

#### Frequency Error vs. Voltage

| Voltage (Vdc) | LTE Band 12               |                       |                 |                       |
|---------------|---------------------------|-----------------------|-----------------|-----------------------|
|               | Channel Bandwidth 1.4 MHz |                       |                 |                       |
|               | Low Channel               |                       | High Channel    |                       |
|               | Frequency (MHz)           | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 3.87          | 699.700035                | 0.050                 | 715.300010      | 0.014                 |
| 3.28          | 699.700036                | 0.051                 | 715.300023      | 0.032                 |
| 4.45          | 699.700016                | 0.023                 | 715.300020      | 0.028                 |

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.45Vdc.

#### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 12               |                       |                 |                       |
|------------|---------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth 1.4 MHz |                       |                 |                       |
|            | Low Channel               |                       | High Channel    |                       |
|            | Frequency (MHz)           | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| -30        | 699.700026                | 0.037                 | 715.300022      | 0.031                 |
| -20        | 699.700020                | 0.029                 | 715.300025      | 0.035                 |
| -10        | 699.700038                | 0.054                 | 715.300028      | 0.039                 |
| 0          | 699.700014                | 0.020                 | 715.300024      | 0.034                 |
| 10         | 699.700011                | 0.016                 | 715.300011      | 0.015                 |
| 20         | 699.699990                | -0.014                | 715.299960      | -0.056                |
| 30         | 699.699976                | -0.034                | 715.299969      | -0.043                |
| 40         | 699.699972                | -0.040                | 715.299963      | -0.052                |
| 50         | 699.699964                | -0.051                | 715.299981      | -0.027                |
| 60         | 699.699968                | -0.046                | 715.299963      | -0.052                |

#### Frequency Error vs. Voltage

| Voltage (Vdc) | LTE Band 12             |                       |                 |                       |
|---------------|-------------------------|-----------------------|-----------------|-----------------------|
|               | Channel Bandwidth 3 MHz |                       |                 |                       |
|               | Low Channel             |                       | High Channel    |                       |
|               | Frequency (MHz)         | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 3.87          | 700.500024              | 0.034                 | 714.500036      | 0.050                 |
| 3.28          | 700.500015              | 0.021                 | 714.500022      | 0.031                 |
| 4.45          | 700.500028              | 0.040                 | 714.500029      | 0.041                 |

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.45Vdc.

#### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 12             |                       |                 |                       |
|------------|-------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth 3 MHz |                       |                 |                       |
|            | Low Channel             |                       | High Channel    |                       |
|            | Frequency (MHz)         | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| -30        | 700.500027              | 0.039                 | 714.500034      | 0.048                 |
| -20        | 700.500030              | 0.043                 | 714.500036      | 0.050                 |
| -10        | 700.500035              | 0.050                 | 714.500035      | 0.049                 |
| 0          | 700.500025              | 0.036                 | 714.500036      | 0.050                 |
| 10         | 700.500014              | 0.020                 | 714.500029      | 0.041                 |
| 20         | 700.499990              | -0.014                | 714.499988      | -0.017                |
| 30         | 700.499982              | -0.026                | 714.499984      | -0.022                |
| 40         | 700.499977              | -0.033                | 714.499960      | -0.056                |
| 50         | 700.499976              | -0.034                | 714.499987      | -0.018                |
| 60         | 700.499988              | -0.017                | 714.499986      | -0.020                |

#### Frequency Error vs. Voltage

| Voltage (Vdc) | LTE Band 12            |                       |                 |                       |
|---------------|------------------------|-----------------------|-----------------|-----------------------|
|               | Channel Bandwidth 5MHz |                       |                 |                       |
|               | Low Channel            |                       | High Channel    |                       |
|               | Frequency (MHz)        | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 3.87          | 701.500021             | 0.030                 | 713.500018      | 0.025                 |
| 3.28          | 701.500013             | 0.019                 | 713.500016      | 0.022                 |
| 4.45          | 701.500023             | 0.033                 | 713.500036      | 0.050                 |

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.45Vdc.

#### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 12            |                       |                 |                       |
|------------|------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth 5MHz |                       |                 |                       |
|            | Low Channel            |                       | High Channel    |                       |
|            | Frequency (MHz)        | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| -30        | 701.500026             | 0.037                 | 713.500030      | 0.042                 |
| -20        | 701.500024             | 0.034                 | 713.500033      | 0.046                 |
| -10        | 701.500024             | 0.034                 | 713.500012      | 0.017                 |
| 0          | 701.500019             | 0.027                 | 713.500028      | 0.039                 |
| 10         | 701.500022             | 0.031                 | 713.500013      | 0.018                 |
| 20         | 701.499965             | -0.050                | 713.499981      | -0.027                |
| 30         | 701.499978             | -0.031                | 713.499976      | -0.034                |
| 40         | 701.499977             | -0.033                | 713.499970      | -0.042                |
| 50         | 701.499962             | -0.054                | 713.499988      | -0.017                |
| 60         | 701.499960             | -0.057                | 713.499981      | -0.027                |

#### Frequency Error vs. Voltage

| Voltage<br>(Vdc) | LTE Band 12             |                       |                 |                       |
|------------------|-------------------------|-----------------------|-----------------|-----------------------|
|                  | Channel Bandwidth 10MHz |                       |                 |                       |
|                  | Low Channel             |                       | High Channel    |                       |
|                  | Frequency (MHz)         | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 3.87             | 704.000037              | 0.053                 | 711.000015      | 0.021                 |
| 3.28             | 704.000025              | 0.036                 | 711.000015      | 0.021                 |
| 4.45             | 704.000034              | 0.048                 | 711.000033      | 0.046                 |

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.45Vdc.

#### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 12             |                       |                 |                       |
|------------|-------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth 10MHz |                       |                 |                       |
|            | Low Channel             |                       | High Channel    |                       |
|            | Frequency (MHz)         | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| -30        | 704.000015              | 0.021                 | 711.000014      | 0.020                 |
| -20        | 704.000013              | 0.018                 | 711.000013      | 0.018                 |
| -10        | 704.000030              | 0.043                 | 711.000024      | 0.034                 |
| 0          | 704.000025              | 0.036                 | 711.000032      | 0.045                 |
| 10         | 704.000015              | 0.021                 | 711.000038      | 0.053                 |
| 20         | 703.999969              | -0.044                | 710.999985      | -0.021                |
| 30         | 703.999988              | -0.017                | 710.999983      | -0.024                |
| 40         | 703.999963              | -0.053                | 710.999980      | -0.028                |
| 50         | 703.999969              | -0.044                | 710.999986      | -0.020                |
| 60         | 703.999979              | -0.030                | 710.999964      | -0.051                |

#### Frequency Error vs. Voltage

| Voltage (Vdc) | LTE Band 13            |                       |                 |                       |
|---------------|------------------------|-----------------------|-----------------|-----------------------|
|               | Channel Bandwidth 5MHz |                       |                 |                       |
|               | Low Channel            |                       | High Channel    |                       |
|               | Frequency (MHz)        | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 3.87          | 779.500040             | 0.051                 | 784.500039      | 0.050                 |
| 3.28          | 779.500023             | 0.030                 | 784.500025      | 0.032                 |
| 4.45          | 779.500018             | 0.023                 | 784.500027      | 0.034                 |

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.45Vdc.

#### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 13            |                       |                 |                       |
|------------|------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth 5MHz |                       |                 |                       |
|            | Low Channel            |                       | High Channel    |                       |
|            | Frequency (MHz)        | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| -30        | 779.500027             | 0.035                 | 784.500015      | 0.019                 |
| -20        | 779.500025             | 0.032                 | 784.500010      | 0.013                 |
| -10        | 779.500039             | 0.050                 | 784.500030      | 0.038                 |
| 0          | 779.500020             | 0.026                 | 784.500027      | 0.034                 |
| 10         | 779.500025             | 0.032                 | 784.500026      | 0.033                 |
| 20         | 779.499983             | -0.022                | 784.499970      | -0.038                |
| 30         | 779.499972             | -0.036                | 784.499978      | -0.028                |
| 40         | 779.499961             | -0.050                | 784.499962      | -0.048                |
| 50         | 779.499974             | -0.033                | 784.499982      | -0.023                |
| 60         | 779.499970             | -0.038                | 784.499974      | -0.033                |

### Frequency Error vs. Voltage

| Voltage<br>(Vdc) | LTE Band 13             |                       |
|------------------|-------------------------|-----------------------|
|                  | Channel Bandwidth 10MHz |                       |
|                  | Frequency (MHz)         | Frequency Error (ppm) |
| 3.87             | 782.000024              | 0.031                 |
| 3.28             | 782.000039              | 0.050                 |
| 4.45             | 782.000030              | 0.038                 |

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.45Vdc.

### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 13             |                       |
|------------|-------------------------|-----------------------|
|            | Channel Bandwidth 10MHz |                       |
|            | Frequency (MHz)         | Frequency Error (ppm) |
| -30        | 782.000014              | 0.018                 |
| -20        | 782.000014              | 0.018                 |
| -10        | 782.000029              | 0.037                 |
| 0          | 782.000034              | 0.043                 |
| 10         | 782.000035              | 0.045                 |
| 20         | 781.999961              | -0.050                |
| 30         | 781.999966              | -0.043                |
| 40         | 781.999963              | -0.047                |
| 50         | 781.999966              | -0.043                |
| 60         | 781.999971              | -0.037                |

#### Frequency Error vs. Voltage

| Voltage (Vdc) | LTE Band 66               |                       |                 |                       |
|---------------|---------------------------|-----------------------|-----------------|-----------------------|
|               | Channel Bandwidth 1.4 MHz |                       |                 |                       |
|               | Low Channel               |                       | High Channel    |                       |
|               | Frequency (MHz)           | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 3.87          | 1710.700037               | 0.022                 | 1779.300010     | 0.006                 |
| 3.28          | 1710.700036               | 0.021                 | 1779.300040     | 0.022                 |
| 4.45          | 1710.700014               | 0.008                 | 1779.300012     | 0.007                 |

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.45Vdc.

#### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 66               |                       |                 |                       |
|------------|---------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth 1.4 MHz |                       |                 |                       |
|            | Low Channel               |                       | High Channel    |                       |
|            | Frequency (MHz)           | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| -30        | 1710.700011               | 0.006                 | 1779.300030     | 0.017                 |
| -20        | 1710.700010               | 0.006                 | 1779.300031     | 0.017                 |
| -10        | 1710.700012               | 0.007                 | 1779.300023     | 0.013                 |
| 0          | 1710.700035               | 0.020                 | 1779.300027     | 0.015                 |
| 10         | 1710.700014               | 0.008                 | 1779.300014     | 0.008                 |
| 20         | 1710.699974               | -0.015                | 1779.299974     | -0.015                |
| 30         | 1710.699966               | -0.020                | 1779.299975     | -0.014                |
| 40         | 1710.699975               | -0.015                | 1779.299987     | -0.007                |
| 50         | 1710.699972               | -0.016                | 1779.299974     | -0.015                |
| 60         | 1710.699962               | -0.022                | 1779.299982     | -0.010                |

#### Frequency Error vs. Voltage

| Voltage (Vdc) | LTE Band 66             |                       |                 |                       |
|---------------|-------------------------|-----------------------|-----------------|-----------------------|
|               | Channel Bandwidth 3 MHz |                       |                 |                       |
|               | Low Channel             |                       | High Channel    |                       |
|               | Frequency (MHz)         | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 3.87          | 1711.500033             | 0.019                 | 1778.500027     | 0.015                 |
| 3.28          | 1711.500023             | 0.013                 | 1778.500036     | 0.020                 |
| 4.45          | 1711.500016             | 0.009                 | 1778.500012     | 0.007                 |

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.45Vdc.

#### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 66             |                       |                 |                       |
|------------|-------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth 3 MHz |                       |                 |                       |
|            | Low Channel             |                       | High Channel    |                       |
|            | Frequency (MHz)         | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| -30        | 1711.500025             | 0.015                 | 1778.500033     | 0.019                 |
| -20        | 1711.500021             | 0.012                 | 1778.500036     | 0.020                 |
| -10        | 1711.500024             | 0.014                 | 1778.500025     | 0.014                 |
| 0          | 1711.500019             | 0.011                 | 1778.500031     | 0.017                 |
| 10         | 1711.500026             | 0.015                 | 1778.500036     | 0.020                 |
| 20         | 1711.499987             | -0.008                | 1778.499973     | -0.015                |
| 30         | 1711.499979             | -0.012                | 1778.499984     | -0.009                |
| 40         | 1711.499981             | -0.011                | 1778.499981     | -0.011                |
| 50         | 1711.499977             | -0.013                | 1778.499966     | -0.019                |
| 60         | 1711.499965             | -0.020                | 1778.499978     | -0.012                |

#### Frequency Error vs. Voltage

| Voltage (Vdc) | LTE Band 66            |                       |                 |                       |
|---------------|------------------------|-----------------------|-----------------|-----------------------|
|               | Channel Bandwidth 5MHz |                       |                 |                       |
|               | Low Channel            |                       | High Channel    |                       |
|               | Frequency (MHz)        | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 3.87          | 1712.500013            | 0.008                 | 1777.500039     | 0.022                 |
| 3.28          | 1712.500022            | 0.013                 | 1777.500040     | 0.023                 |
| 4.45          | 1712.500010            | 0.006                 | 1777.500019     | 0.011                 |

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.45Vdc.

#### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 66            |                       |                 |                       |
|------------|------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth 5MHz |                       |                 |                       |
|            | Low Channel            |                       | High Channel    |                       |
|            | Frequency (MHz)        | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| -30        | 1712.500025            | 0.015                 | 1777.500017     | 0.010                 |
| -20        | 1712.500024            | 0.014                 | 1777.500018     | 0.010                 |
| -10        | 1712.500021            | 0.012                 | 1777.500013     | 0.007                 |
| 0          | 1712.500036            | 0.021                 | 1777.500031     | 0.017                 |
| 10         | 1712.500015            | 0.009                 | 1777.500037     | 0.021                 |
| 20         | 1712.499983            | -0.010                | 1777.499978     | -0.012                |
| 30         | 1712.499979            | -0.012                | 1777.499986     | -0.008                |
| 40         | 1712.499985            | -0.009                | 1777.499981     | -0.011                |
| 50         | 1712.499977            | -0.013                | 1777.499984     | -0.009                |
| 60         | 1712.499983            | -0.010                | 1777.499962     | -0.021                |

### Frequency Error vs. Voltage

| Voltage (Vdc) | LTE Band 66             |                       |                 |                       |
|---------------|-------------------------|-----------------------|-----------------|-----------------------|
|               | Channel Bandwidth 10MHz |                       |                 |                       |
|               | Low Channel             |                       | High Channel    |                       |
|               | Frequency (MHz)         | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 3.87          | 1715.000030             | 0.017                 | 1775.000019     | 0.011                 |
| 3.28          | 1715.000038             | 0.022                 | 1775.000019     | 0.011                 |
| 4.45          | 1715.000016             | 0.009                 | 1775.000031     | 0.017                 |

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.45Vdc.

### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 66             |                       |                 |                       |
|------------|-------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth 10MHz |                       |                 |                       |
|            | Low Channel             |                       | High Channel    |                       |
|            | Frequency (MHz)         | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| -30        | 1715.000031             | 0.018                 | 1775.000027     | 0.015                 |
| -20        | 1715.000030             | 0.017                 | 1775.000029     | 0.016                 |
| -10        | 1715.000029             | 0.017                 | 1775.000040     | 0.023                 |
| 0          | 1715.000032             | 0.019                 | 1775.000035     | 0.020                 |
| 10         | 1715.000025             | 0.015                 | 1775.000031     | 0.017                 |
| 20         | 1714.999977             | -0.013                | 1774.999977     | -0.013                |
| 30         | 1714.999977             | -0.013                | 1774.999979     | -0.012                |
| 40         | 1714.999973             | -0.016                | 1774.999982     | -0.010                |
| 50         | 1714.999977             | -0.013                | 1774.999977     | -0.013                |
| 60         | 1714.999976             | -0.014                | 1774.999983     | -0.010                |

#### Frequency Error vs. Voltage

| Voltage (Vdc) | LTE Band 66             |                       |                 |                       |
|---------------|-------------------------|-----------------------|-----------------|-----------------------|
|               | Channel Bandwidth 15MHz |                       |                 |                       |
|               | Low Channel             |                       | High Channel    |                       |
|               | Frequency (MHz)         | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 3.87          | 1717.500025             | 0.015                 | 1772.500017     | 0.010                 |
| 3.28          | 1717.500030             | 0.017                 | 1772.500012     | 0.007                 |
| 4.45          | 1717.500024             | 0.014                 | 1772.500022     | 0.012                 |

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.45Vdc.

#### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 66             |                       |                 |                       |
|------------|-------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth 15MHz |                       |                 |                       |
|            | Low Channel             |                       | High Channel    |                       |
|            | Frequency (MHz)         | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| -30        | 1717.500032             | 0.019                 | 1772.500013     | 0.007                 |
| -20        | 1717.500036             | 0.021                 | 1772.500011     | 0.006                 |
| -10        | 1717.500017             | 0.010                 | 1772.500022     | 0.012                 |
| 0          | 1717.500012             | 0.007                 | 1772.500026     | 0.015                 |
| 10         | 1717.500013             | 0.008                 | 1772.500020     | 0.011                 |
| 20         | 1717.499987             | -0.008                | 1772.499983     | -0.010                |
| 30         | 1717.499986             | -0.008                | 1772.499965     | -0.020                |
| 40         | 1717.499965             | -0.020                | 1772.499987     | -0.007                |
| 50         | 1717.499967             | -0.019                | 1772.499988     | -0.007                |
| 60         | 1717.499965             | -0.020                | 1772.499968     | -0.018                |

#### Frequency Error vs. Voltage

| Voltage (Vdc) | LTE Band 66             |                       |                 |                       |
|---------------|-------------------------|-----------------------|-----------------|-----------------------|
|               | Channel Bandwidth 20MHz |                       |                 |                       |
|               | Low Channel             |                       | High Channel    |                       |
|               | Frequency (MHz)         | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 3.87          | 1720.000035             | 0.020                 | 1770.000015     | 0.008                 |
| 3.28          | 1720.000017             | 0.010                 | 1770.000016     | 0.009                 |
| 4.45          | 1720.000012             | 0.007                 | 1770.000027     | 0.015                 |

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.45Vdc.

#### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 66             |                       |                 |                       |
|------------|-------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth 20MHz |                       |                 |                       |
|            | Low Channel             |                       | High Channel    |                       |
|            | Frequency (MHz)         | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| -30        | 1720.000026             | 0.015                 | 1770.000030     | 0.017                 |
| -20        | 1720.000028             | 0.016                 | 1770.000029     | 0.016                 |
| -10        | 1720.000038             | 0.022                 | 1770.000027     | 0.015                 |
| 0          | 1720.000024             | 0.014                 | 1770.000021     | 0.012                 |
| 10         | 1720.000039             | 0.023                 | 1770.000011     | 0.006                 |
| 20         | 1719.999986             | -0.008                | 1769.999976     | -0.014                |
| 30         | 1719.999990             | -0.006                | 1769.999982     | -0.010                |
| 40         | 1719.999968             | -0.019                | 1769.999984     | -0.009                |
| 50         | 1719.999987             | -0.008                | 1769.999968     | -0.018                |
| 60         | 1719.999983             | -0.010                | 1769.999987     | -0.007                |

#### Frequency Error vs. Voltage

| Voltage (Vdc) | LTE Band 71            |                       |                 |                       |
|---------------|------------------------|-----------------------|-----------------|-----------------------|
|               | Channel Bandwidth 5MHz |                       |                 |                       |
|               | Low Channel            |                       | High Channel    |                       |
|               | Frequency (MHz)        | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 3.87          | 665.500025             | 0.038                 | 695.500040      | 0.058                 |
| 3.28          | 665.500038             | 0.057                 | 695.500010      | 0.014                 |
| 4.45          | 665.500016             | 0.024                 | 695.500010      | 0.014                 |

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.45Vdc.

#### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 71            |                       |                 |                       |
|------------|------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth 5MHz |                       |                 |                       |
|            | Low Channel            |                       | High Channel    |                       |
|            | Frequency (MHz)        | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| -30        | 665.500032             | 0.048                 | 695.500018      | 0.026                 |
| -20        | 665.500034             | 0.051                 | 695.500015      | 0.022                 |
| -10        | 665.500015             | 0.023                 | 695.500032      | 0.046                 |
| 0          | 665.500024             | 0.036                 | 695.500032      | 0.046                 |
| 10         | 665.500038             | 0.057                 | 695.500010      | 0.014                 |
| 20         | 665.499970             | -0.045                | 695.499963      | -0.053                |
| 30         | 665.499974             | -0.039                | 695.499974      | -0.037                |
| 40         | 665.499977             | -0.035                | 695.499984      | -0.023                |
| 50         | 665.499990             | -0.015                | 695.499986      | -0.020                |
| 60         | 665.499990             | -0.015                | 695.499971      | -0.042                |

#### Frequency Error vs. Voltage

| Voltage (Vdc) | LTE Band 71             |                       |                 |                       |
|---------------|-------------------------|-----------------------|-----------------|-----------------------|
|               | Channel Bandwidth 10MHz |                       |                 |                       |
|               | Low Channel             |                       | High Channel    |                       |
|               | Frequency (MHz)         | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 3.87          | 668.000016              | 0.024                 | 693.000011      | 0.016                 |
| 3.28          | 668.000023              | 0.034                 | 693.000012      | 0.017                 |
| 4.45          | 668.000032              | 0.048                 | 693.000030      | 0.043                 |

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.45Vdc.

#### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 71             |                       |                 |                       |
|------------|-------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth 10MHz |                       |                 |                       |
|            | Low Channel             |                       | High Channel    |                       |
|            | Frequency (MHz)         | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| -30        | 668.000027              | 0.040                 | 693.000034      | 0.049                 |
| -20        | 668.000030              | 0.045                 | 693.000036      | 0.052                 |
| -10        | 668.000015              | 0.022                 | 693.000025      | 0.036                 |
| 0          | 668.000030              | 0.045                 | 693.000034      | 0.049                 |
| 10         | 668.000035              | 0.052                 | 693.000025      | 0.036                 |
| 20         | 667.999966              | -0.051                | 692.999985      | -0.022                |
| 30         | 667.999963              | -0.055                | 692.999978      | -0.032                |
| 40         | 667.999979              | -0.031                | 692.999970      | -0.043                |
| 50         | 667.999979              | -0.031                | 692.999969      | -0.045                |
| 60         | 667.999977              | -0.034                | 692.999962      | -0.055                |

#### Frequency Error vs. Voltage

| Voltage (Vdc) | LTE Band 71             |                       |                 |                       |
|---------------|-------------------------|-----------------------|-----------------|-----------------------|
|               | Channel Bandwidth 15MHz |                       |                 |                       |
|               | Low Channel             |                       | High Channel    |                       |
|               | Frequency (MHz)         | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 3.87          | 670.500027              | 0.040                 | 690.500017      | 0.025                 |
| 3.28          | 670.500012              | 0.018                 | 690.500019      | 0.028                 |
| 4.45          | 670.500036              | 0.054                 | 690.500028      | 0.041                 |

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.45Vdc.

#### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 71             |                       |                 |                       |
|------------|-------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth 15MHz |                       |                 |                       |
|            | Low Channel             |                       | High Channel    |                       |
|            | Frequency (MHz)         | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| -30        | 670.500015              | 0.022                 | 690.500014      | 0.020                 |
| -20        | 670.500010              | 0.015                 | 690.500012      | 0.017                 |
| -10        | 670.500015              | 0.022                 | 690.500010      | 0.014                 |
| 0          | 670.500018              | 0.027                 | 690.500013      | 0.019                 |
| 10         | 670.500013              | 0.019                 | 690.500016      | 0.023                 |
| 20         | 670.499970              | -0.045                | 690.499974      | -0.038                |
| 30         | 670.499976              | -0.036                | 690.499970      | -0.043                |
| 40         | 670.499962              | -0.057                | 690.499984      | -0.023                |
| 50         | 670.499961              | -0.058                | 690.499974      | -0.038                |
| 60         | 670.499967              | -0.049                | 690.499984      | -0.023                |

#### Frequency Error vs. Voltage

| Voltage (Vdc) | LTE Band 71             |                       |                 |                       |
|---------------|-------------------------|-----------------------|-----------------|-----------------------|
|               | Channel Bandwidth 20MHz |                       |                 |                       |
|               | Low Channel             |                       | High Channel    |                       |
|               | Frequency (MHz)         | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 3.87          | 673.000028              | 0.042                 | 688.000040      | 0.058                 |
| 3.28          | 673.000037              | 0.055                 | 688.000026      | 0.038                 |
| 4.45          | 673.000017              | 0.025                 | 688.000028      | 0.041                 |

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.45Vdc.

#### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 71             |                       |                 |                       |
|------------|-------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth 20MHz |                       |                 |                       |
|            | Low Channel             |                       | High Channel    |                       |
|            | Frequency (MHz)         | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| -30        | 673.000032              | 0.048                 | 688.000033      | 0.048                 |
| -20        | 673.000034              | 0.051                 | 688.000040      | 0.058                 |
| -10        | 673.000036              | 0.053                 | 688.000011      | 0.016                 |
| 0          | 673.000013              | 0.019                 | 688.000020      | 0.029                 |
| 10         | 673.000027              | 0.040                 | 688.000020      | 0.029                 |
| 20         | 672.999962              | -0.056                | 687.999984      | -0.023                |
| 30         | 672.999984              | -0.024                | 687.999985      | -0.022                |
| 40         | 672.999962              | -0.056                | 687.999968      | -0.047                |
| 50         | 672.999983              | -0.025                | 687.999962      | -0.055                |
| 60         | 672.999975              | -0.037                | 687.999986      | -0.020                |

## 4.4 Emission Bandwidth Measurement

### 4.4.1 Limits of Emission Bandwidth Measurement

According to FCC 2.1049, the occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 % of the total mean power radiated by a given emission.

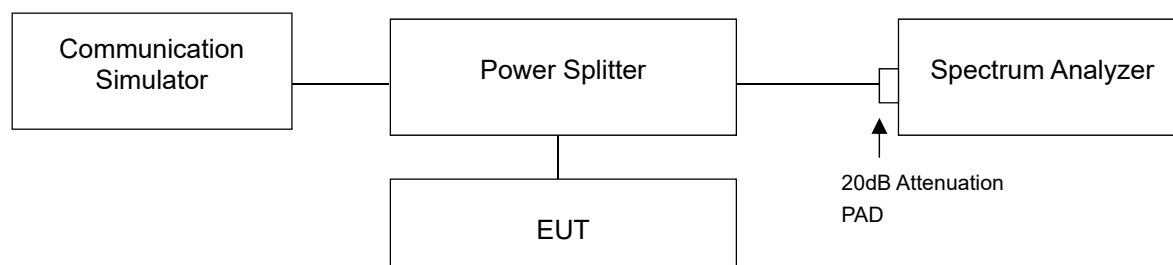
### 4.4.2 Test Procedure

For the 26dBc bandwidth measurement method, please refer to section 5.4.3 of ANSI C63.26.

- The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.
- The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set  $\geq 3 \times \text{RBW}$ .
- Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
- The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target “-X dB” requirement, i.e., if the requirement calls for measuring the -26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.
- Set spectrum analyzer detection mode to peak, and the trace mode to max hold.
- Determine the following reference values: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
- Determine the “-X dB amplitude” as equal to (Reference Value - X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.
- Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “-X dB amplitude” determined in step f). If a marker is below this “-X dB amplitude” value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers.
- The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

For the occupied bandwidth measurement method, please refer to section 5.4.4 of ANSI C63.26.

