# Appendix A: Test Results of 2.4GHz SDR

**APPENDIX A: TEST RESULTS OF 2.4GHZ SDR** ..... **1**
APPENDIX A.1: TEST RESULTS OF CONDUCTED POWER ..... 2
APPENDIX A.2: TEST RESULTS OF CONDUCTED POWER SPECTRAL DENSITY ..... 3
*2.4GHz SDR, 1.4MHz BW* ..... *3*
*2.4GHz SDR, 3MHz BW* ..... *6*
*2.4GHz SDR, 5MHz BW* ..... *9*
*2.4GHz SDR, 10MHz BW* ..... *12*
*2.4GHz SDR, 20MHz BW* ..... *15*
*2.4GHz SDR, 40MHz BW* ..... *18*
*2.4GHz SDR, 60MHz BW* ..... *21*
APPENDIX A.2: TEST RESULTS OF 6DB BANDWIDTH ..... 27
*2.4GHz SDR, 1.4MHz BW* ..... *27*
*2.4GHz SDR, 3MHz BW* ..... *29*
*2.4GHz SDR, 5MHz BW* ..... *31*
*2.4GHz SDR, 10MHz BW* ..... *33*
*2.4GHz SDR, 20MHz BW* ..... *35*
*2.4GHz SDR, 40MHz BW* ..... *37*
APPENDIX A.3: TEST RESULTS OF 99% BANDWIDTH ..... 41
*2.4GHz SDR, 1.4MHz BW* ..... *41*
*2.4GHz SDR, 3MHz BW* ..... *43*
*2.4GHz SDR, 5MHz BW* ..... *45*
*2.4GHz SDR, 10MHz BW* ..... *47*
*2.4GHz SDR, 20MHz BW* ..... *49*
*2.4GHz SDR, 40MHz BW* ..... *51*
*2.4GHz SDR, 60MHz BW* ..... *53*
APPENDIX A.4: TEST RESULTS OF CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 KHZ BANDWIDTH ..... 55
*Bandedge* ..... *55*
*Conducted Spurious Emission* ..... *62*
APPENDIX A.5: TEST RESULTS OF RADIATED SPURIOUS EMISSIONS ..... 89
*30MHz - 1GHz* ..... *89*
*1GHz - 18GHz* ..... *91*
APPENDIX B.6: TEST RESULTS OF RADIATED EMISSIONS IN RESTRICTED BANDS ..... 119
*2.4GHz SDR, 1.4MHz BW* ..... *119*
*2.4GHz SDR, 3MHz BW* ..... *123*
*2.4GHz SDR, 5MHz BW* ..... *127*
*2.4GHz SDR, 10MHz BW* ..... *131*
*2.4GHz SDR, 20MHz BW* ..... *136*
*2.4GHz SDR, 40MHz BW* ..... *141*
*2.4GHz SDR, 60MHz BW* ..... *147*
APPENDIX A.8: TEST RESULTS OF CONDUCTED EMISSION ON AC MAINS ..... 151

## Appendix A.1: Test Results of Conducted Power

| TestMode | Antenna | Channel | Result[dBm] | Limit[dBm] | Verdict |
|---|---|---|---|---|---|
| 1.4MHz BW | Ant1 | 2403.5 | 20.75 | ≤30.00 | PASS |
| | Ant2 | 2403.5 | 20.33 | ≤30.00 | PASS |
| | total | 2403.5 | 23.56 | ≤30.00 | PASS |
| | Ant1 | 2435.5 | 20.82 | ≤30.00 | PASS |
| | Ant2 | 2435.5 | 19.86 | ≤30.00 | PASS |
| | total | 2435.5 | 23.38 | ≤30.00 | PASS |
| | Ant1 | 2469.12 | 20.67 | ≤30.00 | PASS |
| | Ant2 | 2469.12 | 20.36 | ≤30.00 | PASS |
| | total | 2469.12 | 23.53 | ≤30.00 | PASS |
| 3MHz BW | Ant1 | 2405.5 | 23.84 | ≤30.00 | PASS |
| | Ant2 | 2405.5 | 21.88 | ≤30.00 | PASS |
| | total | 2405.5 | 25.99 | ≤30.00 | PASS |
| | Ant1 | 2435.5 | 23.43 | ≤30.00 | PASS |
| | Ant2 | 2435.5 | 22.66 | ≤30.00 | PASS |
| | total | 2435.5 | 26.07 | ≤30.00 | PASS |
| | Ant1 | 2468.2 | 23.04 | ≤30.00 | PASS |
| | Ant2 | 2468.2 | 23.03 | ≤30.00 | PASS |
| | total | 2468.2 | 26.05 | ≤30.00 | PASS |
| 5MHz BW | Ant1 | 2404.5 | 24.10 | ≤30.00 | PASS |
| | Ant2 | 2404.5 | 21.67 | ≤30.00 | PASS |
| | total | 2404.5 | 26.06 | ≤30.00 | PASS |
| | Ant1 | 2434.5 | 23.22 | ≤30.00 | PASS |
| | Ant2 | 2434.5 | 22.54 | ≤30.00 | PASS |
| | total | 2404.5 | 25.90 | ≤30.00 | PASS |
| | Ant1 | 2469.5 | 23.17 | ≤30.00 | PASS |
| | Ant2 | 2469.5 | 22.76 | ≤30.00 | PASS |
| | total | 2469.5 | 25.98 | ≤30.00 | PASS |
| 10MHz BW | Ant1 | 2407.5 | 17.45 | ≤30.00 | PASS |
| | Ant2 | 2407.5 | 16.40 | ≤30.00 | PASS |
| | total | 2407.5 | 19.97 | ≤30.00 | PASS |
| | Ant1 | 2437.5 | 23.14 | ≤30.00 | PASS |
| | Ant2 | 2437.5 | 22.07 | ≤30.00 | PASS |
| | total | 2437.5 | 25.65 | ≤30.00 | PASS |
| | Ant1 | 2467.5 | 22.46 | ≤30.00 | PASS |
| | Ant2 | 2467.5 | 22.23 | ≤30.00 | PASS |
| | total | 2467.5 | 25.36 | ≤30.00 | PASS |
| 20MHz BW | Ant1 | 2412.5 | 17.48 | ≤30.00 | PASS |
| | Ant2 | 2412.5 | 17.15 | ≤30.00 | PASS |
| | total | 2412.5 | 20.33 | ≤30.00 | PASS |
| | Ant1 | 2437.5 | 23.05 | ≤30.00 | PASS |
| | Ant2 | 2437.5 | 21.83 | ≤30.00 | PASS |
| | total | 2437.5 | 25.49 | ≤30.00 | PASS |
| | Ant1 | 2462.5 | 23.03 | ≤30.00 | PASS |
| | Ant2 | 2462.5 | 22.29 | ≤30.00 | PASS |
| | total | 2462.5 | 25.69 | ≤30.00 | PASS |
| 40MHz BW | Ant1 | 2422.5 | 16.70 | ≤30.00 | PASS |
| | Ant2 | 2422.5 | 15.97 | ≤30.00 | PASS |
| | total | 2422.5 | 19.36 | ≤30.00 | PASS |
| | Ant1 | 2437.5 | 19.56 | ≤30.00 | PASS |
| | Ant2 | 2437.5 | 20.12 | ≤30.00 | PASS |
| | total | 2437.5 | 22.86 | ≤30.00 | PASS |
| | Ant1 | 2452.5 | 21.53 | ≤30.00 | PASS |
| | Ant2 | 2452.5 | 20.78 | ≤30.00 | PASS |
| | total | 2452.5 | 24.18 | ≤30.00 | PASS |
| 60MHz BW | Ant1 | 2432.5 | 17.75 | ≤30.00 | PASS |
| | Ant2 | 2432.5 | 17.61 | ≤30.00 | PASS |
| | total | 2432.5 | 20.69 | ≤30.00 | PASS |
| | Ant1 | 2437.5 | 17.74 | ≤30.00 | PASS |
| | Ant2 | 2437.5 | 18.21 | ≤30.00 | PASS |
| | total | 2437.5 | 20.99 | ≤30.00 | PASS |
| | Ant1 | 2442.5 | 18.72 | ≤30.00 | PASS |
| | Ant2 | 2442.5 | 19.28 | ≤30.00 | PASS |
| | total | 2442.5 | 22.02 | ≤30.00 | PASS |

Note: all MIMO modes tested, only the worst-case reported for each bandwidth.

## Appendix A.2: Test Results of Conducted Power Spectral Density

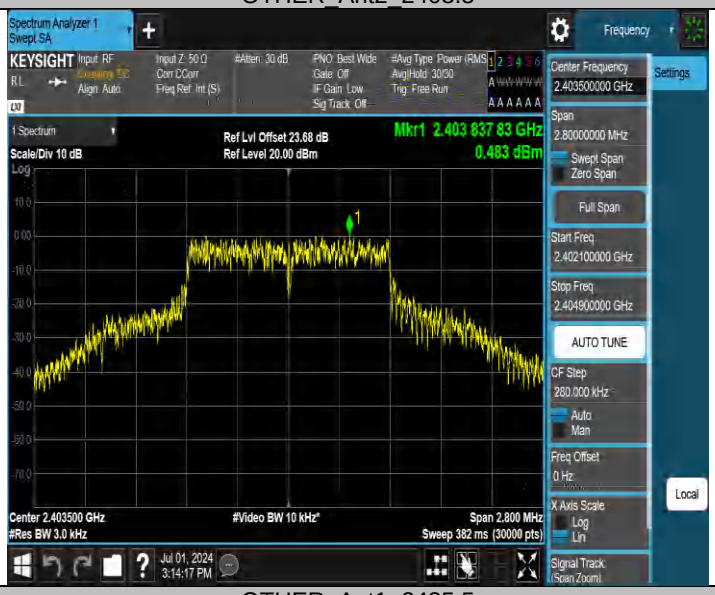
Note: all MIMO modes tested, only the worst-case reported for each bandwidth.

### 2.4GHz SDR, 1.4MHz BW

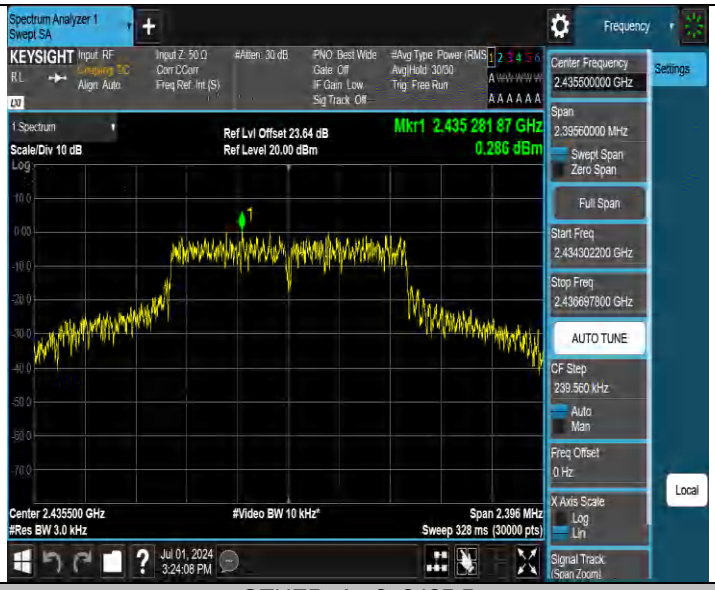
| TestMode | Antenna | Channel | Result[dBm/3-100kHz] | Limit[dBm/3kHz] | Verdict |
|---|---|---|---|---|---|
| 1.4MHz BW | Ant1 | 2403.5 | 0.15 | ≤8.00 | PASS |
| | Ant2 | 2403.5 | 0.48 | ≤8.00 | PASS |
| | total | 2403.5 | 3.33 | ≤8.00 | PASS |
| | Ant1 | 2435.5 | 0.29 | ≤8.00 | PASS |
| | Ant2 | 2435.5 | -0.11 | ≤8.00 | PASS |
| | total | 2435.5 | 3.10 | ≤8.00 | PASS |
| | Ant1 | 2469.12 | 0.36 | ≤8.00 | PASS |
| | Ant2 | 2469.12 | 0.82 | ≤8.00 | PASS |
| | total | 2469.12 | 3.61 | ≤8.00 | PASS |

OTHER_Ant1_2403.5

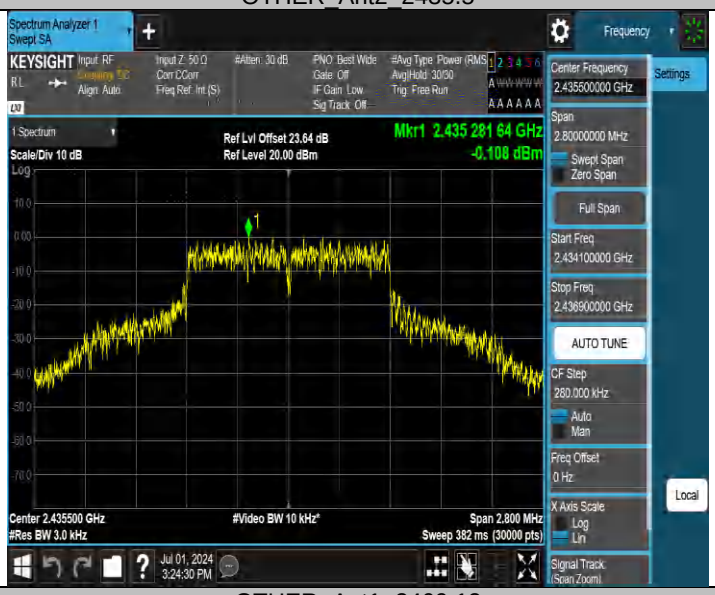
OTHER_Ant2_2403.5



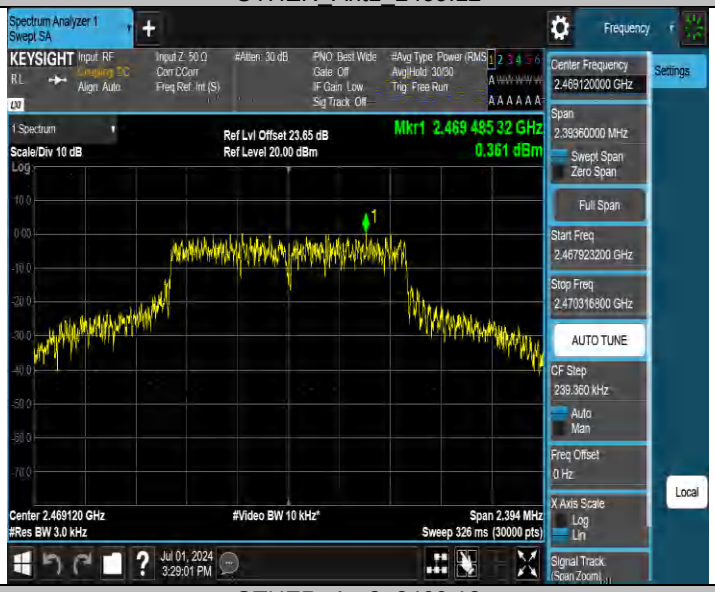

OTHER_Ant1_2435.5



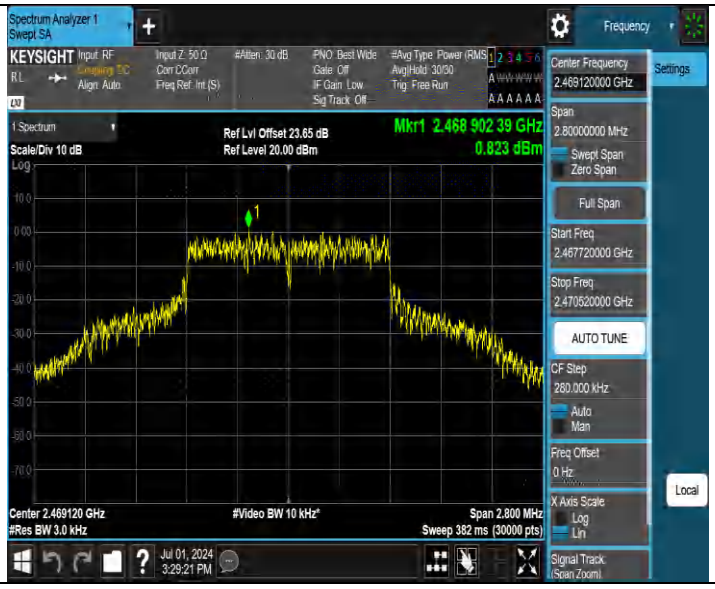

OTHER_Ant2_2435.5




OTHER_Ant1_2469.12



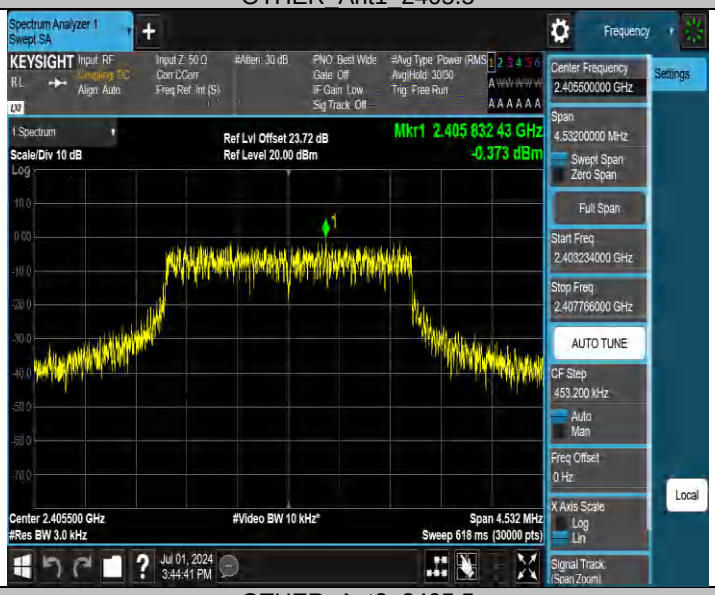

OTHER_Ant2_2469.12


Spectrum Analyzer 1
Swept SA
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto
Input Z: 50 Ω
Corr CCorr
Freq Ref: Int (S)
#Atten: 30 dB
#NO: Best Wide
Gate: Off
IF Gain: Low
Sig Track: Off
#Avg Type: Power (RMS)
Avg|Hold: 30/30
Trig: Free Run
1 Spectrum
Scale/Div 10 dB
Ref Lvl Offset 23.65 dB
Ref Level 20.00 dBm
Mkr1 2.468 902 39 GHz
0.823 dBm
Center 2.469120 GHz
#Res BW 3.0 kHz
#Video BW 10 kHz*
Span 2.800 MHz
Sweep 382 ms (30000 pts)
Jul 01, 2024
3:29:21 PM
Frequency
Settings
Center Frequency
2.469120000 GHz
Span
2.80000000 MHz
Swept Span
Zero Span
Full Span
Start Freq
2.467720000 GHz
Stop Freq
2.470520000 GHz
AUTO TUNE
CF Step
280.000 kHz
Auto
Man
Freq Offset
0 Hz
X Axis Scale
Log
Lin
Signal Track
(Span Zoom)
Local

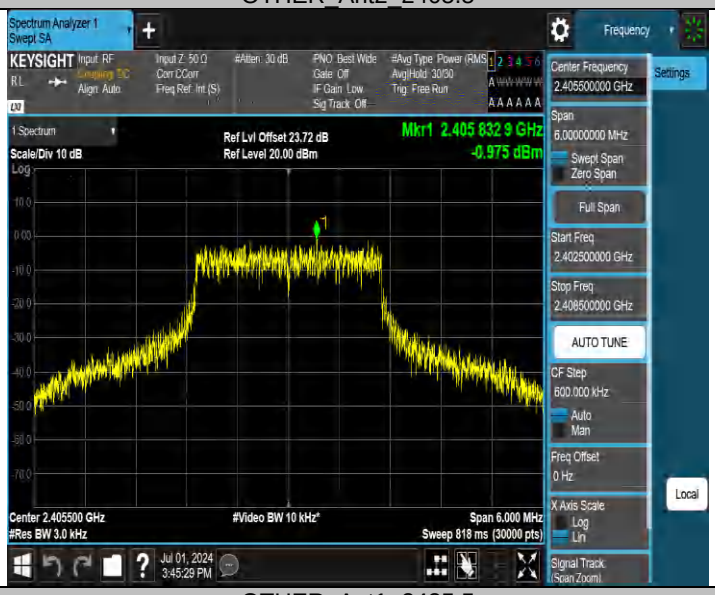
## 2.4GHz SDR, 3MHz BW

| TestMode | Antenna | Channel | Result[dBm/3-100kHz] | Limit[dBm/3kHz] | Verdict |
|---|---|---|---|---|---|
| 3MHz BW | Ant1 | 2405.5 | -0.37 | ≤8.00 | PASS |
| | Ant2 | 2405.5 | -0.98 | ≤8.00 | PASS |
| | total | 2405.5 | 2.35 | ≤8.00 | PASS |
| | Ant1 | 2435.5 | 0.22 | ≤8.00 | PASS |
| | Ant2 | 2435.5 | 0.07 | ≤8.00 | PASS |
| | total | 2435.5 | 3.16 | ≤8.00 | PASS |
| | Ant1 | 2468.2 | 0.57 | ≤8.00 | PASS |
| | Ant2 | 2468.2 | 0.51 | ≤8.00 | PASS |
| | total | 2468.2 | 3.55 | ≤8.00 | PASS |

