

4.6 Out-of-band Emissions

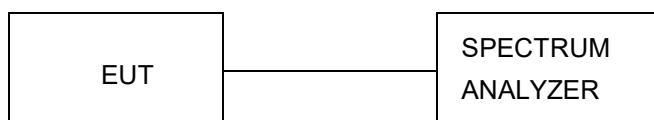
Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section (b)(3) of §15.247 and RSS 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in §15.209(a) and RSS-Gen are not required.

Test Procedure

Connect the transmitter output to spectrum analyzer using a low loss RF cable, and set the spectrum analyzer to RBW=100 kHz, VBW= 300 kHz, peak detector , and max hold. Measurements utilizing these setting are made of the in-band reference level, bandedge and out-of-band emissions.

Test Configuration

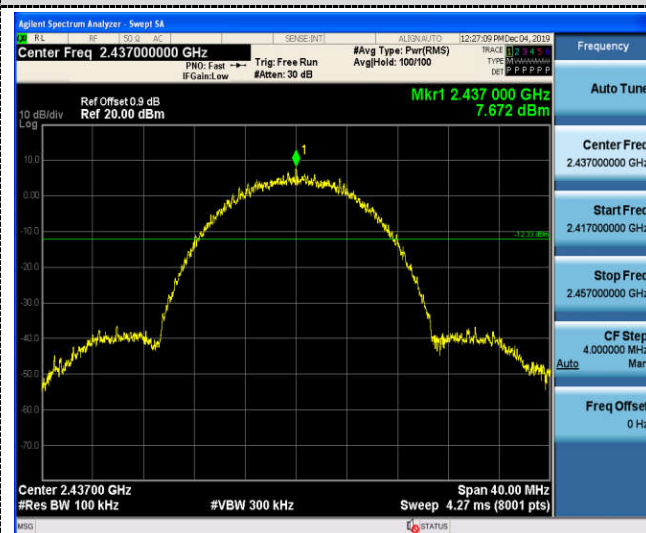


Test Results

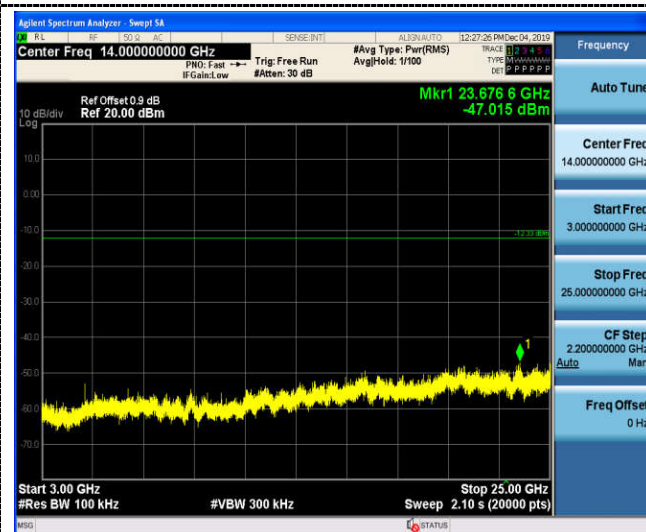
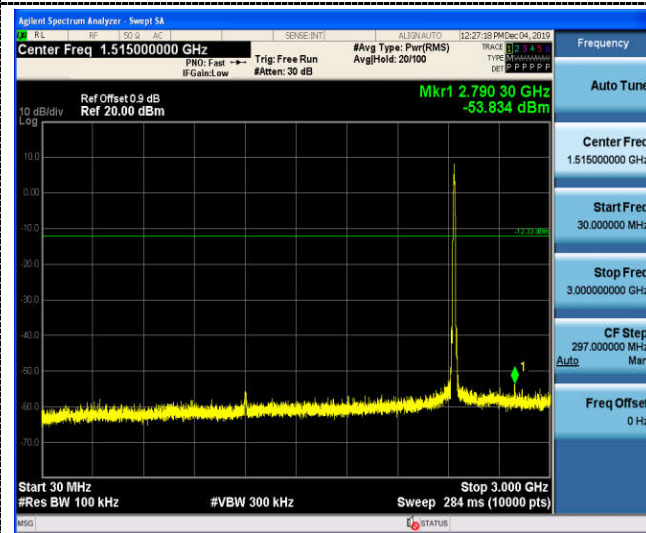
Remark: The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandage measurement data.

Test plot as follows:

