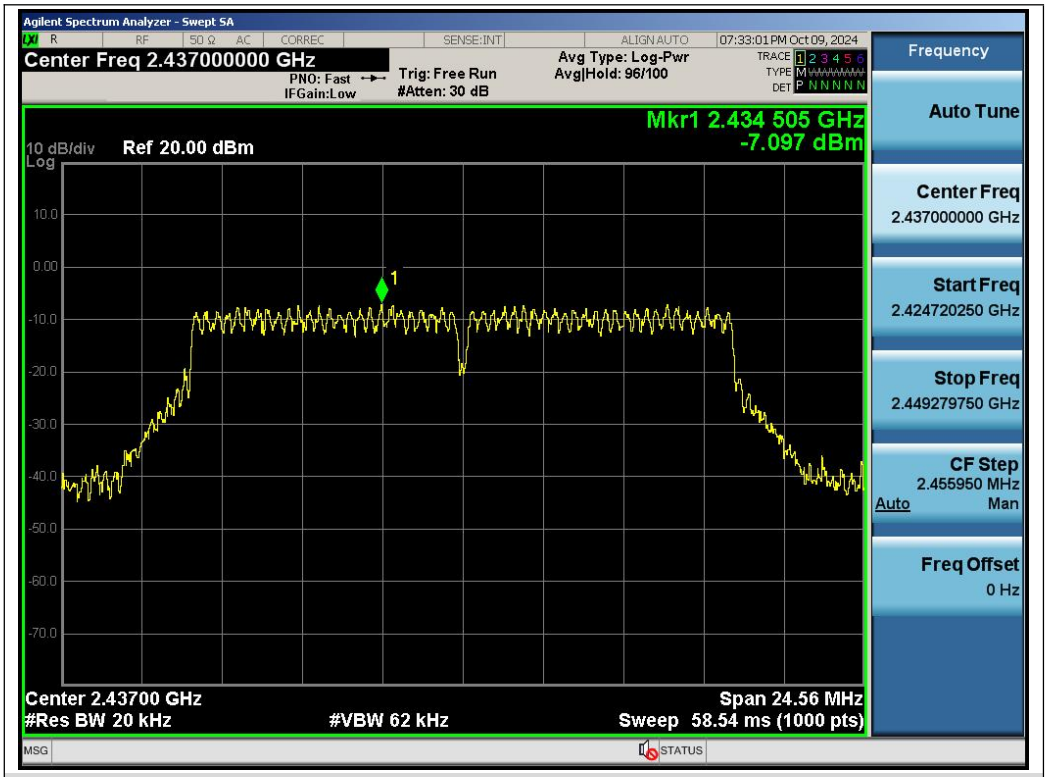
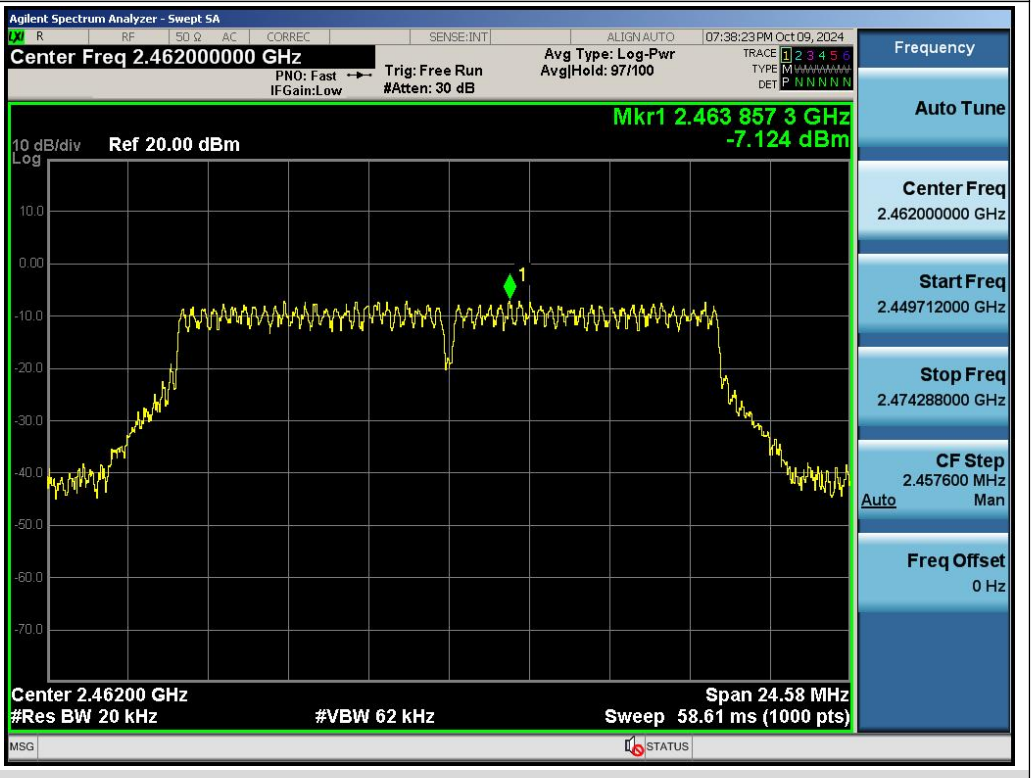
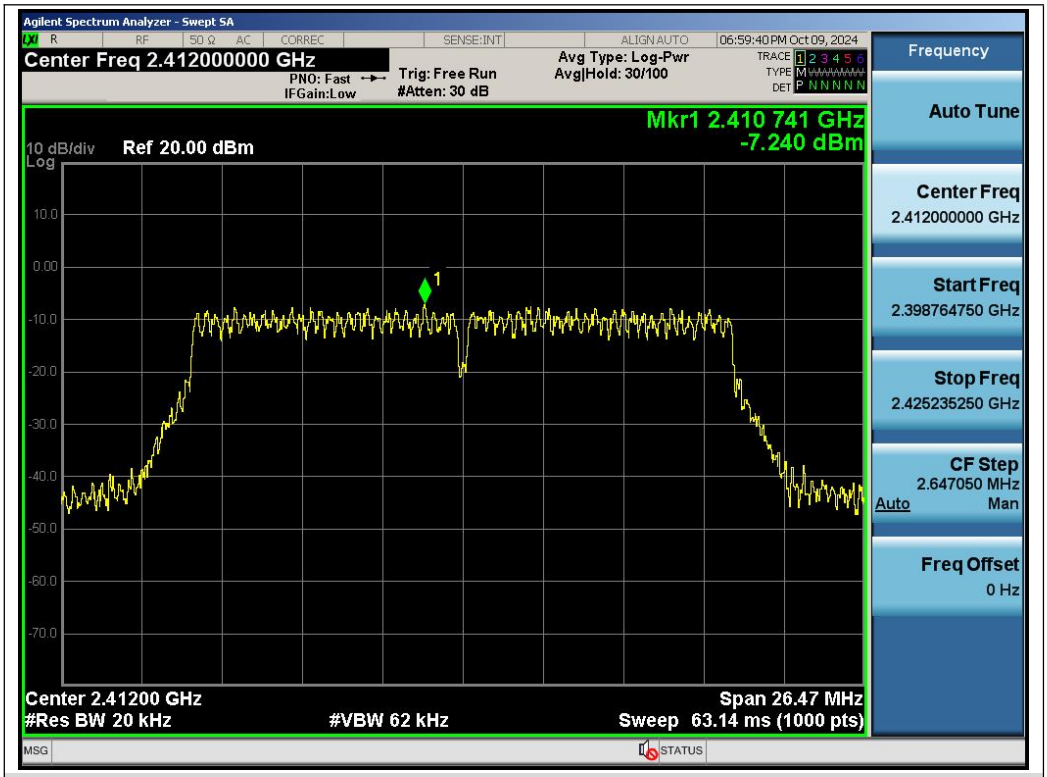