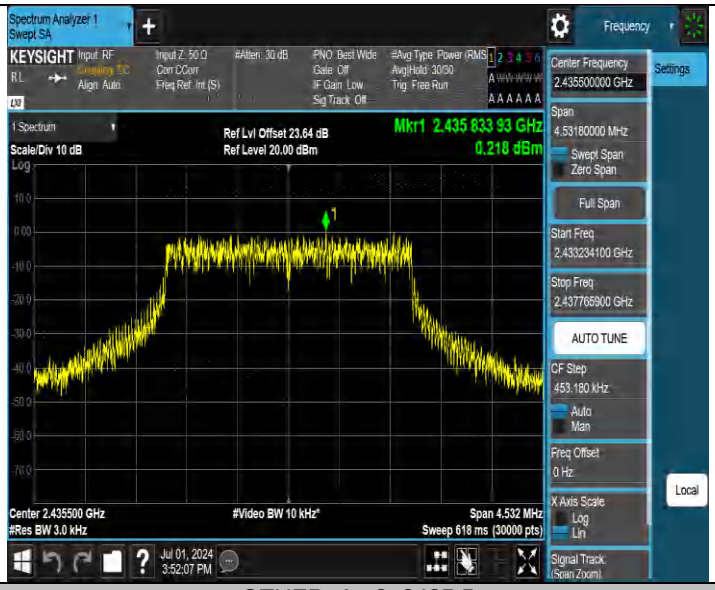
OTHER_Ant1_2405.5



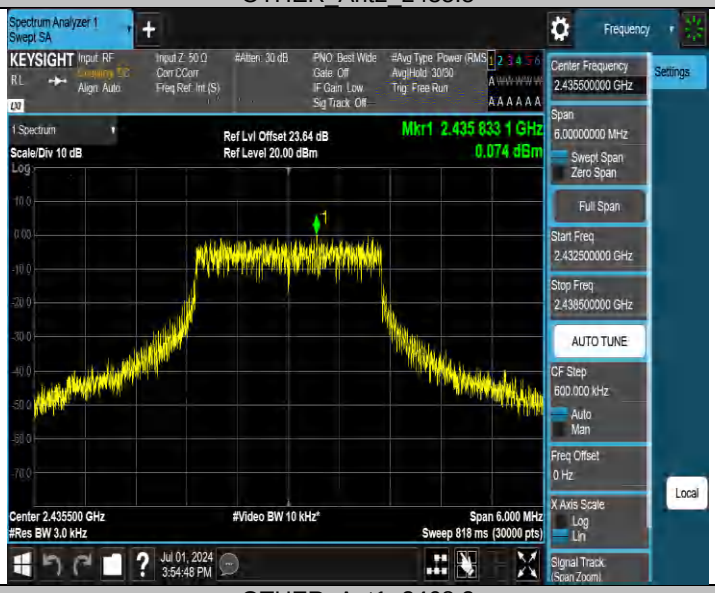

OTHER_Ant2_2405.5



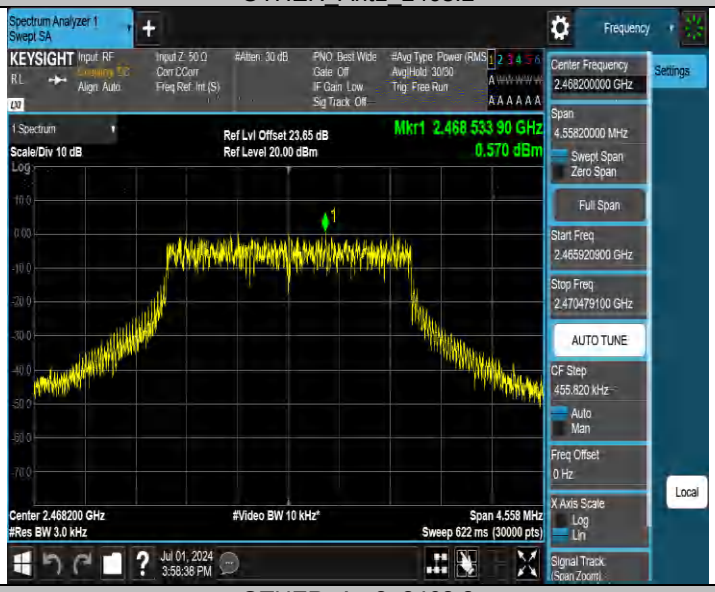

OTHER_Ant1_2435.5



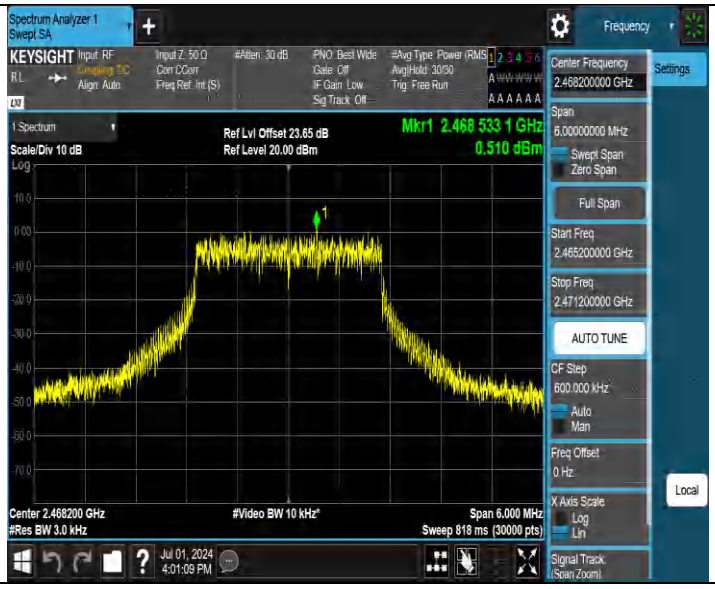

OTHER_Ant2_2435.5




OTHER_Ant1_2468.2



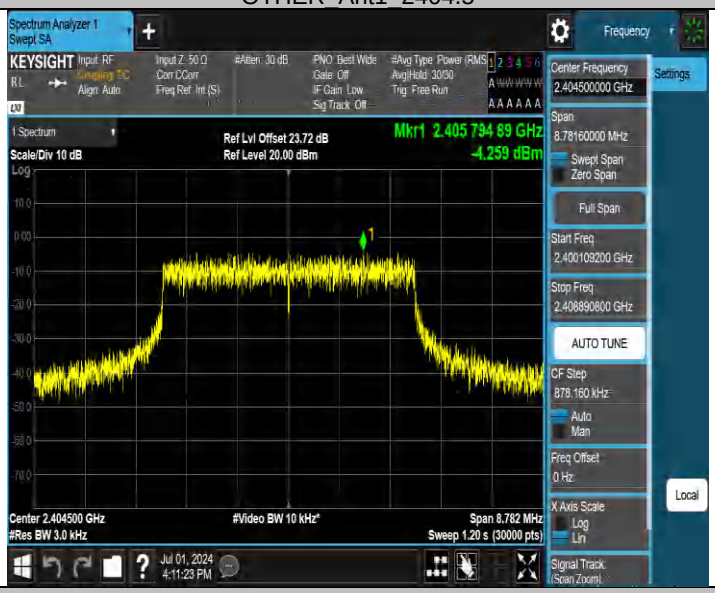

OTHER_Ant2_2468.2


Spectrum Analyzer 1
Swept SA
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto
Input Z: 50 Ω
Corr CCorr
Freq Ref: Int (S)
#Atten: 30 dB
#PNO: Best Wide
Gate: Off
IF Gain: Low
Sig Track: Off
#Avg Type: Power (RMS)
Avg|Hold: 30/30
Trig: Free Run
1 Spectrum
Scale/Div 10 dB
Ref Lvl Offset 23.65 dB
Ref Level 20.00 dBm
Mkr1 2.468 533 1 GHz
0.510 dBm
Center 2.468200 GHz
#Res BW 3.0 kHz
#Video BW 10 kHz*
Span 6.000 MHz
Sweep 818 ms (30000 pts)
Jul 01, 2024
4:01:09 PM
Frequency
Settings
Center Frequency
2.468200000 GHz
Span
6.00000000 MHz
Swept Span
Zero Span
Full Span
Start Freq
2.465200000 GHz
Stop Freq
2.471200000 GHz
AUTO TUNE
CF Step
600.000 kHz
Auto
Man
Freq Offset
0 Hz
X Axis Scale
Log
Lin
Signal Track
(Span Zoom)
Local

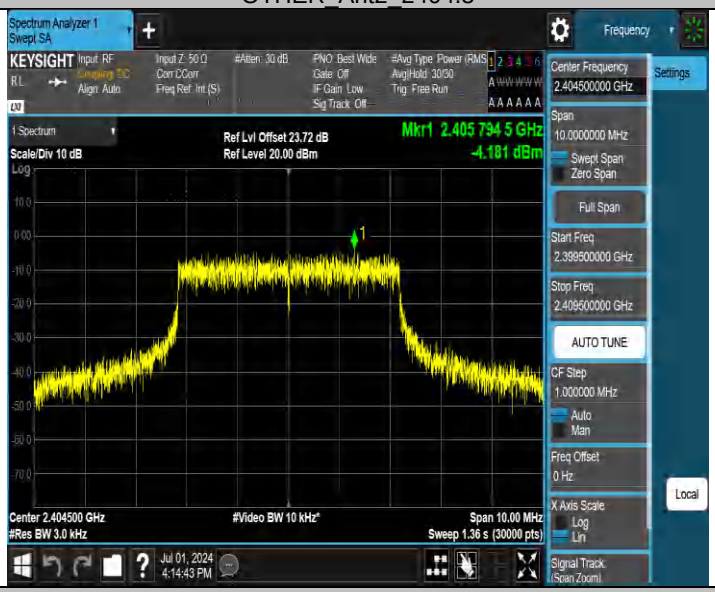
## 2.4GHz SDR, 5MHz BW

| TestMode | Antenna | Channel | Result[dBm/3-100kHz] | Limit[dBm/3kHz] | Verdict |
|---|---|---|---|---|---|
| 5MHz BW | Ant1 | 2404.5 | -4.26 | ≤8.00 | PASS |
| | Ant2 | 2404.5 | -4.18 | ≤8.00 | PASS |
| | total | 2404.5 | -1.21 | ≤8.00 | PASS |
| | Ant1 | 2434.5 | -3.31 | ≤8.00 | PASS |
| | Ant2 | 2434.5 | -3.26 | ≤8.00 | PASS |
| | total | 2404.5 | -0.27 | ≤8.00 | PASS |
| | Ant1 | 2469.5 | -3.15 | ≤8.00 | PASS |
| | Ant2 | 2469.5 | -3.25 | ≤8.00 | PASS |
| | total | 2469.5 | -0.19 | ≤8.00 | PASS |

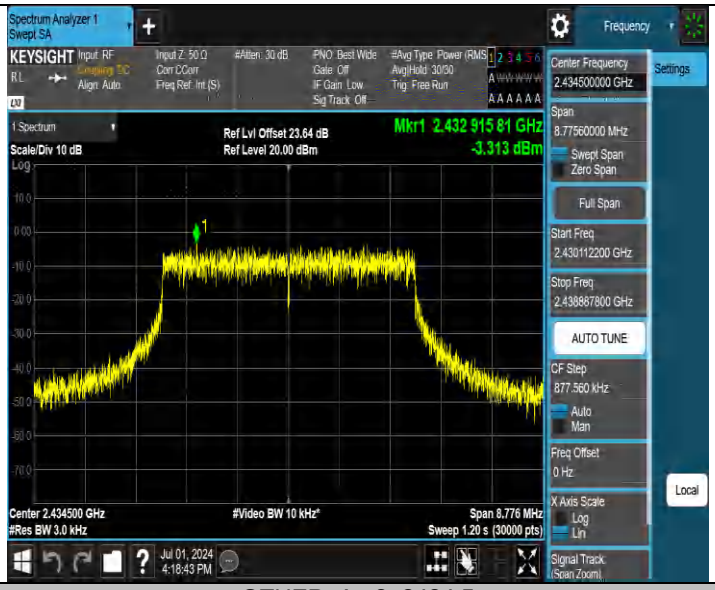
OTHER_Ant1_2404.5



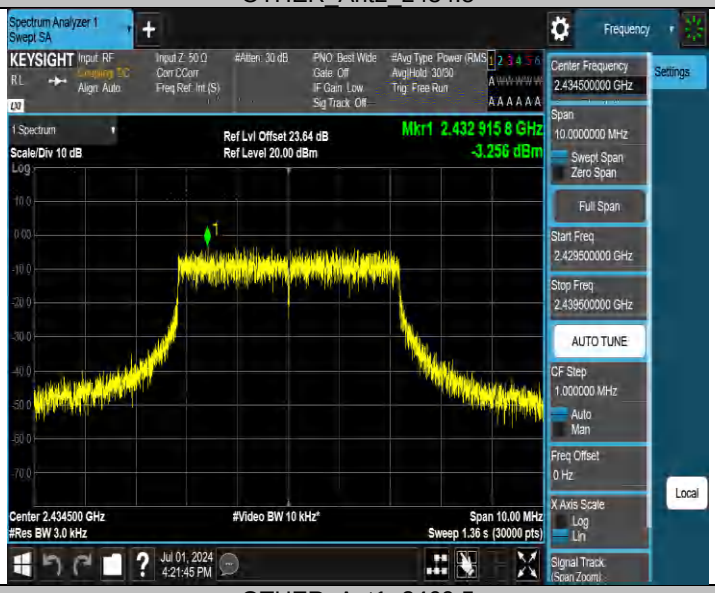

OTHER_Ant2_2404.5



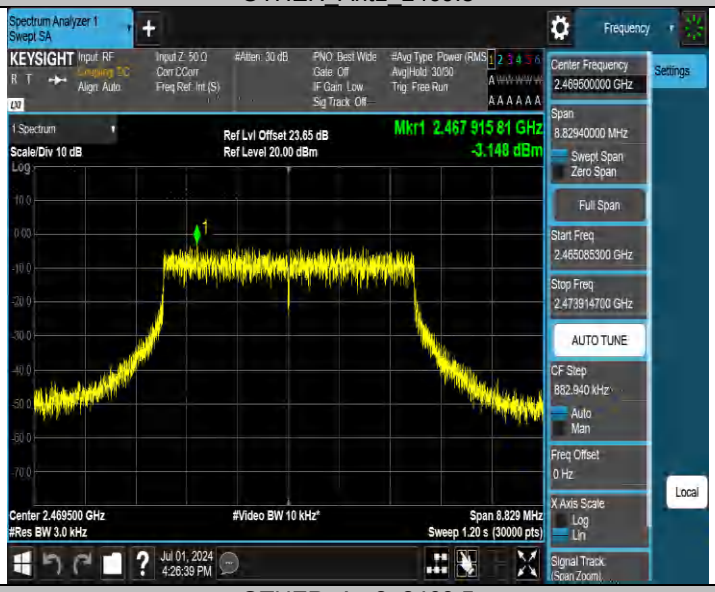

OTHER_Ant1_2434.5



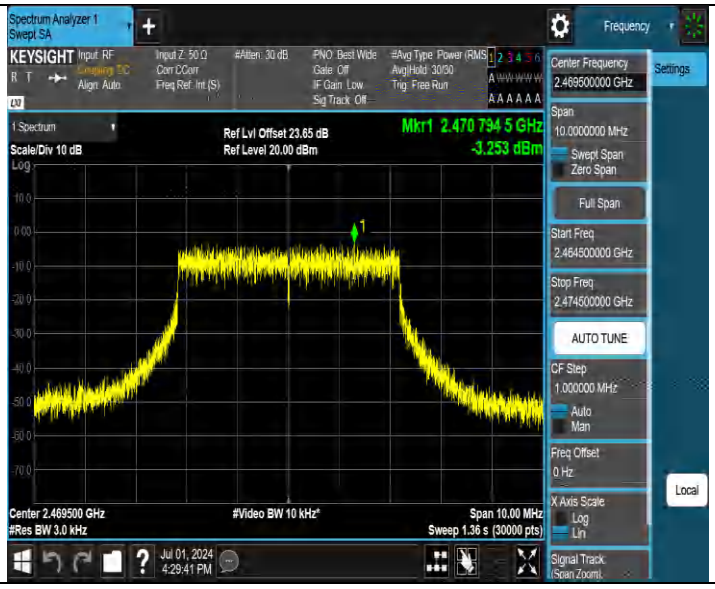

OTHER_Ant2_2434.5




OTHER_Ant1_2469.5



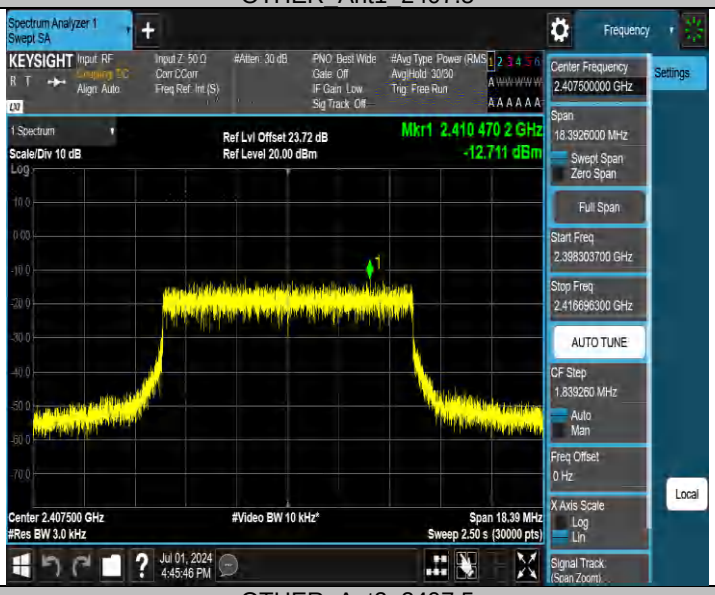

OTHER_Ant2_2469.5


Spectrum Analyzer 1
Swept SA
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto
Input Z: 50 Ω
Corr CCorr
Freq Ref: Int (S)
#Atten: 30 dB
#PNO: Best Wide
Gate: Off
IF Gain: Low
Sig Track: Off
#Avg Type: Power (RMS)
Avg|Hold: 30/30
Trig: Free Run
1 Spectrum
Scale/Div 10 dB
Ref Lvl Offset 23.65 dB
Ref Level 20.00 dBm
Mkr1 2.470 794 5 GHz
-3.253 dBm
Center 2.469500 GHz
#Res BW 3.0 kHz
#Video BW 10 kHz*
Span 10.00 MHz
Sweep 1.36 s (30000 pts)
Jul 01, 2024
4:29:41 PM
Frequency
Settings
Center Frequency
2.469500000 GHz
Span
10.0000000 MHz
Swept Span
Zero Span
Full Span
Start Freq
2.464500000 GHz
Stop Freq
2.474500000 GHz
AUTO TUNE
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz
X Axis Scale
Log
Lin
Signal Track
(Span Zoom)
Local

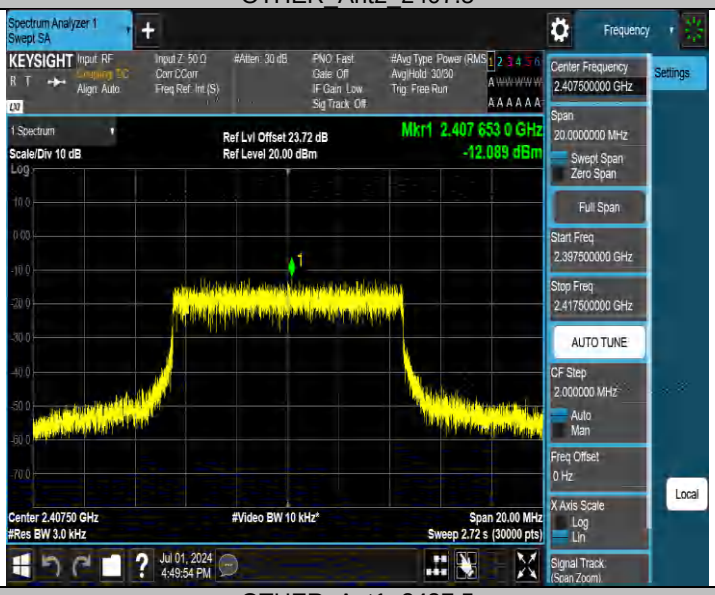
## 2.4GHz SDR, 10MHz BW

| TestMode | Antenna | Channel | Result[dBm/3-100kHz] | Limit[dBm/3kHz] | Verdict |
|---|---|---|---|---|---|
| 10MHz BW | Ant1 | 2407.5 | -12.71 | ≤8.00 | PASS |
| | Ant2 | 2407.5 | -12.09 | ≤8.00 | PASS |
| | total | 2407.5 | -9.38 | ≤8.00 | PASS |
| | Ant1 | 2437.5 | -7.16 | ≤8.00 | PASS |
| | Ant2 | 2437.5 | -6.71 | ≤8.00 | PASS |
| | total | 2437.5 | -3.92 | ≤8.00 | PASS |
| | Ant1 | 2467.5 | -5.40 | ≤8.00 | PASS |
| | Ant2 | 2467.5 | -5.99 | ≤8.00 | PASS |
| | total | 2467.5 | -2.67 | ≤8.00 | PASS |

