# TEST REPORT

Dt&C Co., Ltd.
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Tel : 031-321-2664, Fax : 031-321-1664

1. Report No : DRTFCC2407-0081

2. Customer

- Name (FCC) : BLUEBIRD INC.
- Address (FCC) : 3F, 115, Irwon-ro, Gangnam-gu, Seoul, 06355, Korea

3. Use of Report : FCC Certification

4. Product Name / Model Name : Enterprise Full Touch Handheld Computer / S50
   FCC ID : SS4S50F1

5. FCC Regulation(s): Part 22, 24, 27, 90
   Test Method Used : KDB971168 D01v03, ANSI/TIA-603-E-2016, ANSI C63.26-2015

6. Date of Test : 2024.02.20 ~ 2024.07.24

7. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing

8. Testing Environment : See appended test report.

9. Test Result : Refer to the attached test result.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
This test report is not related to KOLAS accreditation.

| | | |
|---|---|---|
| Affirmation | Tested by<br>Name : SeokHo Han (Signature) | Technical Manager<br>Name : JaeJin Lee (Signature) |

**2024 . 07 . 24 .**

**Dt&C Co., Ltd.**

**If this report is required to confirmation of authenticity, please contact to report@dtnc.net**

# Test Report Version

| Test Report No. | Date | Description | Revised by | Reviewed by |
|---|---|---|---|---|
| DRTFCC2407-0081 | Jul. 24, 2024 | Initial issue | SeokHo Han | JaeJin Lee |
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# 1. GENERAL INFORMATION

| | | |
|---|---|---|
| **Equipment Class** | PCS Licensed Transmitter held to ear(PCE) | |
| **Product Name** | Enterprise Full Touch Handheld Computer | |
| **Model Name(s)** | S50, S70 | |
| **PMN(Product Marketing Name)** | Enterprise Full Touch Handheld Computer | |
| **FVIN(Firmware Version Identification Number)** | R1.00 | |
| **EUT Serial Number** | Conducted: S50A5LAWBA320, S50A5LAWBA326<br>Radiated: S50A5LAWBA321 | |
| **Supplying power** | DC 3.85 V | |
| **Modulation Type** | QPSK, 16QAM, 64QAM, 256QAM | |
| **Channel Bandwidth(MHz)** | LTE Band 71: 20, 15, 10, 5<br>LTE Band 12: 10, 5, 3, 1.4<br>LTE Band 17: 10, 5<br>LTE Band 13: 10, 5<br>LTE Band 14: 10, 5<br>LTE Band 5: 10, 5, 3, 1.4<br>LTE Band 66: 20, 15, 10, 5, 3, 1.4<br>LTE Band 4: 20, 15, 10, 5, 3, 1.4<br>LTE Band 2: 20, 15, 10, 5, 3, 1.4<br>LTE Band 7: 20, 15, 10, 5<br>LTE Band 38: 20, 15, 10, 5 | |
| **Antenna Type** | LDS Antenna | |
| **Antenna Gain** | LTE Band | Gain(dBi) |
| | 71 | Ant 0: -5.44 |
| | 12(17) | Ant 0: -5.44 |
| | 13 | Ant 0: -4.50 |
| | 14 | Ant 0: -3.84 |
| | 5 | Ant 0: -1.91 |
| | 66(4) | Ant 0: 0.30 |
| | 2 | Ant 0: 0.77 |
| | 7 | Ant 0: -2.11 |
| | 38 | Ant 0: 2.21 |

| Mode | TX Frequency (MHz) | Emission Designator | Modulation | Conducted output power | | ERP | |
|---|---|---|---|---|---|---|---|
| | | | | dBm | W | dBm | W |
| LTE Band 71 | 673 ~ 688 | 17M8G7D | QPSK | 22.23 | 0.167 | 14.64 | 0.029 |
| LTE Band 71 | 673 ~ 688 | 17M8W7D | 16QAM | 21.39 | 0.138 | 13.80 | 0.024 |
| LTE Band 71 | 673 ~ 688 | 17M8W7D | 64QAM | 20.34 | 0.108 | 12.75 | 0.019 |
| LTE Band 71 | 673 ~ 688 | 17M8W7D | 256QAM | 17.35 | 0.054 | 9.76 | 0.009 |
| LTE Band 71 | 670.5 ~ 690.5 | 13M4G7D | QPSK | 21.99 | 0.158 | 14.40 | 0.028 |
| LTE Band 71 | 670.5 ~ 690.5 | 13M4W7D | 16QAM | 21.12 | 0.129 | 13.53 | 0.023 |
| LTE Band 71 | 670.5 ~ 690.5 | 13M4W7D | 64QAM | 20.07 | 0.102 | 12.48 | 0.018 |
| LTE Band 71 | 670.5 ~ 690.5 | 13M4W7D | 256QAM | 17.13 | 0.052 | 9.54 | 0.009 |
| LTE Band 71 | 668 ~ 693 | 8M93G7D | QPSK | 22.16 | 0.164 | 14.57 | 0.029 |
| LTE Band 71 | 668 ~ 693 | 8M92W7D | 16QAM | 21.31 | 0.135 | 13.72 | 0.024 |
| LTE Band 71 | 668 ~ 693 | 8M93W7D | 64QAM | 20.29 | 0.107 | 12.70 | 0.019 |
| LTE Band 71 | 668 ~ 693 | 8M97W7D | 256QAM | 17.23 | 0.053 | 9.64 | 0.009 |
| LTE Band 71 | 665.5 ~ 695.5 | 4M48G7D | QPSK | 21.94 | 0.156 | 14.35 | 0.027 |
| LTE Band 71 | 665.5 ~ 695.5 | 4M48W7D | 16QAM | 21.13 | 0.130 | 13.54 | 0.023 |
| LTE Band 71 | 665.5 ~ 695.5 | 4M48W7D | 64QAM | 20.07 | 0.102 | 12.48 | 0.018 |
| LTE Band 71 | 665.5 ~ 695.5 | 4M47W7D | 256QAM | 17.13 | 0.052 | 9.54 | 0.009 |
| LTE Band 12(17) | 704 ~ 711 | 8M95G7D | QPSK | 21.89 | 0.155 | 14.30 | 0.027 |
| LTE Band 12(17) | 704 ~ 711 | 8M92W7D | 16QAM | 21.08 | 0.128 | 13.49 | 0.022 |
| LTE Band 12(17) | 704 ~ 711 | 8M93W7D | QPSK | 20.08 | 0.102 | 12.49 | 0.018 |
| LTE Band 12(17) | 704 ~ 711 | 8M94W7D | 16QAM | 17.05 | 0.051 | 9.46 | 0.009 |
| LTE Band 12(17) | 701.5 ~ 713.5 | 4M48G7D | QPSK | 21.85 | 0.153 | 14.26 | 0.027 |
| LTE Band 12(17) | 701.5 ~ 713.5 | 4M48W7D | 16QAM | 21.04 | 0.127 | 13.45 | 0.022 |
| LTE Band 12(17) | 701.5 ~ 713.5 | 4M48W7D | 64QAM | 19.99 | 0.100 | 12.40 | 0.017 |
| LTE Band 12(17) | 701.5 ~ 713.5 | 4M47W7D | 256QAM | 17.02 | 0.050 | 9.43 | 0.009 |
| LTE Band 12 | 700.5 ~ 714.5 | 2M69G7D | QPSK | 21.83 | 0.152 | 14.24 | 0.027 |
| LTE Band 12 | 700.5 ~ 714.5 | 2M68W7D | 16QAM | 21.02 | 0.126 | 13.43 | 0.022 |
| LTE Band 12 | 700.5 ~ 714.5 | 2M68W7D | 64QAM | 20.01 | 0.100 | 12.42 | 0.017 |
| LTE Band 12 | 700.5 ~ 714.5 | 2M68W7D | 256QAM | 16.99 | 0.050 | 9.40 | 0.009 |
| LTE Band 12 | 699.7 ~ 715.3 | 1M08G7D | QPSK | 21.67 | 0.147 | 14.08 | 0.026 |
| LTE Band 12 | 699.7 ~ 715.3 | 1M08W7D | 16QAM | 20.86 | 0.122 | 13.27 | 0.021 |
| LTE Band 12 | 699.7 ~ 715.3 | 1M08W7D | 64QAM | 19.84 | 0.096 | 12.25 | 0.017 |
| LTE Band 12 | 699.7 ~ 715.3 | 1M08W7D | 256QAM | 16.80 | 0.048 | 9.21 | 0.008 |
| LTE Band 13 | 782 ~ 782 | 8M91G7D | QPSK | 21.83 | 0.152 | 15.18 | 0.033 |
| LTE Band 13 | 782 ~ 782 | 8M90W7D | 16QAM | 20.95 | 0.124 | 14.30 | 0.027 |
| LTE Band 13 | 782 ~ 782 | 8M94W7D | 64QAM | 19.88 | 0.097 | 13.23 | 0.021 |
| LTE Band 13 | 782 ~ 782 | 8M94W7D | 256QAM | 16.94 | 0.049 | 10.29 | 0.011 |
| LTE Band 13 | 779.5 ~ 784.5 | 4M47G7D | QPSK | 21.82 | 0.152 | 15.17 | 0.033 |
| LTE Band 13 | 779.5 ~ 784.5 | 4M46W7D | 16QAM | 20.93 | 0.124 | 14.28 | 0.027 |
| LTE Band 13 | 779.5 ~ 784.5 | 4M47W7D | 64QAM | 19.86 | 0.097 | 13.21 | 0.021 |
| LTE Band 13 | 779.5 ~ 784.5 | 4M46W7D | 256QAM | 16.91 | 0.049 | 10.26 | 0.011 |

| Mode | TX Frequency (MHz) | Emission Designator | Modulation | Conducted output power | | ERP | |
|---|---|---|---|---|---|---|---|
| | | | | dBm | W | dBm | W |
| LTE Band 14 | 793 ~ 793 | 8M91G7D | QPSK | 22.84 | 0.192 | 16.85 | 0.048 |
| LTE Band 14 | 793 ~ 793 | 8M91W7D | 16QAM | 21.96 | 0.157 | 15.97 | 0.040 |
| LTE Band 14 | 793 ~ 793 | 8M93W7D | 64QAM | 20.80 | 0.120 | 14.81 | 0.030 |
| LTE Band 14 | 793 ~ 793 | 8M90W7D | 256QAM | 17.86 | 0.061 | 11.87 | 0.015 |
| LTE Band 14 | 790.5 ~ 795.5 | 4M48G7D | QPSK | 22.78 | 0.190 | 16.79 | 0.048 |
| LTE Band 14 | 790.5 ~ 795.5 | 4M47W7D | 16QAM | 21.95 | 0.157 | 15.96 | 0.039 |
| LTE Band 14 | 790.5 ~ 795.5 | 4M49W7D | 64QAM | 20.86 | 0.122 | 14.87 | 0.031 |
| LTE Band 14 | 790.5 ~ 795.5 | 4M47W7D | 256QAM | 17.92 | 0.062 | 11.93 | 0.016 |
| LTE Band 5 | 829 ~ 844 | 8M93G7D | QPSK | 22.25 | 0.168 | 18.19 | 0.066 |
| LTE Band 5 | 829 ~ 844 | 8M93W7D | 16QAM | 21.27 | 0.134 | 17.21 | 0.053 |
| LTE Band 5 | 829 ~ 844 | 8M95W7D | 64QAM | 20.23 | 0.105 | 16.17 | 0.041 |
| LTE Band 5 | 829 ~ 844 | 8M96W7D | 256QAM | 17.33 | 0.054 | 13.27 | 0.021 |
| LTE Band 5 | 826.5 ~ 846.5 | 4M48G7D | QPSK | 22.14 | 0.164 | 18.08 | 0.064 |
| LTE Band 5 | 826.5 ~ 846.5 | 4M47W7D | 16QAM | 21.26 | 0.134 | 17.20 | 0.052 |
| LTE Band 5 | 826.5 ~ 846.5 | 4M47W7D | 64QAM | 20.15 | 0.104 | 16.09 | 0.041 |
| LTE Band 5 | 826.5 ~ 846.5 | 4M48W7D | 256QAM | 17.32 | 0.054 | 13.26 | 0.021 |
| LTE Band 5 | 825.5 ~ 847.5 | 2M69G7D | QPSK | 22.17 | 0.165 | 18.11 | 0.065 |
| LTE Band 5 | 825.5 ~ 847.5 | 2M68W7D | 16QAM | 21.24 | 0.133 | 17.18 | 0.052 |
| LTE Band 5 | 825.5 ~ 847.5 | 2M68W7D | 64QAM | 20.20 | 0.105 | 16.14 | 0.041 |
| LTE Band 5 | 825.5 ~ 847.5 | 2M68W7D | 256QAM | 17.33 | 0.054 | 13.27 | 0.021 |
| LTE Band 5 | 824.7 ~ 848.3 | 1M09G7D | QPSK | 22.13 | 0.163 | 18.07 | 0.064 |
| LTE Band 5 | 824.7 ~ 848.3 | 1M09W7D | 16QAM | 21.15 | 0.130 | 17.09 | 0.051 |
| LTE Band 5 | 824.7 ~ 848.3 | 1M10W7D | 64QAM | 20.09 | 0.102 | 16.03 | 0.040 |
| LTE Band 5 | 824.7 ~ 848.3 | 1M08W7D | 256QAM | 17.29 | 0.054 | 13.23 | 0.021 |

| Mode | TX Frequency (MHz) | Emission Designator | Modulation | Conducted output power | | EIRP | |
|---|---|---|---|---|---|---|---|
| | | | | dBm | W | dBm | W |
| LTE Band 66(4) | 1 720 ~ 1 770 | 17M9G7D | QPSK | 22.45 | 0.176 | 22.75 | 0.188 |
| LTE Band 66(4) | 1 720 ~ 1 770 | 17M9W7D | 16QAM | 21.54 | 0.143 | 21.84 | 0.153 |
| LTE Band 66(4) | 1 720 ~ 1 770 | 17M9W7D | 64QAM | 20.55 | 0.114 | 20.85 | 0.122 |
| LTE Band 66(4) | 1 720 ~ 1 770 | 17M9W7D | 256QAM | 17.39 | 0.055 | 17.69 | 0.059 |
| LTE Band 66(4) | 1 717.5 ~ 1 772.5 | 13M4G7D | QPSK | 22.34 | 0.171 | 22.64 | 0.184 |
| LTE Band 66(4) | 1 717.5 ~ 1 772.5 | 13M4W7D | 16QAM | 21.47 | 0.140 | 21.77 | 0.150 |
| LTE Band 66(4) | 1 717.5 ~ 1 772.5 | 13M5W7D | 64QAM | 20.49 | 0.112 | 20.79 | 0.120 |
| LTE Band 66(4) | 1 717.5 ~ 1 772.5 | 13M4W7D | 256QAM | 17.37 | 0.055 | 17.67 | 0.058 |
| LTE Band 66(4) | 1 715 ~ 1 775 | 8M97G7D | QPSK | 22.40 | 0.174 | 22.70 | 0.186 |
| LTE Band 66(4) | 1 715 ~ 1 775 | 8M94W7D | 16QAM | 21.50 | 0.141 | 21.80 | 0.151 |
| LTE Band 66(4) | 1 715 ~ 1 775 | 9M00W7D | 64QAM | 20.54 | 0.113 | 20.84 | 0.121 |
| LTE Band 66(4) | 1 715 ~ 1 775 | 8M97W7D | 256QAM | 17.50 | 0.056 | 17.80 | 0.060 |
| LTE Band 66(4) | 1 712.5 ~ 1 777.5 | 4M48G7D | QPSK | 22.40 | 0.174 | 22.70 | 0.186 |
| LTE Band 66(4) | 1 712.5 ~ 1 777.5 | 4M47W7D | 16QAM | 21.49 | 0.141 | 21.79 | 0.151 |
| LTE Band 66(4) | 1 712.5 ~ 1 777.5 | 4M48W7D | 64QAM | 20.46 | 0.111 | 20.76 | 0.119 |
| LTE Band 66(4) | 1 712.5 ~ 1 777.5 | 4M48W7D | 256QAM | 17.57 | 0.057 | 17.87 | 0.061 |
| LTE Band 66(4) | 1 711.5 ~ 1 778.5 | 2M69G7D | QPSK | 22.44 | 0.175 | 22.74 | 0.188 |
| LTE Band 66(4) | 1 711.5 ~ 1 778.5 | 2M69W7D | 16QAM | 21.57 | 0.144 | 21.87 | 0.154 |
| LTE Band 66(4) | 1 711.5 ~ 1 778.5 | 2M69W7D | 64QAM | 20.57 | 0.114 | 20.87 | 0.122 |
| LTE Band 66(4) | 1 711.5 ~ 1 778.5 | 2M69W7D | 256QAM | 17.58 | 0.057 | 17.88 | 0.061 |
| LTE Band 66(4) | 1 710.7 ~ 1 779.3 | 1M08G7D | QPSK | 22.40 | 0.174 | 22.70 | 0.186 |
| LTE Band 66(4) | 1 710.7 ~ 1 779.3 | 1M08W7D | 16QAM | 21.50 | 0.141 | 21.80 | 0.151 |
| LTE Band 66(4) | 1 710.7 ~ 1 779.3 | 1M08W7D | 64QAM | 20.47 | 0.111 | 20.77 | 0.119 |
| LTE Band 66(4) | 1 710.7 ~ 1 779.3 | 1M08W7D | 256QAM | 17.59 | 0.057 | 17.89 | 0.062 |
| LTE Band 2 | 1 860 ~ 1 900 | 17M9G7D | QPSK | 22.47 | 0.177 | 23.24 | 0.211 |
| LTE Band 2 | 1 860 ~ 1 900 | 17M9W7D | 16QAM | 21.49 | 0.141 | 22.26 | 0.168 |
| LTE Band 2 | 1 860 ~ 1 900 | 17M9W7D | 64QAM | 20.44 | 0.111 | 21.21 | 0.132 |
| LTE Band 2 | 1 860 ~ 1 900 | 17M9W7D | 256QAM | 17.51 | 0.056 | 18.28 | 0.067 |
| LTE Band 2 | 1 857.5 ~ 1 902.5 | 13M4G7D | QPSK | 22.14 | 0.164 | 22.91 | 0.195 |
| LTE Band 2 | 1 857.5 ~ 1 902.5 | 13M4W7D | 16QAM | 21.26 | 0.134 | 22.03 | 0.160 |
| LTE Band 2 | 1 857.5 ~ 1 902.5 | 13M4W7D | 64QAM | 20.27 | 0.106 | 21.04 | 0.127 |
| LTE Band 2 | 1 857.5 ~ 1 902.5 | 13M4W7D | 256QAM | 17.28 | 0.053 | 18.05 | 0.064 |
| LTE Band 2 | 1 855 ~ 1 905 | 8M96G7D | QPSK | 22.33 | 0.171 | 23.10 | 0.204 |
| LTE Band 2 | 1 855 ~ 1 905 | 8M94W7D | 16QAM | 21.44 | 0.139 | 22.21 | 0.166 |
| LTE Band 2 | 1 855 ~ 1 905 | 8M97W7D | 64QAM | 20.43 | 0.110 | 21.20 | 0.132 |
| LTE Band 2 | 1 855 ~ 1 905 | 8M96W7D | 256QAM | 17.39 | 0.055 | 18.16 | 0.065 |
| LTE Band 2 | 1 852.5 ~ 1 907.5 | 4M47G7D | QPSK | 22.36 | 0.172 | 23.13 | 0.206 |
| LTE Band 2 | 1 852.5 ~ 1 907.5 | 4M47W7D | 16QAM | 21.45 | 0.140 | 22.22 | 0.167 |
| LTE Band 2 | 1 852.5 ~ 1 907.5 | 4M48W7D | 64QAM | 20.44 | 0.111 | 21.21 | 0.132 |
| LTE Band 2 | 1 852.5 ~ 1 907.5 | 4M48W7D | 256QAM | 17.45 | 0.056 | 18.22 | 0.066 |
| LTE Band 2 | 1 851.5 ~ 1 908.5 | 2M68G7D | QPSK | 22.16 | 0.164 | 22.93 | 0.196 |
| LTE Band 2 | 1 851.5 ~ 1 908.5 | 2M69W7D | 16QAM | 21.35 | 0.136 | 22.12 | 0.163 |
| LTE Band 2 | 1 851.5 ~ 1 908.5 | 2M69W7D | 64QAM | 20.24 | 0.106 | 21.01 | 0.126 |
| LTE Band 2 | 1 851.5 ~ 1 908.5 | 2M68W7D | 256QAM | 17.29 | 0.054 | 18.06 | 0.064 |
| LTE Band 2 | 1 850.7 ~ 1 909.3 | 1M08G7D | QPSK | 22.42 | 0.175 | 23.19 | 0.208 |
| LTE Band 2 | 1 850.7 ~ 1 909.3 | 1M08W7D | 16QAM | 21.43 | 0.139 | 22.20 | 0.166 |
| LTE Band 2 | 1 850.7 ~ 1 909.3 | 1M08W7D | 64QAM | 20.43 | 0.110 | 21.20 | 0.132 |
| LTE Band 2 | 1 850.7 ~ 1 909.3 | 1M08W7D | 256QAM | 17.52 | 0.056 | 18.29 | 0.067 |

| Mode | TX Frequency (MHz) | Emission Designator | Modulation | Conducted output power | | EIRP | |
|---|---|---|---|---|---|---|---|
| | | | | dBm | W | dBm | W |
| LTE Band 7 | 2 510 ~ 2 560 | 17M9G7D | QPSK | 22.78 | 0.190 | 20.67 | 0.117 |
| LTE Band 7 | 2 510 ~ 2 560 | 17M9W7D | 16QAM | 21.87 | 0.154 | 19.76 | 0.095 |
| LTE Band 7 | 2 510 ~ 2 560 | 17M9W7D | 64QAM | 20.84 | 0.121 | 18.73 | 0.075 |
| LTE Band 7 | 2 510 ~ 2 560 | 17M9W7D | 256QAM | 17.87 | 0.061 | 15.76 | 0.038 |
| LTE Band 7 | 2 507.5 ~ 2 562.5 | 13M4G7D | QPSK | 22.60 | 0.182 | 20.49 | 0.112 |
| LTE Band 7 | 2 507.5 ~ 2 562.5 | 13M4W7D | 16QAM | 21.76 | 0.150 | 19.65 | 0.092 |
| LTE Band 7 | 2 507.5 ~ 2 562.5 | 13M4W7D | 64QAM | 20.72 | 0.118 | 18.61 | 0.073 |
| LTE Band 7 | 2 507.5 ~ 2 562.5 | 13M4W7D | 256QAM | 17.71 | 0.059 | 15.60 | 0.036 |
| LTE Band 7 | 2 505 ~ 2 565 | 8M94G7D | QPSK | 22.70 | 0.186 | 20.59 | 0.115 |
| LTE Band 7 | 2 505 ~ 2 565 | 8M94W7D | 16QAM | 21.89 | 0.155 | 19.78 | 0.095 |
| LTE Band 7 | 2 505 ~ 2 565 | 8M95W7D | 64QAM | 20.85 | 0.122 | 18.74 | 0.075 |
| LTE Band 7 | 2 505 ~ 2 565 | 8M94W7D | 256QAM | 17.72 | 0.059 | 15.61 | 0.036 |
| LTE Band 7 | 2 502.5 ~ 2 567.5 | 4M47G7D | QPSK | 22.61 | 0.182 | 20.50 | 0.112 |
| LTE Band 7 | 2 502.5 ~ 2 567.5 | 4M48W7D | 16QAM | 21.81 | 0.152 | 19.70 | 0.093 |
| LTE Band 7 | 2 502.5 ~ 2 567.5 | 4M48W7D | 64QAM | 20.72 | 0.118 | 18.61 | 0.073 |
| LTE Band 7 | 2 502.5 ~ 2 567.5 | 4M47W7D | 256QAM | 17.70 | 0.059 | 15.59 | 0.036 |
| LTE Band 38 | 2 580 ~ 2 610 | 17M9G7D | QPSK | 22.67 | 0.185 | 24.88 | 0.308 |
| LTE Band 38 | 2 580 ~ 2 610 | 17M8W7D | 16QAM | 21.85 | 0.153 | 24.06 | 0.255 |
| LTE Band 38 | 2 580 ~ 2 610 | 17M8W7D | 64QAM | 20.64 | 0.116 | 22.85 | 0.193 |
| LTE Band 38 | 2 580 ~ 2 610 | 17M9W7D | 256QAM | 17.75 | 0.060 | 19.96 | 0.099 |
| LTE Band 38 | 2 577.5 ~ 2 612.5 | 13M5G7D | QPSK | 22.49 | 0.177 | 24.70 | 0.295 |
| LTE Band 38 | 2 577.5 ~ 2 612.5 | 13M4W7D | 16QAM | 21.61 | 0.145 | 23.82 | 0.241 |
| LTE Band 38 | 2 577.5 ~ 2 612.5 | 13M4W7D | 64QAM | 20.53 | 0.113 | 22.74 | 0.188 |
| LTE Band 38 | 2 577.5 ~ 2 612.5 | 13M4W7D | 256QAM | 17.64 | 0.058 | 19.85 | 0.097 |
| LTE Band 38 | 2 575 ~ 2 615 | 8M93G7D | QPSK | 22.57 | 0.181 | 24.78 | 0.301 |
| LTE Band 38 | 2 575 ~ 2 615 | 8M92W7D | 16QAM | 21.76 | 0.150 | 23.97 | 0.249 |
| LTE Band 38 | 2 575 ~ 2 615 | 8M94W7D | 64QAM | 20.72 | 0.118 | 22.93 | 0.196 |
| LTE Band 38 | 2 575 ~ 2 615 | 8M92W7D | 256QAM | 17.65 | 0.058 | 19.86 | 0.097 |
| LTE Band 38 | 2 572.5 ~ 2 617.5 | 4M47G7D | QPSK | 22.45 | 0.176 | 24.66 | 0.292 |
| LTE Band 38 | 2 572.5 ~ 2 617.5 | 4M48W7D | 16QAM | 21.61 | 0.145 | 23.82 | 0.241 |
| LTE Band 38 | 2 572.5 ~ 2 617.5 | 4M48W7D | 64QAM | 20.53 | 0.113 | 22.74 | 0.188 |
| LTE Band 38 | 2 572.5 ~ 2 617.5 | 4M47W7D | 256QAM | 17.59 | 0.057 | 19.80 | 0.095 |

# 2. INTRODUCTION

## 2.1. EUT DESCRIPTION

The Equipment Under Test (EUT) supports 850/1900 GSM, 850/1700/1900 WCDMA, Multi-band LTE/5GNR, 2.4/5/6GHz WLAN, Bluetooth(BDR, EDR, BLE) and NFC.

## 2.2. TESTING ENVIRONMENT

| Ambient Condition | |
|---|---|
| ▪ Temperature | +20 ℃ ~ +25 ℃ |
| ▪ Relative Humidity | 39 % ~ 45 % |

## 2.3. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

## 2.4. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with requirements of ANSI C 63.4-2014. All measurement uncertainty values are shown with a coverage factor of *k* = 2 to indicate a 95 % level of confidence.

| Parameter | Measurement uncertainty |
|---|---|
| Antenna-port conducted Disturbance | 1.0 dB (The confidence level is about 95 %, k = 2) |
| Radiated Disturbance (1 GHz Below) | 5.0 dB (The confidence level is about 95 %, k = 2) |
| Radiated Disturbance (1 GHz ~ 18 GHz) | 4.8 dB (The confidence level is about 95 %, k = 2) |
| Radiated Disturbance (18 GHz Above) | 5.0 dB (The confidence level is about 95 %, k = 2) |

## 2.5. TEST FACILITY

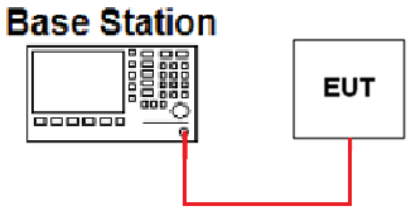
| **Dt&C Co., Ltd.** | | |
|---|---|---|
| The 3 m test site and conducted measurement facility used to collect the radiated data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042.<br>The test site complies with the requirements of Part 2.948 according to ANSI C63.4-2014.<br>**- FCC & IC MRA Designation No. : KR0034**<br>**- ISED#: 5740A** | | |
| www.dtnc.net | | |
| Telephone | : | + 82-31-321-2664 |
| FAX | : | + 82-31-321-1664 |

# 3. DESCRIPTION OF TESTS

## 3.1. MAXIMUM OUTPUT POWER

### Conducted Output Power

### Test Set-up




### Test Procedure

- **KDB971168 D01v03 - Section 5.2.4**
- **ANSI C63.26-2015 – Section 5.2.4.2**

When an average power meter is used to perform RF output power measurements, the fundamental condition that measurements be performed only over durations of active transmissions at maximum output power level applies. Thus, an average power meter can always be used to perform the measurement when the EUT can be configured to transmit continuously.
If the EUT cannot be configured to transmit continuously (i.e., burst duty cycle < 98%), then the following options can be implemented to facilitate measurement of the average power with an average power meter:
a) A gated average power meter can be used to perform the measurement if the gating parameters can be adjusted such that the power is measured only during active transmission bursts at maximum output power levels.
b) A conventional average power meter with no signal gating capability can also be used if the measured burst duty cycle is constant (i.e., duty cycle variations are less than or equal to ±2%) by performing the measurement over the on/off burst cycles and then correcting (increasing) the measured level by a factor equal to [10 log (1/duty cycle)].

### - ERP & EIRP (Effective Radiated Power & Equivalent Isotropic Radiated Power)

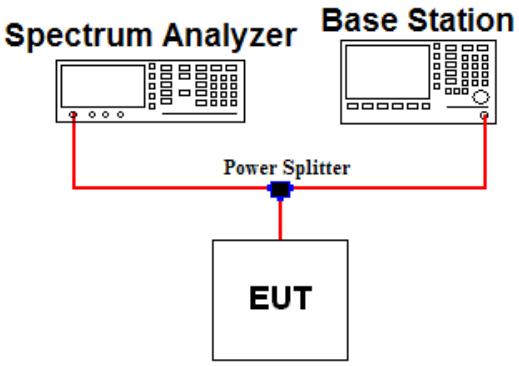
### Test Procedure

- **KDB971168 D01v03 - Section 5.6**
- **ANSI C63.26-2015 – Section 5.2.5.5**

**Determining ERP and EIRP from conducted RF output power measurement results**
ERP or EIRP = $P_{Meas}$ + $G_T$
where:
ERP or EIRP = effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as $P_{Meas}$, typically dBW or dBm);
$P_{Meas}$ = measured transmitter output power or PSD, in dBm or dBW;
$G_T$ = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

## 3.2. PEAK TO AVERAGE RATIO

### Test set-up




### Test Procedure

- **KDB971168 D01v03 - Section 5.7.2**
- **ANSI C63.26-2015 – Section 5.2.3.4**

A peak to average ratio measurement is performed at the conducted port of the EUT.
The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The present of time the signal spends at or above the level defines the probability for that particular power level.

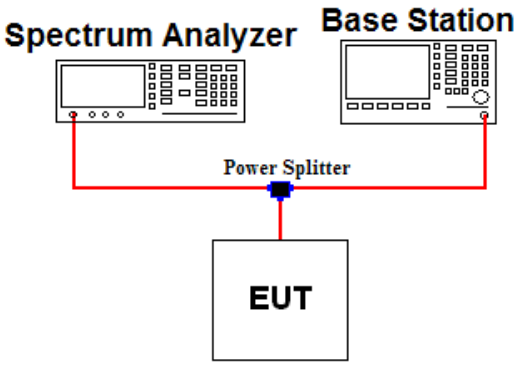
Test setting

The spectrum Analyzer`s CCDF measurement function is enabled.

1. Set resolution/measurement bandwidth ≥ OBW or specified reference bandwidth.
2. Set the number of counts to a value that stabilizes the measured CCDF curve.
3. Set the measurement interval as follows:
   1) For continuous transmissions, set to the greater of [10 × (number of points in sweep) × (transmission symbol period)] or 1 ms.
   2) For burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize. Set the measurement interval to a time that is less than or equal to the burst duration.
   3) If there are several carriers in a single antenna port, the peak power shall be determined for each individual carrier (by disabling the other carriers while measuring the required carrier) and the total peak power calculated from the sum of the individual carrier peak powers.
4. Record the maximum PAPR level associated with a probability of 0.1 %.
5. The peak power level is calculated form the sum of the PAPR value from step d) to the measured average power.

## 3.3. OCCUPIED BANDWIDTH

### Test set-up




### Test Procedure

- **KDB971168 D01v03 - Section 4.3**
- **ANSI C63.26-2015 – Section 5.4.4**

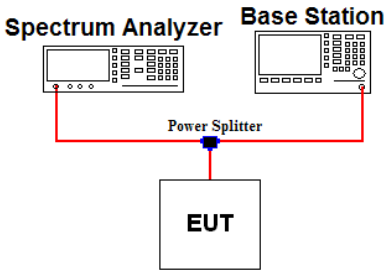
The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power of a given emission.

Test setting

1. The signal analyzer`s automatic bandwidth measurement capability was used to perform the 99 % occupied bandwidth and the 26 dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 % ~ 5 % of the expected OBW & VBW ≥ 3 X RBW
3. Detector = Peak
4. Trance mode = Max hold
5. Sweep = Auto couple
6. The trace was allowed to stabilize
7. If necessary, step 2 ~ 6 were repeated after changing the RBW such that it would be within 1 % ~ 5 % of the 99 % occupied bandwidth observed in step 6.

## 3.4. BAND EDGE EMISSIONS AT ANTENNA TERMINAL

### Test set-up




### Test Procedure

- **KDB971168 D01v03 - Section 6**
- **ANSI C63.26-2015 – Section 5.7**

All out of band emissions are measured by means of a calibrated spectrum analyzer. The EUT was setup to maximum output power at its lowest and highest channel with all bandwidths, modulations and RB configurations.

Test setting

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW ≥ 1 % of the emission bandwidth or Specified bandwidth
4. VBW ≥ 3 X RBW
5. Detector = RMS & Trace mode = Max hold or Average
6. Sweep time = Auto couple or 1 s for band edge
7. Number of sweep point ≥ 2 X span / RBW
8. The trace was allowed to stabilize

Note 1: Per Part 22.917(b)(1) / 24.238(b) / 27.53(h) in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions limit.

Note 2: Per Part 27.53(g) for operations in the 600 MHz band and the 698-746 MHz band, 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.

Note 3: Per Part 27.53(c.4) for all frequencies between 763 MHz - 775 MHz and 793 MHz - 805 MHz, the FCC limit is 65 + 10 log10(P[Watts]) = -35 dBm in a 6.25 kHz bandwidth.

Note 4: For part 27.53(m)(4) the attenuation 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 as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2 490.5 MHz and 2 496 MHz and 55 + 10 log (P) dB at or below 2 490.5 MHz.

Note 5: Per Part 90.543(e) for operations in the 758-768 MHz and the 788-798 MHz bands, the power of any emission outside the 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, in accordance with the following:

(1) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations.

(2) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.

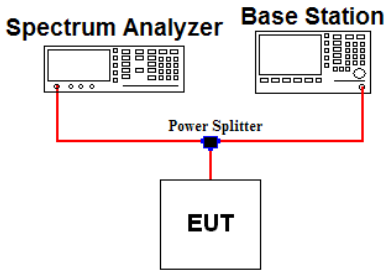
(3) On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + 10 log (P) dB.

(4) Compliance with the provisions of paragraphs (e)(1) and (2) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

(5) Compliance with the provisions of paragraph (e)(3) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of 30 kHz may be employed.

## 3.5. SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL

### Test set-up




### Test Procedure

- **KDB971168 D01v03 - Section 6**
- **ANSI C63.26-2015 – Section 5.7**

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The EUT was setup to maximum output power at its low, middle, high channel with all bandwidths, modulations and RB configurations. The spectrum is scanned from 9 kHz up to a frequency including its 10th harmonic.

The power of any spurious emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log(P) dB.

Test setting

1. RBW = 100 kHz(Below 1 GHz) or 1 MHz(Above 1 GHz) & VBW ≥ 3 X RBW ( Refer to Note 2)
2. Detector = RMS & Trace mode = Max hold or Average
3. Sweep time = Auto couple
4. Number of sweep point ≥ 2 X span / RBW
5. The trace was allowed to stabilize

Note 1: For TDD signal, the trace mode was set to average and trigger was set to free run.
And added 10 log (1/duty cycle) to the measured power level. (Path loss was applied to the spectrum correction factor, and 10 log (1/duty cycle) was applied to the spectrum offset function during measurement.

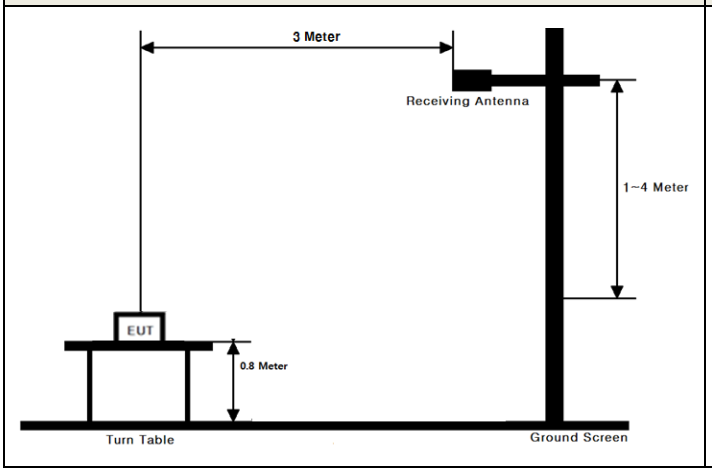
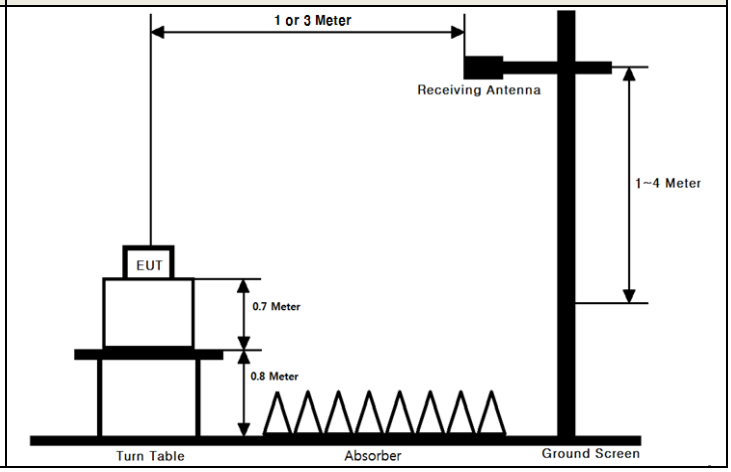
**EUT duty cycle (TDD Bands)**

| Band | $T_{on}$(ms) | $T_{on+off}$ (ms) | Duty cycle = $T_{on}$ / ($T_{on+off}$) | 10 log (1/duty cycle) |
|---|---|---|---|---|
| 38 | 2 | 5 | 0.4 | 3.98 dB |

Note 2: Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than 1GHz.

## 3.6. UNDESIRABLE EMISSIONS

### Test Set-up

| Below 1GHz | Above 1GHz |
|---|---|
|  |  |



These measurements were performed at 3 test site. The equipment under test is placed on a non-conductive table 0.8 or 1.5 meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna. For measurements above 1 GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1 GHz, the absorbers are removed.

