Appendix

Test Data

for BTEK241111036A02E17

Start date	2024/11/28	Finish date	2024/11/28
Temperature	21.8℃	Humidity	28%
RF specifications	2.4G_WIFI-Module 1 7663	Test Engineer	Zora

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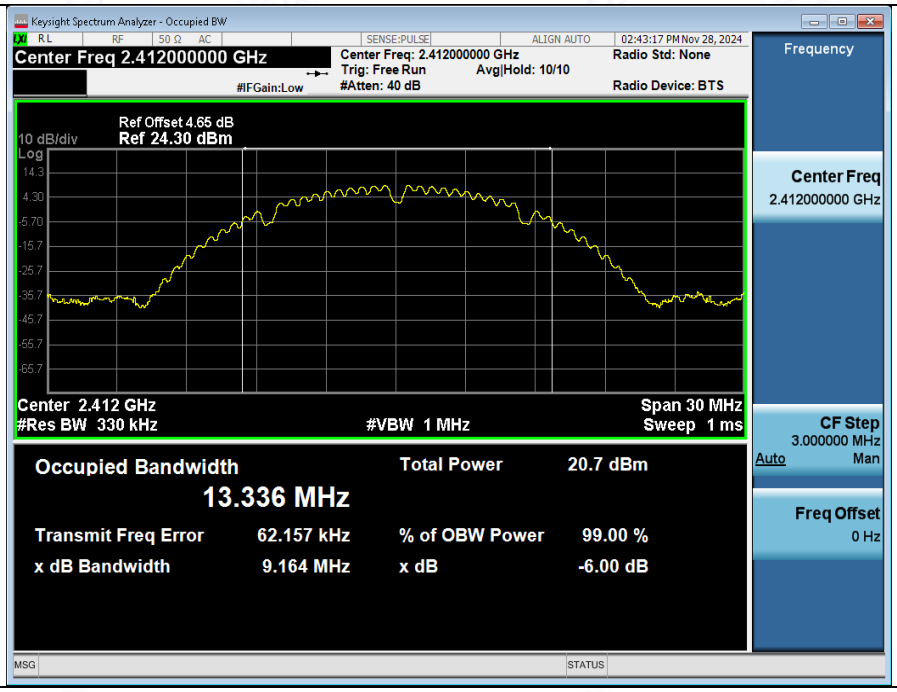
1. -6dB Bandwidth

Condition	Antenna	Modulation	Frequency (MHz)	-6dB BW(MHz)	limit(kHz)	Result
NVNT	ANT1	802.11b	2412.00	9.21	500	Pass
NVNT	ANT2	802.11b	2412.00	9.16	500	Pass
NVNT	ANT1	802.11b	2437.00	9.21	500	Pass
NVNT	ANT2	802.11b	2437.00	9.17	500	Pass
NVNT	ANT1	802.11b	2462.00	9.18	500	Pass
NVNT	ANT2	802.11b	2462.00	9.17	500	Pass
NVNT	ANT1	802.11g	2412.00	16.12	500	Pass
NVNT	ANT2	802.11g	2412.00	16.05	500	Pass
NVNT	ANT1	802.11g	2437.00	15.99	500	Pass
NVNT	ANT2	802.11g	2437.00	16.15	500	Pass
NVNT	ANT1	802.11g	2462.00	16.12	500	Pass
NVNT	ANT2	802.11g	2462.00	15.74	500	Pass
NVNT	ANT1	802.11n(HT20)	2412.00	17.36	500	Pass
NVNT	ANT2	802.11n(HT20)	2412.00	17.36	500	Pass
NVNT	ANT1	802.11n(HT20)	2437.00	17.51	500	Pass
NVNT	ANT2	802.11n(HT20)	2437.00	16.70	500	Pass
NVNT	ANT1	802.11n(HT20)	2462.00	17.44	500	Pass
NVNT	ANT2	802.11n(HT20)	2462.00	16.74	500	Pass
NVNT	ANT1	802.11n(HT40)	2422.00	35.58	500	Pass
NVNT	ANT2	802.11n(HT40)	2422.00	35.76	500	Pass
NVNT	ANT1	802.11n(HT40)	2437.00	34.72	500	Pass
NVNT	ANT2	802.11n(HT40)	2437.00	34.38	500	Pass
NVNT	ANT1	802.11n(HT40)	2452.00	35.36	500	Pass
NVNT	ANT2	802.11n(HT40)	2452.00	35.39	500	Pass

-6dB_Bandwidth_NVNT_ANT1_802_11b_2412

-6dB_Bandwidth_NVNT_ANT2_802_11b_2412



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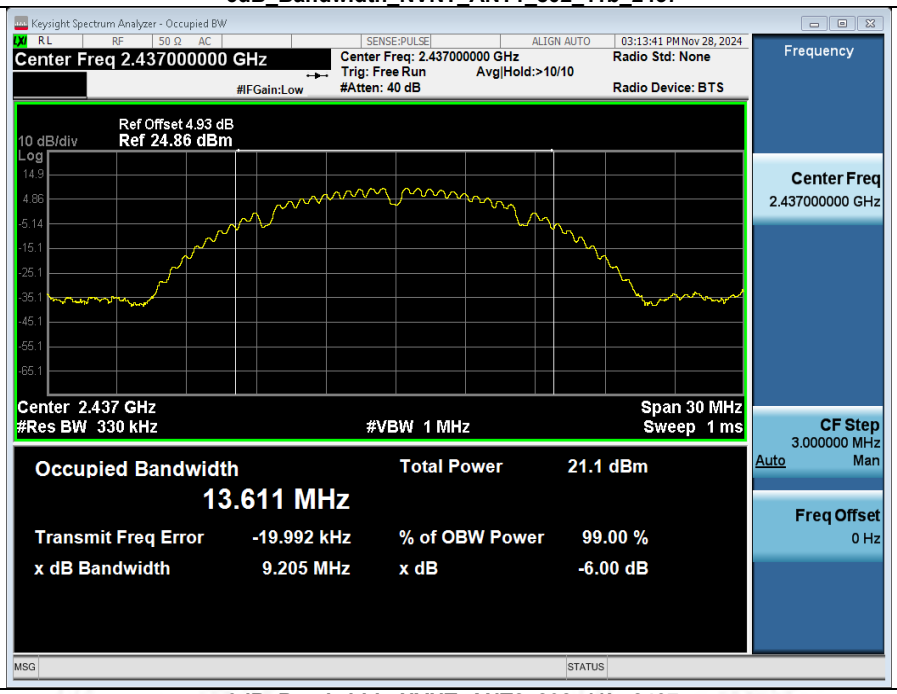

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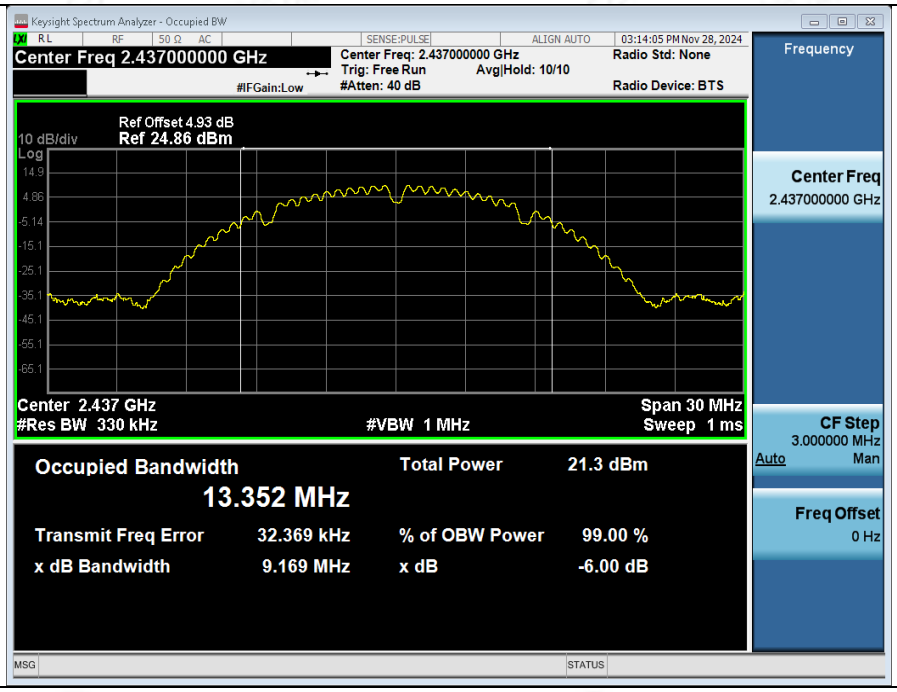

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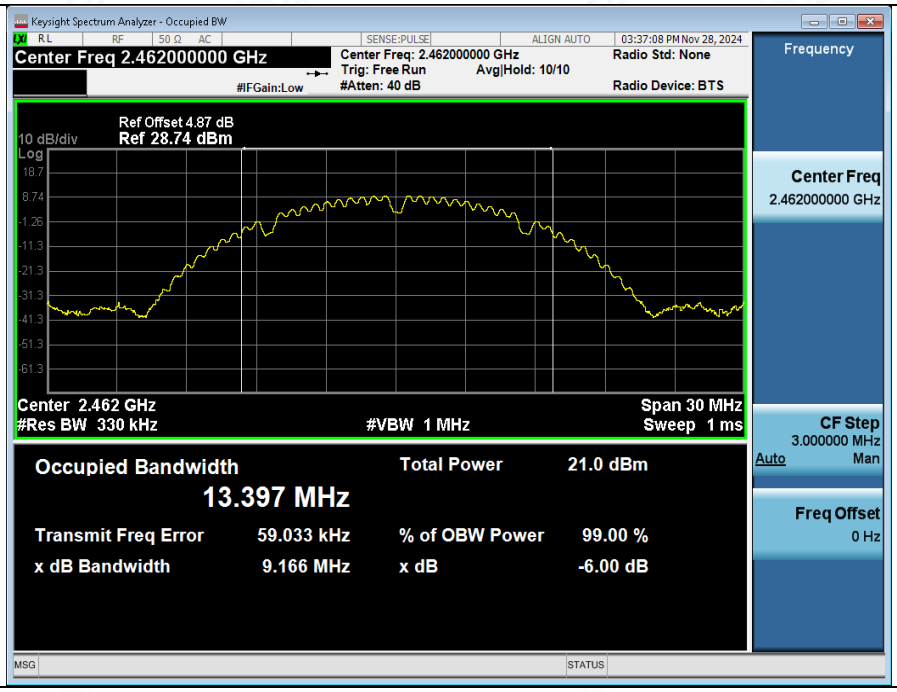

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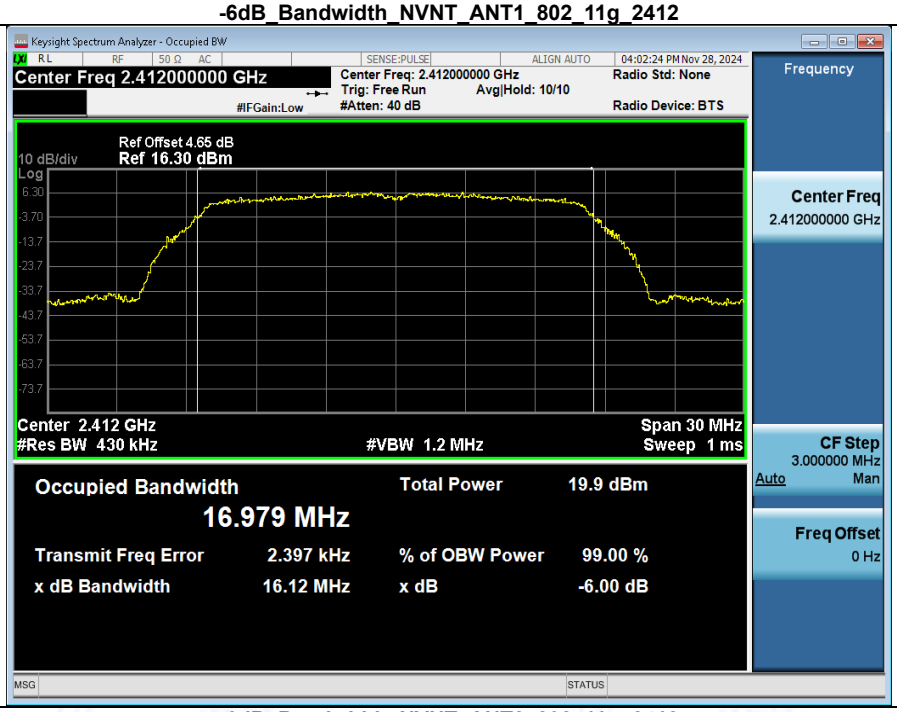

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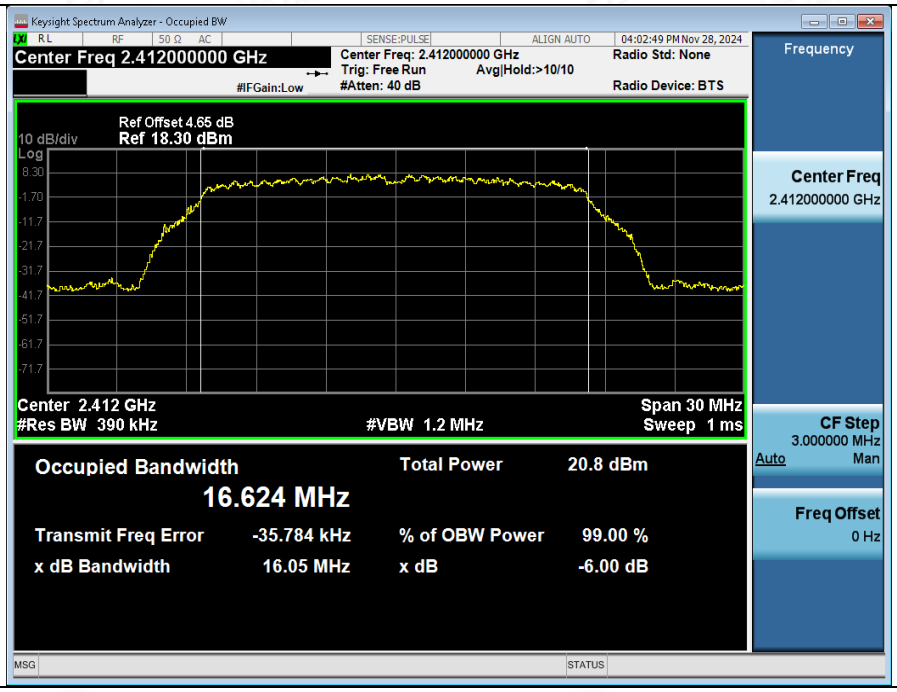

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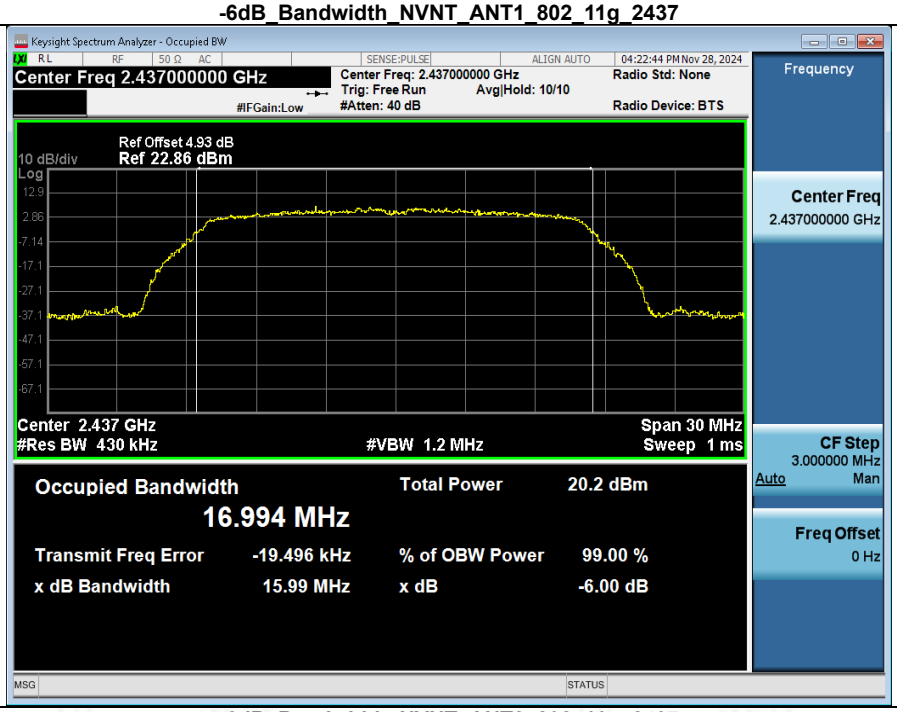

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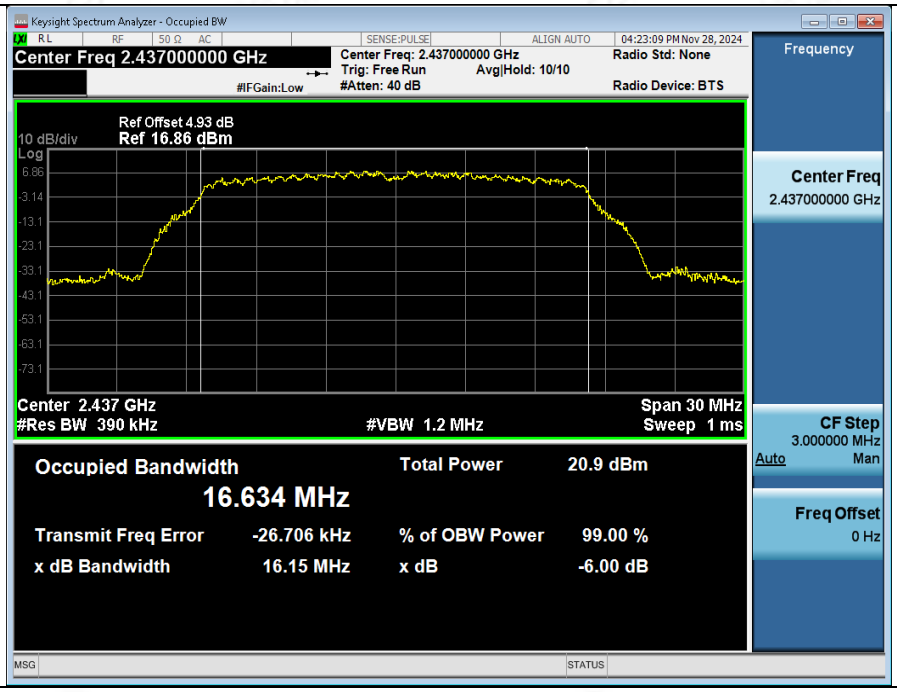

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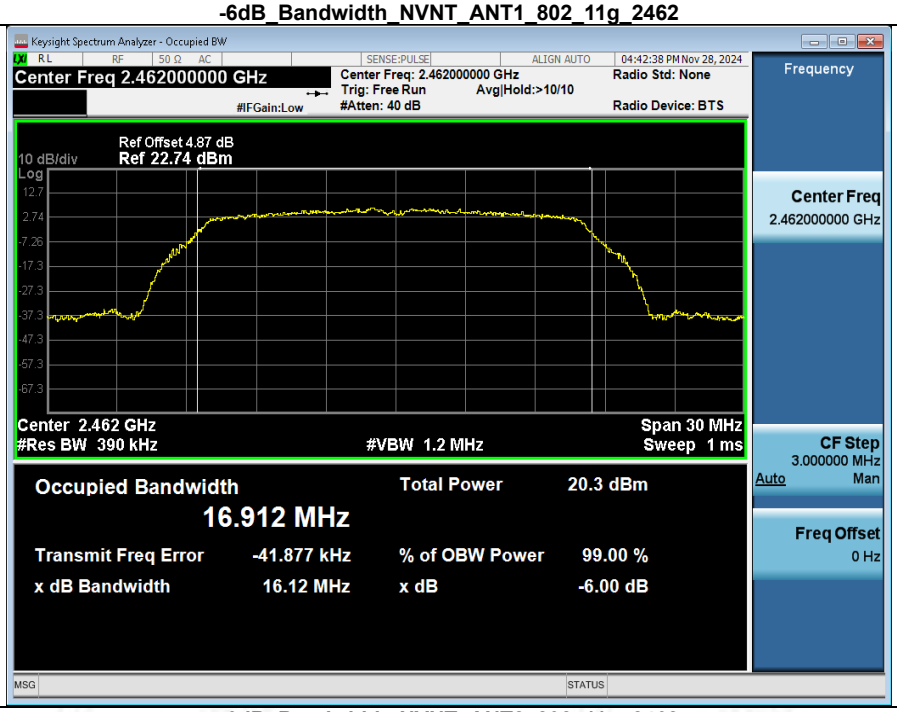

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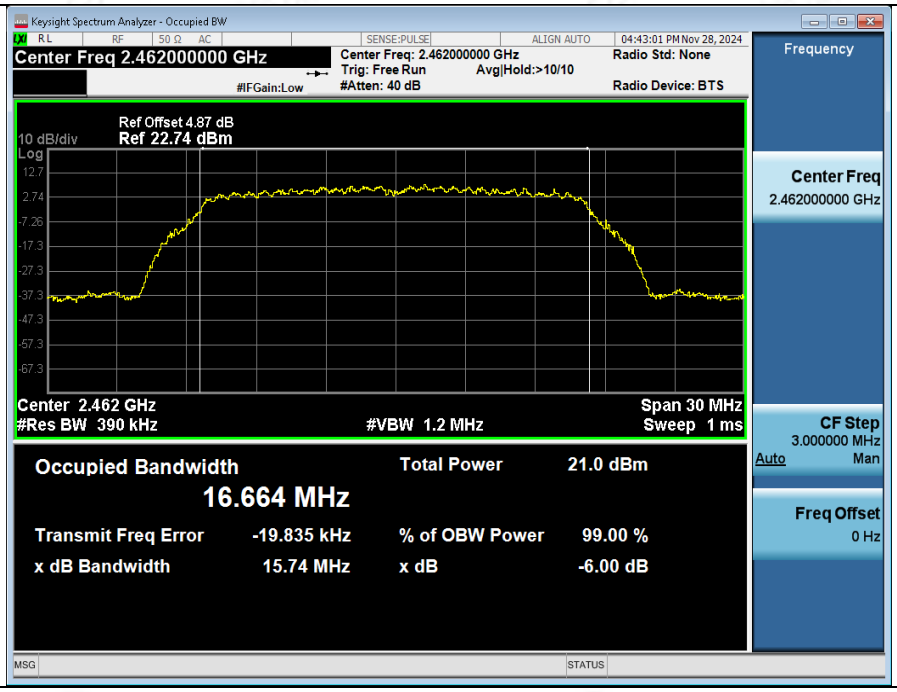

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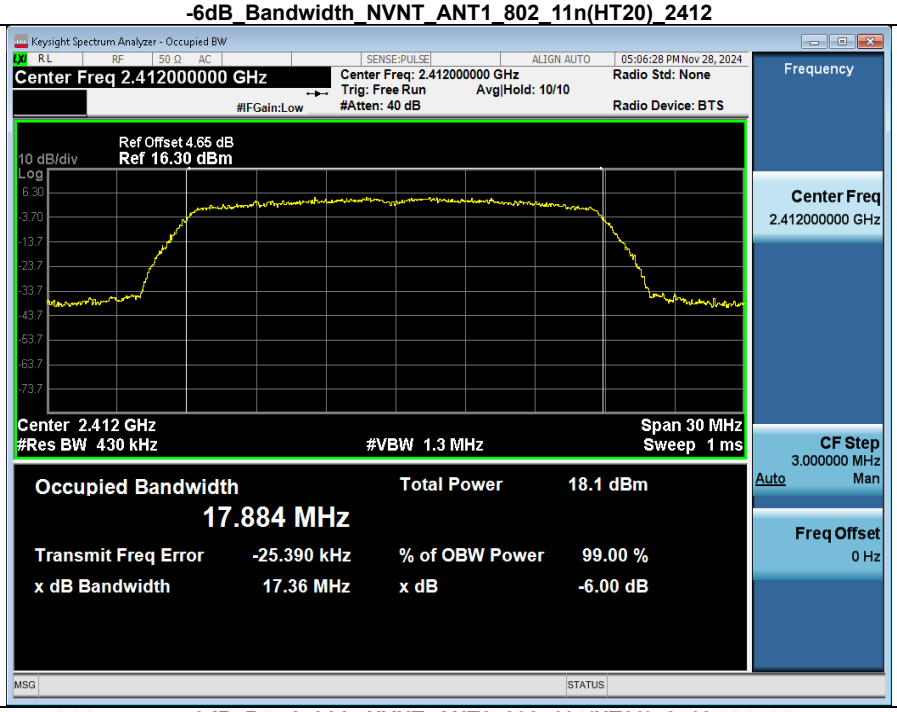

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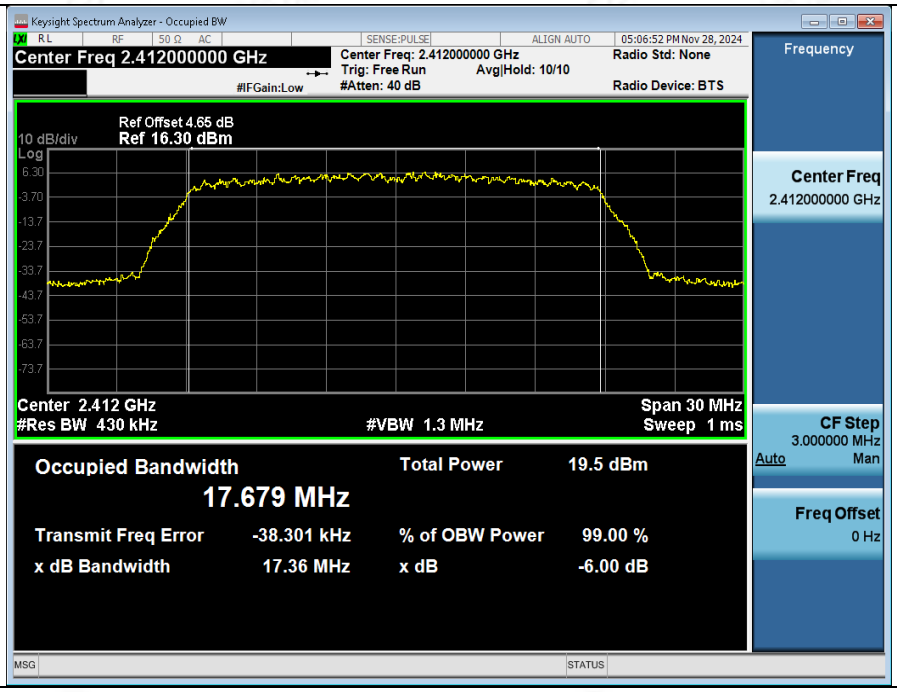

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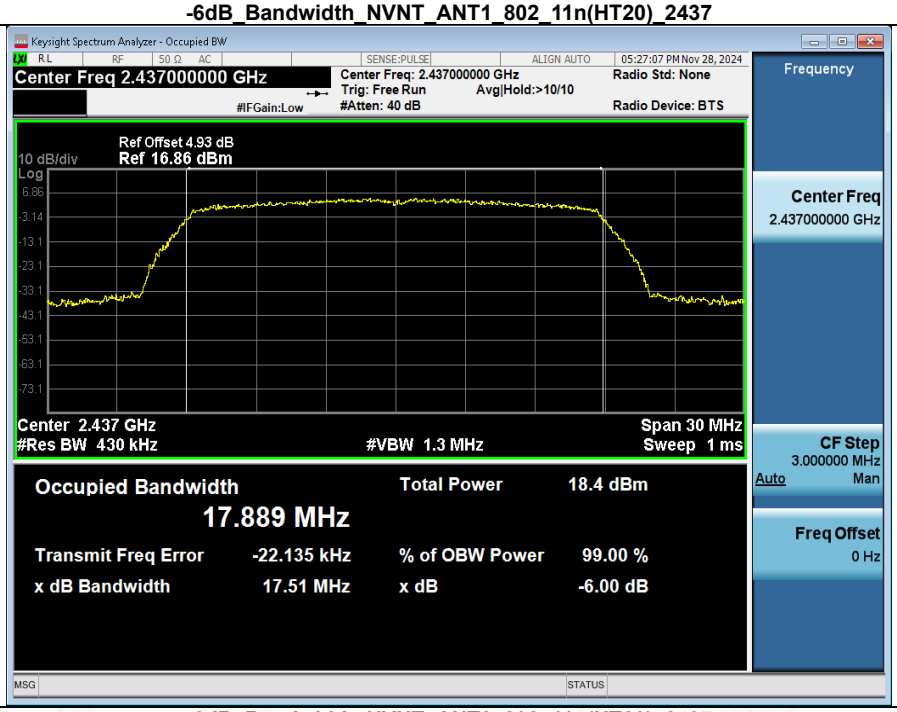

