

KCTL Inc.

65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
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Report No.:
KR21-SRF0065-B
Page (51) of (319)

KCTL

Test mode	Band	Frequency (MHz)	Measured PSD (dBm/MHz)		DCF (dB)	Maximum PSD (dB m/MHz)	Limit (dBm/MHz)
			ANT1	ANT2			
802.11ac VHT40	UNII 1	5 190	-1.10	-2.97	-	1.08	11
		5 230	-0.90	-1.02	-	2.05	
	UNII 2A	5 270	-1.34	-2.51	-	1.12	
		5 310	-2.17	-3.50	-	0.23	
	UNII 2C	5 510	-0.21	-1.35	-	2.27	
		5 590	-0.51	-1.13	-	2.20	
802.11ac VHT80	UNII 1	5 210	-5.85	-7.07	-	-3.41	
		5 290	-6.48	-7.69	-	-4.03	
	UNII 2C	5 530	-7.34	-7.98	-	-4.64	
		5 610	-4.86	-5.55	-	-2.18	

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	5 745	-3.71	-5.28	-	-1.41	30
		5 785	-4.20	-5.70	-	-1.88	
		5 825	-4.55	-5.78	-	-2.11	
802.11n HT20		5 745	-4.76	-5.96	-	-2.31	
		5 785	-4.47	-6.25	-	-2.26	
		5 825	-4.74	-5.94	-	-2.29	
802.11n HT40		5 755	-8.46	-10.49	-	-6.35	
		5 795	-8.50	-10.64	-	-6.43	
802.11ac VHT20		5 745	-4.02	-6.09	-	-1.92	
		5 785	-4.09	-6.32	-	-2.05	
	5 825	-4.34	-6.18	-	-2.15		
802.11ac VHT40	5 755	-8.77	-10.37	-	-6.49		
	5 795	-8.29	-10.50	-	-6.25		
802.11ac VHT80	5 775	-11.36	-13.13	-	-9.15		

Notes:

1. Maximum PSD calculation

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

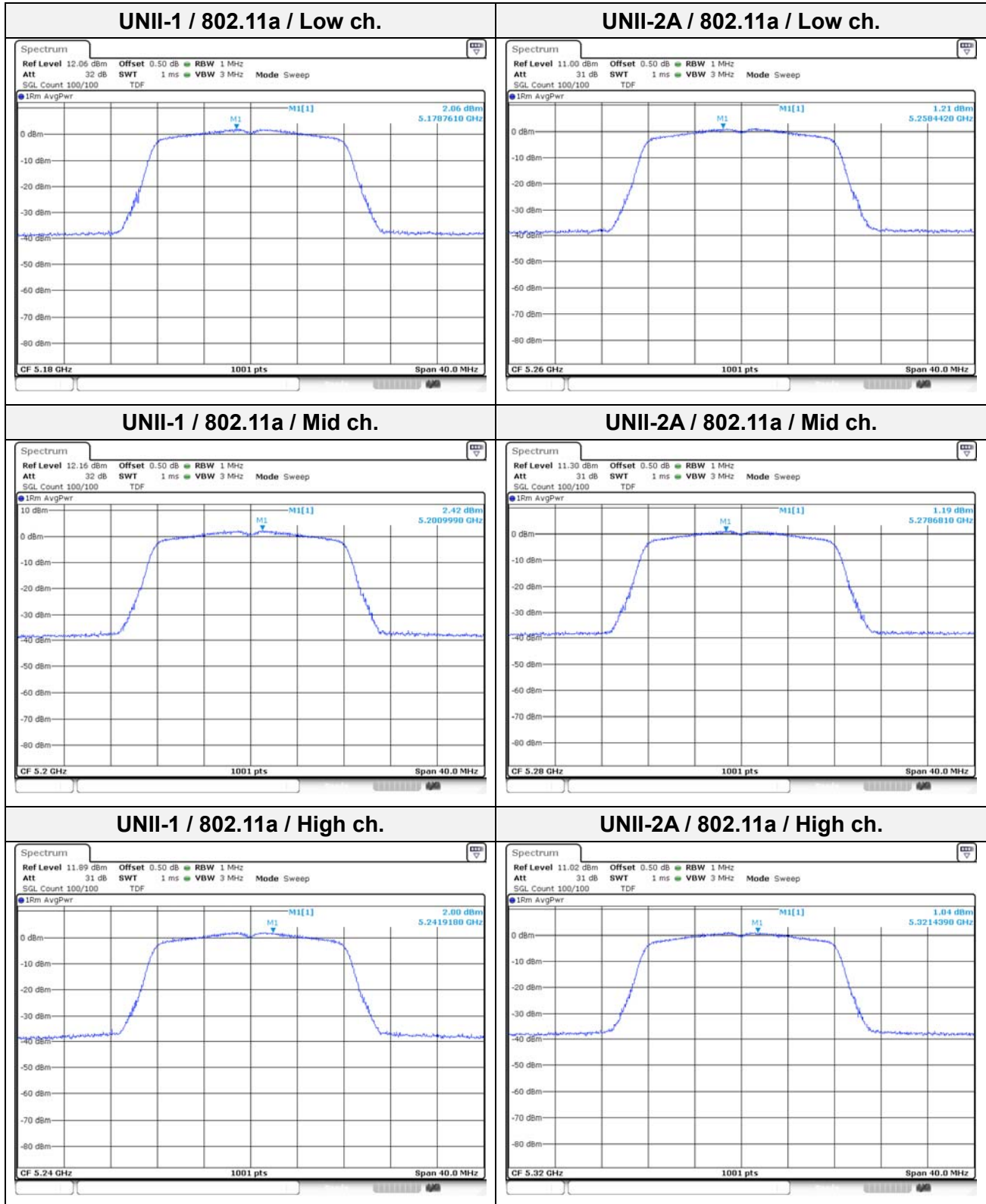
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Report No.:
KR21-SRF0065-B
Page (52) of (319)



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



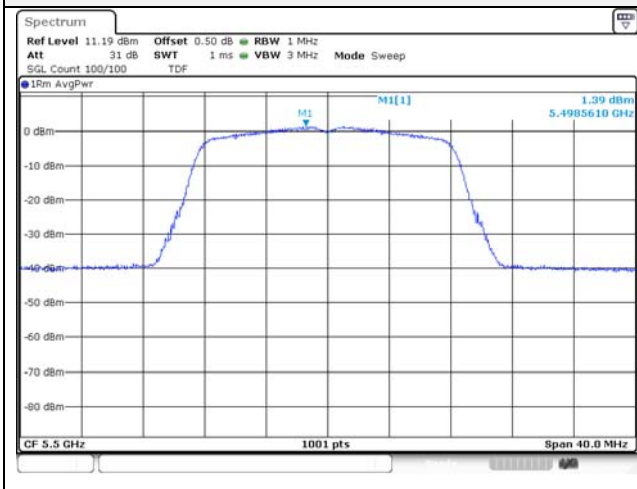
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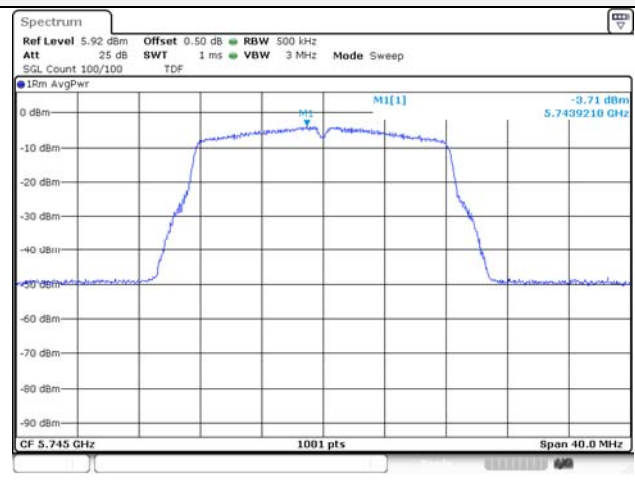
Report No.:
KR21-SRF0065-B
Page (53) of (319)



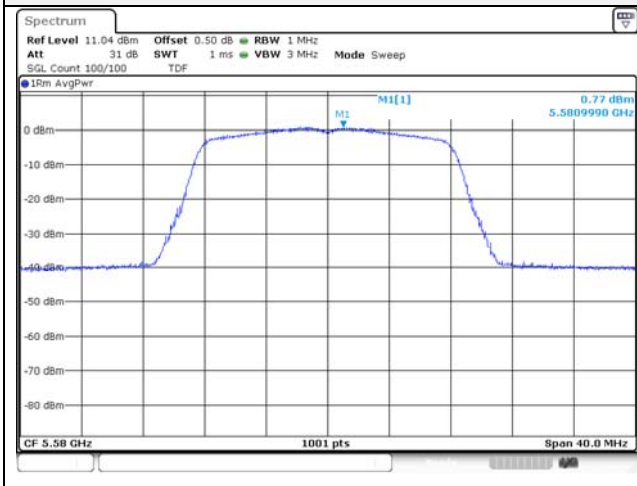
UNII-2C / 802.11a / Low ch.



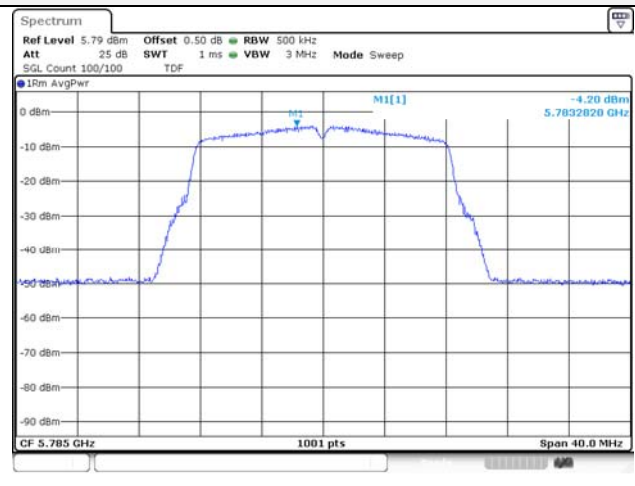
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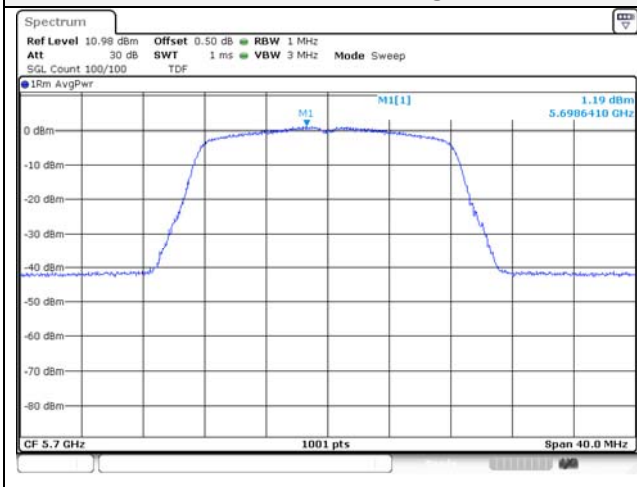
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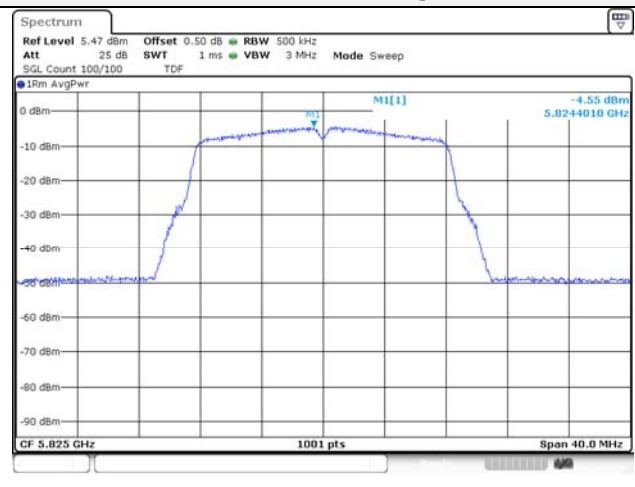
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UNII-2C / 802.11a / High ch.



UNII-3 / 802.11a / High ch.



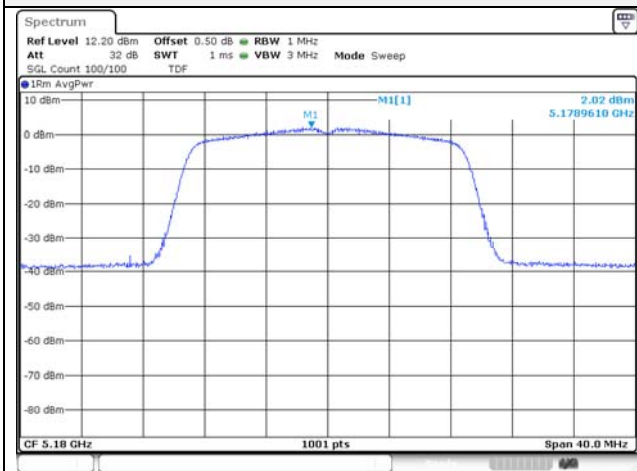
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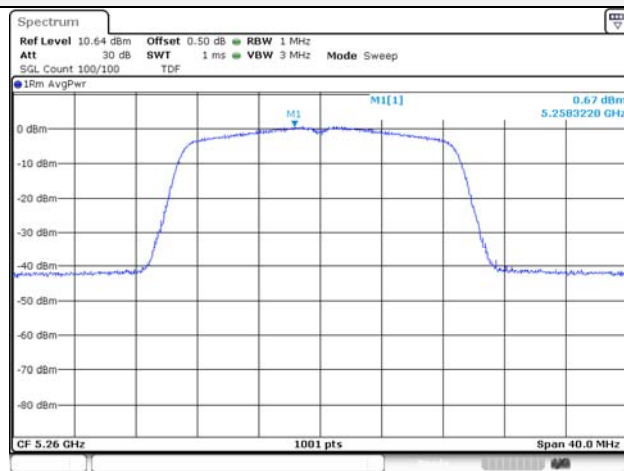
Report No.:
KR21-SRF0065-B
Page (54) of (319)



UNII-1 / 802.11n HT 20 / Low ch.



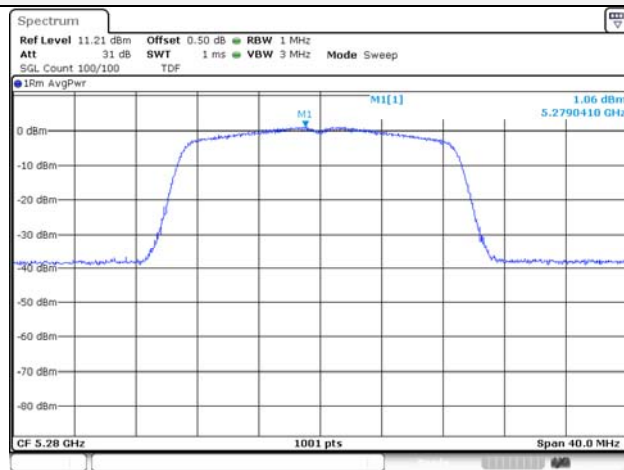
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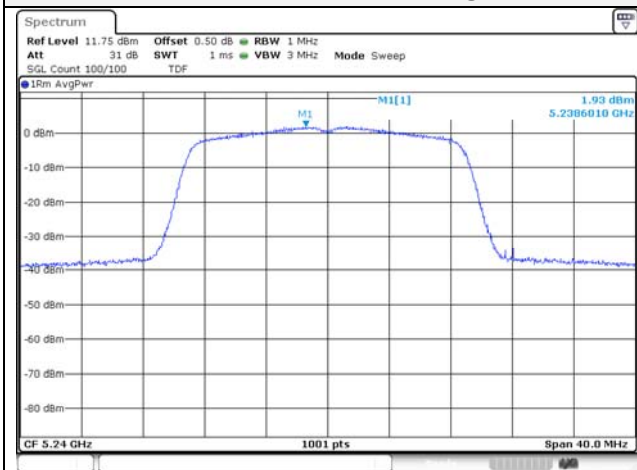
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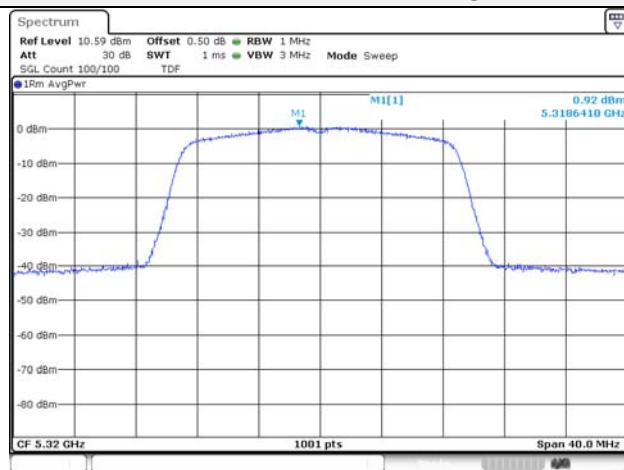
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UNII-1 / 802.11n HT 20 / High ch.



UNII-2A / 802.11n HT 20 / High ch.



