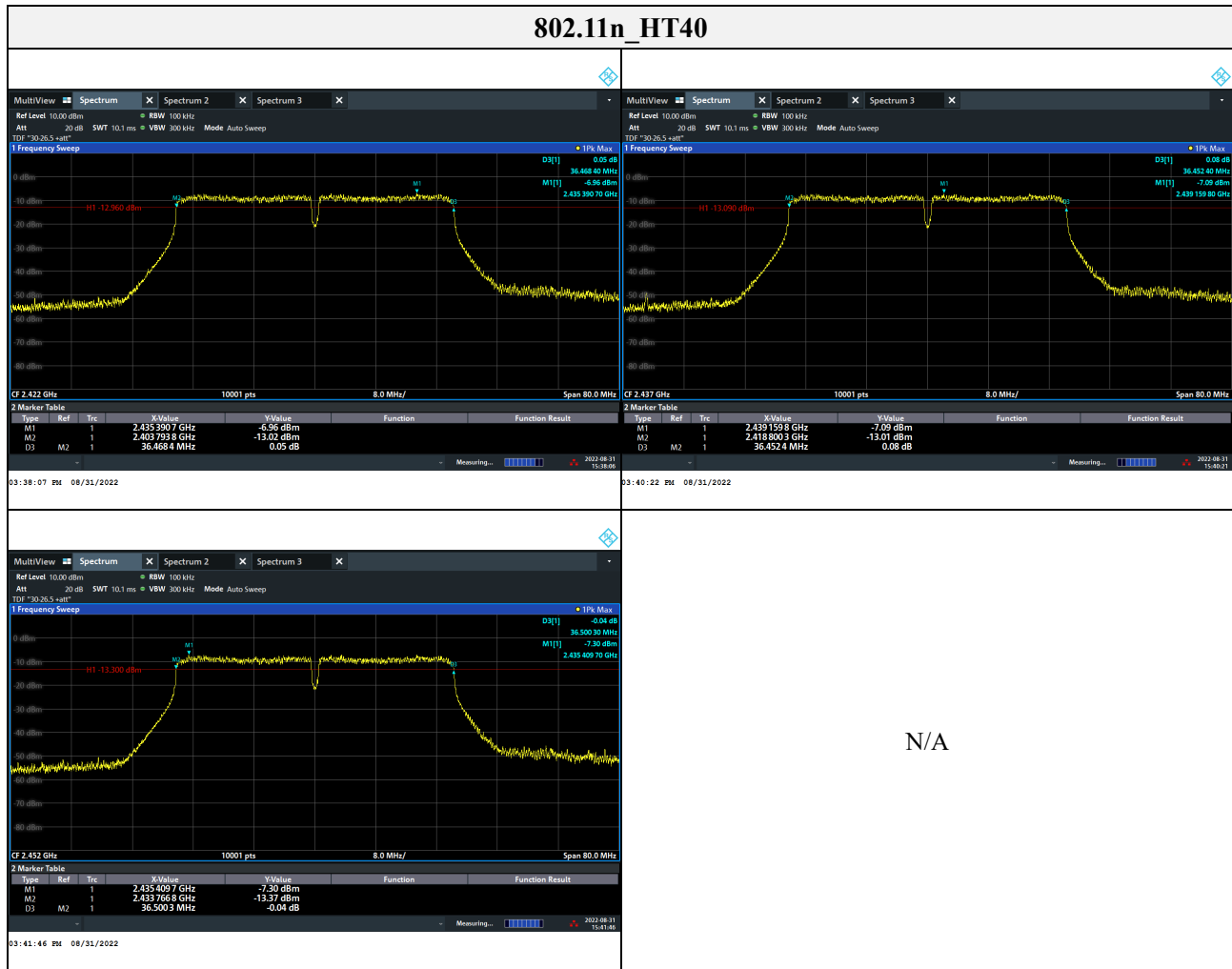


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Mode : 802.11n HT40

Frequency(MHz)	6 dB bandwidth(MHz)	Limit(MHz)
2 422	36.47	≥ 0.500
2 437	36.45	
2 452	36.50	



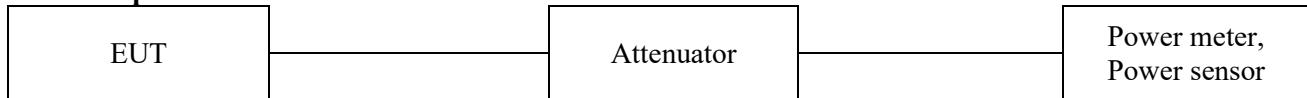
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3.3. Output power

Test procedure

ANSI C63.10-2013 - Section 11.9.1.3 and 11.9.2.3.2

Test setup



ANSI C63.10-2013 - Section 11.9.1.3

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.

