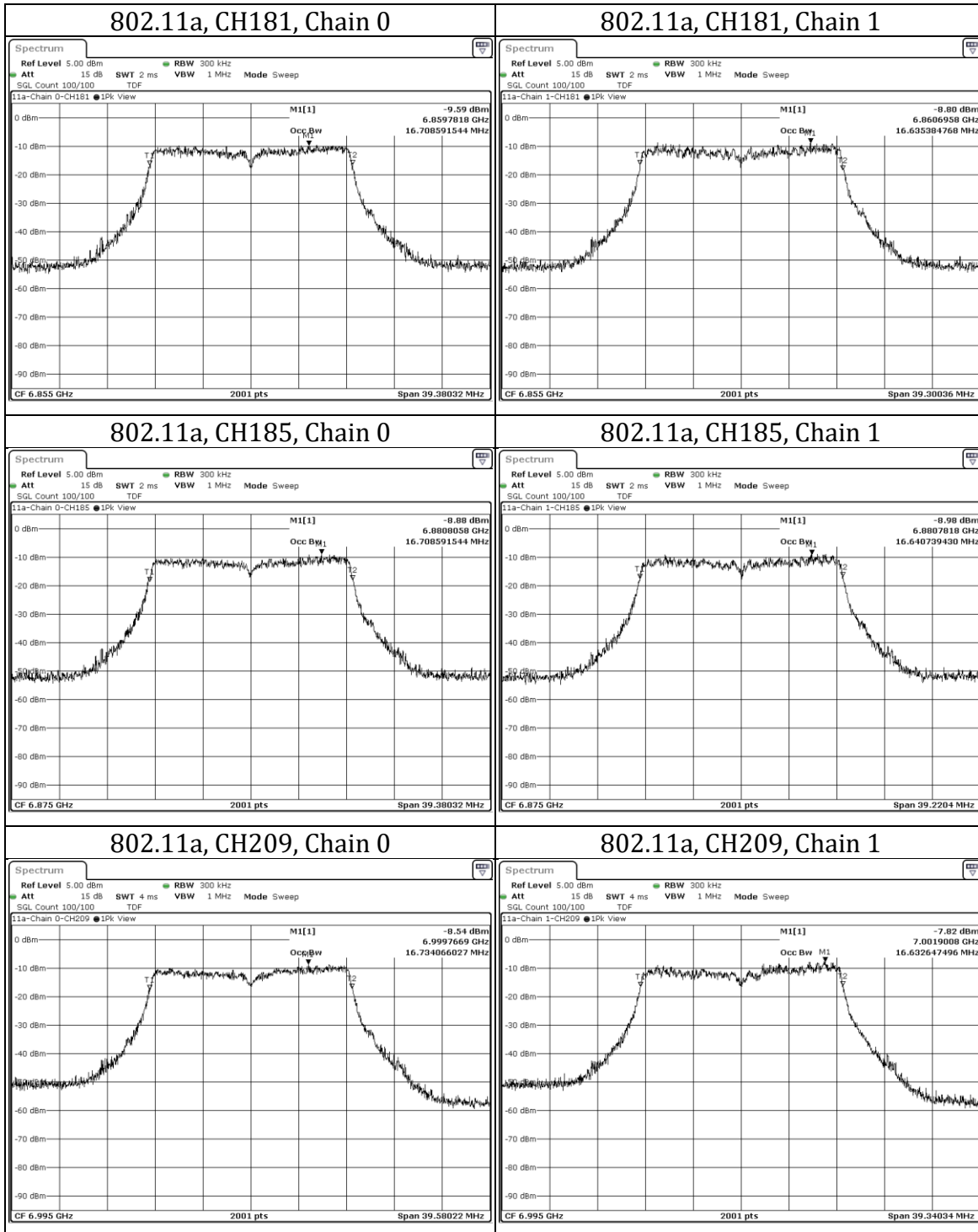




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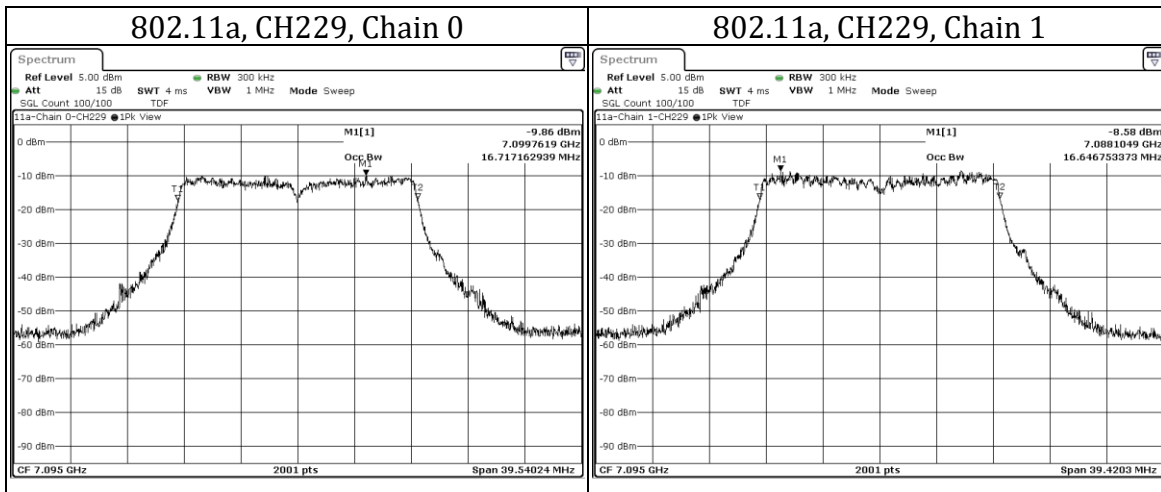
Telephone : +886-2-7737-3000

Facsimile (FAX) : +886-3-583-7948

Doc No: 17-EM-F0988 / 1.0



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Mode	CH	Freq (MHz)	OBW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE20)	2	5935	19.231	19.253	320	PASS
	1	5955	19.253	19.279	320	PASS
	45	6175	19.261	19.205	320	PASS
	93	6415	19.266	19.253	320	PASS
	97	6435	19.222	19.301	320	PASS
	105	6475	19.213	19.288	320	PASS
	113	6515	19.227	19.231	320	PASS
	117	6535	19.284	19.257	320	PASS
	149	6695	19.24	19.266	320	PASS
	181	6855	19.235	19.27	320	PASS
	185	6875	19.191	19.262	320	PASS
	209	6995	19.253	19.244	320	PASS
	229	7095	19.196	19.261	320	PASS
	233	7115	19.196	19.275	320	PASS
	185	6875	19.191	19.262	320	PASS
	209	6995	19.253	19.244	320	PASS
	229	7095	19.196	19.261	320	PASS
	233	7115	19.196	19.275	320	PASS

