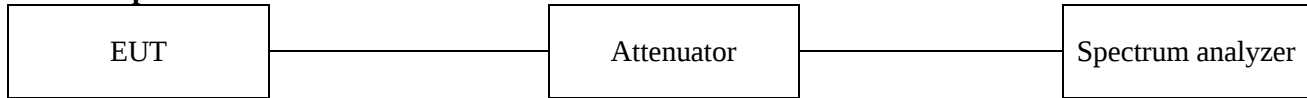


3.2. 6 dB bandwidth

Test procedure

KDB 789033 D02 v02r01– Section C.2

Test setup



Section C.2

1. Set RBW = 100 kHz
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = peak.
4. Sweep = auto couple.
5. Allow the trace to stabilize
6. 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.

Limit

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

Test results

Band	Frequency(MHz)	Mode	6 dB bandwidth(MHz)
UNII-1	5 180	a	16.48
	5 220		16.51
	5 240		16.49
UNII-2A	5 260		16.41
	5 280		16.50
	5 320		16.49
UNII-2C	5 500		16.45
	5 620		16.48
	5 700		16.48
UNII-3	5 745		16.47
	5 785		16.48
	5 825		16.50
UNII-1	5 180	an_HT20	17.61
	5 220		17.61
	5 240		17.62
UNII-2A	5 260		17.61
	5 280		17.61
	5 320		17.67
UNII-2C	5 500		17.60
	5 600		17.61
	5 700		17.59
UNII-3	5 745		17.60
	5 785		17.60
	5 825		17.60

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Band	Frequency(MHz)	Mode	6 dB bandwidth(MHz)
UNII-1	5 180	ac_VHT20	17.62
	5 220		17.61
	5 240		17.61
UNII-2A	5 260		17.60
	5 280		17.61
	5 320		17.60
UNII-2C	5 500		17.60
	5 620		17.62
	5 700		17.60
UNII-3	5 745		17.60
	5 785		17.60
	5 825		17.61
UNII-1	5 190	an_HT40	36.40
	5 230		36.40
UNII-2A	5 270		36.38
	5 310		36.38
UNII-2C	5 510		36.40
	5 590		36.44
	5 670		36.39
UNII-3	5 755		36.39
	5 795		36.39
UNII-1	5 190	ac_VHT40	36.39
	5 230		36.41
UNII-2A	5 270		36.40
	5 310		36.38
UNII-2C	5 510		36.42
	5 590		36.42
	5 670		36.40
UNII-3	5 755		36.42
	5 795		36.41

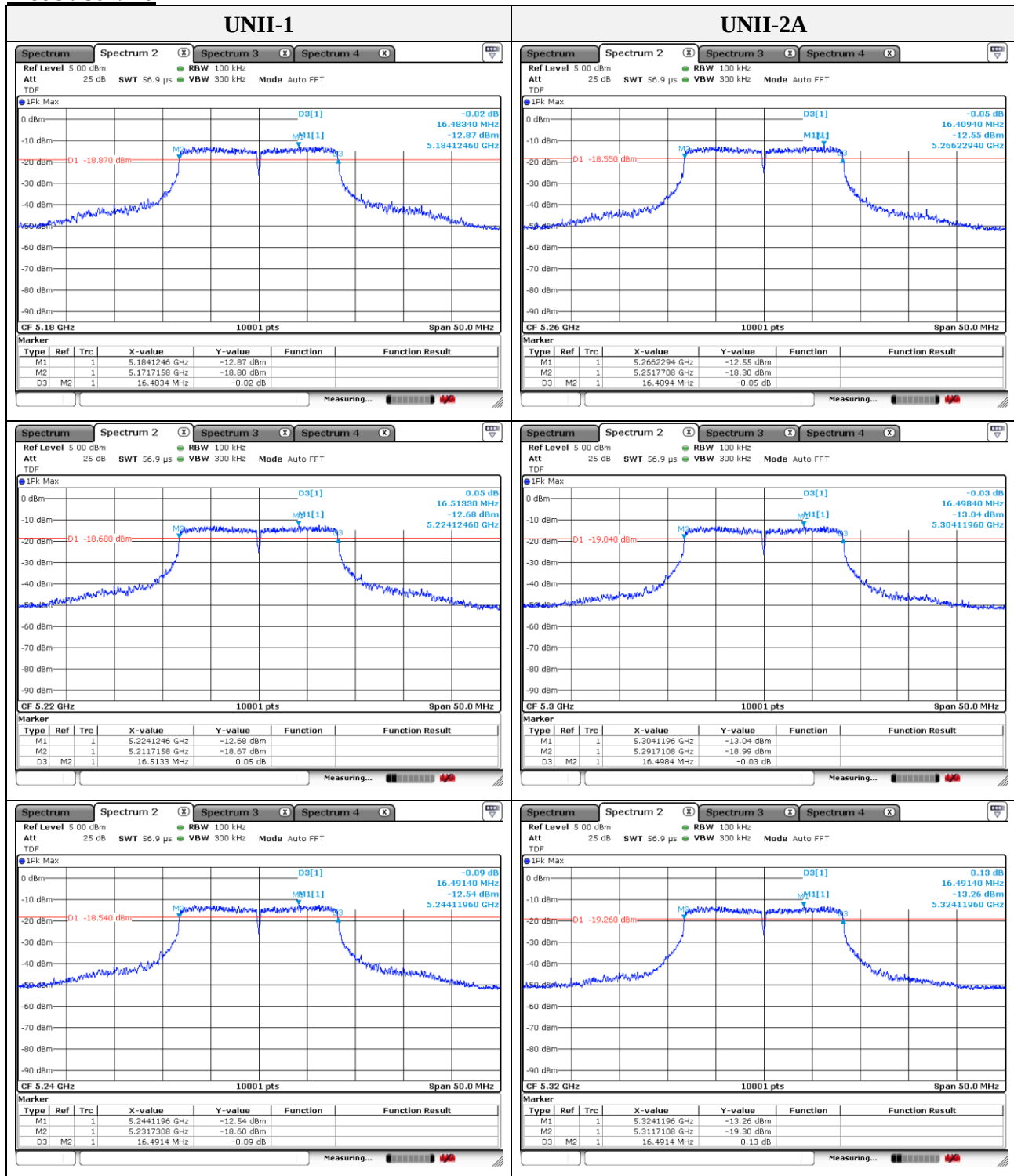
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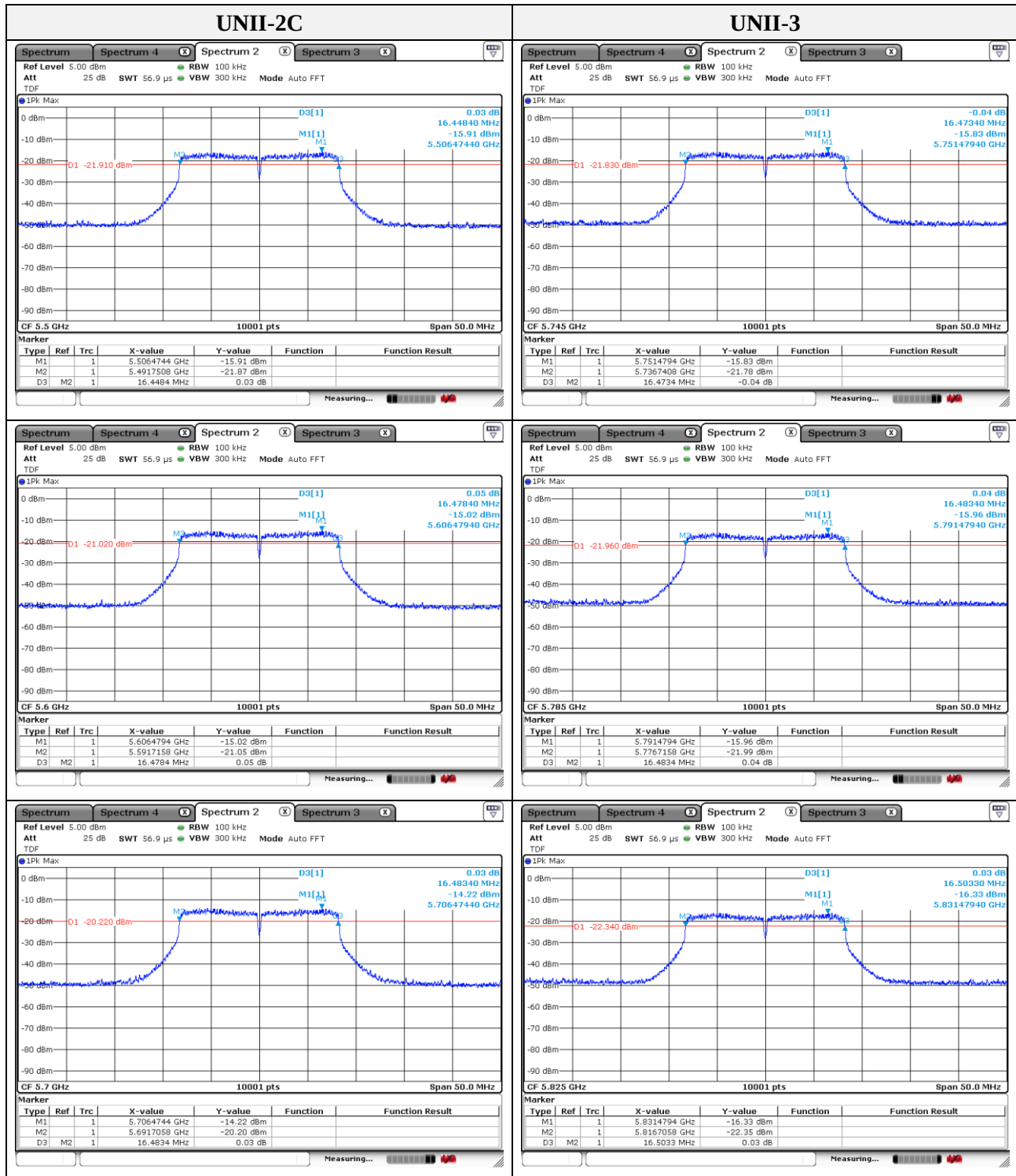
Band	Frequency(MHz)	Mode	6 dB bandwidth(MHz)
UNII-1	5 210	ac_VHT80	76.16
UNII-2A	5 290		76.03
UNII-2C	5 530		76.32
	5 610		76.33
UNII-3	5 775		75.98