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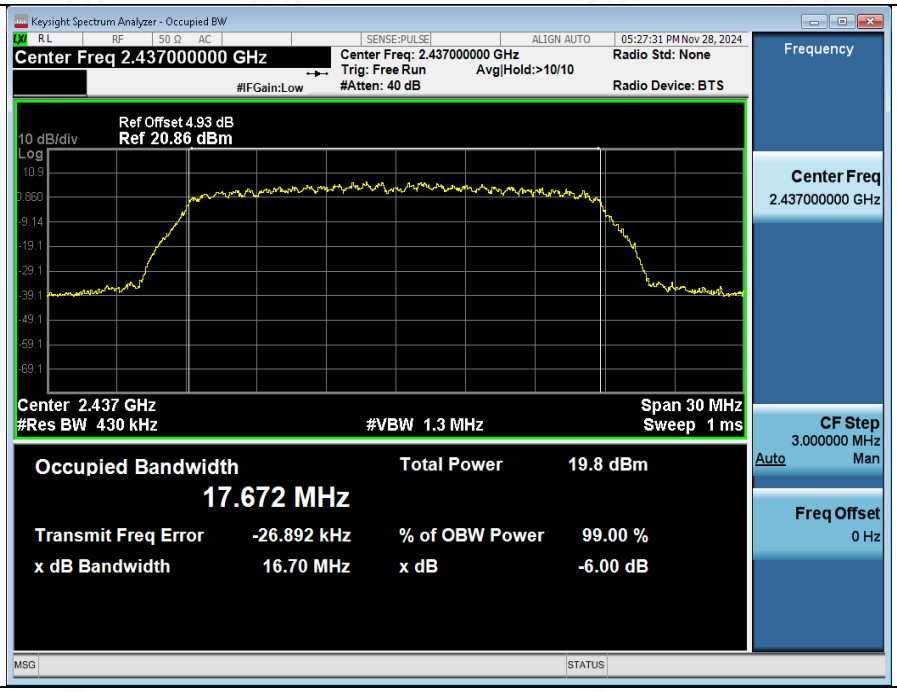

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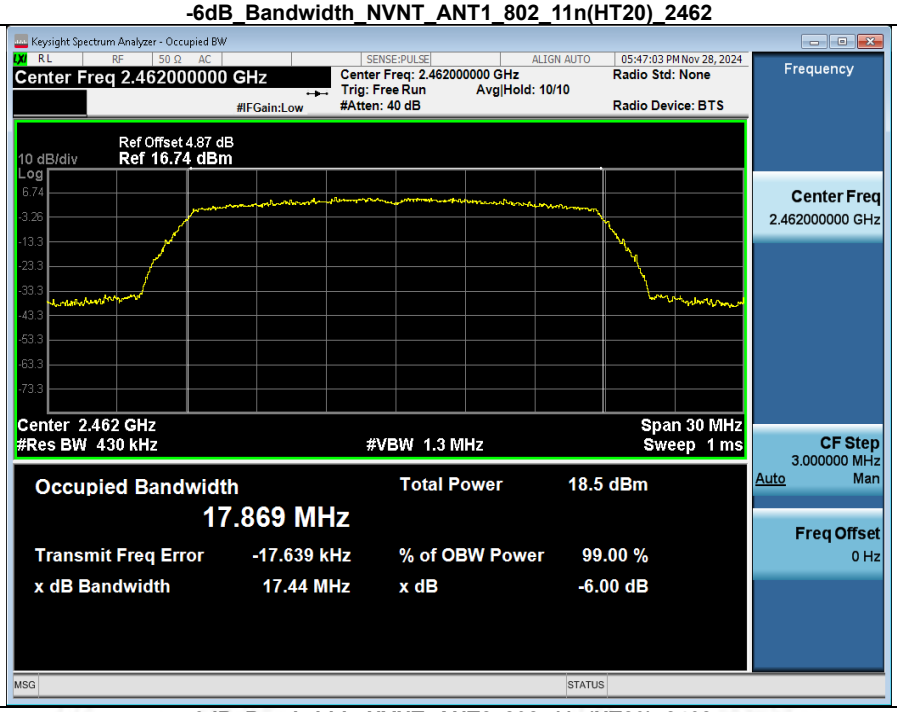

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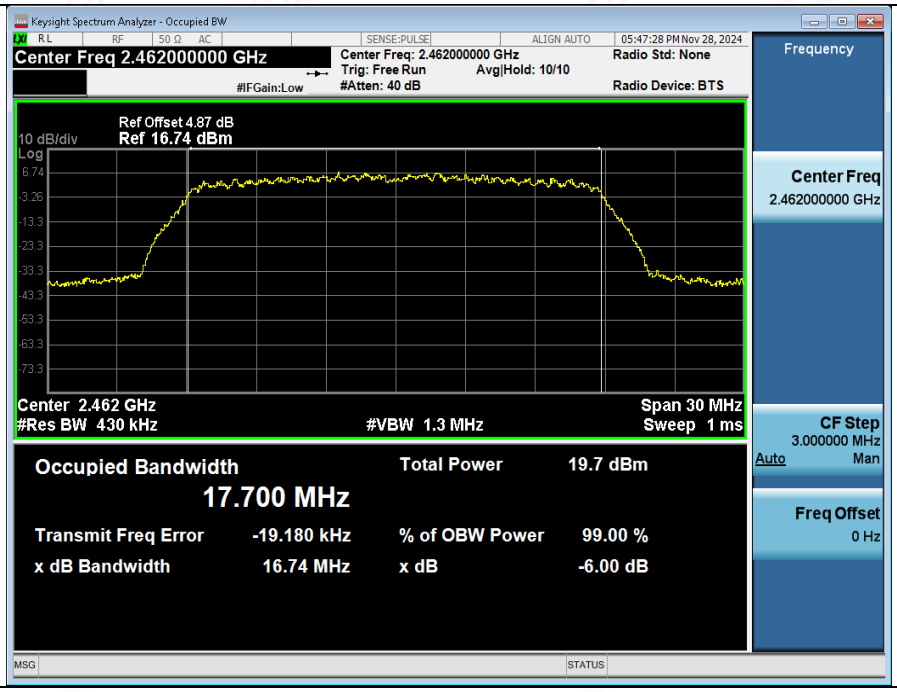

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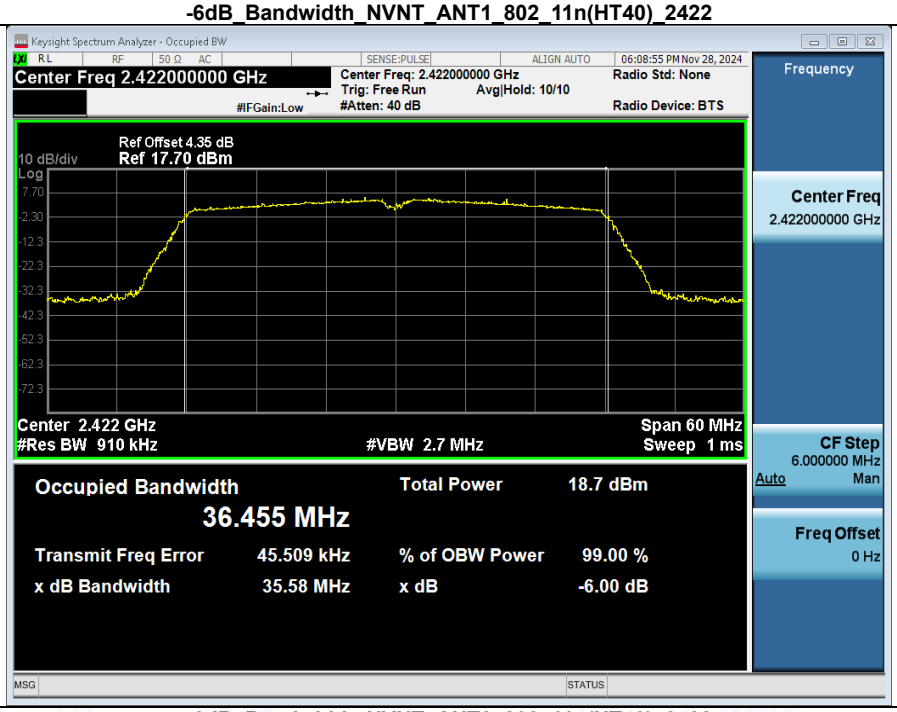

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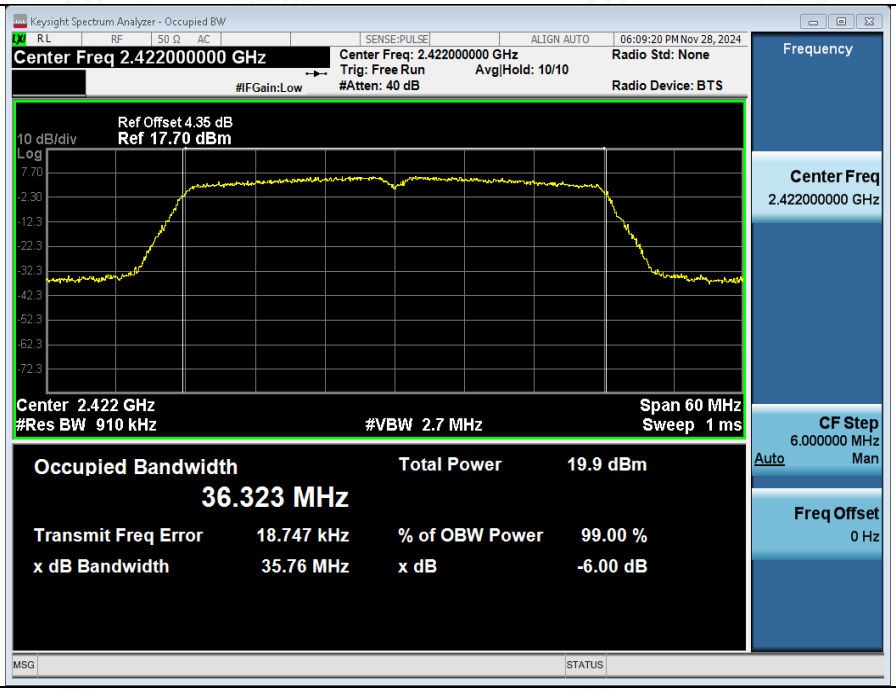

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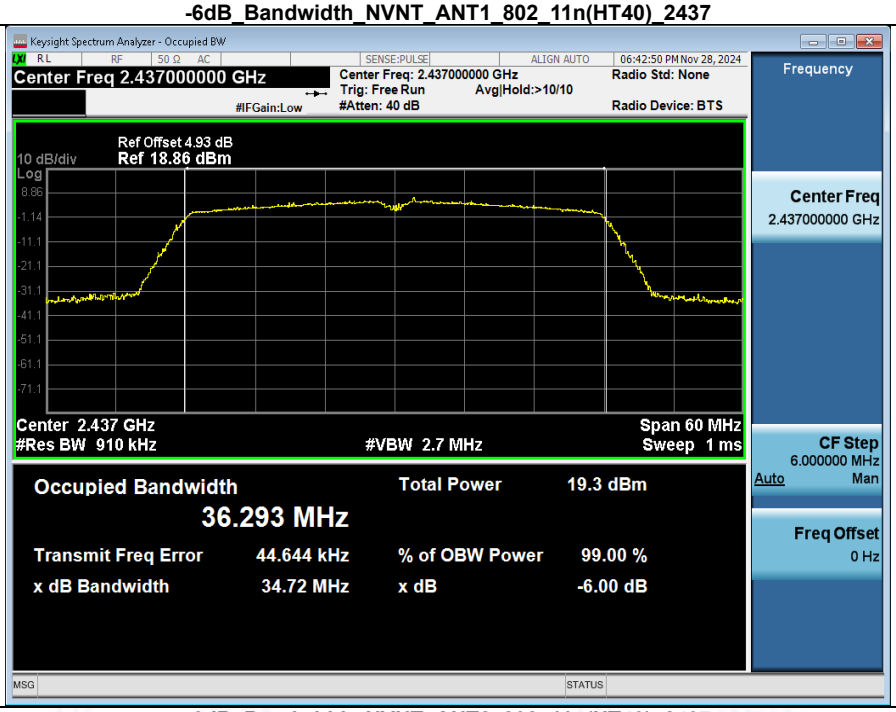

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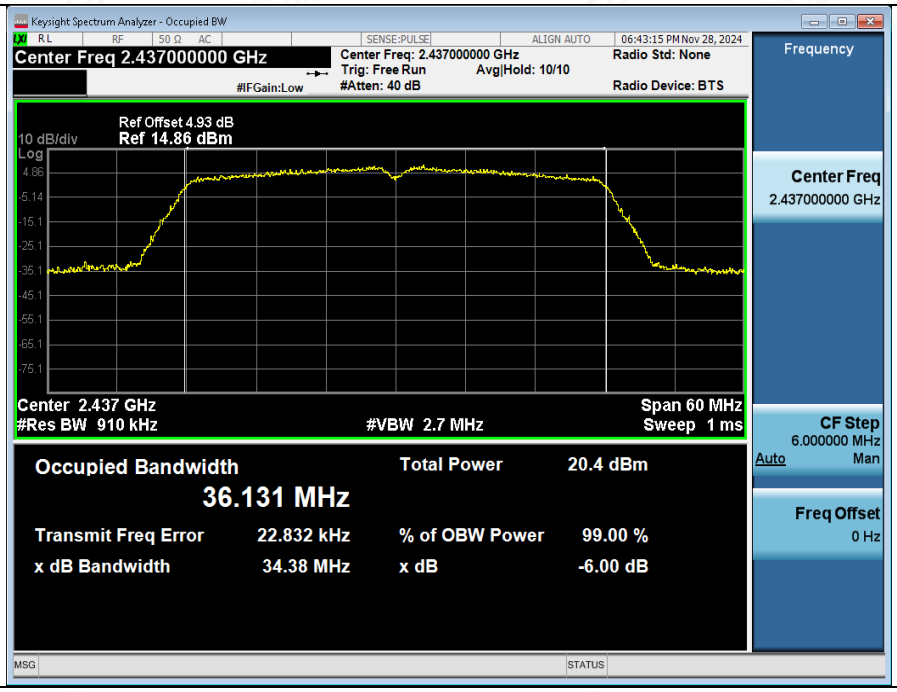

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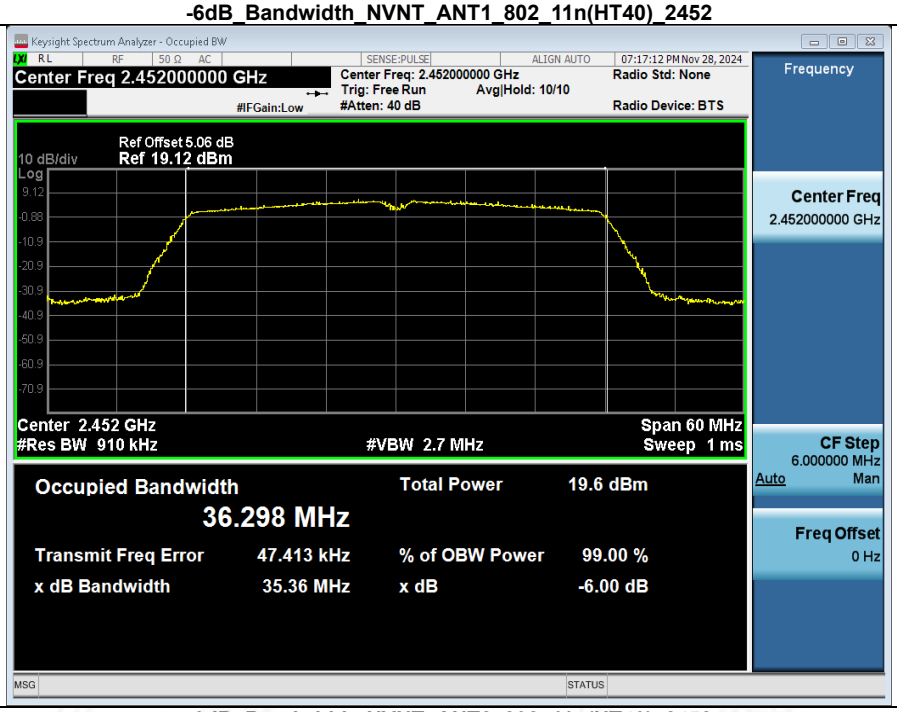
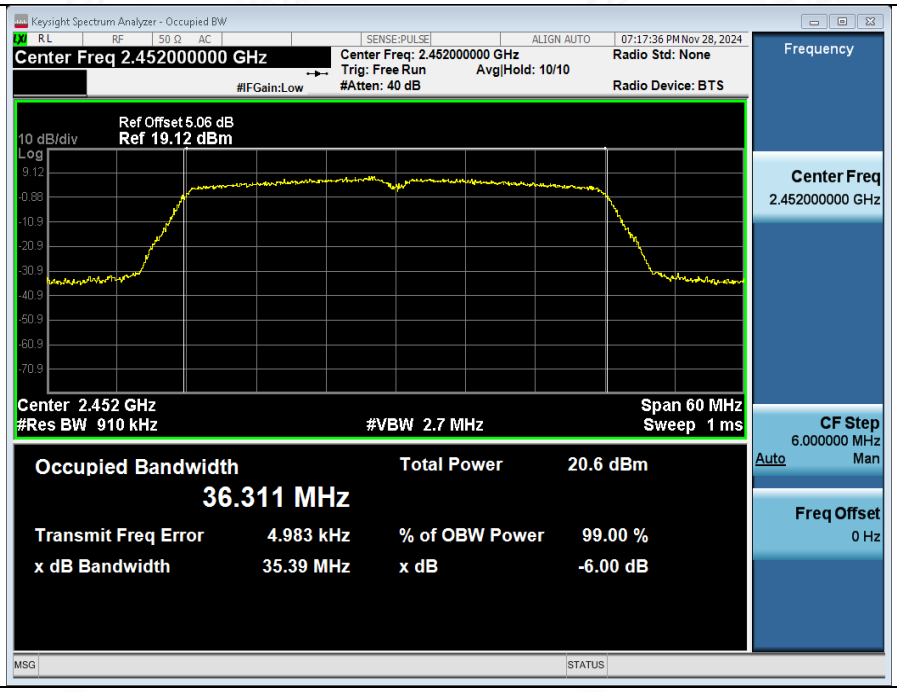


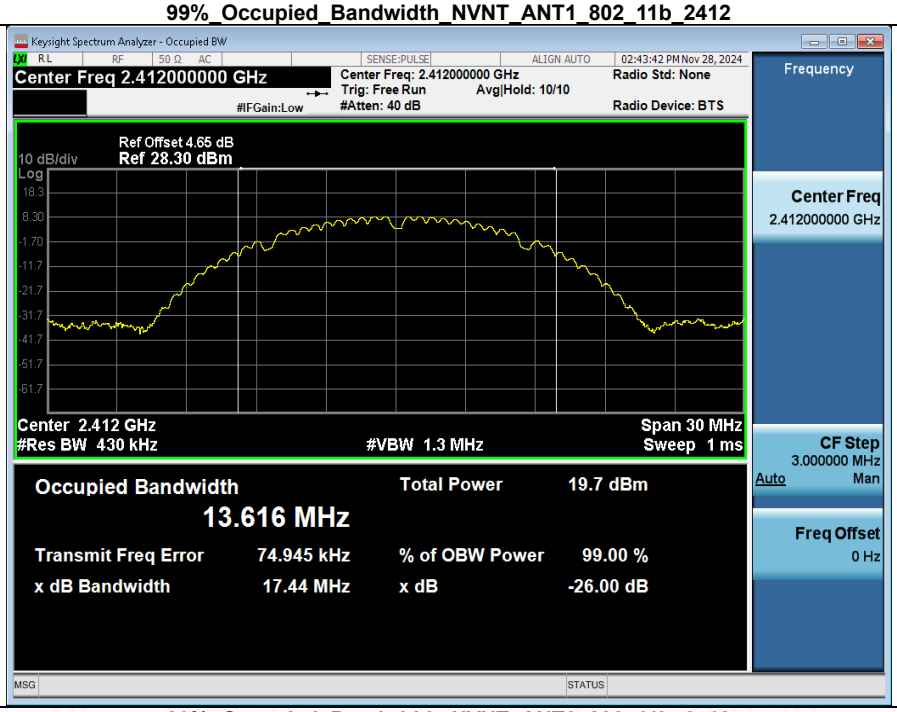
-6dB_Bandwidth_NVNT_ANT2_802_11n(HT40)_2452


Keysight Spectrum Analyzer - Occupied BW
RL
RF
50 Ω AC
SENSE:PULSE
ALIGN AUTO
07:17:36 PM Nov 28, 2024
Center Freq 2.452000000 GHz
Center Freq: 2.452000000 GHz
Trig: Free Run
Avg|Hold: 10/10
#Atten: 40 dB
Radio Std: None
Radio Device: BTS
#IFGain:Low
Frequency
Ref Offset 5.06 dB
10 dB/div
Ref 19.12 dBm
Log
9.12
-0.88
-10.9
-20.9
-30.9
-40.9
-50.9
-60.9
-70.9
Center Freq
2.452000000 GHz
Center 2.452 GHz
#Res BW 910 kHz
#VBW 2.7 MHz
Span 60 MHz
Sweep 1 ms
CF Step
6.000000 MHz
Auto
Man
Occupied Bandwidth
36.311 MHz
Total Power
20.6 dBm
Transmit Freq Error
4.983 kHz
% of OBW Power
99.00 %
x dB Bandwidth
35.39 MHz
x dB
-6.00 dB
Freq Offset
0 Hz
MSG
STATUS

2. 99% Occupied Bandwidth

Condition	Antenna	Modulation	Frequency (MHz)	99%%BW(MHz)
NVNT	ANT1	802.11b	2412.00	13.616
NVNT	ANT2	802.11b	2412.00	13.354
NVNT	ANT1	802.11b	2437.00	13.626
NVNT	ANT2	802.11b	2437.00	13.371
NVNT	ANT1	802.11b	2462.00	13.550
NVNT	ANT2	802.11b	2462.00	13.414
NVNT	ANT1	802.11g	2412.00	17.041
NVNT	ANT2	802.11g	2412.00	16.738
NVNT	ANT1	802.11g	2437.00	17.125
NVNT	ANT2	802.11g	2437.00	16.763
NVNT	ANT1	802.11g	2462.00	17.070
NVNT	ANT2	802.11g	2462.00	16.827
NVNT	ANT1	802.11n(HT20)	2412.00	18.067
NVNT	ANT2	802.11n(HT20)	2412.00	17.731
NVNT	ANT1	802.11n(HT20)	2437.00	18.024
NVNT	ANT2	802.11n(HT20)	2437.00	17.774
NVNT	ANT1	802.11n(HT20)	2462.00	17.979
NVNT	ANT2	802.11n(HT20)	2462.00	17.795
NVNT	ANT1	802.11n(HT40)	2422.00	36.399
NVNT	ANT2	802.11n(HT40)	2422.00	36.386
NVNT	ANT1	802.11n(HT40)	2437.00	36.307
NVNT	ANT2	802.11n(HT40)	2437.00	36.140
NVNT	ANT1	802.11n(HT40)	2452.00	36.412
NVNT	ANT2	802.11n(HT40)	2452.00	36.323

99%_Occupied_Bandwidth_NVNT_ANT1_802_11b_2412



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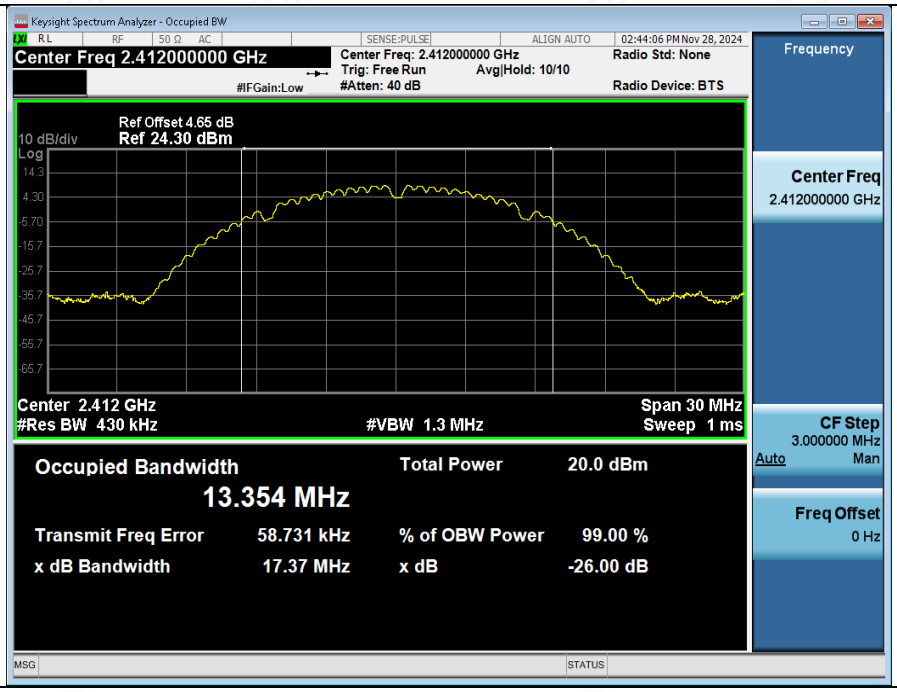

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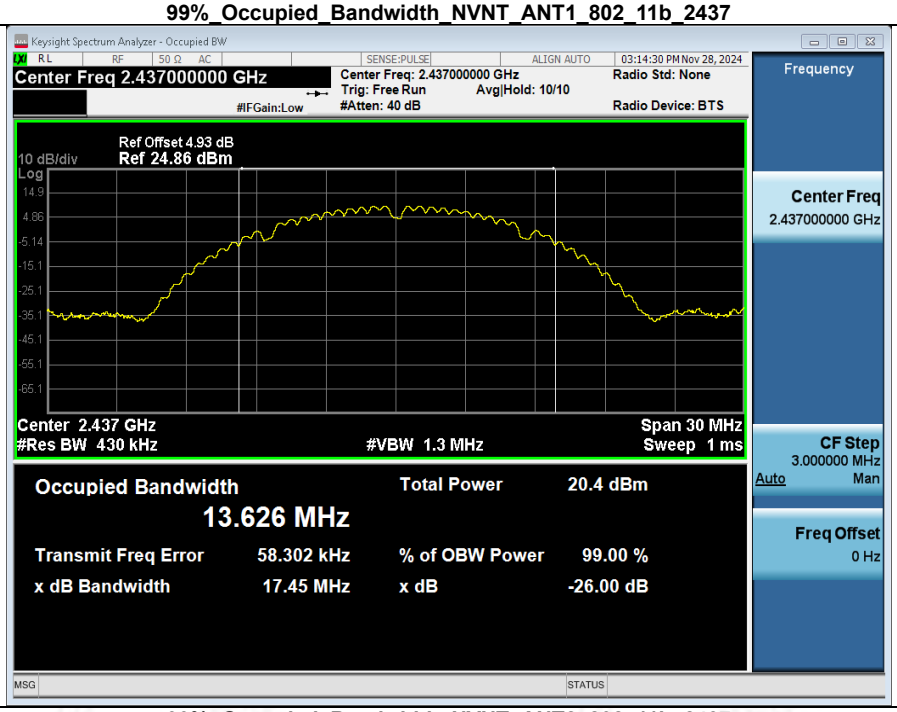

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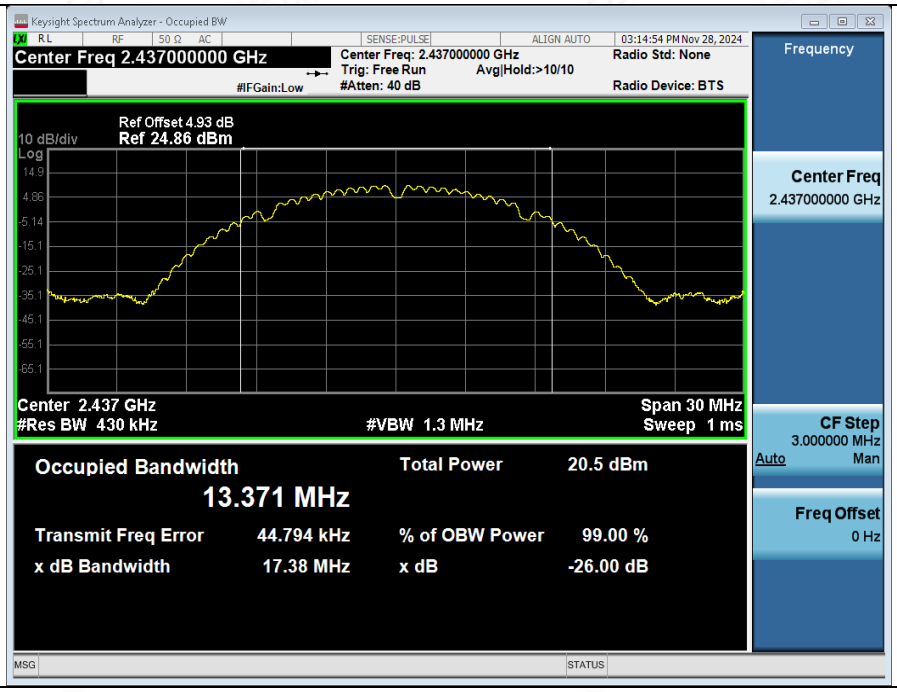

