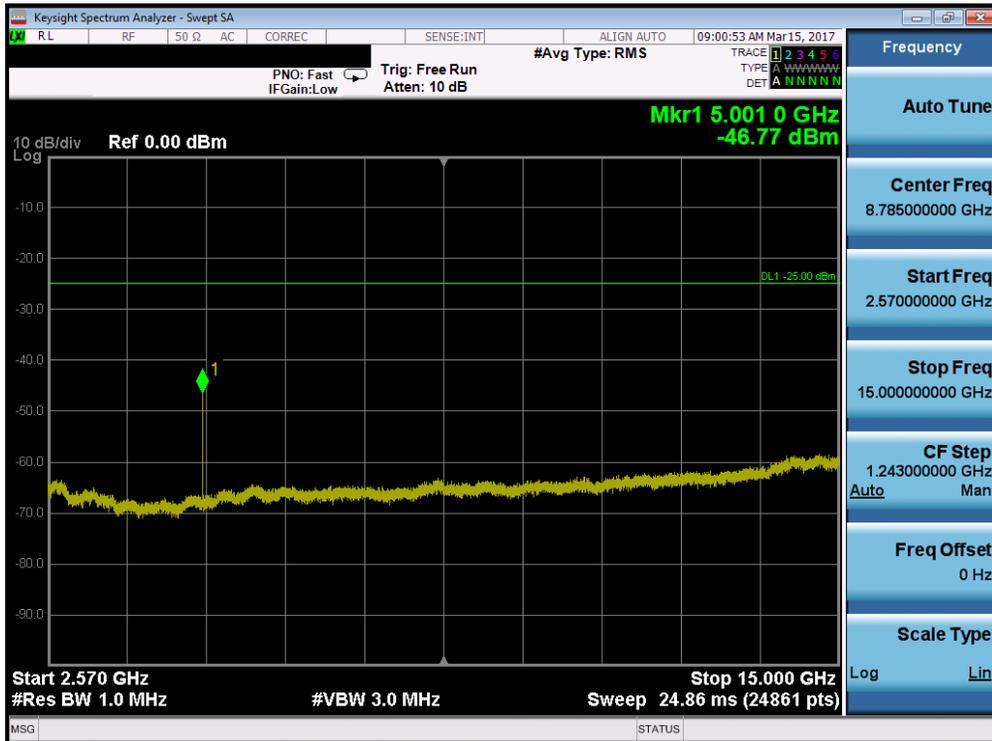
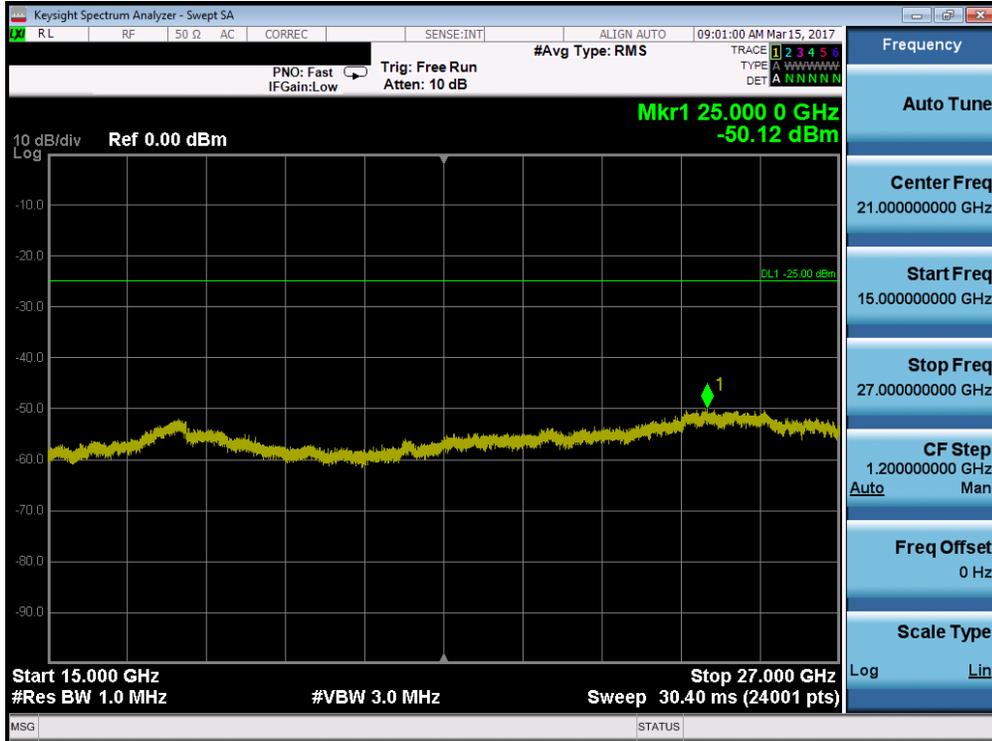


Plot 7-109. Conducted Spurious Plot (Band 7 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

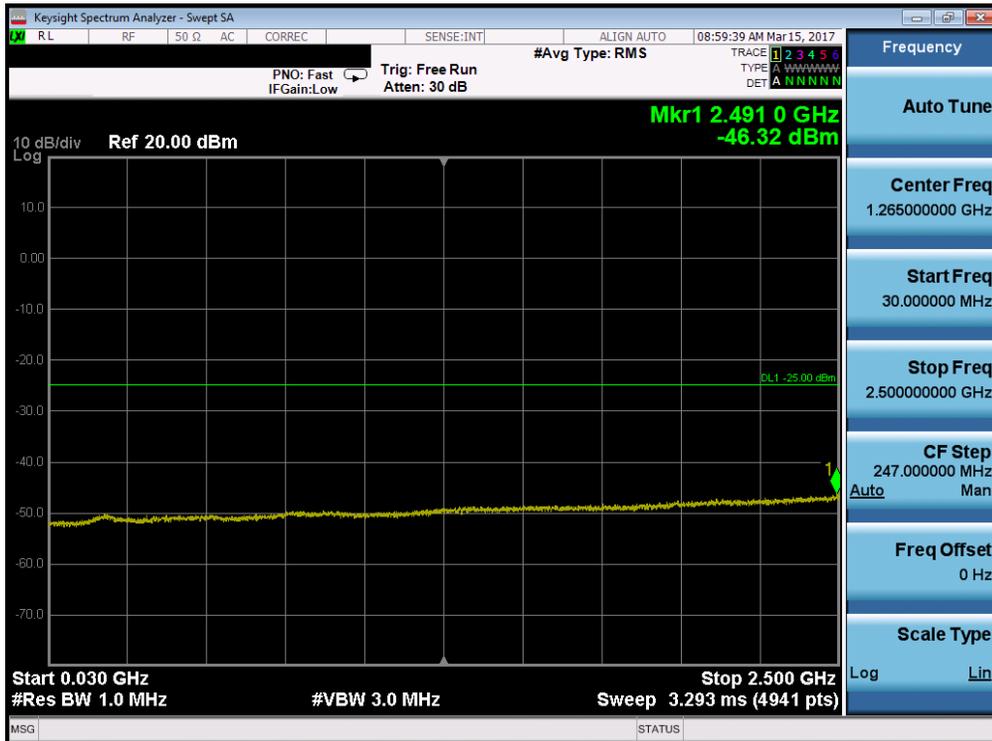


Plot 7-110. Conducted Spurious Plot (Band 7 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 72 of 153

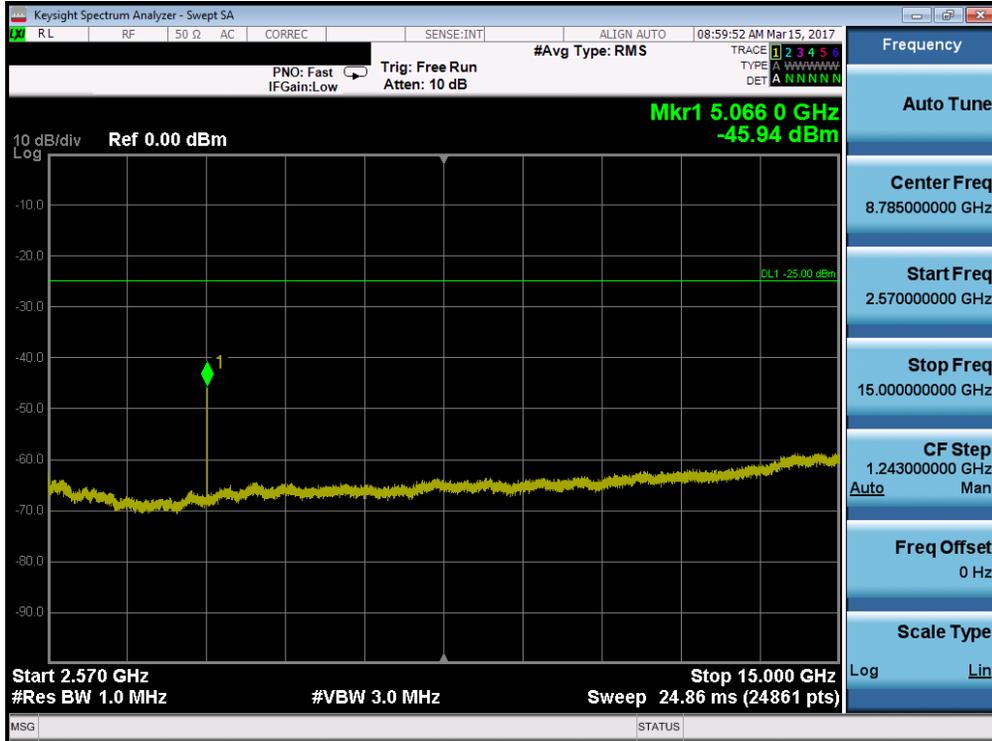


Plot 7-111. Conducted Spurious Plot (Band 7 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

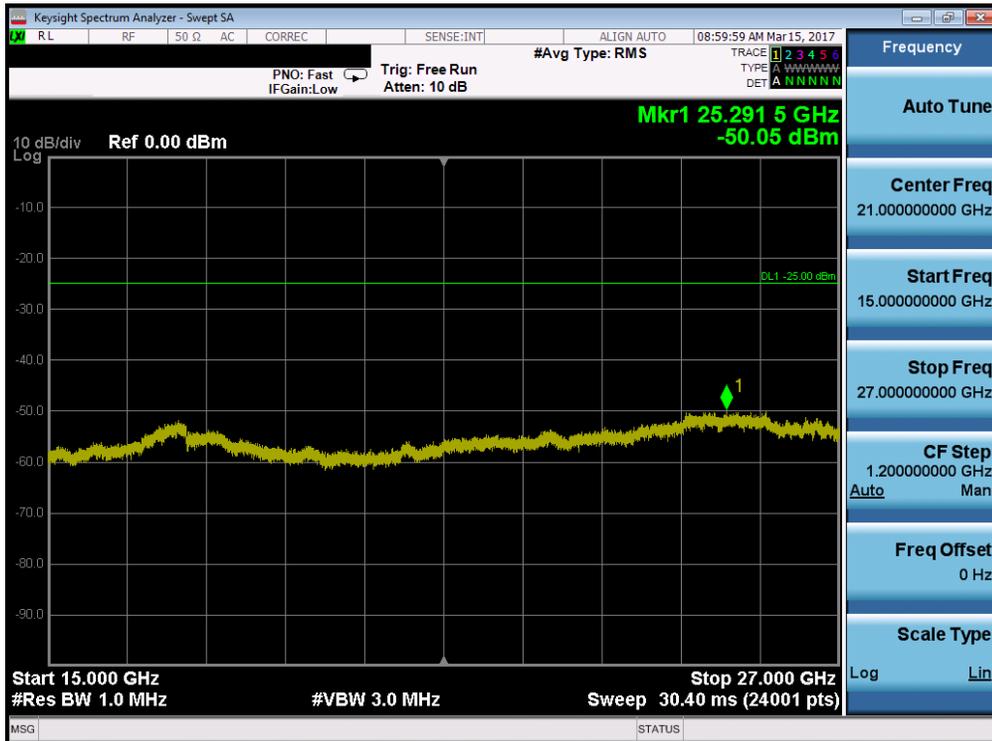


Plot 7-112. Conducted Spurious Plot (Band 7 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

FCC ID: ZNFTP450		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 73 of 153

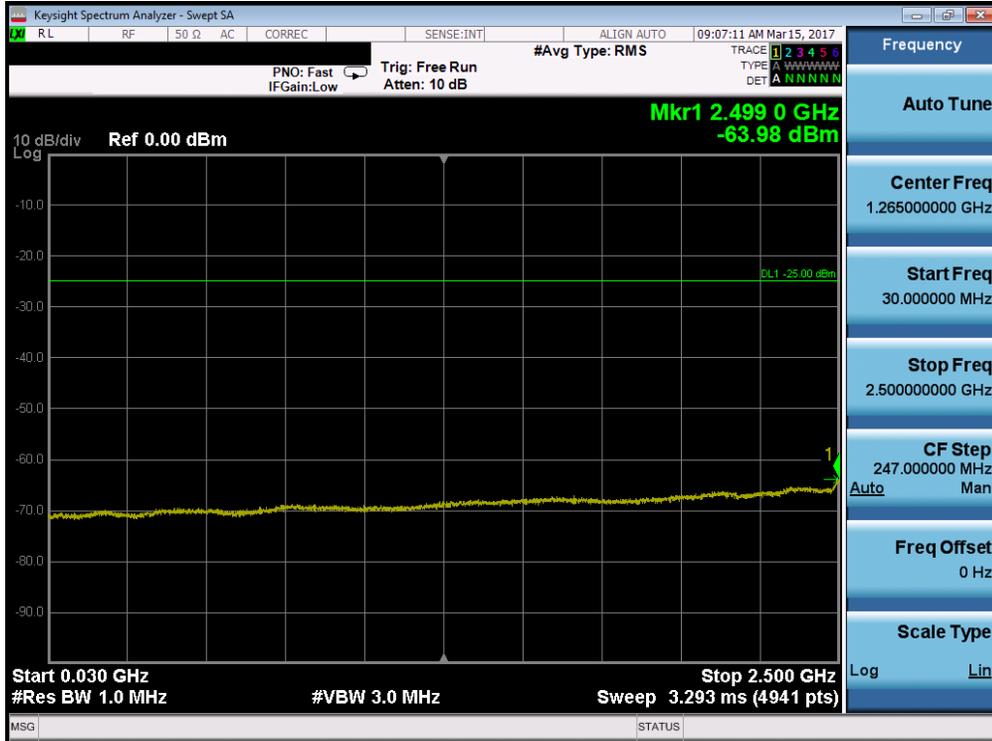


Plot 7-113. Conducted Spurious Plot (Band 7 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

