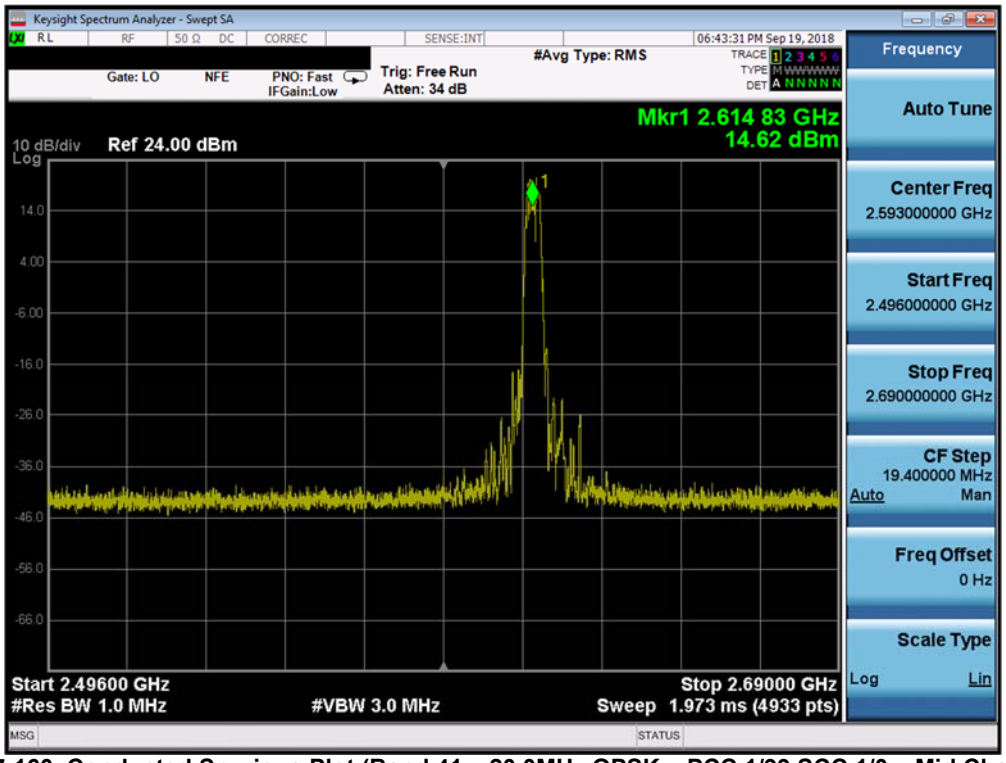
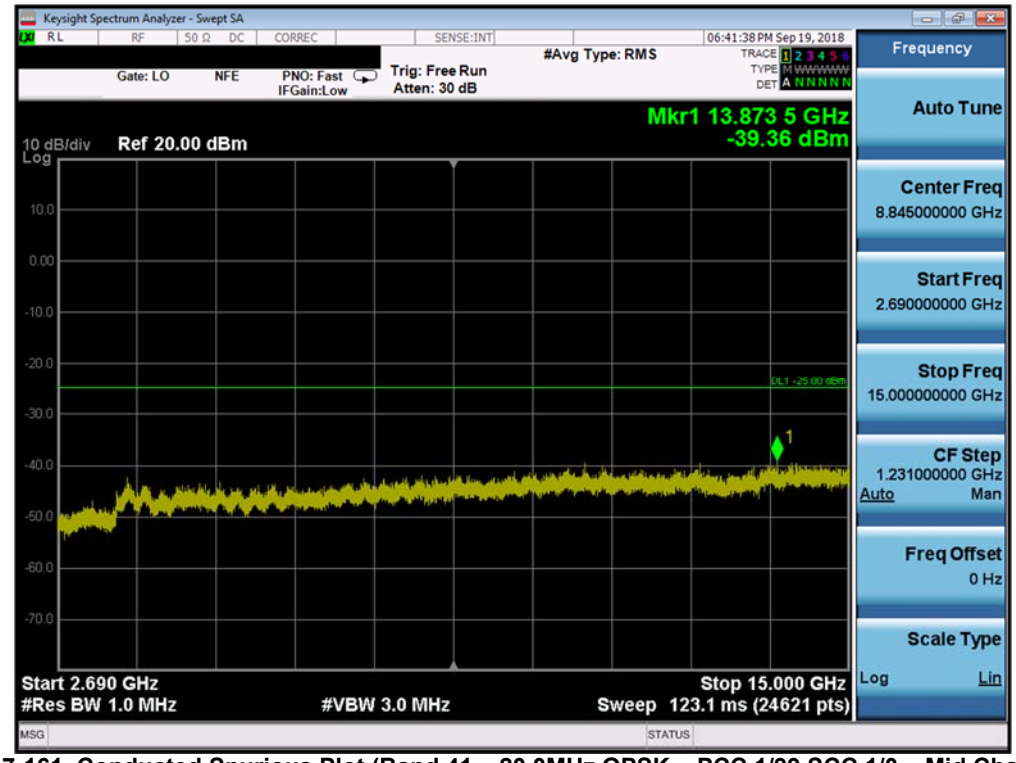



**Plot 7-160. Conducted Spurious Plot (Band 41 – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)**




**Plot 7-161. Conducted Spurious Plot (Band 41 – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)**

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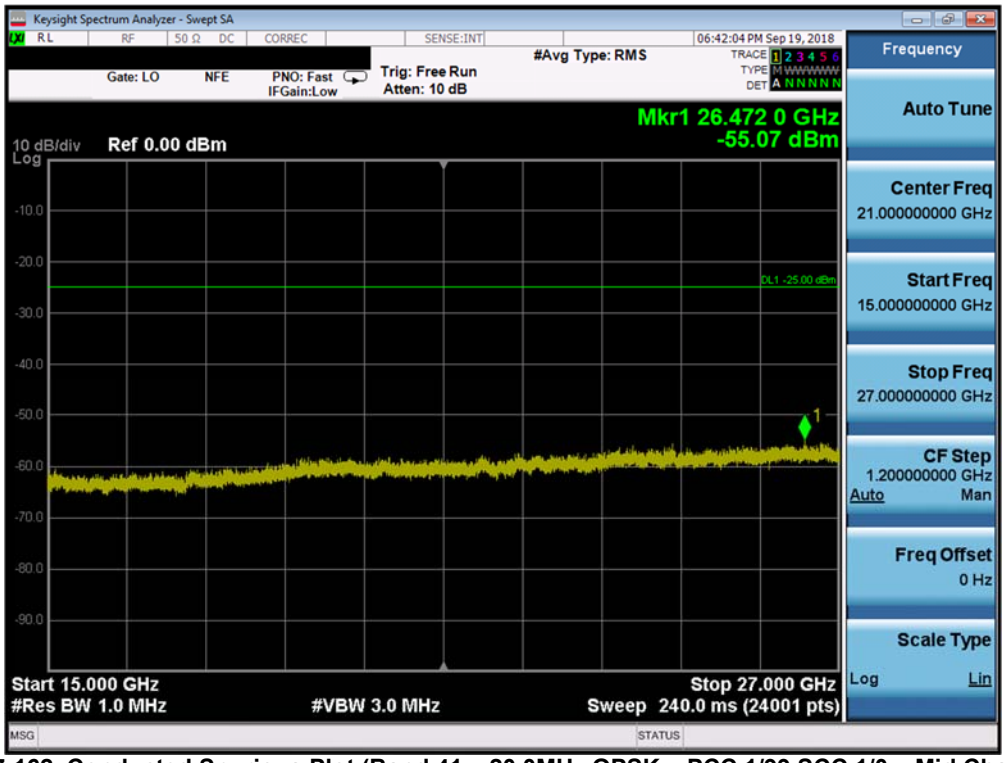
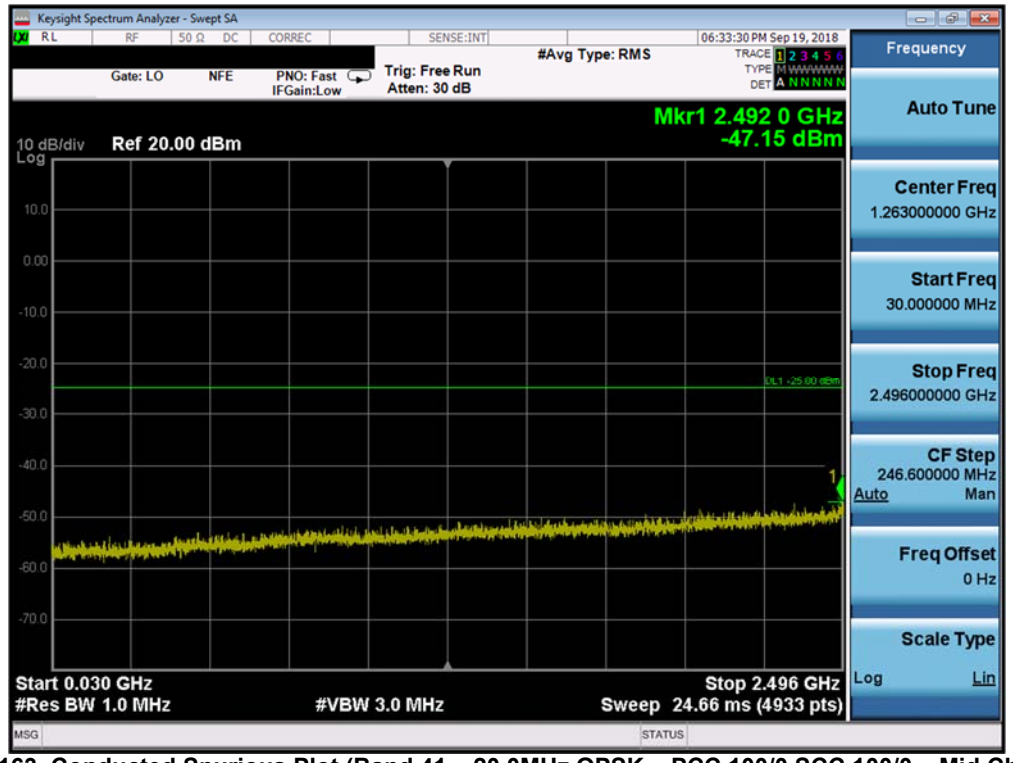



**Plot 7-162. Conducted Spurious Plot (Band 41 – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)**




**Plot 7-163. Conducted Spurious Plot (Band 41 – 20.0MHz QPSK – PCC 100/0 SCC 100/0 – Mid Channel)**

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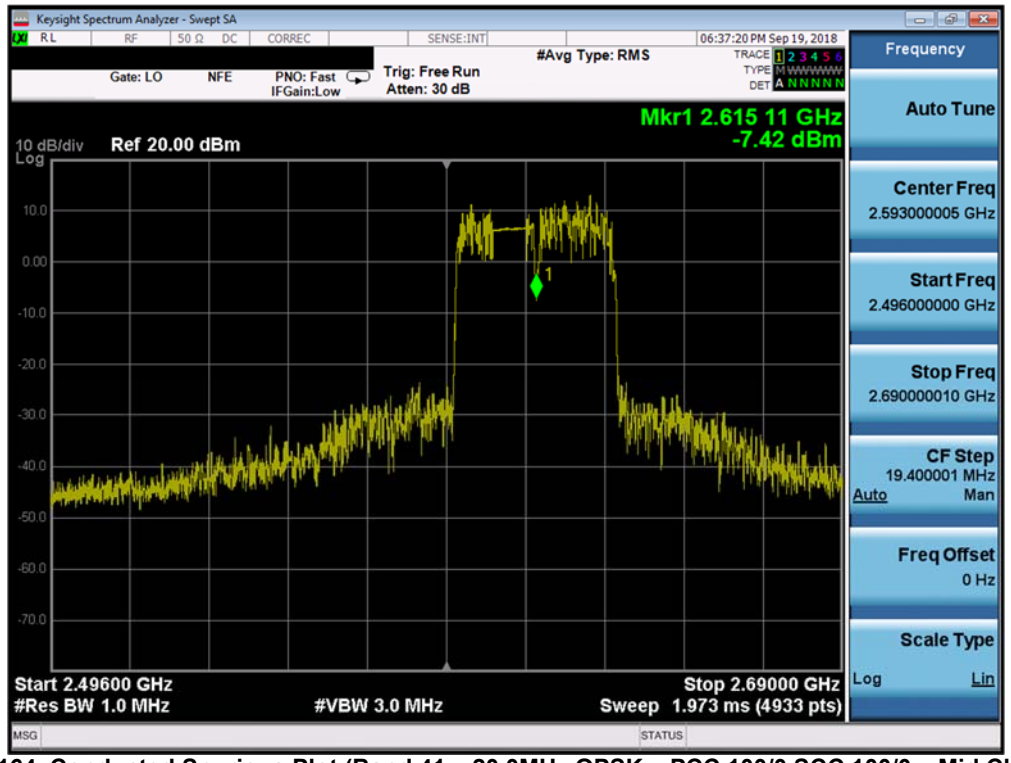
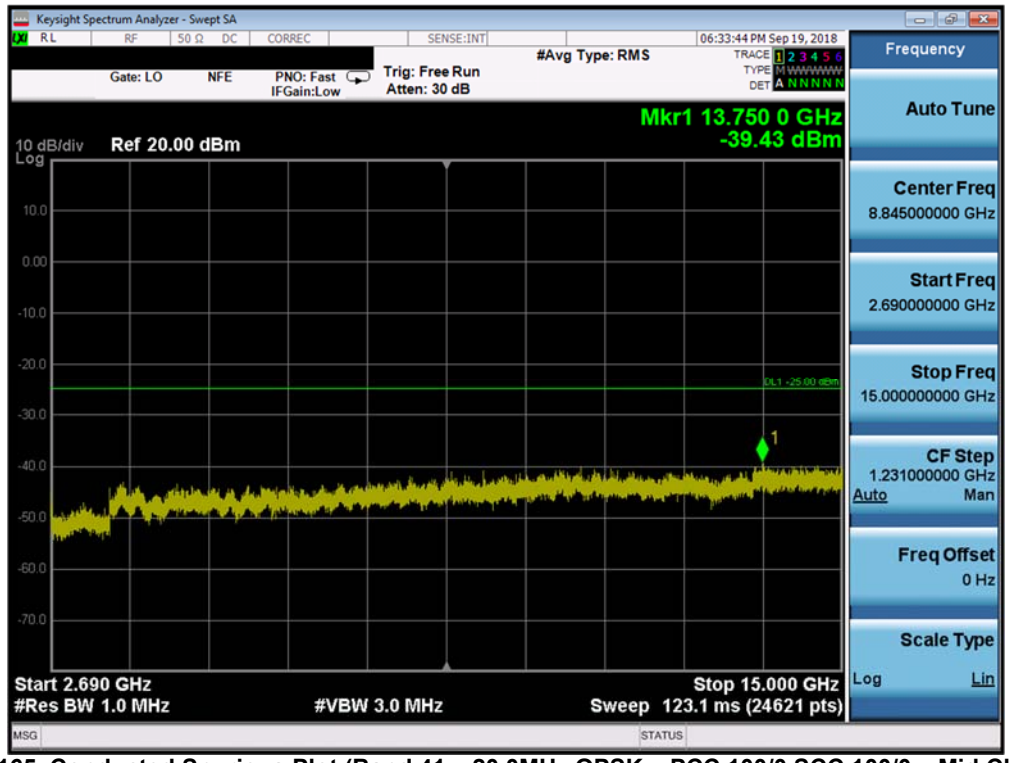



