

## 7.4 Band Edge Emissions at Antenna Terminal

§2.1051 §22.917(a) §24.238(a) §27.53(g) §27.53(h) §27.53(m) §27.53(a.4)

### Test Overview

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

*The minimum permissible attenuation level for Band 30 is  $> 43 + 10\log_{10}(P[\text{Watts}]$  at 2300-2305MHz & 2345-2360MHz,  $> 55 + 10\log_{10}(P[\text{Watts}]$ ) at 2320-2324MHz & 2341-2345MHz,  $> 61 + 10\log_{10}(P[\text{Watts}]$ ) at 2324-2328MHz & 2337-2341MHz,  $> 67 + 10\log_{10}(P[\text{Watts}]$ ) at 2288-2292MHz & 2328-2337MHz, and  $> 70 + 10\log_{10}(P[\text{Watts}]$ ) at frequencies  $< 2288\text{MHz}$  &  $> 2365\text{MHz}$ .*

*The minimum permissible attenuation level for Band 7 is as noted in the Test Notes on the following page.*

*The minimum permissible attenuation level of any spurious emission is  $43 + \log_{10}(P_{[\text{Watts}]})$ , where  $P$  is the transmitter power in Watts.*

### Test Procedure Used

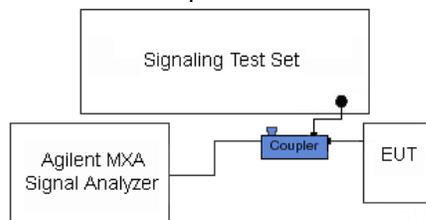
KDB 971168 v02r02 – Section 6.0

### Test Settings

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  $\geq$  1% of the emission bandwidth
4. VBW  $\geq$  3 x RBW
5. Detector = RMS
6. Number of sweep points  $\geq$  2 x Span/RBW
7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
8. Sweep time = auto couple
9. The trace was allowed to stabilize

### Test Setup

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



**Figure 7-3. Test Instrument & Measurement Setup**

|                                      |  |  |  |                                 |
|--------------------------------------|--|--|--|---------------------------------|
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### Test Notes

Per 22.917(b) 24.238(a) 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. The 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 emission are attenuated at least 26 dB below the transmitter power.

Per 27.53(g) for operations in the 698-746 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

Per 27.53(a)(5) in the 1 MHz bands immediately outside and adjacent to the channel blocks at 2305, 2310, 2315, 2320, 2345, 2350, 2355, and 2360 MHz, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e., 1 MHz). The 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 26 dB below the transmitter power.

Per 27.53(m) for operations in the BRS/EBS bands, 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. In addition, the attenuation factor shall not be less that  $43 + 10 \log(P)$  dB on all frequencies between 2490.5 MHz and 2496 MHz and  $55 + 10 \log(P)$  dB at or below 2490.5 MHz.

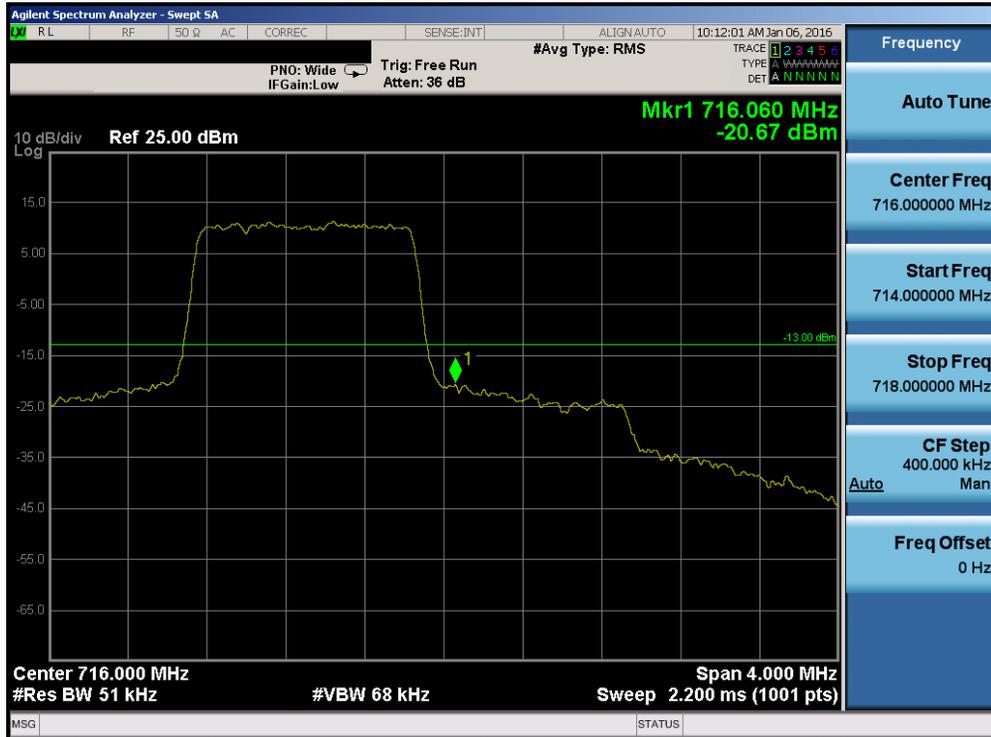


Plot 7-107. Lower Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

|                                   |                                     |   |    |                              |
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Plot 7-108. Lower Extended Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

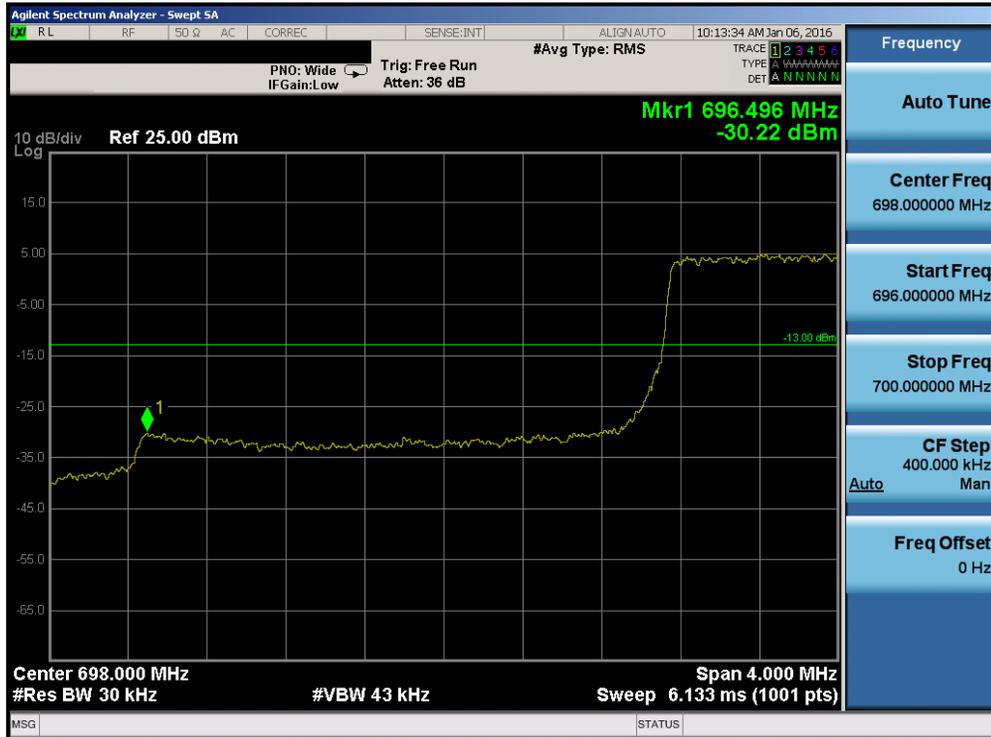


Plot 7-109. Upper Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

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Plot 7-110. Upper Extended Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)



Plot 7-111. Lower Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

|                                      |  |  |    |                                 |
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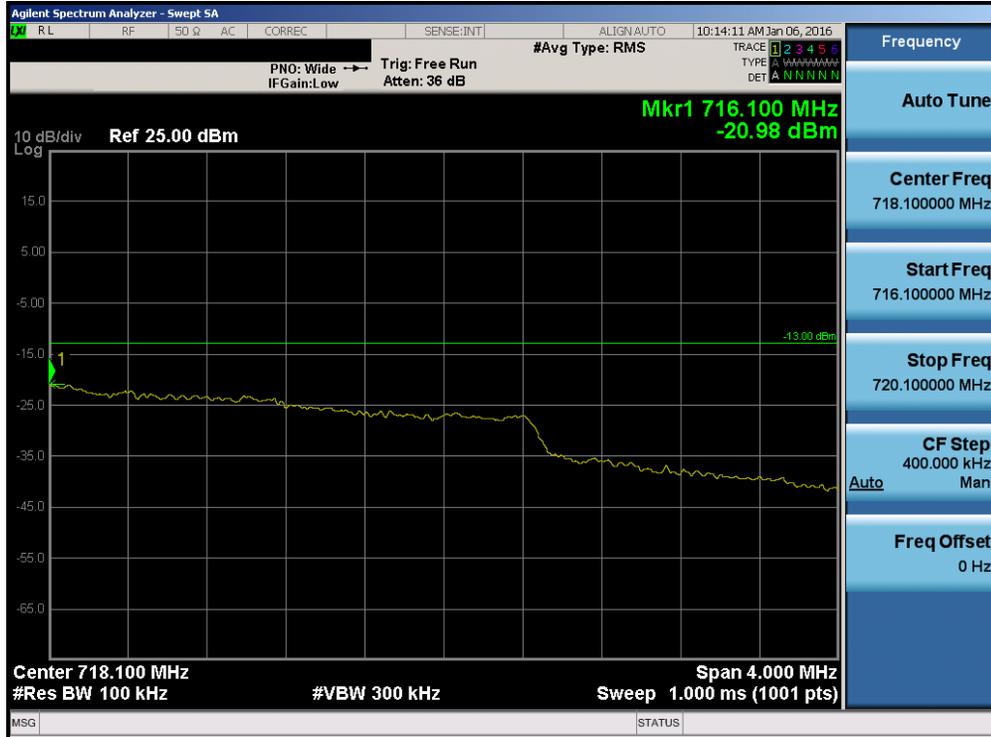


Plot 7-112. Lower Extended Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

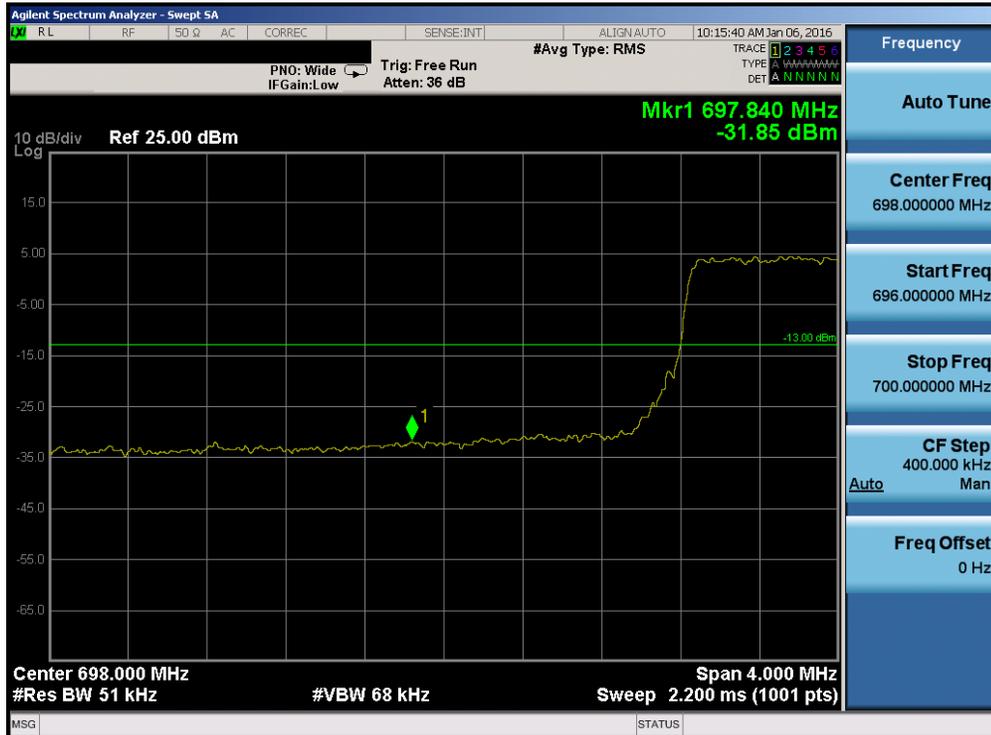


Plot 7-113. Upper Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

|                                      |  |  |    |                                 |
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Plot 7-114. Upper Extended Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

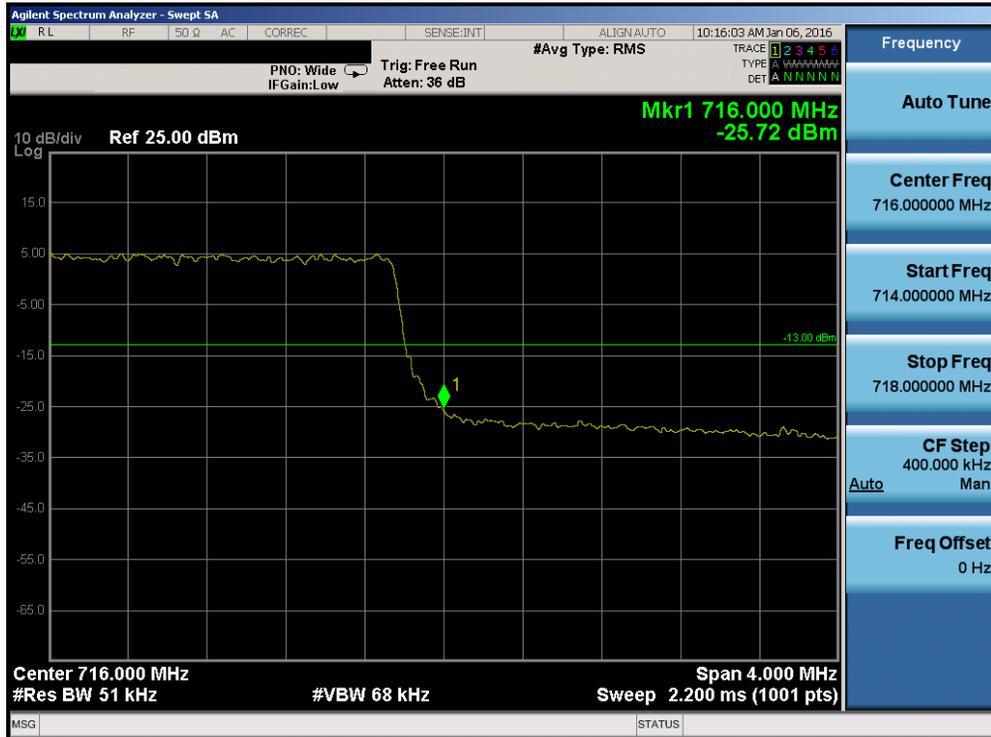


Plot 7-115. Lower Band Edge Plot (Band 12/17 – 5.0MHz QPSK – RB Size 25)

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Plot 7-116. Lower Extended Band Edge Plot (Band 12/17 – 5.0MHz QPSK – RB Size 25)

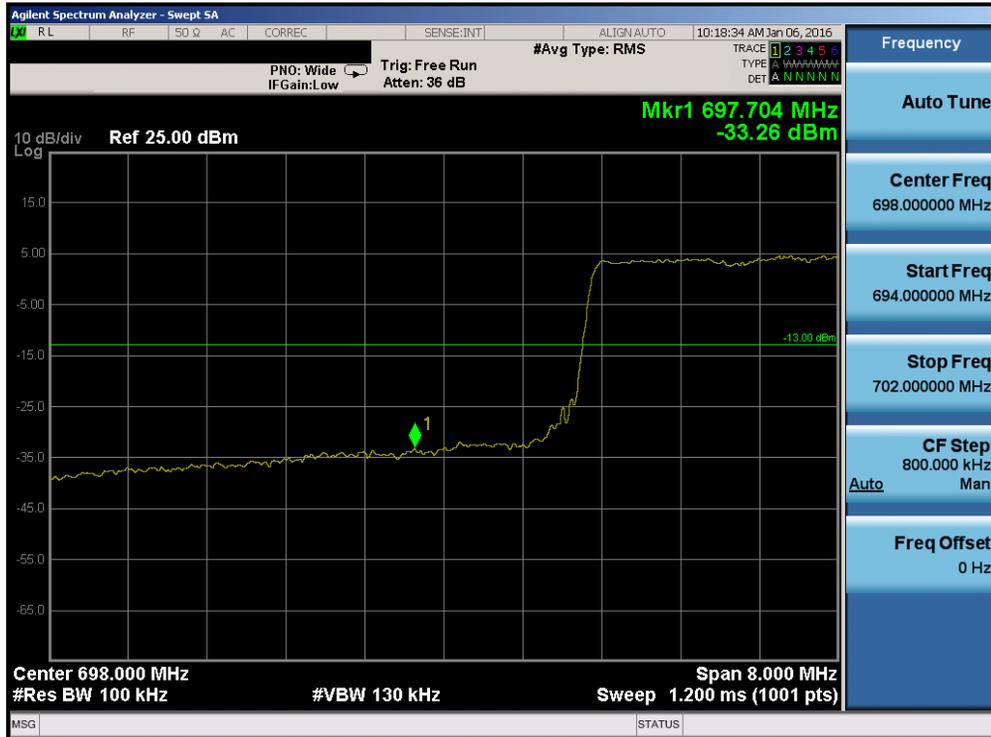


Plot 7-117. Upper Band Edge Plot (Band 12/17 – 5.0MHz QPSK – RB Size 25)

|                                      |                               |  |  |                                 |
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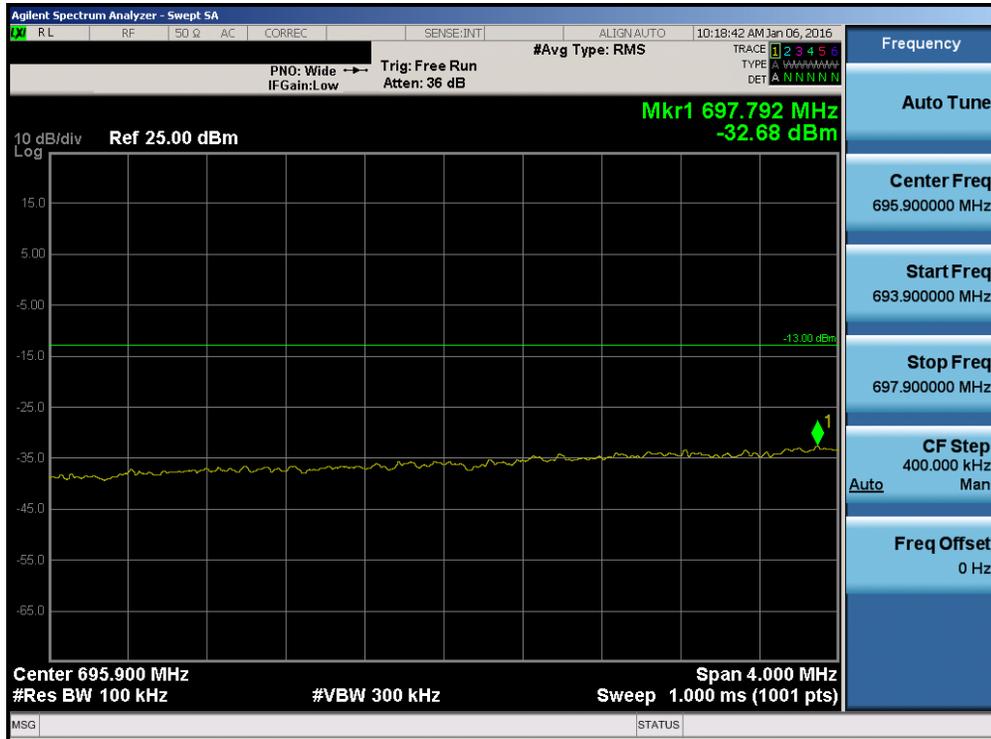


Plot 7-118. Upper Extended Band Edge Plot (Band 12/17 – 5.0MHz QPSK – RB Size 25)



Plot 7-119. Lower Band Edge Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)

|                                      |                               |  |  |                                 |
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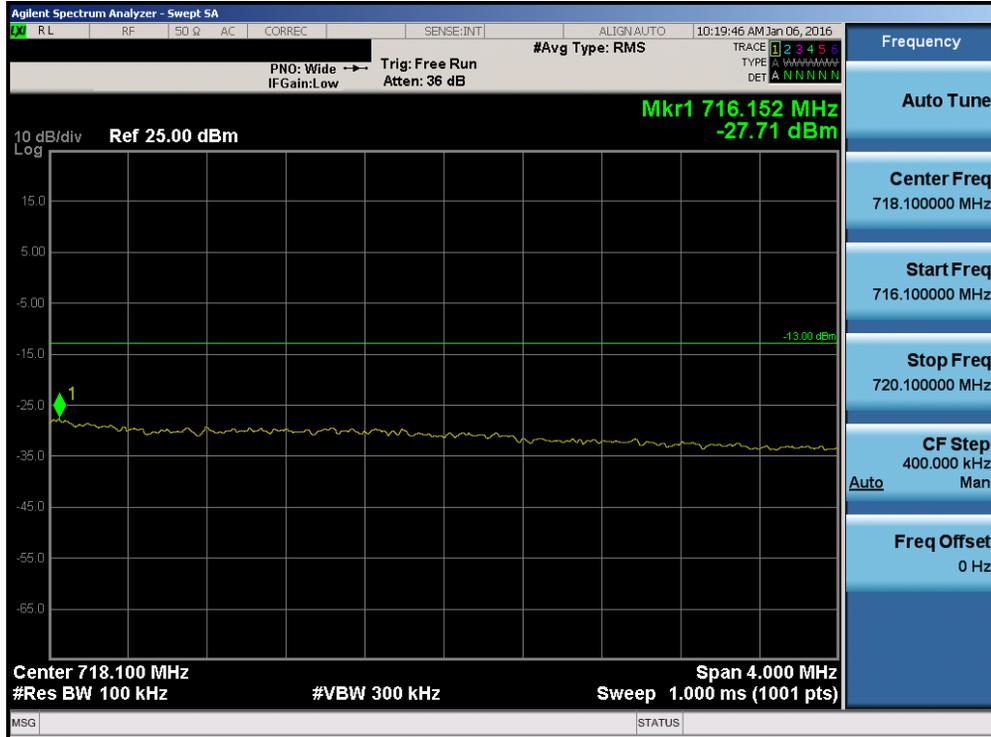


Plot 7-120. Lower Extended Band Edge Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)

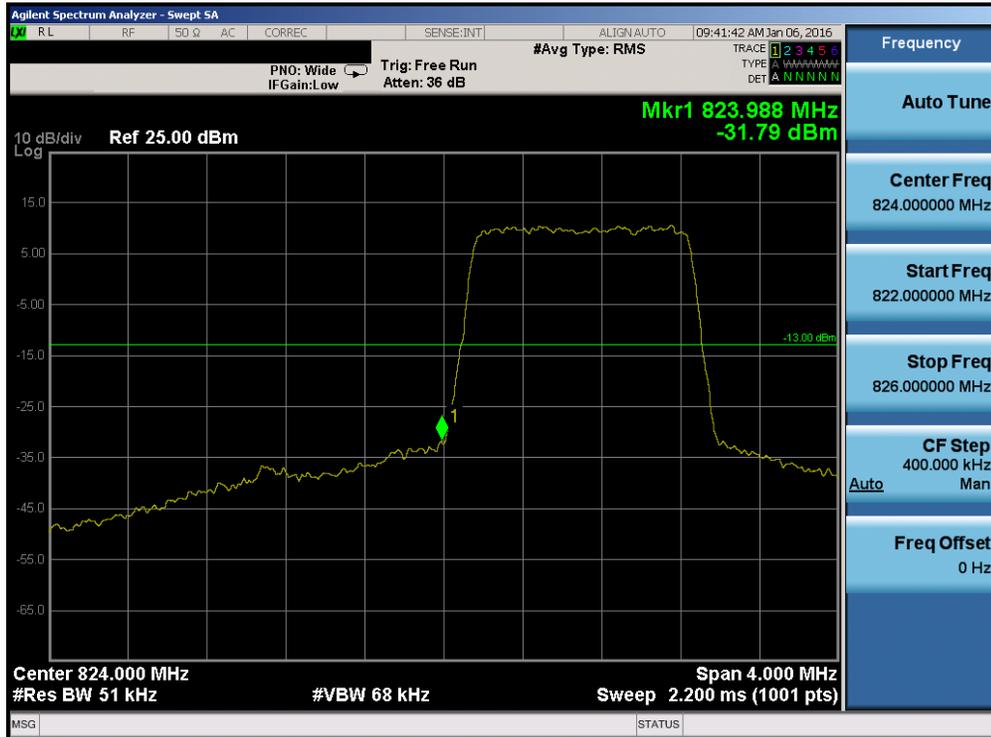


Plot 7-121. Upper Band Edge Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)

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Plot 7-122. Upper Extended Band Edge Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)

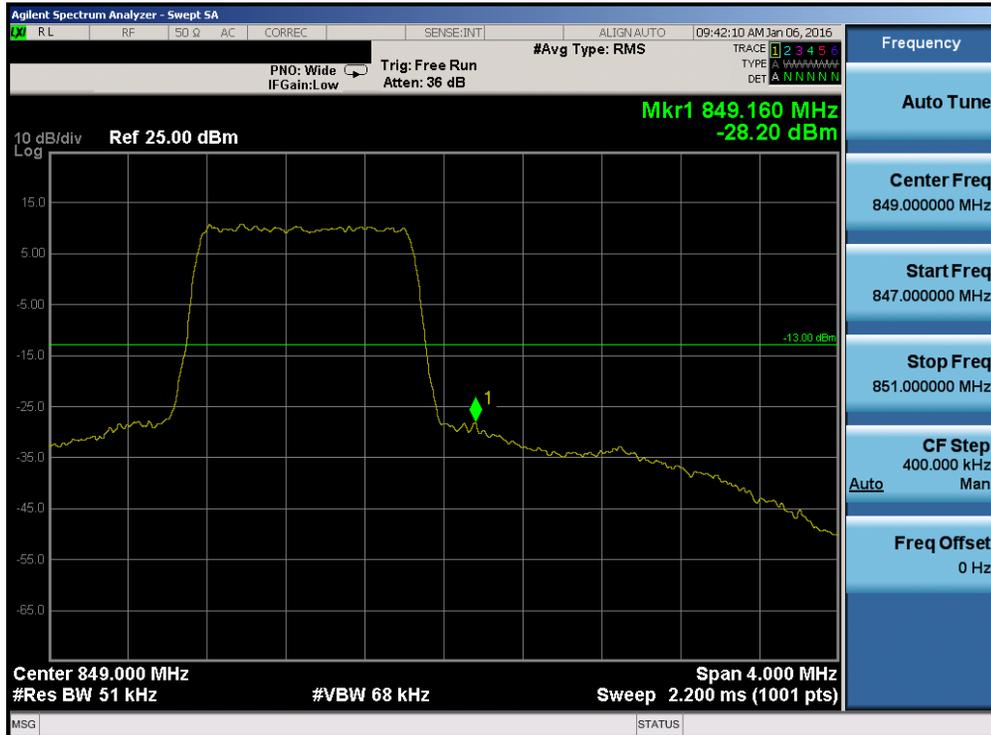


Plot 7-123. Lower Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

|                                      |                               |  |  |                                 |
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Plot 7-124. Lower Extended Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

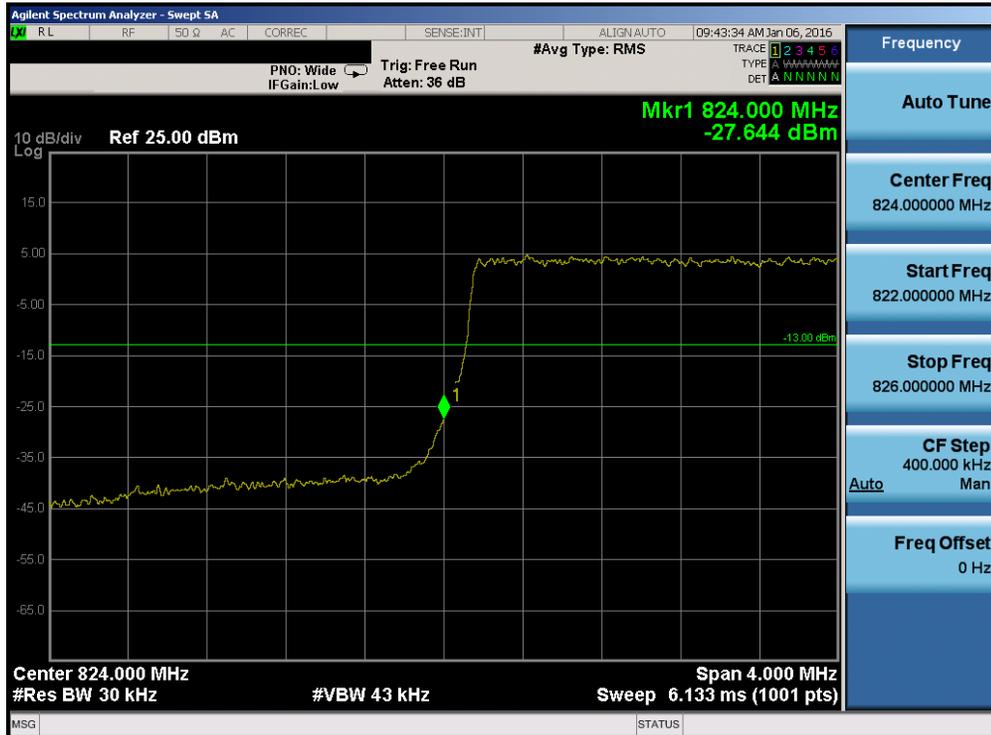


Plot 7-125. Upper Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

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Plot 7-126. Upper Extended Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)



Plot 7-127. Lower Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

|                                      |  |  |    |                                 |
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Plot 7-128. Lower Extended Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

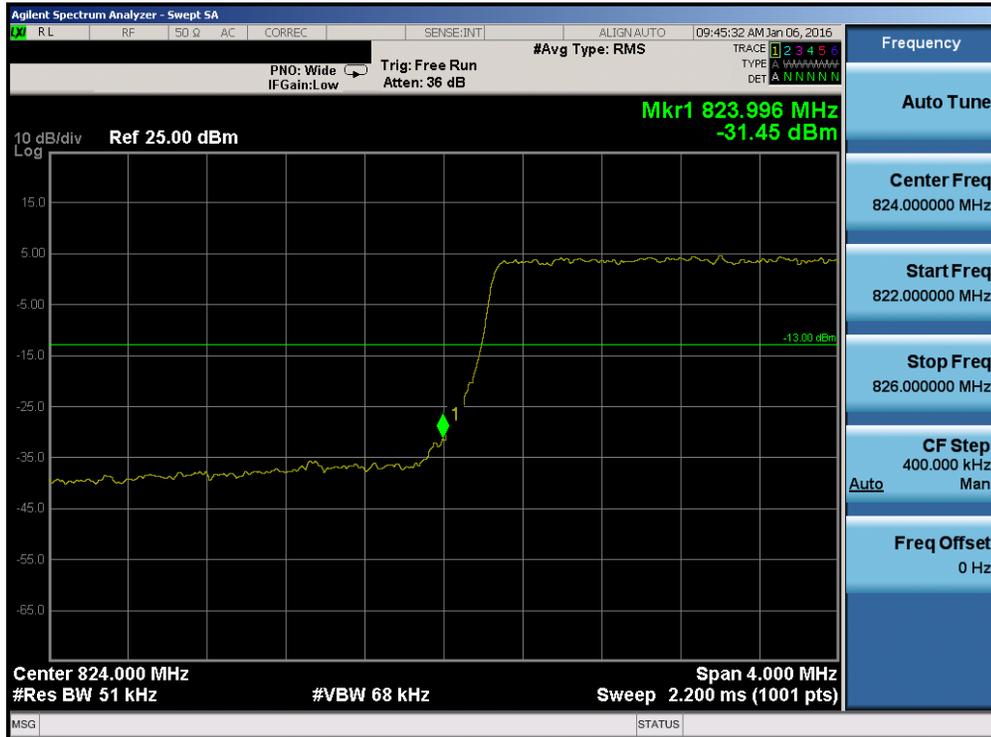


Plot 7-129. Upper Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

|                                      |  |  |    |                                 |
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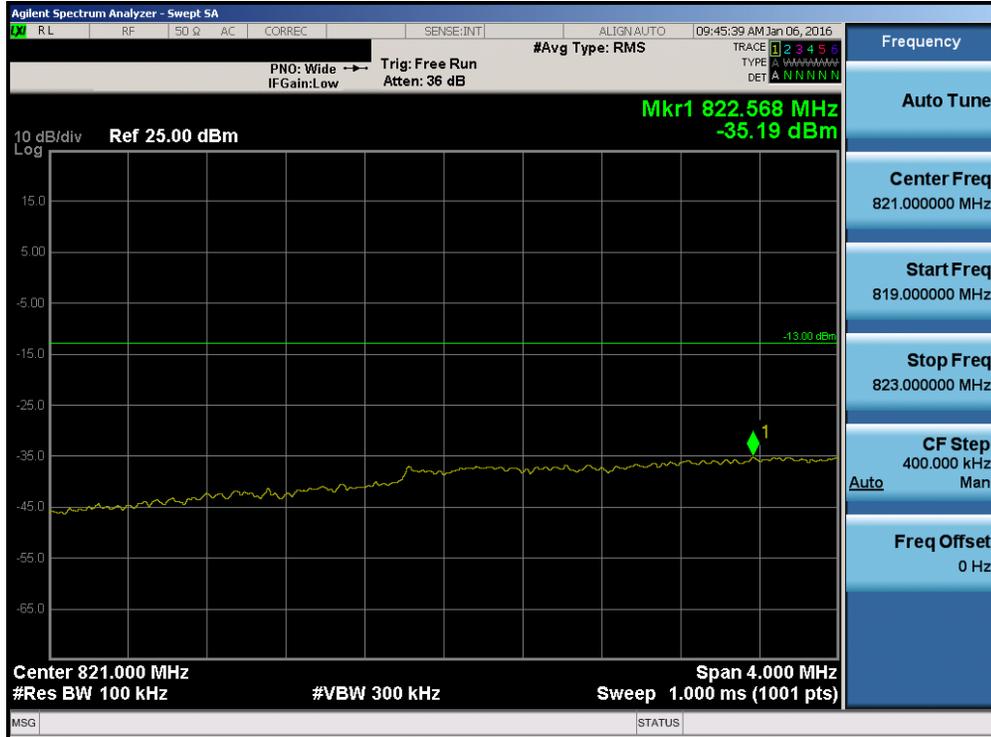


Plot 7-130. Upper Extended Band Edge Plot (Band 5 – Band 5 – 3.0MHz QPSK – RB Size 15)