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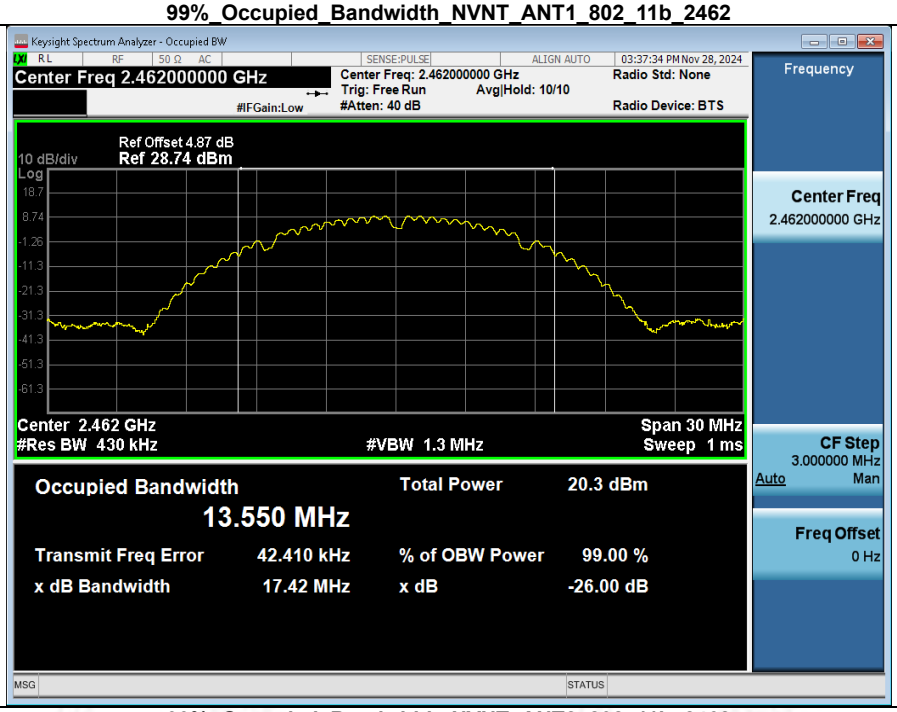

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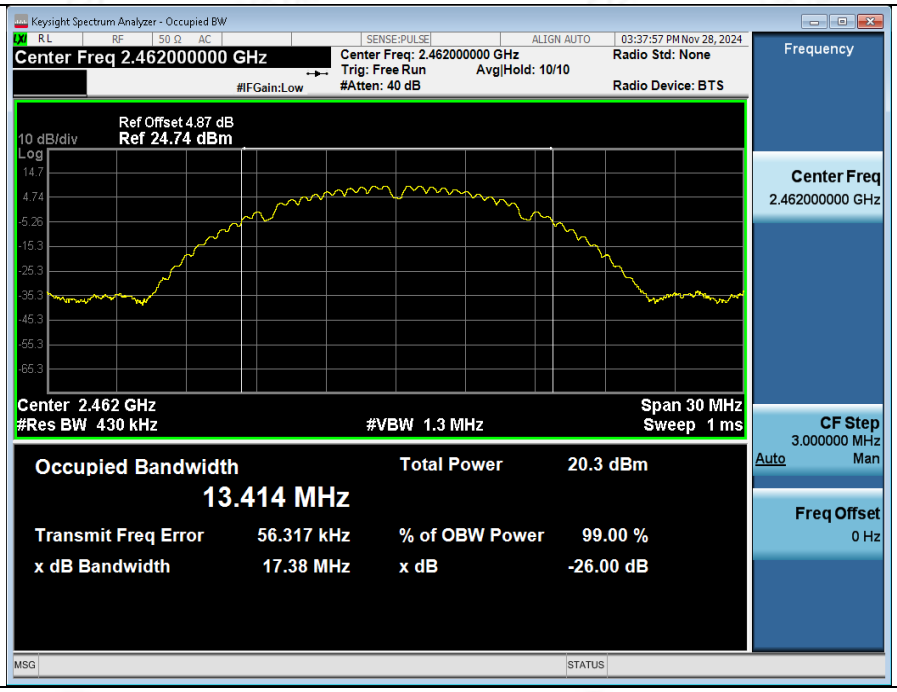

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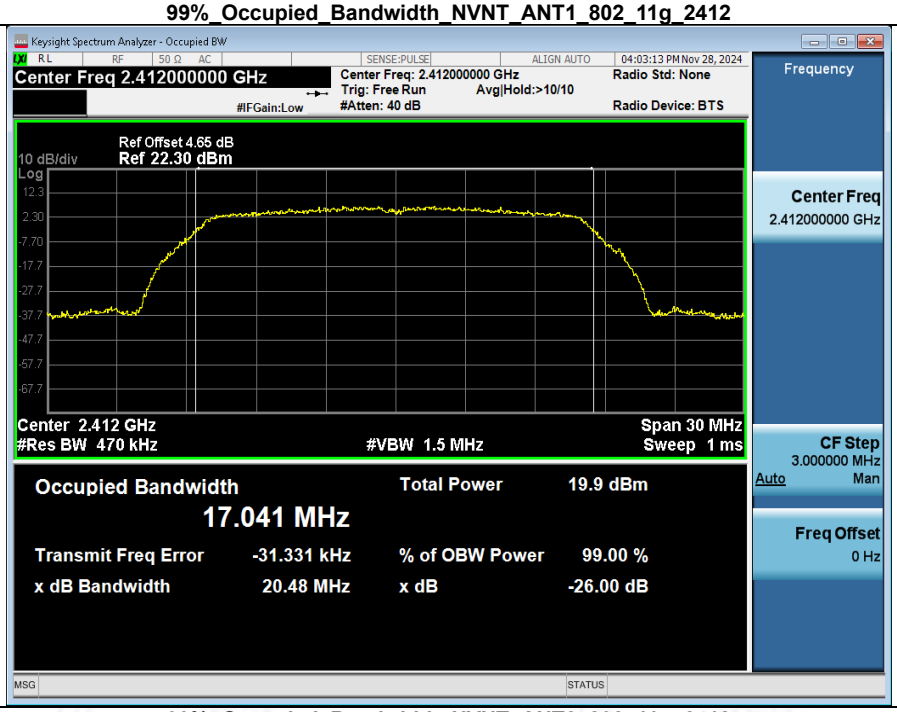

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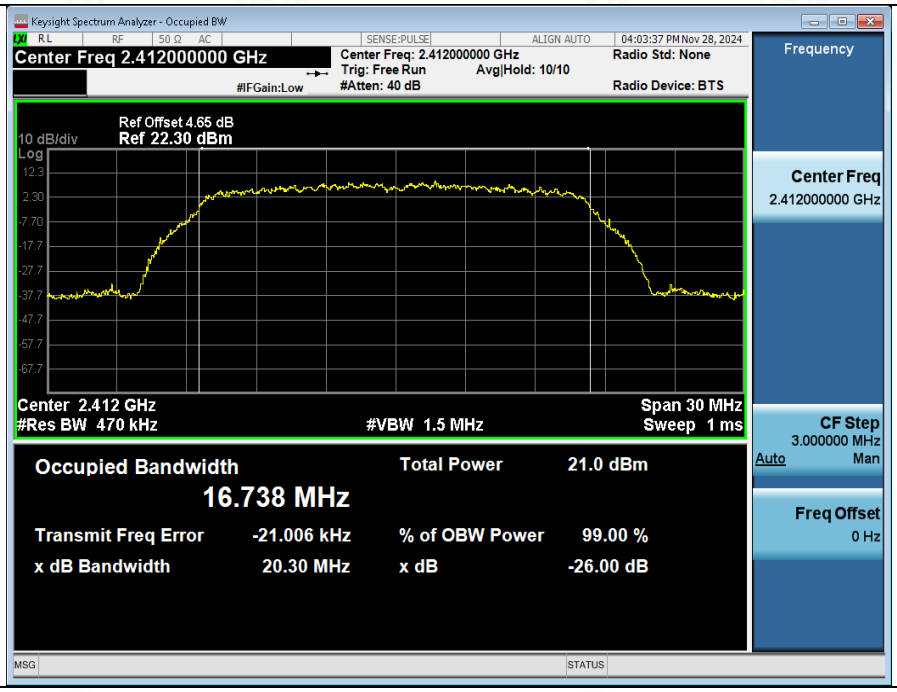

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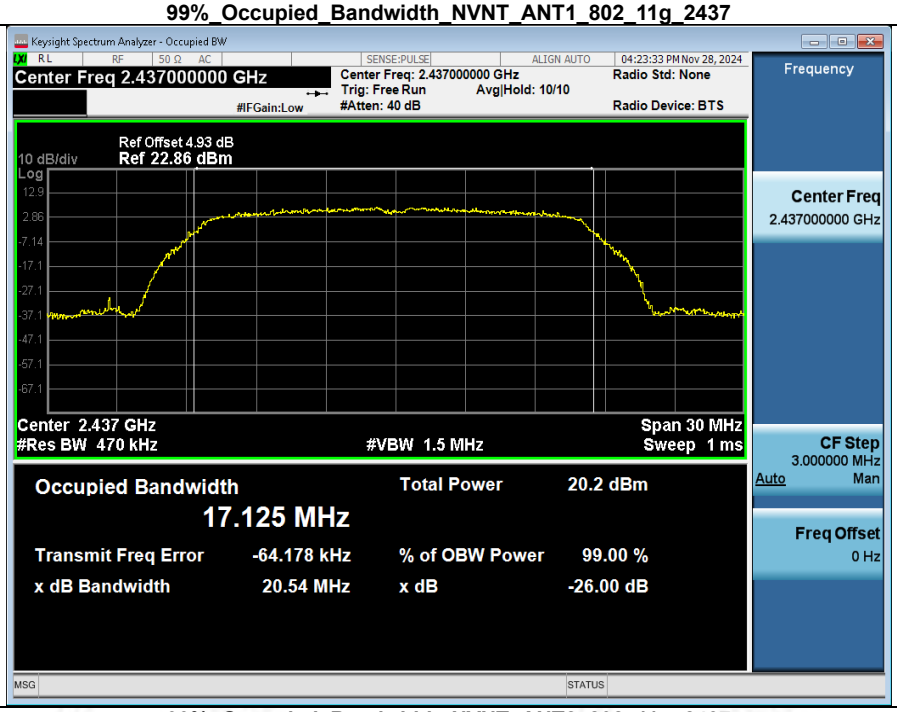

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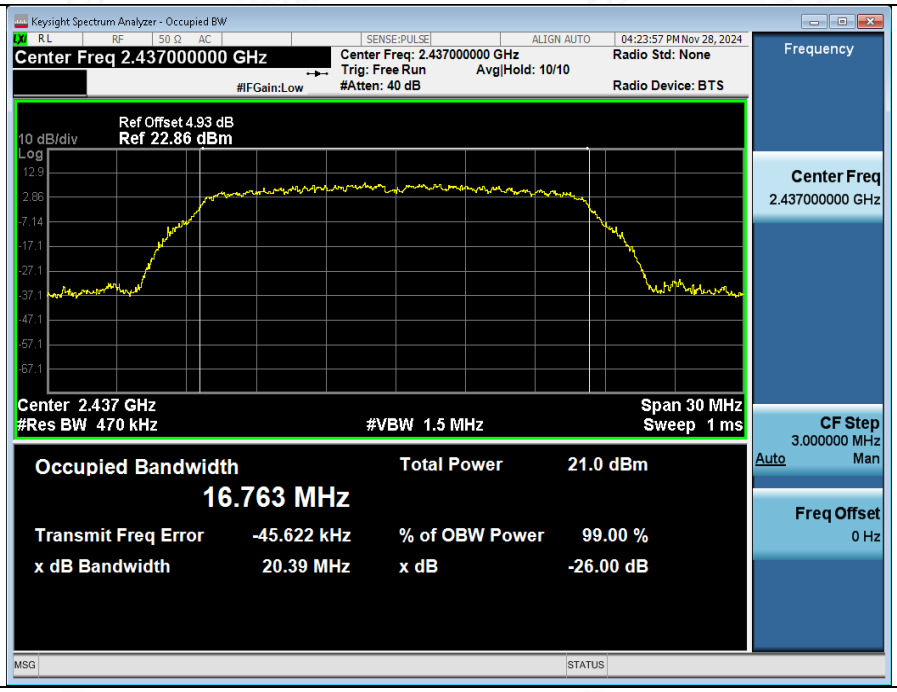

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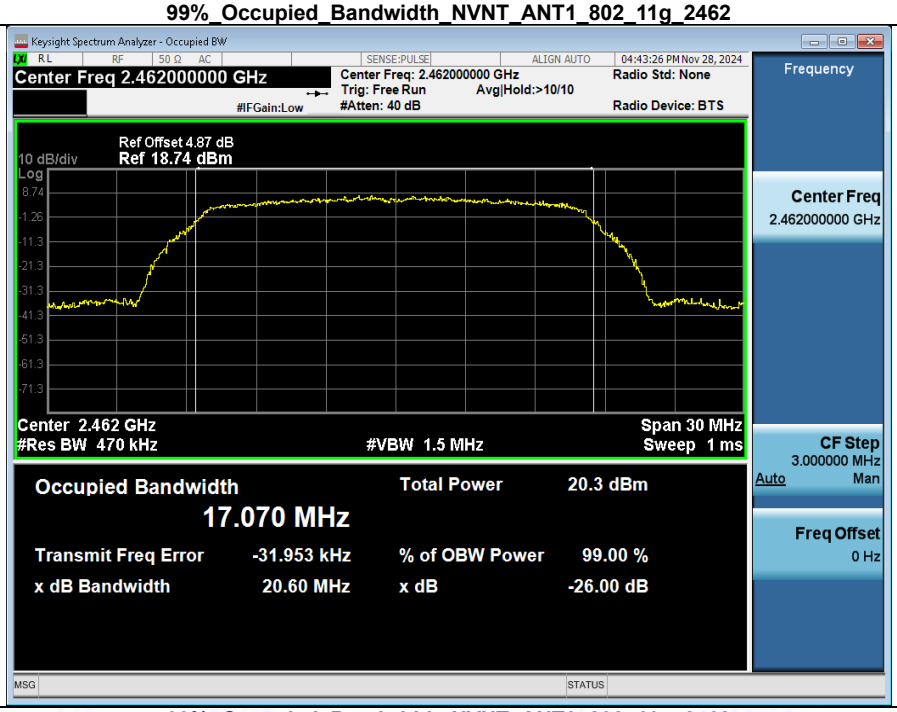

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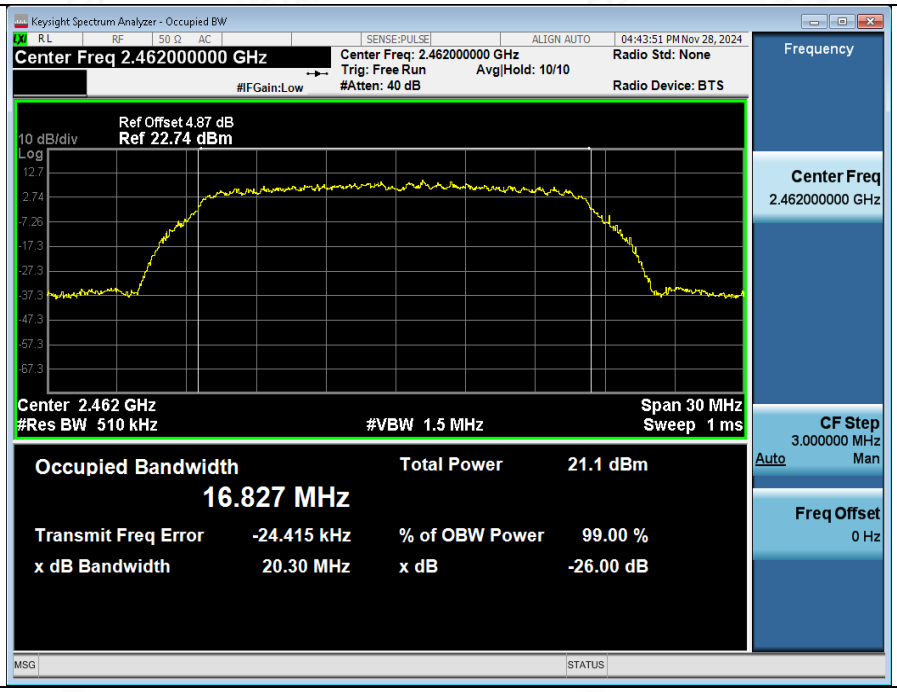

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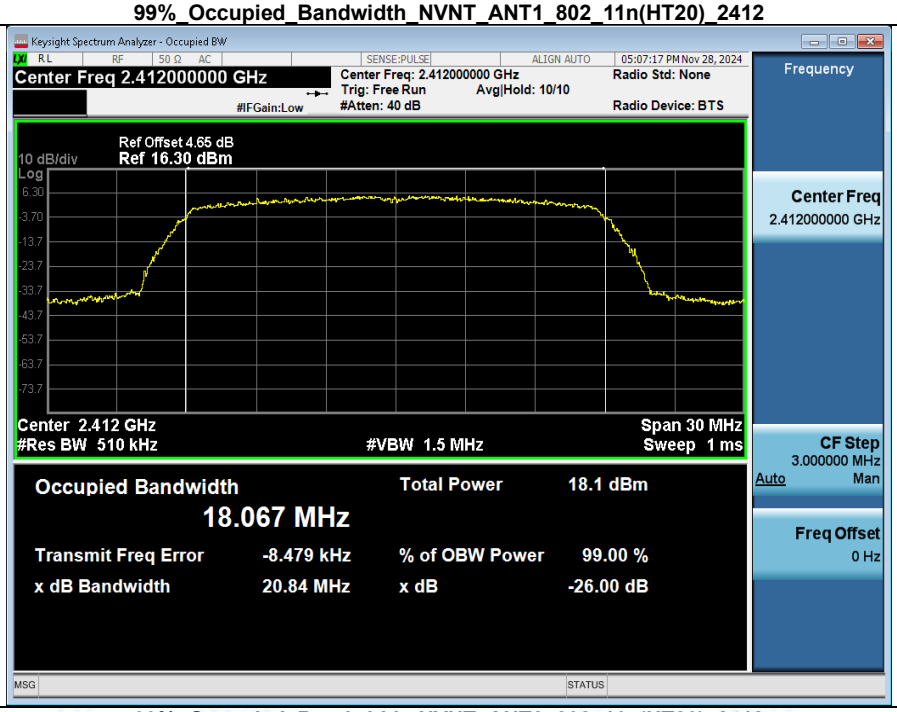

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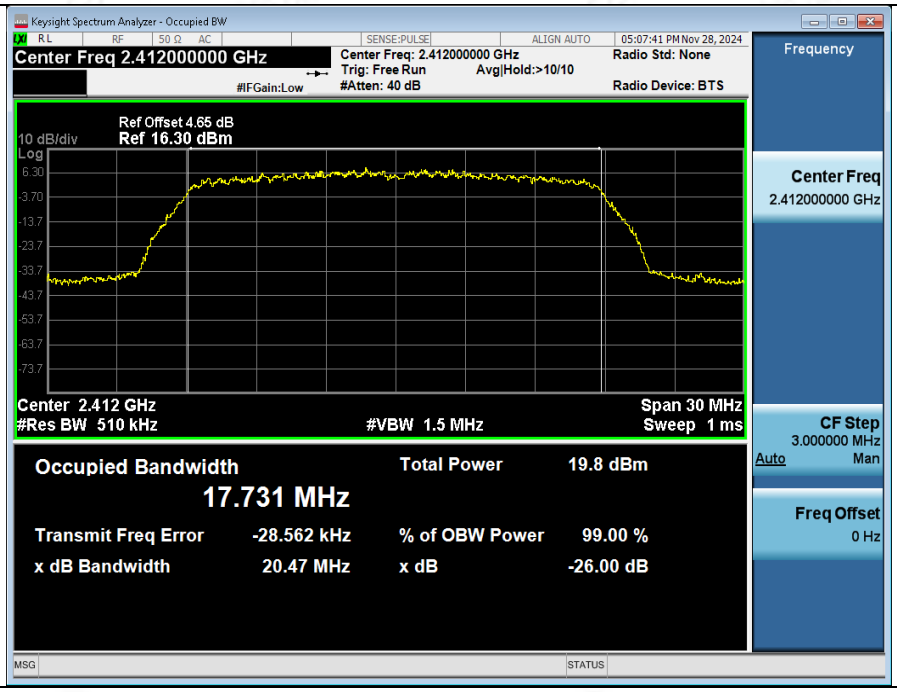

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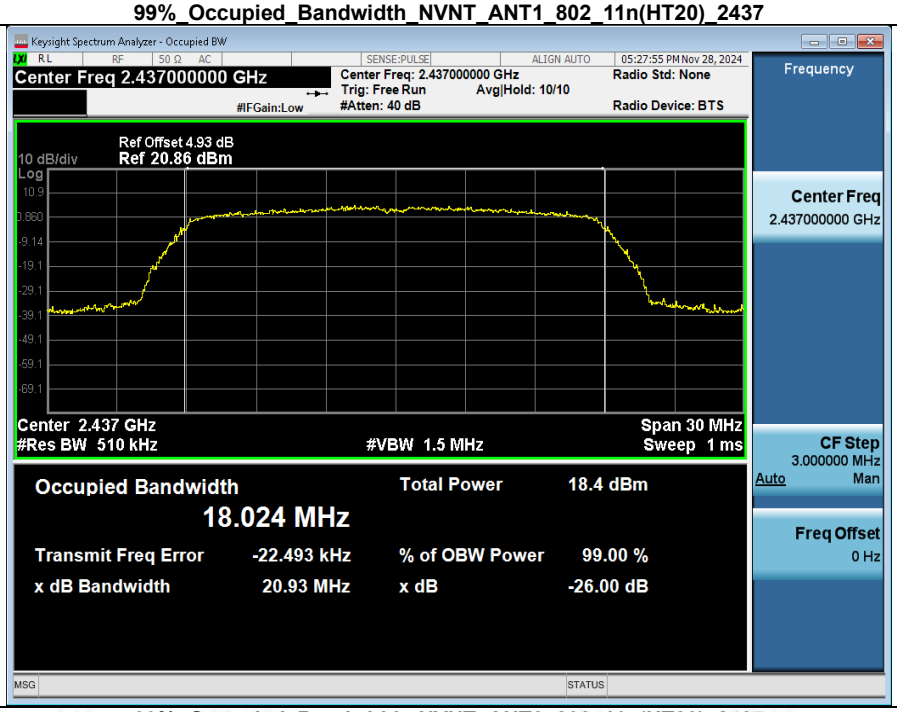

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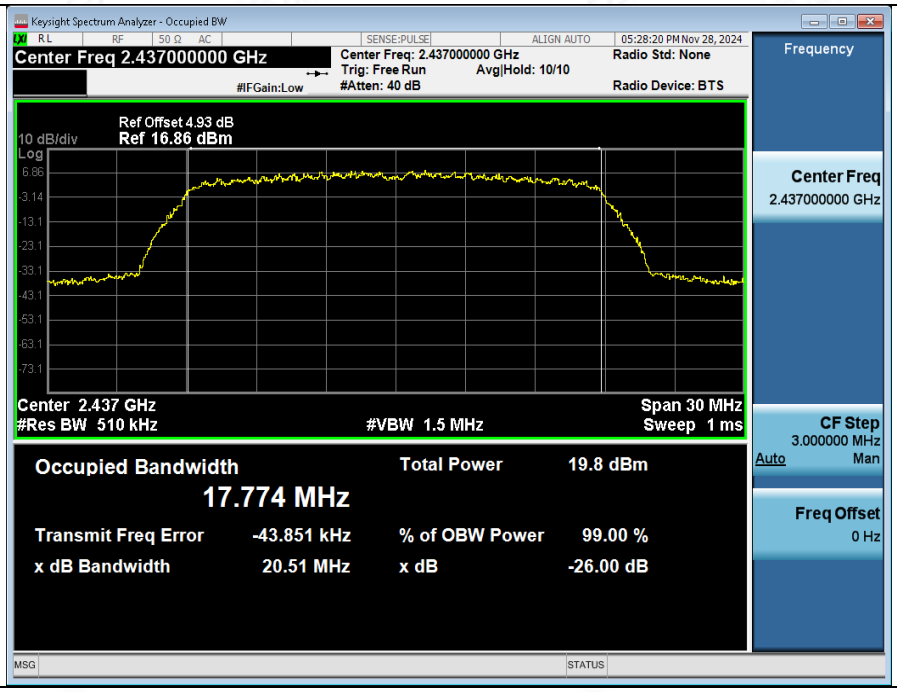
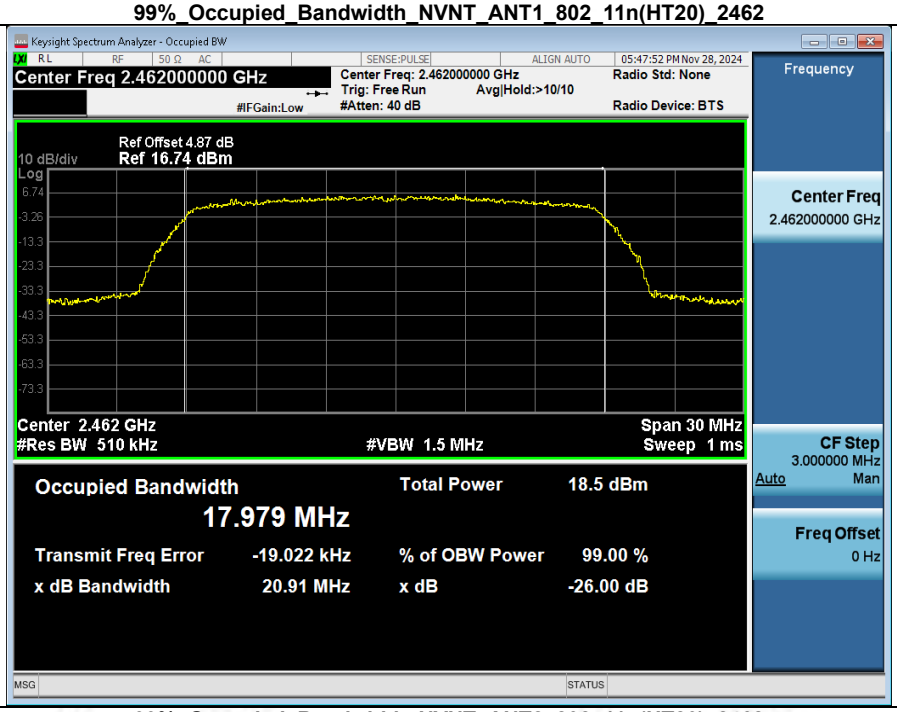
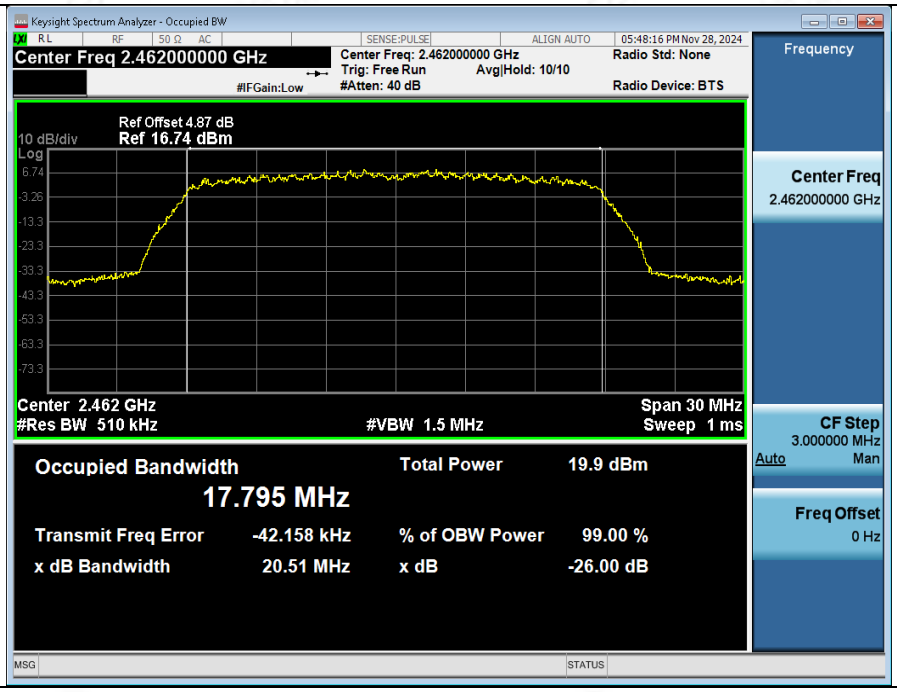