### Test Procedure

- **KDB971168 D01v03 - Section 6**
- **ANSI C63.26-2015 – Section 5.5**
- **ANSI/TIA-603-E-2016 - Section 2.2.12**

Test setting

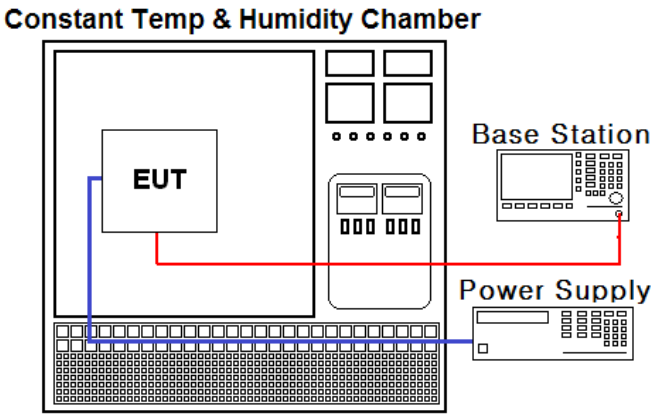
1. RBW = 100 kHz for below 1 GHz and 1 MHz for above 1 GHz / VBW ≥ 3 X RBW
2. Detector = RMS & Trace mode = power averaging (rms)
3. Sweep time = Auto couple
4. Number of sweep point ≥ 2 X span / RBW
5. The trace was allowed to stabilize

Note1: If duty cycle < 98%, add 10 log (1/duty cycle) to the measured power level to compute the average power during continuous transmission. Please refer to the section 3.4 note 1 for duty cycle.

The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer. For radiated power measurements below 1 GHz, a half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading.
For radiated power measurements above 1 GHz, a Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading. The difference between the gain of the horn and an isotropic antenna are taken into consideration. This measurement was performed with the EUT oriented in 3 orthogonal axis.

## 3.7. FREQUENCY STABILITY

### Test Set-up




### Test Procedure

- **KDB971168 D01v03 - Section 9**
- **ANSI/TIA-603-E-2016**

The frequency stability of the transmitter is measured by:

a.) **Temperature:**
The temperature is varied from -30 °C to +50 °C using an environmental chamber.

b.) **Primary Supply Voltage:**
The primary supply voltage is varied from 85 % to 115 % of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

**Specification:**

Part 24.235, Part 27.54: The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.
Part 22.355: The frequency stability of the transmitter shall be maintained within ±0.000 25 % (±2.5 ppm) of the center frequency.
Part 90.539(e): The frequency stability of mobile, portable and control transmitters operating in the wideband segment must be 1.25 parts per million or better when AFC is locked to a base station, and 5 parts per million or better when AFC is not locked.

**Time Period and Procedure:**

1. The carrier frequency of the transmitter is measured at room temperature.
   (20 °C to provide a reference)
2. The equipment is turned on in a “standby” condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10 °C intervals ranging from -30 °C to +50 °C.
   A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

# 4. LIST OF TEST EQUIPMENT

| Type | Manufacturer | Model | Cal.Date (yy/mm/dd) | Next.Cal. Date (yy/mm/dd) | S/N |
|---|---|---|---|---|---|
| Spectrum Analyzer | Agilent Technologies | N9020A | 23/12/15 | 24/12/15 | MY50110097 |
| Spectrum Analyzer | Agilent Technologies | N9020A | 23/12/15 | 24/12/15 | MY50410163 |
| Spectrum Analyzer | KEYSIGHT | N9030B | 23/12/15 | 24/12/15 | MY55480168 |
| DC power supply | H.P | 66332A | 23/12/15 | 24/12/15 | US37471368 |
| Multimeter | FLUKE | 17B+ | 23/12/15 | 24/12/15 | 36390701WS |
| Power Splitter | Anritsu | K241B | 23/06/23<br>24/06/04 | 24/06/23<br>25/06/04 | 020611 |
| Temp & Humi | SJ Science | SJ-TH-S50 | 23/06/22<br>24/06/11 | 24/06/22<br>25/06/11 | SJ-TH-S50-130930 |
| Radio Communication Analyzer | Anritsu | MT8821C | 23/12/15 | 24/12/15 | 6262062793 |
| Thermohygrometer | BODYCOM | BJ5478 | 23/12/15 | 24/12/15 | 120612-1 |
| Thermohygrometer | BODYCOM | BJ5478 | 23/12/15 | 24/12/15 | 120612-2 |
| Signal Generator | Rohde Schwarz | SMBV100A | 23/12/15 | 24/12/15 | 255571 |
| Signal Generator | ANRITSU | MG3695C | 23/12/15 | 24/12/15 | 173501 |
| Loop Antenna | ETS-Lindgren | 6502 | 23/11/09 | 24/11/09 | 00060496 |
| BILOG ANTENNA | Schwarzbeck | VULB9160 | 23/12/15 | 24/12/15 | 3362 |
| Dipole Antenna | Schwarzbeck | UHA9105 | 22/12/16 | 24/12/16 | 2262 |
| HORN ANT | ETS | 3117 | 23/12/15 | 24/12/15 | 00140394 |
| HORN ANT | A.H.Systems | SAS-574 | 23/06/23<br>24/06/11 | 24/06/23<br>25/06/11 | 155 |
| PreAmplifier | H.P | 8447D | 23/12/15 | 24/12/15 | 2944A07774 |
| PreAmplifier | Agilent | 8449B | 23/12/15 | 24/12/15 | 3008A02108 |
| PreAmplifier | tsj | MLA-1840-J02-45 | 23/06/23<br>24/06/03 | 24/06/23<br>25/06/03 | 16966-10728 |
| High Pass Filter | Wainwright Instruments | WHKX12-935-1000-15000-40SS | 23/12/15 | 24/12/15 | 7 |
| High Pass Filter | Wainwright Instruments | WHKX10-2838-3300-18000-60SS | 23/12/15 | 24/12/15 | 2 |
| High Pass Filter | Wainwright Instruments | WHKX6-6320-8000-26500-40CC | 23/12/15 | 24/12/15 | 2 |
| Cable | HUBER+SUHNER | SUCOFLEX100 | 24/01/03 | 25/01/03 | M-1 |
| Cable | HUBER+SUHNER | SUCOFLEX100 | 24/01/03 | 25/01/03 | M-2 |
| Cable | Junkosha | MWX241/B | 24/01/03 | 25/01/03 | M-3 |
| Cable | Junkosha | MWX221 | 24/01/03 | 25/01/03 | M-4 |
| Cable | Junkosha | MWX221 | 24/01/03 | 25/01/03 | M-5 |
| Cable | JUNFLON | J12J101757-00 | 24/01/03 | 25/01/03 | M-7 |
| Cable | HUBER+SUHNER | SUCOFLEX104 | 24/01/03 | 25/01/03 | M-8 |
| Cable | HUBER+SUHNER | SUCOFLEX106 | 24/01/03 | 25/01/03 | M-9 |
| Cable | Junkosha | MWX315 | 24/01/03 | 25/01/03 | M-10 |
| Cable | DTNC | Cable | 24/01/03 | 25/01/03 | RFC-69 |
| Cable | Junkosha | MWX241 | 24/01/03 | 25/01/03 | mmW-1 |
| Cable | Junkosha | MWX241 | 24/01/03 | 25/01/03 | mmW-4 |
| Test Software | tsj | Radiated Emission Measurement | NA | NA | Version 2.00.0185 |
| Test Software | tsj | Noise Terminal Measurement | NA | NA | Version 2.00.0190 |

Note1: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2017.
Note2: The cable is not a regular calibration item, so it has been calibrated by Dt&C itself.

# 5. SUMMARY OF TEST RESULTS

| FCC Part Section(s) | Test Description | Test Limit | Status Note 1 |
|---|---|---|---|
| 2.1046 | Conducted Output Power | N/A | C |
| 2.1049 | Occupied Bandwidth | N/A | C |
| 22.913(d)<br>24.232(d)<br>27.50(d.5) | Peak to Average Ratio | < 13 dB | C |
| 2.1051<br>22.917(a)<br>24.238(a)<br>27.53(g)<br>27.53(h)<br>27.53(c) | Band Edge /<br>Conducted Spurious Emissions | > 43 + 10log$_{10}$ (P) dB at Band edge and for all out-of-band emissions | C |
| 27.53(c.4) | Undesirable emissions in 763 ~ 775MHz & 793 ~ 806MHz | >65 + 10 log (P) dB in a 6.25 kHz band segment frequencies between 763-775 MHz and 793-805 MHz | C |
| 27.53(m) | Band Edge /<br>Conducted Spurious Emissions | > 40 + 10log10 (P) dB at channel edge and 5 MHz from the channel edge<br>> 43 + 10log10 (P) dB at 5 MHz and X MHz from the channel edge<br>> 55 + 10log10 (P) dB at all frequencies more than X MHz from the channel edge | C |
| 90.543(e) | Band Edge /<br>Conducted Spurious Emissions | >65 + 10 log (P) dB in a 6.25 kHz band segment frequencies between 769-775MHz and 799-805MHz<br>>43 + 10 log (P) dB at frequency between 775-788 MHz, above 805 MHz, and below 758 MHz | C |
| 2.1055<br>22.355<br>24.235<br>27.54<br>90.539(e) | Frequency Stability | Refer to section 3.7 of this report. | C |
| 27.50(b.10)<br>27.50(c.10)<br>90.542(a.7) | Radiated Output Power<br>(B12, 17, 13, 14, 71) | < 3 Watts max. ERP | C |
| 22.913(a.5) | Radiated Output Power<br>(B5) | For mobile equipment:<br>< 7 Watts max. ERP | C |
| 27.50(d)(4) | Radiated Output Power<br>(B66, 4) | For mobile equipment:<br>< 1 Watts max. EIRP | C |
| 24.232(c)<br>27.50(h.2) | Radiated Output Power<br>(B2, 7, 38) | For mobile equipment:<br>< 2 Watts max. EIRP | C |
| 2.1053<br>22.917(a)<br>24.238(a)<br>27.53(g)<br>27.53(h)<br>90.543(c) | Undesirable Emissions<br>(B5, 2, 66, 4, 12, 17, 13, 14, 71) | > 43 + 10log$_{10}$ (P) dB for all out-of-band emissions | C Note2 |
| 27.53(f)<br>90.543(f) | Undesirable Emissions in 1559 ~ 1610 MHz<br>(B13, 14) | < -70 dBW/MHz (for wideband signals)<br>< -80 dBW (for discrete emissions of less than 700 Hz bandwidth) | C Note2 |
| 27.53(m)(4) | Undesirable Emissions<br>(B7, 38) | > 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge<br>where X is the greater of 6 megahertz or the actual emission bandwidth | C Note2 |

Note 1: **C**=Comply **NC**=Not Comply **NT**=Not Tested **NA**=Not Applicable
Note 2: This test item was performed in three orthogonal EUT positions and the worst case data was reported.
Note 3: LTE Band 12 (699 ~ 716 MHz) overlaps the entire frequency range of LTE Band 17 (704 ~ 716 MHz).
Therefore, test data provided in this test report covers Band 17 as well as Band 12.
LTE Band 66 (1710 ~ 1780 MHz) overlaps the entire frequency range of LTE Band 4 (1710 ~ 1750 MHz).
Therefore, test data provided in this test report covers Band 4 as well as Band 66.

# 6. SAMPLE CALCULATION

## A. Emission Designator

**LTE Band 5(QPSK)**

Emission Designator = **8M93G7D**
LTE OBW = 8.931 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Data Transmission

**LTE Band 5(16QAM)**

Emission Designator = **8M93W7D**
LTE OBW = 8.929 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Data Transmission

**LTE Band 5(64QAM)**

Emission Designator = **8M95W7D**
LTE OBW = 8.954 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Data Transmission

**LTE Band 5(256QAM)**

Emission Designator = **8M96W7D**
LTE OBW = 8.962 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Data Transmission

## B. For substitution method

**Unwanted emissions**

1) The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1 GHz respectively above ground.
2) The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
3) Vary the measurement antenna height through 1 m to 4 m and the rotate EUT through 360° in order to determine the maximum emission level.
4) Record the measured emission level and frequency using the available test method.
If required by the test method, add 10 log(1/duty cycle) to measured emission level.
5) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
6) Vary the measurement antenna height between 1 m to 4 m to maximize the received (measured) signal amplitude. And adjust the signal generator output power level until the amplitude detected by the measurement instrument equals the previously measured emission level.
7) The conducted power at the terminal of the substitute antenna is measured.
8) Record the level at substituted antenna terminal.
9) The result is calculated as below;

**Result: EIRP(dBm) = Level at Substitute antenna terminal + Substitute Antenna Gain (dBi)**
**Result: ERP(dBm) = Level at Substitute antenna terminal + Substitute Antenna Gain (dBd)**
**Where, TX Antenna Gain (dBd) = TX Antenna Gain (dBi) - 2.15 dB**

# 7. TEST DATA

## 7.1. OCCUPIED BANDWIDTH

- Plots of the EUT's Occupied Bandwidth are shown in Clause 8.1

## 7.2. PEAK TO AVERAGE RATIO

- Plots of the EUT's Peak- to- Average Ratio are shown in Clause 8.2

## 7.3. BAND EDEG EMISSIONS (Conducted)

- Plots of the EUT's Band Edge Emissions are shown in Clause 8.3

## 7.4. SPURIOUS AND HARMONICS EMISSIONS (Conducted)

- Plots of the EUT's Spurious Emissions are shown in Clause 8.4

## 7.5. MAXIMUM OUTPUT POWER

**- Test Notes**

1) The EUT was tested under all bandwidths, modulations and RB configurations and the worst case data are reported in the below table.

2) EIRP = Conducted Output Power(dBm) + Antenna gain(dBi), ERP = EIRP – 2.15(dB)

### 7.5.1. LTE Band 71

| Channel Bandwidth (MHz) | Frequency (MHz) | Modulation | RB Size/ Offset | Conducted Output Power (dBm) | Antenna Gain(dBi) | EIRP (dBm) | ERP (dBm) |
|---|---|---|---|---|---|---|---|
| 20 | 673 | QPSK | 1/50 | 22.10 | -5.44 | 16.66 | 14.51 |
| | | 16QAM | 1/50 | 21.29 | -5.44 | 15.85 | 13.70 |
| | | 64QAM | 1/50 | 20.23 | -5.44 | 14.79 | 12.64 |
| | | 256QAM | 1/50 | 17.27 | -5.44 | 11.83 | 9.68 |
| | 680.5 | QPSK | 1/50 | 22.02 | -5.44 | 16.58 | 14.43 |
| | | 16QAM | 1/50 | 21.17 | -5.44 | 15.73 | 13.58 |
| | | 64QAM | 1/50 | 20.13 | -5.44 | 14.69 | 12.54 |
| | | 256QAM | 1/50 | 17.18 | -5.44 | 11.74 | 9.59 |
| | 688 | QPSK | 1/50 | 22.23 | -5.44 | 16.79 | 14.64 |
| | | 16QAM | 1/50 | 21.39 | -5.44 | 15.95 | 13.80 |
| | | 64QAM | 1/50 | 20.34 | -5.44 | 14.90 | 12.75 |
| | | 256QAM | 1/50 | 17.35 | -5.44 | 11.91 | 9.76 |
| 15 | 670.5 | QPSK | 1/36 | 21.96 | -5.44 | 16.52 | 14.37 |
| | | 16QAM | 1/36 | 21.11 | -5.44 | 15.67 | 13.52 |
| | | 64QAM | 1/36 | 20.05 | -5.44 | 14.61 | 12.46 |
| | | 256QAM | 1/36 | 17.13 | -5.44 | 11.69 | 9.54 |
| | 680.5 | QPSK | 1/36 | 21.95 | -5.44 | 16.51 | 14.36 |
| | | 16QAM | 1/36 | 21.09 | -5.44 | 15.65 | 13.50 |
| | | 64QAM | 1/36 | 20.02 | -5.44 | 14.58 | 12.43 |
| | | 256QAM | 1/36 | 17.06 | -5.44 | 11.62 | 9.47 |
| | 690.5 | QPSK | 1/36 | 21.99 | -5.44 | 16.55 | 14.40 |
| | | 16QAM | 1/36 | 21.12 | -5.44 | 15.68 | 13.53 |
| | | 64QAM | 1/36 | 20.07 | -5.44 | 14.63 | 12.48 |
| | | 256QAM | 1/36 | 17.09 | -5.44 | 11.65 | 9.50 |
| 10 | 668 | QPSK | 1/25 | 22.04 | -5.44 | 16.60 | 14.45 |
| | | 16QAM | 1/25 | 21.23 | -5.44 | 15.79 | 13.64 |
| | | 64QAM | 1/25 | 20.23 | -5.44 | 14.79 | 12.64 |
| | | 256QAM | 1/25 | 17.23 | -5.44 | 11.79 | 9.64 |
| | 680.5 | QPSK | 1/25 | 22.03 | -5.44 | 16.59 | 14.44 |
| | | 16QAM | 1/25 | 21.18 | -5.44 | 15.74 | 13.59 |
| | | 64QAM | 1/25 | 20.19 | -5.44 | 14.75 | 12.60 |
| | | 256QAM | 1/25 | 17.17 | -5.44 | 11.73 | 9.58 |
| | 693 | QPSK | 1/25 | 22.16 | -5.44 | 16.72 | 14.57 |
| | | 16QAM | 1/25 | 21.31 | -5.44 | 15.87 | 13.72 |
| | | 64QAM | 1/25 | 20.29 | -5.44 | 14.85 | 12.70 |
| | | 256QAM | 1/25 | 17.23 | -5.44 | 11.79 | 9.64 |

| Channel Bandwidth (MHz) | Frequency (MHz) | Modulation | RB Size/ Offset | Conducted Output Power (dBm) | Antenna Gain(dBi) | EIRP (dBm) | ERP (dBm) |
|---|---|---|---|---|---|---|---|
| 5 | 665.5 | QPSK | 1/12 | 21.89 | -5.44 | 16.45 | 14.30 |
| | | 16QAM | 1/12 | 21.07 | -5.44 | 15.63 | 13.48 |
| | | 64QAM | 1/12 | 20.03 | -5.44 | 14.59 | 12.44 |
| | | 256QAM | 1/12 | 17.08 | -5.44 | 11.64 | 9.49 |
| | 680.5 | QPSK | 1/12 | 21.84 | -5.44 | 16.40 | 14.25 |
| | | 16QAM | 1/12 | 21.03 | -5.44 | 15.59 | 13.44 |
| | | 64QAM | 1/12 | 20.00 | -5.44 | 14.56 | 12.41 |
| | | 256QAM | 1/12 | 17.03 | -5.44 | 11.59 | 9.44 |
| | 695.5 | QPSK | 1/12 | 21.94 | -5.44 | 16.50 | 14.35 |
| | | 16QAM | 1/12 | 21.13 | -5.44 | 15.69 | 13.54 |
| | | 64QAM | 1/12 | 20.07 | -5.44 | 14.63 | 12.48 |
| | | 256QAM | 1/12 | 17.13 | -5.44 | 11.69 | 9.54 |

### 7.5.2. LTE Band 12(17)

| Channel Bandwidth (MHz) | Frequency (MHz) | Modulation | RB Size/ Offset | Conducted Output Power (dBm) | Antenna Gain(dBi) | EIRP (dBm) | ERP (dBm) |
|---|---|---|---|---|---|---|---|
| 10 | 704 | QPSK | 1/25 | 21.82 | -5.44 | 16.38 | 14.23 |
| | | 16QAM | 1/25 | 20.97 | -5.44 | 15.53 | 13.38 |
| | | 64QAM | 1/25 | 19.98 | -5.44 | 14.54 | 12.39 |
| | | 256QAM | 1/25 | 17.01 | -5.44 | 11.57 | 9.42 |
| | 707.5 | QPSK | 1/25 | 21.89 | -5.44 | 16.45 | 14.30 |
| | | 16QAM | 1/25 | 21.08 | -5.44 | 15.64 | 13.49 |
| | | 64QAM | 1/25 | 20.08 | -5.44 | 14.64 | 12.49 |
| | | 256QAM | 1/25 | 17.05 | -5.44 | 11.61 | 9.46 |
| | 711 | QPSK | 1/25 | 21.85 | -5.44 | 16.41 | 14.26 |
| | | 16QAM | 1/25 | 21.04 | -5.44 | 15.60 | 13.45 |
| | | 64QAM | 1/25 | 20.01 | -5.44 | 14.57 | 12.42 |
| | | 256QAM | 1/25 | 17.04 | -5.44 | 11.60 | 9.45 |
| 5 | 701.5 | QPSK | 1/12 | 21.76 | -5.44 | 16.32 | 14.17 |
| | | 16QAM | 1/12 | 20.95 | -5.44 | 15.51 | 13.36 |
| | | 64QAM | 1/12 | 19.94 | -5.44 | 14.50 | 12.35 |
| | | 256QAM | 1/12 | 16.95 | -5.44 | 11.51 | 9.36 |
| | 707.5 | QPSK | 1/12 | 21.85 | -5.44 | 16.41 | 14.26 |
| | | 16QAM | 1/12 | 21.04 | -5.44 | 15.60 | 13.45 |
| | | 64QAM | 1/12 | 19.99 | -5.44 | 14.55 | 12.40 |
| | | 256QAM | 1/12 | 17.02 | -5.44 | 11.58 | 9.43 |
| | 713.5 | QPSK | 1/12 | 21.81 | -5.44 | 16.37 | 14.22 |
| | | 16QAM | 1/12 | 20.97 | -5.44 | 15.53 | 13.38 |
| | | 64QAM | 1/12 | 19.88 | -5.44 | 14.44 | 12.29 |
| | | 256QAM | 1/12 | 16.96 | -5.44 | 11.52 | 9.37 |
| 3 | 700.5 | QPSK | 1/7 | 21.76 | -5.44 | 16.32 | 14.17 |
| | | 16QAM | 1/7 | 20.94 | -5.44 | 15.50 | 13.35 |
| | | 64QAM | 1/7 | 19.95 | -5.44 | 14.51 | 12.36 |
| | | 256QAM | 1/7 | 16.94 | -5.44 | 11.50 | 9.35 |
| | 707.5 | QPSK | 1/7 | 21.83 | -5.44 | 16.39 | 14.24 |
| | | 16QAM | 1/7 | 21.02 | -5.44 | 15.58 | 13.43 |
| | | 64QAM | 1/7 | 20.01 | -5.44 | 14.57 | 12.42 |
| | | 256QAM | 1/7 | 16.99 | -5.44 | 11.55 | 9.40 |
| | 714.5 | QPSK | 1/7 | 21.80 | -5.44 | 16.36 | 14.21 |
| | | 16QAM | 1/7 | 20.99 | -5.44 | 15.55 | 13.40 |
| | | 64QAM | 1/7 | 19.97 | -5.44 | 14.53 | 12.38 |
| | | 256QAM | 1/7 | 16.97 | -5.44 | 11.53 | 9.38 |

| Channel Bandwidth (MHz) | Frequency (MHz) | Modulation | RB Size/ Offset | Conducted Output Power (dBm) | Antenna Gain(dBi) | EIRP (dBm) | ERP (dBm) |
|---|---|---|---|---|---|---|---|
| 1.4 | 699.7 | QPSK | 1/2 | 21.56 | -5.44 | 16.12 | 13.97 |
| | | 16QAM | 1/2 | 20.75 | -5.44 | 15.31 | 13.16 |
| | | 64QAM | 1/2 | 19.58 | -5.44 | 14.14 | 11.99 |
| | | 256QAM | 1/2 | 16.75 | -5.44 | 11.31 | 9.16 |
| | 707.5 | QPSK | 1/2 | 21.67 | -5.44 | 16.23 | 14.08 |
| | | 16QAM | 1/2 | 20.86 | -5.44 | 15.42 | 13.27 |
| | | 64QAM | 1/2 | 19.84 | -5.44 | 14.40 | 12.25 |
| | | 256QAM | 1/2 | 16.80 | -5.44 | 11.36 | 9.21 |
| | 715.3 | QPSK | 1/2 | 21.63 | -5.44 | 16.19 | 14.04 |
| | | 16QAM | 1/2 | 20.81 | -5.44 | 15.37 | 13.22 |
| | | 64QAM | 1/2 | 19.81 | -5.44 | 14.37 | 12.22 |
| | | 256QAM | 1/2 | 16.78 | -5.44 | 11.34 | 9.19 |

### 7.5.3. LTE Band 13

| Channel Bandwidth (MHz) | Frequency (MHz) | Modulation | RB Size/ Offset | Conducted Output Power (dBm) | Antenna Gain(dBi) | EIRP (dBm) | ERP (dBm) |
|---|---|---|---|---|---|---|---|
| 10 | 782 | QPSK | 1/0 | 21.83 | -4.50 | 17.33 | 15.18 |
| | | 16QAM | 1/0 | 20.95 | -4.50 | 16.45 | 14.30 |
| | | 64QAM | 1/0 | 19.88 | -4.50 | 15.38 | 13.23 |
| | | 256QAM | 1/0 | 16.94 | -4.50 | 12.44 | 10.29 |
| 5 | 779.5 | QPSK | 1/0 | 21.82 | -4.50 | 17.32 | 15.17 |
| | | 16QAM | 1/0 | 20.93 | -4.50 | 16.43 | 14.28 |
| | | 64QAM | 1/0 | 19.86 | -4.50 | 15.36 | 13.21 |
| | | 256QAM | 1/0 | 16.91 | -4.50 | 12.41 | 10.26 |
| | 782 | QPSK | 1/0 | 21.80 | -4.50 | 17.30 | 15.15 |
| | | 16QAM | 1/0 | 20.92 | -4.50 | 16.42 | 14.27 |
| | | 64QAM | 1/0 | 19.83 | -4.50 | 15.33 | 13.18 |
| | | 256QAM | 1/0 | 16.90 | -4.50 | 12.40 | 10.25 |
| | 784.5 | QPSK | 1/0 | 21.72 | -4.50 | 17.22 | 15.07 |
| | | 16QAM | 1/0 | 20.88 | -4.50 | 16.38 | 14.23 |
| | | 64QAM | 1/0 | 19.75 | -4.50 | 15.25 | 13.10 |
| | | 256QAM | 1/0 | 16.89 | -4.50 | 12.39 | 10.24 |

### 7.5.4. LTE Band 14

| Channel Bandwidth (MHz) | Frequency (MHz) | Modulation | RB Size/ Offset | Conducted Output Power (dBm) | Antenna Gain(dBi) | EIRP (dBm) | ERP (dBm) |
|---|---|---|---|---|---|---|---|
| 10 | 793 | QPSK | 1/25 | 22.84 | -3.84 | 19.00 | 16.85 |
| | | 16QAM | 1/25 | 21.96 | -3.84 | 18.12 | 15.97 |
| | | 64QAM | 1/25 | 20.80 | -3.84 | 16.96 | 14.81 |
| | | 256QAM | 1/25 | 17.86 | -3.84 | 14.02 | 11.87 |
| 5 | 790.5 | QPSK | 1/12 | 22.78 | -3.84 | 18.94 | 16.79 |
| | | 16QAM | 1/12 | 21.95 | -3.84 | 18.11 | 15.96 |
| | | 64QAM | 1/12 | 20.86 | -3.84 | 17.02 | 14.87 |
| | | 256QAM | 1/12 | 17.85 | -3.84 | 14.01 | 11.86 |
| | 793 | QPSK | 1/12 | 22.75 | -3.84 | 18.91 | 16.76 |
| | | 16QAM | 1/12 | 21.94 | -3.84 | 18.10 | 15.95 |
| | | 64QAM | 1/12 | 20.82 | -3.84 | 16.98 | 14.83 |
| | | 256QAM | 1/12 | 17.87 | -3.84 | 14.03 | 11.88 |
| | 795.5 | QPSK | 1/12 | 22.73 | -3.84 | 18.89 | 16.74 |
| | | 16QAM | 1/12 | 21.89 | -3.84 | 18.05 | 15.90 |
| | | 64QAM | 1/12 | 20.76 | -3.84 | 16.92 | 14.77 |
| | | 256QAM | 1/12 | 17.92 | -3.84 | 14.08 | 11.93 |

### 7.5.5. LTE Band 5

| Channel Bandwidth (MHz) | Frequency (MHz) | Modulation | RB Size/ Offset | Conducted Output Power (dBm) | Antenna Gain(dBi) | EIRP (dBm) | ERP (dBm) |
|---|---|---|---|---|---|---|---|
| 10 | 829 | QPSK | 1/25 | 22.25 | -1.91 | 20.34 | 18.19 |
| | | 16QAM | 1/25 | 21.26 | -1.91 | 19.35 | 17.20 |
| | | 64QAM | 1/25 | 20.22 | -1.91 | 18.31 | 16.16 |
| | | 256QAM | 1/25 | 17.23 | -1.91 | 15.32 | 13.17 |
| | 836.5 | QPSK | 1/25 | 22.20 | -1.91 | 20.29 | 18.14 |
| | | 16QAM | 1/25 | 21.27 | -1.91 | 19.36 | 17.21 |
| | | 64QAM | 1/25 | 20.23 | -1.91 | 18.32 | 16.17 |
| | | 256QAM | 1/25 | 17.26 | -1.91 | 15.35 | 13.20 |
| | 844 | QPSK | 1/25 | 22.14 | -1.91 | 20.23 | 18.08 |
| | | 16QAM | 1/25 | 21.23 | -1.91 | 19.32 | 17.17 |
| | | 64QAM | 1/25 | 20.12 | -1.91 | 18.21 | 16.06 |
| | | 256QAM | 1/25 | 17.33 | -1.91 | 15.42 | 13.27 |
| 5 | 826.5 | QPSK | 1/12 | 22.14 | -1.91 | 20.23 | 18.08 |
| | | 16QAM | 1/12 | 21.24 | -1.91 | 19.33 | 17.18 |
| | | 64QAM | 1/12 | 20.15 | -1.91 | 18.24 | 16.09 |
| | | 256QAM | 1/12 | 17.32 | -1.91 | 15.41 | 13.26 |
| | 836.5 | QPSK | 1/12 | 22.13 | -1.91 | 20.22 | 18.07 |
| | | 16QAM | 1/12 | 21.26 | -1.91 | 19.35 | 17.20 |
| | | 64QAM | 1/12 | 20.11 | -1.91 | 18.20 | 16.05 |
| | | 256QAM | 1/12 | 17.29 | -1.91 | 15.38 | 13.23 |
| | 846.5 | QPSK | 1/12 | 22.12 | -1.91 | 20.21 | 18.06 |
| | | 16QAM | 1/12 | 21.26 | -1.91 | 19.35 | 17.20 |
| | | 64QAM | 1/12 | 20.14 | -1.91 | 18.23 | 16.08 |
| | | 256QAM | 1/12 | 17.23 | -1.91 | 15.32 | 13.17 |
| 3 | 825.5 | QPSK | 1/7 | 22.17 | -1.91 | 20.26 | 18.11 |
| | | 16QAM | 1/7 | 21.24 | -1.91 | 19.33 | 17.18 |
| | | 64QAM | 1/7 | 20.19 | -1.91 | 18.28 | 16.13 |
| | | 256QAM | 1/7 | 17.25 | -1.91 | 15.34 | 13.19 |
| | 836.5 | QPSK | 1/7 | 22.14 | -1.91 | 20.23 | 18.08 |
| | | 16QAM | 1/7 | 21.20 | -1.91 | 19.29 | 17.14 |
| | | 64QAM | 1/7 | 20.20 | -1.91 | 18.29 | 16.14 |
| | | 256QAM | 1/7 | 17.33 | -1.91 | 15.42 | 13.27 |
| | 847.5 | QPSK | 1/7 | 22.13 | -1.91 | 20.22 | 18.07 |
| | | 16QAM | 1/7 | 21.19 | -1.91 | 19.28 | 17.13 |
| | | 64QAM | 1/7 | 20.19 | -1.91 | 18.28 | 16.13 |
| | | 256QAM | 1/7 | 17.32 | -1.91 | 15.41 | 13.26 |

| Channel Bandwidth (MHz) | Frequency (MHz) | Modulation | RB Size/ Offset | Conducted Output Power (dBm) | Antenna Gain(dBi) | EIRP (dBm) | ERP (dBm) |
|---|---|---|---|---|---|---|---|
| 1.4 | 824.7 | QPSK | 1/2 | 22.13 | -1.91 | 20.22 | 18.07 |
| | | 16QAM | 1/2 | 21.15 | -1.91 | 19.24 | 17.09 |
| | | 64QAM | 1/2 | 20.03 | -1.91 | 18.12 | 15.97 |
| | | 256QAM | 1/2 | 17.29 | -1.91 | 15.38 | 13.23 |
| | 836.5 | QPSK | 1/2 | 22.07 | -1.91 | 20.16 | 18.01 |
| | | 16QAM | 1/2 | 21.09 | -1.91 | 19.18 | 17.03 |
| | | 64QAM | 1/2 | 20.09 | -1.91 | 18.18 | 16.03 |
| | | 256QAM | 1/2 | 17.26 | -1.91 | 15.35 | 13.20 |
| | 848.3 | QPSK | 1/2 | 22.06 | -1.91 | 20.15 | 18.00 |
| | | 16QAM | 1/2 | 21.13 | -1.91 | 19.22 | 17.07 |
| | | 64QAM | 1/2 | 20.06 | -1.91 | 18.15 | 16.00 |
| | | 256QAM | 1/2 | 17.25 | -1.91 | 15.34 | 13.19 |

### 7.5.6. LTE Band 66(4)

| Channel Bandwidth (MHz) | Frequency (MHz) | Modulation | RB Size/ Offset | Conducted Output Power (dBm) | Antenna Gain(dBi) | EIRP (dBm) |
|---|---|---|---|---|---|---|
| 20 | 1 720 | QPSK | 1/50 | 22.30 | 0.30 | 22.60 |
| | | 16QAM | 1/50 | 21.43 | 0.30 | 21.73 |
| | | 64QAM | 1/50 | 20.43 | 0.30 | 20.73 |
| | | 256QAM | 1/50 | 17.24 | 0.30 | 17.54 |
| | 1 745 | QPSK | 1/50 | 22.45 | 0.30 | 22.75 |
| | | 16QAM | 1/50 | 21.54 | 0.30 | 21.84 |
| | | 64QAM | 1/50 | 20.55 | 0.30 | 20.85 |
| | | 256QAM | 1/50 | 17.39 | 0.30 | 17.69 |
| | 1 770 | QPSK | 1/50 | 22.37 | 0.30 | 22.67 |
| | | 16QAM | 1/50 | 21.45 | 0.30 | 21.75 |
| | | 64QAM | 1/50 | 20.48 | 0.30 | 20.78 |
| | | 256QAM | 1/50 | 17.39 | 0.30 | 17.69 |
| 15 | 1 717.5 | QPSK | 1/36 | 22.16 | 0.30 | 22.46 |
| | | 16QAM | 1/36 | 21.35 | 0.30 | 21.65 |
| | | 64QAM | 1/36 | 20.28 | 0.30 | 20.58 |
| | | 256QAM | 1/36 | 17.34 | 0.30 | 17.64 |
| | 1 745 | QPSK | 1/36 | 22.34 | 0.30 | 22.64 |
| | | 16QAM | 1/36 | 21.47 | 0.30 | 21.77 |
| | | 64QAM | 1/36 | 20.49 | 0.30 | 20.79 |
| | | 256QAM | 1/36 | 17.37 | 0.30 | 17.67 |
| | 1 772.5 | QPSK | 1/36 | 22.19 | 0.30 | 22.49 |
| | | 16QAM | 1/36 | 21.34 | 0.30 | 21.64 |
| | | 64QAM | 1/36 | 20.27 | 0.30 | 20.57 |
| | | 256QAM | 1/36 | 17.29 | 0.30 | 17.59 |
| 10 | 1 715 | QPSK | 1/25 | 22.24 | 0.30 | 22.54 |
| | | 16QAM | 1/25 | 21.38 | 0.30 | 21.68 |
| | | 64QAM | 1/25 | 20.36 | 0.30 | 20.66 |
| | | 256QAM | 1/25 | 17.37 | 0.30 | 17.67 |
| | 1 745 | QPSK | 1/25 | 22.40 | 0.30 | 22.70 |
| | | 16QAM | 1/25 | 21.50 | 0.30 | 21.80 |
| | | 64QAM | 1/25 | 20.54 | 0.30 | 20.84 |
| | | 256QAM | 1/25 | 17.50 | 0.30 | 17.80 |
| | 1 775 | QPSK | 1/25 | 22.29 | 0.30 | 22.59 |
| | | 16QAM | 1/25 | 21.44 | 0.30 | 21.74 |
| | | 64QAM | 1/25 | 20.39 | 0.30 | 20.69 |
| | | 256QAM | 1/25 | 17.44 | 0.30 | 17.74 |

| Channel Bandwidth (MHz) | Frequency (MHz) | Modulation | RB Size/ Offset | Conducted Output Power (dBm) | Antenna Gain(dBi) | EIRP (dBm) |
|---|---|---|---|---|---|---|
| 5 | 1 712.5 | QPSK | 1/12 | 22.16 | 0.30 | 22.46 |
| | | 16QAM | 1/12 | 21.29 | 0.30 | 21.59 |
| | | 64QAM | 1/12 | 20.29 | 0.30 | 20.59 |
| | | 256QAM | 1/12 | 17.34 | 0.30 | 17.64 |
| | 1 745 | QPSK | 1/12 | 22.40 | 0.30 | 22.70 |
| | | 16QAM | 1/12 | 21.49 | 0.30 | 21.79 |
| | | 64QAM | 1/12 | 20.46 | 0.30 | 20.76 |
| | | 256QAM | 1/12 | 17.57 | 0.30 | 17.87 |
| | 1 777.5 | QPSK | 1/12 | 22.19 | 0.30 | 22.49 |
| | | 16QAM | 1/12 | 21.33 | 0.30 | 21.63 |
| | | 64QAM | 1/12 | 20.32 | 0.30 | 20.62 |
| | | 256QAM | 1/12 | 17.31 | 0.30 | 17.61 |
| 3 | 1 711.5 | QPSK | 1/7 | 22.29 | 0.30 | 22.59 |
| | | 16QAM | 1/7 | 21.44 | 0.30 | 21.74 |
| | | 64QAM | 1/7 | 20.46 | 0.30 | 20.76 |
| | | 256QAM | 1/7 | 17.47 | 0.30 | 17.77 |
| | 1 745 | QPSK | 1/7 | 22.44 | 0.30 | 22.74 |
| | | 16QAM | 1/7 | 21.57 | 0.30 | 21.87 |
| | | 64QAM | 1/7 | 20.57 | 0.30 | 20.87 |
| | | 256QAM | 1/7 | 17.58 | 0.30 | 17.88 |
| | 1 778.5 | QPSK | 1/7 | 22.31 | 0.30 | 22.61 |
| | | 16QAM | 1/7 | 21.45 | 0.30 | 21.75 |
| | | 64QAM | 1/7 | 20.44 | 0.30 | 20.74 |
| | | 256QAM | 1/7 | 17.44 | 0.30 | 17.74 |
| 1.4 | 1 710.7 | QPSK | 1/2 | 22.27 | 0.30 | 22.57 |
| | | 16QAM | 1/2 | 21.39 | 0.30 | 21.69 |
| | | 64QAM | 1/2 | 20.38 | 0.30 | 20.68 |
| | | 256QAM | 1/2 | 17.39 | 0.30 | 17.69 |
| | 1 745 | QPSK | 1/2 | 22.40 | 0.30 | 22.70 |
| | | 16QAM | 1/2 | 21.50 | 0.30 | 21.80 |
| | | 64QAM | 1/2 | 20.47 | 0.30 | 20.77 |
| | | 256QAM | 1/2 | 17.59 | 0.30 | 17.89 |
| | 1 779.3 | QPSK | 1/2 | 22.28 | 0.30 | 22.58 |
| | | 16QAM | 1/2 | 21.36 | 0.30 | 21.66 |
| | | 64QAM | 1/2 | 20.37 | 0.30 | 20.67 |
| | | 256QAM | 1/2 | 17.40 | 0.30 | 17.70 |

