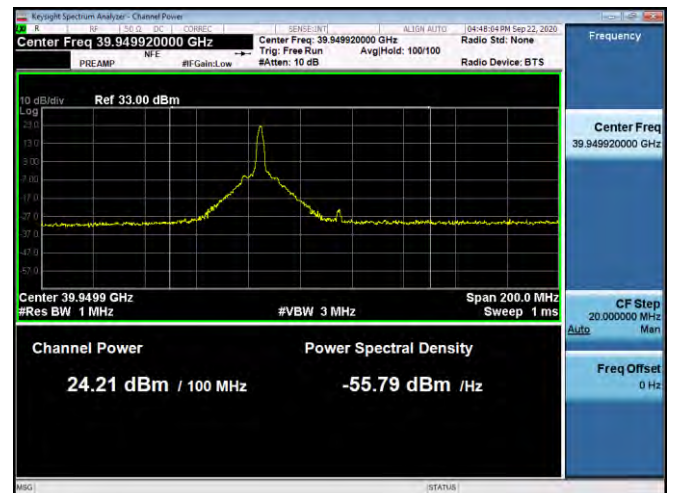
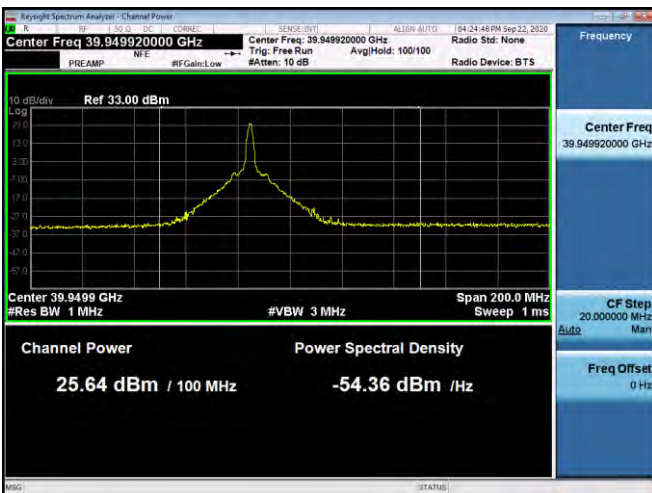
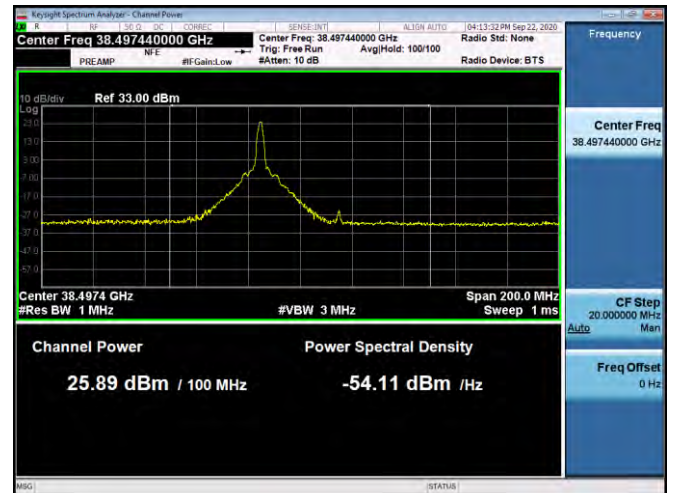
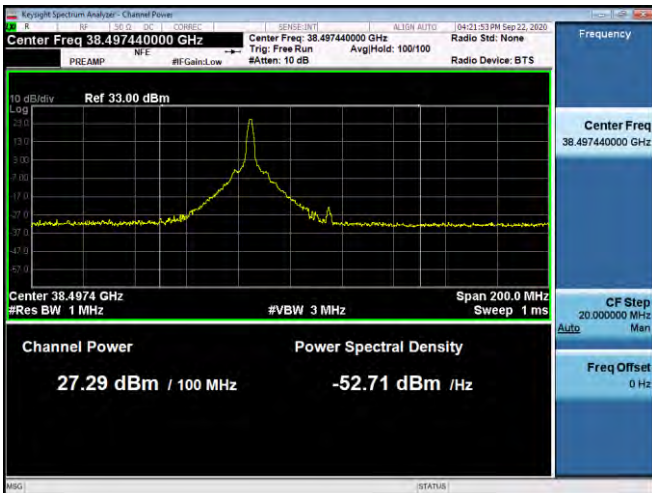
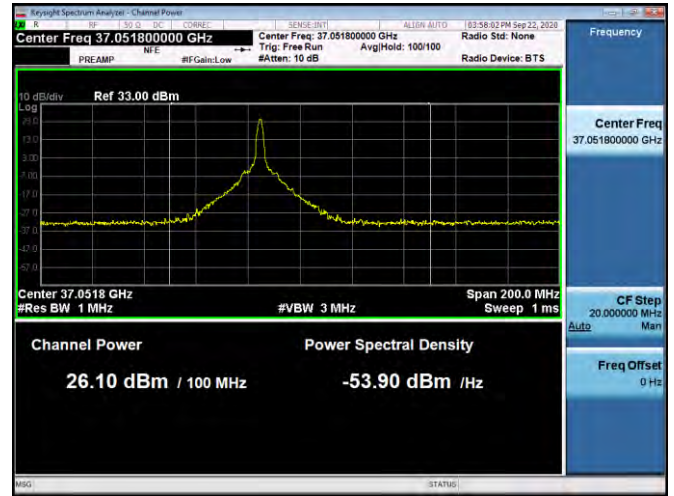
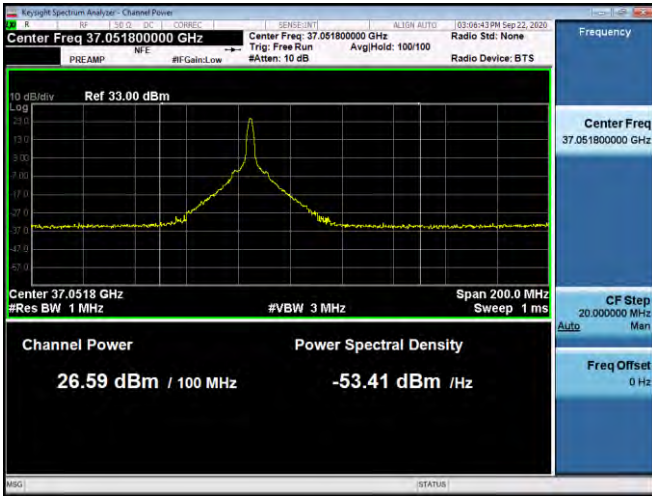
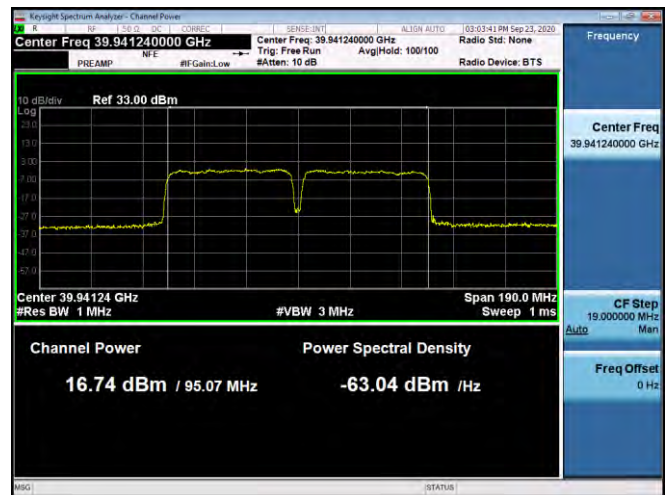
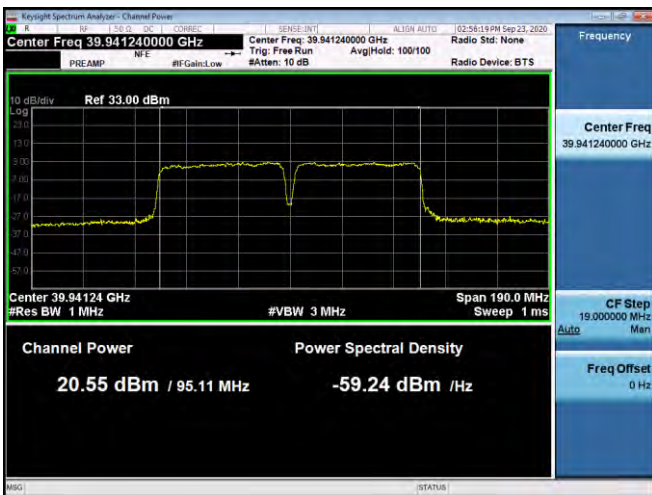
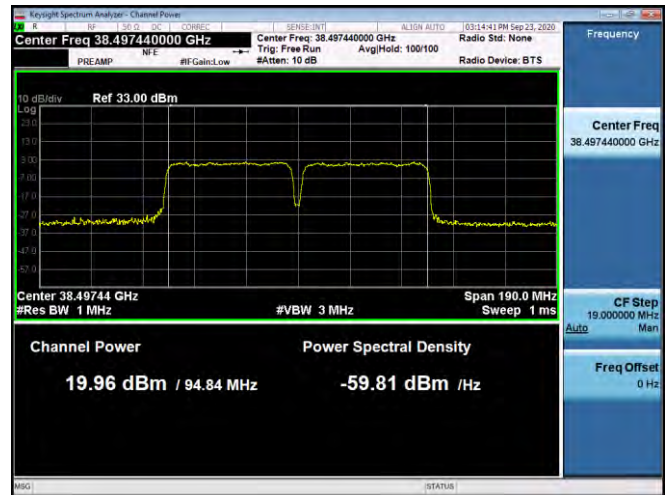
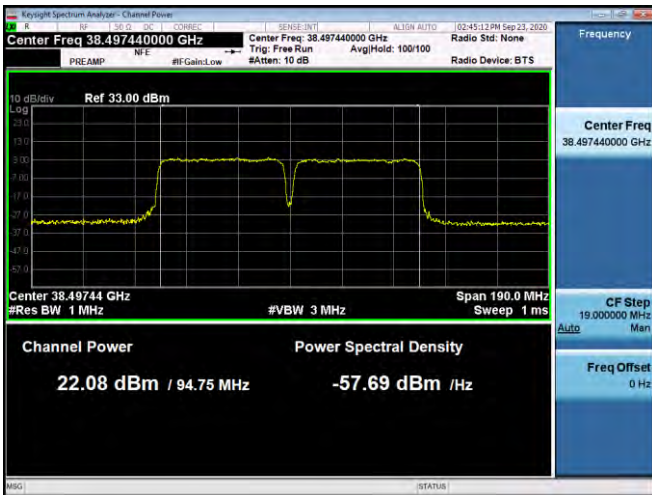
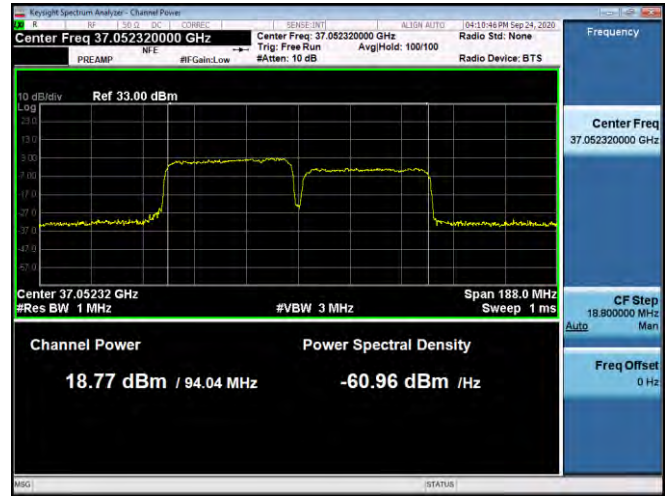
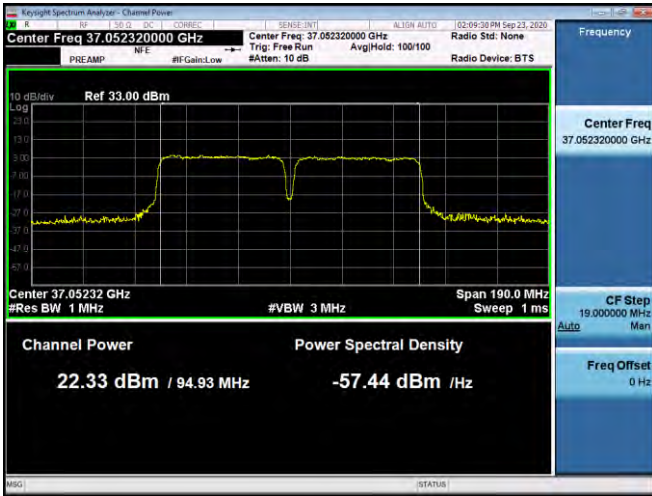


100 MHz, 1CC MIMO

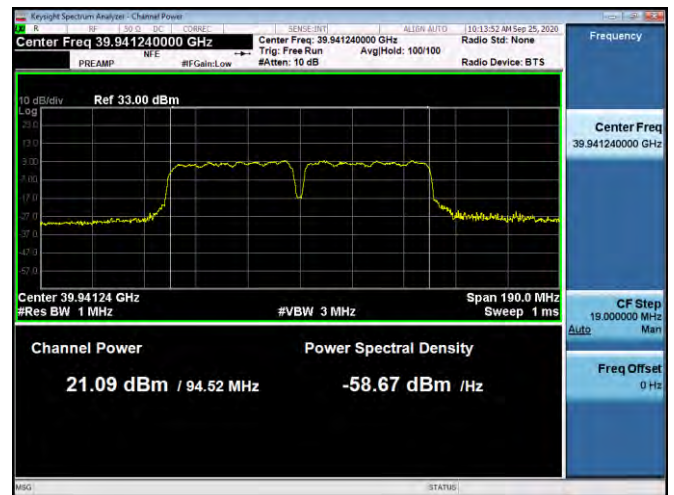
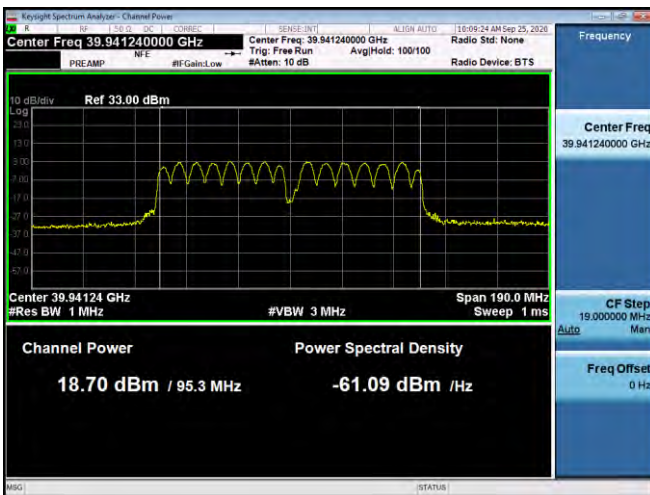
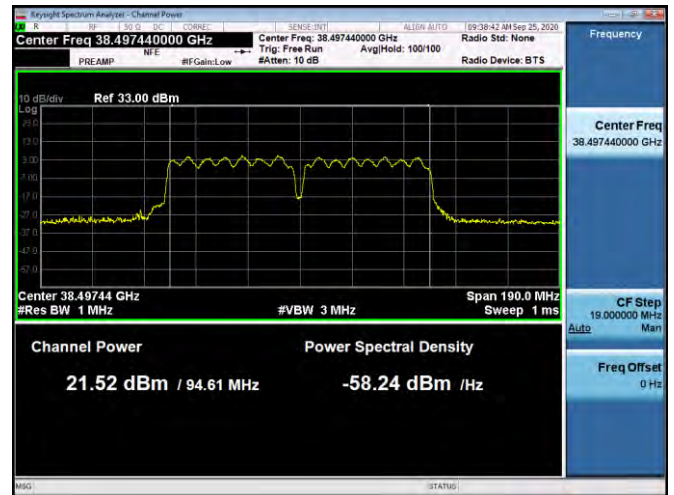
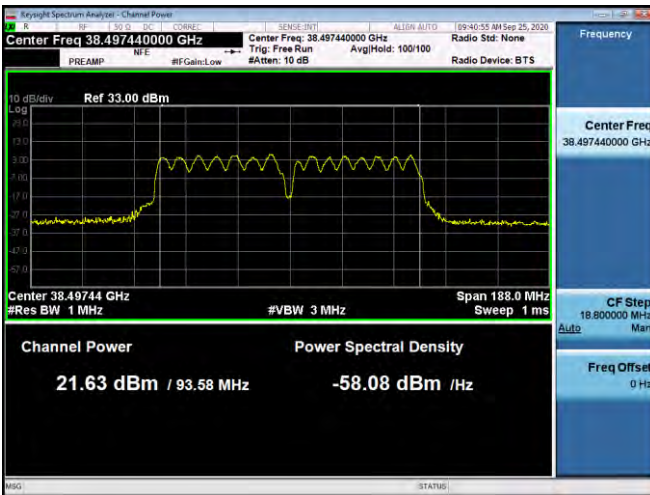
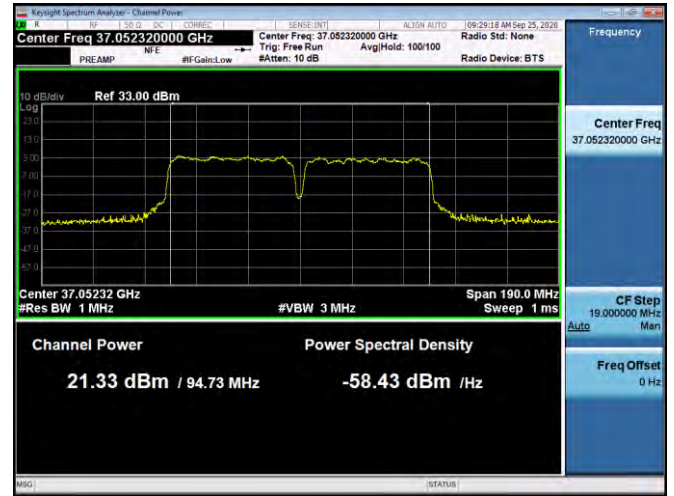
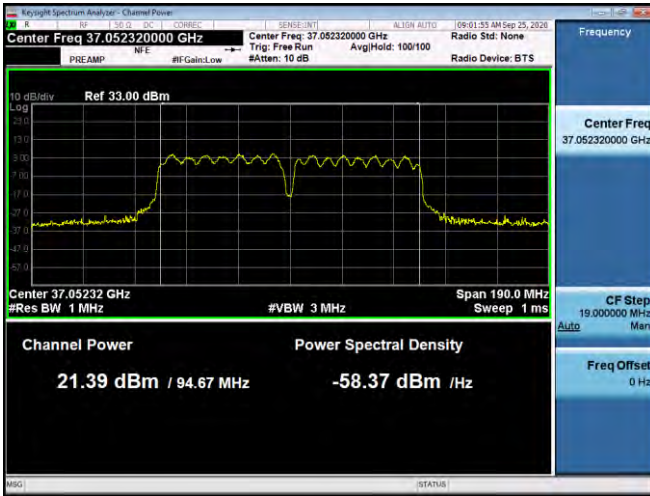


50 MHz, 2CC SISO

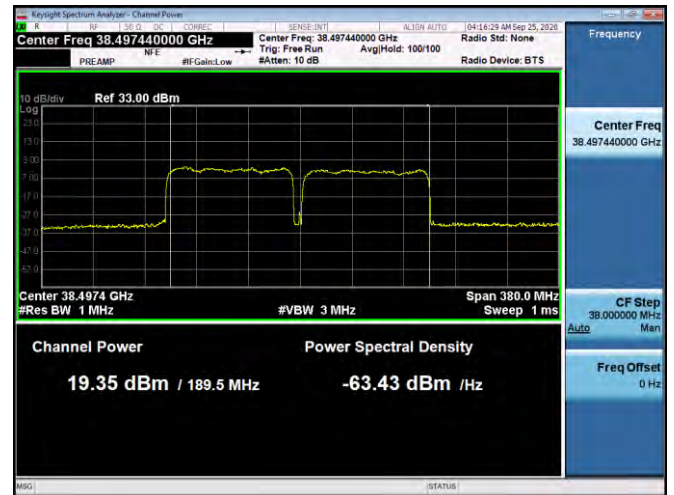
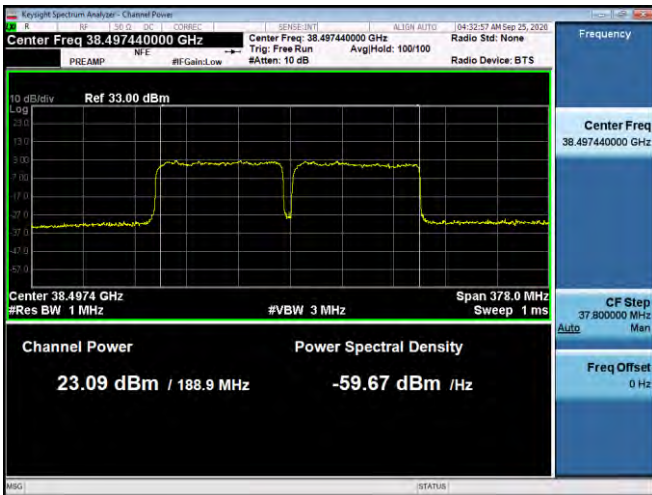
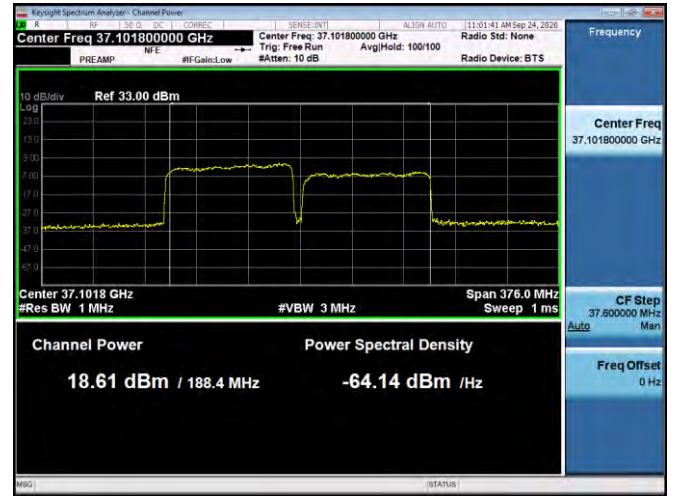