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Mode : 802.11a

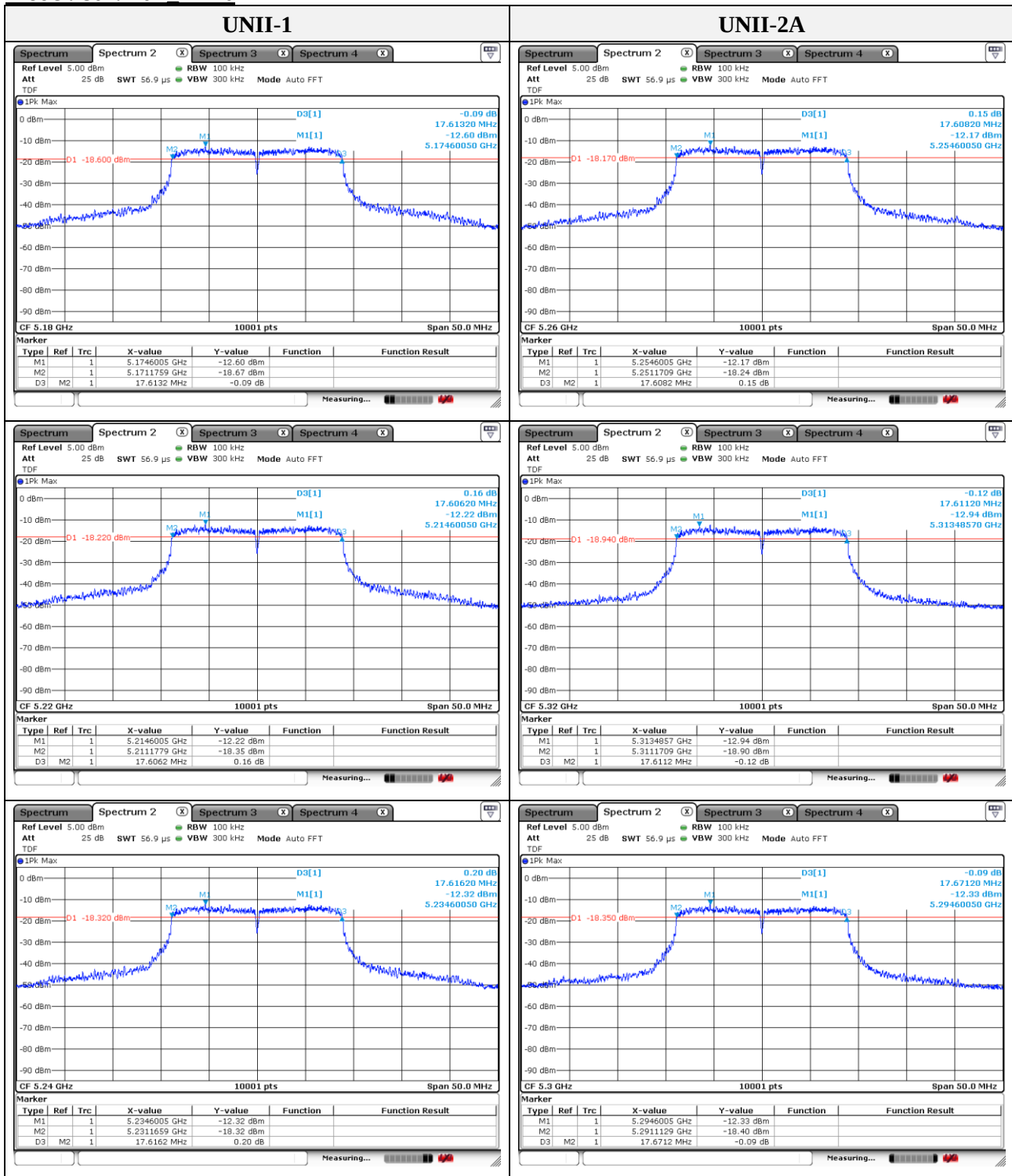


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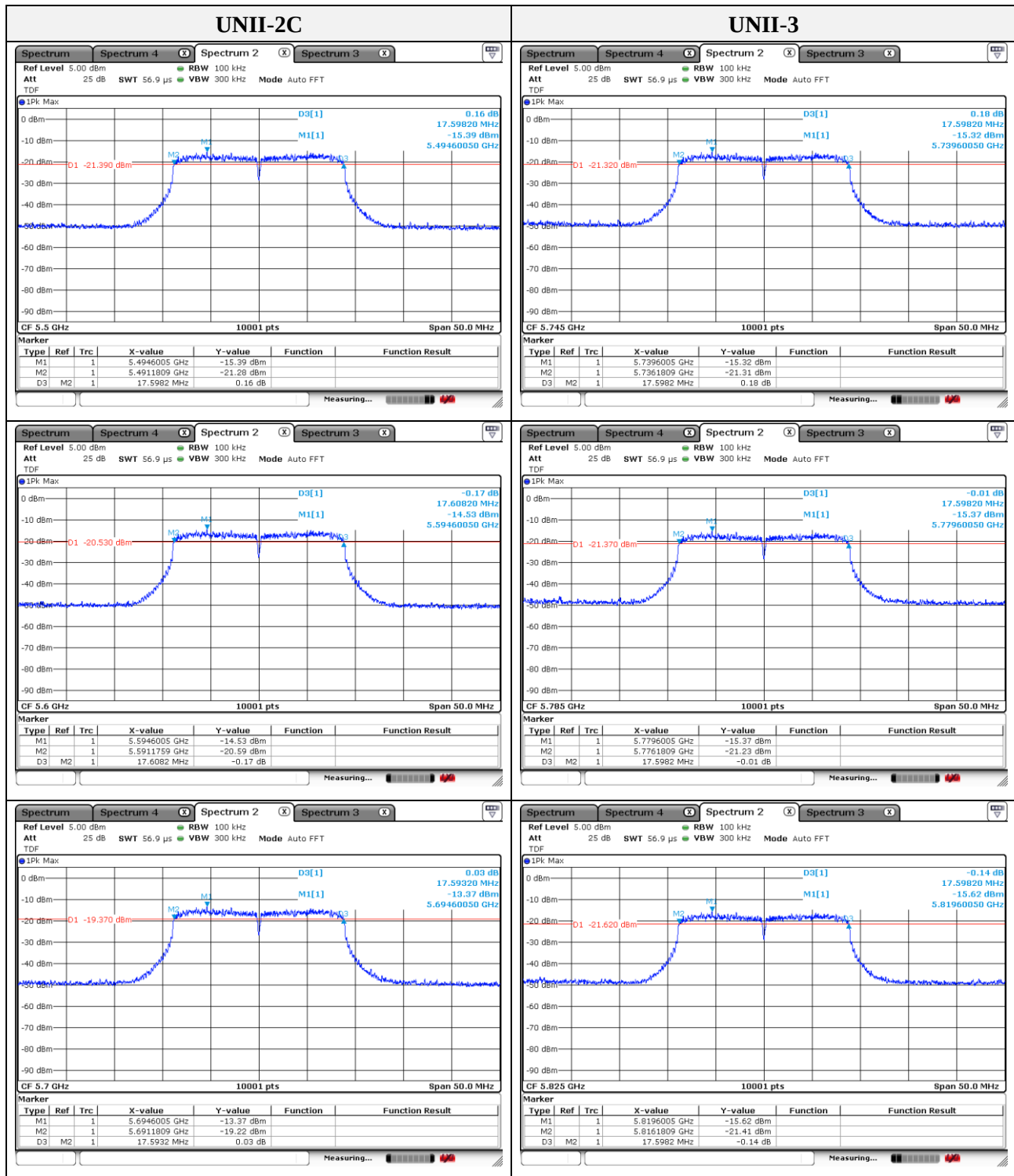


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Mode : 802.11an HT20

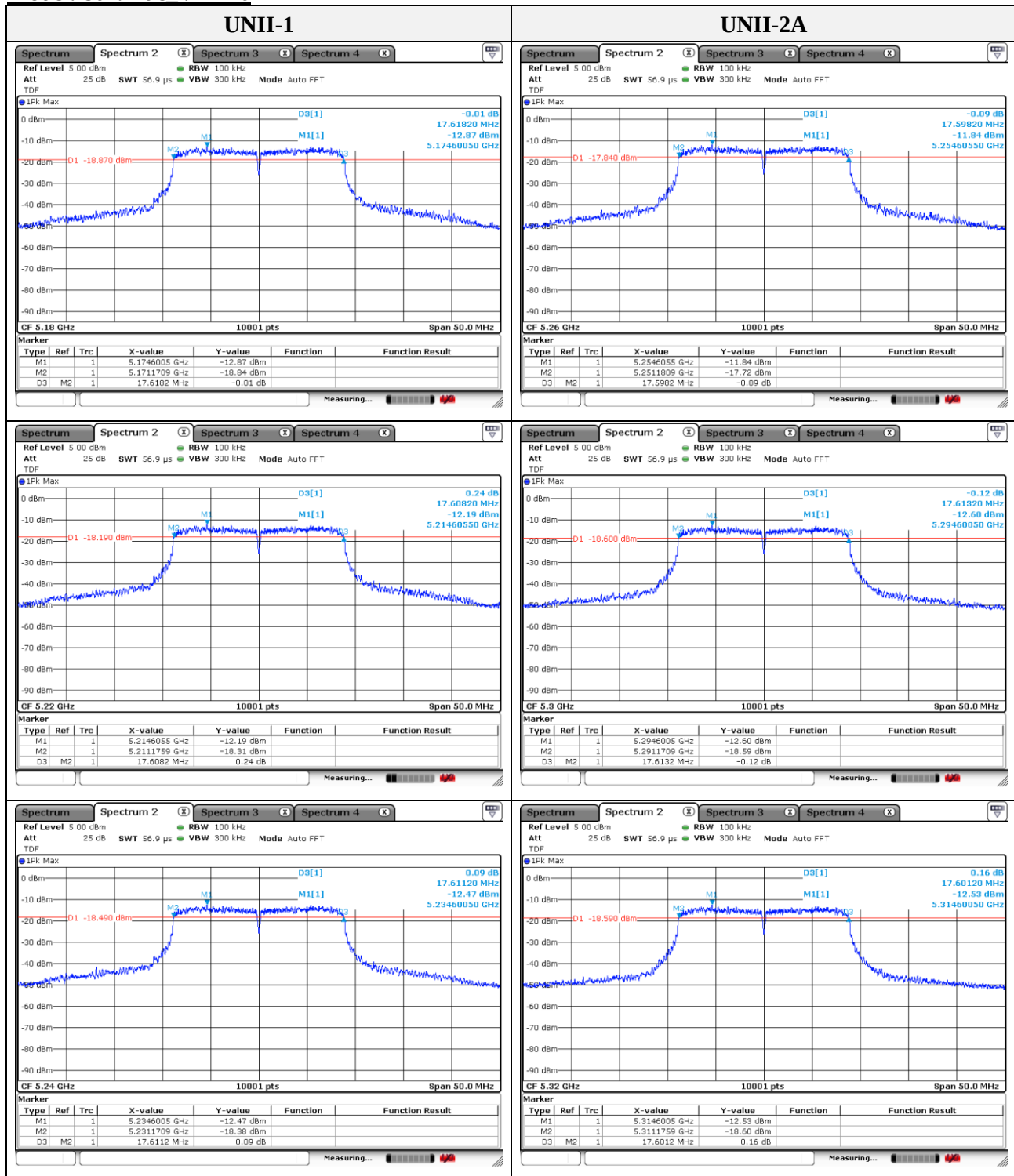


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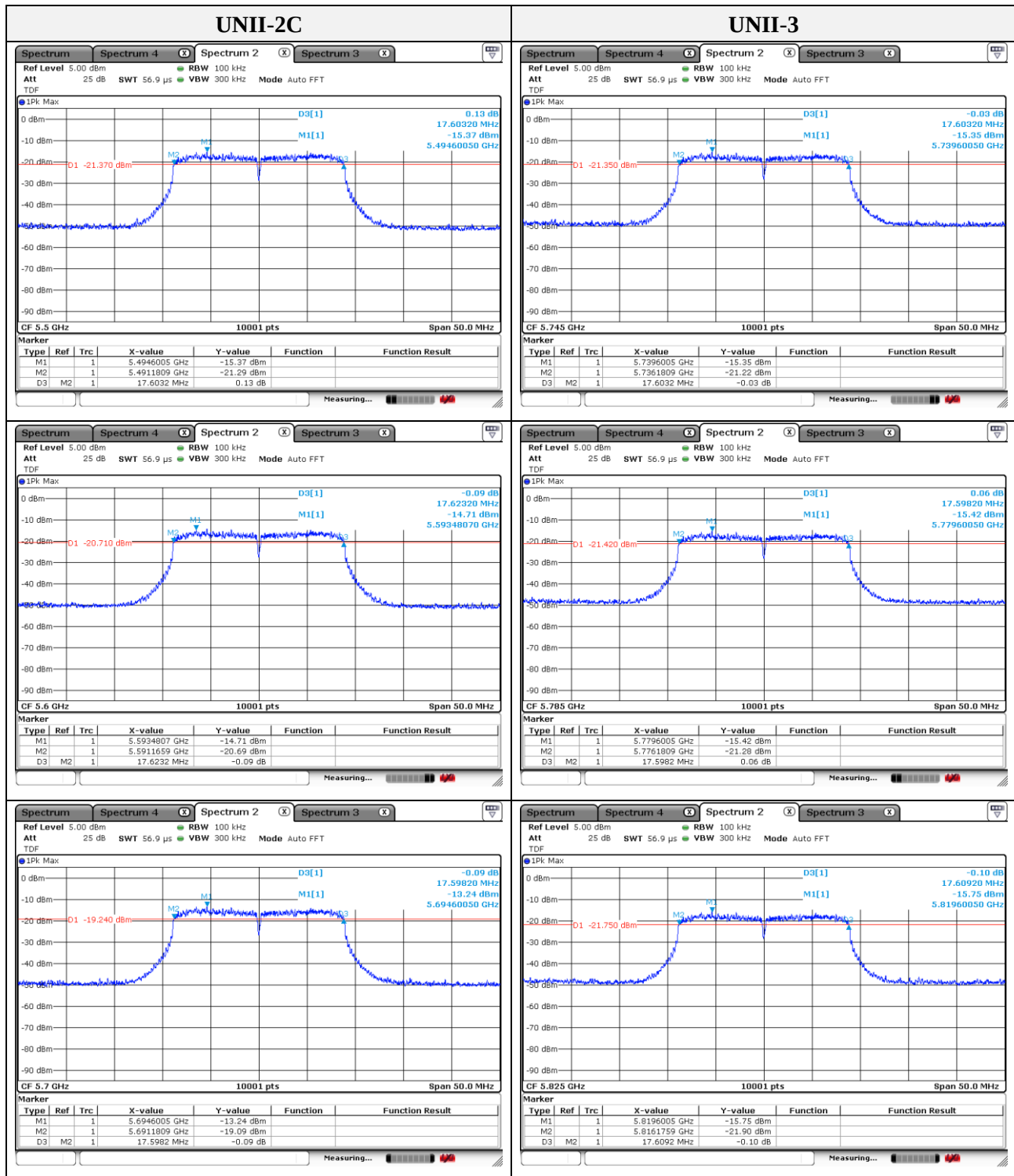


