

PSD NVNT n40 5190MHz Ant1 SISO



PSD NVNT n40 5230MHz Ant1 SISO



PSD NVNT n40 5755MHz Ant1 SISO



PSD NVNT n40 5795MHz Ant1 SISO



PSD NVNT n40 5190MHz Ant2 SISO



PSD NVNT n40 5230MHz Ant2 SISO



PSD NVNT n40 5755MHz Ant2 SISO



PSD NVNT n40 5795MHz Ant2 SISO



PSD NVNT n40 5190MHz Ant1 MIMO



PSD NVNT n40 5190MHz Ant2 MIMO



PSD NVNT n40 5230MHz Ant1 MIMO



PSD NVNT n40 5230MHz Ant2 MIMO



PSD NVNT n40 5755MHz Ant1 MIMO



PSD NVNT n40 5755MHz Ant2 MIMO



PSD NVNT n40 5795MHz Ant1 MIMO



PSD NVNT n40 5795MHz Ant2 MIMO



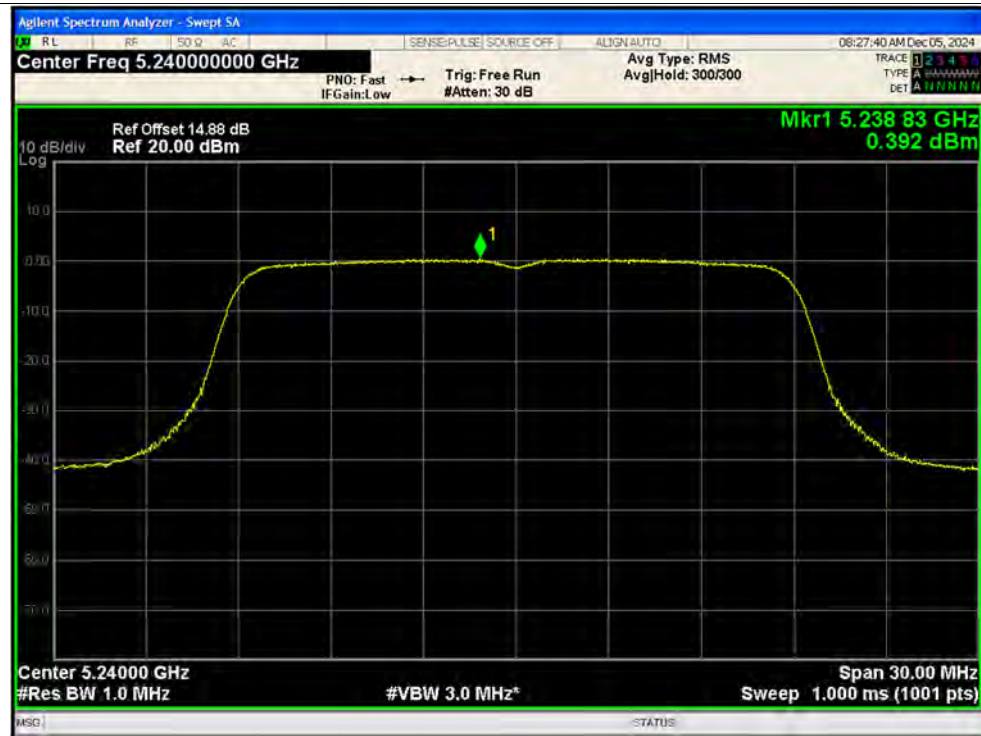
PSD NVNT ac20 5180MHz Ant1 SISO



PSD NVNT ac20 5220MHz Ant1 SISO



PSD NVNT ac20 5240MHz Ant1 SISO



PSD NVNT ac20 5745MHz Ant1 SISO



PSD NVNT ac20 5785MHz Ant1 SISO



PSD NVNT ac20 5825MHz Ant1 SISO



PSD NVNT ac20 5180MHz Ant2 SISO



PSD NVNT ac20 5220MHz Ant2 SISO



PSD NVNT ac20 5240MHz Ant2 SISO



PSD NVNT ac20 5745MHz Ant2 SISO



PSD NVNT ac20 5785MHz Ant2 SISO



PSD NVNT ac20 5825MHz Ant2 SISO



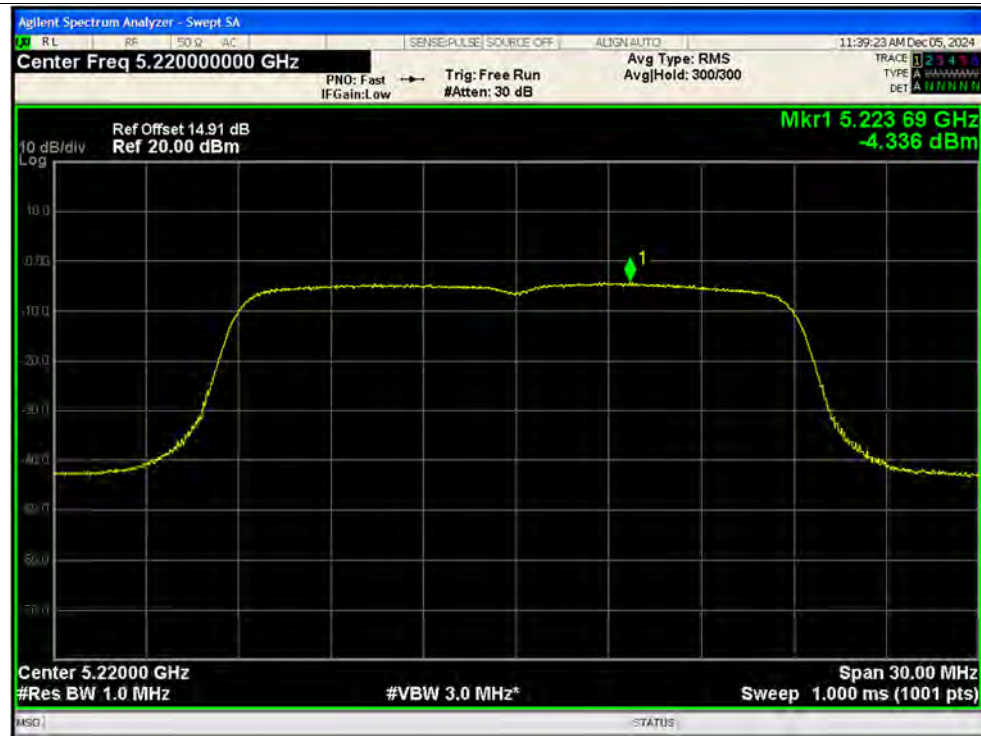
PSD NVNT ac20 5180MHz Ant1 MIMO



PSD NVNT ac20 5180MHz Ant2 MIMO



PSD NVNT ac20 5220MHz Ant1 MIMO



PSD NVNT ac20 5220MHz Ant2 MIMO



PSD NVNT ac20 5240MHz Ant1 MIMO



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PSD NVNT ac40 5190MHz Ant1 SISO



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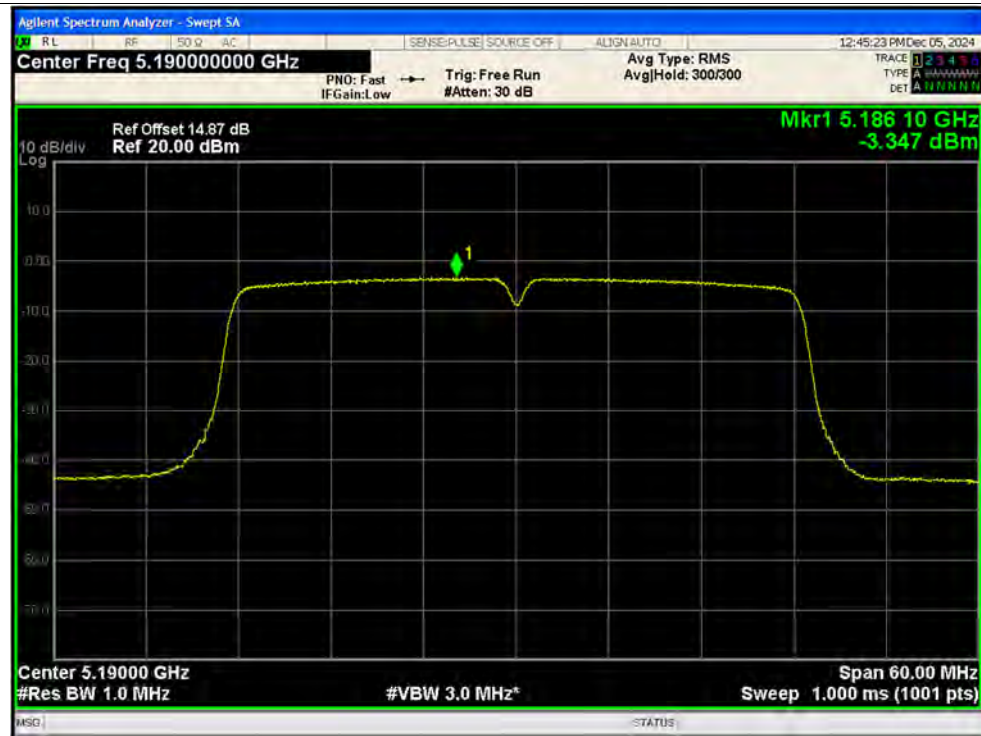
PSD NVNT ac40 5755MHz Ant1 SISO