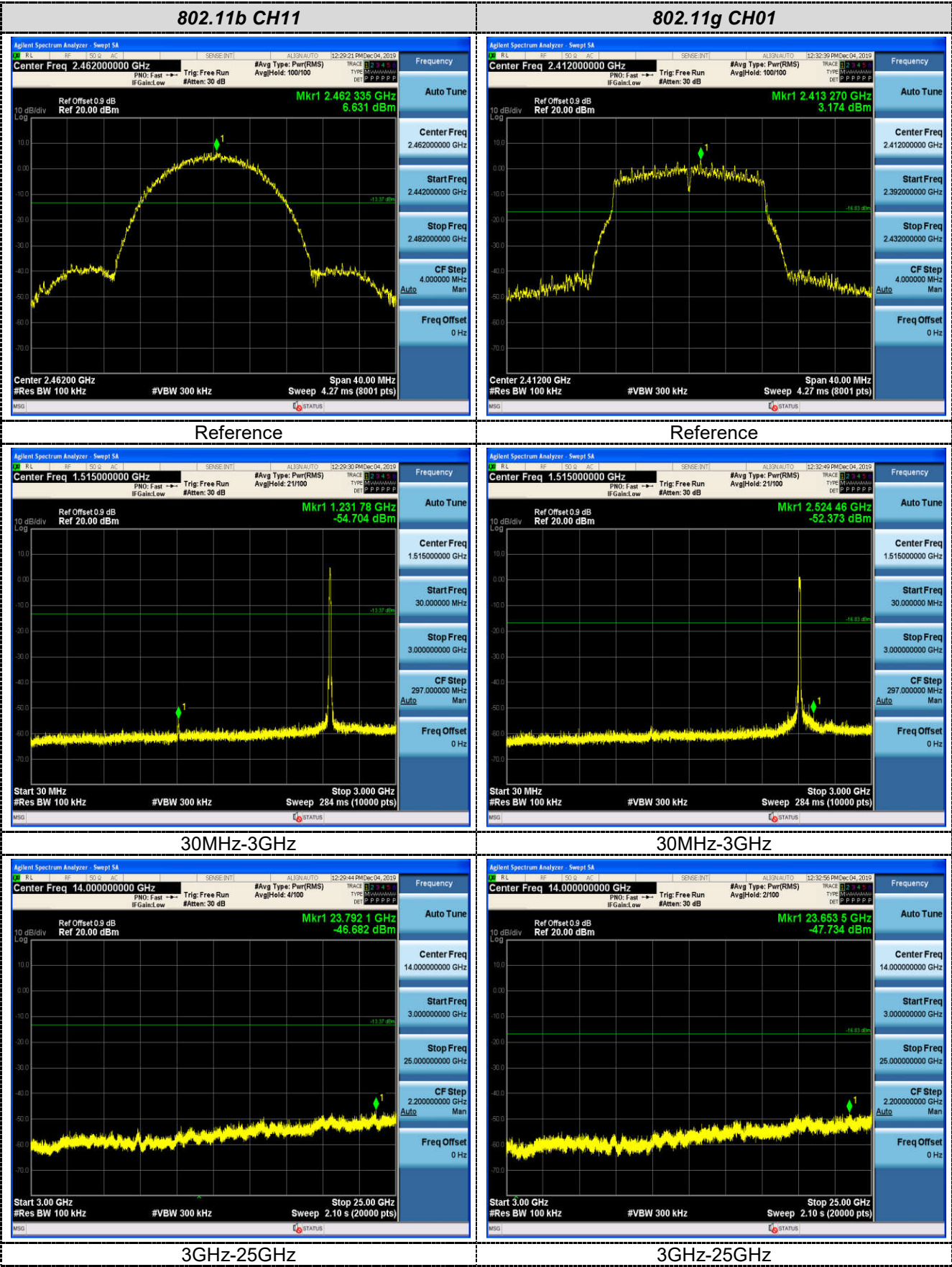
802.11b CH06

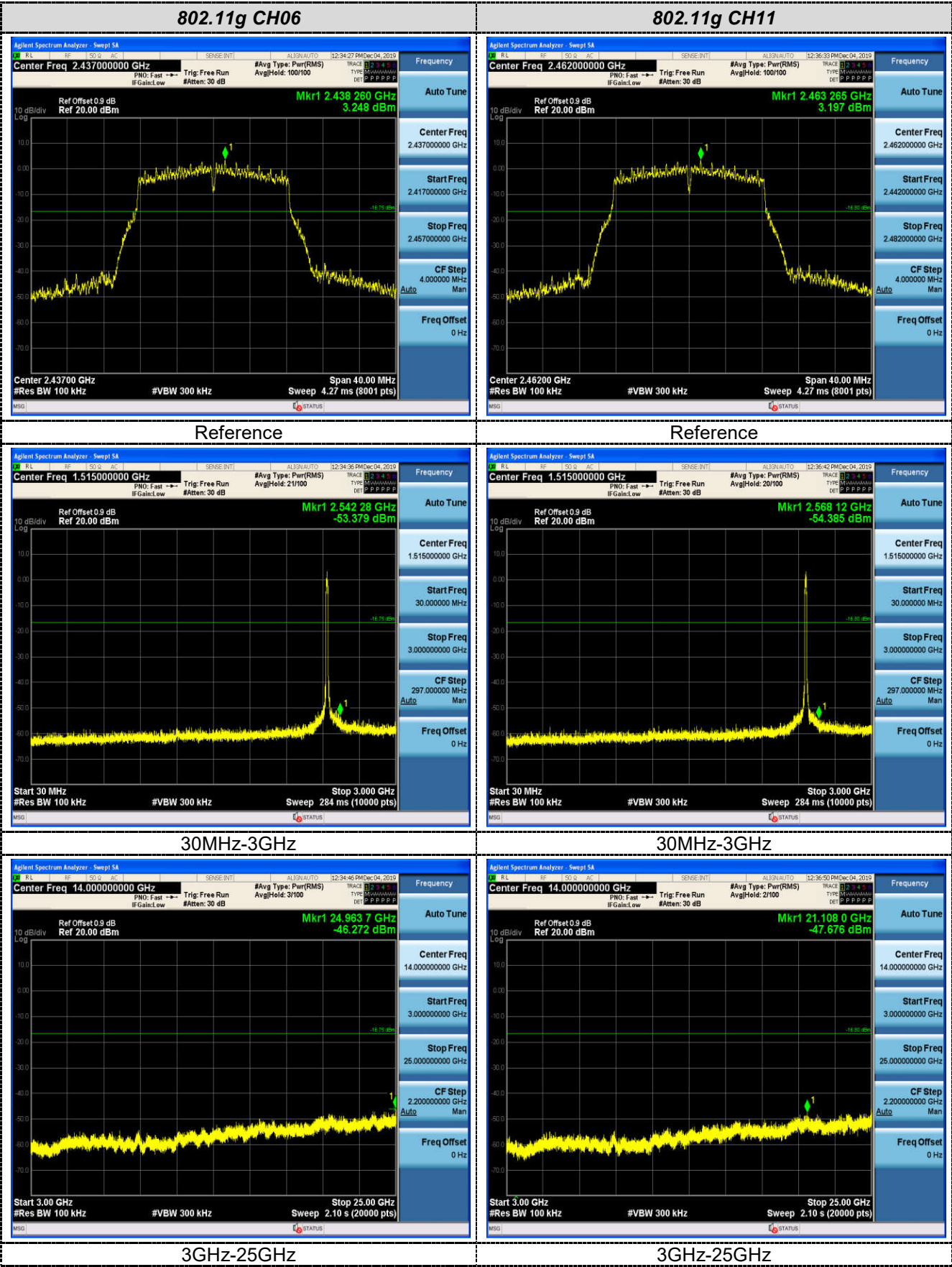


30MHz-3GHz

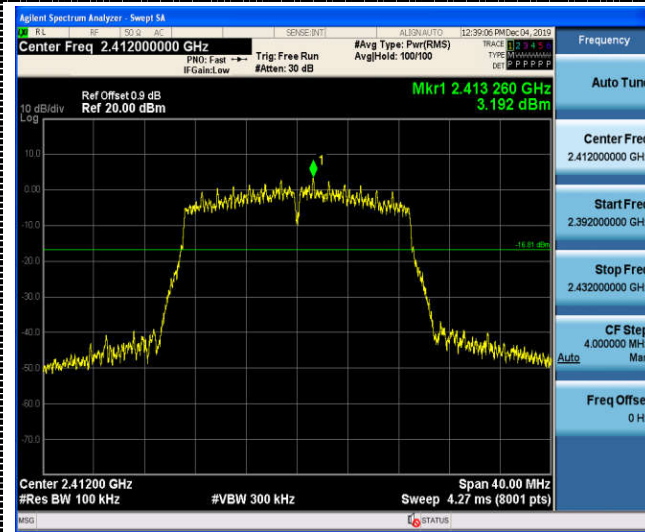


3GHz-25GHz

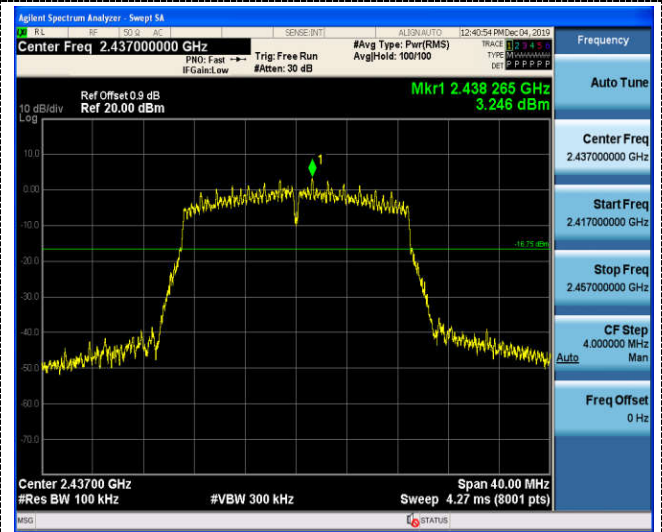




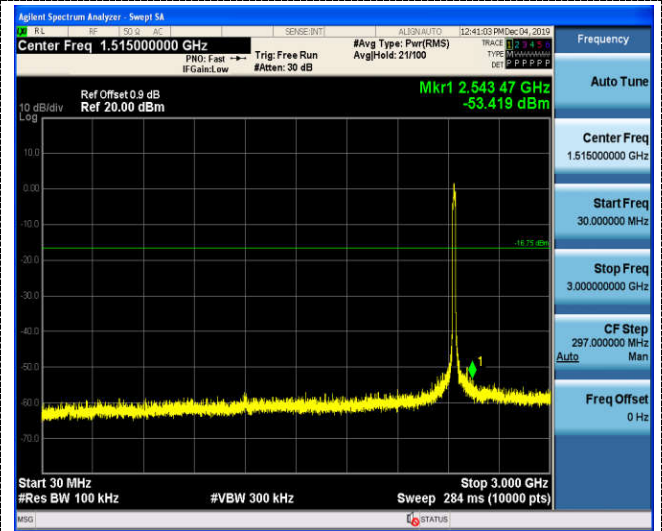
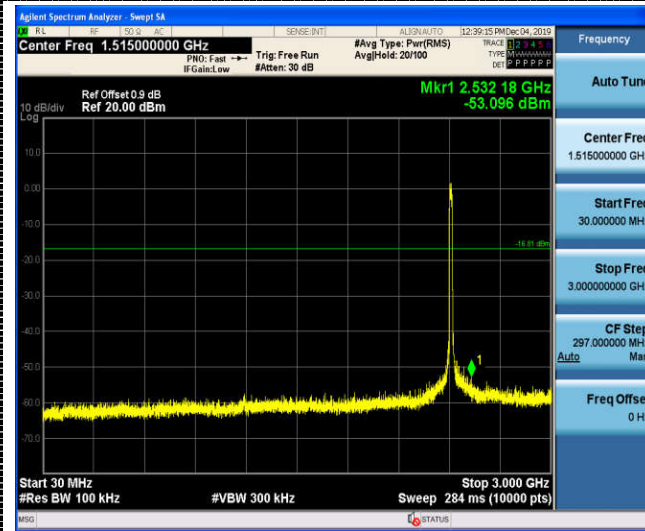
802.11n(HT20) CH01



