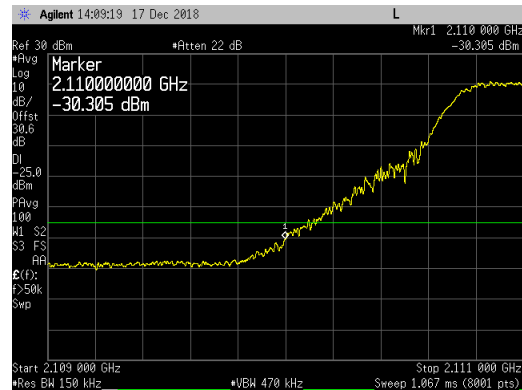
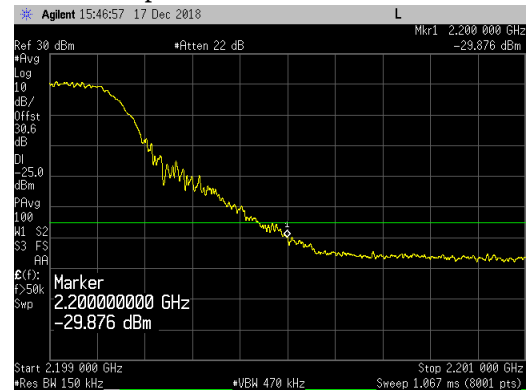


# LTE15 Band Edge Plots for Antenna Port 2 and QPSK Modulation:

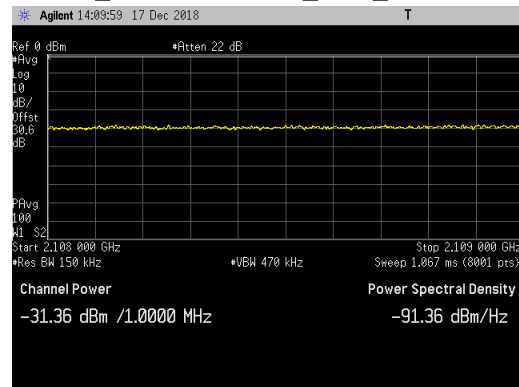
LTE15\_Bottom Channel\_LBE\_2109 to 2111MHz



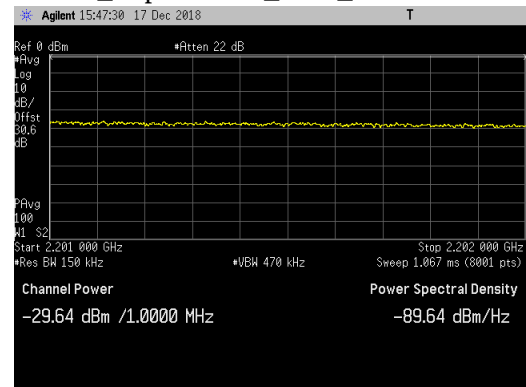
LTE15\_Top Channel\_UBE\_2199 to 2201MHz



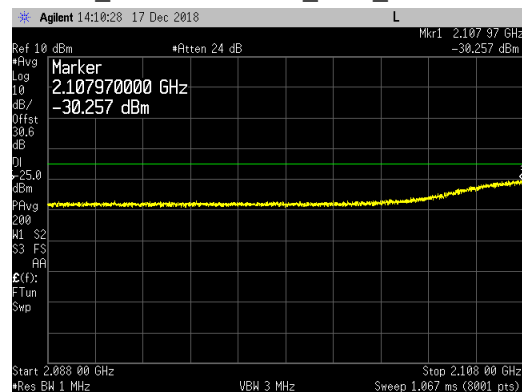
LTE15\_Bottom Channel\_LBE\_2108 to 2109MHz



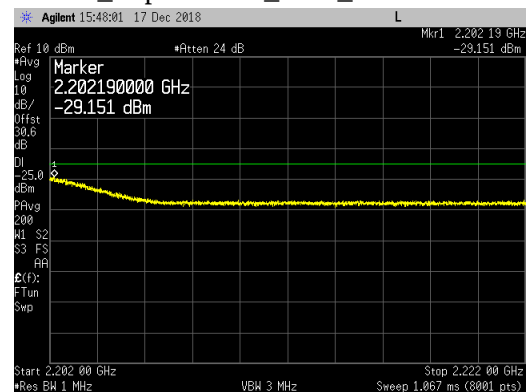
LTE15\_Top Channel\_UBE\_2201 to 2202MHz



LTE15\_Bottom Channel\_LBE\_2088 to 2108MHz

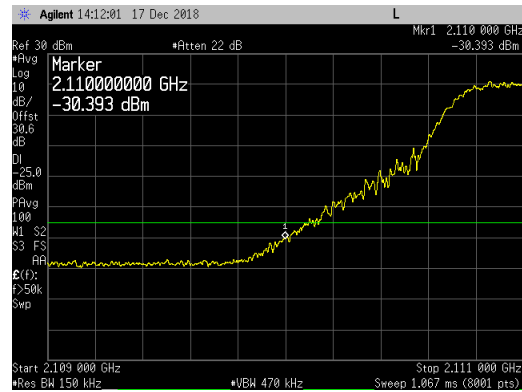


LTE15\_Top Channel\_UBE\_2202 to 2222MHz

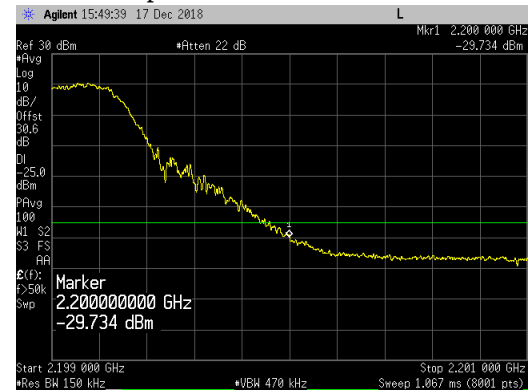


## LTE15 Band Edge Plots for Antenna Port 2 and 16QAM Modulation:

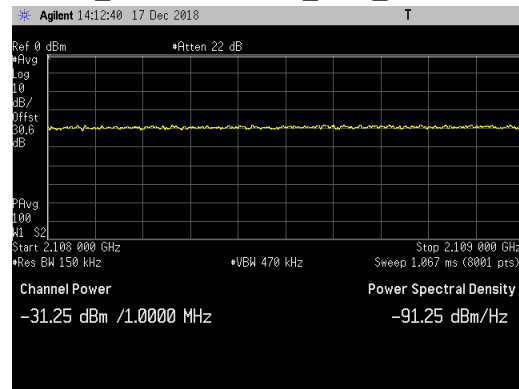
LTE15\_Bottom Channel\_LBE\_2109 to 2111MHz



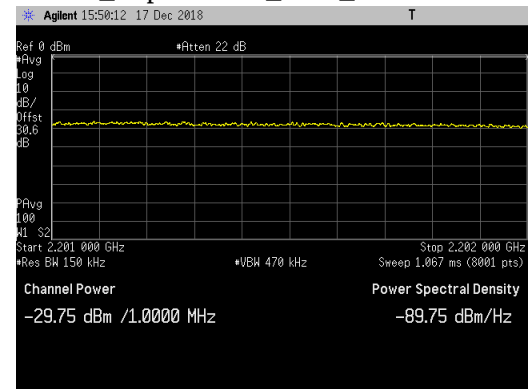
LTE15\_Top Channel\_UBE\_2199 to 2201MHz



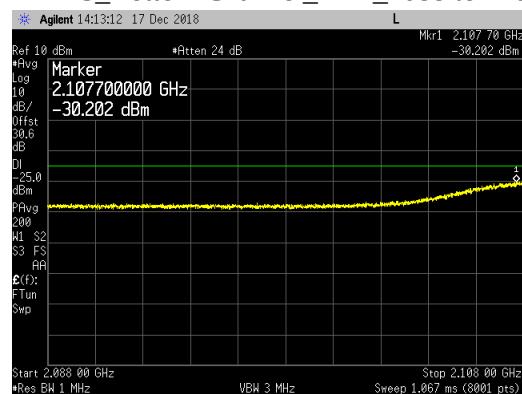
LTE15\_Bottom Channel\_LBE\_2108 to 2109MHz



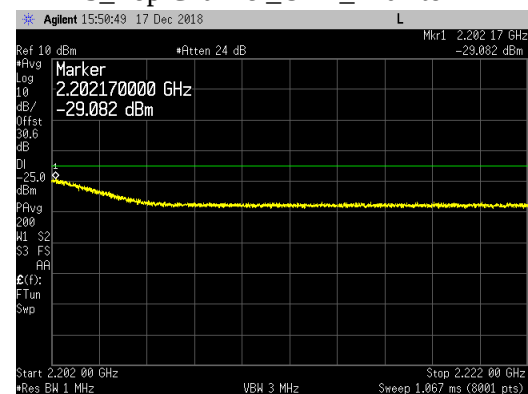
LTE15\_Top Channel\_UBE\_2201 to 2202MHz



LTE15\_Bottom Channel\_LBE\_2088 to 2108MHz

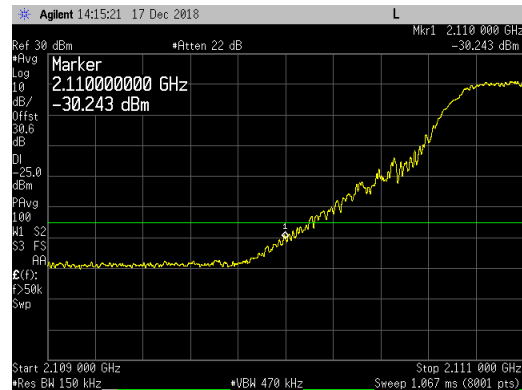


LTE15\_Top Channel\_UBE\_2202 to 2222MHz

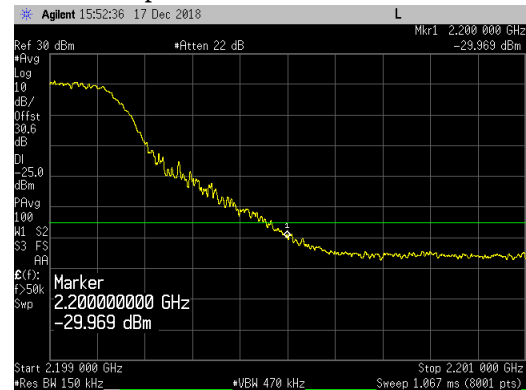


## LTE15 Band Edge Plots for Antenna Port 2 and 64QAM Modulation:

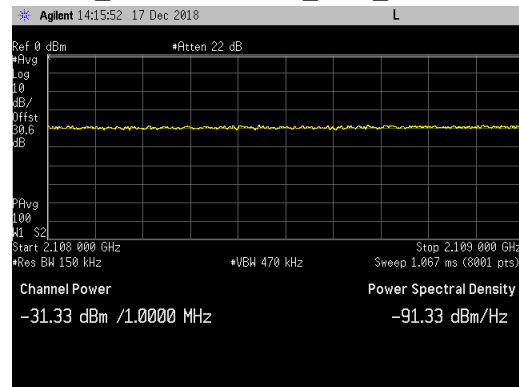
LTE15\_Bottom Channel\_LBE\_2109 to 2111MHz



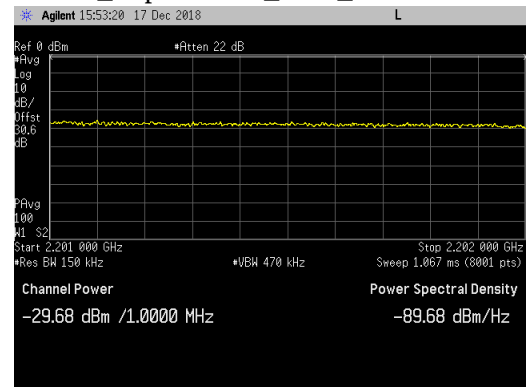
LTE15\_Top Channel\_UBE\_2199 to 2201MHz



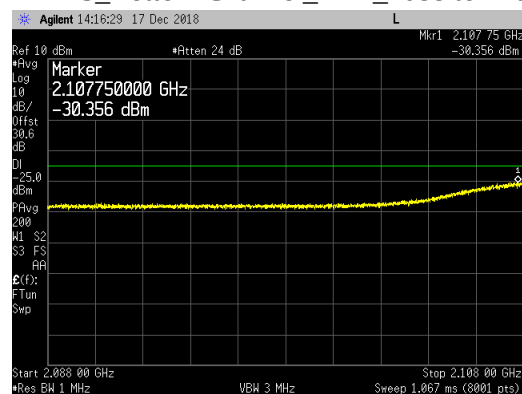
LTE15\_Bottom Channel\_LBE\_2108 to 2109MHz



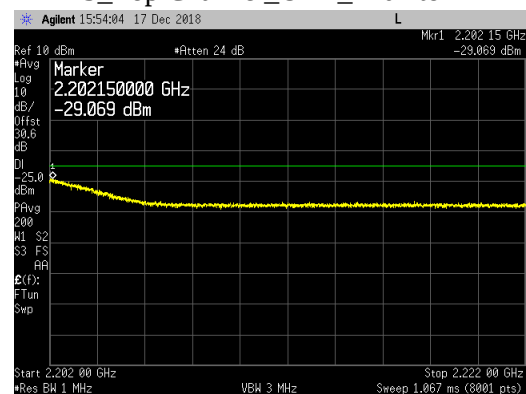
LTE15\_Top Channel\_UBE\_2201 to 2202MHz



LTE15\_Bottom Channel\_LBE\_2088 to 2108MHz

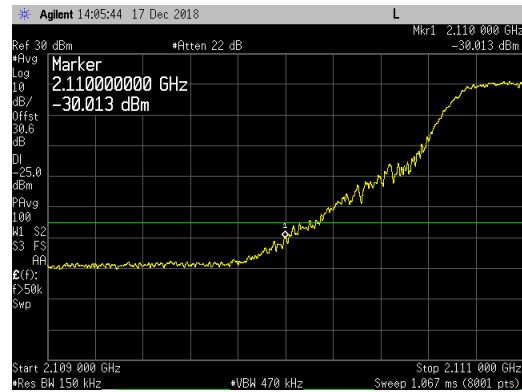


LTE15\_Top Channel\_UBE\_2202 to 2222MHz

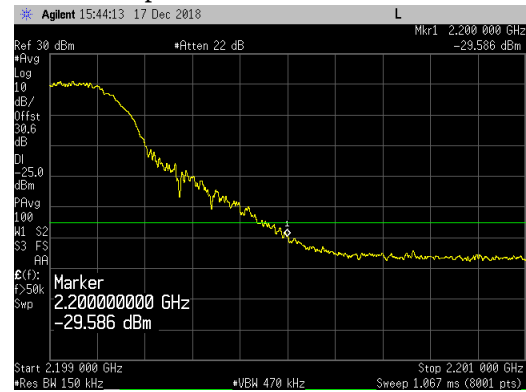


## LTE15 Band Edge Plots for Antenna Port 2 and 256QAM Modulation:

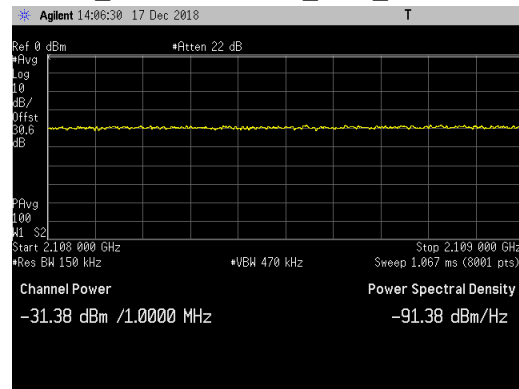
LTE15\_Bottom Channel\_LBE\_2109 to 2111MHz



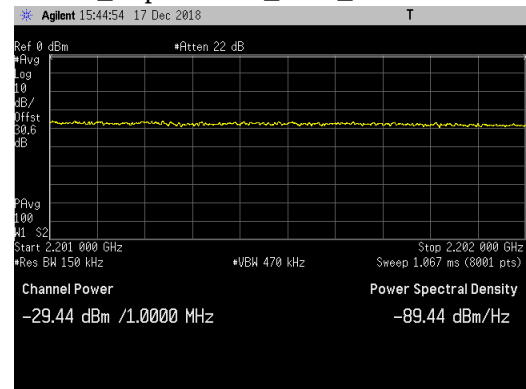
LTE15\_Top Channel\_UBE\_2199 to 2201MHz



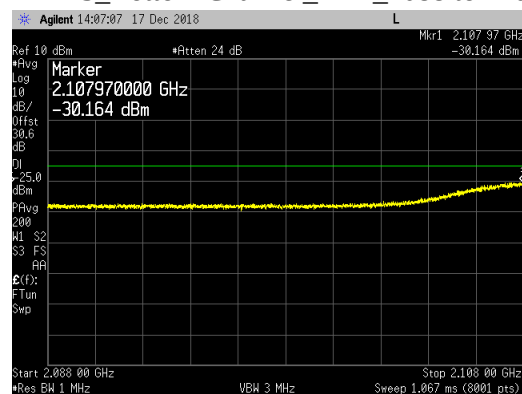
LTE15\_Bottom Channel\_LBE\_2108 to 2109MHz



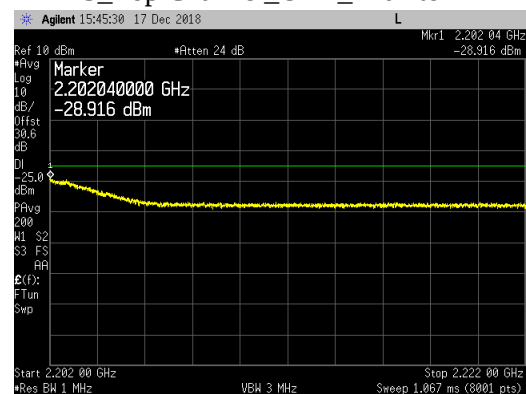
LTE15\_Top Channel\_UBE\_2201 to 2202MHz



LTE15\_Bottom Channel\_LBE\_2088 to 2108MHz

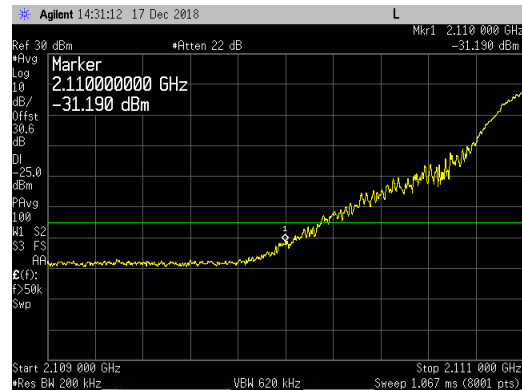


LTE15\_Top Channel\_UBE\_2202 to 2222MHz

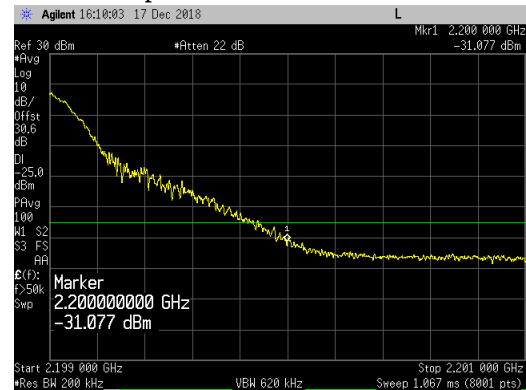


## LTE20 Band Edge Plots for Antenna Port 2 and QPSK Modulation:

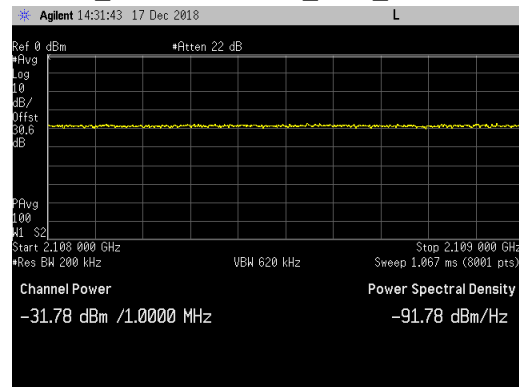
LTE20\_Bottom Channel\_LBE\_2109 to 2111MHz



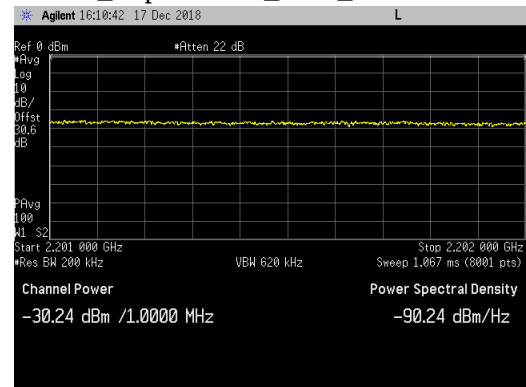
LTE20\_Top Channel\_UBE\_2199 to 2201MHz



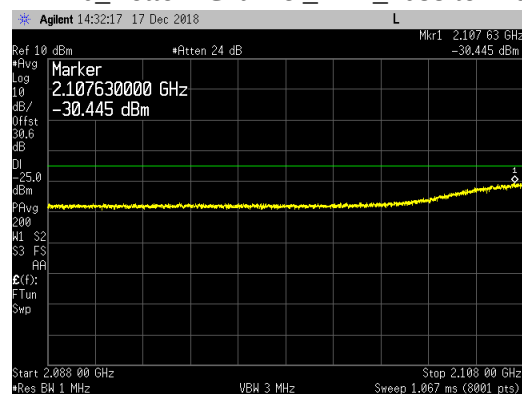
LTE20\_Bottom Channel\_LBE\_2108 to 2109MHz



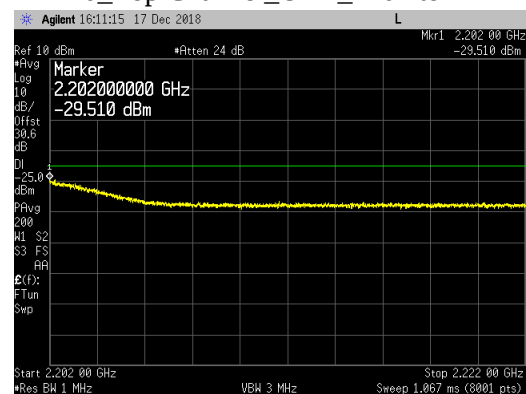
LTE20\_Top Channel\_UBE\_2201 to 2202MHz



LTE20\_Bottom Channel\_LBE\_2088 to 2108MHz

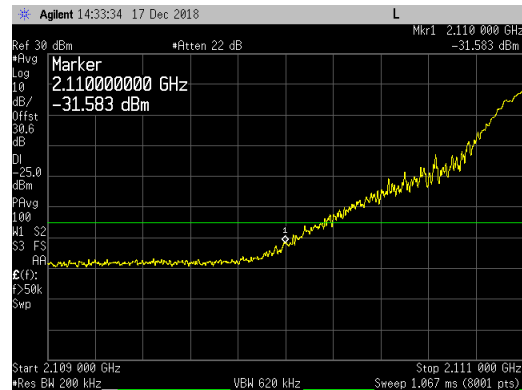


LTE20\_Top Channel\_UBE\_2202 to 2222MHz

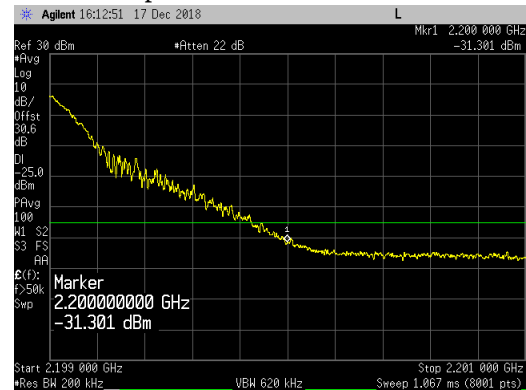


## LTE20 Band Edge Plots for Antenna Port 2 and 16QAM Modulation:

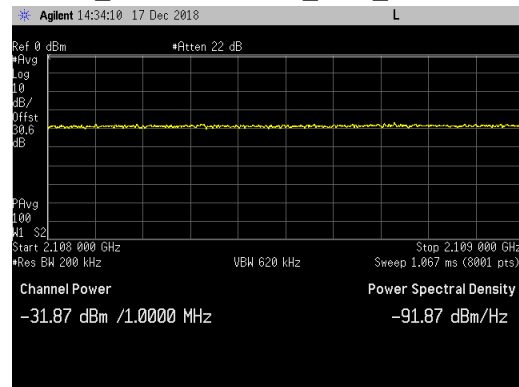
LTE20\_Bottom Channel\_LBE\_2109 to 2111MHz



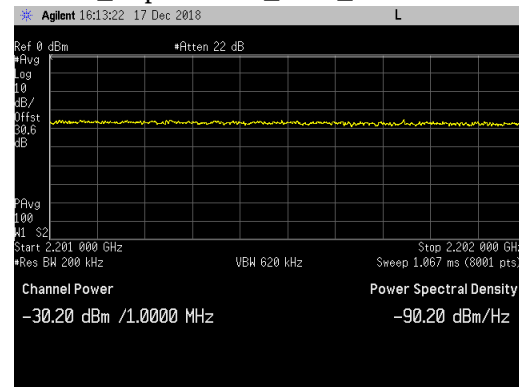
LTE20\_Top Channel\_UBE\_2199 to 2201MHz