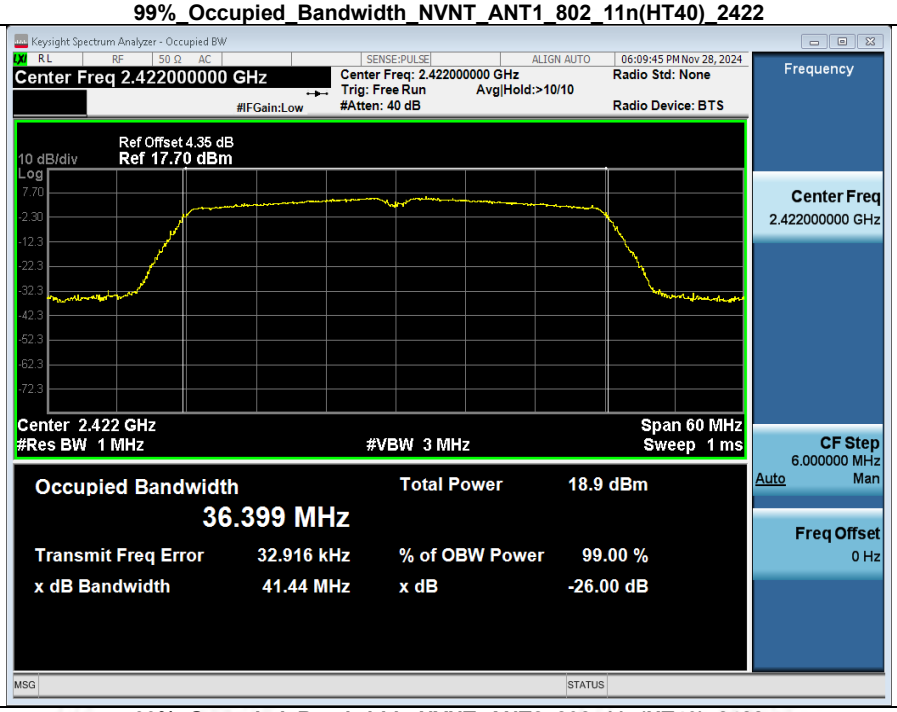
99%_Occupied_Bandwidth_NVNT_ANT1_802_11n(HT20)_2462



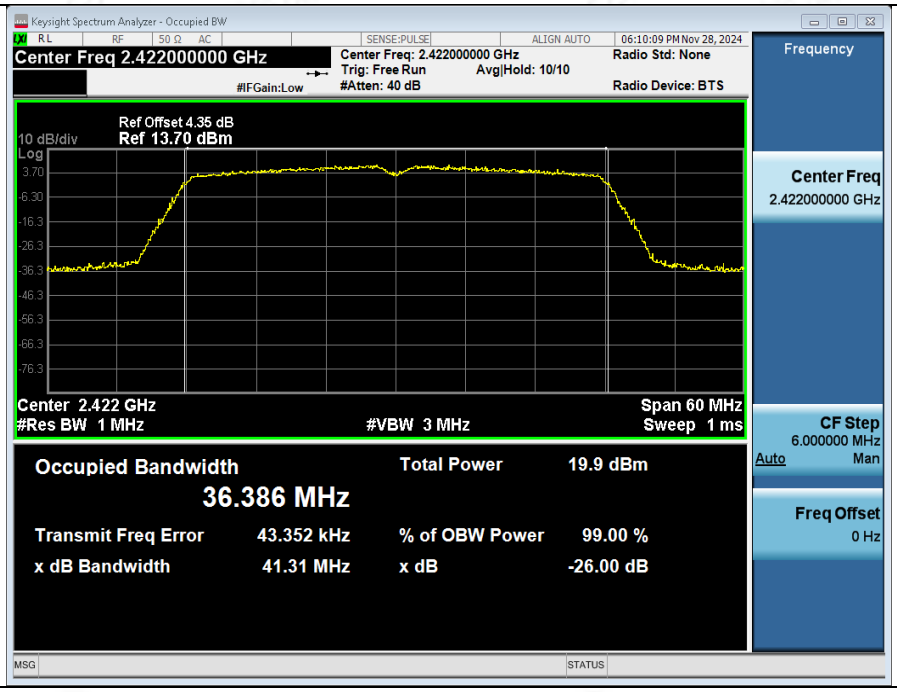
99%_Occupied_Bandwidth_NVNT_ANT2_802_11n(HT20)_2462



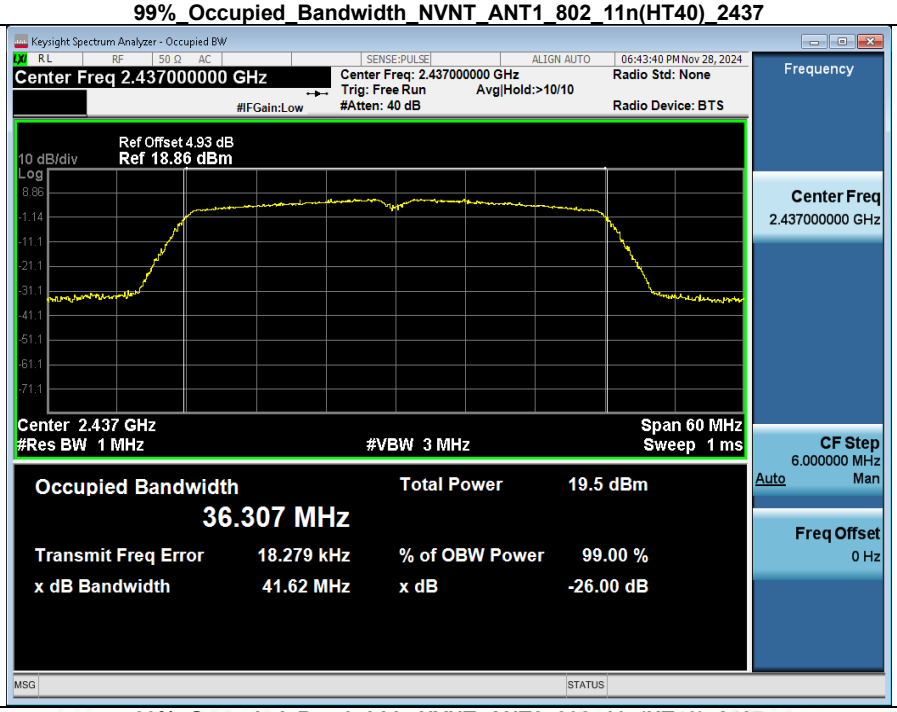
99%_Occupied_Bandwidth_NVNT_ANT1_802_11n(HT40)_2422



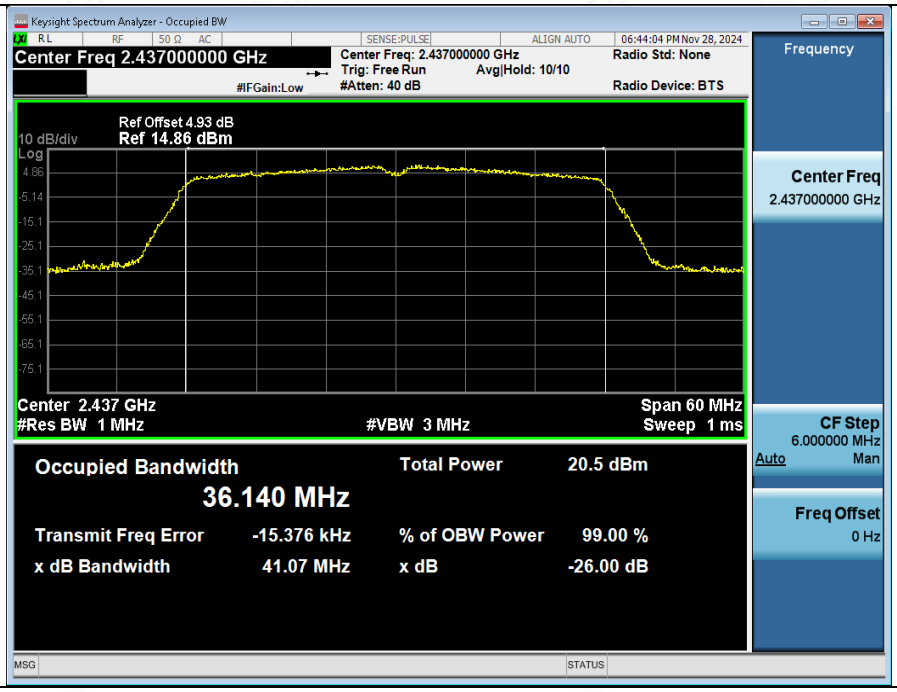
99%_Occupied_Bandwidth_NVNT_ANT2_802_11n(HT40)_2422



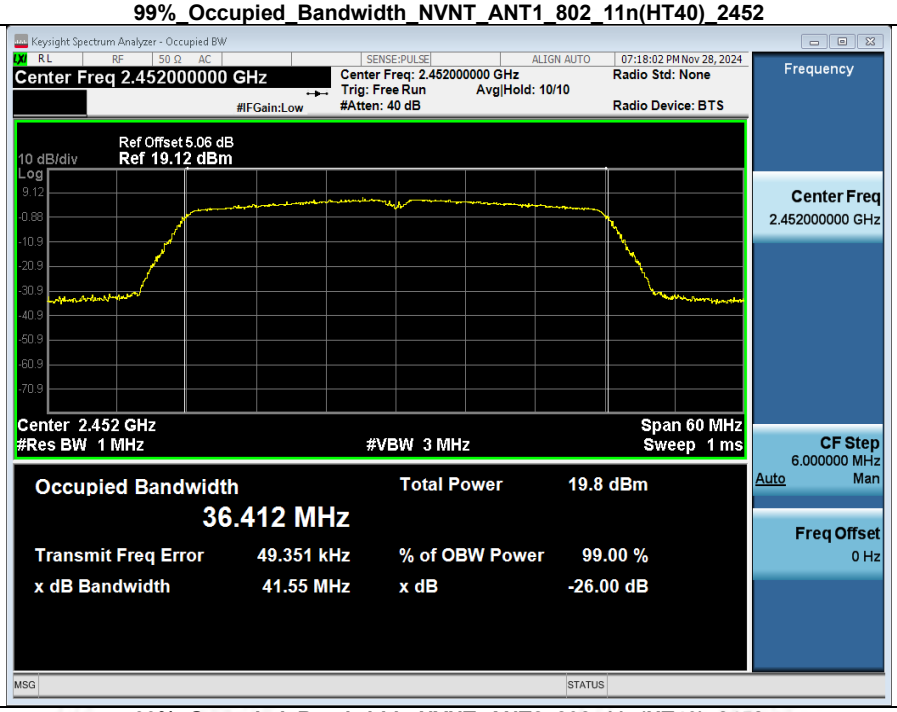
99%_Occupied_Bandwidth_NVNT_ANT1_802_11n(HT40)_2437



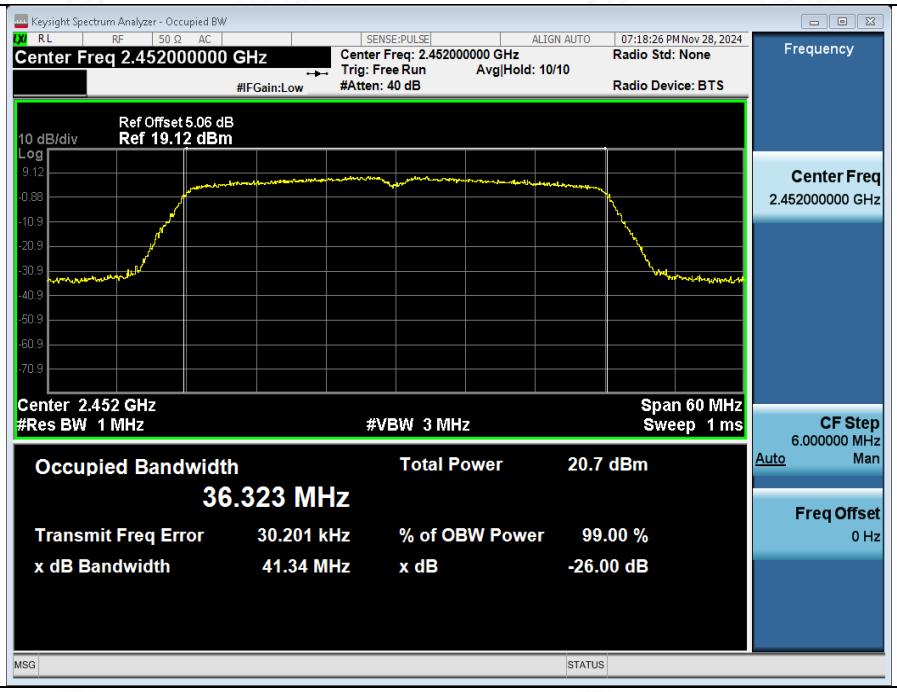
99%_Occupied_Bandwidth_NVNT_ANT2_802_11n(HT40)_2437



99%_Occupied_Bandwidth_NVNT_ANT1_802_11n(HT40)_2452



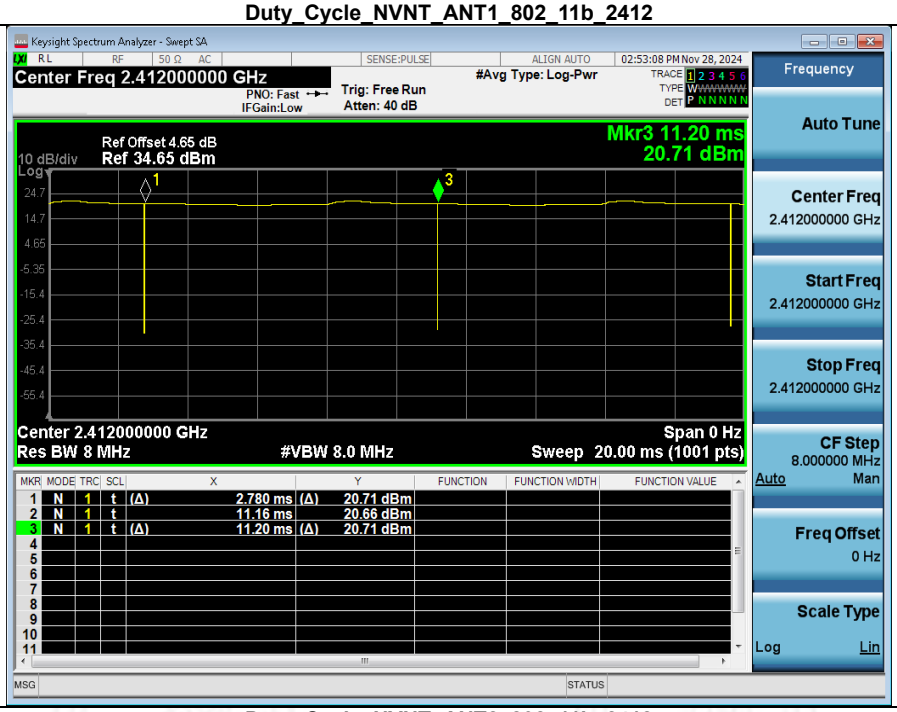
99%_Occupied_Bandwidth_NVNT_ANT2_802_11n(HT40)_2452


Keysight Spectrum Analyzer - Occupied BW
RL
RF
50 Ω AC
SENSE:PULSE
ALIGN AUTO
07:18:26 PM Nov 28, 2024
Center Freq 2.452000000 GHz
Center Freq: 2.452000000 GHz
Trig: Free Run
Avg|Hold: 10/10
#Atten: 40 dB
Radio Std: None
Radio Device: BTS
#IFGain:Low
Frequency
Ref Offset 5.06 dB
10 dB/div
Ref 19.12 dBm
Log
9.12
-0.88
-10.9
-20.9
-30.9
-40.9
-50.9
-60.9
-70.9
Center Freq
2.452000000 GHz
Center 2.452 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 60 MHz
Sweep 1 ms
CF Step
6.000000 MHz
Auto
Man
Occupied Bandwidth
36.323 MHz
Total Power
20.7 dBm
Transmit Freq Error
30.201 kHz
% of OBW Power
99.00 %
x dB Bandwidth
41.34 MHz
x dB
-26.00 dB
Freq Offset
0 Hz
MSG
STATUS

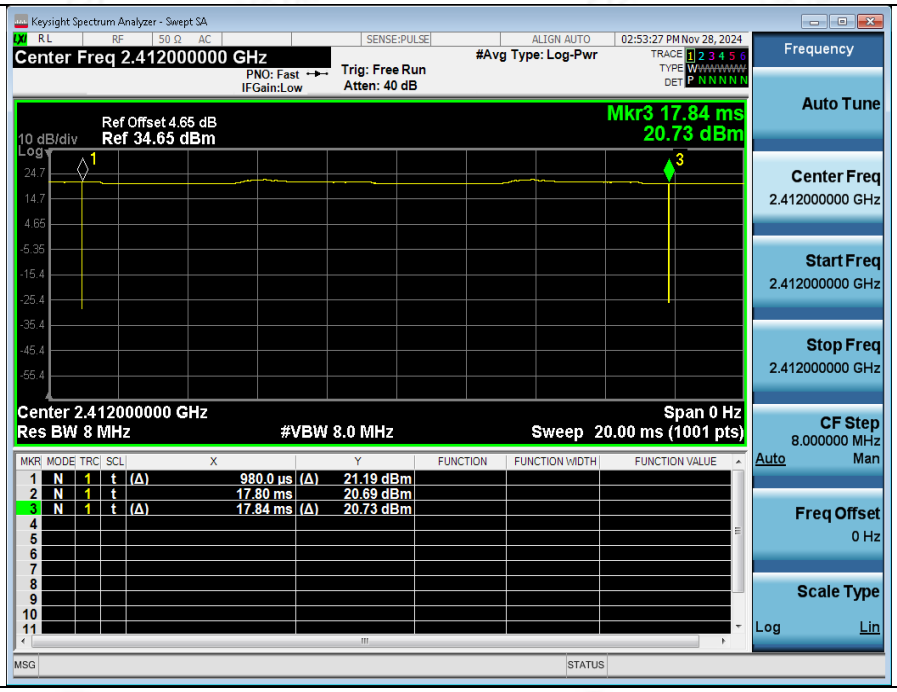
3. Duty Cycle

Condition	Antenna	Modulation	Frequency (MHz)	Duty cycle(%)	Duty factor(dB)
NVNT	ANT1	802.11b	2412.00	99.76	0.00
NVNT	ANT2	802.11b	2412.00	99.88	0.00
NVNT	ANT1	802.11b	2437.00	99.76	0.00
NVNT	ANT2	802.11b	2437.00	99.76	0.00
NVNT	ANT1	802.11b	2462.00	99.76	0.00
NVNT	ANT2	802.11b	2462.00	99.76	0.00
NVNT	ANT1	802.11g	2412.00	98.61	0.00
NVNT	ANT2	802.11g	2412.00	98.61	0.00
NVNT	ANT1	802.11g	2437.00	98.59	0.00
NVNT	ANT2	802.11g	2437.00	98.61	0.00
NVNT	ANT1	802.11g	2462.00	98.61	0.00
NVNT	ANT2	802.11g	2462.00	97.22	0.12
NVNT	ANT1	802.11n(HT20)	2412.00	98.51	0.00
NVNT	ANT2	802.11n(HT20)	2412.00	98.51	0.00
NVNT	ANT1	802.11n(HT20)	2437.00	97.06	0.13
NVNT	ANT2	802.11n(HT20)	2437.00	98.51	0.00
NVNT	ANT1	802.11n(HT20)	2462.00	98.51	0.00
NVNT	ANT2	802.11n(HT20)	2462.00	97.06	0.13
NVNT	ANT1	802.11n(HT40)	2422.00	97.14	0.13
NVNT	ANT2	802.11n(HT40)	2422.00	94.29	0.26
NVNT	ANT1	802.11n(HT40)	2437.00	94.12	0.26
NVNT	ANT2	802.11n(HT40)	2437.00	97.14	0.13
NVNT	ANT1	802.11n(HT40)	2452.00	97.14	0.13
NVNT	ANT2	802.11n(HT40)	2452.00	97.06	0.13