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Mode : 802.11ac VHT20



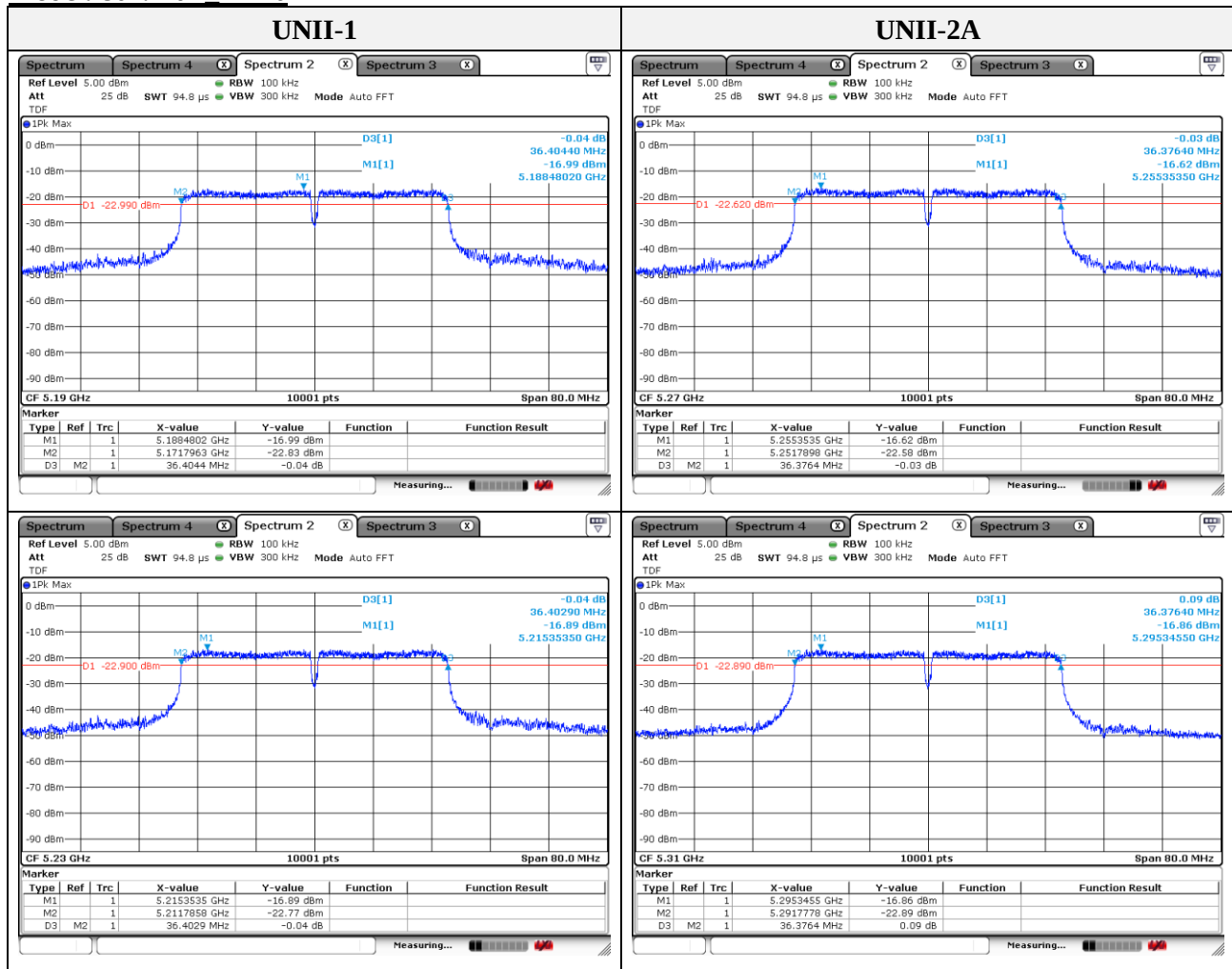
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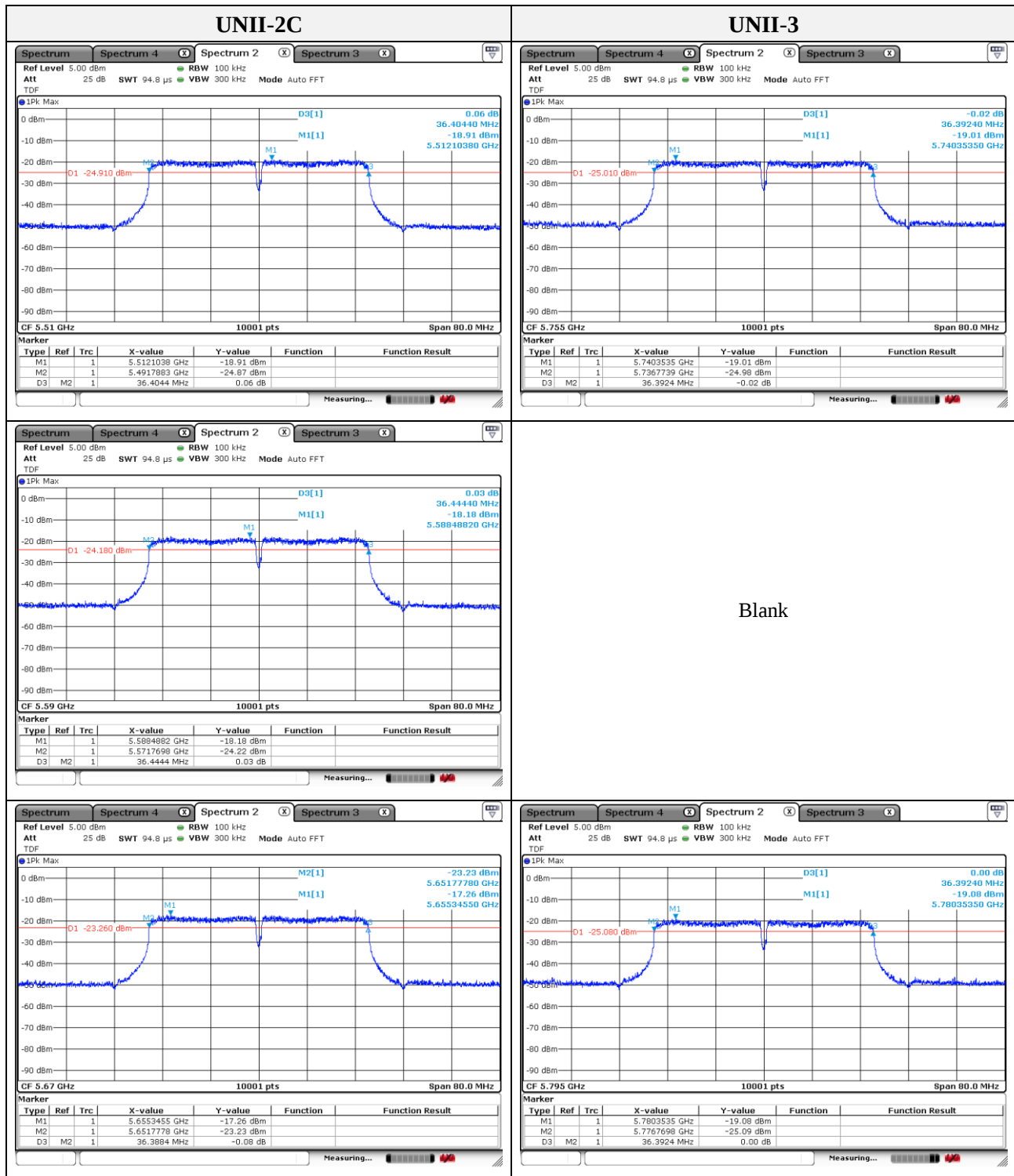
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Mode : 802.11an HT40



