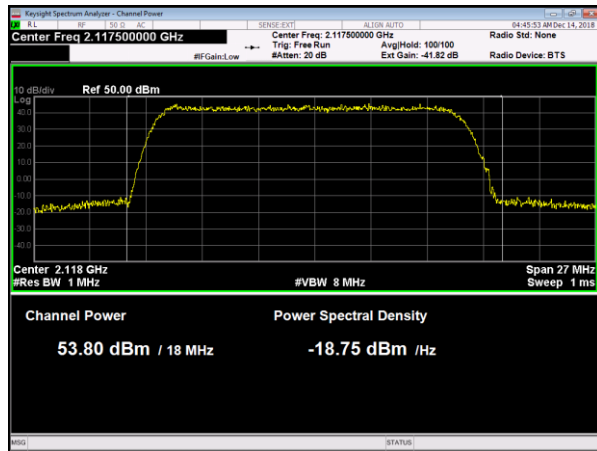
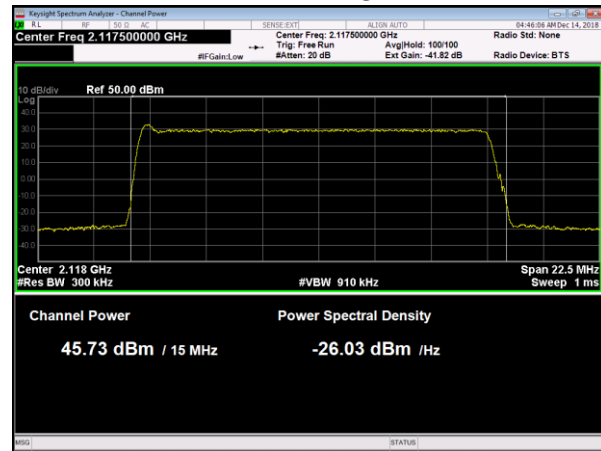