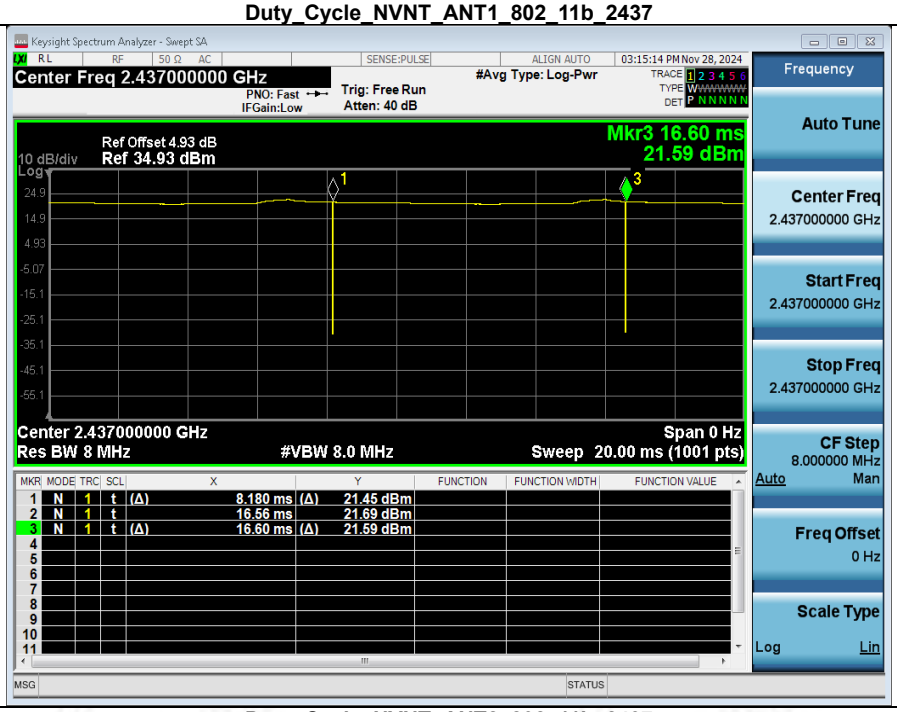
Duty_Cycle_NVNT_ANT1_802_11b_2412



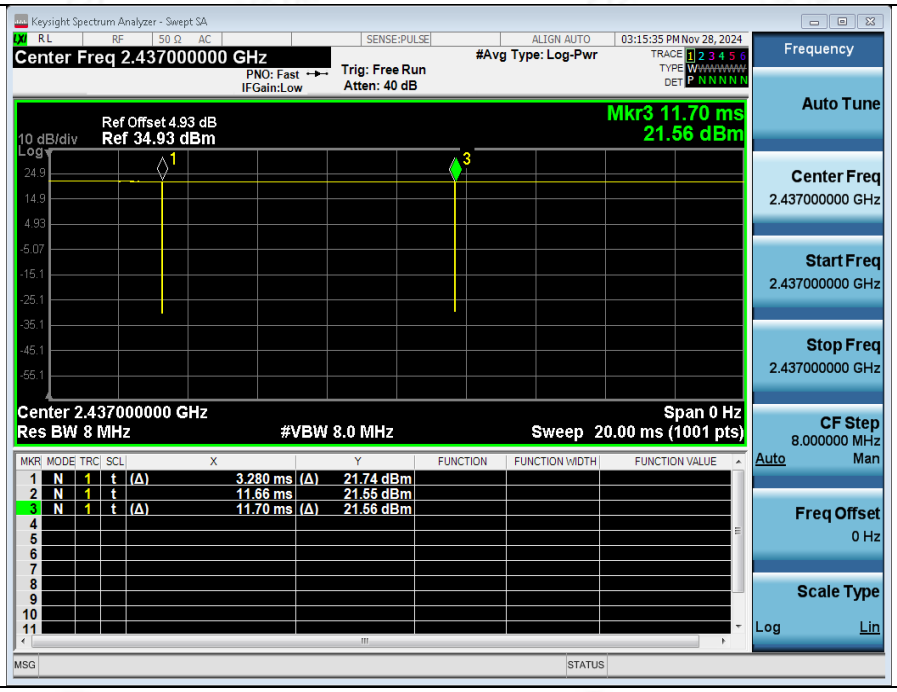
Duty_Cycle_NVNT_ANT2_802_11b_2412



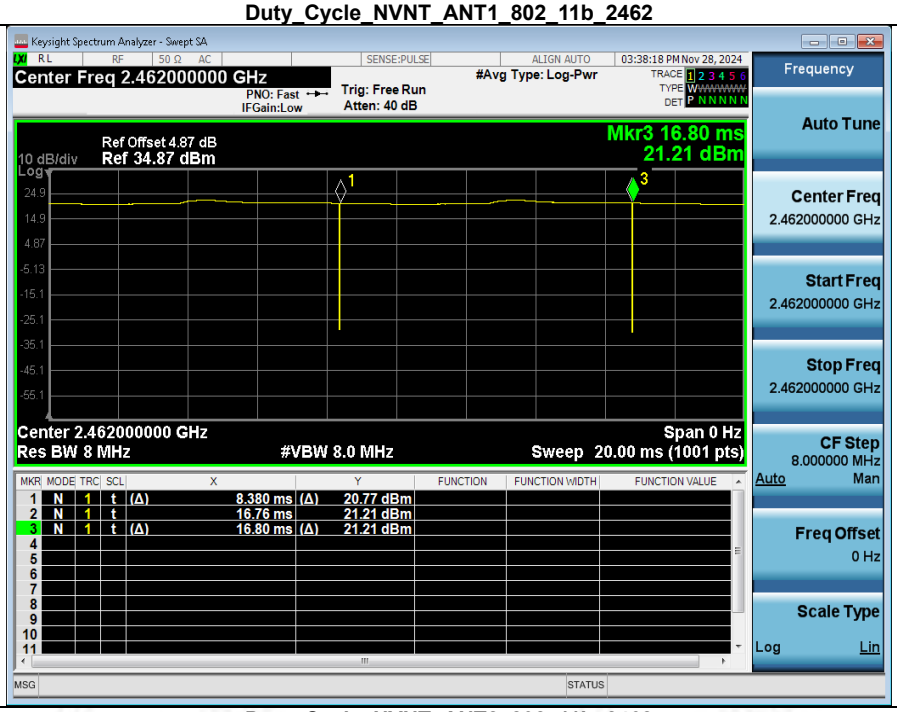
Duty_Cycle_NVNT_ANT1_802_11b_2437



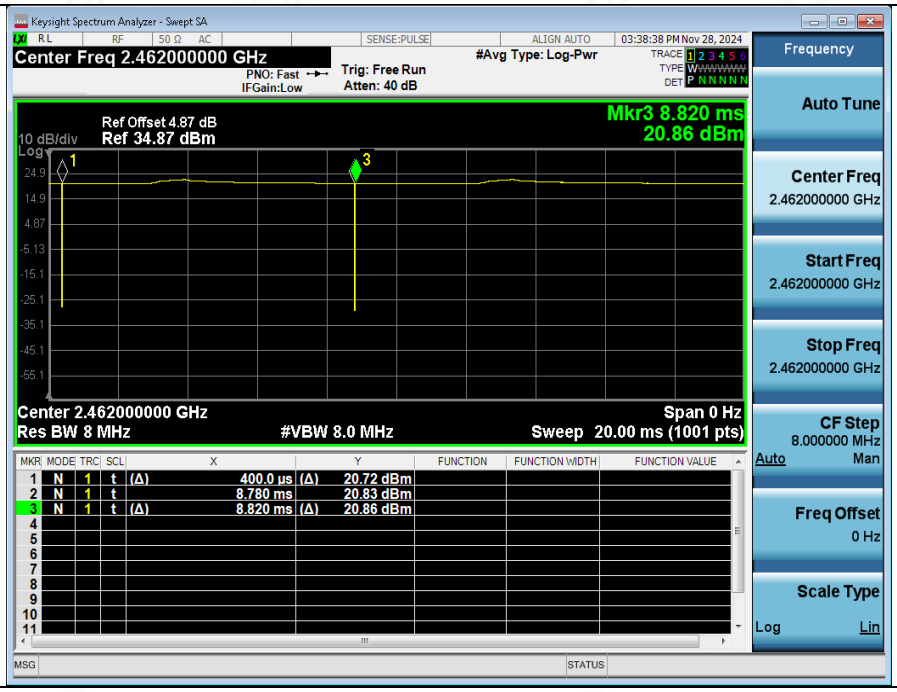
Duty_Cycle_NVNT_ANT2_802_11b_2437



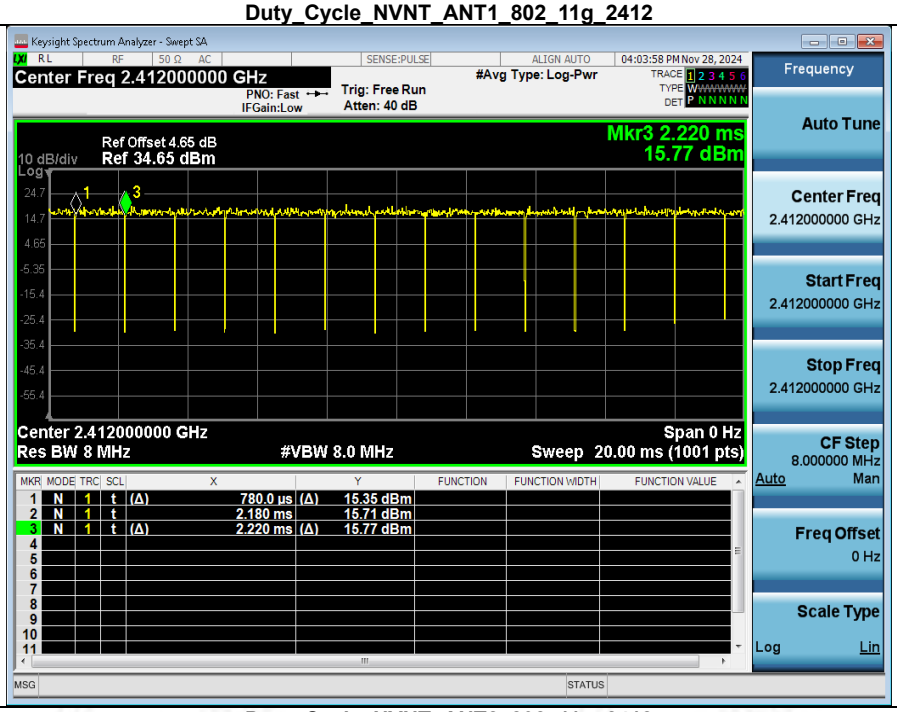
Duty_Cycle_NVNT_ANT1_802_11b_2462



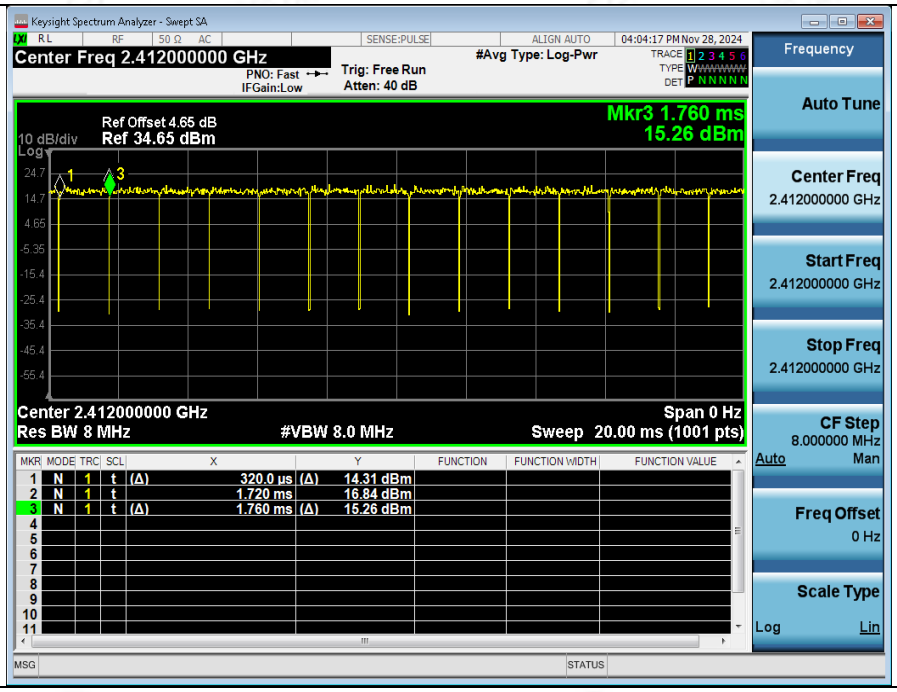
Duty_Cycle_NVNT_ANT2_802_11b_2462



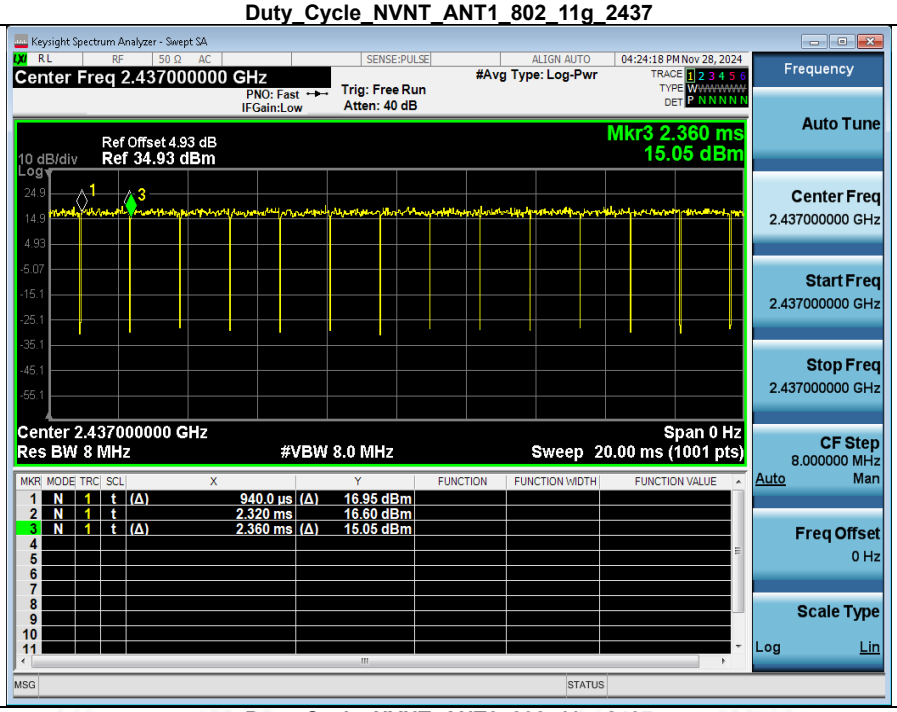
Duty_Cycle_NVNT_ANT1_802_11g_2412



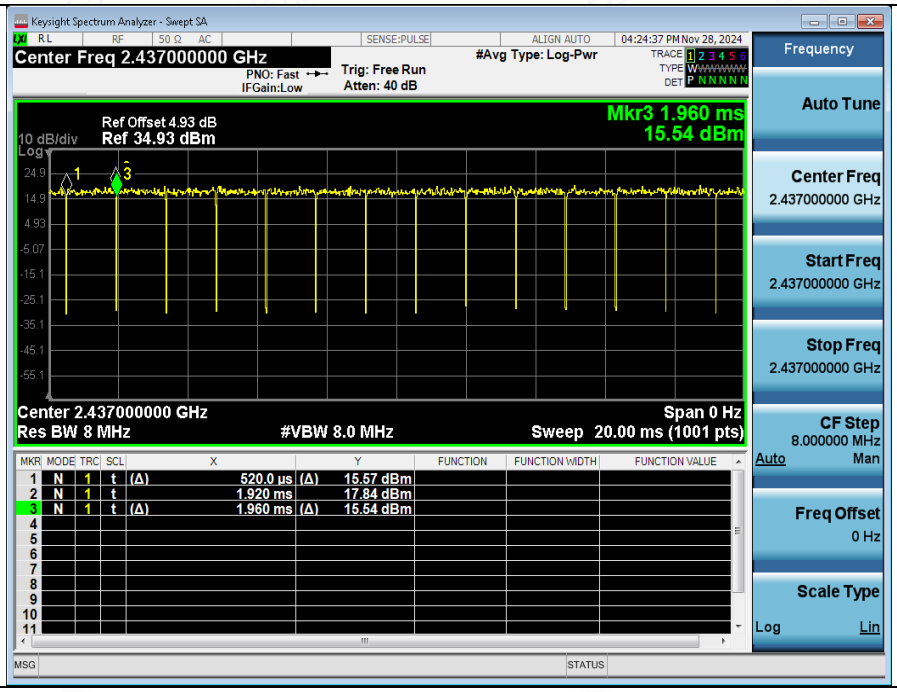
Duty_Cycle_NVNT_ANT2_802_11g_2412



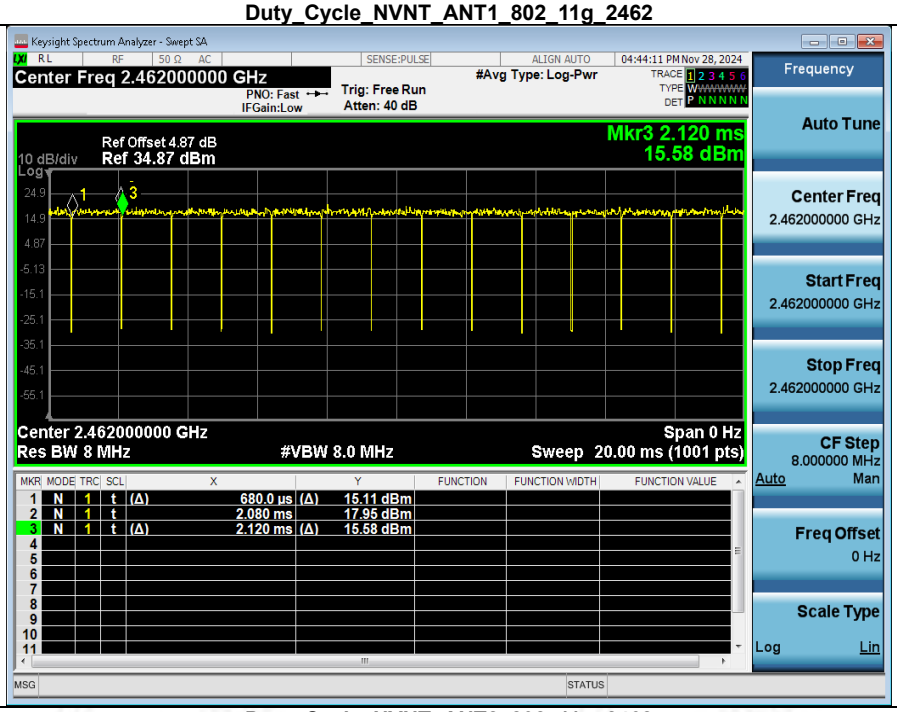
Duty_Cycle_NVNT_ANT1_802_11g_2437



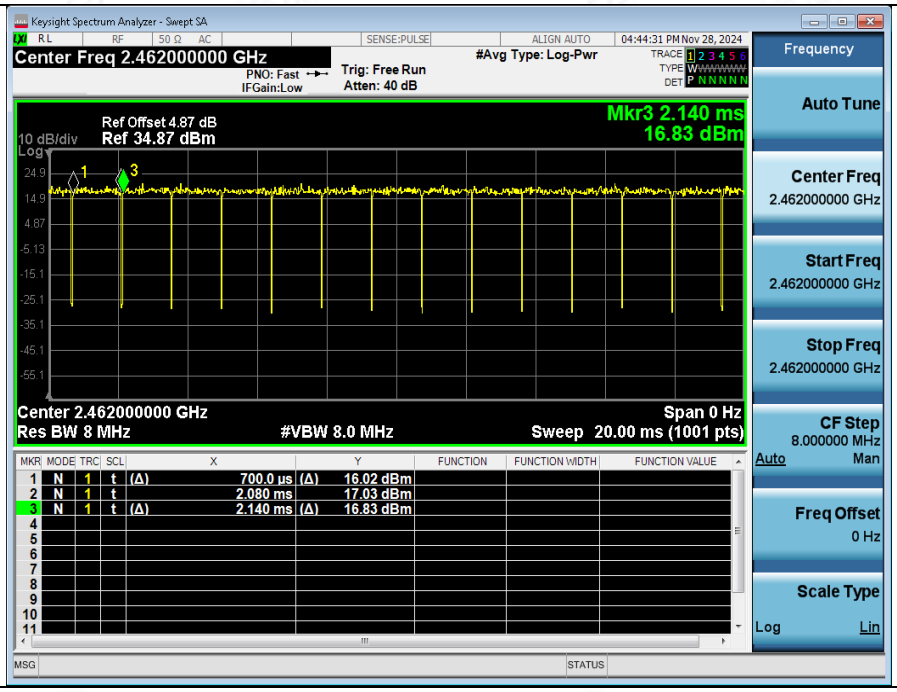
Duty_Cycle_NVNT_ANT2_802_11g_2437



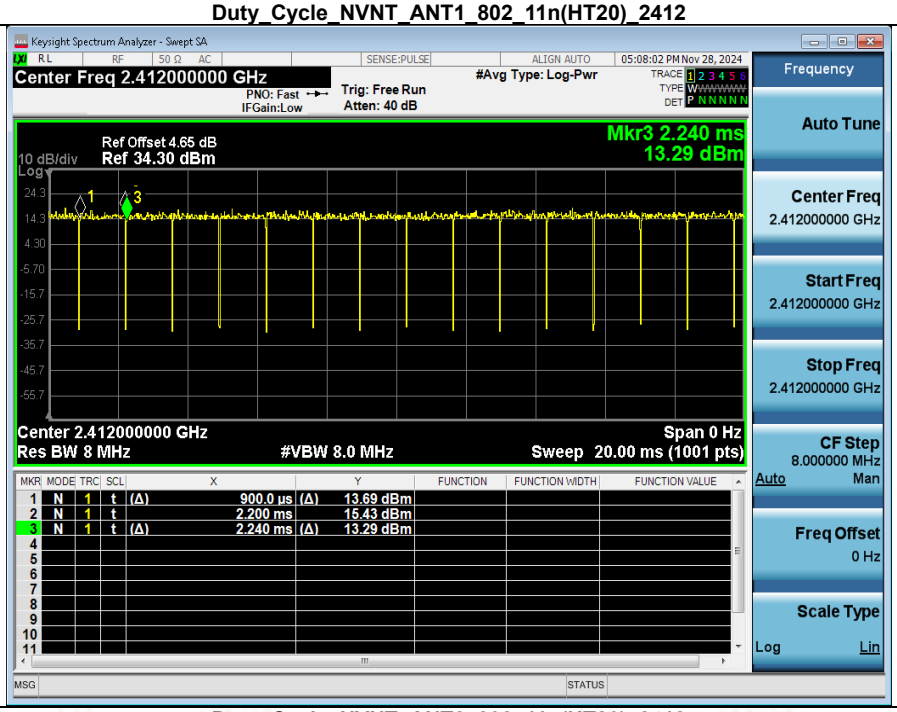
Duty_Cycle_NVNT_ANT1_802_11g_2462



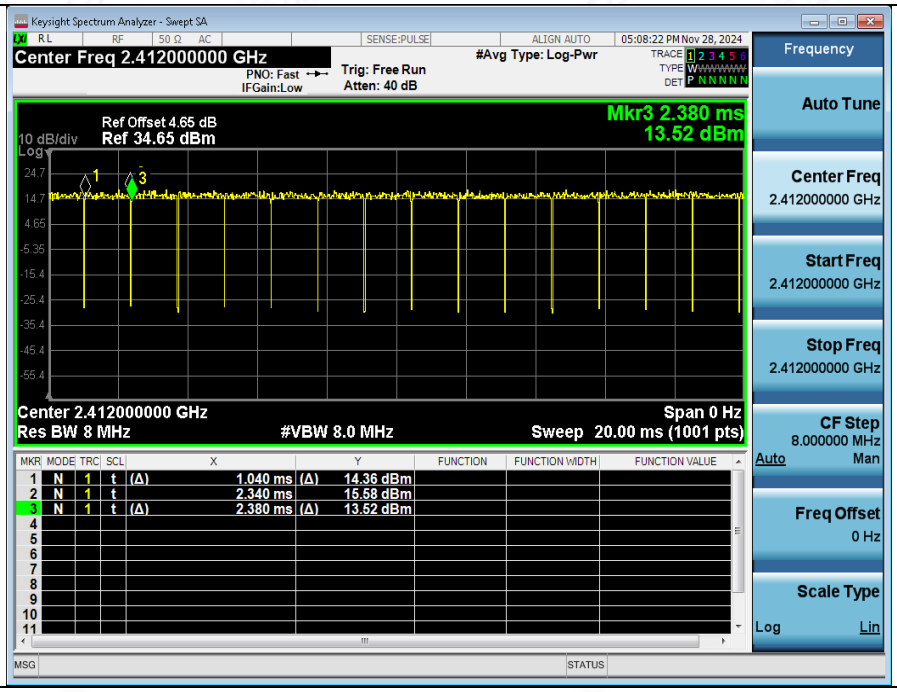
Duty_Cycle_NVNT_ANT2_802_11g_2462



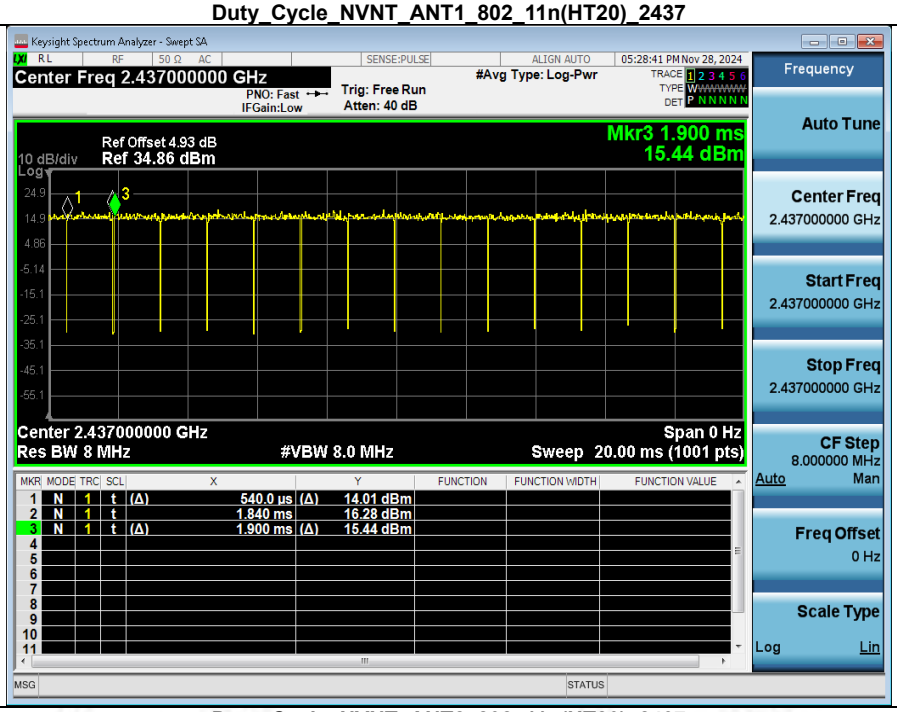
Duty_Cycle_NVNT_ANT1_802_11n(HT20)_2412



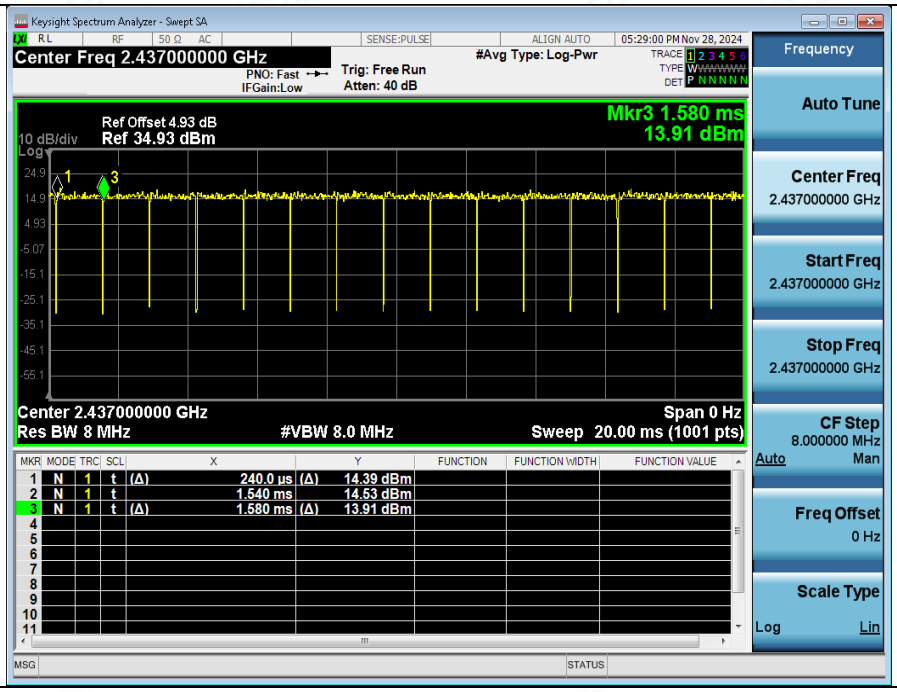
Duty_Cycle_NVNT_ANT2_802_11n(HT20)_2412



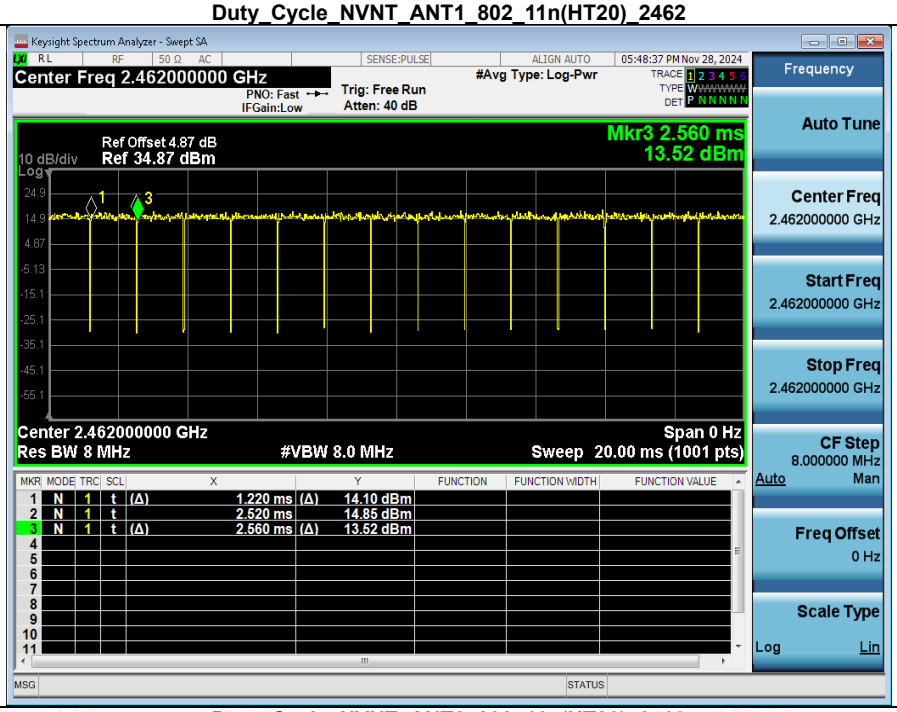
Duty_Cycle_NVNT_ANT1_802_11n(HT20)_2437



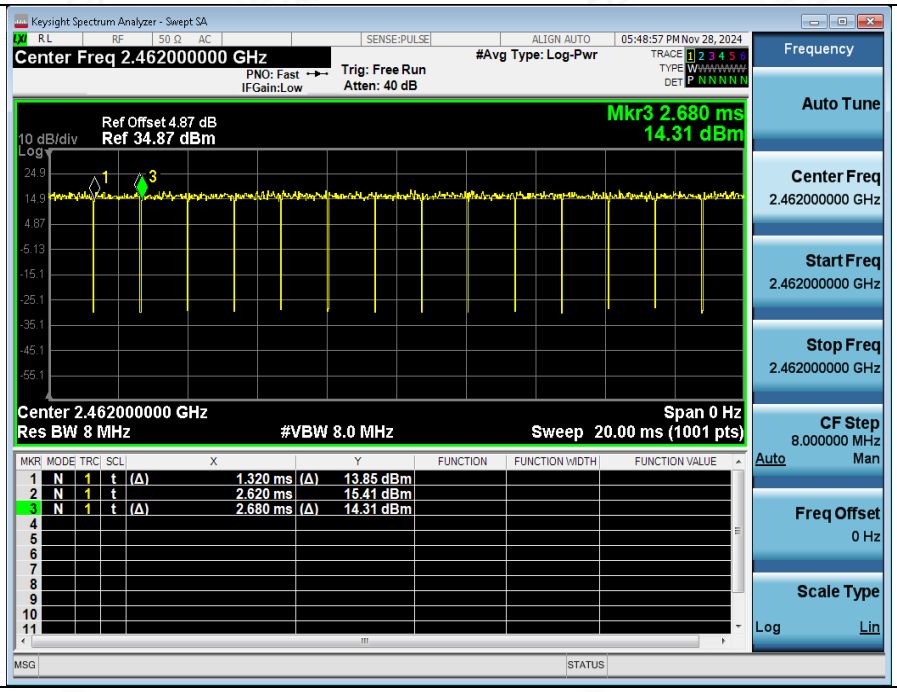
Duty_Cycle_NVNT_ANT2_802_11n(HT20)_2437



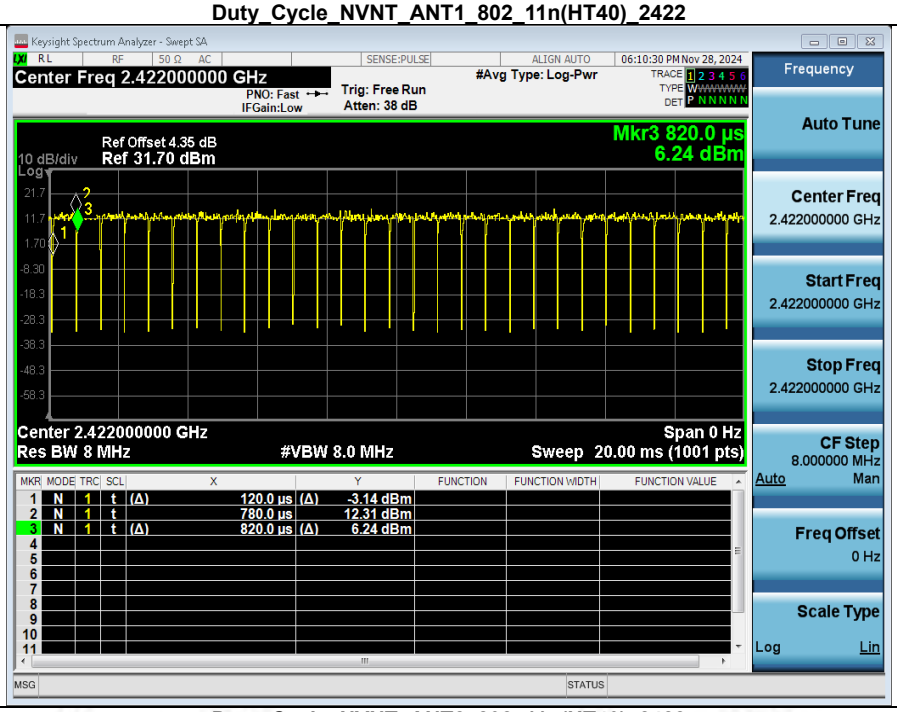
Duty_Cycle_NVNT_ANT1_802_11n(HT20)_2462



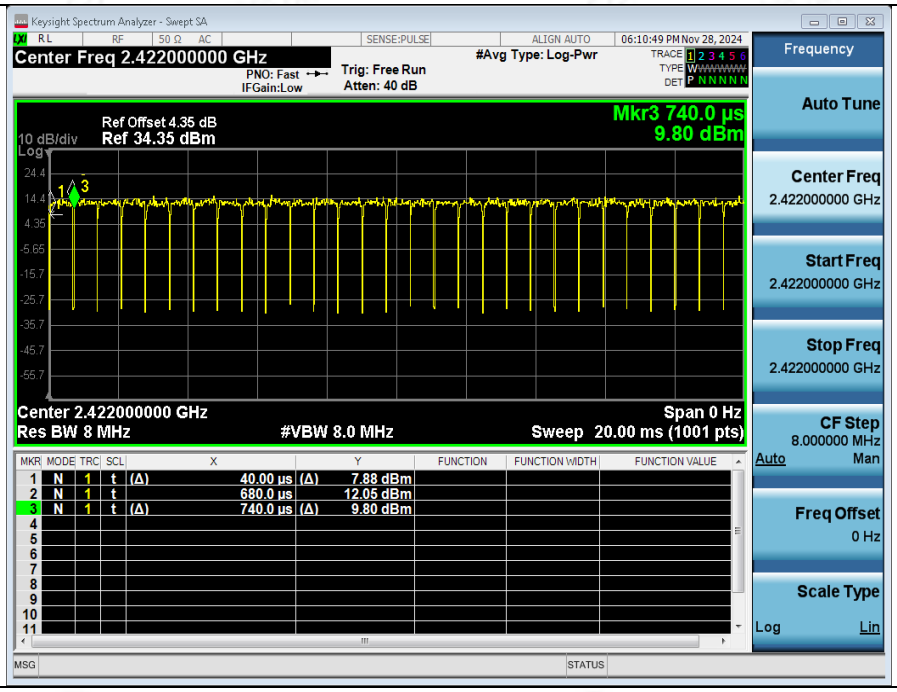
Duty_Cycle_NVNT_ANT2_802_11n(HT20)_2462



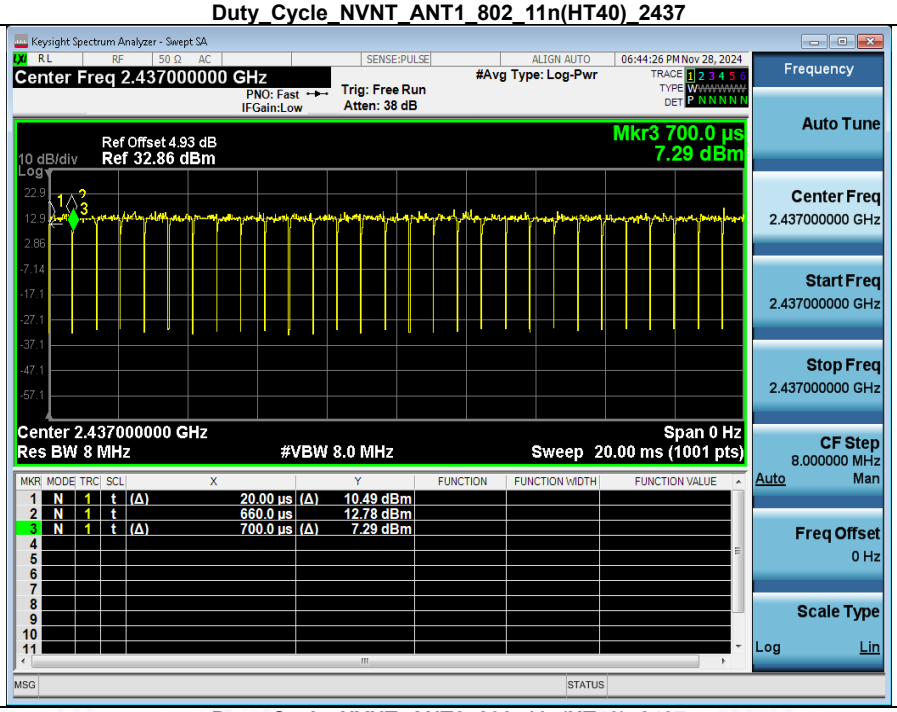
Duty_Cycle_NVNT_ANT1_802_11n(HT40)_2422



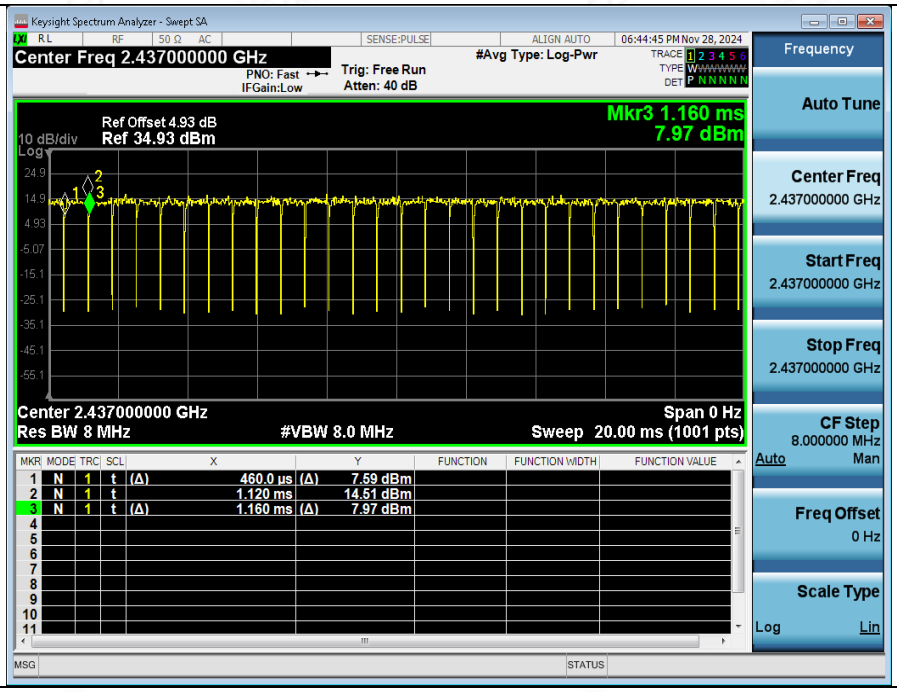
Duty_Cycle_NVNT_ANT2_802_11n(HT40)_2422



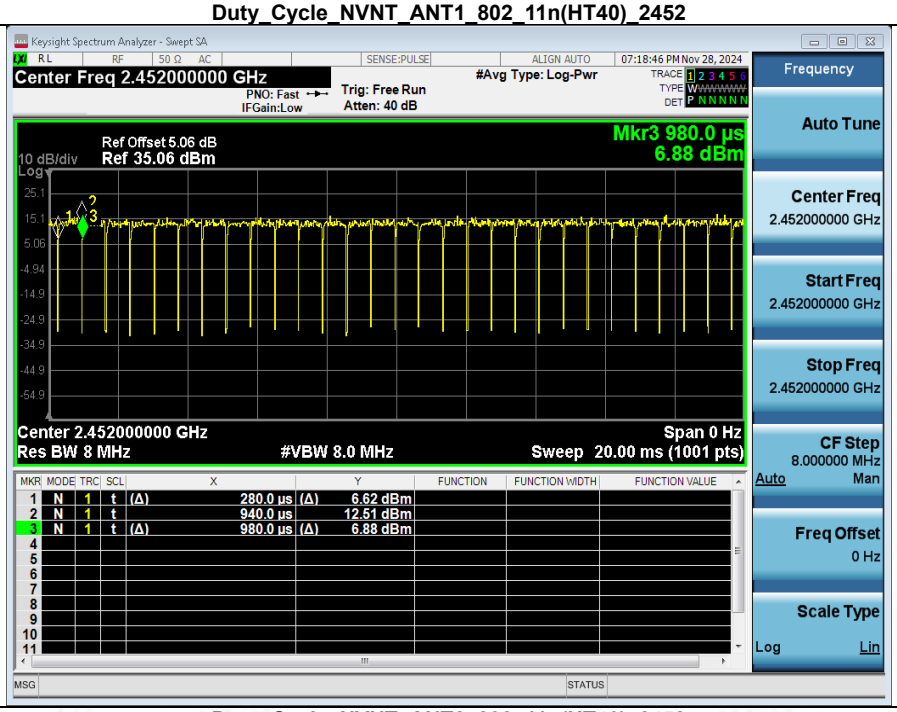
Duty_Cycle_NVNT_ANT1_802_11n(HT40)_2437



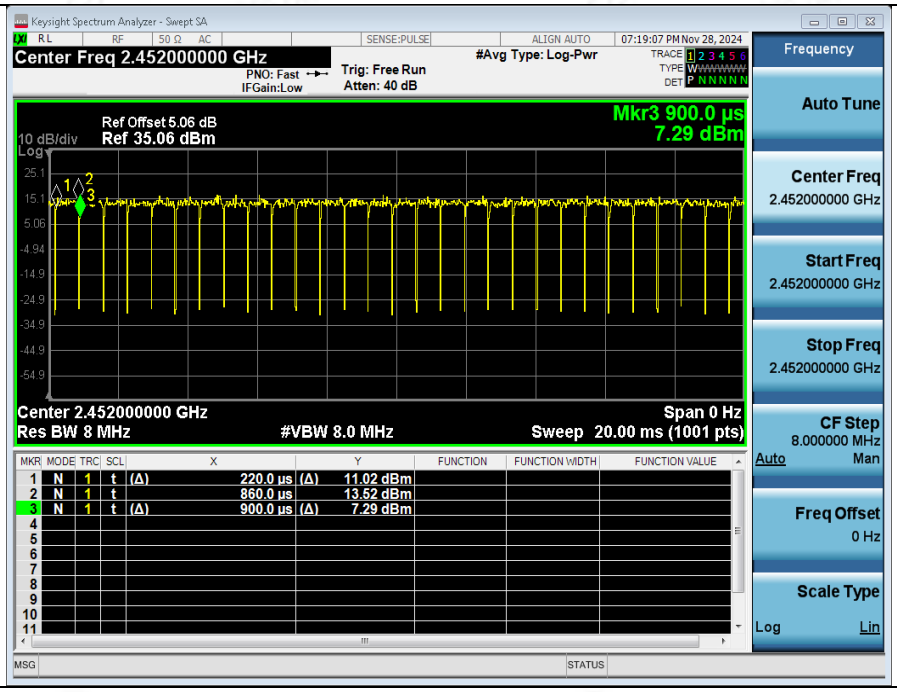
Duty_Cycle_NVNT_ANT2_802_11n(HT40)_2437



Duty_Cycle_NVNT_ANT1_802_11n(HT40)_2452



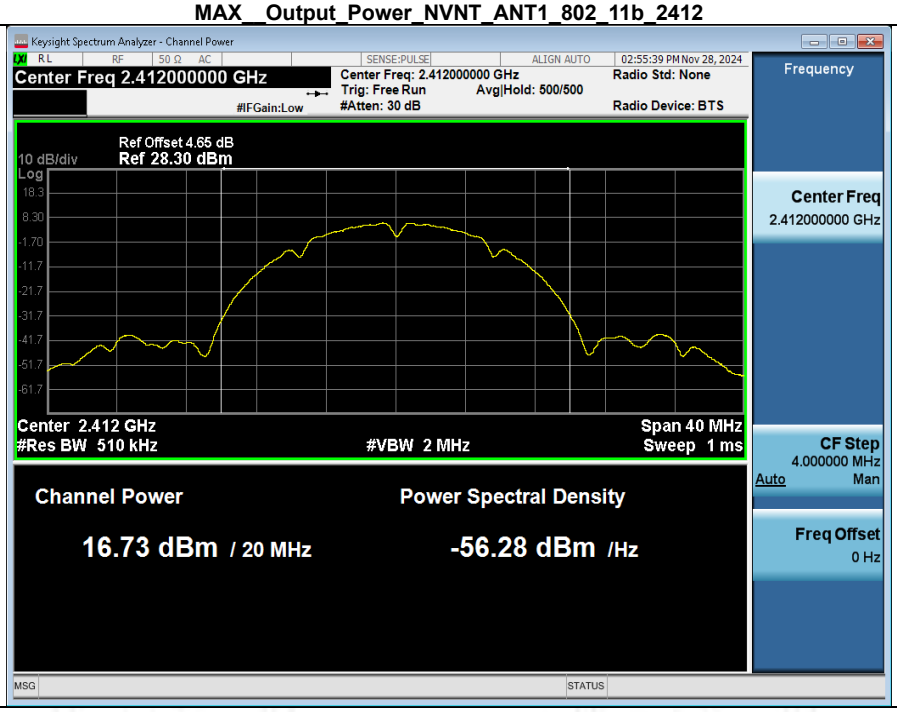
Duty_Cycle_NVNT_ANT2_802_11n(HT40)_2452


Keysight Spectrum Analyzer - Swept SA
Center Freq 2.452000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 40 dB
#Avg Type: Log-Pwr
07:19:07 PM Nov 28, 2024
Ref Offset 5.06 dB
10 dB/div
Ref 35.06 dBm
Mkr3 900.0 µs
7.29 dBm
Center 2.452000000 GHz
Res BW 8 MHz
#VBW 8.0 MHz
Span 0 Hz
Sweep 20.00 ms (1001 pts)
1 N 1 t (Δ) 220.0 µs (Δ) 11.02 dBm
2 N 1 t 860.0 µs 13.52 dBm
3 N 1 t (Δ) 900.0 µs (Δ) 7.29 dBm
Frequency
Auto Tune