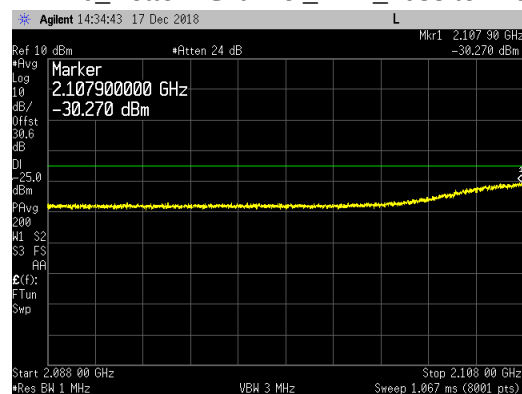
LTE20\_Bottom Channel\_LBE\_2108 to 2109MHz



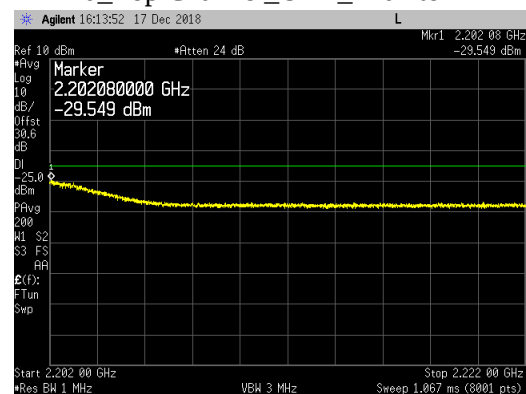
LTE20\_Top Channel\_UBE\_2201 to 2202MHz



LTE20\_Bottom Channel\_LBE\_2088 to 2108MHz

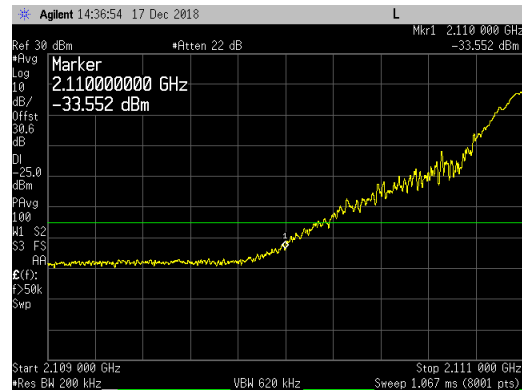


LTE20\_Top Channel\_UBE\_2202 to 2222MHz

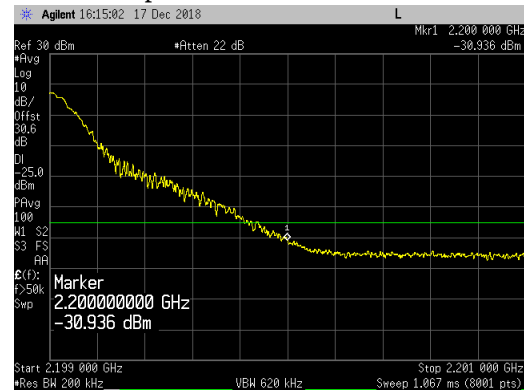


## LTE20 Band Edge Plots for Antenna Port 2 and 64QAM Modulation:

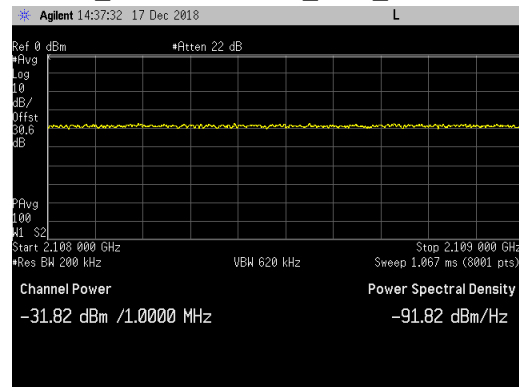
LTE20\_Bottom Channel\_LBE\_2109 to 2111MHz



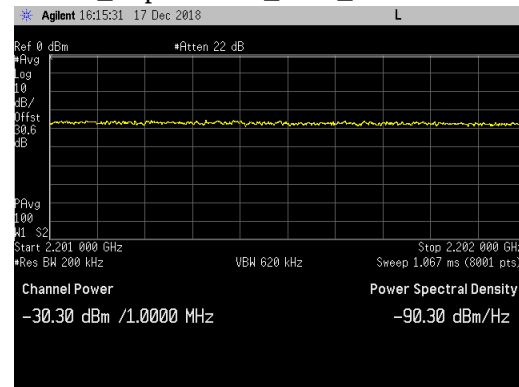
LTE20\_Top Channel\_UBE\_2199 to 2201MHz



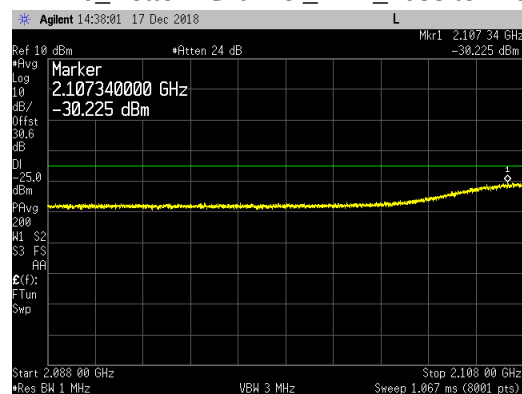
LTE20\_Bottom Channel\_LBE\_2108 to 2109MHz



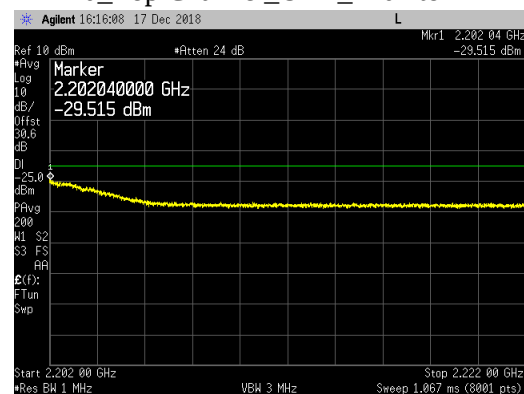
LTE20\_Top Channel\_UBE\_2201 to 2202MHz



LTE20\_Bottom Channel\_LBE\_2088 to 2108MHz

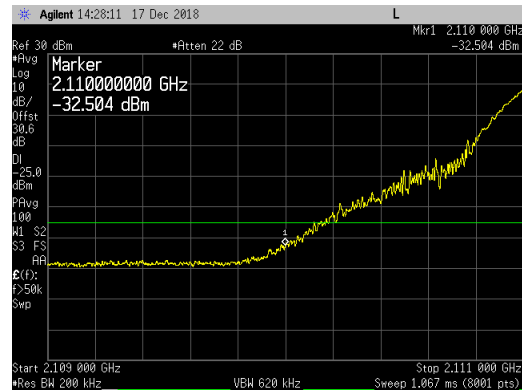


LTE20\_Top Channel\_UBE\_2202 to 2222MHz

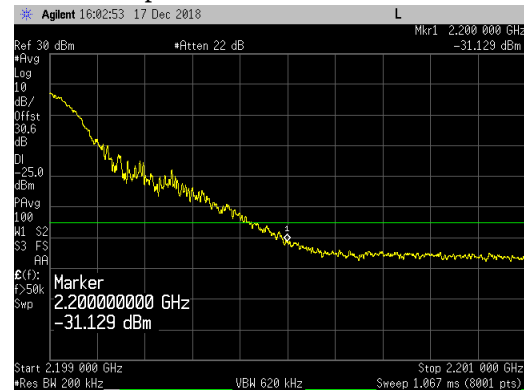


## LTE20 Band Edge Plots for Antenna Port 2 and 256QAM Modulation:

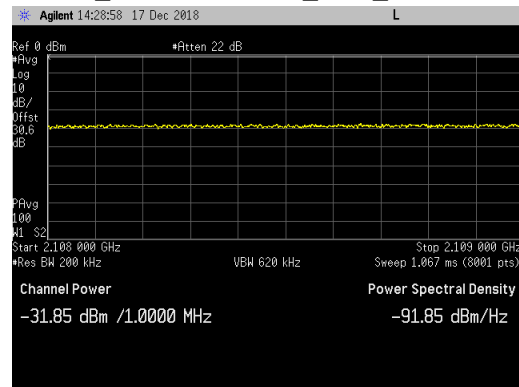
LTE20\_Bottom Channel\_LBE\_2109 to 2111MHz



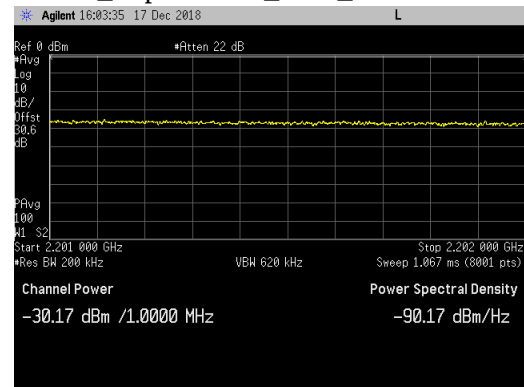
LTE20\_Top Channel\_UBE\_2199 to 2201MHz



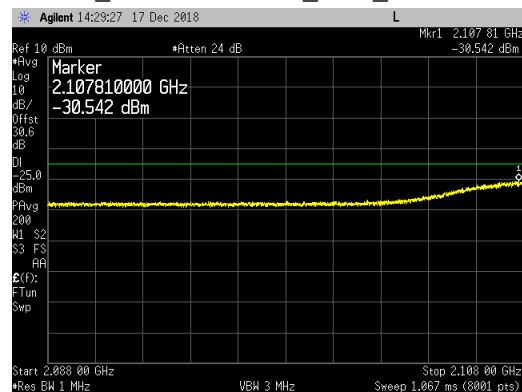
LTE20\_Bottom Channel\_LBE\_2108 to 2109MHz



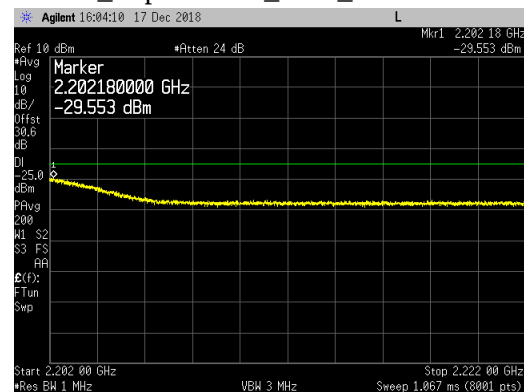
LTE20\_Top Channel\_UBE\_2201 to 2202MHz



LTE20\_Bottom Channel\_LBE\_2088 to 2108MHz



LTE20\_Top Channel\_UBE\_2202 to 2222MHz



### Transmitter Antenna Port Conducted Emissions

Transmitter conducted emission measurements were made at radio module antenna port 2. Measurements were performed over the 9kHz to 22GHz frequency range. The radio module was operated on the AWS middle channel (2155MHz) with all LTE modulation types (QPSK, 16QAM, 64QAM and 256QAM) for LTE bandwidths of 5MHz, 10MHz, 15MHz and 20MHz.

The limit of -25dBm was used in the certification testing. The limit is adjusted to -25dBm [-13dBm -10 log (16)] per FCC KDB 662911D01 v02r01 because the BTS may operate as a 16 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 max hold over 50 sweeps (except for the 9k to 150kHz and the 20MHz to 3GHz frequency ranges). Measurements for the 9k to 150kHz and the 20MHz to 3GHz frequency range were performed with the spectrum analyzer in the RMS average mode over 100 traces.

The limit for the 9kHz to 150kHz frequency range was adjusted to -55dBm to correct for a spectrum analyzer RBW of 1kHz versus required RBW of 1MHz [i.e.: -55dBm = -25dBm -10log(1MHz/1kHz)]. The limit for the 150kHz to 20MHz frequency range was adjusted to -45dBm to correct for a spectrum analyzer RBW of 10kHz versus required RBW of 1MHz [i.e.: -45dBm = -25dBm -10log(1MHz/10kHz)]. The required limit of -25dBm with a RBW of  $\geq 1$ MHz was used for all other frequency ranges.

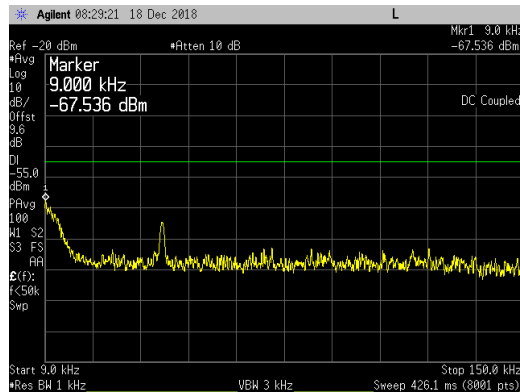
The spectrum analyzer settings that were used for this test are summarized in the following table.

| Frequency Range                                                                                                                                                       | RBW   | VBW   | Number of Data Points | Detector | Sweep Time | Max Hold over | Offset Note (1) |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|-----------------------|----------|------------|---------------|-----------------|
| 9kHz to 150kHz                                                                                                                                                        | 1kHz  | 3kHz  | 8001                  | Average  | Auto       | Note (2)      | 9.6dB           |
| 150kHz to 20MHz                                                                                                                                                       | 10kHz | 30kHz | 8001                  | Peak     | Auto       | 50 Sweeps     | 9.6dB           |
| 20MHz to 3GHz                                                                                                                                                         | 1MHz  | 3MHz  | 8001                  | Average  | Auto       | Note (2)      | 30.3dB          |
| 3GHz to 10GHz                                                                                                                                                         | 2MHz  | 6MHz  | 8192                  | Peak     | Auto       | 50 Sweeps     | 31.4dB          |
| 10GHz to 18GHz                                                                                                                                                        | 2MHz  | 6MHz  | 8192                  | Peak     | Auto       | 50 Sweeps     | 32.5dB          |
| 18GHz to 22GHz                                                                                                                                                        | 1MHz  | 3MHz  | 8192                  | Peak     | Auto       | 50 Sweeps     | 36.7dB          |
| Note 1: The total measurement RF path loss of the test setup (attenuators, test cables and filters) is accounted for by the spectrum analyser reference level offset. |       |       |                       |          |            |               |                 |
| Note 2: Max Hold not used and instead measurements were performed with the spectrum analyser in the RMS average mode over 100 traces.                                 |       |       |                       |          |            |               |                 |

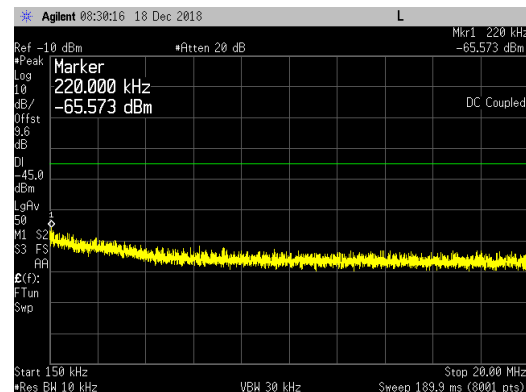
A low pass filter was used to reduce measurement instrumentation noise floor for the frequency ranges less than 20MHz. A high pass filter was used to reduce measurement instrumentation noise floor for the frequency ranges above 3GHz. The total measurement RF path loss of the test setup (attenuators, low pass filter, high pass filter and test cables) as shown in the table is accounted for by the spectrum analyzer reference level offset. The display line on the plots reflects the required limit. Conducted spurious emission plots/measurements are provided in the following pages.