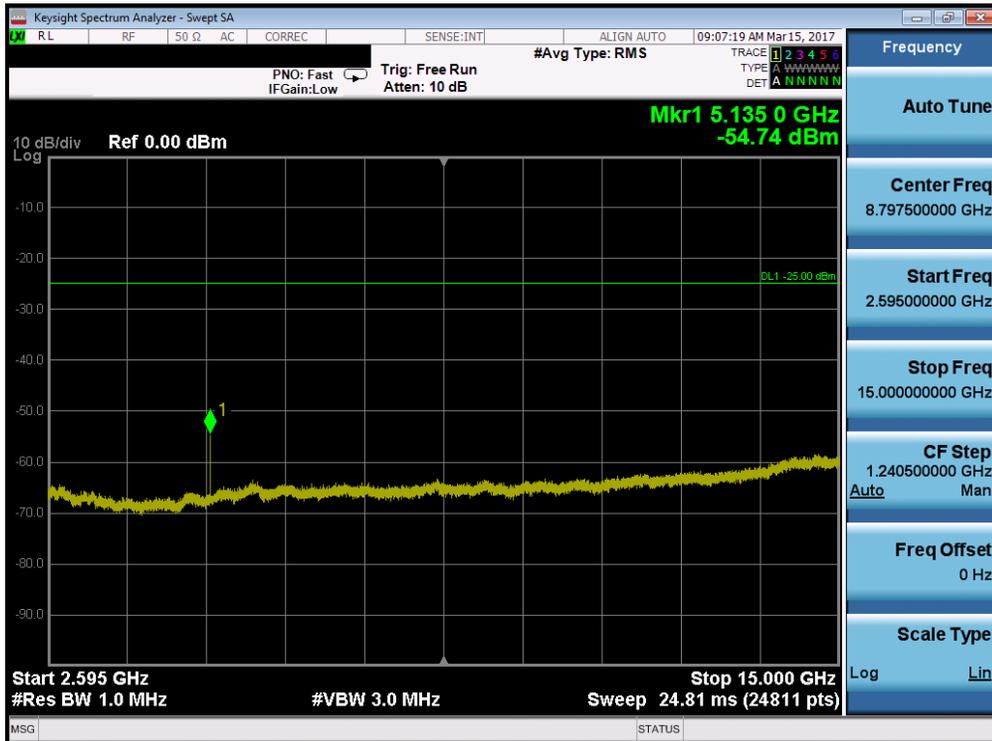


Plot 7-114. Conducted Spurious Plot (Band 7 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 74 of 153

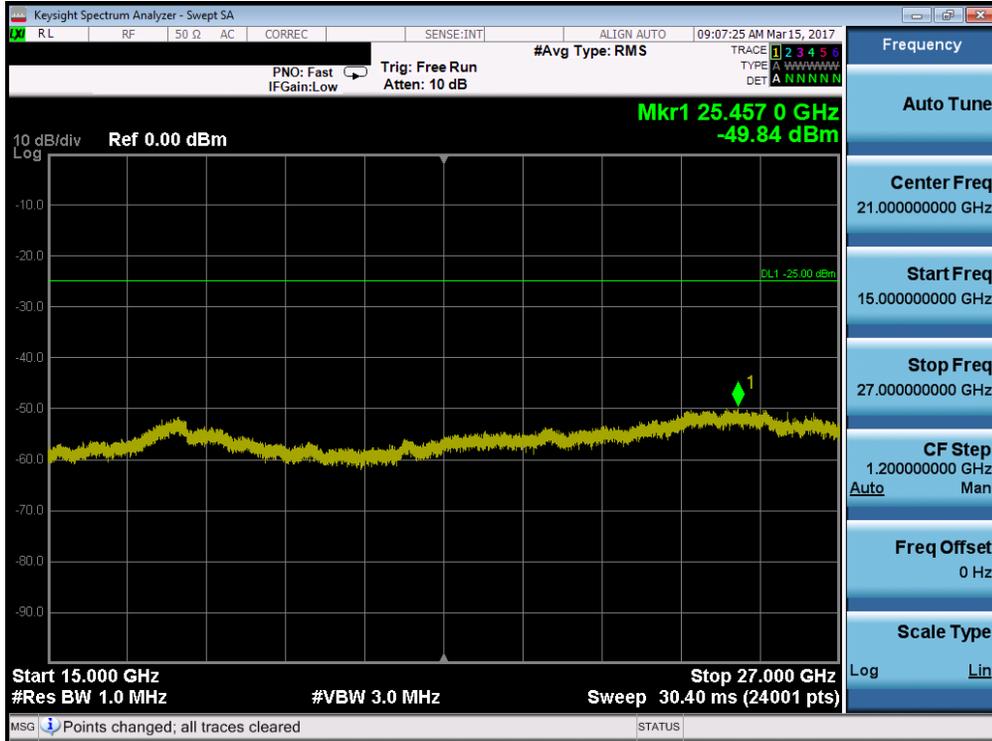


Plot 7-115. Conducted Spurious Plot (Band 7 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)



Plot 7-116. Conducted Spurious Plot (Band 7 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 75 of 153



Plot 7-117. Conducted Spurious Plot (Band 7 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

FCC ID: ZNFTP450		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 76 of 153

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)

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 7 is as noted in the Test Notes on the following page.

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

Test Procedure Used

KDB 971168 D01 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.

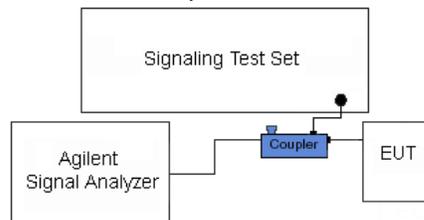


Figure 7-3. Test Instrument & Measurement Setup

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.

FCC ID: ZNFTP450	 PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	 LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 77 of 153

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(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 than $43 + 10 \log(P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log(P)$ dB at or below 2490.5 MHz.

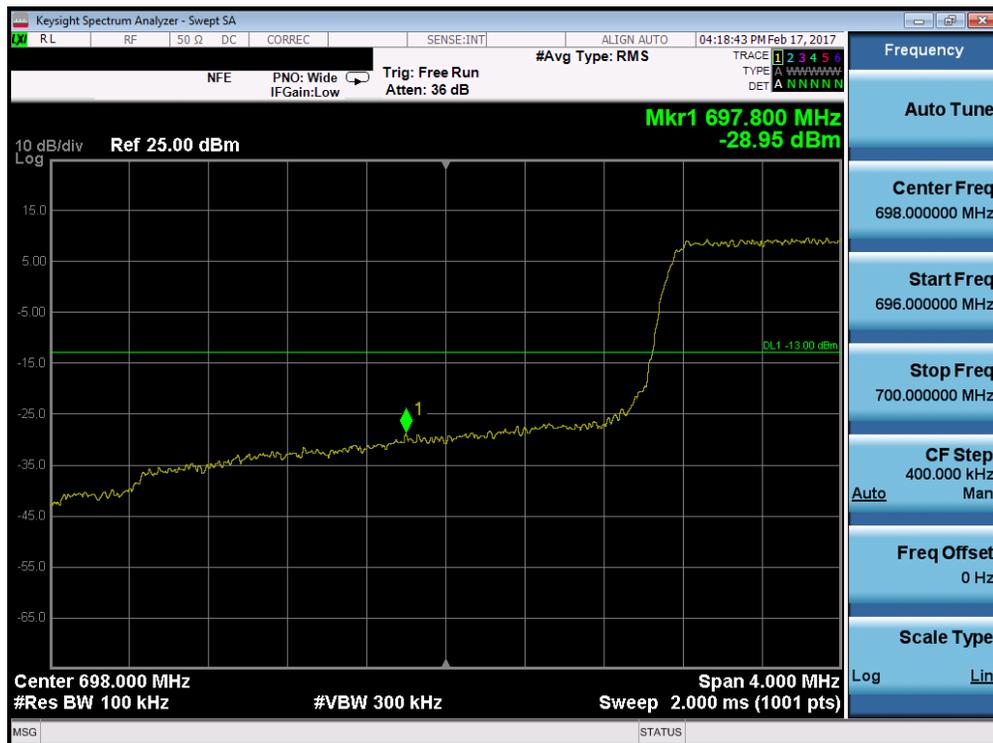


Plot 7-118. Lower Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 78 of 153



Plot 7-119. Upper Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

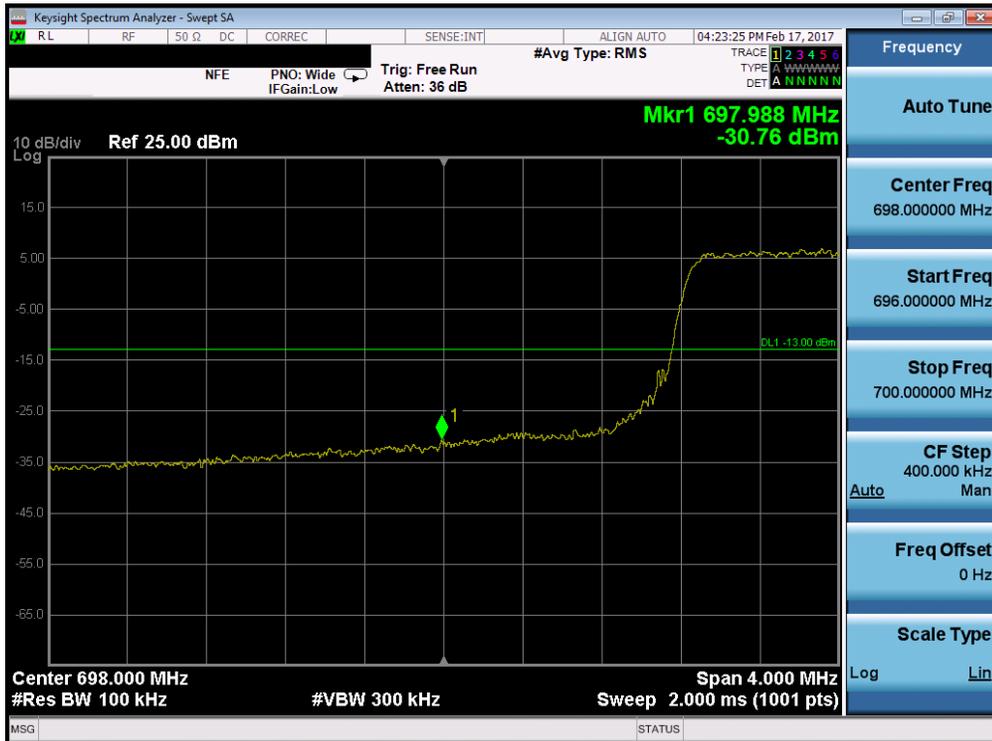


Plot 7-120. Lower Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 79 of 153



Plot 7-121. Upper Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

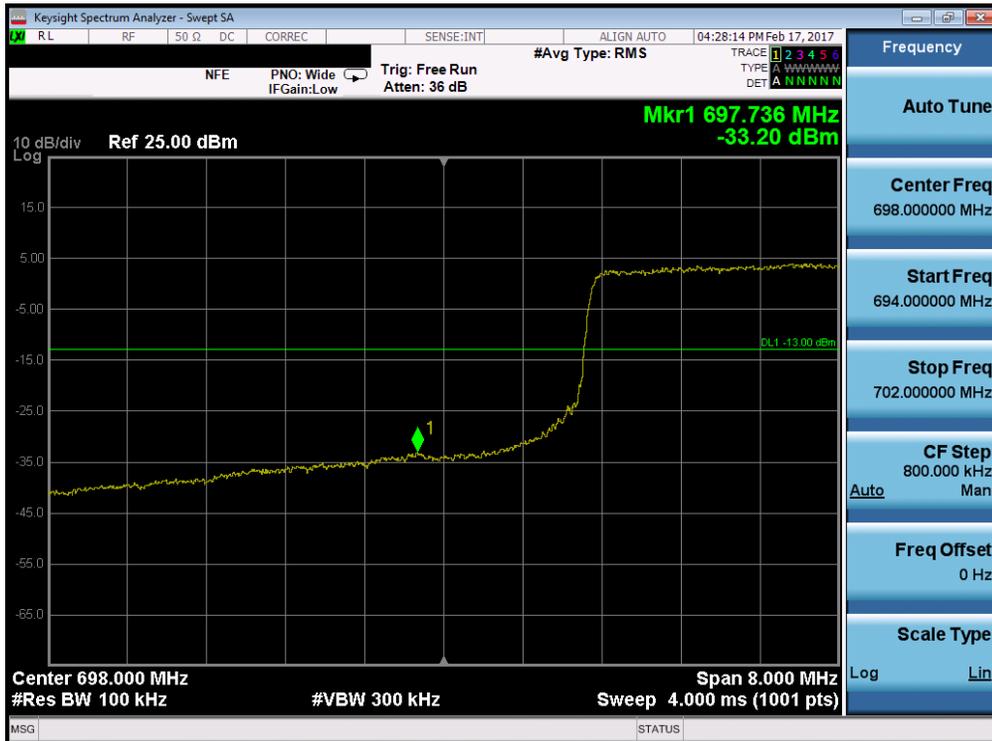


Plot 7-122. Lower Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 80 of 153



Plot 7-123. Upper Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)

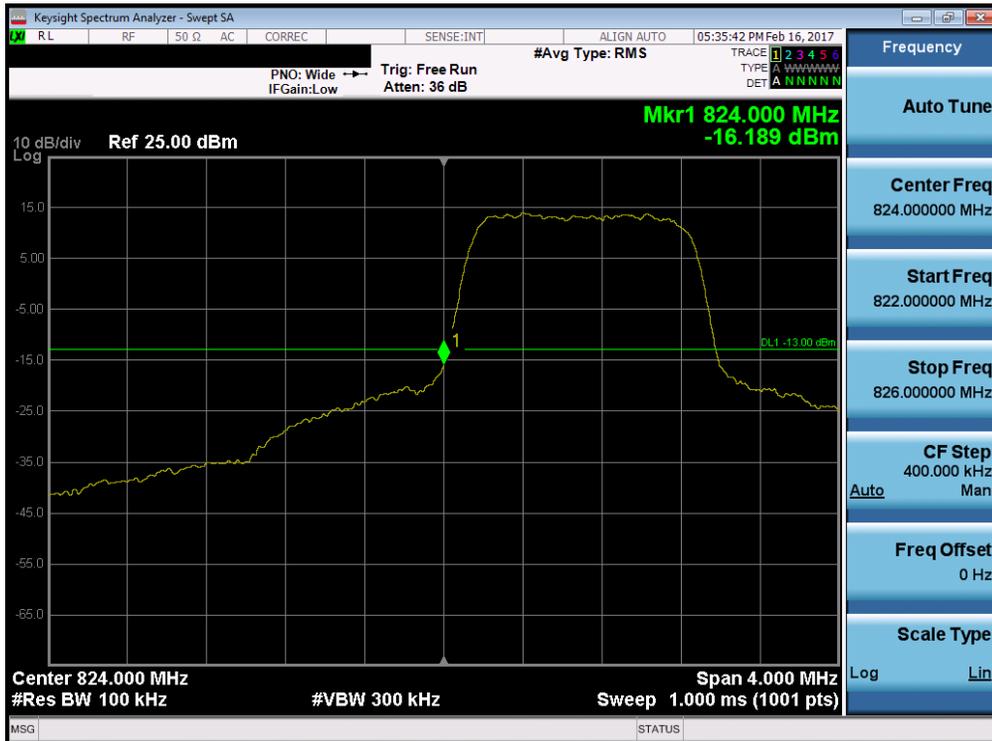


Plot 7-124. Lower Band Edge Plot (Band 12 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFTP450		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 81 of 153