**Plot 7-164. Conducted Spurious Plot (Band 41 – 20.0MHz QPSK – PCC 100/0 SCC 100/0 – Mid Channel)**




**Plot 7-165. Conducted Spurious Plot (Band 41 – 20.0MHz QPSK – PCC 100/0 SCC 100/0 – Mid Channel)**

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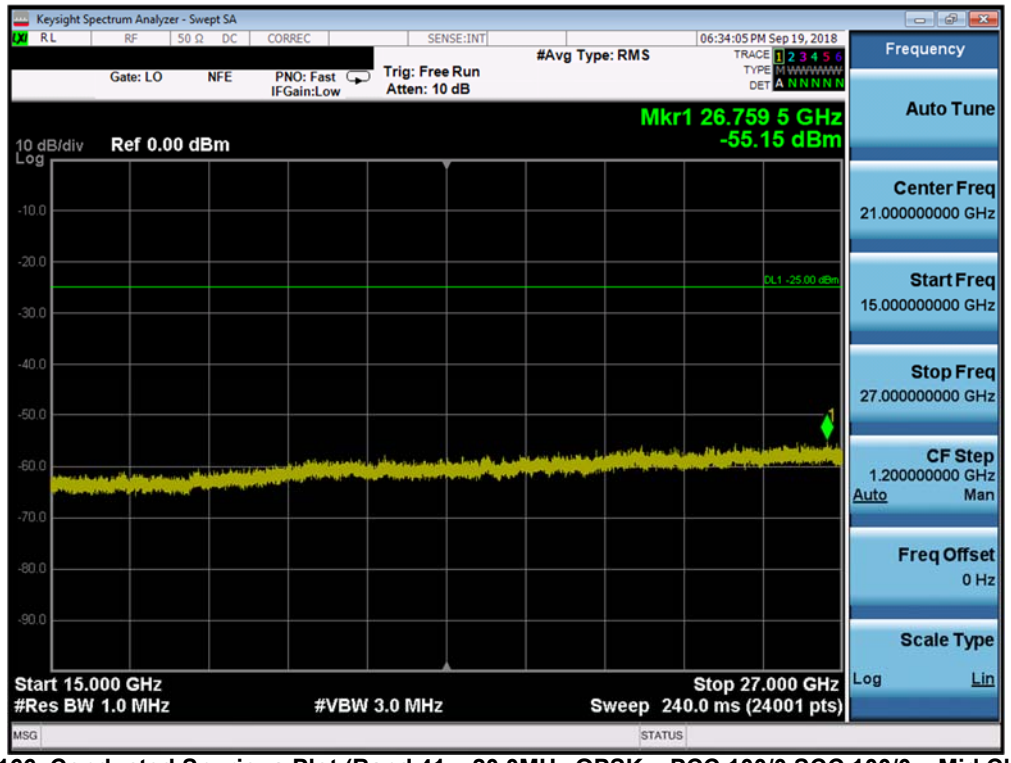
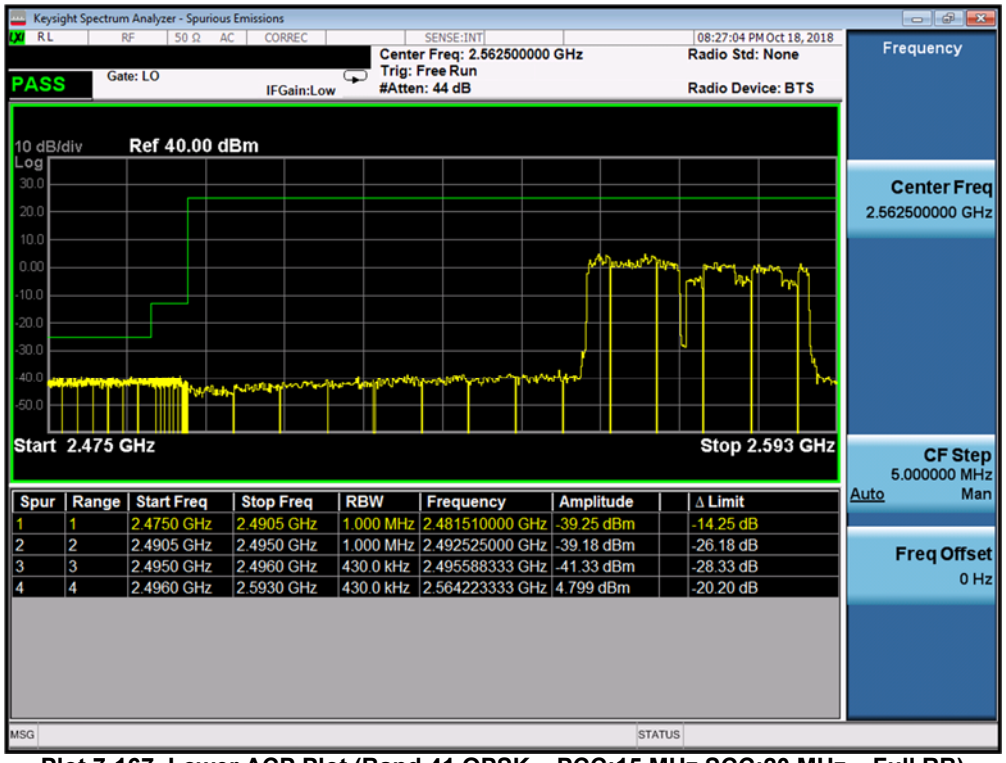



**Plot 7-166. Conducted Spurious Plot (Band 41 – 20.0MHz QPSK – PCC 100/0 SCC 100/0 – Mid Channel)**




| Spur | Range | Start Freq | Stop Freq | RBW | Frequency | Amplitude | Δ Limit |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 2.4750 GHz | 2.4905 GHz | 1.000 MHz | 2.481510000 GHz | -39.25 dBm | -14.25 dB |
| 2 | 2 | 2.4905 GHz | 2.4950 GHz | 1.000 MHz | 2.492525000 GHz | -39.18 dBm | -26.18 dB |
| 3 | 3 | 2.4950 GHz | 2.4960 GHz | 430.0 kHz | 2.495588333 GHz | -41.33 dBm | -28.33 dB |
| 4 | 4 | 2.4960 GHz | 2.5930 GHz | 430.0 kHz | 2.564223333 GHz | 4.799 dBm | -20.20 dB |

**Plot 7-167. Lower ACP Plot (Band 41 QPSK – PCC:15 MHz SCC:20 MHz – Full RB)**



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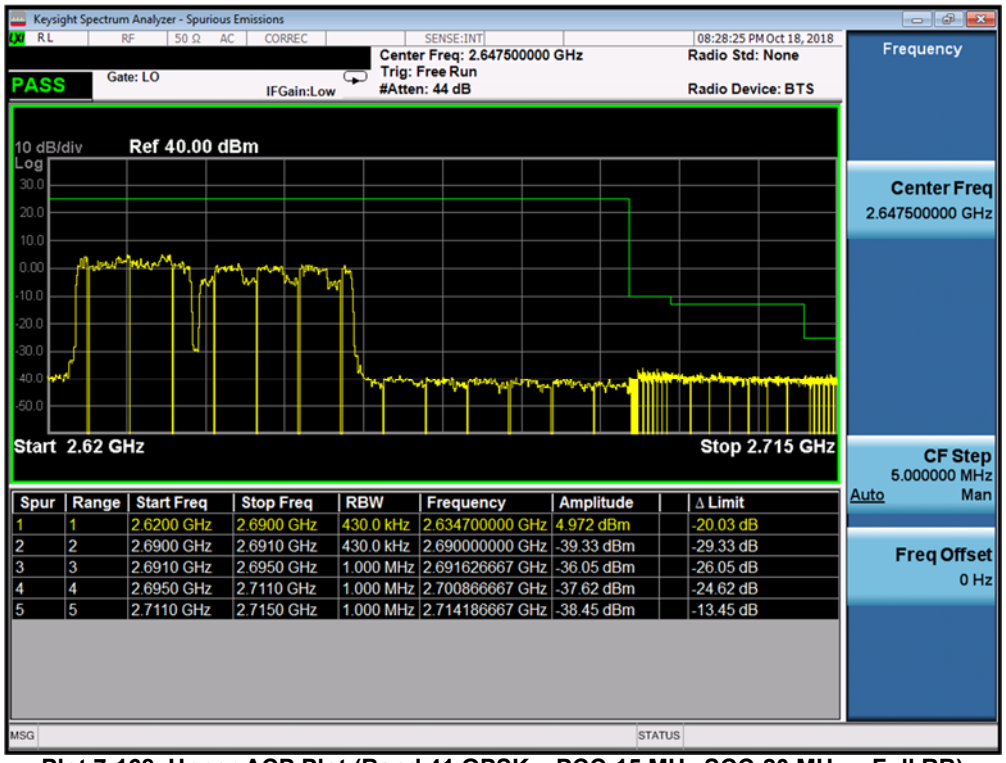
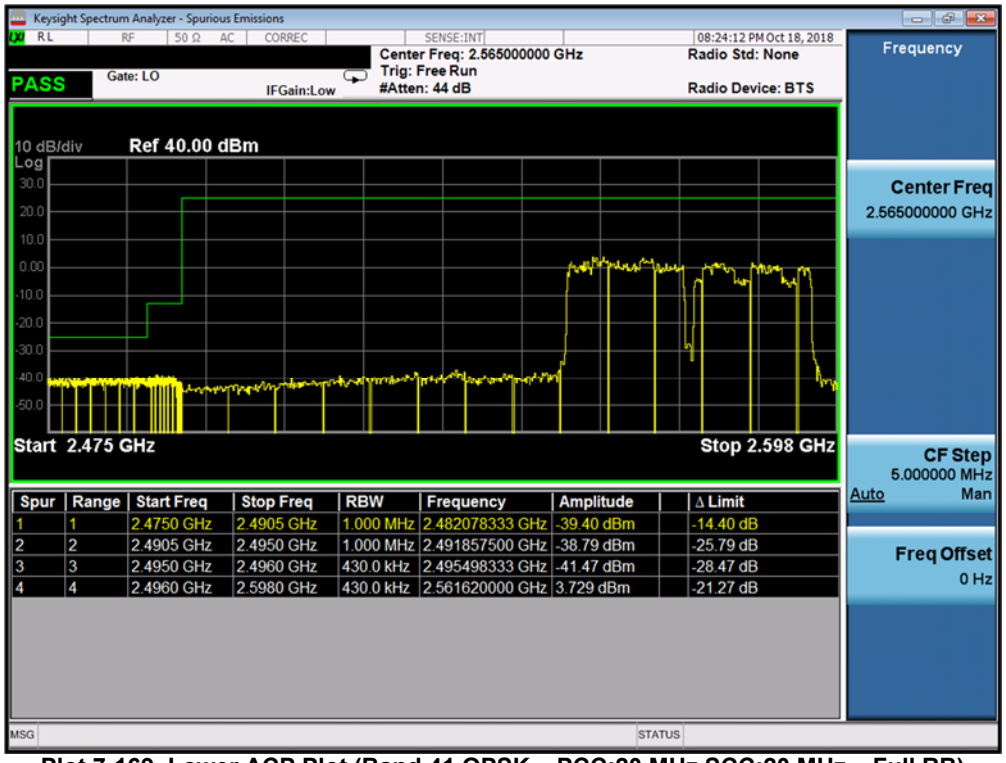



| Spur | Range | Start Freq | Stop Freq | RBW | Frequency | Amplitude | Δ Limit |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 2.6200 GHz | 2.6900 GHz | 430.0 kHz | 2.634700000 GHz | 4.972 dBm | -20.03 dB |
| 2 | 2 | 2.6900 GHz | 2.6910 GHz | 430.0 kHz | 2.690000000 GHz | -39.33 dBm | -29.33 dB |
| 3 | 3 | 2.6910 GHz | 2.6950 GHz | 1.000 MHz | 2.691626667 GHz | -36.05 dBm | -26.05 dB |
| 4 | 4 | 2.6950 GHz | 2.7110 GHz | 1.000 MHz | 2.700866667 GHz | -37.62 dBm | -24.62 dB |
| 5 | 5 | 2.7110 GHz | 2.7150 GHz | 1.000 MHz | 2.714186667 GHz | -38.45 dBm | -13.45 dB |

**Plot 7-168. Upper ACP Plot (Band 41 QPSK – PCC:15 MHz SCC:20 MHz – Full RB)**




| Spur | Range | Start Freq | Stop Freq | RBW | Frequency | Amplitude | Δ Limit |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 2.4750 GHz | 2.4905 GHz | 1.000 MHz | 2.482078333 GHz | -39.40 dBm | -14.40 dB |
| 2 | 2 | 2.4905 GHz | 2.4950 GHz | 1.000 MHz | 2.491857500 GHz | -38.79 dBm | -25.79 dB |
| 3 | 3 | 2.4950 GHz | 2.4960 GHz | 430.0 kHz | 2.495498333 GHz | -41.47 dBm | -28.47 dB |
| 4 | 4 | 2.4960 GHz | 2.5980 GHz | 430.0 kHz | 2.561620000 GHz | 3.729 dBm | -21.27 dB |

**Plot 7-169. Lower ACP Plot (Band 41 QPSK – PCC:20 MHz SCC:20 MHz – Full RB)**



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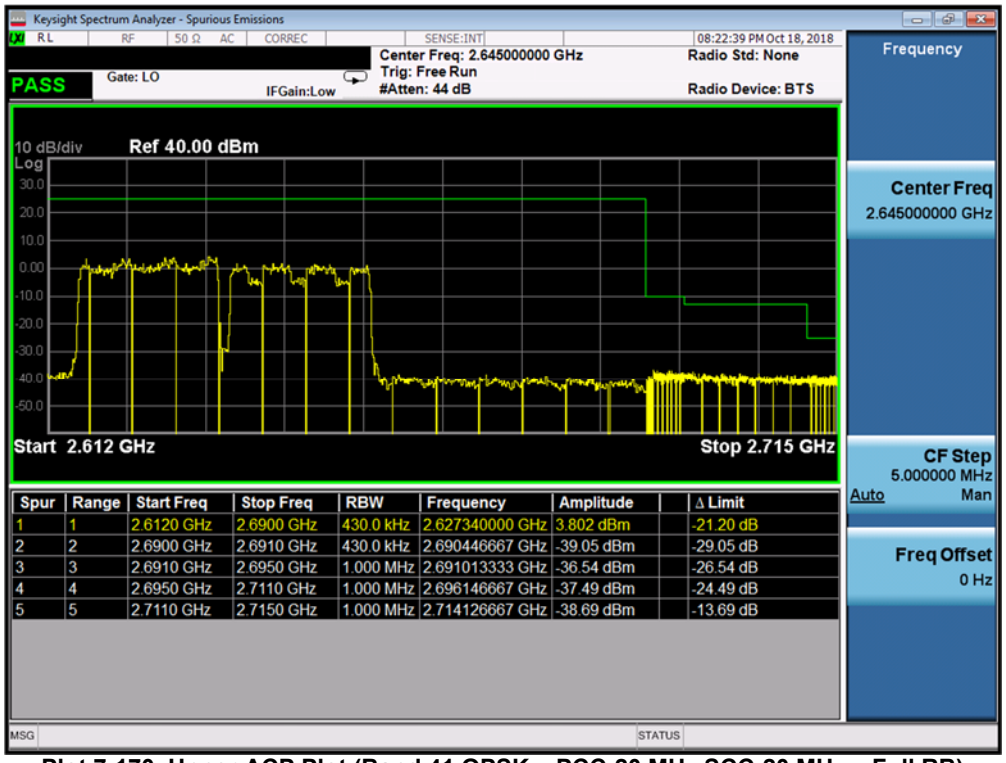


| Spur | Range | Start Freq | Stop Freq | RBW | Frequency | Amplitude | Δ Limit |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 2.6120 GHz | 2.6900 GHz | 430.0 kHz | 2.627340000 GHz | 3.802 dBm | -21.20 dB |
| 2 | 2 | 2.6900 GHz | 2.6910 GHz | 430.0 kHz | 2.690446667 GHz | -39.05 dBm | -29.05 dB |
| 3 | 3 | 2.6910 GHz | 2.6950 GHz | 1.000 MHz | 2.691013333 GHz | -36.54 dBm | -26.54 dB |
| 4 | 4 | 2.6950 GHz | 2.7110 GHz | 1.000 MHz | 2.696146667 GHz | -37.49 dBm | -24.49 dB |
| 5 | 5 | 2.7110 GHz | 2.7150 GHz | 1.000 MHz | 2.714126667 GHz | -38.69 dBm | -13.69 dB |

