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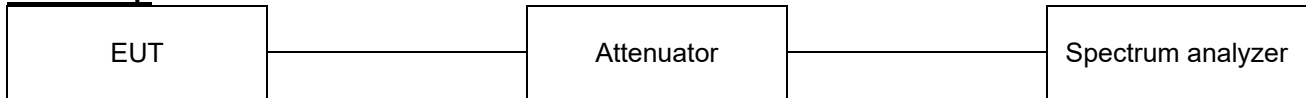
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7.4. 6 dB Bandwidth & 99% Bandwidth

Test setup



Limit

According to §15.407(e), RSS-247(6.2.4) Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth if U-NII devices shall be at least 500kHz

Test procedure

ANSI C63.10-2013 Section 6.9.2
KDB 789033 D02 v02r01 - Section C.2

Test settings

Minimum Emission Bandwidth for the band 5.725–5.85 GHz

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 kHz for the band 5.725–5.85 GHz. The following procedure shall be used for measuring this bandwidth:

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 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 dB relative to the maximum level measured in the fundamental emission.

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**Test results****SISO**

Test mode	Band	Frequency (MHz)	6dB bandwidth (MHz)		Limit (MHz)	99% bandwidth (MHz)	
			ANT1	ANT2		ANT1	ANT2
802.11a	UNII-3	5 745	16.38	16.38	0.50	16.43	16.43
		5 785	16.38	16.38	0.50	16.43	16.48
		5 825	16.38	16.38	0.50	16.53	16.43
802.11n HT20	UNII-3	5 745	17.68	17.68	0.50	17.58	17.58
		5 785	17.68	17.63	0.50	17.58	17.58
		5 825	17.68	17.68	0.50	17.63	17.58
802.11n HT40	UNII-3	5 755	36.46	36.46	0.50	36.36	36.26
		5 795	36.46	36.46	0.50	36.36	36.26
802.11ac VHT20	UNII-3	5 745	17.63	17.68	0.50	17.58	17.58
		5 785	17.43	17.68	0.50	17.58	17.58
		5 825	17.68	17.68	0.50	17.58	17.58
802.11ac VHT40	UNII-3	5 755	36.46	36.46	0.50	36.36	36.26
		5 795	36.46	36.56	0.50	36.36	36.26
802.11ac VHT80	UNII-3	5 775	76.60	76.60	0.50	75.76	75.64

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Test mode	Band	Frequency (MHz)	6dB bandwidth (MHz)		Limit (MHz)	99% bandwidth (MHz)	
			ANT1	ANT2		ANT1	ANT2
802.11a	UNII-3	5 745	16.38	16.43	0.50	16.43	16.38
		5 785	16.38	15.78	0.50	16.43	16.38
		5 825	16.38	16.38	0.50	16.48	16.38
802.11n HT20	UNII-3	5 745	17.68	17.68	0.50	17.58	17.58
		5 785	17.63	17.63	0.50	17.58	17.58
		5 825	17.68	17.68	0.50	17.58	17.58
802.11n HT40	UNII-3	5 755	36.46	36.46	0.50	36.36	36.16
		5 795	36.56	36.56	0.50	36.36	36.26
802.11ac VHT20	UNII-3	5 745	17.68	17.68	0.50	17.53	17.58
		5 785	17.63	17.63	0.50	17.63	17.58
		5 825	17.68	17.68	0.50	17.58	17.63
802.11ac VHT40	UNII-3	5 755	36.56	36.46	0.50	36.26	36.36
		5 795	36.56	36.46	0.50	36.26	36.26
802.11ac VHT80	UNII-3	5 775	76.84	76.60	0.50	75.76	75.76

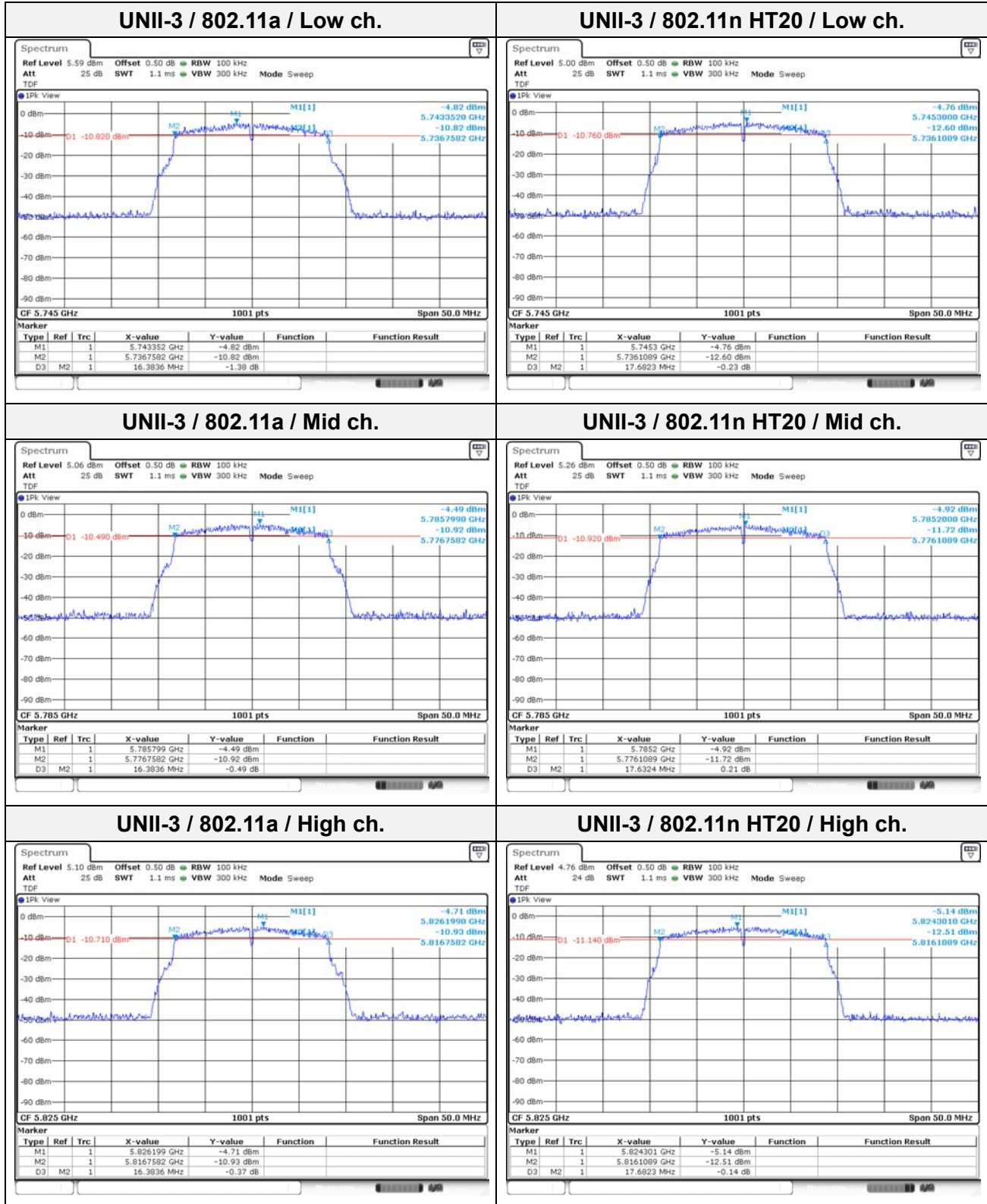
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In order to simplify the report, attached plots were only MIMO
ANT 1
6 dB bandwidth



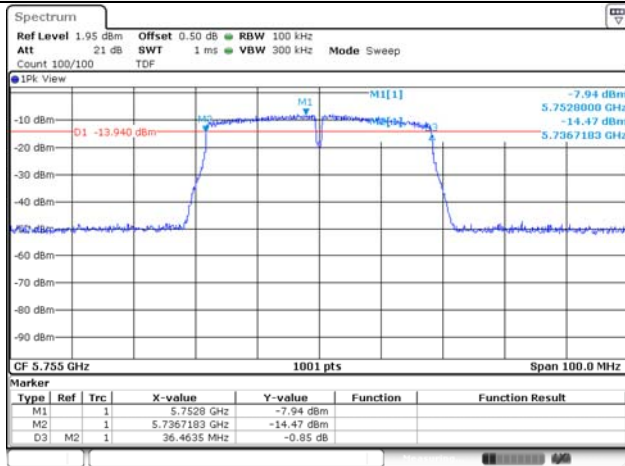
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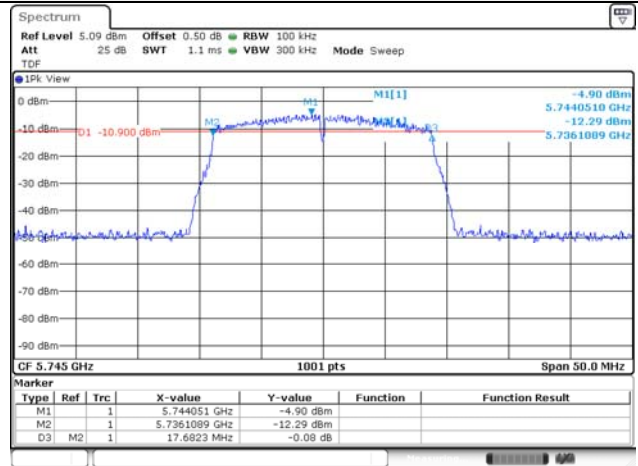
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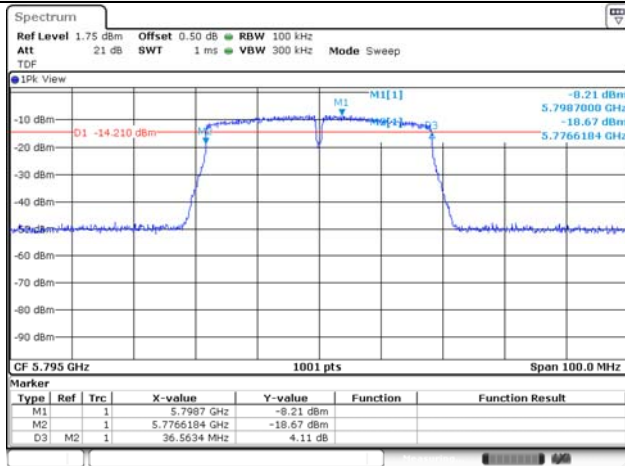
UNII-3 / 802.11n HT40 / Low ch.



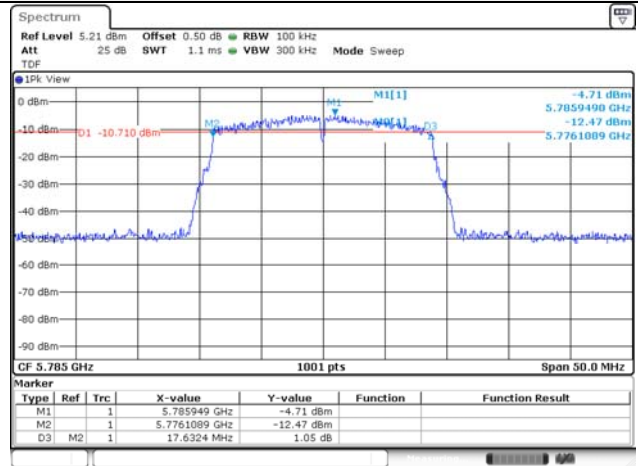
UNII-3 / 802.11ac VHT20 / Low ch.



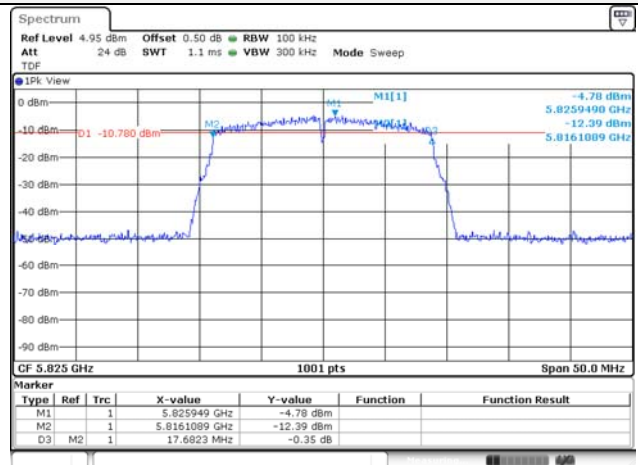
UNII-3 / 802.11n HT40 / High ch.



UNII-3 / 802.11ac VHT20 / Mid ch.



UNII-3 / 802.11ac VHT20 / High ch.



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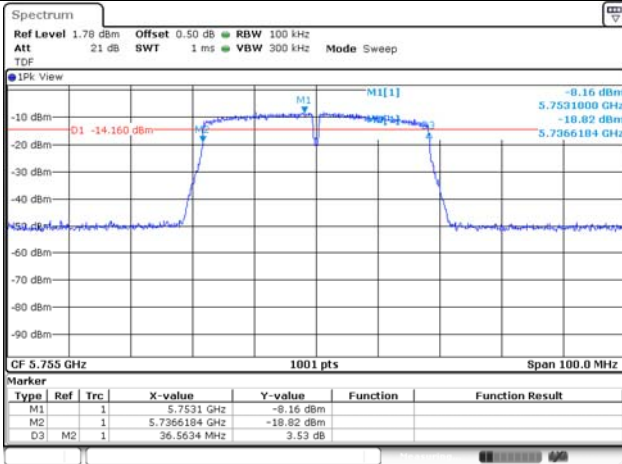
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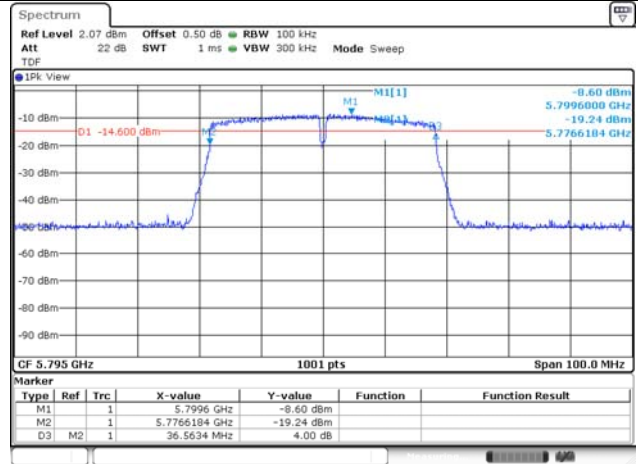
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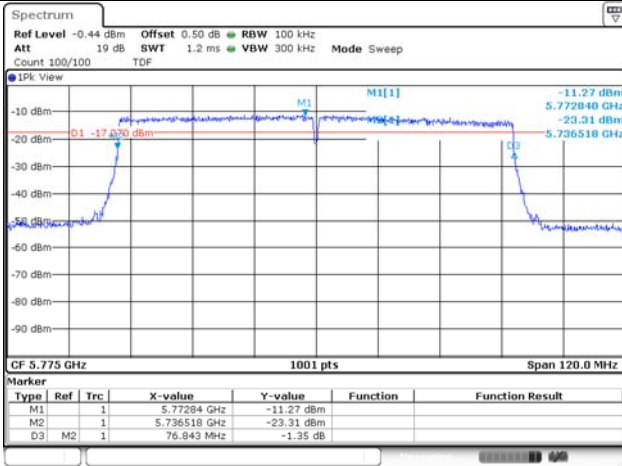
UNII-3 / 802.11ac VHT40 / Low ch.



UNII-3 / 802.11ac VHT40 / High ch.



UNII-3 / 802.11ac VHT80 / Low ch.