Center Freq
2.452000000 GHz
Start Freq
2.452000000 GHz
Stop Freq
2.452000000 GHz
CF Step
8.000000 MHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

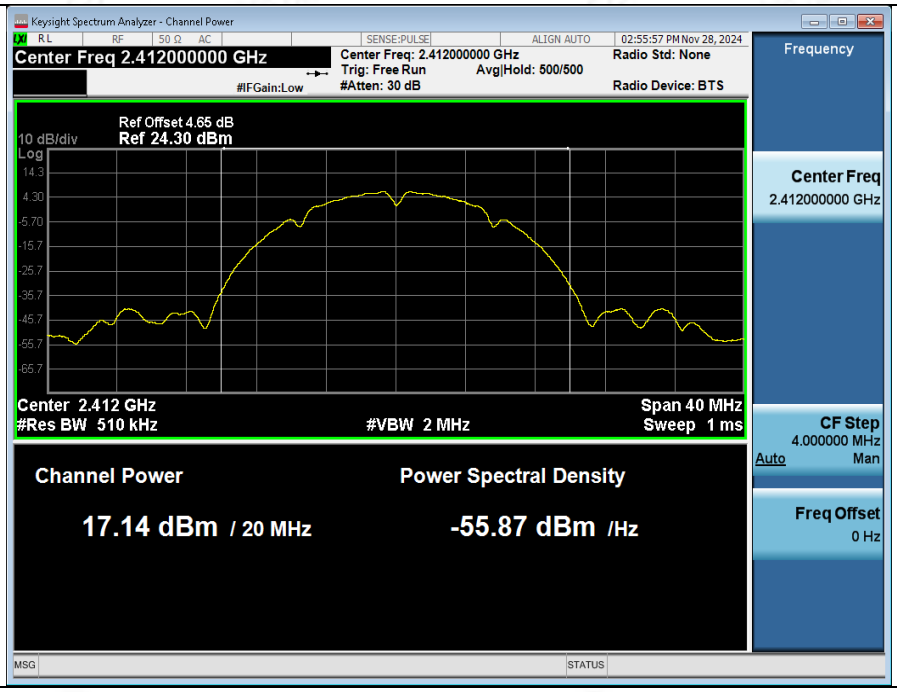
4. MAX. Output Power

Condition	Antenna	Modulation	Frequency (MHz)	Detector	Conducted Power(dBm)	Duty factor(dB)	Total Power(dBm)	limit(dBm)	Result
NVNT	ANT1	802.11b	2412.00	RMS	16.73	0.00	16.73	30	Pass
NVNT	ANT2	802.11b	2412.00	RMS	17.14	0.00	17.14	30	Pass
NVNT	ANT1	802.11b	2437.00	RMS	17.39	0.00	17.39	30	Pass
NVNT	ANT2	802.11b	2437.00	RMS	17.52	0.00	17.52	30	Pass
NVNT	ANT1	802.11b	2462.00	RMS	17.34	0.00	17.34	30	Pass
NVNT	ANT2	802.11b	2462.00	RMS	17.36	0.00	17.36	30	Pass
NVNT	ANT1	802.11g	2412.00	RMS	12.55	0.00	12.55	30	Pass
NVNT	ANT2	802.11g	2412.00	RMS	12.94	0.00	12.94	30	Pass
NVNT	ANT1	802.11g	2437.00	RMS	12.79	0.00	12.79	30	Pass
NVNT	ANT2	802.11g	2437.00	RMS	13.03	0.00	13.03	30	Pass
NVNT	ANT1	802.11g	2462.00	RMS	12.97	0.00	12.97	30	Pass
NVNT	ANT2	802.11g	2462.00	RMS	13.20	0.12	13.32	30	Pass
NVNT	ANT1	802.11n(HT20)	2412.00	RMS	10.85	0.00	10.85	30	Pass
NVNT	ANT2	802.11n(HT20)	2412.00	RMS	11.29	0.00	11.29	30	Pass
NVNT	ANT1	802.11n(HT20)	2437.00	RMS	11.09	0.13	11.22	30	Pass
NVNT	ANT2	802.11n(HT20)	2437.00	RMS	11.46	0.00	11.46	30	Pass
NVNT	ANT1	802.11n(HT20)	2462.00	RMS	11.26	0.00	11.26	30	Pass
NVNT	ANT2	802.11n(HT20)	2462.00	RMS	11.55	0.13	11.68	30	Pass
NVNT	ANT1	802.11n(HT40)	2422.00	RMS	10.41	0.13	10.54	30	Pass
NVNT	ANT2	802.11n(HT40)	2422.00	RMS	10.89	0.26	11.15	30	Pass
NVNT	ANT1	802.11n(HT40)	2437.00	RMS	11.09	0.26	11.35	30	Pass
NVNT	ANT2	802.11n(HT40)	2437.00	RMS	11.49	0.13	11.62	30	Pass
NVNT	ANT1	802.11n(HT40)	2452.00	RMS	11.40	0.13	11.53	30	Pass
NVNT	ANT2	802.11n(HT40)	2452.00	RMS	11.75	0.13	11.88	30	Pass

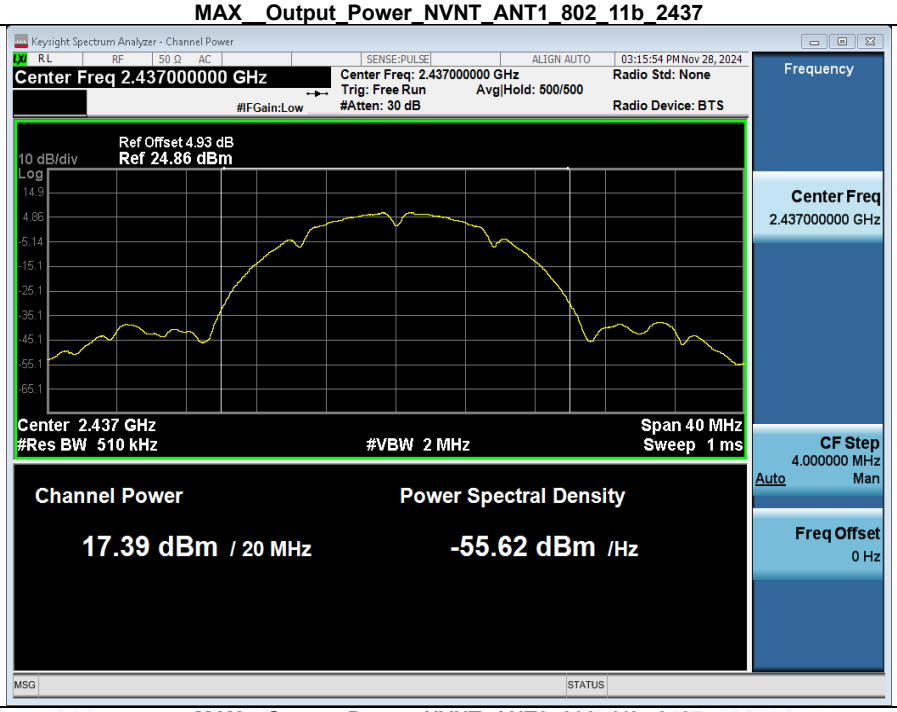
MAX__Output_Power_NVNT_ANT1_802_11b_2412



MAX__Output_Power_NVNT_ANT2_802_11b_2412



MAX__Output_Power_NVNT_ANT1_802_11b_2437



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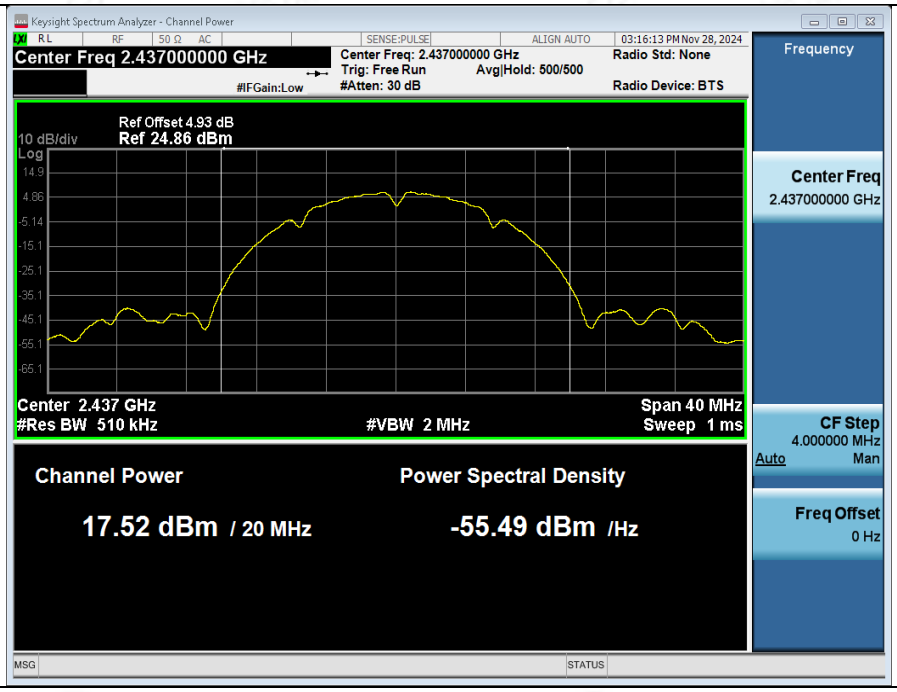
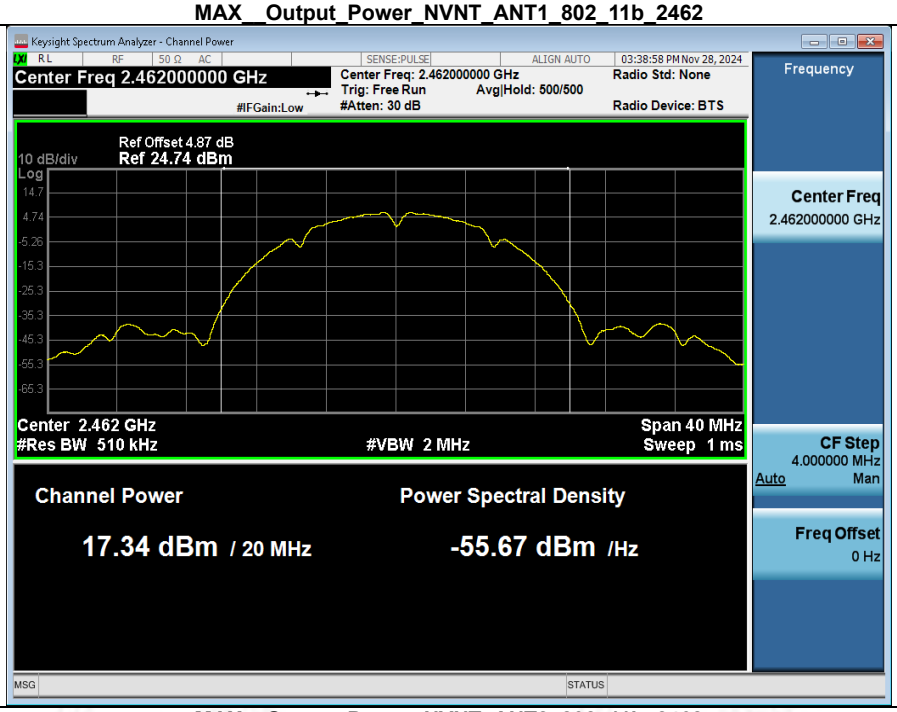


MAX__Output_Power_NVNT_ANT1_802_11b_2462



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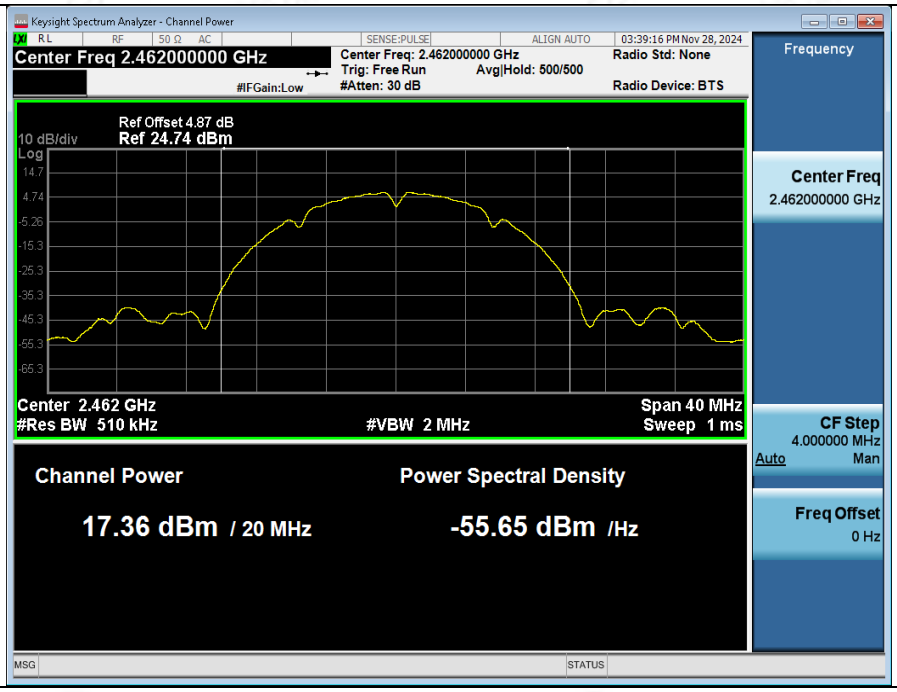

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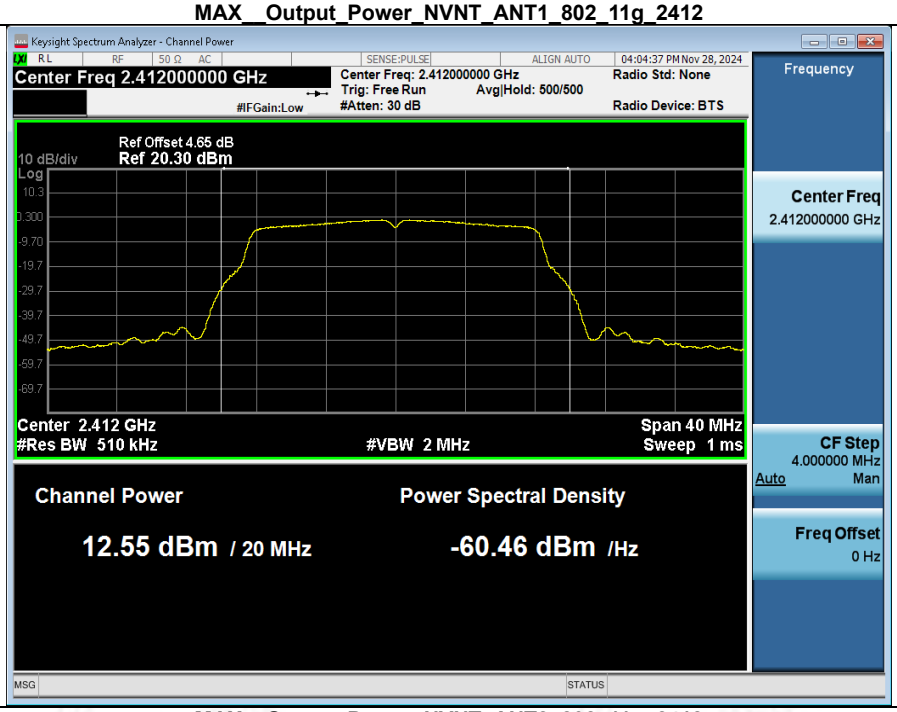
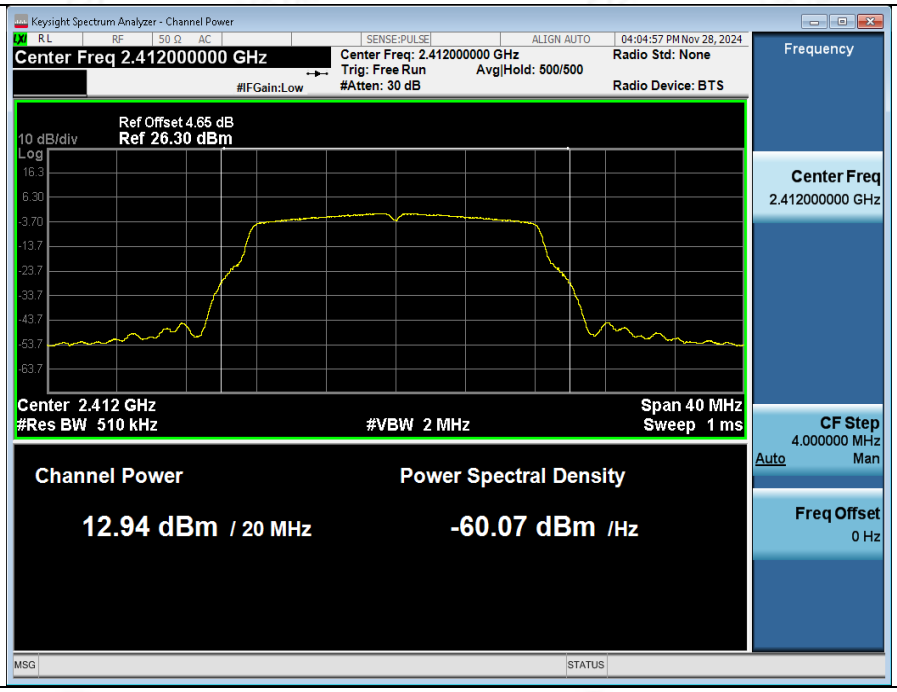