**50 MHz, 2CC MIMO**

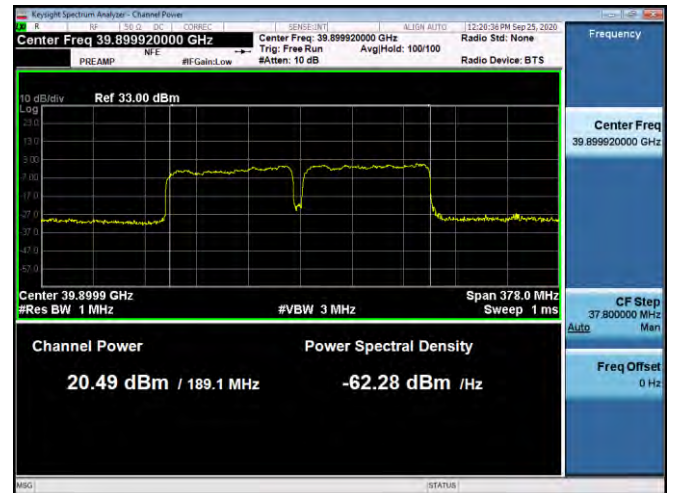
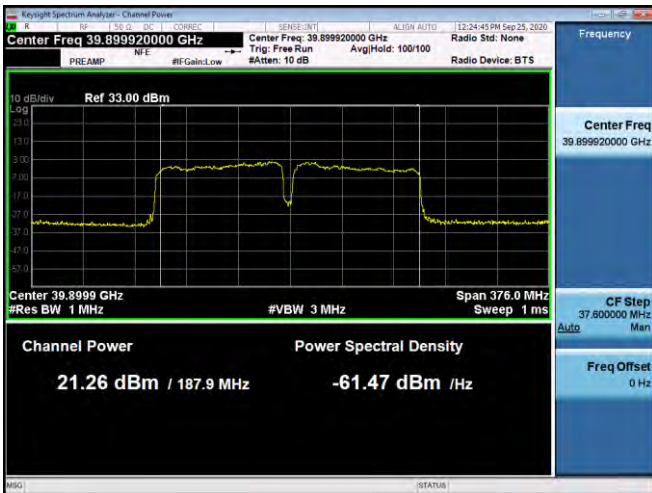
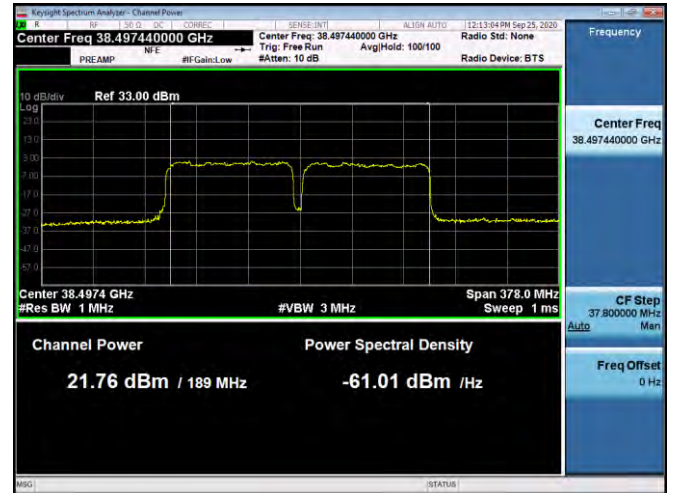
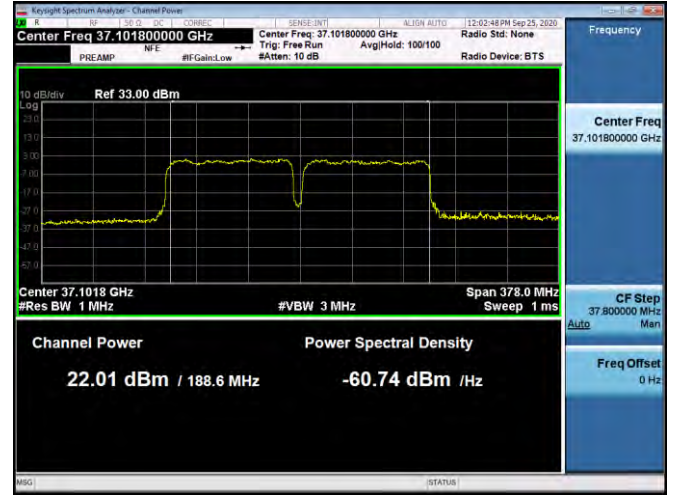
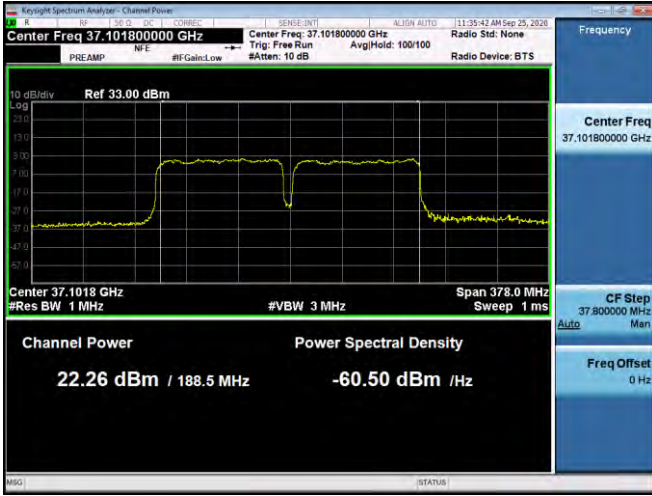


**100 MHz, 2CC SISO**





100 MHz, 2CC MIMO



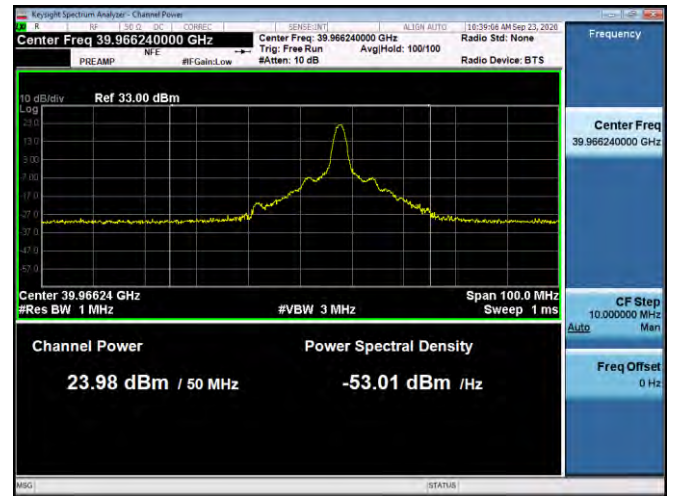
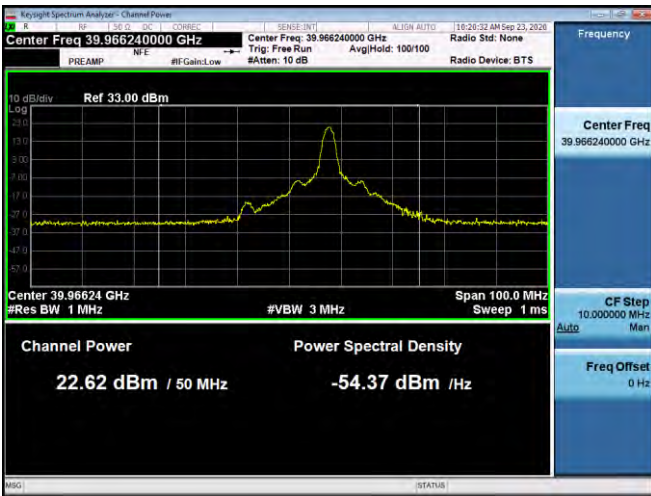
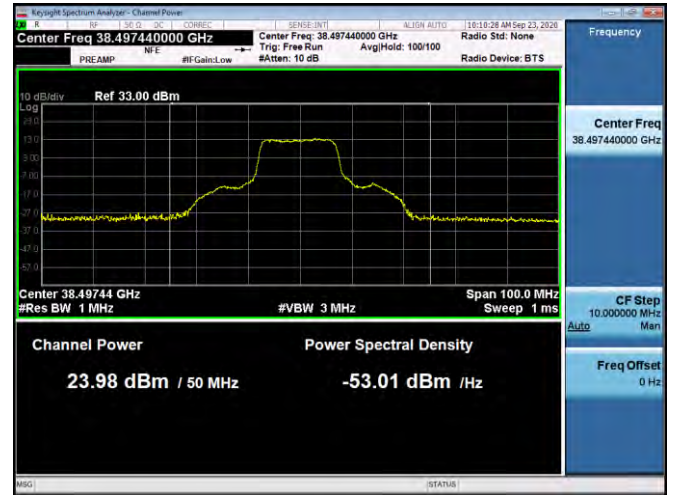
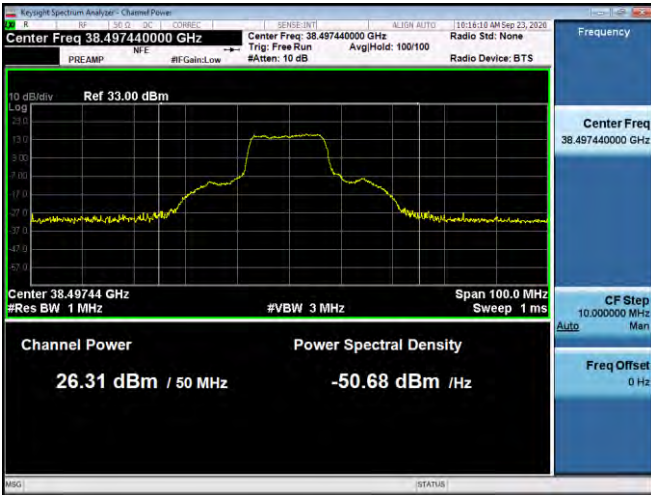
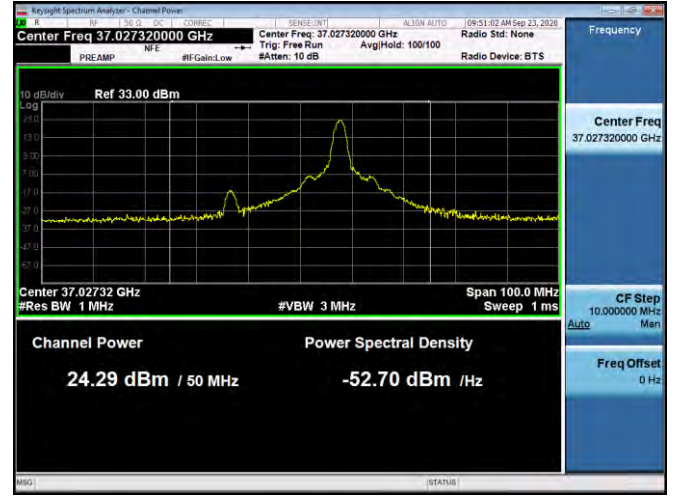
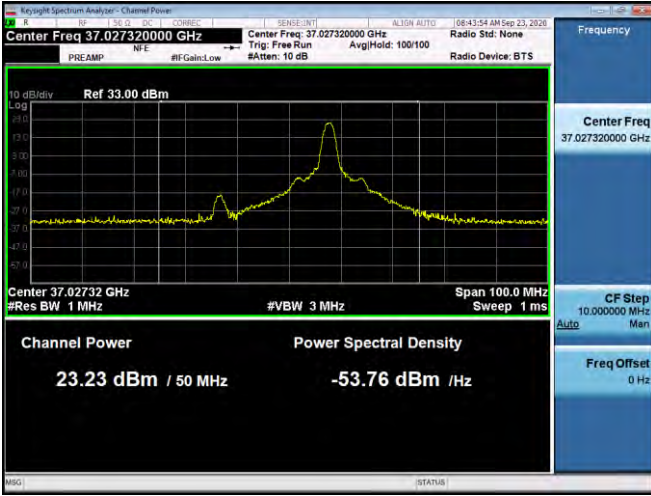
4. Antenna 1(K patch), n260

50 MHz, 1CC SISO

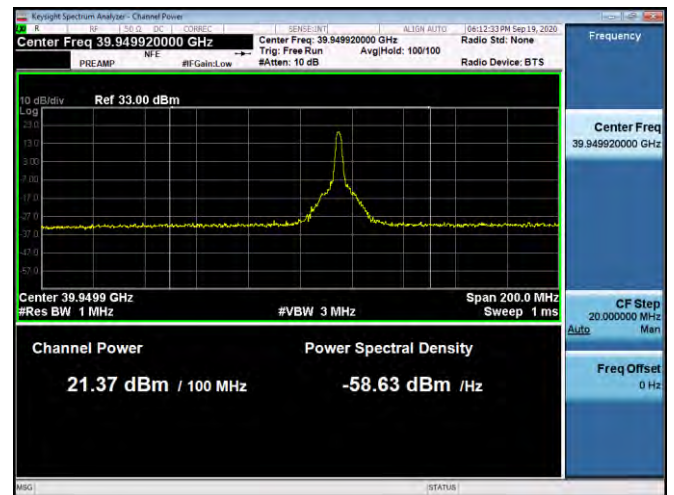
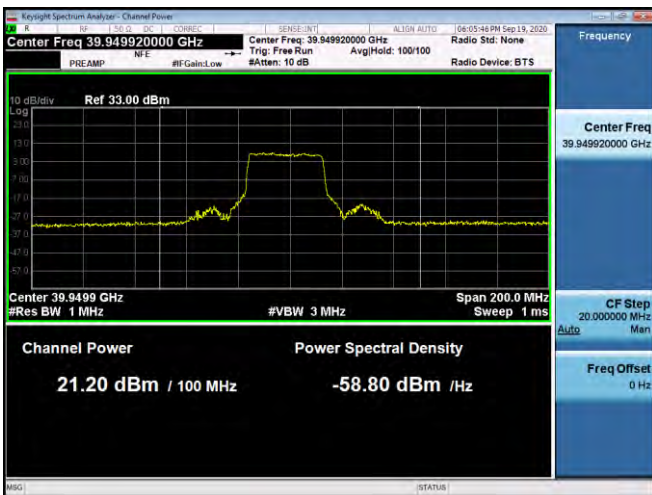
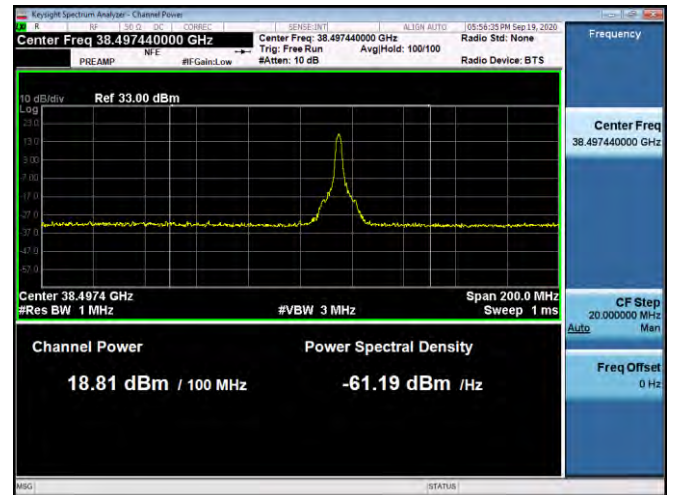
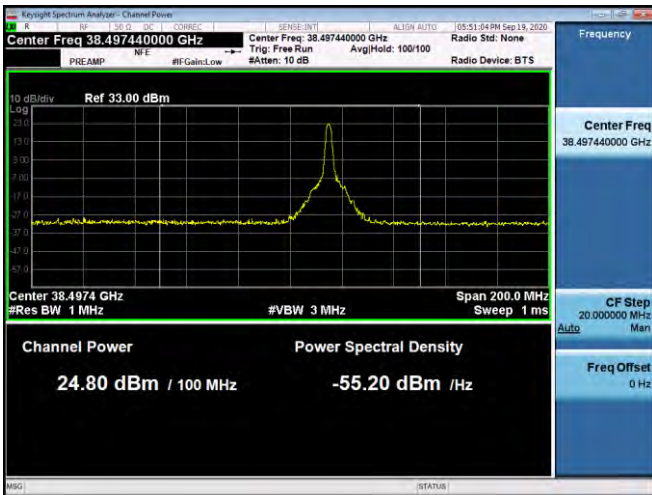
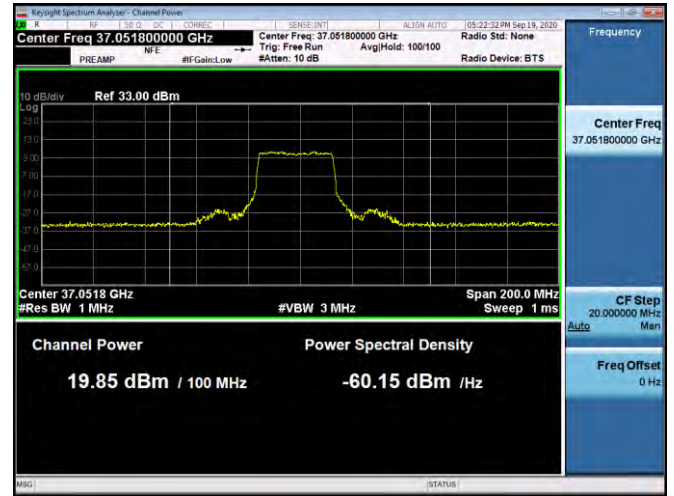
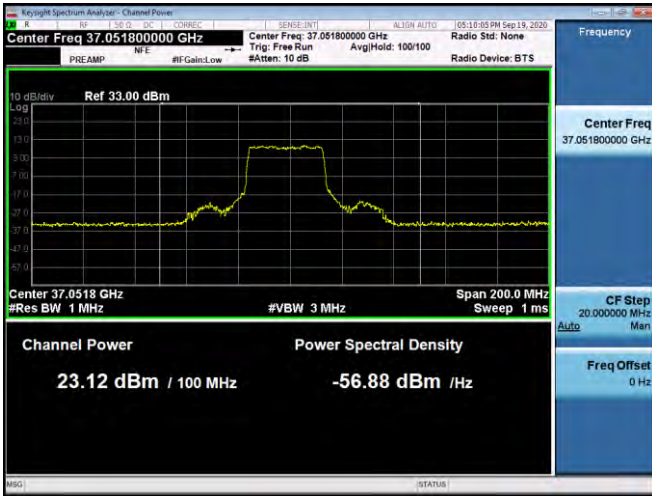