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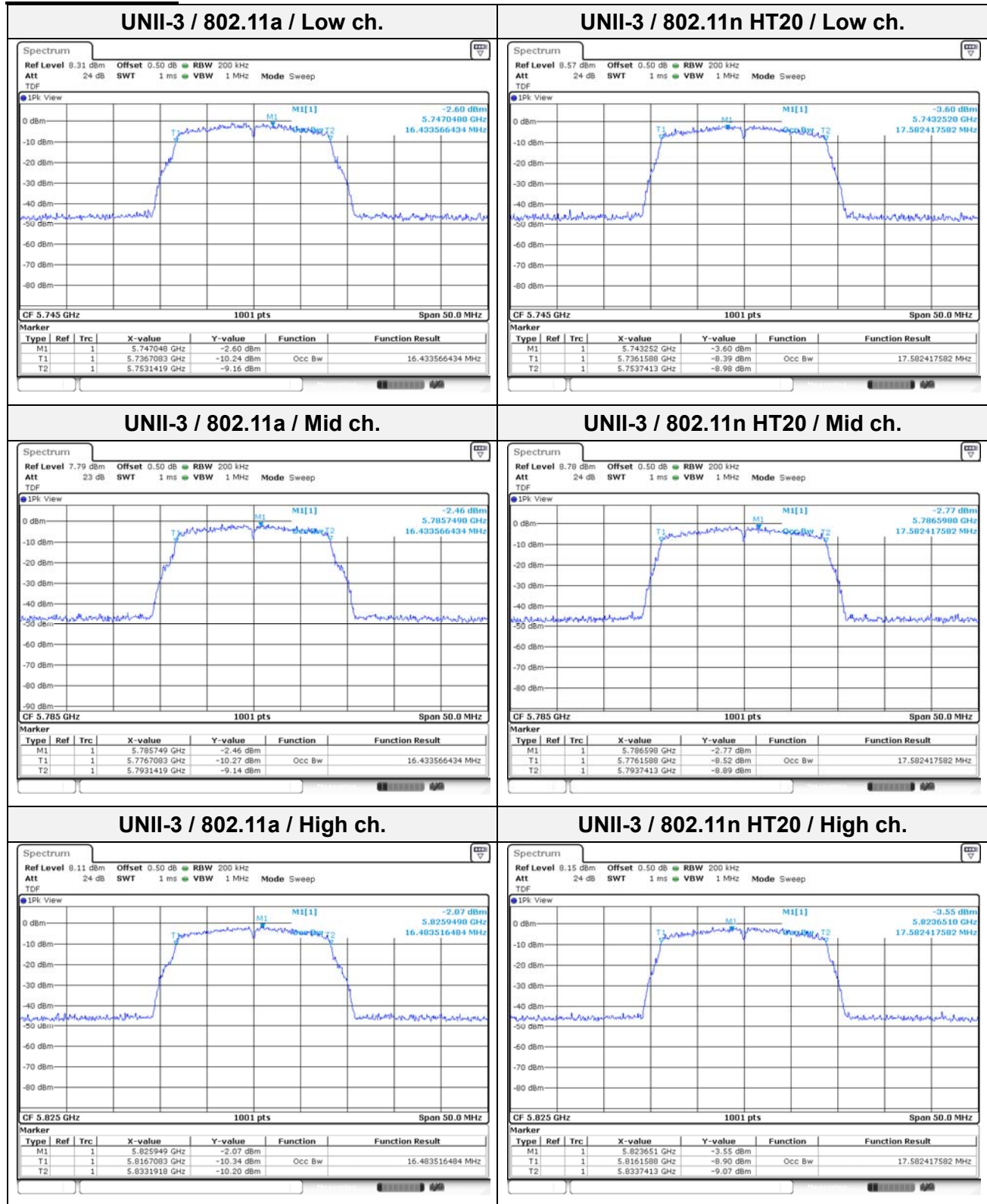
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99% bandwidth



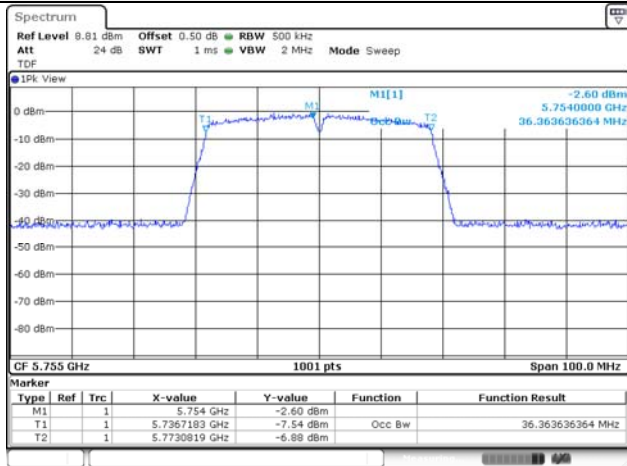
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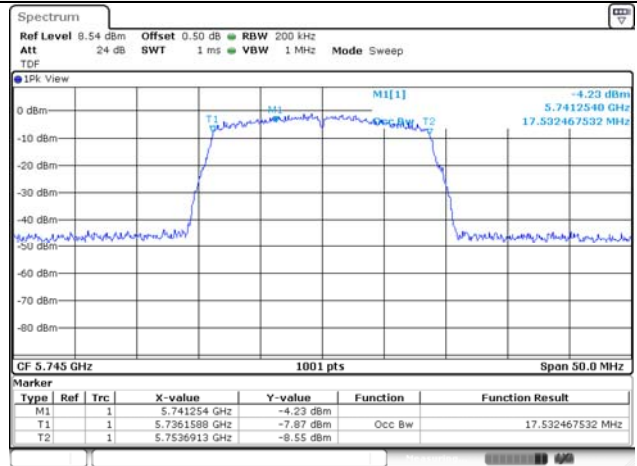
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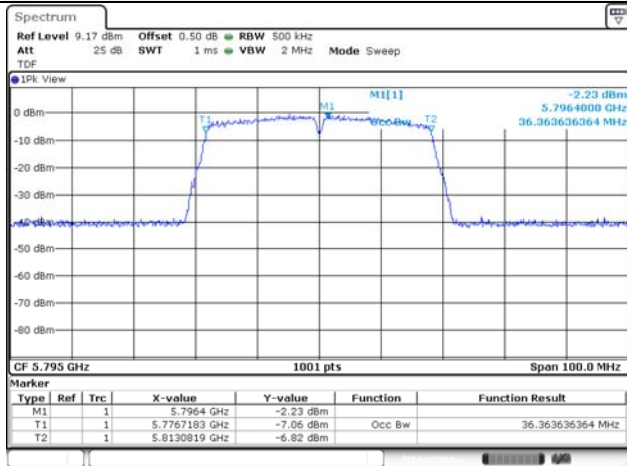
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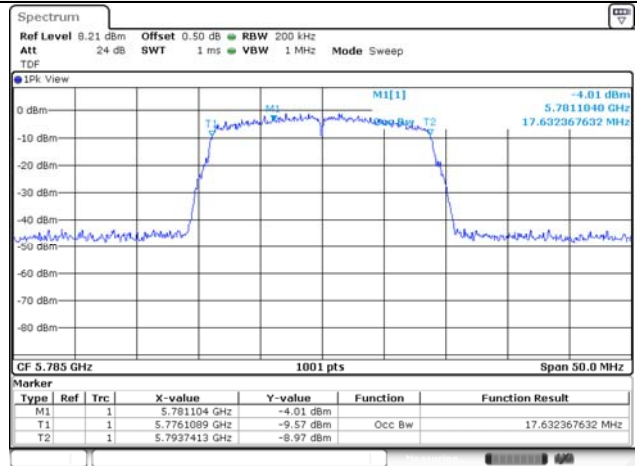
UNII-3 / 802.11ac VHT20 / Low ch.



UNII-3 / 802.11n HT40 / High ch.

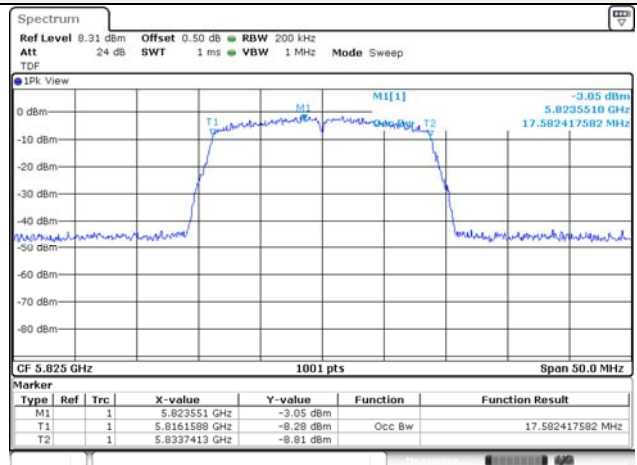


UNII-3 / 802.11ac VHT20 / Mid ch.



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UNII-3 / 802.11ac VHT20 / High ch.



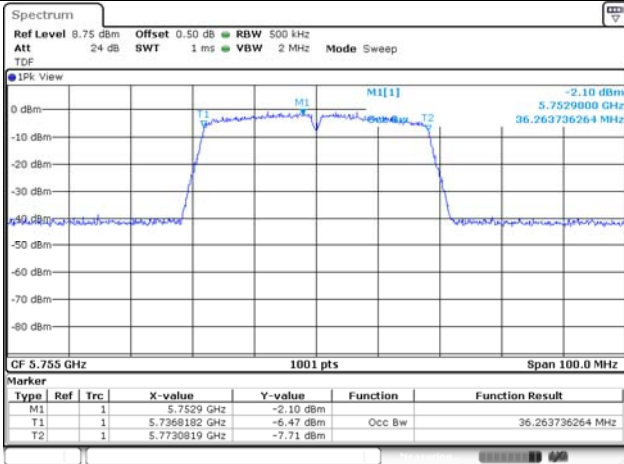
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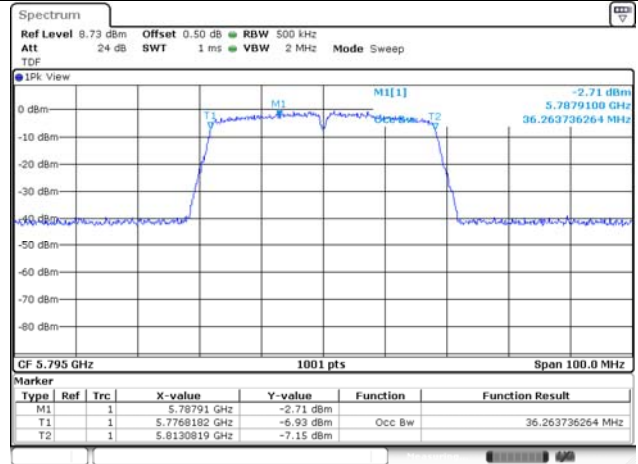
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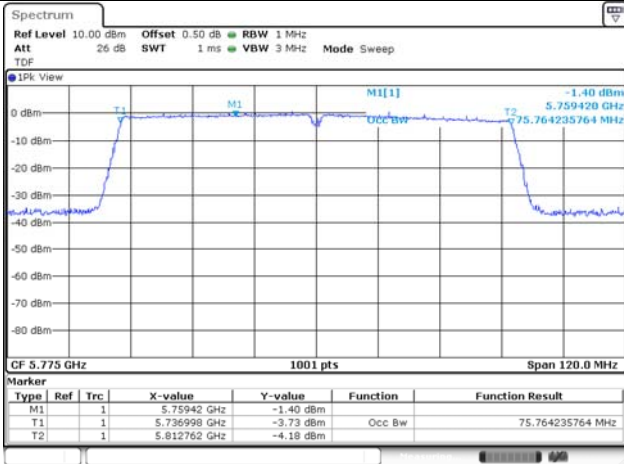
UNII-3 / 802.11ac VHT40 / Low ch.



UNII-3 / 802.11ac VHT40 / High ch.



UNII-3 / 802.11ac VHT80 / Low ch.



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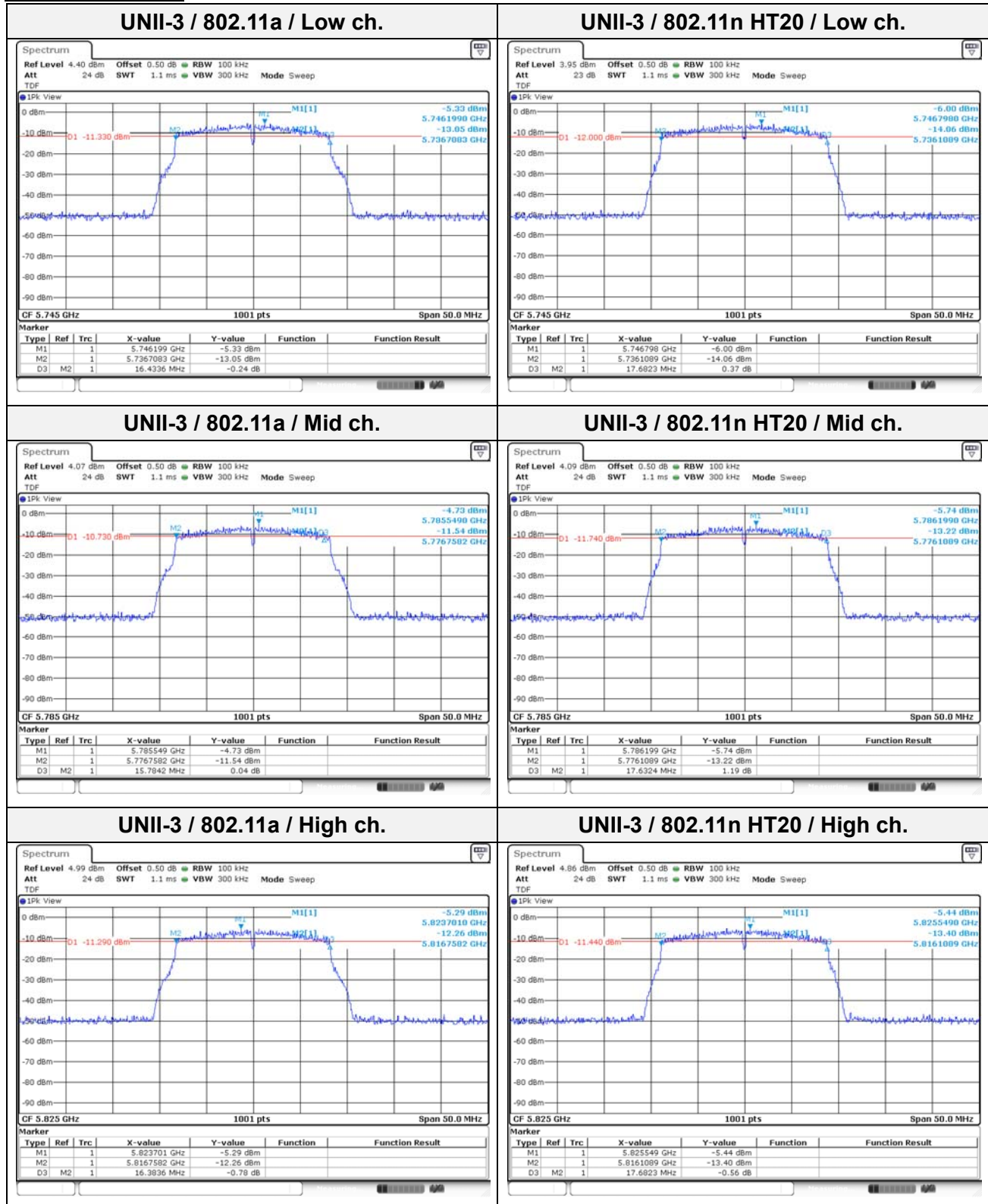
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ANT 2 6 dB bandwidth



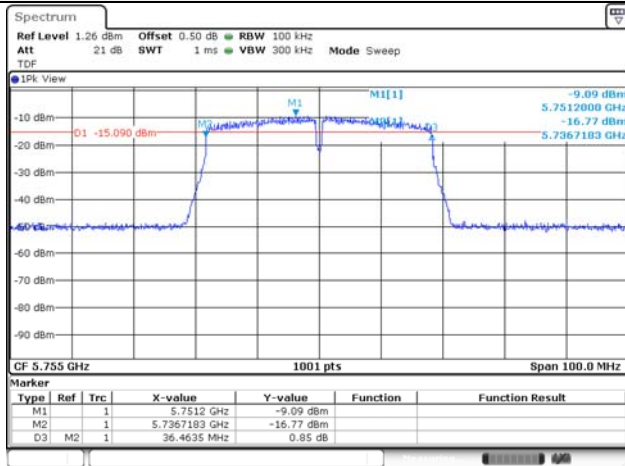
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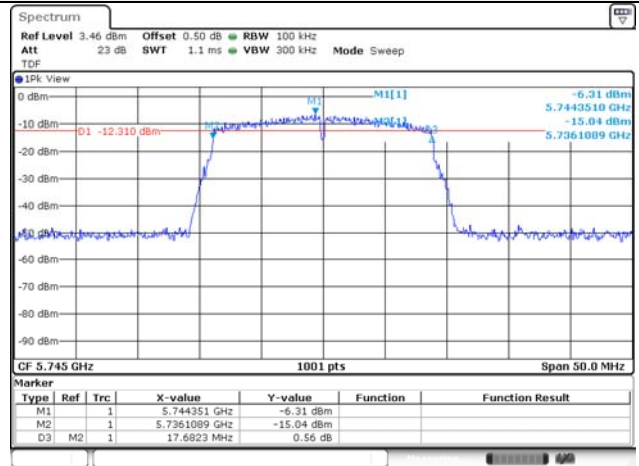
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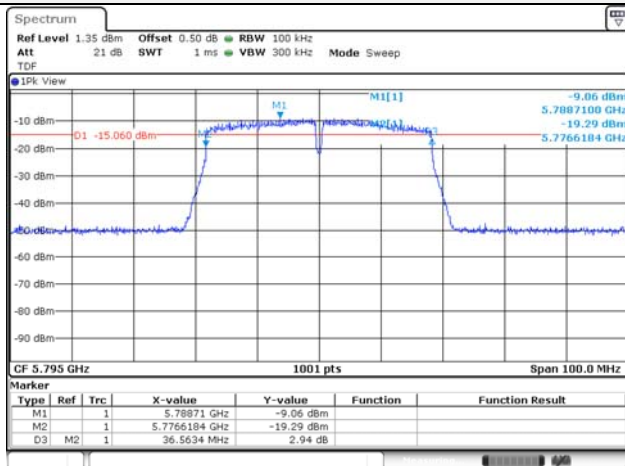
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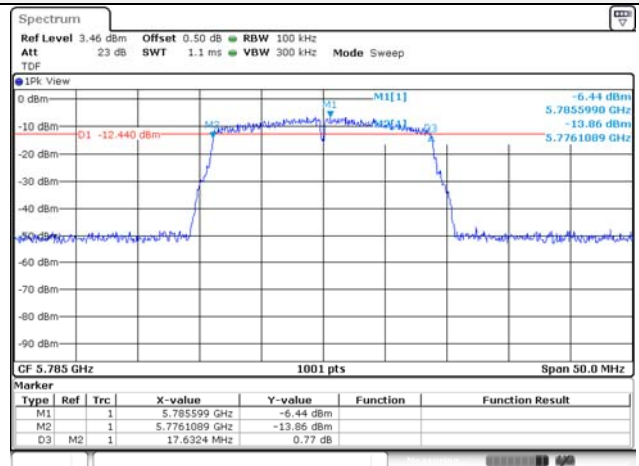
UNII-3 / 802.11ac VHT20 / Low ch.