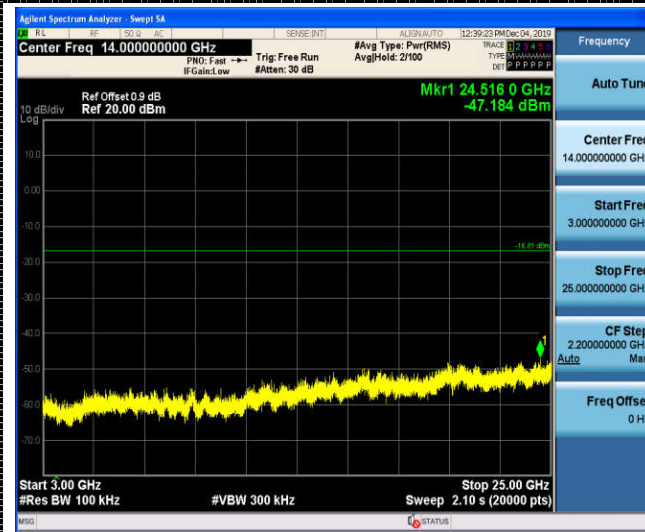
802.11n(HT20) CH06



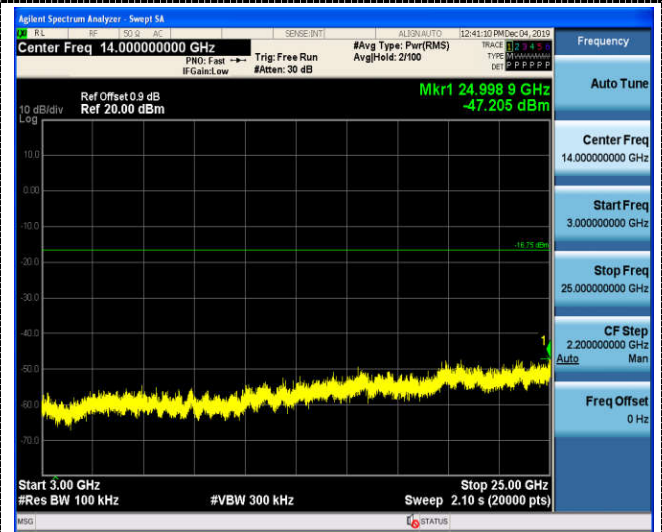
Reference



30MHz-3GHz



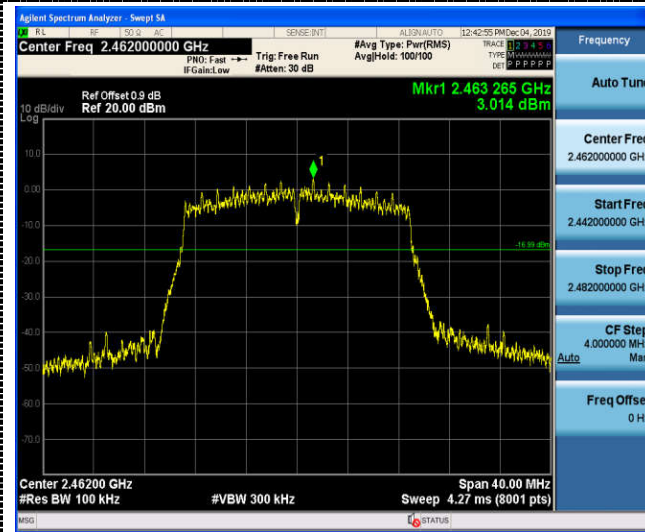
30MHz-3GHz



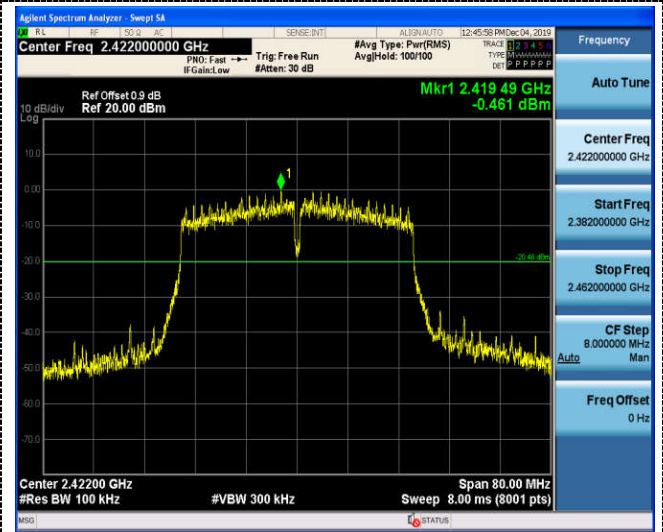
3GHz-25GHz

3GHz-25GHz

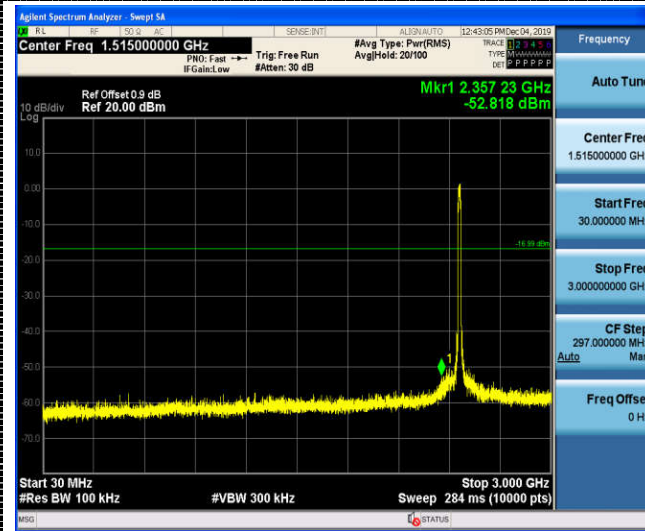
802.11n(HT20) CH11



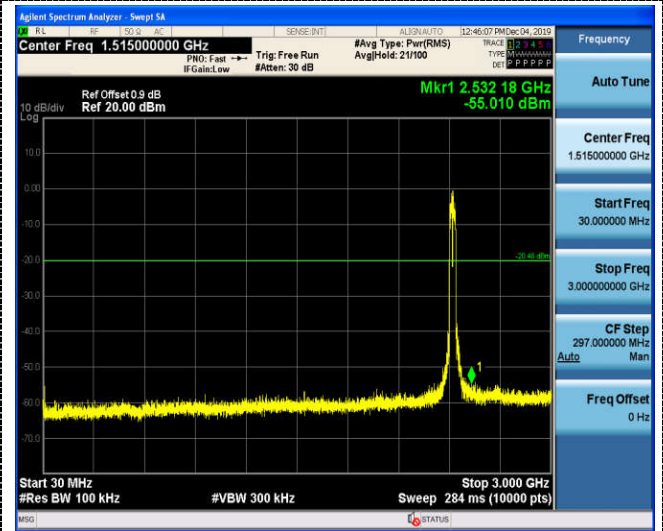
802.11n(HT40) CH03



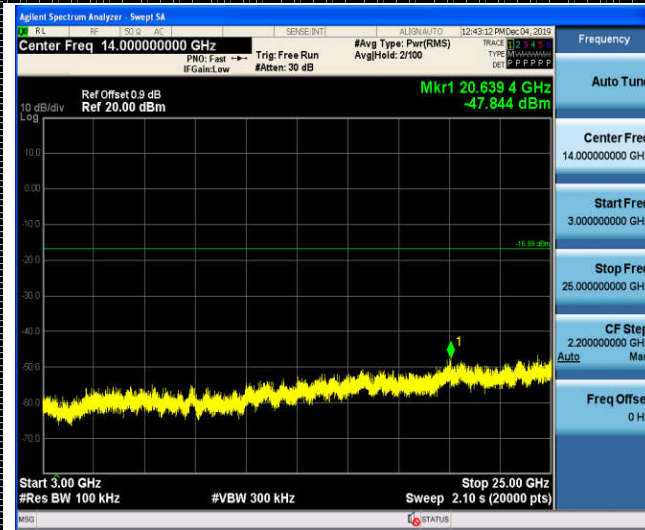
Reference



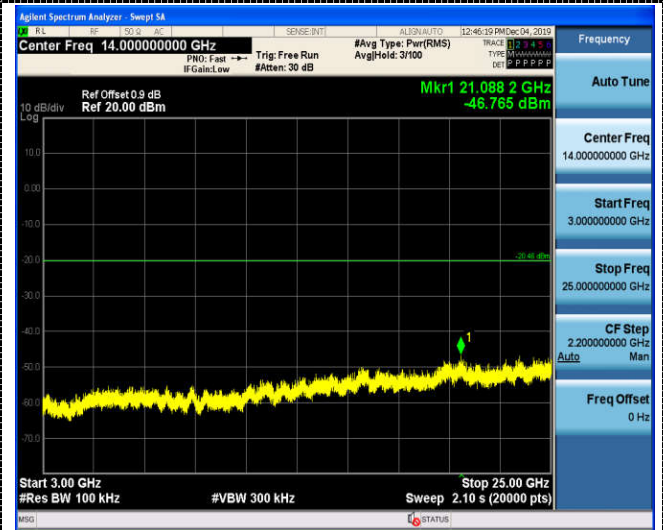
Reference



30MHz-3GHz



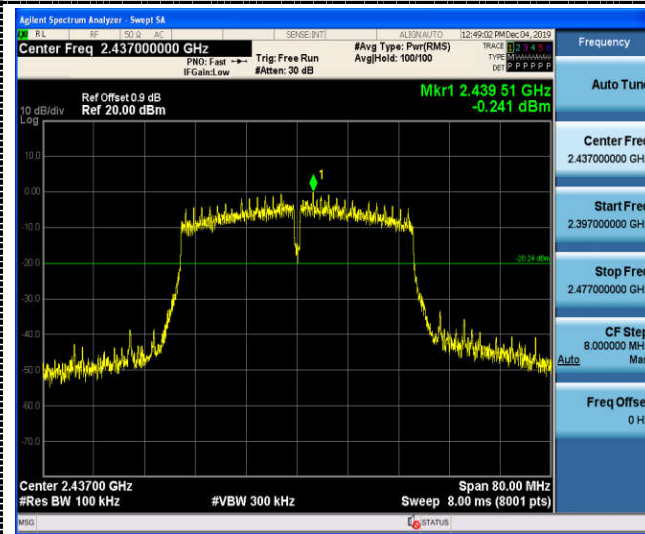
30MHz-3GHz



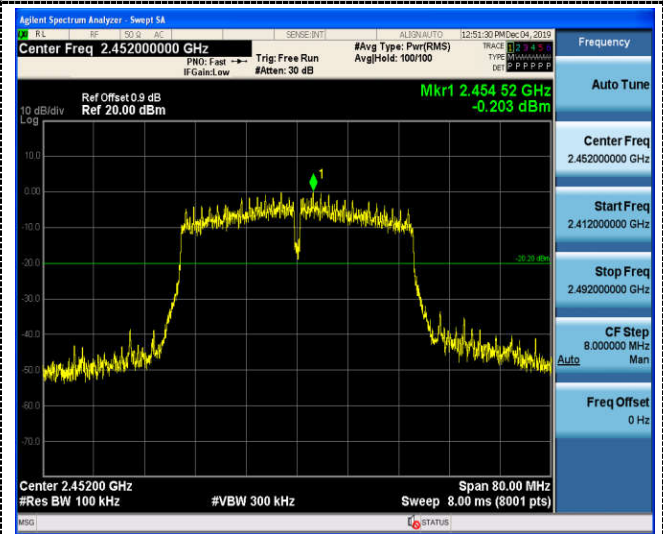
3GHz-25GHz

3GHz-25GHz