## LTE5 Channel Bandwidth \_ QPSK \_ Middle Channel (2155MHz):

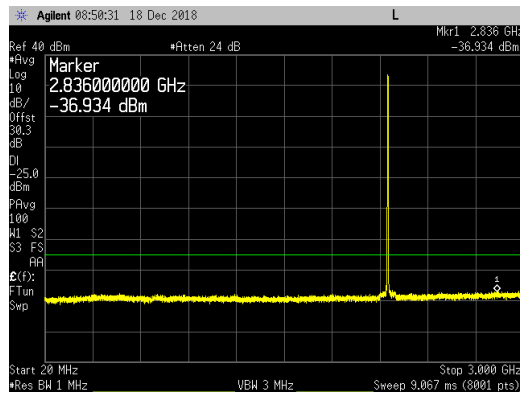
### 9kHz to 150kHz



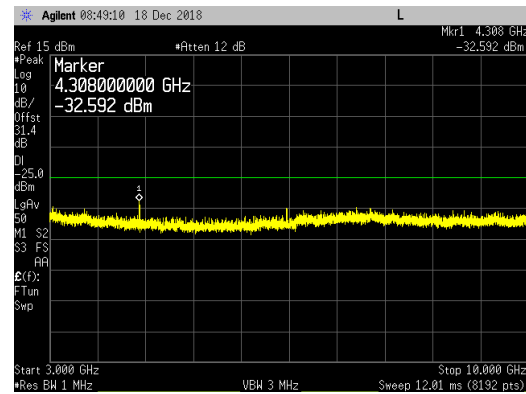
### 150kHz to 20MHz



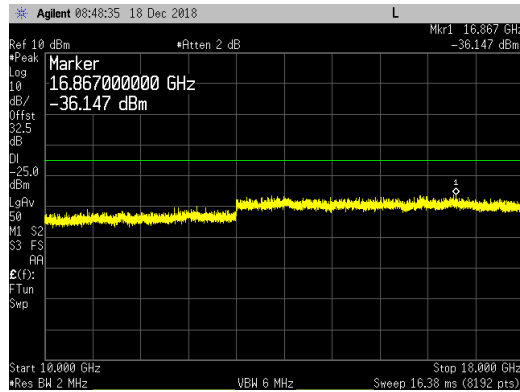
### 20MHz to 3GHz



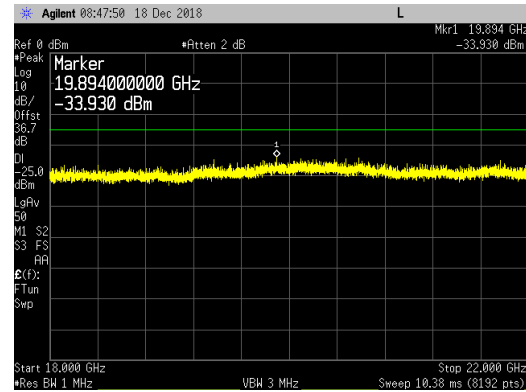
### 3GHz to 10GHz



### 10GHz to 18GHz

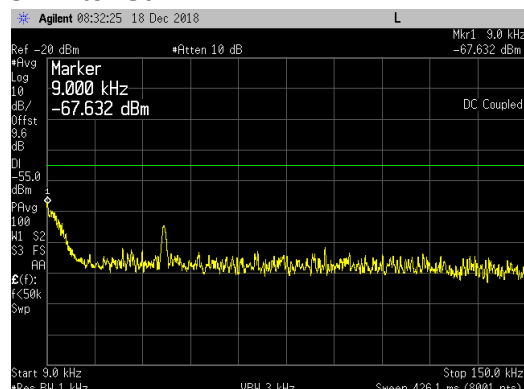


### 18GHz to 22GHz

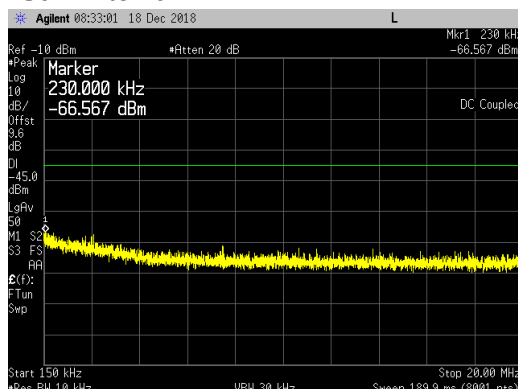


## LTE5 Channel Bandwidth \_ 16QAM \_ Middle Channel (2155MHz):

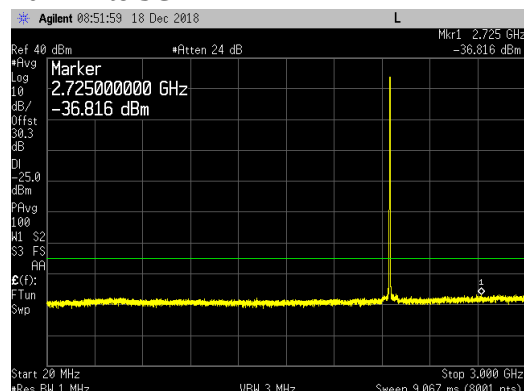
### 9kHz to 150kHz



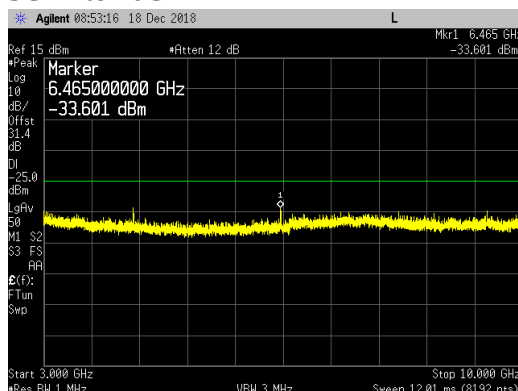
### 150kHz to 20MHz



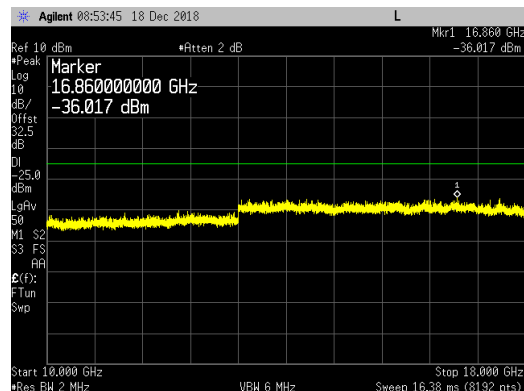
### 20MHz to 3GHz



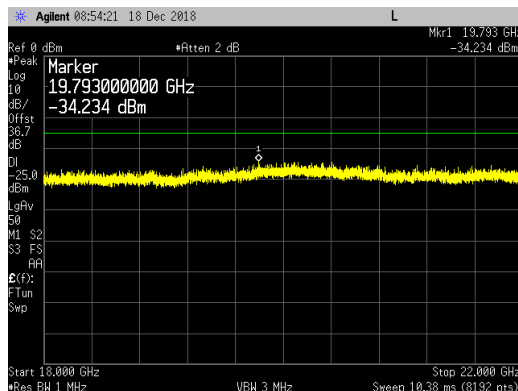
### 3GHz to 10GHz



### 10GHz to 18GHz

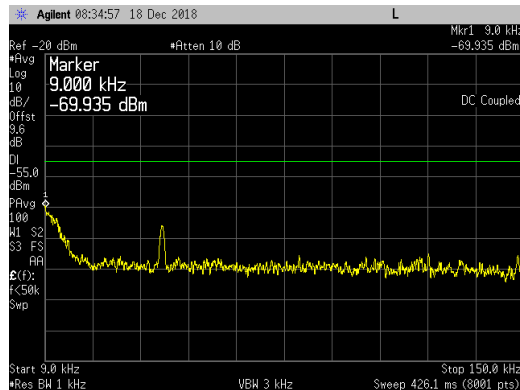


### 18GHz to 22GHz

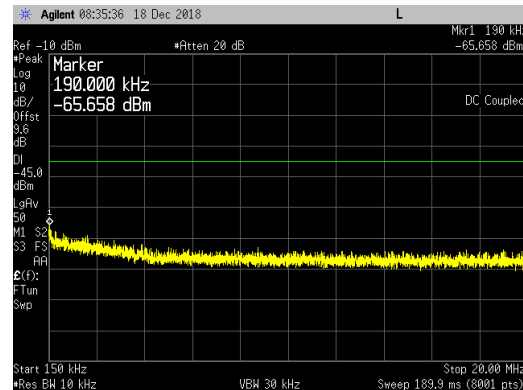


## LTE5 Channel Bandwidth \_64QAM\_ Middle Channel (2155MHz):

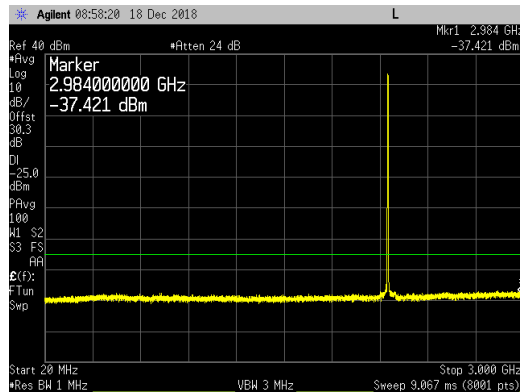
### 9kHz to 150kHz



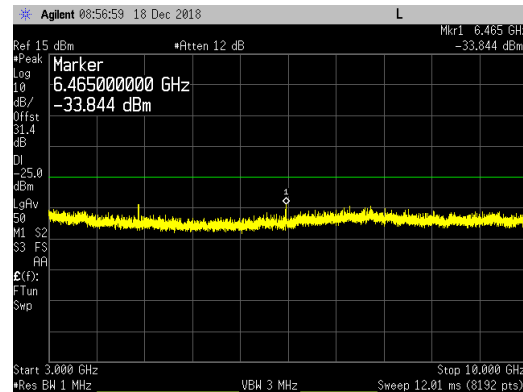
### 150kHz to 20MHz



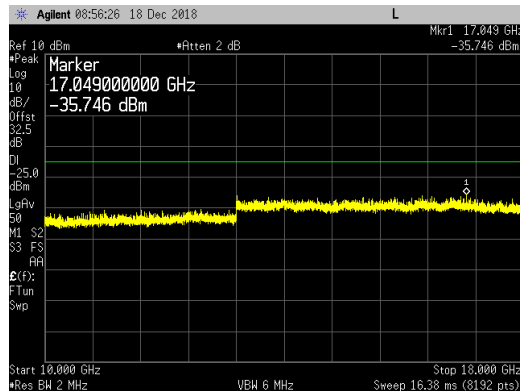
### 20MHz to 3GHz



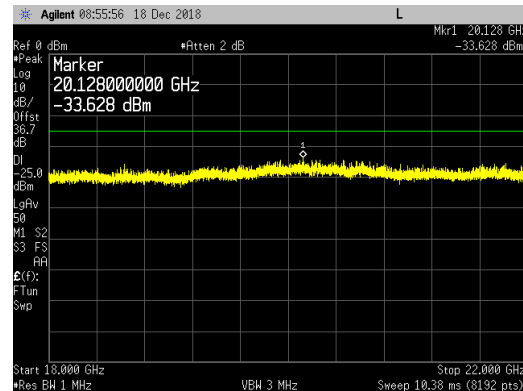
### 3GHz to 10GHz



### 10GHz to 18GHz

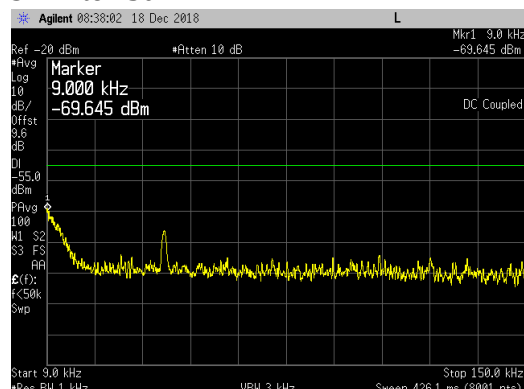


### 18GHz to 22GHz

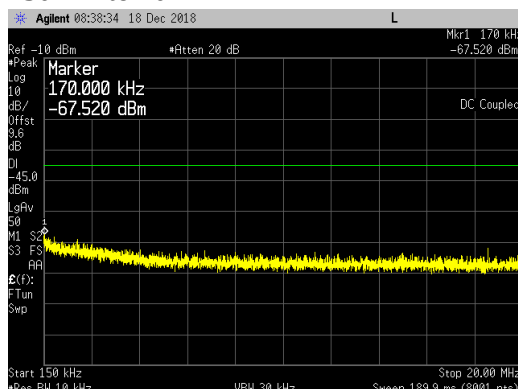


## LTE5 Channel Bandwidth \_256QAM\_ Middle Channel (2155MHz):

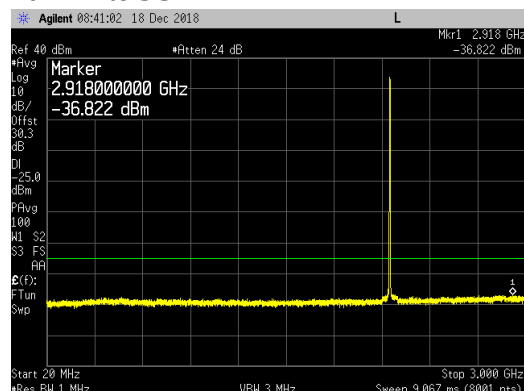
### 9kHz to 150kHz



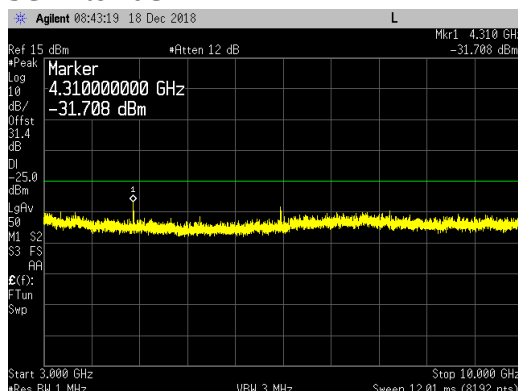
### 150kHz to 20MHz



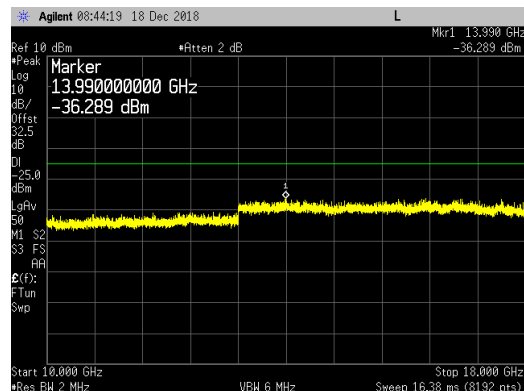
### 20MHz to 3GHz



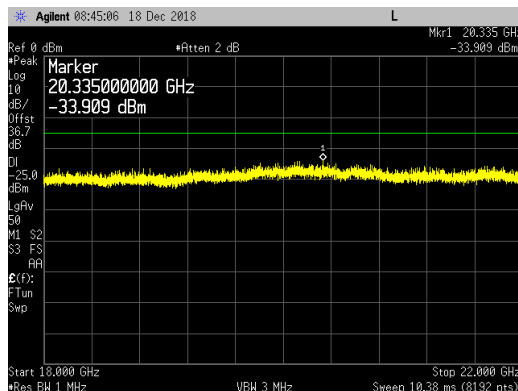
### 3GHz to 10GHz



### 10GHz to 18GHz

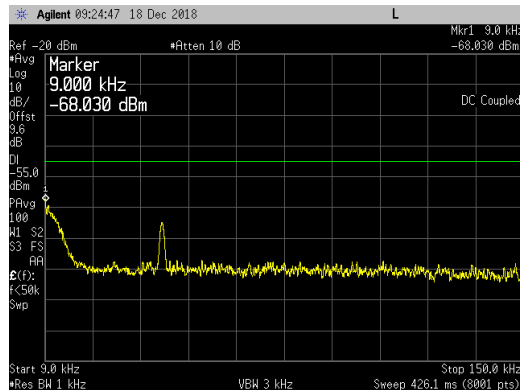


### 18GHz to 22GHz

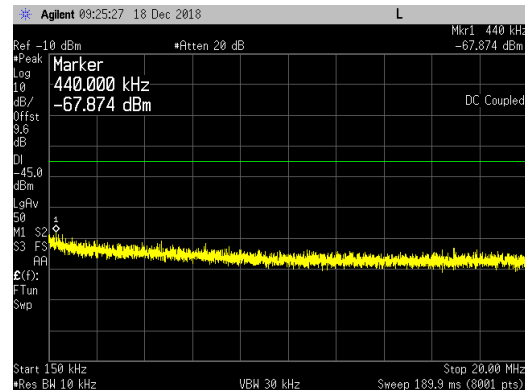


## LTE10 Channel Bandwidth \_ QPSK \_ Middle Channel (2155MHz):

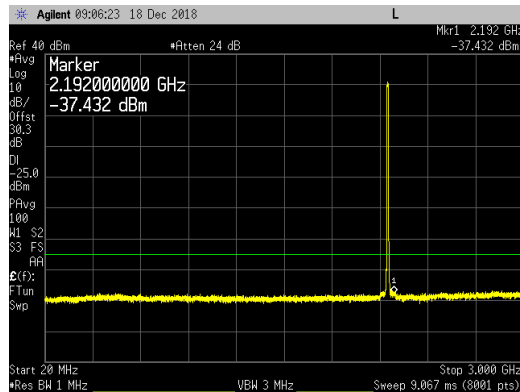
### 9kHz to 150kHz



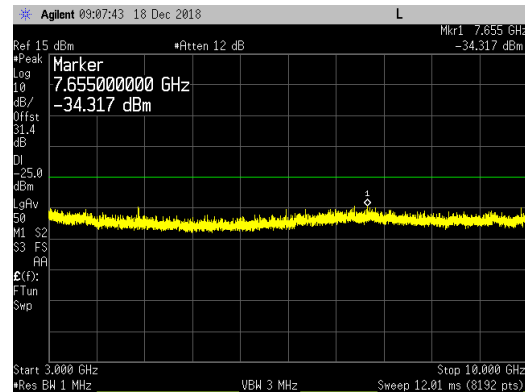
### 150kHz to 20MHz



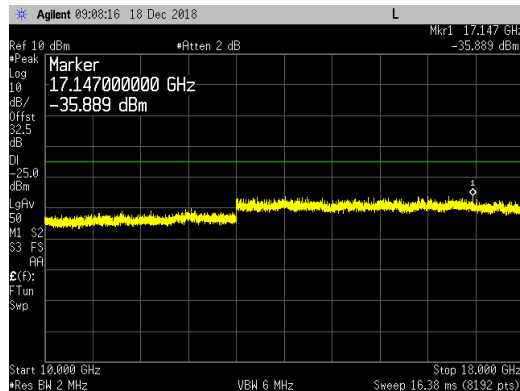
### 20MHz to 3GHz



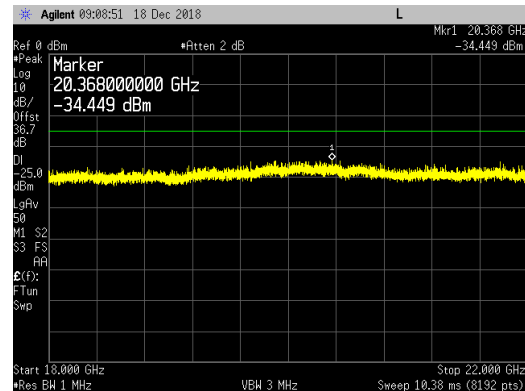
### 3GHz to 10GHz



### 10GHz to 18GHz

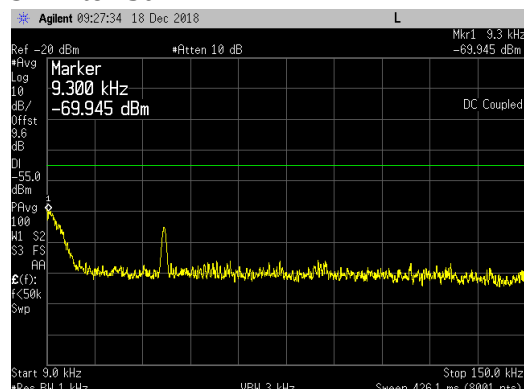


### 18GHz to 22GHz

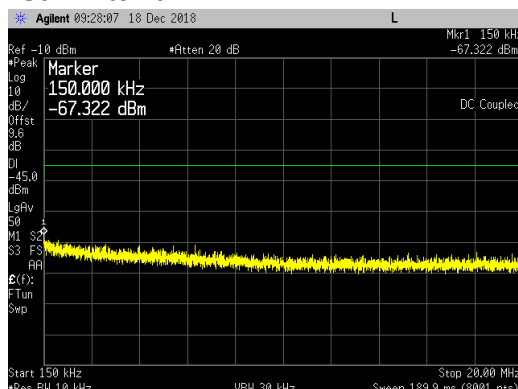


## LTE10 Channel Bandwidth \_ 16QAM \_ Middle Channel (2155MHz):

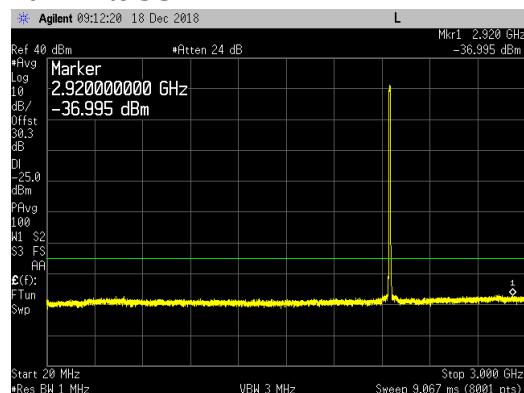
### 9kHz to 150kHz



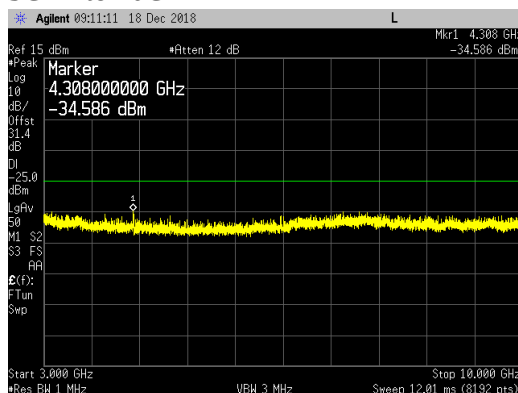
### 150kHz to 20MHz



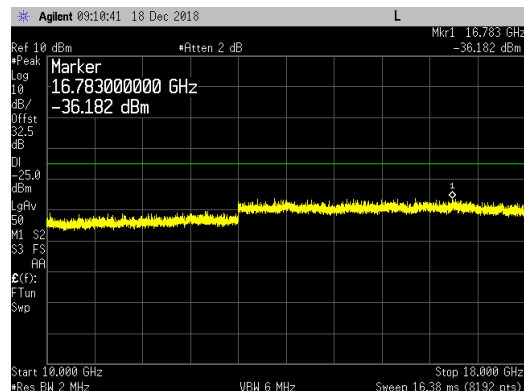
### 20MHz to 3GHz



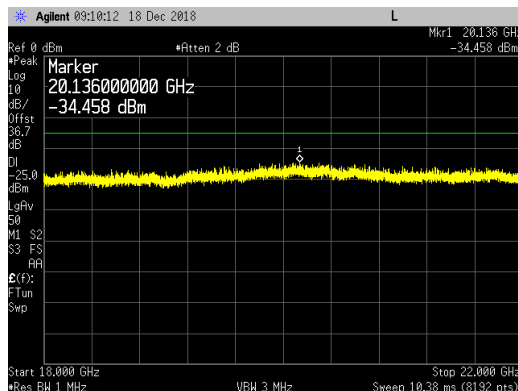
### 3GHz to 10GHz



### 10GHz to 18GHz

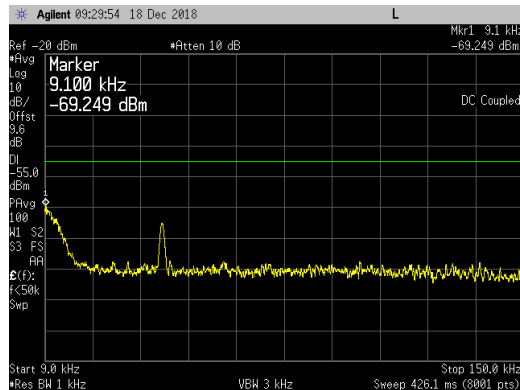


### 18GHz to 22GHz

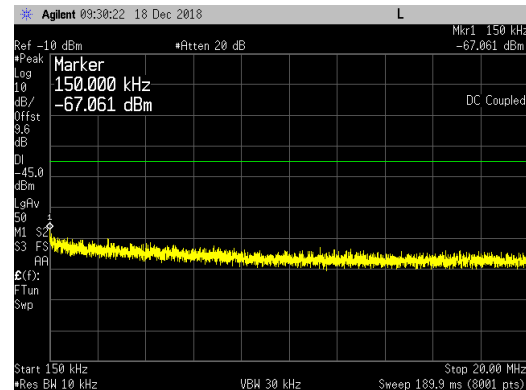


## LTE10 Channel Bandwidth \_64QAM\_ Middle Channel (2155MHz):

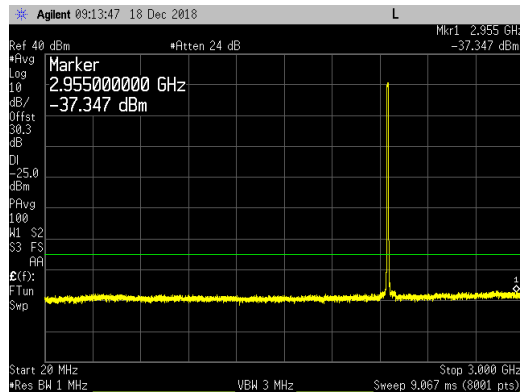
### 9kHz to 150kHz



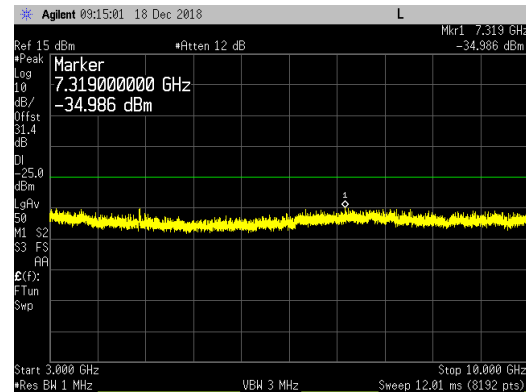
### 150kHz to 20MHz



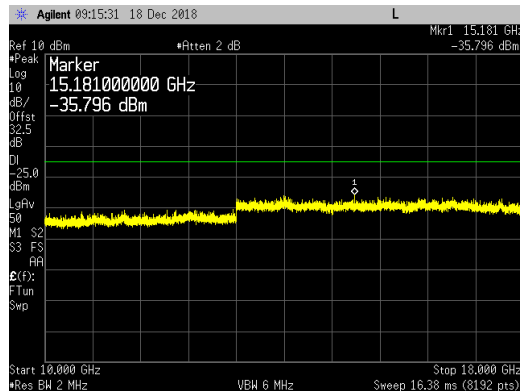
### 20MHz to 3GHz



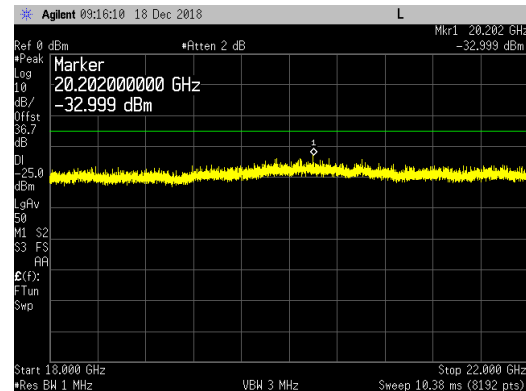
### 3GHz to 10GHz



### 10GHz to 18GHz

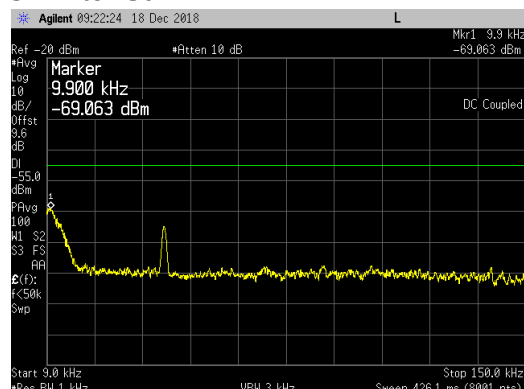


### 18GHz to 22GHz

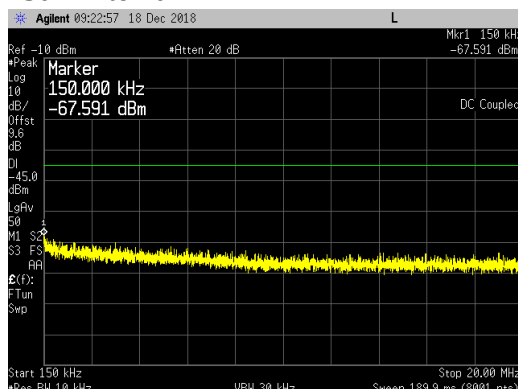


## LTE10 Channel Bandwidth \_256QAM\_ Middle Channel (2155MHz):

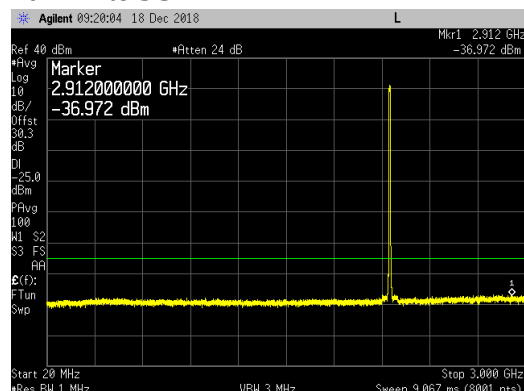
### 9kHz to 150kHz



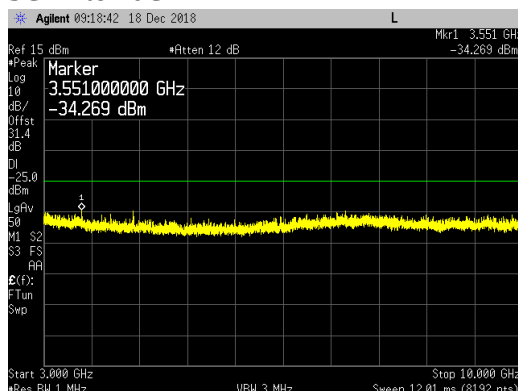
### 150kHz to 20MHz



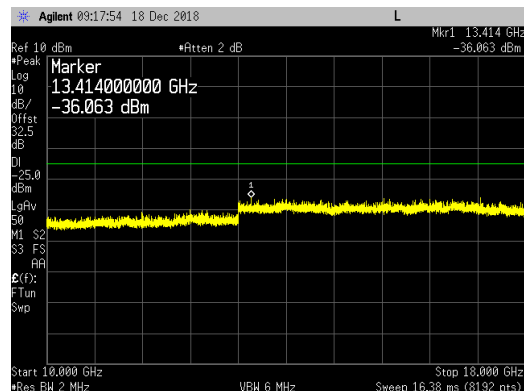
### 20MHz to 3GHz



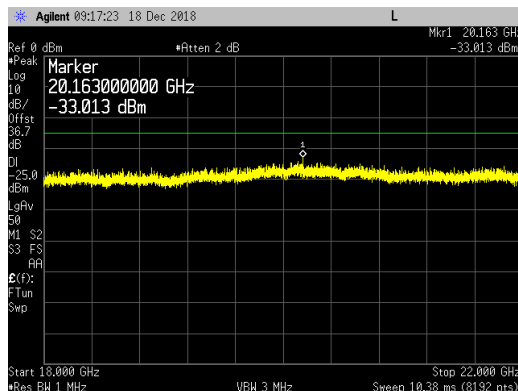
### 3GHz to 10GHz



### 10GHz to 18GHz

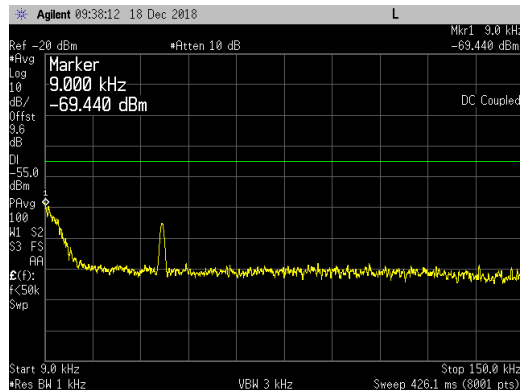


### 18GHz to 22GHz

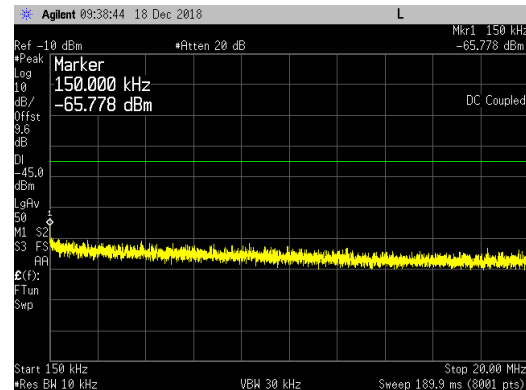


## LTE15 Channel Bandwidth \_ QPSK \_ Middle Channel (2155MHz):

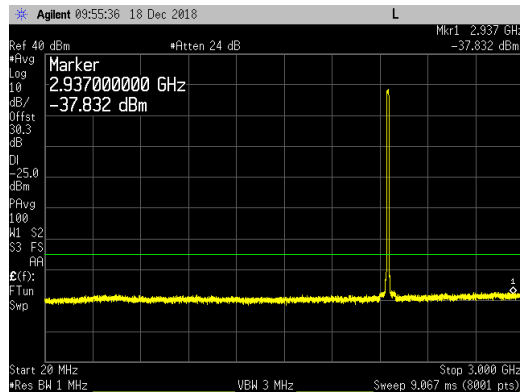
### 9kHz to 150kHz



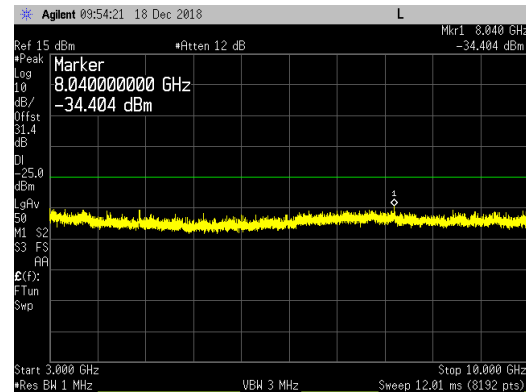
### 150kHz to 20MHz



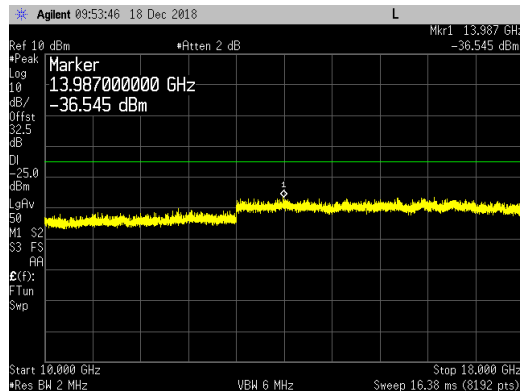
### 20MHz to 3GHz



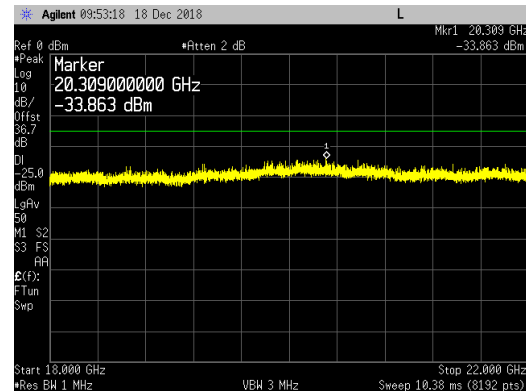
### 3GHz to 10GHz



### 10GHz to 18GHz

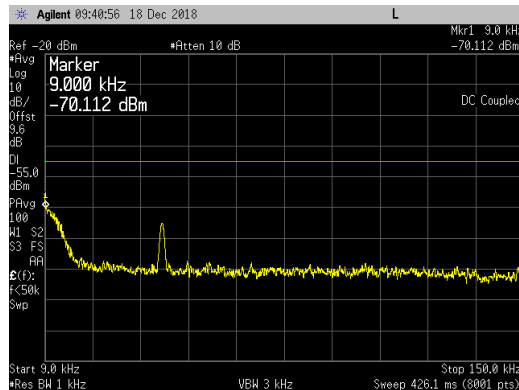


### 18GHz to 22GHz

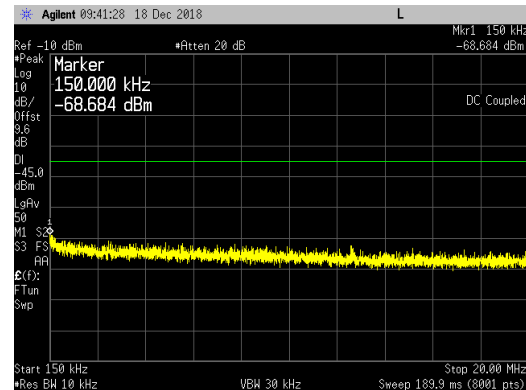


## LTE15 Channel Bandwidth \_ 16QAM \_ Middle Channel (2155MHz):

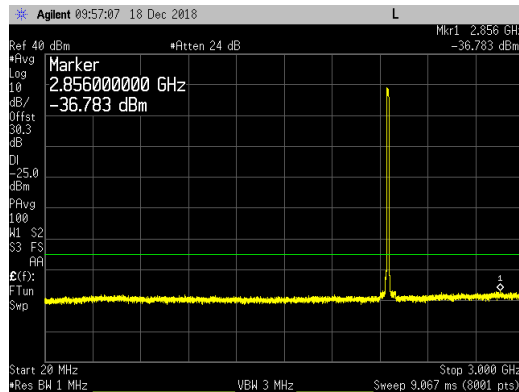
### 9kHz to 150kHz



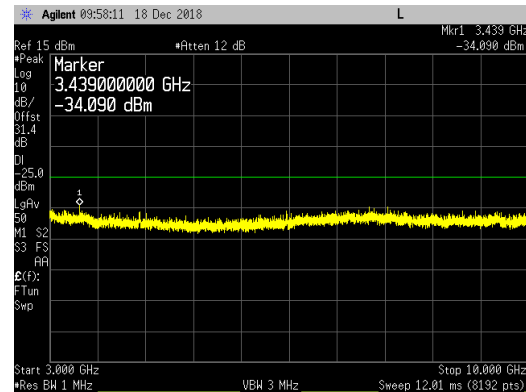
### 150kHz to 20MHz



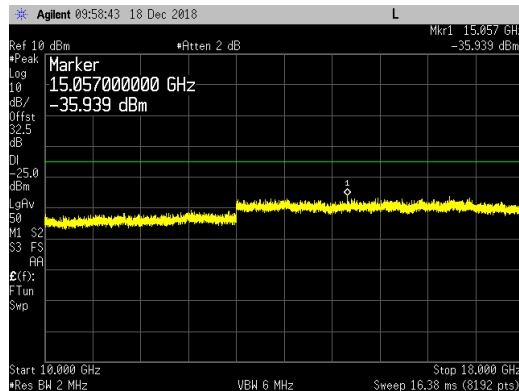
### 20MHz to 3GHz



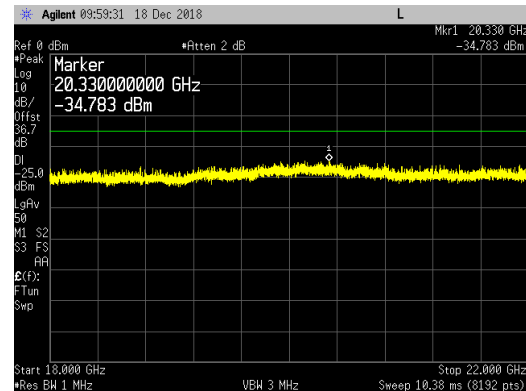
### 3GHz to 10GHz



### 10GHz to 18GHz

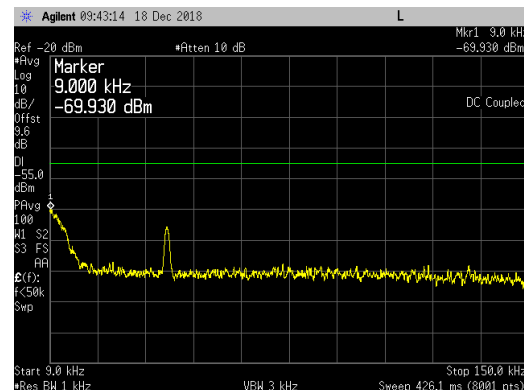


### 18GHz to 22GHz

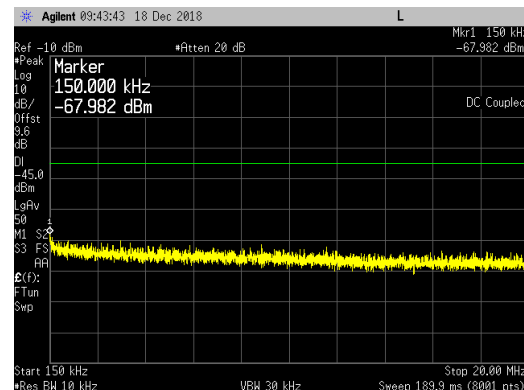


# LTE15 Channel Bandwidth \_64QAM\_ Middle Channel (2155MHz):

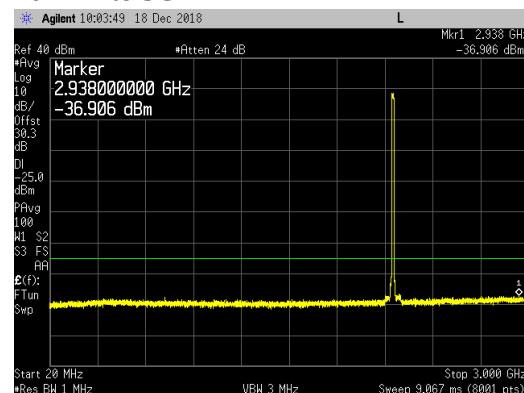
## 9kHz to 150kHz



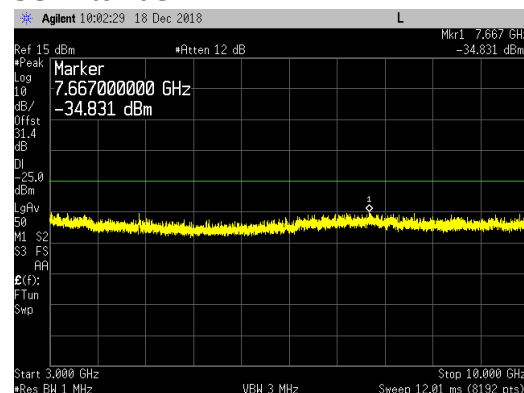
## 150kHz to 20MHz



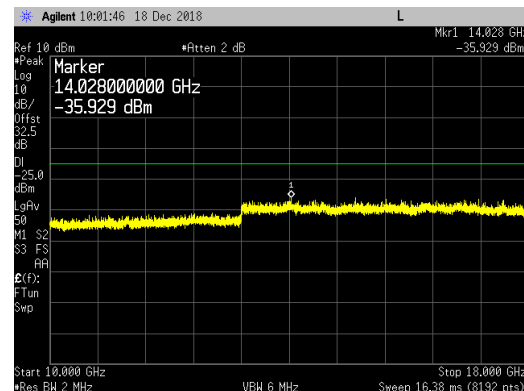
## 20MHz to 3GHz



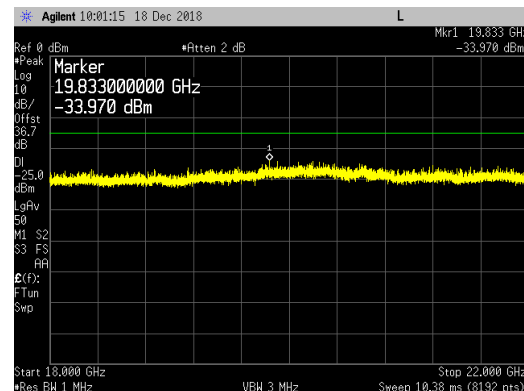
## 3GHz to 10GHz



## 10GHz to 18GHz

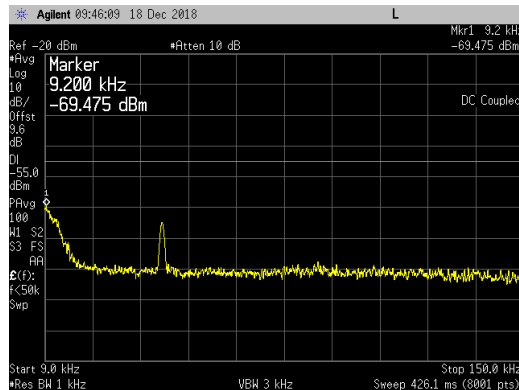


## 18GHz to 22GHz

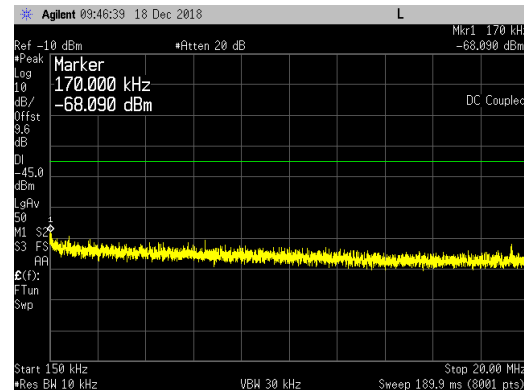


## LTE15 Channel Bandwidth \_256QAM\_ Middle Channel (2155MHz):

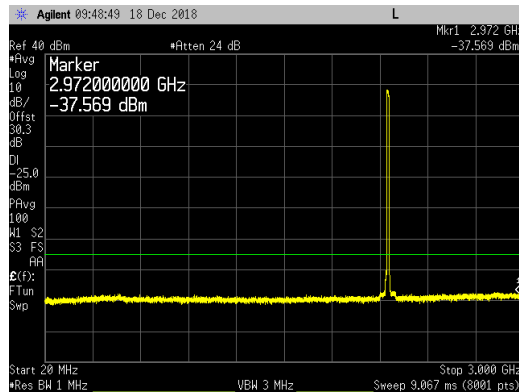
### 9kHz to 150kHz



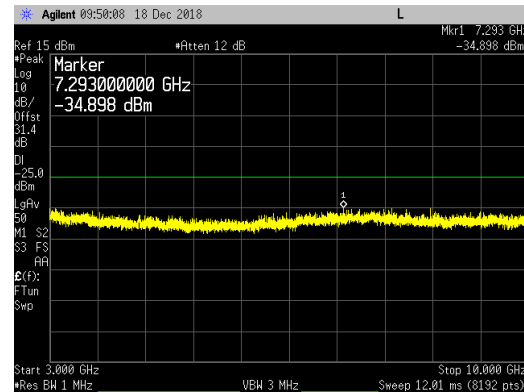
### 150kHz to 20MHz



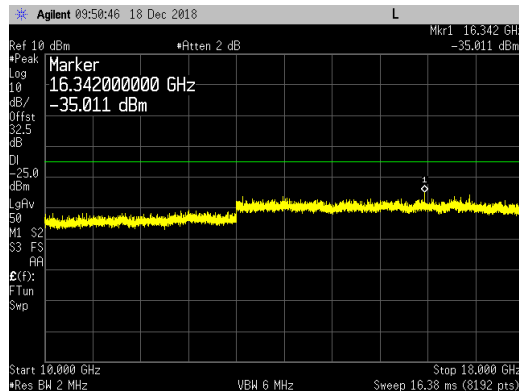
### 20MHz to 3GHz



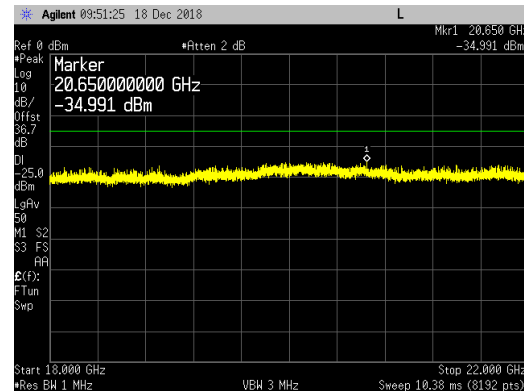
### 3GHz to 10GHz



### 10GHz to 18GHz

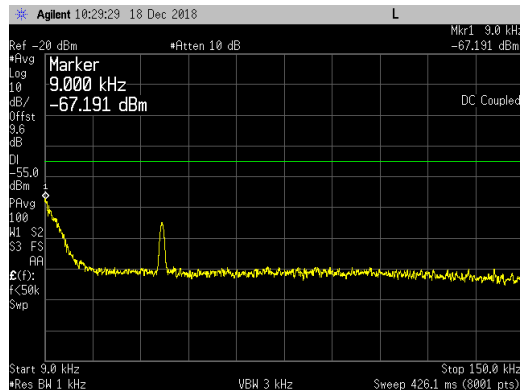


### 18GHz to 22GHz

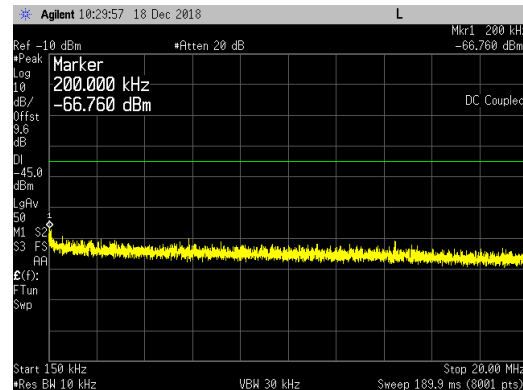


## LTE20 Channel Bandwidth \_ QPSK \_ Middle Channel (2155MHz):

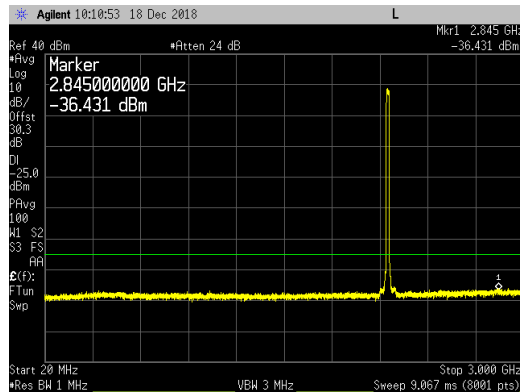
### 9kHz to 150kHz



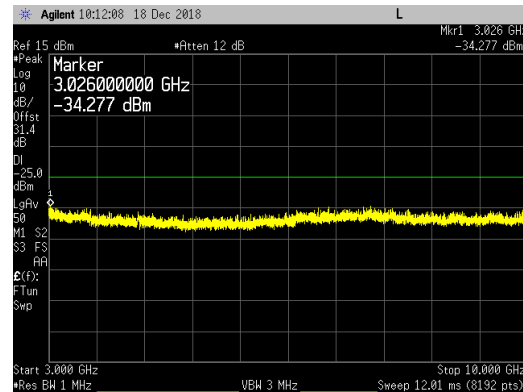
### 150kHz to 20MHz



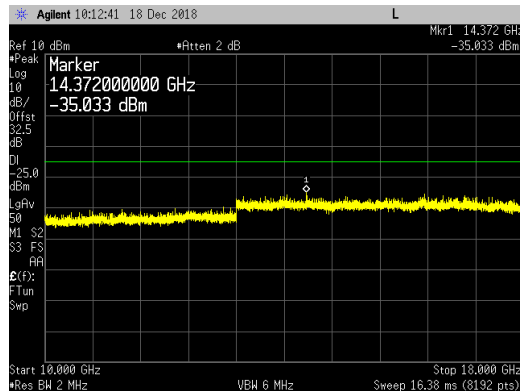
### 20MHz to 3GHz



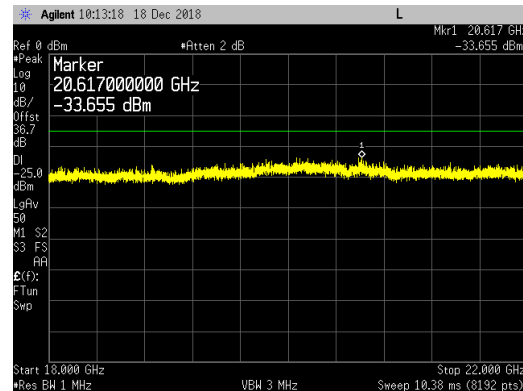
### 3GHz to 10GHz



### 10GHz to 18GHz

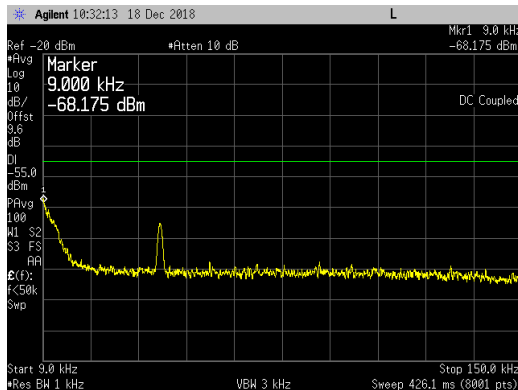


### 18GHz to 22GHz

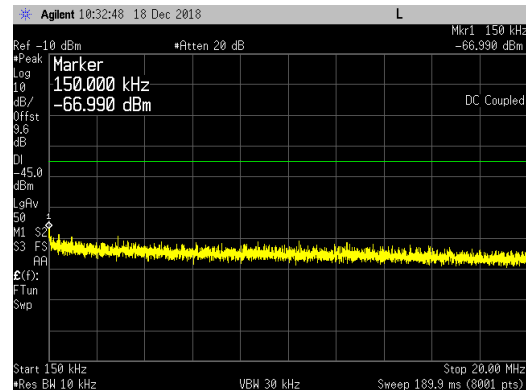


## LTE20 Channel Bandwidth \_ 16QAM \_ Middle Channel (2155MHz):

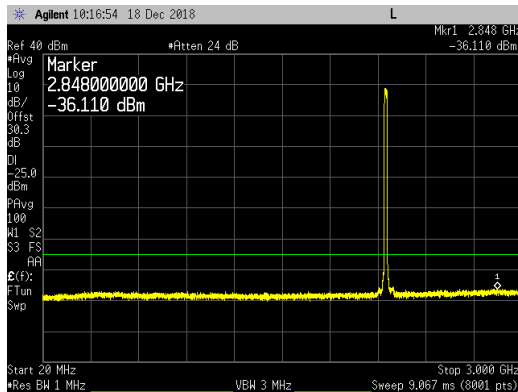
### 9kHz to 150kHz



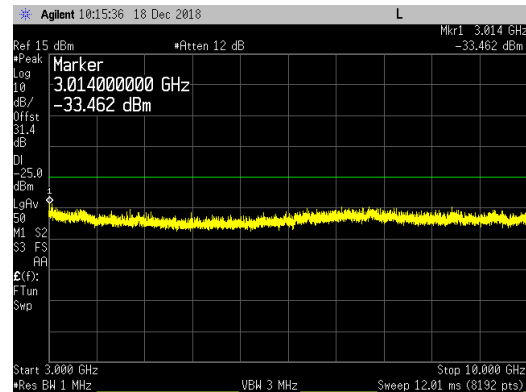
### 150kHz to 20MHz



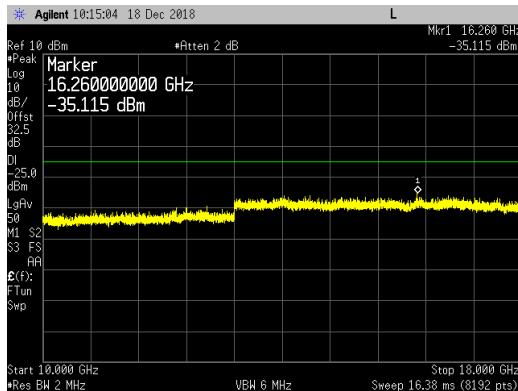
### 20MHz to 3GHz



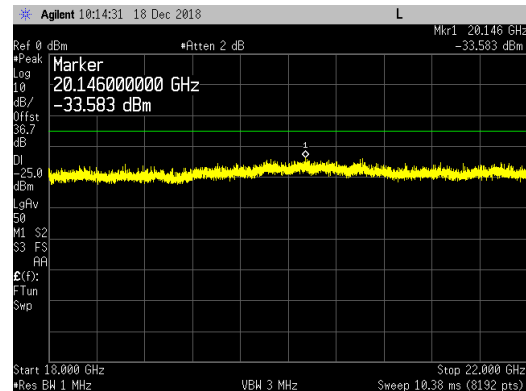
### 3GHz to 10GHz



### 10GHz to 18GHz

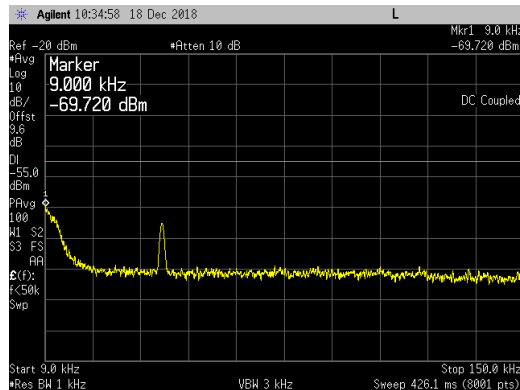


### 18GHz to 22GHz

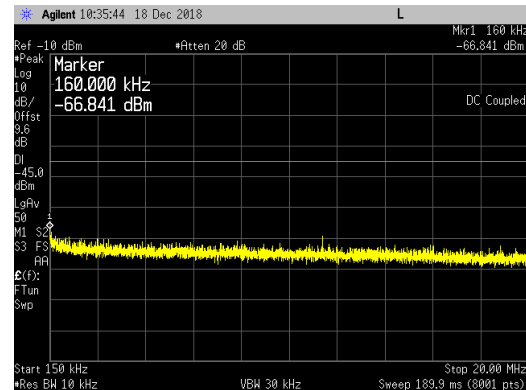


## LTE20 Channel Bandwidth \_64QAM\_ Middle Channel (2155MHz):

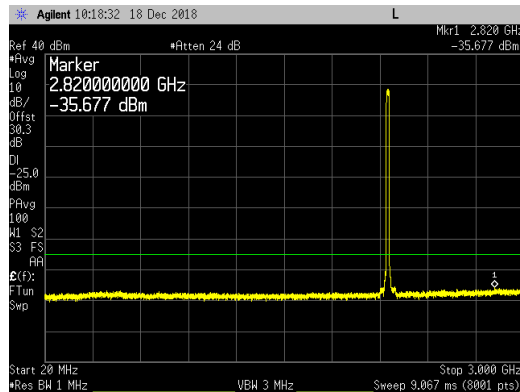
### 9kHz to 150kHz



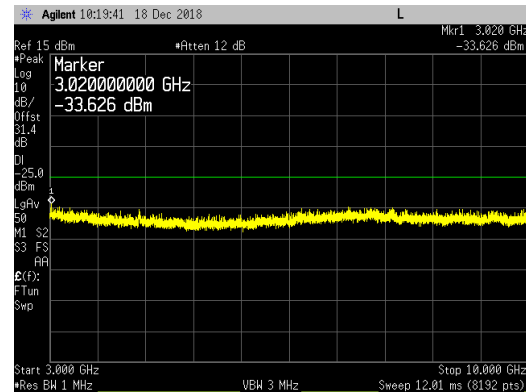
### 150kHz to 20MHz



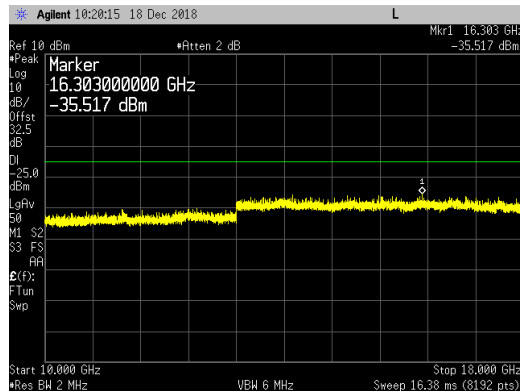
### 20MHz to 3GHz



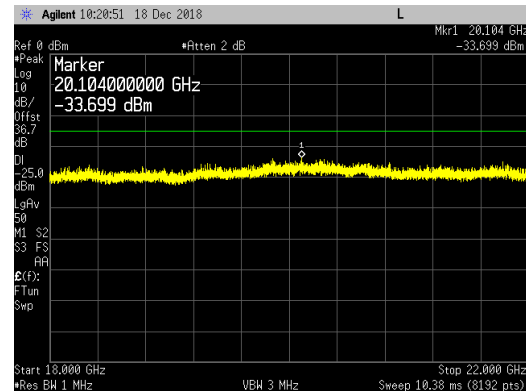
### 3GHz to 10GHz



### 10GHz to 18GHz

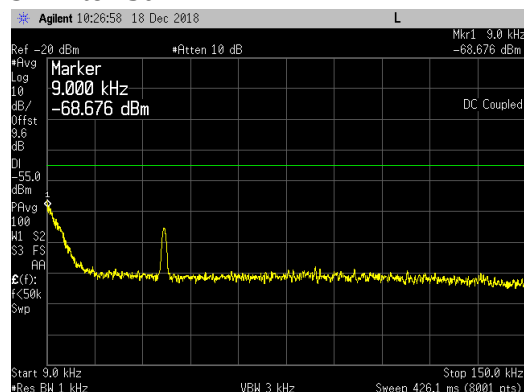


### 18GHz to 22GHz

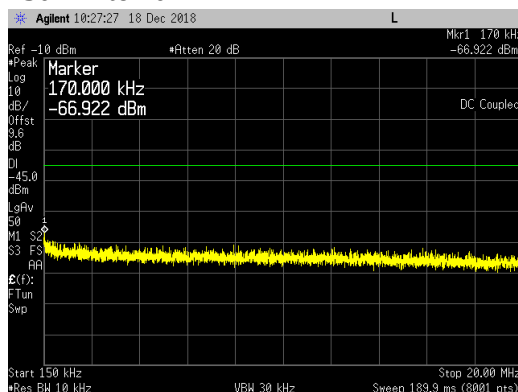


## LTE20 Channel Bandwidth \_256QAM\_ Middle Channel (2155MHz):

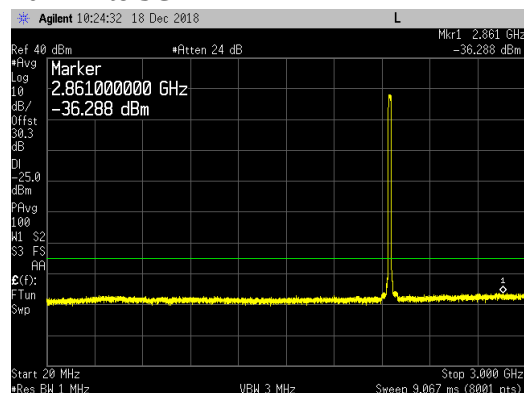
### 9kHz to 150kHz



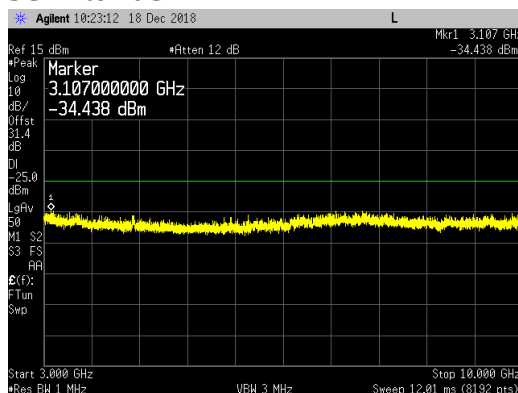
### 150kHz to 20MHz



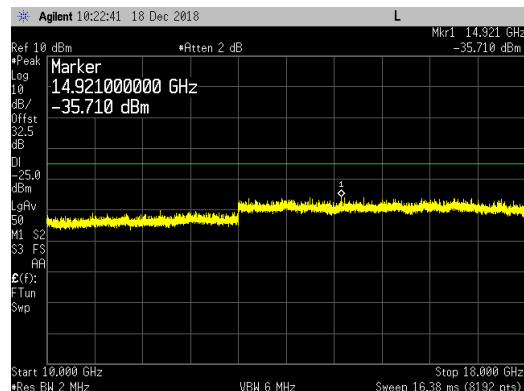
### 20MHz to 3GHz



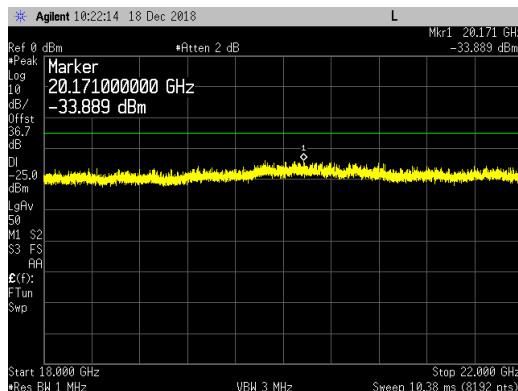
### 3GHz to 10GHz



### 10GHz to 18GHz

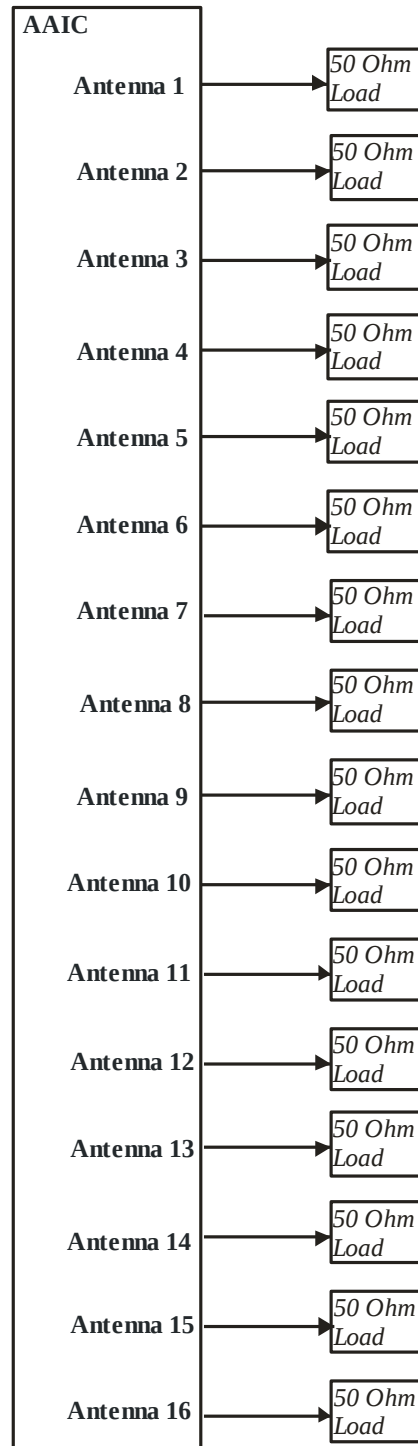


### 18GHz to 22GHz



## Transmitter Radiated Spurious Emissions

During radiated emission testing all antenna ports of the base station were terminated with 50ohm termination blocks as shown in the diagram below.



Test Setup Used for Radiated Emission Measurements on AAIC

See ANSI C63.26-2015 paragraph 5.1 for details of test setup requirements. Based on antenna port conducted spurious emissions tests results, preliminary scans for radiated spurious emissions were performed in 30MHz – 22GHz frequency range. Three radiated emission test configurations were used to prove compliance. The transmitters were enabled simultaneously at maximum power using QPSK modulation on all sixteen ports for this test. The test includes channel bandwidth with the highest spectral density (LTE5). The bottom, middle and top frequency channels were enabled. The carrier configurations for the radiated emission testing is provided below. Final maximized peak radiated emissions were measured in these modes.

| Test Configuration | Antenna Ports | RF Bandwidth | EARFCN                 | Transmit Frequency |
|--------------------|---------------|--------------|------------------------|--------------------|
| 1                  | 1-16          | 5 MHz        | 66461 (Bottom Channel) | 2112.5 MHz         |