**50 MHz, 1CC MIMO**

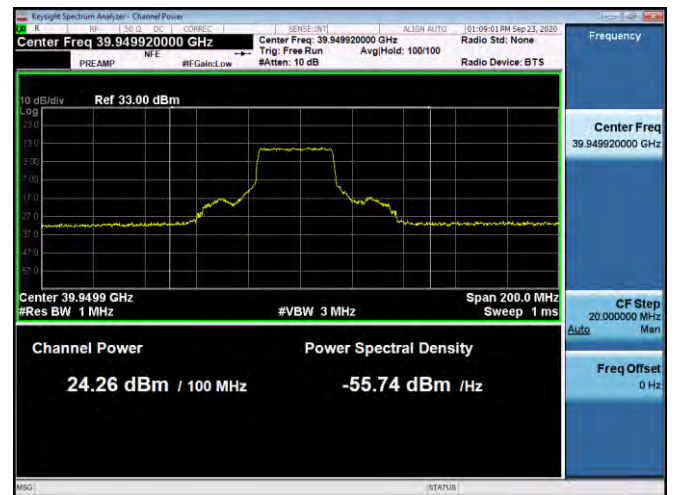
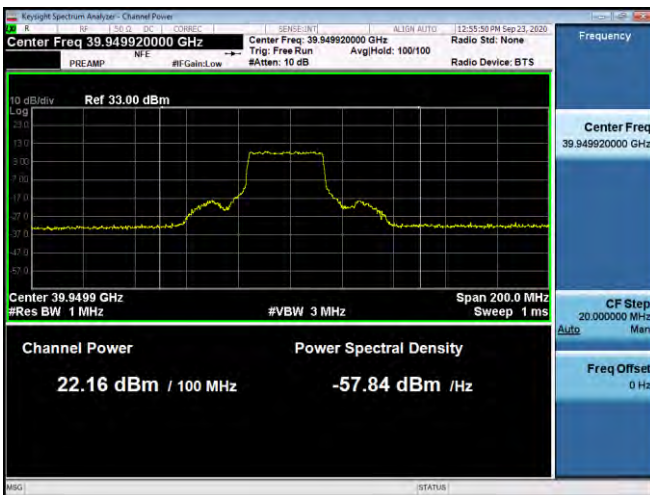
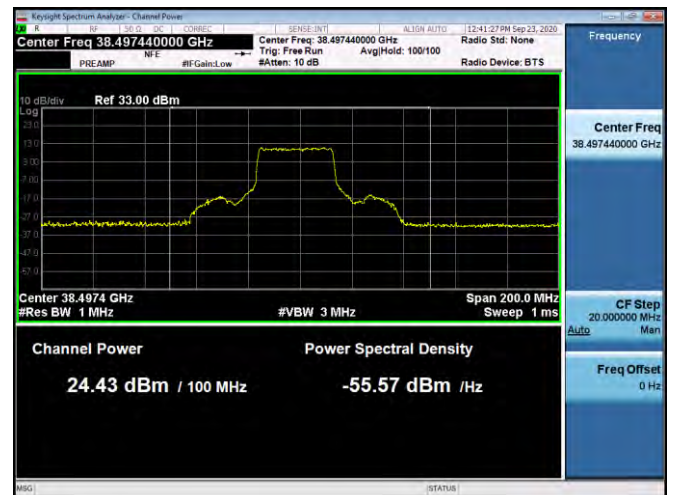
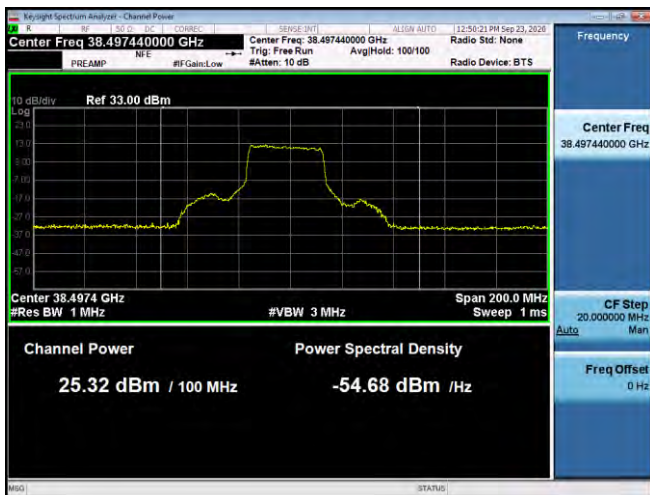
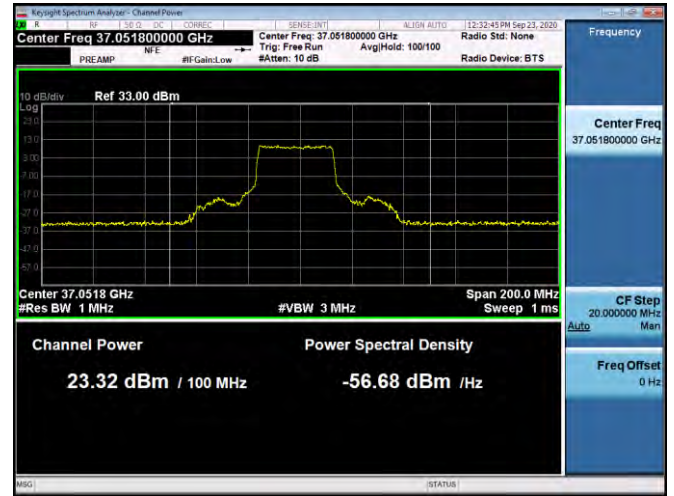
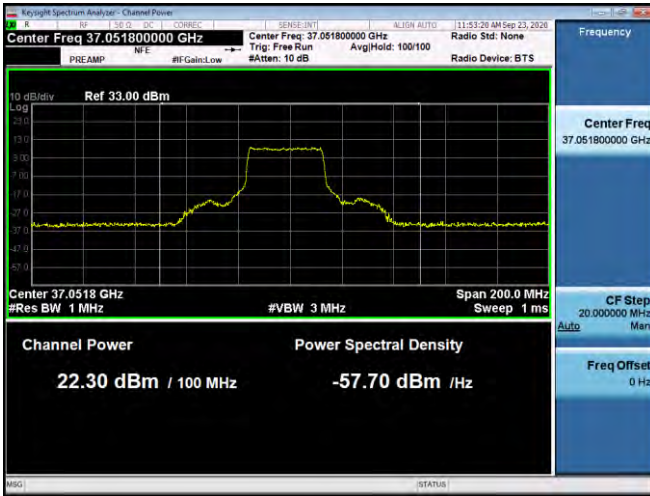


100 MHz, 1CC SISO

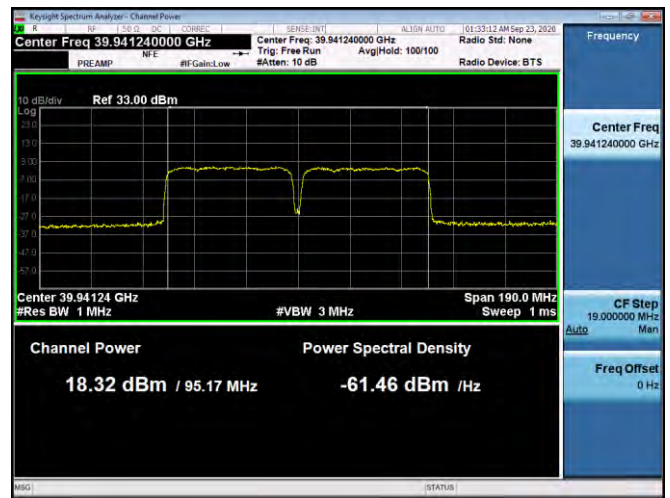
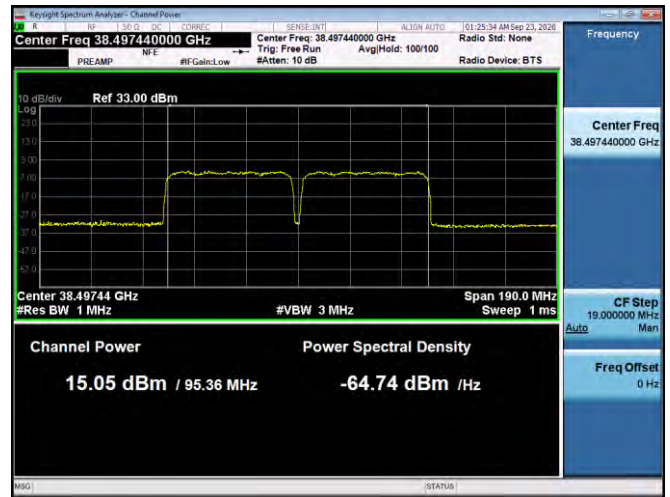
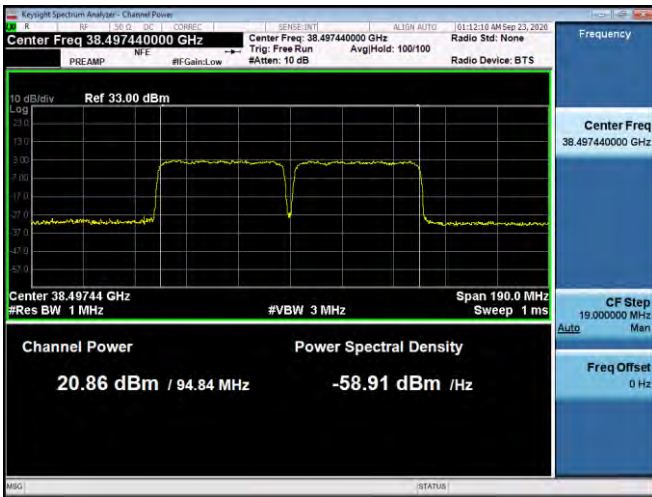
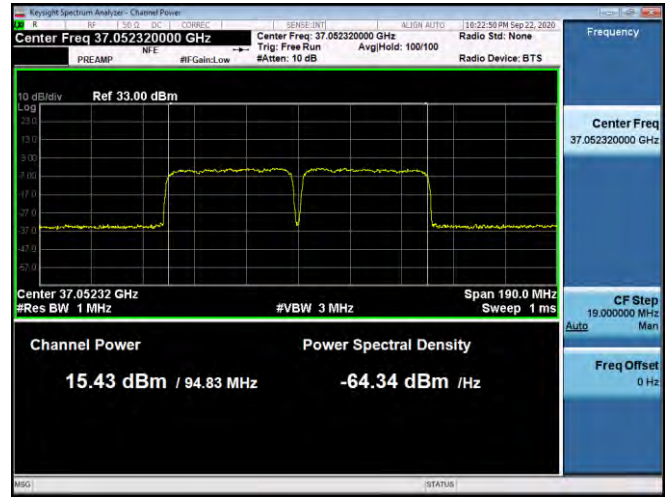
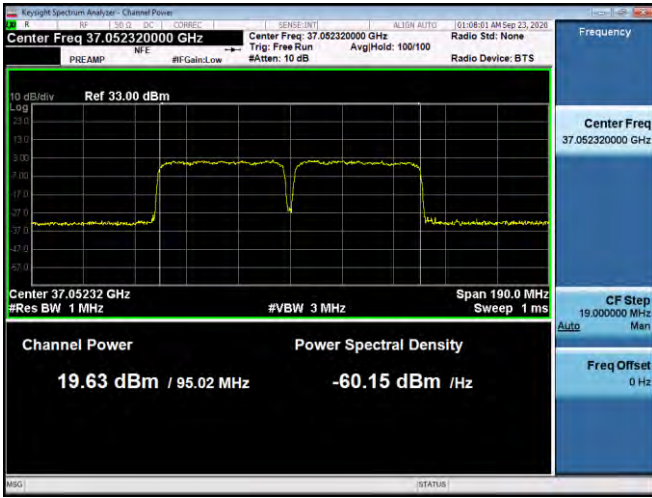




100 MHz, 1CC MIMO

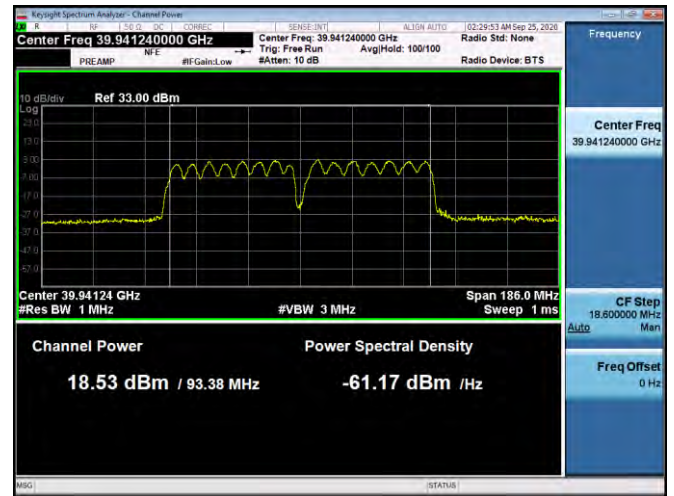
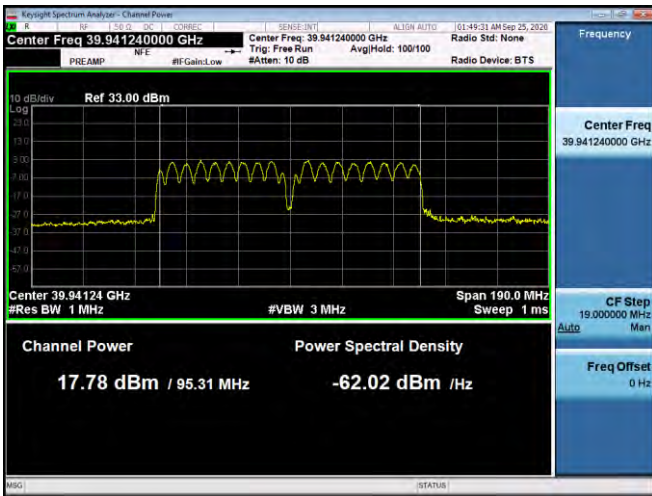
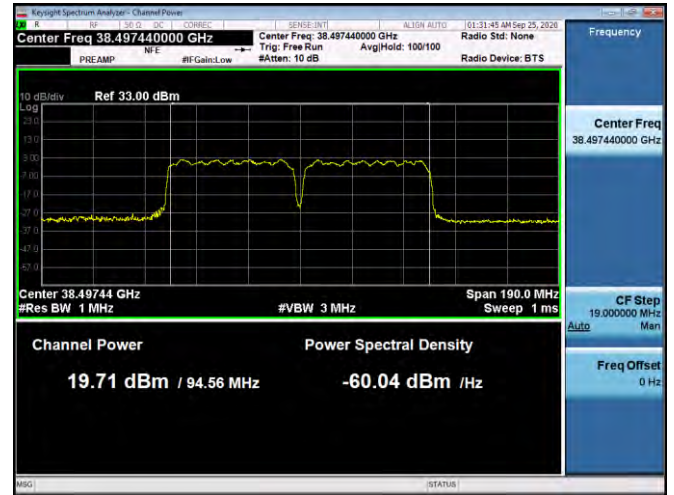
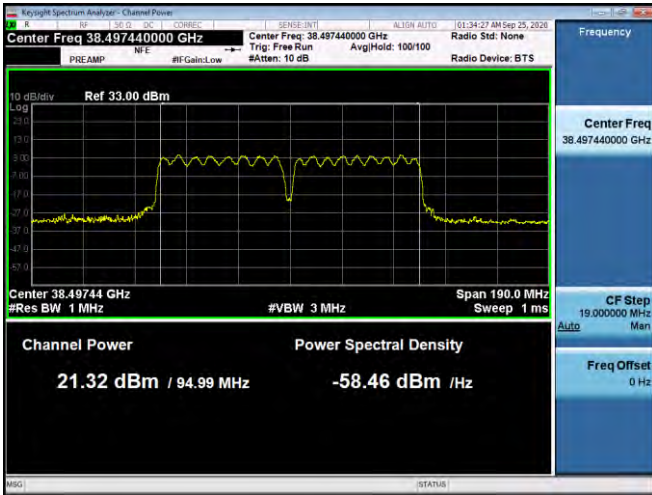
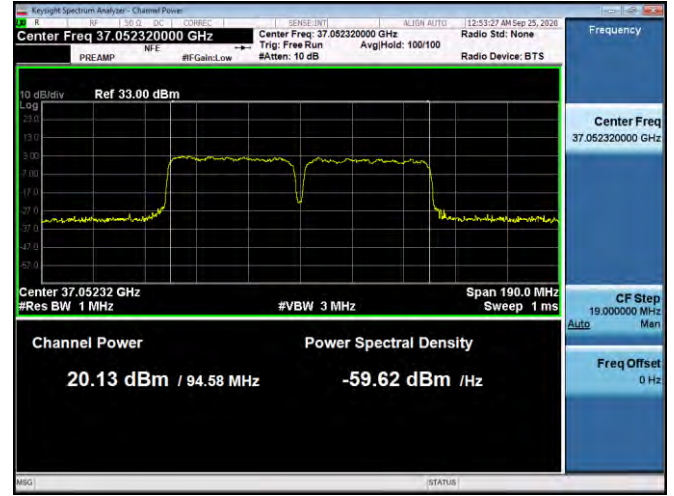
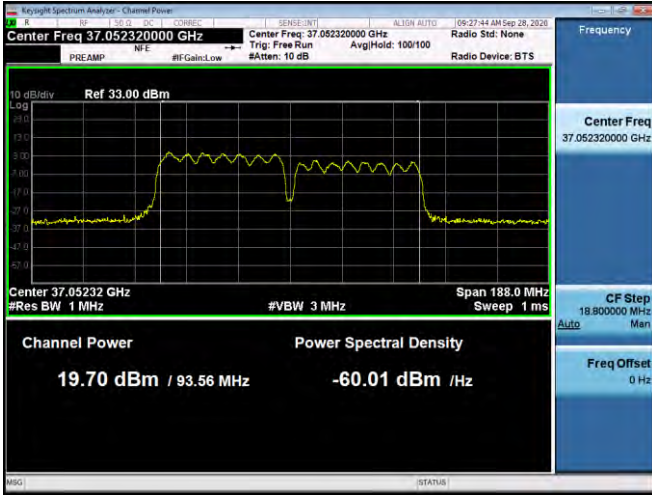


50 MHz, 2CC SISO

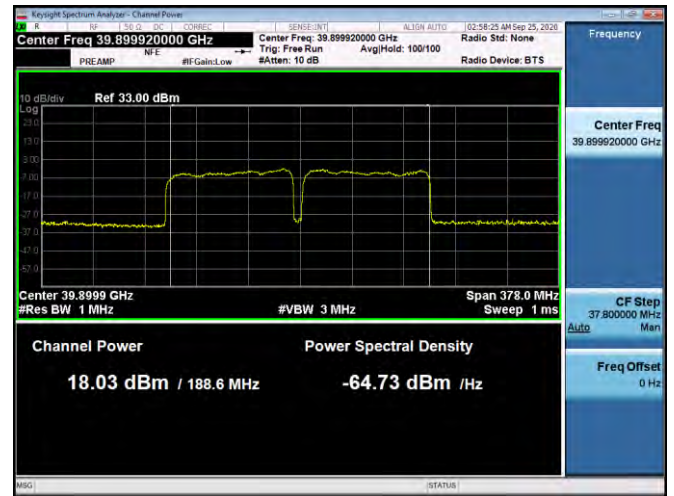
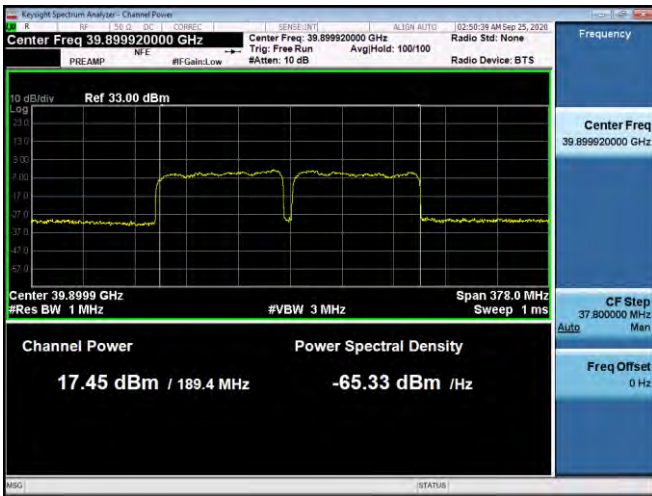
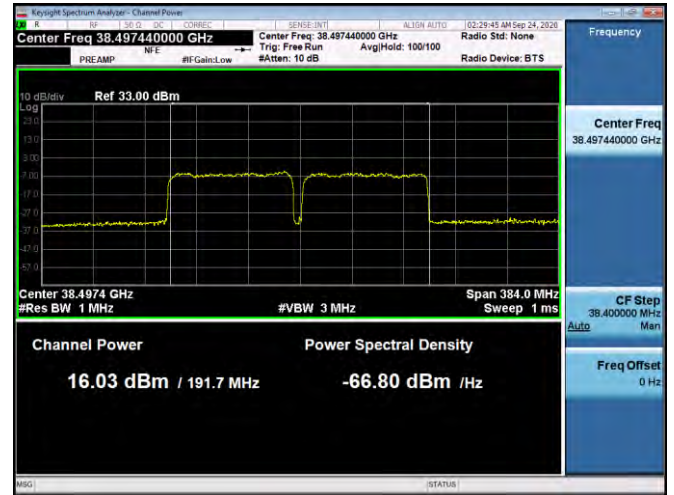
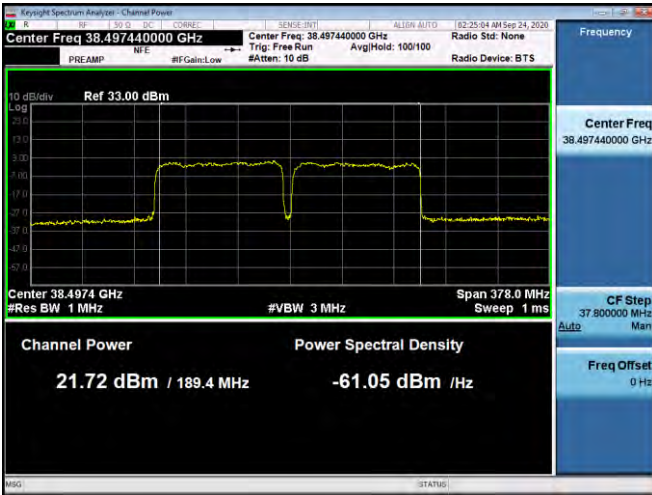
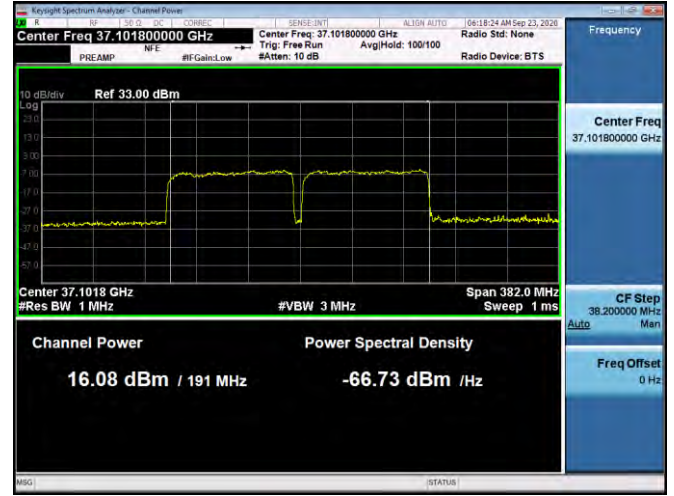
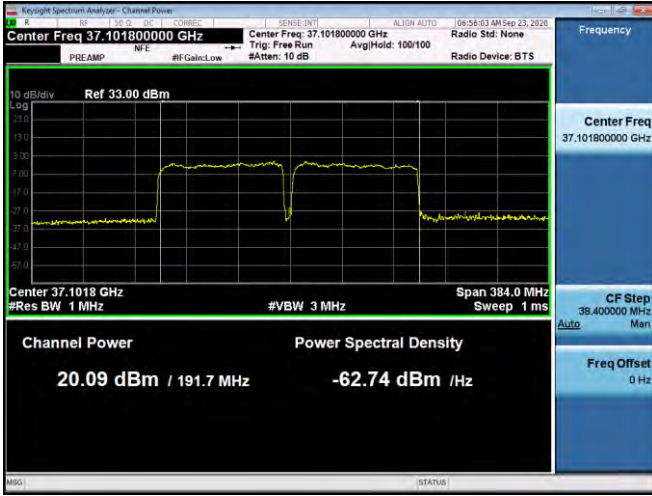