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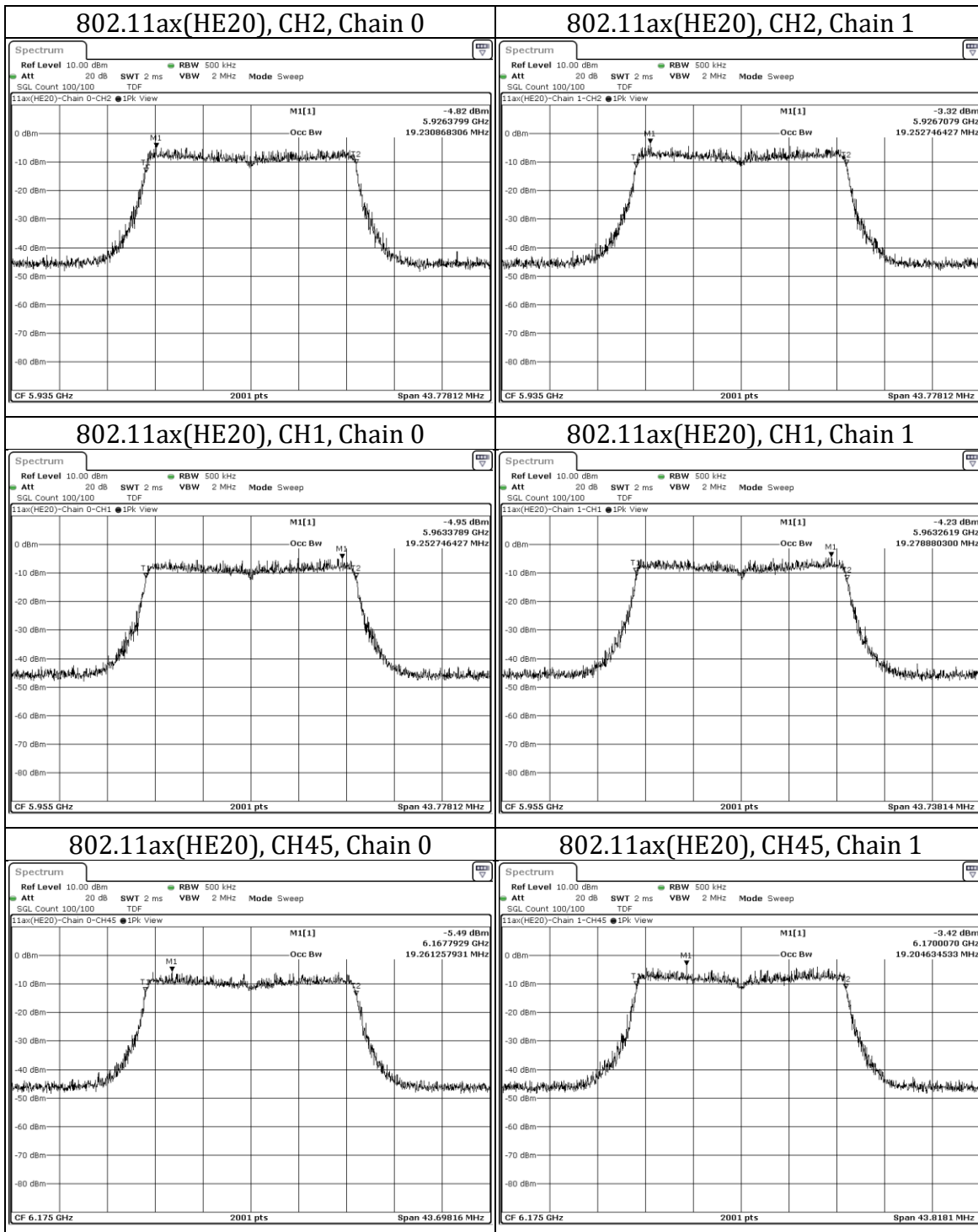
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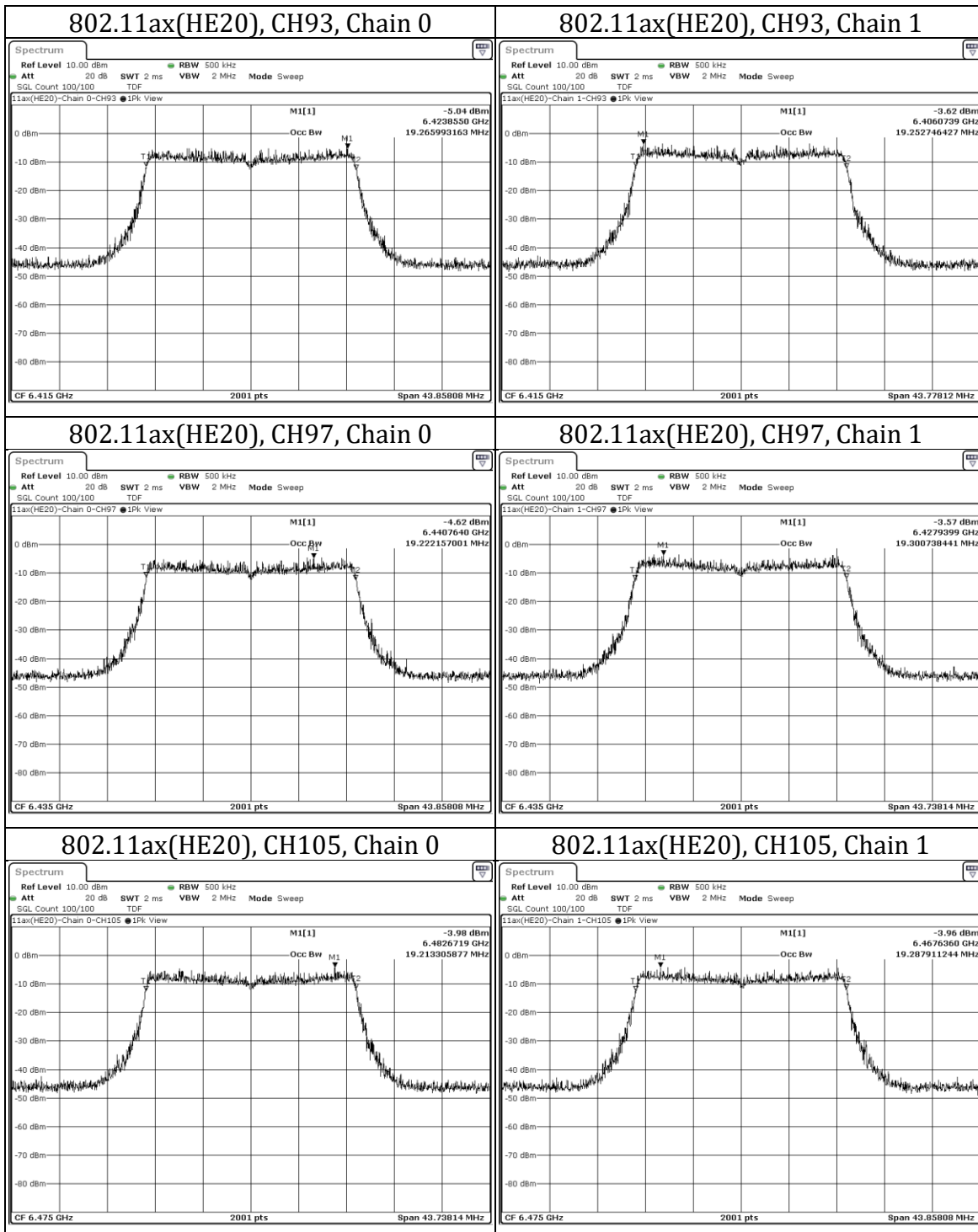
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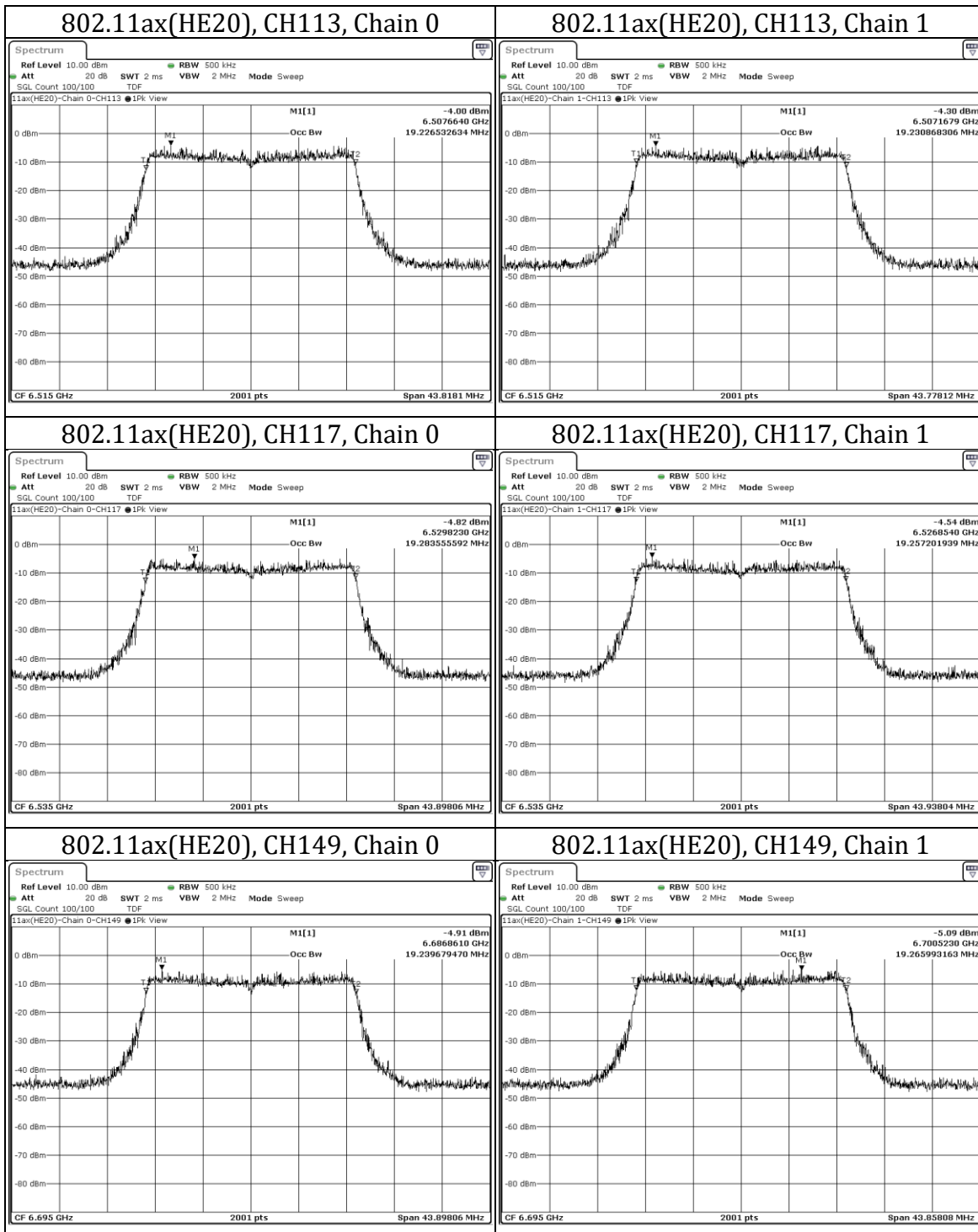
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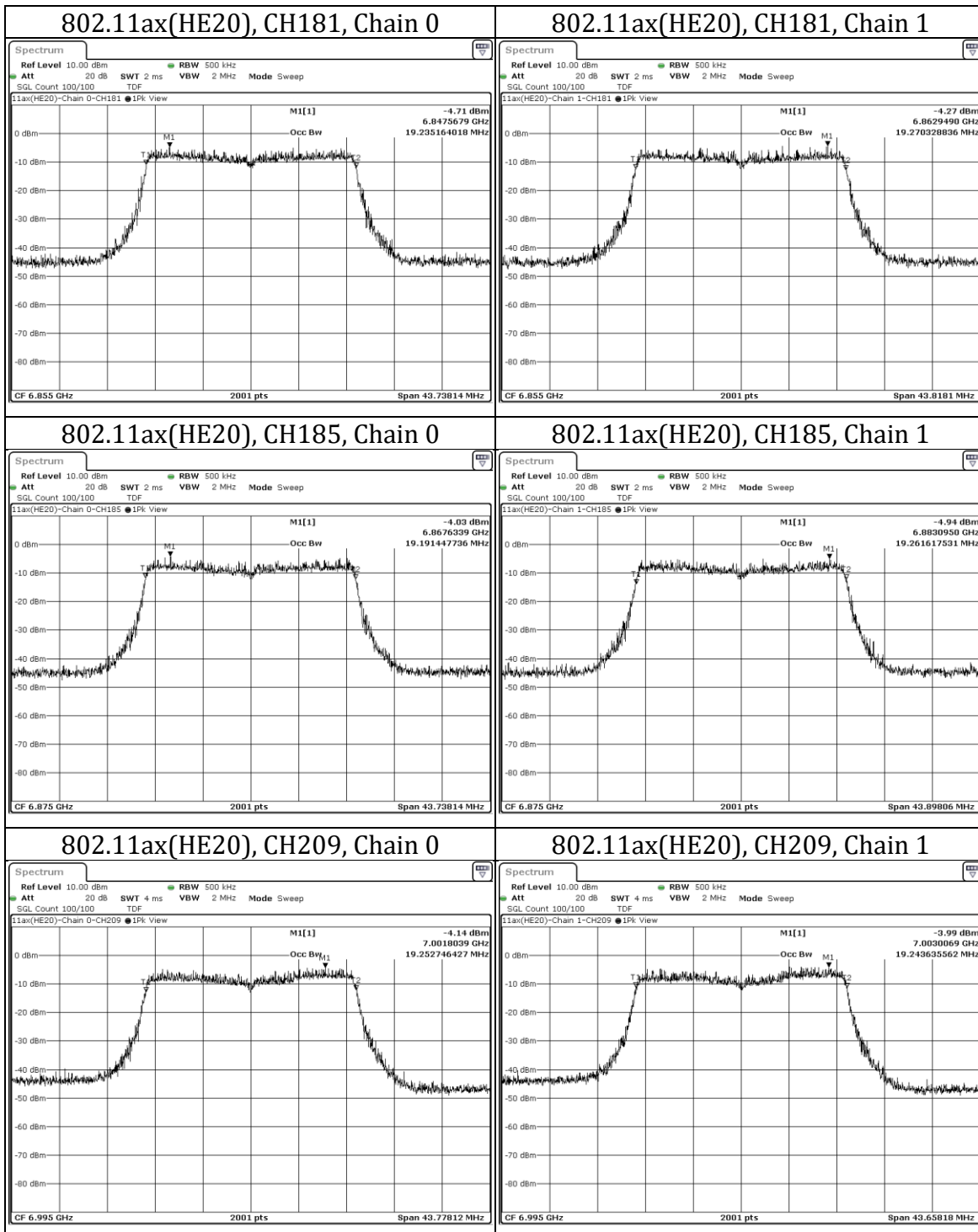
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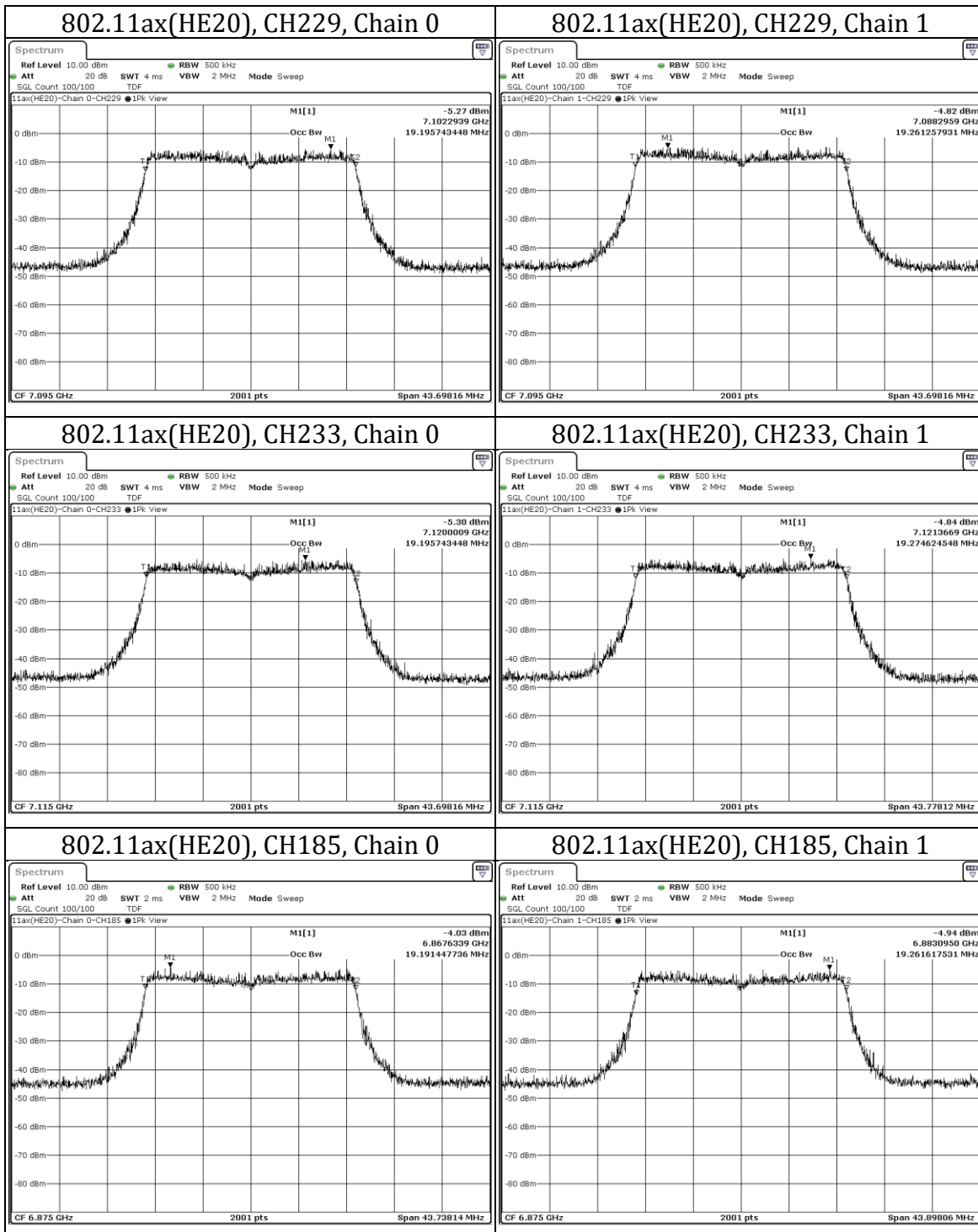
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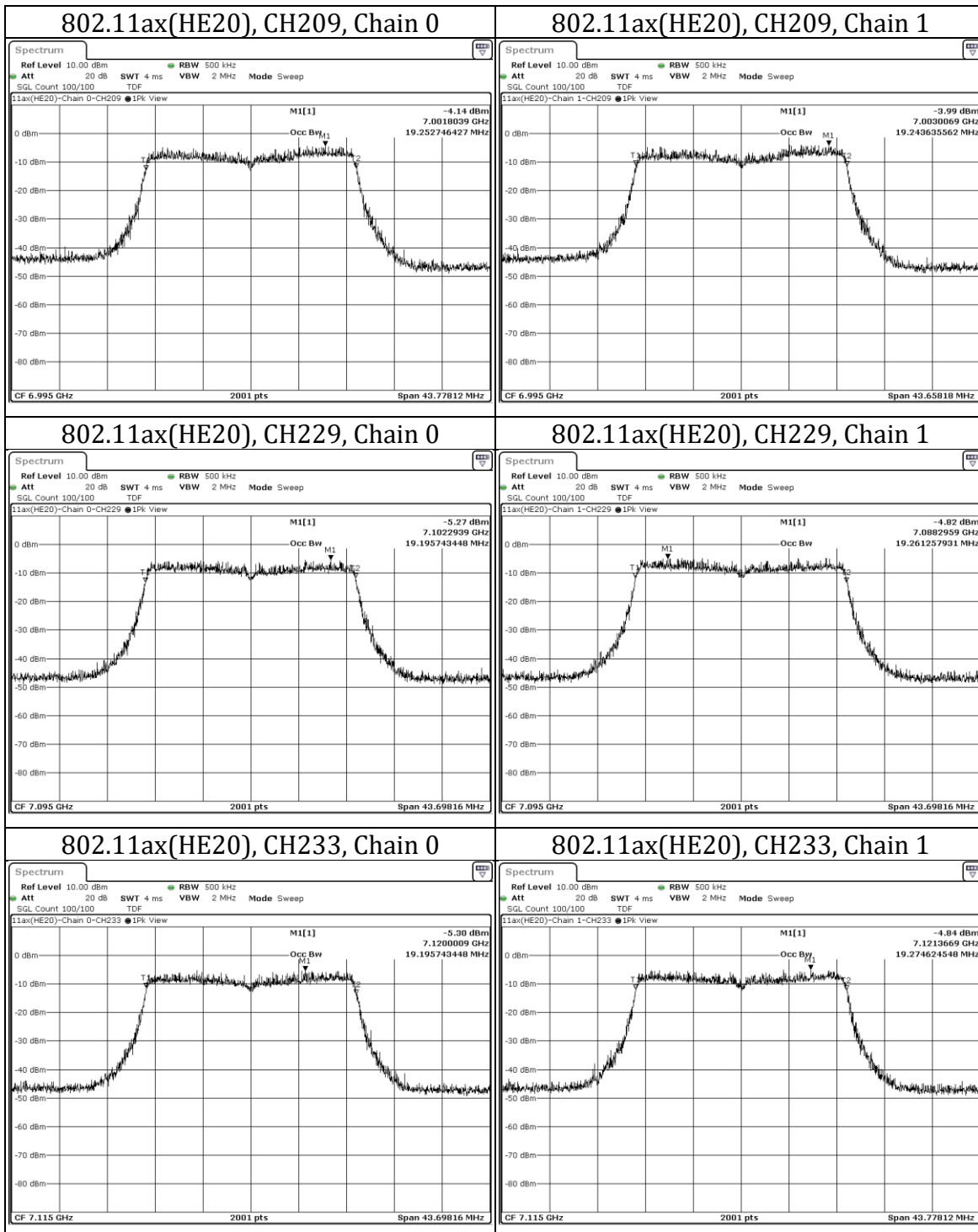
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Mode	CH	Freq (MHz)	OBW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE40)	3	5965	37.791	37.713	320	PASS
	43	6165	37.791	37.75	320	PASS
	91	6405	37.752	37.83	320	PASS
	99	6445	37.714	37.829	320	PASS
	107	6485	37.753	37.791	320	PASS
	115	6525	37.714	37.751	320	PASS
	123	6565	37.752	37.752	320	PASS
	155	6725	37.791	37.829	320	PASS
	179	6845	37.791	37.753	320	PASS
	187	6885	37.753	37.791	320	PASS
	211	7005	37.676	37.715	320	PASS
	227	7085	37.753	37.713	320	PASS

