

4.2 Frequency Stability Measurement

4.2.1 Limits of Frequency Stability Measurement

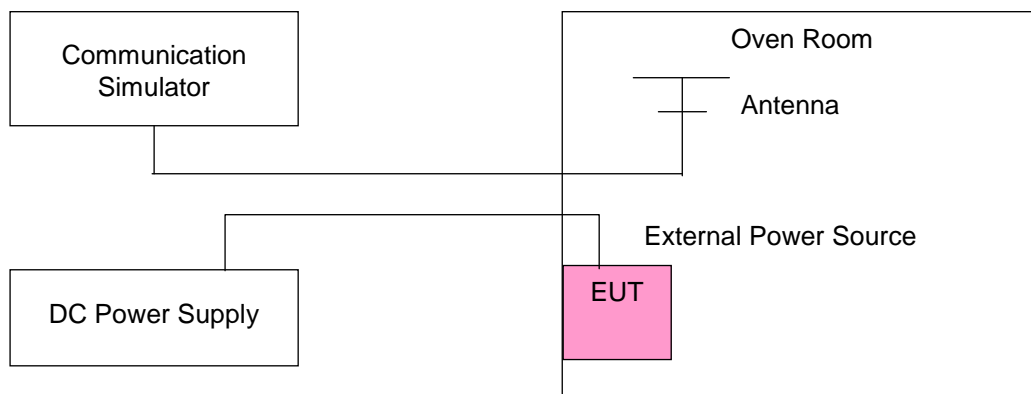
According to the FCC part 2.1055 shall be tested the frequency stability. The rule is defined that "The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block." The test extreme voltage is according to the 2.1055(d)(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment and the extreme temperature rule is comply with specification of EUT $-30^{\circ}\text{C} \sim 50^{\circ}\text{C}$.

4.2.2 Test Procedure

- Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the $\pm 0.5^{\circ}\text{C}$ during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

NOTE: The frequency error was recorded frequency error from the communication simulator.

4.2.3 Test Setup



4.2.4 Test Results (Subcontract Item)

WCDMA

Frequency Error vs. Voltage

| Voltage (Volts) | Frequency Error (ppm) | Limit (ppm) |
|-----------------|-----------------------|-------------|
| | WCDMA | |
| 3.3 | 0.001 | 2.5 |
| 2.805 | 0.001 | 2.5 |
| 3.795 | 0.002 | 2.5 |

Frequency Error vs. Temperature.

| TEMP. (°C) | Frequency Error (ppm) | Limit (ppm) |
|------------|-----------------------|-------------|
| | WCDMA | |
| -30 | 0.001 | 2.5 |
| -20 | 0.002 | 2.5 |
| -10 | 0.002 | 2.5 |
| 0 | 0.001 | 2.5 |
| 10 | 0.001 | 2.5 |
| 20 | -0.001 | 2.5 |
| 30 | -0.001 | 2.5 |
| 40 | -0.001 | 2.5 |
| 50 | -0.002 | 2.5 |

LTE Band 4

| Voltage (Volts) | Frequency Error (ppm) | | | | | | Limit (ppm) |
|-----------------|-----------------------|-------|-------|-------|-------|-------|-------------|
| | 1.4MHz | 3MHz | 5MHz | 10MHz | 15MHz | 20MHz | |
| 3.3 | 0.001 | 0.002 | 0.002 | 0.002 | 0.001 | 0.002 | 2.5 |
| 2.805 | 0.002 | 0.001 | 0.002 | 0.001 | 0.001 | 0.001 | 2.5 |
| 3.795 | 0.002 | 0.001 | 0.002 | 0.002 | 0.001 | 0.001 | 2.5 |

| TEMP. (°C) | Frequency Error (ppm) | | | | | | Limit (ppm) |
|------------|-----------------------|--------|--------|--------|--------|--------|-------------|
| | 1.4MHz | 3MHz | 5MHz | 10MHz | 15MHz | 20MHz | |
| -30 | 0.002 | 0.001 | 0.002 | 0.001 | 0.002 | 0.002 | 2.5 |
| -20 | 0.002 | 0.002 | 0.001 | 0.002 | 0.002 | 0.002 | 2.5 |
| -10 | 0.002 | 0.001 | 0.002 | 0.001 | 0.002 | 0.001 | 2.5 |
| 0 | 0.002 | 0.001 | 0.001 | 0.001 | 0.002 | 0.002 | 2.5 |
| 10 | 0.001 | 0.002 | 0.001 | 0.002 | 0.001 | 0.001 | 2.5 |
| 20 | -0.002 | -0.002 | -0.001 | -0.002 | -0.001 | -0.001 | 2.5 |
| 30 | -0.002 | -0.001 | -0.001 | -0.002 | -0.002 | -0.001 | 2.5 |
| 40 | -0.002 | -0.001 | -0.002 | -0.002 | -0.002 | -0.001 | 2.5 |
| 50 | -0.002 | -0.002 | -0.002 | -0.002 | -0.002 | -0.001 | 2.5 |

LTE Band 7

| Voltage (Volts) | Frequency Error (ppm) | | | | Limit (ppm) |
|-----------------|-----------------------|-------|-------|-------|-------------|
| | 5MHz | 10MHz | 15MHz | 20MHz | |
| 3.3 | 0.001 | 0.001 | 0.000 | 0.001 | 2.5 |
| 2.805 | 0.001 | 0.001 | 0.001 | 0.001 | 2.5 |
| 3.795 | 0.002 | 0.001 | 0.001 | 0.001 | 2.5 |

| TEMP. (°C) | Frequency Error (ppm) | | | | Limit (ppm) |
|------------|-----------------------|--------|--------|--------|-------------|
| | 5MHz | 10MHz | 15MHz | 20MHz | |
| -30 | 0.001 | 0.001 | 0.001 | 0.000 | 2.5 |
| -20 | 0.001 | 0.001 | 0.001 | 0.001 | 2.5 |
| -10 | 0.001 | 0.001 | 0.001 | 0.001 | 2.5 |
| 0 | 0.000 | 0.001 | 0.002 | 0.001 | 2.5 |
| 10 | 0.001 | 0.001 | 0.002 | 0.000 | 2.5 |
| 20 | -0.001 | -0.001 | -0.001 | -0.001 | 2.5 |
| 30 | -0.001 | -0.001 | -0.001 | -0.001 | 2.5 |
| 40 | 0.000 | -0.001 | -0.001 | -0.001 | 2.5 |
| 50 | -0.001 | -0.001 | -0.002 | -0.001 | 2.5 |

LTE Band 12

| Voltage (Volts) | Frequency Error (ppm) | | | | Limit (ppm) |
|-----------------|-----------------------|-------|-------|-------|-------------|
| | 1.4MHz | 3MHz | 5MHz | 10MHz | |
| 3.3 | 0.003 | 0.004 | 0.005 | 0.002 | 2.5 |
| 2.805 | 0.002 | 0.005 | 0.002 | 0.005 | 2.5 |
| 3.795 | 0.002 | 0.004 | 0.005 | 0.003 | 2.5 |

| TEMP. (°C) | Frequency Error (ppm) | | | | Limit (ppm) |
|------------|-----------------------|--------|--------|--------|-------------|
| | 1.4MHz | 3MHz | 5MHz | 10MHz | |
| -30 | 0.002 | 0.005 | 0.004 | 0.006 | 2.5 |
| -20 | 0.005 | 0.004 | 0.003 | 0.005 | 2.5 |
| -10 | 0.003 | 0.003 | 0.003 | 0.004 | 2.5 |
| 0 | 0.004 | 0.003 | 0.003 | 0.004 | 2.5 |
| 10 | 0.004 | 0.005 | 0.004 | 0.004 | 2.5 |
| 20 | -0.004 | -0.003 | -0.003 | -0.006 | 2.5 |
| 30 | -0.003 | -0.005 | -0.003 | -0.002 | 2.5 |
| 40 | -0.002 | -0.004 | -0.002 | -0.004 | 2.5 |
| 50 | -0.006 | -0.005 | -0.005 | -0.005 | 2.5 |

LTE Band 13

| Voltage (Volts) | Frequency Error (ppm) | | Limit (ppm) |
|--------------------|-----------------------|-------|-------------|
| | 5MHz | 10MHz | |
| 3.3 | 0.002 | 0.003 | 2.5 |
| 2.805 | 0.001 | 0.002 | 2.5 |
| 3.795 | 0.004 | 0.004 | 2.5 |

| TEMP. (°C) | Frequency Error (ppm) | | Limit (ppm) |
|------------|-----------------------|--------|-------------|
| | 5MHz | 10MHz | |
| -30 | 0.003 | 0.004 | 2.5 |
| -20 | 0.003 | 0.003 | 2.5 |
| -10 | 0.001 | 0.001 | 2.5 |
| 0 | 0.003 | 0.004 | 2.5 |
| 10 | 0.004 | 0.002 | 2.5 |
| 20 | -0.004 | -0.004 | 2.5 |
| 30 | -0.005 | -0.002 | 2.5 |
| 40 | -0.002 | -0.003 | 2.5 |
| 50 | -0.003 | -0.002 | 2.5 |

LTE Band 17

| Voltage (Volts) | Frequency Error (ppm) | | Limit (ppm) |
|-----------------|-----------------------|-------|-------------|
| | 5MHz | 10MHz | |
| 3.3 | 0.003 | 0.002 | 2.5 |
| 2.805 | 0.002 | 0.004 | 2.5 |
| 3.795 | 0.004 | 0.005 | 2.5 |

| TEMP. (°C) | Frequency Error (ppm) | | Limit (ppm) |
|------------|-----------------------|--------|-------------|
| | 5MHz | 10MHz | |
| -30 | 0.001 | 0.006 | 2.5 |
| -20 | 0.003 | 0.005 | 2.5 |
| -10 | 0.004 | 0.003 | 2.5 |
| 0 | 0.003 | 0.004 | 2.5 |
| 10 | 0.003 | 0.003 | 2.5 |
| 20 | -0.002 | -0.004 | 2.5 |
| 30 | -0.005 | -0.005 | 2.5 |
| 40 | -0.002 | -0.001 | 2.5 |
| 50 | -0.003 | -0.004 | 2.5 |

LTE Band 30

| Voltage (Volts) | Frequency Error (ppm) | | Limit (ppm) |
|-----------------|-----------------------|-------|-------------|
| | 5MHz | 10MHz | |
| 3.3 | 0.001 | 0.002 | 2.5 |
| 2.805 | 0.002 | 0.001 | 2.5 |
| 3.795 | 0.001 | 0.001 | 2.5 |

| TEMP. (°C) | Frequency Error (ppm) | | Limit (ppm) |
|------------|-----------------------|--------|-------------|
| | 5MHz | 10MHz | |
| -30 | 0.002 | 0.001 | 2.5 |
| -20 | 0.002 | 0.001 | 2.5 |
| -10 | 0.001 | 0.001 | 2.5 |
| 0 | 0.001 | 0.001 | 2.5 |
| 10 | 0.001 | 0.001 | 2.5 |
| 20 | -0.002 | -0.001 | 2.5 |
| 30 | -0.001 | -0.001 | 2.5 |
| 40 | -0.001 | -0.002 | 2.5 |
| 50 | -0.002 | -0.002 | 2.5 |

LTE Band 38

| Voltage (Volts) | Frequency Error (ppm) | | | | Limit (ppm) |
|-----------------|-----------------------|-------|-------|-------|-------------|
| | 5MHz | 10MHz | 15MHz | 20MHz | |
| 3.3 | 0.001 | 0.000 | 0.001 | 0.002 | 2.5 |
| 2.805 | 0.001 | 0.001 | 0.001 | 0.001 | 2.5 |
| 3.795 | 0.001 | 0.000 | 0.000 | 0.001 | 2.5 |

| TEMP. (°C) | Frequency Error (ppm) | | | | Limit (ppm) |
|------------|-----------------------|--------|--------|--------|-------------|
| | 5MHz | 10MHz | 15MHz | 20MHz | |
| -30 | 0.001 | 0.001 | 0.000 | 0.001 | 2.5 |
| -20 | 0.001 | 0.001 | 0.001 | 0.001 | 2.5 |
| -10 | 0.000 | 0.000 | 0.001 | 0.001 | 2.5 |
| 0 | 0.001 | 0.001 | 0.001 | 0.001 | 2.5 |
| 10 | 0.001 | -0.001 | -0.001 | -0.001 | 2.5 |
| 20 | -0.001 | -0.001 | -0.001 | -0.001 | 2.5 |
| 30 | -0.001 | -0.001 | -0.001 | -0.001 | 2.5 |
| 40 | -0.001 | -0.001 | -0.001 | -0.001 | 2.5 |
| 50 | 0.001 | 0.001 | 0.000 | 0.001 | 2.5 |

