



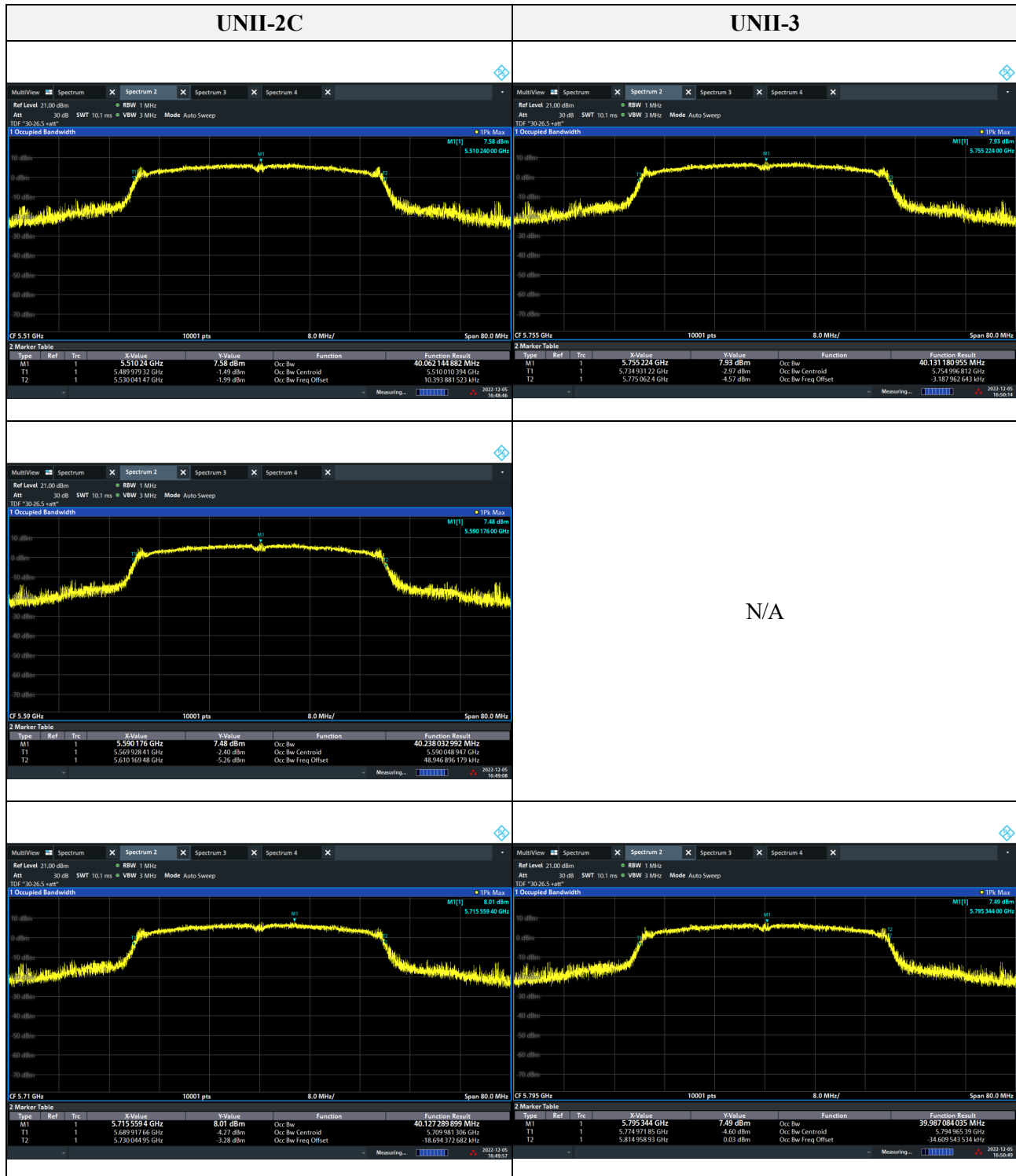
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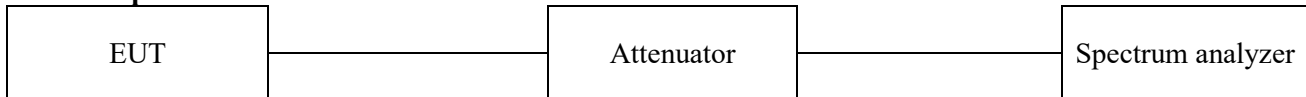
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3.2. 6 dB bandwidth

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.