## Channel Power Plots, NB IoT Lower GB Carrier (15MHz):

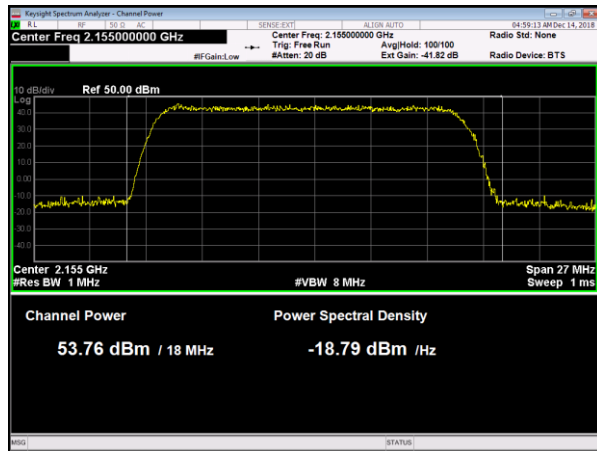
LTE15 Bottom Channel Peak Power



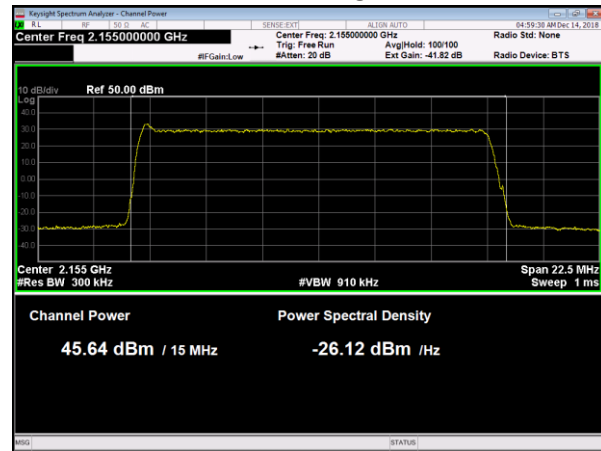
LTE15 Bottom Channel Average Power



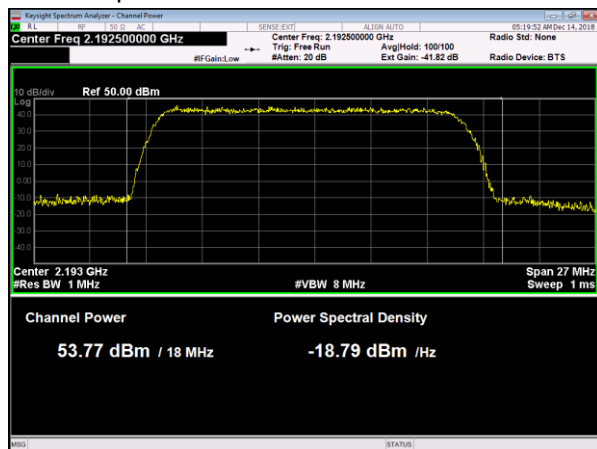
LTE15 Middle Channel Peak Power



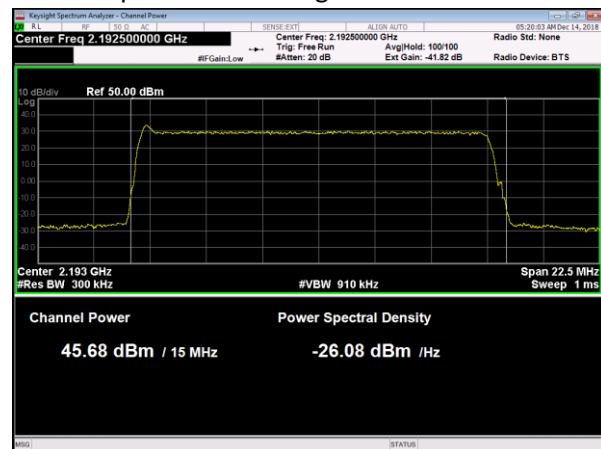
LTE15 Middle Channel Average Power



LTE15 Top Channel Peak Power

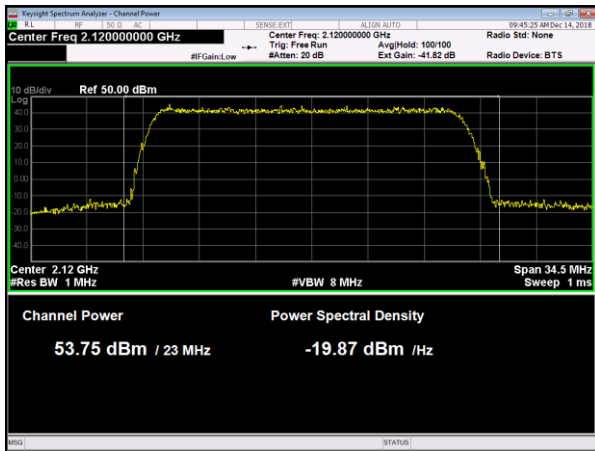


LTE15 Top Channel Average Power

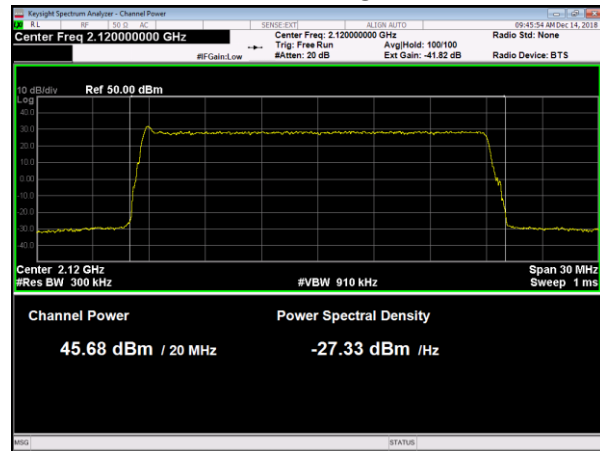


## Channel Power Plots, NB IoT Lower GB Carrier (20MHz):

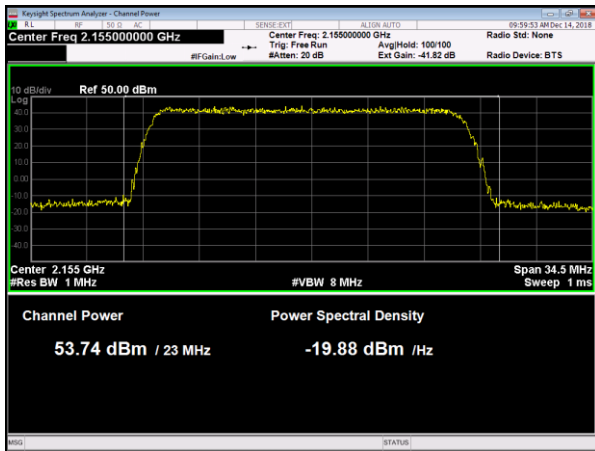
LTE20 Bottom Channel Peak Power



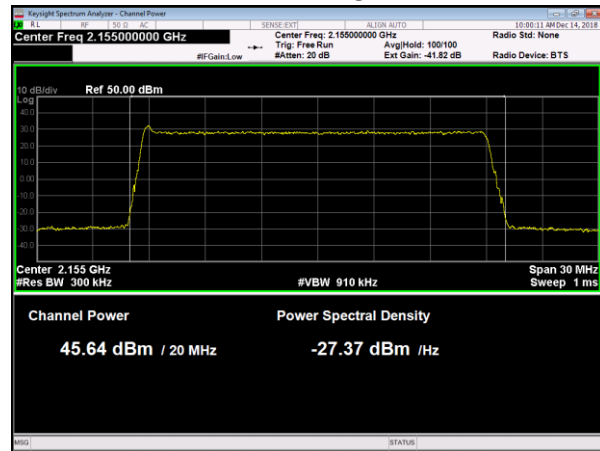
LTE20 Bottom Channel Average Power



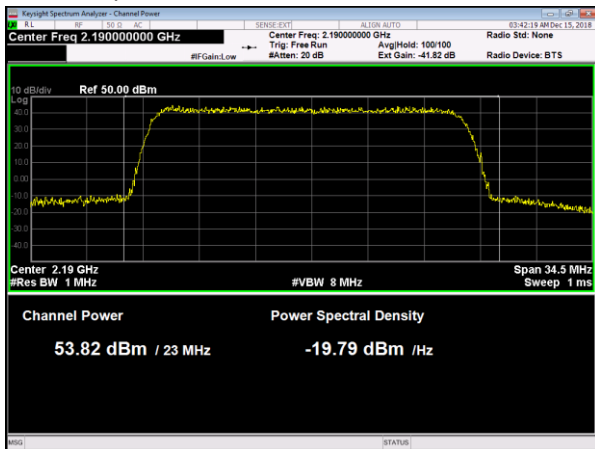
LTE20 Middle Channel Peak Power



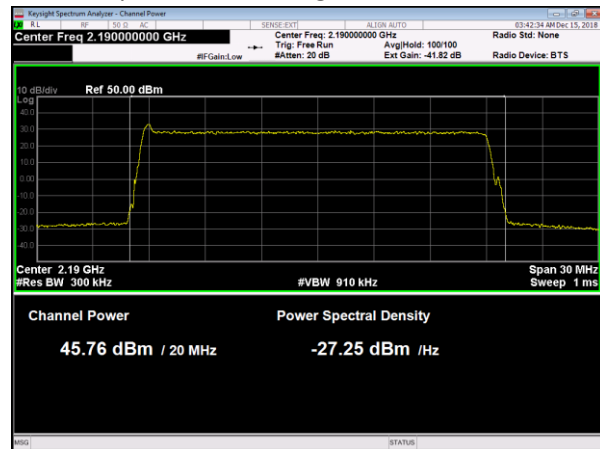
LTE20 Middle Channel Average Power



LTE20 Top Channel Peak Power

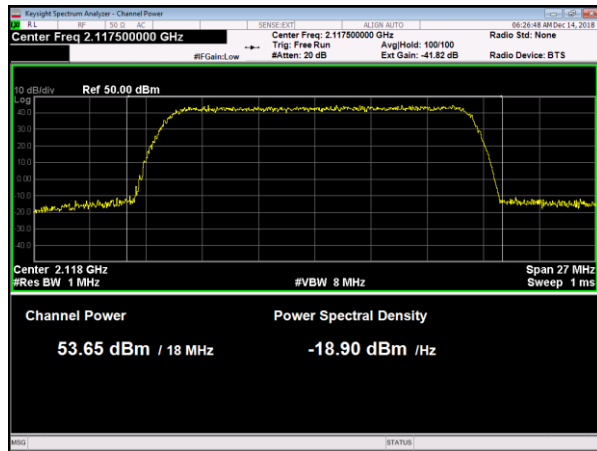


LTE20 Top Channel Average Power

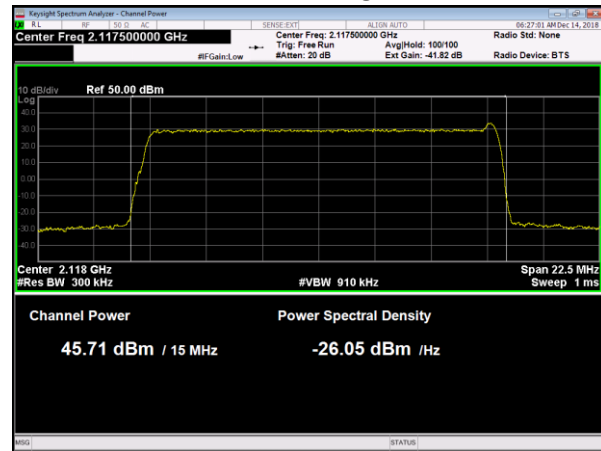


## Channel Power Plots, NB IoT Upper GB Carrier (15MHz):

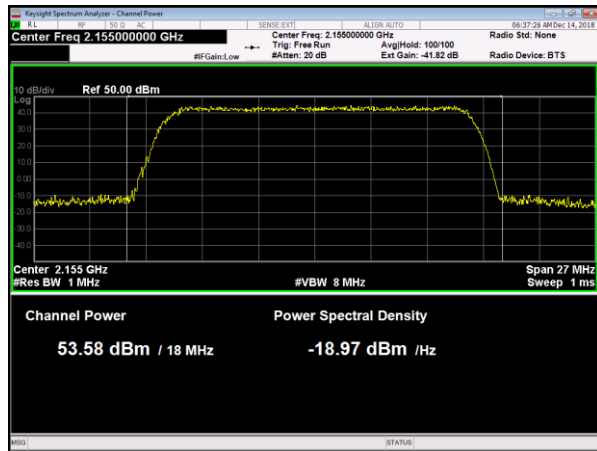
LTE15 Bottom Channel Peak Power



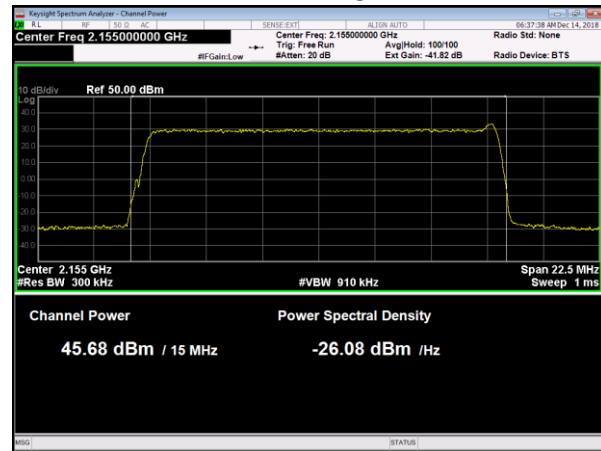
LTE15 Bottom Channel Average Power



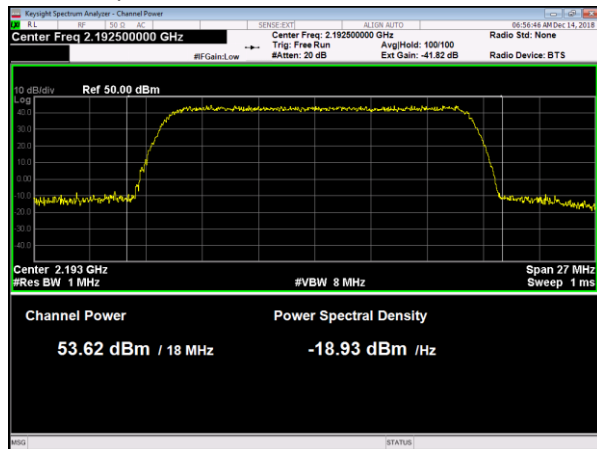
LTE15 Middle Channel Peak Power



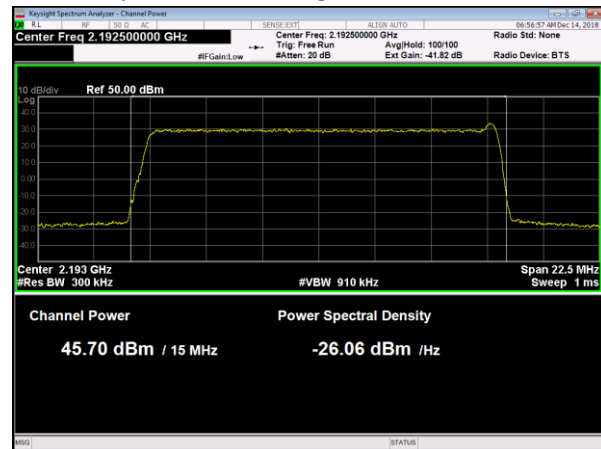
LTE15 Middle Channel Average Power



LTE15 Top Channel Peak Power

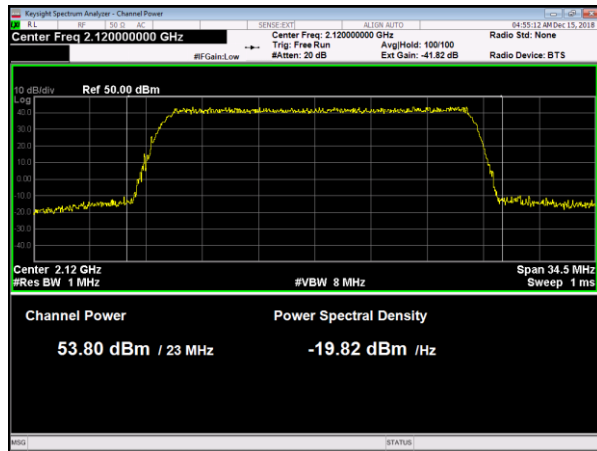


LTE15 Top Channel Average Power

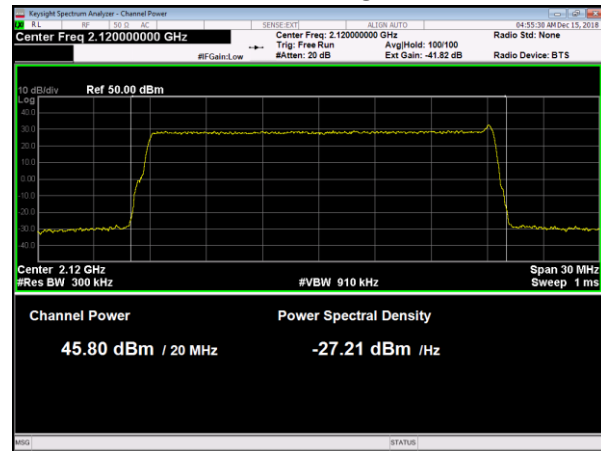


## Channel Power Plots, NB IoT Upper GB Carrier (20MHz):

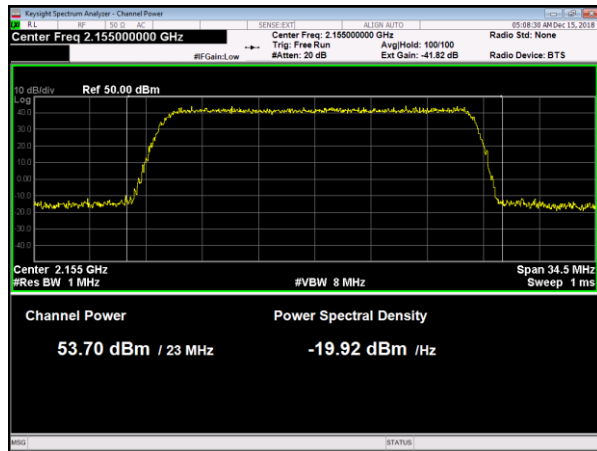
LTE20 Bottom Channel Peak Power



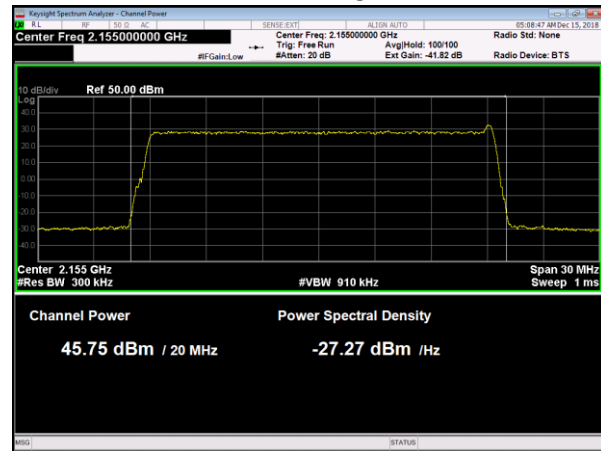
LTE20 Bottom Channel Average Power



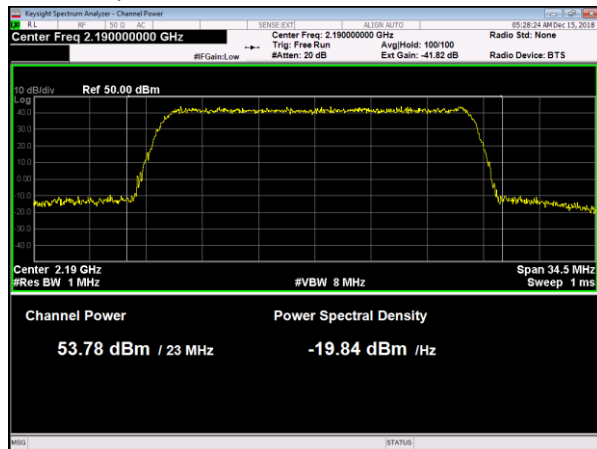
LTE20 Middle Channel Peak Power



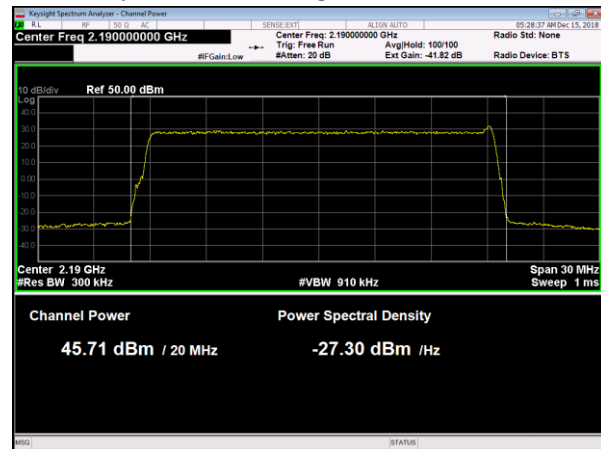
LTE20 Middle Channel Average Power



LTE20 Top Channel Peak Power



LTE20 Top Channel Average Power



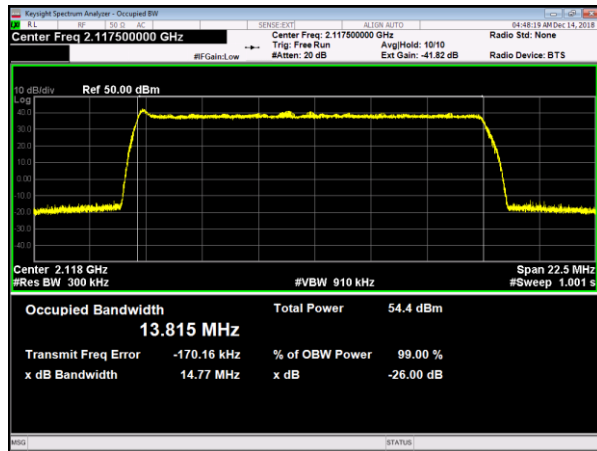
## 13.2 Emission Bandwidth (26 dB down and 99%)

| LTE Bandwidth | Emission Bandwidth Band 66 NB IoT GB (Lower) |           |                |           |             |           |
|---------------|----------------------------------------------|-----------|----------------|-----------|-------------|-----------|
|               | Bottom Channel                               |           | Middle Channel |           | Top Channel |           |
|               | 26dB(MHz)                                    | 99% (MHz) | 26dB(MHz)      | 99% (MHz) | 26dB(MHz)   | 99% (MHz) |
| 15MHz         | 14.77                                        | 13.815    | 14.78          | 13.813    | 14.75       | 13.809    |
| 20MHz         | 19.73                                        | 18.311    | 19.71          | 18.313    | 19.69       | 18.308    |