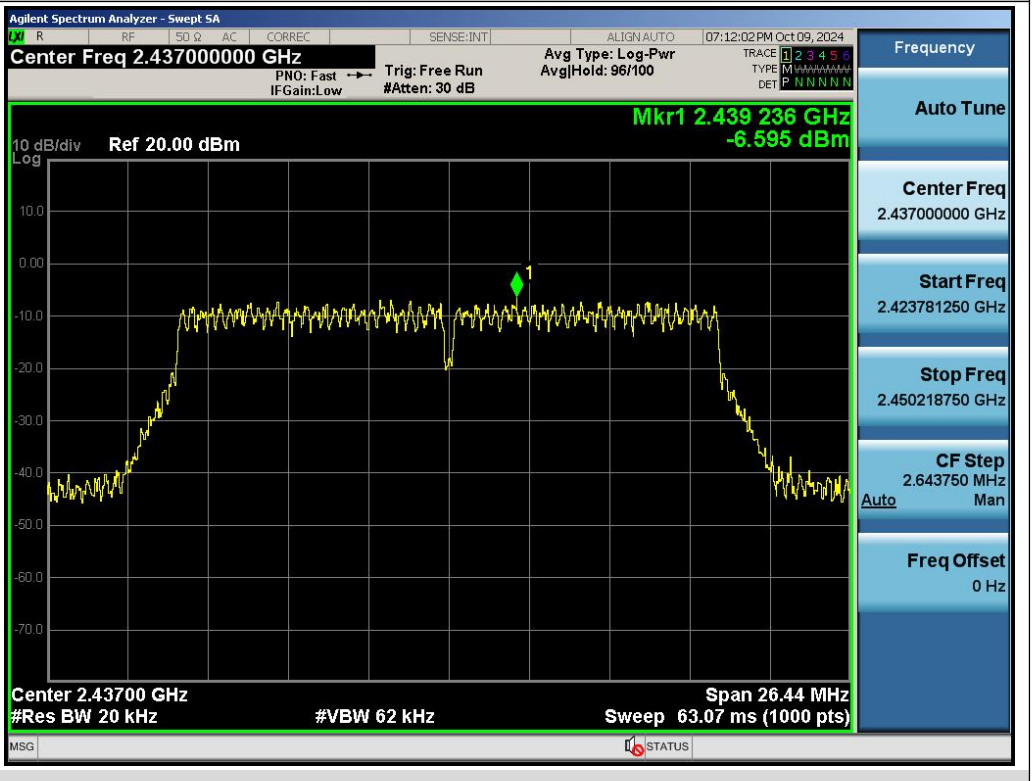
Test_Graph_802.11g_ANT1_2437_6Mbps_PSD



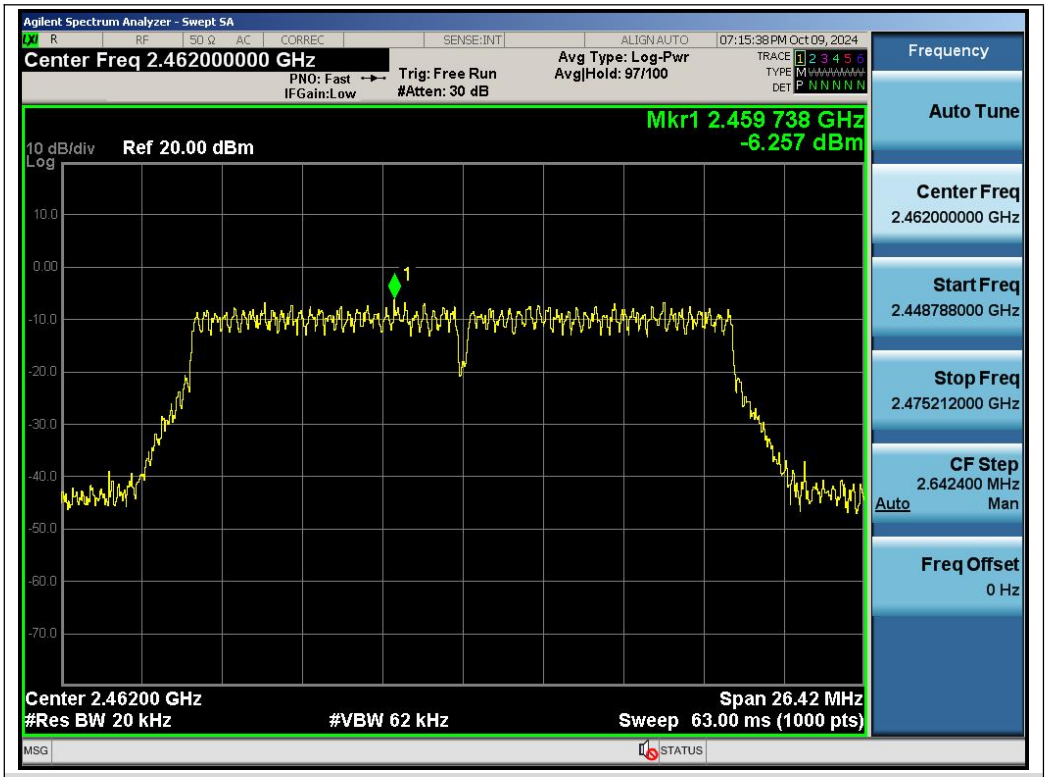
Test_Graph_802.11g_ANT1_2462_6Mbps_PSD



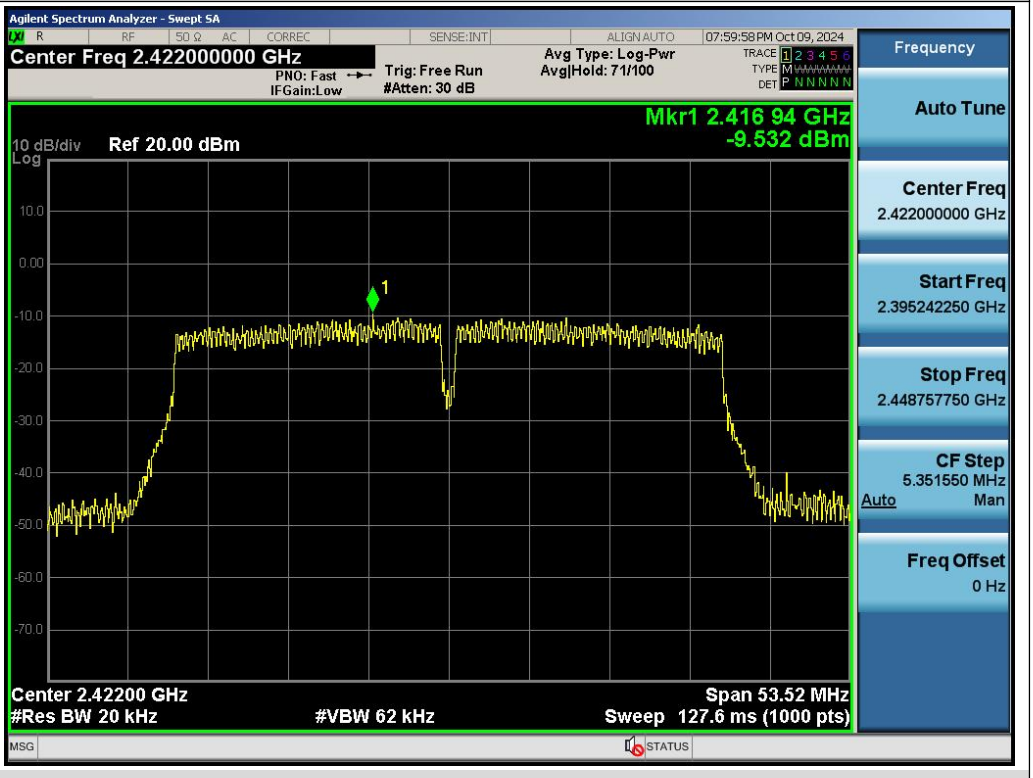
Test_Graph_802.11n20_ANT1_2412_MCS0_PSD



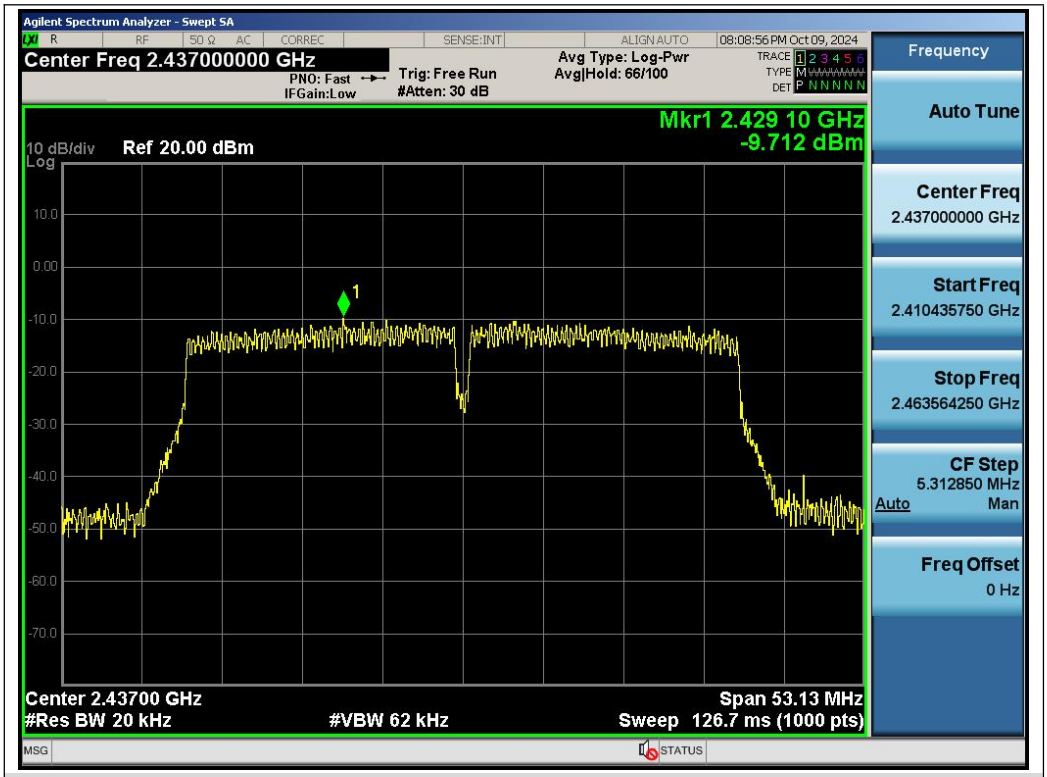
Test_Graph_802.11n20_ANT1_2437_MCS0_PSD



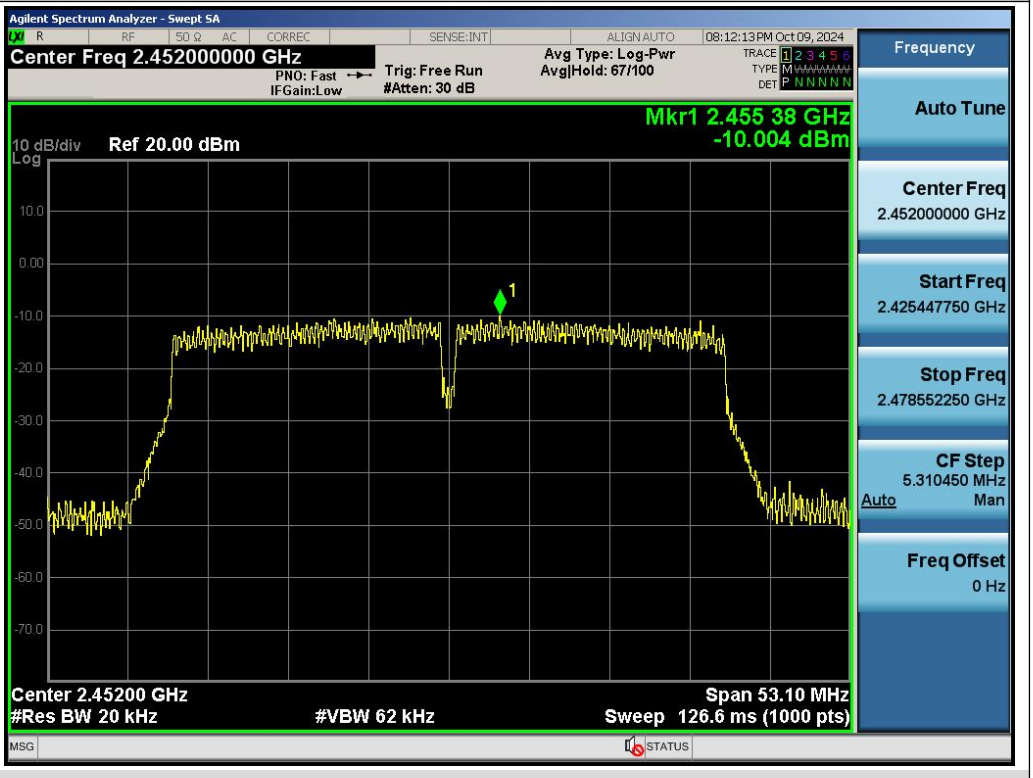
Test_Graph_802.11n20_ANT1_2462_MCS0_PSD



Test_Graph_802.11n40_ANT1_2422_MCS0_PSD



Test_Graph_802.11n40_ANT1_2437_MCS0_PSD



Test_Graph_802.11n40_ANT1_2452_MCS0_PSD

10. Conducted Band Edge and Out-of-Band Emissions

10.1 Provisions Applicable

In any 100kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

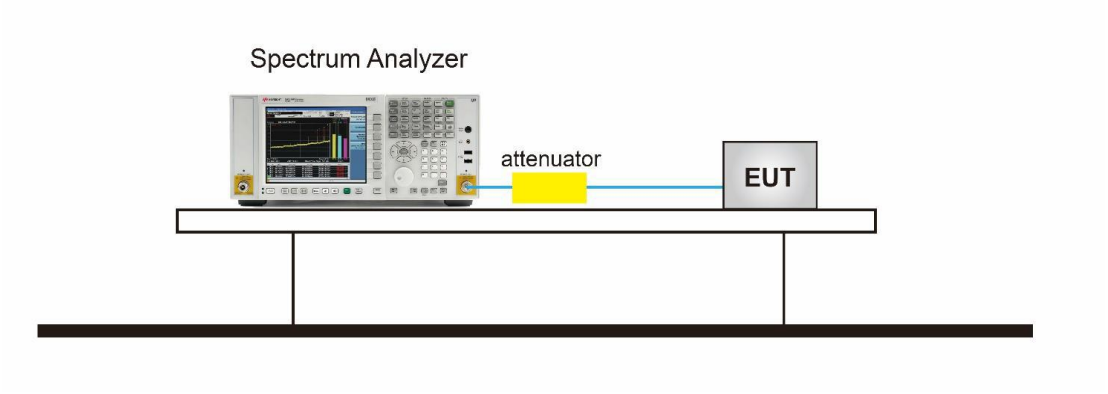
10.2 Measurement Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
Use the following spectrum analyzer settings:

- Step 1: Measurement Procedure In-Band Reference Level
  1. Set instrument center frequency to DTS channel center frequency.
  2. Set the span to ≥ 1.5 times the DTS bandwidth.
  3. Set the RBW = 100 kHz.
  4. Set the VBW ≥ 3 x RBW.
  5. Detector = peak.
  6. Sweep time = auto couple.
  7. Trace mode = max hold.
  8. Allow trace to fully stabilize.
  9. Use the peak marker function to determine the maximum PSD level.
  10. Note that the channel found to contain the maximum PSD level can be used to establish the reference level.
  11. For reference level values, please refer to DTS bandwidth test.
- Step 2: Measurement Procedure Out of Band Emission
  1. Set RBW = 100 kHz.
  2. Set VBW ≥ 300 kHz.
  3. Detector = peak.
  4. Sweep = auto couple.
  5. Trace Mode = max hold.
  6. Allow trace to fully stabilize.
  7. Use the peak marker function to determine the maximum amplitude level.