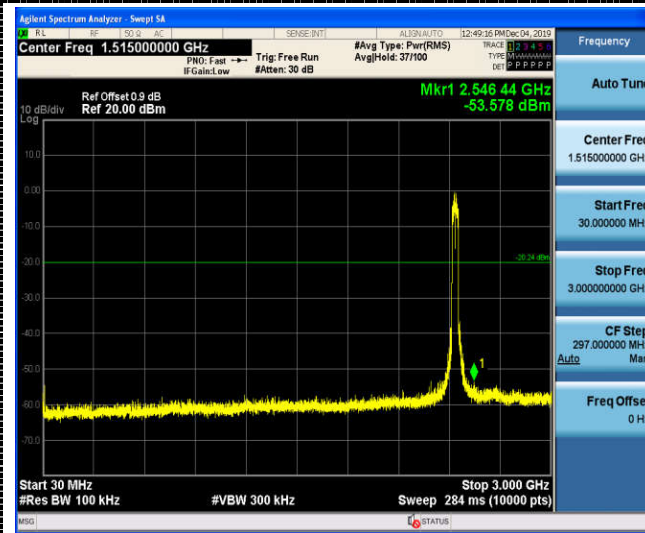
802.11n(HT40) CH06



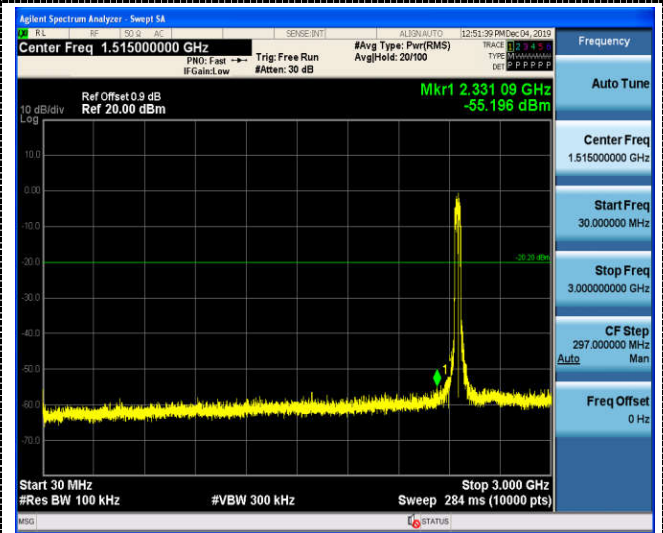
802.11n(HT40) CH09



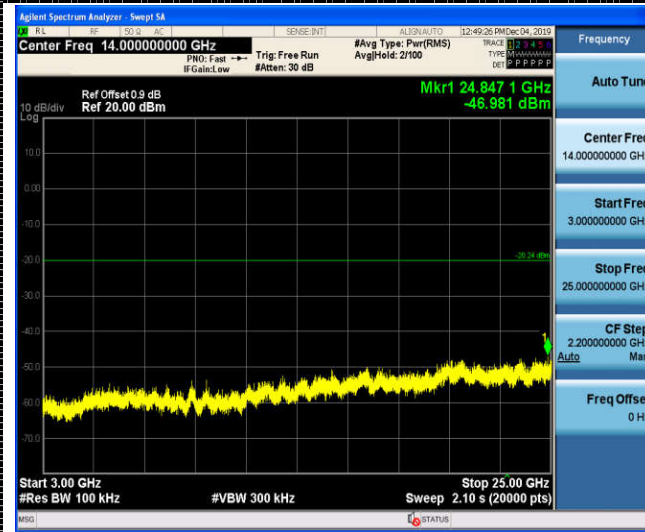
Reference



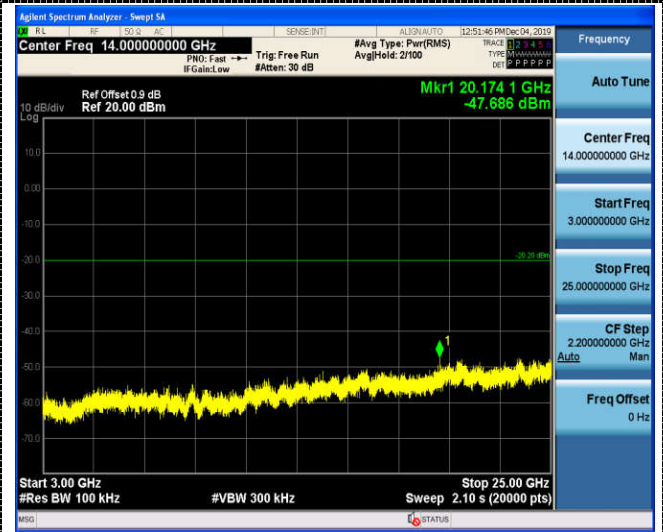
Reference



30MHz-3GHz

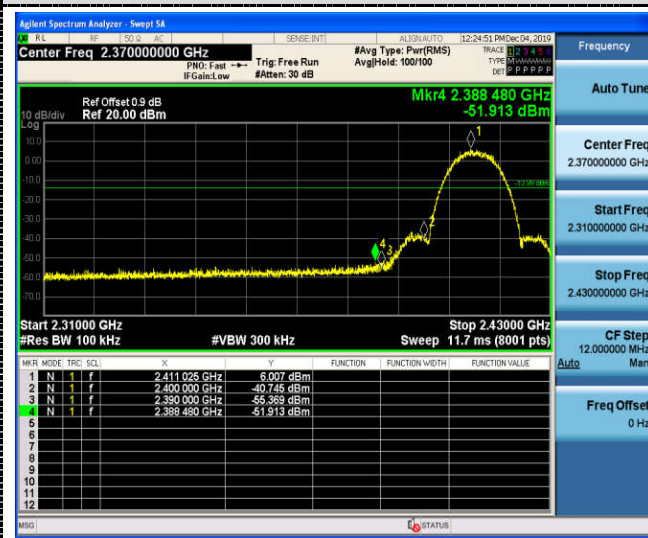


30MHz-3GHz

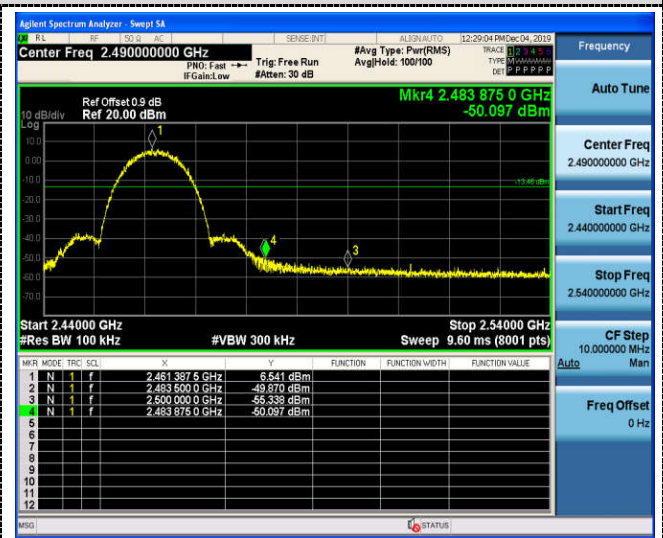


3GHz-25GHz

3GHz-25GHz

Band-edge Measurements for RF Conducted Emissions:**802.11b**

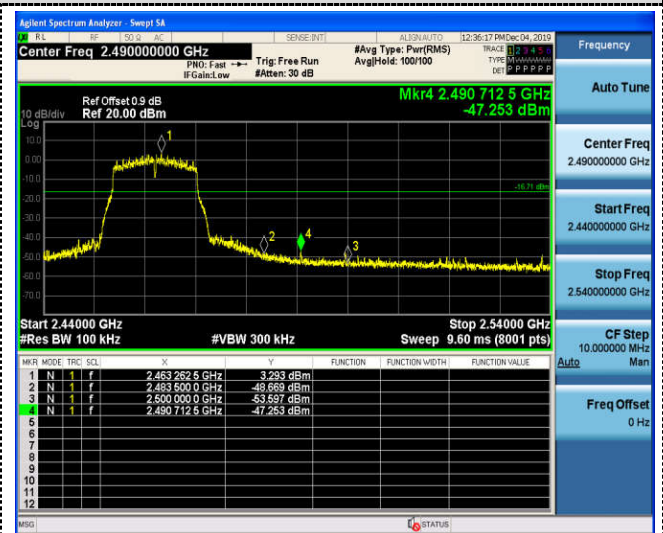
Left bandedge



Right bandedge

802.11g

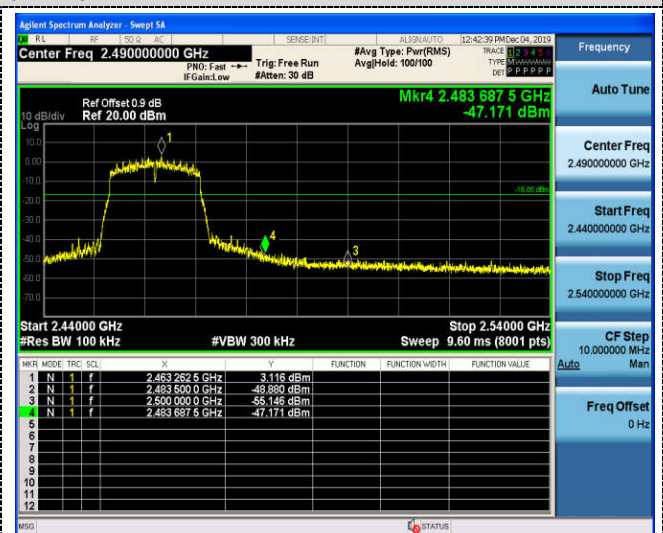
Left bandedge



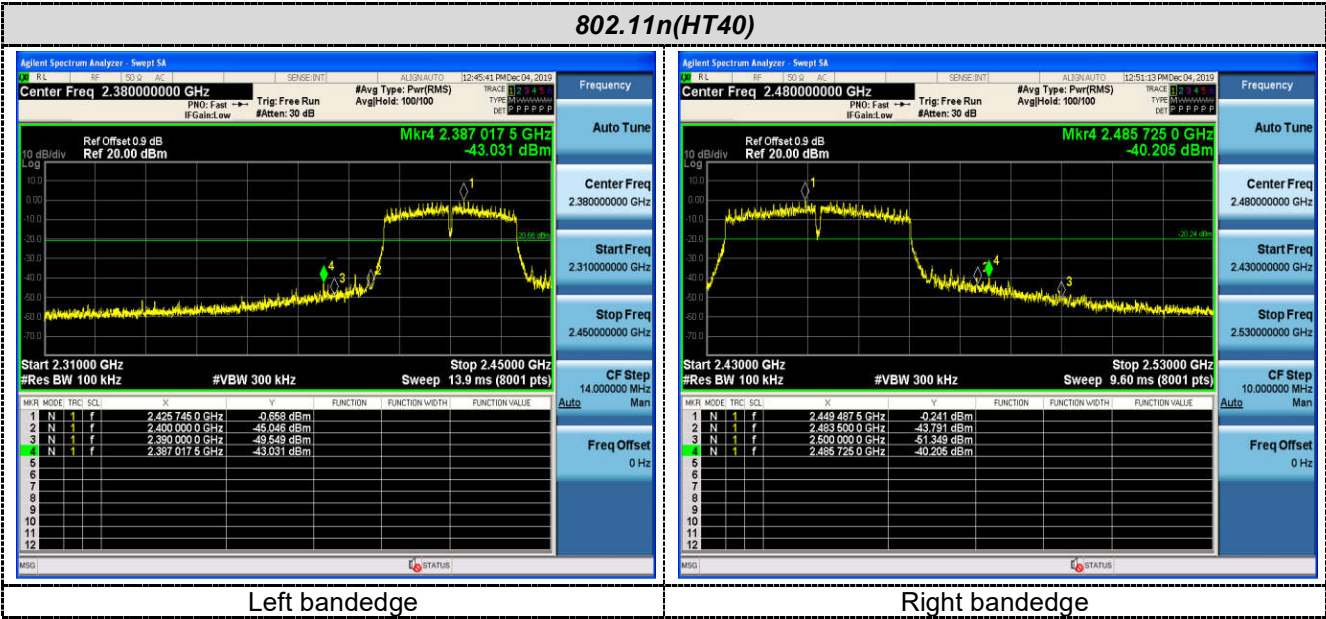
Right bandedge

802.11n(HT20)