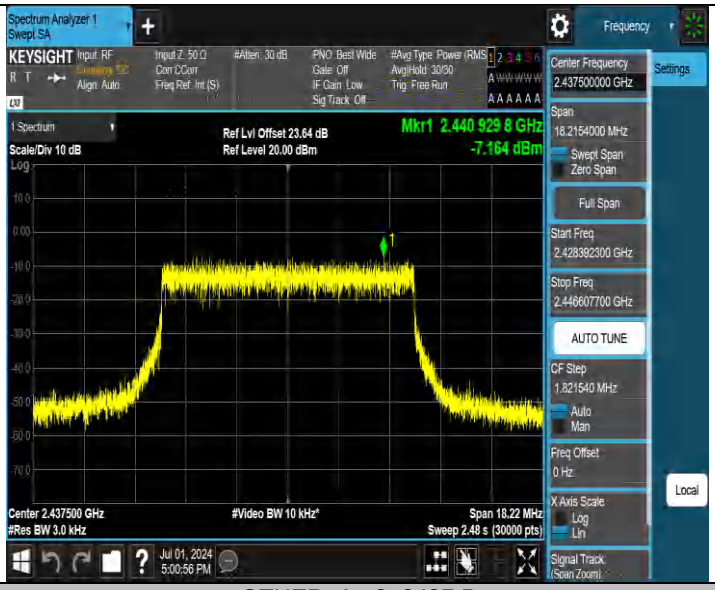
OTHER_Ant1_2407.5



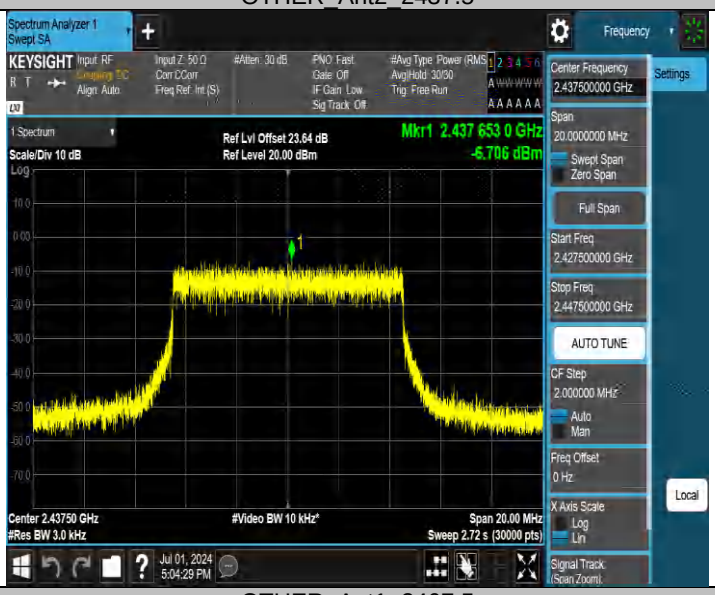

OTHER_Ant2_2407.5



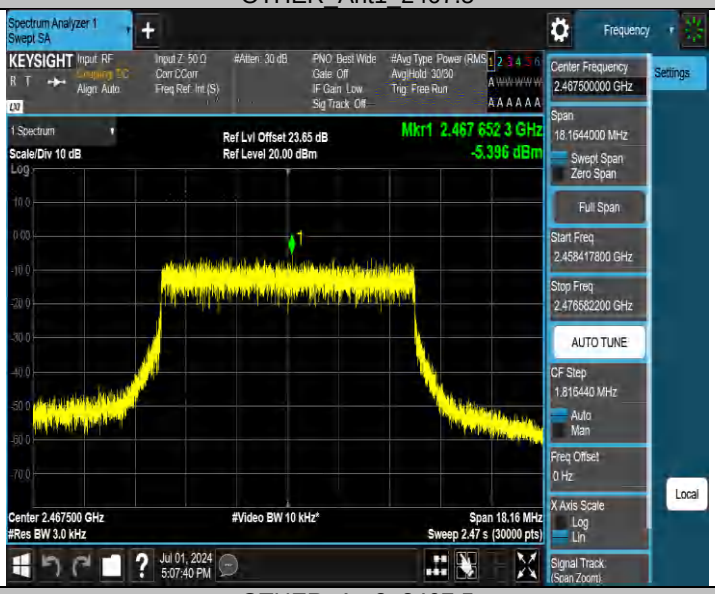

OTHER_Ant1_2437.5



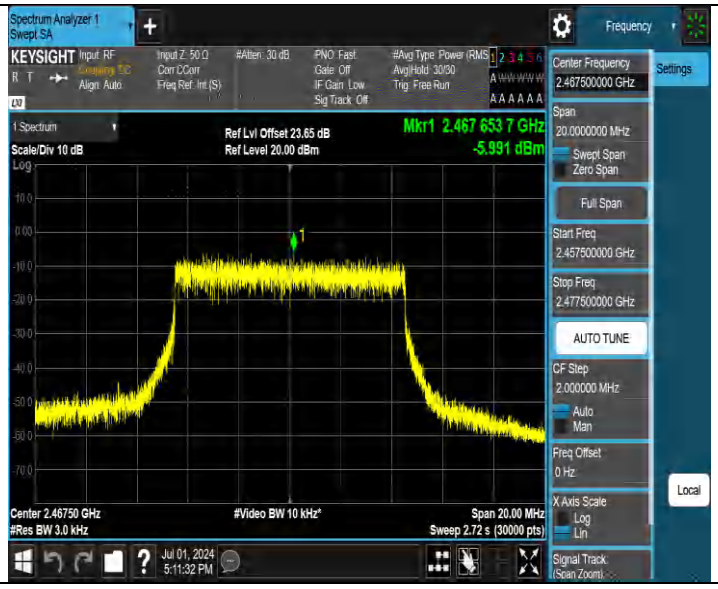

OTHER_Ant2_2437.5




OTHER_Ant1_2467.5



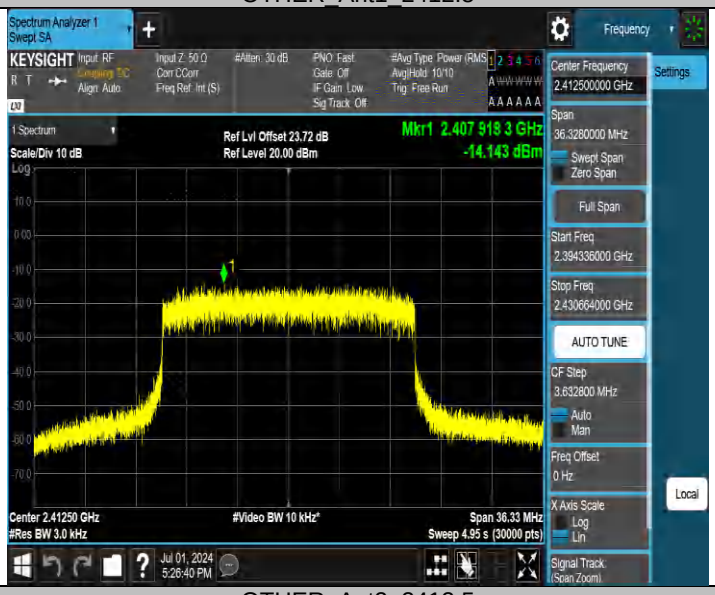

OTHER_Ant2_2467.5


Spectrum Analyzer 1
Swept SA
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto
Input Z: 50 Ω
Corr CCorr
Freq Ref: Int (S)
#Atten: 30 dB
PNO: Fast
Gate: Off
IF Gain: Low
Sig Track: Off
#Avg Type: Power (RMS)
Avg|Hold: 30/30
Trig: Free Run
1 Spectrum
Scale/Div 10 dB
Ref Lvl Offset 23.65 dB
Ref Level 20.00 dBm
Mkr1 2.467 653 7 GHz
-5.991 dBm
Center 2.46750 GHz
#Res BW 3.0 kHz
#Video BW 10 kHz*
Span 20.00 MHz
Sweep 2.72 s (30000 pts)
Jul 01, 2024
5:11:32 PM
Frequency
Settings
Center Frequency
2.467500000 GHz
Span
20.0000000 MHz
Swept Span
Zero Span
Full Span
Start Freq
2.457500000 GHz
Stop Freq
2.477500000 GHz
AUTO TUNE
CF Step
2.000000 MHz
Auto
Man
Freq Offset
0 Hz
X Axis Scale
Log
Lin
Signal Track
(Span Zoom)
Local

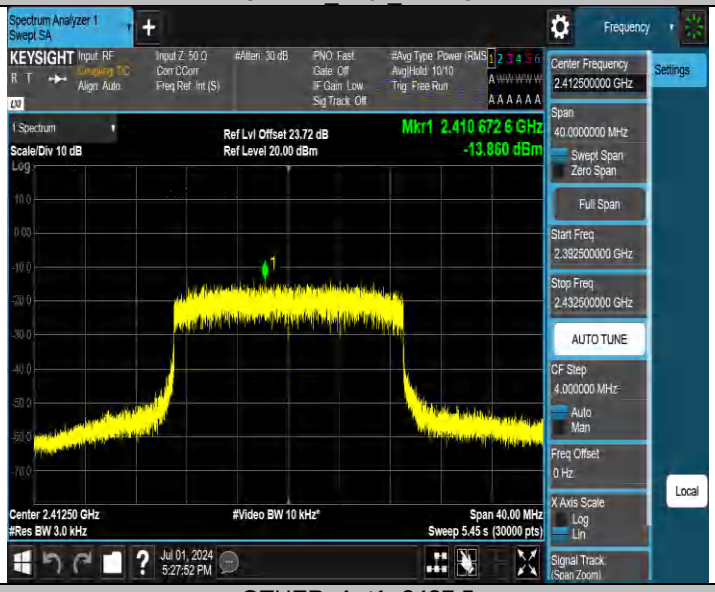
## 2.4GHz SDR, 20MHz BW

| TestMode | Antenna | Channel | Result[dBm/3-100kHz] | Limit[dBm/3kHz] | Verdict |
|---|---|---|---|---|---|
| , 20MHz BW | Ant1 | 2412.5 | -14.14 | ≤8.00 | PASS |
| | Ant2 | 2412.5 | -13.86 | ≤8.00 | PASS |
| | total | 2412.5 | -10.99 | ≤8.00 | PASS |
| | Ant1 | 2437.5 | -10.12 | ≤8.00 | PASS |
| | Ant2 | 2437.5 | -10.03 | ≤8.00 | PASS |
| | total | 2437.5 | -7.06 | ≤8.00 | PASS |
| | Ant1 | 2462.5 | -7.88 | ≤8.00 | PASS |
| | Ant2 | 2462.5 | -8.41 | ≤8.00 | PASS |
| | total | 2462.5 | -5.13 | ≤8.00 | PASS |

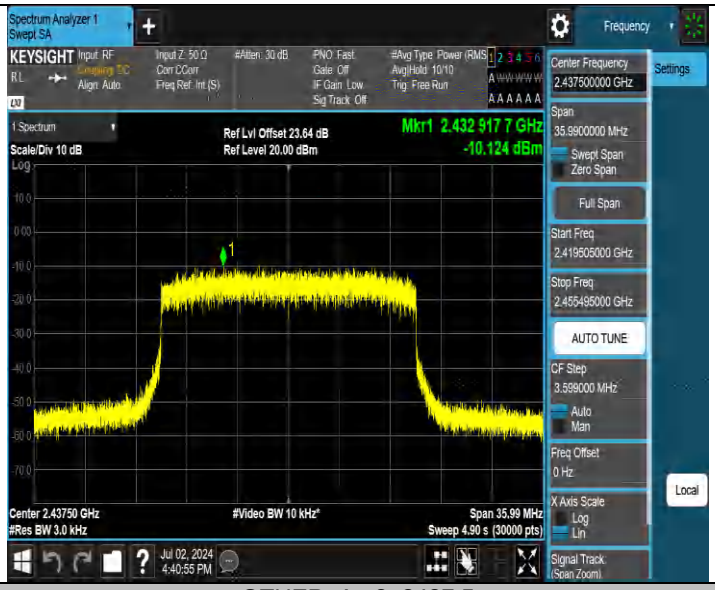
OTHER_Ant1_2412.5



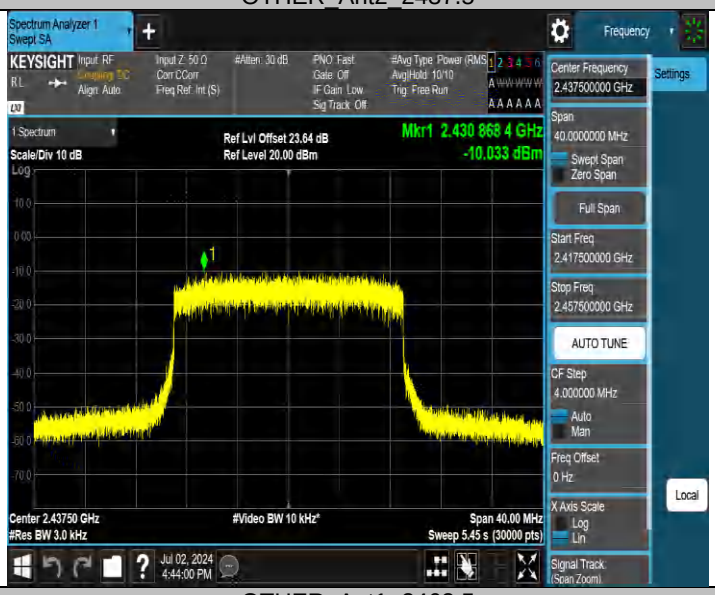

OTHER_Ant2_2412.5



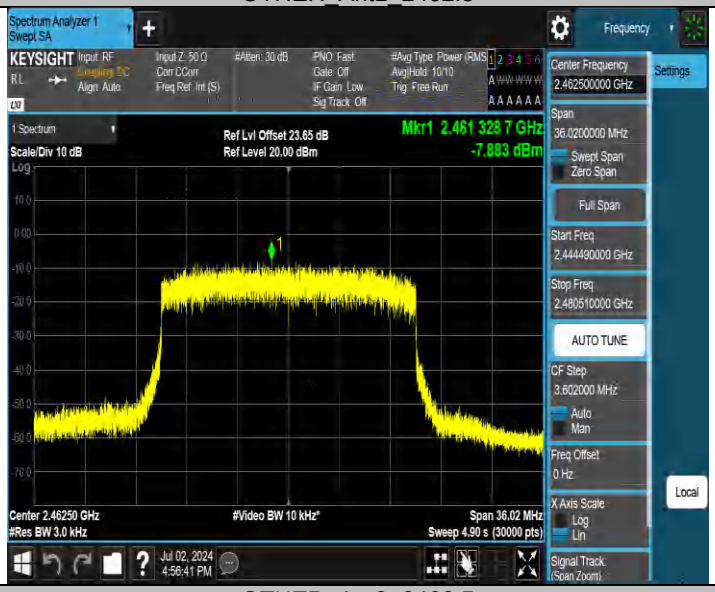

OTHER_Ant1_2437.5



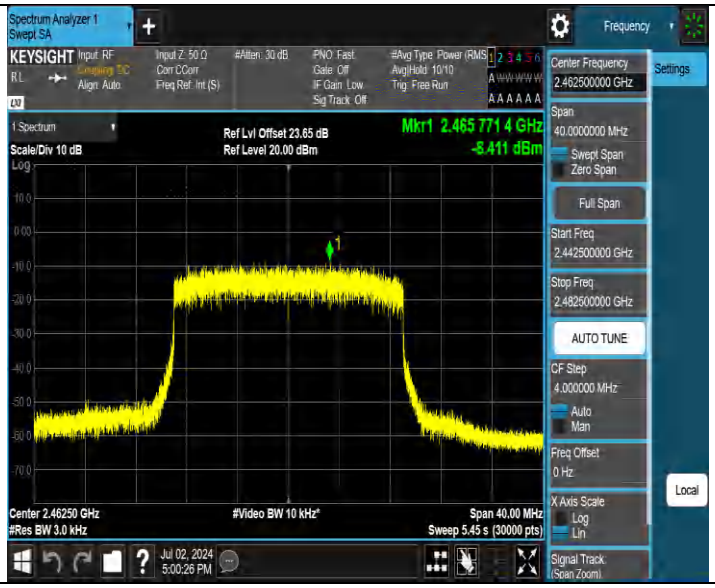

OTHER_Ant2_2437.5




OTHER_Ant1_2462.5



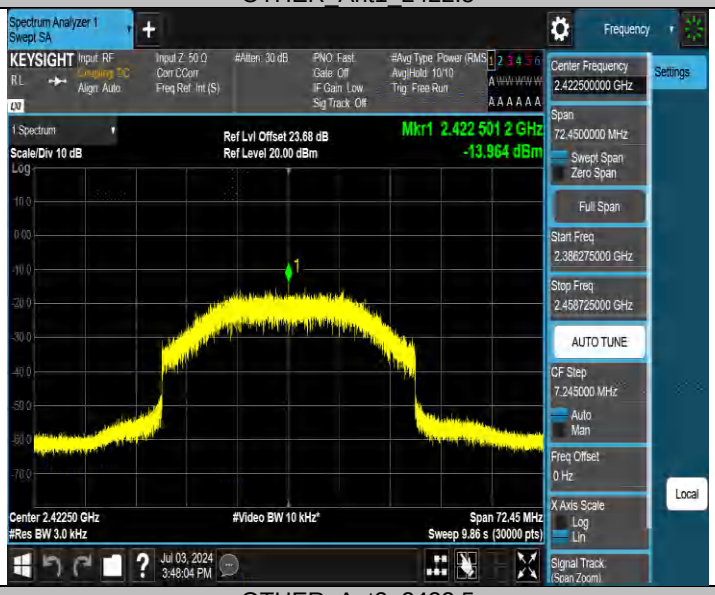

OTHER_Ant2_2462.5


Spectrum Analyzer 1
Swept SA
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto
Input Z: 50 Ω
Corr CCorr
Freq Ref: Int (S)
#Atten: 30 dB
#PNO: Fast
Gate: Off
IF Gain: Low
Sig Track: Off
#Avg Type: Power (RMS)
Avg|Hold: 10/10
Trig: Free Run
1 Spectrum
Scale/Div 10 dB
Log
Ref Lvl Offset 23.65 dB
Ref Level 20.00 dBm
Mkr1 2.465 771 4 GHz
-8.411 dBm
Center 2.46250 GHz
#Res BW 3.0 kHz
#Video BW 10 kHz*
Span 40.00 MHz
Sweep 5.45 s (30000 pts)
Jul 02, 2024
5:00:26 PM
Frequency
Settings
Center Frequency
2.462500000 GHz
Span
40.0000000 MHz
Swept Span
Zero Span
Full Span
Start Freq
2.442500000 GHz
Stop Freq
2.482500000 GHz
AUTO TUNE
CF Step
4.000000 MHz
Auto
Man
Freq Offset
0 Hz
X Axis Scale
Log
Lin
Signal Track
(Span Zoom)
Local

