

Appendix B. Test Plots

QCN5024

Duty cycle

802.11b

On+off time



802.11g

On+off time



802.11ax HE20

On+off time



802.11ax HE40

On+off time



Out of Band Conducted Spurious Emission

802.11b_ANT-0

2412 MHz



2437 MHz



2462 MHz



802.11g_ANT-0

2412 MHz



2437 MHz



2462 MHz



802.11ax HE20_ANT-0

2412 MHz



2437 MHz



2462 MHz



802.11ax HE40_ANT-0

2422 MHz



2437 MHz



2452 MHz



802.11b_ANT-1

2412 MHz



2437 MHz



2462 MHz



802.11g_ANT-1

2412 MHz



2437 MHz



2462 MHz



802.11ax HE20_ANT-1

2412 MHz



2437 MHz



2462 MHz



802.11ax HE40_ANT-1

2422 MHz



2437 MHz



2452 MHz



802.11b_ANT-2

2412 MHz



2437 MHz



2462 MHz



802.11g_ANT-2

2412 MHz



2437 MHz



2462 MHz



802.11ax HE20_ANT-2

2412 MHz



2437 MHz



2462 MHz



802.11ax HE40_ANT-2

2422 MHz



2437 MHz



2452 MHz



802.11b_ANT-3

2412 MHz



2437 MHz



2462 MHz



802.11g_ANT-3

2412 MHz



2437 MHz



2462 MHz



802.11ax HE20_ANT-3

2412 MHz



2437 MHz



2462 MHz



802.11ax HE40_ANT-3

2422 MHz



2437 MHz



2452 MHz



Reference level

802.11b_ANT-0

2412 MHz



2437 MHz



2462 MHz



802.11g_ANT-0

2412 MHz



2437 MHz



2462 MHz



802.11ax HE20_ANT-0

2412 MHz



2437 MHz



2462 MHz



802.11ax HE40_ANT-0

2422 MHz



2437 MHz



2452 MHz



802.11b_ANT-1

2412 MHz



2437 MHz



2462 MHz



802.11g_ANT-1

2412 MHz



2437 MHz



2462 MHz



802.11ax HE20_ANT-1

2412 MHz



2437 MHz

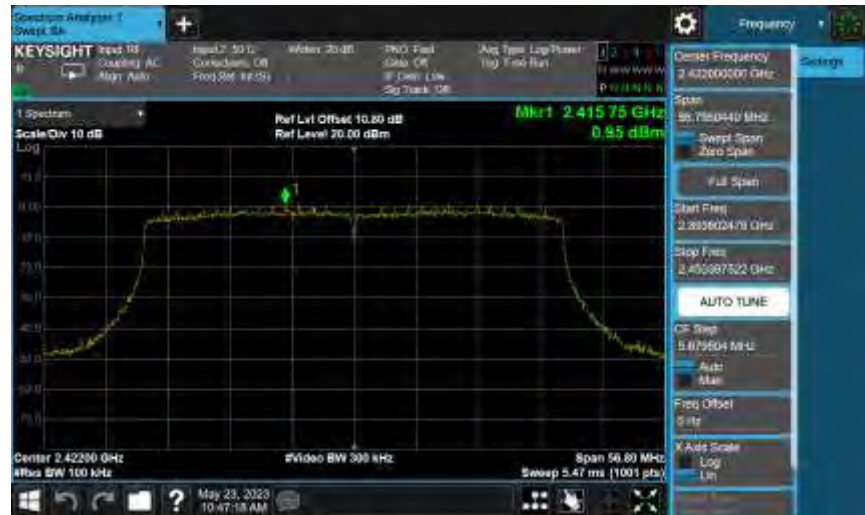


2462 MHz



802.11ax HE40_ANT-1

2422 MHz



2437 MHz



2452 MHz



802.11b_ANT-2

2412 MHz



2437 MHz



2462 MHz



802.11g_ANT-2

2412 MHz



2437 MHz



2462 MHz



802.11ax HE20_ANT-2

2412 MHz



2437 MHz



2462 MHz



802.11ax HE40_ANT-2

2422 MHz



2437 MHz



2452 MHz



802.11b_ANT-3

2412 MHz



2437 MHz



2462 MHz





802.11ax HE20_ANT-3

2412 MHz



2437 MHz



2462 MHz



802.11ax HE40_ANT-3

2422 MHz



2437 MHz



2452 MHz



Conducted Band Edge

802.11b_ANT-0

2412 MHz



2462 MHz



802.11g_ANT-0

2412 MHz



2462 MHz



802.11ax HE20_ANT-0

2412 MHz



2462 MHz



802.11ax HE40_ANT-0

2422 MHz



2452 MHz



802.11b_ANT-1

2412 MHz



2462 MHz



802.11g_ANT-1

2412 MHz



2462 MHz



802.11ax HE20_ANT-1

2412 MHz



2462 MHz



802.11ax HE40_ANT-1

2422 MHz



2452 MHz



802.11b_ANT-2

2412 MHz



2462 MHz



802.11g_ANT-2

2412 MHz



2462 MHz



802.11ax HE20_ANT-2

2412 MHz



2462 MHz



802.11ax HE40_ANT-2

2422 MHz



2452 MHz



802.11b_ANT-3

2412 MHz



2462 MHz



802.11g_ANT-3

2412 MHz



2462 MHz



802.11ax HE20_ANT-3

2412 MHz



2462 MHz



802.11ax HE40_ANT-3

2422 MHz



2452 MHz



6 dB Bandwidth

802.11b_ANT-0

2412 MHz



2437 MHz



2462 MHz



802.11g_ANT-0

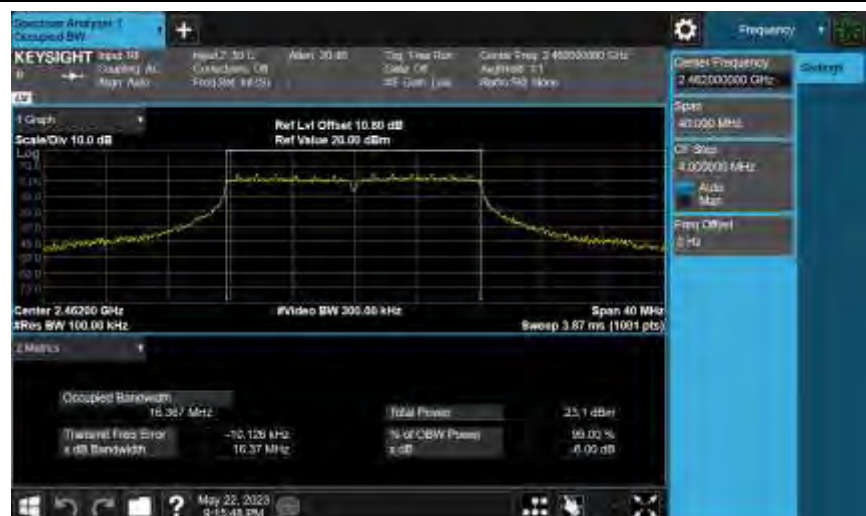
2412 MHz



2437 MHz



2462 MHz



802.11ax HE20_ANT-0

2412 MHz



2437 MHz



2462 MHz



802.11ax HE40_ANT-0

2422 MHz

KEYSIGHT Spectrum Analyzer 1 Occupied BW

Center Frequency: 2.422000000 GHz

Span: 80.000 MHz

Offset Step: 8.000000 MHz

Auto Man

Power Offset: 0 Hz

Scale/Div: 10.0 dB

Ref Lvl Offset: 10.00 dB

Ref Value: 20.00 dBm

Center: 2.42200 GHz

#Video BW: 300.00 kHz

Span: 80 MHz

Sweep: 7.67 ms (1001 pts)

Occupied Bandwidth: 37.610 MHz

Total Power: 23.5 dBm

Transient Freq Error: 847 Hz

% of CBW Power: 99.00 %

x dB Bandwidth: 37.60 MHz

x dB

May 23, 2020 10:28:44 AM

2437 MHz

KEYSIGHT Spectrum Analyzer 1 Occupied BW

Center Frequency: 2.437000000 GHz

Span: 80.000 MHz

Offset Step: 8.000000 MHz

Auto Man

Power Offset: 0 Hz

Scale/Div: 10.0 dB

Ref Lvl Offset: 10.00 dB

Ref Value: 20.00 dBm

Center: 2.43700 GHz

#Video BW: 300.00 kHz

Span: 80 MHz

Sweep: 7.67 ms (1001 pts)

Occupied Bandwidth: 37.637 MHz

Total Power: 25.4 dBm

Transient Freq Error: -15.656 kHz

% of CBW Power: 99.00 %

x dB Bandwidth: 37.00 MHz

x dB

May 23, 2020 10:34:34 AM

2452 MHz

KEYSIGHT Spectrum Analyzer 1 Occupied BW

Center Frequency: 2.452000000 GHz

Span: 80.000 MHz

Offset Step: 8.000000 MHz

Auto Man

Power Offset: 0 Hz

Scale/Div: 10.0 dB

Ref Lvl Offset: 10.00 dB

Ref Value: 20.00 dBm

Center: 2.45200 GHz

#Video BW: 300.00 kHz

Span: 80 MHz

Sweep: 7.67 ms (1001 pts)

