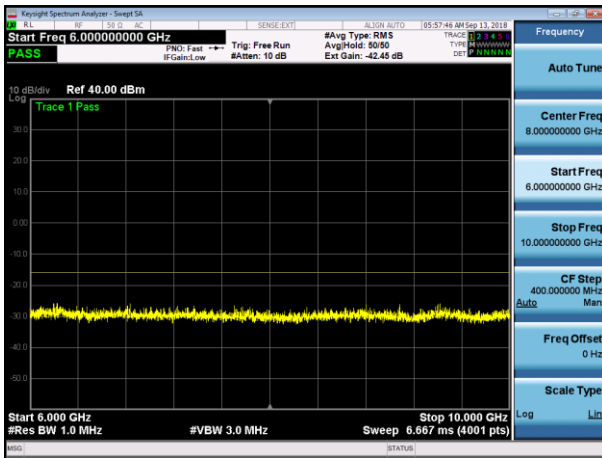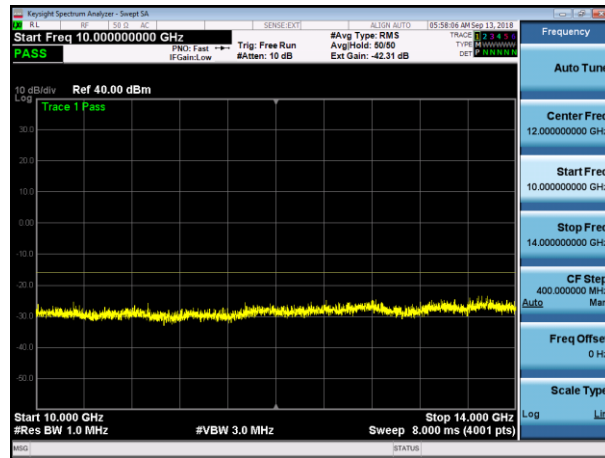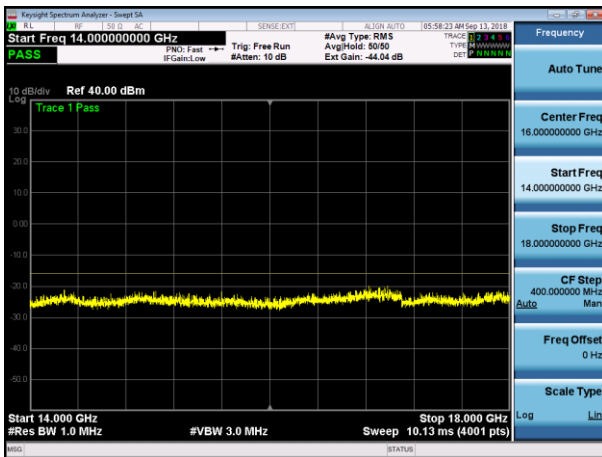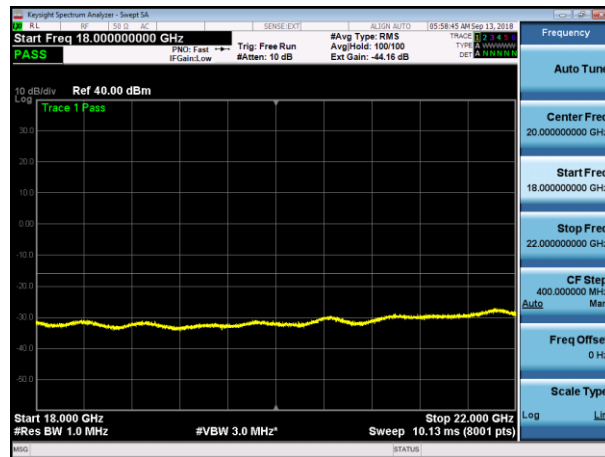LTE15 Top+NB IoT GB (Upper) 6000MHz-10000MHz

LTE15 Top+NB IoT GB (Upper) 10000MHz-14000MHz
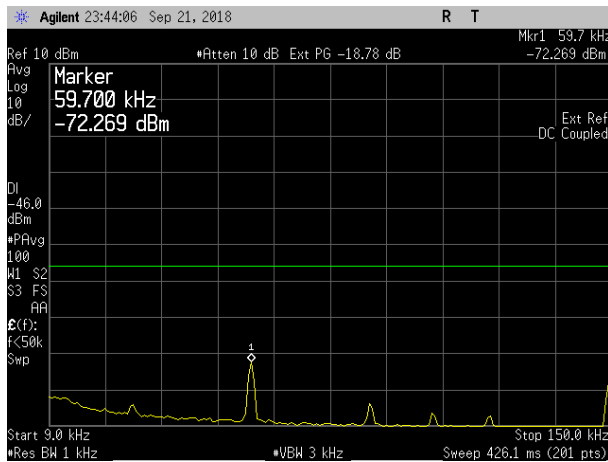

LTE15 Top+NB IoT GB (Upper) 14000MHz-18000MHz

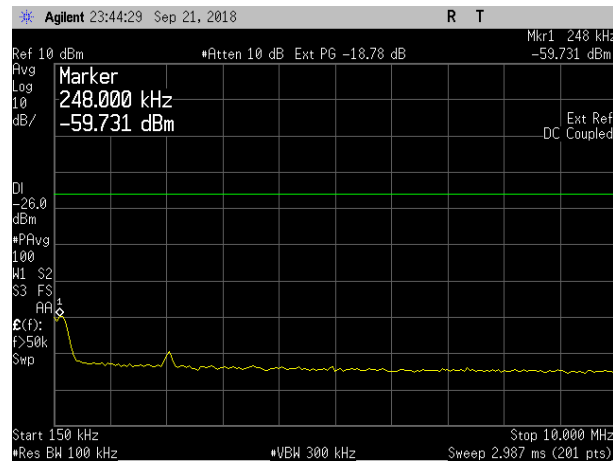LTE15 Top+NB IoT GB (Upper) 18000MHz-22000MHz

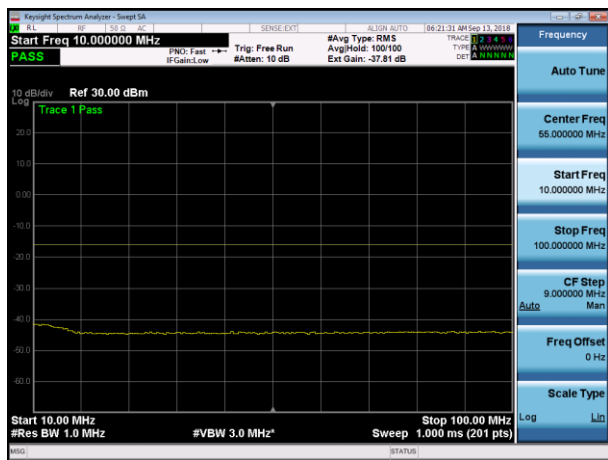**20MHz Bottom Channel (2120MHz) NB IoT at lower Guard Band**

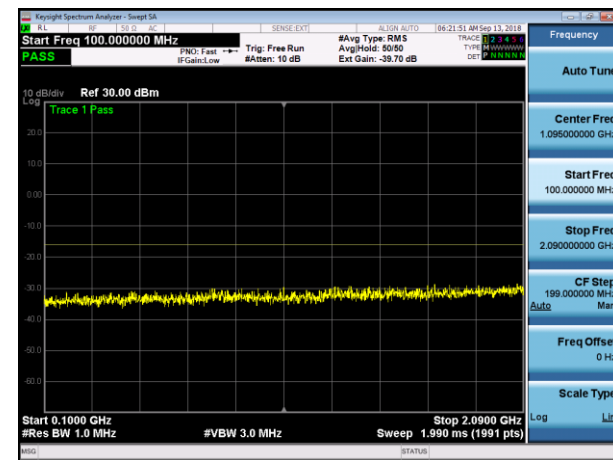LTE20 Bottom+NB IoT GB (Upper) 0.009-0.15Mhz

LTE20 Bottom+NB IoT GB (Upper) 0.15MHz – 10MHz

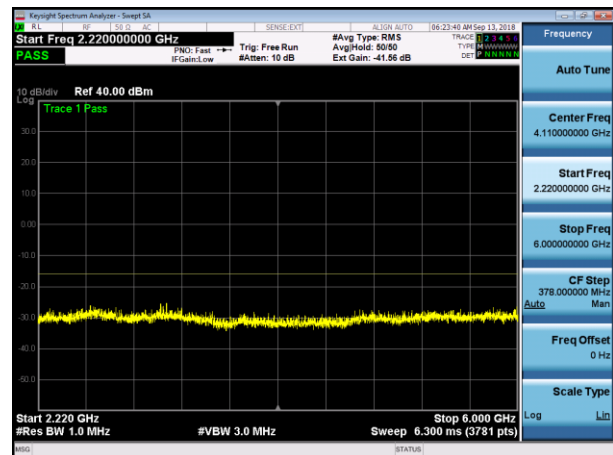LTE20 Bottom+NB IoT GB (Upper) 10-100Mhz

LTE20 Bottom+NB IoT GB (Upper) 100MHz – 2090MHz
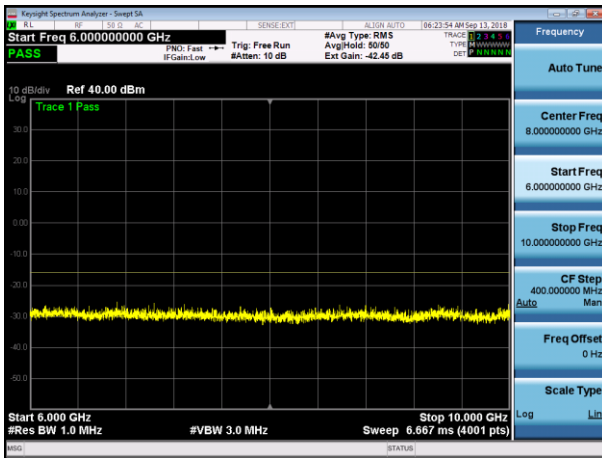