### 4.4.3 Test Setup



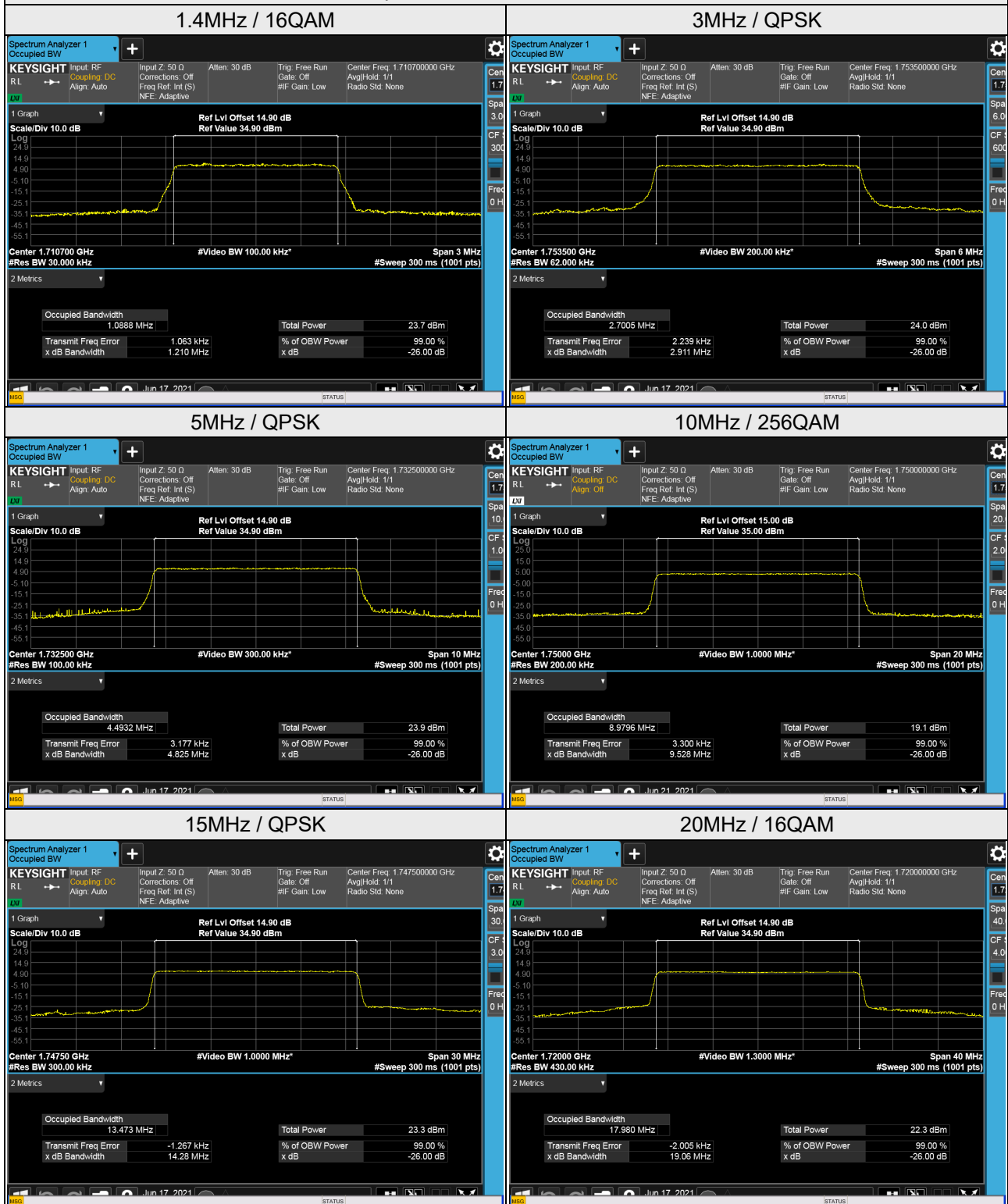
#### 4.4.4 Test Result

##### Occupied Bandwidth

| LTE Band 4, Channel Bandwidth 1.4MHz |                 |                              |       |       |        |
|--------------------------------------|-----------------|------------------------------|-------|-------|--------|
| Channel                              | Frequency (MHz) | 99% Occupied Bandwidth (MHz) |       |       |        |
|                                      |                 | QPSK                         | 16QAM | 64QAM | 256QAM |
| 19957                                | 1710.7          | 1.09                         | 1.09  | 1.09  | 1.09   |
| 20175                                | 1732.5          | 1.09                         | 1.09  | 1.09  | 1.09   |
| 20393                                | 1754.3          | 1.09                         | 1.09  | 1.09  | 1.09   |
| LTE Band 4, Channel Bandwidth 3MHz   |                 |                              |       |       |        |
| Channel                              | Frequency (MHz) | 99% Occupied Bandwidth (MHz) |       |       |        |
|                                      |                 | QPSK                         | 16QAM | 64QAM | 256QAM |
| 19965                                | 1711.5          | 2.70                         | 2.70  | 2.70  | 2.70   |
| 20175                                | 1732.5          | 2.70                         | 2.70  | 2.70  | 2.70   |
| 20385                                | 1753.5          | 2.70                         | 2.70  | 2.70  | 2.70   |
| LTE Band 4, Channel Bandwidth 5MHz   |                 |                              |       |       |        |
| Channel                              | Frequency (MHz) | 99% Occupied Bandwidth (MHz) |       |       |        |
|                                      |                 | QPSK                         | 16QAM | 64QAM | 256QAM |
| 19975                                | 1712.5          | 4.49                         | 4.49  | 4.49  | 4.49   |
| 20175                                | 1732.5          | 4.49                         | 4.49  | 4.49  | 4.49   |
| 20375                                | 1752.5          | 4.49                         | 4.49  | 4.49  | 4.49   |
| LTE Band 4, Channel Bandwidth 10MHz  |                 |                              |       |       |        |
| Channel                              | Frequency (MHz) | 99% Occupied Bandwidth (MHz) |       |       |        |
|                                      |                 | QPSK                         | 16QAM | 64QAM | 256QAM |
| 20000                                | 1715.0          | 8.97                         | 8.97  | 8.97  | 8.98   |
| 20175                                | 1732.5          | 8.97                         | 8.98  | 8.98  | 8.98   |
| 20350                                | 1750.0          | 8.98                         | 8.98  | 8.98  | 8.98   |
| LTE Band 4, Channel Bandwidth 15MHz  |                 |                              |       |       |        |
| Channel                              | Frequency (MHz) | 99% Occupied Bandwidth (MHz) |       |       |        |
|                                      |                 | QPSK                         | 16QAM | 64QAM | 256QAM |
| 20025                                | 1717.5          | 13.47                        | 13.46 | 13.46 | 13.40  |
| 20175                                | 1732.5          | 13.47                        | 13.45 | 13.46 | 13.45  |
| 20325                                | 1747.5          | 13.47                        | 13.46 | 13.46 | 13.46  |

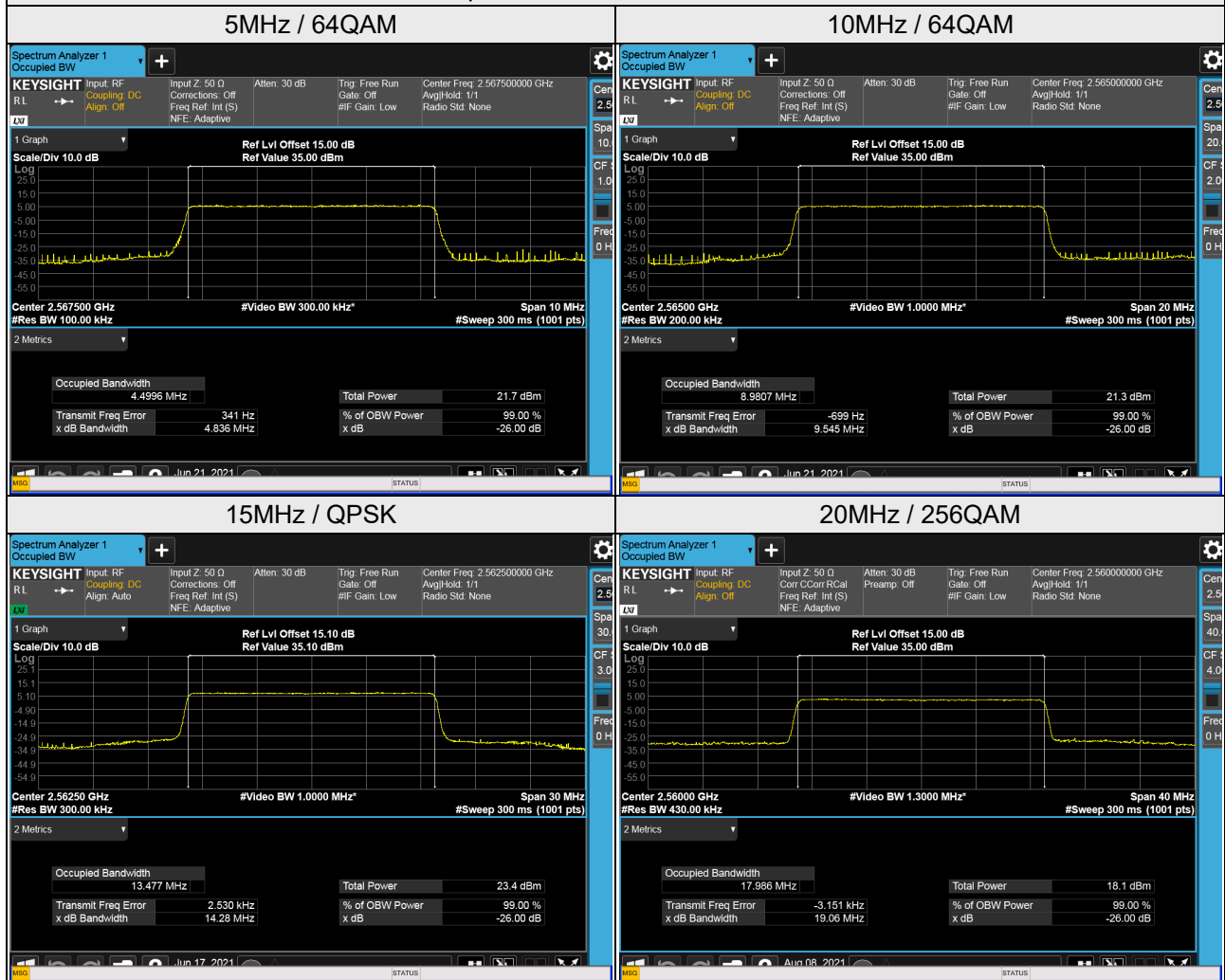
| LTE Band 4, Channel Bandwidth 20MHz |                 |                              |       |       |        |
|-------------------------------------|-----------------|------------------------------|-------|-------|--------|
| Channel                             | Frequency (MHz) | 99% Occupied Bandwidth (MHz) |       |       |        |
|                                     |                 | QPSK                         | 16QAM | 64QAM | 256QAM |
| 20050                               | 1720.0          | 17.96                        | 17.98 | 17.97 | 17.97  |
| 20175                               | 1732.5          | 17.95                        | 17.97 | 17.96 | 17.96  |
| 20300                               | 1745.0          | 17.95                        | 17.97 | 17.95 | 17.97  |

## Spectrum Plot of Worst Value



| LTE Band 7, Channel Bandwidth 5MHz  |                 |                              |       |       |        |
|-------------------------------------|-----------------|------------------------------|-------|-------|--------|
| Channel                             | Frequency (MHz) | 99% Occupied Bandwidth (MHz) |       |       |        |
|                                     |                 | QPSK                         | 16QAM | 64QAM | 256QAM |
| 20775                               | 2502.5          | 4.49                         | 4.49  | 4.50  | 4.49   |
| 21100                               | 2535.0          | 4.49                         | 4.49  | 4.50  | 4.48   |
| 21425                               | 2567.5          | 4.49                         | 4.49  | 4.50  | 4.49   |
| LTE Band 7, Channel Bandwidth 10MHz |                 |                              |       |       |        |
| Channel                             | Frequency (MHz) | 99% Occupied Bandwidth (MHz) |       |       |        |
|                                     |                 | QPSK                         | 16QAM | 64QAM | 256QAM |
| 20800                               | 2505.0          | 8.98                         | 8.97  | 8.98  | 8.98   |
| 21100                               | 2535.0          | 8.97                         | 8.98  | 8.98  | 8.95   |
| 21400                               | 2565.0          | 8.97                         | 8.98  | 8.98  | 8.97   |
| LTE Band 7, Channel Bandwidth 15MHz |                 |                              |       |       |        |
| Channel                             | Frequency (MHz) | 99% Occupied Bandwidth (MHz) |       |       |        |
|                                     |                 | QPSK                         | 16QAM | 64QAM | 256QAM |
| 20825                               | 2507.5          | 13.47                        | 13.46 | 13.45 | 13.43  |
| 21100                               | 2535.0          | 13.46                        | 13.45 | 13.44 | 13.46  |
| 21375                               | 2562.5          | 13.48                        | 13.47 | 13.46 | 13.46  |
| LTE Band 7, Channel Bandwidth 20MHz |                 |                              |       |       |        |
| Channel                             | Frequency (MHz) | 99% Occupied Bandwidth (MHz) |       |       |        |
|                                     |                 | QPSK                         | 16QAM | 64QAM | 256QAM |
| 20850                               | 2510.0          | 17.95                        | 17.97 | 17.96 | 17.96  |
| 21100                               | 2535.0          | 17.93                        | 17.95 | 17.94 | 17.95  |
| 21350                               | 2560.0          | 17.96                        | 17.98 | 17.98 | 17.99  |

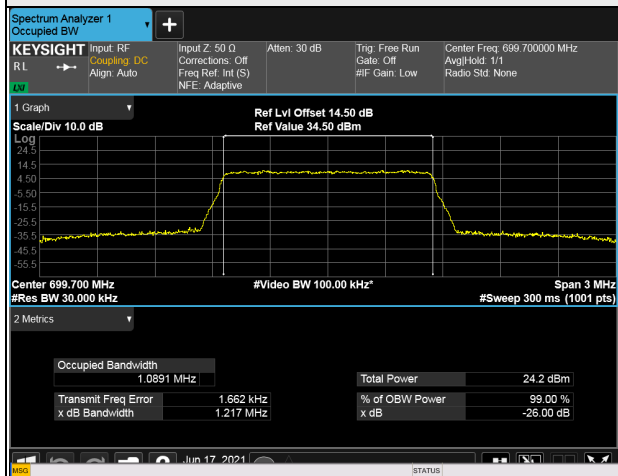
## Spectrum Plot of Worst Value



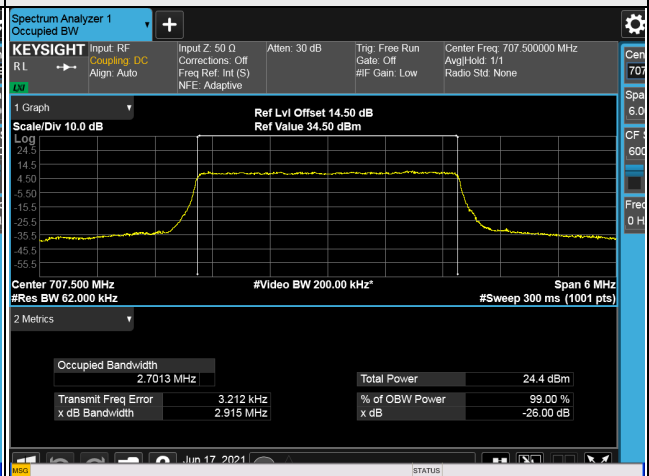
| LTE Band 12, Channel Bandwidth 1.4MHz |                 |                              |       |       |        |
|---------------------------------------|-----------------|------------------------------|-------|-------|--------|
| Channel                               | Frequency (MHz) | 99% Occupied Bandwidth (MHz) |       |       |        |
|                                       |                 | QPSK                         | 16QAM | 64QAM | 256QAM |
| 23017                                 | 699.7           | 1.09                         | 1.09  | 1.09  | 1.08   |
| 23095                                 | 707.5           | 1.09                         | 1.09  | 1.09  | 1.09   |
| 23173                                 | 715.3           | 1.09                         | 1.09  | 1.09  | 1.09   |
| LTE Band 12, Channel Bandwidth 3MHz   |                 |                              |       |       |        |
| Channel                               | Frequency (MHz) | 99% Occupied Bandwidth (MHz) |       |       |        |
|                                       |                 | QPSK                         | 16QAM | 64QAM | 256QAM |
| 23025                                 | 700.5           | 2.70                         | 2.69  | 2.70  | 2.70   |
| 23095                                 | 707.5           | 2.70                         | 2.70  | 2.70  | 2.70   |
| 23165                                 | 714.5           | 2.70                         | 2.69  | 2.70  | 2.70   |
| LTE Band 12, Channel Bandwidth 5MHz   |                 |                              |       |       |        |
| Channel                               | Frequency (MHz) | 99% Occupied Bandwidth (MHz) |       |       |        |
|                                       |                 | QPSK                         | 16QAM | 64QAM | 256QAM |
| 23035                                 | 701.5           | 4.48                         | 4.48  | 4.49  | 4.49   |
| 23095                                 | 707.5           | 4.49                         | 4.49  | 4.50  | 4.49   |
| 23155                                 | 713.5           | 4.49                         | 4.49  | 4.49  | 4.48   |
| LTE Band 12, Channel Bandwidth 10MHz  |                 |                              |       |       |        |
| Channel                               | Frequency (MHz) | 99% Occupied Bandwidth (MHz) |       |       |        |
|                                       |                 | QPSK                         | 16QAM | 64QAM | 256QAM |
| 23060                                 | 704.0           | 8.96                         | 8.96  | 8.96  | 8.97   |
| 23095                                 | 707.5           | 8.98                         | 8.99  | 9.00  | 8.97   |
| 23130                                 | 711.0           | 8.95                         | 8.96  | 8.96  | 8.93   |

## Spectrum Plot of Worst Value

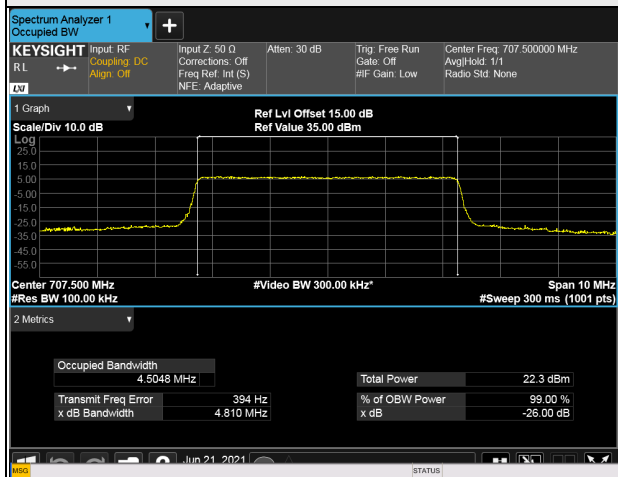
### 1.4MHz / 16QAM



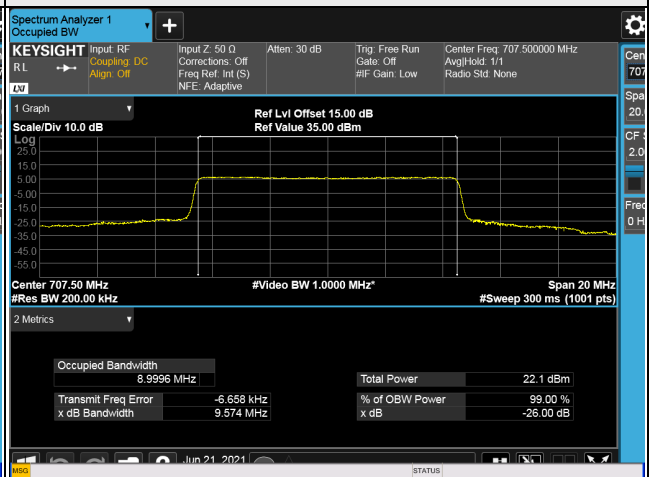
### 3MHz / QPSK



### 5MHz / 64QAM



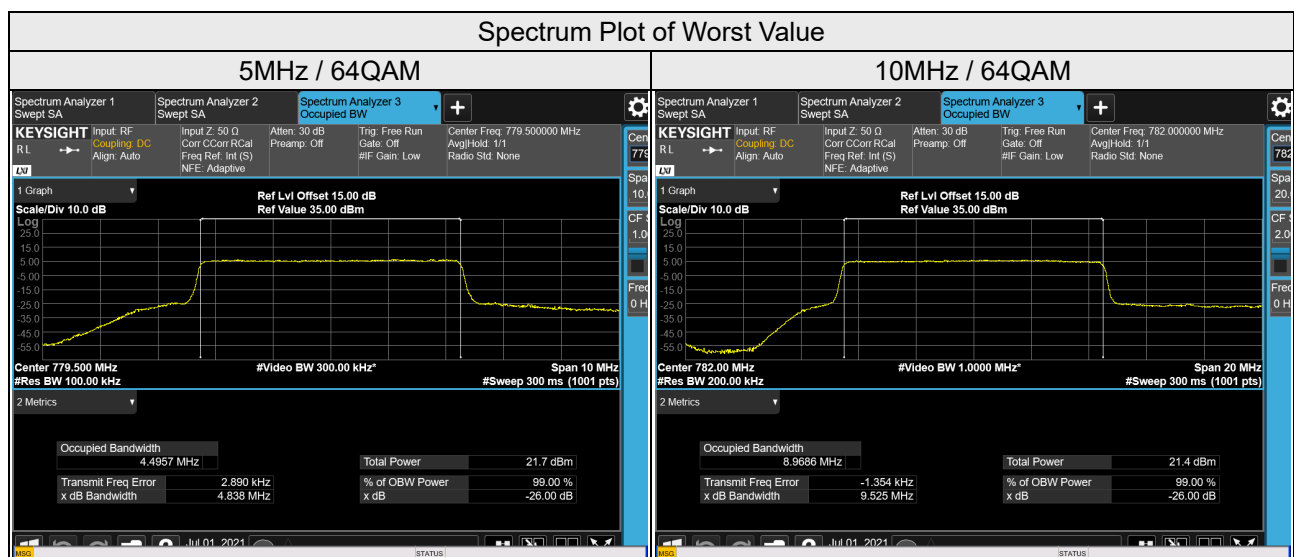
### 10MHz / 64QAM



| LTE Band 13, Channel Bandwidth 5MHz |                 |                              |       |       |        |
|-------------------------------------|-----------------|------------------------------|-------|-------|--------|
| Channel                             | Frequency (MHz) | 99% Occupied Bandwidth (MHz) |       |       |        |
|                                     |                 | QPSK                         | 16QAM | 64QAM | 256QAM |
| 23205                               | 779.5           | 4.49                         | 4.49  | 4.50  | 4.49   |
| 23230                               | 782.0           | 4.49                         | 4.49  | 4.49  | 4.49   |
| 23255                               | 784.5           | 4.49                         | 4.49  | 4.49  | 4.49   |

| LTE Band 13, Channel Bandwidth 10MHz |                 |                              |       |       |        |
|--------------------------------------|-----------------|------------------------------|-------|-------|--------|
| Channel                              | Frequency (MHz) | 99% Occupied Bandwidth (MHz) |       |       |        |
|                                      |                 | QPSK                         | 16QAM | 64QAM | 256QAM |
| 23230                                | 782.0           | 8.95                         | 8.97  | 8.97  | 8.95   |

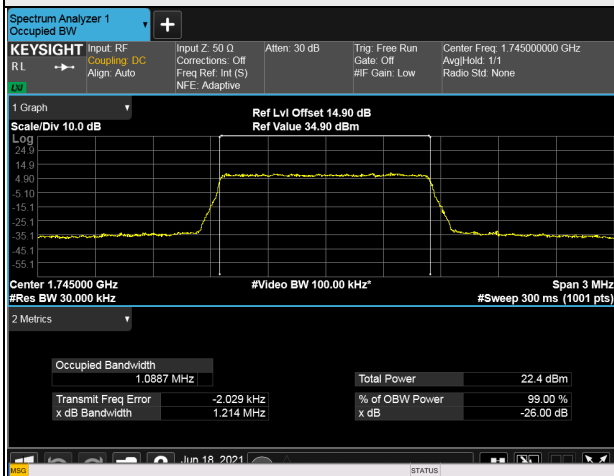


| LTE Band 66, Channel Bandwidth 1.4MHz |                 |                              |       |       |        |
|---------------------------------------|-----------------|------------------------------|-------|-------|--------|
| Channel                               | Frequency (MHz) | 99% Occupied Bandwidth (MHz) |       |       |        |
|                                       |                 | QPSK                         | 16QAM | 64QAM | 256QAM |
| 131979                                | 1710.7          | 1.09                         | 1.09  | 1.09  | 1.09   |
| 132322                                | 1745.0          | 1.09                         | 1.09  | 1.09  | 1.09   |
| 132665                                | 1779.3          | 1.09                         | 1.09  | 1.09  | 1.09   |
| LTE Band 66, Channel Bandwidth 3MHz   |                 |                              |       |       |        |
| Channel                               | Frequency (MHz) | 99% Occupied Bandwidth (MHz) |       |       |        |
|                                       |                 | QPSK                         | 16QAM | 64QAM | 256QAM |
| 131987                                | 1711.5          | 2.70                         | 2.70  | 2.70  | 2.70   |
| 132322                                | 1745.0          | 2.70                         | 2.70  | 2.70  | 2.69   |
| 132657                                | 1778.5          | 2.70                         | 2.70  | 2.70  | 2.70   |
| LTE Band 66, Channel Bandwidth 5MHz   |                 |                              |       |       |        |
| Channel                               | Frequency (MHz) | 99% Occupied Bandwidth (MHz) |       |       |        |
|                                       |                 | QPSK                         | 16QAM | 64QAM | 256QAM |
| 131997                                | 1712.5          | 4.49                         | 4.49  | 4.49  | 4.49   |
| 132322                                | 1745.0          | 4.49                         | 4.49  | 4.49  | 4.49   |
| 132647                                | 1777.5          | 4.49                         | 4.49  | 4.49  | 4.49   |
| LTE Band 66, Channel Bandwidth 10MHz  |                 |                              |       |       |        |
| Channel                               | Frequency (MHz) | 99% Occupied Bandwidth (MHz) |       |       |        |
|                                       |                 | QPSK                         | 16QAM | 64QAM | 256QAM |
| 132022                                | 1715.0          | 8.98                         | 8.98  | 8.97  | 8.97   |
| 132322                                | 1745.0          | 8.99                         | 8.98  | 8.98  | 8.98   |
| 132622                                | 1775.0          | 8.99                         | 8.97  | 8.97  | 8.97   |
| LTE Band 66, Channel Bandwidth 15MHz  |                 |                              |       |       |        |
| Channel                               | Frequency (MHz) | 99% Occupied Bandwidth (MHz) |       |       |        |
|                                       |                 | QPSK                         | 16QAM | 64QAM | 256QAM |
| 132047                                | 1717.5          | 13.46                        | 13.46 | 13.46 | 13.44  |
| 132322                                | 1745.0          | 13.46                        | 13.45 | 13.45 | 13.45  |
| 132597                                | 1772.5          | 13.45                        | 13.45 | 13.45 | 13.46  |

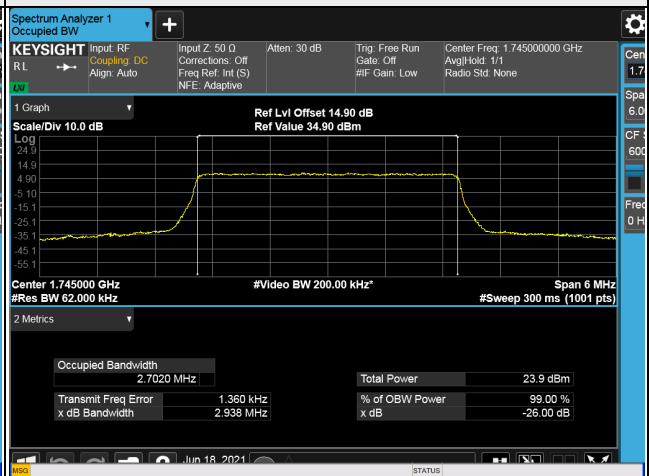
| LTE Band 66, Channel Bandwidth 20MHz |                 |                              |       |       |        |
|--------------------------------------|-----------------|------------------------------|-------|-------|--------|
| Channel                              | Frequency (MHz) | 99% Occupied Bandwidth (MHz) |       |       |        |
|                                      |                 | QPSK                         | 16QAM | 64QAM | 256QAM |
| 132072                               | 1720.0          | 17.97                        | 17.97 | 17.97 | 17.96  |
| 132322                               | 1745.0          | 17.95                        | 17.96 | 17.96 | 17.95  |
| 132572                               | 1770.0          | 17.95                        | 17.95 | 17.95 | 17.96  |

