

TEST REPORT

NB+L+NR-MIMO-MC-3

Antenna Port	NR Modulation	LTE Modulation	NR Carrier Bandwidth (MHz)	LTE Carrier Bandwidth (MHz)	Output power / Peak-to-Average Ratio (PAR)		
					Channel position M		
					Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	QPSK	QPSK	5	1.4	35.32	28.413	-
B	QPSK	QPSK	5	1.4	35.57	28.779	-
C	QPSK	QPSK	5	1.4	35.47	28.477	-
D	QPSK	QPSK	5	1.4	35.45	28.477	-
Total					41.47	34.559	-
Total Power+10.5dBi					51.97	45.059	-

Antenna Port	NR Modulation	LTE Modulation	NR Carrier Bandwidth (MHz)	LTE Carrier Bandwidth (MHz)	Output power / Peak-to-Average Ratio (PAR)		
					Channel position M		
					Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	QPSK	QPSK	5	3	35.45	27.830	-
B	QPSK	QPSK	5	3	35.70	27.935	-
C	QPSK	QPSK	5	3	35.60	27.790	-
D	QPSK	QPSK	5	3	35.54	27.875	-
Total					41.59	33.878	-
Total Power+10.5dBi					52.09	44.378	-

Antenna Port	NR Modulation	LTE Modulation	NR Carrier Bandwidth (MHz)	LTE Carrier Bandwidth (MHz)	Output power / Peak-to-Average Ratio (PAR)		
					Channel position M		
					Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	QPSK	QPSK	10	1.4	35.40	28.469	-
B	QPSK	QPSK	10	1.4	35.58	28.808	-
C	QPSK	QPSK	10	1.4	35.55	28.603	-
D	QPSK	QPSK	10	1.4	35.50	28.484	-
Total					41.53	34.614	-
Total Power+10.5dBi					52.03	45.114	-

Antenna Port	NR Modulation	LTE Modulation	NR Carrier Bandwidth (MHz)	LTE Carrier Bandwidth (MHz)	Output power / Peak-to-Average Ratio (PAR)		
					Channel position M		
					Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	QPSK	QPSK	10	5	36.23	27.745	-
B	QPSK	QPSK	10	5	36.45	28.041	-
C	QPSK	QPSK	10	5	36.35	27.885	-
D	QPSK	QPSK	10	5	36.28	27.975	-
Total					42.35	33.934	-
Total Power+10.5dBi					52.85	44.434	-

Antenna Port	NR Modulation	LTE Modulation	NR Carrier Bandwidth (MHz)	LTE Carrier Bandwidth (MHz)	Output power / Peak-to-Average Ratio (PAR)		
					Channel position M		
					Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	QPSK	QPSK	15	1.4	35.43	28.460	-
B	QPSK	QPSK	15	1.4	35.67	28.686	-
C	QPSK	QPSK	15	1.4	35.59	28.465	-
D	QPSK	QPSK	15	1.4	35.52	28.370	-
Total					41.57	34.517	-
Total Power+10.5dBi					52.07	45.017	-

Antenna Port	NR Modulation	LTE Modulation	NR Carrier Bandwidth (MHz)	LTE Carrier Bandwidth (MHz)	Output power / Peak-to-Average Ratio (PAR)		
					Channel position M		
					Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	QPSK	QPSK	15	5	36.17	27.818	-
B	QPSK	QPSK	15	5	36.43	28.226	-
C	QPSK	QPSK	15	5	36.33	27.516	-
D	QPSK	QPSK	15	5	36.28	28.187	-
Total					42.32	33.967	-
Total Power+10.5dBi					52.82	44.467	-

Antenna Port	NR Modulation	LTE Modulation	NR Carrier Bandwidth (MHz)	LTE Carrier Bandwidth (MHz)	Output power / Peak-to-Average Ratio (PAR)		
					Channel position M		
					Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	QPSK	QPSK	20	1.4	35.41	28.515	-
B	QPSK	QPSK	20	1.4	35.63	28.716	-
C	QPSK	QPSK	20	1.4	35.63	28.480	-
D	QPSK	QPSK	20	1.4	35.55	28.787	-
Total					41.58	34.647	-
Total Power+10.5dBi					52.08	45.147	-

Antenna Port	NR Modulation	LTE Modulation	NR Carrier Bandwidth (MHz)	LTE Carrier Bandwidth (MHz)	Output power / Peak-to-Average Ratio (PAR)		
					Channel position M		
					Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	QPSK	QPSK	20	5	36.12	27.622	-
B	QPSK	QPSK	20	5	36.38	28.045	-
C	QPSK	QPSK	20	5	36.31	27.931	-
D	QPSK	QPSK	20	5	36.27	28.067	-
Total					42.29	33.940	-
Total Power+10.5dBi					52.79	44.440	-

4 Occupied Bandwidth

Test result: Pass

4.1 Measurement Procedure

The EUT was set to transmit at maximum power and testing was carried out on bottom, middle and top channels. Using the Occupied Bandwidth measurement function in the spectrum analyzer, the 26dB bandwidth was measured in accordance with FCC KDB 971168 D01 Clause 4.2.

The measurement method is from KDB 971168 4.2:

- a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (i.e., two to five times the OBW).
- b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
- c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least $10\log(\text{OBW} / \text{RBW})$ below the reference level.
- d) Set the detection mode to peak, and the trace mode to max hold.
- e) Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

4.2 Measurement result

Configuration NR-MIMO-1C

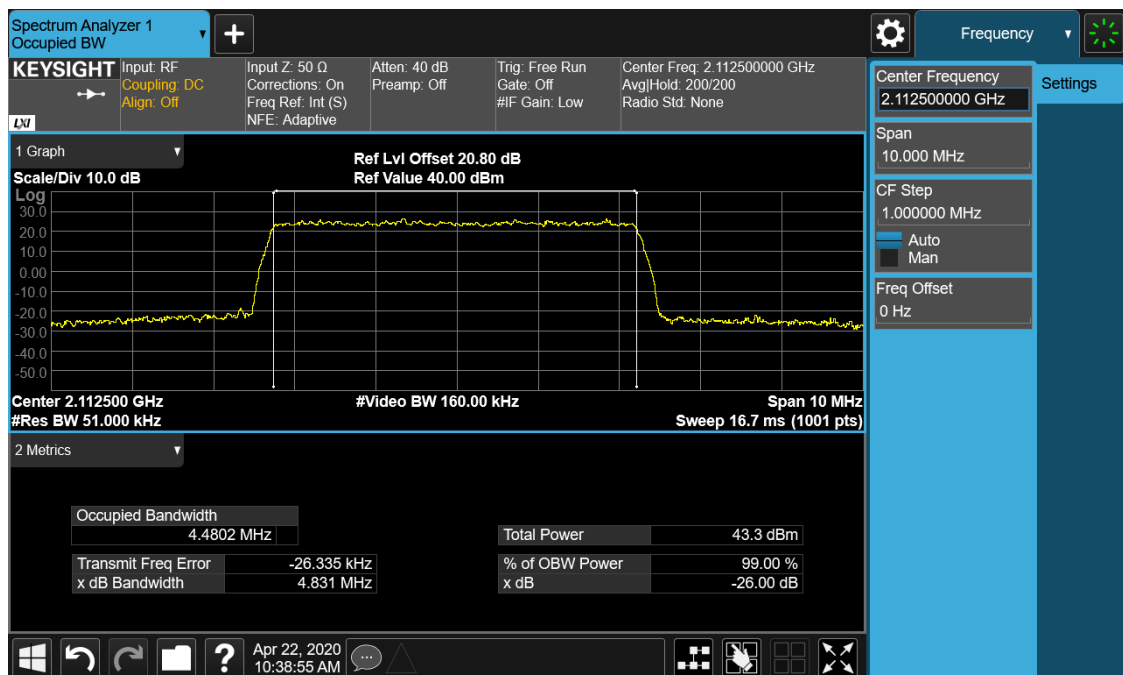
99% Occupied Bandwidth

Antenna Port	Modulation	Bandwidth	Occupied Bandwidth (MHz)		
			Channel Position B	Channel Position M	Channel Position T
A	QPSK	5MHz	4.4802	4.4765	4.4756
A	QPSK	10MHz	9.2649	9.2740	9.2730
A	QPSK	15MHz	14.068	14.074	14.068
A	QPSK	20MHz	18.895	18.906	18.861

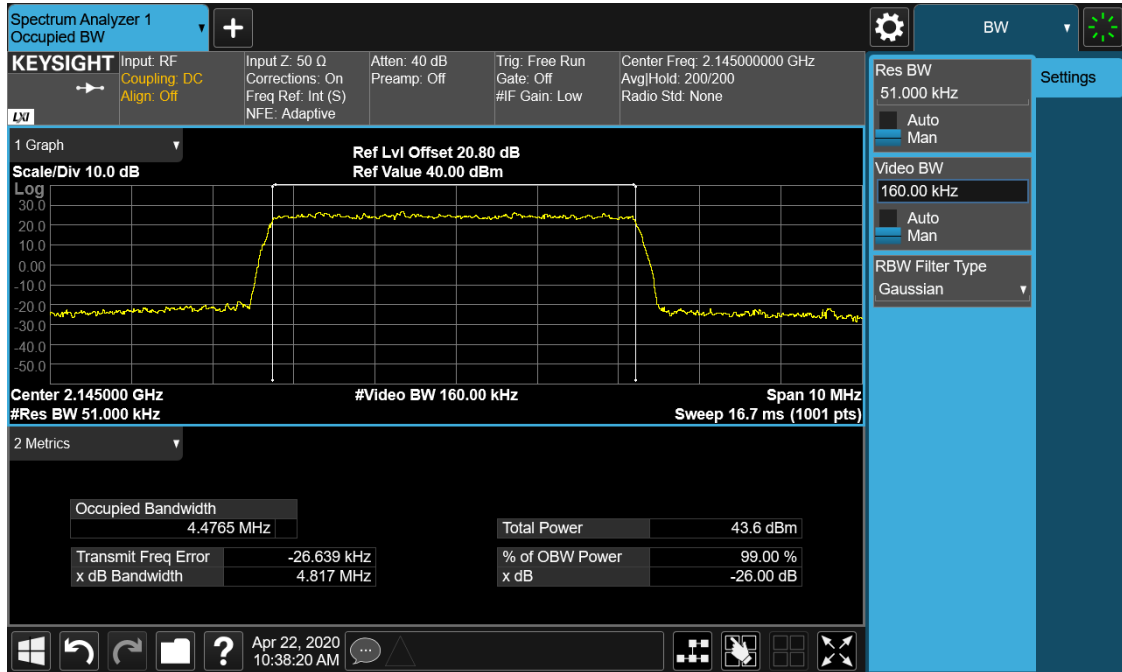
-26dBc Occupied Bandwidth

Antenna Port	Modulation	Bandwidth	Occupied Bandwidth (MHz)		
			Channel Position B	Channel Position M	Channel Position T
A	QPSK	5MHz	4.831	4.817	4.820
A	QPSK	10MHz	9.802	9.806	9.776
A	QPSK	15MHz	14.69	14.70	14.68
A	QPSK	20MHz	19.77	19.74	19.70