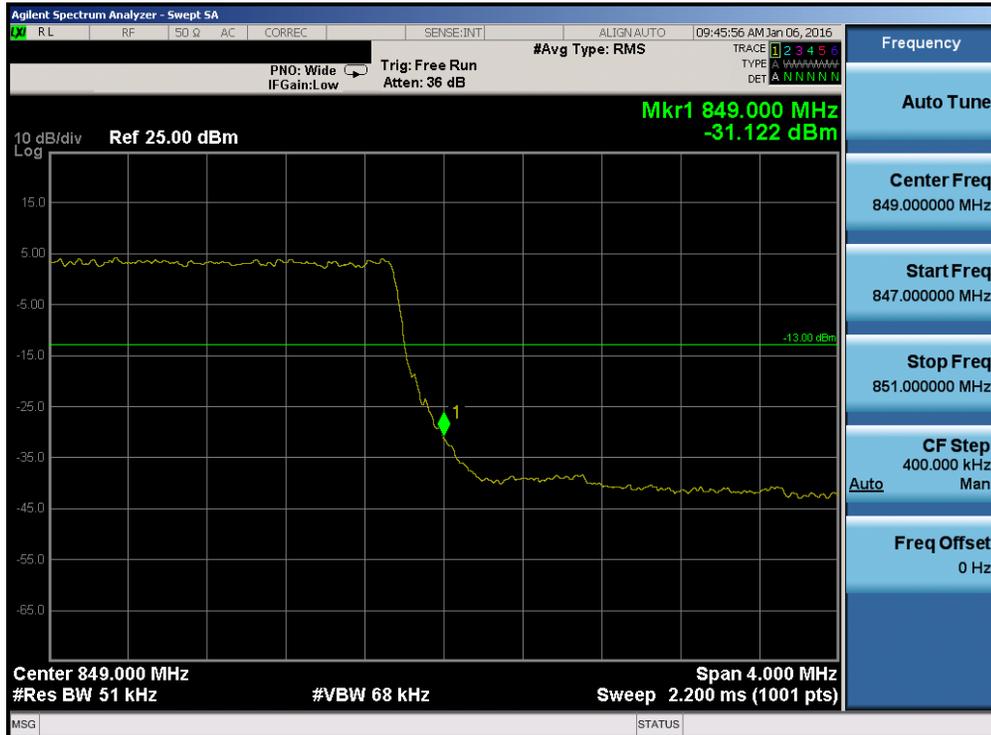


Plot 7-131. Lower Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

|                                      |  |  |    |                                 |
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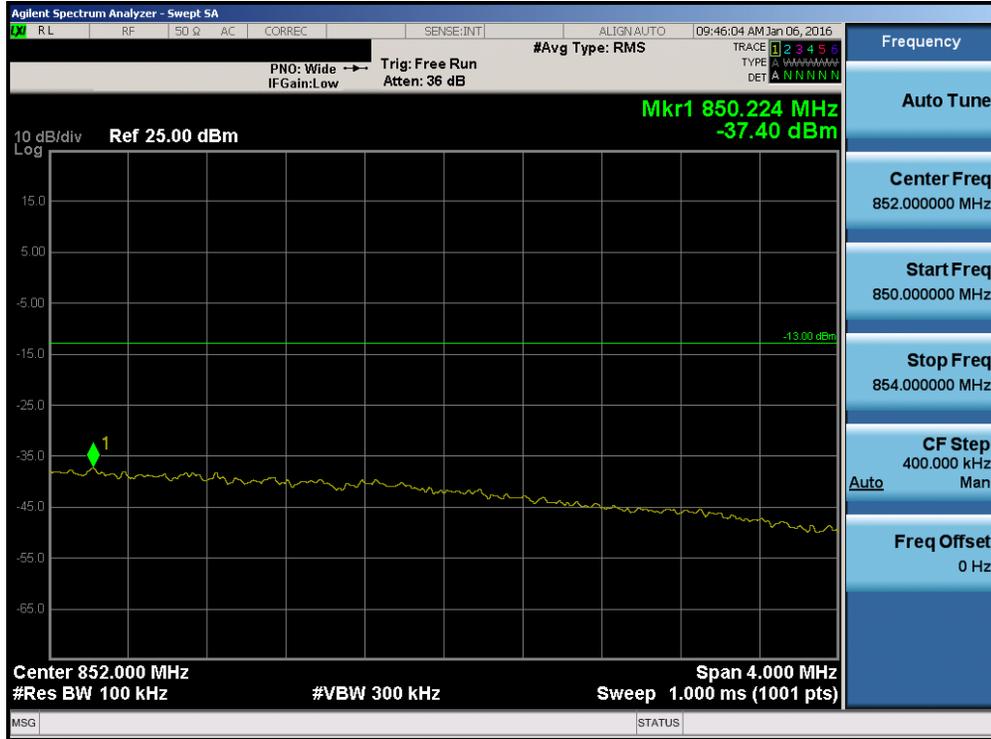


Plot 7-132. Lower Extended Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

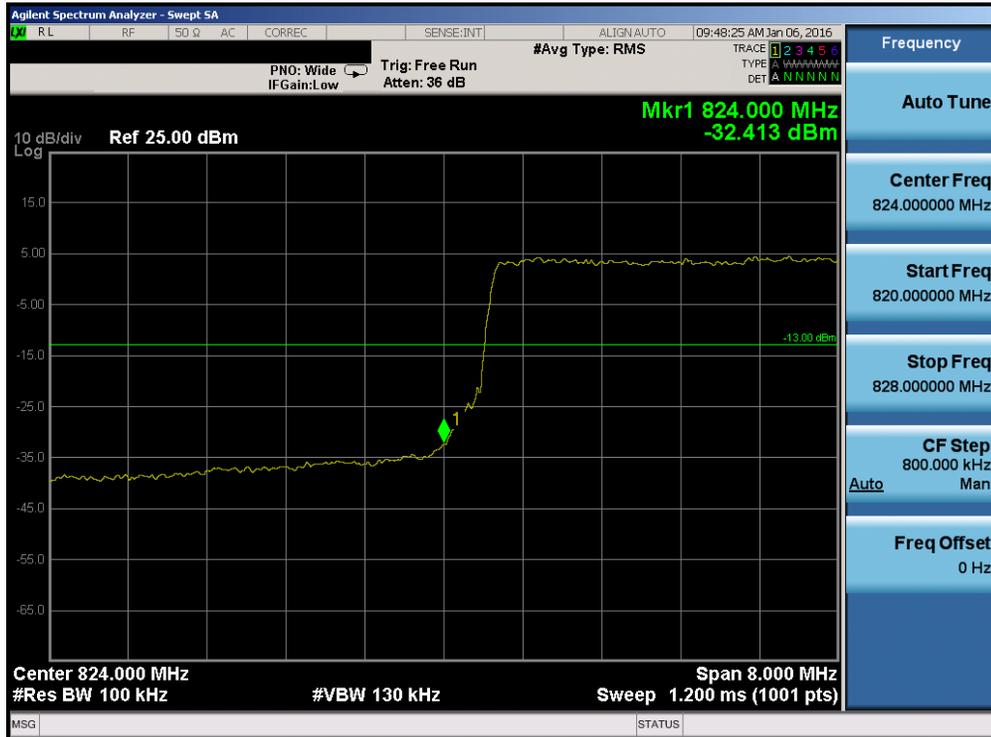


Plot 7-133. Upper Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

|                                      |  |  |    |                                 |
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Plot 7-134. Upper Extended Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

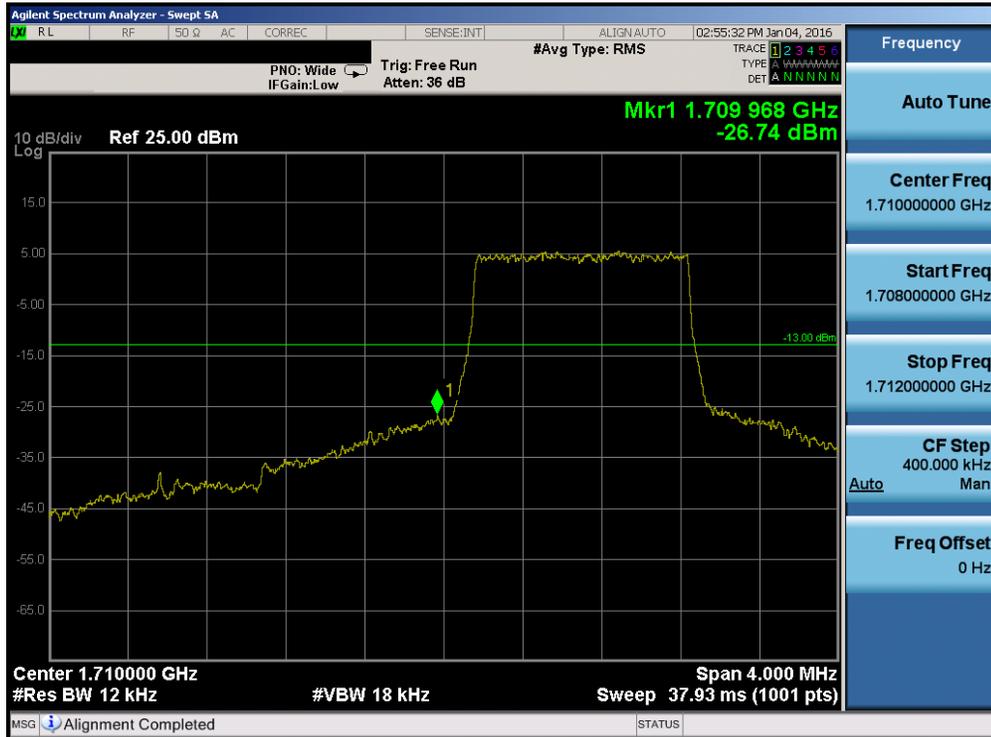


Plot 7-135. Lower Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

|                                      |  |  |    |                                 |
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Plot 7-136. Upper Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

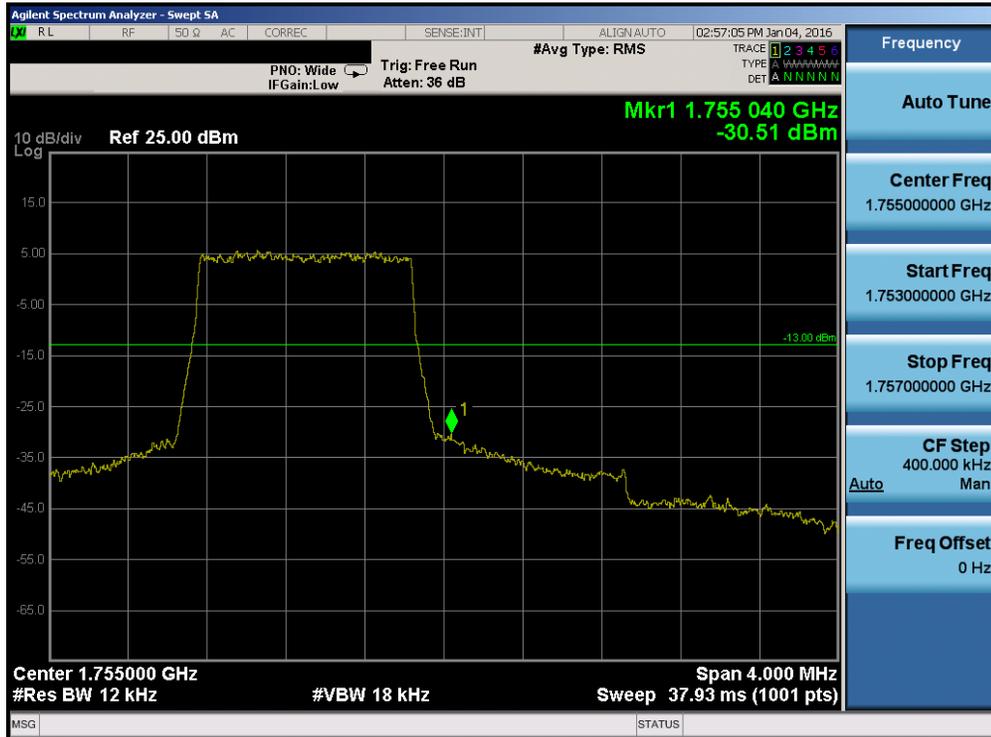


Plot 7-137. Lower Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

|                                   |                                     |   |    |                              |
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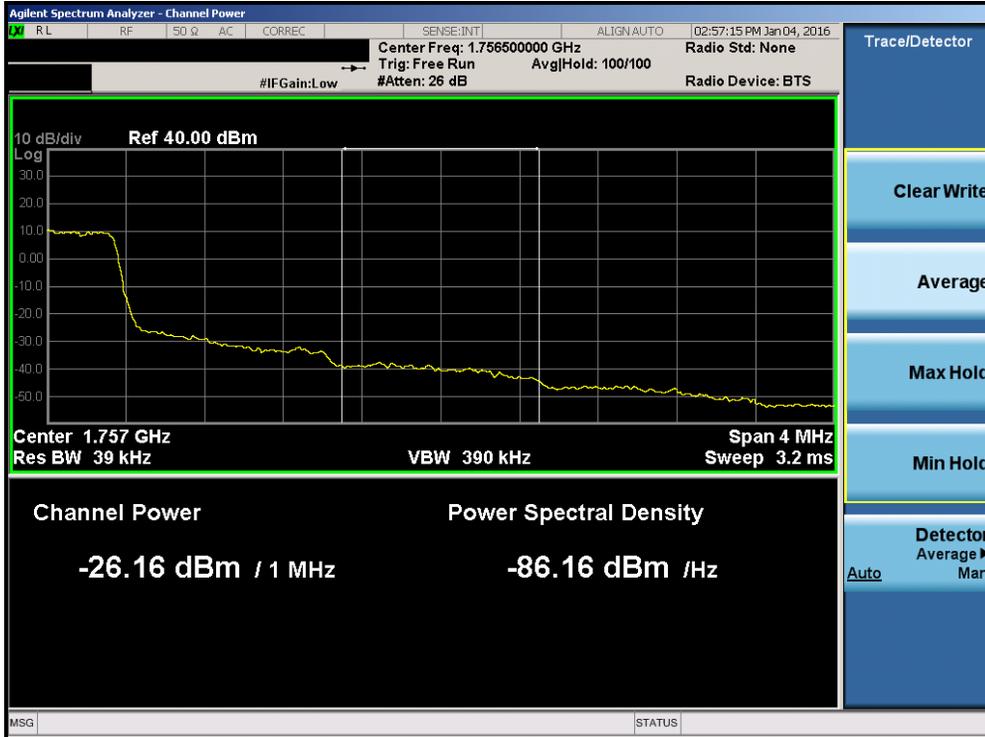


Plot 7-138. Lower Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

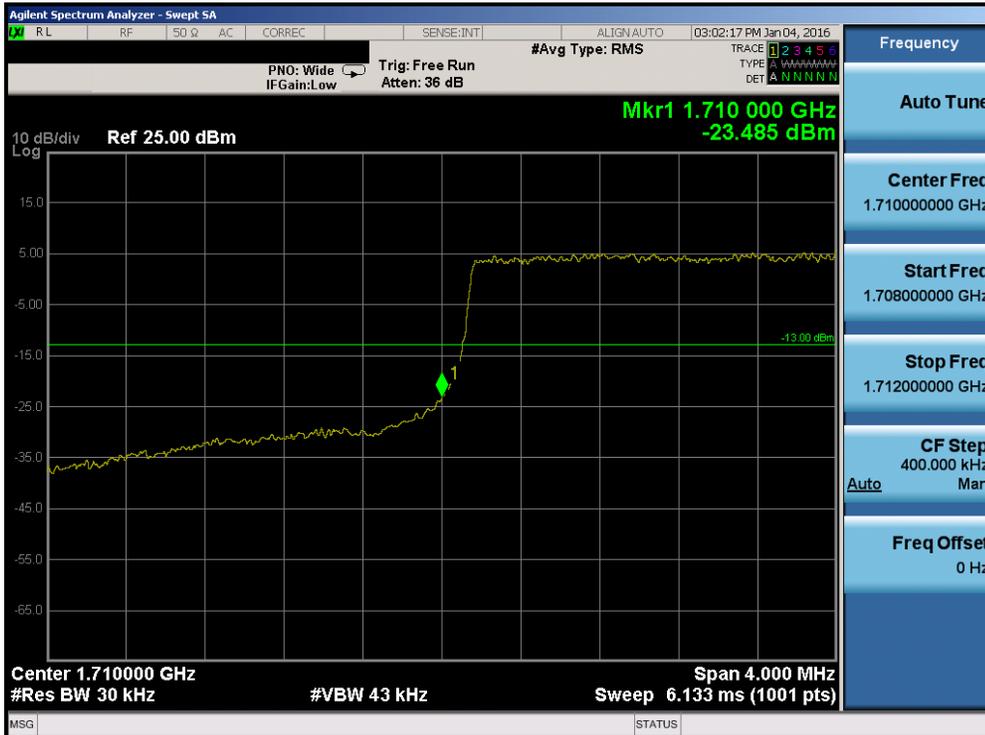


Plot 7-139. Upper Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

|                                      |                               |  |  |                                 |
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Plot 7-140. Upper Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

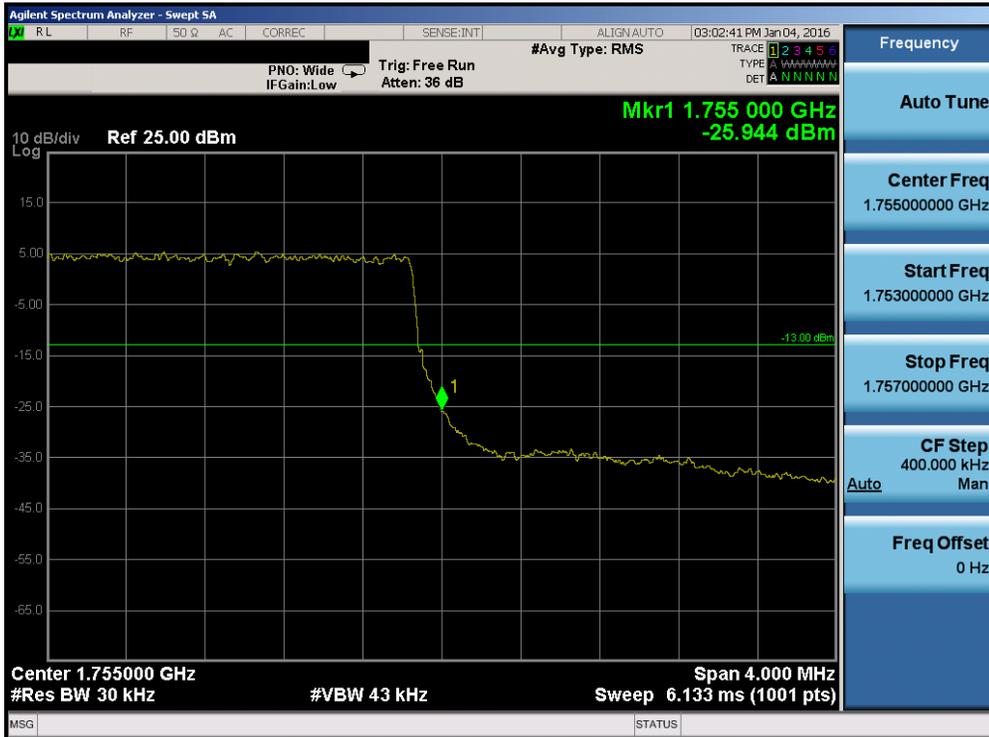


Plot 7-141. Lower Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

|                                      |                               |  |  |                                 |
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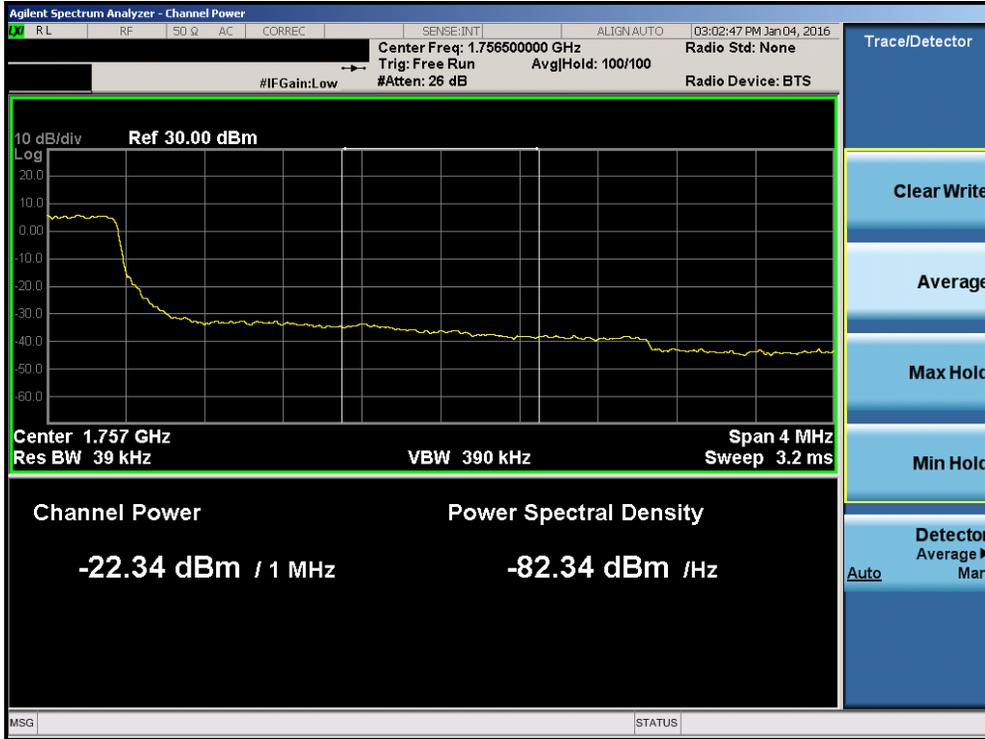


Plot 7-142. Lower Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

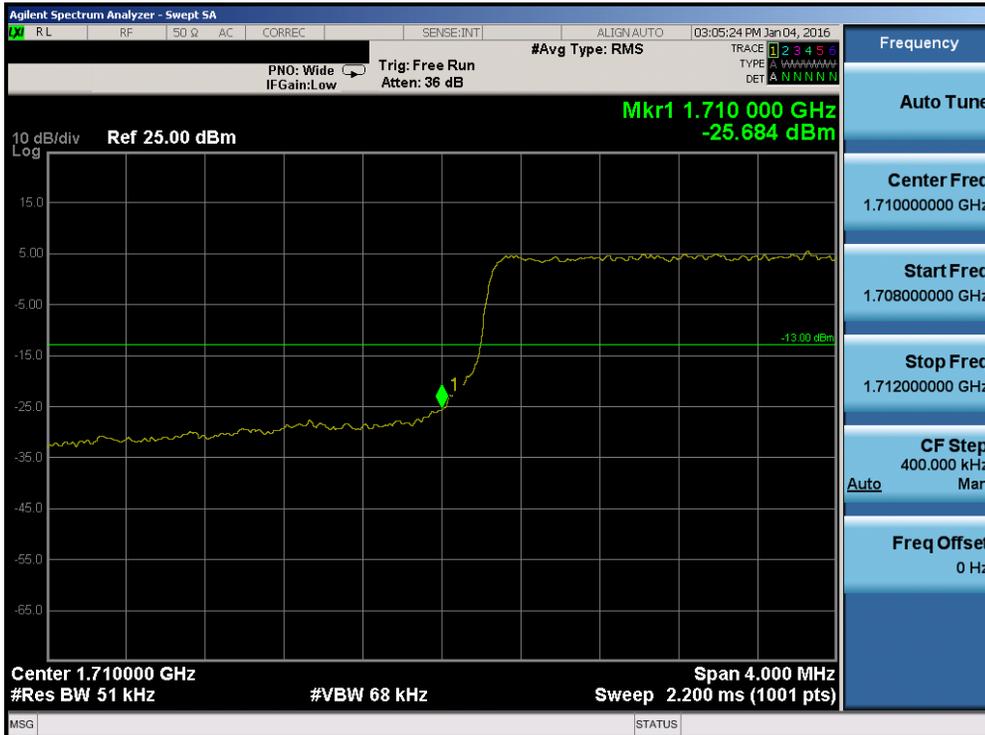


Plot 7-143. Upper Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

|                                      |                               |  |  |                                 |
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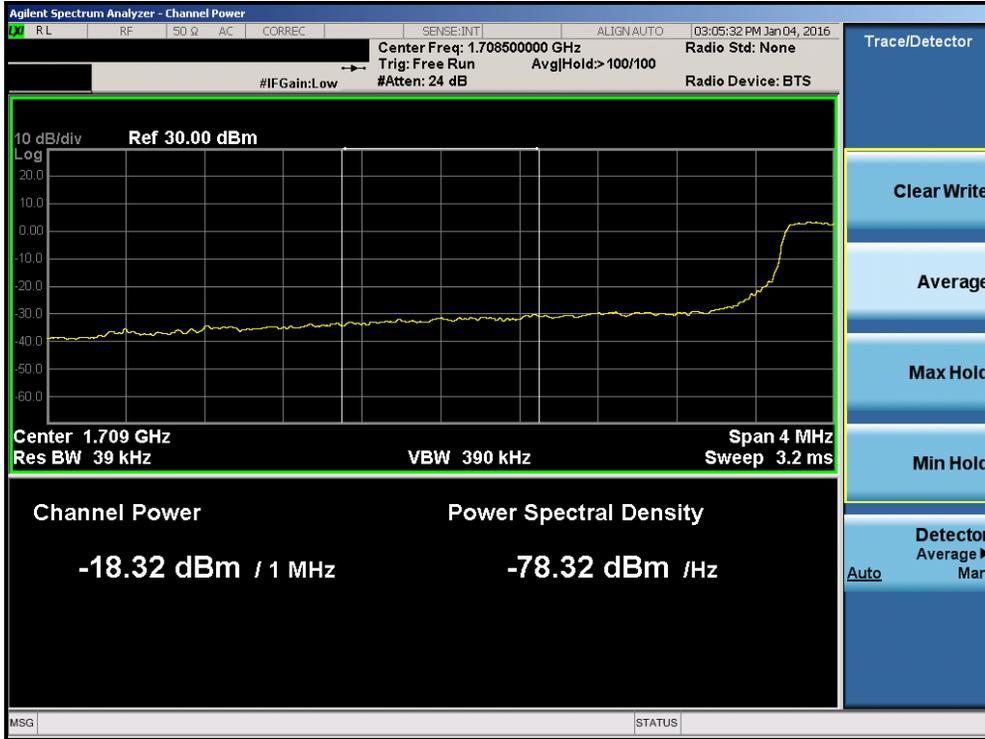


Plot 7-144. Upper Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)



Plot 7-145. Lower Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

|                                      |                               |  |  |                                 |
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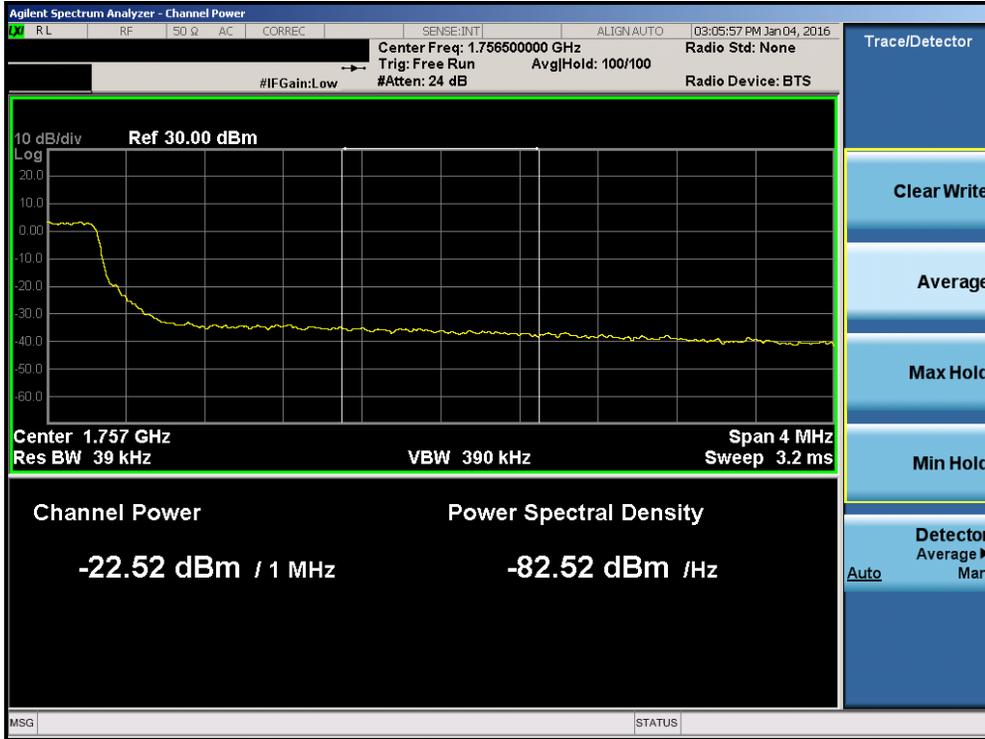


Plot 7-146. Lower Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

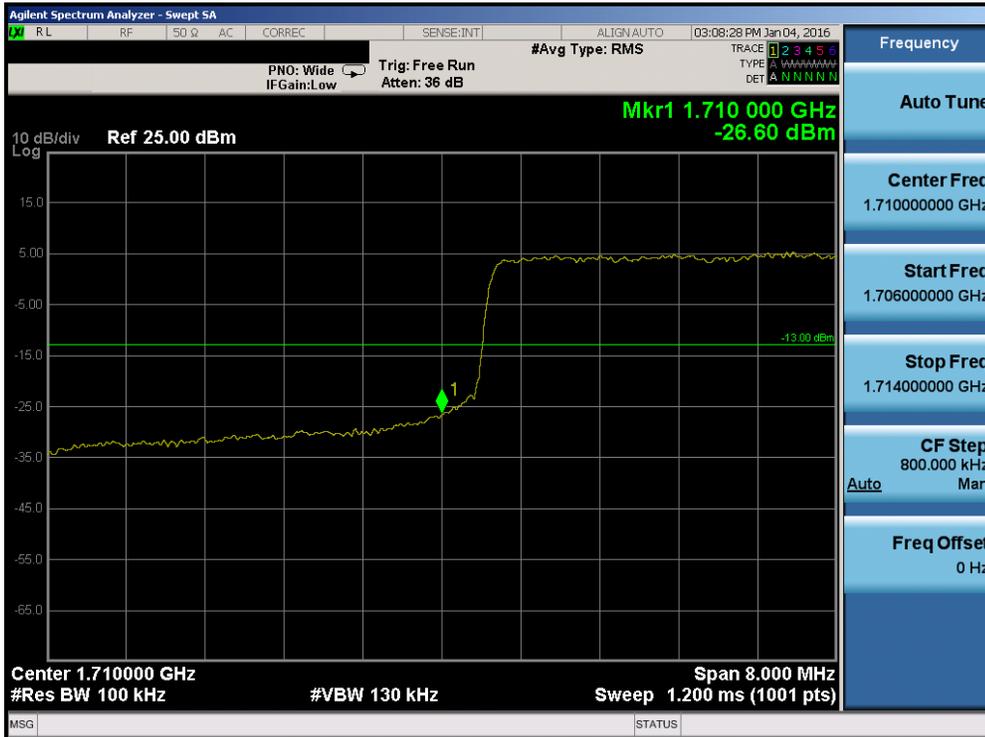


Plot 7-147. Upper Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

|                                      |                               |  |  |                                 |
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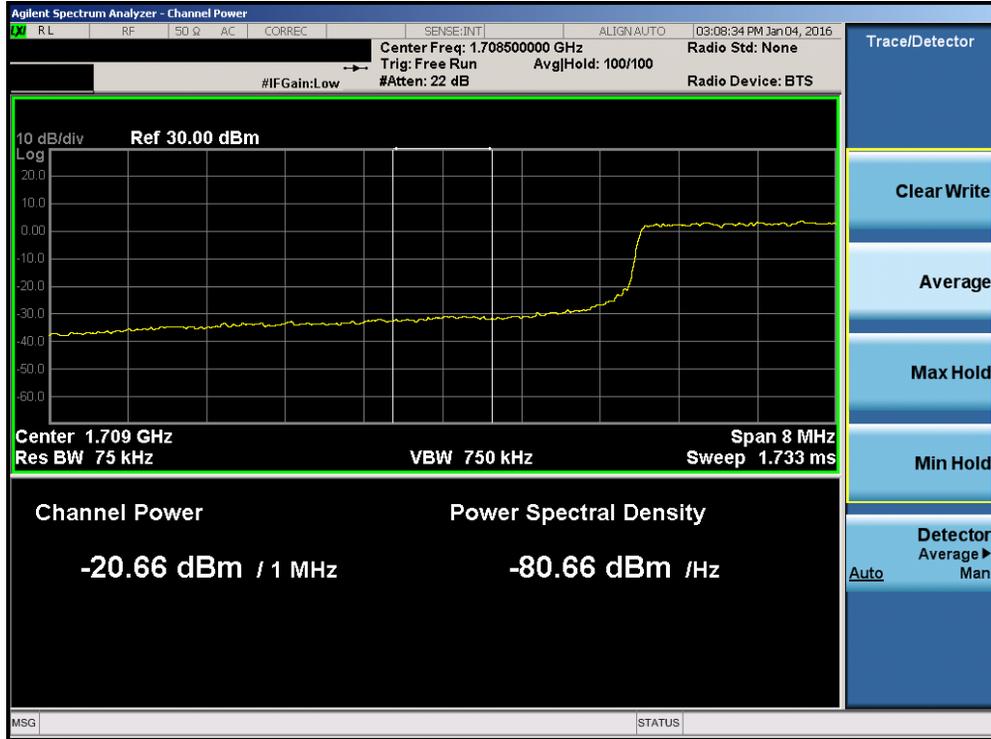


Plot 7-148. Upper Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

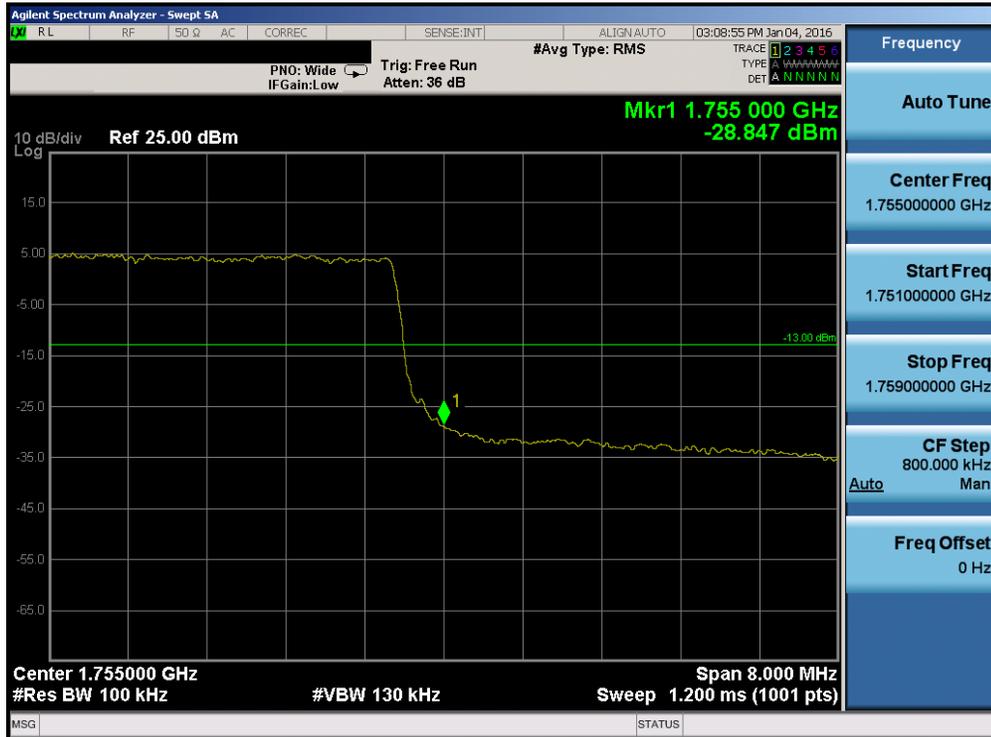


Plot 7-149. Lower Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

|                                      |  |  |    |                                 |
|--------------------------------------|--|--|----|---------------------------------|
| FCC ID: ZNFH820                      | PCTEST<br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | LG | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016          | EUT Type:<br>Portable Handset                                  |    | Page 92 of 160                  |