### 7.5.7. LTE Band 2

| Channel Bandwidth (MHz) | Frequency (MHz) | Modulation | RB Size/ Offset | Conducted Output Power (dBm) | Antenna Gain(dBi) | EIRP (dBm) |
|---|---|---|---|---|---|---|
| 20 | 1 860 | QPSK | 1/0 | 22.39 | 0.77 | 23.16 |
| | | 16QAM | 1/0 | 21.45 | 0.77 | 22.22 |
| | | 64QAM | 1/0 | 20.34 | 0.77 | 21.11 |
| | | 256QAM | 1/0 | 17.46 | 0.77 | 18.23 |
| | 1 880 | QPSK | 1/0 | 22.47 | 0.77 | 23.24 |
| | | 16QAM | 1/0 | 21.49 | 0.77 | 22.26 |
| | | 64QAM | 1/0 | 20.44 | 0.77 | 21.21 |
| | | 256QAM | 1/0 | 17.46 | 0.77 | 18.23 |
| | 1 900 | QPSK | 1/0 | 22.42 | 0.77 | 23.19 |
| | | 16QAM | 1/0 | 21.45 | 0.77 | 22.22 |
| | | 64QAM | 1/0 | 20.36 | 0.77 | 21.13 |
| | | 256QAM | 1/0 | 17.51 | 0.77 | 18.28 |
| 15 | 1 857.5 | QPSK | 1/0 | 22.09 | 0.77 | 22.86 |
| | | 16QAM | 1/0 | 21.24 | 0.77 | 22.01 |
| | | 64QAM | 1/0 | 20.18 | 0.77 | 20.95 |
| | | 256QAM | 1/0 | 17.27 | 0.77 | 18.04 |
| | 1 880 | QPSK | 1/0 | 22.14 | 0.77 | 22.91 |
| | | 16QAM | 1/0 | 21.26 | 0.77 | 22.03 |
| | | 64QAM | 1/0 | 20.27 | 0.77 | 21.04 |
| | | 256QAM | 1/0 | 17.20 | 0.77 | 17.97 |
| | 1 902.5 | QPSK | 1/0 | 22.12 | 0.77 | 22.89 |
| | | 16QAM | 1/0 | 21.24 | 0.77 | 22.01 |
| | | 64QAM | 1/0 | 20.15 | 0.77 | 20.92 |
| | | 256QAM | 1/0 | 17.28 | 0.77 | 18.05 |
| 10 | 1 855 | QPSK | 1/0 | 22.25 | 0.77 | 23.02 |
| | | 16QAM | 1/0 | 21.39 | 0.77 | 22.16 |
| | | 64QAM | 1/0 | 20.34 | 0.77 | 21.11 |
| | | 256QAM | 1/0 | 17.35 | 0.77 | 18.12 |
| | 1 880 | QPSK | 1/0 | 22.33 | 0.77 | 23.10 |
| | | 16QAM | 1/0 | 21.44 | 0.77 | 22.21 |
| | | 64QAM | 1/0 | 20.43 | 0.77 | 21.20 |
| | | 256QAM | 1/0 | 17.35 | 0.77 | 18.12 |
| | 1 905 | QPSK | 1/0 | 22.29 | 0.77 | 23.06 |
| | | 16QAM | 1/0 | 21.43 | 0.77 | 22.20 |
| | | 64QAM | 1/0 | 20.34 | 0.77 | 21.11 |
| | | 256QAM | 1/0 | 17.39 | 0.77 | 18.16 |

| Channel Bandwidth (MHz) | Frequency (MHz) | Modulation | RB Size/ Offset | Conducted Output Power (dBm) | Antenna Gain(dBi) | EIRP (dBm) |
|---|---|---|---|---|---|---|
| 5 | 1 852.5 | QPSK | 1/0 | 22.27 | 0.77 | 23.04 |
| | | 16QAM | 1/0 | 21.43 | 0.77 | 22.20 |
| | | 64QAM | 1/0 | 20.26 | 0.77 | 21.03 |
| | | 256QAM | 1/0 | 17.44 | 0.77 | 18.21 |
| | 1 880 | QPSK | 1/0 | 22.36 | 0.77 | 23.13 |
| | | 16QAM | 1/0 | 21.45 | 0.77 | 22.22 |
| | | 64QAM | 1/0 | 20.44 | 0.77 | 21.21 |
| | | 256QAM | 1/0 | 17.35 | 0.77 | 18.12 |
| | 1 907.5 | QPSK | 1/0 | 22.28 | 0.77 | 23.05 |
| | | 16QAM | 1/0 | 21.45 | 0.77 | 22.22 |
| | | 64QAM | 1/0 | 20.31 | 0.77 | 21.08 |
| | | 256QAM | 1/0 | 17.45 | 0.77 | 18.22 |
| 3 | 1 851.5 | QPSK | 1/0 | 22.13 | 0.77 | 22.90 |
| | | 16QAM | 1/0 | 21.33 | 0.77 | 22.10 |
| | | 64QAM | 1/0 | 20.22 | 0.77 | 20.99 |
| | | 256QAM | 1/0 | 17.24 | 0.77 | 18.01 |
| | 1 880 | QPSK | 1/0 | 22.16 | 0.77 | 22.93 |
| | | 16QAM | 1/0 | 21.35 | 0.77 | 22.12 |
| | | 64QAM | 1/0 | 20.24 | 0.77 | 21.01 |
| | | 256QAM | 1/0 | 17.11 | 0.77 | 17.88 |
| | 1 908.5 | QPSK | 1/0 | 22.15 | 0.77 | 22.92 |
| | | 16QAM | 1/0 | 21.35 | 0.77 | 22.12 |
| | | 64QAM | 1/0 | 20.23 | 0.77 | 21.00 |
| | | 256QAM | 1/0 | 17.29 | 0.77 | 18.06 |
| 1.4 | 1 850.7 | QPSK | 1/0 | 22.22 | 0.77 | 22.99 |
| | | 16QAM | 1/0 | 21.30 | 0.77 | 22.07 |
| | | 64QAM | 1/0 | 20.33 | 0.77 | 21.10 |
| | | 256QAM | 1/0 | 17.37 | 0.77 | 18.14 |
| | 1 880 | QPSK | 1/0 | 22.42 | 0.77 | 23.19 |
| | | 16QAM | 1/0 | 21.43 | 0.77 | 22.20 |
| | | 64QAM | 1/0 | 20.43 | 0.77 | 21.20 |
| | | 256QAM | 1/0 | 17.52 | 0.77 | 18.29 |
| | 1 909.3 | QPSK | 1/0 | 22.30 | 0.77 | 23.07 |
| | | 16QAM | 1/0 | 21.38 | 0.77 | 22.15 |
| | | 64QAM | 1/0 | 20.37 | 0.77 | 21.14 |
| | | 256QAM | 1/0 | 17.43 | 0.77 | 18.20 |

### 7.5.8. LTE Band 7

| Channel Bandwidth (MHz) | Frequency (MHz) | Modulation | RB Size/ Offset | Conducted Output Power (dBm) | Antenna Gain(dBi) | EIRP (dBm) |
|---|---|---|---|---|---|---|
| 20 | 2 510 | QPSK | 1/99 | 22.43 | -2.11 | 20.32 |
| | | 16QAM | 1/99 | 21.62 | -2.11 | 19.51 |
| | | 64QAM | 1/99 | 20.47 | -2.11 | 18.36 |
| | | 256QAM | 1/99 | 17.62 | -2.11 | 15.51 |
| | 2 535 | QPSK | 1/99 | 22.78 | -2.11 | 20.67 |
| | | 16QAM | 1/99 | 21.84 | -2.11 | 19.73 |
| | | 64QAM | 1/99 | 20.84 | -2.11 | 18.73 |
| | | 256QAM | 1/99 | 17.87 | -2.11 | 15.76 |
| | 2 560 | QPSK | 1/99 | 22.68 | -2.11 | 20.57 |
| | | 16QAM | 1/99 | 21.87 | -2.11 | 19.76 |
| | | 64QAM | 1/99 | 20.71 | -2.11 | 18.60 |
| | | 256QAM | 1/99 | 17.79 | -2.11 | 15.68 |
| 15 | 2 507.5 | QPSK | 1/74 | 22.28 | -2.11 | 20.17 |
| | | 16QAM | 1/74 | 21.45 | -2.11 | 19.34 |
| | | 64QAM | 1/74 | 20.40 | -2.11 | 18.29 |
| | | 256QAM | 1/74 | 17.47 | -2.11 | 15.36 |
| | 2 535 | QPSK | 1/74 | 22.60 | -2.11 | 20.49 |
| | | 16QAM | 1/74 | 21.76 | -2.11 | 19.65 |
| | | 64QAM | 1/74 | 20.72 | -2.11 | 18.61 |
| | | 256QAM | 1/74 | 17.71 | -2.11 | 15.60 |
| | 2 562.5 | QPSK | 1/74 | 22.53 | -2.11 | 20.42 |
| | | 16QAM | 1/74 | 21.67 | -2.11 | 19.56 |
| | | 64QAM | 1/74 | 20.53 | -2.11 | 18.42 |
| | | 256QAM | 1/74 | 17.57 | -2.11 | 15.46 |
| 10 | 2 505 | QPSK | 1/49 | 22.38 | -2.11 | 20.27 |
| | | 16QAM | 1/49 | 21.53 | -2.11 | 19.42 |
| | | 64QAM | 1/49 | 20.51 | -2.11 | 18.40 |
| | | 256QAM | 1/49 | 17.52 | -2.11 | 15.41 |
| | 2 535 | QPSK | 1/49 | 22.70 | -2.11 | 20.59 |
| | | 16QAM | 1/49 | 21.89 | -2.11 | 19.78 |
| | | 64QAM | 1/49 | 20.85 | -2.11 | 18.74 |
| | | 256QAM | 1/49 | 17.72 | -2.11 | 15.61 |
| | 2 565 | QPSK | 1/49 | 22.61 | -2.11 | 20.50 |
| | | 16QAM | 1/49 | 21.80 | -2.11 | 19.69 |
| | | 64QAM | 1/49 | 20.73 | -2.11 | 18.62 |
| | | 256QAM | 1/49 | 17.60 | -2.11 | 15.49 |

| Channel Bandwidth (MHz) | Frequency (MHz) | Modulation | RB Size/ Offset | Conducted Output Power (dBm) | Antenna Gain(dBi) | EIRP (dBm) |
|---|---|---|---|---|---|---|
| 5 | 2 502.5 | QPSK | 1/24 | 22.37 | -2.11 | 20.26 |
| | | 16QAM | 1/24 | 21.55 | -2.11 | 19.44 |
| | | 64QAM | 1/24 | 20.47 | -2.11 | 18.36 |
| | | 256QAM | 1/24 | 17.47 | -2.11 | 15.36 |
| | 2 535 | QPSK | 1/24 | 22.61 | -2.11 | 20.50 |
| | | 16QAM | 1/24 | 21.81 | -2.11 | 19.70 |
| | | 64QAM | 1/24 | 20.72 | -2.11 | 18.61 |
| | | 256QAM | 1/24 | 17.70 | -2.11 | 15.59 |
| | 2 567.5 | QPSK | 1/24 | 22.52 | -2.11 | 20.41 |
| | | 16QAM | 1/24 | 21.72 | -2.11 | 19.61 |
| | | 64QAM | 1/24 | 20.56 | -2.11 | 18.45 |
| | | 256QAM | 1/24 | 17.60 | -2.11 | 15.49 |

### 7.5.9. LTE Band 38

| Channel Bandwidth (MHz) | Frequency (MHz) | Modulation | RB Size/ Offset | Conducted Output Power (dBm) | Antenna Gain(dBi) | EIRP (dBm) |
|---|---|---|---|---|---|---|
| 20 | 2 580 | QPSK | 1/50 | 22.67 | 2.21 | 24.88 |
| | | 16QAM | 1/50 | 21.85 | 2.21 | 24.06 |
| | | 64QAM | 1/50 | 20.64 | 2.21 | 22.85 |
| | | 256QAM | 1/50 | 17.64 | 2.21 | 19.85 |
| | 2 595 | QPSK | 1/50 | 22.55 | 2.21 | 24.76 |
| | | 16QAM | 1/50 | 21.70 | 2.21 | 23.91 |
| | | 64QAM | 1/50 | 20.48 | 2.21 | 22.69 |
| | | 256QAM | 1/50 | 17.74 | 2.21 | 19.95 |
| | 2 610 | QPSK | 1/50 | 22.57 | 2.21 | 24.78 |
| | | 16QAM | 1/50 | 21.75 | 2.21 | 23.96 |
| | | 64QAM | 1/50 | 20.57 | 2.21 | 22.78 |
| | | 256QAM | 1/50 | 17.75 | 2.21 | 19.96 |
| 15 | 2 577.5 | QPSK | 1/36 | 22.49 | 2.21 | 24.70 |
| | | 16QAM | 1/36 | 21.61 | 2.21 | 23.82 |
| | | 64QAM | 1/36 | 20.53 | 2.21 | 22.74 |
| | | 256QAM | 1/36 | 17.53 | 2.21 | 19.74 |
| | 2 595 | QPSK | 1/36 | 22.43 | 2.21 | 24.64 |
| | | 16QAM | 1/36 | 21.56 | 2.21 | 23.77 |
| | | 64QAM | 1/36 | 20.44 | 2.21 | 22.65 |
| | | 256QAM | 1/36 | 17.62 | 2.21 | 19.83 |
| | 2 612.5 | QPSK | 1/36 | 22.46 | 2.21 | 24.67 |
| | | 16QAM | 1/36 | 21.57 | 2.21 | 23.78 |
| | | 64QAM | 1/36 | 20.47 | 2.21 | 22.68 |
| | | 256QAM | 1/36 | 17.64 | 2.21 | 19.85 |
| 10 | 2 575 | QPSK | 1/25 | 22.57 | 2.21 | 24.78 |
| | | 16QAM | 1/25 | 21.76 | 2.21 | 23.97 |
| | | 64QAM | 1/25 | 20.72 | 2.21 | 22.93 |
| | | 256QAM | 1/25 | 17.45 | 2.21 | 19.66 |
| | 2 595 | QPSK | 1/25 | 22.46 | 2.21 | 24.67 |
| | | 16QAM | 1/25 | 21.65 | 2.21 | 23.86 |
| | | 64QAM | 1/25 | 20.61 | 2.21 | 22.82 |
| | | 256QAM | 1/25 | 17.65 | 2.21 | 19.86 |
| | 2 615 | QPSK | 1/25 | 22.49 | 2.21 | 24.70 |
| | | 16QAM | 1/25 | 21.64 | 2.21 | 23.85 |
| | | 64QAM | 1/25 | 20.63 | 2.21 | 22.84 |
| | | 256QAM | 1/25 | 17.56 | 2.21 | 19.77 |

| Channel Bandwidth (MHz) | Frequency (MHz) | Modulation | RB Size/ Offset | Conducted Output Power (dBm) | Antenna Gain(dBi) | EIRP (dBm) |
|---|---|---|---|---|---|---|
| 5 | 2 572.5 | QPSK | 1/12 | 22.45 | 2.21 | 24.66 |
| | | 16QAM | 1/12 | 21.61 | 2.21 | 23.82 |
| | | 64QAM | 1/12 | 20.53 | 2.21 | 22.74 |
| | | 256QAM | 1/12 | 17.53 | 2.21 | 19.74 |
| | 2 595 | QPSK | 1/12 | 22.37 | 2.21 | 24.58 |
| | | 16QAM | 1/12 | 21.53 | 2.21 | 23.74 |
| | | 64QAM | 1/12 | 20.46 | 2.21 | 22.67 |
| | | 256QAM | 1/12 | 17.54 | 2.21 | 19.75 |
| | 2 617.5 | QPSK | 1/12 | 22.42 | 2.21 | 24.63 |
| | | 16QAM | 1/12 | 21.55 | 2.21 | 23.76 |
| | | 64QAM | 1/12 | 20.45 | 2.21 | 22.66 |
| | | 256QAM | 1/12 | 17.59 | 2.21 | 19.80 |

## 7.6. UNDESIRABLE EMISSIONS (Radiated)

**- Test Notes**

1) The frequency spectrum is examined from 9 kHz to the 10 th harmonic of the fundamental frequency of the transmitter. No other spurious and harmonic emissions were reported greater than listed emissions.
2) For Band below 1GHz:
   Result(dBm) = Level at Substitute antenna terminal(dBm) + Substitute Antenna Gain (dBd)
   For Band above 1GHz:
   Result(dBm) = Level at Substitute antenna terminal(dBm) + Substitute Antenna Gain (dBi)
3) Limit
   Band 71/12(17)/13/14/5/66(4)/2 = -13dBm
   Band 7/38 = -25dBm
   Limit for 1 559 MHz ~ 1 610 MHz in Band 13/14 = −40dBm/MHz (equivalent isotropically radiated power for wideband signals)

### 7.6.1. LTE Band 71

| Channel Bandwidth (MHz) | Test Freq. (MHz) | RB Size/ Offset | Test Mode | Freq.(MHz) | Ant Pol (H/V) | Level at Antenna Terminal(dBm) | Substitute Antenna Gain(dBd) | Result (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 673 | 1/50 | QPSK | 1 345.28 | V | -68.87 | 2.32 | -66.55 | -13.00 | 53.55 |
| | | | | 2 019.71 | V | -67.01 | 2.96 | -64.05 | -13.00 | 51.05 |
| | | | | 2 692.95 | V | -67.00 | 4.21 | -62.79 | -13.00 | 49.79 |
| | | | | 3 365.90 | V | -67.72 | 5.86 | -61.86 | -13.00 | 48.86 |
| | 680.5 | 1/50 | QPSK | 1 361.05 | V | -68.05 | 2.54 | -65.51 | -13.00 | 52.51 |
| | | | | 2 041.65 | V | -66.10 | 3.07 | -63.03 | -13.00 | 50.03 |
| | | | | 2 722.92 | V | -67.22 | 4.29 | -62.93 | -13.00 | 49.93 |
| | | | | 3 402.49 | V | -67.74 | 5.95 | -61.79 | -13.00 | 48.79 |
| | 688 | 1/50 | QPSK | 1 375.84 | V | -68.84 | 2.74 | -66.10 | -13.00 | 53.10 |
| | | | | 2 064.36 | V | -67.08 | 3.15 | -63.93 | -13.00 | 50.93 |
| | | | | 2 751.68 | V | -67.18 | 4.36 | -62.82 | -13.00 | 49.82 |
| | | | | 3 440.60 | V | -67.84 | 6.09 | -61.75 | -13.00 | 48.75 |

### 7.6.2. LTE Band 12(17)

| Channel Bandwidth (MHz) | Test Freq. (MHz) | RB Size/ Offset | Test Mode | Freq.(MHz) | Ant Pol (H/V) | Level at Antenna Terminal(dBm) | Substitute Antenna Gain(dBd) | Result (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 704 | 1/25 | QPSK | 1 408.14 | V | -64.30 | 3.12 | -61.18 | -13.00 | 48.18 |
| | | | | 2 111.43 | V | -66.53 | 3.22 | -63.31 | -13.00 | 50.31 |
| | | | | 2 815.44 | V | -66.76 | 4.59 | -62.17 | -13.00 | 49.17 |
| | | | | 3 519.90 | V | -67.52 | 6.32 | -61.20 | -13.00 | 48.20 |
| | 707.5 | 1/25 | QPSK | 1 415.24 | V | -66.83 | 3.17 | -63.66 | -13.00 | 50.66 |
| | | | | 2 121.91 | V | -66.76 | 3.20 | -63.56 | -13.00 | 50.56 |
| | | | | 2 829.38 | V | -66.78 | 4.64 | -62.14 | -13.00 | 49.14 |
| | | | | 3 537.32 | V | -67.36 | 6.31 | -61.05 | -13.00 | 48.05 |
| | 711 | 1/25 | QPSK | 1 422.16 | V | -64.94 | 3.22 | -61.72 | -13.00 | 48.72 |
| | | | | 2 132.84 | V | -66.55 | 3.18 | -63.37 | -13.00 | 50.37 |
| | | | | 2 844.40 | V | -66.96 | 4.69 | -62.27 | -13.00 | 49.27 |
| | | | | 3 555.25 | V | -67.90 | 6.29 | -61.61 | -13.00 | 48.61 |

### 7.6.3. LTE Band 13

| Channel Bandwidth (MHz) | Test Freq. (MHz) | RB Size/ Offset | Test Mode | Freq.(MHz) | Ant Pol (H/V) | Level at Antenna Terminal(dBm) | Substitute Antenna Gain(dBd) | Result (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 782 | 1/0 | QPSK | 1 555.16 | V | -62.88 | 3.74 | -59.14 | -13.00 | 46.14 |
| | | | | 2 332.77 | H | -61.80 | 3.76 | -58.04 | -13.00 | 45.04 |
| | | | | 3 108.35 | H | -68.23 | 5.21 | -63.02 | -13.00 | 50.02 |
| | | | | 3 887.56 | V | -67.59 | 6.83 | -60.76 | -13.00 | 47.76 |

**UNDESIRABLE EMISSIONS IN 1 559 MHz ~ 1 610 MHz (LTE Band 13)**

| Channel Bandwidth (MHz) | Test Freq. (MHz) | RB Size/ Offset | Test Mode | Freq.(MHz) | Ant Pol (H/V) | Level at Antenna Terminal(dBm) | Substitute Antenna Gain(dBi) | Result (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 782 | 1/25 | QPSK | 1 564.22 | V | -63.51 | 5.95 | -57.56 | -40.00 | 17.56 |
| | | 1/49 | QPSK | 1 572.72 | V | -68.82 | 6.01 | -62.81 | -40.00 | 22.81 |

### 7.6.4. LTE Band 14

| Channel Bandwidth (MHz) | Test Freq. (MHz) | RB Size/ Offset | Test Mode | Freq.(MHz) | Ant Pol (H/V) | Level at Antenna Terminal(dBm) | Substitute Antenna Gain(dBd) | Result (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 793 | 1/25 | QPSK | 2 379.21 | V | -62.06 | 3.81 | -58.25 | -13.00 | 45.25 |
| | | | | 3 172.70 | V | -66.44 | 5.34 | -61.10 | -13.00 | 48.10 |
| | | | | 3 964.48 | V | -67.72 | 6.91 | -60.81 | -13.00 | 47.81 |

**UNDESIRABLE EMISSIONS IN 1 559 MHz ~ 1 610 MHz (LTE Band 14)**

| Channel Bandwidth (MHz) | Test Freq. (MHz) | RB Size/ Offset | Test Mode | Freq.(MHz) | Ant Pol (H/V) | Level at Antenna Terminal(dBm) | Substitute Antenna Gain(dBi) | Result (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 793 | 1/25 | QPSK | 1 586.16 | H | -67.25 | 6.11 | -61.14 | -40.00 | 21.14 |

### 7.6.5. LTE Band 5

| Channel Bandwidth (MHz) | Test Freq. (MHz) | RB Size/ Offset | Test Mode | Freq.(MHz) | Ant Pol (H/V) | Level at Antenna Terminal(dBm) | Substitute Antenna Gain(dBd) | Result (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 829 | 1/25 | QPSK | 1 657.66 | V | -69.11 | 4.06 | -65.05 | -13.00 | 52.05 |
| | | | | 2 487.27 | V | -61.76 | 3.64 | -58.12 | -13.00 | 45.12 |
| | | | | 3 315.93 | V | -67.82 | 5.69 | -62.13 | -13.00 | 49.13 |
| | | | | 4 145.48 | V | -69.65 | 7.14 | -62.51 | -13.00 | 49.51 |
| | 836.5 | 1/25 | QPSK | 1 672.95 | V | -69.20 | 4.01 | -65.19 | -13.00 | 52.19 |
| | | | | 2 509.85 | V | -62.38 | 3.64 | -58.74 | -13.00 | 45.74 |
| | | | | 3 346.47 | V | -68.06 | 5.82 | -62.24 | -13.00 | 49.24 |
| | | | | 4 182.71 | V | -69.41 | 7.19 | -62.22 | -13.00 | 49.22 |
| | 844 | 1/25 | QPSK | 1 687.84 | V | -68.98 | 3.95 | -65.03 | -13.00 | 52.03 |
| | | | | 2 532.30 | V | -63.49 | 3.82 | -59.67 | -13.00 | 46.67 |
| | | | | 3 376.33 | V | -67.98 | 5.89 | -62.09 | -13.00 | 49.09 |
| | | | | 4 220.28 | V | -69.24 | 7.21 | -62.03 | -13.00 | 49.03 |

### 7.6.6. LTE Band 66(4)

| Channel Bandwidth (MHz) | Test Freq. (MHz) | RB Size/ Offset | Test Mode | Freq.(MHz) | Ant Pol (H/V) | Level at Antenna Terminal(dBm) | Substitute Antenna Gain(dBi) | Result (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 1720 | 1/50 | QPSK | 3 440.15 | V | -66.17 | 8.23 | -57.94 | -13.00 | 44.94 |
| | | | | 5 160.18 | V | -63.33 | 10.15 | -53.18 | -13.00 | 40.18 |
| | | | | 6 879.84 | V | -67.32 | 11.41 | -55.91 | -13.00 | 42.91 |
| | | | | 8 600.15 | V | -66.81 | 12.93 | -53.88 | -13.00 | 40.88 |
| | | | | 10 320.61 | H | -61.33 | 12.87 | -48.46 | -13.00 | 35.46 |
| | 1745 | 1/50 | QPSK | 3 490.12 | V | -65.20 | 8.44 | -56.76 | -13.00 | 43.76 |
| | | | | 5 235.34 | V | -63.79 | 10.22 | -53.57 | -13.00 | 40.57 |
| | | | | 6 980.82 | V | -67.52 | 11.56 | -55.96 | -13.00 | 42.96 |
| | | | | 8 724.92 | V | -66.11 | 12.98 | -53.13 | -13.00 | 40.13 |
| | | | | 10 470.56 | H | -55.00 | 13.09 | -41.91 | -13.00 | 28.91 |
| | 1770 | 1/50 | QPSK | 3 540.17 | V | -65.61 | 8.46 | -57.15 | -13.00 | 44.15 |
| | | | | 5 310.24 | V | -62.92 | 10.22 | -52.70 | -13.00 | 39.70 |
| | | | | 7 080.01 | V | -67.96 | 11.69 | -56.27 | -13.00 | 43.27 |
| | | | | 8 850.53 | V | -66.13 | 12.96 | -53.17 | -13.00 | 40.17 |
| | | | | 10 620.52 | H | -52.54 | 13.02 | -39.52 | -13.00 | 26.52 |

### 7.6.7. LTE Band 2

| Channel Bandwidth (MHz) | Test Freq. (MHz) | RB Size/ Offset | Test Mode | Freq.(MHz) | Ant Pol (H/V) | Level at Antenna Terminal(dBm) | Substitute Antenna Gain(dBi) | Result (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 1860 | 1/0 | QPSK | 3 702.14 | H | -66.34 | 8.34 | -58.00 | -13.00 | 45.00 |
| | | | | 5 562.29 | H | -67.34 | 10.32 | -57.02 | -13.00 | 44.02 |
| | | | | 7 421.60 | H | -67.35 | 12.06 | -55.29 | -13.00 | 42.29 |
| | | | | 9 281.17 | H | -66.06 | 13.01 | -53.05 | -13.00 | 40.05 |
| | 1880 | 1/0 | QPSK | 3 742.28 | H | -66.79 | 8.29 | -58.50 | -13.00 | 45.50 |
| | | | | 5 613.33 | H | -62.06 | 10.41 | -51.65 | -13.00 | 38.65 |
| | | | | 7 493.10 | H | -67.78 | 12.15 | -55.63 | -13.00 | 42.63 |
| | | | | 9 371.98 | H | -65.61 | 12.99 | -52.62 | -13.00 | 39.62 |
| | 1900 | 1/0 | QPSK | 3 782.23 | H | -64.58 | 8.41 | -56.17 | -13.00 | 43.17 |
| | | | | 5 682.11 | H | -66.69 | 10.50 | -56.19 | -13.00 | 43.19 |
| | | | | 7 582.41 | H | -68.16 | 12.18 | -55.98 | -13.00 | 42.98 |
| | | | | 9 482.82 | H | -65.53 | 12.95 | -52.58 | -13.00 | 39.58 |

### 7.6.8. LTE Band 7

| Channel Bandwidth (MHz) | Test Freq. (MHz) | RB Size/ Offset | Test Mode | Freq.(MHz) | Ant Pol (H/V) | Level at Antenna Terminal(dBm) | Substitute Antenna Gain(dBi) | Result (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 2510 | 1/99 | QPSK | 5 037.79 | V | -68.24 | 10.01 | -58.23 | -25.00 | 33.23 |
| | | | | 7 556.78 | V | -64.39 | 12.20 | -52.19 | -25.00 | 27.19 |
| | | | | 10 075.04 | V | -60.93 | 12.89 | -48.04 | -25.00 | 23.04 |
| | | | | 12 595.25 | V | -62.95 | 13.29 | -49.66 | -25.00 | 24.66 |
| | 2535 | 1/99 | QPSK | 5 086.07 | V | -68.28 | 10.05 | -58.23 | -25.00 | 33.23 |
| | | | | 7 631.79 | V | -65.59 | 12.20 | -53.39 | -25.00 | 28.39 |
| | | | | 10 176.28 | V | -61.92 | 12.87 | -49.05 | -25.00 | 24.05 |
| | | | | 12 721.79 | V | -62.29 | 13.36 | -48.93 | -25.00 | 23.93 |
| | 2560 | 1/99 | QPSK | 5 137.60 | V | -68.38 | 10.12 | -58.26 | -25.00 | 33.26 |
| | | | | 7 706.64 | V | -63.89 | 12.22 | -51.67 | -25.00 | 26.67 |
| | | | | 10 275.98 | V | -62.68 | 12.87 | -49.81 | -25.00 | 24.81 |
| | | | | 12 844.80 | V | -61.63 | 13.49 | -48.14 | -25.00 | 23.14 |

### 7.6.9. LTE Band 38

| Channel Bandwidth (MHz) | Test Freq. (MHz) | RB Size/ Offset | Test Mode | Freq.(MHz) | Ant Pol (H/V) | Level at Antenna Terminal(dBm) | Substitute Antenna Gain(dBi) | Result (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 2 580 | 1/50 | QPSK | 5 160.51 | V | -64.22 | 10.15 | -54.07 | -25.00 | 29.07 |
| | | | | 7 740.19 | H | -62.53 | 12.25 | -50.28 | -25.00 | 25.28 |
| | | | | 10 320.34 | V | -56.49 | 12.87 | -43.62 | -25.00 | 18.62 |
| | | | | 12 900.72 | V | -61.92 | 13.47 | -48.45 | -25.00 | 23.45 |
| | 2 595 | 1/50 | QPSK | 5 190.87 | V | -68.05 | 10.20 | -57.85 | -25.00 | 32.85 |
| | | | | 7 785.27 | H | -59.69 | 12.31 | -47.38 | -25.00 | 22.38 |
| | | | | 10 380.26 | V | -55.38 | 12.99 | -42.39 | -25.00 | 17.39 |
| | | | | 12 975.54 | V | -61.79 | 13.57 | -48.22 | -25.00 | 23.22 |
| | 2 610 | 1/50 | QPSK | 5 219.99 | V | -68.21 | 10.21 | -58.00 | -25.00 | 33.00 |
| | | | | 7 830.22 | H | -61.43 | 12.34 | -49.09 | -25.00 | 24.09 |
| | | | | 10 440.39 | V | -53.53 | 13.09 | -40.44 | -25.00 | 15.44 |
| | | | | 13 050.13 | V | -61.86 | 13.68 | -48.18 | -25.00 | 23.18 |

## 7.7. FREQUENCY STABILITY

**- Test Notes**

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

### 7.7.1. LTE Band 71

OPERATING FREQUENCY : 680.5 MHz
REFERENCE VOLTAGE : 3.85 V DC
LIMIT(FCC) : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

| VOLTAGE (%) | POWER (V DC) | TEMP (℃) | FREQ (Hz) | Deviation | |
|---|---|---|---|---|---|
| | | | | (%) | (ppm) |
| 100 % | 3.85 | +20 | 680,500,009 | 0.0000013 | 0.013 |
| 100 % | | -30 | 680,500,008 | 0.0000012 | 0.012 |
| 100 % | | -20 | 680,500,006 | 0.0000009 | 0.009 |
| 100 % | | -10 | 680,500,008 | 0.0000012 | 0.012 |
| 100 % | | 0 | 680,500,005 | 0.0000007 | 0.007 |
| 100 % | | +10 | 680,500,007 | 0.0000010 | 0.010 |
| 100 % | | +20 | 680,500,009 | 0.0000013 | 0.013 |
| 100 % | | +30 | 680,500,007 | 0.0000010 | 0.010 |
| 100 % | | +40 | 680,500,005 | 0.0000007 | 0.007 |
| 100 % | | +50 | 680,500,006 | 0.0000009 | 0.009 |
| 115 % | 4.43 | +20 | 680,500,007 | 0.0000010 | 0.010 |
| BAT End Point | 3.15 | +20 | 680,500,009 | 0.0000013 | 0.013 |

### 7.7.2. LTE Band 12(17)

OPERATING FREQUENCY : 707.5 MHz
REFERENCE VOLTAGE : 3.85 V DC
LIMIT(FCC) : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

| VOLTAGE (%) | POWER (V DC) | TEMP (℃) | FREQ (Hz) | Deviation | |
|---|---|---|---|---|---|
| | | | | (%) | (ppm) |
| 100 % | 3.85 | +20 | 707,500,003 | 0.0000004 | 0.004 |
| 100 % | | -30 | 707,500,004 | 0.0000006 | 0.006 |
| 100 % | | -20 | 707,500,004 | 0.0000006 | 0.006 |
| 100 % | | -10 | 707,500,003 | 0.0000004 | 0.004 |
| 100 % | | 0 | 707,500,003 | 0.0000004 | 0.004 |
| 100 % | | +10 | 707,500,001 | 0.0000001 | 0.001 |
| 100 % | | +20 | 707,500,003 | 0.0000004 | 0.004 |
| 100 % | | +30 | 707,500,003 | 0.0000004 | 0.004 |
| 100 % | | +40 | 707,500,005 | 0.0000007 | 0.007 |
| 100 % | | +50 | 707,500,004 | 0.0000006 | 0.006 |
| 115 % | 4.43 | +20 | 707,500,003 | 0.0000004 | 0.004 |
| BAT End Point | 3.15 | +20 | 707,500,002 | 0.0000003 | 0.003 |

### 7.7.3. LTE Band 13

OPERATING FREQUENCY : 782 MHz
REFERENCE VOLTAGE : 3.85 V DC
LIMIT(FCC) : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

| VOLTAGE (%) | POWER (V DC) | TEMP (℃) | FREQ (Hz) | Deviation | |
|---|---|---|---|---|---|
| | | | | (%) | (ppm) |
| 100 % | 3.85 | +20 | 782,000,005 | 0.0000006 | 0.006 |
| 100 % | | -30 | 782,000,004 | 0.0000005 | 0.005 |
| 100 % | | -20 | 782,000,005 | 0.0000006 | 0.006 |
| 100 % | | -10 | 782,000,006 | 0.0000008 | 0.008 |
| 100 % | | 0 | 782,000,004 | 0.0000005 | 0.005 |
| 100 % | | +10 | 782,000,004 | 0.0000005 | 0.005 |
| 100 % | | +20 | 782,000,005 | 0.0000006 | 0.006 |
| 100 % | | +30 | 782,000,004 | 0.0000005 | 0.005 |
| 100 % | | +40 | 782,000,006 | 0.0000008 | 0.008 |
| 100 % | | +50 | 782,000,003 | 0.0000004 | 0.004 |
| 115 % | 4.43 | +20 | 782,000,005 | 0.0000006 | 0.006 |
| BAT End Point | 3.15 | +20 | 782,000,007 | 0.0000009 | 0.009 |

### 7.7.4. LTE Band 14

OPERATING FREQUENCY : 793 MHz
REFERENCE VOLTAGE : 3.85 V DC
DEVIATION LIMIT(FCC) : ± 0.000125 % or 1.25 ppm

| VOLTAGE (%) | POWER (V DC) | TEMP (℃) | FREQ (Hz) | Deviation | |
|---|---|---|---|---|---|
| | | | | (%) | (ppm) |
| 100 % | 3.85 | +20 | 793,000,003 | 0.0000004 | 0.004 |
| 100 % | | -30 | 793,000,003 | 0.0000004 | 0.004 |
| 100 % | | -20 | 793,000,004 | 0.0000005 | 0.005 |
| 100 % | | -10 | 793,000,002 | 0.0000003 | 0.003 |
| 100 % | | 0 | 793,000,001 | 0.0000001 | 0.001 |
| 100 % | | +10 | 793,000,003 | 0.0000004 | 0.004 |
| 100 % | | +20 | 793,000,003 | 0.0000004 | 0.004 |
| 100 % | | +30 | 793,000,004 | 0.0000005 | 0.005 |
| 100 % | | +40 | 793,000,002 | 0.0000003 | 0.003 |
| 100 % | | +50 | 793,000,004 | 0.0000005 | 0.005 |
| 115 % | 4.43 | +20 | 793,000,005 | 0.0000006 | 0.006 |
| BAT End Point | 3.15 | +20 | 793,000,003 | 0.0000004 | 0.004 |

### 7.7.5. LTE Band 5

OPERATING FREQUENCY : 836.5 MHz
REFERENCE VOLTAGE : 3.85 V DC
LIMIT(FCC) : ± 0.00025 % or 2.5 ppm

| VOLTAGE (%) | POWER (V DC) | TEMP (℃) | FREQ (Hz) | Deviation | |
|---|---|---|---|---|---|
| | | | | (%) | (ppm) |
| 100 % | 3.85 | +20 | 836,499,997 | -0.0000003 | -0.003 |
| 100 % | | -30 | 836,499,997 | -0.0000004 | -0.004 |
| 100 % | | -20 | 836,499,998 | -0.0000003 | -0.003 |
| 100 % | | -10 | 836,499,998 | -0.0000003 | -0.003 |
| 100 % | | 0 | 836,499,998 | -0.0000002 | -0.002 |
| 100 % | | +10 | 836,499,999 | -0.0000002 | -0.002 |
| 100 % | | +20 | 836,499,997 | -0.0000003 | -0.003 |
| 100 % | | +30 | 836,499,996 | -0.0000004 | -0.004 |
| 100 % | | +40 | 836,499,997 | -0.0000004 | -0.004 |
| 100 % | | +50 | 836,499,998 | -0.0000002 | -0.002 |
| 115 % | 4.43 | +20 | 836,499,999 | -0.0000002 | -0.002 |
| BAT End Point | 3.15 | +20 | 836,499,996 | -0.0000005 | -0.005 |