Occupied Bandwidth: 37.627 MHz

Total Power: 23.5 dBm

Transient Freq Error: -35.594 kHz

% of CBW Power: 99.00 %

x dB Bandwidth: 37.02 MHz

x dB

May 23, 2020 10:39:20 AM

802.11b_ANT-1

2412 MHz



2437 MHz

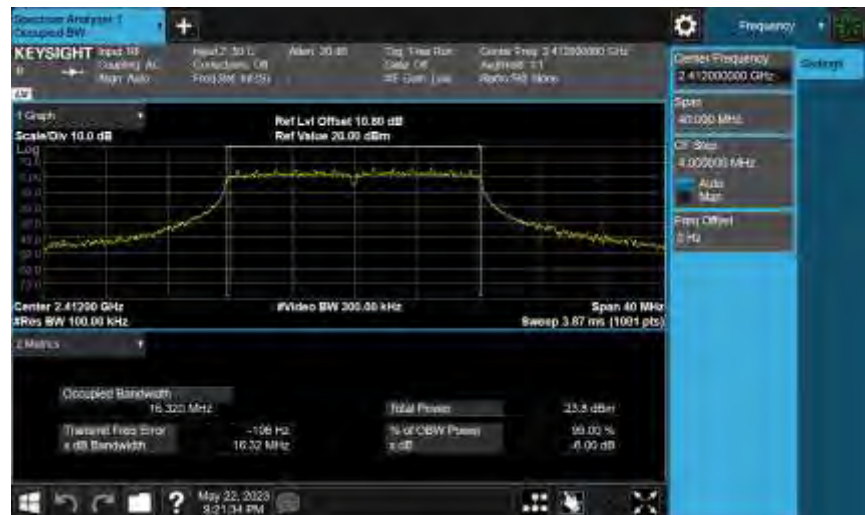


2462 MHz



802.11g_ANT-1

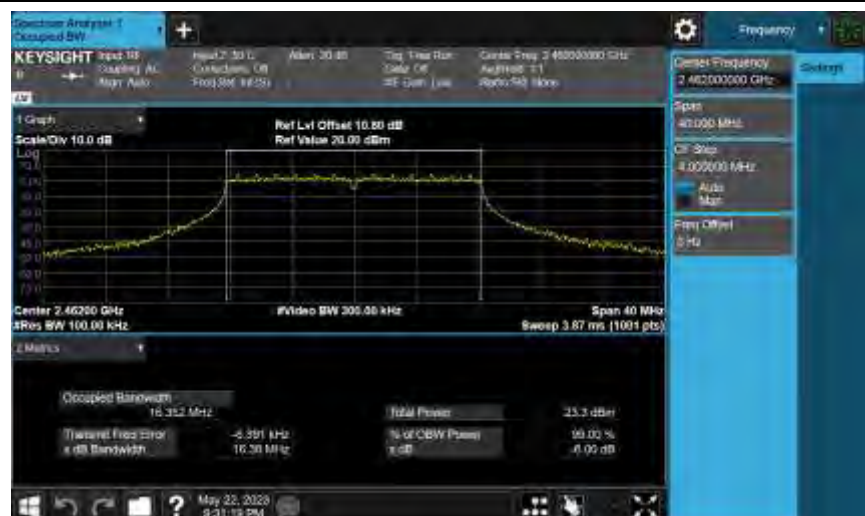
2412 MHz



2437 MHz

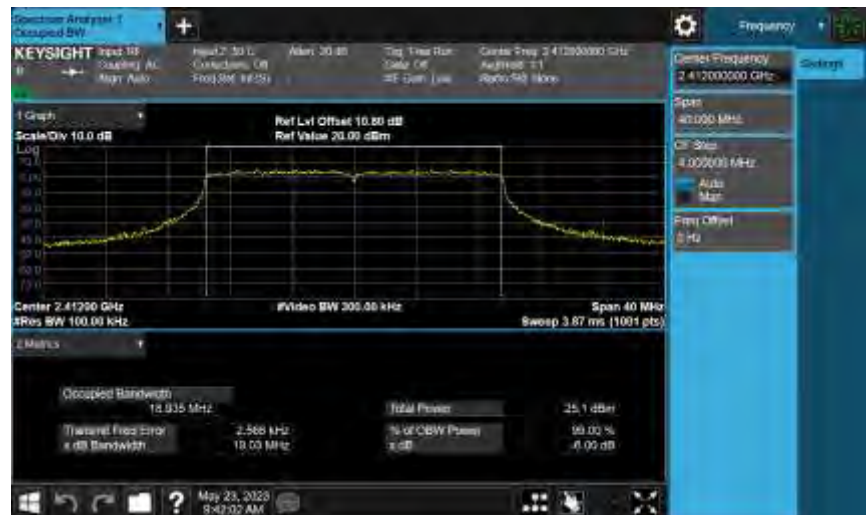


2462 MHz



802.11ax HE20_ANT-1

2412 MHz



2437 MHz



2462 MHz



802.11ax HE40_ANT-1

2422 MHz



2437 MHz



2452 MHz



802.11b_ANT-2

2412 MHz



2437 MHz



2462 MHz



802.11g_ANT-2

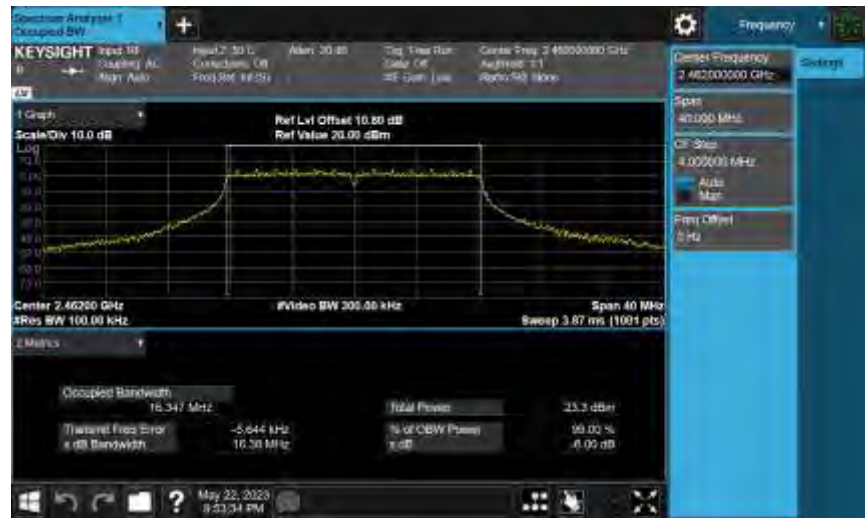
2412 MHz



2437 MHz



2462 MHz



802.11ax HE20_ANT-2

2412 MHz

KEYSIGHT Spectrum Analyzer 1
 Occupied BW
 Result: 30.0
 Coupling: AC
 Filter: 500 Hz
 Span: 40 MHz
 Center Freq: 2.412000000 GHz
 Ref Lvl Offset: 10.00 dB
 Ref Value: 20.00 dBm
 Scale/Div: 10.0 dB
 Span: 40 MHz
 #Video BW: 300.00 kHz
 Span: 40 MHz
 Sweep: 3.87 ms (1001 pts)
 Center: 2.41200 GHz
 #Res BW: 100.00 kHz
 Occupied Bandwidth: 18.002 MHz
 Total Power: 25.1 dBm
 Transient Freq Error: 1.103 kHz
 % of CBW Power: 99.00 %
 3 dB Bandwidth: 18.07 MHz
 3 dB: 6.00 dB
 May 23, 2020 9:57:14 AM

2437 MHz

KEYSIGHT Spectrum Analyzer 1
 Occupied BW
 Result: 30.0
 Coupling: AC
 Filter: 500 Hz
 Span: 40 MHz
 Center Freq: 2.437000000 GHz
 Ref Lvl Offset: 10.00 dB
 Ref Value: 20.00 dBm
 Scale/Div: 10.0 dB
 Span: 40 MHz
 #Video BW: 300.00 kHz
 Span: 40 MHz
 Sweep: 3.87 ms (1001 pts)
 Center: 2.43700 GHz
 #Res BW: 100.00 kHz
 Occupied Bandwidth: 18.074 MHz
 Total Power: 25.5 dBm
 Transient Freq Error: 3.726 kHz
 % of CBW Power: 99.00 %
 3 dB Bandwidth: 18.00 MHz
 3 dB: 6.00 dB
 May 23, 2020 10:02:31 AM

2462 MHz

KEYSIGHT Spectrum Analyzer 1
 Occupied BW
 Result: 30.0
 Coupling: AC
 Filter: 500 Hz
 Span: 40 MHz
 Center Freq: 2.462000000 GHz
 Ref Lvl Offset: 10.00 dB
 Ref Value: 20.00 dBm
 Scale/Div: 10.0 dB
 Span: 40 MHz
 #Video BW: 300.00 kHz
 Span: 40 MHz
 Sweep: 3.87 ms (1001 pts)
 Center: 2.46200 GHz
 #Res BW: 100.00 kHz
 Occupied Bandwidth: 18.875 MHz
 Total Power: 23.5 dBm
 Transient Freq Error: 2.856 kHz
 % of CBW Power: 99.00 %
 3 dB Bandwidth: 18.94 MHz
 3 dB: 6.00 dB
 May 23, 2020 10:09:28 AM

