

9. Maximum Power Spectral Density

9.1 Standard and Limit

According to FCC 15.247(e), For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

9.2 Test Procedure

- 1) Remove the antenna from the EUT and connect to the spectrum analyzer via a low loss RF cable.
- 2) Set the spectrum analyzer to any one measured frequency within its operating range.
- 3) Set RBW = 3kHz, VBW = 10kHz, Sweep = Auto, Detector = RMS.
- 4) Measure the highest amplitude appearing on spectral display and mark the value.
- 5) Repeat above procedures until all frequencies measured were complete.



Test Setup Block Diagram

9.3 Test Data and Results

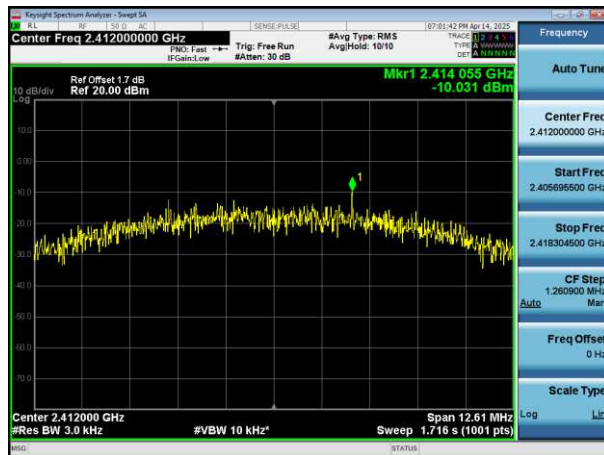
Test Mode	Antenna	Test Channel (MHz)	Conducted PSD (dBm/3kHz)	Duty Factor (dB)	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Test Result
802.11b	ANT 1	2412	-10.03	0.16	-9.87	8	Pass
		2437	-12.54	0.16	-12.38	8	Pass
		2462	-12.37	0.17	-12.20	8	Pass
	ANT 2	2412	-12.43	0.16	-12.27	8	Pass
		2437	-11.51	0.17	-11.34	8	Pass
		2462	-13.88	0.16	-13.72	8	Pass
802.11g	ANT 1	2412	-19.62	0.96	-18.66	8	Pass
		2437	-19.26	0.92	-18.34	8	Pass
		2462	-19.28	0.96	-18.32	8	Pass
	ANT 2	2412	-20.23	0.96	-19.27	8	Pass
		2437	-20.12	1.01	-19.11	8	Pass
		2462	-19.32	0.97	-18.35	8	Pass
802.11n(HT20) MIMO	ANT 1	2412	-18.01	1.02	-16.99	8	Pass
		2437	-18.18	1.03	-17.15	8	Pass
		2462	-18.57	1.03	-17.54	8	Pass
	ANT 2	2412	-19.93	1.03	-18.9	8	Pass
		2437	-19.06	1.02	-18.04	8	Pass
		2462	-19.15	1.03	-18.12	8	Pass
	MIMO Total	2412	-	-	-14.83	6.07	Pass
		2437	-	-	-14.56	6.07	Pass
		2462	-	-	-14.81	6.07	Pass
802.11n(HT40) MIMO	ANT 1	2422	-23.02	1.58	-21.44	8	Pass
		2437	-23.06	1.58	-21.48	8	Pass
		2452	-22.73	1.58	-21.15	8	Pass
	ANT 2	2422	-24.33	1.58	-22.75	8	Pass
		2437	-24.12	1.58	-22.54	8	Pass
		2452	-23.79	1.5	-22.29	8	Pass
	MIMO Total	2422	-	-	-19.04	6.07	Pass
		2437	-	-	-18.97	6.07	Pass
		2452	-	-	-18.67	6.07	Pass

Note 1: Total PSD = Conducted PSD + Duty Factor; MIMO PSD=ANT1 PSD+ANT2 PSD

Note 2: For MIMO mode Limit =8-7.93+6=6.07dBm.

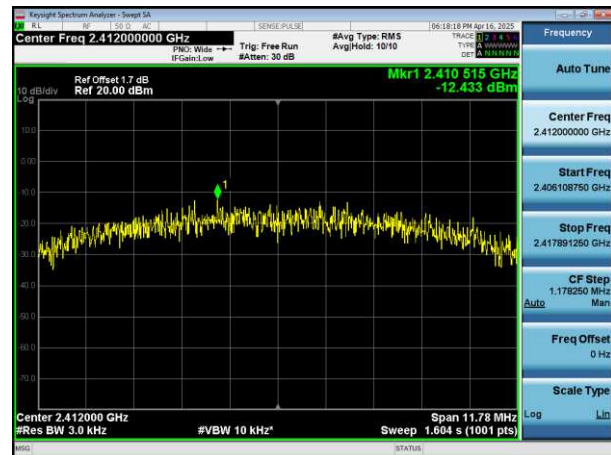
802.11b_ANT 1

2412MHz

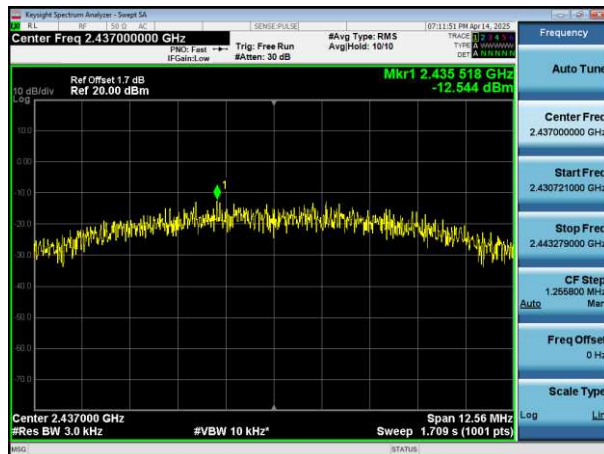


802.11b_ANT 2

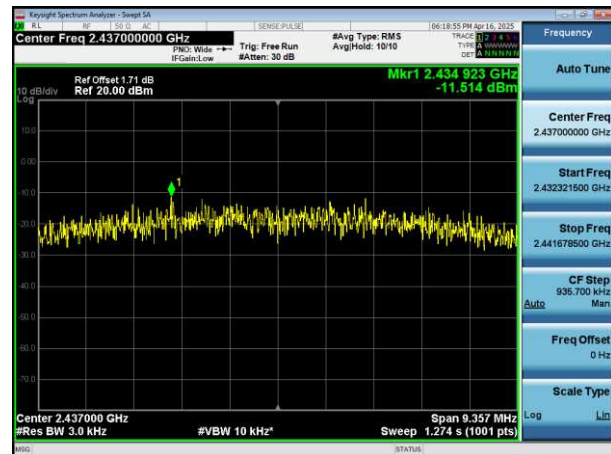
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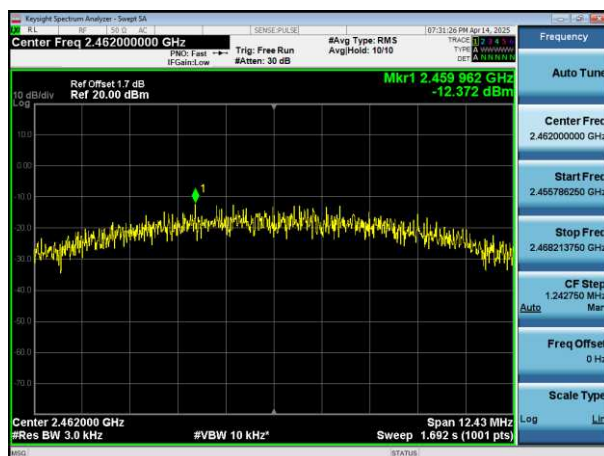
2437MHz