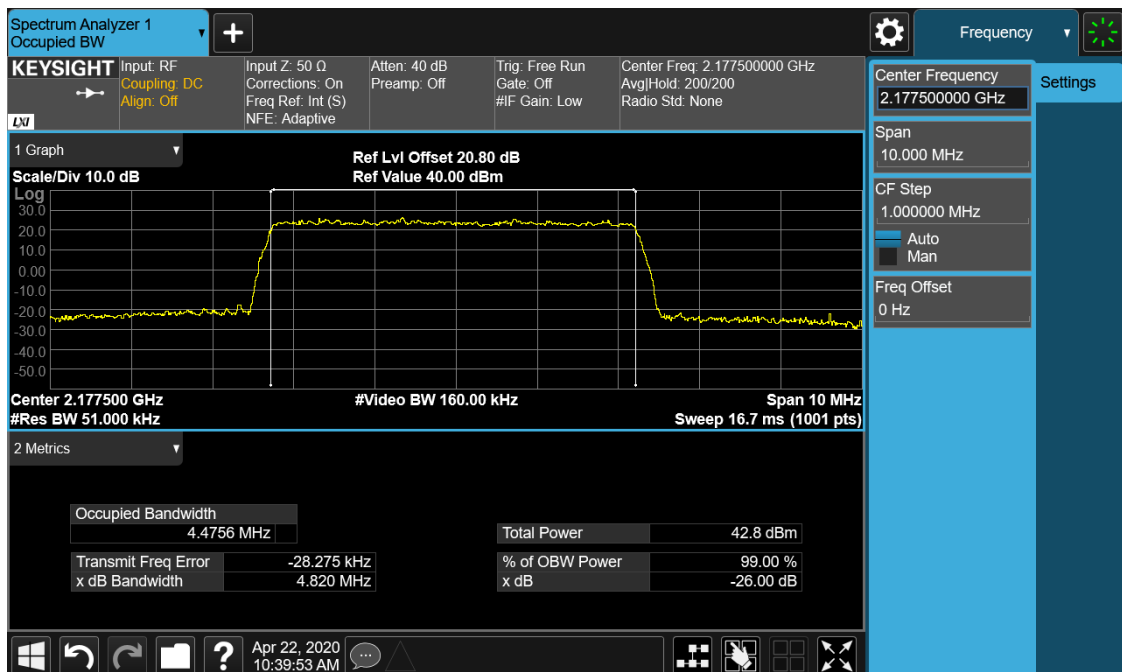
QPSK, 5MHz, Channel position B



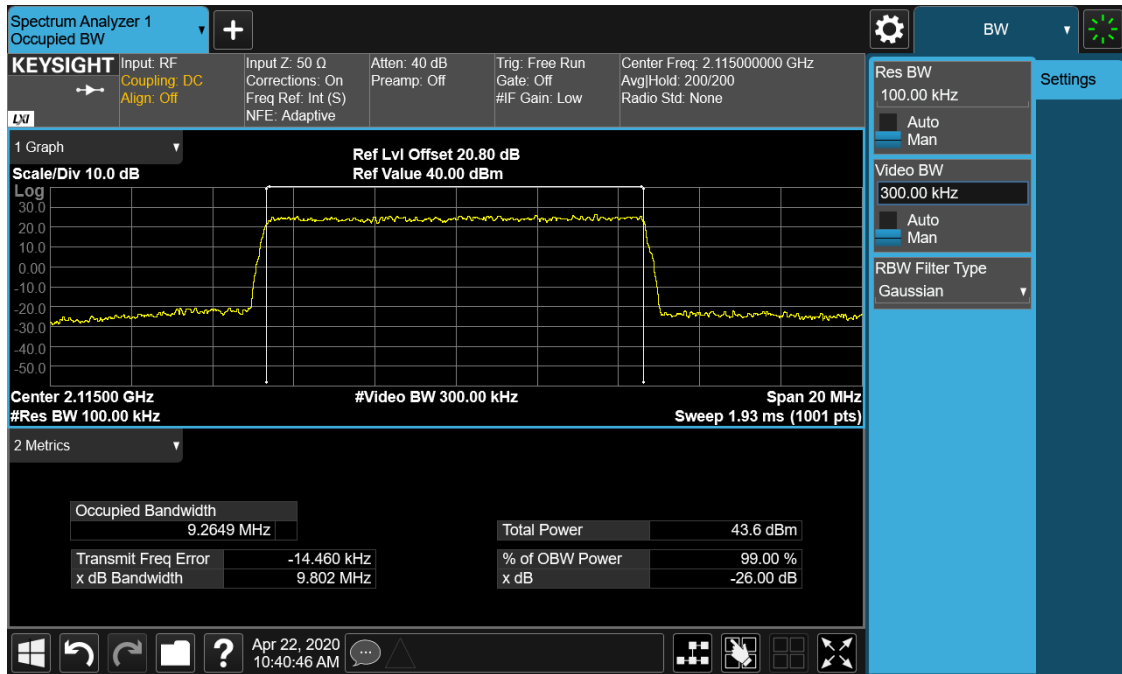
QPSK, 5MHz, Channel position M



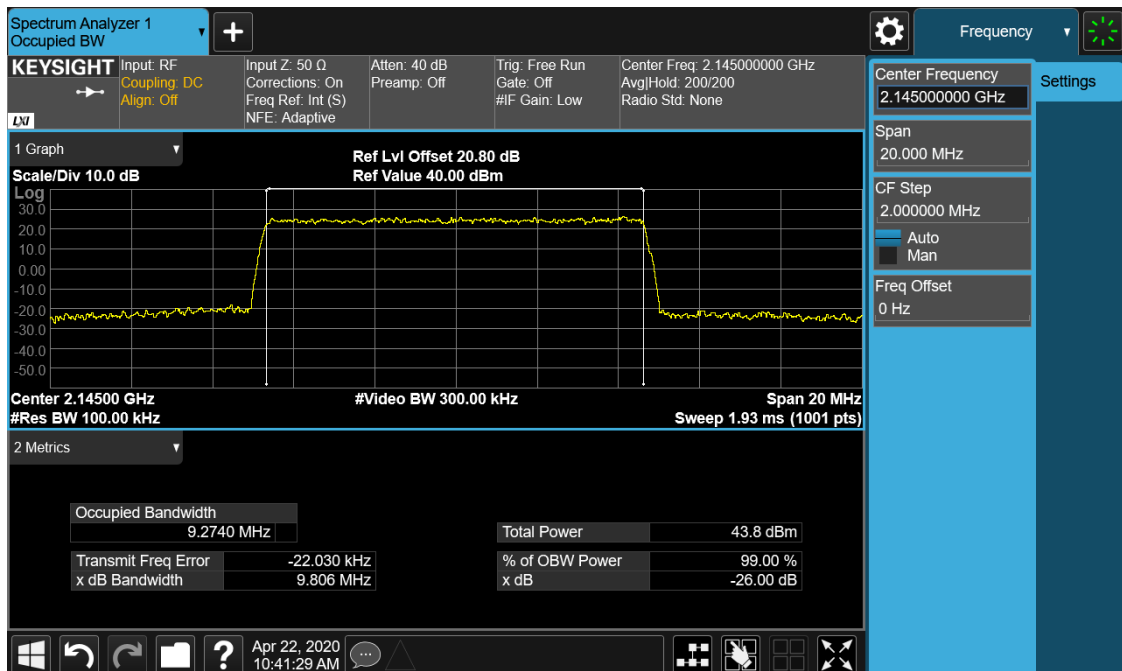
QPSK, 5MHz, Channel position T



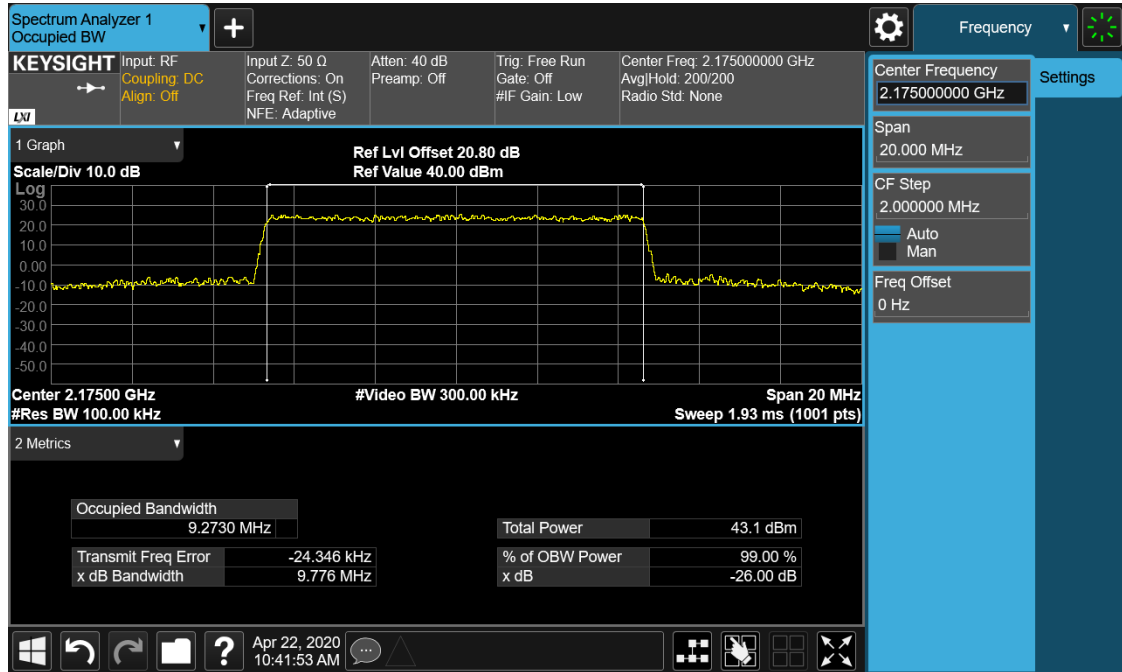
QPSK, 10MHz, Channel position B



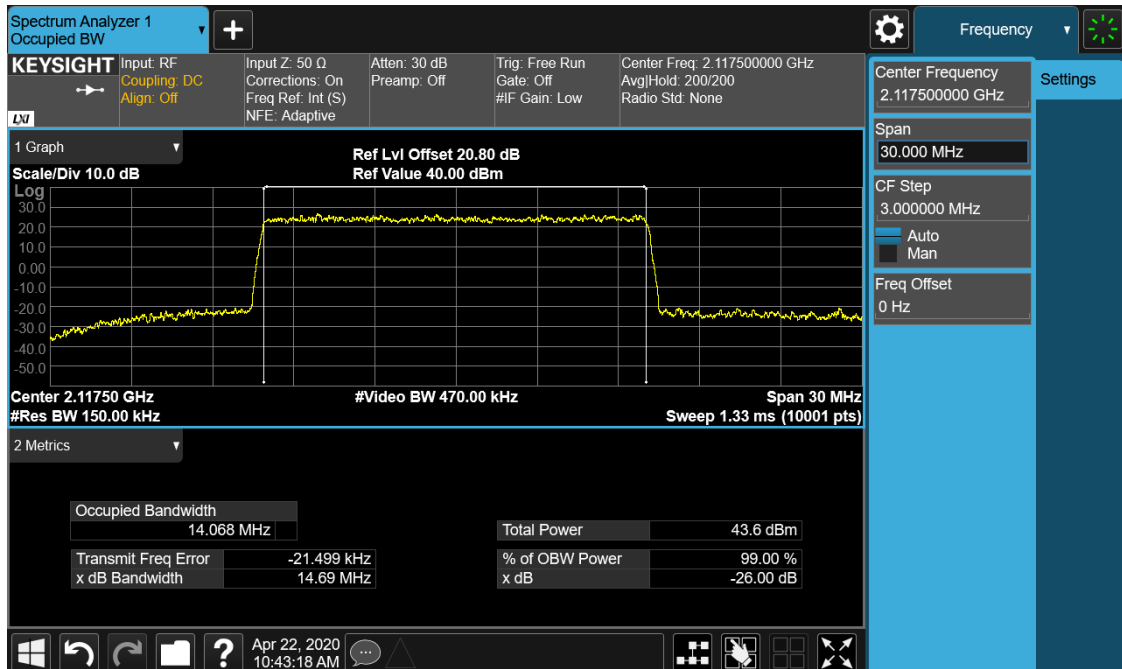
QPSK, 10MHz, Channel position M



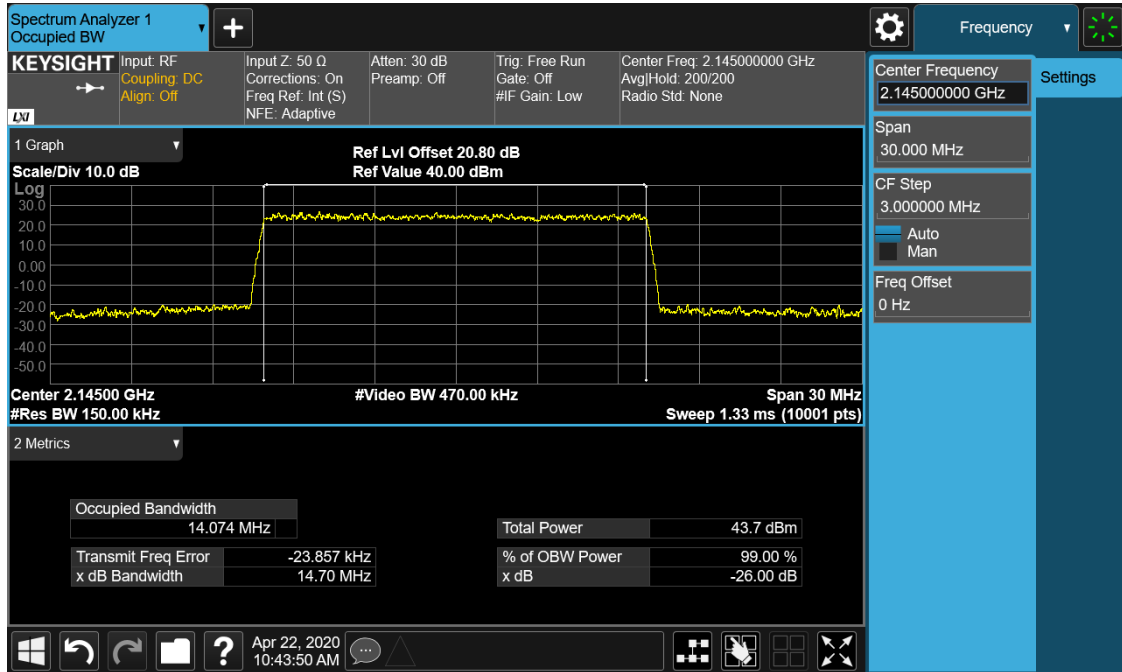
QPSK, 10MHz, Channel position T



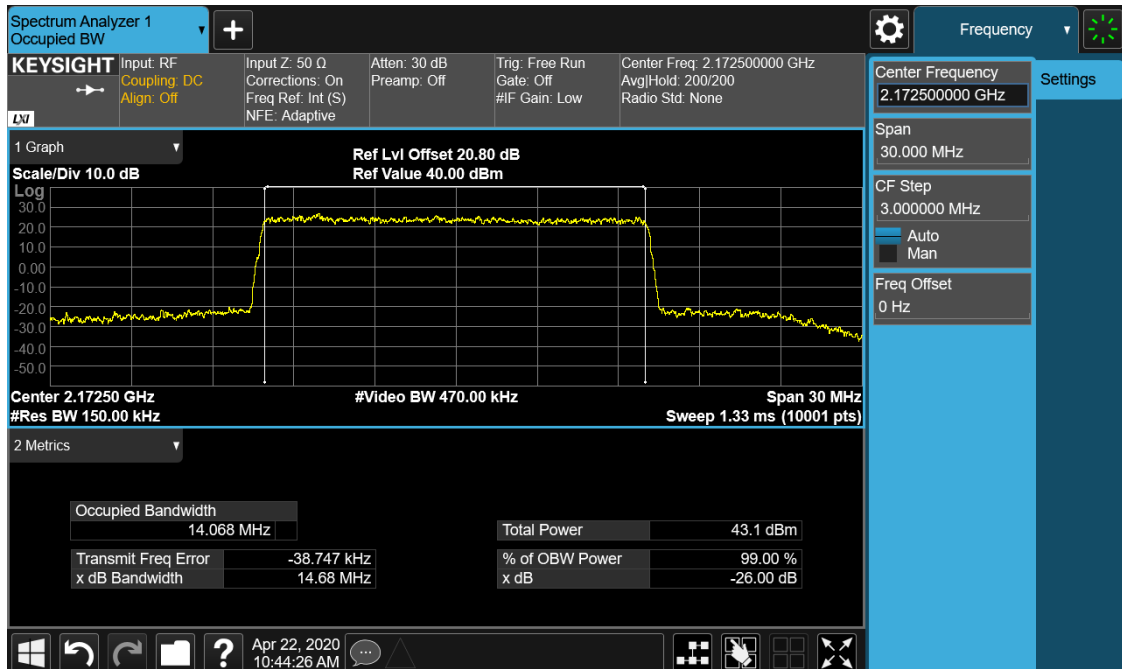
QPSK, 15MHz, Channel position B



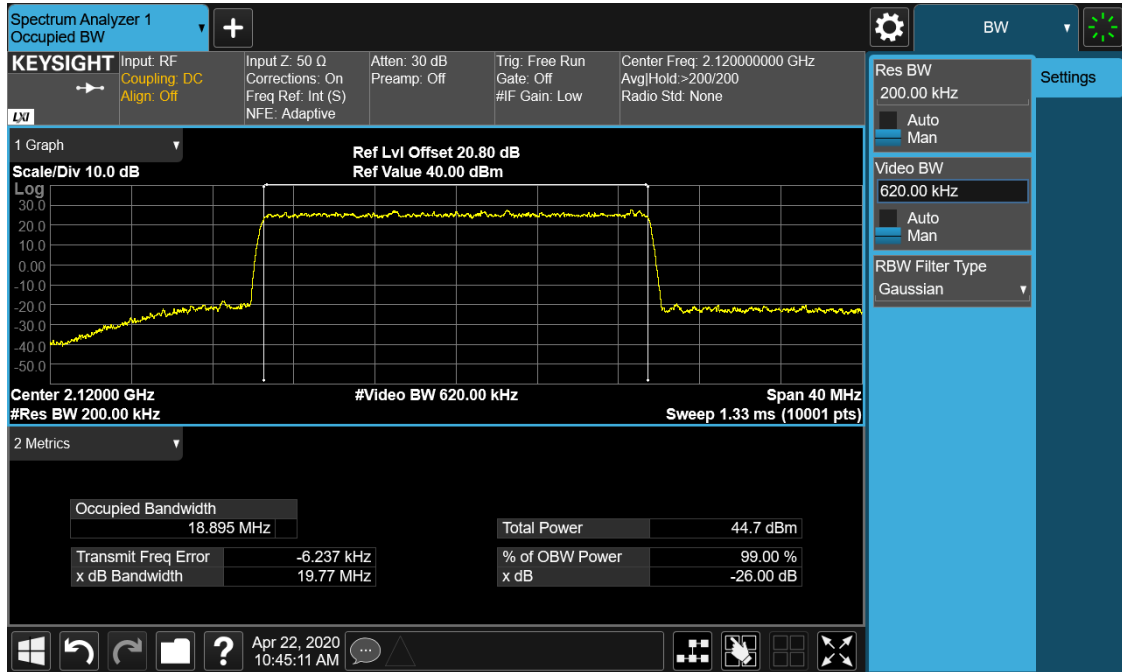
QPSK, 15MHz, Channel position M



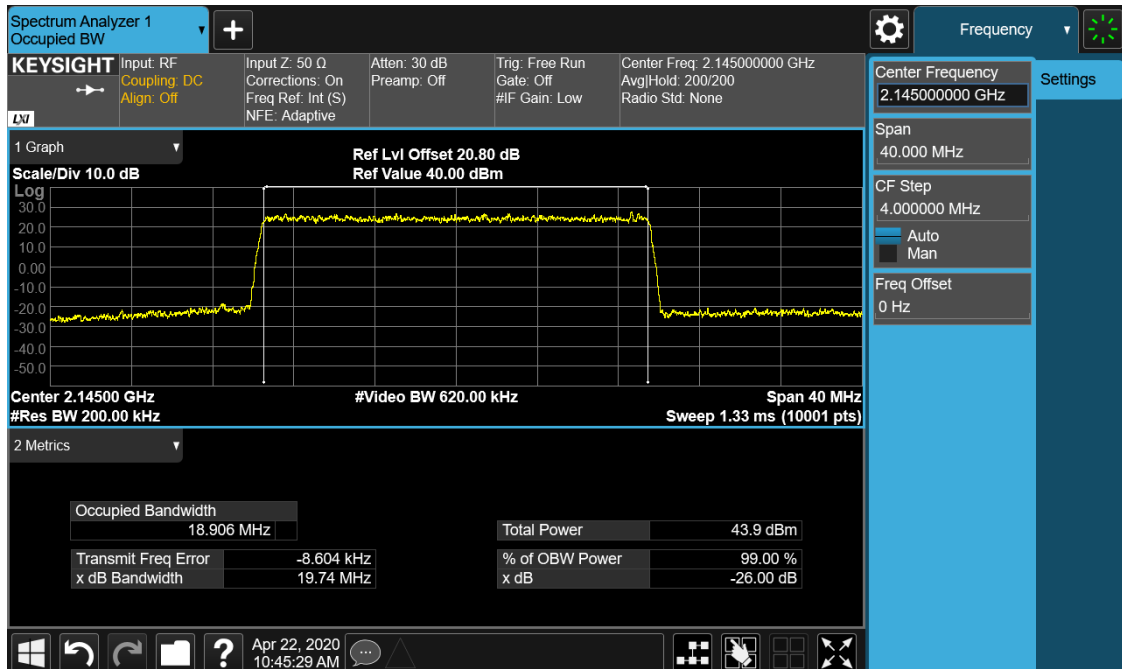
QPSK, 15MHz, Channel position T



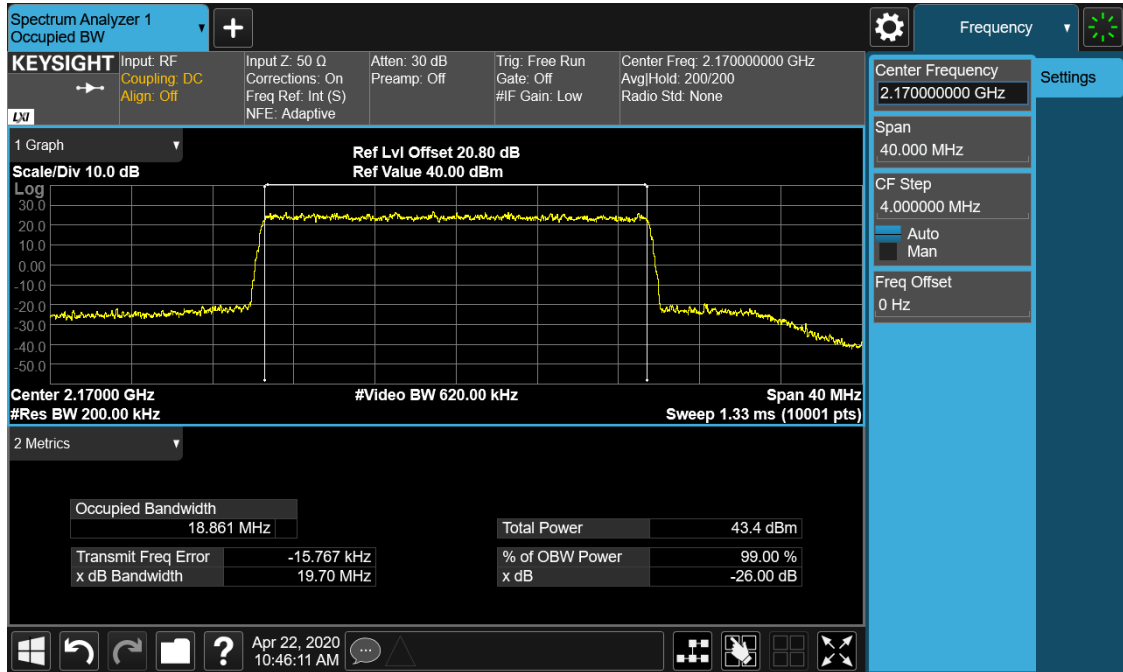
QPSK, 20MHz, Channel position B



QPSK, 20MHz, Channel position M



QPSK, 20MHz, Channel position T



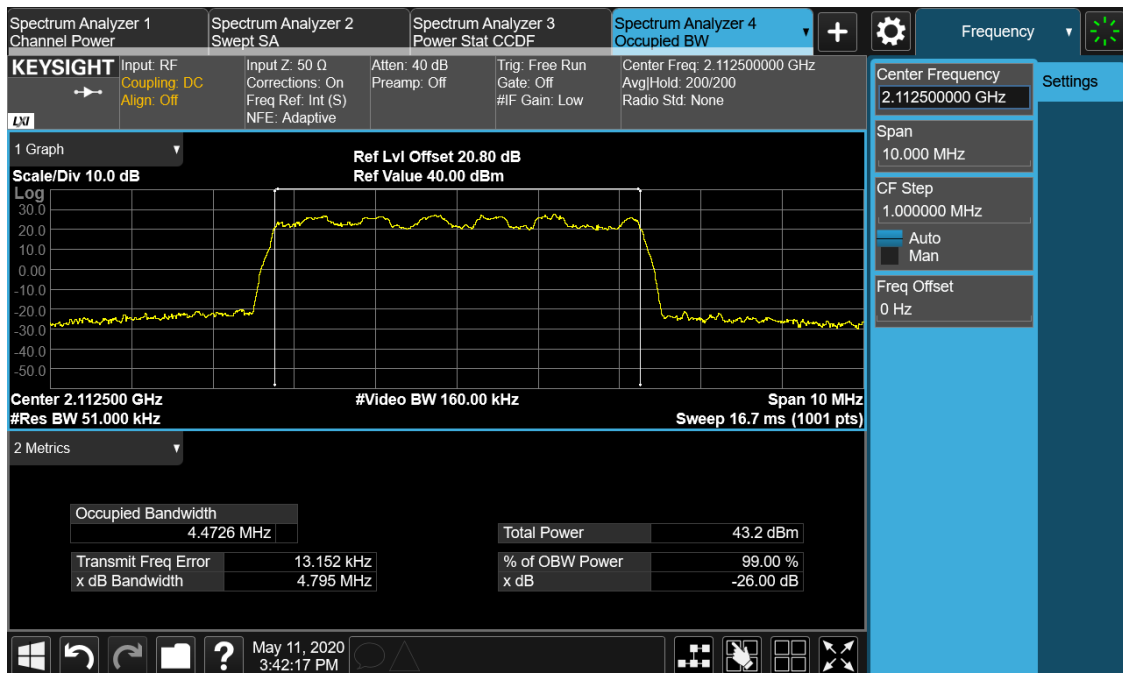
99% Occupied Bandwidth

Antenna Port	Modulation	Bandwidth	Occupied Bandwidth (MHz)		
			Channel Position B	Channel Position M	Channel Position T
A	16QAM	5MHz	4.4726	4.4776	4.4776
A	16QAM	10MHz	9.2023	9.2023	9.2111
A	16QAM	15MHz	14.060	14.094	14.099
A	16QAM	20MHz	18.945	18.918	18.887