802.11ax HE40_ANT-2

2422 MHz



2437 MHz



2452 MHz



802.11b_ANT-3

2412 MHz



2437 MHz

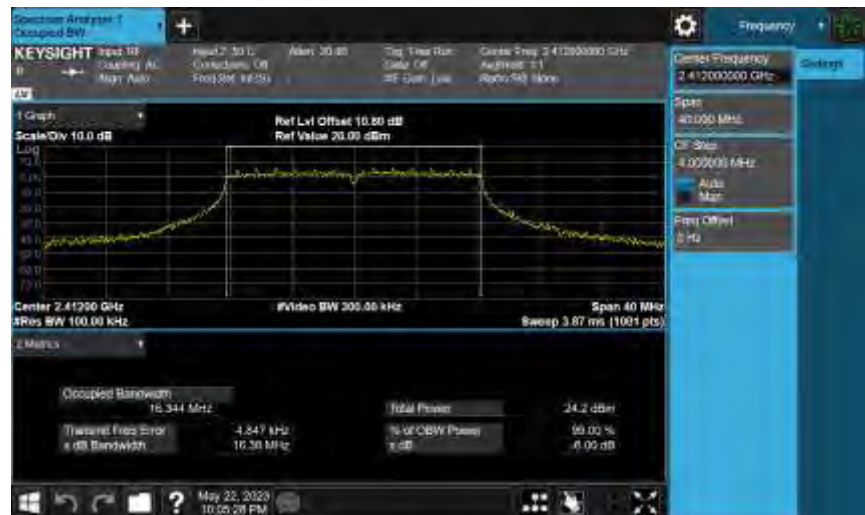


2462 MHz



802.11g_ANT-3

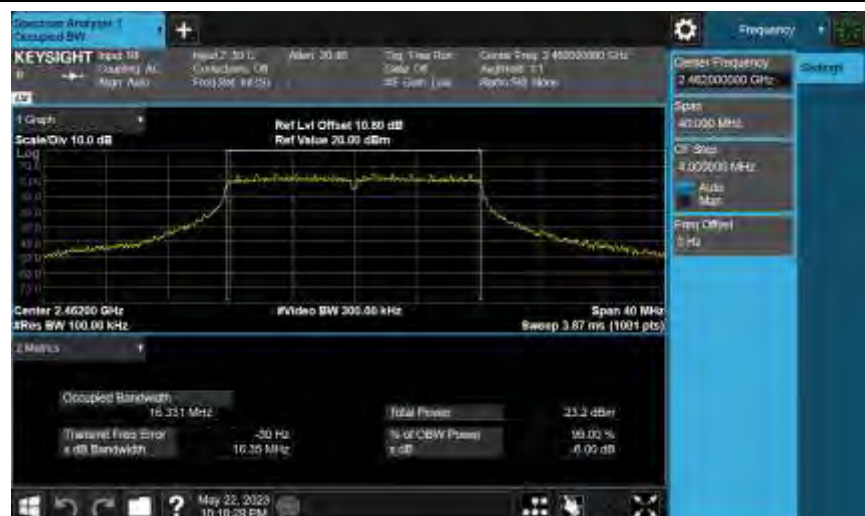
2412 MHz



2437 MHz



2462 MHz



802.11ax HE20_ANT-3

2412 MHz



2437 MHz



2462 MHz



802.11ax HE40_ANT-3

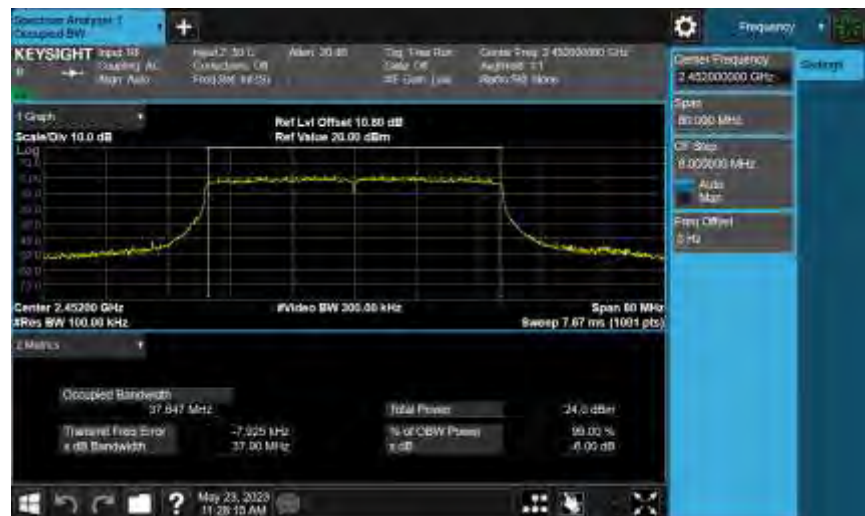
2422 MHz



2437 MHz



2452 MHz



99% Occupied Bandwidth

802.11b_ANT-0

2412 MHz



2437 MHz



2462 MHz



802.11g_ANT-0

2412 MHz

KEYSIGHT Spectrum Analyzer 1 Occupied BW

Center Frequency: 2.412000000 GHz
Span: 40.000 MHz
Ref Lvl Offset: 10.00 dB
Ref Value: 20.00 dBm

Occupied Bandwidth: 16.455 MHz
Total Power: 25.5 dBm
Transient Freq Error: 25.465 kHz
3 dB Bandwidth: 20.33 MHz
% of CBW Power: 99.00 %

Center: 2.41200 GHz
#Res BW: 300.00 kHz
#Video BW: 1.0000 MHz
Span: 40 MHz
Sweep: 1.00 ms (1001 pts)

May 22, 2020 9:05:56 PM

2437 MHz

KEYSIGHT Spectrum Analyzer 1 Occupied BW

Center Frequency: 2.437000000 GHz
Span: 40.000 MHz
Ref Lvl Offset: 10.00 dB
Ref Value: 20.00 dBm

Occupied Bandwidth: 17.167 MHz
Total Power: 27.5 dBm
Transient Freq Error: 111.85 kHz
3 dB Bandwidth: 32.45 MHz
% of CBW Power: 99.00 %

Center: 2.43700 GHz
#Res BW: 300.00 kHz
#Video BW: 1.0000 MHz
Span: 40 MHz
Sweep: 1.00 ms (1001 pts)

May 22, 2020 9:12:03 PM

2462 MHz

KEYSIGHT Spectrum Analyzer 1 Occupied BW

Center Frequency: 2.462000000 GHz
Span: 40.000 MHz
Ref Lvl Offset: 10.00 dB
Ref Value: 20.00 dBm

Occupied Bandwidth: 16.523 MHz
Total Power: 25.5 dBm
Transient Freq Error: -15.871 kHz
3 dB Bandwidth: 19.75 MHz
% of CBW Power: 99.00 %

Center: 2.46200 GHz
#Res BW: 300.00 kHz
#Video BW: 1.0000 MHz
Span: 40 MHz
Sweep: 1.00 ms (1001 pts)

May 22, 2020 9:16:12 PM

802.11ax HE20_ANT-0

2412 MHz



2437 MHz



2462 MHz

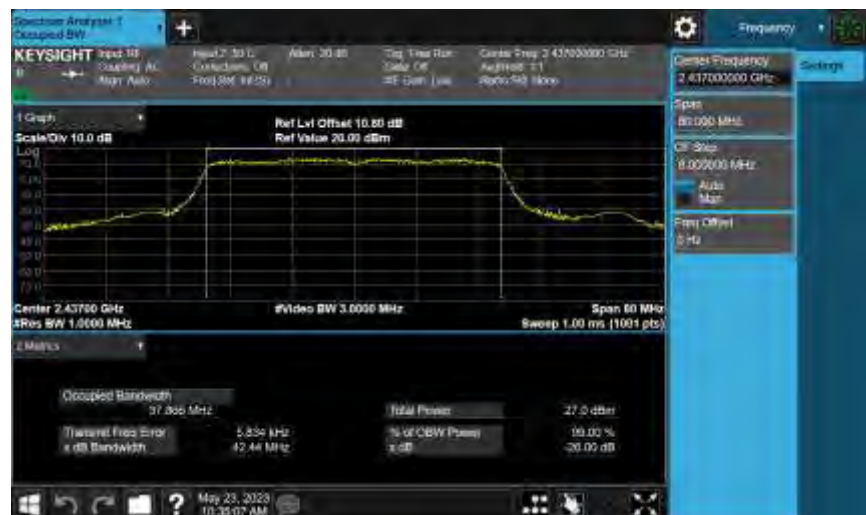


802.11ax HE40_ANT-0

2422 MHz



2437 MHz



2452 MHz



802.11b_ANT-1

2412 MHz



2437 MHz



2462 MHz



802.11g_ANT-1

2412 MHz

KEYSIGHT Spectrum Analyzer 1 Occupied BW

Center 2.41200 GHz
#Res BW 300.00 kHz
#Video BW 1.0000 MHz
Span 40 MHz
Sweep 1.00 ms (1001 pts)

Occupied Bandwidth: 16.352 MHz
Total Power: -24.0 dBm
Transmit Freq Error: 10.742 kHz
% of CBW Power: 99.00 %
x dB Bandwidth: 18.31 MHz
x dB

May 22, 2023 9:21:58 PM

2437 MHz

KEYSIGHT Spectrum Analyzer 1 Occupied BW

Center 2.43700 GHz
#Res BW 300.00 kHz
#Video BW 1.0000 MHz
Span 40 MHz
Sweep 1.00 ms (1001 pts)