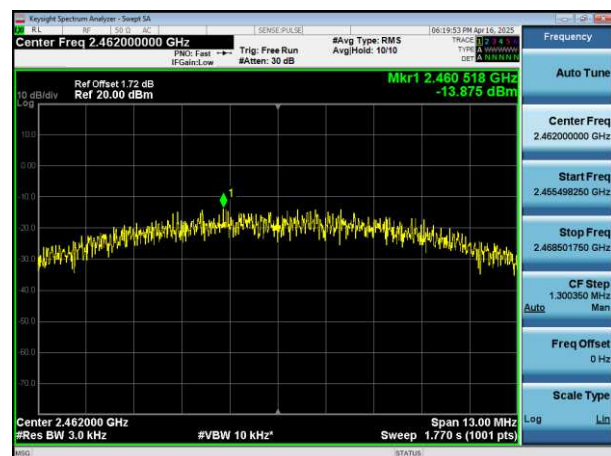
2437MHz



2462MHz



2462MHz



802.11g_ANT 1

2412MHz



802.11g_ANT 2

2412MHz



2437MHz



2437MHz



2462MHz



2462MHz



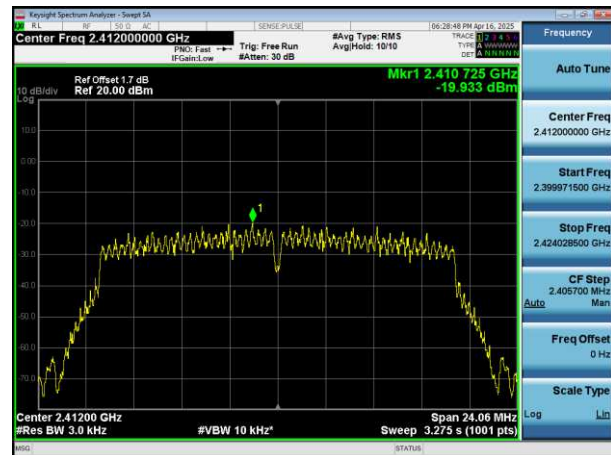
802.11n(HT20)_ANT1_MIMO

2412MHz



802.11n(HT20)_ANT2_MIMO

2412MHz



2437MHz



2437MHz



2462MHz



2462MHz



802.11n(HT40)_ANT1_MIMO

2422MHz



802.11n(HT40)_ANT2_MIMO

2422MHz



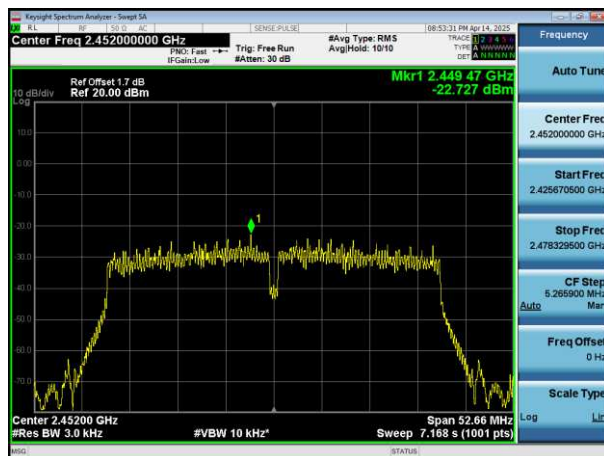
2437MHz



2437MHz



2452MHz



2452MHz



10. Band-edge Emission(Conducted)

10.1 Standard and Limit

According to §15.247(d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator 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 the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

10.2 Test Procedure

Test is conducting under the description of ANSI C63.10 - 2013 section 6.10.

- 1) Remove the antenna from the EUT and connect to the spectrum analyzer via a low loss RF cable.
- 2) Set the spectrum analyzer to any one measured frequency within its operating range.
- 3) Set RBW = 100kHz, VBW = 300kHz, Sweep = Auto, Detector = Peak.
- 4) Measure the highest amplitude appearing on spectral display and set it as a reference level.
- 5) Set a convenient frequency span including 100 kHz bandwidth from band edge.
- 6) Measure the emission and marking the edge frequency.
- 7) Repeat above procedures until all frequencies measured were complete.



Test Setup Block Diagram

10.3 Test Data and Results

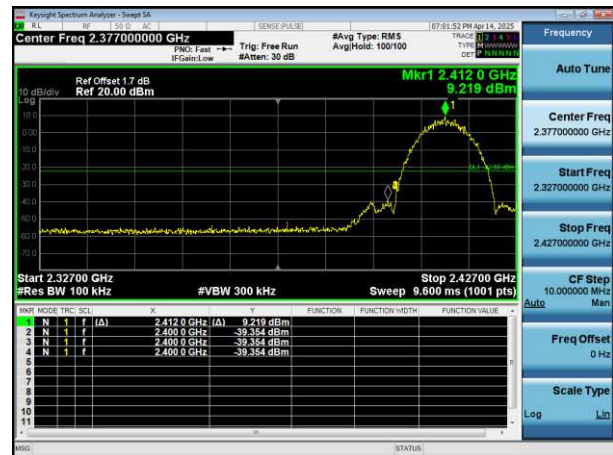
Test Mode	Antenna	Band-edge	Test Channel (MHz)	Max. Value (dBc)	Limit (dBc)	Test Result
802.11b	ANT 1	Lowest	2412	-46.77	-30	Pass
		Highest	2462	-60.11	-30	Pass
	ANT 2	Lowest	2412	-44.59	-30	Pass
		Highest	2462	-59.29	-30	Pass
802.11g	ANT 1	Lowest	2412	-45.14	-30	Pass
		Highest	2462	-54.46	-30	Pass
	ANT 2	Lowest	2412	-42.04	-30	Pass
		Highest	2462	-44.96	-30	Pass
802.11n(HT20)	ANT 1	Lowest	2412	-46.49	-30	Pass
		Highest	2462	-53.5	-30	Pass
	ANT 2	Lowest	2412	-43.74	-30	Pass
		Highest	2462	-48.23	-30	Pass
802.11n(HT40)	ANT 1	Lowest	2422	-39.79	-30	Pass
		Highest	2452	-48.04	-30	Pass
	ANT 2	Lowest	2422	-41.07	-30	Pass
		Highest	2452	-49.48	-30	Pass