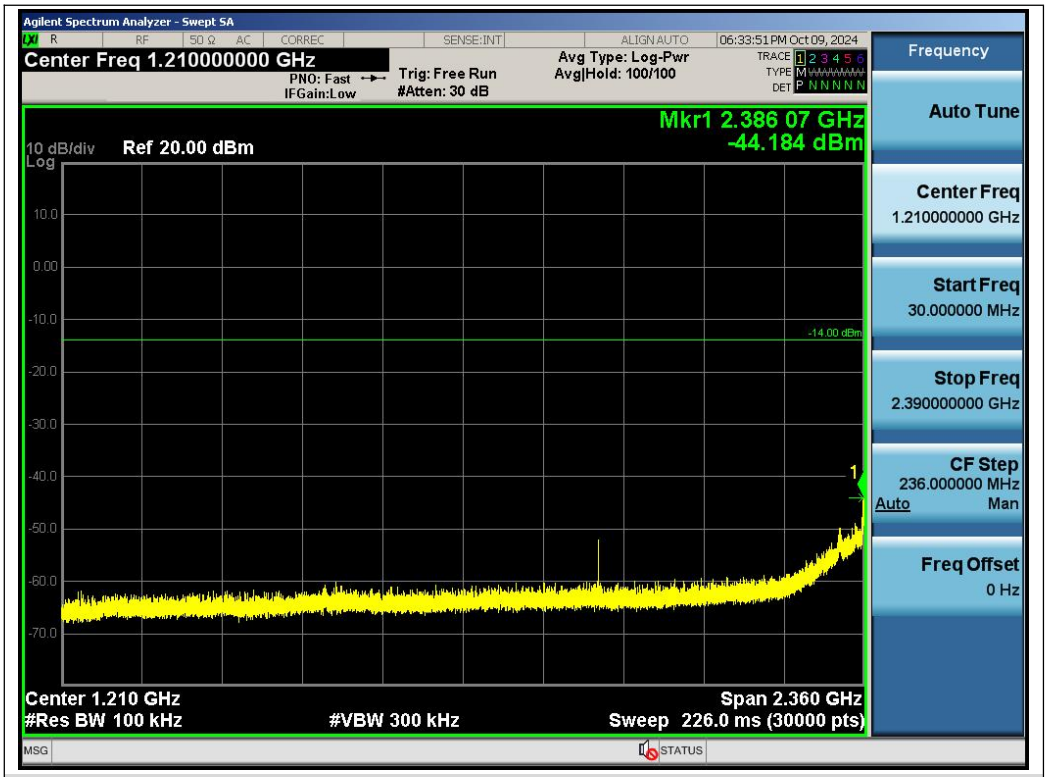
Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

10.3 Measurement Setup (Block Diagram of Configuration)

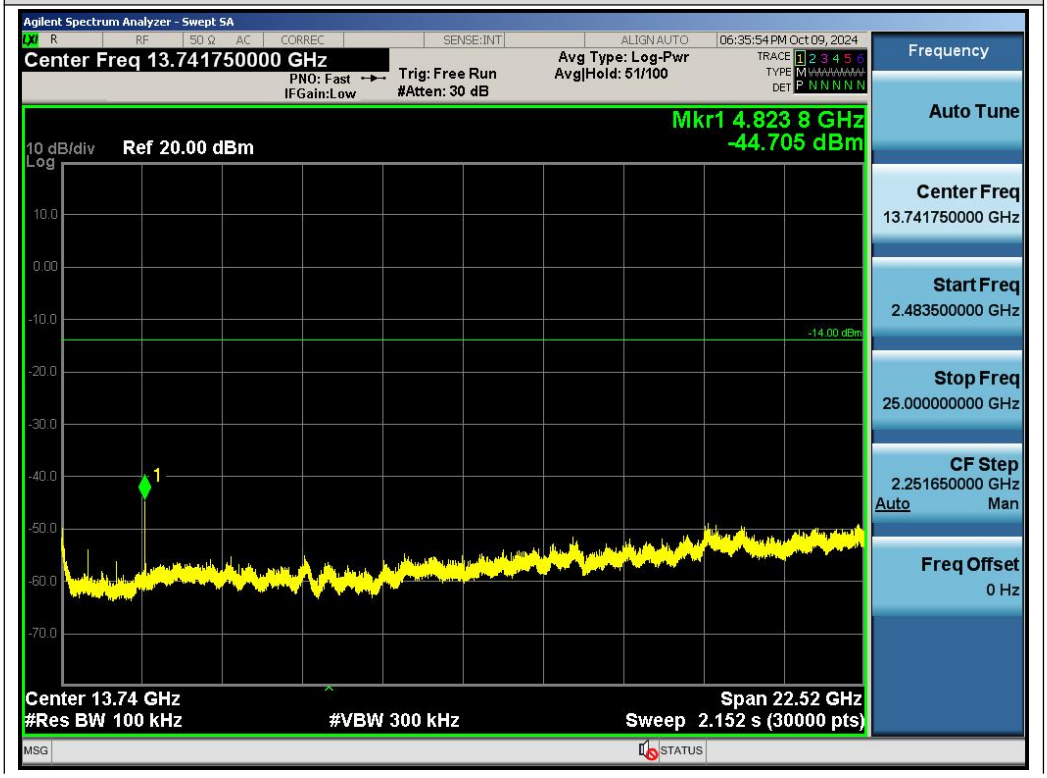


10.4 Measurement Result

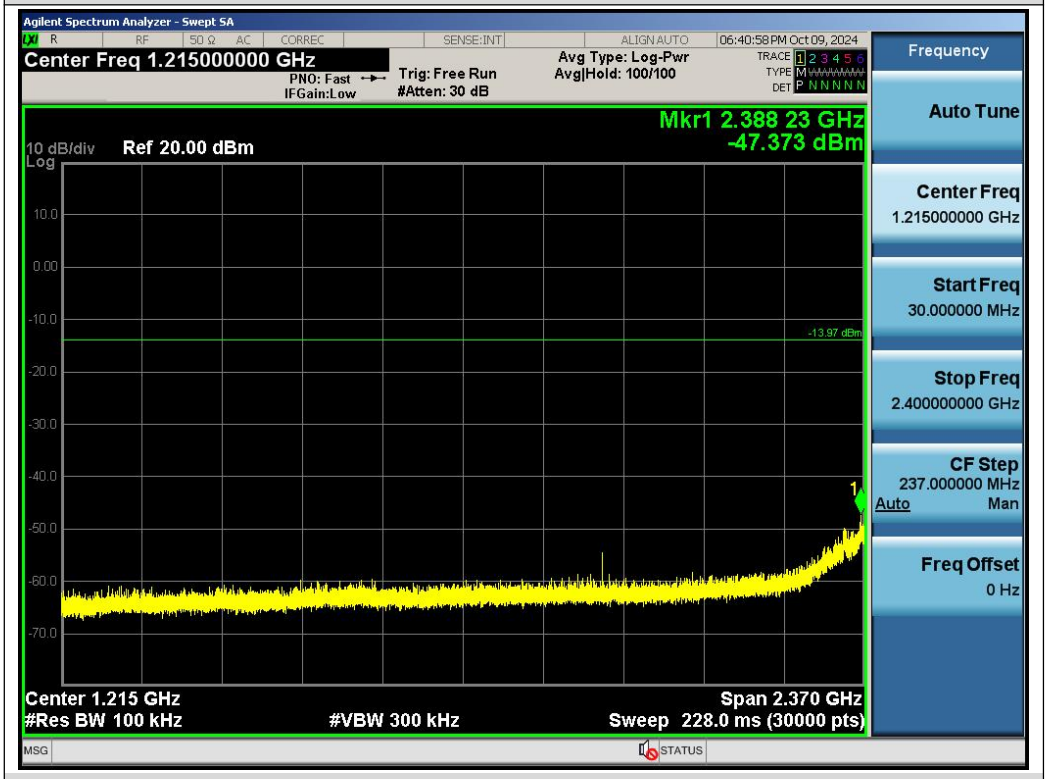
Test Graphs of Spurious Emissions in Non-Restricted Frequency Bands