**50 MHz, 2CC MIMO**

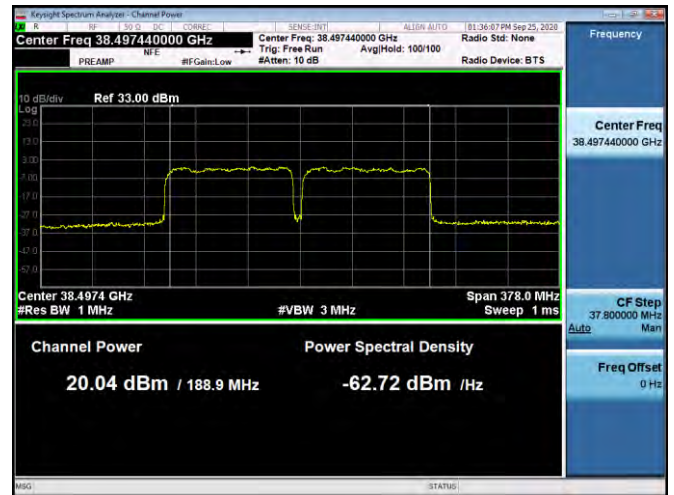
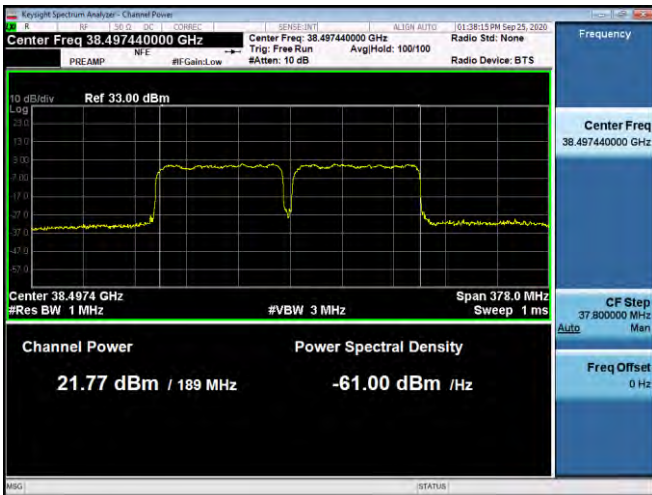
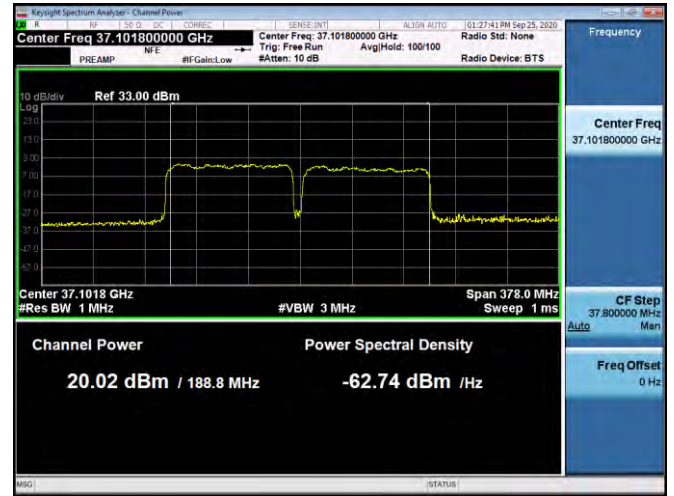
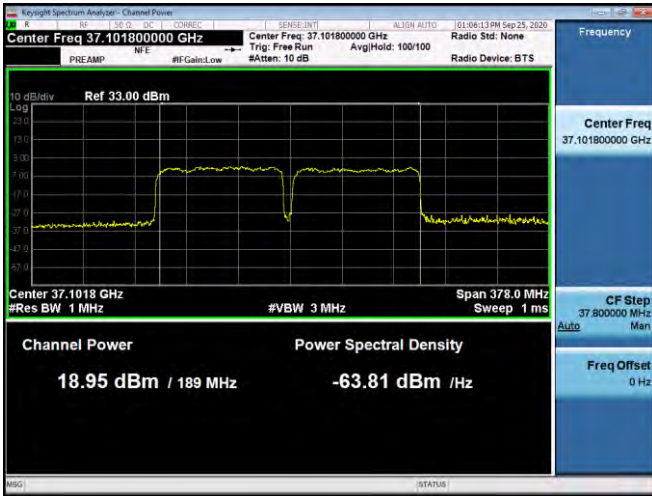


100 MHz, 2CC SISO





100 MHz, 2CC MIMO



### 5.3. BAND EDGE

#### Test Overview

All out of band emissions are measured in a radiated setup while the EUT is operating at maximum power, and at the appropriate frequencies. All modulations were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

The minimum permissible attenuation level of any spurious emission is -13dBm/1MHz. However, in the bands immediately outside and adjacent to the licensee's frequency block, having a bandwidth equal to 10 percent of the channel bandwidth, the conductive power or the total radiated power of any emission shall be -5 dBm/MHz or lower.

#### FCC Rules

#### Test Requirements:

#### § 30.203 Emission limits.

- (a) The conductive power or the total radiated power of any emission outside a licensee's frequency block shall be -13 dBm/MHz or lower. However, in the bands immediately outside and adjacent to the licensee's frequency block, having a bandwidth equal to 10 percent of the channel bandwidth, the conductive power or the total radiated power of any emission shall be -5 dBm/MHz or lower.
- (b)(1) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater.
- (2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges as the design permits.
- (3) The measurements of emission power can be expressed in peak or average values.

#### Test Procedures:

The measurement is performed in accordance with Section 5.7.3 of ANSI C63.26.

##### 5.7.3 Out-of-band unwanted emissions measurements

- a) Set the spectrum analyzer center frequency to the block, band, or channel edge frequency.
- b) Set the span wide enough to capture the fundamental emission closest to the authorized block or band edge, and to include all modulation products that spill into the immediately adjacent frequency band. In some cases, it may be possible to set the center frequency and span so as to encompass the fundamental emission and the unwanted out-of-band (band-edge) emissions on either side of the authorized block, band, or channel. This can be accomplished with a single (slow) sweep, if adequate overload protection and sufficient dynamic range can be maintained.
- c) Set the number of points in sweep  $\geq 2 \times \text{span} / \text{RBW}$ .



d) Sweep time should be auto for peak detection. For rms detection the sweep time should be set as follows:

1), 2) Omitted

3) If the device cannot be configured to transmit continuously (duty cycle < 98%) and a free running sweep must be used, set the sweep time so that the averaging is performed over multiple on/off cycles by setting the sweep time > (number of points in sweep) × (transmitter period) (i.e., the transmit on-time + the off-time). The spectrum analyzer readings shall subsequently be corrected by  $[10 \log (1/\text{duty cycle})]$ . This assumes that the transmission period and duty cycle is relatively constant (duty cycle variation  $\leq \pm 2\%$ ).

4) Omitted

e) The test report shall include the plots of the measuring instrument display and the measured data.

- The TRP measurement is performed in accordance with Section 4.4.2.4 of KDB 842590 v01r01 (2020-04).

#### 4.4.2.4 Spherical Grid Method

a) Measure the antenna dimensions, i.e., depth (d), width (w), and height (h) (see Figure A.1 in Appendix A). If the antenna dimensions are not accessible use the mechanical dimensions of the entire device.

b) Calculate the spherical and cylindrical diameters (D and D<sub>cyl</sub>) using Equations (A.1) and (A.2) in Appendix A in KDB 842590 v01r01.

c) For the highest frequency (smallest wavelength) of the frequency band measured, calculate the reference angular steps  $\Delta\theta_{\text{ref}}$  and  $\Delta\theta_{\text{ref}}$  using Equations (A.3) and (A.4) in Appendix A in KDB 842590 v01r01.

d) Set the grid spatial sampling step  $\Delta\theta \leq \Delta\theta_{\text{ref}}$  for the vertical angle and  $\Delta\theta \leq \Delta\theta_{\text{ref}}$  for the horizontal angle.

e) For each emission frequency, measure the total EIRP (sum of two orthogonal polarizations) on the selected grid.

f) For each emission frequency, calculate the TRP using weighted angular average value using numerical integration as described in Appendix B in KDB 842590 v01r01.

g) Compare measured TRP with the applicable TRP limit to make a pass/fail decision.

**Sample Calculation for TRP**

User Equipment			
$d$ (cm)		0.794	
$w$ (cm)		7.1	
$h$ (cm)		15.16	
Frequency (MHz)		28000	
Wavelength (cm)		1.071428571	
Vertical sampling		Horizontal sampling	
$D$	16.75906	$D_{cyl}$	7.144259
$D/\lambda$	15.64179	$D_{cyl}/\lambda$	6.667975
$\Delta\theta_{ref}$	3.662994	$\Delta\phi_{ref}$	8.592681
$\Delta\theta$	3	$\Delta\phi$	8
$\Delta\theta_{max}$	15	$\Delta\phi_{max}$	15
SF = Max of		1	
SFmax = Max of		4	
$\Delta TRP = SF - 1 / SF_{max} - 1$		0	

Note : Angular step is  $\Delta\theta = 3$  degrees,  $\Delta\phi = 8$  degrees for TRP test. We were added the correction factor( $\Delta TRP$ ) to the measured TRP.



**Test Results:**

**Antenna 0(L patch), n261**

CCs active	BW	Frequency [MHz]	Channel	Beam Pol	Modulation	Ant. Pol [H/V]	RB Size/Offset	Band Edge [dBm]	SUM [dBm]
1	50 MHz	27534.84	Low	MIMO	BPSK	H	1/0	-19.549	-15.153 <sup>*1</sup>
		27534.84	Low	MIMO	BPSK	V		-17.114	
		27534.84	Low	MIMO	QPSK	H	32/0	-23.401	-18.380
		27534.84	Low	MIMO	QPSK	V		-20.021	
		28319.52	High	MIMO	BPSK	H	1/31	-14.866	-12.601 <sup>*1</sup>
		28319.52	High	MIMO	BPSK	V		-16.511	
		28319.52	High	MIMO	BPSK	H	32/0	-22.103	-20.707
		28319.52	High	MIMO	BPSK	V		-26.314	
	100 MHz	27559.32	Low	MIMO	QPSK	H	1/0	-20.548	-15.100 <sup>*1</sup>
		27559.32	Low	MIMO	QPSK	V		-16.559	
		27559.32	Low	MIMO	QPSK	H	64/0	-25.639	-19.615
		27559.32	Low	MIMO	QPSK	V		-20.863	
		28292.16	High	MIMO	QPSK	H	1/63	-18.346	-15.372 <sup>*1</sup>
		28292.16	High	MIMO	QPSK	V		-18.419	
		28292.16	High	MIMO	QPSK	H	64/0	-24.163	-22.494
		28292.16	High	MIMO	QPSK	V		-27.454	
2	50 MHz	27559.84	Low	MIMO	BPSK	H	1/0	-16.932	-11.61 <sup>*2</sup>
		27559.84	Low	MIMO	BPSK	V		-13.116	
		27559.84	Low	MIMO	QPSK	H	32/0	-24.394	-20.727
		27559.84	Low	MIMO	QPSK	V		-23.167	
		28294.52	High	MIMO	BPSK	H	1/31	-18.330	-16.486
		28294.52	High	MIMO	BPSK	V		-21.095	
		28294.52	High	MIMO	BPSK	H	32/0	-26.065	-23.868
		28294.52	High	MIMO	BPSK	V		-27.879	
	100 MHz	27609.32	Low	MIMO	BPSK	H	1/0	-16.024	-10.785 <sup>*3</sup>
		27609.32	Low	MIMO	BPSK	V		-12.330	
		27609.32	Low	MIMO	QPSK	H	64/0	-27.234	-21.539
		27609.32	Low	MIMO	QPSK	V		-22.902	
		28242.16	High	MIMO	QPSK	H	1/63	-17.768	-16.163
		28242.16	High	MIMO	QPSK	V		-21.265	
		28242.16	High	MIMO	QPSK	H	64/0	-26.656	-24.734
		28242.16	High	MIMO	QPSK	V		-29.200	

<sup>\*1</sup> Note: Limit: -5 dBm

<sup>\*2</sup> Note: Limit: -13 dBm, TRP result is -18.79 dBm

<sup>\*3</sup> Note: Limit: -13 dBm, TRP result is -19.45 dBm

**Antenna 1(K patch), n261**

CCs active	BW	Frequency [MHz]	Channel	Beam Pol	Modulation	Ant. Pol [H/V]	RB Size/Offset	Band Edge [dBm]	SUM [dBm]
1	50 MHz	27534.84	Low	MIMO	BPSK	H	1/0	-22.944	-20.996
		27534.84	Low	MIMO	BPSK	V		-25.415	
		27534.84	Low	MIMO	QPSK	H	32/0	-21.692	-18.457
		27534.84	Low	MIMO	QPSK	V		-21.254	
		28319.52	High	MIMO	BPSK	H	1/31	-17.669	-15.435*1
		28319.52	High	MIMO	BPSK	V		-19.391	
		28319.52	High	MIMO	BPSK	H	32/0	-22.878	-19.949
		28319.52	High	MIMO	BPSK	V		-23.043	
	100 MHz	27559.32	Low	MIMO	BPSK	H	1/0	-23.811	-21.666
		27559.32	Low	MIMO	BPSK	V		-25.758	
		27559.32	Low	MIMO	QPSK	H	64/0	-23.010	-20.307
		27559.32	Low	MIMO	QPSK	V		-23.648	
		28292.16	High	MIMO	QPSK	H	1/63	-23.471	-21.372
		28292.16	High	MIMO	QPSK	V		-25.537	
		28292.16	High	MIMO	QPSK	H	64/0	-22.187	-20.120
		28292.16	High	MIMO	QPSK	V		-24.338	
2	50 MHz	27559.84	Low	MIMO	BPSK	H	1/0	-18.641	-14.714*2
		27559.84	Low	MIMO	BPSK	V		-16.967	
		27559.84	Low	MIMO	BPSK	H	32/0	-24.846	-21.022
		27559.84	Low	MIMO	BPSK	V		-23.347	
		28294.52	High	MIMO	BPSK	H	1/31	-15.602	-14.534*3
		28294.52	High	MIMO	BPSK	V		-21.148	
		28294.52	High	MIMO	BPSK	H	32/0	-25.133	-22.598
		28294.52	High	MIMO	BPSK	V		-26.141	
	100 MHz	27609.32	Low	MIMO	BPSK	H	1/0	-17.008	-14.124*4
		27609.32	Low	MIMO	BPSK	V		-17.265	
		27609.32	Low	MIMO	QPSK	H	64/0	-25.882	-23.181
		27609.32	Low	MIMO	QPSK	V		-26.524	
		28242.16	High	MIMO	QPSK	H	1/63	-16.116	-14.436*5
		28242.16	High	MIMO	QPSK	V		-19.374	
		28242.16	High	MIMO	QPSK	H	64/0	-24.734	-22.386
		28242.16	High	MIMO	QPSK	V		-26.177	

\*1 Note: Limit: -5 dBm

\*2 Note: Limit: -13 dBm, TRP result is -21.69 dBm

\*3 Note: Limit: -13 dBm, TRP result is -21.83 dBm

\*4 Note: Limit: -13 dBm, TRP result is -20.95 dBm

\*5 Note: Limit: -13 dBm, TRP result is -21.31 dBm



**Antenna 0(L patch), n260**

CCs active	BW	Frequency [MHz]	Channel	Beam Pol	Modulation	Ant. Pol [H/V]	RB Size/Offset	Band Edge [dBm]	SUM [dBm]
1	50 MHz	37027.32	Low	MIMO	BPSK	H	1/0	-4.896	-2.300 <sup>*2</sup>
		37027.32	Low	MIMO	BPSK	V		-5.768	
		37027.32	Low	MIMO	QPSK	H	32/0	-15.281	-12.590 <sup>*1</sup>
		37027.32	Low	MIMO	QPSK	V		-15.946	
		39966.24	High	MIMO	BPSK	H	1/31	-14.003	-11.928 <sup>*1</sup>
		39966.24	High	MIMO	BPSK	V		-16.133	
		39966.24	High	MIMO	BPSK	H	32/0	-22.556	-20.101
		39966.24	High	MIMO	BPSK	V		-23.747	
	100 MHz	37051.80	Low	MIMO	BPSK	H	1/0	-6.099	-3.148 <sup>*2</sup>
		37051.80	Low	MIMO	BPSK	V		-6.218	
		37051.80	Low	MIMO	QPSK	H	64/0	-20.110	-16.460
		37051.80	Low	MIMO	QPSK	V		-18.912	
		39949.92	High	MIMO	BPSK	H	1/63	-6.171	-3.814 <sup>*2</sup>
		39949.92	High	MIMO	BPSK	V		-7.594	
		39949.92	High	MIMO	BPSK	H	64/0	-20.454	-17.922
		39949.92	High	MIMO	BPSK	V		-21.469	
2	50 MHz	37052.32	Low	MIMO	BPSK	H	1/0	-14.877	-12.440 <sup>*1</sup>
		37052.32	Low	MIMO	BPSK	V		-16.112	
		37052.32	Low	MIMO	QPSK	H	32/0	-22.612	-20.088
		37052.32	Low	MIMO	QPSK	V		-23.647	
		39941.24	High	MIMO	BPSK	H	1/31	-21.711	-19.650
		39941.24	High	MIMO	BPSK	V		-23.877	
		39941.24	High	MIMO	BPSK	H	32/0	-26.462	-21.607
		39941.24	High	MIMO	BPSK	V		-23.326	
	100 MHz	37101.80	Low	MIMO	BPSK	H	1/0	-13.799	-11.514 <sup>*1</sup>
		37101.80	Low	MIMO	BPSK	V		-15.395	
		37101.80	Low	MIMO	QPSK	H	64/0	-24.861	-22.500
		37101.80	Low	MIMO	QPSK	V		-26.275	
		39899.92	High	MIMO	BPSK	H	1/32	-17.952	-14.947 <sup>*1</sup>
		39899.92	High	MIMO	BPSK	V		-17.963	
		39899.92	High	MIMO	BPSK	H	64/0	-24.017	-20.971
		39899.92	High	MIMO	BPSK	V		-23.945	

<sup>\*1</sup> Note: Limit: -5 dBm

<sup>\*2</sup> Note: Limit: -5 dBm, For Band Edge used uncorrelated gain to comply conductive limit.