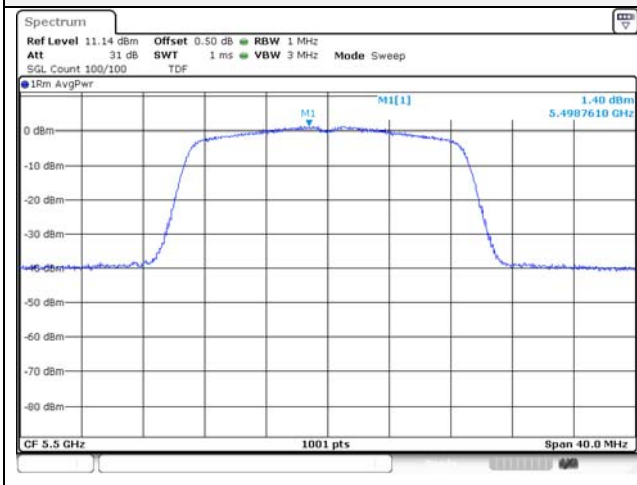
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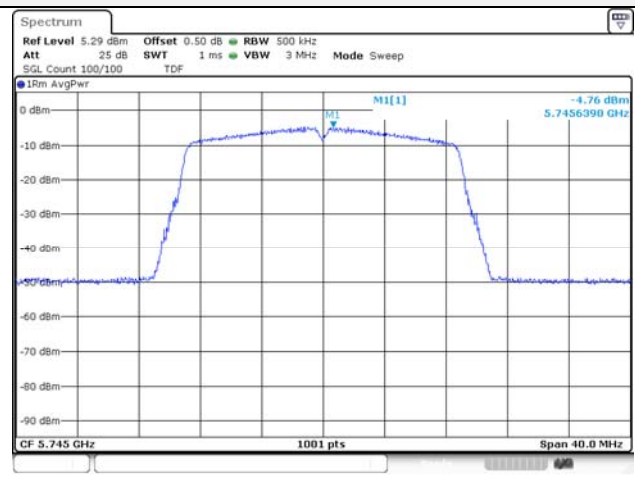
Report No.:
KR21-SRF0065-B
Page (55) of (319)



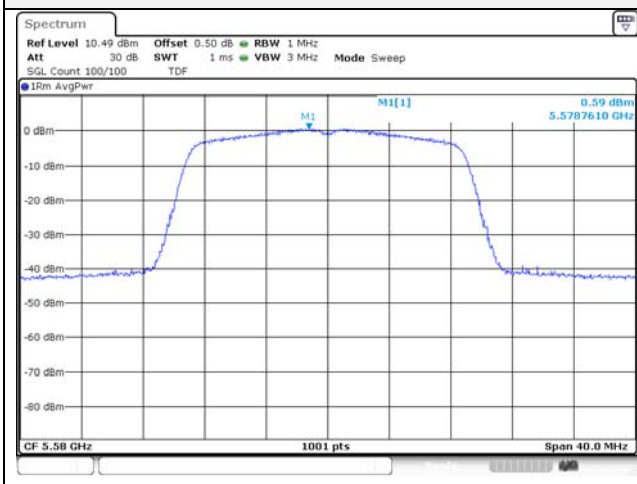
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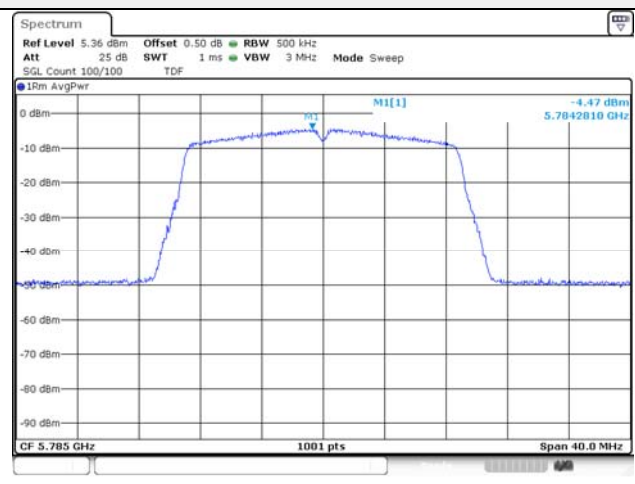
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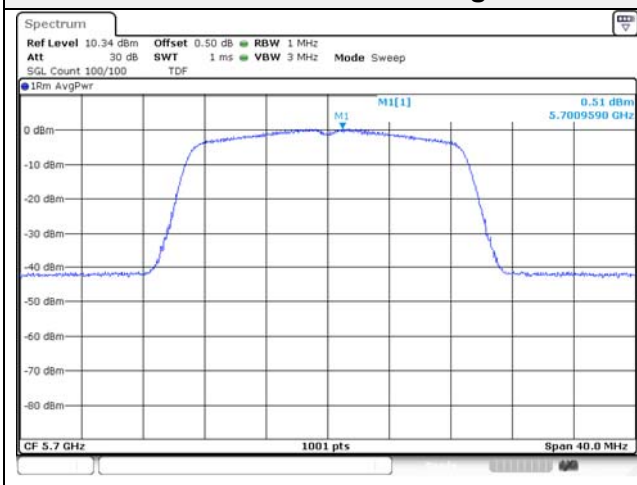
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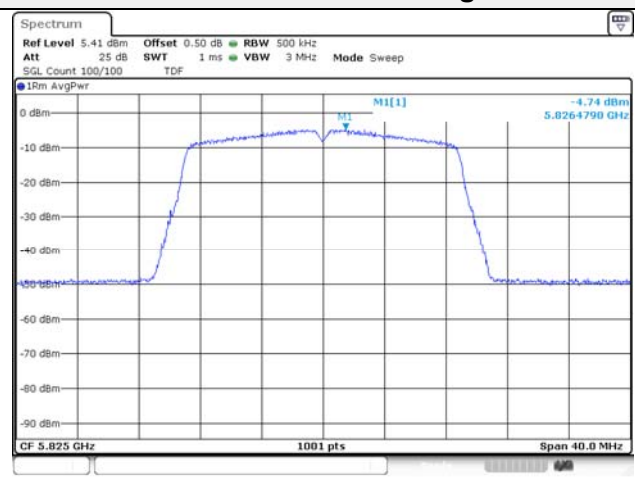
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UNII-2C / 802.11n HT 20 / High ch.



UNII-3 / 802.11n HT 20 / High ch.



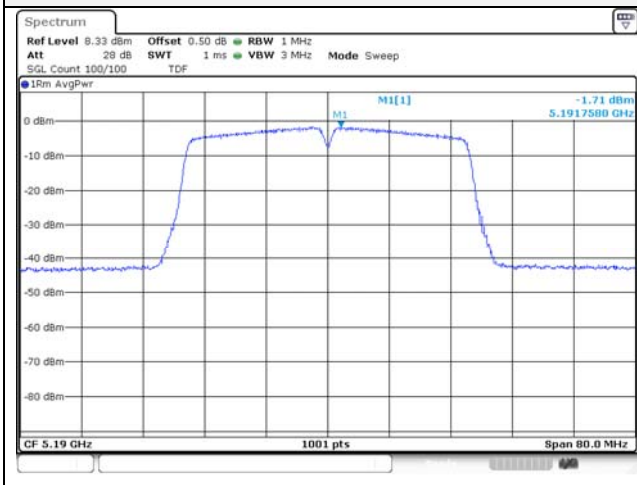
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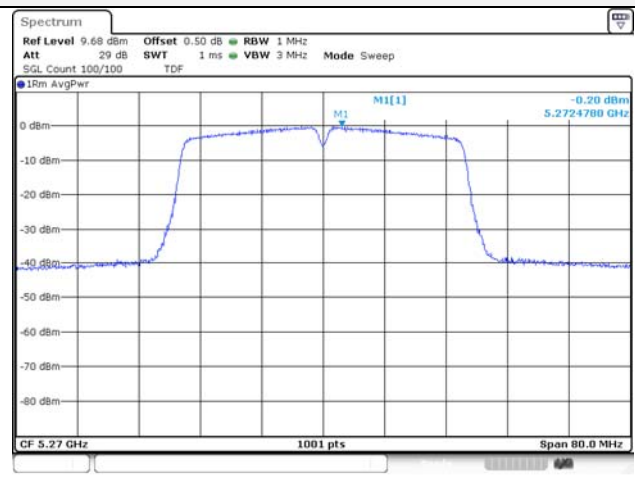
Report No.:
KR21-SRF0065-B
Page (56) of (319)



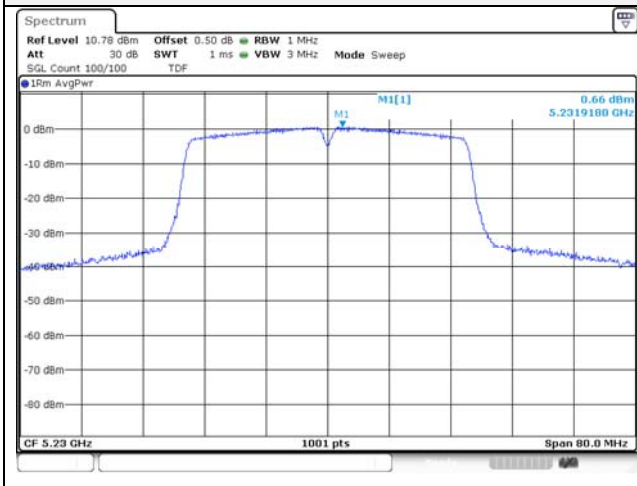
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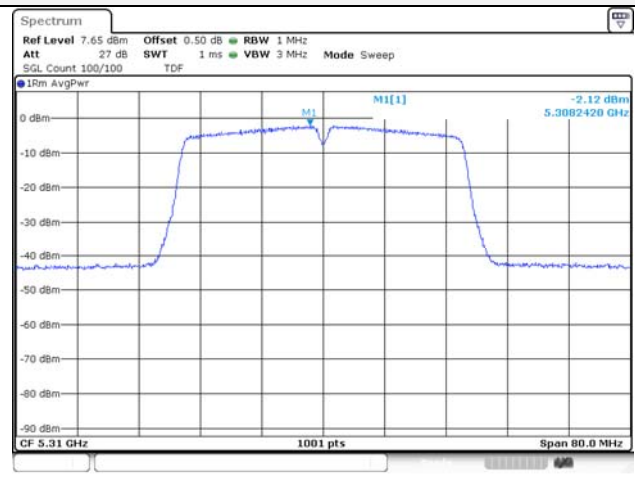
UNII-2A / 802.11n HT 40 / Low ch.



UNII-1 / 802.11n HT 40 / High ch.



UNII-2A / 802.11n HT 40 / High ch.



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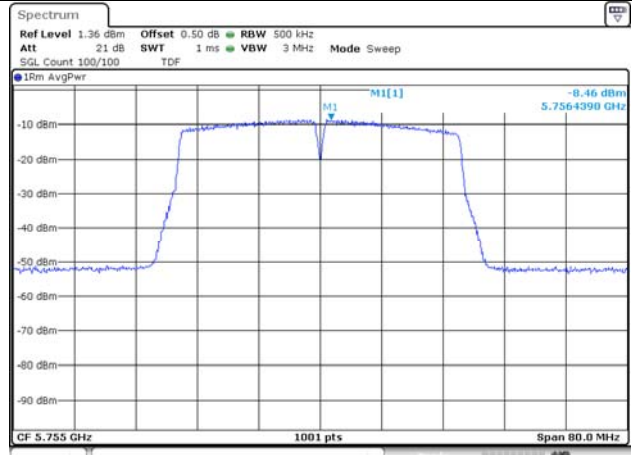
Report No.:
KR21-SRF0065-B
Page (57) of (319)



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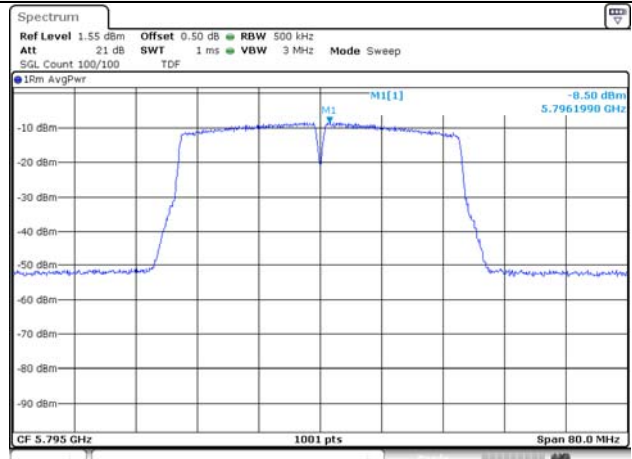
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UNII-2C / 802.11n HT 40 / Mid ch.



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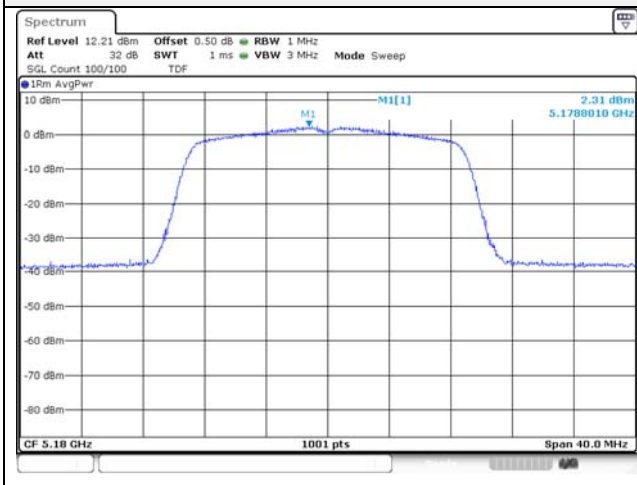
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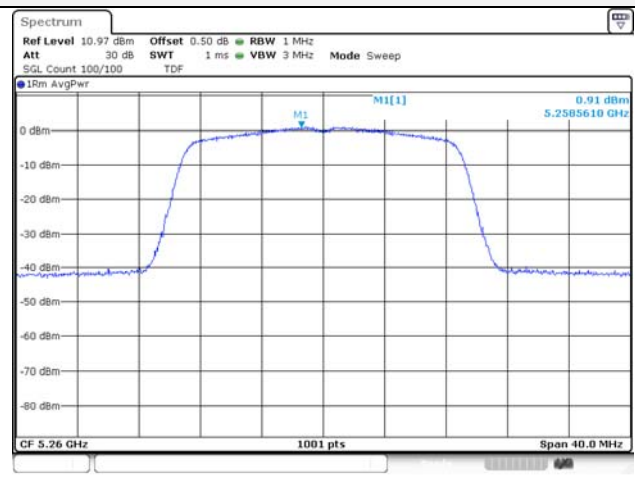
Report No.:
KR21-SRF0065-B
Page (58) of (319)



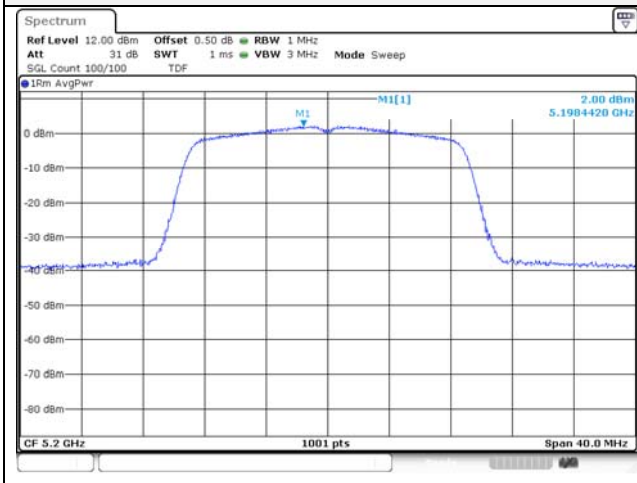
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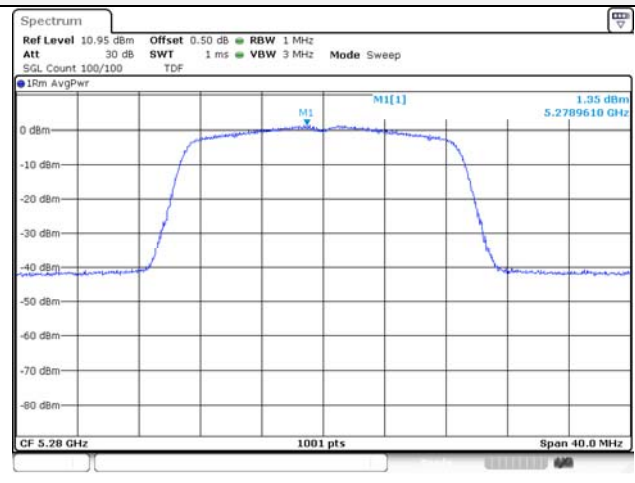
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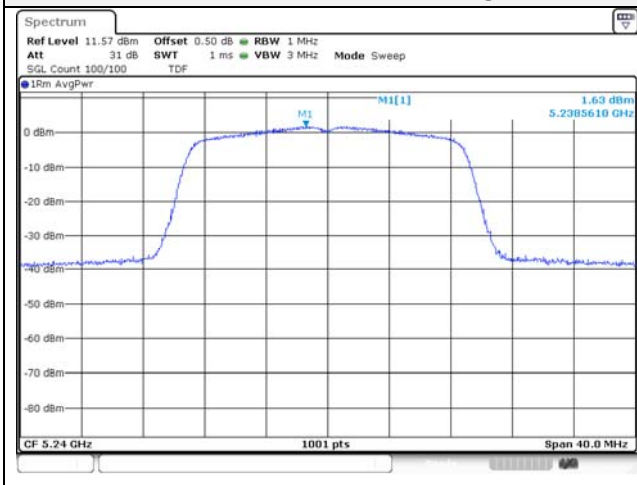
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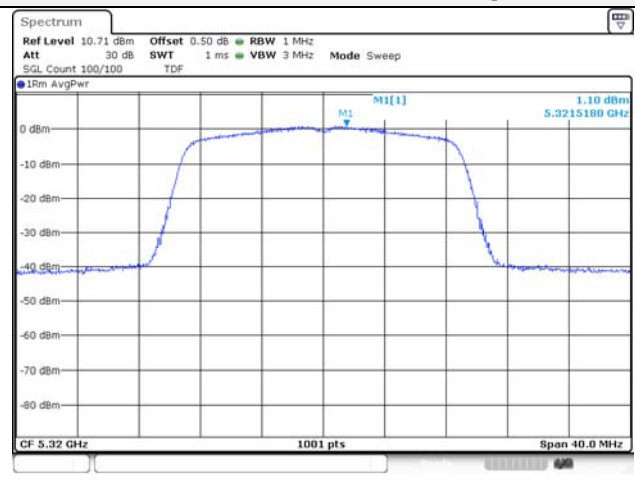
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UNII-1 / 802.11ac VHT 20 / High ch.



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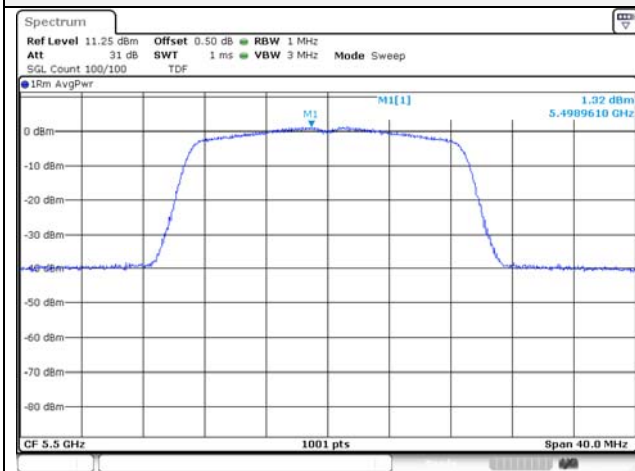
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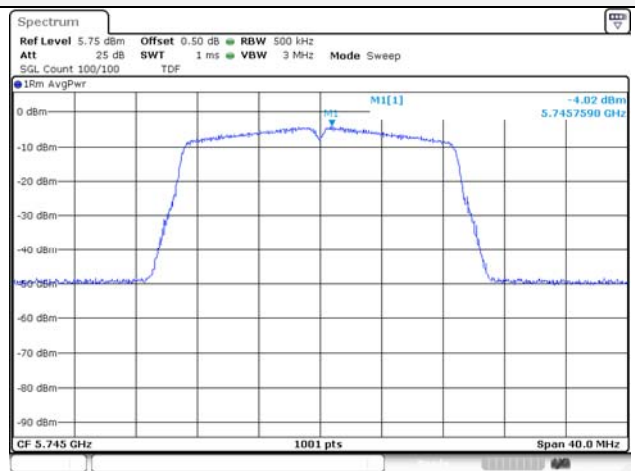
Report No.:
KR21-SRF0065-B
Page (59) of (319)



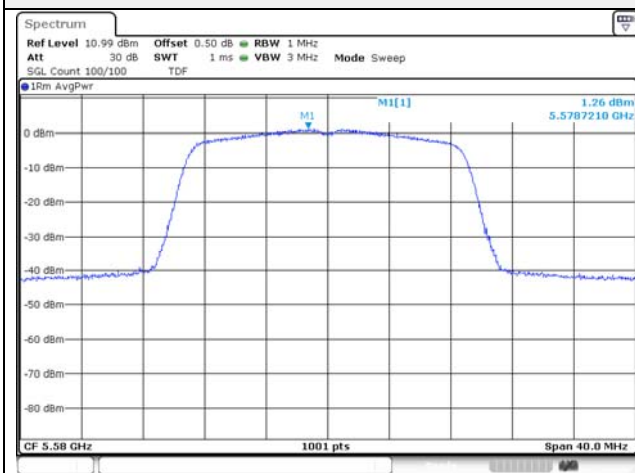
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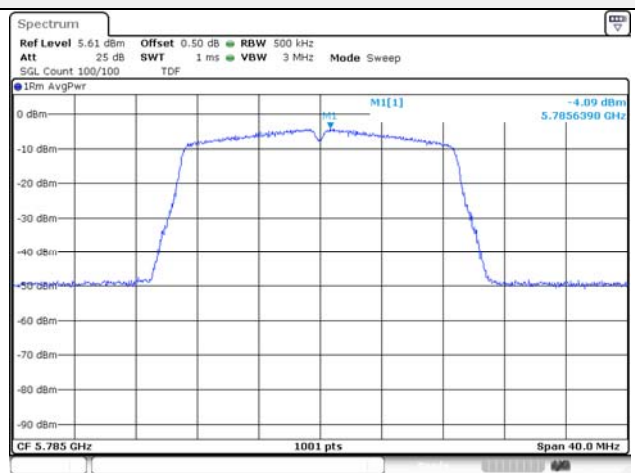
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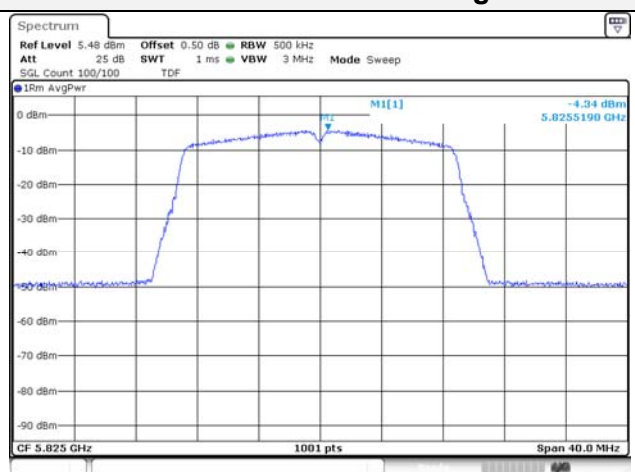
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UNII-2C / 802.11ac VHT 20 / High ch.