LTE20 BOTTOM+NB IoT GB (Upper) 2090MHz – 2220MHz

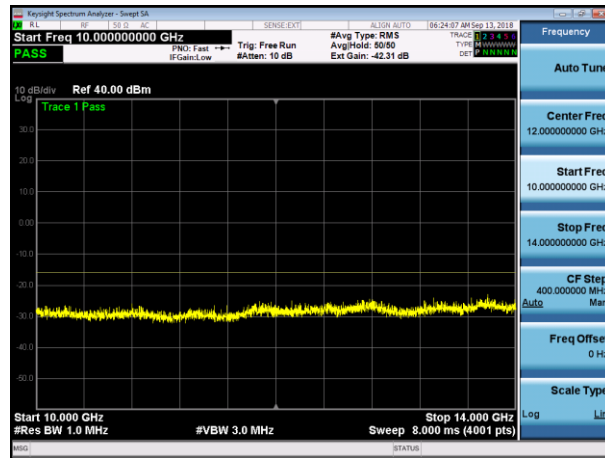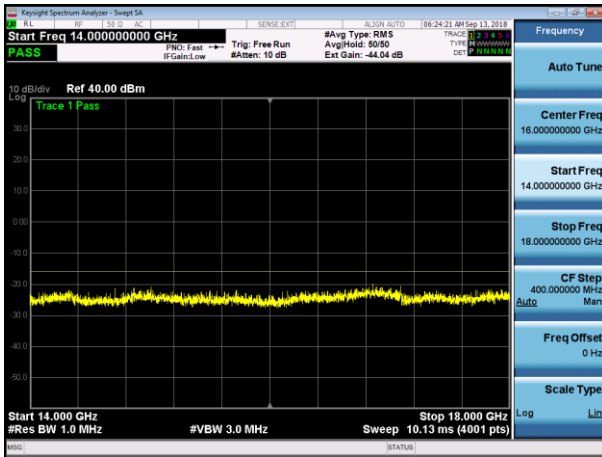LTE20 BOTTOM+NB IoT GB (Upper) 2220MHz-6000Mhz
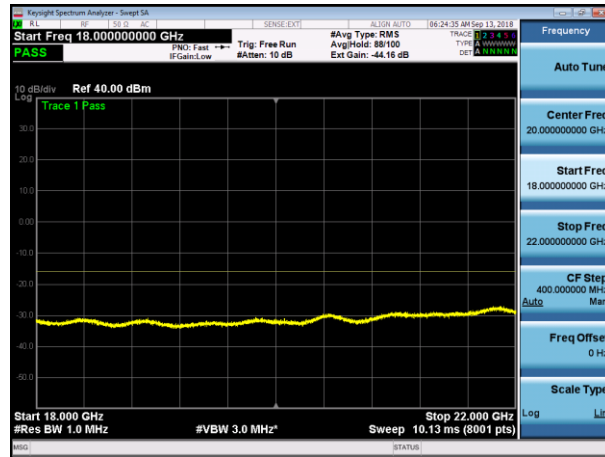
LTE20 BOTTOM+NB IoT GB (Upper) 6000MHz-10000MHz

LTE20 BOTTOM+NB IoT GB (Upper) 10000-14000MHz

LTE20 BOTTOM+NB IoT GB (Upper) 14000MHz − 18000MHz
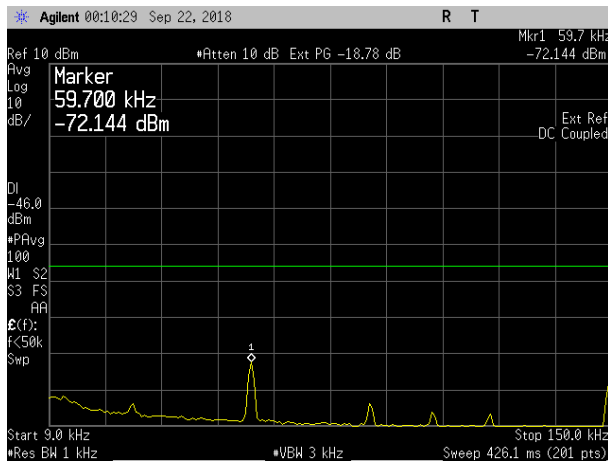

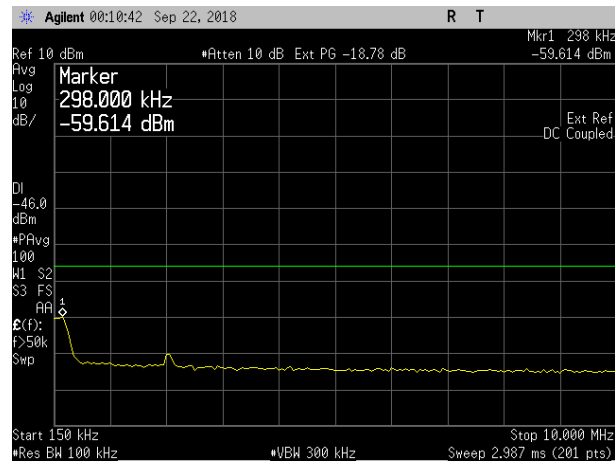LTE20 BOTTOM+NB IoT GB (Upper) 18000MHz − 22000MHz

20MHz Middle Channel (2132.5MHz) NB IoT at lower Guard Band

LTE20 Mid+NB IoT GB (Upper) 0.009-0.15Mhz

LTE20 Mid+NB IoT GB (Upper) 0.15MHz – 10MHz

LTE20 Mid+NB IoT GB (Upper) 10MHz-100MHz

LTE20 Mid+NB IoT GB (Upper) 100MHz-2090MHz

LTE20 Mid+NB IoT GB (Upper) 2090MHz-2220MHz

LTE20 Mid+NB IoT GB (Upper) 2220MHz-6000MHz

LTE20 Mid+NB IoT GB (Upper) 6000MHz-10000MHz

LTE20 Mid+NB IoT GB (Upper) 10000MHz-14000MHz

LTE20 Mid+NB IoT GB (Upper) 14000MHz-18000MHz

LTE20 Mid+NB IoT GB (Upper) 18000MHz-22000MHz

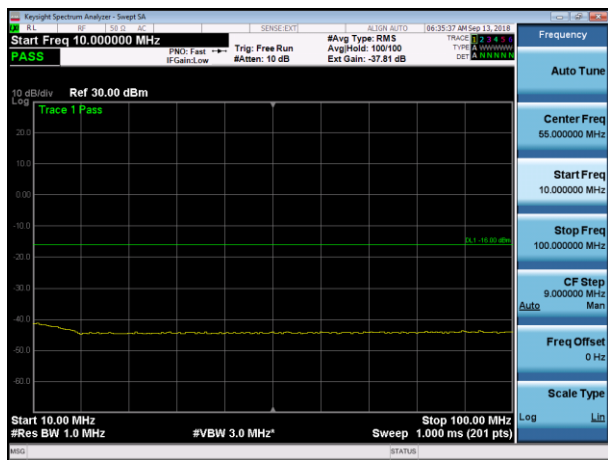**20MHz Top Channel (2145MHz) NB IoT at lower Guard Band**

LTE20 Top+NB IoT GB (Upper) 0.009-0.15Mhz
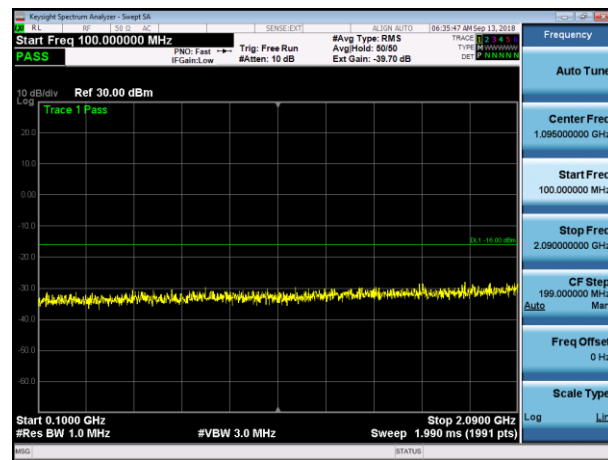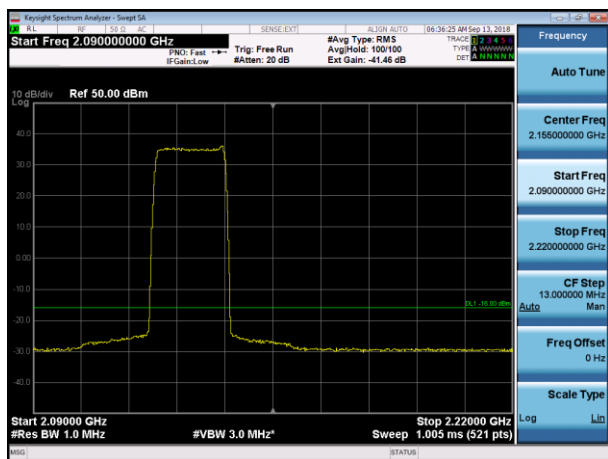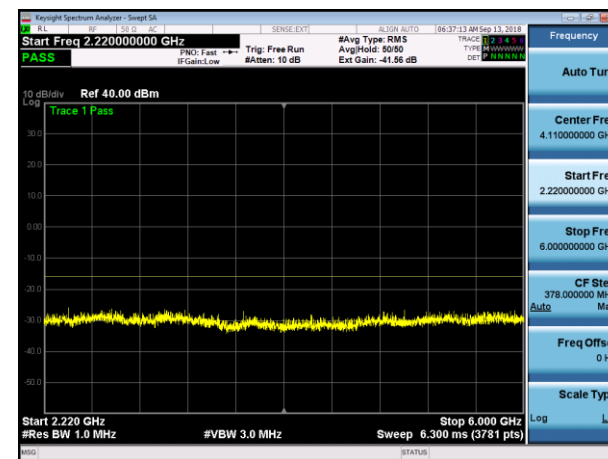