Test_Graph_802.11b_ANT1_2412_1Mbps_Lower Band Emissions

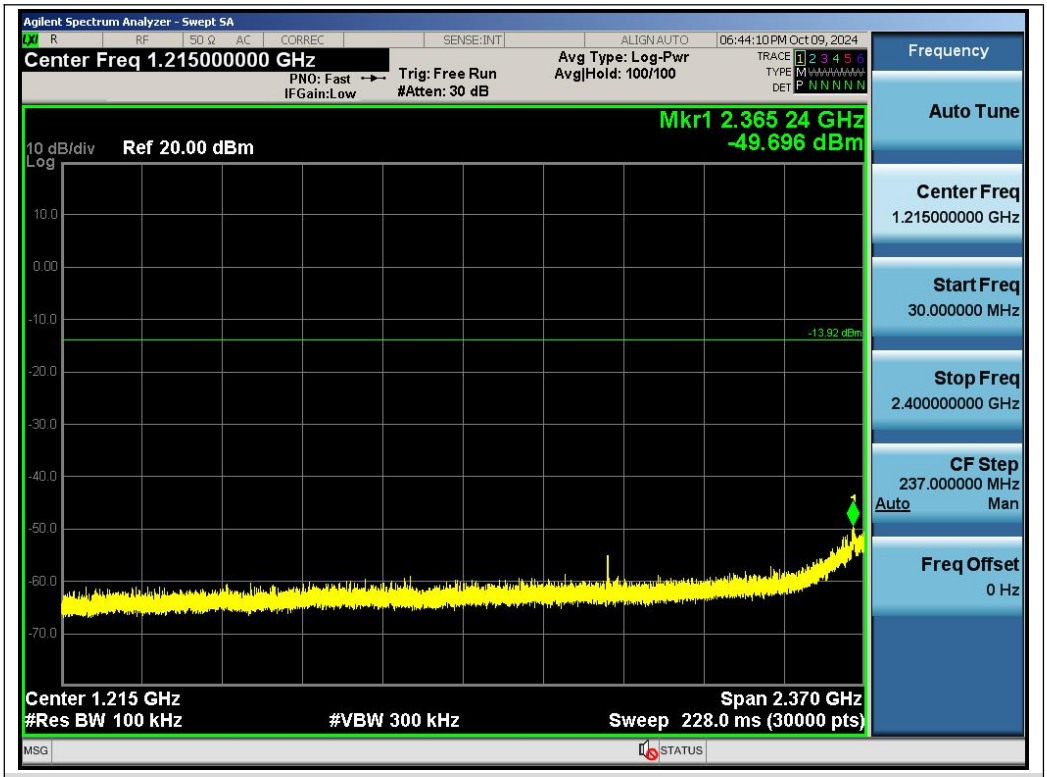


Test_Graph_802.11b_ANT1_2412_1Mbps_Higher Band Emissions

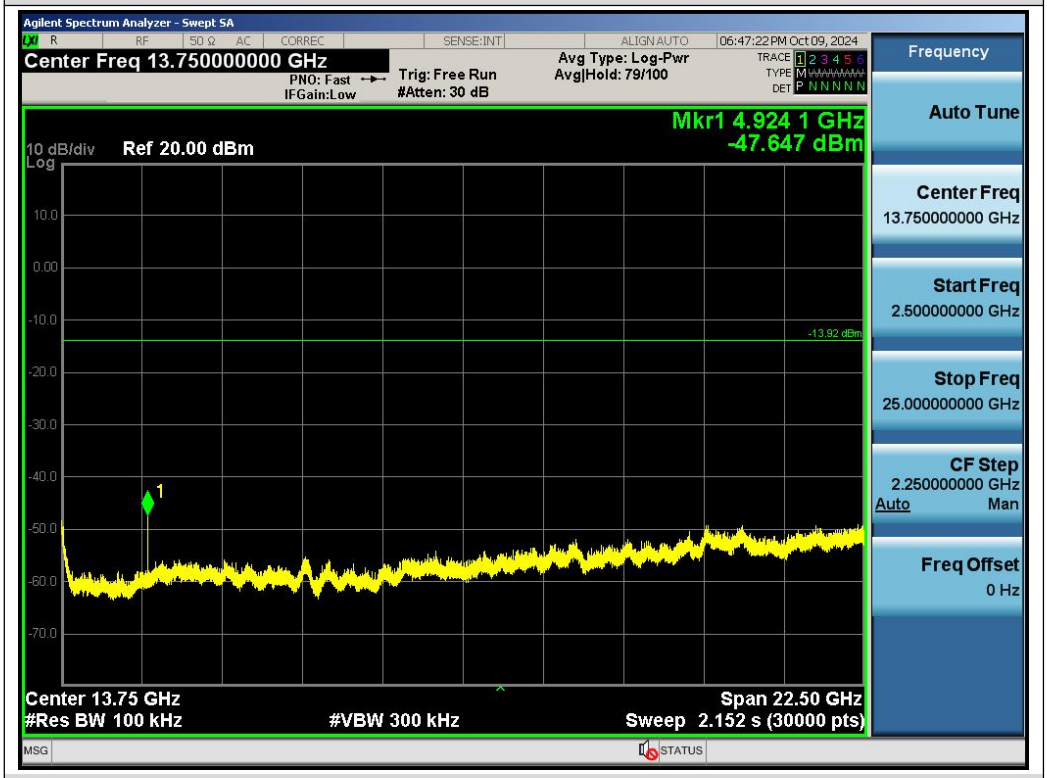


Test_Graph_802.11b_ANT1_2437_1Mbps_Lower Band Emissions

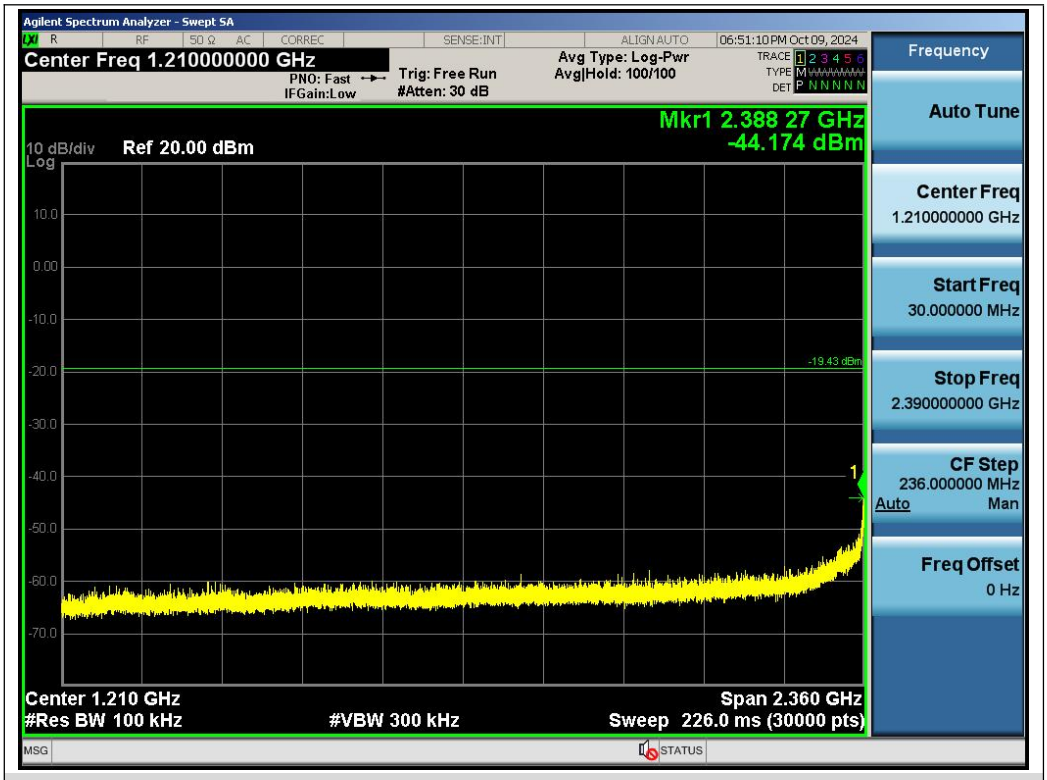
Test_Graph_802.11b_ANT1_2437_1Mbps_Higher Band Emissions



Test_Graph_802.11b_ANT1_2462_1Mbps_Lower Band Emissions

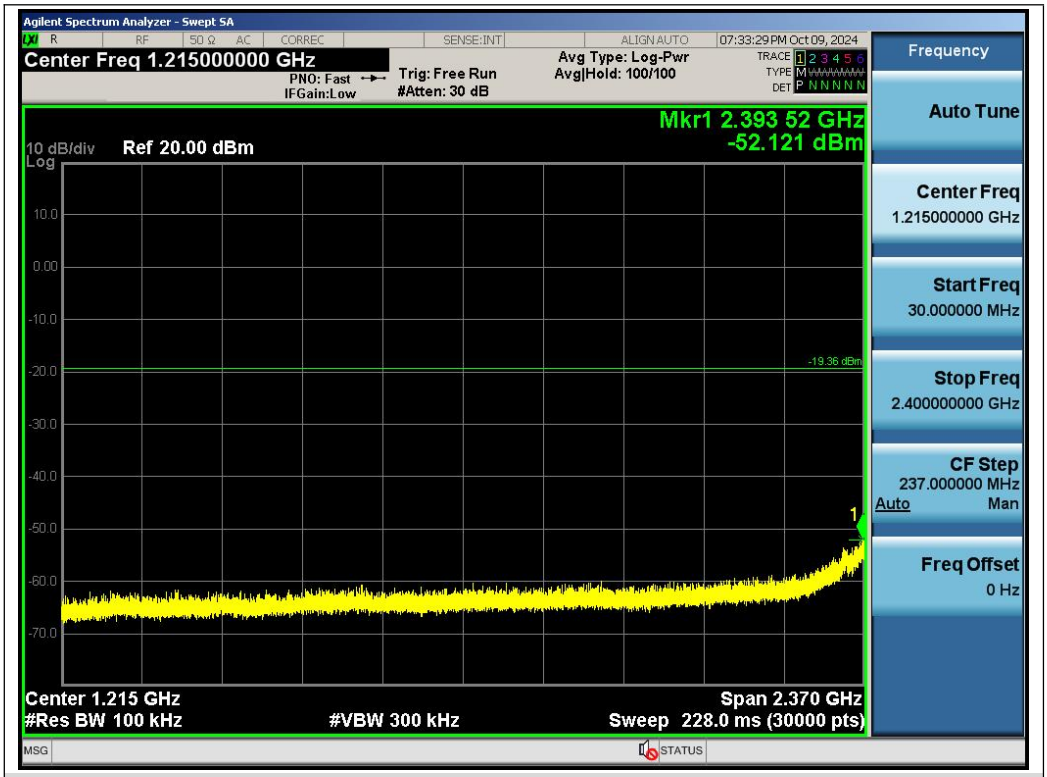


Test_Graph_802.11b_ANT1_2462_1Mbps_Higher Band Emissions

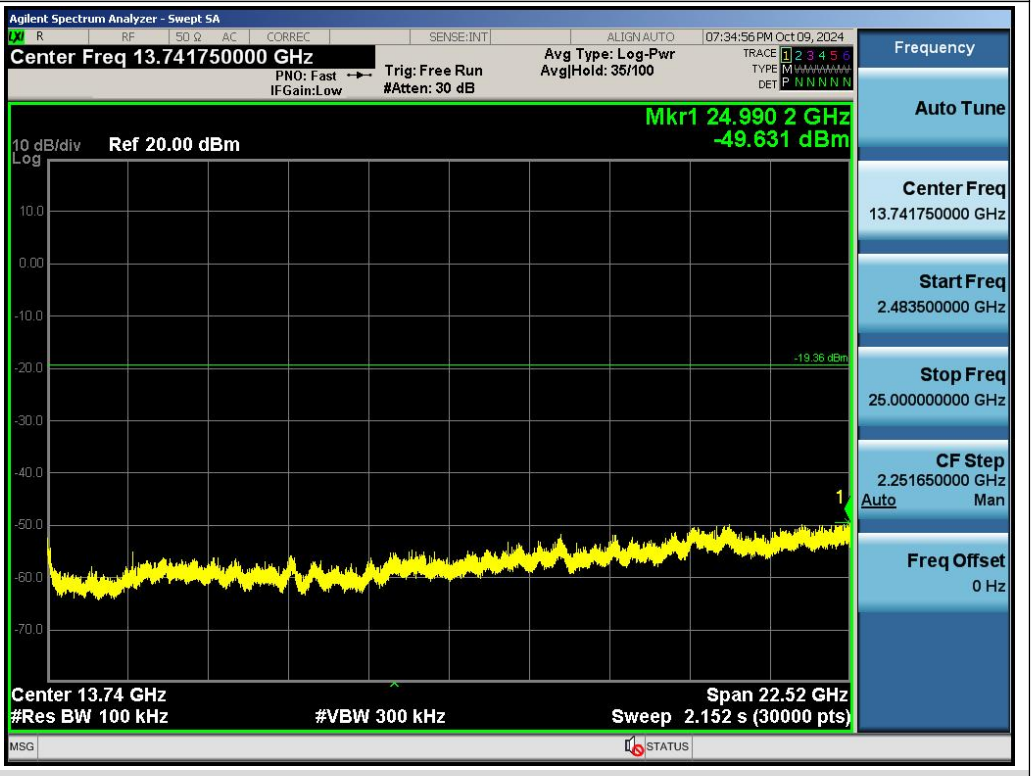


Test_Graph_802.11g_ANT1_2412_6Mbps_Lower Band Emissions

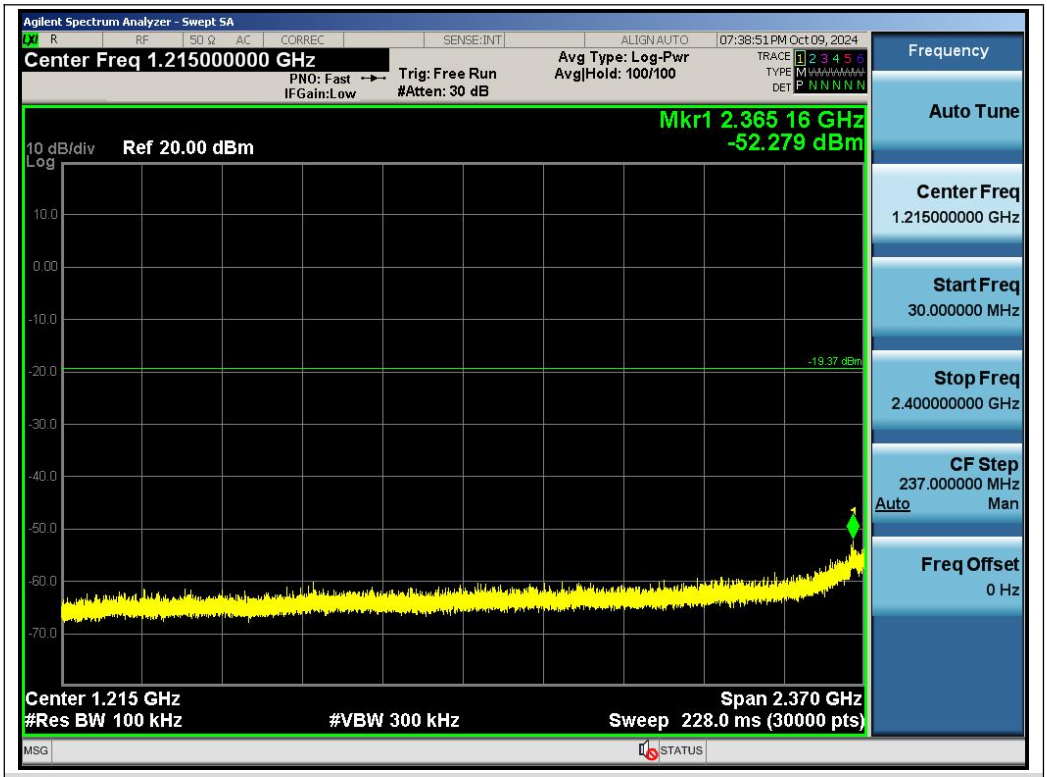
Test_Graph_802.11g_ANT1_2412_6Mbps_Higher Band Emissions



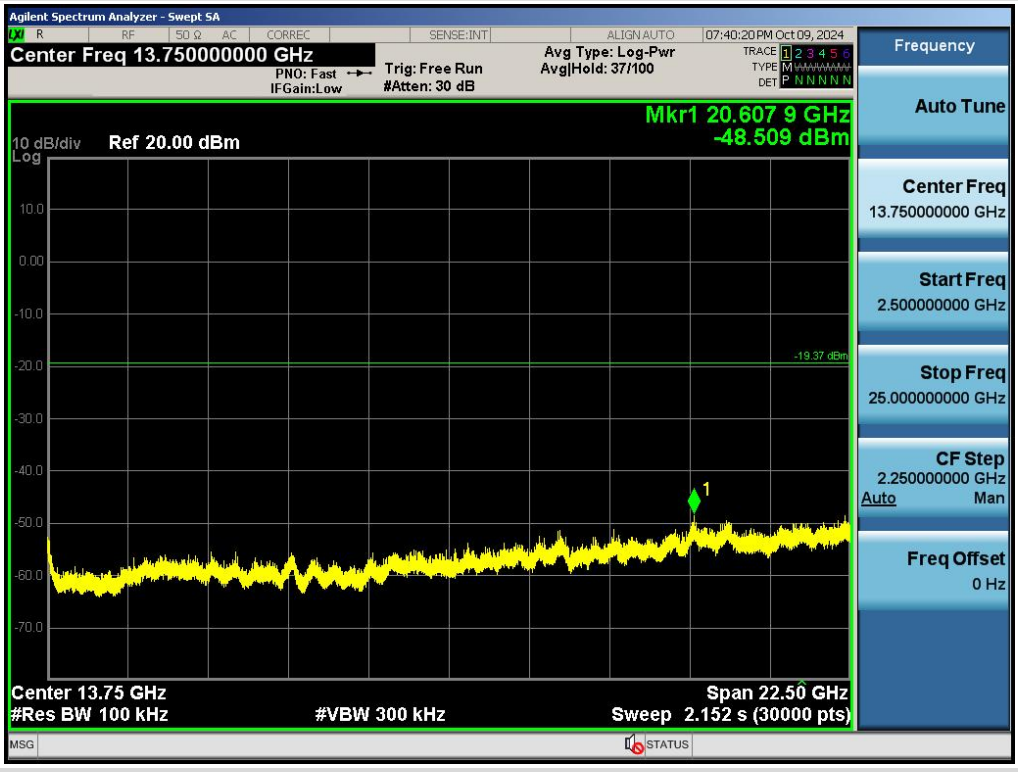
Test_Graph_802.11g_ANT1_2437_6Mbps_Lower Band Emissions