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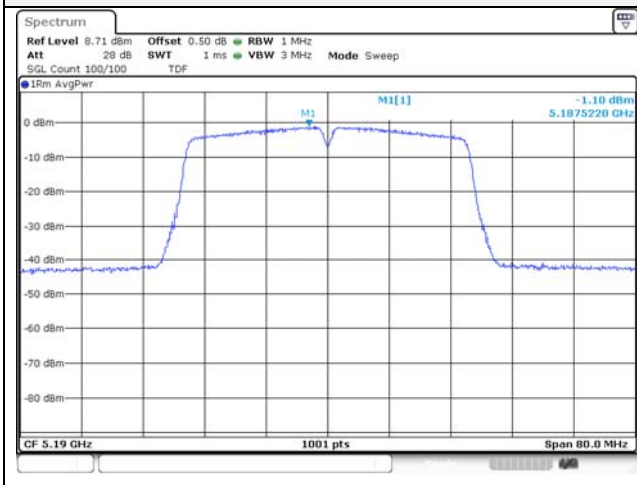
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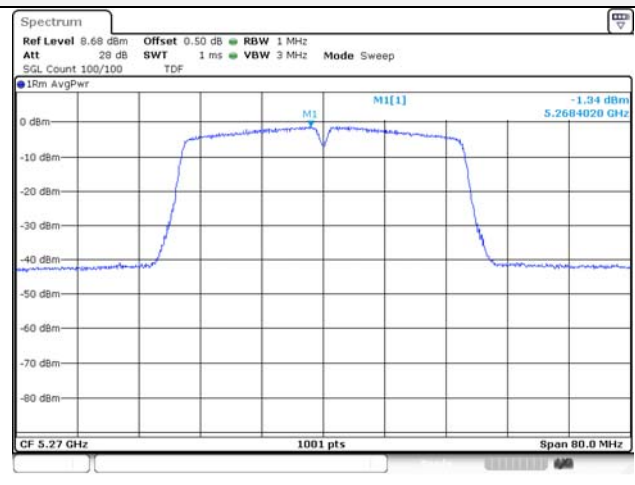
Report No.:
KR21-SRF0065-B
Page (60) of (319)



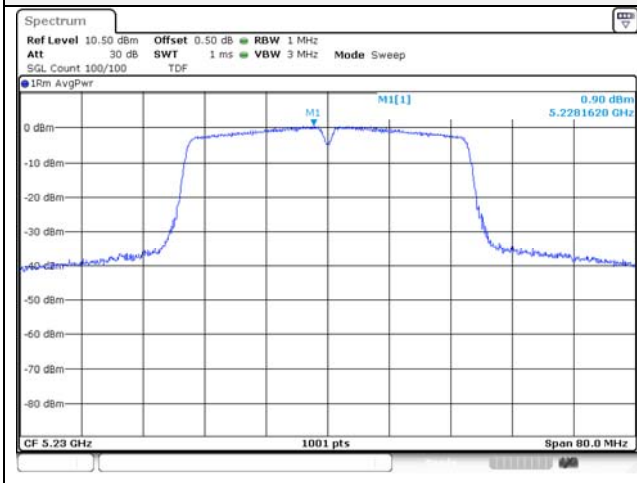
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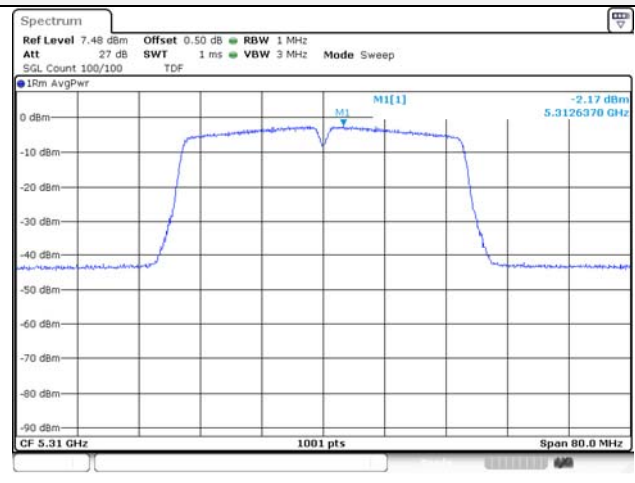
UNII-2A / 802.11ac VHT40 / Low ch.



UNII-1 / 802.11ac VHT40 / High ch.



UNII-2A / 802.11ac VHT40 / High ch.



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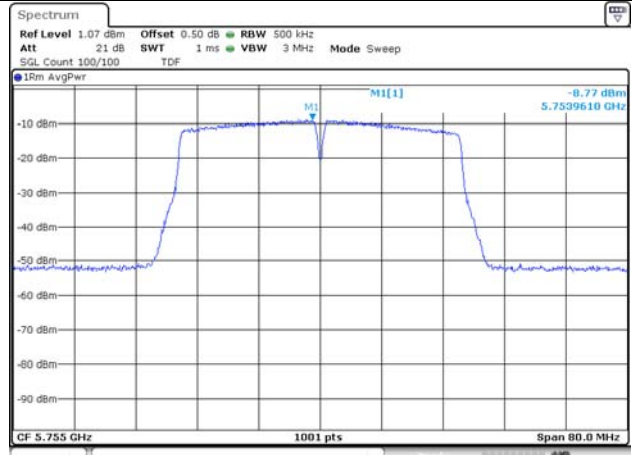
Report No.:
KR21-SRF0065-B
Page (61) of (319)



UNII-2C / 802.11ac VHT40 / Low ch.



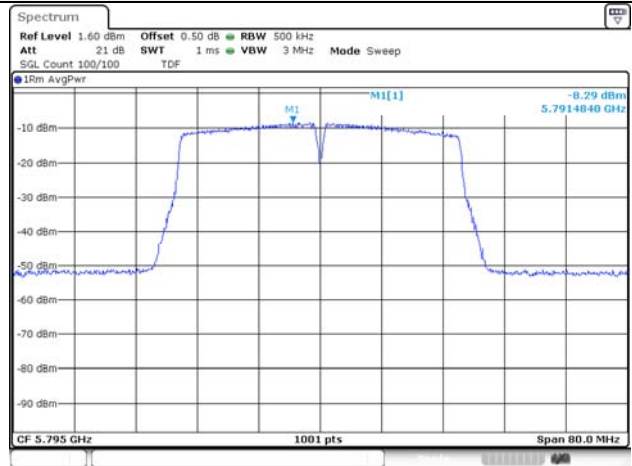
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UNII-2C / 802.11ac VHT40 / Mid ch.



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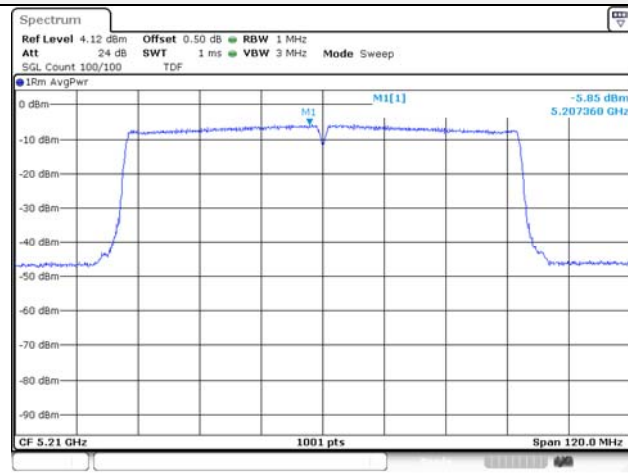
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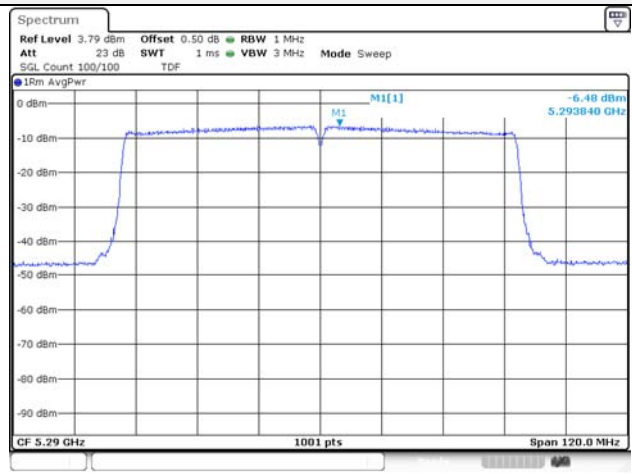
Report No.:
KR21-SRF0065-B
Page (62) of (319)



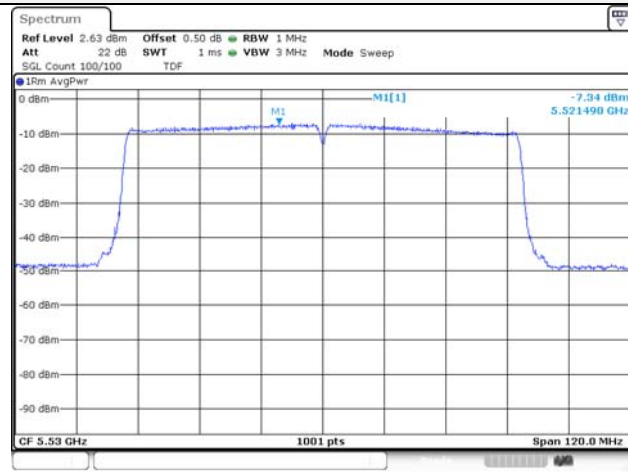
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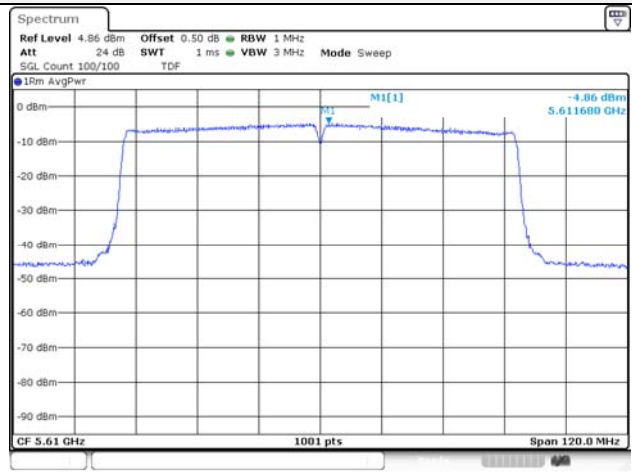
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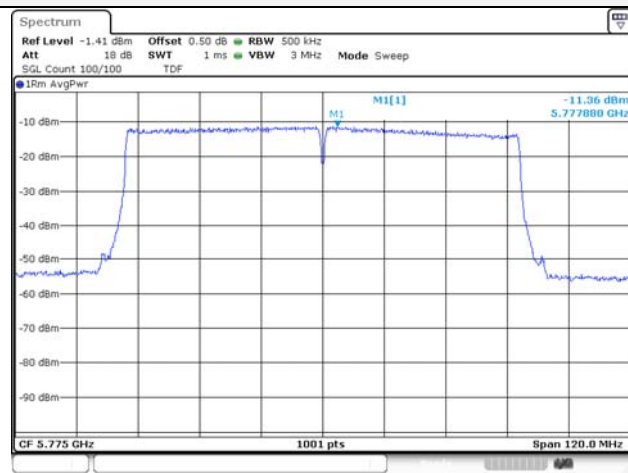
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UNII-2C / 802.11ac VHT80 / High ch.



UNII-3 / 802.11ac VHT80 / Low ch.



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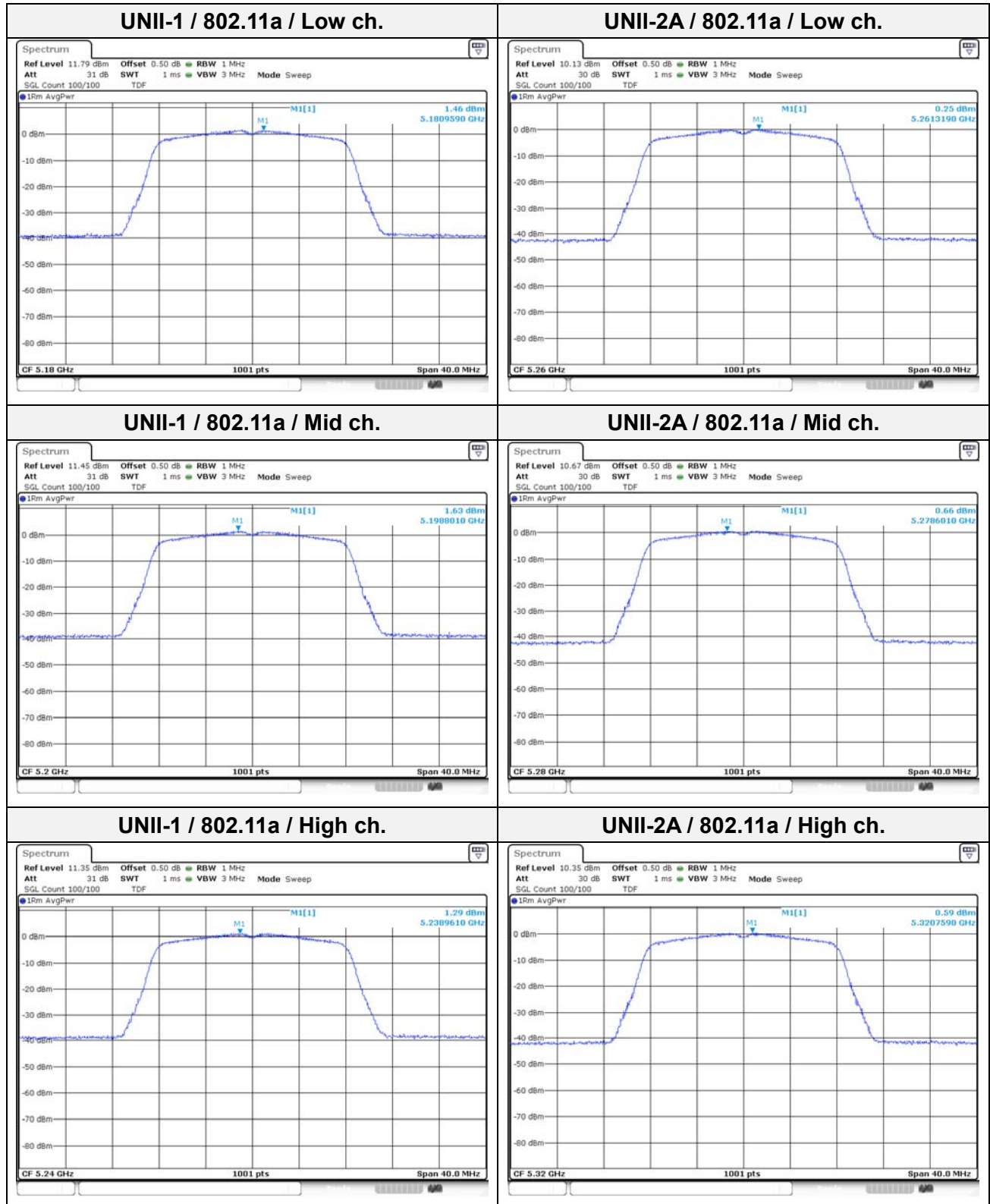
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Report No.:
KR21-SRF0065-B
Page (63) of (319)



MIMO ANT 2



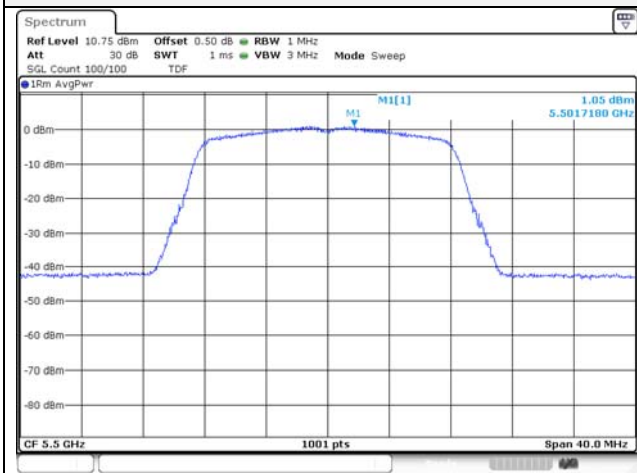
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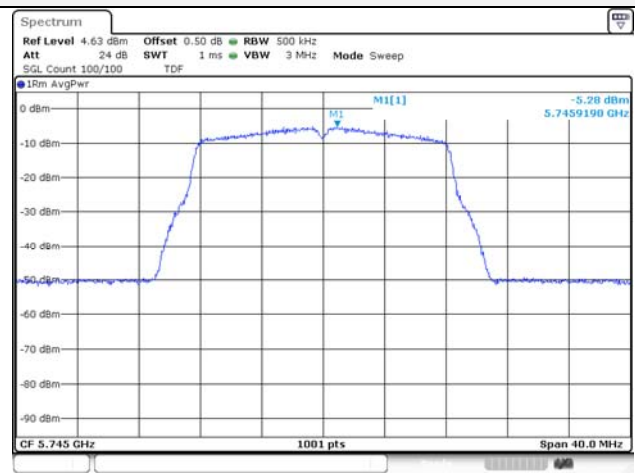
Report No.:
KR21-SRF0065-B
Page (64) of (319)



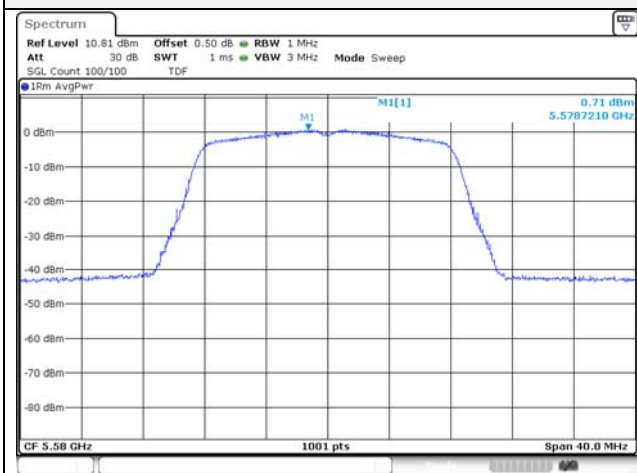
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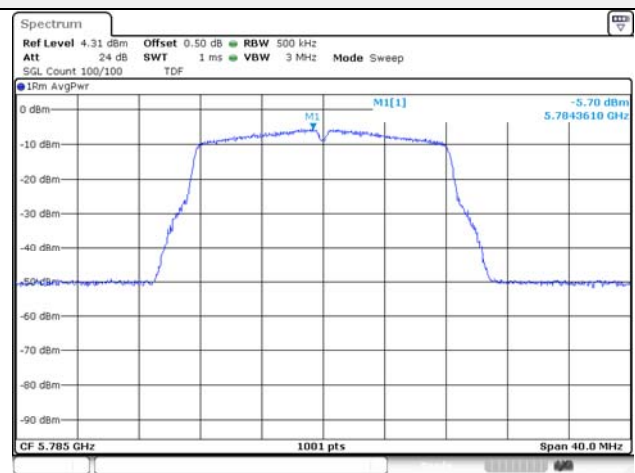
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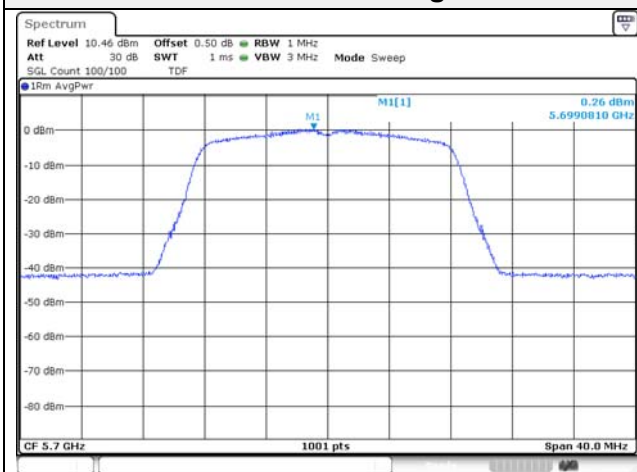
UNII-2C / 802.11a / Mid ch.