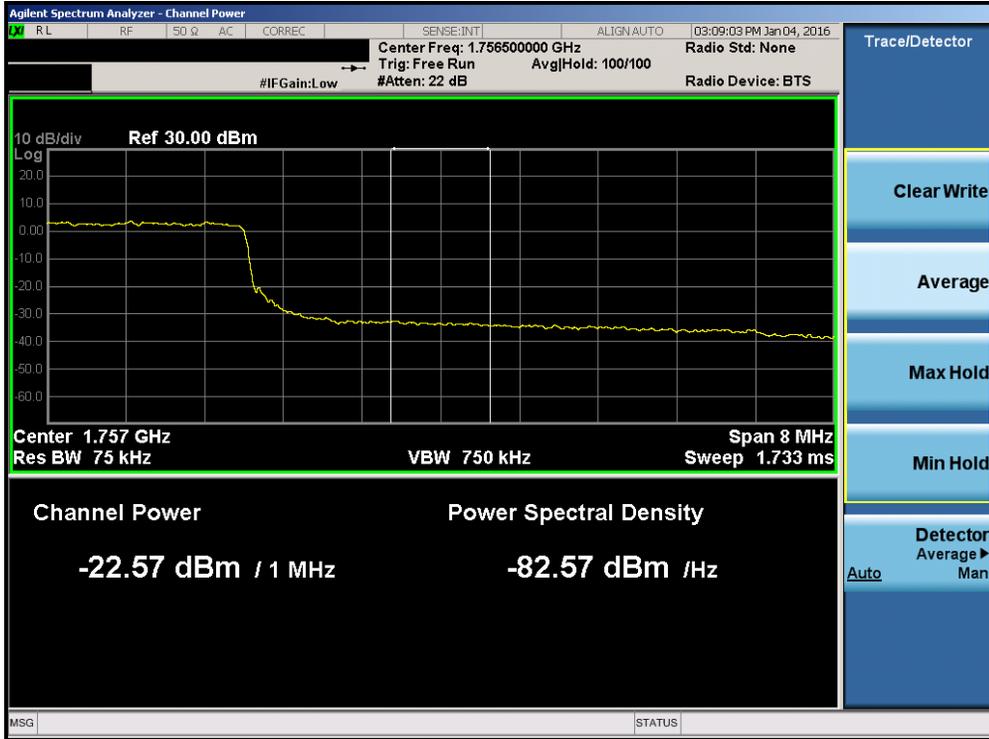


Plot 7-150. Lower Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

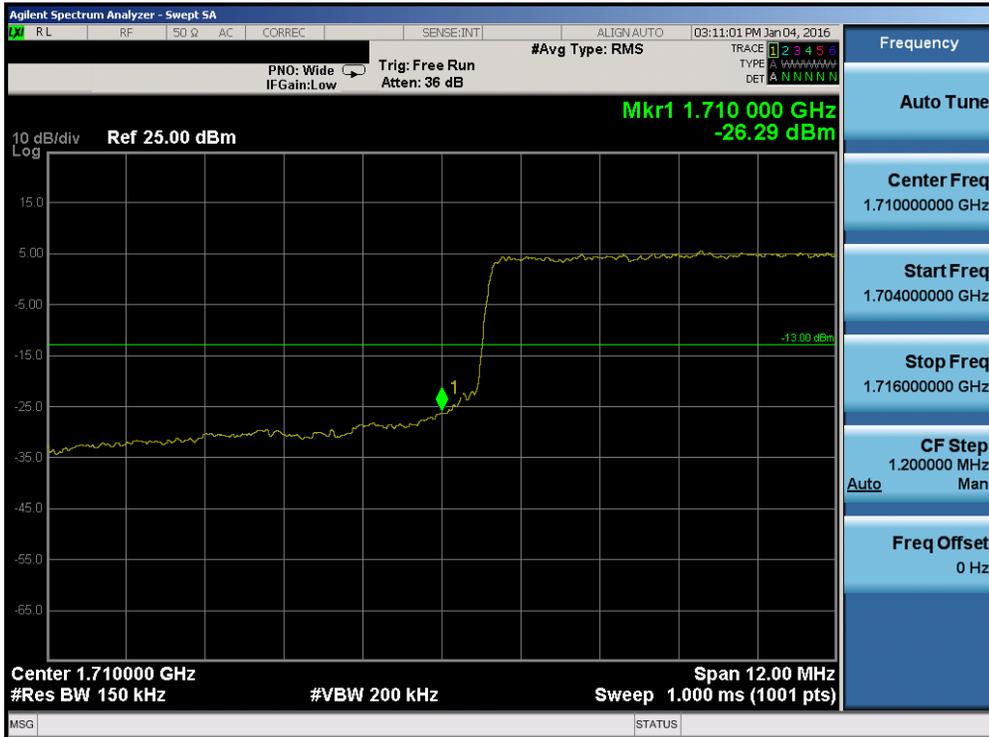


Plot 7-151. Upper Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

|                                      |                               |  |  |                                 |
|--------------------------------------|-------------------------------|--|--|---------------------------------|
| FCC ID: ZNFH820                      |                               | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016 | EUT Type:<br>Portable Handset                                  |  | Page 93 of 160                  |

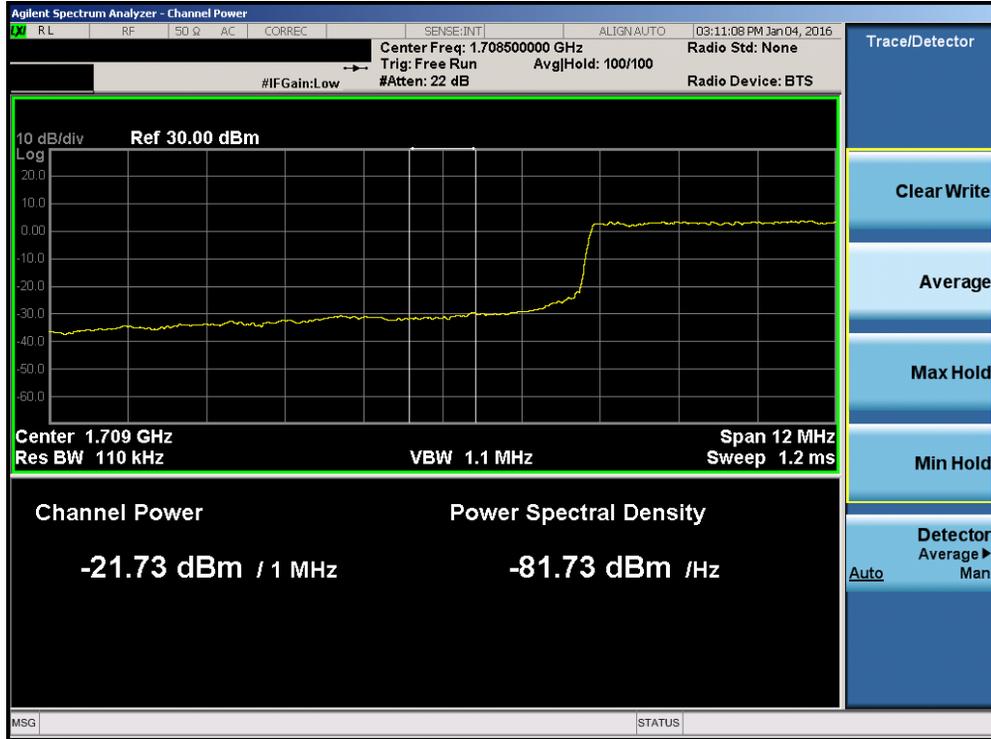


Plot 7-152. Upper Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)



Plot 7-153. Lower Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

|                                   |                            |   |  |                              |
|-----------------------------------|----------------------------|---|--|------------------------------|
| FCC ID: ZNFH820                   |                            | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION) |  | Reviewed by: Quality Manager |
| Test Report S/N: 0Y1601040003.ZNF | Test Dates: 1/4 - 3/2/2016 | EUT Type: Portable Handset                                  |  | Page 94 of 160               |

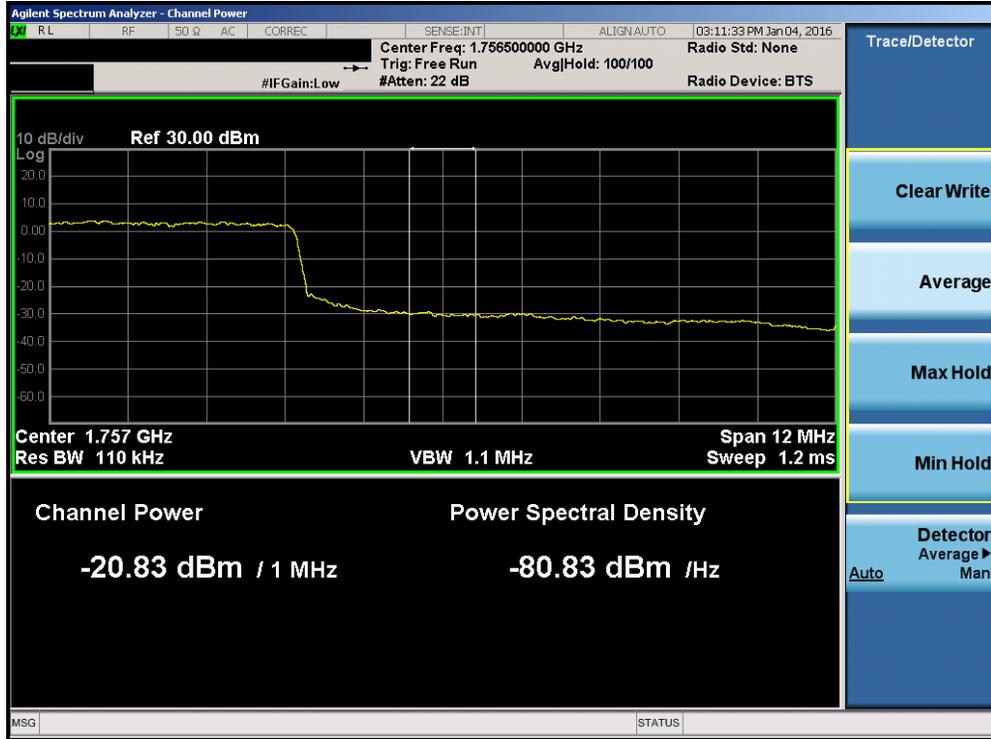


Plot 7-154. Lower Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

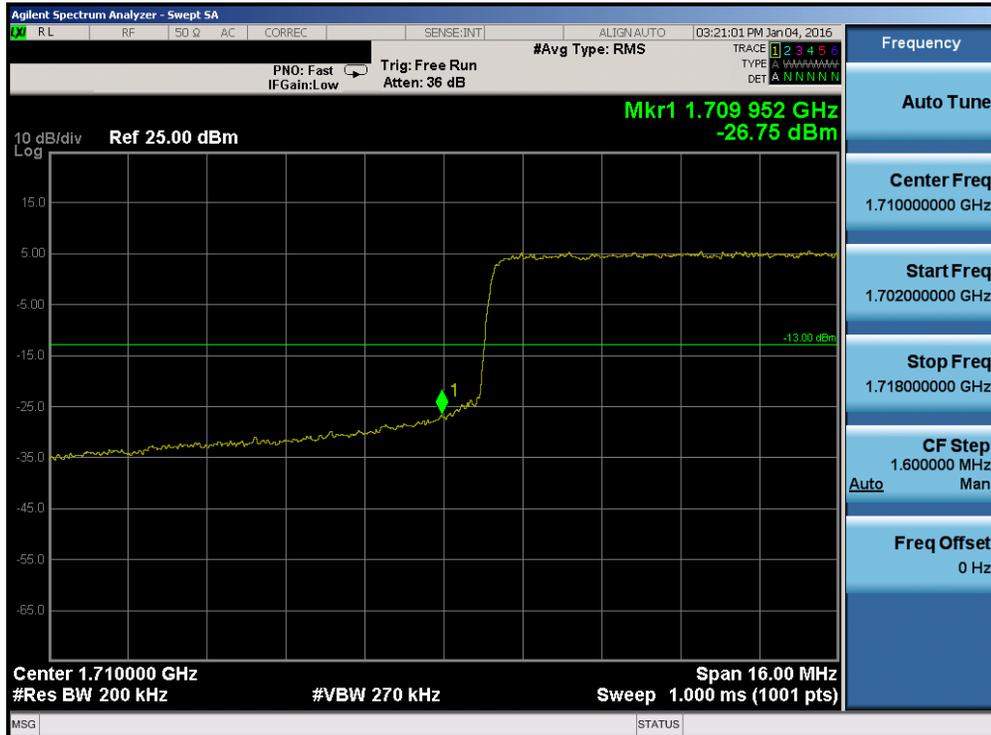


Plot 7-155. Upper Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

|                                      |                               |  |  |                                 |
|--------------------------------------|-------------------------------|--|--|---------------------------------|
| FCC ID: ZNFH820                      |                               | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016 | EUT Type:<br>Portable Handset                                  |  | Page 95 of 160                  |

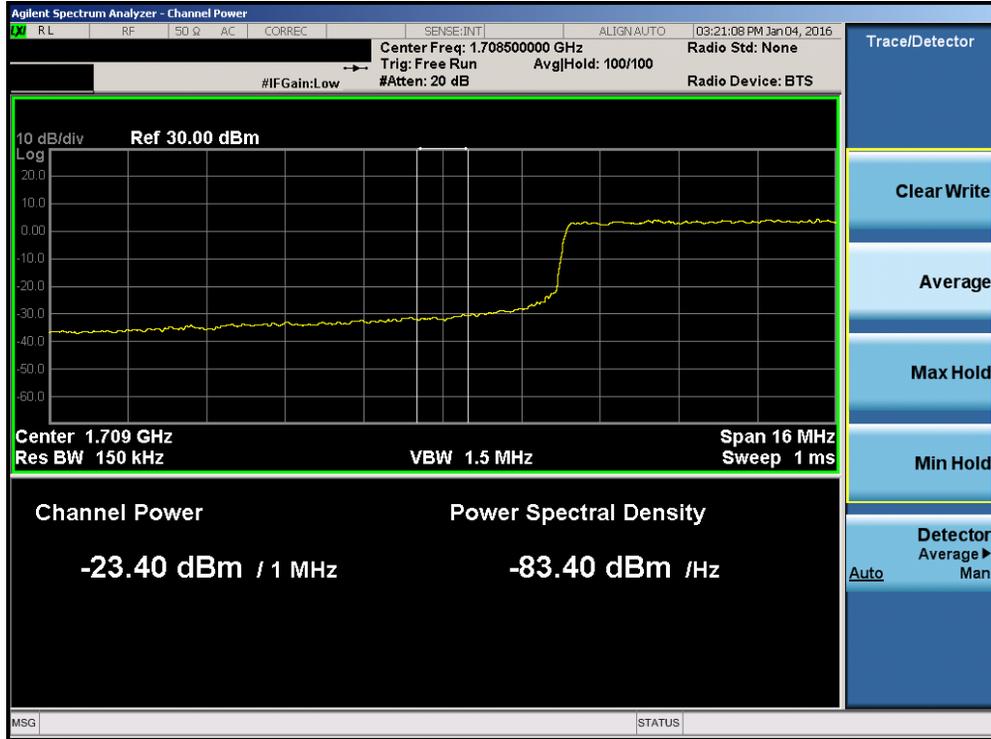


Plot 7-156. Upper Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)



Plot 7-157. Lower Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

|                                      |                               |  |  |                                 |
|--------------------------------------|-------------------------------|--|--|---------------------------------|
| FCC ID: ZNFH820                      |                               | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016 | EUT Type:<br>Portable Handset                                  |  | Page 96 of 160                  |

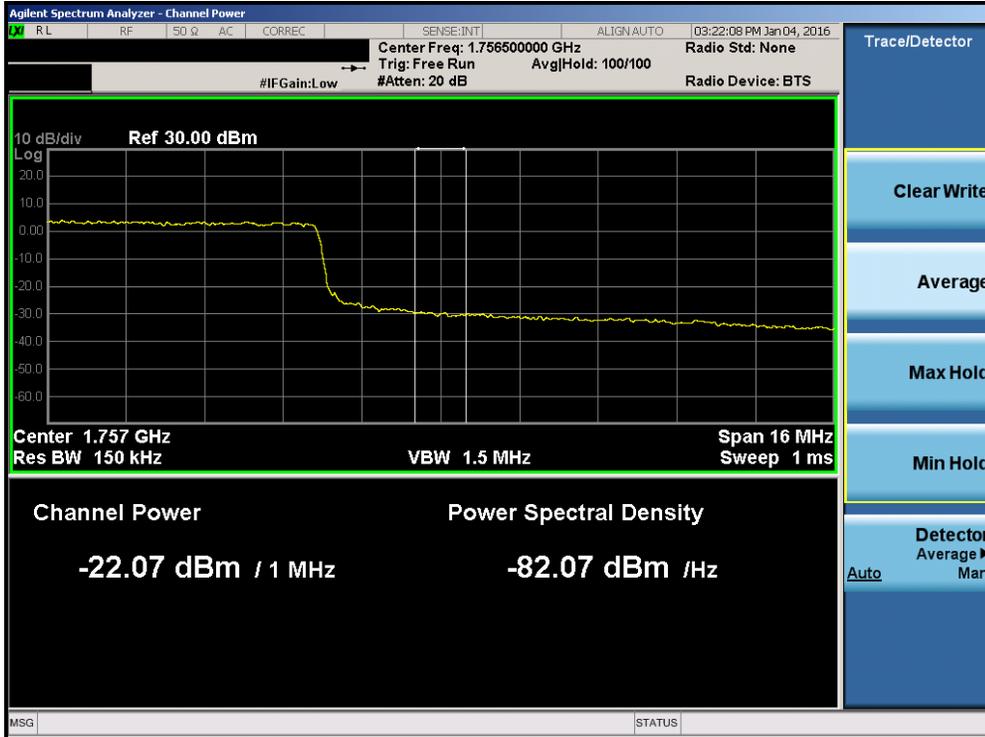


Plot 7-158. Lower Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

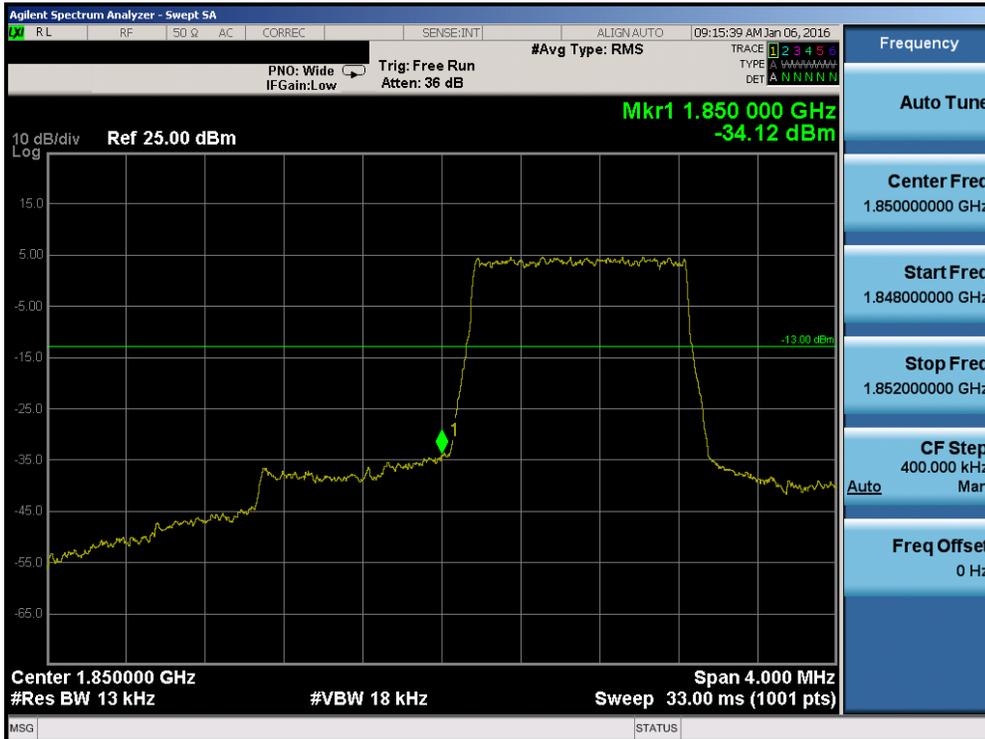


Plot 7-159. Upper Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

|                                      |                               |  |  |                                 |
|--------------------------------------|-------------------------------|--|--|---------------------------------|
| FCC ID: ZNFH820                      |                               | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016 | EUT Type:<br>Portable Handset                                  |  | Page 97 of 160                  |

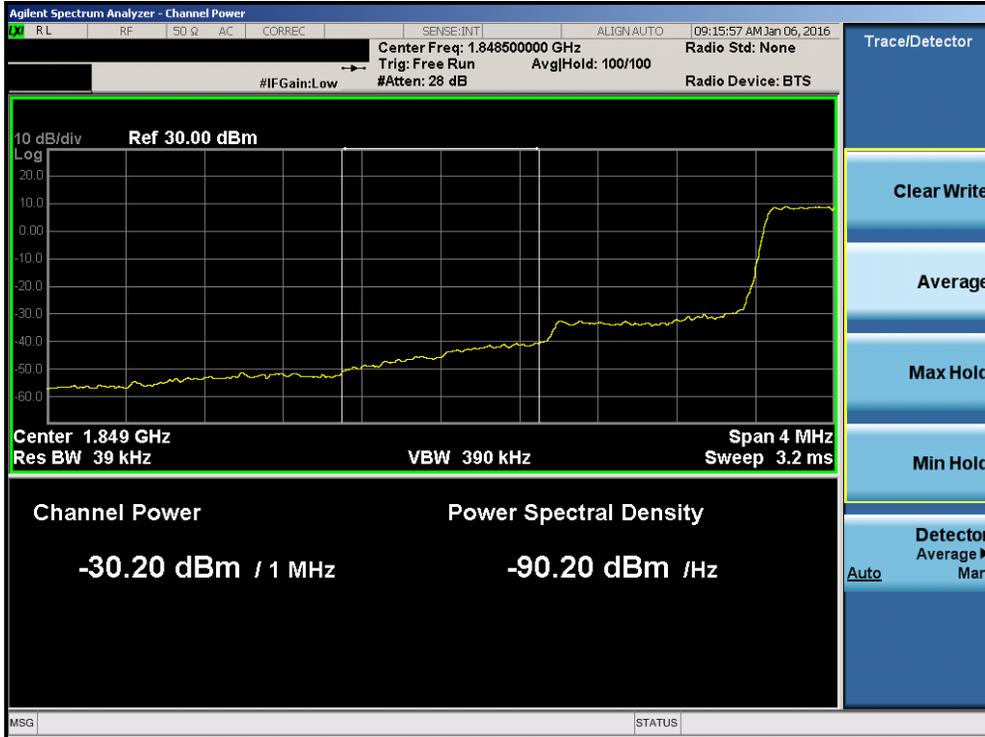


Plot 7-160. Upper Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)



Plot 7-161. Lower Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

|                                      |                               |  |  |                                 |
|--------------------------------------|-------------------------------|--|--|---------------------------------|
| FCC ID: ZNFH820                      |                               | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016 | EUT Type:<br>Portable Handset                                  |  | Page 98 of 160                  |

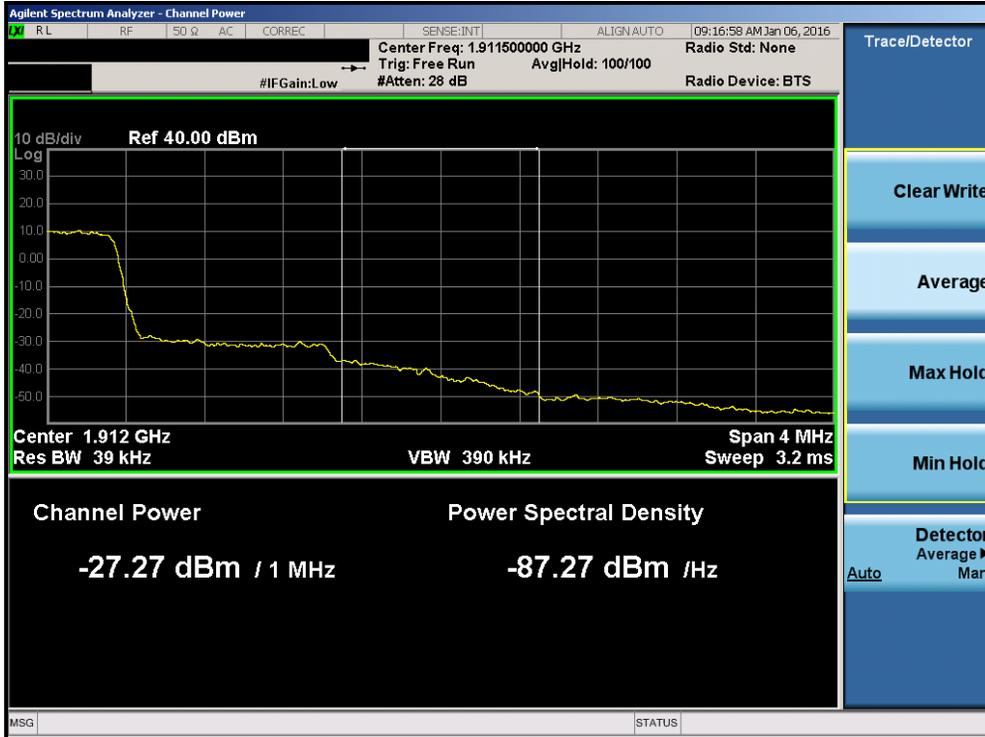


Plot 7-162. Lower Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

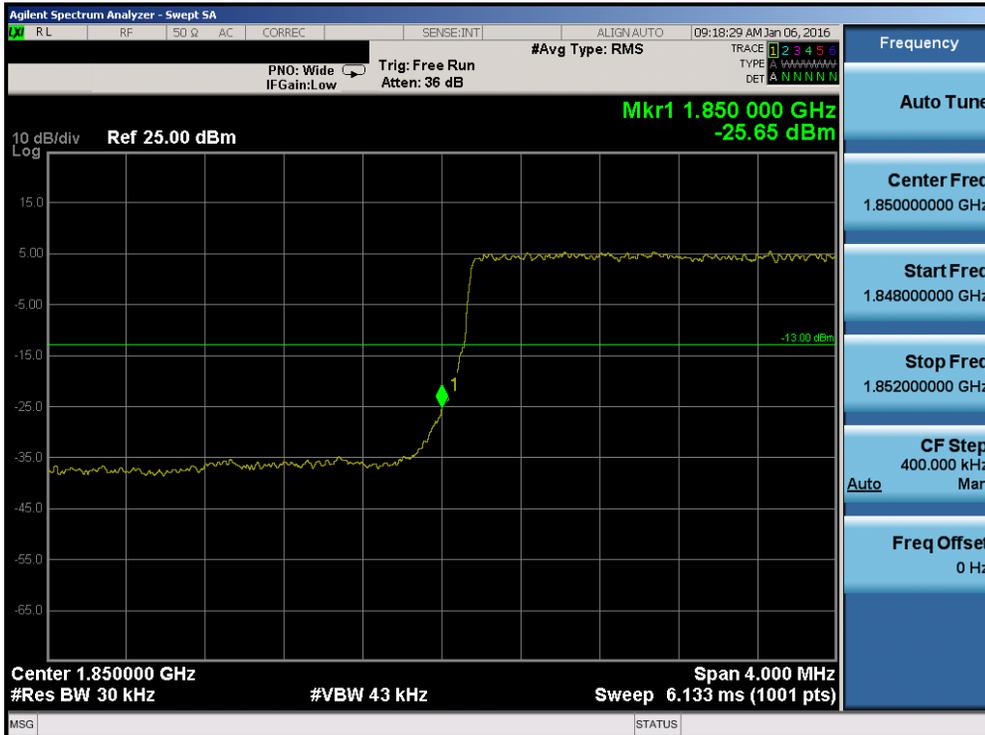


Plot 7-163. Upper Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

|                                      |                               |  |  |                                 |
|--------------------------------------|-------------------------------|--|--|---------------------------------|
| FCC ID: ZNFH820                      |                               | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016 | EUT Type:<br>Portable Handset                                  |  | Page 99 of 160                  |



Plot 7-164. Upper Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

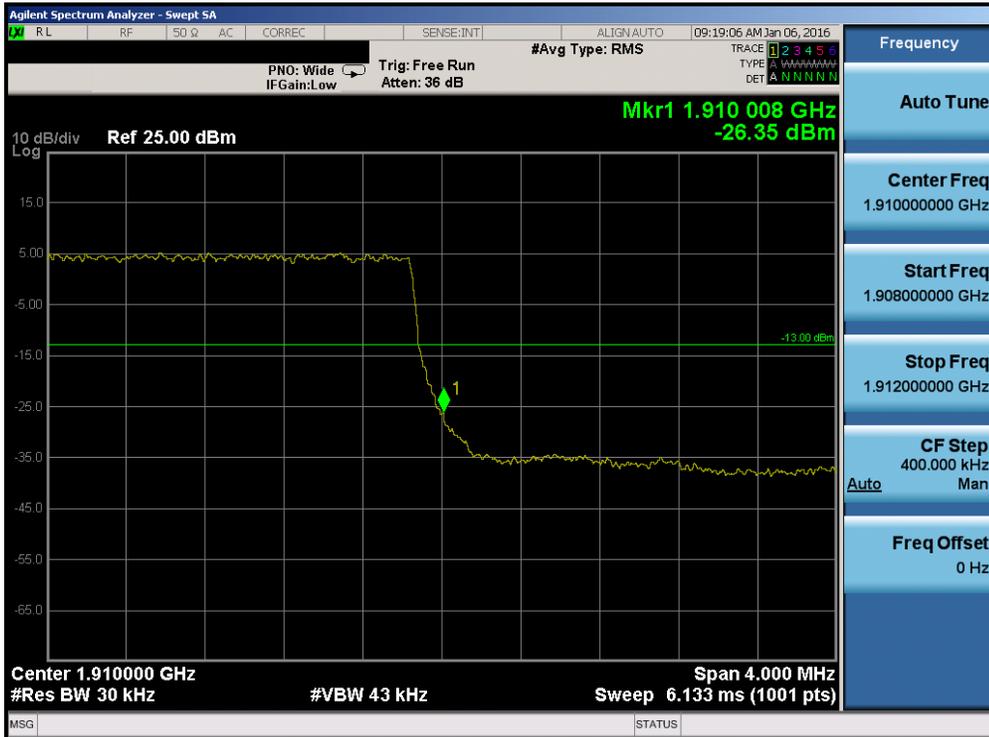


Plot 7-165. Lower Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

|                                      |                               |  |  |                                 |
|--------------------------------------|-------------------------------|--|--|---------------------------------|
| FCC ID: ZNFH820                      |                               | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016 | EUT Type:<br>Portable Handset                                  |  | Page 100 of 160                 |



Plot 7-166. Lower Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

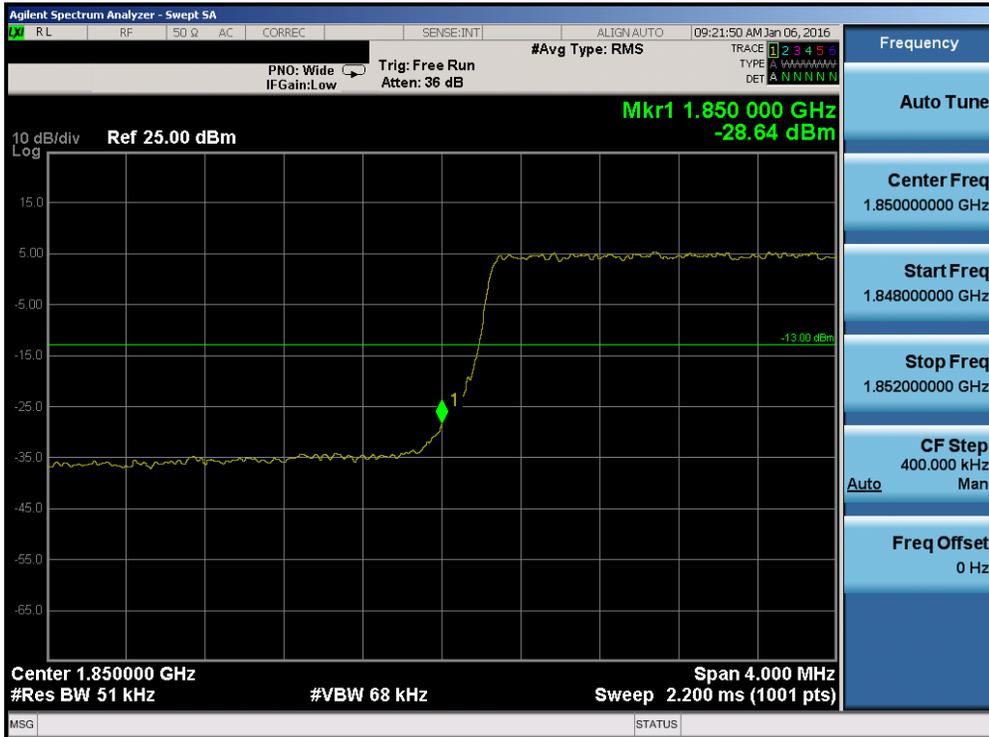


Plot 7-167. Upper Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

|                                      |                               |  |  |                                 |
|--------------------------------------|-------------------------------|--|--|---------------------------------|
| FCC ID: ZNFH820                      |                               | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016 | EUT Type:<br>Portable Handset                                  |  | Page 101 of 160                 |

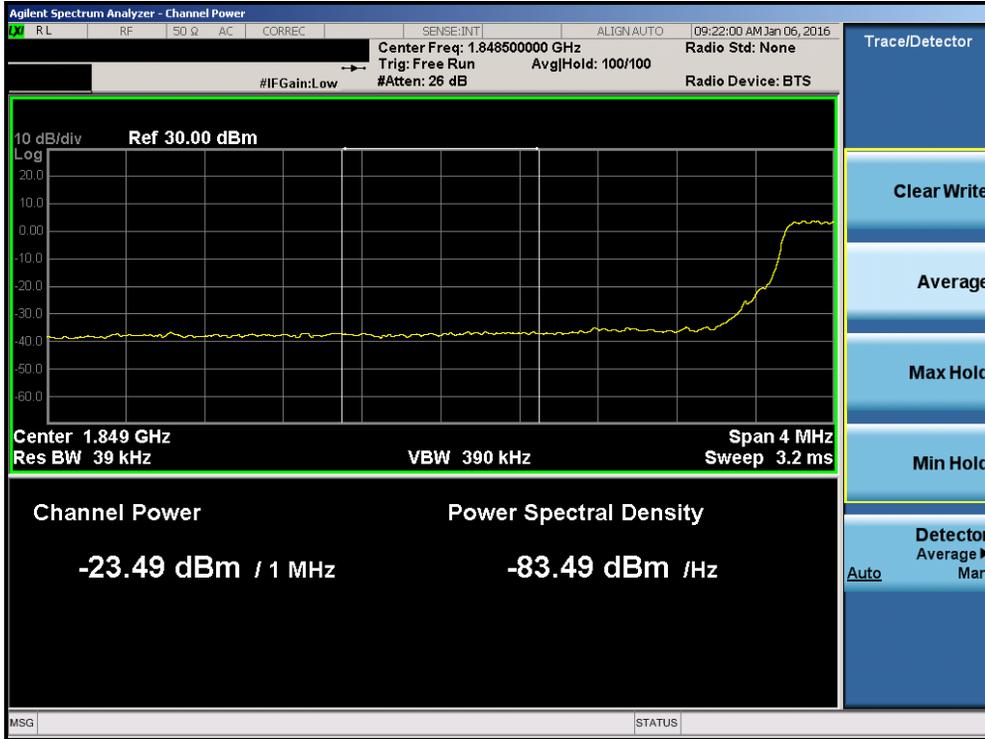


Plot 7-168. Upper Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

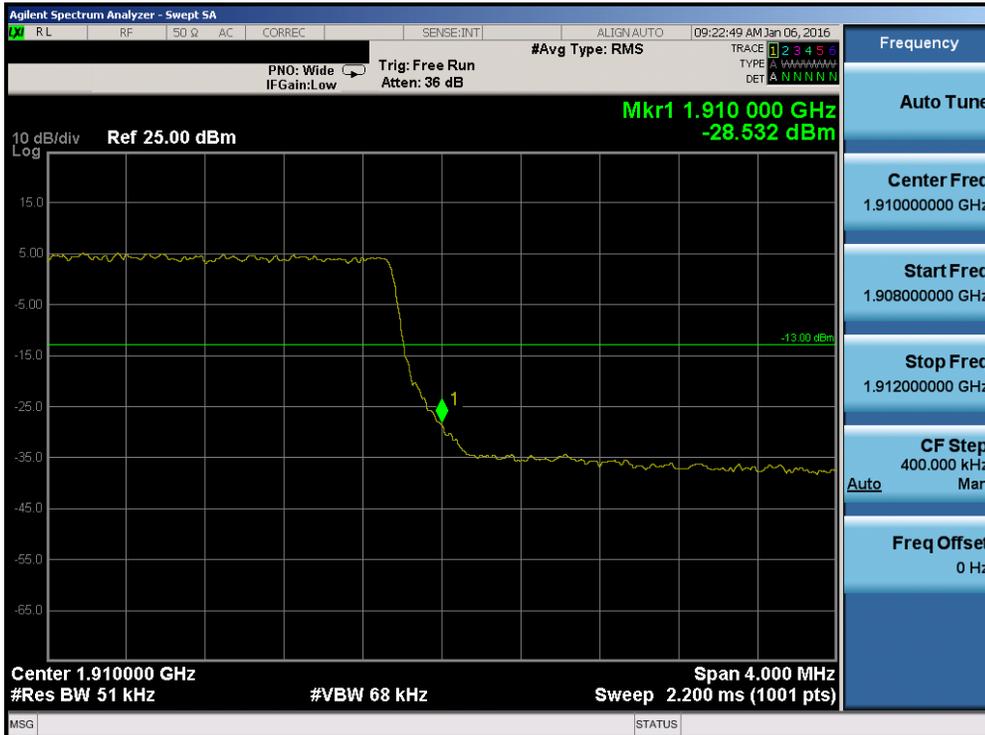


Plot 7-169. Lower Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

|                                      |                               |  |  |                                 |
|--------------------------------------|-------------------------------|--|--|---------------------------------|
| FCC ID: ZNFH820                      |                               | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016 | EUT Type:<br>Portable Handset                                  |  | Page 102 of 160                 |