### 7.7.6. LTE Band 66(4)

OPERATING FREQUENCY : 1 755 MHz
REFERENCE VOLTAGE 3.85 V DC
LIMIT(FCC) : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.
:

| VOLTAGE (%) | POWER (V DC) | TEMP (℃) | FREQ (Hz) | Deviation | |
|---|---|---|---|---|---|
| | | | | (%) | (ppm) |
| 100 % | 3.85 | +20 | 1,755,000,016 | 0.0000009 | 0.009 |
| 100 % | | -30 | 1,755,000,012 | 0.0000007 | 0.007 |
| 100 % | | -20 | 1,755,000,011 | 0.0000006 | 0.006 |
| 100 % | | -10 | 1,755,000,015 | 0.0000009 | 0.009 |
| 100 % | | 0 | 1,755,000,014 | 0.0000008 | 0.008 |
| 100 % | | +10 | 1,755,000,012 | 0.0000007 | 0.007 |
| 100 % | | +20 | 1,755,000,016 | 0.0000009 | 0.009 |
| 100 % | | +30 | 1,755,000,014 | 0.0000008 | 0.008 |
| 100 % | | +40 | 1,755,000,015 | 0.0000009 | 0.009 |
| 100 % | | +50 | 1,755,000,010 | 0.0000006 | 0.006 |
| 115 % | 4.43 | +20 | 1,755,000,011 | 0.0000006 | 0.006 |
| BAT End Point | 3.15 | +20 | 1,755,000,010 | 0.0000006 | 0.006 |

### 7.7.7. LTE Band 2

OPERATING FREQUENCY : 1 880 MHz
REFERENCE VOLTAGE 3.85 V DC
LIMIT(FCC) : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

| VOLTAGE (%) | POWER (V DC) | TEMP (℃) | FREQ (Hz) | Deviation | |
|---|---|---|---|---|---|
| | | | | (%) | (ppm) |
| 100 % | 3.85 | +20 | 1,879,999,997 | -0.0000002 | -0.002 |
| 100 % | | -30 | 1,879,999,999 | -0.0000001 | -0.001 |
| 100 % | | -20 | 1,879,999,995 | -0.0000003 | -0.003 |
| 100 % | | -10 | 1,879,999,998 | -0.0000001 | -0.001 |
| 100 % | | 0 | 1,879,999,997 | -0.0000002 | -0.002 |
| 100 % | | +10 | 1,879,999,995 | -0.0000003 | -0.003 |
| 100 % | | +20 | 1,879,999,997 | -0.0000002 | -0.002 |
| 100 % | | +30 | 1,879,999,996 | -0.0000002 | -0.002 |
| 100 % | | +40 | 1,879,999,998 | -0.0000001 | -0.001 |
| 100 % | | +50 | 1,879,999,997 | -0.0000002 | -0.002 |
| 115 % | 4.43 | +20 | 1,879,999,996 | -0.0000002 | -0.002 |
| BAT End Point | 3.15 | +20 | 1,879,999,998 | -0.0000001 | -0.001 |

### 7.7.8. LTE Band 7

OPERATING FREQUENCY : 2 535 MHz
REFERENCE VOLTAGE 3.85 V DC
LIMIT(FCC) : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

| VOLTAGE (%) | POWER (V DC) | TEMP (℃) | FREQ (Hz) | Deviation | |
|---|---|---|---|---|---|
| | | | | (%) | (ppm) |
| 100 % | 3.85 | +20 | 2,535,000,011 | 0.0000004 | 0.004 |
| 100 % | | -30 | 2,535,000,008 | 0.0000003 | 0.003 |
| 100 % | | -20 | 2,535,000,013 | 0.0000005 | 0.005 |
| 100 % | | -10 | 2,535,000,011 | 0.0000004 | 0.004 |
| 100 % | | 0 | 2,535,000,007 | 0.0000003 | 0.003 |
| 100 % | | +10 | 2,535,000,010 | 0.0000004 | 0.004 |
| 100 % | | +20 | 2,535,000,011 | 0.0000004 | 0.004 |
| 100 % | | +30 | 2,535,000,013 | 0.0000005 | 0.005 |
| 100 % | | +40 | 2,535,000,014 | 0.0000006 | 0.006 |
| 100 % | | +50 | 2,535,000,014 | 0.0000006 | 0.006 |
| 115 % | 4.43 | +20 | 2,535,000,011 | 0.0000004 | 0.004 |
| BAT End Point | 3.15 | +20 | 2,535,000,015 | 0.0000006 | 0.006 |

### 7.7.9. LTE Band 38

OPERATING FREQUENCY : 2 595 MHz
REFERENCE VOLTAGE 3.85 V DC
LIMIT(FCC) : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

| VOLTAGE (%) | POWER (V DC) | TEMP (℃) | FREQ (Hz) | Deviation | |
|---|---|---|---|---|---|
| | | | | (%) | (ppm) |
| 100 % | 3.85 | +20 | 2,594,999,994 | -0.0000002 | -0.002 |
| 100 % | | -30 | 2,594,999,995 | -0.0000002 | -0.002 |
| 100 % | | -20 | 2,594,999,993 | -0.0000003 | -0.003 |
| 100 % | | -10 | 2,594,999,993 | -0.0000003 | -0.003 |
| 100 % | | 0 | 2,594,999,994 | -0.0000002 | -0.002 |
| 100 % | | +10 | 2,594,999,996 | -0.0000002 | -0.002 |
| 100 % | | +20 | 2,594,999,994 | -0.0000002 | -0.002 |
| 100 % | | +30 | 2,594,999,996 | -0.0000002 | -0.002 |
| 100 % | | +40 | 2,594,999,996 | -0.0000002 | -0.002 |
| 100 % | | +50 | 2,594,999,992 | -0.0000003 | -0.003 |
| 115 % | 4.43 | +20 | 2,594,999,994 | -0.0000002 | -0.002 |
| BAT End Point | 3.15 | +20 | 2,594,999,995 | -0.0000002 | -0.002 |

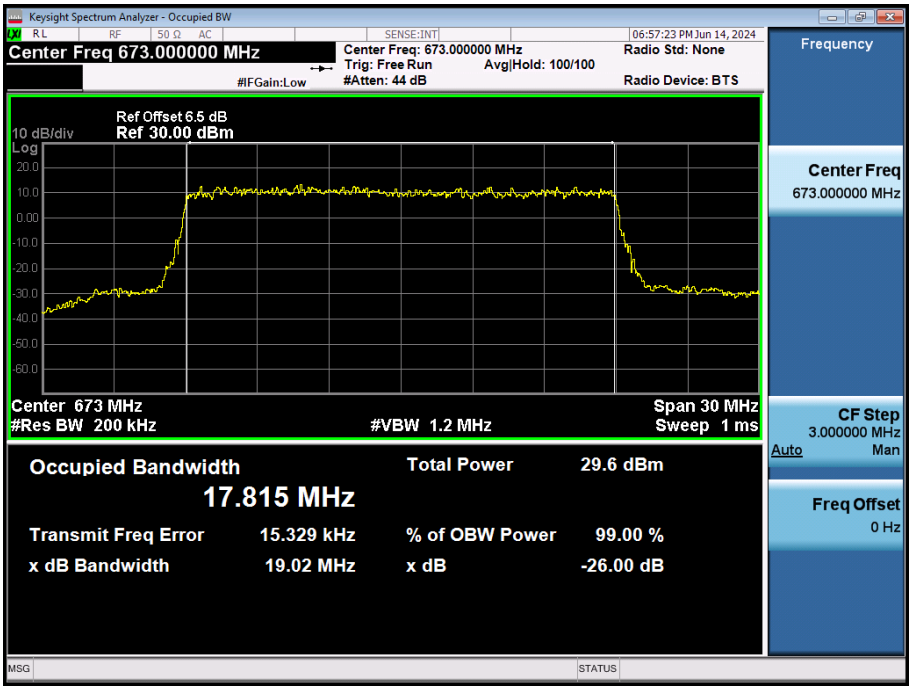
# 8. TEST PLOTS

**- Test Notes:**

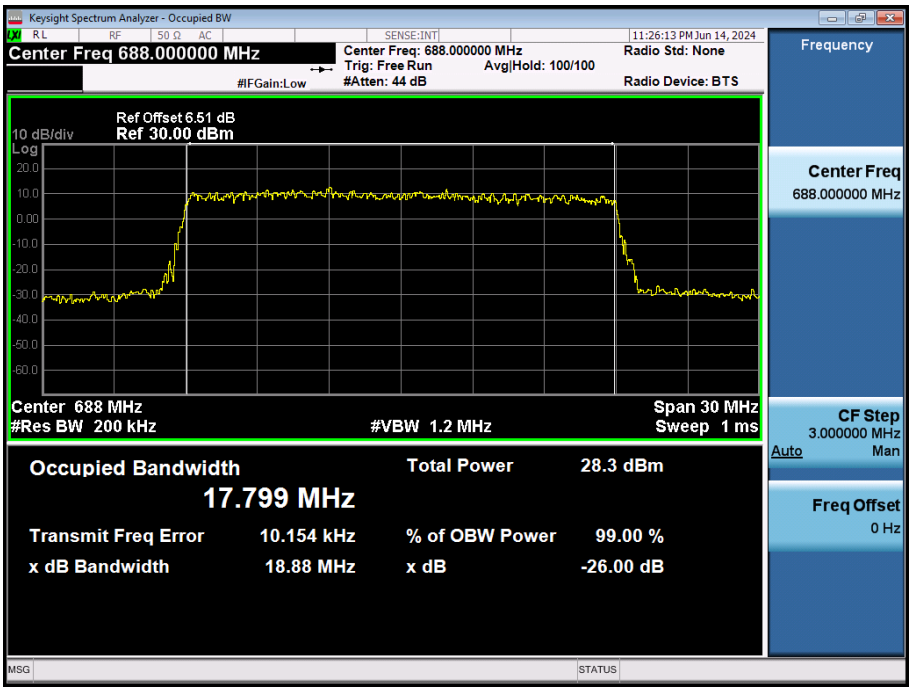
All bandwidths, RB configurations, and modulations were investigated.
The worst case test results are reported.