LTE Band 41

| Voltage (Volts) | Frequency Error (ppm) | | | | Limit (ppm) |
|-----------------|-----------------------|-------|-------|-------|-------------|
| | 5MHz | 10MHz | 15MHz | 20MHz | |
| 3.3 | 0.001 | 0.002 | 0.001 | 0.001 | 2.5 |
| 2.805 | 0.001 | 0.001 | 0.002 | 0.001 | 2.5 |
| 3.795 | 0.000 | 0.002 | 0.001 | 0.001 | 2.5 |

| TEMP. (°C) | Frequency Error (ppm) | | | | Limit (ppm) |
|------------|-----------------------|--------|--------|--------|-------------|
| | 5MHz | 10MHz | 15MHz | 20MHz | |
| -30 | 0.001 | 0.001 | 0.001 | 0.001 | 2.5 |
| -20 | 0.001 | 0.001 | 0.000 | 0.001 | 2.5 |
| -10 | 0.002 | 0.001 | 0.001 | 0.001 | 2.5 |
| 0 | 0.001 | 0.001 | 0.001 | 0.001 | 2.5 |
| 10 | 0.001 | 0.001 | 0.001 | 0.001 | 2.5 |
| 20 | -0.001 | -0.001 | -0.001 | -0.001 | 2.5 |
| 30 | -0.001 | -0.001 | -0.001 | 0.000 | 2.5 |
| 40 | -0.001 | -0.001 | -0.001 | -0.001 | 2.5 |
| 50 | -0.001 | -0.001 | -0.001 | -0.001 | 2.5 |

LTE Band 66

| Voltage (Volts) | Frequency Error (ppm) | | | | | | Limit (ppm) |
|-----------------|-----------------------|-------|-------|-------|-------|-------|-------------|
| | 1.4MHz | 3MHz | 5MHz | 10MHz | 15MHz | 20MHz | |
| 3.3 | 0.001 | 0.002 | 0.001 | 0.001 | 0.002 | 0.001 | 2.5 |
| 2.805 | 0.001 | 0.002 | 0.002 | 0.002 | 0.002 | 0.001 | 2.5 |
| 3.795 | 0.002 | 0.002 | 0.002 | 0.001 | 0.001 | 0.002 | 2.5 |

| TEMP. (°C) | Frequency Error (ppm) | | | | | | Limit (ppm) |
|------------|-----------------------|--------|--------|--------|--------|--------|-------------|
| | 1.4MHz | 3MHz | 5MHz | 10MHz | 15MHz | 20MHz | |
| -30 | 0.001 | 0.002 | 0.002 | 0.002 | 0.001 | 0.001 | 2.5 |
| -20 | 0.001 | 0.002 | 0.002 | 0.002 | 0.001 | 0.002 | 2.5 |
| -10 | 0.002 | 0.001 | 0.002 | 0.001 | 0.001 | 0.002 | 2.5 |
| 0 | 0.002 | 0.002 | 0.001 | 0.001 | 0.002 | 0.002 | 2.5 |
| 10 | -0.002 | -0.001 | 0.001 | 0.002 | 0.001 | 0.001 | 2.5 |
| 20 | -0.002 | -0.002 | -0.001 | -0.002 | -0.001 | -0.001 | 2.5 |
| 30 | -0.001 | -0.002 | -0.001 | -0.001 | -0.001 | -0.001 | 2.5 |
| 40 | -0.002 | -0.001 | -0.001 | -0.002 | -0.001 | -0.001 | 2.5 |
| 50 | -0.001 | -0.001 | -0.001 | -0.002 | -0.001 | -0.001 | 2.5 |

4.3 Emission Bandwidth Measurement

4.3.1 Limits of Emission Bandwidth Measurement

-26dBc Bandwidth

According to FCC 27.53 specified that emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power.

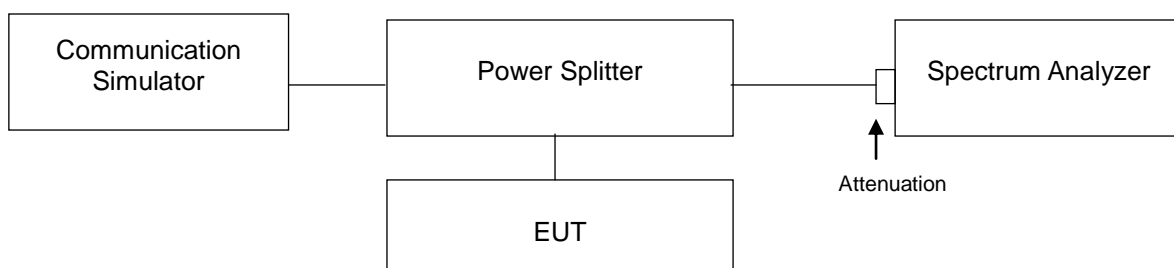
Occupied Bandwidth

The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

4.3.2 Test Procedure

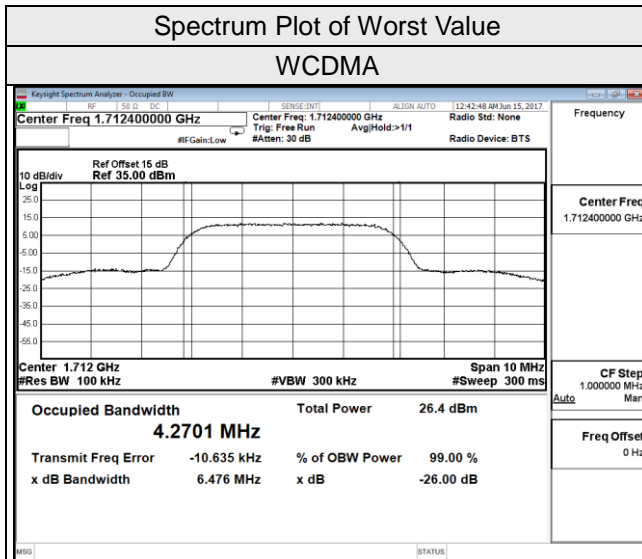
The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with $RBW \geq 1\% \times OBW$ and $VBW \geq 3 \times VBW$.

4.3.3 Test Setup



4.3.4 Test Results (-26dBc Bandwidth, Subcontract Item)

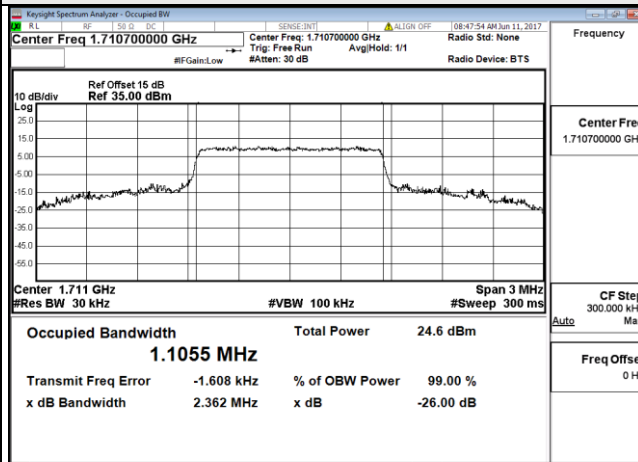
| Channel | FREQ. (MHz) | -26dB Bandwidth (MHz) |
|---------|-------------|-----------------------|
| | | WCDMA |
| 1312 | 1712.4 | 6.48 |
| 1413 | 1732.6 | 4.99 |
| 1513 | 1752.6 | 4.87 |



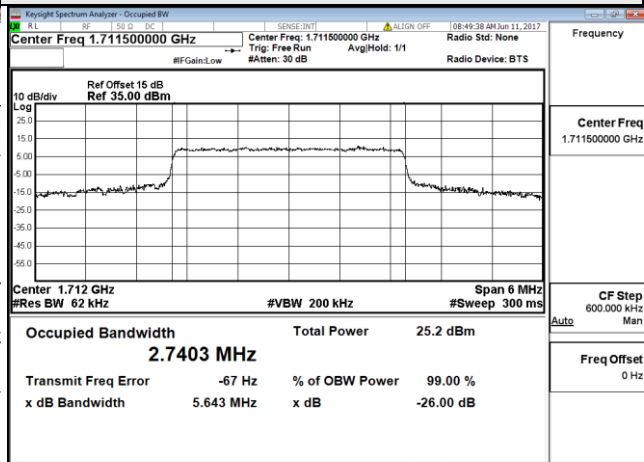
| LTE Band 4 | | | | | | | |
|--------------------------|-----------------|-----------------------|-------|-------------------------|-----------------|-----------------------|-------|
| Channel Bandwidth 1.4MHz | | | | Channel Bandwidth 3MHz | | | |
| Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | | Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 19957 | 1710.7 | 2.10 | 2.36 | 19965 | 1711.5 | 5.64 | 5.56 |
| 20175 | 1732.5 | 1.80 | 1.86 | 20175 | 1732.5 | 5.34 | 5.01 |
| 20393 | 1754.3 | 1.47 | 1.44 | 20385 | 1753.5 | 3.28 | 2.97 |
| Channel Bandwidth 5MHz | | | | Channel Bandwidth 10MHz | | | |
| Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | | Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 19975 | 1712.5 | 9.26 | 9.02 | 20000 | 1715 | 20.00 | 16.38 |
| 20175 | 1732.5 | 6.48 | 8.14 | 20175 | 1732.5 | 14.93 | 14.11 |
| 20375 | 1752.5 | 6.45 | 4.87 | 20350 | 1750 | 10.01 | 9.58 |
| Channel Bandwidth 15MHz | | | | Channel Bandwidth 20MHz | | | |
| Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | | Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 20025 | 1717.5 | 21.11 | 16.22 | 20050 | 1720 | 25.33 | 22.65 |
| 20175 | 1732.5 | 18.25 | 14.51 | 20175 | 1732.5 | 24.52 | 19.38 |
| 20325 | 1747.5 | 24.91 | 20.56 | 20300 | 1745 | 35.49 | 33.14 |