802.11b Lowest_ANT1

Reference Power



Band-edge Emission

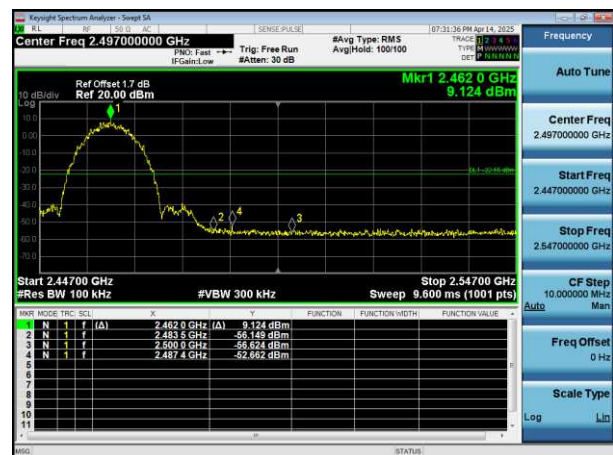


802.11b Highest_ANT1

Reference Power



Band-edge Emission

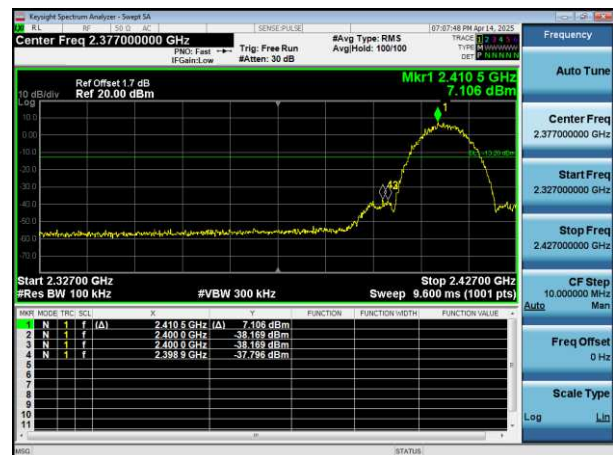


802.11b Lowest_ANT2

Reference Power



Band-edge Emission

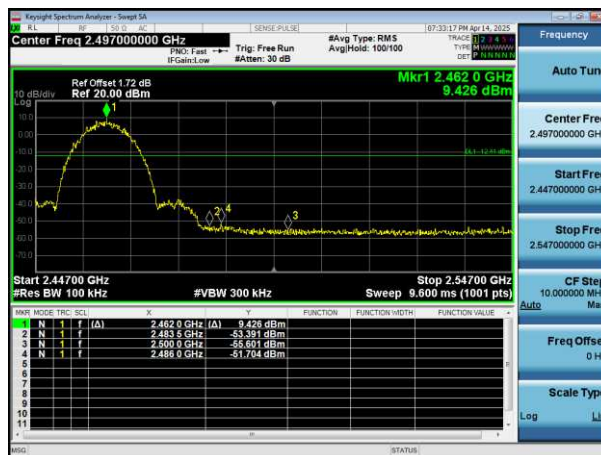


802.11b Highest_ANT2

Reference Power

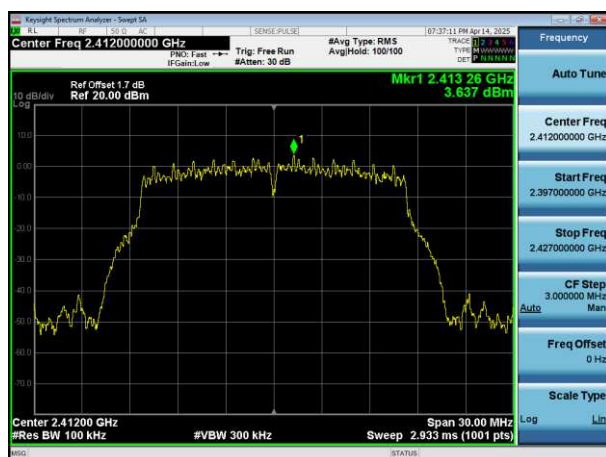


Band-edge Emission

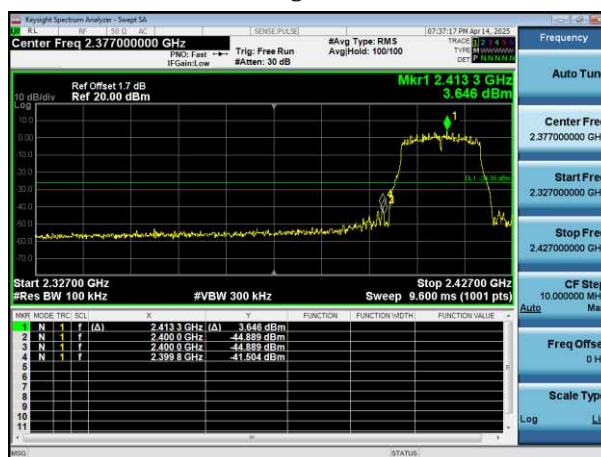


802.11g Lowest_ANT1

Reference Power

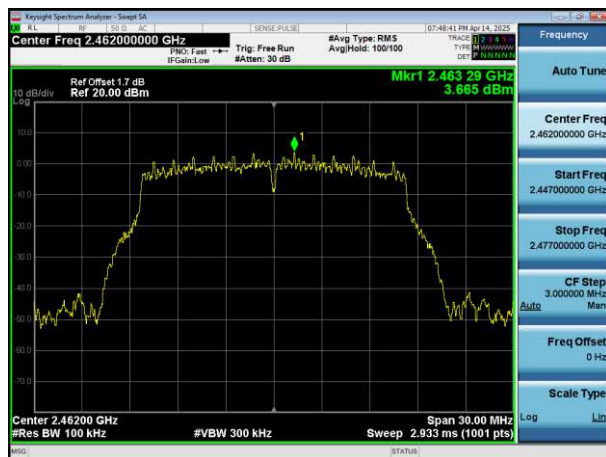


Band-edge Emission

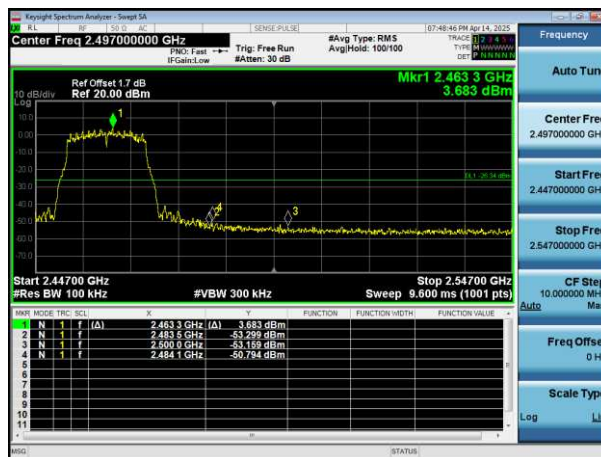


802.11g Highest_ANT1

Reference Power



Band-edge Emission

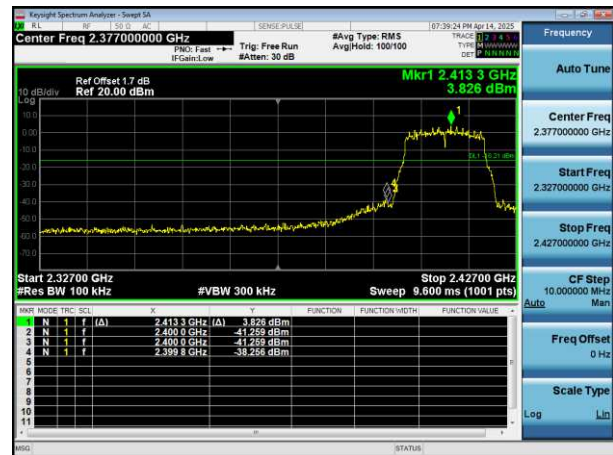


802.11g Lowest_ANT2

Reference Power

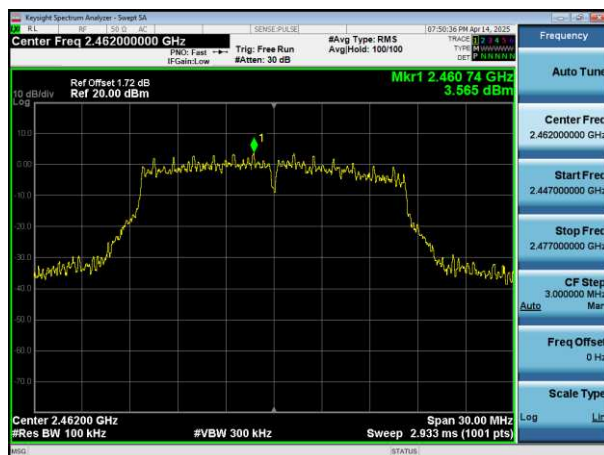


Band-edge Emission



802.11g Highest_ANT2

Reference Power

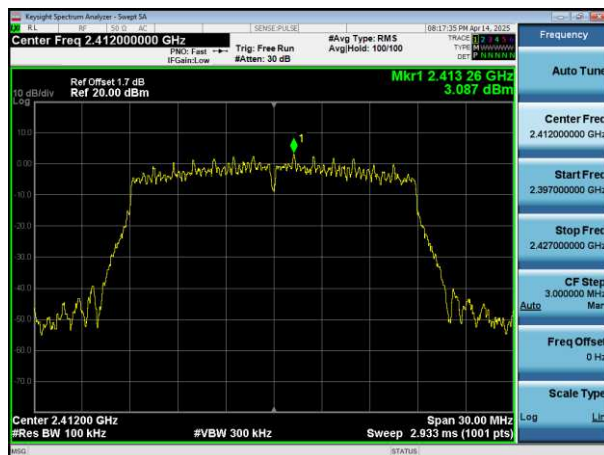


Band-edge Emission

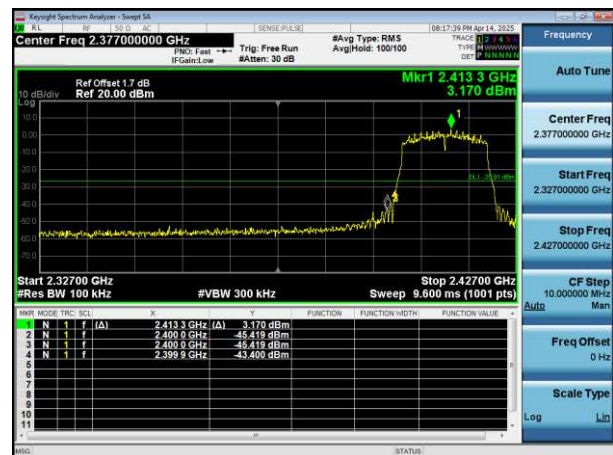


802.11n(HT20) Lowest_ANT1

Reference Power

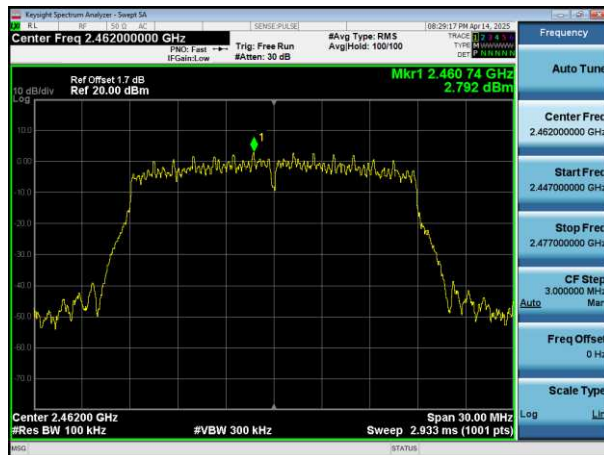


Band-edge Emission

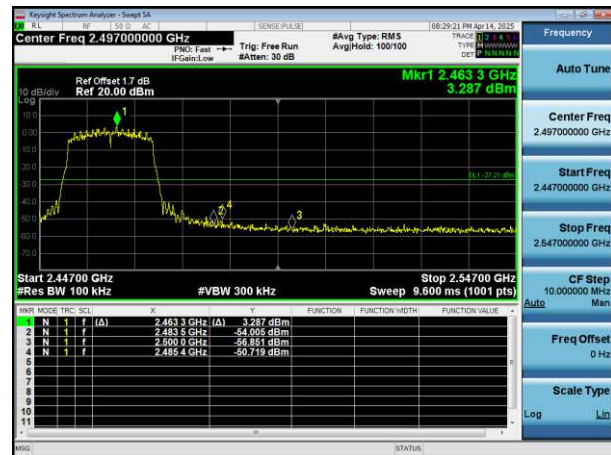


802.11n(HT20) Highest_ANT1

Reference Power