PSD NVNT ac40 5795MHz Ant1 SISO



PSD NVNT ac40 5190MHz Ant2 SISO



PSD NVNT ac40 5230MHz Ant2 SISO



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PSD NVNT ac80 5210MHz Ant1 SISO



PSD NVNT ac80 5775MHz Ant1 SISO



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PSD NVNT ax20 5785MHz Ant2 MIMO



PSD NVNT ax20 5825MHz Ant1 MIMO



PSD NVNT ax20 5825MHz Ant2 MIMO



PSD NVNT ax40 5190MHz Ant1 SISO



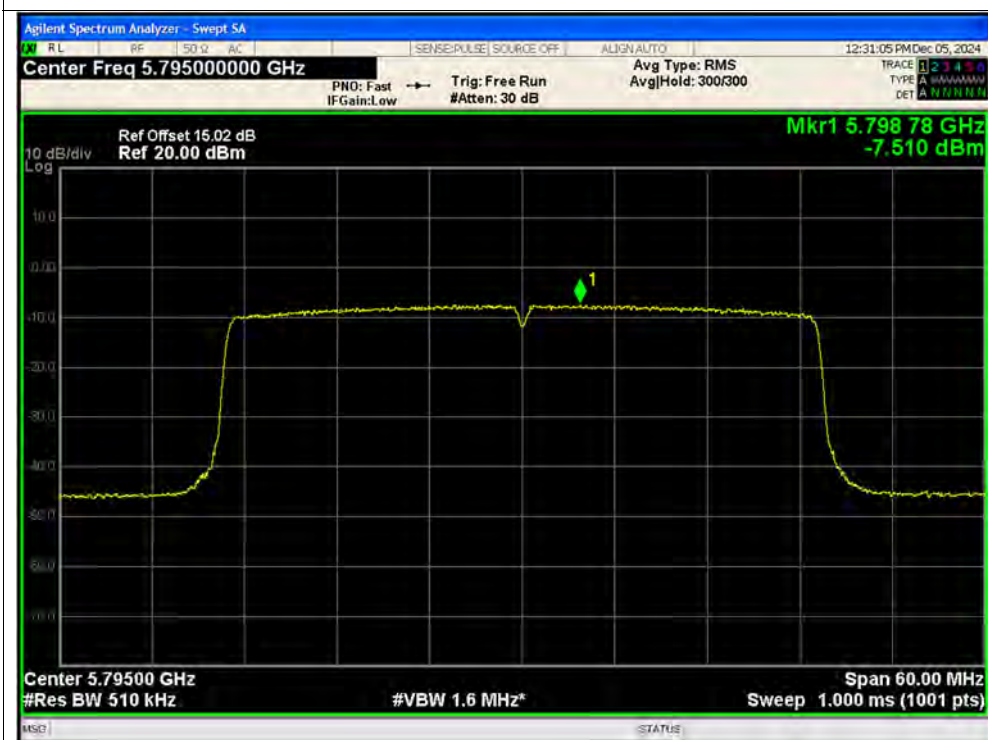
PSD NVNT ax40 5230MHz Ant1 SISO



PSD NVNT ax40 5755MHz Ant1 SISO



PSD NVNT ax40 5795MHz Ant1 SISO



PSD NVNT ax40 5190MHz Ant2 SISO



PSD NVNT ax40 5230MHz Ant2 SISO



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PSD NVNT ax80 5210MHz Ant1 SISO



PSD NVNT ax80 5775MHz Ant1 SISO



PSD NVNT ax80 5210MHz Ant2 SISO



PSD NVNT ax80 5775MHz Ant2 SISO



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PSD NVNT ax80 5775MHz Ant2 MIMO



**A.5. Frequency Stability**

Condition	Mode	Frequency (MHz)	Antenna	Measured Frequency (MHz)	Frequency Error (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
20C 3.5V	Carrier	5180	Ant1	5179.996	-4000	-0.77	25	Pass
20C 3.85V	Carrier	5180	Ant1	5179.996	-4000	-0.77	25	Pass
20C 4.3V	Carrier	5180	Ant1	5179.996	-4000	-0.77	25	Pass
-10C 3.85V	Carrier	5180	Ant1	5179.996	-4000	-0.77	25	Pass
0C 3.85V	Carrier	5180	Ant1	5179.996	-4000	-0.77	25	Pass
10C 3.85V	Carrier	5180	Ant1	5179.996	-4000	-0.77	25	Pass
30C 3.85V	Carrier	5180	Ant1	5179.996	-4000	-0.77	25	Pass
40C 3.85V	Carrier	5180	Ant1	5179.996	-4000	-0.77	25	Pass
50C 3.85V	Carrier	5180	Ant1	5179.996	-4000	-0.77	25	Pass
55C 3.85V	Carrier	5180	Ant1	5179.996	-4000	-0.77	25	Pass
20C 3.5V	Carrier	5745	Ant1	5744.996	-4000	-0.7	25	Pass
20C 3.85V	Carrier	5745	Ant1	5744.995	-5000	-0.87	25	Pass
20C 4.3V	Carrier	5745	Ant1	5744.996	-4000	-0.7	25	Pass
-10C 3.85V	Carrier	5745	Ant1	5744.996	-4000	-0.7	25	Pass
0C 3.85V	Carrier	5745	Ant1	5744.996	-4000	-0.7	25	Pass
10C 3.85V	Carrier	5745	Ant1	5744.996	-4000	-0.7	25	Pass
30C 3.85V	Carrier	5745	Ant1	5744.995	-5000	-0.87	25	Pass
40C 3.85V	Carrier	5745	Ant1	5744.995	-5000	-0.87	25	Pass
50C 3.85V	Carrier	5745	Ant1	5744.995	-5000	-0.87	25	Pass
55C 3.85V	Carrier	5745	Ant1	5744.995	-5000	-0.87	25	Pass



A.6. Conducted Emission

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Set RBW=9kHz, VBW=30kHz. Refer to recorded points and plots below.

Note: Both of the test voltage AC 120V/60Hz and AC 230V/50Hz were considered and tested respectively, only the results of the worst case AC 120V/60Hz were recorded in this report.