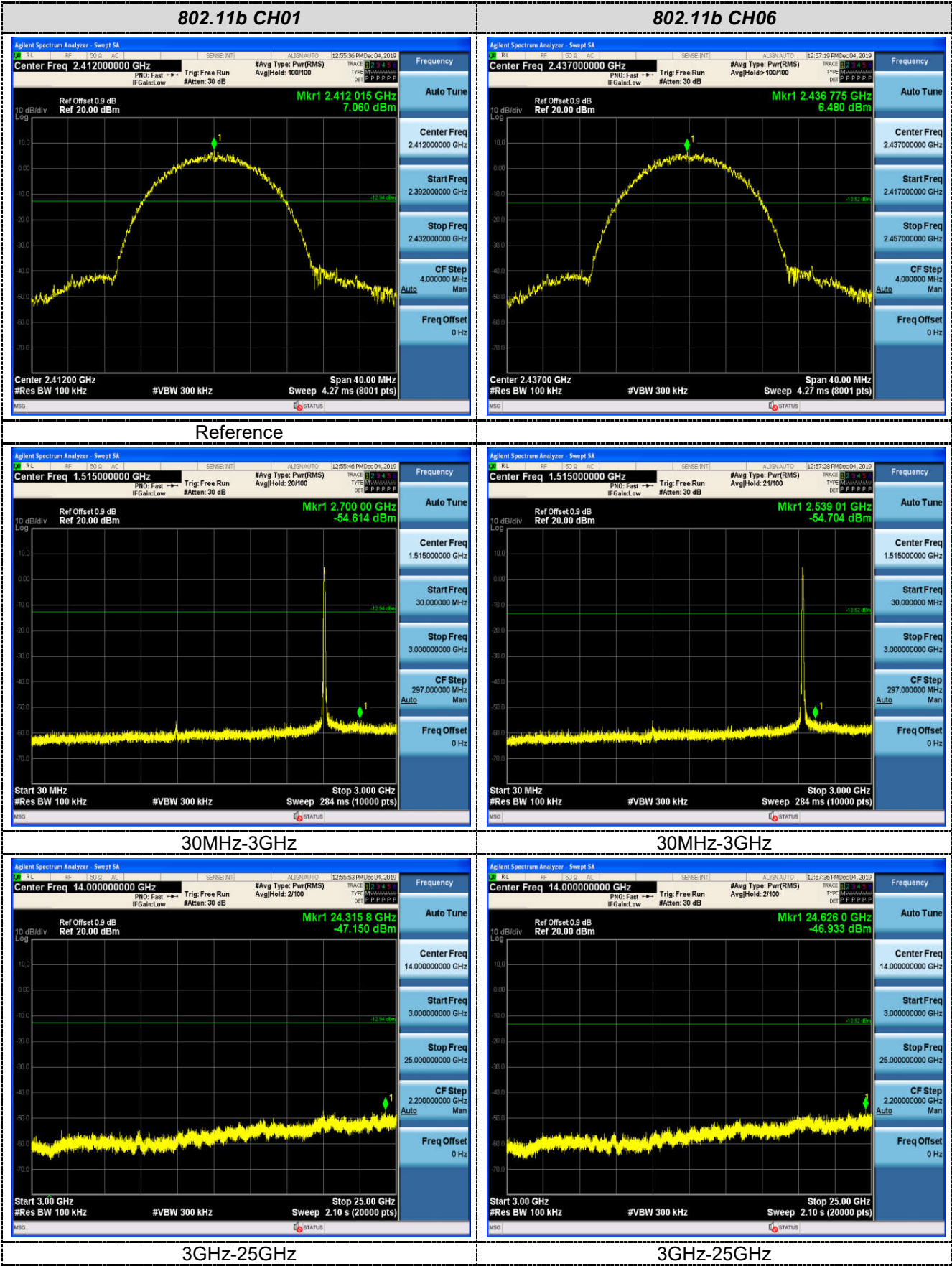
Left bandedge

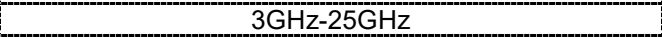
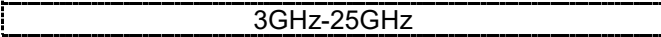
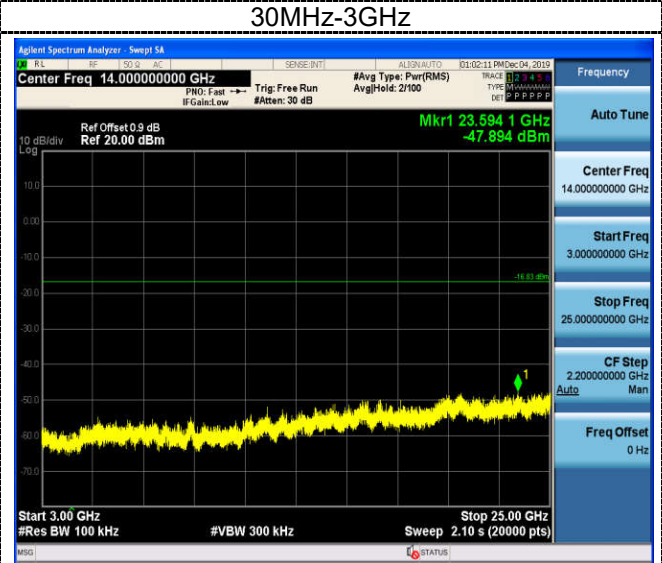
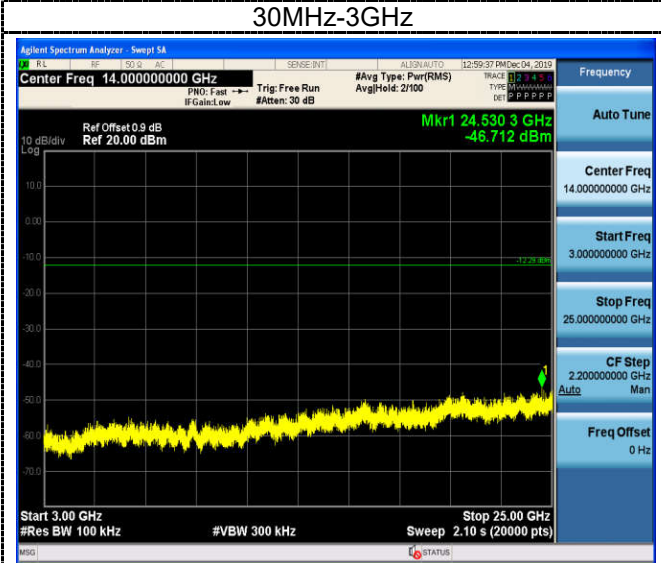
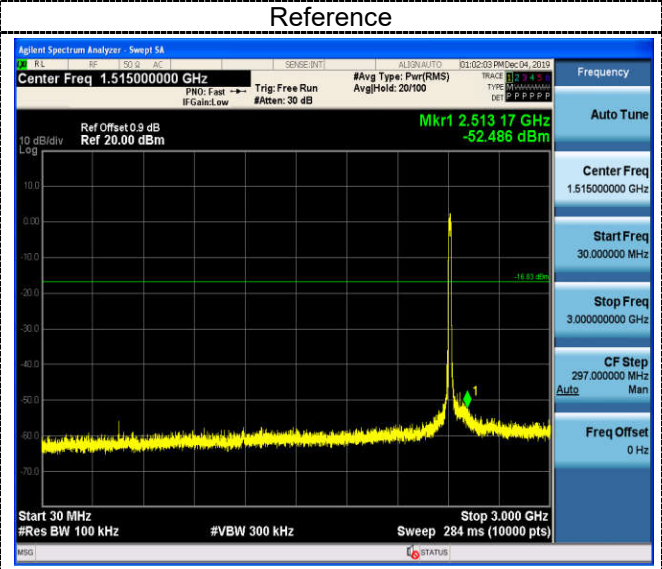
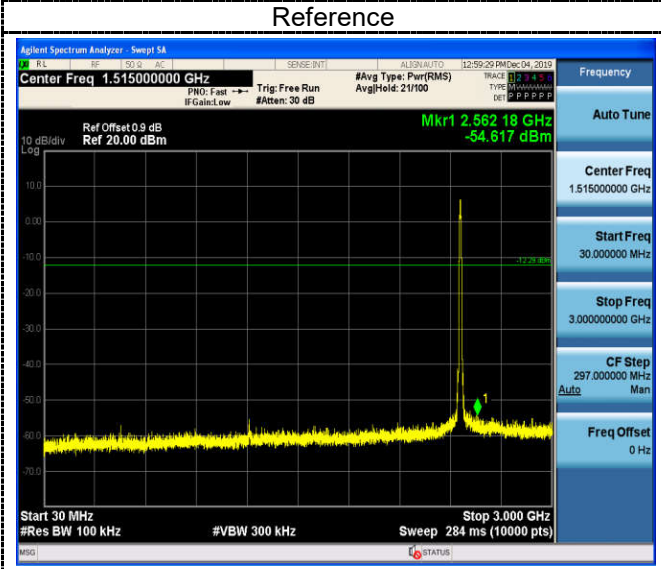
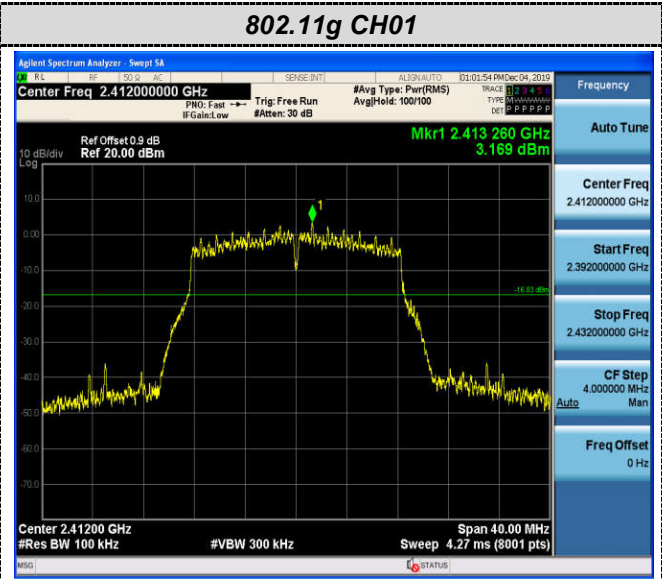
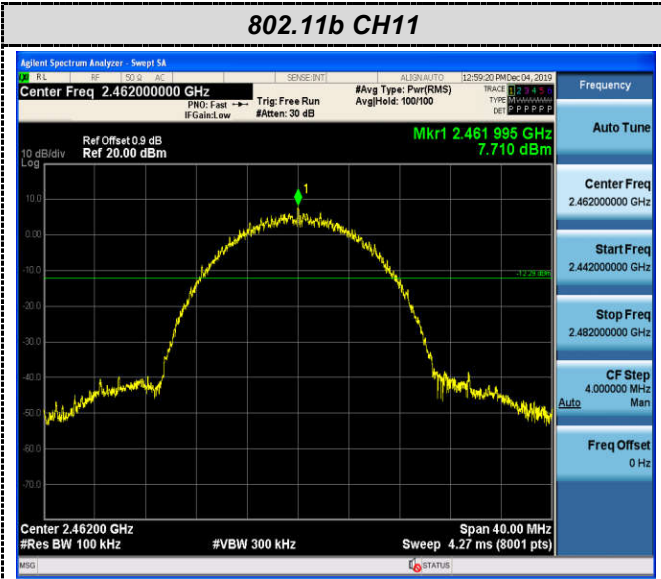


