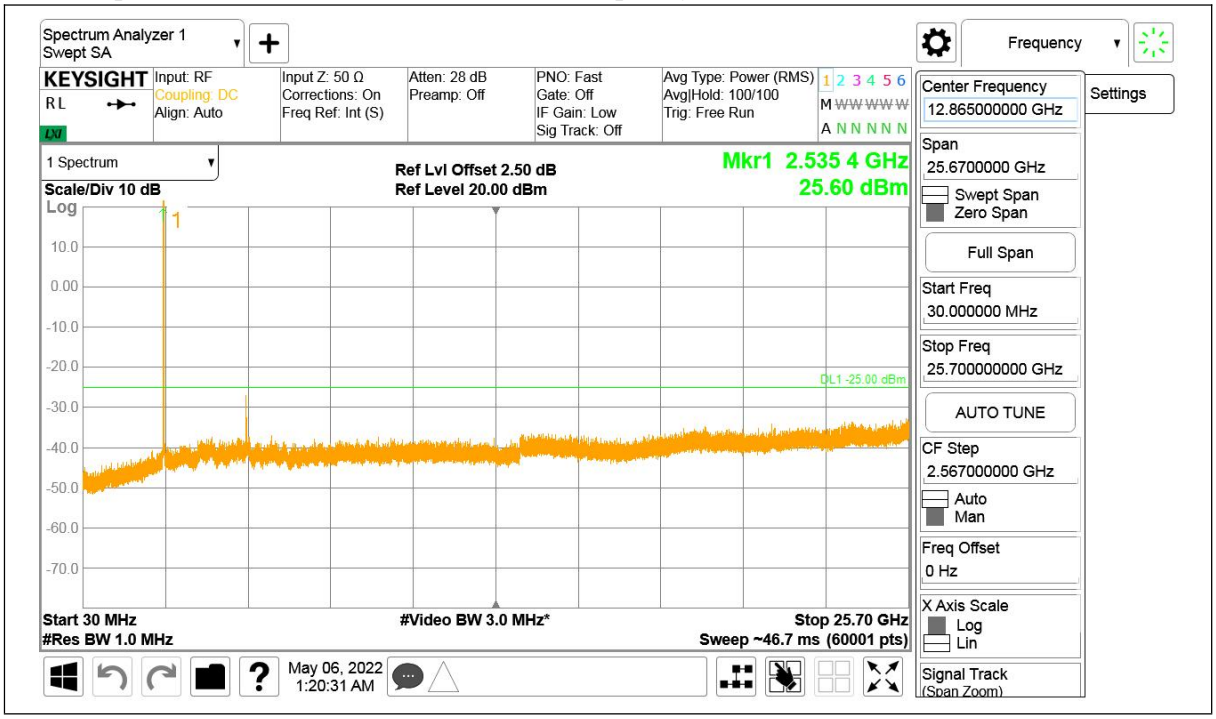
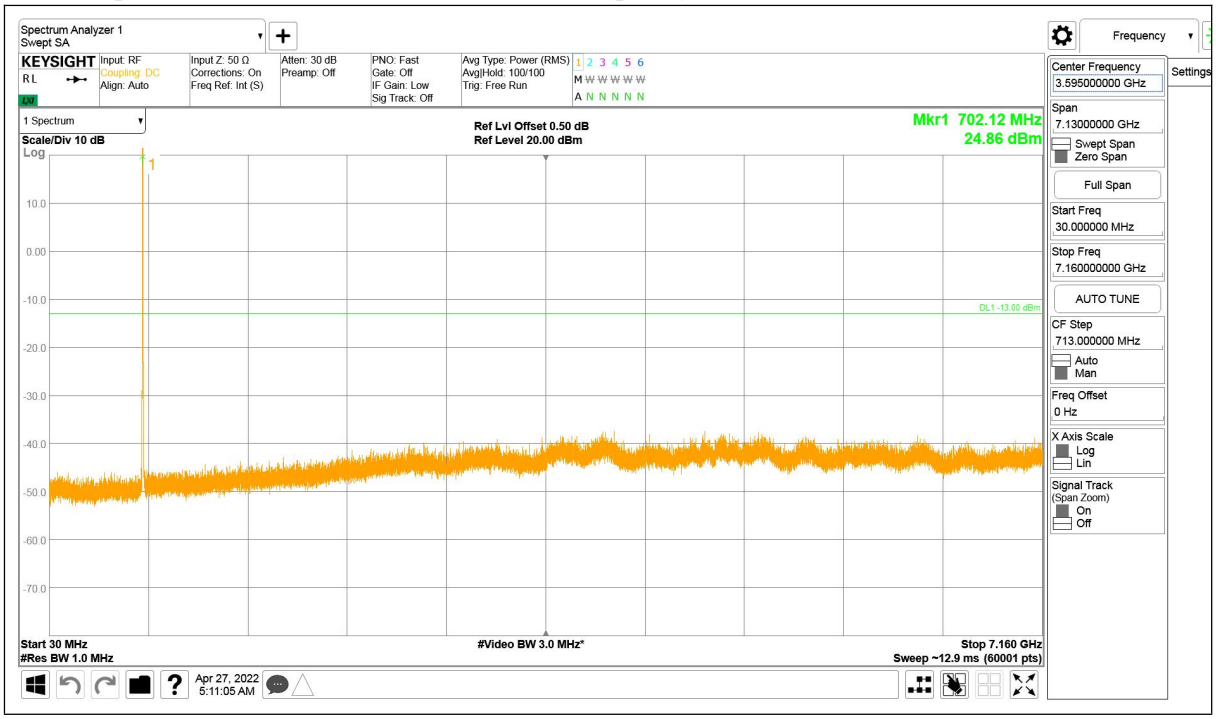
n7

NOTE: peak above the limit line is the carrier frequency.



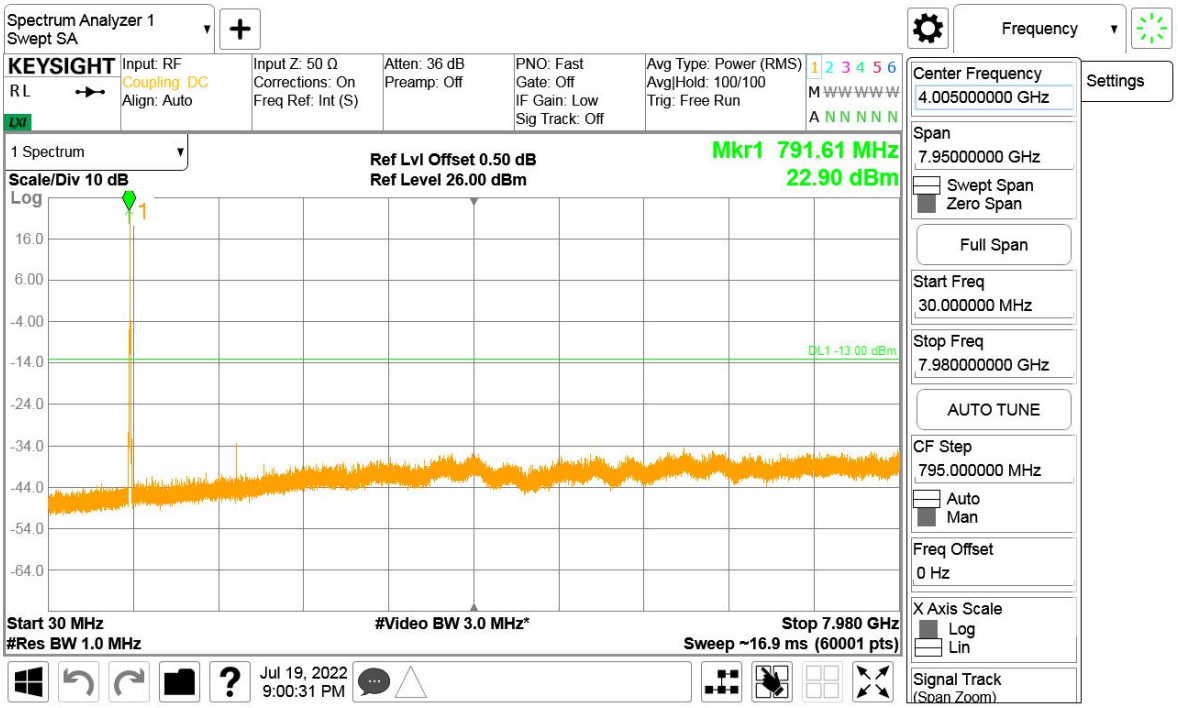
n12

NOTE: peak above the limit line is the carrier frequency.



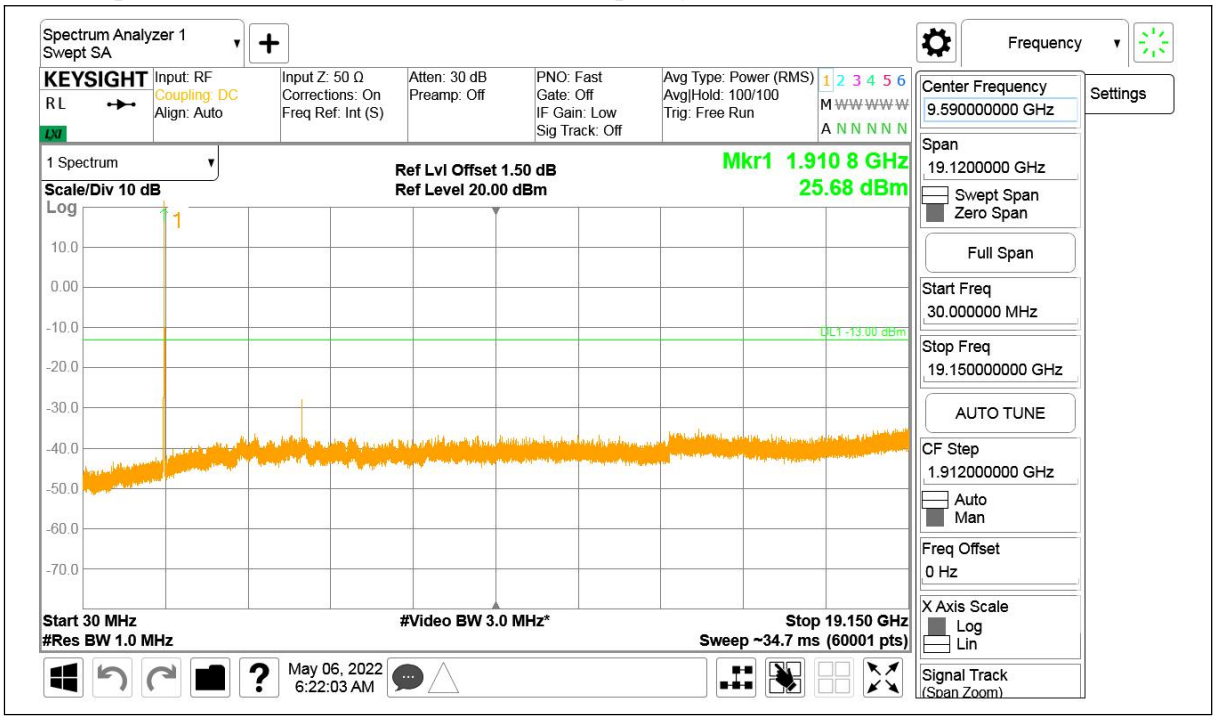
n14

NOTE: peak above the limit line is the carrier frequency.