A. Test Setup:

Test Mode: EUT + Adapter + USB Cable + WIFI TX

Test voltage: AC 120V/60Hz

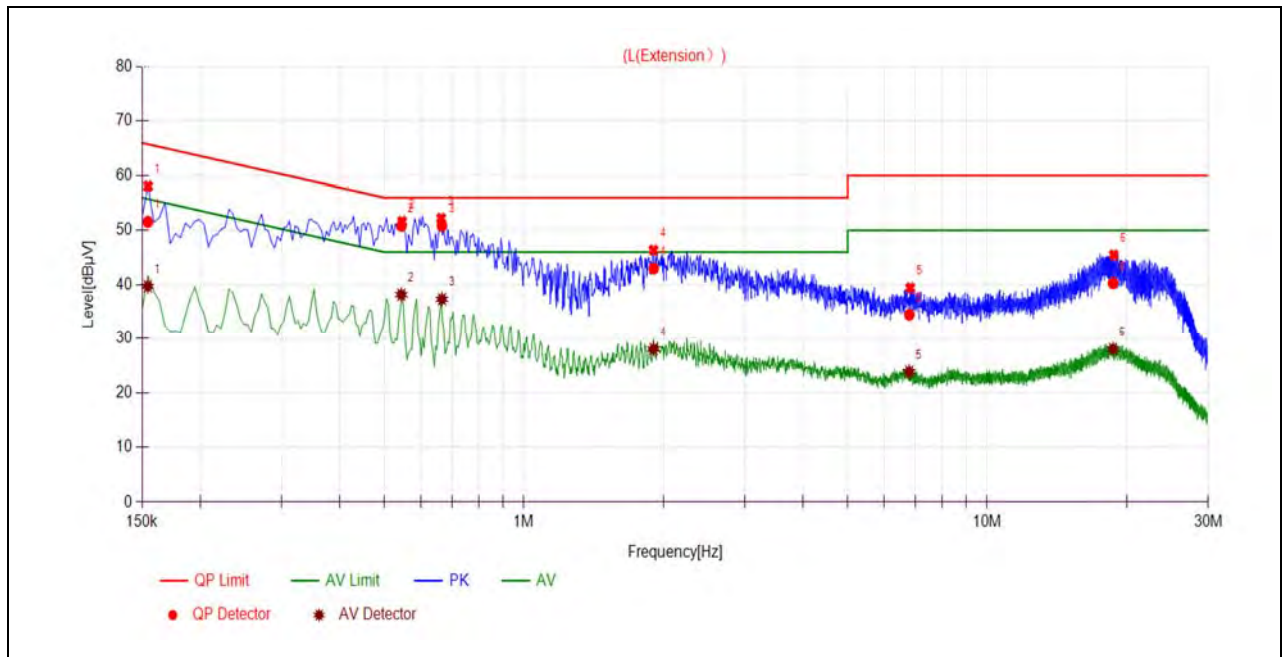
The measurement results are obtained as below:

$$E \text{ [dB}\mu\text{V]} = U_R + L_{\text{Cable loss}} \text{ [dB]} + A_{\text{Factor}}$$

U_R : Receiver Reading

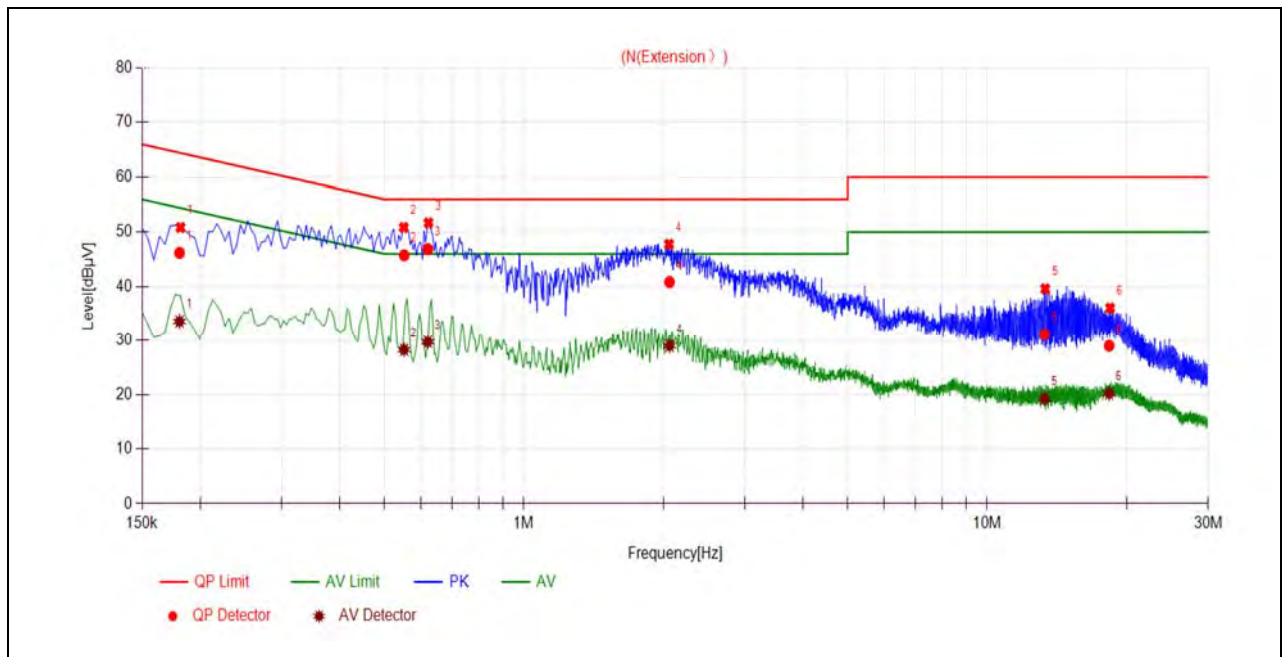
A_{Factor} : Voltage division factor of LISN

B. Test Plot:



(L Phase)

No.	Fre. (MHz)	Emission Level (dBμV)		Limit (dBμV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1543	51.57	39.73	65.77	39.73	Line	PASS
2	0.5440	50.87	38.17	56.00	38.17		PASS
3	0.6656	50.85	37.34	56.00	37.34		PASS
4	1.9061	42.98	28.01	56.00	28.01		PASS
5	6.7903	34.47	23.85	60.00	23.85		PASS
6	18.6881	40.29	28.01	60.00	28.01		PASS



(N Phase)

No.	Fre. (MHz)	Emission Level (dBμV)		Limit (dBμV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1806	46.20	33.59	64.46	54.46	Neutral	PASS
2	0.5516	45.75	28.26	56.00	46.00		PASS
3	0.6207	46.89	29.73	56.00	46.00		PASS
4	2.0627	40.83	28.98	56.00	46.00		PASS
5	13.3015	31.16	19.22	60.00	50.00		PASS
6	18.3379	29.00	20.17	60.00	50.00		PASS



A.7. Restricted Frequency Bands

The lowest and highest channels are tested to verify the Restricted Frequency Bands.

The measurement results are obtained as below:

$$E \text{ [dB}\mu\text{V/m]} = U_R + A_T + A_{\text{Factor}} \text{ [dB]}; A_T = L_{\text{Cable loss}} \text{ [dB]} - G_{\text{preamp}} \text{ [dB]}$$

A_T : Total correction Factor except Antenna

U_R : Receiver Reading

G_{preamp} : Preamplifier Gain

A_{Factor} : Antenna Factor at 3m

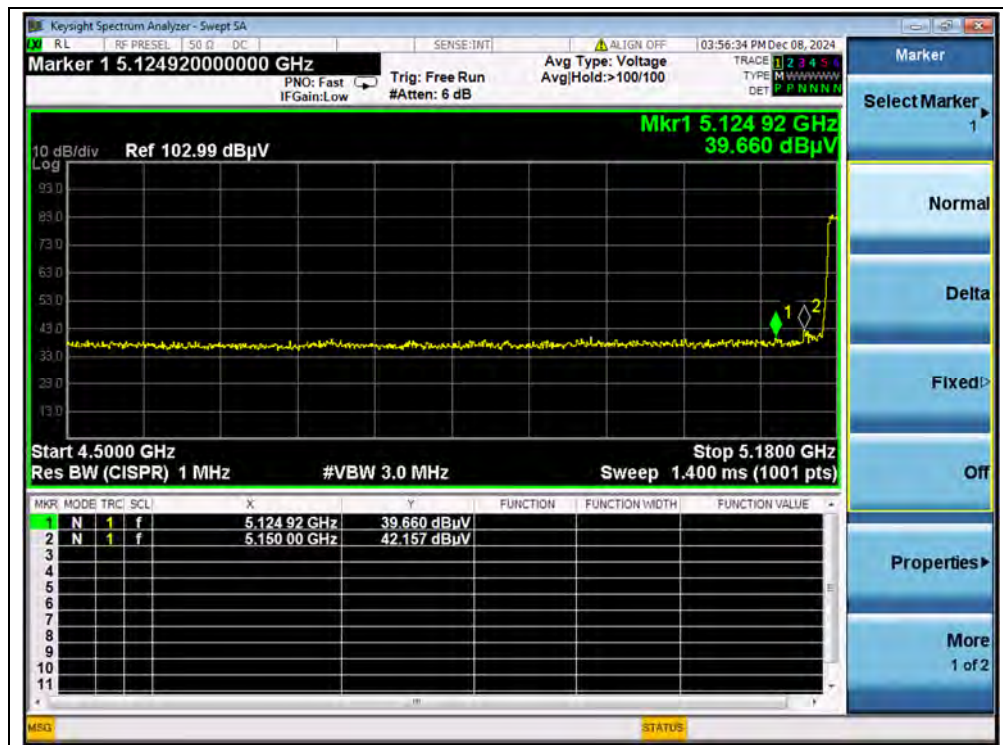
Note 1: Restricted Frequency Bands were performed when antenna was at vertical and horizontal polarity, and only the worse test condition (horizontal) was recorded in this test report.