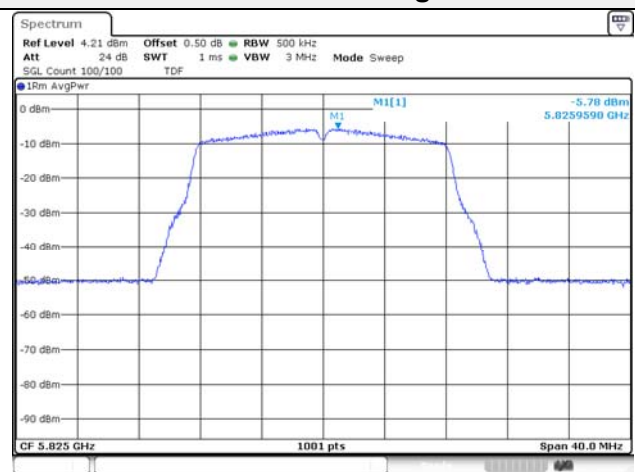
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UNII-2C / 802.11a / High ch.



UNII-3 / 802.11a / High ch.



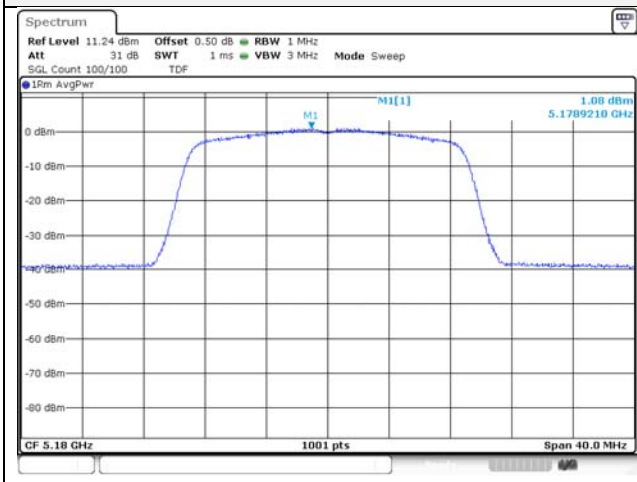
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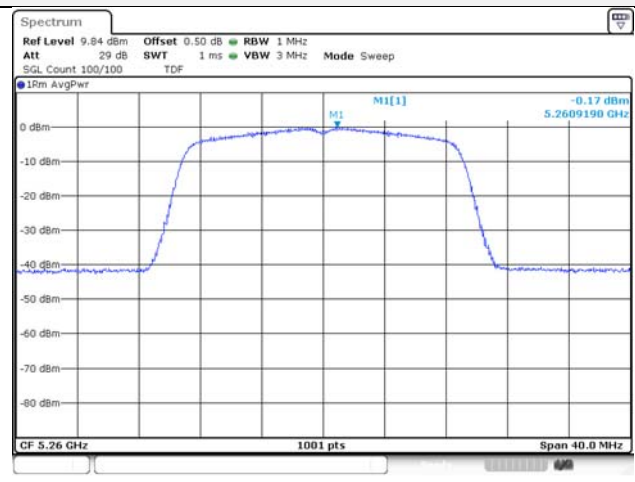
Report No.:
KR21-SRF0065-B
Page (65) of (319)



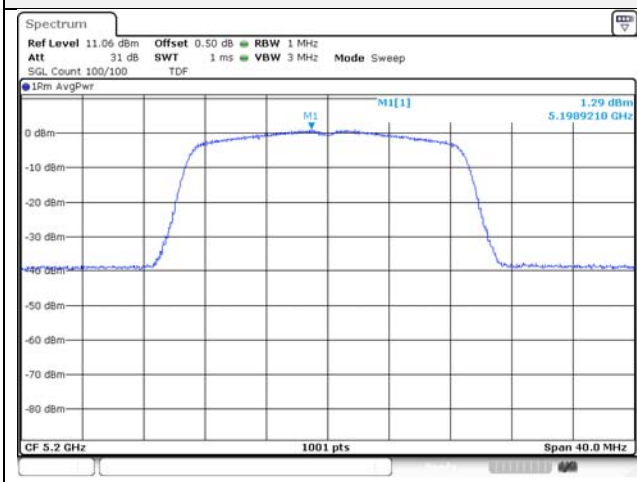
UNII-1 / 802.11n HT 20 / Low ch.



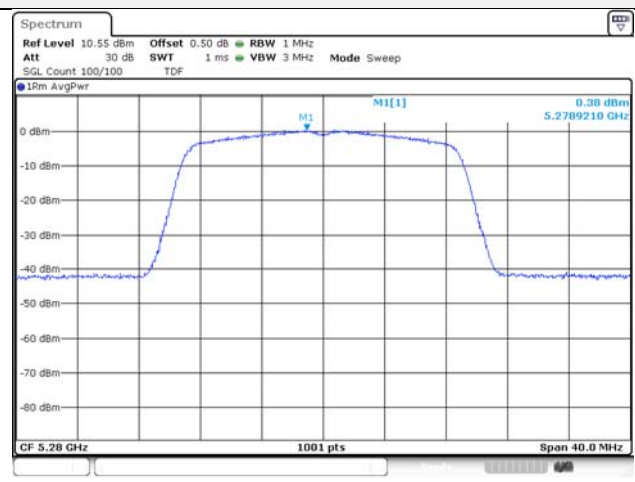
UNII-2A / 802.11n HT 20 / Low ch.



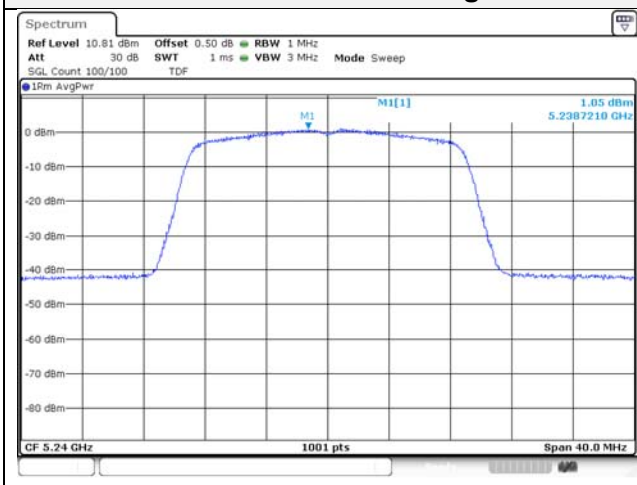
UNII-1 / 802.11n HT 20 / Mid ch.



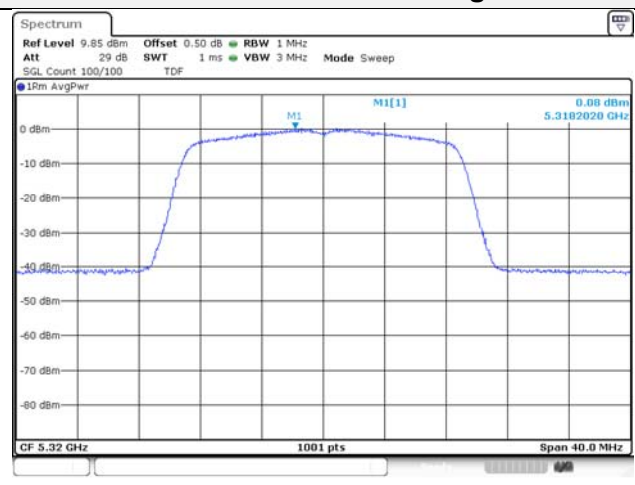
UNII-2A / 802.11n HT 20 / Mid ch.



UNII-1 / 802.11n HT 20 / High ch.



UNII-2A / 802.11n HT 20 / High ch.



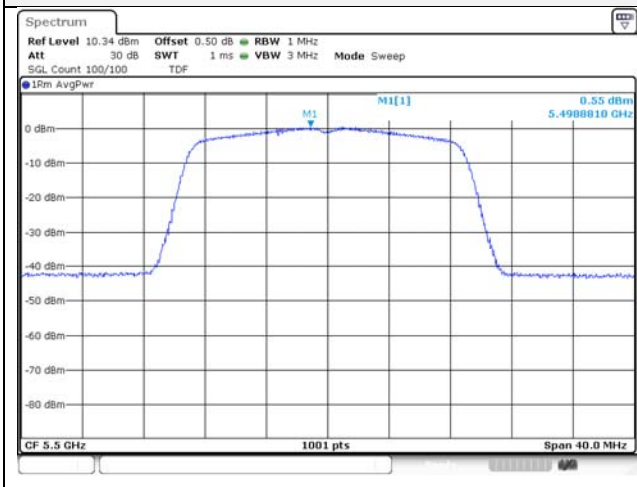
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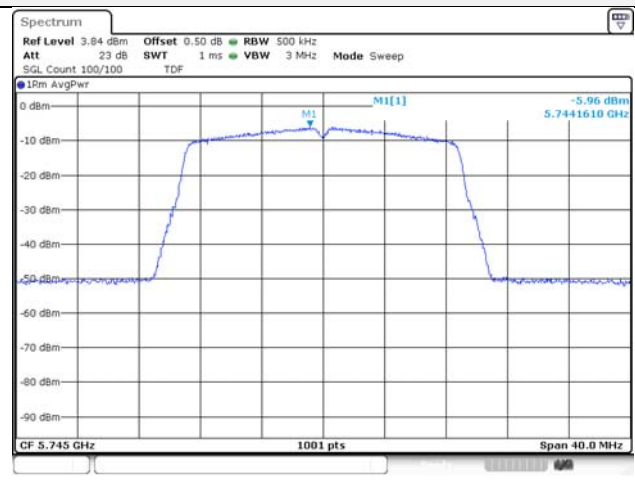
Report No.:
KR21-SRF0065-B
Page (66) of (319)



UNII-2C / 802.11n HT 20 / Low ch.



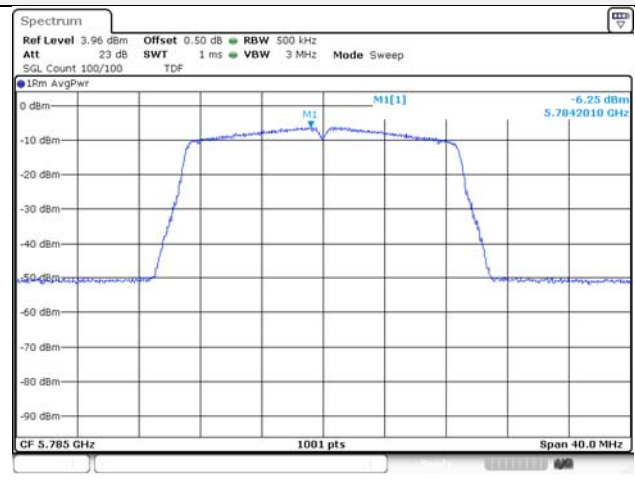
UNII-3 / 802.11n HT 20 / Low ch.



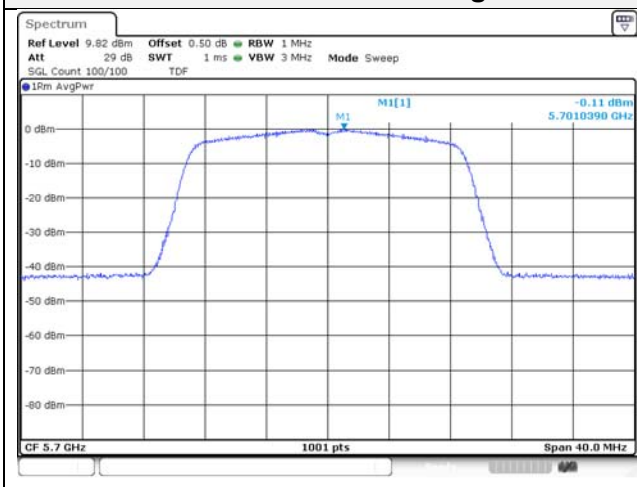
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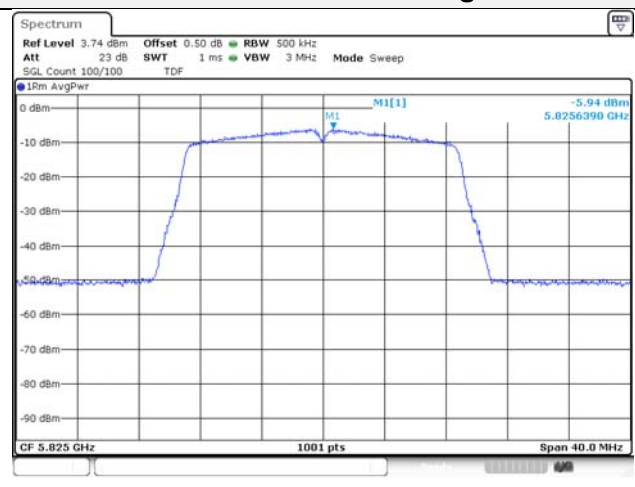
UNII-3 / 802.11n HT 20 / Mid ch.



UNII-2C / 802.11n HT 20 / High ch.



UNII-3 / 802.11n HT 20 / High ch.



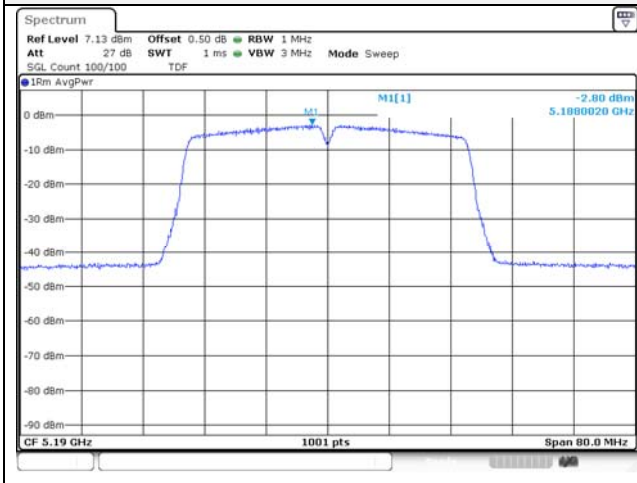
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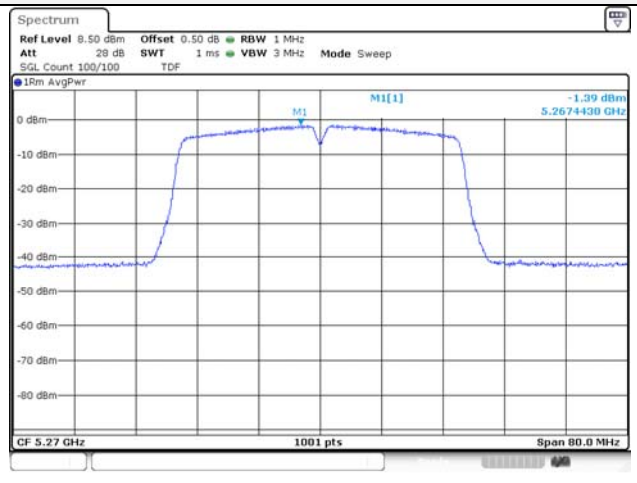
Report No.:
KR21-SRF0065-B
Page (67) of (319)



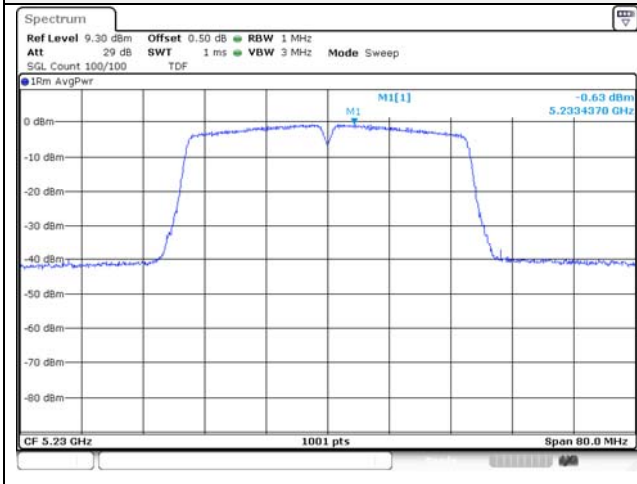
UNII-1 / 802.11n HT 40 / Low ch.



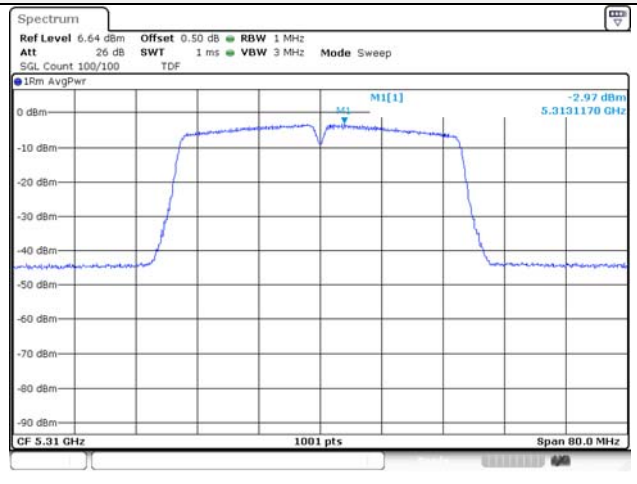
UNII-2A / 802.11n HT 40 / Low ch.



