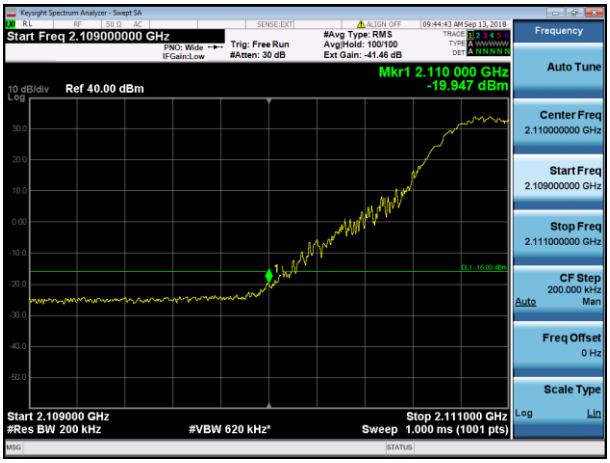
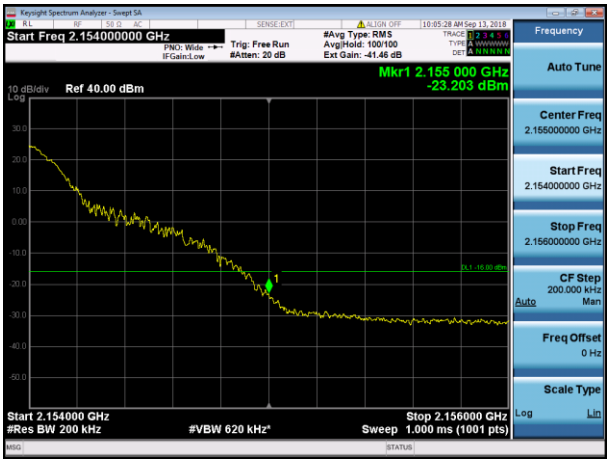
LTE20 + Lower NB IoT GB Carrier Band Edge Plots:

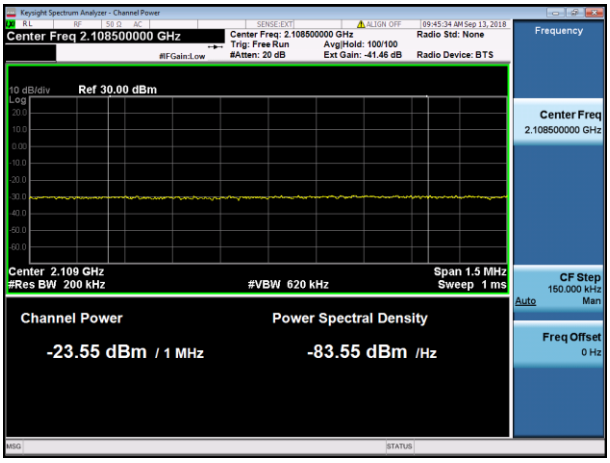
LTE20_Bottom Channel_LBE_2109 to 2111MHz



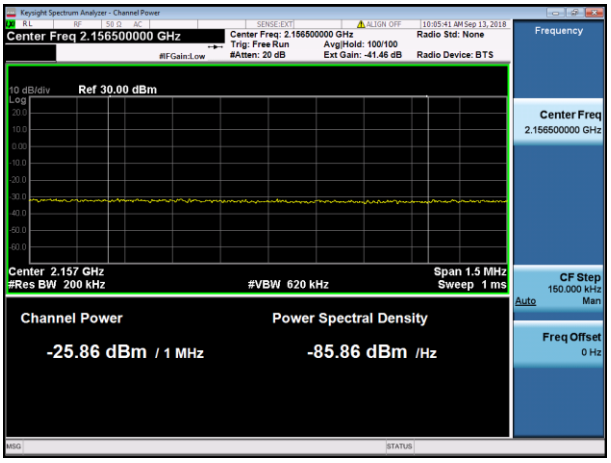
LTE20_Top Channel_UBE_2154 to 2156MHz



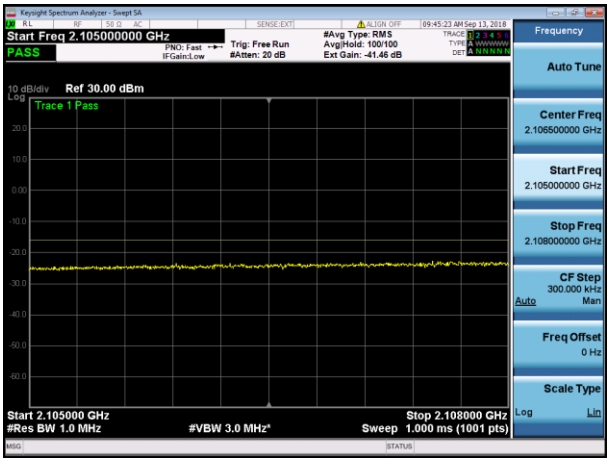
LTE20_Bottom Channel_LBE_2108 to 2109MHz



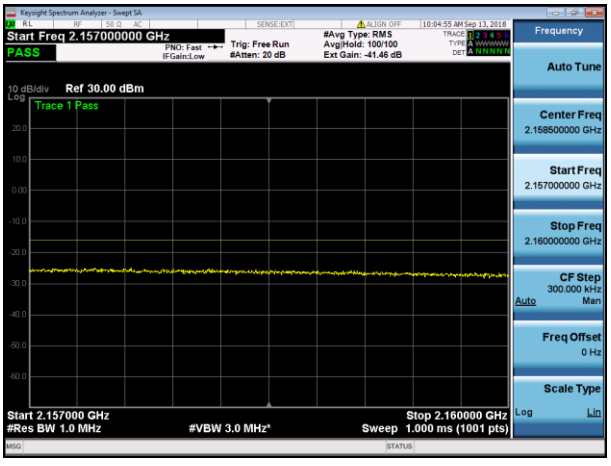
LTE20_Top Channel_UBE_2156 to 2157MHz



LTE20_Bottom Channel_LBE_2105 to 2108MHz

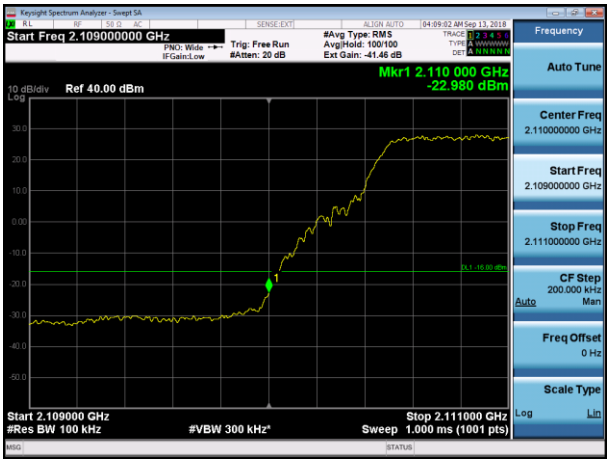


LTE20_Top Channel_UBE_2157 to 2160MHz

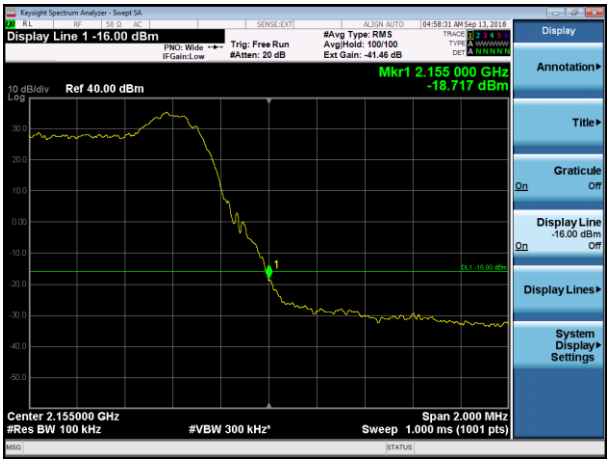


LTE10 + Upper NB IoT GB Carrier Band Edge Plots:

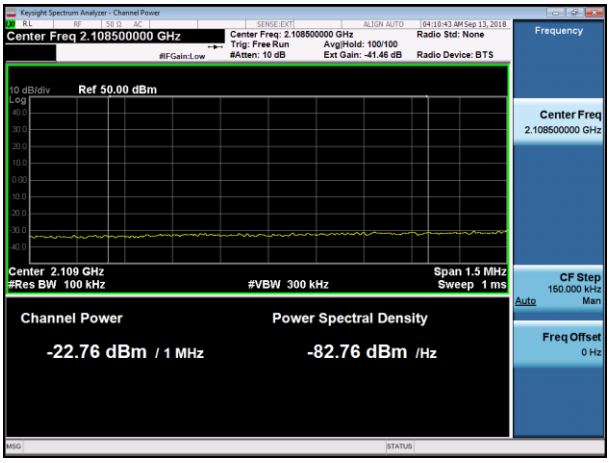
LTE10_Bottom Channel_LBE_2109 to 2111MHz



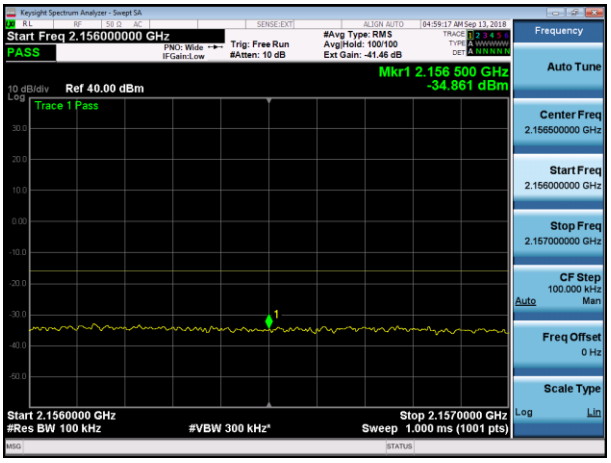
LTE10_Top Channel_UBE_2154 to 2156MHz



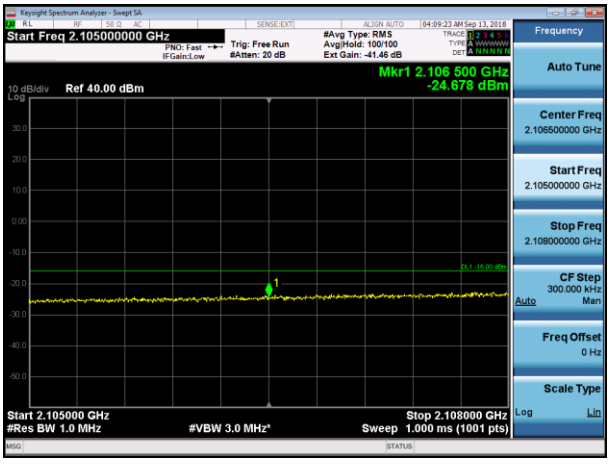
LTE10_Bottom Channel_LBE_2108 to 2109MHz