Occupied Bandwidth: 17.017 MHz
Total Power: -27.7 dBm
Transmit Freq Error: 89.800 kHz
% of CBW Power: 99.00 %
x dB Bandwidth: 23.30 MHz
x dB

May 22, 2023 9:27:06 PM

2462 MHz

KEYSIGHT Spectrum Analyzer 1 Occupied BW

Center 2.46200 GHz
#Res BW 300.00 kHz
#Video BW 1.0000 MHz
Span 40 MHz
Sweep 1.00 ms (1001 pts)

Occupied Bandwidth: 16.485 MHz
Total Power: -25.4 dBm
Transmit Freq Error: -1.421 kHz
% of CBW Power: 99.00 %
x dB Bandwidth: 19.85 MHz
x dB

May 22, 2023 9:31:43 PM

802.11ax HE20_ANT-1

2412 MHz

KEYSIGHT Spectrum Analyzer I Occupied BW

Center 2.41200 GHz
#Res BW 300.00 kHz
#Video BW 1.0000 MHz
Span 40 MHz
Sweep 1.00 ms (1001 pts)

Occupied Bandwidth: 18.935 MHz
Total Power: -25.3 dBm
% of CBW Power: 99.00 %
% dB Bandwidth: 21.43 MHz

May 23, 2020 9:42:45 AM

2437 MHz

KEYSIGHT Spectrum Analyzer I Occupied BW

Center 2.43700 GHz
#Res BW 300.00 kHz
#Video BW 1.0000 MHz
Span 40 MHz
Sweep 1.00 ms (1001 pts)

Occupied Bandwidth: 19.265 MHz
Total Power: -29.3 dBm
% of CBW Power: 99.00 %
% dB Bandwidth: 24.805 MHz

May 23, 2020 9:47:56 AM

2462 MHz

KEYSIGHT Spectrum Analyzer I Occupied BW

Center 2.46200 GHz
#Res BW 300.00 kHz
#Video BW 1.0000 MHz
Span 40 MHz
Sweep 1.00 ms (1001 pts)

Occupied Bandwidth: 18.936 MHz
Total Power: -25.1 dBm
% of CBW Power: 99.00 %
% dB Bandwidth: 21.72 MHz

May 23, 2020 9:51:50 AM

802.11ax HE40_ANT-1

2422 MHz



2437 MHz



2452 MHz



802.11b_ANT-2

2412 MHz



2437 MHz

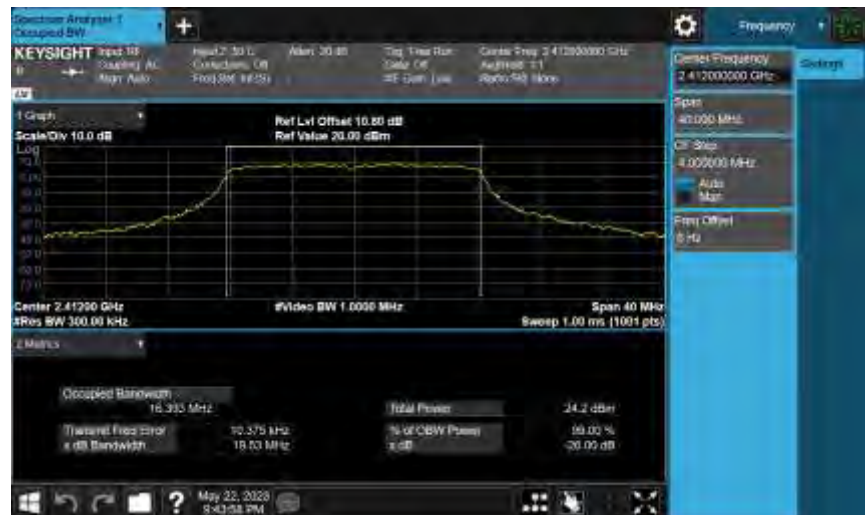


2462 MHz



802.11g_ANT-2

2412 MHz



2437 MHz



2462 MHz



802.11ax HE20_ANT-2

2412 MHz



2437 MHz



2462 MHz



802.11ax HE40_ANT-2

2422 MHz



2437 MHz



2452 MHz



802.11b_ANT-3

2412 MHz



2437 MHz

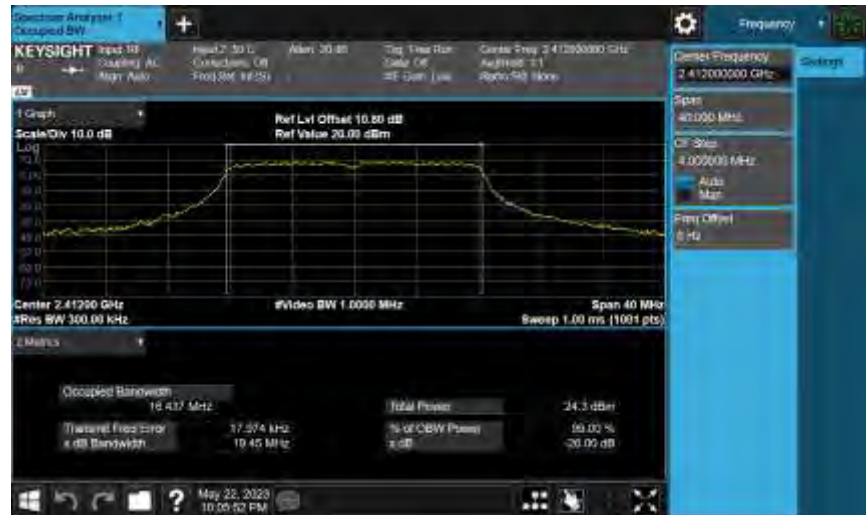


2462 MHz



802.11g_ANT-3

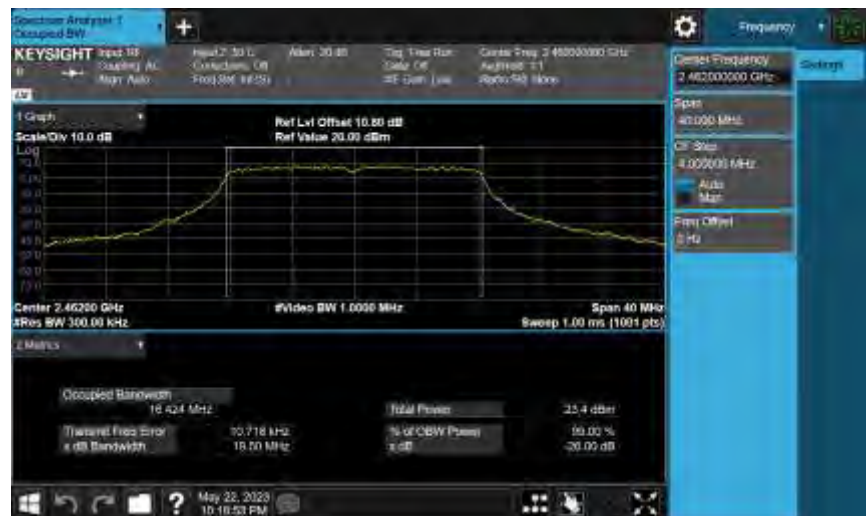
2412 MHz



2437 MHz



2462 MHz



802.11ax HE20_ANT-3

2412 MHz

KEYSIGHT Spectrum Analyzer 1 Occupied BW

Center Frequency: 2.41200000 GHz

Span: 40.000 MHz

Ref Lvl Offset: 10.00 dB

Ref Value: 20.00 dBm

Scale/Div: 10.0 dB

Center: 2.41200 GHz

#Video BW: 1.0000 MHz

Span: 40 MHz

Sweep: 1.00 ms (1001 pts)

Occupied Bandwidth: 18.931 MHz

Total Power: -25.1 dBm

Transmit Freq Error: 15.336 kHz

% of CBW Power: 99.00 %

x dB Bandwidth: 21.56 MHz

x dB

May 23, 2020 10:12:33 AM

2437 MHz

KEYSIGHT Spectrum Analyzer 1 Occupied BW

Center Frequency: 2.43700000 GHz

Span: 40.000 MHz

Ref Lvl Offset: 10.00 dB

Ref Value: 20.00 dBm

Scale/Div: 10.0 dB

Center: 2.43700 GHz

#Video BW: 1.0000 MHz

Span: 40 MHz

Sweep: 1.00 ms (1001 pts)

Occupied Bandwidth: 18.185 MHz

Total Power: -25.7 dBm

Transmit Freq Error: 35.826 kHz

% of CBW Power: 99.00 %

x dB Bandwidth: 23.50 MHz

x dB

May 23, 2020 10:18:13 AM

2462 MHz

KEYSIGHT Spectrum Analyzer 1 Occupied BW

Center Frequency: 2.46200000 GHz

Span: 40.000 MHz

Ref Lvl Offset: 10.00 dB

Ref Value: 20.00 dBm

Scale/Div: 10.0 dB

Center: 2.46200 GHz

#Video BW: 1.0000 MHz

Span: 40 MHz

Sweep: 1.00 ms (1001 pts)