Spectrum Plot of Worst Value

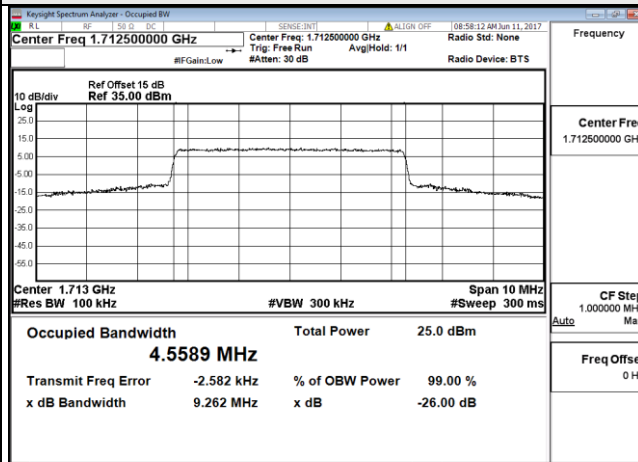
1.4MHz / 16QAM



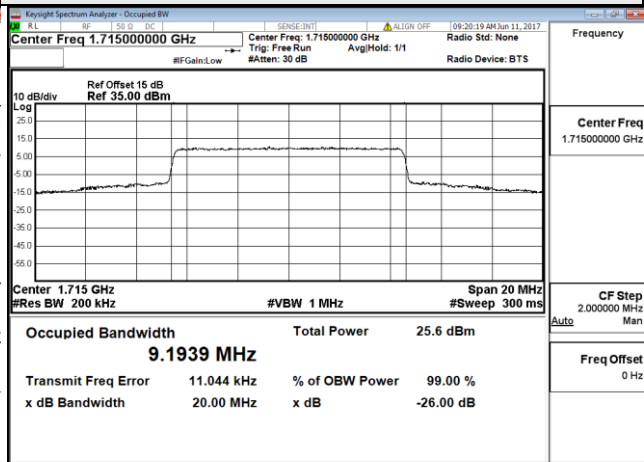
3MHz / QPSK



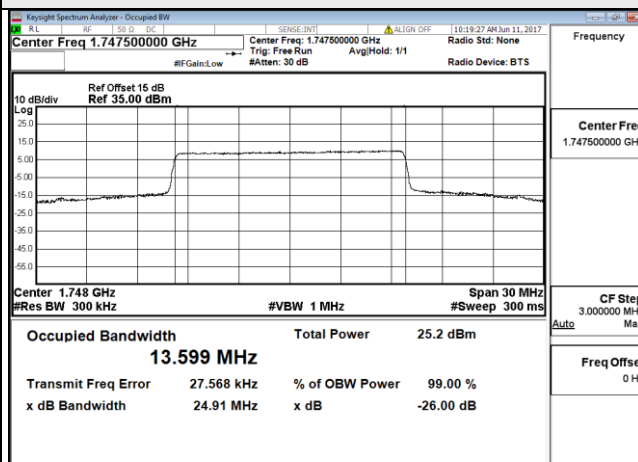
5MHz / QPSK



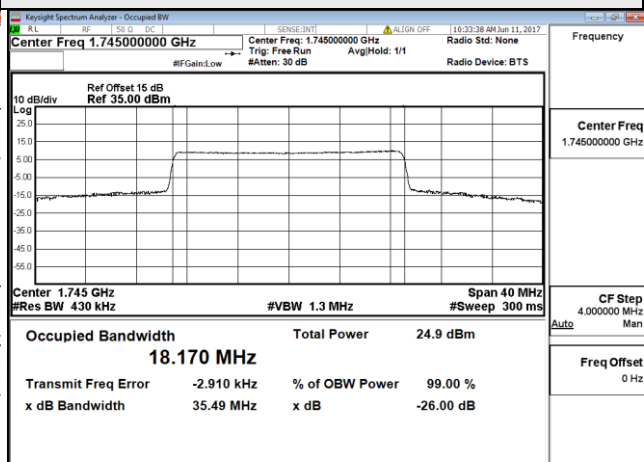
10MHz / QPSK



15MHz / QPSK



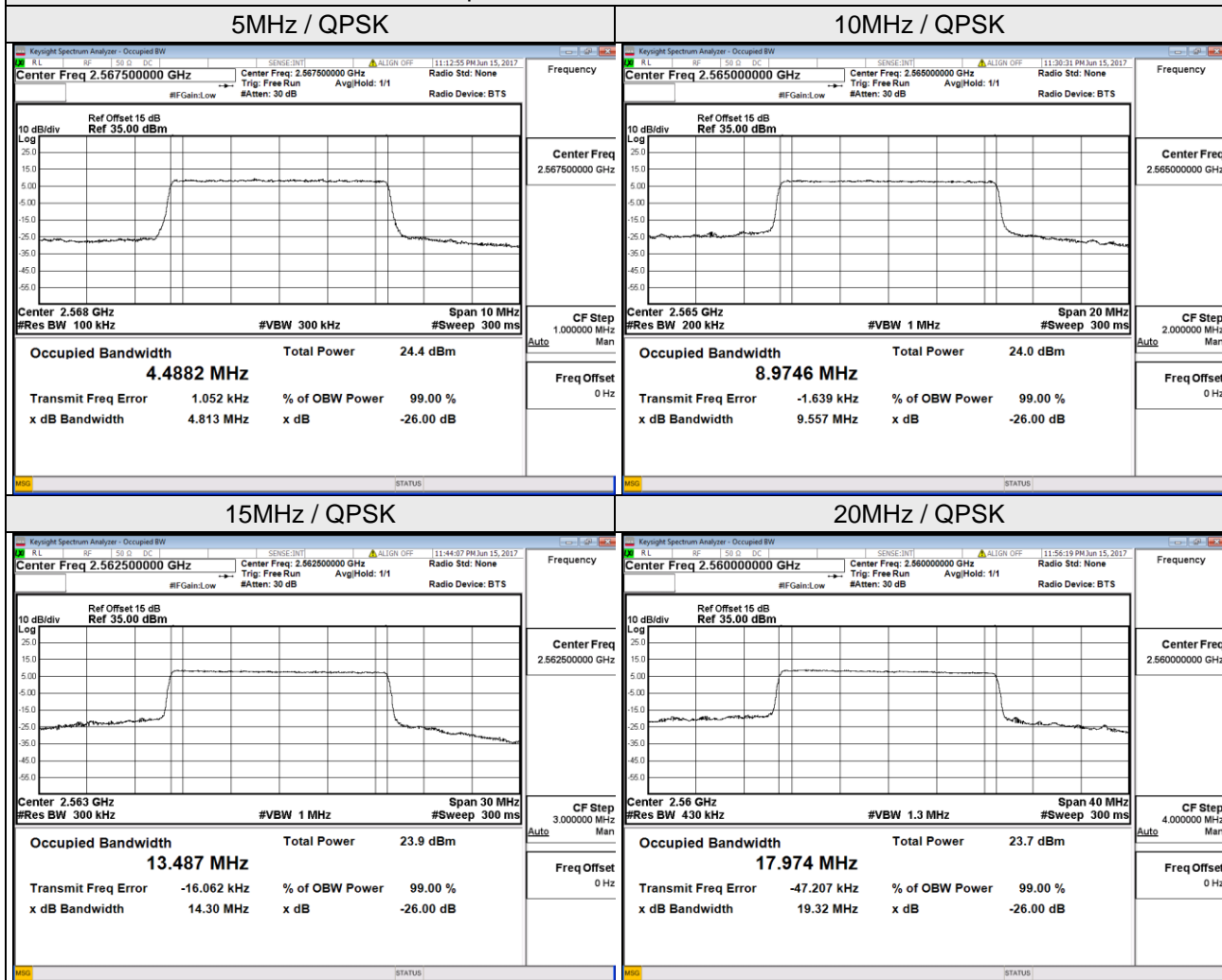
20MHz / QPSK



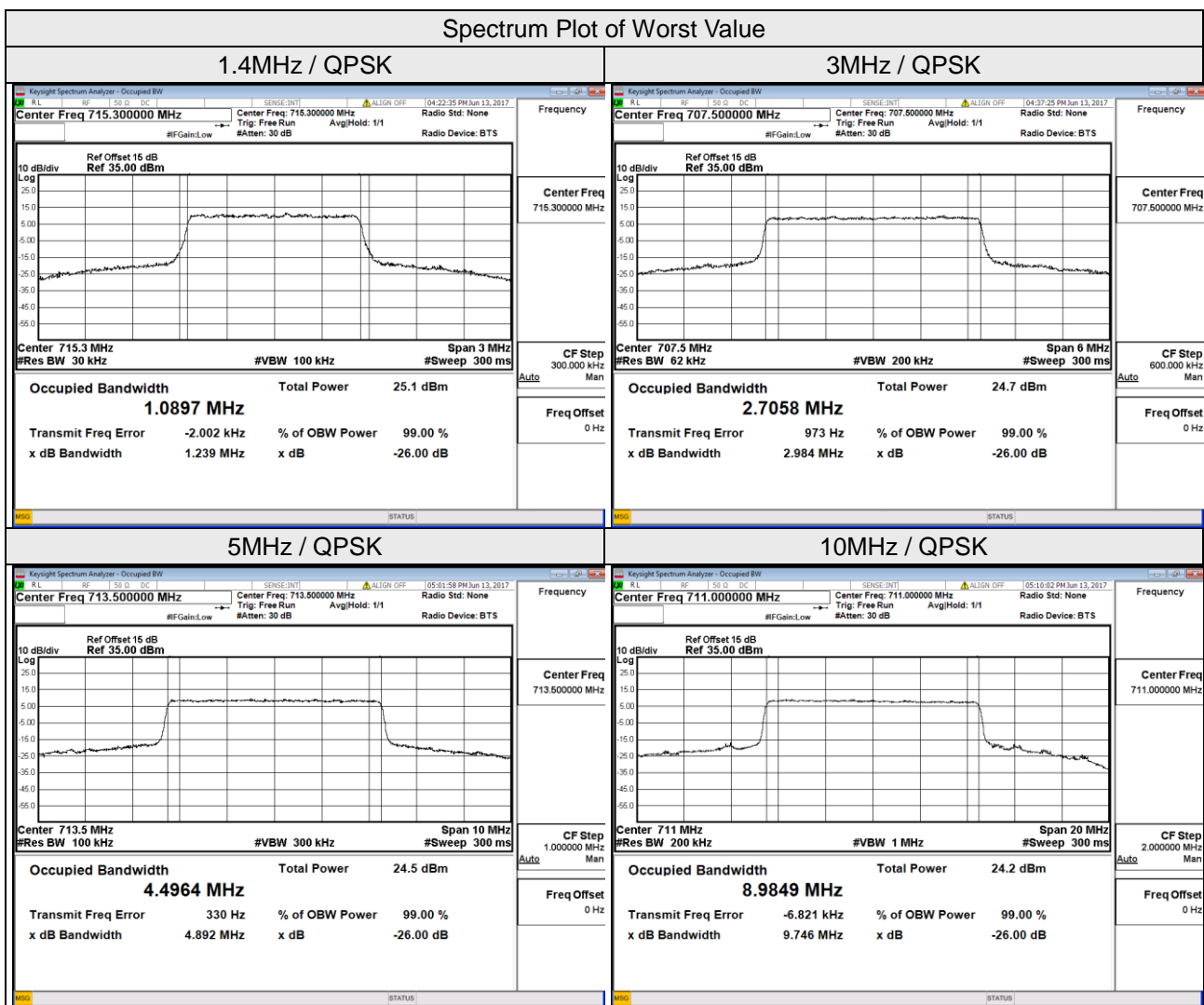
LTE Band 7

| Channel Bandwidth 5MHz | | | | Channel Bandwidth 10MHz | | | |
|-------------------------|-----------------|-----------------------|-------|-------------------------|-----------------|-----------------------|-------|
| Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | | Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 20775 | 2502.5 | 4.80 | 4.81 | 20800 | 2505 | 9.52 | 9.52 |
| 21100 | 2535 | 4.81 | 4.81 | 21100 | 2535 | 9.52 | 9.55 |
| 21425 | 2567.5 | 4.81 | 4.81 | 21400 | 2565 | 9.56 | 9.53 |
| Channel Bandwidth 15MHz | | | | Channel Bandwidth 20MHz | | | |
| Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | | Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 20825 | 2507.5 | 14.25 | 14.26 | 20850 | 2510 | 19.06 | 19.03 |
| 21100 | 2535 | 14.29 | 14.29 | 21100 | 2535 | 19.13 | 19.10 |
| 21375 | 2562.5 | 14.30 | 14.30 | 21350 | 2560 | 19.32 | 19.07 |

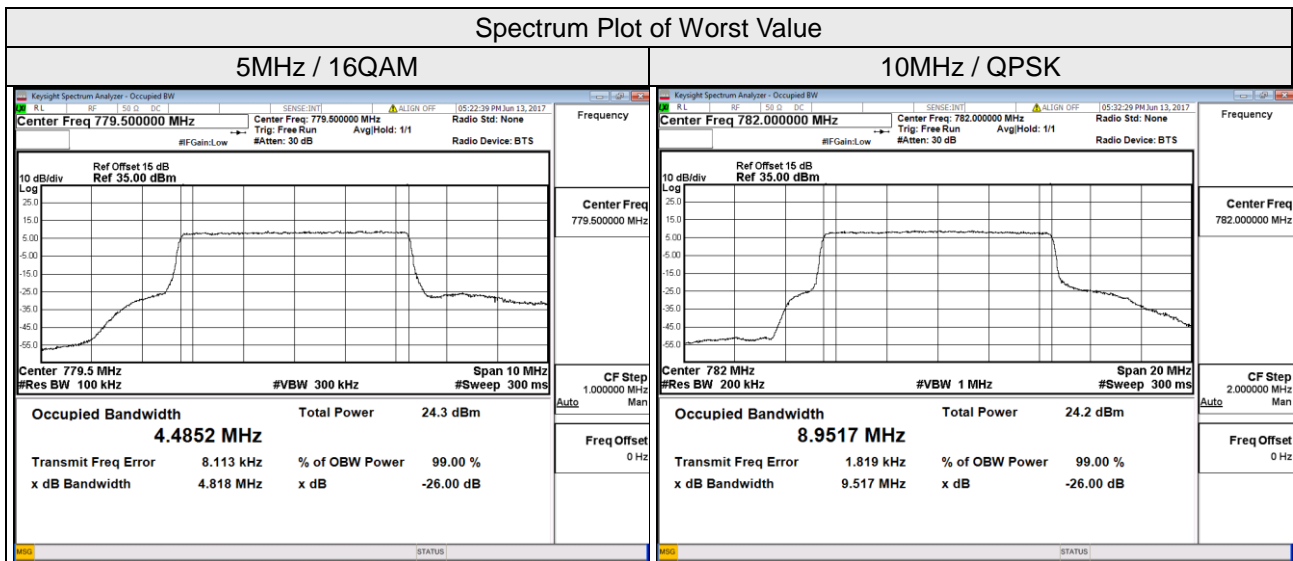
Spectrum Plot of Worst Value



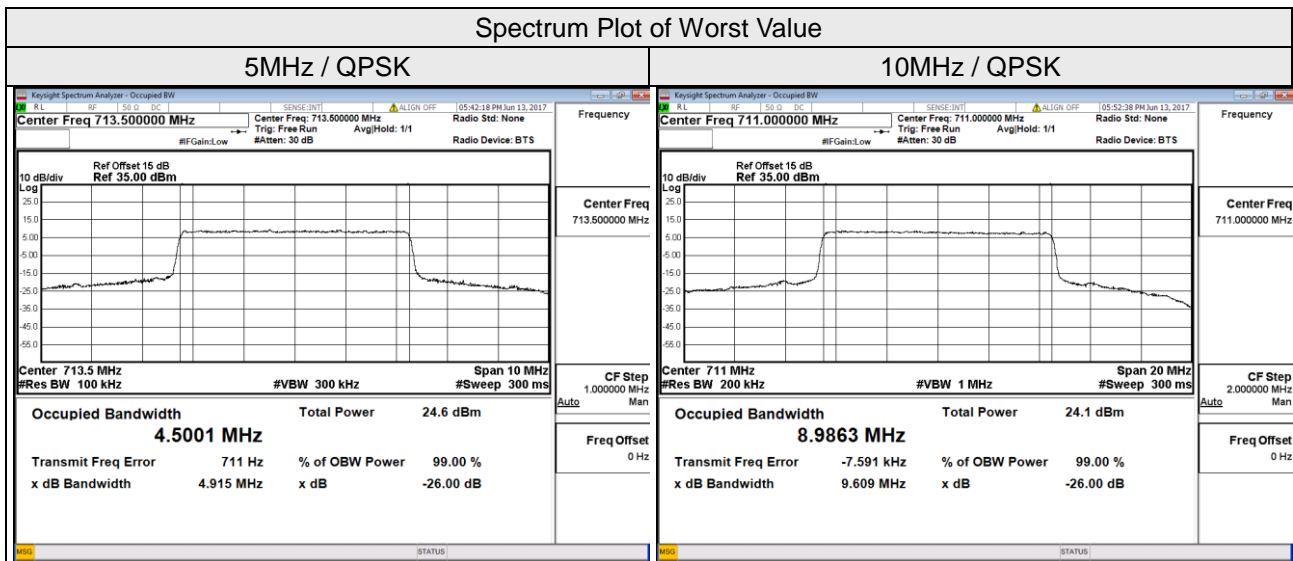
| LTE Band 12 | | | | | | | |
|--------------------------|-----------------|-----------------------|-------|-------------------------|-----------------|-----------------------|-------|
| Channel Bandwidth 1.4MHz | | | | Channel Bandwidth 3MHz | | | |
| Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | | Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 23017 | 699.7 | 1.23 | 1.22 | 23025 | 700.5 | 2.94 | 2.94 |
| 23095 | 707.5 | 1.23 | 1.23 | 23095 | 707.5 | 2.98 | 2.97 |
| 23173 | 715.3 | 1.24 | 1.23 | 23165 | 714.5 | 2.95 | 2.96 |
| Channel Bandwidth 5MHz | | | | Channel Bandwidth 10MHz | | | |
| Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | | Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 23035 | 701.5 | 4.87 | 4.83 | 23060 | 704 | 9.59 | 9.57 |
| 23095 | 707.5 | 4.86 | 4.84 | 23095 | 707.5 | 9.60 | 9.54 |
| 23155 | 713.5 | 4.89 | 4.87 | 23130 | 711 | 9.75 | 9.55 |