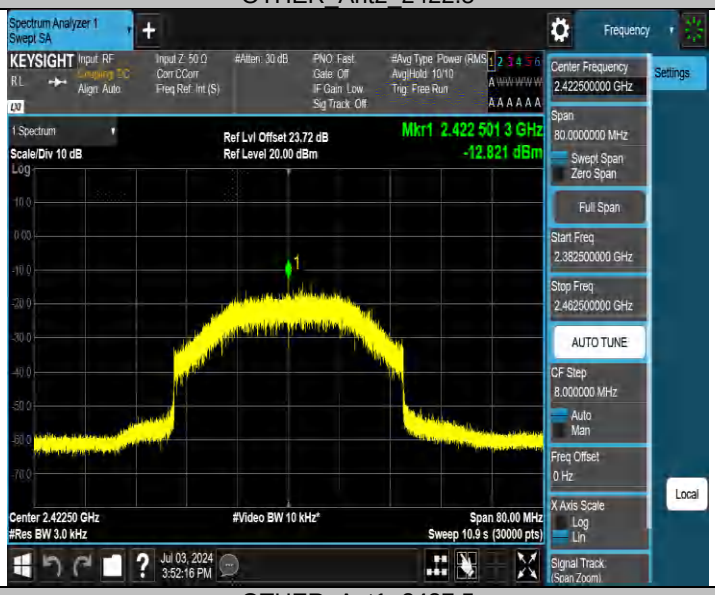
## 2.4GHz SDR, 40MHz BW

| TestMode | Antenna | Channel | Result[dBm/3-100kHz] | Limit[dBm/3kHz] | Verdict |
|---|---|---|---|---|---|
| 40MHz BW | Ant1 | 2422.5 | -13.96 | ≤8.00 | PASS |
| | Ant2 | 2422.5 | -12.82 | ≤8.00 | PASS |
| | total | 2422.5 | -10.34 | ≤8.00 | PASS |
| | Ant1 | 2437.5 | -12.55 | ≤8.00 | PASS |
| | Ant2 | 2437.5 | -10.64 | ≤8.00 | PASS |
| | total | 2437.5 | -8.48 | ≤8.00 | PASS |
| | Ant1 | 2452.5 | -10.53 | ≤8.00 | PASS |
| | Ant2 | 2452.5 | -7.27 | ≤8.00 | PASS |
| | total | 2452.5 | -5.59 | ≤8.00 | PASS |

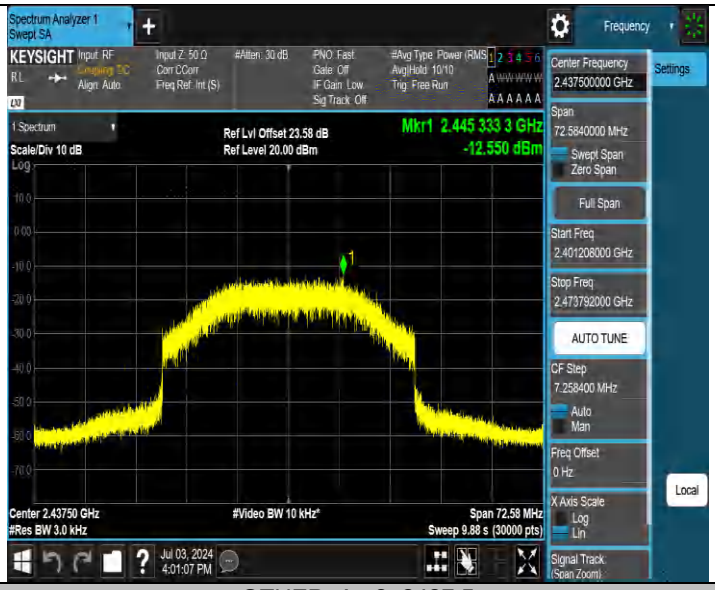
OTHER_Ant1_2422.5



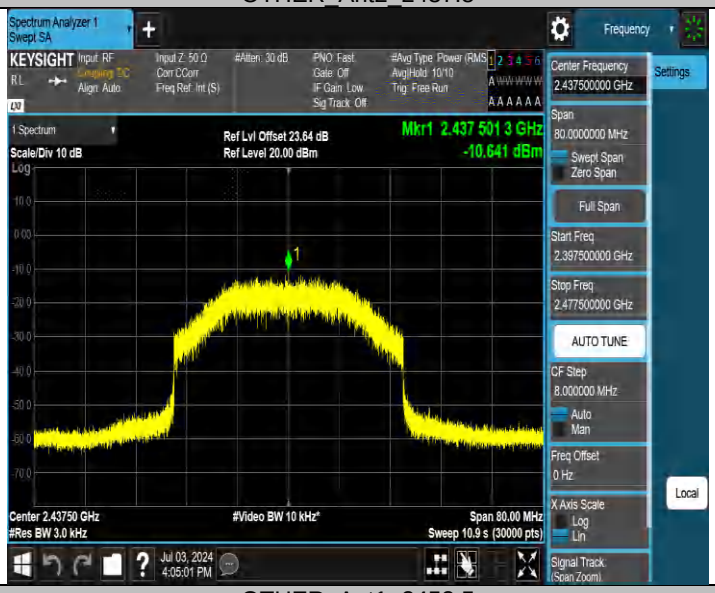

OTHER_Ant2_2422.5



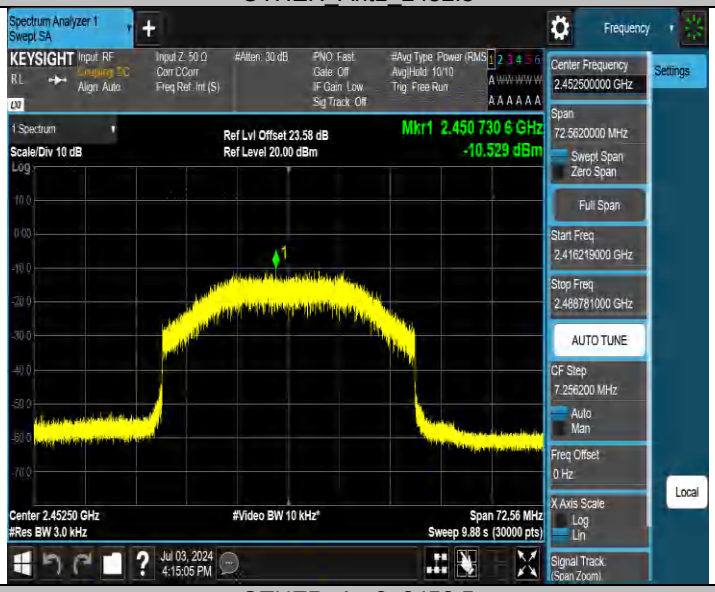

OTHER_Ant1_2437.5



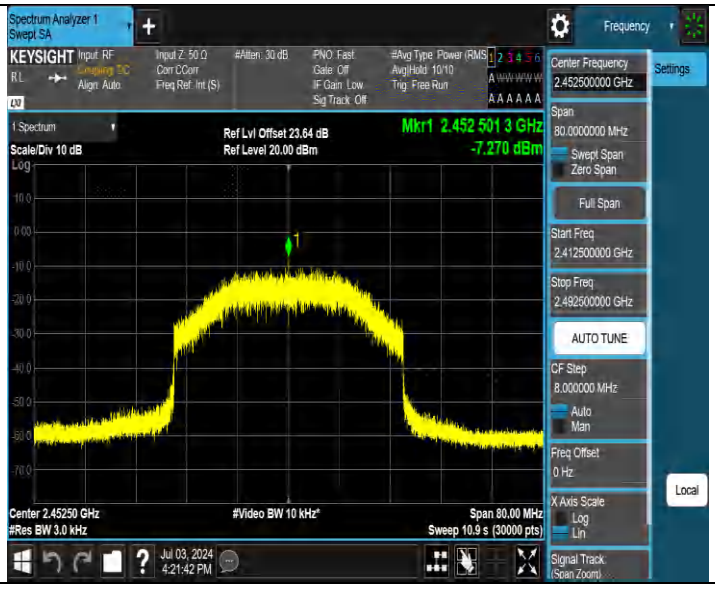

OTHER_Ant2_2437.5




OTHER_Ant1_2452.5



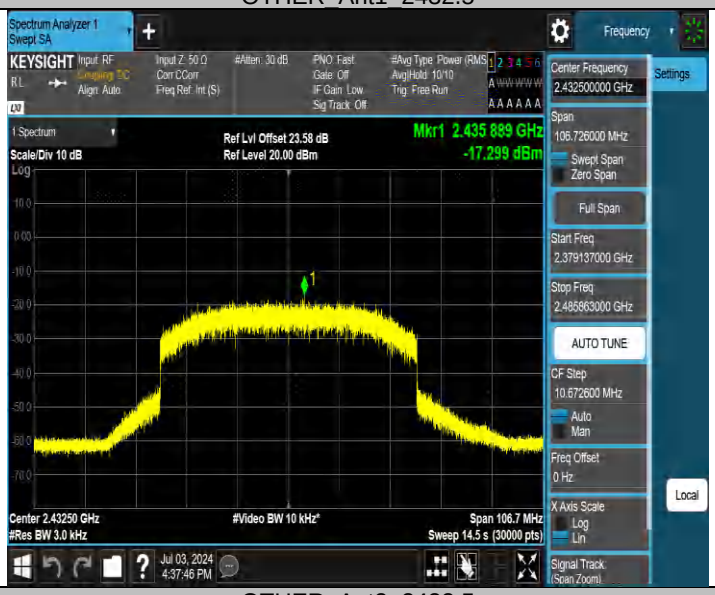

OTHER_Ant2_2452.5


Spectrum Analyzer 1
Swept SA
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto
Input Z: 50 Ω
Corr CCorr
Freq Ref: Int (S)
#Atten: 30 dB
#PNO: Fast
Gate: Off
IF Gain: Low
Sig Track: Off
#Avg Type: Power (RMS)
Avg|Hold: 10/10
Trig: Free Run
1 Spectrum
Scale/Div 10 dB
Log
Ref Lvl Offset 23.64 dB
Ref Level 20.00 dBm
Mkr1 2.452 501 3 GHz
-7.270 dBm
Center 2.45250 GHz
#Res BW 3.0 kHz
#Video BW 10 kHz*
Span 80.00 MHz
Sweep 10.9 s (30000 pts)
Jul 03, 2024
4:21:42 PM
Frequency
Center Frequency
2.452500000 GHz
Settings
Span
80.0000000 MHz
Swept Span
Zero Span
Full Span
Start Freq
2.412500000 GHz
Stop Freq
2.492500000 GHz
AUTO TUNE
CF Step
8.000000 MHz
Auto
Man
Freq Offset
0 Hz
X Axis Scale
Log
Lin
Signal Track
(Span Zoom)
Local

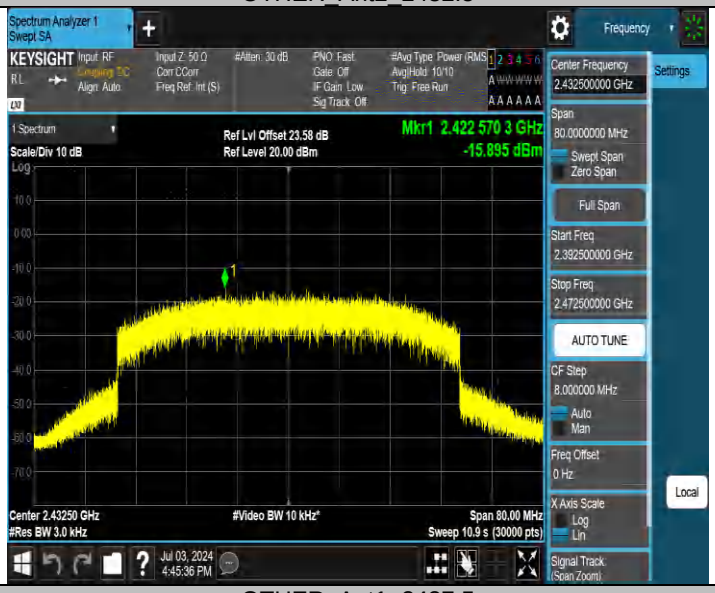
## 2.4GHz SDR, 60MHz BW

| TestMode | Antenna | Channel | Result[dBm/3-100kHz] | Limit[dBm/3kHz] | Verdict |
|---|---|---|---|---|---|
| 60MHz BW | Ant1 | 2432.5 | -17.30 | ≤8.00 | PASS |
| | Ant2 | 2432.5 | -15.90 | ≤8.00 | PASS |
| | total | 2432.5 | -13.53 | ≤8.00 | PASS |
| | Ant1 | 2437.5 | -17.28 | ≤8.00 | PASS |
| | Ant2 | 2437.5 | -16.40 | ≤8.00 | PASS |
| | total | 2437.5 | -13.81 | ≤8.00 | PASS |
| | Ant1 | 2442.5 | -16.09 | ≤8.00 | PASS |
| | Ant2 | 2442.5 | -16.18 | ≤8.00 | PASS |
| | total | 2442.5 | -13.12 | ≤8.00 | PASS |

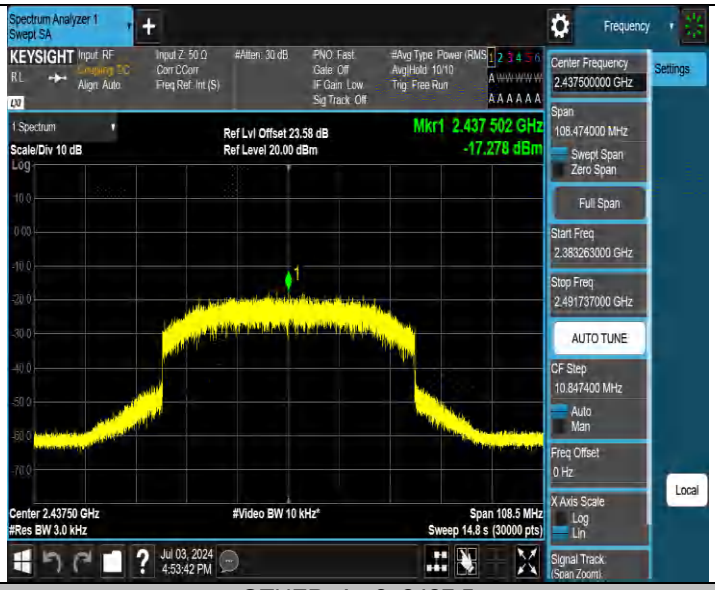
OTHER_Ant1_2432.5



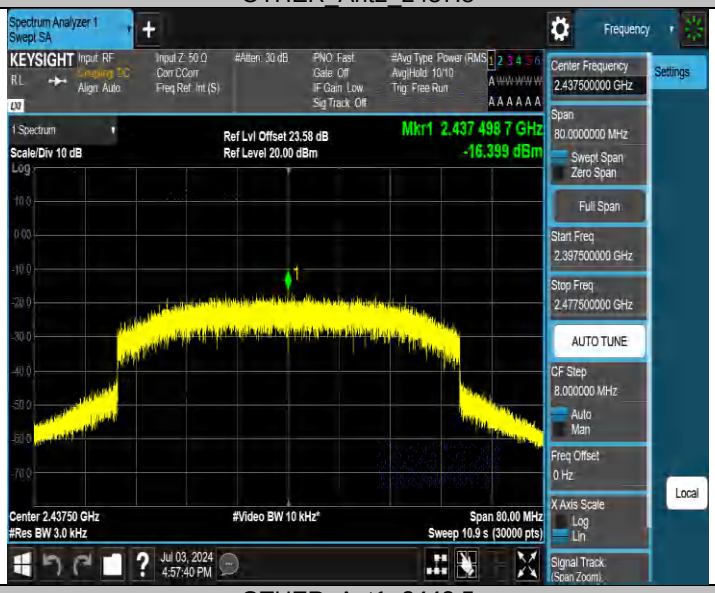

OTHER_Ant2_2432.5



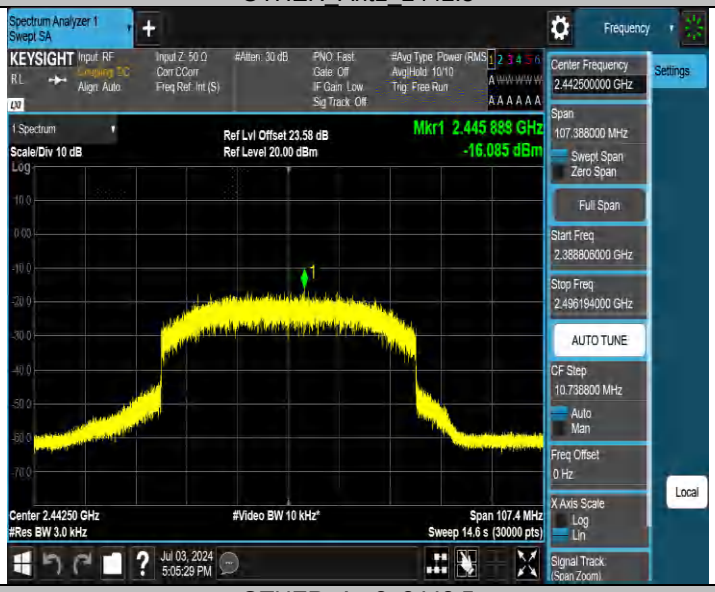

OTHER_Ant1_2437.5



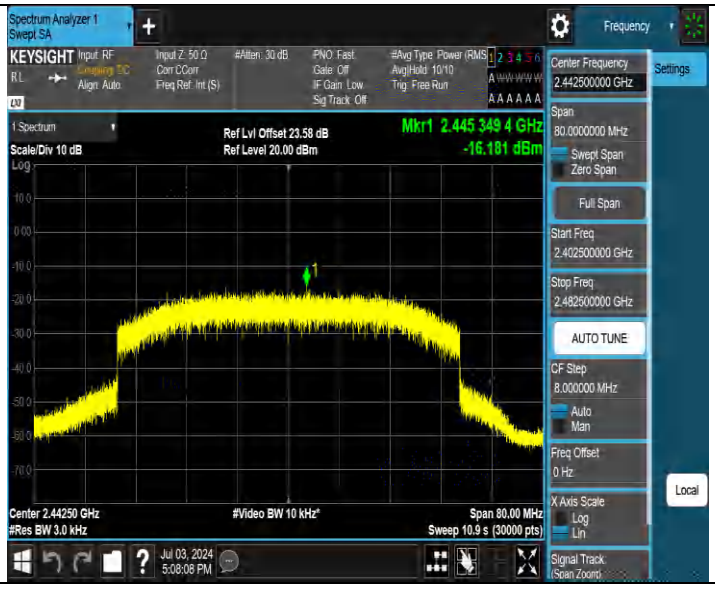

OTHER_Ant2_2437.5




OTHER_Ant1_2442.5

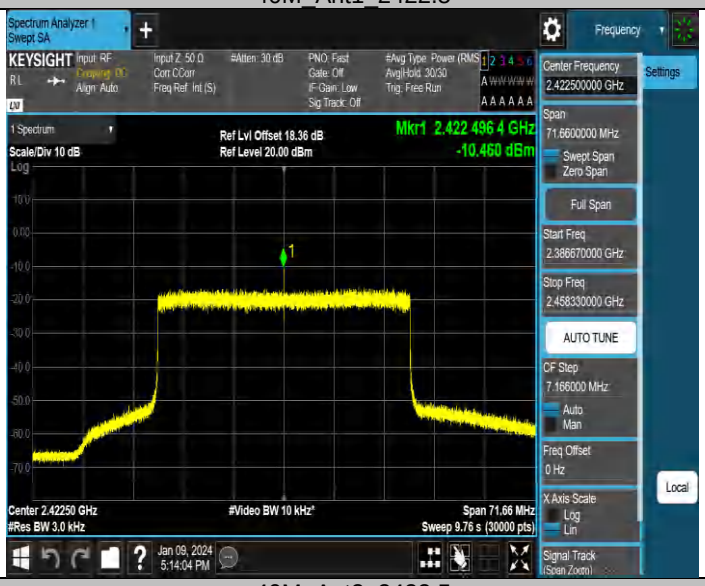



OTHER_Ant2_2442.5

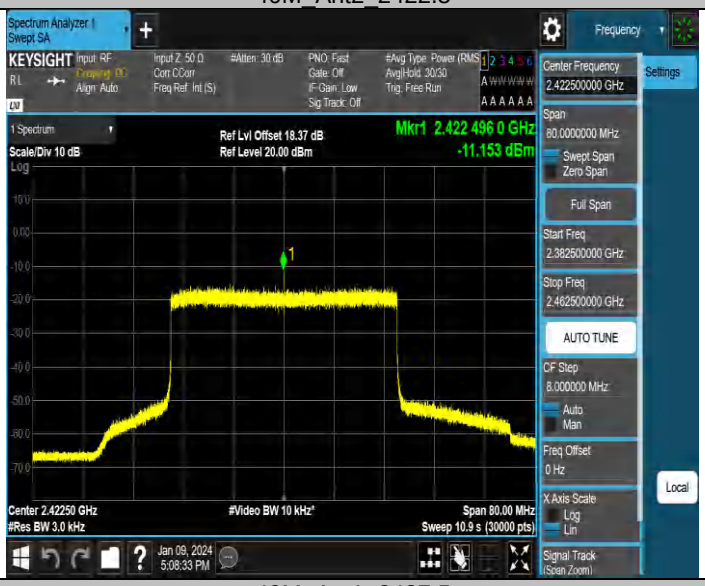

Spectrum Analyzer 1
Swept SA
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto
Input Z: 50 Ω
Corr CCorr
Freq Ref: Int (S)
#Atten: 30 dB
#NO: Fast
Gate: Off
IF Gain: Low
Sig Track: Off
#Avg Type: Power (RMS)
Avg|Hold: 10/10
Trig: Free Run
1 Spectrum
Scale/Div 10 dB
Ref Lvl Offset 23.58 dB
Ref Level 20.00 dBm
Mkr1 2.445 349 4 GHz
-16.181 dBm
Center 2.44250 GHz
#Res BW 3.0 kHz
#Video BW 10 kHz*
Span 80.00 MHz
Sweep 10.9 s (30000 pts)
Jul 03, 2024
5:08:08 PM
Frequency
Settings
Center Frequency
2.442500000 GHz
Span
80.0000000 MHz
Swept Span
Zero Span
Full Span
Start Freq
2.402500000 GHz
Stop Freq
2.482500000 GHz
AUTO TUNE
CF Step
8.000000 MHz
Auto
Man
Freq Offset
0 Hz
X Axis Scale
Log
Lin
Signal Track
(Span Zoom)
Local

| TestMode | Antenna | Channel | Result[dBm/3-100kHz] | Limit[dBm/3kHz] | Verdict |
|---|---|---|---|---|---|
| 40M | Ant1 | 2422.5 | -10.46 | ≤8.00 | PASS |
| | Ant2 | 2422.5 | -11.15 | ≤8.00 | PASS |
| | total | 2422.5 | -7.78 | ≤8.00 | PASS |
| | Ant1 | 2437.5 | -6.57 | ≤8.00 | PASS |
| | Ant2 | 2437.5 | -10.05 | ≤8.00 | PASS |
| | total | 2437.5 | -4.96 | ≤8.00 | PASS |
| | Ant1 | 2452.5 | -10.63 | ≤8.00 | PASS |
| | Ant2 | 2452.5 | -14.03 | ≤8.00 | PASS |
| | total | 2452.5 | -9 | ≤8.00 | PASS |