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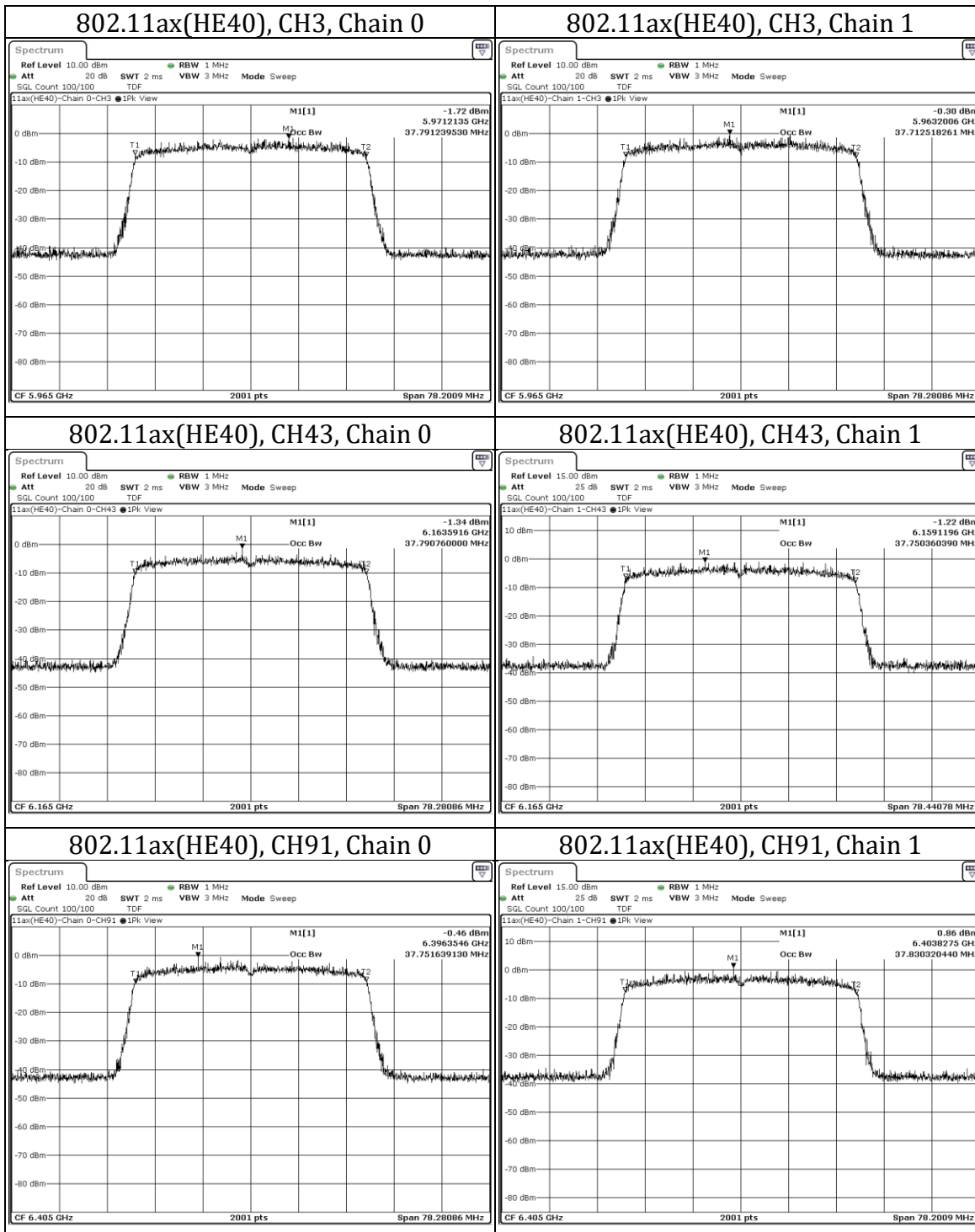
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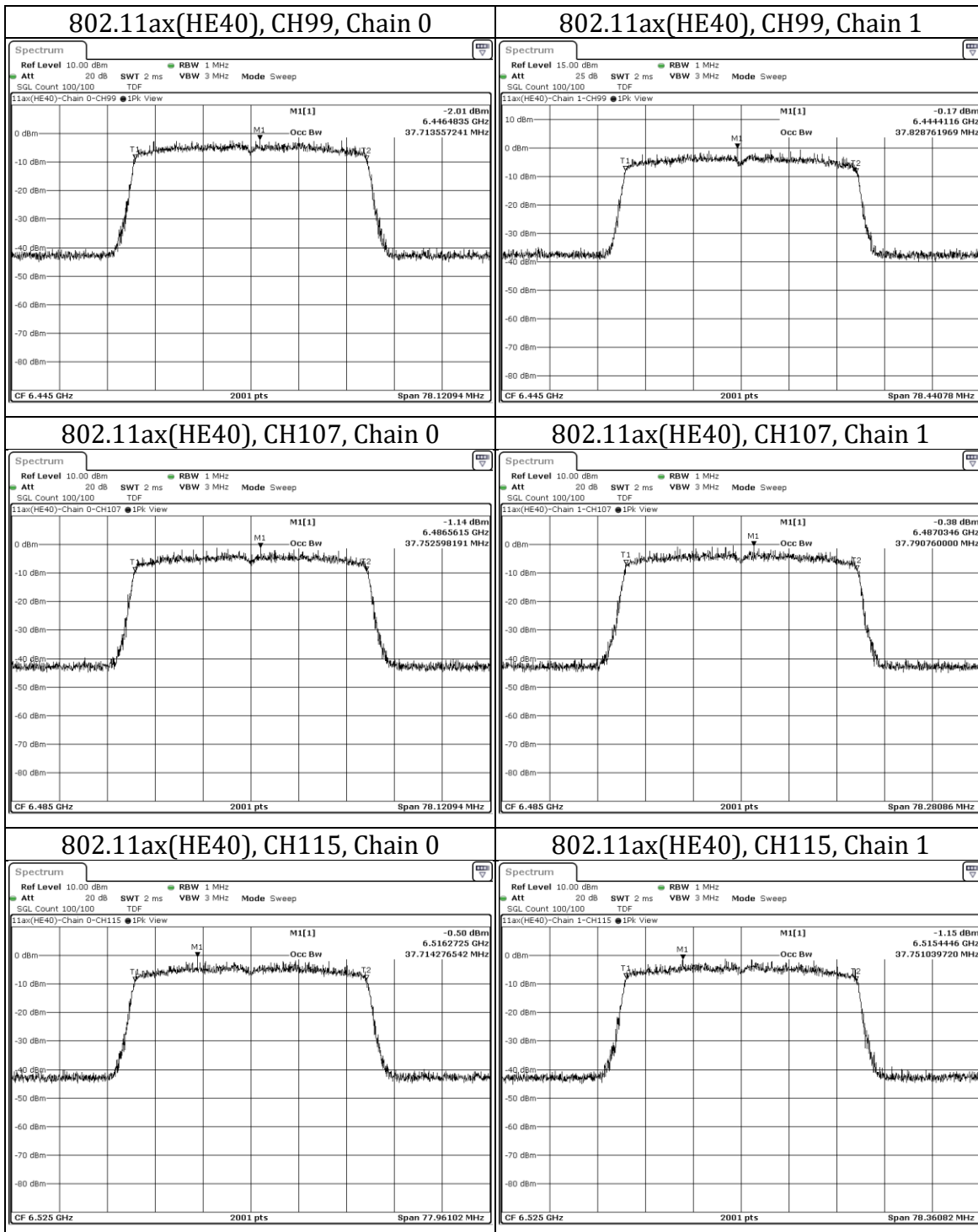
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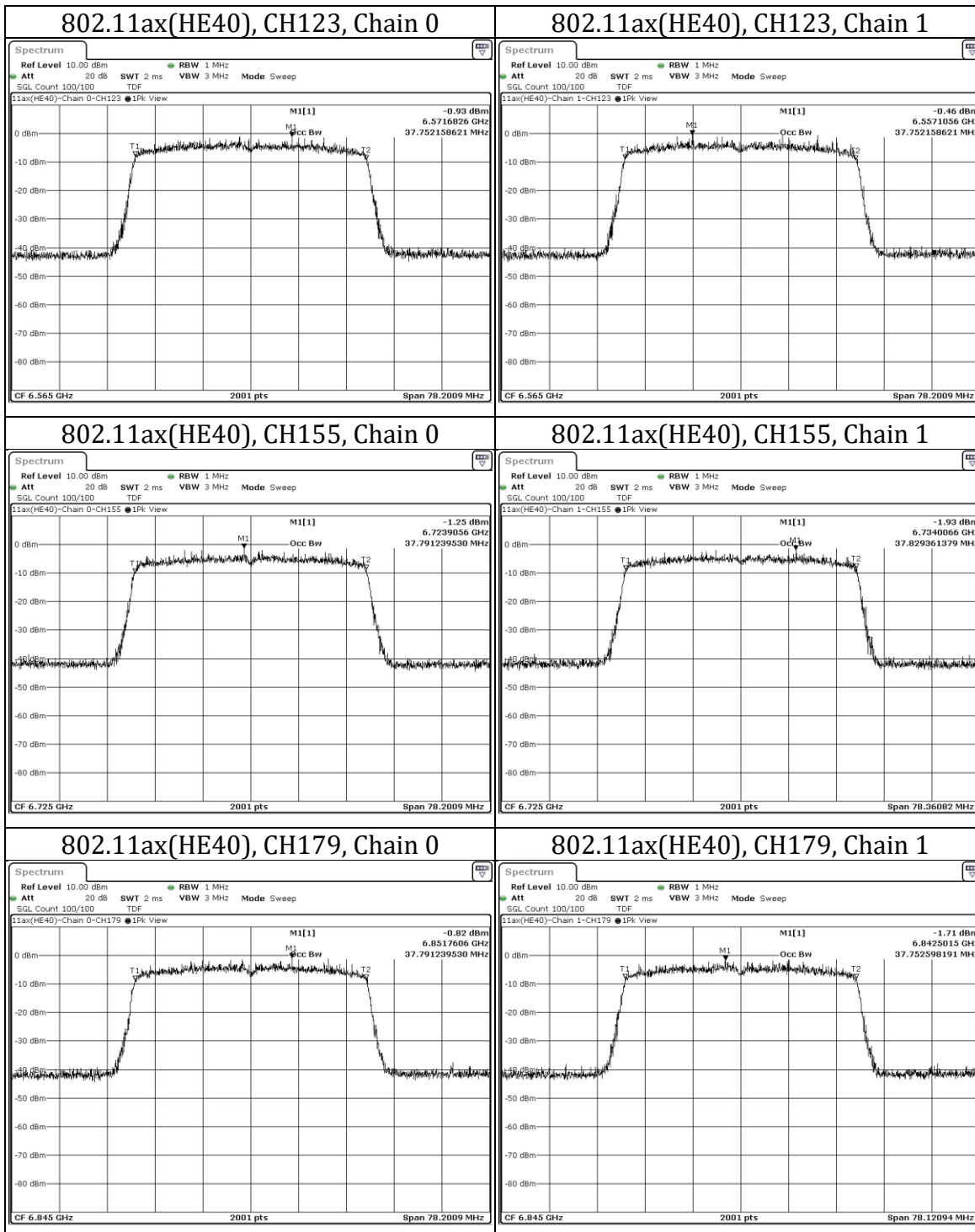
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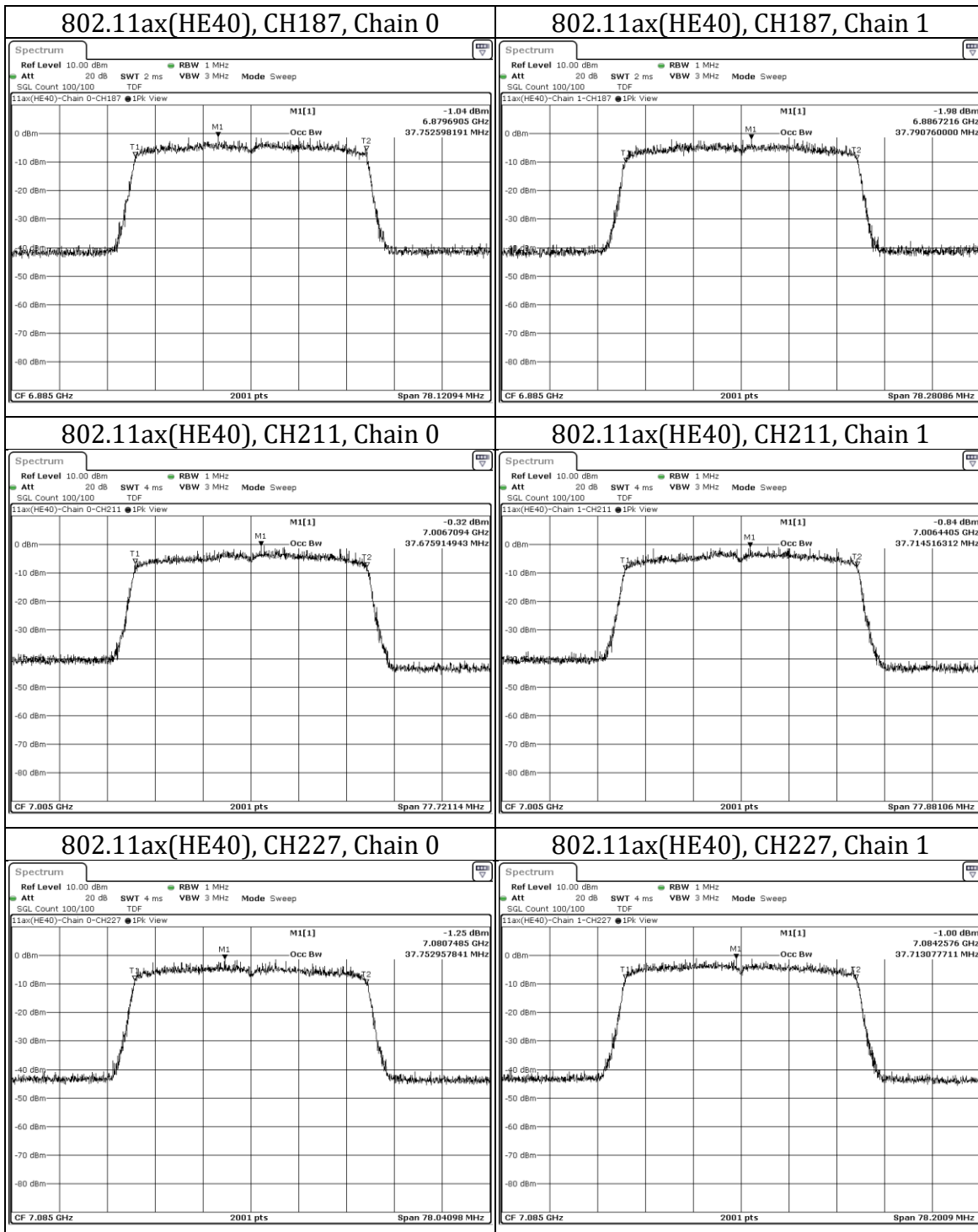
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Mode	CH	Freq (MHz)	OBW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE80)	7	5985	77.801	77.801	320	PASS
	39	6145	77.881	77.721	320	PASS
	87	6385	77.801	77.881	320	PASS
	103	6465	77.881	77.801	320	PASS
	119	6545	77.801	77.721	320	PASS
	135	6625	78.041	77.881	320	PASS
	151	6705	77.801	77.801	320	PASS
	167	6785	77.881	77.881	320	PASS
	183	6865	77.881	77.881	320	PASS
	199	6945	77.721	77.801	320	PASS
	215	7025	77.561	77.401	320	PASS