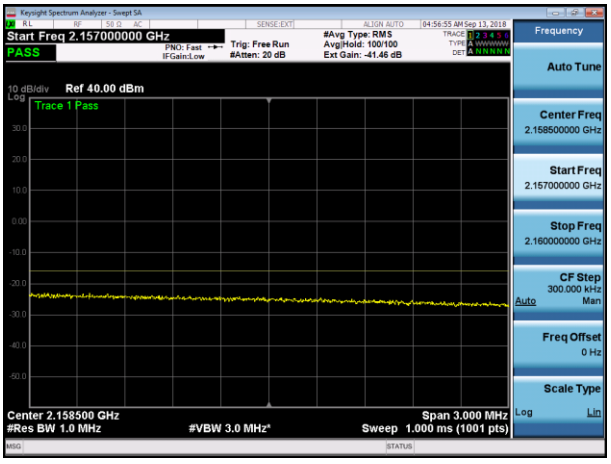
LTE10_Top Channel_UBE_2156 to 2157MHz



LTE10_Bottom Channel_LBE_2105 to 2108MHz

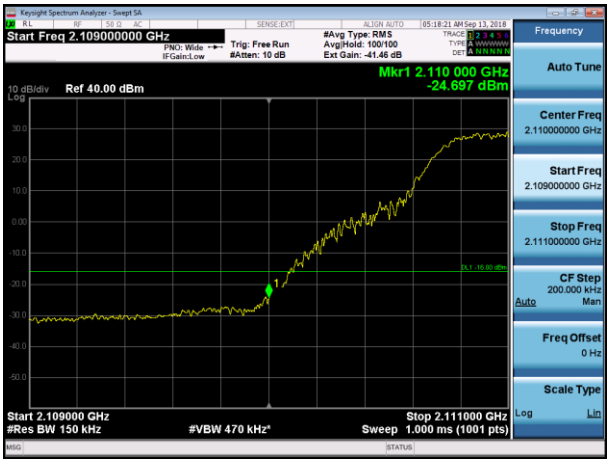


LTE10_Top Channel_UBE_2157 to 2160MHz

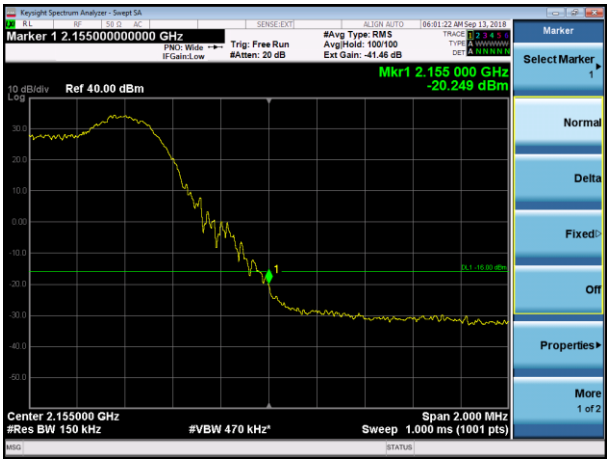


LTE15 + Upper NB IoT GB Carrier Band Edge Plot:

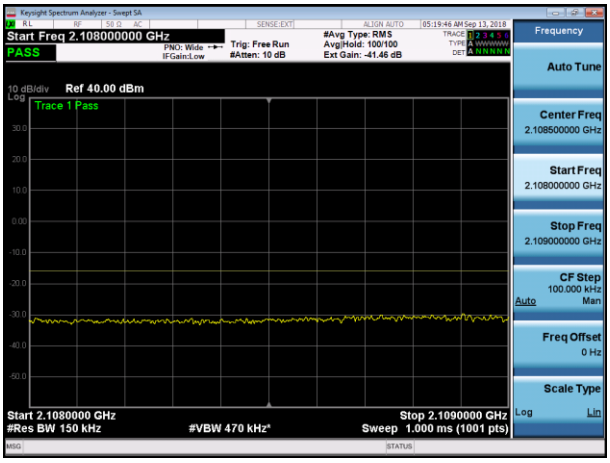
LTE15_Bottom Channel_LBE_2109 to 2111MHz



LTE15_Top Channel_UBE_2154 to 2156MHz

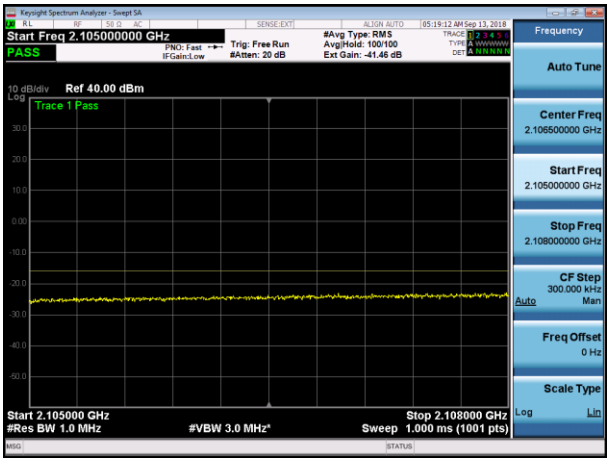


LTE15_Bottom Channel_LBE_2108 to 2109MHz

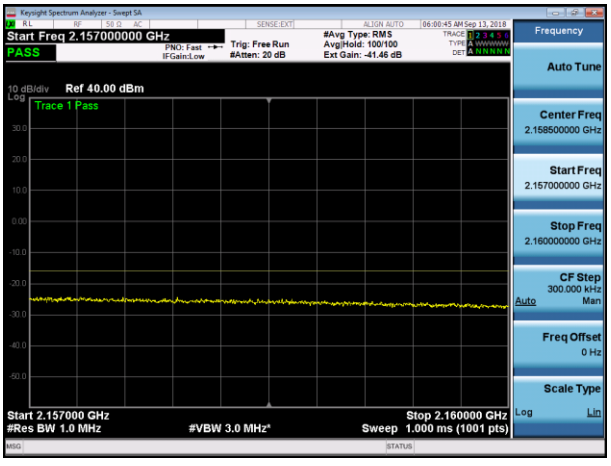


LTE15_Top Channel_UBE_2156 to 2157MHz

LTE15_Bottom Channel_LBE_2105 to 2108MHz

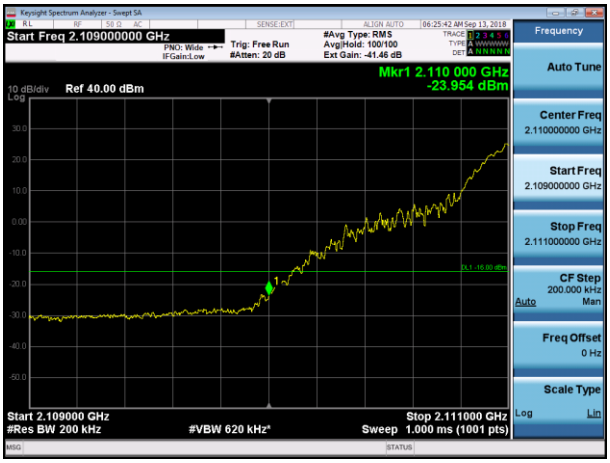


LTE15_Top Channel_UBE_2157 to 2160MHz



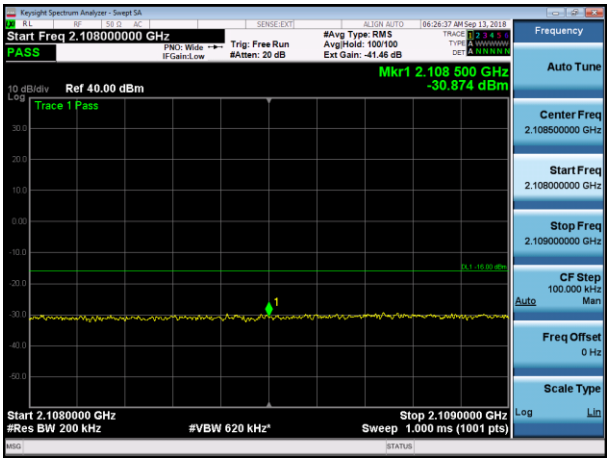
LTE20 + Upper NB IoT GB Carrier Band Edge Plots:

LTE20_Bottom Channel_LBE_2109 to 2111MHz

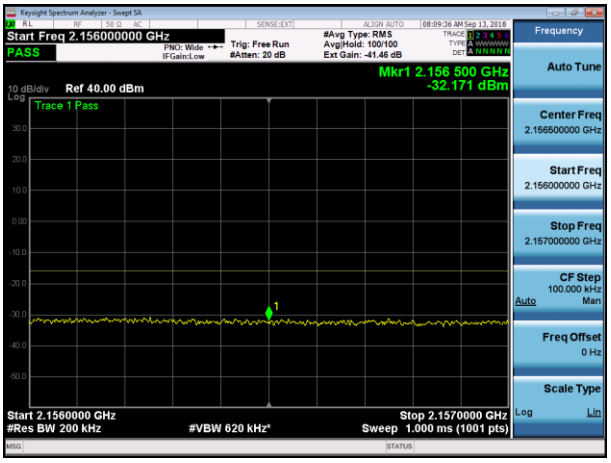


LTE20_Top Channel_UBE_2154 to 2156MHz

LTE20_Bottom Channel_LBE_2108 to 2109MHz

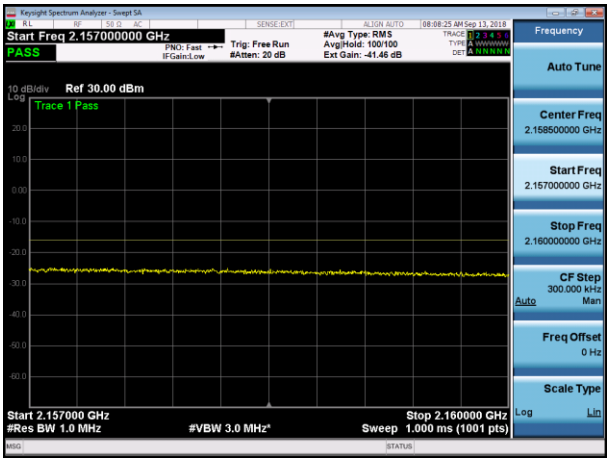


LTE20_Top Channel_UBE_2156 to 2157MHz



LTE20_Bottom Channel_LBE_2105 to 2108MHz

LTE20_Top Channel_UBE_2157 to 2160MHz



11.4. Transmitter Antenna Port Conducted Emissions

Transmitter conducted emission measurements were made at FRIG RRH antenna port #1. Measurements were performed over the 9kHz to 22GHz frequency range. The FRIG was operated on the middle channel (2132.5MHz) with a single NB IoT Guard band carrier with LTE bandwidths of 10MHz, 15MHz and 20MHz.