Band Edge(-2.300 dBm) - Peak Ant. Gain(10.01 (dBi)) = **-12.310 dBm**

Band Edge(-3.148 dBm) - Peak Ant. Gain(10.01 (dBi)) = **-13.158 dBm**

Band Edge(-3.814 dBm) - Peak Ant. Gain(9.51 (dBi)) = **-13.324 dBm**

**Antenna 1(K patch), n260**

CCs active	BW	Frequency [MHz]	Channel	Beam Pol	Modulation	Ant. Pol [H/V]	RB Size/Offset	Band Edge [dBm]	SUM [dBm]
1	50 MHz	37027.32	Low	MIMO	BPSK	H	1/0	-12.778	-8.453*1
		37027.32	Low	MIMO	BPSK	V		-10.455	
		37027.32	Low	MIMO	QPSK	H	32/0	-22.035	-18.390
		37027.32	Low	MIMO	QPSK	V		-20.846	
		39966.24	High	MIMO	BPSK	H	1/31	-22.316	-17.793
		39966.24	High	MIMO	BPSK	V		-19.683	
		39966.24	High	MIMO	BPSK	H	32/0	-26.109	-21.758
		39966.24	High	MIMO	BPSK	V		-23.746	
	100 MHz	37051.80	Low	MIMO	BPSK	H	1/0	-12.236	-8.911*1
		37051.80	Low	MIMO	BPSK	V		-11.627	
		37051.80	Low	MIMO	QPSK	H	64/0	-25.406	-22.443
		37051.80	Low	MIMO	QPSK	V		-25.501	
		39949.92	High	MIMO	BPSK	H	1/63	-11.181	-7.622*2
		39949.92	High	MIMO	BPSK	V		-10.146	
		39949.92	High	MIMO	BPSK	H	64/0	-25.209	-21.296
		39949.92	High	MIMO	BPSK	V		-23.560	
2	50 MHz	37052.32	Low	MIMO	BPSK	H	1/0	-18.677	-15.573*1
		37052.32	Low	MIMO	BPSK	V		-18.492	
		37052.32	Low	MIMO	QPSK	H	32/0	-25.993	-21.830
		37052.32	Low	MIMO	QPSK	V		-23.931	
		39941.24	High	MIMO	BPSK	H	1/31	-20.817	-15.147*1
		39941.24	High	MIMO	BPSK	V		-16.520	
		39941.24	High	MIMO	BPSK	H	32/0	-27.521	-22.224
		39941.24	High	MIMO	BPSK	V		-23.744	
	100 MHz	37101.80	Low	MIMO	BPSK	H	1/0	-19.220	-16.044
		37101.80	Low	MIMO	BPSK	V		-18.894	
		37101.80	Low	MIMO	QPSK	H	64/0	-30.082	-27.226
		37101.80	Low	MIMO	QPSK	V		-30.396	
		39899.92	High	MIMO	BPSK	H	1/63	-21.049	-15.376*1
		39899.92	High	MIMO	BPSK	V		-16.748	
		39899.92	High	MIMO	BPSK	H	64/0	-28.329	-23.237
		39899.92	High	MIMO	BPSK	V		-24.846	

\*1 Note: Limit: -5 dBm

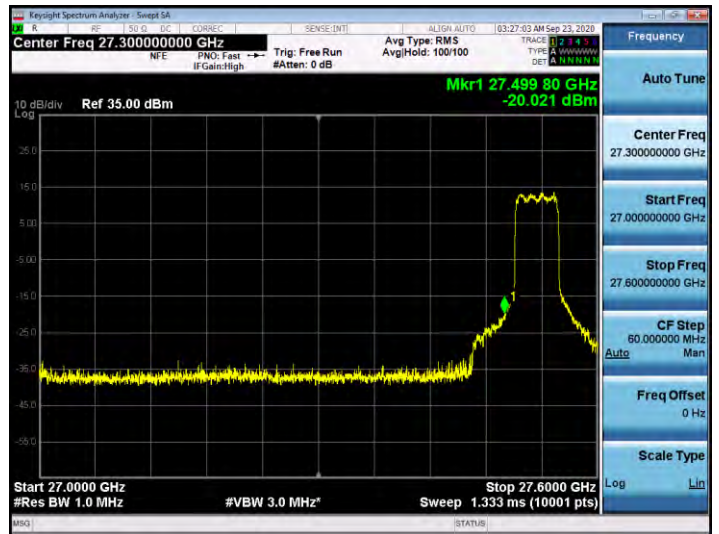
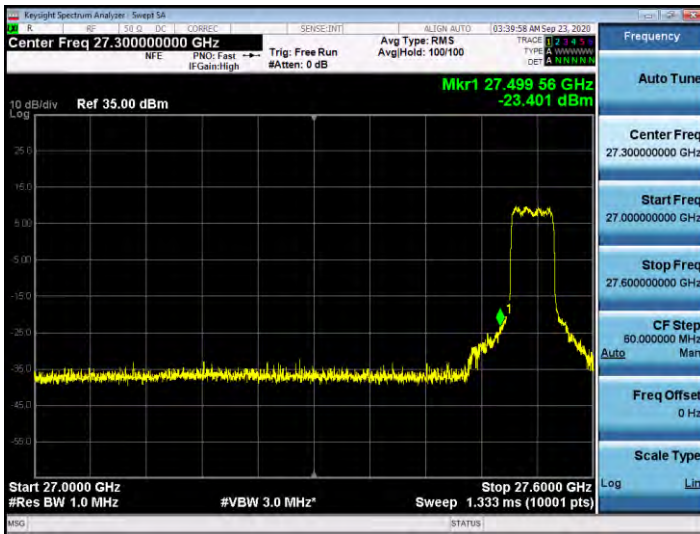
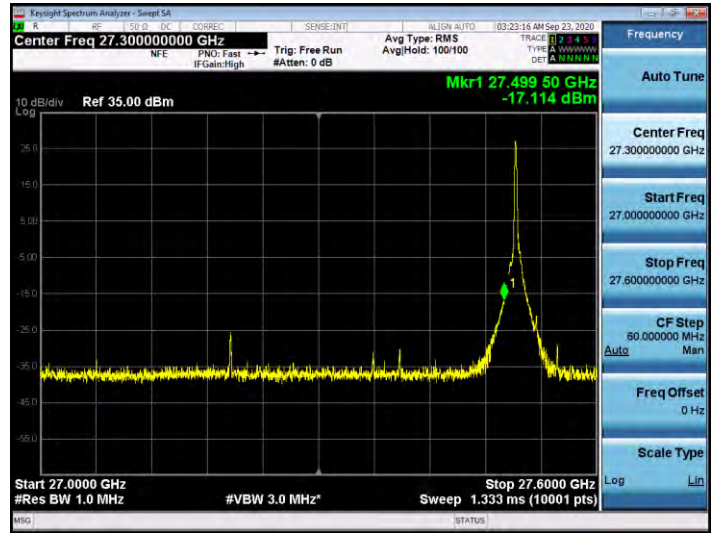
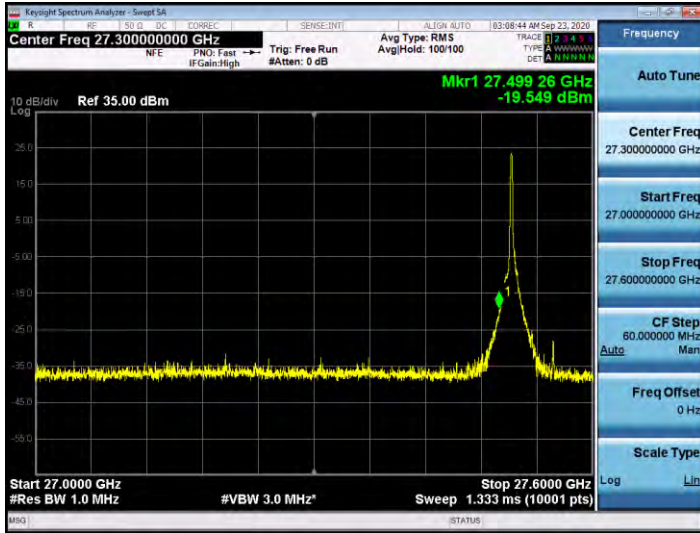
\*2 Note: Limit: -5 dBm, For Band Edge used uncorrelated gain to comply conductive limit.  
 Band Edge(-7.622 dBm) - Peak Ant. Gain(9.62 (dBi)) = **-17.242 dBm**



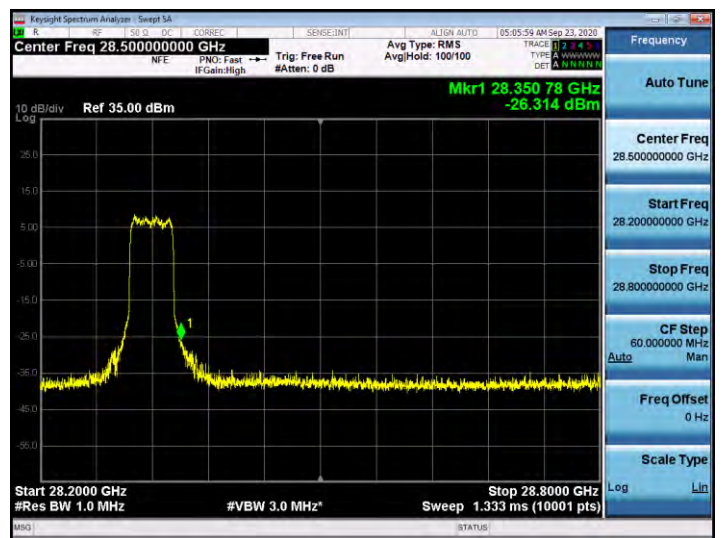
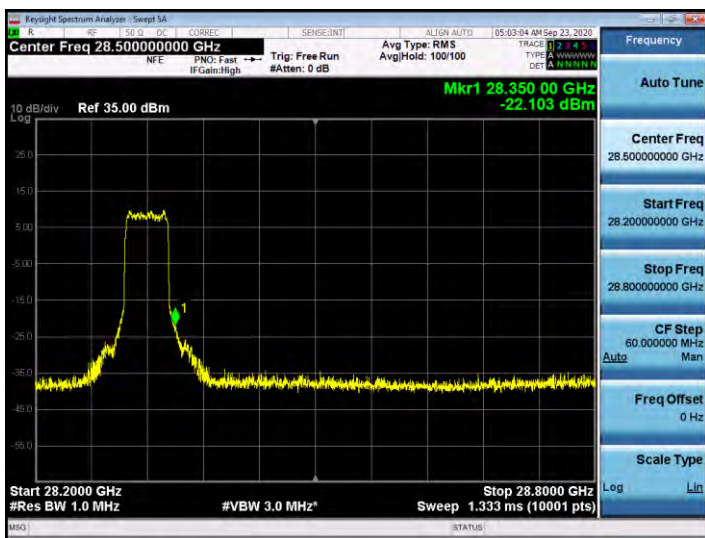
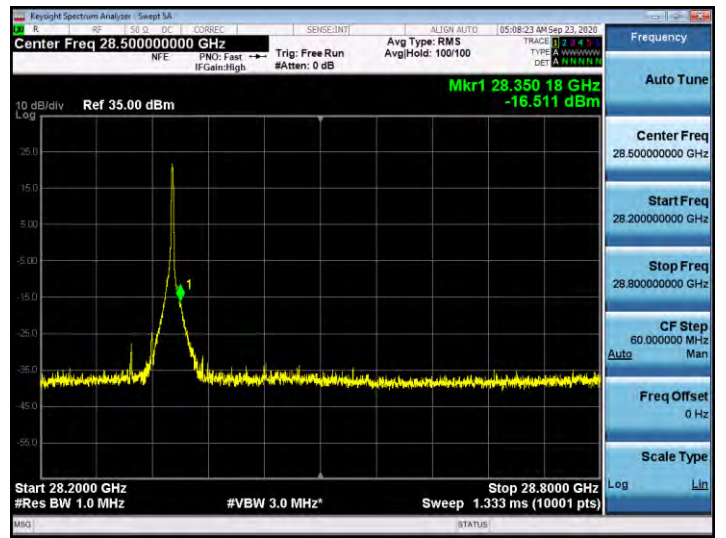
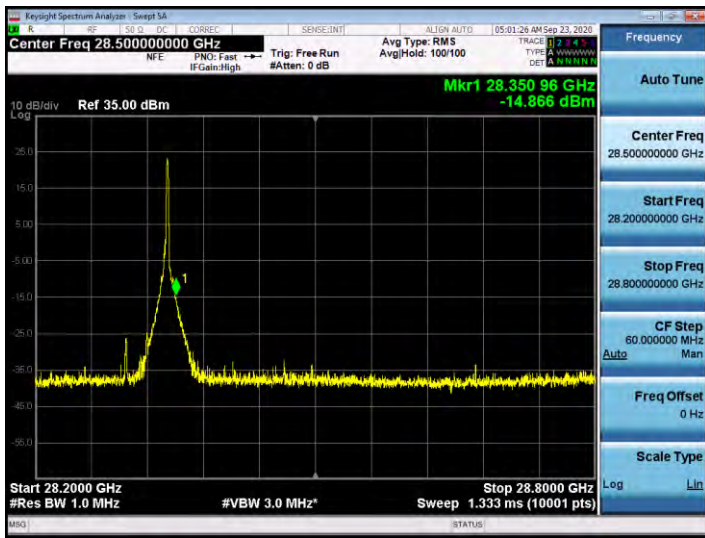
Plot data of Band Edge

1. Antenna 0(L patch), n261

50 MHz, 1CC MIMO

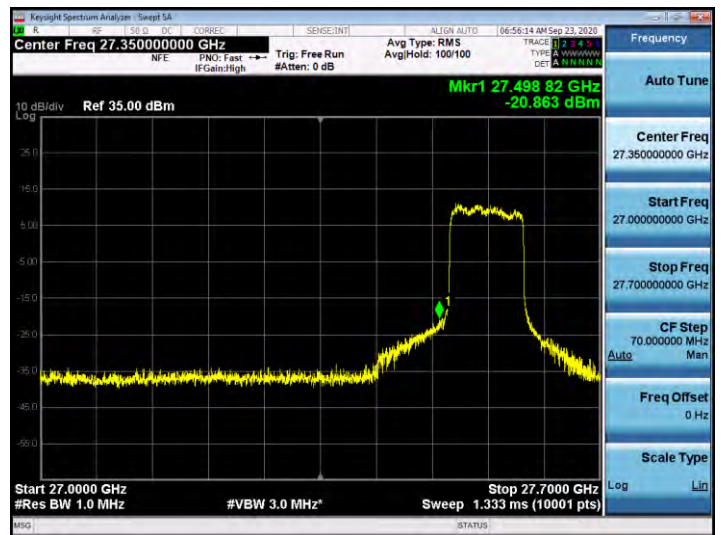
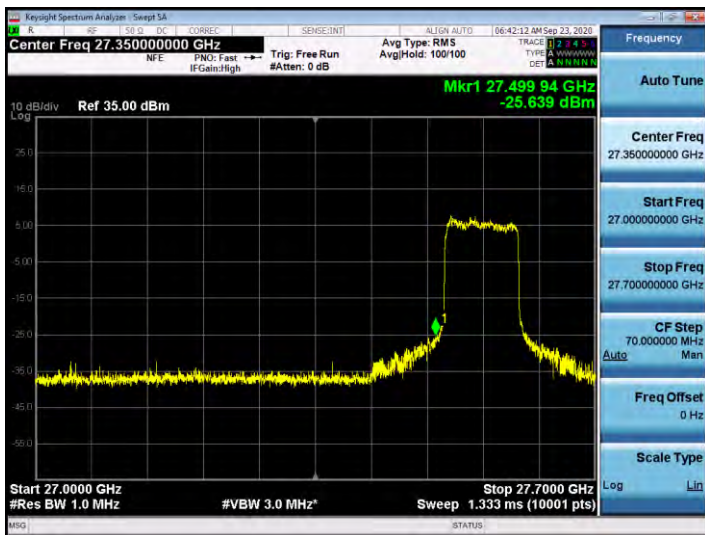
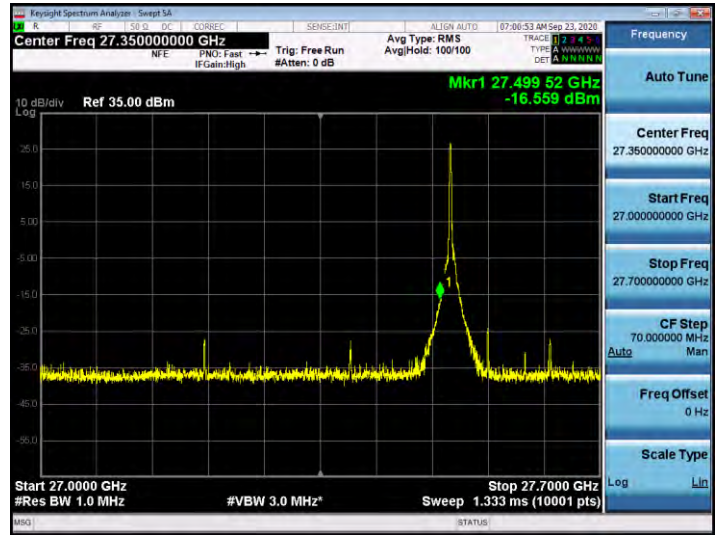
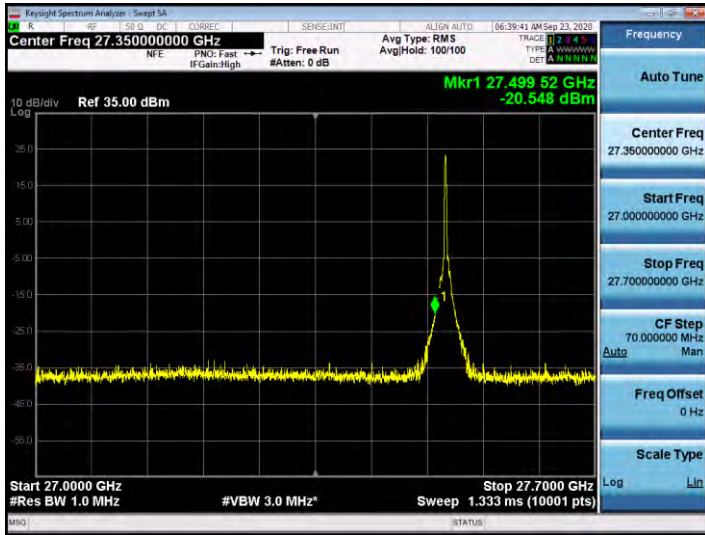


50 MHz, 1CC MIMO

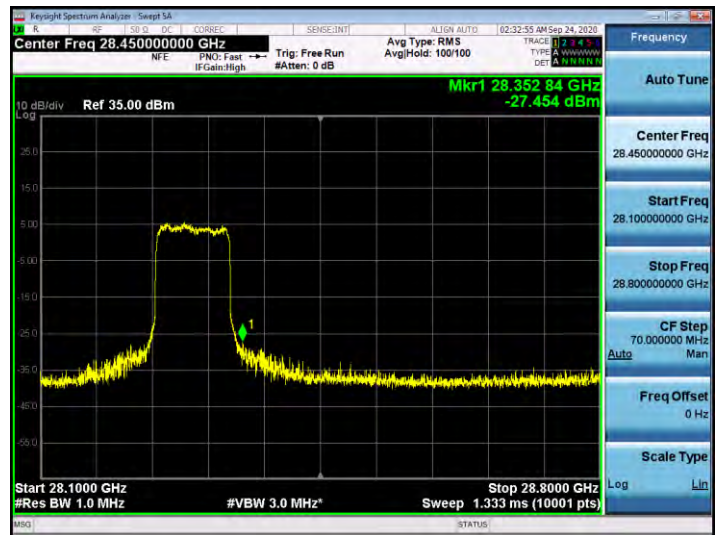
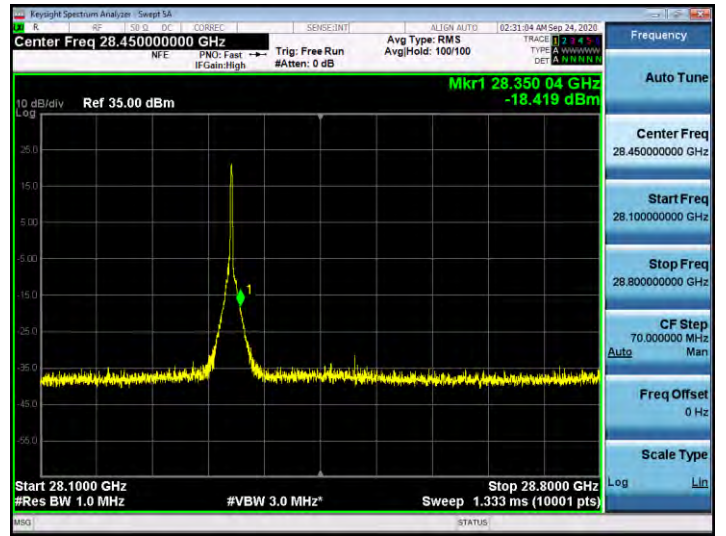
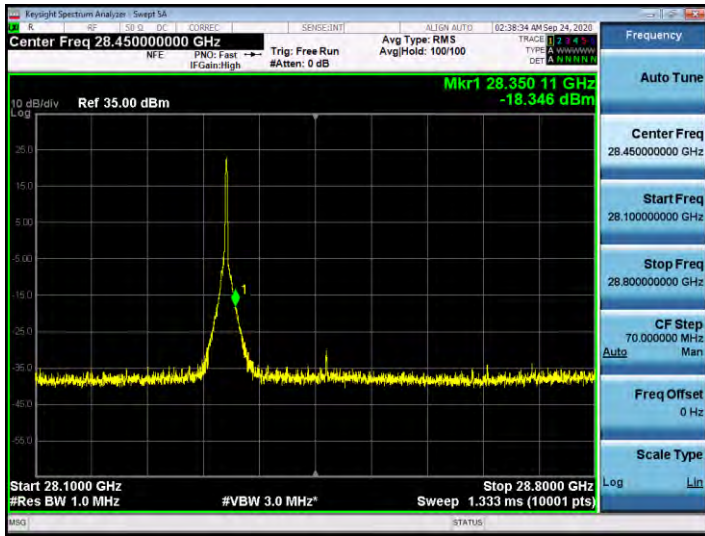