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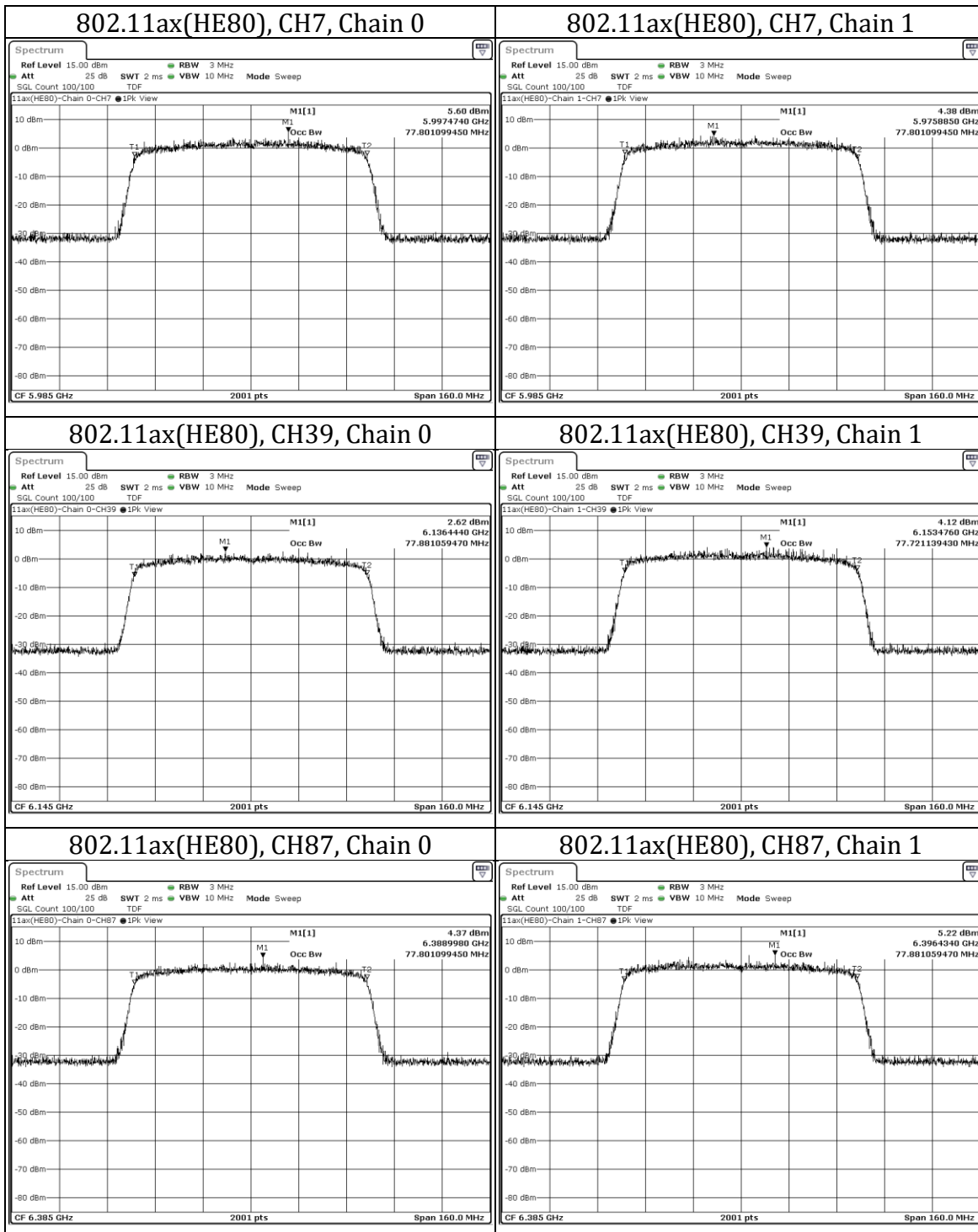
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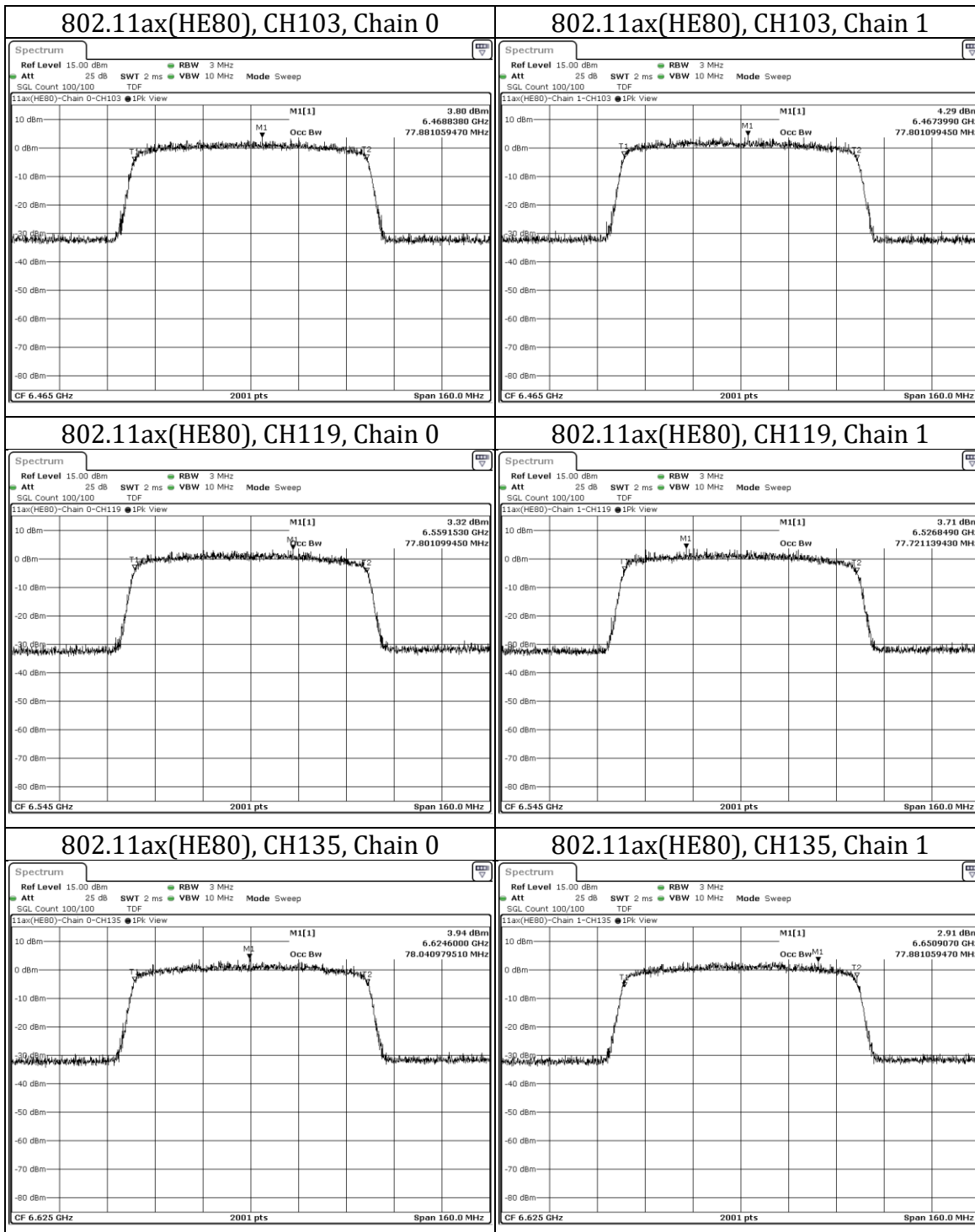
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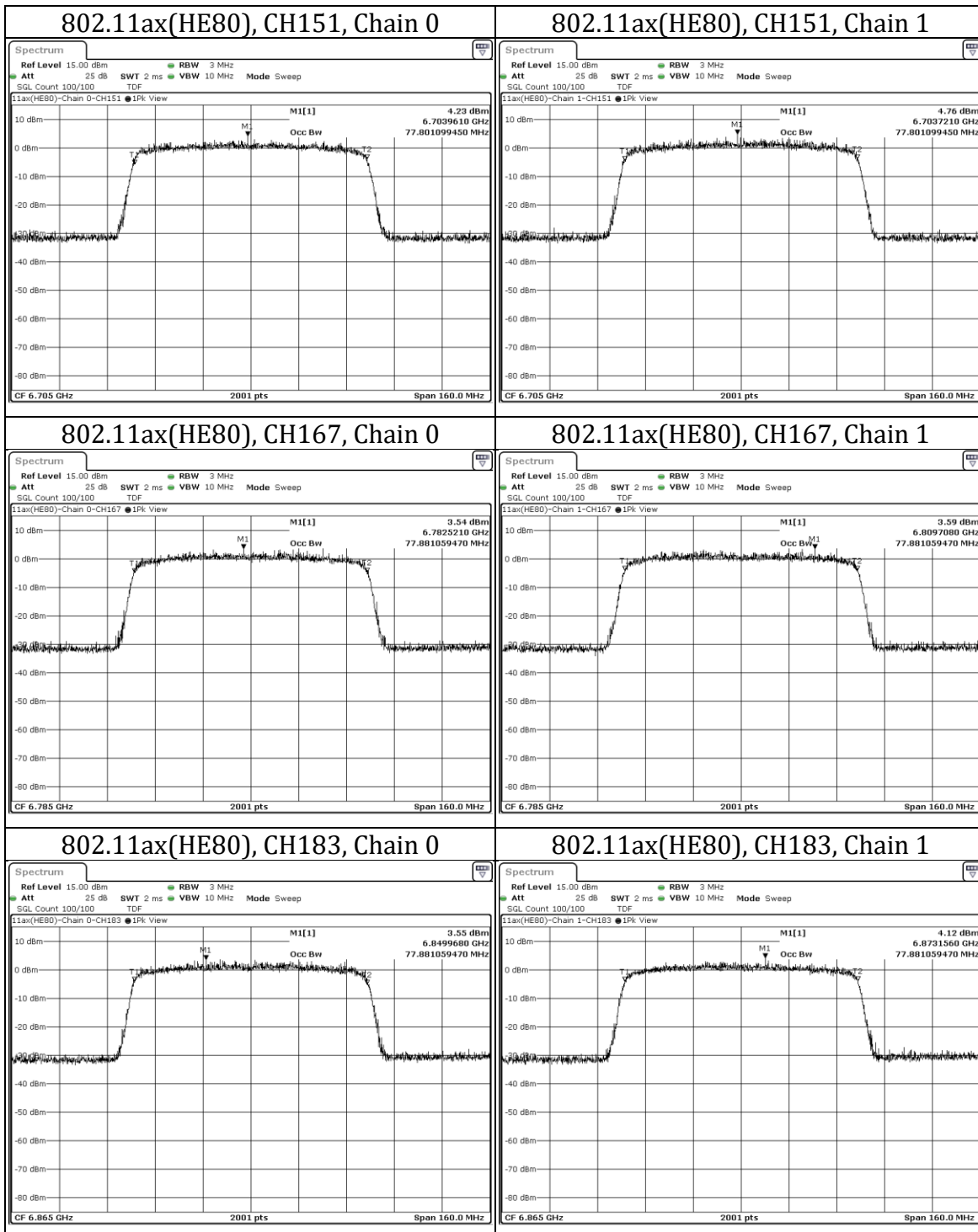
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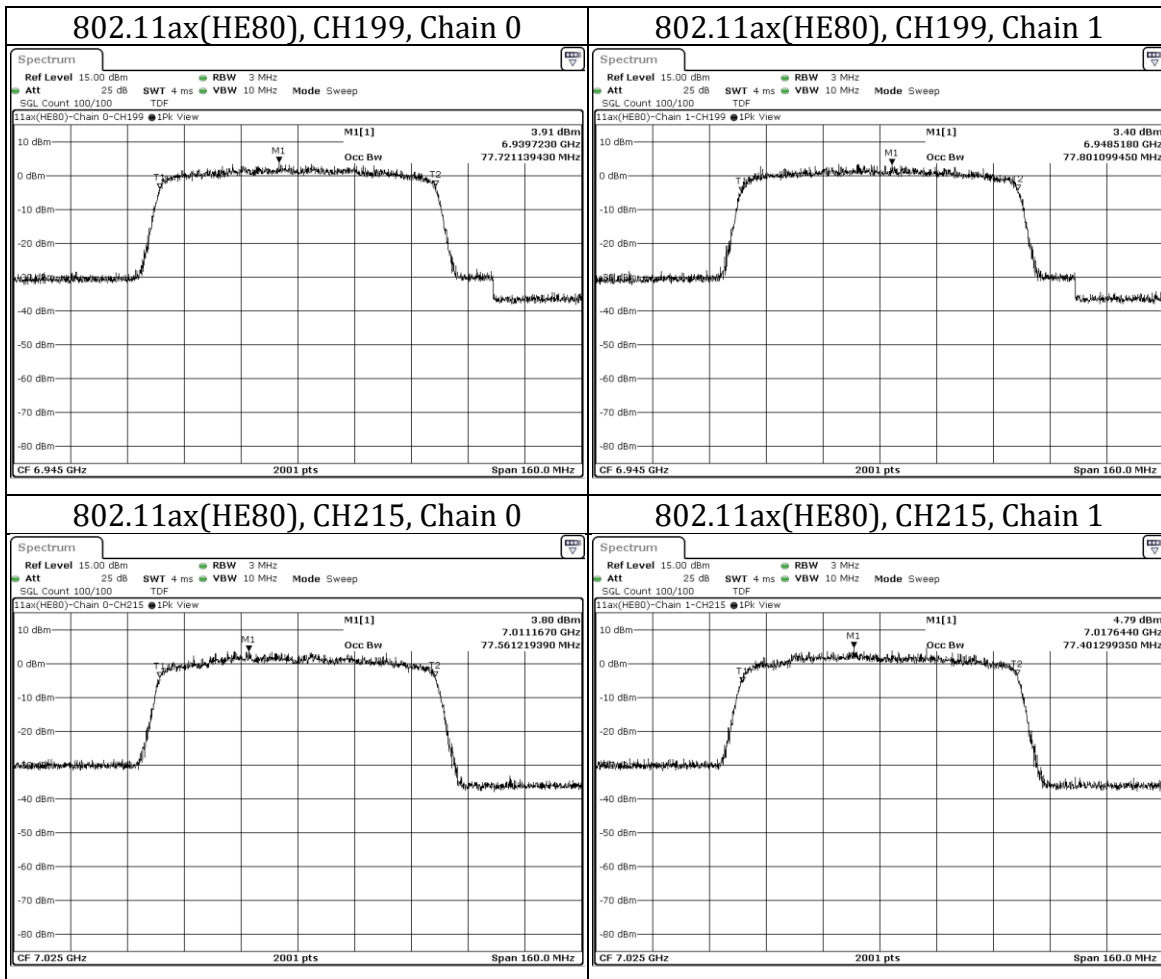
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Mode	CH	Freq (MHz)	OBW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE160)	15	6025	155.388	154.906	320	PASS
	47	6185	155.383	155.065	320	PASS
	79	6345	155.388	155.065	320	PASS
	111	6505	155.692	155.224	320	PASS
	143	6665	155.383	155.701	320	PASS
	175	6825	155.388	155.858	320	PASS
	207	6985	155.062	155.217	320	PASS