UNII-3 / 802.11n HT40 / High ch.

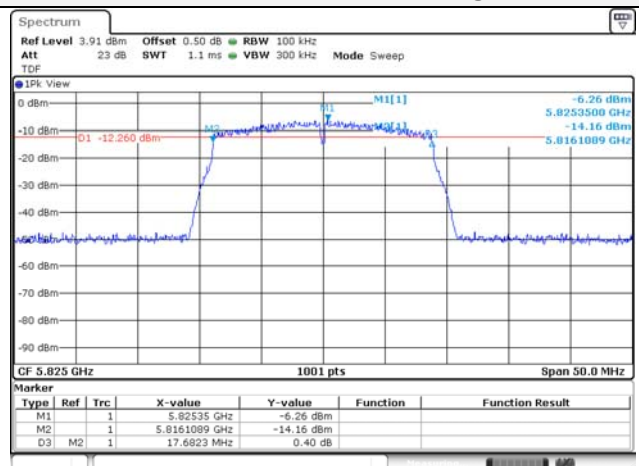


UNII-3 / 802.11ac VHT20 / Mid ch.



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UNII-3 / 802.11ac VHT20 / High ch.



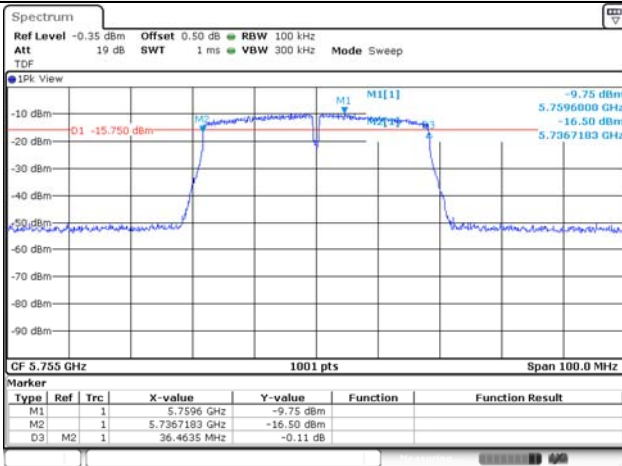
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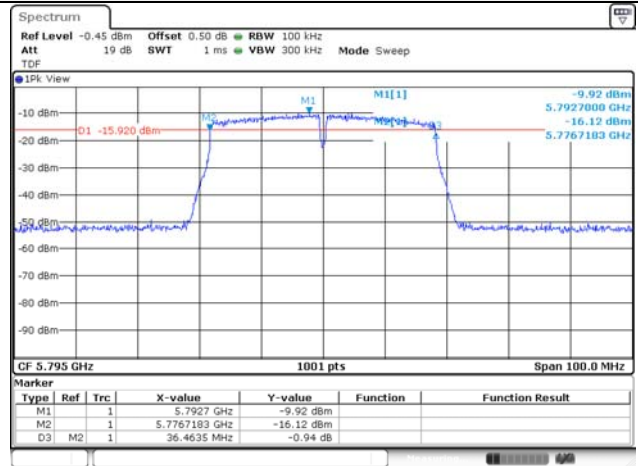
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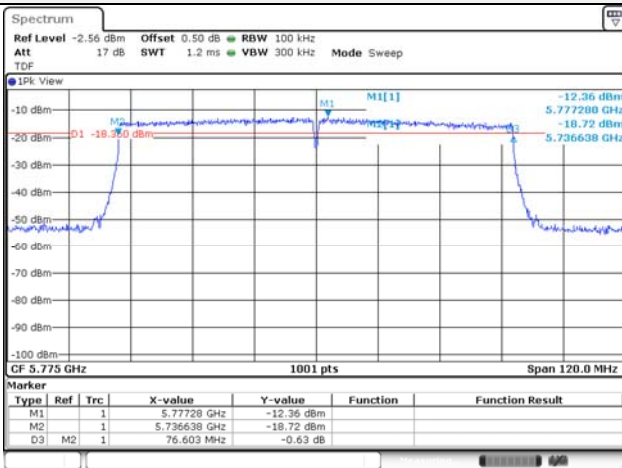
UNII-3 / 802.11ac VHT40 / Low ch.



UNII-3 / 802.11ac VHT40 / High ch.



UNII-3 / 802.11ac VHT80 / Low ch.



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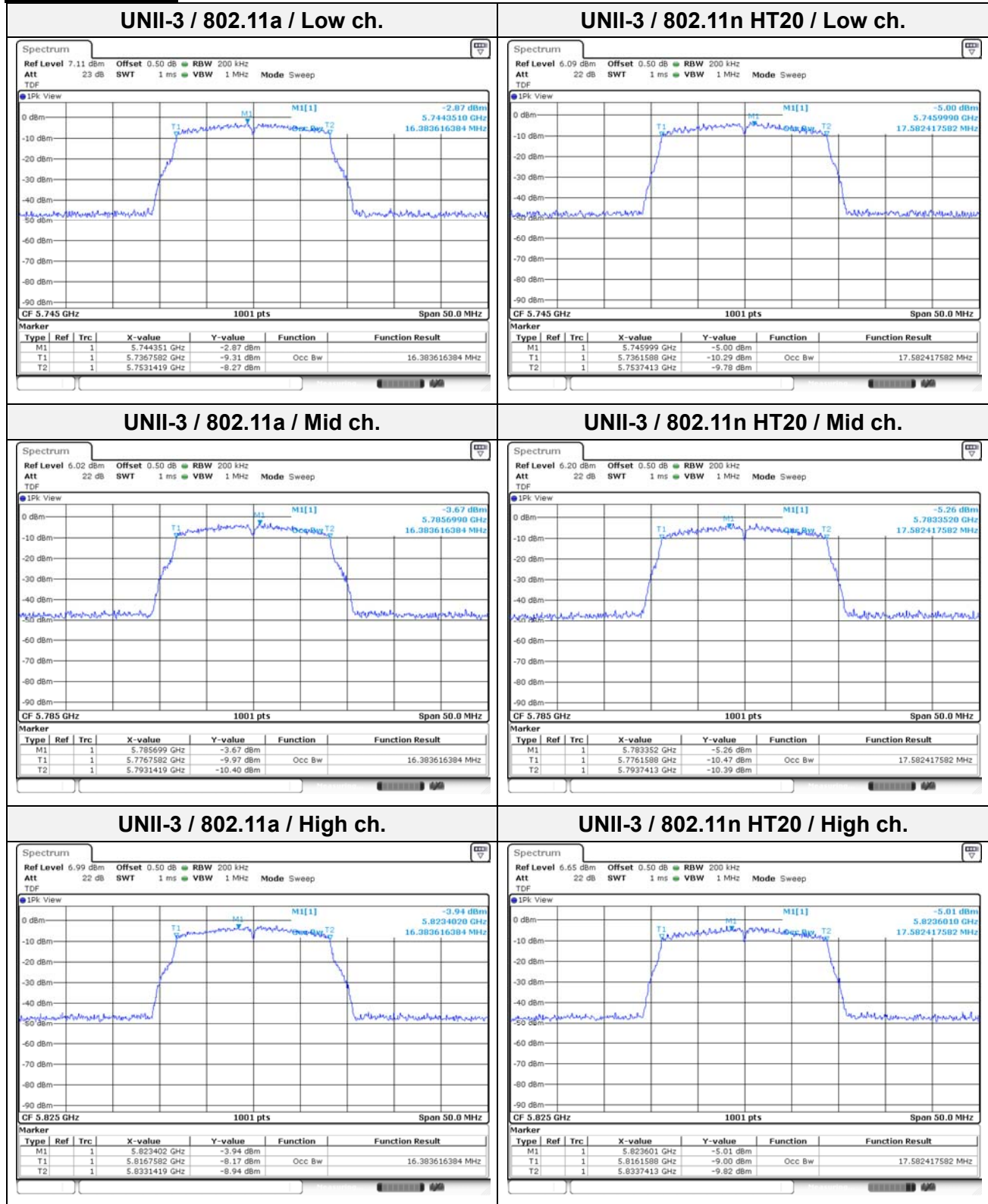
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99% bandwidth



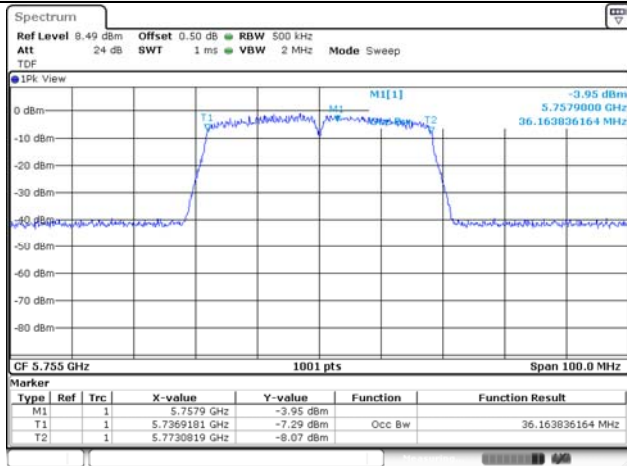
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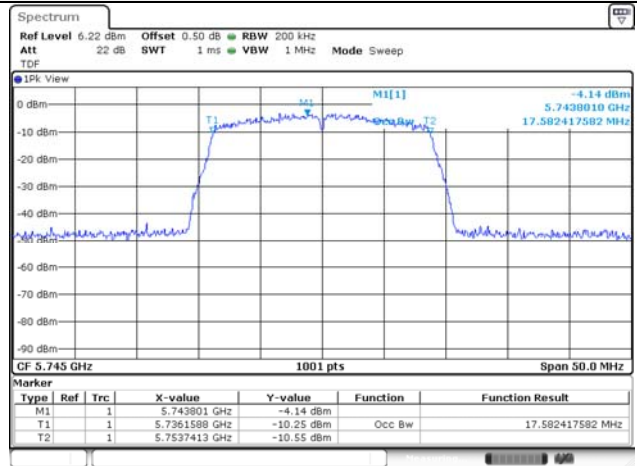
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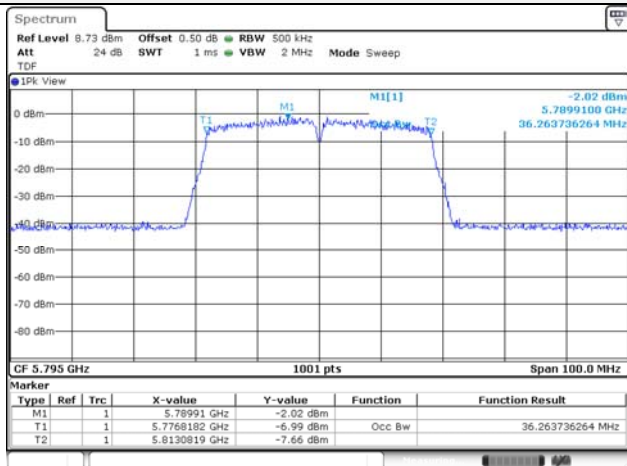
UNII-3 / 802.11n HT40 / Low ch.



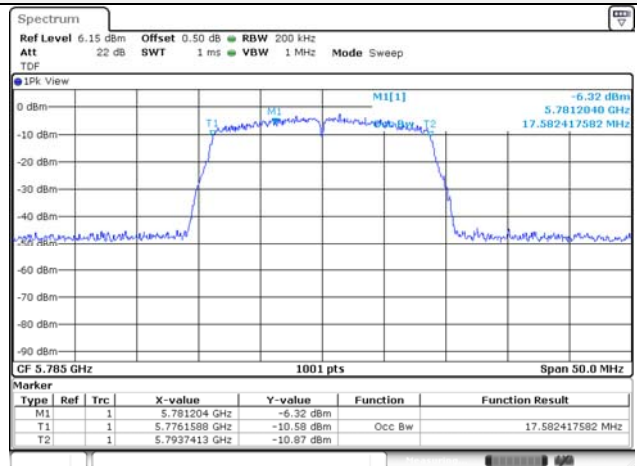
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UNII-3 / 802.11n HT40 / High ch.

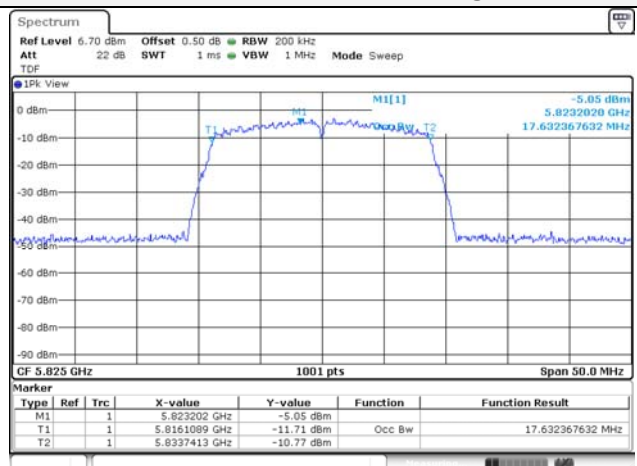


UNII-3 / 802.11ac VHT20 / Mid ch.



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UNII-3 / 802.11ac VHT20 / High ch.



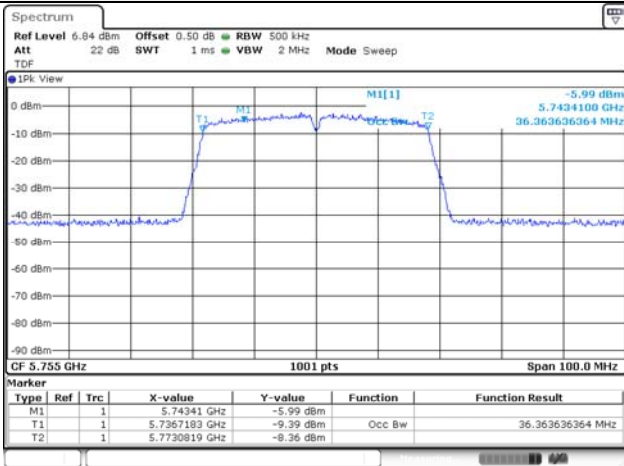
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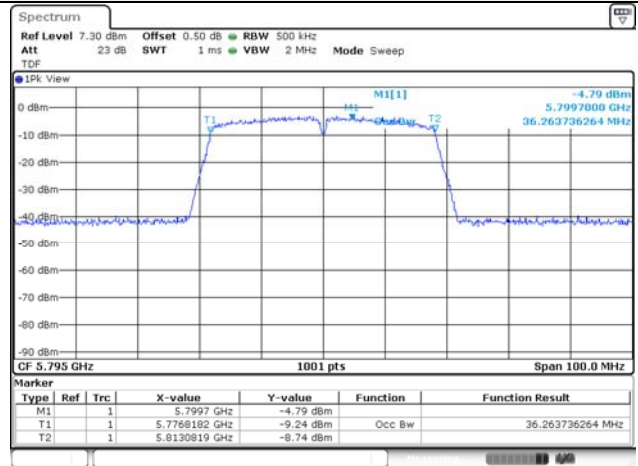
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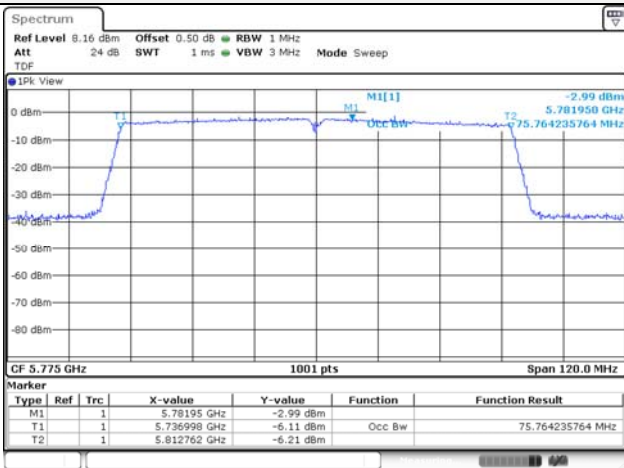
UNII-3 / 802.11ac VHT40 / Low ch.