**Plot 7-170. Upper ACP Plot (Band 41 QPSK – PCC:20 MHz SCC:20 MHz – Full RB)**




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## 7.7 Radiated Power (ERP/EIRP)

**Test Overview**

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

**Test Procedures Used**

KDB 971168 D01 v03r01 – Section 5.2.1

ANSI/TIA-603-E-2016 – Section 2.2.17

**Test Settings**

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation. For signals with burst transmission, the signal analyzer's "time domain power" measurement capability is used
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW ≥ 3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points ≥ 2 x span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto". Trigger is set to enable triggering only on full power bursts with the sweep time set less than or equal to the transmission burst duration
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation. For signals with burst transmission, the "gating" function was enabled to ensure that measurements are performed during times in which the transmitter is operating at its maximum power
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize



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## Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

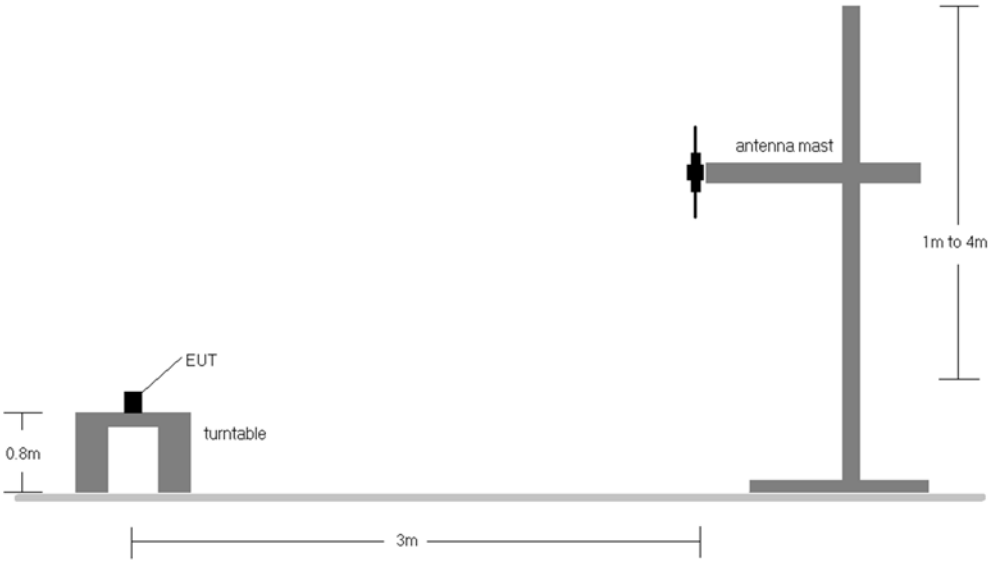


**Figure 7-6. Radiated Test Setup <1GHz**

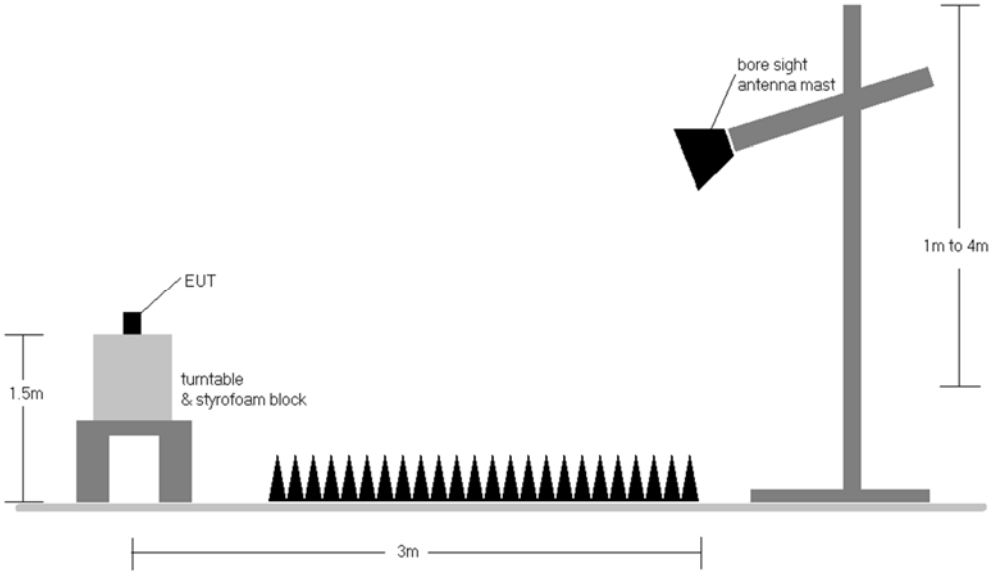


**Figure 7-7. Radiated Test Setup >1GHz**

## Test Notes

1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.

2) This unit was tested with its standard battery.




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| Frequency [MHz] | Channel Bandwidth [MHz] | Mod. | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | RB Size/Offset | Substitute Level [dBm] | Ant. Gain [dBi] | ERP [dBm] | ERP [Watts] | ERP Limit [dBm] | Margin [dB] | EIRP [dBm] | EIRP [Watts] | EIRP Limit [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 699.70 | 1.4 | QPSK | H | 150 | 358 | 1 / 0 | 19.96 | 1.10 | 18.91 | 0.078 | 34.77 | -15.86 | 21.06 | 0.128 | 36.99 | -15.93 |
| 707.50 | 1.4 | QPSK | H | 150 | 2 | 1 / 0 | 20.16 | 1.13 | **19.14** | 0.082 | 34.77 | -15.63 | **21.29** | 0.135 | 36.99 | -15.70 |
| 715.30 | 1.4 | QPSK | H | 150 | 1 | 1 / 0 | 20.00 | 1.16 | 19.01 | 0.080 | 34.77 | -15.76 | 21.16 | 0.131 | 36.99 | -15.83 |
| 715.30 | 1.4 | 16-QAM | H | 150 | 1 | 1 / 0 | 19.57 | 1.16 | **18.58** | 0.072 | 34.77 | -16.19 | **20.73** | 0.118 | 36.99 | -16.26 |
| 699.70 | 1.4 | 64-QAM | H | 150 | 358 | 1 / 0 | 18.66 | 1.10 | **17.61** | 0.058 | 34.77 | -17.16 | **19.76** | 0.095 | 36.99 | -17.23 |
| 700.50 | 3 | QPSK | H | 150 | 0 | 1 / 0 | 19.96 | 1.10 | 18.91 | 0.078 | 34.77 | -15.86 | 21.06 | 0.128 | 36.99 | -15.93 |
| 707.50 | 3 | QPSK | H | 150 | 0 | 1 / 0 | 19.91 | 1.13 | 18.89 | 0.077 | 34.77 | -15.88 | 21.04 | 0.127 | 36.99 | -15.95 |
| 714.50 | 3 | QPSK | H | 150 | 3 | 1 / 0 | 20.25 | 1.16 | **19.26** | 0.084 | 34.77 | -15.51 | **21.41** | 0.138 | 36.99 | -15.58 |
| 714.50 | 3 | 16-QAM | H | 150 | 0 | 1 / 0 | 19.96 | 1.16 | **18.97** | 0.079 | 34.77 | -15.80 | **21.12** | 0.129 | 36.99 | -15.87 |
| 714.50 | 3 | 64-QAM | H | 150 | 0 | 1 / 0 | 18.76 | 1.16 | **17.77** | 0.060 | 34.77 | -17.00 | **19.92** | 0.098 | 36.99 | -17.07 |

**Table 7-5. ERP Data (Band 12)**

| Frequency [MHz] | Channel Bandwidth [MHz] | Mod. | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | RB Size/Offset | Substitute Level [dBm] | Ant. Gain [dBi] | ERP [dBm] | ERP [Watts] | ERP Limit [dBm] | Margin [dB] | EIRP [dBm] | EIRP [Watts] | EIRP Limit [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 701.50 | 5 | QPSK | H | 150 | 1 | 1 / 0 | 20.05 | 1.11 | 19.01 | 0.080 | 34.77 | -15.77 | 21.16 | 0.130 | 36.99 | -15.83 |
| 707.50 | 5 | QPSK | H | 150 | 8 | 1 / 0 | 20.06 | 1.13 | **19.04** | 0.080 | 34.77 | -15.73 | **21.19** | 0.132 | 36.99 | -15.80 |
| 713.50 | 5 | QPSK | H | 150 | 5 | 1 / 0 | 19.96 | 1.15 | 18.96 | 0.079 | 34.77 | -15.81 | 21.11 | 0.129 | 36.99 | -15.88 |
| 701.50 | 5 | 16-QAM | H | 150 | 1 | 1 / 0 | 19.57 | 1.11 | **18.53** | 0.071 | 34.77 | -16.25 | **20.68** | 0.117 | 36.99 | -16.31 |
| 713.50 | 5 | 64-QAM | H | 150 | 5 | 1 / 0 | 18.51 | 1.15 | **17.51** | 0.056 | 34.77 | -17.26 | **19.66** | 0.093 | 36.99 | -17.33 |
| 704.00 | 10 | QPSK | H | 150 | 358 | 1 / 0 | 19.96 | 1.12 | 18.93 | 0.078 | 34.77 | -15.84 | 21.08 | 0.128 | 36.99 | -15.91 |
| 707.50 | 10 | QPSK | H | 150 | 1 | 1 / 0 | 20.46 | 1.13 | **19.44** | **0.088** | 34.77 | -15.33 | **21.59** | **0.144** | 36.99 | -15.40 |
| 711.00 | 10 | QPSK | H | 150 | 5 | 1 / 0 | 19.96 | 1.14 | 18.95 | 0.079 | 34.77 | -15.82 | 21.10 | 0.129 | 36.99 | -15.89 |
| 707.50 | 10 | 16-QAM | H | 150 | 1 | 1 / 0 | 19.56 | 1.13 | **18.54** | 0.071 | 34.77 | -16.23 | **20.69** | 0.117 | 36.99 | -16.30 |
| 704.00 | 10 | 64-QAM | H | 150 | 358 | 1 / 0 | 18.46 | 1.12 | **17.43** | 0.055 | 34.77 | -17.34 | **19.58** | 0.091 | 36.99 | -17.41 |
| 707.50 | 10 | QPSK | V | 150 | 80 | 1 / 0 | 18.56 | 1.16 | 17.57 | 0.057 | 34.77 | -17.20 | 19.72 | 0.094 | 36.99 | -17.27 |

**Table 7-6. ERP Data (Band 12/17)**




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| Frequency [MHz] | Channel Bandwidth [MHz] | Mod. | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | RB Size/Offset | Substitute Level [dBm] | Ant. Gain [dBi] | ERP [dBm] | ERP [Watts] | ERP Limit [dBm] | Margin [dB] | EIRP [dBm] | EIRP [Watts] | EIRP Limit [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 824.70 | 1.4 | QPSK | H | 150 | 7 | 1 / 5 | 20.17 | 1.50 | 19.52 | 0.090 | 38.45 | -18.93 | 21.67 | 0.147 | 40.61 | -18.94 |
| 836.50 | 1.4 | QPSK | H | 150 | 9 | 1 / 5 | 21.23 | 1.50 | 20.58 | 0.114 | 38.45 | -17.87 | 22.73 | 0.187 | 40.61 | -17.88 |
| 848.30 | 1.4 | QPSK | H | 150 | 7 | 1 / 5 | 21.99 | 1.50 | **21.34** | 0.136 | 38.45 | -17.11 | **23.49** | 0.223 | 40.61 | -17.12 |
| 848.30 | 1.4 | 16-QAM | H | 150 | 7 | 1 / 5 | 20.83 | 1.50 | **20.18** | 0.104 | 38.45 | -18.27 | **22.33** | 0.171 | 40.61 | -18.28 |
| 848.30 | 1.4 | 64-QAM | H | 150 | 7 | 1 / 5 | 19.76 | 1.50 | **19.11** | 0.081 | 38.45 | -19.34 | **21.26** | 0.134 | 40.61 | -19.35 |
| 825.50 | 3 | QPSK | H | 150 | 12 | 1 / 14 | 20.49 | 1.50 | 19.84 | 0.096 | 38.45 | -18.61 | 21.99 | 0.158 | 40.61 | -18.62 |
| 836.50 | 3 | QPSK | H | 150 | 10 | 1 / 14 | 21.42 | 1.50 | 20.77 | 0.119 | 38.45 | -17.68 | 22.92 | 0.196 | 40.61 | -17.69 |
| 847.50 | 3 | QPSK | H | 150 | 10 | 1 / 14 | 22.08 | 1.50 | **21.43** | 0.139 | 38.45 | -17.02 | **23.58** | 0.228 | 40.61 | -17.03 |
| 847.50 | 3 | 16-QAM | H | 150 | 10 | 1 / 14 | 21.02 | 1.50 | **20.37** | 0.109 | 38.45 | -18.08 | **22.52** | 0.179 | 40.61 | -18.09 |
| 847.50 | 3 | 64-QAM | H | 150 | 10 | 1 / 14 | 19.91 | 1.50 | **19.26** | 0.084 | 38.45 | -19.19 | **21.41** | 0.138 | 40.61 | -19.20 |
| 826.50 | 5 | QPSK | H | 150 | 13 | 1 / 24 | 20.85 | 1.50 | 20.20 | 0.105 | 38.45 | -18.25 | 22.35 | 0.172 | 40.61 | -18.26 |
| 836.50 | 5 | QPSK | H | 150 | 9 | 1 / 24 | 21.63 | 1.50 | 20.98 | 0.125 | 38.45 | -17.47 | 23.13 | 0.206 | 40.61 | -17.48 |
| 846.50 | 5 | QPSK | H | 150 | 6 | 1 / 24 | 22.22 | 1.50 | **21.57** | **0.144** | 38.45 | -16.88 | **23.72** | **0.236** | 40.61 | -16.89 |
| 846.50 | 5 | 16-QAM | H | 150 | 6 | 1 / 24 | 21.05 | 1.50 | **20.40** | 0.110 | 38.45 | -18.05 | **22.55** | 0.180 | 40.61 | -18.06 |
| 846.50 | 5 | 64-QAM | H | 150 | 6 | 1 / 24 | 20.23 | 1.50 | **19.58** | 0.091 | 38.45 | -18.87 | **21.73** | 0.149 | 40.61 | -18.88 |
| 829.00 | 10 | QPSK | H | 150 | 6 | 1 / 49 | 20.99 | 1.50 | 20.34 | 0.108 | 38.45 | -18.11 | 22.49 | 0.177 | 40.61 | -18.12 |
| 836.50 | 10 | QPSK | H | 150 | 8 | 1 / 49 | 21.50 | 1.50 | 20.85 | 0.122 | 38.45 | -17.60 | 23.00 | 0.200 | 40.61 | -17.61 |
| 844.00 | 10 | QPSK | H | 150 | 8 | 1 / 49 | 21.83 | 1.50 | **21.18** | 0.131 | 38.45 | -17.27 | **23.33** | 0.215 | 40.61 | -17.28 |
| 844.00 | 10 | 16-QAM | H | 150 | 8 | 1 / 49 | 20.94 | 1.50 | **20.29** | 0.107 | 38.45 | -18.16 | **22.44** | 0.175 | 40.61 | -18.17 |
| 844.00 | 10 | 64-QAM | H | 150 | 8 | 1 / 49 | 19.96 | 1.50 | **19.31** | 0.085 | 38.45 | -19.14 | **21.46** | 0.140 | 40.61 | -19.15 |
| 846.50 | 5 | QPSK | V | 150 | 70 | 1 / 24 | 21.76 | 1.50 | 21.11 | 0.129 | 38.45 | -17.34 | 23.26 | 0.212 | 40.61 | -17.35 |