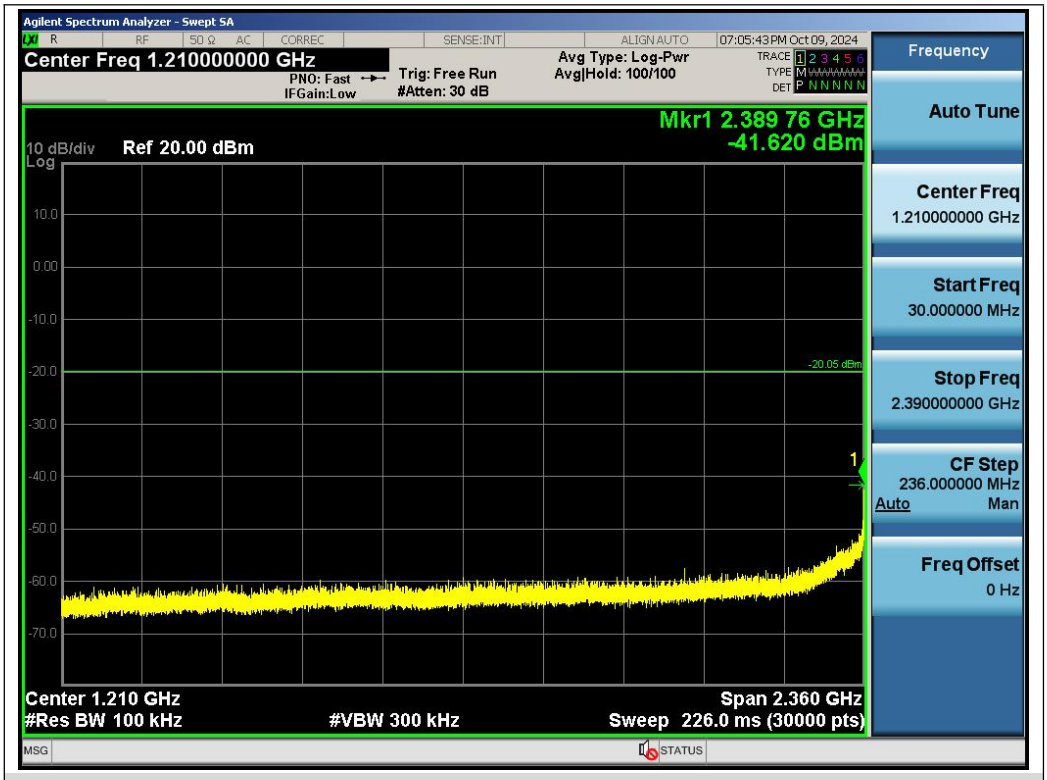
Test_Graph_802.11g_ANT1_2437_6Mbps_Higher Band Emissions



Test_Graph_802.11g_ANT1_2462_6Mbps_Lower Band Emissions

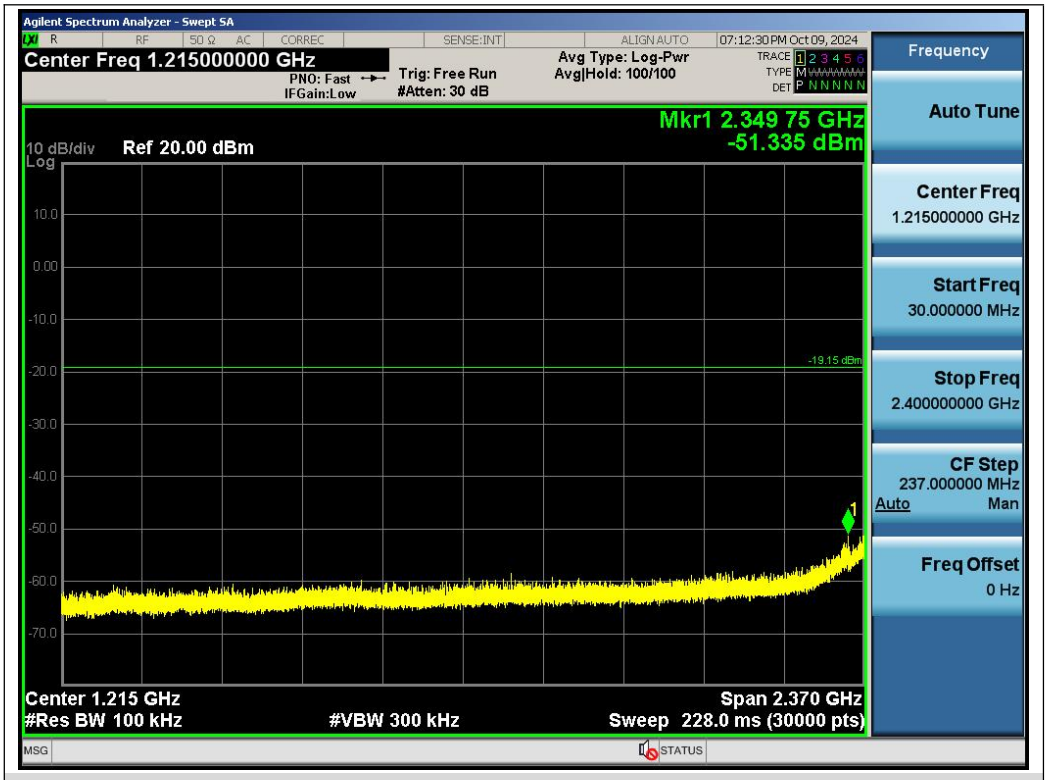


Test_Graph_802.11g_ANT1_2462_6Mbps_Higher Band Emissions

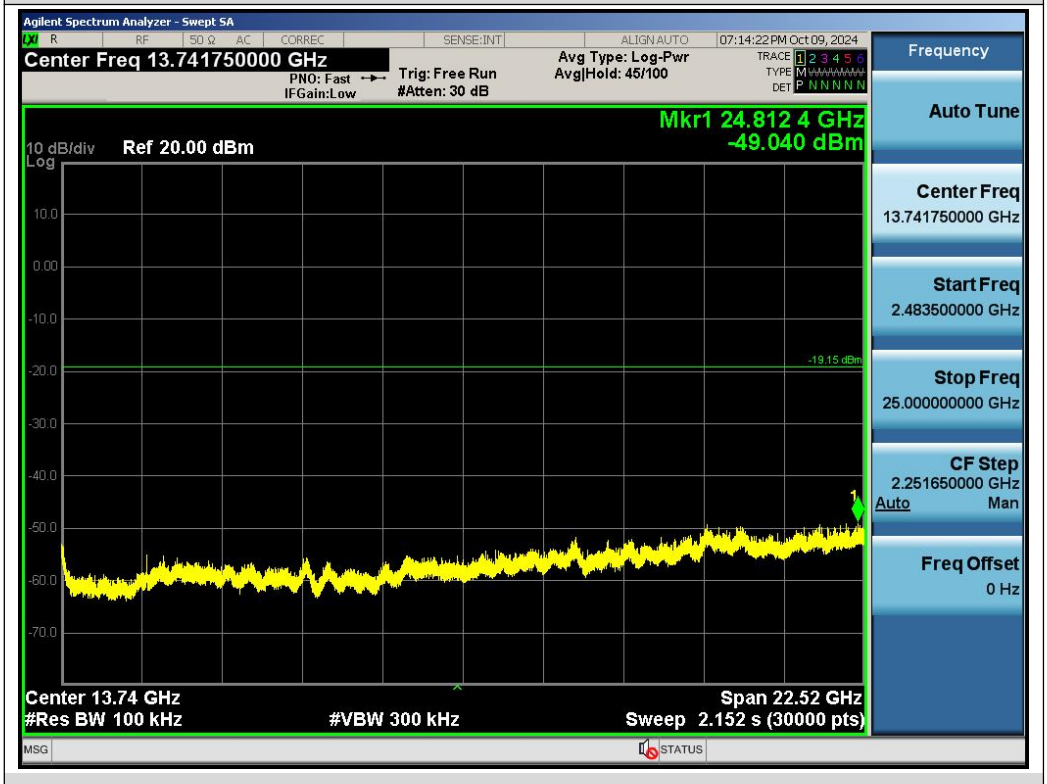


Test_Graph_802.11n20_ANT1_2412_MCS0_Lower Band Emissions

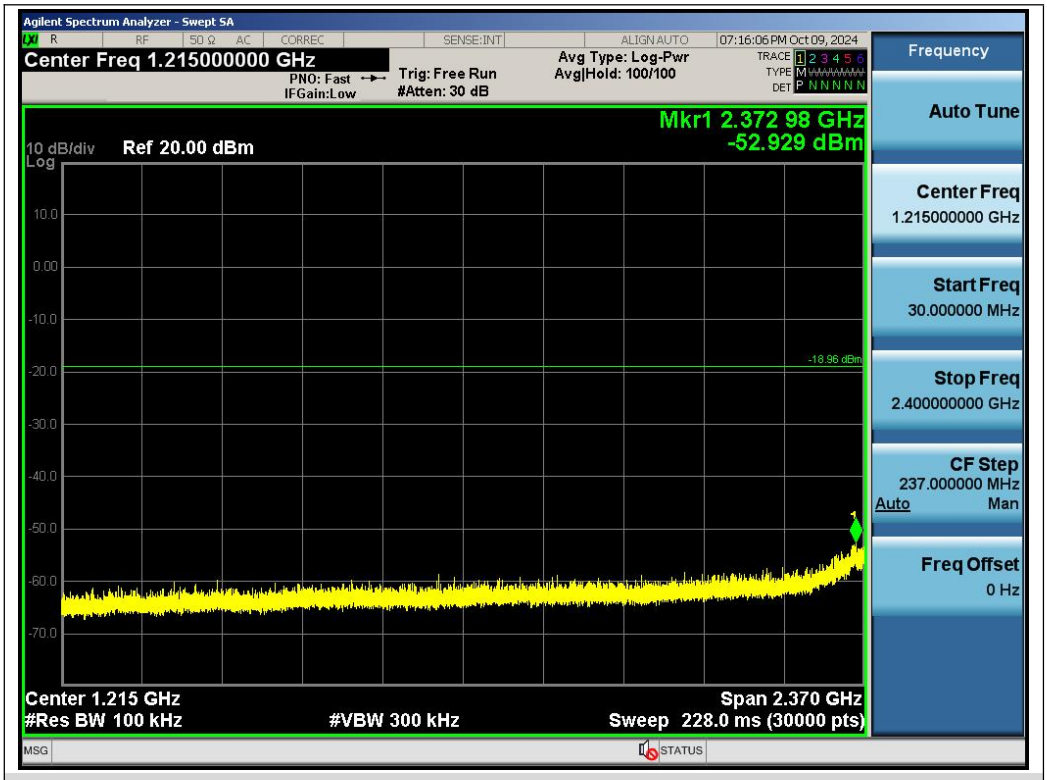
Test_Graph_802.11n20_ANT1_2412_MCS0_Higher Band Emissions