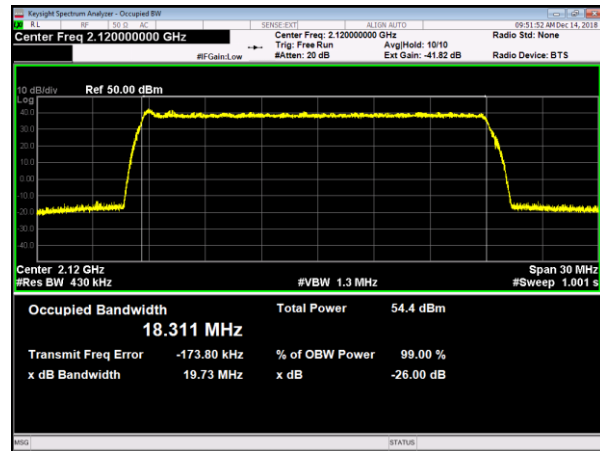
| LTE Bandwidth | Emission Bandwidth Band 66 NB IoT GB (Upper) |           |                |           |             |           |
|---------------|----------------------------------------------|-----------|----------------|-----------|-------------|-----------|
|               | Bottom Channel                               |           | Middle Channel |           | Top Channel |           |
|               | 26dB(MHz)                                    | 99% (MHz) | 26dB(MHz)      | 99% (MHz) | 26dB(MHz)   | 99% (MHz) |
| 15MHz         | 14.73                                        | 13.824    | 14.74          | 13.828    | 14.74       | 13.824    |
| 20MHz         | 19.69                                        | 18.305    | 19.72          | 18.316    | 19.71       | 18.310    |

## Plots for LTE15 and LTE20 Bandwidths + NB-IoT-GB in the Lower Guard Band:

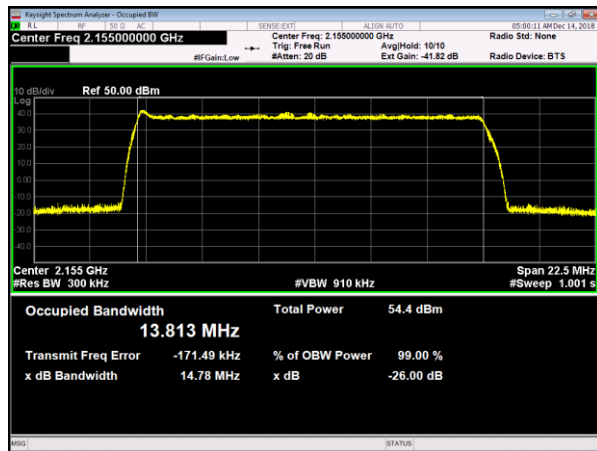
LTE15 Bottom Channel



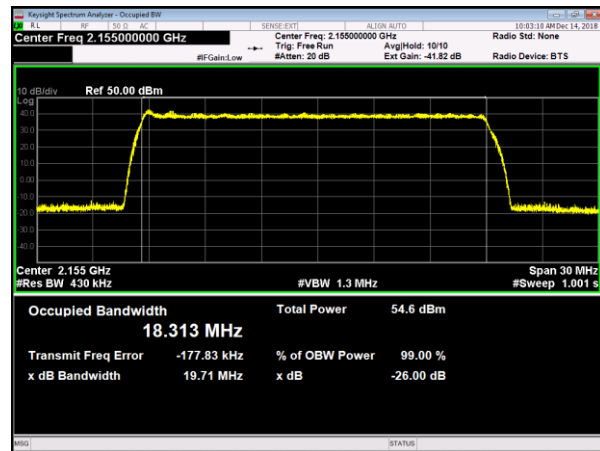
LTE20 Bottom Channel



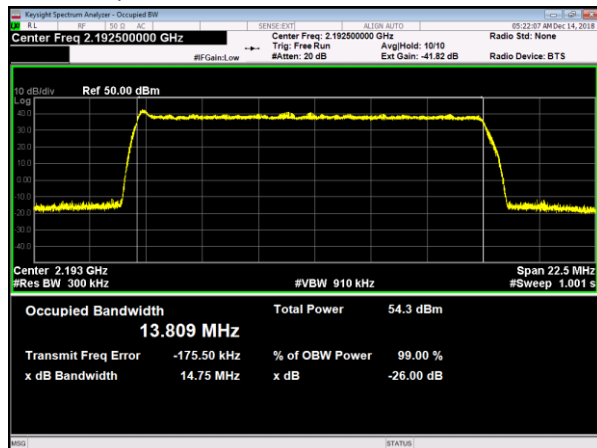
LTE15 Middle Channel



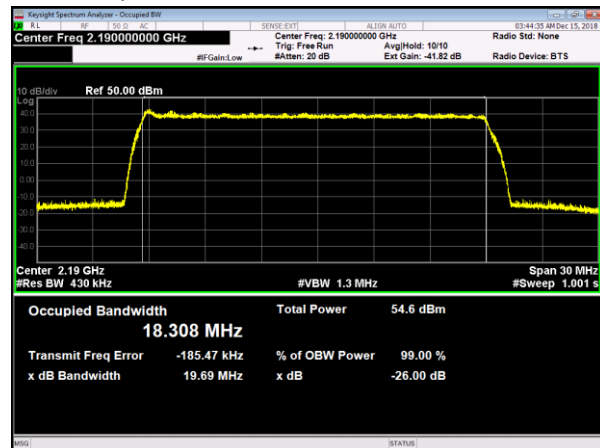
LTE20 Middle Channel



LTE15 Top Channel

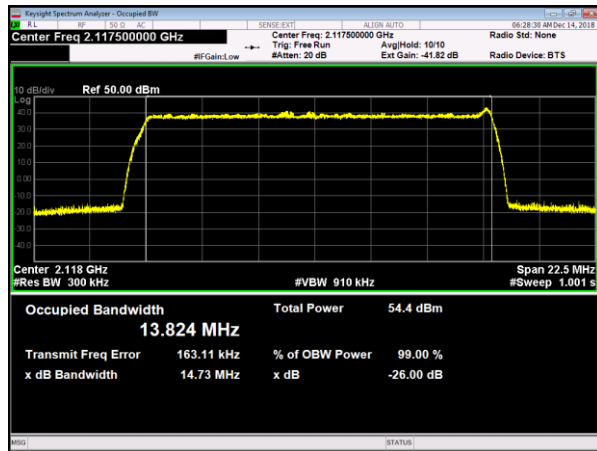


LTE20 Top Channel

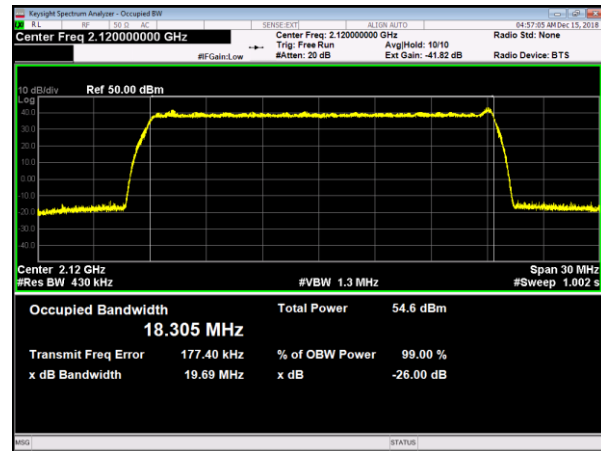


## Plots for LTE15 and LTE20 Bandwidth + NB-IoT-GB in the Upper Guard Band:

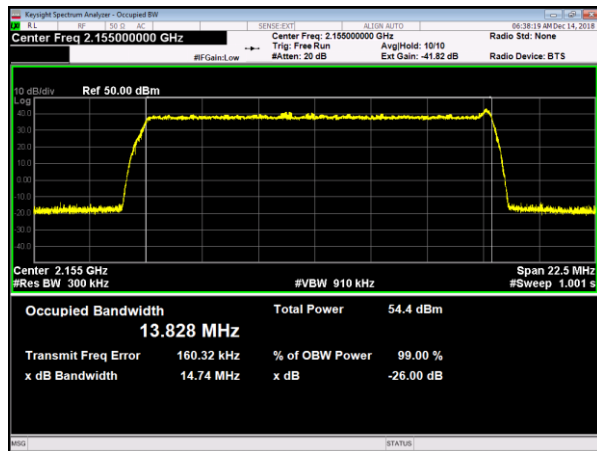
LTE15 Bottom Channel



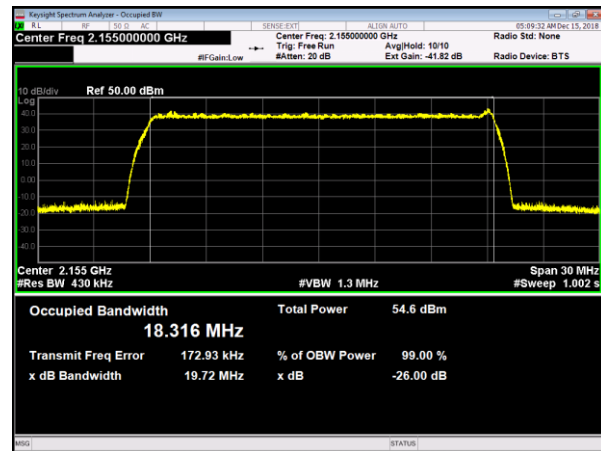
LTE20 Bottom Channel



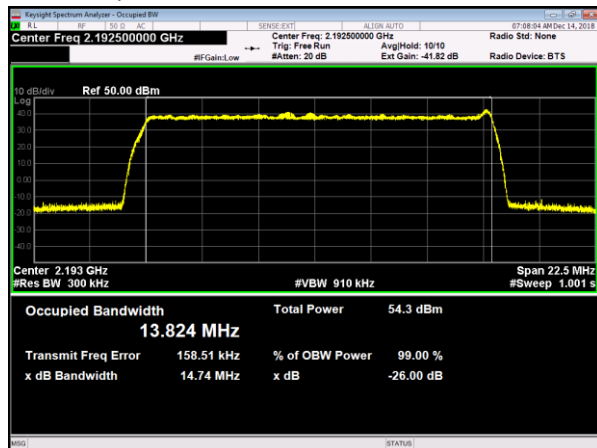
LTE15 Middle Channel



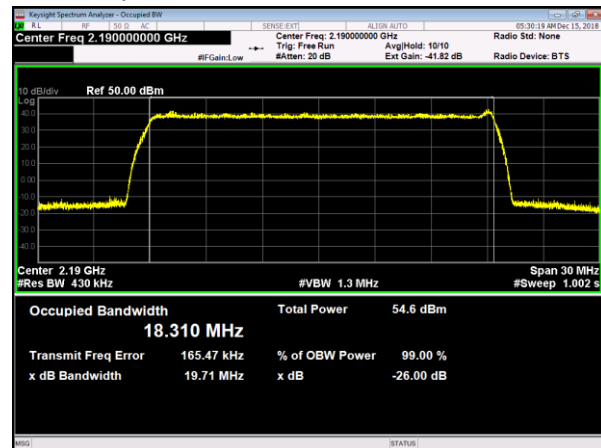
LTE20 Middle Channel



LTE15 Top Channel



LTE20 Top Channel



### 13.3 Antenna Port Conducted Band Edge

Conducted band edge measurements were made at AHFIB RRH antenna port 2. The AHFIB was operated at the band edge frequencies with a single NB IoT GB carrier for 10MHz LTE bandwidth.