Plot 7-125. Upper Band Edge Plot (Band 12 – 10.0MHz QPSK – RB Size 50)

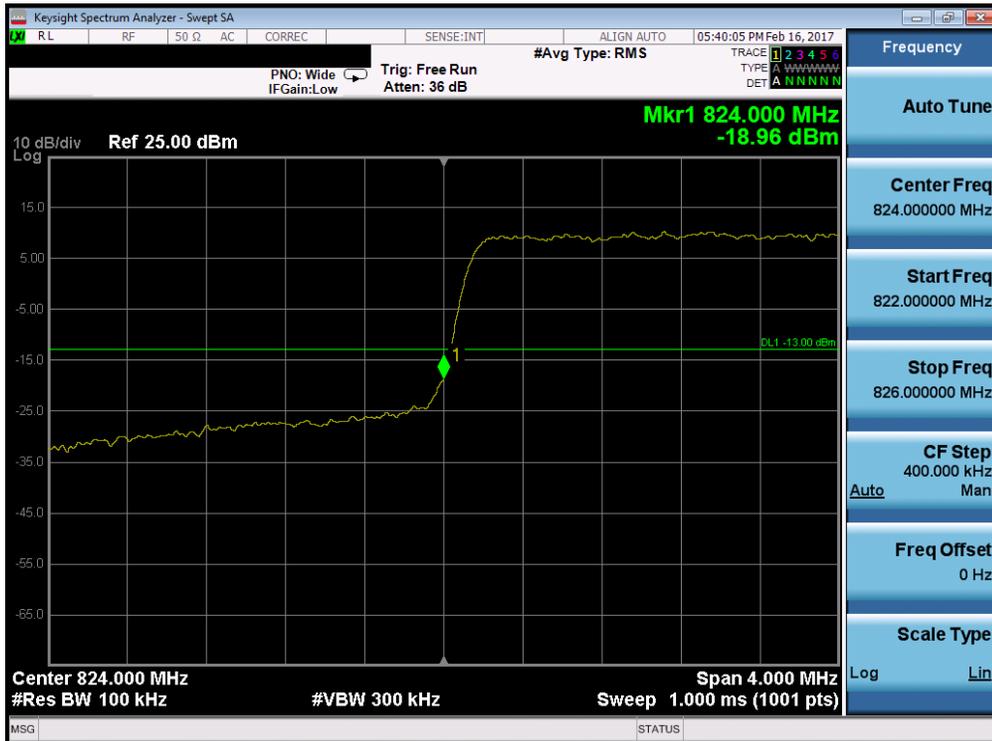


Plot 7-126. Lower Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 82 of 153

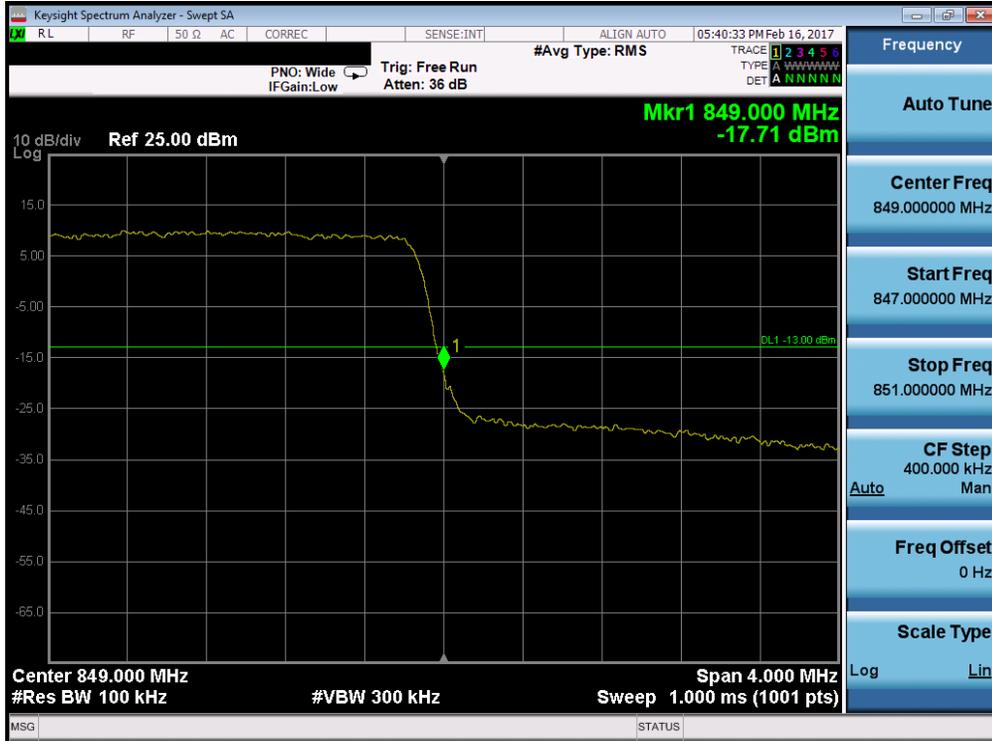


Plot 7-127. Upper Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

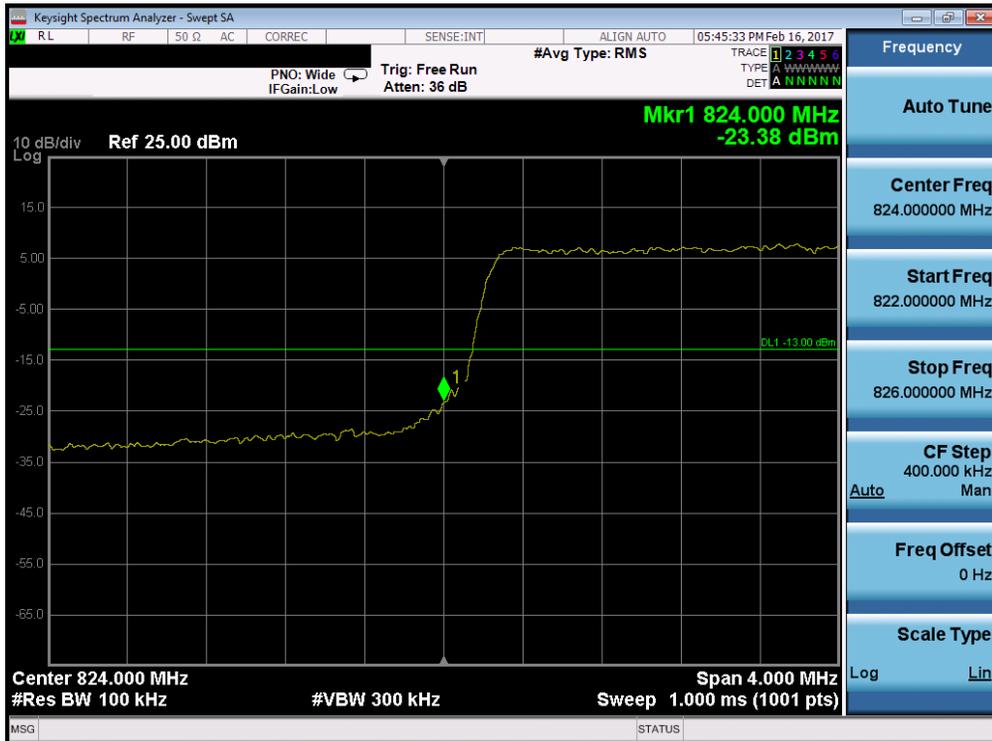


Plot 7-128. Lower Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 83 of 153



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

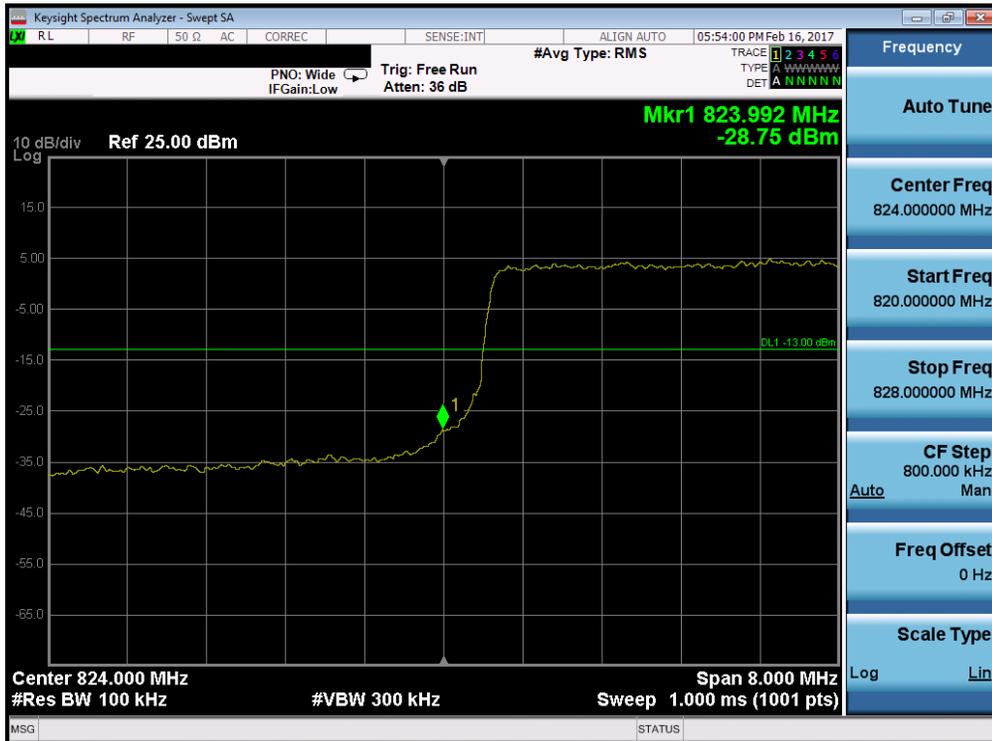


Plot 7-130. Lower Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 84 of 153



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

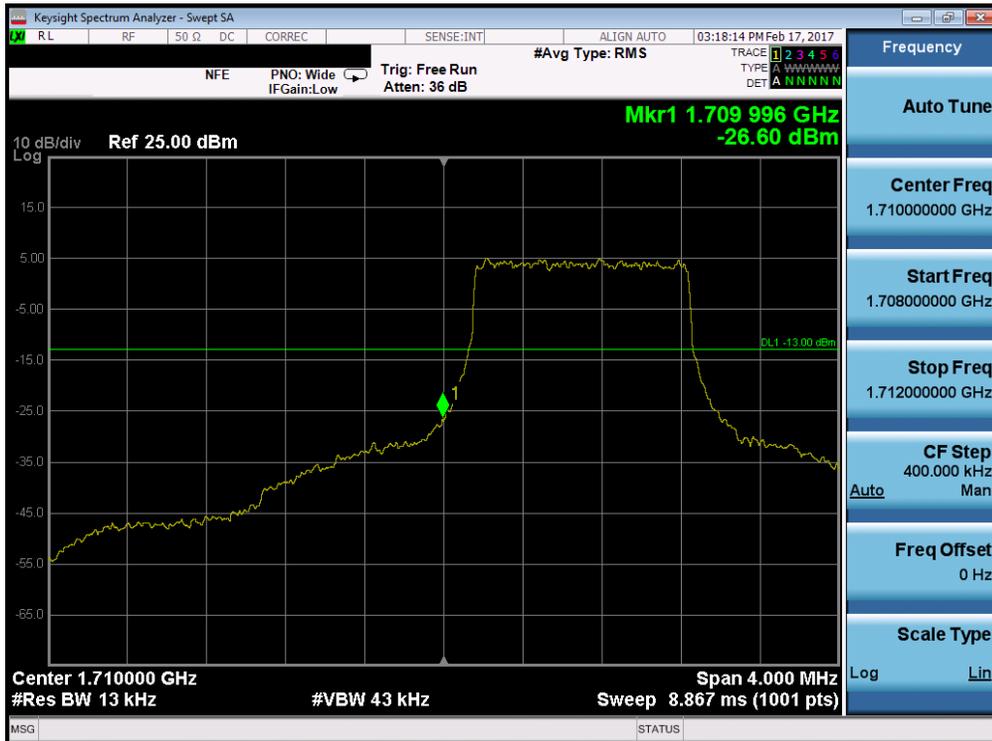


Plot 7-132. Lower Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 85 of 153

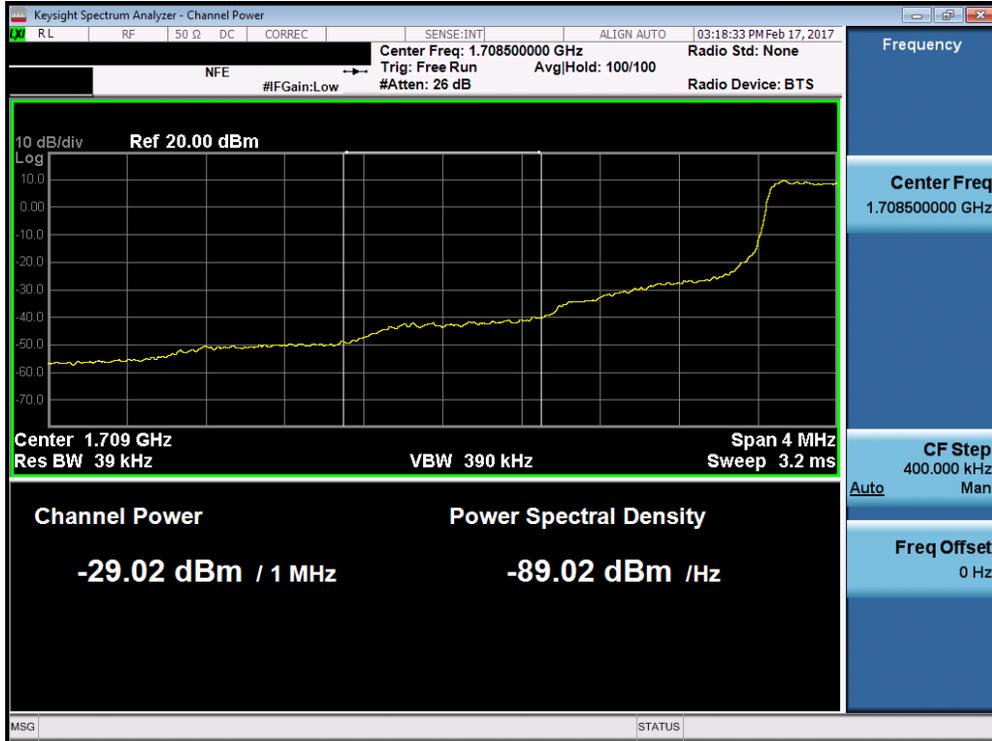


Plot 7-133. Upper Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)