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Test results

Band	Frequency(MHz)	Mode	6 dB bandwidth(MHz)
UNII-3	5 745	802.11a	15.64
	5 785		15.68
	5 825		15.67
	5 745	802.11 n_HT20	15.06
	5 785		15.06
	5 825		15.06
	5 755	802.11 n_HT40	37.16
	5 795		35.79
UNII-3 (Band-Crossing channels)	5 720	802.11 a	2.89
	5 720	802.11 n_HT20	2.53
	5 710	802.11 n_HT40	3.39

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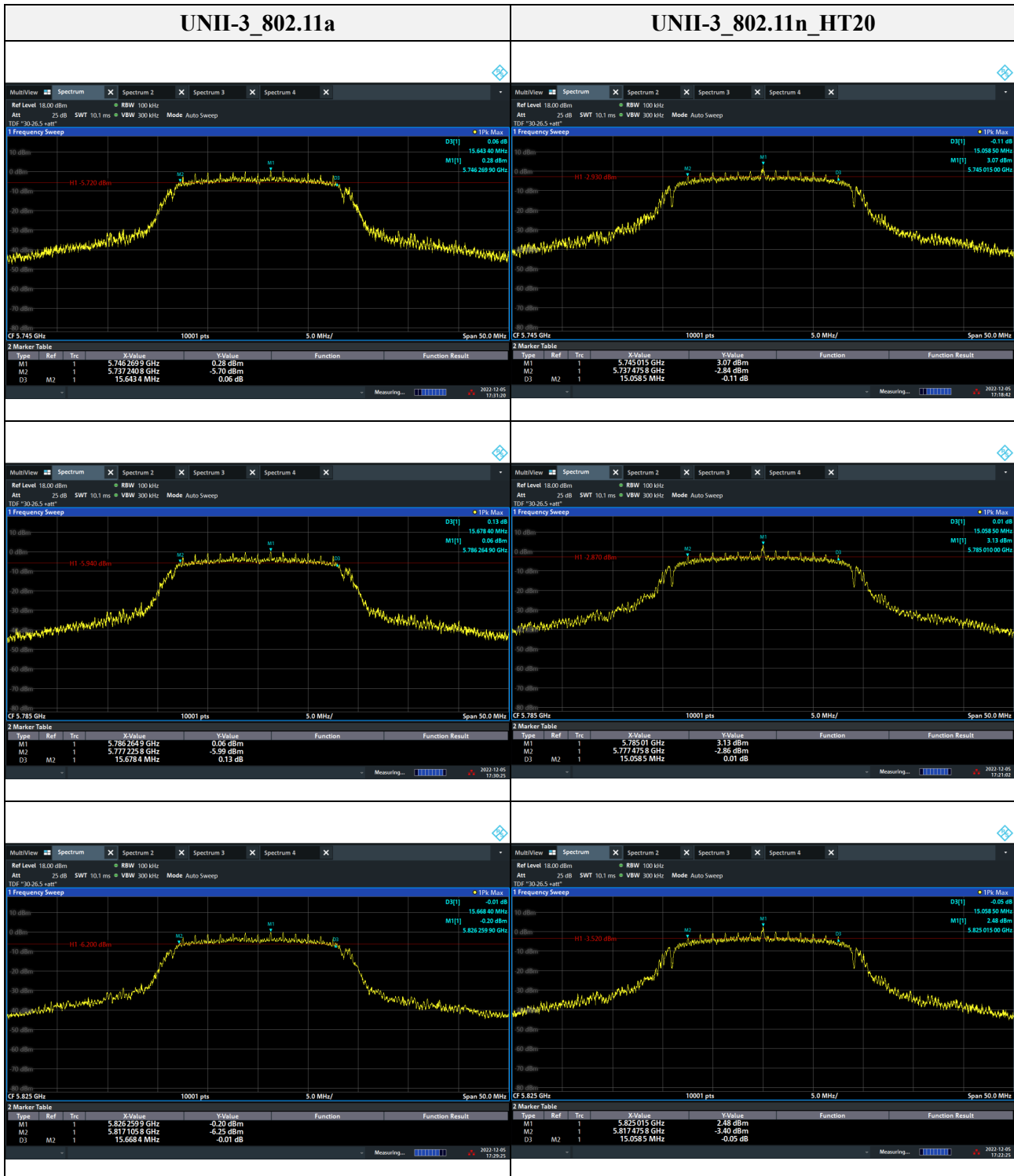
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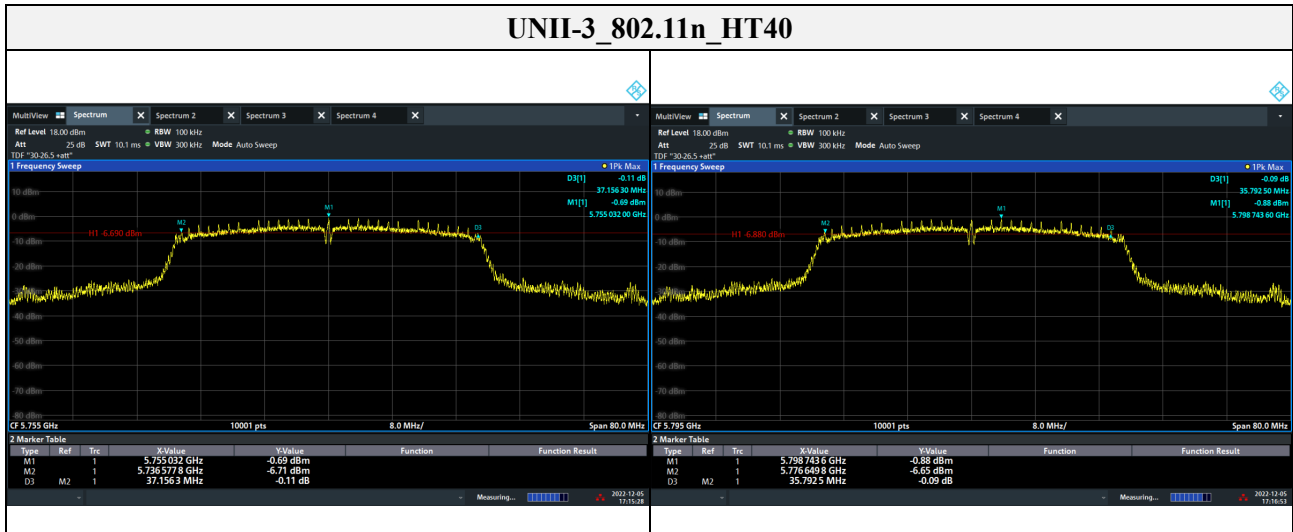
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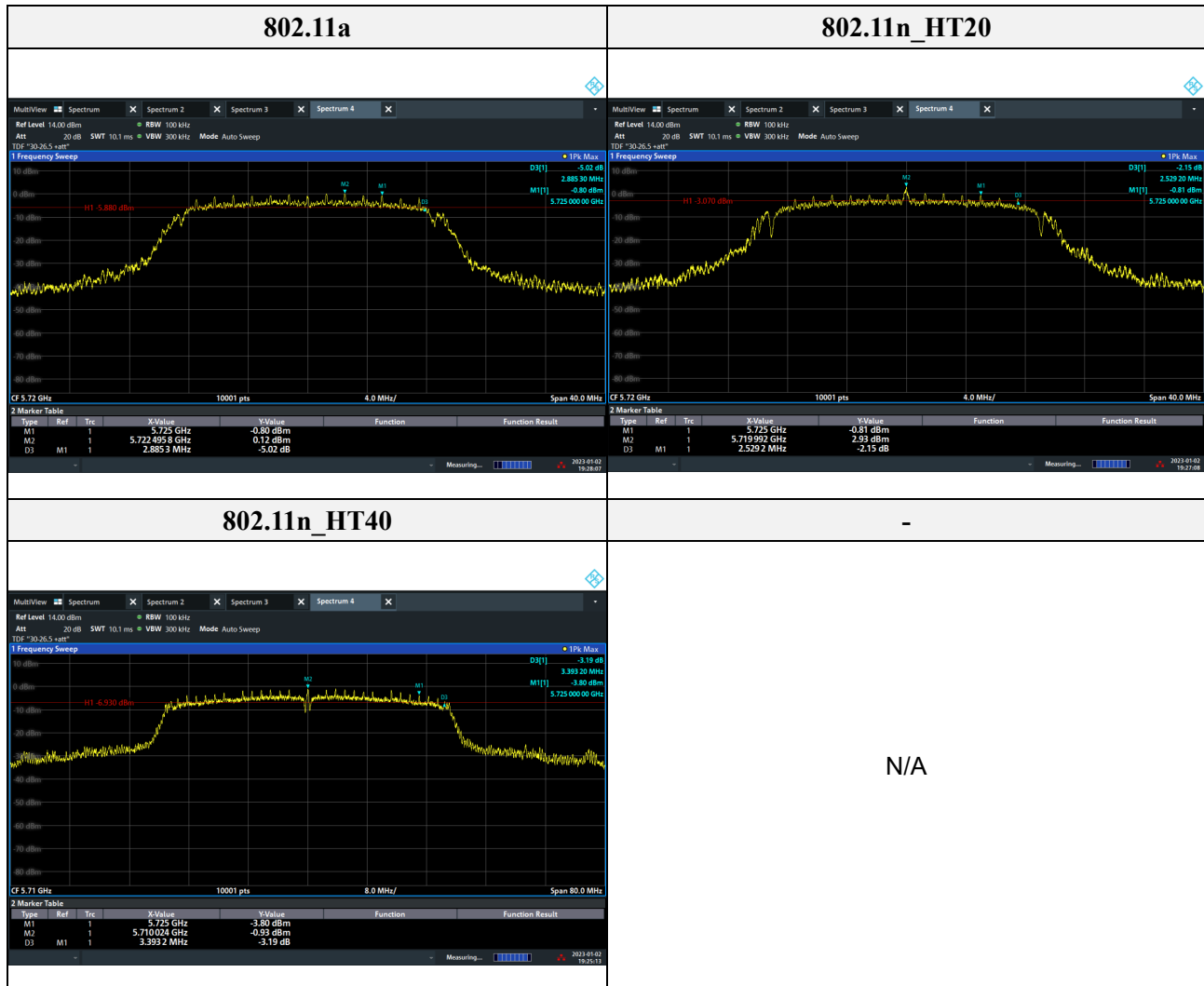