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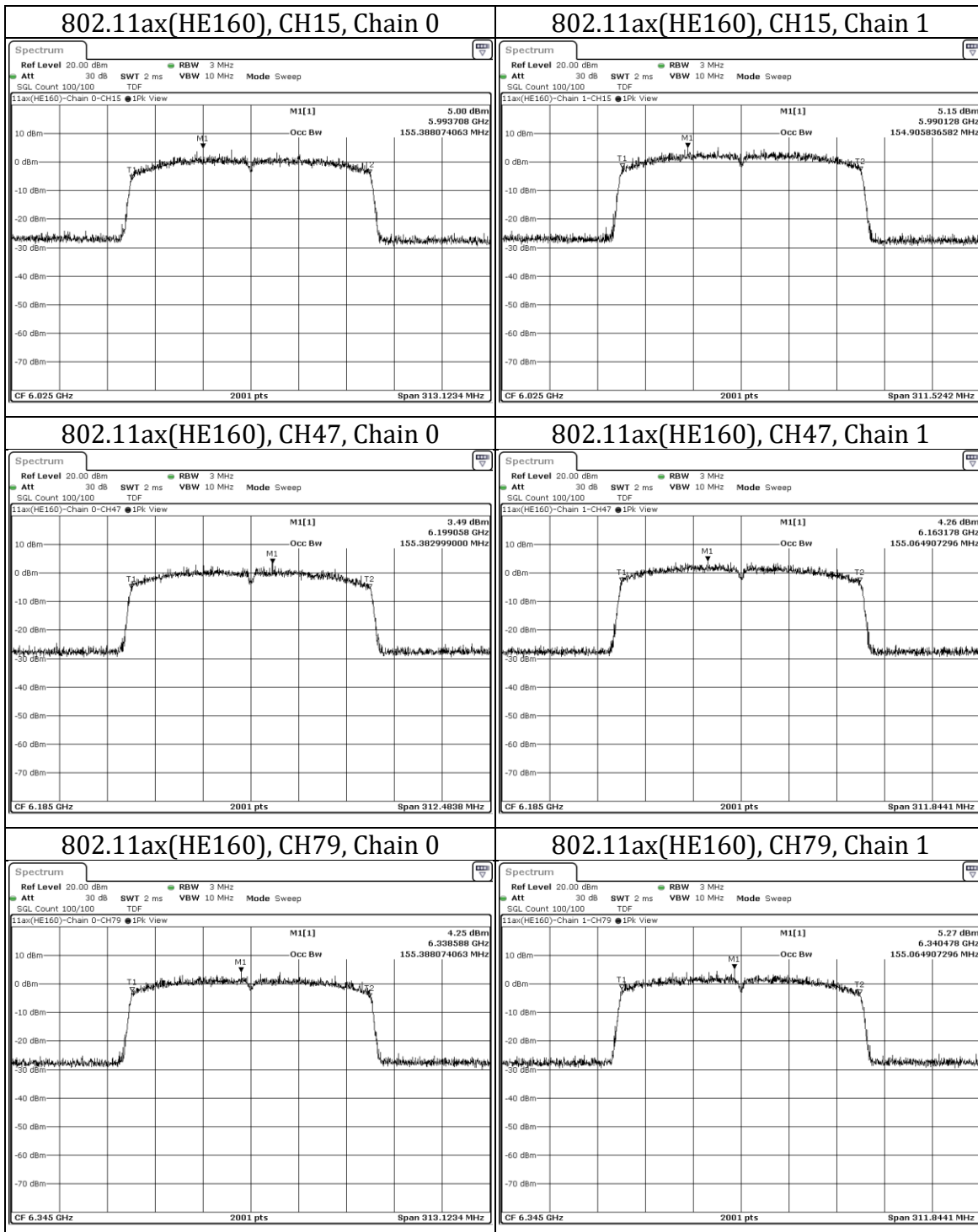
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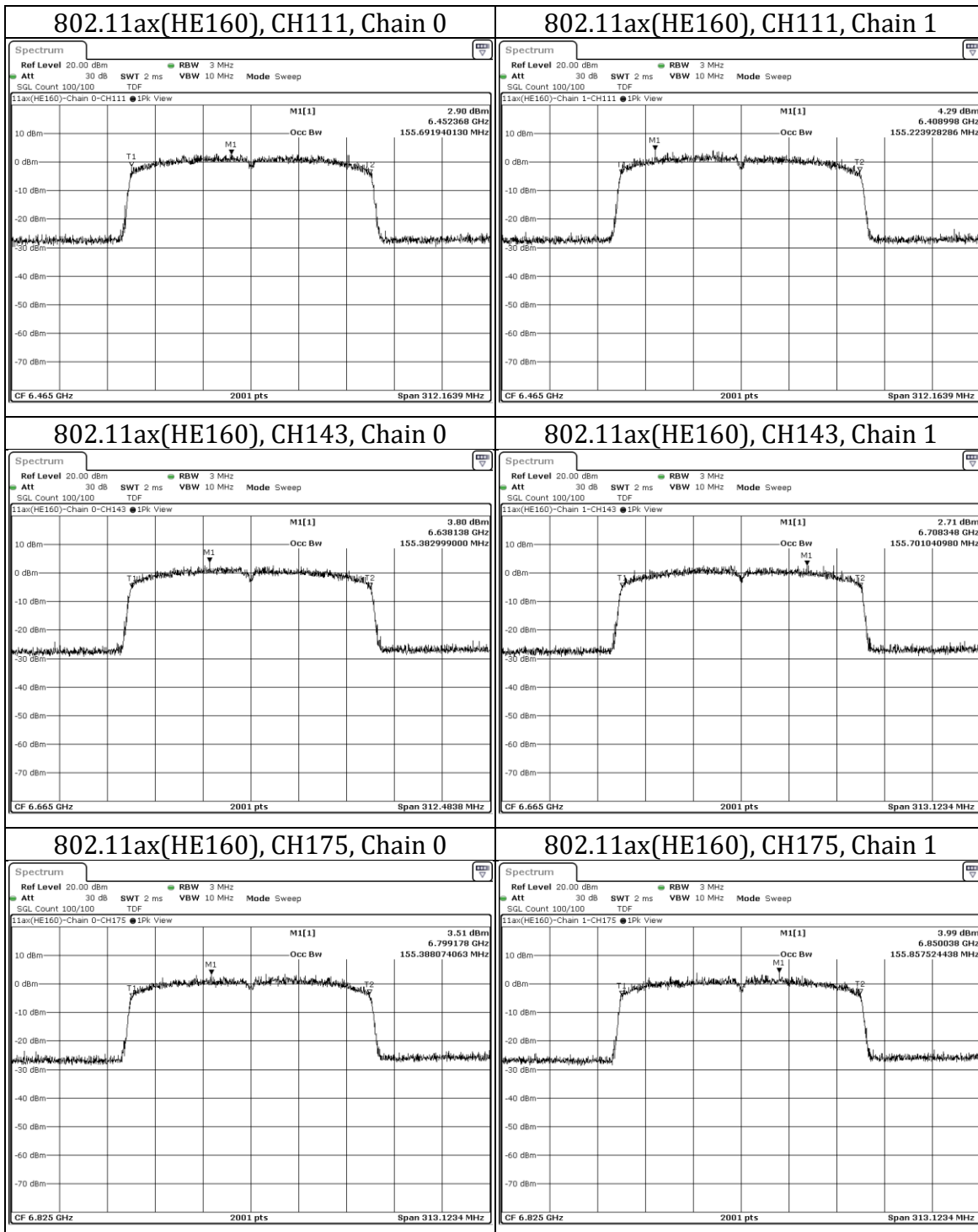
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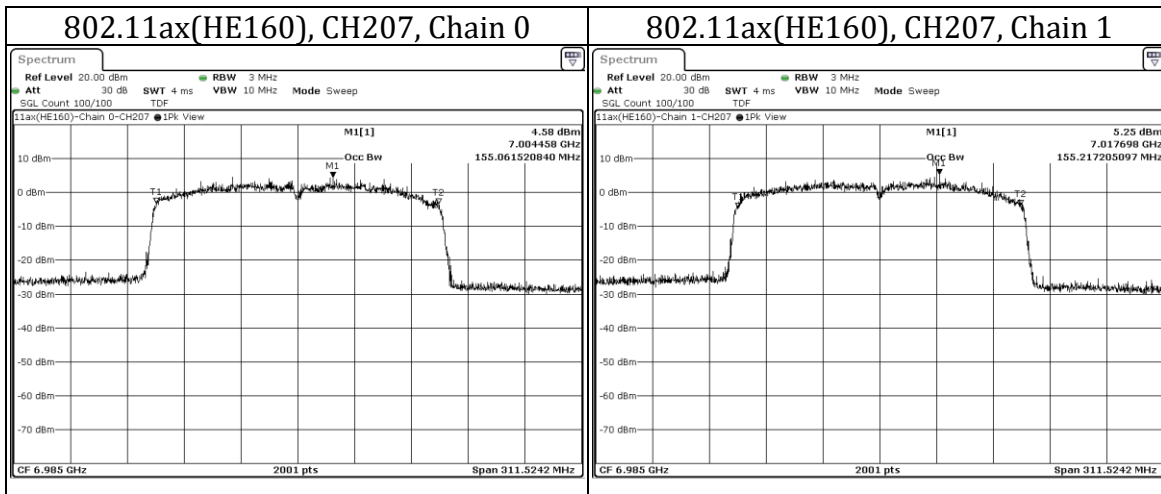
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9.3. Transmit Power Measurement