Note 2: Restricted Frequency Bands were performed in X, Y, Z axis direction, and only the worst axis (X axis) test condition was recorded in this test report.

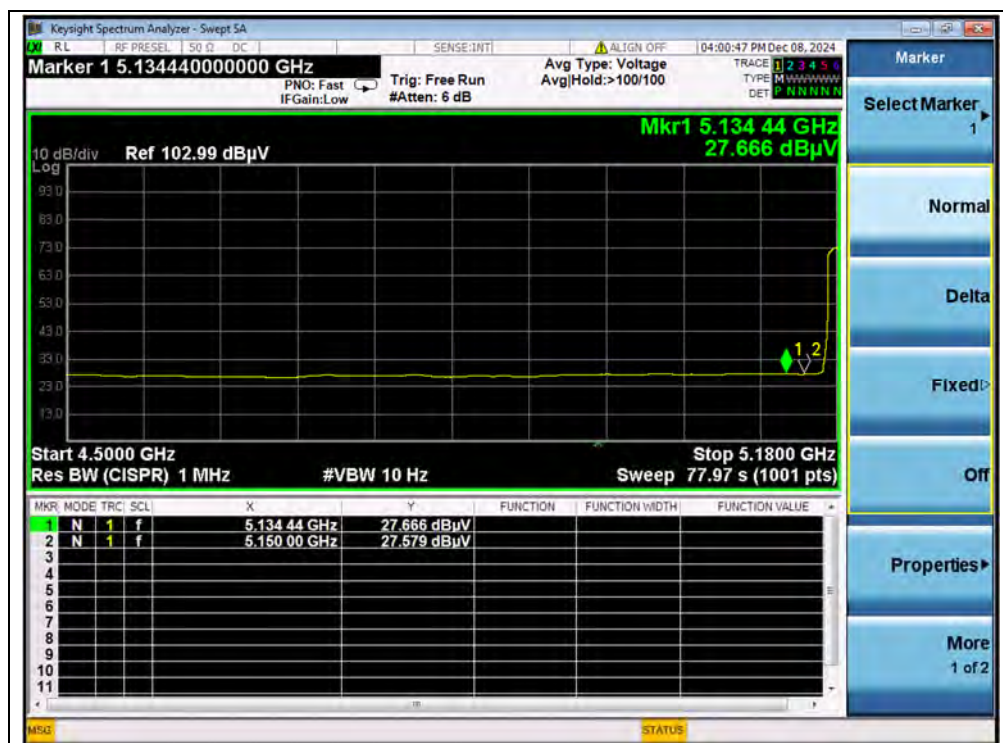
Note 3: All test modes and bandwidth were considered and evaluated respectively by performing full test, only the worst data were recorded for each bandwidth.

802.11a Mode

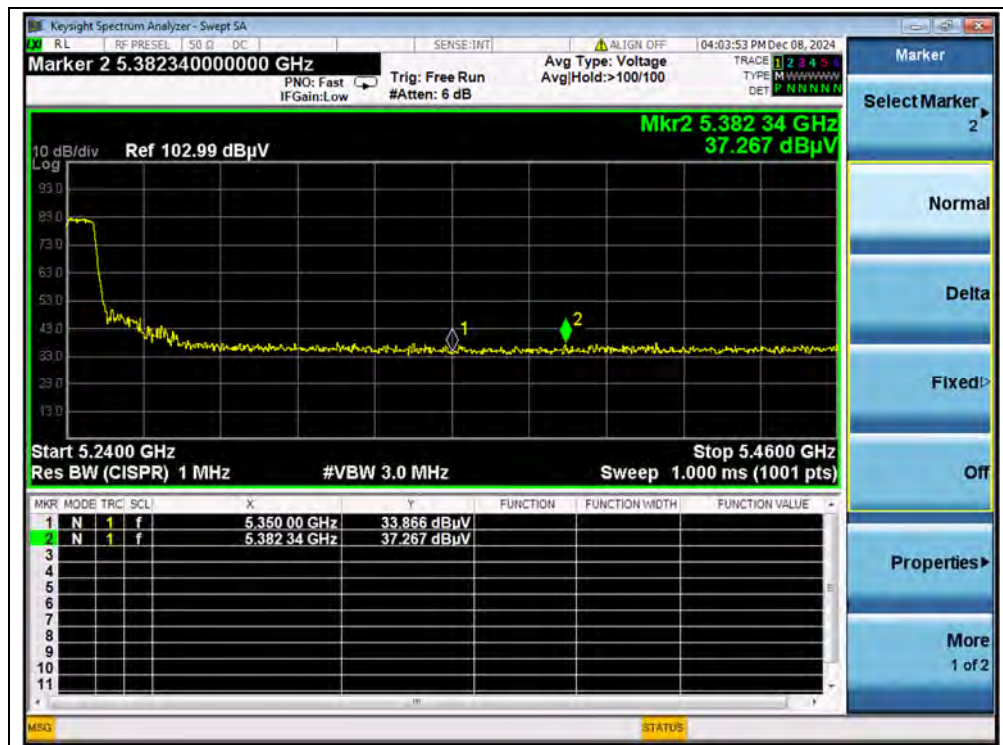
Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dB μ V)	A_T (dB)	A_{Factor} (dB)	Max. Emission E (dB μ V/m)	Limit (dB μ V/m)	Verdict
		PK/ AV						
36	5150.00	PK	42.16	-16.90	33.10	58.36	74	PASS
36	5134.44	AV	27.67	-16.90	33.10	43.87	54	PASS
48	5382.34	PK	37.27	-16.90	33.10	53.47	74	PASS
48	5453.62	AV	26.24	-16.90	33.10	42.44	54	PASS
149	5725.00	PK	50.01	-14.70	33.50	68.81	122.23	PASS
165	5855.00	PK	45.75	-14.70	33.50	64.55	110.83	PASS



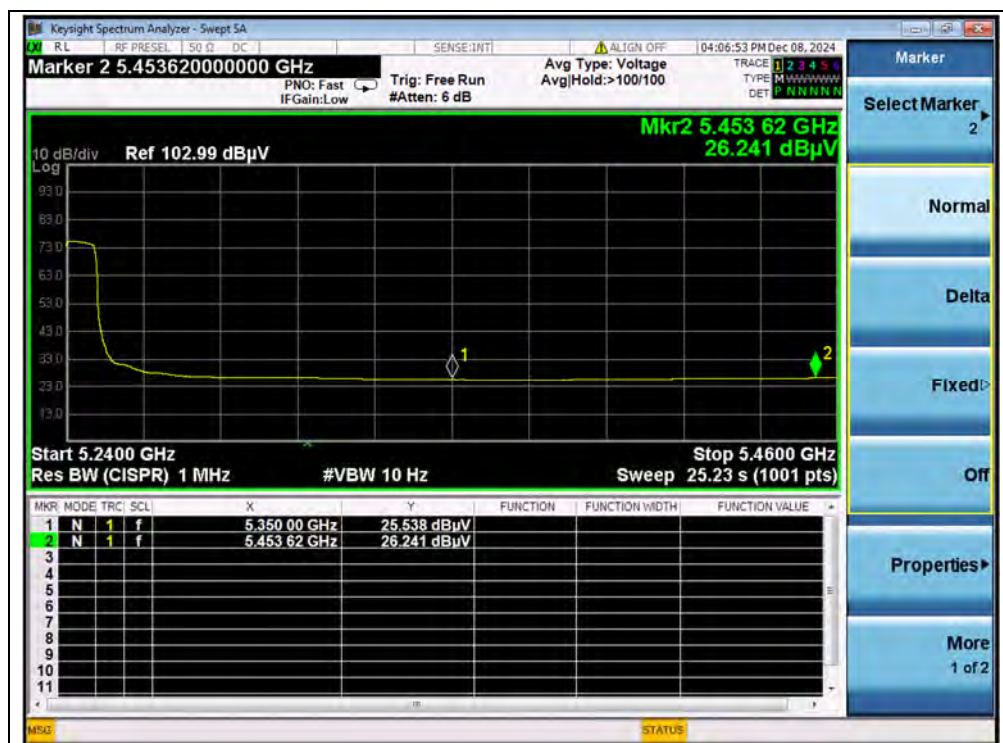
(PEAK, Channel 36, 802.11a)