## Spectrum Plot of Worst Value

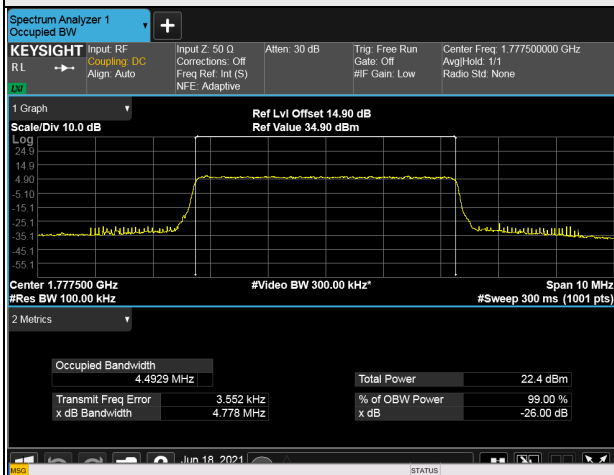
### 1.4MHz / 64QAM



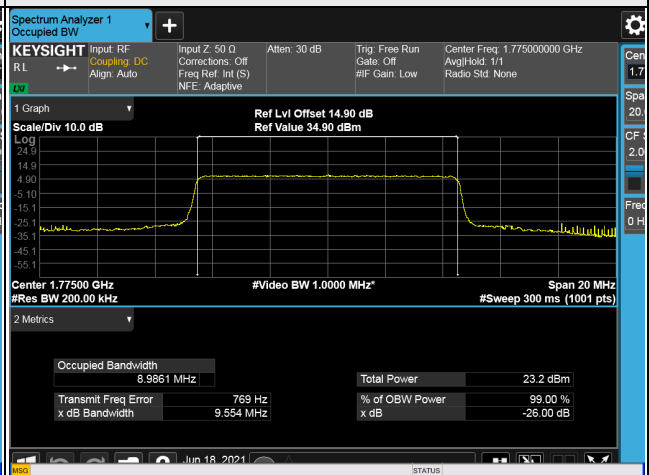
### 3MHz / QPSK



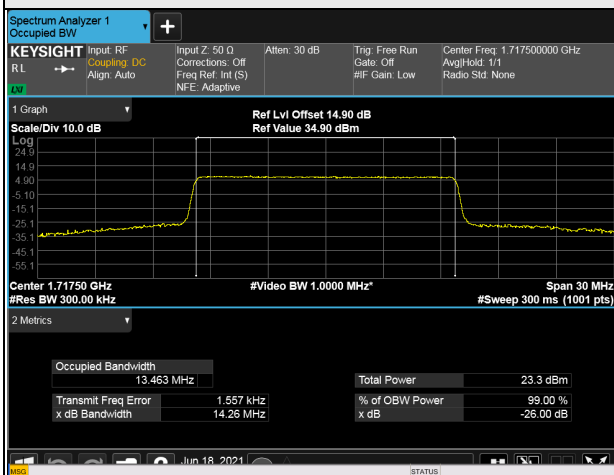
### 5MHz / 16QAM



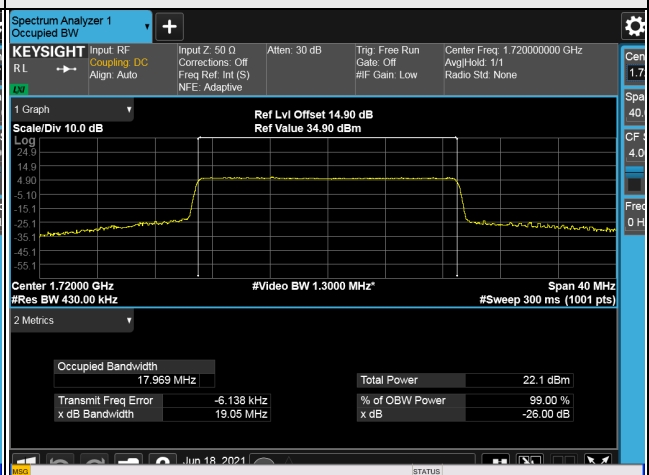
### 10MHz / QPSK



### 15MHz / QPSK



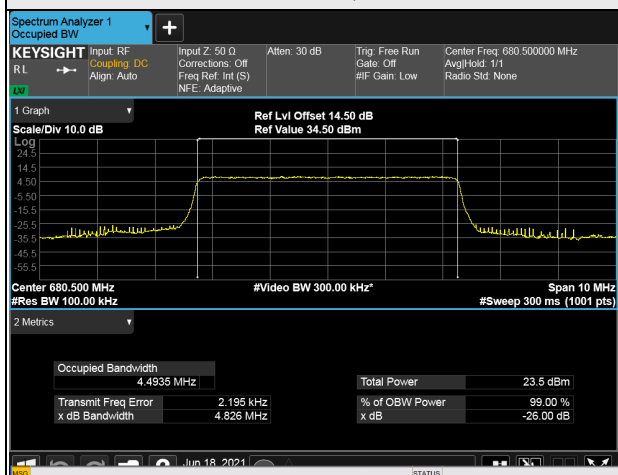
### 20MHz / 16QAM



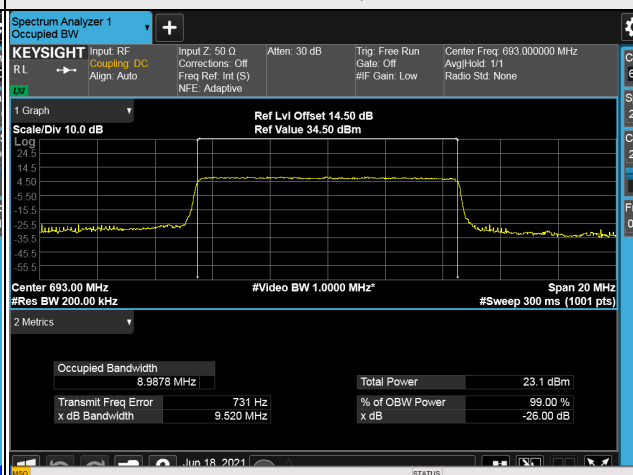
| LTE Band 71, Channel Bandwidth 5MHz  |                 |                              |       |       |        |
|--------------------------------------|-----------------|------------------------------|-------|-------|--------|
| Channel                              | Frequency (MHz) | 99% Occupied Bandwidth (MHz) |       |       |        |
|                                      |                 | QPSK                         | 16QAM | 64QAM | 256QAM |
| 133147                               | 665.5           | 4.48                         | 4.49  | 4.49  | 4.49   |
| 133297                               | 680.5           | 4.49                         | 4.49  | 4.49  | 4.49   |
| 133447                               | 695.5           | 4.49                         | 4.49  | 4.49  | 4.49   |
| LTE Band 71, Channel Bandwidth 10MHz |                 |                              |       |       |        |
| Channel                              | Frequency (MHz) | 99% Occupied Bandwidth (MHz) |       |       |        |
|                                      |                 | QPSK                         | 16QAM | 64QAM | 256QAM |
| 133172                               | 668.0           | 8.96                         | 8.96  | 8.95  | 8.96   |
| 133297                               | 680.5           | 8.97                         | 8.97  | 8.97  | 8.96   |
| 133422                               | 693.0           | 8.99                         | 8.97  | 8.96  | 8.95   |
| LTE Band 71, Channel Bandwidth 15MHz |                 |                              |       |       |        |
| Channel                              | Frequency (MHz) | 99% Occupied Bandwidth (MHz) |       |       |        |
|                                      |                 | QPSK                         | 16QAM | 64QAM | 256QAM |
| 133197                               | 670.5           | 13.42                        | 13.43 | 13.43 | 13.42  |
| 133297                               | 680.5           | 13.44                        | 13.44 | 13.44 | 13.43  |
| 133397                               | 690.5           | 13.44                        | 13.44 | 13.44 | 13.44  |
| LTE Band 71, Channel Bandwidth 20MHz |                 |                              |       |       |        |
| Channel                              | Frequency (MHz) | 99% Occupied Bandwidth (MHz) |       |       |        |
|                                      |                 | QPSK                         | 16QAM | 64QAM | 256QAM |
| 133222                               | 673.0           | 17.90                        | 17.90 | 17.91 | 17.88  |
| 133297                               | 680.5           | 17.91                        | 17.91 | 17.92 | 17.91  |
| 133372                               | 688.0           | 17.92                        | 17.92 | 17.91 | 17.91  |

## Spectrum Plot of Worst Value

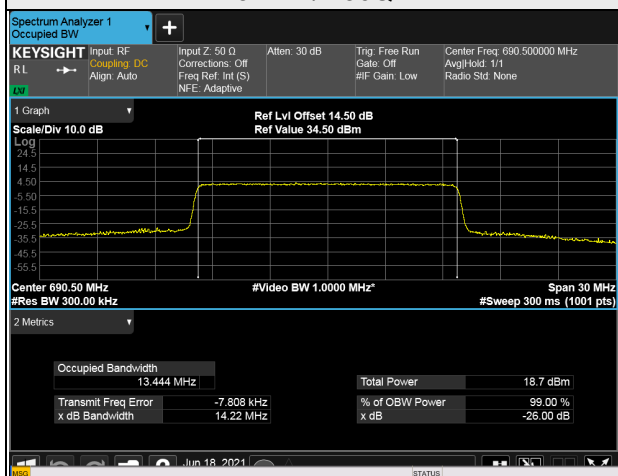
### 5MHz / QPSK



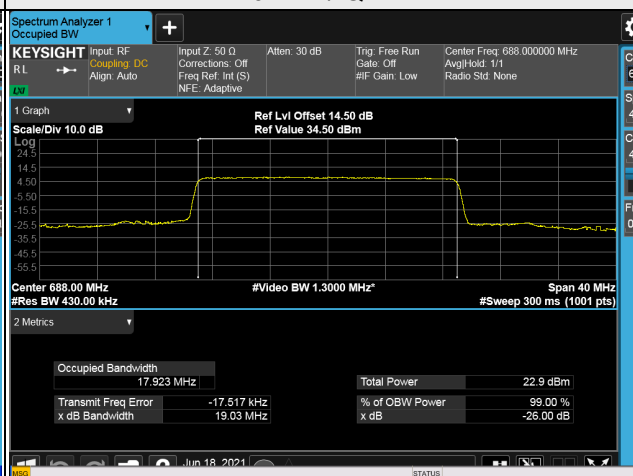
### 10MHz / QPSK



### 15MHz / 256QAM



### 20MHz / QPSK



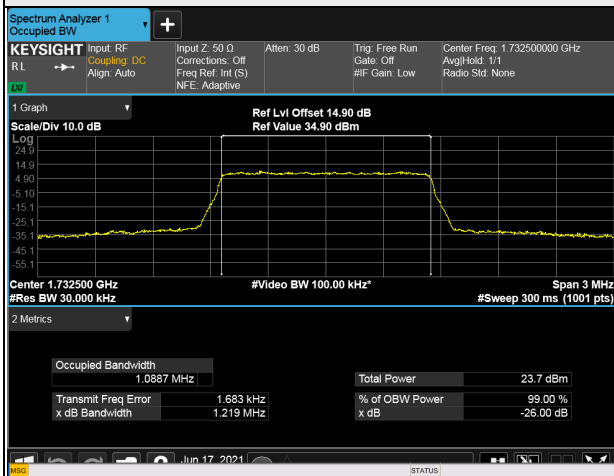
## 26dB Bandwidth

| LTE Band 4, Channel Bandwidth 1.4MHz |                 |                      |       |       |        |
|--------------------------------------|-----------------|----------------------|-------|-------|--------|
| Channel                              | Frequency (MHz) | 26dB Bandwidth (MHz) |       |       |        |
|                                      |                 | QPSK                 | 16QAM | 64QAM | 256QAM |
| 19957                                | 1710.7          | 1.22                 | 1.21  | 1.19  | 1.21   |
| 20175                                | 1732.5          | 1.22                 | 1.22  | 1.21  | 1.20   |
| 20393                                | 1754.3          | 1.22                 | 1.21  | 1.21  | 1.21   |
| LTE Band 4, Channel Bandwidth 3MHz   |                 |                      |       |       |        |
| Channel                              | Frequency (MHz) | 26dB Bandwidth (MHz) |       |       |        |
|                                      |                 | QPSK                 | 16QAM | 64QAM | 256QAM |
| 19965                                | 1711.5          | 2.92                 | 2.94  | 2.93  | 2.90   |
| 20175                                | 1732.5          | 2.92                 | 2.93  | 2.91  | 2.91   |
| 20385                                | 1753.5          | 2.91                 | 2.93  | 2.92  | 2.91   |
| LTE Band 4, Channel Bandwidth 5MHz   |                 |                      |       |       |        |
| Channel                              | Frequency (MHz) | 26dB Bandwidth (MHz) |       |       |        |
|                                      |                 | QPSK                 | 16QAM | 64QAM | 256QAM |
| 19975                                | 1712.5          | 4.81                 | 4.80  | 4.80  | 4.79   |
| 20175                                | 1732.5          | 4.83                 | 4.81  | 4.81  | 4.81   |
| 20375                                | 1752.5          | 4.80                 | 4.81  | 4.81  | 4.81   |
| LTE Band 4, Channel Bandwidth 10MHz  |                 |                      |       |       |        |
| Channel                              | Frequency (MHz) | 26dB Bandwidth (MHz) |       |       |        |
|                                      |                 | QPSK                 | 16QAM | 64QAM | 256QAM |
| 20000                                | 1715.0          | 9.52                 | 9.53  | 9.52  | 9.52   |
| 20175                                | 1732.5          | 9.52                 | 9.53  | 9.52  | 9.53   |
| 20350                                | 1750.0          | 9.53                 | 9.53  | 9.53  | 9.53   |
| LTE Band 4, Channel Bandwidth 15MHz  |                 |                      |       |       |        |
| Channel                              | Frequency (MHz) | 26dB Bandwidth (MHz) |       |       |        |
|                                      |                 | QPSK                 | 16QAM | 64QAM | 256QAM |
| 20025                                | 1717.5          | 14.27                | 14.24 | 14.26 | 13.91  |
| 20175                                | 1732.5          | 14.28                | 14.25 | 14.26 | 13.94  |
| 20325                                | 1747.5          | 14.28                | 14.27 | 14.26 | 14.27  |

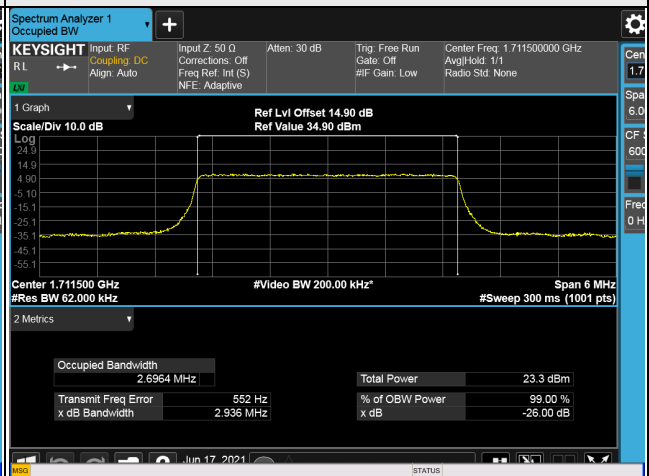
| LTE Band 4, Channel Bandwidth 20MHz |                 |                      |       |       |        |
|-------------------------------------|-----------------|----------------------|-------|-------|--------|
| Channel                             | Frequency (MHz) | 26dB Bandwidth (MHz) |       |       |        |
|                                     |                 | QPSK                 | 16QAM | 64QAM | 256QAM |
| 20050                               | 1720.0          | 19.08                | 19.06 | 19.05 | 19.05  |
| 20175                               | 1732.5          | 19.05                | 19.04 | 19.03 | 19.03  |
| 20300                               | 1745.0          | 19.05                | 19.07 | 19.07 | 19.05  |

## Spectrum Plot of Worst Value

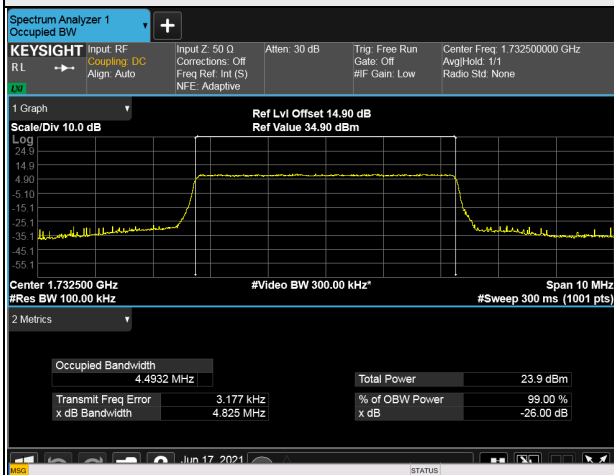
### 1.4MHz / 16QAM



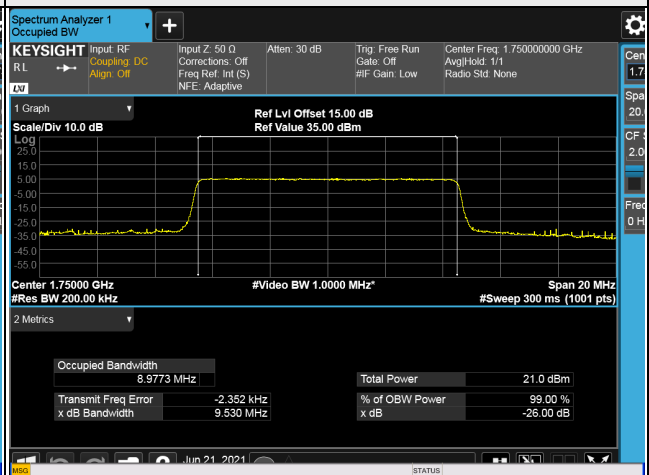
### 3MHz / 16QAM



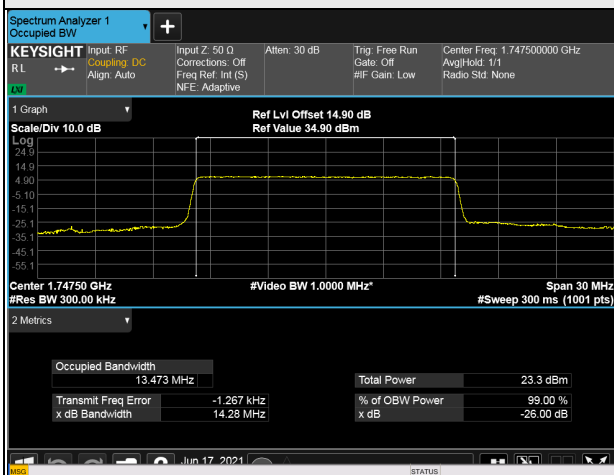
### 5MHz / QPSK



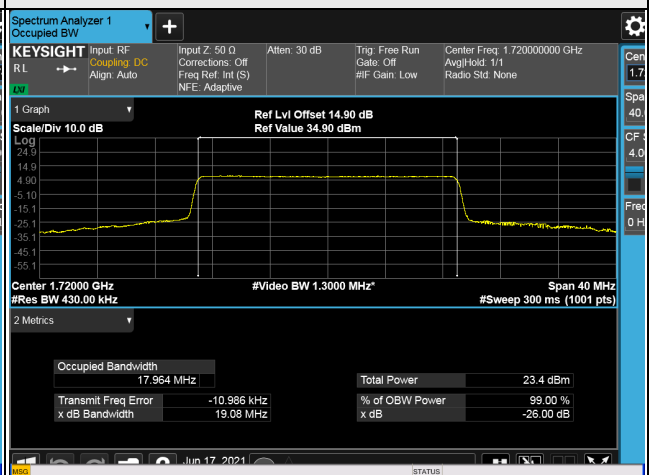
### 10MHz / 64QAM



### 15MHz / QPSK



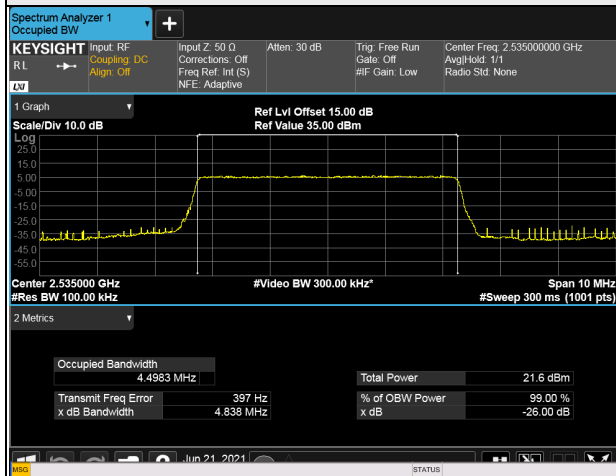
### 20MHz / QPSK



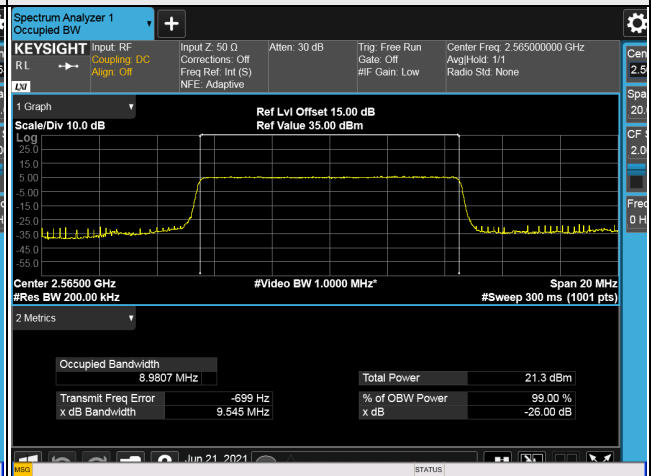
| LTE Band 7, Channel Bandwidth 5MHz  |                 |                      |       |       |        |
|-------------------------------------|-----------------|----------------------|-------|-------|--------|
| Channel                             | Frequency (MHz) | 26dB Bandwidth (MHz) |       |       |        |
|                                     |                 | QPSK                 | 16QAM | 64QAM | 256QAM |
| 20775                               | 2502.5          | 4.80                 | 4.81  | 4.82  | 4.82   |
| 21100                               | 2535.0          | 4.81                 | 4.80  | 4.84  | 4.69   |
| 21425                               | 2567.5          | 4.82                 | 4.81  | 4.84  | 4.72   |
| LTE Band 7, Channel Bandwidth 10MHz |                 |                      |       |       |        |
| Channel                             | Frequency (MHz) | 26dB Bandwidth (MHz) |       |       |        |
|                                     |                 | QPSK                 | 16QAM | 64QAM | 256QAM |
| 20800                               | 2505.0          | 9.52                 | 9.53  | 9.53  | 9.53   |
| 21100                               | 2535.0          | 9.52                 | 9.51  | 9.52  | 9.31   |
| 21400                               | 2565.0          | 9.51                 | 9.52  | 9.55  | 9.37   |
| LTE Band 7, Channel Bandwidth 15MHz |                 |                      |       |       |        |
| Channel                             | Frequency (MHz) | 26dB Bandwidth (MHz) |       |       |        |
|                                     |                 | QPSK                 | 16QAM | 64QAM | 256QAM |
| 20825                               | 2507.5          | 14.26                | 14.28 | 14.26 | 13.92  |
| 21100                               | 2535.0          | 14.24                | 14.26 | 14.22 | 14.25  |
| 21375                               | 2562.5          | 14.28                | 14.26 | 14.26 | 14.21  |
| LTE Band 7, Channel Bandwidth 20MHz |                 |                      |       |       |        |
| Channel                             | Frequency (MHz) | 26dB Bandwidth (MHz) |       |       |        |
|                                     |                 | QPSK                 | 16QAM | 64QAM | 256QAM |
| 20850                               | 2510.0          | 19.04                | 19.05 | 19.06 | 19.05  |
| 21100                               | 2535.0          | 19.04                | 19.03 | 19.04 | 19.01  |
| 21350                               | 2560.0          | 19.05                | 19.06 | 19.05 | 19.06  |

## Spectrum Plot of Worst Value

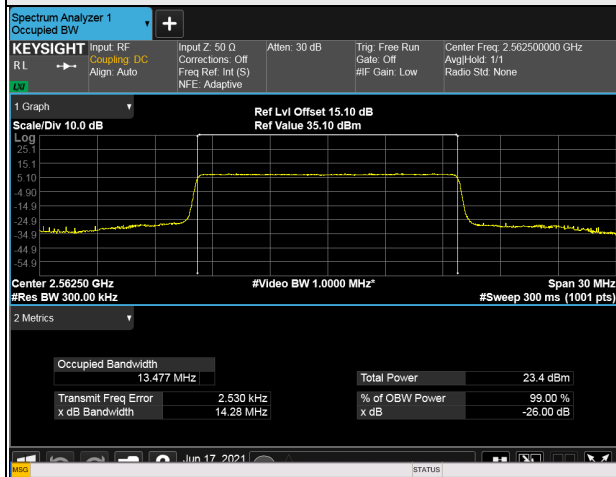
5MHz / 64QAM



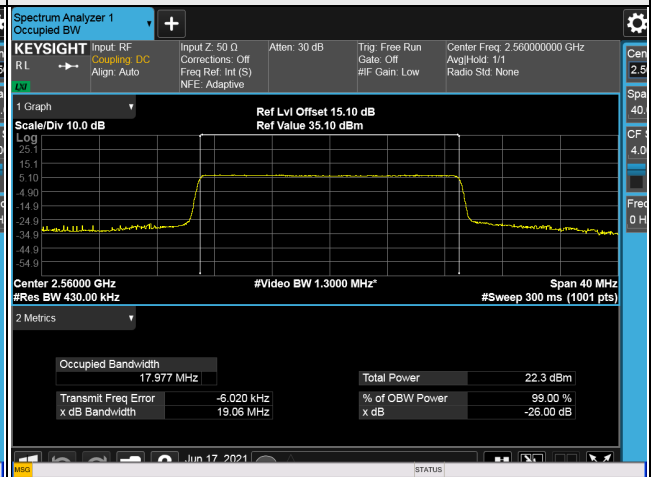
10MHz / 64QAM



15MHz / QPSK



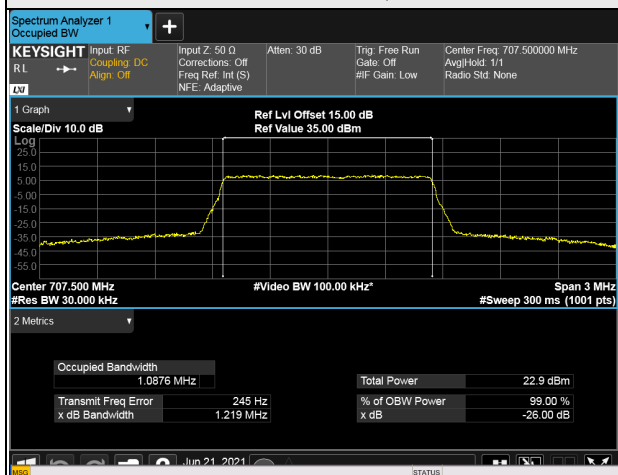
20MHz / 16QAM



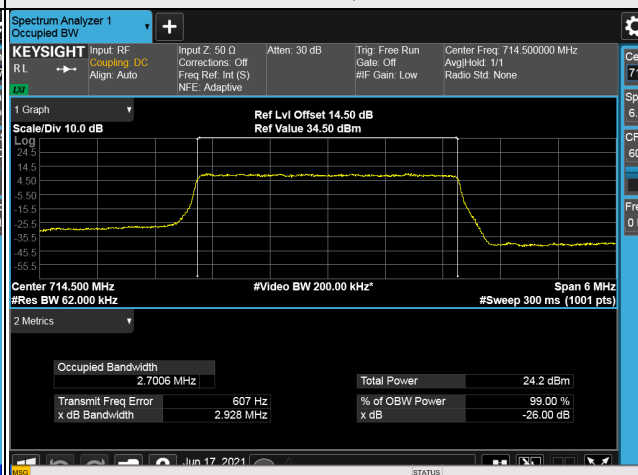
| LTE Band 12, Channel Bandwidth 1.4MHz |                 |                      |       |       |        |
|---------------------------------------|-----------------|----------------------|-------|-------|--------|
| Channel                               | Frequency (MHz) | 26dB Bandwidth (MHz) |       |       |        |
|                                       |                 | QPSK                 | 16QAM | 64QAM | 256QAM |
| 23017                                 | 699.7           | 1.22                 | 1.22  | 1.21  | 1.17   |
| 23095                                 | 707.5           | 1.21                 | 1.21  | 1.22  | 1.17   |
| 23173                                 | 715.3           | 1.21                 | 1.22  | 1.22  | 1.21   |
| LTE Band 12, Channel Bandwidth 3MHz   |                 |                      |       |       |        |
| Channel                               | Frequency (MHz) | 26dB Bandwidth (MHz) |       |       |        |
|                                       |                 | QPSK                 | 16QAM | 64QAM | 256QAM |
| 23025                                 | 700.5           | 2.92                 | 2.93  | 2.90  | 2.85   |
| 23095                                 | 707.5           | 2.92                 | 2.92  | 2.91  | 2.82   |
| 23165                                 | 714.5           | 2.93                 | 2.92  | 2.89  | 2.84   |
| LTE Band 12, Channel Bandwidth 5MHz   |                 |                      |       |       |        |
| Channel                               | Frequency (MHz) | 26dB Bandwidth (MHz) |       |       |        |
|                                       |                 | QPSK                 | 16QAM | 64QAM | 256QAM |
| 23035                                 | 701.5           | 4.81                 | 4.80  | 4.83  | 4.82   |
| 23095                                 | 707.5           | 4.83                 | 4.81  | 4.81  | 4.81   |
| 23155                                 | 713.5           | 4.80                 | 4.80  | 4.80  | 4.81   |
| LTE Band 12, Channel Bandwidth 10MHz  |                 |                      |       |       |        |
| Channel                               | Frequency (MHz) | 26dB Bandwidth (MHz) |       |       |        |
|                                       |                 | QPSK                 | 16QAM | 64QAM | 256QAM |
| 23060                                 | 704.0           | 9.50                 | 9.50  | 9.51  | 9.50   |
| 23095                                 | 707.5           | 9.52                 | 9.52  | 9.57  | 9.31   |
| 23130                                 | 711.0           | 9.50                 | 9.50  | 9.50  | 9.34   |