LTE20 Top+NB IoT GB (Upper) 0.15MHz – 10MHz

LTE20 Top+NB IoT GB (Upper) 10MHz-100MHz

LTE20 Top+NB IoT GB (Upper) 100MHz-2090MHz
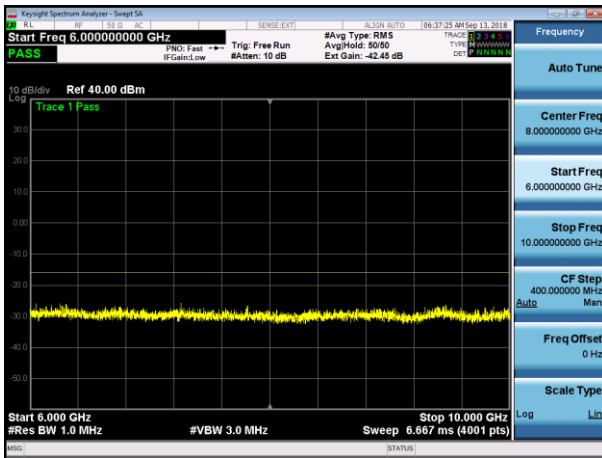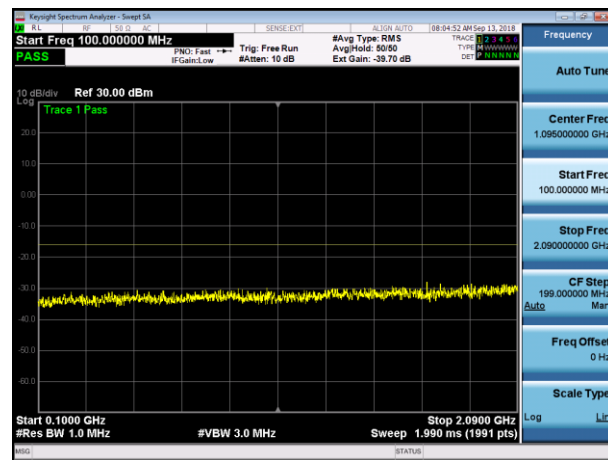

LTE20 Top+NB IoT GB (Upper) 2090MHz-2220MHz
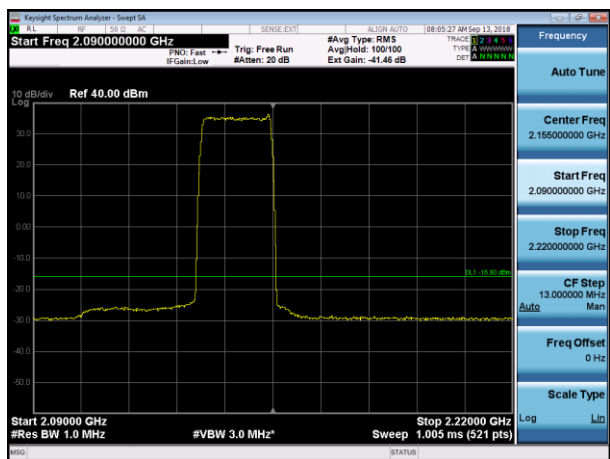
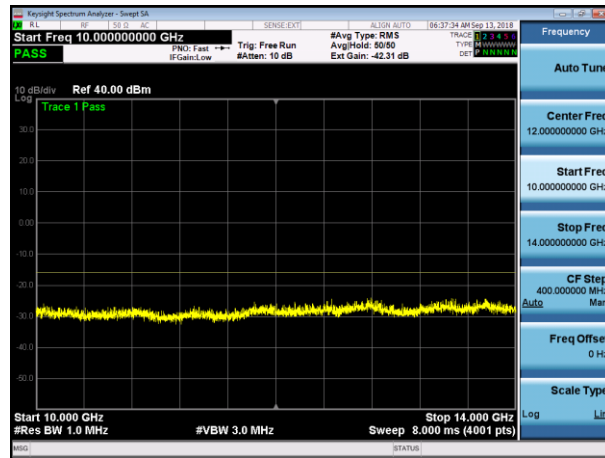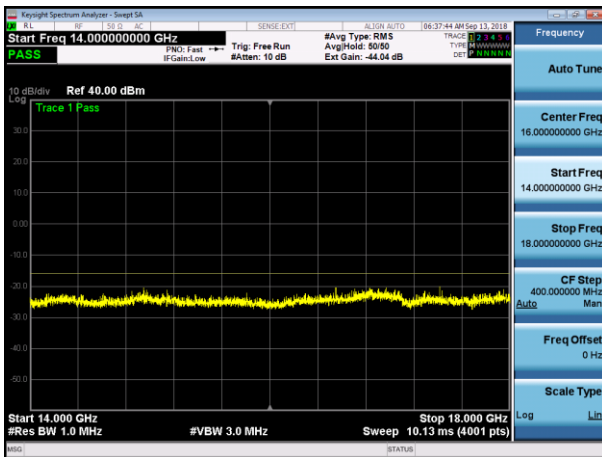LTE20 Top+NB IoT GB (Upper) 2220MHz-6000MHz
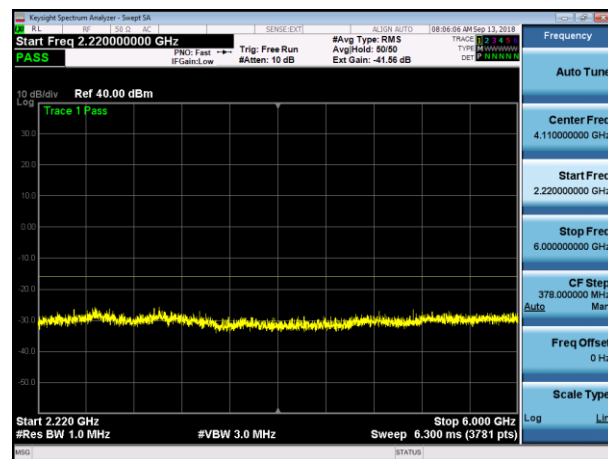
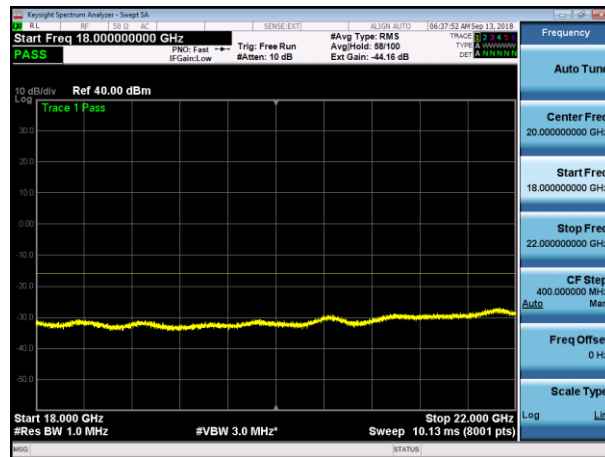LTE20 Top+NB IoT GB (Upper) 6000MHz-10000MHz
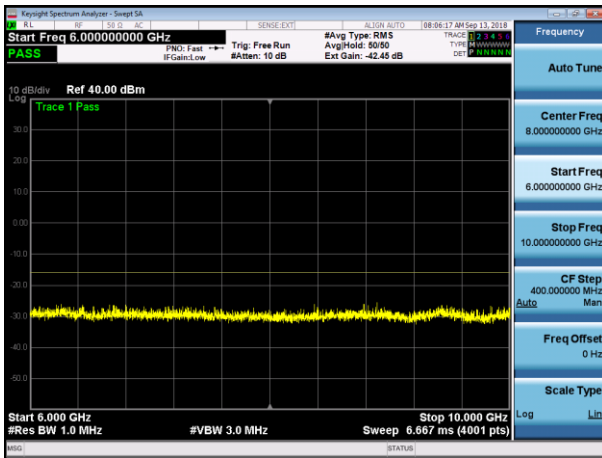
LTE20 Top+NB IoT GB (Upper) 10000MHz-14000MHz
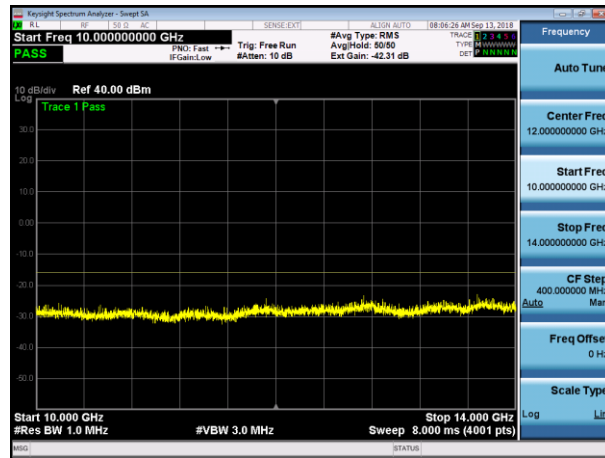
LTE20 Top+NB IoT GB (Upper) 14000MHz-18000MHz