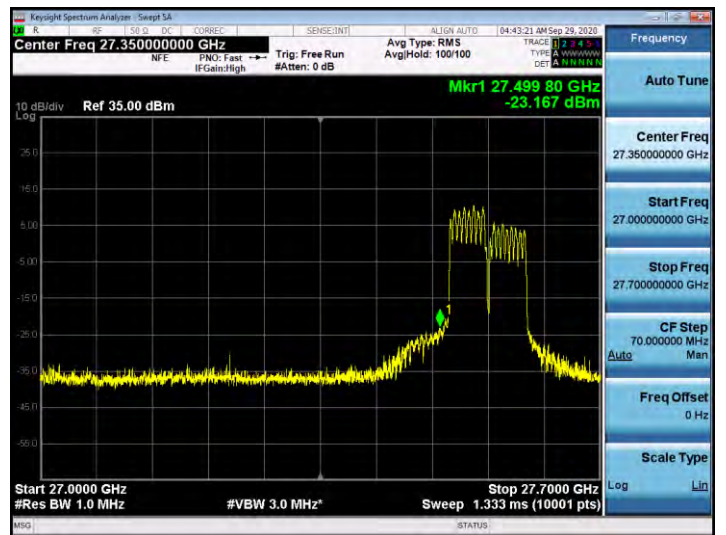
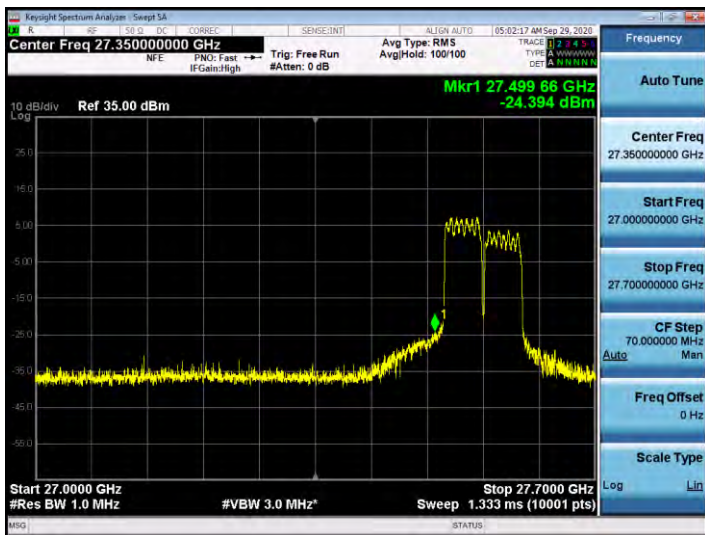
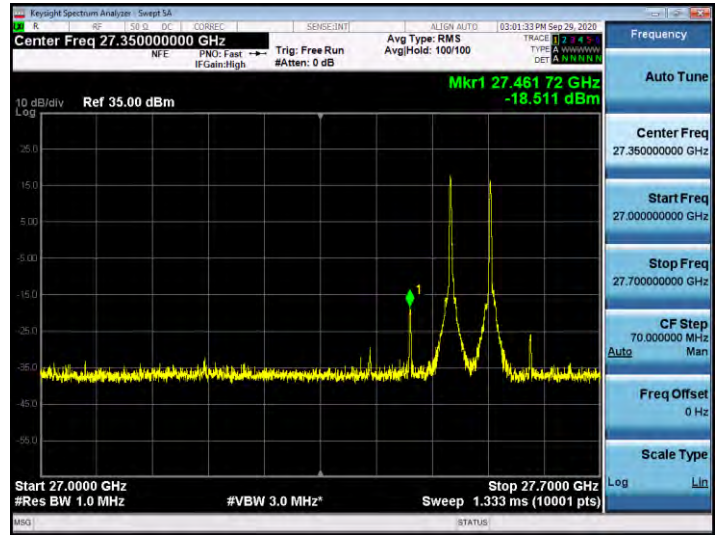
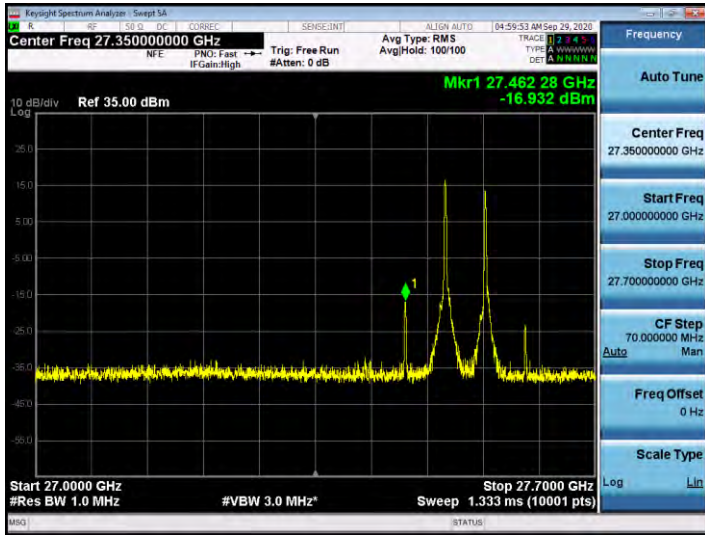
100 MHz, 1CC MIMO



100 MHz, 1CC MIMO

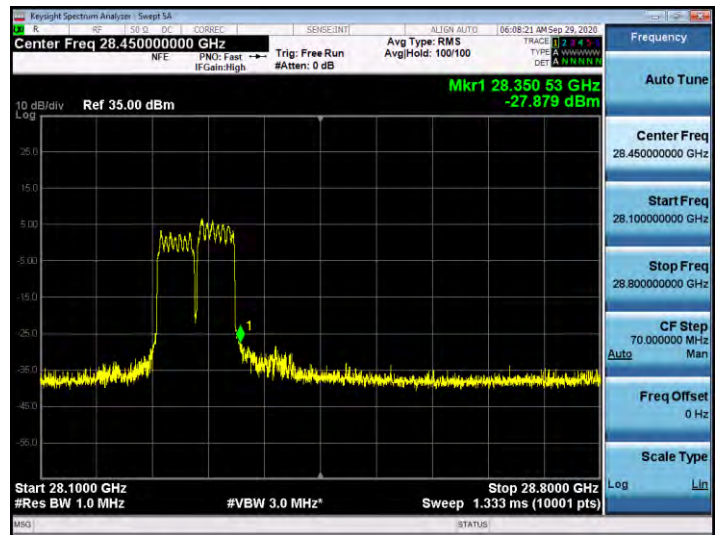
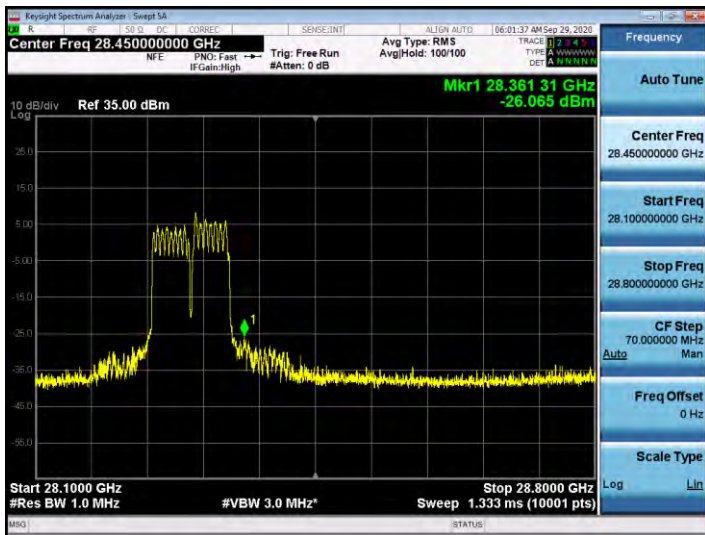
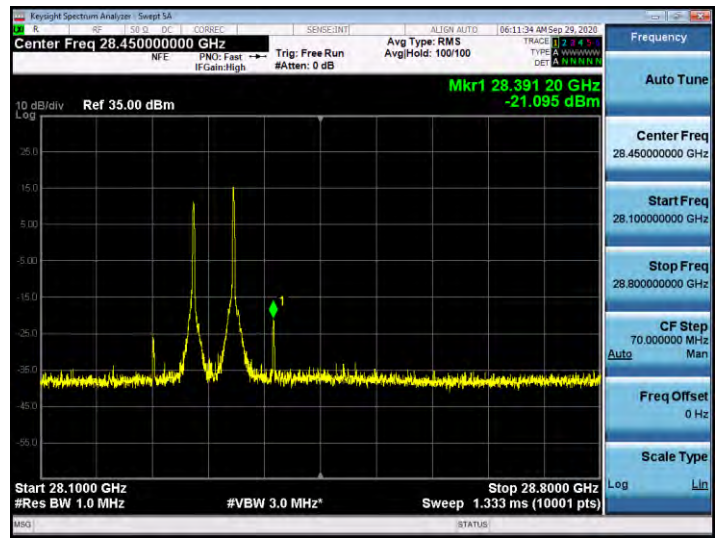
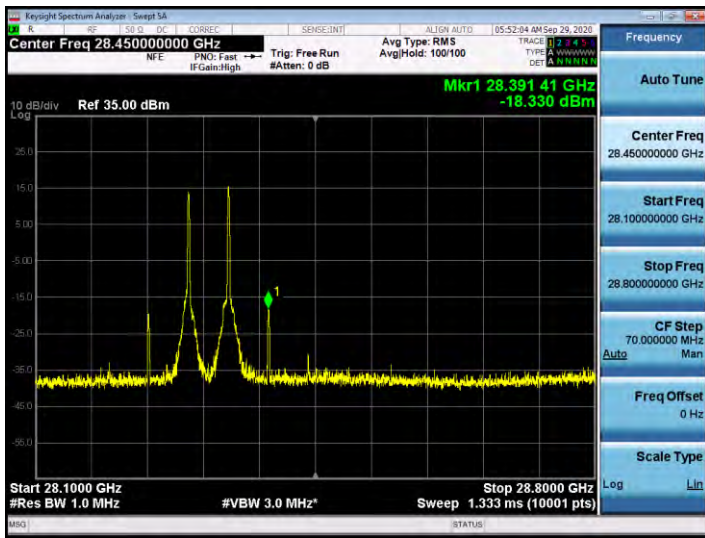


**50 MHz, 2CC MIMO**

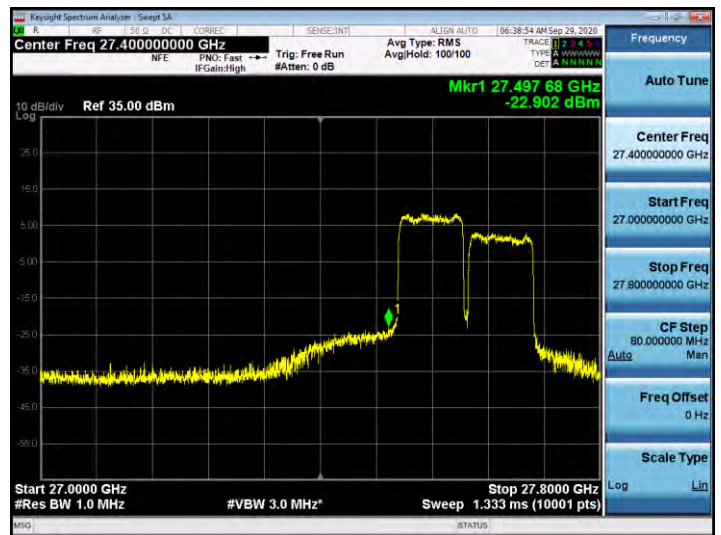
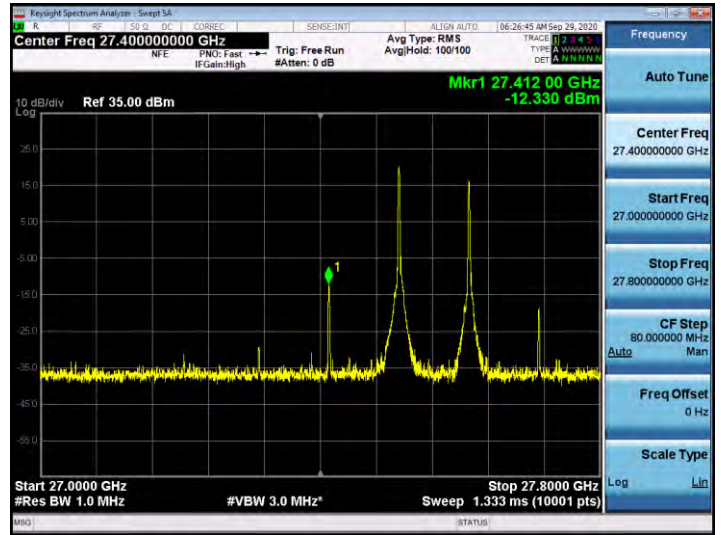
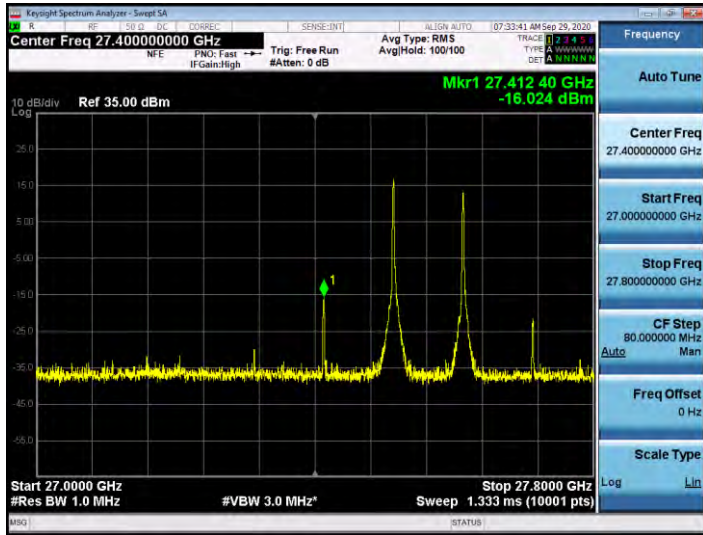




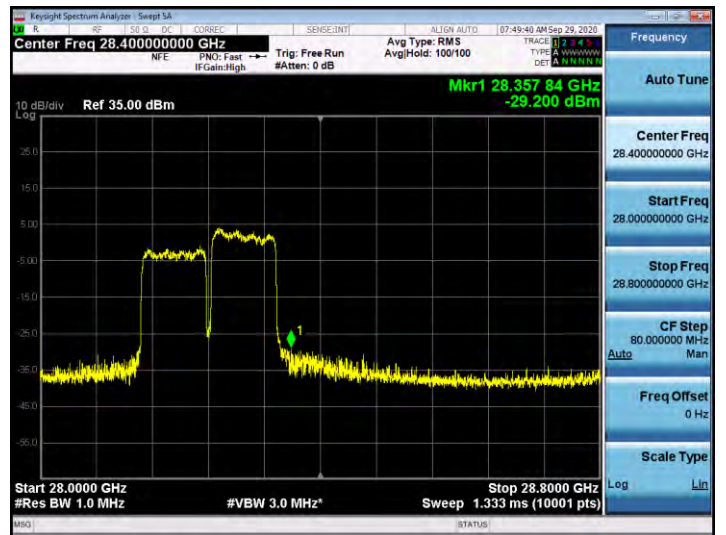
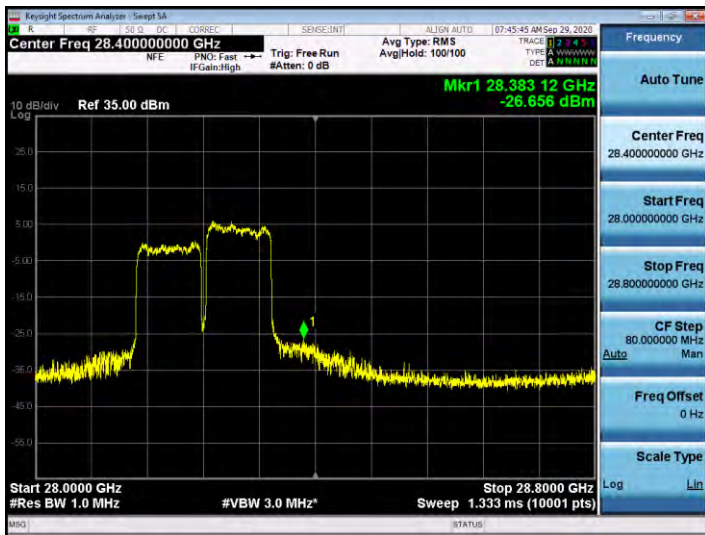
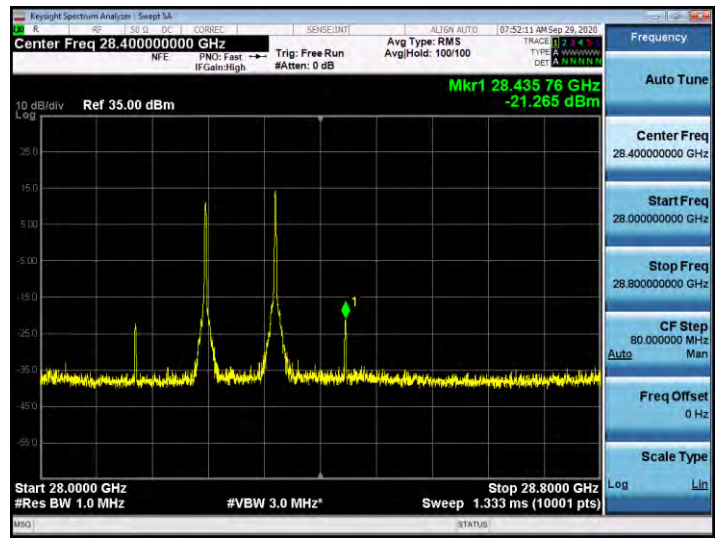
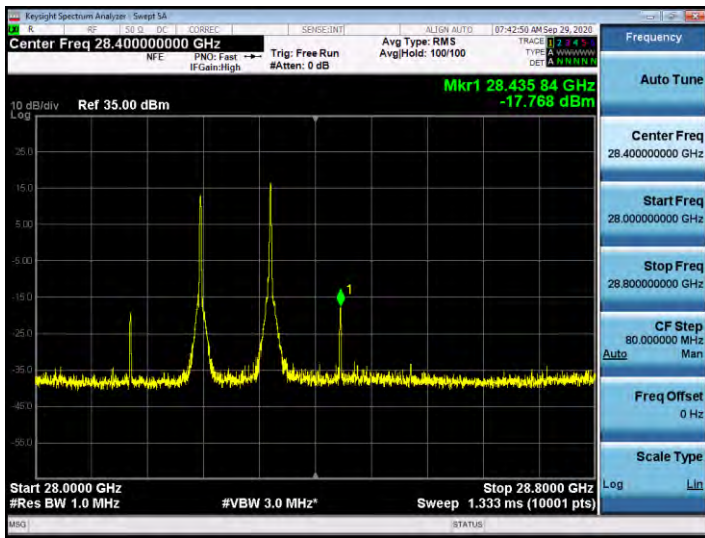
50 MHz, 2CC MIMO



100 MHz, 2CC MIMO



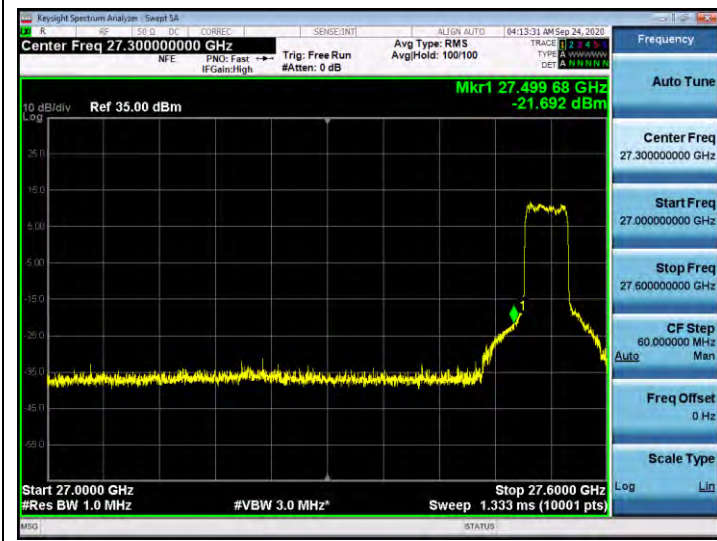
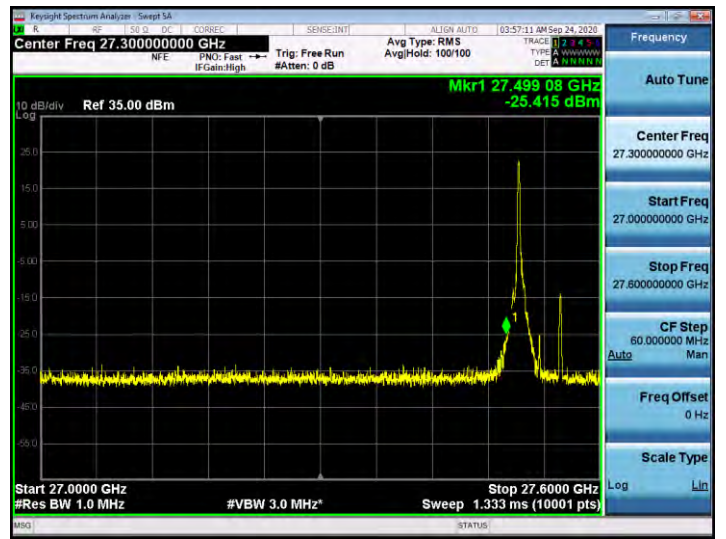
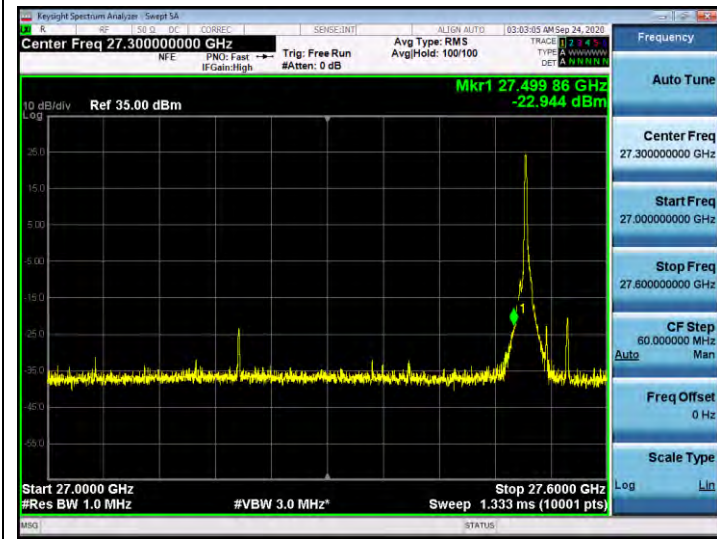
100 MHz, 2CC MIMO