## Spectrum Plot of Worst Value

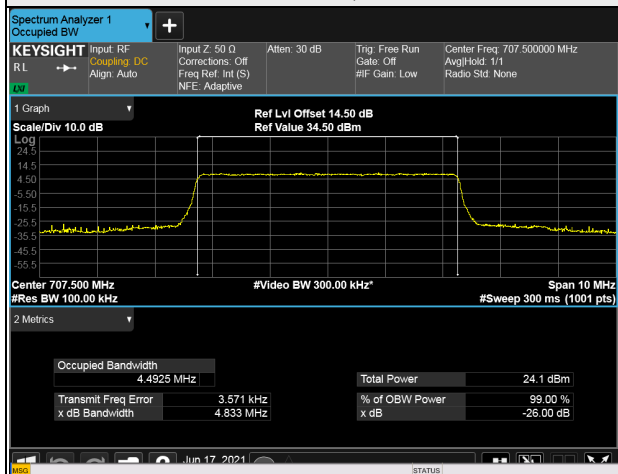
### 1.4MHz / 64QAM



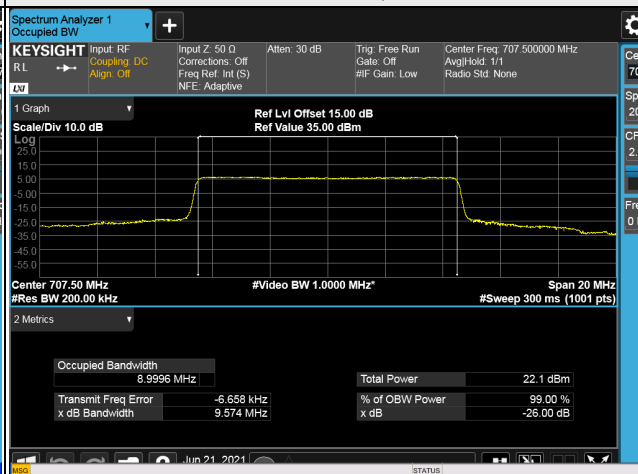
### 3MHz / QPSK



### 5MHz / QPSK



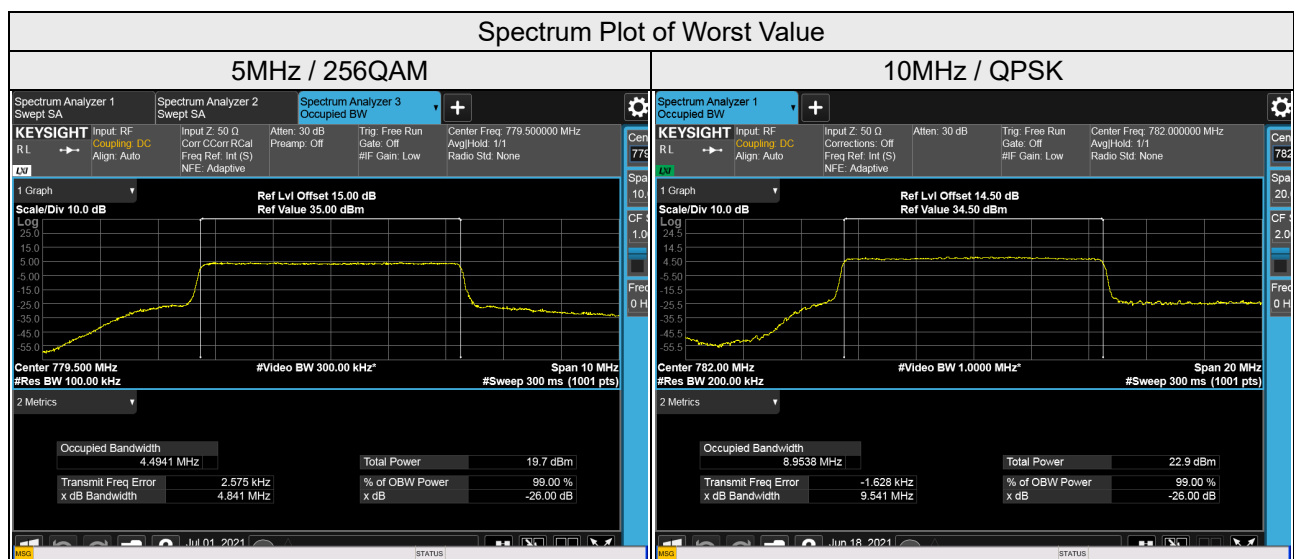
### 10MHz / 64QAM



| LTE Band 13, Channel Bandwidth 5MHz |                 |                      |       |       |        |
|-------------------------------------|-----------------|----------------------|-------|-------|--------|
| Channel                             | Frequency (MHz) | 26dB Bandwidth (MHz) |       |       |        |
|                                     |                 | QPSK                 | 16QAM | 64QAM | 256QAM |
| 23205                               | 779.5           | 4.82                 | 4.82  | 4.84  | 4.84   |
| 23230                               | 782.0           | 4.82                 | 4.81  | 4.81  | 4.82   |
| 23255                               | 784.5           | 4.78                 | 4.81  | 4.84  | 4.82   |

| LTE Band 13, Channel Bandwidth 10MHz |                 |                      |       |       |        |
|--------------------------------------|-----------------|----------------------|-------|-------|--------|
| Channel                              | Frequency (MHz) | 26dB Bandwidth (MHz) |       |       |        |
|                                      |                 | QPSK                 | 16QAM | 64QAM | 256QAM |
| 23230                                | 782.0           | 9.54                 | 9.51  | 9.53  | 9.52   |

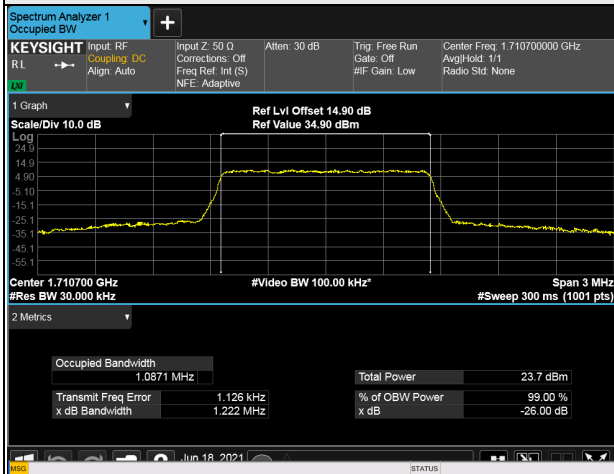


| LTE Band 66, Channel Bandwidth 1.4MHz |                 |                      |       |       |        |
|---------------------------------------|-----------------|----------------------|-------|-------|--------|
| Channel                               | Frequency (MHz) | 26dB Bandwidth (MHz) |       |       |        |
|                                       |                 | QPSK                 | 16QAM | 64QAM | 256QAM |
| 131979                                | 1710.7          | 1.22                 | 1.22  | 1.22  | 1.21   |
| 132322                                | 1745.0          | 1.21                 | 1.21  | 1.21  | 1.21   |
| 132665                                | 1779.3          | 1.21                 | 1.21  | 1.22  | 1.21   |
| LTE Band 66, Channel Bandwidth 3MHz   |                 |                      |       |       |        |
| Channel                               | Frequency (MHz) | 26dB Bandwidth (MHz) |       |       |        |
|                                       |                 | QPSK                 | 16QAM | 64QAM | 256QAM |
| 131987                                | 1711.5          | 2.95                 | 2.91  | 2.90  | 2.91   |
| 132322                                | 1745.0          | 2.94                 | 2.92  | 2.91  | 2.91   |
| 132657                                | 1778.5          | 2.92                 | 2.91  | 2.91  | 2.91   |
| LTE Band 66, Channel Bandwidth 5MHz   |                 |                      |       |       |        |
| Channel                               | Frequency (MHz) | 26dB Bandwidth (MHz) |       |       |        |
|                                       |                 | QPSK                 | 16QAM | 64QAM | 256QAM |
| 131997                                | 1712.5          | 4.84                 | 4.82  | 4.82  | 4.82   |
| 132322                                | 1745.0          | 4.82                 | 4.82  | 4.81  | 4.82   |
| 132647                                | 1777.5          | 4.82                 | 4.78  | 4.81  | 4.82   |
| LTE Band 66, Channel Bandwidth 10MHz  |                 |                      |       |       |        |
| Channel                               | Frequency (MHz) | 26dB Bandwidth (MHz) |       |       |        |
|                                       |                 | QPSK                 | 16QAM | 64QAM | 256QAM |
| 132022                                | 1715.0          | 9.53                 | 9.55  | 9.49  | 9.51   |
| 132322                                | 1745.0          | 9.50                 | 9.54  | 9.52  | 9.51   |
| 132622                                | 1775.0          | 9.55                 | 9.52  | 9.53  | 9.51   |
| LTE Band 66, Channel Bandwidth 15MHz  |                 |                      |       |       |        |
| Channel                               | Frequency (MHz) | 26dB Bandwidth (MHz) |       |       |        |
|                                       |                 | QPSK                 | 16QAM | 64QAM | 256QAM |
| 132047                                | 1717.5          | 14.26                | 14.24 | 14.25 | 14.22  |
| 132322                                | 1745.0          | 14.25                | 14.23 | 14.24 | 14.22  |
| 132597                                | 1772.5          | 14.23                | 14.23 | 14.26 | 14.23  |

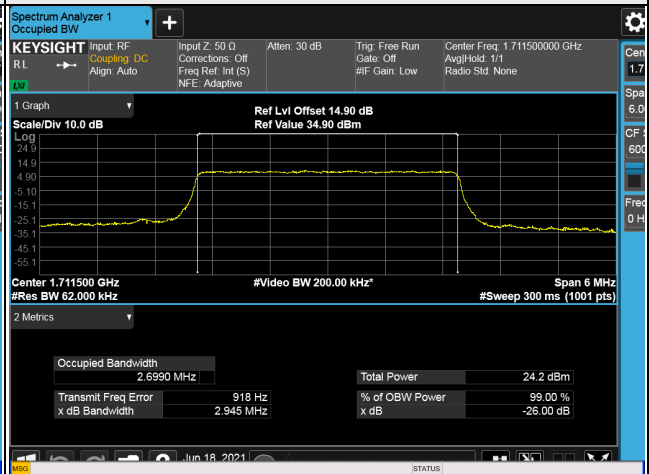
| LTE Band 66, Channel Bandwidth 20MHz |                 |                      |       |       |        |
|--------------------------------------|-----------------|----------------------|-------|-------|--------|
| Channel                              | Frequency (MHz) | 26dB Bandwidth (MHz) |       |       |        |
|                                      |                 | QPSK                 | 16QAM | 64QAM | 256QAM |
| 132072                               | 1720.0          | 19.10                | 19.05 | 19.05 | 19.06  |
| 132322                               | 1745.0          | 19.03                | 19.04 | 19.03 | 19.02  |
| 132572                               | 1770.0          | 19.04                | 19.03 | 19.06 | 19.04  |

## Spectrum Plot of Worst Value

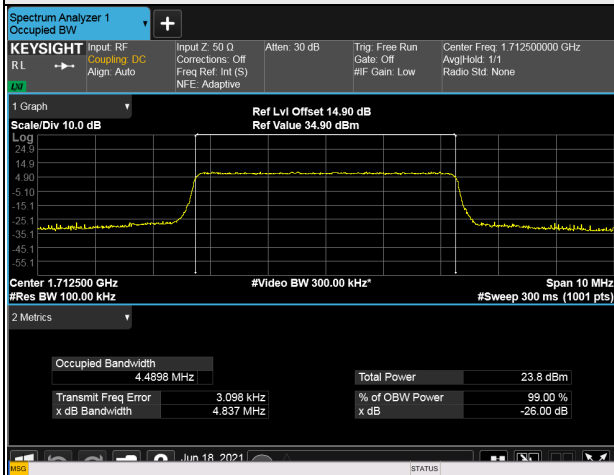
### 1.4MHz / 16QAM



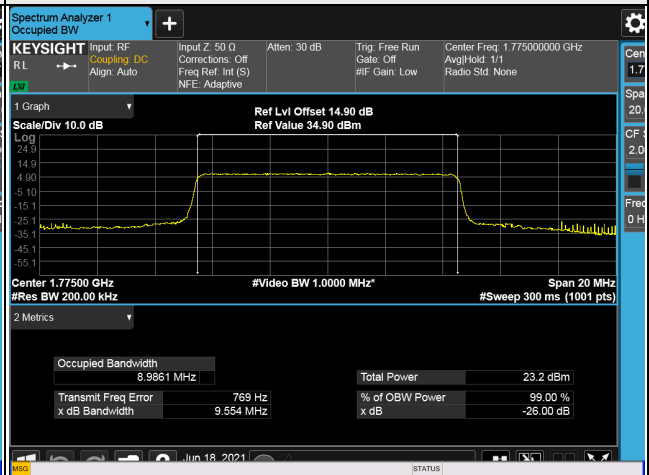
### 3MHz / QPSK



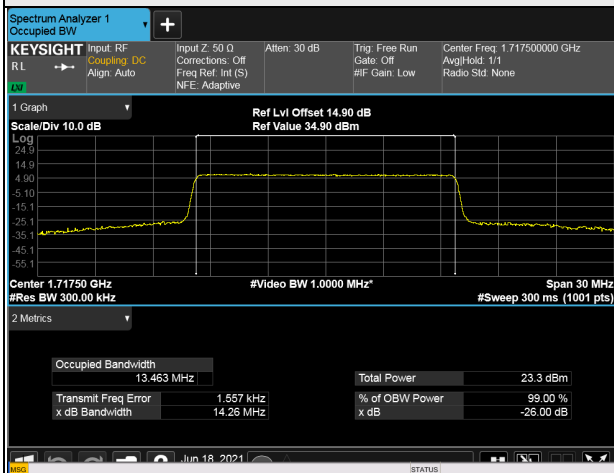
### 5MHz / QPSK



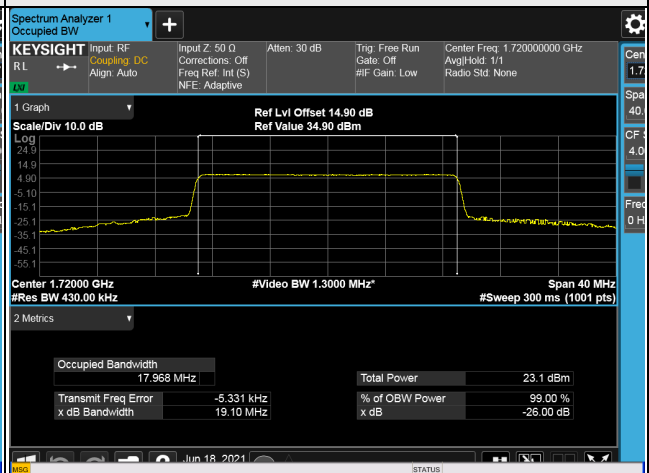
### 10MHz / QPSK



### 15MHz / QPSK



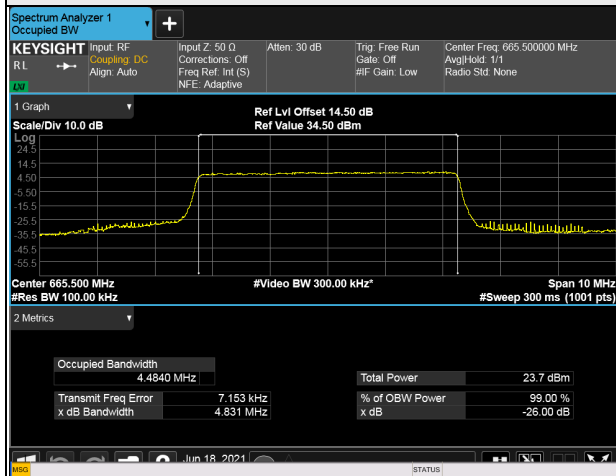
### 20MHz / QPSK



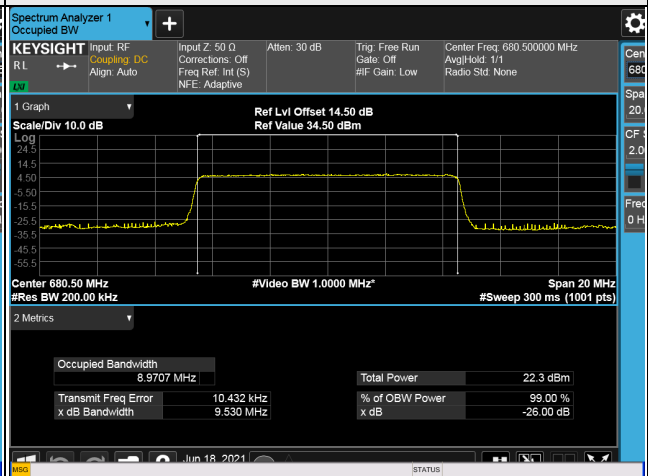
| LTE Band 71, Channel Bandwidth 5MHz  |                 |                      |       |       |        |
|--------------------------------------|-----------------|----------------------|-------|-------|--------|
| Channel                              | Frequency (MHz) | 26dB Bandwidth (MHz) |       |       |        |
|                                      |                 | QPSK                 | 16QAM | 64QAM | 256QAM |
| 133147                               | 665.5           | 4.83                 | 4.79  | 4.80  | 4.82   |
| 133297                               | 680.5           | 4.83                 | 4.82  | 4.82  | 4.80   |
| 133447                               | 695.5           | 4.83                 | 4.80  | 4.80  | 4.80   |
| LTE Band 71, Channel Bandwidth 10MHz |                 |                      |       |       |        |
| Channel                              | Frequency (MHz) | 26dB Bandwidth (MHz) |       |       |        |
|                                      |                 | QPSK                 | 16QAM | 64QAM | 256QAM |
| 133172                               | 668.0           | 9.51                 | 9.52  | 9.52  | 9.47   |
| 133297                               | 680.5           | 9.51                 | 9.53  | 9.50  | 9.47   |
| 133422                               | 693.0           | 9.52                 | 9.52  | 9.52  | 9.50   |
| LTE Band 71, Channel Bandwidth 15MHz |                 |                      |       |       |        |
| Channel                              | Frequency (MHz) | 26dB Bandwidth (MHz) |       |       |        |
|                                      |                 | QPSK                 | 16QAM | 64QAM | 256QAM |
| 133197                               | 670.5           | 14.24                | 14.23 | 14.24 | 14.24  |
| 133297                               | 680.5           | 14.25                | 14.23 | 14.26 | 14.23  |
| 133397                               | 690.5           | 14.24                | 14.24 | 14.23 | 14.22  |
| LTE Band 71, Channel Bandwidth 20MHz |                 |                      |       |       |        |
| Channel                              | Frequency (MHz) | 26dB Bandwidth (MHz) |       |       |        |
|                                      |                 | QPSK                 | 16QAM | 64QAM | 256QAM |
| 133222                               | 673.0           | 19.02                | 19.04 | 19.03 | 19.01  |
| 133297                               | 680.5           | 19.02                | 19.03 | 19.01 | 19.03  |
| 133372                               | 688.0           | 19.03                | 19.01 | 19.02 | 19.01  |

## Spectrum Plot of Worst Value

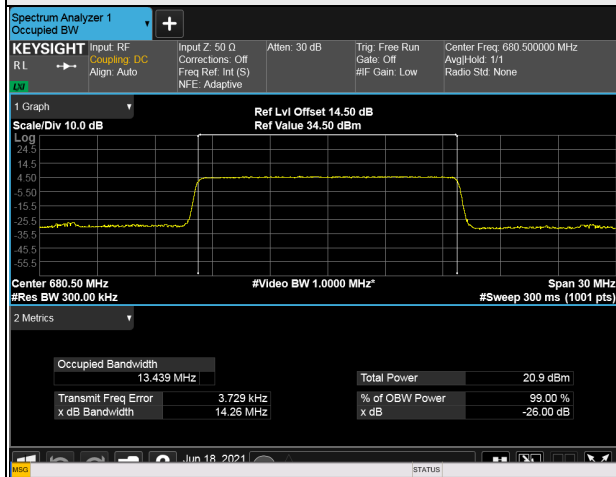
### 5MHz / QPSK



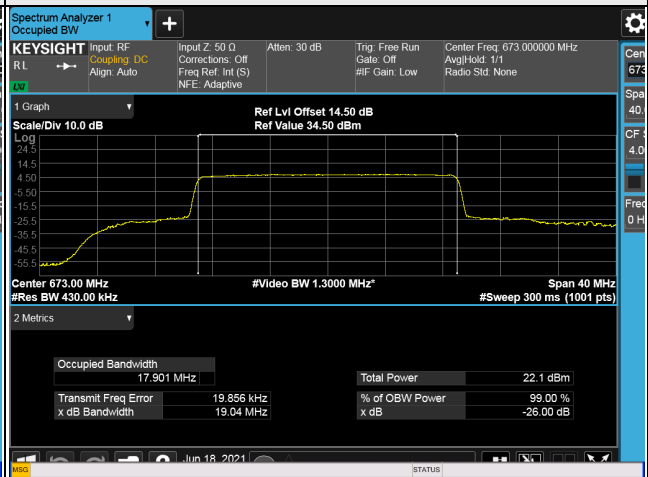
### 10MHz / 16QAM



### 15MHz / 64QAM



### 20MHz / 16QAM



## 4.5 Channel Edge / Out-of-Band Emission Measurement

### 4.5.1 Limits of Channel Edge / Out-of-Band Emission Measurement

For LTE Band 4, 66:

According to FCC 27.53(h), for operations in the 1695-1710MHz, 1710-1755MHz, 1755-1780 MHz, 1915-1920MHz, 1995-2000 MHz, 2000-2020MHz, 2110-2155MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log (P)$  dB. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

For LTE Band 7:

According to FCC 27.53(m)(4) regulations, any transmit power of any emission outside of the channel edge must be attenuated below the transmitting power (P) by a factor shall be not less than  $40 + 10 \log (P)$  dB on all frequencies between the channel edge and 5 megahertz from the channel edge,  $43 + 10 \log (P)$  dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and  $55 + 10 \log (P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth. In addition, the attenuation factor shall not be less that  $43 + 10 \log (P)$  dB on all frequencies between 2490.5MHz and 2496 MHz and  $55 + 10 \log (P)$  dB at or below 2490.5MHz. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed, except when the 1 megahertz band is 2495-2496 MHz, in which case a resolution bandwidth of at least one percent may be employed.

For LTE Band 12, 71:

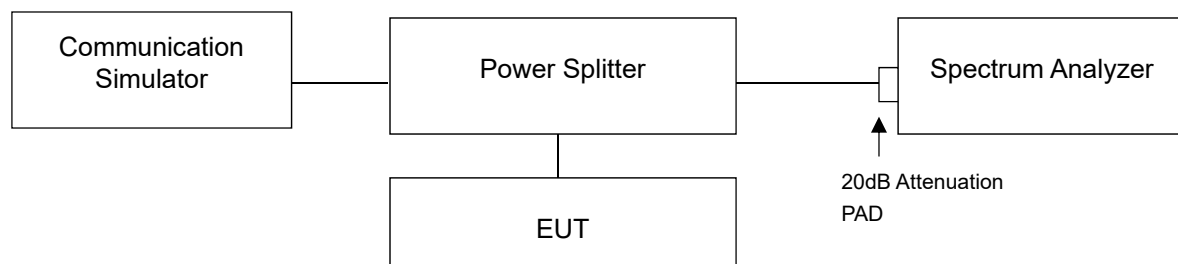
According to FCC 27.53(g), for operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least  $43 + 10 \log (P)$  dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

For LTE Band 13:

According to FCC 27.53(c)(2), for on any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

According to 27.53(c)(4), on all frequencies between 763-775MHz and 793-805MHz, by a factor not less than  $65 + 10 \log (P)$  dB in a 6.25 kHz band segment, for mobile and portable stations

### 4.5.2 Test Setup

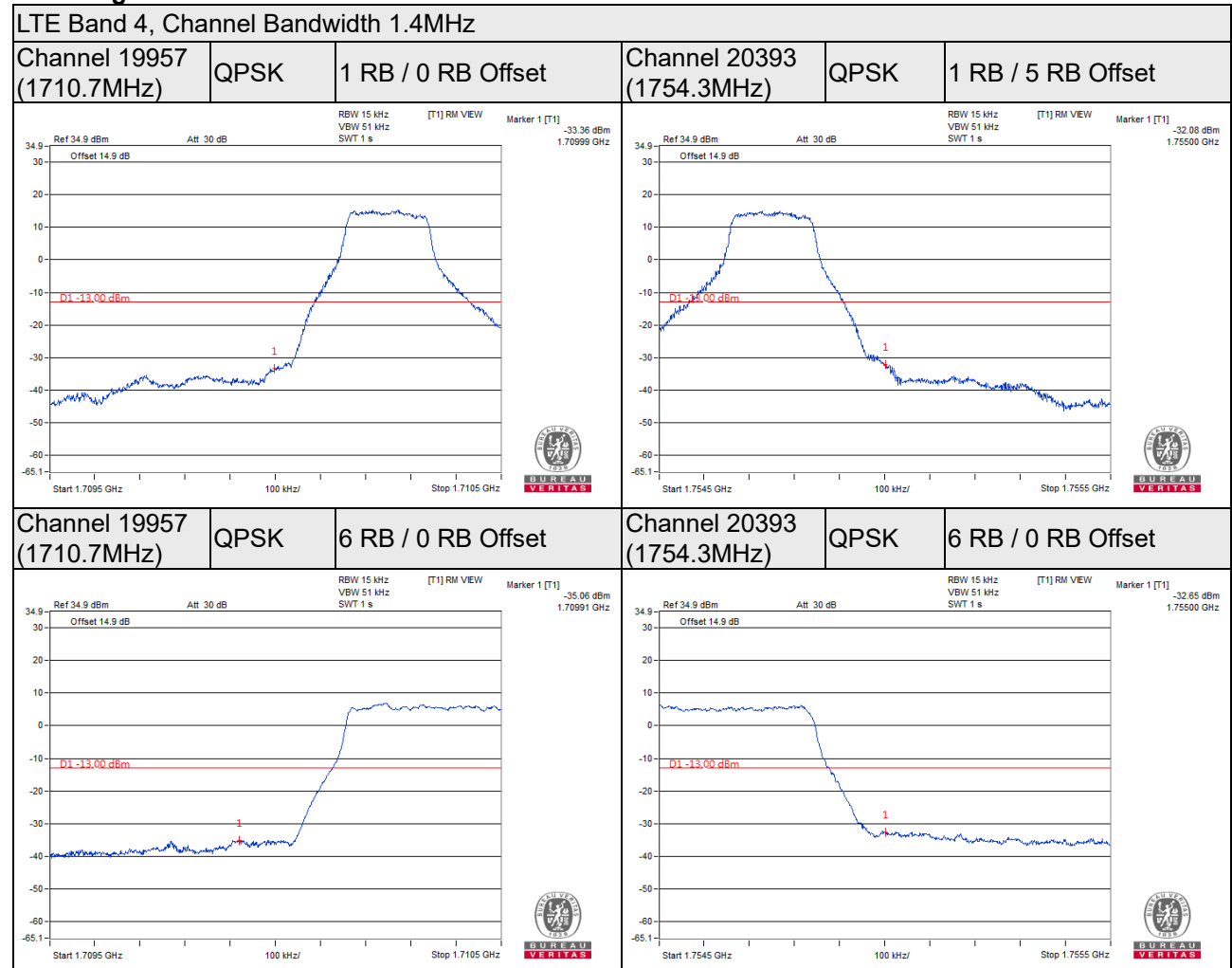


### 4.5.3 Test Procedures

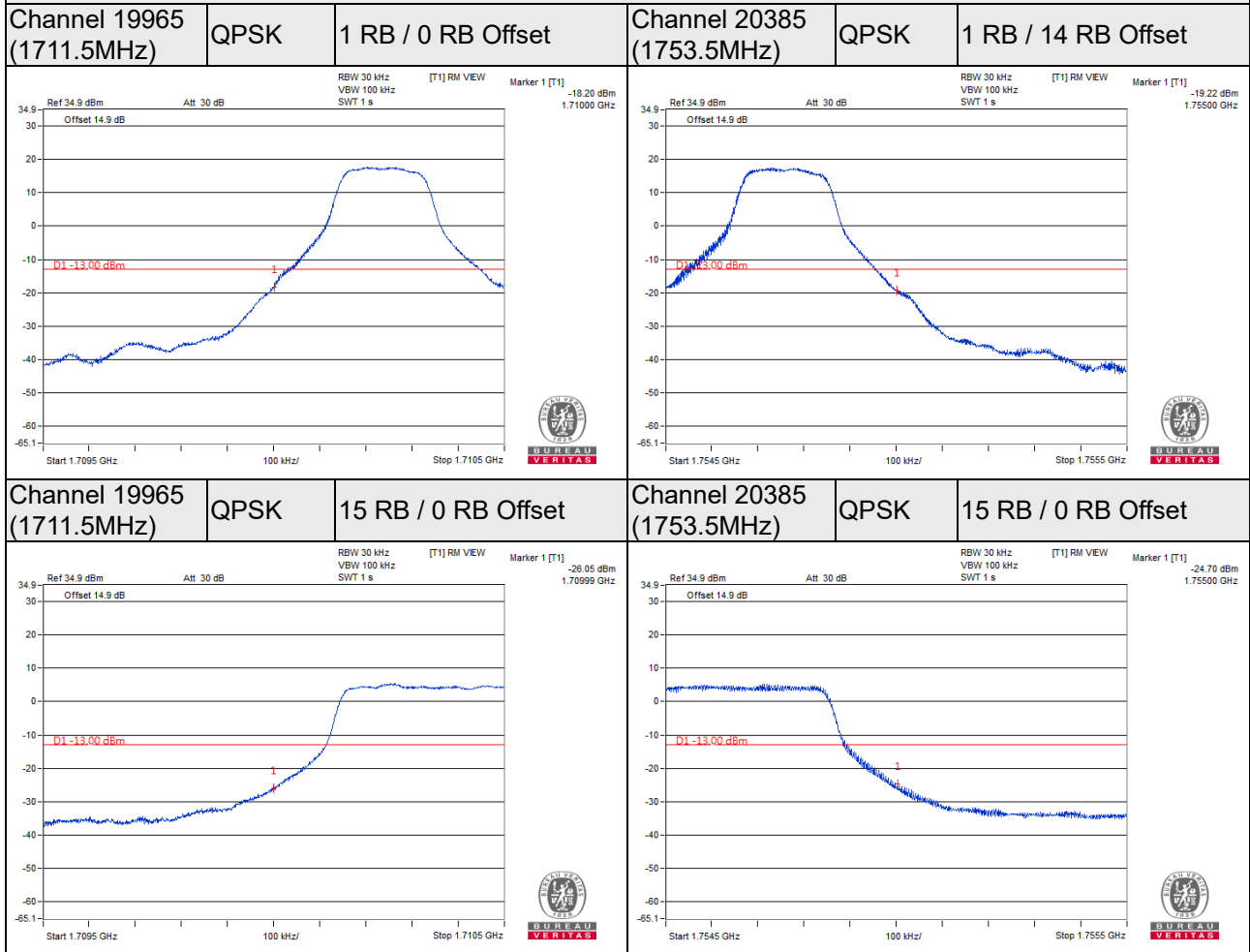
- The EUT was set up for the rated peak power. The power was measured with Spectrum Analyzer. All measurements were done at 2 channels: low and high operational frequency range.
- Measurement refer to ANSI C63.26 section 5.7.2 and FCC Part 27 section 27.53.
- Record the max trace plot into the test report.