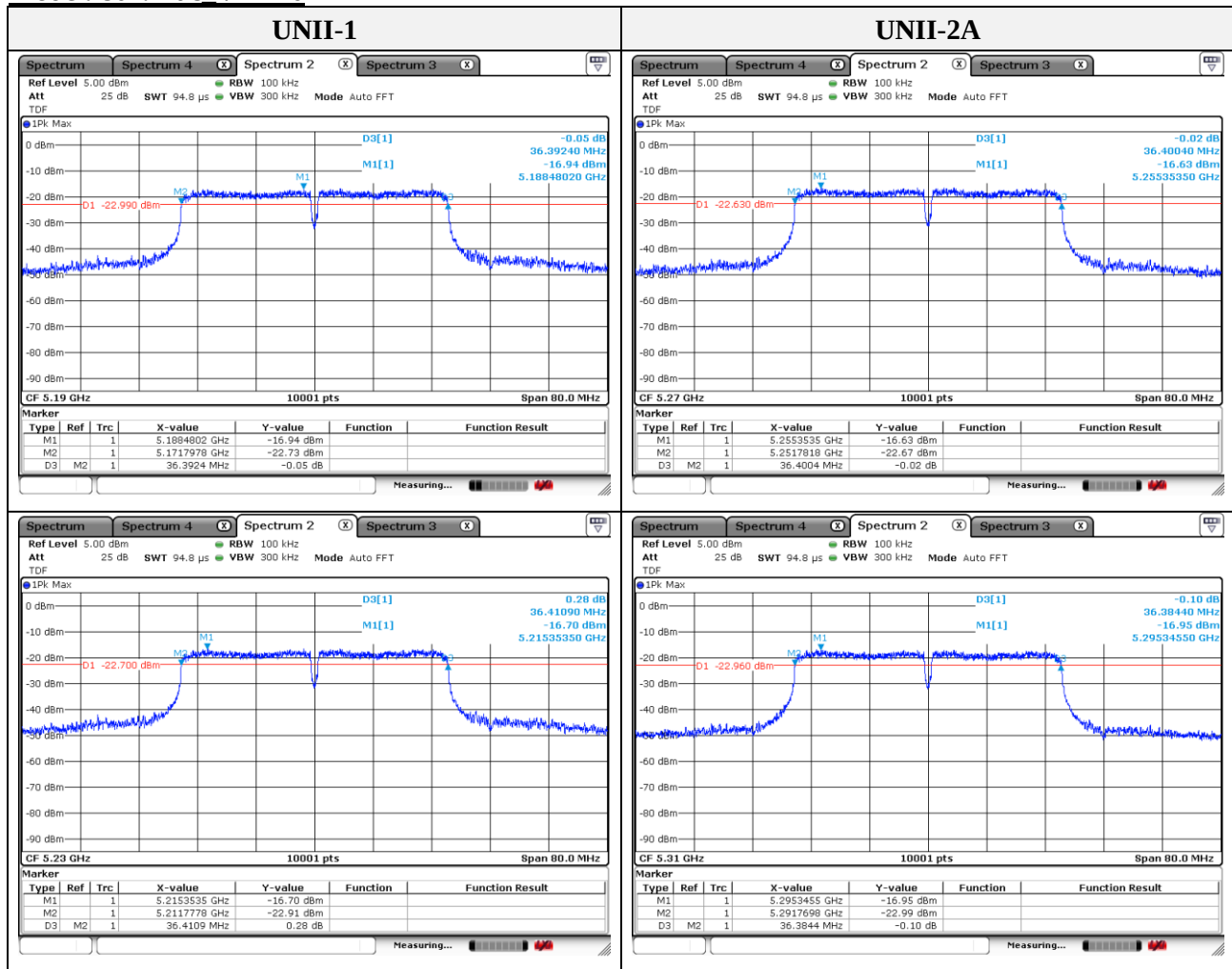
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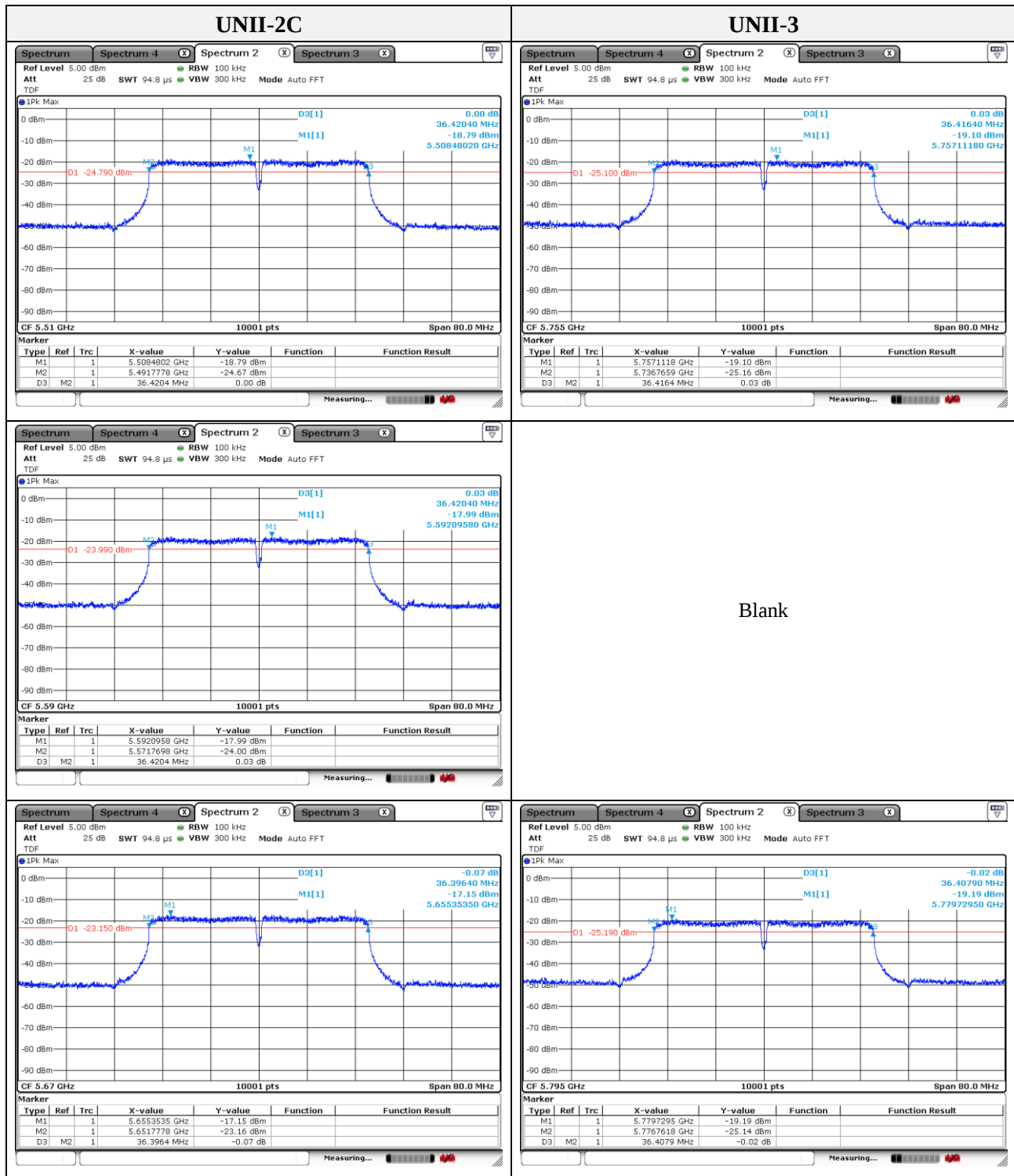
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Mode : 802.11ac VHT40

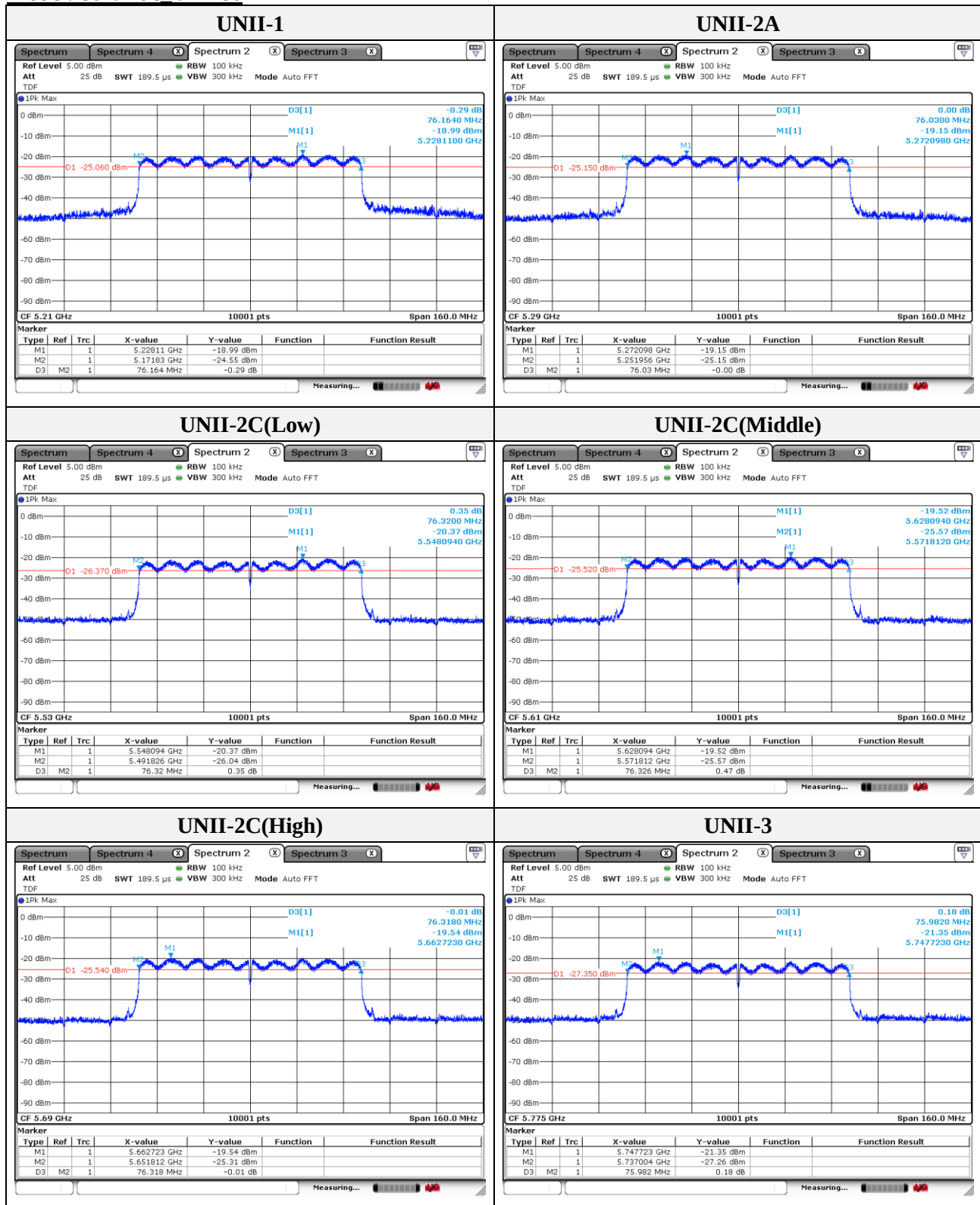


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Mode : 802.11ac VHT80



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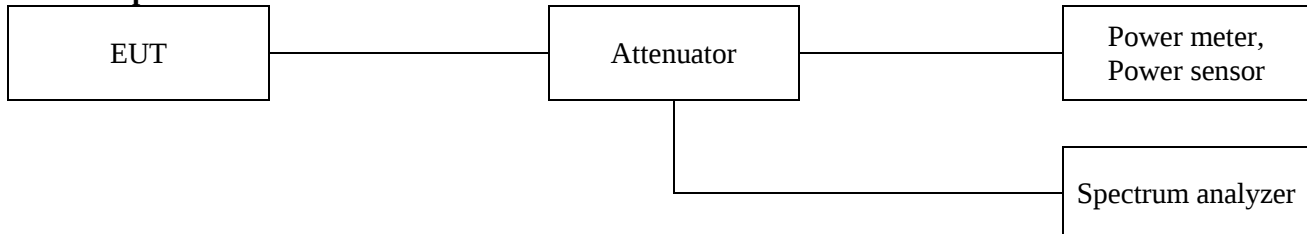
3.3. Maximum conducted output power

Test procedure

KDB 789033 D02 v02r01– Section E.3.a) or b)

Used test method is Section E.3.b)

Test setup



Section E.3.a)

Method PM (Measurement using an RF average power meter):

- i. 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.
- ii. If the transmitter does not transmit continuously, measure the duty cycle, x , of the transmitter output signal as described in section II.B.
- iii. Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
- iv. Adjust the measurement in dBm 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.

**Limit
FCC**

Band	EUT Category		Limit
UNII-1		Outdoor access point	1 W (30 dBm)
		Indoor access point	
		Fixed point-to-point access point	
	✓	Mobile and portable client device	250 mW(24 dBm)
UNII-2A	✓		250 mW or 11 dBm + 10logB*
UNII-2C	✓		250 mW or 11 dBm + 10logB*
UNII-3	✓		1 W (30 dBm)

Note.

- Where 'B' is the 26 dB emission bandwidth in megahertz.

Test results

Mode	Frequency (MHz)	Mode	Detector mode	Ant Gain (dBi)	Output power (dBm)	Limit (dBm)
						FCC
UNII-1	5 180	802.11 a	AV	2.86	6.29	24.00
	5 220		AV		6.61	
	5 240		AV		6.72	
UNII-2A	5 260		AV	2.33	6.46	30.00
	5 280		AV		6.64	
	5 320		AV		6.53	
UNII-2C	5 500		AV	1.33	4.31	30.00
	5 600		AV		3.48	
	5 700		AV		4.75	
UNII-3	5 745		AV	1.03	2.59	30.00
	5 785		AV		1.94	
	5 825		AV		1.68	

Mode	Frequency (MHz)	Mode	Detector mode	Ant Gain (dBi)	Output power (dBm)	Limit (dBm)
						FCC
UNII-1	5 180	802.11 an HT20	AV	2.86	6.29	24.00
	5 220		AV		6.61	
	5 240		AV		6.83	
UNII-2A	5 260		AV	2.33	6.64	30.00
	5 280		AV		6.70	
	5 320		AV		6.56	
UNII-2C	5 500		AV	1.33	4.36	30.00
	5 600		AV		3.38	
	5 700		AV		4.73	
UNII-3	5 745		AV	1.03	2.54	30.00
	5 785		AV		1.95	
	5 825		AV		1.70	

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Mode	Frequency (MHz)	Mode	Detector mode	Ant Gain (dBi)	Output power (dBm)	Limit (dBm)
						FCC
UNII-1	5 180	802.11 ac VHT20	AV	2.86	6.38	24.00
	5 220		AV		6.64	
	5 240		AV		6.70	
UNII-2A	5 260		AV	2.33	6.52	30.00
	5 280		AV		6.83	
	5 320		AV		6.65	
UNII-2C	5 500		AV	1.33	4.31	30.00
	5 600		AV		3.31	
	5 700		AV		4.51	
UNII-3	5 745		AV	1.03	2.51	30.00
	5 785		AV		1.93	
	5 825		AV		1.69	

Mode	Frequency (MHz)	Mode	Detector mode	Ant Gain (dBi)	Output power (dBm)	Limit (dBm)
						FCC
UNII-1	5 190	802.11 an HT40	AV	2.86	6.77	24.00
	5 230		AV		7.10	
UNII-2A	5 270		AV	2.33	6.97	30.00
	5 310		AV		7.21	
UNII-2C	5 510		AV	1.33	4.80	30.00
	5 590		AV		3.81	
	5 670		AV		4.33	
UNII-3	5 755		AV	1.03	3.14	30.00
	5 795		AV		2.44	

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Mode	Frequency (MHz)	Mode	Detector mode	Ant Gain (dBi)	Output power (dBm)	Limit (dBm)
						FCC
UNII-1	5 190	802.11 ac VHT40	AV	2.86	6.91	24.00
	5 230		AV		7.17	
UNII-2A	5 270		AV	2.33	7.03	30.00
	5 310		AV		7.28	
UNII-2C	5 510		AV	1.33	4.81	30.00
	5 590		AV		3.84	
	5 670		AV		4.32	
UNII-3	5 755		AV	1.03	3.16	30.00
	5 795		AV		2.52	

Mode	Frequency (MHz)	Mode	Detector mode	Ant Gain (dBi)	Output power (dBm)	Limit (dBm)
						FCC
UNII-1	5 210	802.11 ac VHT80	AV	2.86	7.15	24.00
UNII-2A	5 290		AV	2.33	7.11	30.00
UNII-2C	5 530		AV	1.33	4.84	30.00
	5 610		AV		4.63	
UNII-3	5 775		AV	1.03	2.91	30.00

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3.4. Power spectral density

Test procedure

KDB 789033 D02 v02r01 – Section F

Test setup



Section F

1. Create an average power spectrum for the EUT operating mode being tested by following the instructions in section 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. Use the peak search function on the instrument to find the peak of the spectrum and record its value.
3. Make the following 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 step 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 above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 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 a RBWs less than 1 MHz, 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 $RBW \geq 1/T$, where T is defined in section II.B.1.a)
 - b) Set $VBW \geq 3 RBW$.
 - c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10 \log (500 \text{ kHz}/RBW)$ to the measured result, whereas $RBW (< 500 \text{ kHz})$ 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 $10 \log (1 \text{ MHz}/RBW)$ to the measured result, whereas $RBW (< 1 \text{ MHz})$ 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 sections 5.c) and 5.d) above, since $RBW=100 \text{ kHz}$ is available on nearly all spectrum analyzers.