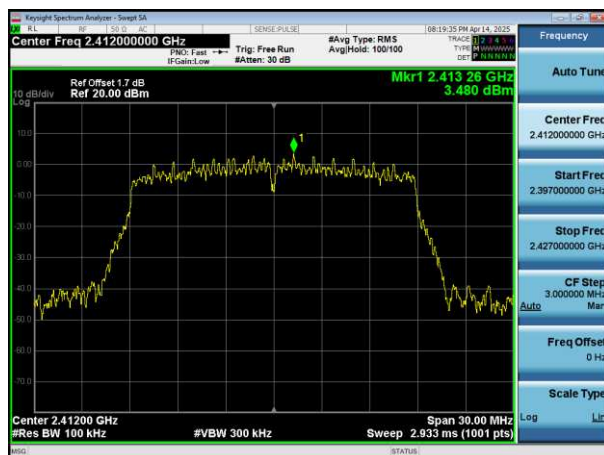


Band-edge Emission

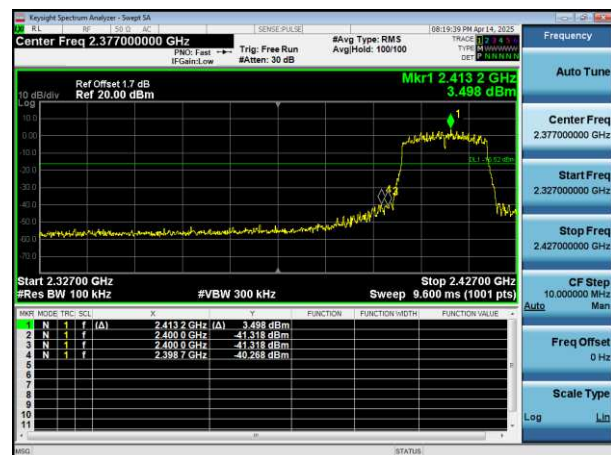


802.11n(HT20) Lowest_ANT2

Reference Power

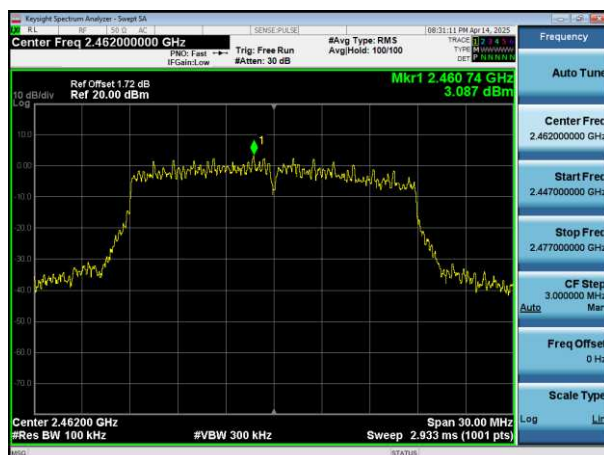


Band-edge Emission

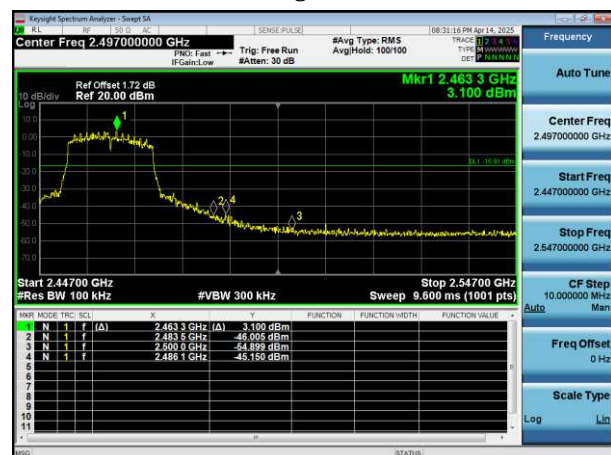


802.11n(HT20) Highest_ANT2

Reference Power



Band-edge Emission

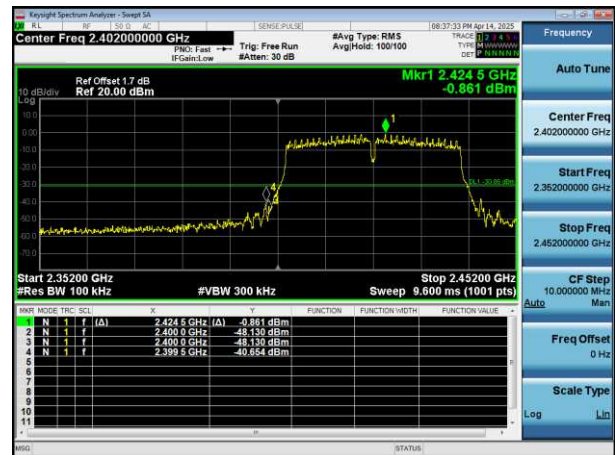


802.11n(HT40) Lowest_ANT1

Reference Power



Band-edge Emission

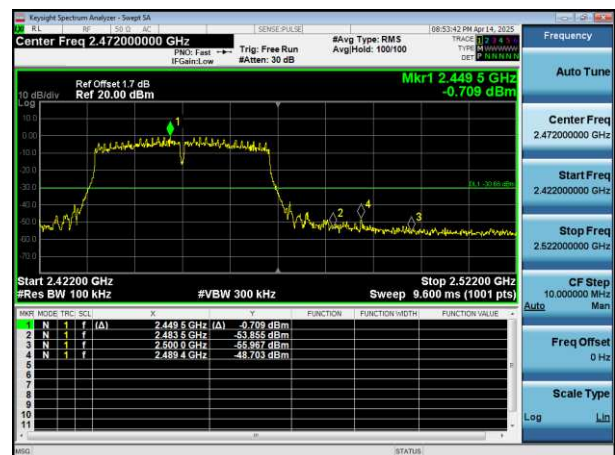


802.11n(HT40) Highest_ANT1

Reference Power



Band-edge Emission

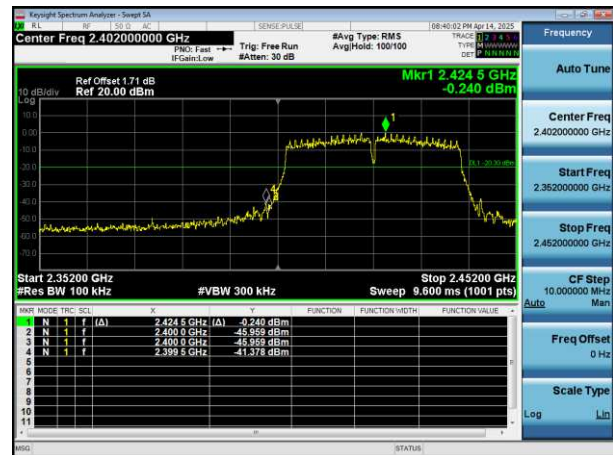


802.11n(HT40) Lowest_ANT2

Reference Power

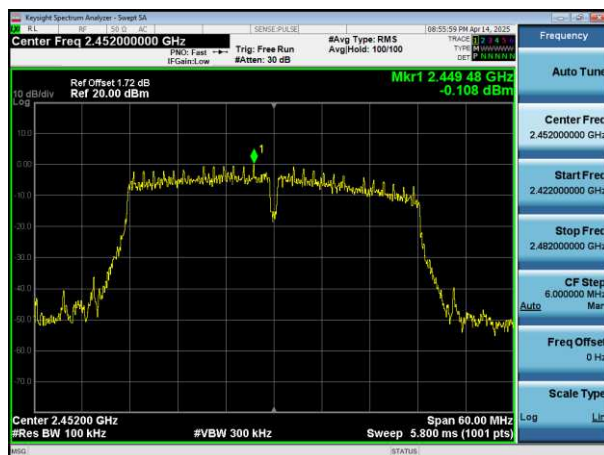


Band-edge Emission



802.11n(HT40) Highest_ANT2

Reference Power



Band-edge Emission



11. Conducted RF Spurious Emissions

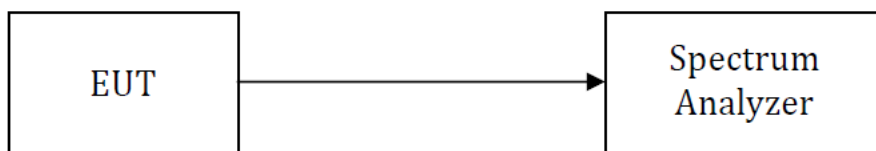
11.1 Standard and Limit

According to §15.247(d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator 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 the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

11.2 Test Procedure

Test is conducting under the description of ANSI C63.10 - 2013 section 6.7.