## 8.1. OCCUPIED BANDWIDTH

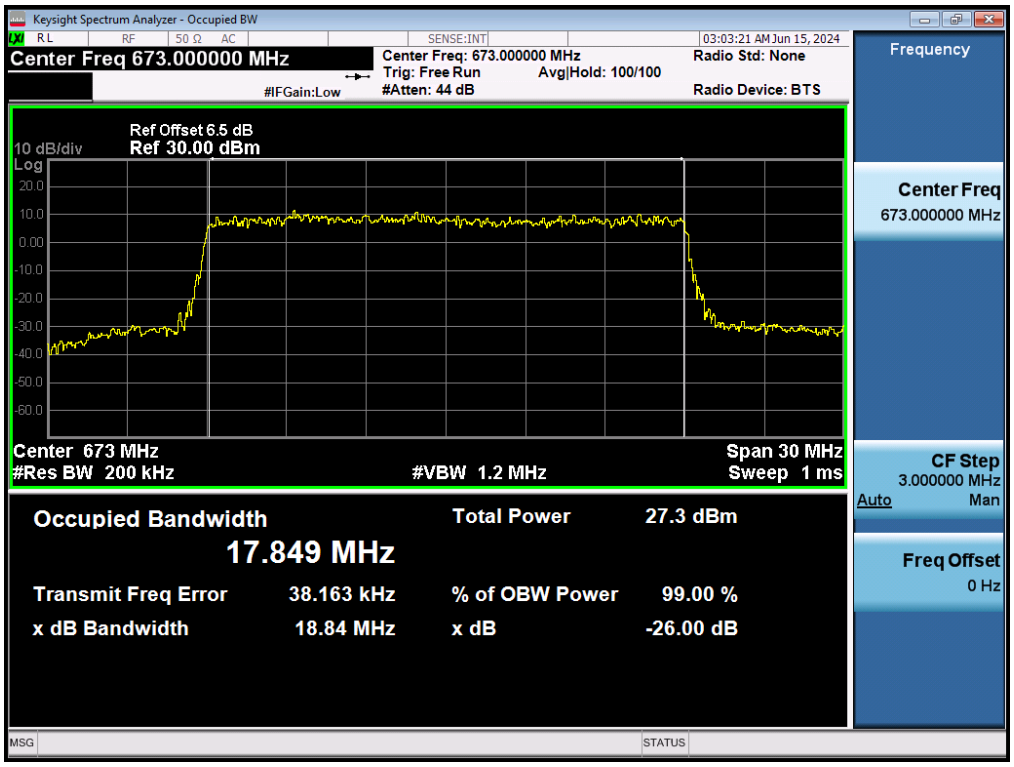
### 8.1.1. LTE Band 71



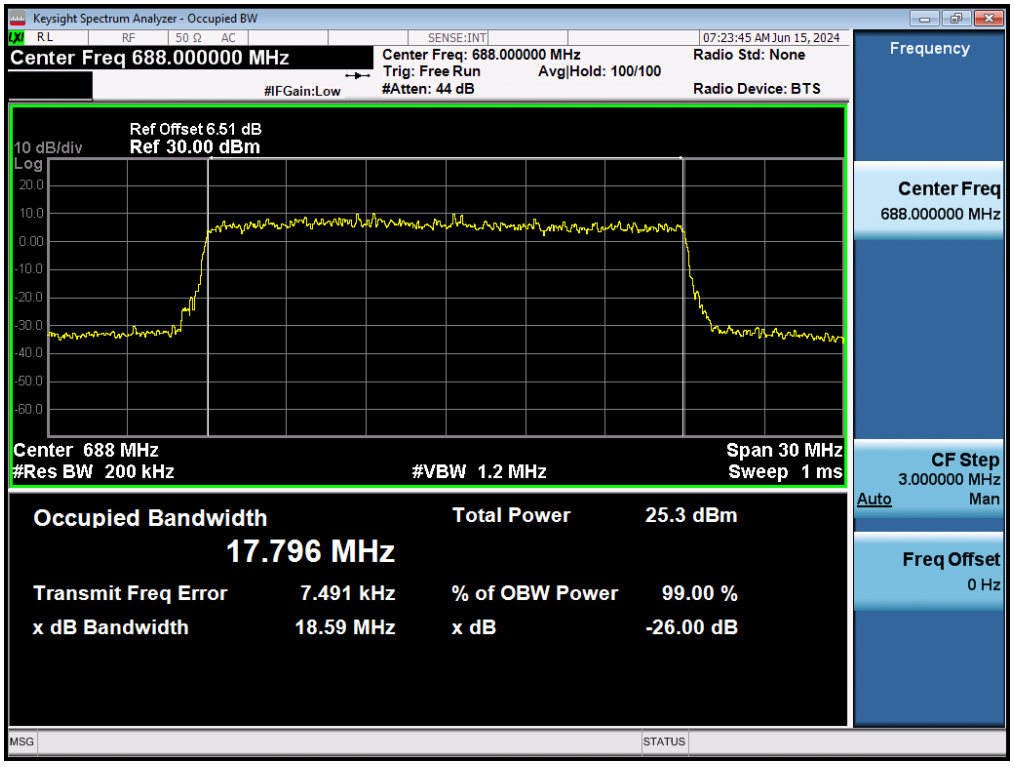

LTE Band 71 / 20 MHz / QPSK / FULL RB Size



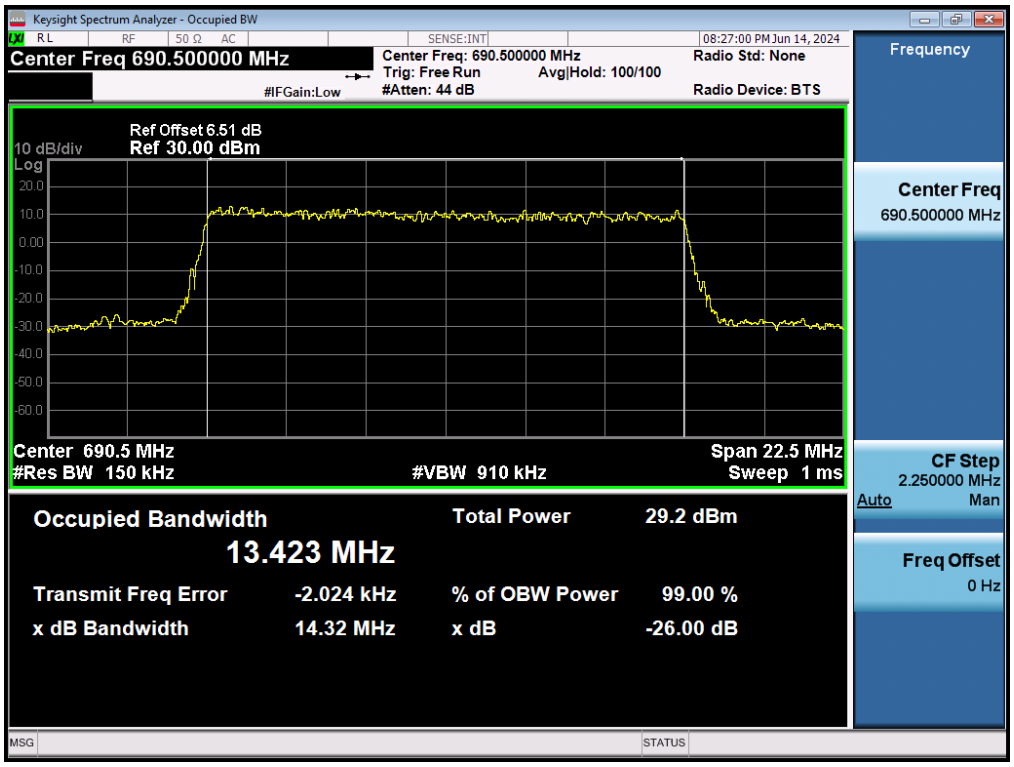

LTE Band 71 / 20 MHz / 16QAM / FULL RB Size



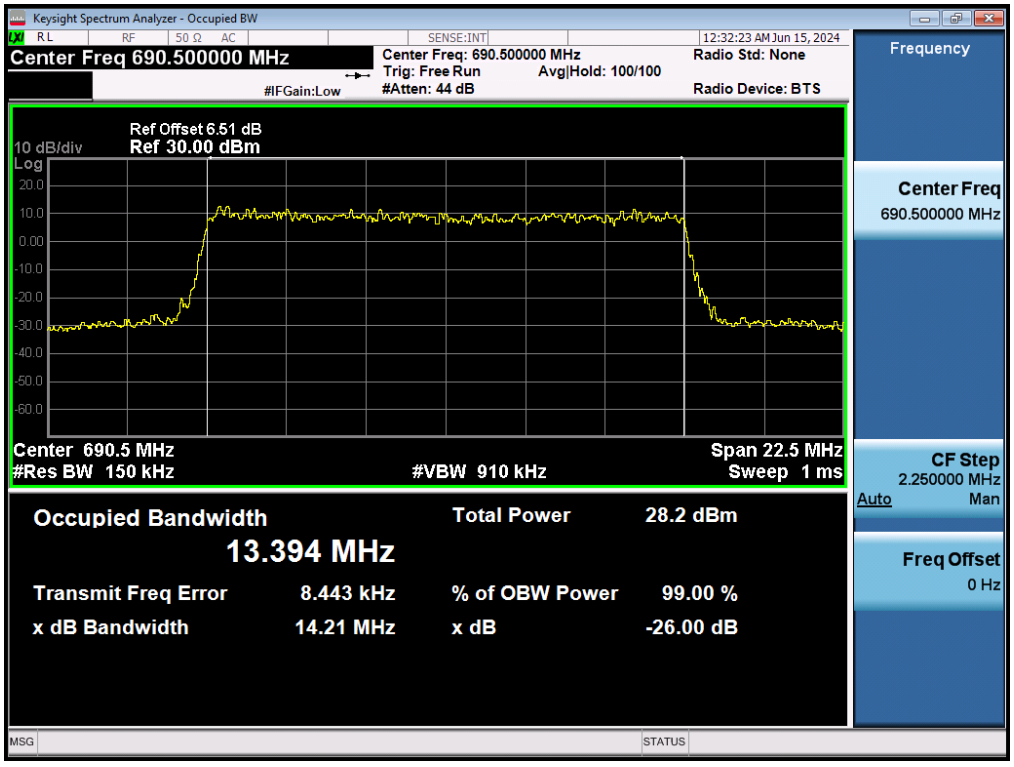

LTE Band 71 / 20 MHz / 64QAM / FULL RB Size



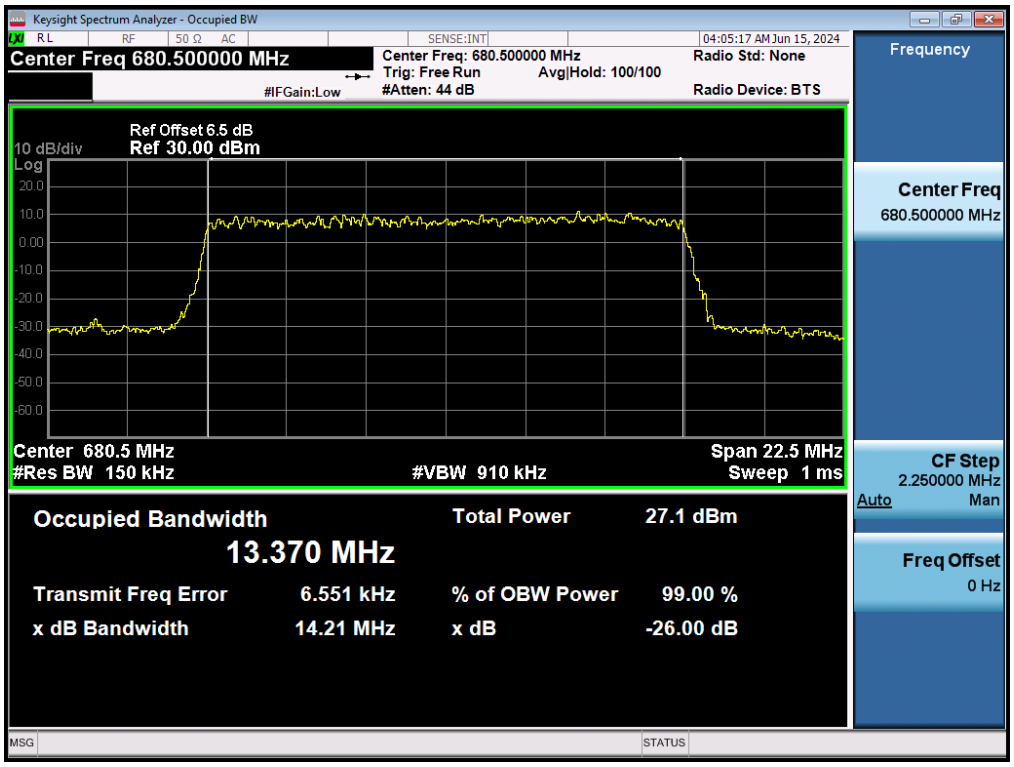

LTE Band 71 / 20 MHz / 256QAM / FULL RB Size



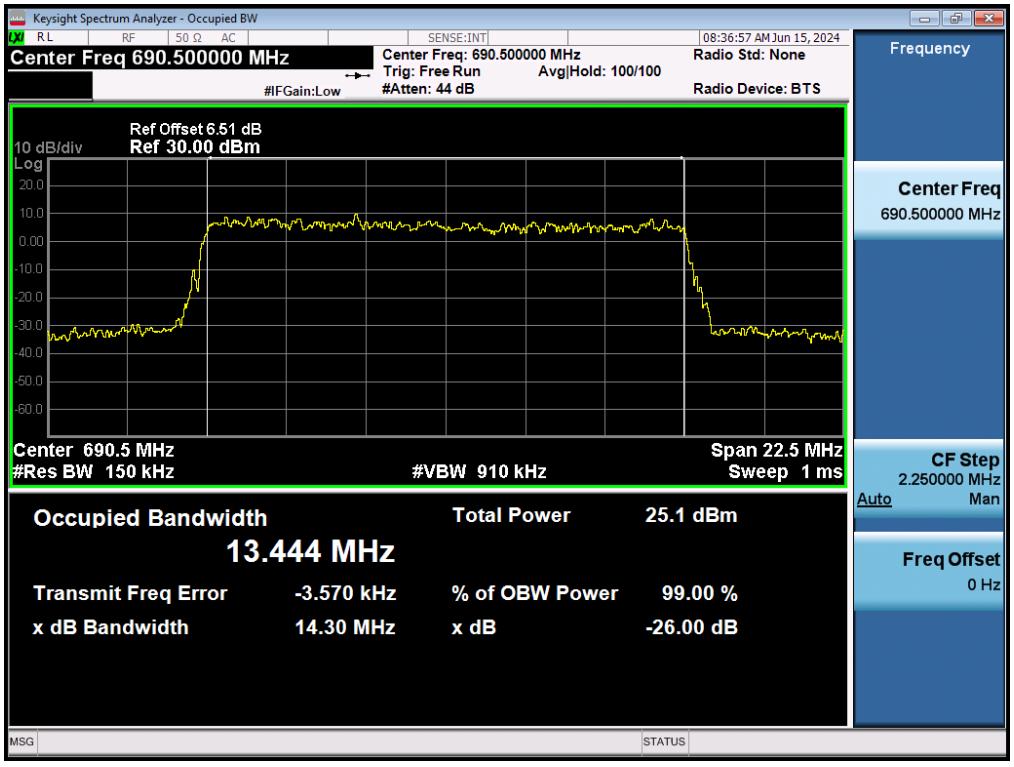

LTE Band 71 / 15 MHz / QPSK / FULL RB Size



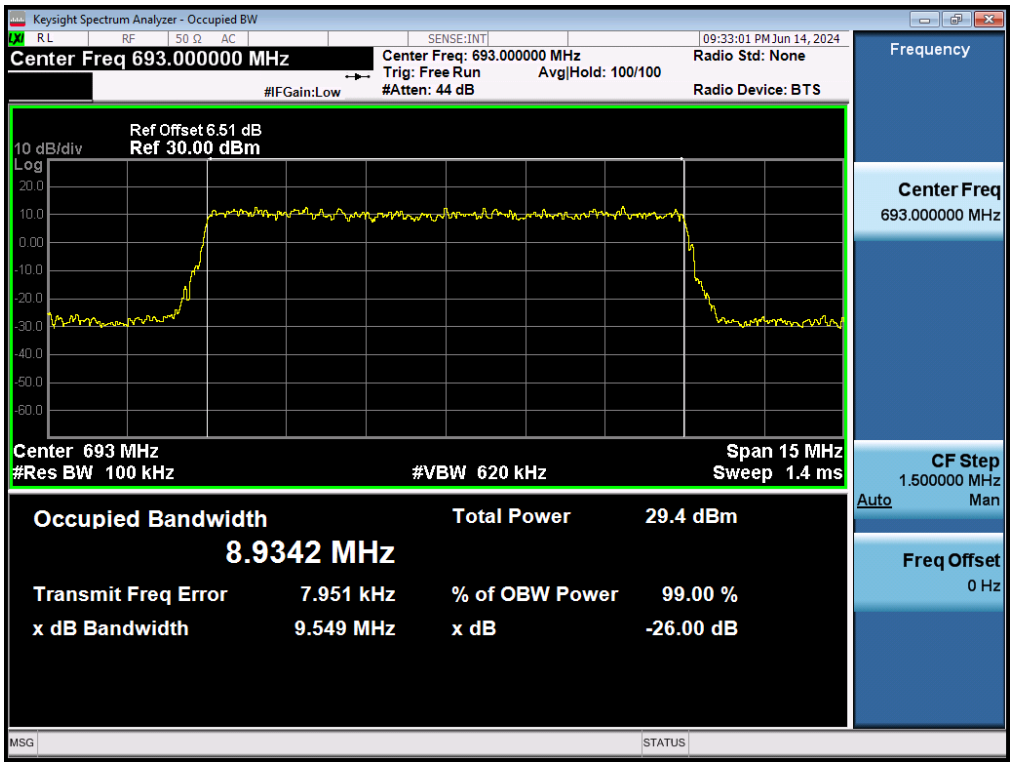

LTE Band 71 / 15 MHz / 16QAM / FULL RB Size



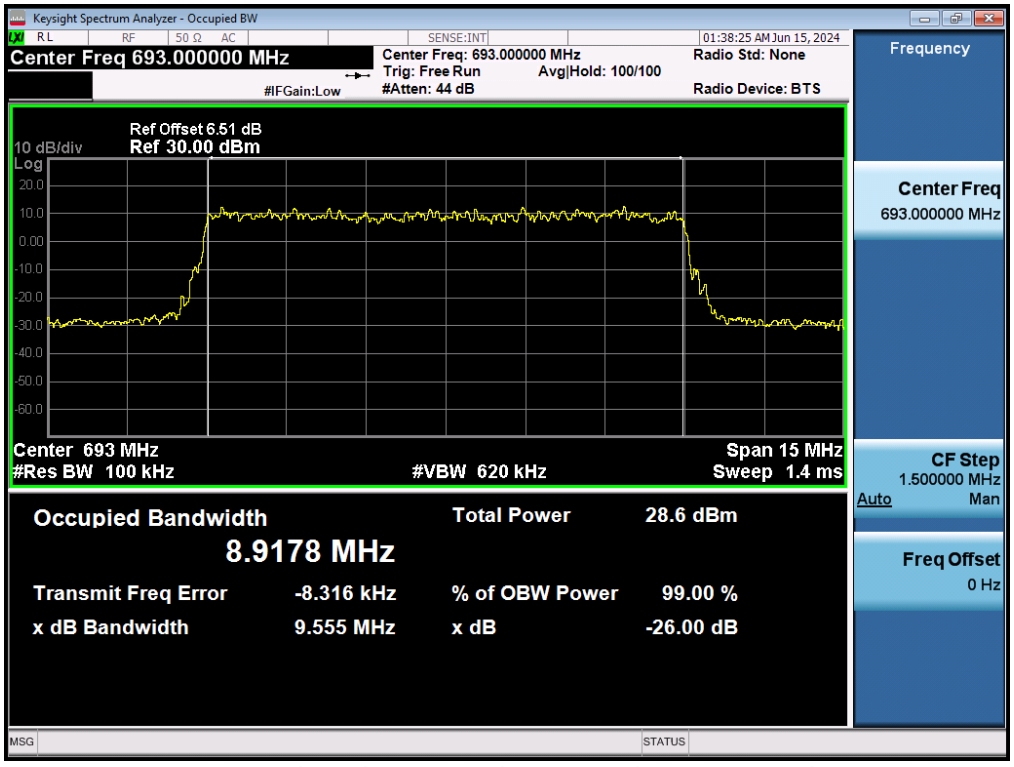

LTE Band 71 / 15 MHz / 64QAM / FULL RB Size



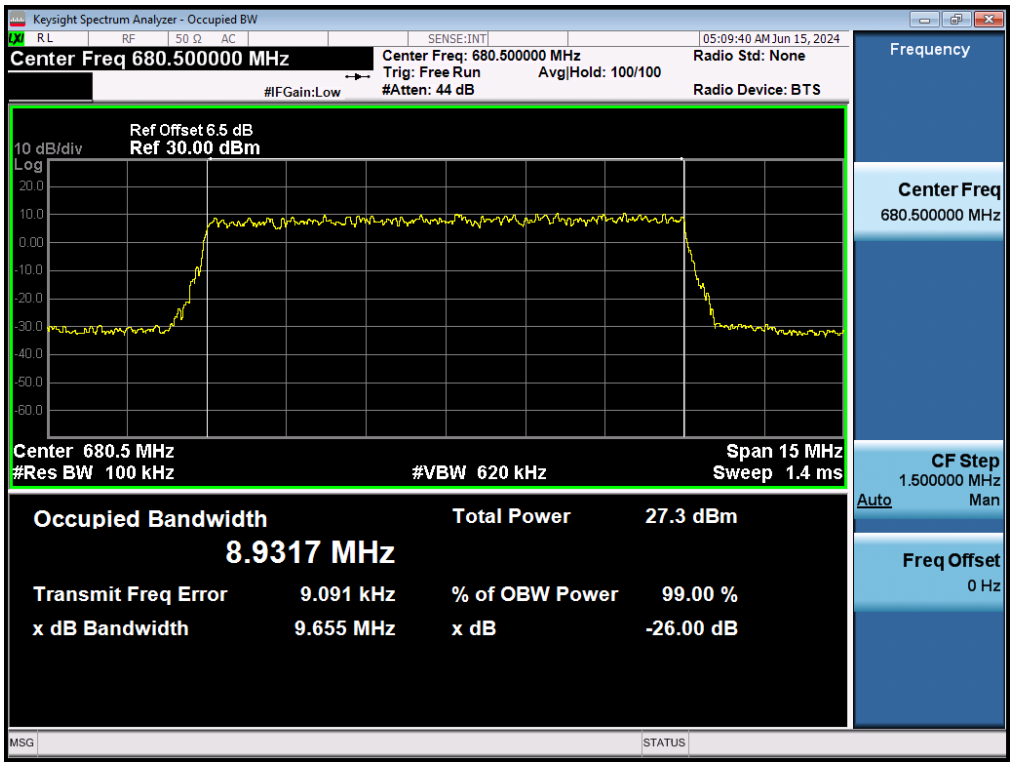

LTE Band 71 / 15 MHz / 256QAM / FULL RB Size



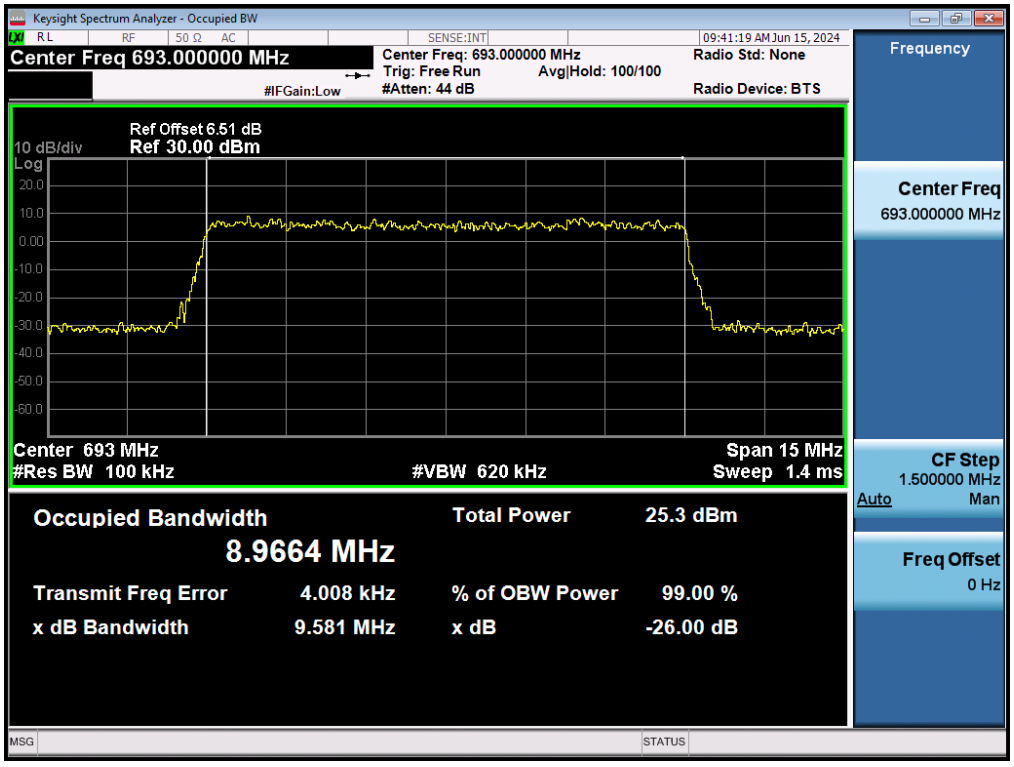

LTE Band 71 / 10 MHz / QPSK / FULL RB Size



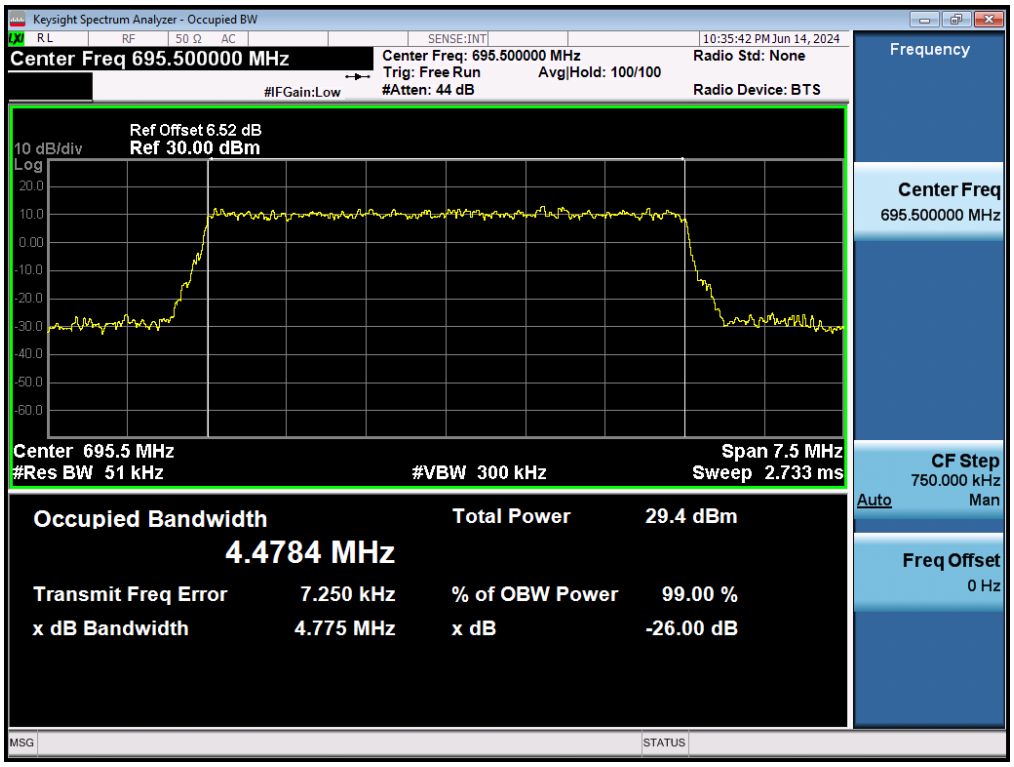

LTE Band 71 / 10 MHz / 16QAM / FULL RB Size



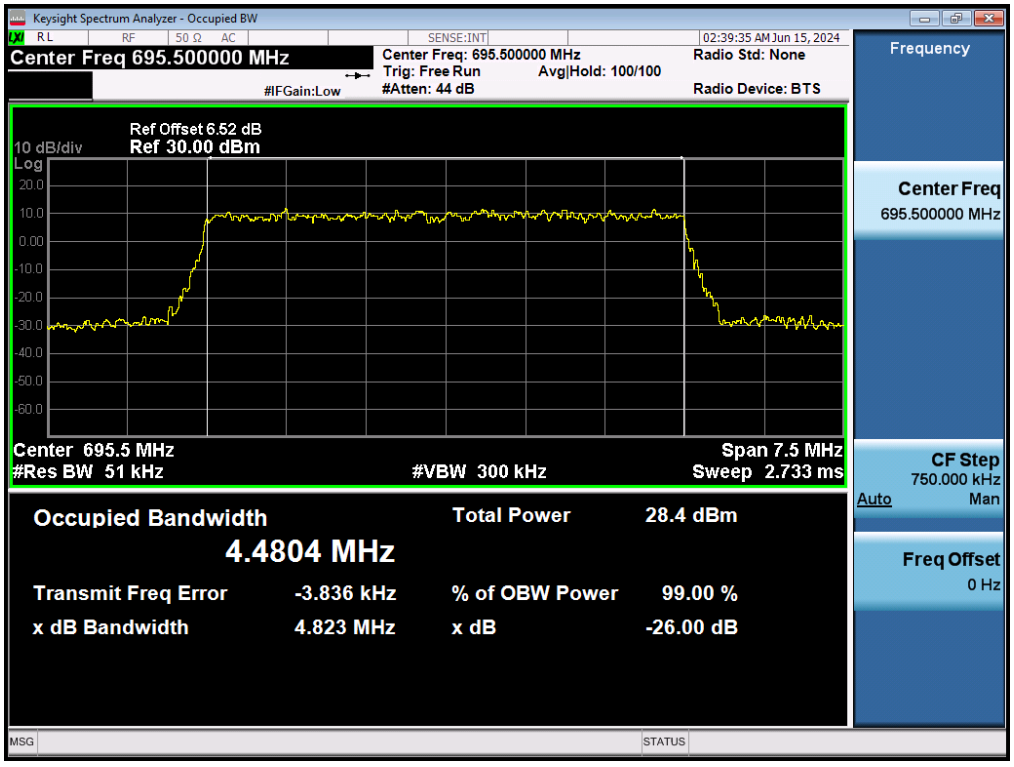

LTE Band 71 / 10 MHz / 64QAM / FULL RB Size



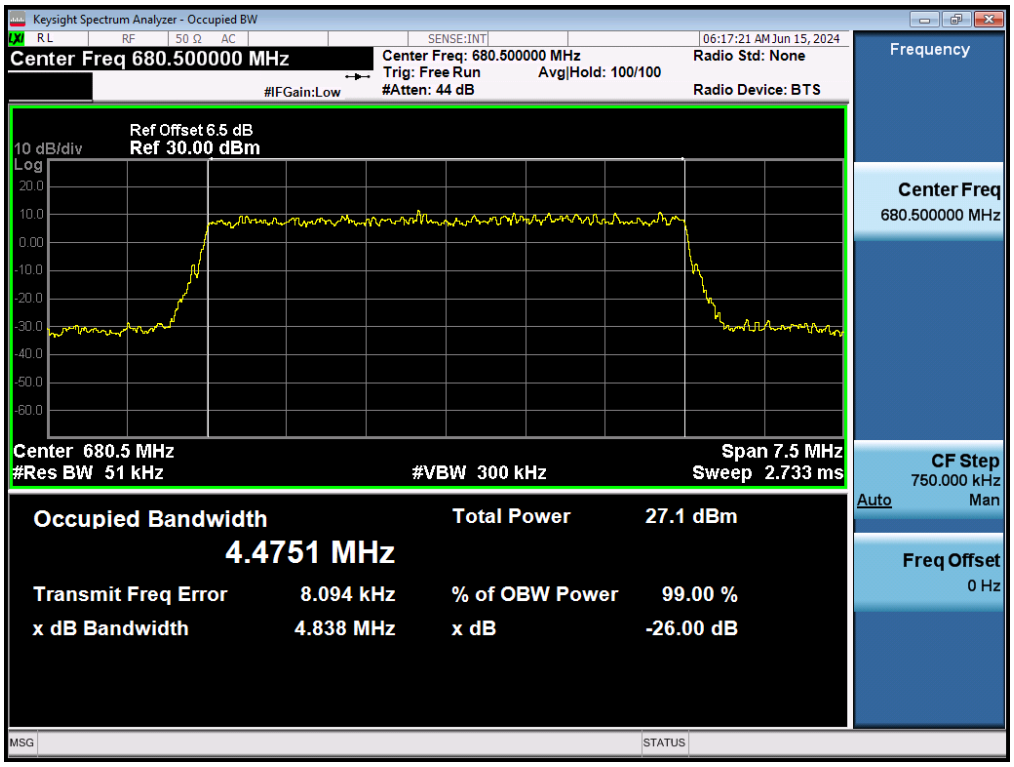

LTE Band 71 / 10 MHz / 256QAM / FULL RB Size



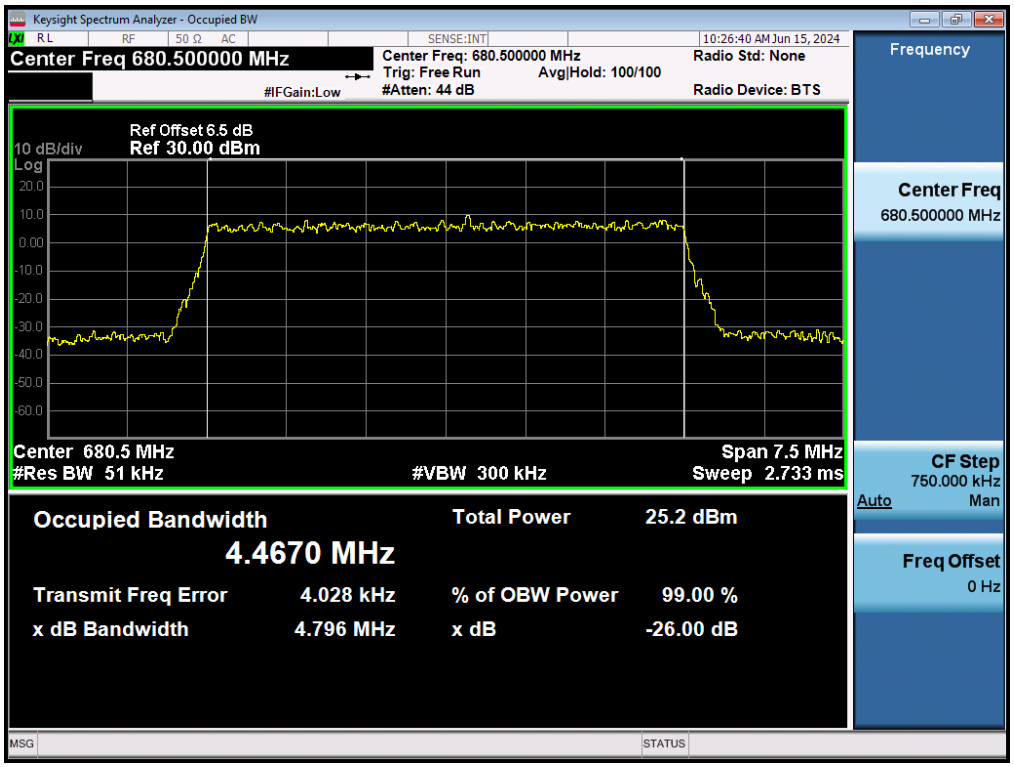

LTE Band 71 / 5 MHz / QPSK / FULL RB Size




LTE Band 71 / 5 MHz / 16QAM / FULL RB Size

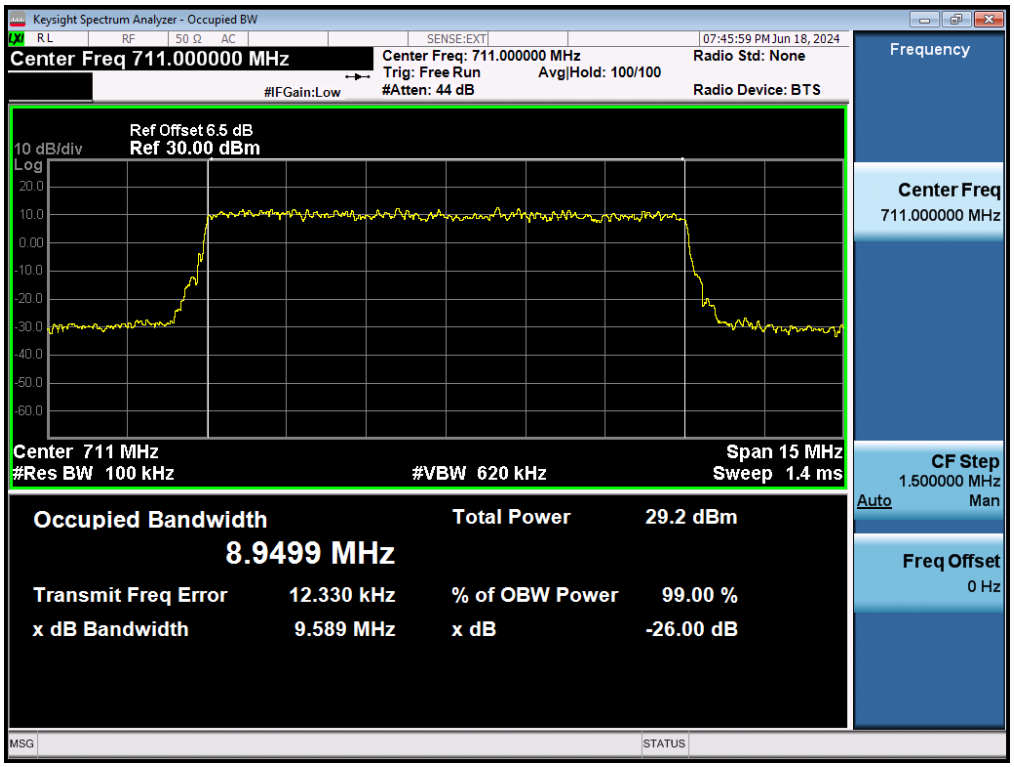



LTE Band 71 / 5 MHz / 64QAM / FULL RB Size

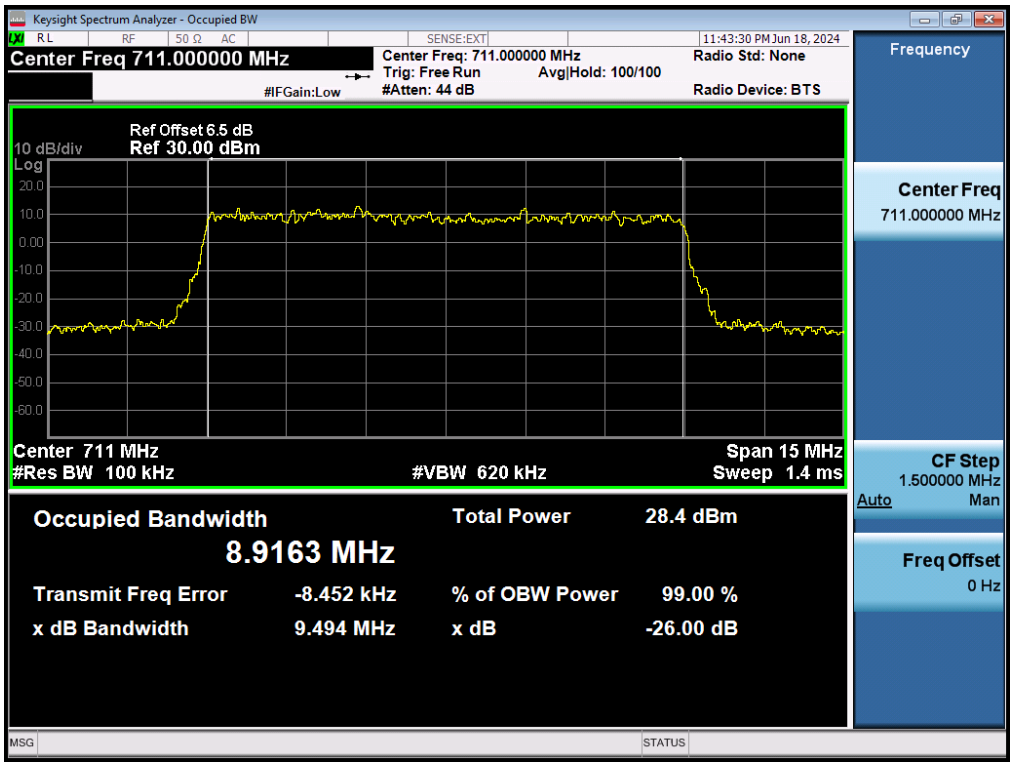



LTE Band 71 / 5 MHz / 256QAM / FULL RB Size

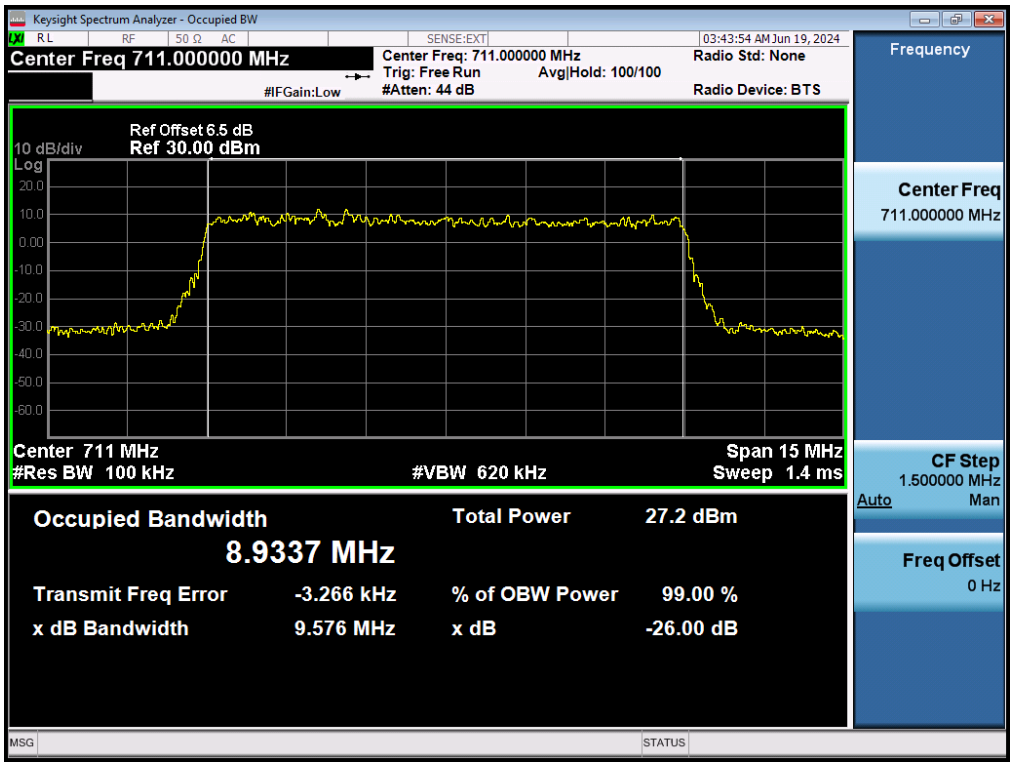
### 8.1.2. LTE Band 12(17)



