802.11n_HT40 (Band 1)_MCS0

A. Low Channel (5 190 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
*4 500.00	38.16	Peak	H	32.10	-33.56	-	36.70	74.00	37.30
*4 500.00	30.11	Average	H	32.10	-33.56	0.61	29.26	54.00	24.74
*5 142.53	44.92	Peak	H	33.49	-32.67	-	45.74	74.00	28.26
*5 148.06	35.13	Average	H	33.50	-32.67	0.61	36.57	54.00	17.43
*5 150.00	42.63	Peak	H	33.50	-32.67	-	43.46	74.00	30.54
*5 150.00	35.17	Average	H	33.50	-32.67	0.61	**36.61**	54.00	17.39

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
Above 1 000.00	Not detected	-	-	-	-	-	-	-	-

B. High Channel (5 230 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
Above 1 000.00	Not detected	-	-	-	-	-	-	-	-

802.11n_HT40 (Band 2A)_MCS0

A. Low Channel (5 270 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
Above 1 000.00	Not detected	-	-	-	-	-	-	-	-

B. High Channel (5 310 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
*5 350.00	46.70	Peak	V	33.90	-32.44	-	48.16	74.00	25.84
*5 350.00	37.74	Average	V	33.90	-32.44	0.61	39.81	54.00	14.19
*5 351.47	49.85	Peak	V	33.90	-32.44	-	51.31	74.00	22.69
*5 350.27	37.99	Average	V	33.90	-32.44	0.61	**40.06**	54.00	13.94
*5 460.00	37.15	Peak	V	33.90	-32.21	-	38.84	74.00	35.16
*5 460.00	29.35	Average	V	33.90	-32.21	0.61	31.65	54.00	22.35

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
Above 1 000.00	Not detected	-	-	-	-	-	-	-	-

802.11n_HT40 (Band 2C)_MCS0

A. Low Channel (5 510 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
*5 350.00	35.55	Peak	V	33.90	-32.44	-	37.01	74.00	36.99
*5 350.00	29.15	Average	V	33.90	-32.44	0.61	31.22	54.00	22.78
*5 458.57	44.62	Peak	V	33.90	-32.21	-	46.31	74.00	27.69
*5 459.61	34.27	Average	V	33.90	-32.21	0.61	36.57	54.00	17.43
*5 460.00	40.24	Peak	V	33.90	-32.21	-	41.93	74.00	32.07
*5 460.00	34.54	Average	V	33.90	-32.21	0.61	**36.84**	54.00	17.16

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
Above 1 000.00	Not detected	-	-	-	-	-	-	-	-

B. Middle Channel (5 550 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
Above 1 000.00	Not detected	-	-	-	-	-	-	-	-

C. High Channel (5 710 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
Above 1 000.00	Not detected	-	-	-	-	-	-	-	-

802.11n_HT40 (Band 3)_MCS0

A. Low Channel (5 755 ㎒)

Radiated Emissions			Ant.	Correction Factors		Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
5 611.78	41.76	Peak	V	34.00	-32.17	43.59	68.23	24.64
5 694.51	45.11	Peak	V	34.09	-32.08	47.12	101.16	54.04
5 720.00	56.11	Peak	V	34.06	-32.11	58.06	110.83	52.77
5 725.00	56.22	Peak	V	34.05	-32.11	58.16	122.23	64.07

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
Above 1 000.00	Not detected	-	-	-	-	-	-	-	-

B. High Channel (5 795 ㎒)

Radiated Emissions			Ant.	Correction Factors		Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
5 851.50	47.32	Peak	V	34.30	-31.94	49.68	118.81	69.13
5 860.69	43.11	Peak	V	34.32	-31.95	45.48	109.23	63.75
5 875.00	41.29	Peak	V	34.35	-31.97	43.67	105.23	61.56
5 951.91	41.55	Peak	V	34.60	-31.90	**44.25**	68.25	24.00

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
Above 1 000.00	Not detected	-	-	-	-	-	-	-	-

802.11ac_VHT80 (Band 1)_MCS0

A. Middle Channel (5 210 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
*4 500.00	37.99	Peak	H	32.10	-33.56	-	36.53	74.00	37.47
*4 500.00	29.41	Average	H	32.10	-33.56	1.17	29.12	54.00	24.88
*5 147.27	46.98	Peak	H	33.49	-32.67	-	47.80	74.00	26.20
*5 146.48	36.42	Average	H	33.49	-32.67	1.17	**38.41**	54.00	15.59
*5 150.00	45.79	Peak	H	33.50	-32.67	-	46.62	74.00	27.38
*5 150.00	35.85	Average	H	33.50	-32.67	1.17	37.85	54.00	16.15

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
Above 1 000.00	Not detected	-	-	-	-	-	-	-	-

802.11ac_VHT80 (Band 2A)_MCS0

A. Middle Channel (5 290 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
*5 350.00	48.70	Peak	V	33.90	-32.44	-	50.16	74.00	23.84
*5 350.00	38.23	Average	V	33.90	-32.44	1.17	40.86	54.00	13.14
*5 351.71	49.67	Peak	V	33.90	-32.44	-	51.13	74.00	22.87
*5 353.63	38.81	Average	V	33.91	-32.44	1.17	**41.45**	54.00	12.55
*5 460.00	39.05	Peak	V	33.90	-32.21	-	40.74	74.00	33.26
*5 460.00	30.65	Average	V	33.90	-32.21	1.17	33.51	54.00	20.49

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
Above 1 000.00	Not detected	-	-	-	-	-	-	-	-

802.11ac_VHT80 (Band 2C)_MCS0

A. Low Channel (5 530 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
*5 350.00	37.14	Peak	V	33.90	-32.44	-	38.60	74.00	35.40
*5 350.00	29.28	Average	V	33.90	-32.44	1.17	31.91	54.00	22.09
*5 455.45	49.32	Peak	V	33.90	-32.21	-	51.01	74.00	22.99
*5 458.05	39.26	Average	V	33.90	-32.21	1.17	**42.12**	54.00	11.88
*5 460.00	47.05	Peak	V	33.90	-32.21	-	48.74	74.00	25.26
*5 460.00	38.01	Average	V	33.90	-32.21	1.17	40.87	54.00	13.13

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
Above 1 000.00	Not detected	-	-	-	-	-	-	-	-

B. High Channel (5 690 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
Above 1 000.00	Not detected	-	-	-	-	-	-	-	-

802.11ac_VHT80 (Band 3)_MCS0

A. Middle Channel (5 775 ㎒)

Radiated Emissions			Ant.	Correction Factors		Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
5 648.02	42.44	Peak	V	34.00	-32.13	44.31	68.23	23.92
5 693.28	49.71	Peak	V	34.09	-32.08	51.72	100.25	48.53
5 718.47	56.43	Peak	V	34.06	-32.11	58.38	110.40	52.02
5 723.80	56.25	Peak	V	34.05	-32.11	58.19	119.49	61.30
5 850.00	47.56	Peak	V	34.30	-31.94	49.92	122.23	72.31
5 855.63	48.28	Peak	V	34.31	-31.95	50.64	110.65	60.01
5 911.01	42.51	Peak	V	34.44	-31.98	44.97	78.58	33.61
5 925.25	43.16	Peak	V	34.50	-31.96	**45.70**	68.23	22.53

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
Above 1 000.00	Not detected	-	-	-	-	-	-	-	-

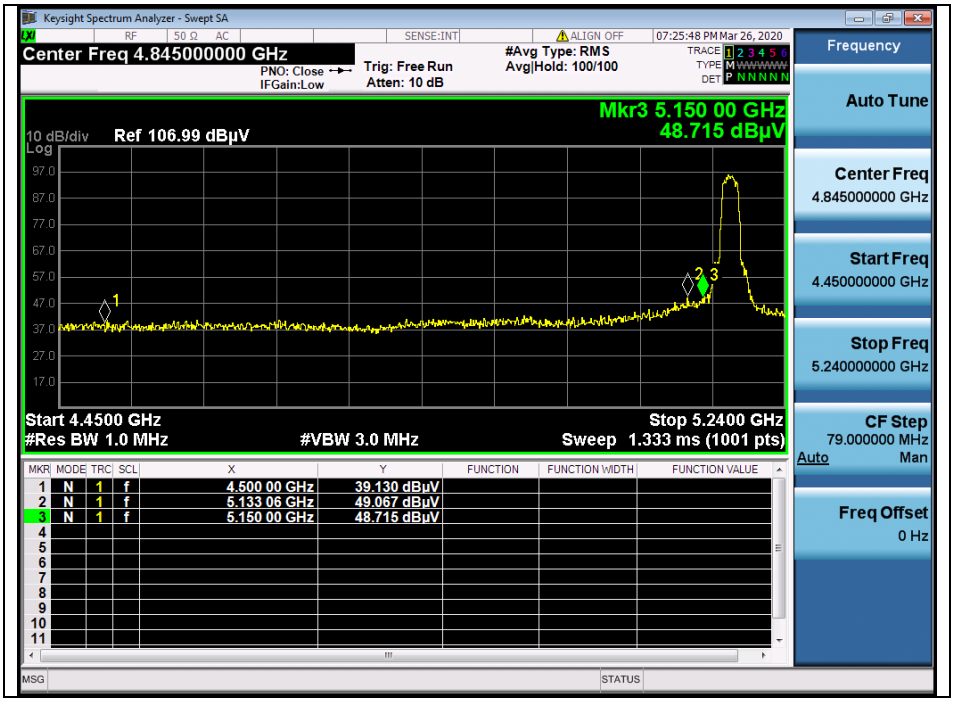
Remark;

1. "*" means the restricted band.
2. Radiated emissions measured in frequency above 1 000 ㎒ were made with an instrument using Peak / average detector mode if frequency was in restricted band. Otherwise the frequency was out of restricted band, only peak detector should be used.
3. Actual = Reading + AF + AMP + CL + (DF).
4. If frequency was out of restricted band, the calculation method for peak limit is same as below.
   68.23 dB㎶/m = EIRP - 20 log (d) + 104.77 = -27 - 20 log (3) + 104.77
5. In case of the emissions within ±75 ㎒ from band edge of band 3, limit should be adjusted to emission mask of 15.407(4)(i).
6. According to § 15.31(o), emission levels are not reported much lower than the limits by over 20 dB.
7. The maximized peak measured value complies with the average limit, to perform an average measurement is unnecessary.