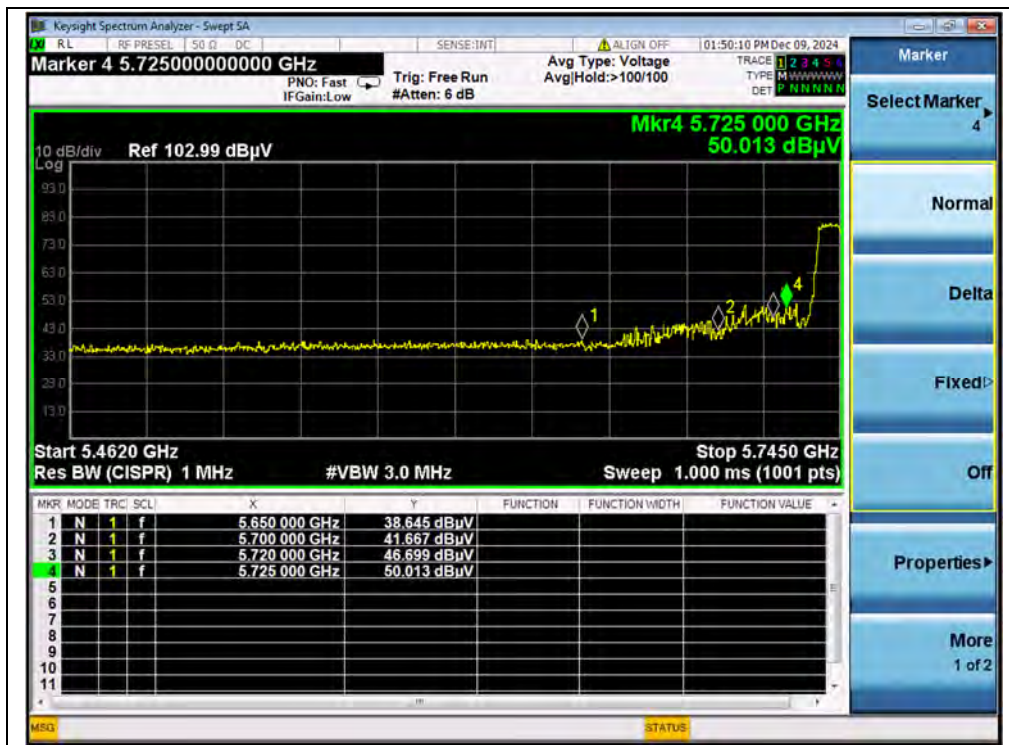
(AVERAGE, Channel 36, 802.11a)



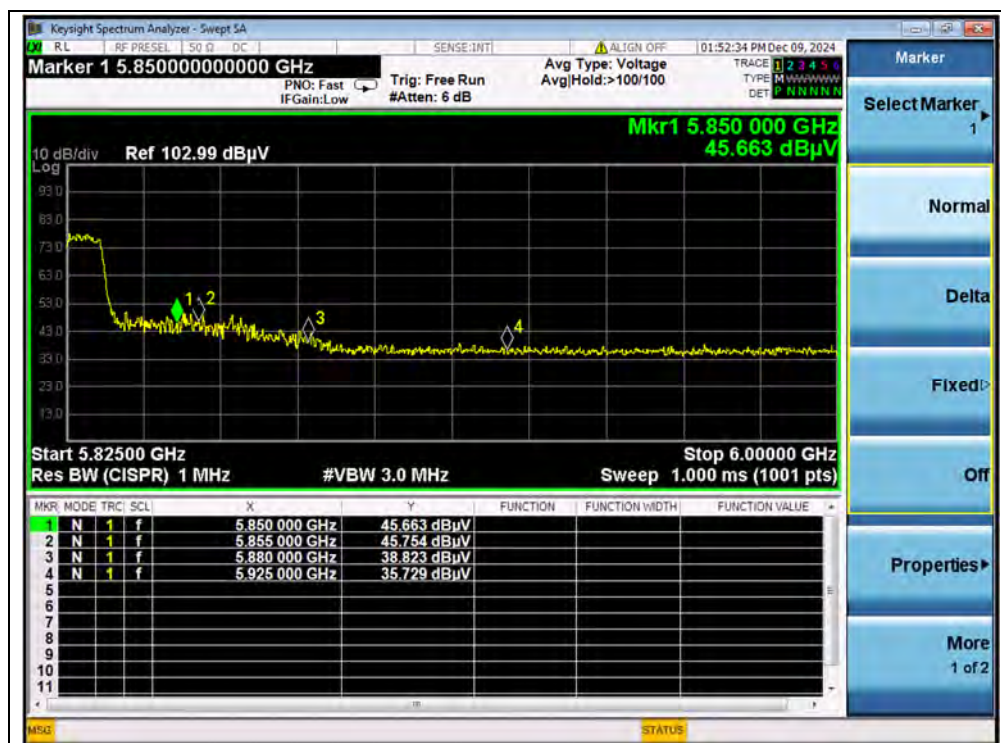
(PEAK, Channel 48, 802.11a)



(AVERAGE, Channel 48, 802.11a)



(PEAK, Channel 149, 802.11a)

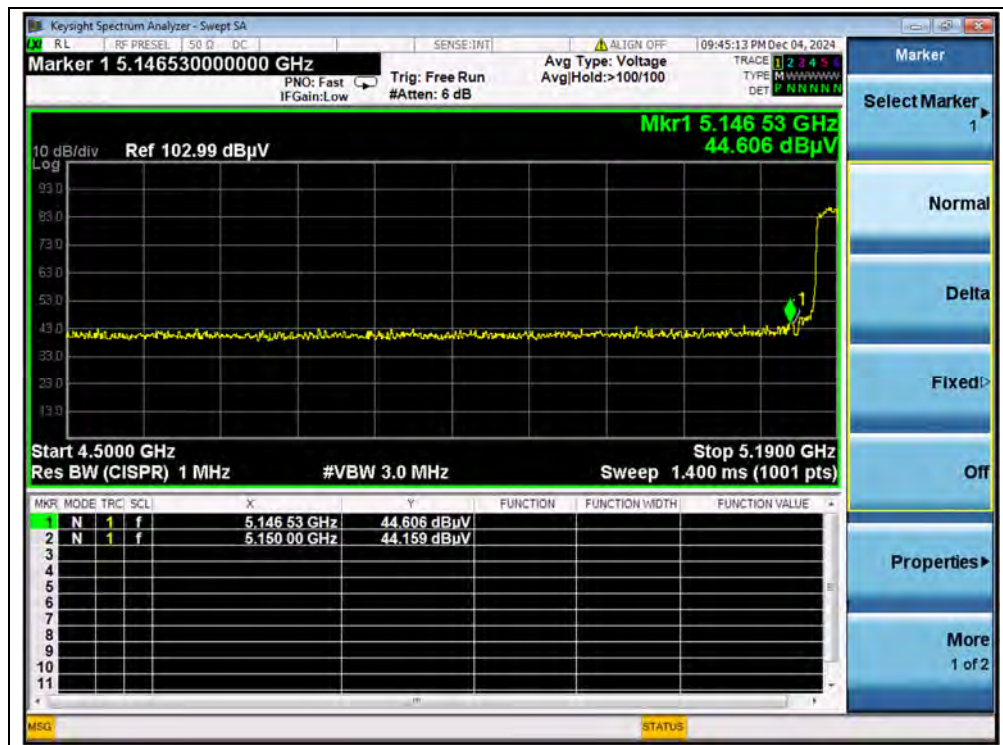


(PEAK, Channel 165, 802.11a)