- 1) Remove the antenna from the EUT and connect to the spectrum analyzer via a low loss RF cable.
- 2) Set the spectrum analyzer to any one measured frequency within its operating range.
- 3) Set RBW = 100kHz, VBW = 300kHz, Sweep = Auto, Detector = Peak.
- 4) Measure the highest amplitude appearing on spectral display and set it as a reference level.
- 5) Measure the spurious emissions with frequency range from 9kHz to 26.5GHz.
- 6) Repeat above procedures until all measured frequencies were complete.



Test Setup Block Diagram

11.3 Test Data and Results

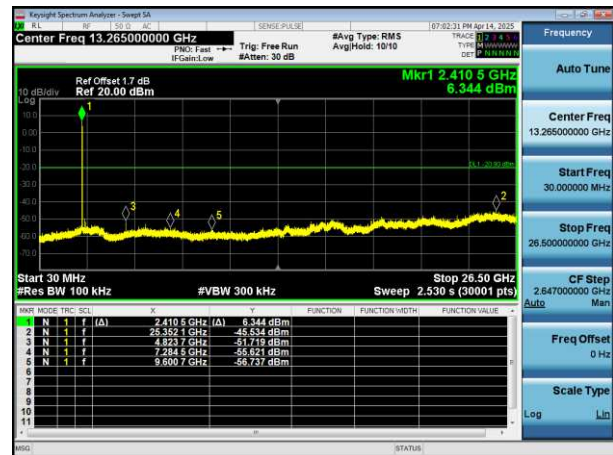
Note: The measurement frequency range is from 9kHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions measurement data.