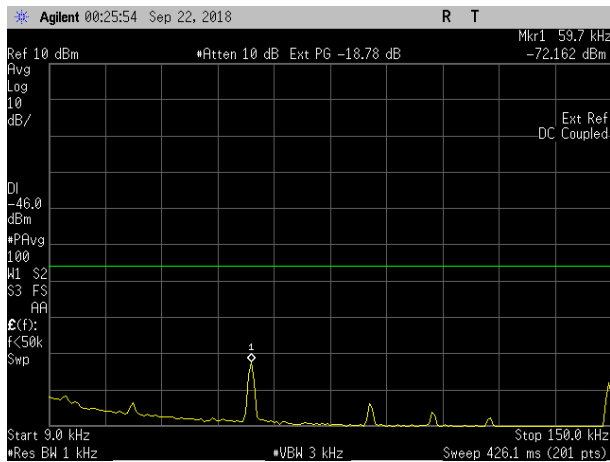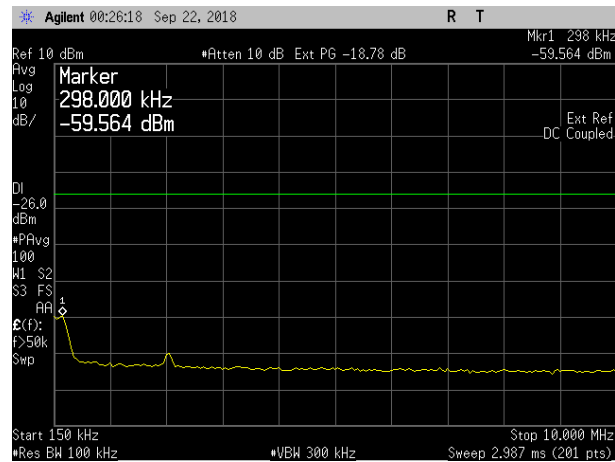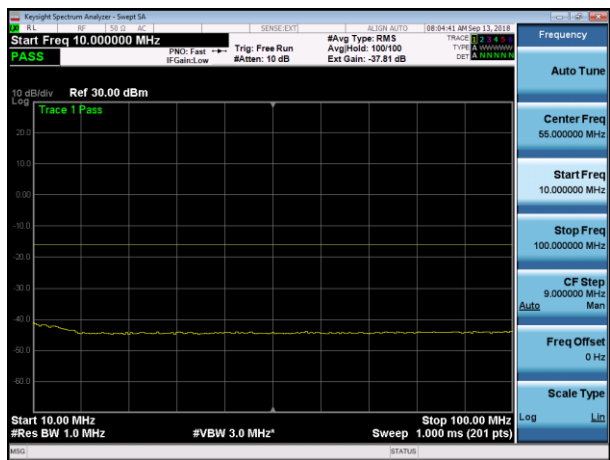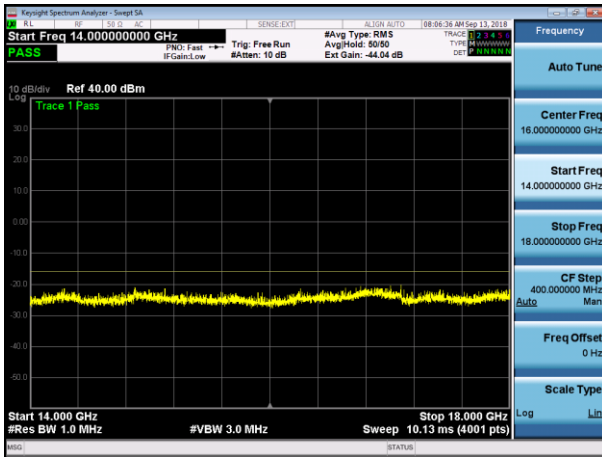LTE20 Top+NB IoT GB (Upper) 18000MHz-22000MHz
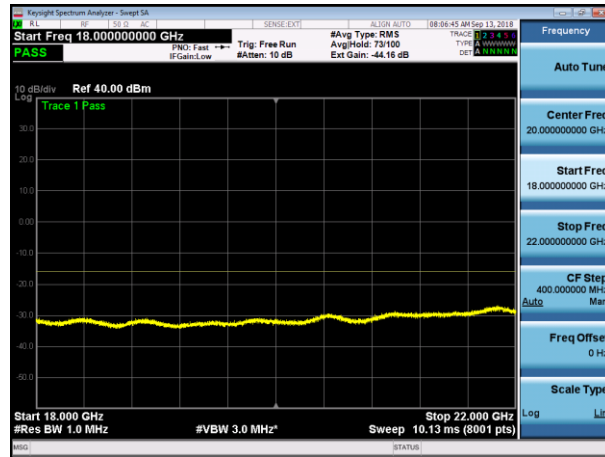
12. TEST DATA FOR FRIG 4X30W CONFIGURATION

All conducted RF measurements for this test effort in this section were made at FRIG antenna port 1 (the highest power 60W port). The general test setup used is provided below. See Test Setup Photographs and Auxillary Equipment for details.
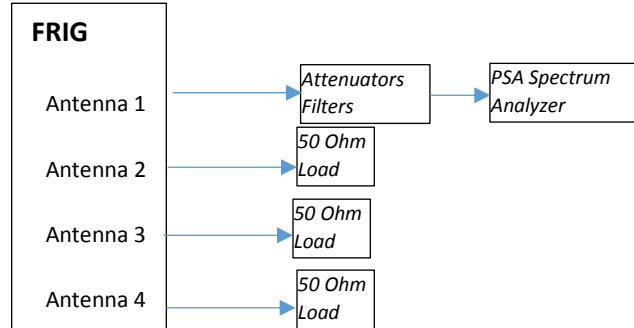
General Test Setup Used for Conducted RF Measurements on FRIG for 4x30W Configuration

12.1. RF Output Power

Peak and RMS Average RF output power was measured at the FRIG RRH antenna port. Measurements were made on the bottom, middle and top channels placing the NB IoT Guard Band carrier at the lower end of the carrier and then the upper end of the carrier for the LTE bandwidths of 10MHz, 15MHz, and 20MHz. Peak to average power ratio (PAPR) has been calculated as described in section 5.7.2 of KDB971168 D01 v03r01. The results of the power measurements and PAPR calculations are provided in the table below.

**NB IoT Guard Band Carrier in Lower Guard Band**

FRIG Ant 1 Port	LTE Bandwidth	LTE - Aggregate w/NB IoT GB		
		Peak (dBm)	Average (dBm)	PAPR (dB)
Bottom Channel	10M	52.20	44.22	7.98
	15M	52.23	44.25	7.98
	20M	51.48	43.55	7.93
Middle Channel	10M	52.48	44.46	8.02
	15M	52.44	44.47	7.97
	20M	51.71	43.72	7.99
Top channel	10M	52.28	44.42	7.86
	15M	52.30	44.38	7.92
	20M	52.38	44.39	7.99

NB IoT Guard Band Carrier in Upper Guard Band

| FRIG Ant 1 Port	LTE Bandwidth	LTE - Aggregate w/NB IoT GB		
		Peak (dBm)	Average (dBm)	PAPR (dB)
Bottom Channel	10M	51.90	44.08	7.82
	15M	52.30	44.24	8.06
	20M	52.20	44.24	7.96
Middle Channel	10M	52.08	44.21	7.87
	15M	52.35	44.45	7.9
	20M	52.43	44.37	8.06
Top channel	10M	52.23	44.31	7.92
	15M	52.35	44.37	7.98
	20M	52.36	44.35	8.01

All measurement results are provided in the following pages. The total measurement RF path loss of the test setup (attenuator and test cables) was 41.46 dB and is accounted for by the spectrum analyzer reference level offset.

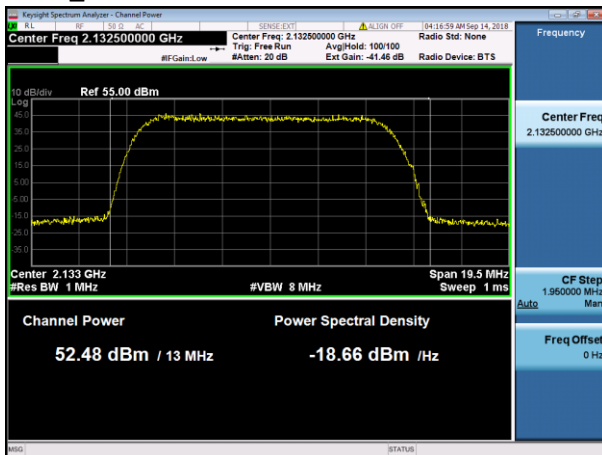**Channel Power Plots, NB IoT Guard Band Carrier in Lower Guard Band (10MHz)**:
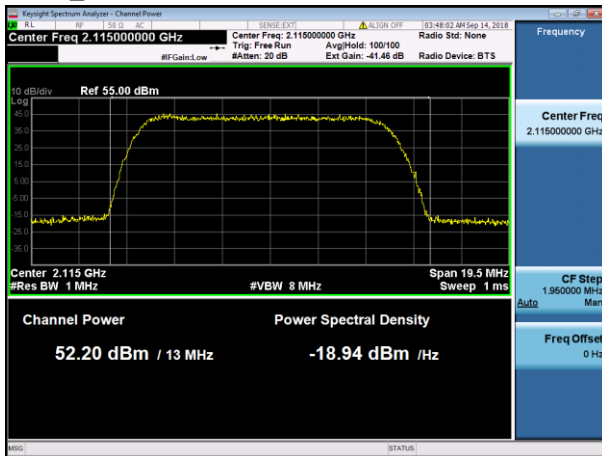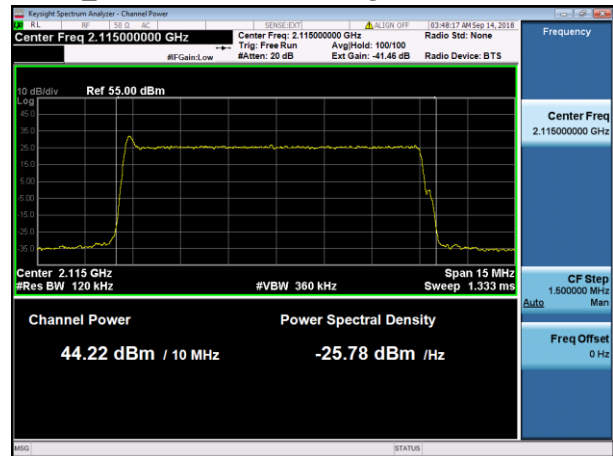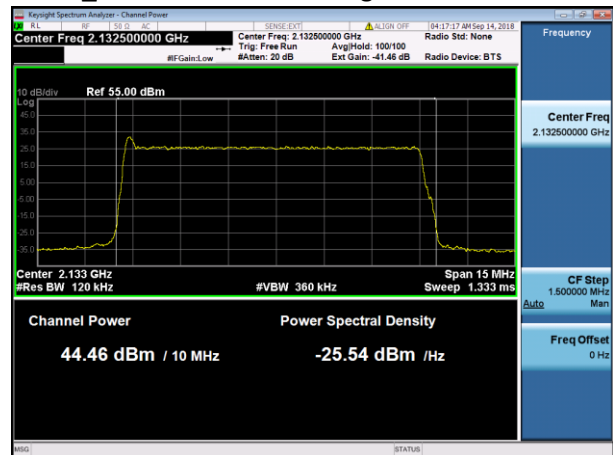
LTE10_Bottom Channel Peak
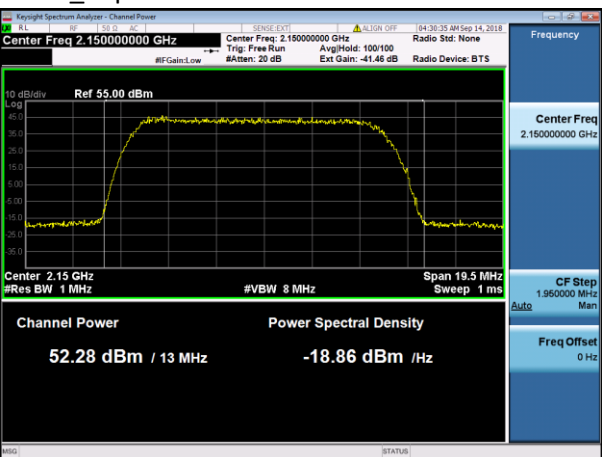