ANSI C63.10-2013 - Section 11.9.2.3.2

Alternatively, 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. Because the measurement is made only during the ON time of the transmitter, no duty cycle correction is required.

Limit

According to §15.247(b)(3), For systems using digital modulation in the 902~928 MHz, 2 400~2 483.5 MHz, and 5 725~5 850 MHz 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 out-put power. Maximum Conducted Out-put 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.

Limit

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, 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 results

SISO ANT1

Mode	2 412 MHz		2 437 MHz		2 462 MHz	
	Average (dBm)	Peak (dBm)	Average (dBm)	Peak (dBm)	Average (dBm)	Peak (dBm)
802.11b	16.36	19.24	15.72	18.59	15.79	18.65

Mode	2 412 MHz		2 437 MHz		2 462 MHz	
	Average (dBm)	Peak (dBm)	Average (dBm)	Peak (dBm)	Average (dBm)	Peak (dBm)
802.11g	14.13	19.24	13.62	19.55	13.22	19.36

Mode	2 412 MHz		2 437 MHz		2 462 MHz	
	Average (dBm)	Peak (dBm)	Average (dBm)	Peak (dBm)	Average (dBm)	Peak (dBm)
802.11n_HT20	13.85	19.82	13.39	19.95	13.07	19.07

Mode	2 422 MHz		2 437 MHz		2 452 MHz	
	Average (dBm)	Peak (dBm)	Average (dBm)	Peak (dBm)	Average (dBm)	Peak (dBm)
802.11n_HT40	11.58	19.62	11.33	19.51	11.10	19.33

SISO ANT2

Mode	2 412 MHz		2 437 MHz		2 462 MHz	
	Average (dBm)	Peak (dBm)	Average (dBm)	Peak (dBm)	Average (dBm)	Peak (dBm)
802.11b	17.95	19.82	17.80	19.66	17.56	19.42

Mode	2 412 MHz		2 437 MHz		2 462 MHz	
	Average (dBm)	Peak (dBm)	Average (dBm)	Peak (dBm)	Average (dBm)	Peak (dBm)
802.11g	14.81	19.20	14.83	19.48	14.81	19.55

Mode	2 412 MHz		2 437 MHz		2 462 MHz	
	Average (dBm)	Peak (dBm)	Average (dBm)	Peak (dBm)	Average (dBm)	Peak (dBm)
802.11n_HT20	14.81	19.07	14.82	19.41	14.71	19.28

Mode	2 422 MHz		2 437 MHz		2 452 MHz	
	Average (dBm)	Peak (dBm)	Average (dBm)	Peak (dBm)	Average (dBm)	Peak (dBm)
802.11n_HT40	12.53	19.15	12.48	19.14	12.34	19.50

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MIMO : ANT1+2

Mode	2 412 MHz		2 437 MHz		2 462 MHz	
	Average (dBm)	Peak (dBm)	Average (dBm)	Peak (dBm)	Average (dBm)	Peak (dBm)
802.11n_HT20 (ANT1)	9.85	15.82	9.39	15.95	9.07	15.07
802.11n_HT20 (ANT2)	7.58	15.82	7.33	15.51	7.10	15.33
SUM	11.87	18.73	11.49	18.75	11.21	18.21

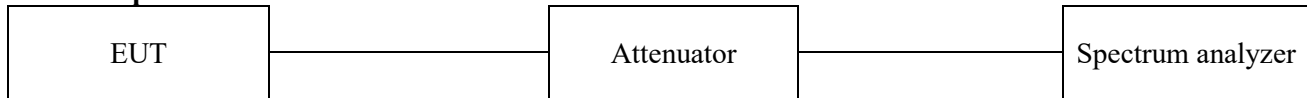
Mode	2 422 MHz		2 437 MHz		2 452 MHz	
	Average (dBm)	Peak (dBm)	Average (dBm)	Peak (dBm)	Average (dBm)	Peak (dBm)
802.11n_HT40 (ANT1)	10.81	15.07	10.82	15.41	10.71	15.28
802.11n_HT40 (ANT2)	8.53	15.15	8.48	15.14	8.34	15.50
SUM	12.83	18.12	12.82	18.29	12.70	18.40

3.4. Power spectral density

Test procedure

ANSI C63.10-2013 - Section 11.10.2

Test setup



Section 10.2 & ANSI C63.10-2013 - Section 11.10.2

- Set analyzer center frequency to DTS channel center frequency.
- Set the span to 1.5 times the DTS bandwidth.
- Set the RBW to $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$
- Set the VBW $\geq [3 \times \text{RBW}]$.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level within the RBW.
- If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

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 kHz 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.