| 2                  | 1-16          | 5 MHz        | 66886 (Middle Channel) | 2155.0 MHz         |
| 3                  | 1-16          | 5 MHz        | 67311 (Top Channel)    | 2197.5 MHz         |

Radiated Spurious Emissions Testing Transmit Characteristics

# RE Data LTE5-QPSK-High Channel

| Frequency<br>MHz | Peaks Raw<br>dBuV/m | Antenna<br>dB | Pre Amp<br>dB | Cables<br>dB | Peaks<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | Tower<br>cm | Turntable<br>Degrees | Polarity<br>H/V |
|------------------|---------------------|---------------|---------------|--------------|-----------------|-----------------|--------------|-------------|----------------------|-----------------|
| 17998.00         | 32.370              | 48.782        | -36.506       | 9.109        | 53.755          | 91.7            | -37.945      | 100         | 359                  | H               |
| 17758.70         | 33.862              | 47.400        | -37.272       | 8.04         | 52.030          | 91.7            | -39.670      | 100         | 1                    | H               |
| 21225.30         | 24.29               | 45.165        | -30.047       | 12.476       | 51.883          | 91.7            | -39.817      | 230         | 0                    | H               |
| 17870.50         | 30.342              | 48.052        | -36.913       | 8.532        | 50.013          | 91.7            | -41.687      | 100         | 1                    | V               |
| 2.13E+04         | 19.8                | 45.14         | -29.553       | 12.449       | 47.837          | 91.7            | -43.863      | 230.1       | 0.1                  | V               |
| 17920.70         | 27.112              | 48.250        | -36.753       | 8.759        | 47.368          | 91.7            | -44.332      | 100         | 307                  | H               |
| 17988.90         | 25.448              | 48.72         | -36.535       | 9.068        | 46.701          | 91.7            | -44.999      | 100         | 1                    | V               |
| 17839.10         | 26.571              | 47.863        | -37.014       | 8.389        | 45.809          | 91.7            | -45.891      | 100         | 1                    | H               |
| 2199.31          | 51.131              | 27.628        | -37.839       | 4.462        | 45.381          | 82.2            | -36.819      | 100         | 334                  | H               |
| 13393.10         | 29.146              | 40.922        | -34.255       | 8.806        | 44.619          | 91.7            | -47.081      | 100         | 1                    | V               |
| 12717.70         | 32.830              | 39.722        | -35.851       | 7.506        | 44.207          | 91.7            | -47.493      | 100         | 1                    | V               |
| 17799.90         | 24.584              | 47.523        | -37.139       | 8.212        | 43.180          | 91.7            | -48.520      | 100         | 1                    | H               |
| 18383.50         | 20.427              | 44.784        | -35.079       | 11.095       | 41.228          | 91.7            | -50.472      | 230.1       | 0                    | H               |
| 17677.30         | 21.724              | 46.761        | -37.271       | 7.723        | 38.937          | 91.7            | -52.763      | 100         | 1                    | H               |
| 14977.50         | 24.101              | 39.292        | -32.55        | 3.396        | 34.239          | 91.7            | -57.461      | 100         | 1                    | V               |
| 3726.45          | 32.388              | 32.210        | -37.146       | 5.014        | 32.465          | 82.2            | -49.735      | 100         | 359                  | V               |
| 8542.83          | 28.359              | 37.355        | -38.239       | 4.859        | 32.336          | 82.2            | -49.864      | 100         | 359                  | V               |
| 9428.05          | 29.237              | 37.739        | -38.8         | 3.38         | 31.556          | 82.2            | -50.644      | 100         | 359                  | V               |
| 14185.10         | 19.467              | 42.101        | -34.303       | 3.017        | 30.282          | 91.7            | -61.418      | 100         | 1                    | V               |
| 1879.69          | 30.749              | 27.479        | -38.046       | 9.186        | 29.368          | 82.2            | -52.832      | 100         | 359                  | V               |
| 7749.11          | 23.064              | 36.359        | -37.701       | 6.282        | 28.004          | 82.2            | -54.196      | 100         | 359                  | H               |
| 929.68           | 33.309              | 25.700        | -34.3         | 2.968        | 27.677          | 82.2            | -54.523      | 128         | 359                  | V               |
| 7839.68          | 22.532              | 36.460        | -38.026       | 6.134        | 27.102          | 82.2            | -55.098      | 100         | 359                  | V               |
| 7734.00          | 21.610              | 36.356        | -37.713       | 6.307        | 26.560          | 82.2            | -55.640      | 100         | 359                  | H               |
| 867.17           | 33.585              | 24.383        | -34.41        | 2.949        | 26.506          | 82.2            | -55.694      | 100         | 359                  | V               |
| 4061.56          | 24.925              | 32.401        | -36.824       | 5.045        | 25.544          | 82.2            | -56.656      | 100         | 359                  | V               |
| 749.86           | 32.802              | 23.286        | -34.487       | 2.464        | 24.065          | 82.2            | -58.135      | 350         | 359                  | H               |
| 2169.86          | 25.388              | 27.733        | -37.862       | 4.484        | 19.743          | 82.2            | -62.457      | 100         | 359                  | H               |
| 2078.41          | 24.087              | 27.565        | -37.935       | 4.742        | 18.458          | 82.2            | -63.742      | 100         | 359                  | H               |
| 528.00           | 31.224              | 19.500        | -34.6         | 1.866        | 17.989          | 82.2            | -64.211      | 241         | 359                  | H               |
| 2259.51          | 23.354              | 27.592        | -37.788       | 4.426        | 17.584          | 82.2            | -64.616      | 100         | 359                  | H               |
| 747.89           | 25.651              | 23.189        | -34.484       | 2.456        | 16.812          | 82.2            | -65.388      | 328         | 359                  | H               |
| 865.15           | 22.369              | 24.400        | -34.415       | 2.941        | 15.294          | 82.2            | -66.906      | 350         | 54                   | H               |
| 749.76           | 22.010              | 23.275        | -34.487       | 2.464        | 13.263          | 82.2            | -68.937      | 100         | 1                    | V               |
| 390.19           | 28.635              | 16.781        | -35.022       | 1.704        | 12.098          | 82.2            | -70.102      | 100         | 93                   | V               |
| 863.19           | 17.998              | 24.481        | -34.42        | 2.933        | 10.991          | 82.2            | -71.209      | 117         | 1                    | V               |
| 469.79           | 24.865              | 18.179        | -34.906       | 1.895        | 10.031          | 82.2            | -72.169      | 100         | 359                  | H               |
| 929.67           | 14.024              | 25.700        | -34.3         | 2.968        | 8.392           | 82.2            | -73.808      | 284         | 176                  | H               |
| 753.85           | 9.898               | 23.400        | -34.493       | 2.482        | 1.287           | 82.2            | -80.913      | 256         | 81                   | V               |