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Band-crossing channels



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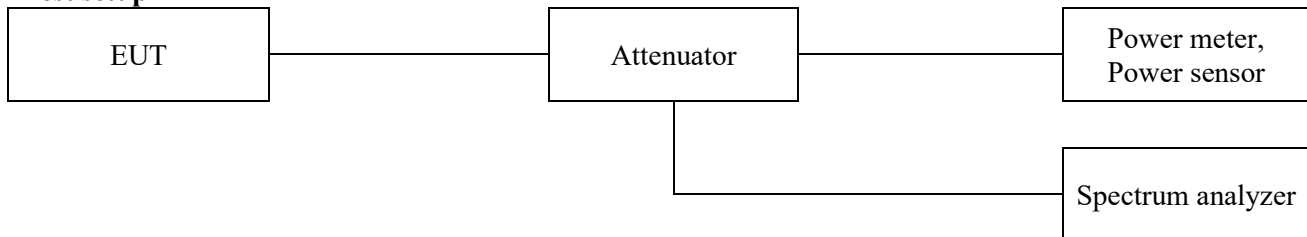
3.3. Maximum conducted output power

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.

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Limit

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.

1. Limit B is the 26 dB emission bandwidth.

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Test results

Band	Frequency (MHz)	Mode	Detector mode	Ant Gain (dBi)	Output power (dBm)	Limit (dBm)
UNII-1 (E.I.R.P)	5 180	802.11 a	AV	3.3	13.08	30.00
	5 220		AV		14.72	
	5 240		AV		14.03	
UNII-2A	5 260		AV		10.83	24.00
	5 280		AV		10.73	
	5 320		AV		10.99	
UNII-2C	5 500		AV	3.3	11.29	24.00
	5 600		AV		10.37	
	5 700		AV		8.17	
	5 720		AV		11.25	
UNII-3	5 745		AV		11.03	30.00
	5 785		AV		10.75	
	5 825		AV		10.64	

Note.

- In case of UNII-1(E.I.R.P), Output power = Measurement result + Ant Gain

Band	Frequency (MHz)	Mode	Detector mode	Ant Gain (dBi)	Output power (dBm)	Limit (dBm)
UNII-1 (E.I.R.P)	5 180	802.11 n_HT20	AV	3.3	13.08	30.00
	5 220		AV		14.80	
	5 240		AV		14.01	
UNII-2A	5 260		AV		10.51	24.00
	5 280		AV		10.73	
	5 320		AV		10.96	
UNII-2C	5 500		AV	3.3	10.87	24.00
	5 600		AV		10.53	
	5 700		AV		8.06	
	5 720		AV		11.17	
UNII-3	5 745		AV		11.01	30.00
	5 785		AV		10.81	
	5 825		AV		10.66	

Note.