### 4.5.4 Test Results

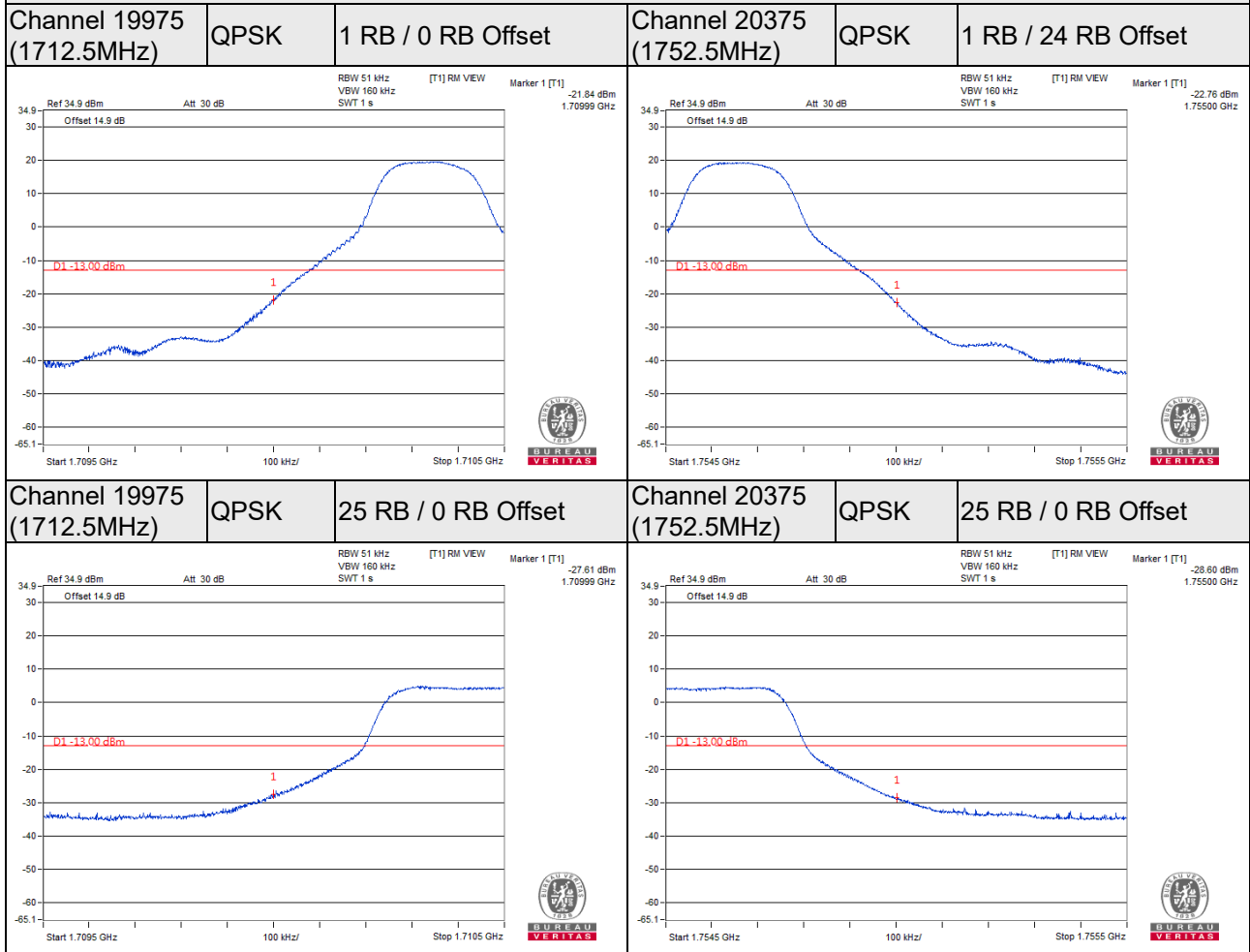
#### Band Edge



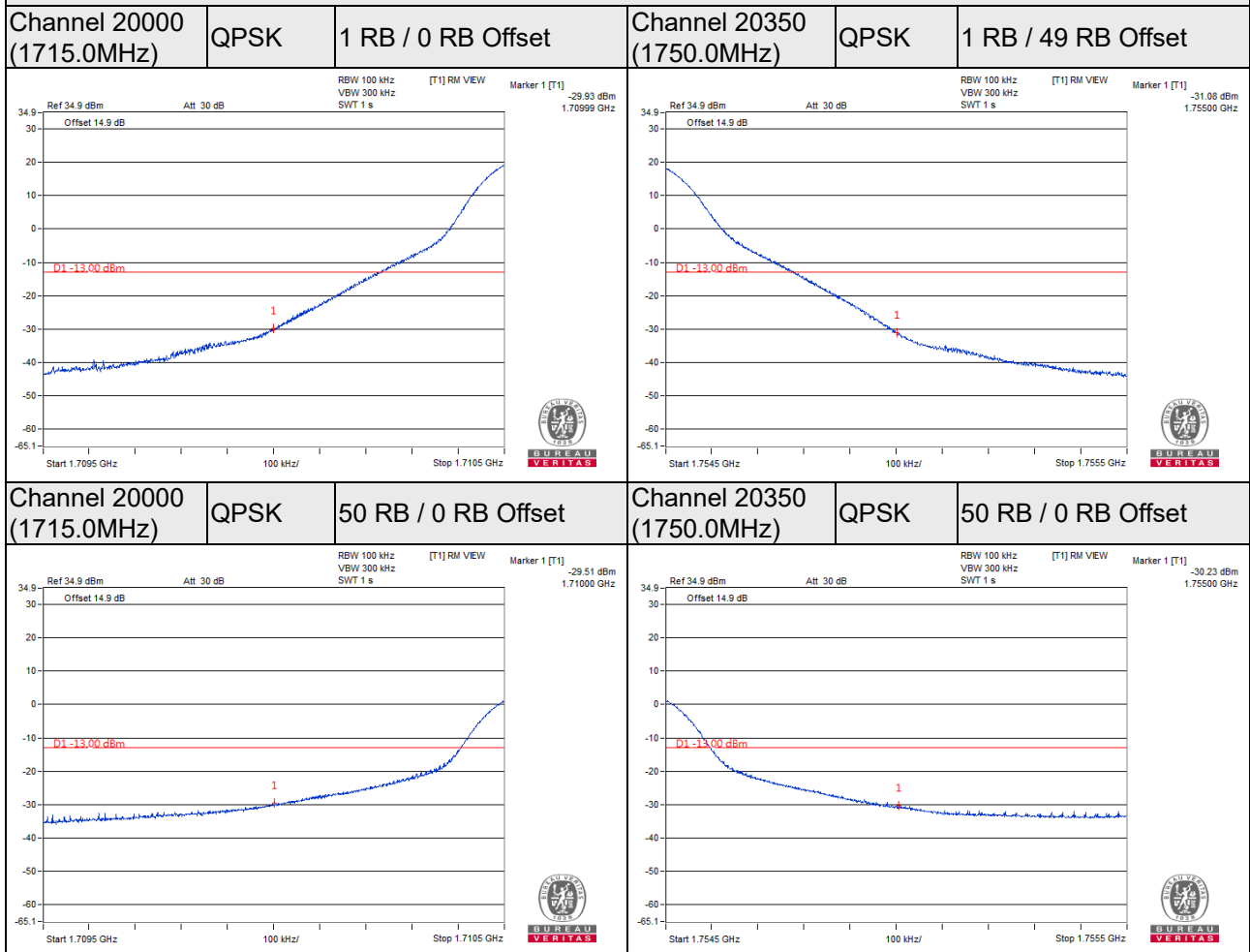
# LTE Band 4, Channel Bandwidth 3MHz



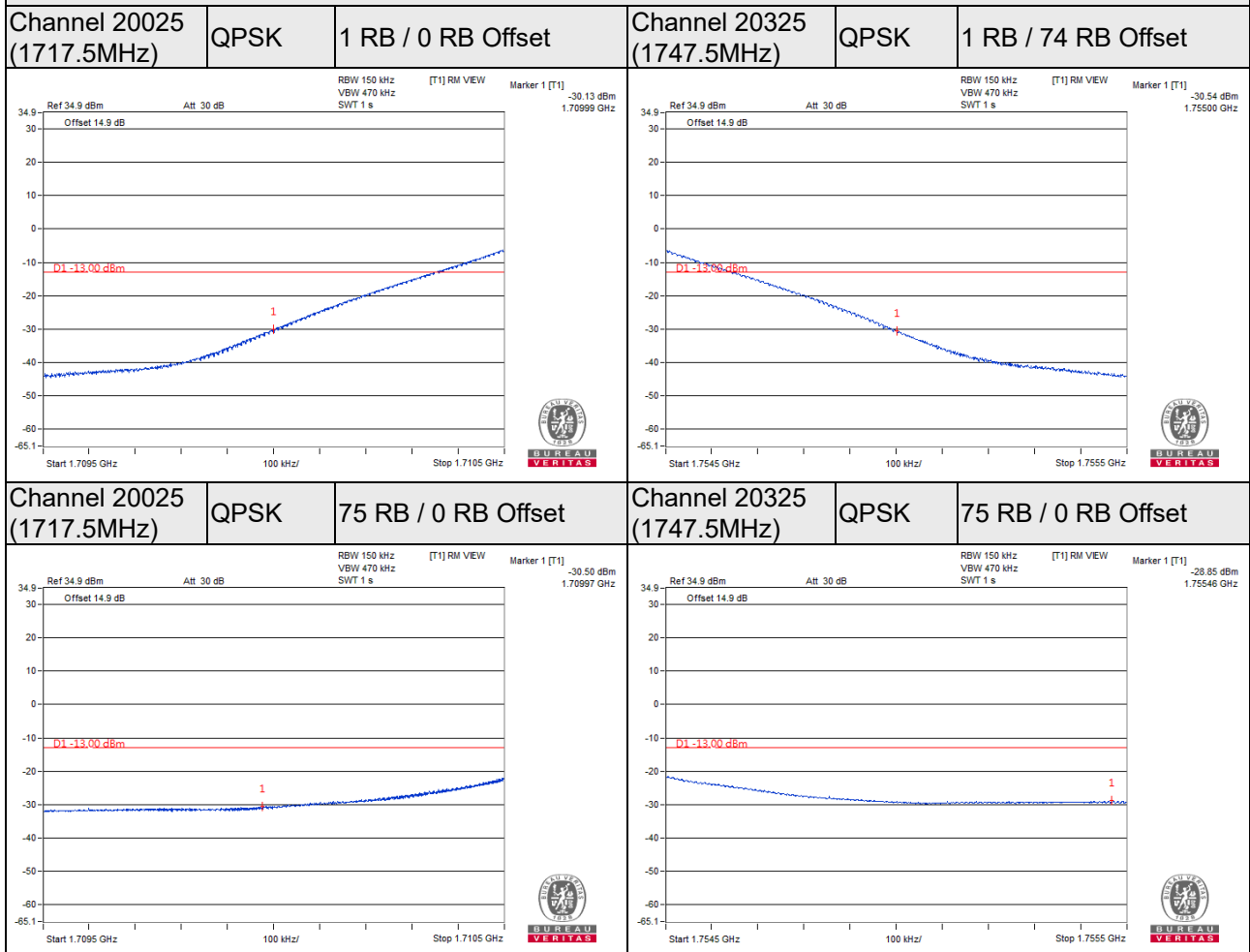
# LTE Band 4, Channel Bandwidth 5MHz



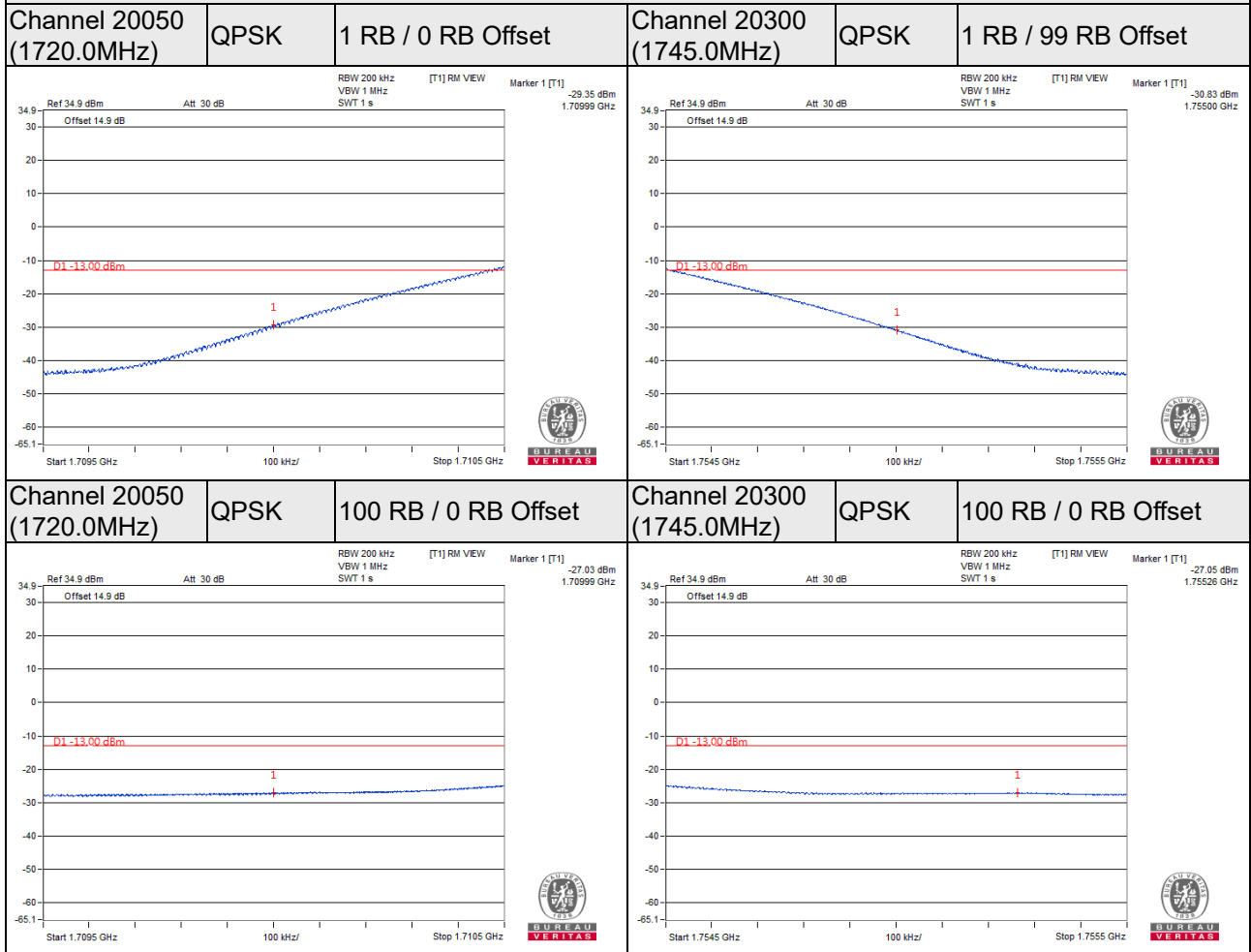
# LTE Band 4, Channel Bandwidth 10MHz



# LTE Band 4, Channel Bandwidth 15MHz



# LTE Band 4, Channel Bandwidth 20MHz



## Out-of-Band Emission

LTE Band 7, Channel Bandwidth 5MHz

Channel 20775  
(2502.5MHz)

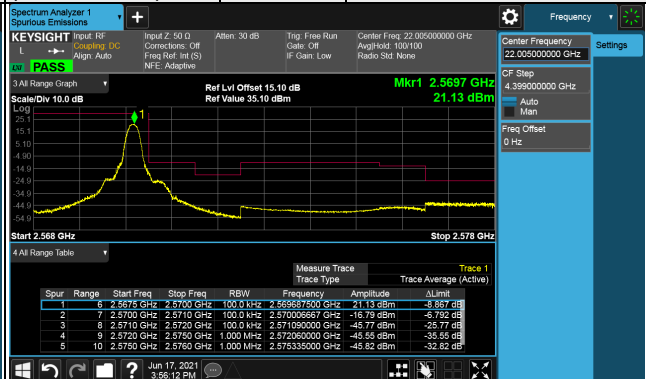
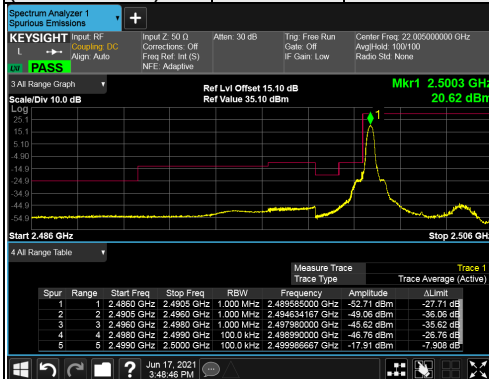
QPSK

1 RB / 0 RB Offset

Channel 21425  
(2567.5MHz)

QPSK

1 RB / 24 RB Offset



Channel 20775  
(2502.5MHz)

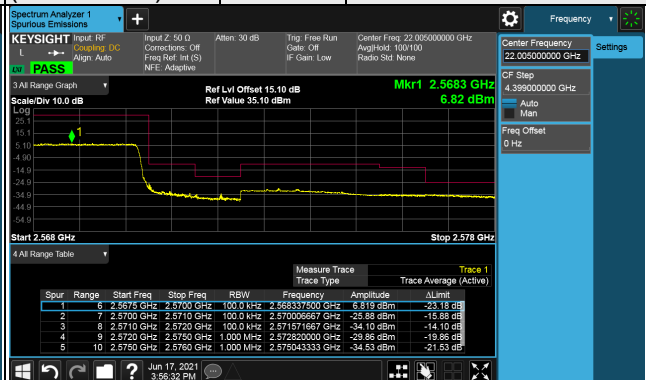
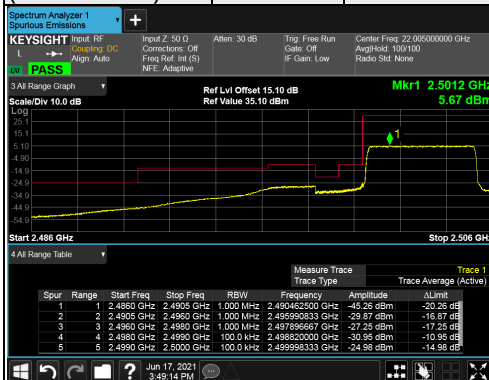
QPSK

25 RB / 0 RB Offset

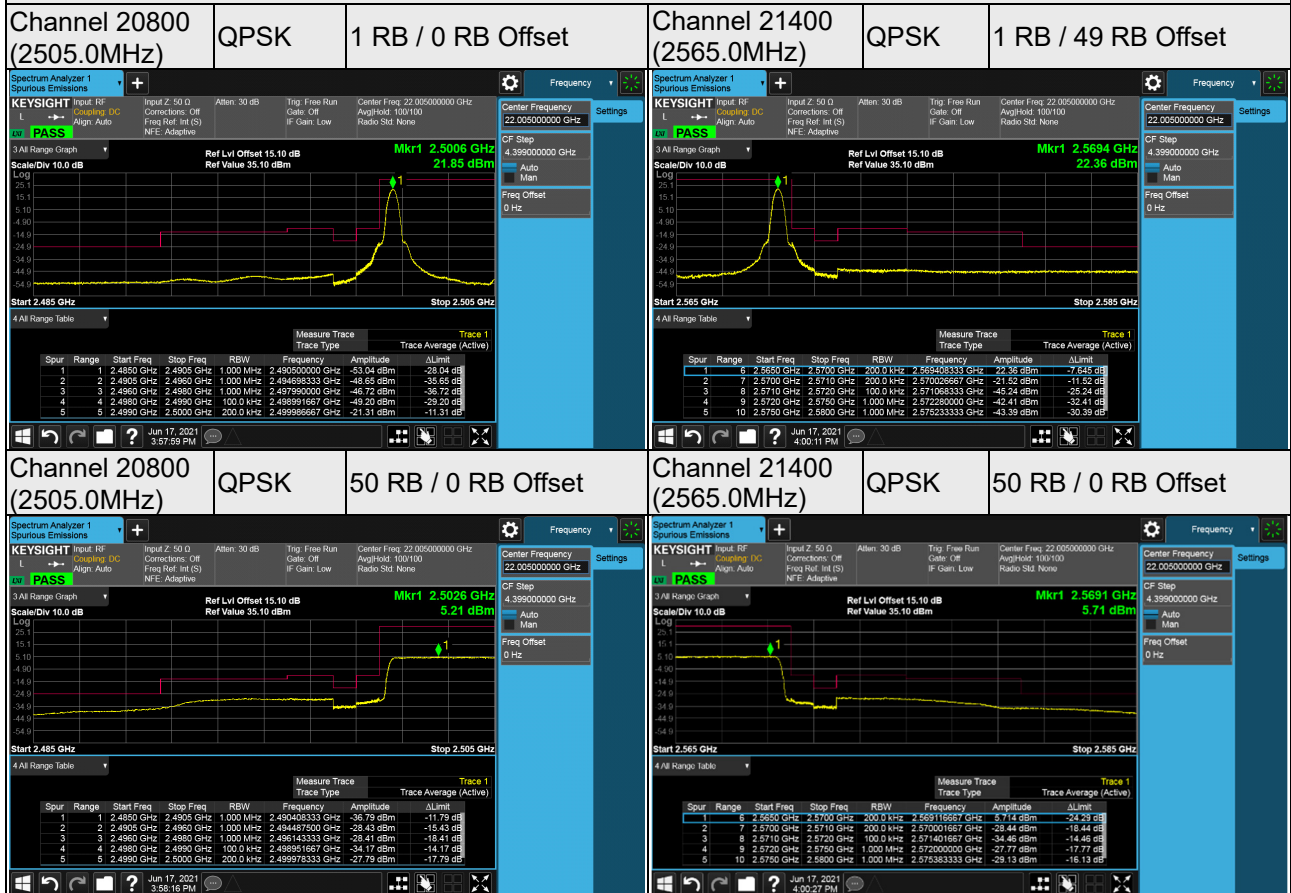
Channel 21425  
(2567.5MHz)

QPSK

25 RB / 0 RB Offset



## LTE Band 7, Channel Bandwidth 10MHz

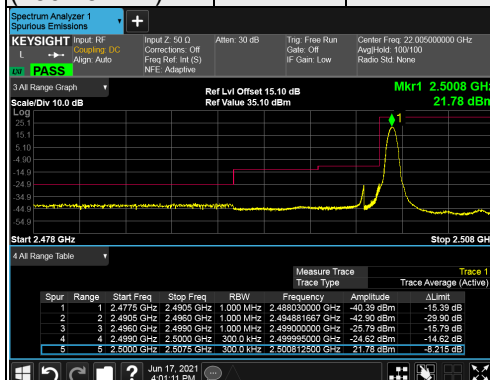


# LTE Band 7, Channel Bandwidth 15MHz

Channel 20825  
(2507.5MHz)

QPSK

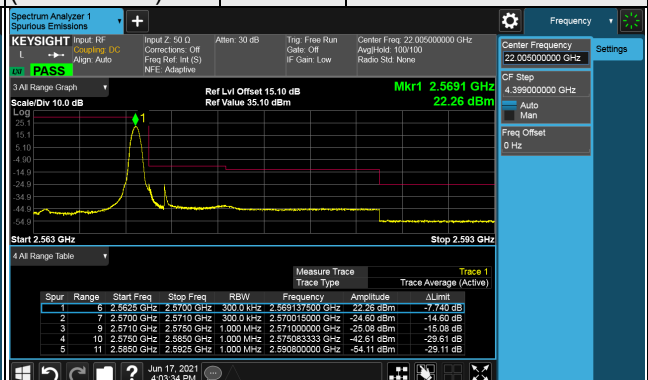
1 RB / 0 RB Offset



Channel 21375  
(2562.5MHz)

QPSK

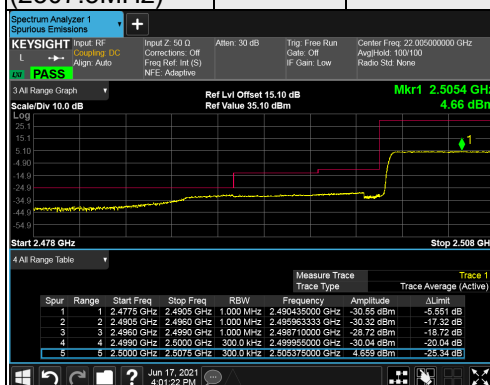
1 RB / 74 RB Offset



Channel 20825  
(2507.5MHz)