The same limit of -16dBm used in the original certification testing is used for this testing. The limit is adjusted to -16dBm [-13dBm -10 log (2)] per FCC KDB 662911D01 v02r01 because the BTS may operate as a 2 port MIMO transmitter. The required measurement parameters include a 1MHz bandwidth with power measured in average value (since transmitter power was measured in average value).

Measurements were performed with a spectrum analyzer using a peak detector with either max hold over 50 sweeps or RMS average mode over 100 traces (see table below).

The limit for the 9kHz to 150kHz frequency range was adjusted to –46dBm to correct for a spectrum analyzer RBW of 1kHz versus required RBW of 1MHz [i.e.: -46dBm = -16dBm -10log(1MHz/1kHz)]. The limit for the 150kHz to 20MHz frequency range was adjusted to –26dBm to correct for a spectrum analyzer RBW of 100kHz versus required RBW of 1MHz [i.e.: -26dBm = -16dBm -10log(1MHz/100kHz)]. The required limit of -16dBm with a RBW of 1MHz was used for all other frequency ranges. The limit was adjusted from -13 dBm to -16dBm [-13dBm -10 log (2)] per FCC KDB 662911D01 v02r01 because the BTS may operate as a 2 port MIMO transmitter.

The spectrum analyzer settings that were used for this test are summarized in the following table.

TABLE OF ANALYZER SETTINGS FOR CONDUCTED SPURIOUS EMISSIONS

Frequency Range	RBW	VBW	Number of Data Points	Detector/ Avg type	Sweep Time	Max Hold over	Path Loss Note (1)
9kHz to 150kHz	1kHz	3kHz	201	RMS Avg	Auto	Note (2)	18.78dB
150kHz to 10MHz	100kHz	300kHz	201	RMS Avg	Auto	Note (2)	18.78dB
10MHz to 100MHz	1MHz	3MHz	201	RMS Avg	Auto	Note (2)	37.81dB
100MHz to 2090MHz	1MHz	3MHz	1991	Max Peak	Auto	50 Sweeps	39.7dB
2090MHz to 2200MHz	1MHz	3MHz	521	RMS Avg	Auto	Note (2)	41.46dB
2200GHz to 6GHz	1MHz	3MHz	4001	Max Peak	Auto	50 Sweeps	41.56dB
6GHz to 10GHz	1MHz	3MHz	4001	Max Peak	Auto	50 Sweeps	42.45dB
10GHz to 14GHz	1MHz	3MHz	4001	Max Peak	Auto	50 Sweeps	42.31dB
14GHz to 18GHz	1MHz	3MHz	8001	RMS Avg	Auto	Note (2)	44.04dB
18GHz to 22GHz	1MHz	3MHz	8001	RMS Avg	Auto	Note (2)	44.16dB

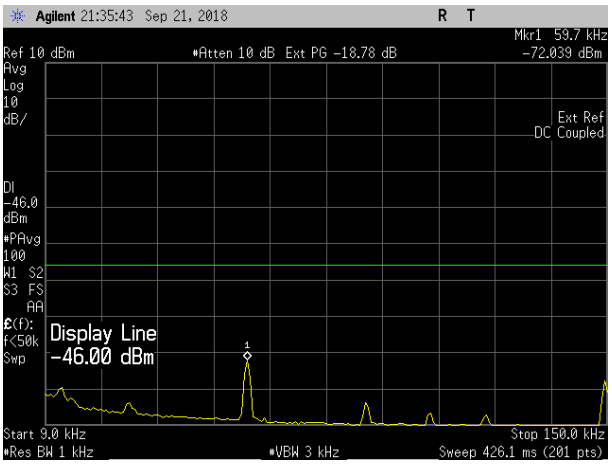
Note 1: The total measurement RF path loss of the test setup (attenuators, test cables and filters) is accounted for by the spectrum analyzer external gain offset.
Note 2: Max Hold not used and instead measurements were performed with the spectrum analyzer in the RMS average mode over 100 traces.

A low pass/carrier blocking filter was used to reduce measurement instrumentation noise floor for the frequency ranges less than 10MHz. The total measurement RF path loss of the test setup (attenuators, filter, cables) as shown in the table is accounted for by the spectrum analyzer reference level offset. The display line or limit line on the plots reflects the required limit.

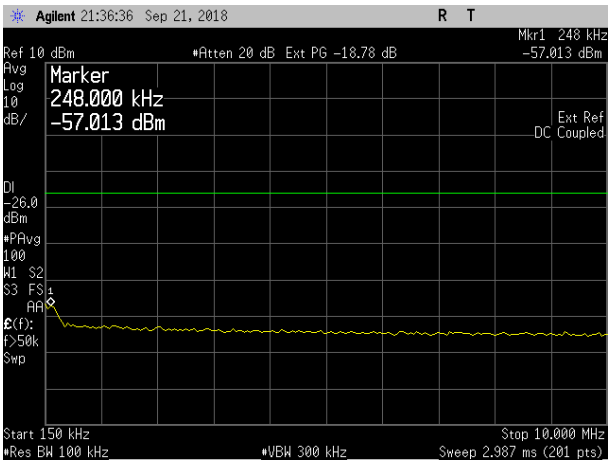
Conducted spurious emission plots/measurements are provided in the following pages.

10MHz Bottom Channel (2115MHz) NB IoT at lower Guard Band:

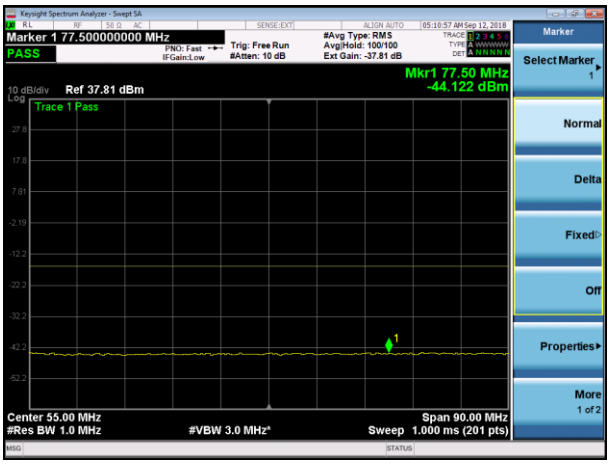
LTE10 Bottom+NB IoT GB (Lower) 0.009-0.15Mhz



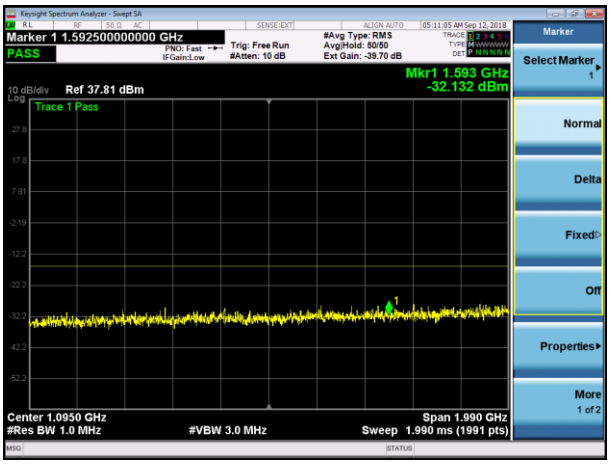
LTE10 Bottom+NB IoT GB (Lower) 0.15MHz – 10MHz



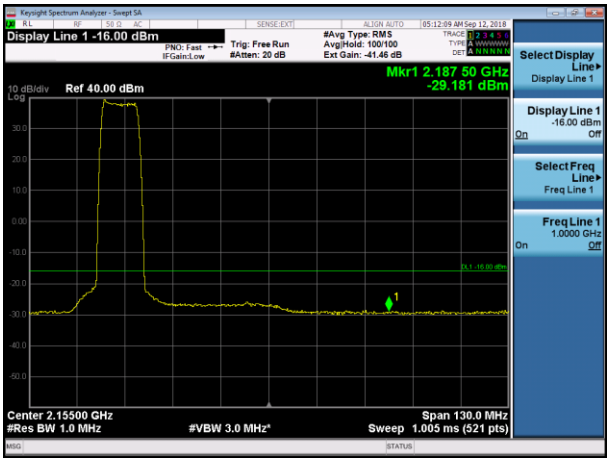
LTE10 Bottom+NB IoT GB (Lower) 10-100Mhz



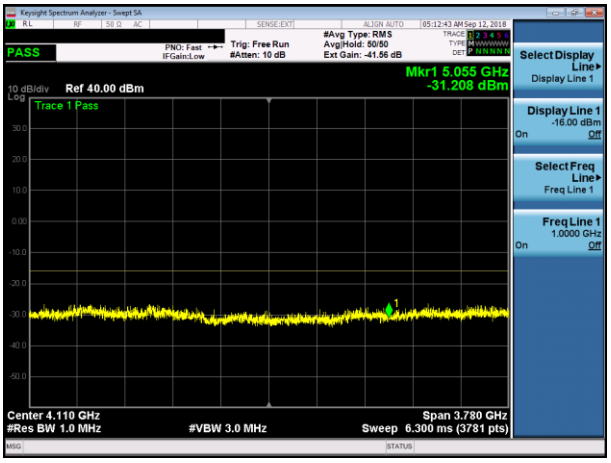
LTE10 Bottom+NB IoT GB (Lower) 100MHz – 2090MHz



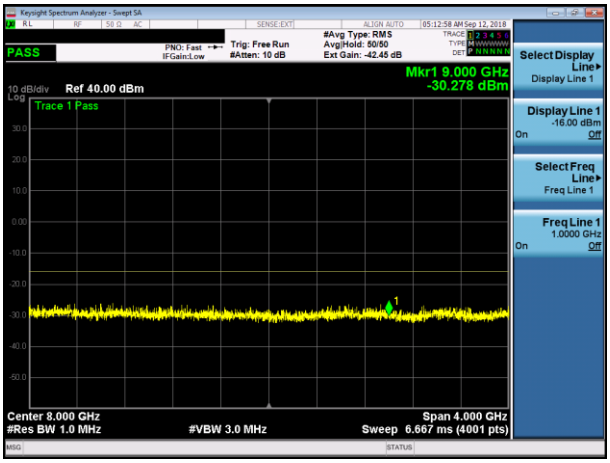
LTE10 BOTTOM+NB IoT GB (Lower) 2090MHz – 2220MHz