**Table 7-7. ERP Data (Band 5)**




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| Frequency [MHz] | Channel Bandwidth [MHz] | Mod. | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | RB Size/Offset | Substitute Level [dBm] | Ant. Gain [dBi] | EIRP [dBm] | EIRP [Watts] | EIRP Limit [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1710.70 | 1.4 | QPSK | H | 150 | 50 | 1 / 5 | 16.78 | 5.56 | 22.34 | 0.171 | 30.00 | -7.66 |
| 1732.50 | 1.4 | QPSK | H | 150 | 337 | 1 / 5 | 17.42 | 5.32 | **22.74** | 0.188 | 30.00 | -7.26 |
| 1754.30 | 1.4 | QPSK | H | 150 | 50 | 1 / 5 | 16.02 | 5.09 | 21.11 | 0.129 | 30.00 | -8.89 |
| 1732.50 | 1.4 | 16-QAM | H | 150 | 337 | 1 / 5 | 16.34 | 5.32 | **21.66** | 0.147 | 30.00 | -8.34 |
| 1732.50 | 1.4 | 64-QAM | H | 150 | 337 | 1 / 5 | 15.00 | 5.32 | **20.32** | 0.108 | 30.00 | -9.68 |
| 1711.50 | 3 | QPSK | H | 150 | 8 | 1 / 0 | 16.75 | 5.55 | 22.30 | 0.170 | 30.00 | -7.70 |
| 1732.50 | 3 | QPSK | H | 150 | 8 | 1 / 0 | 17.09 | 5.32 | **22.41** | 0.174 | 30.00 | -7.59 |
| 1753.50 | 3 | QPSK | H | 150 | 8 | 1 / 0 | 16.20 | 5.10 | 21.30 | 0.135 | 30.00 | -8.70 |
| 1711.50 | 3 | 16-QAM | H | 150 | 8 | 1 / 0 | 15.66 | 5.55 | **21.21** | 0.132 | 30.00 | -8.79 |
| 1711.50 | 3 | 64-QAM | H | 150 | 8 | 1 / 0 | 14.57 | 5.55 | **20.12** | 0.103 | 30.00 | -9.88 |
| 1712.50 | 5 | QPSK | H | 150 | 346 | 1 / 0 | 15.45 | 5.55 | 21.00 | 0.126 | 30.00 | -9.00 |
| 1732.50 | 5 | QPSK | H | 150 | 346 | 1 / 0 | 16.97 | 5.32 | **22.29** | 0.170 | 30.00 | -7.71 |
| 1752.50 | 5 | QPSK | H | 150 | 346 | 1 / 0 | 16.05 | 5.10 | 21.15 | 0.130 | 30.00 | -8.85 |
| 1732.50 | 5 | 16-QAM | H | 150 | 346 | 1 / 0 | 16.04 | 5.32 | **21.36** | 0.137 | 30.00 | -8.64 |
| 1732.50 | 5 | 64-QAM | H | 150 | 346 | 1 / 0 | 15.17 | 5.32 | **20.49** | 0.112 | 30.00 | -9.51 |
| 1715.00 | 10 | QPSK | H | 150 | 337 | 1 / 0 | 15.89 | 5.53 | 21.42 | 0.139 | 30.00 | -8.58 |
| 1732.50 | 10 | QPSK | H | 150 | 337 | 1 / 0 | 16.85 | 5.32 | **22.17** | 0.165 | 30.00 | -7.83 |
| 1750.00 | 10 | QPSK | H | 150 | 337 | 1 / 0 | 15.97 | 5.12 | 21.09 | 0.129 | 30.00 | -8.91 |
| 1732.50 | 10 | 16-QAM | H | 150 | 337 | 1 / 0 | 15.83 | 5.32 | **21.15** | 0.130 | 30.00 | -8.85 |
| 1732.50 | 10 | 64-QAM | H | 150 | 337 | 1 / 0 | 14.76 | 5.32 | **20.08** | 0.102 | 30.00 | -9.92 |
| 1717.50 | 15 | QPSK | H | 150 | 363 | 1 / 74 | 16.57 | 5.51 | 22.08 | 0.161 | 30.00 | -7.92 |
| 1732.50 | 15 | QPSK | H | 150 | 363 | 1 / 74 | 17.49 | 5.32 | **22.81** | **0.191** | 30.00 | -7.19 |
| 1747.50 | 15 | QPSK | H | 150 | 363 | 1 / 74 | 16.17 | 5.14 | 21.31 | 0.135 | 30.00 | -8.69 |
| 1732.50 | 15 | 16-QAM | H | 150 | 363 | 1 / 74 | 16.47 | 5.32 | **21.79** | 0.151 | 30.00 | -8.21 |
| 1732.50 | 15 | 64-QAM | H | 150 | 363 | 1 / 74 | 15.36 | 5.32 | **20.68** | 0.117 | 30.00 | -9.32 |
| 1720.00 | 20 | QPSK | H | 150 | 346 | 1 / 99 | 16.36 | 5.49 | 21.85 | 0.153 | 30.00 | -8.15 |
| 1732.50 | 20 | QPSK | H | 150 | 346 | 1 / 99 | 17.09 | 5.32 | **22.41** | 0.174 | 30.00 | -7.59 |
| 1745.00 | 20 | QPSK | H | 150 | 346 | 1 / 99 | 16.22 | 5.15 | 21.37 | 0.137 | 30.00 | -8.63 |
| 1732.50 | 20 | 16-QAM | H | 150 | 346 | 1 / 99 | 16.20 | 5.32 | **21.52** | 0.142 | 30.00 | -8.48 |
| 1732.50 | 20 | 64-QAM | H | 150 | 346 | 1 / 99 | 15.45 | 5.32 | **20.77** | 0.119 | 30.00 | -9.23 |
| 1732.50 | 15 | QPSK | V | 150 | 136 | 1 / 74 | 15.82 | 5.32 | 21.14 | 0.130 | 30.00 | -8.86 |

**Table 7-8. EIRP Data (Band 4)**



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| Frequency [MHz] | Channel Bandwidth [MHz] | Mod. | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | RB Size/Offset | Substitute Level [dBm] | Ant. Gain [dBi] | EIRP [dBm] | EIRP [Watts] | EIRP Limit [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2557.50 | 5 | QPSK | V | 150 | 72 | 1 / 24 | 16.56 | 5.94 | **22.51** | 0.178 | 33.01 | -10.50 |
| 2605.00 | 5 | QPSK | V | 150 | 72 | 1 / 9 | 16.13 | 6.12 | 22.25 | 0.168 | 33.01 | -10.76 |
| 2652.50 | 5 | QPSK | V | 150 | 70 | 1 / 3 | 16.13 | 6.33 | 22.46 | 0.176 | 33.01 | -10.55 |
| 2557.50 | 5 | 16-QAM | V | 150 | 72 | 1 / 24 | 15.69 | 5.94 | **21.64** | 0.146 | 33.01 | -11.37 |
| 2557.50 | 5 | 64-QAM | V | 150 | 72 | 1 / 24 | 14.63 | 5.94 | **20.57** | 0.114 | 33.01 | -12.44 |
| 2560.00 | 10 | QPSK | V | 150 | 71 | 1 / 49 | 16.44 | 5.95 | 22.39 | 0.173 | 33.01 | -10.62 |
| 2605.00 | 10 | QPSK | V | 150 | 68 | 1 / 45 | 16.20 | 6.12 | 22.32 | 0.171 | 33.01 | -10.69 |
| 2650.00 | 10 | QPSK | V | 150 | 71 | 1 /5 | 16.23 | 6.32 | **22.55** | 0.180 | 33.01 | -10.46 |
| 2650.00 | 10 | 16-QAM | V | 150 | 71 | 1 / 49 | 15.48 | 6.32 | **21.80** | 0.151 | 33.01 | -11.21 |
| 2650.00 | 10 | 64-QAM | V | 150 | 71 | 1 / 49 | 14.47 | 6.32 | **20.79** | 0.120 | 33.01 | -12.22 |
| 2562.50 | 15 | QPSK | V | 150 | 74 | 1 / 0 | 16.52 | 5.96 | 22.48 | 0.177 | 33.01 | -10.53 |
| 2605.00 | 15 | QPSK | V | 150 | 71 | 1 / 52 | 16.47 | 6.12 | **22.59** | 0.181 | 33.01 | -10.42 |
| 2647.50 | 15 | QPSK | V | 150 | 70 | 1 / 8 | 16.27 | 6.31 | 22.58 | 0.181 | 33.01 | -10.43 |
| 2605.00 | 15 | 16-QAM | V | 150 | 71 | 1 / 0 | 15.65 | 6.12 | **21.77** | 0.150 | 33.01 | -11.24 |
| 2605.00 | 15 | 64-QAM | V | 150 | 71 | 1 / 0 | 14.49 | 6.12 | **20.61** | 0.115 | 33.01 | -12.40 |
| 2565.00 | 20 | QPSK | V | 150 | 73 | 1 / 99 | 16.59 | 5.97 | 22.56 | 0.180 | 33.01 | -10.45 |
| 2605.00 | 20 | QPSK | V | 150 | 70 | 1 / 76 | 16.37 | 6.12 | 22.49 | 0.178 | 33.01 | -10.52 |
| 2645.00 | 20 | QPSK | V | 150 | 69 | 1 / 99 | 16.34 | 6.30 | **22.63** | **0.183** | 33.01 | -10.38 |
| 2645.00 | 20 | 16-QAM | V | 150 | 69 | 1 / 99 | 15.54 | 6.30 | **21.84** | 0.153 | 33.01 | -11.17 |
| 2645.00 | 20 | 64-QAM | V | 150 | 69 | 1 / 99 | 14.61 | 6.30 | **20.91** | 0.123 | 33.01 | -12.10 |
| 2645.00 | 20 | QPSK | H | 150 | 342 | 1 / 99 | 15.46 | 6.30 | 21.76 | 0.150 | 33.01 | -11.25 |

**Table 7-9. EIRP Data (Band 41)**



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## 7.8 Radiated Spurious Emissions Measurements

**Test Overview**

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas.

**Test Procedures Used**

KDB 971168 D01 v03r01 – Section 5.8

ANSI/TIA-603-E-2016 – Section 2.2.12

**Test Settings**

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW ≥ 3 x RBW
3. Span = 1.5 times the OBW
4. No. of sweep points ≥ 2 x span / RBW
5. Detector = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize




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## Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

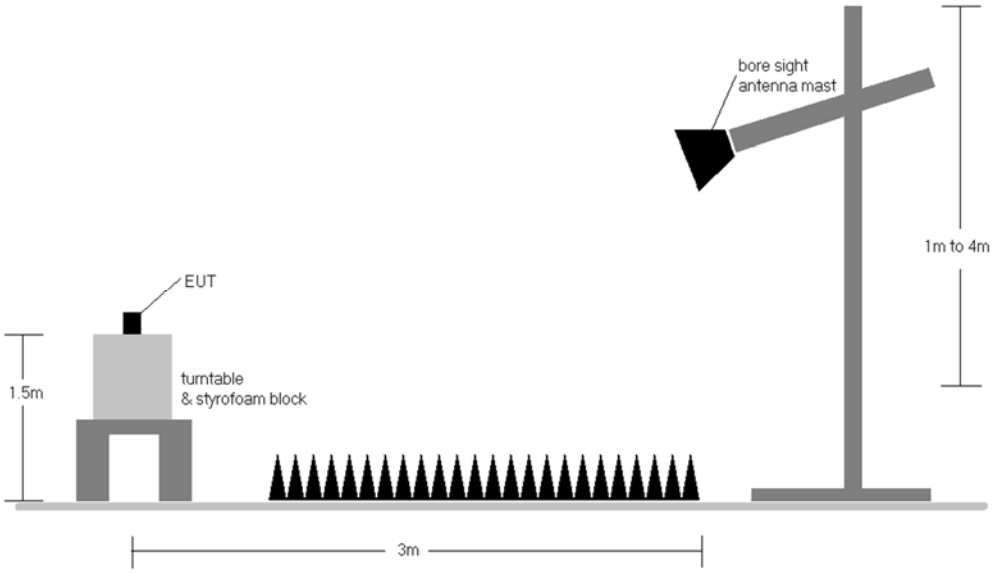


**Figure 7-8. Test Instrument & Measurement Setup**

## Test Notes

1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.

2) This unit was tested with its standard battery.

3) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.

4) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

5) The "-" shown in the following RSE tables are used to denote a noise floor measurement.




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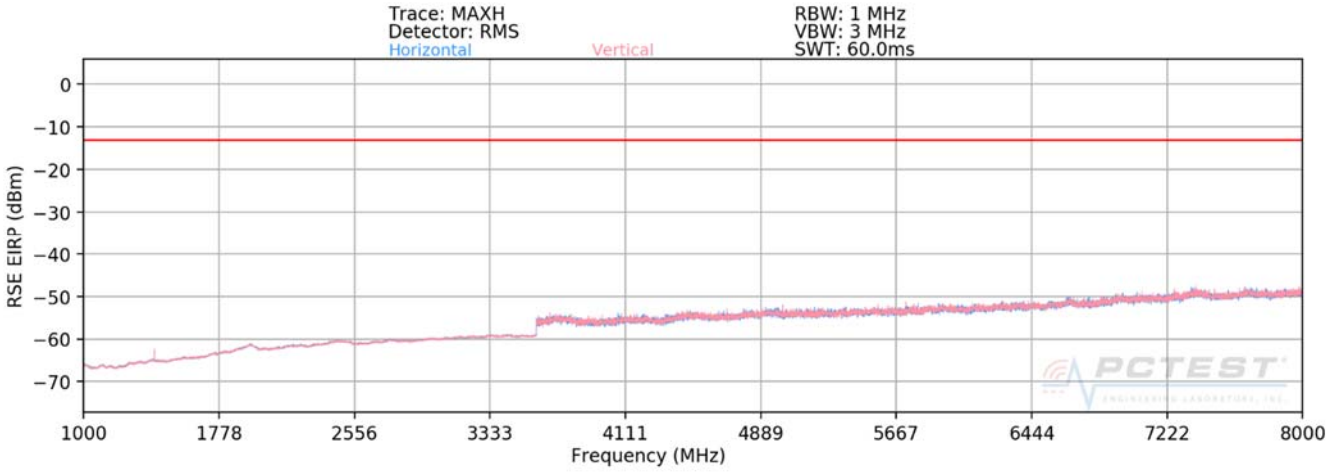
## Band 17/12




**Plot 7-171. Radiated Spurious Plot above 1GHz (Band 17/12)**

| | | |
|---|---|---|
| OPERATING FREQUENCY: | 704.00 | MHz |
| CHANNEL: | 23060 | |
| MODULATION SIGNAL: | QPSK | |
| BANDWIDTH: | 5.0 | MHz |
| DISTANCE: | 3 | meters |
| LIMIT: | -13 | dBm |

| Frequency [MHz] | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Level at Antenna Terminals [dBm] | Substitute Antenna Gain [dBi] | Spurious Emission Level [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|---|
| 1408.00 | H | 164 | 271 | -77.75 | 7.54 | -70.21 | -57.2 |
| 2112.00 | H | 150 | 130 | -78.21 | 8.85 | -69.36 | -56.4 |
| 2816.00 | H | - | - | -79.64 | 10.12 | -69.52 | -56.5 |