- In case of UNII-1(E.I.R.P), Output power = Measurement result + Ant Gain

Band	Frequency (MHz)	Mode	Detector mode	Ant Gain (dBi)	Output power (dBm)	Limit (dBm)
UNII-1 (E.I.R.P)	5 190	802.11 n_HT40	AV	3.3	7.22	30.00
	5 230		AV		14.88	
UNII-2A	5 270		AV		12.01	24.00
	5 310		AV		8.43	
UNII-2C	5 510		AV	3.3	4.78	24.00
	5 590		AV		11.85	
	5 670		AV		7.70	
	5 710		AV		12.07	
UNII-3	5 755		AV		12.52	30.00
	5 795		AV		12.52	

Note.

- In case of UNII-1(E.I.R.P), Output power = Measurement result + Ant Gain

Band	Frequency (MHz)	Mode	Detector mode	Ant Gain (dBi)	Output power (dBm)	Limit (dBm)
UNII-2C (Band-crossing channels)	5 720	802.11 a	AV	3.3	9.32	23.10
	5 720	802.11 n_HT20	AV		9.07	23.27
	5 710	802.11 n_HT40	AV		11.30	24.00
UNII-3 (Band-crossing channels)	5 720	802.11 a	AV		2.25	30.00
	5 720	802.11 n_HT20	AV		2.39	
	5 710	802.11 n_HT40	AV		-0.34	

Note.

- In case of UNII-1(E.I.R.P), Output power = Measurement result + Ant Gain



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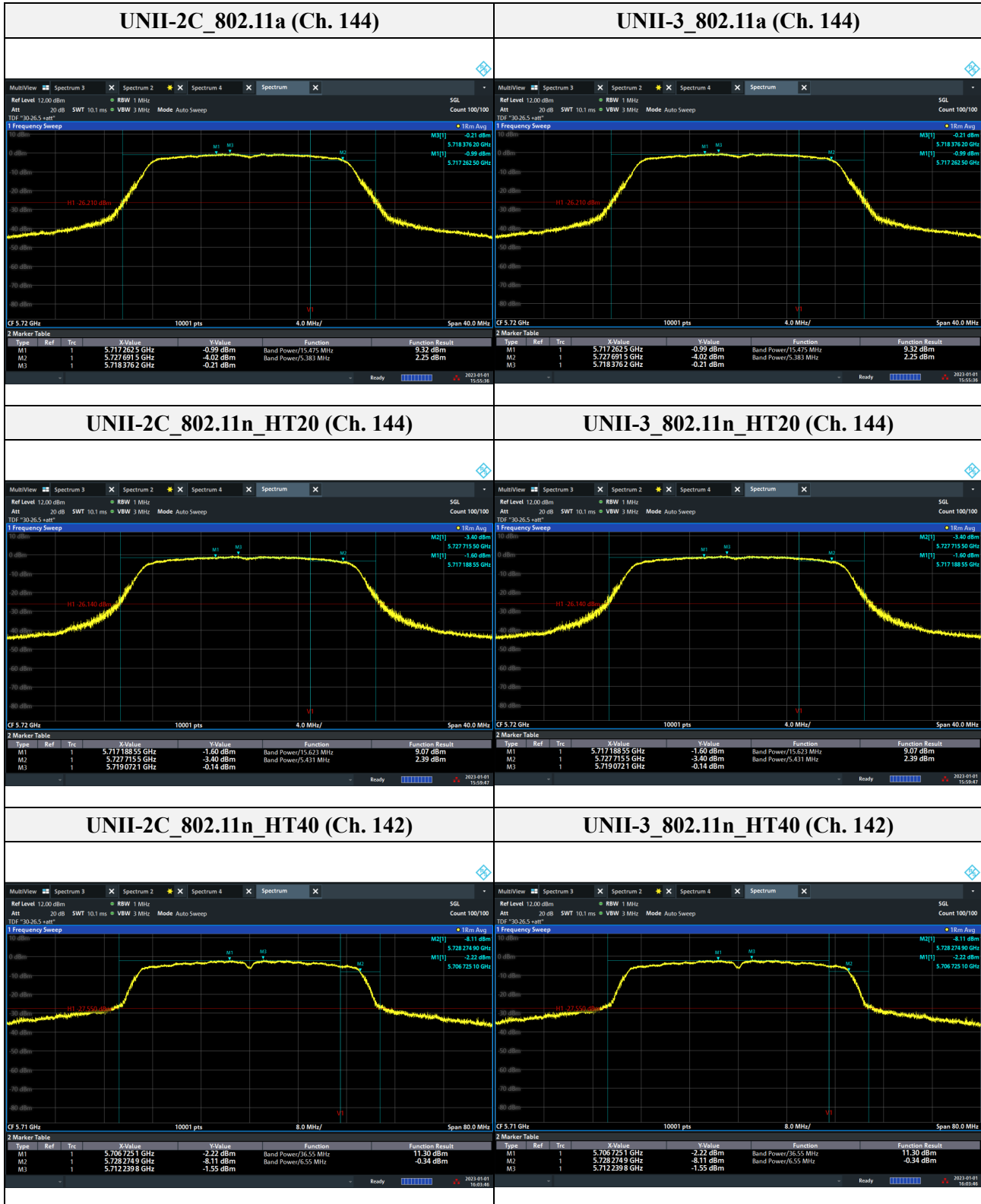
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Band-crossing channels