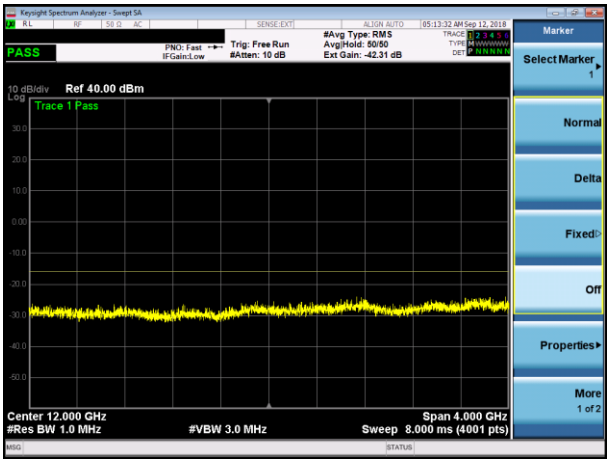
LTE10 BOTTOM+NB IoT GB (Lower) 2220MHz-6000Mhz



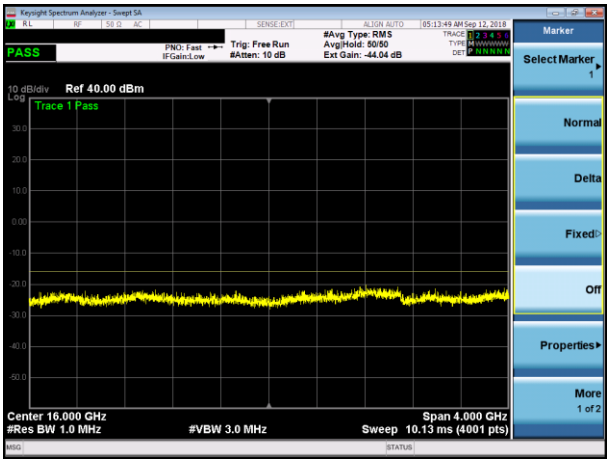
LTE10 BOTTOM+NB IoT GB (Lower) 6000MHz-10000MHz



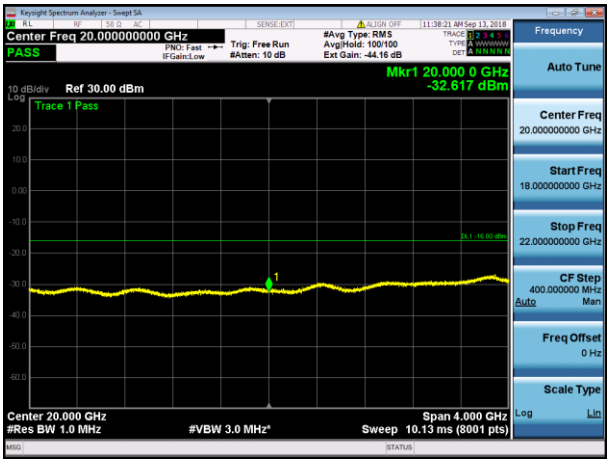
LTE10 BOTTOM+NB IoT GB (Lower) 10000-14000MHz



LTE10 BOTTOM+NB IoT GB (Lower) 14000MHz – 18000MHz

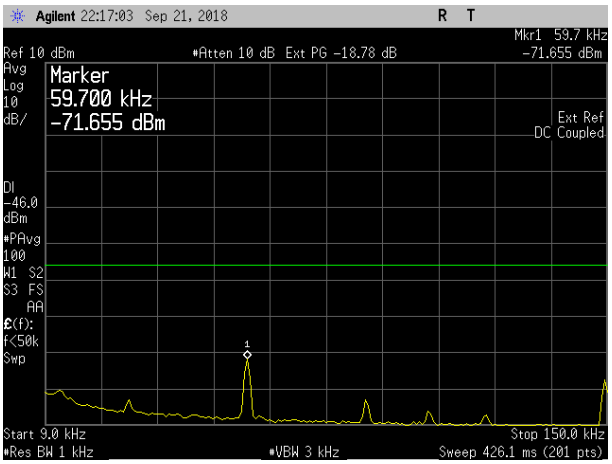


LTE10 BOTTOM+NB IoT GB (Lower) 18000MHz – 22000MHz

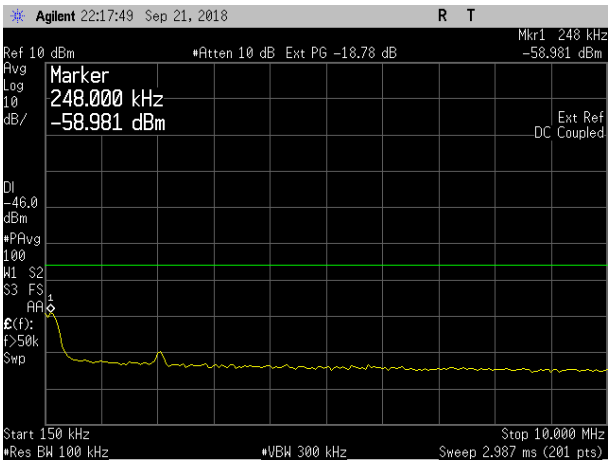


10MHz Middle Channel (2132.5MHz) NB IoT at lower Guard Band:

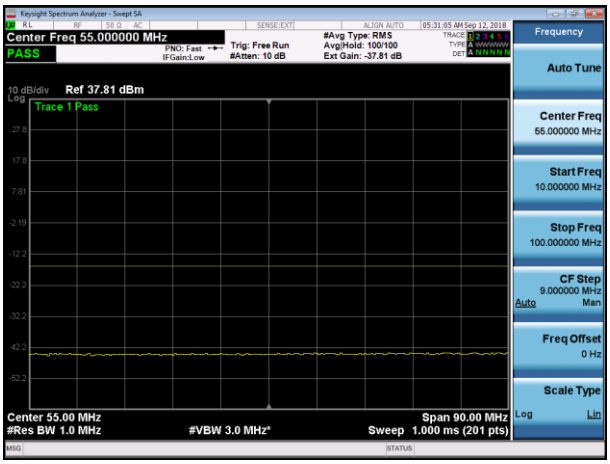
LTE10 Mid+NB IoT GB (Lower) 0.009-0.15Mhz



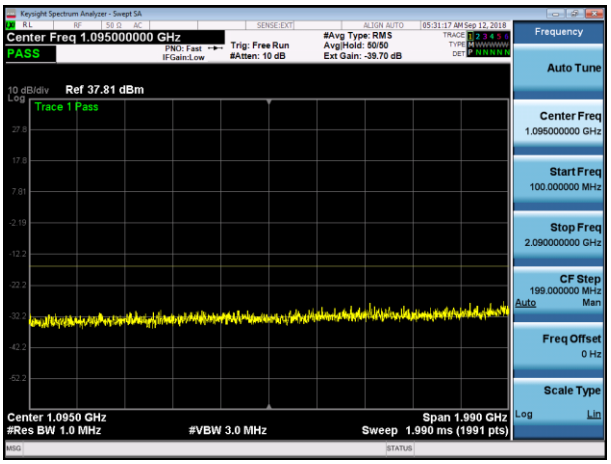
LTE10 Mid+NB IoT GB (Lower) 0.15MHz – 10MHz



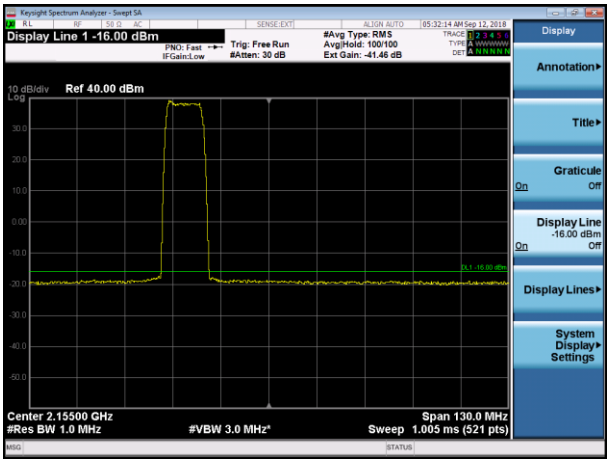
LTE10 Mid+NB IoT GB (Lower) 10MHz-100MHz



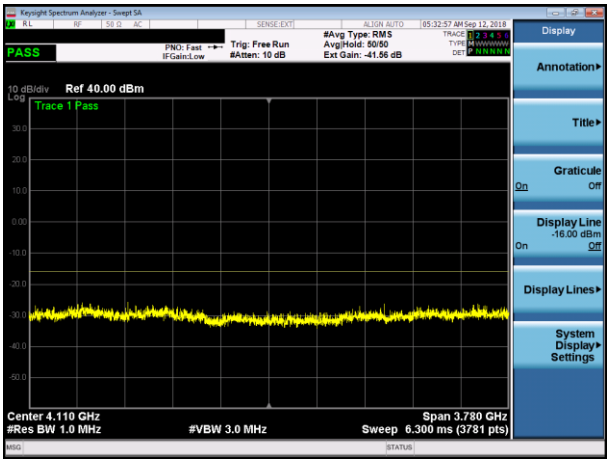
LTE10 Mid+NB IoT GB (Lower) 100MHz-2090MHz



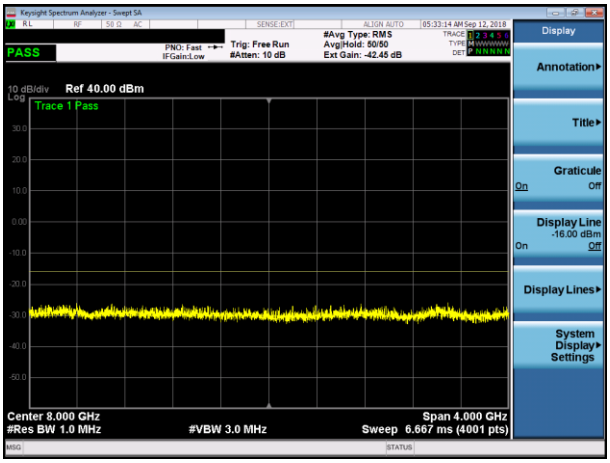
LTE10 Mid+NB IoT GB (Lower) 2090MHz-2220MHz