Right bandedge

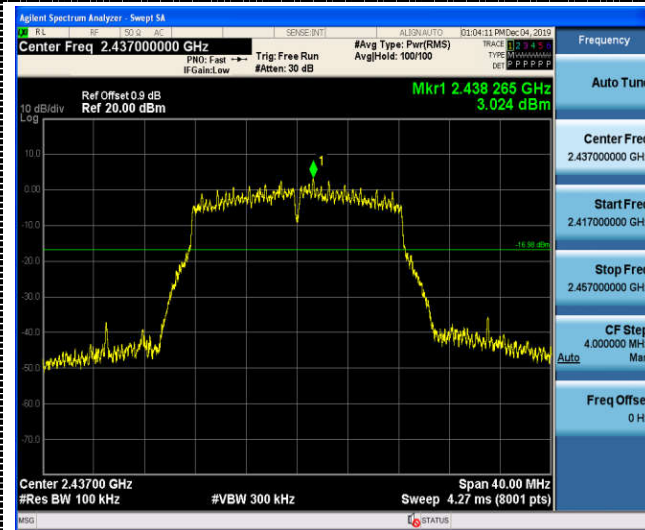


Ant2

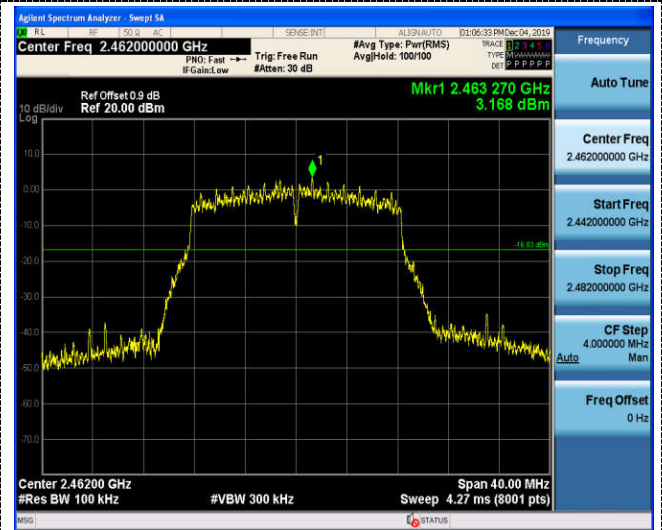




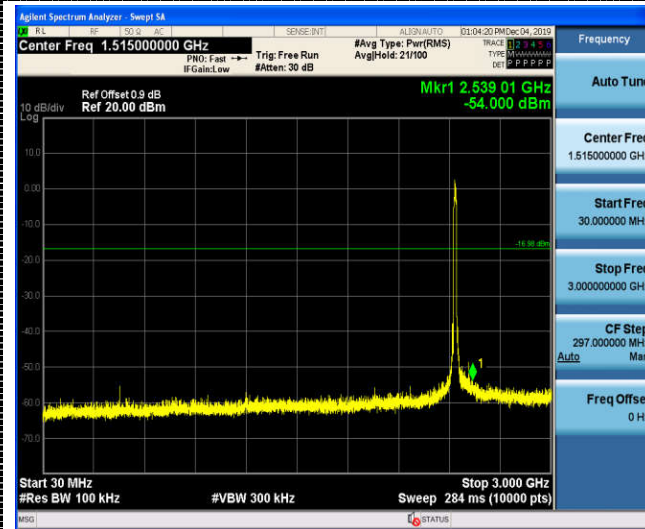
802.11g CH06



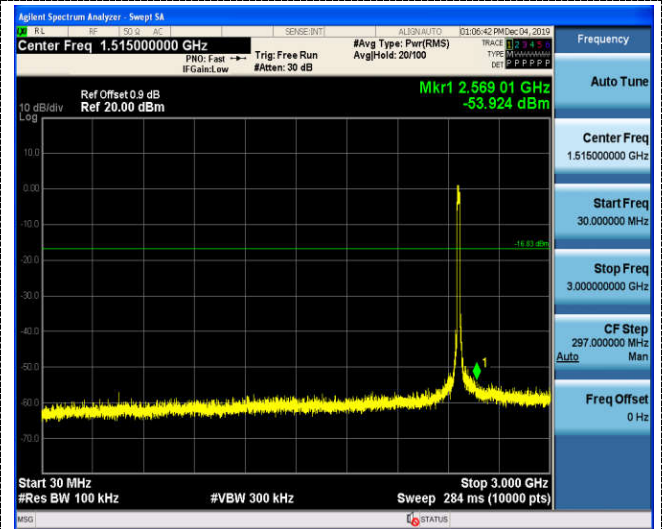
802.11g CH11



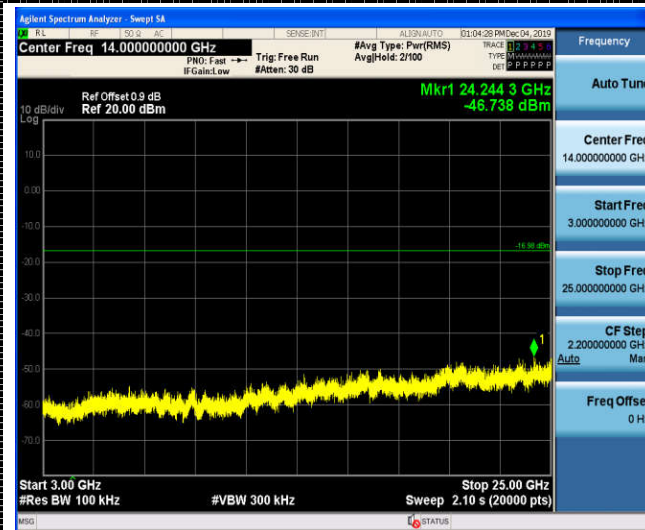
Reference



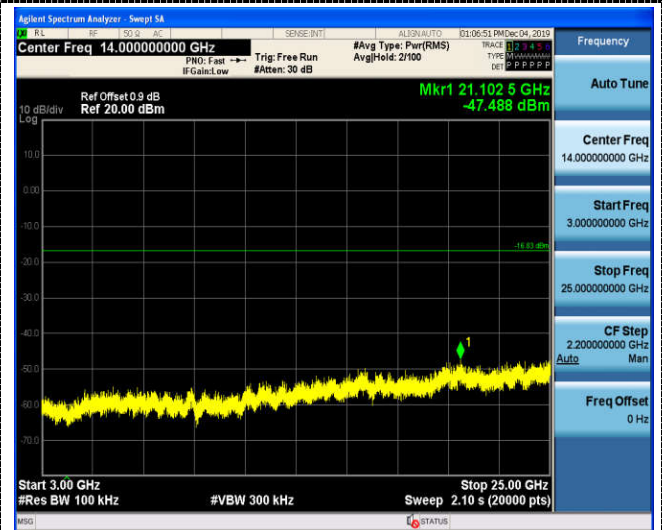
Reference



30MHz-3GHz

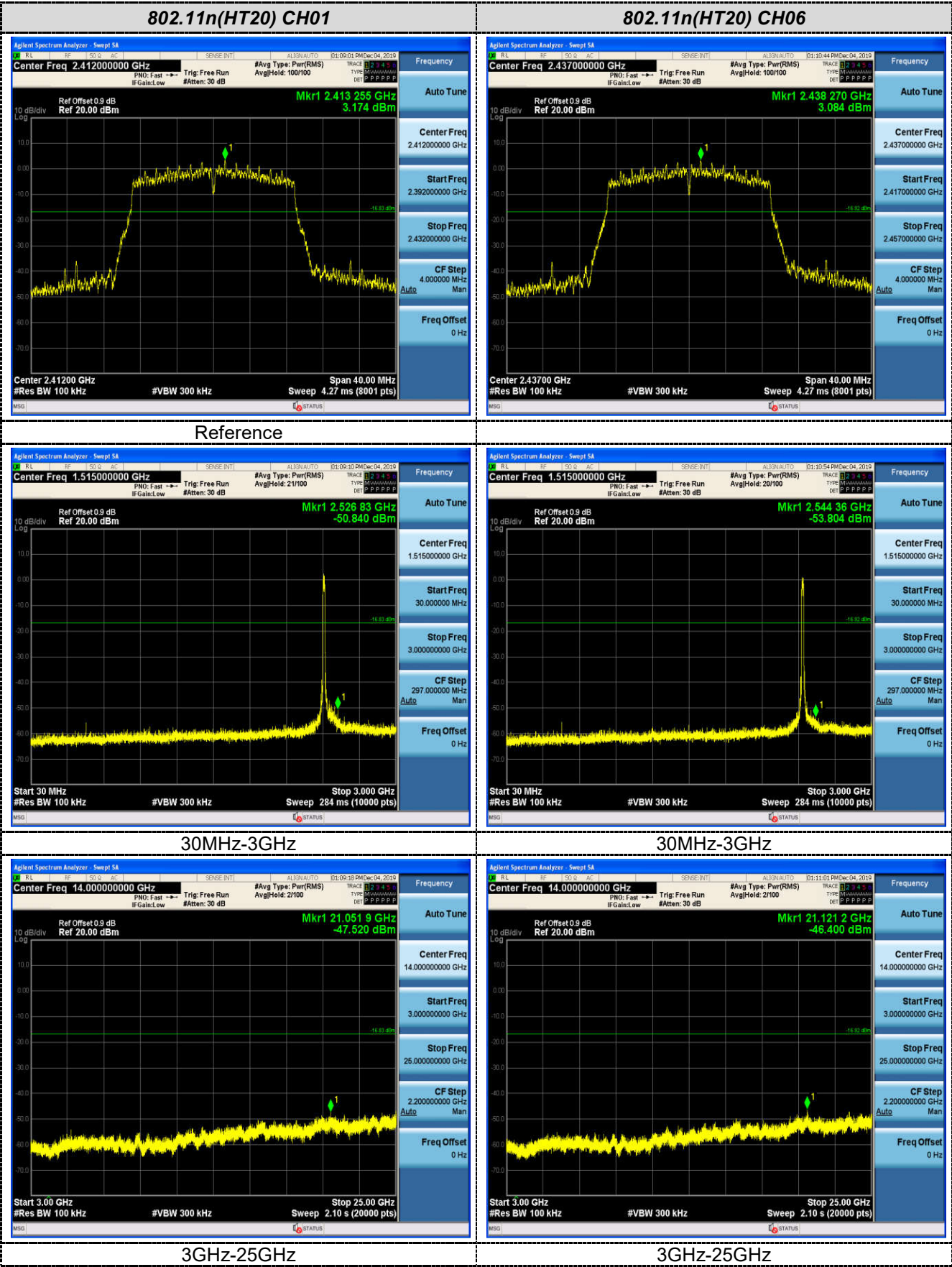


30MHz-3GHz



3GHz-25GHz

3GHz-25GHz



Reference

Agilent Spectrum Analyzer - Sweep SA

Center Freq 1.515000000 GHz

Ref Offset 0.9 dB
Ref 20.00 dBm

Mkr1 2.526 83 GHz
-50.840 dBm

Frequency

Auto Tune

Center Freq
1.515000000 GHz

Start Freq
30.000000 MHz

Stop Freq
3.000000000 GHz

CF Step
297.000000 MHz

Freq Offset
0 Hz

Start 30 MHz
#Res BW 100 kHz

#VBW 300 kHz

Sweep 284 ms (10000 pts)

Agilent Spectrum Analyzer - Sweep SA

Center Freq 1.515000000 GHz

Ref Offset 0.9 dB
Ref 20.00 dBm

Mkr1 2.544 36 GHz
-53.804 dBm

Frequency

Auto Tune

Center Freq
1.515000000 GHz

Start Freq
30.000000 MHz

Stop Freq
3.000000000 GHz

CF Step
297.000000 MHz

Freq Offset
0 Hz

Start 30 MHz
#Res BW 100 kHz

#VBW 300 kHz

Sweep 284 ms (10000 pts)

30MHz-3GHz

Agilent Spectrum Analyzer - Sweep SA

Center Freq 14.000000000 GHz

Ref Offset 0.9 dB
Ref 20.00 dBm

Mkr1 21.051 9 GHz
-47.520 dBm

Frequency

Auto Tune

Center Freq
14.000000000 GHz

Start Freq
3.000000000 GHz

Stop Freq
25.000000000 GHz

CF Step
2.200000000 GHz

Freq Offset
0 Hz

Start 3.00 GHz
#Res BW 100 kHz

#VBW 300 kHz

Sweep 2.10 s (20000 pts)