Occupied Bandwidth: 18.017 MHz

Total Power: -24.3 dBm

Transmit Freq Error: 15.636 kHz

% of CBW Power: 99.00 %

x dB Bandwidth: 21.31 MHz

x dB

May 23, 2020 10:22:15 AM

802.11ax HE40_ANT-3

2422 MHz



2437 MHz



2452 MHz



Maximum Power Spectral Density

802.11b_ANT-0

2412 MHz



2437 MHz

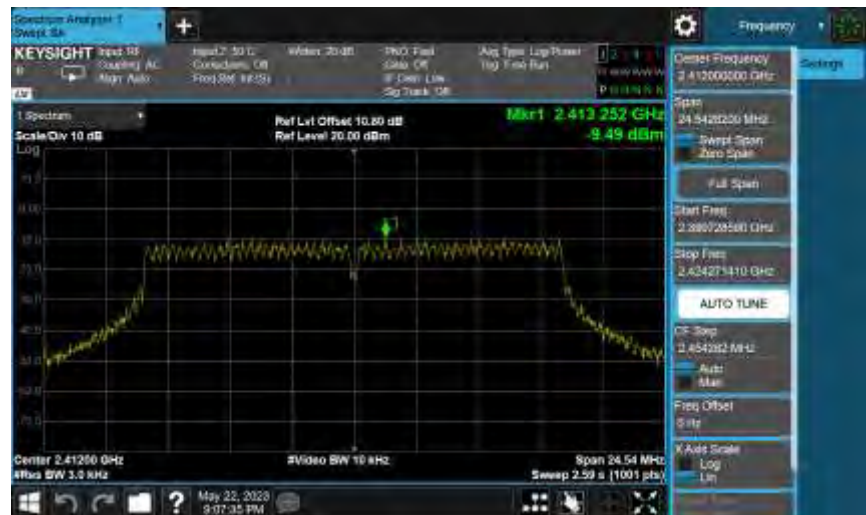


2462 MHz



802.11g_ANT-0

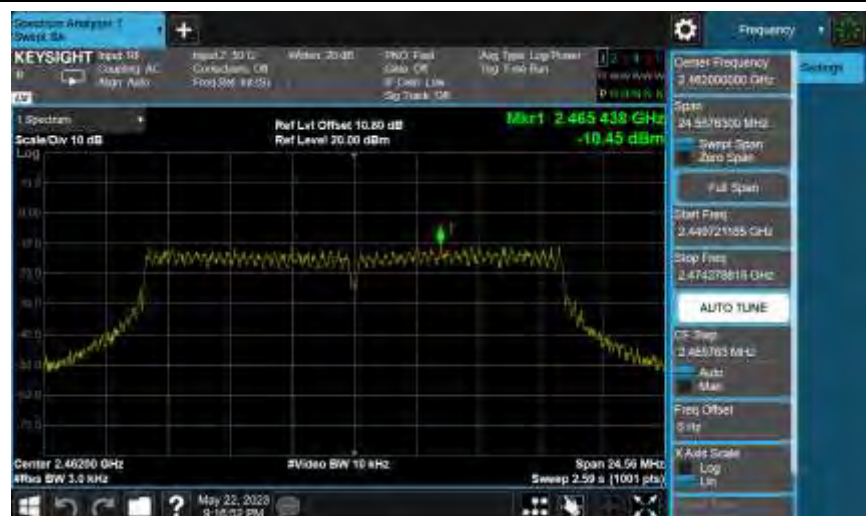
2412 MHz



2437 MHz

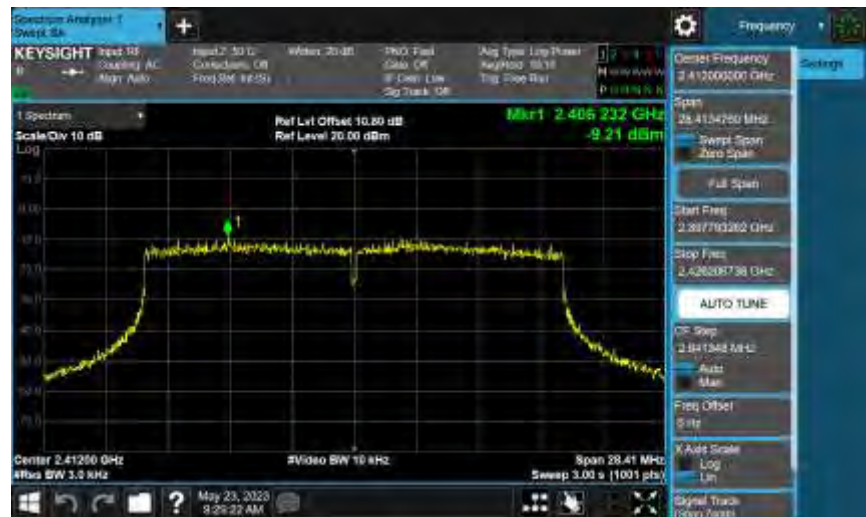


2462 MHz



802.11ax HE20_ANT-0

2412 MHz



2437 MHz



2462 MHz



802.11ax HE40_ANT-0

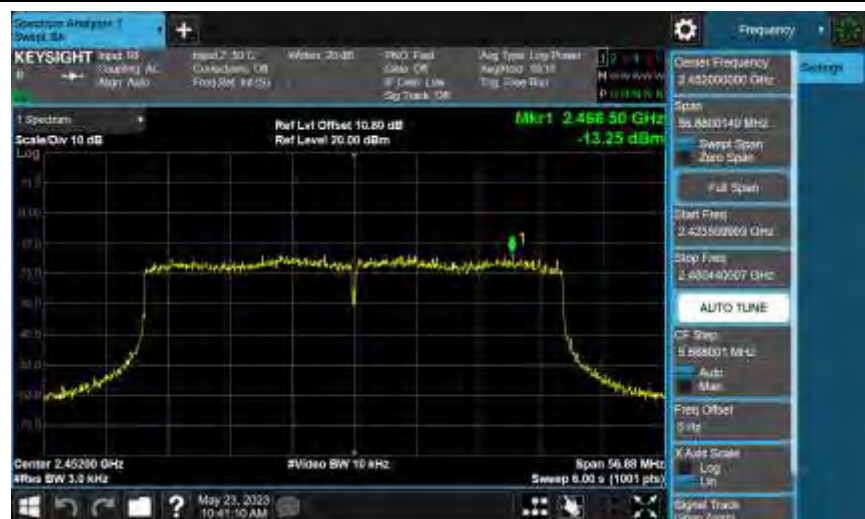
2422 MHz



2437 MHz



2452 MHz



802.11b_ANT-1

2412 MHz



2437 MHz

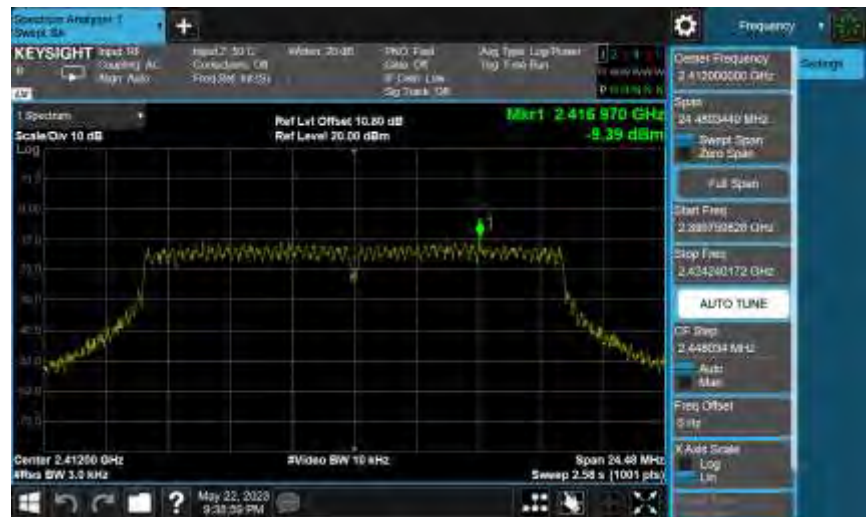


2462 MHz



802.11g_ANT-1

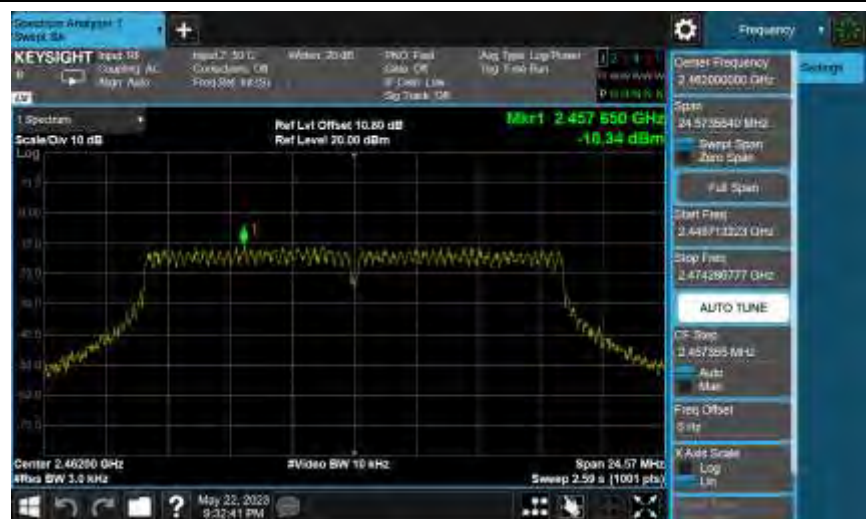
2412 MHz



2437 MHz



2462 MHz



802.11ax HE20_ANT-1

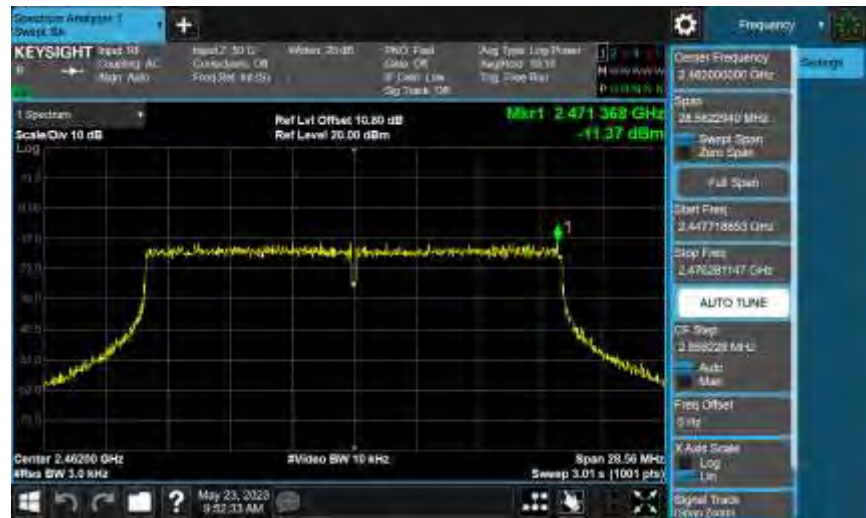
2412 MHz



2437 MHz



2462 MHz



802.11ax HE40_ANT-1

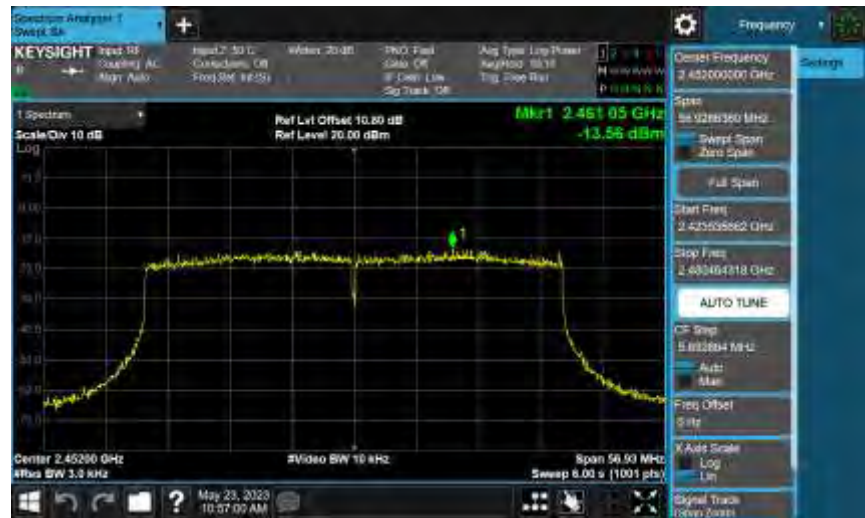
2422 MHz



2437 MHz



2452 MHz



802.11b_ANT-2

2412 MHz