UNII-3 / 802.11ac VHT40 / High ch.



UNII-3 / 802.11ac VHT80 / Low ch.



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7.5. Straddle channel

26dB bandwidth & 99% Bandwidth

SISO

Test mode	Band	Frequency (MHz)	26dB Bandwidth (MHz)		99% Bandwidth (MHz)	
			ANT1	ANT2	ANT1	ANT2
802.11a	UNII-2C	5 720	14.89	15.04	13.29	13.24
802.11n HT20			15.14	15.04	13.84	13.84
802.11ac VHT20			15.24	15.09	13.84	13.84
802.11a	UNII-3	5 720	4.84	4.79	3.24	3.19
802.11n HT20			5.09	4.94	3.79	3.74
802.11ac VHT20			5.04	5.09	3.79	3.74
802.11n HT40	UNII-2C	5 710	35.48	35.48	33.18	33.28
802.11ac VHT40			35.58	35.48	33.28	33.28
802.11n HT40	UNII-3	5 710	5.48	5.38	3.18	3.18
802.11ac VHT40			5.68	5.48	3.18	3.18
802.11ac VHT80	UNII-2C	5 690	75.88	75.88	73.00	73.00
	UNII-3	5 690	5.64	5.76	2.88	2.88

Notes:

1. [UNII-C] 26dB Bandwidth & 99% Bandwidth = 5 725MHz – Measured Frequency[MHz]
2. [UNII-3] 26dB Bandwidth & 99% Bandwidth = Measured Frequency[MHz] – 5 725MHz

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**MIMO**

Test mode	Band	Frequency (MHz)	26dB Bandwidth (MHz)		99% Bandwidth (MHz)	
			ANT1	ANT2	ANT1	ANT2
802.11a	UNII-2C	5 720	15.04	15.04	13.24	13.24
802.11n HT20			15.09	15.04	13.84	13.84
802.11ac VHT20			15.09	15.09	13.84	13.84
802.11a	UNII-3	5 720	4.94	4.89	3.19	3.19
802.11n HT20			5.04	4.79	3.74	3.74
802.11ac VHT20			5.04	4.89	3.74	3.74
802.11n HT40	UNII-2C	5 710	35.68	35.18	33.18	33.18
802.11ac VHT40			35.48	35.58	33.18	33.28
802.11n HT40	UNII-3	5 710	5.58	5.18	3.18	3.08
802.11ac VHT40			5.58	5.38	3.18	3.18
802.11ac VHT80	UNII-2C	5 690	75.76	76.00	73.00	73.00
	UNII-3	5 690	5.76	5.76	2.88	2.76

Notes:

1. [UNII-C] 26dB Bandwidth & 99% Bandwidth = 5 725MHz – Measured Frequency[MHz]
2. [UNII-3] 26dB Bandwidth & 99% Bandwidth = Measured Frequency[MHz] – 5 725MHz

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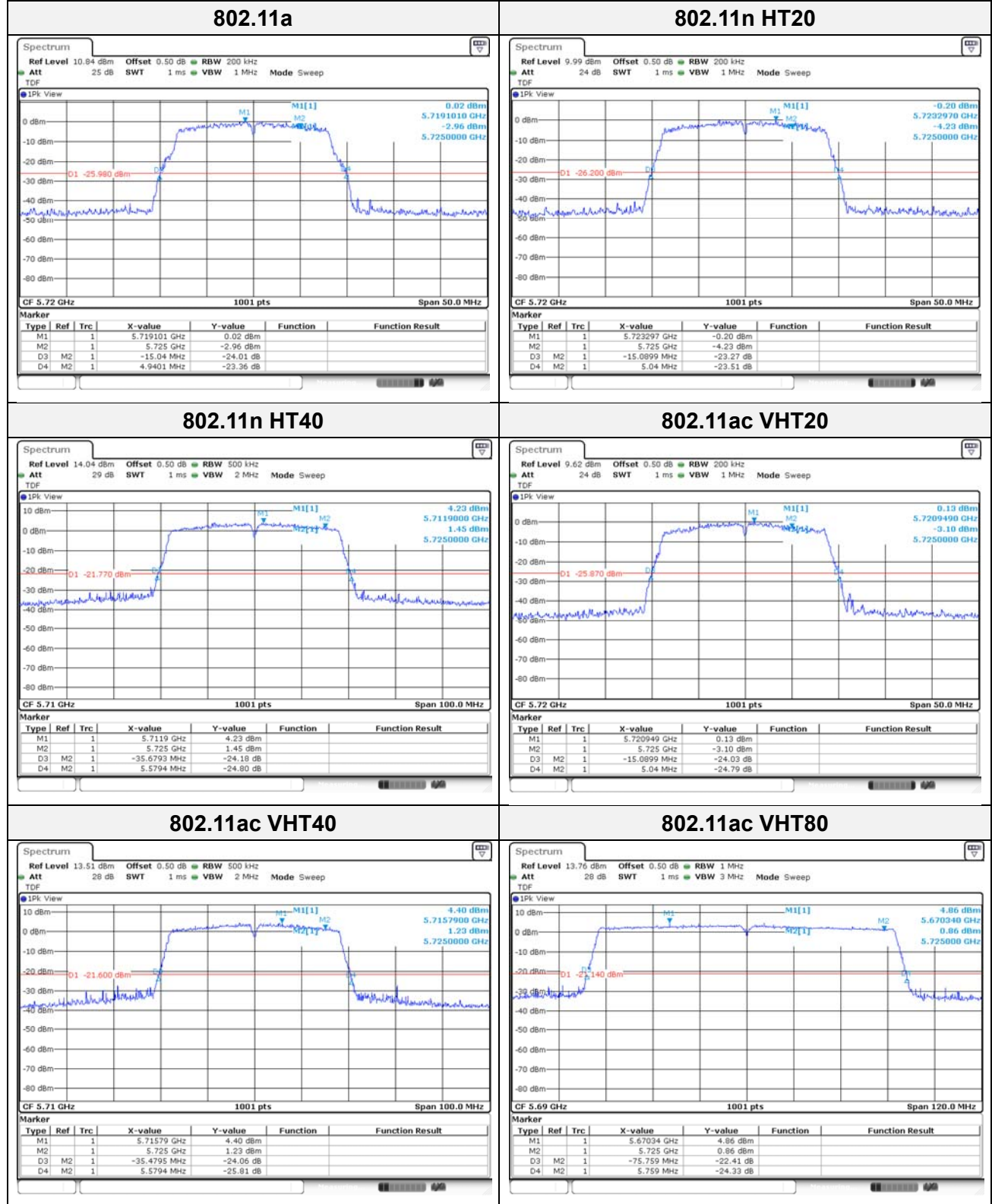
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In order to simplify the report, attached plots were only MIMO
ANT 1

26dB bandwidth



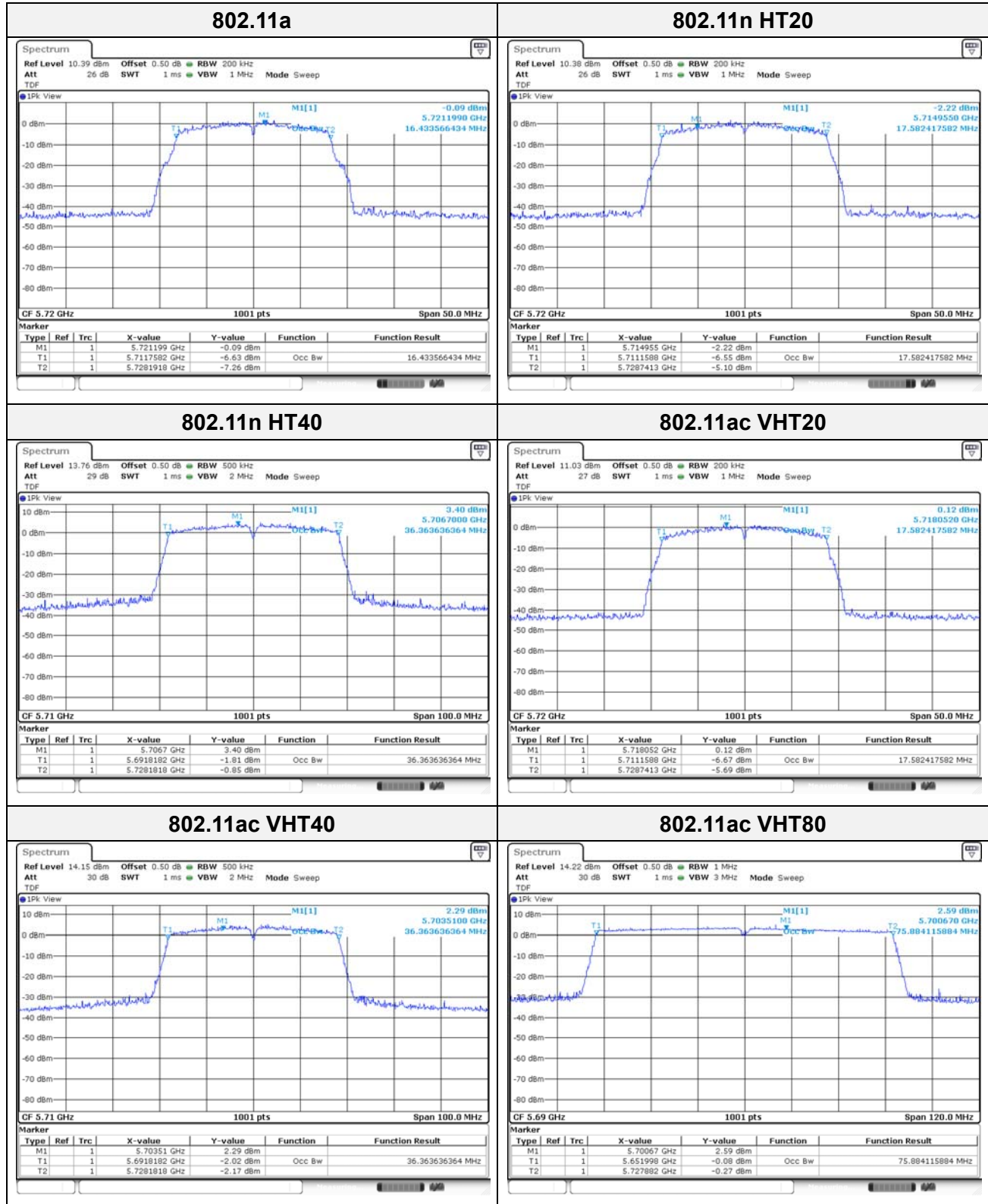
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99% bandwidth



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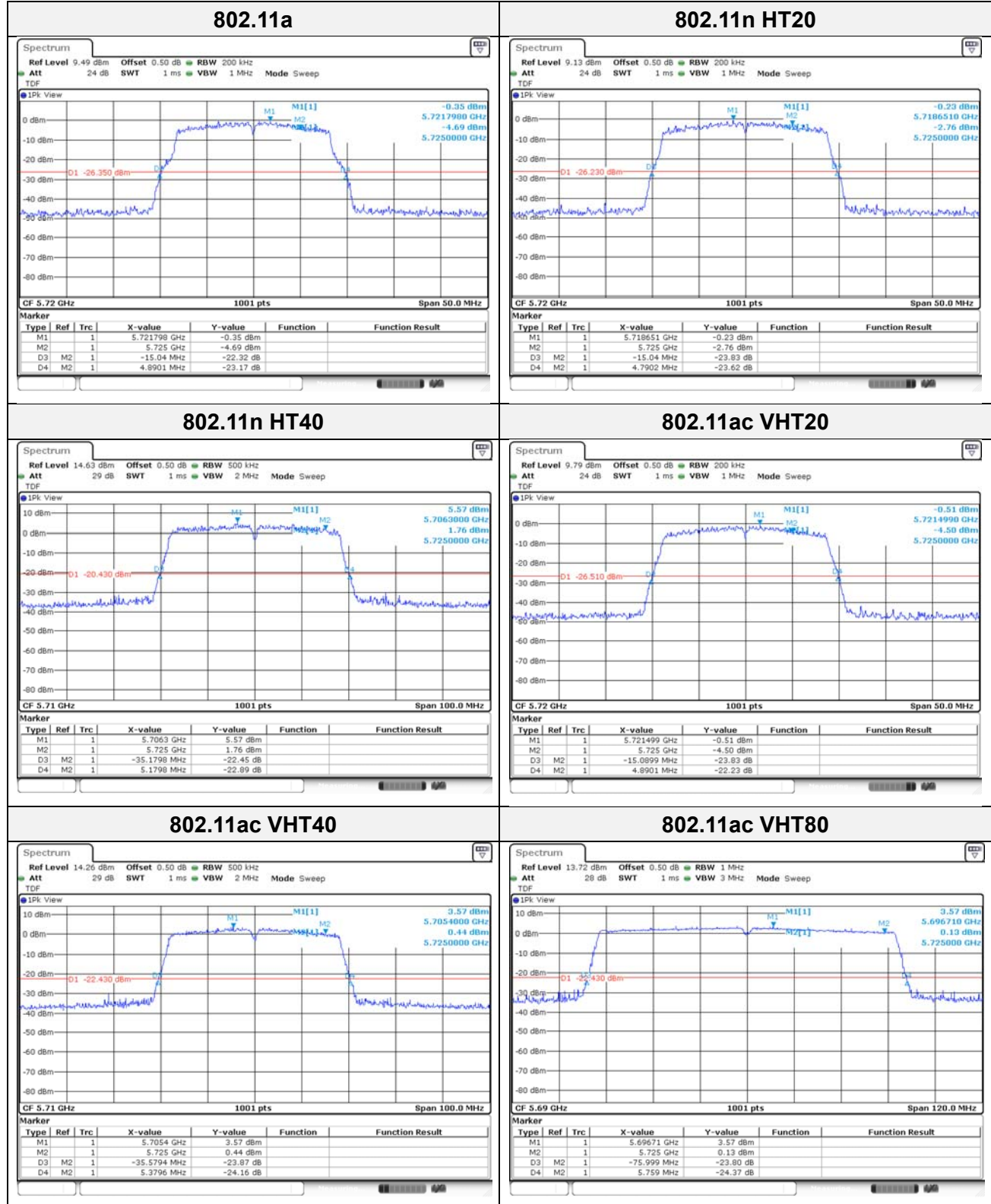
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ANT 2