UNII-1 / 802.11n HT 40 / High ch.



UNII-2A / 802.11n HT 40 / High ch.



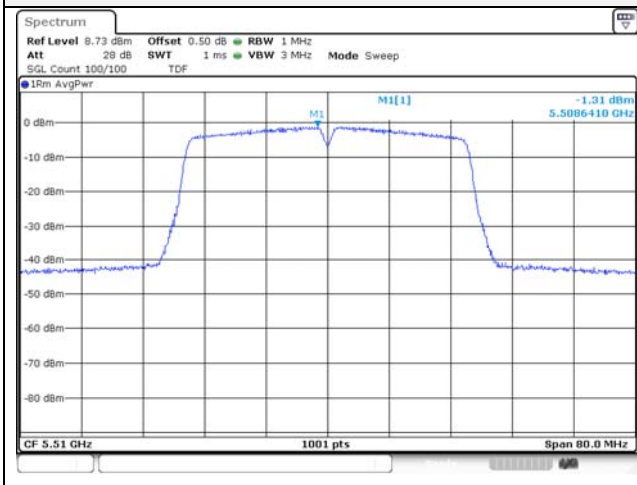
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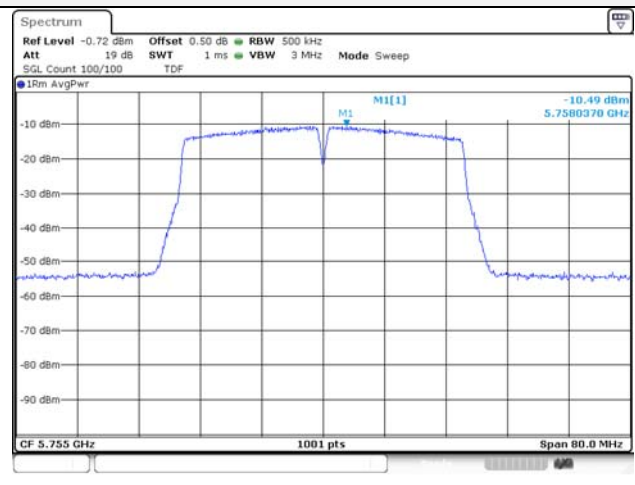
Report No.:
KR21-SRF0065-B
Page (68) of (319)



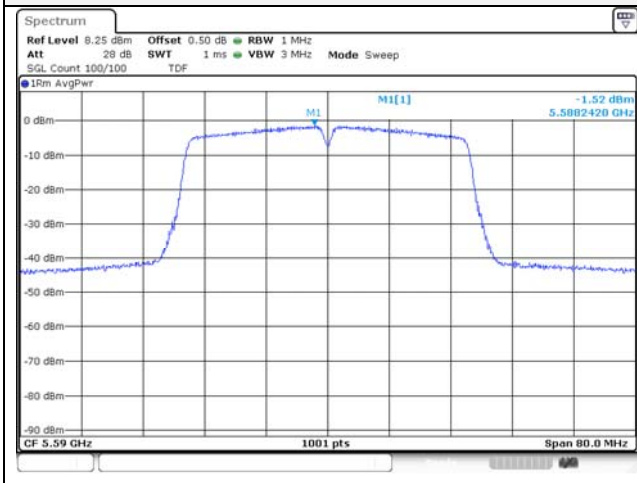
UNII-2C / 802.11n HT 40 / Low ch.



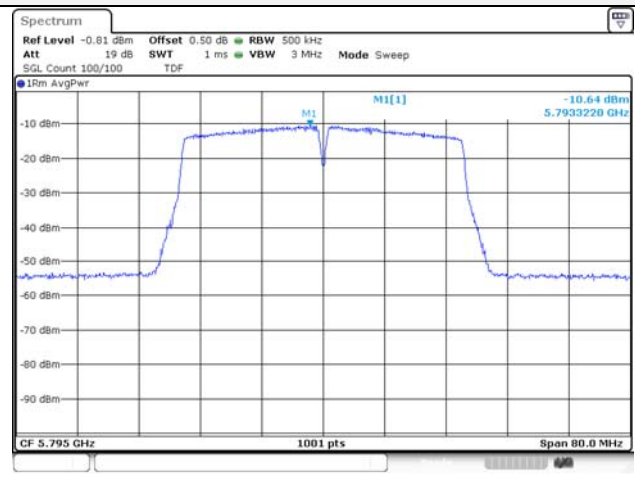
UNII-3 / 802.11n HT 40 / Low ch.



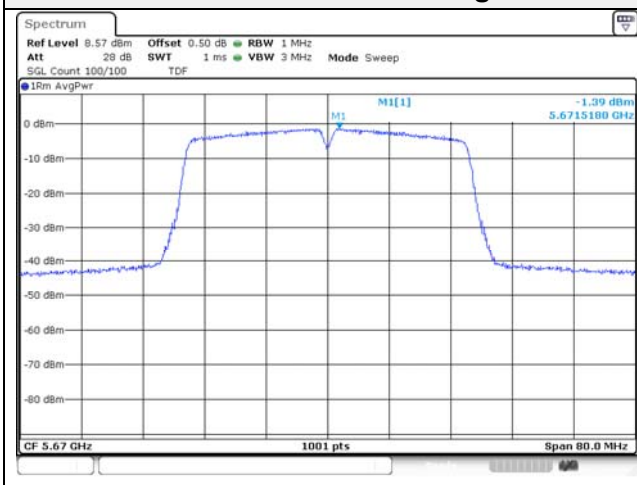
UNII-2C / 802.11n HT 40 / Mid ch.



UNII-3 / 802.11n HT 40 / High ch.



UNII-2C / 802.11n HT 40 / High ch.



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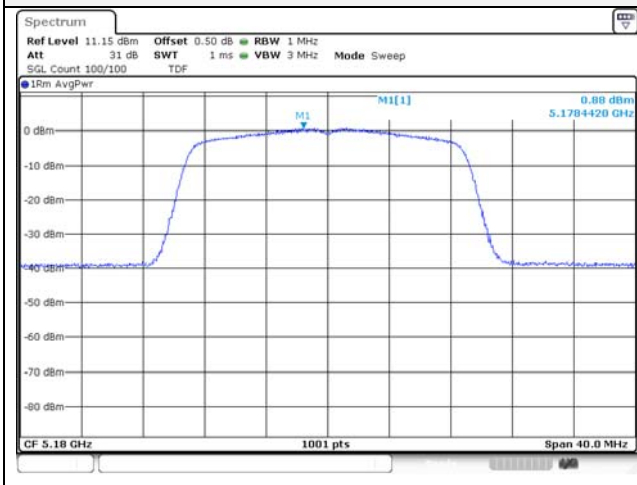
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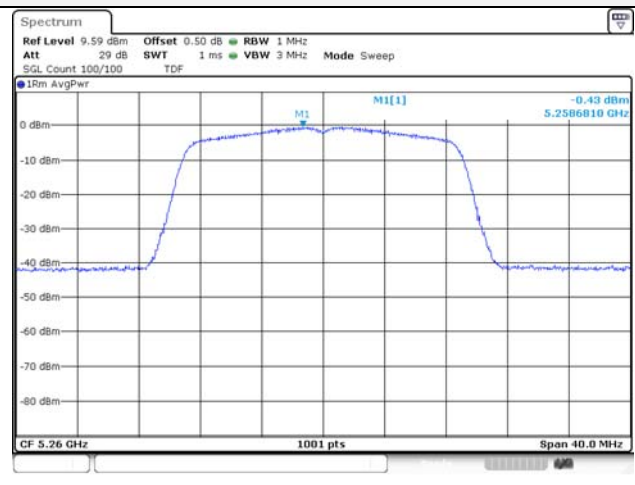
Report No.:
KR21-SRF0065-B
Page (69) of (319)



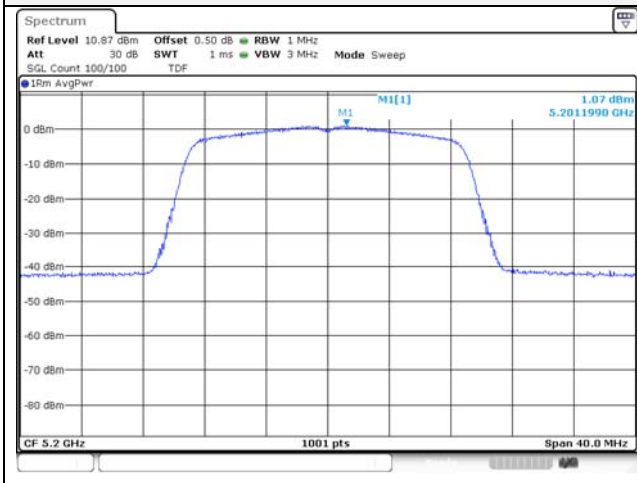
UNII-1 / 802.11ac VHT 20 / Low ch.



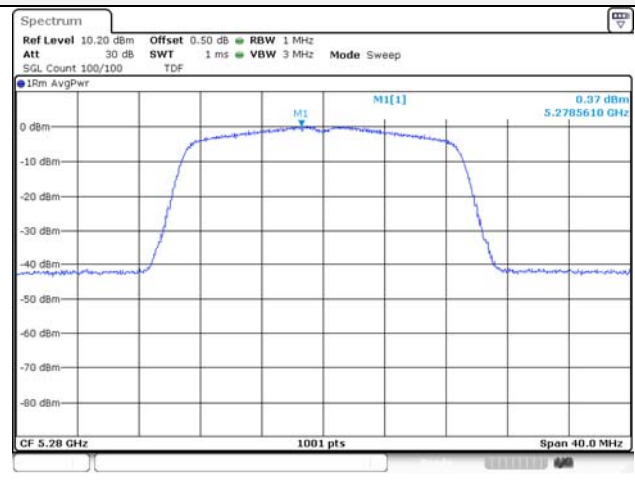
UNII-2A / 802.11ac VHT 20 / Low ch.



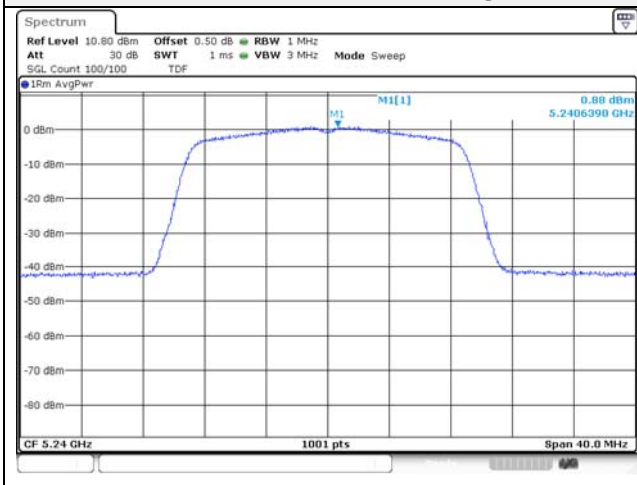
UNII-1 / 802.11ac VHT 20 / Mid ch.



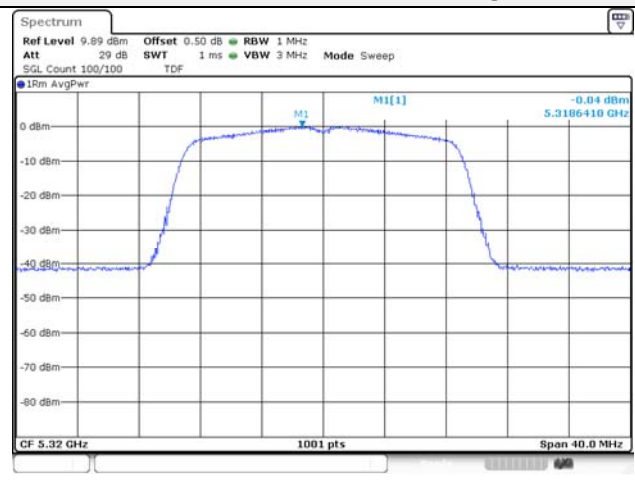
UNII-2A / 802.11ac VHT 20 / Mid ch.



UNII-1 / 802.11ac VHT 20 / High ch.



UNII-2A / 802.11ac VHT 20 / High ch.



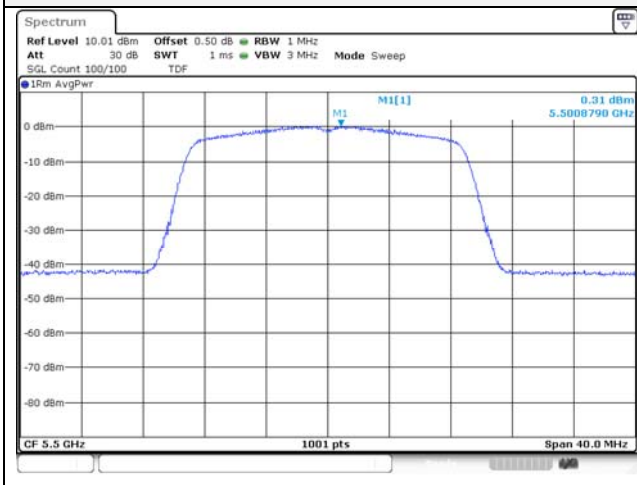
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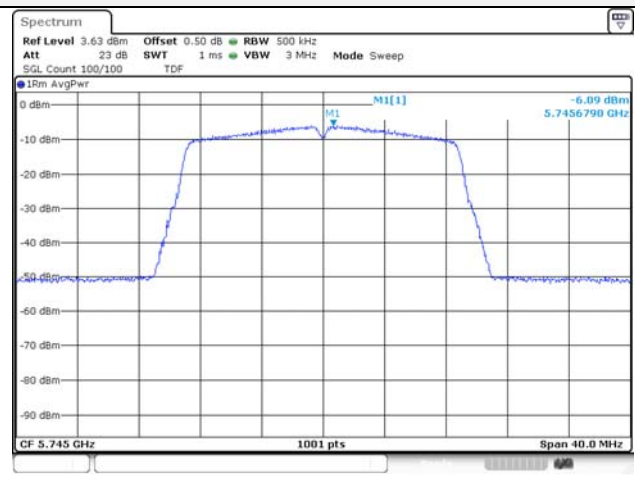
Report No.:
KR21-SRF0065-B
Page (70) of (319)



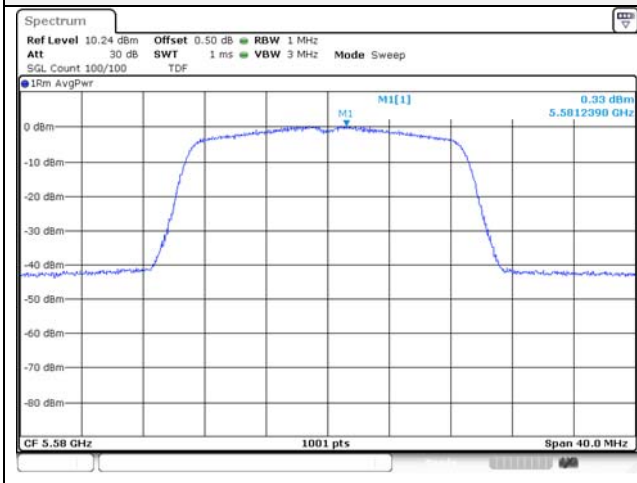
UNII-2C / 802.11ac VHT 20 / Low ch.



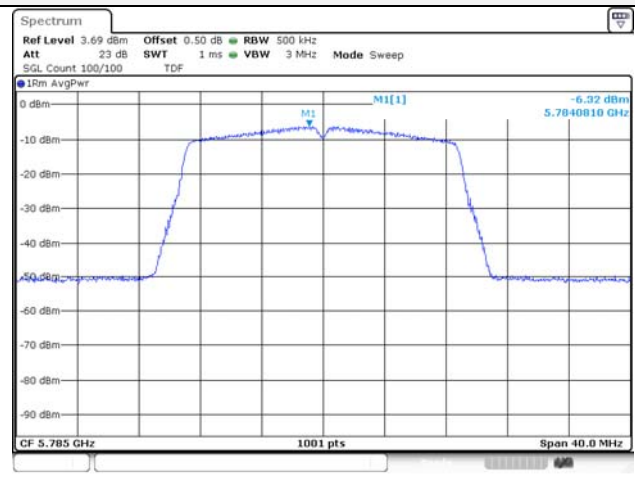
UNII-3 / 802.11ac VHT 20 / Low ch.



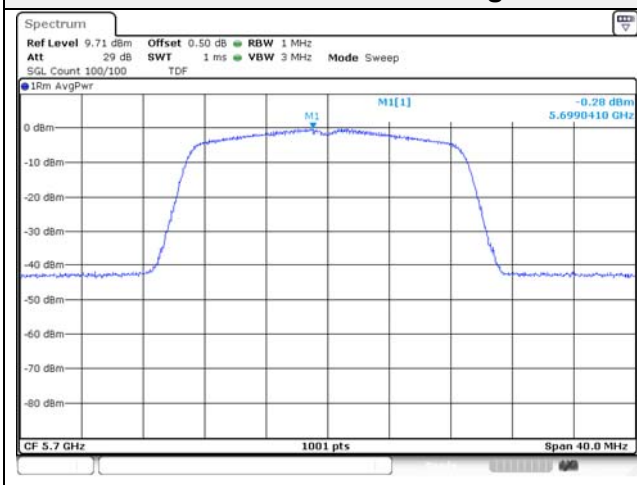
UNII-2C / 802.11ac VHT 20 / Mid ch.



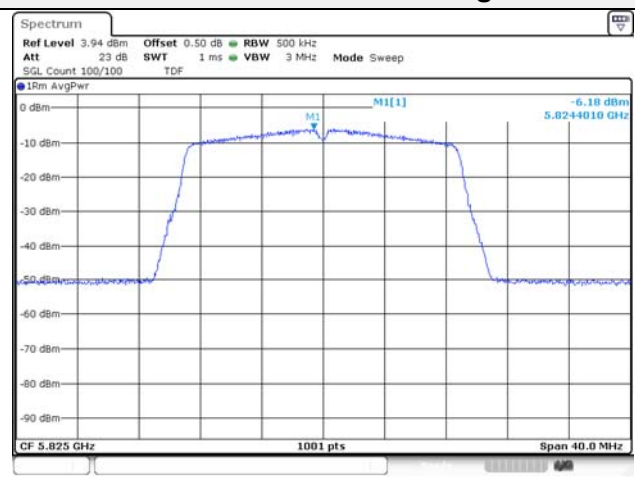
UNII-3 / 802.11ac VHT 20 / Mid ch.



UNII-2C / 802.11ac VHT 20 / High ch.



UNII-3 / 802.11ac VHT 20 / High ch.