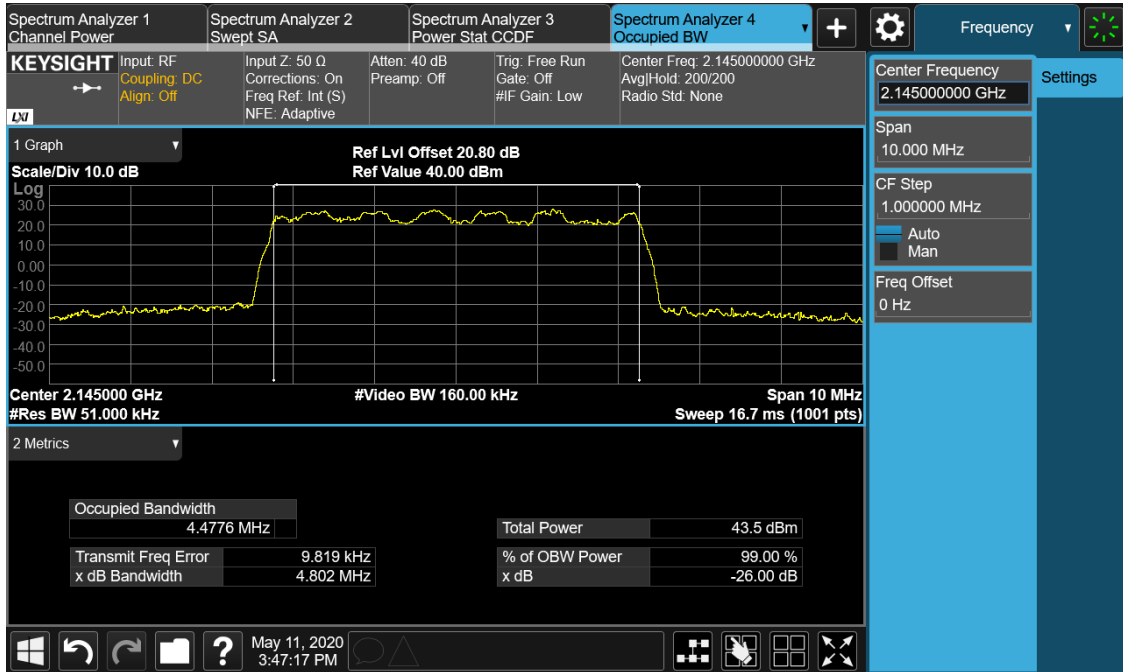
-26dBc Occupied Bandwidth

Antenna Port	Modulation	Bandwidth	Occupied Bandwidth (MHz)		
			Channel Position B	Channel Position M	Channel Position T
A	16QAM	5MHz	4.795	4.802	4.800
A	16QAM	10MHz	9.706	9.731	9.700
A	16QAM	15MHz	14.63	14.75	14.67
A	16QAM	20MHz	19.74	19.58	19.71