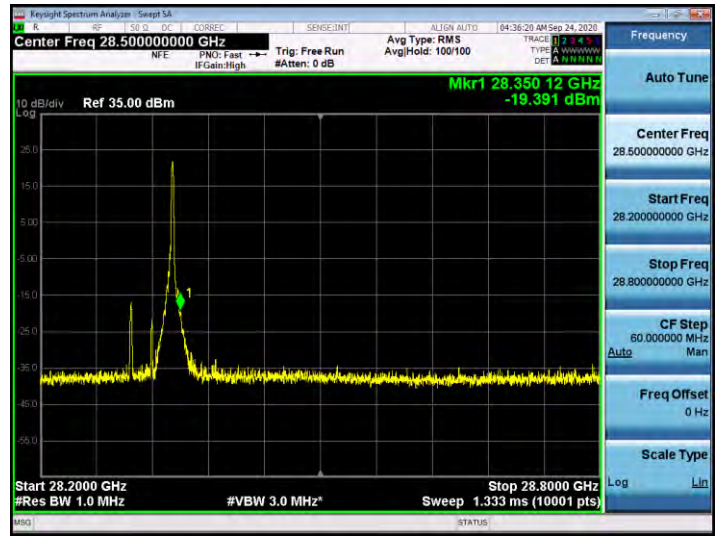
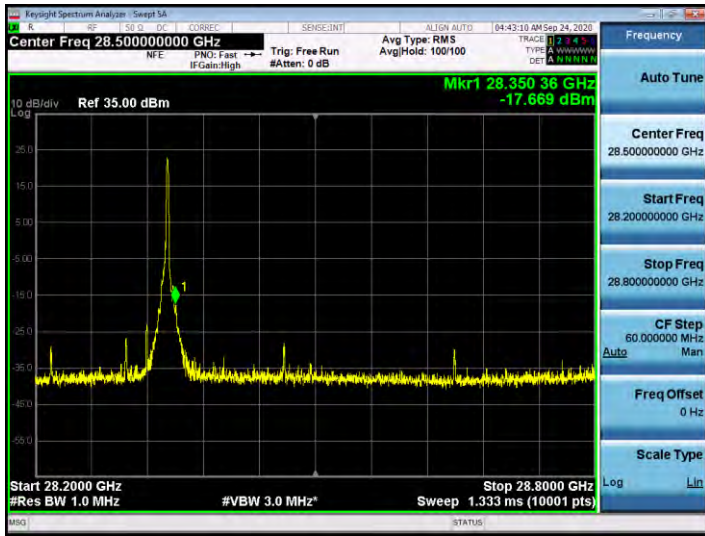


2. Antenna 1(K patch), n261

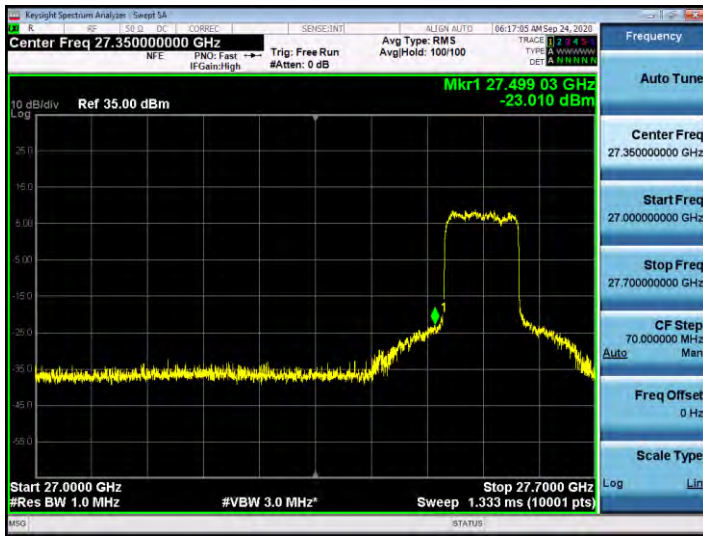
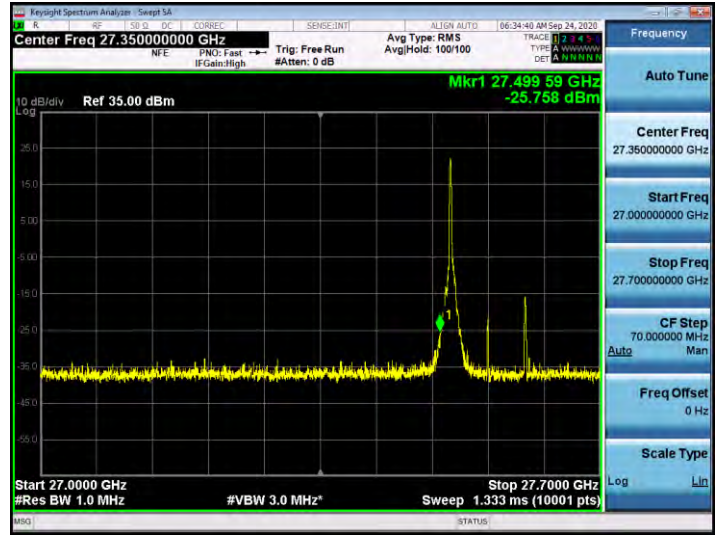
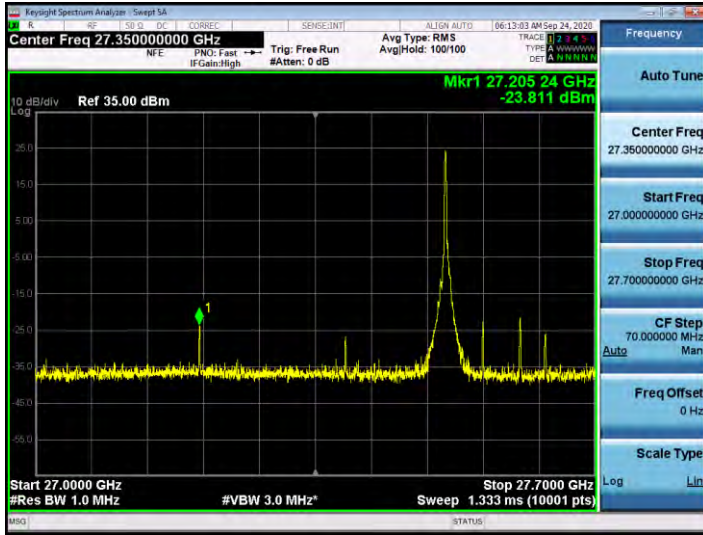
50 MHz, 1CC MIMO



50 MHz, 1CC MIMO

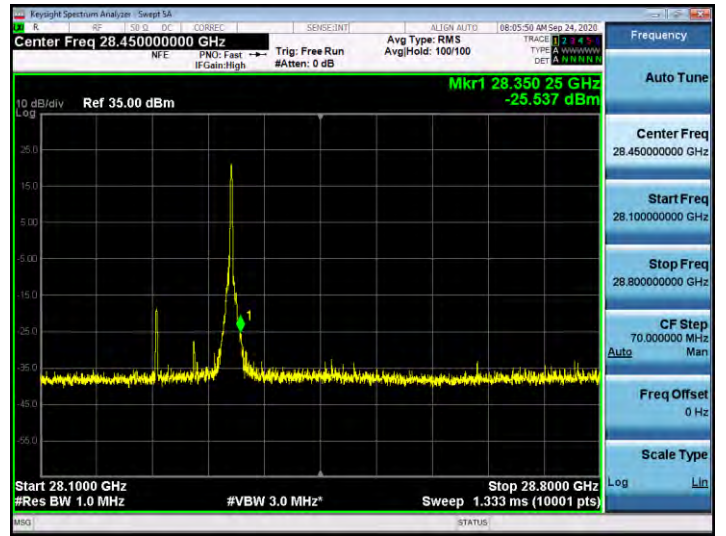
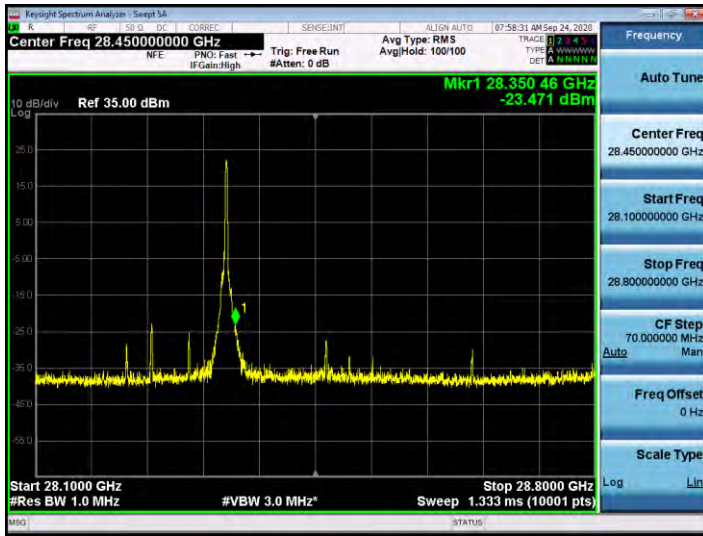


100 MHz, 1CC MIMO

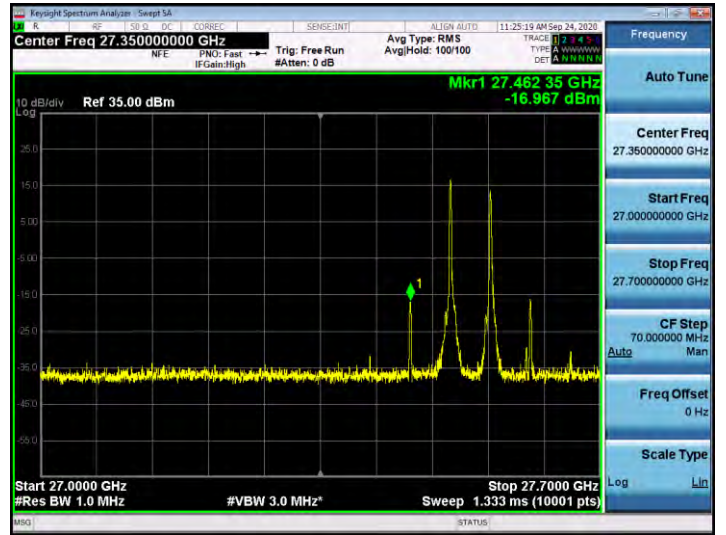
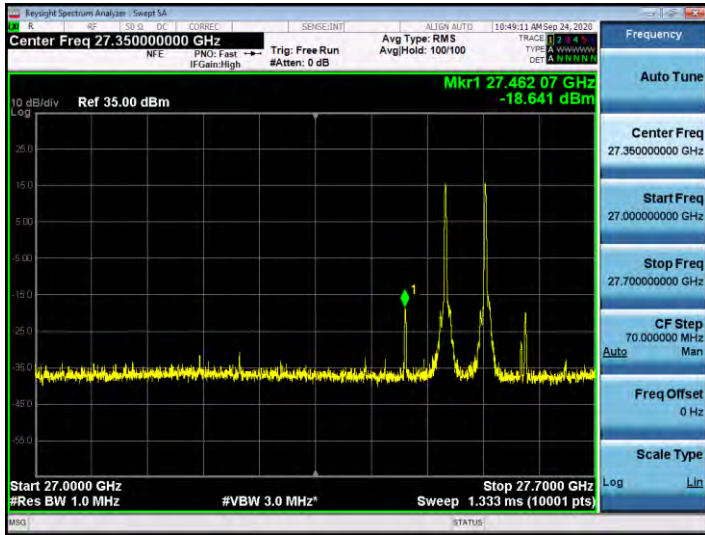




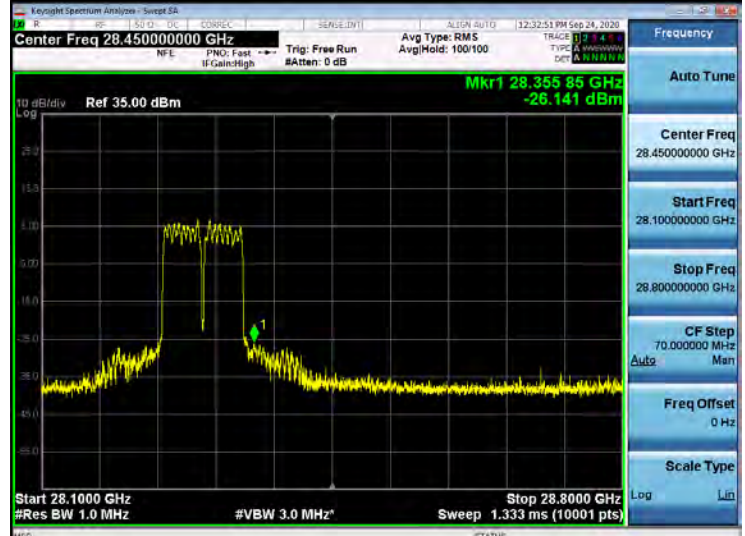
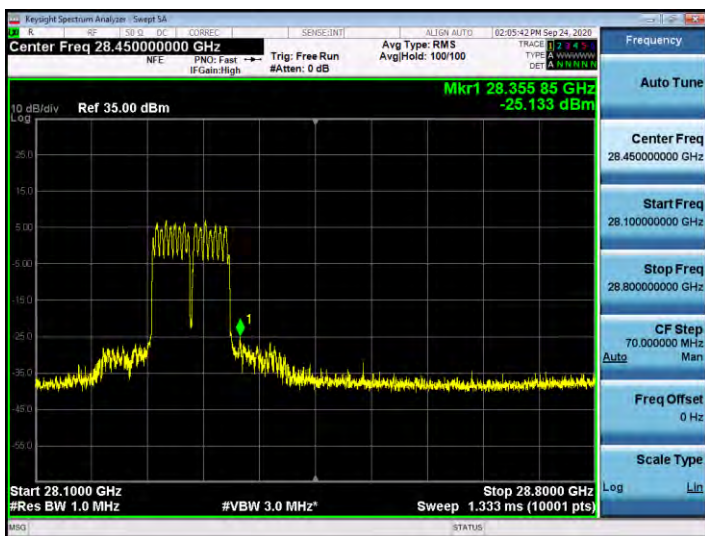
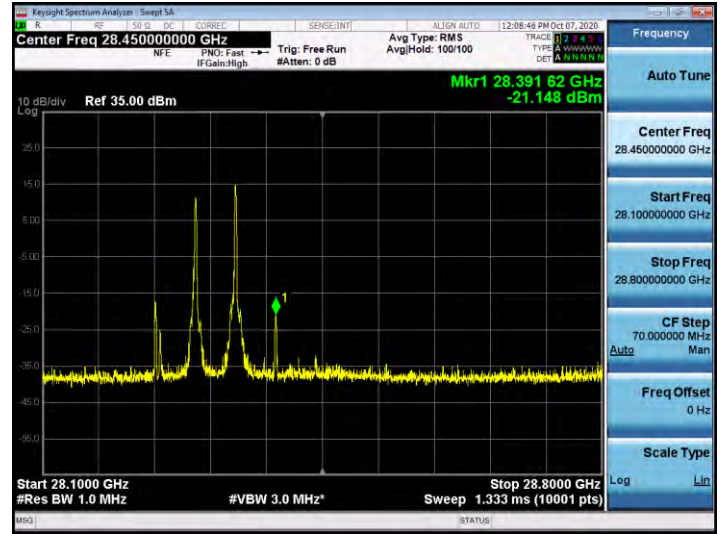
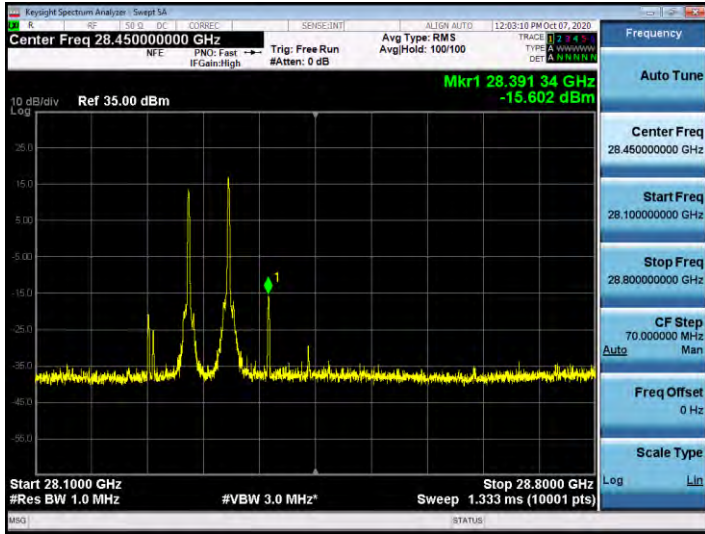
100 MHz, 1CC MIMO



**50 MHz, 2CC MIMO**

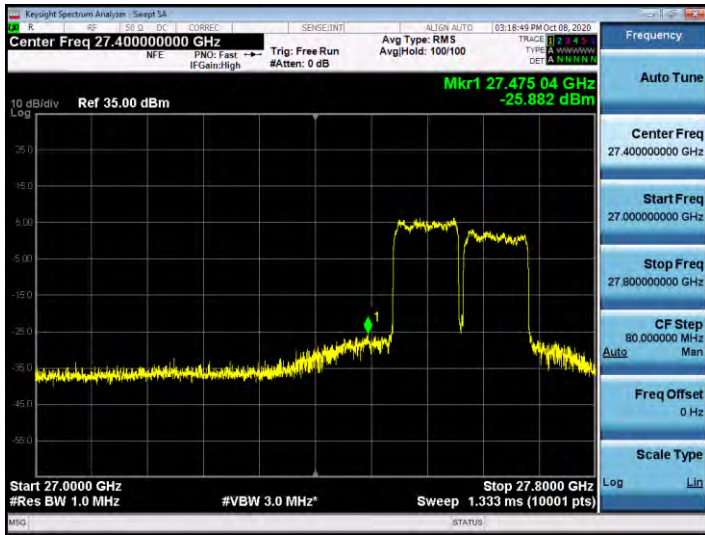
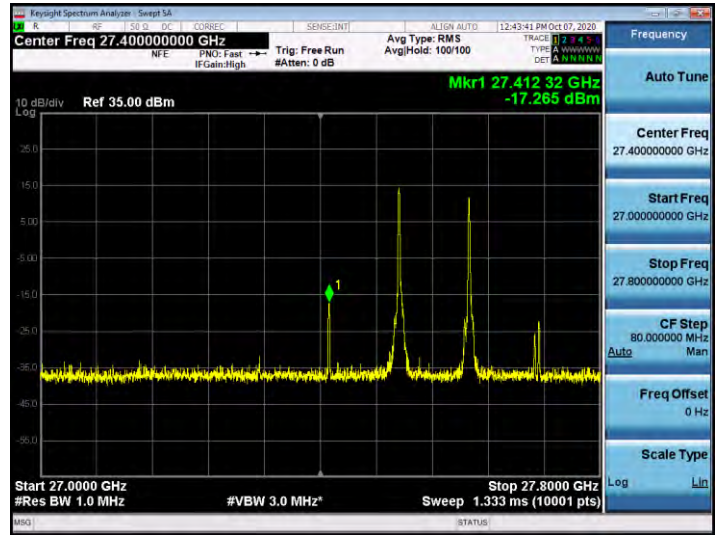
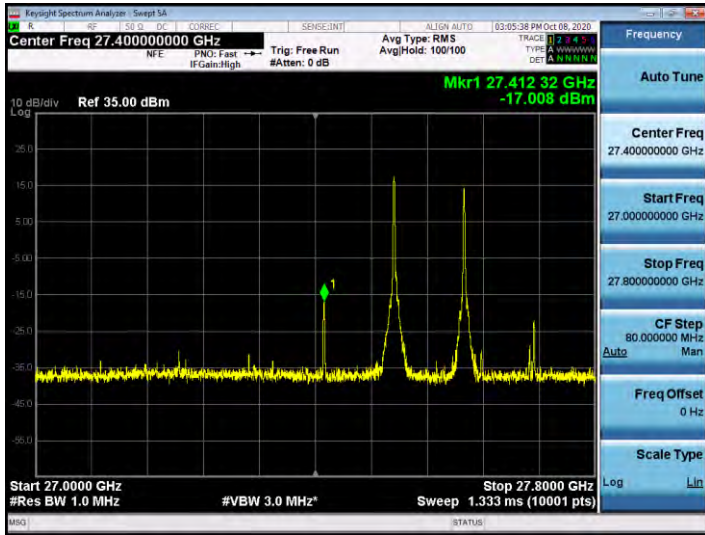