The same limit of -19dBm used in the original certification testing is used for this testing. The limit is adjusted from -13dBm to -19dBm  $[-13\text{dBm} - 10 \log(4)]$  per FCC KDB 662911D01 v02r01 because the BTS may operate as a 4 port MIMO transmitter.

Measurements were performed with the spectrum analyzer in the RMS average mode over 100 traces. In the 1MHz bands outside and adjacent to the frequency block, a resolution bandwidth of 1% of the emission bandwidth was used. In the 1 to 2MHz frequency range outside the band edge (i.e.: 2108 to 2109MHz and 2199 to 2201MHz bands) the RBW was again reduced to 1% of the emission bandwidth and the power integrated over 1MHz. In the 2 to 5MHz frequency range outside the band edge (i.e.: 2105 to 2108MHz and 2202 to 2205MHz bands) a 1MHz RBW and 3MHz VBW was used.

The total measurement RF path loss of the test setup (attenuator and test cables) was 41.82 dB and is accounted for by the spectrum analyzer external gain offset.

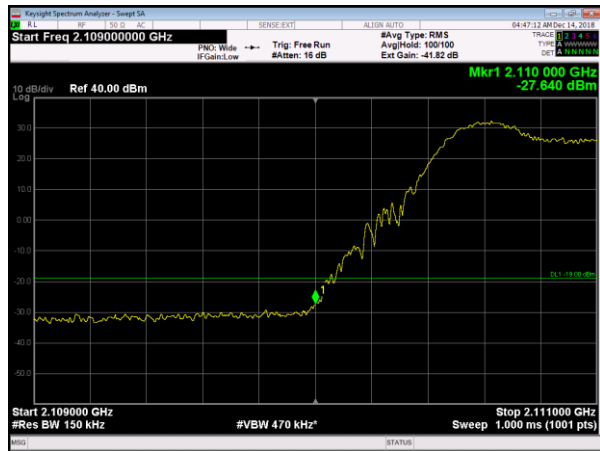
The results are summarized in the following table. The highest (worst case) emissions from the measurement data are provided.

| LTE BW | NB IoT Guardband Placement | Bottom Channel (dBm) | Top Channel (dBm) |
|--------|----------------------------|----------------------|-------------------|
| 15 MHz | Lower                      | -23.151              | -22.328           |
| 15 MHz | Upper                      | -24.250              | -20.956           |
| 20MHz  | Lower                      | -24.046              | -22.459           |
| 20MHz  | Upper                      | -24.799              | -20.919           |

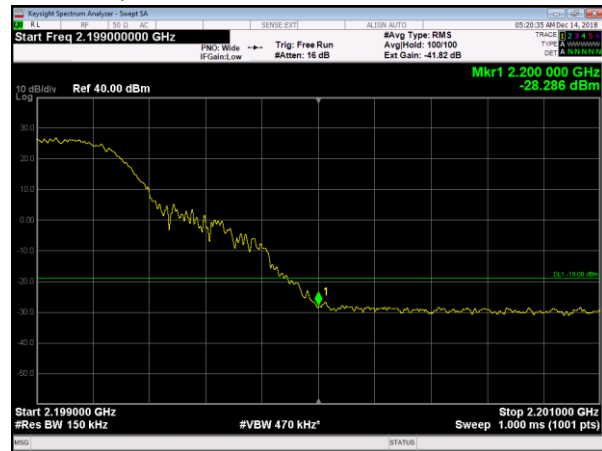
Conducted band edge measurements are provided in the following pages. Captions are marked with LBE for lower band edge and UBE for upper band edge.

## LTE15 + Lower NB IoT GB Carrier Band Edge Plots:

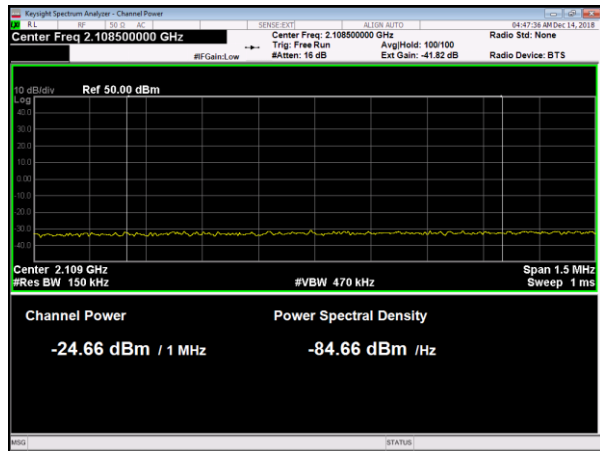
LTE15 Bottom Channel LBE 2109MHz to 2111MHz



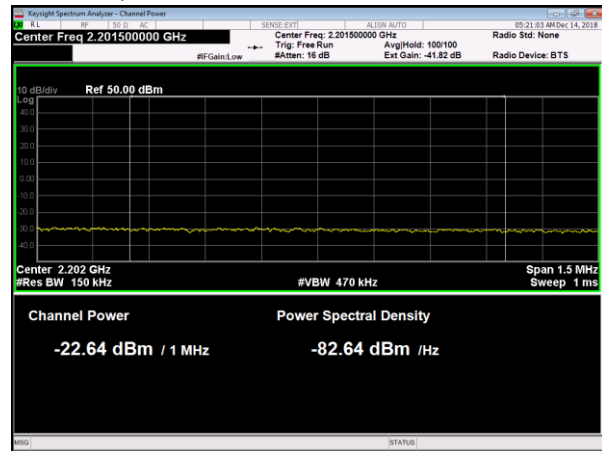
LTE15 Top Channel UBE 2199MHz to 2201MHz



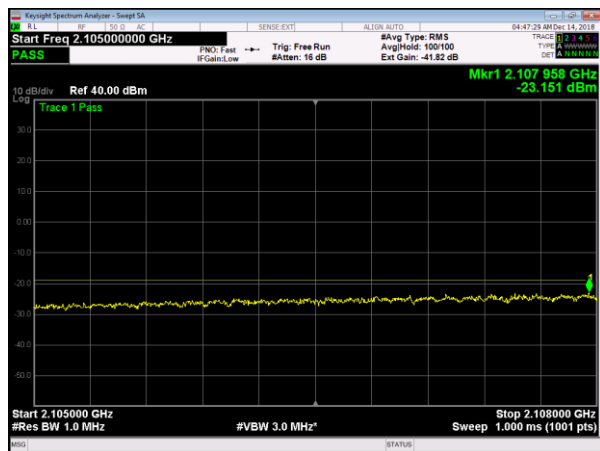
LTE15 Bottom Channel LBE 2108MHz to 2109MHz



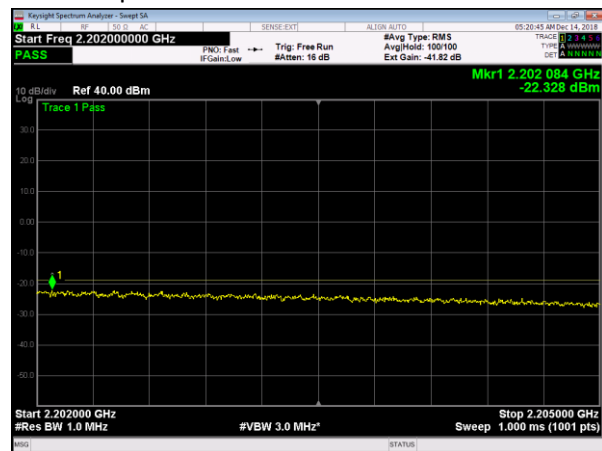
LTE15 Top Channel UBE 2201MHz to 2202MHz



LTE15 Bottom Channel LBE 2105MHz to 2108MHz

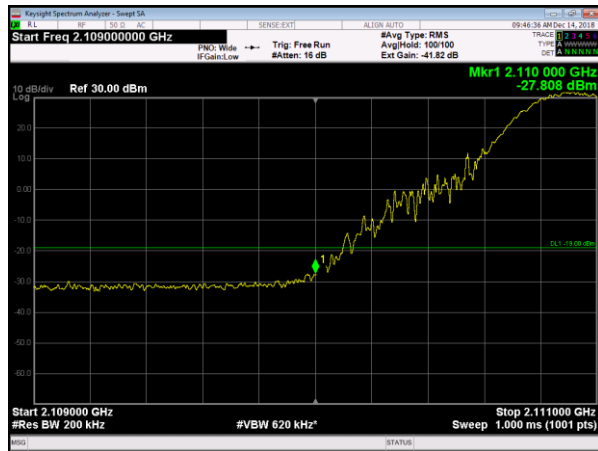


LTE15 Top Channel UBE 2202MHz to 2205MHz

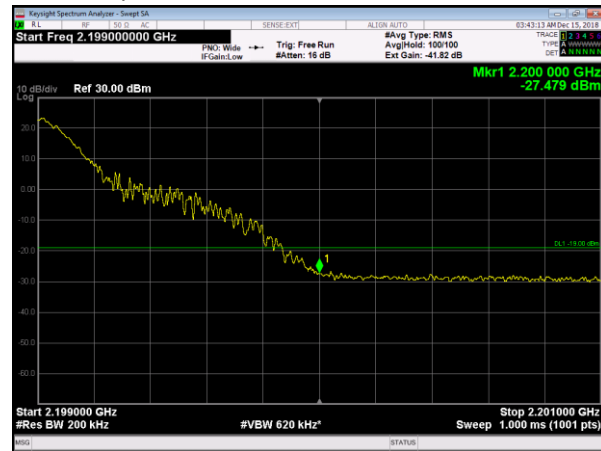


## LTE20 + Lower NB IoT GB Carrier Band Edge Plots:

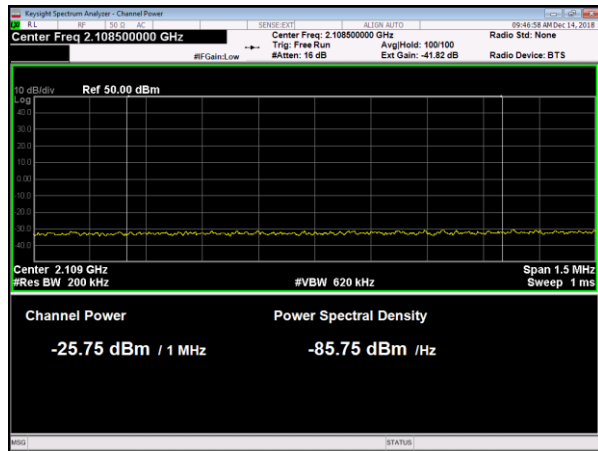
LTE20 Bottom Channel LBE 2109MHz to 2111MHz