QPSK

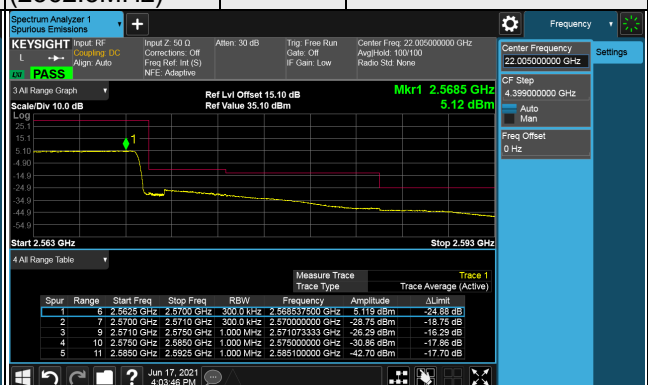
75 RB / 0 RB Offset



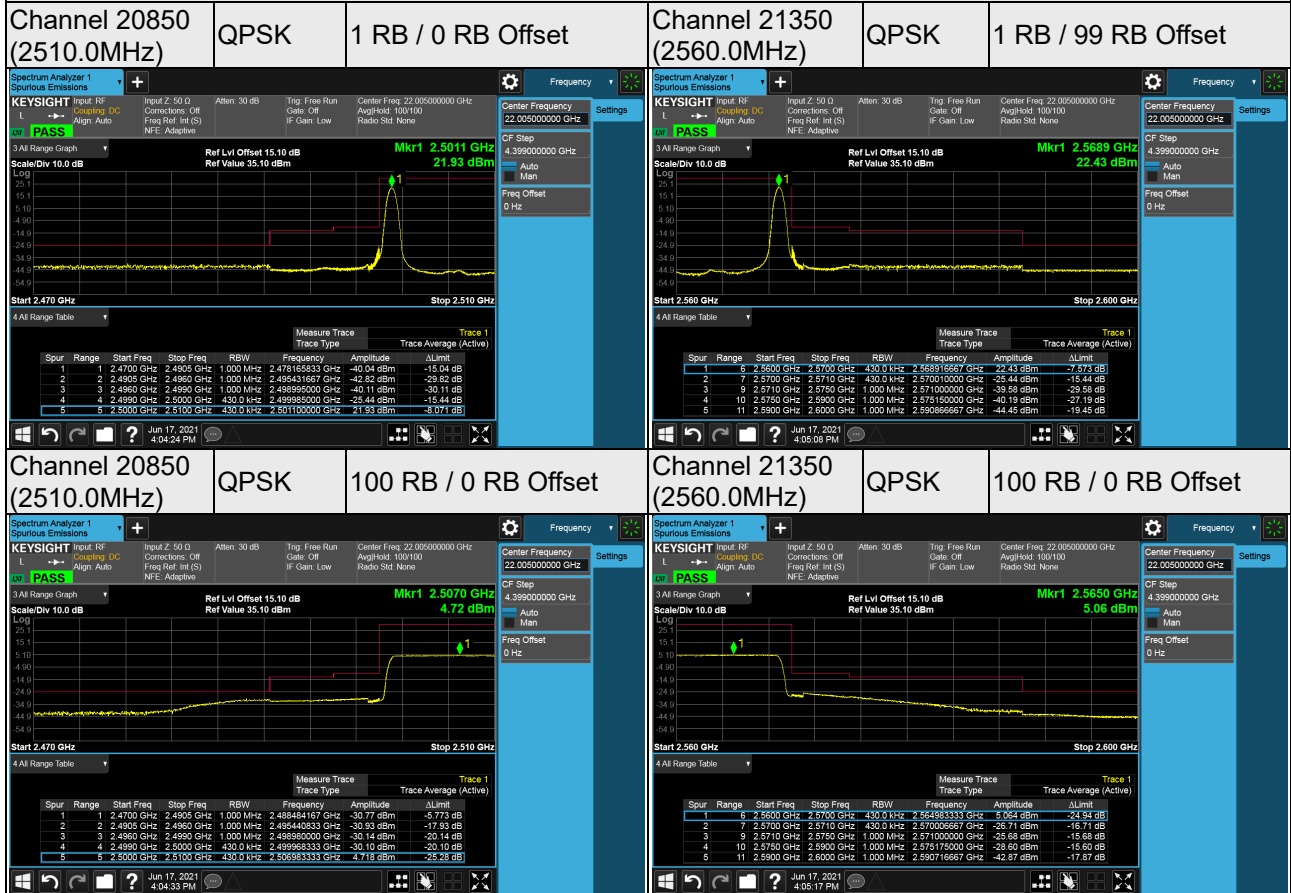
Channel 21375  
(2562.5MHz)