40M_Ant1_2422.5



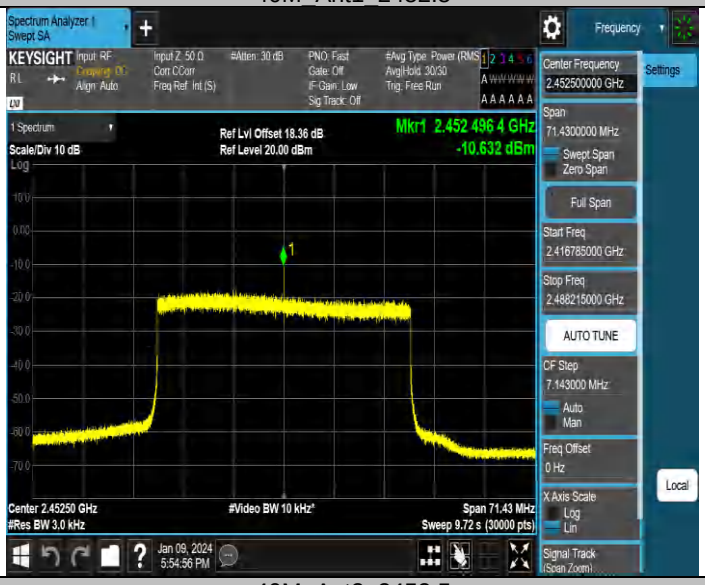

40M_Ant2_2422.5



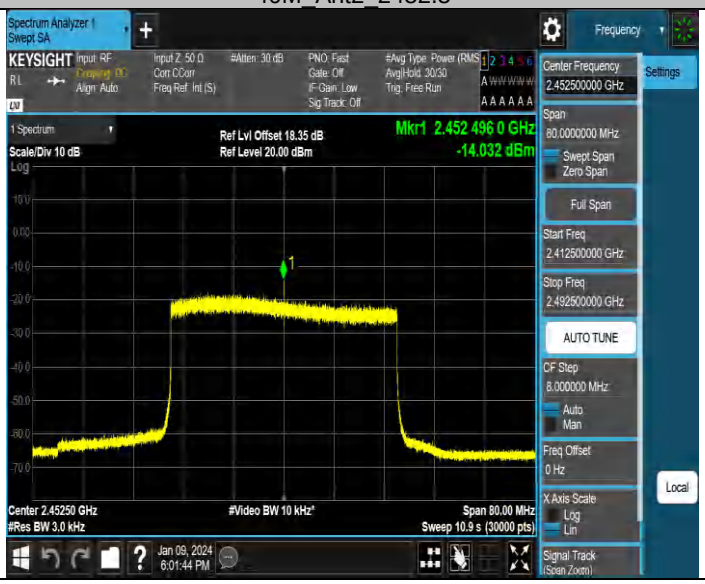

40M_Ant1_2437.5

40M_Ant2_2437.5

40M_Ant1_2452.5




40M_Ant2_2452.5



## Appendix A.3: Test Results of 6dB Bandwidth

### 2.4GHz SDR, 1.4MHz BW

| Antenna | Channel | DTS BW[MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|---|---|---|---|---|---|---|
| Ant1 | 2403.5 | 1.140 | 2402.948 | 2404.088 | 0.5 | PASS |
| | 2435.5 | 1.112 | 2434.954 | 2436.066 | 0.5 | PASS |
| | 2469.12 | 1.061 | 2468.596 | 2469.658 | 0.5 | PASS |

OTHER_Ant1_2403.5

OTHER_Ant1_2435.5

OTHER_Ant1_2469.12

Spectrum Analyzer 1
Swept SA
KEYSIGHT
Input: RF
Align: Auto
Input Z: 50 Ω
Corr CCorr
Freq Ref: Int (S)
#Atten: 40 dB
#NO: Best Wide
Gate: Off
IF Gain: Low
Sig Track: Off
#Avg Type: Power (RMS)
Avg|Hold: 50/50
Trig: Free Run
1 Spectrum
Scale/Div 10 dB
Ref Lvl Offset 23.11 dB
Ref Level 30.00 dBm
ΔMkr3 1.061 2 MHz
-0.29 dB
Center 2.469120 GHz
#Res BW 100 kHz
#Video BW 300 kHz
Span 2.800 MHz
Sweep 1.00 ms (1001 pts)
5 Marker Table
Mode Trace Scale X Y Function Function Width Function Value
1 N 1 f 2.468 596 4 GHz -0.5281 dBm
2 N 1 f 2.469 125 6 GHz 5.157 dBm
3 Δ1 1 f (Δ) 1.061 2 MHz (Δ) -0.2916 dB
Jul 01, 2024
2:56:26 PM
Frequency
Settings
Center Frequency
2.469120000 GHz
Span
2.80000000 MHz
Swept Span
Zero Span
Full Span
Start Freq
2.467720000 GHz
Stop Freq
2.470520000 GHz
AUTO TUNE
CF Step
280.000 kHz
Auto
Man
Freq Offset
0 Hz
X Axis Scale
Log
Lin
Signal Track
Local

**2.4GHz SDR, 3MHz BW**

| Antenna | Channel | DTS BW[MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|---|---|---|---|---|---|---|
| Ant1 | 2405.5 | 2.148 | 2404.438 | 2406.586 | 0.5 | PASS |
| | 2435.5 | 2.190 | 2434.408 | 2436.598 | 0.5 | PASS |
| | 2468.2 | 2.166 | 2467.120 | 2469.286 | 0.5 | PASS |

OTHER_Ant1_2405.5

OTHER_Ant1_2435.5

OTHER_Ant1_2468.2

Spectrum Analyzer 1
Swept SA
KEYSIGHT
Input: RF
Align: Auto
Input Z: 50 Ω
Corr CCorr
Freq Ref: Int (S)
#Atten: 40 dB
#NO: Best Wide
Gate: Off
IF Gain: Low
Sig Track: Off
#Avg Type: Power (RMS)
Avg|Hold: 50/50
Trig: Free Run
1 Spectrum
Scale/Div 10 dB
Ref Lvl Offset 23.61 dB
Ref Level 30.00 dBm
ΔMkr3 2.166 MHz
0.33 dB
Center 2.468200 GHz
#Res BW 100 kHz
#Video BW 300 kHz
Span 6.000 MHz
Sweep 1.00 ms (1001 pts)
5 Marker Table
Mode Trace Scale X Y Function Function Width Function Value
1 N 1 f 2.467 120 GHz -1.737 dBm
2 N 1 f 2.468 206 GHz 4.194 dBm
3 Δ1 1 f (Δ) 2.166 MHz (Δ) 0.3305 dB
Jul 01, 2024
3:38:59 PM
Frequency
Settings
Center Frequency
2.468200000 GHz
Span
6.00000000 MHz
Swept Span
Zero Span
Full Span
Start Freq
2.465200000 GHz
Stop Freq
2.471200000 GHz
AUTO TUNE
CF Step
600.000 kHz
Auto
Man
Freq Offset
0 Hz
X Axis Scale
Log
Lin
Local

**2.4GHz SDR, 5MHz BW**

| Antenna | Channel | DTS BW[MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|---|---|---|---|---|---|---|
| Ant1 | 2404.5 | 4.300 | 2402.360 | 2406.660 | 0.5 | PASS |
| | 2434.5 | 4.310 | 2432.330 | 2436.640 | 0.5 | PASS |
| | 2469.5 | 4.300 | 2467.350 | 2471.650 | 0.5 | PASS |

OTHER_Ant1_2404.5

OTHER_Ant1_2434.5

OTHER_Ant1_2469.5

Spectrum Analyzer 1
Swept SA
KEYSIGHT
Input: RF
Align: Auto
Input Z: 50 Ω
Corr CCorr
Freq Ref: Int (S)
#Atten: 40 dB
#NO: Best Wide
Gate: Off
IF Gain: Low
Sig Track: Off
#Avg Type: Power (RMS)
Avg|Hold: 50/50
Trig: Free Run
1 Spectrum
Scale/Div 10 dB
Ref Lvl Offset 23.61 dB
Ref Level 30.00 dBm
ΔMkr3 4.30 MHz
-0.48 dB
Center 2.469500 GHz
#Res BW 100 kHz
#Video BW 300 kHz
Span 10.00 MHz
Sweep 1.00 ms (1001 pts)
5 Marker Table
Mode Trace Scale X Y Function Function Width Function Value
1 N 1 f 2.467 35 GHz -2.552 dBm
2 N 1 f 2.469 51 GHz 2.888 dBm
3 Δ1 1 f (Δ) 4.30 MHz (Δ) -0.4781 dB
Jul 01, 2024
4:06:55 PM
Frequency
Settings
Center Frequency
2.469500000 GHz
Span
10.0000000 MHz
Swept Span
Zero Span
Full Span
Start Freq
2.464500000 GHz
Stop Freq
2.474500000 GHz
AUTO TUNE
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz
X Axis Scale
Log
Lin
Signal Track
(Span Zoom)
Local

**2.4GHz SDR, 10MHz BW**

| Antenna | Channel | DTS BW[MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|---|---|---|---|---|---|---|
| Ant1 | 2407.5 | 9.020 | 2403.000 | 2412.020 | 0.5 | PASS |
| | 2437.5 | 9.020 | 2433.000 | 2442.020 | 0.5 | PASS |
| | 2467.5 | 9.020 | 2462.980 | 2472.000 | 0.5 | PASS |

OTHER_Ant1_2407.5

OTHER_Ant1_2437.5

OTHER_Ant1_2467.5

Spectrum Analyzer 1
Swept SA
KEYSIGHT
Input: RF
Input Z: 50 Ω
Corr CCorr
Freq Ref: Int (S)
#Atten: 40 dB
PNO: Fast
Gate: Off
IF Gain: Low
Sig Track: Off
#Avg Type: Power (RMS)
Avg|Hold: 50/50
Trig: Free Run
Align: Auto
1 Spectrum
Scale/Div 10 dB
Ref Lvl Offset 23.61 dB
Ref Level 30.00 dBm
ΔMkr3 9.02 MHz
1.62 dB
Center 2.46750 GHz
#Res BW 100 kHz
#Video BW 300 kHz
Span 20.00 MHz
Sweep 1.93 ms (1001 pts)
5 Marker Table
Mode Trace Scale X Y Function Function Width Function Value
1 N 1 f 2.462 98 GHz -5.803 dBm
2 N 1 f 2.470 84 GHz 0.1090 dBm
3 Δ1 1 f (Δ) 9.02 MHz (Δ) 1.619 dB
Jul 01, 2024
4:36:49 PM
Frequency
Center Frequency
2.467500000 GHz
Settings
Span
20.00000000 MHz
Swept Span
Zero Span
Full Span
Start Freq
2.457500000 GHz
Stop Freq
2.477500000 GHz
AUTO TUNE
CF Step
2.000000 MHz
Auto
Man
Freq Offset
0 Hz
X Axis Scale
Log
Lin
Local

## 2.4GHz SDR, 20MHz BW

| Antenna | Channel | DTS BW[MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|---|---|---|---|---|---|---|
| Ant1 | 2412.5 | 17.840 | 2403.660 | 2421.500 | 0.5 | PASS |
| | 2437.5 | 18.000 | 2428.500 | 2446.500 | 0.5 | PASS |
| | 2462.5 | 17.880 | 2453.540 | 2471.420 | 0.5 | PASS |

OTHER_Ant1_2412.5

OTHER_Ant1_2437.5

OTHER_Ant1_2462.5

Spectrum Analyzer 1
Swept SA
KEYSIGHT
Input: RF
Align: Auto
Input Z: 50 Ω
Corr CCorr
Freq Ref: Int (S)
#Atten: 40 dB
PNO: Fast
Gate: Off
IF Gain: Low
Sig Track: Off
#Avg Type: Power (RMS)
Avg|Hold: 50/50
Trig: Free Run
1 Spectrum
Scale/Div 10 dB
Ref Lvl Offset 23.61 dB
Ref Level 30.00 dBm
ΔMkr3 17.88 MHz
0.03 dB
Center 2.46250 GHz
#Res BW 100 kHz
#Video BW 300 kHz
Span 40.00 MHz
Sweep 3.87 ms (1001 pts)
5 Marker Table
Mode Trace Scale X Y Function Function Width Function Value
1 N 1 f 2.453 54 GHz -5.258 dBm
2 N 1 f 2.456 50 GHz 0.3608 dBm
3 Δ1 1 f (Δ) 17.88 MHz (Δ) 0.03316 dB
Jul 01, 2024
5:17:32 PM
Frequency
Center Frequency
2.462500000 GHz
Settings
Span
40.00000000 MHz
Swept Span
Zero Span
Full Span
Start Freq
2.442500000 GHz
Stop Freq
2.482500000 GHz
AUTO TUNE
CF Step
4.000000 MHz
Auto
Man
Freq Offset
0 Hz
X Axis Scale
Log
Lin
Local

## 2.4GHz SDR, 40MHz BW

| Antenna | Channel | DTS BW[MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|---|---|---|---|---|---|---|
| Ant1 | 2422.5 | 35.760 | 2404.660 | 2440.420 | 0.5 | PASS |
| | 2437.5 | 35.920 | 2419.580 | 2455.500 | 0.5 | PASS |
| | 2452.5 | 35.760 | 2434.580 | 2470.340 | 0.5 | PASS |

OTHER_Ant1_2422.5

OTHER_Ant1_2437.5

OTHER_Ant1_2452.5

Spectrum Analyzer 1
Swept SA
KEYSIGHT
Input: RF
Input Z: 50 Ω
Corr CCorr
Freq Ref: Int (S)
#Atten: 40 dB
PNO: Fast
Gate: Off
IF Gain: Low
Sig Track: Off
#Avg Type: Power (RMS)
Avg|Hold: 50/50
Trig: Free Run
Align: Auto
1 Spectrum
Scale/Div 10 dB
Ref Lvl Offset 23.58 dB
Ref Level 30.00 dBm
ΔMkr3 35.76 MHz
-0.43 dB
Center 2.45250 GHz
#Res BW 100 kHz
#Video BW 300 kHz
Span 80.00 MHz
Sweep 7.67 ms (1001 pts)
5 Marker Table
Mode Trace Scale X Y Function Function Width Function Value
1 N 1 f 2.434 58 GHz -7.957 dBm
2 N 1 f 2.465 22 GHz -3.251 dBm
3 Δ1 1 f (Δ) 35.76 MHz (Δ) -0.4314 dB
Jul 02, 2024
5:09:18 PM
Frequency
Center Frequency
2.452500000 GHz
Settings
Span
80.00000000 MHz
Swept Span
Zero Span
Full Span
Start Freq
2.412500000 GHz
Stop Freq
2.492500000 GHz
AUTO TUNE
CF Step
8.000000 MHz
Auto
Man
Freq Offset
0 Hz
X Axis Scale
Log
Lin
Local

## 2.4GHz SDR, 60MHz BW

| Antenna | Channel | DTS BW[MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|---|---|---|---|---|---|---|
| Ant1 | 2432.5 | 53.680 | 2405.700 | 2459.380 | 0.5 | PASS |
| | 2437.5 | 53.600 | 2410.700 | 2464.300 | 0.5 | PASS |
| | 2442.5 | 53.440 | 2415.700 | 2469.140 | 0.5 | PASS |

OTHER_Ant1_2432.5

OTHER_Ant1_2437.5

OTHER_Ant1_2442.5

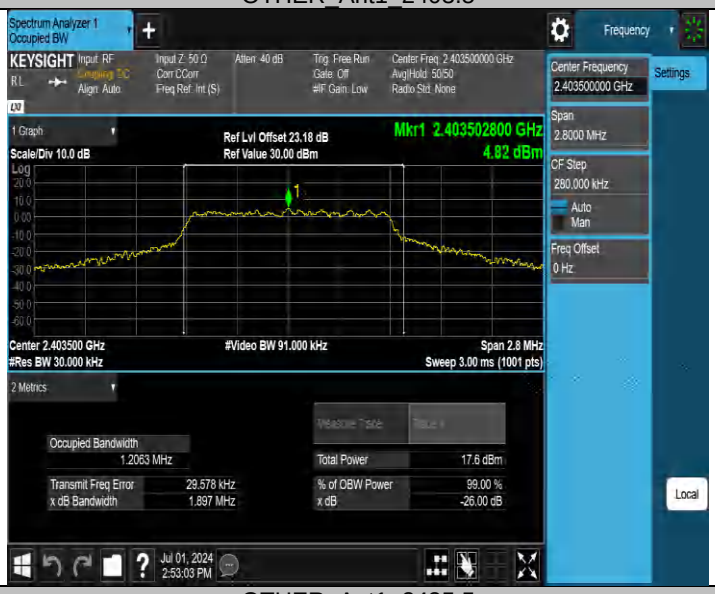
Spectrum Analyzer 1
Swept SA
KEYSIGHT
Input: RF
Input Z: 50 Ω
#Atten: 40 dB
PNO: Fast
#Avg Type: Power (RMS)
Gate: Off
Avg|Hold: 50/50
IF Gain: Low
Trig: Free Run
Sig Track: Off
Align: Auto
Freq Ref: Int (S)
1 Spectrum
Scale/Div 10 dB
Ref Lvl Offset 23.58 dB
Ref Level 30.00 dBm
ΔMkr3 53.44 MHz
0.80 dB
Center 2.44250 GHz
#Res BW 100 kHz
#Video BW 300 kHz
Span 80.00 MHz
Sweep 7.67 ms (1001 pts)
5 Marker Table
Mode Trace Scale X Y Function Function Width Function Value
1 N 1 f 2.415 70 GHz -13.45 dBm
2 N 1 f 2.445 46 GHz -8.219 dBm
3 Δ1 1 f (Δ) 53.44 MHz (Δ) 0.7968 dB
Jul 03, 2024
4:27:42 PM
Frequency
Center Frequency
2.442500000 GHz
Settings
Span
80.0000000 MHz
Swept Span
Zero Span
Full Span
Start Freq
2.402500000 GHz
Stop Freq
2.482500000 GHz
AUTO TUNE
CF Step
8.000000 MHz
Auto
Man
Freq Offset
0 Hz
X Axis Scale
Log
Lin
Signal Track
(Span Zoom)
Local

## Appendix A.4: Test Results of 99% Bandwidth

### 2.4GHz SDR, 1.4MHz BW

| Antenna | Channel | OCB [MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|---|---|---|---|---|---|---|
| Ant1 | 2403.5 | 1.2063 | 2402.9264 | 2404.1327 | --- | --- |
| | 2435.5 | 1.1978 | 2434.9280 | 2436.1258 | --- | --- |
| | 2469.12 | 1.1968 | 2468.5454 | 2469.7422 | --- | --- |