Plot 7-134. Lower Band Edge Plot (Band 4/66 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 86 of 153

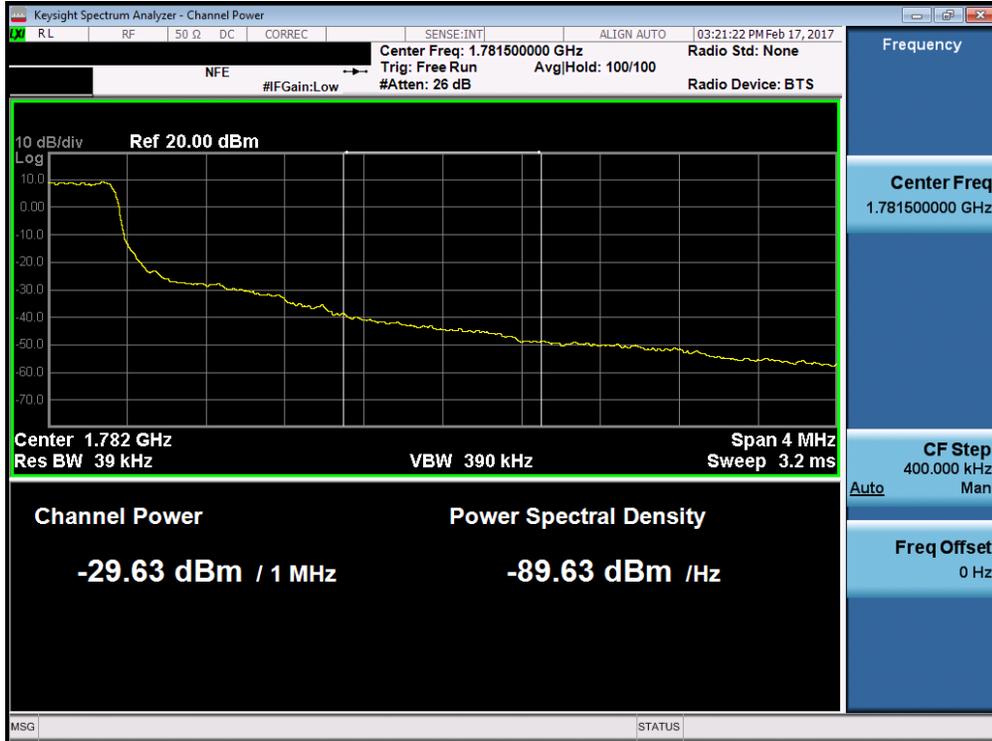


Plot 7-135. Lower Extended Band Edge Plot (Band 4/66 – 1.4MHz QPSK – RB Size 6)

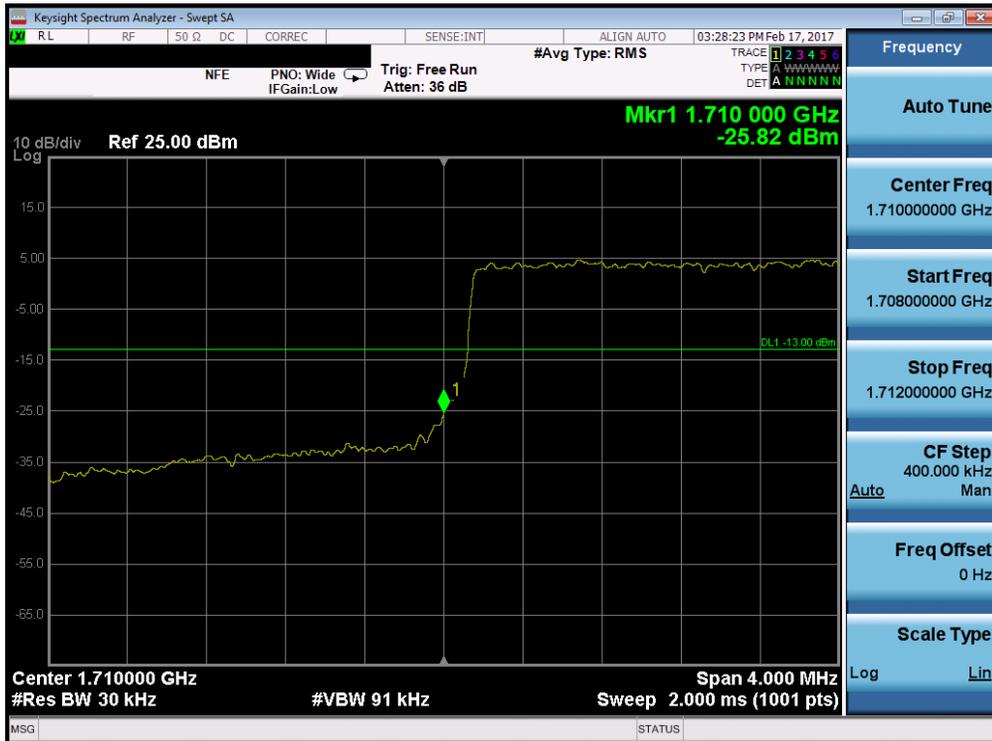


Plot 7-136. Upper Band Edge Plot (Band 4/66 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 87 of 153

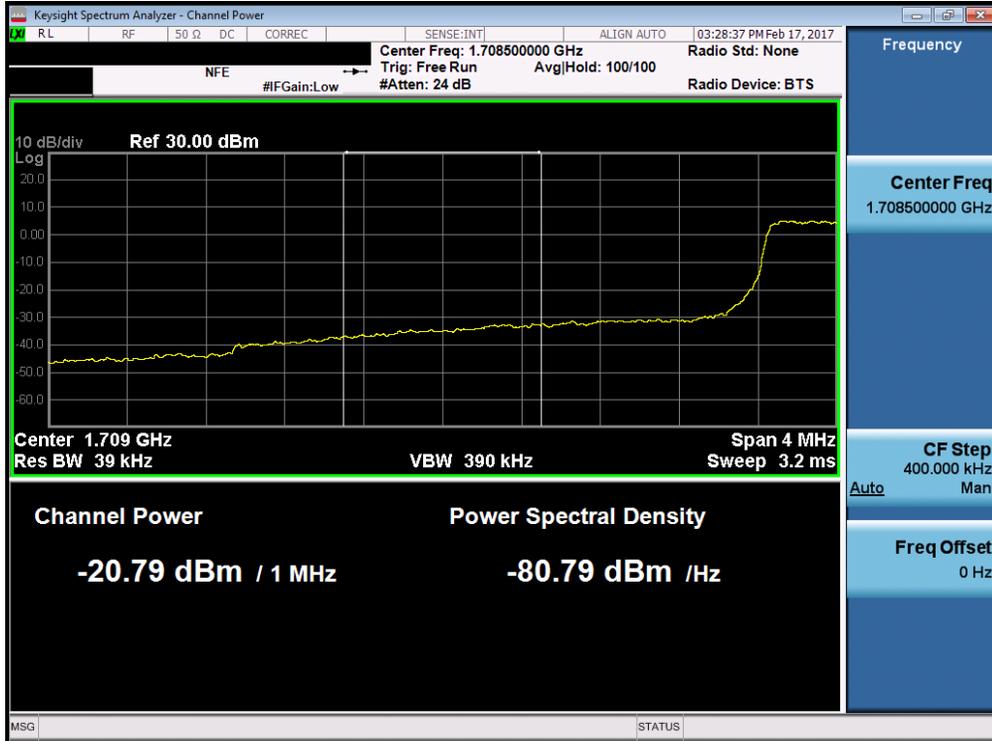


Plot 7-137. Upper Extended Band Edge Plot (Band 4/66 – 1.4MHz QPSK – RB Size 6)

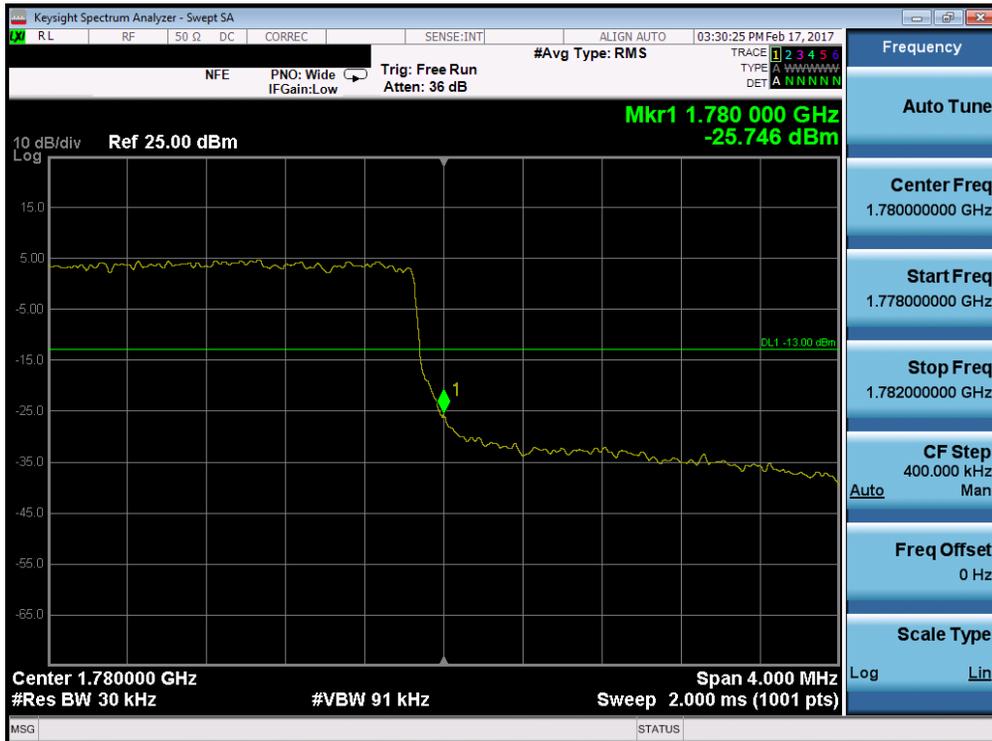


Plot 7-138. Lower Band Edge Plot (Band 4/66 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 88 of 153

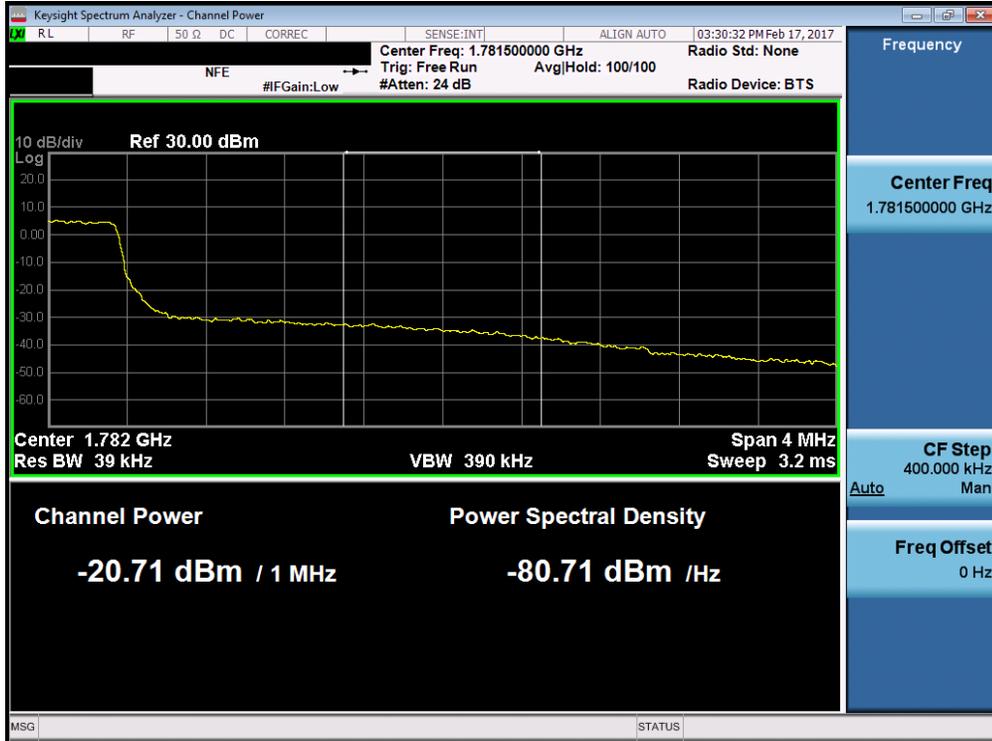


Plot 7-139. Lower Extended Band Edge Plot (Band 4/66 – 3.0MHz QPSK – RB Size 15)