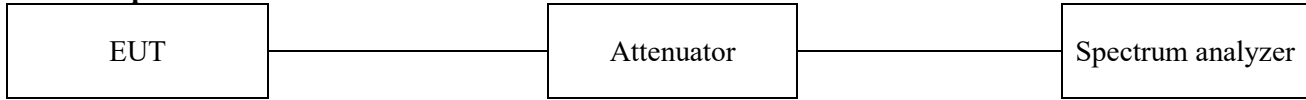
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3.4. Power spectral density

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.

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Limit

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.

2. 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.

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Test results

Mode	Frequency (MHz)	Band	PSD (dBm/MHz)	RBWF Note1	DCF Note2	Ant Gain	Sum Note3	Limit	
802.11 a	5 180	UNII-1 (E.I.R.P)	-0.86	-	0.18	3.3	2.62	17.00 (dB m/MHz)	
	5 220		1.20				4.68		
	5 240		0.09				3.57		
	5 260	UNII-2A	0.42		0.18	3.3	0.60	11.00 (dB m/MHz)	
	5 280		0.38				0.56		
	5 320		0.86				1.04		
	5 500	UNII-2C	0.80		0.18	3.3	0.98		
	5 600		0.20				0.38		
	5 720		0.41				0.59		
	5 745	UNII-3	-2.01		0.18		3.3	-1.83	30.00 (dBm/500 kHz)
	5 785		-1.69					-1.51	
	5 825		-2.46					-2.28	

Mode	Frequency (MHz)	Band	PSD (dBm/MHz)	RBWF Note1	DCF Note2	Ant Gain	Sum Note3	Limit	
802.11 n_HT20	5 180	UNII-1 (E.I.R.P)	-0.46	-	0.04	3.3	2.88	17.00 (dB m/MHz)	
	5 220		-0.51				2.83		
	5 240		0.33				3.67		
	5 260	UNII-2A	0.42		0.04	3.3	3.80	11.00 (dB m/MHz)	
	5 280		-1.56				1.82		
	5 320		-1.20				2.18		
	5 500	UNII-2C	0.41		0.04	3.3	3.79		
	5 600		-1.83				1.55		
	5 720		0.22				3.60		
	5 745	UNII-3	-2.57		0.04		3.3	0.81	30.00 (dBm/500 kHz)
	5 785		-3.92					-0.54	
	5 825		-4.35					-0.97	

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Mode	Frequency (MHz)	Band	PSD (dBm/MHz)	RBWF Note1	DCF Note2	Ant Gain	Sum Note3	Limit
802.11 n_HT40	5 190	UNII-1 (E.I.R.P)	-2.19	-	0.27	3.3	1.38	17.00
	5 230		-2.04				1.53	(dB m/MHz)
	5 270	UNII-2A	-1.95		0.27		-1.68	11.00 (dB m/MHz)
	5 310		-1.29				-1.02	
	5 510	UNII-2C	-2.01		0.27	-1.74		
	5 590		-3.72			-3.45		
	5 710		-1.96			-1.69		
	5 755	UNII-3	-3.83		0.27	-3.56	30.00	
	5 795		-4.09			-3.82	(dBm/500 kHz)	