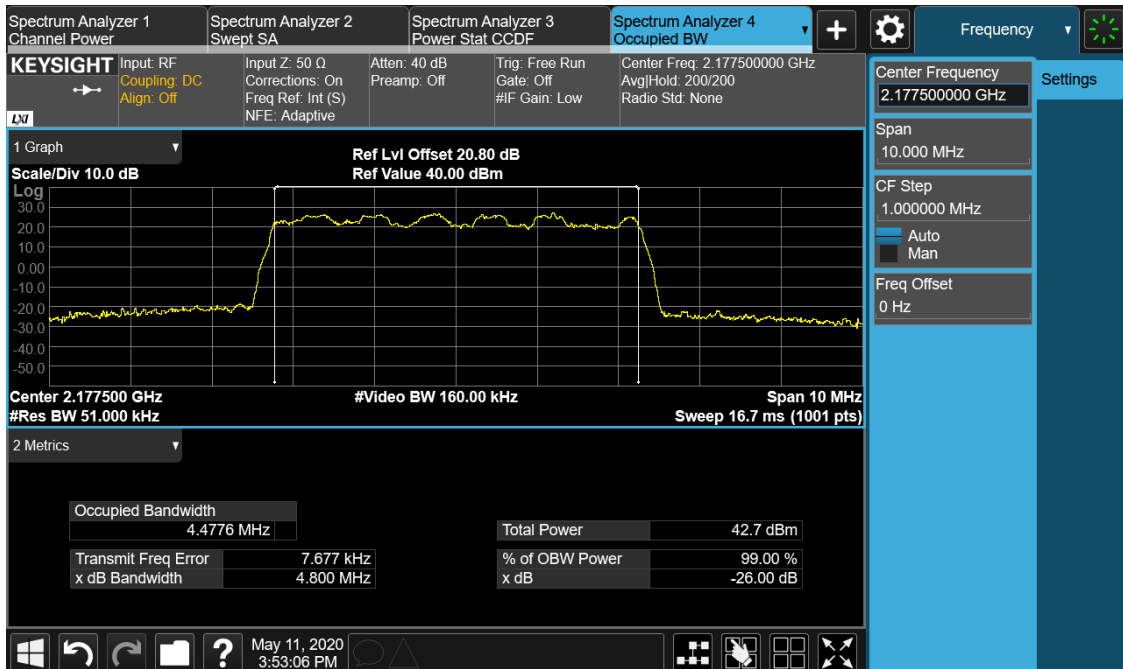
16QAM, 5MHz, Channel position B



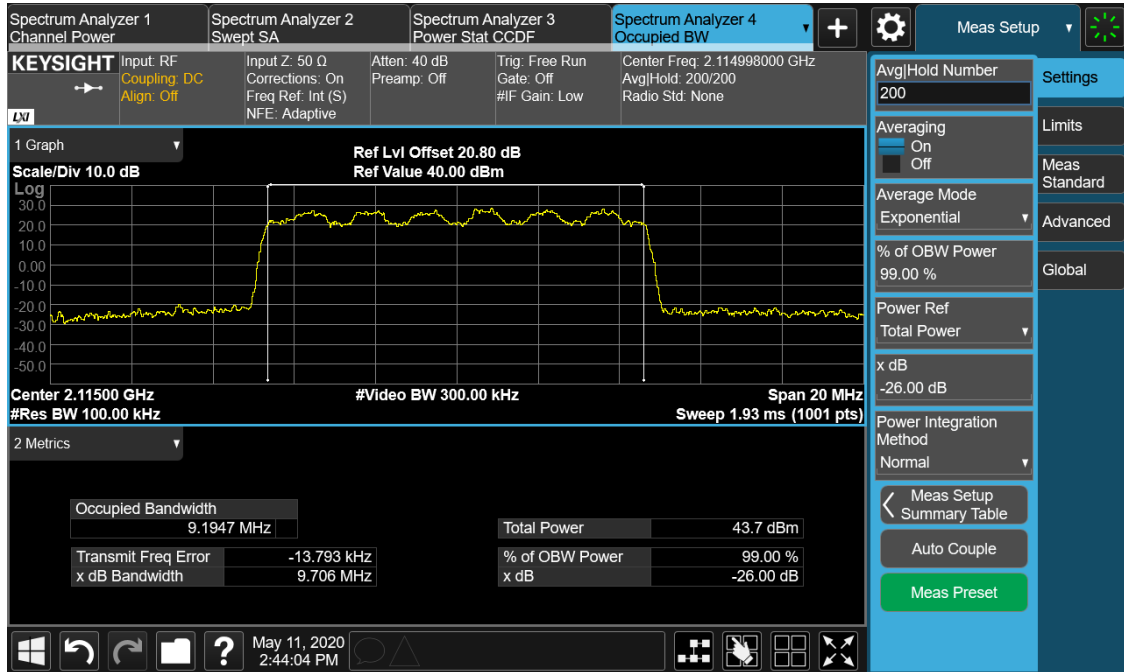
16QAM, 5MHz, Channel position M



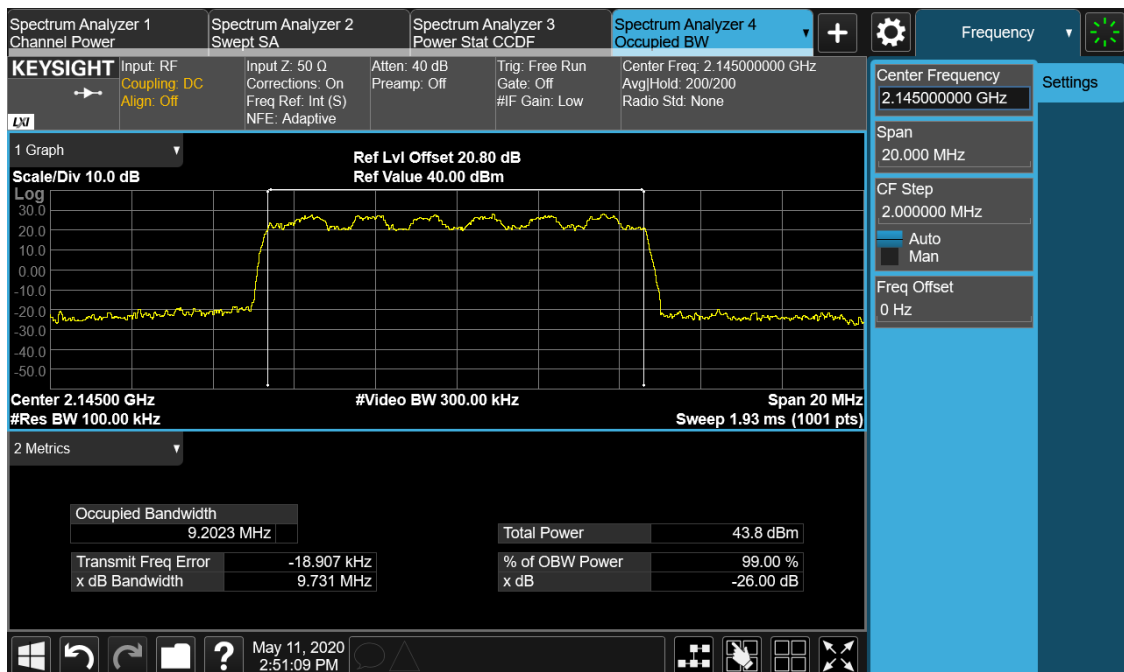
16QAM, 5MHz, Channel position T



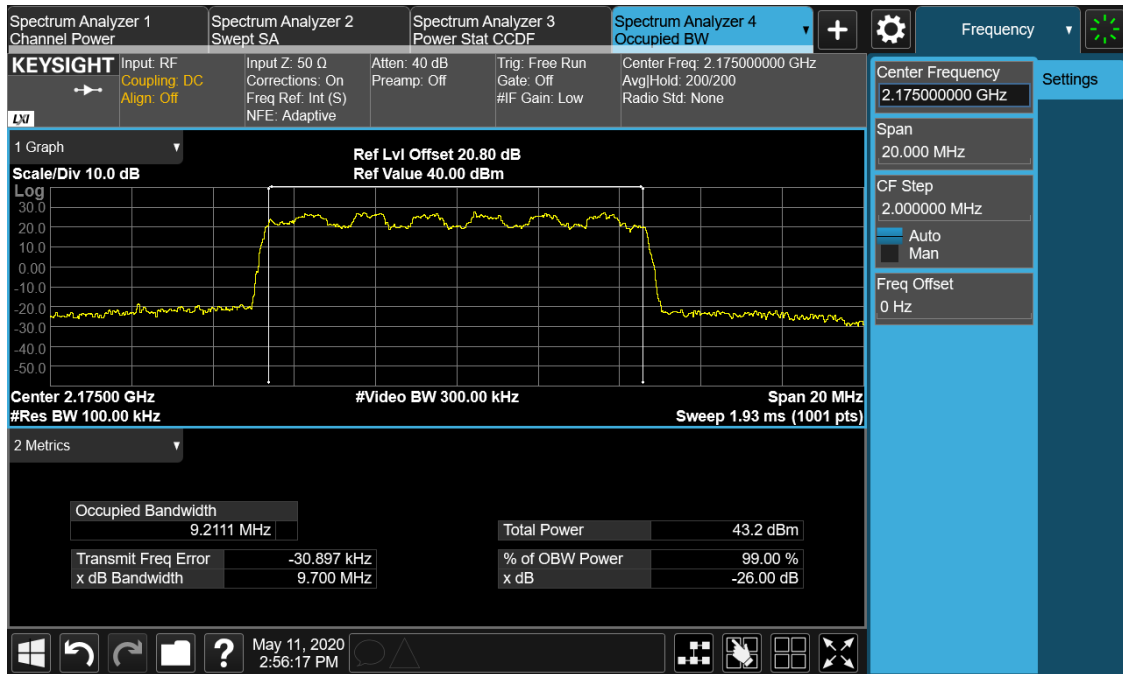
16QAM, 10MHz, Channel position B



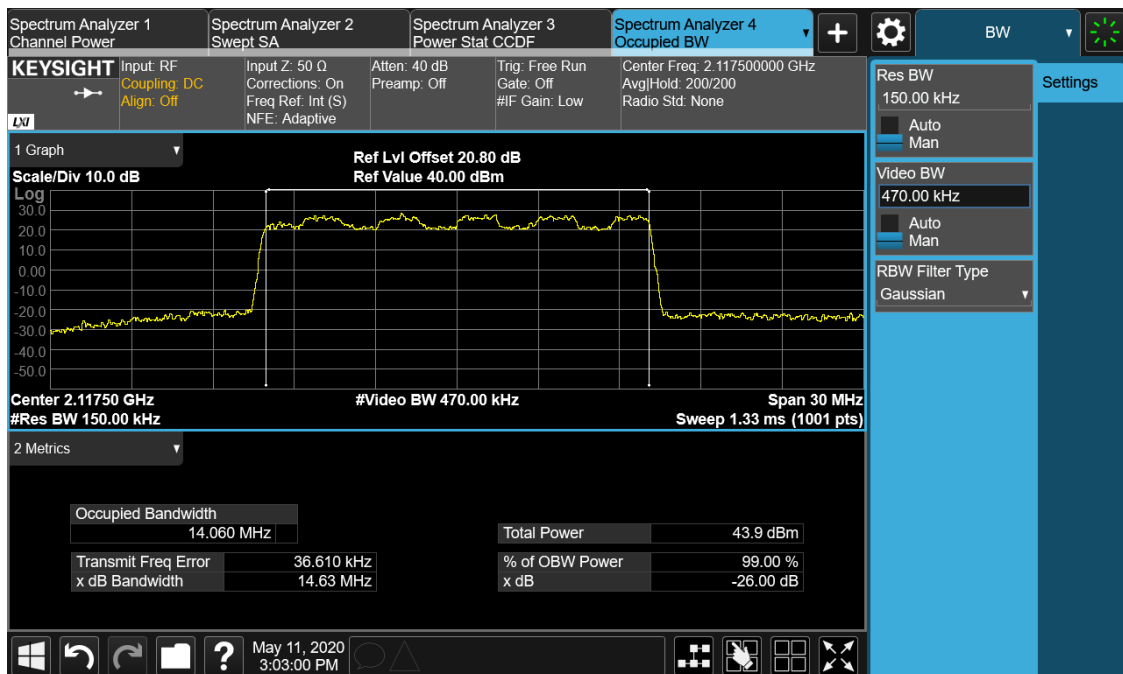
16QAM, 10MHz, Channel position M



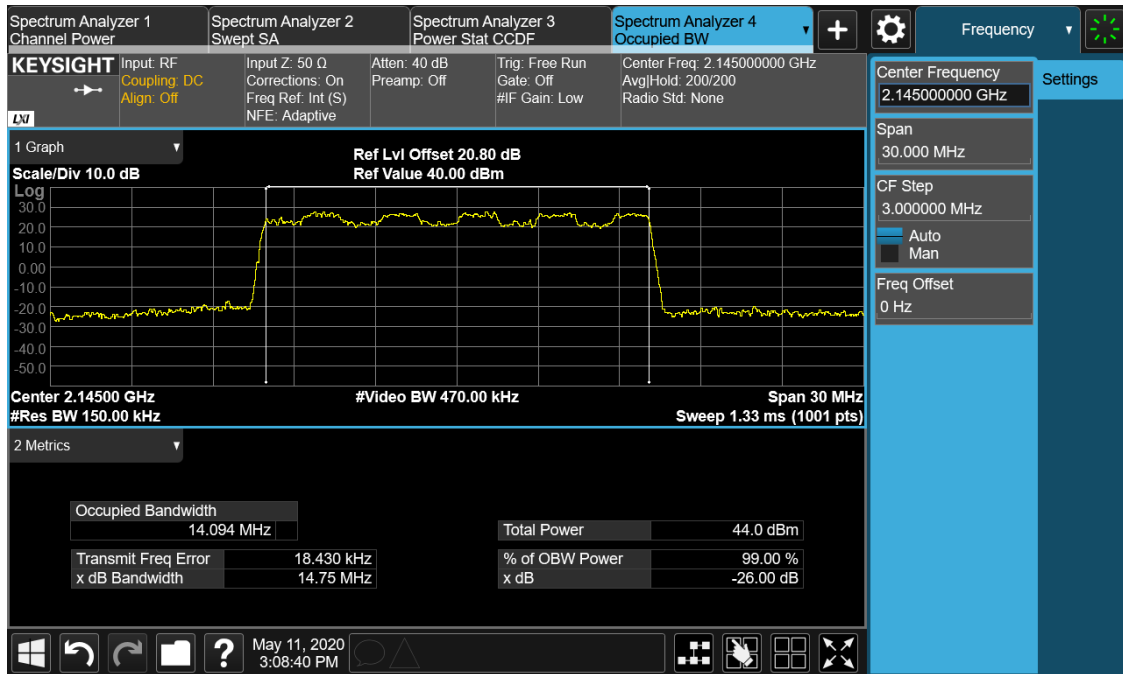
16QAM, 10MHz, Channel position T



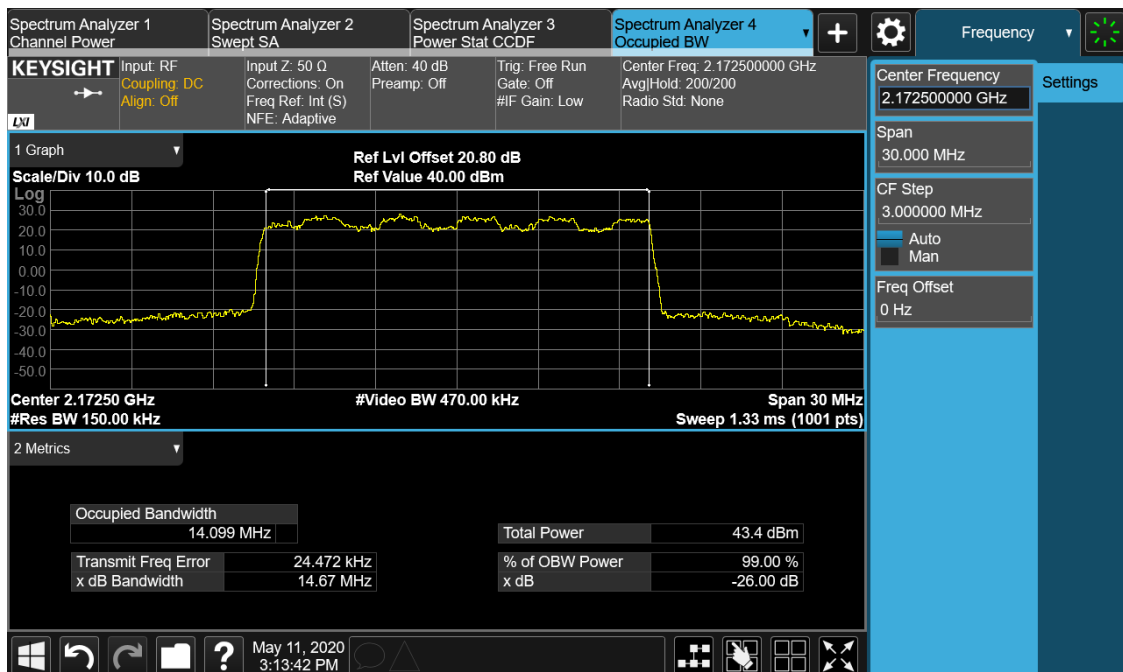
16QAM, 15MHz, Channel position B



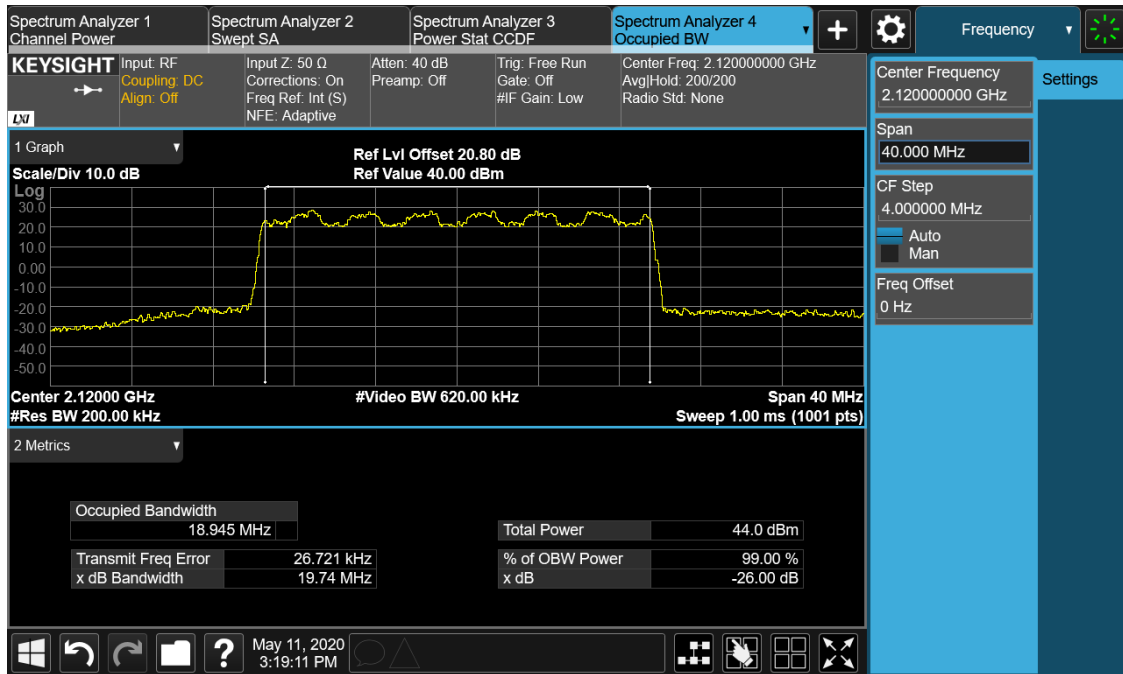
16QAM, 15MHz, Channel position M



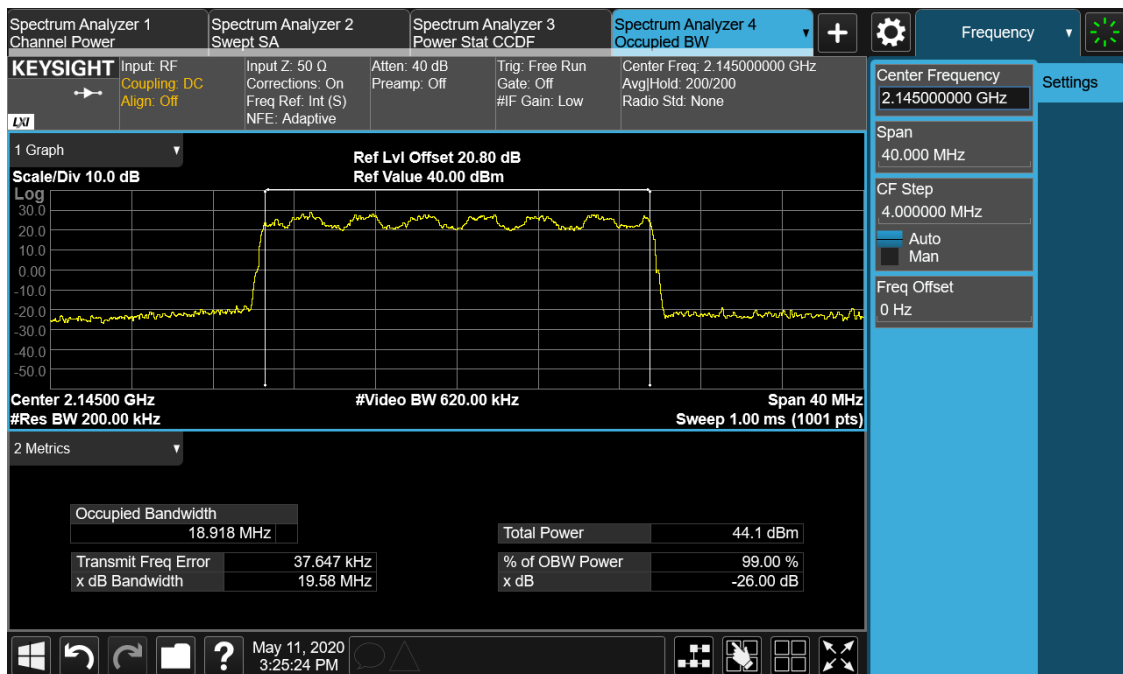
16QAM, 15MHz, Channel position T



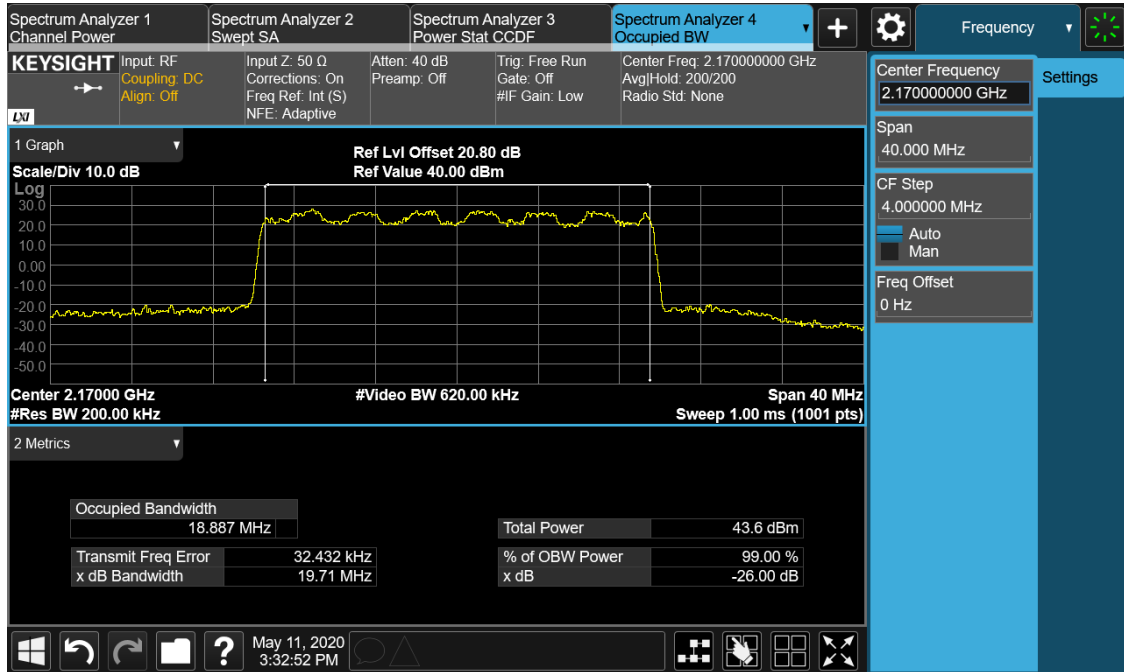
16QAM, 20MHz, Channel position B



16QAM, 20MHz, Channel position M



16QAM, 20MHz, Channel position T



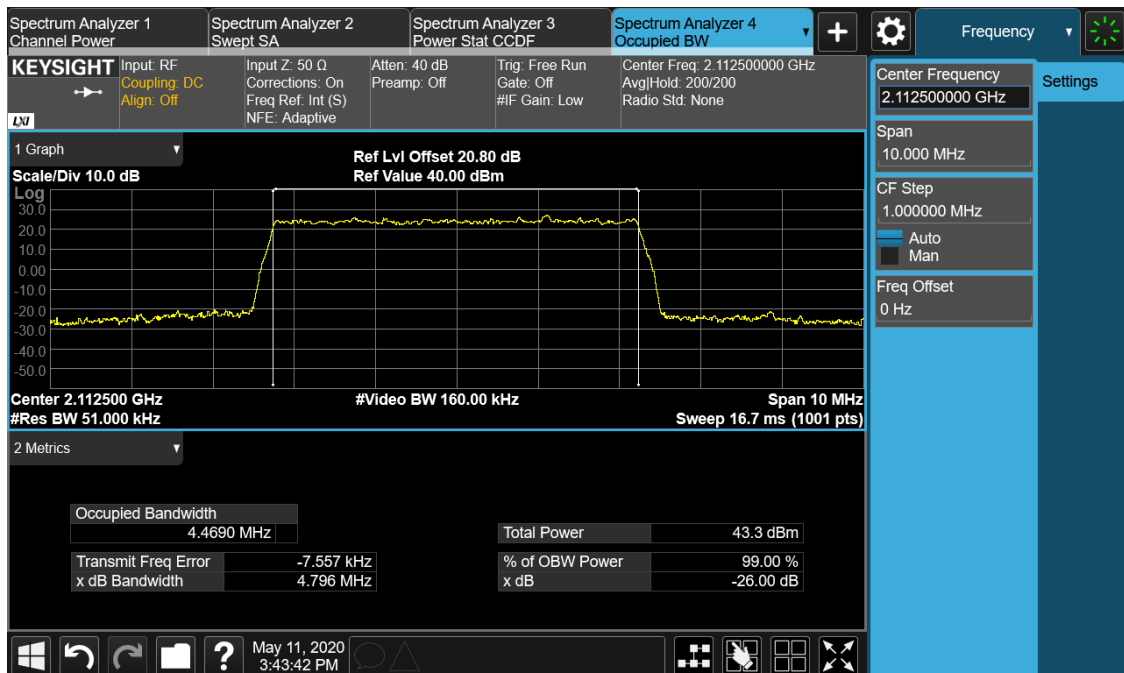
99% Occupied Bandwidth

Antenna Port	Modulation	Bandwidth	Occupied Bandwidth (MHz)		
			Channel Position B	Channel Position M	Channel Position T
A	64QAM	5MHz	4.4690	4.4730	4.4690
A	64QAM	10MHz	9.3069	9.2928	9.2972
A	64QAM	15MHz	14.104	14.107	14.128
A	64QAM	20MHz	18.917	18.893	18.919

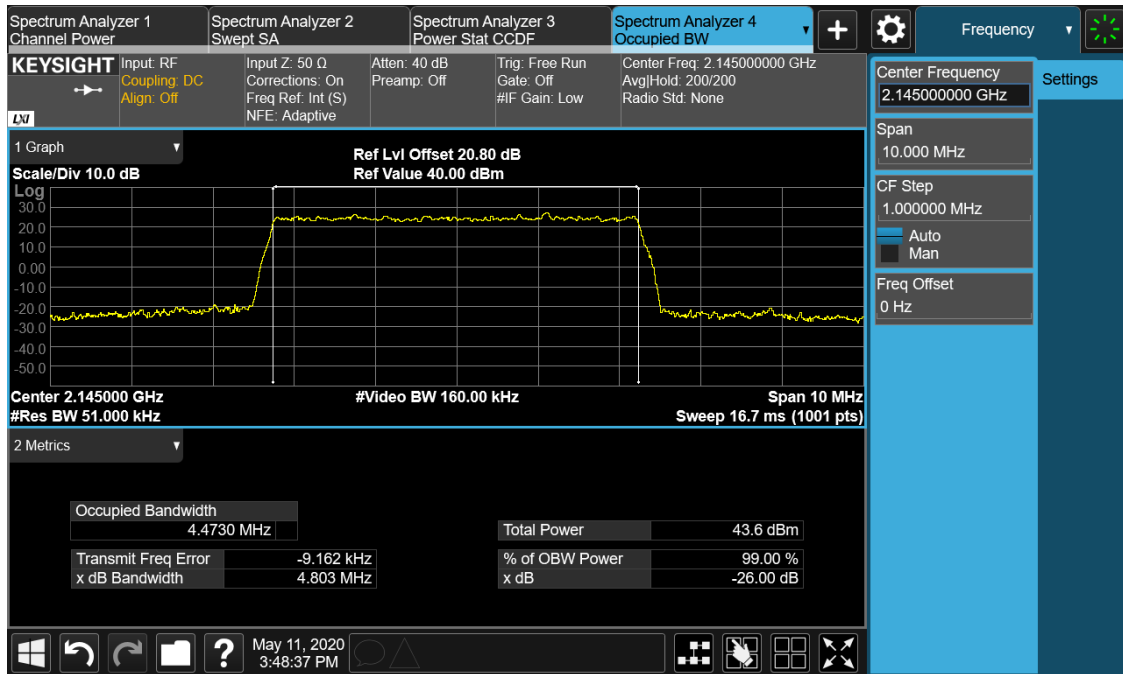
-26dBc Occupied Bandwidth

Antenna Port	Modulation	Bandwidth	Occupied Bandwidth (MHz)		
			Channel Position B	Channel Position M	Channel Position T
A	64QAM	5MHz	4.769	4.803	4.804
A	64QAM	10MHz	9.769	9.751	9.753
A	64QAM	15MHz	14.77	14.71	14.74
A	64QAM	20MHz	19.74	19.74	19.72