Requirements

EUT Category		Operation Band	Limit
			Max Average Power
	Standard Power AP (6SD)	U-NII-5 U-NII-7	EIRP $\leq$ 36 dBm
			Outdoor device and any elevation angle above 30 degrees: EIRP $\leq$ 21 dBm
	Fixed Client (6FC)	U-NII-5 U-NII-7	EIRP $\leq$ 36 dBm
			Any elevation angle above 30 degrees: EIRP $\leq$ 21 dBm
	Standard Client (6FX)	U-NII-5 U-NII-7	EIRP $\leq$ 30 dBm
	Indoor AP (6ID)	U-NII-5, U-NII-6 U-NII-7, U-NII-8	EIRP $\leq$ 30 dBm
	Subordinate (6PP)	U-NII-5, U-NII-6 U-NII-7, U-NII-8	EIRP $\leq$ 30 dBm
√	Indoor Client (6XD)	U-NII-5, U-NII-6 U-NII-7, U-NII-8	EIRP $\leq$ 24 dBm
	Dual Client (6CD)	Control of a low power indoor AP: U-NII-5, U-NII-6 U-NII-7, U-NII-8	EIRP $\leq$ 24 dBm
		Control of a standard power AP: U-NII-5 U-NII-7	EIRP $\leq$ 30 dBm

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Note:

1. P_{Out} = maximum conducted output power in dBm,
2. G_{TX} = the maximum transmitting antenna directional gain in dBi.
3. Directional Gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{Gn/20})^2 / N_{ant}]$ dBi.
Nant: Number of Transmit Antennas
G1, G2,..., Gn: Gain of Individual Antennas
4. Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT} ;
Array Gain = $5 \log(N_{ANT}/N_{SS})$ dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.
For power measurements on all other devices: Array Gain = $10 \log(N_{ANT}/N_{SS})$ dB.
5. For power measurement of KDB 662911 is used with multiple transmitter output. Total conducted power is the sum of the conducted power levels measured at the various output ports.
6. EIRP Power = Sum of the conducted power levels + Directional Gain
7. AD-501AX with the highest antenna gain (5 dBi), so it was used for transmit power measurement
For non-beamforming mode,

$$\text{Directional gain} = 5 \text{ dBi} + \text{Array Gain} = 5 \text{ dBi} + 0 \text{ dB} = 5 \text{ dBi}$$

For beamforming mode,

$$\begin{aligned} \text{Directional Gain} &= 10 \log[(10^{G1/20} + 10^{G2/20})^2 / N_{ant}] \text{ dBi} \\ &= 10 \log[(10^{5/20} + 10^{5/20})^2 / 2] \text{ dBi} \\ &= 10 \log[(10^{5/20} + 10^{5/20})^2 / 2] \text{ dBi} \\ &= 8.01 \text{ dBi} \end{aligned}$$

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Test Procedure

For Average Power Measurement

Test method PM

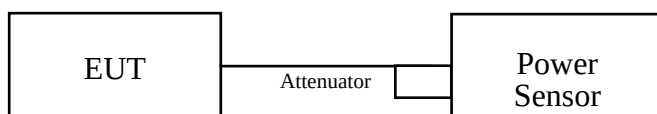
Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst and set the detector to average. Duty factor is not added to measured value.

* If transmit duty cycle < 98%, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle $\geq 98\%$, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run.”

EIRP = Maximum Conducted Power + Directional Gain

Test Setup

For Average Power Measurement



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

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Test Data

Non-Beamforming mode

802.11ax (HE20)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (dBm)	Directional Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Pass/Fail
		Chain 0	Chain 1					
2	5935	1.12	1.64	4.40	5.00	9.40	24	PASS
1	5955	0.74	1.27	4.02	5.00	9.02	24	PASS
45	6175	0.38	1.66	4.08	5.00	9.08	24	PASS
93	6415	0.48	1.56	4.06	5.00	9.06	24	PASS
97	6435	0.42	1.36	3.93	5.00	8.93	24	PASS
105	6475	0.45	0.93	3.71	5.00	8.71	24	PASS
113	6515	0.74	0.81	3.79	5.00	8.79	24	PASS
117	6535	0.76	0.72	3.75	5.00	8.75	24	PASS
149	6695	0.55	0.75	3.66	5.00	8.66	24	PASS
181	6855	1.28	1.12	4.21	5.00	9.21	24	PASS
185	6875	0.89	0.76	3.84	5.00	8.84	24	PASS
209	6995	0.72	0.81	3.78	5.00	8.78	24	PASS
229	7095	0.01	0.52	3.28	5.00	8.28	24	PASS
233	7115	0.34	0.81	3.59	5.00	8.59	24	PASS

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Doc No: 17-EM-F0988 / 1.0



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FCC ID : RYK-WPEQ276AX

802.11ax (HE40)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (dBm)	Directional Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Pass/Fail
		Chain 0	Chain 1					
3	5965	3.76	4.26	7.03	5.00	12.03	24	PASS
43	6165	2.88	4.20	6.60	5.00	11.60	24	PASS
91	6405	2.96	4.26	6.67	5.00	11.67	24	PASS
99	6445	2.87	3.88	6.41	5.00	11.41	24	PASS
107	6485	3.29	3.70	6.51	5.00	11.51	24	PASS
115	6525	3.75	3.84	6.81	5.00	11.81	24	PASS
123	6565	3.50	3.32	6.42	5.00	11.42	24	PASS
155	6725	3.37	3.30	6.35	5.00	11.35	24	PASS
179	6845	3.85	3.64	6.76	5.00	11.76	24	PASS
187	6885	3.97	3.59	6.79	5.00	11.79	24	PASS
211	7005	3.18	3.21	6.21	5.00	11.21	24	PASS
227	7085	2.67	3.36	6.04	5.00	11.04	24	PASS