**Table 7-10. Radiated Spurious Data (Band 17/12– Low Channel)**

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| | | |
|---|---|---|
| OPERATING FREQUENCY: | 707.50 | MHz |
| CHANNEL: | 23095 | |
| MODULATION SIGNAL: | QPSK | |
| BANDWIDTH: | 5.0 | MHz |
| DISTANCE: | 3 | meters |
| LIMIT: | -13 | dBm |

| Frequency [MHz] | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Level at Antenna Terminals [dBm] | Substitute Antenna Gain [dBi] | Spurious Emission Level [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|---|
| 1415.00 | H | 215 | 249 | -78.03 | 7.63 | -70.40 | -57.4 |
| 2122.50 | H | - | - | -78.41 | 8.86 | -69.55 | -56.5 |
| 2830.00 | H | - | - | -79.34 | 10.10 | -69.25 | -56.2 |

**Table 7-11. Radiated Spurious Data (Band 17/12– Mid Channel)**

| | | |
|---|---|---|
| OPERATING FREQUENCY: | 711.00 | MHz |
| CHANNEL: | 23130 | |
| MODULATION SIGNAL: | QPSK | |
| BANDWIDTH: | 5.0 | MHz |
| DISTANCE: | 3 | meters |
| LIMIT: | -13 | dBm |

| Frequency [MHz] | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Level at Antenna Terminals [dBm] | Substitute Antenna Gain [dBi] | Spurious Emission Level [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|---|
| 1422.00 | H | 147 | 115 | -76.23 | 7.72 | -68.51 | -55.5 |
| 2133.00 | H | 147 | 188 | -73.06 | 8.87 | -64.19 | -51.2 |
| 2844.00 | H | - | - | -77.97 | 10.07 | -67.90 | -54.9 |

**Table 7-12. Radiated Spurious Data (Band 17/12– High Channel)**




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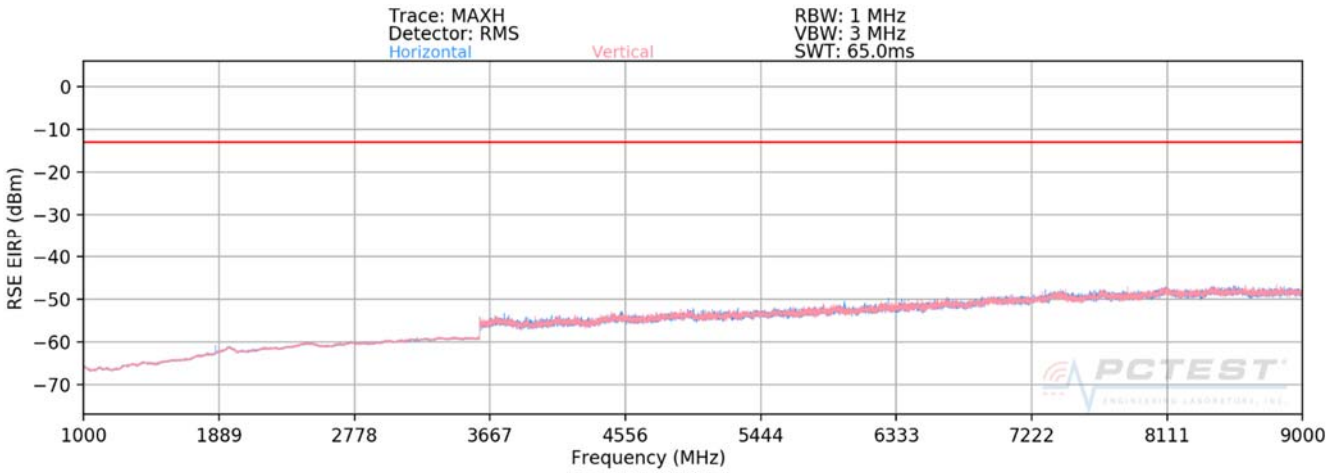
## Band 5




**Plot 7-172. Radiated Spurious Plot above 1GHz (Band 5)**

| | | |
|---|---|---|
| OPERATING FREQUENCY: | 825.50 | MHz |
| CHANNEL: | 26805 | |
| MODULATION SIGNAL: | QPSK | |
| BANDWIDTH: | 3.0 | MHz |
| DISTANCE: | 3 | meters |
| LIMIT: | -13 | dBm |

| Frequency [MHz] | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Level at Antenna Terminals [dBm] | Substitute Antenna Gain [dBi] | Spurious Emission Level [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|---|
| 1651.00 | H | - | - | -75.32 | 9.39 | -65.93 | -52.9 |
| 2476.50 | H | 102 | 116 | -70.06 | 8.78 | -61.28 | -48.3 |
| 3302.00 | H | - | - | -70.46 | 8.43 | -62.03 | -49.0 |

**Table 7-13. Radiated Spurious Data (Band 5 – Low Channel)**

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| | | |
|---|---|---|
| OPERATING FREQUENCY: | 836.50 | MHz |
| CHANNEL: | 26915 | |
| MODULATION SIGNAL: | QPSK | |
| BANDWIDTH: | 3.0 | MHz |
| DISTANCE: | 3 | meters |
| LIMIT: | -13 | dBm |

| Frequency [MHz] | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Level at Antenna Terminals [dBm] | Substitute Antenna Gain [dBi] | Spurious Emission Level [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|---|
| 1673.00 | V | 113 | 267 | -74.54 | 9.44 | -65.10 | -52.1 |
| 2509.50 | V | 118 | 121 | -70.39 | 8.72 | -61.67 | -48.7 |
| 3346.00 | V | - | - | -70.43 | 8.72 | -61.71 | -48.7 |

**Table 7-14. Radiated Spurious Data (Band 5 – Mid Channel)**

| | | |
|---|---|---|
| OPERATING FREQUENCY: | 847.50 | MHz |
| CHANNEL: | 27025 | |
| MODULATION SIGNAL: | QPSK | |
| BANDWIDTH: | 3.0 | MHz |
| DISTANCE: | 3 | meters |
| LIMIT: | -13 | dBm |

| Frequency [MHz] | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Level at Antenna Terminals [dBm] | Substitute Antenna Gain [dBi] | Spurious Emission Level [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|---|
| 1695.00 | V | - | - | -75.32 | 9.48 | -65.84 | -52.8 |
| 2542.50 | V | 314 | 8 | -71.01 | 8.57 | -62.44 | -49.4 |
| 3390.00 | V | - | - | -70.94 | 9.01 | -61.93 | -48.9 |

**Table 7-15. Radiated Spurious Data (Band 5 – High Channel)**




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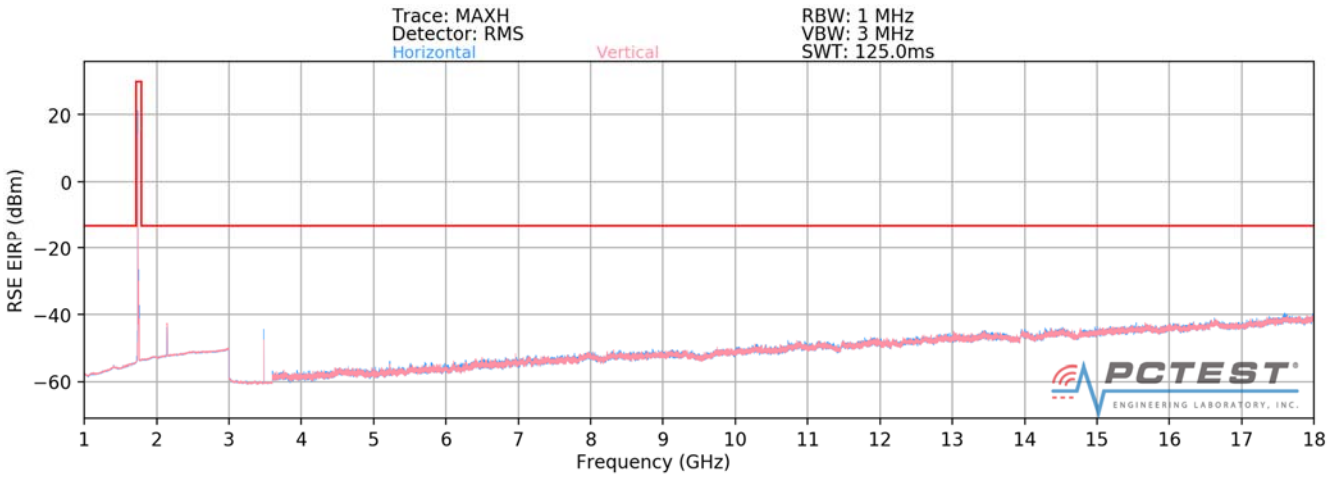
## Band 4




**Plot 7-173. Radiated Spurious Plot above 1GHz (Band 4)**

| | | |
|---|---|---|
| OPERATING FREQUENCY: | 1717.50 | MHz |
| CHANNEL: | 20025 | |
| MODULATION SIGNAL: | QPSK | |
| BANDWIDTH: | 15.0 | MHz |
| DISTANCE: | 3 | meters |
| LIMIT: | -13 | dBm |

| Frequency [MHz] | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Level at Antenna Terminals [dBm] | Substitute Antenna Gain [dBi] | Spurious Emission Level [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|---|
| 3435.00 | H | 113 | 326 | -57.68 | 9.84 | -47.84 | -34.8 |
| 5152.50 | H | 319 | 125 | -67.66 | 10.70 | -56.96 | -44.0 |
| 6870.00 | H | 182 | 350 | -65.95 | 11.67 | -54.28 | -41.3 |
| 8587.50 | H | - | - | -67.96 | 11.10 | -56.86 | -43.9 |

**Table 7-16. Radiated Spurious Data (Band 4 – Low Channel)**

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| | | |
|---|---|---|
| OPERATING FREQUENCY: | 1732.50 | MHz |
| CHANNEL: | 20175 | |
| MODULATION SIGNAL: | QPSK | |
| BANDWIDTH: | 15.0 | MHz |
| DISTANCE: | 3 | meters |
| LIMIT: | -13 | dBm |

| Frequency [MHz] | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Level at Antenna Terminals [dBm] | Substitute Antenna Gain [dBi] | Spurious Emission Level [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|---|
| 3465.00 | H | 134 | 325 | -57.58 | 9.88 | -47.70 | -34.7 |
| 5197.50 | H | 140 | 319 | -68.40 | 10.76 | -57.65 | -44.6 |
| 6930.00 | H | 137 | 45 | -68.51 | 11.74 | -56.77 | -43.8 |
| 8662.50 | H | - | - | -68.12 | 11.02 | -57.10 | -44.1 |

**Table 7-17. Radiated Spurious Data (Band 4 – Mid Channel)**

| | | |
|---|---|---|
| OPERATING FREQUENCY: | 1747.50 | MHz |
| CHANNEL: | 20325 | |
| MODULATION SIGNAL: | QPSK | |
| BANDWIDTH: | 15.0 | MHz |
| DISTANCE: | 3 | meters |
| LIMIT: | -13 | dBm |

| Frequency [MHz] | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Level at Antenna Terminals [dBm] | Substitute Antenna Gain [dBi] | Spurious Emission Level [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|---|
| 3495.00 | H | 149 | 319 | -64.44 | 9.92 | -54.52 | -41.5 |
| 5242.50 | H | 129 | 321 | -70.40 | 10.73 | -59.67 | -46.7 |
| 6990.00 | H | 118 | 286 | -71.42 | 11.84 | -59.58 | -46.6 |
| 8737.50 | H | - | - | -68.36 | 10.99 | -57.38 | -44.4 |

**Table 7-18. Radiated Spurious Data (Band 4 – High Channel)**




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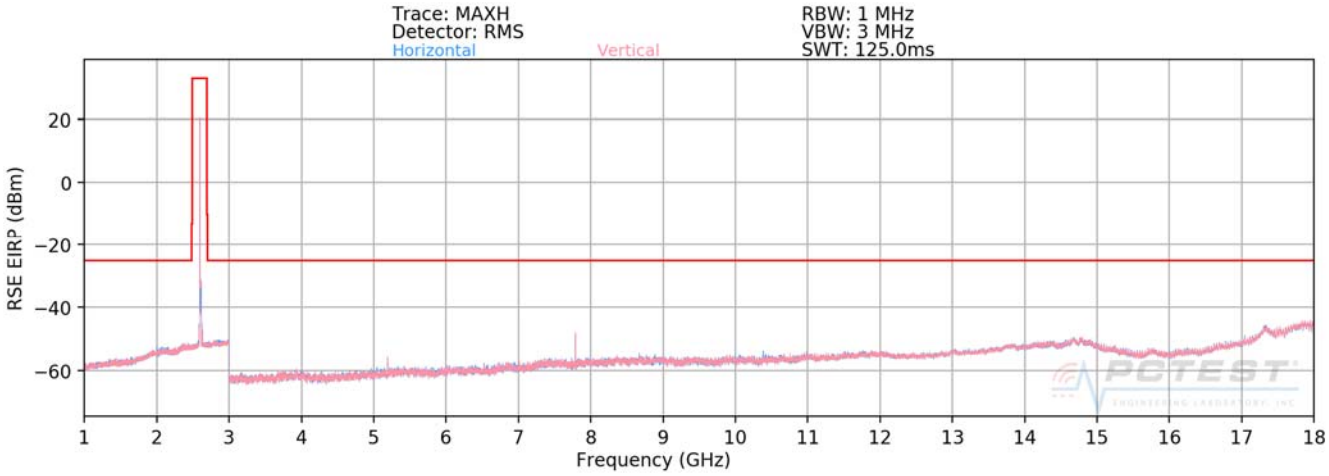
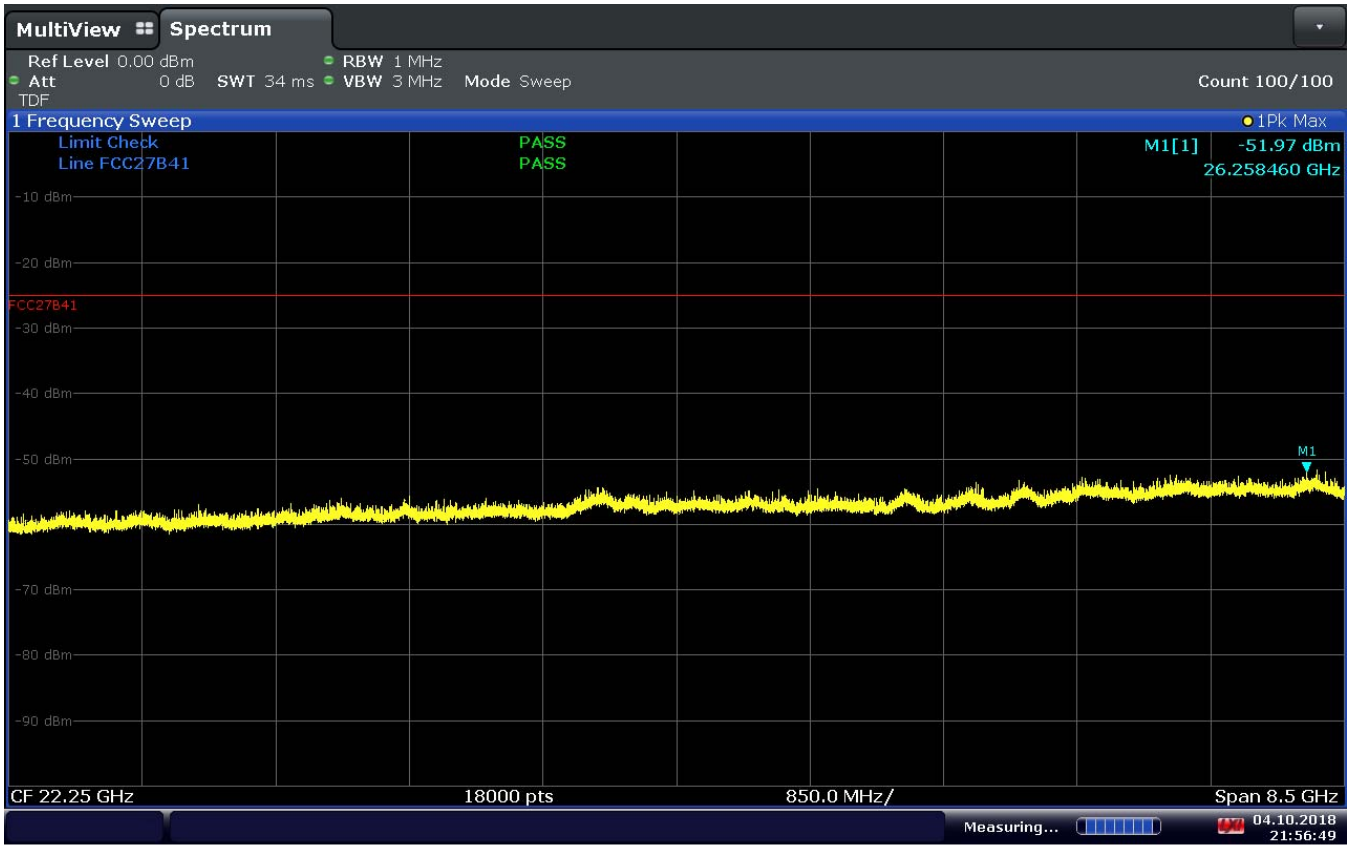
## Band 41 (Narrow Band)