Agilent Spectrum Analyzer - Sweep SA

Center Freq 14.000000000 GHz

Ref Offset 0.9 dB
Ref 20.00 dBm

Mkr1 21.121 2 GHz
-46.400 dBm

Frequency

Auto Tune

Center Freq
14.000000000 GHz

Start Freq
3.000000000 GHz

Stop Freq
25.000000000 GHz

CF Step
2.200000000 GHz

Freq Offset
0 Hz

Start 3.00 GHz
#Res BW 100 kHz

#VBW 300 kHz

Sweep 2.10 s (20000 pts)

3GHz-25GHz

Agilent Spectrum Analyzer - Sweep SA

Center Freq 14.000000000 GHz

Ref Offset 0.9 dB
Ref 20.00 dBm

Mkr1 21.051 9 GHz
-47.520 dBm

Frequency

Auto Tune

Center Freq
14.000000000 GHz

Start Freq
3.000000000 GHz

Stop Freq
25.000000000 GHz

CF Step
2.200000000 GHz

Freq Offset
0 Hz

Start 3.00 GHz
#Res BW 100 kHz

#VBW 300 kHz

Sweep 2.10 s (20000 pts)

Agilent Spectrum Analyzer - Sweep SA

Center Freq 14.000000000 GHz

Ref Offset 0.9 dB
Ref 20.00 dBm

Mkr1 21.121 2 GHz
-46.400 dBm

Frequency

Auto Tune

Center Freq
14.000000000 GHz

Start Freq
3.000000000 GHz

Stop Freq
25.000000000 GHz

CF Step
2.200000000 GHz

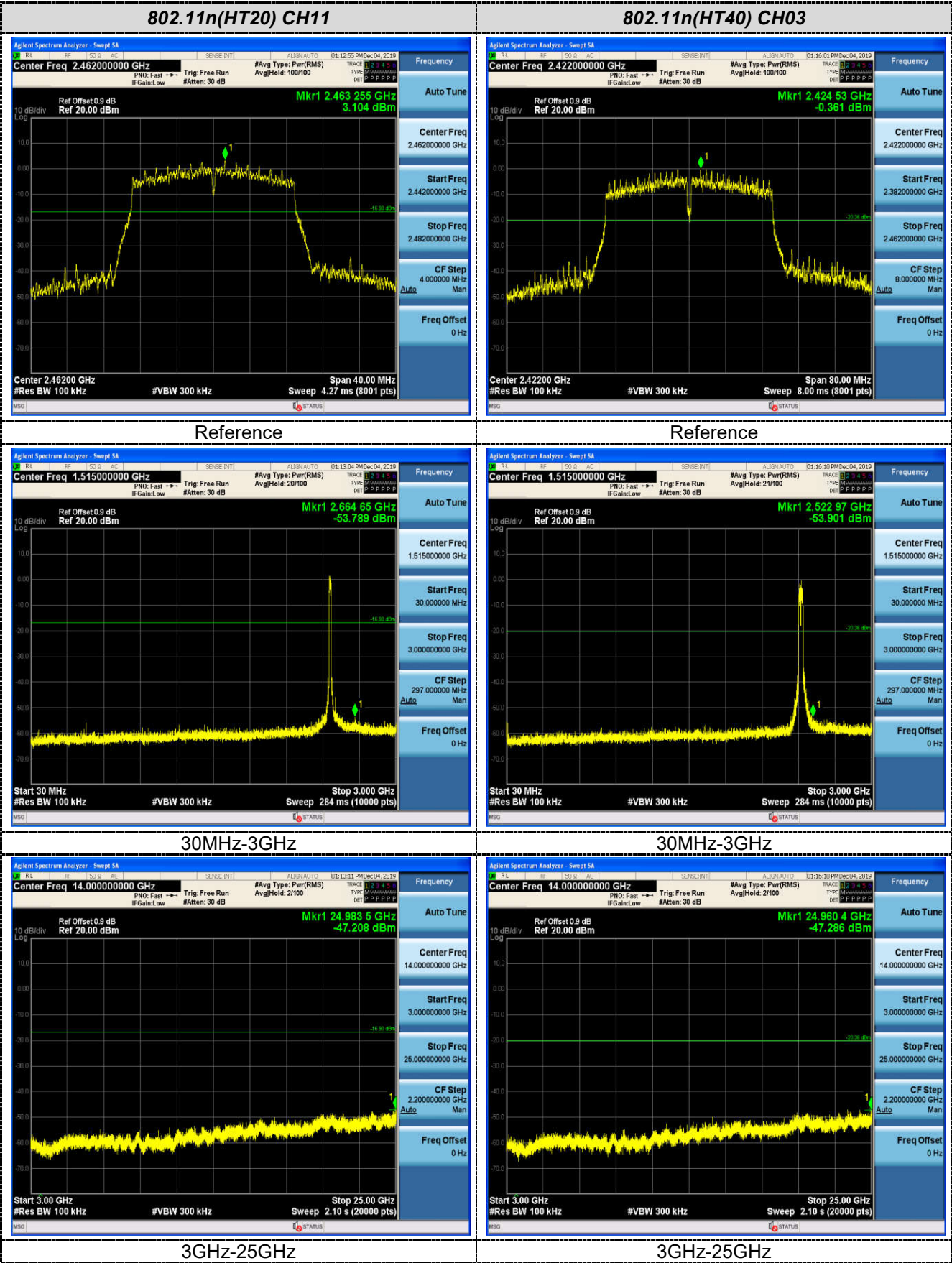
Freq Offset
0 Hz

Start 3.00 GHz
#Res BW 100 kHz

#VBW 300 kHz

Sweep 2.10 s (20000 pts)

3GHz-25GHz



Reference

Agilent Spectrum Analyzer - Sweep 5A

Center Freq 1.515000000 GHz

Ref Offset 0.9 dB
Ref 20.00 dBm

Mkr1 2.664 65 GHz
-53.789 dBm

Frequency

Auto Tune

Center Freq 1.515000000 GHz

Start Freq 30.000000 MHz

Stop Freq 3.000000000 GHz

CF Step 297.000000 MHz

Freq Offset 0 Hz

Start 30 MHz

#Res BW 100 kHz

#VBW 300 kHz

Sweep 284 ms (10000 pts)