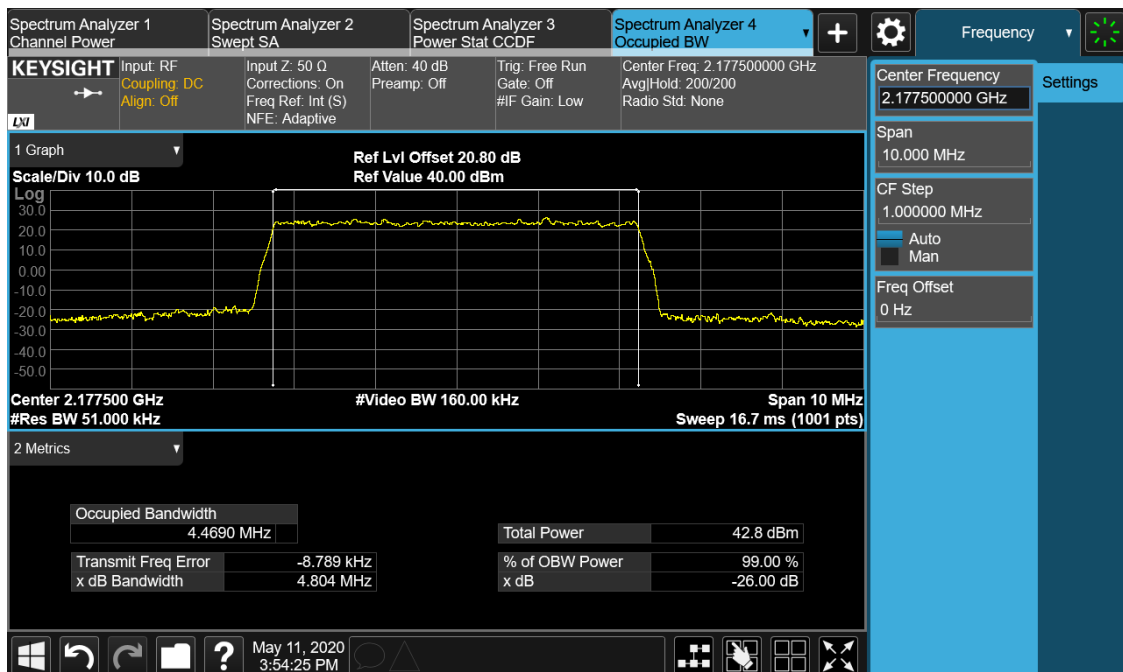
64QAM, 5MHz, Channel position B



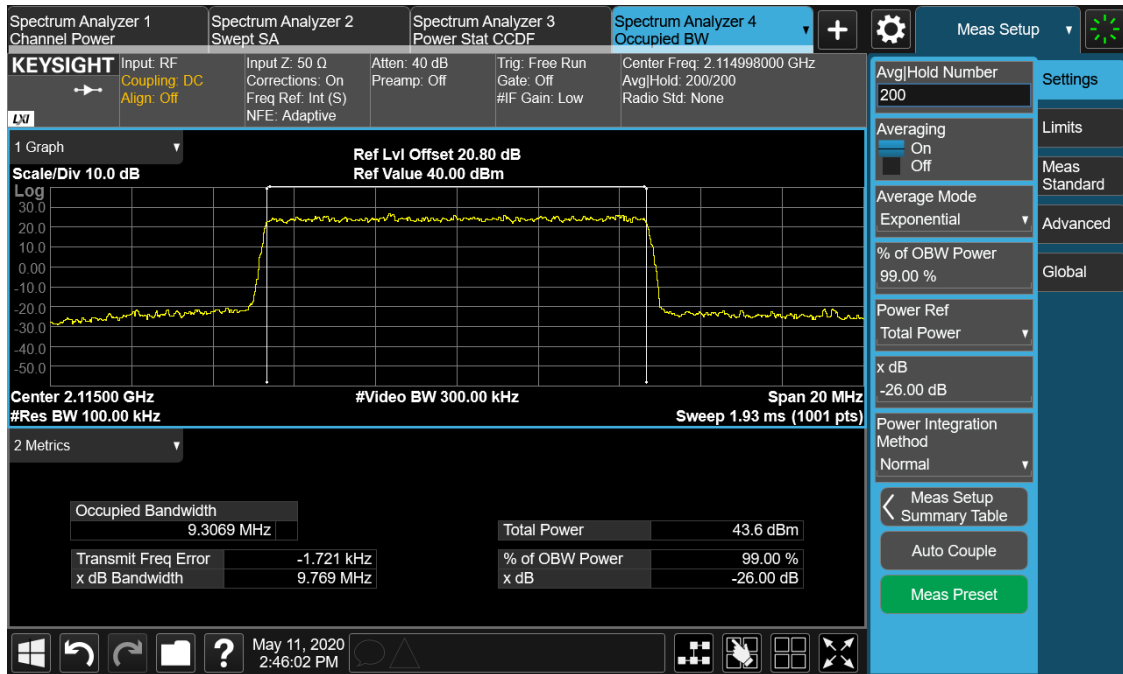
64QAM, 5MHz, Channel position M



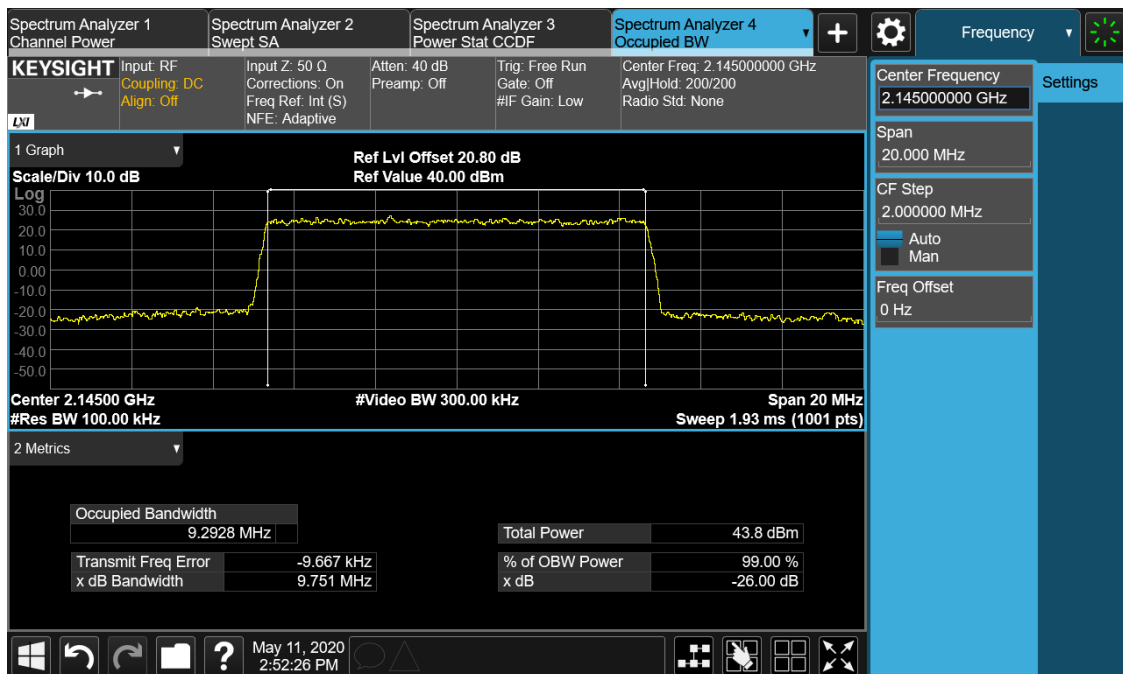
64QAM, 5MHz, Channel position T



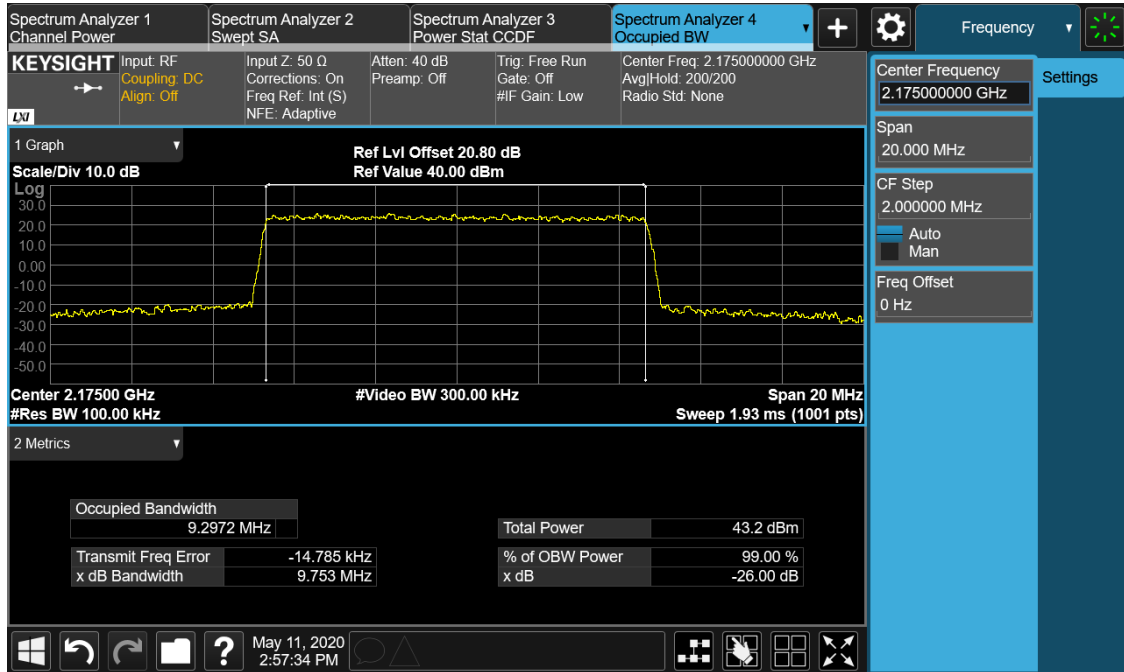
64QAM, 10MHz, Channel position B



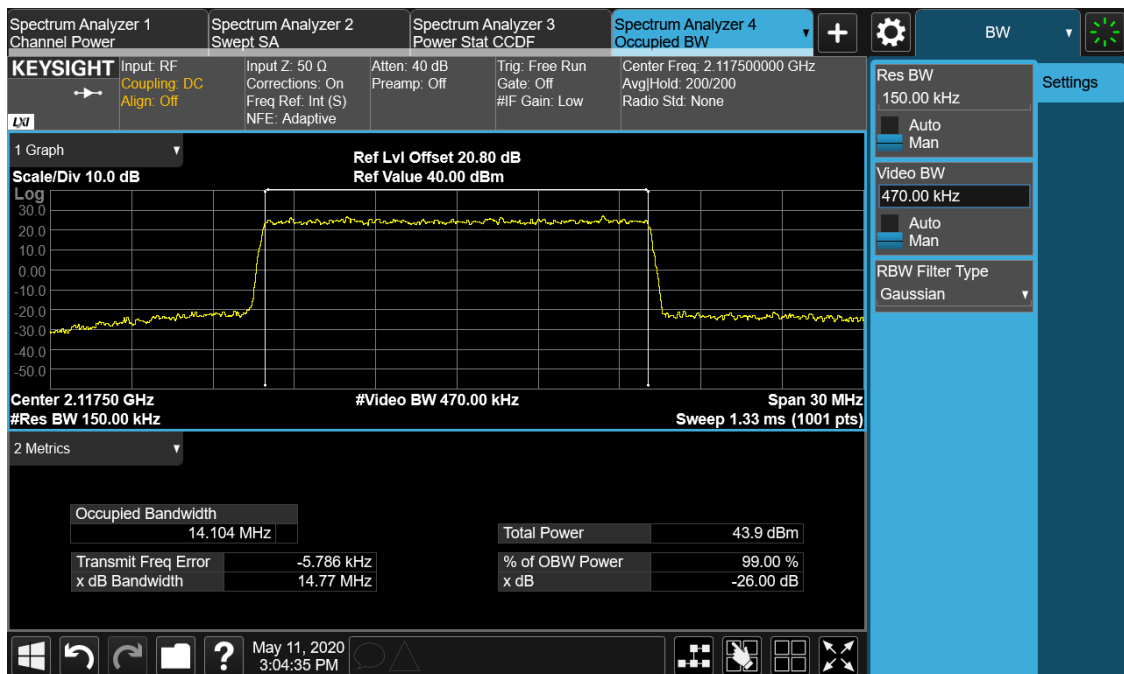
64QAM, 10MHz, Channel position M



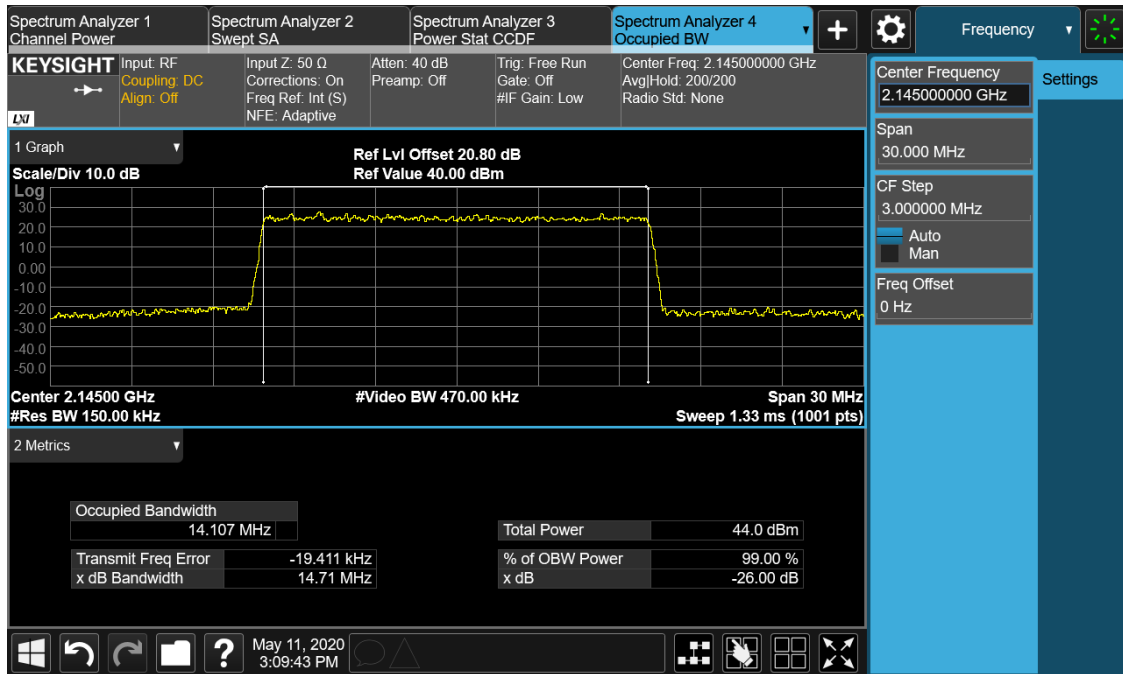
64QAM, 10MHz, Channel position T



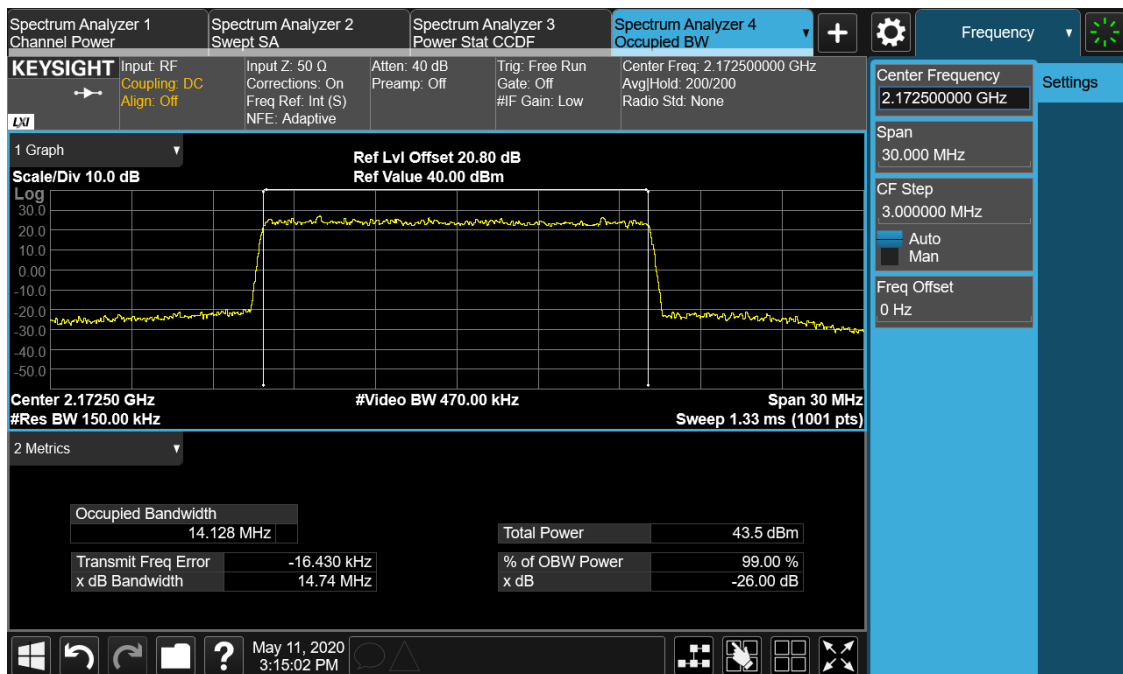
64QAM, 15MHz, Channel position B



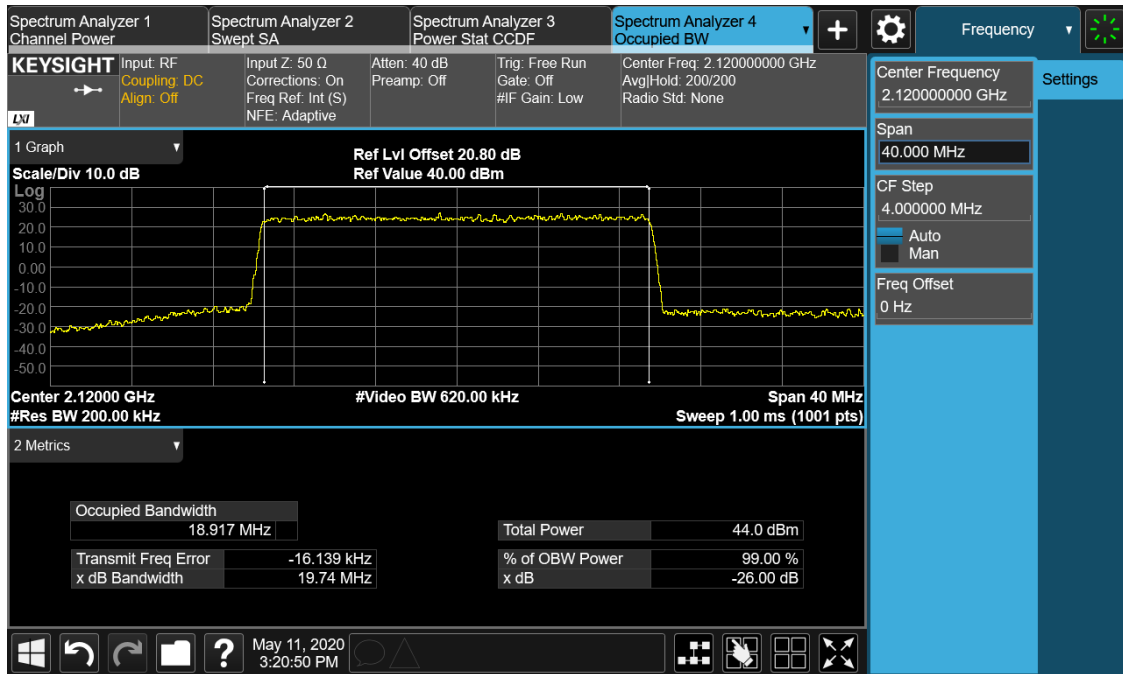
64QAM, 15MHz, Channel position M



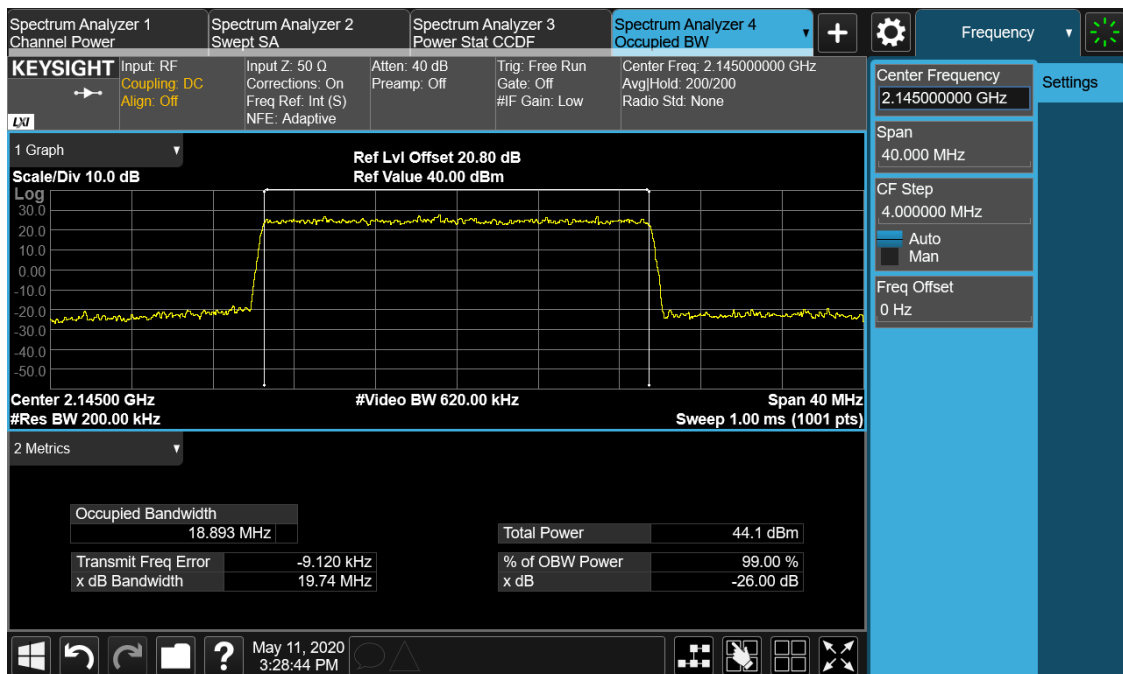
64QAM, 15MHz, Channel position T



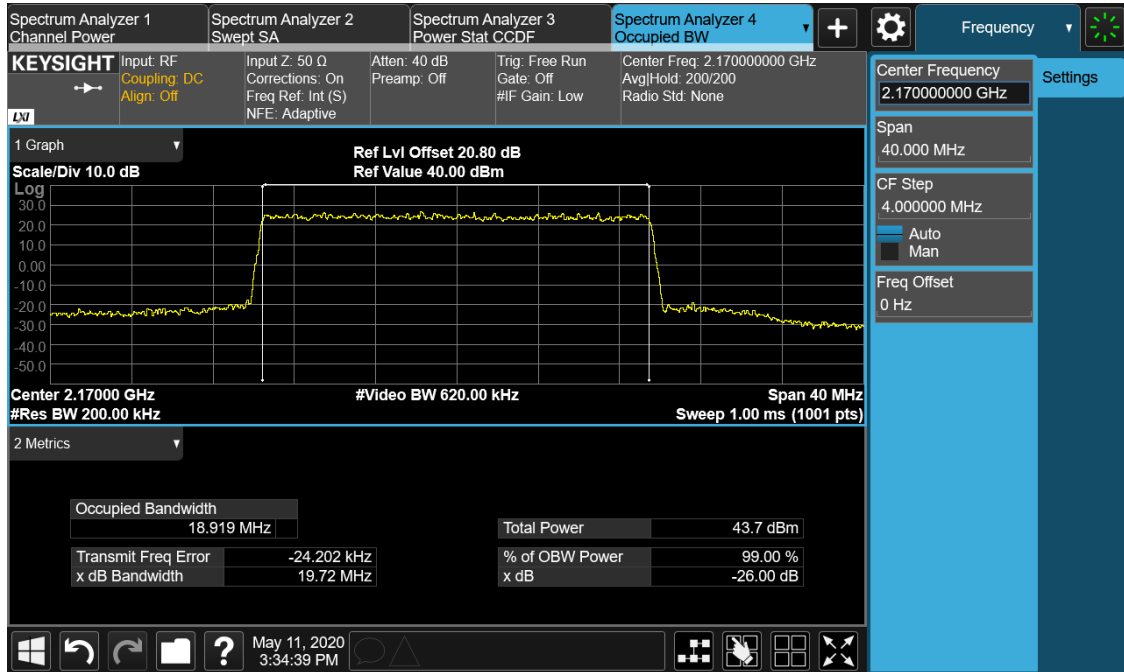