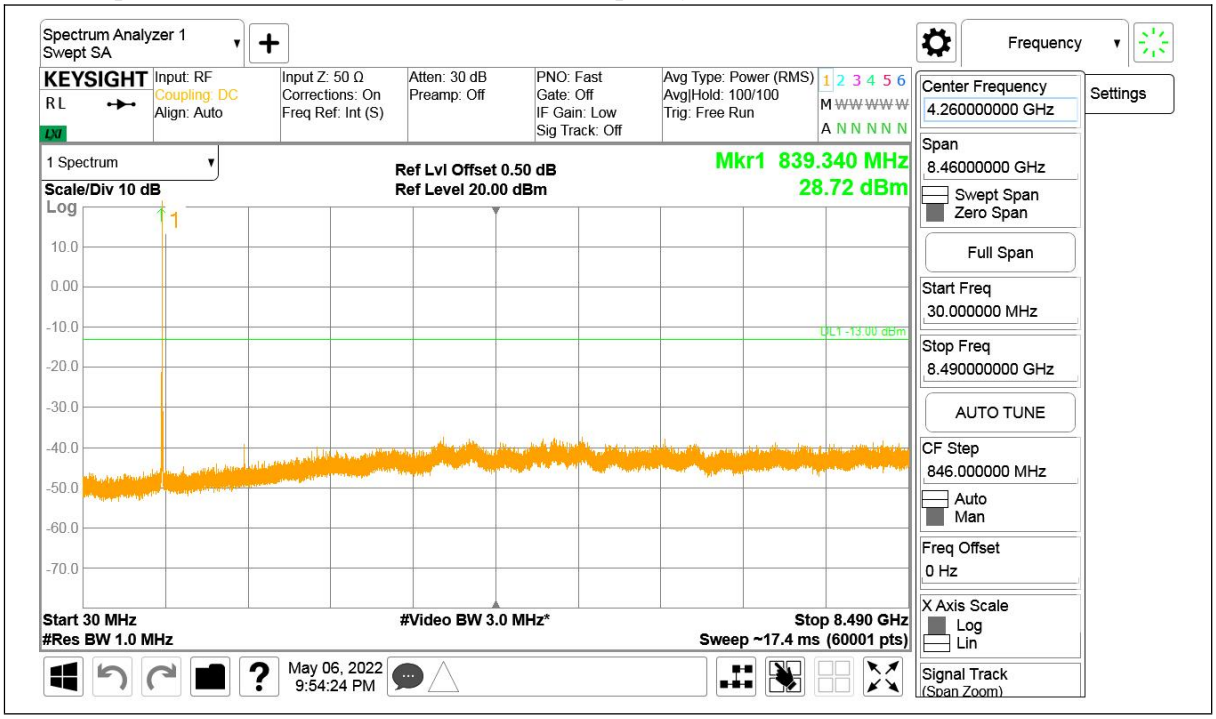
LTE Band 66+NR n25

NOTE: peak above the limit line is the carrier frequency.



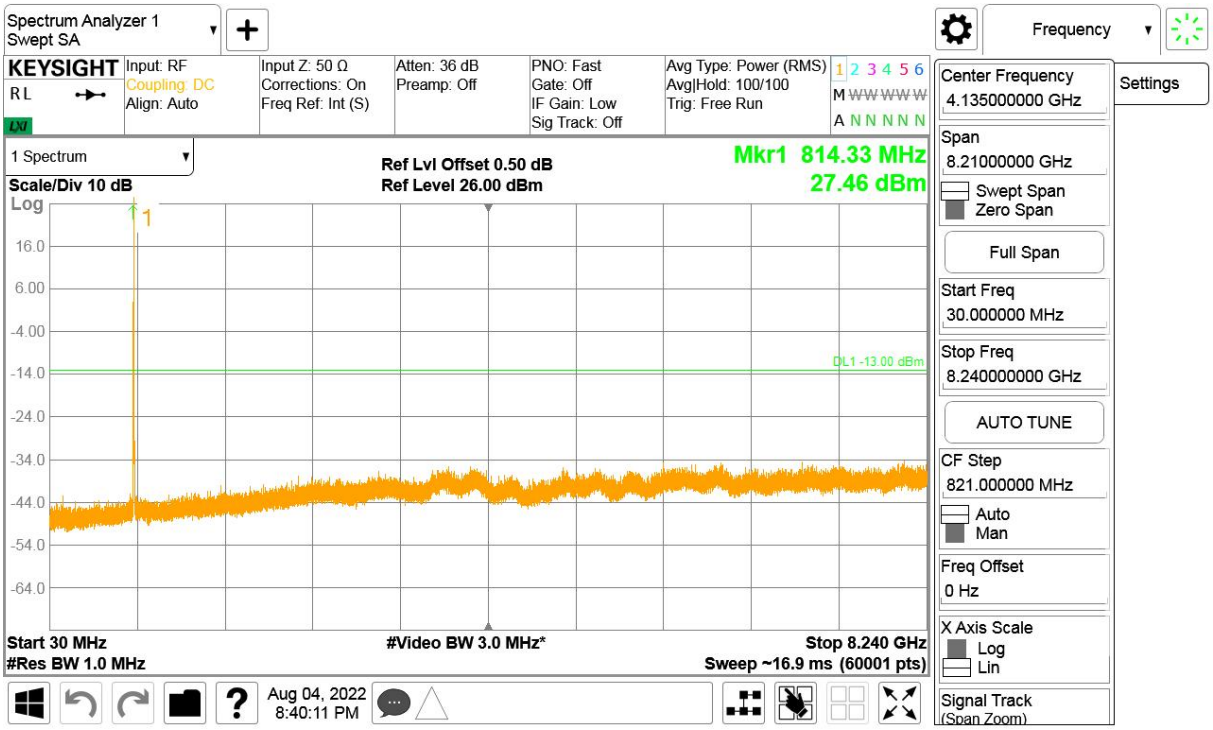
n26PART22

NOTE: peak above the limit line is the carrier frequency.



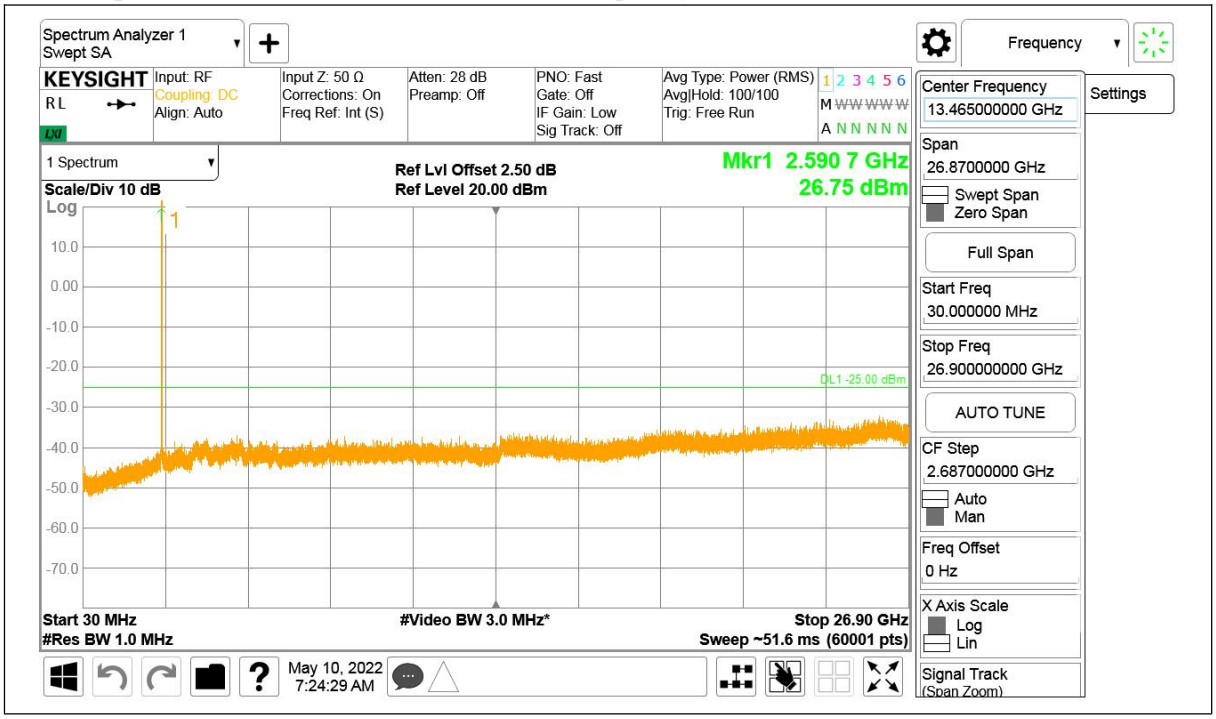
n26PART90

NOTE: peak above the limit line is the carrier frequency.



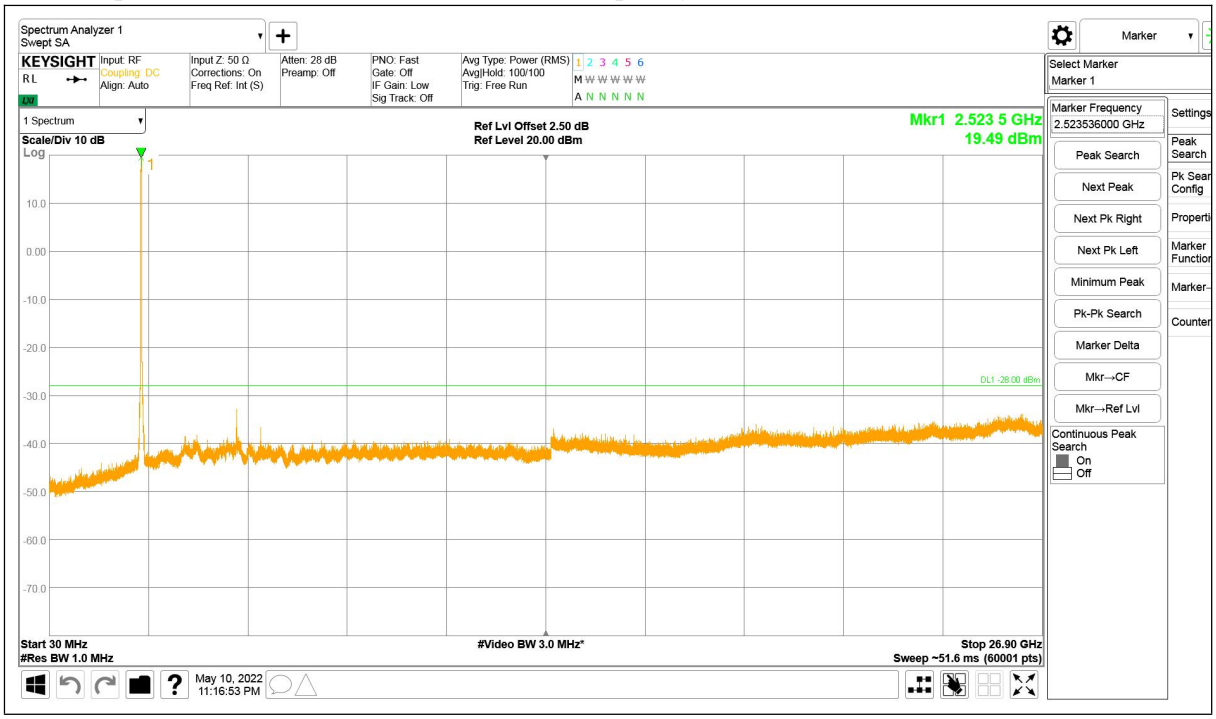
n41

NOTE: peak above the limit line is the carrier frequency.