OTHER_Ant1_2403.5




OTHER_Ant1_2435.5

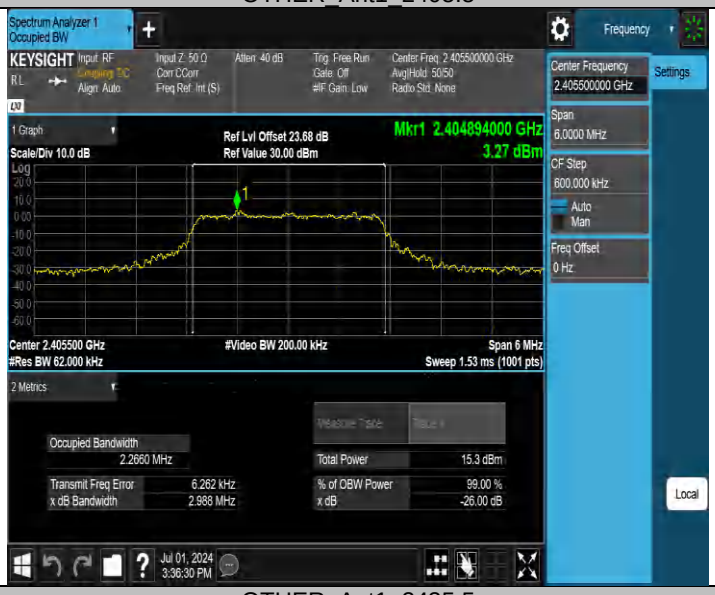
OTHER_Ant1_2469.12

Spectrum Analyzer 1
Occupied BW
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto
Input Z: 50 Ω
Corr CCorr
Freq Ref: Int (S)
Atten: 40 dB
Trig: Free Run
Gate: Off
#IF Gain: Low
Center Freq: 2.469120000 GHz
Avg|Hold: 50/50
Radio Std: None
Frequency
Center Frequency
2.469120000 GHz
Settings
Span
2.8000 MHz
CF Step
280.000 kHz
Auto
Man
Freq Offset
0 Hz
1 Graph
Scale/Div 10.0 dB
Ref Lvl Offset 23.11 dB
Ref Value 30.00 dBm
Mkr1 2.469128400 GHz
1.28 dBm
Center 2.469120 GHz
#Res BW 30.000 kHz
#Video BW 91.000 kHz
Span 2.8 MHz
Sweep 3.00 ms (1001 pts)
2 Metrics
Occupied Bandwidth
1.1968 MHz
Total Power
11.3 dBm
Transmit Freq Error
23.792 kHz
x dB Bandwidth
1.622 MHz
% of OBW Power
99.00 %
x dB
-26.00 dB
Local
Jul 01, 2024
2:56:32 PM

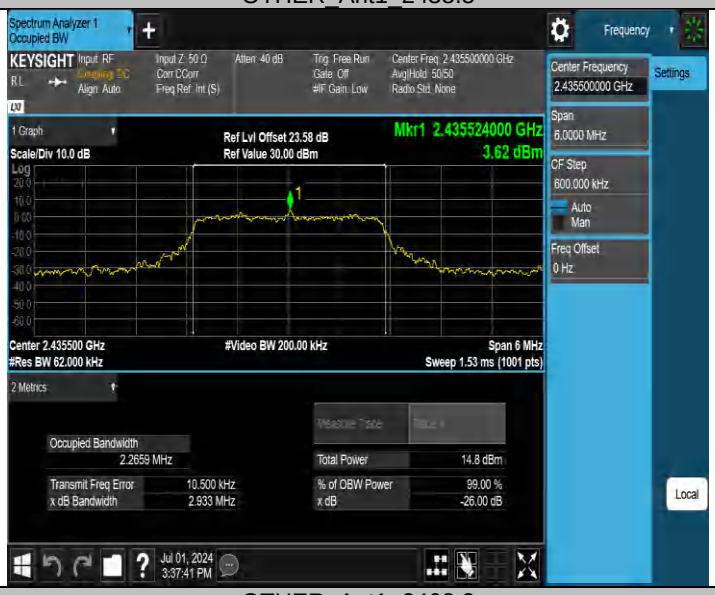
## 2.4GHz SDR, 3MHz BW

| Antenna | Channel | OCB [MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|---|---|---|---|---|---|---|
| Ant1 | 2405.5 | 2.2660 | 2404.3733 | 2406.6393 | --- | --- |
| | 2435.5 | 2.2659 | 2434.3776 | 2436.6435 | --- | --- |
| | 2468.2 | 2.2791 | 2467.0627 | 2469.3418 | --- | --- |

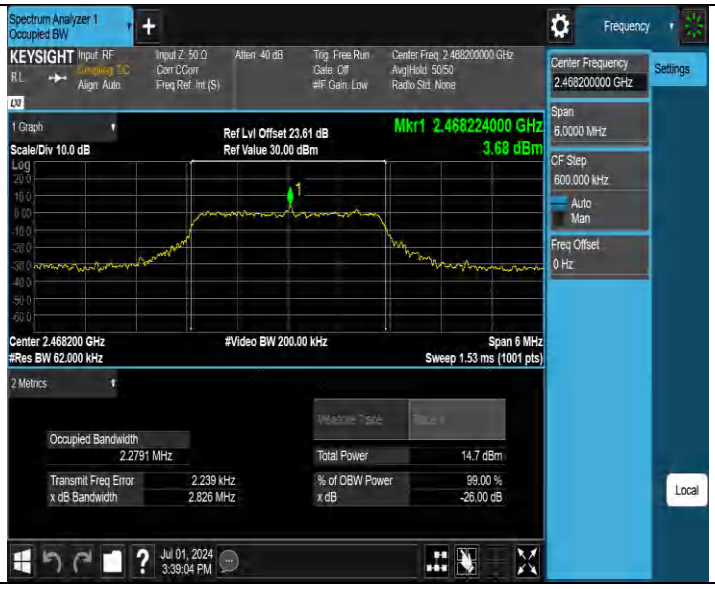
OTHER_Ant1_2405.5




OTHER_Ant1_2435.5




OTHER_Ant1_2468.2

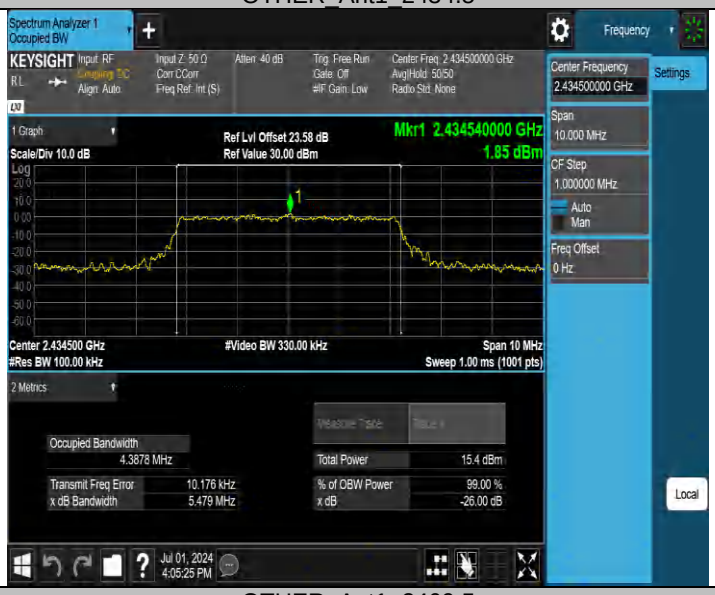

Spectrum Analyzer 1
Occupied BW
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto
Input Z: 50 Ω
Corr CCorr
Freq Ref: Int (S)
Atten: 40 dB
Trig: Free Run
Gate: Off
#IF Gain: Low
Center Freq: 2.468200000 GHz
Avg|Hold: 50/50
Radio Std: None
Frequency
Center Frequency
2.468200000 GHz
Settings
Span
6.0000 MHz
CF Step
600.000 kHz
Auto
Man
Freq Offset
0 Hz
1 Graph
Scale/Div 10.0 dB
Ref Lvl Offset 23.61 dB
Ref Value 30.00 dBm
Mkr1 2.468224000 GHz
3.68 dBm
Center 2.468200 GHz
#Res BW 62.000 kHz
#Video BW 200.00 kHz
Span 6 MHz
Sweep 1.53 ms (1001 pts)
2 Metrics
Occupied Bandwidth
2.2791 MHz
Total Power
14.7 dBm
Transmit Freq Error
2.239 kHz
x dB Bandwidth
2.826 MHz
% of OBW Power
99.00 %
x dB
-26.00 dB
Local
Jul 01, 2024
3:39:04 PM

## 2.4GHz SDR, 5MHz BW

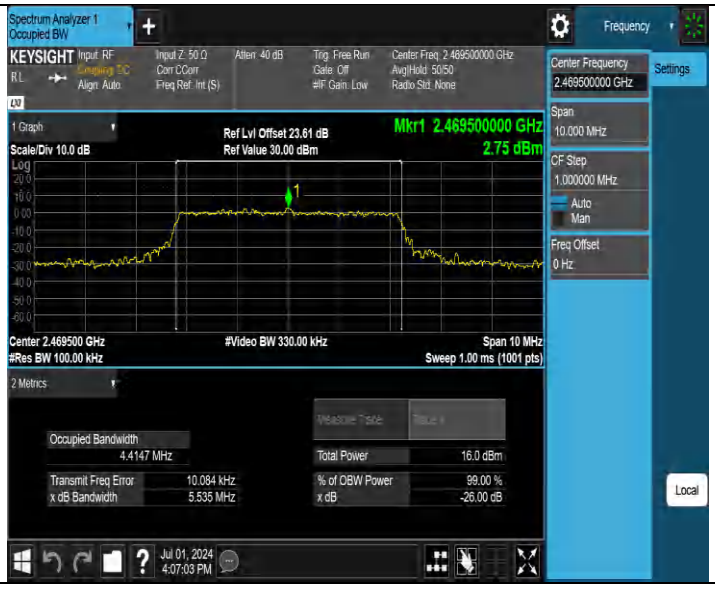
| Antenna | Channel | OCB [MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|---|---|---|---|---|---|---|
| Ant1 | 2404.5 | 4.3908 | 2402.3143 | 2406.7051 | --- | --- |
| | 2434.5 | 4.3878 | 2432.3163 | 2436.7041 | --- | --- |
| | 2469.5 | 4.4147 | 2467.3027 | 2471.7174 | --- | --- |

OTHER_Ant1_2404.5

OTHER_Ant1_2434.5



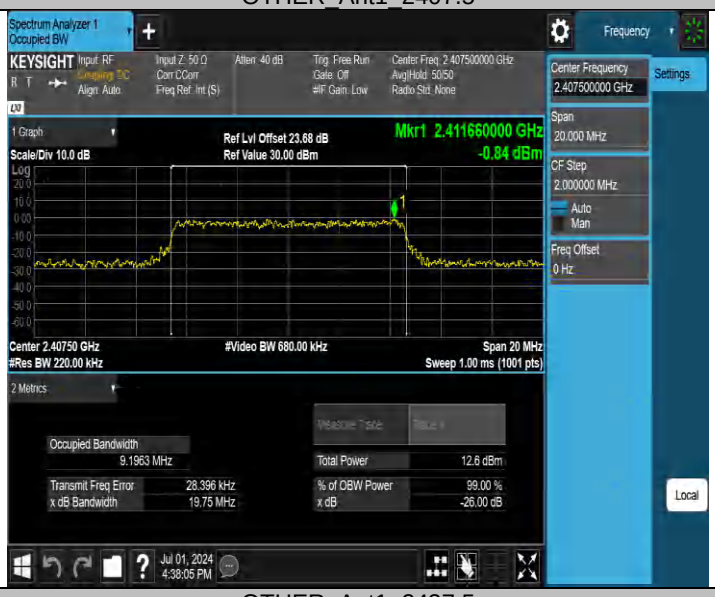

OTHER_Ant1_2469.5


Spectrum Analyzer 1
Occupied BW
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto
Input Z: 50 Ω
Corr CCorr
Freq Ref: Int (S)
Atten: 40 dB
Trig: Free Run
Gate: Off
#IF Gain: Low
Center Freq: 2.469500000 GHz
Avg|Hold: 50/50
Radio Std: None
Frequency
1 Graph
Scale/Div 10.0 dB
Ref Lvl Offset 23.61 dB
Ref Value 30.00 dBm
Mkr1 2.469500000 GHz
2.75 dBm
Center 2.469500 GHz
#Res BW 100.00 kHz
#Video BW 330.00 kHz
Span 10 MHz
Sweep 1.00 ms (1001 pts)
2 Metrics
Occupied Bandwidth
4.4147 MHz
Total Power
16.0 dBm
Transmit Freq Error
10.084 kHz
x dB Bandwidth
5.535 MHz
% of OBW Power
99.00 %
x dB
-26.00 dB
Center Frequency
2.469500000 GHz
Settings
Span
10.000 MHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz
Local
Jul 01, 2024
4:07:03 PM

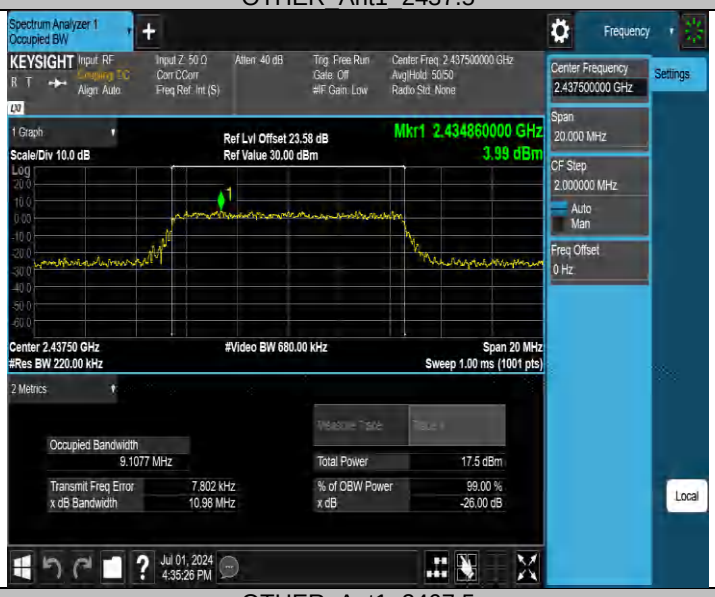
**2.4GHz SDR, 10MHz BW**

| Antenna | Channel | OCB [MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|---|---|---|---|---|---|---|
| Ant1 | 2407.5 | 9.1963 | 2402.9303 | 2412.1266 | --- | --- |
| | 2437.5 | 9.1077 | 2432.9540 | 2442.0617 | --- | --- |
| | 2467.5 | 9.0822 | 2462.9606 | 2472.0428 | --- | --- |

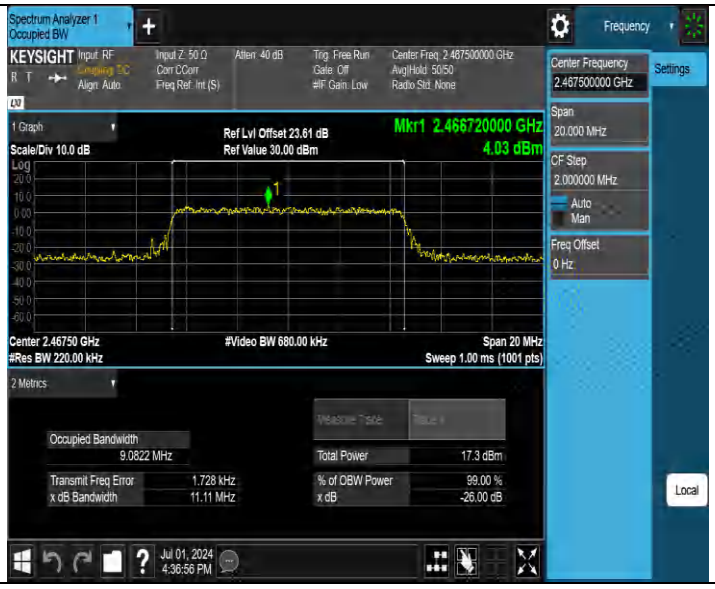
OTHER_Ant1_2407.5




OTHER_Ant1_2437.5



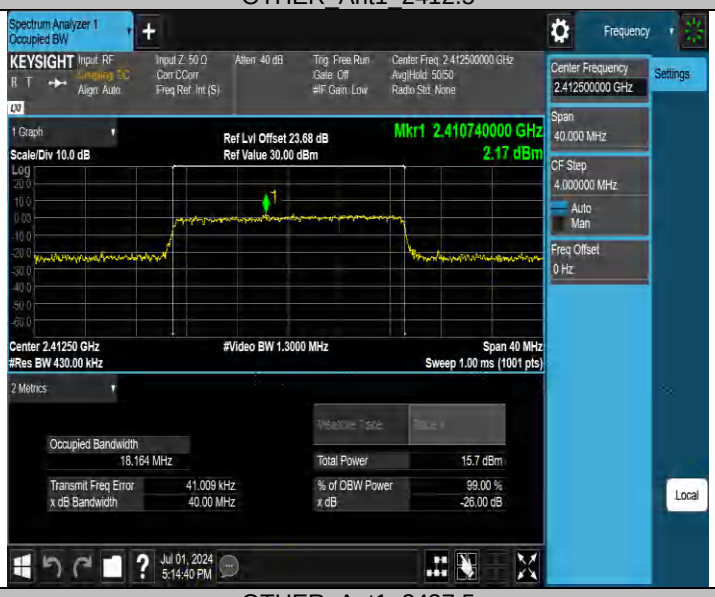

OTHER_Ant1_2467.5


Spectrum Analyzer 1
Occupied BW
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto
Input Z: 50 Ω
Corr CCorr
Freq Ref: Int (S)
Atten: 40 dB
Trig: Free Run
Gate: Off
#IF Gain: Low
Center Freq: 2.467500000 GHz
Avg|Hold: 50/50
Radio Std: None
Frequency
Center Frequency
2.467500000 GHz
Settings
Span
20.000 MHz
CF Step
2.000000 MHz
Auto
Man
Freq Offset
0 Hz
1 Graph
Scale/Div 10.0 dB
Ref Lvl Offset 23.61 dB
Ref Value 30.00 dBm
Mkr1 2.466720000 GHz
4.03 dBm
Center 2.46750 GHz
#Res BW 220.00 kHz
#Video BW 680.00 kHz
Span 20 MHz
Sweep 1.00 ms (1001 pts)
2 Metrics
Occupied Bandwidth
9.0822 MHz
Total Power
17.3 dBm
Transmit Freq Error
1.728 kHz
x dB Bandwidth
11.11 MHz
% of OBW Power
99.00 %
x dB
-26.00 dB
Local
Jul 01, 2024
4:36:56 PM

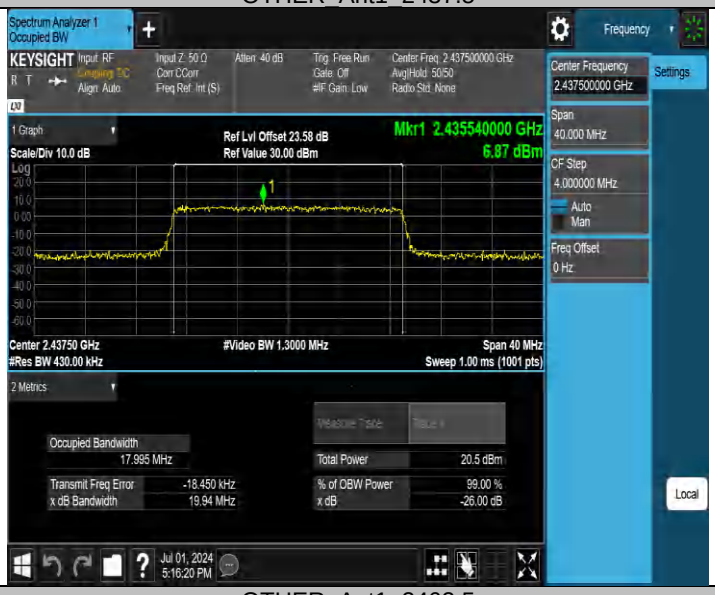
**2.4GHz SDR, 20MHz BW**

| Antenna | Channel | OCB [MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|---|---|---|---|---|---|---|
| Ant1 | 2412.5 | 18.164 | 2403.4590 | 2421.6230 | --- | --- |
| | 2437.5 | 17.995 | 2428.4841 | 2446.4791 | --- | --- |
| | 2462.5 | 18.010 | 2453.4922 | 2471.5022 | --- | --- |