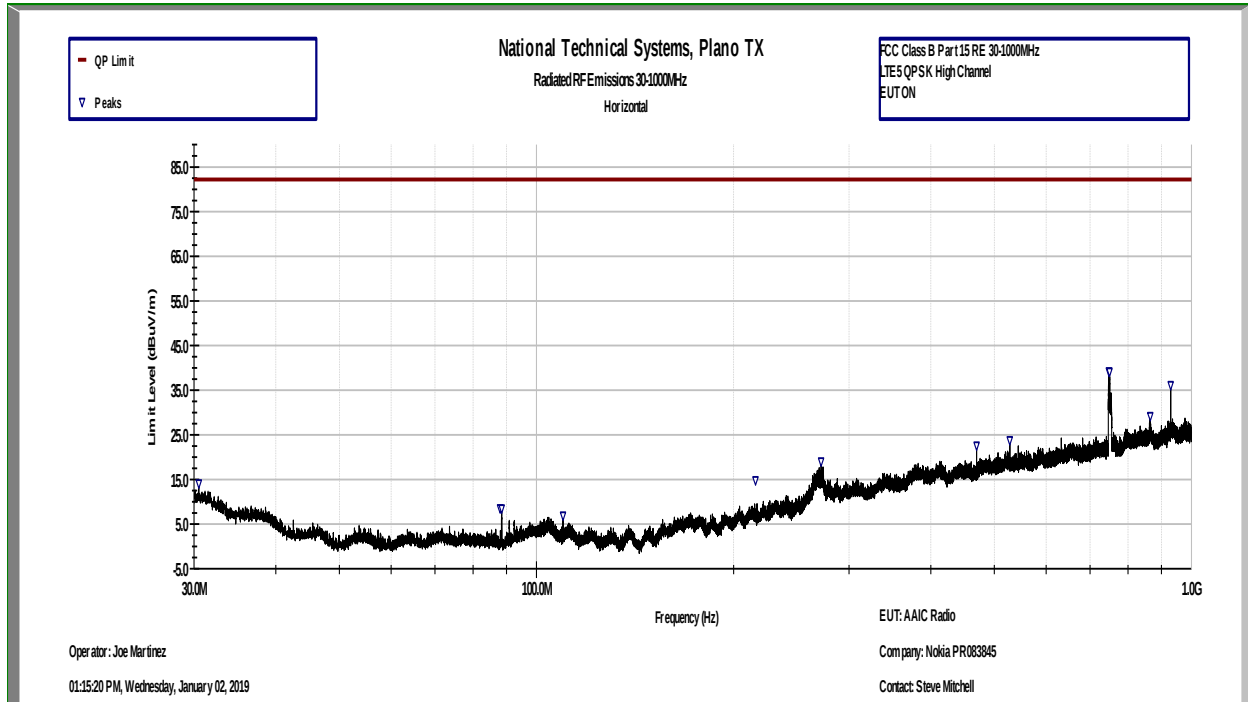
# RE Data LTE5-QPSK-Mid Channel

| Frequency<br>MHz | Peaks Raw<br>dBuV/m | Antenna<br>dB | Pre Amp<br>dB | Cables<br>dB | Peaks<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | Tower<br>cm | Turntable<br>Degrees | Polarity<br>H/V |
|------------------|---------------------|---------------|---------------|--------------|-----------------|-----------------|--------------|-------------|----------------------|-----------------|
| 17988.00         | 33.160              | 47.765        | -36.538       | 9.063        | 53.593          | 91.7            | -38.107      | 100         | 359                  | V               |
| 21250.70         | 25.244              | 45.147        | -29.317       | 12.456       | 53.531          | 91.7            | -38.169      | 229         | 0                    | H               |
| 17995.50         | 31.758              | 47.786        | -36.514       | 9.097        | 52.282          | 91.7            | -39.418      | 100         | 359                  | H               |
| 21290.30         | 23.974              | 45.120        | -30.240       | 12.426       | 51.284          | 91.7            | -40.416      | 229.2       | 0                    | V               |
| 17931.30         | 28.823              | 47.608        | -36.719       | 8.807        | 48.568          | 91.7            | -43.132      | 100         | 359                  | H               |
| 17838.80         | 29.195              | 47.008        | -37.014       | 8.388        | 47.689          | 91.7            | -44.011      | 100         | 288                  | H               |
| 18370.40         | 24.674              | 44.798        | -35.110       | 11.1         | 45.461          | 91.7            | -46.239      | 229.9       | 0.1                  | V               |
| 17759.80         | 28.059              | 46.418        | -37.268       | 8.044        | 45.252          | 91.7            | -46.448      | 100         | 359                  | H               |
| 17680.40         | 28.159              | 45.780        | -37.272       | 7.735        | 44.663          | 91.7            | -47.037      | 100         | 262                  | H               |
| 12859.40         | 30.959              | 39.250        | -35.800       | 7.91         | 42.356          | 91.7            | -49.344      | 100         | 359                  | V               |
| 14924.60         | 29.396              | 40.665        | -33.140       | 3.379        | 40.430          | 91.7            | -51.270      | 100         | 359                  | V               |
| 17922.30         | 20.402              | 47.582        | -36.748       | 8.766        | 40.037          | 91.7            | -51.663      | 100         | 359                  | H               |
| 7940.65          | 33.892              | 36.699        | -38.389       | 5.969        | 38.171          | 82.2            | -44.029      | 100         | 359                  | V               |
| 12734.50         | 27.209              | 38.935        | -35.825       | 7.554        | 37.873          | 91.7            | -53.827      | 100         | 359                  | V               |
| 14169.30         | 24.562              | 42.080        | -34.328       | 3.01         | 35.323          | 91.7            | -56.377      | 100         | 359                  | V               |
| 9436.29          | 32.929              | 37.741        | -38.800       | 3.377        | 35.247          | 82.2            | -46.953      | 100         | 359                  | V               |
| 18379.90         | 14.174              | 44.788        | -35.087       | 11.096       | 34.971          | 91.7            | -56.729      | 229         | 0.1                  | H               |
| 2426.44          | 37.080              | 28.536        | -37.585       | 4.379        | 32.409          | 82.2            | -49.791      | 100         | 359                  | V               |
| 2350.89          | 35.389              | 28.279        | -37.675       | 4.399        | 30.391          | 82.2            | -51.809      | 100         | 359                  | H               |
| 6740.81          | 24.901              | 35.040        | -37.186       | 6.454        | 29.209          | 82.2            | -52.991      | 100         | 359                  | V               |
| 2529.96          | 32.526              | 28.770        | -37.487       | 4.372        | 28.179          | 82.2            | -54.021      | 100         | 359                  | H               |
| 13343.20         | 11.454              | 40.097        | -34.375       | 9.203        | 26.378          | 91.7            | -65.322      | 100         | 359                  | V               |
| 2620.02          | 28.611              | 29.216        | -37.451       | 4.439        | 24.815          | 82.2            | -57.385      | 100         | 359                  | H               |
| 940.96           | 30.569              | 25.600        | -34.300       | 2.945        | 24.814          | 82.2            | -57.386      | 100         | 145                  | V               |
| 527.99           | 36.641              | 19.500        | -34.600       | 1.866        | 23.407          | 82.2            | -58.793      | 164         | 359                  | V               |
| 754.29           | 31.802              | 23.371        | -34.493       | 2.484        | 23.163          | 82.2            | -59.037      | 192         | 1                    | H               |
| 2171.31          | 26.640              | 27.729        | -37.860       | 4.483        | 20.991          | 82.2            | -61.209      | 100         | 359                  | H               |
| 1798.82          | 25.205              | 26.823        | -38.079       | 6.388        | 20.336          | 82.2            | -61.864      | 100         | 359                  | V               |
| 8537.17          | 14.895              | 37.347        | -38.220       | 4.88         | 18.902          | 82.2            | -63.298      | 100         | 359                  | V               |
| 528.00           | 31.564              | 19.500        | -34.600       | 1.866        | 18.329          | 82.2            | -63.871      | 100         | 1                    | H               |
| 929.62           | 23.938              | 25.700        | -34.300       | 2.968        | 18.306          | 82.2            | -63.894      | 100         | 148                  | H               |
| 863.46           | 24.254              | 24.454        | -34.419       | 2.934        | 17.221          | 82.2            | -64.979      | 157         | 1                    | V               |
| 2259.59          | 21.743              | 27.592        | -37.788       | 4.426        | 15.973          | 82.2            | -66.227      | 100         | 316                  | H               |
| 2440.99          | 19.876              | 28.522        | -37.568       | 4.376        | 15.205          | 82.2            | -66.995      | 100         | 359                  | H               |
| 929.78           | 20.361              | 25.700        | -34.300       | 2.968        | 14.729          | 82.2            | -67.471      | 100         | 234                  | V               |
| 749.77           | 21.991              | 23.277        | -34.487       | 2.464        | 13.246          | 82.2            | -68.954      | 100         | 54                   | V               |
| 753.89           | 21.197              | 23.400        | -34.493       | 2.482        | 12.586          | 82.2            | -69.614      | 100         | 1                    | V               |
| 747.66           | 17.113              | 23.166        | -34.484       | 2.455        | 8.250           | 82.2            | -73.950      | 100         | 179                  | H               |
| 209.04           | 30.361              | 11.400        | -37.800       | 1.231        | 5.192           | 82.2            | -77.008      | 100         | 1                    | H               |
| 216.01           | 19.385              | 11.401        | -37.800       | 1.238        | -5.776          | 82.2            | -87.976      | 100         | 1                    | H               |