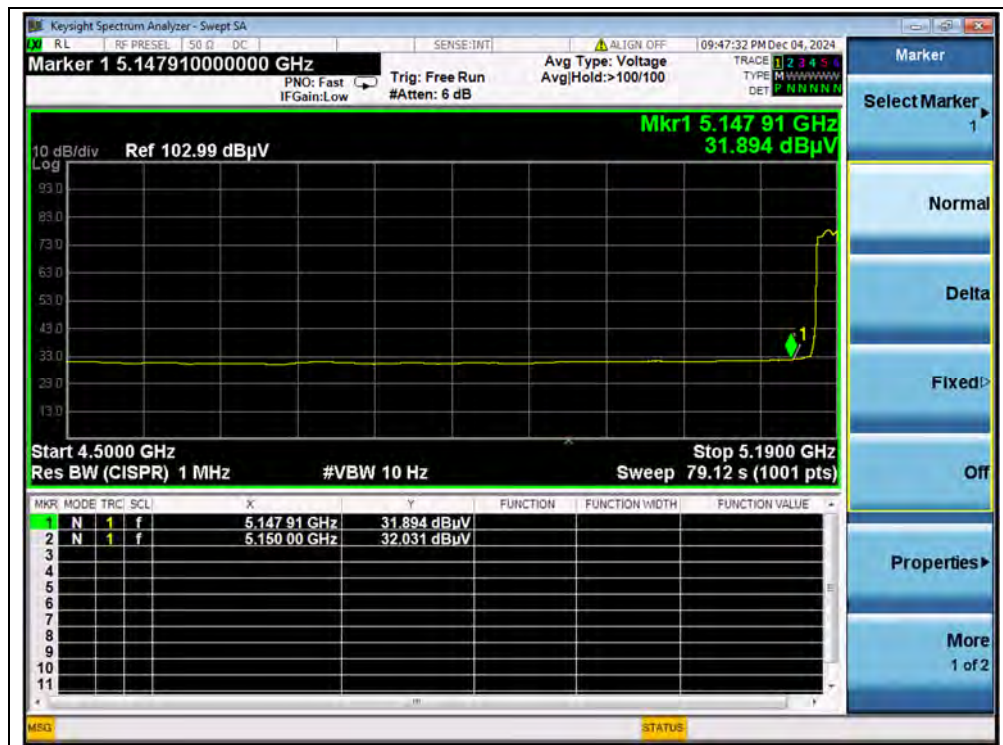


802.11n (HT40) Mode

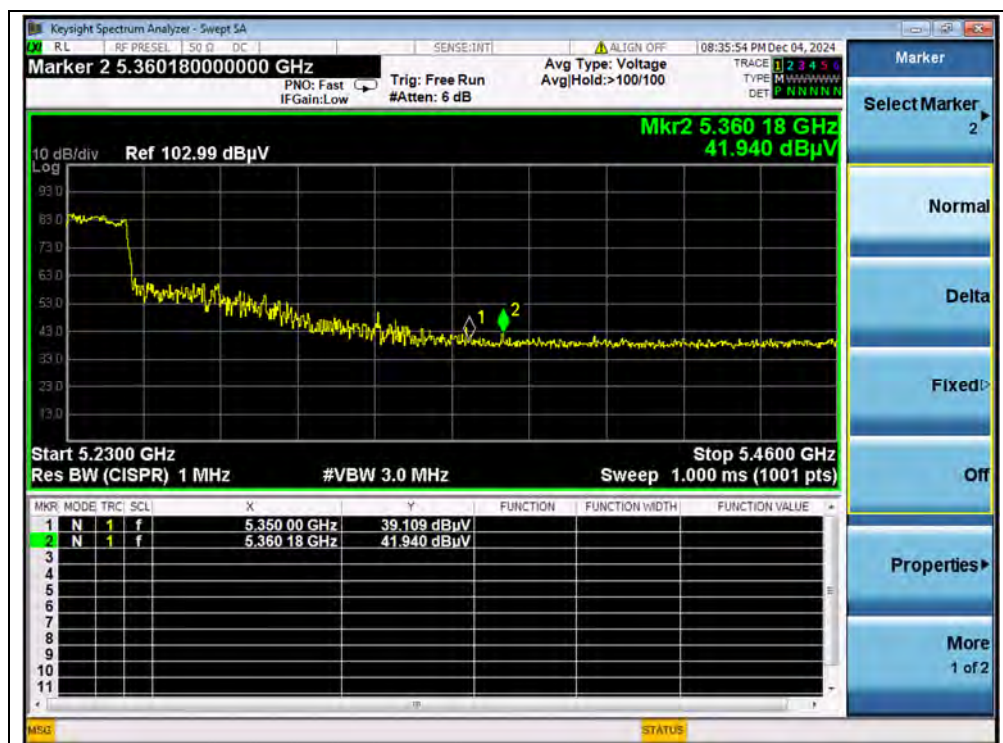
Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dB μ V)	A_T (dB)	A_{Factor} (dB)	Max. Emission E (dB μ V/m)	Limit (dB μ V/m)	Verdict
		PK/ AV						
38	5146.53	PK	44.61	-16.90	33.10	60.81	74	PASS
38	5150.00	AV	32.03	-16.90	33.10	48.23	54	PASS
46	5360.18	PK	41.94	-16.90	33.10	58.14	74	PASS
46	5351.90	AV	29.66	-16.90	33.10	45.86	54	PASS
151	5725.00	PK	47.51	-14.70	33.50	66.31	122.23	PASS
159	5855.00	PK	43.85	-14.70	33.50	62.65	110.83	PASS



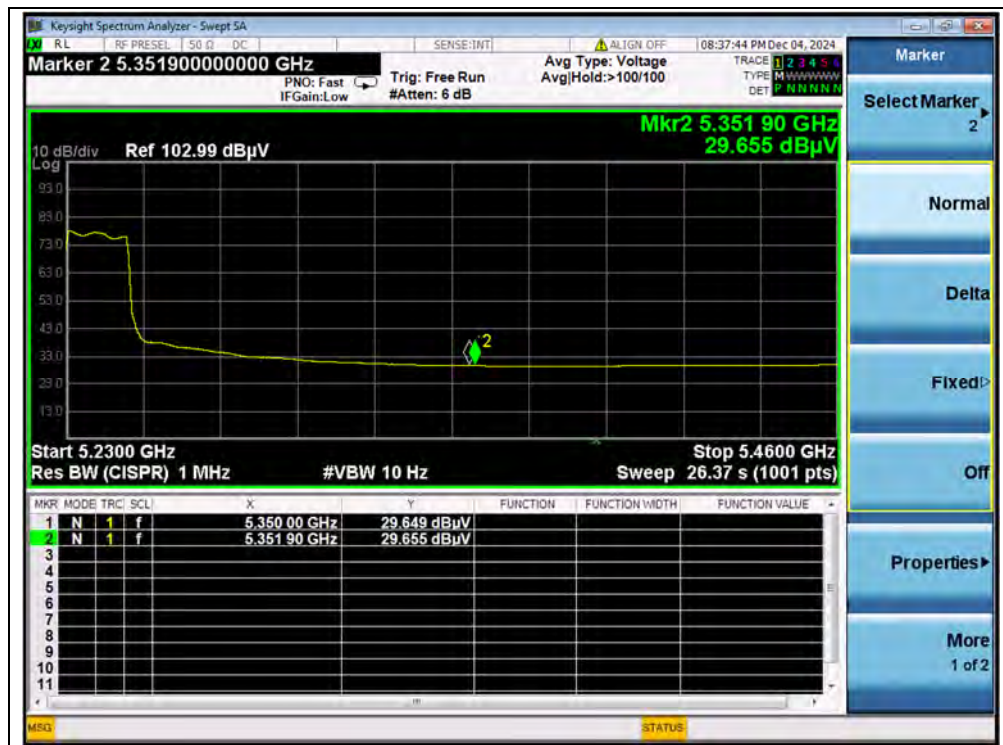
(PEAK, Channel 38, 802.11n (HT40))