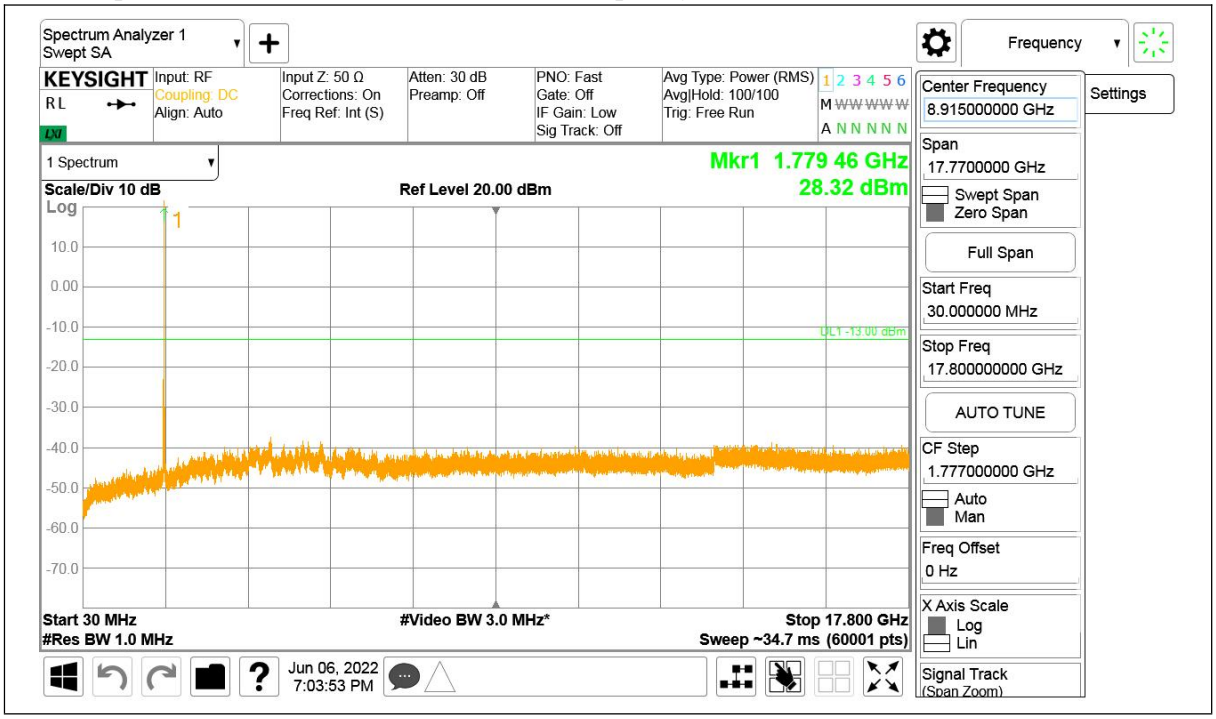
n41-MIMO

NOTE: peak above the limit line is the carrier frequency.



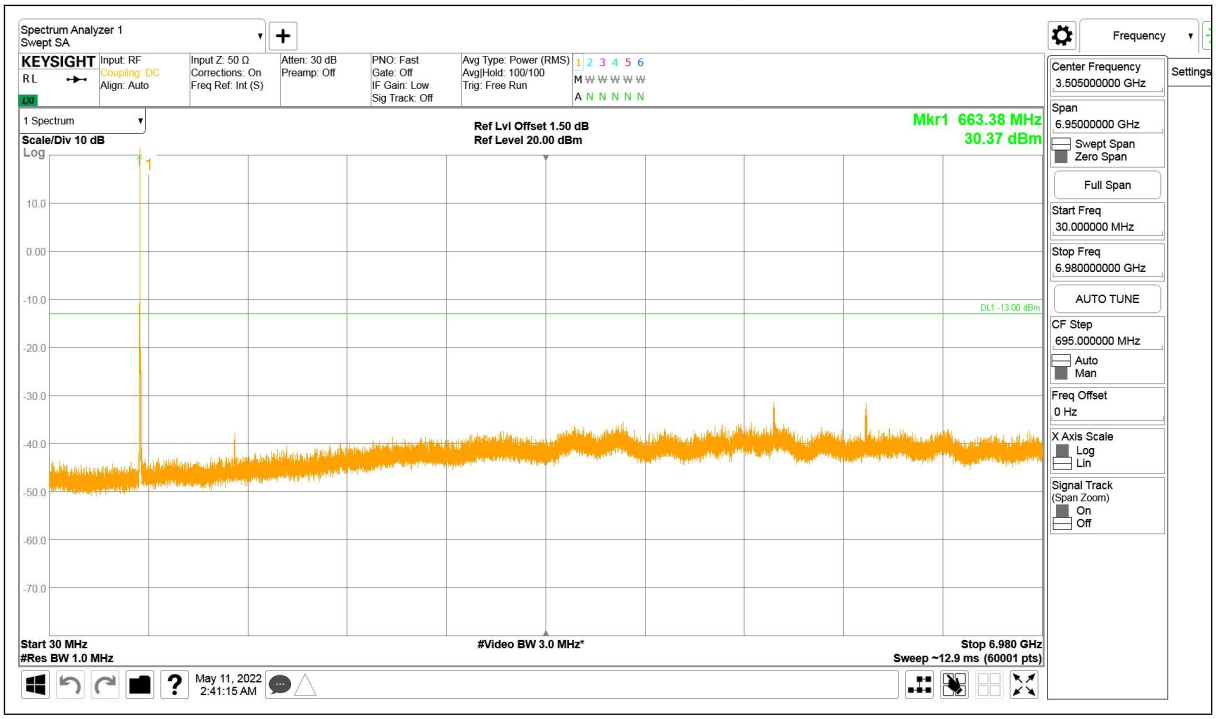
n66

NOTE: peak above the limit line is the carrier frequency.



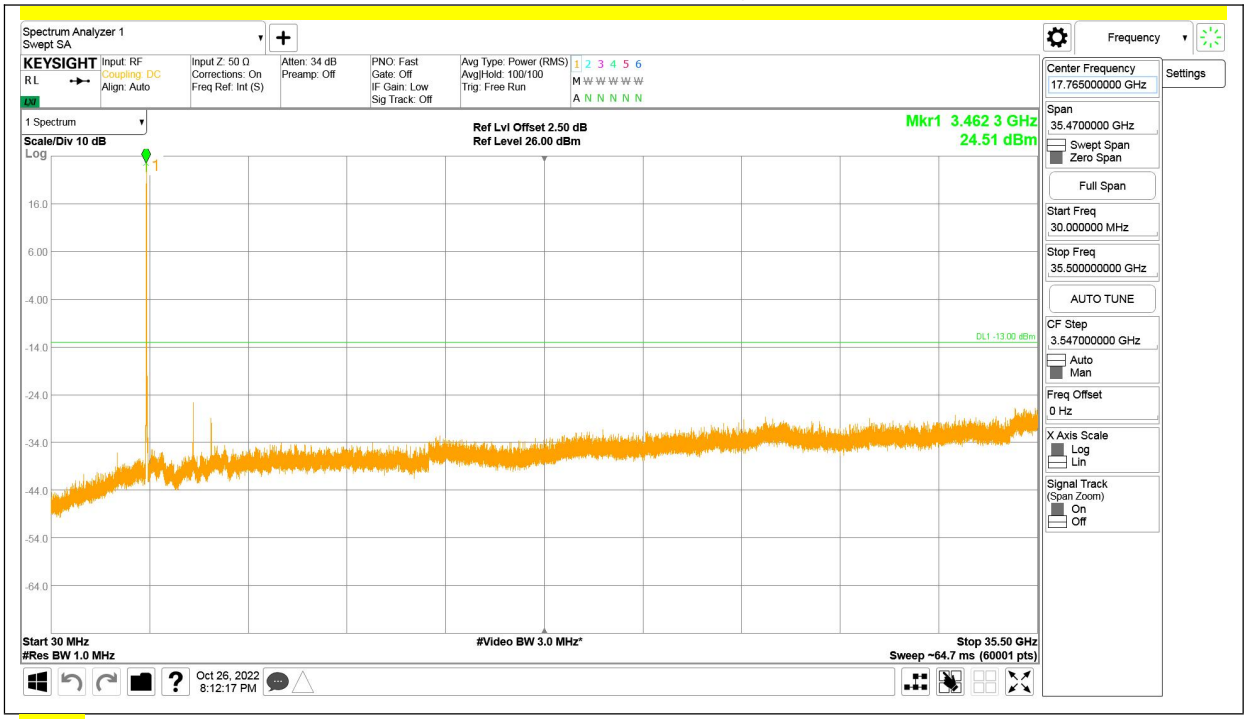
n71

NOTE: peak above the limit line is the carrier frequency.