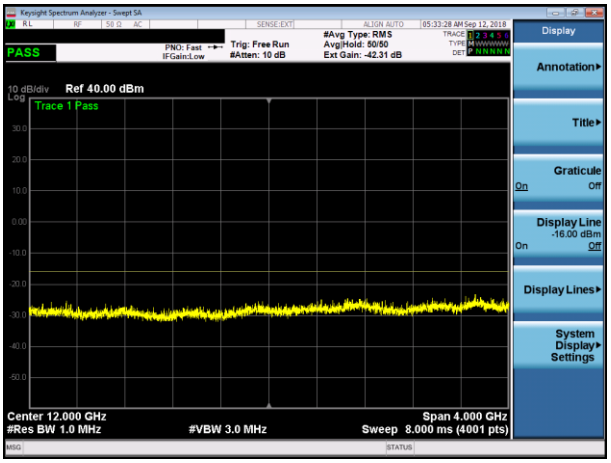
LTE10 Mid+NB IoT GB (Lower) 2220MHz-6000MHz



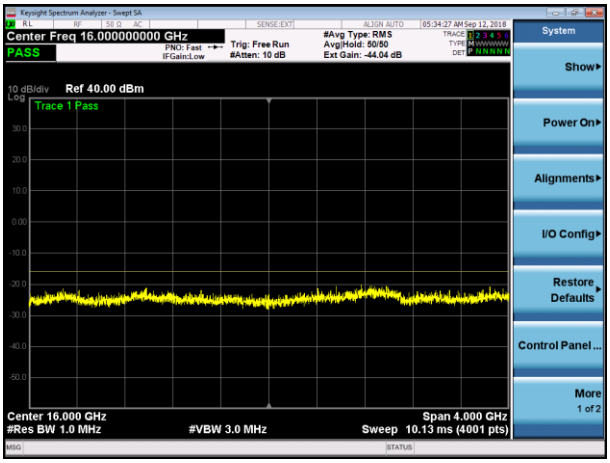
LTE10 Mid+NB IoT GB (Lower) 6000MHz-10000MHz



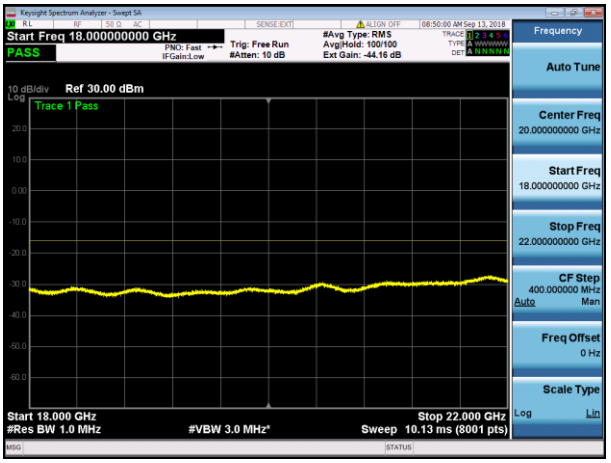
LTE10 Mid+NB IoT GB (Lower) 10000MHz-14000MHz



LTE10 Mid+NB IoT GB (Lower) 14000MHz-18000MHz

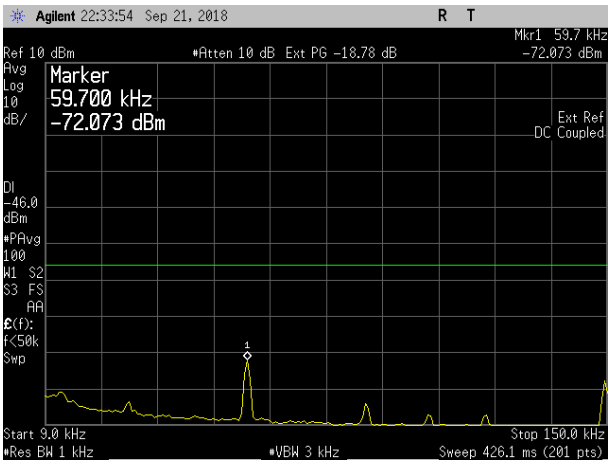


LTE10 Mid+NB IoT GB (Lower) 18000MHz-22000MHz

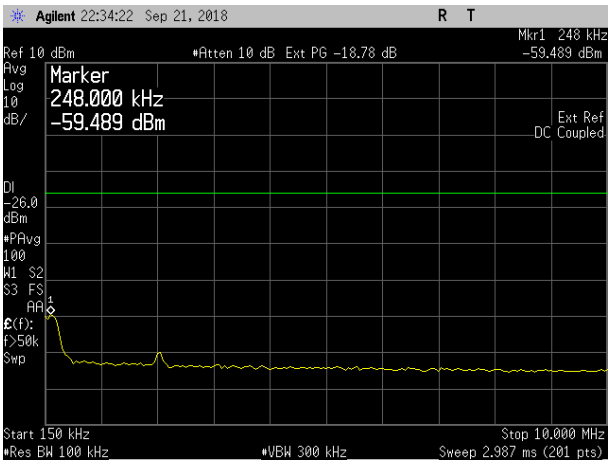


10MHz Top Channel (2150MHz) NB IoT at lower Guard Band:

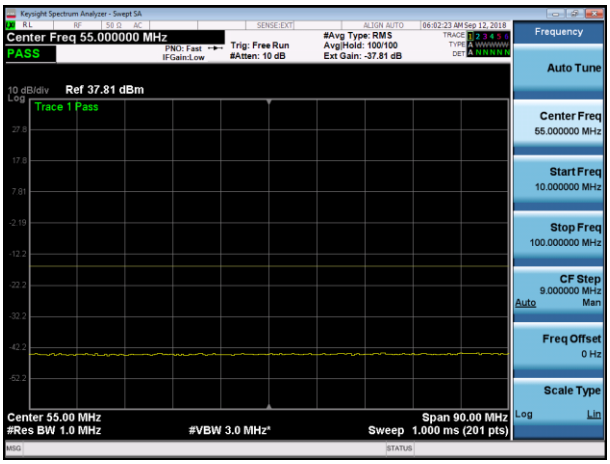
LTE10 Top+NB IoT GB (Lower) 0.009-0.15Mhz



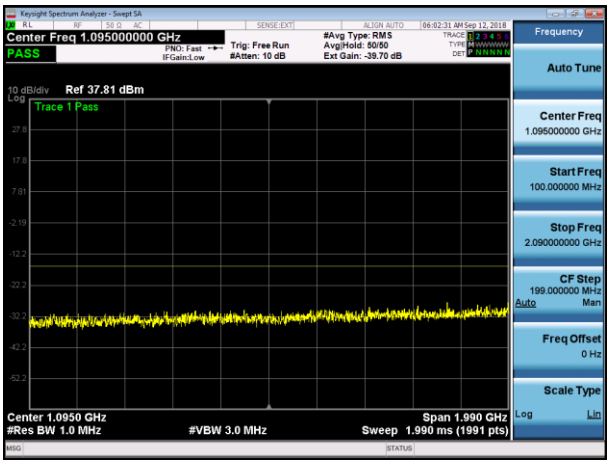
LTE10 Top+NB IoT GB (Lower) 0.15MHz – 10MHz



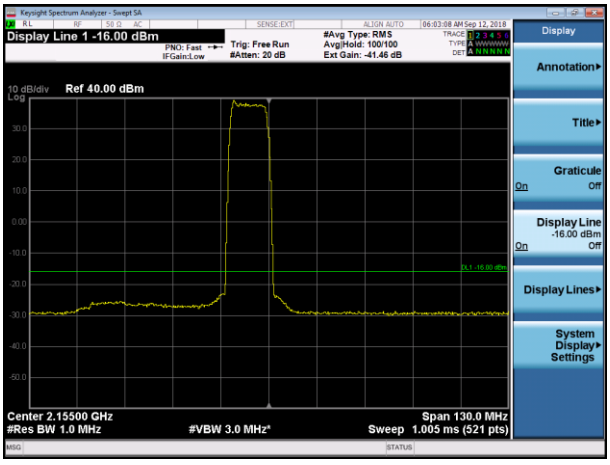
LTE10 Top+NB IoT GB (Lower) 10MHz-100MHz



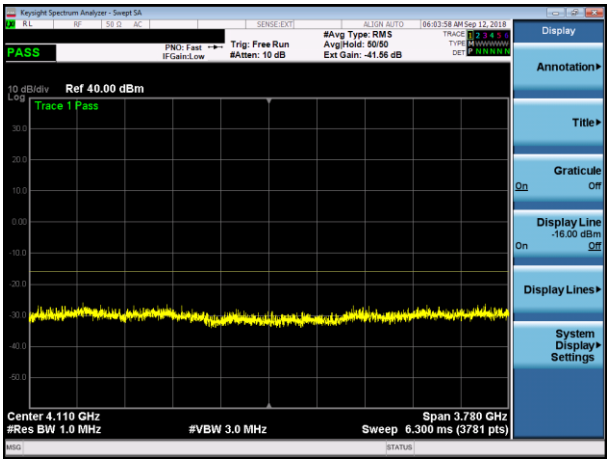
LTE10 Top+NB IoT GB (Lower) 100MHz-2090MHz



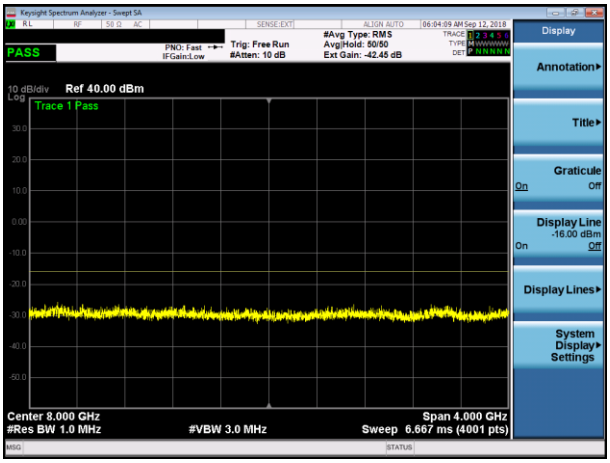
LTE10 Top+NB IoT GB (Lower) 2090MHz-2220MHz



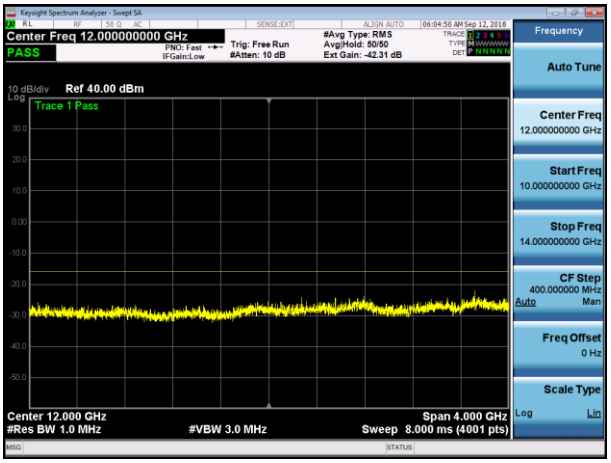
LTE10 Top+NB IoT GB (Lower) 2220MHz-6000MHz