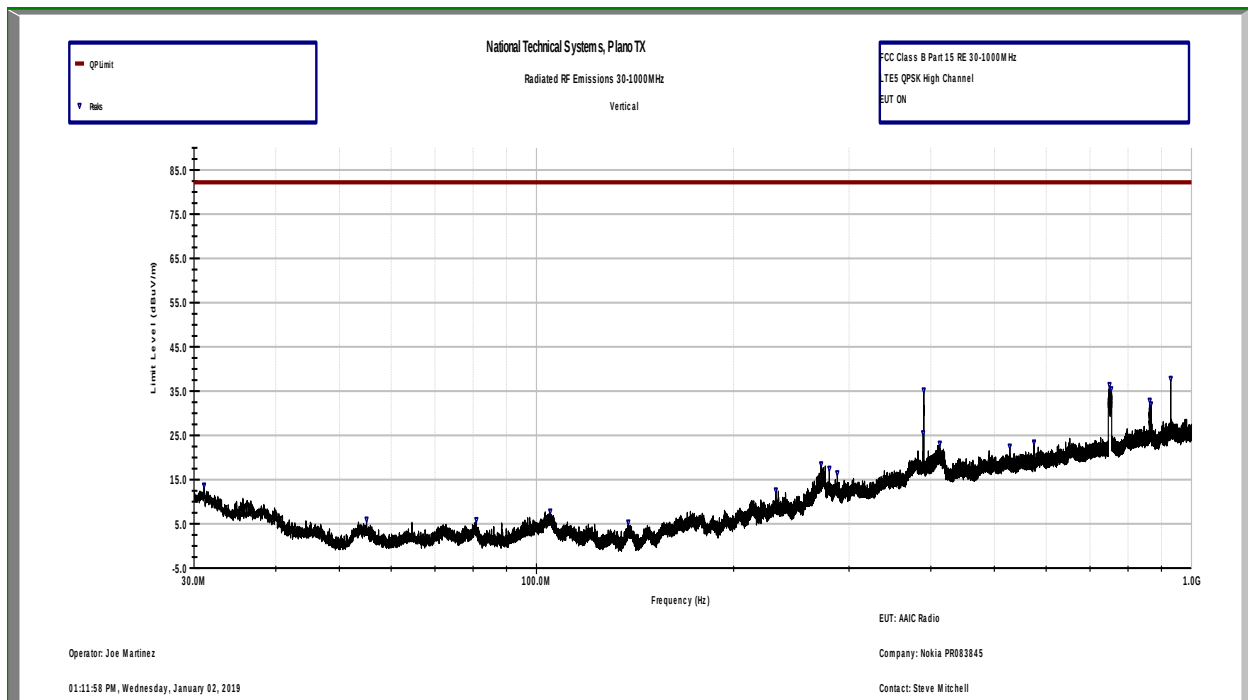
# RE Data LTE5-QPSK-Low Channel

| Frequency<br>MHz | Peaks Raw<br>dBuV/m | Antenna<br>dB | Pre Amp<br>dB | Cables<br>dB | Peaks<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | Tower<br>cm | Turntable<br>Degrees | Polarity<br>H/V |
|------------------|---------------------|---------------|---------------|--------------|-----------------|-----------------|--------------|-------------|----------------------|-----------------|
| 17989.50         | 32.201              | 47.770        | -36.533       | 9.07         | 52.508          | 91.7            | -39.192      | 350         | 1                    | H               |
| 17840.00         | 29.815              | 47.012        | -37.011       | 8.393        | 48.209          | 91.7            | -43.491      | 350         | 1                    | H               |
| 17920.60         | 28.277              | 47.578        | -36.753       | 8.758        | 47.860          | 91.7            | -43.840      | 350         | 1                    | H               |
| 21278.50         | 19.659              | 45.128        | -29.964       | 12.435       | 47.258          | 91.7            | -44.442      | 229         | 0.1                  | H               |
| 17997.70         | 25.807              | 47.792        | -36.507       | 9.107        | 46.199          | 91.7            | -45.501      | 100         | 1                    | V               |
| 18440.60         | 25.171              | 44.790        | -34.942       | 11.077       | 46.096          | 91.7            | -45.604      | 229         | 0                    | V               |
| 17813.20         | 27.648              | 46.916        | -37.097       | 8.272        | 45.739          | 91.7            | -45.961      | 350         | 1                    | H               |
| 21265.60         | 15.982              | 45.137        | -29.664       | 12.445       | 43.900          | 91.7            | -47.800      | 229         | 0.1                  | V               |
| 17679.40         | 27.619              | 45.775        | -37.272       | 7.731        | 43.853          | 91.7            | -47.847      | 100         | 1                    | H               |
| 14900.80         | 30.217              | 40.740        | -33.406       | 3.368        | 40.919          | 91.7            | -50.781      | 100         | 1                    | V               |
| 14197.00         | 29.973              | 42.121        | -34.284       | 3.023        | 40.833          | 91.7            | -50.867      | 100         | 1                    | V               |
| 12664.90         | 29.068              | 38.734        | -35.935       | 7.356        | 39.223          | 91.7            | -52.477      | 100         | 1                    | V               |
| 17762.00         | 20.400              | 46.425        | -37.261       | 8.053        | 37.617          | 91.7            | -54.083      | 292         | 1                    | H               |
| 929.60           | 4.32E+01            | 25.7          | -34.3         | 2.968        | 37.574          | 82.2            | -44.626      | 185         | 359                  | V               |
| 8504.33          | 3.31E+01            | 37.297        | -38.114       | 4.998        | 37.285          | 82.2            | -44.915      | 335         | 288                  | V               |
| 929.61           | 4.25E+01            | 25.7          | -34.3         | 2.968        | 36.854          | 82.2            | -45.346      | 290         | 234                  | H               |
| 13370.60         | 21.901              | 40.121        | -34.309       | 8.985        | 36.698          | 91.7            | -55.002      | 100         | 1                    | V               |
| 9991.66          | 3.33E+01            | 38.036        | -38.133       | 2.839        | 36.067          | 82.2            | -46.133      | 350         | 359                  | V               |
| 12043.40         | 28.823              | 39.087        | -36.865       | 4.497        | 35.542          | 91.7            | -56.158      | 100         | 1                    | V               |
| 9412.22          | 3.05E+01            | 37.736        | -38.8         | 3.384        | 32.841          | 82.2            | -49.359      | 350         | 359                  | V               |
| 6938.39          | 2.81E+01            | 35.225        | -37.578       | 6.502        | 32.294          | 82.2            | -49.906      | 350         | 359                  | H               |
| 18420.80         | 11.269              | 44.779        | -34.989       | 11.083       | 32.142          | 91.7            | -59.558      | 229.1       | 0                    | H               |
| 1870.34          | 31.82               | 27.399        | -38.05        | 8.862        | 30.031          | 82.2            | -52.169      | 100         | 359                  | V               |
| 7638.64          | 24.912              | 36.339        | -37.788       | 6.463        | 29.926          | 82.2            | -52.274      | 100         | 218                  | V               |
| 2347.71          | 3.41E+01            | 28.246        | -37.679       | 4.4          | 29.046          | 82.2            | -53.154      | 350         | 359                  | H               |
| 1989.71          | 33.503              | 27.524        | -38.004       | 5.454        | 28.477          | 82.2            | -53.723      | 350         | 359                  | H               |
| 748.07           | 37.25               | 23.2          | -34.484       | 2.456        | 28.422          | 82.2            | -53.778      | 100         | 359                  | V               |
| 2167.92          | 3.29E+01            | 27.738        | -37.863       | 4.486        | 27.217          | 82.2            | -54.983      | 350         | 359                  | H               |
| 1863.23          | 29.193              | 27.315        | -38.053       | 8.616        | 27.071          | 82.2            | -55.129      | 100         | 359                  | V               |
| 527.99           | 34.546              | 19.5          | -34.6         | 1.866        | 21.312          | 82.2            | -60.888      | 163         | 237                  | H               |
| 748.82           | 29.382              | 23.2          | -34.485       | 2.46         | 20.557          | 82.2            | -61.643      | 206         | 359                  | H               |
| 2261.87          | 2.63E+01            | 27.6          | -37.785       | 4.425        | 20.556          | 82.2            | -61.644      | 350         | 359                  | H               |
| 2080.53          | 23.949              | 27.579        | -37.933       | 4.729        | 18.324          | 82.2            | -63.876      | 350         | 359                  | H               |
| 754.96           | 2.26E+01            | 23.304        | -34.494       | 2.487        | 13.932          | 82.2            | -68.268      | 214         | 137                  | V               |
| 867.44           | 1.57E+01            | 24.356        | -34.409       | 2.95         | 8.554           | 82.2            | -73.646      | 100         | 245                  | V               |
| 863.17           | 1.50E+01            | 24.483        | -34.42        | 2.933        | 8.012           | 82.2            | -74.188      | 100         | 1                    | H               |
| 960.06           | 1.31E+01            | 25.6          | -34.3         | 2.907        | 7.260           | 82.2            | -74.940      | 350         | 359                  | H               |
| 380.65           | 16.139              | 17.065        | -35.048       | 1.679        | -0.165          | 82.2            | -82.365      | 100         | 332                  | V               |
| 992.56           | 3.24E+00            | 25.7          | -34.3         | 2.842        | -2.521          | 82.2            | -84.721      | 350         | 359                  | H               |
| 39.75            | 12.447              | 12.851        | -37.5         | 0.549        | -11.653         | 82.2            | -93.853      | 100         | 237                  | V               |

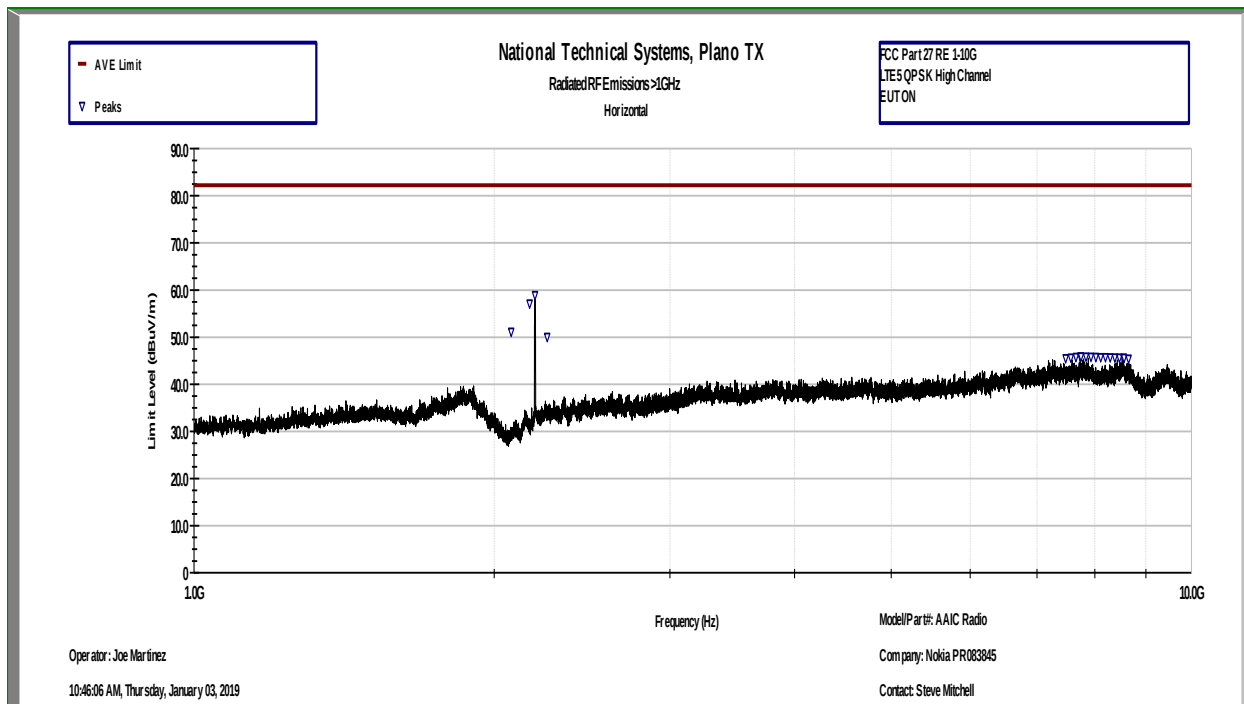
A three meter measurement distance was used for radiated emission less than 10GHz. A one meter measurement distance was used for radiated emission greater than 10GHz. The highest radiated emissions detected were more than 20dB below the three meter limit of 82.2dBuV/m and the one meter limit of 91.7dBuV/m (equivalent to -13dBm EIRP). Since all maximized measurements were more than 20dB below these levels, substitution measurements were not performed. TILE software was used for all preliminary scans and plots that are included on the following pages.



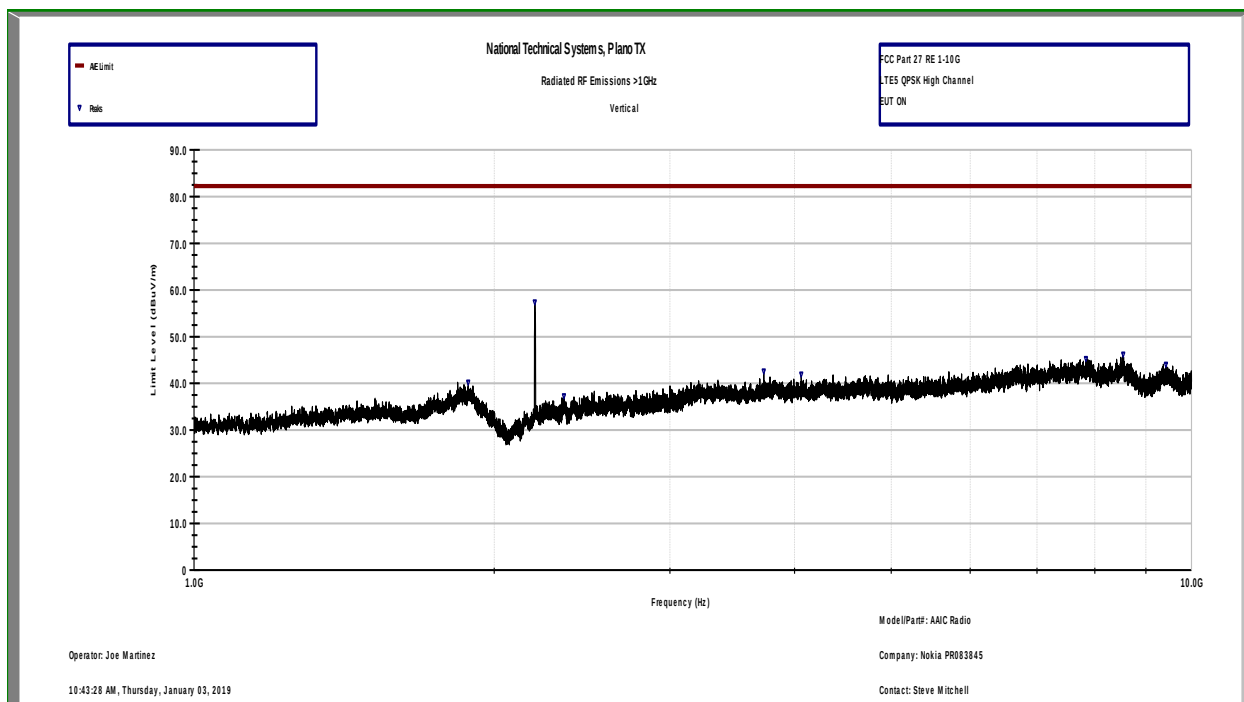
LTE5-QPSK-High Channel 30-1000MHz – Horizontal at 3m



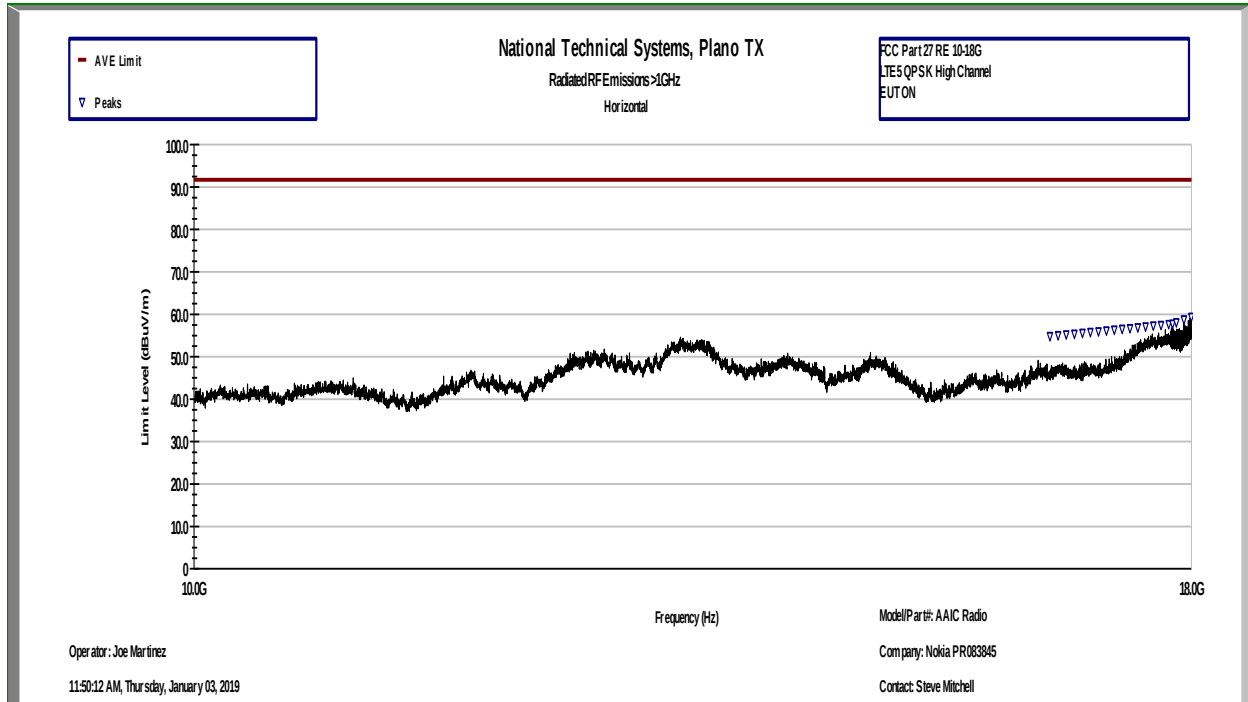
LTE5-QPSK-High Channel 30-1000MHz – Vertical at 3m



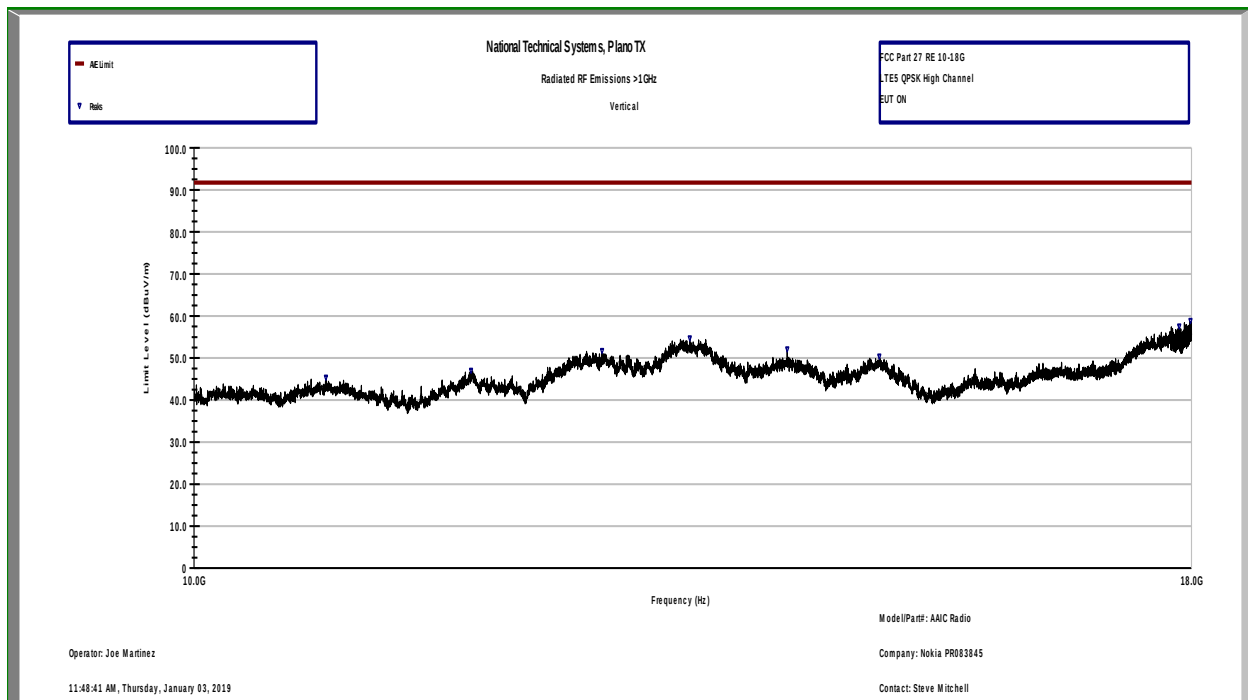
LTE5-QPSK-High Channel 1-10GHz – Horizontal at 3m



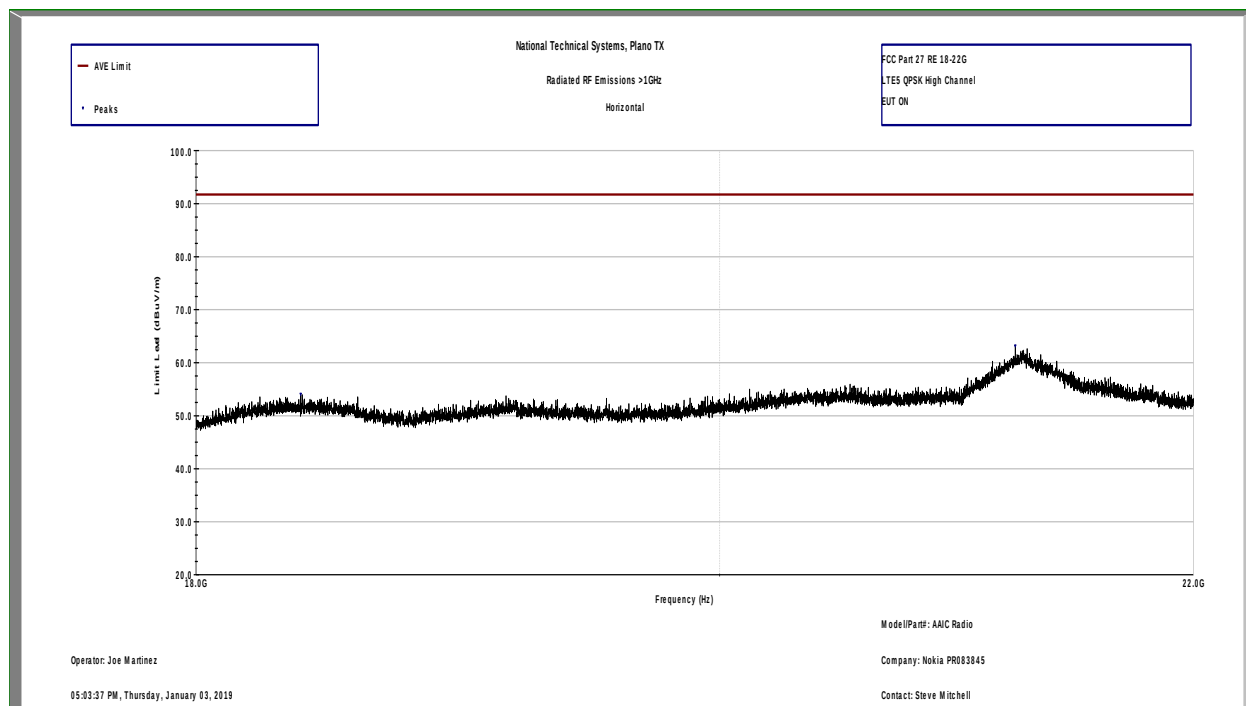
LTE5-QPSK-High Channel 1-10GHz – Vertical at 3m