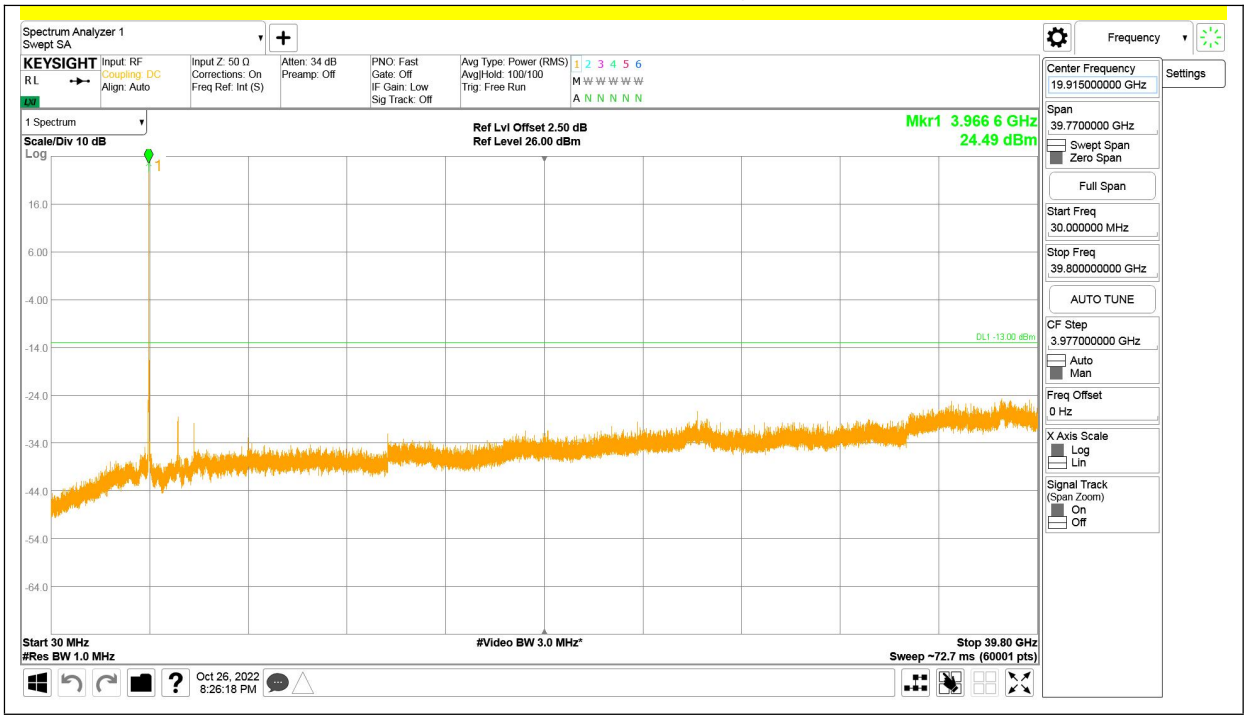
n77L

NOTE: peak above the limit line is the carrier frequency.



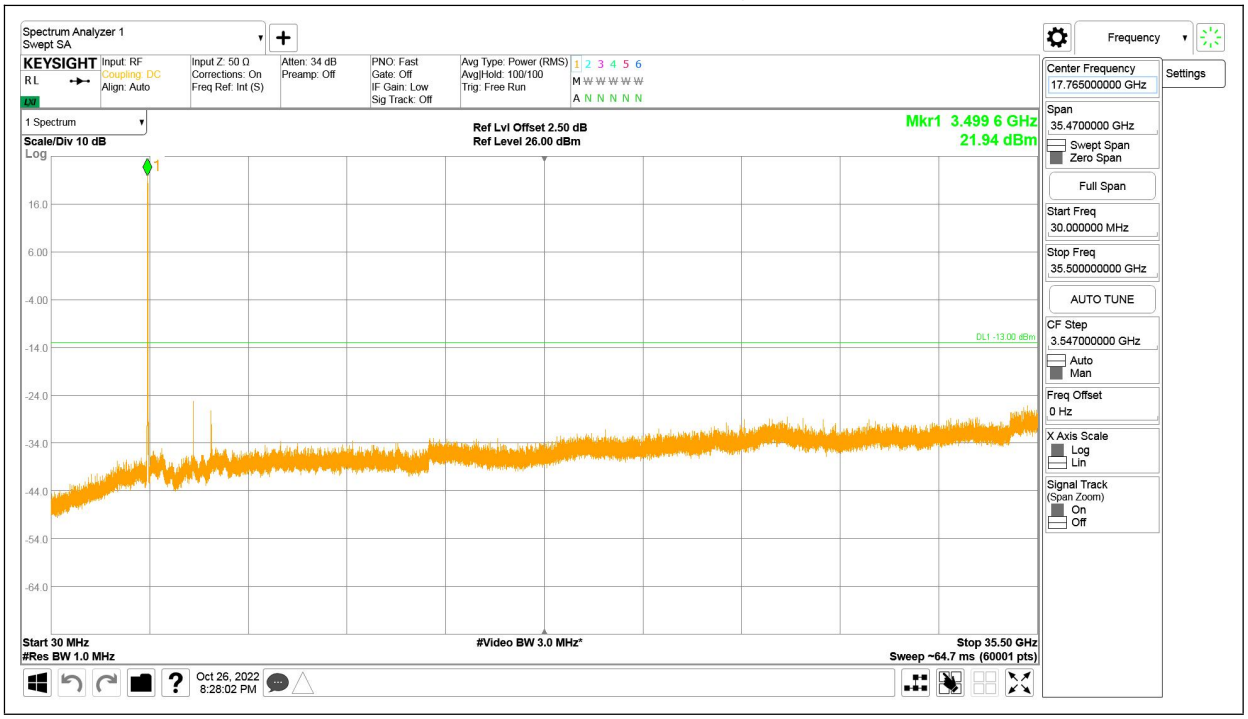
n77H

NOTE: peak above the limit line is the carrier frequency.



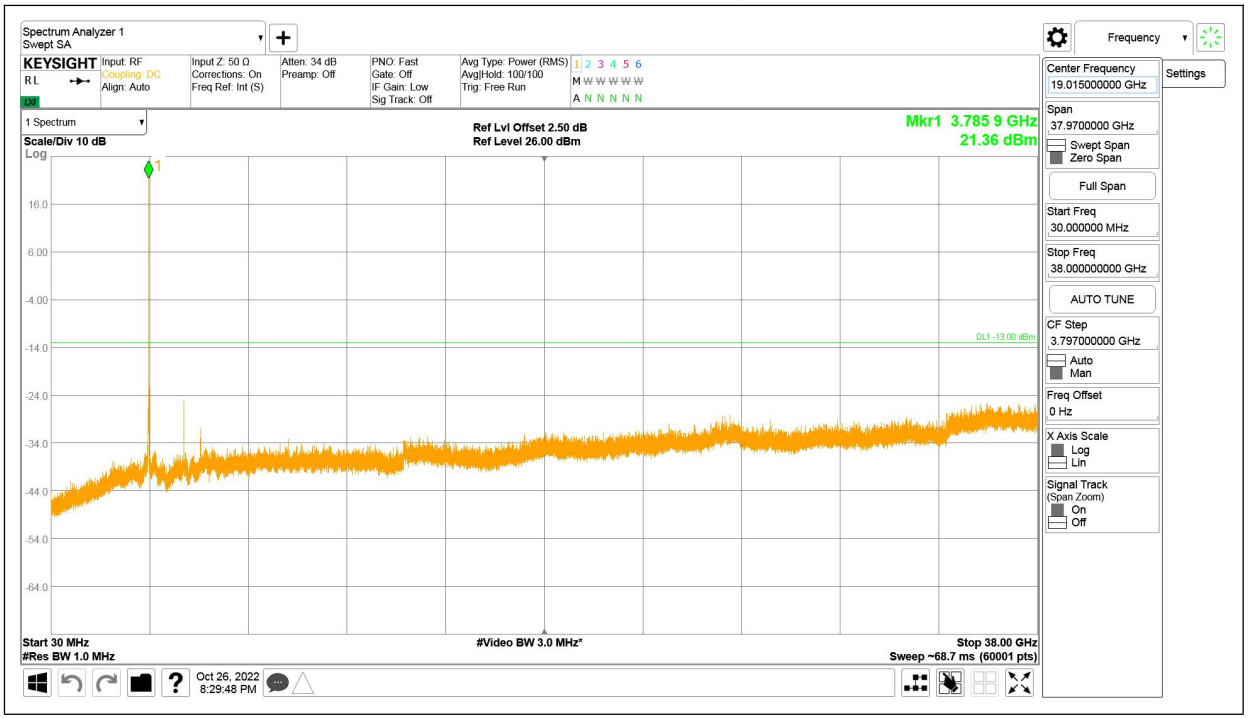
n78L

NOTE: peak above the limit line is the carrier frequency.



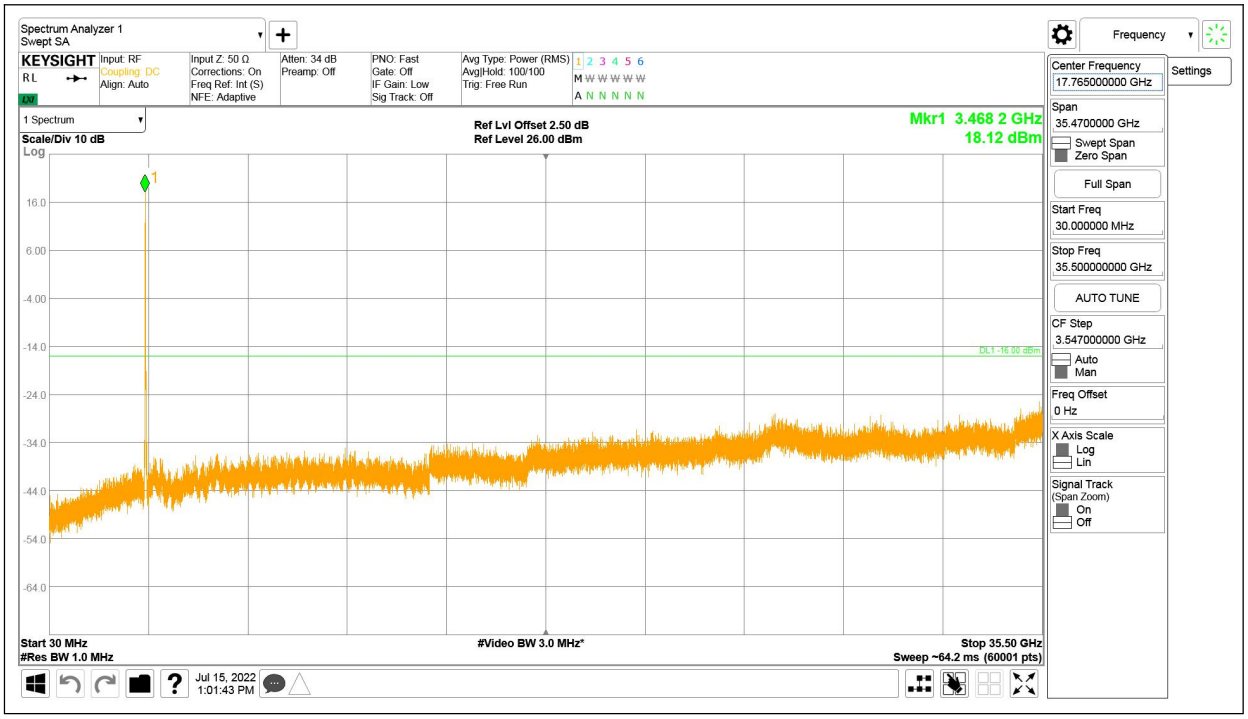
n78H

NOTE: peak above the limit line is the carrier frequency.