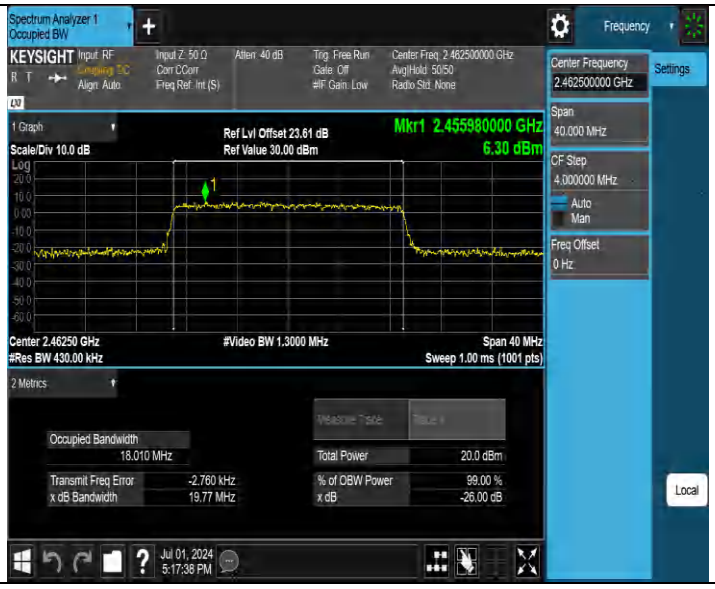
OTHER_Ant1_2412.5




OTHER_Ant1_2437.5



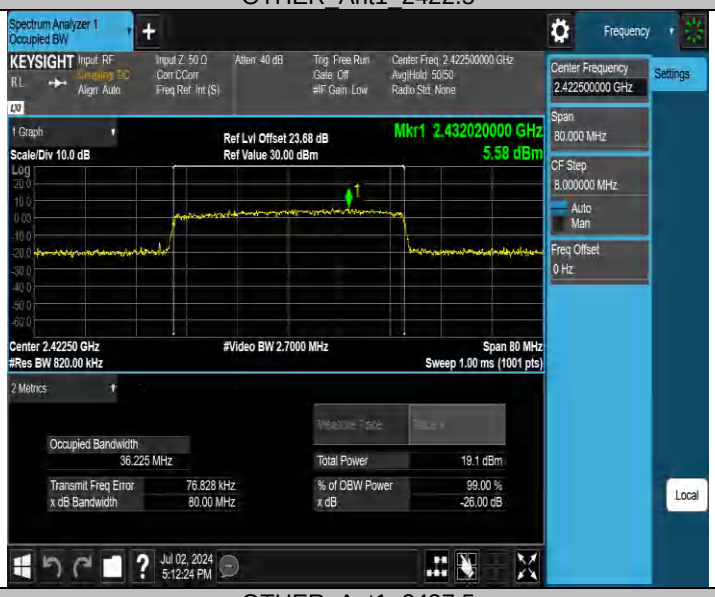

OTHER_Ant1_2462.5


Spectrum Analyzer 1
Occupied BW
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto
Input Z: 50 Ω
Corr CCorr
Freq Ref: Int (S)
Atten: 40 dB
Trig: Free Run
Gate: Off
#IF Gain: Low
Center Freq: 2.462500000 GHz
Avg|Hold: 50/50
Radio Std: None
Frequency
Center Frequency
2.462500000 GHz
Settings
Span
40.000 MHz
CF Step
4.000000 MHz
Auto
Man
Freq Offset
0 Hz
1 Graph
Scale/Div 10.0 dB
Ref Lvl Offset 23.61 dB
Ref Value 30.00 dBm
Mkr1 2.455980000 GHz
6.30 dBm
Center 2.46250 GHz
#Res BW 430.00 kHz
#Video BW 1.3000 MHz
Span 40 MHz
Sweep 1.00 ms (1001 pts)
2 Metrics
Occupied Bandwidth
18.010 MHz
Total Power
20.0 dBm
Transmit Freq Error
-2.760 kHz
x dB Bandwidth
19.77 MHz
% of OBW Power
99.00 %
x dB
-26.00 dB
Local
Jul 01, 2024
5:17:38 PM

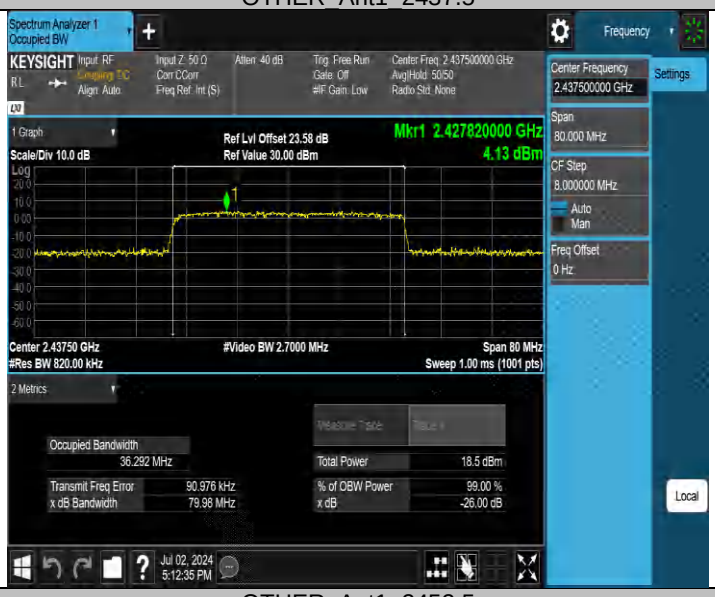
**2.4GHz SDR, 40MHz BW**

| Antenna | Channel | OCB [MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|---|---|---|---|---|---|---|
| Ant1 | 2422.5 | 36.225 | 2404.4643 | 2440.6893 | --- | --- |
| | 2437.5 | 36.292 | 2419.4450 | 2455.7370 | --- | --- |
| | 2452.5 | 36.281 | 2434.4040 | 2470.6850 | --- | --- |

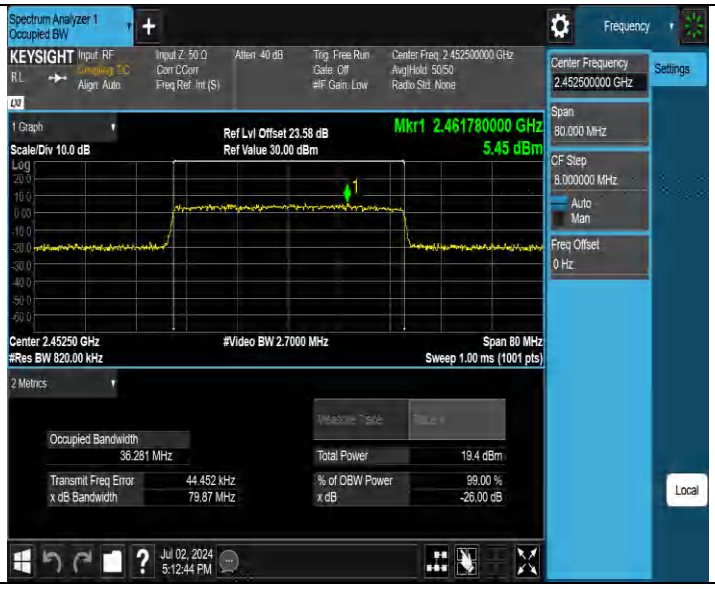
OTHER_Ant1_2422.5




OTHER_Ant1_2437.5



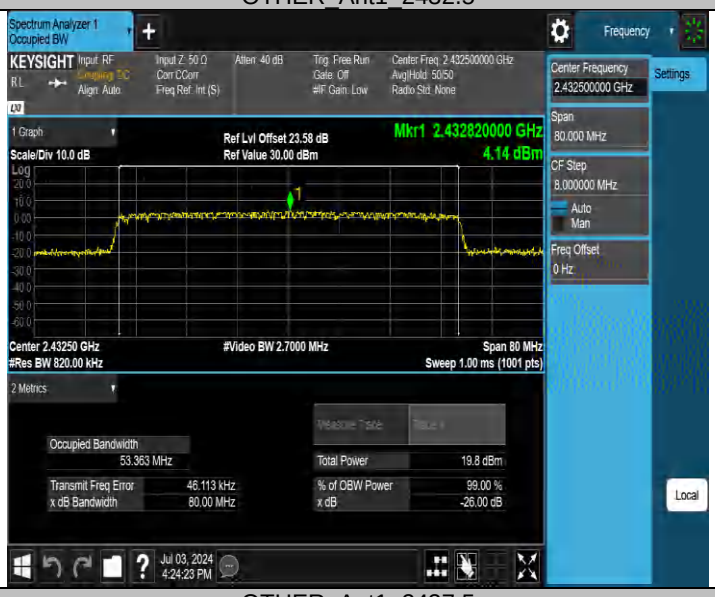

OTHER_Ant1_2452.5


Spectrum Analyzer 1
Occupied BW
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto
Input Z: 50 Ω
Corr CCorr
Freq Ref: Int (S)
Atten: 40 dB
Trig: Free Run
Gate: Off
#IF Gain: Low
Center Freq: 2.452500000 GHz
Avg|Hold: 50/50
Radio Std: None
Frequency
Center Frequency
2.452500000 GHz
Settings
Span
80.000 MHz
CF Step
8.000000 MHz
Auto
Man
Freq Offset
0 Hz
1 Graph
Scale/Div 10.0 dB
Ref Lvl Offset 23.58 dB
Ref Value 30.00 dBm
Mkr1 2.461780000 GHz
5.45 dBm
Center 2.45250 GHz
#Res BW 820.00 kHz
#Video BW 2.7000 MHz
Span 80 MHz
Sweep 1.00 ms (1001 pts)
2 Metrics
Occupied Bandwidth
36.281 MHz
Total Power
19.4 dBm
Transmit Freq Error
44.452 kHz
x dB Bandwidth
79.87 MHz
% of OBW Power
99.00 %
x dB
-26.00 dB
Local
Jul 02, 2024
5:12:44 PM

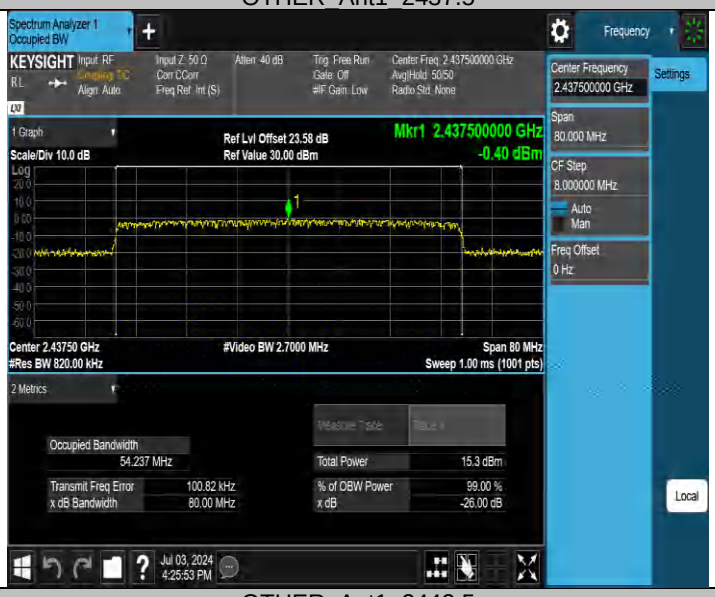
**2.4GHz SDR, 60MHz BW**

| Antenna | Channel | OCB [MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|---|---|---|---|---|---|---|
| Ant1 | 2432.5 | 53.363 | 2405.8646 | 2459.2276 | --- | --- |
| | 2437.5 | 54.237 | 2410.4823 | 2464.7193 | --- | --- |
| | 2442.5 | 53.694 | 2415.6646 | 2469.3586 | --- | --- |

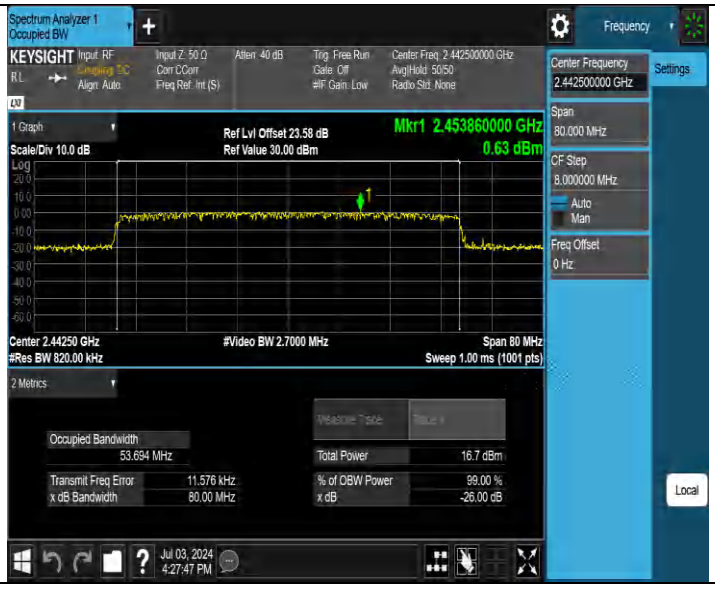
OTHER_Ant1_2432.5




OTHER_Ant1_2437.5




OTHER_Ant1_2442.5


Spectrum Analyzer 1
Occupied BW
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto
Input Z: 50 Ω
Corr CCorr
Freq Ref: Int (S)
Atten: 40 dB
Trig: Free Run
Gate: Off
#IF Gain: Low
Center Freq: 2.442500000 GHz
Avg|Hold: 50/50
Radio Std: None
Frequency
Center Frequency
2.442500000 GHz
Settings
Span
80.000 MHz
CF Step
8.000000 MHz
Auto
Man
Freq Offset
0 Hz
1 Graph
Scale/Div 10.0 dB
Ref Lvl Offset 23.58 dB
Ref Value 30.00 dBm
Mkr1 2.453860000 GHz
0.63 dBm
Center 2.44250 GHz
#Res BW 820.00 kHz
#Video BW 2.7000 MHz
Span 80 MHz
Sweep 1.00 ms (1001 pts)
2 Metrics
Occupied Bandwidth
53.694 MHz
Total Power
16.7 dBm
Transmit Freq Error
11.576 kHz
x dB Bandwidth
80.00 MHz
% of OBW Power
99.00 %
x dB
-26.00 dB
Local
Jul 03, 2024
4:27:47 PM

## Appendix A.5: Test Results of Conducted Spurious Emissions Measured in 100 kHz Bandwidth

### Bandedge

2.4GHz SDR, 1.4MHz BW

| Antenna | ChName | Channel | RefLevel [dBm] | Result [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|---|---|
| Ant1 | Low | 2403.5 | 19.62 | -34.49 | ≤-10.38 | PASS |
| | High | 2469.12 | 18.60 | -37.82 | ≤-11.40 | PASS |

OTHER_Ant1_Low_2403.5

OTHER_Ant1_High_2469.12

2.4GHz SDR, 3MHz BW

| Antenna | ChName | Channel | RefLevel [dBm] | Result [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|---|---|
| Ant1 | Low | 2405.5 | 18.51 | -30.36 | ≤-11.49 | PASS |
| | High | 2468.2 | 20.22 | -38.74 | ≤-9.78 | PASS |

OTHER _Ant1_Low_2405.5

OTHER _Ant1_High_2468.2

2.4GHz SDR, 5MHz BW

| Antenna | ChName | Channel | RefLevel [dBm] | Result [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|---|---|
| Ant1 | Low | 2404.5 | 16.69 | -18.22 | ≤-13.31 | PASS |
| | High | 2469.5 | 16.26 | -37.16 | ≤-13.74 | PASS |

OTHER _Ant1_Low_2404.5

OTHER _Ant1_High_2469.5

2.4GHz SDR, 10MHz BW

| Antenna | ChName | Channel | RefLevel [dBm] | Result [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|---|---|
| Ant1 | Low | 2407.5 | 6.292 | -27.00 | ≤-23.71 | PASS |
| | High | 2467.5 | 11.63 | -38.53 | ≤-18.37 | PASS |

OTHER _Ant1_Low_2407.5

OTHER _Ant1_High_2467.5

2.4GHz SDR, 20MHz BW

| Antenna | ChName | Channel | RefLevel [dBm] | Result [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|---|---|
| Ant1 | Low | 2412.5 | 4.437 | -33.10 | ≤-25.56 | PASS |
| | High | 2462.5 | 10.68 | -39.31 | ≤-19.32 | PASS |

OTHER _Ant1_Low_2412.5

OTHER _Ant1_High_2462.5

2.4GHz SDR,40MHz BW

| Antenna | ChName | Channel | RefLevel [dBm] | Result [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|---|---|
| Ant1 | Low | 2422.5 | 5.233 | -34.08 | ≤-24.77 | PASS |
| | High | 2452.5 | 11.20 | -37.20 | ≤-18.80 | PASS |

OTHER _Ant1_Low_2422.5

OTHER _Ant1_High_2452.5

2.4GHz SDR, 60MHz BW

| Antenna | ChName | Channel | RefLevel [dBm] | Result [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|---|---|
| Ant1 | Low | 2432.5 | 1.814 | -30.16 | ≤-28.19 | PASS |
| | High | 2442.5 | 3.423 | -37.27 | ≤-26.58 | PASS |

OTHER _Ant1_Low_2432.5

OTHER _Ant1_High_2442.5

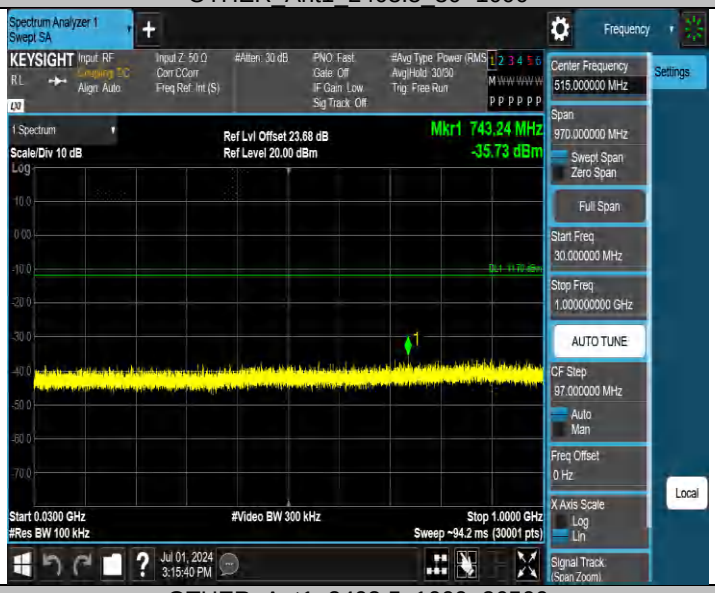
## Conducted Spurious Emission

2.4GHz SDR, 1.4MHz BW

| Antenna | Channel | FreqRange [MHz] | RefLevel [dBm] | Result [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|---|---|
| Ant1 | 2403.5 | Reference | 18.30 | 18.30 | --- | PASS |
| | | 30~1000 | 18.30 | -35.73 | ≤-11.7 | PASS |
| | | 1000~26500 | 18.30 | -27.13 | ≤-11.7 | PASS |
| | 2435.5 | Reference | 17.65 | 17.65 | --- | PASS |
| | | 30~1000 | 17.65 | -37.2 | ≤-12.35 | PASS |
| | | 1000~26500 | 17.65 | -27.96 | ≤-12.35 | PASS |
| | 2469.12 | Reference | 19.03 | 19.03 | --- | PASS |
| | | 30~1000 | 19.03 | -36.24 | ≤-10.97 | PASS |
| | | 1000~26500 | 19.03 | -27.22 | ≤-10.97 | PASS |