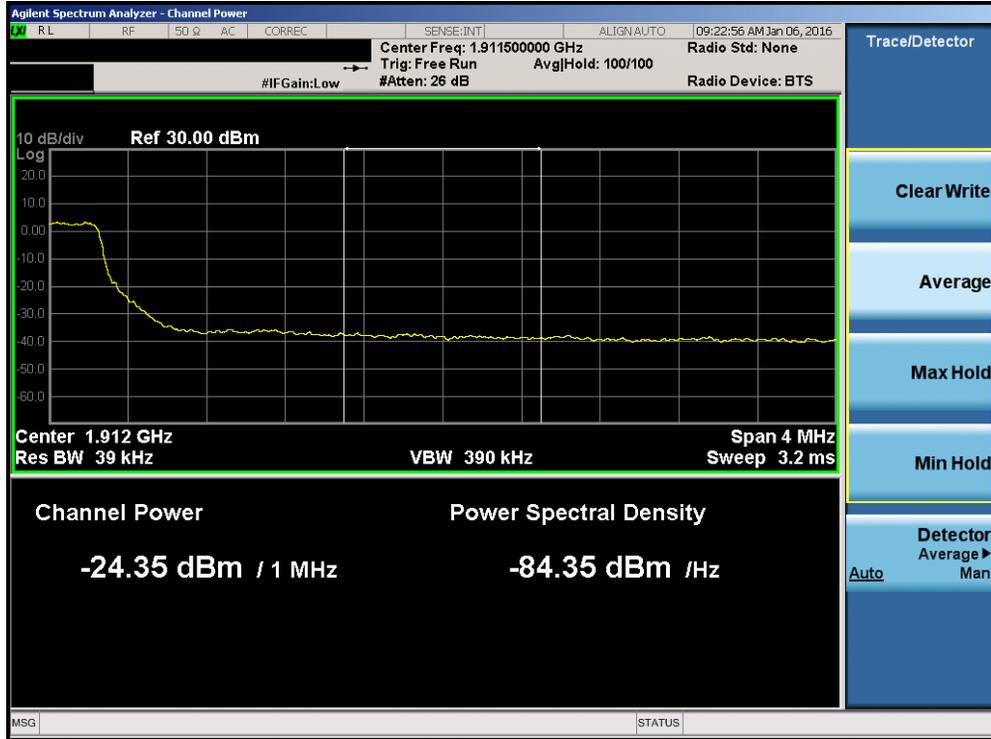


Plot 7-170. Lower Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

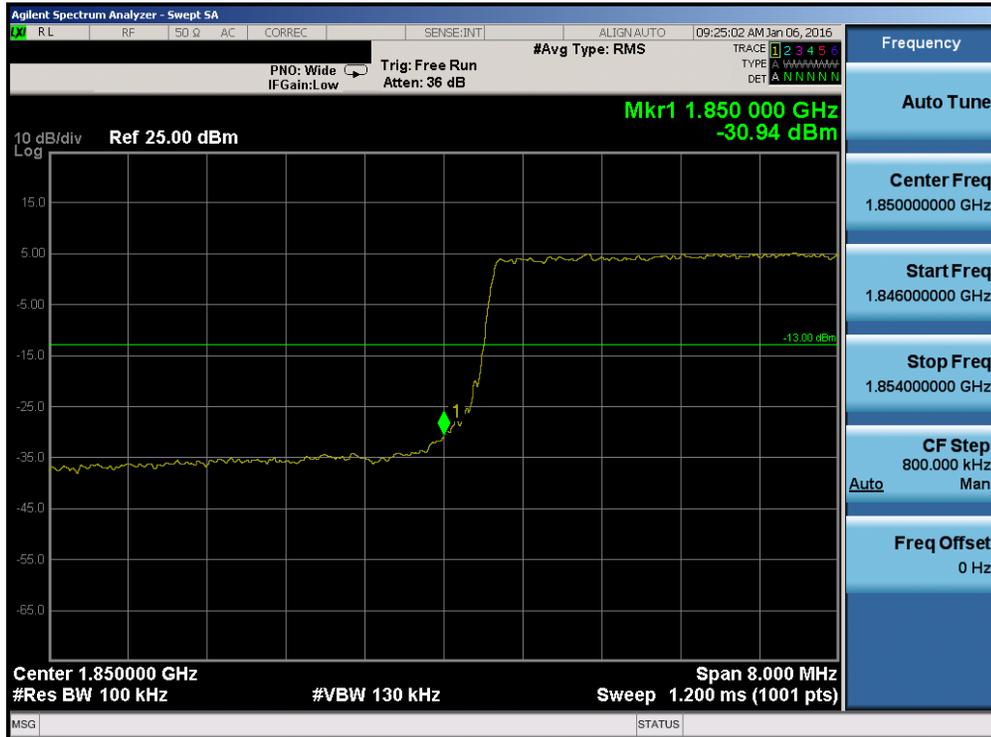


Plot 7-171. Upper Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

|                                      |                               |  |  |                                 |
|--------------------------------------|-------------------------------|--|--|---------------------------------|
| FCC ID: ZNFH820                      |                               | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016 | EUT Type:<br>Portable Handset                                  |  | Page 103 of 160                 |

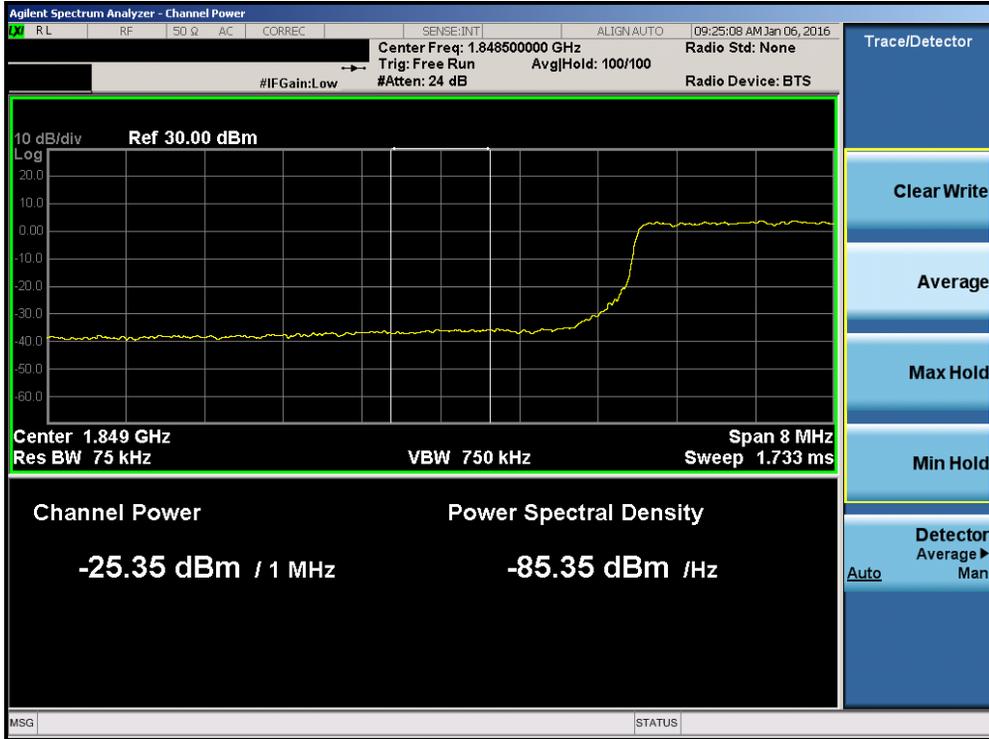


Plot 7-172. Upper Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

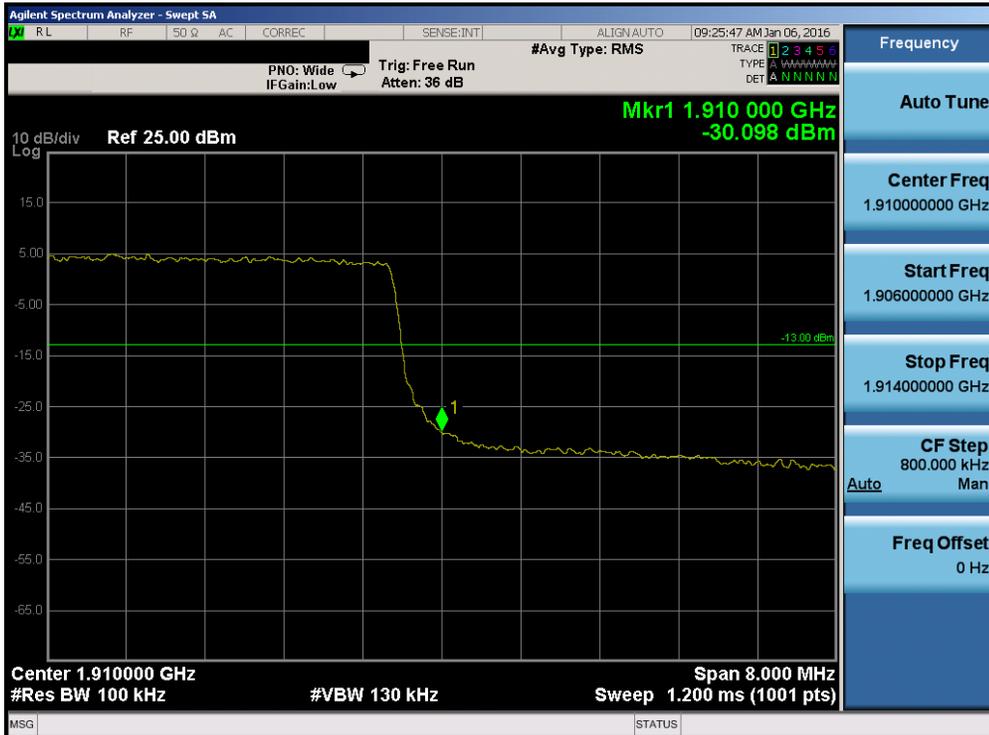


Plot 7-173. Lower Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

|                                      |  |  |    |                                 |
|--------------------------------------|--|--|----|---------------------------------|
| FCC ID: ZNFH820                      | PCTEST<br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | LG | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016          | EUT Type:<br>Portable Handset                                  |    | Page 104 of 160                 |



Plot 7-174. Lower Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

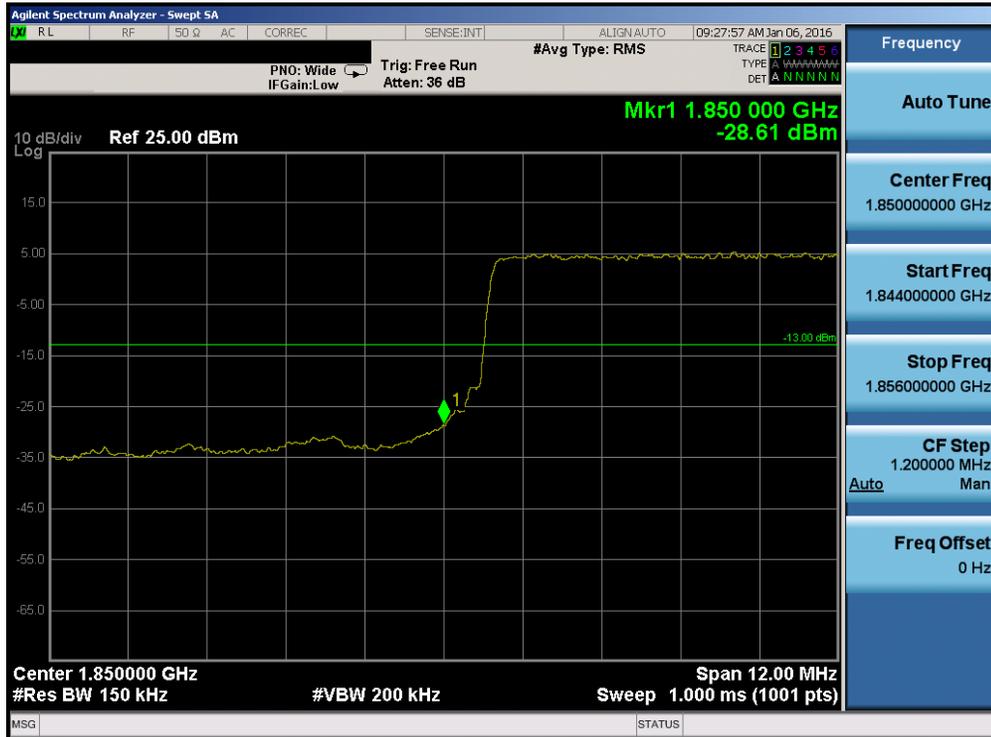


Plot 7-175. Upper Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

|                                      |                               |  |  |                                 |
|--------------------------------------|-------------------------------|--|--|---------------------------------|
| FCC ID: ZNFH820                      |                               | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016 | EUT Type:<br>Portable Handset                                  |  | Page 105 of 160                 |

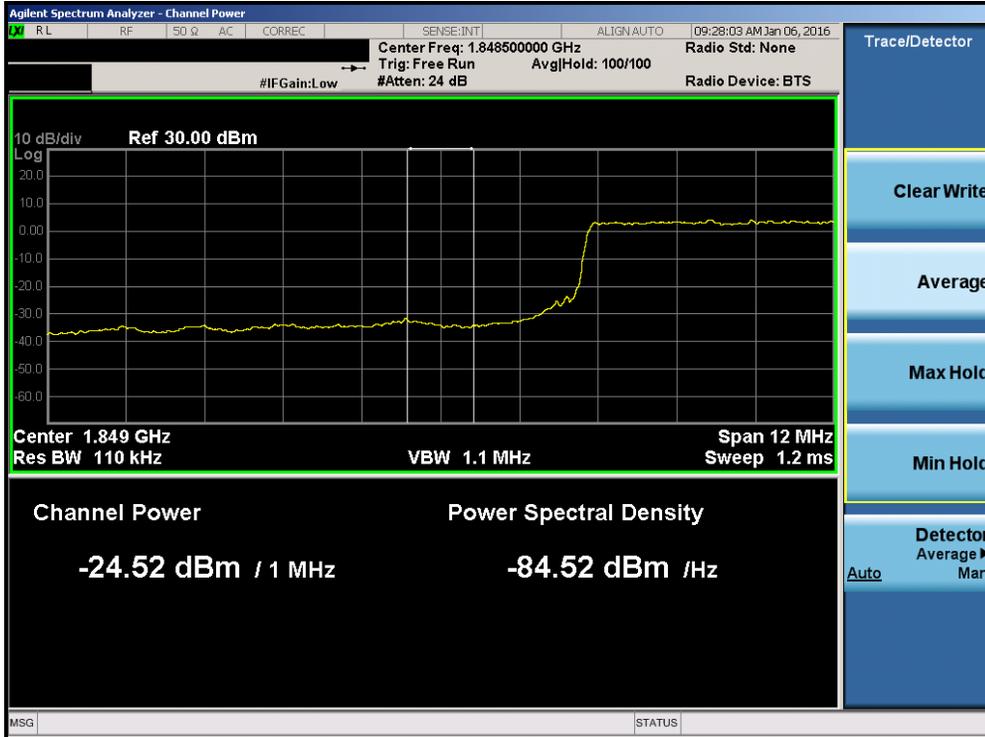


Plot 7-176. Upper Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)



Plot 7-177. Lower Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

|                                      |                               |  |  |                                 |
|--------------------------------------|-------------------------------|--|--|---------------------------------|
| FCC ID: ZNFH820                      |                               | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016 | EUT Type:<br>Portable Handset                                  |  | Page 106 of 160                 |

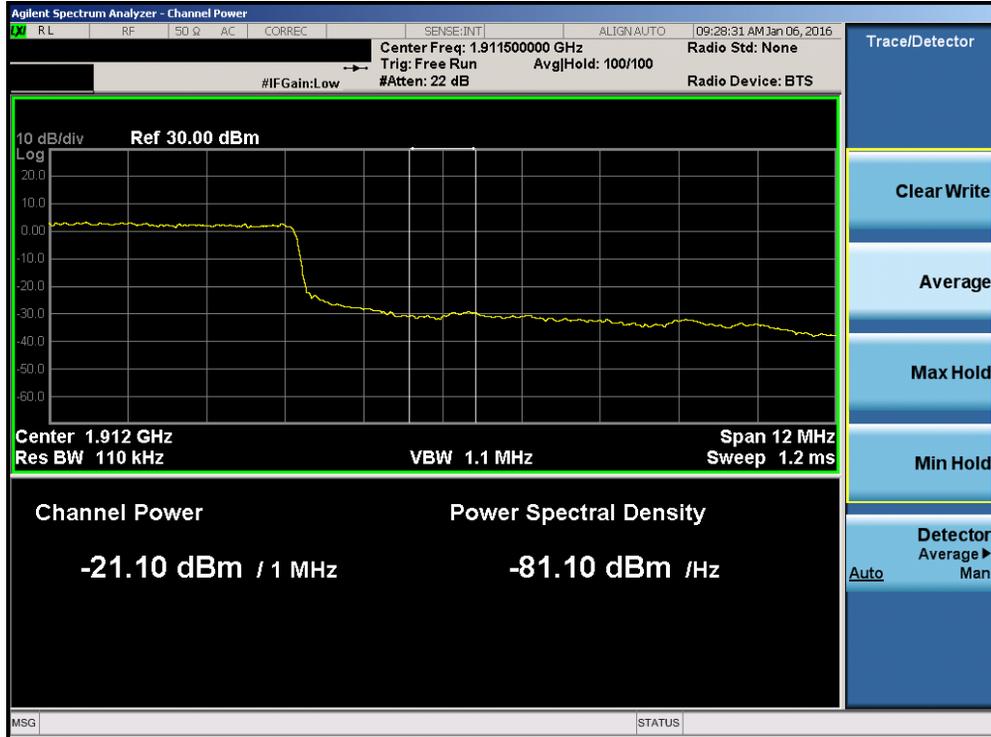


Plot 7-178. Lower Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

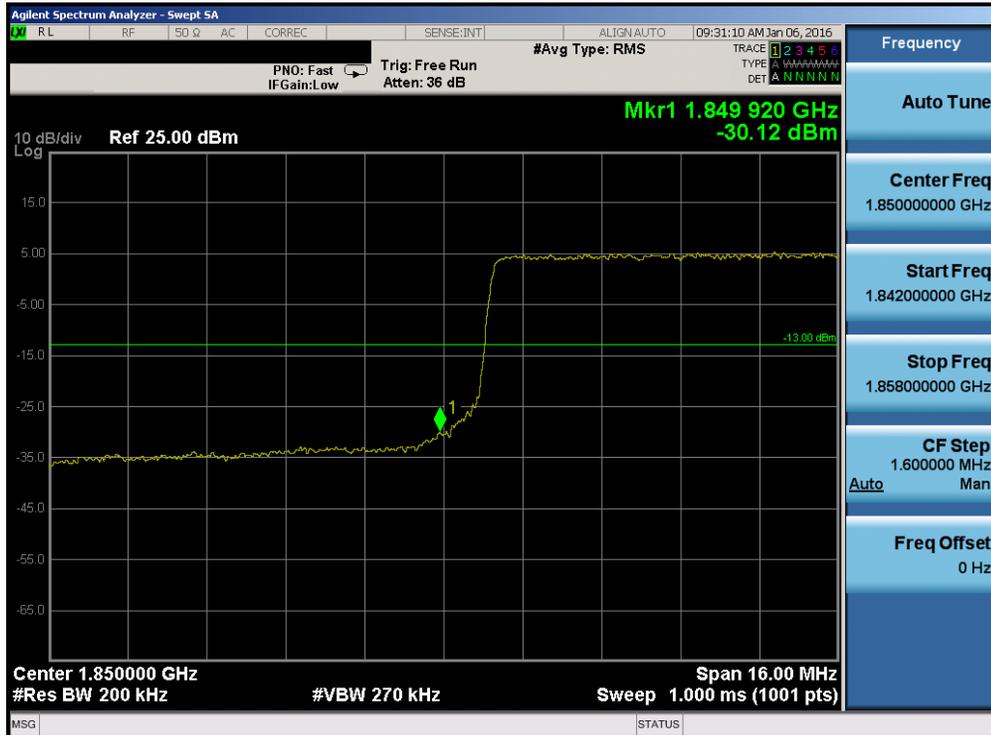


Plot 7-179. Upper Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

|                                      |                               |  |  |                                 |
|--------------------------------------|-------------------------------|--|--|---------------------------------|
| FCC ID: ZNFH820                      |                               | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016 | EUT Type:<br>Portable Handset                                  |  | Page 107 of 160                 |

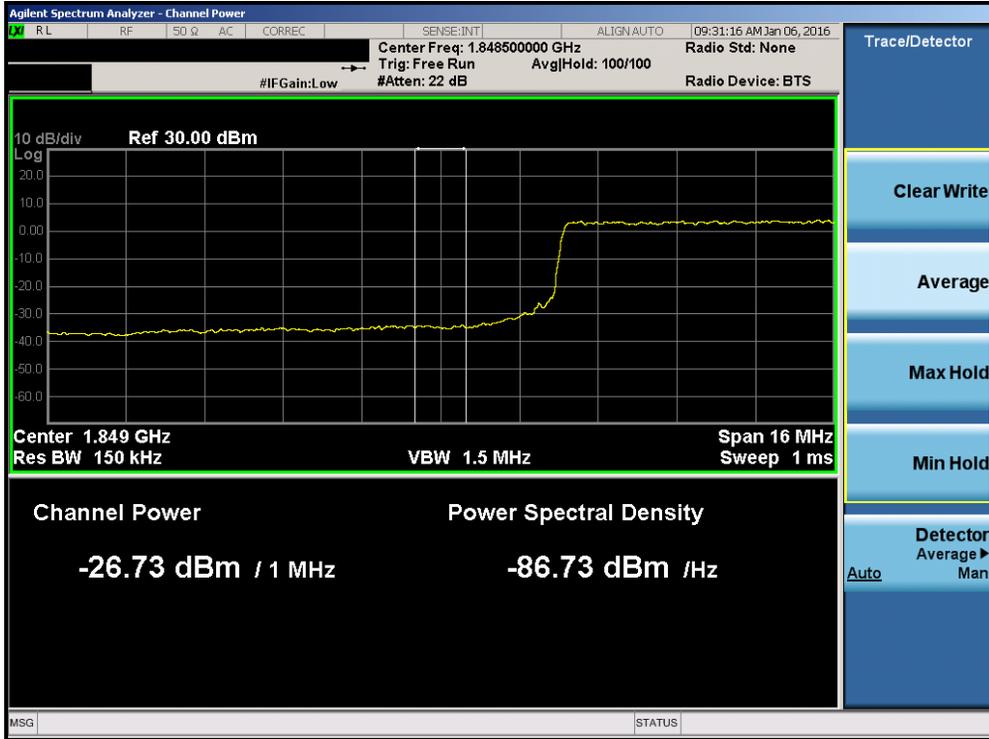


Plot 7-180. Upper Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)



Plot 7-181. Lower Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

|                                      |                               |  |  |                                 |
|--------------------------------------|-------------------------------|--|--|---------------------------------|
| FCC ID: ZNFH820                      |                               | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016 | EUT Type:<br>Portable Handset                                  |  | Page 108 of 160                 |

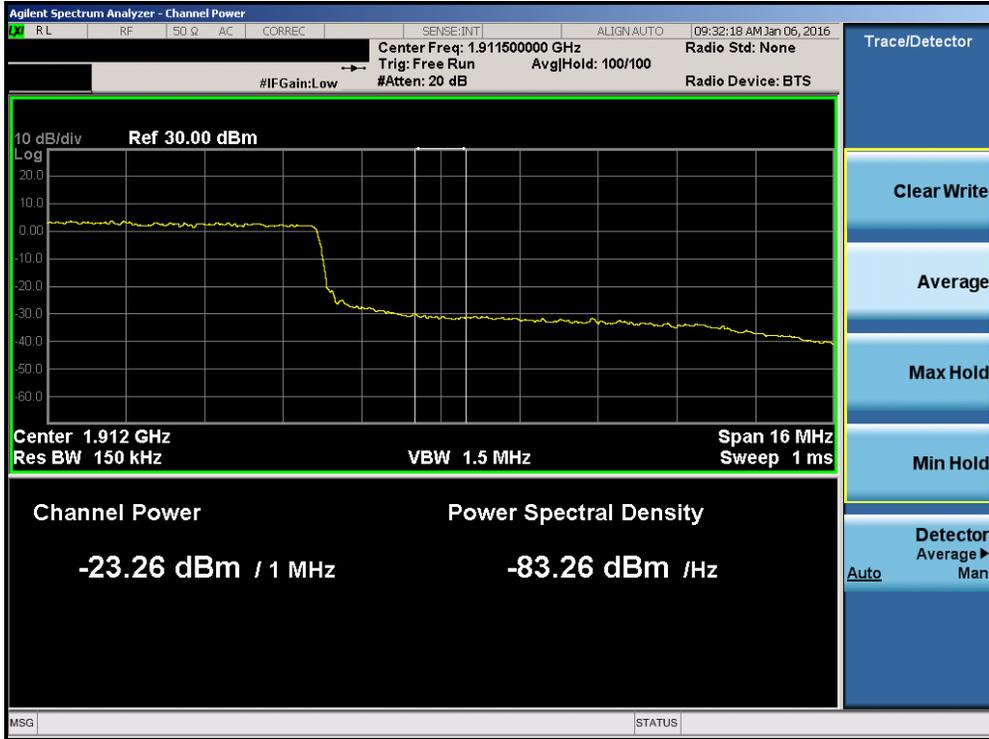


Plot 7-182. Lower Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

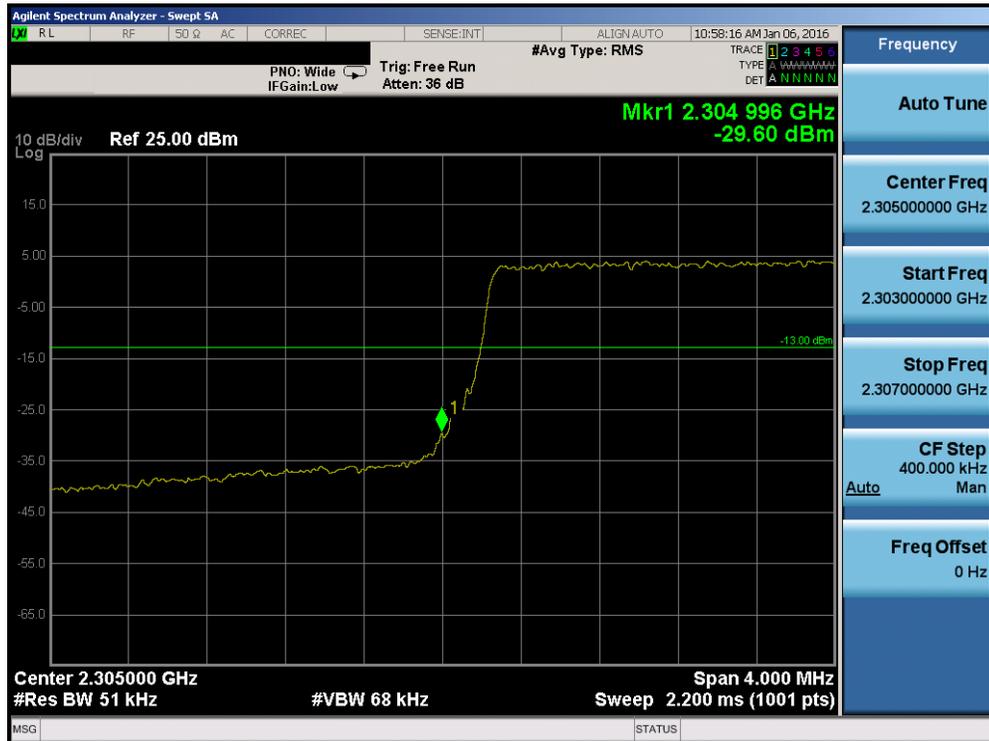


Plot 7-183. Upper Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

|                                      |  |  |    |                                 |
|--------------------------------------|--|--|----|---------------------------------|
| FCC ID: ZNFH820                      | PCTEST<br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | LG | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016          | EUT Type:<br>Portable Handset                                  |    | Page 109 of 160                 |



Plot 7-184. Upper Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 7-185. Lower Band Edge Plot (Band 30 – 5.0MHz QPSK – RB Size 25)

|                                      |                               |  |  |                                 |
|--------------------------------------|-------------------------------|--|--|---------------------------------|
| FCC ID: ZNFH820                      |                               | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016 | EUT Type:<br>Portable Handset                                  |  | Page 110 of 160                 |

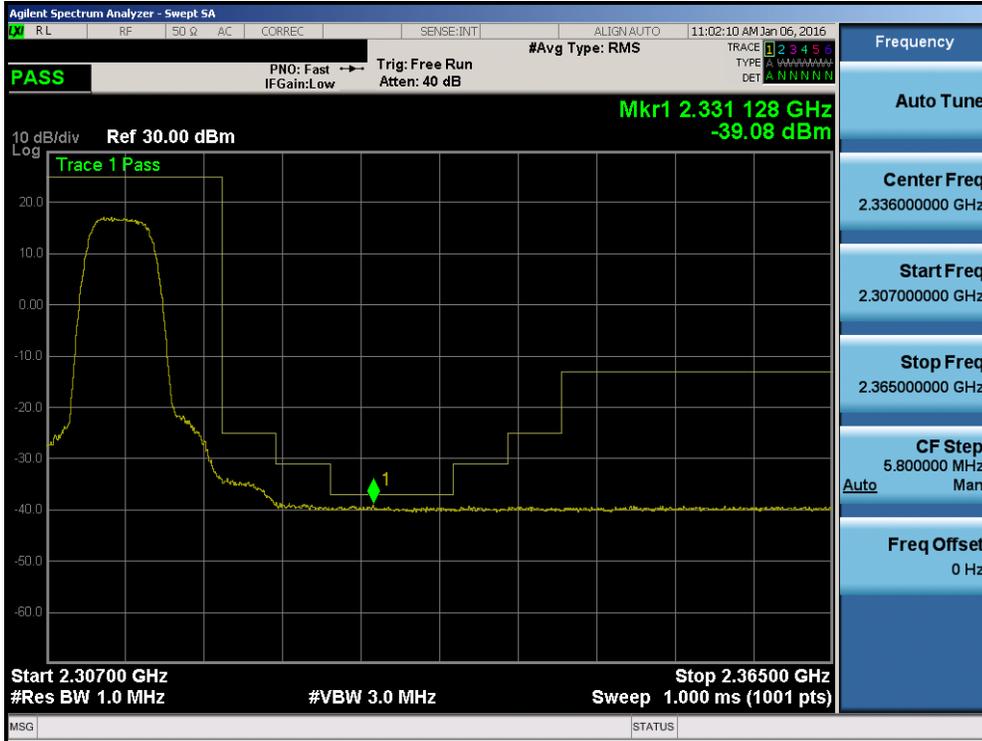


Plot 7-186. Lower Extended Band Edge Plot (Band 30 – 5.0MHz QPSK – RB Size 25)

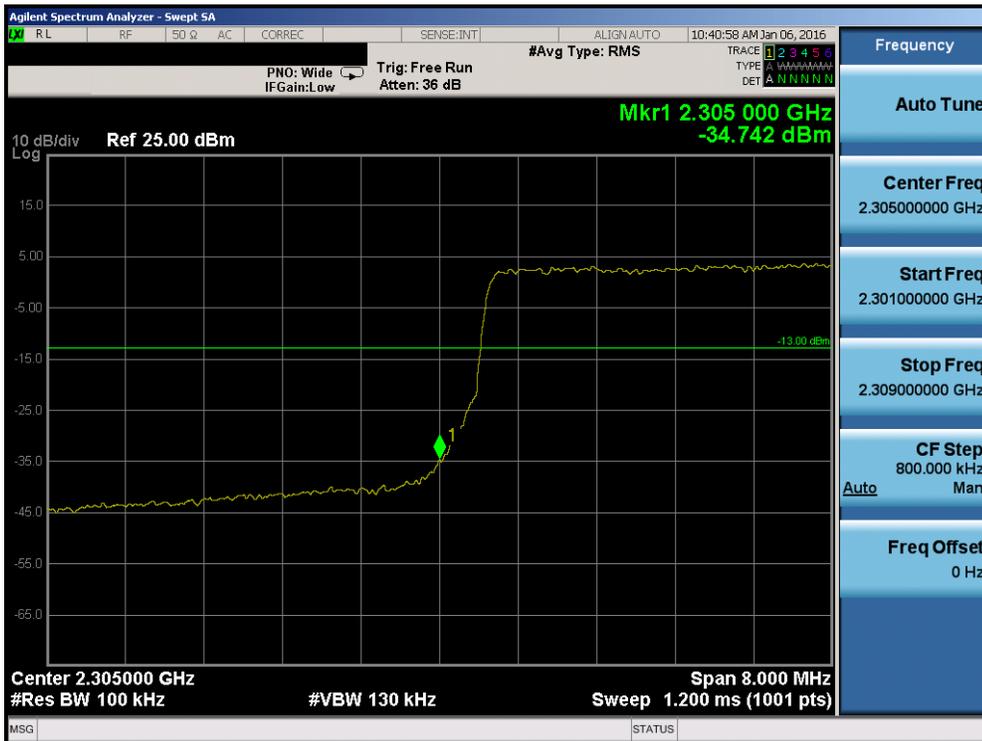


Plot 7-187. Upper Band Edge Plot (Band 30 – 5.0MHz QPSK – RB Size 25)

|                                   |                            |   |  |                              |
|-----------------------------------|----------------------------|---|--|------------------------------|
| FCC ID: ZNFH820                   |                            | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION) |  | Reviewed by: Quality Manager |
| Test Report S/N: 0Y1601040003.ZNF | Test Dates: 1/4 - 3/2/2016 | EUT Type: Portable Handset                                  |  | Page 111 of 160              |

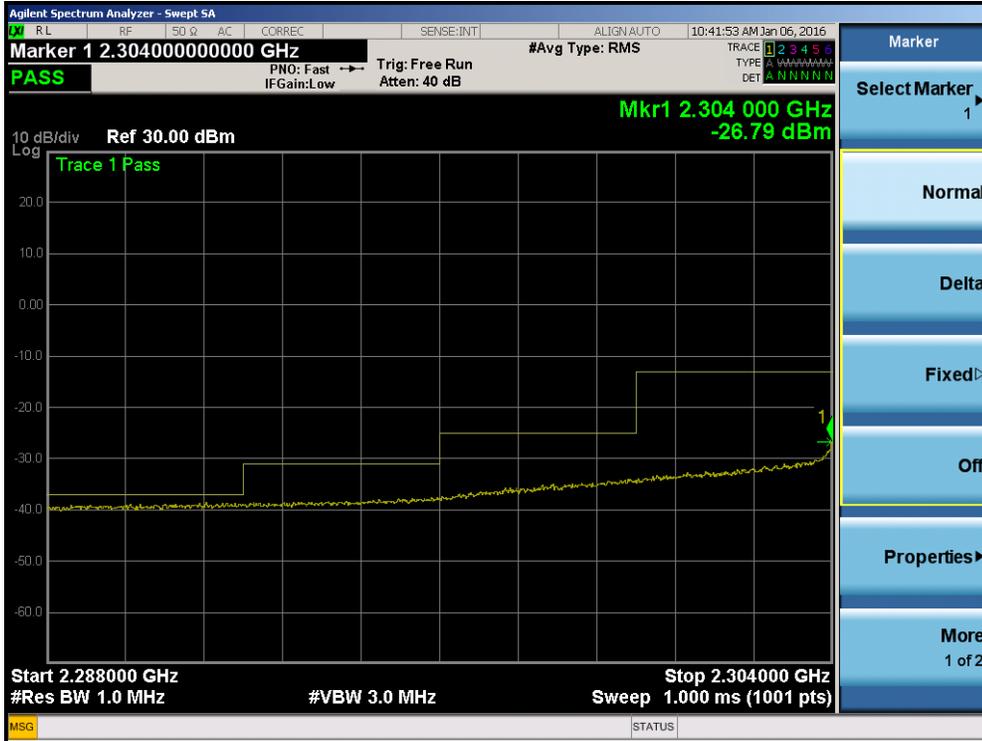


Plot 7-188. Upper Extended Band Edge Plot (Band 30 – 5.0MHz QPSK – RB Size 25)