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802.11ax (HE80)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (dBm)	Directional Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Pass/Fail
		Chain 0	Chain 1					
7	5985	6.47	6.88	9.69	5.00	14.69	24	PASS
39	6145	5.75	6.82	9.33	5.00	14.33	24	PASS
87	6385	6.11	7.00	9.59	5.00	14.59	24	PASS
103	6465	6.06	6.67	9.39	5.00	14.39	24	PASS
119	6545	6.58	6.64	9.62	5.00	14.62	24	PASS
135	6625	6.64	6.62	9.64	5.00	14.64	24	PASS
151	6705	6.52	6.78	9.66	5.00	14.66	24	PASS
167	6785	6.55	6.64	9.61	5.00	14.61	24	PASS
183	6865	6.90	6.77	9.85	5.00	14.85	24	PASS
199	6945	6.98	6.60	9.80	5.00	14.80	24	PASS
215	7025	6.13	6.35	9.25	5.00	14.25	24	PASS

802.11ax (HE160)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (dBm)	Directional Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Pass/Fail
		Chain 0	Chain 1					
15	6025	8.49	10.26	12.47	5.00	17.47	24	PASS
47	6185	8.49	10.01	12.33	5.00	17.33	24	PASS
79	6345	9.61	9.79	12.71	5.00	17.71	24	PASS
111	6505	9.42	9.49	12.47	5.00	17.47	24	PASS
143	6665	9.16	9.03	12.11	5.00	17.11	24	PASS
175	6825	9.50	9.38	12.45	5.00	17.45	24	PASS
207	6985	9.51	9.76	12.65	5.00	17.65	24	PASS

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Beamforming mode

802.11ax (HE20)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (dBm)	Directional Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Pass/Fail
		Chain 0	Chain 1					
2	5935	0.92	1.30	4.12	8.01	12.13	24	PASS
1	5955	0.36	0.93	3.66	8.01	11.67	24	PASS
45	6175	0.01	1.22	3.67	8.01	11.68	24	PASS
93	6415	0.23	1.34	3.83	8.01	11.84	24	PASS
97	6435	0.10	1.02	3.59	8.01	11.60	24	PASS
105	6475	0.19	0.55	3.38	8.01	11.39	24	PASS
113	6515	0.42	0.58	3.51	8.01	11.52	24	PASS
117	6535	0.55	0.52	3.55	8.01	11.56	24	PASS
149	6695	0.18	0.46	3.33	8.01	11.34	24	PASS
181	6855	0.96	0.85	3.92	8.01	11.93	24	PASS
185	6875	0.67	0.56	3.63	8.01	11.64	24	PASS
209	6995	0.43	0.49	3.47	8.01	11.48	24	PASS
229	7095	-0.34	0.08	2.89	8.01	10.90	24	PASS
233	7115	0.05	0.55	3.32	8.01	11.33	24	PASS

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802.11ax (HE40)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (dBm)	Directional Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Pass/Fail
		Chain 0	Chain 1					
3	5965	3.40	3.91	6.67	8.01	14.68	24	PASS
43	6165	2.63	3.92	6.33	8.01	14.34	24	PASS
91	6405	2.52	4.01	6.34	8.01	14.35	24	PASS
99	6445	2.55	3.57	6.10	8.01	14.11	24	PASS
107	6485	3.04	3.44	6.25	8.01	14.26	24	PASS
115	6525	3.42	3.40	6.42	8.01	14.43	24	PASS
123	6565	3.18	3.11	6.16	8.01	14.17	24	PASS
155	6725	3.13	3.06	6.11	8.01	14.12	24	PASS
179	6845	3.49	3.41	6.46	8.01	14.47	24	PASS
187	6885	3.69	3.35	6.53	8.01	14.54	24	PASS
211	7005	2.77	2.97	5.88	8.01	13.89	24	PASS
227	7085	2.23	3.01	5.65	8.01	13.66	24	PASS

802.11ax (HE80)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (dBm)	Directional Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Pass/Fail
		Chain 0	Chain 1					
7	5985	6.03	6.58	9.32	8.01	17.33	24	PASS
39	6145	5.31	6.41	8.91	8.01	16.92	24	PASS
87	6385	5.82	6.56	9.22	8.01	17.23	24	PASS
103	6465	5.72	6.45	9.11	8.01	17.12	24	PASS
119	6545	6.32	6.26	9.30	8.01	17.31	24	PASS
135	6625	6.28	6.37	9.34	8.01	17.35	24	PASS
151	6705	6.24	6.39	9.33	8.01	17.34	24	PASS
167	6785	6.30	6.22	9.27	8.01	17.28	24	PASS
183	6865	6.55	6.44	9.51	8.01	17.52	24	PASS
199	6945	6.77	6.20	9.50	8.01	17.51	24	PASS
215	7025	5.70	6.05	8.89	8.01	16.90	24	PASS

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802.11ax (HE160)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (dBm)	Directional Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Pass/Fail
		Chain 0	Chain 1					
15	6025	8.06	9.85	12.06	8.01	20.07	24	PASS
47	6185	8.29	9.67	12.04	8.01	20.05	24	PASS
79	6345	9.18	9.46	12.33	8.01	20.34	24	PASS
111	6505	9.07	9.17	12.13	8.01	20.14	24	PASS
143	6665	8.96	8.72	11.85	8.01	19.86	24	PASS
175	6825	9.07	8.93	12.01	8.01	20.02	24	PASS
207	6985	9.20	9.38	12.30	8.01	20.31	24	PASS

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9.4. Power Spectral Density

Requirements

EUT Category		Operation Band	Limit
			Max Average Power Density
	Standard Power AP (6SD)	U-NII-5 U-NII-7	$EIRP \leq 23 \text{ dBm/MHz}$
	Fixed Client (6FC)	U-NII-5 U-NII-7	$EIRP \leq 23 \text{ dBm/MHz}$
	Standard Client (6FX)	U-NII-5 U-NII-7	$EIRP \leq 17 \text{ dBm/MHz}$
	Indoor AP (6ID)	U-NII-5, U-NII-6 U-NII-7, U-NII-8	$EIRP \leq 5 \text{ dBm/MHz}$
	Subordinate (6PP)	U-NII-5, U-NII-6 U-NII-7, U-NII-8	$EIRP \leq 5 \text{ dBm/MHz}$
√	Indoor Client (6XD)	U-NII-5, U-NII-6 U-NII-7, U-NII-8	$EIRP \leq -1 \text{ dBm/MHz}$
	Dual Client (6CD)	Control of a low power indoor AP: U-NII-5, U-NII-6 U-NII-7, U-NII-8	$EIRP \leq -1 \text{ dBm/MHz}$
		Control of a standard power AP: U-NII-5 U-NII-7	$EIRP \leq 17 \text{ dBm/MHz}$

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Note:

1. PSD = power spectral density that he same method as used to determine the conducted output power shall be used to determine the power spectral density. And power spectral density in dBm/MHz
2. G_{TX} = the maximum transmitting antenna directional gain in dBi.
3. Directional Gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{Gn/20})^2 / Nant]$ dBi.

Nant: Number of Transmit Antennas

G1, G2,..., Gn: Gain of Individual Antennas

AD-501AX with the highest antenna gain (5 dBi), so it was used for power spectral measurement

$$\text{Directional Gain} = 10 \log[(10^{G1/20} + 10^{G2/20})^2 / Nant] \text{ dBi}$$

$$= 10 \log[(10^{5/20} + 10^{5/20})^2 / 2] \text{ dBi}$$

$$= 10 \log[(10^{5/20} + 10^{5/20})^2 / 2] \text{ dBi}$$

$$= 8.01 \text{ dBi}$$

4. "PSD per chain" of the report shown is maximum value for each chain, at the "Total PSD" is summing entire spectra across corresponding frequency bins on the various outputs by computer, refer KDB 662911 Method a) for calculating total power density.
5. Method a) of power density measurement of KDB 662911 is used for calculating total power density with multiple transmitter output. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
6. EIRP Power Density = Sum of the conducted power density levels + Directional Gain
7. Refer to section 6.6 for duty cycle spectrum plot. (If duty cycle<98%)

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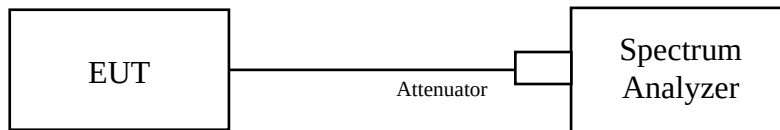


Test procedure

Using method:

- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 1 MHz, Set VBW $\geq$ 3 RBW, Detector = RMS
- Sweep time = auto, trigger set to “free run”.
- Trace average at least 100 traces in power averaging mode.
- Record the max value and add 10 log (1/duty cycle) *If duty cycle<98%

Test Setup



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

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Test Data

Mode	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ax(HE20)	2	5935	8.01	-1.034	-1	PASS
	1	5955	8.01	-1.272	-1	PASS
	45	6175	8.01	-1.143	-1	PASS
	93	6415	8.01	-1.216	-1	PASS
	97	6435	8.01	-1.251	-1	PASS
	105	6475	8.01	-1.327	-1	PASS
	113	6515	8.01	-1.49	-1	PASS
	117	6535	8.01	-1.368	-1	PASS
	149	6695	8.01	-1.511	-1	PASS
	181	6855	8.01	-1.304	-1	PASS
	185	6875	8.01	-1.616	-1	PASS
	209	6995	8.01	-1.096	-1	PASS
	229	7095	8.01	-1.555	-1	PASS
	233	7115	8.01	-1.563	-1	PASS
	185	6875	8.01	-1.616	-1	PASS
	209	6995	8.01	-1.096	-1	PASS
	229	7095	8.01	-1.555	-1	PASS
	233	7115	8.01	-1.563	-1	PASS

Mode	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ax(HE20)	2	5935	-11.866	-11.768
	1	5955	-12.393	-11.987
	45	6175	-12.944	-11.303
	93	6415	-12.087	-11.475
	97	6435	-12.375	-11.573
	105	6475	-12.274	-11.806
	113	6515	-12.185	-12.03
	117	6535	-12.035	-12.238
	149	6695	-12.694	-12.303
	181	6855	-11.948	-12.039
	185	6875	-12.173	-12.565
	209	6995	-12.125	-11.903
	229	7095	-13.116	-11.787
	233	7115	-12.703	-12.239
	185	6875	-12.173	-12.565
	209	6995	-12.125	-11.903
	229	7095	-13.116	-11.787
	233	7115	-12.703	-12.239