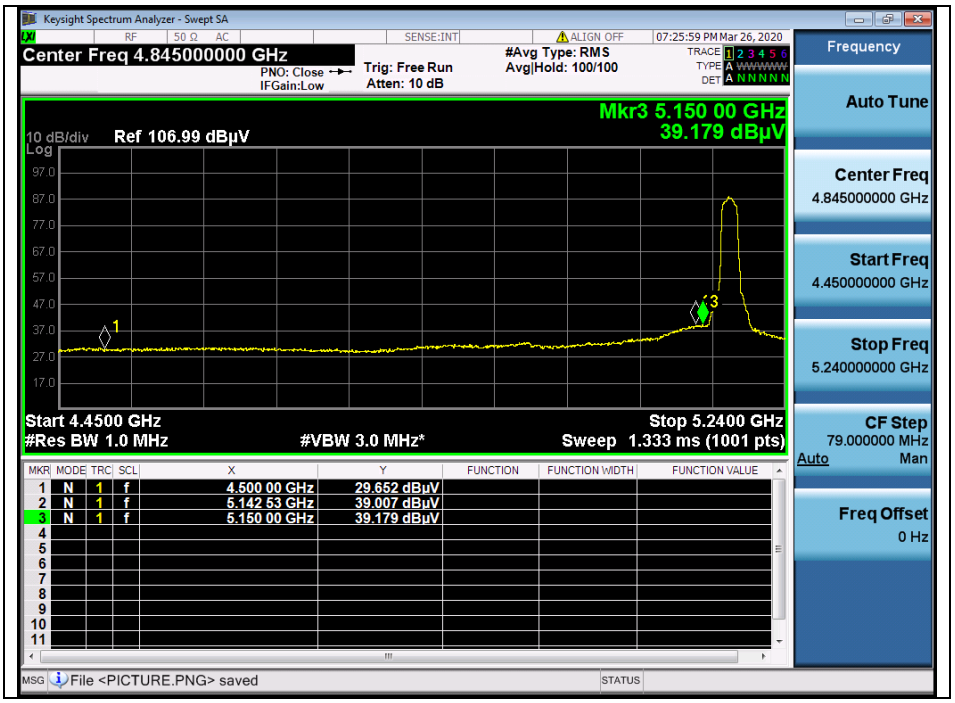
- Test plots

OFDM: 802.11a (6 Mbps)

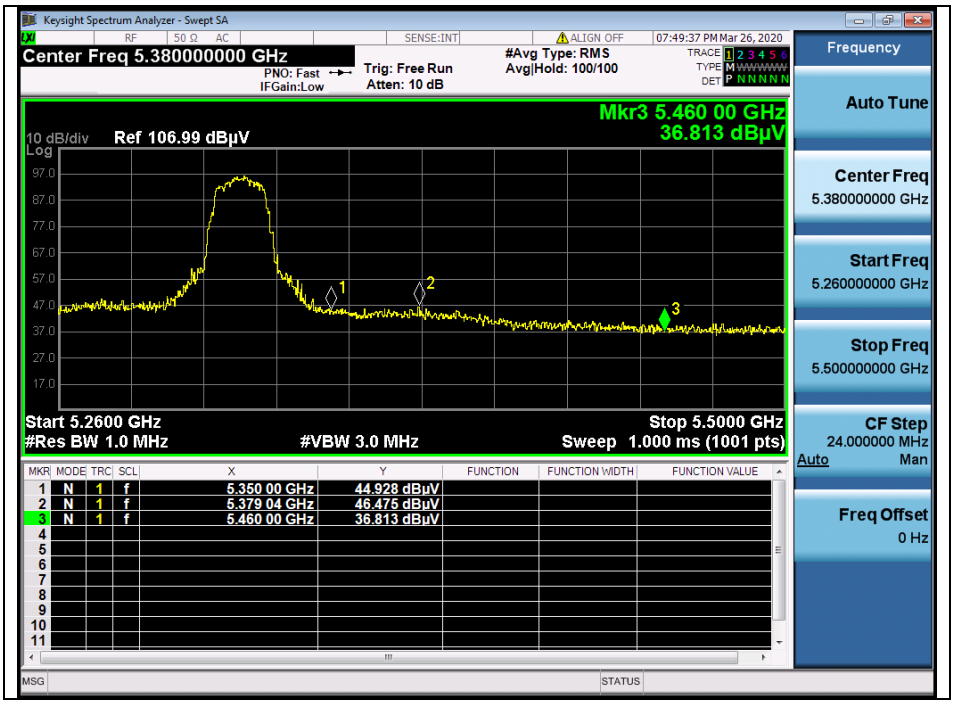
Low channel Band edge (Peak) - Band 1



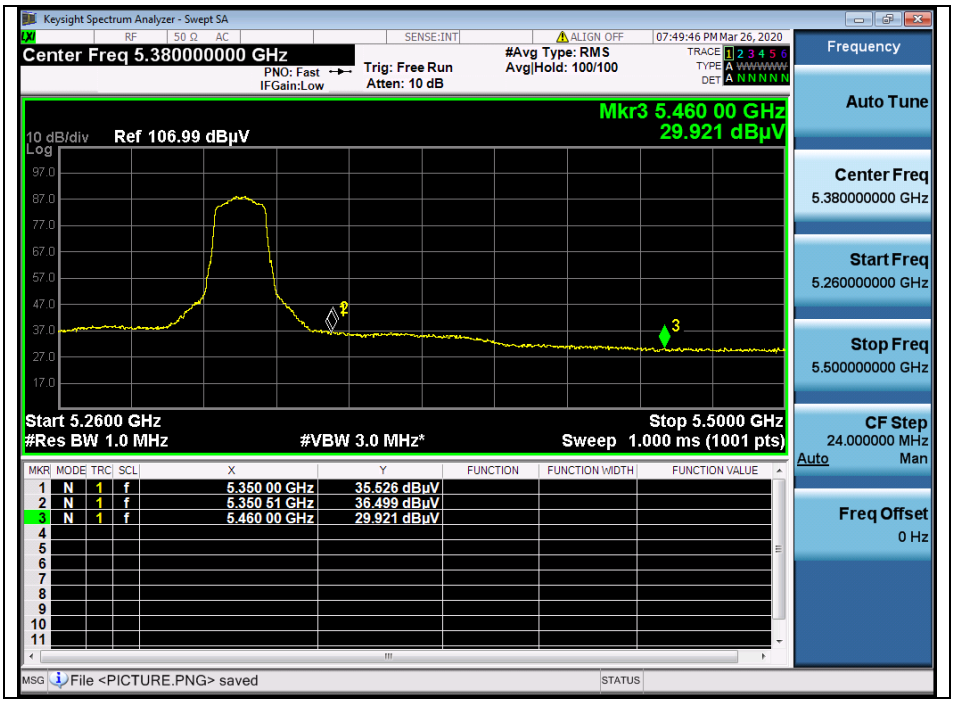
Low channel Band edge (Average) - Band 1



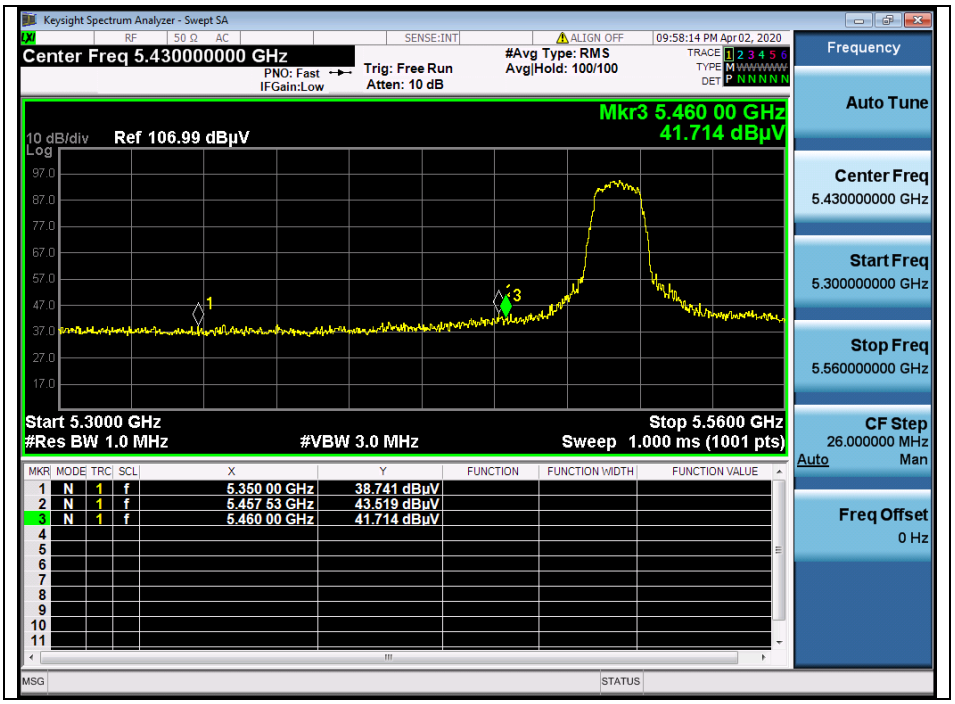
High channel Band edge (Peak) - Band 2A



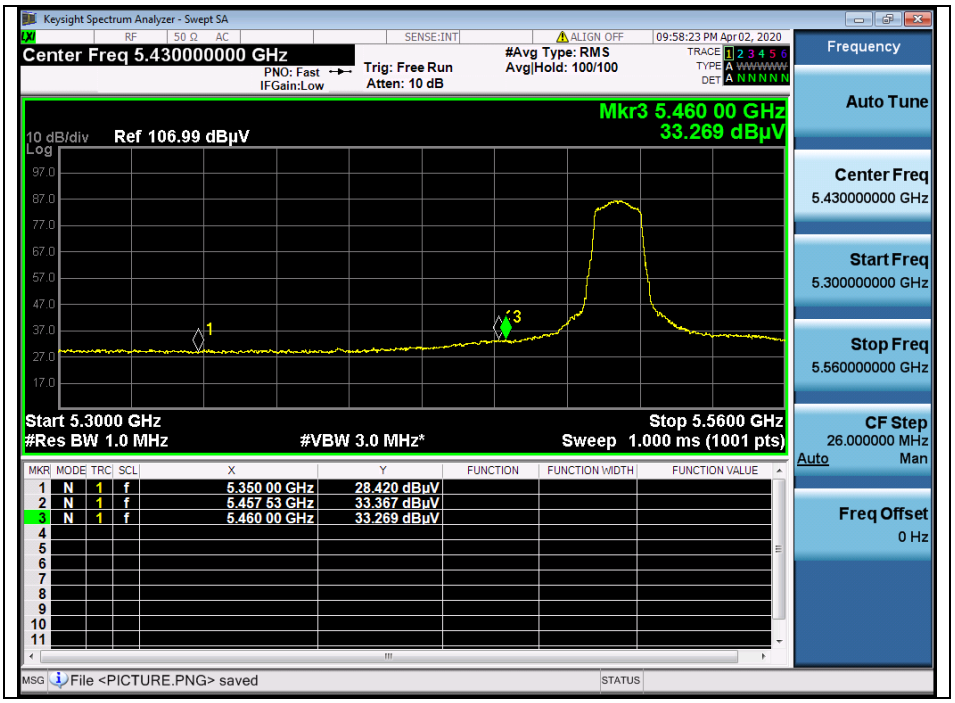
High channel Band edge (Average) - Band 2A