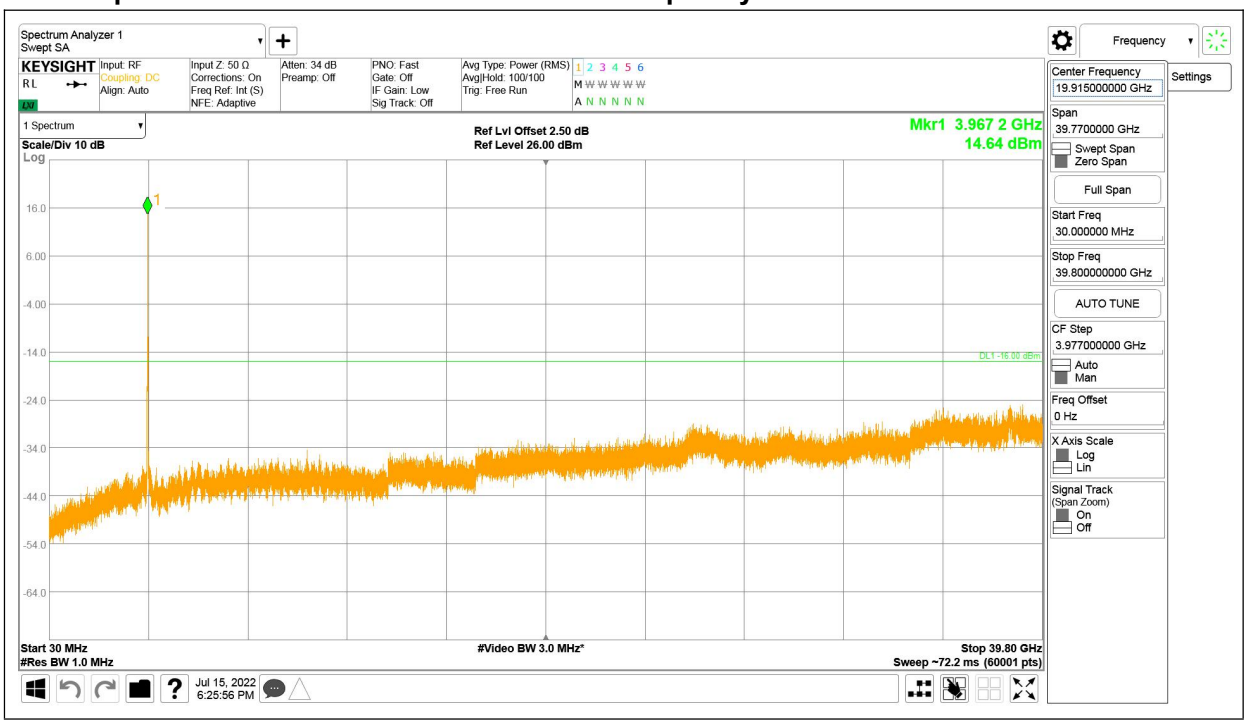
n77L-MIMO

NOTE: peak above the limit line is the carrier frequency.



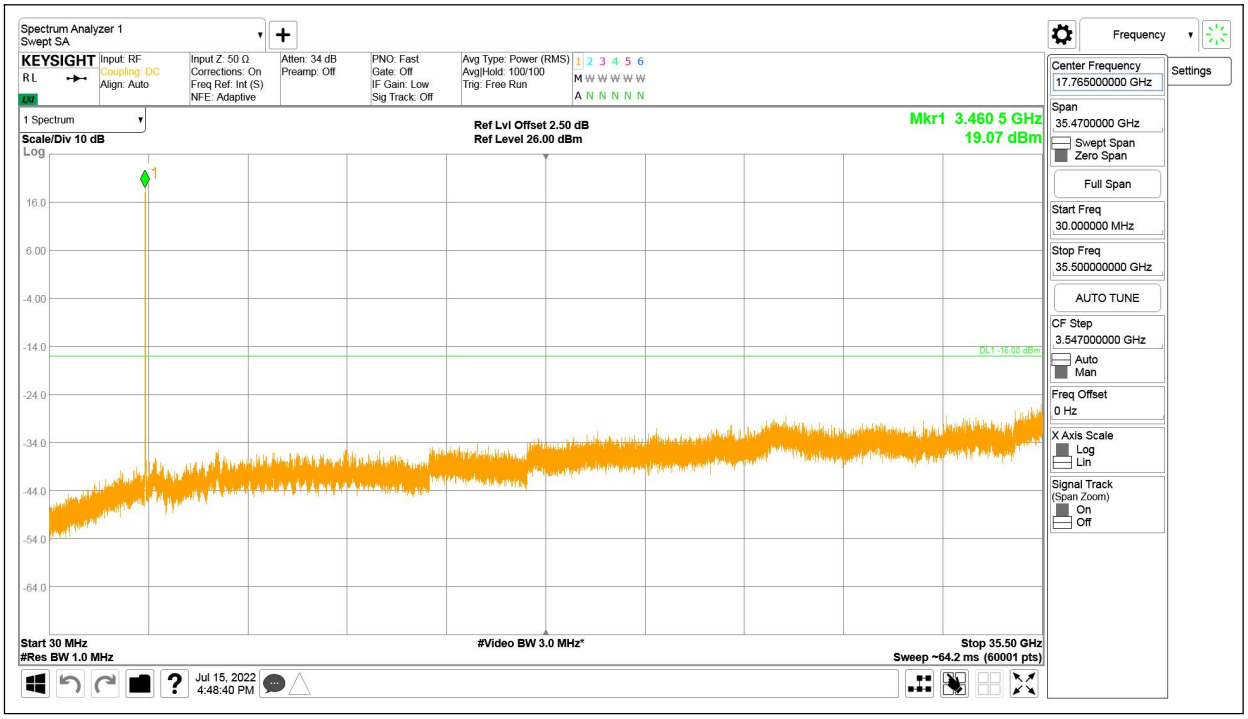
n77H-MIMO

NOTE: peak above the limit line is the carrier frequency.



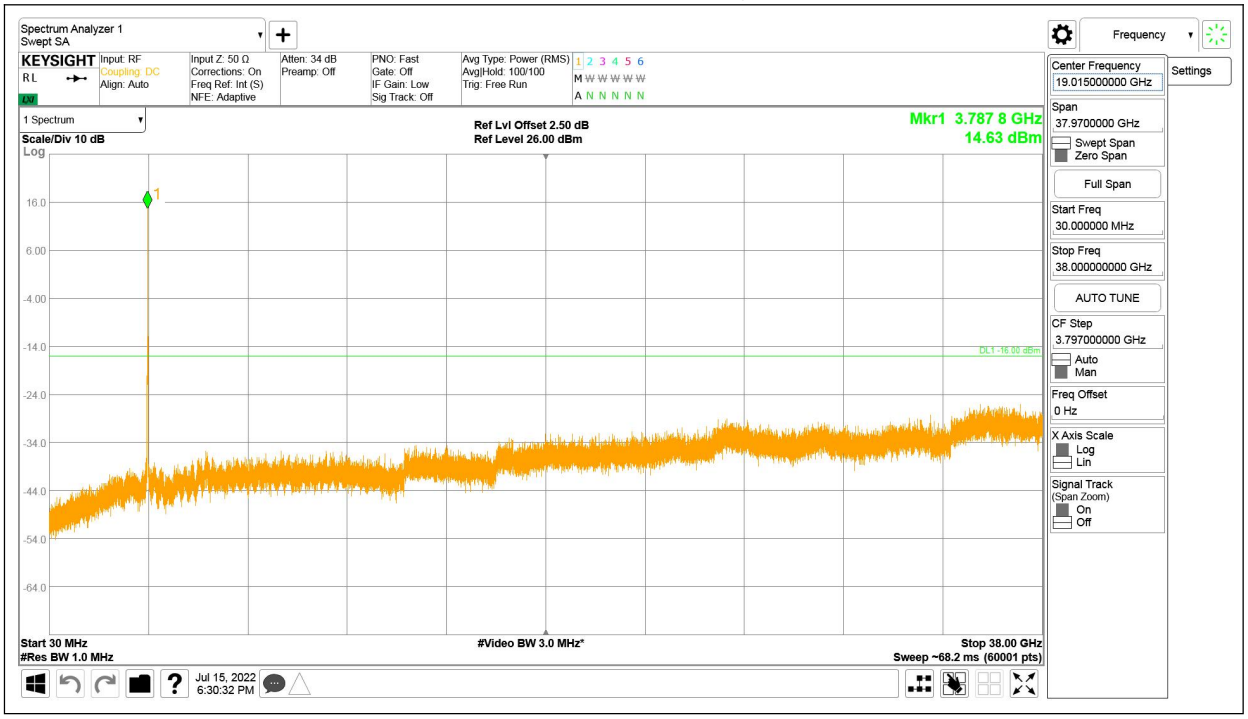
n78L-MIMO

NOTE: peak above the limit line is the carrier frequency.



n78H-MIMO

NOTE: peak above the limit line is the carrier frequency.



6.6.Radiated Spurious Emission

Specifications:	FCC Part 2.1051, 2.1053, 24.238, 22.917, 27.53
DUT Serial Number:	864788050018584
Test conditions:	Ambient Temperature:15℃-35℃ Relative Humidity:30%-60% Air pressure: 86-106kPa
Test Results:	Pass

Limit Level Construction:

According to Part 22.917 (a), i.e., Out of Band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

According to Part 24.238 (a), i.e., Out of Band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB, so the limit level is: P(dBm)– (43 + 10 log(P)) dB= -13dBm.

According to Part 27.53(c):

On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

According to Part 27.53(h):

Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 Bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10(P) dB.

According to Part 27.53(g):

For operations in the 600 MHz Band and the 698-746 MHz Band, the power of any emission outside a licensee's frequency Band(s) of operation shall be attenuated below the transmitter power (P) within the licensed Band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution Bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz Bands immediately outside and adjacent to a licensee's frequency block, a resolution Bandwidth of at least 30 kHz may be employed.