**Plot 7-174. Radiated Spurious Plot 1GHz - 18GHz (Band 41)**




**21:56:50 04.10.2018**

**Plot 7-175. Radiated Spurious Plot 18GHz – 26.5GHz (Band 41) , H Pol.**

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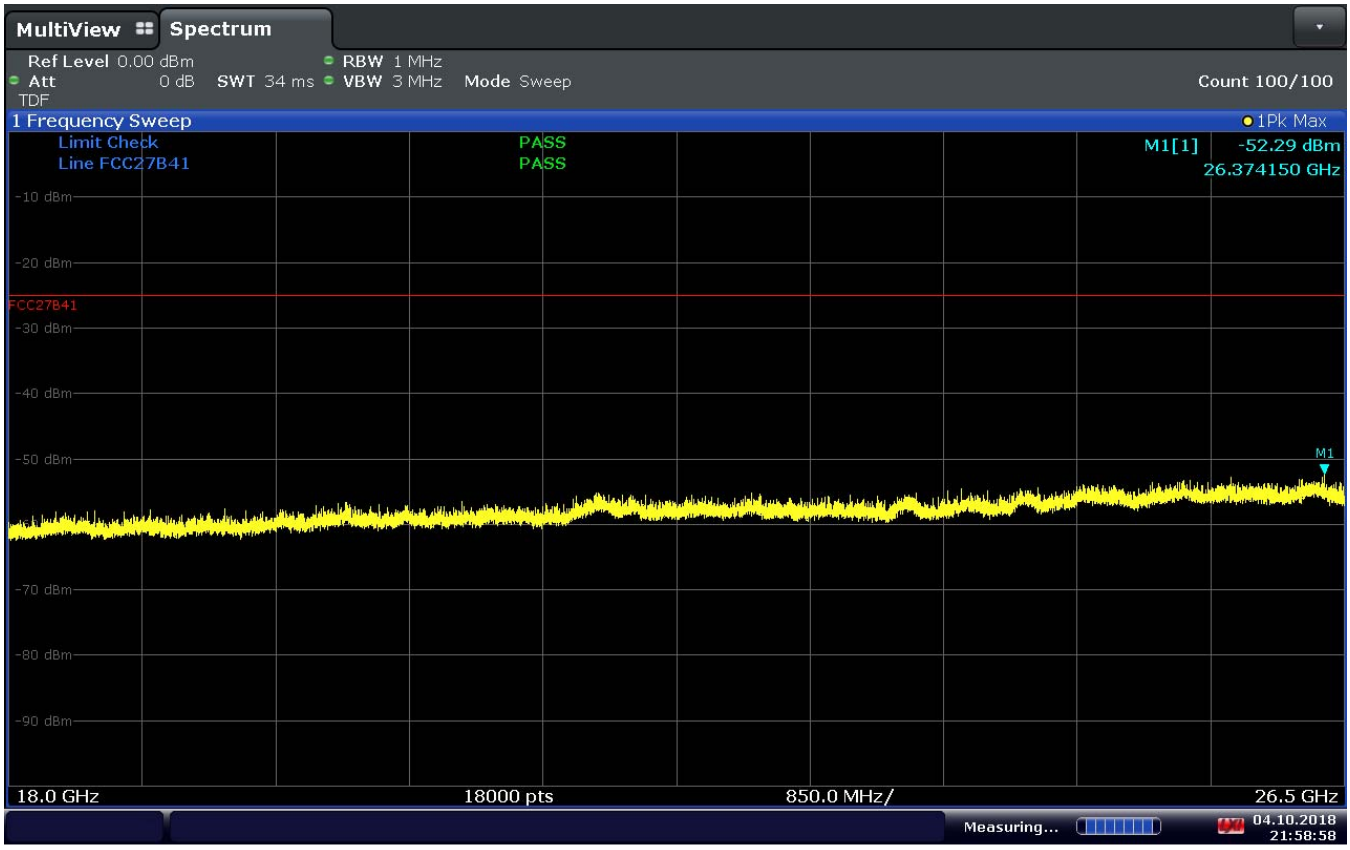


21:58:58 04.10.2018

**Plot 7-176. Radiated Spurious Plot 18GHz – 26.5GHz (Band 41) , V Pol.**

| | | |
|---|---|---|
| OPERATING FREQUENCY: | 2565.00 | MHz |
| CHANNEL: | 40340 | |
| MODULATION SIGNAL: | QPSK | |
| BANDWIDTH: | 20.0 | MHz |
| DISTANCE: | 3 | meters |
| LIMIT: | -25 | dBm |

| Frequency [MHz] | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Level at Antenna Terminals [dBm] | Substitute Antenna Gain [dBi] | Spurious Emission Level [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|---|
| 5130.00 | H | 313 | 189 | -52.32 | 8.78 | -43.54 | -18.5 |
| 7695.00 | H | 100 | 126 | -41.09 | 9.31 | -31.78 | -6.8 |
| 10260.00 | H | 246 | 176 | -44.19 | 9.78 | -34.41 | -9.4 |
| 12825.00 | H | 111 | 267 | -50.71 | 8.80 | -41.91 | -16.9 |
| 15390.00 | H | - | - | -49.76 | 8.89 | -40.88 | -15.9 |

**Table 7-19. Radiated Spurious Data (Band 41 – Low Channel)**




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| | | |
|---|---|---|
| OPERATING FREQUENCY: | 2605.00 | MHz |
| CHANNEL: | 40740 | |
| MODULATION SIGNAL: | QPSK | |
| BANDWIDTH: | 20.0 | MHz |
| DISTANCE: | 3 | meters |
| LIMIT: | -25 | dBm |

| Frequency [MHz] | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Level at Antenna Terminals [dBm] | Substitute Antenna Gain [dBi] | Spurious Emission Level [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|---|
| 5210.00 | H | 294 | 172 | -56.18 | 9.03 | -47.16 | -22.2 |
| 7815.00 | H | 111 | 295 | -52.15 | 9.29 | -42.86 | -17.9 |
| 10420.00 | H | 330 | 116 | -50.31 | 9.50 | -40.81 | -15.8 |
| 13025.00 | H | 396 | 152 | -51.60 | 8.75 | -42.85 | -17.8 |
| 15630.00 | H | - | - | -48.66 | 8.47 | -40.19 | -15.2 |

**Table 7-20. Radiated Spurious Data (Band 41 – Mid Channel)**

| | | |
|---|---|---|
| OPERATING FREQUENCY: | 2645.00 | MHz |
| CHANNEL: | 41140 | |
| MODULATION SIGNAL: | QPSK | |
| BANDWIDTH: | 20.0 | MHz |
| DISTANCE: | 3 | meters |
| LIMIT: | -25 | dBm |

| Frequency [MHz] | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Level at Antenna Terminals [dBm] | Substitute Antenna Gain [dBi] | Spurious Emission Level [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|---|
| 5290.00 | H | 313 | 189 | -51.77 | 8.99 | -42.78 | -17.8 |
| 7935.00 | H | 100 | 126 | -40.04 | 9.35 | -30.69 | -5.7 |
| 10580.00 | H | 246 | 176 | -42.46 | 9.39 | -33.07 | -8.1 |
| 13225.00 | H | 111 | 267 | -48.87 | 8.67 | -40.20 | -15.2 |
| 15870.00 | H | - | - | -48.09 | 8.46 | -39.64 | -14.6 |

**Table 7-21. Radiated Spurious Data (Band 41 – High Channel)**



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## 7.9 Uplink Carrier Aggregation Radiated Measurements

**§2.1053, §27.53(m)**

### Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-D-2010 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as peak measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

### Test Procedures Used

KDB 971168 D01 v02r02 – Section 5.8

ANSI/TIA-603-D-2010 – Section 2.2.12

### Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW ≥ 3 x RBW
3. No. of sweep points ≥ 2 x span / RBW
4. Detector = RMS
5. Trace mode = Max Hold
6. The trace was allowed to stabilize




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## Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

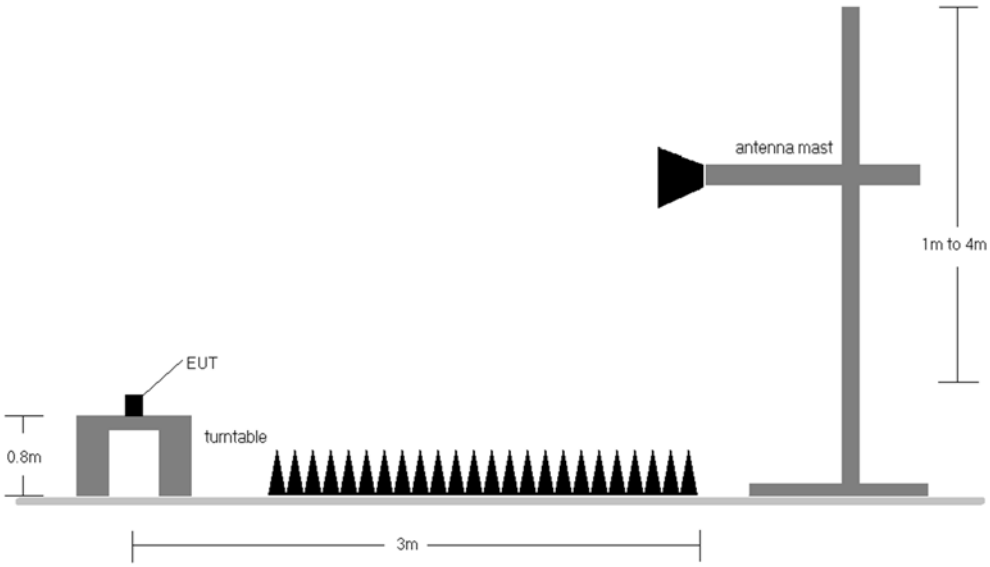


**Figure 7-9. Test Instrument & Measurement Setup**

## Test Notes

1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.

2) This unit was tested with its standard battery.

3) Radiated spurious emissions measurements were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. The worst case (highest) emissions were found while operating with QPSK modulation with both carriers set to transmit using 1RB.

4) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.

5) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

6) No significant emissions were found as a result of two uplink carriers operating contiguously.



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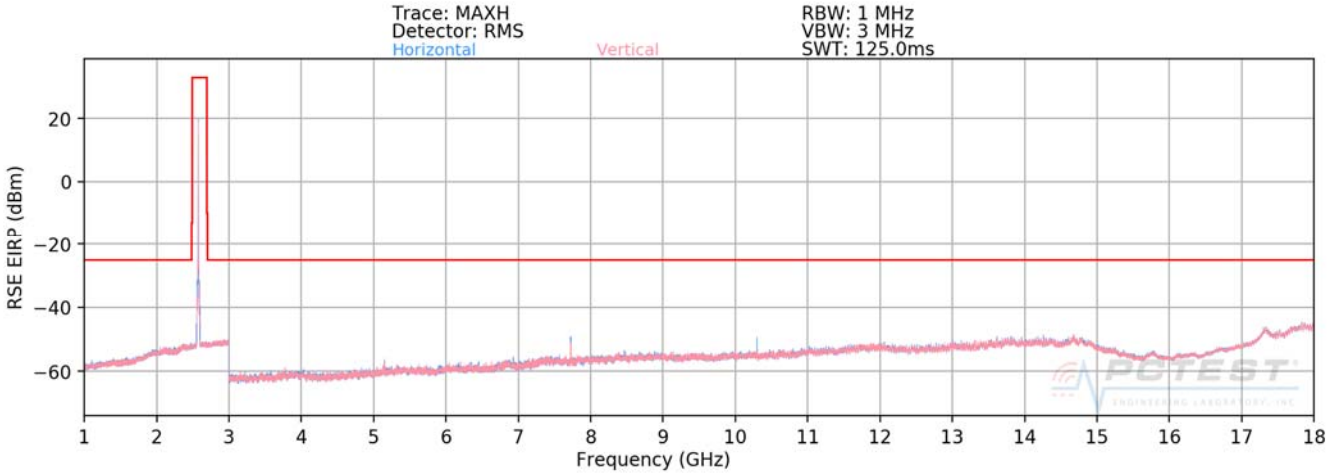
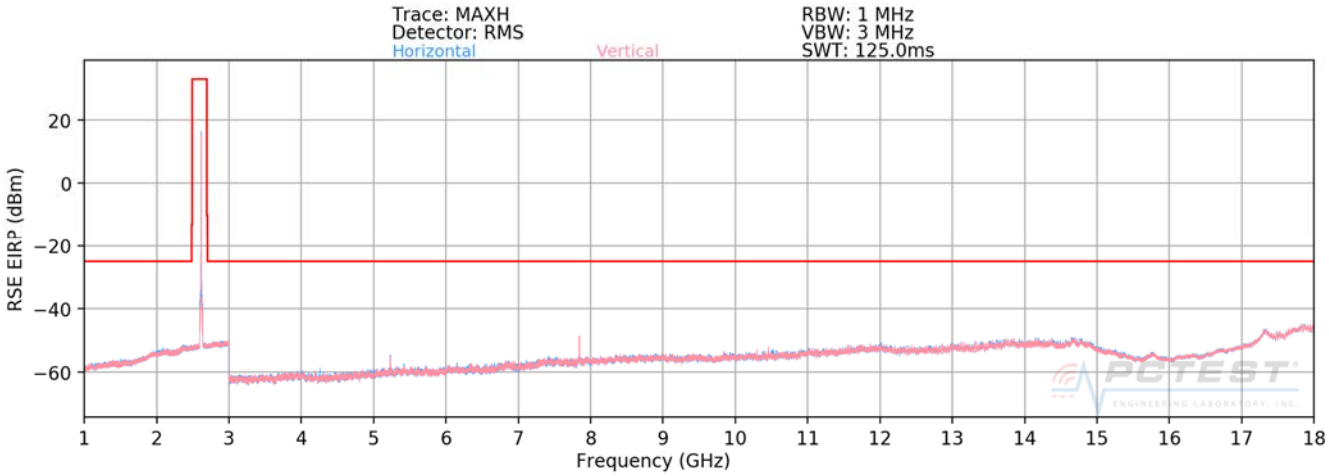
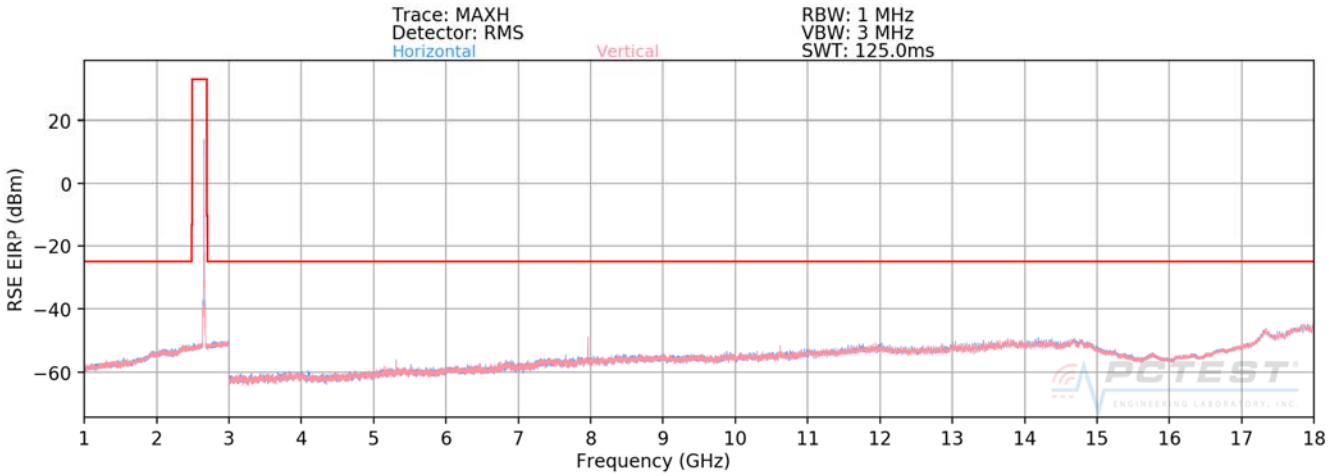