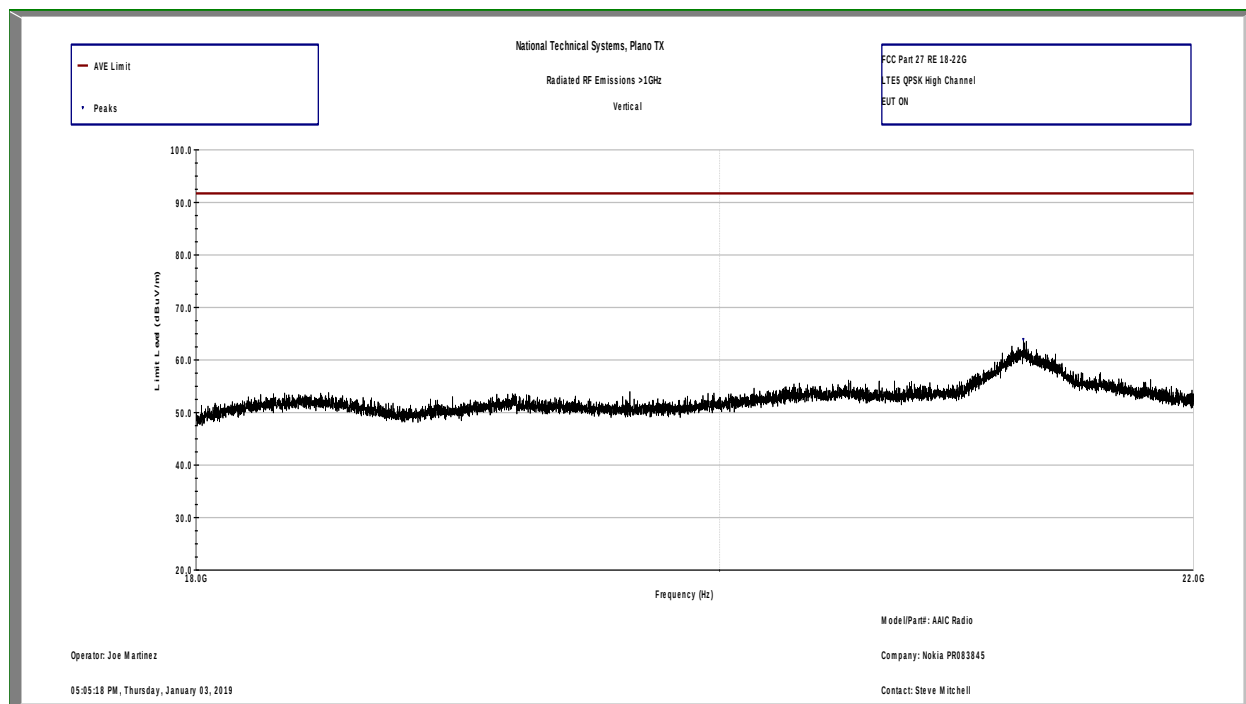
LTE5-QPSK-High Channel 10-18GHz – Horizontal at 1m



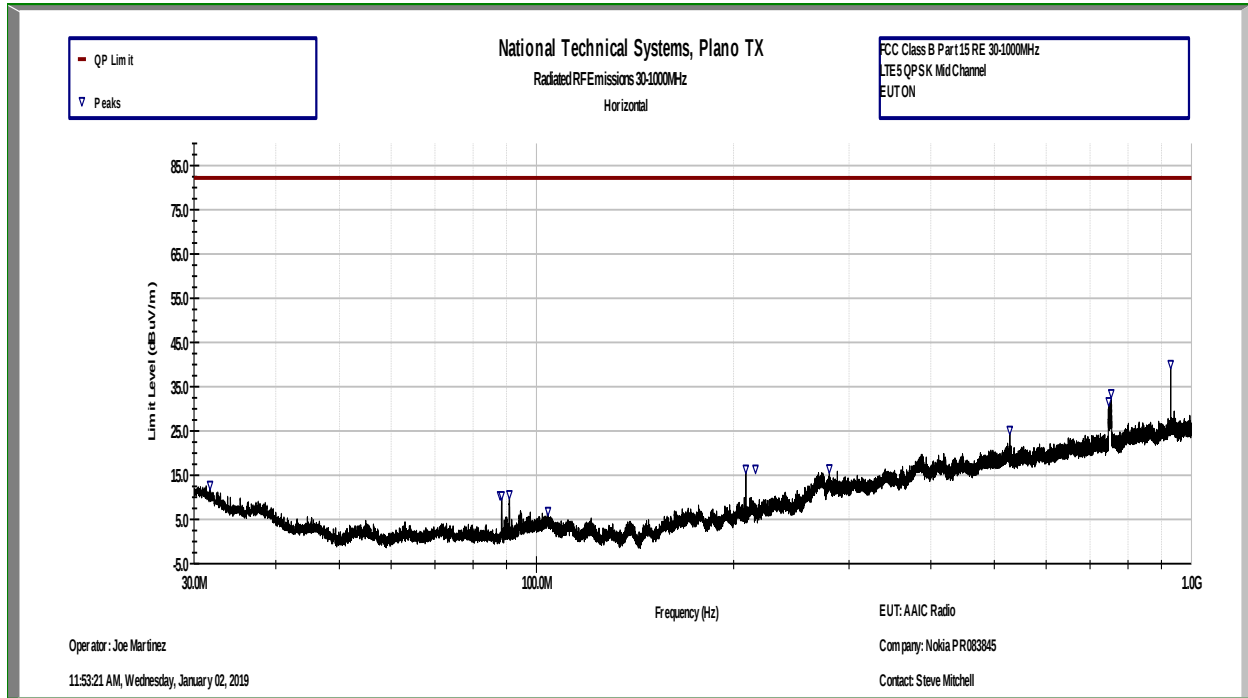
LTE5-QPSK-High Channel 10-18GHz – Vertical at 1m



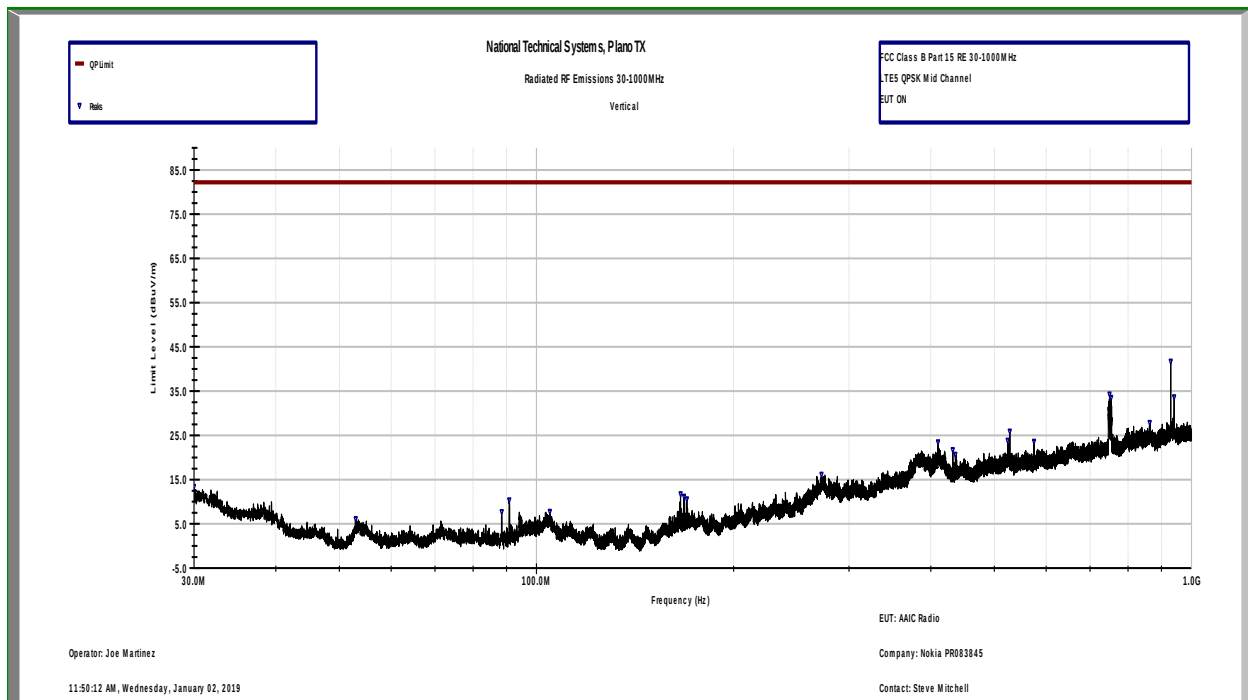
LTE5-QPSK-High Channel 18-22GHz – Horizontal at 1m



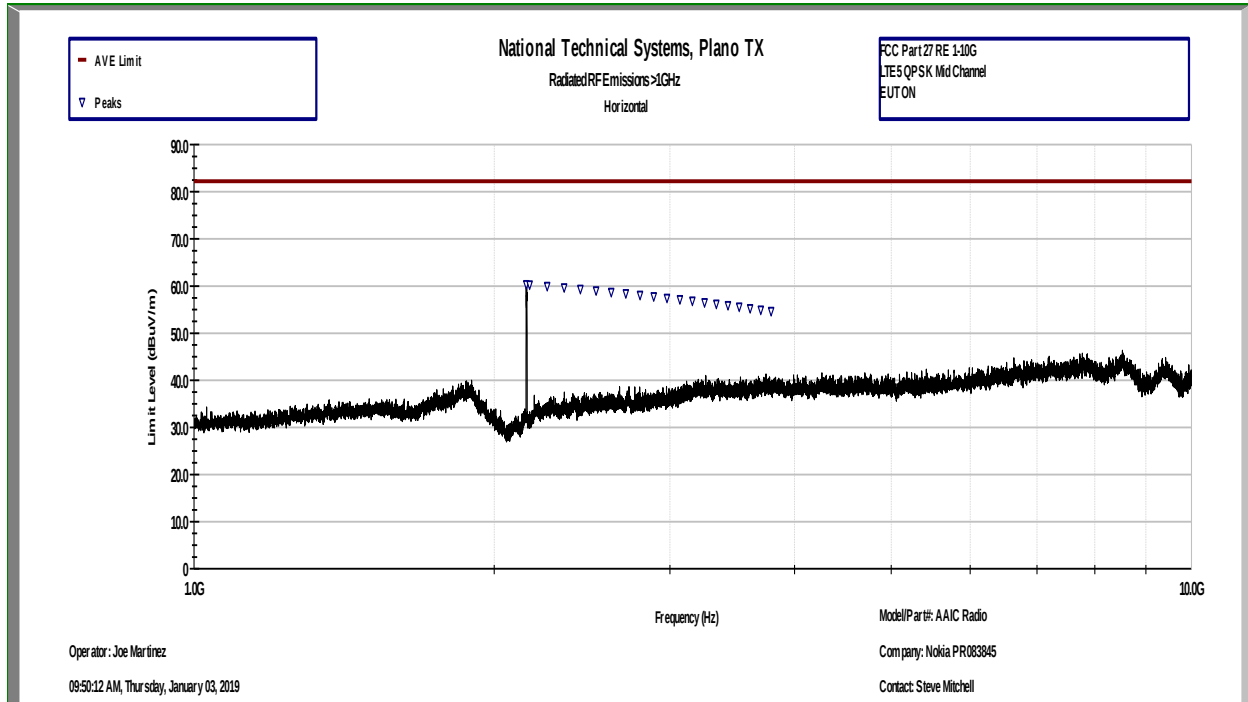
LTE5-QPSK-High Channel 18-22GHz – Horizontal at 1m



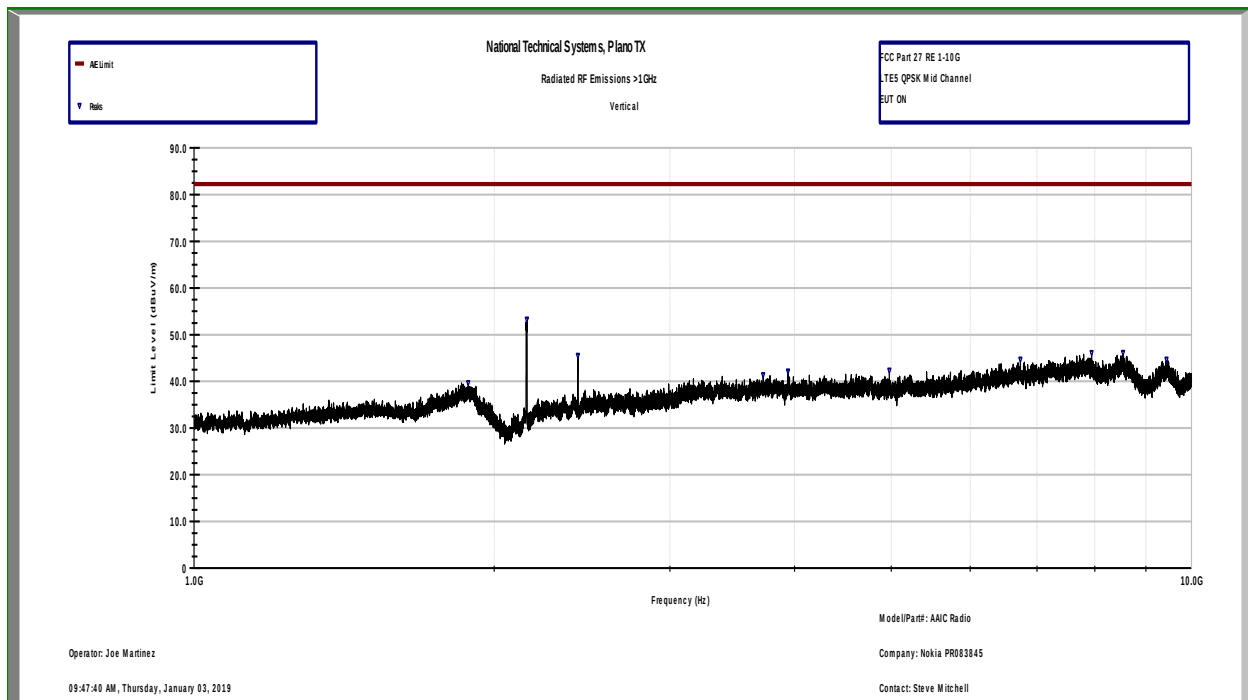
LTE5-QPSK-Mid Channel 30-1000MHz – Horizontal at 3m



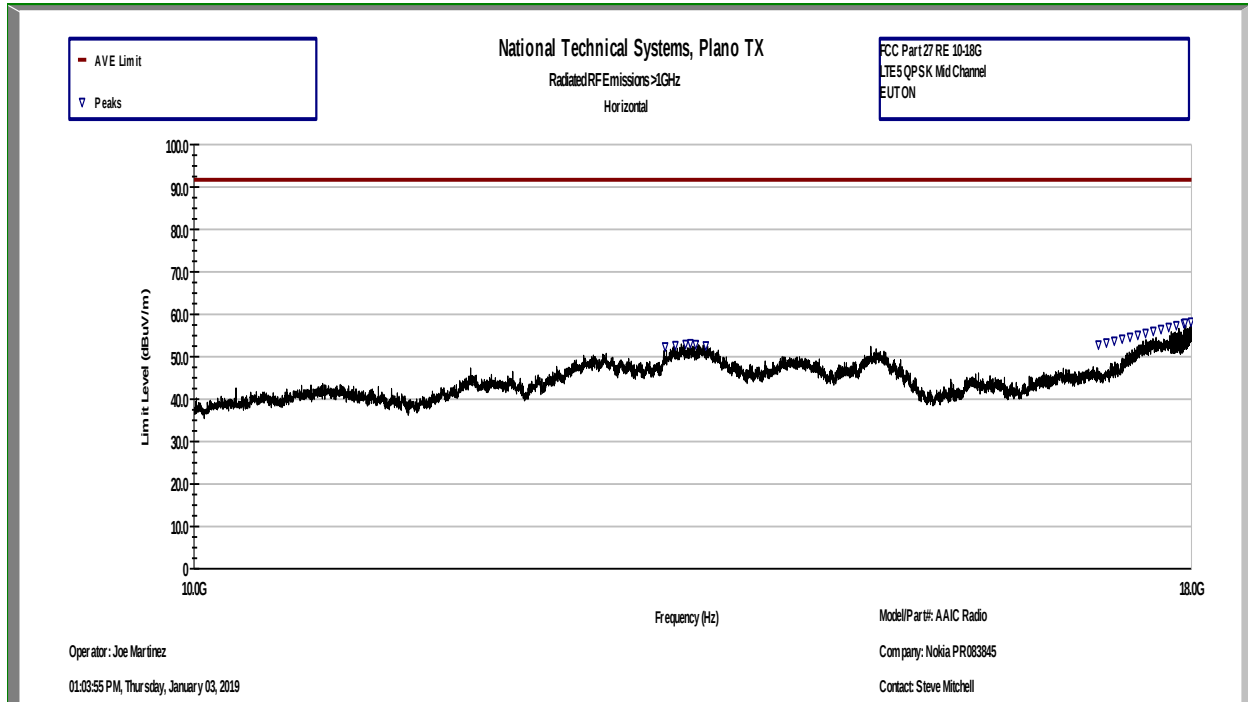
LTE5-QPSK-Mid Channel 30-1000MHz – Vertical at 3m



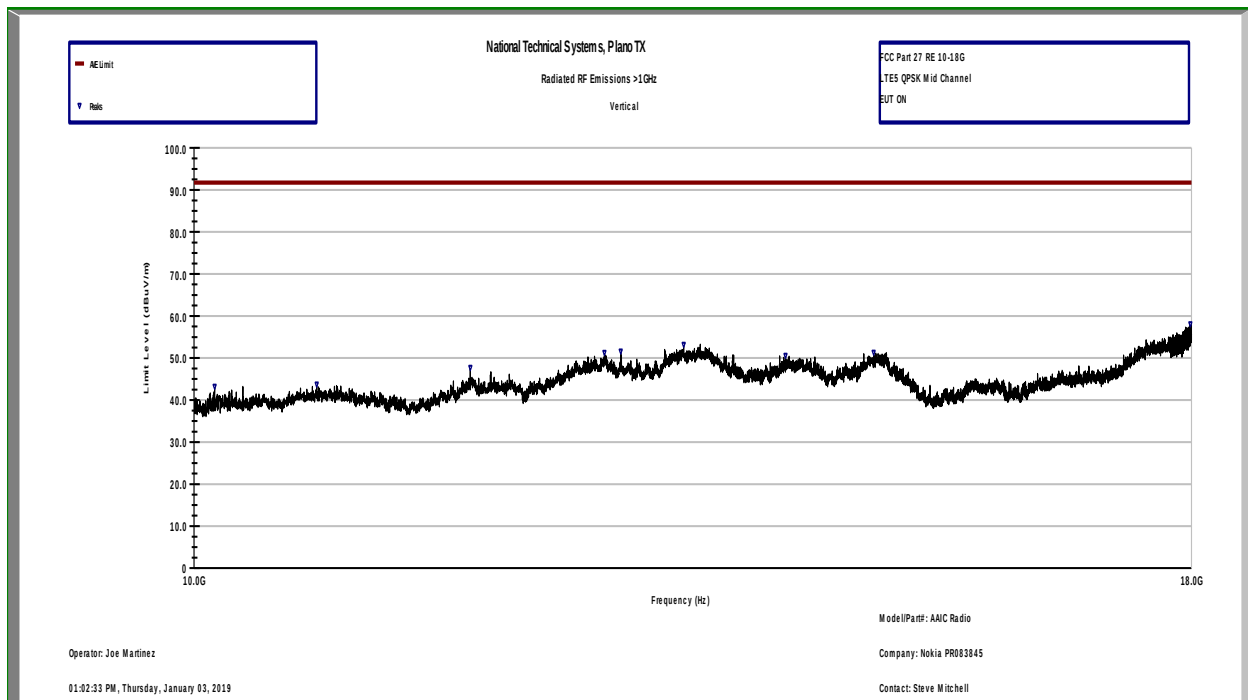
LTE5-QPSK-Mid Channel 1-10GHz – Horizontal at 3m



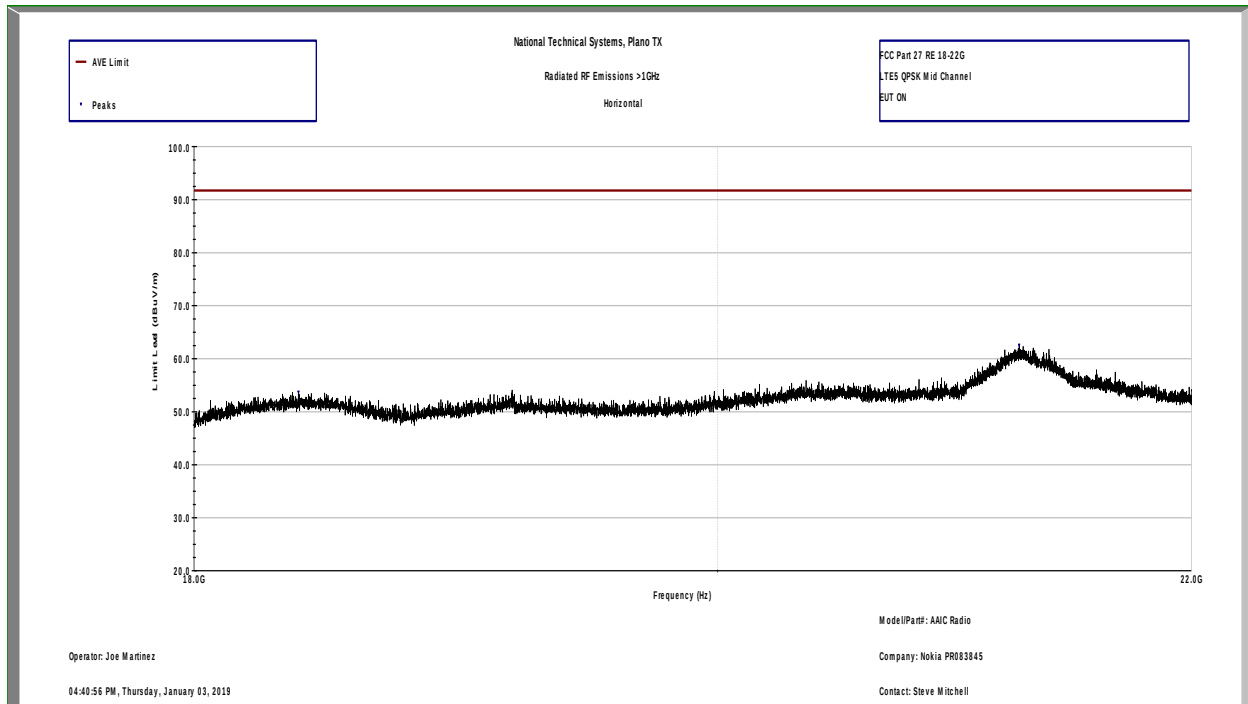
LTE5-QPSK-Mid Channel 1-10GHz – Vertical at 3m



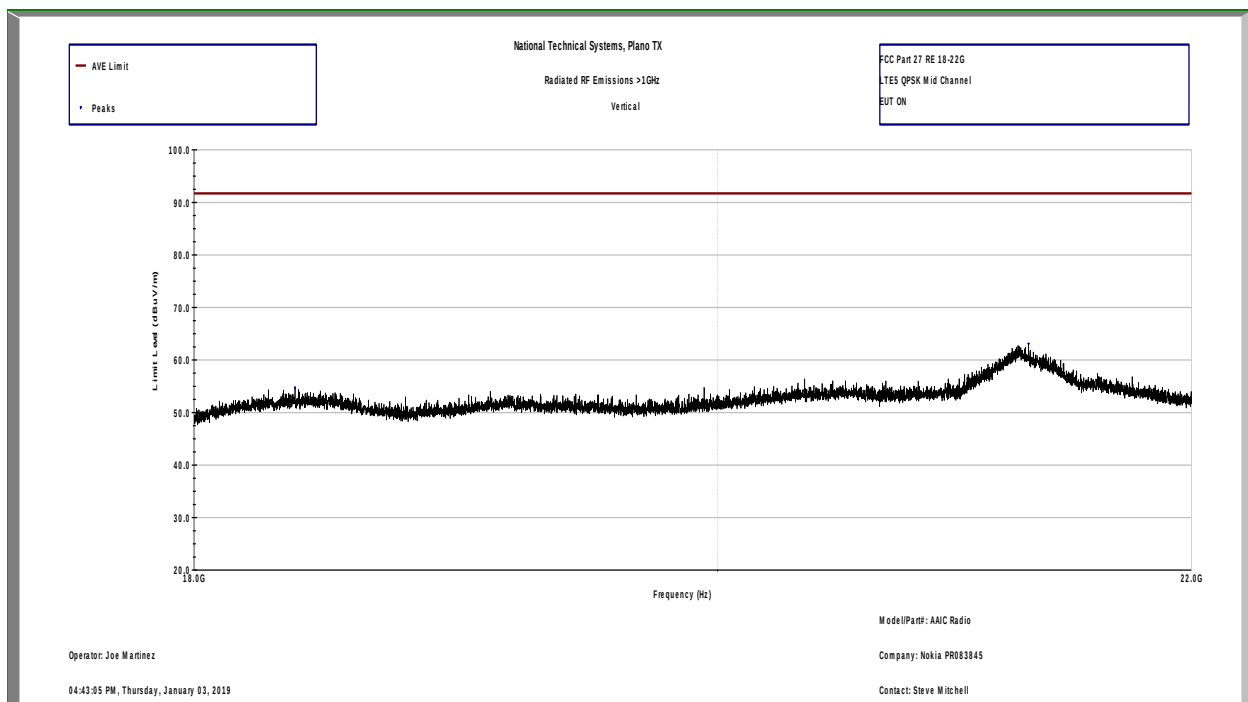
LTE5-QPSK-Mid Channel 10-18GHz – Horizontal at 1m