Band-crossing channels

Mode	Frequency (MHz)	Band	PSD (dBm/MHz)	RBWF Note1	DCF Note2	Ant Gain	Sum Note3	Limit
802.11 a	5 720	UNII-2C	-0.22	-	0.18	3.3	-0.04	11.00 (dB m/MHz)
802.11 n_HT20	5 720		-1.24	-	0.04		-1.20	
802.11 n_HT40	5 710		-2.33	-	0.27		-2.06	
802.11 a	5 720	UNII-3	-3.89	-	0.18	3.3	-3.71	30.00 (dBm/500 kHz)
802.11 n_HT20	5 720		-3.96	-	0.04		-3.92	
802.11 n_HT40	5 710		-7.54	-	0.27		-7.27	

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 57 on this report.
- $\text{Sum(dBm)} = \text{PSD(dBm)} + \text{RBWF} + \text{Duty correction factor (dB)}$

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Mode : 802.11a



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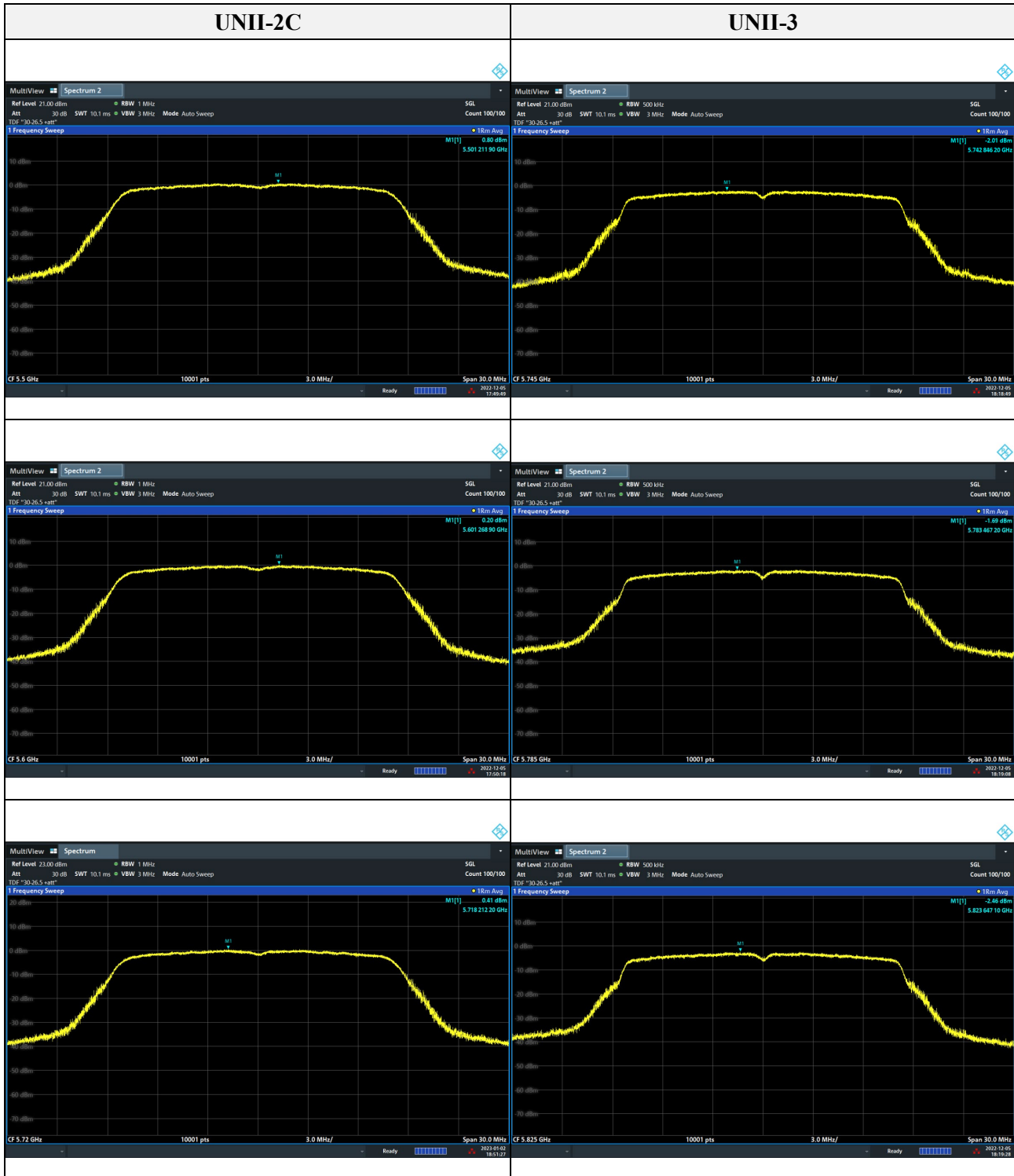
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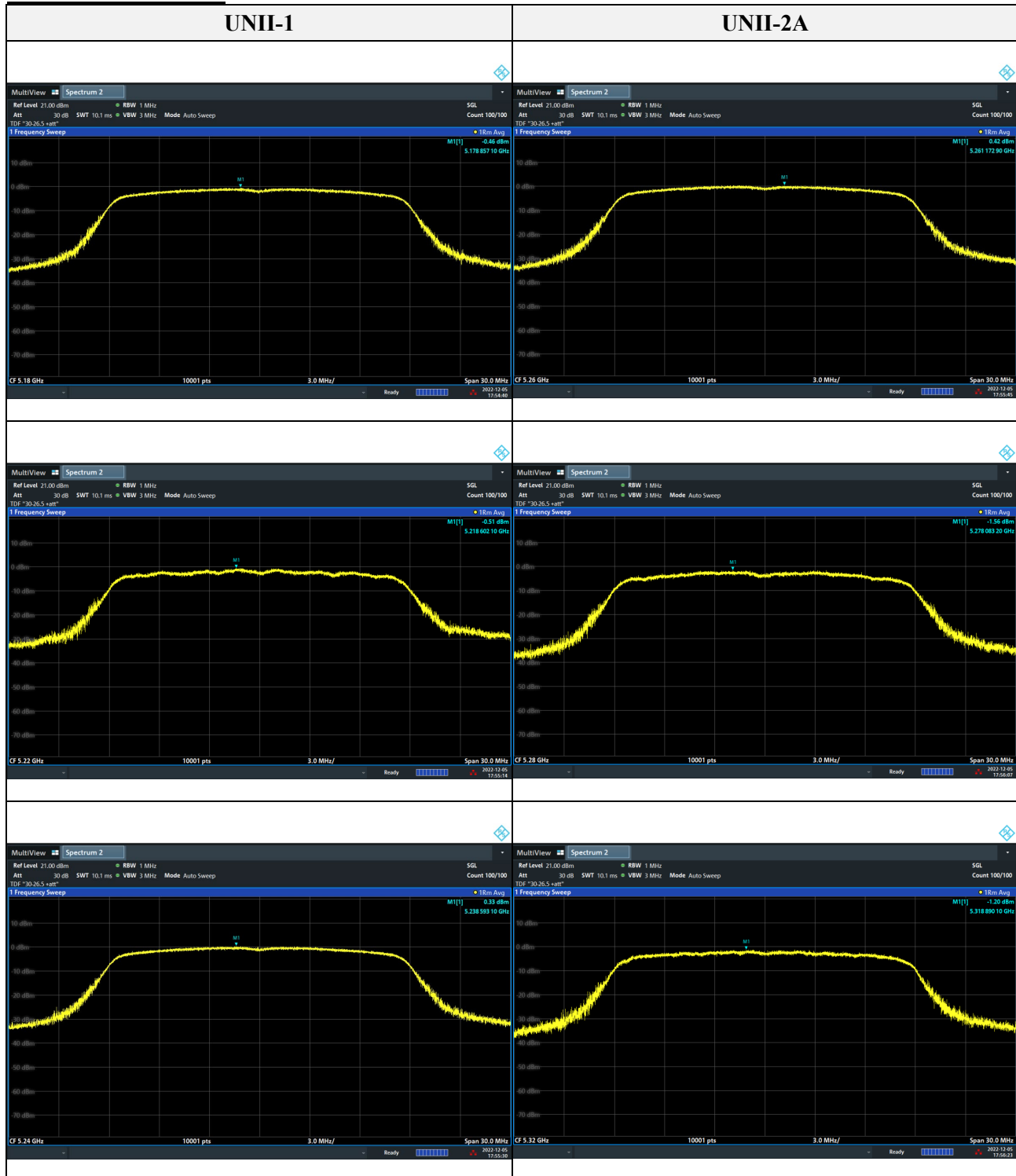
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Mode : 802.11n HT20



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