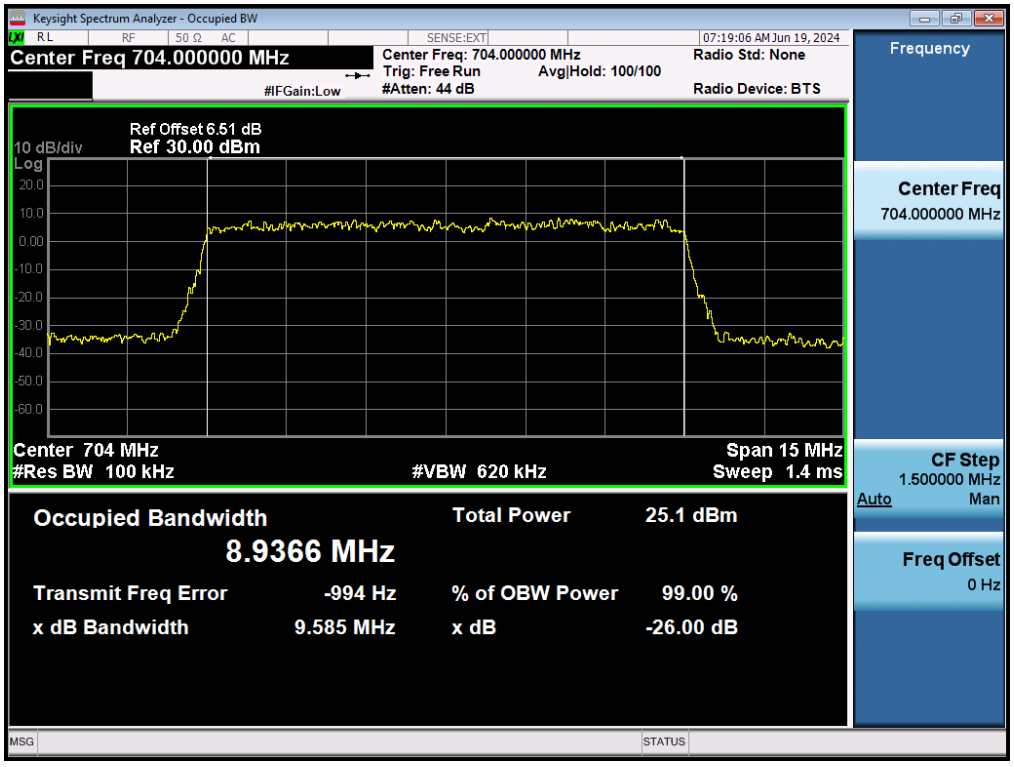

LTE Band 12 / 10 MHz / QPSK / FULL RB Size



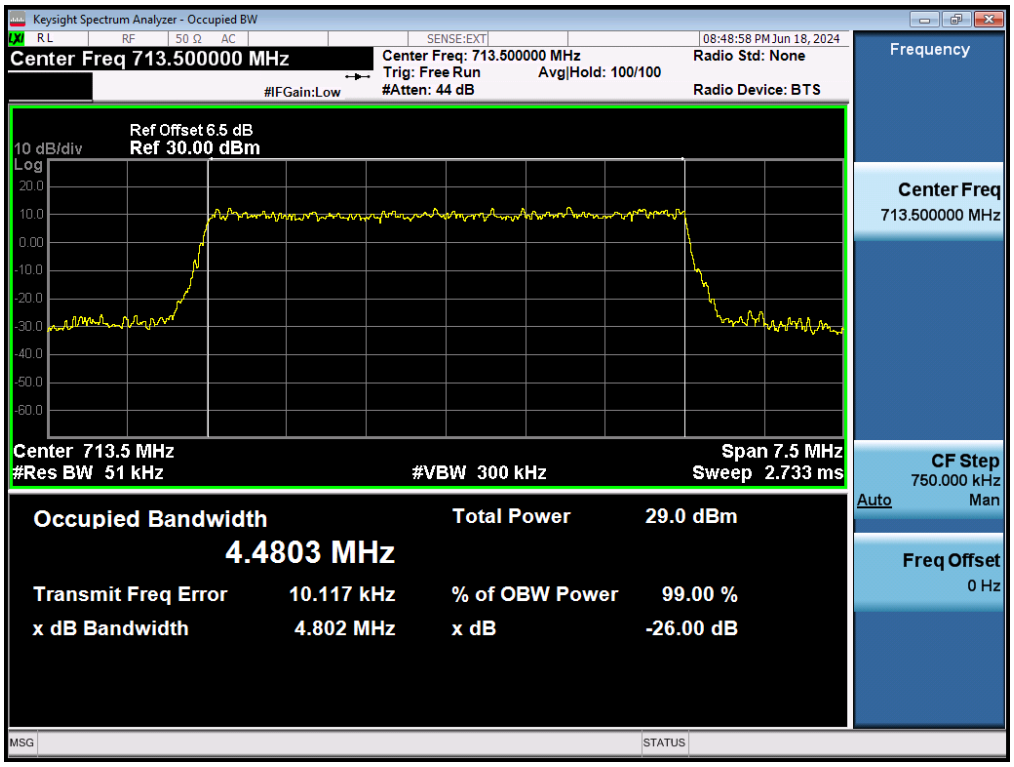

LTE Band 12 / 10 MHz / 16QAM / FULL RB Size



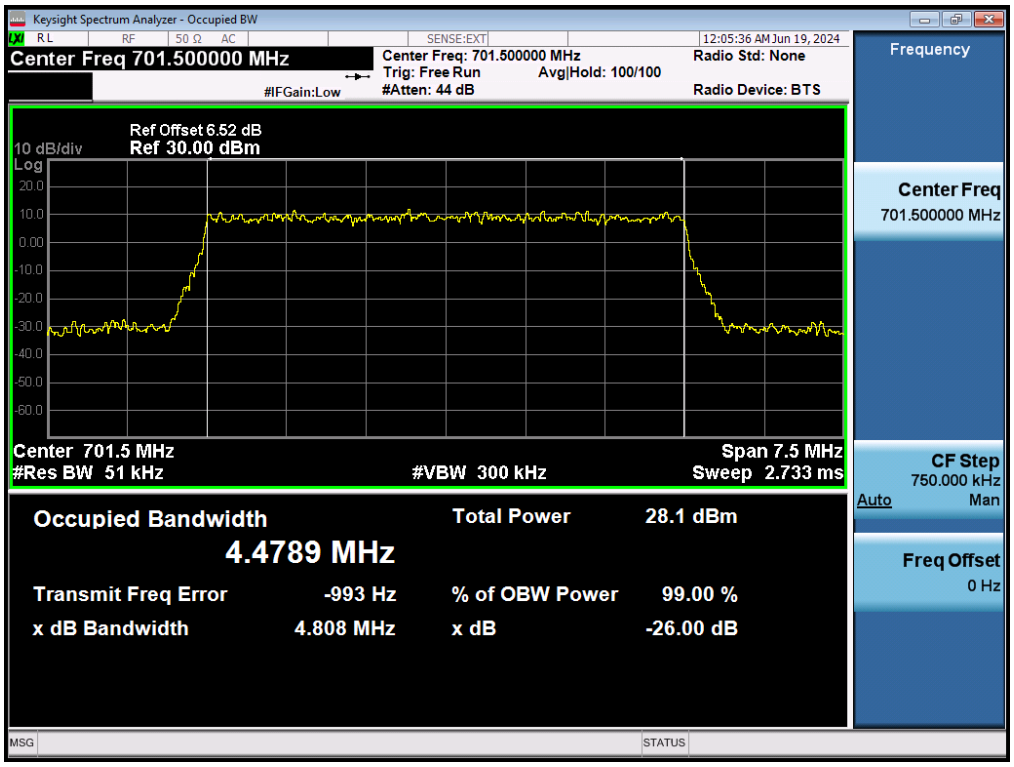

LTE Band 12 / 10 MHz / 64QAM / FULL RB Size



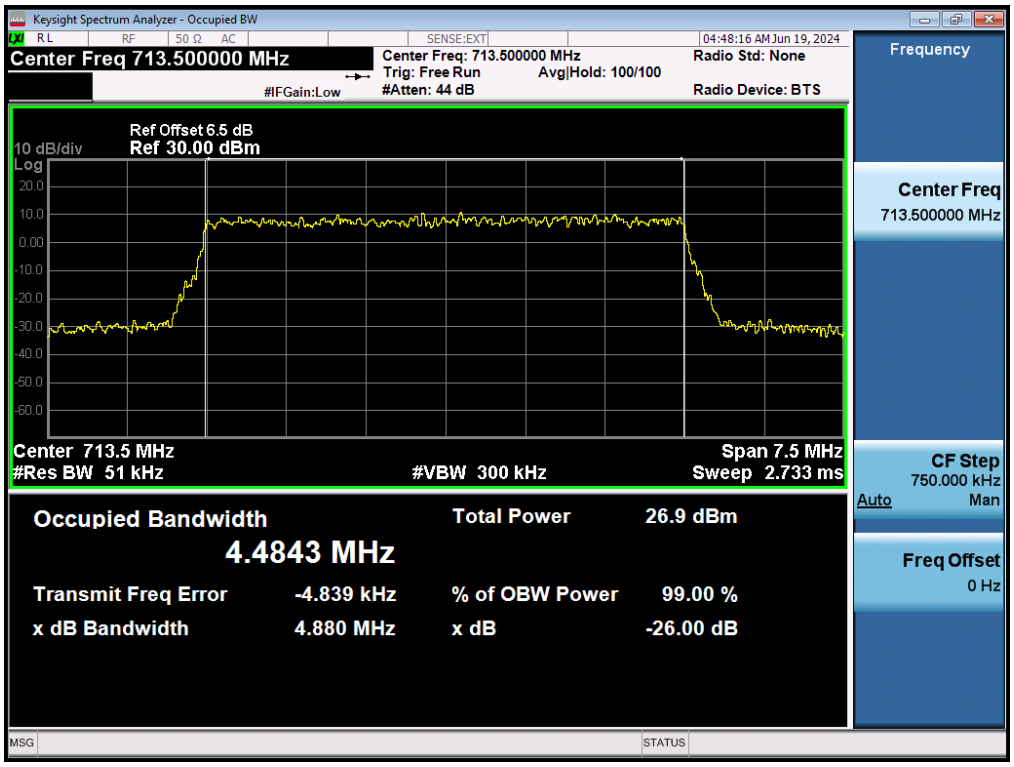

LTE Band 12 / 10 MHz / 256QAM / FULL RB Size



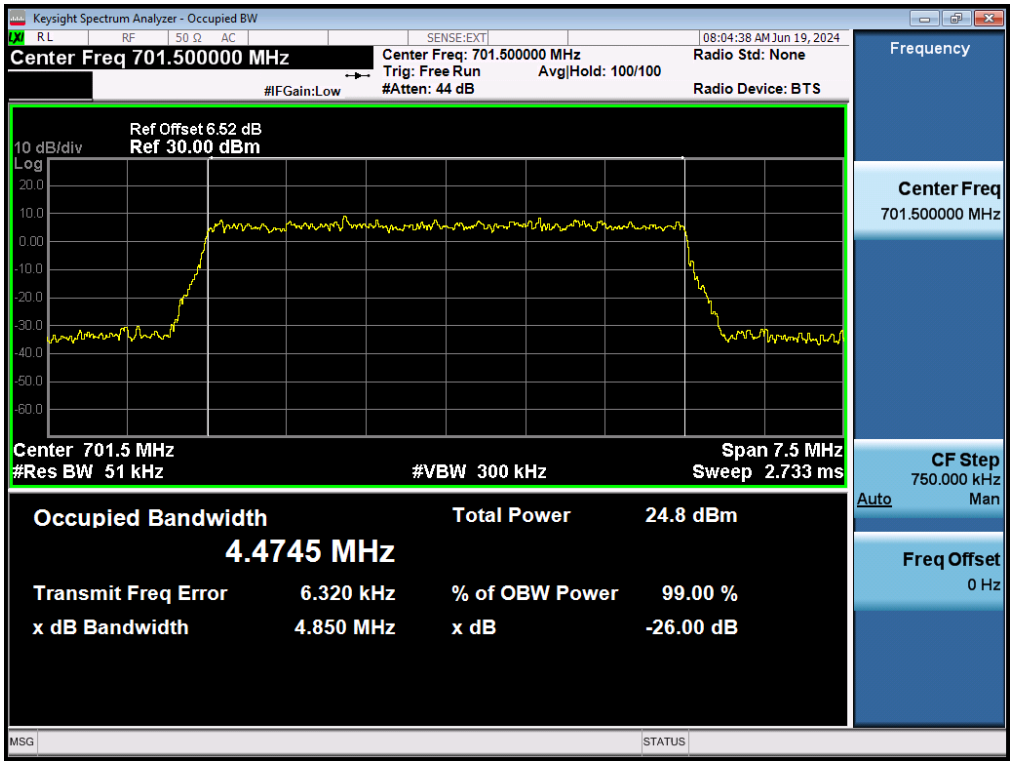

LTE Band 12 / 5 MHz / QPSK / FULL RB Size



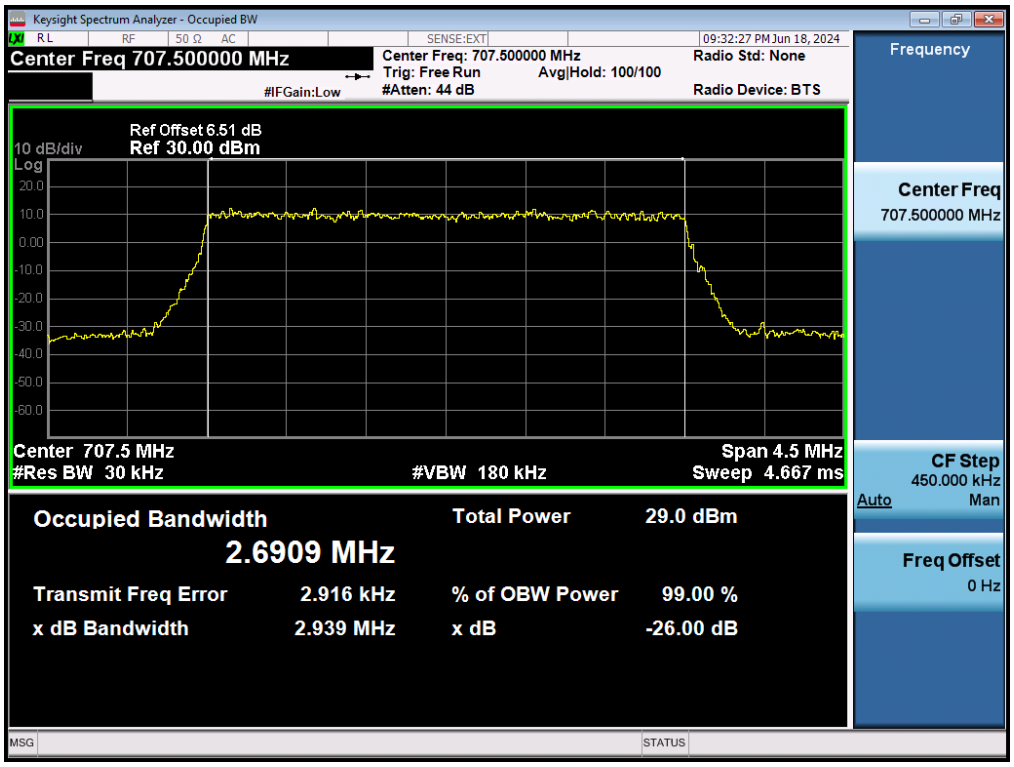

LTE Band 12 / 5 MHz / 16QAM / FULL RB Size



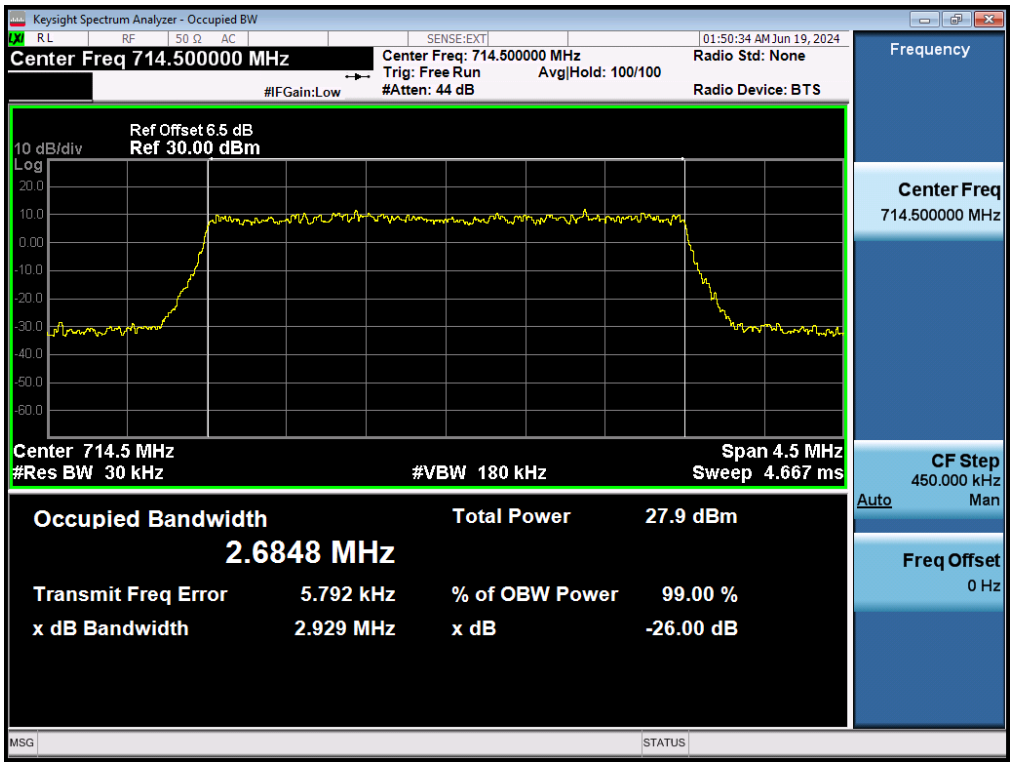

LTE Band 12 / 5 MHz / 64QAM / FULL RB Size



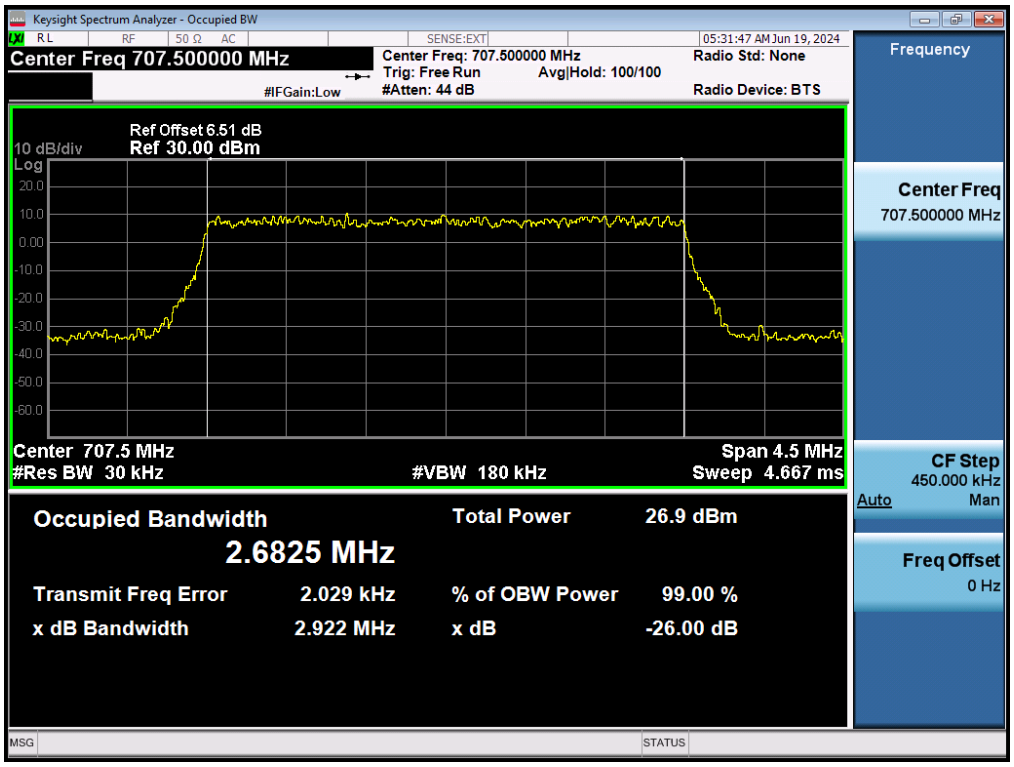

LTE Band 12 / 5 MHz / 256QAM / FULL RB Size



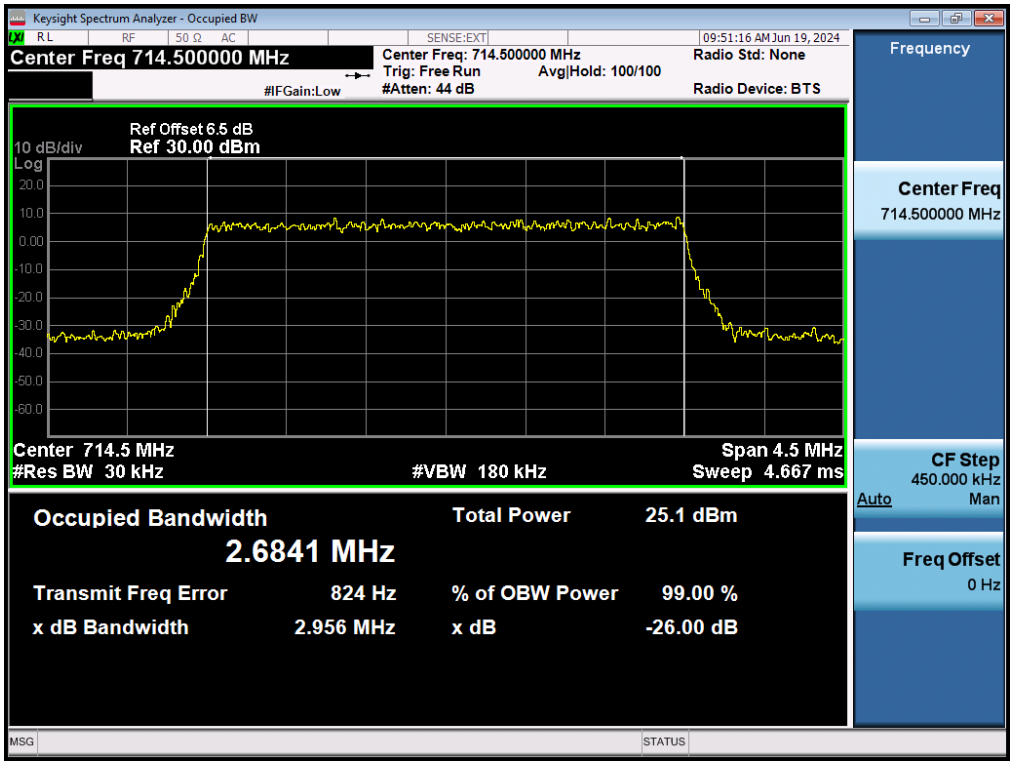

LTE Band 12 / 3 MHz / QPSK / FULL RB Size



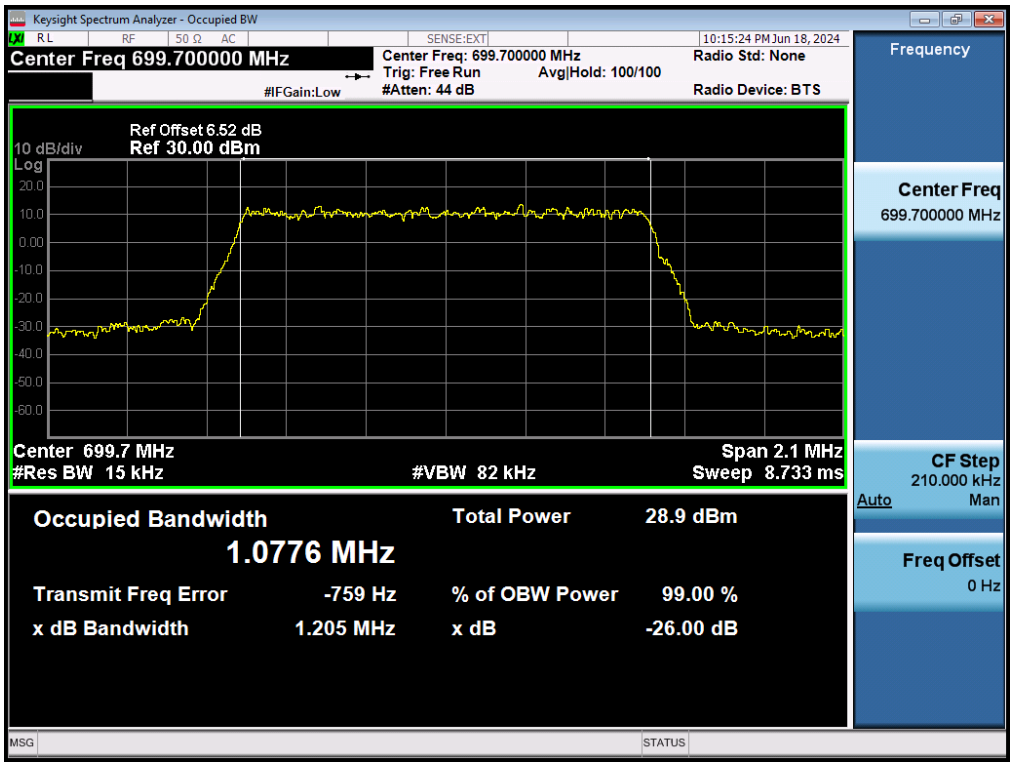

LTE Band 12 / 3 MHz / 16QAM / FULL RB Size



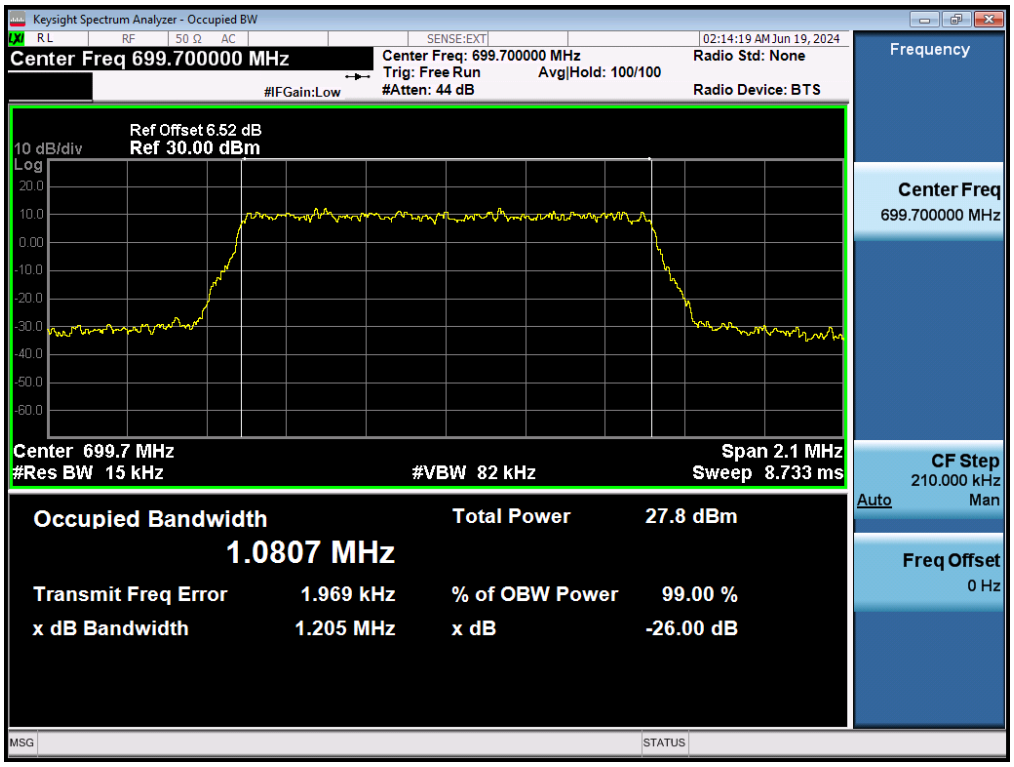

LTE Band 12 / 3 MHz / 64QAM / FULL RB Size



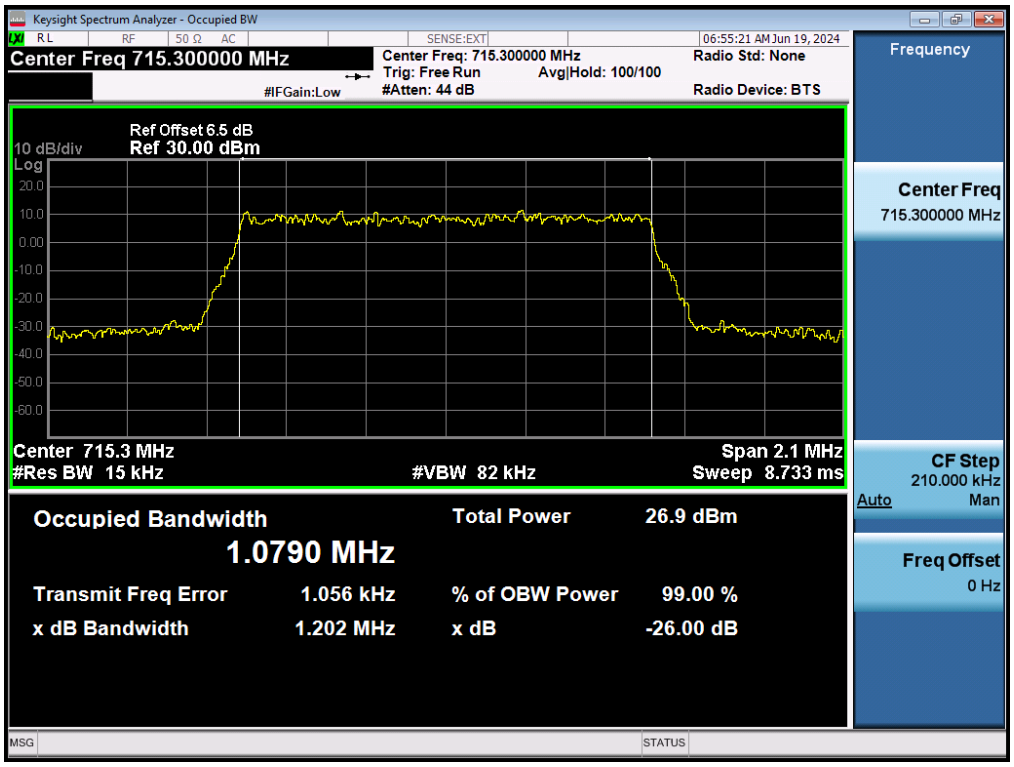

LTE Band 12 / 3 MHz / 256QAM / FULL RB Size



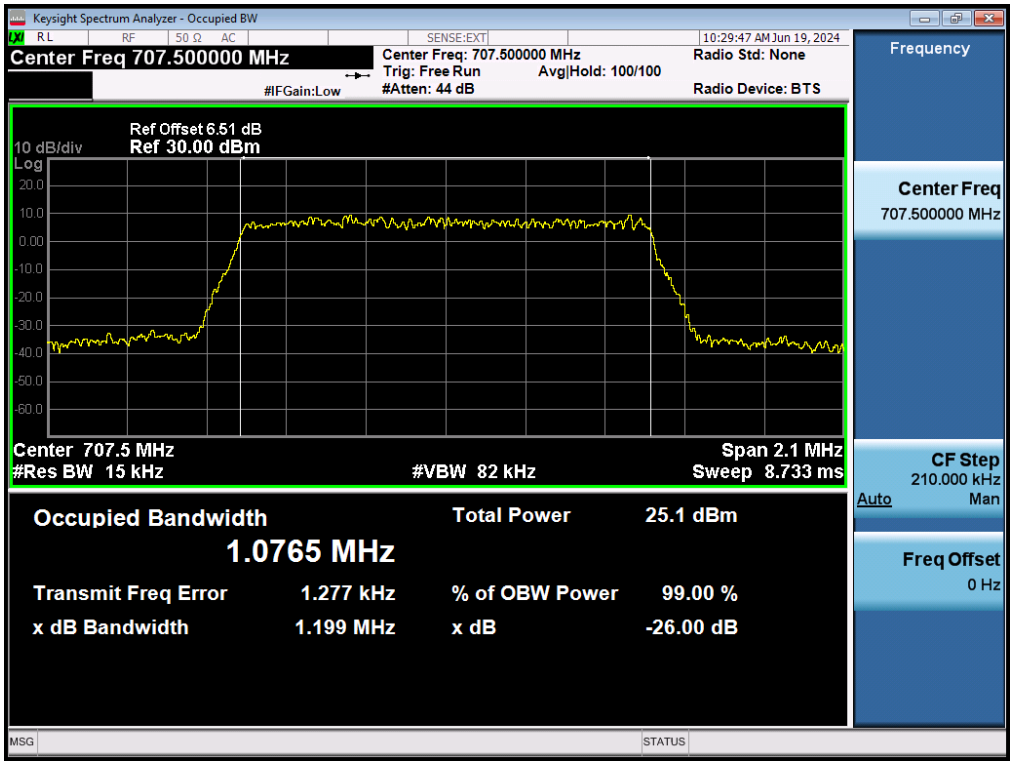

LTE Band 12 / 1.4 MHz / QPSK / FULL RB Size




LTE Band 12 / 1.4 MHz / 16QAM / FULL RB Size

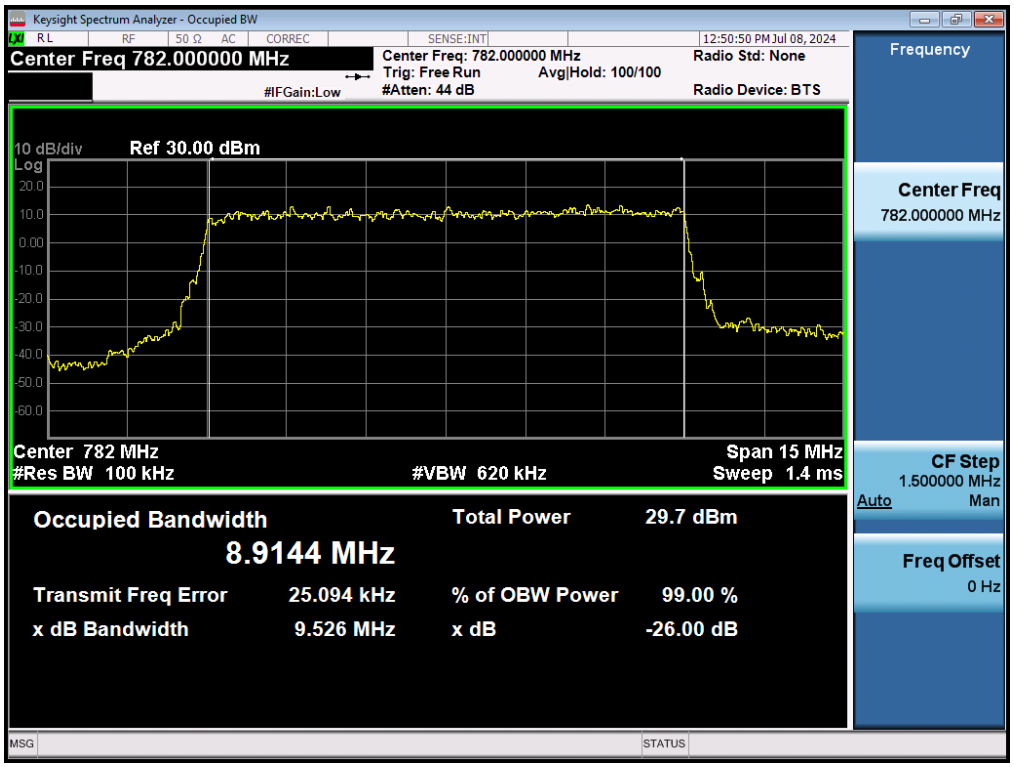



LTE Band 12 / 1.4 MHz / 64QAM / FULL RB Size

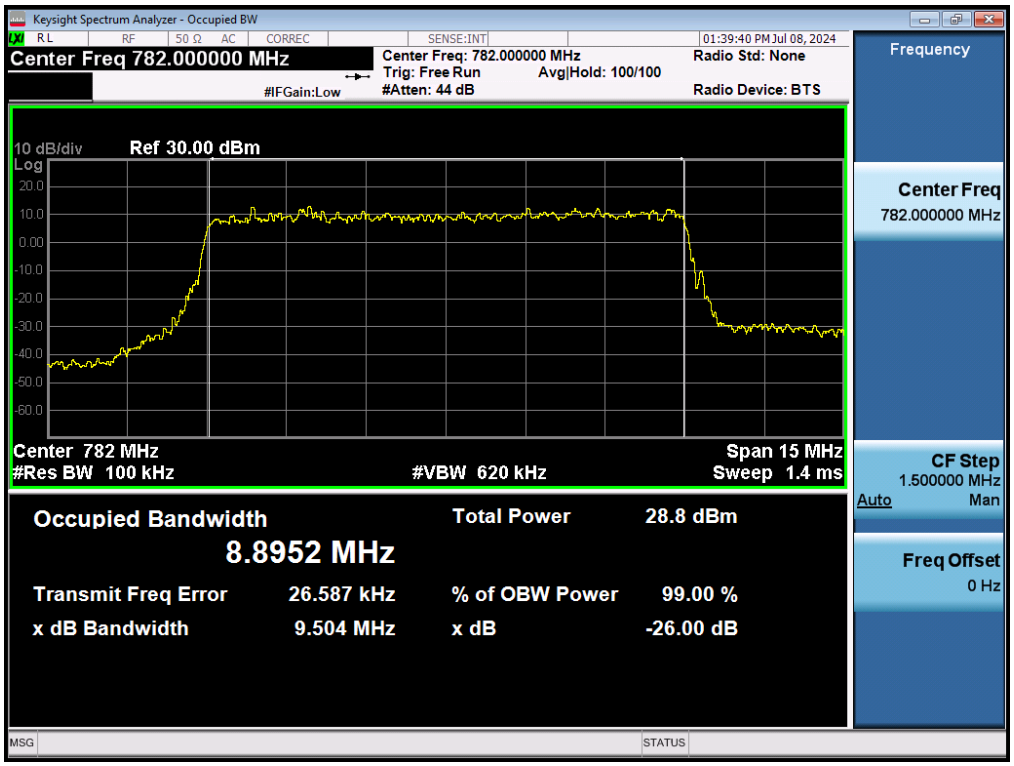



LTE Band 12 / 1.4 MHz / 256QAM / FULL RB Size

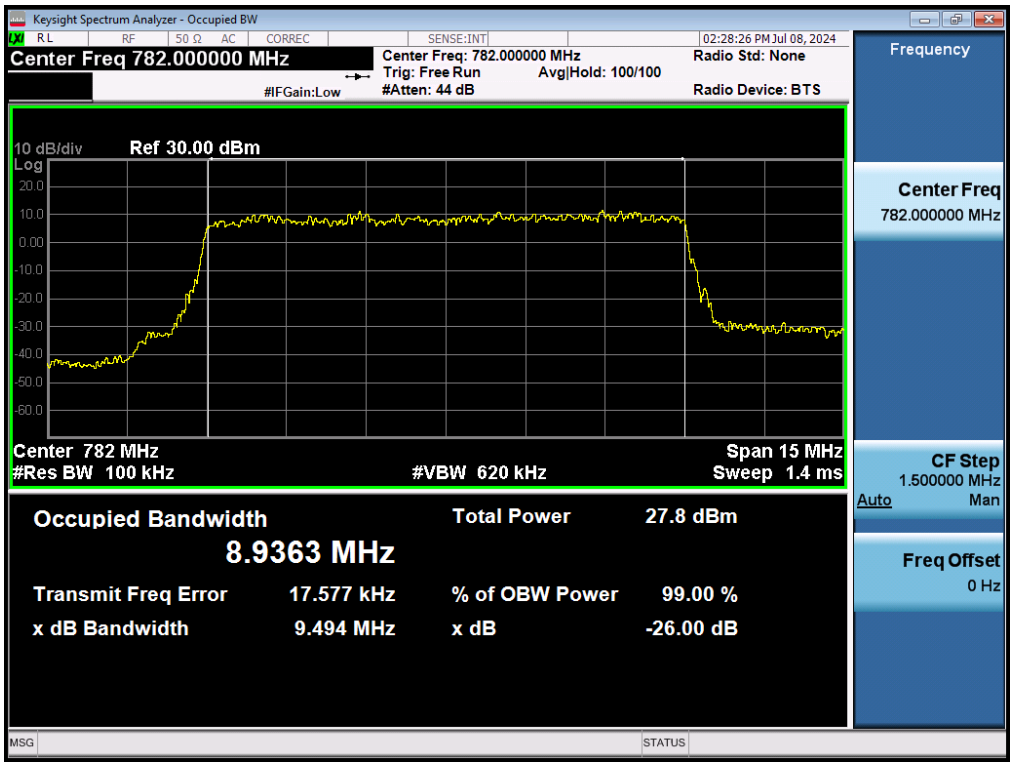
### 8.1.3. LTE Band 13



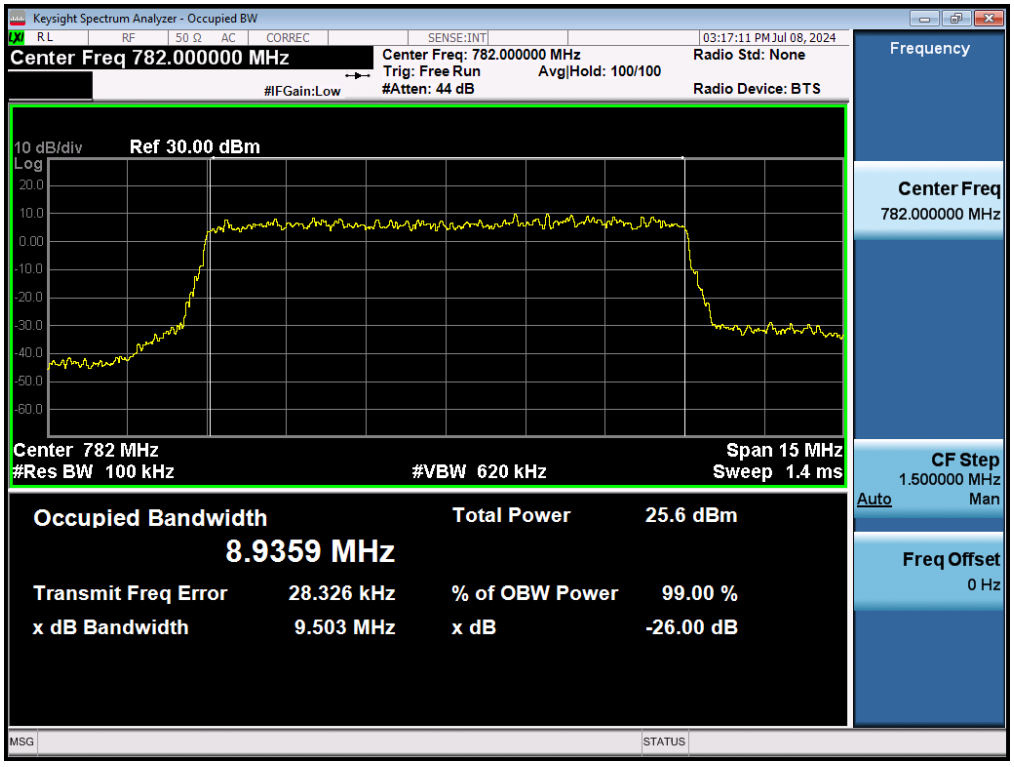

LTE Band 13 / 10 MHz / QPSK / FULL RB Size



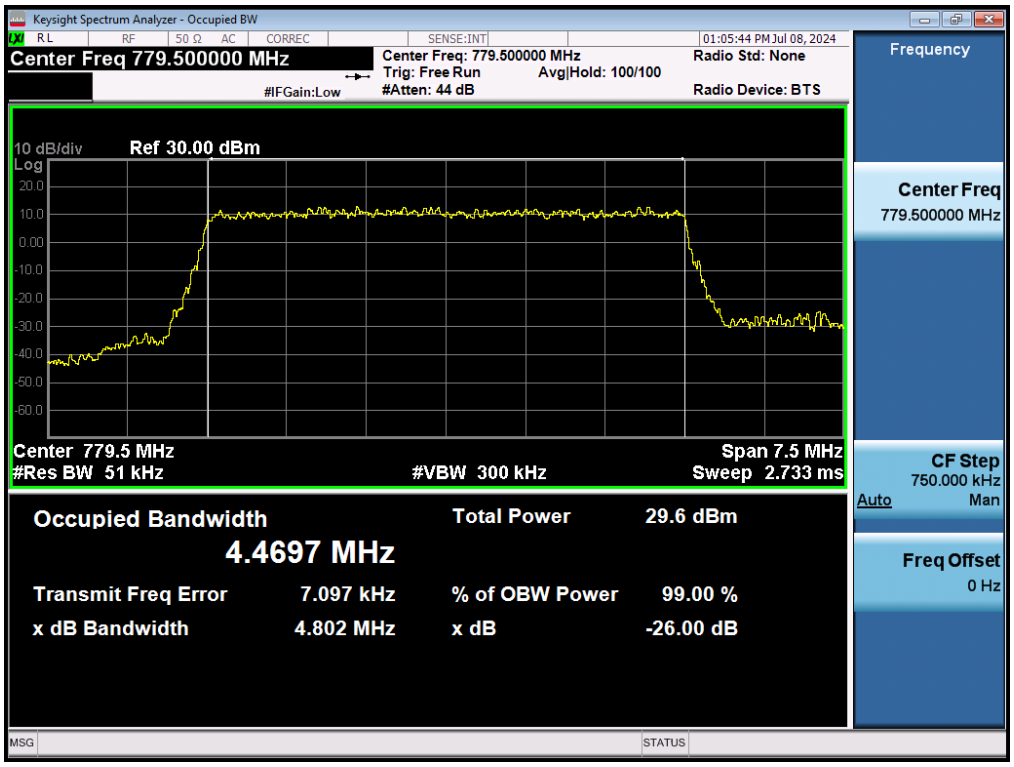

LTE Band 13 / 10 MHz / 16QAM / FULL RB Size



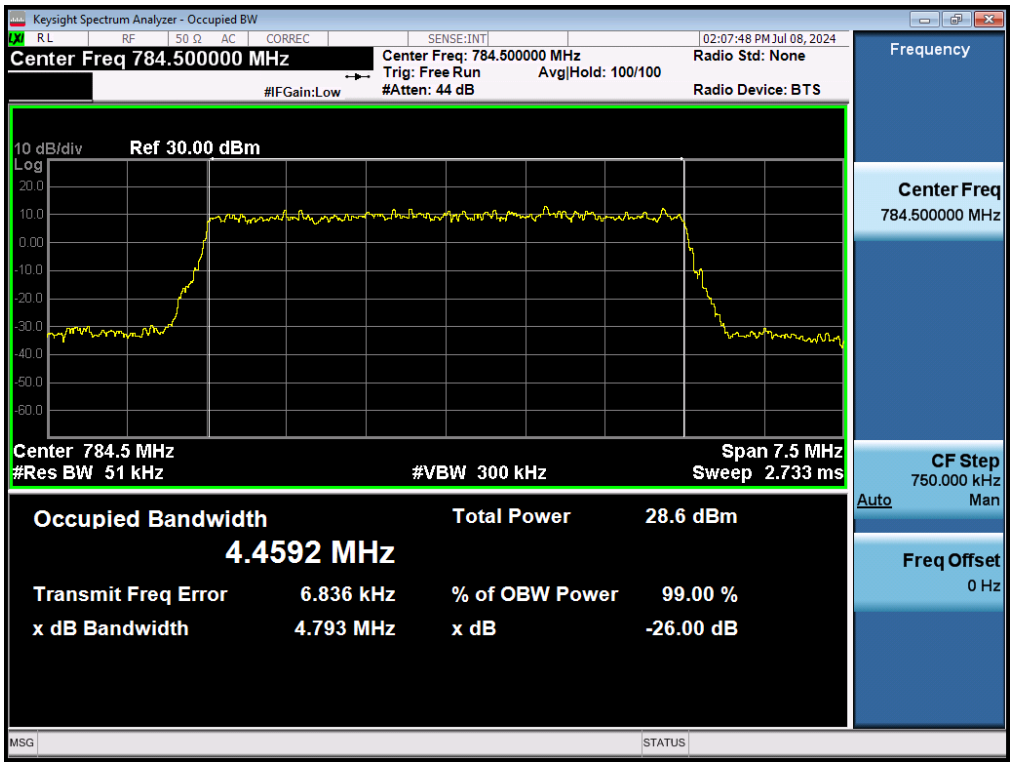

LTE Band 13 / 10 MHz / 64QAM / FULL RB Size