QPSK

75 RB / 0 RB Offset

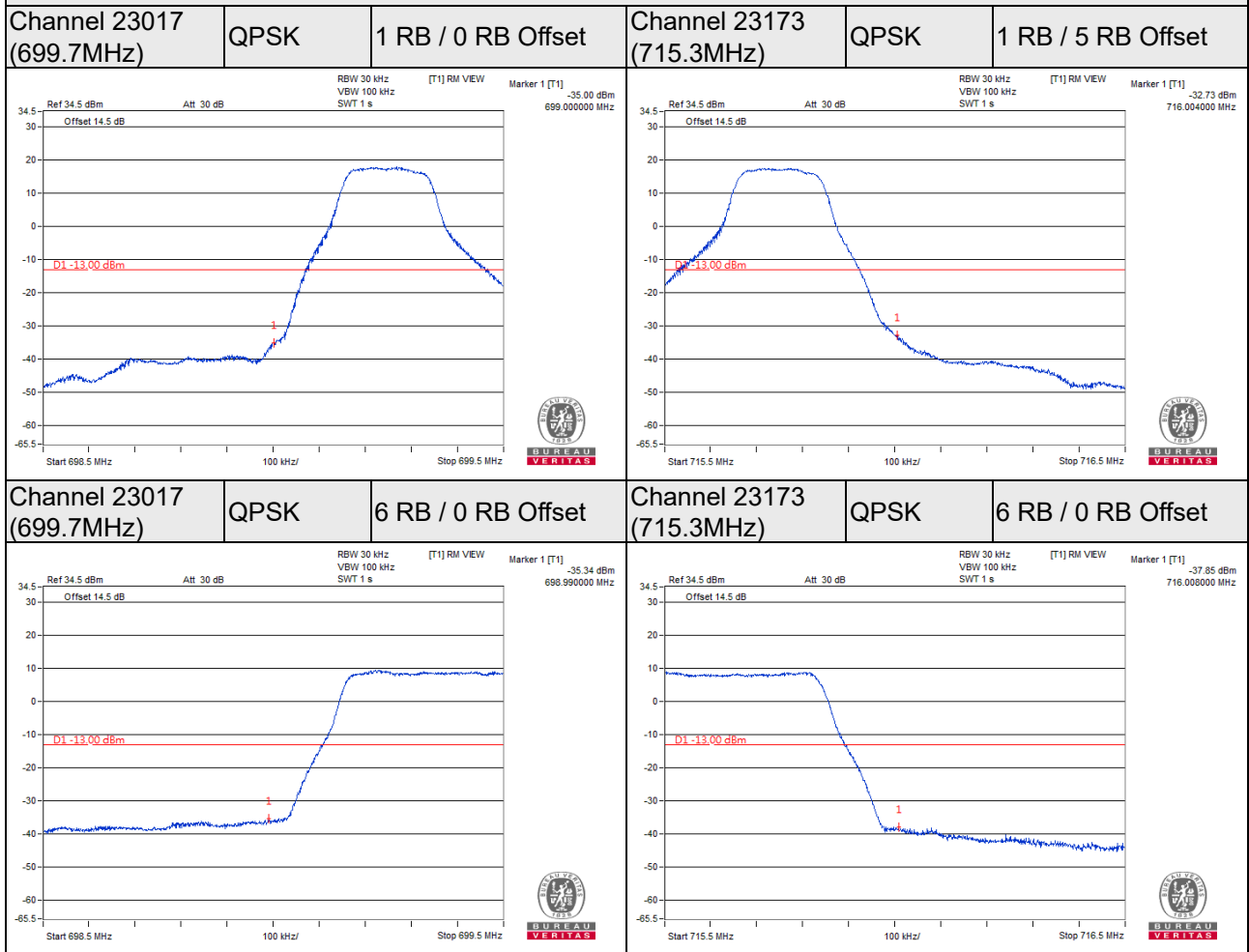


## LTE Band 7, Channel Bandwidth 20MHz

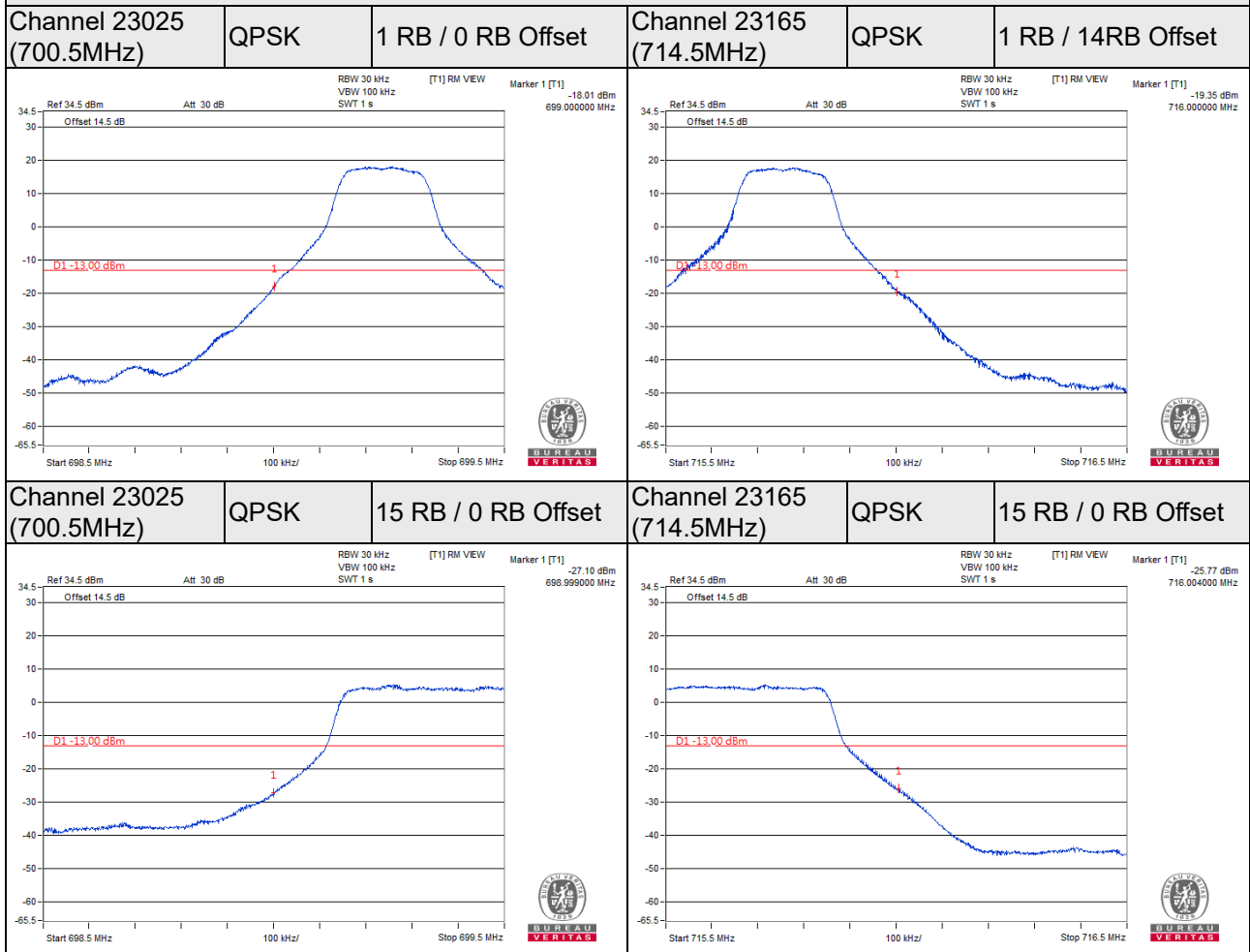


## Band Edge

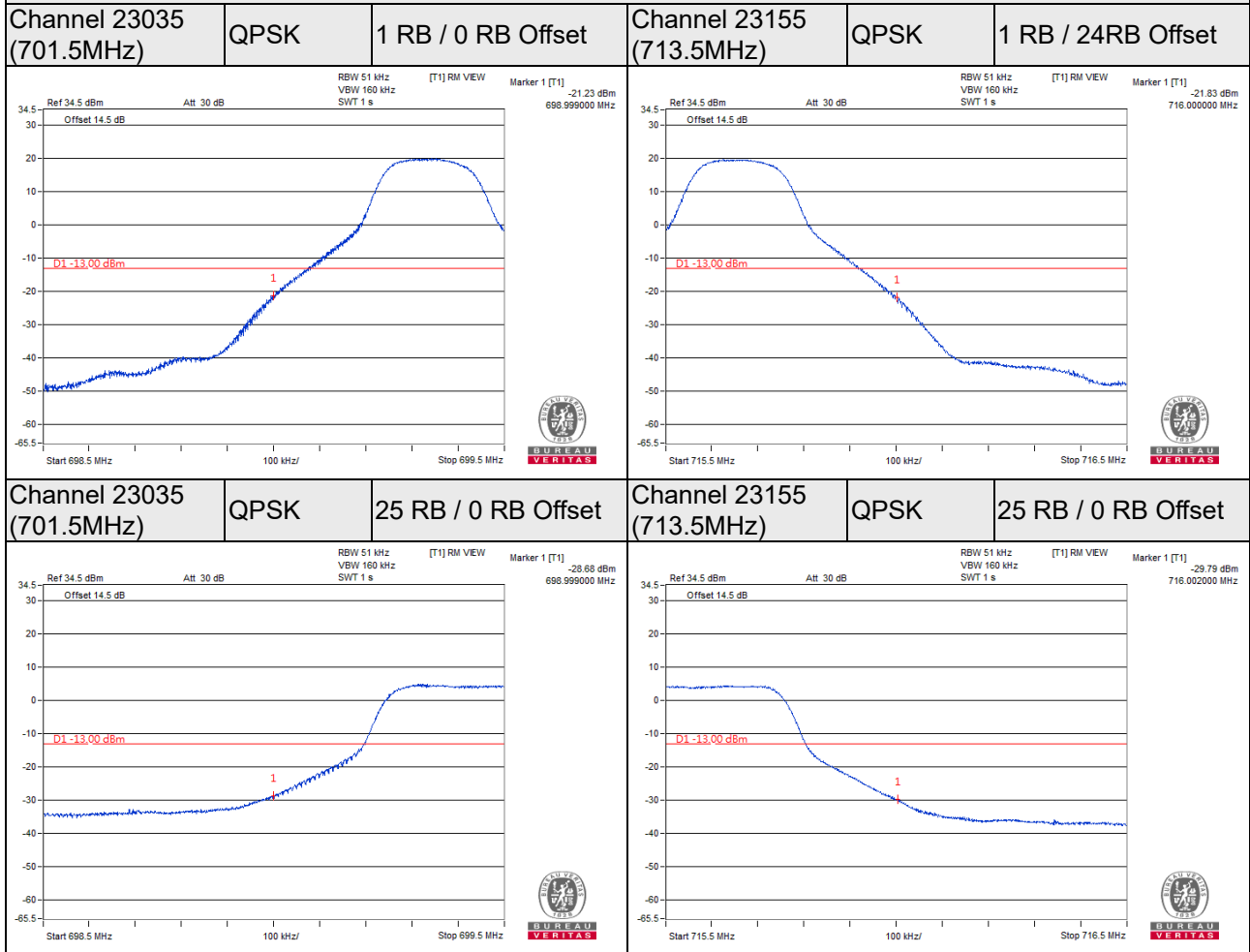
LTE Band 12, Channel Bandwidth 1.4MHz



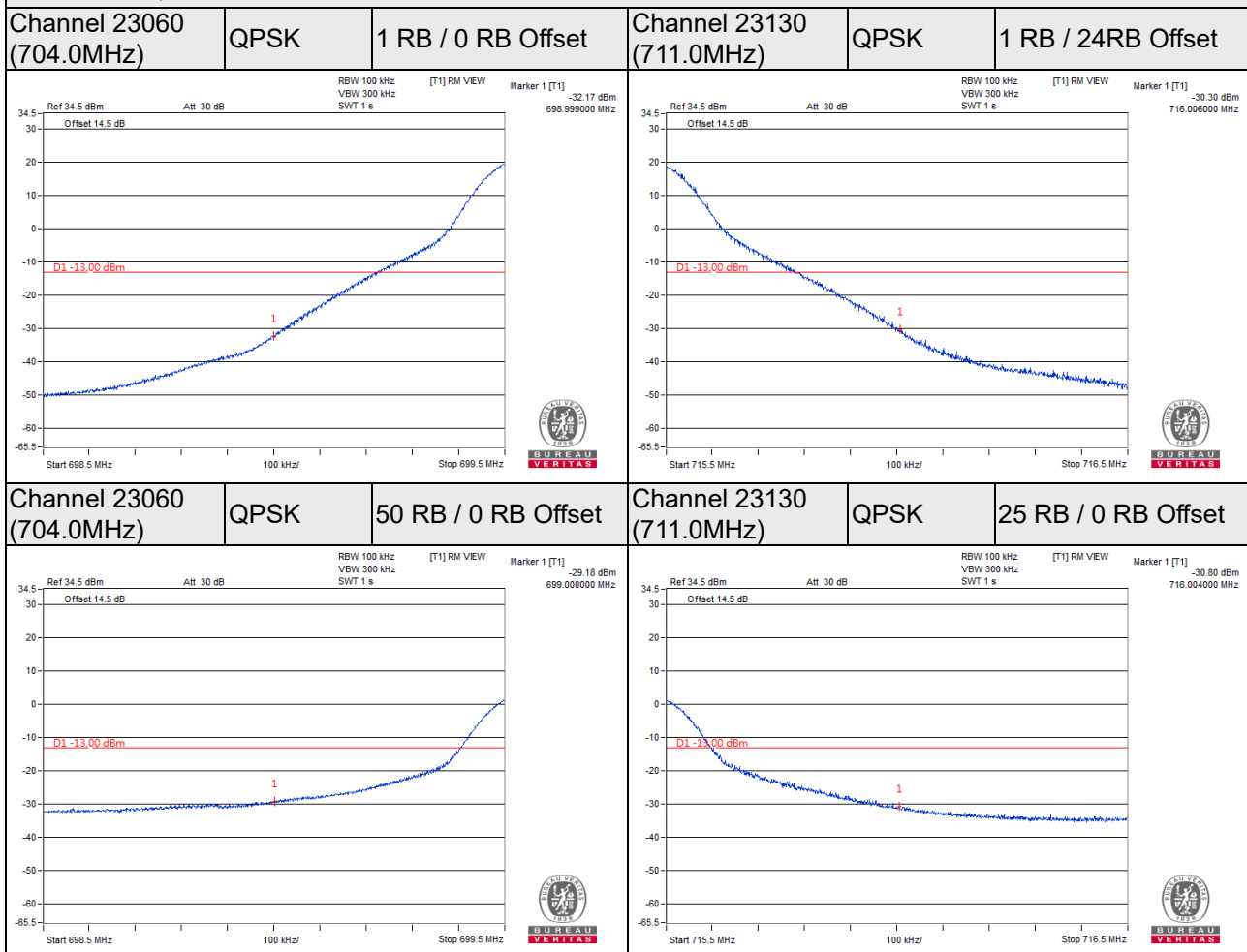
# LTE Band 12, Channel Bandwidth 3MHz



# LTE Band 12, Channel Bandwidth 5MHz

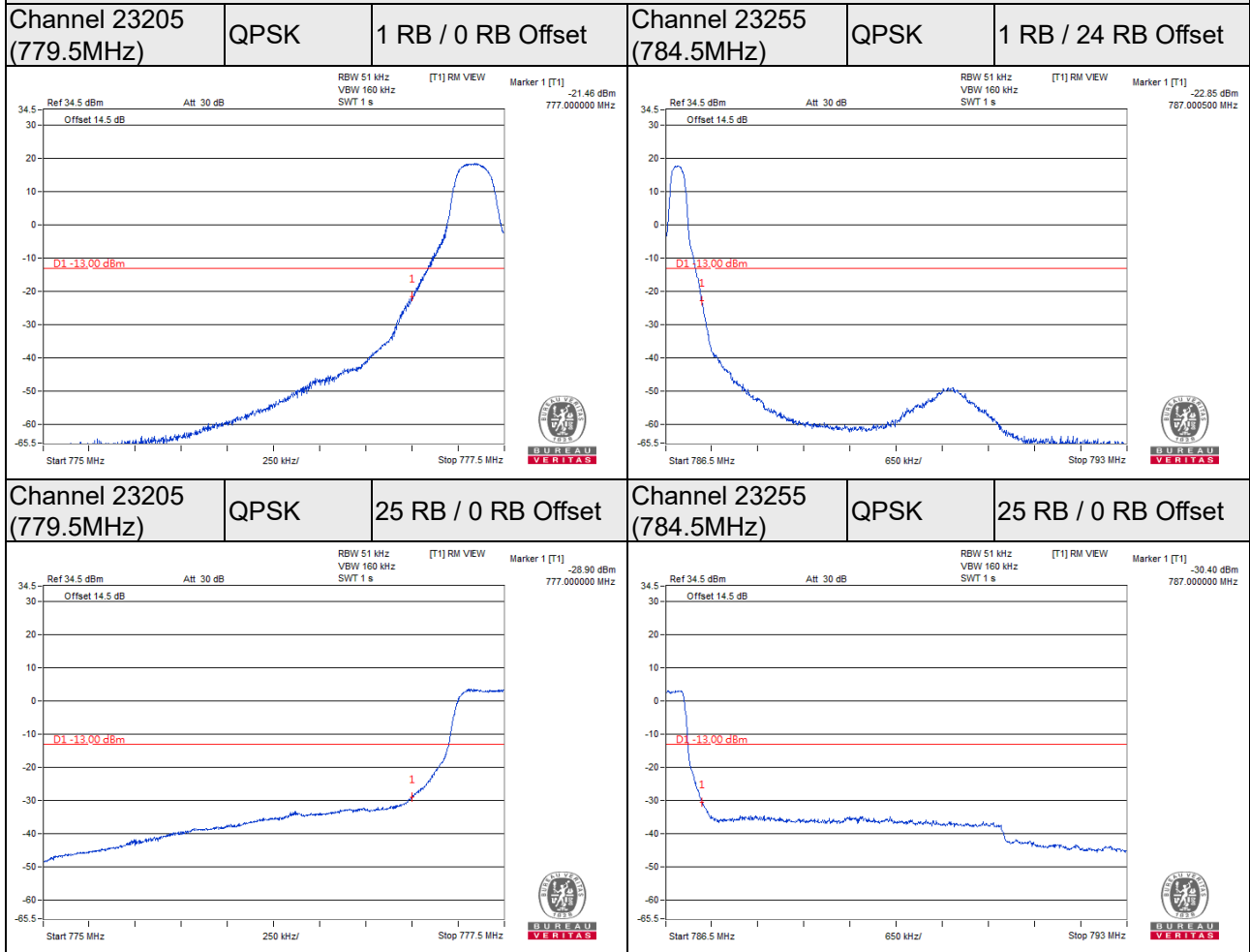


# LTE Band 12, Channel Bandwidth 10MHz

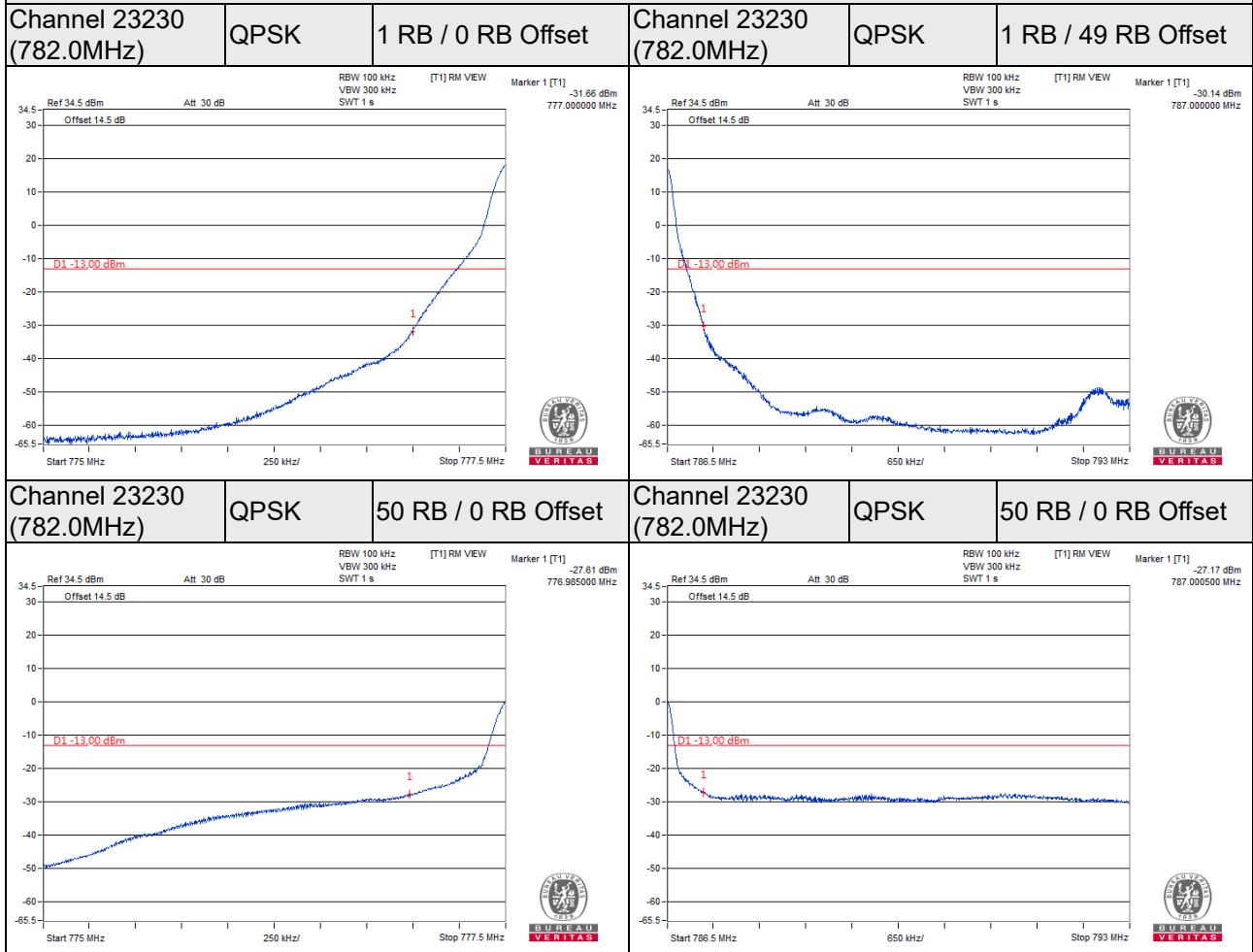


## Band Edge

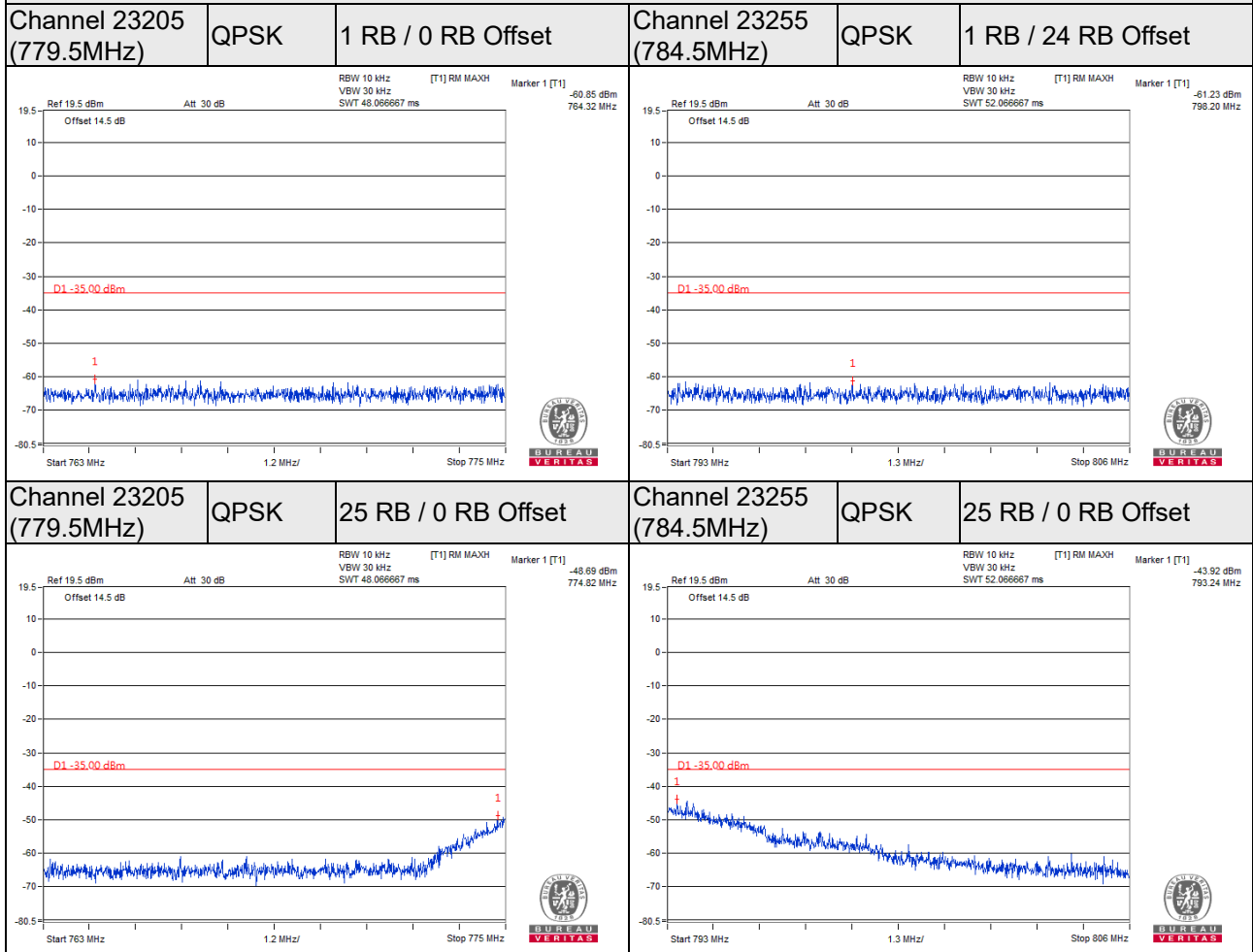
### LTE Band 13, Channel Bandwidth 5MHz



# LTE Band 13, Channel Bandwidth 10MHz

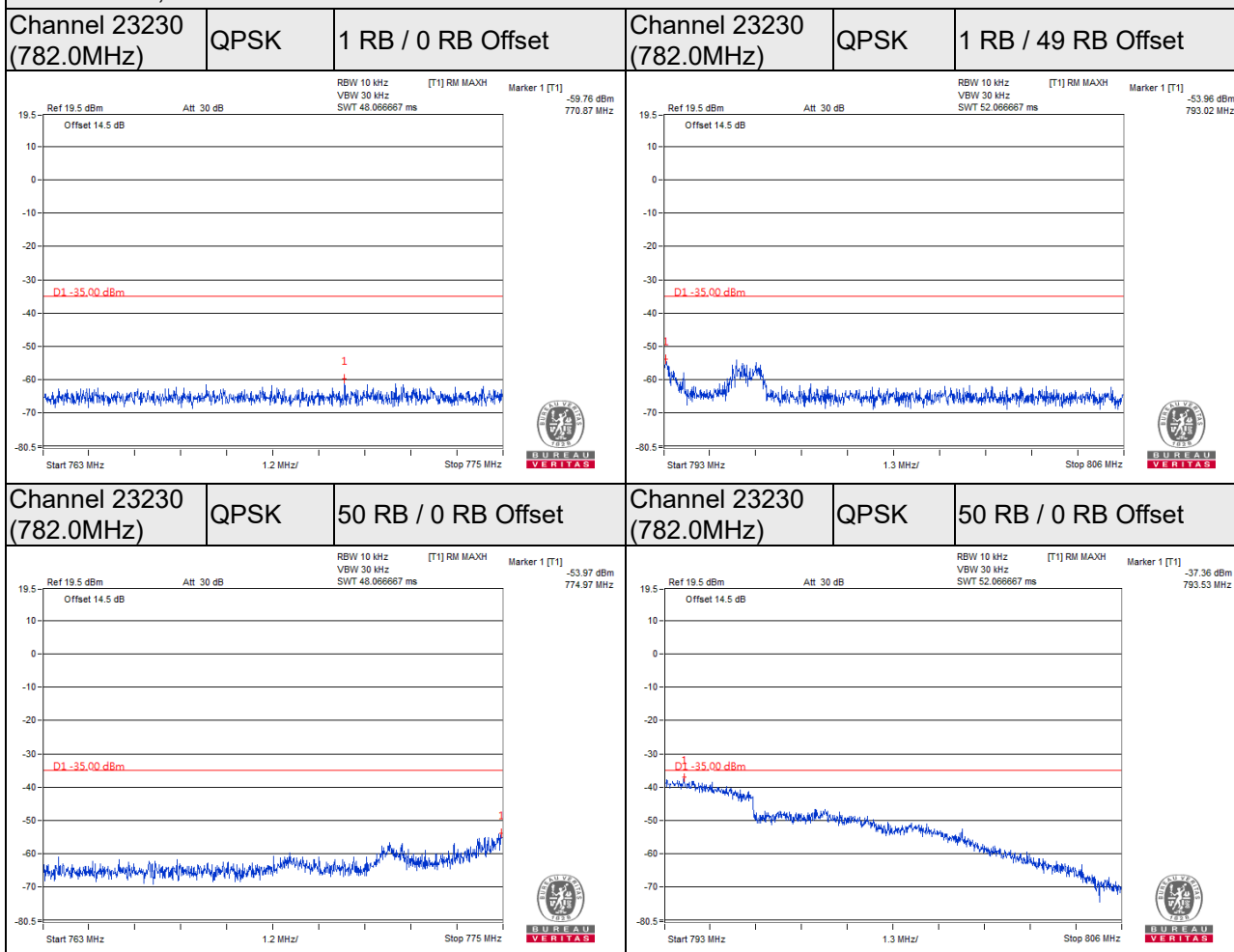


# LTE Band 13, Channel Bandwidth 5MHz



For the 763-775MHz and 793-805MHz band, the FCC limit is  $65 + 10\log(P[\text{watt}])$  in a 6.25 kHz bandwidth. Since it was not possible to set the resolution bandwidth to 6.25 kHz with the available equipment, a bandwidth of 10 kHz was used instead to show compliance, and the correction factor is compensated at the spectrum. By using a 10 kHz bandwidth on the spectrum analyzer.

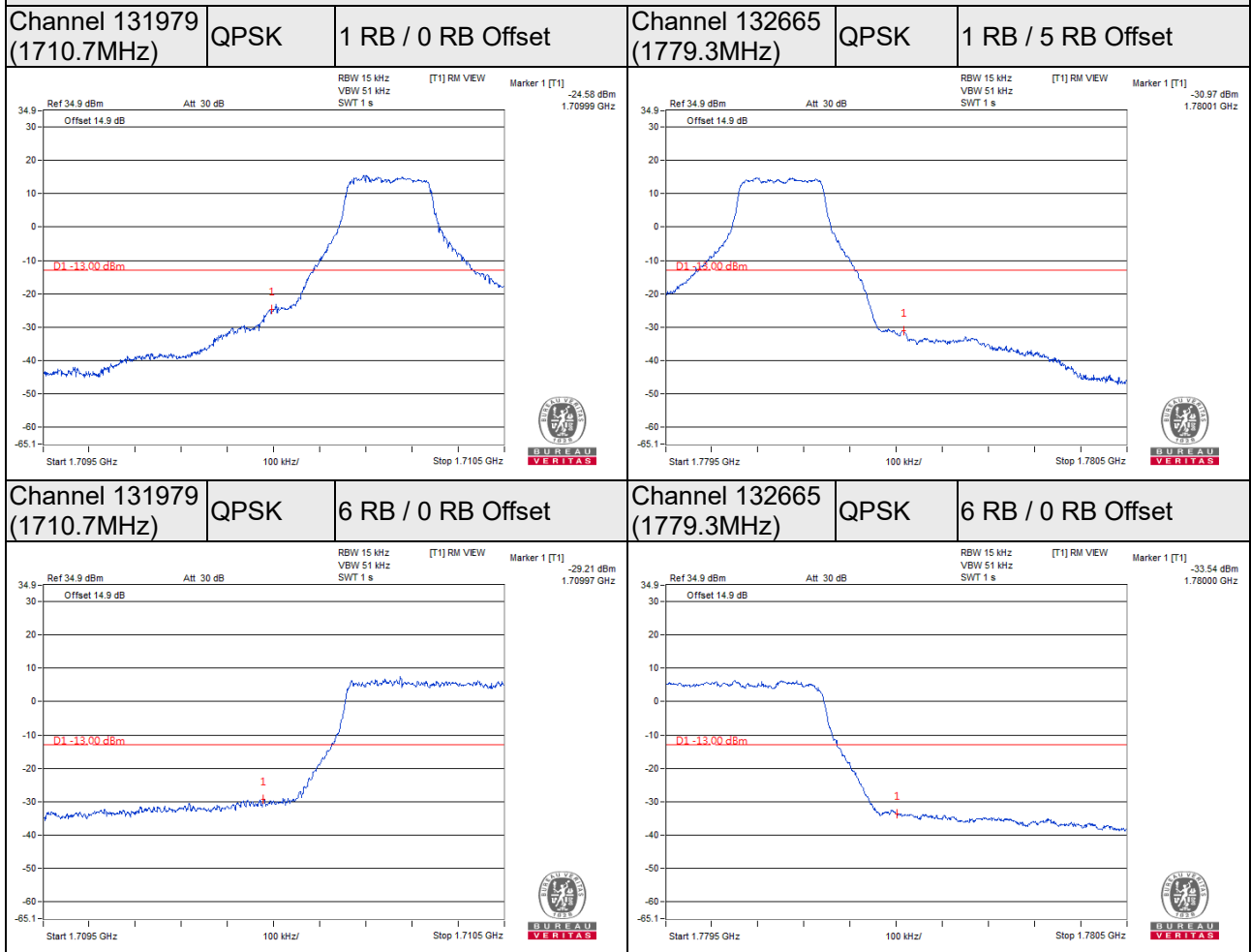
# LTE Band 13, Channel Bandwidth 10MHz



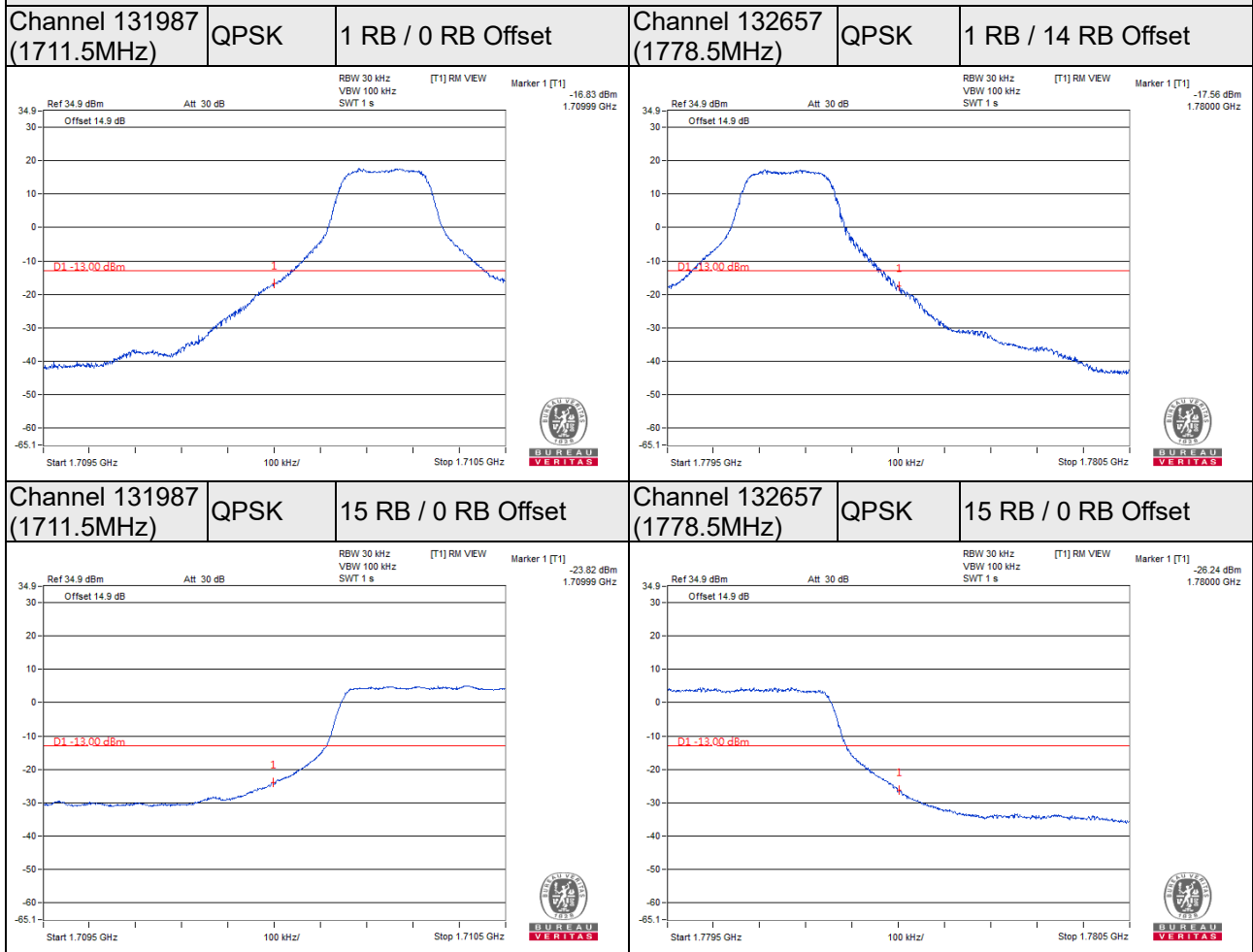
For the 763-775MHz and 793-805MHz band, the FCC limit is  $65+10\log(P[\text{watt}])$  in a 6.25 kHz bandwidth. Since it was not possible to set the resolution bandwidth to 6.25 kHz with the available equipment, a bandwidth of 10 kHz was used instead to show compliance, and the correction factor is compensated at the spectrum. By using a 10 kHz bandwidth on the spectrum analyzer.