Limit

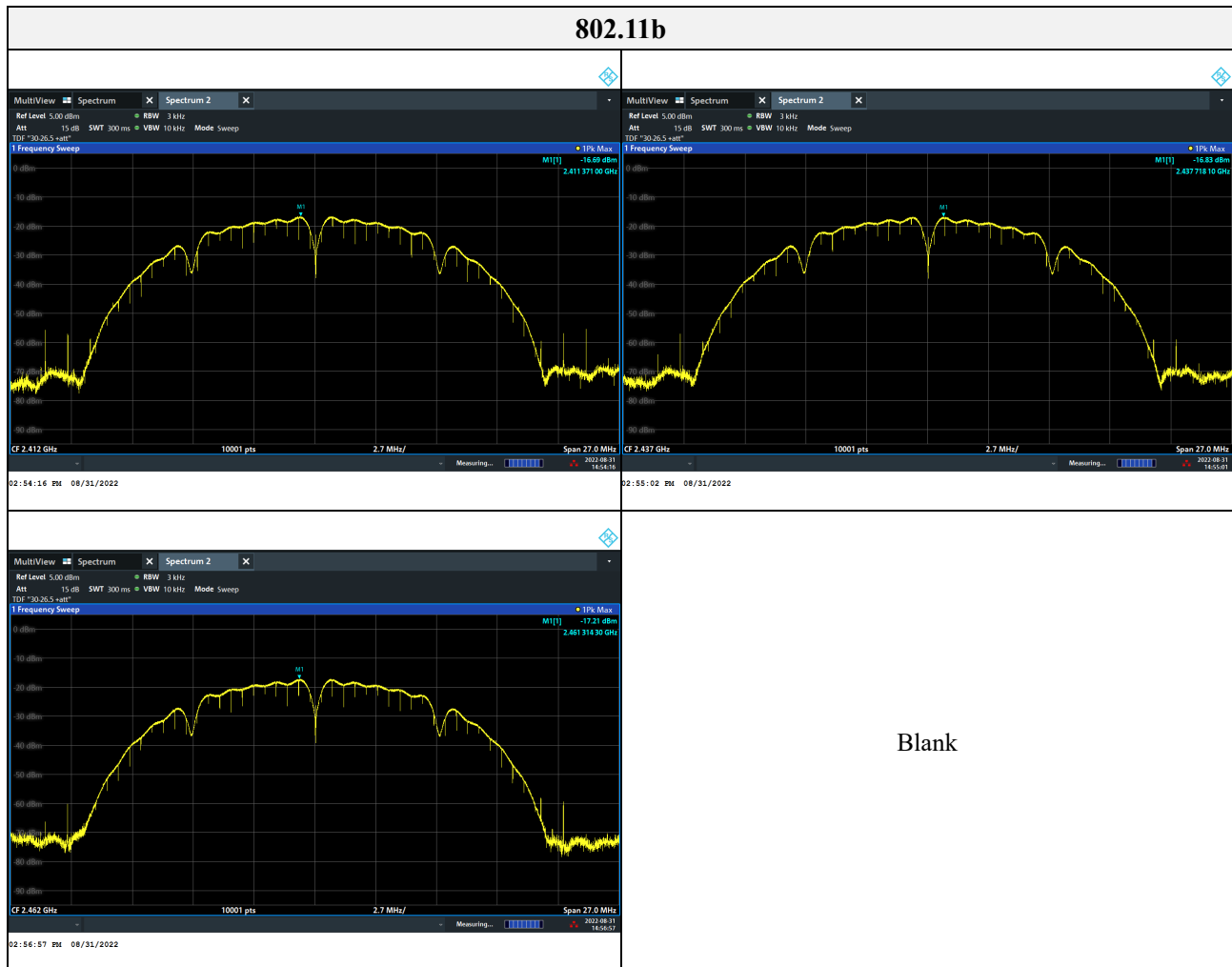
According to RSS-247 5.2(b), The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of section 5.4(d), (i.e. the power spectral density shall be determined using the same method as is used to determine the conducted output power).

Results

SISO ANT1

Mode : 802.11b

Frequency(MHz)	PSD (dBm)	Limit(dBm)
2 412	-16.69	8
2 437	-16.83	
2 462	-17.21	



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