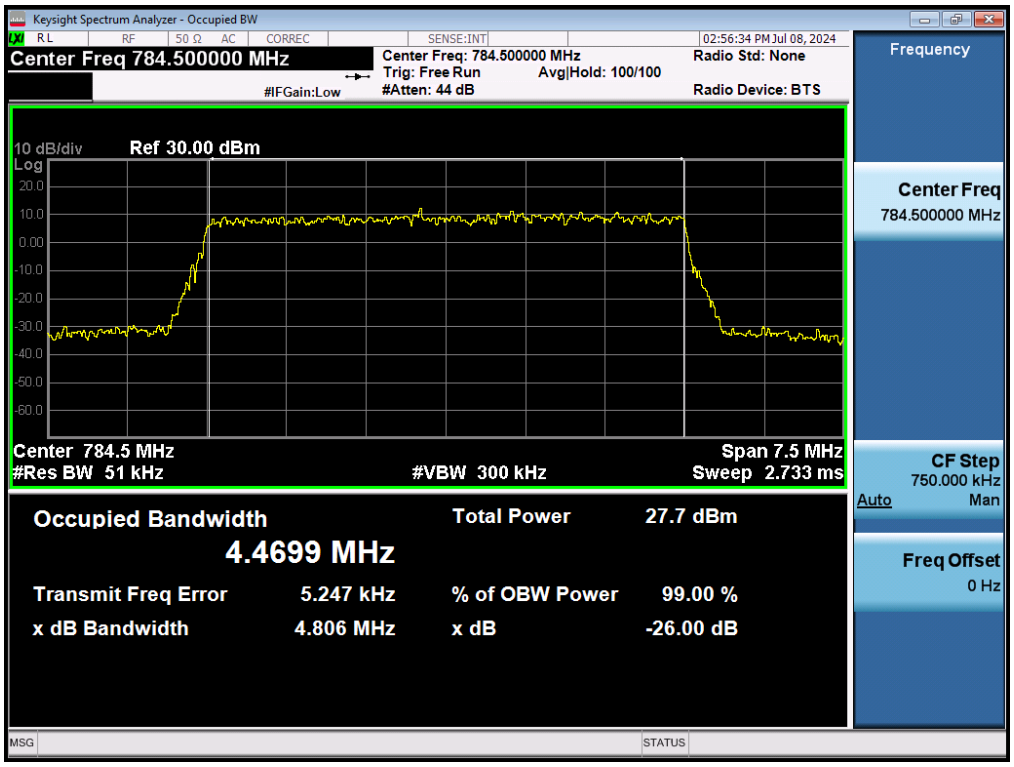

LTE Band 13 / 10 MHz / 256QAM / FULL RB Size



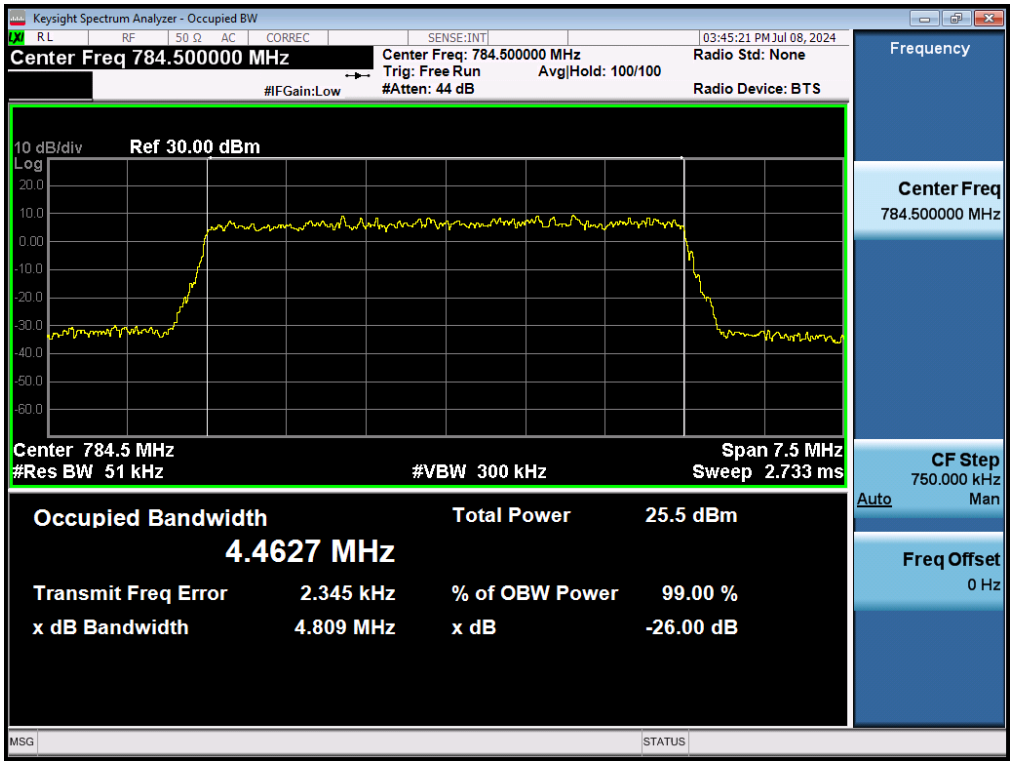

LTE Band 13 / 5 MHz / QPSK / FULL RB Size




LTE Band 13 / 5 MHz / 16QAM / FULL RB Size

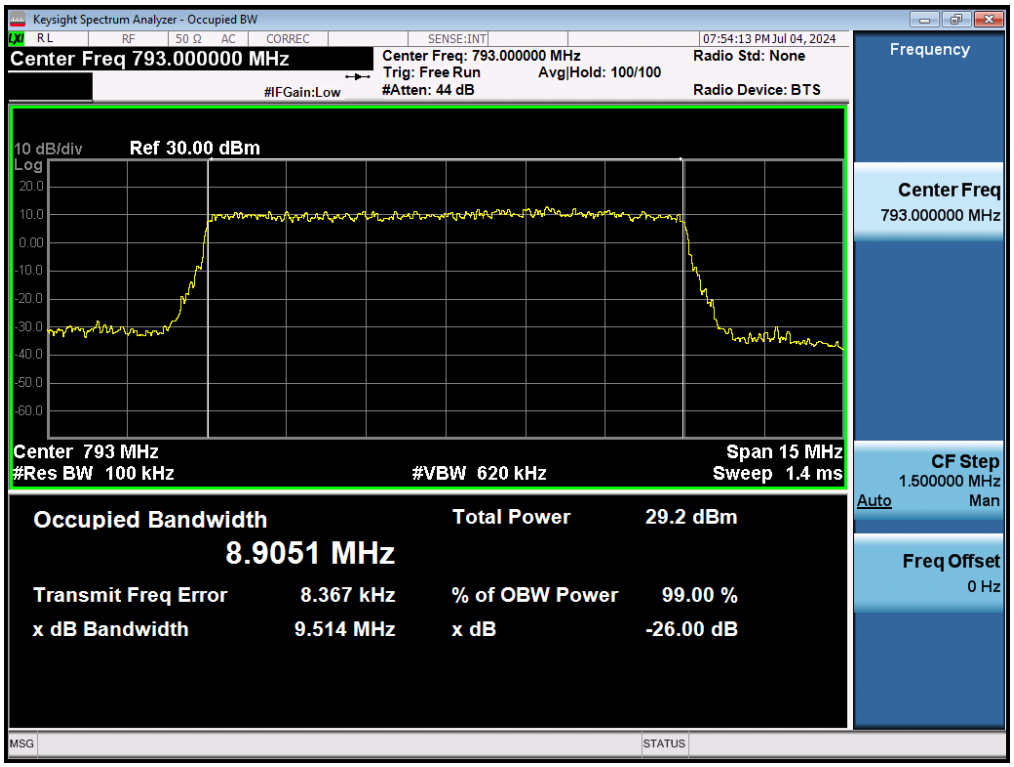



LTE Band 13 / 5 MHz / 64QAM / FULL RB Size

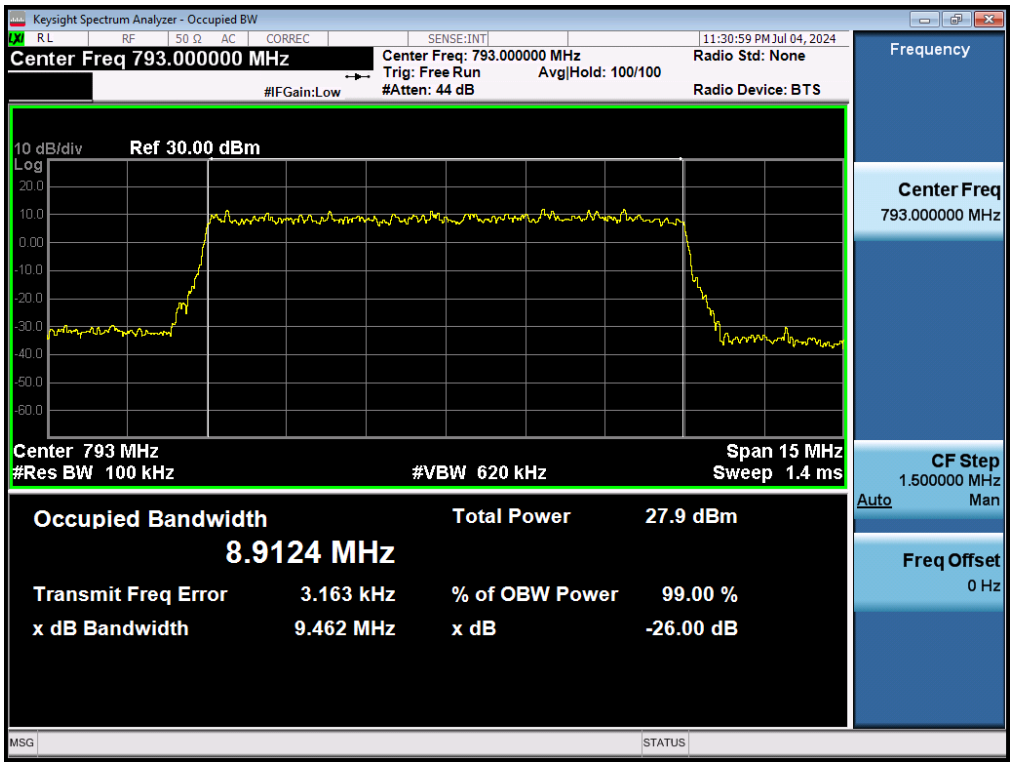



LTE Band 13 / 5 MHz / 256QAM / FULL RB Size

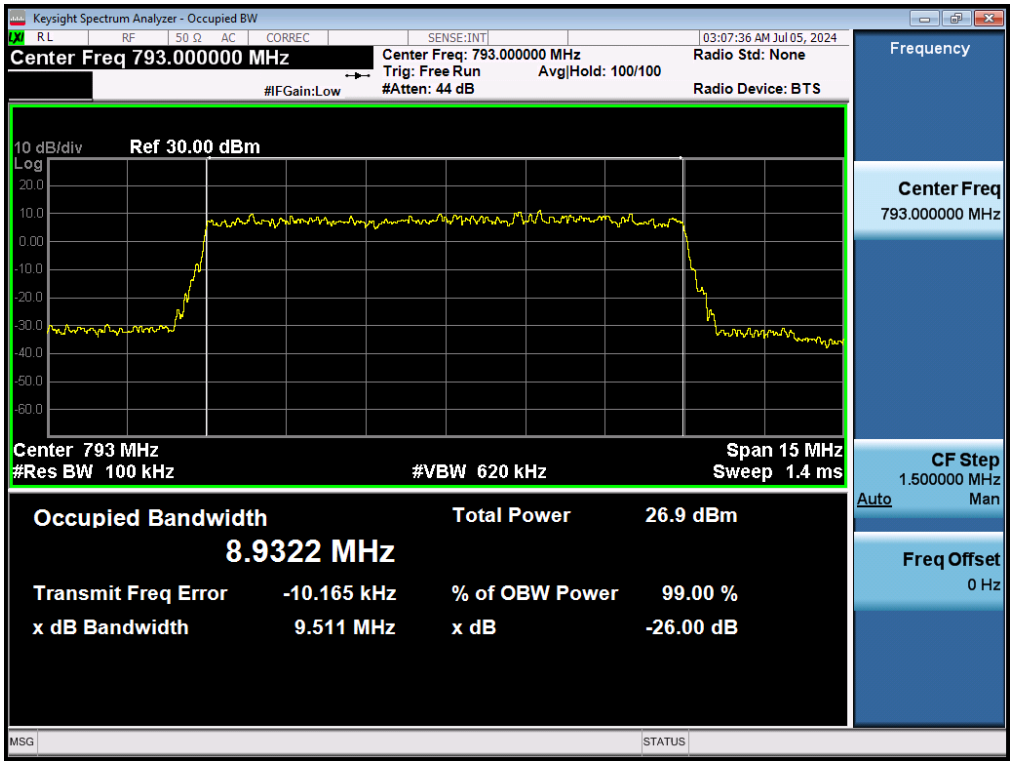
### 8.1.4. LTE Band 14



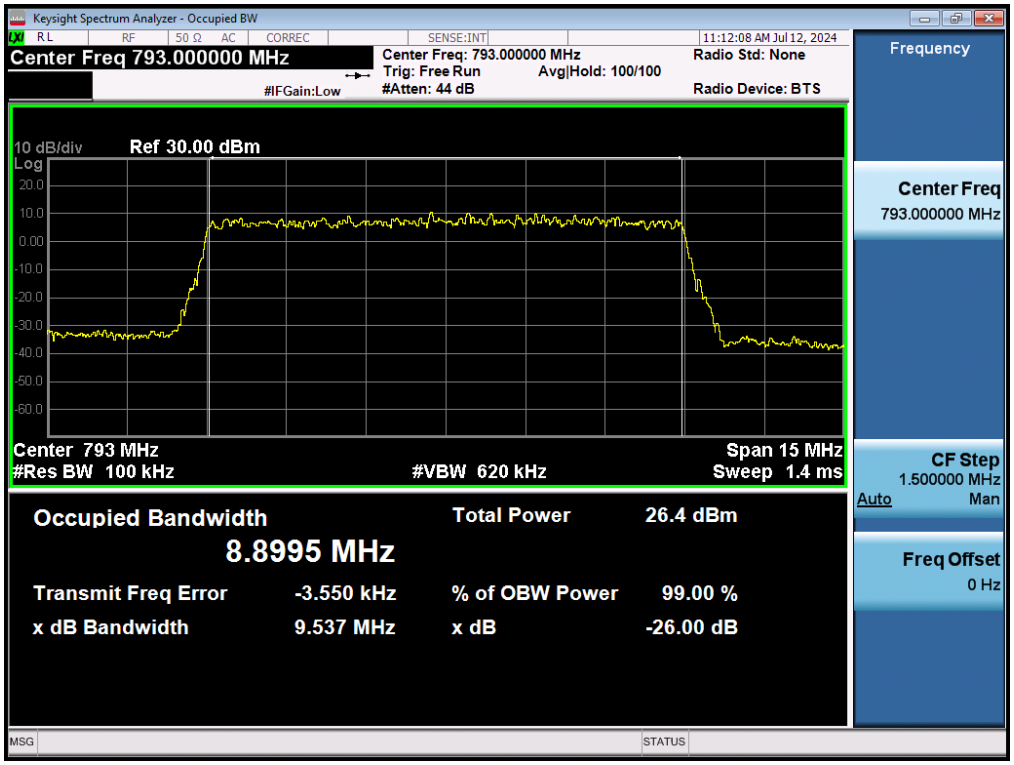

LTE Band 14 / 10 MHz / QPSK / FULL RB Size



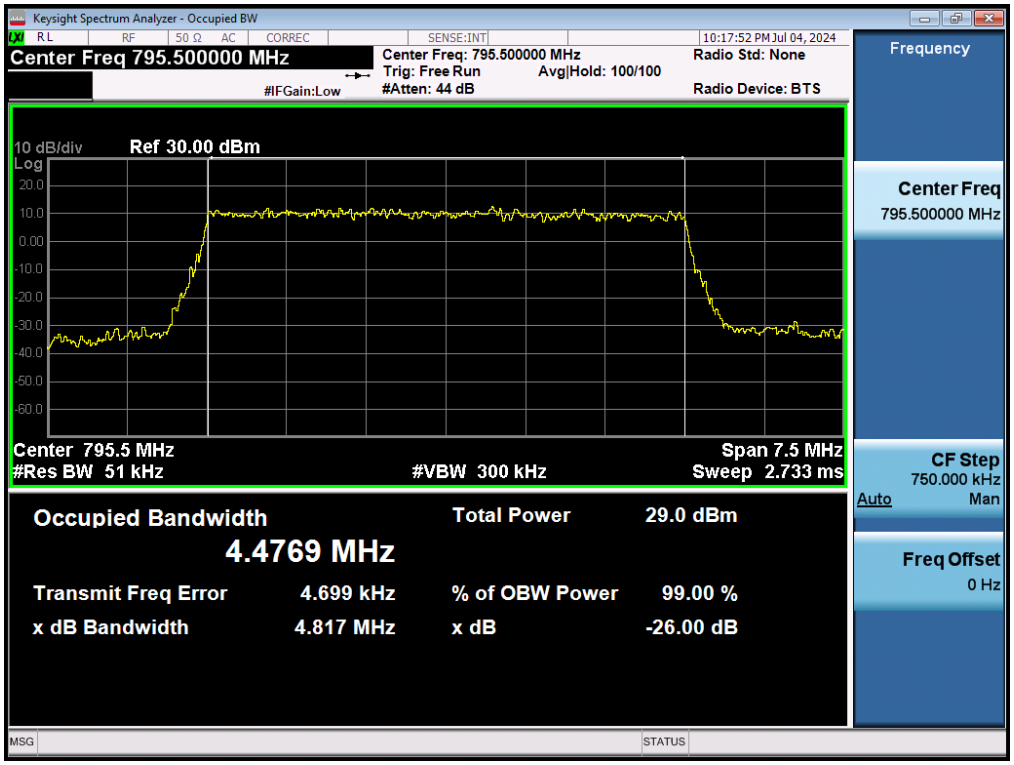

LTE Band 14 / 10 MHz / 16QAM / FULL RB Size



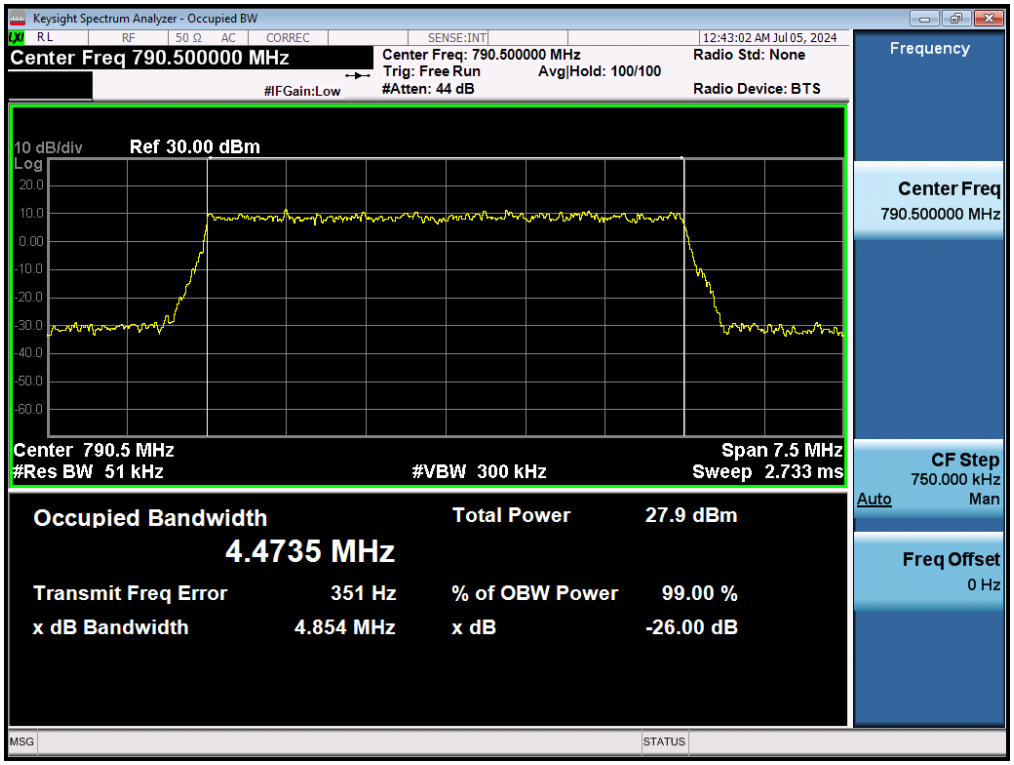

LTE Band 14 / 10 MHz / 64QAM / FULL RB Size



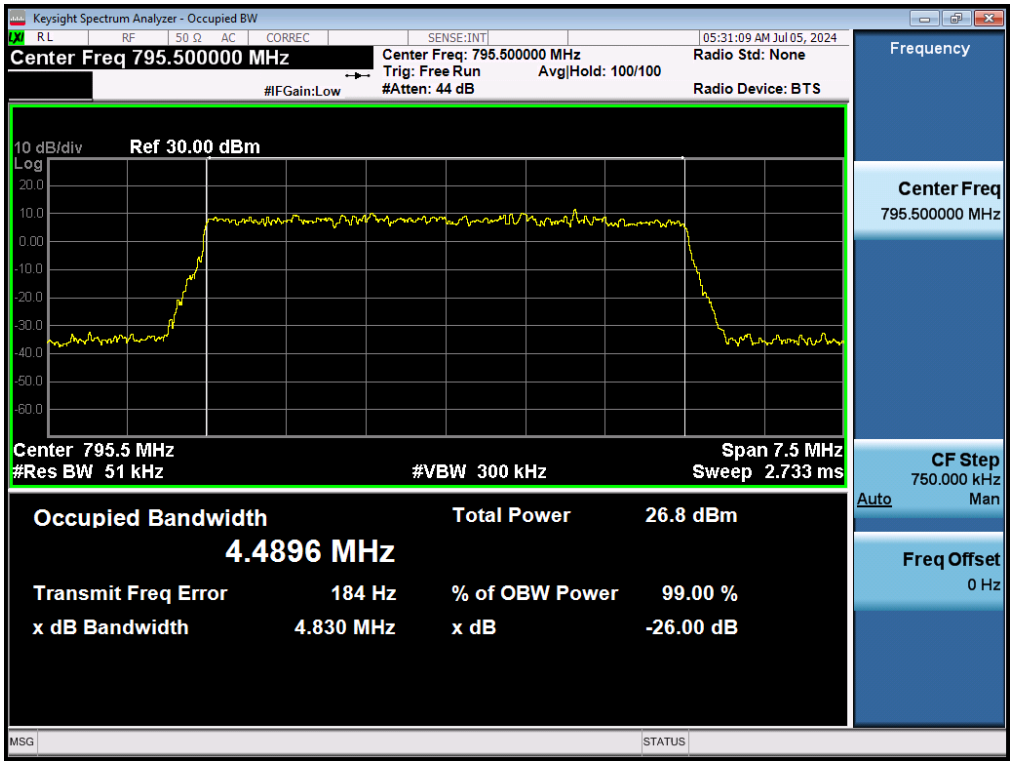

LTE Band 14 / 10 MHz / 256QAM / FULL RB Size



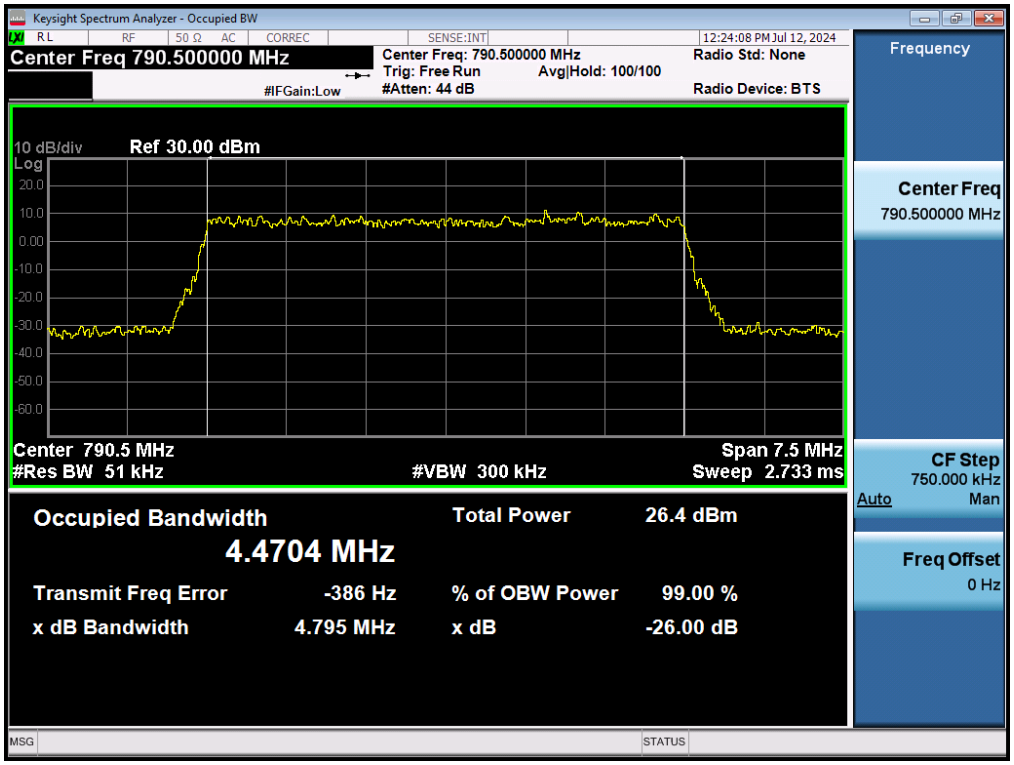

LTE Band 14 / 5 MHz / QPSK / FULL RB Size




LTE Band 14 / 5 MHz / 16QAM / FULL RB Size

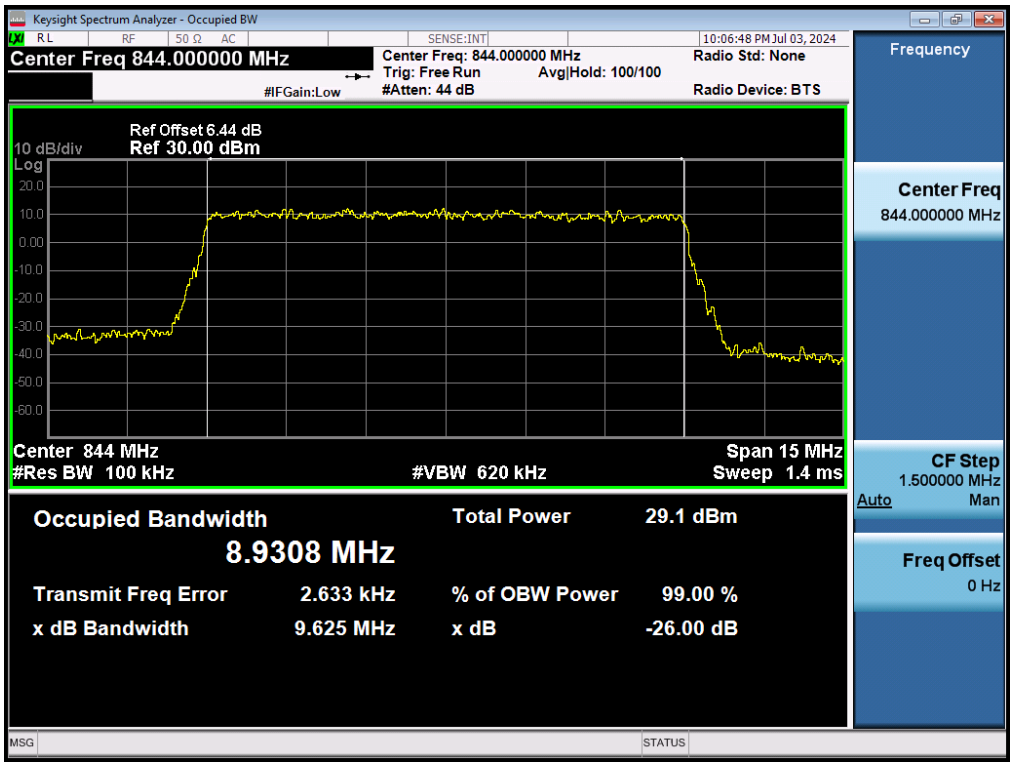



LTE Band 14 / 5 MHz / 64QAM / FULL RB Size

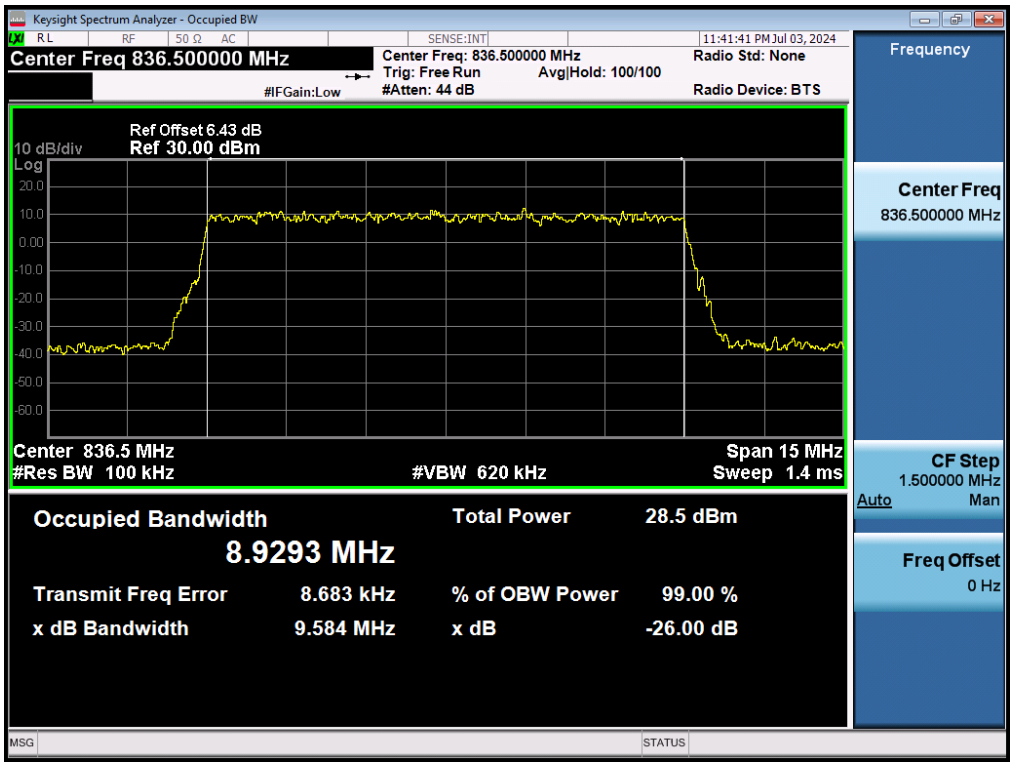



LTE Band 14 / 5 MHz / 256QAM / FULL RB Size

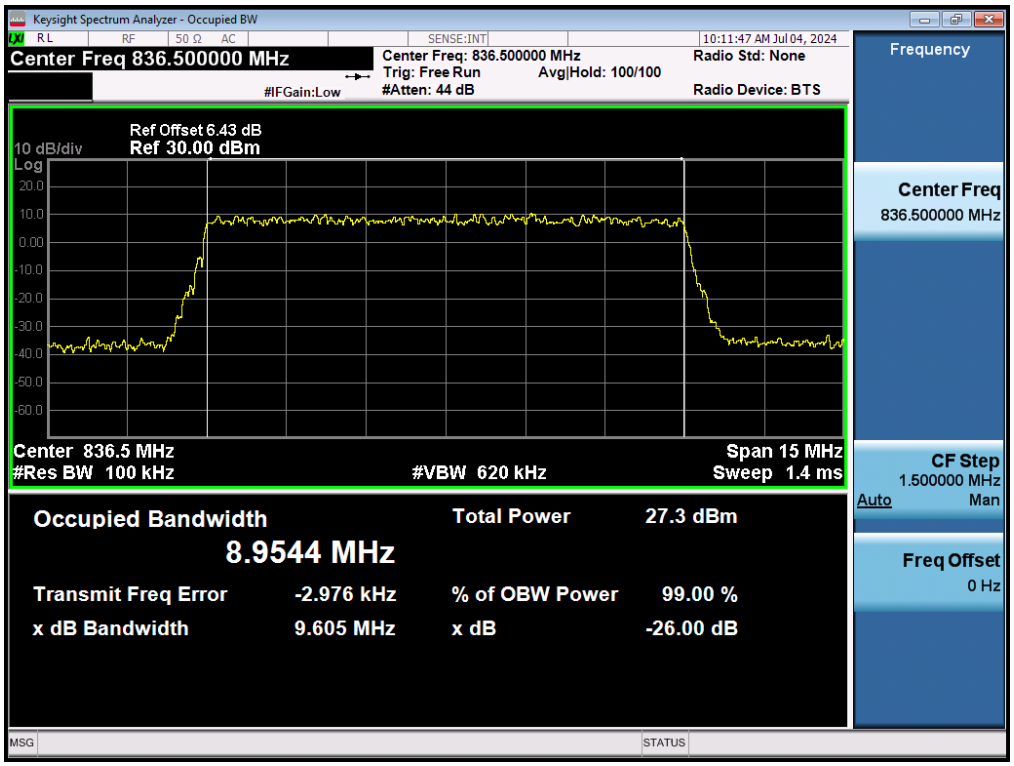
### 8.1.5. LTE Band 5



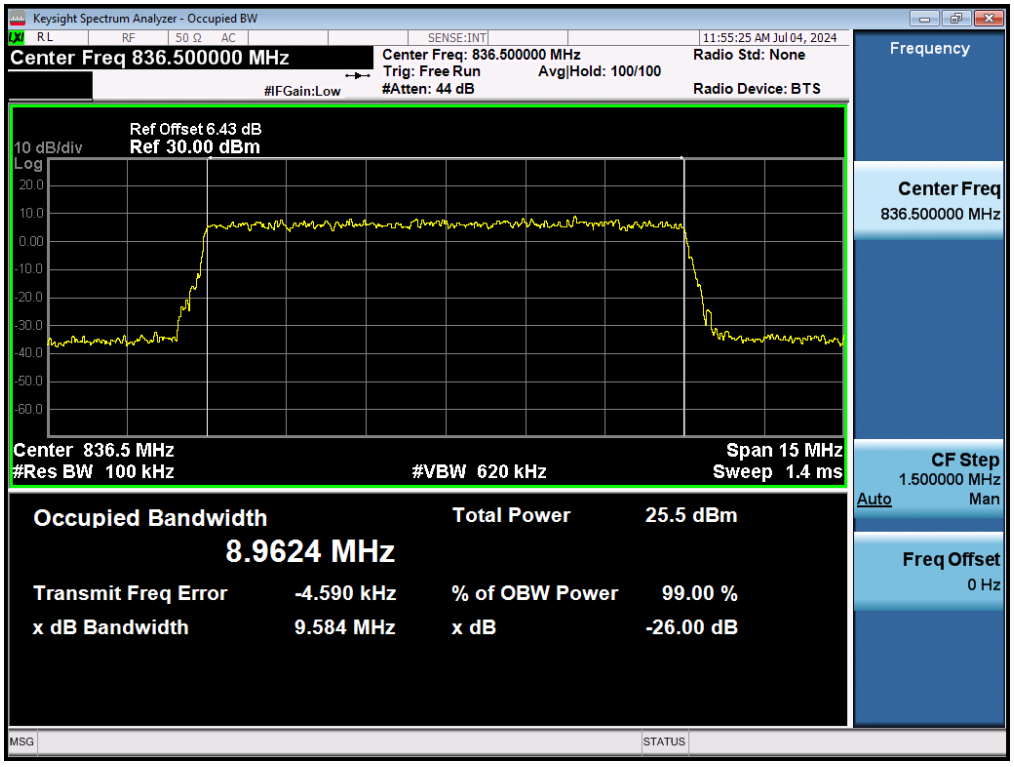

LTE Band 5 / 10 MHz / QPSK / FULL RB Size



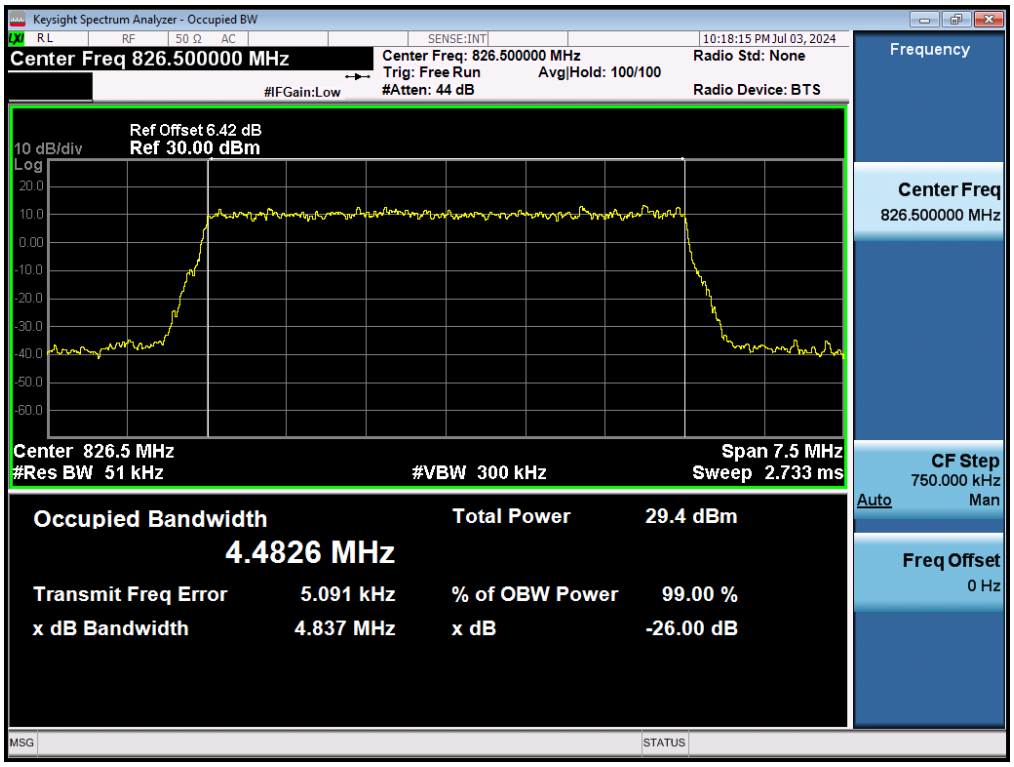

LTE Band 5 / 10 MHz / 16QAM / FULL RB Size



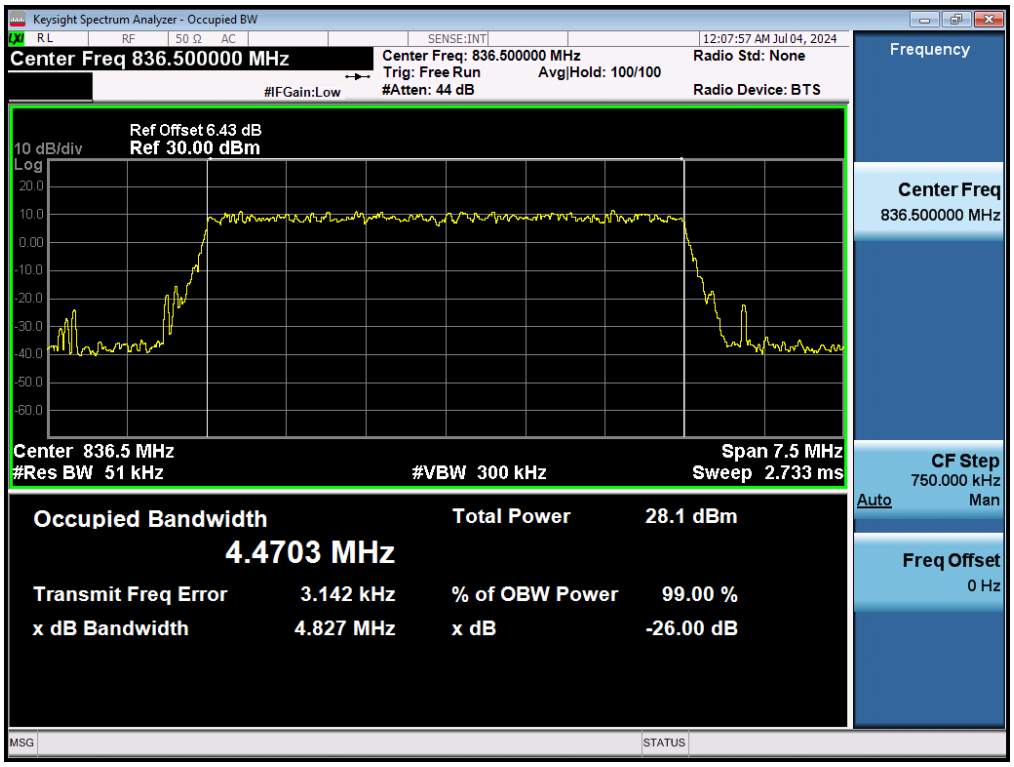

LTE Band 5 / 10 MHz / 64QAM / FULL RB Size



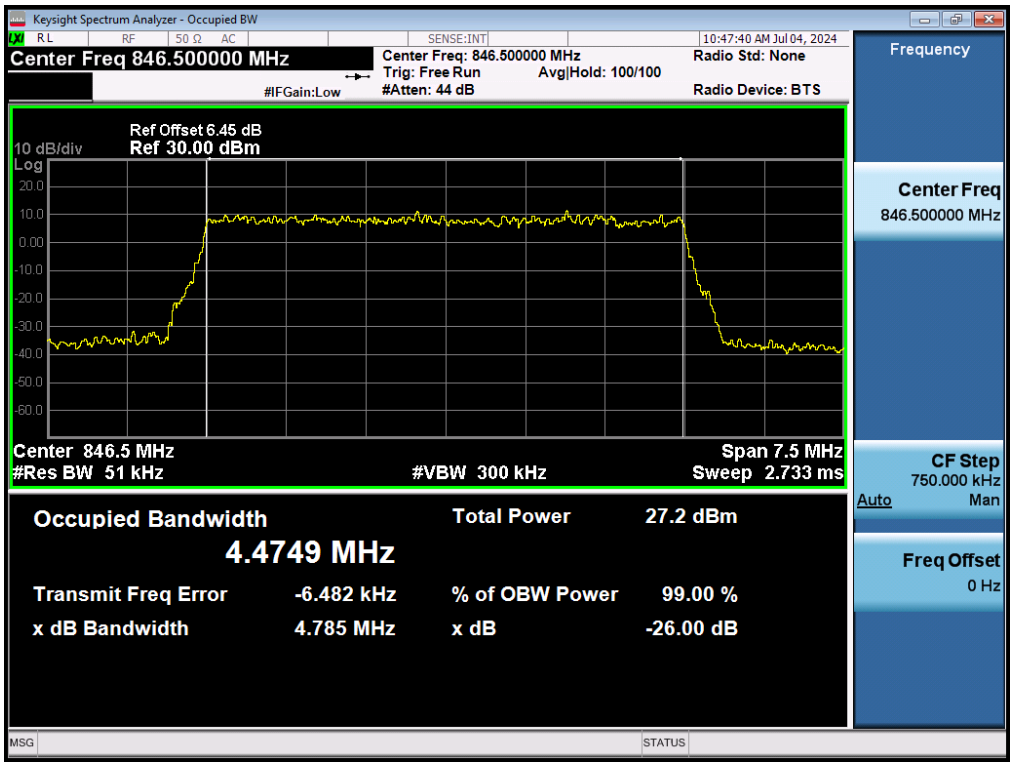

LTE Band 5 / 10 MHz / 256QAM / FULL RB Size



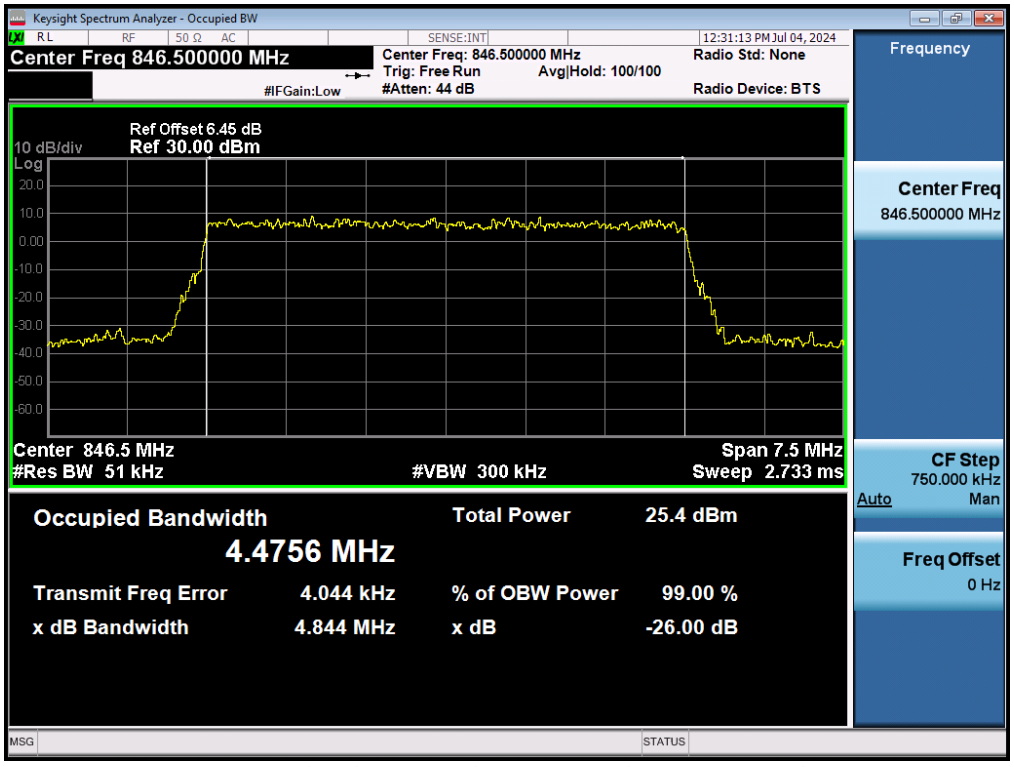

LTE Band 5 / 5 MHz / QPSK / FULL RB Size



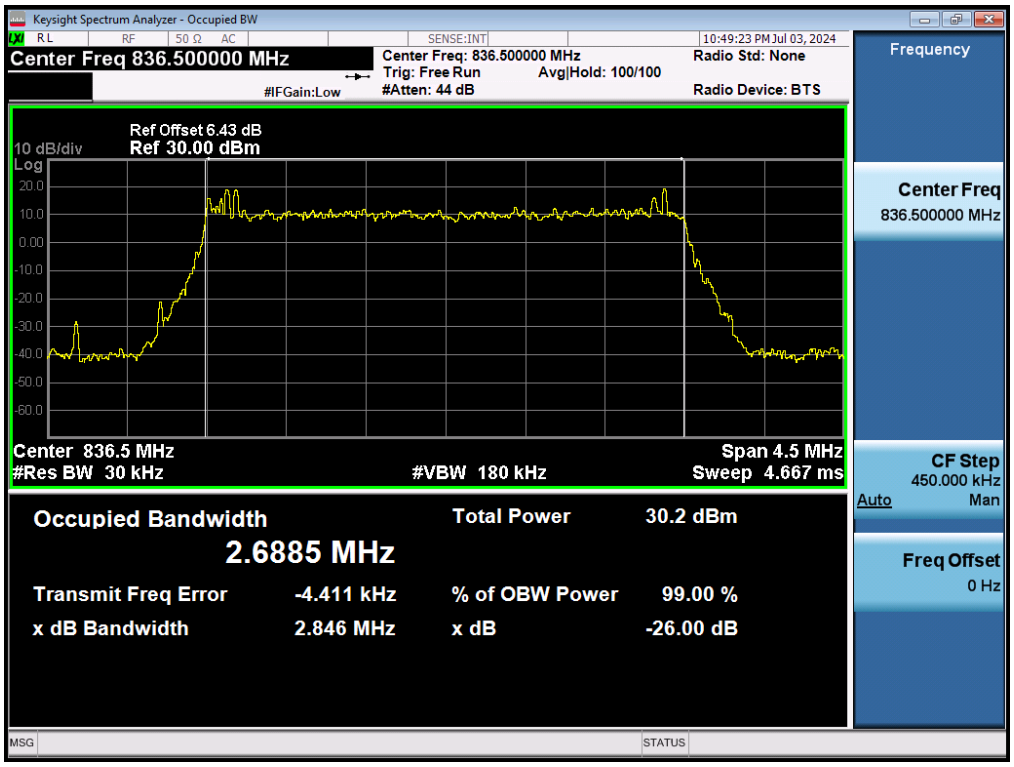