802.11b Lowest_ANT1

Reference Power



Spurious Emissions

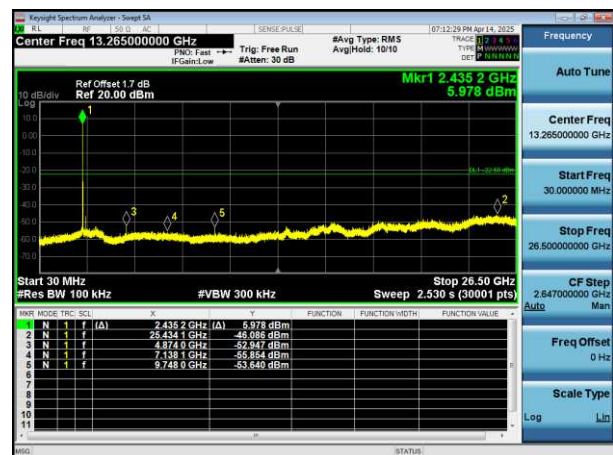


802.11b Middle_ANT1

Reference Power



Spurious Emissions

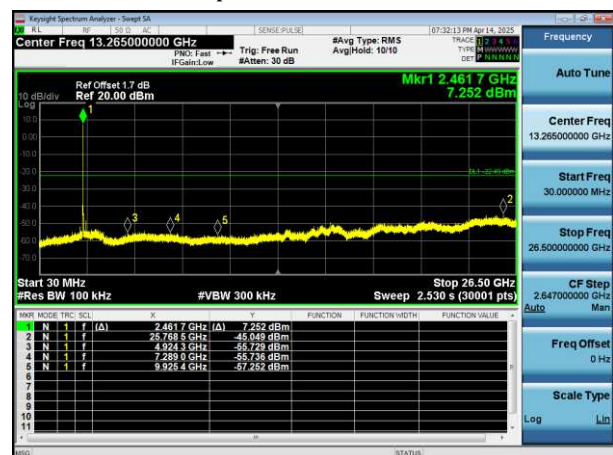


802.11b Highest_ANT1

Reference Power



Spurious Emissions

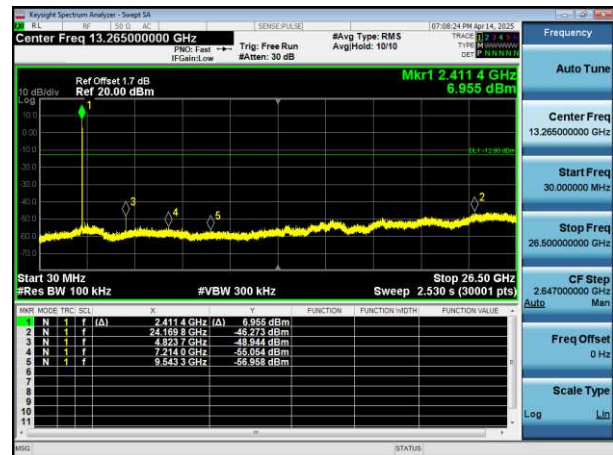


802.11b Lowest_ANT2

Reference Power



Spurious Emissions

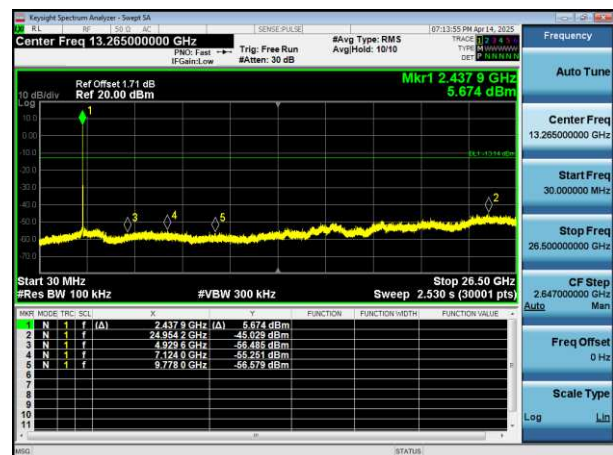


802.11b Middle_ANT2

Reference Power



Spurious Emissions

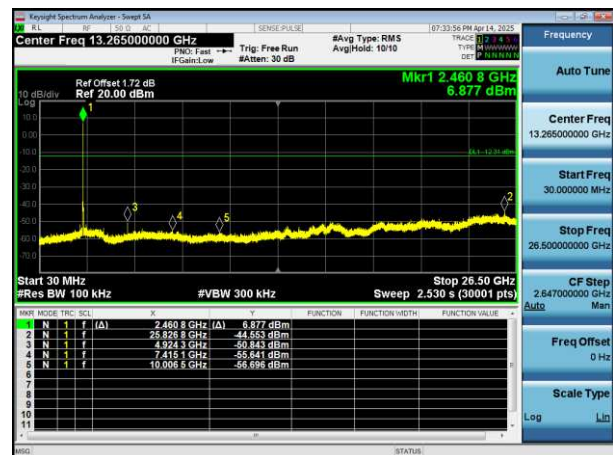


802.11b Highest_ANT2

Reference Power



Spurious Emissions

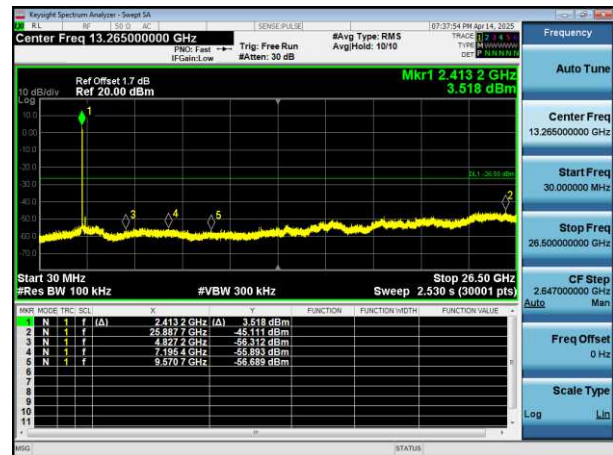


802.11g Lowest_ANT1

Reference Power

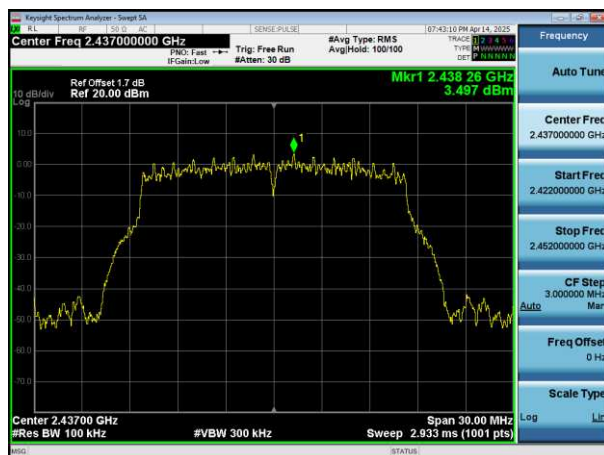


Spurious Emissions

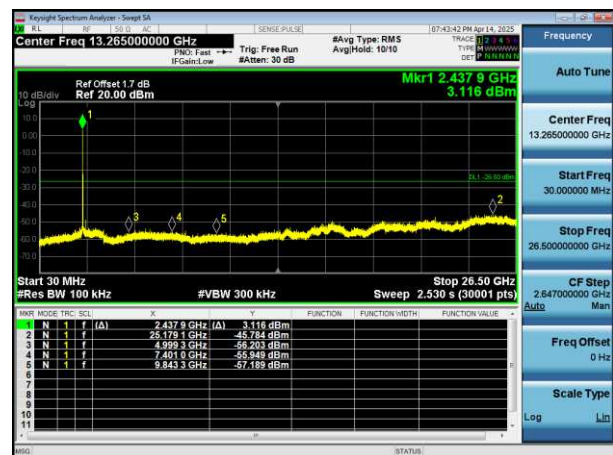


802.11g Middle_ANT1

Reference Power



Spurious Emissions

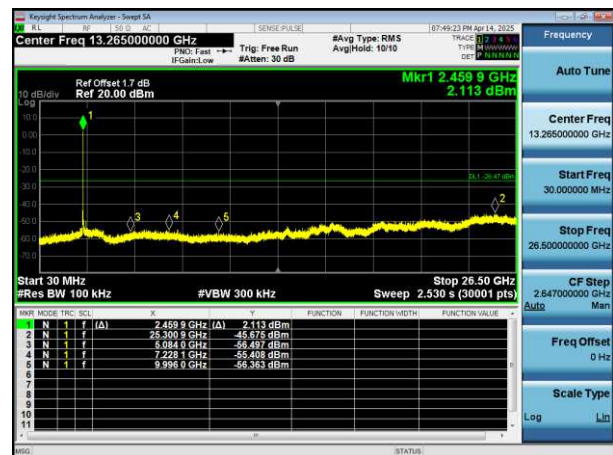


802.11g Highest_ANT1

Reference Power

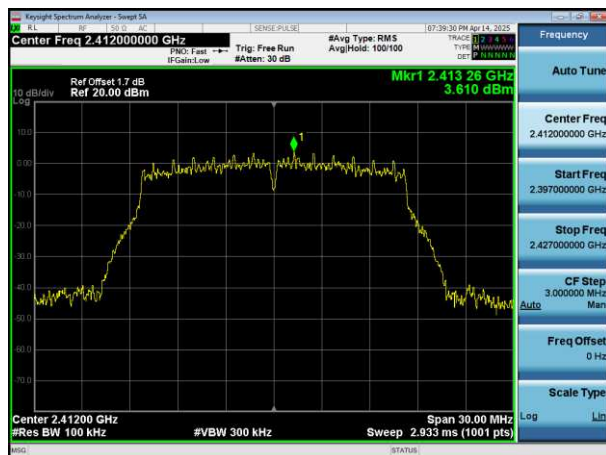


Spurious Emissions