64QAM, 20MHz, Channel position B



64QAM, 20MHz, Channel position M



64QAM, 20MHz, Channel position T



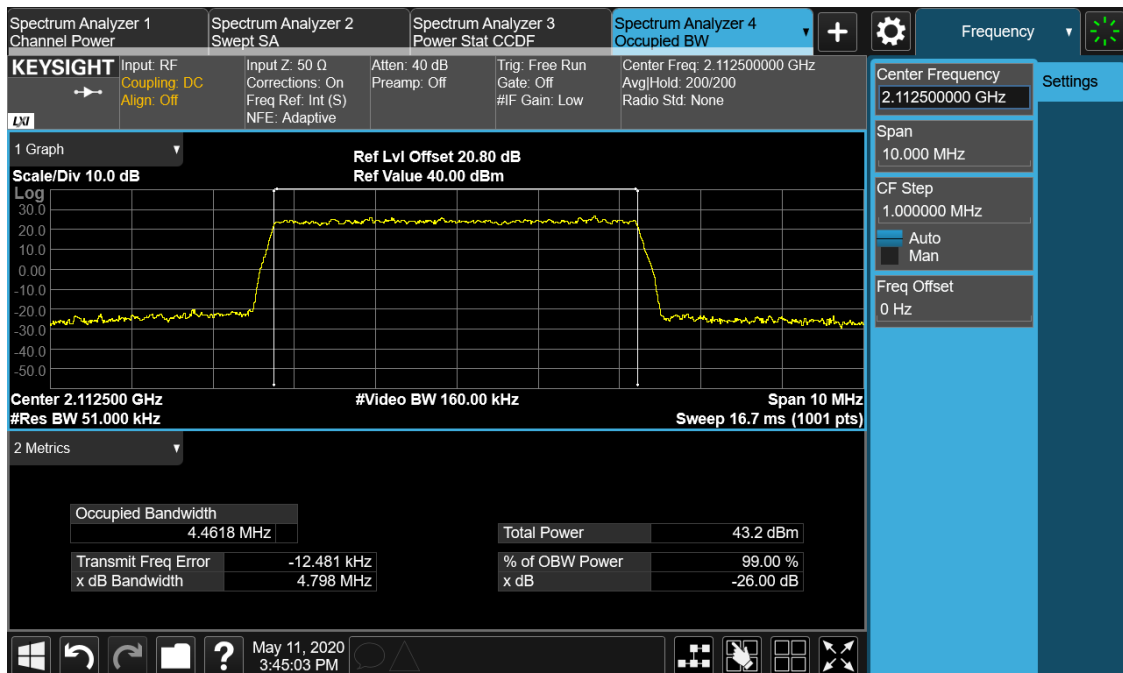
99% Occupied Bandwidth

Antenna Port	Modulation	Bandwidth	Occupied Bandwidth (MHz)		
			Channel Position B	Channel Position M	Channel Position T
A	256QAM	5MHz	4.4618	4.4627	4.4623
A	256QAM	10MHz	9.2815	9.2878	9.2749
A	256QAM	15MHz	14.113	14.098	14.085
A	256QAM	20MHz	18.903	18.920	18.897

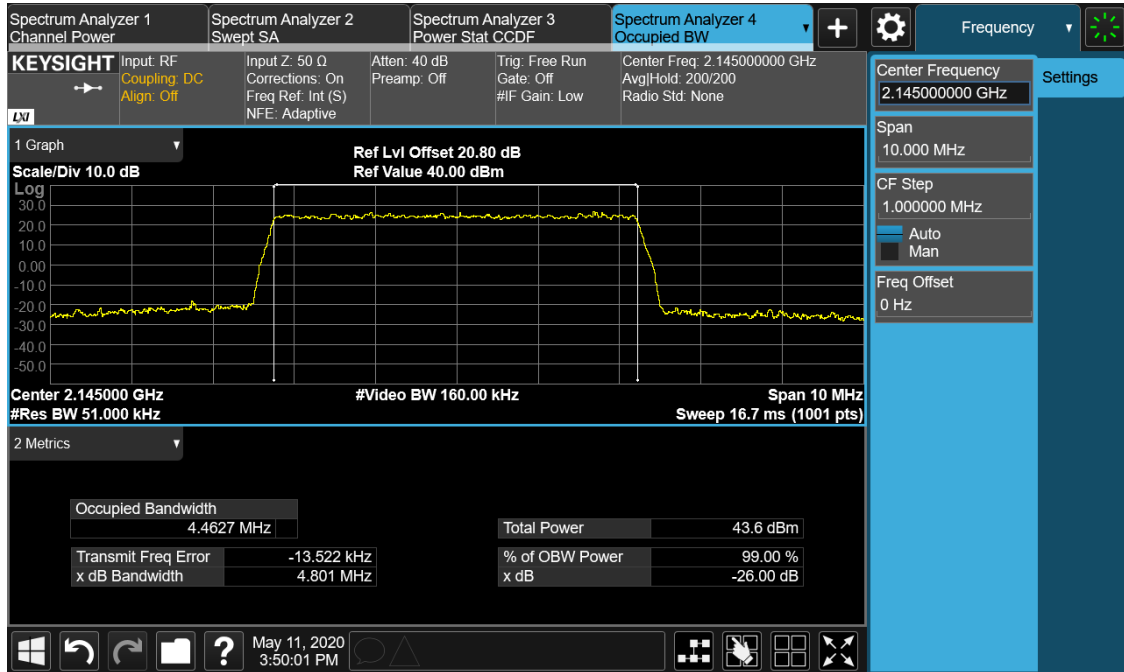
-26dBc Occupied Bandwidth

Antenna Port	Modulation	Bandwidth	Occupied Bandwidth (MHz)		
			Channel Position B	Channel Position M	Channel Position T
A	256QAM	5MHz	4.798	4.801	4.812
A	256QAM	10MHz	9.751	9.735	9.721
A	256QAM	15MHz	14.76	14.76	14.74
A	256QAM	20MHz	19.75	19.76	19.71