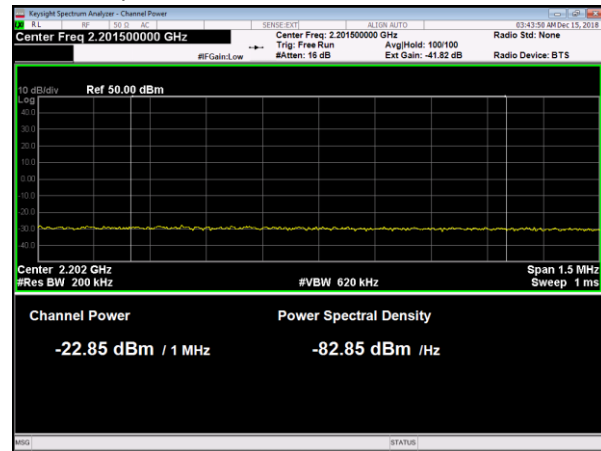
LTE20 Top Channel UBE 2199MHz to 2201MHz



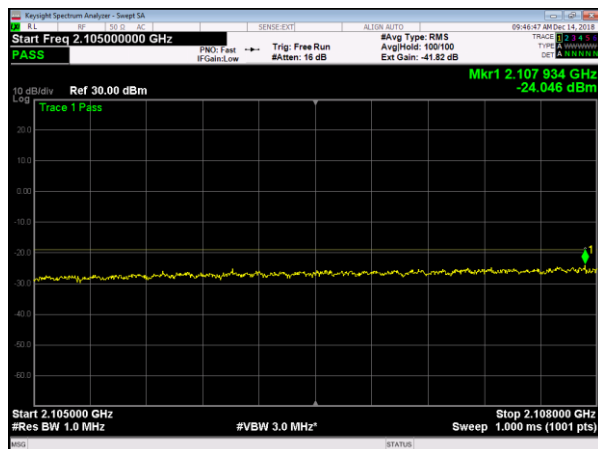
LTE20 Bottom Channel LBE 2108MHz to 2109MHz



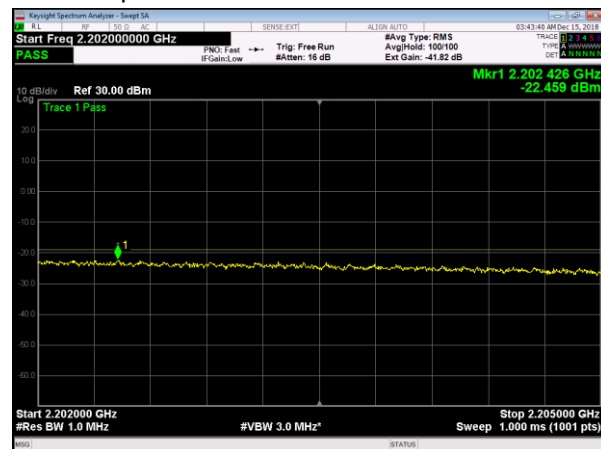
LTE20 Top Channel UBE 2201MHz to 2202MHz



LTE20 Bottom Channel LBE 2105MHz to 2108MHz

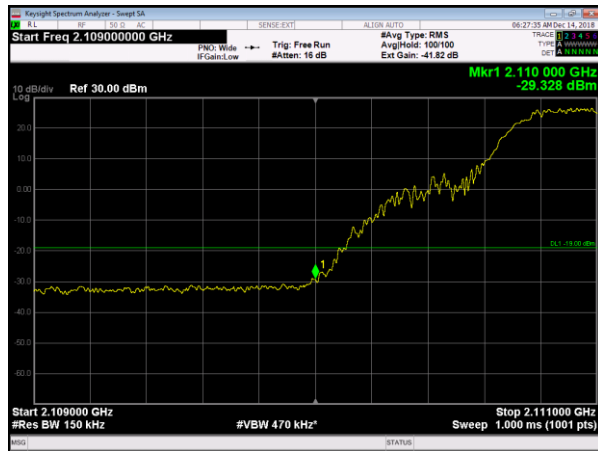


LTE20 Top Channel UBE 2202MHz to 2205MHz

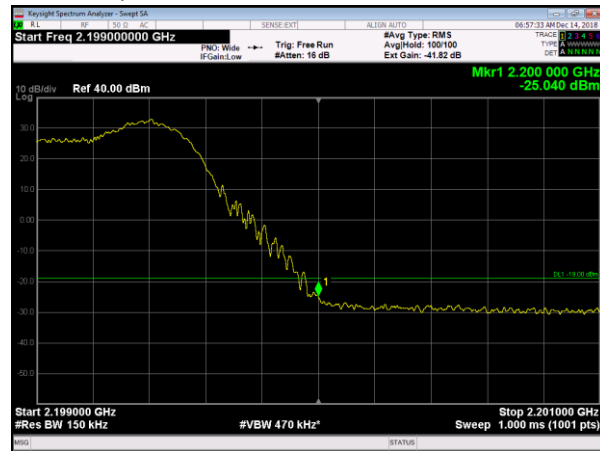


## LTE15 + Upper NB IoT GB Carrier Band Edge Plots:

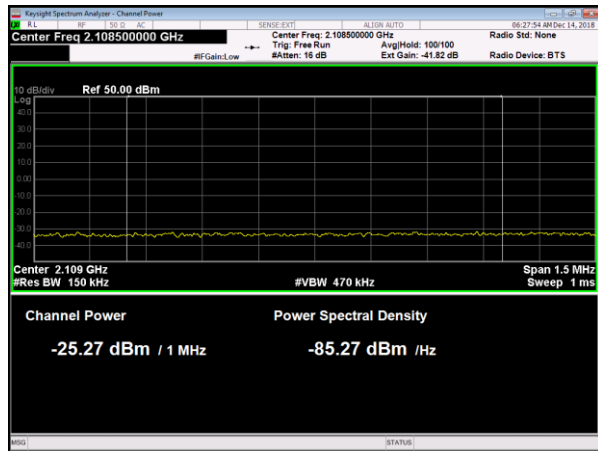
LTE15 Bottom Channel LBE 2109MHz to 2111MHz



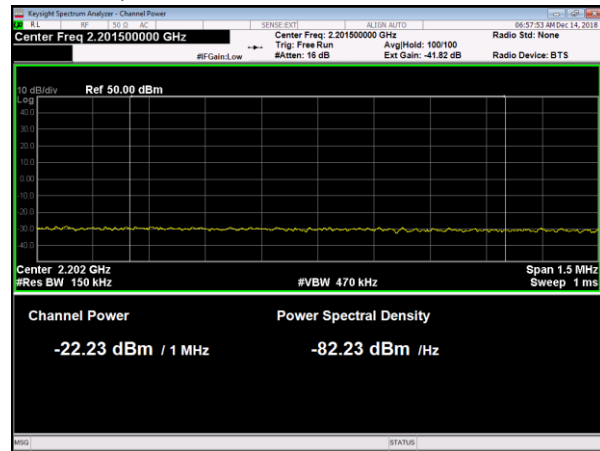
LTE15 Top Channel UBE 2199MHz to 2201MHz



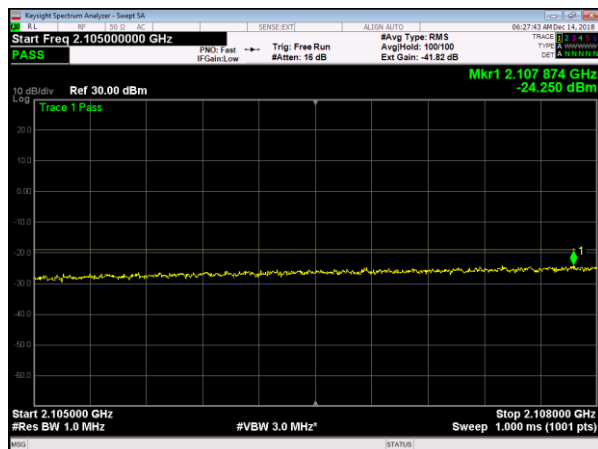
LTE15 Bottom Channel LBE 2108MHz to 2109MHz



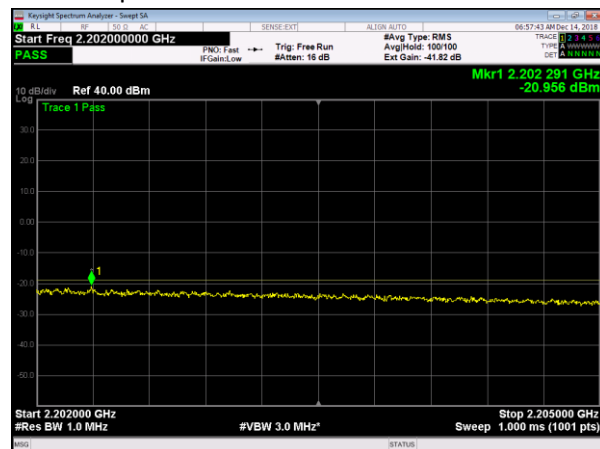
LTE15 Top Channel UBE 2201MHz to 2202MHz



LTE15 Bottom Channel LBE 2105MHz to 2108MHz

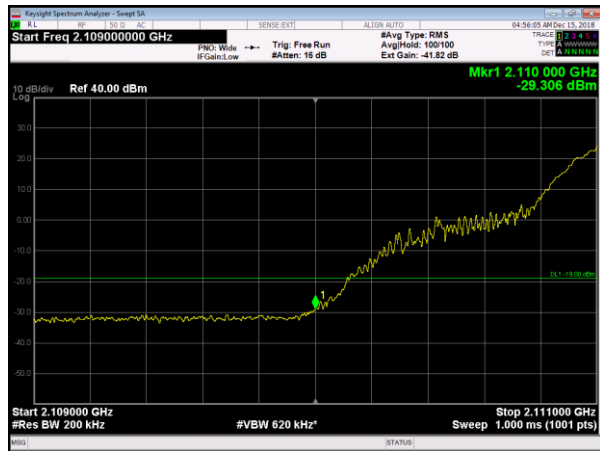


LTE15 Top Channel UBE 2202MHz to 2205MHz

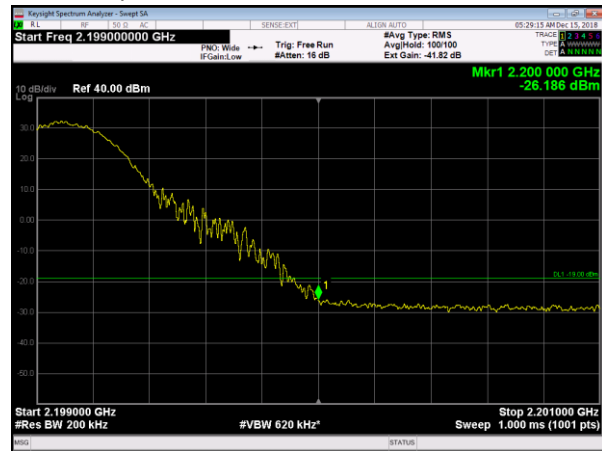


## LTE20 + Upper NB IoT GB Carrier Band Edge Plots:

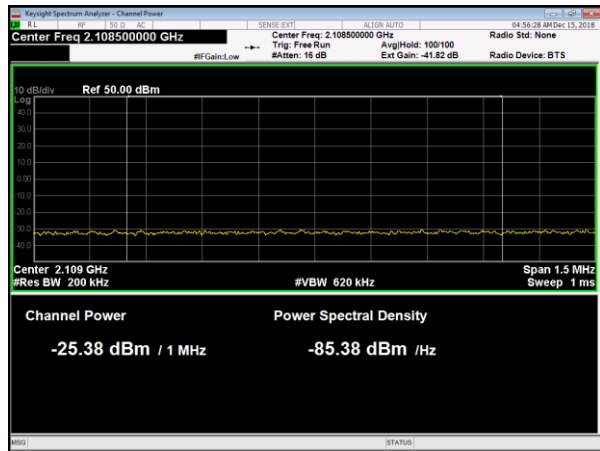
LTE20 Bottom Channel LBE 2109MHz to 2111MHz