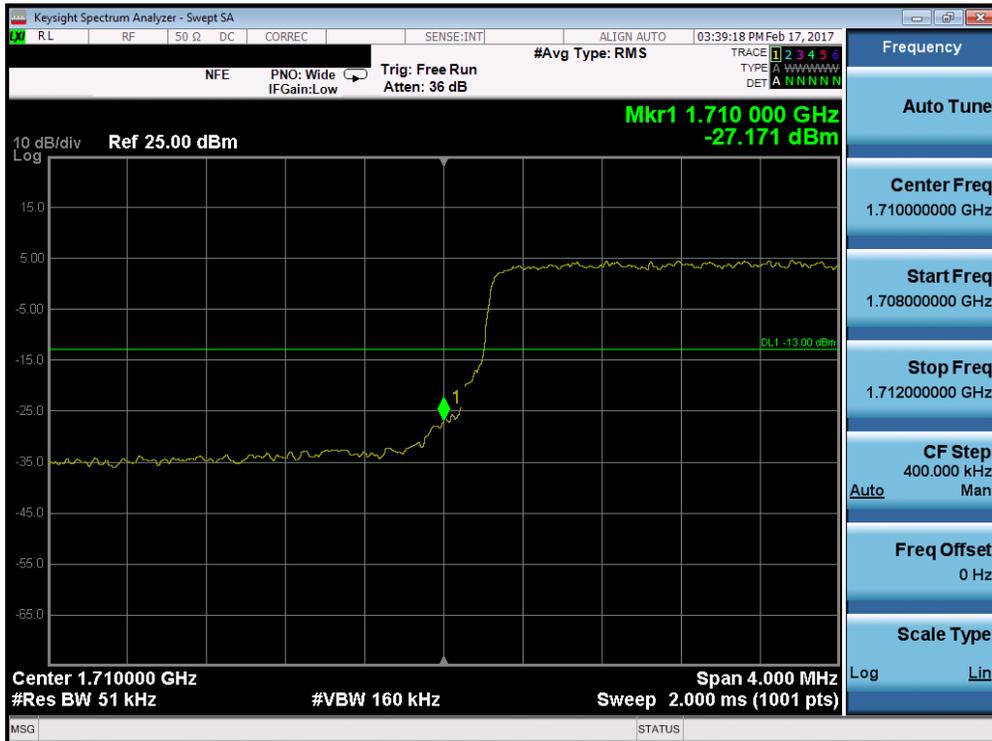


Plot 7-140. Upper Band Edge Plot (Band 4/66 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 89 of 153

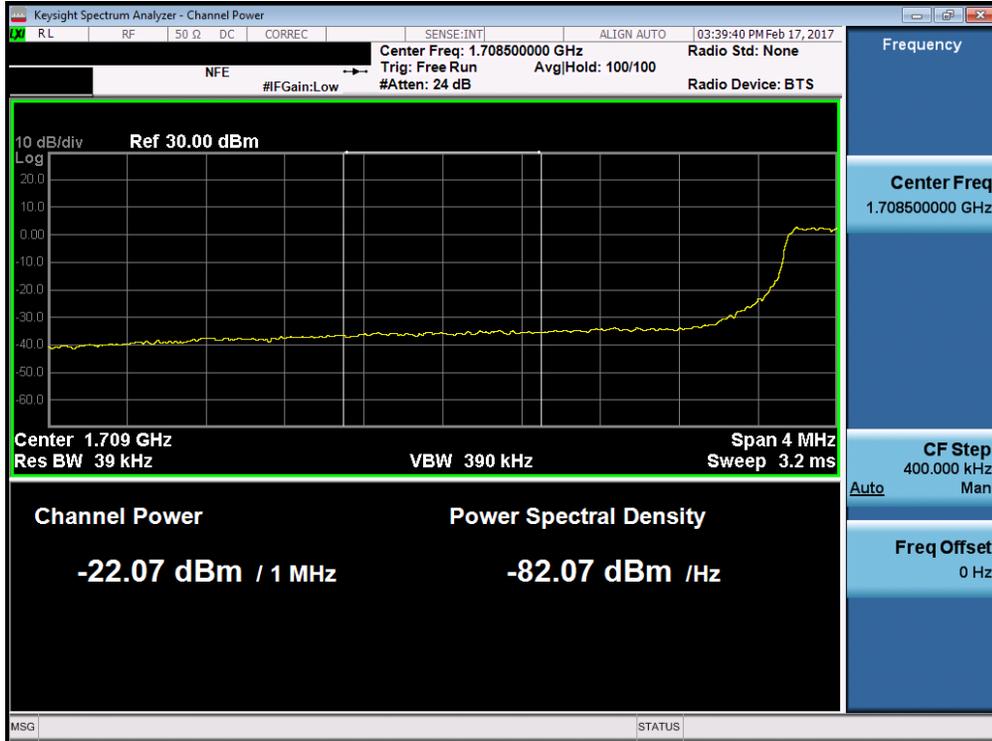


Plot 7-141. Upper Extended Band Edge Plot (Band 4/66 – 3.0MHz QPSK – RB Size 15)

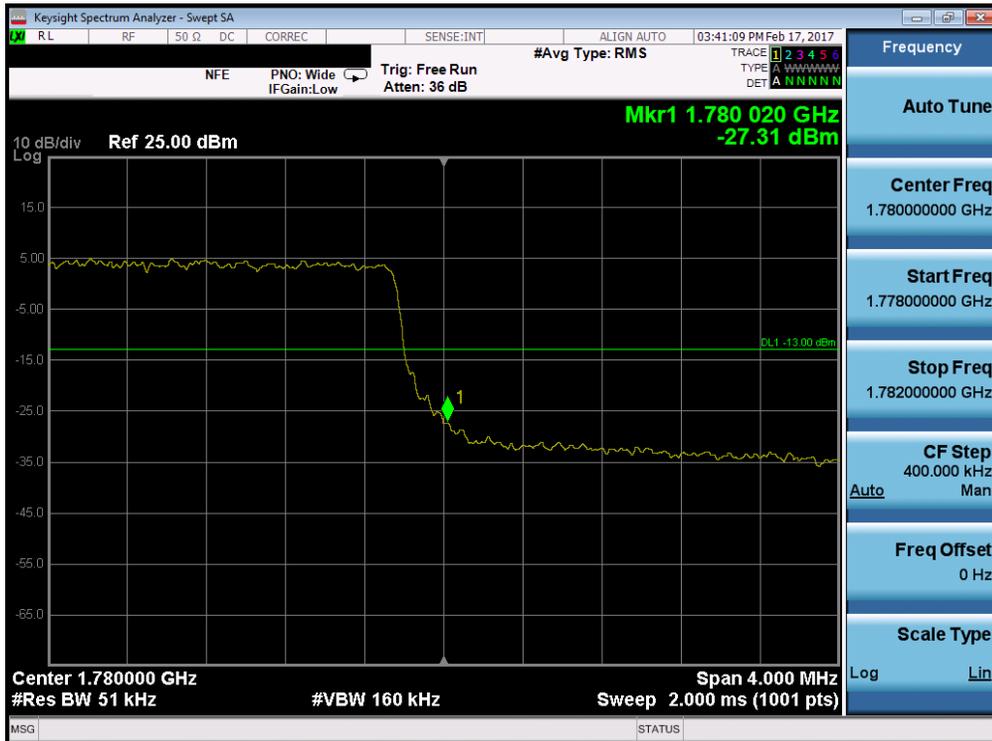


Plot 7-142. Lower Band Edge Plot (Band 4/66 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 90 of 153

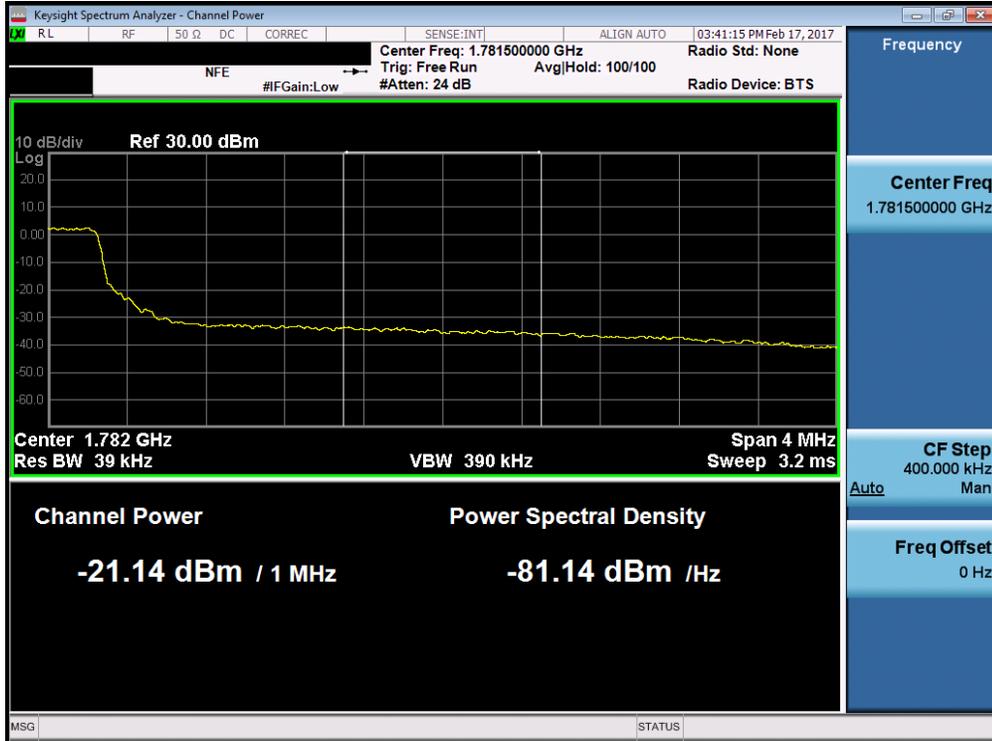


Plot 7-143. Lower Extended Band Edge Plot (Band 4/66 – 5.0MHz QPSK – RB Size 25)

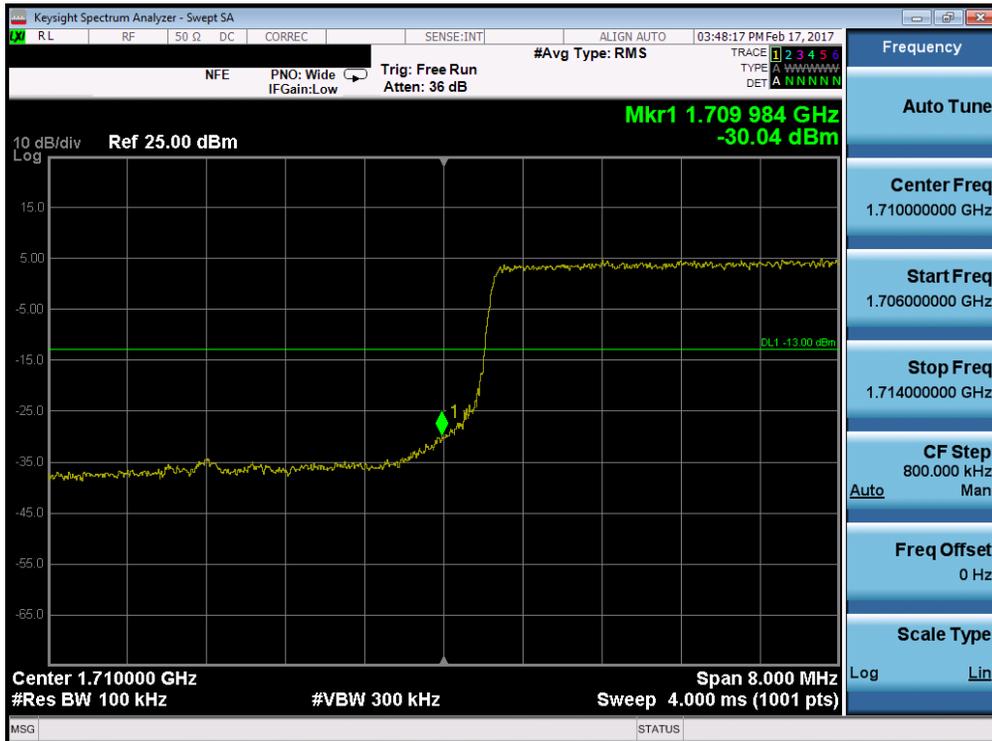


Plot 7-144. Upper Band Edge Plot (Band 4/66 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 91 of 153

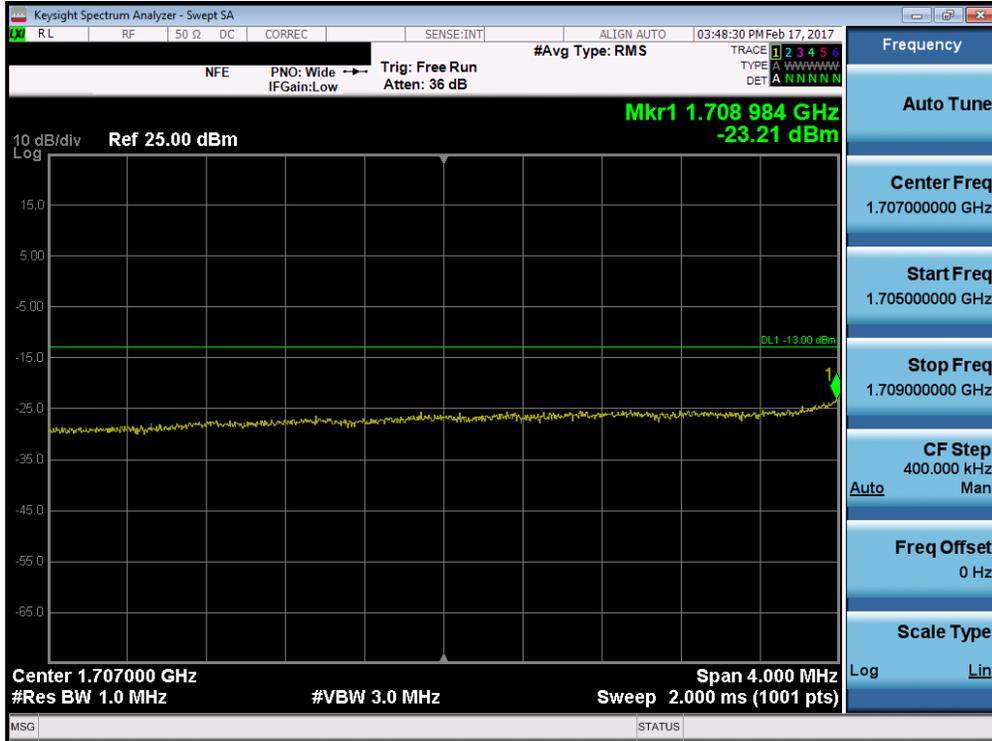


Plot 7-145. Upper Extended Band Edge Plot (Band 4/66 – 5.0MHz QPSK – RB Size 25)