**Limit
FCC**

Band	EUT Category		Limit
UNII-1		Outdoor access point	17 dBm/MHz
		Indoor access point	
		Fixed point-to-point access point	
	✓	Mobile and portable client device	11 dBm/MHz
UNII-2A	✓		11 dBm/MHz
UNII-2C	✓		11 dBm/MHz
UNII-3	✓		30 dBm/500 kHz

Note.

1. 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 of the antenna exceed 6 dBi.

Test results

Mode	Frequency (MHz)	Band	PSD (dBm/MHz)	RBWF Note1	DCF Note2	Ant Gain	Sum Note3	Limit(dBm/MHz)
								FCC
802.11 a	5 180	UNII-1	-11.86	-	1.73	2.86	-10.13	11.00
	5 220		-11.11				-9.38	
	5 240		-11.81				-10.08	
	5 260	UNII-2A	-10.82		1.74	2.33	-9.08	11.00
	5 300		-11.47				-9.73	
	5 320		-11.23				-9.49	
	5 500	UNII-2C	-13.56		1.74	1.33	-11.82	
	5 600		-13.58				-11.84	
	5 700		-11.69				-9.95	
	5 745	UNII-3	-17.25		1.74	1.03	-15.51	30.00
	5 785		-17.22				-15.48	
	5 825		-17.32				-15.58	

Mode	Frequency (MHz)	Band	PSD (dBm/MHz)	RBWF Note1	DCF Note2	Ant Gain	Sum Note3	Limit(dBm/MHz)
								FCC
802.11 an_HT20	5 180	UNII-1	-12.62	-	1.84	2.86	-10.78	11.00
	5 220		-11.30				-9.46	
	5 240		-11.97				-10.13	
	5 260	UNII-2A	-12.04		1.84	2.33	-10.20	11.00
	5 300		-10.88				-9.04	
	5 320		-11.97				-10.13	
	5 500	UNII-2C	-14.08		1.84	1.33	-12.24	
	5 600		-13.57				-11.73	
	5 700		-12.05				-10.21	
	5 745	UNII-3	-17.29		1.84	1.03	-15.45	30.00
	5 785		-17.67				-15.83	
	5 825		-17.53				-15.69	

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Mode	Frequency (MHz)	Band	PSD (dBm/MHz)	RBWF Note1	DCF Note2	Ant Gain	Sum Note3	Limit(dBm/MHz)
								FCC
802.11 ac_VHT20	5 180	UNII-1	-12.42	-	1.83	2.86	-10.59	11.00
	5 220		-11.81				-9.98	
	5 240		-11.37				-9.54	
	5 260	UNII-2A	-11.50		1.83	2.33	-9.67	11.00
	5 300		-12.31				-10.48	
	5 320		-12.36				-10.53	
	5 500	UNII-2C	-13.61		1.82	1.33	-11.79	
	5 600		-13.38				-11.56	
	5 700		-12.18				-10.36	
	5 745	UNII-3	-17.57		1.84	1.03	-15.73	30.00
	5 785		-18.33				-16.49	
	5 825		-18.35				-16.51	

Mode	Frequency (MHz)	Band	PSD (dBm/MHz)	RBWF Note1	DCF Note2	Ant Gain	Sum Note3	Limit(dBm/MHz)
								FCC
802.11 an_HT40	5 190	UNII-1	-13.69	-	3.15	2.86	-10.54	11.00
	5 230		-13.60				-10.45	
	5 270	UNII-2A	-13.62		3.15	2.33	-10.47	11.00
	5 310		-13.99				-10.84	
	5 510	UNII-2C	-16.65		3.14	1.33	-13.51	
	5 590		-15.82				-12.68	
	5 670		-15.09				-11.95	
	5 755	UNII-3	-19.97		3.17	1.03	-16.80	30.00
	5 795		-19.83				-16.66	

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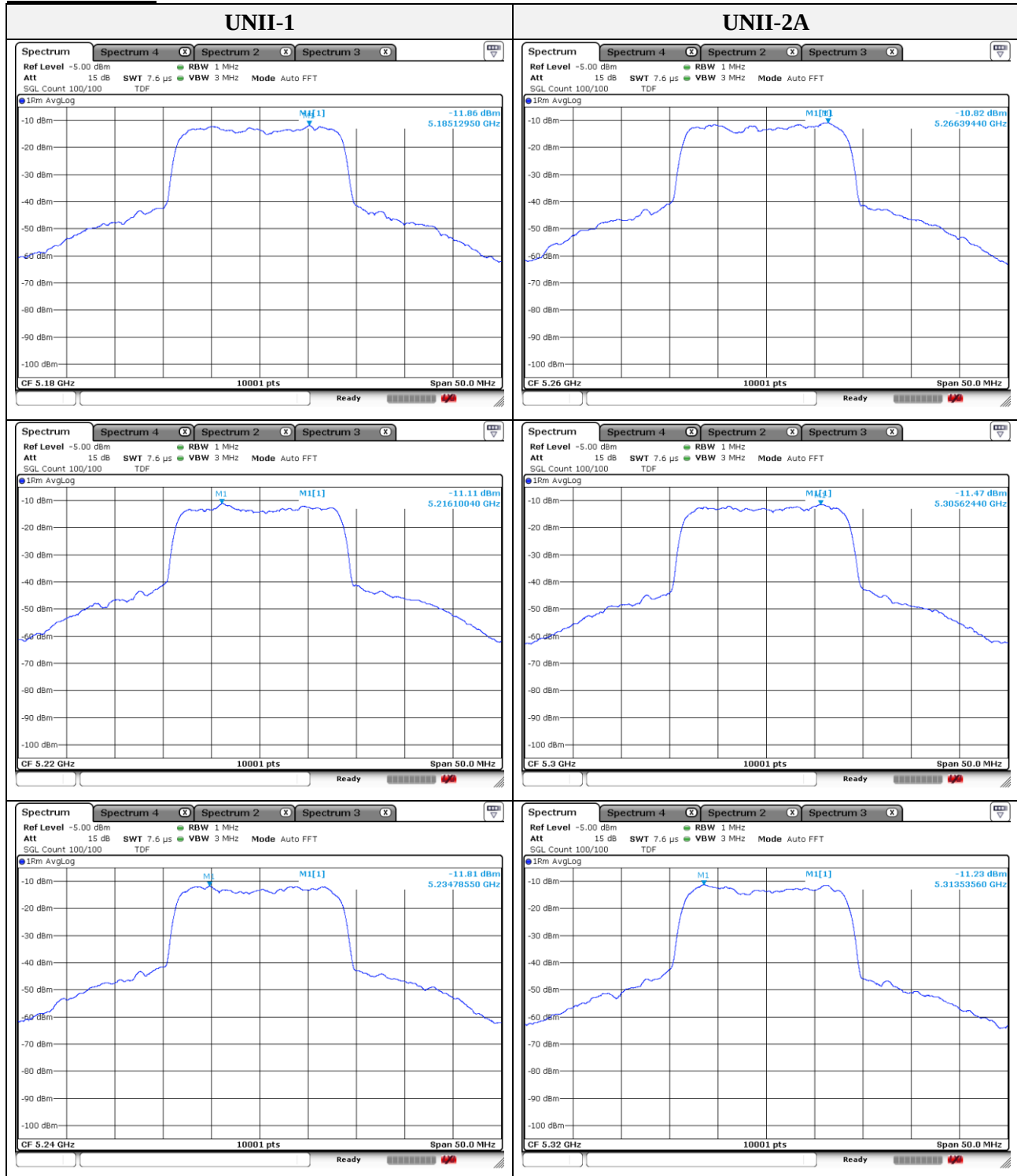
Mode	Frequency (MHz)	Band	PSD (dBm/MHz)	RBWF Note1	DCF Note2	Ant Gain	Sum Note3	Limit(dBm/MHz)
								FCC
802.11 ac_VHT40	5 190	UNII-1	-13.84	-	3.16	2.86	-10.68	11.00
	5 230		-13.97				-10.81	
	5 270	UNII-2A	-13.92		3.16	2.33	-10.76	11.00
	5 310		-13.61				-10.45	
	5 510	UNII-2C	-16.50		3.16	1.33	-13.34	
	5 590		-15.80				-12.64	
	5 670		-14.88				-11.72	
	5 755	UNII-3	-20.25		3.13	1.03	-17.12	30.00
	5 795		-20.37				-17.24	

Mode	Frequency (MHz)	Band	PSD (dBm/MHz)	RBWF Note1	DCF Note2	Ant Gain	Sum Note3	Limit(dBm/MHz)
								FCC
802.11 ac_VHT80	5 210	UNII-1	-16.16	-	5.02	2.86	-11.14	11.00
	5 290	UNII-2A	-15.93		5.00	2.33	-10.93	
	5 530	UNII-2C	-17.49		5.04	1.33	-12.45	11.00
	5 610		-17.30				-12.26	
	5 690		-17.49				-12.45	
	5 775	UNII-3	-22.89		5.02	1.03	-17.87	30.00