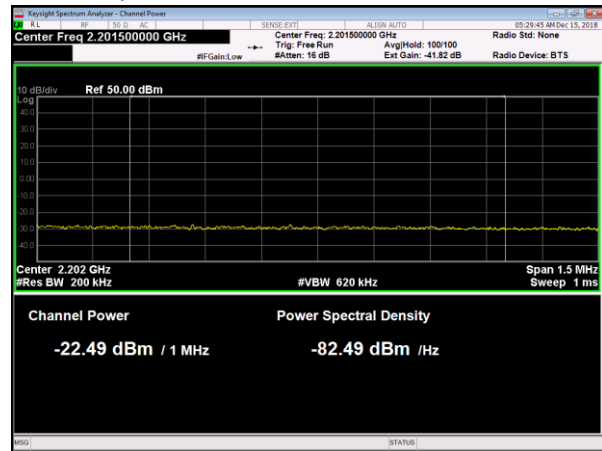
LTE20 Top Channel UBE 2199MHz to 2201MHz



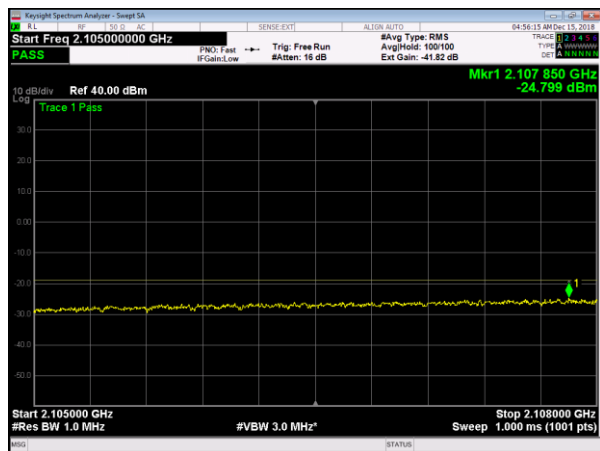
LTE20 Bottom Channel LBE 2108MHz to 2109MHz



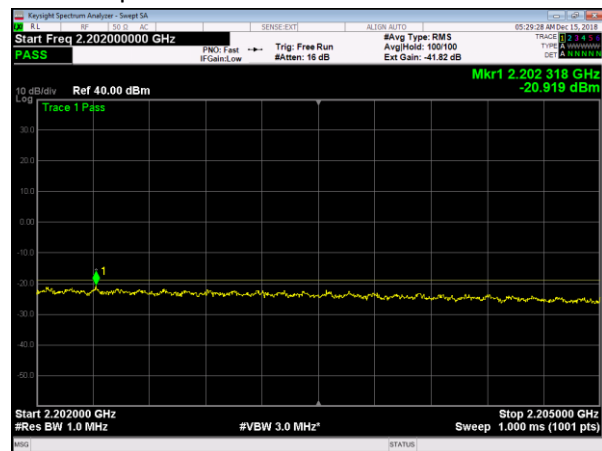
LTE20 Top Channel UBE 2201MHz to 2202MHz



LTE20 Bottom Channel LBE 2105MHz to 2108MHz



LTE20 Top Channel UBE 2202MHz to 2205MHz



### 13.4 Transmitter Antenna Port Conducted Emissions

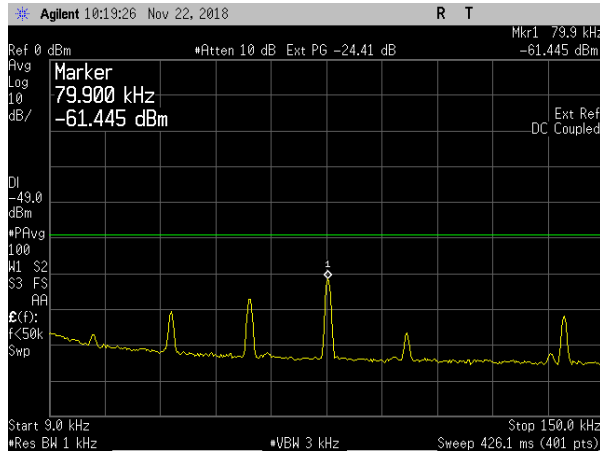
Transmitter conducted spurious emissions measurement were made at AHFIB RRH antenna port 2 across the range 9 kHz-22GHz. The AHFIB was operated on bottom, middle and top channels with a single NB IoT GB carrier with LTE bandwidth of 15MHz and 20MHz at maximum port power. The Keysight PSA E4440A was used to measure frequencies below 10MHz because of the lower noise floor in that frequency range, and the MXA N2090A was used to measure from 10MHz to 22GHz. The total measurement RF path loss of the test setup (attenuators, high pass filter and test cables) was accounted for by the spectrum analyzer reference level offset (see table below).

The same limit of -19dBm used in the original certification testing is used for this testing. The limit is adjusted from -13dBm to -19dBm  $[-13\text{dBm} - 10 \log(4)]$  per FCC KDB 662911D01 v02r01 because the BTS may operate as a 4 port MIMO transmitter.

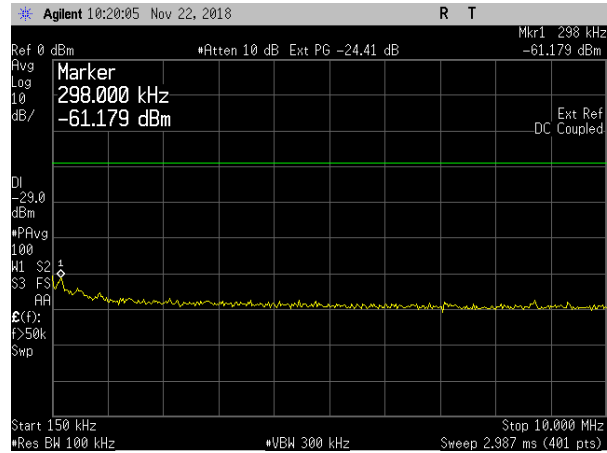
| Frequency Range   | RBW (KHz) | VBW (KHz) | Detector/Avg Type | Sweep Time | Path Loss (dB) |
|-------------------|-----------|-----------|-------------------|------------|----------------|
| 9KHz to 150KHz    | 1         | 3         | RMS Avg           | Auto       | 24.41          |
| 150KHz to 10MHz   | 100       | 300       | RMS Avg           | Auto       | 24.41          |
| 10-100 MHz        | 1000      | 3000      | Peak/Max          | Auto       | 39.38          |
| 100-1910 MHz      | 1000      | 3000      | Peak/Max          | Auto       | 39.84          |
| 1910-2220 MHz     | 1000      | 3000      | RMS Avg           | Auto       | 41.73          |
| 2220MHz to 6.2GHz | 1000      | 3000      | Peak/Max          | Auto       | 41.87          |
| 6.2GHz to 10GHz   | 1000      | 3000      | Peak/Max          | Auto       | 42.76          |
| 10GHz to 14GHz    | 1000      | 3000      | Peak/Max          | Auto       | 42.89          |
| 14GHz to 18GHz    | 1000      | 3000      | RMS Avg           | Auto       | 45.04          |
| 18 GHz to 22GHz   | 1000      | 3000      | RMS Avg           | Auto       | 45.71          |

## LTE15 Bottom Channel (2117.5) NB IoT at lower Guard Band:

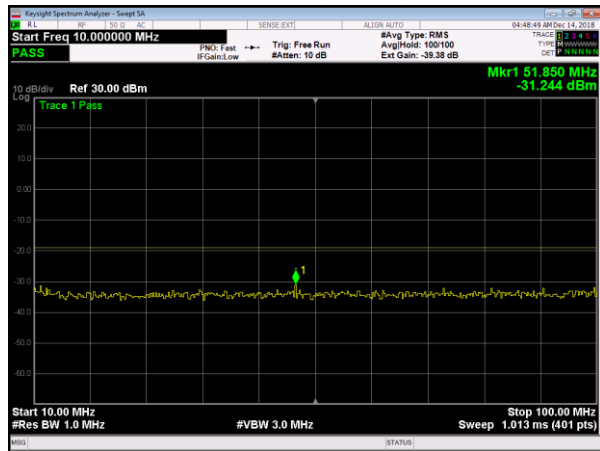
### LTE15 Bottom+NB IoT GB (Lower) 9-150KHz



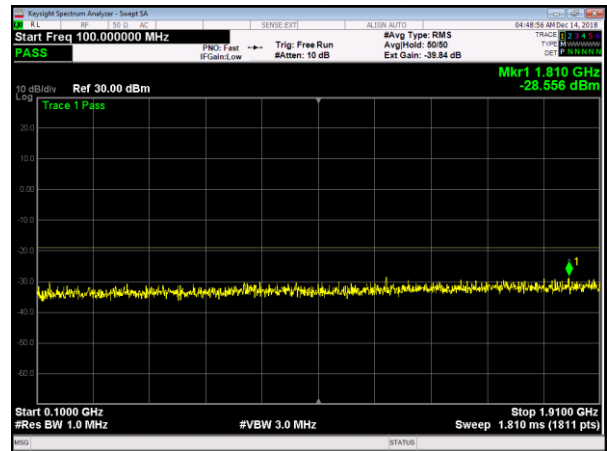
### LTE15 Bottom+NB IoT GB (Lower) 150 KHz-10MHz



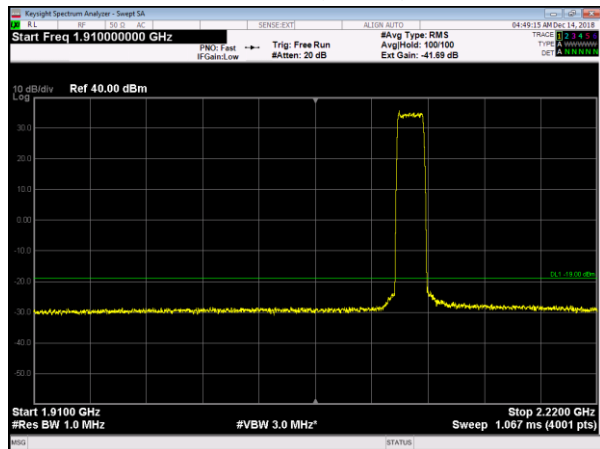
### LTE15 Bottom+NB IoT GB (Lower) 10MHz-100MHz



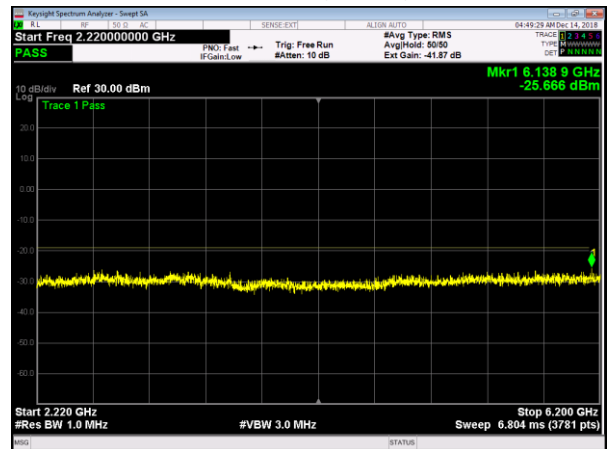
### LTE15 Bottom+NB IoT GB (Lower) 100MHz-1910MHz