LTE10_Bottom Channel Average

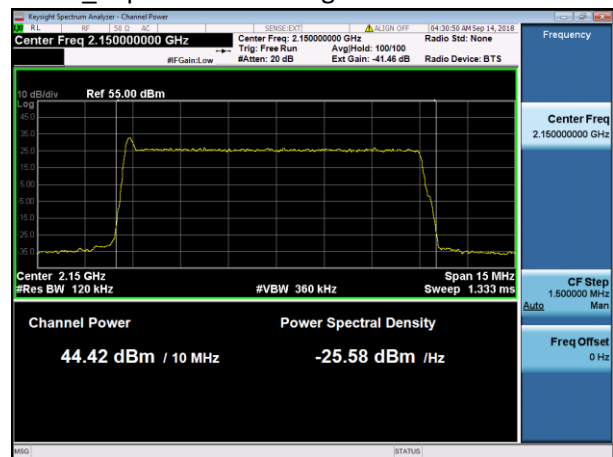
LTE10_Middle Channel Peak
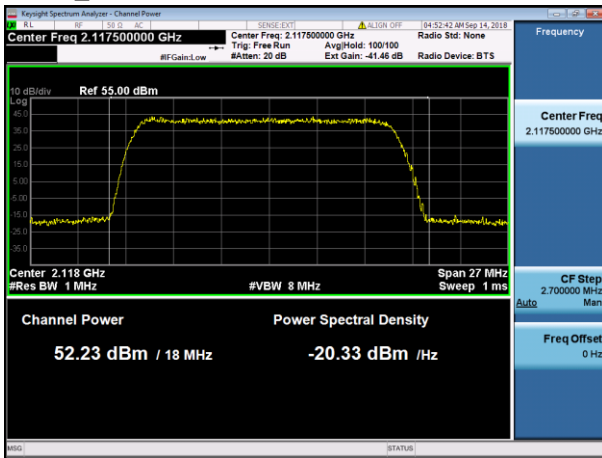

LTE10_Middle Channel Average
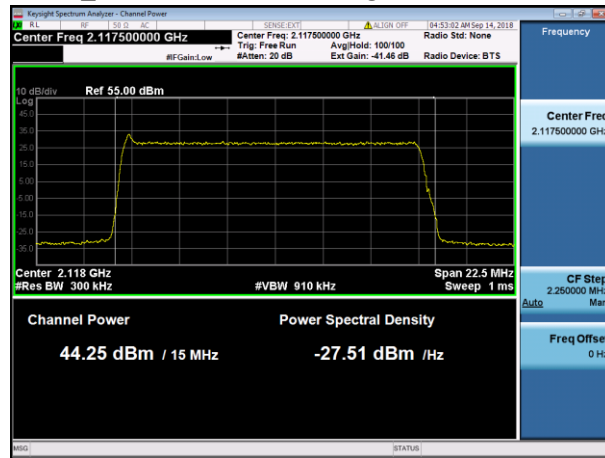

LTE10_Top Channel Peak

LTE10_Top Channel Average

Channel Power Plots, NB IoT Guard Band Carrier in Lower Guard Band (15MHz):
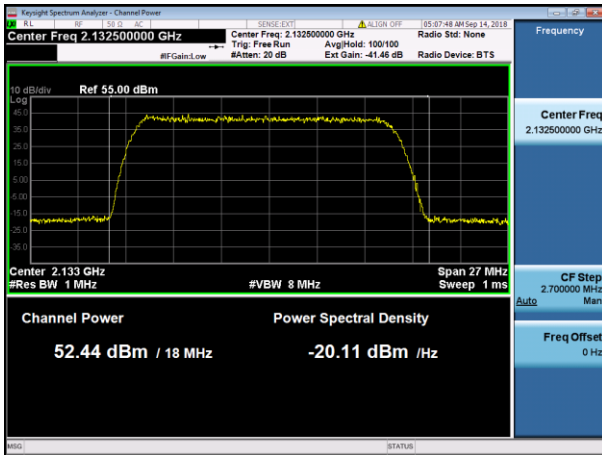
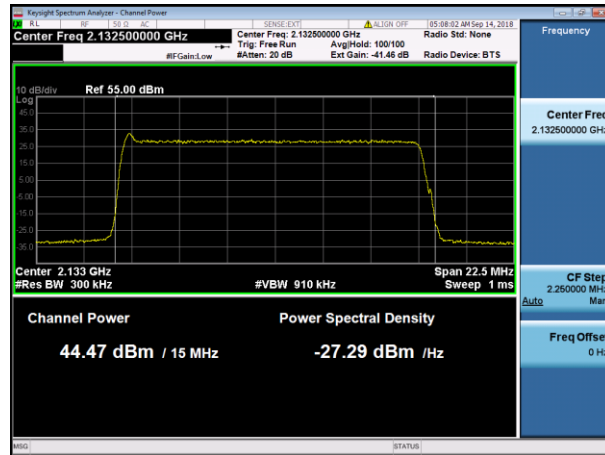LTE15_Bottom Channel Peak

LTE15_Bottom Channel Average

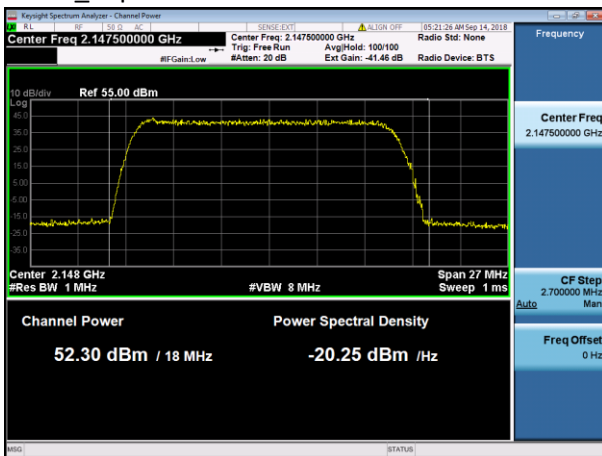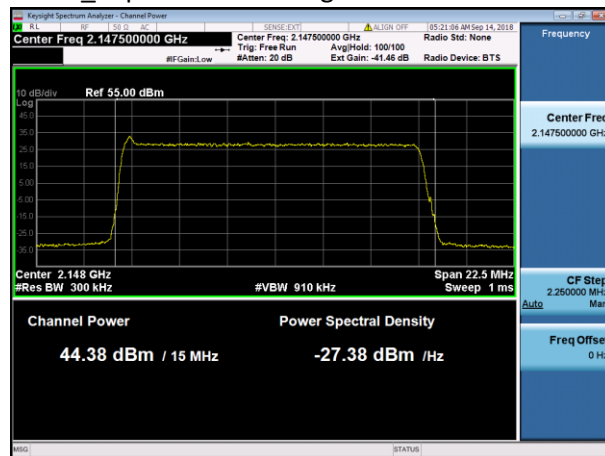
LTE15_Middle Channel Peak