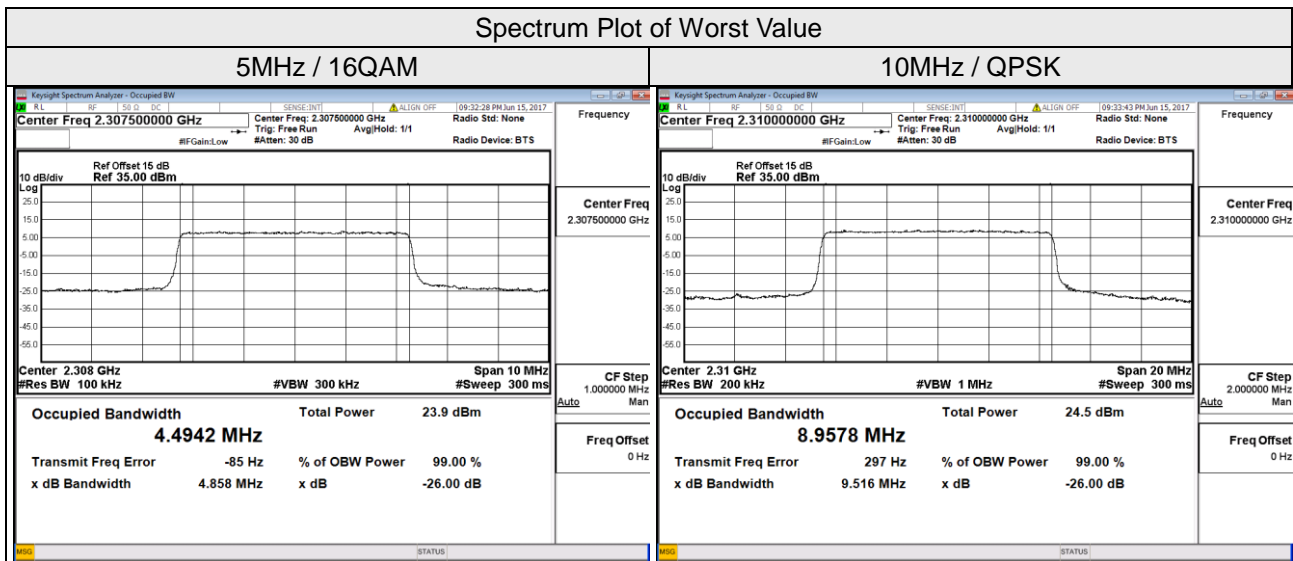
| LTE Band 13 | | | | | | | |
|------------------------|-----------------|-----------------------|-------|-------------------------|-----------------|-----------------------|-------|
| Channel Bandwidth 5MHz | | | | Channel Bandwidth 10MHz | | | |
| Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | | Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 23205 | 779.5 | 4.82 | 4.80 | 23230 | 782 | 9.52 | 9.51 |
| 23230 | 782 | 4.79 | 4.80 | | | | |
| 23255 | 784.5 | 4.81 | 4.81 | | | | |



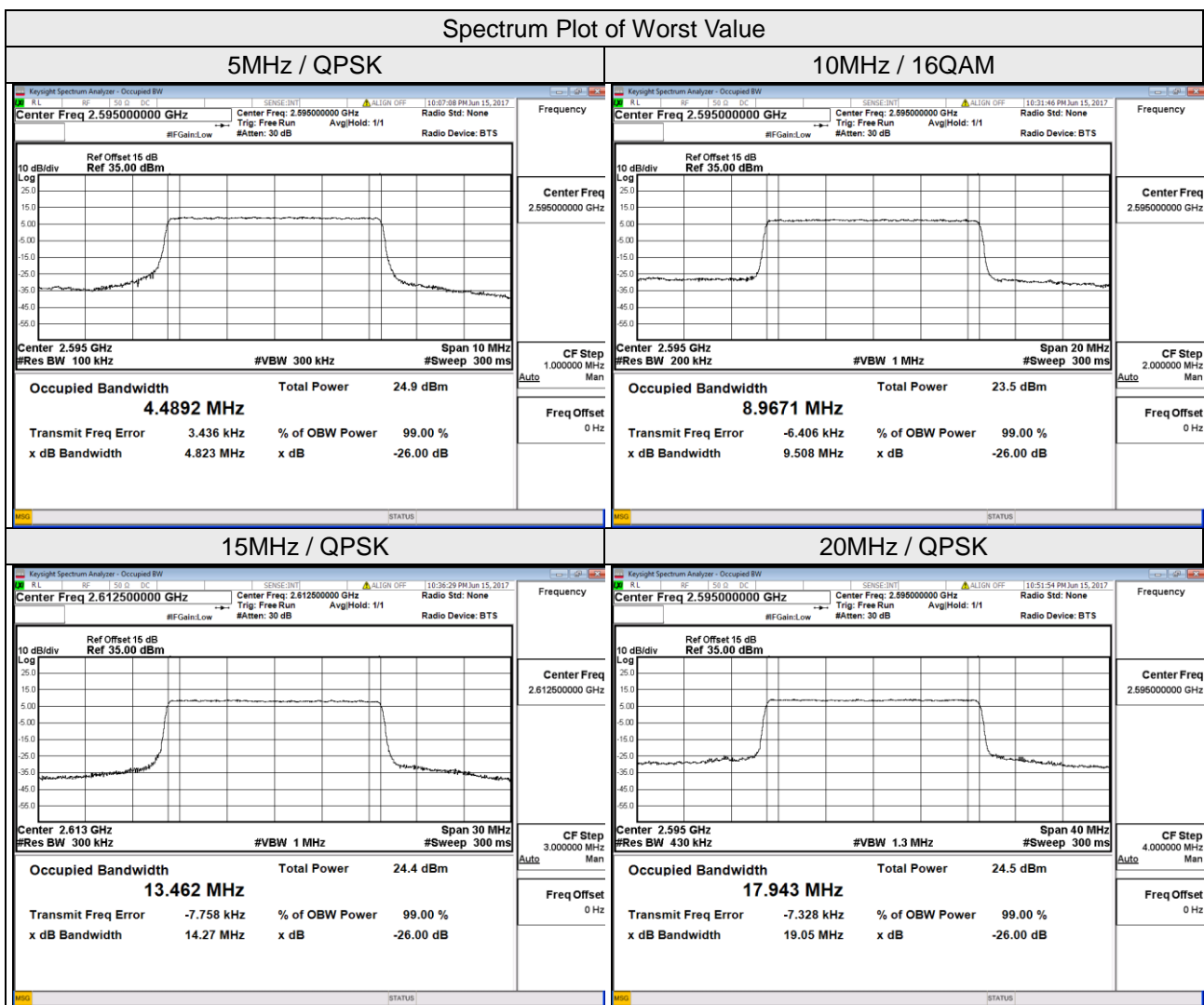
| LTE Band 17 | | | | | | | |
|------------------------|-----------------|-----------------------|-------|-------------------------|-----------------|-----------------------|-------|
| Channel Bandwidth 5MHz | | | | Channel Bandwidth 10MHz | | | |
| Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | | Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 23775 | 706.5 | 4.84 | 4.83 | 23780 | 709 | 9.55 | 9.55 |
| 23790 | 710 | 4.86 | 4.85 | 23790 | 710 | 9.58 | 9.55 |
| 23825 | 713.5 | 4.92 | 4.86 | 23800 | 711 | 9.61 | 9.57 |



| LTE Band 30 | | | | | | | |
|------------------------|-----------------|-----------------------|-------|-------------------------|-----------------|-----------------------|-------|
| Channel Bandwidth 5MHz | | | | Channel Bandwidth 10MHz | | | |
| Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | | Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 27685 | 2307.5 | 4.83 | 4.86 | 27710 | 2310 | 9.52 | 9.51 |
| 27710 | 2310 | 4.81 | 4.80 | | | | |
| 27735 | 2312.5 | 4.81 | 4.80 | | | | |



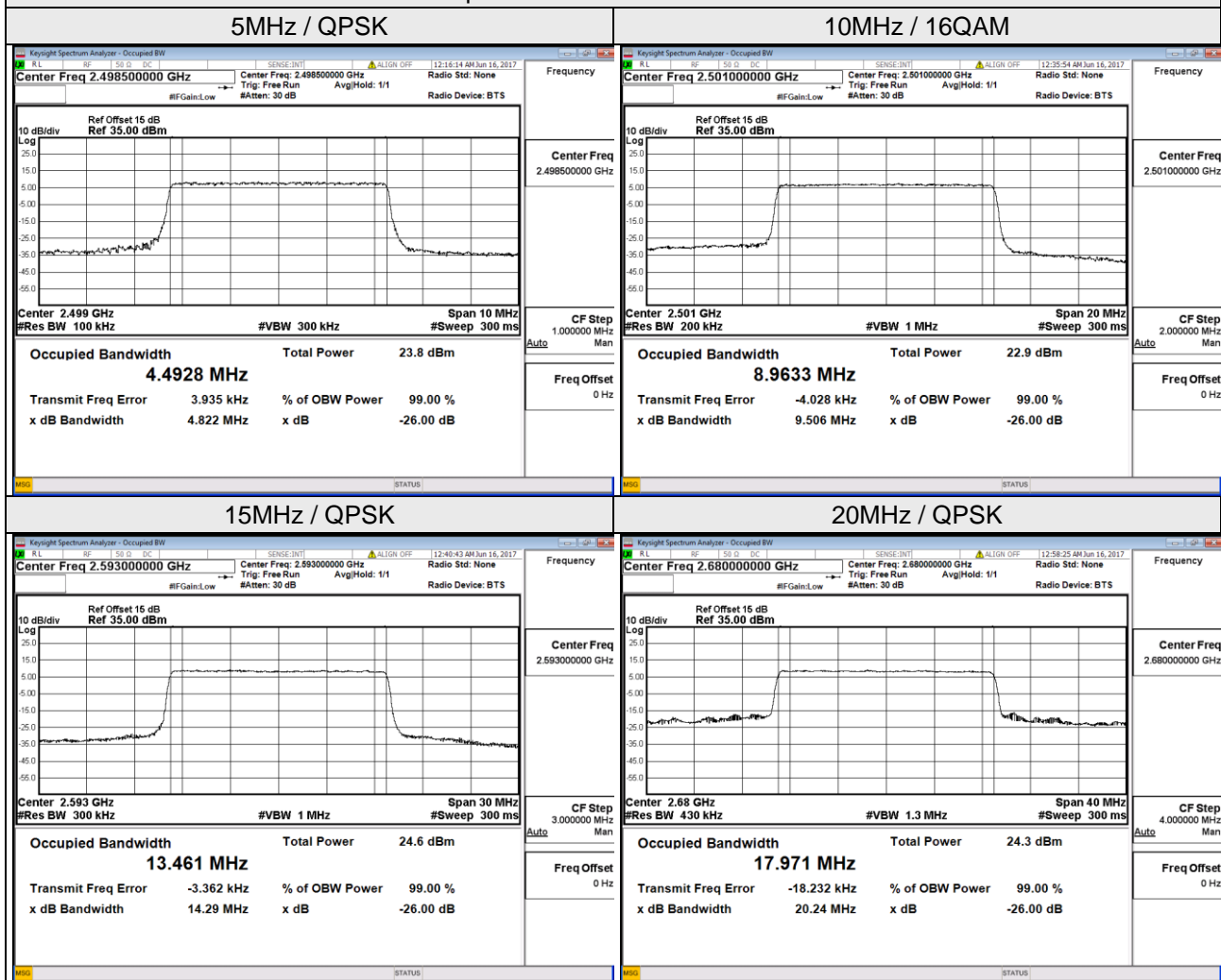
| LTE Band 38 | | | | | | | |
|-------------------------|-----------------|-----------------------|-------|-------------------------|-----------------|-----------------------|-------|
| Channel Bandwidth 5MHz | | | | Channel Bandwidth 10MHz | | | |
| Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | | Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 37775 | 2572.5 | 4.80 | 4.78 | 37800 | 2575 | 9.50 | 9.87 |
| 38000 | 2595 | 4.82 | 4.79 | 38000 | 2595 | 9.48 | 9.51 |
| 38225 | 2617.5 | 4.80 | 4.79 | 38200 | 2615 | 9.49 | 9.48 |
| Channel Bandwidth 15MHz | | | | Channel Bandwidth 20MHz | | | |
| Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | | Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 37825 | 2577.5 | 14.25 | 14.25 | 37850 | 2580 | 19.04 | 19.02 |
| 38000 | 2595 | 14.26 | 14.24 | 38000 | 2595 | 19.05 | 19.05 |
| 38175 | 2612.5 | 14.27 | 14.26 | 38150 | 2610 | 19.03 | 19.01 |