26dB bandwidth



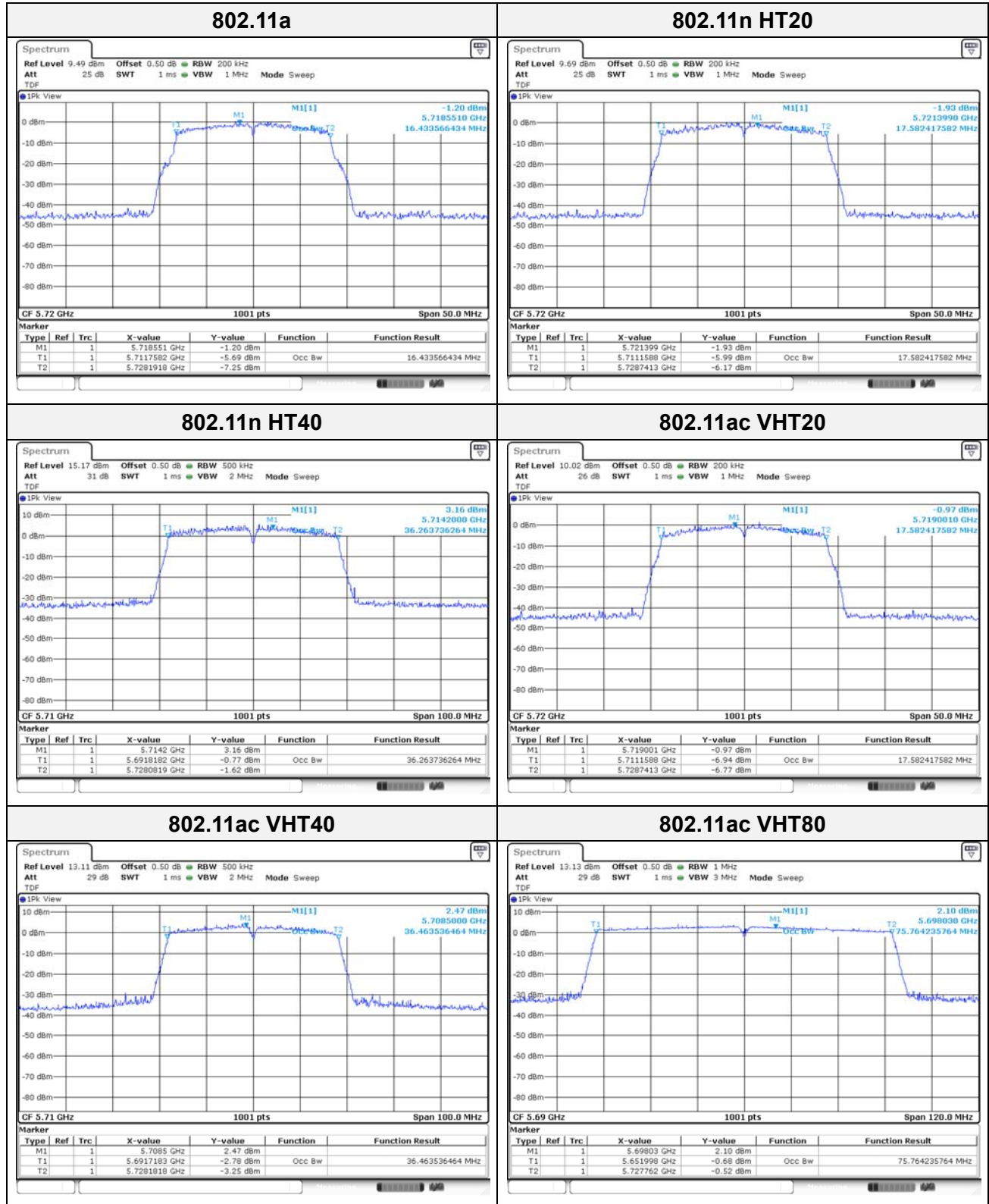
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99% bandwidth



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KCTL**6dB bandwidth****SISO**

Test mode	Band	Frequency (MHz)	6dB Bandwidth (MHz)		Limit (MHz)
			ANT1	ANT2	
802.11a	UNII-3	5 720	3.14	3.14	≥0.5
802.11n HT20			3.79	3.79	≥0.5
802.11ac VHT20			3.79	3.79	≥0.5
802.11n HT40	UNII-3	5 710	3.18	3.18	≥0.5
802.11ac VHT40			3.18	3.18	≥0.5
802.11ac VHT80	UNII-3	5 690	3.24	3.24	≥0.5

MIMO

Test mode	Band	Frequency (MHz)	6dB Bandwidth (MHz)		Limit (MHz)
			ANT1	ANT2	
802.11a	UNII-3	5 720	3.14	3.14	≥0.5
802.11n HT20			3.79	3.79	≥0.5
802.11ac VHT20			3.74	3.74	≥0.5
802.11n HT40	UNII-3	5 710	3.18	3.18	≥0.5
802.11ac VHT40			3.18	3.18	≥0.5
802.11ac VHT80	UNII-3	5 690	3.24	3.24	≥0.5

Notes:

1. 6dB Bandwidth = Measured Frequency[MHz] – 5 725MHz

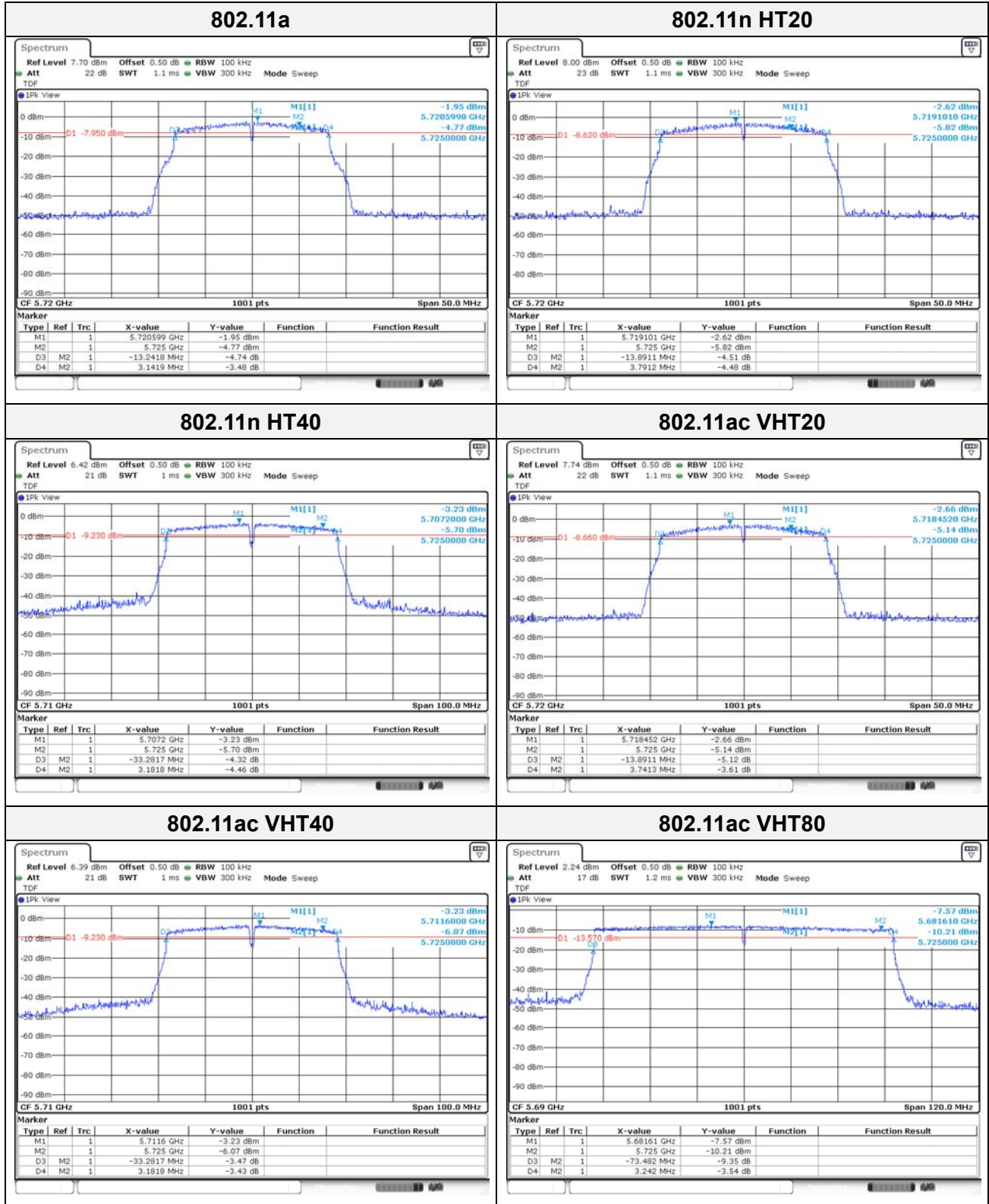
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ANT 1



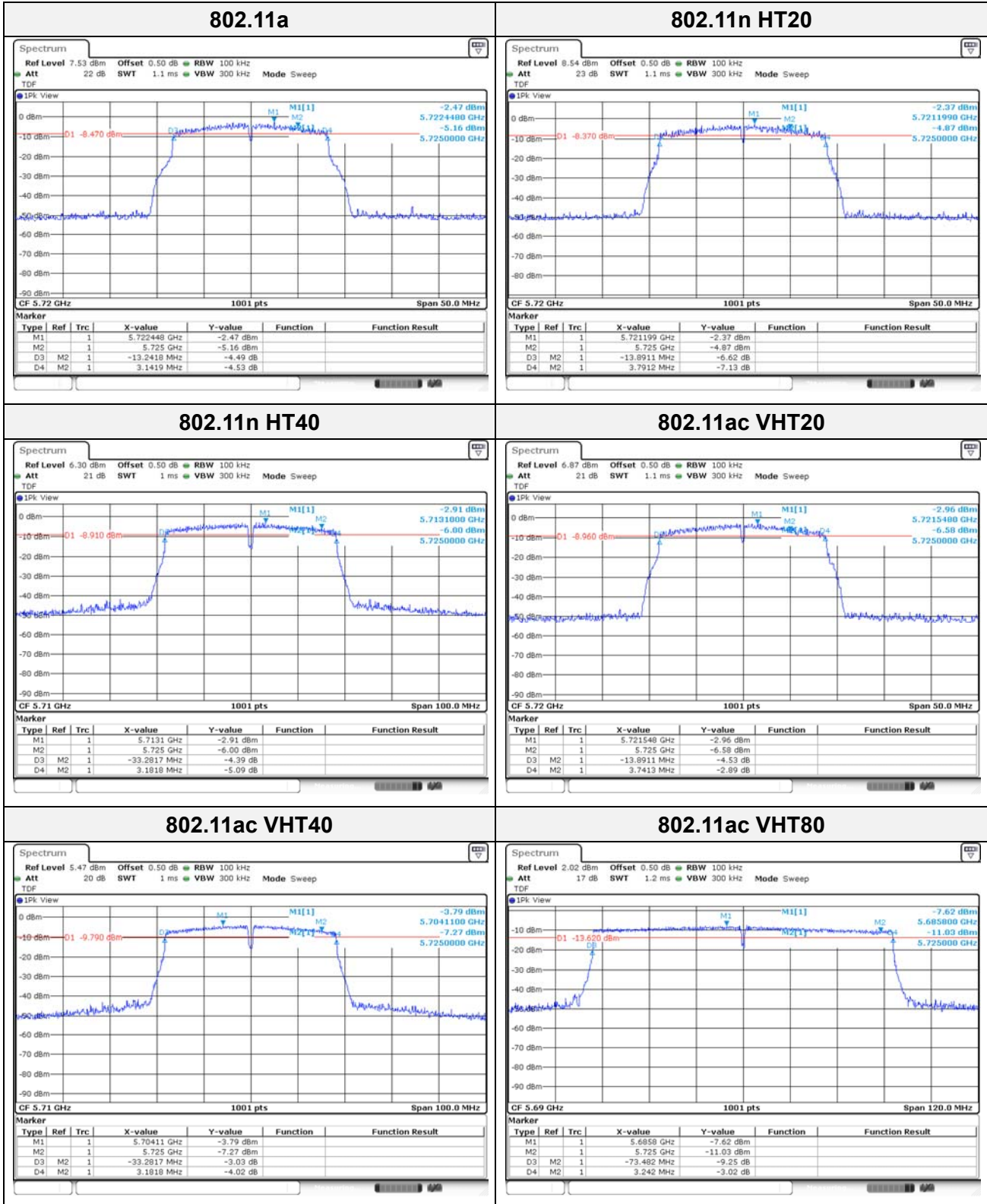
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ANT 2



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KCTL**Output Power****-SISO Conducted Output Power**

Test mode	Band	Frequency (MHz)	Measured output power					Limit (dBm)
			Reading (dBm)		DCF (dB)	Result (dBm)		
			ANT1	ANT2		ANT1	ANT2	
802.11a	UNII-2C	5 720	14.93	12.89	-	14.93	12.89	23.93
802.11n HT20			14.76	12.79	-	14.76	12.79	23.98
802.11ac VHT20			14.81	12.99	-	14.81	12.99	
802.11a	UNII-3	5 720	7.32	5.15	-	7.32	5.15	30.00
802.11n HT20			7.65	5.55	-	7.65	5.55	
802.11ac VHT20			7.70	5.72	-	7.70	5.72	
802.11n HT40	UNII-2C	5 710	14.03	14.05	-	14.03	14.05	23.98
802.11ac VHT40			14.04	13.99	-	14.04	13.99	
802.11n HT40	UNII-3	5 710	2.52	2.19	-	2.52	2.19	30.00
802.11ac VHT40			2.53	2.13	-	2.53	2.13	
802.11ac VHT80	UNII-2C	5 690	12.45	12.87	-	12.45	12.87	23.98
	UNII-3	5 690	-1.93	-1.83	-	-1.93	-1.83	30.00

Notes.

1. Result(dB m) = Reading Power + D.C.F

-SISO e.i.r.p.

Test mode	Band	Frequency (MHz)	Measured output power						MAX e.i.r.p Limit (dBm)	
			Conducted Output Power (dBm)		ANT gain (dB)		MAX e.i.r.p (dBm)		ANT1	ANT2
			ANT1	ANT2	ANT1	ANT2	ANT1	ANT2		
802.11a	UNII-2C	5 720	14.93	12.89	1.10	1.10	16.03	13.99	29.18	29.16
802.11n HT20			14.76	12.79			15.86	13.89	29.46	29.45
802.11ac VHT20			14.81	12.99			15.91	14.09	29.46	29.45
802.11a	UNII-3	5 720	7.32	5.15	1.00	1.00	8.32	6.15	30.00	30.00
802.11n HT20			7.65	5.55			8.65	6.55		
802.11ac VHT20			7.70	5.72			8.70	6.72		
802.11n HT40	UNII-2C	5 710	14.03	14.05	1.10	1.10	15.13	15.15		
802.11ac VHT40			14.04	13.99			15.14	15.09		
802.11n HT40	UNII-3	5 710	2.52	2.19	1.00	1.00	3.52	3.19		
802.11ac VHT40			2.53	2.13			3.53	3.13		
802.11ac VHT80	UNII-2C	5 690	12.45	12.87	1.10	1.10	13.55	13.97		
	UNII-3	5 690	-1.93	-1.83	1.00	1.00	-0.93	-0.83		

Notes:

1. e.i.r.p. Calculation: e.i.r.p. (dBm) = Conducted output power (dBm) + Antenna gain (dBi)

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KCTL**-MIMO Conducted Output Power**

Test mode	Band	Frequency (MHz)	Measured output power				Limit (dBm)
			Reading (dBm)		DCF (dB)	Result (dBm)	
			ANT1	ANT2			
802.11a	UNII-2C	5 720	10.52	9.58	-	13.09	23.94
802.11n HT20			10.47	9.54	-	13.04	23.98
802.11ac VHT20			10.53	9.84	-	13.12	
802.11a	UNII-3	5 720	2.92	1.81	-	5.41	30.00
802.11n HT20			3.35	2.29	-	5.86	
802.11ac VHT20			3.29	2.48	-	5.91	
802.11n HT40	UNII-2C	5 710	12.88	12.07	-	16.23	23.98
802.11ac VHT40			12.98	12.22	-	15.63	
802.11n HT40	UNII-3	5 710	1.34	0.16	-	4.57	30.00
802.11ac VHT40			1.46	0.37	-	3.96	
802.11ac VHT80	UNII-2C	5 690	12.46	11.87	-	15.19	23.98
	UNII-3	5 690	-1.89	-2.85	-	0.67	30.00

Notes:

1. $\text{Result}(\text{dBm}) = 10\log(10^{(\text{ANT } 1/10)} + 10^{(\text{ANT } 2/10)}) + \text{D.C.F}$

-MIMO e.i.r.p.