LTE15_Middle Channel Average
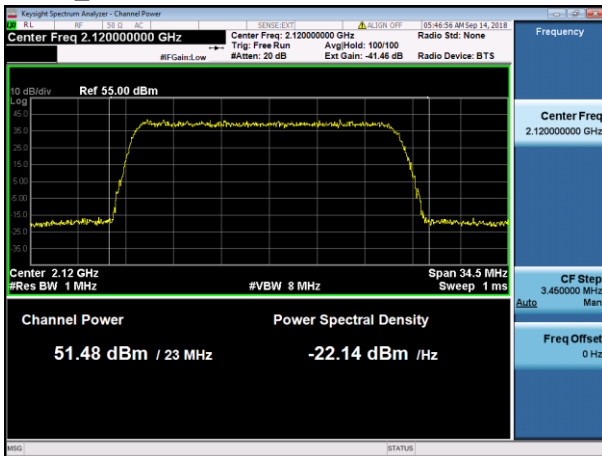

LTE15_Top Channel Peak
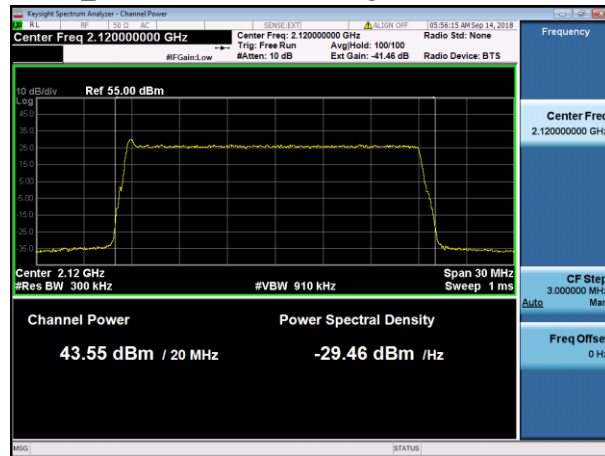

LTE15_Top Channel Average

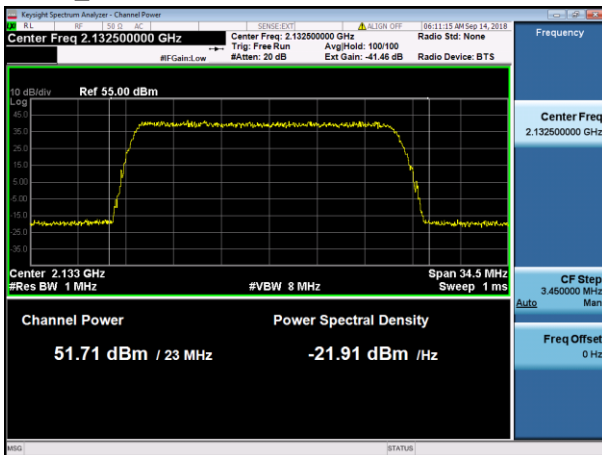**Channel Power Plots, NB IoT Guard Band Carrier in Lower Guard Band (20MHz)**:

LTE20_Bottom Channel Peak

LTE20_Bottom Channel Average

LTE20_Middle Channel Peak

LTE20_Middle Channel Average

LTE20_Top Channel Peak

LTE20_Top Channel Average

Channel Power Plots, NB IoT Guard Band Carrier in Upper Guard Band (10MHz):

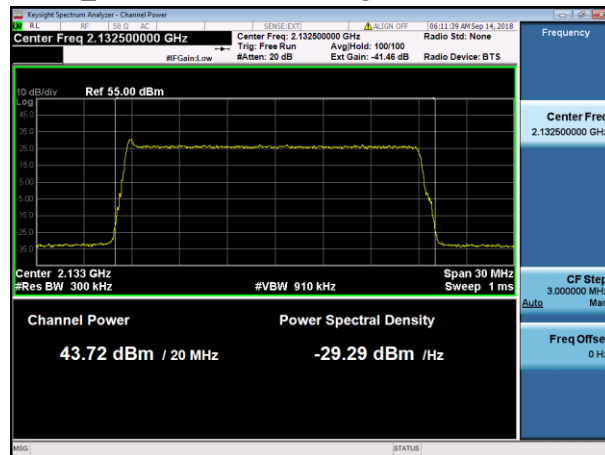LTE10_Bottom Channel Peak

LTE10_Bottom Channel Average

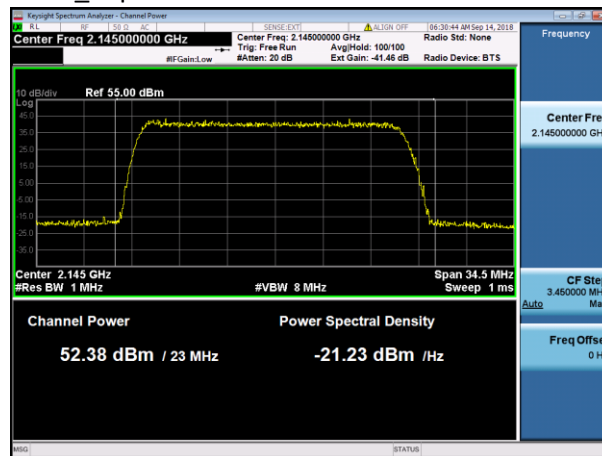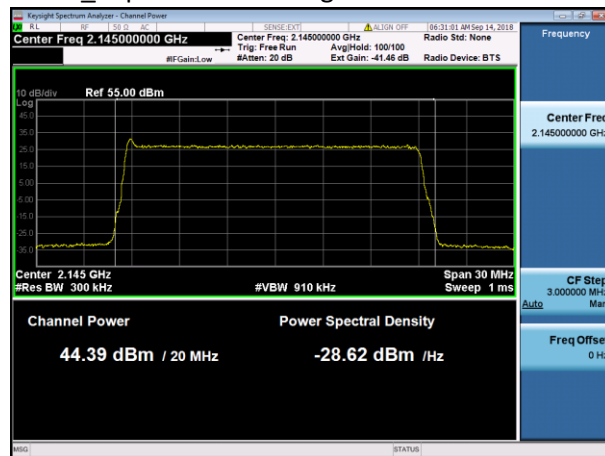
LTE10_Middle Channel Peak

LTE10_Middle Channel Average
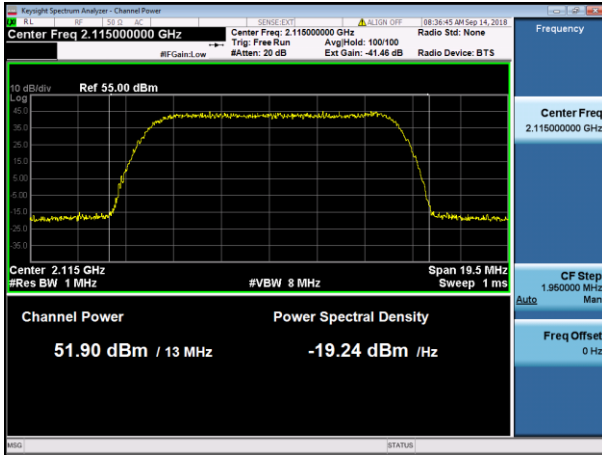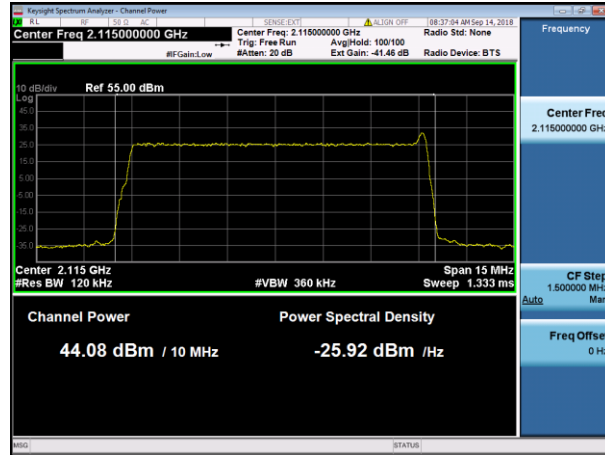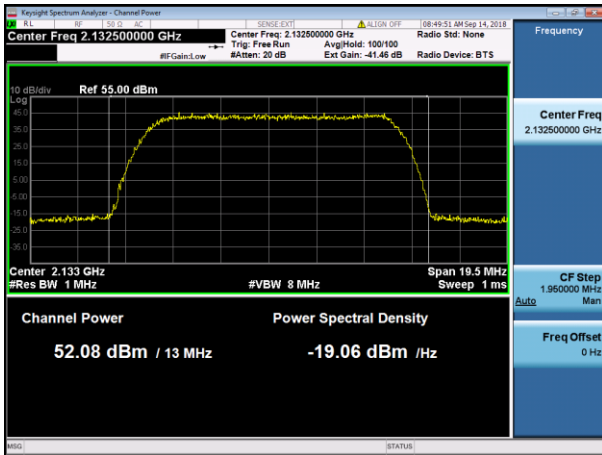

LTE10_Top Channel Peak

LTE10_Top Channel Average

Channel Power Plots, NB IoT Guard Band Carrier in Upper Guard Band (15MHz):