LTE Band 41

| Channel Bandwidth 5MHz | | | | Channel Bandwidth 10MHz | | | |
|-------------------------|-----------------|-----------------------|-------|-------------------------|-----------------|-----------------------|-------|
| Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | | Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 39675 | 2498.5 | 4.82 | 4.79 | 39700 | 2501 | 9.49 | 9.51 |
| 40620 | 2593 | 4.81 | 4.78 | 50620 | 2593 | 9.49 | 9.51 |
| 41565 | 2687.5 | 4.79 | 4.81 | 41540 | 2685 | 9.48 | 9.50 |
| Channel Bandwidth 15MHz | | | | Channel Bandwidth 20MHz | | | |
| Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | | Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 39725 | 2503.5 | 14.25 | 14.25 | 39750 | 2506 | 19.05 | 19.03 |
| 40620 | 2593 | 14.29 | 14.25 | 40620 | 2593 | 19.08 | 19.03 |
| 41515 | 2682.5 | 14.26 | 14.23 | 41490 | 2680 | 20.24 | 19.07 |

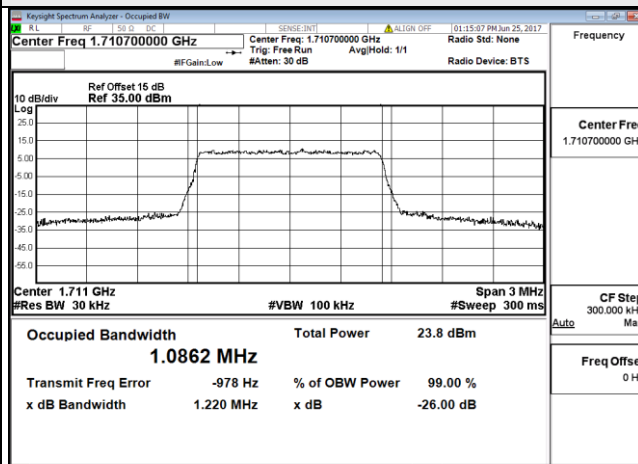
Spectrum Plot of Worst Value



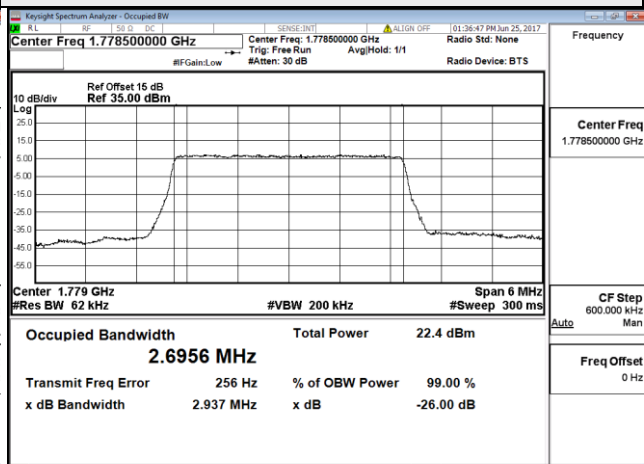
| LTE Band 66 | | | | | | | |
|--------------------------|-----------------|-----------------------|-------|-------------------------|-----------------|-----------------------|-------|
| Channel Bandwidth 1.4MHz | | | | Channel Bandwidth 3MHz | | | |
| Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | | Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 131979 | 1710.7 | 1.22 | 1.22 | 131987 | 1711.5 | 2.93 | 2.93 |
| 132322 | 1745 | 1.21 | 1.22 | 132322 | 1745 | 2.92 | 2.92 |
| 132665 | 1779.3 | 1.21 | 1.22 | 132657 | 1778.5 | 2.92 | 2.94 |
| Channel Bandwidth 5MHz | | | | Channel Bandwidth 10MHz | | | |
| Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | | Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 131997 | 1712.5 | 5.54 | 4.90 | 132022 | 1715 | 9.86 | 9.59 |
| 132322 | 1745 | 4.80 | 4.82 | 132322 | 1745 | 9.54 | 9.52 |
| 132647 | 1777.5 | 5.58 | 5.10 | 132622 | 1775 | 10.46 | 9.67 |
| Channel Bandwidth 15MHz | | | | Channel Bandwidth 20MHz | | | |
| Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | | Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 132047 | 1717.5 | 14.51 | 14.31 | 132072 | 1720 | 20.84 | 19.10 |
| 132322 | 1745 | 14.39 | 14.30 | 132322 | 1745 | 19.33 | 19.12 |
| 132597 | 1722.5 | 19.42 | 14.60 | 132572 | 1770 | 28.44 | 22.13 |

Spectrum Plot of Worst Value

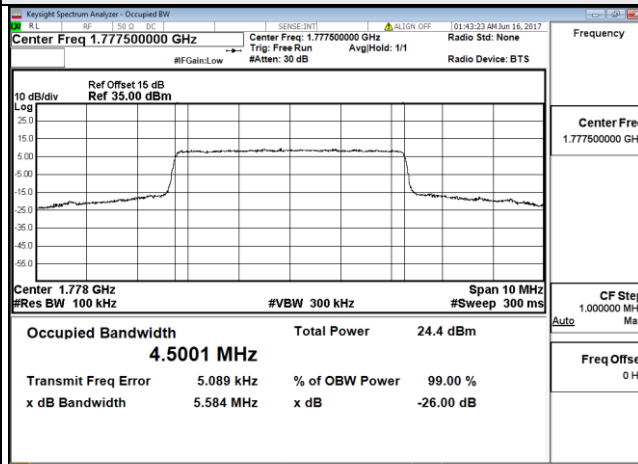
1.4MHz / QPSK



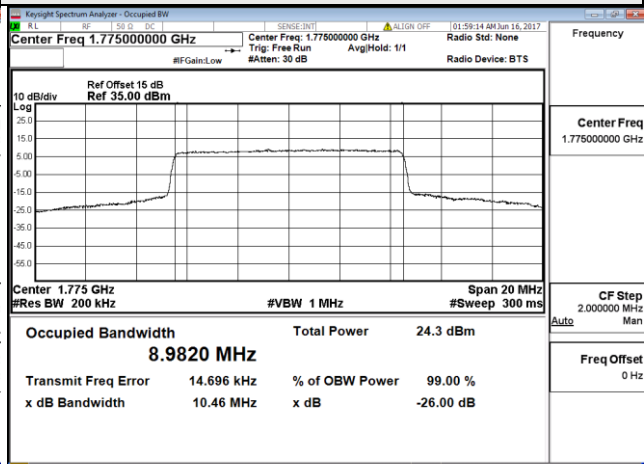
3MHz / 16QAM



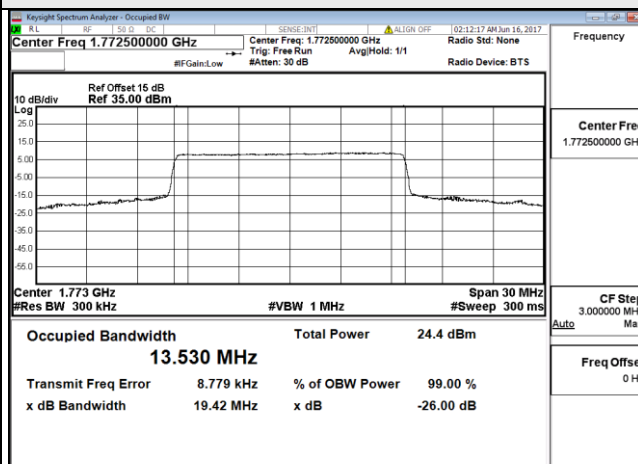
5MHz / QPSK



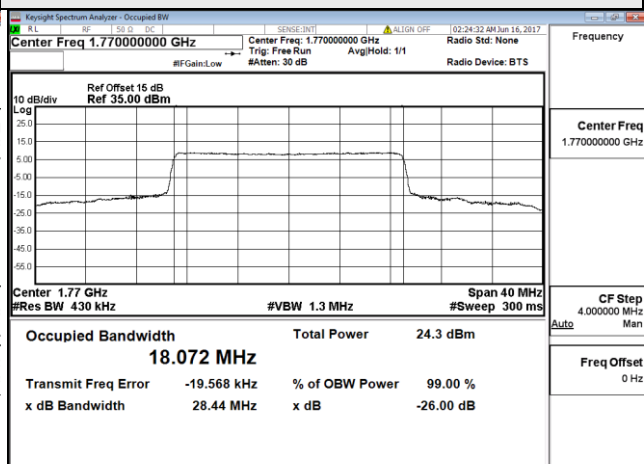
10MHz / QPSK



15MHz / QPSK

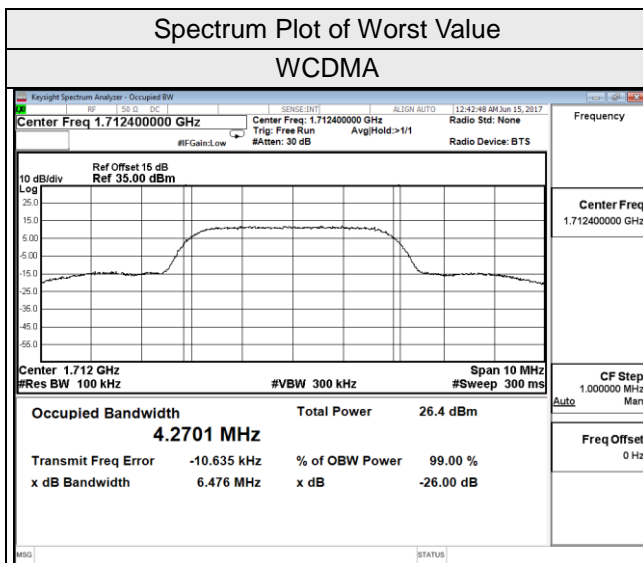


20MHz / QPSK



4.3.5 Test Results (Occupied Bandwidth, Subcontract Item)

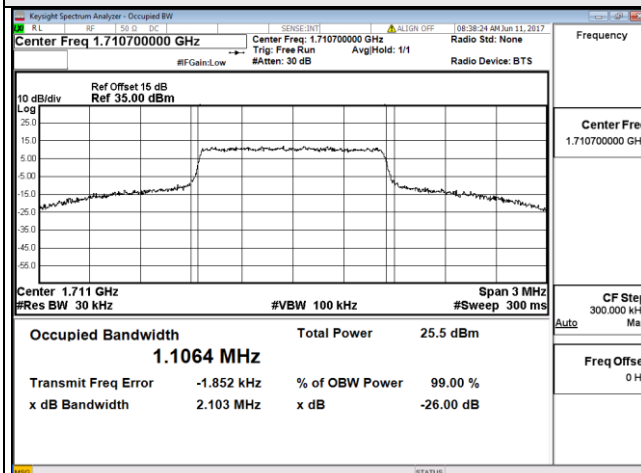
| Channel | FREQ. (MHz) | Occupied Bandwidth (MHz) |
|---------|-------------|--------------------------|
| | | WCDMA |
| 1312 | 1712.4 | 4.27 |
| 1413 | 1732.6 | 4.26 |
| 1513 | 1752.6 | 4.20 |



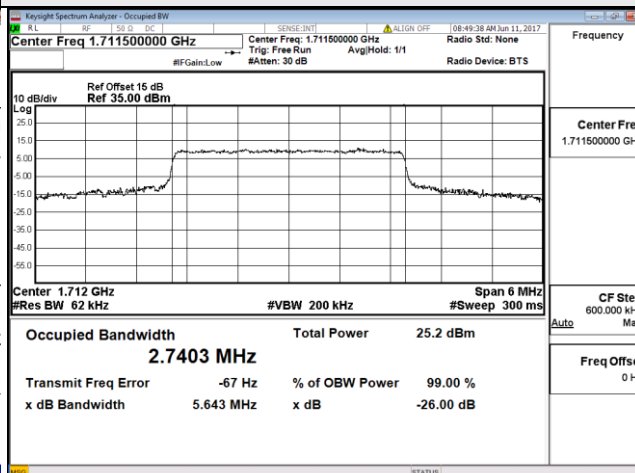
| LTE Band 4 | | | | | | | |
|--------------------------|-----------------|--------------------------|-------|-------------------------|-----------------|--------------------------|-------|
| Channel Bandwidth 1.4MHz | | | | Channel Bandwidth 3MHz | | | |
| Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | | Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 19957 | 1710.7 | 1.11 | 1.11 | 19965 | 1711.5 | 2.74 | 2.74 |
| 20175 | 1732.5 | 1.10 | 1.10 | 20175 | 1732.5 | 2.73 | 2.72 |
| 20393 | 1754.3 | 1.10 | 1.10 | 20385 | 1753.5 | 2.71 | 2.70 |
| Channel Bandwidth 5MHz | | | | Channel Bandwidth 10MHz | | | |
| Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | | Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 19975 | 1712.5 | 4.56 | 4.54 | 20000 | 1715 | 9.19 | 9.05 |
| 20175 | 1732.5 | 4.51 | 4.52 | 20175 | 1732.5 | 9.03 | 9.01 |
| 20375 | 1752.5 | 4.50 | 4.50 | 20350 | 1750 | 8.99 | 8.99 |
| Channel Bandwidth 15MHz | | | | Channel Bandwidth 20MHz | | | |
| Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | | Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 20025 | 1717.5 | 13.56 | 13.53 | 20050 | 1720 | 18.06 | 18.05 |
| 20175 | 1732.5 | 13.49 | 13.46 | 20175 | 1732.5 | 17.97 | 17.96 |
| 20325 | 1747.5 | 13.60 | 13.55 | 20300 | 1745 | 18.17 | 18.15 |