Test mode	Band	Frequency (MHz)	Measured output power			Limit (dBm)
			Conducted output Power (dBm)	ANT gain (dBi)	MAX e.i.r.p (dBm)	
802.11a	UNII-2C	5 720	13.09	4.11	17.20	28.22
802.11n HT20			13.04		17.15	28.41
802.11ac VHT20			13.12		17.32	28.41
802.11a	UNII-3	5 720	5.41	4.01	9.52	30.00
802.11n HT20			5.86		9.97	
802.11ac VHT20			5.91		10.02	
802.11n HT40	UNII-2C	5 710	16.23	4.11	19.61	
802.11ac VHT40			15.63		19.74	
802.11n HT40	UNII-3	5 710	4.57	4.01	7.91	
802.11ac VHT40			3.96		8.07	
802.11ac VHT80	UNII-2C	5 690	15.19	4.11	19.30	
	UNII-3	5 690	0.67	4.01	4.78	

Notes:

1. e.i.r.p. Calculation: $\text{e.i.r.p. (dBm)} = \text{Conducted output power (dBm)} + \text{Antenna gain (dBi)}$

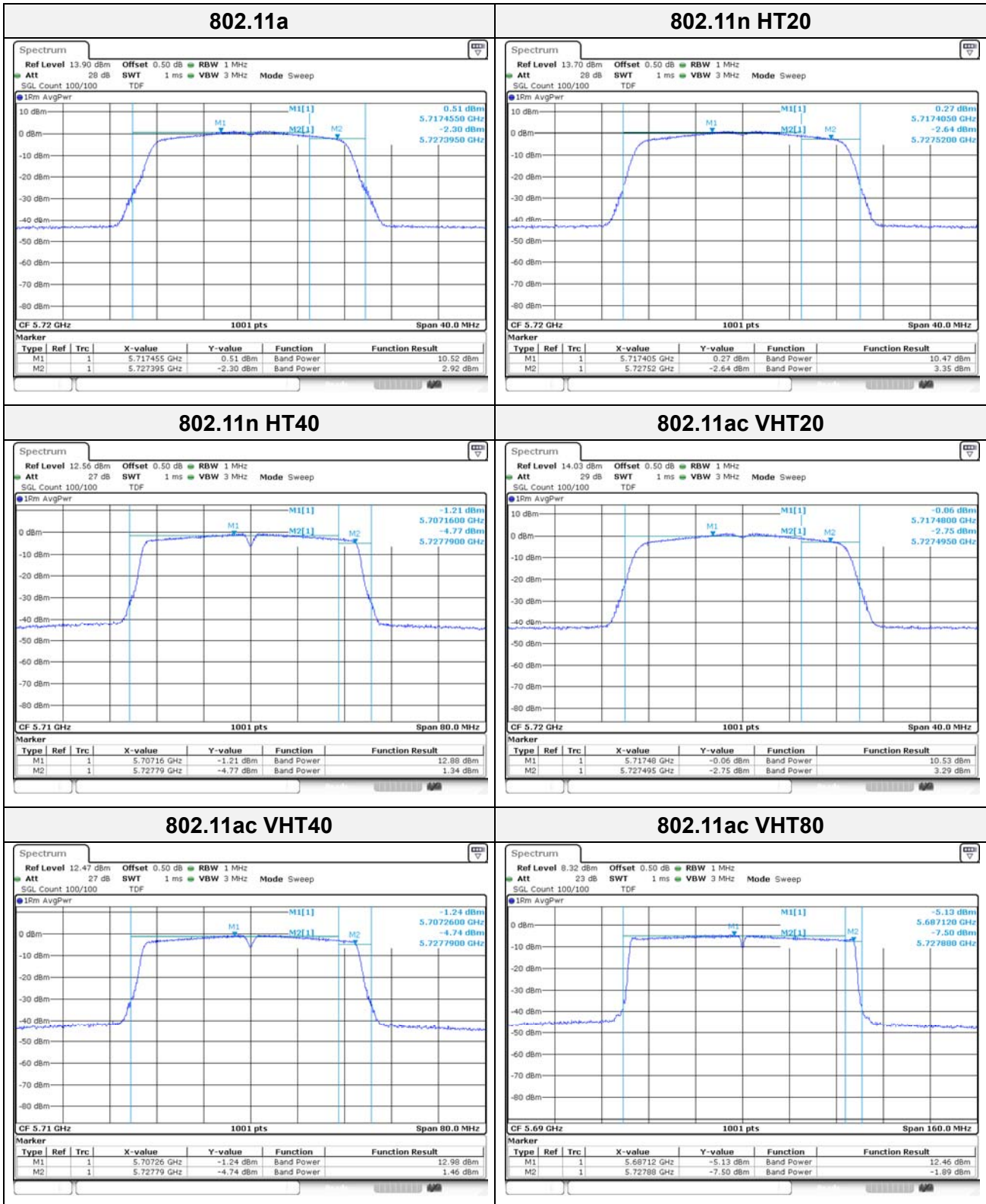
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ANT 1



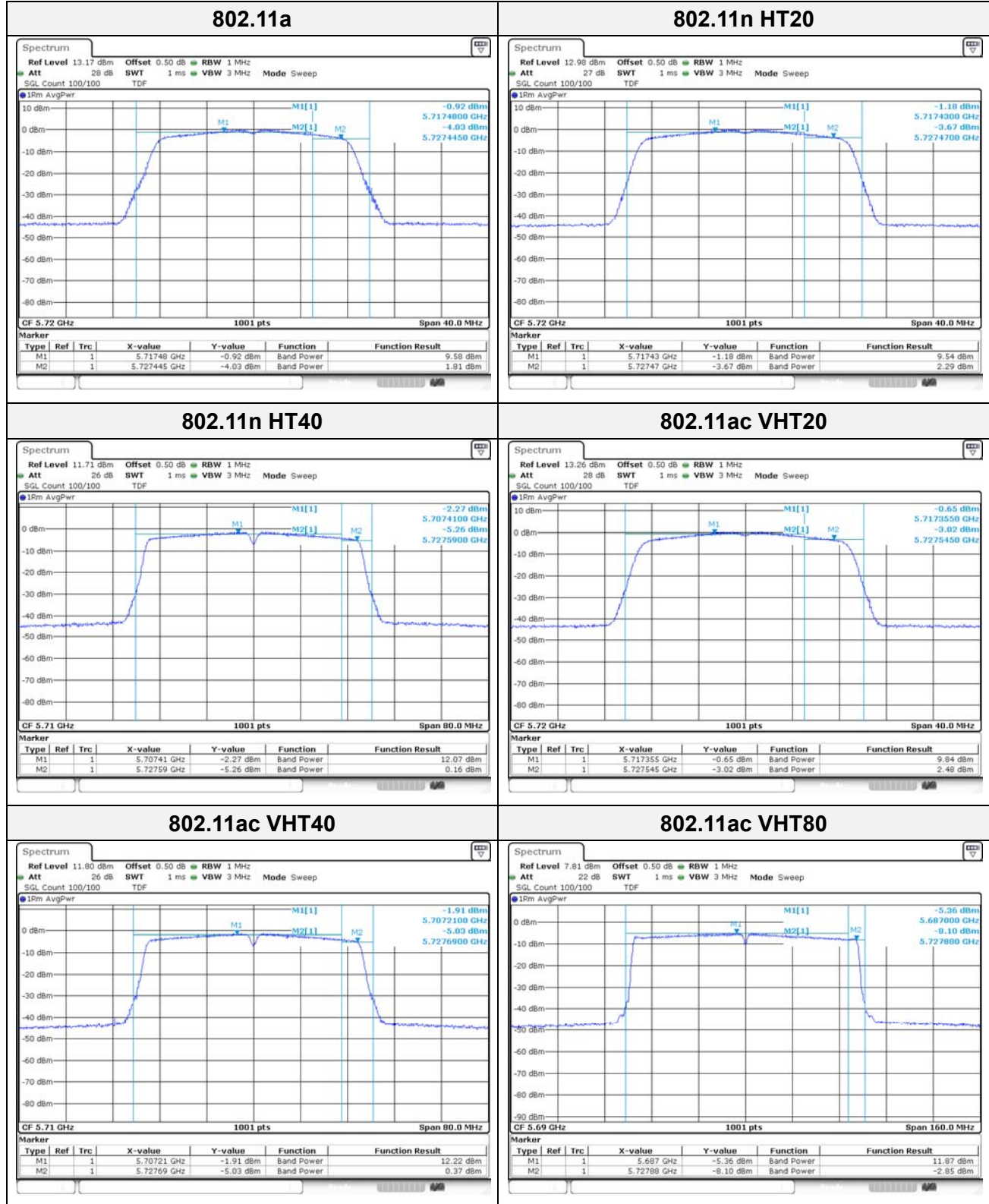
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ANT2



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KCTL**Power Spectral Density
-SISO**

Test mode	Band	Frequency (MHz)	Measured PSD (dBm/MHz)		DCF (dB)	Maximum PSD (dB m/MHz)		Limit (dBm/MHz)
			ANT1	ANT2		ANT1	ANT2	
802.11a	UNII-2C	5 720	5.46	3.50	-	5.46	3.50	11.00
802.11n HT20			5.27	3.31	-	5.27	3.31	
802.11ac VHT20			5.28	3.38	-	5.28	3.38	
802.11n HT40	UNII-2C	5 710	0.47	0.65	-	0.47	0.65	
802.11ac VHT40			0.70	0.54	-	0.70	0.54	
802.11ac VHT80	UNII-2C	5 690	-4.43	-4.05	-	-4.43	-4.05	

Test mode	Band	Frequency (MHz)	Measured PSD (dBm/ 500 kHz)		DCF (dB)	Maximum PSD (dBm/ 500 kHz)		Limit (dBm /500 kHz)
			ANT1	ANT2		ANT1	ANT2	
802.11a	UNII-3	5 720	1.05	-1.07	-	1.05	-1.07	30.00
802.11n HT20			0.61	-1.53	-	0.61	-1.53	
802.11ac VHT20			0.48	-1.29	-	0.48	-1.29	
802.11n HT40		5 710	-4.30	-4.90	-	-4.30	-4.90	
802.11ac VHT40			-4.04	-4.87	-	-4.04	-4.87	
802.11ac VHT80		5 690	-8.92	-8.75	-	-8.92	-8.75	

Notes:

- Maximum PSD calculation
- Maximum PSD = Measured PSD + D.C.F

-MIMO

Test mode	Band	Frequency (MHz)	Measured PSD (dBm/MHz)		DCF (dB)	Maximum PSD (dB m/MHz)	Limit (dBm/MHz)
			ANT1	ANT2			
802.11a	UNII-2C	5 720	1.02	0.22	-	3.65	11.00
802.11n HT20			0.88	0.07	-	3.50	
802.11ac VHT20			1.10	0.39	-	3.77	
802.11n HT40	UNII-2C	5 710	-0.65	-1.17	-	2.11	
802.11ac VHT40			-0.33	-1.13	-	2.30	
802.11ac VHT80	UNII-2C	5 690	-4.64	-5.09	-	-1.85	

Test mode	Band	Frequency (MHz)	Measured PSD (dBm/ 500 kHz)		DCF (dB)	Maximum PSD (dBm / 500 kHz)	Limit (dBm / 500 kHz)
			ANT1	ANT2			
802.11a	UNII-3	5 720	-3.74	-4.43	-	-1.06	30.00
802.11n HT20			-3.76	-4.80	-	-1.24	
802.11ac VHT20			-3.64	-4.70	-	-1.13	
802.11n HT40		5 710	-5.68	-6.73	-	-3.16	
802.11ac VHT40			-5.35	-6.47	-	-2.86	
802.11ac VHT80		5 690	-8.94	-9.91	-	-6.39	

Notes:

1. Maximum PSD calculation

- Maximum PSD = Measured $10\log(10^{(ANT\ 1/10)} + 10^{(ANT\ 2/10)}) + D.C.F$

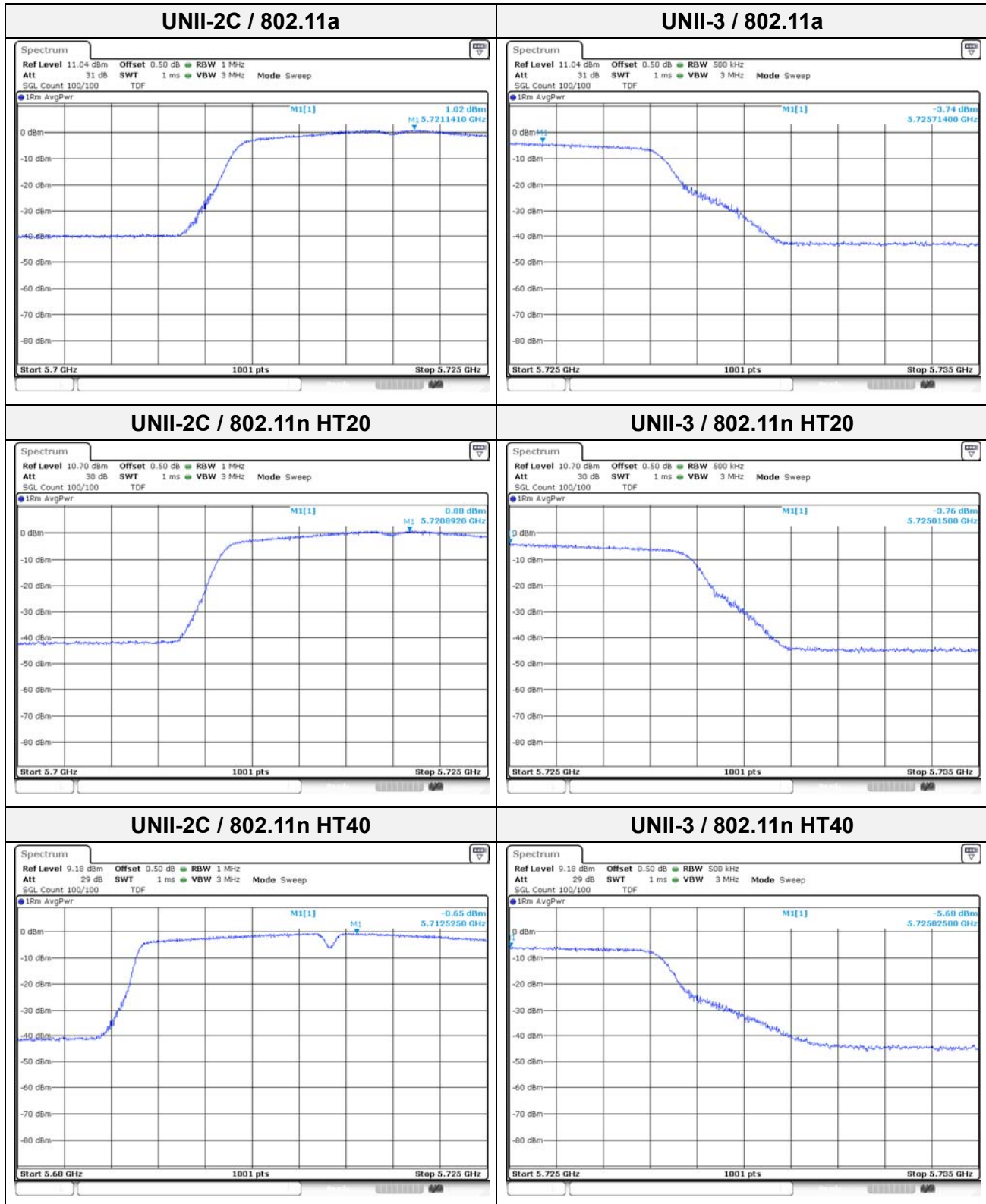
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ANT1



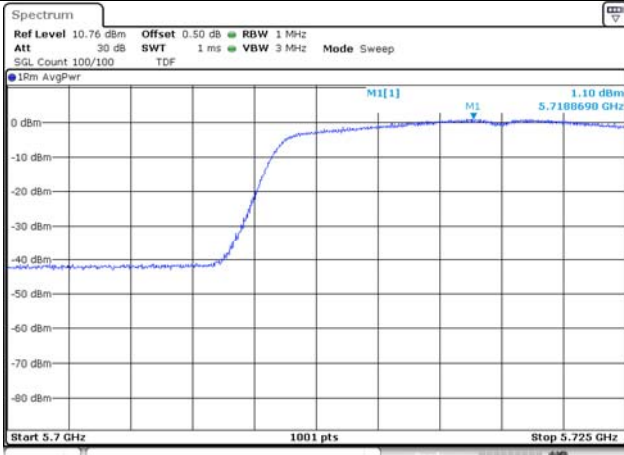
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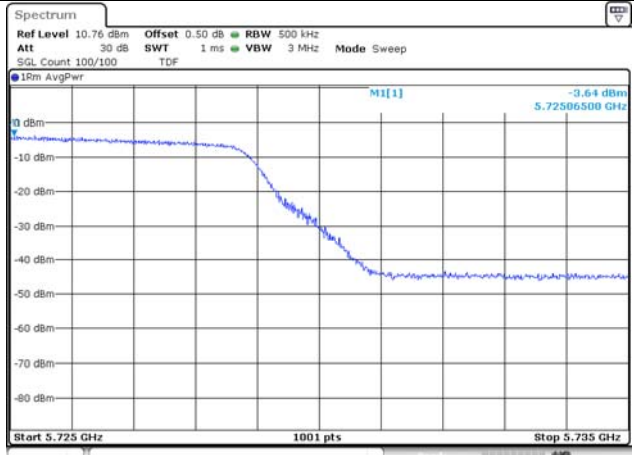
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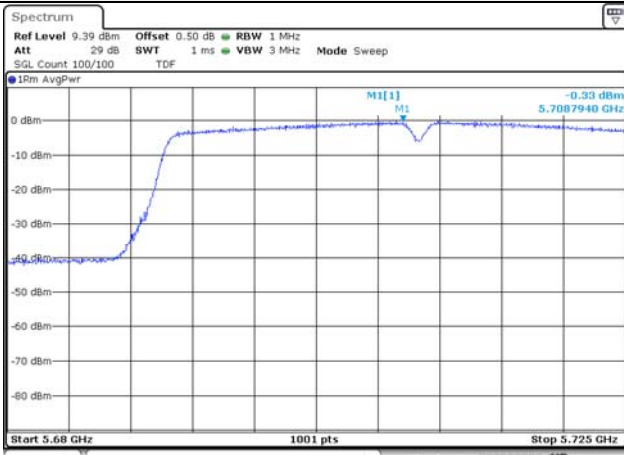
UNII-2C / 802.11ac VHT20