Reference

Agilent Spectrum Analyzer - Sweep 5A

Center Freq 1.515000000 GHz

Ref Offset 0.9 dB
Ref 20.00 dBm

Mkr1 2.522 97 GHz
-53.901 dBm

Frequency

Auto Tune

Center Freq 1.515000000 GHz

Start Freq 30.000000 MHz

Stop Freq 3.000000000 GHz

CF Step 297.000000 MHz

Freq Offset 0 Hz

Start 30 MHz

#Res BW 100 kHz

#VBW 300 kHz

Sweep 284 ms (10000 pts)

30MHz-3GHz

Agilent Spectrum Analyzer - Sweep 5A

Center Freq 14.000000000 GHz

Ref Offset 0.9 dB
Ref 20.00 dBm

Mkr1 24.983 5 GHz
-47.208 dBm

Frequency

Auto Tune

Center Freq 14.000000000 GHz

Start Freq 3.000000000 GHz

Stop Freq 25.000000000 GHz

CF Step 2.200000000 GHz

Freq Offset 0 Hz

Start 3.00 GHz

#Res BW 100 kHz

#VBW 300 kHz

Sweep 2.10 s (20000 pts)

30MHz-3GHz

Agilent Spectrum Analyzer - Sweep 5A

Center Freq 14.000000000 GHz

Ref Offset 0.9 dB
Ref 20.00 dBm

Mkr1 24.960 4 GHz
-47.286 dBm

Frequency

Auto Tune

Center Freq 14.000000000 GHz

Start Freq 3.000000000 GHz

Stop Freq 25.000000000 GHz

CF Step 2.200000000 GHz

Freq Offset 0 Hz

Start 3.00 GHz

#Res BW 100 kHz

#VBW 300 kHz

Sweep 2.10 s (20000 pts)

3GHz-25GHz

Agilent Spectrum Analyzer - Sweep 5A

Center Freq 14.000000000 GHz

Ref Offset 0.9 dB
Ref 20.00 dBm

Mkr1 24.983 5 GHz
-47.208 dBm

Frequency

Auto Tune

Center Freq 14.000000000 GHz

Start Freq 3.000000000 GHz

Stop Freq 25.000000000 GHz

CF Step 2.200000000 GHz

Freq Offset 0 Hz

Start 3.00 GHz

#Res BW 100 kHz

#VBW 300 kHz

Sweep 2.10 s (20000 pts)

3GHz-25GHz

Agilent Spectrum Analyzer - Sweep 5A

Center Freq 14.000000000 GHz

Ref Offset 0.9 dB
Ref 20.00 dBm

Mkr1 24.960 4 GHz
-47.286 dBm

Frequency

Auto Tune

Center Freq 14.000000000 GHz

Start Freq 3.000000000 GHz

Stop Freq 25.000000000 GHz

CF Step 2.200000000 GHz

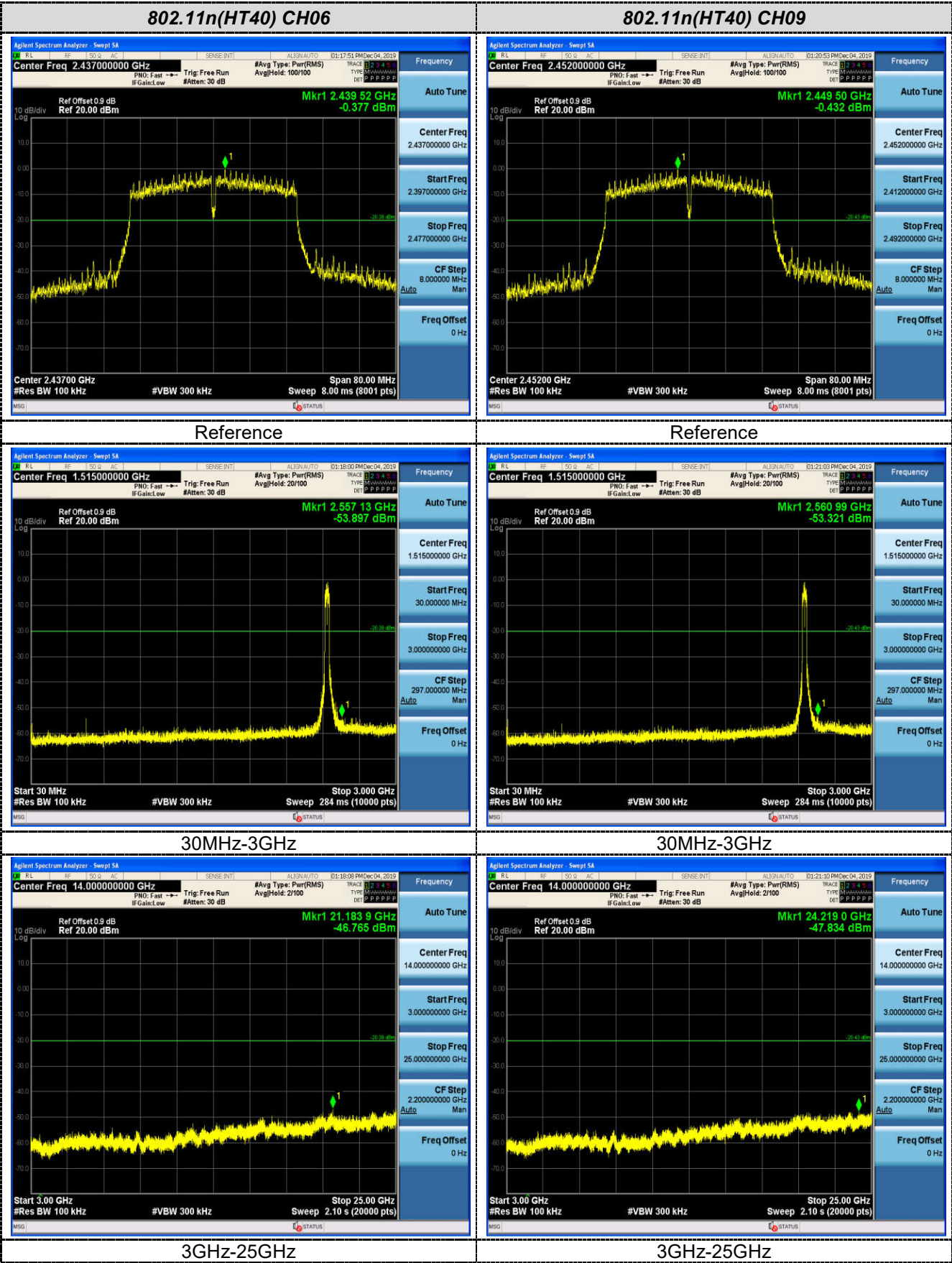
Freq Offset 0 Hz

Start 3.00 GHz

#Res BW 100 kHz

#VBW 300 kHz

Sweep 2.10 s (20000 pts)



Reference

Agilent Spectrum Analyzer - Swept SA

Center Freq 1.515000000 GHz

Ref Offset 0.9 dB
Ref 20.00 dBm

Mkr1 2.557 13 GHz
-53.897 dBm

Frequency

Auto Tune

Center Freq
1.515000000 GHz

Start Freq
30.000000 MHz

Stop Freq
3.000000000 GHz

CF Step
297.000000 MHz

Freq Offset
0 Hz

Start 30 MHz
#Res BW 100 kHz

#VBW 300 kHz

Sweep 284 ms (10000 pts)

Reference

Agilent Spectrum Analyzer - Swept SA

Center Freq 1.515000000 GHz

Ref Offset 0.9 dB
Ref 20.00 dBm

Mkr1 2.560 99 GHz
-53.321 dBm

Frequency

Auto Tune

Center Freq
1.515000000 GHz

Start Freq
30.000000 MHz

Stop Freq
3.000000000 GHz

CF Step
297.000000 MHz

Freq Offset
0 Hz

Start 30 MHz
#Res BW 100 kHz

#VBW 300 kHz

Sweep 284 ms (10000 pts)

30MHz-3GHz

Agilent Spectrum Analyzer - Swept SA

Center Freq 14.000000000 GHz

Ref Offset 0.9 dB
Ref 20.00 dBm

Mkr1 21.183 9 GHz
-46.765 dBm

Frequency

Auto Tune

Center Freq
14.000000000 GHz

Start Freq
3.000000000 GHz

Stop Freq
25.000000000 GHz

CF Step
2.200000000 GHz

Freq Offset
0 Hz

Start 3.00 GHz
#Res BW 100 kHz

#VBW 300 kHz

Sweep 2.10 s (20000 pts)

30MHz-3GHz

Agilent Spectrum Analyzer - Swept SA

Center Freq 14.000000000 GHz

Ref Offset 0.9 dB
Ref 20.00 dBm

Mkr1 24.219 0 GHz
-47.834 dBm

Frequency

Auto Tune

Center Freq
14.000000000 GHz

Start Freq
3.000000000 GHz

Stop Freq
25.000000000 GHz

CF Step
2.200000000 GHz

Freq Offset
0 Hz

Start 3.00 GHz
#Res BW 100 kHz

#VBW 300 kHz

Sweep 2.10 s (20000 pts)

3GHz-25GHz

Agilent Spectrum Analyzer - Swept SA

Center Freq 14.000000000 GHz

Ref Offset 0.9 dB
Ref 20.00 dBm

Mkr1 21.183 9 GHz
-46.765 dBm

Frequency

Auto Tune

Center Freq
14.000000000 GHz

Start Freq
3.000000000 GHz

Stop Freq
25.000000000 GHz

CF Step
2.200000000 GHz

Freq Offset
0 Hz

Start 3.00 GHz
#Res BW 100 kHz

#VBW 300 kHz

Sweep 2.10 s (20000 pts)

3GHz-25GHz

Agilent Spectrum Analyzer - Swept SA

Center Freq 14.000000000 GHz

Ref Offset 0.9 dB
Ref 20.00 dBm

Mkr1 24.219 0 GHz
-47.834 dBm

Frequency

Auto Tune

Center Freq
14.000000000 GHz

Start Freq
3.000000000 GHz

Stop Freq
25.000000000 GHz

CF Step
2.200000000 GHz

Freq Offset
0 Hz

Start 3.00 GHz
#Res BW 100 kHz

#VBW 300 kHz

Sweep 2.10 s (20000 pts)