According to Part 90.691:

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log10(f/6.1) decibels or 50 + 10 Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f

is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

Limits for Radiated spurious emissions(UE)	
Frequency range	**Limit Level /Resolution Bandwidth**
30 MHz to 20000 MHz	-13dBm/1MHz

Measurement Uncertainty:

Item	Uncertainty
Expanded Uncertainty（30MHz-150MHz）	5.15 dB (k=2)
Expanded Uncertainty（150MHz-1GHz）	4.09dB (k=2)
Expanded Uncertainty（1GHz-3GHz）	2.92dB (k=2)
Expanded Uncertainty（3GHz-6GHz）	2.93dB (k=2)
Expanded Uncertainty（3GHz-12.75GHz）	2.69dB (k=2)

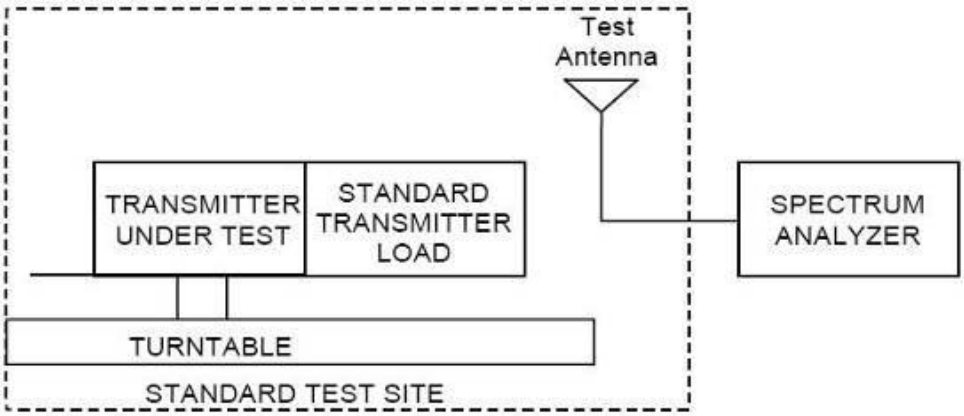
Test Setup:

The EUT was placed in an anechoic chamber. The Wireless Communications Test Set was used to set the TX channel and power level and modulate the TX signal with different bit patterns.

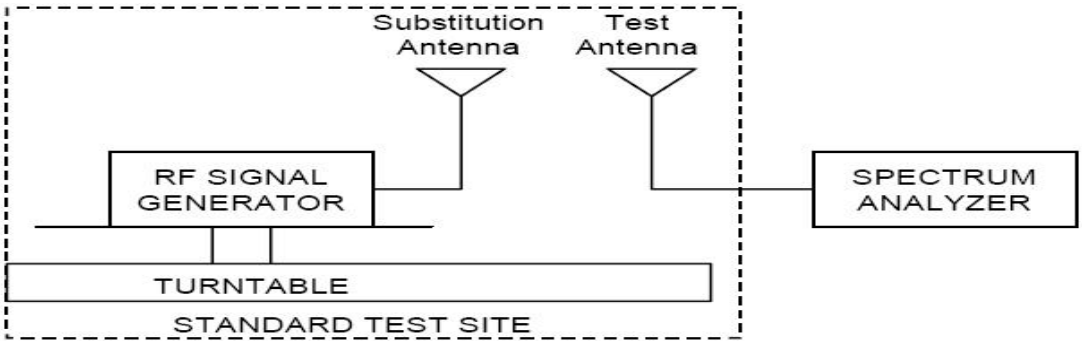
Test Method:

The measurement method is substitution method accordance with section 2.2.12 of ANSI/TIA-603-E: Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

(a) Connect the equipment as illustrated and measure the spurious emissions as the method as above. The distance from the device to the antenna is 3 m .



(b) Reconnect the equipment as illustrated.



(c) Remove the transmitter and replace it with a substitution antenna. The center of the substitution antenna should be approximately at the same location as the center of the transmitter.

(d) Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a non-radiating cable. With the antennas at both ends horizontally polarized, and with the signal generator tuned to a particular spurious frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.

(e) Repeat step d) with both antennas vertically polarized for each spurious frequency.

(f) Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps d) and e) by the power loss in the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna by the following formula:

P_d(dBm) = P_g(dBm) – cable loss (dB) + antenna gain (dB)

where:

Pd is the dipole equivalent power and Pg is the generator output power into the substitution antenna.

Note: The evaluation of radiated spurious emission under the simultaneous transmission of WWAN & WLAN.

Test frequency: 30MHz- 20GHz

All modes were tested,only the worst case was reported.

6.6.1 SA Radiated Spurious Emission Results

SA N2 Radiated Spurious Emission Results

Test Data （20MHz bandwidth 376000 QPSK Mode）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
47.3	-63.9	0.1	-16.4	-80.4	H
90.5	-73.1	0.2	-6.6	-79.9	V
242.2	-71.4	0.4	-0.8	-72.6	H
1137.4	-61.1	0.8	1.4	-60.5	V
4310.8	-69.5	1.8	8.8	-62.5	V
8756.8	-68.3	3.3	12.0	-59.6	V

SA N5 Radiated Spurious Emission Results

Test Data （15MHz bandwidth 167300 QPSK Mode）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
90.1	-73.0	0.2	-6.6	-79.8	H
236.0	-71.1	0.4	-0.6	-72.1	V
1097.8	-66.8	0.8	0.8	-66.8	H
1928.6	-61.3	1.1	0.8	-61.6	H
3947.6	-71.0	1.7	9.0	-63.7	V
8685.6	-67.5	3.3	12.0	-58.78	V

SA N12 Radiated Spurious Emission Results

Test Data （10MHz bandwidth 141500 QPSK Mode）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
90.6	-74.1	0.2	-6.6	-80.9	V
230.3	-72.1	0.4	-0.6	-73.1	H
593.2	-79.5	0.6	0.4	-79.7	H
2187.4	-59.6	1.2	0.0	-60.8	V
3936.0	-70.0	1.7	9.0	-62.7	V
7811.6	-69.3	2.6	11.7	-60.2	V

SA N14 Radiated Spurious Emission Results

Test Data （10MHz bandwidth 152600 QPSK Mode）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
46.4	-53.5	0.2	-16.6	-70.3	H
236.0	-72.5	0.4	-0.6	-73.5	H
1442.6	-67.4	0.9	1.8	-66.5	V
2361.0	-58.0	1.3	0.4	-58.9	H
3913.6	-70.5	1.7	9.0	-63.2	V
9018.4	-68.1	3.2	12.1	-59.2	V

SA N25 Radiated Spurious Emission Results

Test Data （10MHz bandwidth 376500 BPSK Mode）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
90.1	-71.6	0.2	-6.7	-78.5	H
242.5	-72.3	0.4	-0.8	-73.5	H
1565.0	-68.1	1	0.2	-68.9	H
2667.5	-55.0	1.3	-0.4	-56.7	V
4191.4	-70.6	1.8	9	-63.4	V
9706.0	-68.5	3.3	12.8	-59	V

SA N26 Radiated Spurious Emission Results

Test Data （20MHz bandwidth 166300 QPSK Mode）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
90.7	-73.6	0.2	-6.7	-80.5	H
242.6	-71.9	0.4	-0.8	-73.1	H
1566.2	-65.1	1.0	0.2	-65.9	H
2667.0	-56.0	1.3	-0.4	-57.7	V
4192.4	-70.8	1.8	9.0	-63.6	V
9706.0	-68.5	3.3	12.8	-59.0	V

SA N41 Radiated Spurious Emission Results

Test Data （20MHz bandwidth 518601 QPSK Mode）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
50.8	-54.5	0.2	-15.7	-70.4	H
236.5	-72.6	0.4	-0.6	-73.6	H
1335.0	-64.2	0.9	1.3	-63.8	V
2225.4	-58.5	1.2	-0.2	-59.9	H
3863.6	-70.7	1.7	9.0	-63.4	V
9344.8	-67.7	3.2	12.2	-58.7	V

SA N66 Radiated Spurious Emission Results

Test Data （25MHz bandwidth 349000 QPSK Mode）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
46.6	-55.3	0.2	-16.4	-71.9	H
242.7	-73.1	0.4	-0.7	-74.2	V
1285.8	-67.4	0.9	1.0	-67.3	H
2469.2	-58.1	1.3	0.3	-59.1	V
4330.8	-69.8	1.8	8.8	-62.8	V
9311.2	-67.5	3.3	12.2	-58.6	V

SA N71 Radiated Spurious Emission Results

Test Data （10MHz bandwidth 136100 QPSK Mode）

Frequency	Generator	Cable loss	Antenna	Spurious	Antenna

[MHz]	output power(Pg) [dBm]	[dB]	Gain [dB]	Emission Power (Pd) [dBm]	Polarization [H/V]
90.4	-74.3	0.2	-6.6	-81.1	H
245.8	-72.7	0.4	-0.7	-73.8	V
1483.4	-66.1	1.0	1.5	-65.6	V
2550.4	-57.3	1.3	0.2	-58.4	H
4393.2	-69.3	1.8	9.0	-62.1	V
9472.8	-67.2	3.3	12.4	-58.1	V

SA N77 Radiated Spurious Emission Results

Test Data （30MHz bandwidth 650000 16QAM Mode）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
57.6	-67.4	0.2	-13.7	-81.3	H
242.7	-72.4	0.4	-0.8	-73.6	H
1545.8	-65.5	1.0	0.2	-66.3	V
2718.8	-55.1	1.3	-0.5	-56.9	H
6539.3	-69.1	2.4	11.1	-60.4	V
10205.6	-67.0	3.9	13.1	-57.8	V

SA N78 Radiated Spurious Emission Results

Test Data （30MHz bandwidth 636667 BPSK Mode）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
90.7	-71.4	0.2	-6.7	-78.3	H
702.9	-81.6	0.7	1.5	-80.8	V
1429.4	-68.1	0.9	1.8	-67.2	H
2571.2	-57.3	1.3	0.2	-58.4	H
5571.0	-71.2	2.2	10.6	-62.8	V
10916.4	-68.1	3.3	13.5	-57.9	V

6.6.2 NSA Radiated Spurious Emission Results

NSA B66+N5 Radiated Spurious Emission Results

Test Data （15MHz bandwidth 831.5M QPSK Mode）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
90.7	-74.6	0.2	-6.7	-81.5	H
593.4	-78.8	0.6	0.4	-79.0	V
1483.6	-66.1	1.0	1.5	-65.6	H
2723.6	-55.2	1.3	-0.5	-57.0	V
4569.6	-70.7	1.8	9.9	-62.6	V
9401.2	-67.5	3.3	12.3	-58.5	V

Test Data （15MHz bandwidth 836.5M QPSK Mode）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
90.2	-74.8	0.2	-6.6	-81.6	V
537.7	-84.3	0.6	1.2	-83.7	V
1459.4	-67.1	1.0	1.8	-66.3	H
2623.6	-57.1	1.3	0.4	-58.0	V
3922.4	-70.8	1.7	9.0	-63.5	V
8714.4	-68.3	3.1	12.0	-59.4	V

Test Data （15MHz bandwidth 841.5M QPSK Mode）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
90.7	-74.2	0.2	-6.7	-81.1	H
698.4	-81.2	0.7	1.4	-80.5	V
1483.6	-67.1	1.0	1.5	-66.6	V
2619.0	-56.0	1.3	-0.4	-57.7	V
3903.6	-70.6	1.7	9.0	-63.3	V
8695.2	-67.8	3.2	12.0	-59.0	V