Spectrum Plot of Worst Value

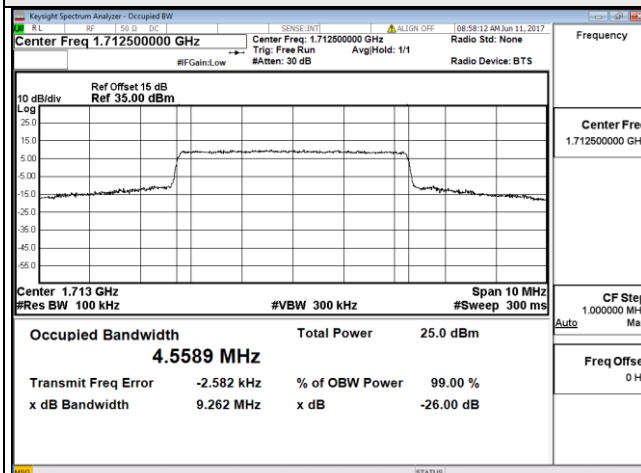
1.4MHz / 16QAM



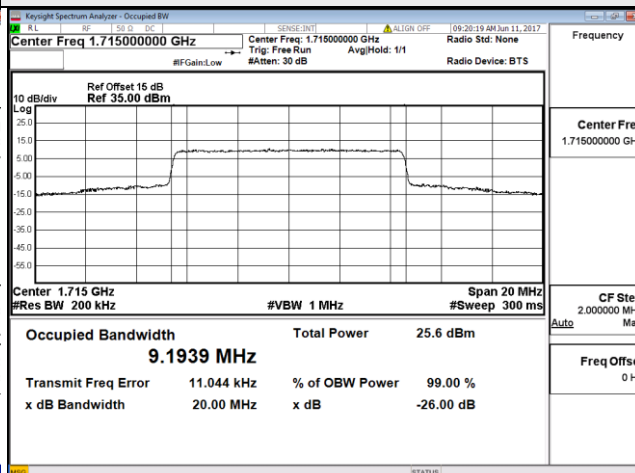
3MHz / QPSK



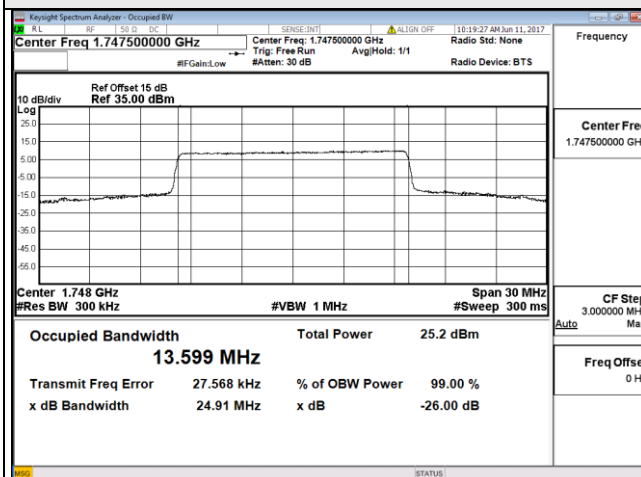
5MHz / QPSK



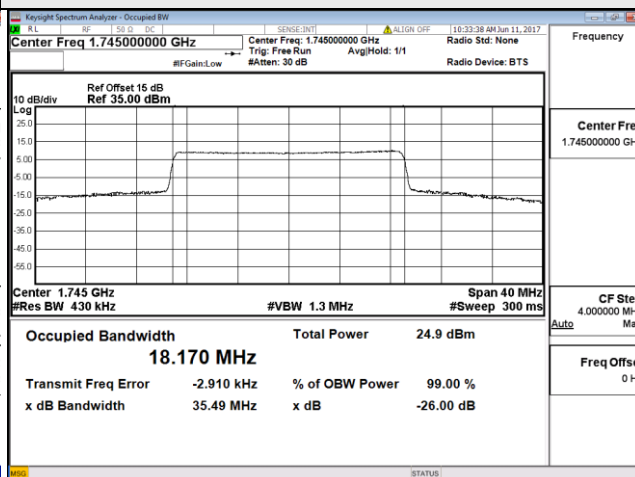
10MHz / QPSK



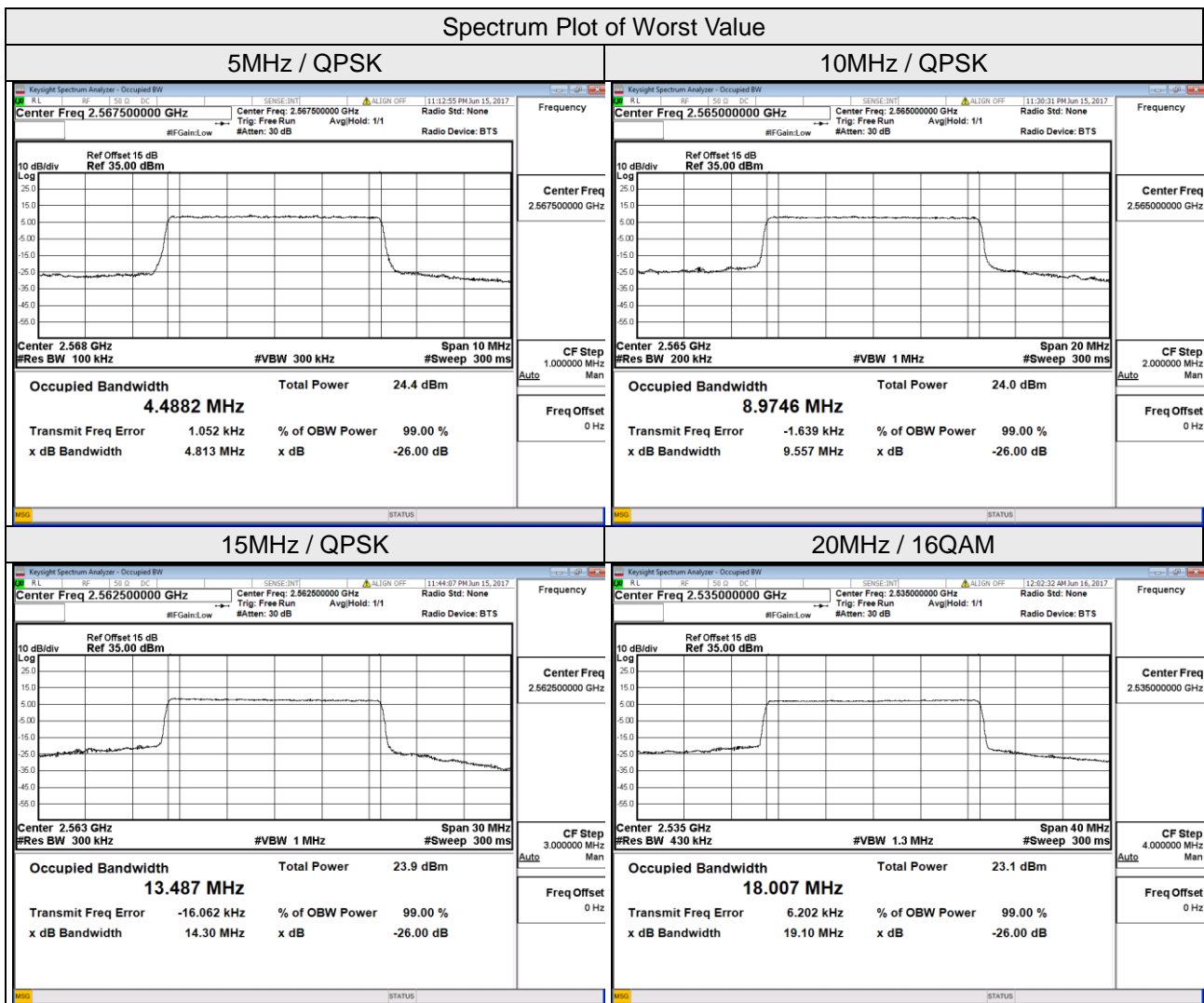
15MHz / QPSK



20MHz / QPSK



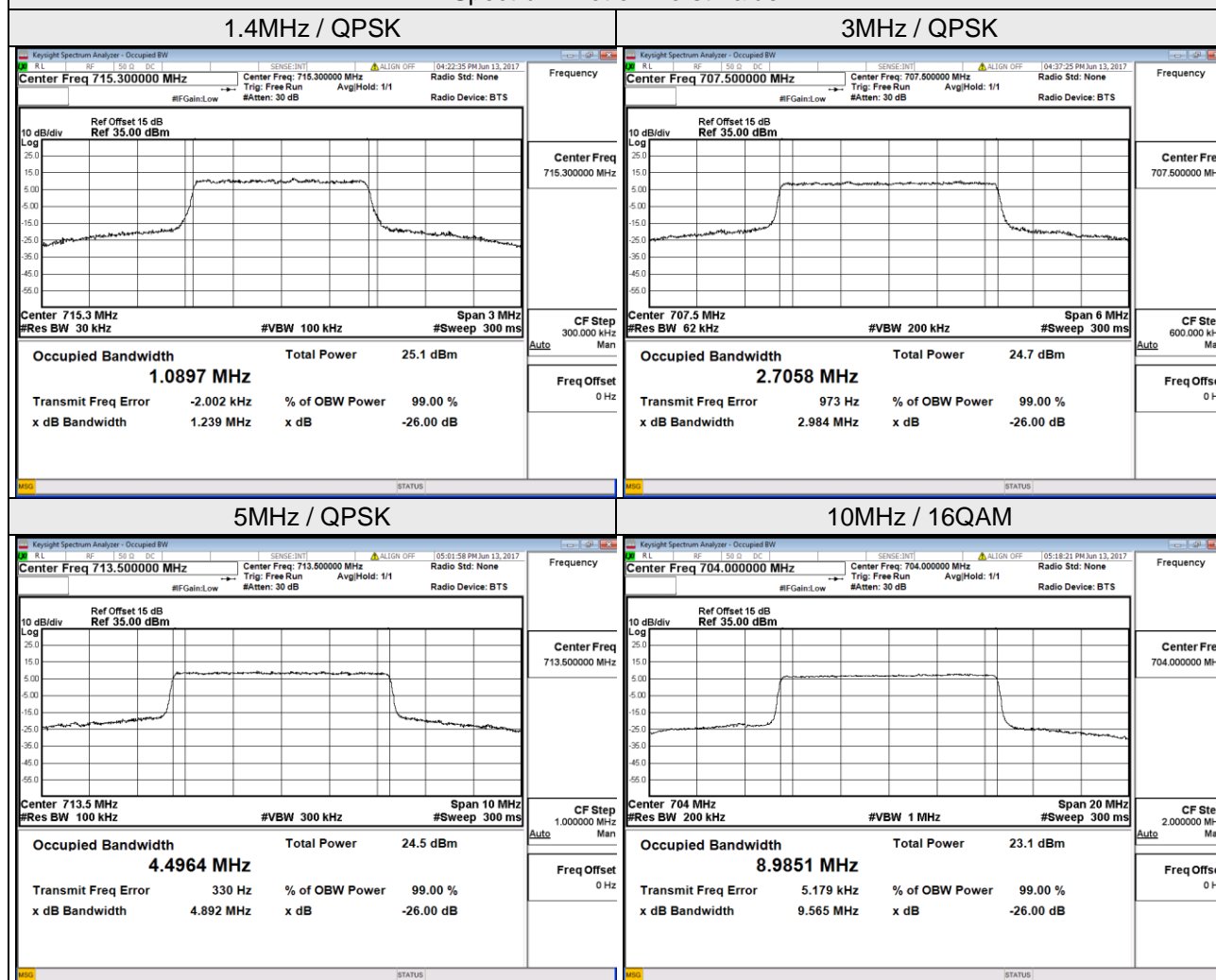
| LTE Band 7 | | | | | | | |
|-------------------------|-----------------|--------------------------|-------|-------------------------|-----------------|--------------------------|-------|
| Channel Bandwidth 5MHz | | | | Channel Bandwidth 10MHz | | | |
| Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | | Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 20775 | 2502.5 | 4.49 | 4.49 | 20800 | 2505 | 8.96 | 8.97 |
| 21100 | 2535 | 4.49 | 4.49 | 21100 | 2535 | 8.97 | 8.97 |
| 21425 | 2567.5 | 4.49 | 4.49 | 21400 | 2565 | 8.97 | 8.97 |
| Channel Bandwidth 15MHz | | | | Channel Bandwidth 20MHz | | | |
| Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | | Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 20825 | 2507.5 | 13.46 | 13.45 | 20850 | 2510 | 17.94 | 17.95 |
| 21100 | 2535 | 13.48 | 13.47 | 21100 | 2535 | 17.99 | 18.01 |
| 21375 | 2562.5 | 13.49 | 13.47 | 21350 | 2560 | 17.97 | 17.98 |