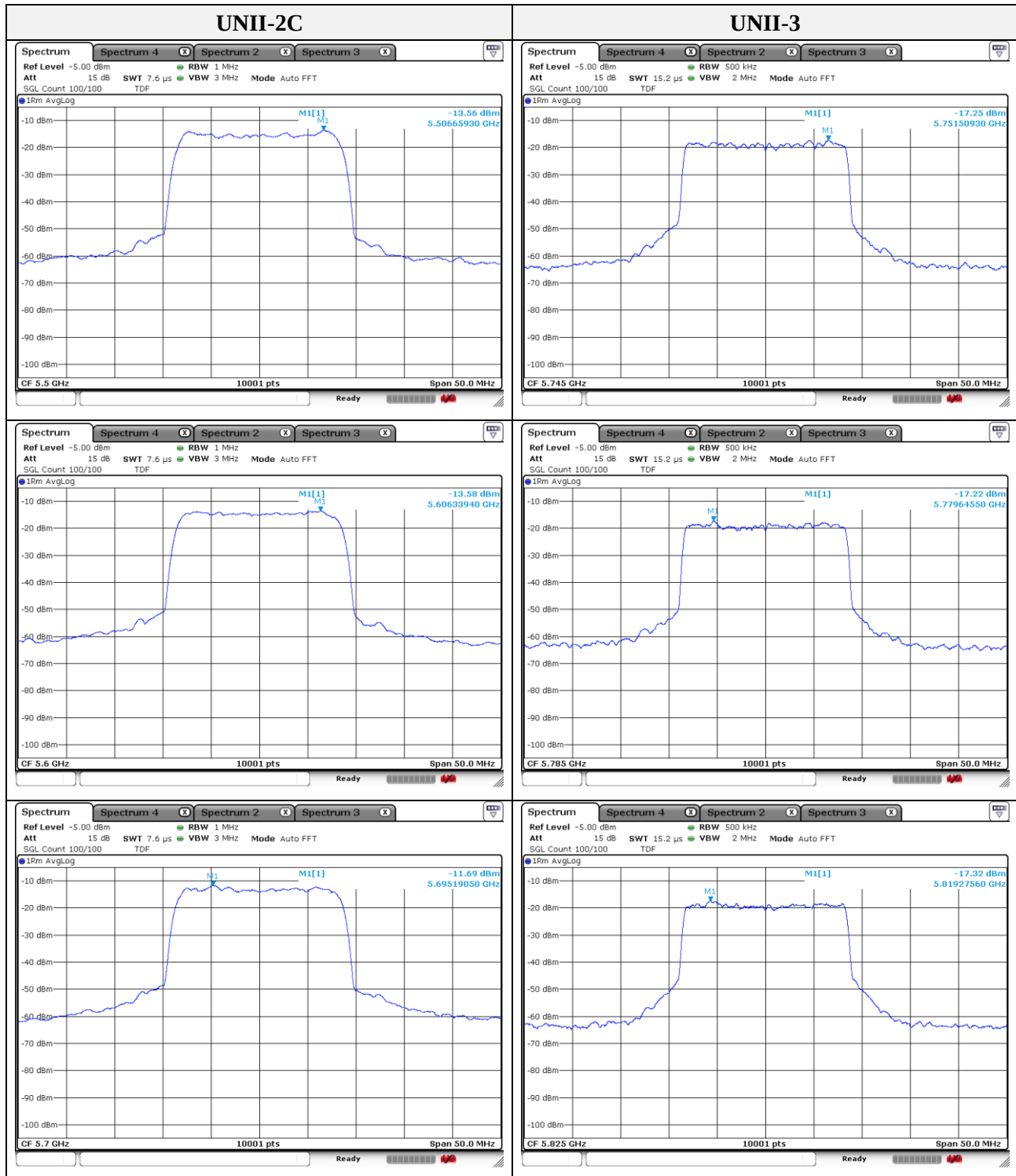
Note.

- UNII-1 = $10\log(1 \text{ MHz}/1 \text{ MHz})$
UNII-2A = $10\log(1 \text{ MHz}/1 \text{ MHz})$
UNII-2C = $10\log(1 \text{ MHz}/1 \text{ MHz})$
UNII-3 = $10\log(500 \text{ kHz}/500 \text{ kHz})$
- Refer to the page 90 on this report.
- Sum(dBm) = PSD(dBm) + RBWF + Duty correction factor (dB)

Mode : 802.11a



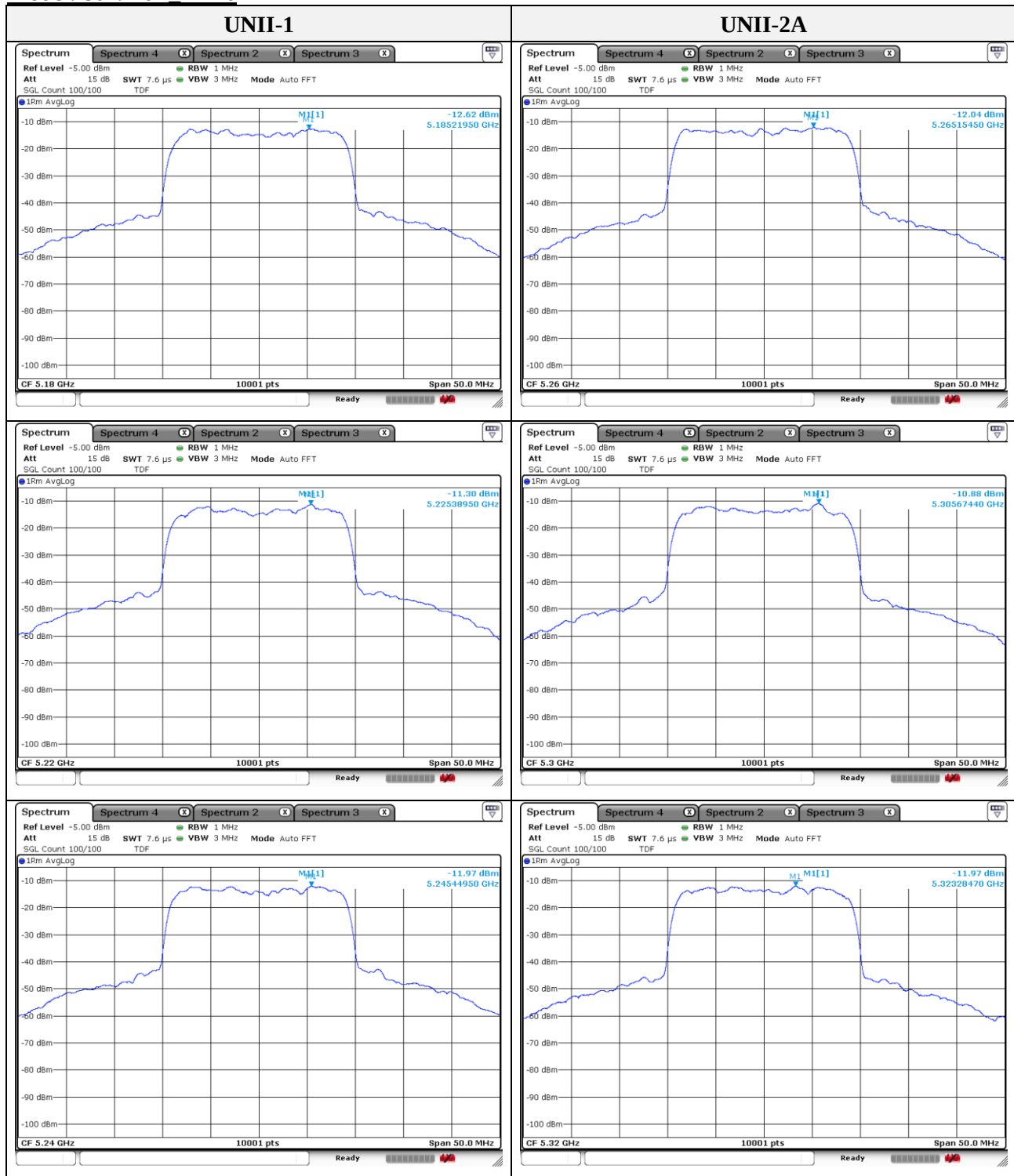
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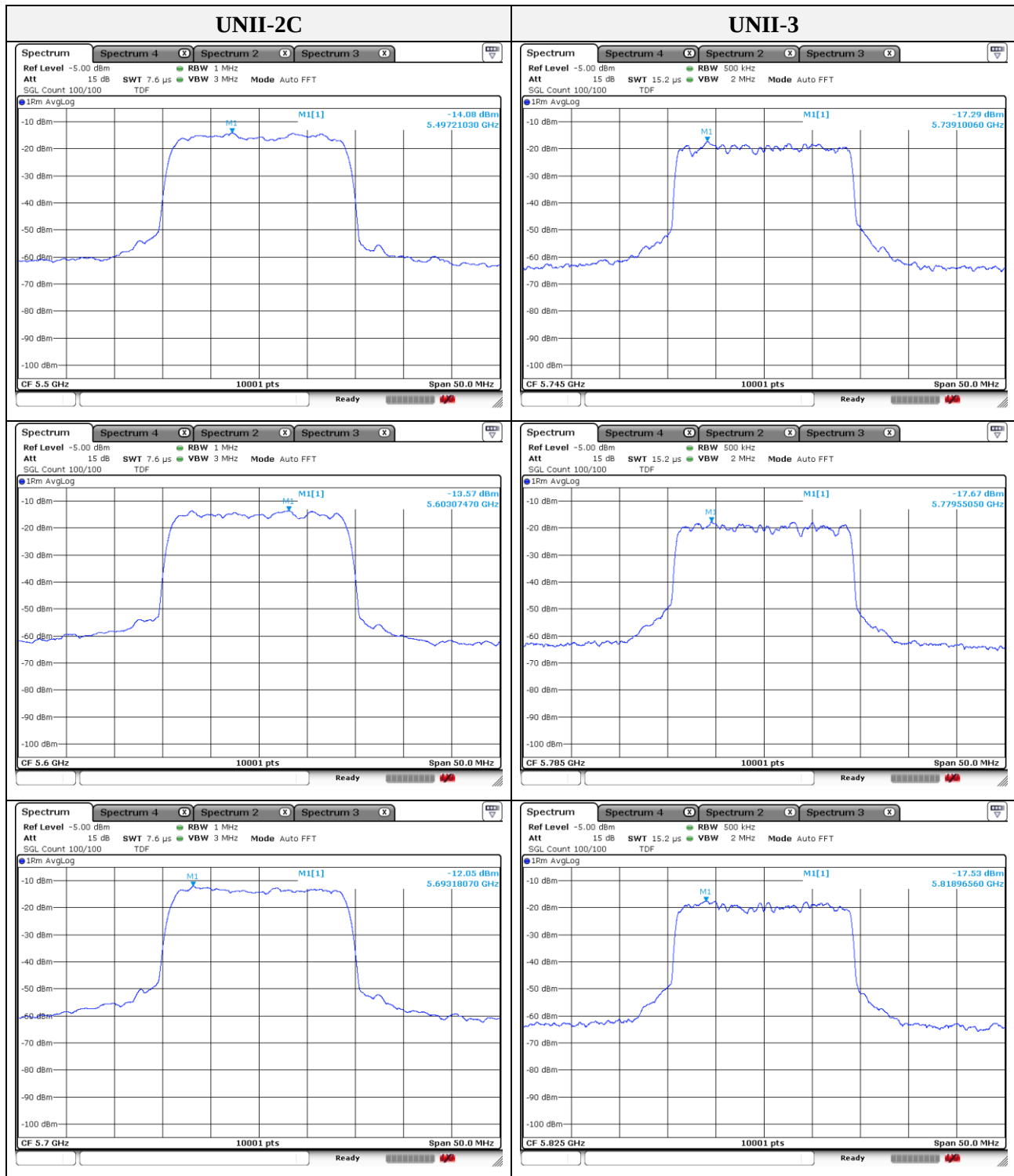
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Mode : 802.11an HT20