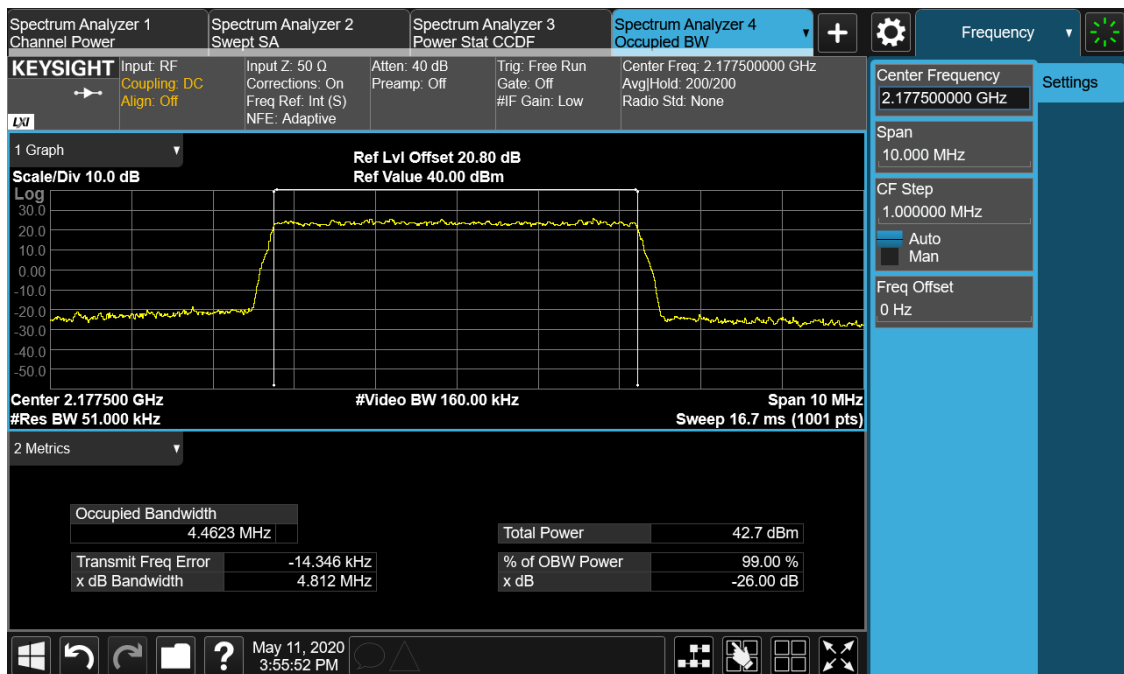
256QAM, 5MHz, Channel position B



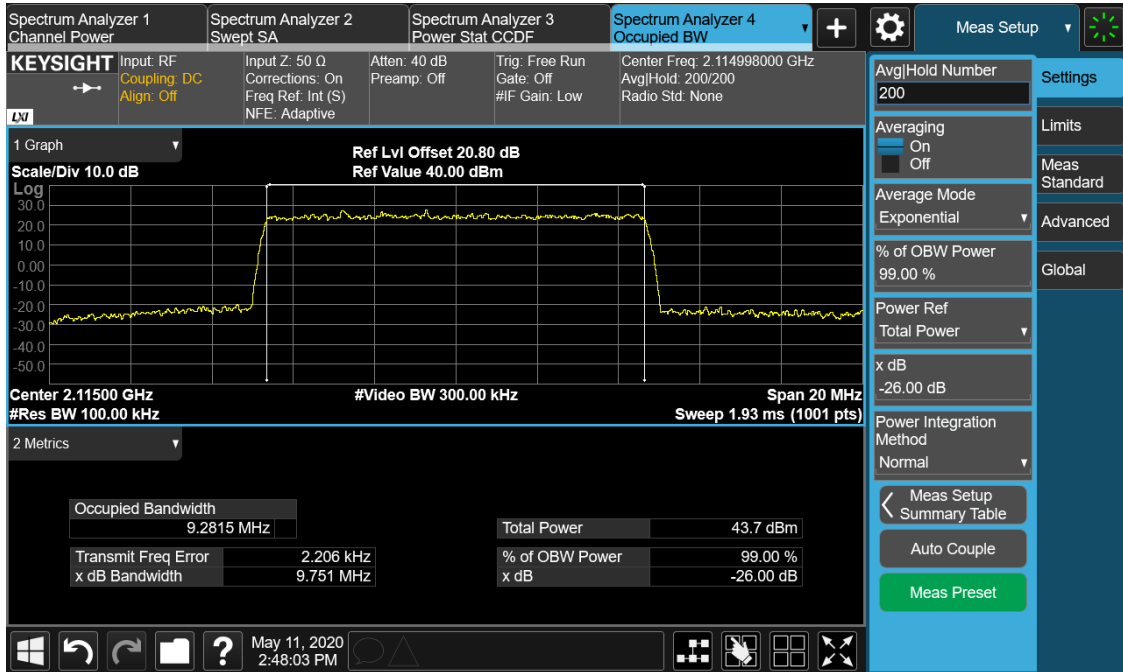
256QAM, 5MHz, Channel position M



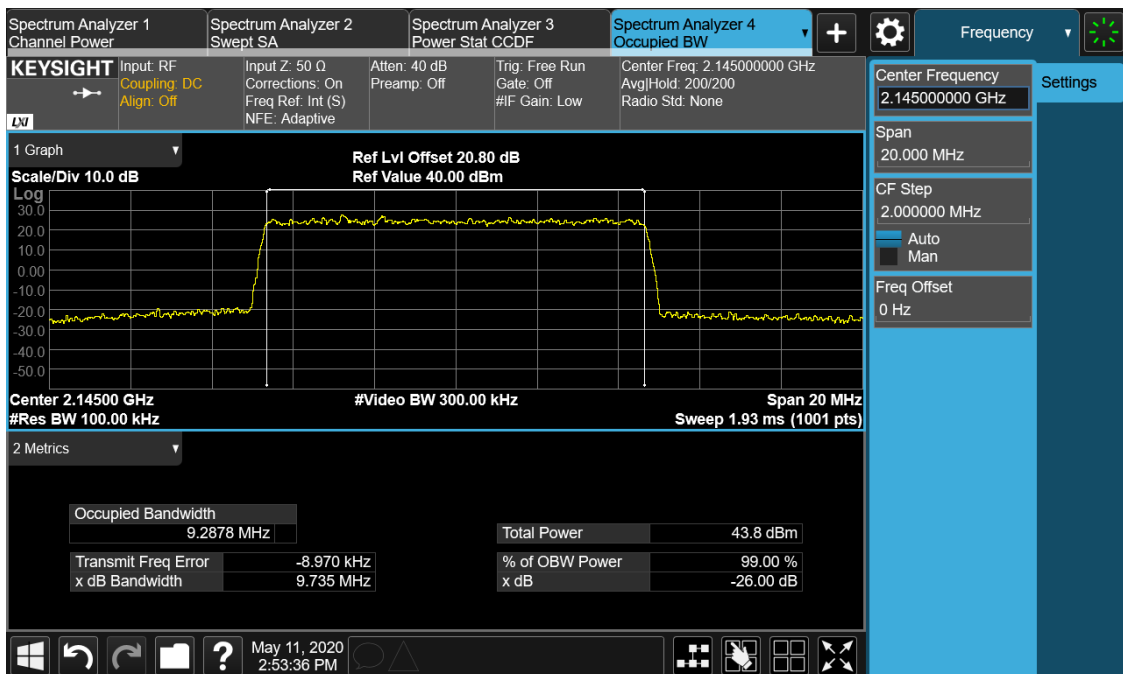
256QAM, 5MHz, Channel position T



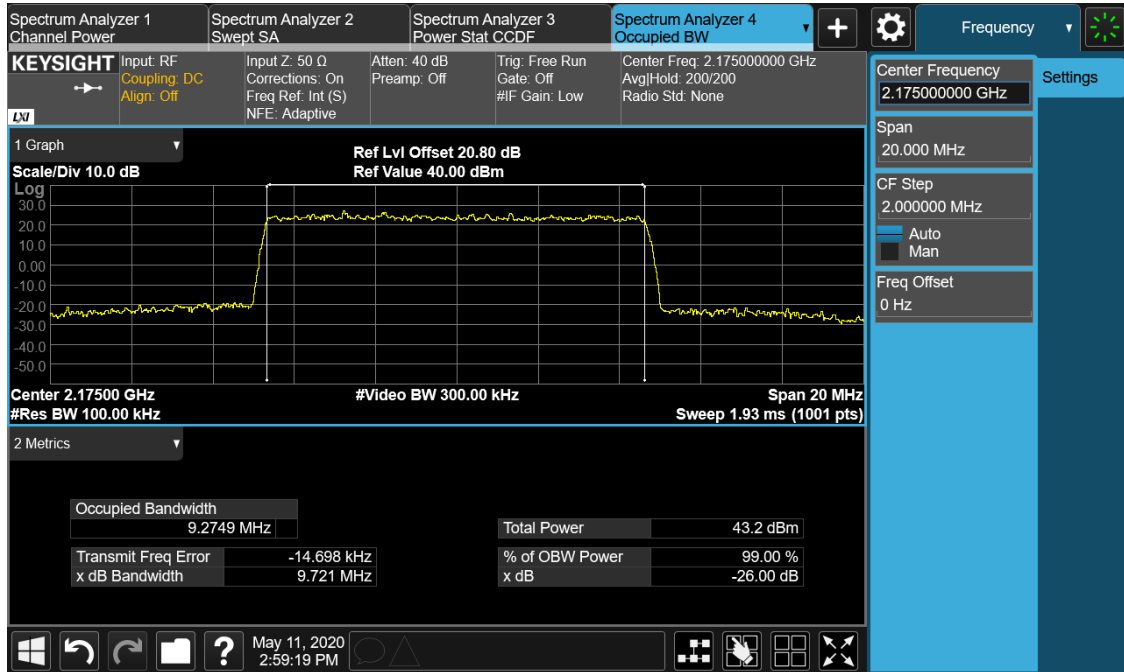
256QAM, 10MHz, Channel position B



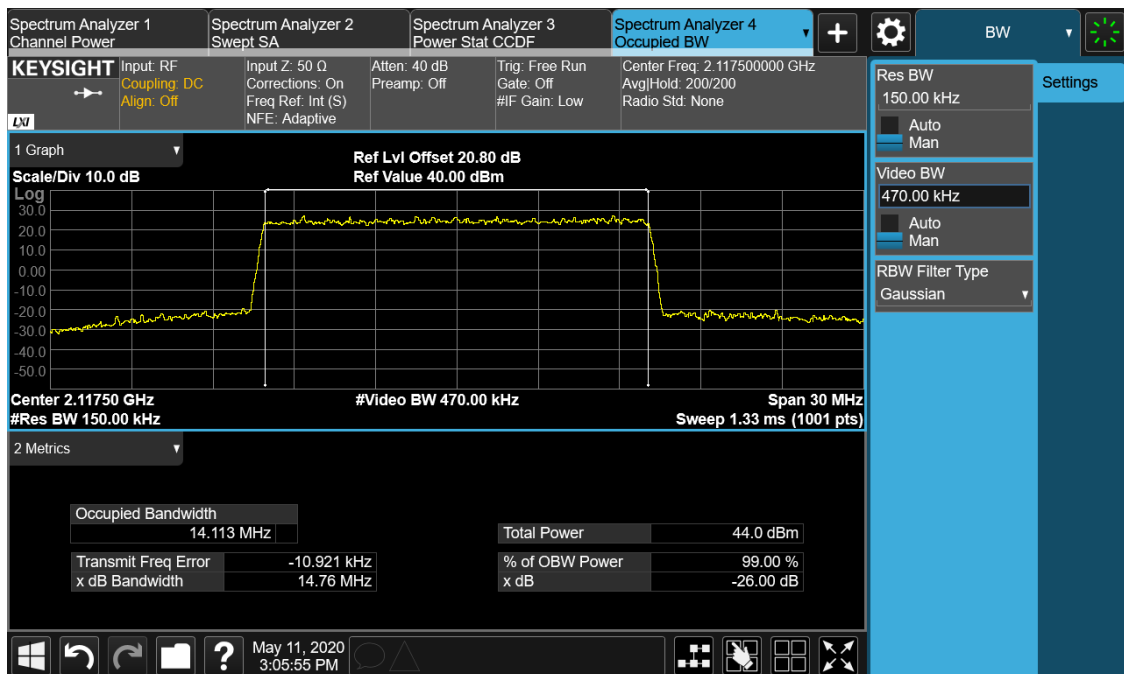
256QAM, 10MHz, Channel position M



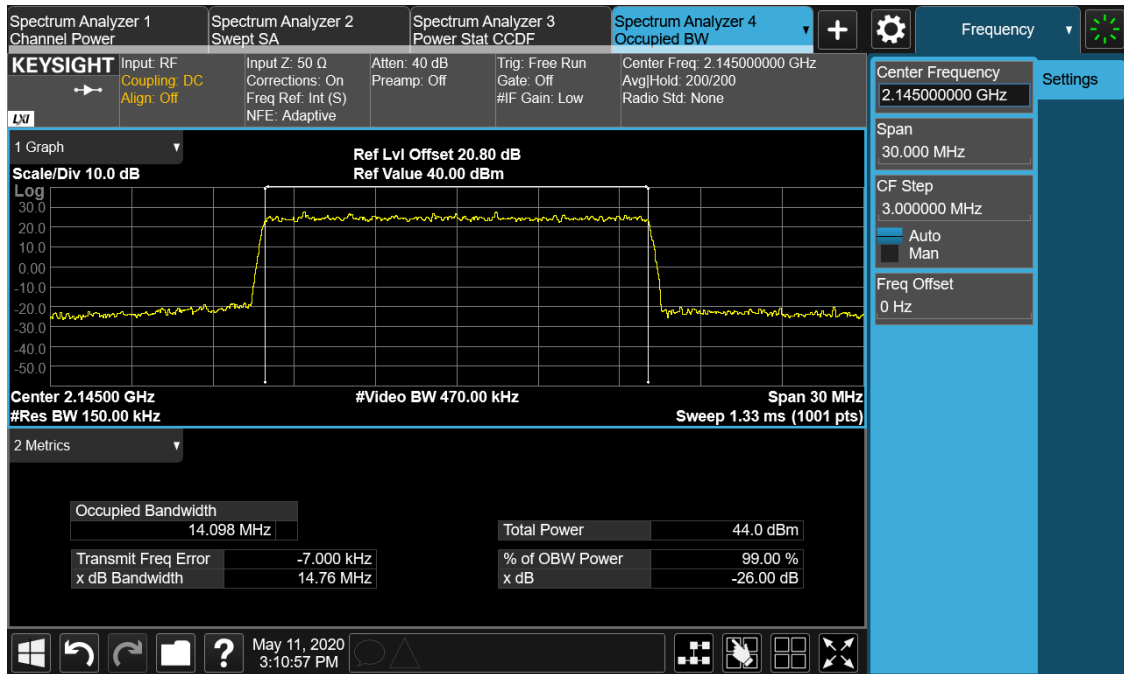
256QAM, 10MHz, Channel position T



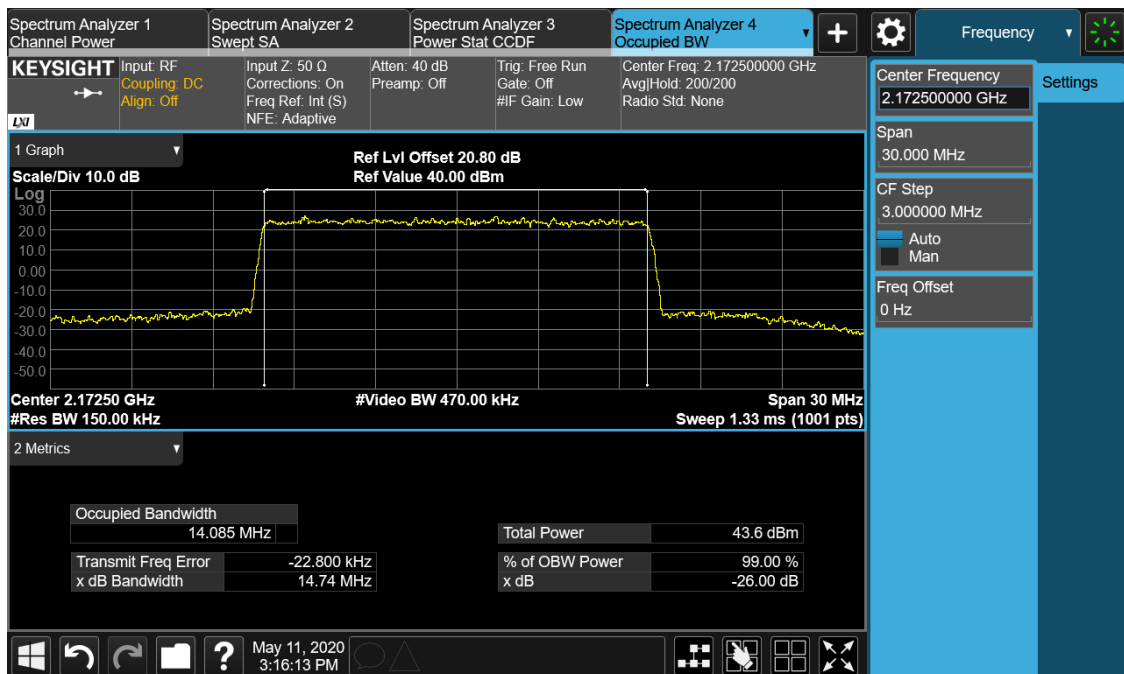
256QAM, 15MHz, Channel position B



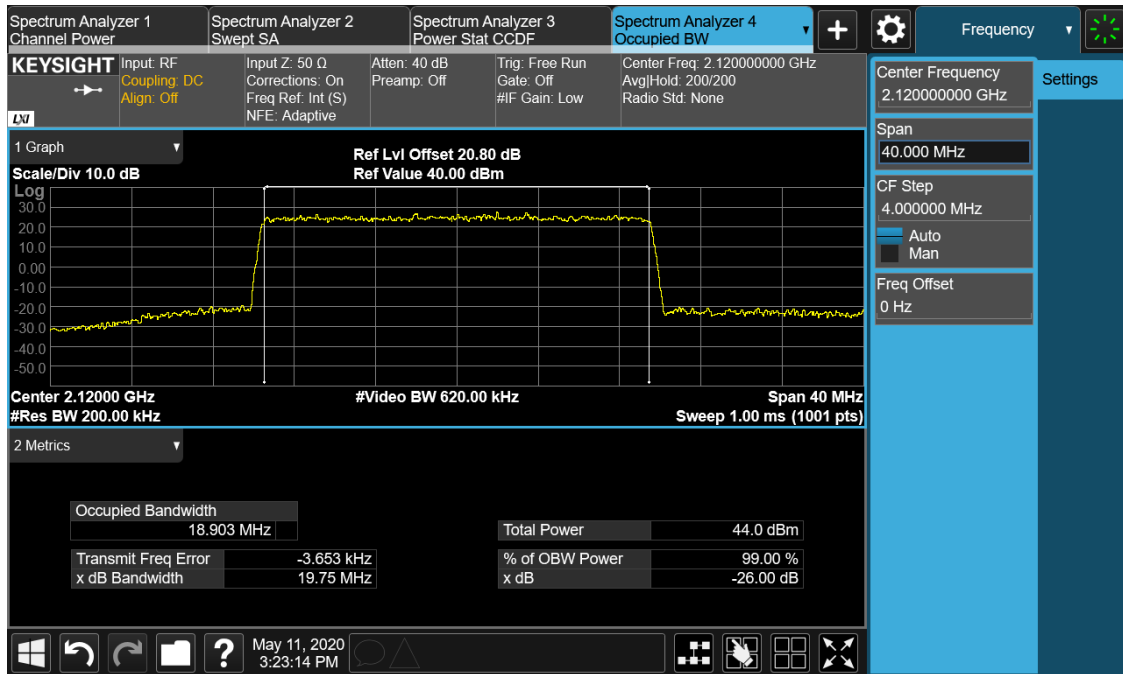
256QAM, 15MHz, Channel position M



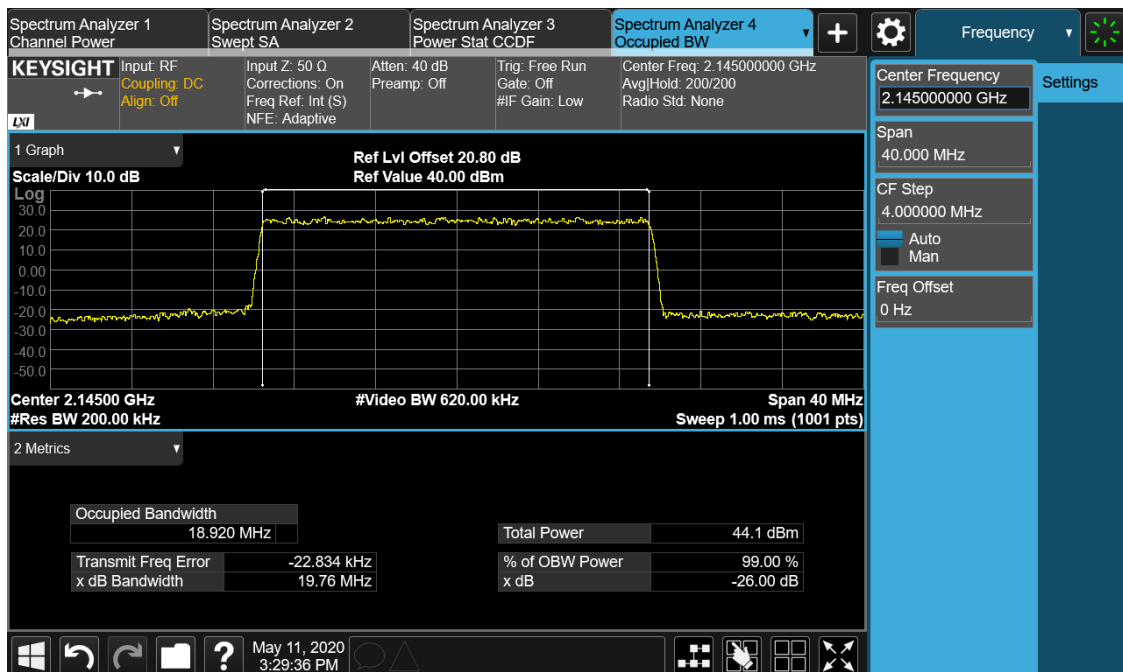
256QAM, 15MHz, Channel position T



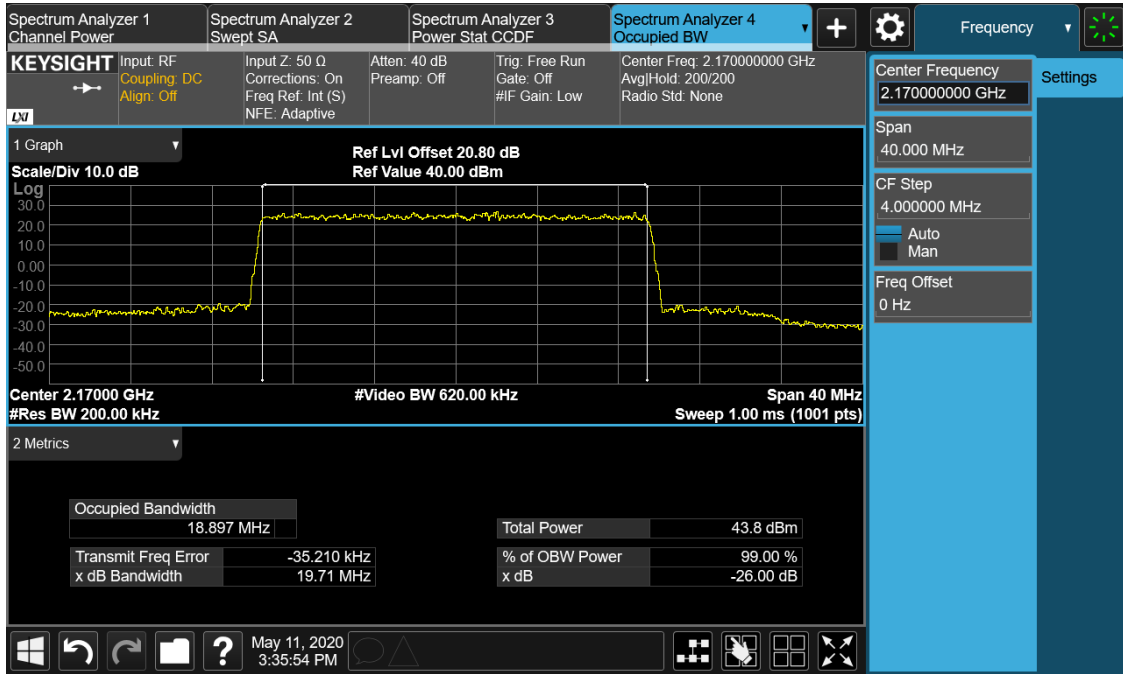
256QAM, 20MHz, Channel position B



256QAM, 20MHz, Channel position M



256QAM, 20MHz, Channel position T



5 Unwanted Emissions at Band Edge

Test result: Pass

5.1 Limit

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.