## Band Edge

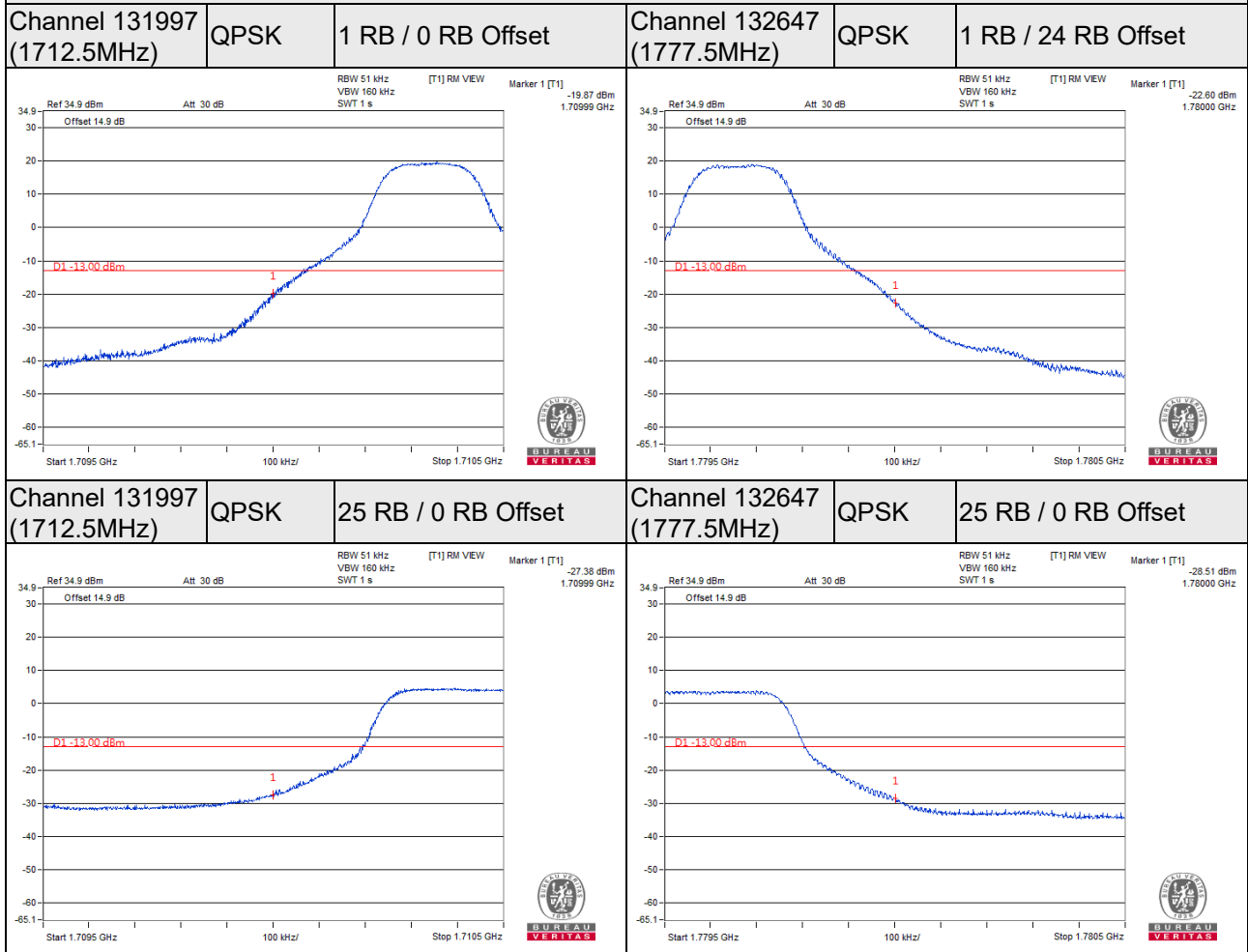
LTE Band 66, Channel Bandwidth 1.4MHz



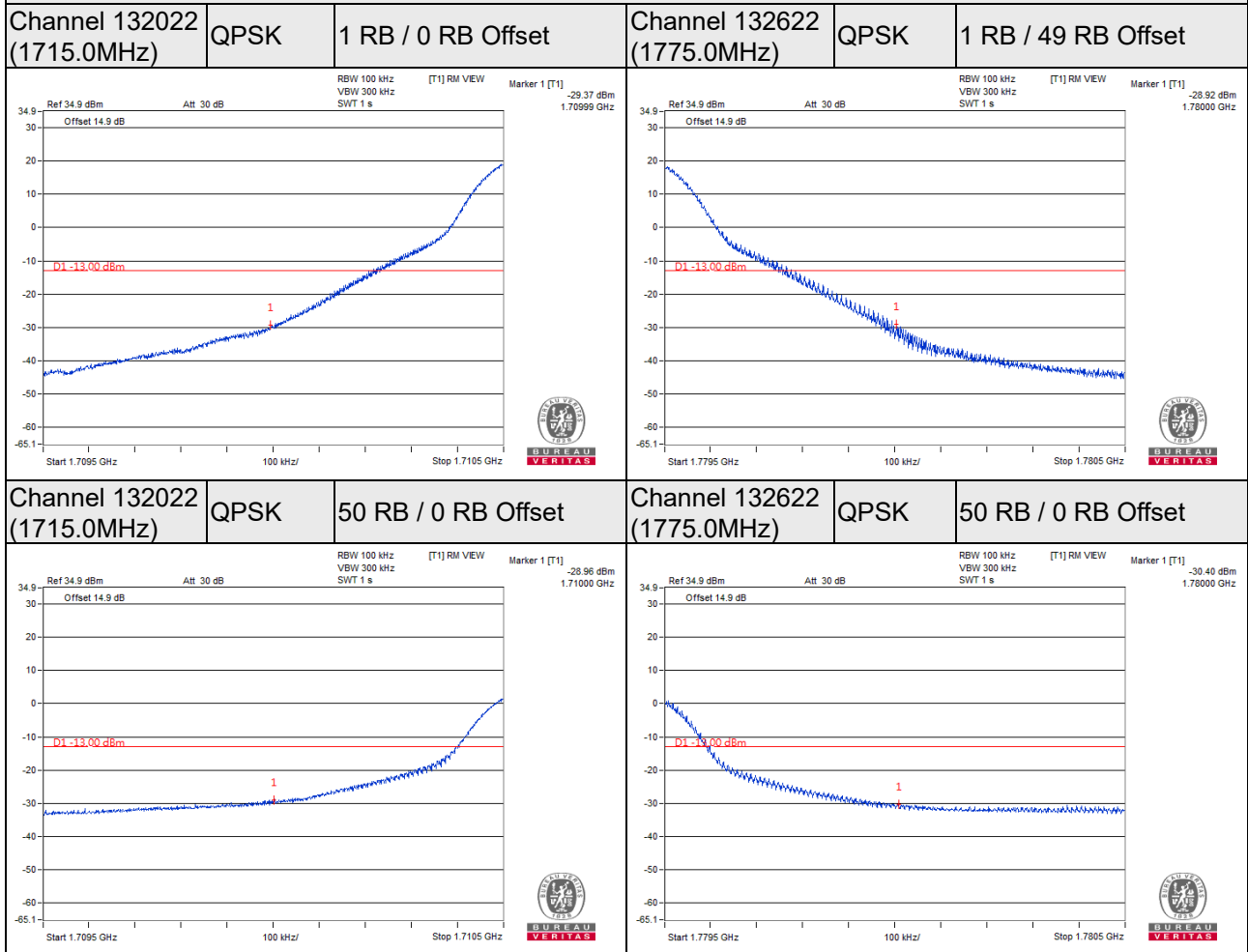
# LTE Band 66, Channel Bandwidth 3MHz



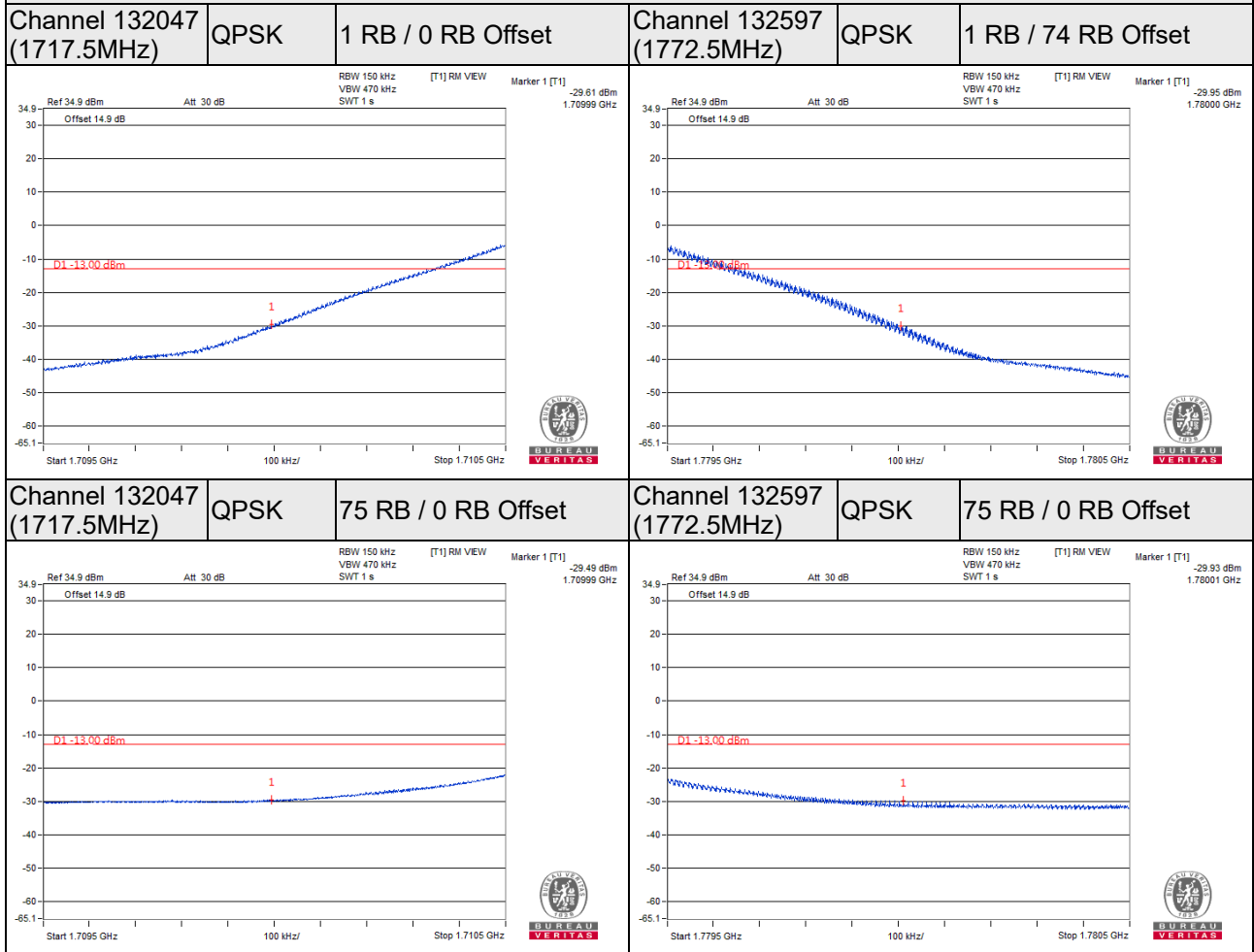
# LTE Band 66, Channel Bandwidth 5MHz



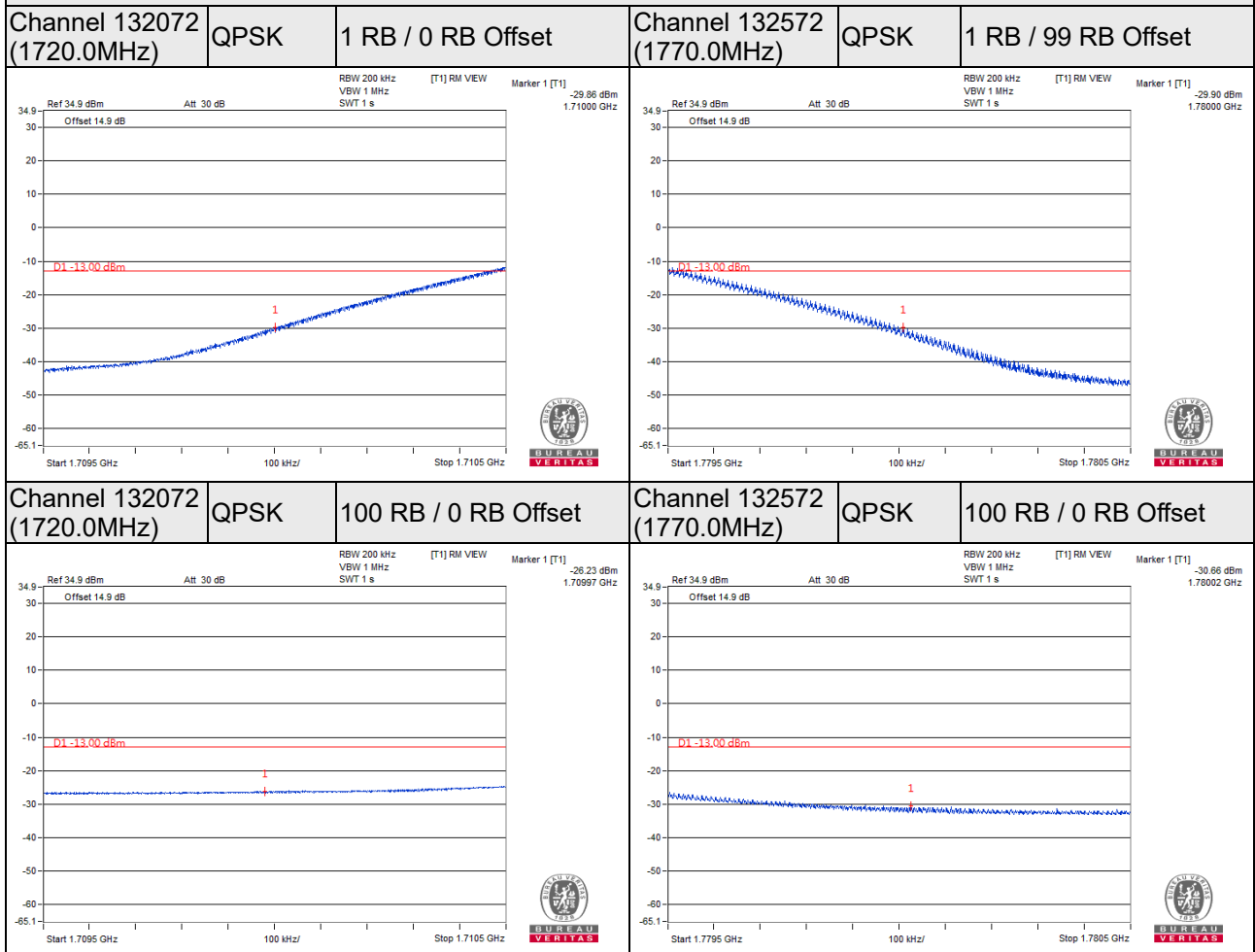
# LTE Band 66, Channel Bandwidth 10MHz



# LTE Band 66, Channel Bandwidth 15MHz

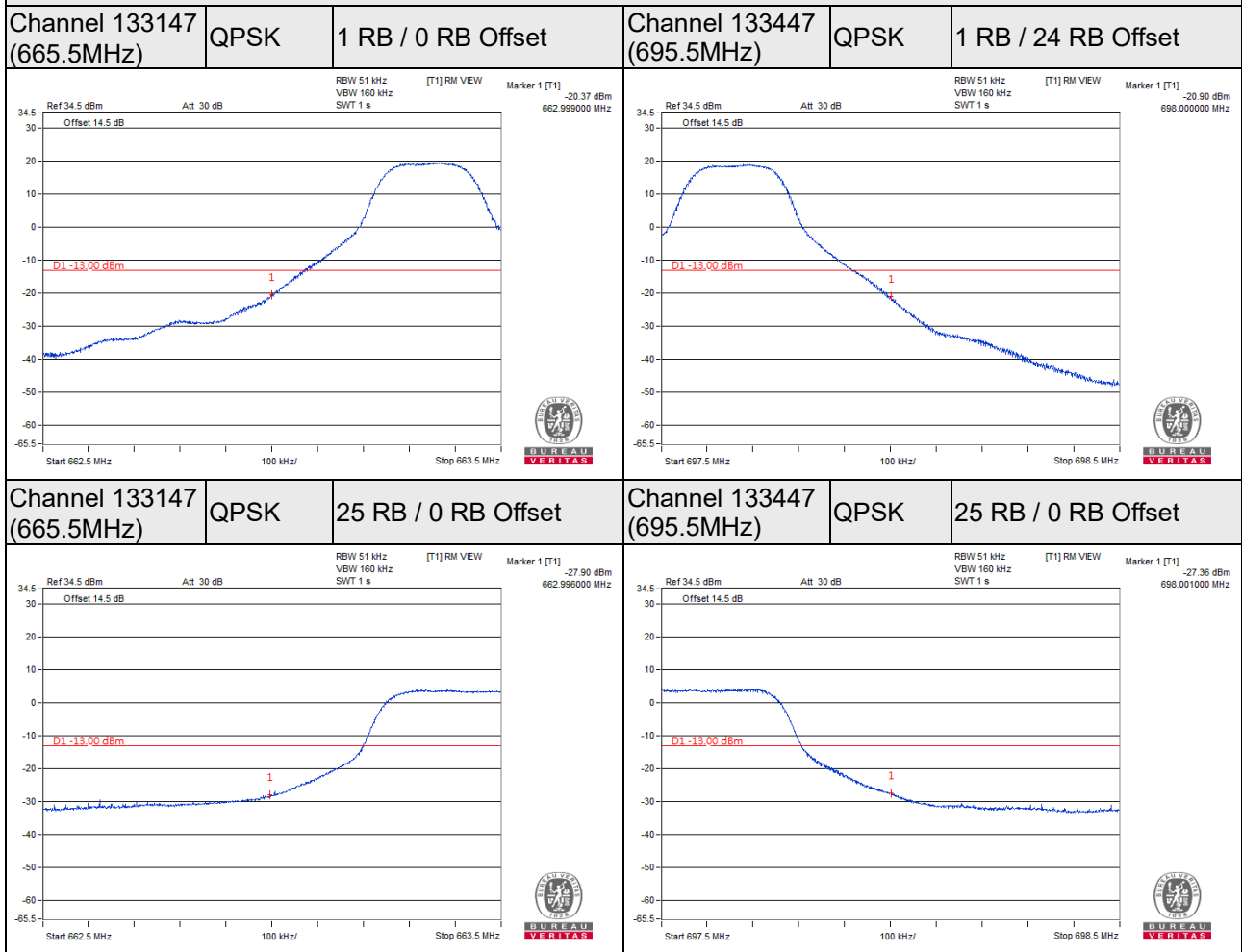


# LTE Band 66, Channel Bandwidth 20MHz

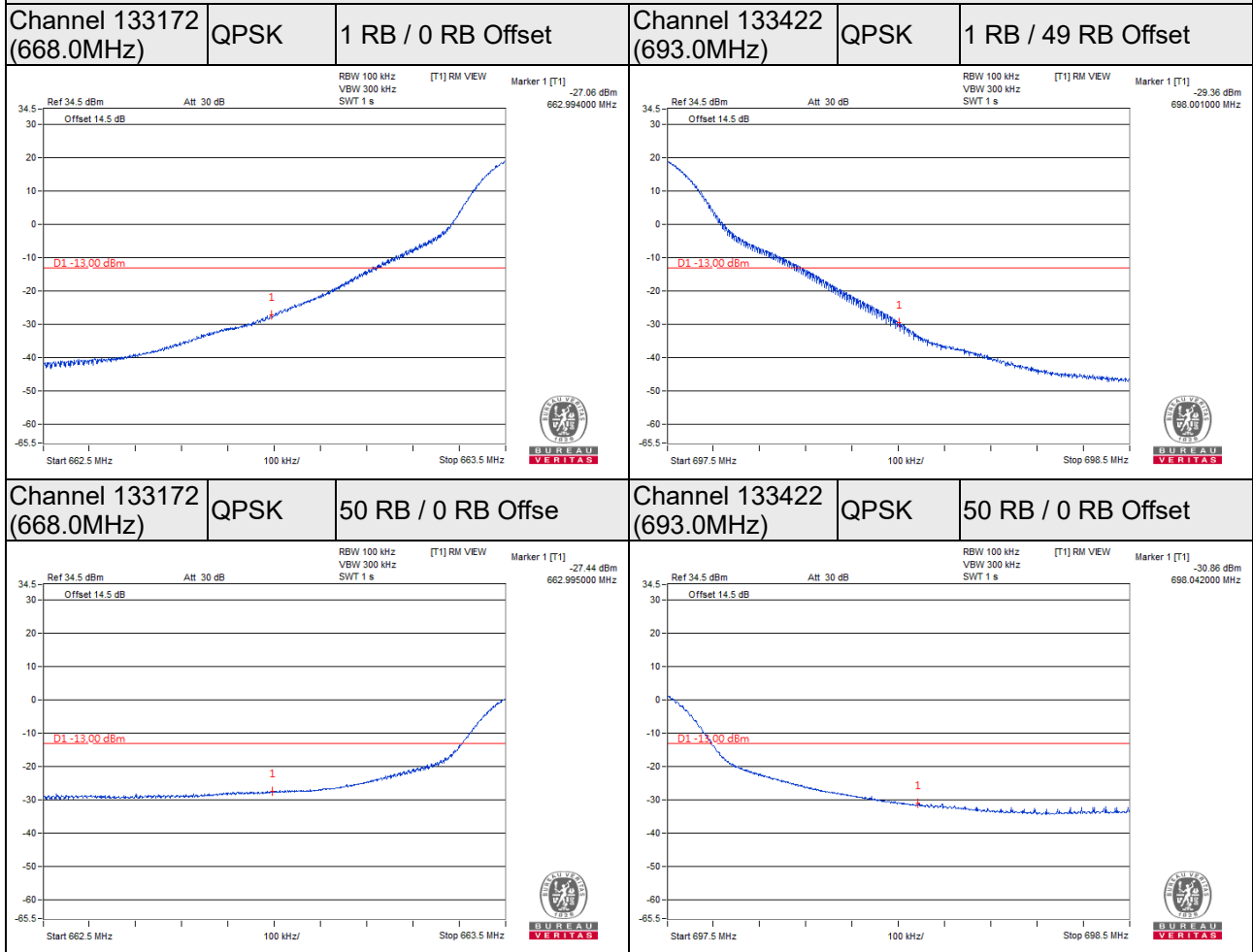


## Band Edge

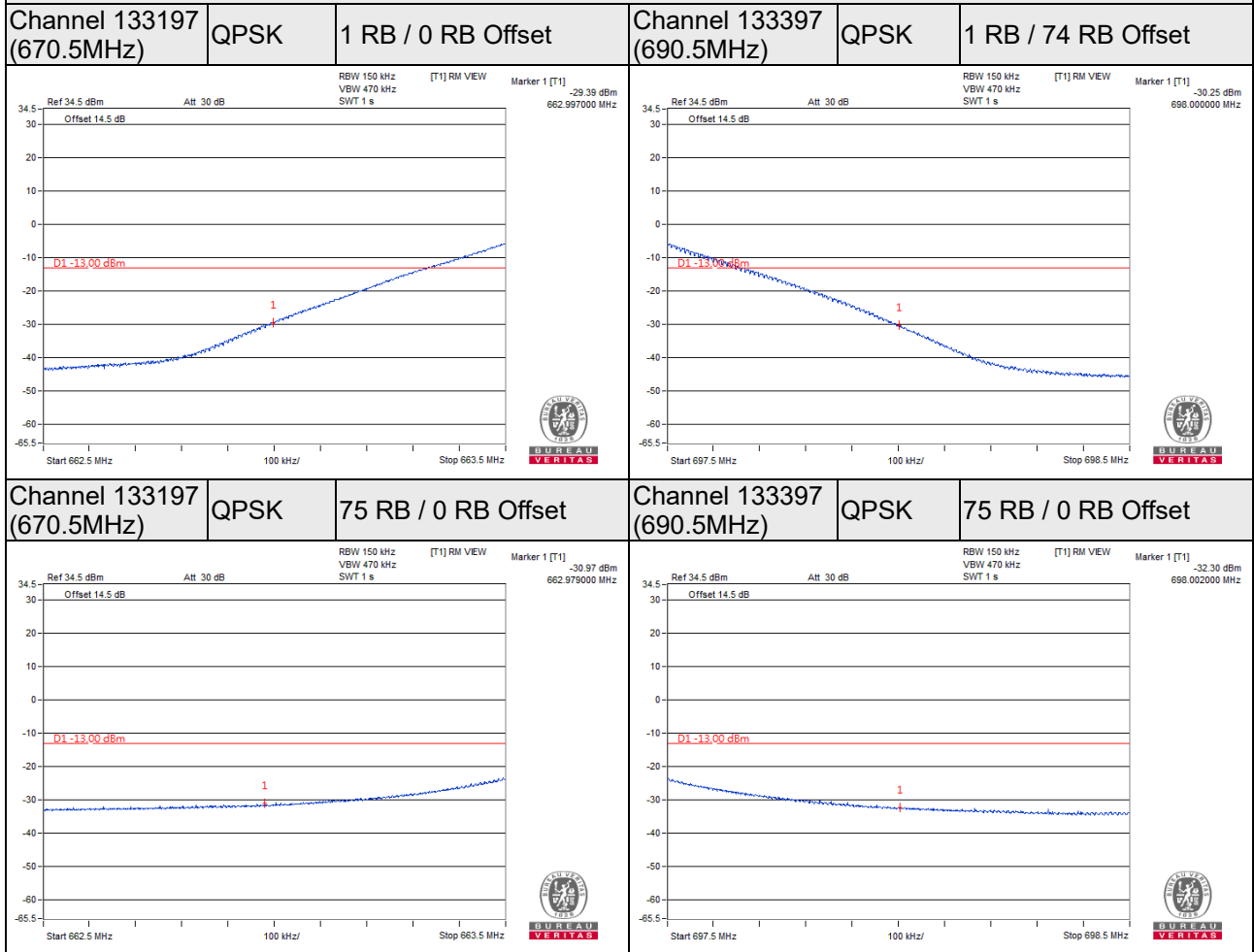
LTE Band 71, Channel Bandwidth 5MHz



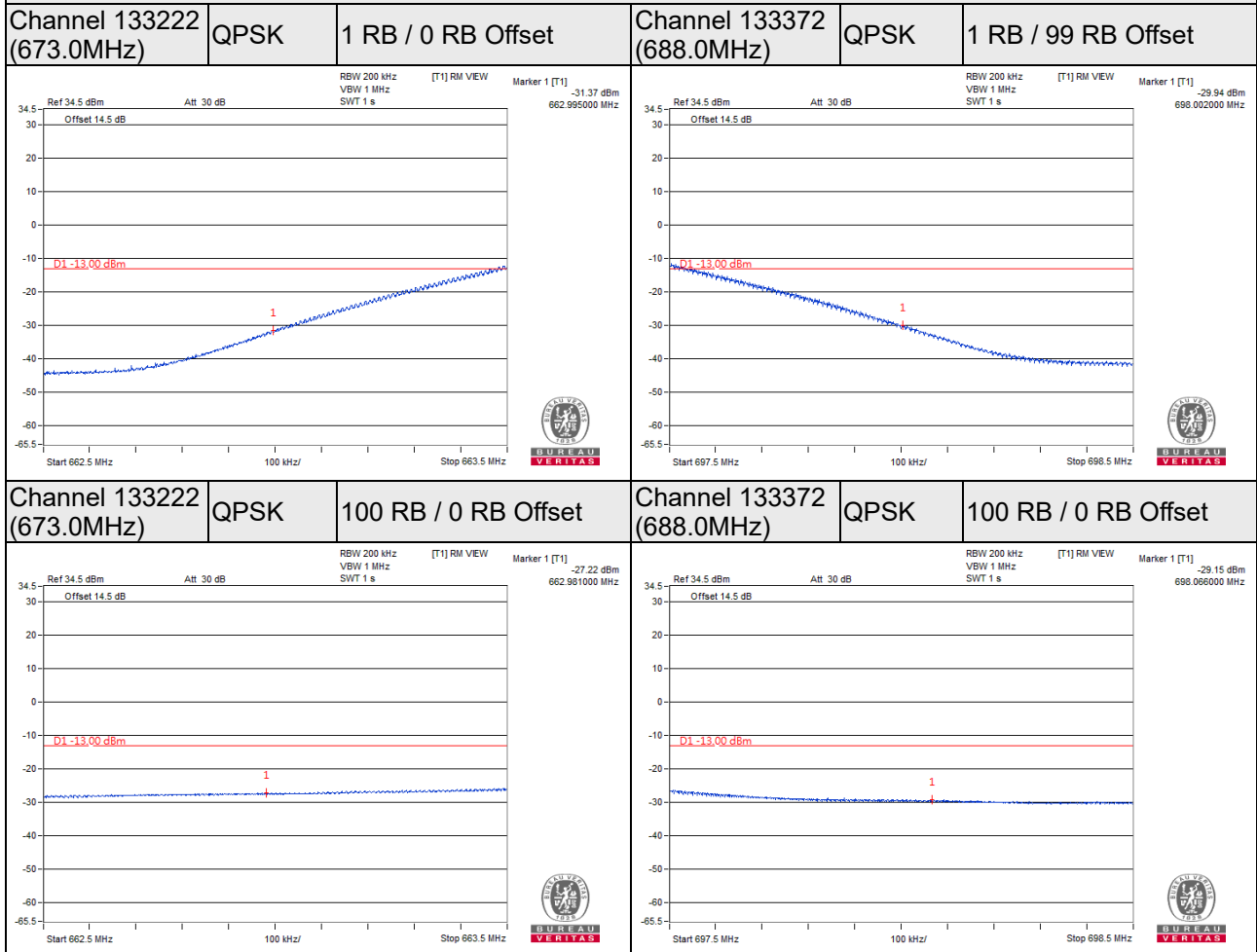
# LTE Band 71, Channel Bandwidth 10MHz



# LTE Band 71, Channel Bandwidth 15MHz



# LTE Band 71, Channel Bandwidth 20MHz

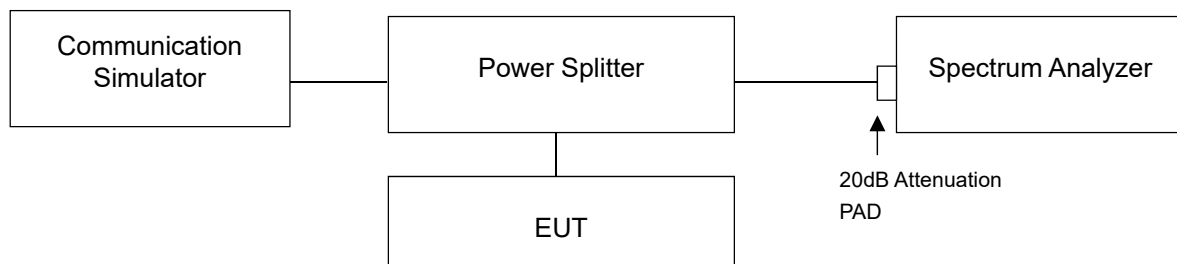


## 4.6 Peak to Average Ratio

### 4.6.1 Limits of Peak to Average Ratio Measurement

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB

### 4.6.2 Test Setup



### 4.6.3 Test Procedures

- Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth;
- Set the number of counts to a value that stabilizes the measured CCDF curve;
- Record the maximum PAPR level associated with a probability of 0.1%.

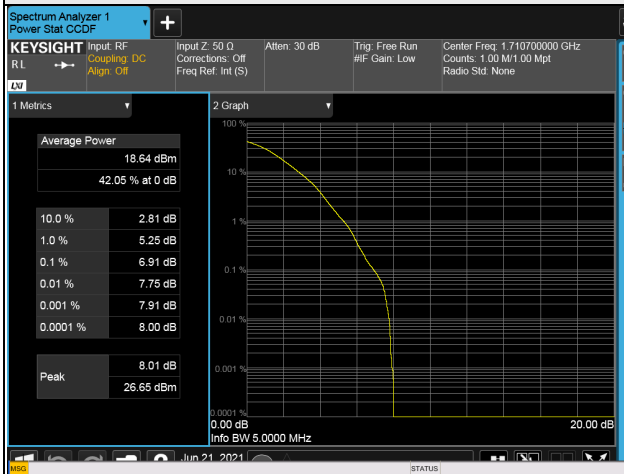
#### 4.6.4 Test Results

| LTE Band 4, Channel Bandwidth 1.4MHz |                 |                            |       |       |        |
|--------------------------------------|-----------------|----------------------------|-------|-------|--------|
| Channel                              | Frequency (MHz) | Peak To Average Ratio (dB) |       |       |        |
|                                      |                 | QPSK                       | 16QAM | 64QAM | 256QAM |
| 19957                                | 1710.7          | 3.82                       | 4.50  | 6.35  | 6.91   |
| 20175                                | 1732.5          | 3.87                       | 5.60  | 6.88  | 6.70   |
| 20393                                | 1754.3          | 3.93                       | 4.69  | 6.34  | 6.89   |
| LTE Band 4, Channel Bandwidth 3MHz   |                 |                            |       |       |        |
| Channel                              | Frequency (MHz) | Peak To Average Ratio (dB) |       |       |        |
|                                      |                 | QPSK                       | 16QAM | 64QAM | 256QAM |
| 19965                                | 1711.5          | 3.61                       | 4.35  | 6.22  | 6.98   |
| 20175                                | 1732.5          | 3.62                       | 5.46  | 6.86  | 6.83   |
| 20385                                | 1753.5          | 3.64                       | 4.56  | 6.26  | 7.15   |
| LTE Band 4, Channel Bandwidth 5MHz   |                 |                            |       |       |        |
| Channel                              | Frequency (MHz) | Peak To Average Ratio (dB) |       |       |        |
|                                      |                 | QPSK                       | 16QAM | 64QAM | 256QAM |
| 19975                                | 1712.5          | 3.55                       | 4.27  | 6.24  | 7.07   |
| 20175                                | 1732.5          | 3.66                       | 5.35  | 6.70  | 7.85   |
| 20375                                | 1752.5          | 3.65                       | 4.66  | 6.24  | 9.07   |
| LTE Band 4, Channel Bandwidth 10MHz  |                 |                            |       |       |        |
| Channel                              | Frequency (MHz) | Peak To Average Ratio (dB) |       |       |        |
|                                      |                 | QPSK                       | 16QAM | 64QAM | 256QAM |
| 20000                                | 1715.0          | 3.54                       | 4.25  | 6.12  | 6.85   |
| 20175                                | 1732.5          | 3.58                       | 5.06  | 6.30  | 6.90   |
| 20350                                | 1750.0          | 3.55                       | 5.13  | 6.56  | 6.94   |
| LTE Band 4, Channel Bandwidth 15MHz  |                 |                            |       |       |        |
| Channel                              | Frequency (MHz) | Peak To Average Ratio (dB) |       |       |        |
|                                      |                 | QPSK                       | 16QAM | 64QAM | 256QAM |
| 20025                                | 1717.5          | 3.51                       | 4.42  | 6.17  | 7.26   |
| 20175                                | 1732.5          | 3.49                       | 4.95  | 6.28  | 6.81   |
| 20325                                | 1747.5          | 3.49                       | 5.27  | 6.80  | 7.10   |

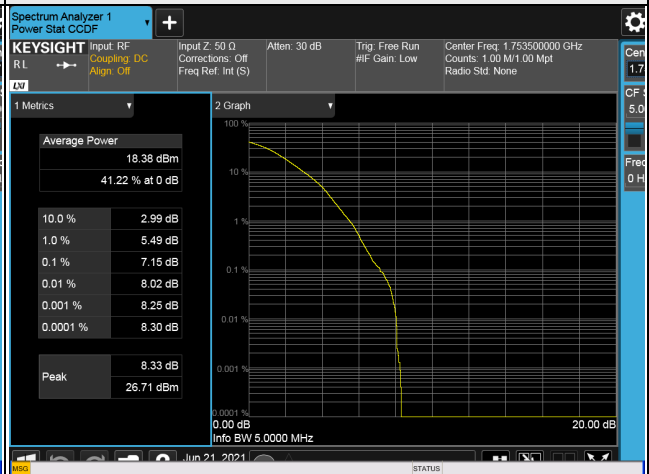
| LTE Band 4, Channel Bandwidth 20MHz |                 |                            |       |       |        |
|-------------------------------------|-----------------|----------------------------|-------|-------|--------|
| Channel                             | Frequency (MHz) | Peak To Average Ratio (dB) |       |       |        |
|                                     |                 | QPSK                       | 16QAM | 64QAM | 256QAM |
| 20050                               | 1720.0          | 3.46                       | 4.60  | 6.17  | 6.79   |
| 20175                               | 1732.5          | 3.48                       | 4.73  | 6.26  | 6.83   |
| 20300                               | 1745.0          | 3.52                       | 5.24  | 6.60  | 6.17   |

## Spectrum Plot of Worst Value

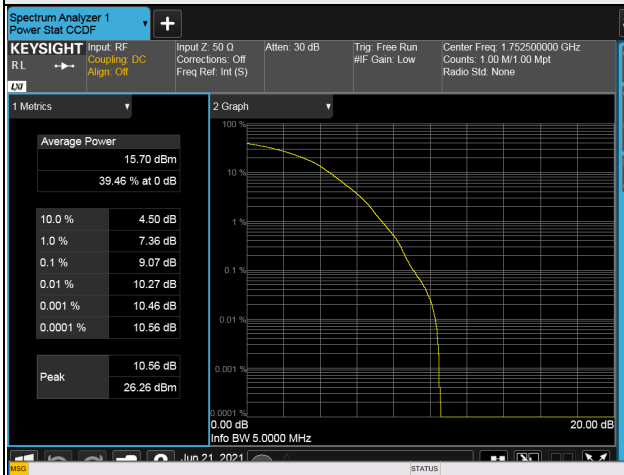
### 1.4MHz / 256QAM



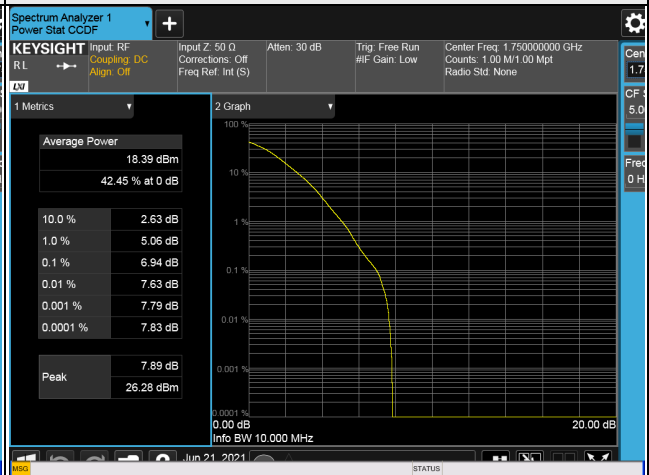
### 3MHz / 256QAM



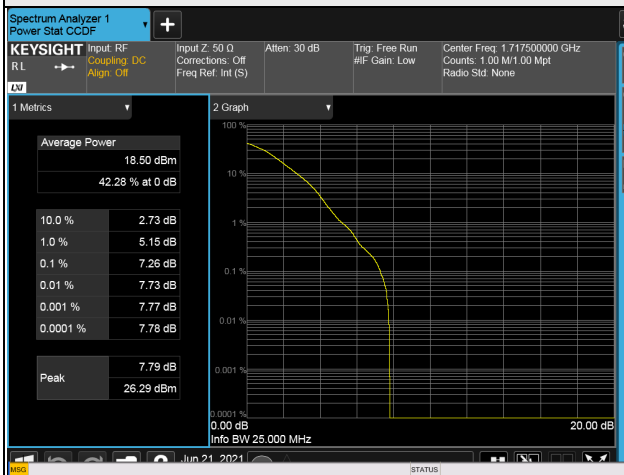
### 5MHz / 256QAM



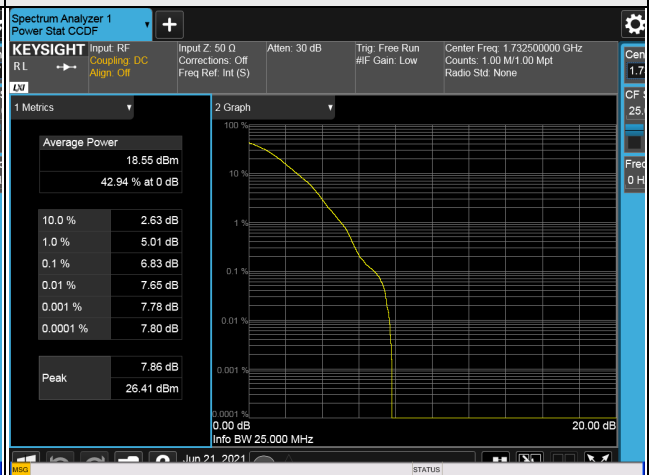
### 10MHz / 256QAM



### 15MHz / 256QAM



### 20MHz / 256QAM



| LTE Band 7, Channel Bandwidth 5MHz  |                 |                            |       |       |        |
|-------------------------------------|-----------------|----------------------------|-------|-------|--------|
| Channel                             | Frequency (MHz) | Peak To Average Ratio (dB) |       |       |        |
|                                     |                 | QPSK                       | 16QAM | 64QAM | 256QAM |
| 20775                               | 2502.5          | 3.60                       | 4.87  | 6.36  | 7.32   |
| 21100                               | 2535.0          | 3.75                       | 5.42  | 7.09  | 7.24   |
| 21425                               | 2567.5          | 3.70                       | 5.47  | 6.79  | 7.97   |
| LTE Band 7, Channel Bandwidth 10MHz |                 |                            |       |       |        |
| Channel                             | Frequency (MHz) | Peak To Average Ratio (dB) |       |       |        |
|                                     |                 | QPSK                       | 16QAM | 64QAM | 256QAM |
| 20800                               | 2505.0          | 3.56                       | 4.92  | 6.37  | 7.12   |
| 21100                               | 2535.0          | 3.67                       | 5.39  | 7.15  | 7.38   |
| 21400                               | 2565.0          | 3.65                       | 5.43  | 6.55  | 7.74   |
| LTE Band 7, Channel Bandwidth 15MHz |                 |                            |       |       |        |
| Channel                             | Frequency (MHz) | Peak To Average Ratio (dB) |       |       |        |
|                                     |                 | QPSK                       | 16QAM | 64QAM | 256QAM |
| 20825                               | 2507.5          | 3.52                       | 5.18  | 6.33  | 6.94   |
| 21100                               | 2535.0          | 3.56                       | 5.29  | 7.01  | 7.45   |
| 21375                               | 2562.5          | 3.62                       | 5.43  | 6.68  | 7.89   |
| LTE Band 7, Channel Bandwidth 20MHz |                 |                            |       |       |        |
| Channel                             | Frequency (MHz) | Peak To Average Ratio (dB) |       |       |        |
|                                     |                 | QPSK                       | 16QAM | 64QAM | 256QAM |
| 20850                               | 2510.0          | 3.50                       | 5.23  | 6.35  | 6.95   |
| 21100                               | 2535.0          | 3.61                       | 5.28  | 7.04  | 7.64   |
| 21350                               | 2560.0          | 3.59                       | 5.36  | 6.69  | 6.95   |