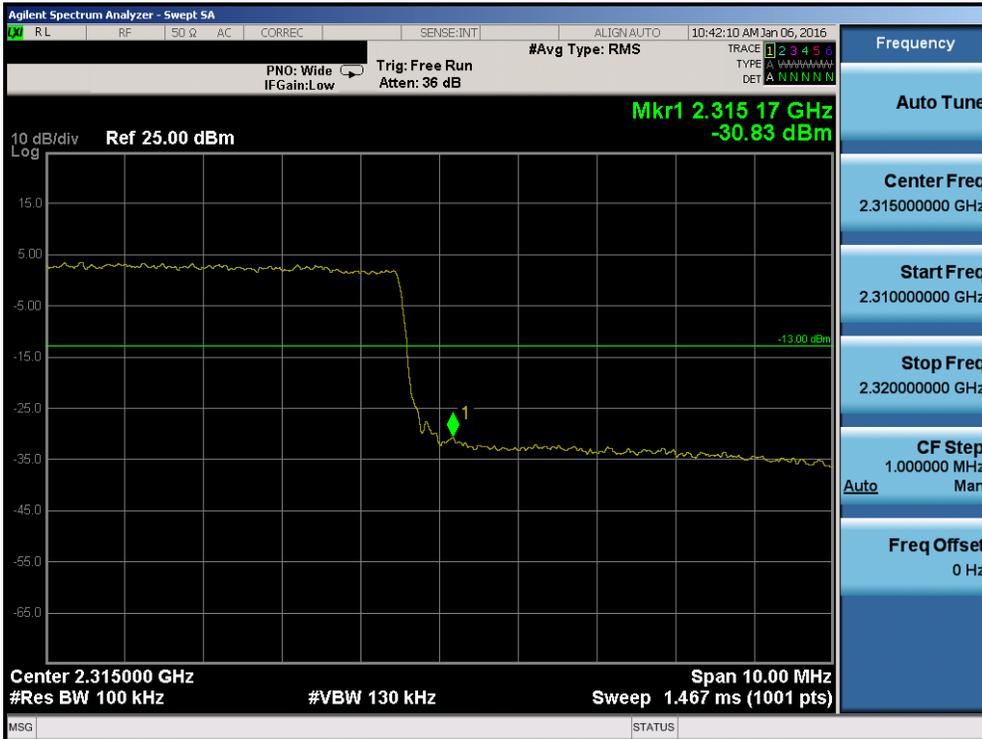


Plot 7-189. Lower Band Edge Plot (Band 30 – 10.0MHz QPSK – RB Size 50)

|                                   |                                     |   |                 |                              |
|-----------------------------------|-------------------------------------|---|-----------------|------------------------------|
| FCC ID: ZNFH820                   | PCTEST ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION) | LG              | Reviewed by: Quality Manager |
| Test Report S/N: 0Y1601040003.ZNF | Test Dates: 1/4 - 3/2/2016          | EUT Type: Portable Handset                                  | Page 112 of 160 |                              |



Plot 7-190. Lower Extended Band Edge Plot (Band 30 – 10.0MHz QPSK – RB Size 50)



Plot 7-191. Upper Band Edge Plot (Band 30 – 10.0MHz QPSK – RB Size 50)

|                                      |  |  |    |                                 |
|--------------------------------------|--|--|----|---------------------------------|
| FCC ID: ZNFH820                      | PCTEST<br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | LG | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016          | EUT Type:<br>Portable Handset                                  |    | Page 113 of 160                 |

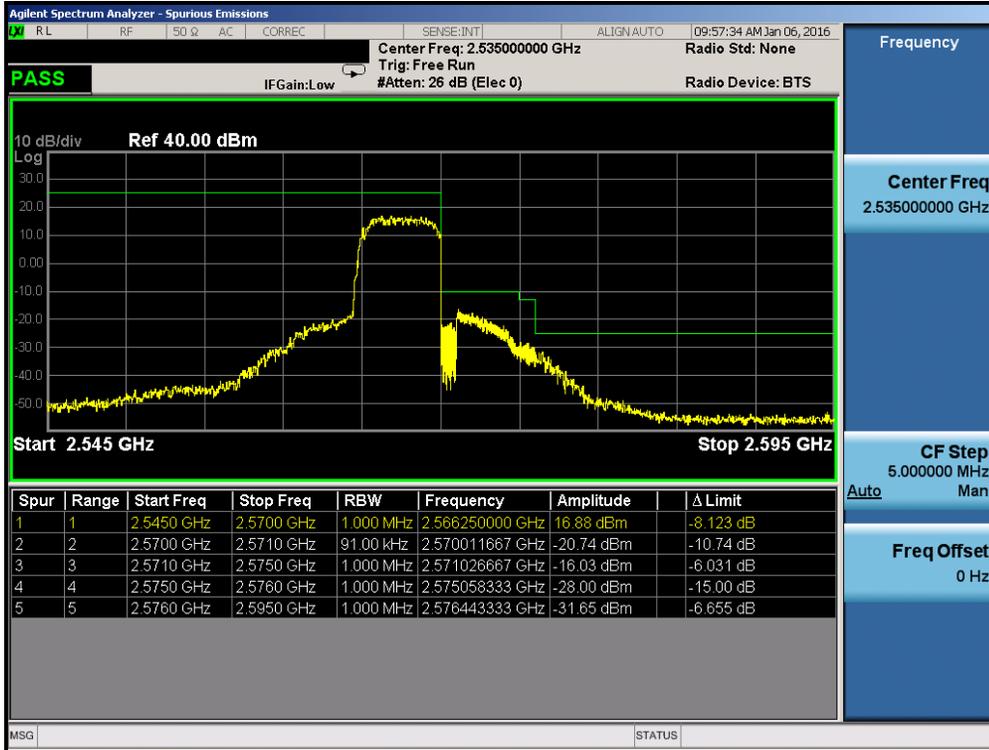


Plot 7-192. Upper Extended Band Edge Plot (Band 30 – 10.0MHz QPSK – RB Size 50)

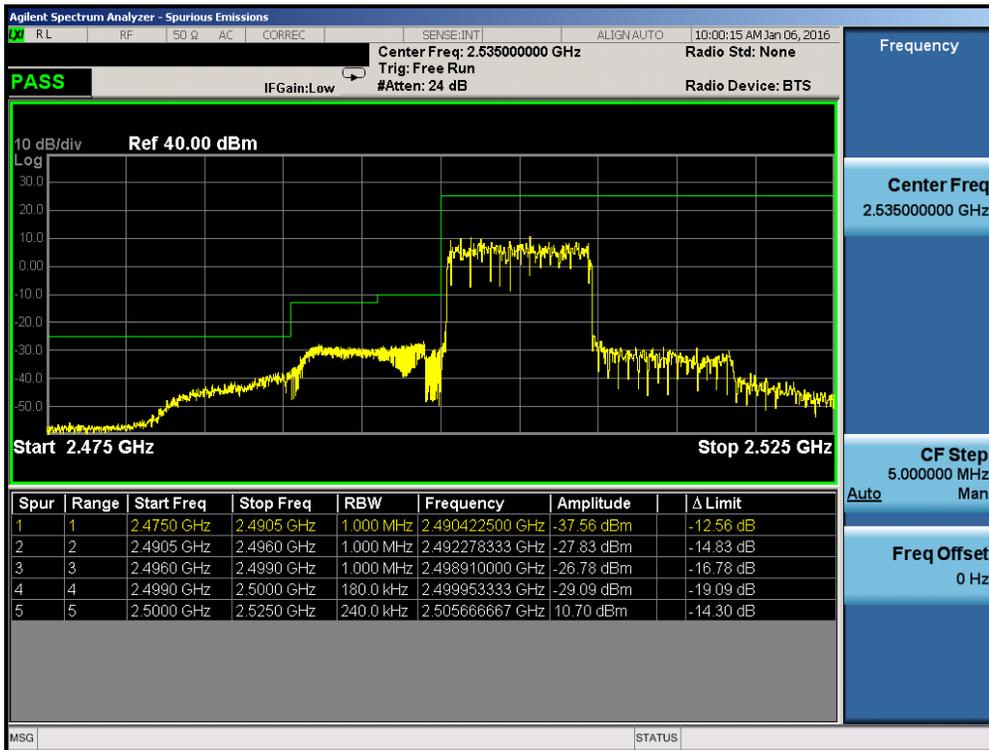


Plot 7-193. Lower ACP Plot (Band 7 – 5.0MHz QPSK – RB Size 25)

|                                      |  |  |                 |                                 |
|--------------------------------------|--|--|-----------------|---------------------------------|
| FCC ID: ZNFH820                      | PCTEST<br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | LG              | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016          | EUT Type:<br>Portable Handset                                  | Page 114 of 160 |                                 |



Plot 7-194. Upper ACP Plot (Band 7 – 5.0MHz QPSK – RB Size 25)

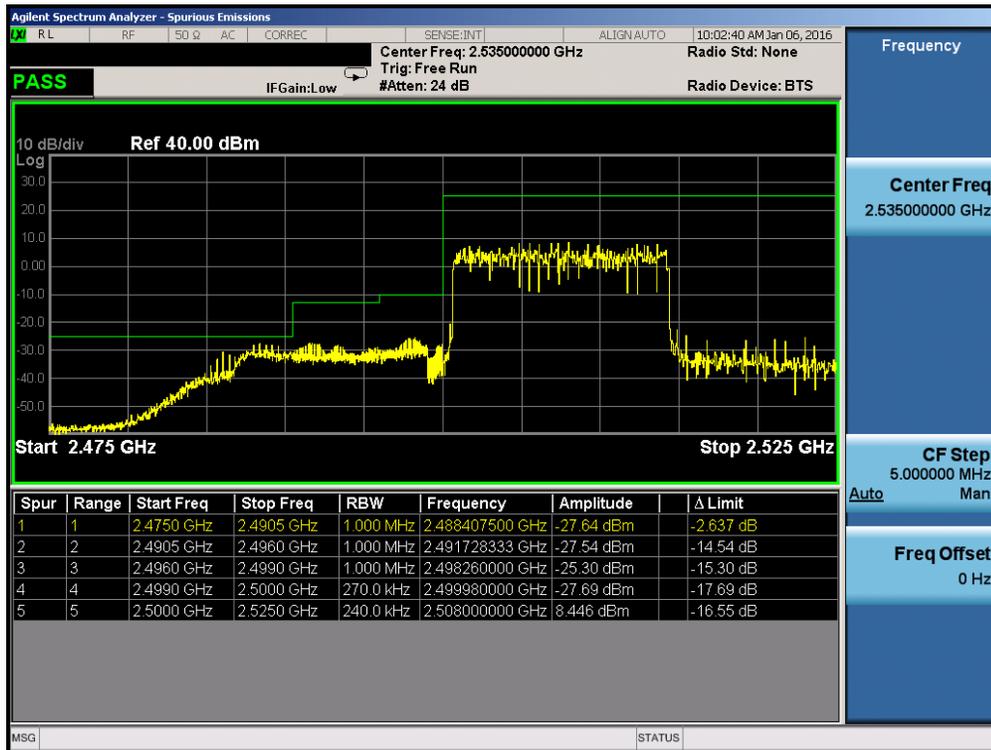


Plot 7-195. Lower ACP Plot (Band 7 – 10.0MHz QPSK – RB Size 50)

|                                      |                               |  |  |                                 |
|--------------------------------------|-------------------------------|--|--|---------------------------------|
| FCC ID: ZNFH820                      |                               | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016 | EUT Type:<br>Portable Handset                                  |  | Page 115 of 160                 |



Plot 7-196. Upper ACP Plot (Band 7 – 10.0MHz QPSK – RB Size 50)

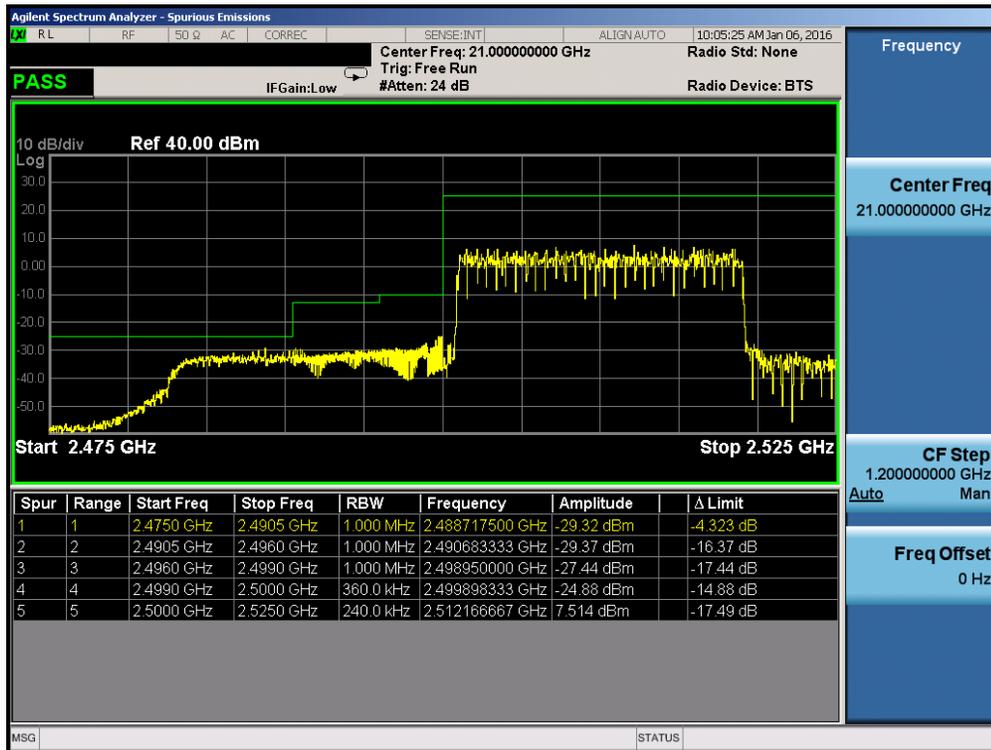


Plot 7-197. Lower ACP Plot (Band 7 – 15.0MHz QPSK – RB Size 75)

|                                      |                               |  |  |                                 |
|--------------------------------------|-------------------------------|--|--|---------------------------------|
| FCC ID: ZNFH820                      |                               | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016 | EUT Type:<br>Portable Handset                                  |  | Page 116 of 160                 |

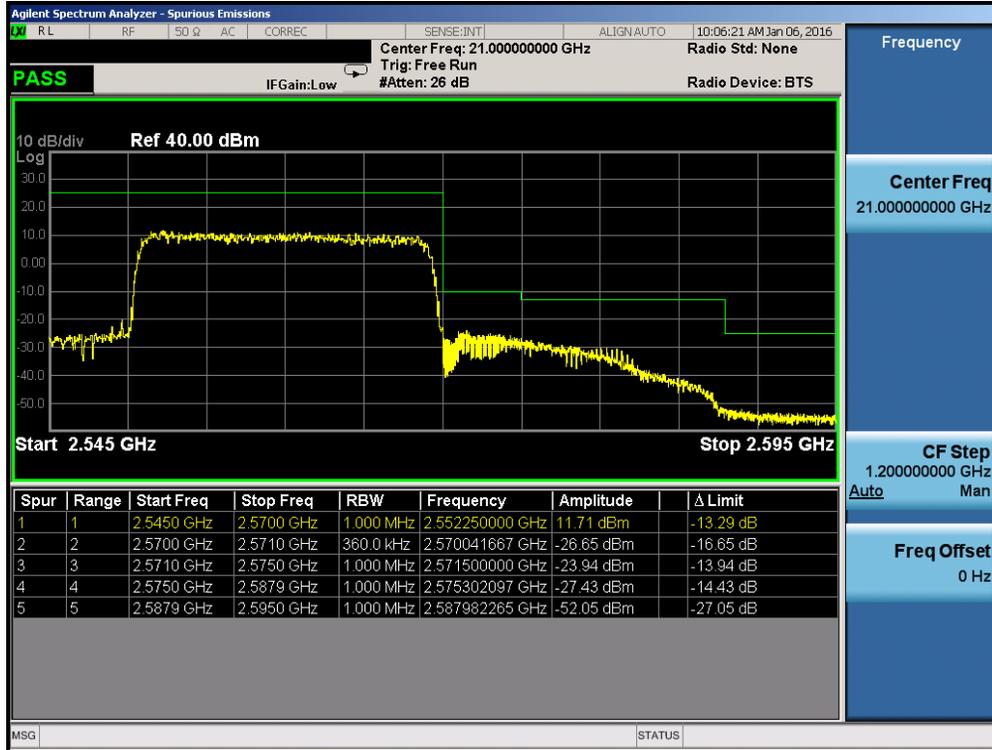


Plot 7-198. Upper ACP Plot (Band 7 – 15.0MHz QPSK – RB Size 75)



Plot 7-199. Lower ACP Plot (Band 7 – 20.0MHz QPSK – RB Size 100)

|                                      |                               |  |  |                                 |
|--------------------------------------|-------------------------------|--|--|---------------------------------|
| FCC ID: ZNFH820                      |                               | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016 | EUT Type:<br>Portable Handset                                  |  | Page 117 of 160                 |



Plot 7-200. Upper ACP Plot (Band 7 – 20.0MHz QPSK – RB Size 100)

|                                      |  |  |    |                                 |
|--------------------------------------|--|--|----|---------------------------------|
| FCC ID: ZNFH820                      | PCTEST<br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | LG | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016          | EUT Type:<br>Portable Handset                                  |    | Page 118 of 160                 |

## 7.5 Peak-Average Ratio

### §24.232(d)

#### Test Overview

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 percent of time the signal spends at or above the level defines the probability for that particular power level.

#### Test Procedure Used

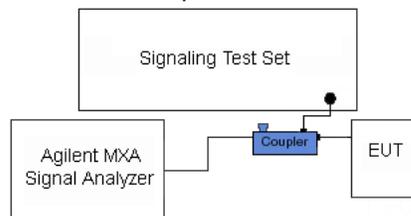
KDB 971168 v02r02 – Section 5.7.1

#### Test Settings

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW > Emission bandwidth of signal
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms.

#### Test Setup

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

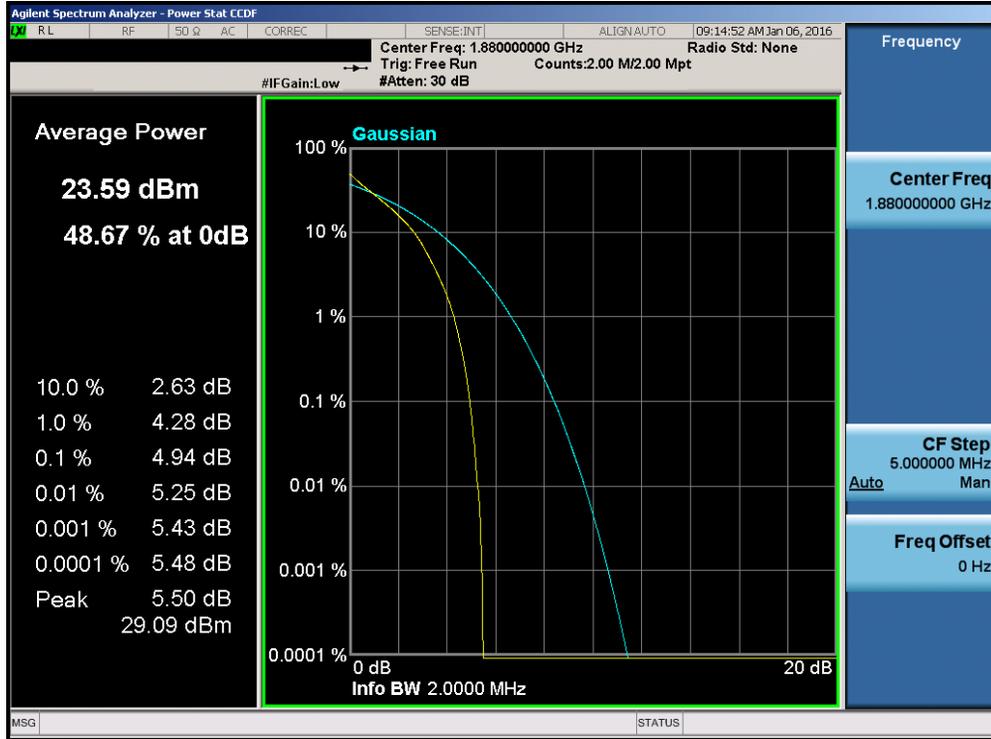


**Figure 7-4. Test Instrument & Measurement Setup**

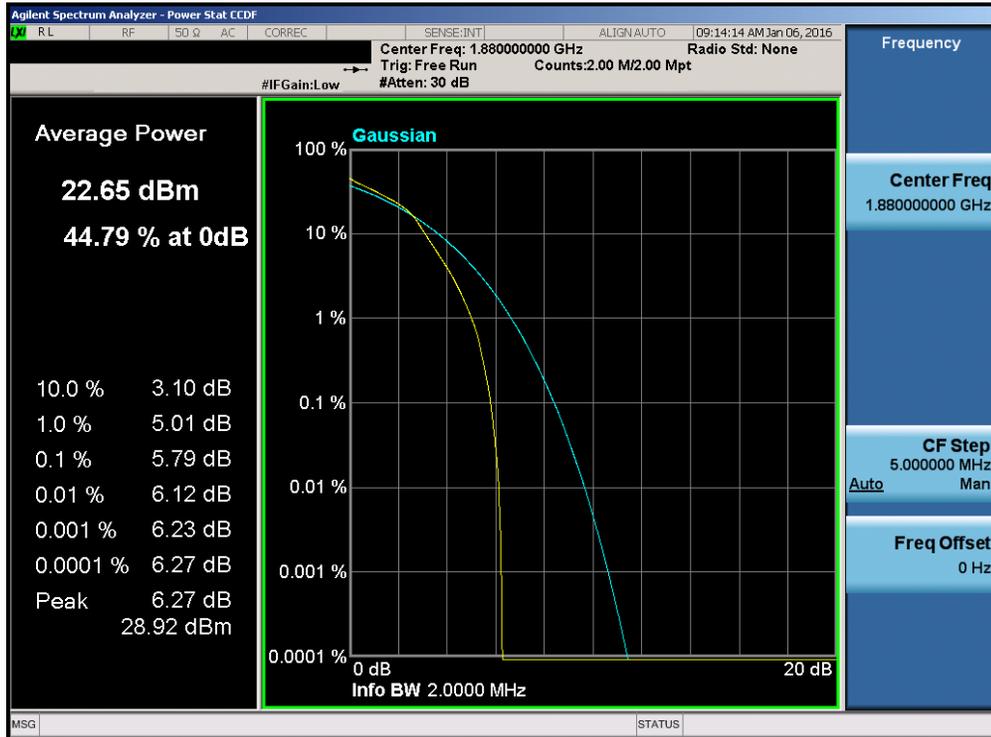
#### Test Notes

None.

|                                      |  |  |  |                                 |
|--------------------------------------|--|--|--|---------------------------------|
| FCC ID: ZNFH820                      |  PCTEST<br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  LG | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016  | EUT Type:<br>Portable Handset                                  |  | Page 119 of 160                 |

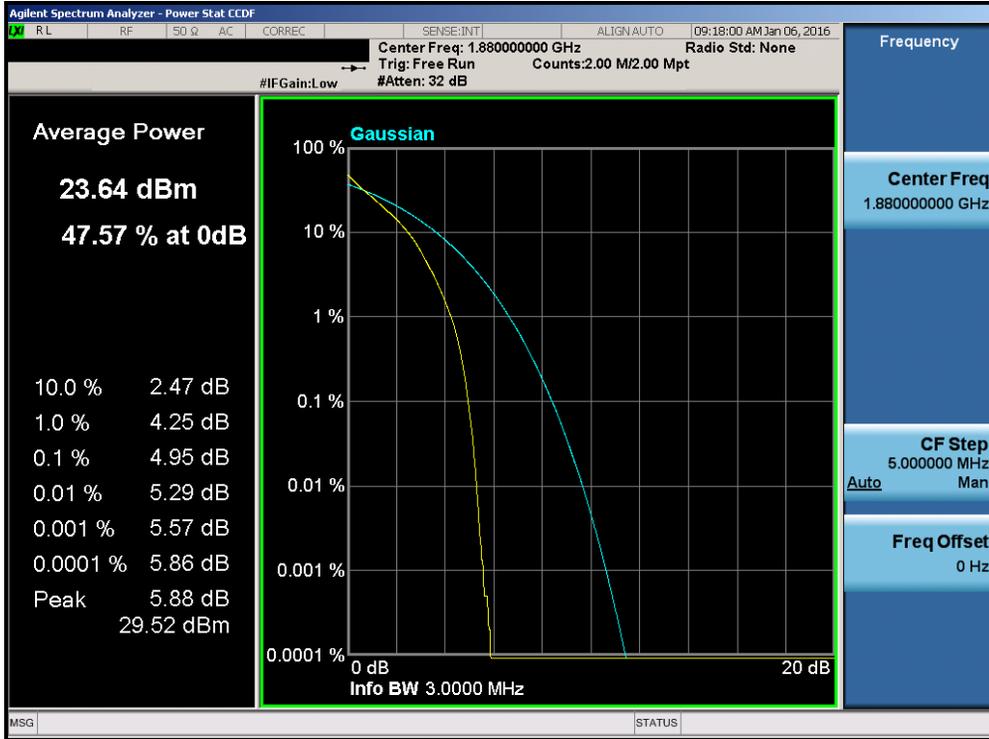


Plot 7-201. PAR Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

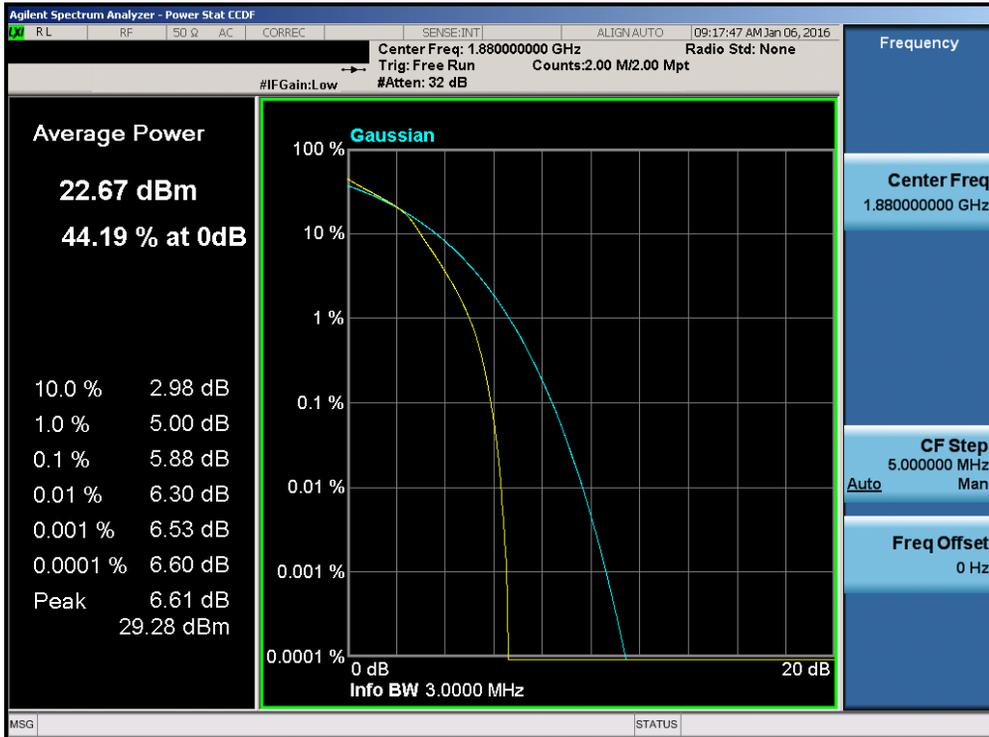


Plot 7-202. PAR Plot (Band 2 – 1.4MHz 16-QAM – RB Size 6)

|                                      |                               |  |  |                                 |
|--------------------------------------|-------------------------------|--|--|---------------------------------|
| FCC ID: ZNFH820                      |                               | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016 | EUT Type:<br>Portable Handset                                  |  | Page 120 of 160                 |

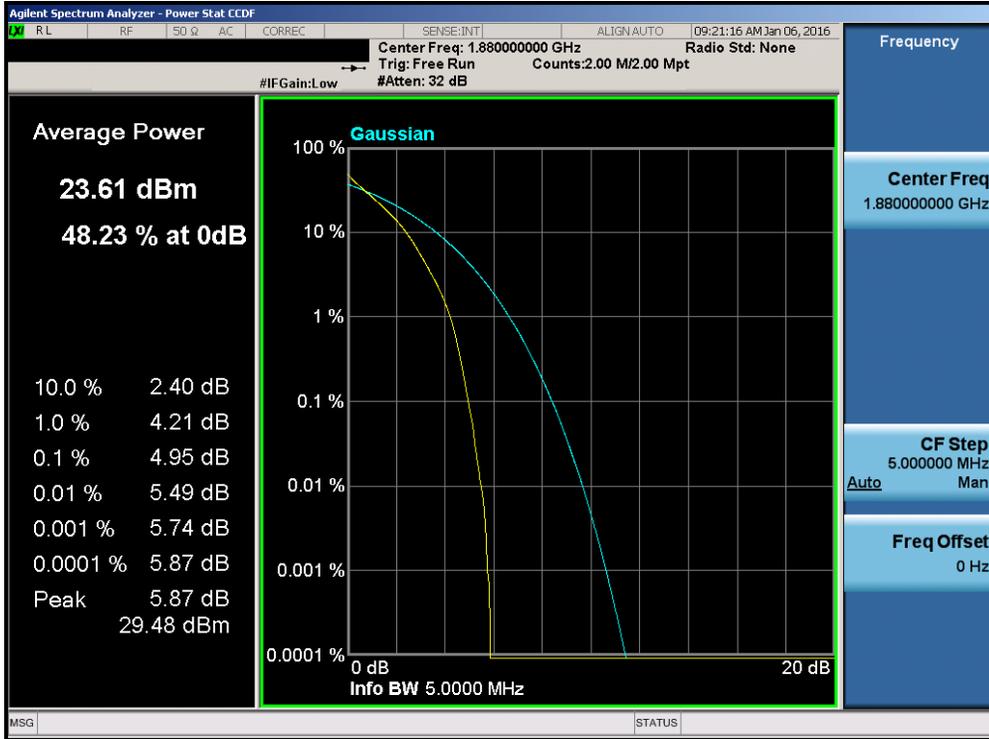


Plot 7-203. PAR Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

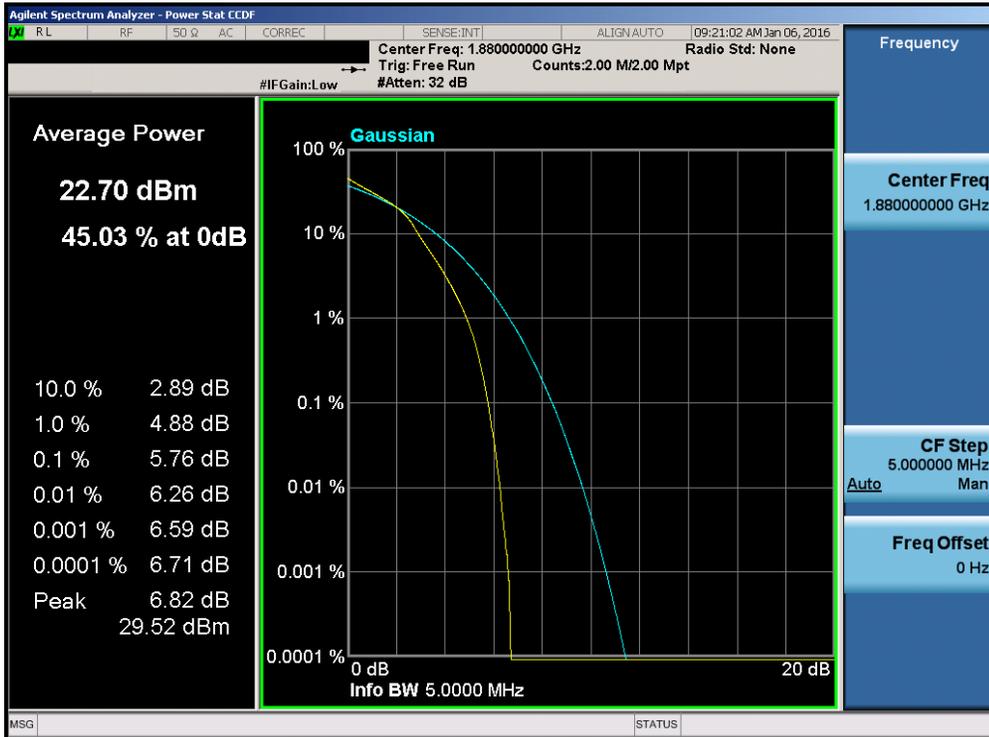


Plot 7-204. PAR Plot (Band 2 – 3.0MHz 16-QAM – RB Size 15)

|                                      |                               |  |  |                                 |
|--------------------------------------|-------------------------------|--|--|---------------------------------|
| FCC ID: ZNFH820                      |                               | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016 | EUT Type:<br>Portable Handset                                  |  | Page 121 of 160                 |

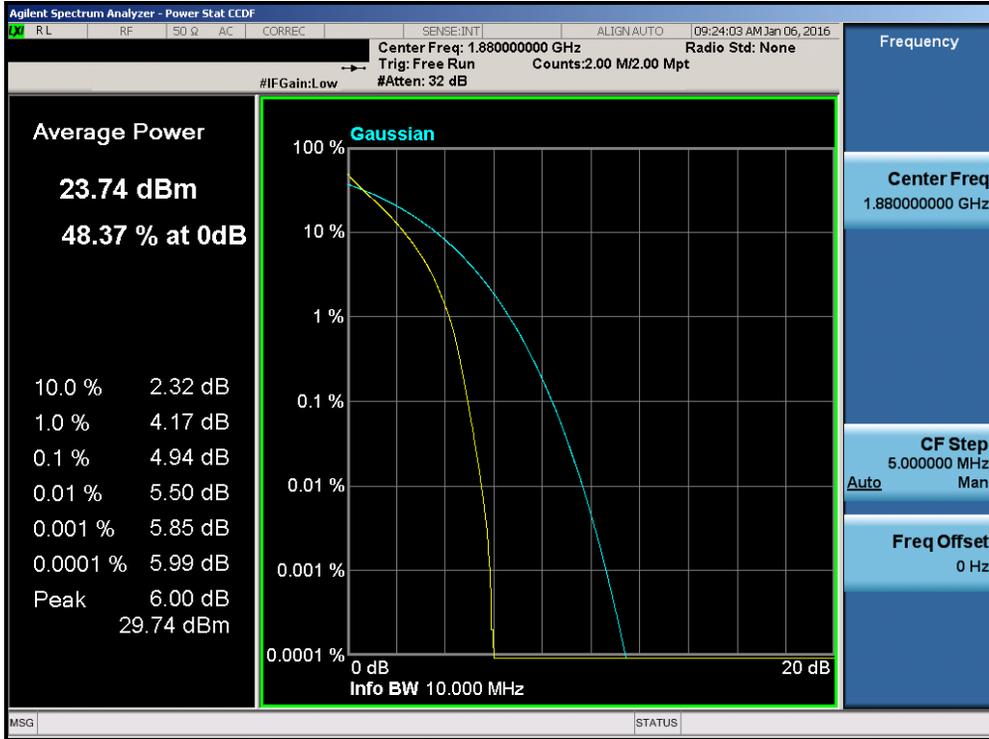


Plot 7-205. PAR Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

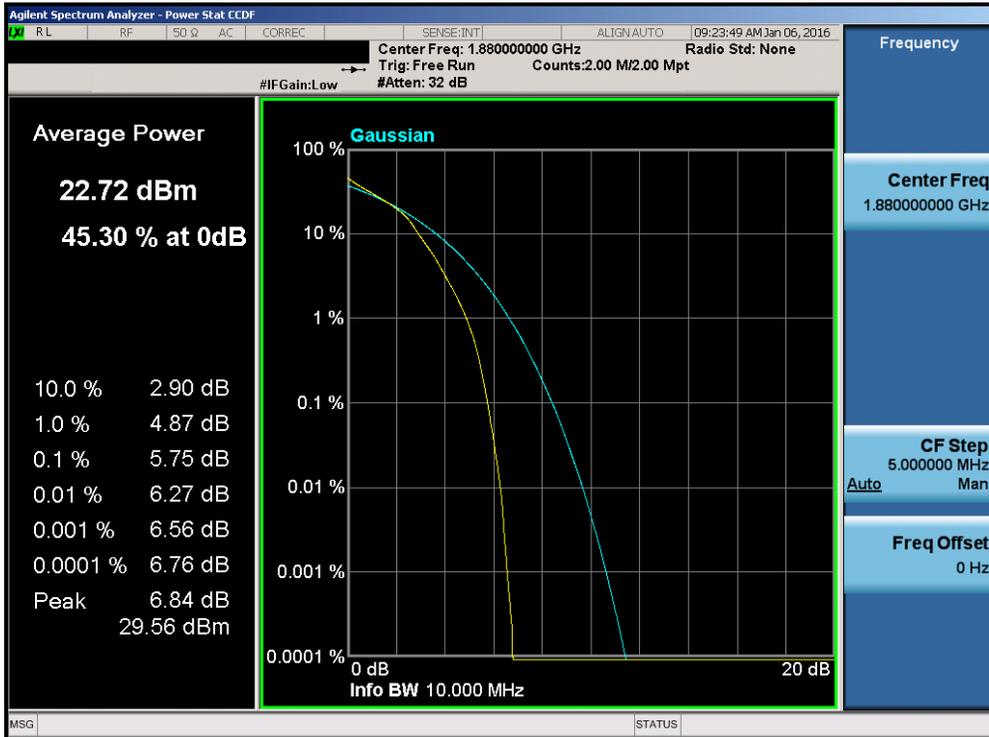


Plot 7-206. PAR Plot (Band 2 – 5.0MHz 16-QAM – RB Size 25)

|                                      |  |  |    |                                 |
|--------------------------------------|--|--|----|---------------------------------|
| FCC ID: ZNFH820                      | PCTEST<br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | LG | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016          | EUT Type:<br>Portable Handset                                  |    | Page 122 of 160                 |