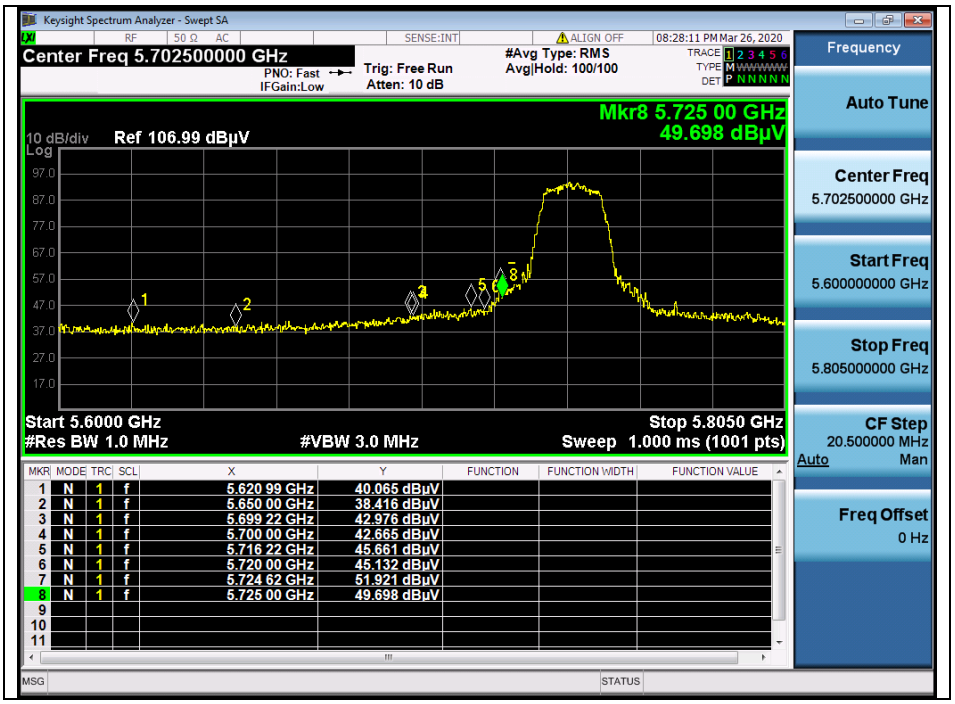
Low channel Band edge (Peak) - Band 2C



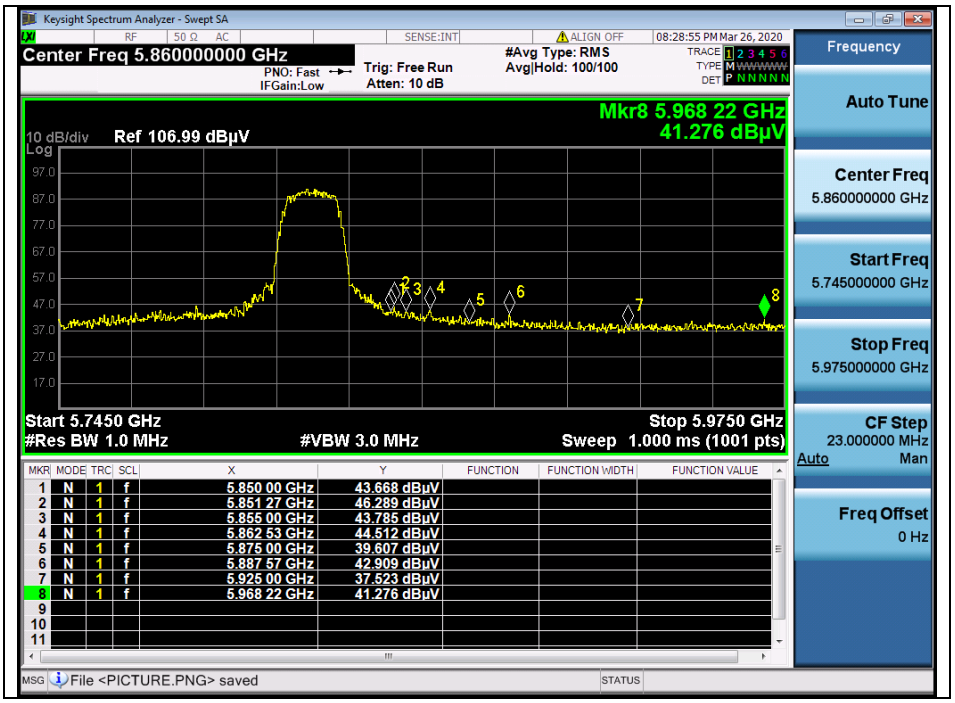
Low channel Band edge (Average) - Band 2C



Low channel Band edge (Peak) - Band 3

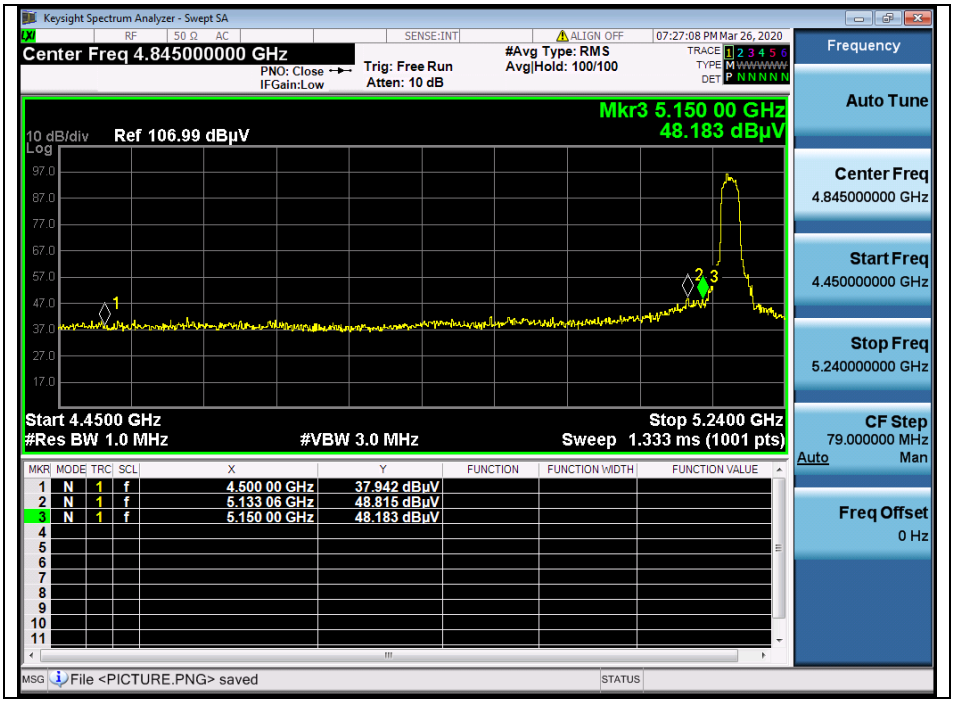


High channel Band edge (Peak) - Band 3

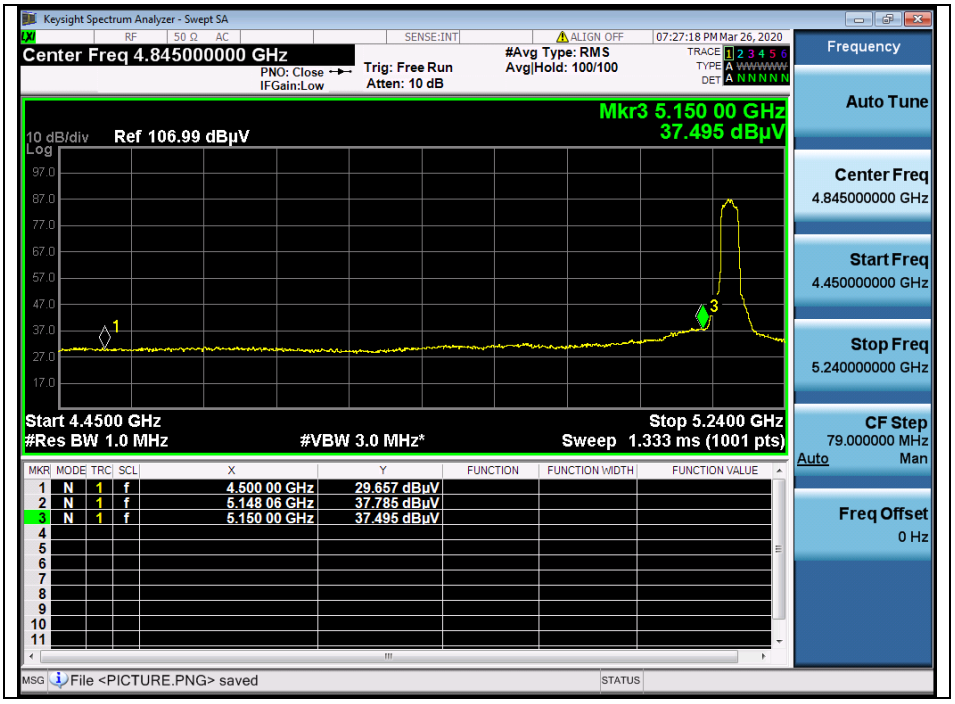


OFDM: 802.11n_HT20 (MCS2)