2437 MHz

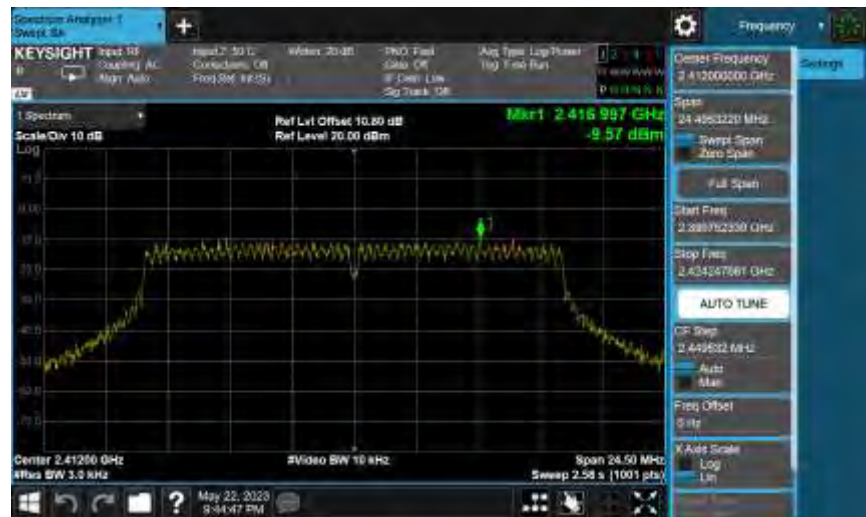


2462 MHz



802.11g_ANT-2

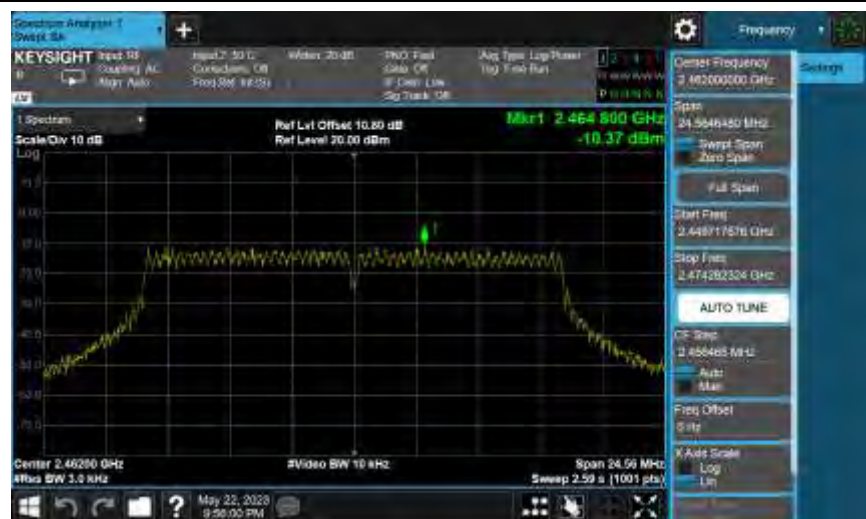
2412 MHz

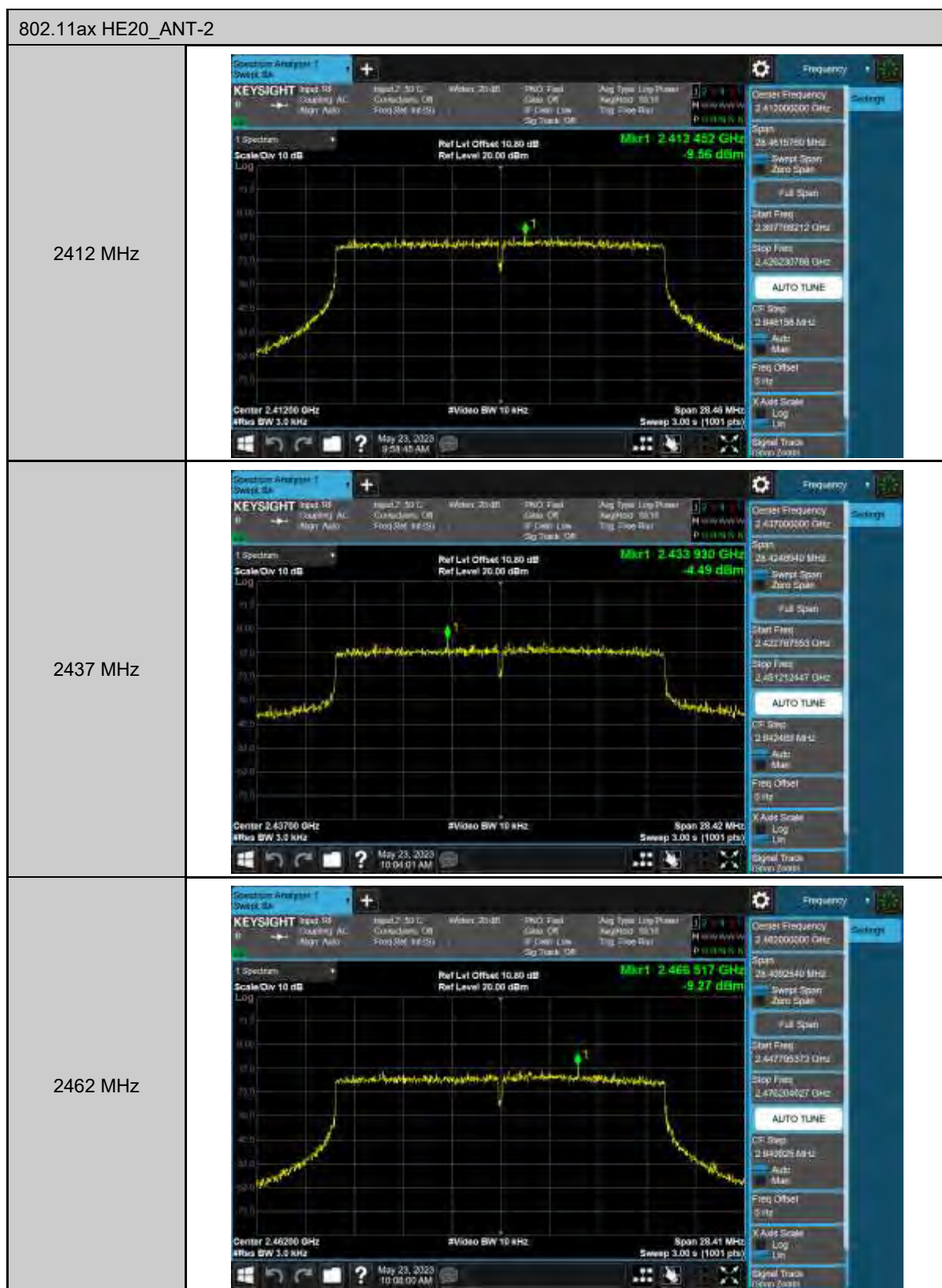


2437 MHz



2462 MHz



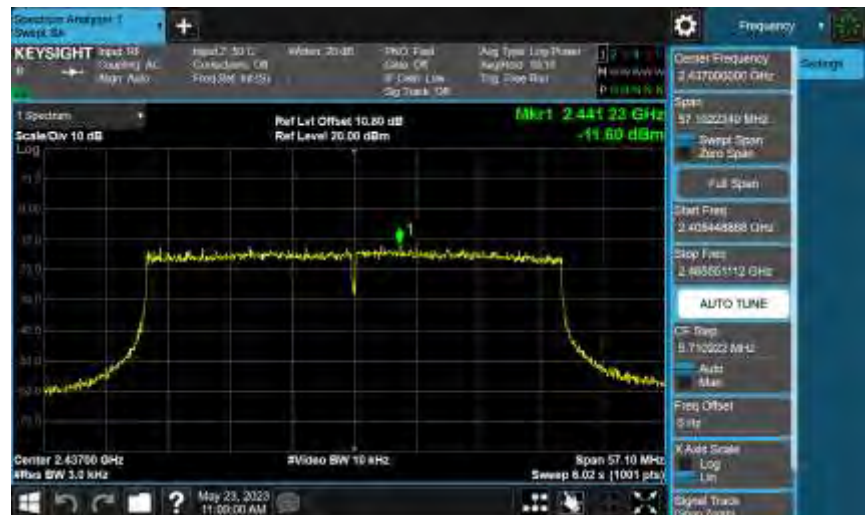


802.11ax HE40_ANT-2

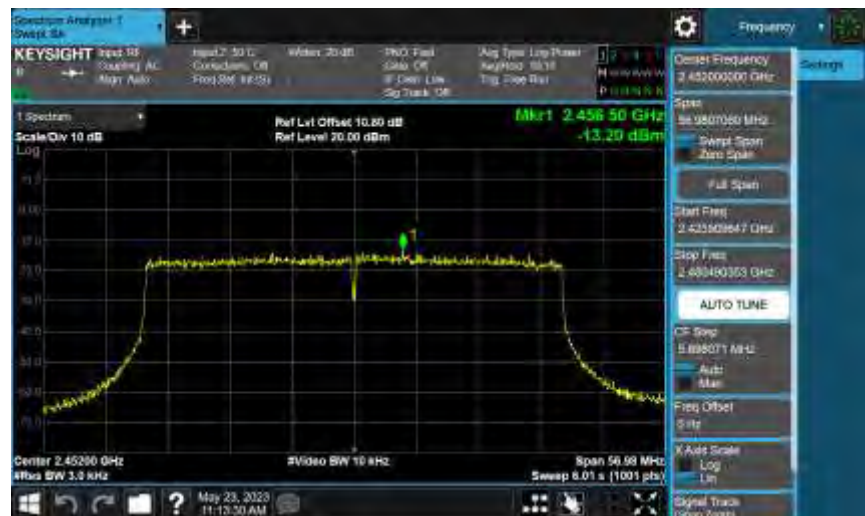
2422 MHz



2437 MHz



2452 MHz



802.11b_ANT-3

2412 MHz



2437 MHz

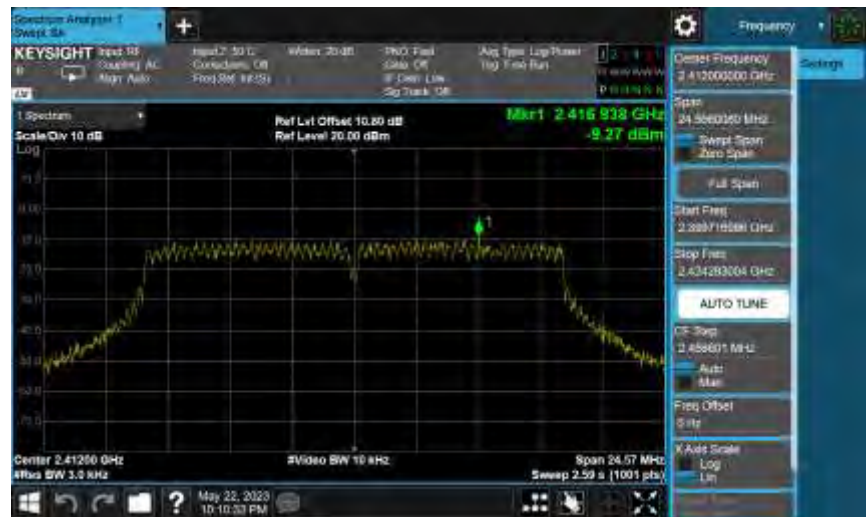


2462 MHz



802.11g_ANT-3

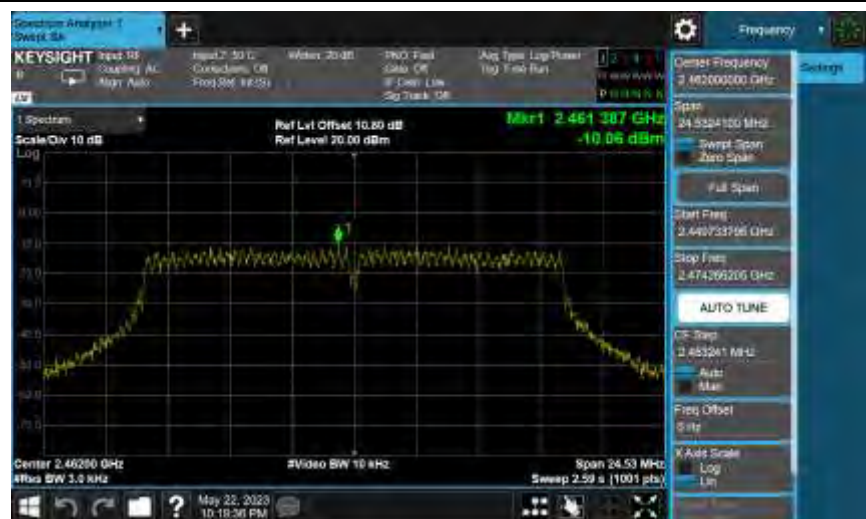
2412 MHz



2437 MHz

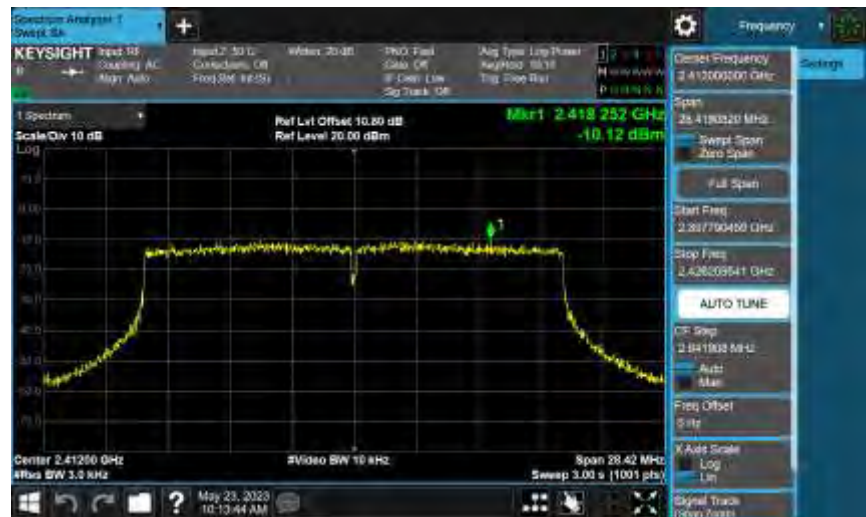


2462 MHz



802.11ax HE20_ANT-3

2412 MHz



2437 MHz



2462 MHz

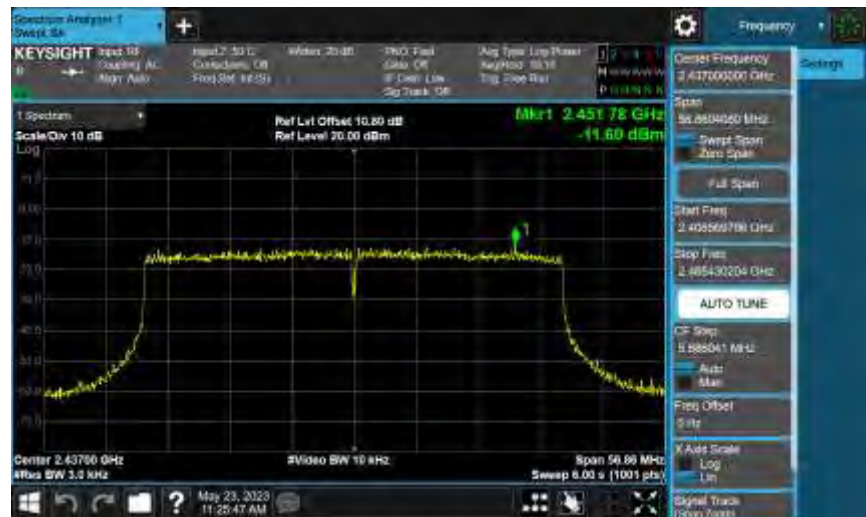


802.11ax HE40_ANT-3

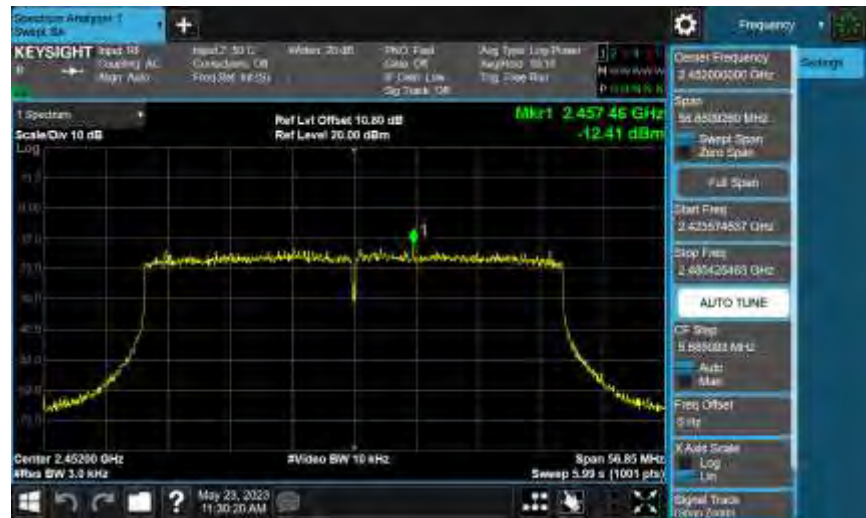
2422 MHz



2437 MHz



2452 MHz



QCA9889

Duty cycle

802.11b

On+off time



802.11g

On+off time



802.11n VHT20

On+off time



802.11n VHT40

On+off time



Out of Band Conducted Spurious Emission

[illegible]

802.11g_ANT-0

2412 MHz



2437 MHz



2462 MHz



802.11n VHT20_ANT-0

2412 MHz



2437 MHz