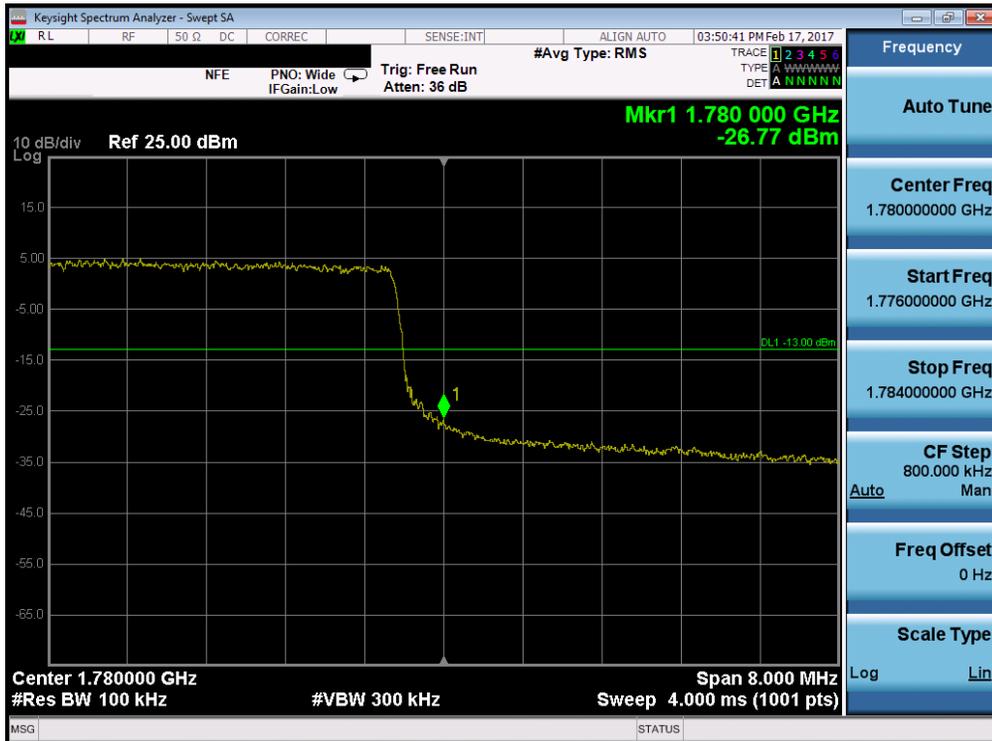


Plot 7-146. Lower Band Edge Plot (Band 4/66 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 92 of 153

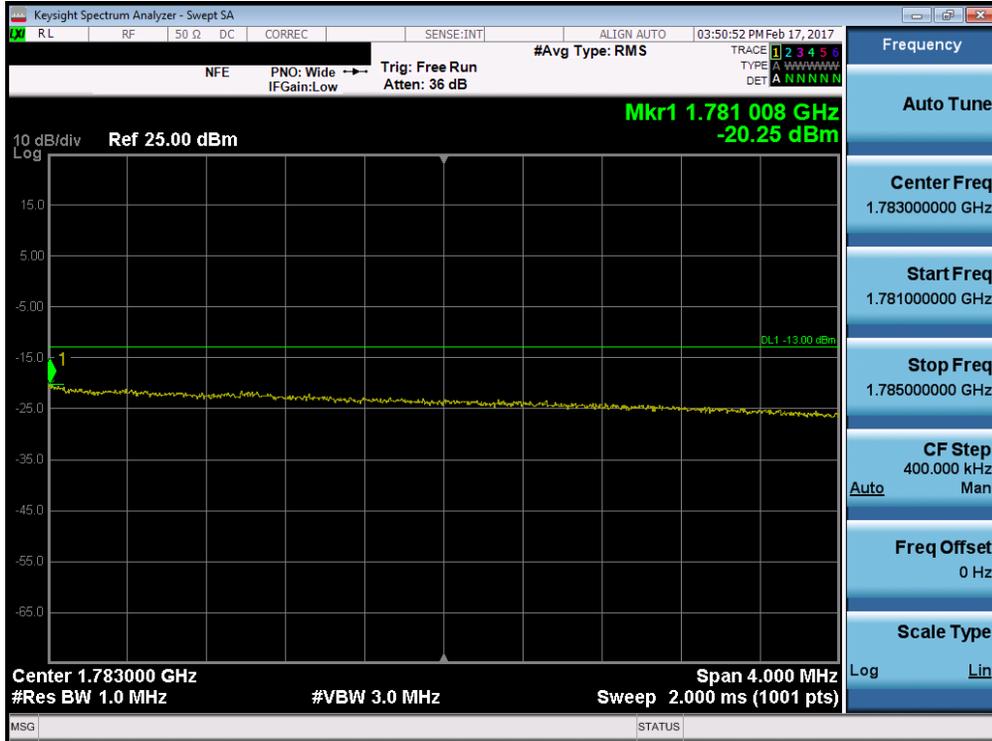


Plot 7-147. Lower Extended Band Edge Plot (Band 4/66 – 10.0MHz QPSK – RB Size 50)

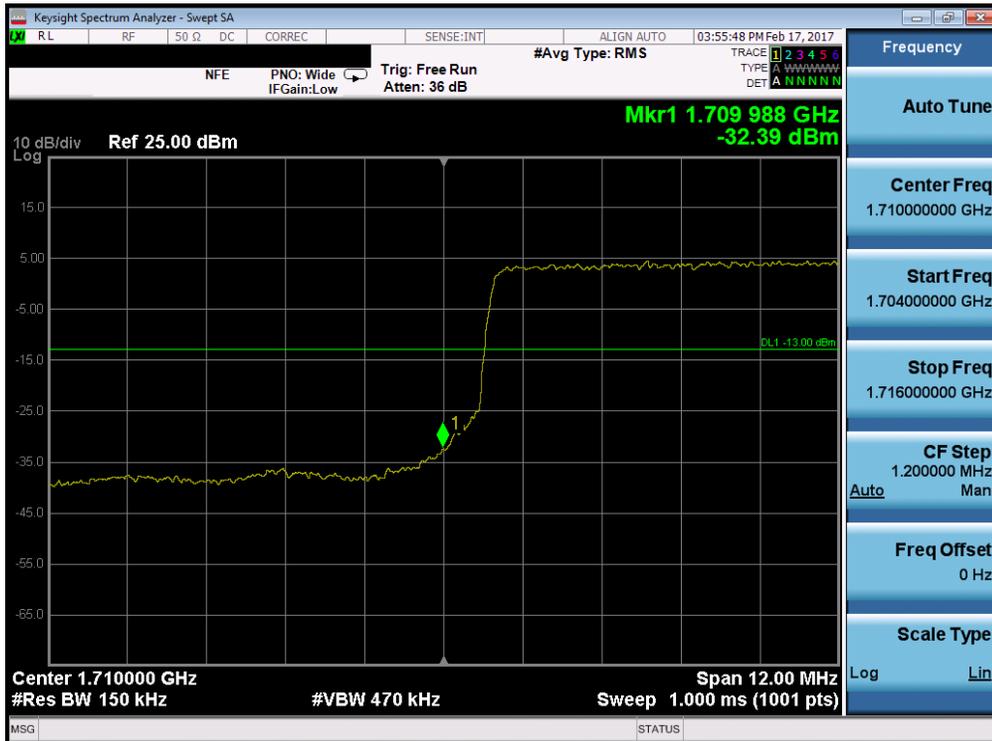


Plot 7-148. Upper Band Edge Plot (Band 4/66 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 93 of 153

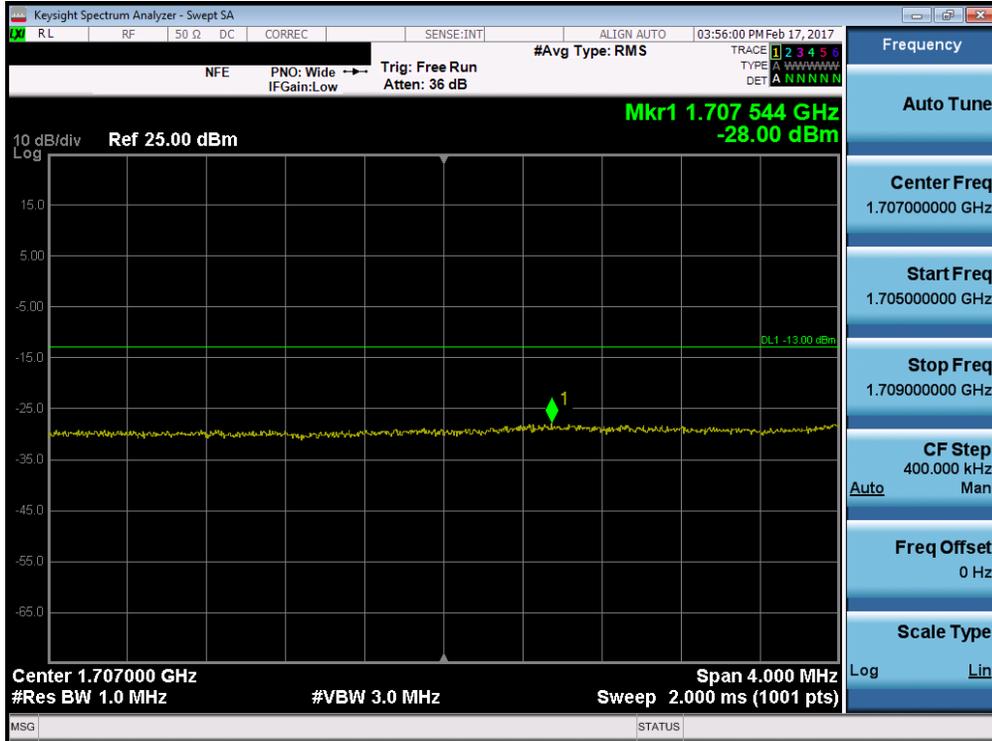


Plot 7-149. Upper Extended Band Edge Plot (Band 4/66 – 10.0MHz QPSK – RB Size 50)

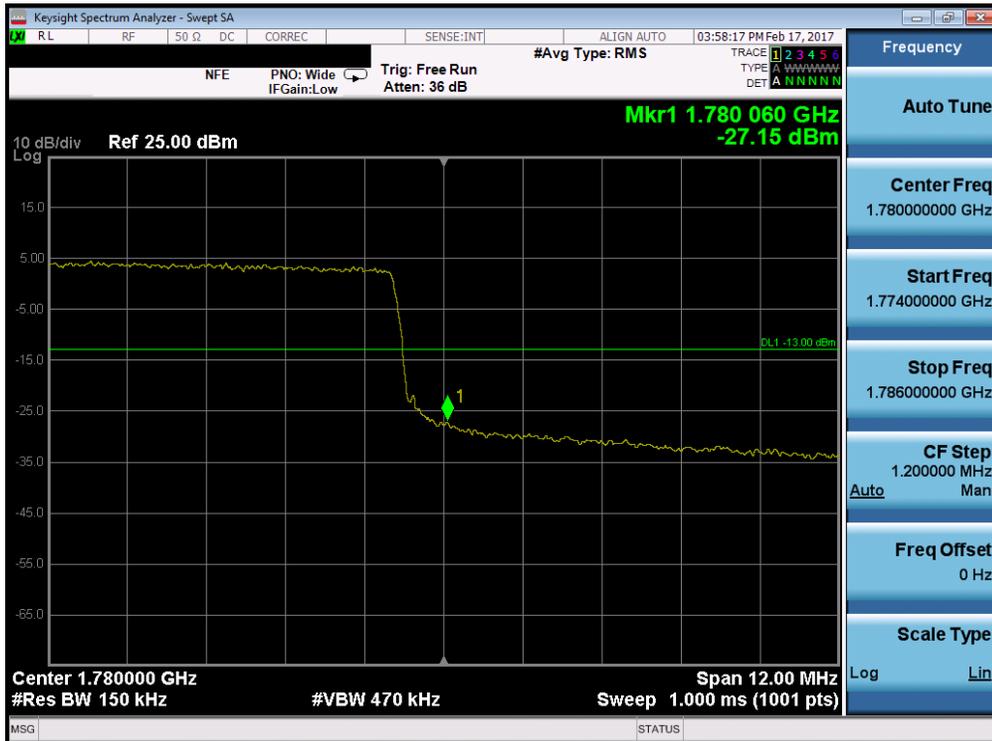


Plot 7-150. Lower Band Edge Plot (Band 4/66 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFTP450		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 94 of 153

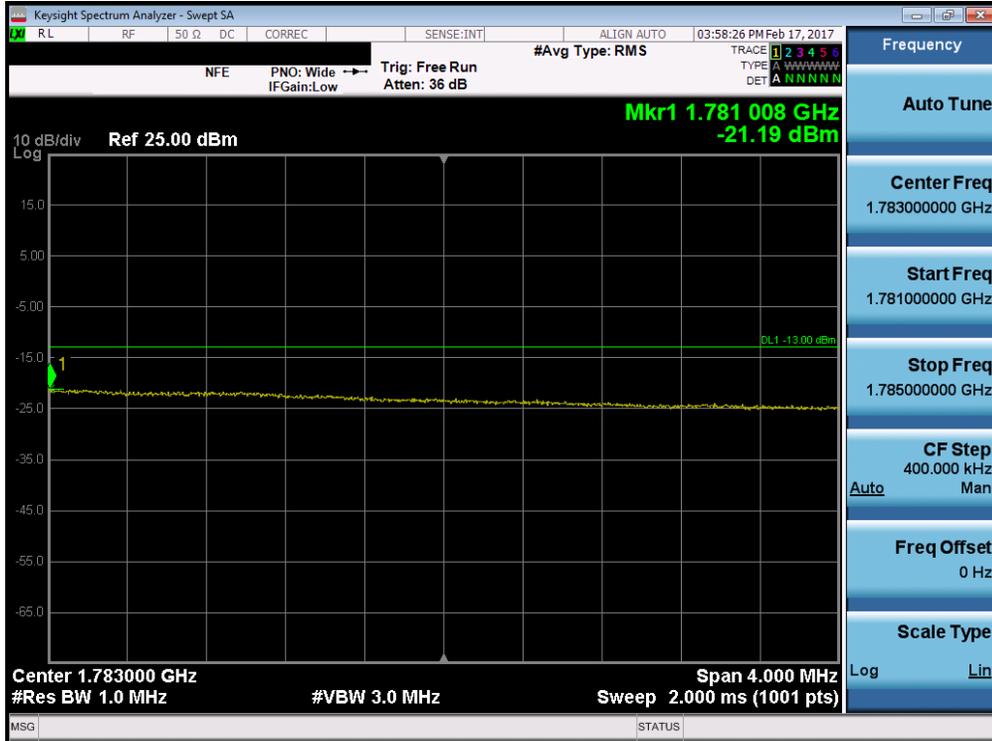


Plot 7-151. Lower Extended Band Edge Plot (Band 4/66 – 15.0MHz QPSK – RB Size 75)