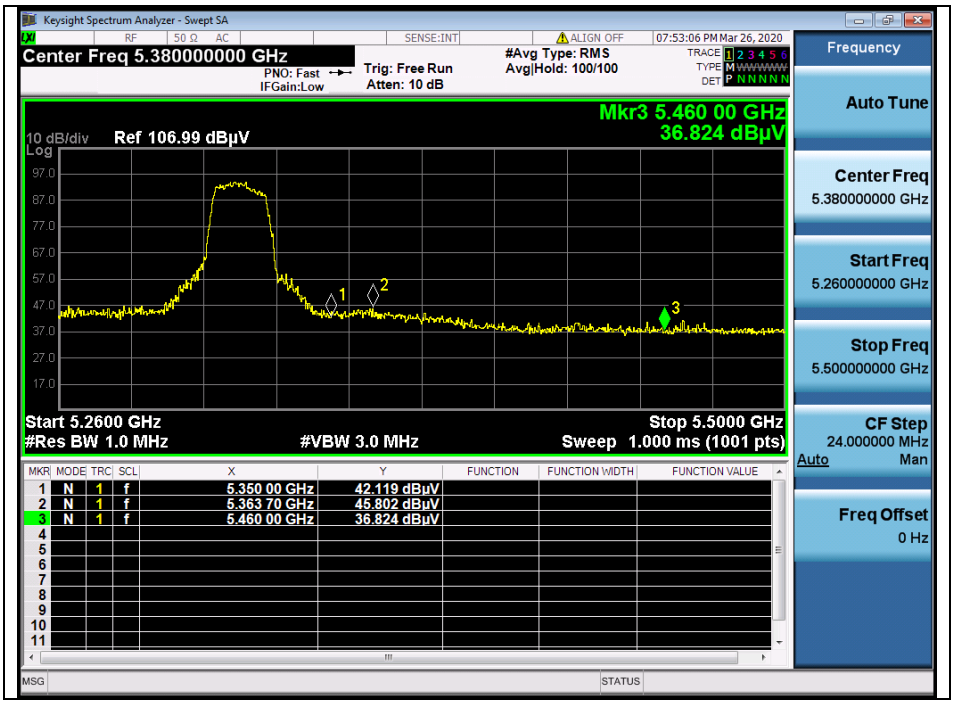
Low channel Band edge (Peak) - Band 1



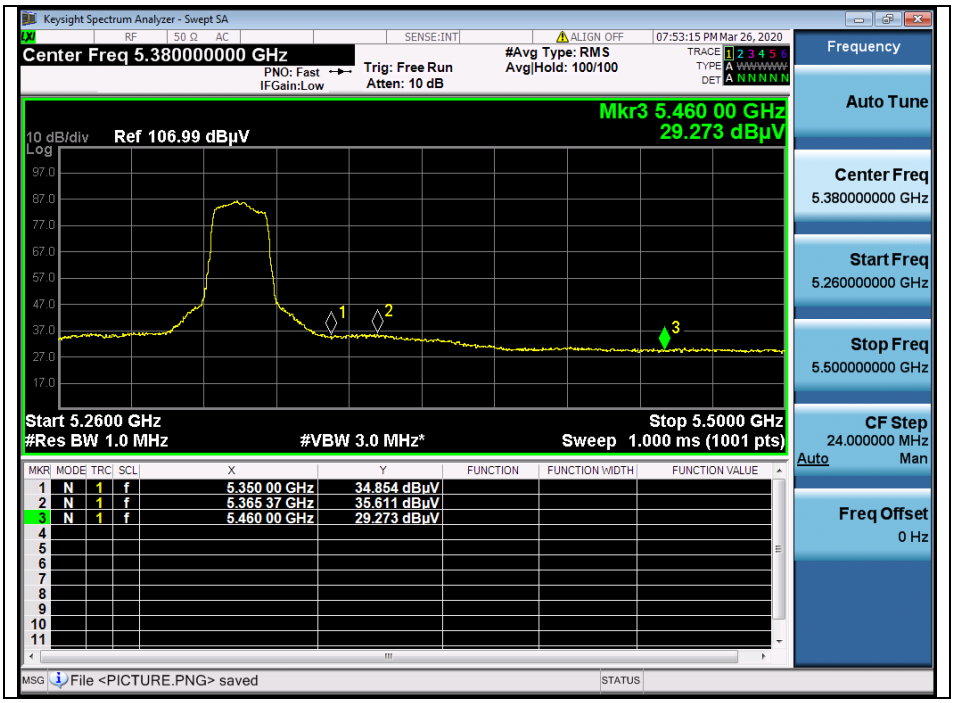
Low channel Band edge (Average) - Band 1



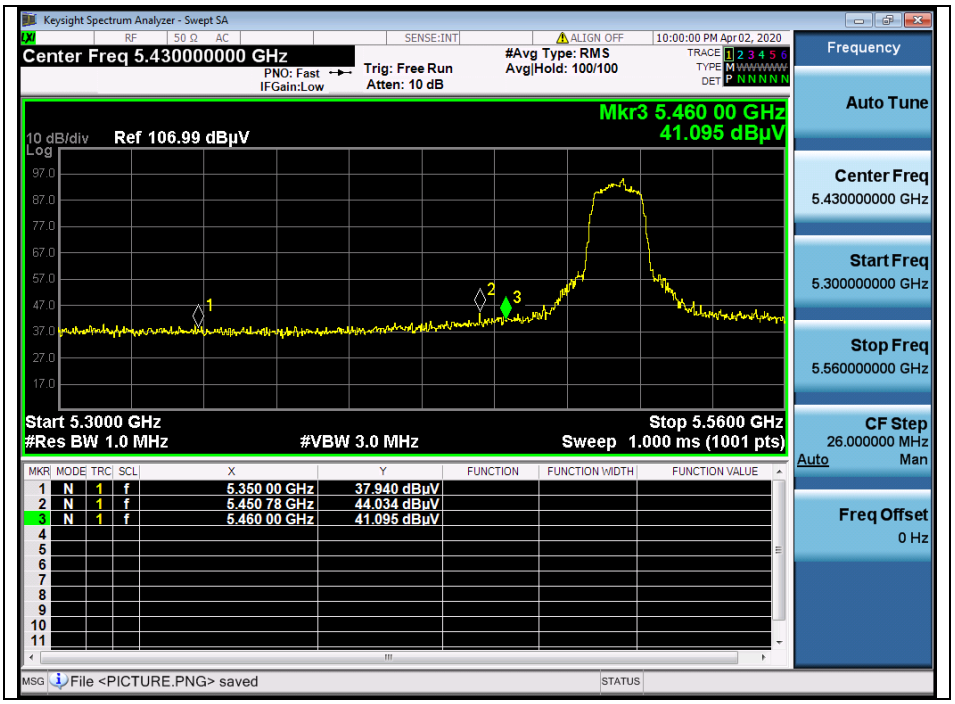
High channel Band edge (Peak) - Band 2A



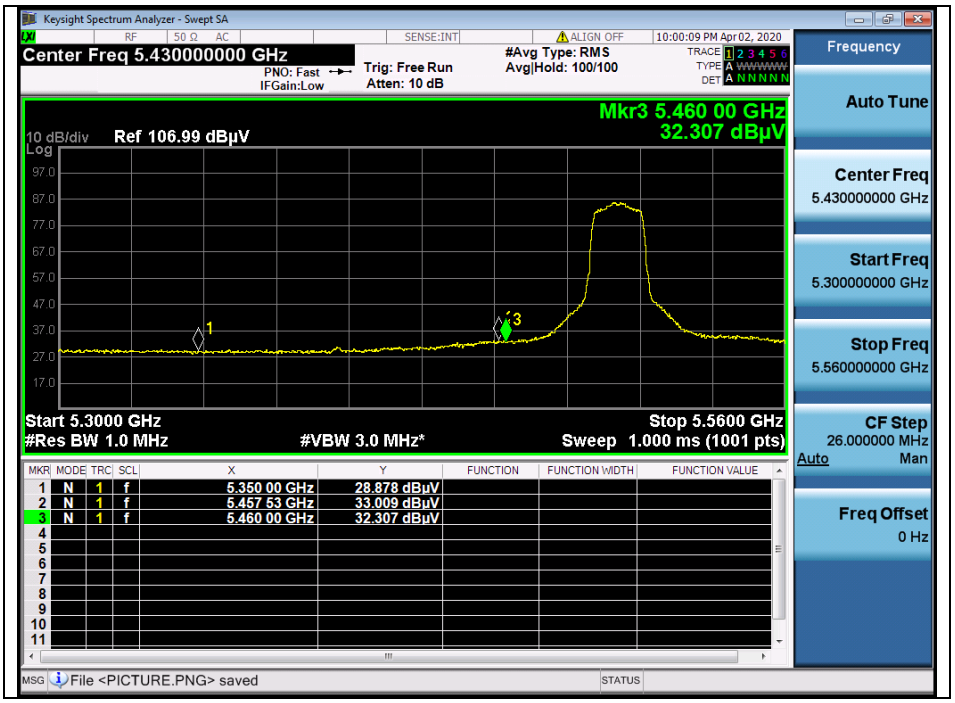
High channel Band edge (Average) - Band 2A



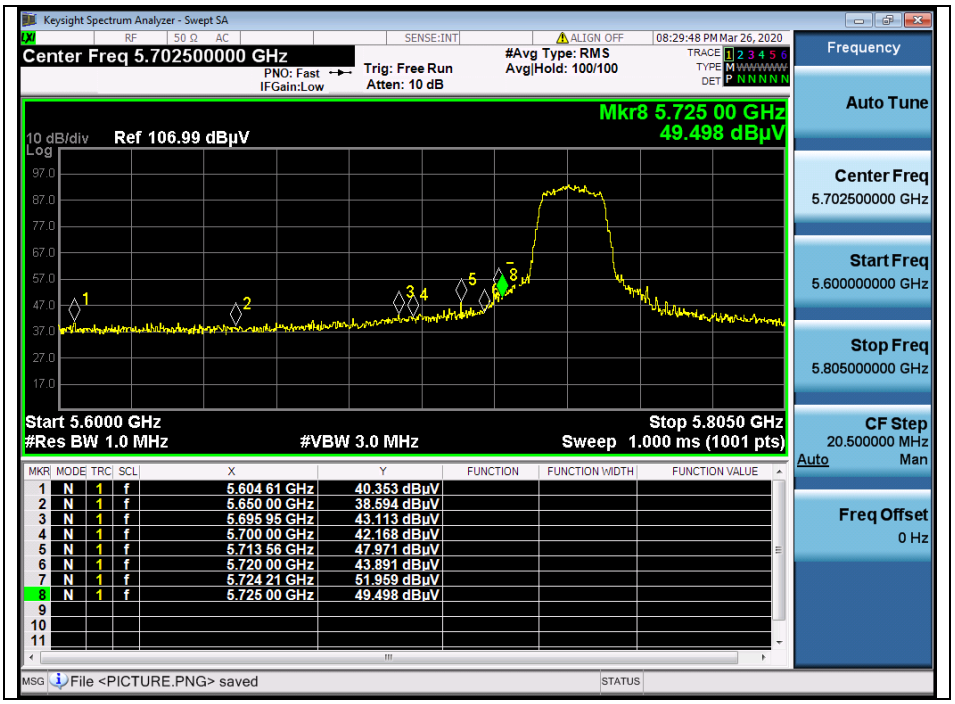
Low channel Band edge (Peak) - Band 2C



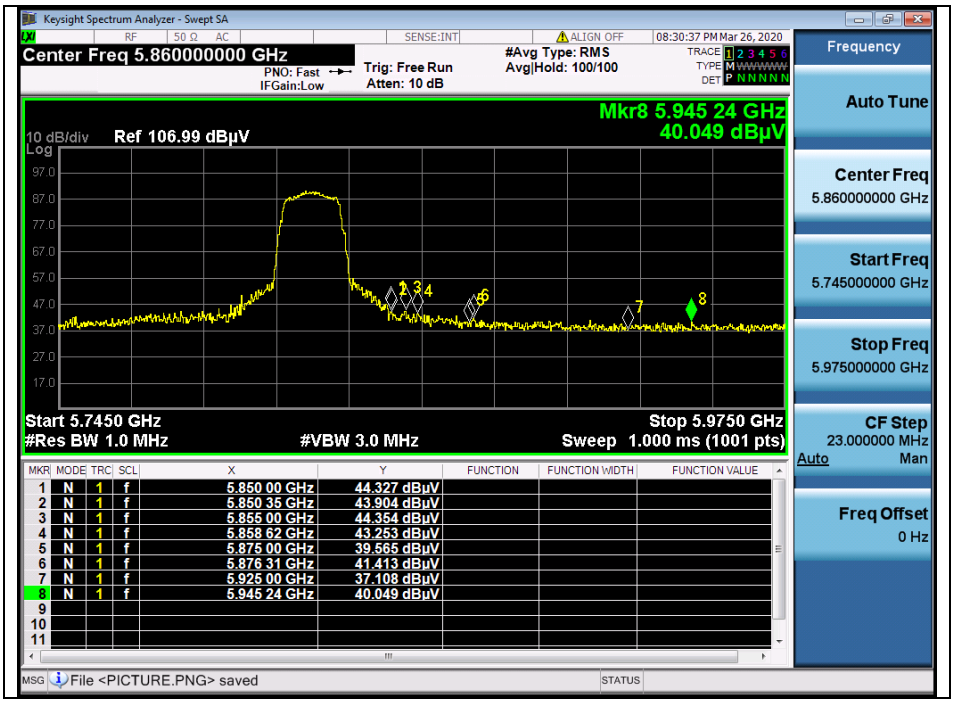
Low channel Band edge (Average) - Band 2C