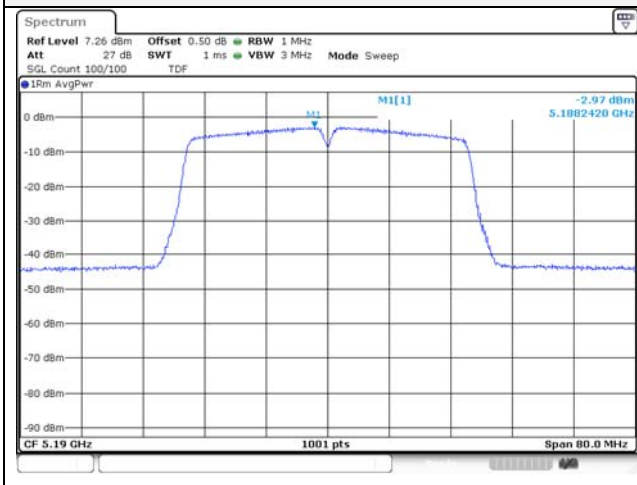
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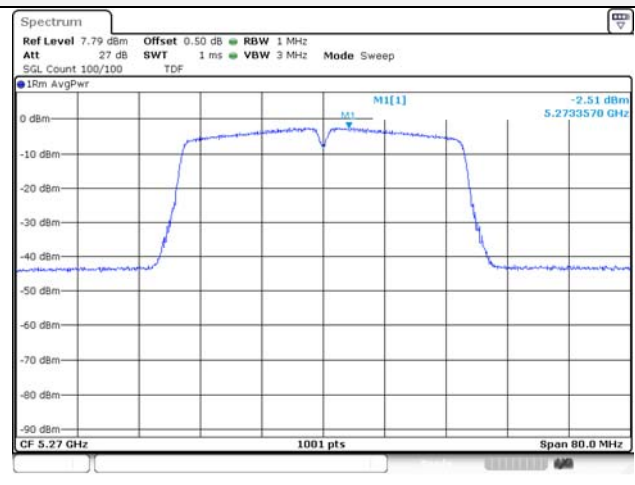
Report No.:
KR21-SRF0065-B
Page (71) of (319)



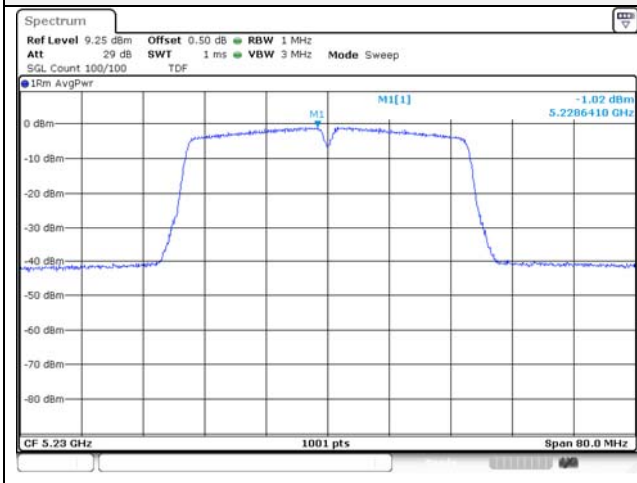
UNII-1 / 802.11ac VHT40 / Low ch.



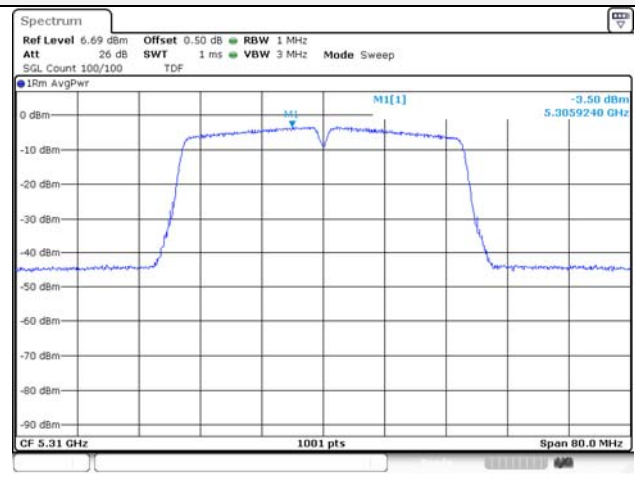
UNII-2A / 802.11ac VHT40 / Low ch.



UNII-1 / 802.11ac VHT40 / High ch.



UNII-2A / 802.11ac VHT40 / High ch.



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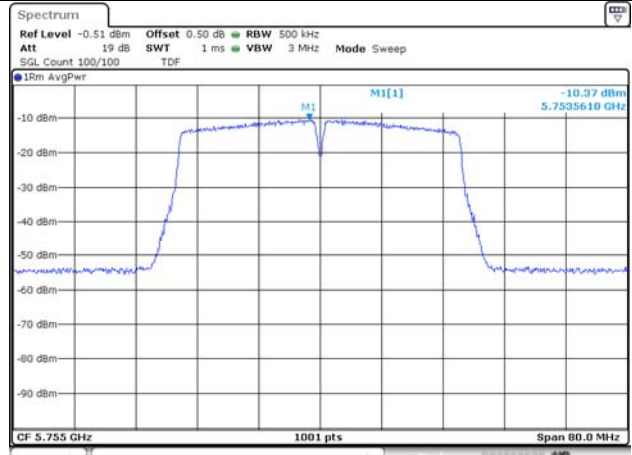
Report No.:
KR21-SRF0065-B
Page (72) of (319)



UNII-2C / 802.11ac VHT40 / Low ch.



UNII-3 / 802.11ac VHT40 / Low ch.



UNII-2C / 802.11ac VHT40 / Mid ch.



UNII-3 / 802.11ac VHT40 / High ch.



UNII-2C / 802.11ac VHT40 / High ch.



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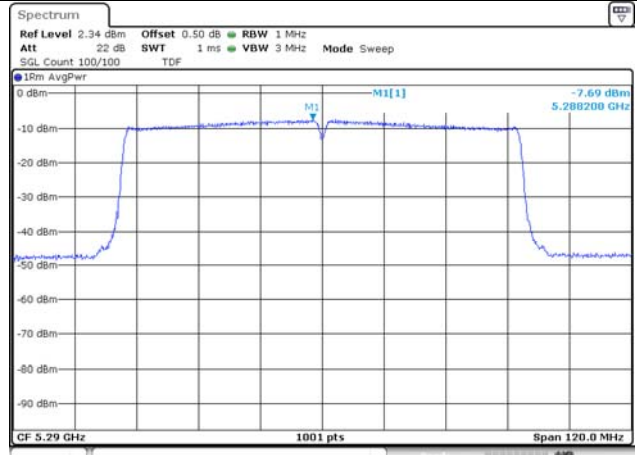
Report No.:
KR21-SRF0065-B
Page (73) of (319)



UNII-1 / 802.11ac VHT80 / Low ch.



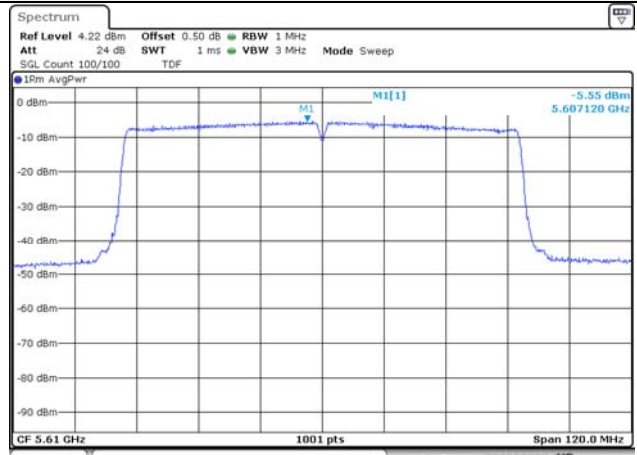
UNII-2A / 802.11ac VHT80 / Low ch.



UNII-2C / 802.11ac VHT80 / Low ch.



UNII-2C / 802.11ac VHT80 / High ch.



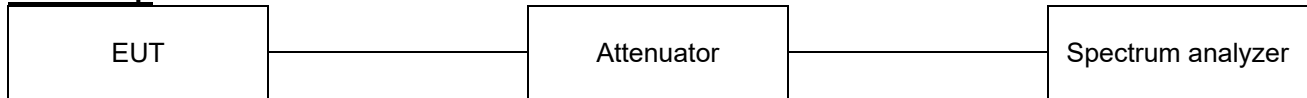
UNII-3 / 802.11ac VHT80 / Low ch.



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7.3. 26 dB Bandwidth & 99% Bandwidth

Test setup



Limit

N/A

Test procedure

ANSI C63.10-2013 Section 12.4

KDB 789033 D02 v02r01 - Section C.1 (26dB bandwidth)

KDB 789033 D02 v02r01 - Section D (99% bandwidth)

Test settings

1. 26 dB Bandwidth

- a. Set RBW = approximately 1% of the emission bandwidth.
- b. Set the VBW > RBW.
- c. Detector = Peak.
- d. Trace mode = max hold.
- e. Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

2. 99% Occupied Bandwidth

- a. Set center frequency to the nominal EUT channel center frequency.
- b. Set span = 1.5 times to 5.0 times the OBW.
- c. Set RBW = 1% to 5% of the OBW
- d. Set VBW $\geq 3 \times$ RBW
- e. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
- f. Use the 99% power bandwidth function of the instrument (if available).
- g. If the instrument does not have a 99% power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

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Report No.:
KR21-SRF0065-B
Page (75) of (319)

KCTL**Test results****SISO**

Test mode	Band	Frequency(MHz)	26 dB bandwidth (MHz)		99% bandwidth (MHz)	
			ANT1	ANT2	ANT1	ANT2
802.11a	UNII-1	5 180	19.93	19.83	16.43	16.43
		5 200	19.78	19.83	16.48	16.48
		5 240	20.03	19.83	16.48	16.48
	UNII-2A	5 260	20.68	19.93	16.58	16.48
		5 280	20.23	19.73	16.58	16.48
		5 320	20.68	19.78	16.63	16.53
	UNII-2C	5 500	20.23	20.03	16.58	16.43
		5 580	19.98	19.78	16.53	16.48
		5 700	19.83	20.13	16.48	16.48
802.11n HT20	UNII-1	5 180	20.23	20.18	17.63	17.58
		5 200	19.98	20.18	17.58	17.63
		5 240	20.03	20.08	17.58	17.63
	UNII-2A	5 260	20.83	19.98	17.73	17.63
		5 280	20.43	20.13	17.73	17.58
		5 320	20.53	20.18	17.73	17.63
	UNII-2C	5 500	20.28	20.23	17.78	17.58
		5 580	20.63	20.43	17.68	17.63
		5 700	20.13	20.13	17.63	17.63
802.11n HT40	UNII-1	5 190	40.96	40.86	36.26	36.26
		5 230	40.66	41.06	36.36	36.36
	UNII-2A	5 270	41.36	40.76	36.36	36.16
		5 310	41.06	40.96	36.36	36.36
	UNII-2C	5 510	41.36	41.26	36.36	36.36
		5 590	41.36	40.96	36.36	36.36
		5 670	40.86	41.06	36.36	36.36

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Report No.:
KR21-SRF0065-B
Page (76) of (319)

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Test mode	Band	Frequency(MHz)	26 dB bandwidth (MHz)		99% bandwidth (MHz)	
			ANT1	ANT2	ANT1	ANT2
802.11ac VHT20	UNII-1	5 180	20.13	20.13	17.58	17.58
		5 200	20.08	20.08	17.63	17.58
		5 240	20.18	20.18	17.58	17.58
	UNII-2A	5 260	20.28	20.23	17.68	17.63
		5 280	20.13	20.18	17.68	17.58
		5 320	21.13	20.18	17.73	17.58
	UNII-2C	5 500	20.38	19.98	17.68	17.63
		5 580	20.08	20.13	17.63	17.58
		5 700	20.13	20.13	17.68	17.58
802.11ac VHT40	UNII-1	5 190	40.96	41.16	36.36	36.36
		5 230	40.96	40.86	36.46	36.36
	UNII-2A	5 270	41.16	40.76	36.36	36.36
		5 310	40.76	40.96	36.36	36.36
	UNII-2C	5 510	41.06	41.16	36.36	36.36
		5 590	40.86	41.46	36.36	36.36
		5 670	41.06	41.16	36.36	36.36
802.11ac VHT80	UNII-1	5 210	81.88	81.64	75.76	75.76
	UNII-2A	5 290	81.52	81.64	75.76	75.64
	UNII-2C	5 530	81.52	81.76	75.76	75.76
		5 610	82.00	81.40	75.64	75.76

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Report No.:
KR21-SRF0065-B
Page (77) of (319)

KCTL**MIMO**

Test mode	Band	Frequency(MHz)	26 dB bandwidth (MHz)		99% bandwidth (MHz)	
			ANT1	ANT2	ANT1	ANT2
802.11a	UNII-1	5 180	19.93	19.53	16.43	16.43
		5 200	19.93	19.73	16.43	16.38
		5 240	19.88	19.88	16.48	16.38
	UNII-2A	5 260	19.63	19.83	16.48	16.43
		5 280	19.73	19.63	16.48	16.38
		5 320	19.83	19.58	16.48	16.38
	UNII-2C	5 500	19.48	19.68	16.43	16.38
		5 580	19.73	19.58	16.48	16.38
		5 700	19.83	19.68	16.43	16.38
802.11n HT20	UNII-1	5 180	20.28	20.13	17.63	17.53
		5 200	20.18	20.23	17.58	17.58
		5 240	20.18	19.98	17.58	17.58
	UNII-2A	5 260	20.08	20.13	17.58	17.58
		5 280	20.13	19.93	17.58	17.58
		5 320	20.23	20.08	17.58	17.58
	UNII-2C	5 500	20.18	20.18	17.63	17.58
		5 580	20.23	20.28	17.58	17.58
		5 700	19.98	20.03	17.58	17.58
802.11n HT40	UNII-1	5 190	40.56	40.46	36.36	36.16
		5 230	41.06	40.36	36.36	36.16
	UNII-2A	5 270	40.76	40.26	36.36	36.16
		5 310	40.86	40.56	36.36	36.26
	UNII-2C	5 510	40.86	40.56	36.26	36.16
		5 590	40.96	40.56	36.36	36.16
		5 670	40.96	40.36	36.36	36.16

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Report No.:
KR21-SRF0065-B
Page (78) of (319)



Test mode	Band	Frequency(MHz)	26 dB bandwidth (MHz)		99% bandwidth (MHz)	
			ANT1	ANT2	ANT1	ANT2
802.11ac VHT20	UNII-1	5 180	20.08	20.23	17.58	17.58
		5 200	20.28	20.03	17.58	17.58
		5 240	20.03	20.33	17.58	17.58
	UNII-2A	5 260	20.28	20.28	17.58	17.63
		5 280	20.18	20.23	17.58	17.58
		5 320	20.28	20.18	17.58	17.58
	UNII-2C	5 500	20.08	20.18	17.58	17.58
		5 580	20.03	20.08	17.63	17.58
		5 700	20.08	20.18	17.58	17.58
802.11ac VHT40	UNII-1	5 190	41.06	40.86	36.36	36.36
		5 230	41.56	40.96	36.46	36.36
	UNII-2A	5 270	41.06	40.86	36.26	36.26
		5 310	41.06	41.06	36.36	36.36
	UNII-2C	5 510	41.06	40.96	36.36	36.36
		5 590	41.16	40.86	36.36	36.36
		5 670	40.86	41.06	36.26	36.46
802.11ac VHT80	UNII-1	5 210	81.52	81.64	75.76	75.76
	UNII-2A	5 290	81.76	81.28	75.76	75.76
	UNII-2C	5 530	82.00	81.28	75.64	75.64
		5 610	81.76	81.52	75.76	75.76

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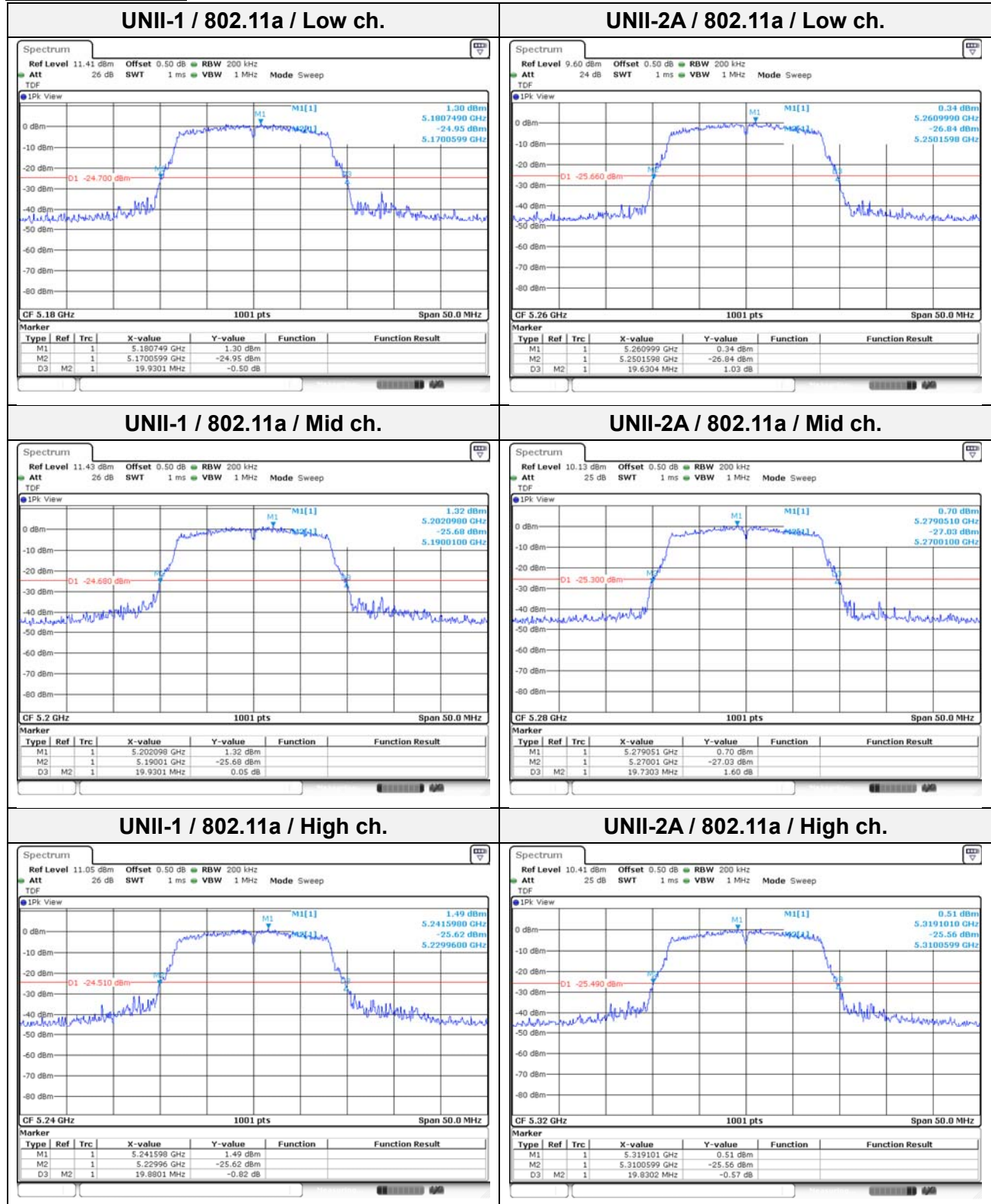
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Report No.:
KR21-SRF0065-B
Page (79) of (319)



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

26 dB bandwidth



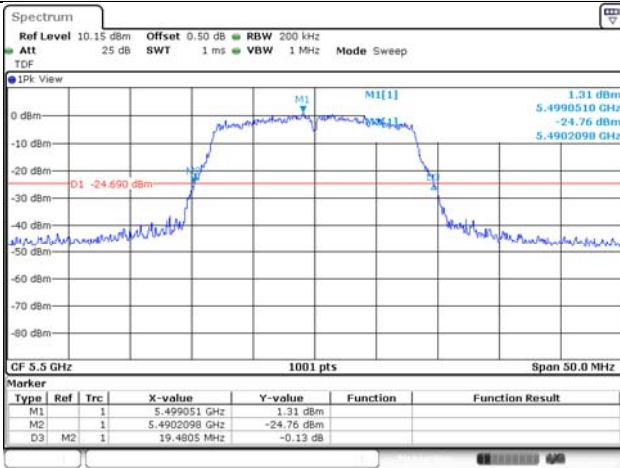
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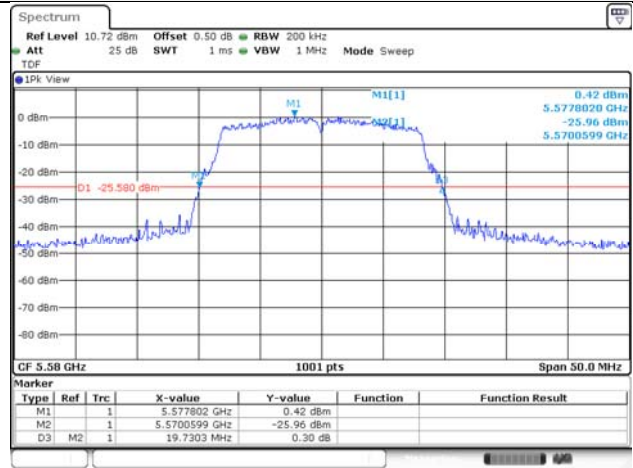
Report No.:
KR21-SRF0065-B
Page (80) of (319)



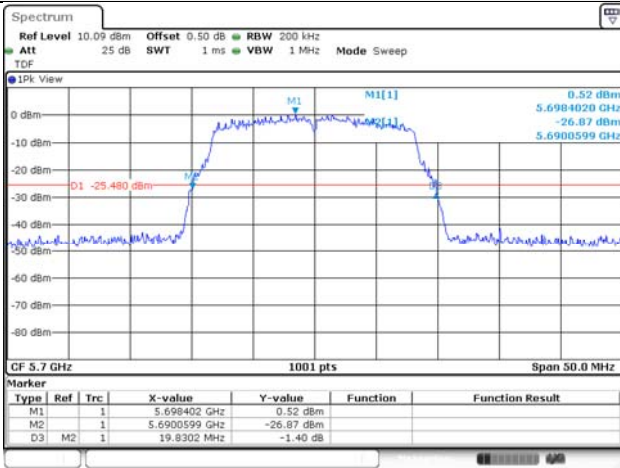
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UNII-2C / 802.11a / Mid ch.