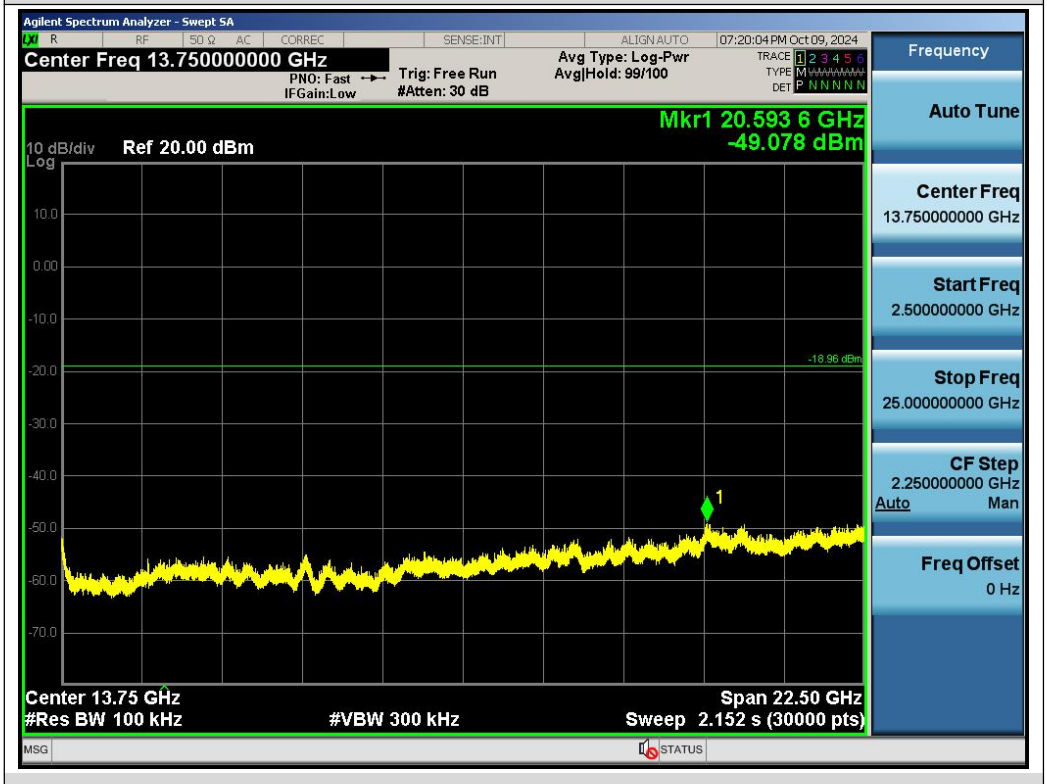
Test_Graph_802.11n20_ANT1_2437_MCS0_Lower Band Emissions



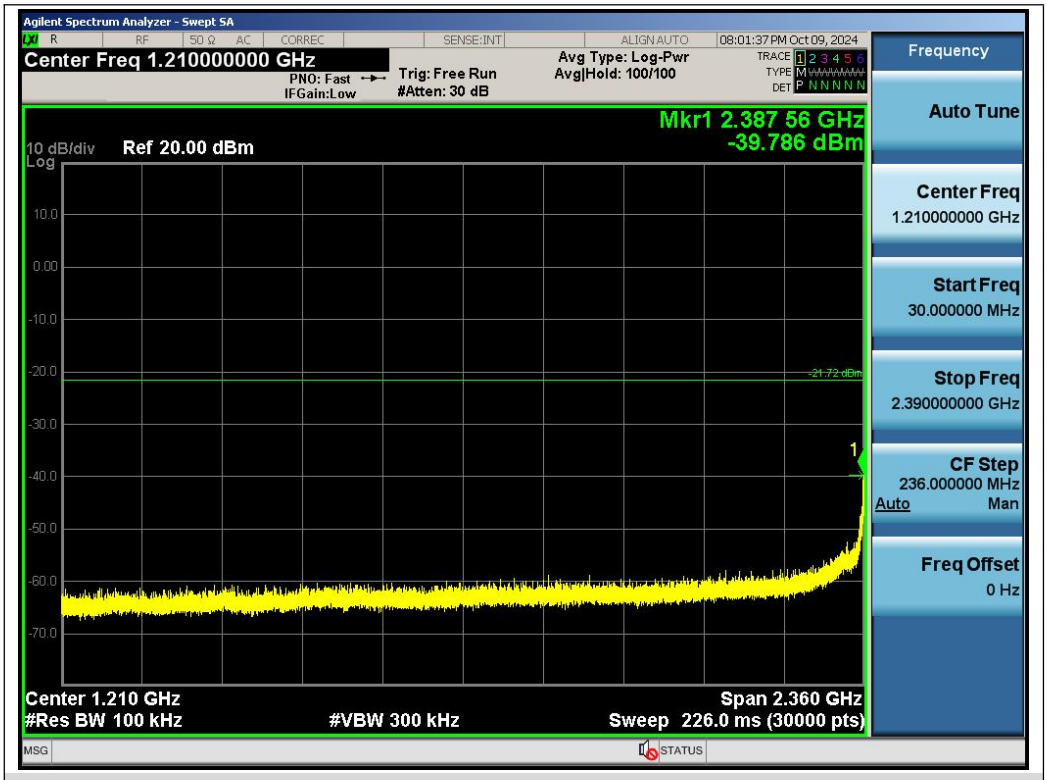
Test_Graph_802.11n20_ANT1_2437_MCS0_Higher Band Emissions



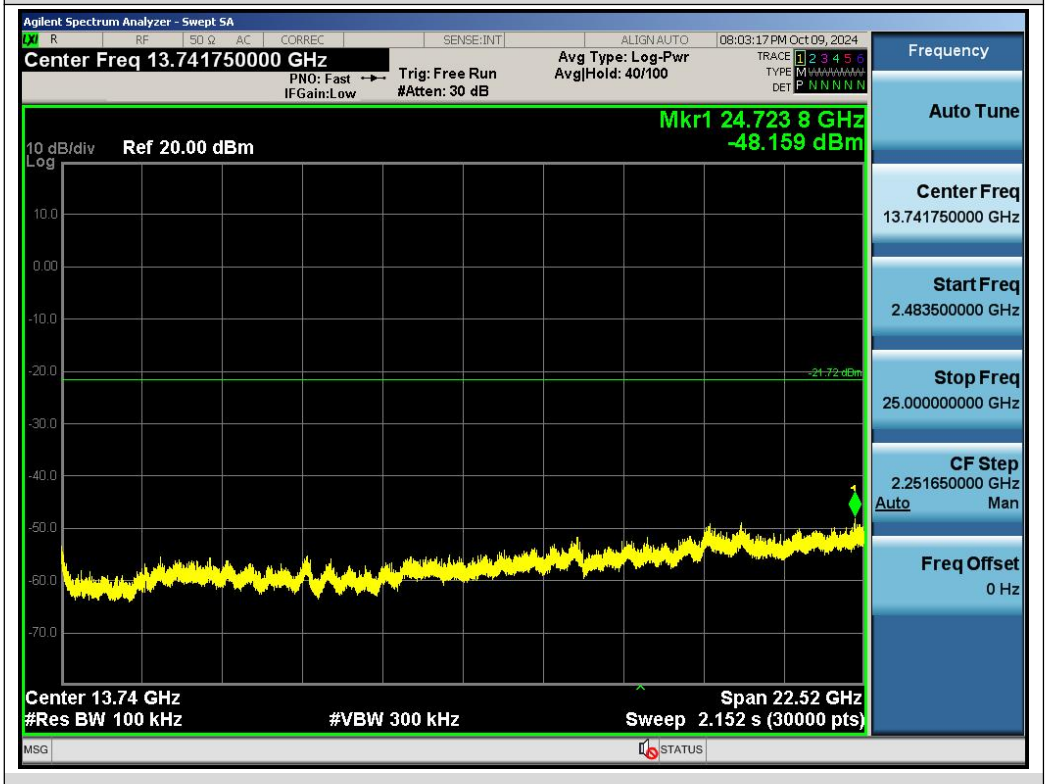
Test_Graph_802.11n20_ANT1_2462_MCS0_Lower Band Emissions



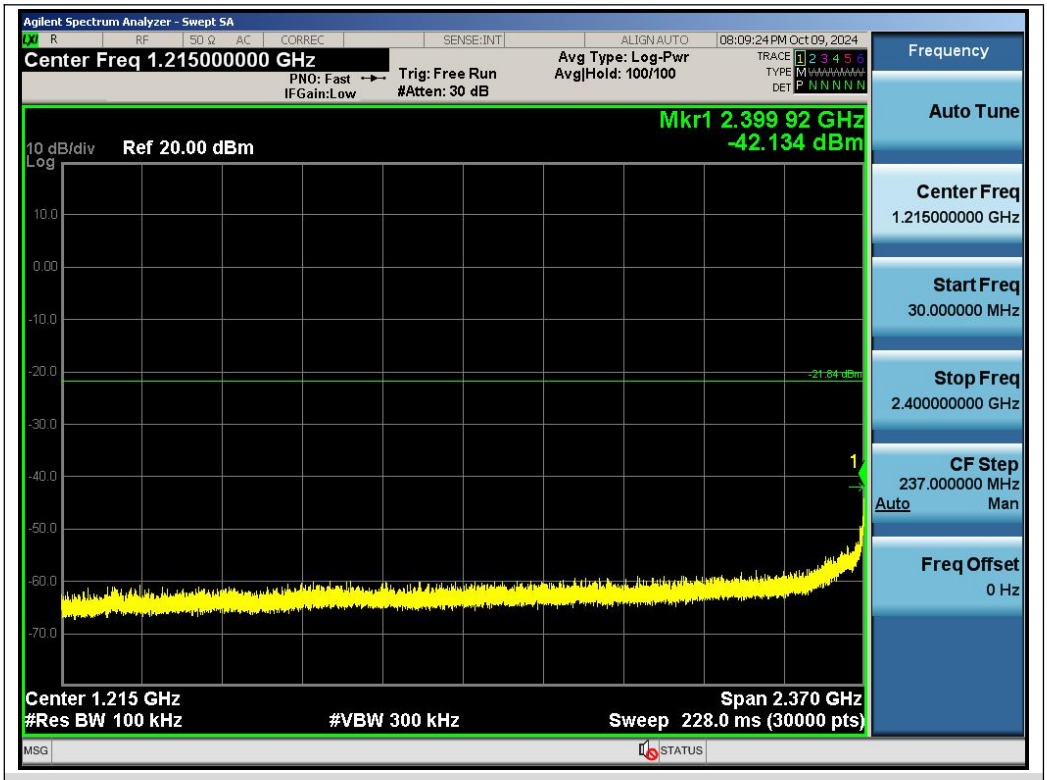
Test_Graph_802.11n20_ANT1_2462_MCS0_Higher Band Emissions