2462 MHz



802.11n VHT40_ANT-0

2422 MHz



2437 MHz



2452 MHz



Reference level

802.11b_ANT-0

2412 MHz



2437 MHz



2462 MHz



802.11g_ANT-0

2412 MHz



2437 MHz



2462 MHz



802.11n VHT20_ANT-0

2412 MHz



2437 MHz



2462 MHz



802.11n VHT40_ANT-0

2422 MHz



2437 MHz



2452 MHz



Conducted Band Edge

802.11b_ANT-0

2412 MHz



2462 MHz



802.11g_ANT-0

2412 MHz



2462 MHz



802.11n VHT20_ANT-0

2412 MHz



2462 MHz



802.11n VHT40_ANT-0

2422 MHz



2452 MHz



6 dB Bandwidth

802.11b_ANT-0

2412 MHz



2437 MHz



2462 MHz



802.11g_ANT-0

2412 MHz



2437 MHz



2462 MHz



802.11n VHT20_ANT-0

2412 MHz



2437 MHz



2462 MHz



802.11n VHT40_ANT-0

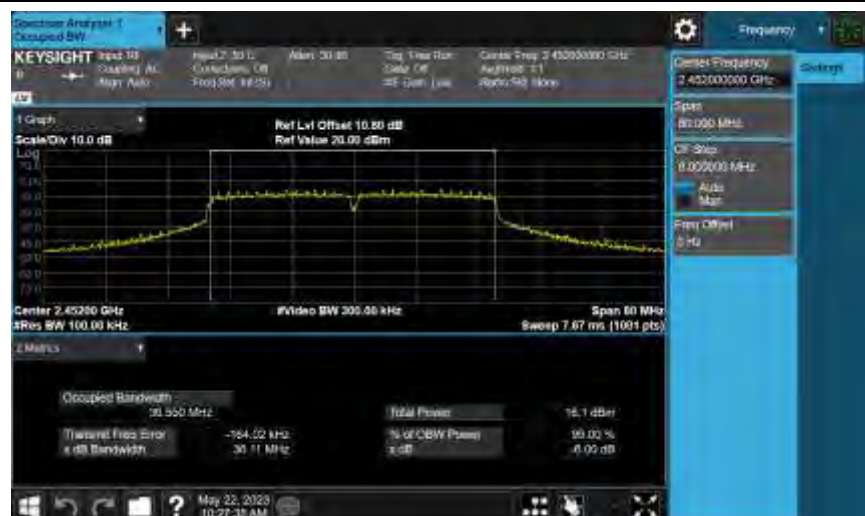
2422 MHz



2437 MHz



2452 MHz



99% Occupied Bandwidth

802.11b_ANT-0	 Keysight Spectrum Analyzer 1 Occupied BW Center Frequency: 2 412000000 GHz Span: 40.000 MHz Ref Lvl Offset: 10.00 dB Ref Value: 20.00 dBm Occupied Bandwidth: 12.463 MHz Total Power: 18.6 dBm Reference Level Error: 43.046 MHz Reference Level Error: 16.20 MHz