Low channel Band edge (Peak) - Band 3

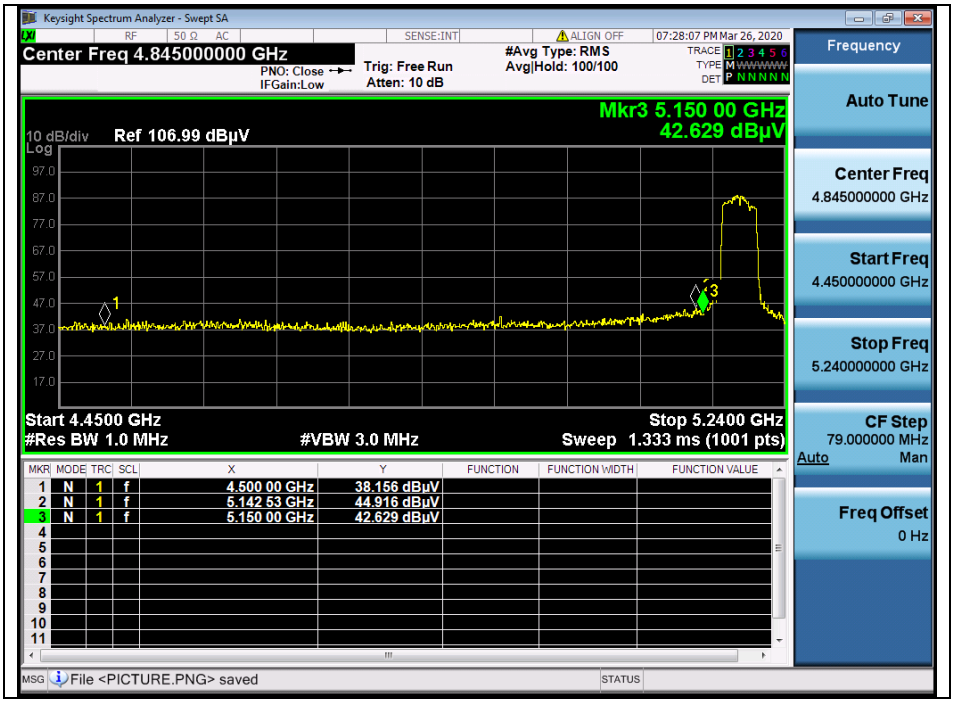


High channel Band edge (Peak) - Band 3

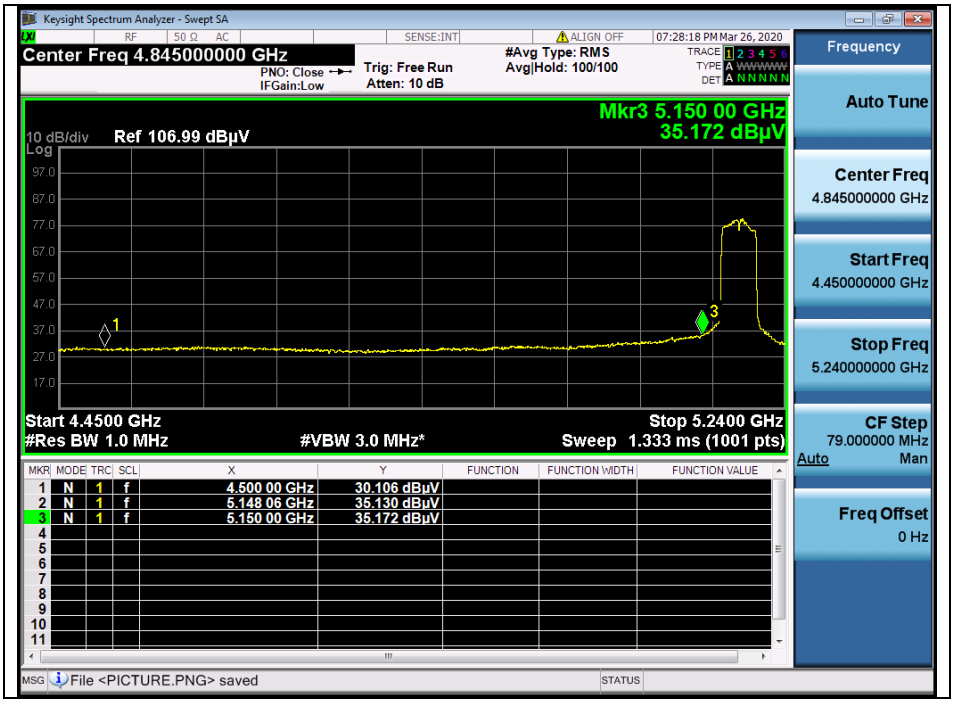


OFDM: 802.11n_HT40 (MCS0)