Test_Graph_802.11n40_ANT1_2422_MCS0_Lower Band Emissions



Test_Graph_802.11n40_ANT1_2422_MCS0_Higher Band Emissions



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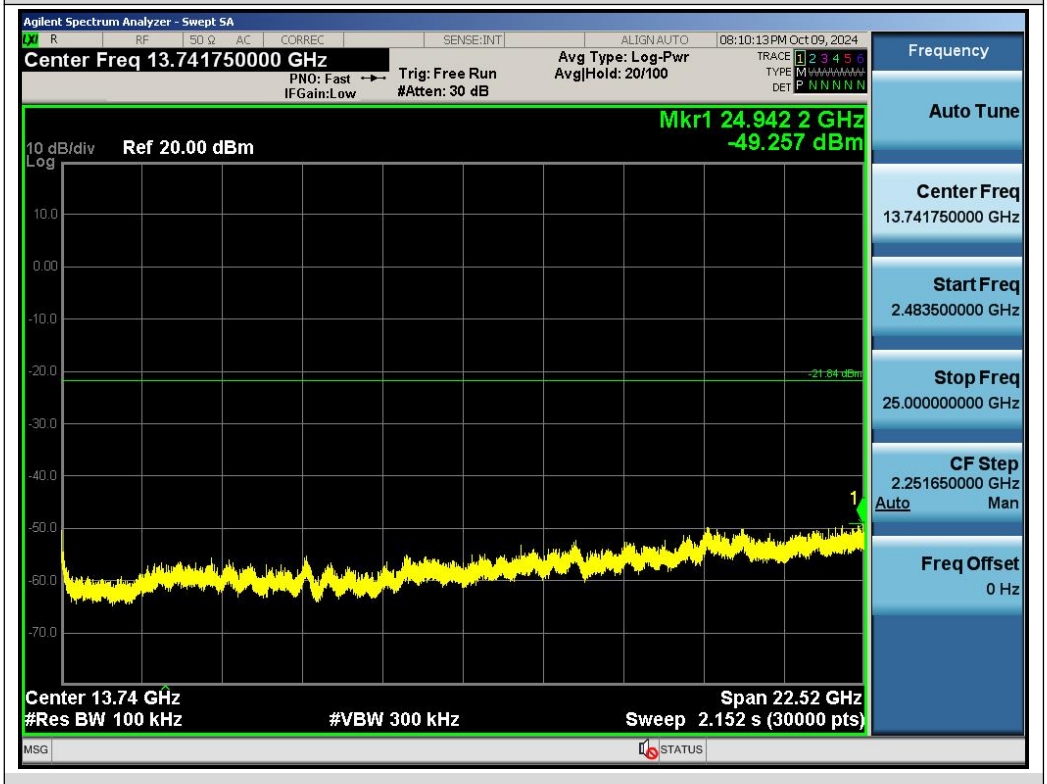
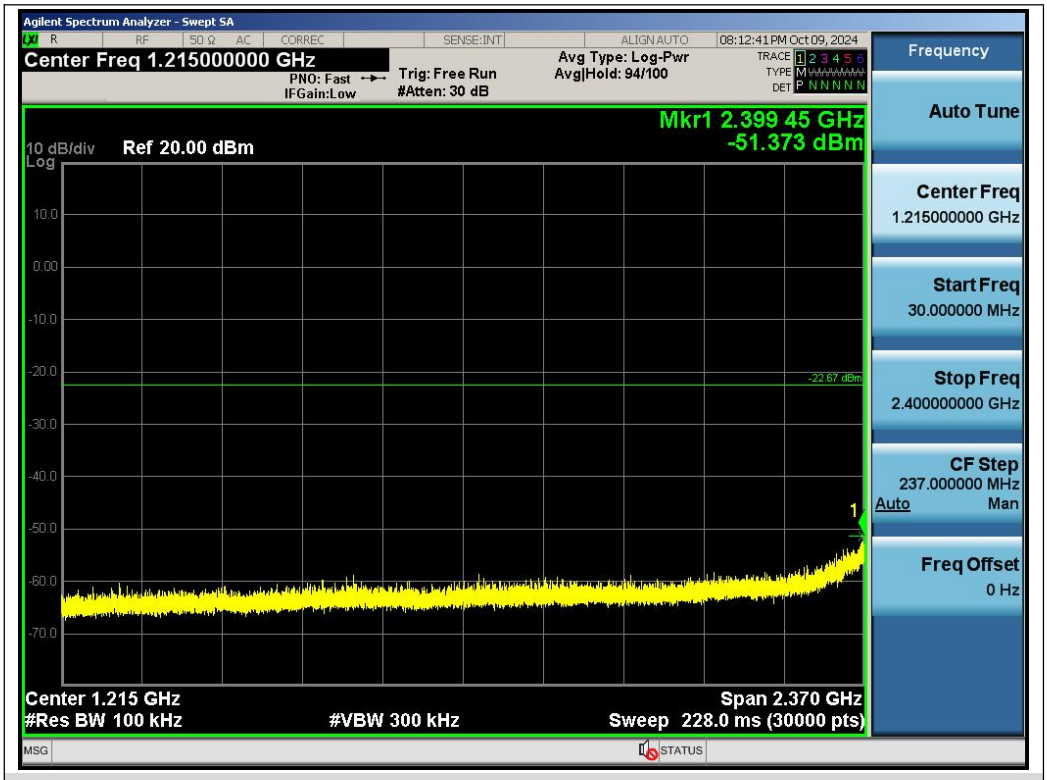
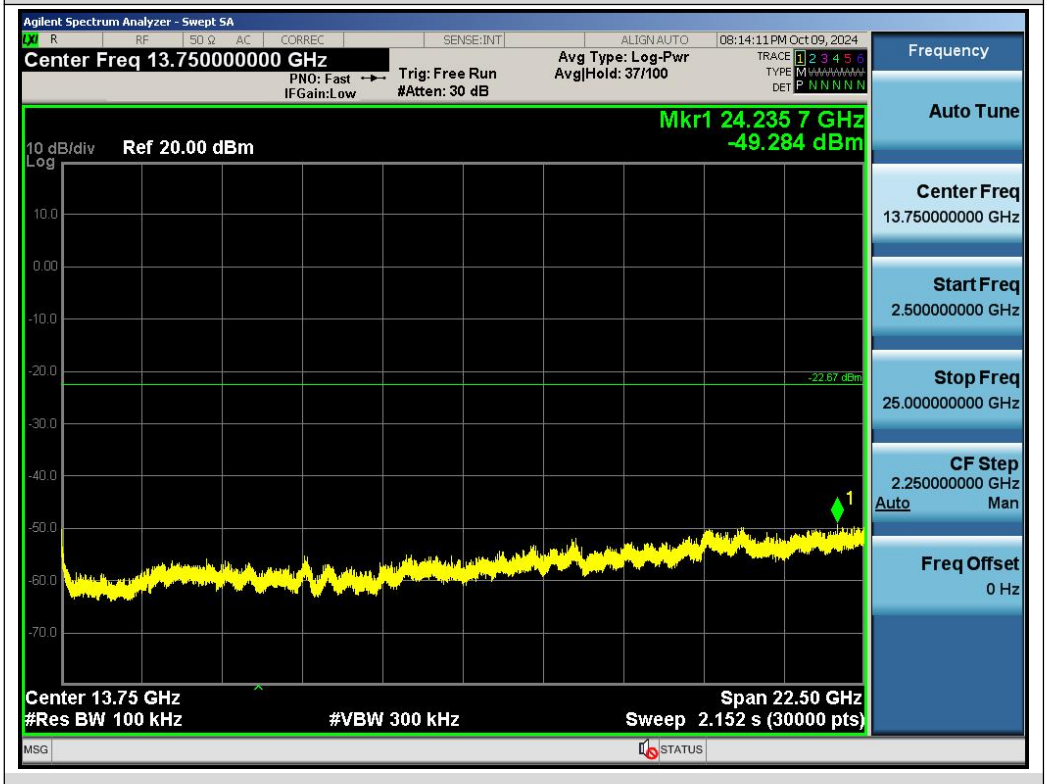


Test_Graph_802.11n40_ANT1_2437_MCS0_Higher Band Emissions



Test_Graph_802.11n40_ANT1_2452_MCS0_Lower Band Emissions



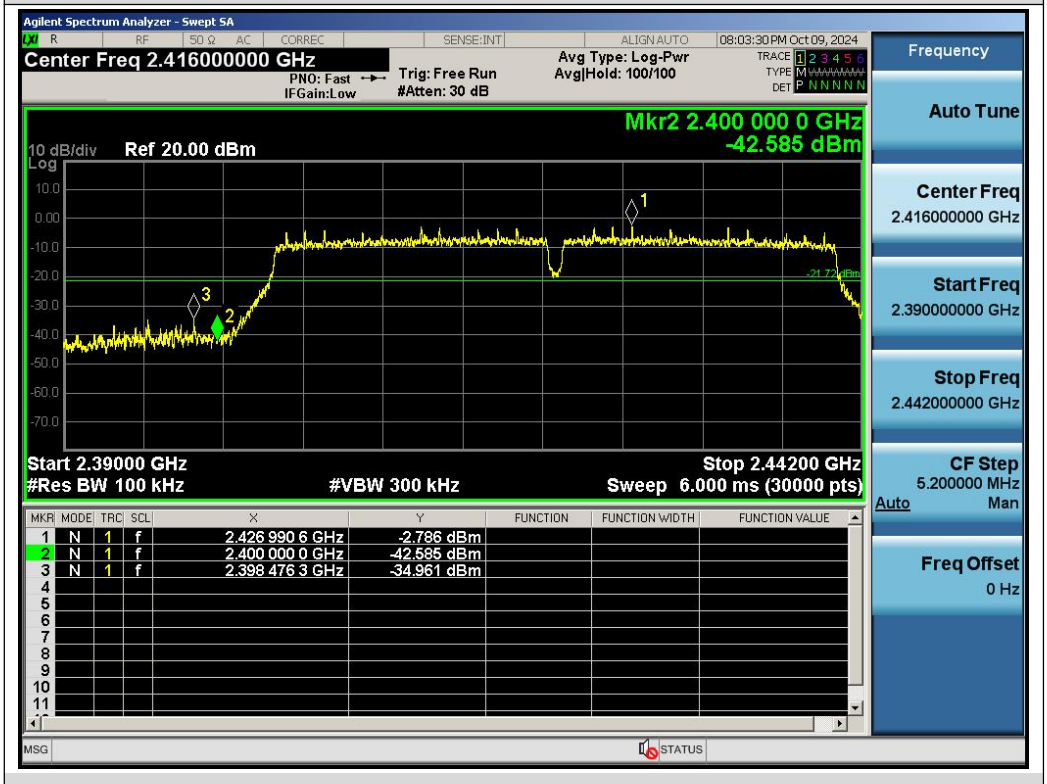
Test_Graph_802.11n40_ANT1_2452_MCS0_Higher Band Emissions

Test Graphs of Band Edge Emissions in Non-Restricted Frequency Bands

Test_Graph_802.11b_ANT1_2412_1Mbps_Lower Band Edge Emissions

Test_Graph_802.11g_ANT1_2412_6Mbps_Lower Band Edge Emissions

Test_Graph_802.11n20_ANT1_2412_MCS0_Lower Band Edge Emissions



Test_Graph_802.11n40_ANT1_2422_MCS0_Lower Band Edge Emissions

11. Radiated Spurious Emission

11.1 Measurement Limits

15.209(a) Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Note: All modes were tested for restricted band radiated emission, the test records reported below are the worst result compared to other modes.

11.2 Measurement Procedure

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds.

As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.

8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

◆ The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	9kHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150kHz~30MHz/RB 9kHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120kHz for QP
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/3MHz for Peak, 1MHz/3MHz for Average

Receiver Parameter	Setting
Start ~Stop Frequency	9kHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150kHz~30MHz/RB 9kHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120kHz for QP

- **Quasi-Peak Measurements below 1GHz**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = as shown in the table above
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

- **Peak Measurements above 1GHz**

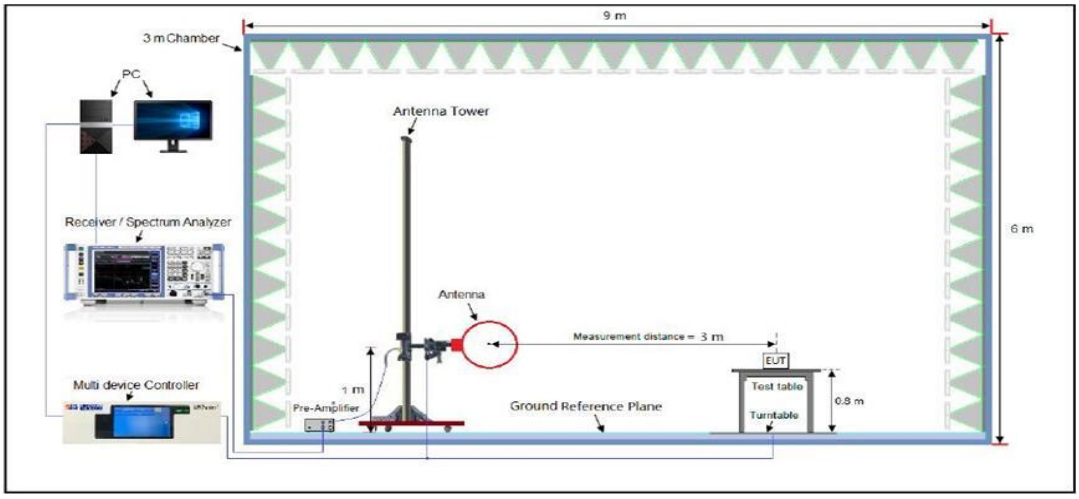
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

- **Average Measurements above 1GHz**

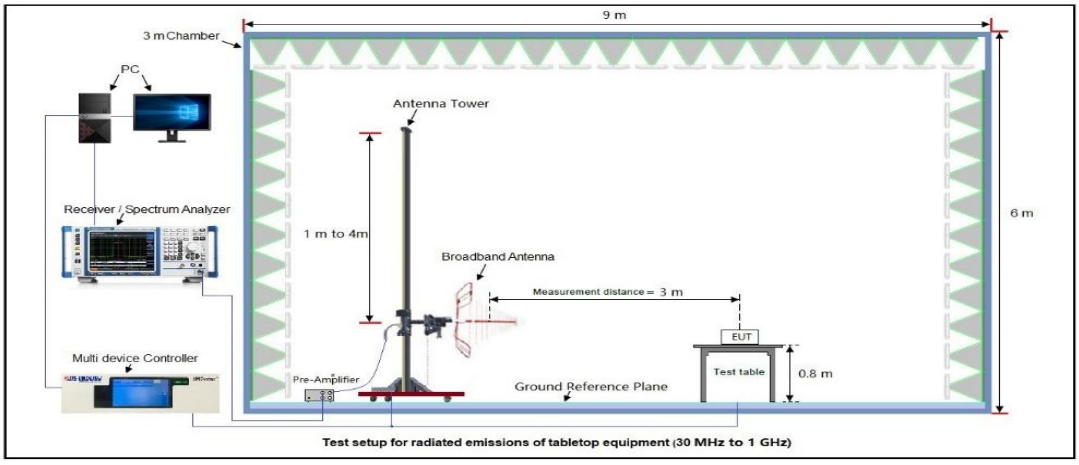
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW ≥ [3 × RBW]
4. Detector = Power averaging (rms)
5. Averaging type = power (i.e., rms)
6. Sweep time = auto
7. Perform a trace average of at least 100 traces.
8. The applicable correction factor is [10*log (1 / D)], where D is the duty cycle. The factor had been edited in the “Input Correction” of the Spectrum Analyzer.