UNII-2C / 802.11a / High ch.



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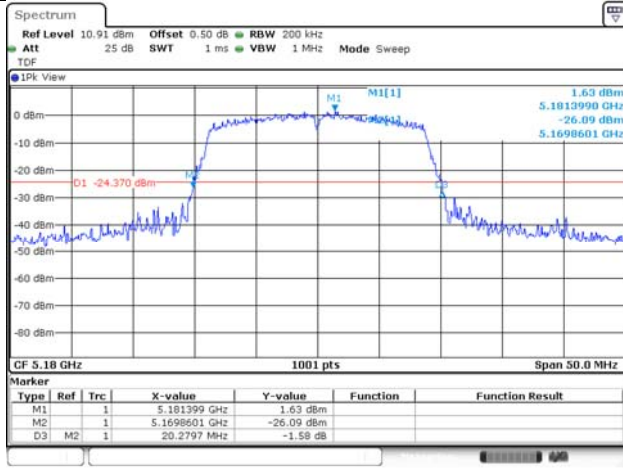
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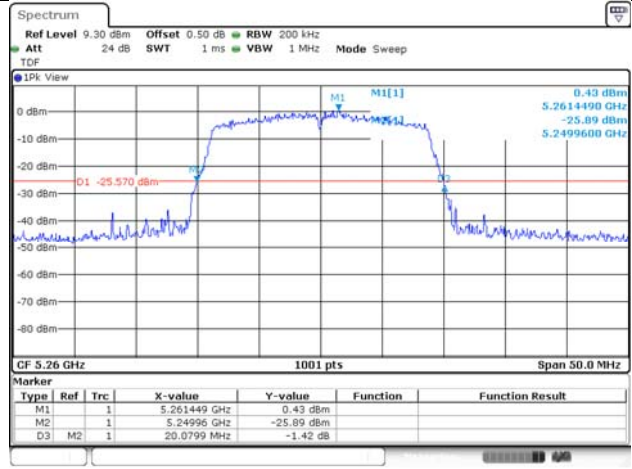
Report No.:
KR21-SRF0065-B
Page (81) of (319)



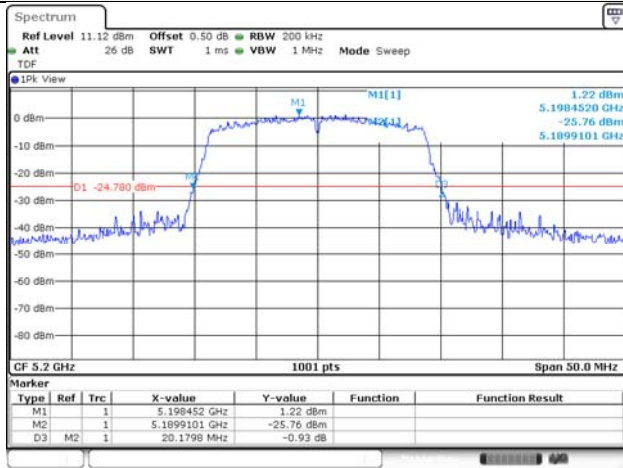
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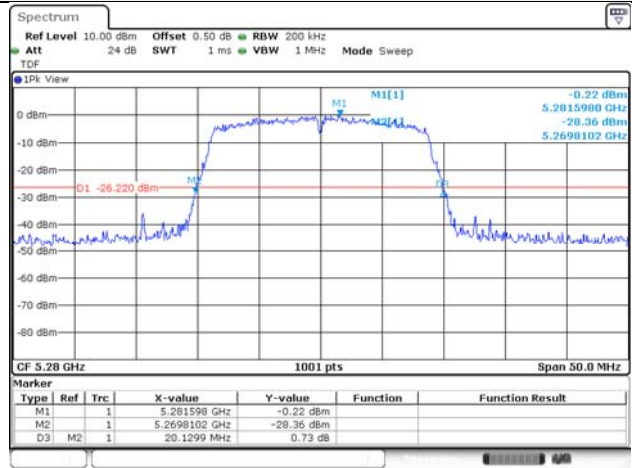
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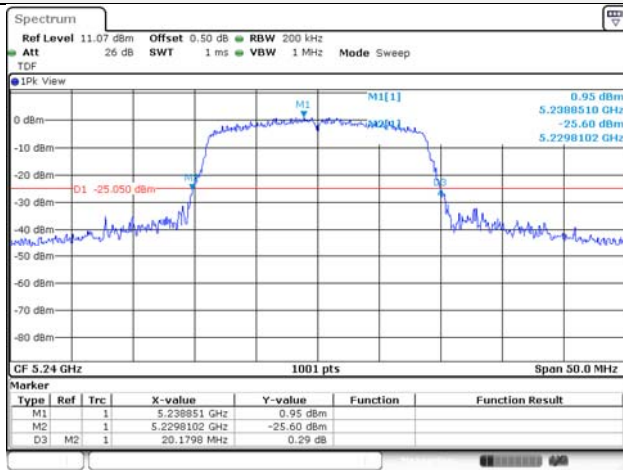
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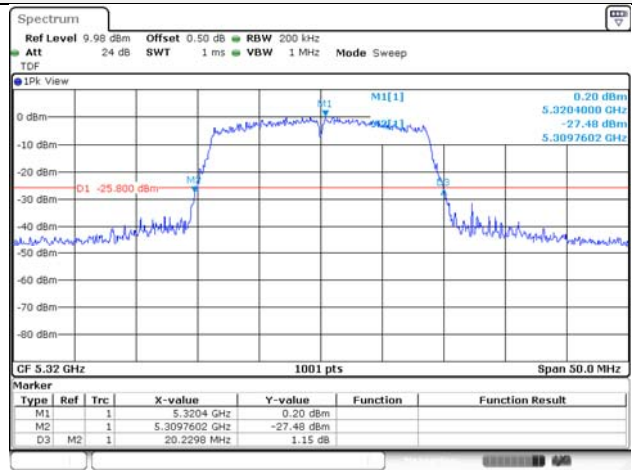
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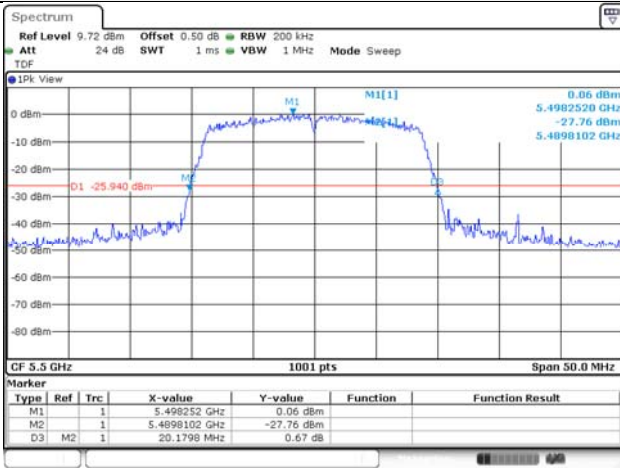
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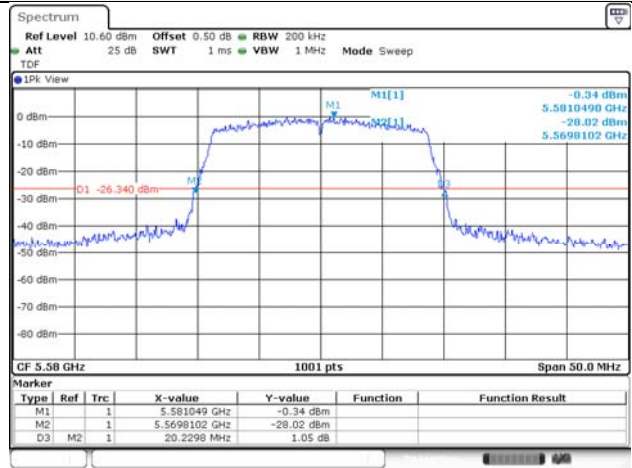
Report No.:
KR21-SRF0065-B
Page (82) of (319)



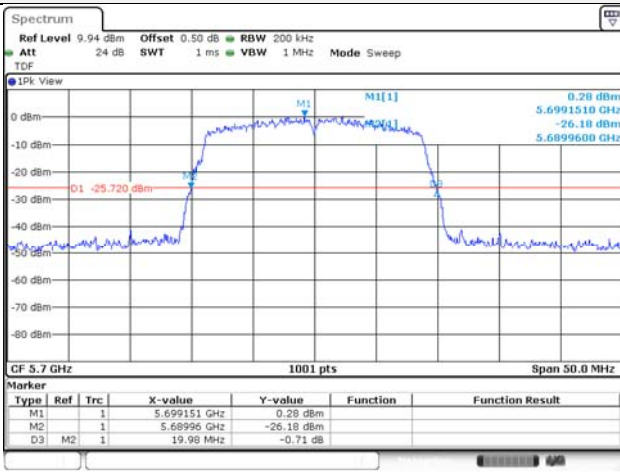
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UNII-2C / 802.11n HT20 / High ch.



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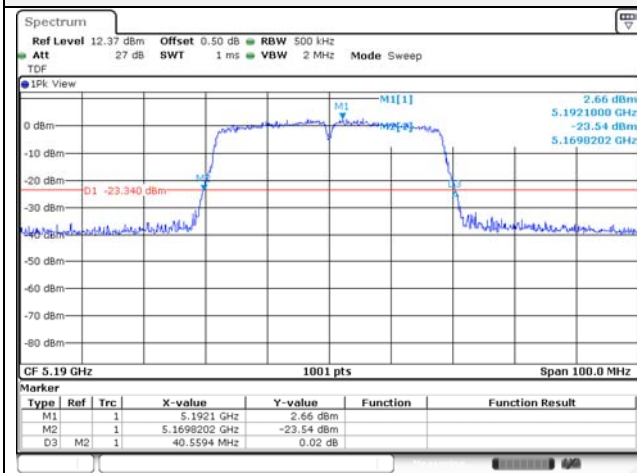
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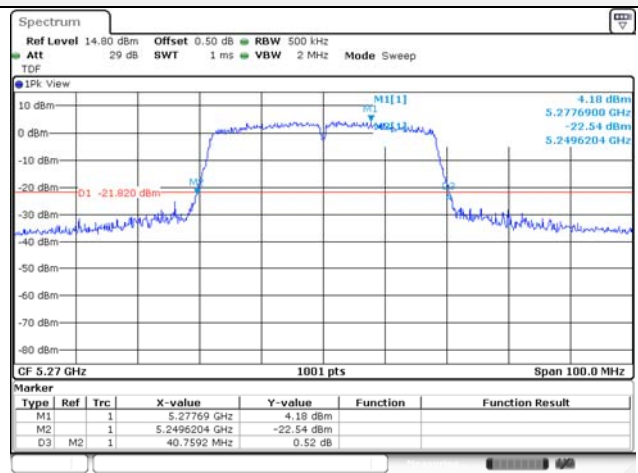
Report No.:
KR21-SRF0065-B
Page (83) of (319)



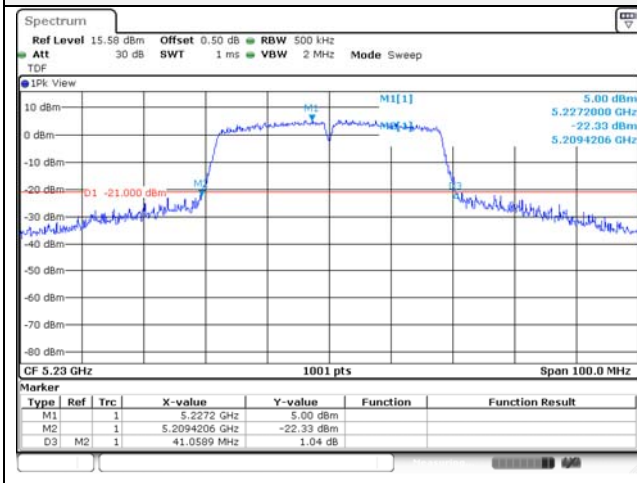
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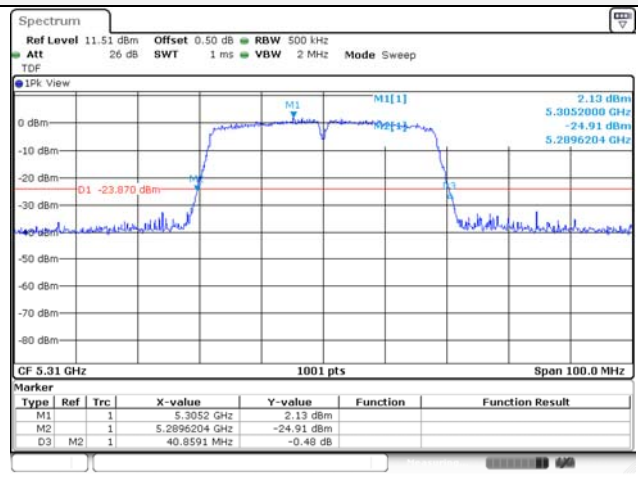
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UNII-1 / 802. 11n HT40 / High ch.



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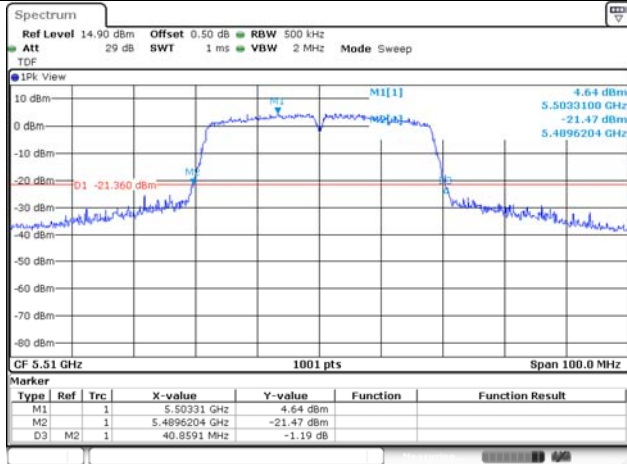
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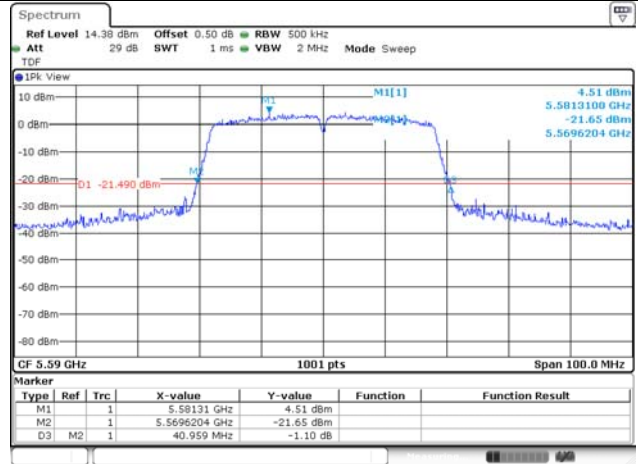
Report No.:
KR21-SRF0065-B
Page (84) of (319)



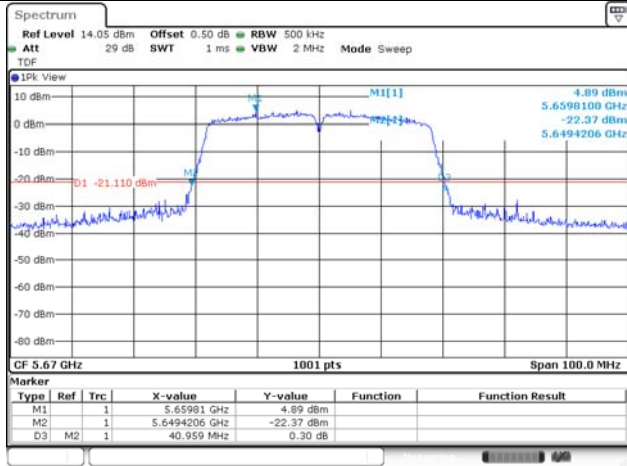
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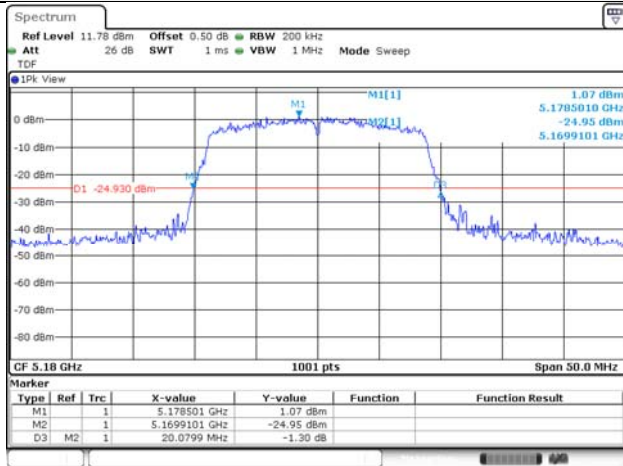
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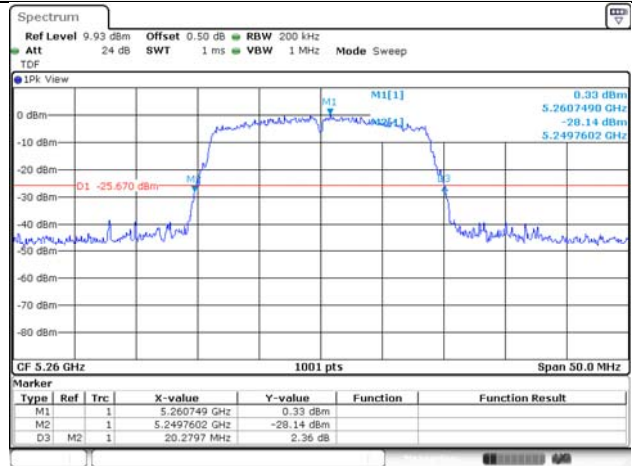
Report No.:
KR21-SRF0065-B
Page (85) of (319)