2437 MHz	 Keysight Spectrum Analyzer 1 Occupied BW Center Frequency: 2 437000000 GHz Span: 40.000 MHz Ref Lvl Offset: 10.00 dB Ref Value: 20.00 dBm Occupied Bandwidth: 12.765 MHz Total Power: 20.5 dBm Reference Level Error: 47.350 MHz Reference Level Error: 16.70 MHz
2462 MHz	 Keysight Spectrum Analyzer 1 Occupied BW Center Frequency: 2 462000000 GHz Span: 40.000 MHz Ref Lvl Offset: 10.00 dB Ref Value: 20.00 dBm Occupied Bandwidth: 12.857 MHz Total Power: 20.5 dBm Reference Level Error: 60.151 MHz Reference Level Error: 16.32 MHz

802.11g_ANT-0

2412 MHz



2437 MHz

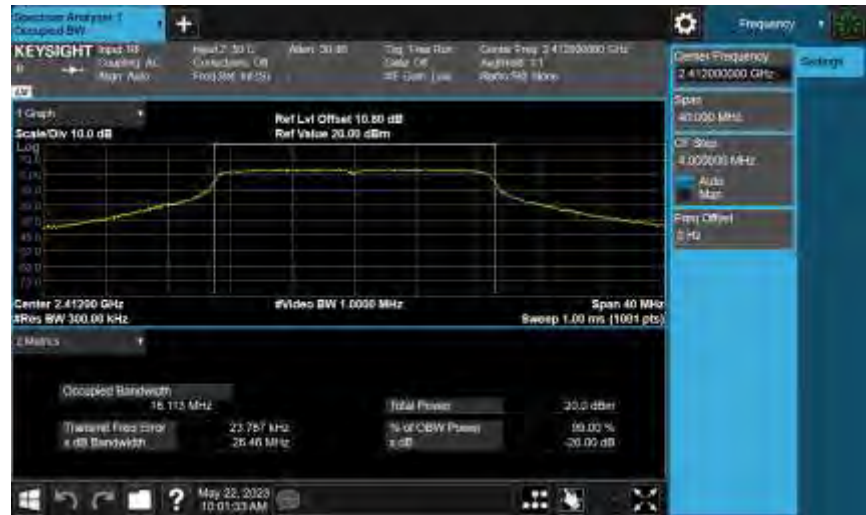


2462 MHz



802.11n VHT20_ANT-0

2412 MHz



2437 MHz



2462 MHz



802.11n VHT40_ANT-0

2422 MHz



2437 MHz



2452 MHz



Maximum Power Spectral Density

802.11b_ANT-0

2412 MHz



2437 MHz



2462 MHz



802.11g_ANT-0

2412 MHz



2437 MHz



2462 MHz



802.11n VHT20_ANT-0

2412 MHz



2437 MHz



2462 MHz

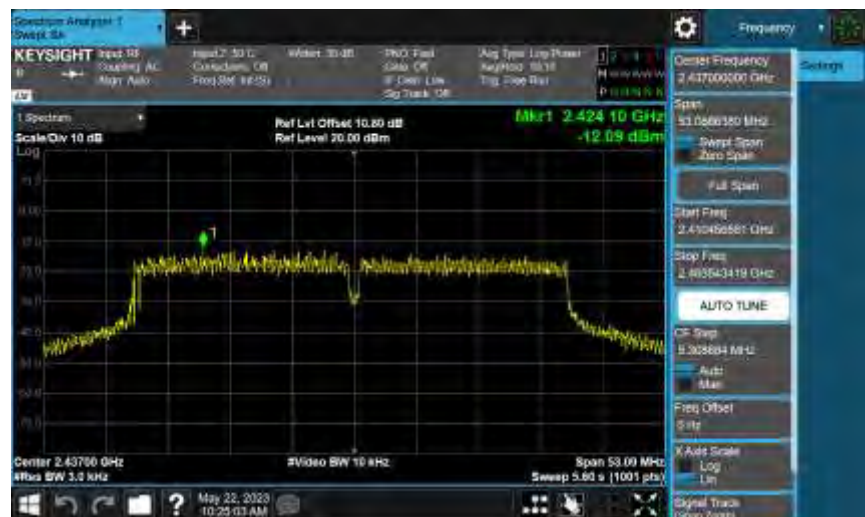


802.11n VHT40_ANT-0

2422 MHz



2437 MHz



2452 MHz