11.3 Measurement Setup (Block Diagram of Configuration)

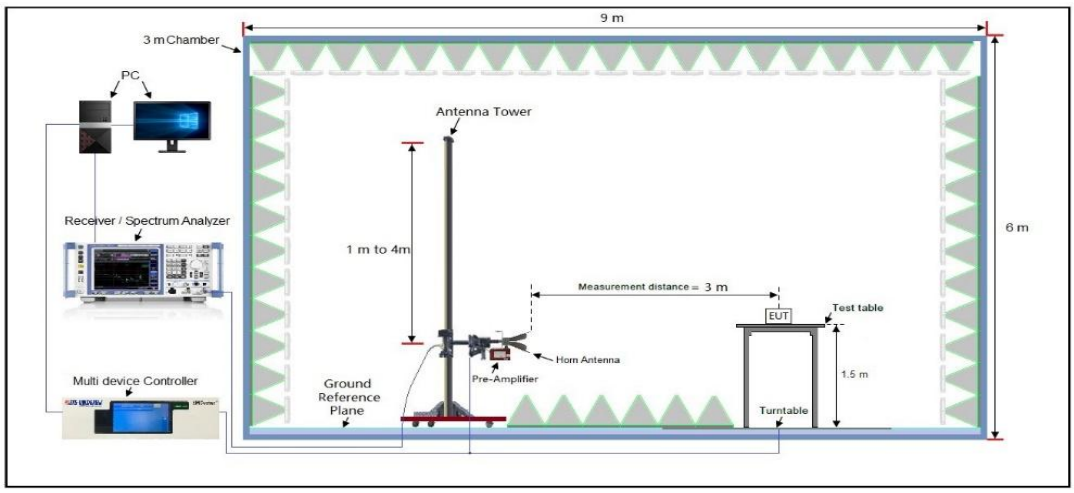
Radiated Emission Test Setup 9kHz-30MHz



Radiated Emission Test Setup 30MHz-1000MHz



Radiated Emission Test Setup Above 1000MHz

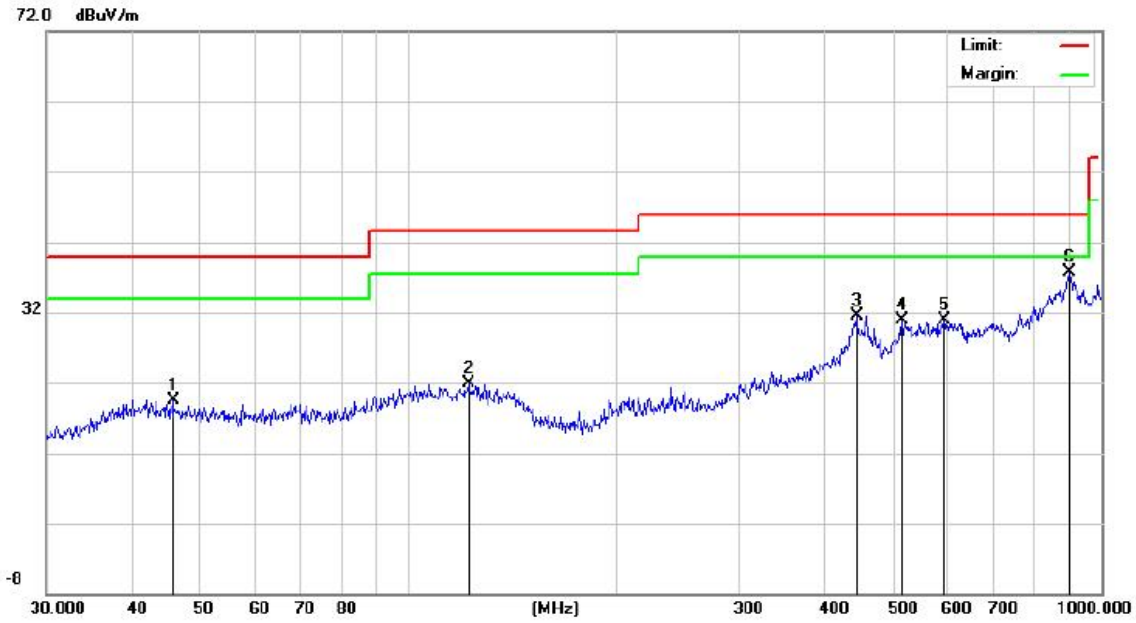


11.4 Measurement Result

Radiated Emission at 9kHz-30MHz

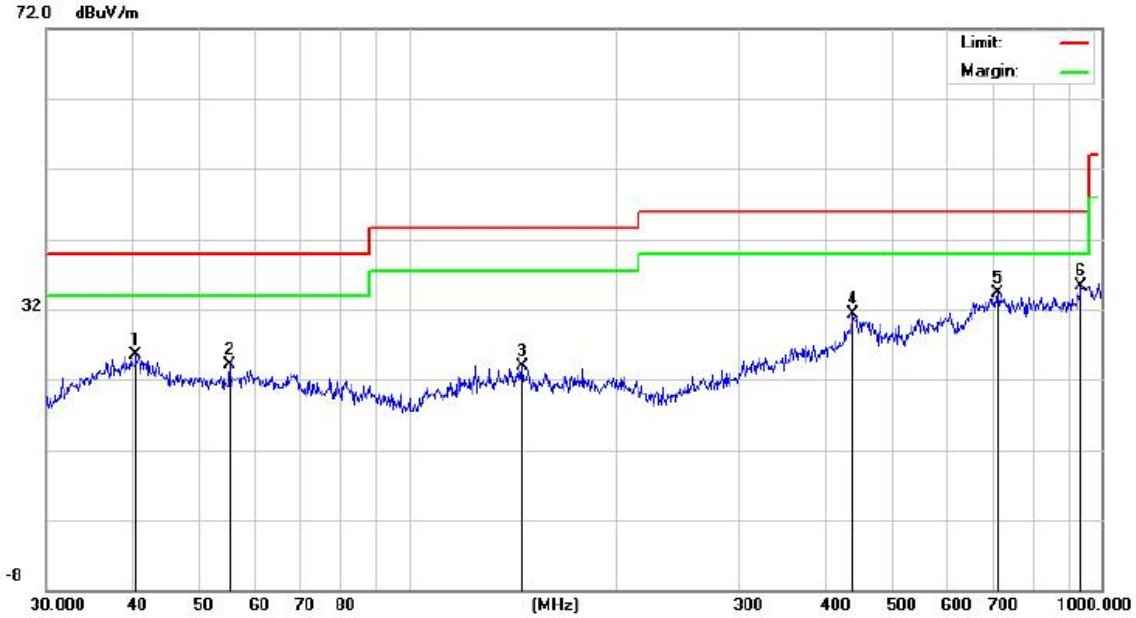
The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.

Radiated Emission Test Results at 30MHz-1GHz			
EUT Name	Dash Camera	**Model Name**	VREC-Z820DC
Temperature	22.6 ℃	**Relative Humidity**	58.3 %
Pressure	960hPa	**Test Voltage**	DC 12V
Test Mode	Mode 9 (Car Charger 1: CA01)	**Antenna Polarity**	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		45.6948	6.06	13.50	19.56	40.00	-20.44	peak
2		121.9755	5.62	16.28	21.90	43.50	-21.60	peak
3		443.2943	6.57	24.98	31.55	46.00	-14.45	peak
4		515.4374	6.36	24.49	30.85	46.00	-15.15	peak
5		593.0497	6.03	24.82	30.85	46.00	-15.15	peak
6	*	900.1474	5.97	31.78	37.75	46.00	-8.25	peak

Radiated Emission Test Results at 30MHz-1GHz			
EUT Name	Dash Camera	**Model Name**	VREC-Z820DC
Temperature	22.6 ℃	**Relative Humidity**	58.3 %
Pressure	960hPa	**Test Voltage**	DC 12V
Test Mode	Mode 9 (Car Charger 1: CA01)	**Antenna Polarity**	Vertical



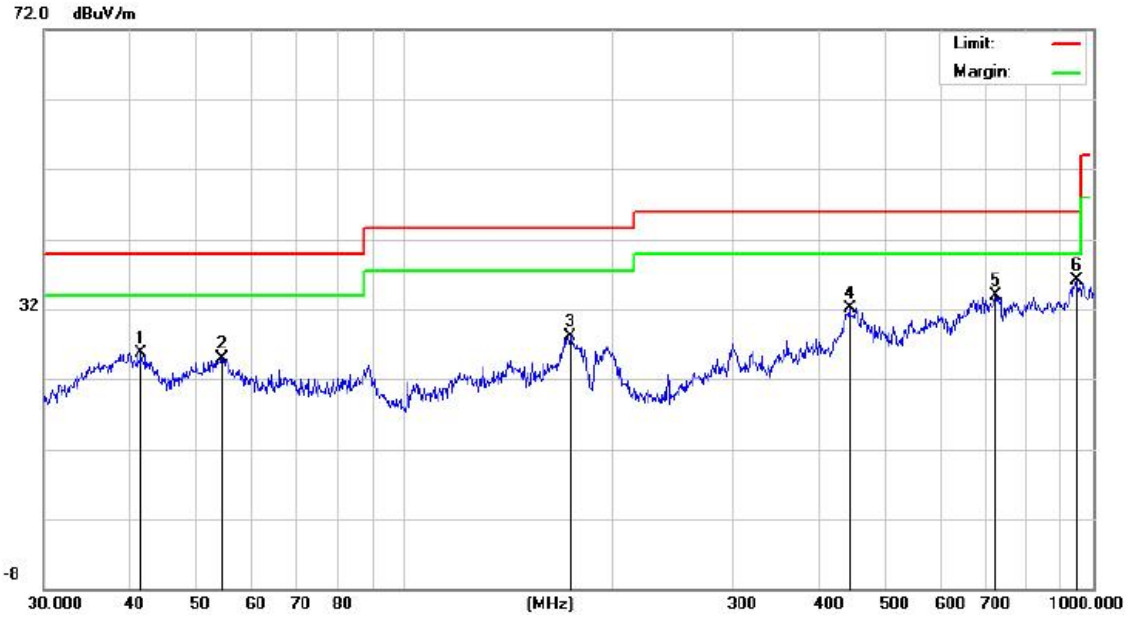
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		40.4172	8.69	16.90	25.59	40.00	-14.41	peak
2		55.2207	6.96	17.05	24.01	40.00	-15.99	peak
3		145.8610	5.80	18.20	24.00	43.50	-19.50	peak
4		438.6553	5.35	25.88	31.23	46.00	-14.77	peak
5		709.1823	5.96	28.42	34.38	46.00	-11.62	peak
6	*	935.5462	4.87	30.40	35.27	46.00	-10.73	peak

RESULT: Pass

Radiated Emission Test Results at 30MHz-1GHz			
EUT Name	Dash Camera	**Model Name**	VREC-Z820DC
Temperature	22.6 ℃	**Relative Humidity**	58.3 %
Pressure	960hPa	**Test Voltage**	DC 12V
Test Mode	Mode 9 (Car Charger 2: EC-21A 2.4A)	**Antenna Polarity**	Horizontal

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		40.1347	5.74	13.89	19.63	40.00	-20.37	peak
2		124.1330	6.12	16.15	22.27	43.50	-21.23	peak
3		300.3672	10.41	16.50	26.91	46.00	-19.09	peak
4		441.7426	7.91	25.04	32.95	46.00	-13.05	peak
5		545.1826	7.88	23.98	31.86	46.00	-14.14	peak
6	*	900.1474	6.20	31.78	37.98	46.00	-8.02	peak

Radiated Emission Test Results at 30MHz-1GHz			
EUT Name	Dash Camera	**Model Name**	VREC-Z820DC
Temperature	22.6 ℃	**Relative Humidity**	58.3 %
Pressure	960hPa	**Test Voltage**	DC 12V
Test Mode	Mode 9 (Car Charger 2: EC-21A 2.4A)	**Antenna Polarity**	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		41.5670	8.83	16.92	25.75	40.00	-14.25	peak
2		54.4515	7.96	17.04	25.00	40.00	-15.00	peak
3		174.4241	9.62	18.42	28.04	43.50	-15.46	peak
4		443.2943	6.11	25.95	32.06	46.00	-13.94	peak
5		721.7259	5.29	28.64	33.93	46.00	-12.07	peak
6	*	945.4398	5.33	30.78	36.11	46.00	-9.89	peak

RESULT: Pass

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. All test modes had been pre-tested. The mode 9 is the worst case and recorded in the report.