LTE15_Bottom Channel Peak

Channel Power: 52.30 dBm / 18 MHz
Power Spectral Density: -20.26 dBm /Hz

LTE15_Bottom Channel Average

Channel Power: 44.24 dBm / 15 MHz
Power Spectral Density: -27.52 dBm /Hz

LTE15_Middle Channel Peak

Channel Power: 52.35 dBm / 18 MHz
Power Spectral Density: -20.20 dBm /Hz

LTE15_Middle Channel Average

Channel Power: 44.45 dBm / 15 MHz
Power Spectral Density: -27.31 dBm /Hz

LTE15_Top Channel Peak

Channel Power: 52.35 dBm / 18 MHz
Power Spectral Density: -20.21 dBm /Hz

LTE15_Top Channel Average

Channel Power: 44.37 dBm / 15 MHz
Power Spectral Density: -27.39 dBm /Hz

Channel Power Plots, NB IoT Guard Band Carrier in Upper Guard Band (20MHz):
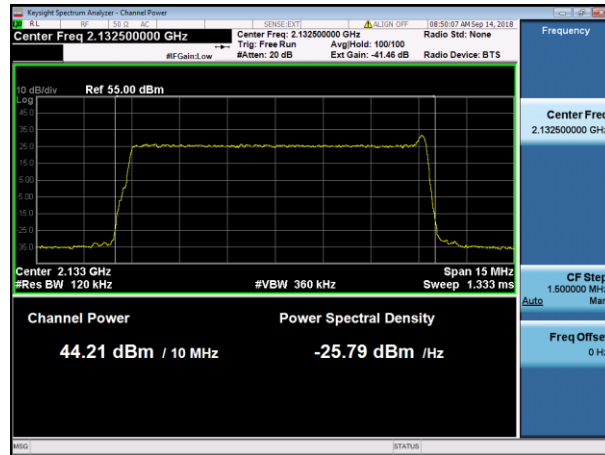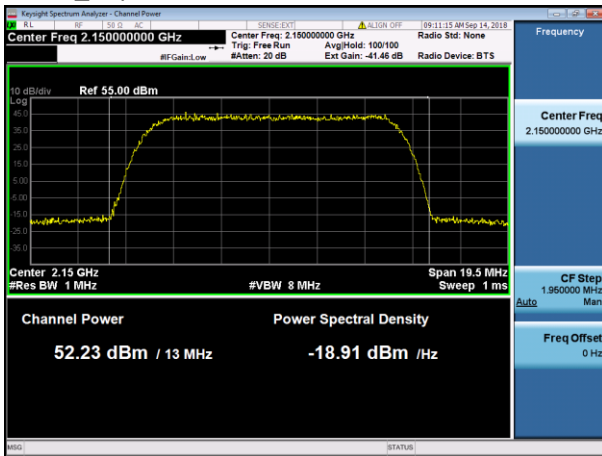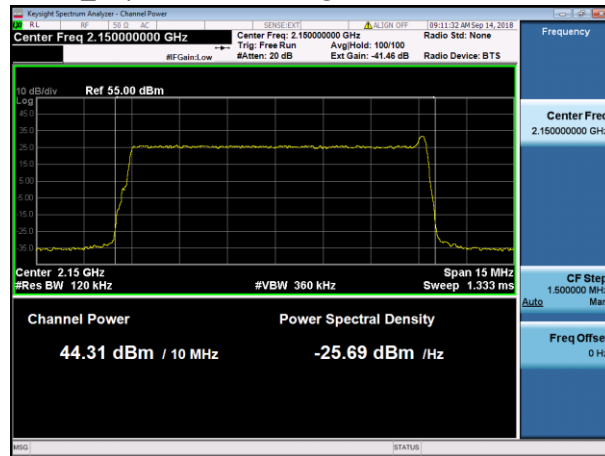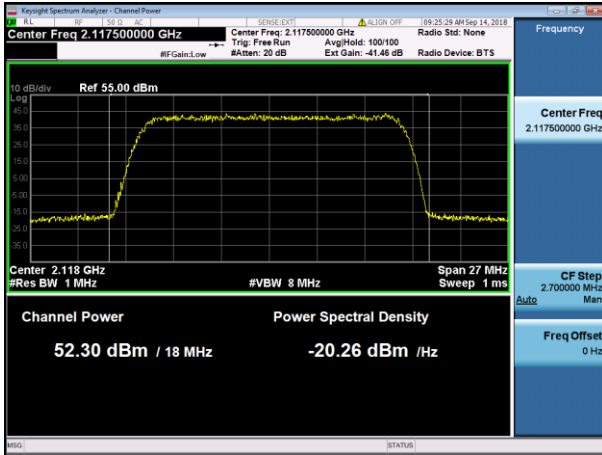
LTE20_Bottom Channel Peak

LTE20_Bottom Channel Average

LTE20_Middle Channel Peak

LTE20_Middle Channel Average
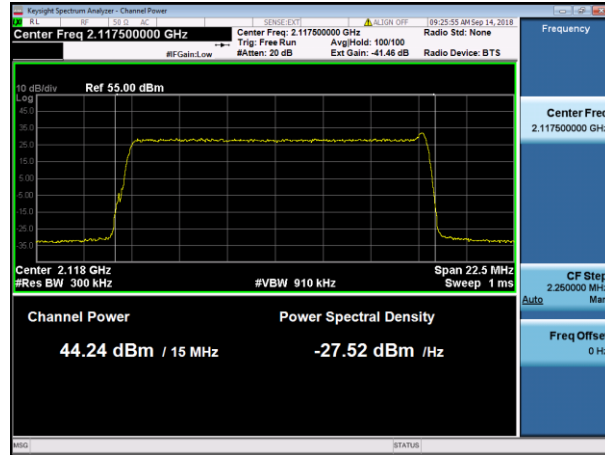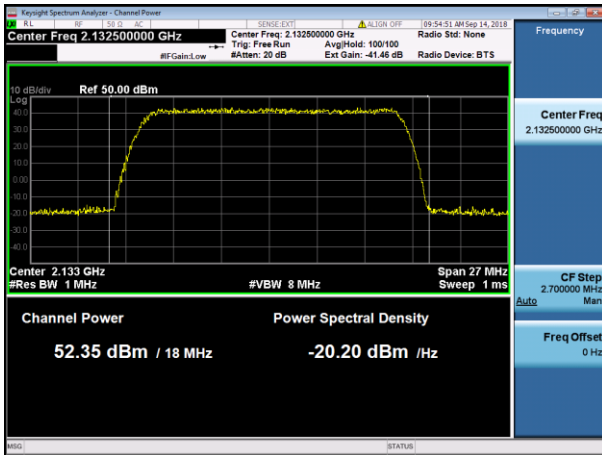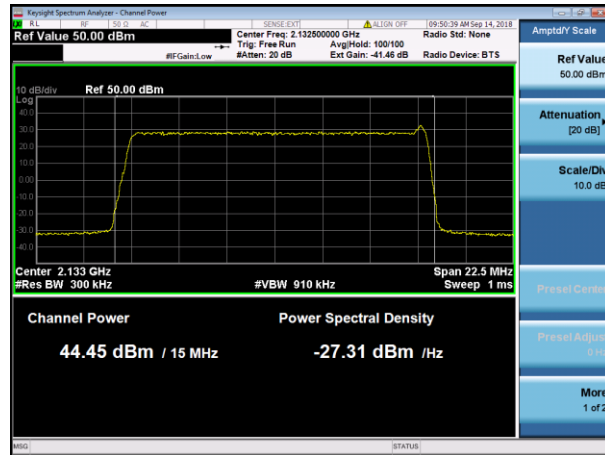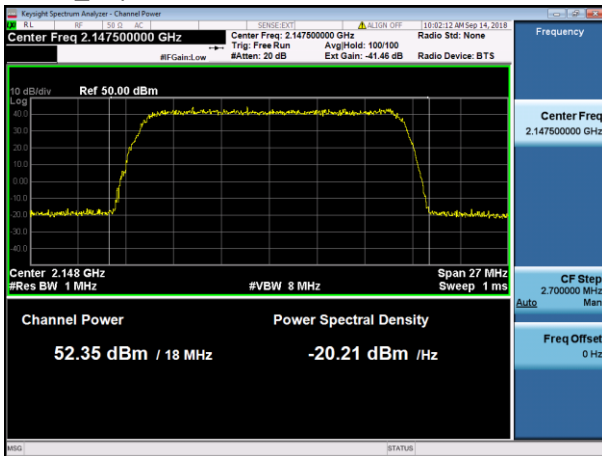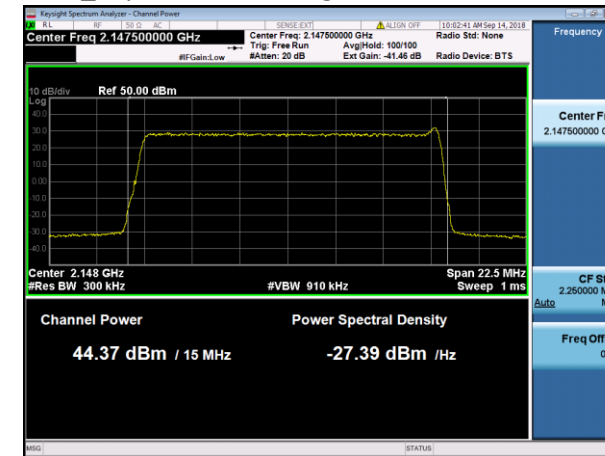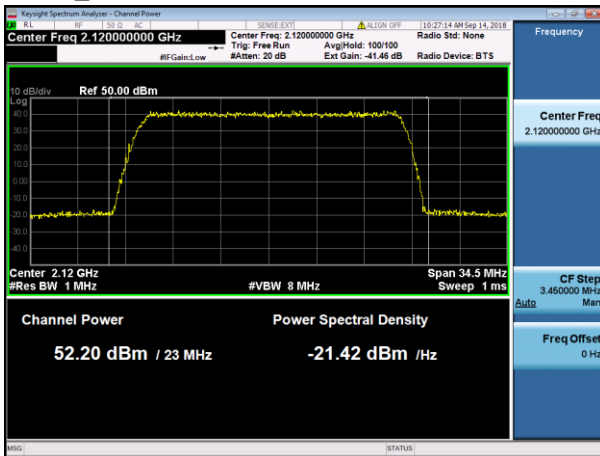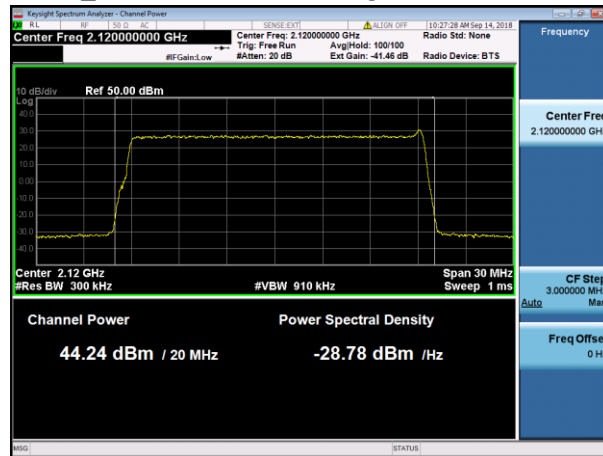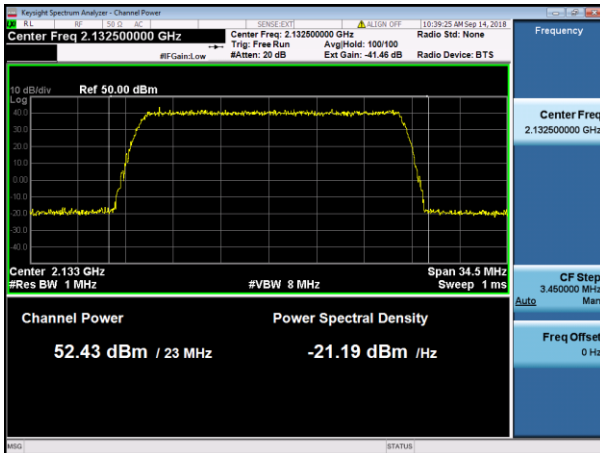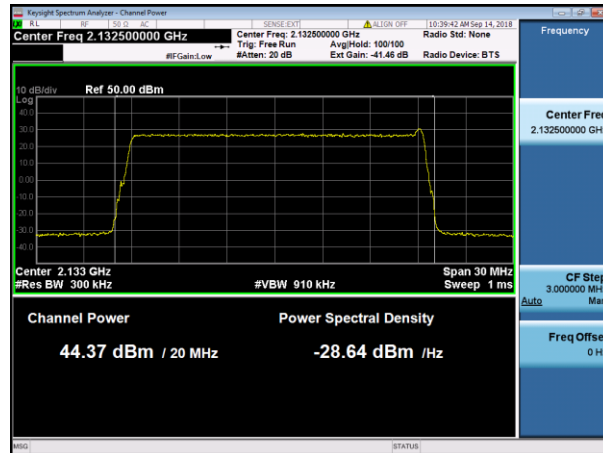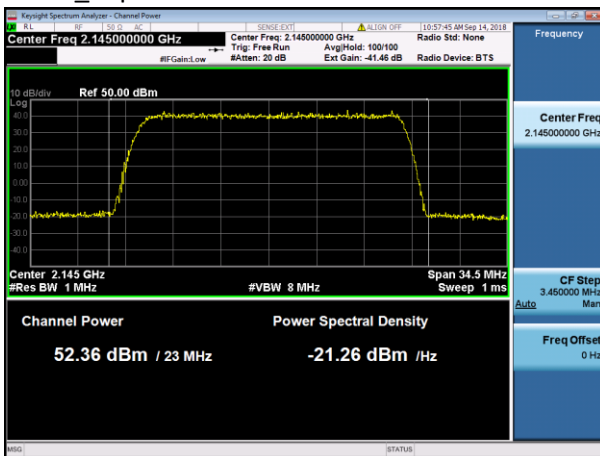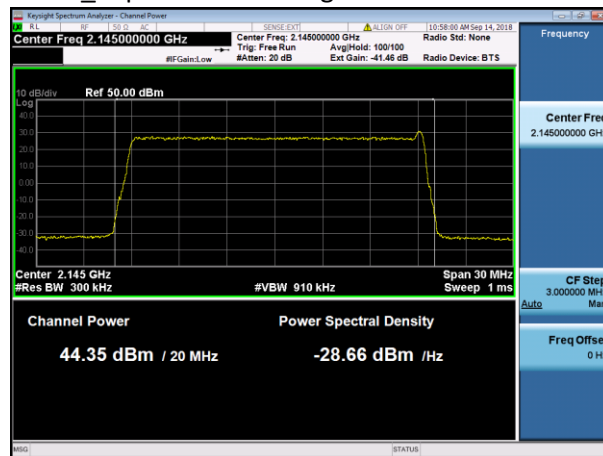