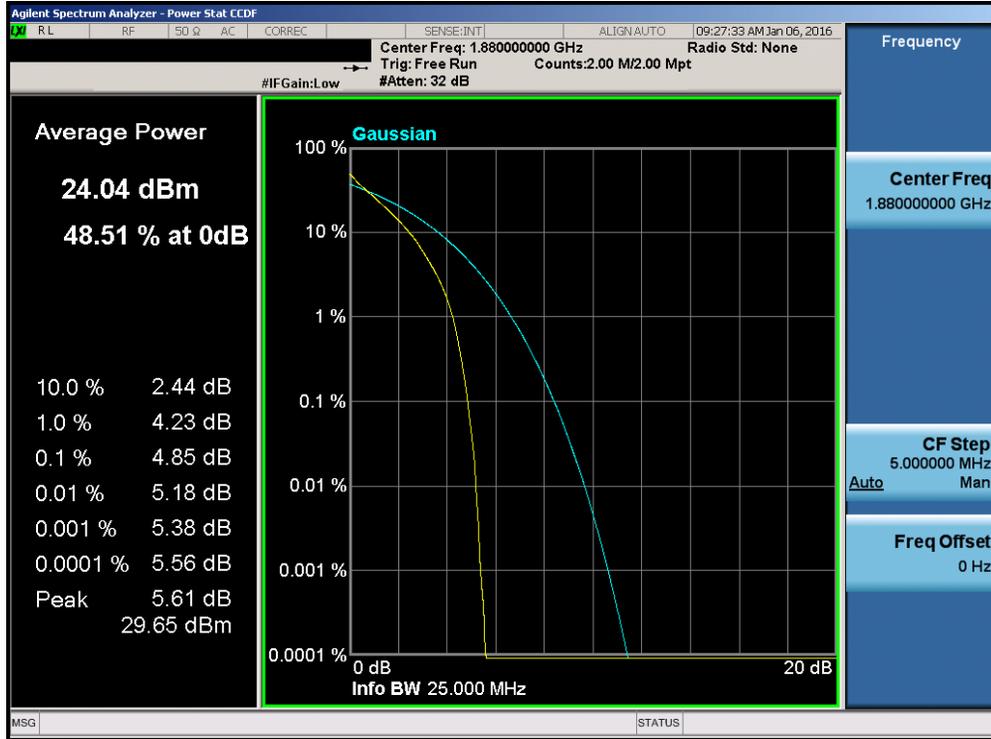


Plot 7-207. PAR Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

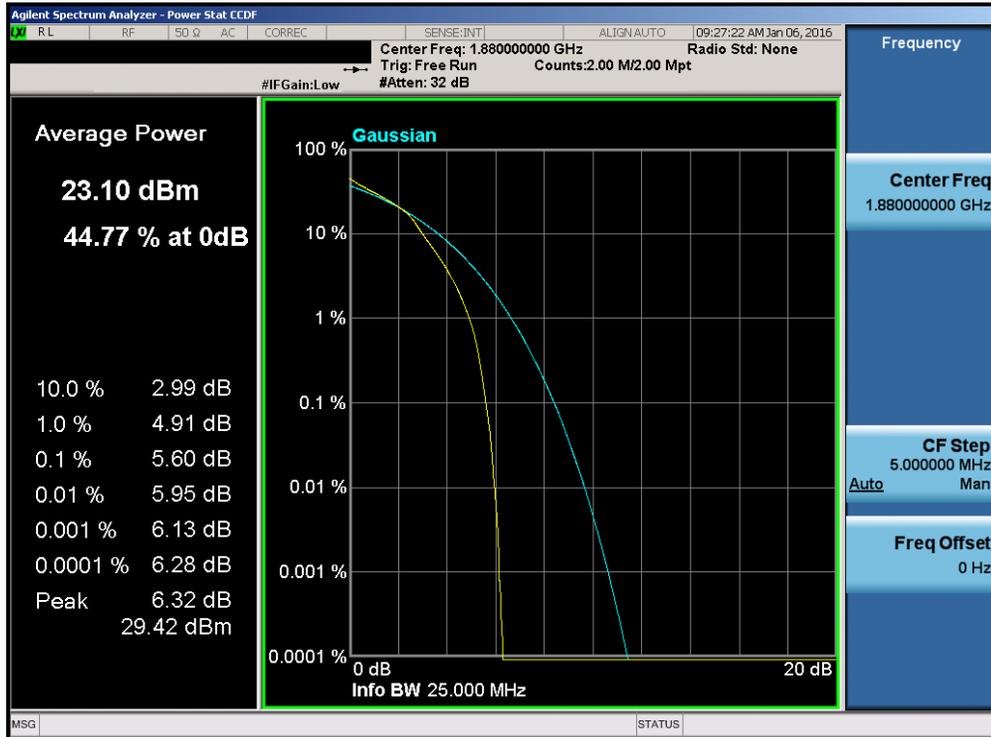


Plot 7-208. PAR Plot (Band 2 – 10.0MHz 16-QAM – RB Size 50)

|                                      |                               |  |  |                                 |
|--------------------------------------|-------------------------------|--|--|---------------------------------|
| FCC ID: ZNFH820                      |                               | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016 | EUT Type:<br>Portable Handset                                  |  | Page 123 of 160                 |

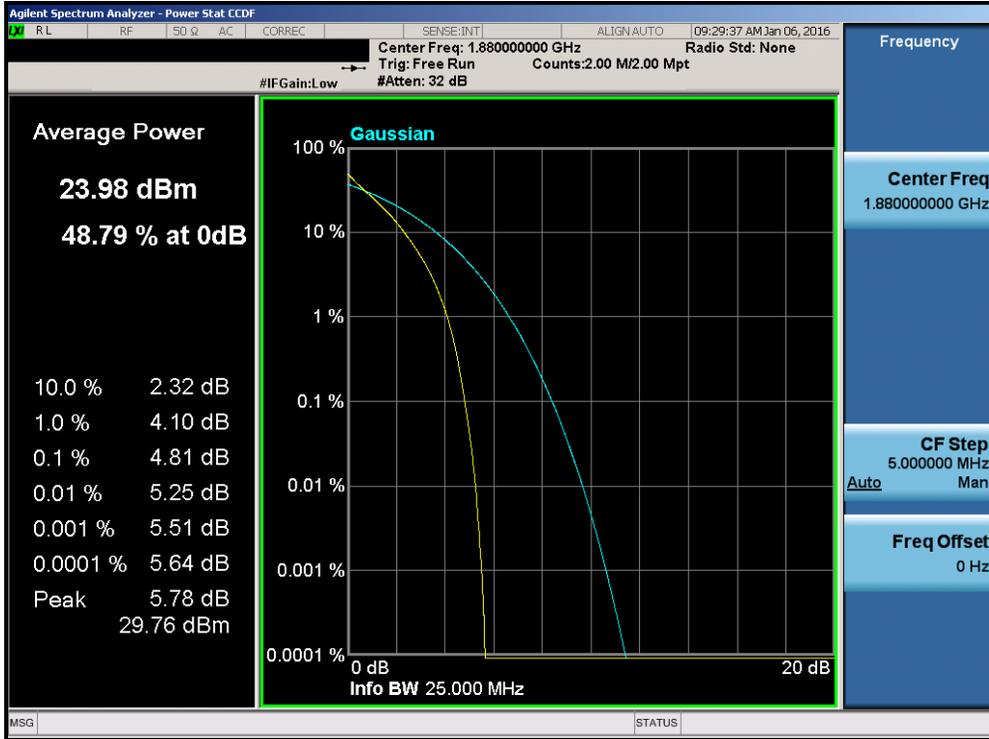


Plot 7-209. PAR Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

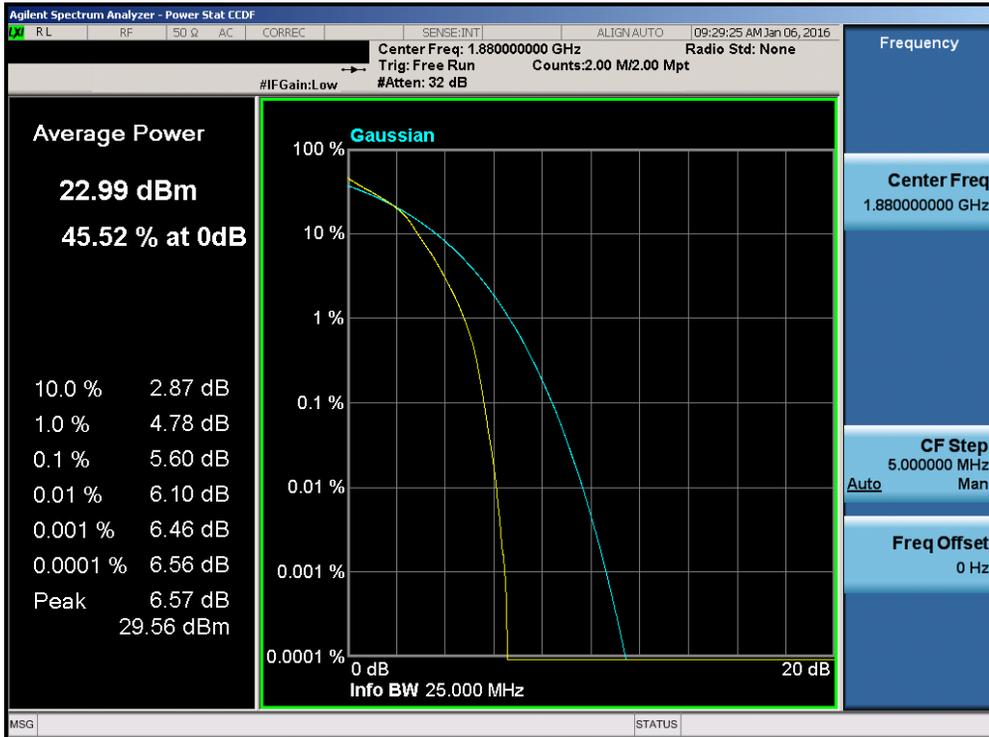


Plot 7-210. PAR Plot (Band 2 – 15.0MHz 16-QAM – RB Size 75)

|                                      |                               |  |  |                                 |
|--------------------------------------|-------------------------------|--|--|---------------------------------|
| FCC ID: ZNFH820                      |                               | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016 | EUT Type:<br>Portable Handset                                  |  | Page 124 of 160                 |



Plot 7-211. PAR Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 7-212. PAR Plot (Band 2 – 20.0MHz 16-QAM – RB Size 100)

|                                      |                               |  |  |                                 |
|--------------------------------------|-------------------------------|--|--|---------------------------------|
| FCC ID: ZNFH820                      |                               | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016 | EUT Type:<br>Portable Handset                                  |  | Page 125 of 160                 |

## 7.6 Radiated Power (ERP/EIRP)

§22.913(a.2) §24.232(c.2) §27.50(h.2) §27.50(c.10) §27.50(d.4) §27.50(a.3)

### Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-C-2004 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using horizontally and vertically polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using horizontally and vertically 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 v02r02 – Section 5.2.1

ANSI/TIA-603-C-2004 – Section 2.2.17

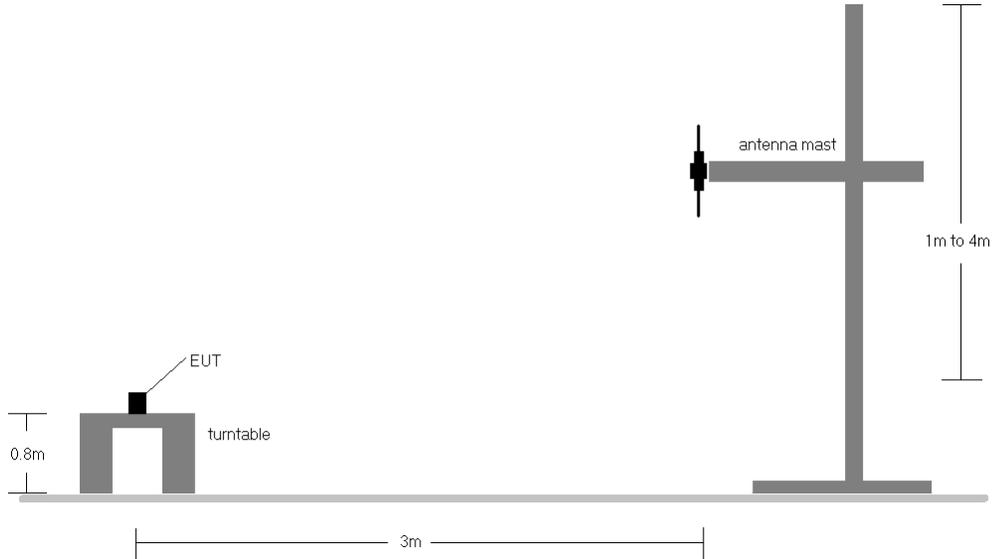
### Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW  $\geq$  3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points  $\geq$  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".
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

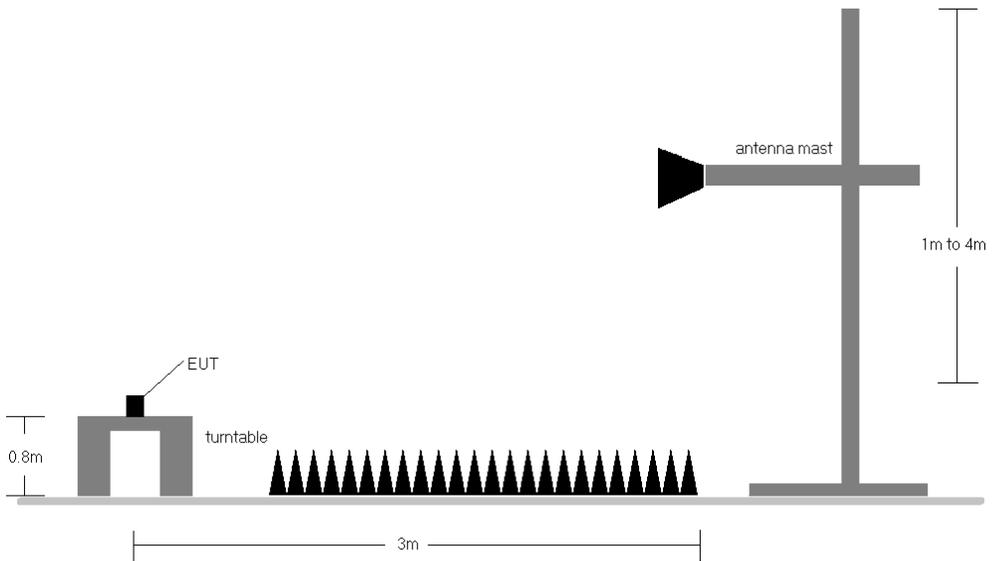
|   |  |                                      |   |  |
|---|--|--------------------------------------|---|--|
| FCC ID: ZNFH820                             |  <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b> |                                      |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Test Report S/N:</b><br>0Y1601040003.ZNF | <b>Test Dates:</b><br>1/4 - 3/2/2016   | <b>EUT Type:</b><br>Portable Handset | Page 126 of 160   |  |

**Test Setup**

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



**Figure 7-5. Radiated Test Setup <1GHz**



**Figure 7-6. 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.

|                                      |                                     |   |    |                                 |
|--------------------------------------|-------------------------------------|---|----|---------------------------------|
| FCC ID: ZNFH820                      | PCTEST ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION) | LG | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016       | EUT Type:<br>Portable Handset                               |    | Page 127 of 160                 |

| Frequency [MHz] | Channel Bandwidth [MHz] | Mod.   | Ant. Pol. [H/V] | Antenna | Antenna Height [cm] | Turntable Azimuth [degree] | RB Size/Offset | Substitute Level [dBm] | Ant. Gain [dBd] | ERP [dBm] | ERP Limit [dBm] | Margin [dB] |
|-----------------|-------------------------|--------|-----------------|---------|---------------------|----------------------------|----------------|------------------------|-----------------|-----------|-----------------|-------------|
| 699.70          | 1.4                     | QPSK   | H               | Main    | 223                 | 170                        | 1 / 0          | 16.02                  | 2.34            | 18.36     | 34.77           | -16.42      |
| 707.50          | 1.4                     | QPSK   | H               | Main    | 254                 | 166                        | 1 / 0          | 16.09                  | 2.47            | 18.56     | 34.77           | -16.21      |
| 715.30          | 1.4                     | QPSK   | H               | Main    | 216                 | 175                        | 1 / 0          | 16.05                  | 2.63            | 18.68     | 34.77           | -16.09      |
| 699.70          | 1.4                     | 16-QAM | H               | Main    | 223                 | 170                        | 1 / 0          | 15.22                  | 2.34            | 17.56     | 34.77           | -17.22      |
| 707.50          | 1.4                     | 16-QAM | H               | Main    | 254                 | 166                        | 1 / 0          | 15.13                  | 2.47            | 17.60     | 34.77           | -17.17      |
| 715.30          | 1.4                     | 16-QAM | H               | Main    | 216                 | 175                        | 1 / 0          | 15.30                  | 2.63            | 17.93     | 34.77           | -16.84      |
| 700.50          | 3                       | QPSK   | H               | Main    | 223                 | 170                        | 1 / 7          | 16.19                  | 2.34            | 18.53     | 34.77           | -16.25      |
| 707.50          | 3                       | QPSK   | H               | Main    | 254                 | 166                        | 1 / 7          | 16.16                  | 2.47            | 18.63     | 34.77           | -16.14      |
| 714.50          | 3                       | QPSK   | H               | Main    | 216                 | 175                        | 1 / 7          | 16.10                  | 2.61            | 18.71     | 34.77           | -16.06      |
| 700.50          | 3                       | 16-QAM | H               | Main    | 223                 | 170                        | 1 / 7          | 15.28                  | 2.34            | 17.62     | 34.77           | -17.16      |
| 707.50          | 3                       | 16-QAM | H               | Main    | 254                 | 166                        | 1 / 7          | 15.17                  | 2.47            | 17.64     | 34.77           | -17.13      |
| 714.50          | 3                       | 16-QAM | H               | Main    | 216                 | 175                        | 1 / 7          | 15.31                  | 2.61            | 17.92     | 34.77           | -16.85      |
| 701.50          | 5                       | QPSK   | H               | Main    | 223                 | 170                        | 1 / 24         | 16.28                  | 2.36            | 18.64     | 34.77           | -16.14      |
| 707.50          | 5                       | QPSK   | H               | Main    | 254                 | 166                        | 1 / 0          | 16.22                  | 2.47            | 18.69     | 34.77           | -16.08      |
| 713.50          | 5                       | QPSK   | H               | Main    | 216                 | 175                        | 1 / 24         | 16.31                  | 2.59            | 18.90     | 34.77           | -15.87      |
| 701.50          | 5                       | 16-QAM | H               | Main    | 223                 | 170                        | 1 / 24         | 15.45                  | 2.36            | 17.81     | 34.77           | -16.97      |
| 707.50          | 5                       | 16-QAM | H               | Main    | 254                 | 166                        | 1 / 0          | 15.47                  | 2.47            | 17.94     | 34.77           | -16.83      |
| 713.50          | 5                       | 16-QAM | H               | Main    | 216                 | 175                        | 1 / 24         | 15.46                  | 2.59            | 18.05     | 34.77           | -16.72      |
| 704.00          | 10                      | QPSK   | H               | Main    | 223                 | 170                        | 1 / 49         | 16.40                  | 2.40            | 18.80     | 34.77           | -15.97      |
| 707.50          | 10                      | QPSK   | H               | Main    | 254                 | 166                        | 1 / 25         | 16.27                  | 2.47            | 18.74     | 34.77           | -16.03      |
| 711.00          | 10                      | QPSK   | H               | Main    | 216                 | 175                        | 1 / 49         | 16.42                  | 2.54            | 18.96     | 34.77           | -15.81      |
| 704.00          | 10                      | 16-QAM | H               | Main    | 223                 | 170                        | 1 / 49         | 15.48                  | 2.40            | 17.88     | 34.77           | -16.89      |
| 707.50          | 10                      | 16-QAM | H               | Main    | 254                 | 166                        | 1 / 0          | 15.53                  | 2.47            | 18.00     | 34.77           | -16.77      |
| 711.00          | 10                      | 16-QAM | H               | Main    | 216                 | 175                        | 1 / 49         | 15.58                  | 2.54            | 18.12     | 34.77           | -16.65      |
| 704.00          | 10                      | QPSK   | H               | CM      | 212                 | 176                        | 1 / 49         | 12.43                  | 2.40            | 14.83     | 34.77           | -19.94      |
| 707.50          | 10                      | QPSK   | H               | CM      | 201                 | 188                        | 1 / 25         | 12.64                  | 2.47            | 15.11     | 34.77           | -19.66      |
| 711.00          | 10                      | QPSK   | H               | CM      | 196                 | 193                        | 1 / 49         | 12.71                  | 2.54            | 15.25     | 34.77           | -19.52      |
| 704.00          | 10                      | 16-QAM | H               | CM      | 212                 | 176                        | 1 / 49         | 11.71                  | 2.40            | 14.11     | 34.77           | -20.66      |
| 707.50          | 10                      | 16-QAM | H               | CM      | 201                 | 188                        | 1 / 49         | 11.82                  | 2.47            | 14.29     | 34.77           | -20.48      |
| 711.00          | 10                      | 16-QAM | H               | CM      | 196                 | 193                        | 1 / 49         | 11.70                  | 2.54            | 14.24     | 34.77           | -20.53      |

**Table 7-2. ERP Data (Band 12/17)**

|                                      |   |  |   |                                 |
|--------------------------------------|---|--|---|---------------------------------|
| FCC ID: ZNFH820                      |  | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016   | EUT Type:<br>Portable Handset                                  | Page 128 of 160   |                                 |

| Frequency [MHz] | Channel Bandwidth [MHz] | Mod.   | Ant. Pol. [H/V] | Antenna | Antenna Height [cm] | Turntable Azimuth [degree] | RB Size/Offset | Substitute Level [dBm] | Ant. Gain [dBd] | ERP [dBm] | ERP Limit [dBm] | Margin [dB] |
|-----------------|-------------------------|--------|-----------------|---------|---------------------|----------------------------|----------------|------------------------|-----------------|-----------|-----------------|-------------|
| 824.70          | 1.4                     | QPSK   | H               | Main    | 176                 | 147                        | 1 / 0          | 14.88                  | 4.62            | 19.50     | 38.45           | -18.95      |
| 836.50          | 1.4                     | QPSK   | H               | Main    | 327                 | 154                        | 1 / 0          | 15.13                  | 4.82            | 19.95     | 38.45           | -18.50      |
| 848.30          | 1.4                     | QPSK   | H               | Main    | 312                 | 151                        | 1 / 0          | 15.77                  | 5.02            | 20.79     | 38.45           | -17.66      |
| 824.70          | 1.4                     | 16-QAM | H               | Main    | 176                 | 147                        | 1 / 0          | 14.15                  | 4.62            | 18.77     | 38.45           | -19.68      |
| 836.50          | 1.4                     | 16-QAM | H               | Main    | 327                 | 154                        | 1 / 0          | 14.36                  | 4.82            | 19.18     | 38.45           | -19.27      |
| 848.30          | 1.4                     | 16-QAM | H               | Main    | 312                 | 151                        | 1 / 0          | 15.14                  | 5.02            | 20.16     | 38.45           | -18.29      |
| 825.50          | 3                       | QPSK   | H               | Main    | 176                 | 147                        | 1 / 0          | 14.85                  | 4.64            | 19.49     | 38.45           | -18.96      |
| 836.50          | 3                       | QPSK   | H               | Main    | 327                 | 154                        | 1 / 0          | 15.21                  | 4.82            | 20.03     | 38.45           | -18.42      |
| 847.50          | 3                       | QPSK   | H               | Main    | 312                 | 151                        | 1 / 0          | 15.73                  | 5.00            | 20.73     | 38.45           | -17.72      |
| 825.50          | 3                       | 16-QAM | H               | Main    | 176                 | 147                        | 1 / 0          | 14.14                  | 4.64            | 18.78     | 38.45           | -19.67      |
| 836.50          | 3                       | 16-QAM | H               | Main    | 327                 | 154                        | 1 / 0          | 14.46                  | 4.82            | 19.28     | 38.45           | -19.17      |
| 847.50          | 3                       | 16-QAM | H               | Main    | 312                 | 151                        | 1 / 0          | 15.05                  | 5.00            | 20.05     | 38.45           | -18.40      |
| 826.50          | 5                       | QPSK   | H               | Main    | 176                 | 147                        | 1 / 24         | 14.98                  | 4.65            | 19.63     | 38.45           | -18.82      |
| 836.50          | 5                       | QPSK   | H               | Main    | 327                 | 154                        | 1 / 0          | 15.25                  | 4.82            | 20.07     | 38.45           | -18.38      |
| 846.50          | 5                       | QPSK   | H               | Main    | 312                 | 151                        | 1 / 0          | 15.90                  | 4.99            | 20.89     | 38.45           | -17.56      |
| 826.50          | 5                       | 16-QAM | H               | Main    | 176                 | 147                        | 1 / 24         | 14.19                  | 4.65            | 18.84     | 38.45           | -19.61      |
| 836.50          | 5                       | 16-QAM | H               | Main    | 327                 | 154                        | 1 / 0          | 14.59                  | 4.82            | 19.41     | 38.45           | -19.04      |
| 846.50          | 5                       | 16-QAM | H               | Main    | 312                 | 151                        | 1 / 0          | 15.07                  | 4.99            | 20.06     | 38.45           | -18.39      |
| 829.00          | 10                      | QPSK   | H               | Main    | 176                 | 147                        | 1 / 49         | 14.85                  | 4.70            | 19.55     | 38.45           | -18.90      |
| 836.50          | 10                      | QPSK   | H               | Main    | 327                 | 154                        | 1 / 49         | 15.07                  | 4.82            | 19.89     | 38.45           | -18.56      |
| 844.00          | 10                      | QPSK   | H               | Main    | 312                 | 151                        | 1 / 0          | 15.79                  | 4.95            | 20.74     | 38.45           | -17.71      |
| 829.00          | 10                      | 16-QAM | H               | Main    | 176                 | 147                        | 1 / 49         | 14.02                  | 4.70            | 18.72     | 38.45           | -19.73      |
| 836.50          | 10                      | 16-QAM | H               | Main    | 327                 | 154                        | 1 / 49         | 14.20                  | 4.82            | 19.02     | 38.45           | -19.43      |
| 844.00          | 10                      | 16-QAM | H               | Main    | 312                 | 151                        | 1 / 0          | 14.98                  | 4.95            | 19.93     | 38.45           | -18.52      |
| 826.50          | 5                       | QPSK   | H               | CM      | 176                 | 147                        | 1 / 24         | 8.45                   | 4.65            | 13.10     | 38.45           | -25.35      |
| 836.50          | 5                       | QPSK   | H               | CM      | 327                 | 154                        | 1 / 0          | 8.15                   | 4.82            | 12.97     | 38.45           | -25.48      |
| 846.50          | 5                       | QPSK   | H               | CM      | 312                 | 151                        | 1 / 24         | 8.10                   | 4.99            | 13.09     | 38.45           | -25.36      |
| 826.50          | 5                       | 16-QAM | H               | CM      | 176                 | 147                        | 1 / 24         | 7.35                   | 4.65            | 12.00     | 38.45           | -26.45      |
| 836.50          | 5                       | 16-QAM | H               | CM      | 327                 | 154                        | 1 / 0          | 7.11                   | 4.82            | 11.93     | 38.45           | -26.52      |
| 846.50          | 5                       | 16-QAM | H               | CM      | 312                 | 151                        | 1 / 24         | 7.39                   | 4.99            | 12.38     | 38.45           | -26.07      |

**Table 7-3. ERP Data (Band 5)**

|                                      |  |   |                                 |
|--------------------------------------|--|---|---------------------------------|
| FCC ID: ZNFH820                      |  <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b> |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016  | EUT Type:<br>Portable Handset   | Page 129 of 160                 |

| Frequency [MHz] | Channel Bandwidth [MHz] | Mod.   | Ant. Pol. [H/V] | Antenna | Antenna Height [cm] | Turntable Azimuth [degree] | RB Size/Offset | Substitute Level [dBm] | Ant. Gain [dBi] | EIRP [dBm] | EIRP Limit [dBm] | Margin [dB] |
|-----------------|-------------------------|--------|-----------------|---------|---------------------|----------------------------|----------------|------------------------|-----------------|------------|------------------|-------------|
| 1710.70         | 1.4                     | QPSK   | H               | Main    | 211.0               | 239                        | 1 / 0          | 14.08                  | 9.84            | 23.92      | 30.00            | -6.08       |
| 1732.50         | 1.4                     | QPSK   | H               | Main    | 203.0               | 234                        | 1 / 0          | 13.98                  | 9.78            | 23.76      | 30.00            | -6.24       |
| 1754.30         | 1.4                     | QPSK   | H               | Main    | 199.7               | 234                        | 1 / 0          | 14.91                  | 9.73            | 24.64      | 30.00            | -5.36       |
| 1710.70         | 1.4                     | 16-QAM | H               | Main    | 211.0               | 239                        | 1 / 0          | 13.46                  | 9.84            | 23.30      | 30.00            | -6.70       |
| 1732.50         | 1.4                     | 16-QAM | H               | Main    | 203.0               | 234                        | 1 / 0          | 13.24                  | 9.78            | 23.02      | 30.00            | -6.98       |
| 1754.30         | 1.4                     | 16-QAM | H               | Main    | 199.7               | 234                        | 1 / 0          | 14.34                  | 9.73            | 24.07      | 30.00            | -5.93       |
| 1711.50         | 3                       | QPSK   | H               | Main    | 211.0               | 239                        | 1 / 0          | 14.23                  | 9.84            | 24.07      | 30.00            | -5.93       |
| 1732.50         | 3                       | QPSK   | H               | Main    | 203.0               | 234                        | 1 / 0          | 14.08                  | 9.78            | 23.86      | 30.00            | -6.14       |
| 1753.50         | 3                       | QPSK   | H               | Main    | 199.7               | 234                        | 1 / 0          | 15.14                  | 9.74            | 24.88      | 30.00            | -5.12       |
| 1711.50         | 3                       | 16-QAM | H               | Main    | 211.0               | 239                        | 1 / 0          | 13.68                  | 9.84            | 23.52      | 30.00            | -6.48       |
| 1732.50         | 3                       | 16-QAM | H               | Main    | 203.0               | 234                        | 1 / 0          | 13.47                  | 9.78            | 23.25      | 30.00            | -6.75       |
| 1753.50         | 3                       | 16-QAM | H               | Main    | 199.7               | 234                        | 1 / 0          | 14.66                  | 9.74            | 24.40      | 30.00            | -5.60       |
| 1712.50         | 5                       | QPSK   | H               | Main    | 211.0               | 239                        | 1 / 0          | 14.41                  | 9.83            | 24.24      | 30.00            | -5.76       |
| 1732.50         | 5                       | QPSK   | H               | Main    | 203.0               | 234                        | 1 / 0          | 14.25                  | 9.78            | 24.03      | 30.00            | -5.97       |
| 1752.50         | 5                       | QPSK   | H               | Main    | 199.7               | 234                        | 1 / 0          | 15.32                  | 9.74            | 25.06      | 30.00            | -4.94       |
| 1712.50         | 5                       | 16-QAM | H               | Main    | 211.0               | 239                        | 1 / 0          | 13.80                  | 9.83            | 23.63      | 30.00            | -6.37       |
| 1732.50         | 5                       | 16-QAM | H               | Main    | 203.0               | 234                        | 1 / 0          | 13.59                  | 9.78            | 23.37      | 30.00            | -6.63       |
| 1752.50         | 5                       | 16-QAM | H               | Main    | 199.7               | 234                        | 1 / 0          | 14.75                  | 9.74            | 24.49      | 30.00            | -5.51       |
| 1715.00         | 10                      | QPSK   | H               | Main    | 211.0               | 239                        | 1 / 0          | 14.34                  | 9.83            | 24.17      | 30.00            | -5.83       |
| 1732.50         | 10                      | QPSK   | H               | Main    | 203.0               | 234                        | 1 / 0          | 14.18                  | 9.78            | 23.96      | 30.00            | -6.04       |
| 1750.00         | 10                      | QPSK   | H               | Main    | 199.7               | 234                        | 1 / 0          | 15.05                  | 9.74            | 24.79      | 30.00            | -5.21       |
| 1715.00         | 10                      | 16-QAM | H               | Main    | 211.0               | 239                        | 1 / 0          | 13.82                  | 9.83            | 23.65      | 30.00            | -6.35       |
| 1732.50         | 10                      | 16-QAM | H               | Main    | 203.0               | 234                        | 1 / 0          | 13.47                  | 9.78            | 23.25      | 30.00            | -6.75       |
| 1750.00         | 10                      | 16-QAM | H               | Main    | 199.7               | 234                        | 1 / 0          | 14.61                  | 9.74            | 24.35      | 30.00            | -5.65       |
| 1717.50         | 15                      | QPSK   | H               | Main    | 211.0               | 239                        | 1 / 0          | 14.41                  | 9.82            | 24.23      | 30.00            | -5.77       |
| 1732.50         | 15                      | QPSK   | H               | Main    | 203.0               | 234                        | 1 / 0          | 14.11                  | 9.78            | 23.89      | 30.00            | -6.11       |
| 1747.50         | 15                      | QPSK   | H               | Main    | 199.7               | 234                        | 1 / 0          | 15.10                  | 9.75            | 24.85      | 30.00            | -5.15       |
| 1717.50         | 15                      | 16-QAM | H               | Main    | 211.0               | 239                        | 1 / 0          | 13.86                  | 9.82            | 23.68      | 30.00            | -6.32       |
| 1732.50         | 15                      | 16-QAM | H               | Main    | 203.0               | 234                        | 1 / 0          | 13.34                  | 9.78            | 23.12      | 30.00            | -6.88       |
| 1747.50         | 15                      | 16-QAM | H               | Main    | 199.7               | 234                        | 1 / 0          | 14.55                  | 9.75            | 24.30      | 30.00            | -5.70       |
| 1720.00         | 20                      | QPSK   | H               | Main    | 211.0               | 239                        | 1 / 0          | 14.43                  | 9.81            | 24.24      | 30.00            | -5.76       |
| 1732.50         | 20                      | QPSK   | H               | Main    | 203.0               | 234                        | 1 / 0          | 14.17                  | 9.78            | 23.95      | 30.00            | -6.05       |
| 1745.00         | 20                      | QPSK   | H               | Main    | 199.7               | 234                        | 1 / 0          | 15.06                  | 9.76            | 24.82      | 30.00            | -5.18       |
| 1720.00         | 20                      | 16-QAM | H               | Main    | 211.0               | 239                        | 1 / 0          | 13.81                  | 9.81            | 23.62      | 30.00            | -6.38       |
| 1732.50         | 20                      | 16-QAM | H               | Main    | 203.0               | 234                        | 1 / 0          | 13.41                  | 9.78            | 23.19      | 30.00            | -6.81       |
| 1745.00         | 20                      | 16-QAM | H               | Main    | 199.7               | 234                        | 1 / 0          | 14.33                  | 9.76            | 24.09      | 30.00            | -5.91       |
| 1752.50         | 5                       | QPSK   | H               | Div     | 190                 | 60                         | 1 / 0          | 8.65                   | 9.74            | 18.39      | 30.00            | -11.61      |
| 1712.50         | 5                       | QPSK   | H               | CM      | 211.0               | 239                        | 1 / 0          | 14.27                  | 9.83            | 24.10      | 30.00            | -5.90       |
| 1732.50         | 5                       | QPSK   | H               | CM      | 203.0               | 234                        | 1 / 0          | 14.25                  | 9.78            | 24.03      | 30.00            | -5.97       |
| 1752.50         | 5                       | QPSK   | H               | CM      | 199.7               | 234                        | 1 / 0          | 15.08                  | 9.74            | 24.82      | 30.00            | -5.18       |
| 1712.50         | 5                       | 16-QAM | H               | CM      | 211.0               | 239                        | 1 / 0          | 13.58                  | 9.83            | 23.41      | 30.00            | -6.59       |
| 1732.50         | 5                       | 16-QAM | H               | CM      | 203.0               | 234                        | 1 / 0          | 13.42                  | 9.78            | 23.20      | 30.00            | -6.80       |
| 1752.50         | 5                       | 16-QAM | H               | CM      | 199.7               | 234                        | 1 / 0          | 14.62                  | 9.74            | 24.36      | 30.00            | -5.64       |