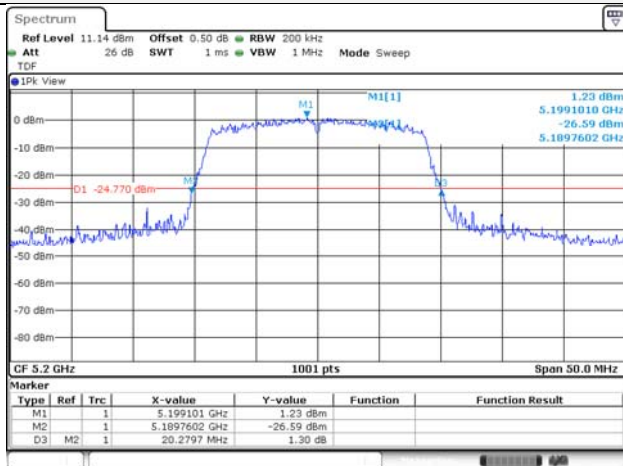
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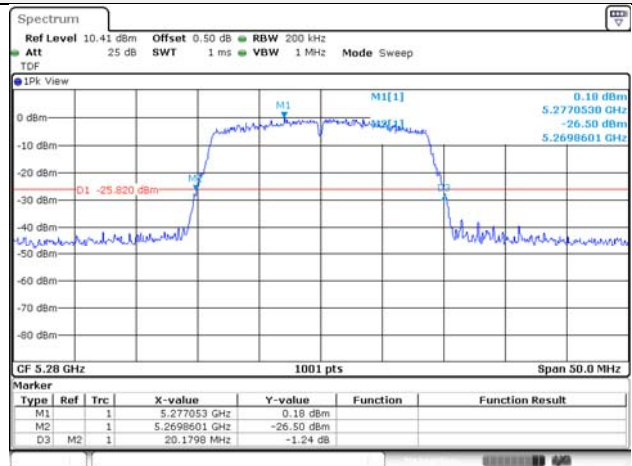
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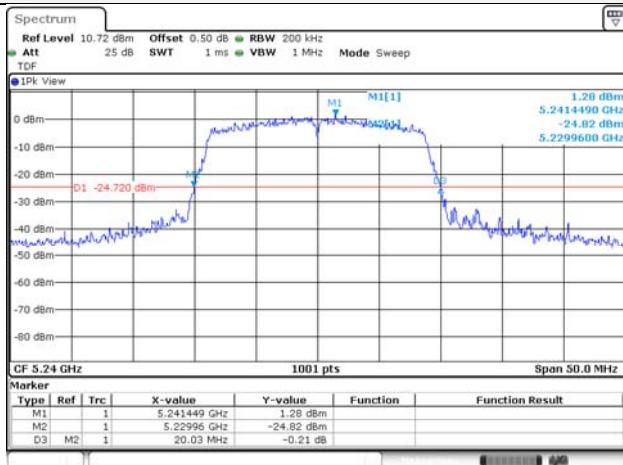
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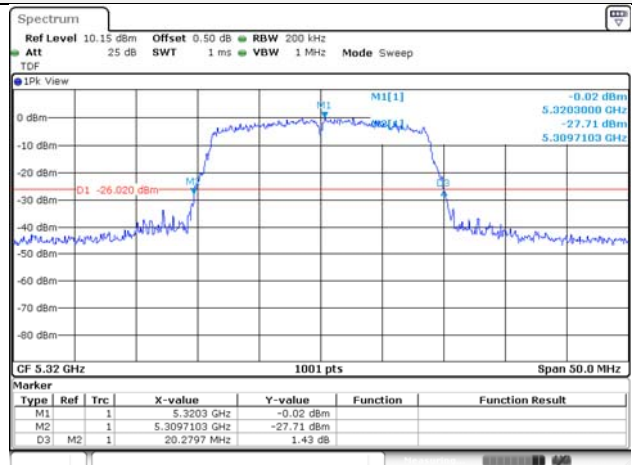
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UNII-1 / 802.11ac VHT20 / High ch.



UNII-2A / 802.11ac VHT20 / High ch.



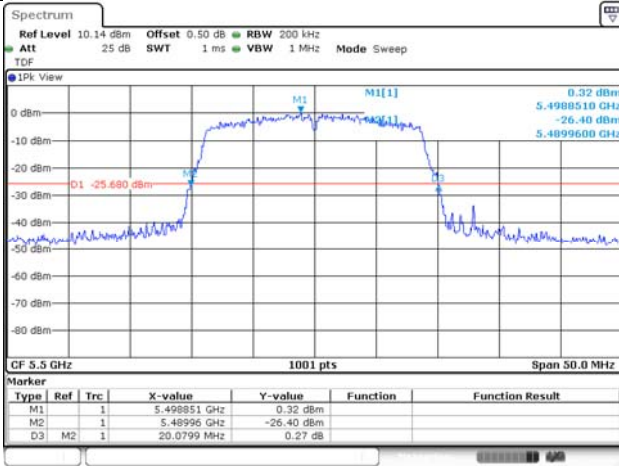
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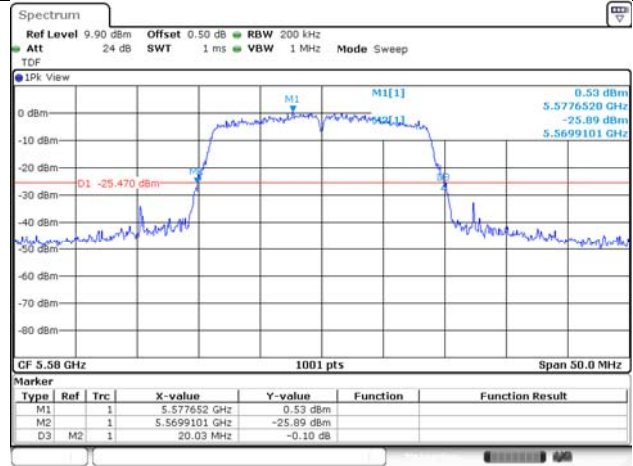
Report No.:
KR21-SRF0065-B
Page (86) of (319)



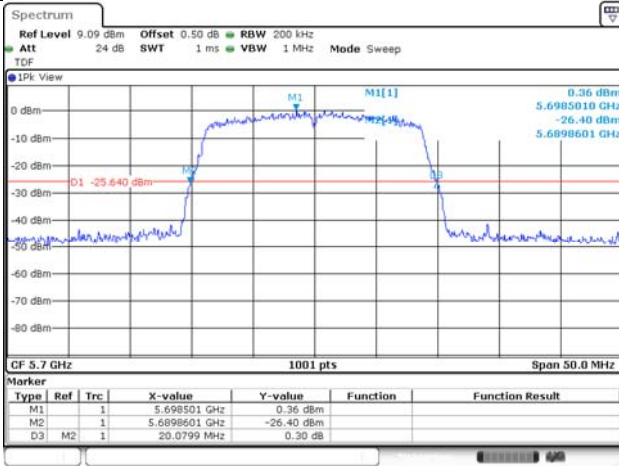
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UNII-2C / 802.11ac VHT20 / Mid ch.



UNII-2C / 802.11ac VHT20 / High ch.



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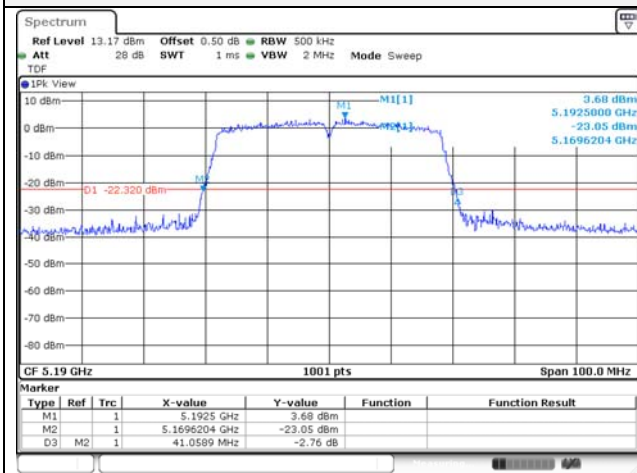
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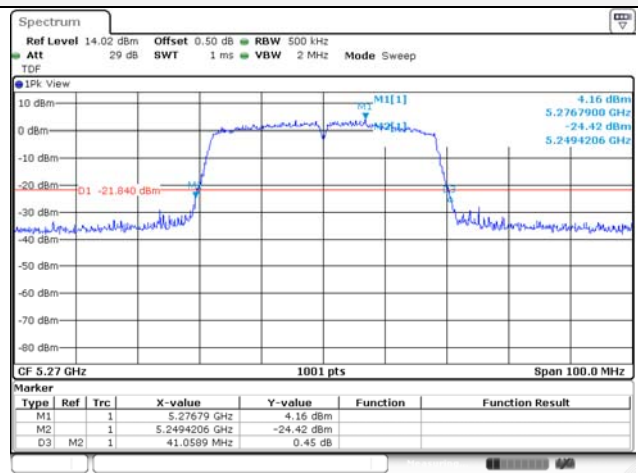
Report No.:
KR21-SRF0065-B
Page (87) of (319)



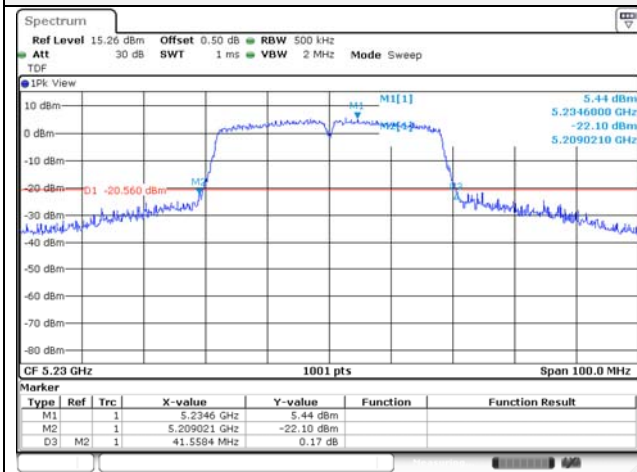
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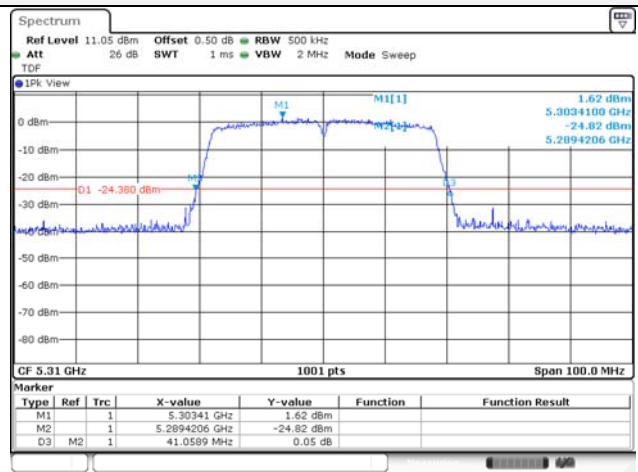
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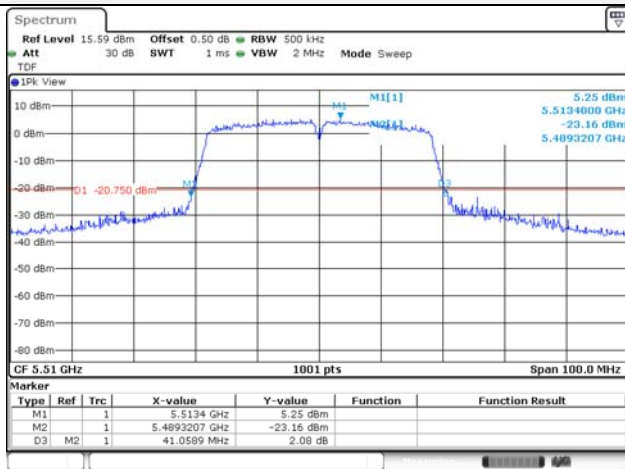
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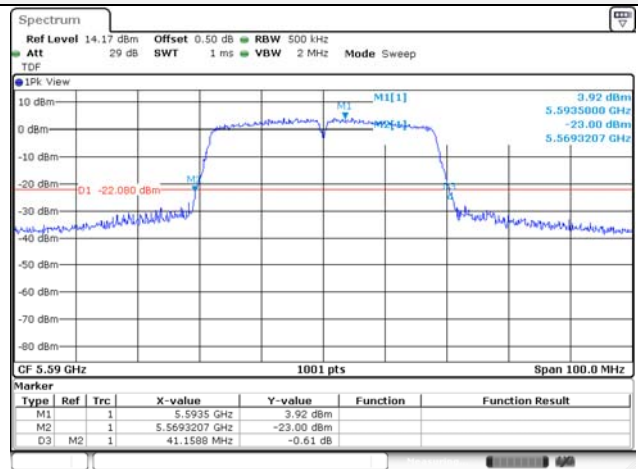
Report No.:
KR21-SRF0065-B
Page (88) of (319)



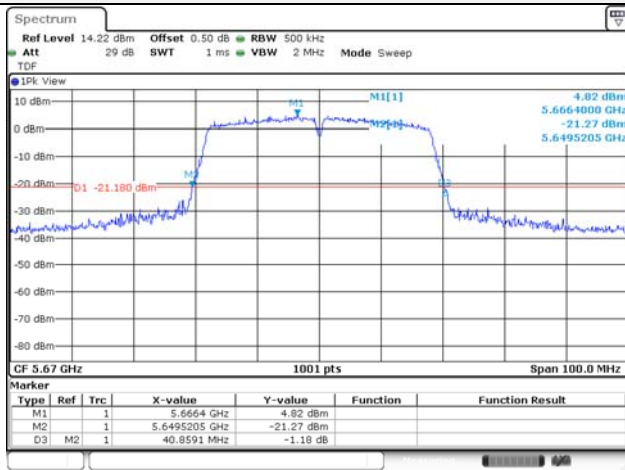
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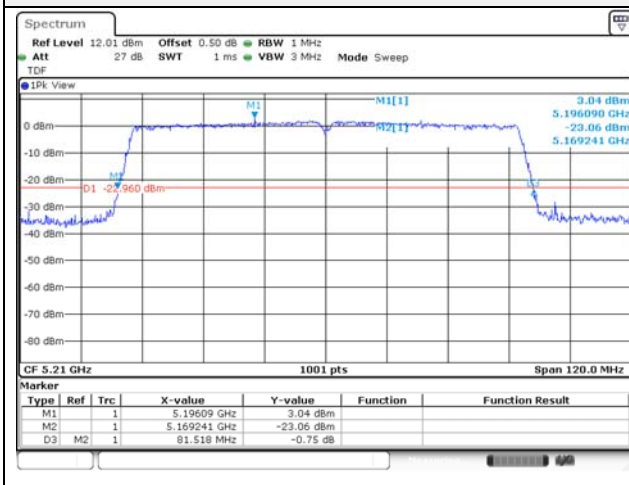
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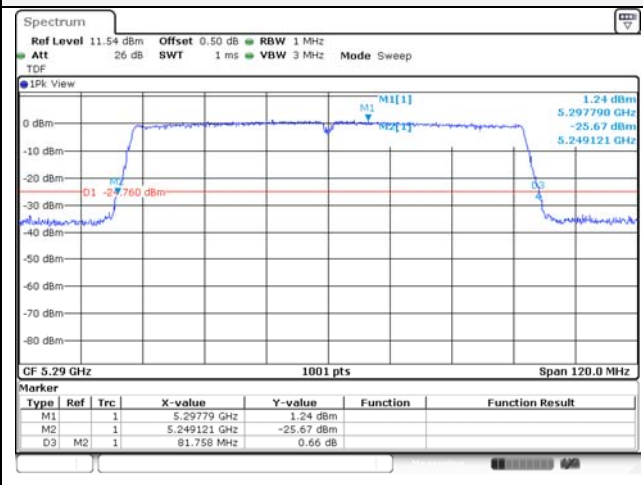
Report No.:
KR21-SRF0065-B
Page (89) of (319)



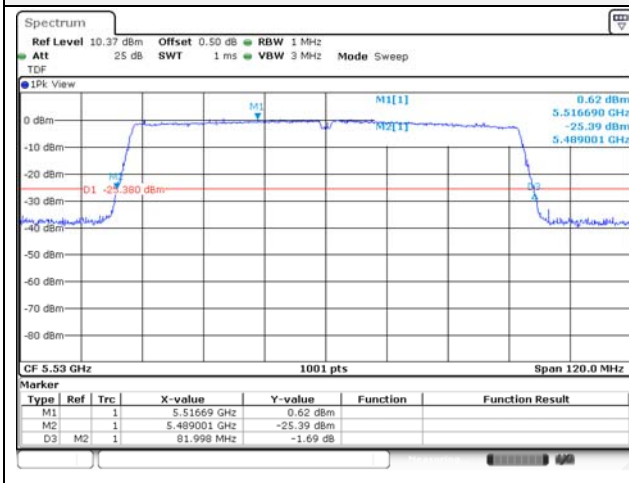
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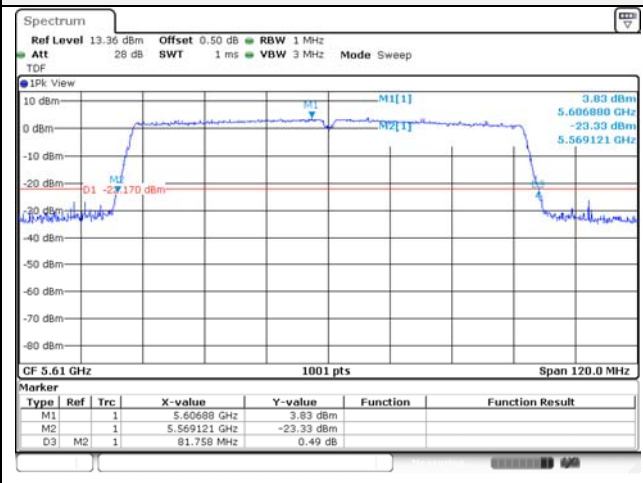
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UNII-2C / 802.11ac VHT80 / Low ch.



UNII-2C / 802.11ac VHT80 / High ch.



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Report No.:
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Page (90) of (319)



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