MAX__Output_Power_NVNT_ANT2_802_11g_2412



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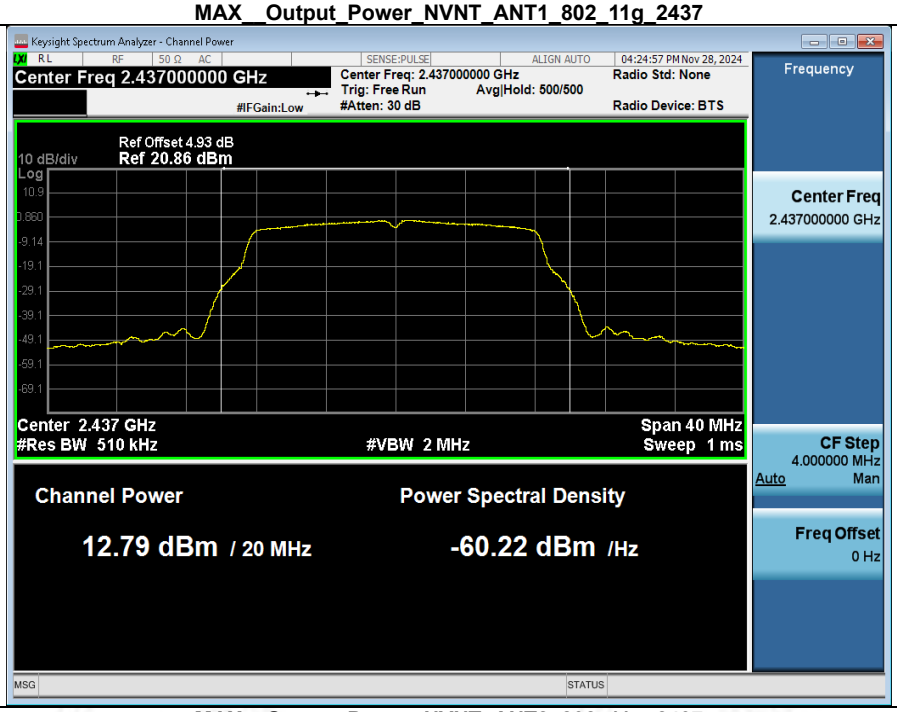

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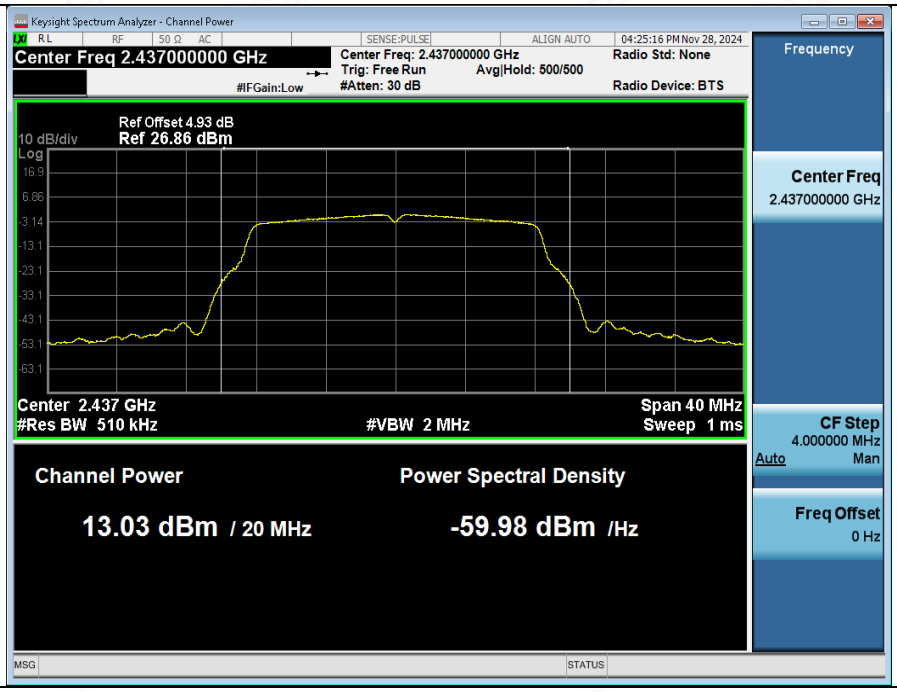

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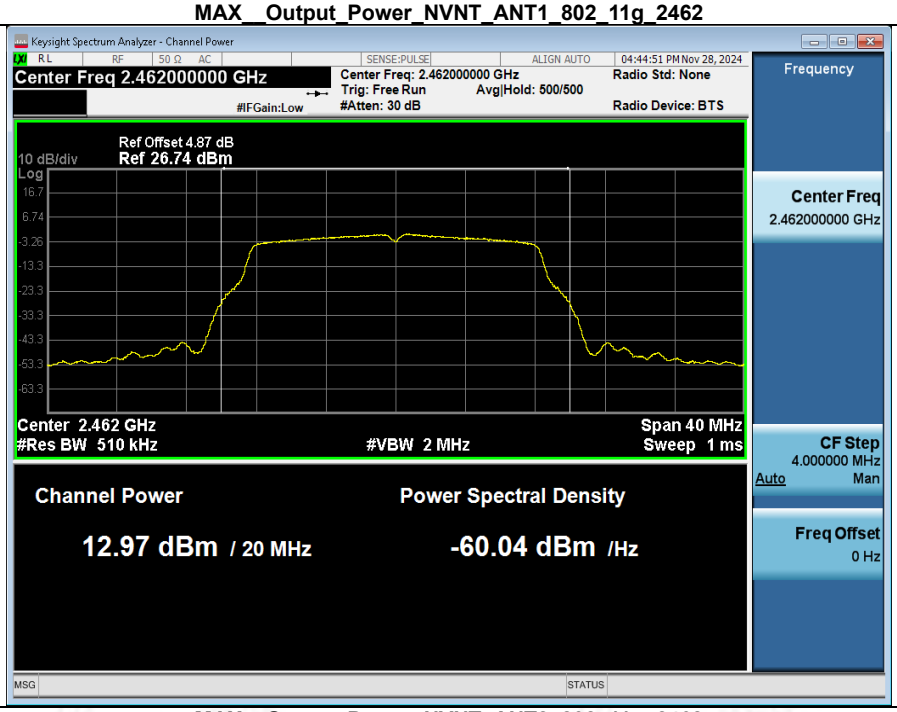

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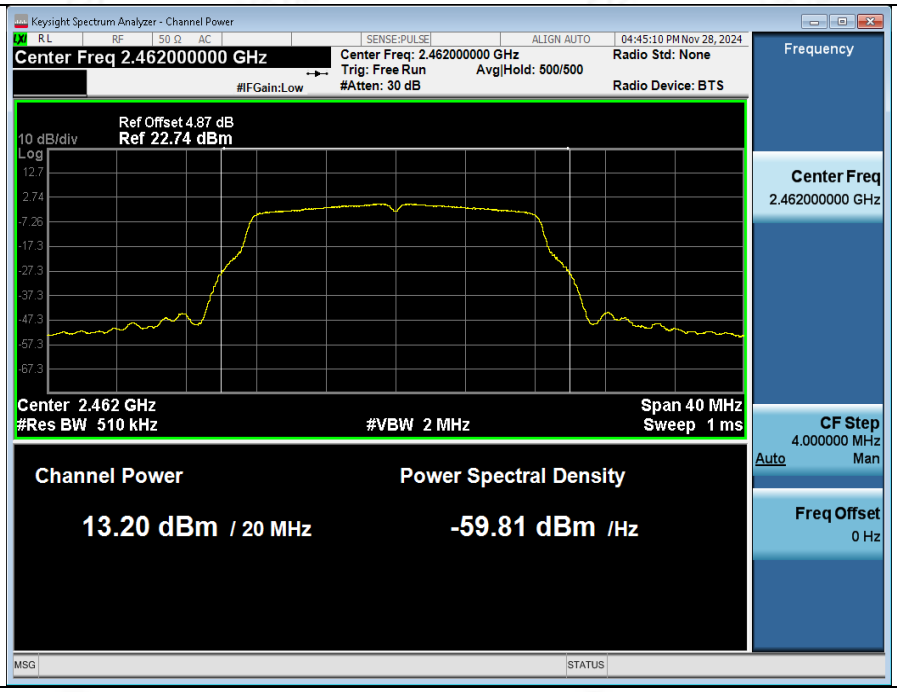
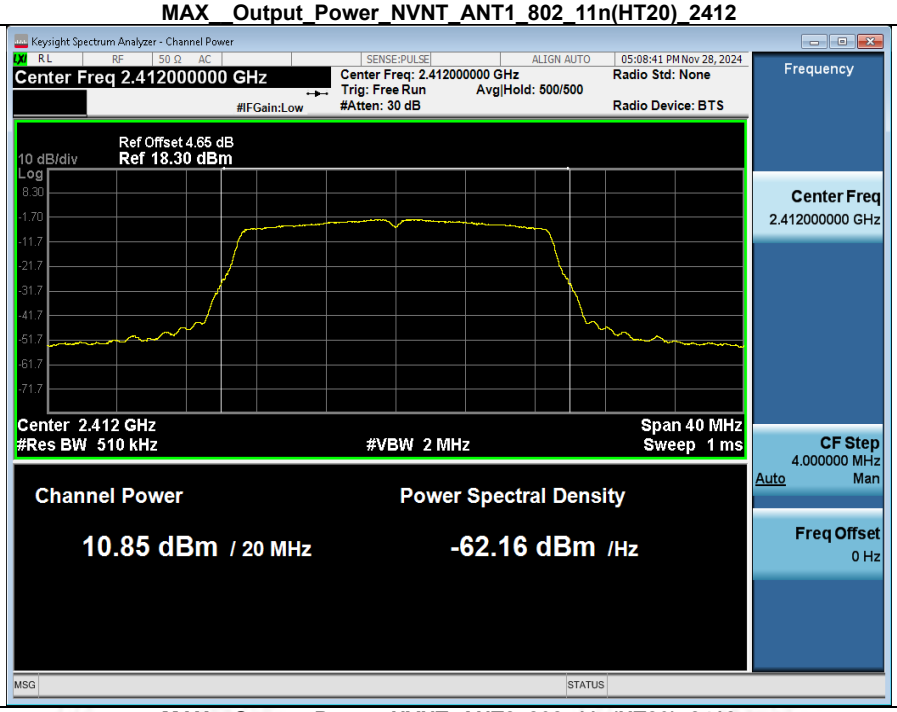


MAX__Output_Power_NVNT_ANT1_802_11n(HT20)_2412



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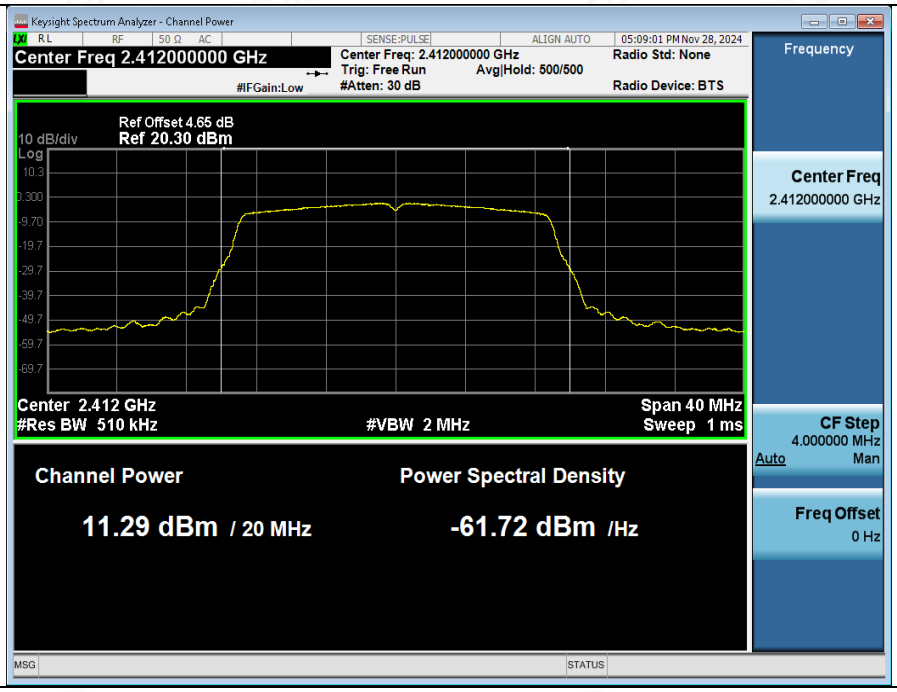

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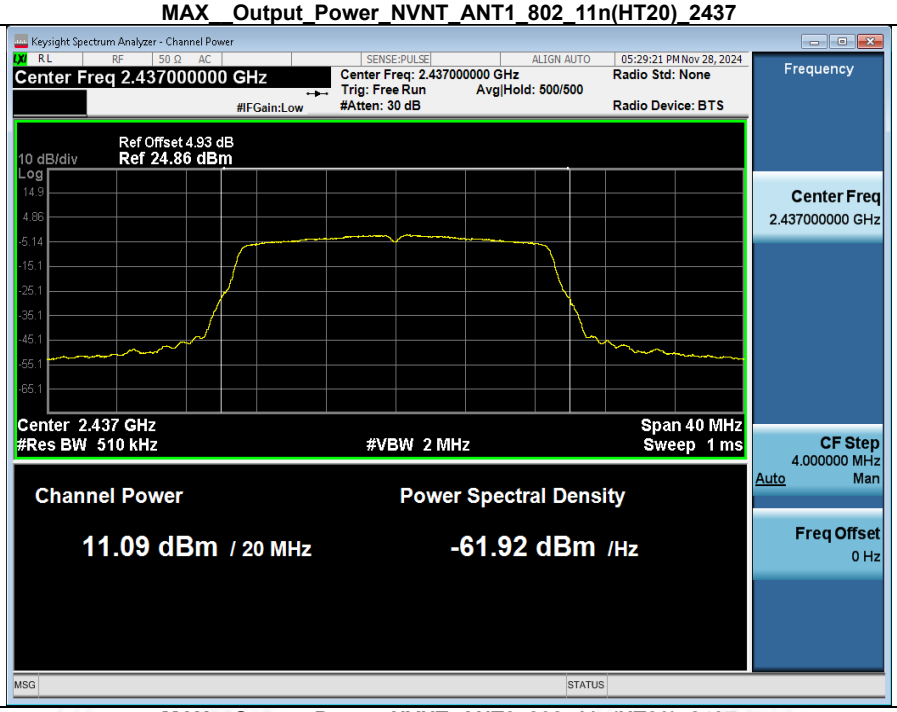

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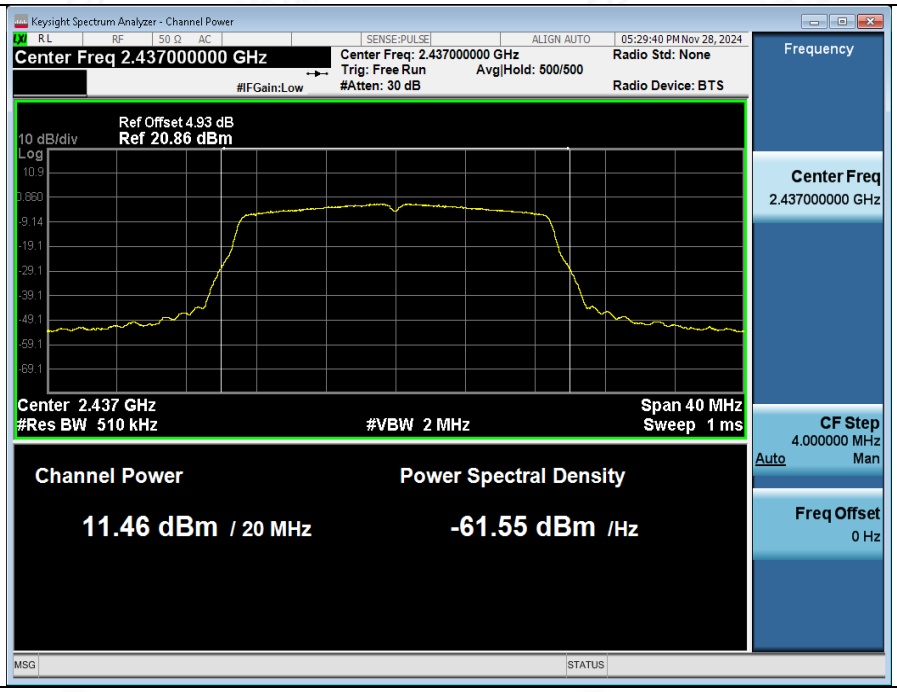
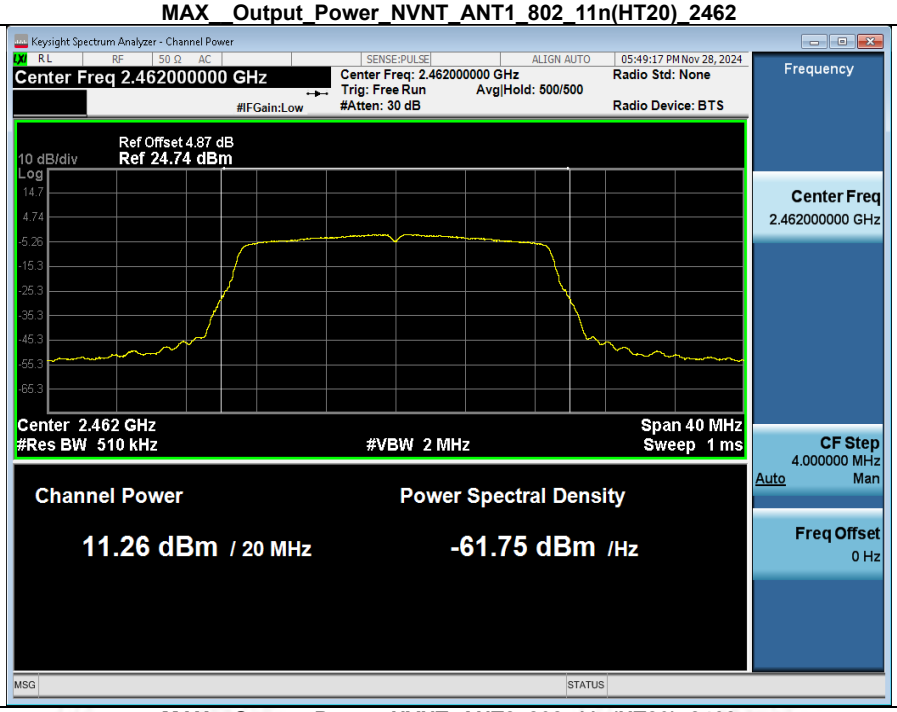


MAX__Output_Power_NVNT_ANT1_802_11n(HT20)_2462



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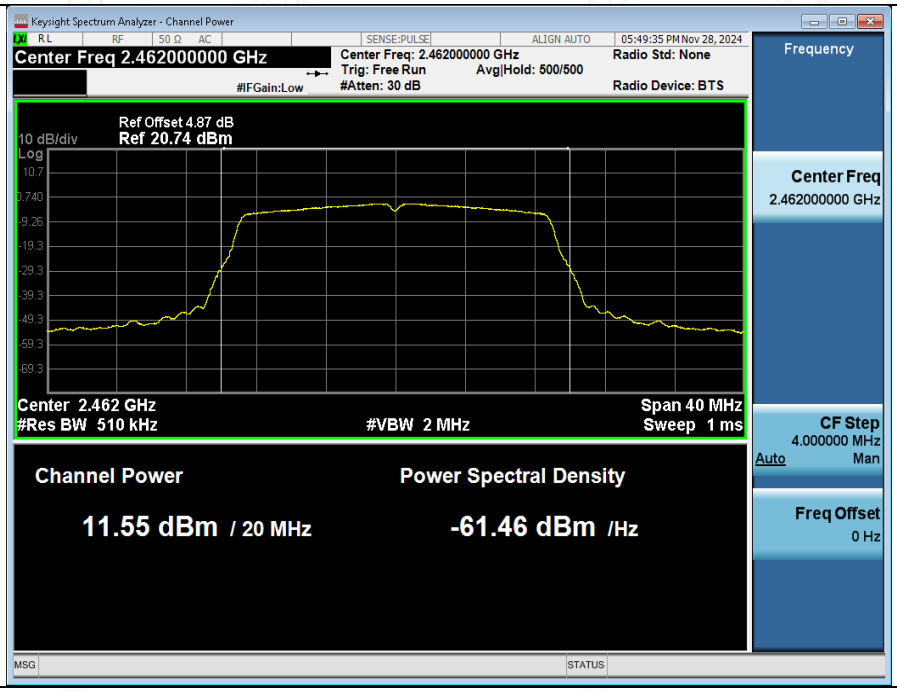
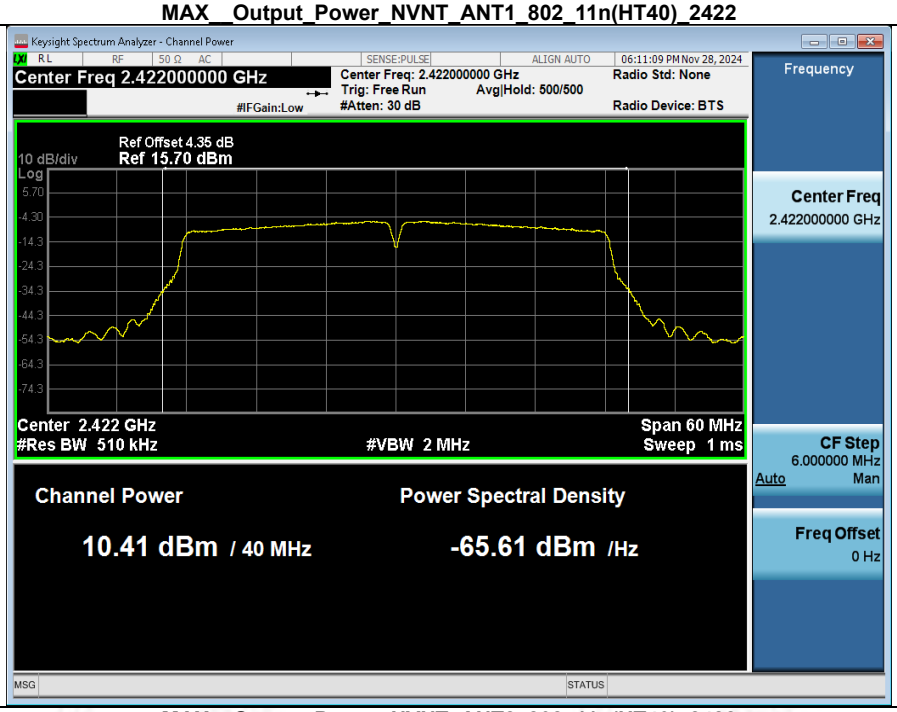


MAX__Output_Power_NVNT_ANT1_802_11n(HT40)_2422



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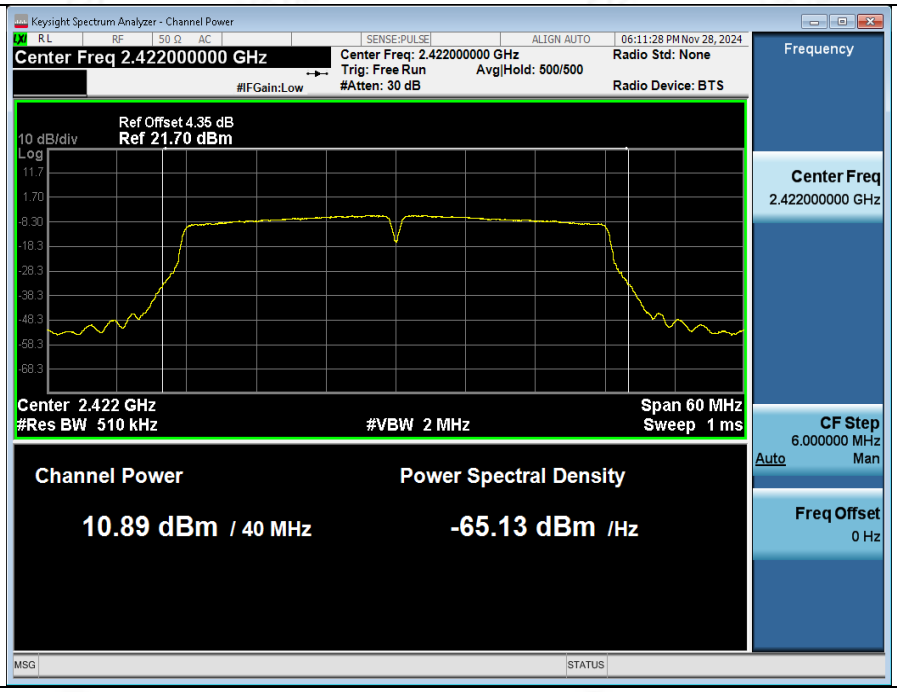
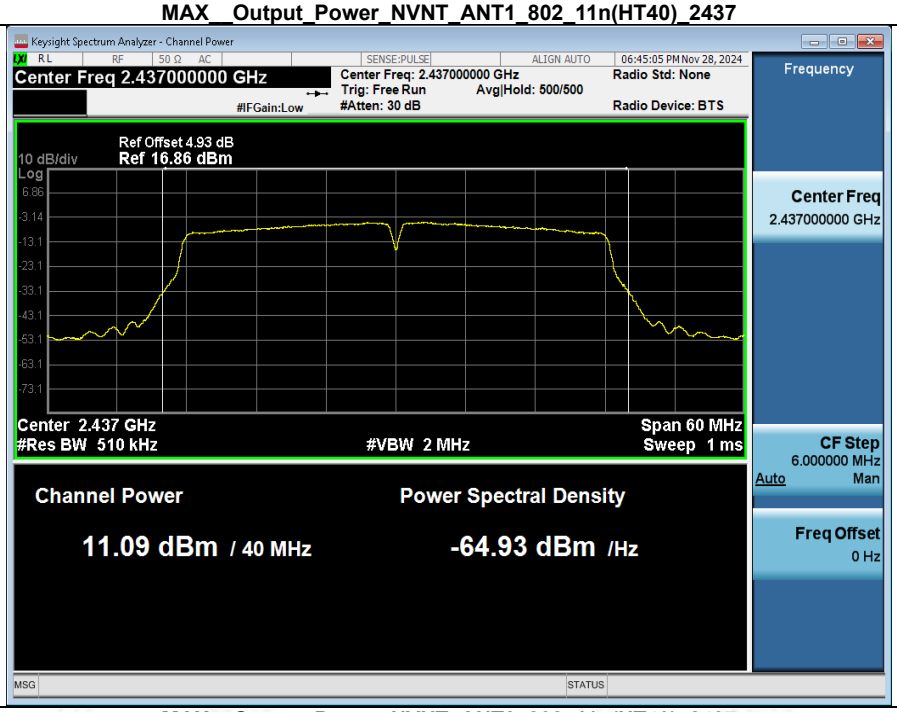


MAX__Output_Power_NVNT_ANT1_802_11n(HT40)_2437



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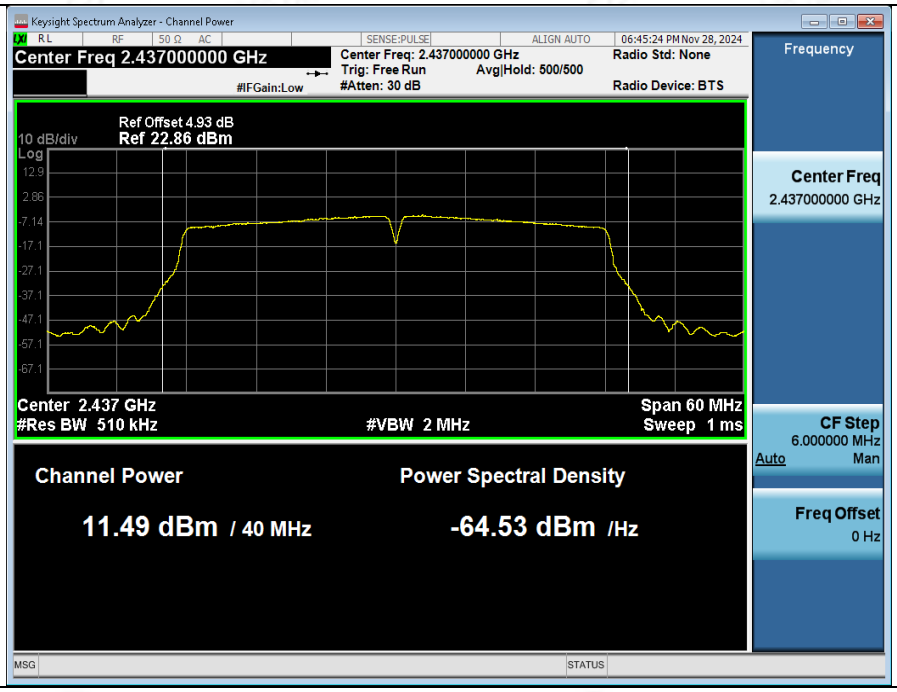