**Plot 7-177. Radiated Spruious Plot (ULCA B41 Low Channel PCC: RB 1 Offset 99, SCC: RB 1 Offset 0)**




**Plot 7-178. Radiated Spruious Plot (ULCA B41 Mid Channel PCC: RB 1 Offset 99, SCC: RB 1 Offset 0)**




**Plot 7-179. Radiated Spruious Plot (ULCA B41 High Channel PCC: RB 1 Offset 99, SCC: RB 1 Offset 0)**

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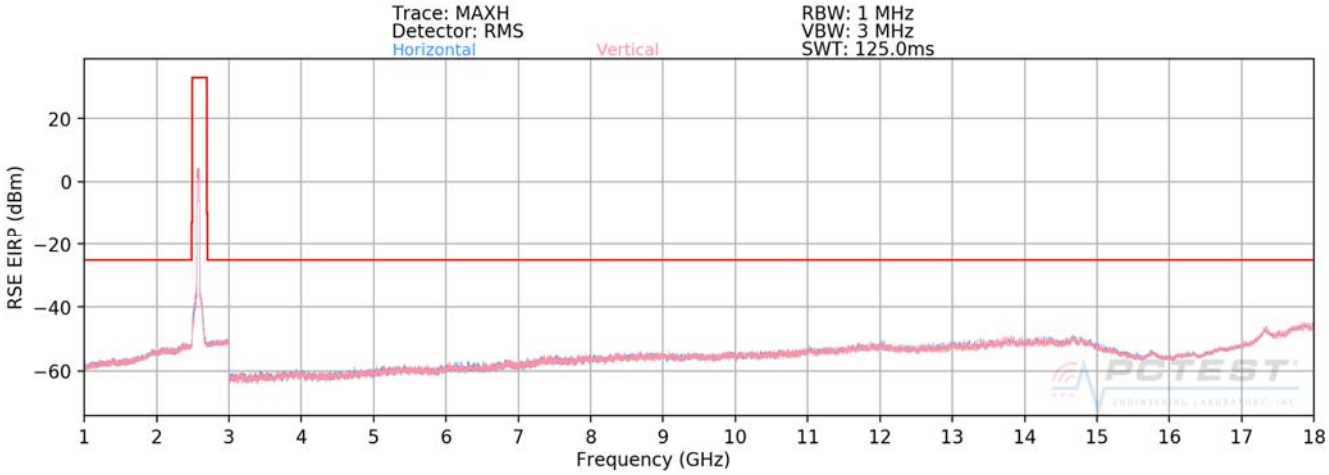
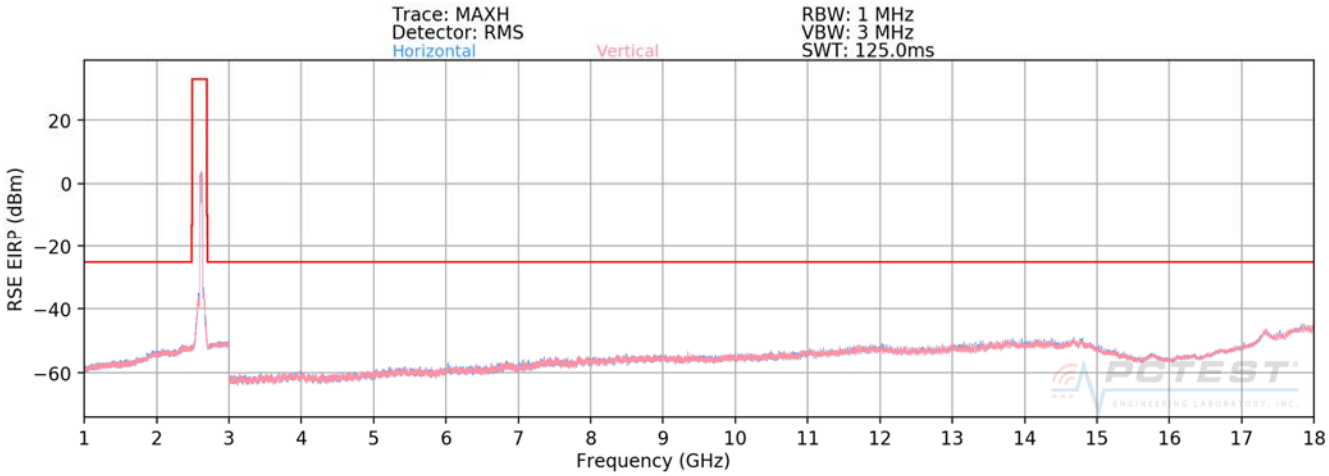
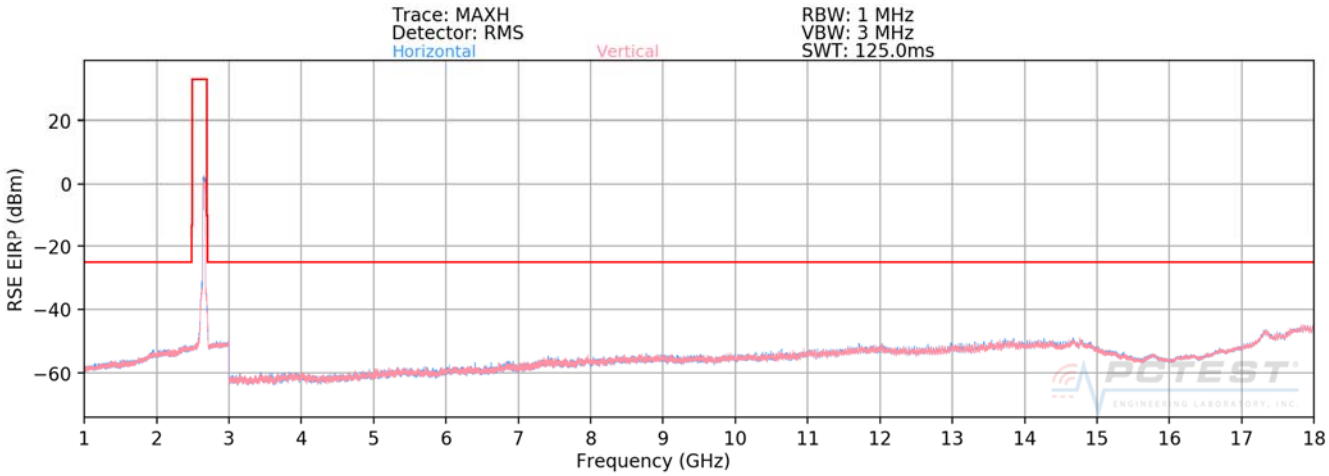



**Plot 7-180. Radiated Spruious Plot (ULCA B41 Low Channel PCC: RB 100 Offset 0, SCC: RB 100 Offset 0)**




**Plot 7-181. Radiated Spruious Plot (ULCA B41 Mid Channel PCC: RB 100 Offset 0, SCC: RB 100 Offset 0)**




**Plot 7-182. Radiated Spruious Plot (ULCA B41 High Channel PCC: RB 100 Offset 0, SCC: RB 100 Offset 0)**

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| | | |
|---|---|---|
| OPERATING FREQUENCY (PCC): | 2565.00 | MHz |
| OPERATING FREQUENCY (SCC): | 2584.80 | |
| CHANNEL (PCC): | 40340 | |
| CHANNEL (SCC): | 40538 | |
| MODULATION SIGNAL: | QPSK | |
| BANDWIDTH: | 20.0 | MHz |
| DISTANCE: | 3 | meters |
| LIMIT: | -25 | dBm |

| Frequency [MHz] | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Level at Antenna Terminals [dBm] | Substitute Antenna Gain [dBi] | Spurious Emission Level [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|---|
| 5130.00 | H | 206 | 53 | -61.78 | 8.63 | -53.15 | -28.1 |
| 7695.00 | H | 136 | 310 | -53.26 | 8.56 | -44.70 | -19.7 |
| 10260.00 | H | 155 | 51 | -55.31 | 9.61 | -45.70 | -20.7 |
| 12825.00 | H | 210 | 301 | -53.91 | 9.08 | -44.82 | -19.8 |
| 15390.00 | H | - | - | -53.75 | 8.44 | -45.30 | -20.3 |

**Table 7-22. Radiated Spruious Data (ULCA B41 Low Channel PCC: RB 1 Offset 99, SCC: RB 1 Offset 0)**

| | | |
|---|---|---|
| OPERATING FREQUENCY (PCC): | 2605.00 | MHz |
| OPERATING FREQUENCY (SCC): | 2624.80 | |
| CHANNEL (PCC): | 40740 | |
| CHANNEL (SCC): | 40938 | |
| MODULATION SIGNAL: | QPSK | |
| BANDWIDTH: | 20.0 | MHz |
| DISTANCE: | 3 | meters |
| LIMIT: | -25 | dBm |

| Frequency [MHz] | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Level at Antenna Terminals [dBm] | Substitute Antenna Gain [dBi] | Spurious Emission Level [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|---|
| 5210.00 | H | 188 | 48 | -59.81 | 8.68 | -51.12 | -26.1 |
| 7815.00 | H | 132 | 328 | -52.56 | 8.70 | -43.86 | -18.9 |
| 10420.00 | H | 118 | 46 | -54.73 | 9.57 | -45.16 | -20.2 |
| 13025.00 | H | 197 | 295 | -54.55 | 8.92 | -45.63 | -20.6 |
| 15630.00 | H | - | - | -53.08 | 8.20 | -44.88 | -19.9 |

**Table 7-23. Radiated Spruious Data (ULCA B41 Mid Channel PCC: RB 1 Offset 99, SCC: RB 1 Offset 0)**



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| | | |
|---|---|---|
| OPERATING FREQUENCY (PCC): | 2645.00 | MHz |
| OPERATING FREQUENCY (SCC): | 2664.80 | |
| CHANNEL (PCC): | 41140 | |
| CHANNEL (SCC): | 41338 | |
| MODULATION SIGNAL: | QPSK | |
| BANDWIDTH: | 20.0 | MHz |
| DISTANCE: | 3 | meters |
| LIMIT: | -25 | dBm |

| Frequency [MHz] | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Level at Antenna Terminals [dBm] | Substitute Antenna Gain [dBi] | Spurious Emission Level [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|---|
| 5290.00 | H | 107 | 61 | -62.57 | 8.71 | -53.86 | -28.9 |
| 7935.00 | H | 127 | 319 | -54.20 | 8.75 | -45.45 | -20.4 |
| 10580.00 | H | 116 | 49 | -53.27 | 9.47 | -43.80 | -18.8 |
| 13225.00 | H | 183 | 267 | -55.19 | 9.02 | -46.17 | -21.2 |
| 15870.00 | H | - | - | -53.39 | 8.16 | -45.23 | -20.2 |

**Table 7-24. Radiated Spruious Data (ULCA B41 High Channel PCC: RB 1 Offset 99, SCC: RB 1 Offset 0)**




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## 7.10 Frequency Stability / Temperature Variation

**Test Overview and Limit**

Frequency stability testing is performed in accordance with the guidelines of 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 in 10°C increments 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.

***For Part 22, the frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency. For Part 27, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.***

**Test Procedure Used**

ANSI/TIA-603-E-2016

**Test Settings**

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 fifteen minutes 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.

**Test Setup**

The EUT was connected via an RF cable to a spectrum analyzer with the EUT placed inside an environmental chamber.

**Test Notes**

None




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## Band 12/17 Frequency Stability Measurements

OPERATING FREQUENCY: 707,500,000 Hz

CHANNEL: 23790

REFERENCE VOLTAGE: 4.26 VDC

| VOLTAGE (%) | POWER (VDC) | TEMP (°C) | FREQUENCY (Hz) | Freq. Dev. (Hz) | Deviation (%) |
|---|---|---|---|---|---|
| 100 % | 4.26 | + 20 (Ref) | 707,499,861 | -139 | -0.0000196 |
| 100 % | | - 30 | 707,499,930 | -70 | -0.0000099 |
| 100 % | | - 20 | 707,499,971 | -29 | -0.0000041 |
| 100 % | | - 10 | 707,499,911 | -89 | -0.0000125 |
| 100 % | | 0 | 707,499,826 | -174 | -0.0000247 |
| 100 % | | + 10 | 707,499,837 | -163 | -0.0000230 |
| 100 % | | + 20 | 707,499,907 | -93 | -0.0000131 |
| 100 % | | + 30 | 707,499,818 | -182 | -0.0000257 |
| 100 % | | + 40 | 707,499,829 | -171 | -0.0000241 |
| 100 % | | + 50 | 707,499,912 | -88 | -0.0000125 |
| BATT. ENDPOINT | 3.42 | + 20 | 707,499,991 | -9 | -0.0000012 |

**Table 7-25. Frequency Stability Data (Band 12/17)**

**Note:**

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.