Low channel Band edge (Peak) - Band 1

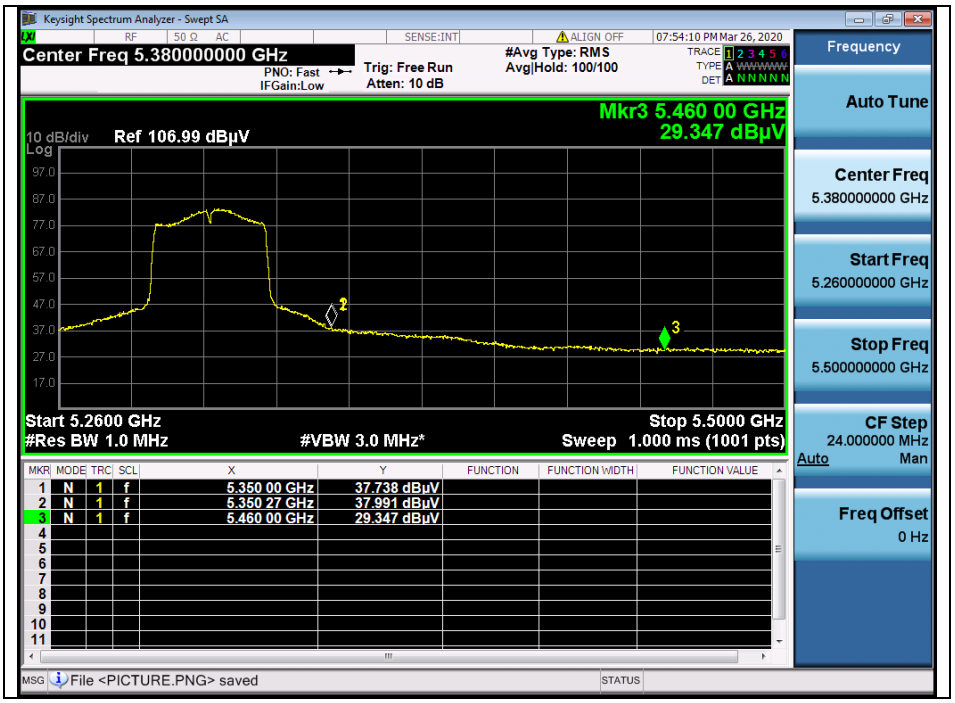


Low channel Band edge (Average) - Band 1

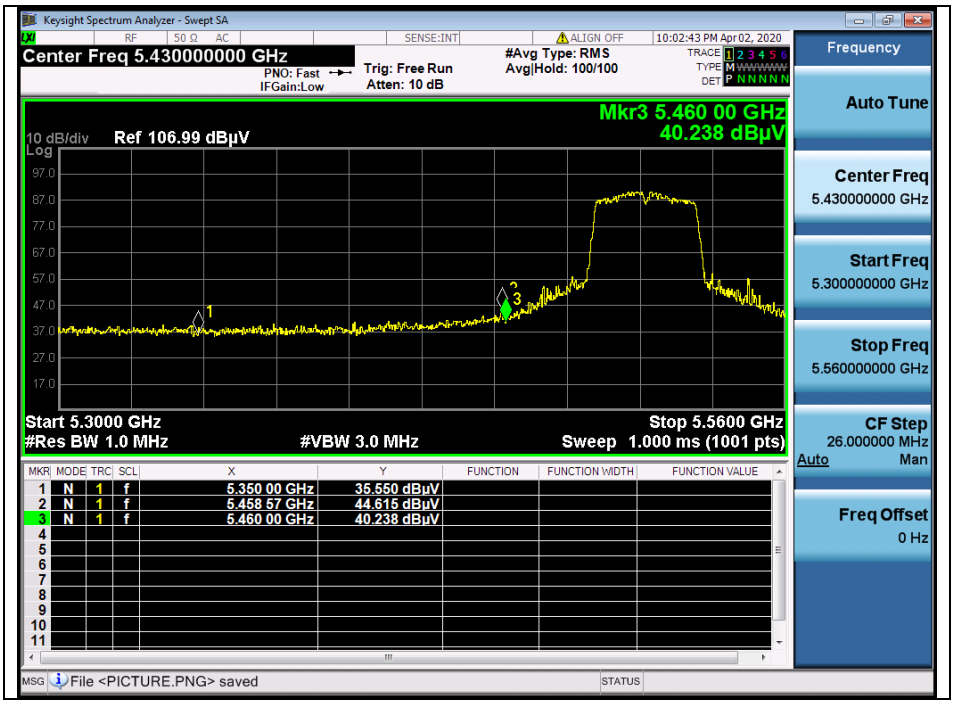


High channel Band edge (Peak) - Band 2A

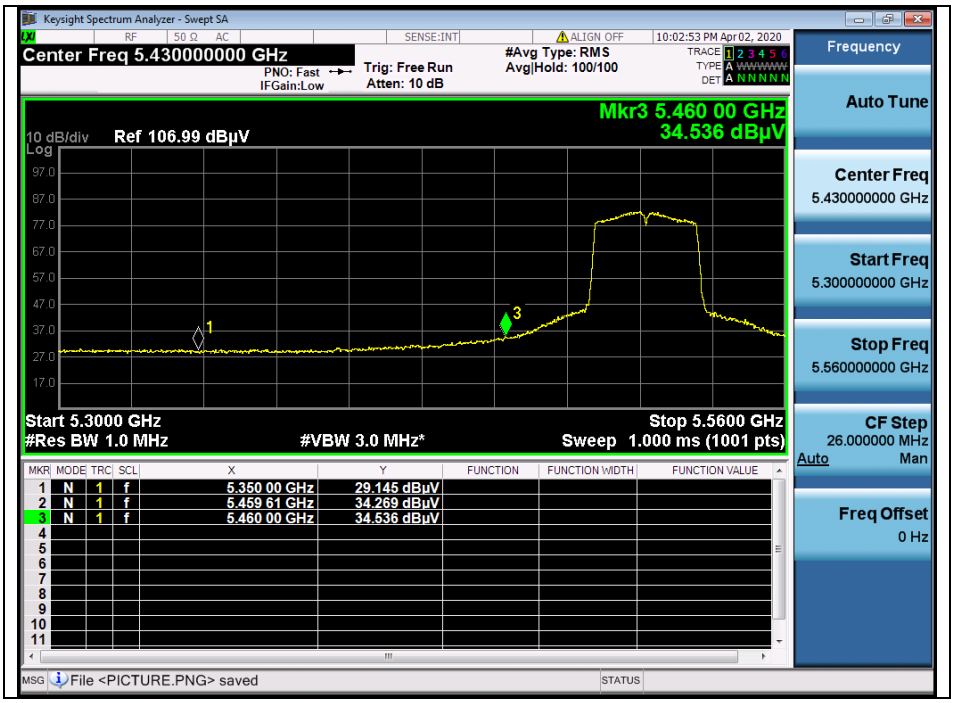
High channel Band edge (Average) - Band 2A



Low channel Band edge (Peak) - Band 2C



Low channel Band edge (Average) - Band 2C

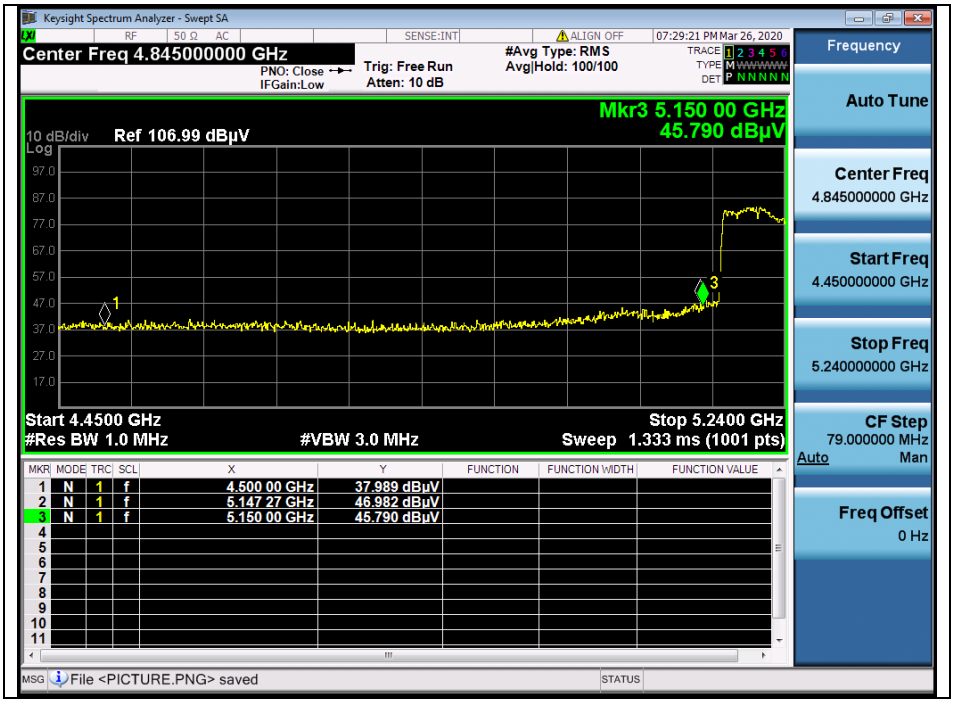


Low channel Band edge (Peak) - Band 3

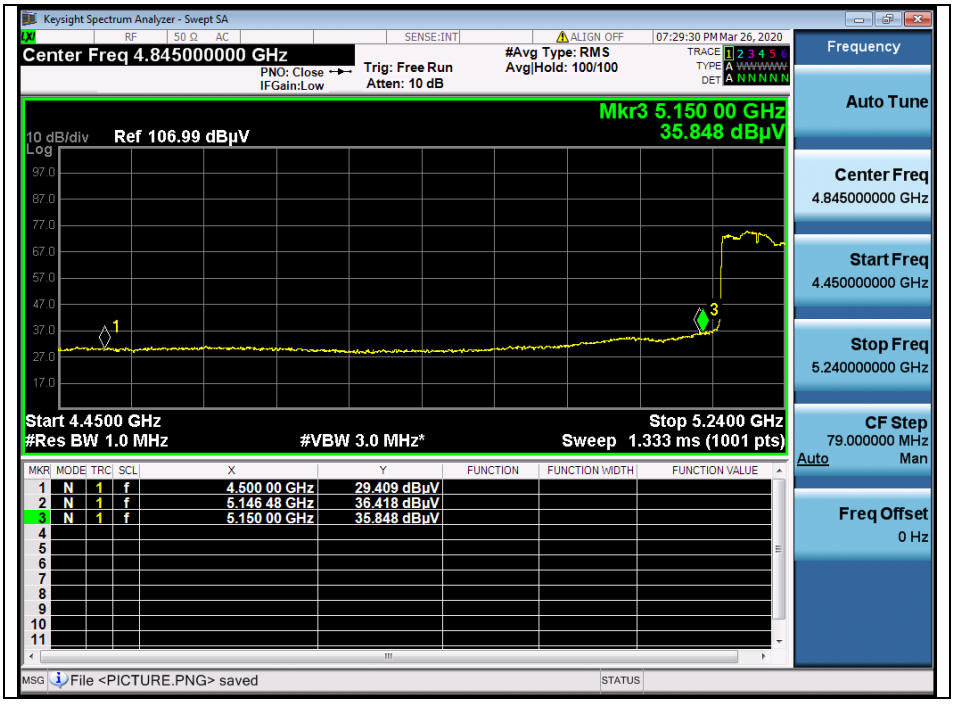
High channel Band edge (Peak) - Band 3

OFDM: 802.11ac_VHT80 (MCS0)

Middle channel Band edge (Peak) - Band 1

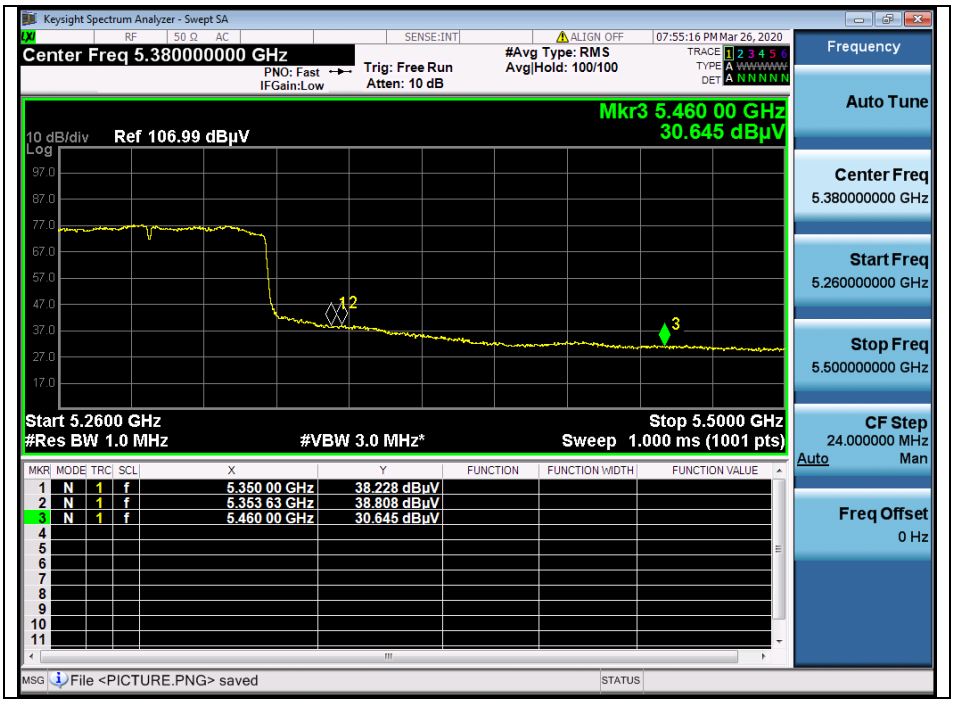


Middle channel Band edge (Average) - Band 1



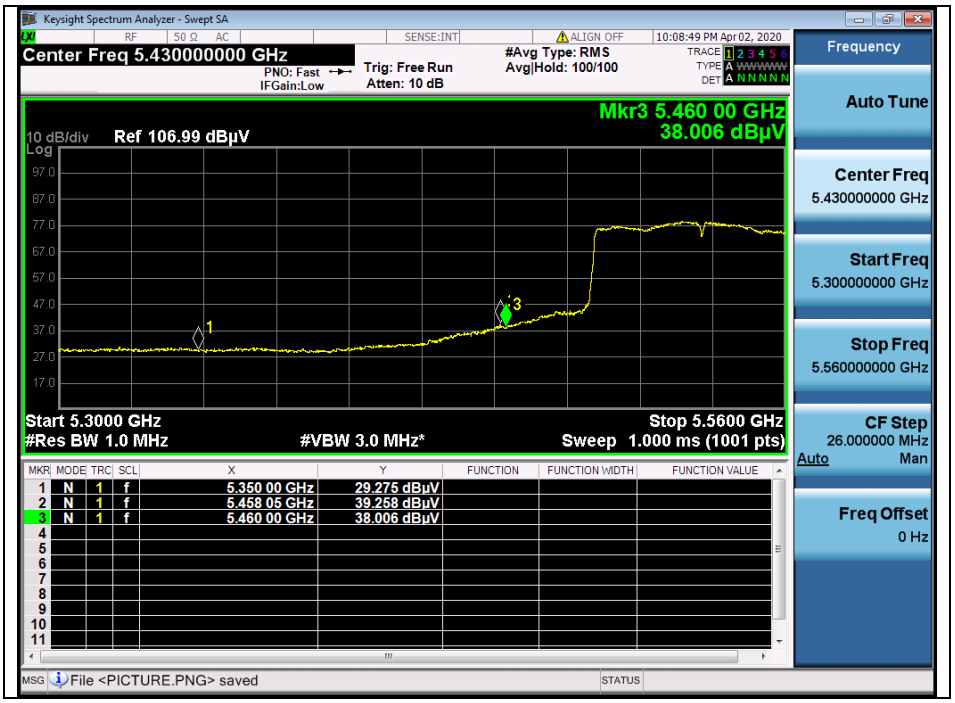
Middle channel Band edge (Peak) - Band 2A

Middle channel Band edge (Average) - Band 2A



Low channel Band edge (Peak) - Band 2C

Low channel Band edge (Average) - Band 2C

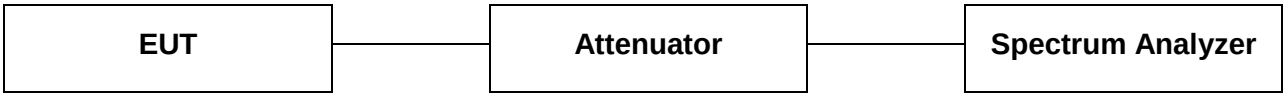


Middle channel Band edge (Peak) - Band 3

Middle channel Band edge (Peak) - Band 3

3. 26 ㏈ Bandwidth & 99 % Bandwidth

3.1. Test Setup



3.2. Limit

None; for reporting purpose only.