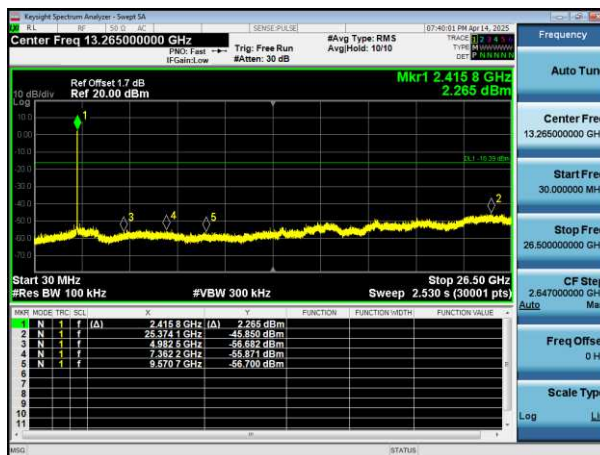


802.11g Lowest_ANT2

Reference Power

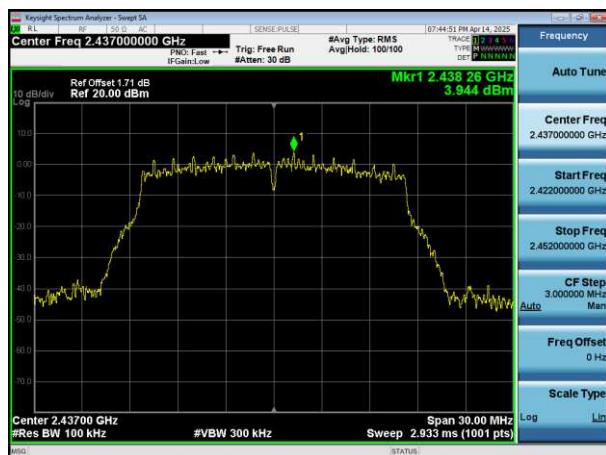


Spurious Emissions

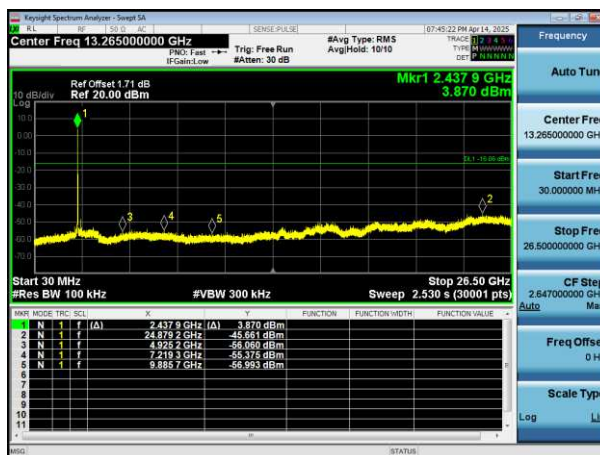


802.11g Middle_ANT2

Reference Power

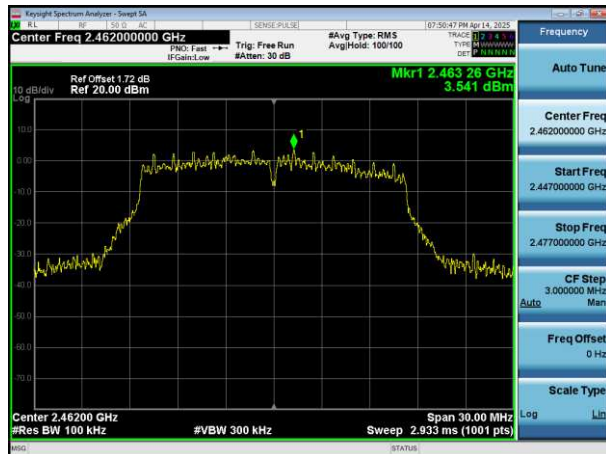


Spurious Emissions

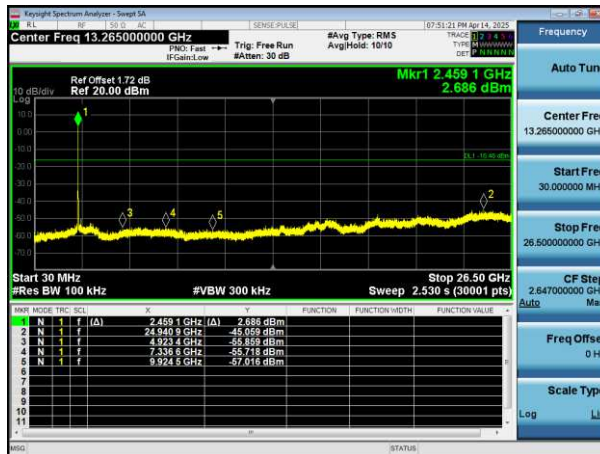


802.11g Highest_ANT2

Reference Power



Spurious Emissions

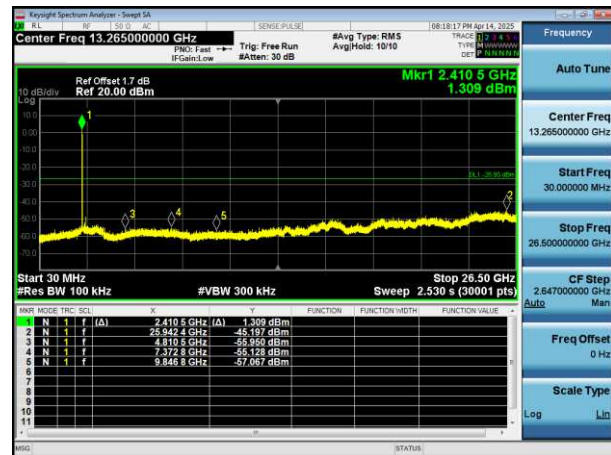


802.11n(HT20) Lowest_ANT1

Reference Power



Spurious Emissions

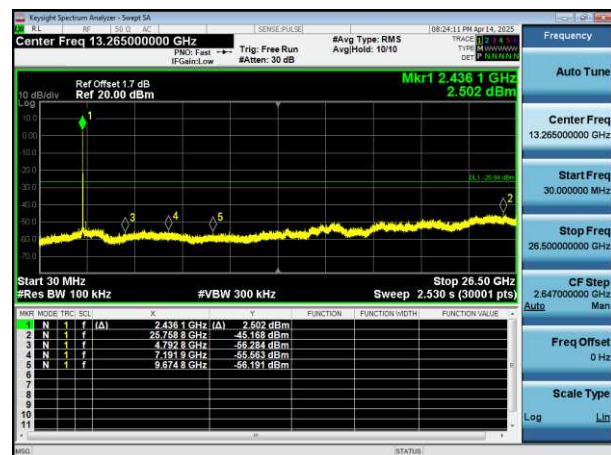


802.11n(HT20) Middle_ANT1

Reference Power

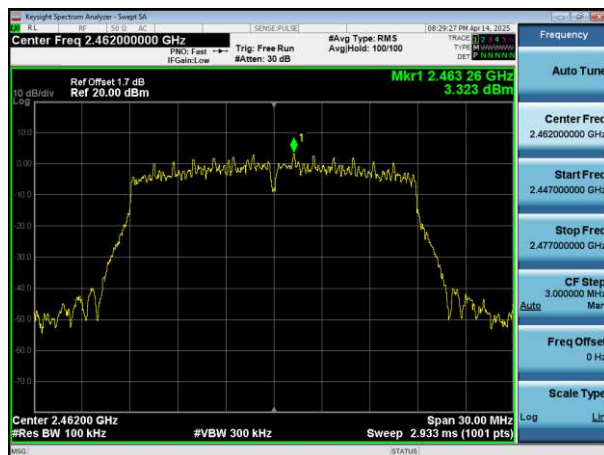


Spurious Emissions

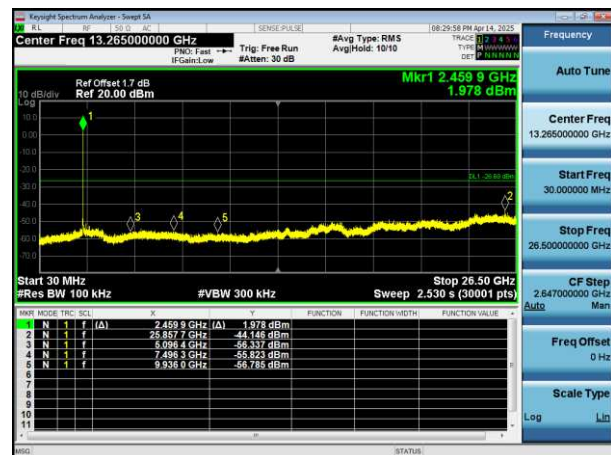


802.11n(HT20) Highest_ANT1

Reference Power



Spurious Emissions

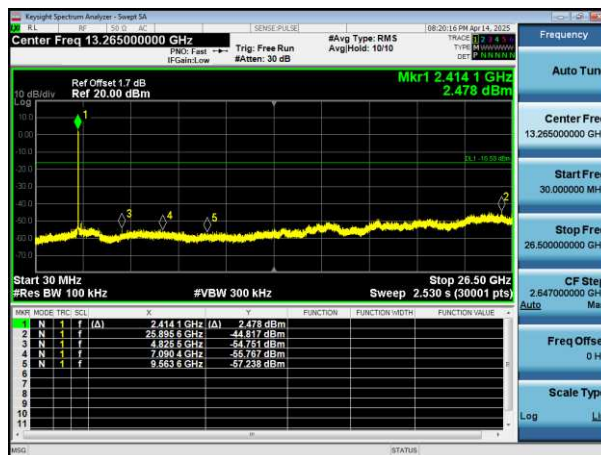


802.11n(HT20) Lowest_ANT2

Reference Power

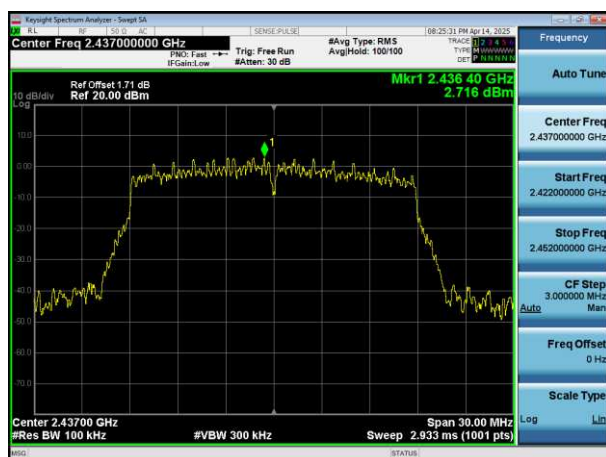


Spurious Emissions

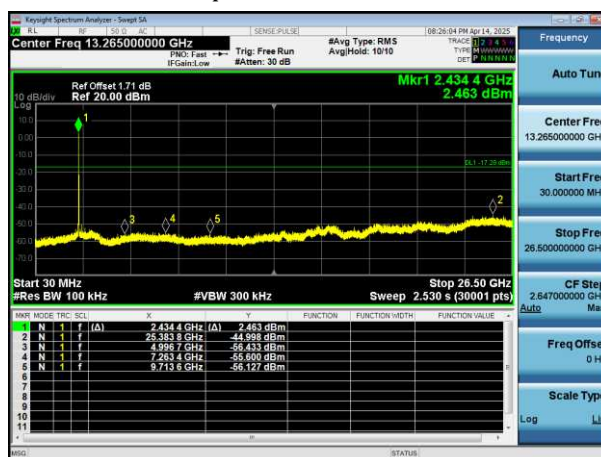


802.11n(HT20) Middle_ANT2

Reference Power