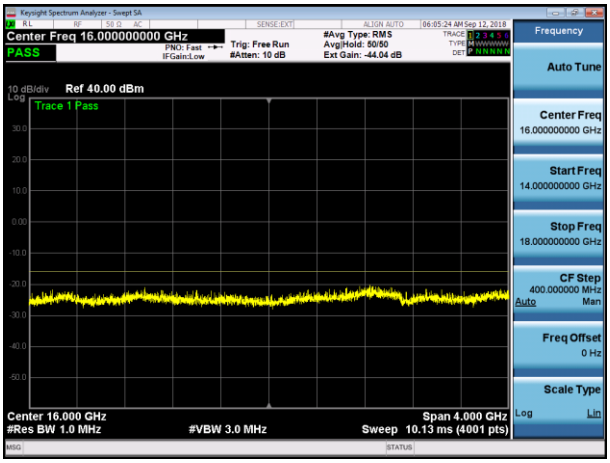
LTE10 Top+NB IoT GB (Lower) 6000MHz-10000MHz



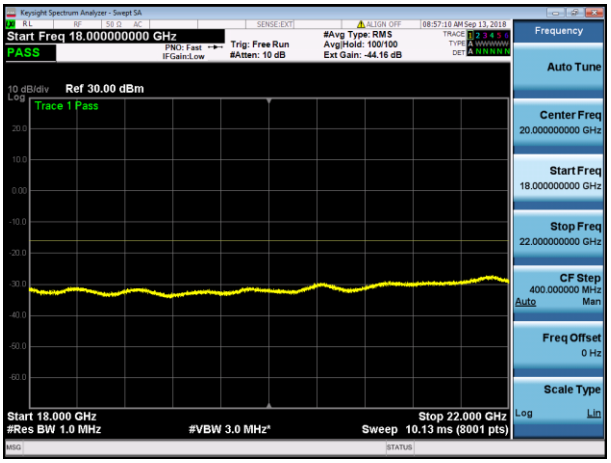
LTE10 Top+NB IoT GB (Lower) 10000MHz-14000MHz



LTE10 Top+NB IoT GB (Lower) 14000MHz-18000MHz

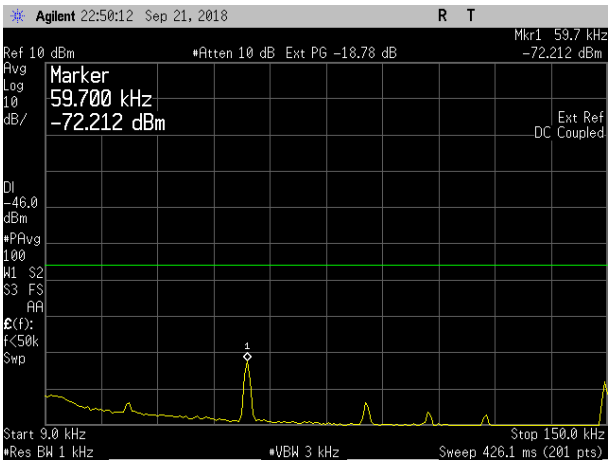


LTE10 Top+NB IoT GB (Lower) 18000MHz-22000MHz

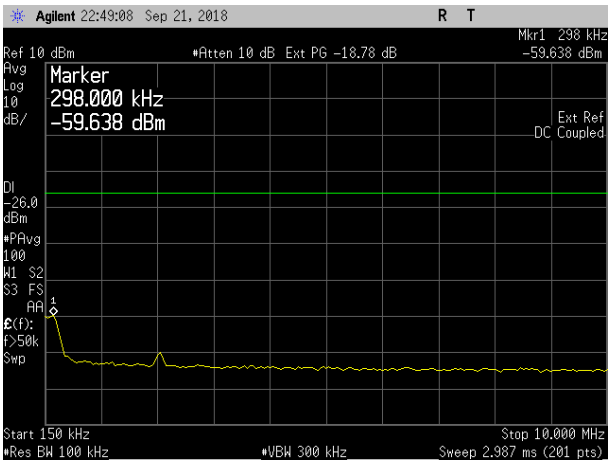


15MHz Bottom Channel (2117.5MHz) NB IoT at lower Guard Band:

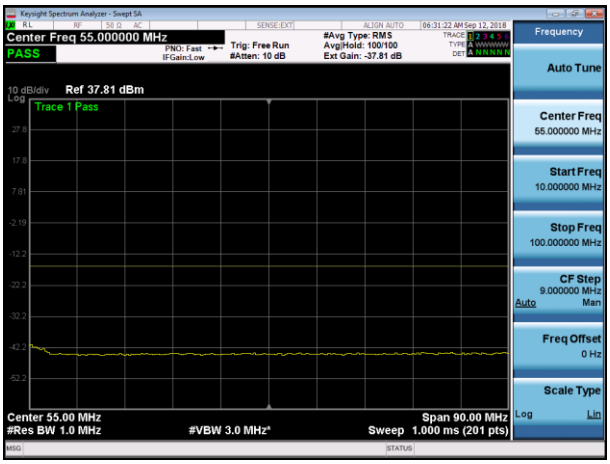
LTE15 Bottom+NB IoT GB (Lower) 0.009-0.15Mhz



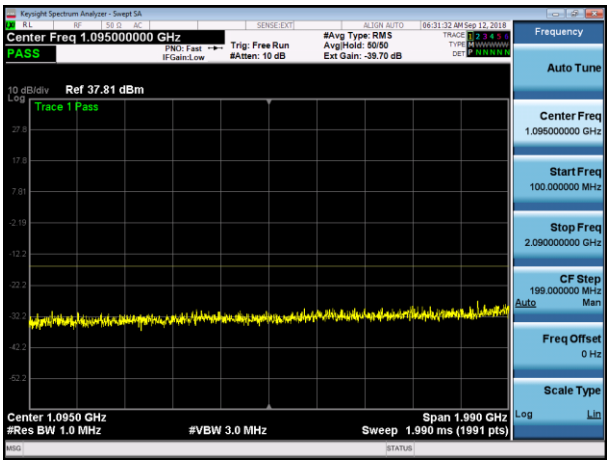
LTE15 Bottom+NB IoT GB (Lower) 0.15MHz – 10MHz



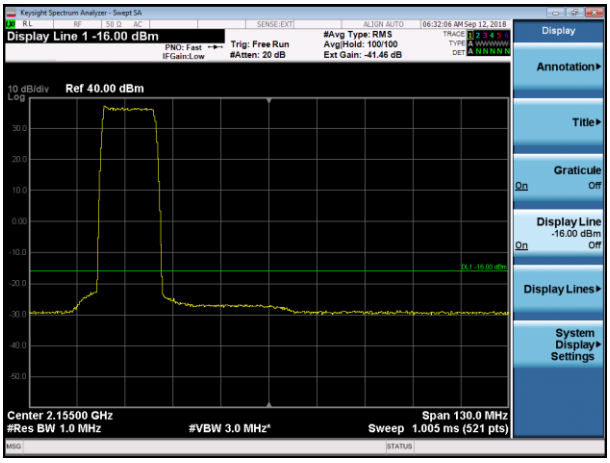
LTE15 Bottom+NB IoT GB (Lower) 10-100Mhz



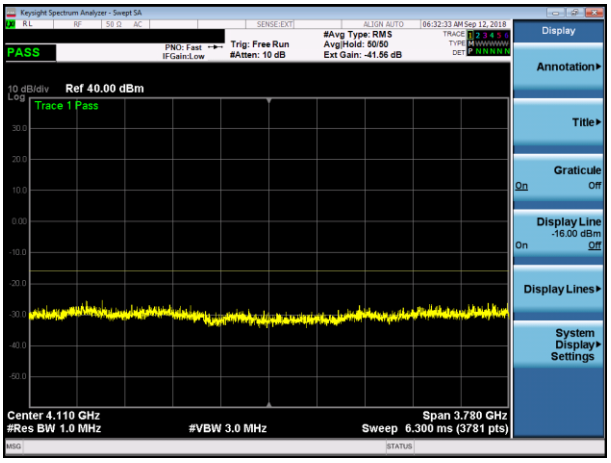
LTE15 Bottom+NB IoT GB (Lower) 100MHz – 2090MHz



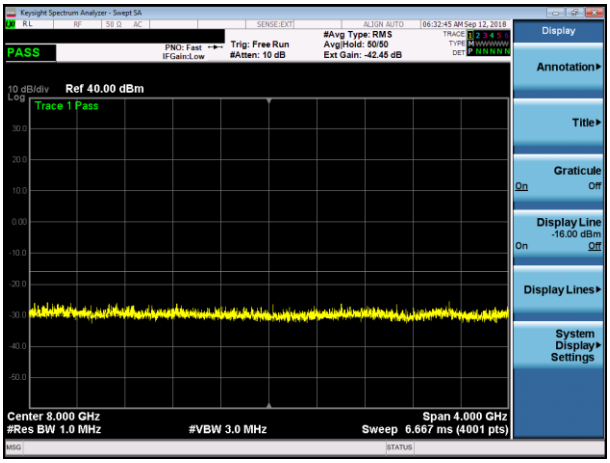
LTE15 BOTTOM+NB IoT GB (Lower) 2090MHz – 2220MHz



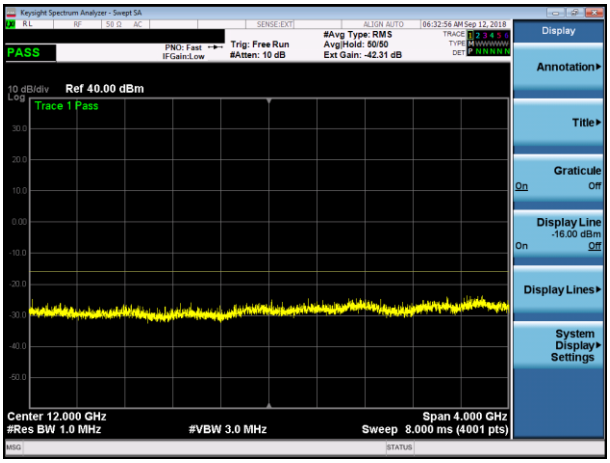
LTE15 BOTTOM+NB IoT GB (Lower) 2220MHz-6000Mhz