3.3. Test Procedure

All data rates and modes were investigated for this test. The full data for the worst case data rate are reported in this section.

3.3.1. 26 ㏈ Bandwidth

1. This measurement settings are specified in section Ⅱ.C.1 of KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
2. Set RBW = approximately 1 % of the emission bandwidth.
3. Set the VBW > RBW.
4. Detector = Peak.
5. Trace mode = max hold.
6. Measure the maximum width of the emission that is 26 ㏈ down from the peak 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 %.

3.3.2. 99 % Bandwidth

3.3.2.1 FCC

1. This measurement settings are specified in section Ⅱ.D of KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
2. Set center frequency to the nominal EUT channel center frequency.
3. Set span = 1.5 times to 5.0 times the OBW.
4. Set RBW = 1 % to 5 % of the OBW.
5. Set VBW ≥ 3 x RBW.
6. 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.
7. Use the 99 % power bandwidth function of the instrument (if available).
8. 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.

In the result,
- DFS requirements are not applicable in the 5 150 ㎒ ~ 5 250 ㎒.

Remark;

In case of band crossing channels 138, 142 and 144, the measurement is complied with section Ⅲ.A of KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

3.3.2.2 IC

● The span of the spectrum analyzer shall be set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency, but small enough to avoid having other emissions (e.g. on adjacent channels) within the span.

● The detector of the spectrum analyzer shall be set to “Sample”. However, a peak, or peak hold, may be used in place of the sampling detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or “Max Hold”) may be necessary to determine the occupied / x ㏈ bandwidth if the device is not transmitting continuously.

● The resolution bandwidth (RBW) shall be in the range of 1 % to 5 % of the actual occupied / x ㏈ bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted.

Note: It may be necessary to repeat the measurement a few times until the RBW and VBW are in compliance with the above requirement.

For the 99 % emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99 % emission bandwidth).

3.4. Test Result

Ambient temperature : (23 ± 1) ℃
Relative humidity : 47 % R.H.

Test mode: 11a

Band	Frequency (㎒)	Ch.	Data Rate (Mbps)	26 ㏈ Bandwidth (㎒)	99 % Bandwidth (㎒)
U-NII 1	5 180	36	6	20.897	17.019
	5 220	44		21.013	17.019
	5 240	48		21.071	17.019
U-NII 2A	5 260	52		21.013	17.019
	5 300	60		21.245	17.019
	5 320	64		21.071	17.019
U-NII 2C	5 500	100		21.187	17.019
	5 580	116		21.013	17.077
	5 720	144		21.187	17.077
U-NII 3	5 745	149		21.071	17.077
	5 785	157		21.013	17.077
	5 825	165		21.013	17.077

Test mode: 11n_HT20

Band	Frequency (㎒)	Ch.	Data Rate (Mbps)	26 ㏈ Bandwidth (㎒)	99 % Bandwidth (㎒)
U-NII 1	5 180	36	MCS2	21.418	18.003
	5 220	44		21.360	17.945
	5 240	48		21.418	17.945
U-NII 2A	5 260	52		21.418	17.945
	5 300	60		21.476	17.945
	5 320	64		21.534	17.945
U-NII 2C	5 500	100		21.418	18.003
	5 580	116		21.418	17.945
	5 720	144		21.360	17.945
U-NII 3	5 745	149		21.129	17.945
	5 785	157		21.303	17.945
	5 825	165		21.360	17.945

Test mode: 11n_HT40

Band	Frequency (㎒)	Ch.	Data Rate (Mbps)	26 ㏈ Bandwidth (㎒)	99 % Bandwidth (㎒)
U-NII 1	5 190	38	MCS0	39.826	36.237
	5 230	46		40.058	36.353
U-NII 2A	5 270	54		40.058	36.237
	5 310	62		40.521	36.353
U-NII 2C	5 510	102		40.405	36.353
	5 550	110		40.058	36.237
	5 710	142		40.174	36.353
U-NII 3	5 755	151		40.174	36.353
	5 795	159		40.289	36.353

Test mode: 11ac_VHT80

Band	Frequency (㎒)	Ch.	Data Rate (Mbps)	26 ㏈ Bandwidth (㎒)	99 % Bandwidth (㎒)
U-NII 1	5 210	42	MCS0	81.505	75.485
U-NII 2A	5 290	58		82.431	75.716
U-NII 2C	5 530	106		81.968	75.948
	5 690	138		82.431	75.948
U-NII 3	5 775	155		81.968	75.716

Band-crossing channel

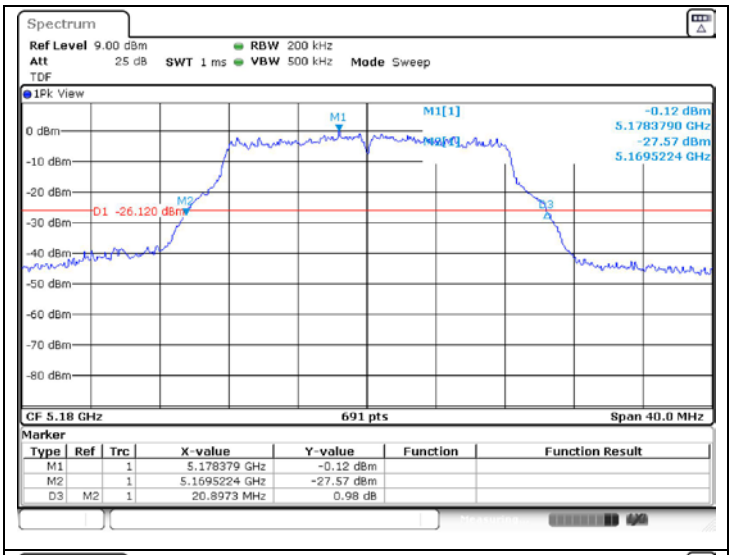
Band	Frequency (㎒)	Ch.	Data Rate (Mbps)	26 ㏈ Bandwidth (㎒)
11a	5 720	144	6	15.536
11n_HT20	5 720	144	MCS2	15.767
11n_HT40	5 710	142	MCS0	35.145
11ac_VHT80	5 690	138	MCS0	76.216

- Test plots

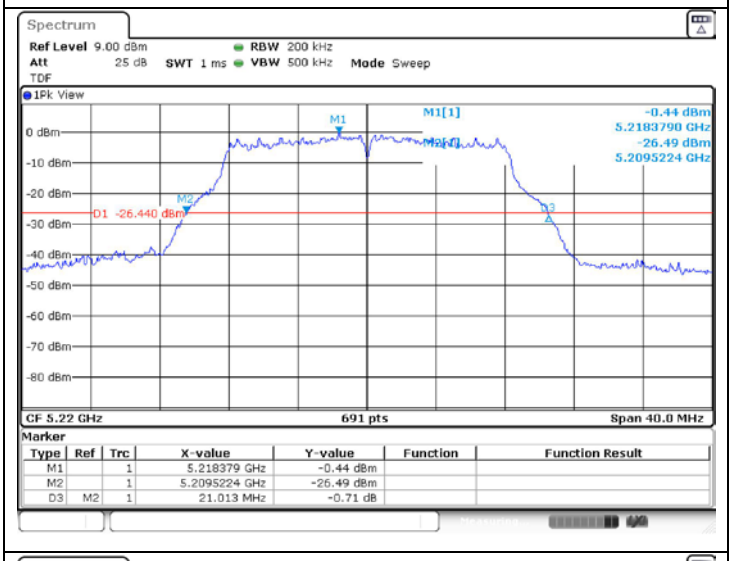
26 dB Bandwidth

802.11a (Band 1)

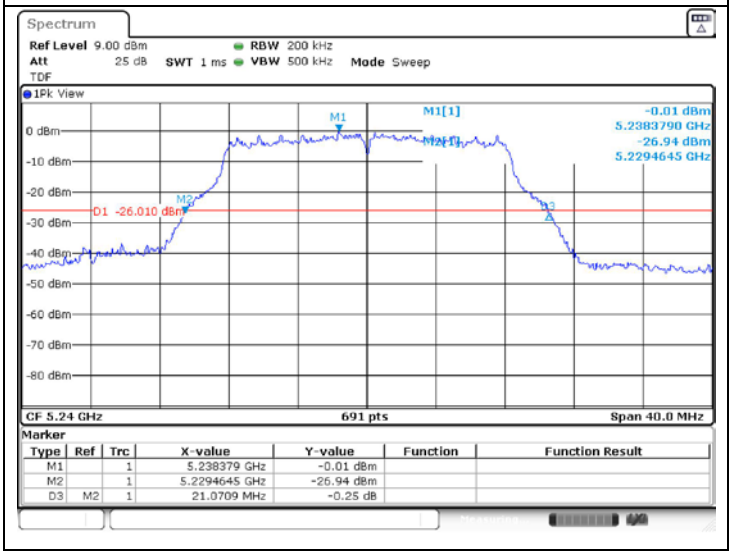
Low Channel
(5 180 ㎒)



Middle Channel
(5 220 ㎒)