LTE20_Top Channel Peak

LTE20_Top Channel Average

12.2. Emission Bandwidth (26 dB down and 99%)

Emission bandwidth measurements were made at FRIG antenna port 1 for NB IoT GB. Measurements were made on the bottom, middle and top channels for LTE bandwidths of 10MHz, 15MHz, and 20MHz. The results are provided in the following table.

LTE Bandwidth	NB IoT Guard band (Lower)					
	Bottom Channel		Middle Channel		Top Channel	
	26dB(MHz)	99% (MHz)	26dB(MHz)	99% (MHz)	26dB(MHz)	99% (MHz)
10M	9.67	9.23	9.66	9.24	9.66	9.25
15M	14.44	13.81	14.44	13.8	14.48	13.81
20M	19.21	18.29	19.23	18.3	19.2	18.29

LTE Bandwidth	NB IoT Guard band (upper)					
	Bottom Channel		Middle Channel		Top Channel	
	26dB(MHz)	99% (MHz)	26dB(MHz)	99% (MHz)	26dB(MHz)	99% (MHz)
10M	9.65	9.24	9.66	9.25	9.51	9.19
15M	14.45	13.81	14.47	13.81	14.44	13.83
20M	19.21	18.30	19.19	18.29	19.23	18.29

Emission bandwidth measurement data are provided in the following pages.
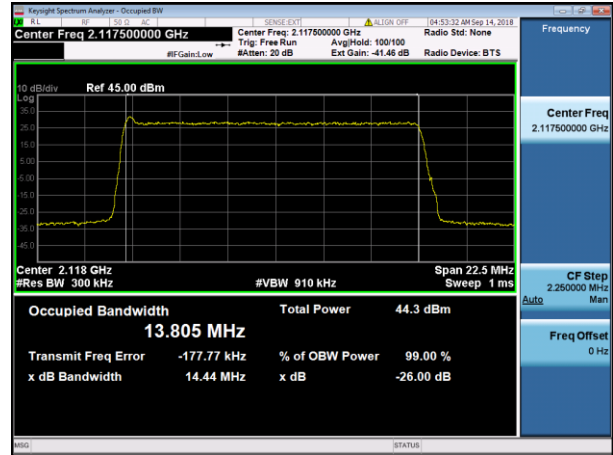
LTE10 and LTE15 plus NB IoT Guard Band Carrier in lower Guard Band (Lower) Bandwidth Plots:
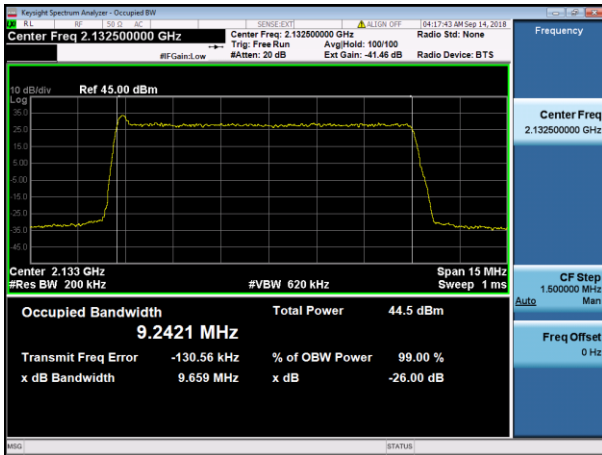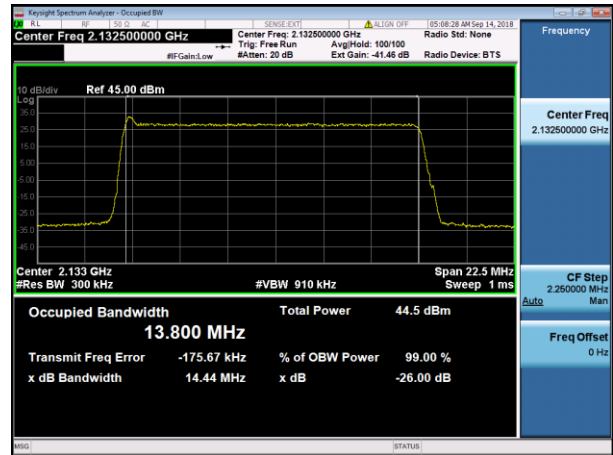
LTE10_Bottom Channel
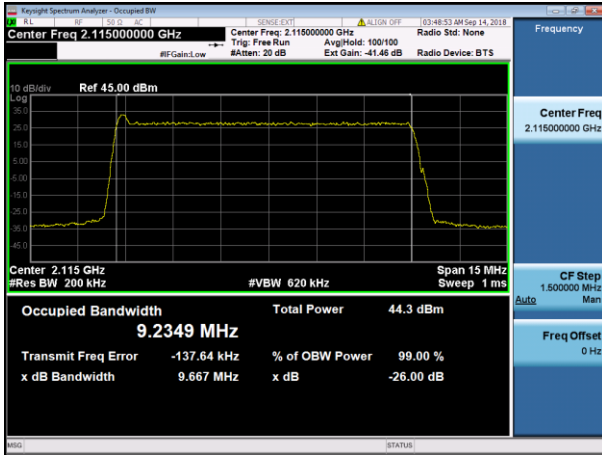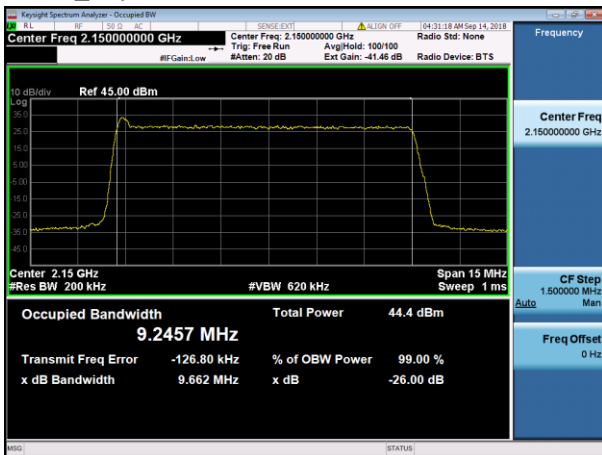

LTE15_Bottom Channel

LTE10_Middle Channel

LTE15_Middle Channel

LTE10_Top Channel

LTE15_Top Channel