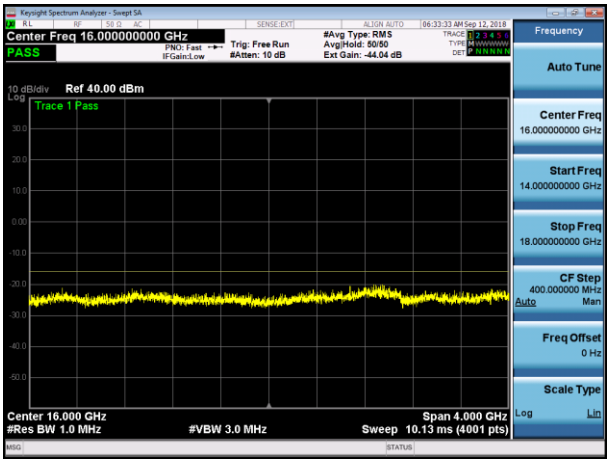
LTE15 BOTTOM+NB IoT GB (Lower) 6000MHz-10000MHz



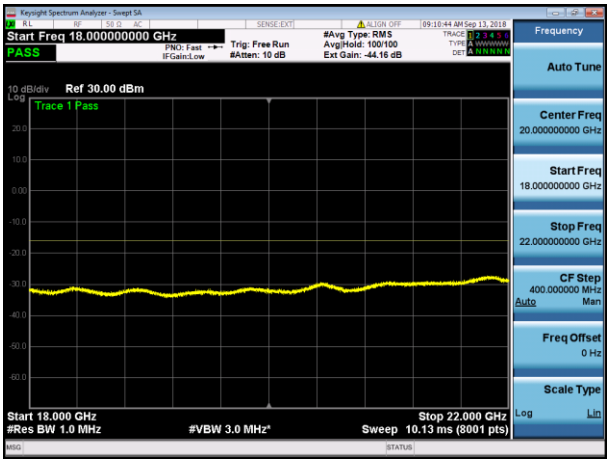
LTE15 BOTTOM+NB IoT GB (Lower) 10000-14000MHz



LTE15 BOTTOM+NB IoT GB (Lower) 14000MHz – 18000MHz

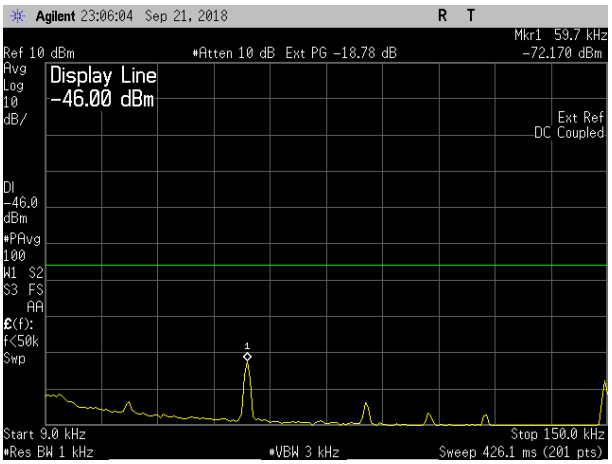


LTE15 BOTTOM+NB IoT GB (Lower) 18000MHz – 22000MHz

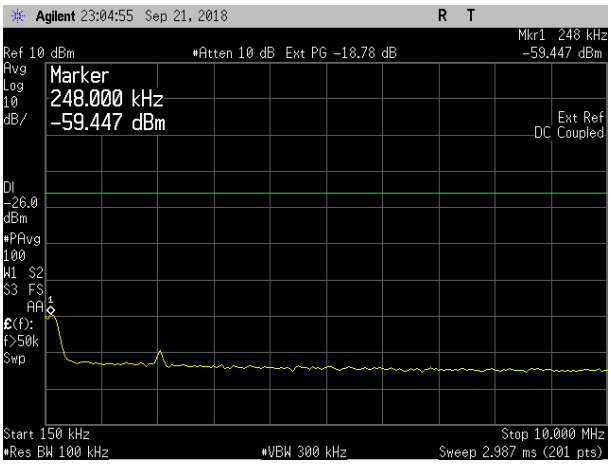


15MHz Middle Channel (2132.5MHz) NB IoT at lower Guard Band:

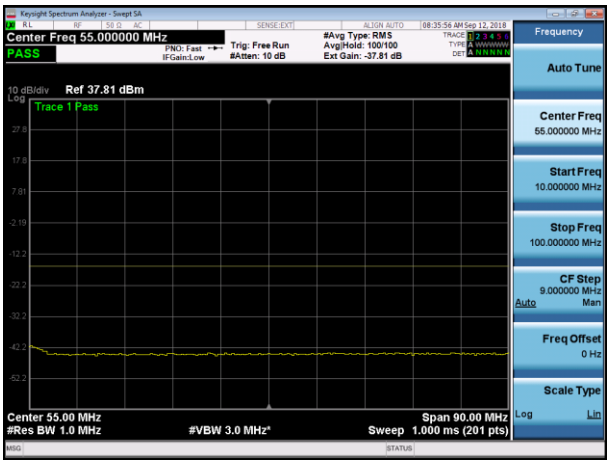
LTE15 Mid+NB IoT GB (Lower) 0.009-0.15Mhz



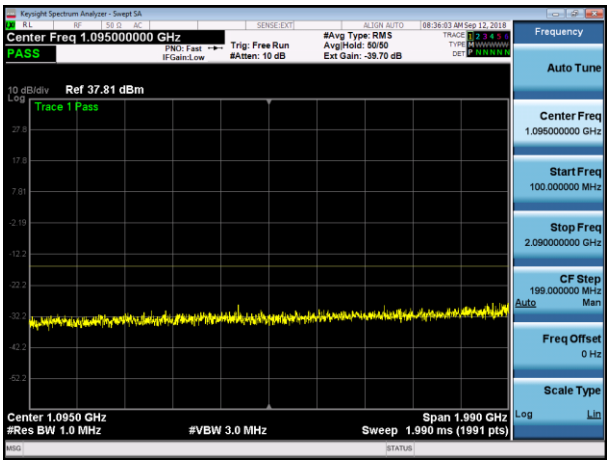
LTE15 Mid+NB IoT GB (Lower) 0.15MHz – 10MHz



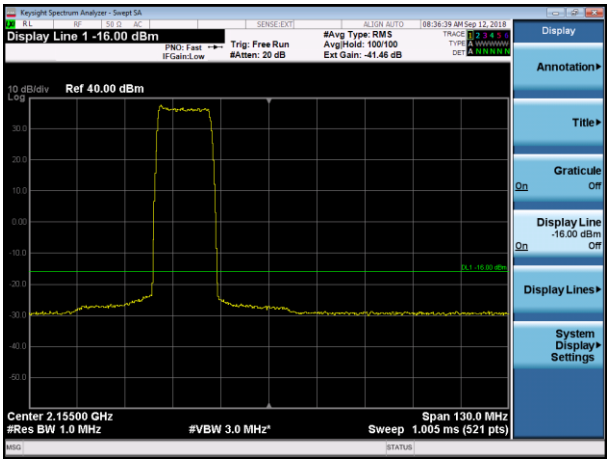
LTE15 Mid+NB IoT GB (Lower) 10MHz-100MHz



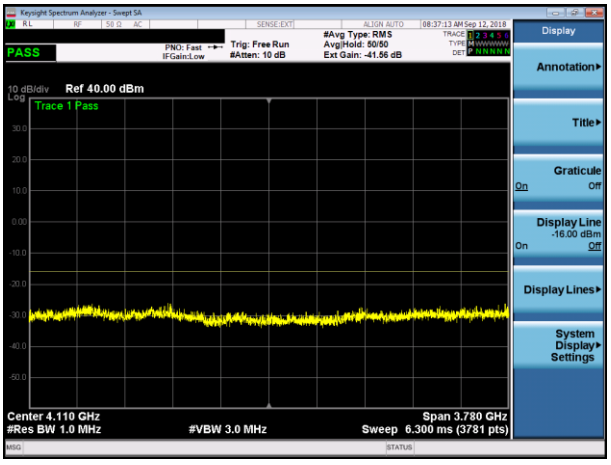
LTE15 Mid+NB IoT GB (Lower) 100MHz-2090MHz



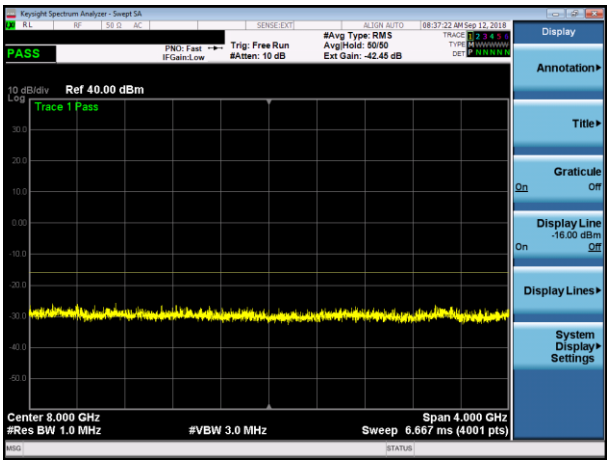
LTE15 Mid+NB IoT GB (Lower) 2090MHz-2220MHz



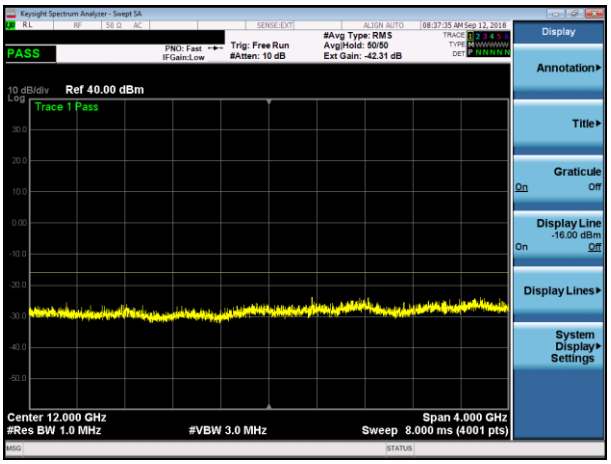
LTE15 Mid+NB IoT GB (Lower) 2220MHz-6000MHz



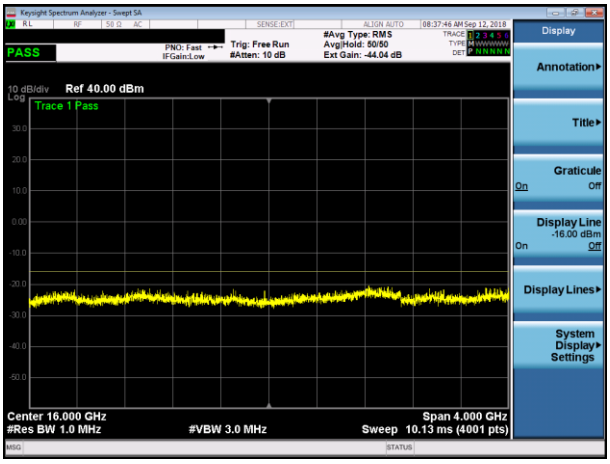
LTE15 Mid+NB IoT GB (Lower) 6000MHz-10000MHz