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## Band 12/17 Frequency Stability Measurements

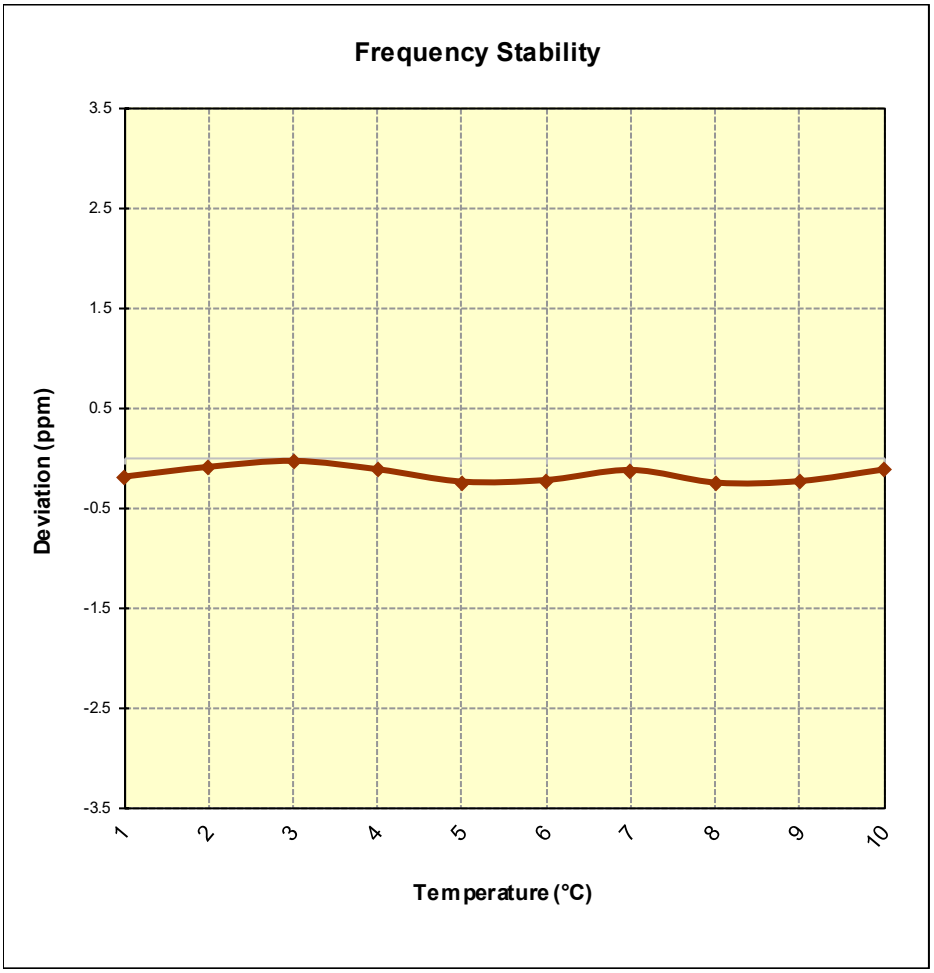


**Figure 7-10. Frequency Stability Graph (Band 12/17)**




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## Band 5 Frequency Stability Measurements

| | | |
|---|---|---|
| OPERATING FREQUENCY: | 831,500,000 | Hz |
| CHANNEL: | 26865 | |
| REFERENCE VOLTAGE: | 4.26 | VDC |
| DEVIATION LIMIT: | ± 0.00025 % or 2.5 ppm | |

| VOLTAGE (%) | POWER (VDC) | TEMP (°C) | FREQUENCY (Hz) | Freq. Dev. (Hz) | Deviation (%) |
|---|---|---|---|---|---|
| 100 % | 4.26 | + 20 (Ref) | 831,499,967 | -33 | -0.0000040 |
| 100 % | | - 30 | 831,499,965 | -35 | -0.0000043 |
| 100 % | | - 20 | 831,499,978 | -22 | -0.0000026 |
| 100 % | | - 10 | 831,499,859 | -141 | -0.0000170 |
| 100 % | | 0 | 831,499,966 | -34 | -0.0000041 |
| 100 % | | + 10 | 831,499,887 | -113 | -0.0000136 |
| 100 % | | + 20 | 831,499,933 | -67 | -0.0000081 |
| 100 % | | + 30 | 831,499,854 | -146 | -0.0000175 |
| 100 % | | + 40 | 831,499,916 | -84 | -0.0000101 |
| 100 % | | + 50 | 831,499,985 | -15 | -0.0000018 |
| BATT. ENDPOINT | 3.42 | + 20 | 831,499,885 | -115 | -0.0000138 |

**Table 7-26. Frequency Stability Data (Band 5)**




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## Band 5 Frequency Stability Measurements

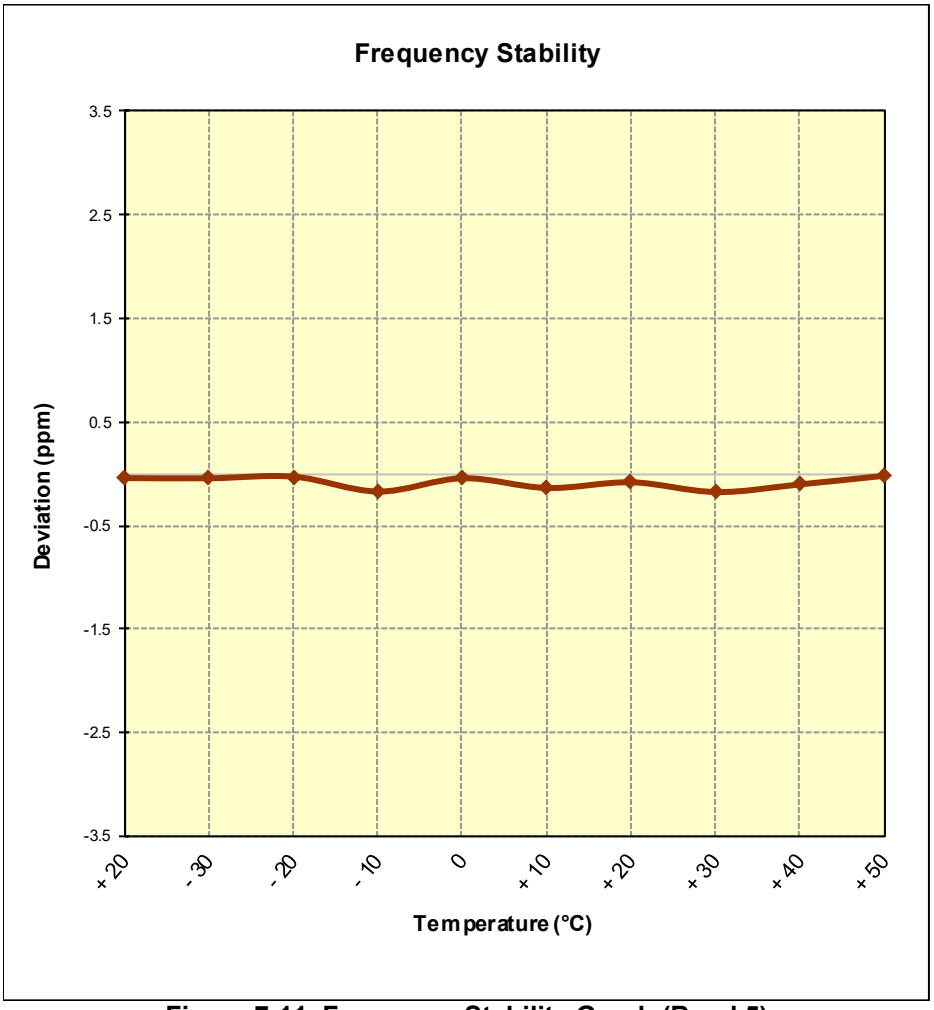


**Figure 7-11. Frequency Stability Graph (Band 5)**




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## Band 4 Frequency Stability Measurements

OPERATING FREQUENCY: 1,745,000,000 Hz

CHANNEL: 132322

REFERENCE VOLTAGE: 4.26 VDC

| VOLTAGE (%) | POWER (VDC) | TEMP (°C) | FREQUENCY (Hz) | Freq. Dev. (Hz) | Deviation (%) |
|---|---|---|---|---|---|
| 100 % | 4.26 | + 20 (Ref) | 1,744,999,865 | -135 | -0.0000077 |
| 100 % | | - 30 | 1,744,999,854 | -146 | -0.0000084 |
| 100 % | | - 20 | 1,744,999,948 | -52 | -0.0000030 |
| 100 % | | - 10 | 1,744,999,902 | -98 | -0.0000056 |
| 100 % | | 0 | 1,744,999,998 | -2 | -0.0000001 |
| 100 % | | + 10 | 1,744,999,822 | -178 | -0.0000102 |
| 100 % | | + 20 | 1,744,999,936 | -64 | -0.0000037 |
| 100 % | | + 30 | 1,744,999,909 | -91 | -0.0000052 |
| 100 % | | + 40 | 1,744,999,989 | -11 | -0.0000006 |
| 100 % | | + 50 | 1,744,999,932 | -68 | -0.0000039 |
| BATT. ENDPOINT | 3.42 | + 20 | 1,744,999,992 | -8 | -0.0000005 |

**Table 7-27. Frequency Stability Data (Band 4)**

**Note:**

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.




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## Band 4 Frequency Stability Measurements

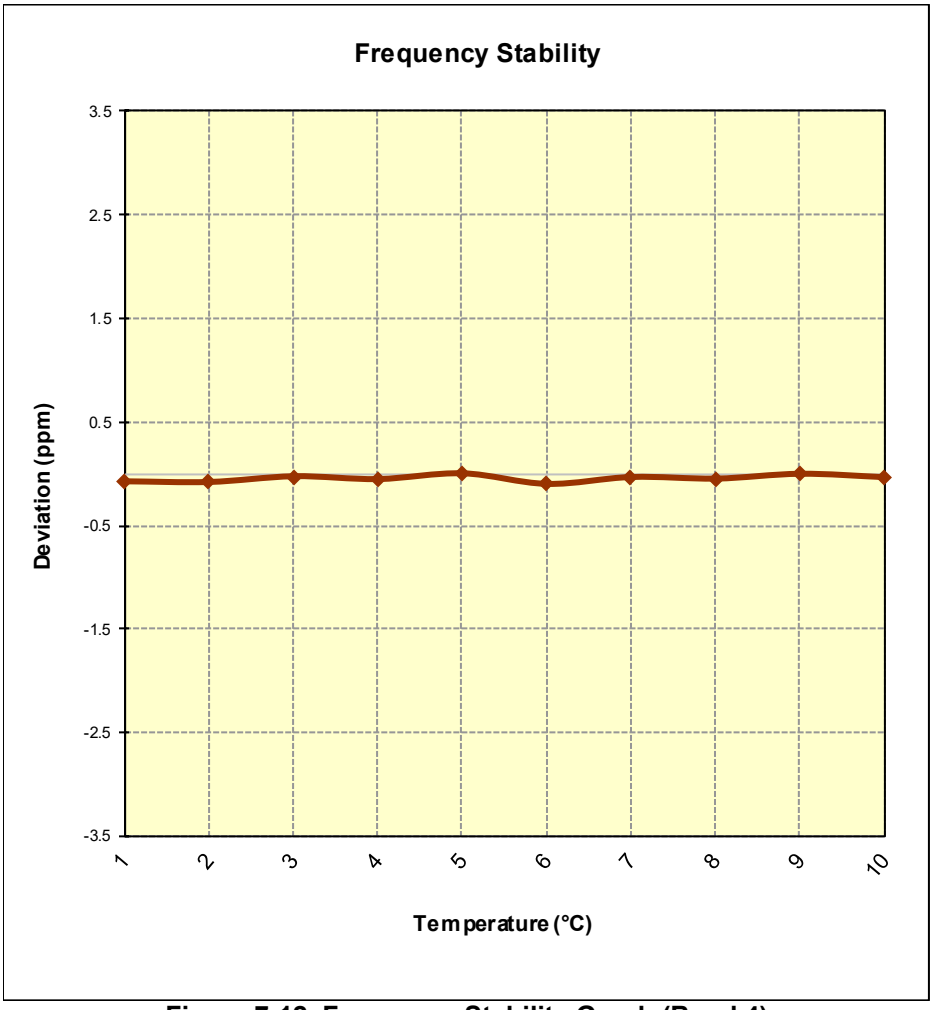


**Figure 7-12. Frequency Stability Graph (Band 4)**




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## Band 41 Frequency Stability Measurements

OPERATING FREQUENCY: 2,593,000,000 Hz

CHANNEL: 40620

REFERENCE VOLTAGE: 4.26 VDC

| VOLTAGE (%) | POWER (VDC) | TEMP (°C) | FREQUENCY (Hz) | Freq. Dev. (Hz) | Deviation (%) |
|---|---|---|---|---|---|
| 100 % | 4.26 | + 20 (Ref) | 2,592,999,940 | -60 | -0.0000023 |
| 100 % | | - 30 | 2,592,999,849 | -151 | -0.0000058 |
| 100 % | | - 20 | 2,592,999,861 | -139 | -0.0000053 |
| 100 % | | - 10 | 2,592,999,998 | -2 | -0.0000001 |
| 100 % | | 0 | 2,592,999,958 | -42 | -0.0000016 |
| 100 % | | + 10 | 2,592,999,920 | -80 | -0.0000031 |
| 100 % | | + 20 | 2,592,999,991 | -9 | -0.0000003 |
| 100 % | | + 30 | 2,592,999,832 | -168 | -0.0000065 |
| 100 % | | + 40 | 2,592,999,820 | -180 | -0.0000069 |
| 100 % | | + 50 | 2,592,999,978 | -22 | -0.0000009 |
| BATT. ENDPOINT | 3.42 | + 20 | 2,592,999,952 | -48 | -0.0000019 |

**Table 7-28. Frequency Stability Data (Band 41)**

**Note:**

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.




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## Band 41 Frequency Stability Measurements

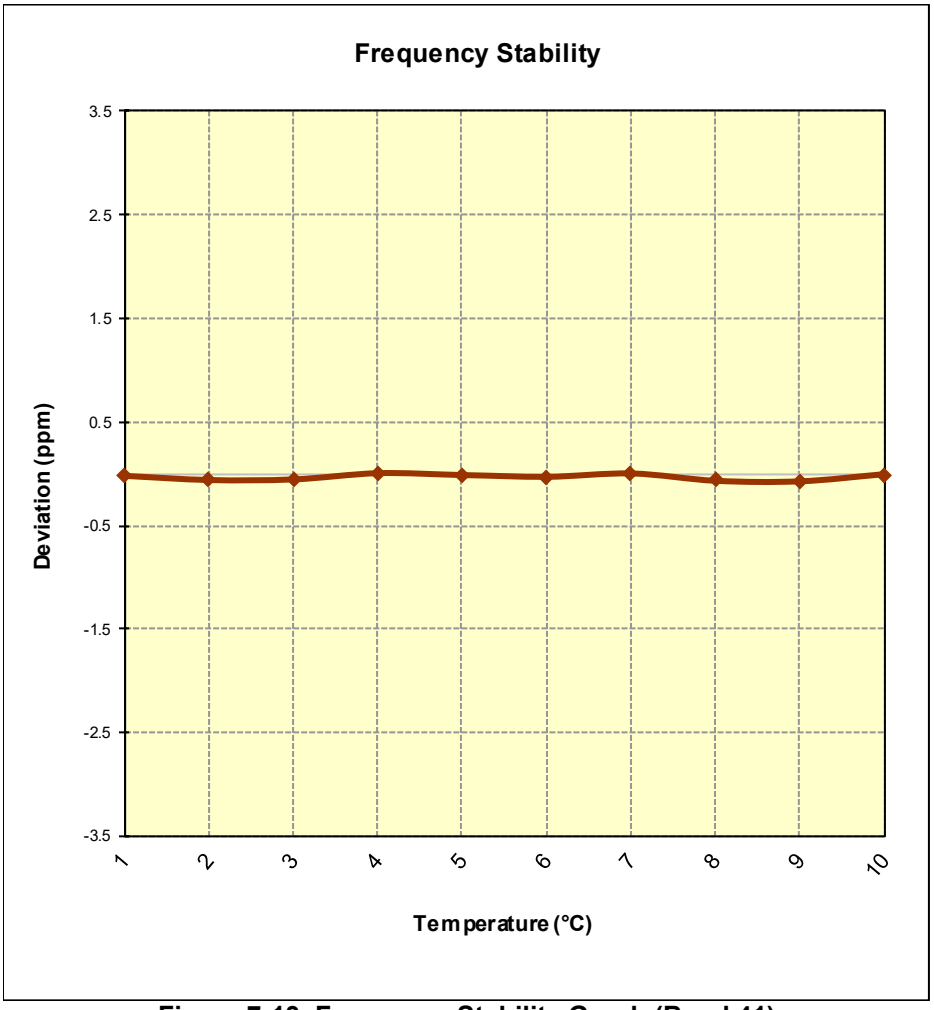


**Figure 7-13. Frequency Stability Graph (Band 41)**




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# 8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMA9200** complies with all the requirements of Part 22 & 27 of the FCC Rules for LTE operation only.




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