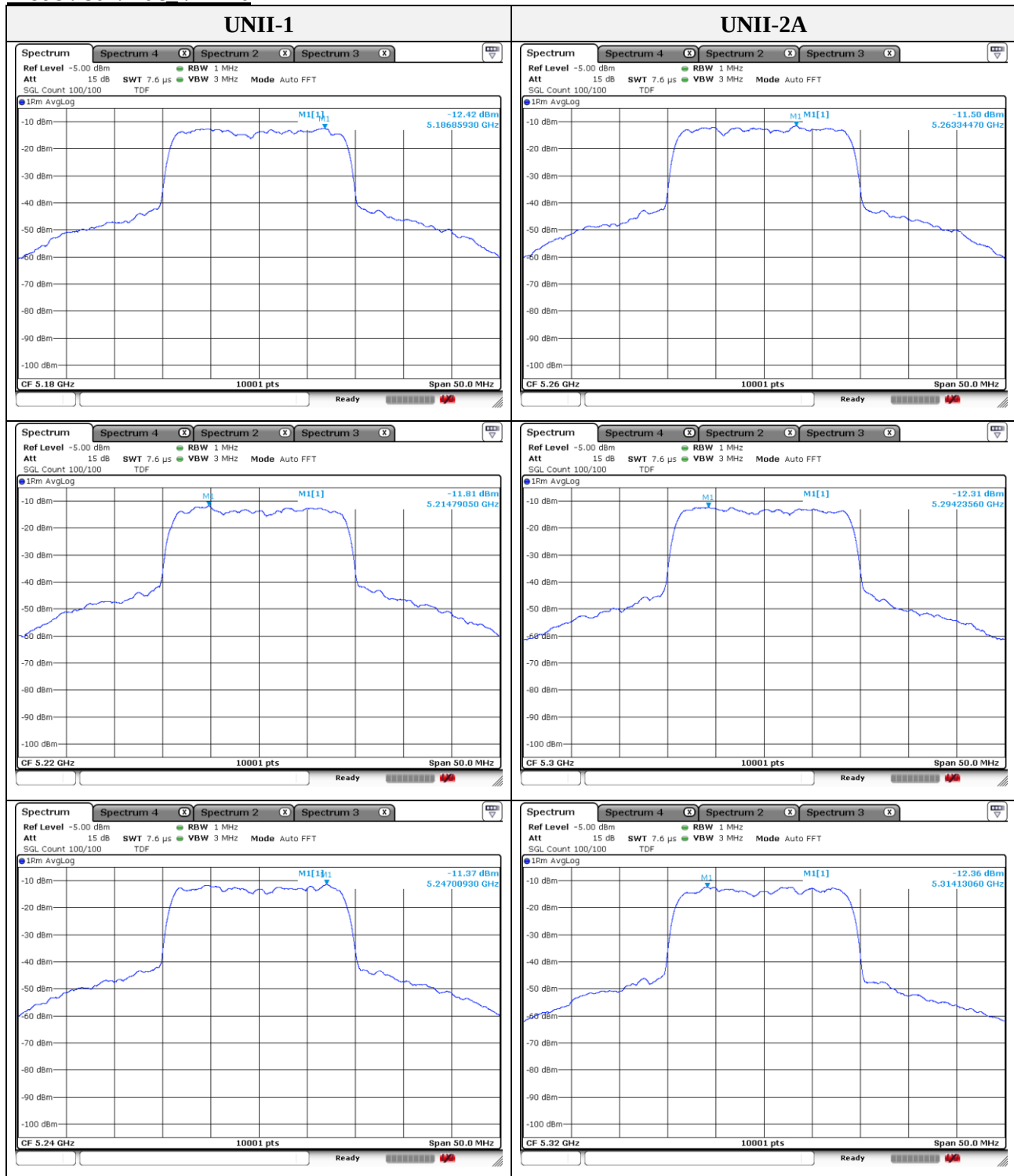


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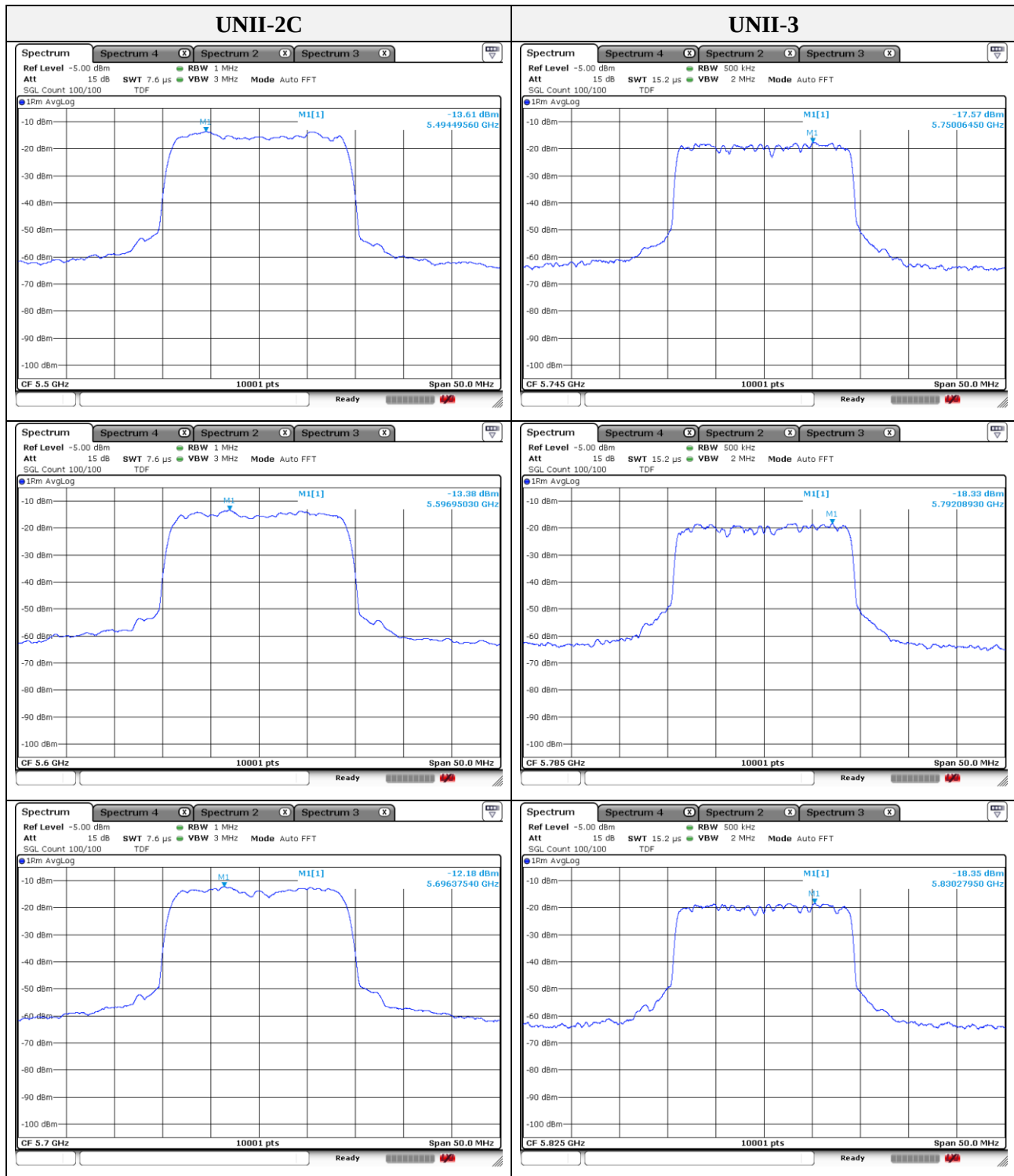


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Mode : 802.11ac VHT20



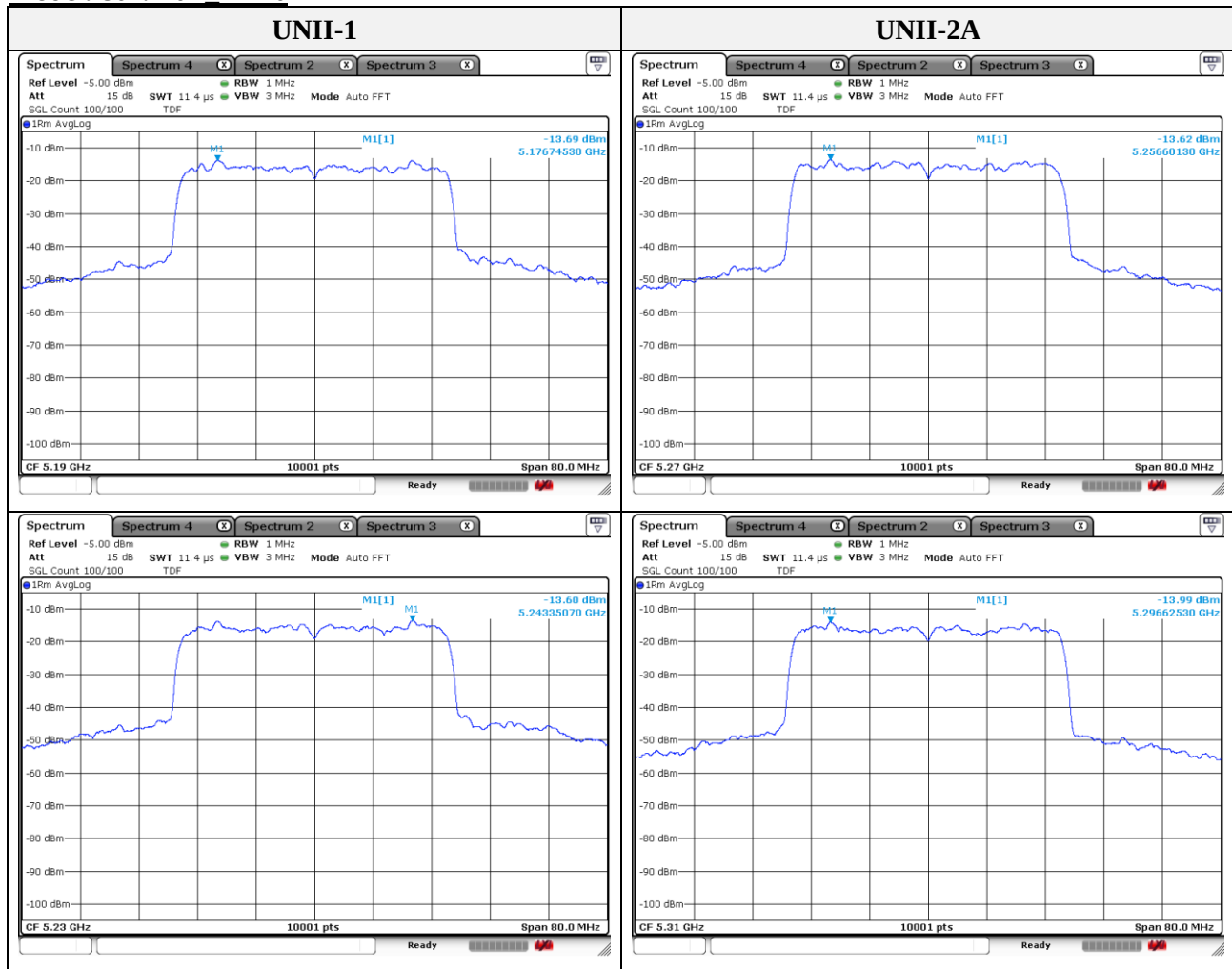
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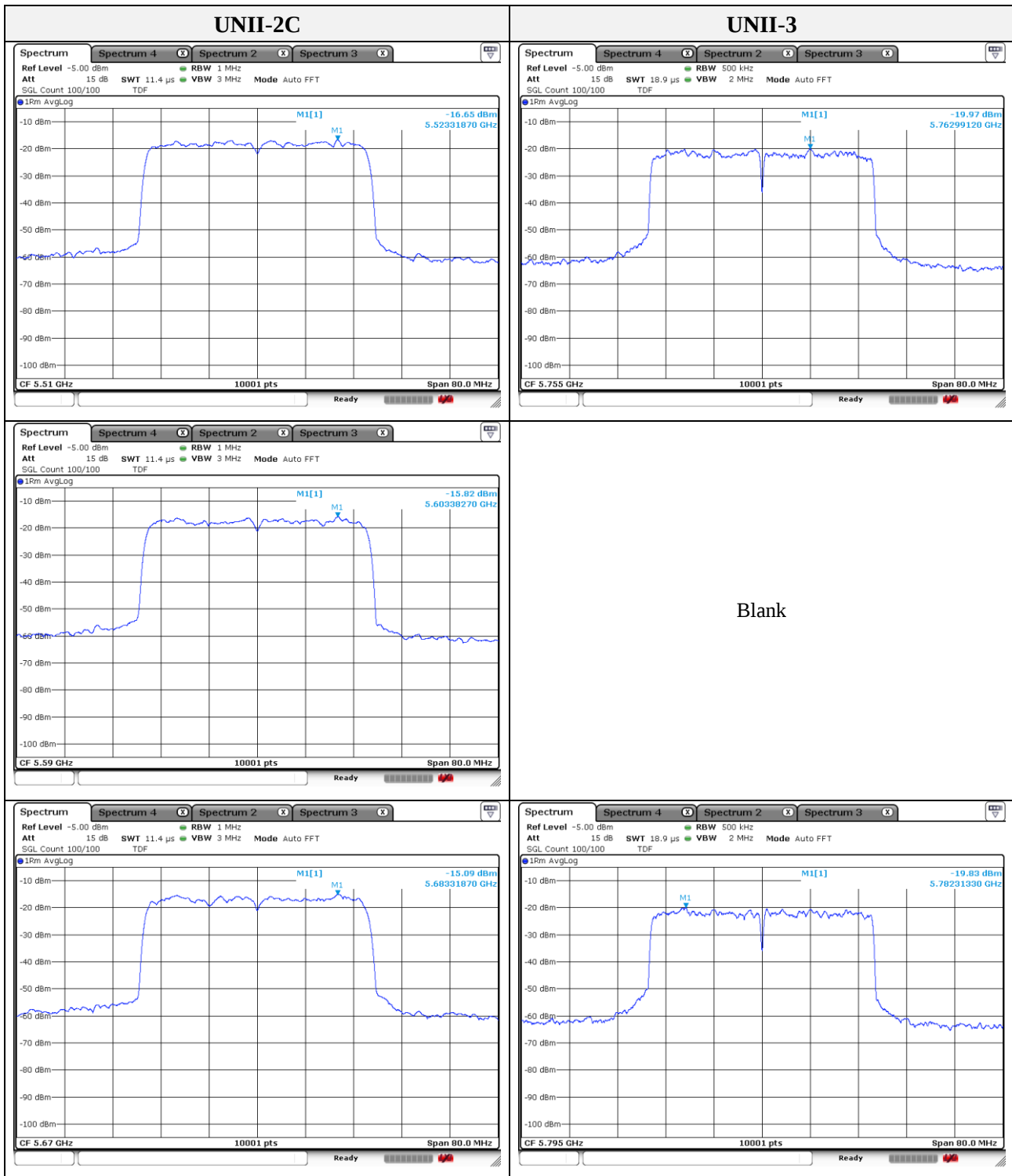
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Mode : 802.11an HT40