LTE Band 5 / 5 MHz / 16QAM / FULL RB Size



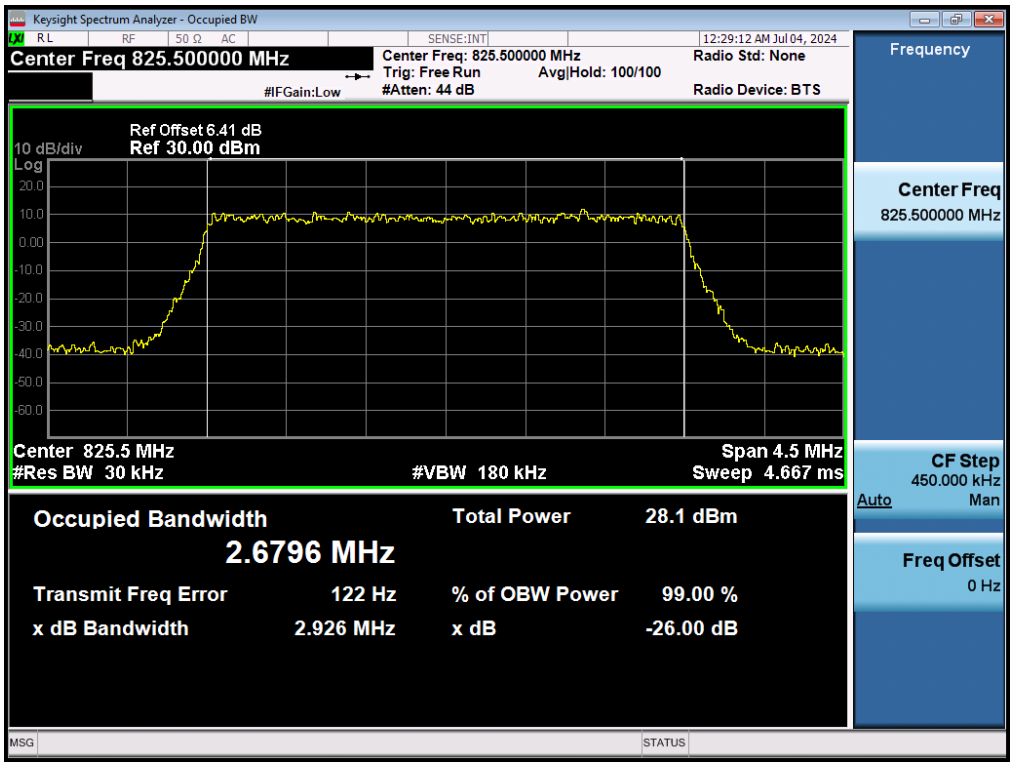

LTE Band 5 / 5 MHz / 64QAM / FULL RB Size



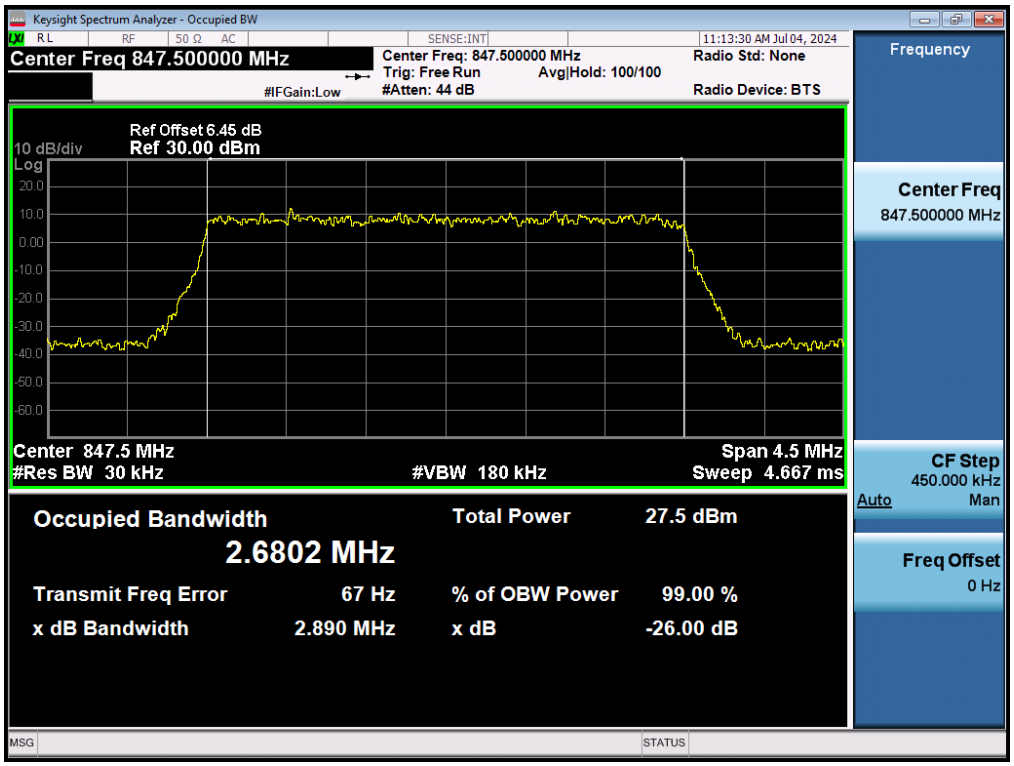

LTE Band 5 / 5 MHz / 256QAM / FULL RB Size



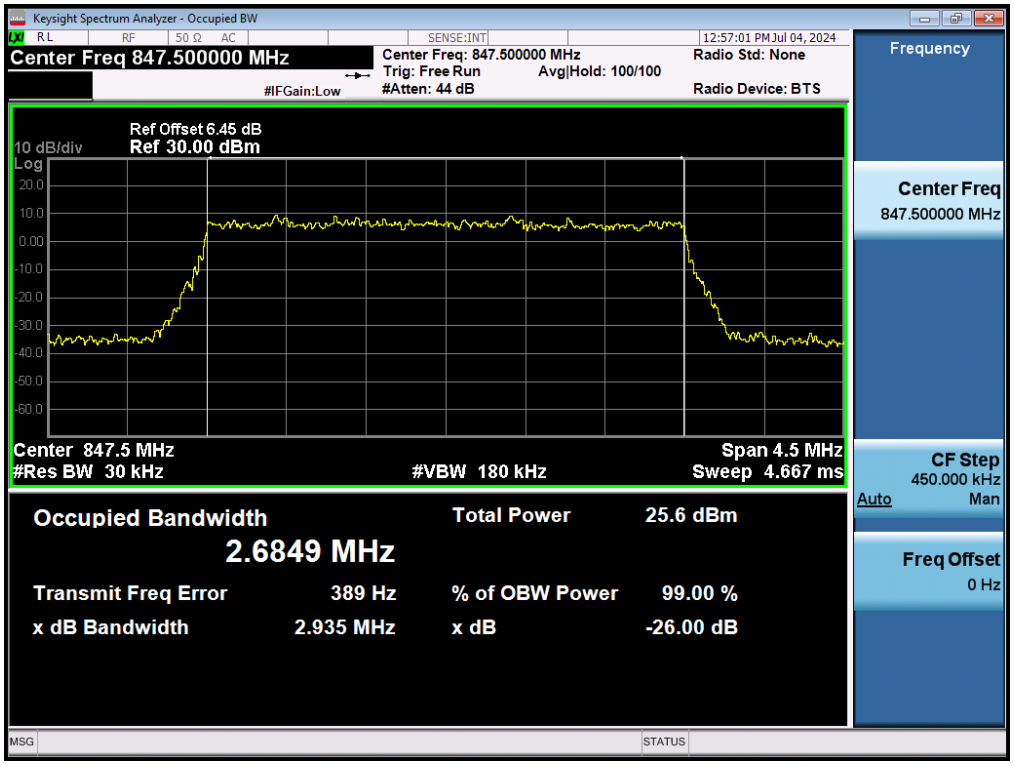

LTE Band 5 / 3 MHz / QPSK / FULL RB Size



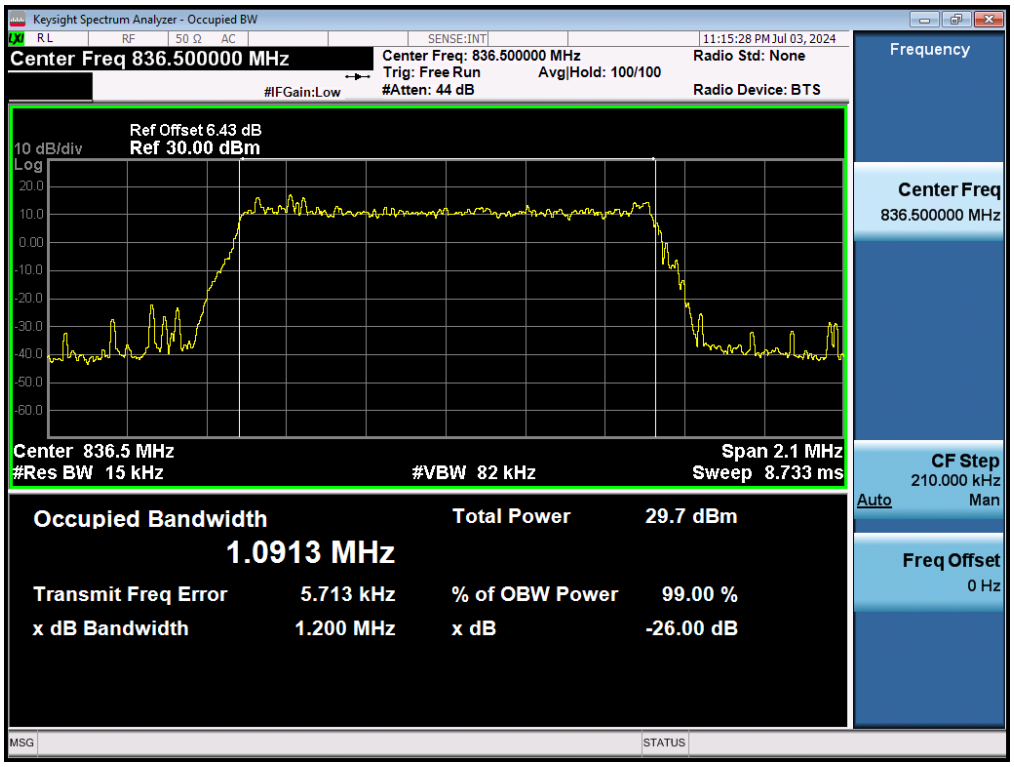

LTE Band 5 / 3 MHz / 16QAM / FULL RB Size



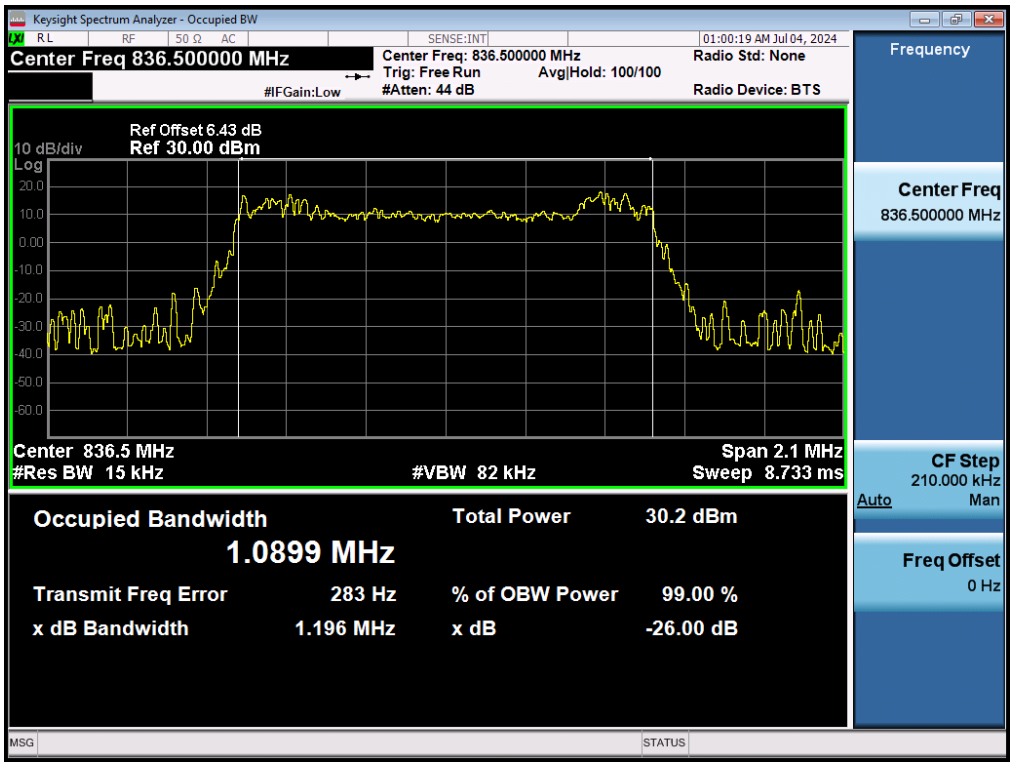

LTE Band 5 / 3 MHz / 64QAM / FULL RB Size



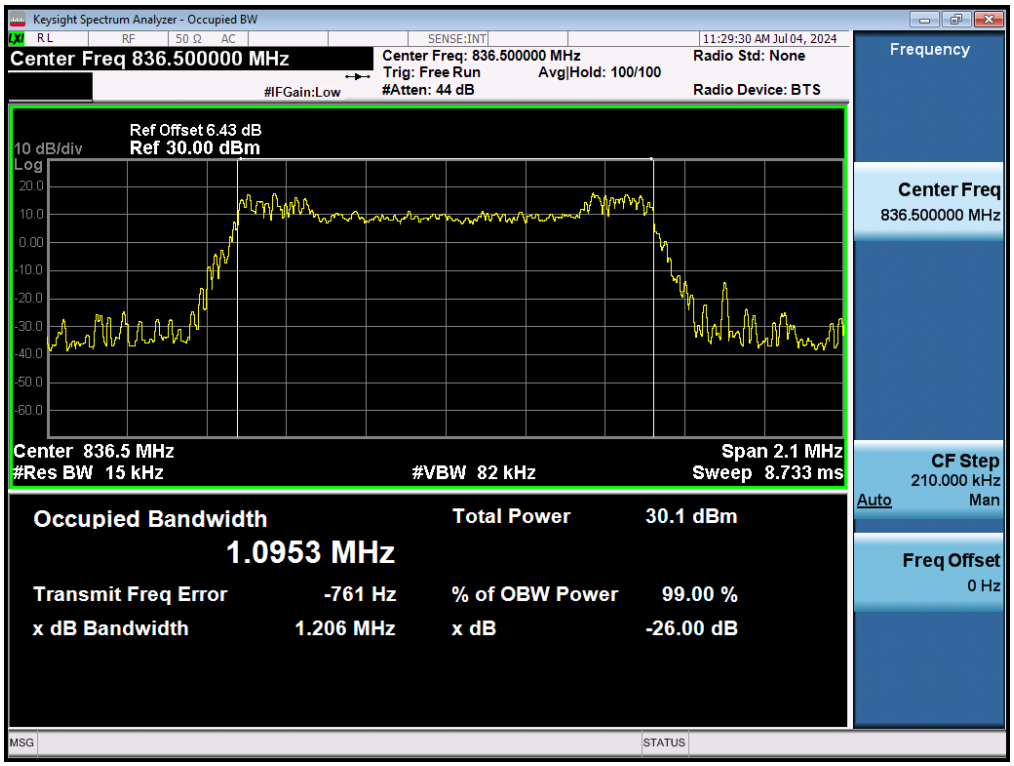

LTE Band 5 / 3 MHz / 256QAM / FULL RB Size



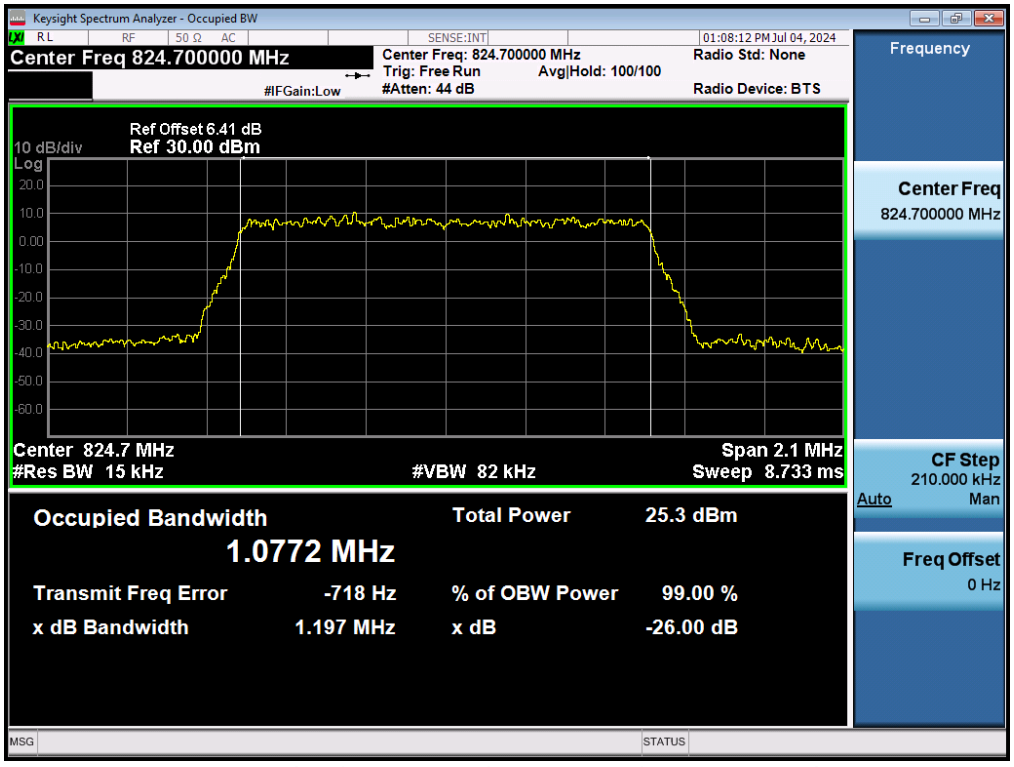

LTE Band 5 / 1.4 MHz / QPSK / FULL RB Size




LTE Band 5 / 1.4 MHz / 16QAM / FULL RB Size

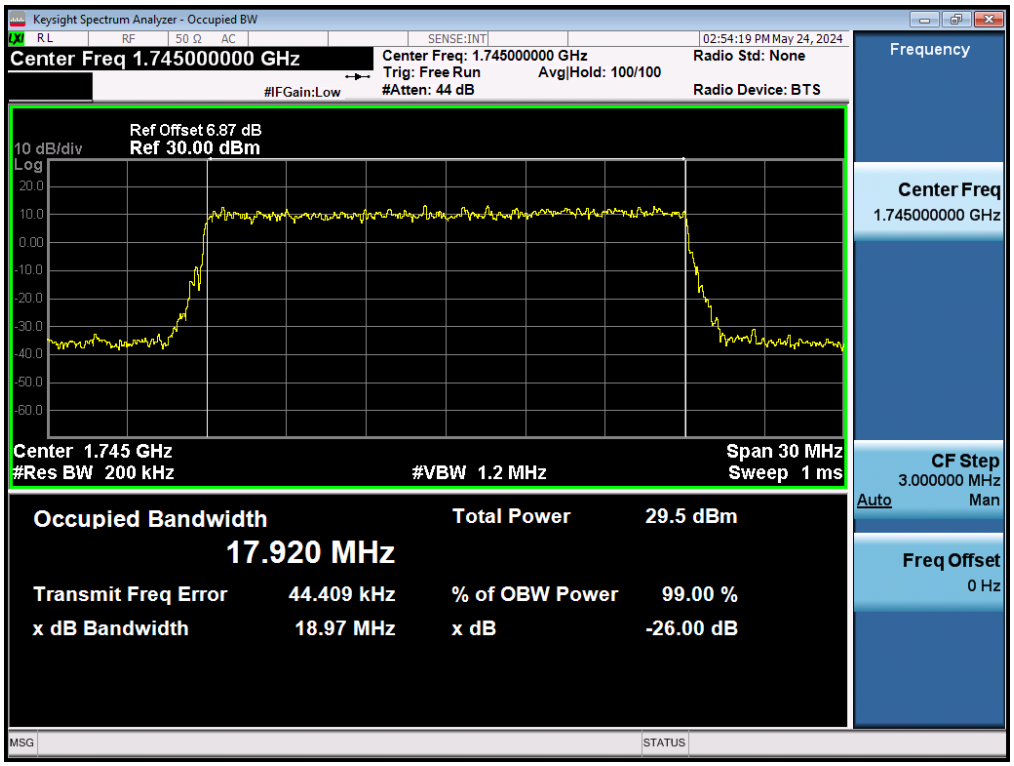



LTE Band 5 / 1.4 MHz / 64QAM / FULL RB Size

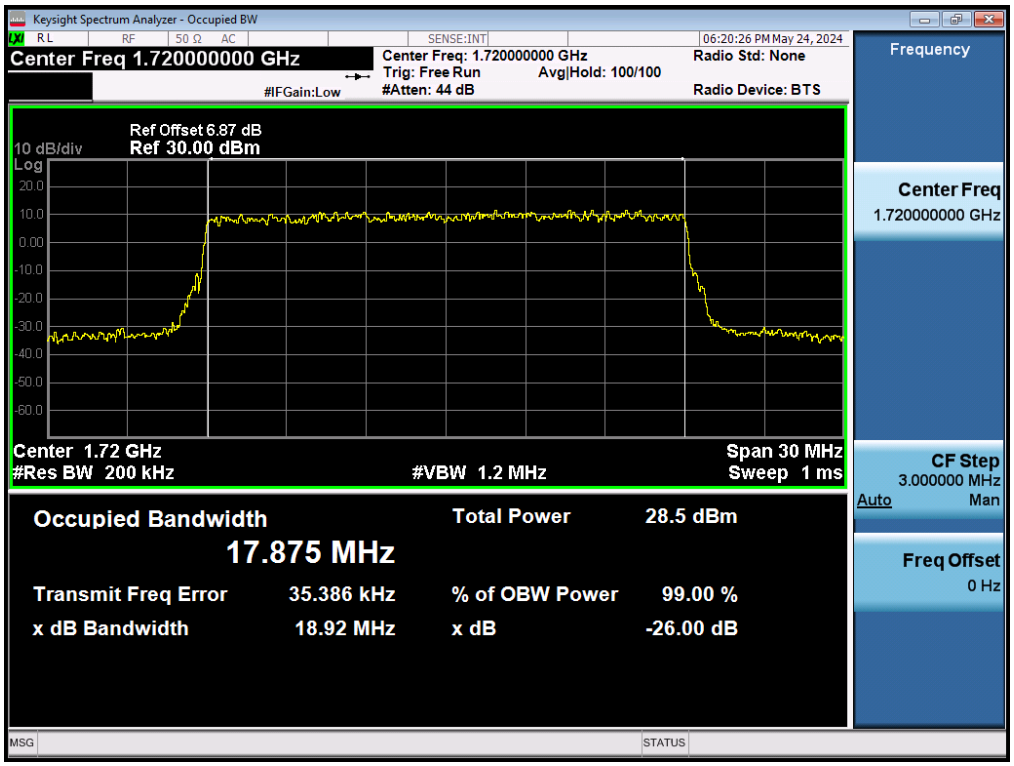



LTE Band 5 / 1.4 MHz / 256QAM / FULL RB Size

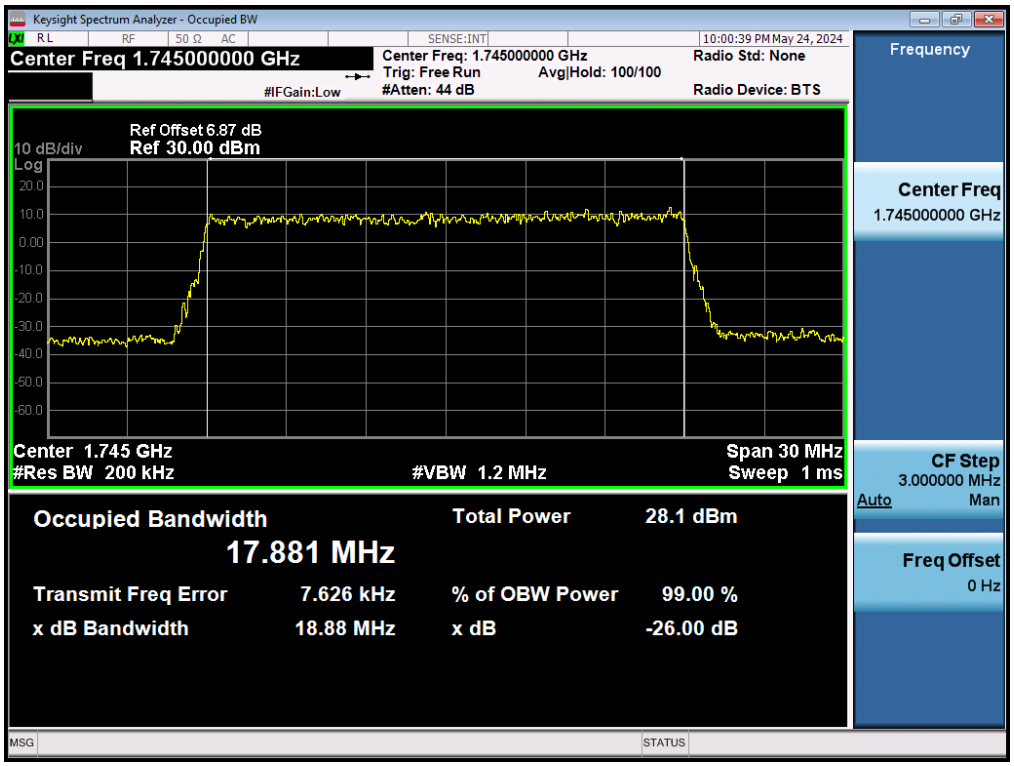
### 8.1.6. LTE Band 66(4)



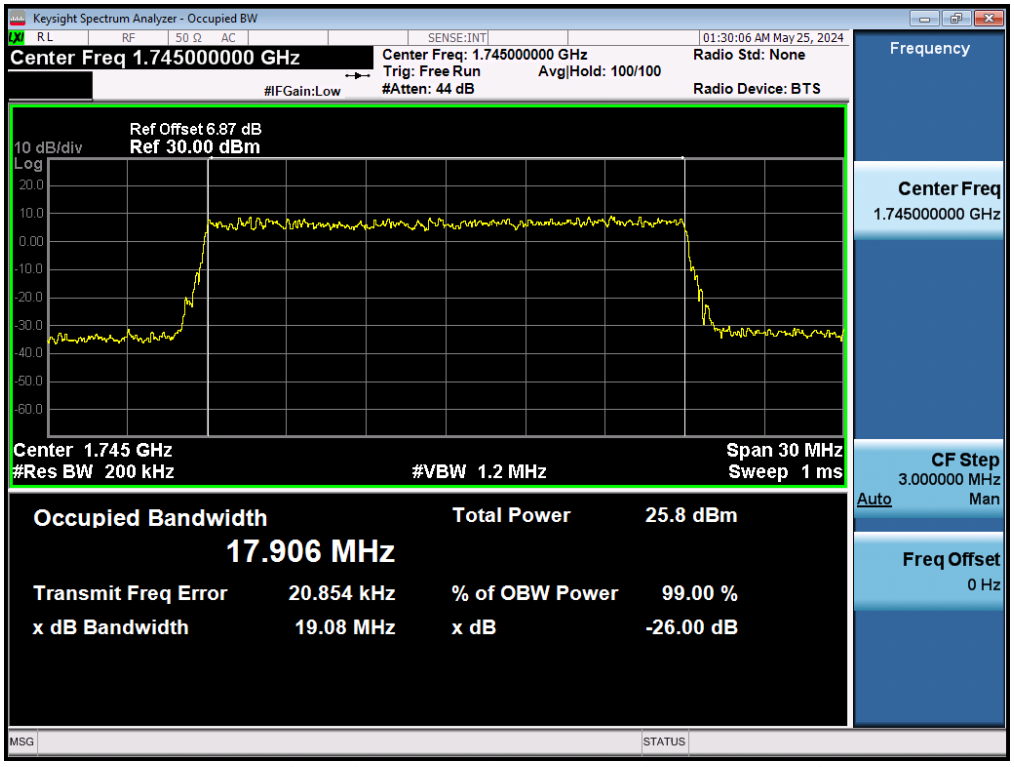

LTE Band 66 / 20 MHz / QPSK / FULL RB Size



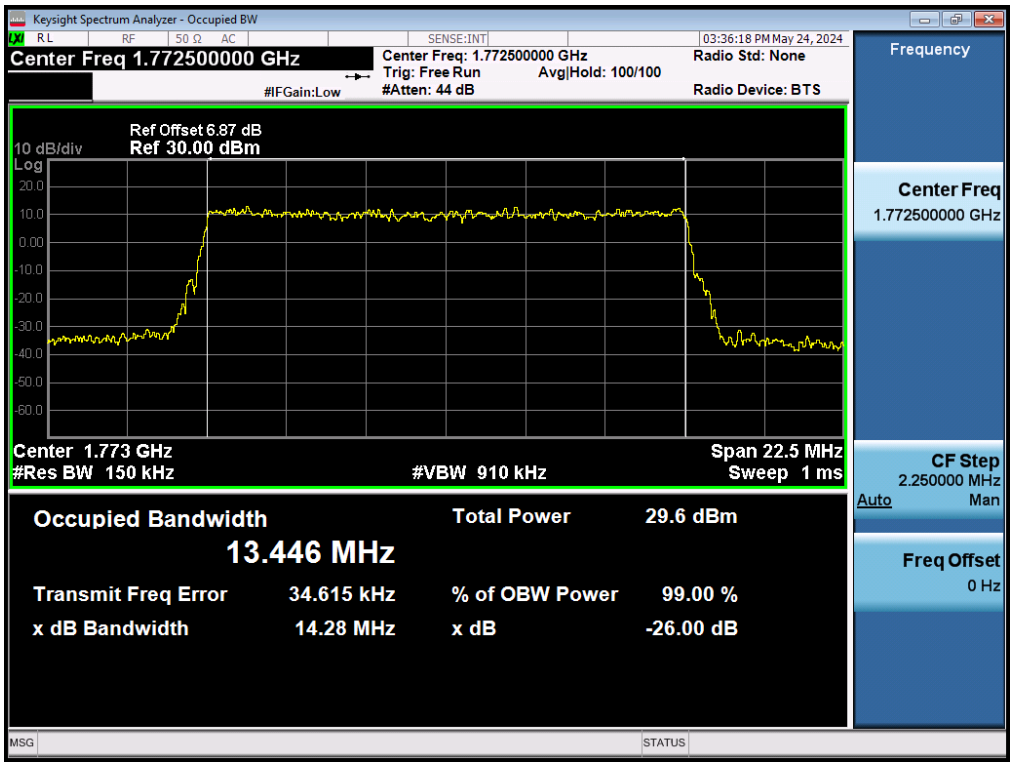

LTE Band 66 / 20 MHz / 16QAM / FULL RB Size



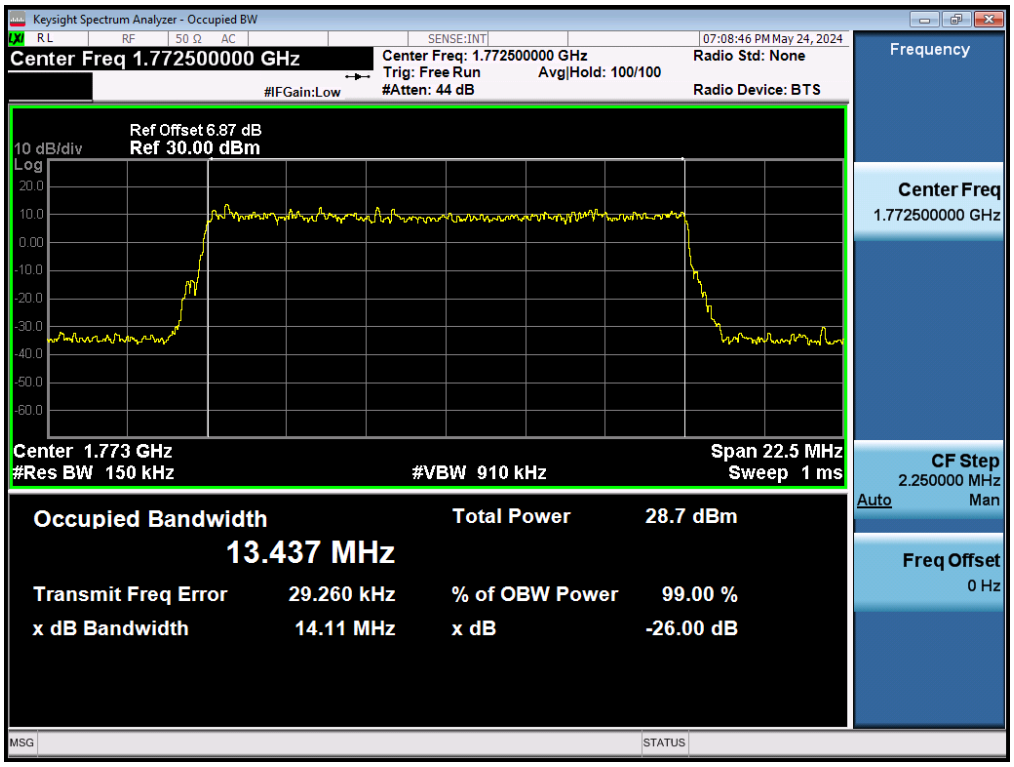

LTE Band 66 / 20 MHz / 64QAM / FULL RB Size



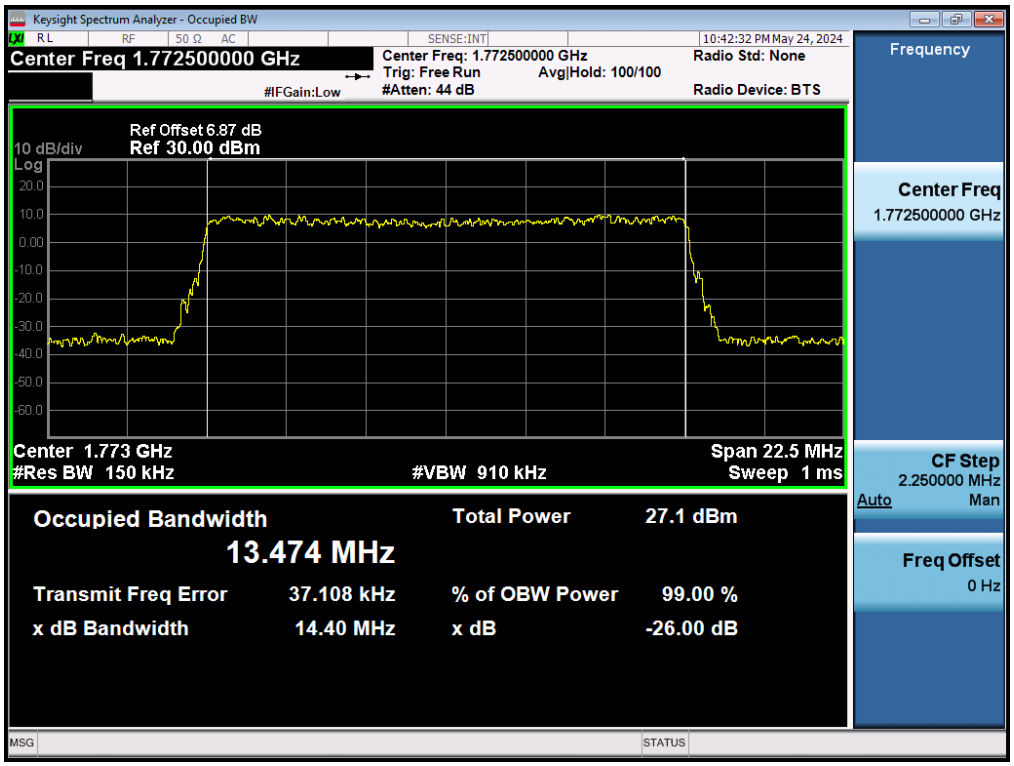

LTE Band 66 / 20 MHz / 256QAM / FULL RB Size



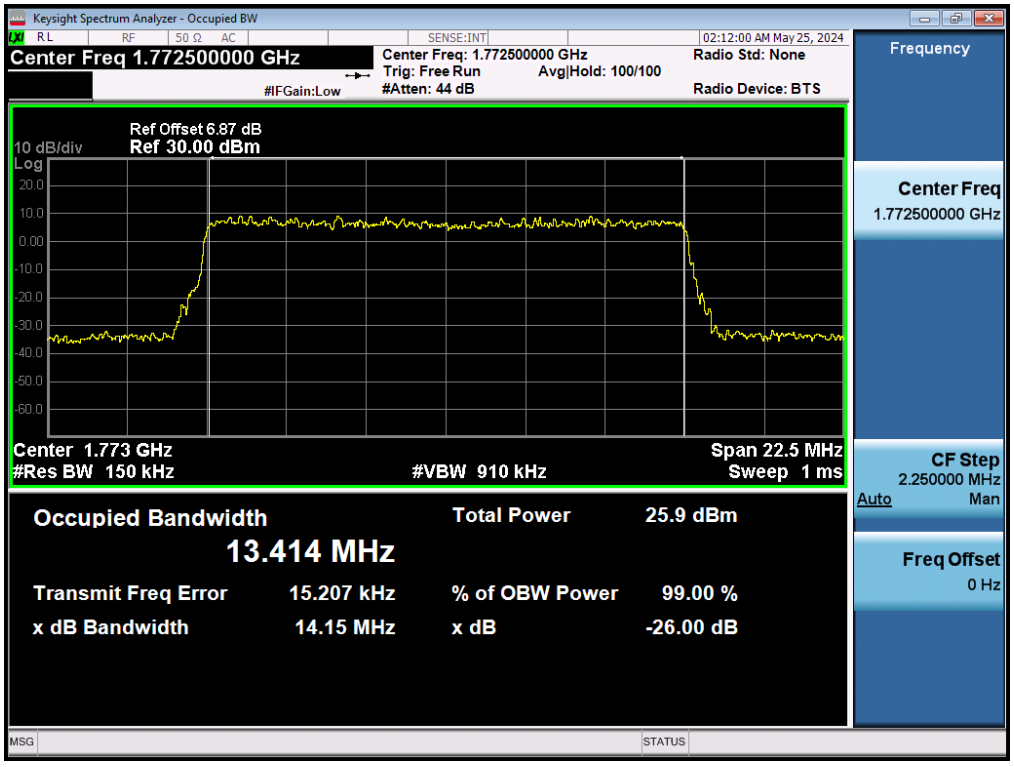

LTE Band 66 / 15 MHz / QPSK / FULL RB Size



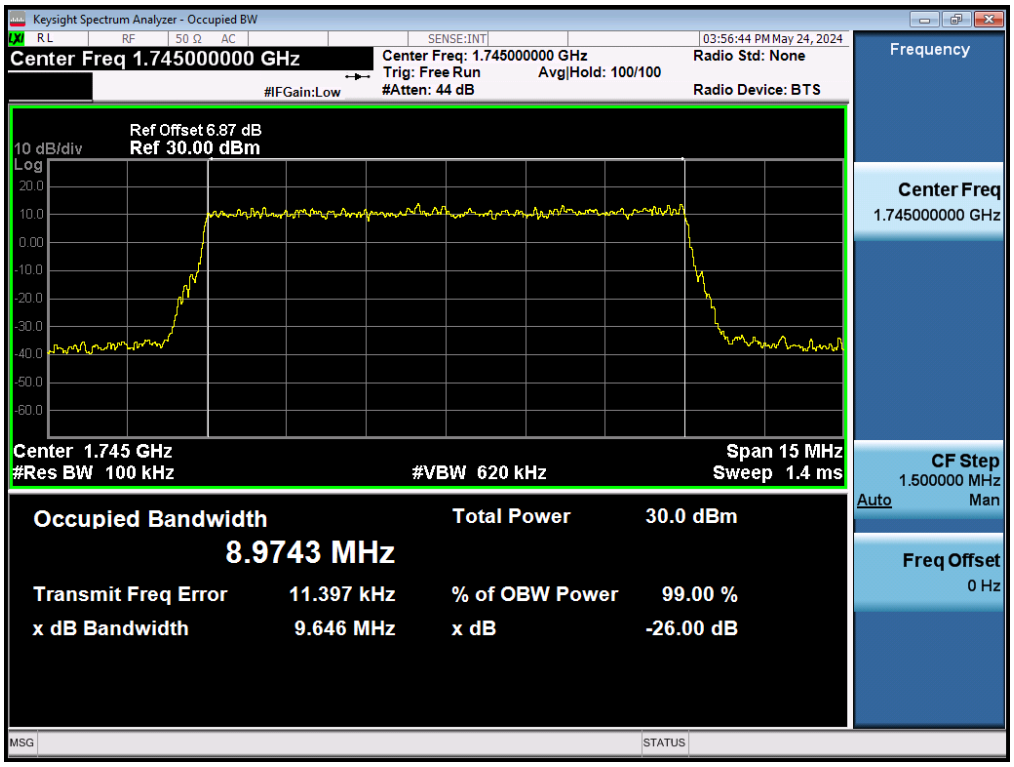

LTE Band 66 / 15 MHz / 16QAM / FULL RB Size



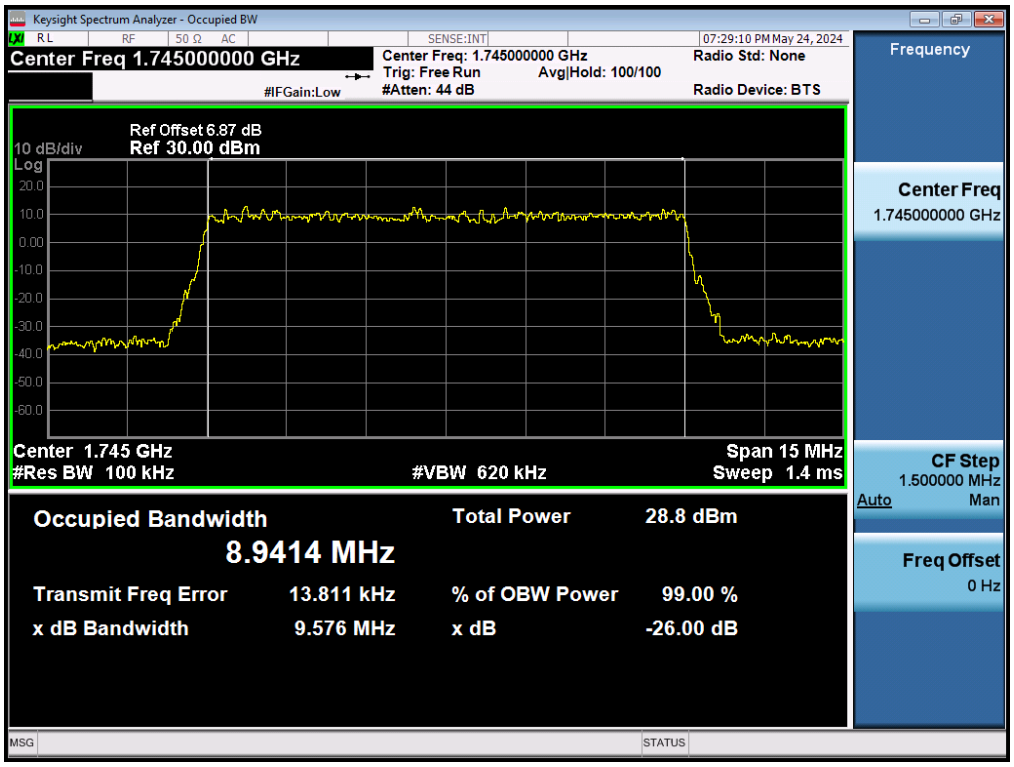

LTE Band 66 / 15 MHz / 64QAM / FULL RB Size




LTE Band 66 / 15 MHz / 256QAM / FULL RB Size




LTE Band 66 / 10 MHz / QPSK / FULL RB Size




LTE Band 66 / 10 MHz / 16QAM / FULL RB Size