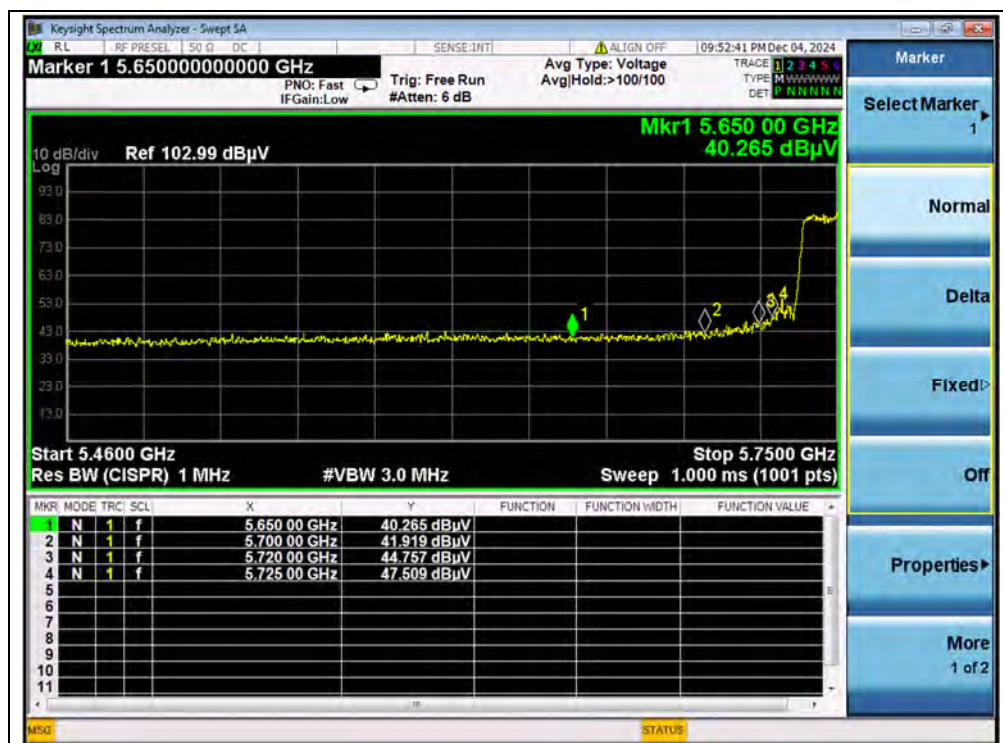
(AVERAGE, Channel 38, 802.11n (HT40))



(PEAK, Channel 46, 802.11n (HT40))



(AVERAGE, Channel 46, 802.11n (HT40))



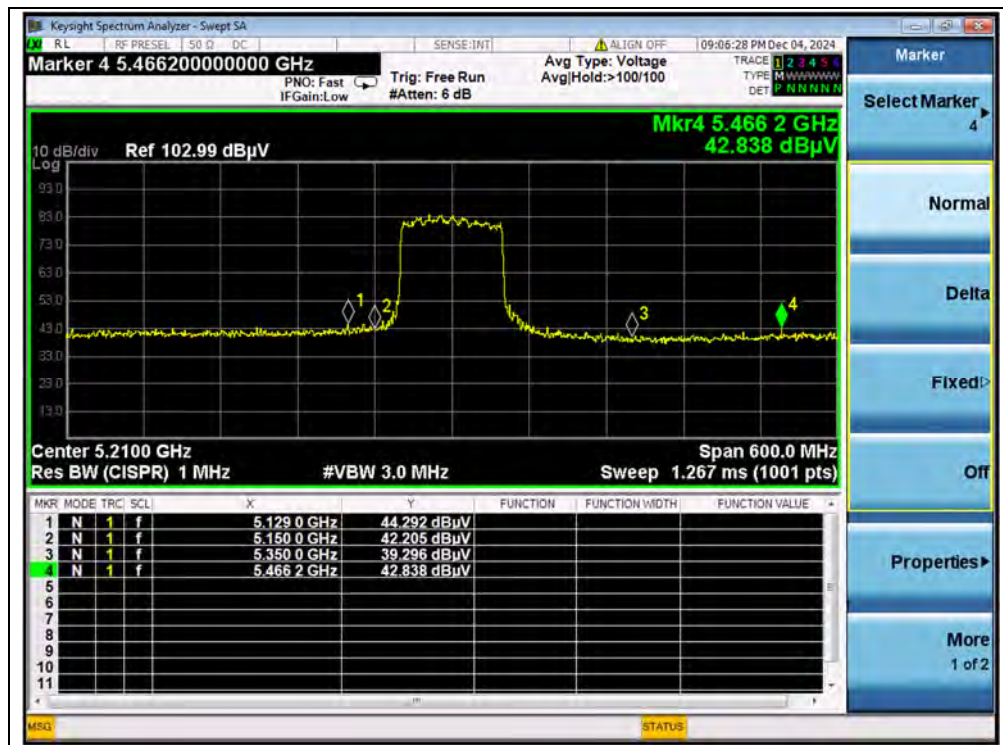
(PEAK, Channel 151, 802.11n (HT40))



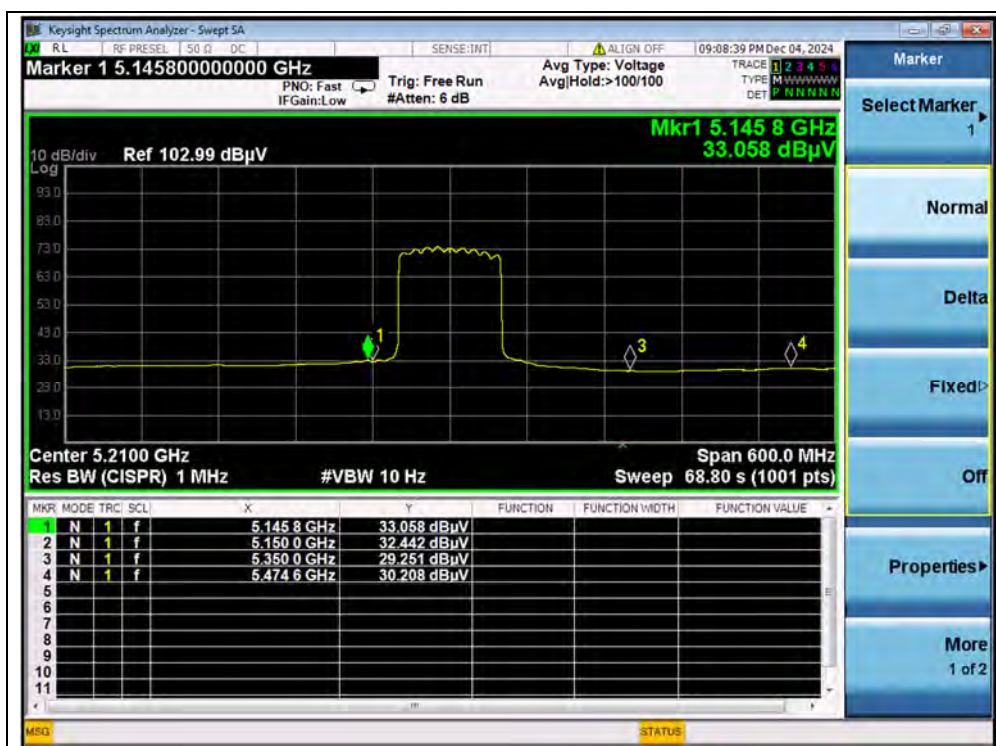
(PEAK, Channel 159, 802.11n (HT40))