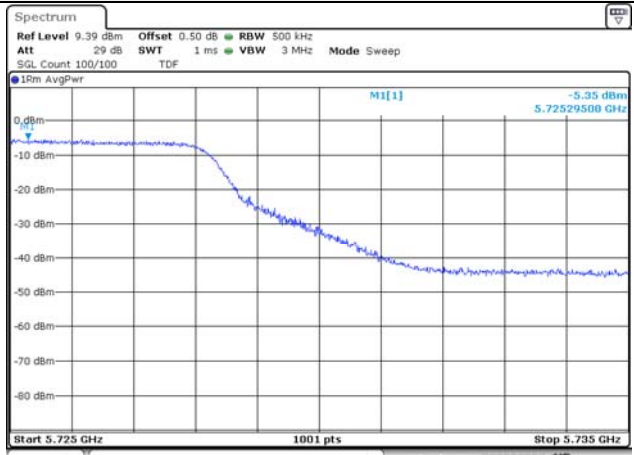
UNII-3 / 802.11ac VHT20



UNII-2C / 802.11ac VHT40



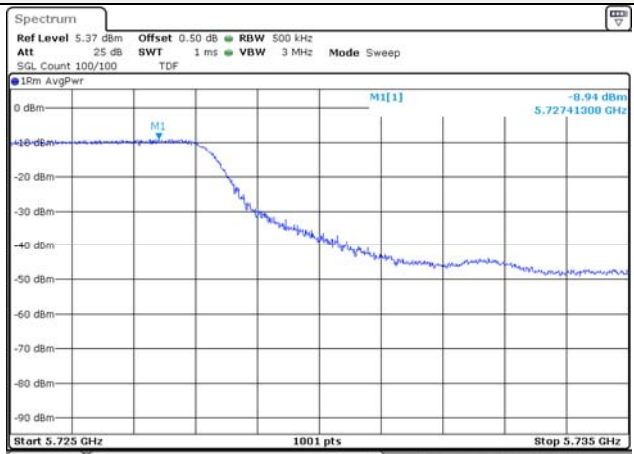
UNII-3 / 802.11ac VHT40



UNII-2C / 802.11ac VHT80



UNII-3 / 802.11ac VHT80



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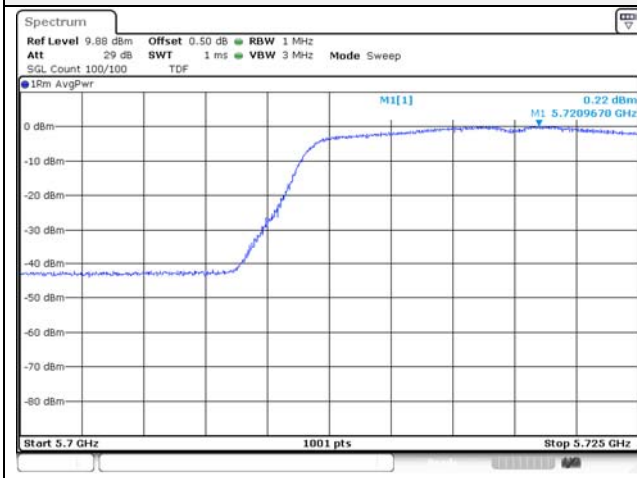
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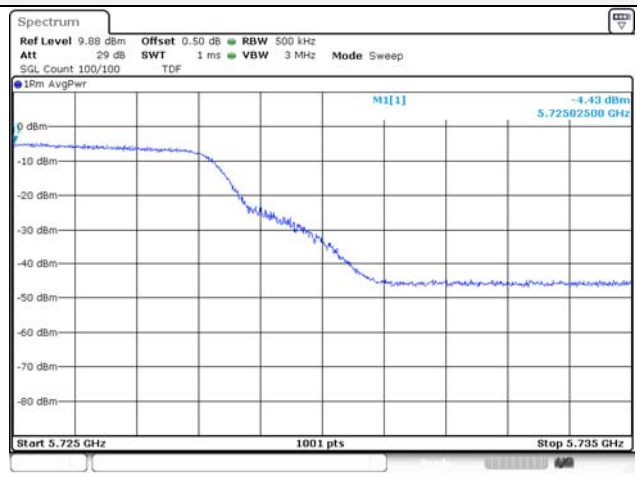


MIMO ANT2

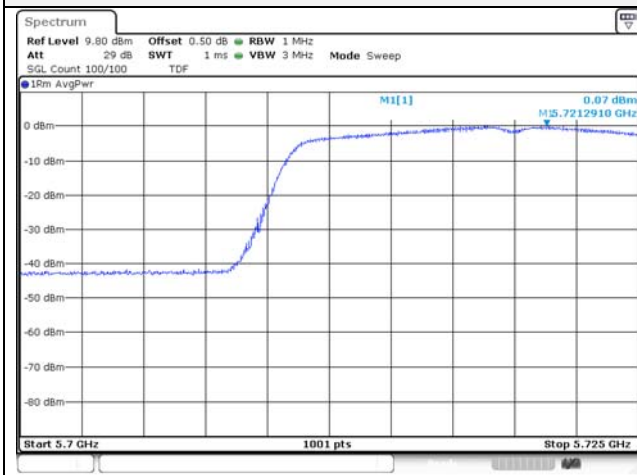
UNII-2C / 802.11a



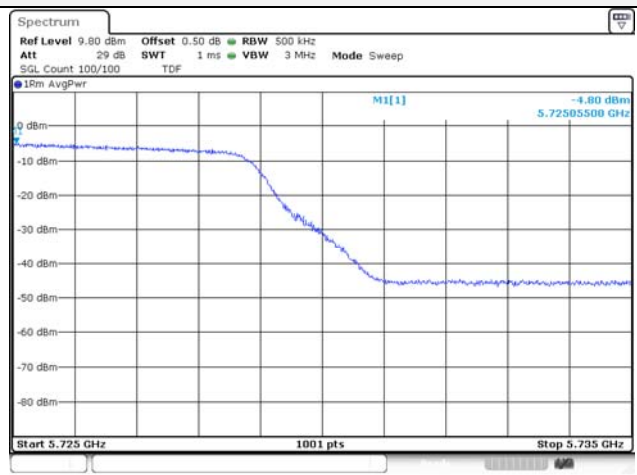
UNII-3 / 802.11a



UNII-2C / 802.11n HT20



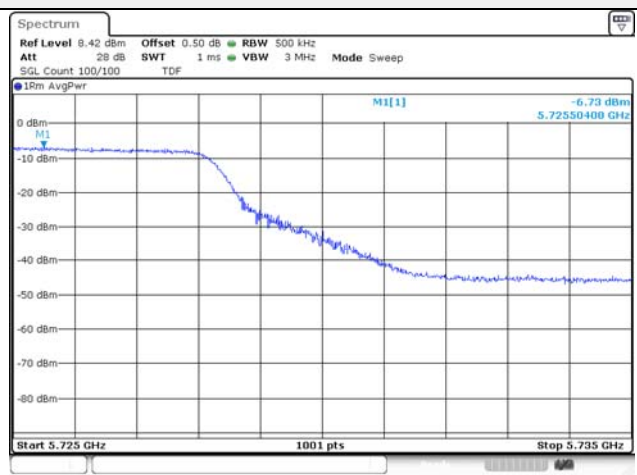
UNII-3 / 802.11n HT20



UNII-2C / 802.11n HT40



UNII-3 / 802.11n HT40



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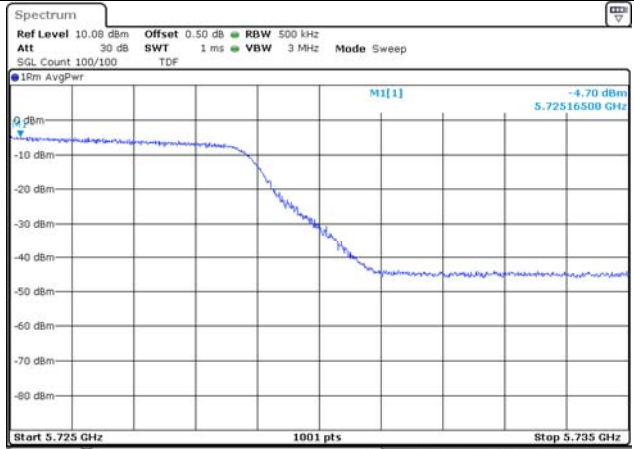
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UNII-2C / 802.11ac VHT20



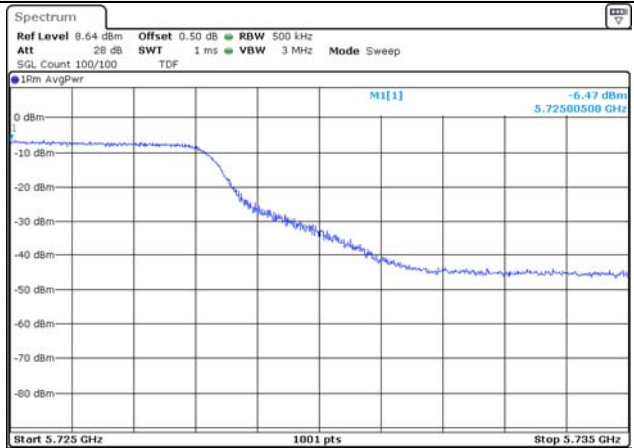
UNII-3 / 802.11ac VHT20



UNII-2C / 802.11ac VHT40



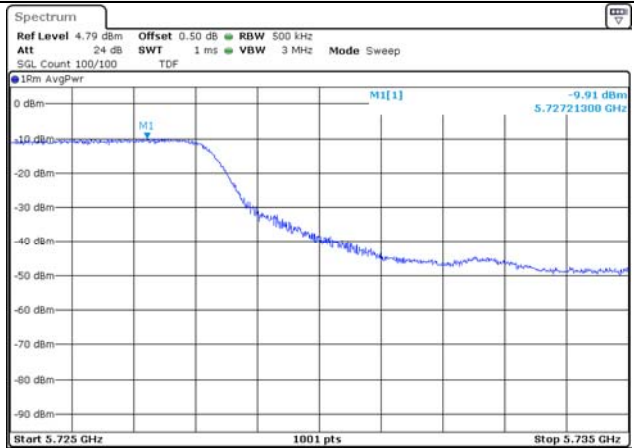
UNII-3 / 802.11ac VHT40



UNII-2C / 802.11ac VHT80



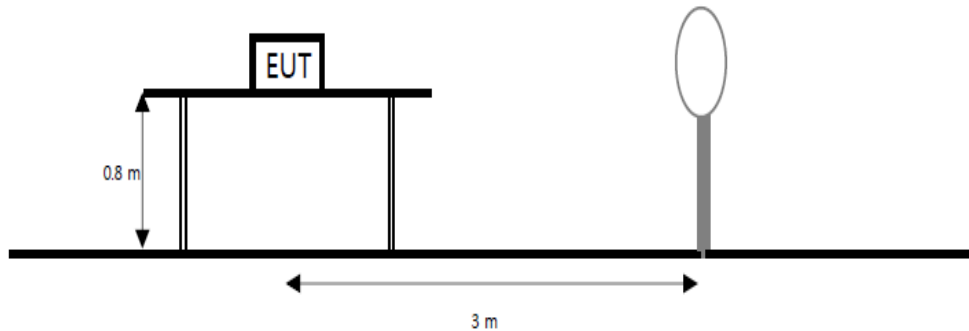
UNII-3 / 802.11ac VHT80



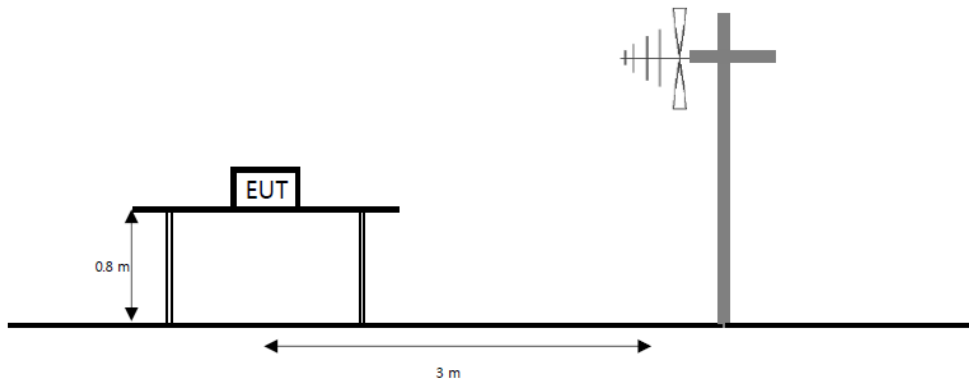
7.6. Spurious Emission, Band Edge and Restricted bands

Test setup

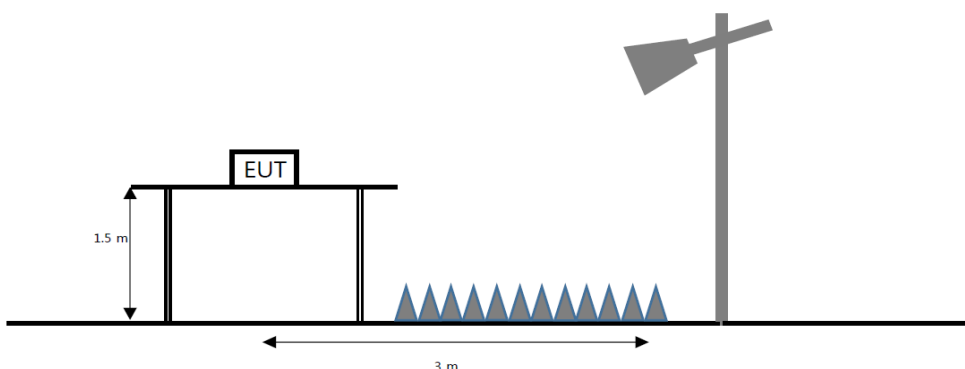
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz Emissions



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz emissions, whichever is lower.



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**Limit****FCC**

According to section 15.209(a) except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength ($\mu\text{V}/\text{m}$)	Measurement distance (m)
0.009 - 0.490	2 400/F(kHz)	300
0.490 - 1.705	24 000/F(kHz)	30
1.705 - 30	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54–72 MHz, 76–88 MHz, 174–216 MHz or 470–806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., Section 15.231 and 15.241.

According to section 15.205(a) and (b) only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.009 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505	16.694 75 - 16.695 25	608 - 614	5.35 - 5.46
2.173 5 - 2.190 5	16.804 25 - 16.804 75	960 - 1 240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1 300 - 1 427	8.025 - 8.5
4.177 25 - 4.177 75	37.5 - 38.25	1 435 - 1 626.5	9.0 - 9.2
4.207 25 - 4.207 75	73 - 74.6	1 645.5 - 1 646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1 660 - 1 710	10.6 - 12.7
6.267 75 - 6.268 25	108 - 121.94	1 718.8 - 1 722.2	13.25 - 13.4
6.311 75 - 6.312 25	123 - 138	2 200 - 2 300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2 310 - 2 390	15.35 - 16.2
8.362 - 8.366	156.524 75 - 156.525	2 483.5 - 2 500	17.7 - 21.4
8.376 25 - 8.386 75	25	2 690 - 2 900	22.01 - 23.12
8.414 25 - 8.414 75	156.7 - 156.9	3 260 - 3 267	23.6 - 24.0
12.29 - 12.293	162.012 5 - 167.17	3 332 - 3 339	31.2 - 31.8
12.519 75 - 12.520 25	167.72 - 173.2	3 345.8 - 3 358	36.43 - 36.5
12.576 75 - 12.577 25	240 - 285	3 600 - 4 400	Above 38.6
13.36 - 13.41	322 - 335.4		

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in section 15.209. At frequencies equal to or less than 1 000 MHz, compliance with the limits in section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1 000 MHz, compliance with the emission limits in section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in section 15.35 apply to these measurements.

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According to section 15.407(b), undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz

For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

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**IC**

According to RSS-247(5.5), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

According to RSS-Gen(8.9), Except where otherwise indicated in the applicable RSS, radiated emissions shall comply with the field strength limits shown in table 5 and table 6. Additionally, the level of any transmitter unwanted emission shall not exceed the level of the transmitter's fundamental emission.

The limits for spurious emissions below 30 MHz in RSS GEN Section 8.9 Table 6 are given in dBuA/m while the FCC Part 15.209(a) limits are expressed in dBuV/m. Using the free space impedance of 377Ω to convert between electric and magnetic field strength (a factor of 51.5dB in logarithmic units) the two sets of limits are equivalent and therefore a measured value of X dBuV/m shown in the plots and tables is equal to a magnetic field strength of (X - 51.5) dBuA/m and the margin of that emission relative to the RSS GEN limit (FCC 15.209 limit - 51.5) dBuA/m would be the same as the margin to the FCC limit detailed in those plots/tables.