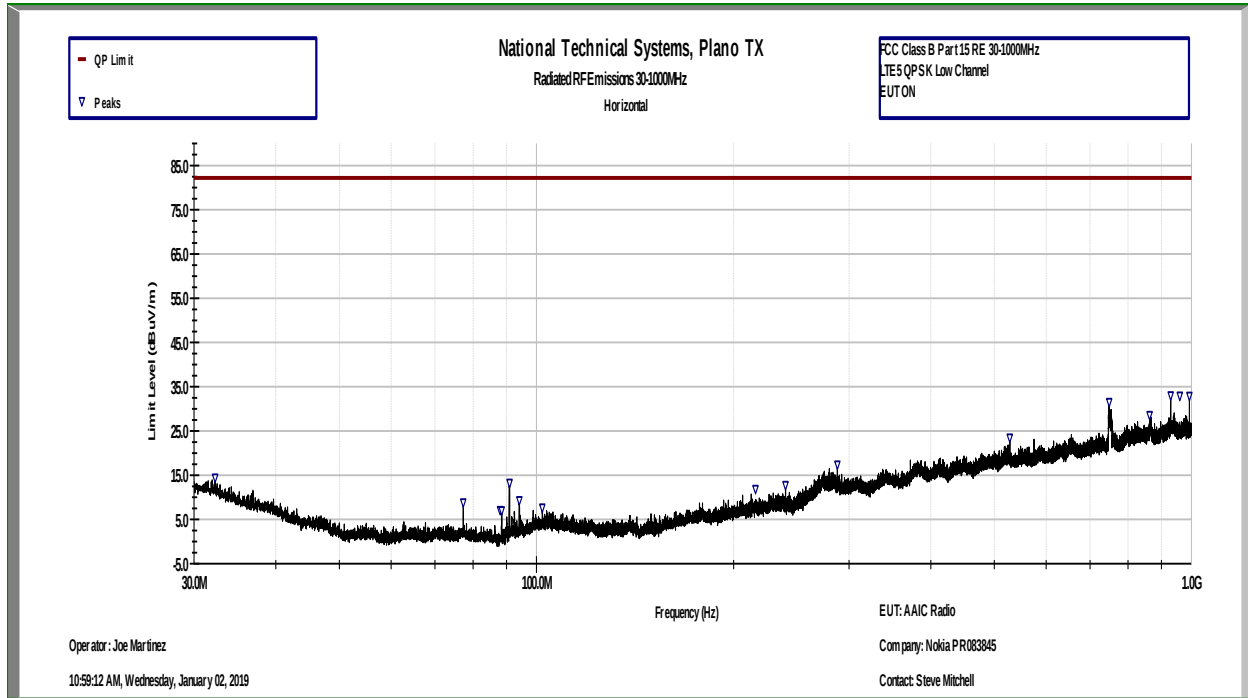
LTE5-QPSK-Mid Channel 10-18GHz – Vertical at 1m



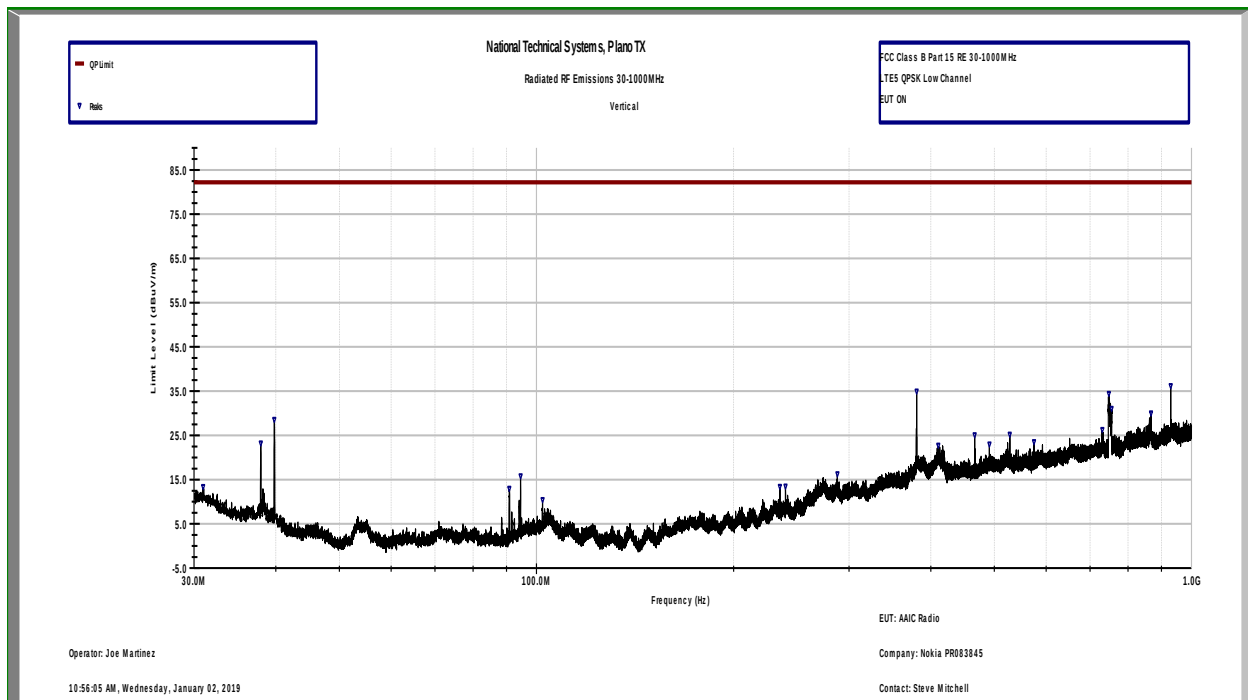
LTE5-QPSK-Mid Channel 18-22GHz – Horizontal at 1m



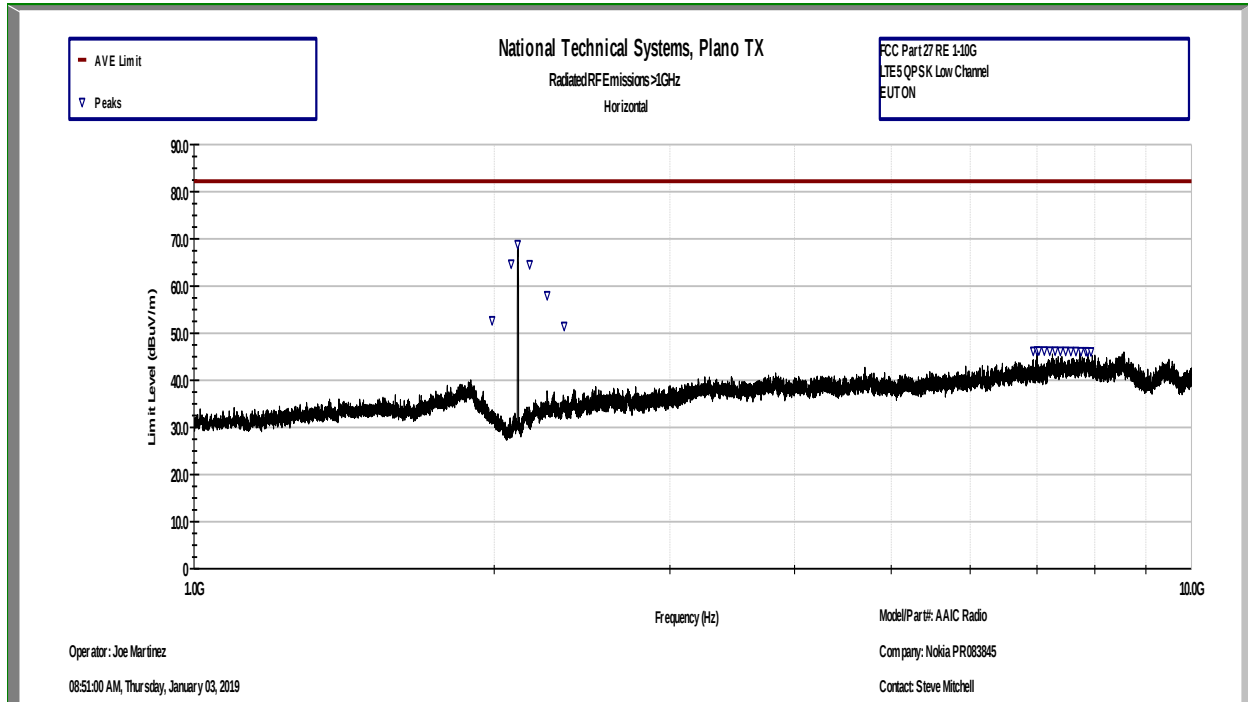
LTE5-QPSK-Mid Channel 18-22GHz – Vertical at 1m



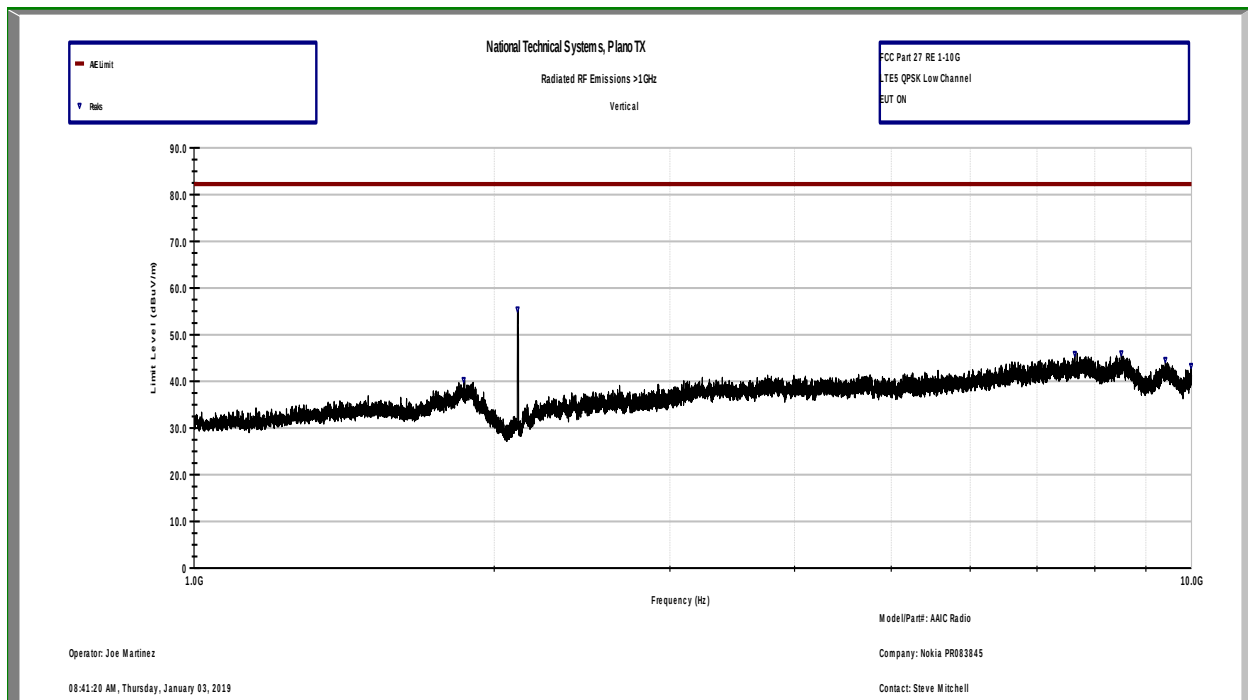
LTE5-QPSK-Low Channel 30-1000MHz – Horizontal at 3m



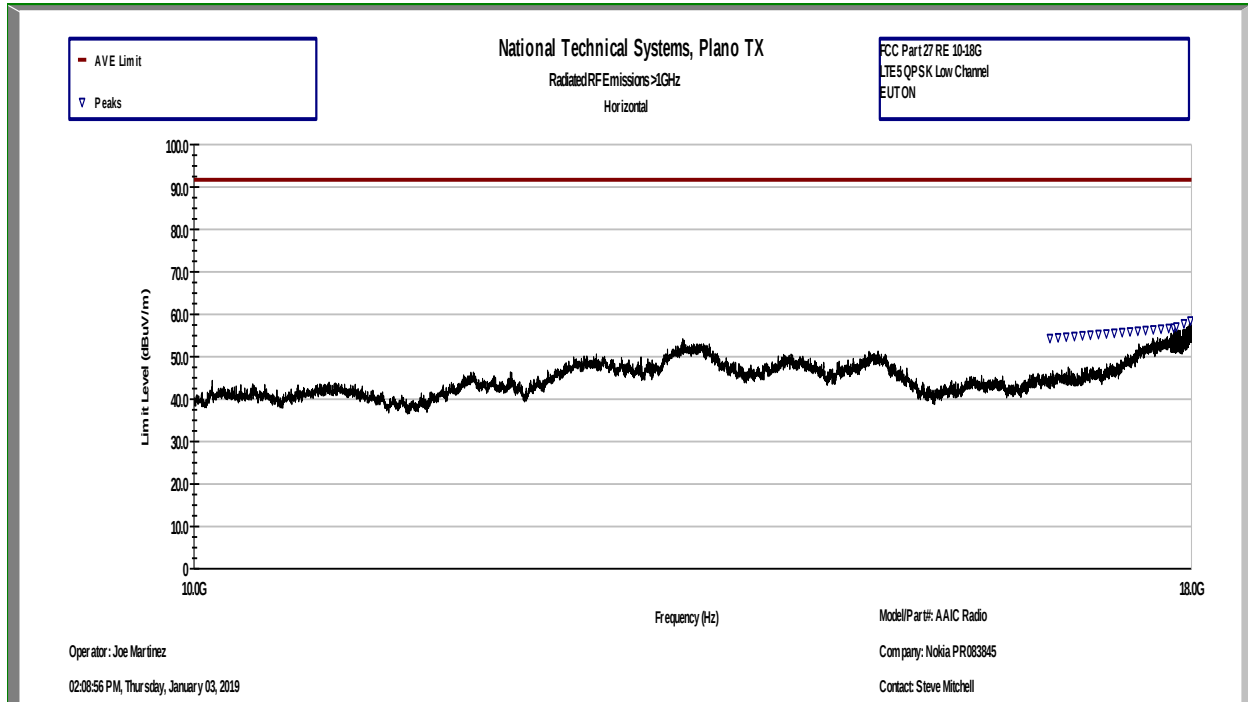
LTE5-QPSK-Low Channel 30-1000MHz – Vertical at 3m



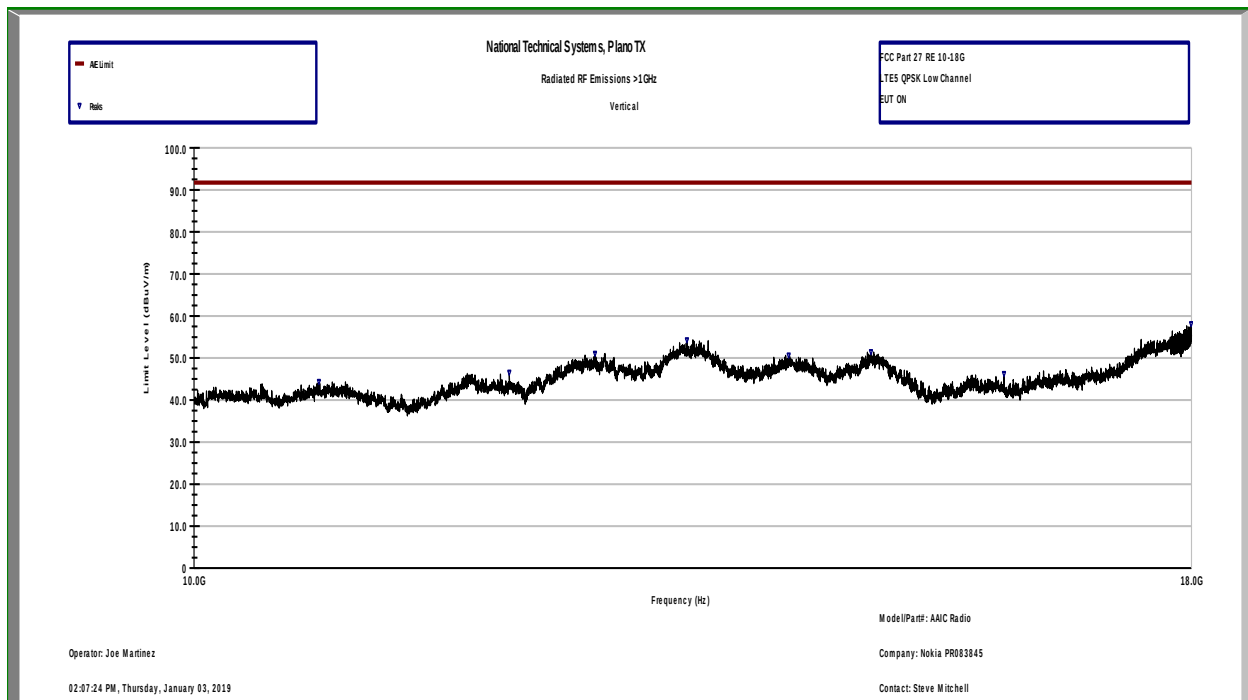
LTE5-QPSK-Low Channel 1-10GHz – Horizontal at 3m



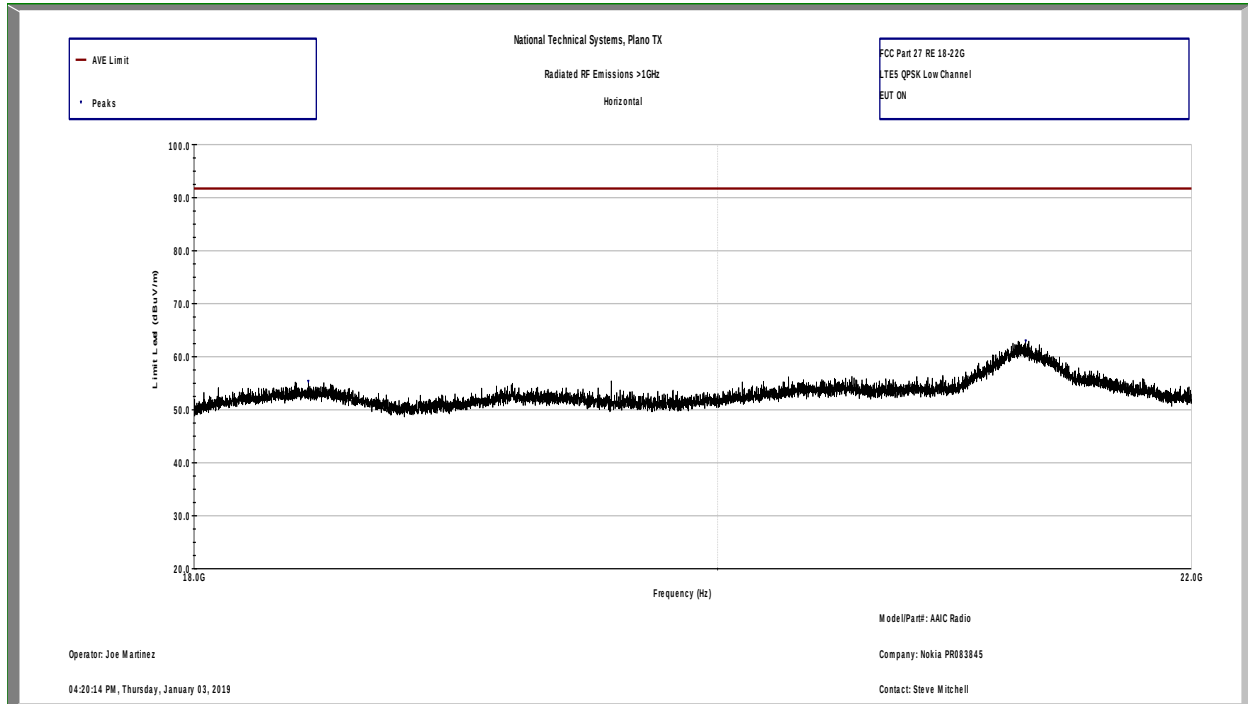
LTE5-QPSK-Low Channel 1-10GHz – Vertical at 3m



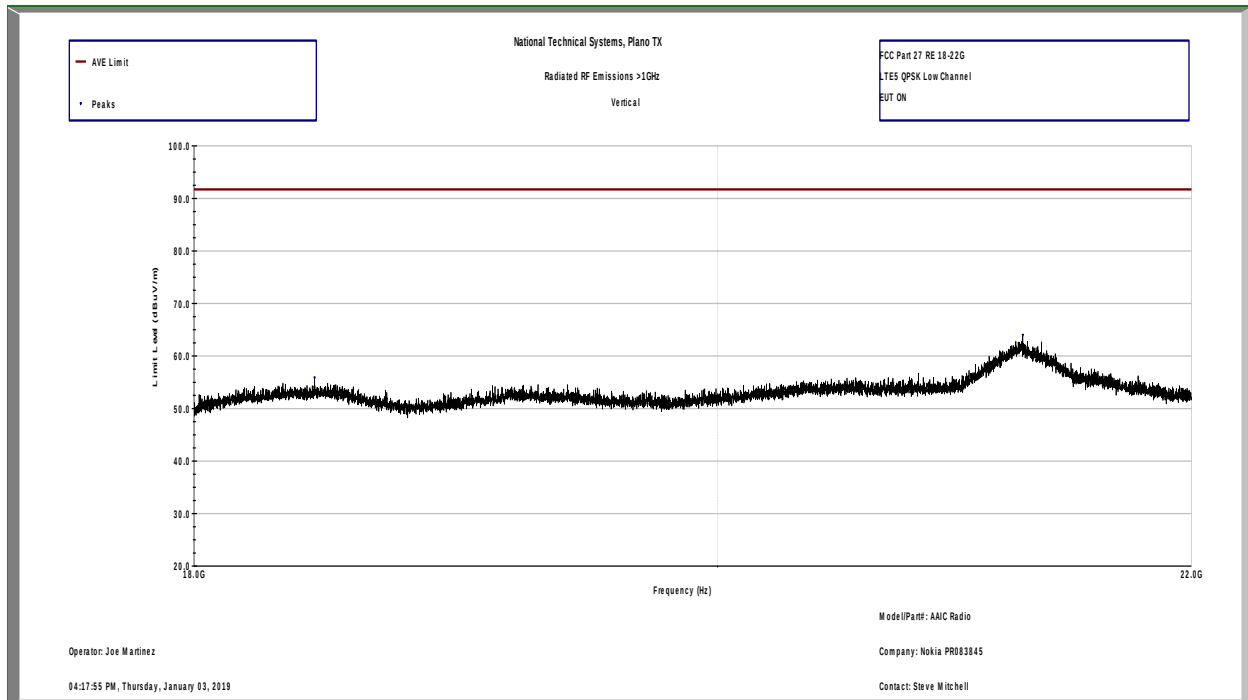
LTE5-QPSK-Low Channel 10-18GHz – Horizontal at 1m



LTE5-QPSK-Low Channel 10-18GHz – Vertical at 1m



LTE5-QPSK-Low Channel 18-22GHz – Horizontal at 1m



LTE5-QPSK-Low Channel 18-22GHz – Vertical at 1m

**Frequency Stability/Accuracy**

Measurement methods are detailed in KDB 971168 D01v03r01 section 9 and ANSI C63.26-2015. Carrier frequency stability at extreme temperatures and voltages, frequency error was measured as follows:

- (1) Transmitting in 5MHz-QPSK-LTE mode at center channel (2155.0MHz) on port 2.
- (2) The EUT temperature was stabilized at each temperature step (for a minimum of 30 minutes) prior to frequency accuracy measurement.

Nominal operating voltage of the product is declared as 48VDC.

Frequency error results are listed below for extreme voltages and temperatures.

**Extreme Voltages:**

| Percentage of Rated Supply | DC Voltage (VDC) | Frequency Error (Hz) at 20°C |
|----------------------------|------------------|------------------------------|
| 85%                        | 40.8             | 2.82                         |
| 100%                       | 48.0             | 3.62                         |
| 115%                       | 55.2             | 3.40                         |

**Extreme Temperatures:**

| Temperature | Frequency Error (Hz) at 48VDC |
|-------------|-------------------------------|
| -30 °C      | 1.56                          |
| -20 °C      | 1.93                          |
| -10 °C      | 1.51                          |
| 0 °C        | 1.55                          |
| 10 °C       | 1.38                          |
| 20 °C       | <b>3.62</b>                   |
| 30 °C       | 1.58                          |
| 40 °C       | 1.93                          |
| 50 °C       | 1.74                          |

Based on the results above, highest recorded frequency error (3.62Hz or 0.0017ppm) ensures that the transmitted signal remains in its authorized frequency block at extreme voltages and temperatures.

The results above are deemed sufficient to demonstrate carrier frequency stability for all other channel bandwidth modes and modulations since all carriers are controlled by the same frequency stabilization circuitry that was subjected to the extreme conditions under this test.

**End of Report**