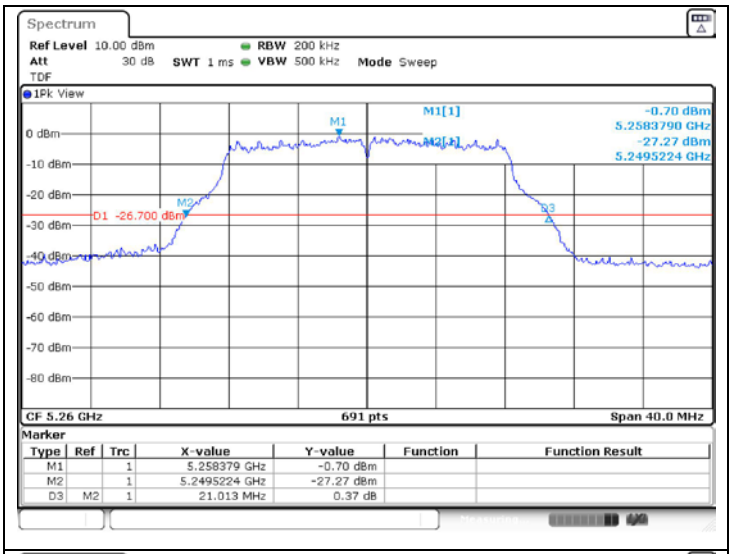


High Channel
(5 240 ㎒)

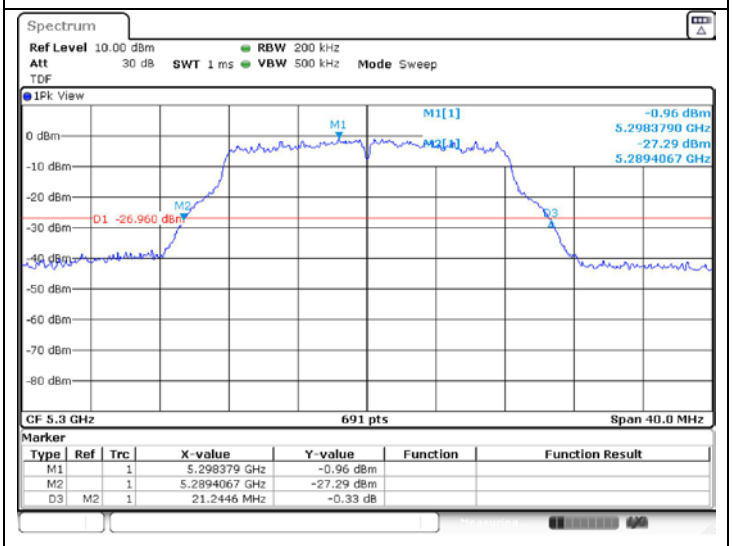


802.11a (Band 2A)

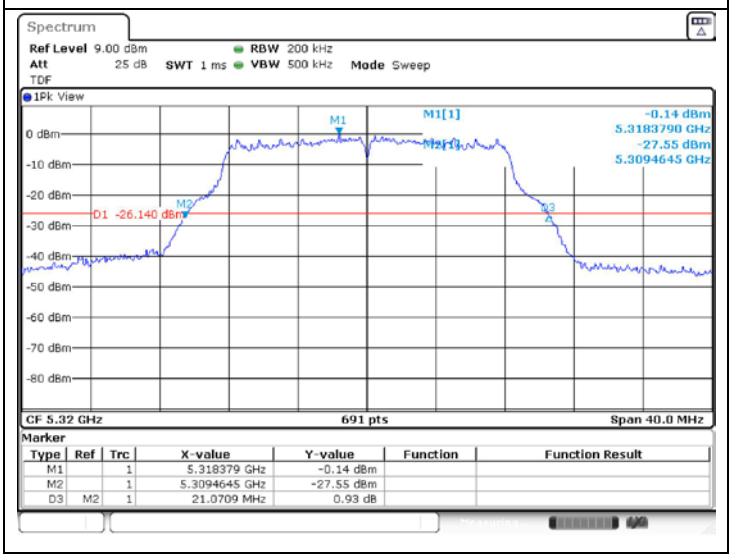
Low Channel
(5 260 ㎒)



Middle Channel
(5 300 ㎒)

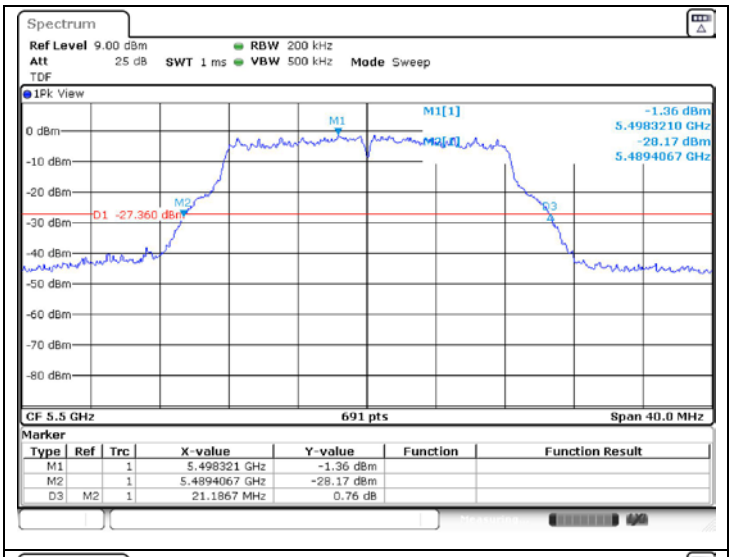


High Channel
(5 320 ㎒)

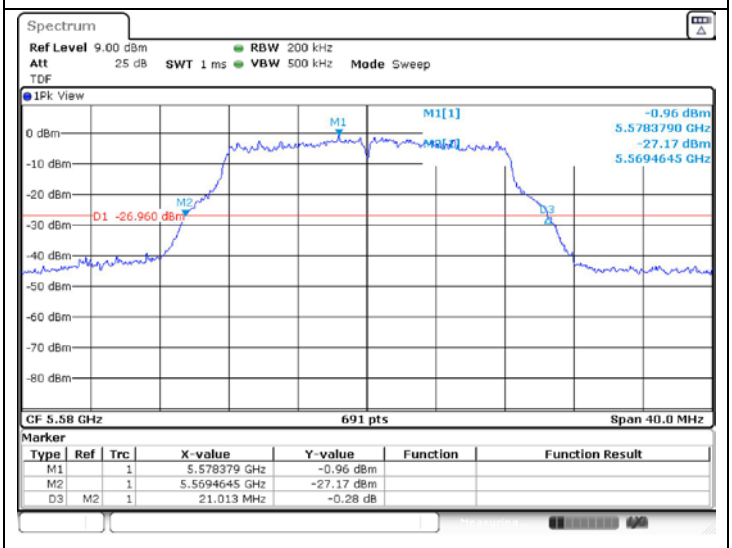


802.11a (Band 2C)

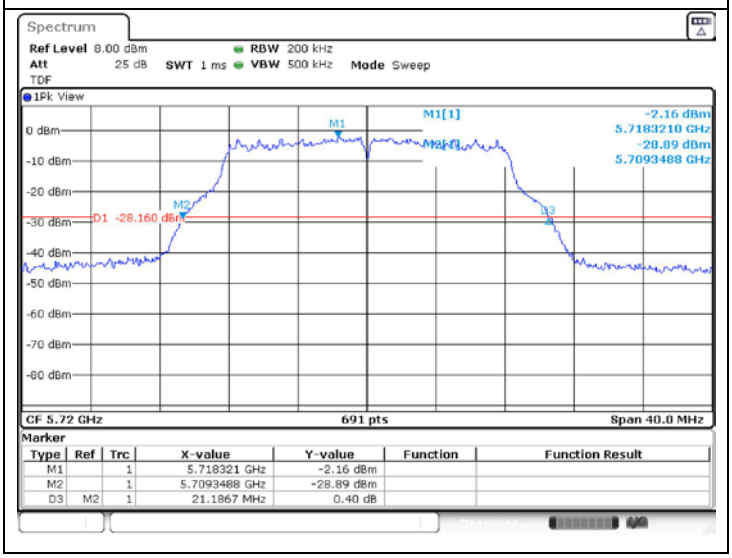
Low Channel
(5 500 ㎒)



Middle Channel
(5 580 ㎒)

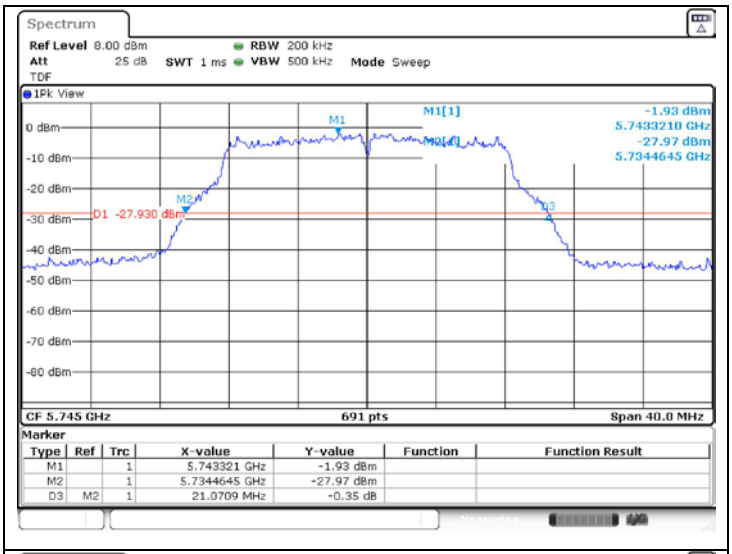


High Channel
(5 720 ㎒)

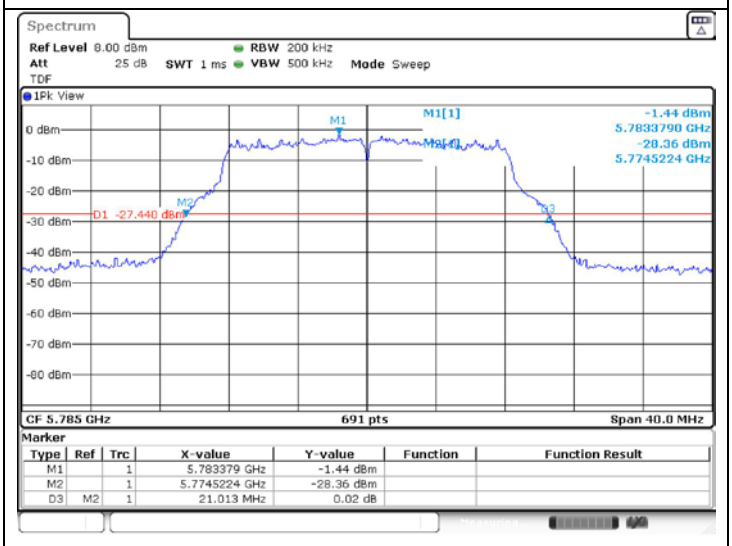


802.11a (Band 3)

Low Channel
(5 745 ㎒)



Middle Channel
(5 785 ㎒)



High Channel
(5 825 ㎒)