OTHER_Ant1_2403.5_0~Reference

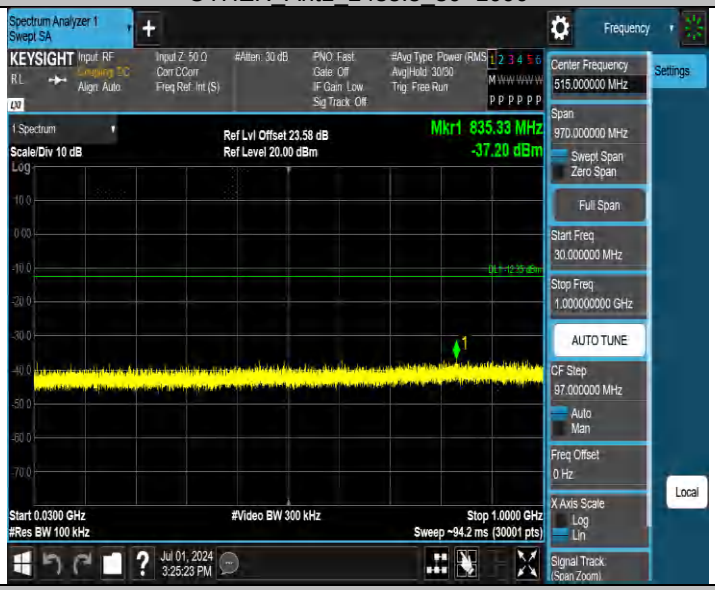
OTHER_Ant1_2403.5_30~1000




OTHER_Ant1_2403.5_1000~26500

OTHER_Ant1_2435.5_0~Reference

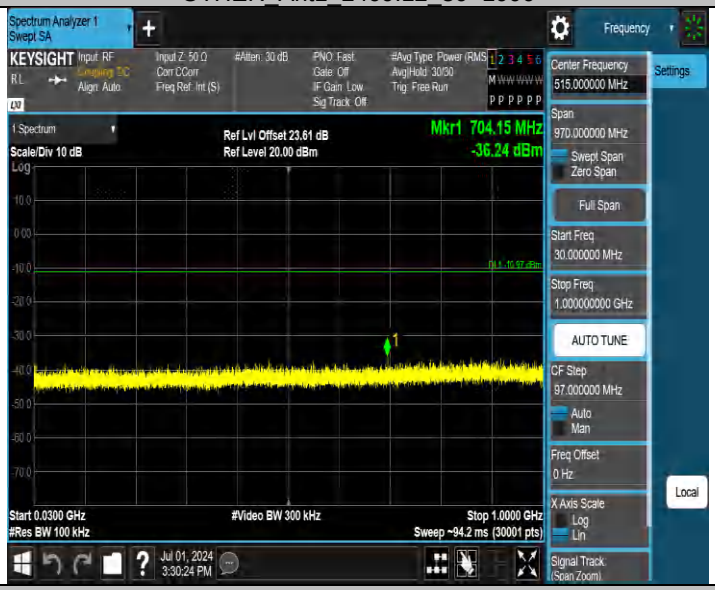
OTHER_Ant1_2435.5_30~1000




OTHER_Ant1_2435.5_1000~26500

OTHER_Ant1_2469.12_0~Reference

OTHER_Ant1_2469.12_30~1000




OTHER_Ant1_2469.12_1000~26500

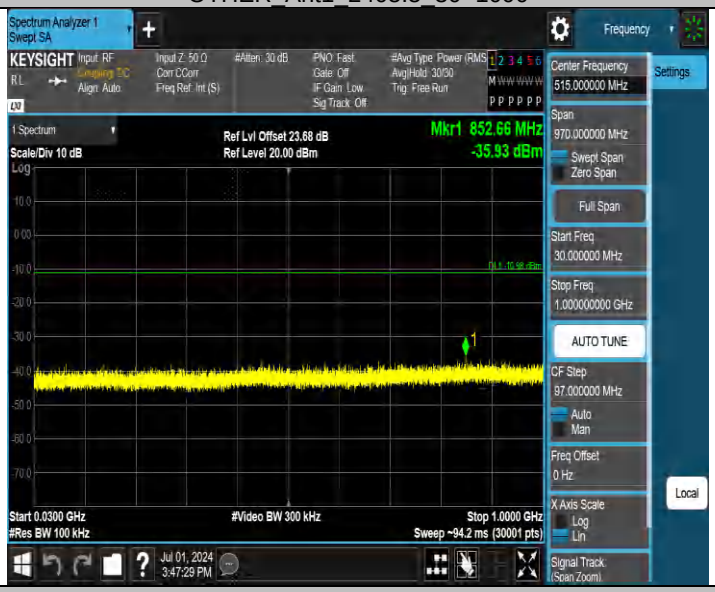
Spectrum Analyzer 1
Swept SA
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto
Input Z: 50 Ω
Corr CCorr
Freq Ref: Int (S)
#Atten: 30 dB
PNO: Fast
Gate: Off
IF Gain: Low
Sig Track: Off
#Avg Type: Power (RMS)
Avg|Hold: 30/30
Trig: Free Run
1 Spectrum
Scale/Div 10 dB
Log
Ref Lvl Offset 23.61 dB
Ref Level 20.00 dBm
Mkr2 26.082 65 GHz
-27.22 dBm
Start 1.00 GHz
#Res BW 100 kHz
#Video BW 300 kHz
Stop 26.50 GHz
Sweep ~2.44 s (30001 pts)
5 Marker Table
Mode Trace Scale X Y Function Function Width Function Value
1 N 1 f 2.468 80 GHz 18.86 dBm
2 N 1 f 26.082 65 GHz -27.22 dBm
3
4
5
6
Jul 01, 2024
3:31:57 PM
Frequency
Settings
Center Frequency
13.750000000 GHz
Span
25.5000000 GHz
Swept Span
Zero Span
Full Span
Start Freq
1.000000000 GHz
Stop Freq
26.500000000 GHz
AUTO TUNE
CF Step
2.550000000 GHz
Auto
Man
Freq Offset
0 Hz
X Axis Scale
Log
Lin
Signal Track
(Span Zoom)
Local

2.4GHz SDR, 3MHz BW

| Antenna | Channel | FreqRange [MHz] | RefLevel [dBm] | Result [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|---|---|
| Ant1 | 2405.5 | Reference | 19.02 | 19.02 | --- | PASS |
| | | 30~1000 | 19.02 | -35.93 | ≤-10.98 | PASS |
| | | 1000~26500 | 19.02 | -27.53 | ≤-10.98 | PASS |
| | 2435.5 | Reference | 16.82 | 16.82 | --- | PASS |
| | | 30~1000 | 16.82 | -36.81 | ≤-13.18 | PASS |
| | | 1000~26500 | 16.82 | -25.99 | ≤-13.18 | PASS |
| | 2468.2 | Reference | 18.76 | 18.76 | --- | PASS |
| | | 30~1000 | 18.76 | -36.21 | ≤-11.24 | PASS |
| | | 1000~26500 | 18.76 | -27.55 | ≤-11.24 | PASS |

OTHER_Ant1_2405.5_0~Reference

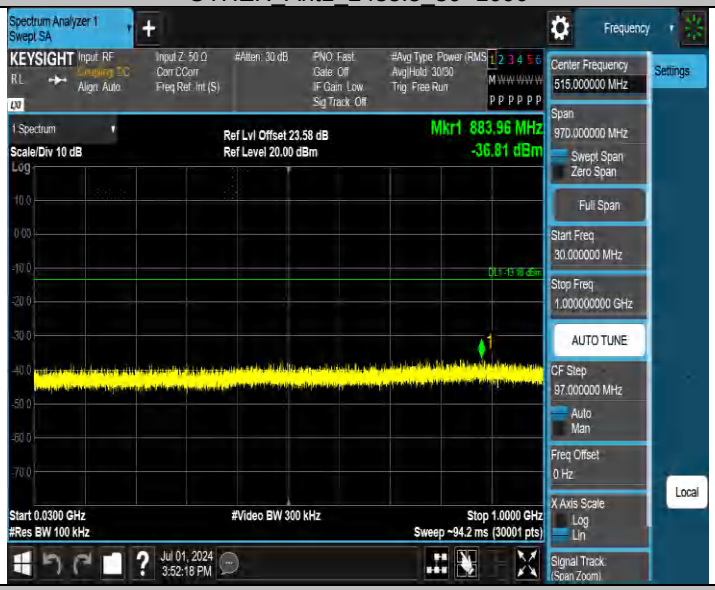
OTHER_Ant1_2405.5_30~1000




OTHER_Ant1_2405.5_1000~26500

OTHER_Ant1_2435.5_0~Reference

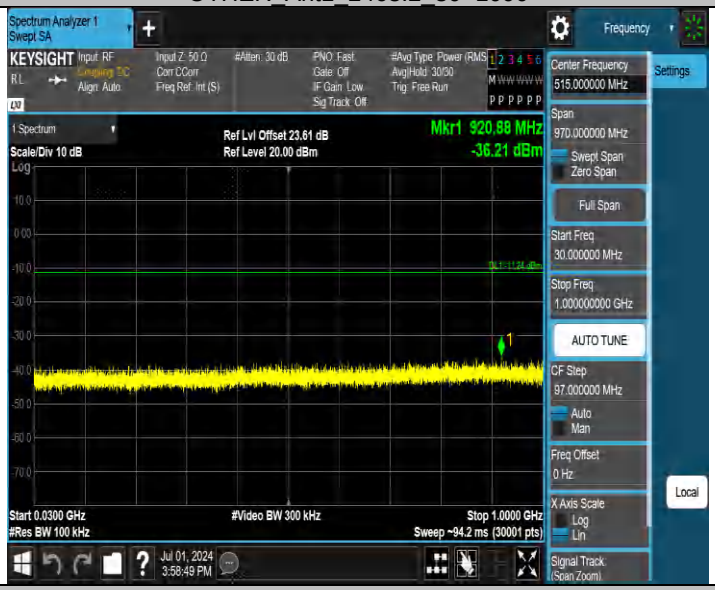
OTHER_Ant1_2435.5_30~1000




OTHER_Ant1_2435.5_1000~26500

OTHER_Ant1_2468.2_0~Reference

OTHER_Ant1_2468.2_30~1000




OTHER_Ant1_2468.2_1000~26500

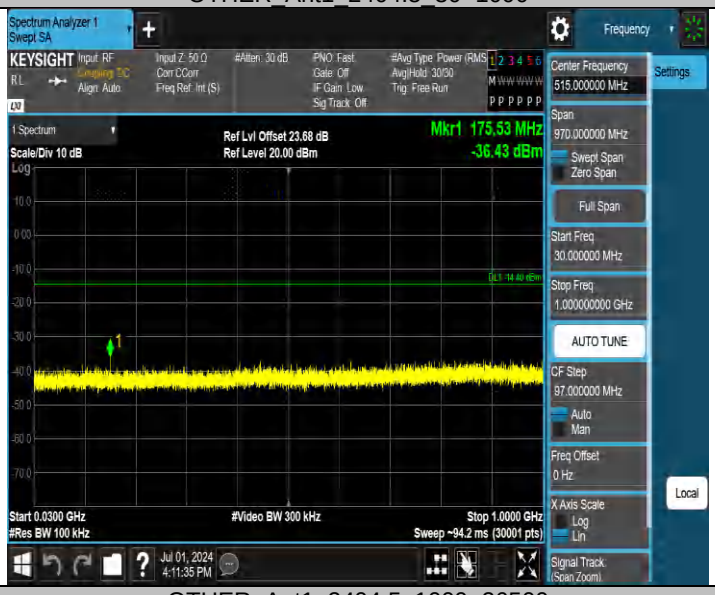
Spectrum Analyzer 1
Swept SA
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto
Input Z: 50 Ω
Corr CCorr
Freq Ref: Int (S)
#Atten: 30 dB
PNO: Fast
Gate: Off
IF Gain: Low
Sig Track: Off
#Avg Type: Power (RMS)
Avg|Hold: 30/30
Trig: Free Run
1 Spectrum
Scale/Div 10 dB
Ref Lvl Offset 23.61 dB
Ref Level 20.00 dBm
Mkr2 26.012 95 GHz
-27.55 dBm
Start 1.00 GHz
#Res BW 100 kHz
#Video BW 300 kHz
Stop 26.50 GHz
Sweep ~2.44 s (30001 pts)
5 Marker Table
Mode Trace Scale X Y Function Function Width Function Value
1 N 1 f 2.468 80 GHz 17.72 dBm
2 N 1 f 26.012 95 GHz -27.55 dBm
Jul 01, 2024
4:00:22 PM
Frequency
Center Frequency
13.750000000 GHz
Settings
Span
25.5000000 GHz
Swept Span
Zero Span
Full Span
Start Freq
1.000000000 GHz
Stop Freq
26.500000000 GHz
AUTO TUNE
CF Step
2.550000000 GHz
Auto
Man
Freq Offset
0 Hz
X Axis Scale
Log
Lin
Local

2.4GHz SDR, 5MHz BW

| Antenna | Channel | FreqRange [MHz] | RefLevel [dBm] | Result [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|---|---|
| Ant1 | 2404.5 | Reference | 15.60 | 15.60 | --- | PASS |
| | | 30~1000 | 15.60 | -36.43 | ≤-14.4 | PASS |
| | | 1000~26500 | 15.60 | -27.46 | ≤-14.4 | PASS |
| | 2434.5 | Reference | 15.60 | 15.60 | --- | PASS |
| | | 30~1000 | 15.60 | -35.91 | ≤-14.4 | PASS |
| | | 1000~26500 | 15.60 | -27.62 | ≤-14.4 | PASS |
| | 2469.5 | Reference | 15.37 | 15.37 | --- | PASS |
| | | 30~1000 | 15.37 | -36.72 | ≤-14.63 | PASS |
| | | 1000~26500 | 15.37 | -27.38 | ≤-14.63 | PASS |

OTHER_Ant1_2404.5_0~Reference

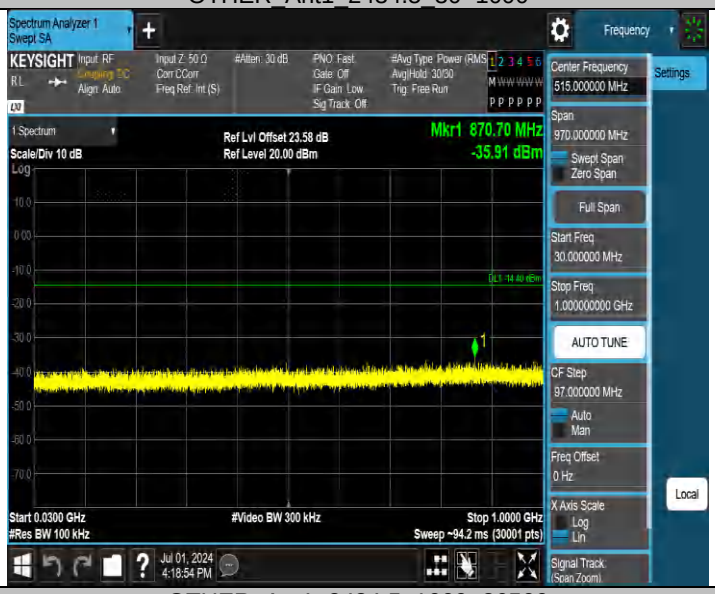
OTHER_Ant1_2404.5_30~1000




OTHER_Ant1_2404.5_1000~26500

OTHER_Ant1_2434.5_0~Reference

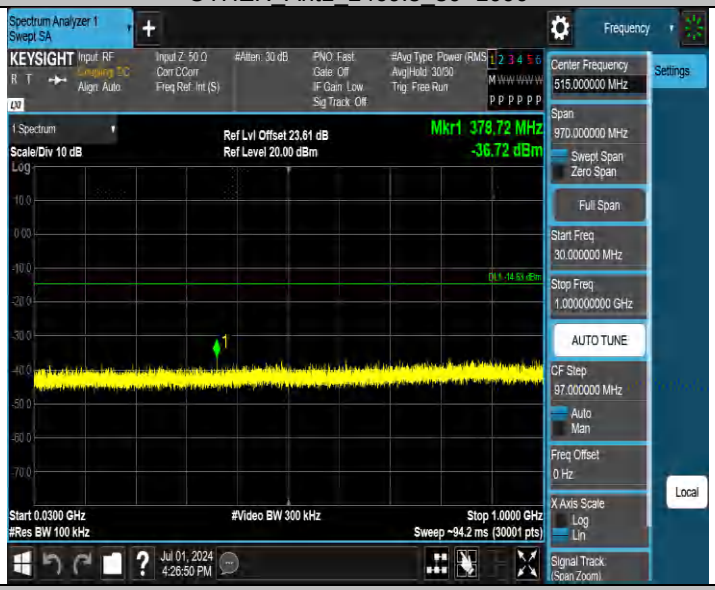
OTHER_Ant1_2434.5_30~1000




OTHER_Ant1_2434.5_1000~26500

OTHER_Ant1_2469.5_0~Reference

OTHER_Ant1_2469.5_30~1000



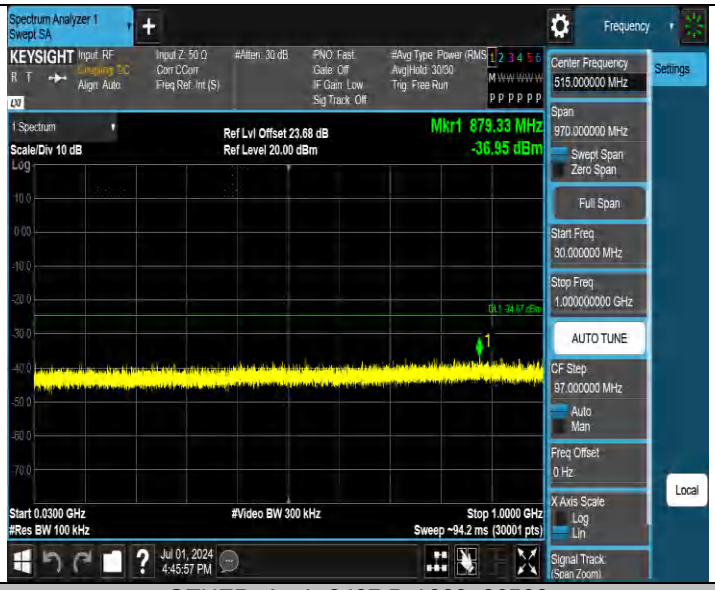

OTHER_Ant1_2469.5_1000~26500

2.4GHz SDR, 10MHz BW

| Antenna | Channel | FreqRange [MHz] | RefLevel [dBm] | Result [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|---|---|
| Ant1 | 2407.5 | Reference | 5.33 | 5.33 | --- | PASS |
| | | 30~1000 | 5.33 | -36.95 | ≤-24.67 | PASS |
| | | 1000~26500 | 5.33 | -27.12 | ≤-24.67 | PASS |
| | 2437.5 | Reference | 11.34 | 11.34 | --- | PASS |
| | | 30~1000 | 11.34 | -36.45 | ≤-18.66 | PASS |
| | | 1000~26500 | 11.34 | -27.74 | ≤-18.66 | PASS |
| | 2467.5 | Reference | 11.59 | 11.59 | --- | PASS |
| | | 30~1000 | 11.59 | -36.73 | ≤-18.41 | PASS |
| | | 1000~26500 | 11.59 | -26.76 | ≤-18.41 | PASS |

OTHER_Ant1_2407.5_0~Reference

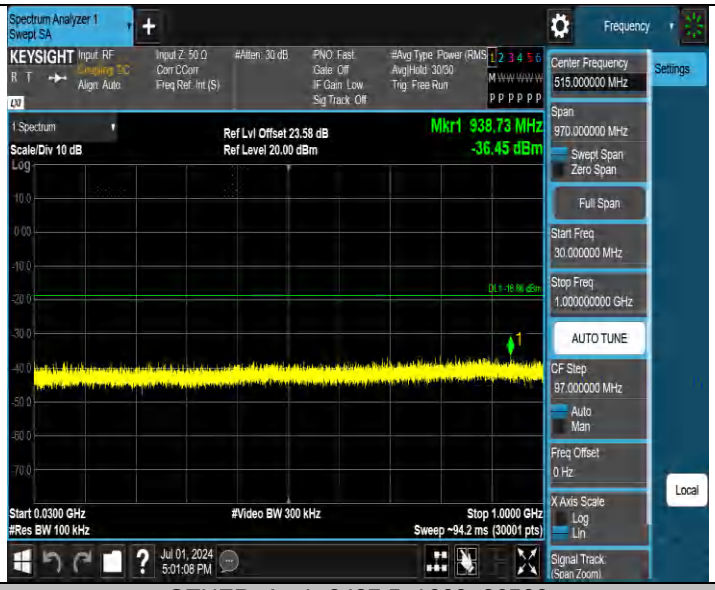
OTHER_Ant1_2407.5_30~1000




OTHER_Ant1_2407.5_1000~26500

OTHER_Ant1_2437.5_0~Reference

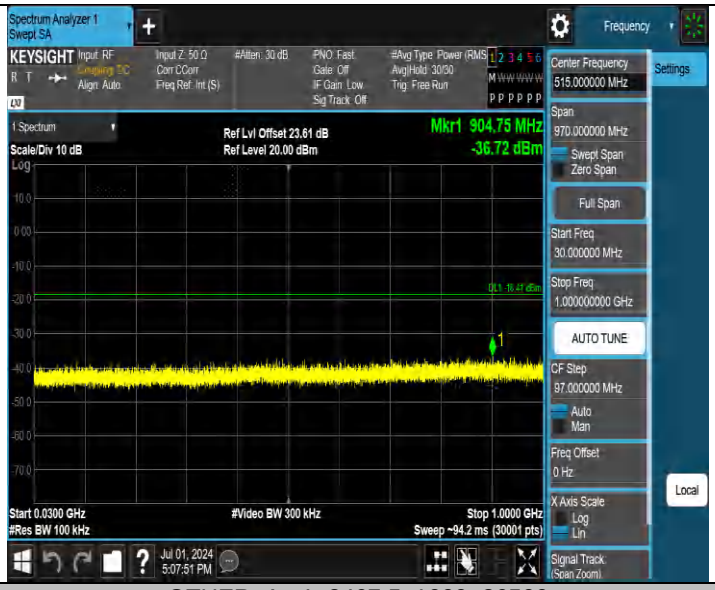
OTHER_Ant1_2437.5_30~1000




OTHER_Ant1_2437.5_1000~26500

OTHER_Ant1_2467.5_0~Reference

OTHER_Ant1_2467.5_30~1000




OTHER_Ant1_2467.5_1000~26500