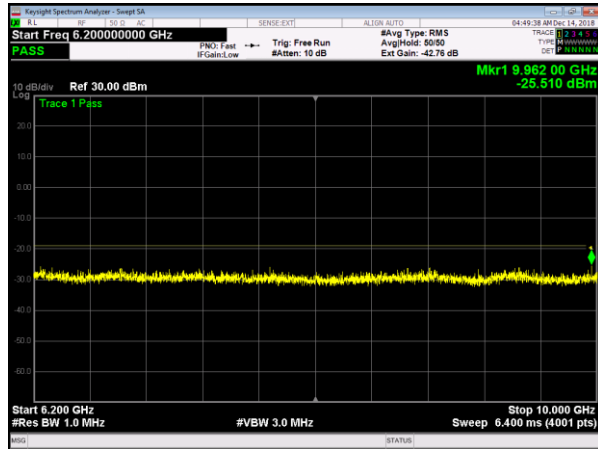
### LTE15 Bottom+NB IoT GB (Lower) 1910MHz-2220MHz



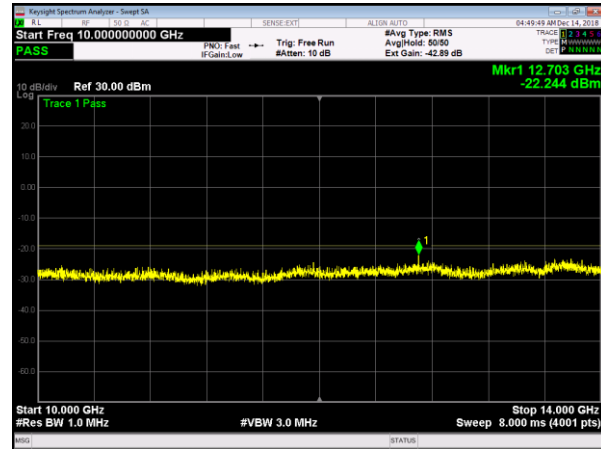
### LTE15 Bottom+NB IoT GB (Lower) 2220MHz-6.2GHz



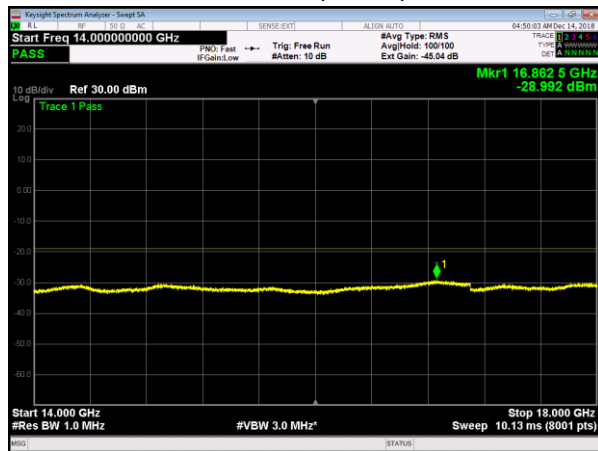
### LTE15 Bottom+NB IoT GB (Lower) 6.2GHz-10GHz



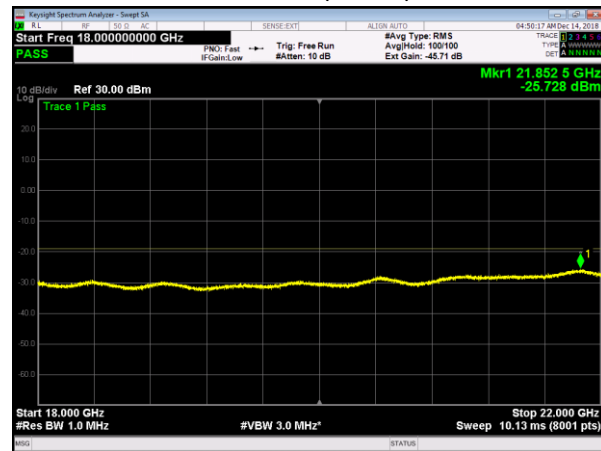
### LTE15 Bottom+NB IoT GB (Lower) 10GHz-14GHz



### LTE15 Bottom+NB IoT GB (Lower) 14GHz-18GHz

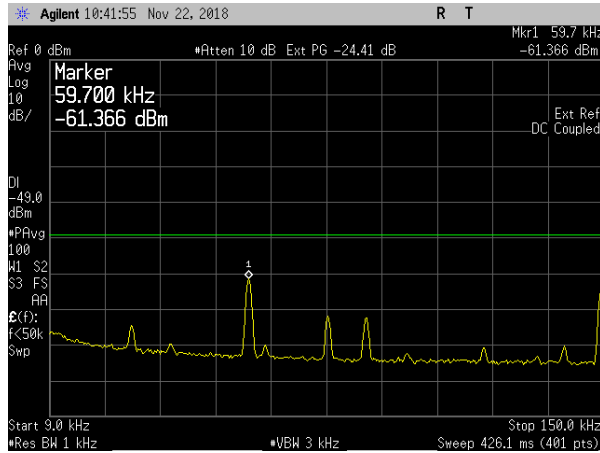


### LTE15 Bottom+NB IoT GB (Lower) 18GHz-22GHz

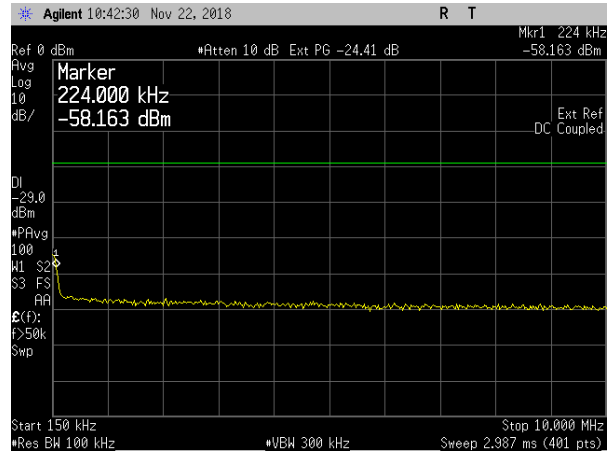


## LTE15 Middle Channel (2155MHz) NB IoT at lower Guard Band:

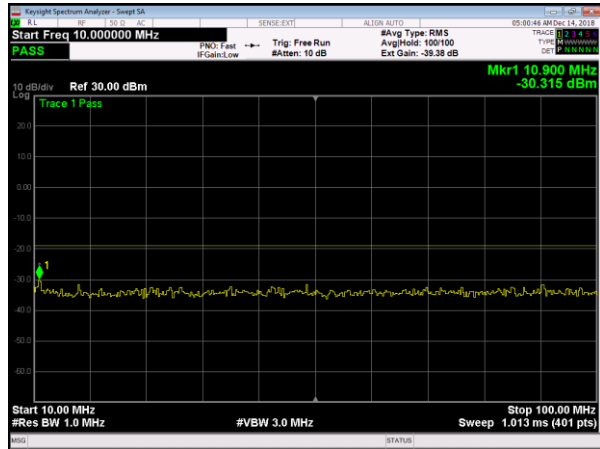
LTE15 Middle+NB IoT GB (Lower) 9-150KHz



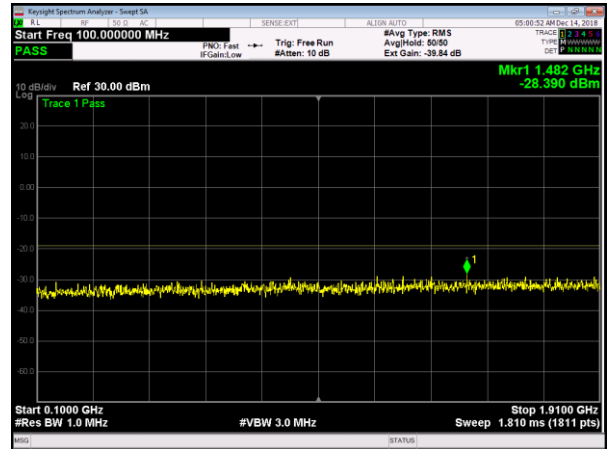
LTE15 Middle+NB IoT GB (Lower) 150 KHz-10MHz



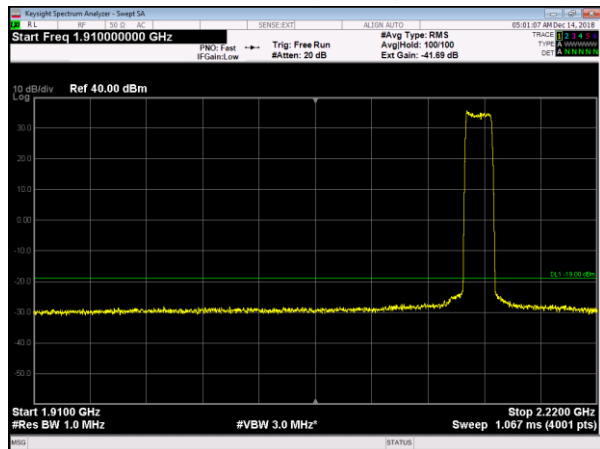
LTE15 Middle+NB IoT GB (Lower) 10MHz-100MHz



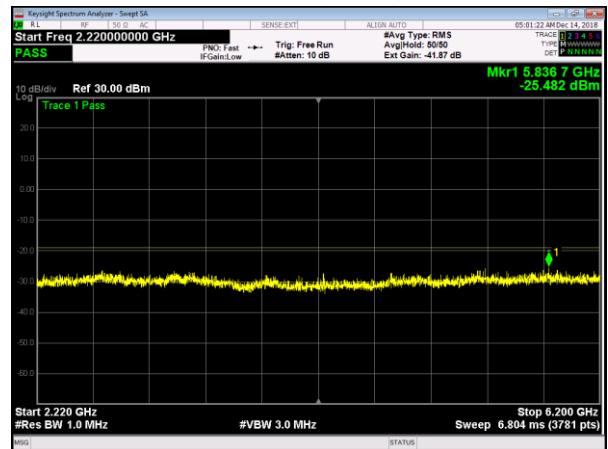
LTE15 Middle+NB IoT GB (Lower) 100MHz-1910MHz



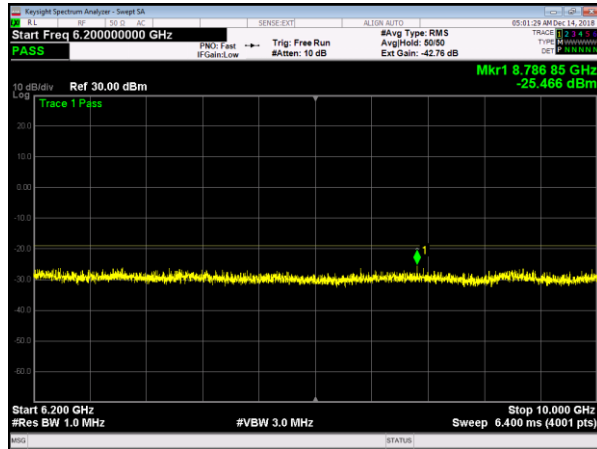
LTE15 Middle+NB IoT GB (Lower) 1910MHz-2220MHz



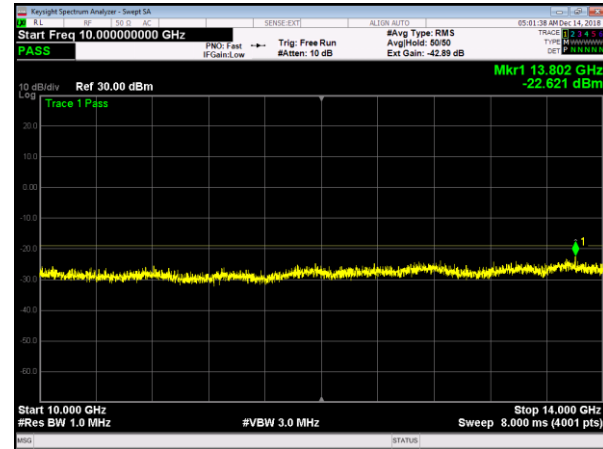
LTE15 Middle+NB IoT GB (Lower) 2220MHz-6.2GHz