**802.11ax (HEW80) Mode**

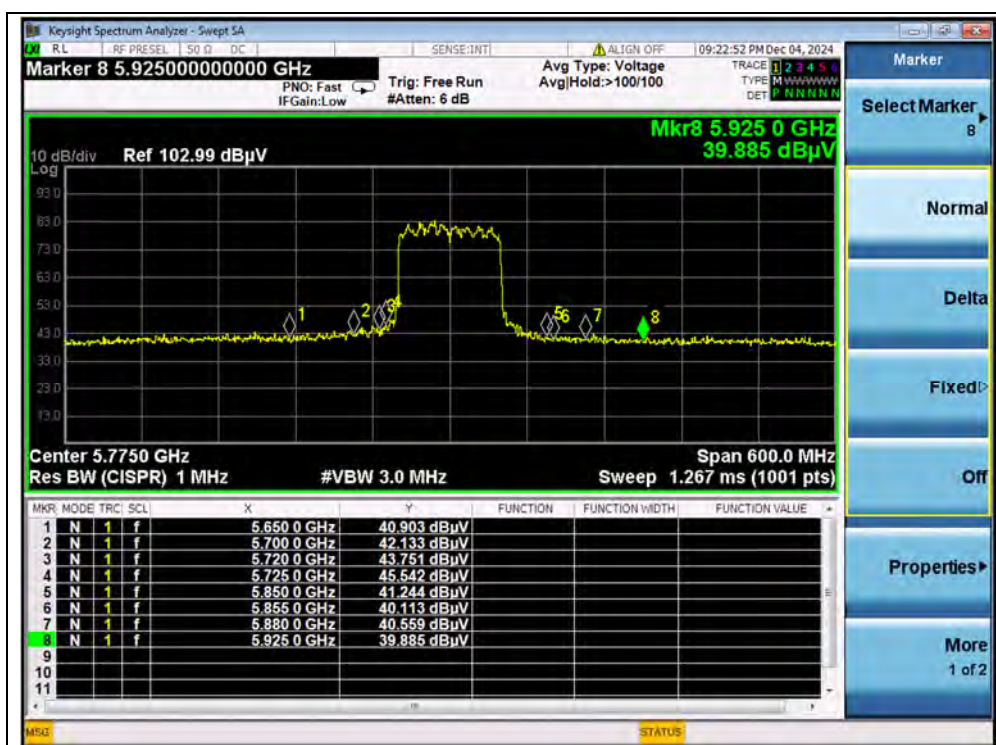
Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dB μ V)	A_T (dB)	A_{Factor} (dB)	Max. Emission E (dB μ V/m)	Limit (dB μ V/m)	Verdict
		PK/ AV						
42	5129.00	PK	44.29	-16.90	33.10	60.49	74	PASS
42	5145.80	AV	33.06	-16.90	33.10	49.26	54	PASS
42	5466.20	PK	42.84	-16.90	33.10	59.04	74	PASS
42	5474.60	AV	30.21	-16.90	33.10	46.41	54	PASS
155	5725.00	PK	45.54	-14.70	33.50	64.34	122.23	PASS
155	5850.00	PK	41.24	-14.70	33.50	60.04	122.23	PASS



(PEAK, Channel 42, 802.11ac (VHT80))



(AVERAGE, Channel 42, 802.11ac (VHT80))



(PEAK, Channel 155, 802.11ac (VHT80))



A.8. Radiated Emission

According to ANSI C63.10, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak (or average) limit, it is unnecessary to perform an quasi-peak measurement (or average).

The measurement results are obtained as below:

$$E [\text{dB}\mu\text{V/m}] = U_R + A_T + A_{\text{Factor}} [\text{dB}]; A_T = L_{\text{Cable loss}} [\text{dB}] - G_{\text{preamp}} [\text{dB}]$$

A_T : Total correction Factor except Antenna

U_R : Receiver Reading

G_{preamp} : Preamplifier Gain

A_{Factor} : Antenna Factor at 3m

During the test, the total correction Factor A_T and A_{Factor} were built in test software.

Note1: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Note2: For the frequency, which started from 9kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

Note3: For the frequency, which started from 18GHz to 40GHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

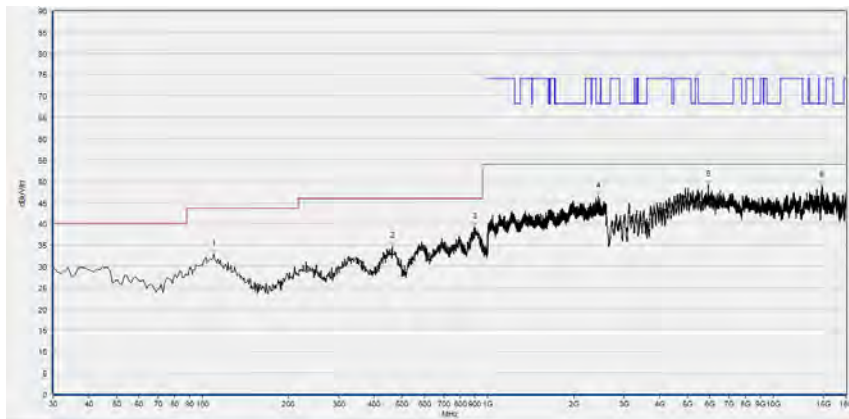
Note 4: All test modes and bandwidth were considered and evaluated respectively by performing full test, only the worst data were recorded for each bandwidth.

Field strength of fundamental:

Frequency (MHz)	Reading_Peak (dB μ V/m)	Path Loss (dB)	Antenna Factor (dB)	Final_Peak (dB μ V/m)	Antenna Polarity
5224.05	81.67	-16.90	33.10	97.87	Horizontal

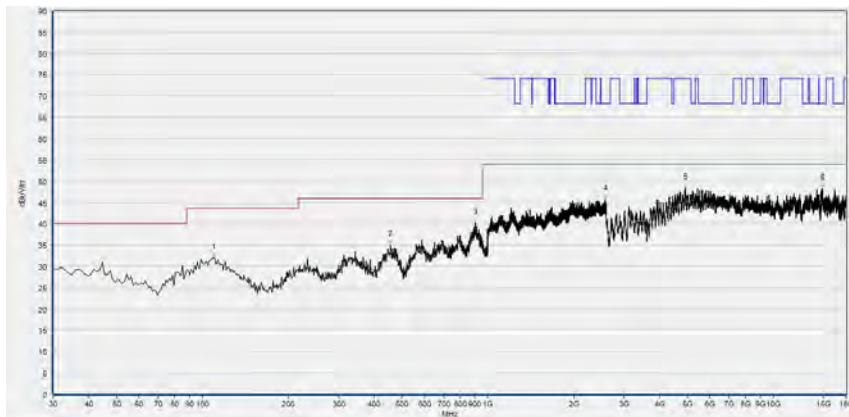
The field strength (the lowest) of fundamenta is more than 20dB higher than the unwanted emissions, in accordance with FCC part 15.215(b).



**802.11a Mode****Plot for Channel 44**

Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
109.540	32.92	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
462.620	34.68	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
899.120	39.14	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2433.067	46.46	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
5920.240	49.13	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
14778.320	48.87	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

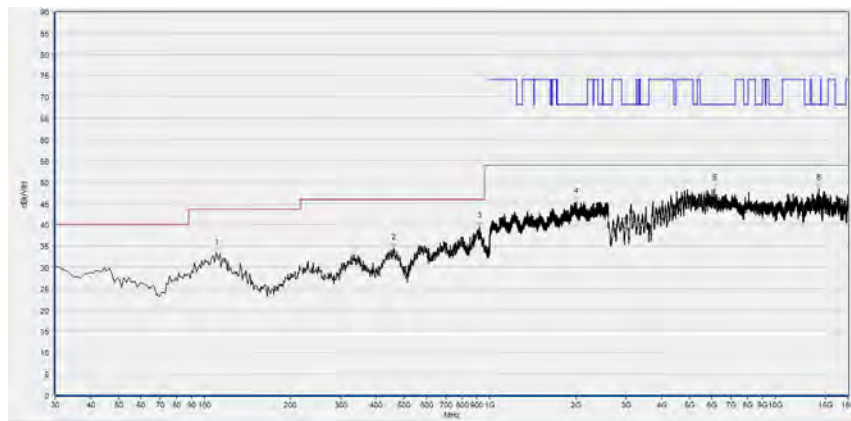
(Antenna Horizontal, 30MHz to 18GHz)



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
109.540	32.04	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
455.830	34.95	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
903.000	40.16	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2573.867	45.72	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
4925.400	48.41	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
14849.160	48.29	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

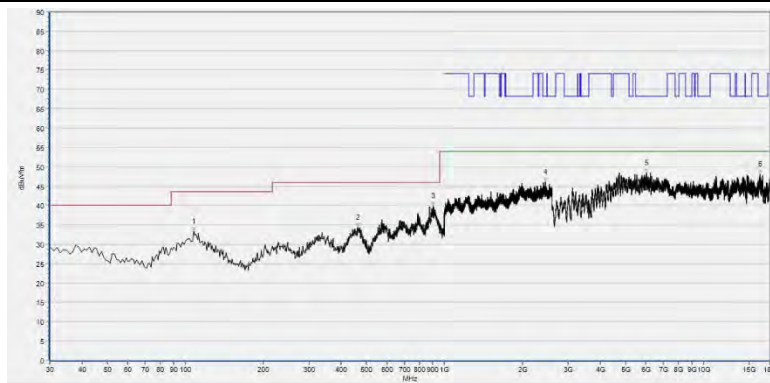
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 157



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
110.510	33.30	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
460.680	34.48	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
918.520	39.49	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2008.533	45.46	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
6129.680	48.50	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
14186.960	48.49	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
107.600	33.40	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
462.620	34.34	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
903.000	39.96	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2452.267	46.04	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
6018.800	48.51	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
16549.320	48.18	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

END OF REPORT