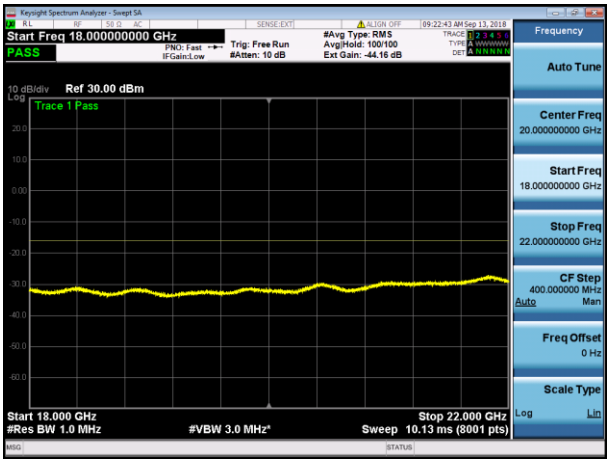
LTE15 Mid+NB IoT GB (Lower) 10000MHz-14000MHz



LTE15 Mid+NB IoT GB (Lower) 14000MHz-18000MHz

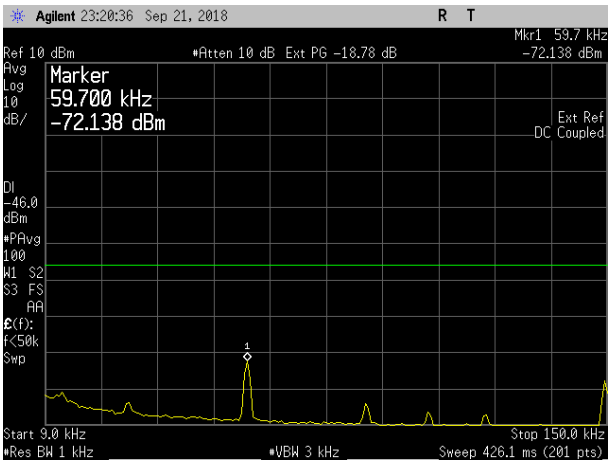


LTE15 Mid+NB IoT GB (Lower) 18000MHz-22000MHz

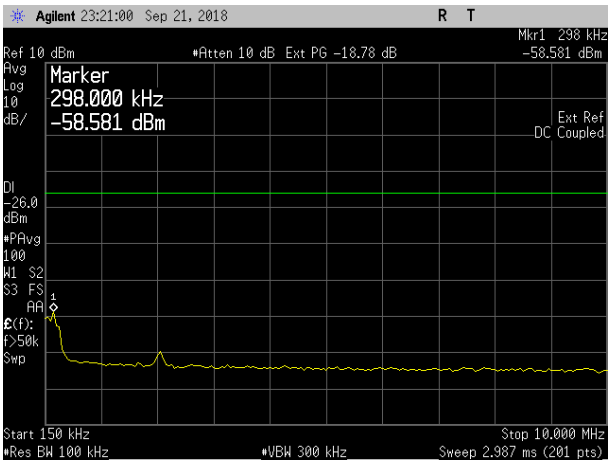


15MHz Top Channel (2147.5MHz) NB IoT at lower Guard Band:

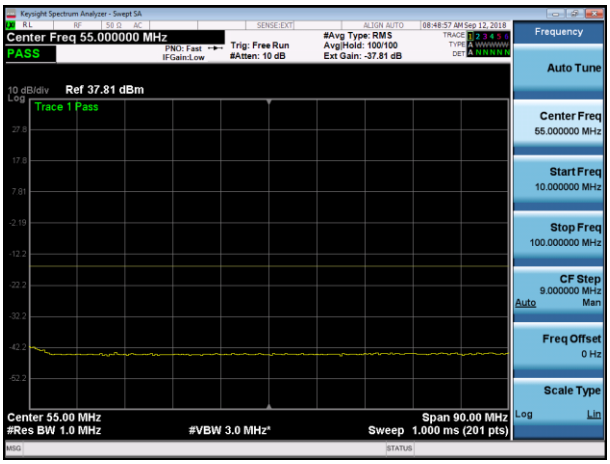
LTE15 Top+NB IoT GB (Lower) 0.009-0.15Mhz



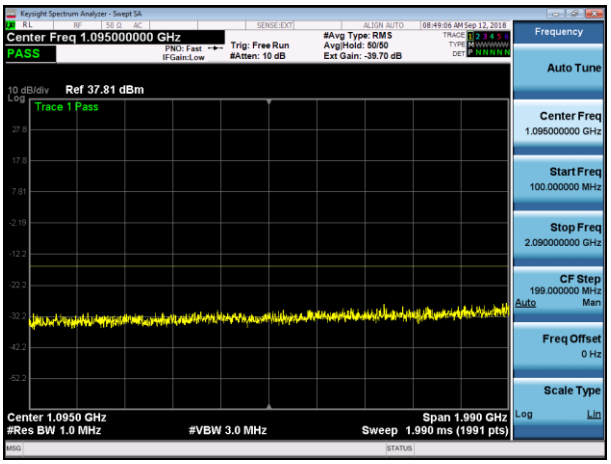
LTE15 Top+NB IoT GB (Lower) 0.15MHz – 10MHz



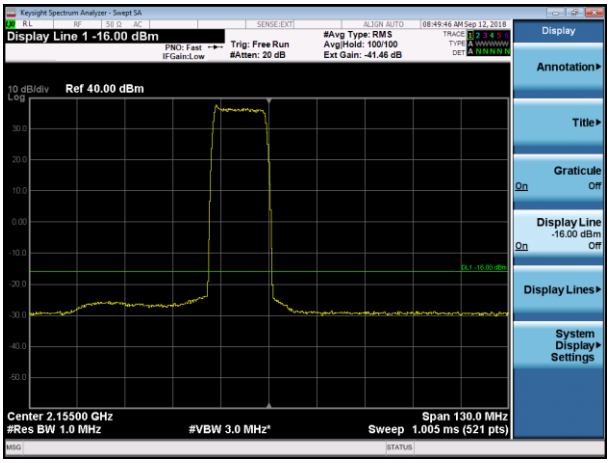
LTE15 Top+NB IoT GB (Lower) 10MHz-100MHz



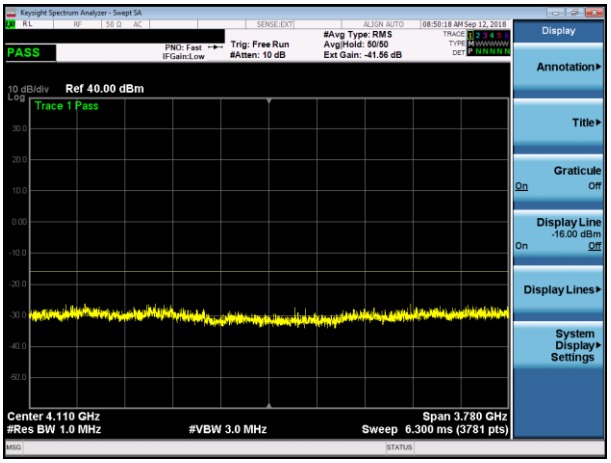
LTE15 Top+NB IoT GB (Lower) 100MHz-2090MHz



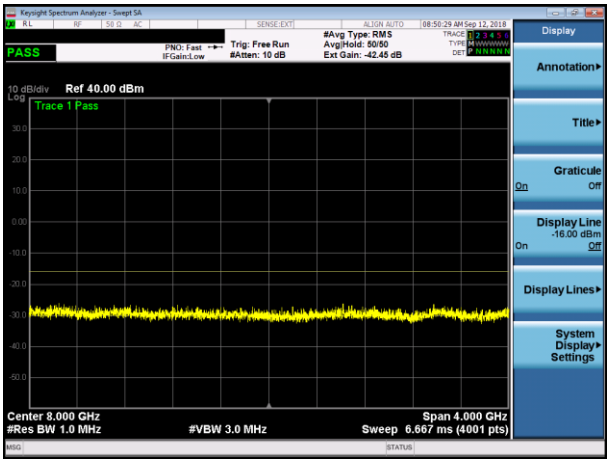
LTE15 Top+NB IoT GB (Lower) 2090MHz-2220MHz



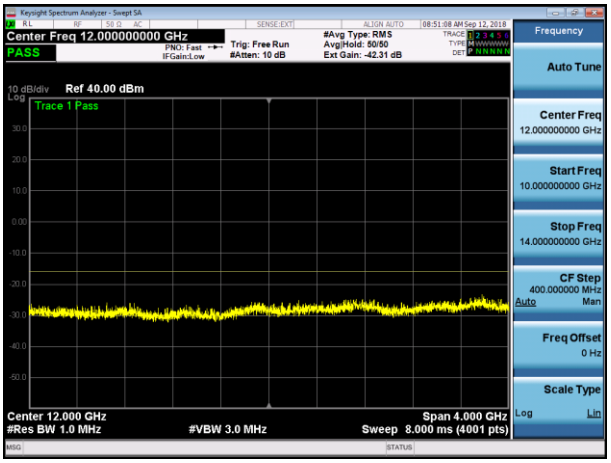
LTE15 Top+NB IoT GB (Lower) 2220MHz-6000MHz



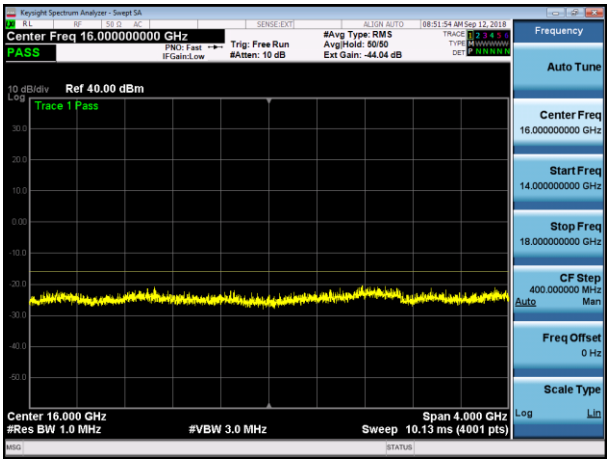
LTE15 Top+NB IoT GB (Lower) 6000MHz-10000MHz



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



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



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