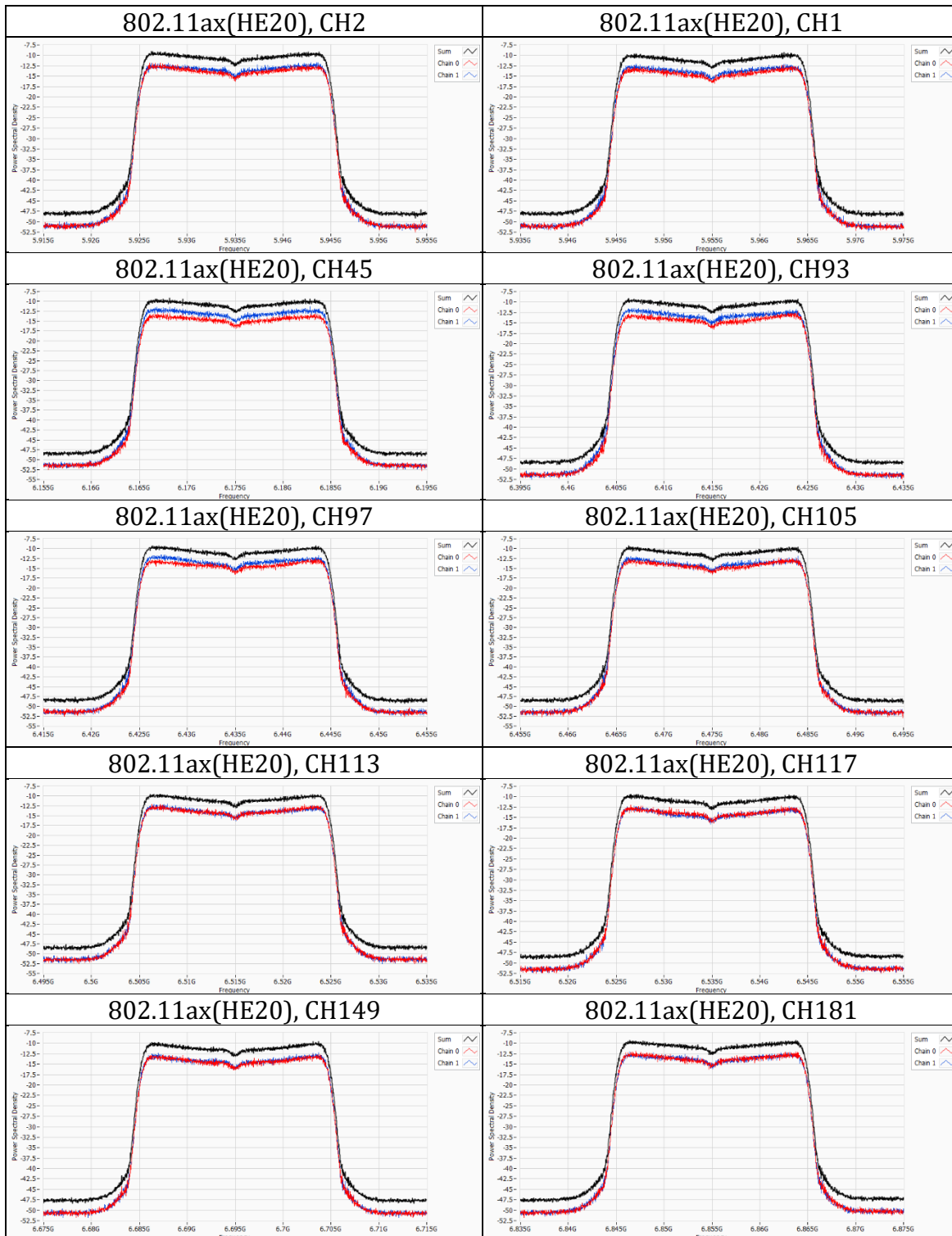
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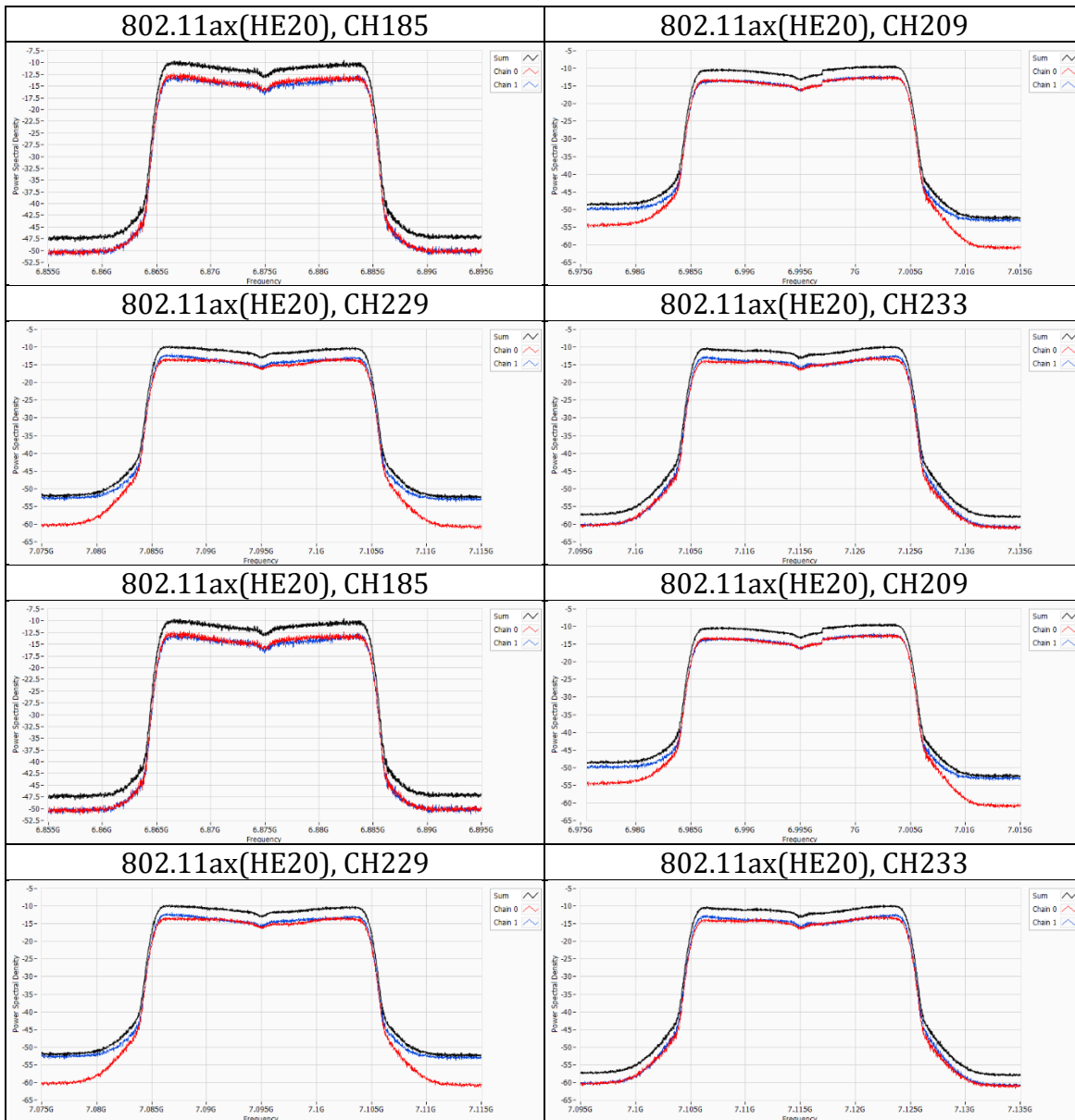
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Mode	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ax(HE40)	3	5965	8.01	-1.001	-1	PASS
	43	6165	8.01	-1.454	-1	PASS
	91	6405	8.01	-1.58	-1	PASS
	99	6445	8.01	-1.586	-1	PASS
	107	6485	8.01	-1.485	-1	PASS
	115	6525	8.01	-1.26	-1	PASS
	123	6565	8.01	-1.649	-1	PASS
	155	6725	8.01	-1.415	-1	PASS
	179	6845	8.01	-1.261	-1	PASS
	187	6885	8.01	-1.445	-1	PASS
	211	7005	8.01	-1.206	-1	PASS
	227	7085	8.01	-1.528	-1	PASS

Mode	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ax(HE40)	3	5965	-12.033	-11.569
	43	6165	-12.885	-11.769
	91	6405	-12.683	-11.674
	99	6445	-13.05	-12.014
	107	6485	-12.483	-12.29
	115	6525	-12.208	-12.046
	123	6565	-11.985	-12.559
	155	6725	-12.339	-12.442
	179	6845	-11.812	-11.892
	187	6885	-11.889	-12.367
	211	7005	-12.135	-12.079
	227	7085	-12.747	-12.159

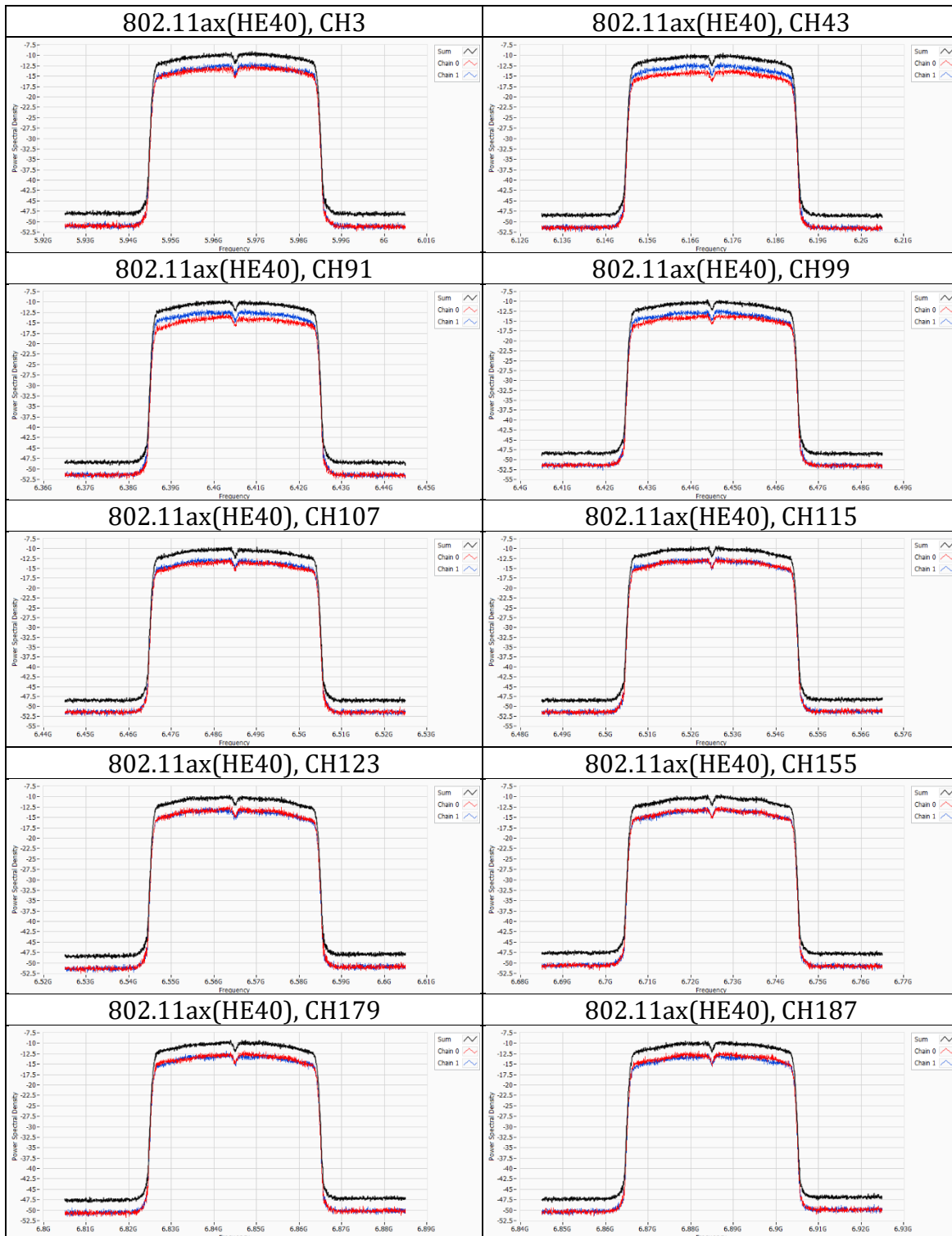
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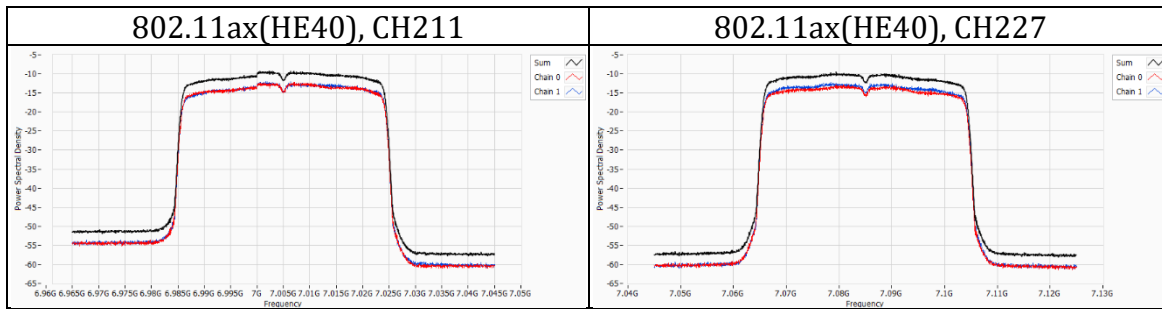
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Mode	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ax(HE80)	7	5985	8.01	-1.304	-1	PASS
	39	6145	8.01	-1.533	-1	PASS
	87	6385	8.01	-1.504	-1	PASS
	103	6465	8.01	-1.547	-1	PASS
	119	6545	8.01	-1.377	-1	PASS
	135	6625	8.01	-1.489	-1	PASS
	151	6705	8.01	-1.403	-1	PASS
	167	6785	8.01	-1.433	-1	PASS
	183	6865	8.01	-1.368	-1	PASS
	199	6945	8.01	-1.645	-1	PASS
	215	7025	8.01	-1.331	-1	PASS

Mode	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ax(HE80)	7	5985	-12.098	-11.956
	39	6145	-12.824	-12
	87	6385	-12.874	-11.841
	103	6465	-12.672	-11.974
	119	6545	-11.963	-12.006
	135	6625	-12.297	-12.184
	151	6705	-12.192	-12.12
	167	6785	-12.035	-12.102
	183	6865	-11.934	-12.149
	199	6945	-12.338	-12.816
	215	7025	-12.312	-12.002

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