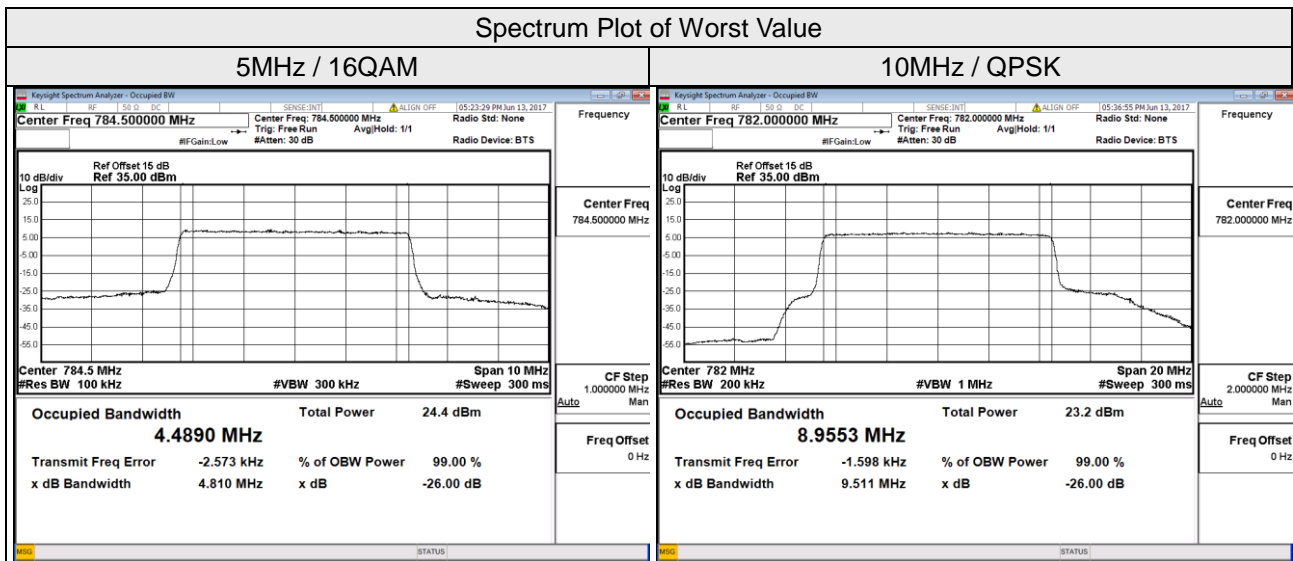
LTE Band 12

| Channel Bandwidth 1.4MHz | | | | Channel Bandwidth 3MHz | | | |
|--------------------------|-----------------|--------------------------|-------|-------------------------|-----------------|--------------------------|-------|
| Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | | Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 23017 | 699.7 | 1.09 | 1.09 | 23025 | 700.5 | 2.70 | 2.70 |
| 23095 | 707.5 | 1.09 | 1.09 | 23095 | 707.5 | 2.71 | 2.70 |
| 23173 | 715.3 | 1.09 | 1.09 | 23165 | 714.5 | 2.70 | 2.70 |
| Channel Bandwidth 5MHz | | | | Channel Bandwidth 10MHz | | | |
| Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | | Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 23035 | 701.5 | 4.50 | 4.50 | 23060 | 704 | 8.98 | 8.99 |
| 23095 | 707.5 | 4.49 | 4.49 | 23095 | 707.5 | 8.97 | 8.96 |
| 23155 | 713.5 | 4.50 | 4.50 | 23130 | 711 | 8.98 | 8.98 |

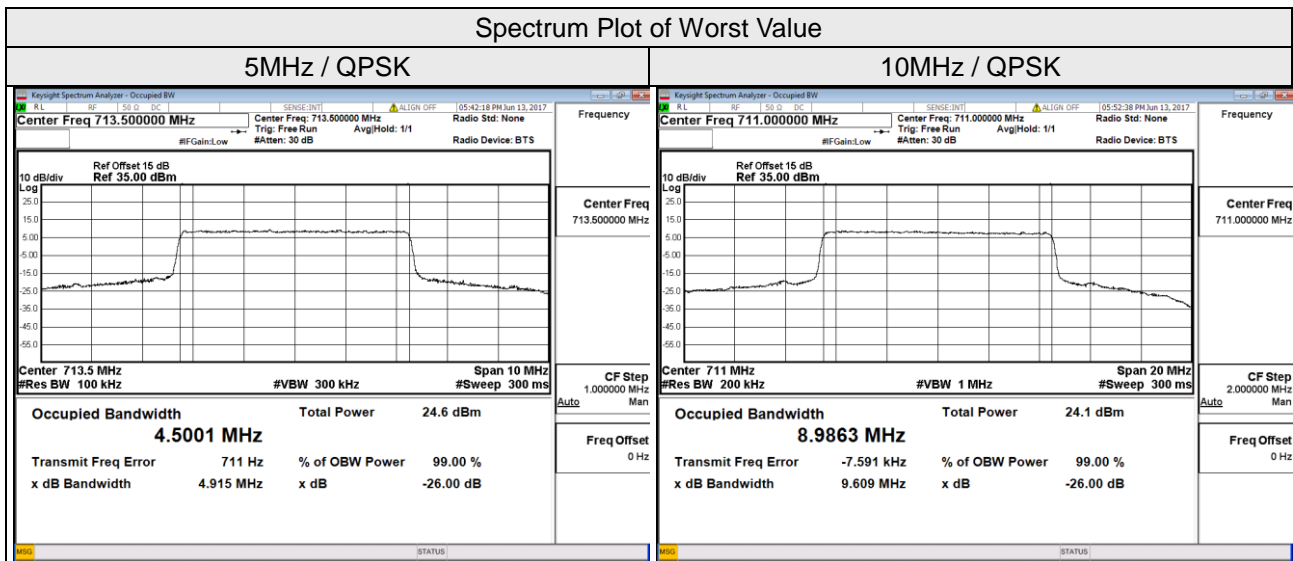
Spectrum Plot of Worst Value



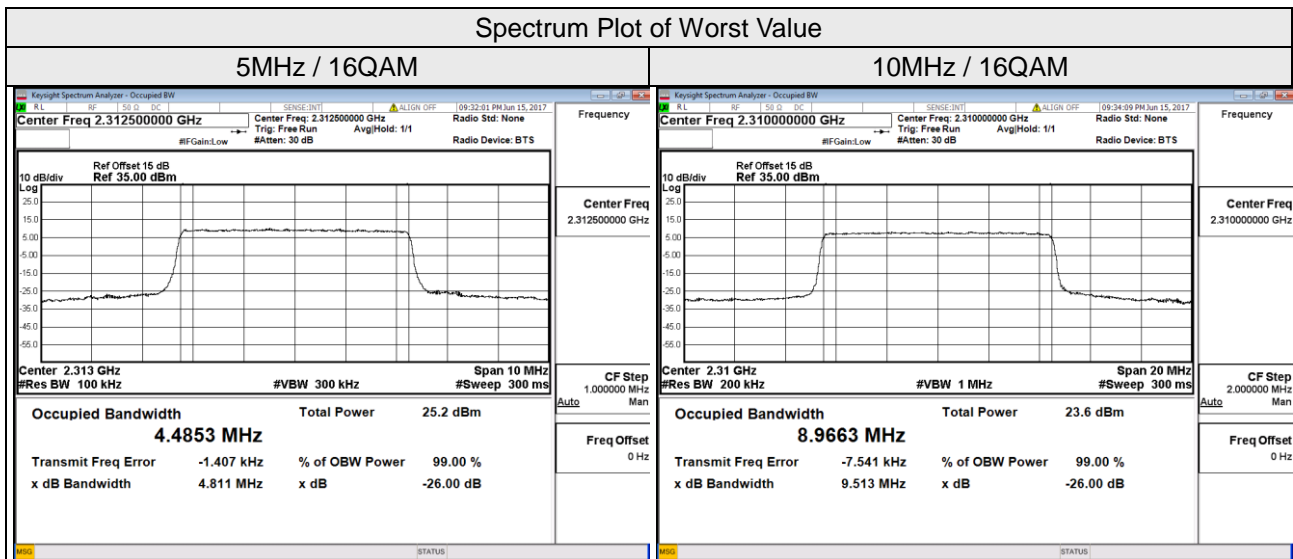
| LTE Band 13 | | | | | | | |
|------------------------|-----------------|--------------------------|-------|-------------------------|-----------------|--------------------------|-------|
| Channel Bandwidth 5MHz | | | | Channel Bandwidth 10MHz | | | |
| Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | | Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 23205 | 779.5 | 4.49 | 4.49 | 23230 | 782 | 8.95 | 8.96 |
| 23230 | 782 | 4.49 | 4.49 | | | | |
| 23255 | 784.5 | 4.49 | 4.49 | | | | |



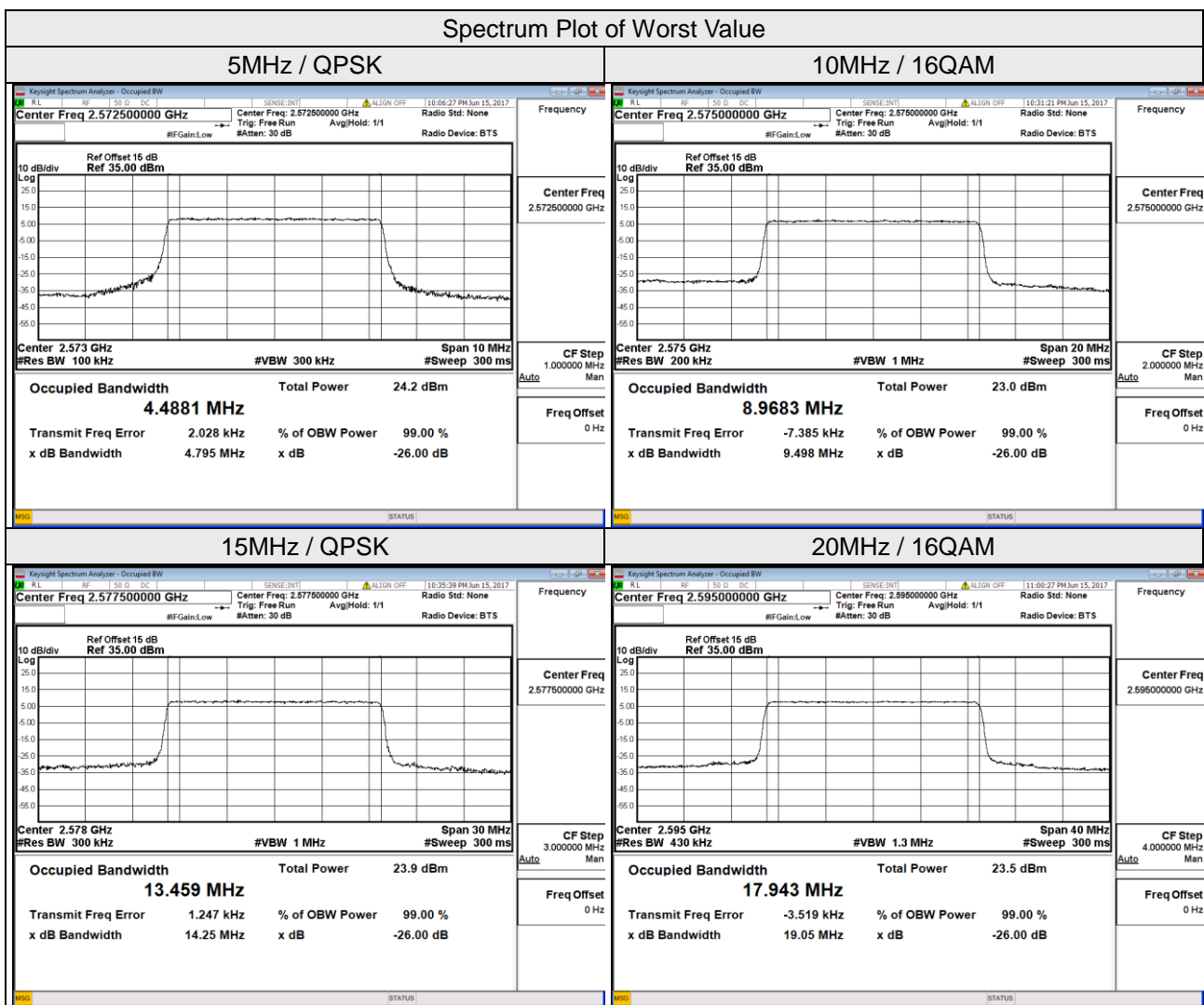
| LTE Band 17 | | | | | | | |
|------------------------|-----------------|-----------------------|-------|-------------------------|-----------------|--------------------------|-------|
| Channel Bandwidth 5MHz | | | | Channel Bandwidth 10MHz | | | |
| Channel | Frequency (MHz) | -26dB Bandwidth (MHz) | | Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 23775 | 706.5 | 4.49 | 4.49 | 23780 | 709 | 8.97 | 8.96 |
| 23790 | 710 | 4.50 | 4.49 | 23790 | 710 | 8.98 | 8.97 |
| 23825 | 713.5 | 4.50 | 4.50 | 23800 | 711 | 8.99 | 8.98 |