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

|                                      |   |  |   |                                 |
|--------------------------------------|---|--|---|---------------------------------|
| FCC ID: ZNFH820                      |  | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016   | EUT Type:<br>Portable Handset                                  | Page 130 of 160   |                                 |

| Frequency [MHz] | Channel Bandwidth [MHz] | Mod.   | Ant. Pol. [H/V] | Antenna | Antenna Height [cm] | Turntable Azimuth [degree] | RB Size/Offset | Substitute Level [dBm] | Ant. Gain [dBi] | EIRP [dBm] | EIRP Limit [dBm] | Margin [dB] |
|-----------------|-------------------------|--------|-----------------|---------|---------------------|----------------------------|----------------|------------------------|-----------------|------------|------------------|-------------|
| 1850.70         | 1.4                     | QPSK   | H               | Main    | 187                 | 239                        | 1 / 0          | 13.80                  | 9.54            | 23.34      | 33.01            | -9.67       |
| 1880.00         | 1.4                     | QPSK   | H               | Main    | 182                 | 239                        | 1 / 0          | 14.37                  | 9.50            | 23.87      | 33.01            | -9.14       |
| 1909.30         | 1.4                     | QPSK   | H               | Main    | 232                 | 246                        | 1 / 0          | 14.98                  | 9.48            | 24.46      | 33.01            | -8.55       |
| 1850.70         | 1.4                     | 16-QAM | H               | Main    | 187                 | 239                        | 1 / 0          | 13.11                  | 9.54            | 22.65      | 33.01            | -10.36      |
| 1880.00         | 1.4                     | 16-QAM | H               | Main    | 182                 | 239                        | 1 / 0          | 13.32                  | 9.50            | 22.82      | 33.01            | -10.19      |
| 1909.30         | 1.4                     | 16-QAM | H               | Main    | 232                 | 246                        | 1 / 0          | 13.70                  | 9.48            | 23.18      | 33.01            | -9.83       |
| 1851.50         | 3                       | QPSK   | H               | Main    | 187                 | 239                        | 1 / 0          | 14.02                  | 9.54            | 23.56      | 33.01            | -9.45       |
| 1880.00         | 3                       | QPSK   | H               | Main    | 182                 | 239                        | 1 / 0          | 14.59                  | 9.50            | 24.09      | 33.01            | -8.92       |
| 1908.50         | 3                       | QPSK   | H               | Main    | 232                 | 246                        | 1 / 0          | 15.04                  | 9.48            | 24.52      | 33.01            | -8.49       |
| 1851.50         | 3                       | 16-QAM | H               | Main    | 187                 | 239                        | 1 / 0          | 13.19                  | 9.54            | 22.73      | 33.01            | -10.28      |
| 1880.00         | 3                       | 16-QAM | H               | Main    | 182                 | 239                        | 1 / 0          | 13.51                  | 9.50            | 23.01      | 33.01            | -10.00      |
| 1908.50         | 3                       | 16-QAM | H               | Main    | 232                 | 246                        | 1 / 0          | 14.03                  | 9.48            | 23.51      | 33.01            | -9.50       |
| 1852.50         | 5                       | QPSK   | H               | Main    | 187                 | 239                        | 1 / 0          | 14.21                  | 9.54            | 23.75      | 33.01            | -9.26       |
| 1880.00         | 5                       | QPSK   | H               | Main    | 182                 | 239                        | 1 / 0          | 14.83                  | 9.50            | 24.33      | 33.01            | -8.68       |
| 1907.50         | 5                       | QPSK   | H               | Main    | 232                 | 246                        | 1 / 0          | 15.08                  | 9.48            | 24.56      | 33.01            | -8.45       |
| 1852.50         | 5                       | 16-QAM | H               | Main    | 187                 | 239                        | 1 / 0          | 13.42                  | 9.54            | 22.96      | 33.01            | -10.05      |
| 1880.00         | 5                       | 16-QAM | H               | Main    | 182                 | 239                        | 1 / 0          | 13.76                  | 9.50            | 23.26      | 33.01            | -9.75       |
| 1907.50         | 5                       | 16-QAM | H               | Main    | 232                 | 246                        | 1 / 0          | 14.19                  | 9.48            | 23.67      | 33.01            | -9.34       |
| 1855.00         | 10                      | QPSK   | H               | Main    | 187                 | 239                        | 1 / 0          | 14.29                  | 9.54            | 23.83      | 33.01            | -9.18       |
| 1880.00         | 10                      | QPSK   | H               | Main    | 182                 | 239                        | 1 / 25         | 14.89                  | 9.50            | 24.39      | 33.01            | -8.62       |
| 1905.00         | 10                      | QPSK   | H               | Main    | 232                 | 246                        | 1 / 0          | 15.21                  | 9.47            | 24.68      | 33.01            | -8.33       |
| 1855.00         | 10                      | 16-QAM | H               | Main    | 187                 | 239                        | 1 / 0          | 13.55                  | 9.54            | 23.09      | 33.01            | -9.92       |
| 1880.00         | 10                      | 16-QAM | H               | Main    | 182                 | 239                        | 1 / 25         | 13.91                  | 9.50            | 23.41      | 33.01            | -9.60       |
| 1905.00         | 10                      | 16-QAM | H               | Main    | 232                 | 246                        | 1 / 0          | 14.33                  | 9.47            | 23.80      | 33.01            | -9.21       |
| 1857.50         | 15                      | QPSK   | H               | Main    | 187                 | 239                        | 1 / 0          | 14.18                  | 9.53            | 23.71      | 33.01            | -9.30       |
| 1880.00         | 15                      | QPSK   | H               | Main    | 182                 | 239                        | 1 / 0          | 14.74                  | 9.50            | 24.24      | 33.01            | -8.77       |
| 1902.50         | 15                      | QPSK   | H               | Main    | 232                 | 246                        | 1 / 0          | 15.17                  | 9.47            | 24.64      | 33.01            | -8.37       |
| 1857.50         | 15                      | 16-QAM | H               | Main    | 187                 | 239                        | 1 / 0          | 13.62                  | 9.53            | 23.15      | 33.01            | -9.86       |
| 1880.00         | 15                      | 16-QAM | H               | Main    | 182                 | 239                        | 1 / 0          | 13.77                  | 9.50            | 23.27      | 33.01            | -9.74       |
| 1902.50         | 15                      | 16-QAM | H               | Main    | 232                 | 246                        | 1 / 0          | 14.20                  | 9.47            | 23.67      | 33.01            | -9.34       |
| 1860.00         | 20                      | QPSK   | H               | Main    | 187                 | 239                        | 1 / 0          | 14.14                  | 9.53            | 23.67      | 33.01            | -9.34       |
| 1880.00         | 20                      | QPSK   | H               | Main    | 182                 | 239                        | 1 / 0          | 14.82                  | 9.50            | 24.32      | 33.01            | -8.69       |
| 1900.00         | 20                      | QPSK   | H               | Main    | 232                 | 246                        | 1 / 0          | 15.09                  | 9.46            | 24.55      | 33.01            | -8.46       |
| 1860.00         | 20                      | 16-QAM | H               | Main    | 187                 | 239                        | 1 / 0          | 13.65                  | 9.53            | 23.18      | 33.01            | -9.83       |
| 1880.00         | 20                      | 16-QAM | H               | Main    | 182                 | 239                        | 1 / 0          | 13.67                  | 9.50            | 23.17      | 33.01            | -9.84       |
| 1900.00         | 20                      | 16-QAM | H               | Main    | 232                 | 246                        | 1 / 0          | 14.11                  | 9.46            | 23.57      | 33.01            | -9.44       |
| 1905.00         | 10                      | QPSK   | H               | Div     | 166                 | 58                         | 1 / 0          | 8.74                   | 9.47            | 18.21      | 33.01            | -14.80      |
| 1855.00         | 10                      | QPSK   | H               | CM      | 241                 | 141                        | 1 / 0          | 9.04                   | 9.54            | 18.58      | 33.01            | -14.43      |
| 1880.00         | 10                      | QPSK   | H               | CM      | 100                 | 0                          | 1 / 25         | 7.47                   | 9.50            | 16.97      | 33.01            | -16.04      |
| 1905.00         | 10                      | QPSK   | H               | CM      | 231                 | 156                        | 1 / 0          | 9.89                   | 9.47            | 19.36      | 33.01            | -13.65      |
| 1855.00         | 10                      | 16-QAM | H               | CM      | 241                 | 141                        | 1 / 0          | 8.38                   | 9.54            | 17.92      | 33.01            | -15.09      |
| 1880.00         | 10                      | 16-QAM | H               | CM      | 100                 | 0                          | 1 / 25         | 6.81                   | 9.50            | 16.31      | 33.01            | -16.70      |
| 1905.00         | 10                      | 16-QAM | H               | CM      | 231                 | 156                        | 1 / 0          | 9.17                   | 9.47            | 18.64      | 33.01            | -14.37      |

**Table 7-5. EIRP Data (Band 2)**

|                                      |   |  |   |                                 |
|--------------------------------------|---|--|---|---------------------------------|
| FCC ID: ZNFH820                      |  | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016   | EUT Type:<br>Portable Handset                                  | Page 131 of 160   |                                 |

| Frequency [MHz] | Channel Bandwidth [MHz] | Mod.   | Ant. Pol. [H/V] | Antenna | Antenna Height [cm] | Turntable Azimuth [degree] | RB Size/Offset | Substitute Level [dBm] | Ant. Gain [dBi] | EIRP [dBm] | EIRP Limit [dBm] | Margin [dB] |
|-----------------|-------------------------|--------|-----------------|---------|---------------------|----------------------------|----------------|------------------------|-----------------|------------|------------------|-------------|
| 2307.50         | 5                       | QPSK   | H               | Main    | 175                 | 124                        | 1 / 0          | 7.12                   | 9.23            | 16.35      | 23.98            | -7.63       |
| 2310.00         | 5                       | QPSK   | H               | Main    | 196                 | 118                        | 1 / 0          | 7.29                   | 9.23            | 16.52      | 23.98            | -7.46       |
| 2312.50         | 5                       | QPSK   | H               | Main    | 214                 | 113                        | 1 / 0          | 7.19                   | 9.23            | 16.42      | 23.98            | -7.56       |
| 2307.50         | 5                       | 16-QAM | H               | Main    | 175                 | 124                        | 1 / 0          | 6.40                   | 9.23            | 15.63      | 23.98            | -8.35       |
| 2310.00         | 5                       | 16-QAM | H               | Main    | 196                 | 118                        | 1 / 0          | 6.58                   | 9.23            | 15.81      | 23.98            | -8.17       |
| 2312.50         | 5                       | 16-QAM | H               | Main    | 214                 | 113                        | 1 / 0          | 6.33                   | 9.23            | 15.56      | 23.98            | -8.42       |
| 2310.00         | 10                      | QPSK   | H               | Main    | 196                 | 118                        | 1 / 49         | 7.37                   | 9.23            | 16.60      | 23.98            | -7.38       |
| 2310.00         | 10                      | 16-QAM | H               | Main    | 196                 | 118                        | 1 / 49         | 6.67                   | 9.23            | 15.90      | 23.98            | -8.08       |
| 2310.00         | 10                      | QPSK   | H               | CM      | 154                 | 270                        | 1 / 0          | 8.23                   | 9.23            | 17.46      | 23.98            | -6.52       |
| 2310.00         | 10                      | 16-QAM | H               | CM      | 154                 | 270                        | 1 / 0          | 7.47                   | 9.23            | 16.70      | 23.98            | -7.28       |

**Table 7-6. EIRP Data (Band 30)**

|                                      |   |   |   |                                 |
|--------------------------------------|---|---|---|---------------------------------|
| FCC ID: ZNFH820                      |  | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016   | EUT Type:<br>Portable Handset                               | Page 132 of 160   |                                 |

| Frequency [MHz] | Channel Bandwidth [MHz] | Mod.   | Ant. Pol. [H/V] | Antenna | Antenna Height [cm] | Turntable Azimuth [degree] | RB Size/Offset | Substitute Level [dBm] | Ant. Gain [dBi] | EIRP [dBm] | EIRP Limit [dBm] | Margin [dB] |
|-----------------|-------------------------|--------|-----------------|---------|---------------------|----------------------------|----------------|------------------------|-----------------|------------|------------------|-------------|
| 2502.50         | 5                       | QPSK   | H               | Main    | 180                 | 83                         | 1 / 24         | 10.19                  | 9.01            | 19.20      | 33.01            | -13.82      |
| 2535.00         | 5                       | QPSK   | H               | Main    | 178                 | 99                         | 1 / 0          | 7.54                   | 8.92            | 16.46      | 33.01            | -16.55      |
| 2567.50         | 5                       | QPSK   | H               | Main    | 213                 | 82                         | 1 / 0          | 10.98                  | 8.83            | 19.81      | 33.01            | -13.20      |
| 2502.50         | 5                       | 16-QAM | H               | Main    | 180                 | 83                         | 1 / 24         | 9.59                   | 9.01            | 18.60      | 33.01            | -14.42      |
| 2535.00         | 5                       | 16-QAM | H               | Main    | 178                 | 99                         | 1 / 0          | 7.04                   | 8.92            | 15.96      | 33.01            | -17.05      |
| 2567.50         | 5                       | 16-QAM | H               | Main    | 213                 | 82                         | 1 / 0          | 10.38                  | 8.83            | 19.21      | 33.01            | -13.80      |
| 2505.00         | 10                      | QPSK   | H               | Main    | 180                 | 83                         | 1 / 0          | 9.77                   | 9.00            | 18.77      | 33.01            | -14.24      |
| 2535.00         | 10                      | QPSK   | H               | Main    | 178                 | 99                         | 1 / 0          | 7.41                   | 8.92            | 16.33      | 33.01            | -16.68      |
| 2565.00         | 10                      | QPSK   | H               | Main    | 213                 | 82                         | 1 / 0          | 11.15                  | 8.83            | 19.98      | 33.01            | -13.03      |
| 2505.00         | 10                      | 16-QAM | H               | Main    | 180                 | 83                         | 1 / 0          | 9.48                   | 9.00            | 18.48      | 33.01            | -14.53      |
| 2535.00         | 10                      | 16-QAM | H               | Main    | 178                 | 99                         | 1 / 0          | 6.95                   | 8.92            | 15.87      | 33.01            | -17.14      |
| 2565.00         | 10                      | 16-QAM | H               | Main    | 213                 | 82                         | 1 / 0          | 10.46                  | 8.83            | 19.29      | 33.01            | -13.72      |
| 2507.50         | 15                      | QPSK   | H               | Main    | 182                 | 113                        | 1 / 0          | 8.00                   | 8.99            | 16.99      | 33.01            | -16.02      |
| 2535.00         | 15                      | QPSK   | H               | Main    | 174                 | 107                        | 1 / 0          | 6.59                   | 8.92            | 15.51      | 33.01            | -17.50      |
| 2562.50         | 15                      | QPSK   | H               | Main    | 178                 | 139                        | 1 / 37         | 12.43                  | 8.84            | 21.27      | 33.01            | -11.74      |
| 2507.50         | 15                      | 16-QAM | H               | Main    | 182                 | 113                        | 1 / 0          | 7.45                   | 8.99            | 16.44      | 33.01            | -16.57      |
| 2535.00         | 15                      | 16-QAM | H               | Main    | 174                 | 107                        | 1 / 0          | 6.07                   | 8.92            | 14.99      | 33.01            | -18.02      |
| 2562.50         | 15                      | 16-QAM | H               | Main    | 178                 | 139                        | 1 / 37         | 9.33                   | 8.84            | 18.17      | 33.01            | -14.84      |
| 2510.00         | 20                      | QPSK   | H               | Main    | 182                 | 113                        | 1 / 0          | 7.98                   | 8.98            | 16.96      | 33.01            | -16.05      |
| 2535.00         | 20                      | QPSK   | H               | Main    | 174                 | 107                        | 1 / 0          | 6.44                   | 8.92            | 15.36      | 33.01            | -17.65      |
| 2560.00         | 20                      | QPSK   | H               | Main    | 178                 | 139                        | 1 / 0          | 11.81                  | 8.85            | 20.66      | 33.01            | -12.35      |
| 2510.00         | 20                      | 16-QAM | H               | Main    | 182                 | 113                        | 1 / 0          | 7.22                   | 8.98            | 16.20      | 33.01            | -16.81      |
| 2535.00         | 20                      | 16-QAM | H               | Main    | 174                 | 107                        | 1 / 0          | 5.97                   | 8.92            | 14.89      | 33.01            | -18.12      |
| 2560.00         | 20                      | 16-QAM | H               | Main    | 178                 | 139                        | 1 / 0          | 11.20                  | 8.85            | 20.05      | 33.01            | -12.96      |
| 2507.50         | 15                      | QPSK   | H               | CM      | 182                 | 113                        | 1 / 0          | 10.21                  | 8.99            | 19.20      | 33.01            | -13.81      |
| 2535.00         | 15                      | QPSK   | H               | CM      | 141                 | 307                        | 1 / 0          | 10.47                  | 8.92            | 19.39      | 33.01            | -13.62      |
| 2562.50         | 15                      | QPSK   | H               | CM      | 178                 | 139                        | 1 / 37         | 9.02                   | 8.84            | 17.86      | 33.01            | -15.15      |
| 2507.50         | 15                      | 16-QAM | H               | CM      | 182                 | 113                        | 1 / 0          | 9.32                   | 8.99            | 18.31      | 33.01            | -14.70      |
| 2535.00         | 15                      | 16-QAM | H               | CM      | 141                 | 307                        | 1 / 0          | 9.94                   | 8.92            | 18.86      | 33.01            | -14.15      |
| 2562.50         | 15                      | 16-QAM | H               | CM      | 178                 | 139                        | 1 / 37         | 8.00                   | 8.84            | 16.84      | 33.01            | -16.17      |

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

|   |  |                                      |   |  |
|---|--|--------------------------------------|---|--|
| FCC ID: ZNFH820                             |  <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b> |                                      |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Test Report S/N:</b><br>0Y1601040003.ZNF | <b>Test Dates:</b><br>1/4 - 3/2/2016   | <b>EUT Type:</b><br>Portable Handset | Page 133 of 160   |  |

## 7.7 Radiated Spurious Emissions Measurements

§2.1053 §22.917(a) §24.238(a) §27.53(g) §27.53(h) §27.53(m) §27.53(a.4)

### Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-C-2004 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 v02r02 – Section 5.8

ANSI/TIA-603-C-2004 – Section 2.2.12

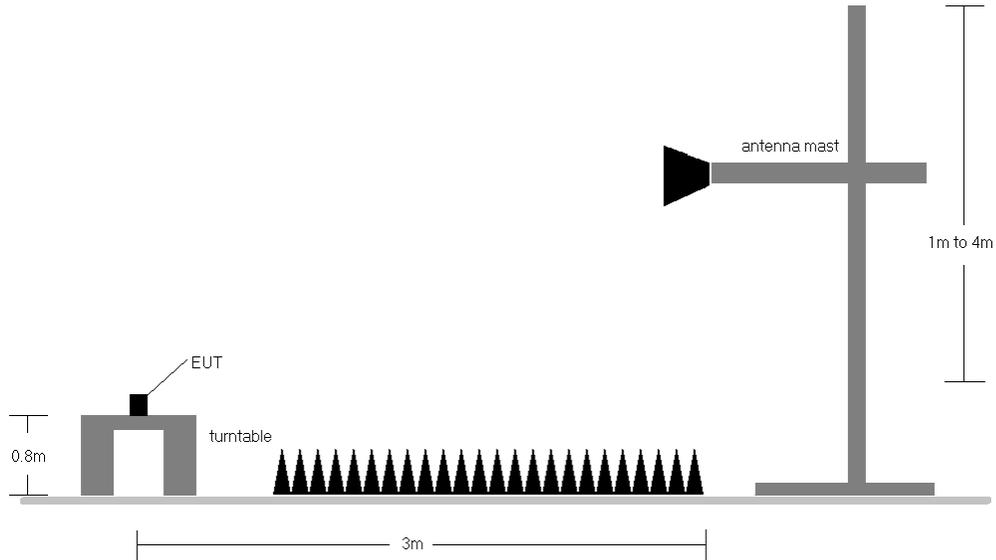
### Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW  $\geq 3 \times$  RBW
3. Span = 1.5 times the OBW
4. No. of sweep points  $\geq 2 \times$  span / RBW
5. Detector = Peak
6. Trace mode = max hold
7. The trace was allowed to stabilize

|   |  |                                      |   |  |
|---|--|--------------------------------------|---|--|
| FCC ID: ZNFH820                             |  <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b> |                                      |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Test Report S/N:</b><br>0Y1601040003.ZNF | <b>Test Dates:</b><br>1/4 - 3/2/2016   | <b>EUT Type:</b><br>Portable Handset |   | Page 134 of 160                        |

## Test Setup

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



**Figure 7-7. 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.

|                                      |  |  |  |                                 |
|--------------------------------------|--|--|--|---------------------------------|
| FCC ID: ZNFH820                      |  PCTEST<br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  LG | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016  | EUT Type:<br>Portable Handset                                  | Page 135 of 160  |                                 |

OPERATING FREQUENCY: 704.00 MHz  
 CHANNEL: 23060  
 MEASURED OUTPUT POWER: 18.80 dBm = 0.076 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  31.80 dBc

| Frequency [MHz] | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Level at Antenna Terminals [dBm] | Substitute Antenna Gain [dBd] | Spurious Emission Level [dBm] | [dBc] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------|
| 1408.00         | H               | 138                 | 20                         | -56.10                           | 6.21                          | -49.89                        | 68.7  |
| 2112.00         | H               | 100                 | 259                        | -43.24                           | 6.78                          | -36.46                        | 55.3  |
| 2816.00         | H               | 100                 | 268                        | -56.01                           | 8.05                          | -47.97                        | 66.8  |
| 3520.00         | H               | -                   | -                          | -58.16                           | 7.63                          | -50.52                        | 69.3  |

Table 7-8. Radiated Spurious Data (Band 12 – Low Channel)

OPERATING FREQUENCY: 707.50 MHz  
 CHANNEL: 23095  
 MEASURED OUTPUT POWER: 18.74 dBm = 0.075 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  31.74 dBc

| Frequency [MHz] | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Level at Antenna Terminals [dBm] | Substitute Antenna Gain [dBd] | Spurious Emission Level [dBm] | [dBc] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------|
| 1415.00         | H               | 110                 | 264                        | -56.44                           | 6.23                          | -50.22                        | 69.0  |
| 2122.50         | H               | 110                 | 272                        | -39.83                           | 6.80                          | -33.03                        | 51.8  |
| 2830.00         | H               | 123                 | 280                        | -54.87                           | 8.07                          | -46.81                        | 65.6  |
| 3537.50         | H               | -                   | -                          | -59.04                           | 7.68                          | -51.37                        | 70.1  |

Table 7-9. Radiated Spurious Data (Band 12/17 – Mid Channel)

|                                      |   |   |   |                                 |
|--------------------------------------|---|---|---|---------------------------------|
| FCC ID: ZNFH820                      |  | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016   | EUT Type:<br>Portable Handset                               | Page 136 of 160   |                                 |

OPERATING FREQUENCY: 711.00 MHz  
 CHANNEL: 23130  
 MEASURED OUTPUT POWER: 18.96 dBm = 0.079 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  31.96 dBc

| Frequency [MHz] | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Level at Antenna Terminals [dBm] | Substitute Antenna Gain [dBd] | Spurious Emission Level [dBm] | [dBc] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------|
| 1422.00         | H               | 110                 | 268                        | -56.25                           | 6.25                          | -50.00                        | 69.0  |
| 2133.00         | H               | 113                 | 264                        | -39.92                           | 6.82                          | -33.10                        | 52.1  |
| 2844.00         | H               | 118                 | 277                        | -53.83                           | 8.09                          | -45.75                        | 64.7  |
| 3555.00         | H               | -                   | -                          | -59.79                           | 7.72                          | -52.07                        | 71.0  |

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

OPERATING FREQUENCY: 711.00 MHz  
 CHANNEL: 23130  
 MEASURED OUTPUT POWER: 15.25 dBm = 0.034 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  28.25 dBc

| Frequency [MHz] | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Level at Antenna Terminals [dBm] | Substitute Antenna Gain [dBd] | Spurious Emission Level [dBm] | [dBc] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------|
| 1422.00         | H               | 186                 | 244                        | -63.35                           | 5.77                          | -57.58                        | 72.8  |
| 2133.00         | H               | 198                 | 221                        | -43.59                           | 6.79                          | -36.80                        | 52.1  |
| 2844.00         | H               | -                   | -                          | -63.97                           | 7.78                          | -56.19                        | 71.4  |

**Table 7-11. Radiated Spurious Data with CM Accessory (Band 12/17 – High Channel)**

|                                      |   |   |   |                                 |
|--------------------------------------|---|---|---|---------------------------------|
| FCC ID: ZNFH820                      |  | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016   | EUT Type:<br>Portable Handset                               | Page 137 of 160   |                                 |

OPERATING FREQUENCY: 826.50 MHz  
 CHANNEL: 20425  
 MEASURED OUTPUT POWER: 19.63 dBm = 0.092 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  32.63 dBc

| Frequency [MHz] | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Level at Antenna Terminals [dBm] | Substitute Antenna Gain [dBd] | Spurious Emission Level [dBm] | [dBc] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------|
| 1653.00         | H               | 131                 | 231                        | -55.05                           | 6.23                          | -48.82                        | 68.4  |
| 2479.50         | H               | 121                 | 351                        | -56.29                           | 6.61                          | -49.67                        | 69.3  |
| 3306.00         | H               | -                   | -                          | -60.02                           | 7.01                          | -53.01                        | 72.6  |

**Table 7-12. Radiated Spurious Data (Band 5 – Low Channel)**

OPERATING FREQUENCY: 836.50 MHz  
 CHANNEL: 20525  
 MEASURED OUTPUT POWER: 20.07 dBm = 0.102 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  33.07 dBc

| Frequency [MHz] | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Level at Antenna Terminals [dBm] | Substitute Antenna Gain [dBd] | Spurious Emission Level [dBm] | [dBc] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------|
| 1673.00         | H               | 129                 | 236                        | -54.54                           | 6.13                          | -48.41                        | 68.5  |
| 2509.50         | H               | 116                 | 344                        | -56.41                           | 6.64                          | -49.77                        | 69.8  |
| 3346.00         | H               | -                   | -                          | -58.11                           | 7.14                          | -50.97                        | 71.0  |

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

|                                      |   |   |   |                                 |
|--------------------------------------|---|---|---|---------------------------------|
| FCC ID: ZNFH820                      |  | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016   | EUT Type:<br>Portable Handset                               | Page 138 of 160   |                                 |

OPERATING FREQUENCY: 846.50 MHz  
 CHANNEL: 20625  
 MEASURED OUTPUT POWER: 20.89 dBm = 0.123 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  33.89 dBc

| Frequency [MHz] | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Level at Antenna Terminals [dBm] | Substitute Antenna Gain [dBd] | Spurious Emission Level [dBm] | [dBc] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------|
| 1693.00         | H               | 102                 | 345                        | -51.27                           | 6.03                          | -45.24                        | 66.1  |
| 2539.50         | H               | 106                 | 26                         | -56.63                           | 6.72                          | -49.91                        | 70.8  |
| 3386.00         | H               | -                   | -                          | -58.98                           | 7.27                          | -51.72                        | 72.6  |

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

OPERATING FREQUENCY: 846.50 MHz  
 CHANNEL: 20625  
 MEASURED OUTPUT POWER: 13.10 dBm = 0.020 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  26.10 dBc

| Frequency [MHz] | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Level at Antenna Terminals [dBm] | Substitute Antenna Gain [dBd] | Spurious Emission Level [dBm] | [dBc] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------|
| 1693.00         | H               | 111                 | 262                        | -66.61                           | 6.03                          | -60.58                        | 73.7  |
| 2539.50         | H               | 105                 | 280                        | -55.80                           | 6.72                          | -49.08                        | 62.2  |
| 3386.00         | H               | -                   | -                          | -65.19                           | 7.27                          | -57.93                        | 71.0  |

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

|                                      |   |   |   |                                 |
|--------------------------------------|---|---|---|---------------------------------|
| FCC ID: ZNFH820                      |  | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016   | EUT Type:<br>Portable Handset                               | Page 139 of 160   |                                 |

OPERATING FREQUENCY: 1712.50 MHz  
 CHANNEL: 19975  
 MEASURED OUTPUT POWER: 24.24 dBm = 0.266 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  37.24 dBc

| 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] | [dBc] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------|
| 3425.00         | H               | 130                 | 270                        | -45.67                           | 9.53                          | -36.13                        | 60.4  |
| 5137.50         | H               | -                   | -                          | -51.35                           | 11.03                         | -40.32                        | 64.6  |
| 6850.00         | H               | -                   | -                          | -48.11                           | 10.75                         | -37.36                        | 61.6  |

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

OPERATING FREQUENCY: 1732.50 MHz  
 CHANNEL: 20175  
 MEASURED OUTPUT POWER: 24.03 dBm = 0.253 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  37.03 dBc

| 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] | [dBc] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------|
| 3465.00         | H               | 136                 | 260                        | -42.92                           | 9.64                          | -33.28                        | 57.3  |
| 5197.50         | H               | -                   | -                          | -52.33                           | 10.98                         | -41.35                        | 65.4  |
| 6930.00         | H               | -                   | -                          | -48.53                           | 10.85                         | -37.68                        | 61.7  |

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

|                                      |   |   |   |                                 |
|--------------------------------------|---|---|---|---------------------------------|
| FCC ID: ZNFH820                      |  | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016   | EUT Type:<br>Portable Handset                               | Page 140 of 160   |                                 |

OPERATING FREQUENCY: 1752.50 MHz  
 CHANNEL: 20375  
 MEASURED OUTPUT POWER: 25.06 dBm = 0.320 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  38.06 dBc

| 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] | [dBc] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------|
| 3505.00         | H               | 130                 | 250                        | -38.86                           | 9.75                          | -29.11                        | 54.2  |
| 5257.50         | H               | -                   | -                          | -51.91                           | 11.06                         | -40.86                        | 65.9  |
| 7010.00         | H               | -                   | -                          | -48.42                           | 11.00                         | -37.41                        | 62.5  |

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

OPERATING FREQUENCY: 1752.50 MHz  
 CHANNEL: 20375  
 MEASURED OUTPUT POWER: 24.82 dBm = 0.303 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  37.82 dBc

| 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] | [dBc] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------|
| 3505.00         | H               | 211                 | 65                         | -54.08                           | 9.73                          | -44.35                        | 69.2  |
| 5257.50         | H               | 255                 | 78                         | -43.73                           | 10.64                         | -33.09                        | 57.9  |
| 7010.00         | H               | -                   | -                          | -53.39                           | 11.75                         | -41.63                        | 66.4  |

**Table 7-19. Radiated Spurious Data with CM Accessory (Band 4 – High Channel)**

|                                      |   |   |   |                                 |
|--------------------------------------|---|---|---|---------------------------------|
| FCC ID: ZNFH820                      |  | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016   | EUT Type:<br>Portable Handset                               | Page 141 of 160   |                                 |

OPERATING FREQUENCY: 1855.00 MHz  
 CHANNEL: 18650  
 MEASURED OUTPUT POWER: 23.83 dBm = 0.241 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  36.83 dBc

| 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] | [dBc] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------|
| 3710.00         | H               | 180                 | 40                         | -44.69                           | 9.87                          | -34.82                        | 58.7  |
| 5565.00         | H               | -                   | -                          | -52.18                           | 11.18                         | -41.00                        | 64.8  |
| 7420.00         | H               | -                   | -                          | -45.88                           | 10.85                         | -35.04                        | 58.9  |

**Table 7-20. Radiated Spurious Data (Band 2 – Low Channel)**

OPERATING FREQUENCY: 1880.00 MHz  
 CHANNEL: 18900  
 MEASURED OUTPUT POWER: 24.39 dBm = 0.275 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  37.39 dBc

| 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] | [dBc] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------|
| 3760.00         | H               | 170                 | 280                        | -44.47                           | 9.63                          | -34.84                        | 59.2  |
| 5640.00         | H               | -                   | -                          | -53.12                           | 11.29                         | -41.83                        | 66.2  |
| 7520.00         | H               | -                   | -                          | -47.17                           | 11.12                         | -36.04                        | 60.4  |

**Table 7-21. Radiated Spurious Data (Band 2 – Mid Channel)**

|                                      |   |   |   |                                 |
|--------------------------------------|---|---|---|---------------------------------|
| FCC ID: ZNFH820                      |  | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016   | EUT Type:<br>Portable Handset                               | Page 142 of 160   |                                 |

OPERATING FREQUENCY: 1905.00 MHz  
 CHANNEL: 19150  
 MEASURED OUTPUT POWER: 24.68 dBm = 0.294 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  37.68 dBc

| 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] | [dBc] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------|
| 3810.00         | H               | 179                 | 340                        | -46.90                           | 9.41                          | -37.48                        | 62.2  |
| 5715.00         | H               | -                   | -                          | -53.52                           | 11.37                         | -42.16                        | 66.8  |
| 7620.00         | H               | -                   | -                          | -48.23                           | 11.33                         | -36.90                        | 61.6  |

**Table 7-22. Radiated Spurious Data (Band 2 – High Channel)**

OPERATING FREQUENCY: 1905.00 MHz  
 CHANNEL: 19150  
 MEASURED OUTPUT POWER: 19.36 dBm = 0.086 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  32.36 dBc

| 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] | [dBc] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------|
| 3810.00         | H               | 176                 | 217                        | -56.18                           | 9.41                          | -46.76                        | 66.1  |
| 5715.00         | H               | 190                 | 227                        | -56.43                           | 11.37                         | -45.07                        | 64.4  |
| 7620.00         | H               | -                   | -                          | -56.82                           | 11.33                         | -45.49                        | 64.9  |

**Table 7-23. Radiated Spurious Data with CM Accessory (Band 2 – High Channel)**

|                                      |   |   |   |                                 |
|--------------------------------------|---|---|---|---------------------------------|
| FCC ID: ZNFH820                      |  | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016   | EUT Type:<br>Portable Handset                               | Page 143 of 160   |                                 |

OPERATING FREQUENCY: 2310.00 MHz  
 CHANNEL: 27710  
 MEASURED OUTPUT POWER: 16.60 dBm = 0.046 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $70 + 10 \log_{10}(W) =$  56.60 dBc

| 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] | [dBc] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------|
| 4620.00         | H               | 102                 | 252                        | -65.95                           | 11.33                         | -54.62                        | 71.2  |
| 6930.00         | H               | -                   | -                          | -62.14                           | 10.85                         | -51.29                        | 67.9  |
| 9240.00         | H               | -                   | -                          | -62.97                           | 12.31                         | -50.66                        | 67.3  |