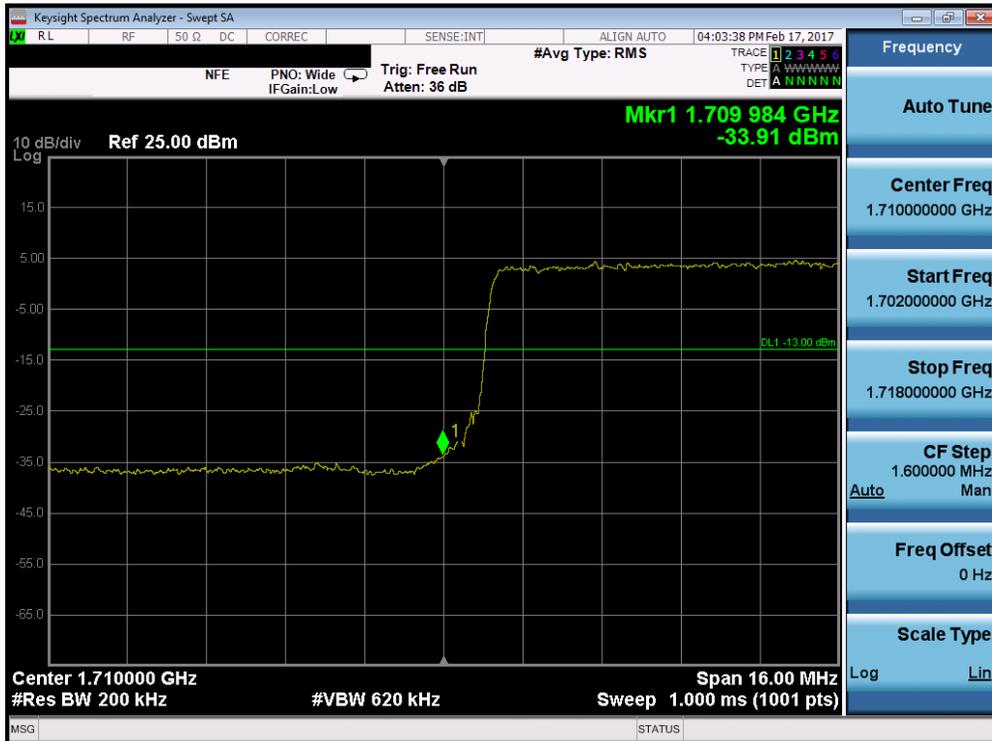


Plot 7-152. Upper Band Edge Plot (Band 4/66 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 95 of 153

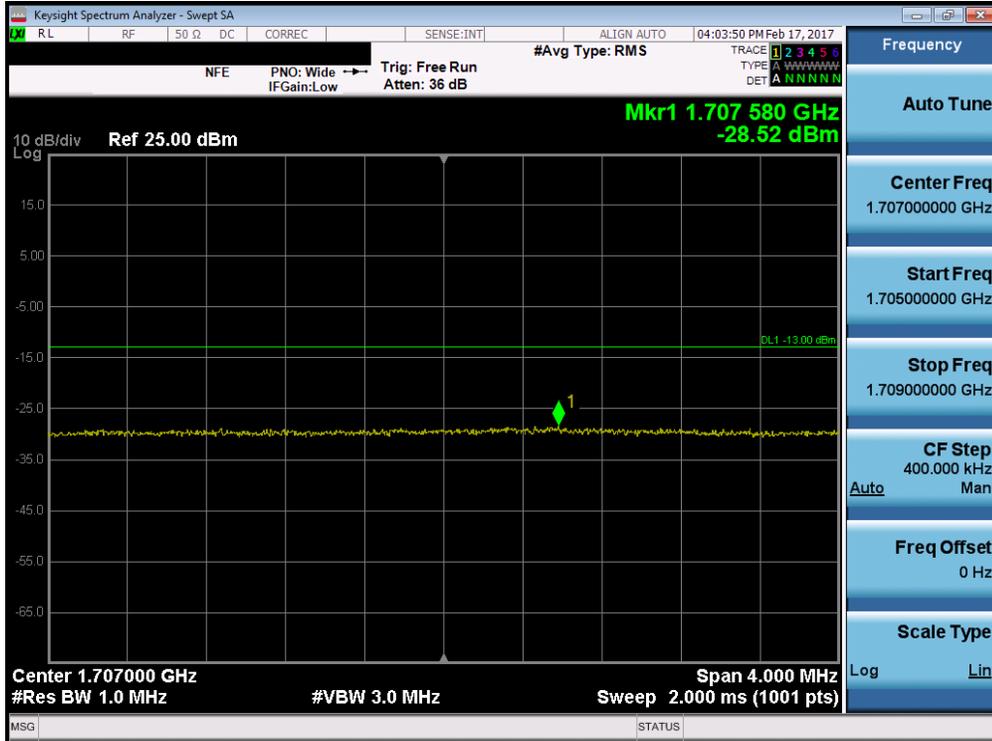


Plot 7-153. Upper Extended Band Edge Plot (Band 4/66 – 15.0MHz QPSK – RB Size 75)

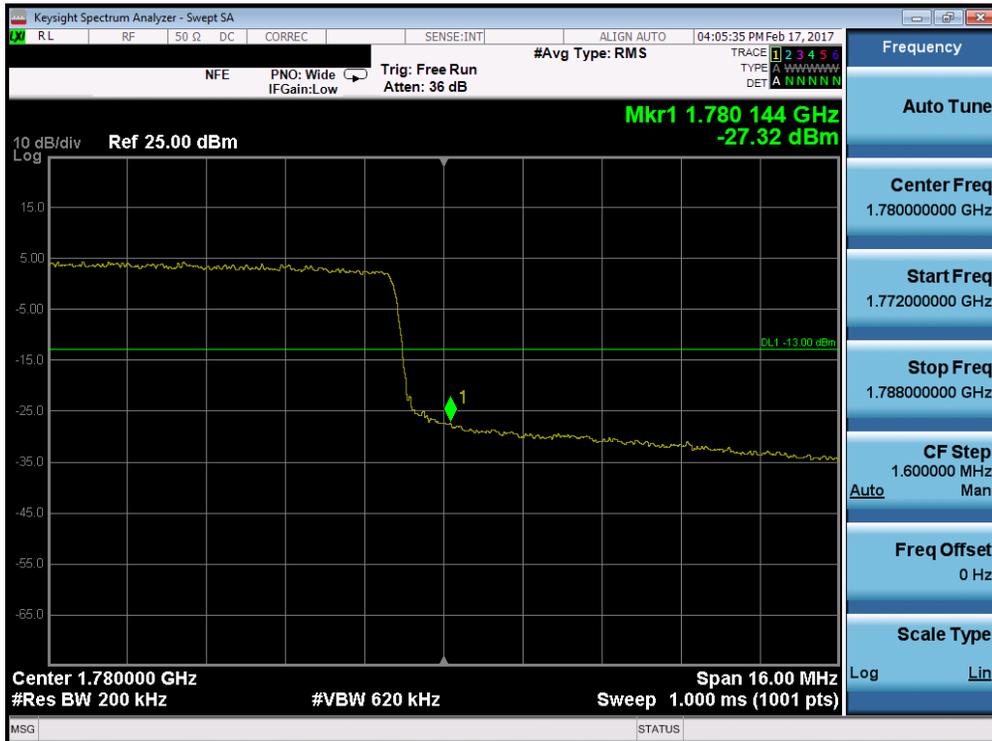


Plot 7-154. Lower Band Edge Plot (Band 4/66 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 96 of 153

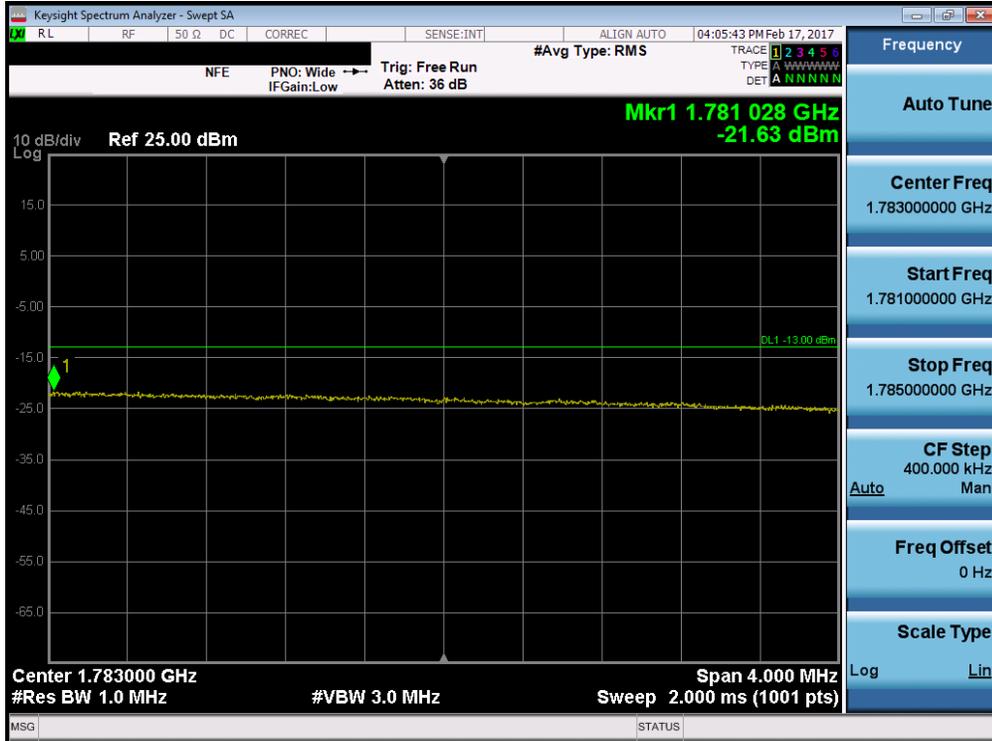


Plot 7-155. Lower Extended Band Edge Plot (Band 4/66 – 20.0MHz QPSK – RB Size 100)

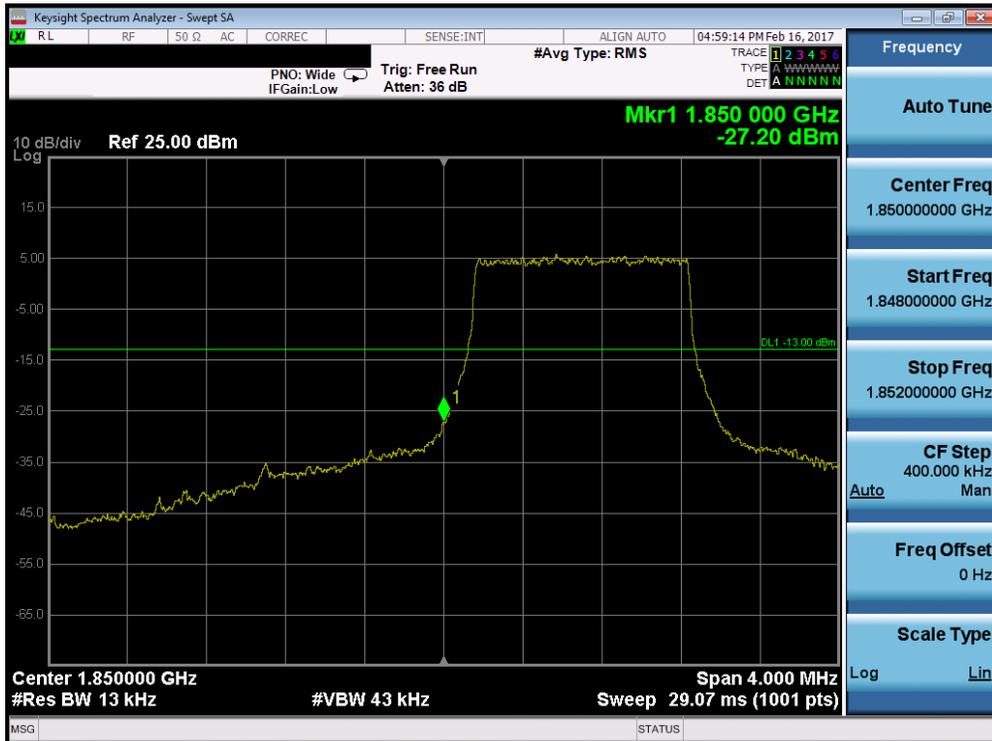


Plot 7-156. Upper Band Edge Plot (Band 4/66 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 97 of 153

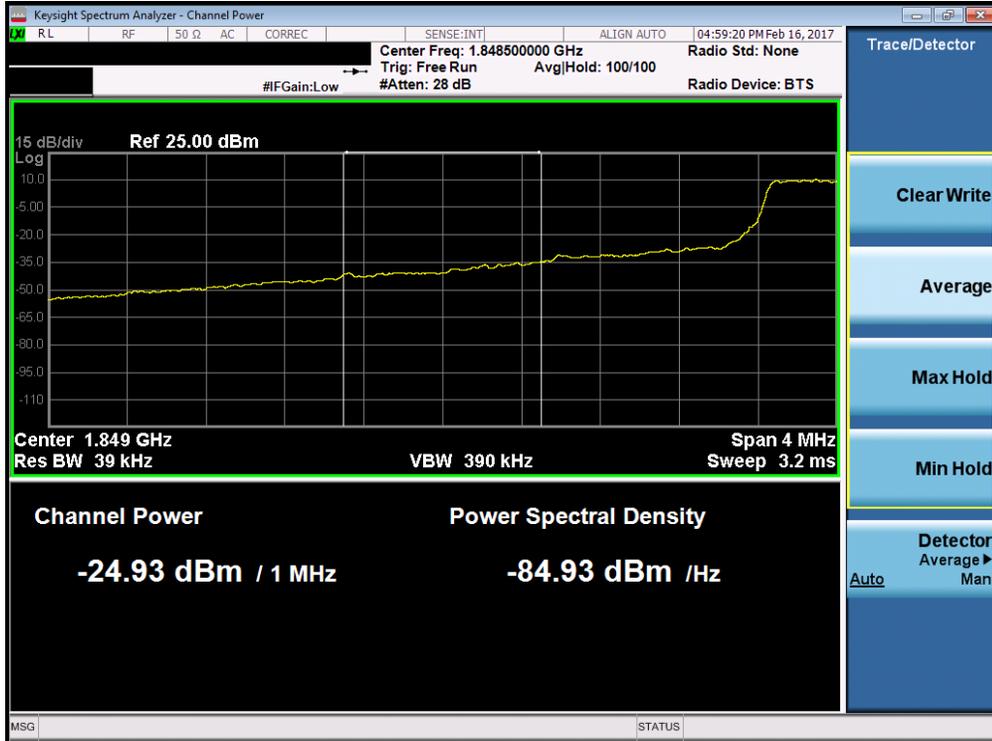


Plot 7-157. Upper Extended Band Edge Plot (Band 4/66 – 20.0MHz QPSK – RB Size 100)