NSA B66+N25 Radiated Spurious Emission Results

Test Data （10MHz bandwidth 1855M BPSK Mode）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
131.9	-79.9	0.3	-1.8	-82.0	V
701.8	-81.1	0.7	1.4	-80.4	V
1484.4	-67.0	1.0	1.5	-66.5	H
2621.4	-55.7	1.3	-0.4	-57.4	V
4312.4	-69.9	1.8	8.8	-62.9	V
9377.2	-67.3	3.3	12.3	-58.3	V

Test Data （10MHz bandwidth 1882.5M BPSK Mode）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
63.4	-68.1	0.2	-11.8	-80.1	V
254.5	-76.6	0.4	-0.5	-77.5	H
1400.0	-68.3	0.9	1.7	-67.5	V
2581.0	-56.1	1.3	-0.4	-57.8	V
4084.4	-71.3	1.7	9.3	-63.7	V
9383.6	-67.1	3.3	12.3	-58.1	V

Test Data （10MHz bandwidth 1910M BPSK Mode）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
90.7	-74.8	0.2	-6.7	-81.7	H
477.5	-83.9	0.5	1.1	-83.3	H
1443.6	-67.3	0.9	1.8	-66.4	V
2608.8	-56.3	1.3	-0.4	-58.0	V
3880.8	-71.0	1.7	9.0	-63.7	V
8396.8	-68.6	2.6	12.0	-59.2	V

6.6.3 MIMO Radiated Spurious Emission Results

MIMO B41 Radiated Spurious Emission Results

Test Data （20MHz bandwidth QPSK Mode）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
63.3	-71.4	0.2	-11.8	-83.4	H
263.8	-74.2	0.4	0.0	-74.6	H
1526.0	-66.1	1.0	0.2	-66.9	V
2925.0	-55.4	1.4	-0.1	-56.9	V
4413.6	-69.7	1.8	9.1	-62.4	V
10208.4	-67.3	3.9	13.1	-58.1	V

MIMO B77 Radiated Spurious Emission Results

Test Data （30MHz bandwidth QPSK Mode）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
69.0	-74.9	0.2	-9.4	-84.5	V
593.4	-79.5	0.6	0.4	-79.7	H
1484.6	-66.8	1.0	1.5	-66.3	V
2699.2	-55.6	1.3	-0.5	-57.4	V
6500.0	-69.4	2.4	11.2	-60.6	V
10865.2	-69.0	3.2	13.5	-58.7	V

MIMO B78 Radiated Spurious Emission Results

Test Data （40MHz bandwidth QPSK Mode）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
68.2	-74.3	0.2	-9.6	-84.1	H
290.3	-75.0	0.4	0.1	-75.3	V
1292.2	-67.7	0.9	1.0	-67.6	H
2684.0	-55.5	1.3	-0.5	-57.3	V
6179.1	-70.1	2.4	11.1	-61.4	V
10584.8	-69.6	3.2	13.3	-59.5	V

6.7.Band Edge

Specifications:	FCC Part 2.1051,24.238, 2.1053, 22.917, 27.53,90.691
DUT Serial Number:	864284040456696
Test conditions:	Ambient Temperature:15℃-35℃ Relative Humidity:30%-60% Air pressure: 86-106kPa
Test Results:	Pass

Limit Level Construction:

According to Part 22.917 (a), i.e., Out of Band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

According to Part 24.238 (a), i.e., Out of Band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB, so the limit level is: P(dBm)– (43 + 10 log(P)) dB= -13dBm.

According to Part 27.53(h):

Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 Bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10(P) dB.

According to Part 27.53(g):

For operations in the 600 MHz Band and the 698-746 MHz Band, the power of any emission outside a licensee's frequency Band(s) of operation shall be attenuated below the transmitter power (P) within the licensed Band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution Bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz Bands immediately outside and adjacent to a licensee's frequency block, a resolution Bandwidth of at least 30 kHz may be employed.

According to Part 90.691:

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log10(f/6.1) decibels or 50 + 10 Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the

center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

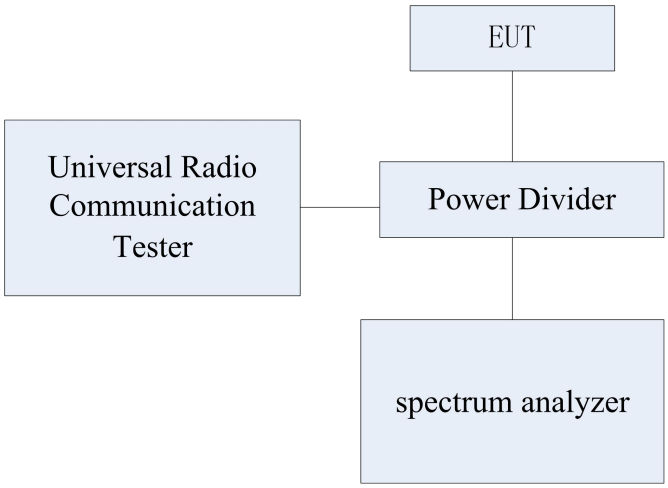
(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

Measurement Uncertainty:

Item	Uncertainty	
Expanded Uncertainty	9kHz < f≤4GHz	0.71 dB (k=2)
	4GHz≤f < 12.75GHz	0.74 dB (k=2)
	12.75GHz≤f < 26GHz	2.70 dB (k=2)

Test Setup:

During the test, the EUT was controlled via the Wireless Communications Test Set to ensure max power transmission and proper modulation and measured by spectrum analyzer.



Test Method:

1) The EUT was coupled to the EMI test receiver analyzer mode and the base station simulator through a power divider. The lost of the cables the test system is calibrated to correct the readings.

2) The spectrum analyzer was set to Average Detector function and Maximum hold mode.

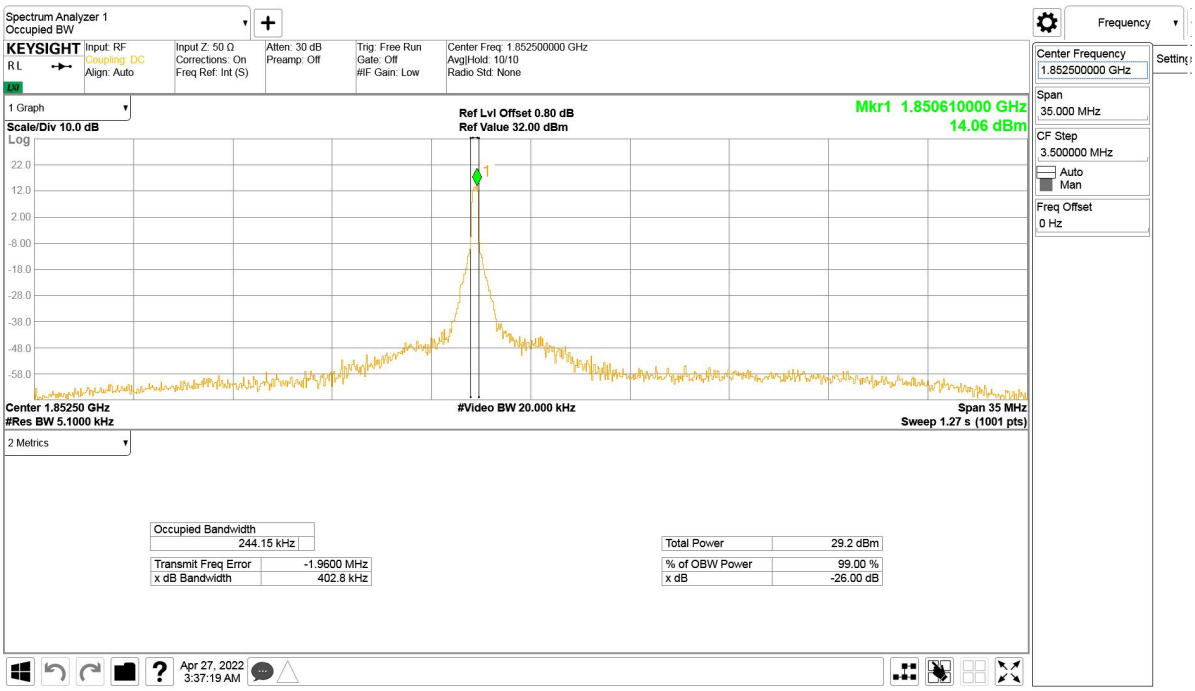
3) The resolution Bandwidth of the spectrum analyzer was a little greater than 1% of the 26dB emission Bandwidth.

Note: In the graphical result description (X, Y), X represents the number of RB, Y represents the RB offset.