Table 5- General field strength limits at frequencies above 30 MHz

Frequency(MHz)	Field strength ($\mu V/m$ at 3 m)
30 to 88	100
88 to 216	150
216 to 960	200
Above 960	500

Table 6- General field strength limits at frequencies below 30 MHz

Frequency	Magnetic field strength (H-Field) ($\mu A/m$)	Measurement distance(m)
9 – 490 kHz ¹⁾	6.37/F (F in kHz)	300
490 – 1705 kHz	63.7/F (F in kHz)	30
1.705 - 30 MHz	0.08	30

According to RSS-Gen(8.10), Restricted frequency bands, identified in table 7, are designated primarily for safety-of-life services (distress calling and certain aeronautical activities), certain satellite downlinks, radio astronomy and some government uses. Except where otherwise indicated, the following conditions related to the restricted frequency bands apply:

- (a) The transmit frequency, including fundamental components of modulation, of licence-exempt radio apparatus shall not fall within the restricted frequency bands listed in table 7 except for apparatus compliant with RSS-287, Emergency Position Indicating Radio Beacons (EPIRB), Emergency Locator Transmitters (ELT), Personal Locator Beacons (PLB), and Maritime Survivor Locator Devices (MSLD).
- (b) Unwanted emissions that fall into restricted frequency bands listed in table 7 shall comply with the limits specified in table 5 and table 6.
- (c) Unwanted emissions that do not fall within the restricted frequency bands listed in table 7 shall comply either with the limits specified in the applicable RSS or with those specified in table 5 and table 6.

Table 7- Restricted frequency bands*

MHz	MHz	GHz
0.090 - 0.110	149.9 - 150.05	9.0 - 9.2
0.495 - 0.505	156.52475 - 156.52525	9.3 - 9.5
2.1735 - 2.1905	156.7 - 156.9	10.6 - 12.7
3.020 - 3.026	162.0125 - 167.17	13.25 - 13.4
4.125 - 4.128	167.72 - 173.2	14.47 - 14.5
4.17725 - 4.17775	240 - 285	15.35 - 16.2
4.20725 - 4.20775	322 - 335.4	17.7 - 21.4
5.677 - 5.683	399.9 - 410	22.01 - 23.12
6.215 - 6.218	608 - 614	23.6 - 24.0
6.26775 - 6.26825	960 - 1427	31.2 - 31.8
6.31175 - 6.31225	1435 - 1626.5	36.43 - 36.5
8.291 - 8.294	1645.5 - 1646.5	Above 38.6
8.362 - 8.366	1660 - 1710	
8.37625 - 8.38675	1718.8 - 1722.2	
8.41425 - 8.41475	2200 - 2300	
12.29 - 12.293	2310 - 2390	
12.51975 - 12.52025	2483.5 - 2500	
12.57675 - 12.57725	2655 - 2900	
13.36 - 13.41	3260 - 3267	
16.42 - 16.423	3332 - 3339	
16.69475 - 16.69525	3345.8 - 3358	
16.80425 - 16.80475	3500 - 4400	
25.5 - 25.67	4500 - 5150	
37.5 - 38.25	5350 - 5460	
73 - 74.6	7250 - 7750	
74.8 - 75.2	8025 - 8500	
108 - 138	--	

* Certain frequency bands listed in table 7 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

Test procedureANSI C63.10-2013 Section 12.7.7.2, 12.7.5, 12.7.6
KDB 789033 D02 v02r01 – Section G**Test settings****Peak field strength measurements**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = as specified in table
3. VBW \geq (3 \times RBW)
4. Detector = peak
5. Sweep time = auto
6. Trace mode = max hold
7. Allow sweeps to continue until the trace stabilizes

Table. RBW as a function of frequency

Frequency	RBW
9 kHz to 150 kHz	200 Hz to 300 Hz
0.15 MHz to 30 MHz	9 kHz to 10 kHz
30 MHz to 1 000 MHz	100 kHz to 120 kHz
> 1 000 MHz	1 MHz

Average field strength measurements**Trace averaging with continuous EUT transmission at full power**

If the EUT can be configured or modified to transmit continuously ($D \geq 98\%$), then the average emission levels shall be measured using the following method (with EUT transmitting continuously):

1. RBW = 1 MHz (unless otherwise specified).
2. VBW \geq (3 \times RBW).
3. Detector = RMS (power averaging), if $[\text{span} / (\# \text{ of points in sweep})] \leq (\text{RBW} / 2)$. Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.
4. Averaging type = power (i.e., rms):
 - 1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
 - 2) Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.
5. Sweep time = auto.
6. Perform a trace average of at least 100 traces.

Trace averaging across ON and OFF times of the EUT transmissions followed by duty cycle correction

If continuous transmission of the EUT ($D \geq 98\%$) cannot be achieved and the duty cycle is constant (duty cycle variations are less than $\pm 2\%$), then the following procedure shall be used:

1. The EUT shall be configured to operate at the maximum achievable duty cycle.
2. Measure the duty cycle D of the transmitter output signal as described in 11.6.
3. RBW = 1 MHz (unless otherwise specified).
4. VBW \geq [3 \times RBW].
5. Detector = RMS (power averaging), if $[\text{span} / (\# \text{ of points in sweep})] \leq (\text{RBW} / 2)$. Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.

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6. Averaging type = power (i.e., rms):
 - 1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
 - 2) Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.
7. Sweep time = auto.
8. Perform a trace average of at least 100 traces.
9. A correction factor shall be added to the measurement results prior to comparing with the emission limit to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:
 - 1) If power averaging (rms) mode was used in step f), then the applicable correction factor is $[10 \log (1 / D)]$, where D is the duty cycle.
 - 2) If linear voltage averaging mode was used in step f), then the applicable correction factor is $[20 \log (1 / D)]$, where D is the duty cycle.
 - 3) If a specific emission is demonstrated to be continuous ($D \geq 98\%$) rather than turning ON and OFF with with the transmit cycle, then no duty cycle correction is required for that emission.

Notes:

1. $f < 30$ MHz, extrapolation factor of 40 dB/decade of distance. $F_d = 40 \log(D_m/D_s)$
 $f \geq 30$ MHz, extrapolation factor of 20 dB/decade of distance. $F_d = 20 \log(D_m/D_s)$
Where:
 - F_d = Distance factor in dB
 - D_m = Measurement distance in meters
 - D_s = Specification distance in meters
2. Factors(dB) = Antenna factor(dB/m) + Cable loss(dB) + or Amp. gain(dB) + or F_d (dB)
3. The worst-case emissions are reported however emissions whose levels were not within 20 dB of respective limits were not reported.
4. Average test would be performed if the peak result were greater than the average limit.
5. ¹⁾ means restricted band.
6. According to part 15.31(f)(2), an extrapolation factor of 40 dB/decade is applied because measured distance of radiated emission is 3 m.
7. Below 30 MHz frequency range, In order to search for the worst result, all orientations about parallel, perpendicular, and ground-parallel were investigated then reported. when the emission level was higher than 20 dB of the limit, then the following statement shall be made: "No spurious emissions were detected within 20 dB of the limit."

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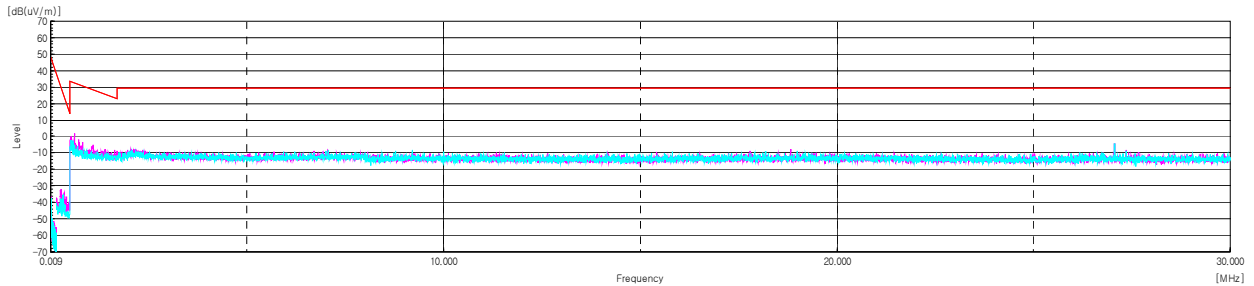


Test results (Below 30 MHz) – Worst case: 802.11ac VHT 40 2TX MIMO / UNII-1 5 230 MHz

Frequency	Pol.	Reading	Ant. Factor	Amp. +Cable	Distance Factor	DCF	Result	Limit	Margin
[MHz]	[V/H]	[dB(μV)]	[dB]	[dB]	[dB]	[dB]	[dB(μV/m)]	[dB(μV/m)]	[dB]

No spurious emissions were detected within 20 dB of the limit.

Horizontal/Vertical



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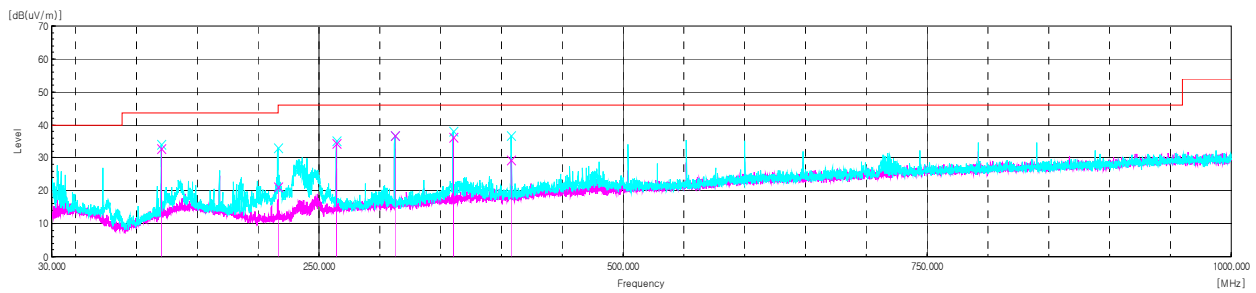
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Test results (Below 1 000 MHz) –case: 802.11ac VHT 40 2TX MIMO / UNII-1 5 230 MHz

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Quasi peak data								
119.97	V	44.50	17.10	-28.76	-	32.84	43.50	10.66
216.00	V	33.20	15.56	-27.54	-	21.22	43.50	22.28
264.01	V	43.10	18.26	-26.97	-	34.39	46.00	11.61
312.03	V	43.50	19.64	-26.48	-	36.66	46.00	9.34
360.04	V	41.70	20.60	-25.98	-	36.32	46.00	9.68
408.06	V	33.30	21.66	-25.63	-	29.33	46.00	16.67

Horizontal/Vertical



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**Test results (Above 1 000 MHz)****802.11a UNII-1 ANT1****Lowest Channel (5 180 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
5 108.50 ¹⁾	H	42.33	34.10	-26.72	-	49.71	74.00	24.29
10 337.41	V	59.23	37.54	-49.95	-	46.82	68.20	21.38
15 569.19 ¹⁾	H	54.89	39.97	-46.14	-	48.72	74.00	25.28
Average Data								
No spurious emissions were detected within 20 dB of the limit								

Middle Channel (5 200 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
10 611.97 ¹⁾	H	59.44	37.81	-49.77	-	47.48	74.00	26.52
15 666.94 ¹⁾	V	56.02	39.93	-46.12	-	49.83	74.00	24.17
Average Data								
No spurious emissions were detected within 20 dB of the limit								

Highest Channel (5 240 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
10 462.83	H	58.82	37.66	-50.06	-	46.42	68.20	21.78
15 669.09 ¹⁾	H	56.34	39.93	-46.12	-	50.15	74.00	23.85
Average Data								
No spurious emissions were detected within 20 dB of the limit								

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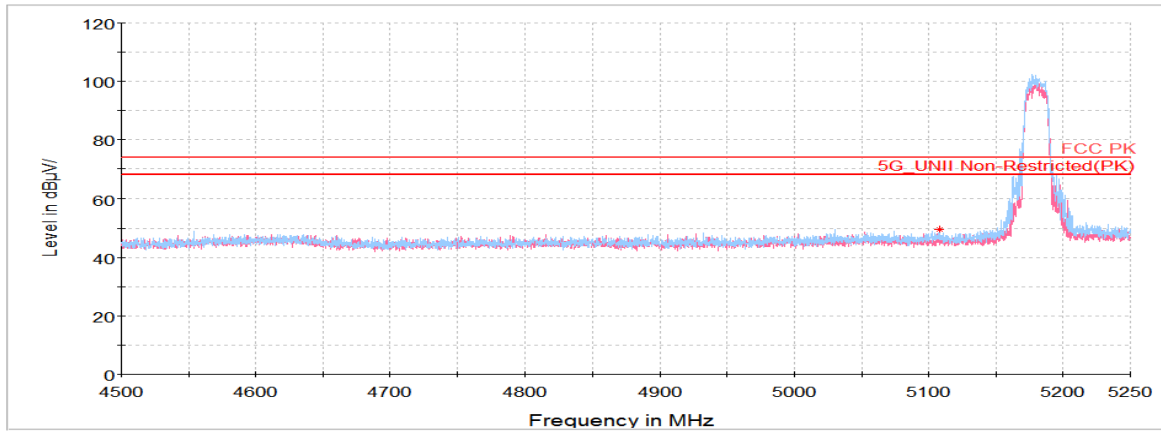
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802.11a UNII-1 ANT1

Lowest Channel (5 180 MHz)

Horizontal/Vertical for Band-edge



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KCTL**802.11a UNII-1 ANT2****Lowest Channel (5 180 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
5 144.25	H	41.22	34.16	-26.33	-	49.05	74.00	24.95
10 359.69	V	59.06	37.56	-49.97	-	46.65	68.20	21.55
15 579.97	H	54.54	39.97	-46.14	-	48.37	74.00	25.63
Average Data								
No spurious emissions were detected within 20 dB of the limit								

Middle Channel (5 200 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
10 401.02	H	59.17	37.60	-50.01	-	46.76	68.20	21.44
16 226.84	V	56.76	40.87	-46.89	-	50.74	68.20	17.46
Average Data								
No spurious emissions were detected within 20 dB of the limit								

Highest Channel (5 240 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
10 479.72	V	58.86	37.68	-50.07	-	46.47	68.20	21.73
14 905.06	H	55.30	41.03	-45.56	-	50.77	68.20	17.43
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

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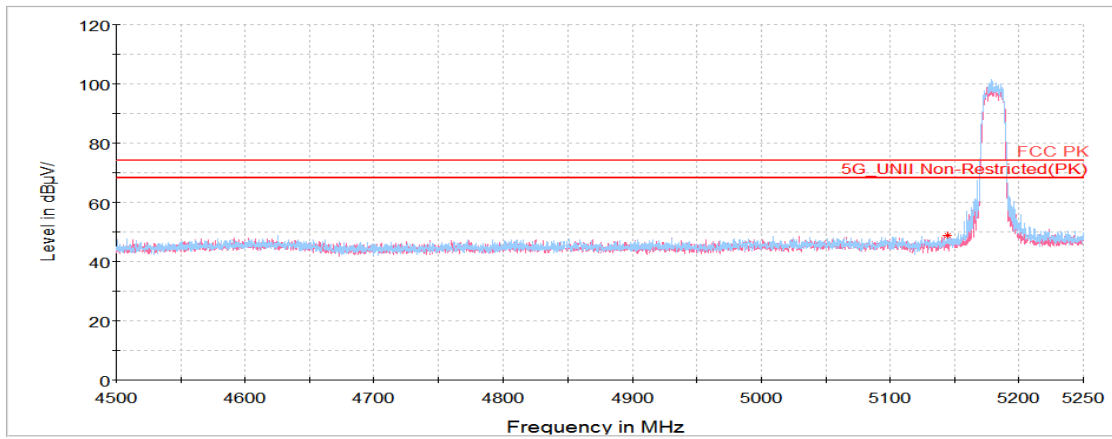
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802.11a UNII-1 ANT2

Lowest Channel (5 180 MHz)

Horizontal/Vertical for Band-edge



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KCTL**802.11a UNII-1 2TX MIMO****Lowest Channel (5 180 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
5 139.09 ¹⁾	H	43.22	34.15	-26.39	-	50.98	74.00	23.02
10 358.97	V	60.78	37.56	-49.97	-	48.37	68.20	19.83
15 456.34 ¹⁾	H	56.13	40.11	-46.06	-	50.18	74.00	23.82
Average Data								
No spurious emissions were detected within 20 dB of the limit								

Middle Channel (5 200 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
10 401.73	V	61.58	37.60	-50.01	-	49.17	68.20	19.03
15 941.14 ¹⁾	V	56.70	39.82	-46.06	-	50.46	74.00	23.54
Average Data								
No spurious emissions were detected within 20 dB of the limit								

Highest Channel (5 240 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
10 482.95	V	58.44	37.68	-50.07	-	46.05	68.20	22.15
16 076.98 ¹⁾	H	56.31	40.69	-46.33	-	50.67	74.00	23.33
Average Data								
No spurious emissions were detected within 20 dB of the limit								