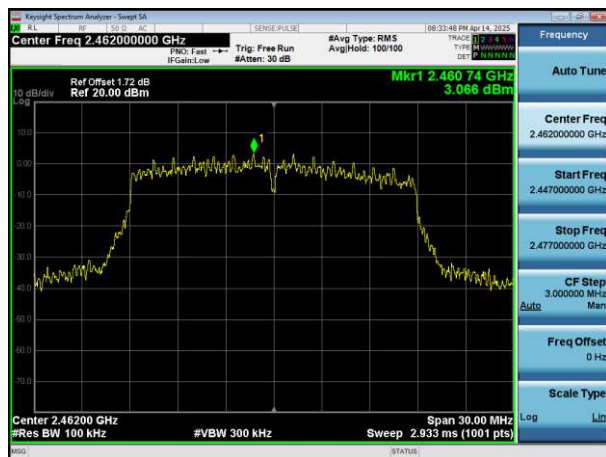


Spurious Emissions

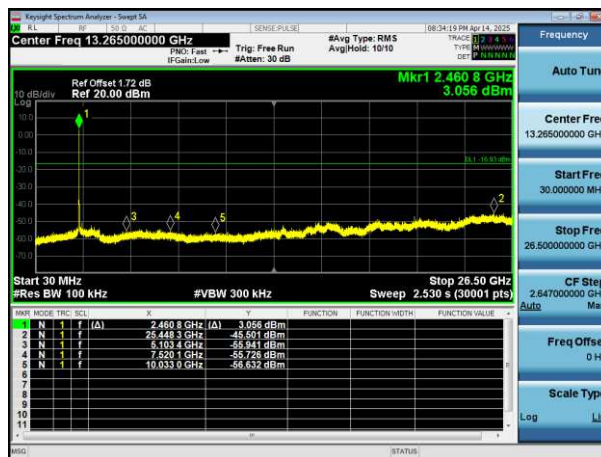


802.11n(HT20) Highest_ANT2

Reference Power



Spurious Emissions

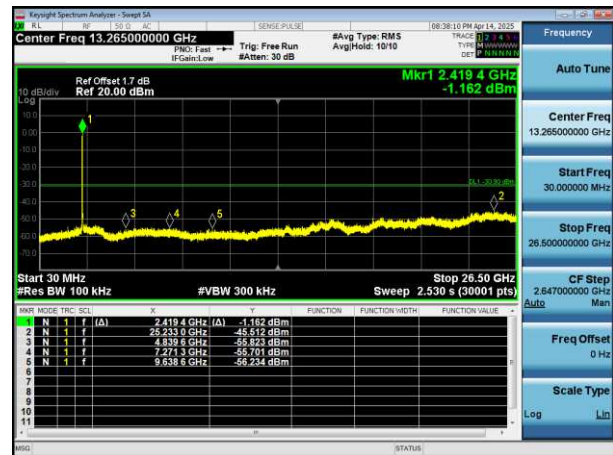


802.11n(HT40) Lowest_ANT1

Reference Power

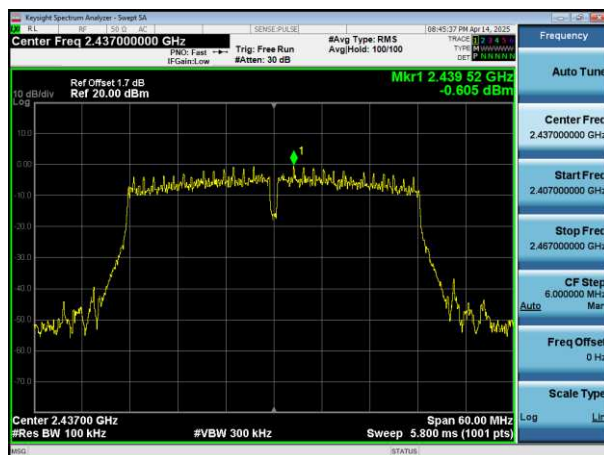


Spurious Emissions

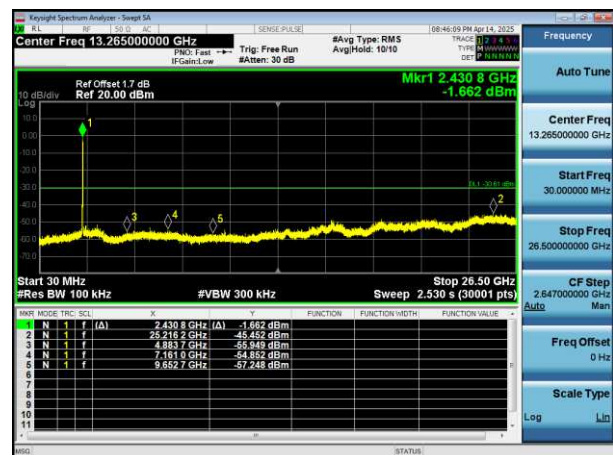


802.11n(HT40) Middle_ANT1

Reference Power



Spurious Emissions

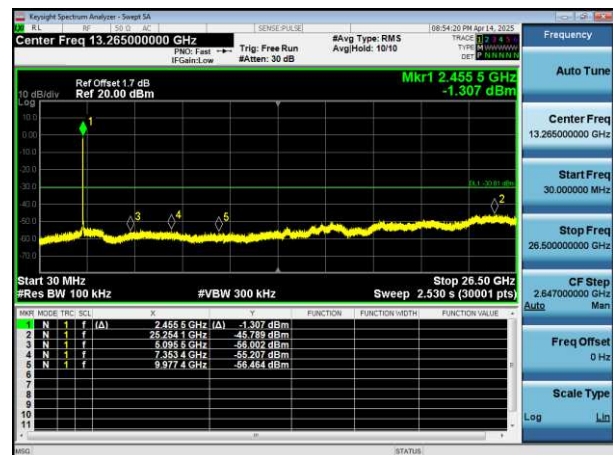


802.11n(HT40) Highest_ANT1

Reference Power



Spurious Emissions

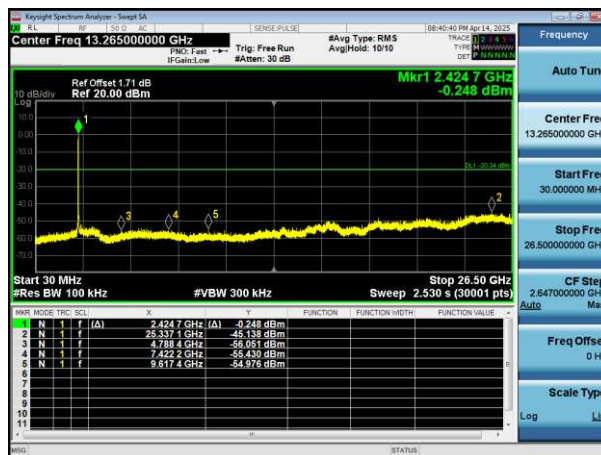


802.11n(HT40) Lowest_ANT2

Reference Power

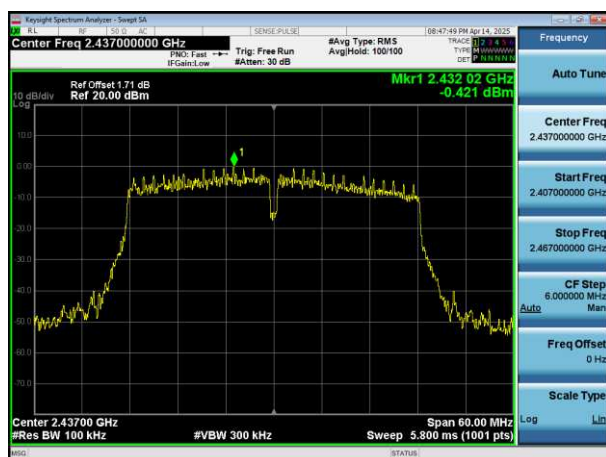


Spurious Emissions

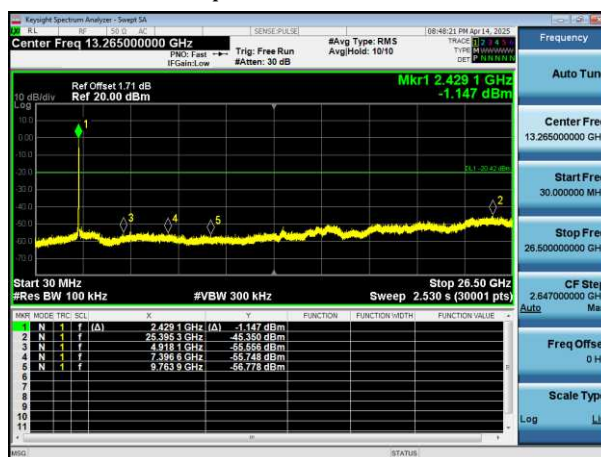


802.11n(HT40) Middle_ANT2

Reference Power

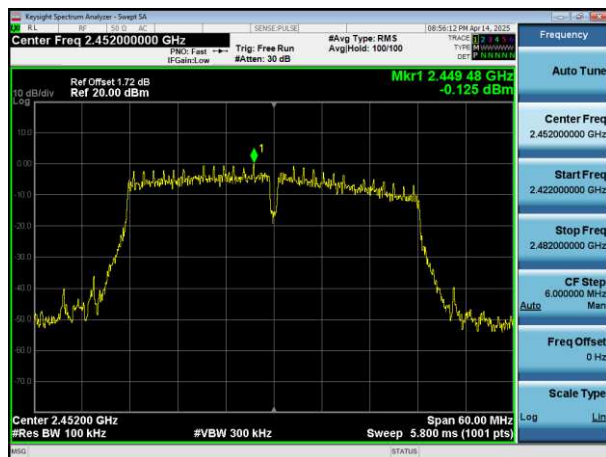


Spurious Emissions

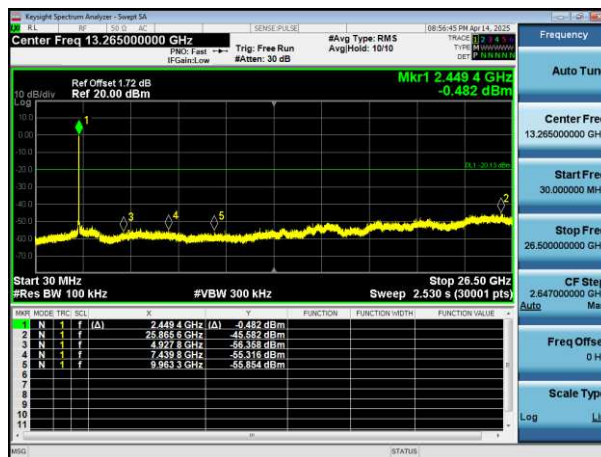


802.11n(HT40) Highest_ANT2

Reference Power



Spurious Emissions



***** END OF REPORT *****