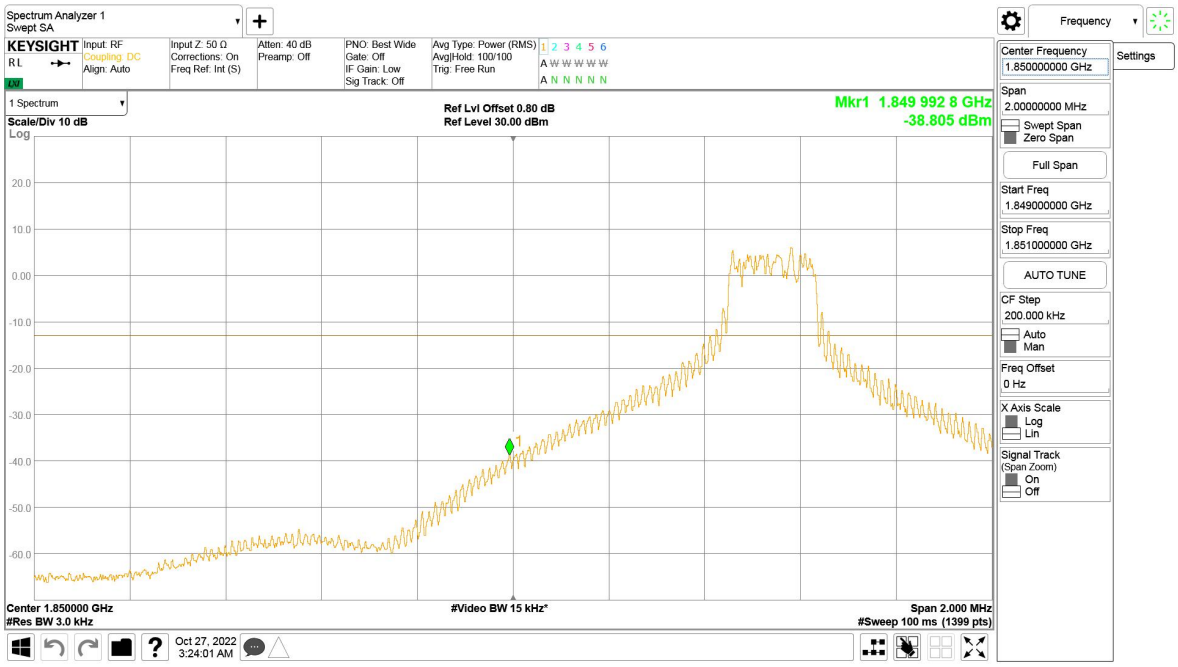
6.7.1 Band Edge Results

n2

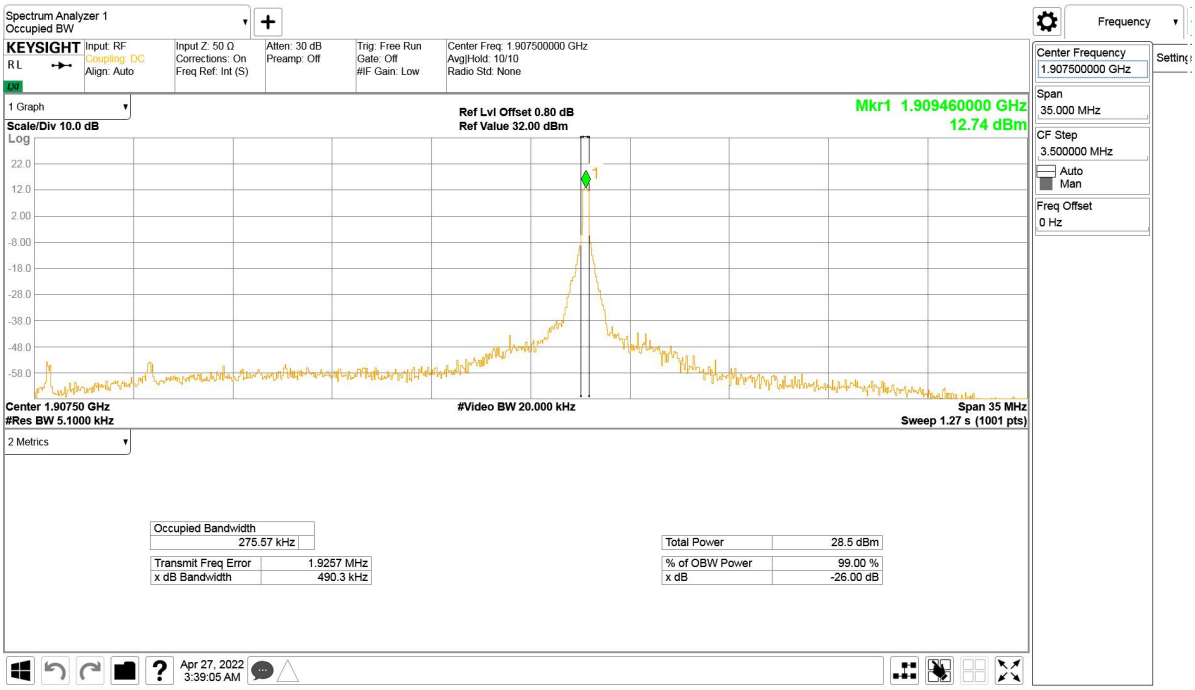
OBW: 1RB-LOW_offset



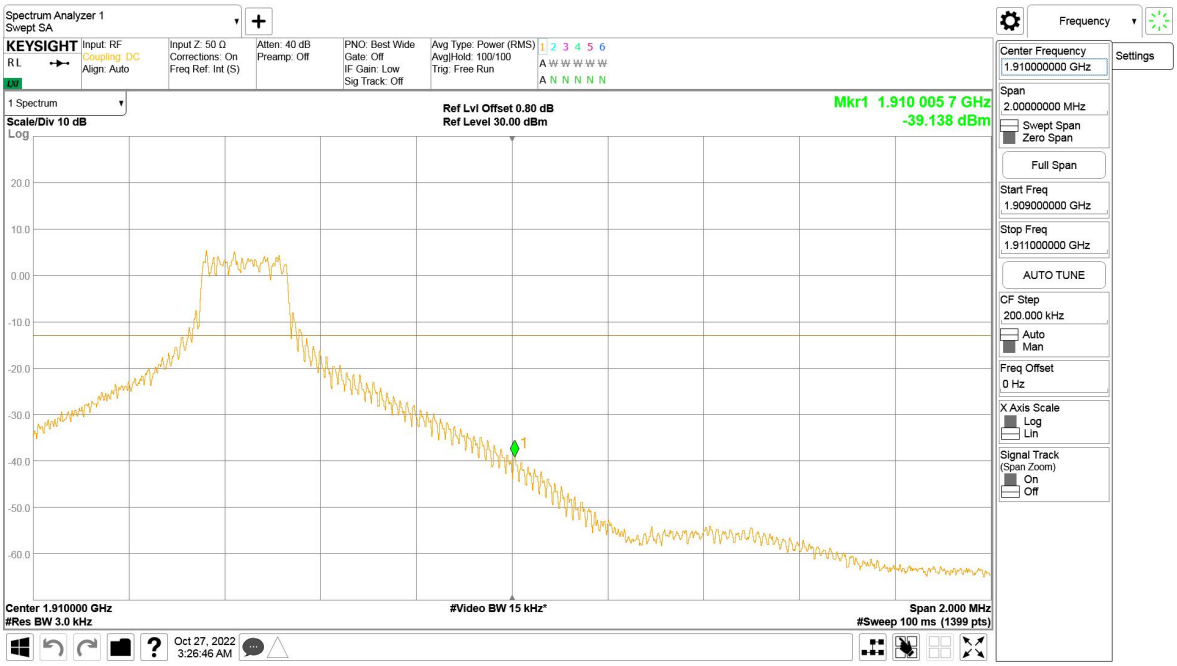
LOW BAND EDGE BLOCK-1RB-LOW_offset



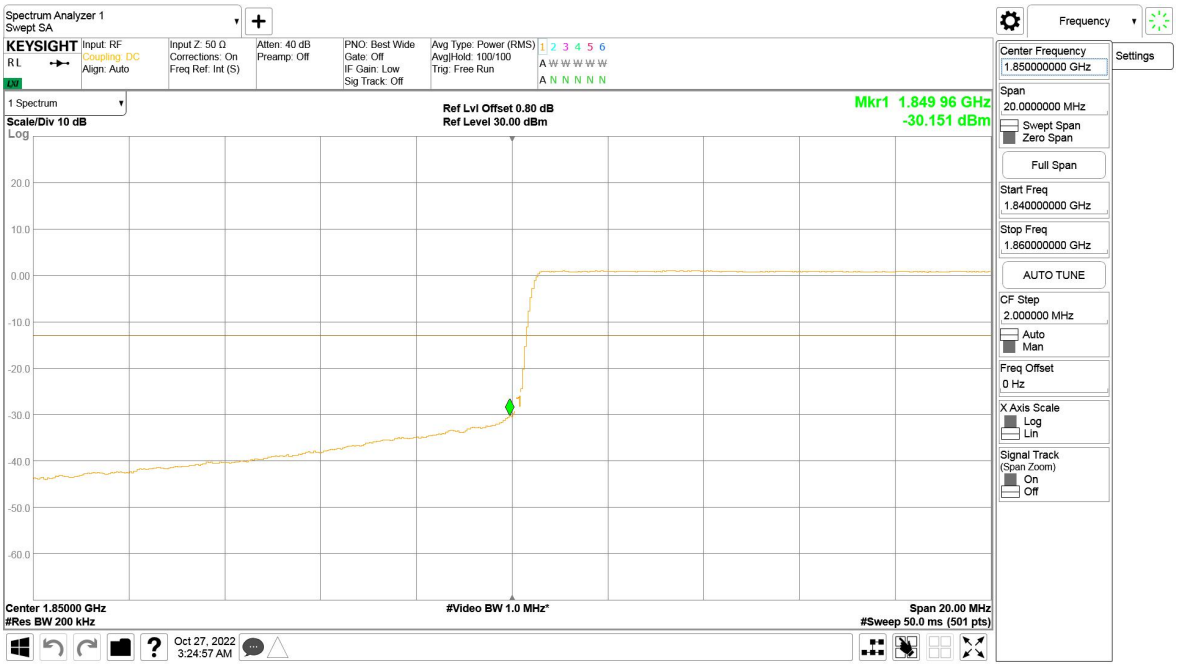
OBW: 1RB-HIGH_offset



HIGH BAND EDGE BLOCK-1RB-HIGH_offset



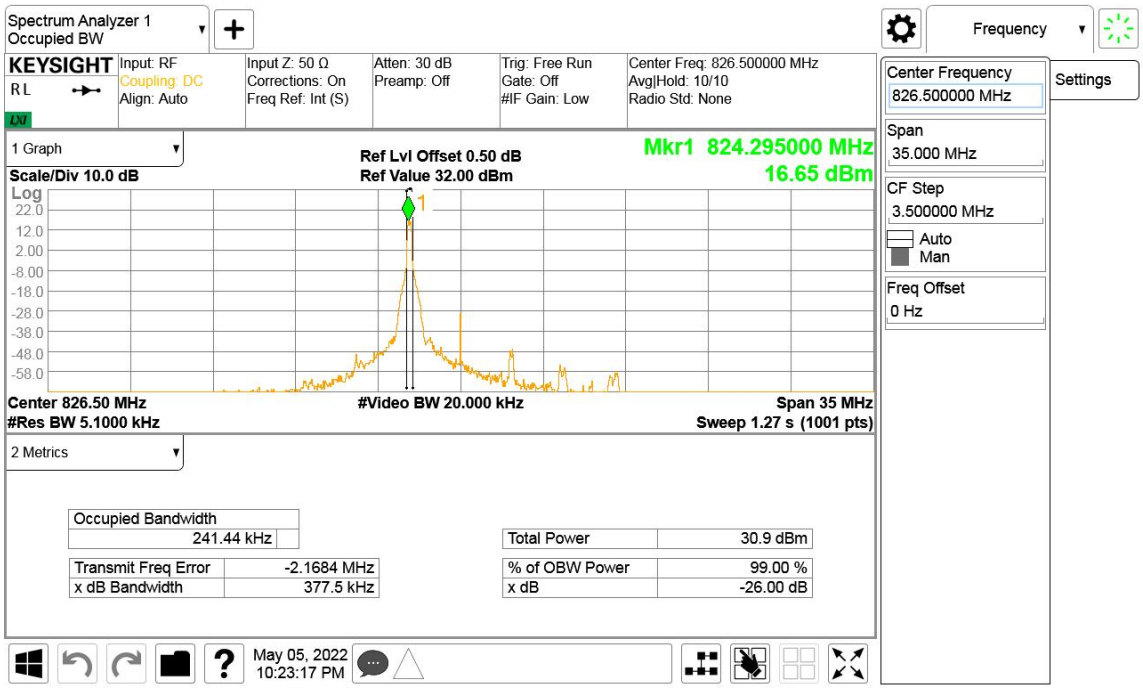
LOW BAND EDGE BLOCK-20M-100%RB



HIGH BAND EDGE BLOCK-20M-100%RB

LTE Band 66+NR n5

OBW: 1RB-LOW_offset



LOW BAND EDGE BLOCK-20M-100%RB