**50 MHz, 2CC MIMO**

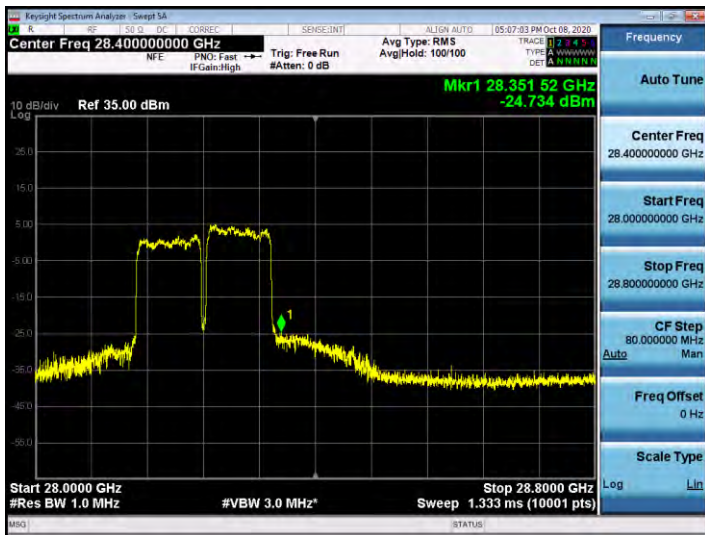
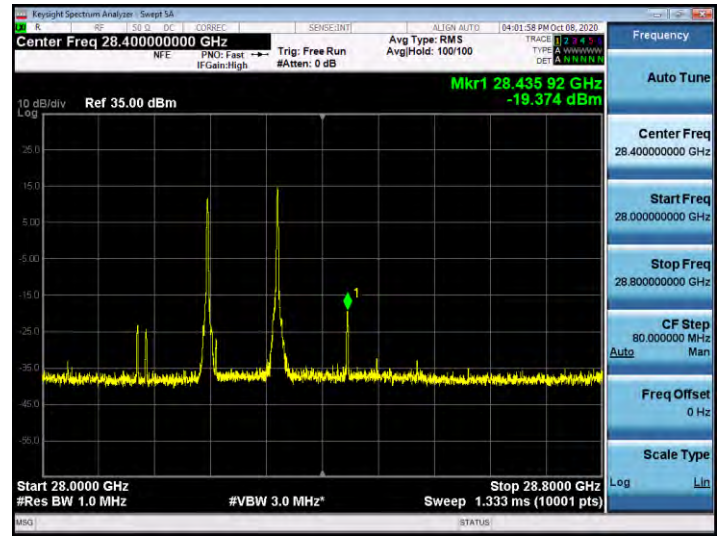
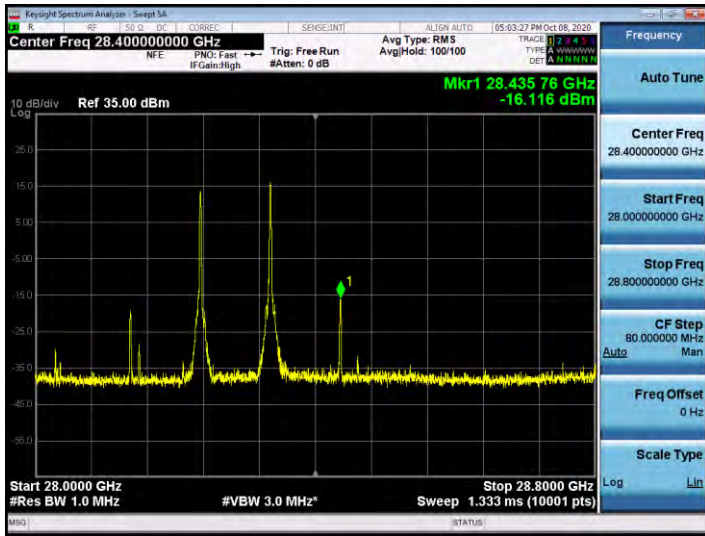




100 MHz, 2CC MIMO

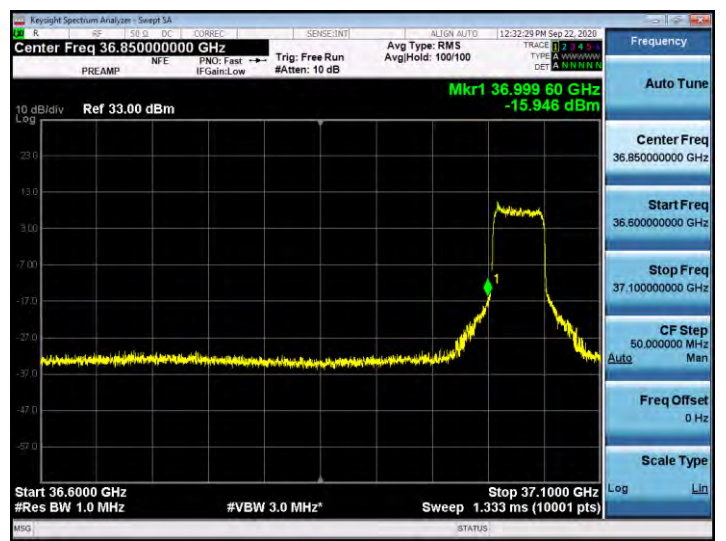
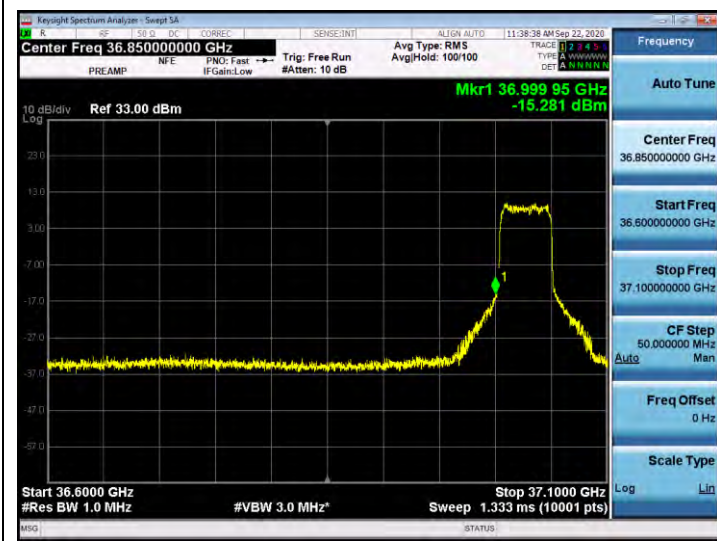
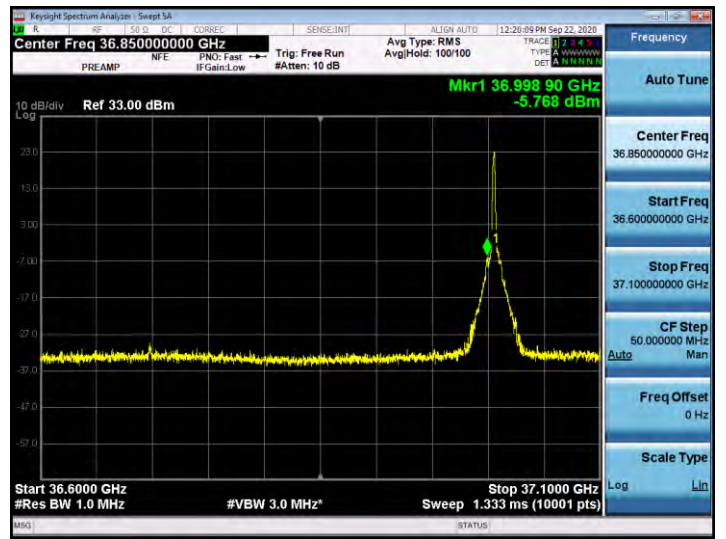
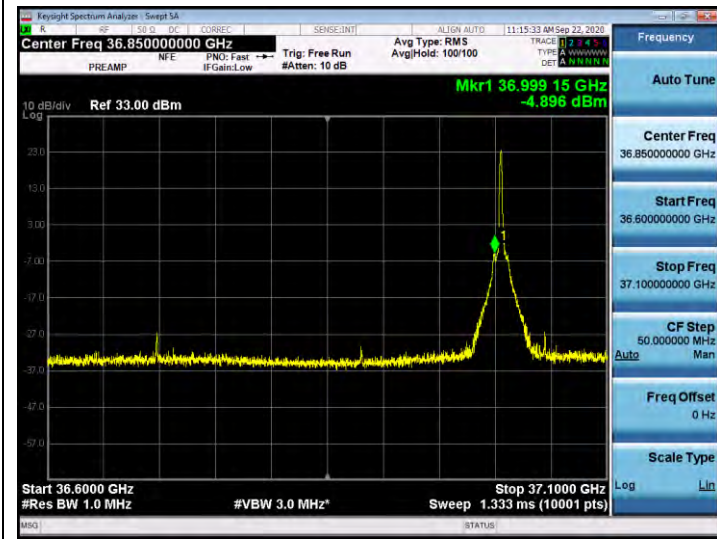


100 MHz, 2CC MIMO



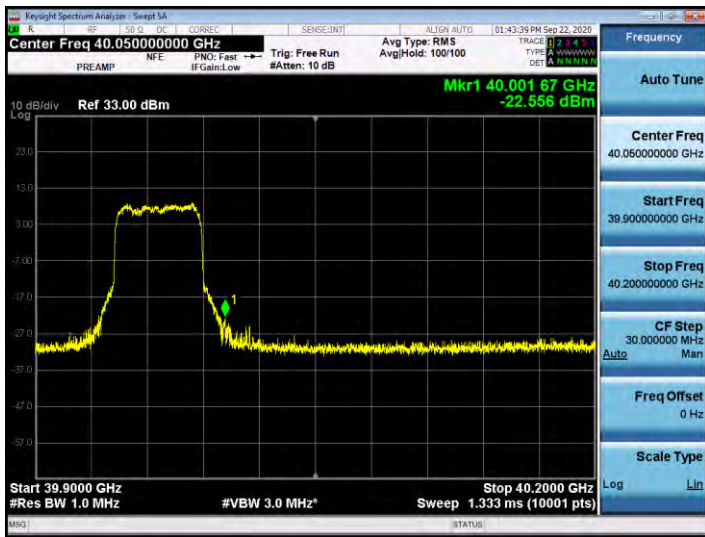
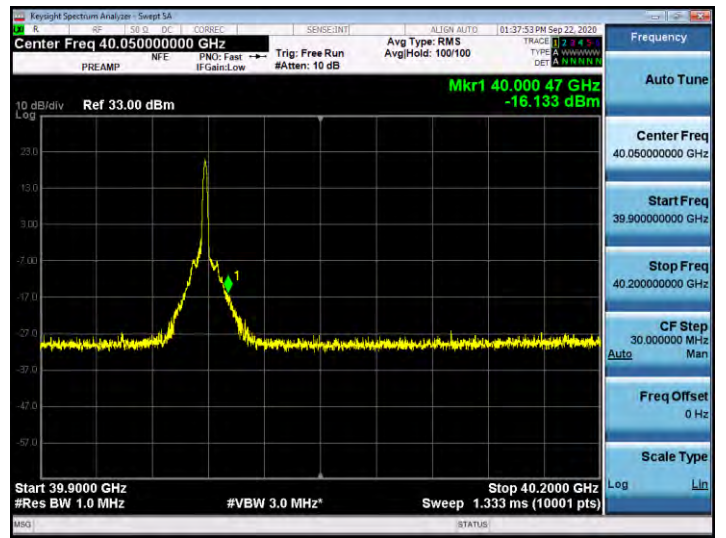
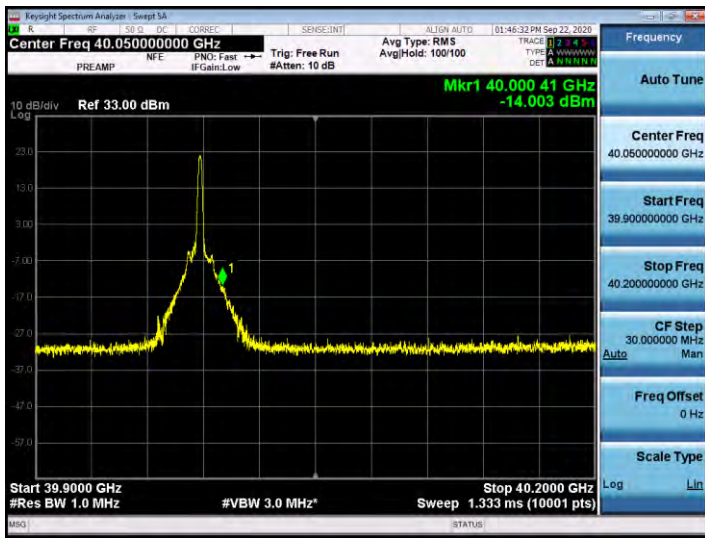
3. Antenna 0(L patch), n260

50 MHz, 1CC MIMO

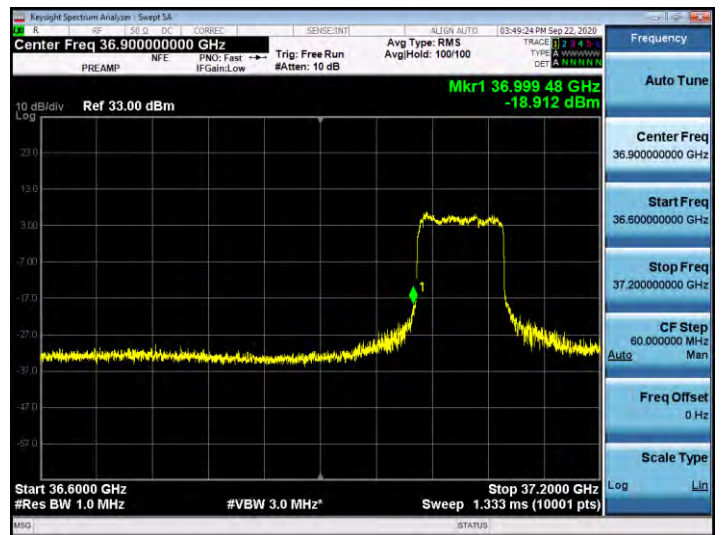
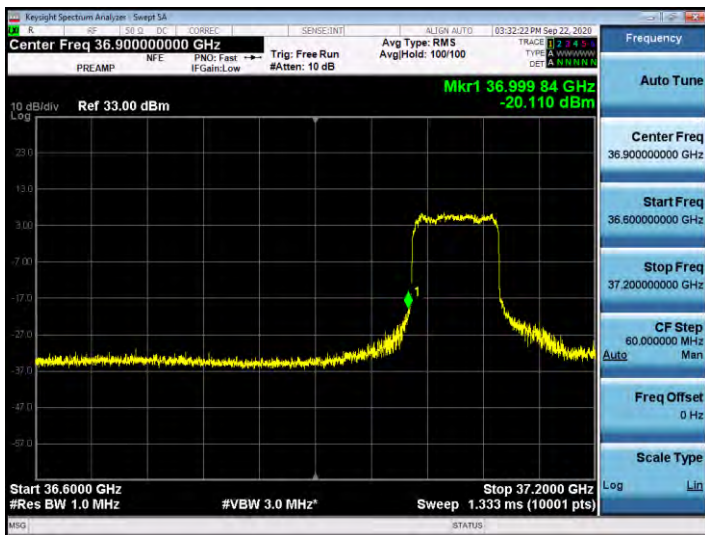
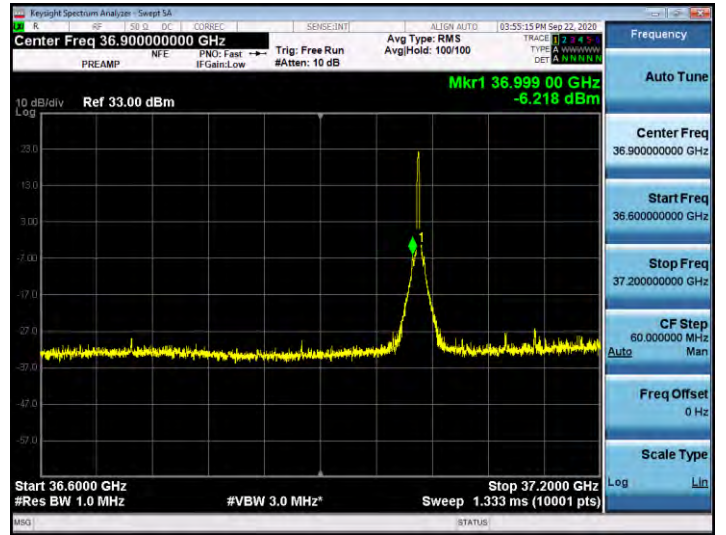
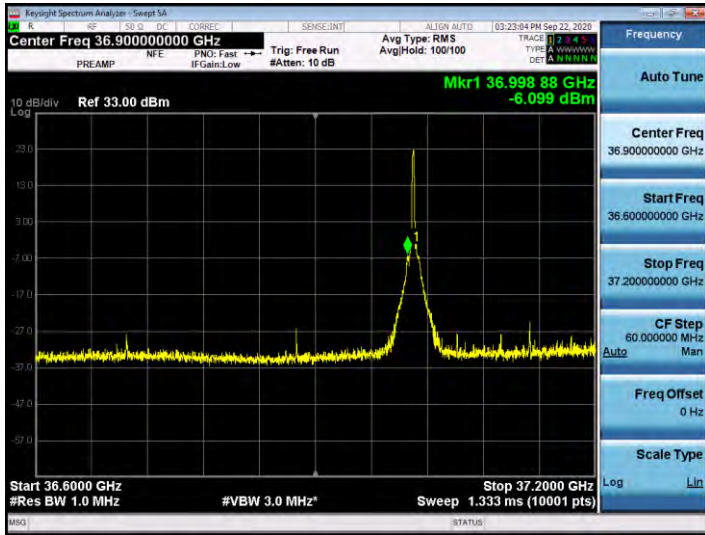




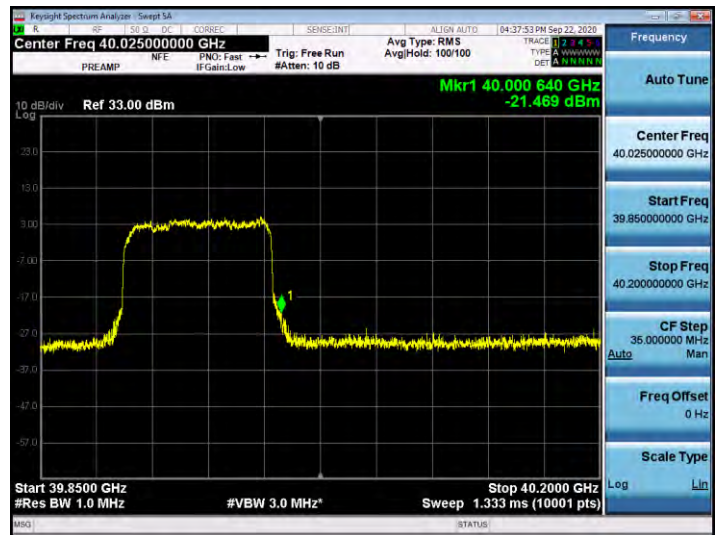
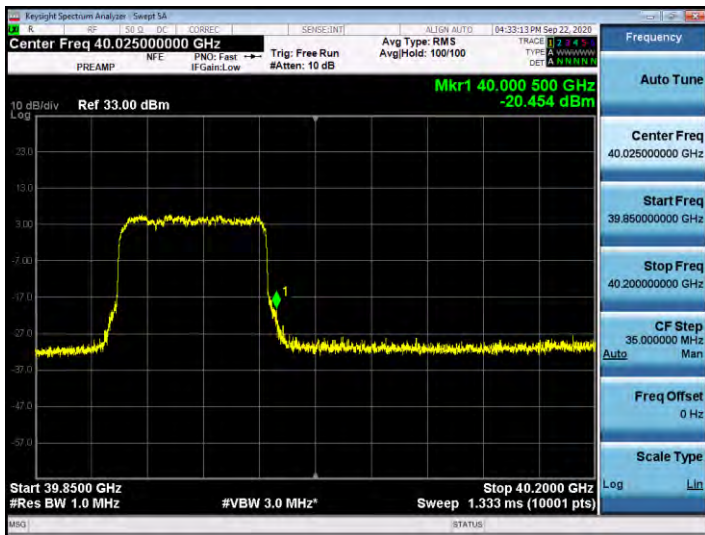
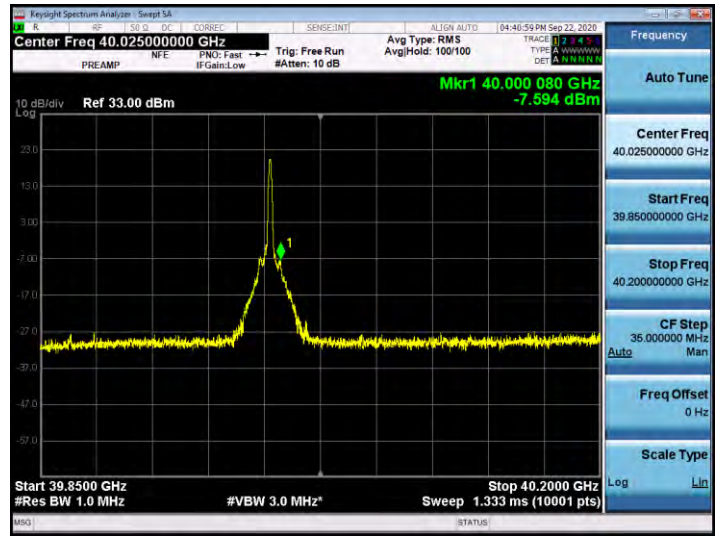
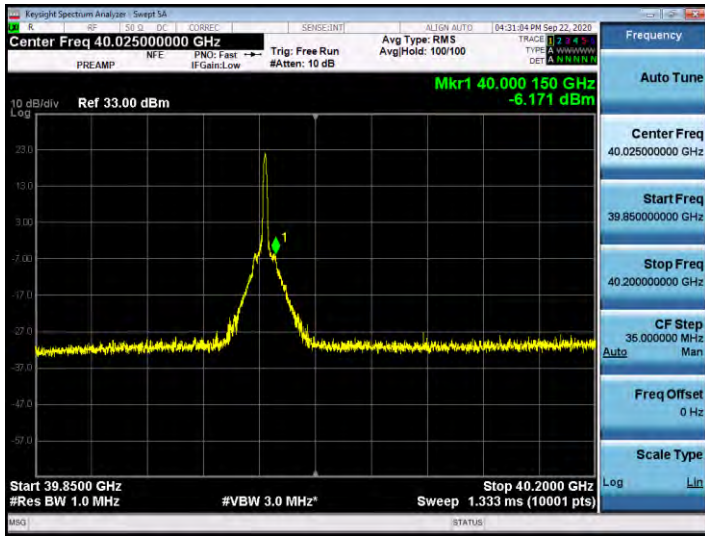
50 MHz, 1CC MIMO



100 MHz, 1CC MIMO



100 MHz, 1CC MIMO





**50 MHz, 2CC MIMO**