**Table 7-24. Radiated Spurious Data (Band 30)**

OPERATING FREQUENCY: 2310.00 MHz  
 CHANNEL: 27710  
 MEASURED OUTPUT POWER: 17.46 dBm = 0.056 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $70 + 10 \log_{10}(W) =$  57.46 dBc

| 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] | [dBc] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------|
| 4620.00         | H               | 110                 | 219                        | -62.12                           | 11.33                         | -50.79                        | 68.3  |
| 6930.00         | H               | -                   | -                          | -58.25                           | 10.85                         | -47.40                        | 64.9  |
| 9240.00         | H               | -                   | -                          | -57.85                           | 12.31                         | -45.54                        | 63.0  |

**Table 7-25. Radiated Spurious Data with CM Accessory (Band 30)**

|                                      |   |   |   |                                 |
|--------------------------------------|---|---|---|---------------------------------|
| FCC ID: ZNFH820                      |  | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016   | EUT Type:<br>Portable Handset                               | Page 144 of 160   |                                 |

OPERATING FREQUENCY: 2507.50 MHz  
 CHANNEL: 20825  
 MEASURED OUTPUT POWER: 16.99 dBm = 0.050 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 15.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $55 + 10 \log_{10}(W)$  41.99 dBc

| 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] | [dBc] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------|
| 5015.00         | H               | 189                 | 324                        | -50.59                           | 10.15                         | -40.44                        | 57.4  |
| 7522.50         | H               | 189                 | 324                        | -55.58                           | 12.11                         | -43.47                        | 60.5  |
| 10030.00        | H               | 189                 | 324                        | -53.55                           | 13.26                         | -40.29                        | 57.3  |
| 12537.50        | H               | -                   | -                          | -49.72                           | 13.19                         | -36.54                        | 53.5  |

**Table 7-26. Radiated Spurious Data (Band 7 – Low Channel)**

OPERATING FREQUENCY: 2535.00 MHz  
 CHANNEL: 21100  
 MEASURED OUTPUT POWER: 15.51 dBm = 0.036 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 15.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $55 + 10 \log_{10}(W)$  40.51 dBc

| 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] | [dBc] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------|
| 5070.00         | H               | 162                 | 338                        | -50.08                           | 10.19                         | -39.89                        | 55.4  |
| 7605.00         | H               | 162                 | 338                        | -55.41                           | 12.18                         | -43.22                        | 58.7  |
| 10140.00        | H               | 162                 | 338                        | -53.29                           | 13.29                         | -40.00                        | 55.5  |
| 12675.00        | H               | -                   | -                          | -50.44                           | 13.19                         | -37.25                        | 52.8  |

**Table 7-27. Radiated Spurious Data (Band 7 – Mid Channel)**

|                                      |   |   |   |                                 |
|--------------------------------------|---|---|---|---------------------------------|
| FCC ID: ZNFH820                      |  | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016   | EUT Type:<br>Portable Handset                               | Page 145 of 160   |                                 |

OPERATING FREQUENCY: 2562.50 MHz  
 CHANNEL: 21375  
 MEASURED OUTPUT POWER: 21.27 dBm = 0.134 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 15.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $55 + 10 \log_{10}(W)$  46.27 dBc

| 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] | [dBc] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------|
| 5125.00         | H               | 135                 | 315                        | -52.39                           | 10.25                         | -42.14                        | 63.4  |
| 7687.50         | H               | 135                 | 315                        | -55.35                           | 12.27                         | -43.08                        | 64.4  |
| 10250.00        | H               | 135                 | 315                        | -50.13                           | 13.28                         | -36.85                        | 58.1  |
| 12812.50        | H               | -                   | -                          | -50.31                           | 13.26                         | -37.05                        | 58.3  |

**Table 7-28. Radiated Spurious Data (Band 7 – High Channel)**

OPERATING FREQUENCY: 2535.00 MHz  
 CHANNEL: 21100  
 MEASURED OUTPUT POWER: 19.39 dBm = 0.087 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 15.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $55 + 10 \log_{10}(W)$  44.39 dBc

| 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] | [dBc] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------|
| 5070.00         | H               | 145                 | 342                        | -45.40                           | 10.25                         | -35.15                        | 54.5  |
| 7605.00         | H               | 145                 | 342                        | -54.79                           | 12.27                         | -42.52                        | 61.9  |
| 10140.00        | H               | 145                 | 342                        | -50.75                           | 13.28                         | -37.47                        | 56.9  |
| 12675.00        | H               | -                   | -                          | -50.73                           | 13.26                         | -37.47                        | 56.9  |

**Table 7-29. Radiated Spurious Data with CM Accessory (Band 7 – Mid Channel)**

|                                      |   |   |   |                                 |
|--------------------------------------|---|---|---|---------------------------------|
| FCC ID: ZNFH820                      |  | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016   | EUT Type:<br>Portable Handset                               | Page 146 of 160   |                                 |

## 7.8 Frequency Stability / Temperature Variation

§2.1055 §22.355 §24.235 §27.54

### Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-C-2004. 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  $\pm 0.00025\%$  ( $\pm 2.5$  ppm) of the center frequency. For Part 24 and 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-C-2004

### 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

|                                      |   |                               |  |   |                                 |
|--------------------------------------|---|-------------------------------|--|---|---------------------------------|
| FCC ID: ZNFH820                      |  |                               | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016   | EUT Type:<br>Portable Handset |  |   | Page 147 of 160                 |

## Band 12/17 Frequency Stability Measurements

§2.1055 §27.54

OPERATING FREQUENCY: 707,500,000 Hz  
 CHANNEL: 23790  
 REFERENCE VOLTAGE: 3.80 VDC

| VOLTAGE (%)    | POWER (VDC) | TEMP (°C)  | FREQUENCY (Hz) | Freq. Dev. (Hz) | Deviation (%) |
|----------------|-------------|------------|----------------|-----------------|---------------|
| 100 %          | 3.80        | + 20 (Ref) | 707,499,909    | -91             | -0.0000129    |
| 100 %          |             | - 30       | 707,499,927    | -73             | -0.0000103    |
| 100 %          |             | - 20       | 707,499,850    | -150            | -0.0000212    |
| 100 %          |             | - 10       | 707,500,066    | 66              | 0.0000093     |
| 100 %          |             | 0          | 707,500,015    | 15              | 0.0000021     |
| 100 %          |             | + 10       | 707,500,071    | 71              | 0.0000100     |
| 100 %          |             | + 20       | 707,499,921    | -79             | -0.0000112    |
| 100 %          |             | + 30       | 707,500,054    | 54              | 0.0000076     |
| 100 %          |             | + 40       | 707,499,999    | -1              | -0.0000001    |
| 100 %          |             | + 50       | 707,499,900    | -100            | -0.0000141    |
| BATT. ENDPOINT | 3.40        | + 20       | 707,500,108    | 108             | 0.0000153     |

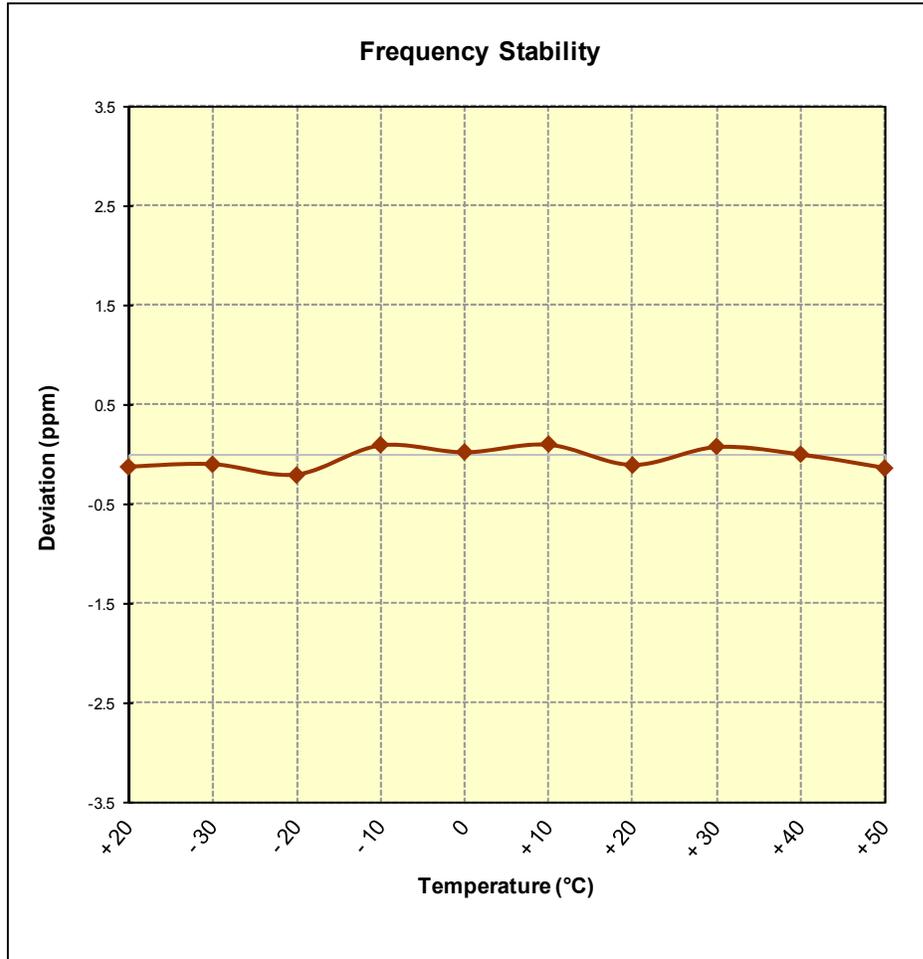
**Table 7-30. Frequency Stability Data (Band 12/17)**

**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.

|                                      |   |  |   |                                 |
|--------------------------------------|---|--|---|---------------------------------|
| FCC ID: ZNFH820                      |  | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016   | EUT Type:<br>Portable Handset                                  | Page 148 of 160   |                                 |

**Band 12/17 Frequency Stability Measurements**  
**§2.1055 §27.54**



**Figure 7-8. Frequency Stability Graph (Band 12/17)**

|   |   |  |   |  |
|---|---|--|---|--|
| <b>FCC ID:</b> ZNFH820                      |  | <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b> |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Test Report S/N:</b><br>0Y1601040003.ZNF | <b>Test Dates:</b><br>1/4 - 3/2/2016  | <b>EUT Type:</b><br>Portable Handset                                   | Page 149 of 160   |  |

## Band 5 Frequency Stability Measurements

§2.1055 §22.355

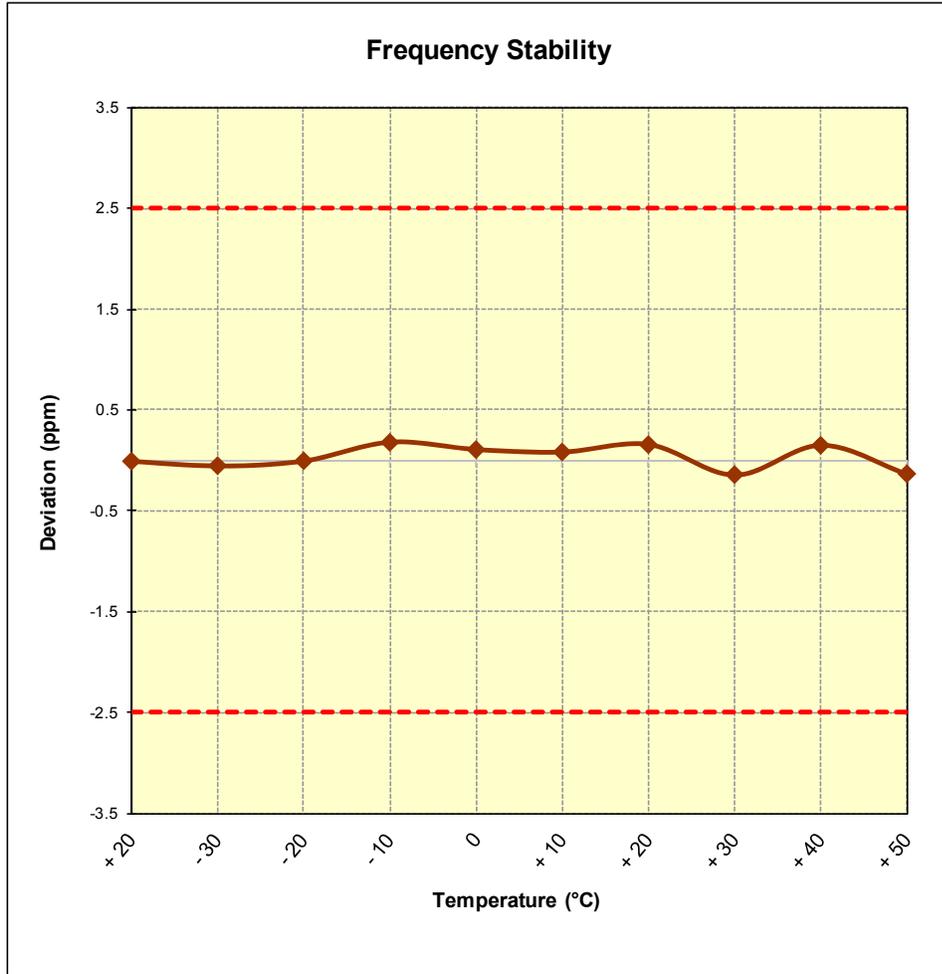
OPERATING FREQUENCY: 836,500,000 Hz  
 CHANNEL: 20525  
 REFERENCE VOLTAGE: 3.80 VDC  
 DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

| VOLTAGE (%)    | POWER (VDC) | TEMP (°C)  | FREQUENCY (Hz) | Freq. Dev. (Hz) | Deviation (%) |
|----------------|-------------|------------|----------------|-----------------|---------------|
| 100 %          | 3.80        | + 20 (Ref) | 836,499,994    | -6              | -0.0000007    |
| 100 %          |             | - 30       | 836,499,957    | -43             | -0.0000051    |
| 100 %          |             | - 20       | 836,499,997    | -3              | -0.0000004    |
| 100 %          |             | - 10       | 836,500,150    | 150             | 0.0000179     |
| 100 %          |             | 0          | 836,500,090    | 90              | 0.0000108     |
| 100 %          |             | + 10       | 836,500,070    | 70              | 0.0000084     |
| 100 %          |             | + 20       | 836,500,131    | 131             | 0.0000157     |
| 100 %          |             | + 30       | 836,499,883    | -117            | -0.0000140    |
| 100 %          |             | + 40       | 836,500,125    | 125             | 0.0000149     |
| 100 %          |             | + 50       | 836,499,889    | -111            | -0.0000133    |
| BATT. ENDPOINT | 3.40        | + 20       | 836,499,999    | -1              | -0.0000001    |

Table 7-31. Frequency Stability Data (Band 5)

|                                      |   |   |   |                                 |
|--------------------------------------|---|---|---|---------------------------------|
| FCC ID: ZNFH820                      |  | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016   | EUT Type:<br>Portable Handset                               | Page 150 of 160   |                                 |

**Band 5 Frequency Stability Measurements**  
**§2.1055 §22.355**



**Figure 7-9. Frequency Stability Graph (Band 5)**

|                                      |   |  |   |                                 |
|--------------------------------------|---|--|---|---------------------------------|
| FCC ID: ZNFH820                      |  | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016   | EUT Type:<br>Portable Handset                                  | Page 151 of 160   |                                 |

## Band 4 Frequency Stability Measurements

§2.1055 §§27.54

OPERATING FREQUENCY: 1,732,500,000 Hz  
 CHANNEL: 20175  
 REFERENCE VOLTAGE: 3.80 VDC

| VOLTAGE (%)    | POWER (VDC) | TEMP (°C)  | FREQUENCY (Hz) | Freq. Dev. (Hz) | Deviation (%) |
|----------------|-------------|------------|----------------|-----------------|---------------|
| 100 %          | 3.80        | + 20 (Ref) | 1,732,499,977  | -23             | -0.0000013    |
| 100 %          |             | - 30       | 1,732,499,959  | -41             | -0.0000024    |
| 100 %          |             | - 20       | 1,732,499,902  | -98             | -0.0000057    |
| 100 %          |             | - 10       | 1,732,499,867  | -133            | -0.0000077    |
| 100 %          |             | 0          | 1,732,499,871  | -129            | -0.0000074    |
| 100 %          |             | + 10       | 1,732,499,969  | -31             | -0.0000018    |
| 100 %          |             | + 20       | 1,732,499,991  | -9              | -0.0000005    |
| 100 %          |             | + 30       | 1,732,500,139  | 139             | 0.0000080     |
| 100 %          |             | + 40       | 1,732,499,958  | -42             | -0.0000024    |
| 100 %          |             | + 50       | 1,732,500,053  | 53              | 0.0000031     |
| BATT. ENDPOINT | 3.40        | + 20       | 1,732,499,978  | -22             | -0.0000013    |

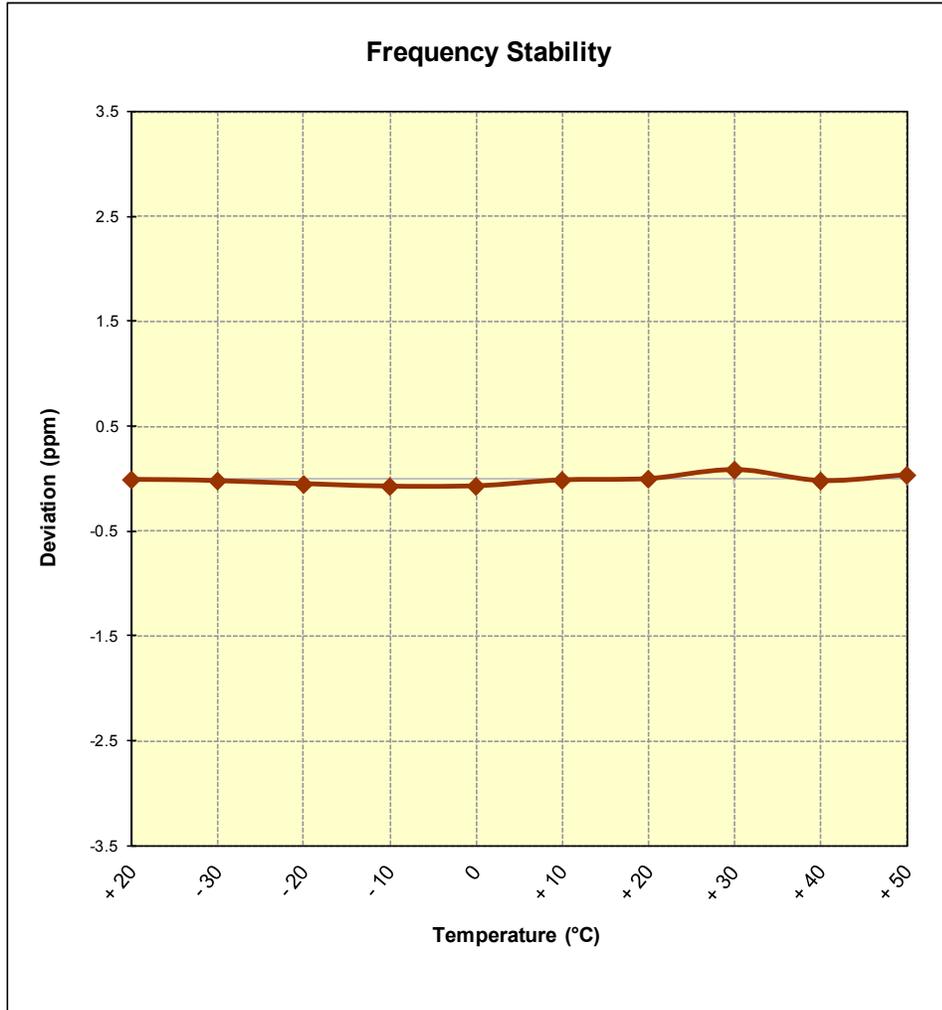
**Table 7-32. Frequency Stability Data (Band 4)**

**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.

|                                      |   |   |   |                                 |
|--------------------------------------|---|---|---|---------------------------------|
| FCC ID: ZNFH820                      |  | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016   | EUT Type:<br>Portable Handset                               | Page 152 of 160   |                                 |

**Band 4 Frequency Stability Measurements**  
**§2.1055 §§27.54**



**Figure 7-10. Frequency Stability Graph (Band 4)**

|                                      |                               |   |                 |                                 |
|--------------------------------------|-------------------------------|---|-----------------|---------------------------------|
| FCC ID: ZNFH820                      |                               | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION) |                 | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016 | EUT Type:<br>Portable Handset                               | Page 153 of 160 |                                 |

## Band 2 Frequency Stability Measurements

§2.1055 §24.235

OPERATING FREQUENCY: 1,880,000,000 Hz  
 CHANNEL: 18900  
 REFERENCE VOLTAGE: 3.80 VDC

| VOLTAGE (%)    | POWER (VDC) | TEMP (°C)  | FREQUENCY (Hz) | Freq. Dev. (Hz) | Deviation (%) |
|----------------|-------------|------------|----------------|-----------------|---------------|
| 100 %          | 3.80        | + 20 (Ref) | 1,879,999,999  | -1              | -0.0000001    |
| 100 %          |             | - 30       | 1,880,000,093  | 93              | 0.0000049     |
| 100 %          |             | - 20       | 1,879,999,907  | -93             | -0.0000049    |
| 100 %          |             | - 10       | 1,879,999,888  | -112            | -0.0000060    |
| 100 %          |             | 0          | 1,879,999,967  | -33             | -0.0000018    |
| 100 %          |             | + 10       | 1,880,000,043  | 43              | 0.0000023     |
| 100 %          |             | + 20       | 1,879,999,963  | -37             | -0.0000020    |
| 100 %          |             | + 30       | 1,880,000,131  | 131             | 0.0000070     |
| 100 %          |             | + 40       | 1,880,000,142  | 142             | 0.0000076     |
| 100 %          |             | + 50       | 1,879,999,857  | -143            | -0.0000076    |
| BATT. ENDPOINT | 3.40        | + 20       | 1,880,000,119  | 119             | 0.0000063     |

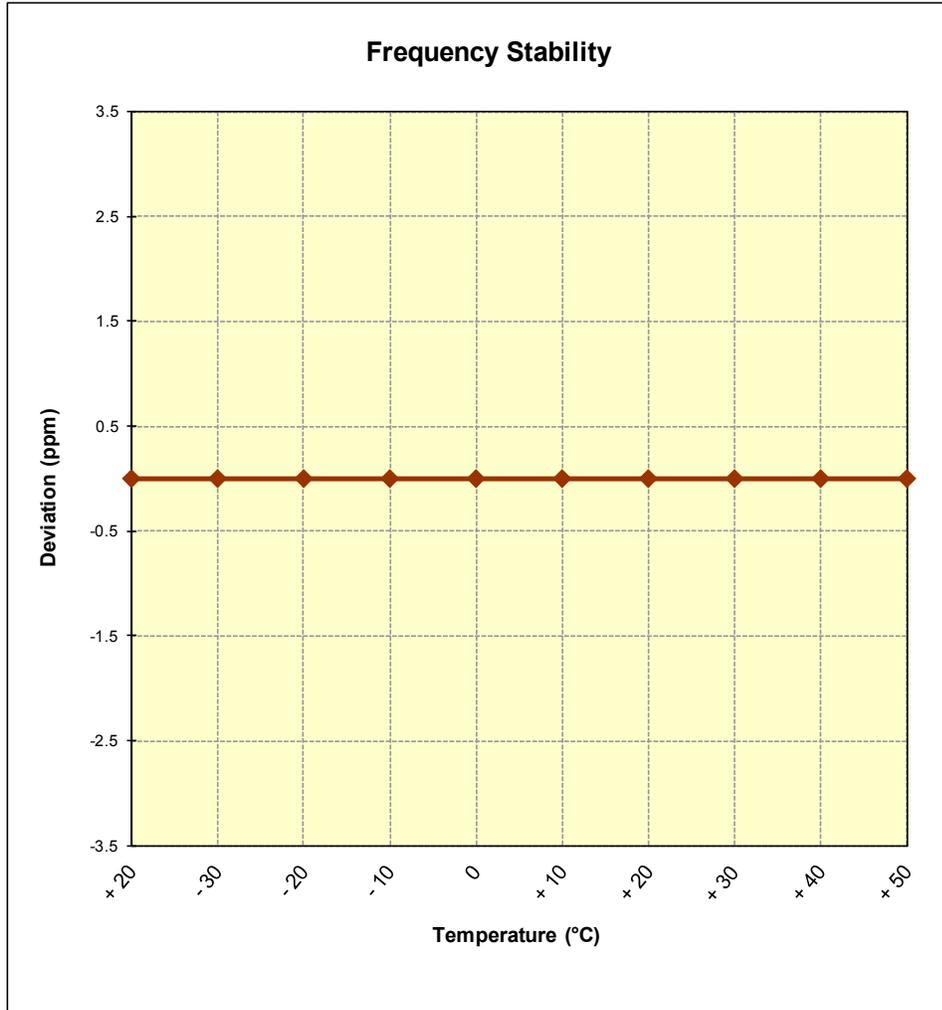
Table 7-33. Frequency Stability Data (Band 2)

**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.

|                                      |  |                               |   |                                 |
|--------------------------------------|--|-------------------------------|---|---------------------------------|
| FCC ID: ZNFH820                      |  FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |                               |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016  | EUT Type:<br>Portable Handset | Page 154 of 160   |                                 |

**Band 2 Frequency Stability Measurements**  
**§2.1055 §24.235**



**Figure 7-11. Frequency Stability Graph (Band 2)**

|                                      |   |  |   |                                 |
|--------------------------------------|---|--|---|---------------------------------|
| FCC ID: ZNFH820                      |  | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016   | EUT Type:<br>Portable Handset                                  | Page 155 of 160   |                                 |

## Band 30 Frequency Stability Measurements

§2.1055 §24.235

OPERATING FREQUENCY: 2,310,000,000 Hz  
 CHANNEL: 27710  
 REFERENCE VOLTAGE: 3.80 VDC

| VOLTAGE (%)    | POWER (VDC) | TEMP (°C)  | FREQUENCY (Hz) | Freq. Dev. (Hz) | Deviation (%) |
|----------------|-------------|------------|----------------|-----------------|---------------|
| 100 %          | 3.80        | + 20 (Ref) | 2,309,999,989  | -11             | -0.0000005    |
| 100 %          |             | - 30       | 2,309,999,961  | -39             | -0.0000017    |
| 100 %          |             | - 20       | 2,310,000,128  | 128             | 0.0000055     |
| 100 %          |             | - 10       | 2,310,000,072  | 72              | 0.0000031     |
| 100 %          |             | 0          | 2,310,000,132  | 132             | 0.0000057     |
| 100 %          |             | + 10       | 2,310,000,089  | 89              | 0.0000039     |
| 100 %          |             | + 20       | 2,310,000,119  | 119             | 0.0000052     |
| 100 %          |             | + 30       | 2,310,000,020  | 20              | 0.0000009     |
| 100 %          |             | + 40       | 2,309,999,985  | -15             | -0.0000006    |
| 100 %          |             | + 50       | 2,310,000,072  | 72              | 0.0000031     |
| BATT. ENDPOINT | 3.40        | + 20       | 2,309,999,976  | -24             | -0.0000010    |

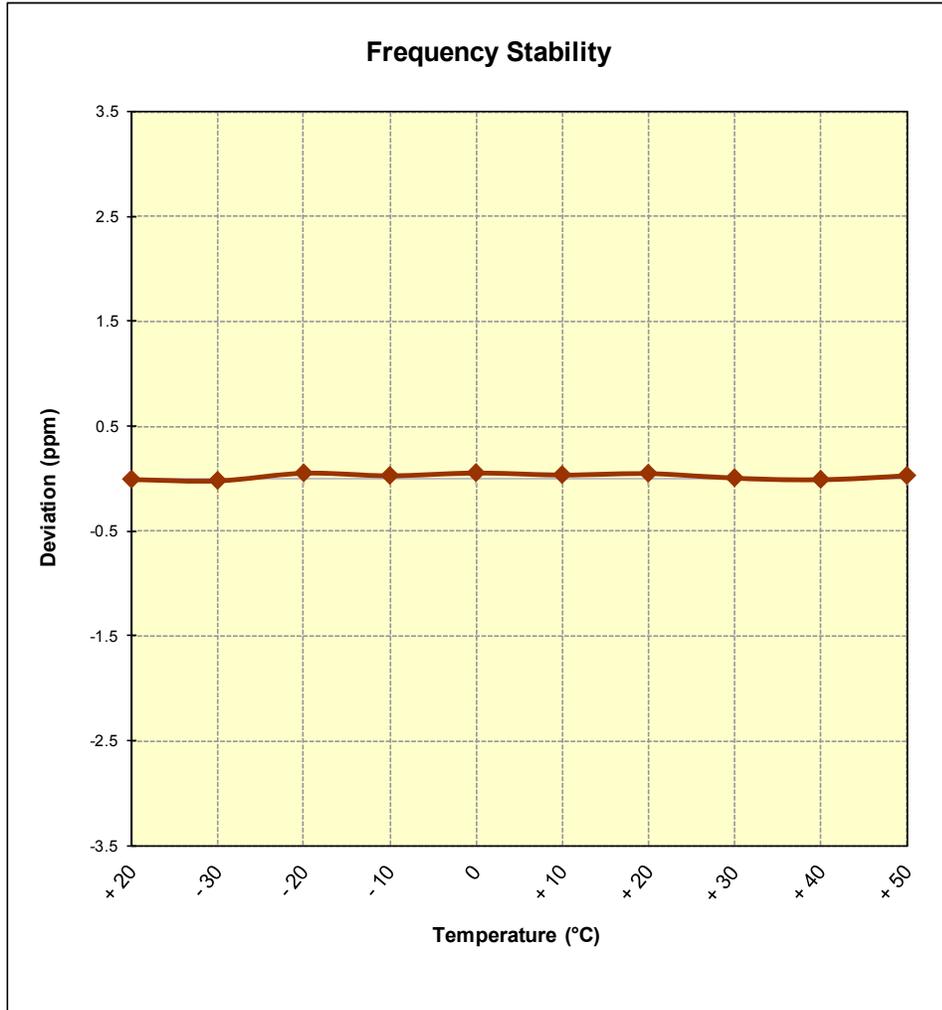
**Table 7-34. Frequency Stability Data (Band 30)**

**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.

|                                      |  |                               |   |                                 |
|--------------------------------------|--|-------------------------------|---|---------------------------------|
| FCC ID: ZNFH820                      |  FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |                               |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016  | EUT Type:<br>Portable Handset |   | Page 156 of 160                 |

**Band 30 Frequency Stability Measurements**  
**§2.1055 §24.235**



**Figure 7-12. Frequency Stability Graph (Band 30)**

|   |                                      |  |                 |  |
|---|--------------------------------------|--|-----------------|--|
| <b>FCC ID:</b> ZNFH820                      |                                      | <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b> |                 | <b>Reviewed by:</b><br>Quality Manager |
| <b>Test Report S/N:</b><br>0Y1601040003.ZNF | <b>Test Dates:</b><br>1/4 - 3/2/2016 | <b>EUT Type:</b><br>Portable Handset                                   | Page 157 of 160 |  |

## Band 7 Frequency Stability Measurements

§2.1055 §27.54

OPERATING FREQUENCY: 2,535,000,000 Hz  
 CHANNEL: 21100  
 REFERENCE VOLTAGE: 3.80 VDC

| VOLTAGE (%)    | POWER (VDC) | TEMP (°C)  | FREQUENCY (Hz) | Freq. Dev. (Hz) | Deviation (%) |
|----------------|-------------|------------|----------------|-----------------|---------------|
| 100 %          | 3.80        | + 20 (Ref) | 2,534,999,932  | -68             | -0.0000027    |
| 100 %          |             | - 30       | 2,534,999,913  | -87             | -0.0000034    |
| 100 %          |             | - 20       | 2,535,000,052  | 52              | 0.0000021     |
| 100 %          |             | - 10       | 2,535,000,107  | 107             | 0.0000042     |
| 100 %          |             | 0          | 2,534,999,950  | -50             | -0.0000020    |
| 100 %          |             | + 10       | 2,534,999,853  | -147            | -0.0000058    |
| 100 %          |             | + 20       | 2,535,000,144  | 144             | 0.0000057     |
| 100 %          |             | + 30       | 2,534,999,877  | -123            | -0.0000049    |
| 100 %          |             | + 40       | 2,534,999,937  | -63             | -0.0000025    |
| 100 %          |             | + 50       | 2,534,999,988  | -12             | -0.0000005    |
| BATT. ENDPOINT |             | 3.40       | + 20           | 2,535,000,072   | 72            |

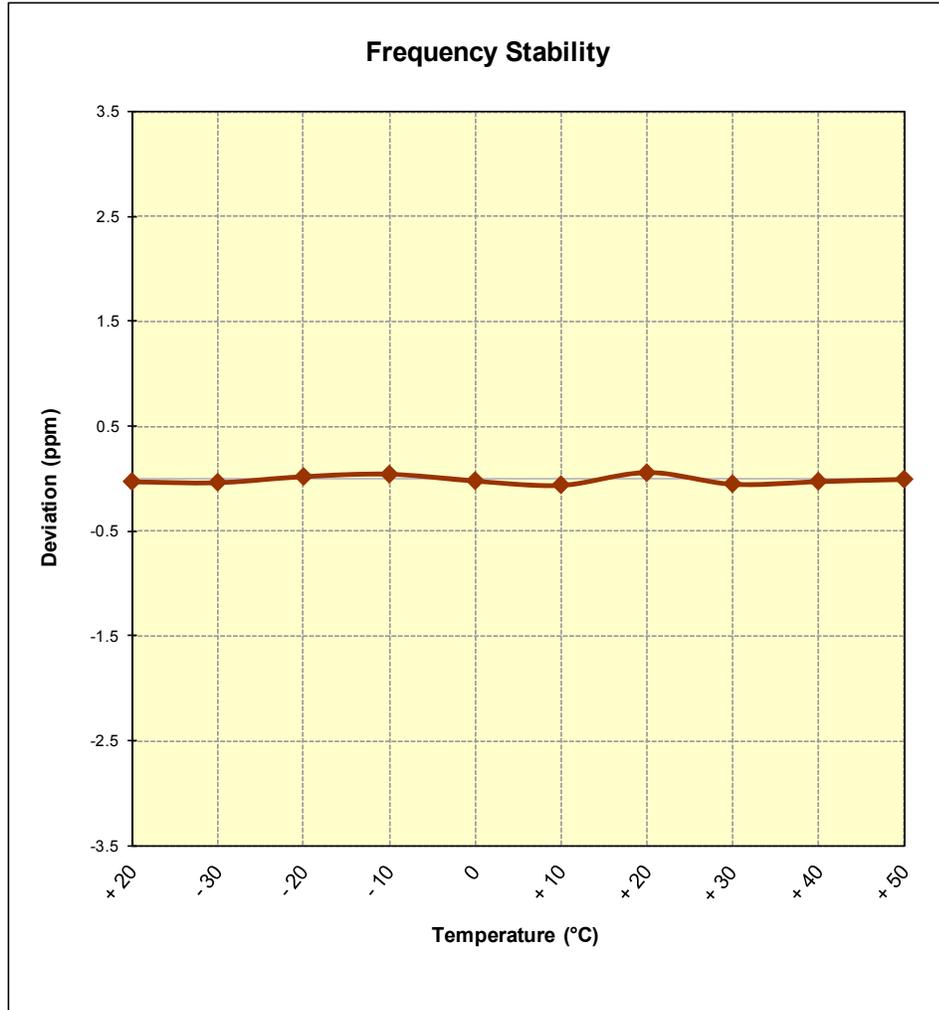
**Table 7-35. Frequency Stability Data (Band 7)**

**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.

|                                      |   |   |   |                                 |
|--------------------------------------|---|---|---|---------------------------------|
| FCC ID: ZNFH820                      |  | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016   | EUT Type:<br>Portable Handset                               | Page 158 of 160   |                                 |

**Band 7 Frequency Stability Measurements**  
**§2.1055 §27.54**



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

|                                      |                               |   |                 |                                 |
|--------------------------------------|-------------------------------|---|-----------------|---------------------------------|
| FCC ID: ZNFH820                      |                               | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION) |                 | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016 | EUT Type:<br>Portable Handset                               | Page 159 of 160 |                                 |

## 8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFH820** complies with all the requirements of Parts 22, 24, & 27 of the FCC rules for LTE operation only.

|                                      |   |  |   |                                 |
|--------------------------------------|---|--|---|---------------------------------|
| FCC ID: ZNFH820                      |  | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1601040003.ZNF | Test Dates:<br>1/4 - 3/2/2016   | EUT Type:<br>Portable Handset                                  |   | Page 160 of 160                 |