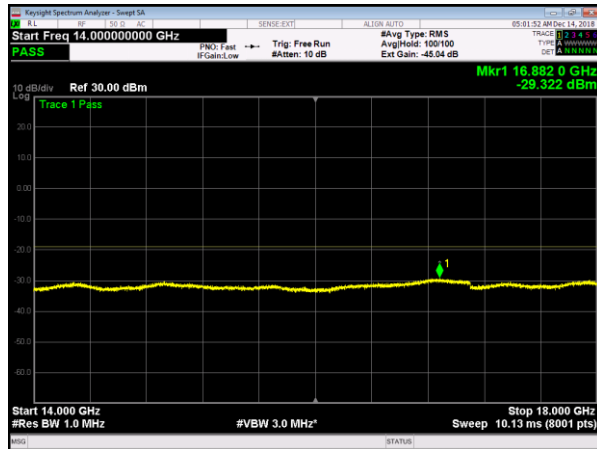
### LTE15 Middle+NB IoT GB (Lower) 6.2GHz-10GHz



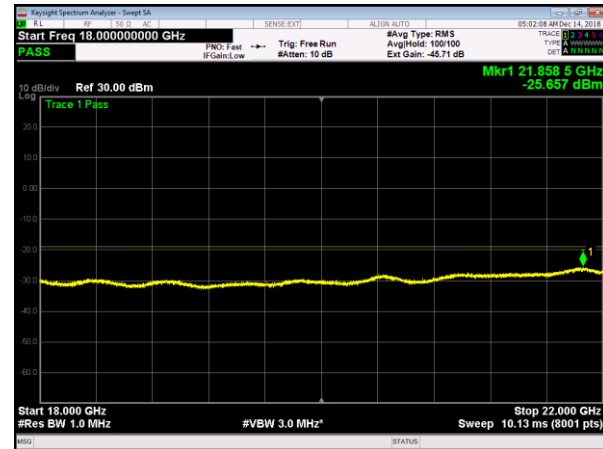
### LTE15 Middle+NB IoT GB (Lower) 10GHz-14GHz



### LTE15 Middle+NB IoT GB (Lower) 14GHz-18GHz

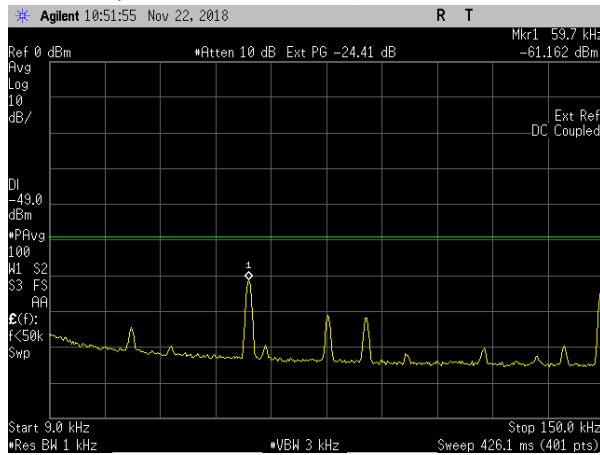


### LTE15 Middle+NB IoT GB (Lower) 18GHz-22GHz

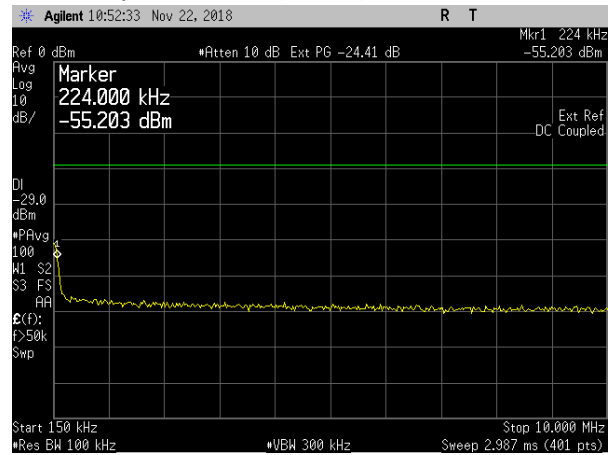


## LTE15 Top Channel (2192.5MHz) NB IoT at lower Guard Band:

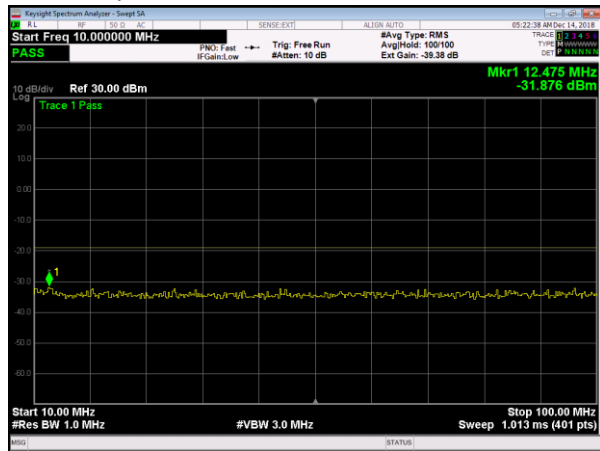
### LTE15 Top+NB IoT GB (Lower) 9-150KHz



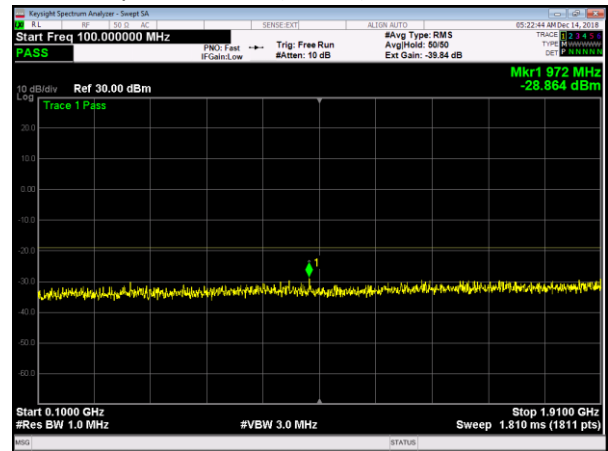
### LTE15 Top+NB IoT GB (Lower) 150 KHz-10MHz



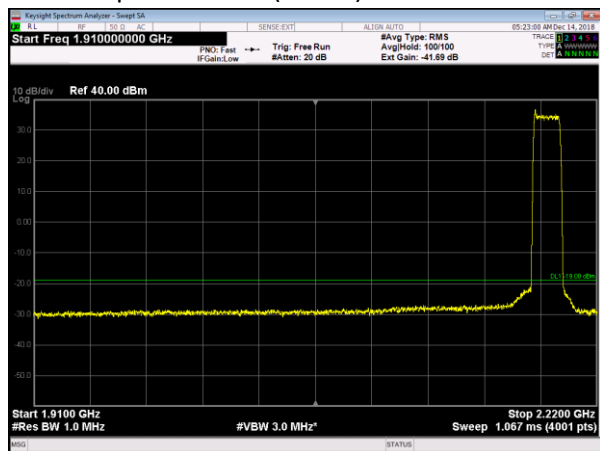
### LTE15 Top+NB IoT GB (Lower) 10MHz-100MHz



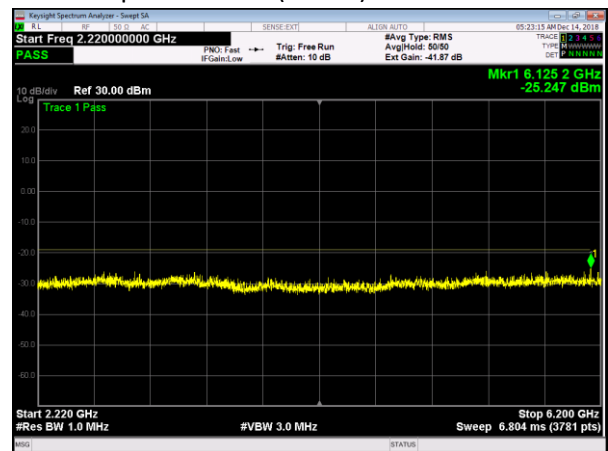
### LTE15 Top+NB IoT GB (Lower) 100MHz-1910MHz



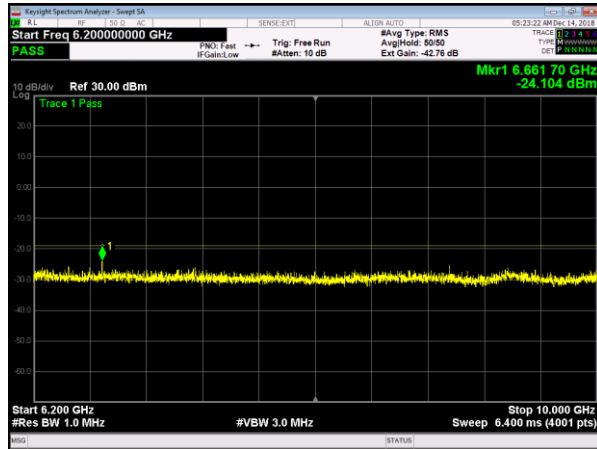
### LTE15 Top+NB IoT GB (Lower) 1910MHz-2220MHz



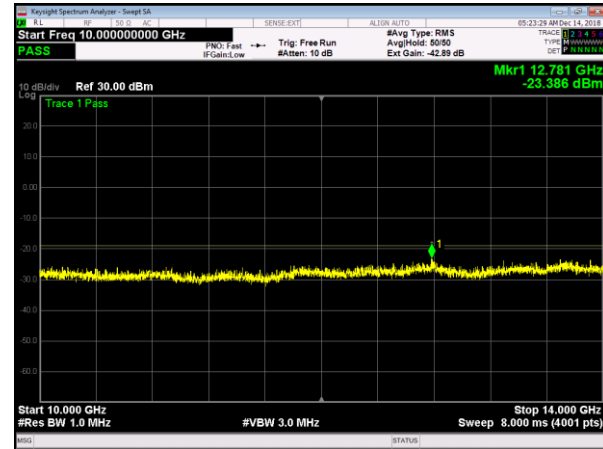
### LTE15 Top+NB IoT GB (Lower) 2220MHz-6.2GHz



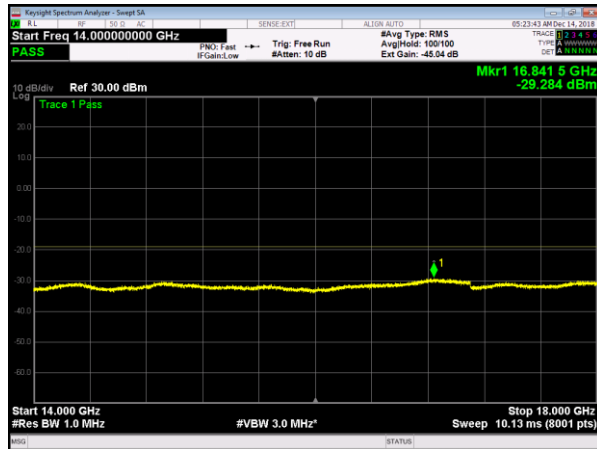
### LTE15 Top+NB IoT GB (Lower) 6.2GHz-10GHz



### LTE15 Top+NB IoT GB (Lower) 10GHz-14GHz



### LTE15 Top+NB IoT GB (Lower) 14GHz-18GHz



### LTE15 Top+NB IoT GB (Lower) 18GHz-22GHz