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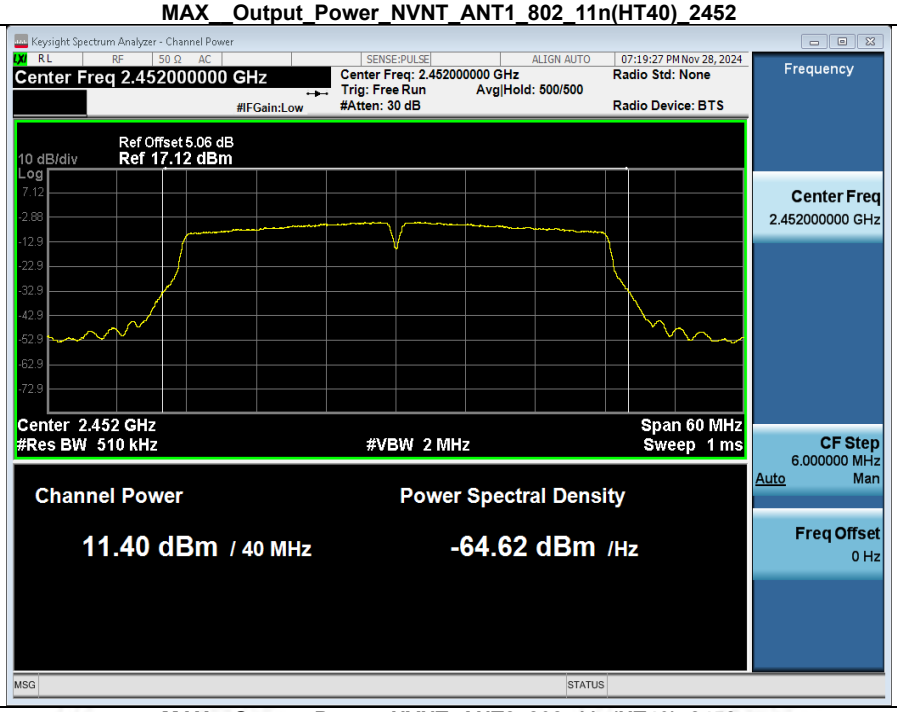
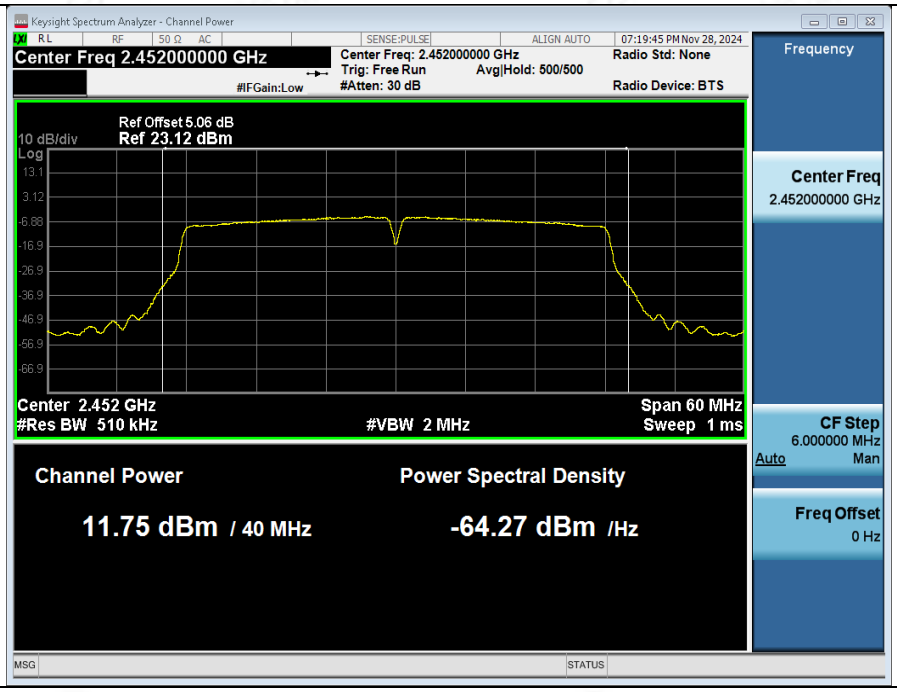


MAX__Output_Power_NVNT_ANT2_802_11n(HT40)_2452

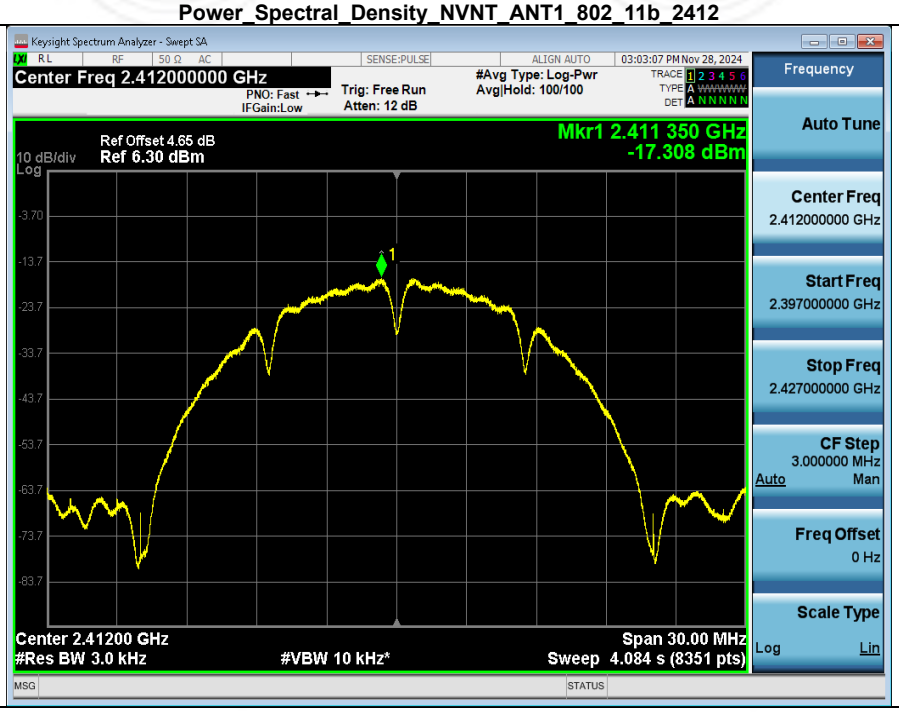


Condition	Antenna	Mode	Frequency(MHz)	MIMO_Conducted_Power(dBm)	Limit(dBm)	Result
NVNT	MIMO_TX	802.11n(HT20)	2412.00	14.09	30	Pass
NVNT	MIMO_TX	802.11n(HT20)	2437.00	14.35	30	Pass
NVNT	MIMO_TX	802.11n(HT20)	2462.00	14.49	30	Pass
NVNT	MIMO_TX	802.11n(HT40)	2422.00	13.87	30	Pass
NVNT	MIMO_TX	802.11n(HT40)	2437.00	14.50	30	Pass
NVNT	MIMO_TX	802.11n(HT40)	2452.00	14.72	30	Pass

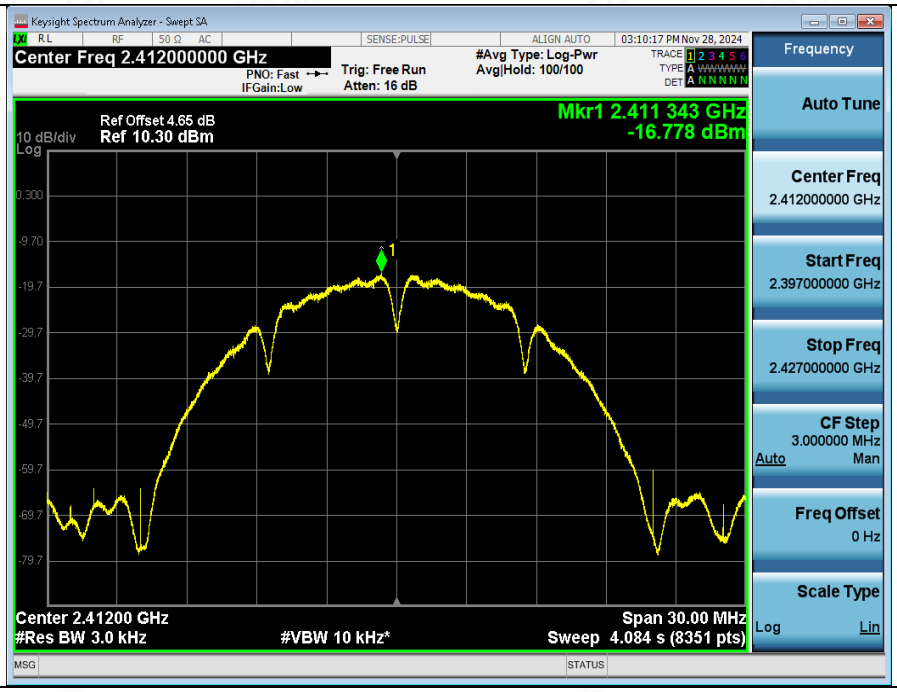
5. Power Spectral Density

Condition	Antenna	Modulation	Frequency (MHz)	SA_PSD(dBm/3kHz)	Duty factor(dB)	RB factor(dB)	PSD(dBm/3kHz)	limit(dBm/3kHz)	Result
NVNT	ANT1	802.11b	2412.00	-17.31	0.00	0.00	-17.31	8	Pass
NVNT	ANT2	802.11b	2412.00	-16.78	0.00	0.00	-16.78	8	Pass
NVNT	ANT1	802.11b	2437.00	-16.74	0.00	0.00	-16.74	8	Pass
NVNT	ANT2	802.11b	2437.00	-16.58	0.00	0.00	-16.58	8	Pass
NVNT	ANT1	802.11b	2462.00	-16.86	0.00	0.00	-16.86	8	Pass
NVNT	ANT2	802.11b	2462.00	-16.65	0.00	0.00	-16.65	8	Pass
NVNT	ANT1	802.11g	2412.00	-22.61	0.00	0.00	-22.61	8	Pass
NVNT	ANT2	802.11g	2412.00	-22.36	0.00	0.00	-22.36	8	Pass
NVNT	ANT1	802.11g	2437.00	-22.77	0.00	0.00	-22.77	8	Pass
NVNT	ANT2	802.11g	2437.00	-22.40	0.00	0.00	-22.40	8	Pass
NVNT	ANT1	802.11g	2462.00	-22.56	0.00	0.00	-22.56	8	Pass
NVNT	ANT2	802.11g	2462.00	-22.14	0.12	0.00	-22.02	8	Pass
NVNT	ANT1	802.11n(HT20)	2412.00	-24.80	0.00	0.00	-24.80	8	Pass
NVNT	ANT2	802.11n(HT20)	2412.00	-23.93	0.00	0.00	-23.93	8	Pass
NVNT	ANT1	802.11n(HT20)	2437.00	-24.55	0.13	0.00	-24.42	8	Pass
NVNT	ANT2	802.11n(HT20)	2437.00	-23.97	0.00	0.00	-23.97	8	Pass
NVNT	ANT1	802.11n(HT20)	2462.00	-23.96	0.00	0.00	-23.96	8	Pass
NVNT	ANT2	802.11n(HT20)	2462.00	-23.80	0.13	0.00	-23.67	8	Pass
NVNT	ANT1	802.11n(HT40)	2422.00	-27.05	0.13	0.00	-26.92	8	Pass
NVNT	ANT2	802.11n(HT40)	2422.00	-26.65	0.26	0.00	-26.39	8	Pass
NVNT	ANT1	802.11n(HT40)	2437.00	-26.43	0.26	0.00	-26.17	8	Pass
NVNT	ANT2	802.11n(HT40)	2437.00	-25.67	0.13	0.00	-25.54	8	Pass
NVNT	ANT1	802.11n(HT40)	2452.00	-25.58	0.13	0.00	-25.45	8	Pass
NVNT	ANT2	802.11n(HT40)	2452.00	-26.28	0.13	0.00	-26.15	8	Pass

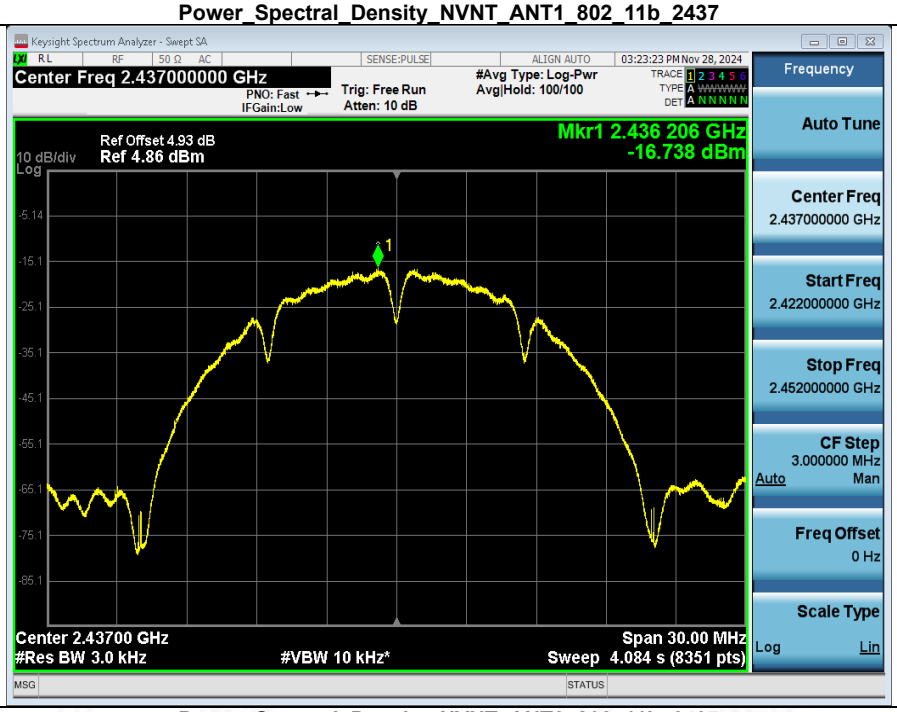
Power_Spectral_Density_NVNT_ANT1_802_11b_2412



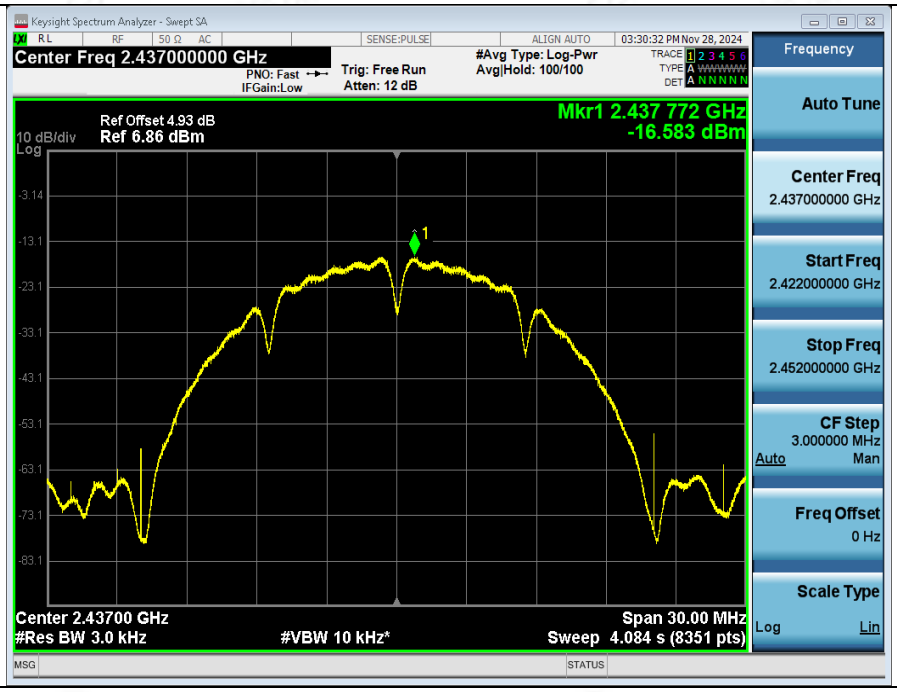
Power_Spectral_Density_NVNT_ANT2_802_11b_2412



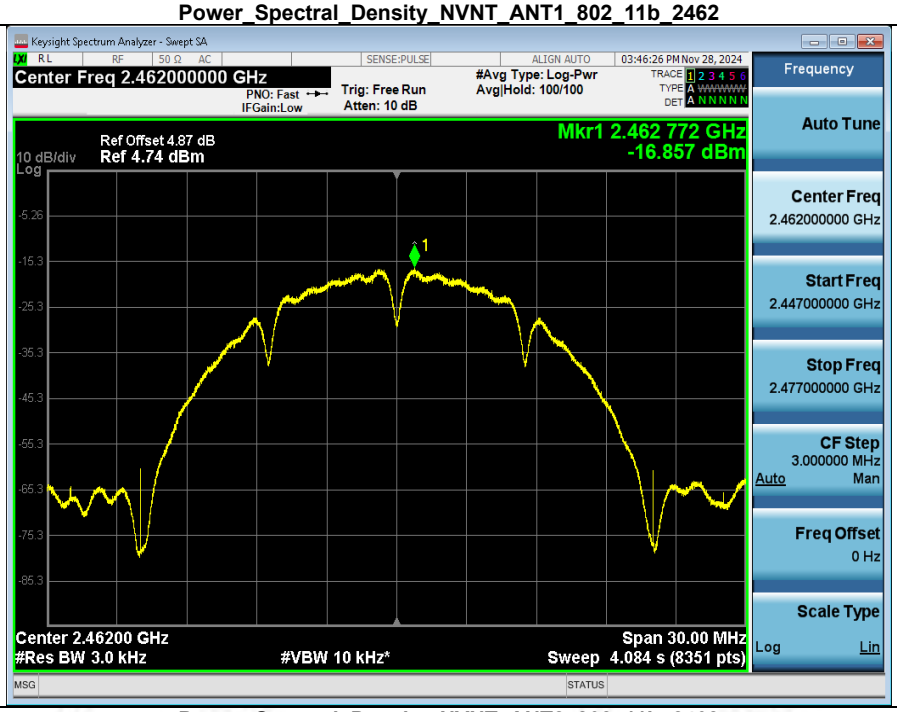
Power_Spectral_Density_NVNT_ANT1_802_11b_2437



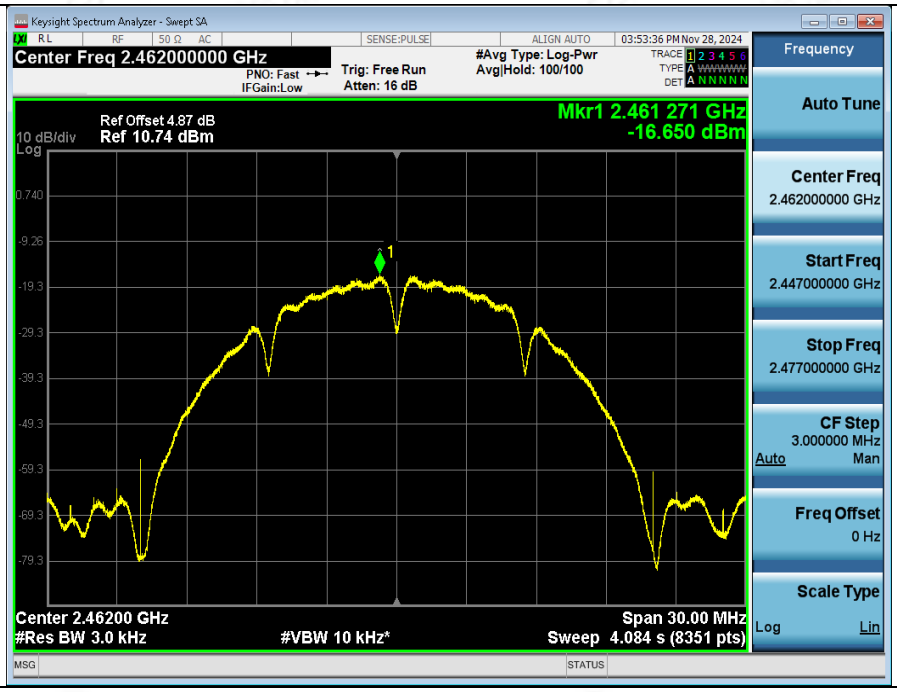
Power_Spectral_Density_NVNT_ANT2_802_11b_2437



Power_Spectral_Density_NVNT_ANT1_802_11b_2462



Power_Spectral_Density_NVNT_ANT2_802_11b_2462



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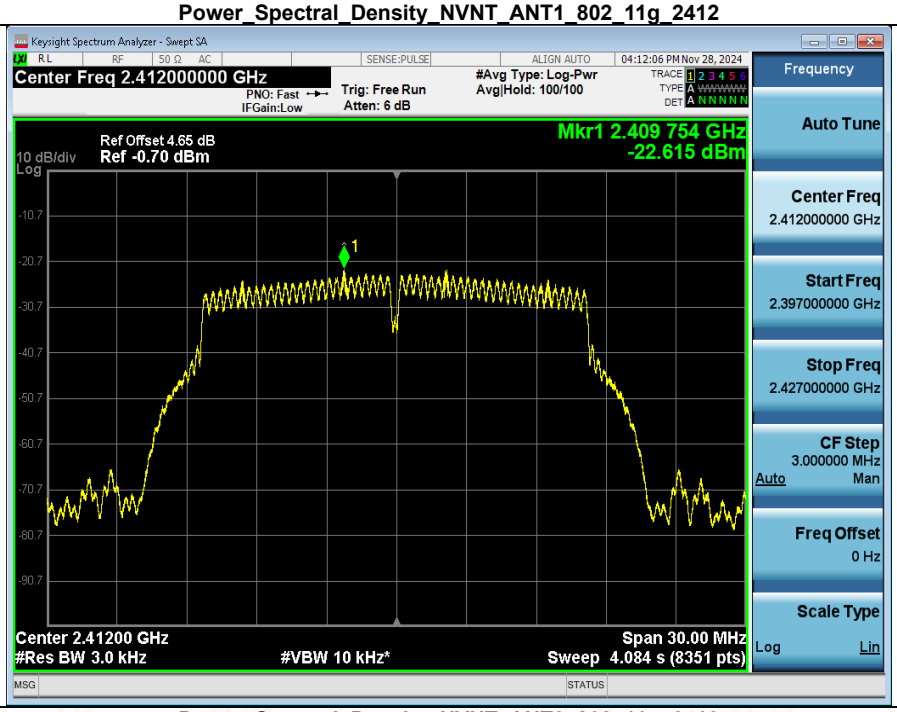

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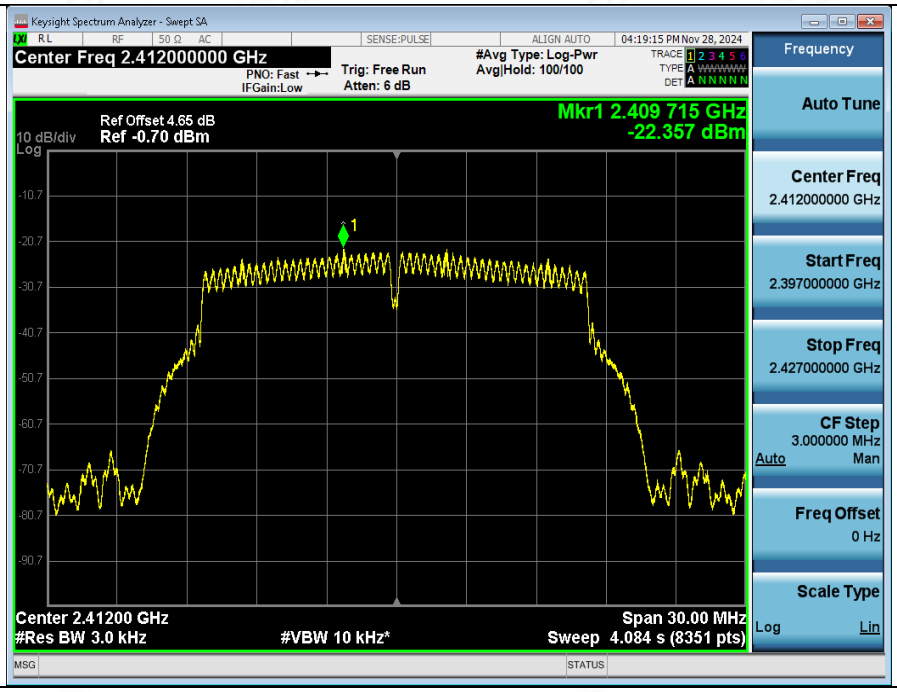

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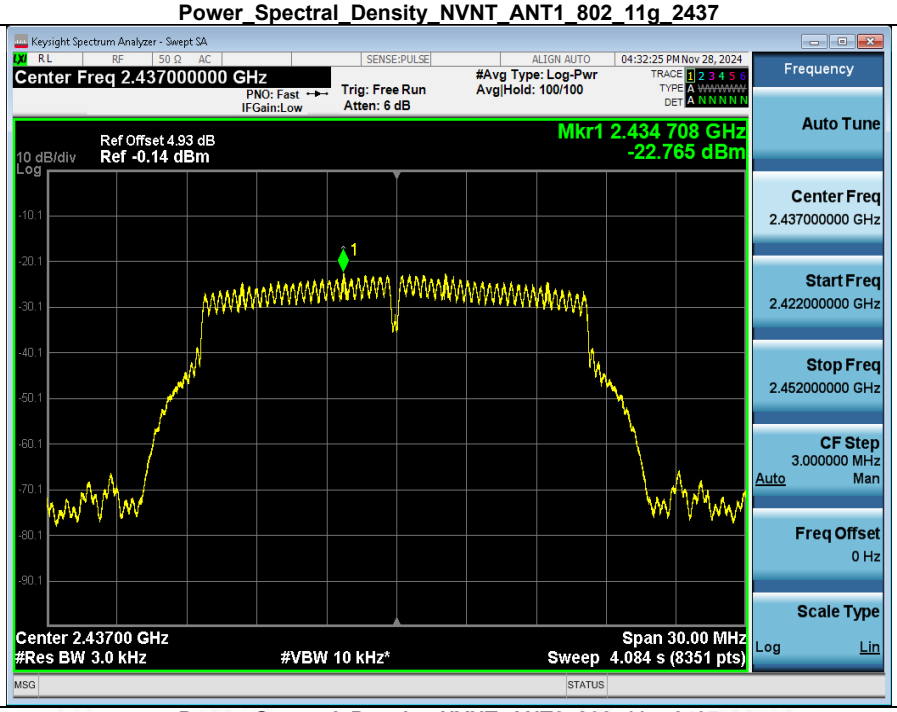
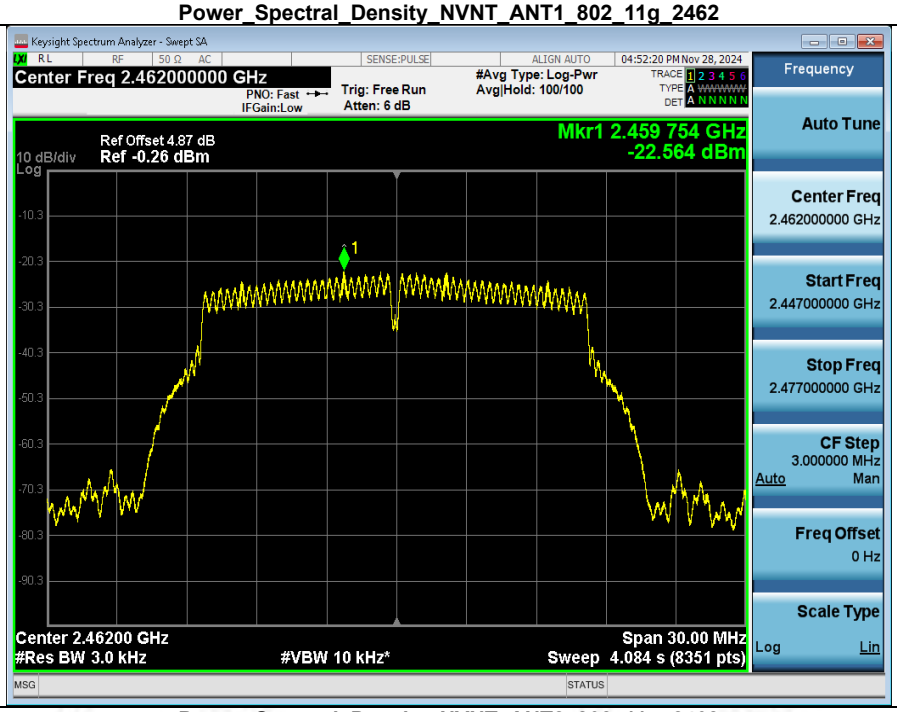


Power_Spectral_Density_NVNT_ANT2_802_11g_2437

Power_Spectral_Density_NVNT_ANT1_802_11g_2462



Power_Spectral_Density_NVNT_ANT2_802_11g_2462