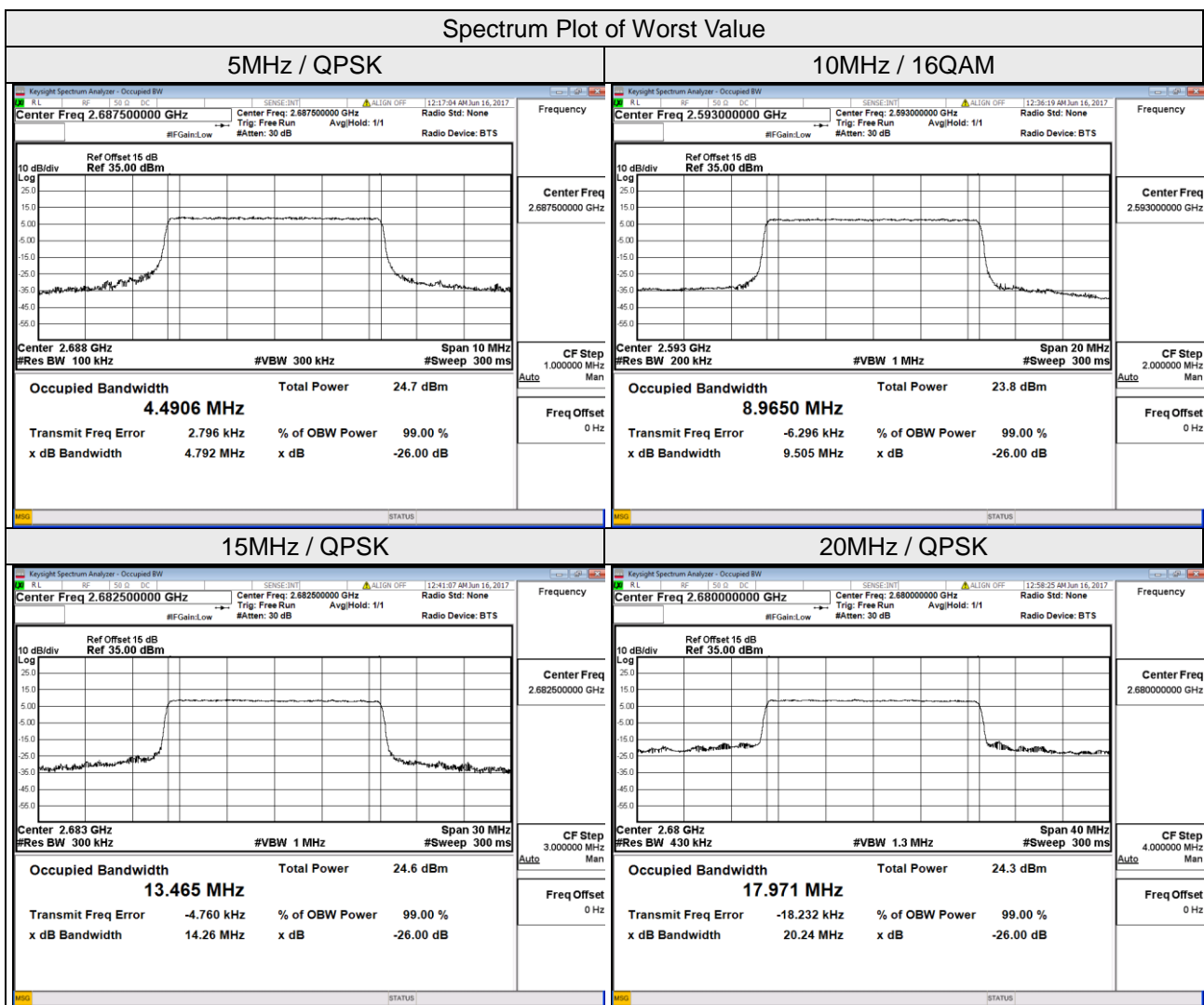
| LTE Band 30 | | | | | | | |
|------------------------|-----------------|--------------------------|-------|-------------------------|-----------------|--------------------------|-------|
| Channel Bandwidth 5MHz | | | | Channel Bandwidth 10MHz | | | |
| Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | | Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 27685 | 2307.5 | 4.49 | 4.49 | 27710 | 2310 | 8.96 | 8.97 |
| 27710 | 2310 | 4.49 | 4.49 | | | | |
| 27735 | 2312.5 | 4.49 | 4.49 | | | | |



| LTE Band 38 | | | | | | | |
|-------------------------|-----------------|--------------------------|-------|-------------------------|-----------------|--------------------------|-------|
| Channel Bandwidth 5MHz | | | | Channel Bandwidth 10MHz | | | |
| Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | | Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 37775 | 2572.5 | 4.49 | 4.49 | 37800 | 2575 | 8.96 | 8.97 |
| 38000 | 2595 | 4.49 | 4.49 | 38000 | 2595 | 8.96 | 8.97 |
| 38225 | 2617.5 | 4.49 | 4.49 | 38200 | 2615 | 8.95 | 8.97 |
| Channel Bandwidth 15MHz | | | | Channel Bandwidth 20MHz | | | |
| Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | | Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 37825 | 2577.5 | 13.46 | 13.45 | 37850 | 2580 | 17.94 | 17.93 |
| 38000 | 2595 | 13.46 | 13.45 | 38000 | 2595 | 17.94 | 17.94 |
| 38175 | 2612.5 | 13.46 | 13.45 | 38150 | 2610 | 17.93 | 17.92 |



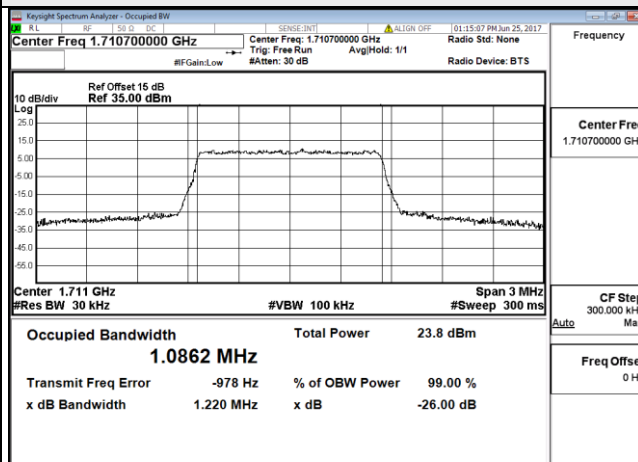
| LTE Band 41 | | | | | | | |
|-------------------------|-----------------|--------------------------|-------|-------------------------|-----------------|--------------------------|-------|
| Channel Bandwidth 5MHz | | | | Channel Bandwidth 10MHz | | | |
| Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | | Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 39675 | 2498.5 | 4.49 | 4.49 | 39700 | 2501 | 8.95 | 8.96 |
| 40620 | 2593 | 4.49 | 4.49 | 50620 | 2593 | 8.95 | 8.97 |
| 41565 | 2687.5 | 4.49 | 4.49 | 41540 | 2685 | 8.96 | 8.96 |
| Channel Bandwidth 15MHz | | | | Channel Bandwidth 20MHz | | | |
| Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | | Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 39725 | 2503.5 | 13.46 | 13.45 | 39750 | 2506 | 17.94 | 17.93 |
| 40620 | 2593 | 13.46 | 13.45 | 40620 | 2593 | 17.95 | 17.94 |
| 41515 | 2682.5 | 13.47 | 13.45 | 41490 | 2680 | 17.97 | 17.95 |



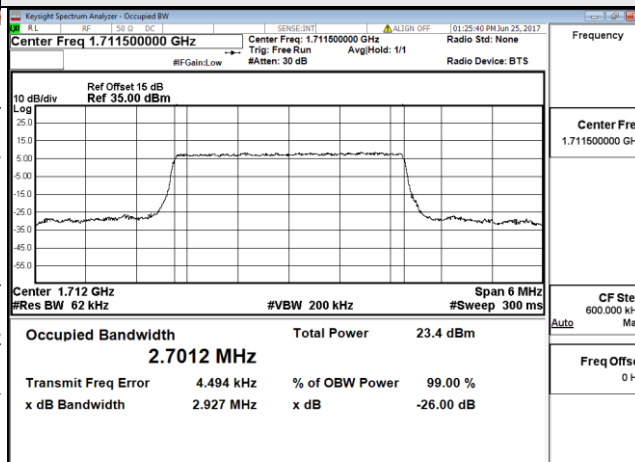
| LTE Band 66 | | | | | | | |
|--------------------------|-----------------|--------------------------|-------|-------------------------|-----------------|--------------------------|-------|
| Channel Bandwidth 1.4MHz | | | | Channel Bandwidth 3MHz | | | |
| Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | | Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 131979 | 1710.7 | 1.09 | 1.09 | 131987 | 1711.5 | 2.70 | 2.70 |
| 132322 | 1745 | 1.09 | 1.09 | 132322 | 1745 | 2.70 | 2.70 |
| 132665 | 1779.3 | 1.09 | 1.09 | 132657 | 1778.5 | 2.70 | 2.70 |
| Channel Bandwidth 5MHz | | | | Channel Bandwidth 10MHz | | | |
| Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | | Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 131997 | 1712.5 | 4.50 | 4.50 | 132022 | 1715 | 9.00 | 8.99 |
| 132322 | 1745 | 4.49 | 4.49 | 132322 | 1745 | 8.98 | 8.98 |
| 132647 | 1777.5 | 4.50 | 4.50 | 132622 | 1775 | 8.98 | 8.98 |
| Channel Bandwidth 15MHz | | | | Channel Bandwidth 20MHz | | | |
| Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | | Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 132047 | 1717.5 | 13.52 | 13.49 | 132072 | 1720 | 18.01 | 18.01 |
| 132322 | 1745 | 13.51 | 13.49 | 132322 | 1745 | 18.03 | 18.04 |
| 132597 | 1722.5 | 13.53 | 13.50 | 132572 | 1770 | 18.07 | 18.05 |

Spectrum Plot of Worst Value

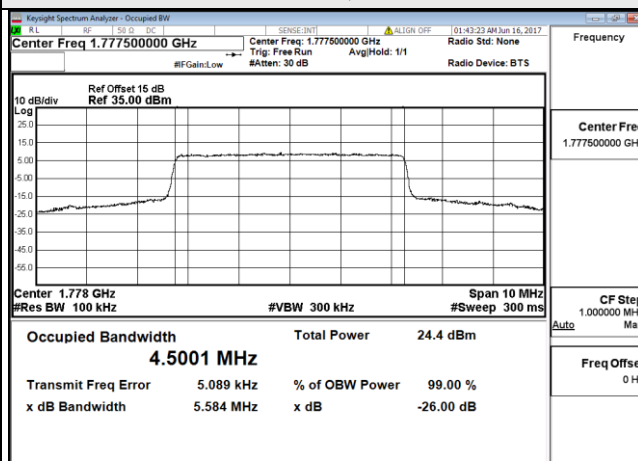
1.4MHz / QPSK



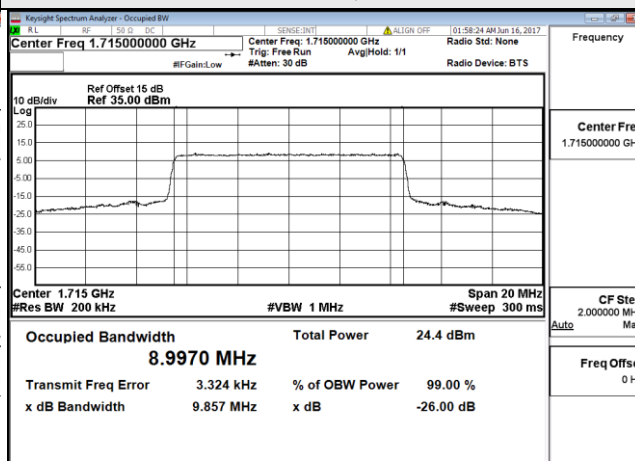
3MHz / QPSK



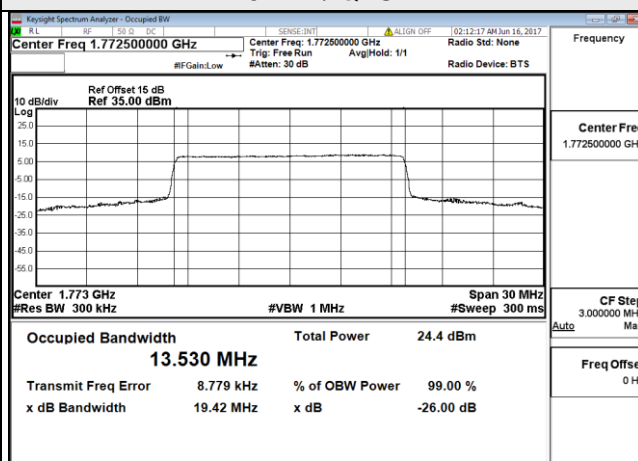
5MHz / QPSK



10MHz / QPSK



15MHz / QPSK



20MHz / QPSK