5.2 Measurement Procedure

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.

For MIMO mode configurations, the limit was adjusted with a correction of -6.02dB [$10\log(1/4)$] by using the Measure and Add $10\log(N)$ dB technique according to KDB 662911 D01 Multiple Transmitter Output accounting for simultaneous transmission from antenna ports . Then the limit was adjusted to -19.02dBm .

In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed and a RBW of 1MHz for measurements of emissions > 1MHz away from the band edges. The limit was adjusted with -6.99dB [$10\log(200/1000)$] to compensate for the reduce measurement bandwidth 200kHz for emission more than 1MHz away from the band edges. For MIMO mode, the limit of -26.01dBm was used for emission more than 1MHz away from the band edges. For Non-MIMO mode, the limit of -19.02dBm was used for emission more than 1MHz away from the band edges.

Spectrum analyzer detector was set as RMS.

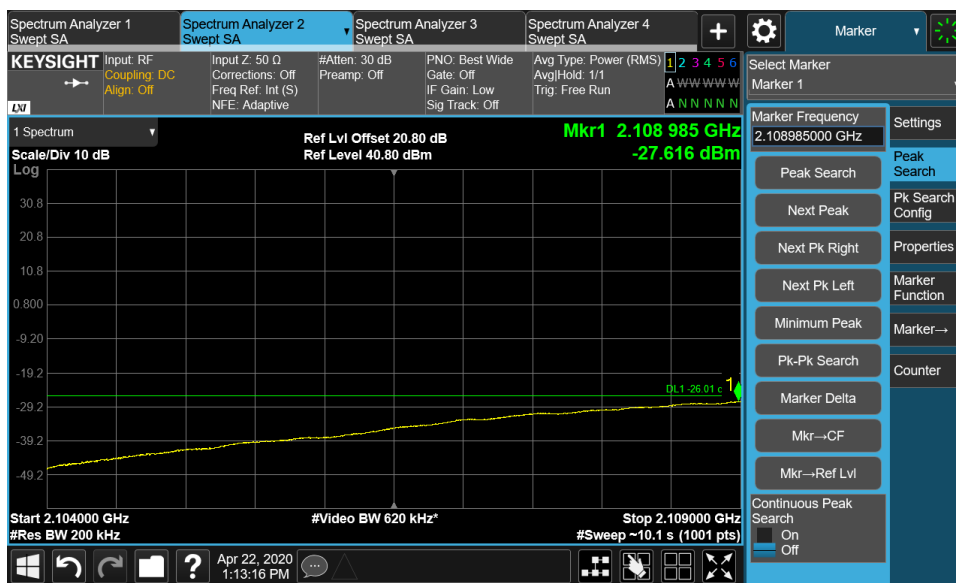
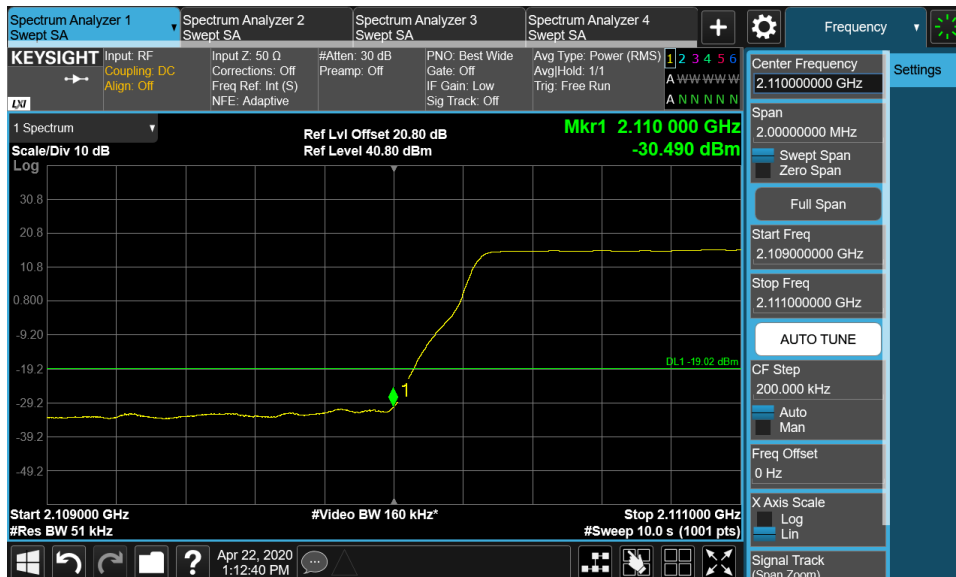
5.3 Measurement result

NR mode:

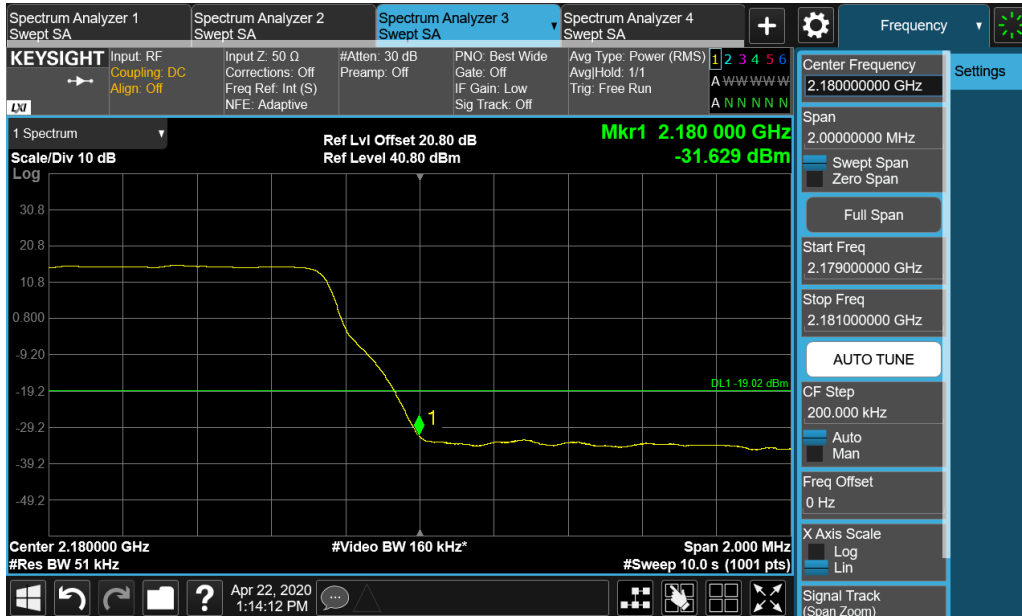
Configuration NR-MIMO-1C-BE

Antenna Port	Channel Position	Modulation	Channel Bandwidth (MHz)	RBW (kHz)	Limit (dBm)
A	B	QPSK	5	51	-19.02
				200	-26.01
A	T	QPSK	5	51	-19.02
				200	-26.01

Channel Position B

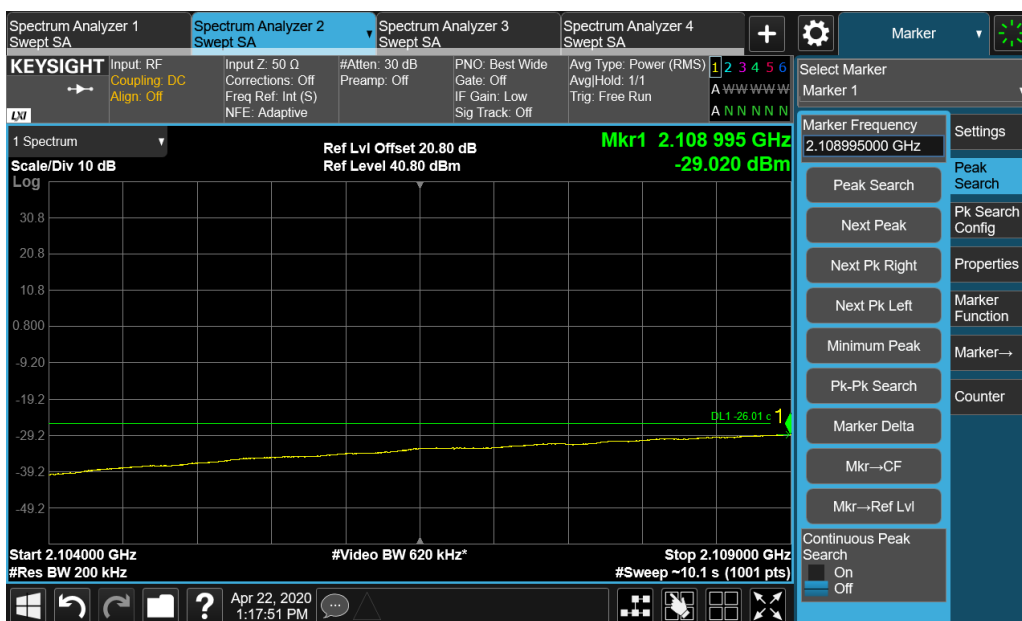
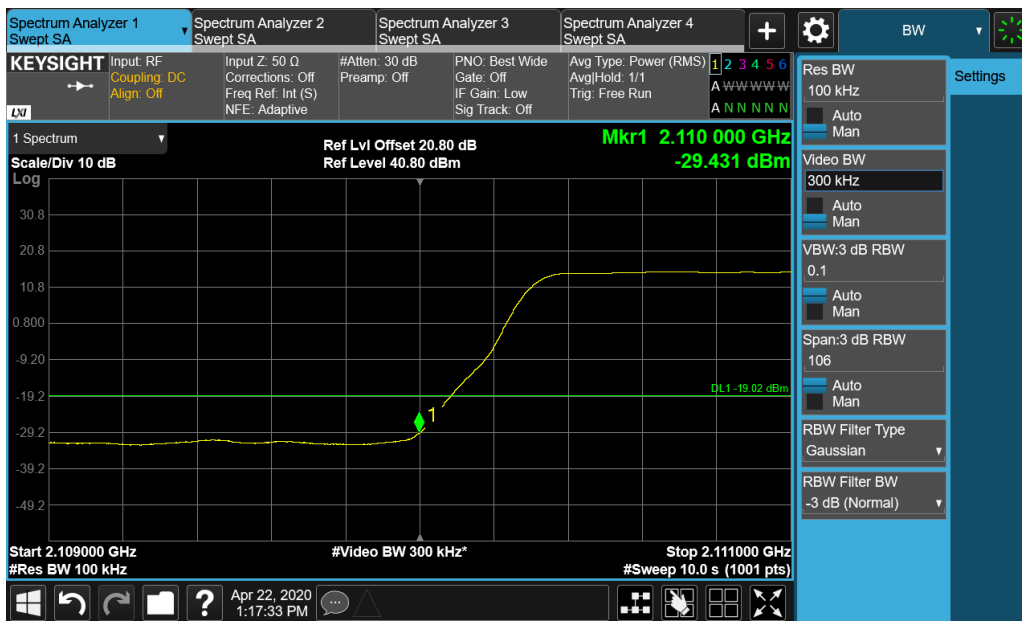


Channel Position T

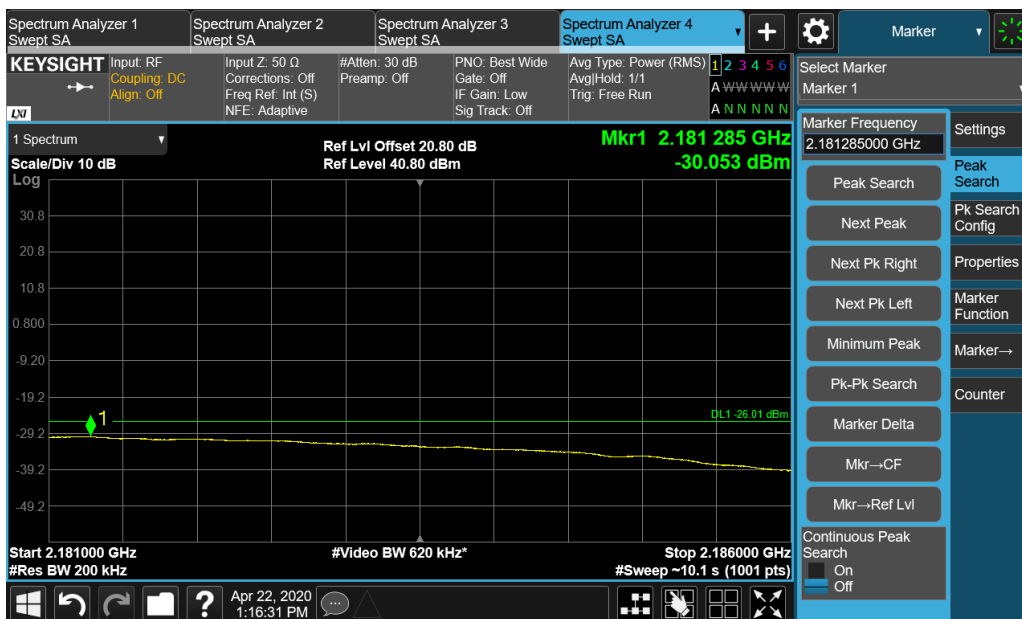
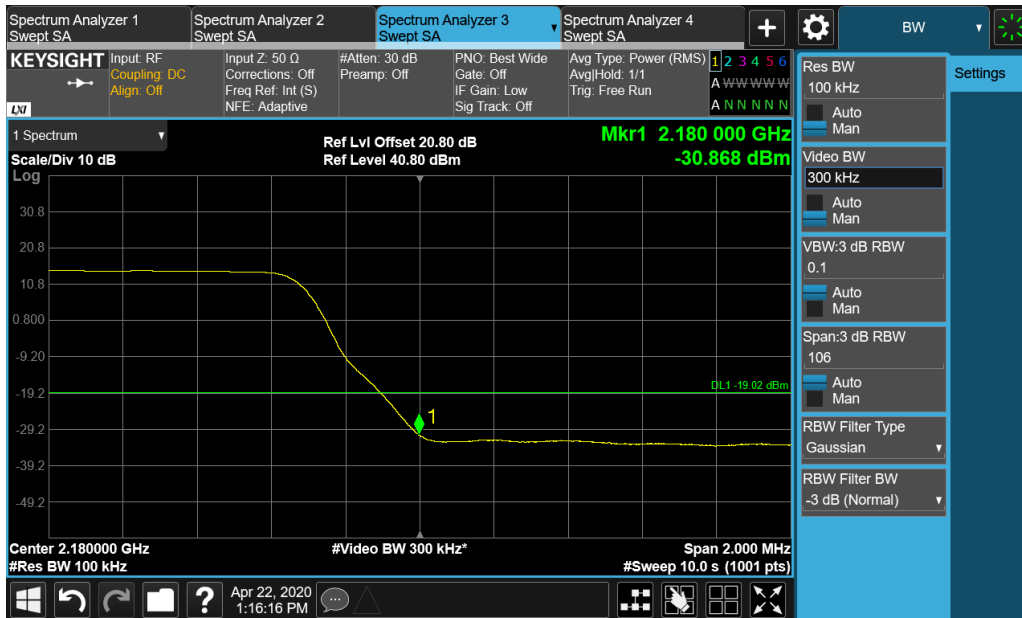


Antenna Port	Channel Position	Modulation	Channel Bandwidth (MHz)	RBW (kHz)	Limit (dBm)
A	B	QPSK	10	100	-19.02
				200	-26.01
A	T	QPSK	10	100	-19.02
				200	-26.01

Channel Position B



Channel Position T



Antenna Port	Channel Position	Modulation	Channel Bandwidth (MHz)	RBW (kHz)	Limit (dBm)
A	B	QPSK	15	150	-19.02
				200	-26.01
A	T	QPSK	15	150	-19.02
				200	-26.01

Channel Position B