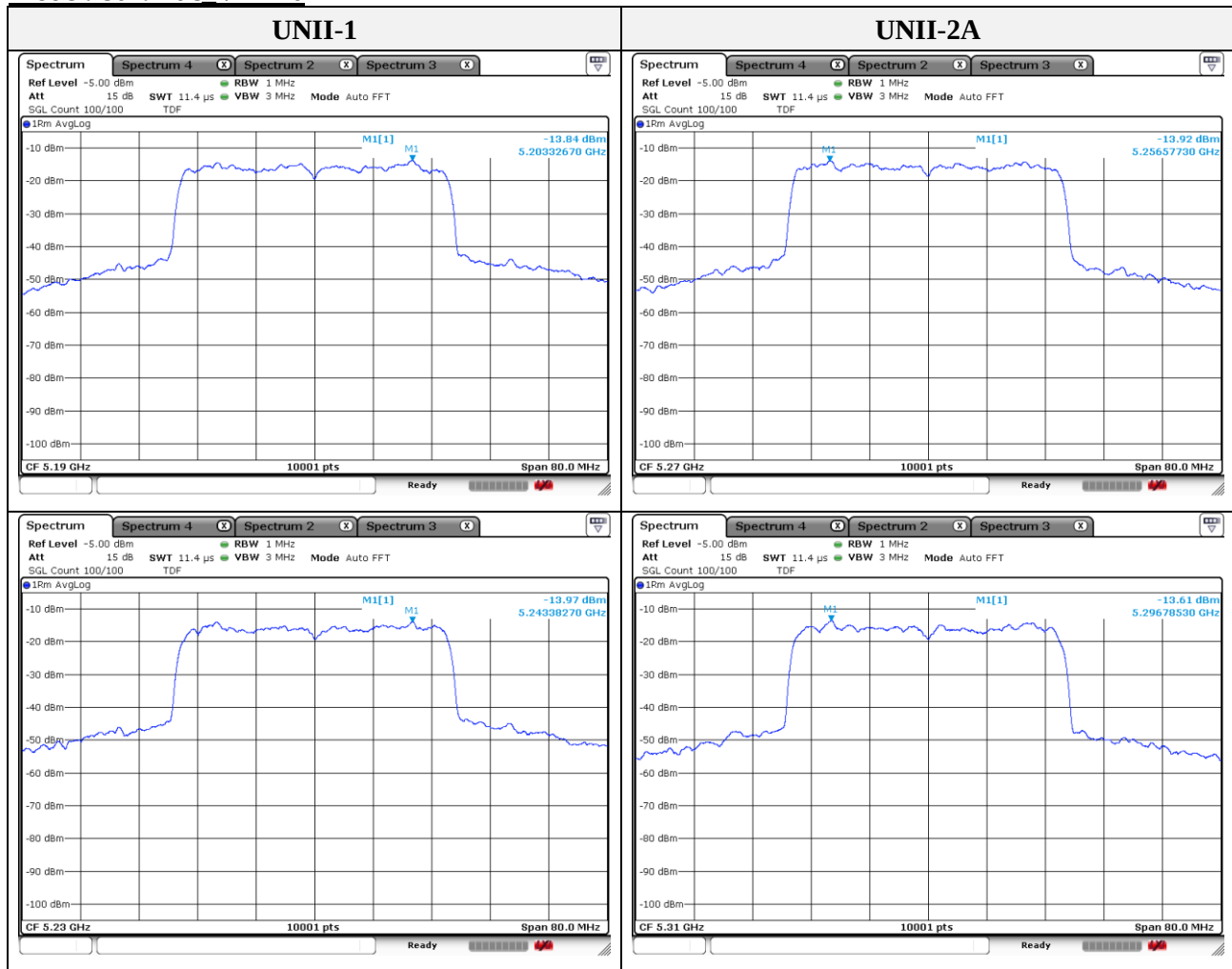


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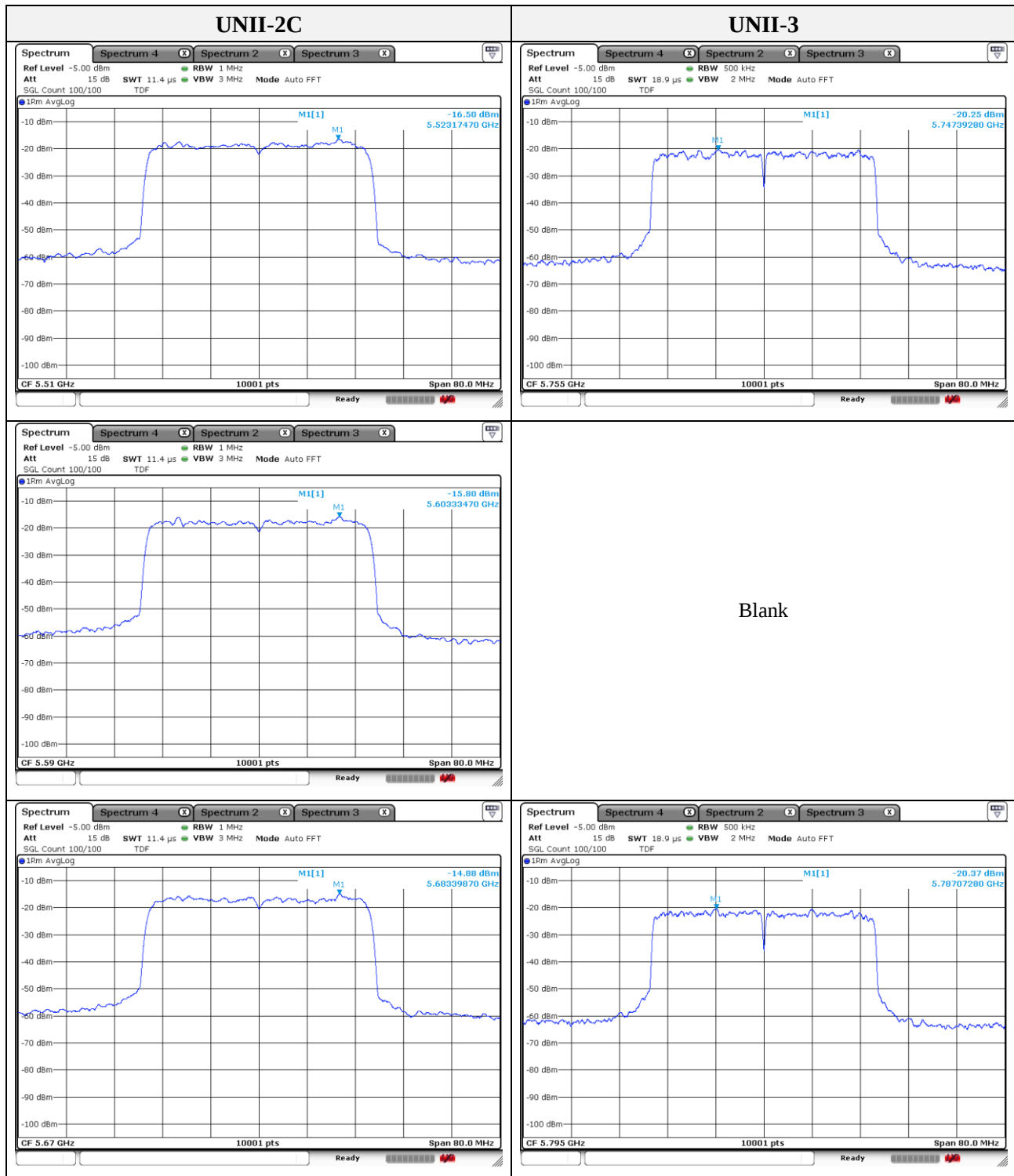


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Mode : 802.11ac VHT40

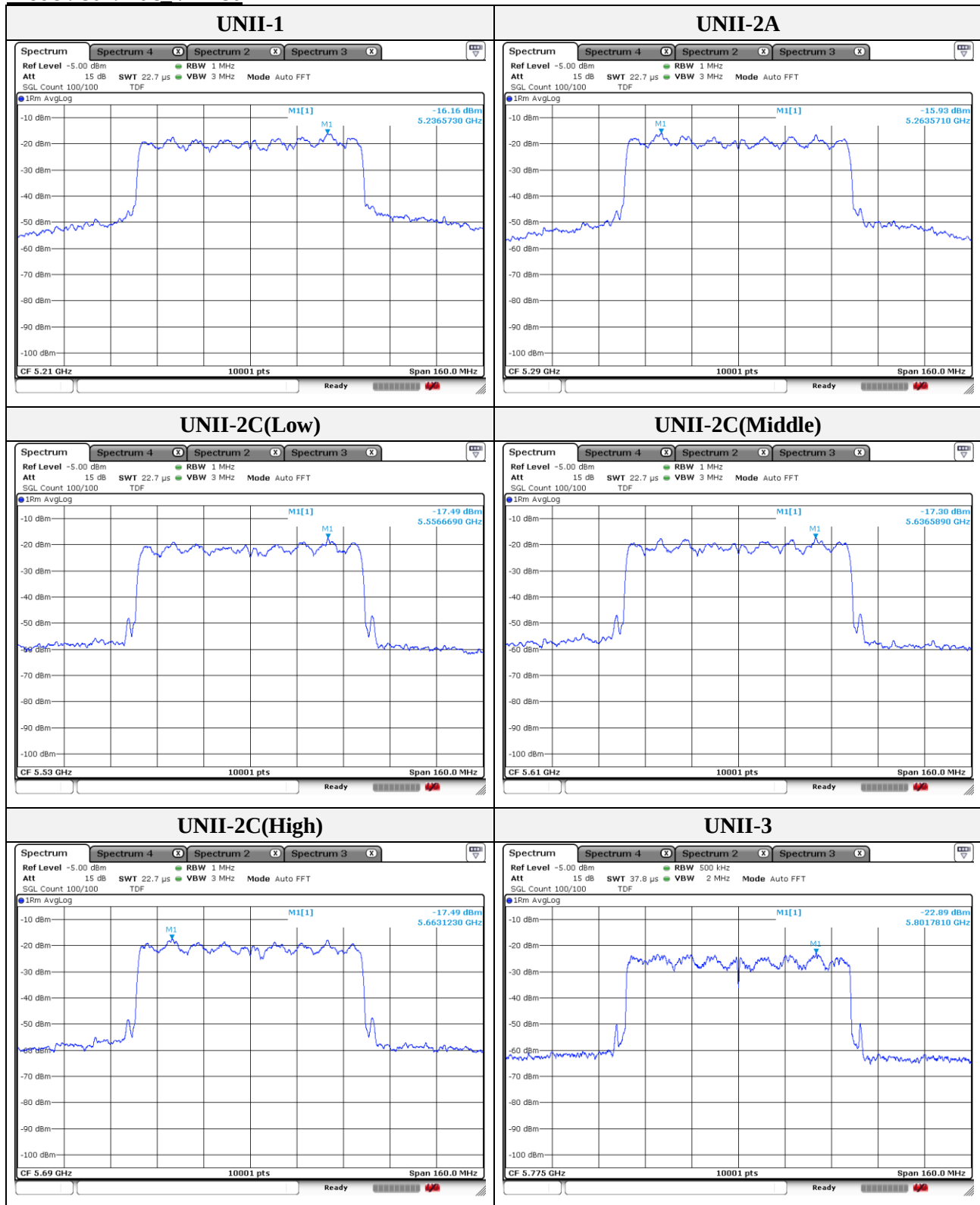


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Mode : 802.11ac VHT80



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