Plot 7-158. Lower Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 98 of 153

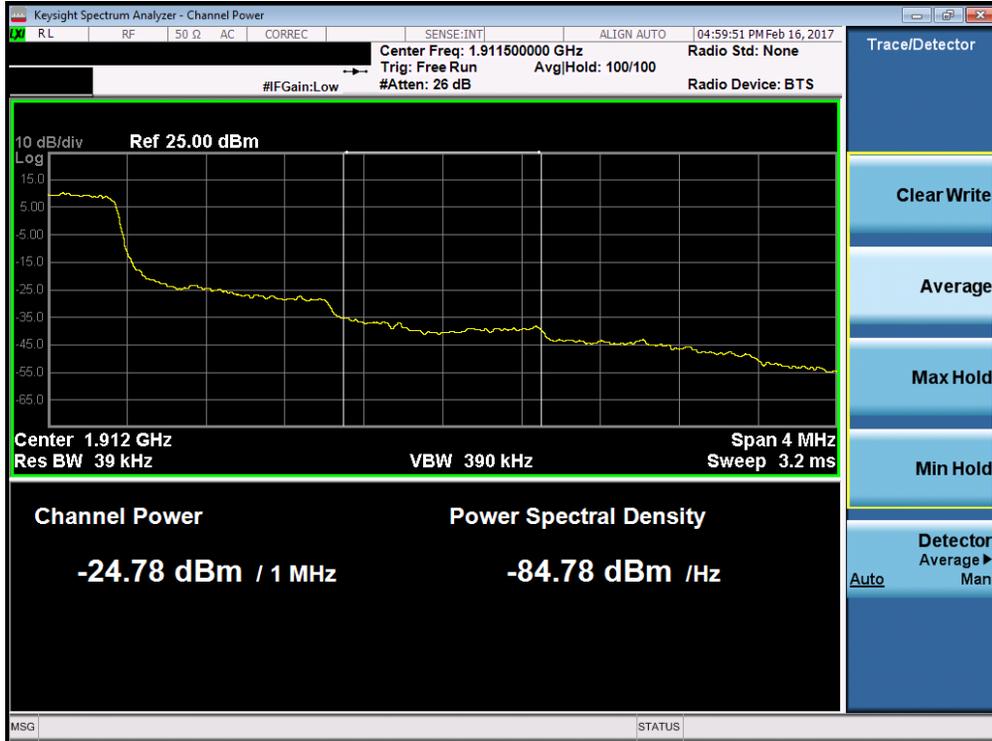


Plot 7-159. Lower Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

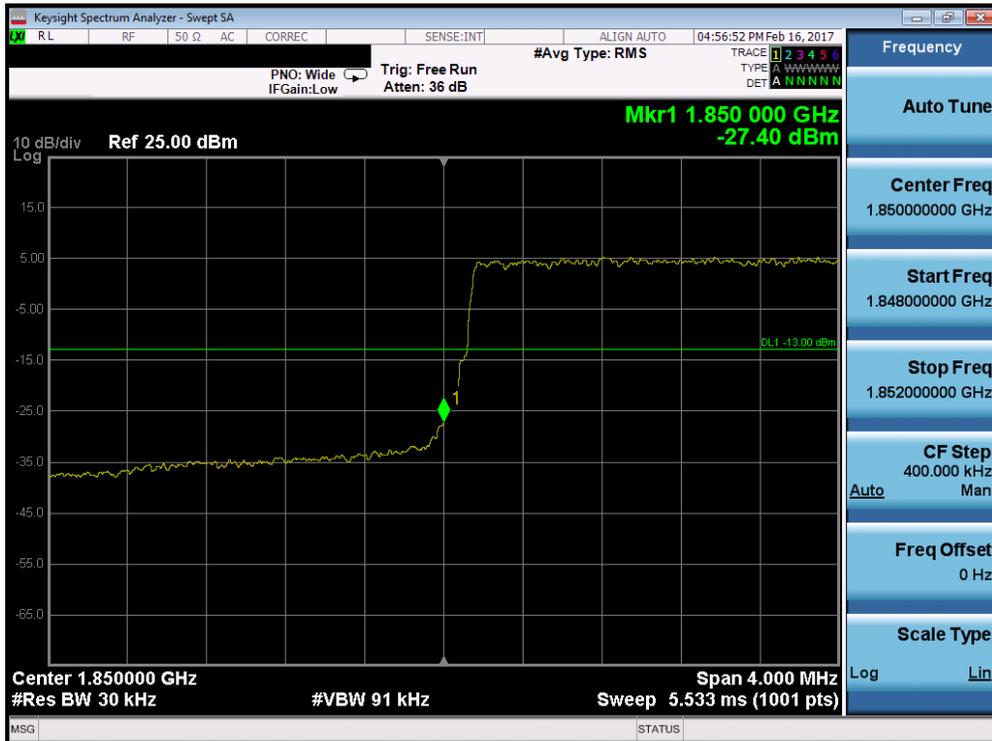


Plot 7-160. Upper Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 99 of 153

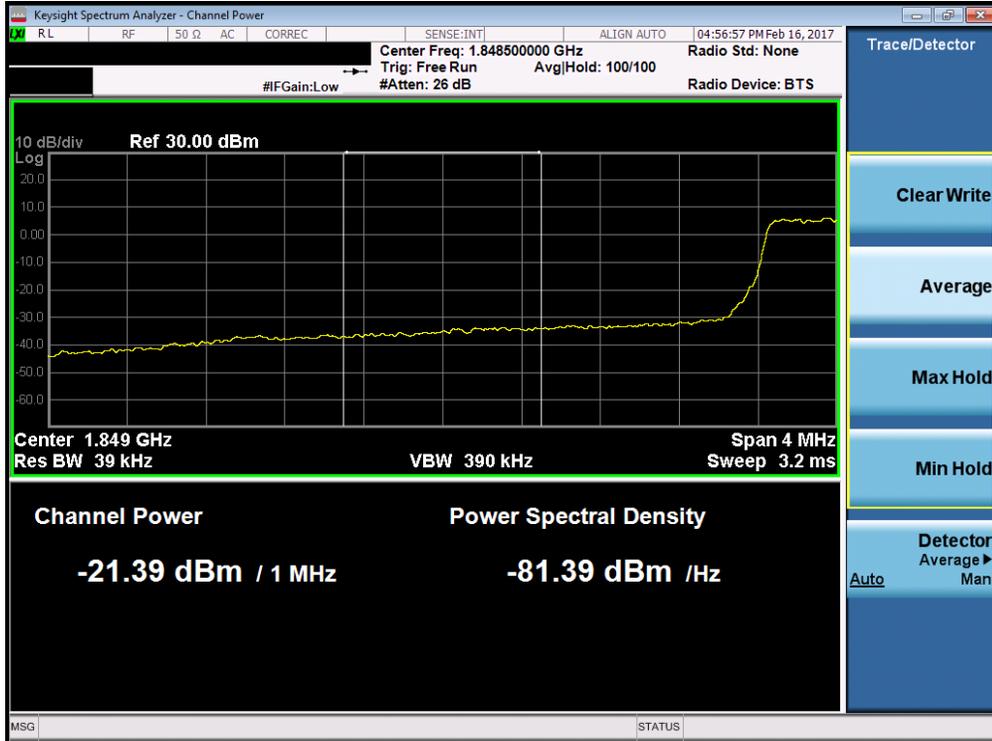


Plot 7-161. Upper Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

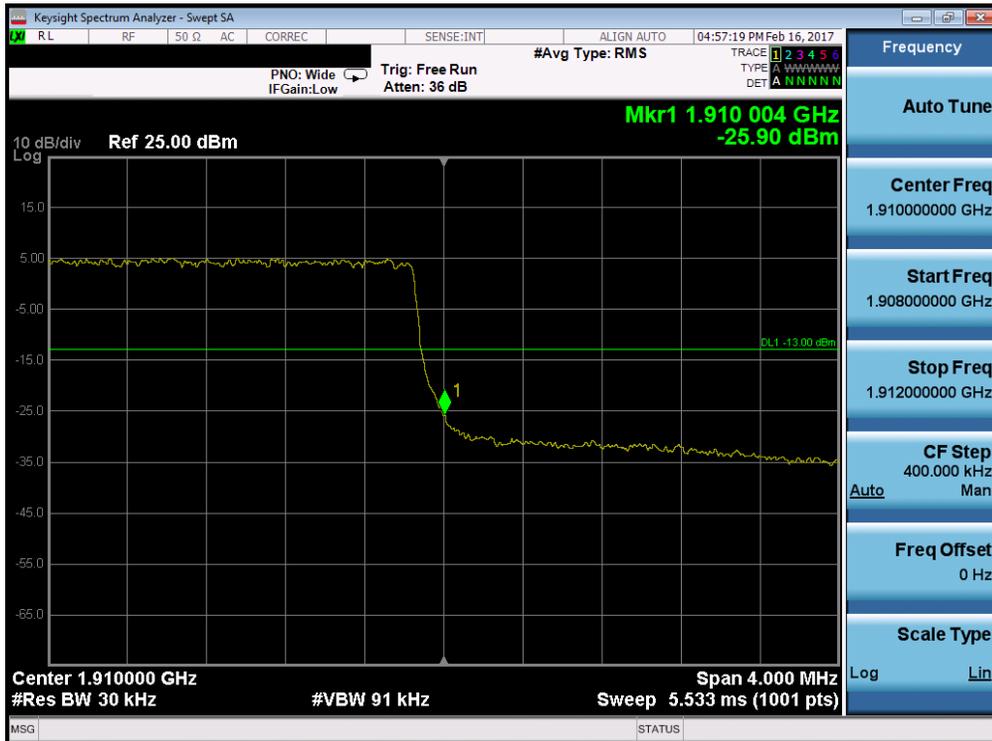


Plot 7-162. Lower Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 100 of 153

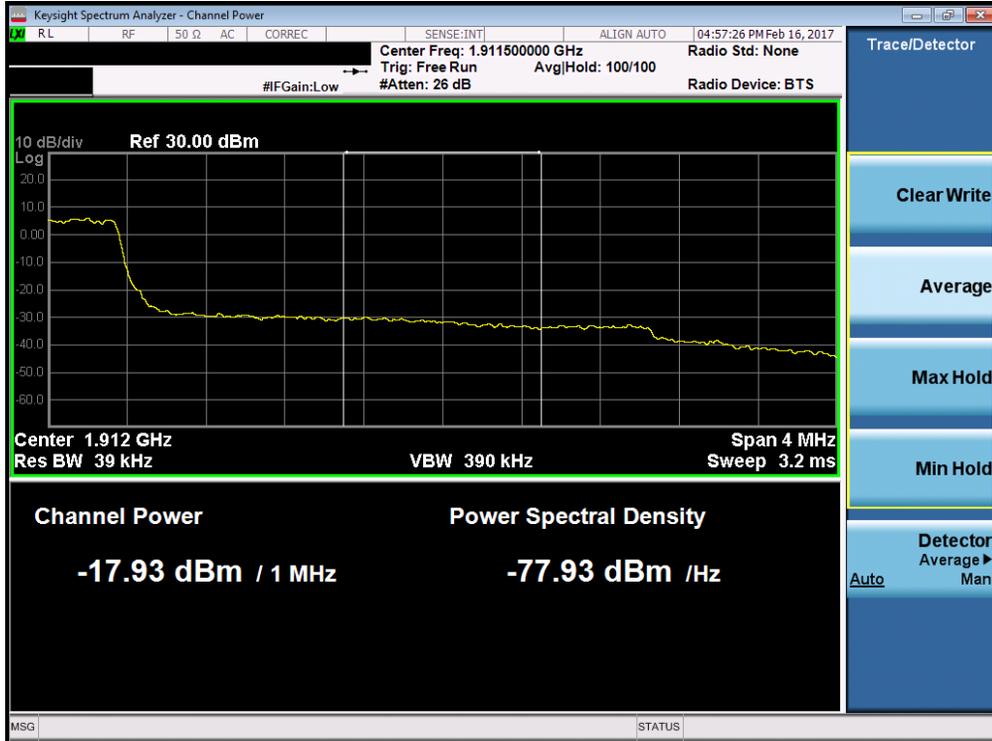


Plot 7-163. Lower Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

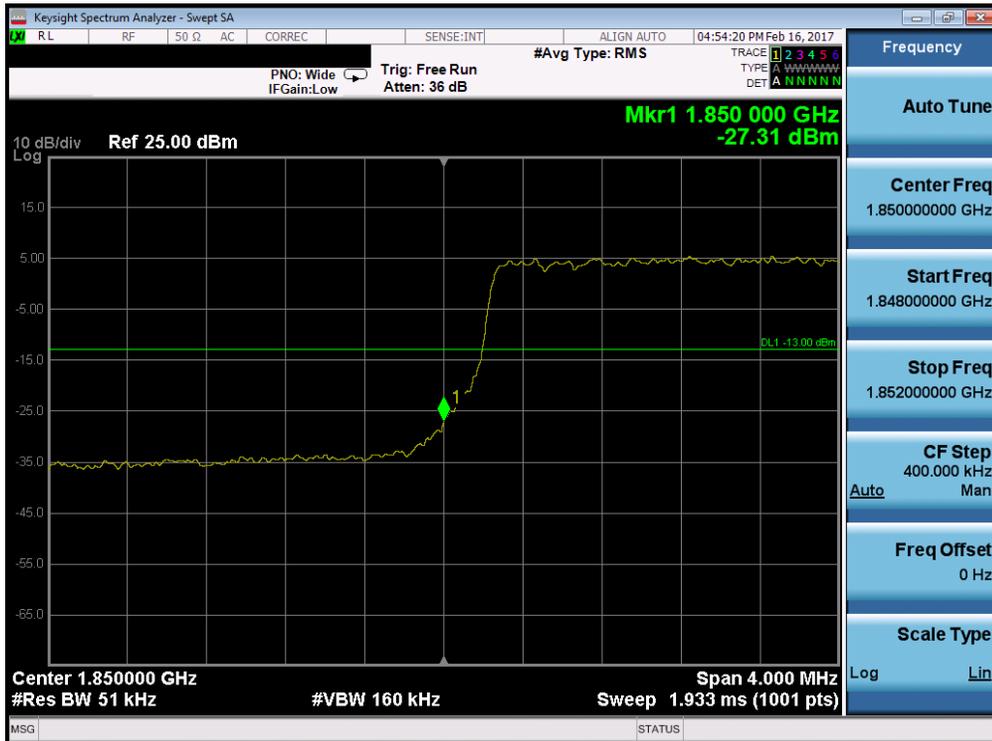


Plot 7-164. Upper Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 101 of 153

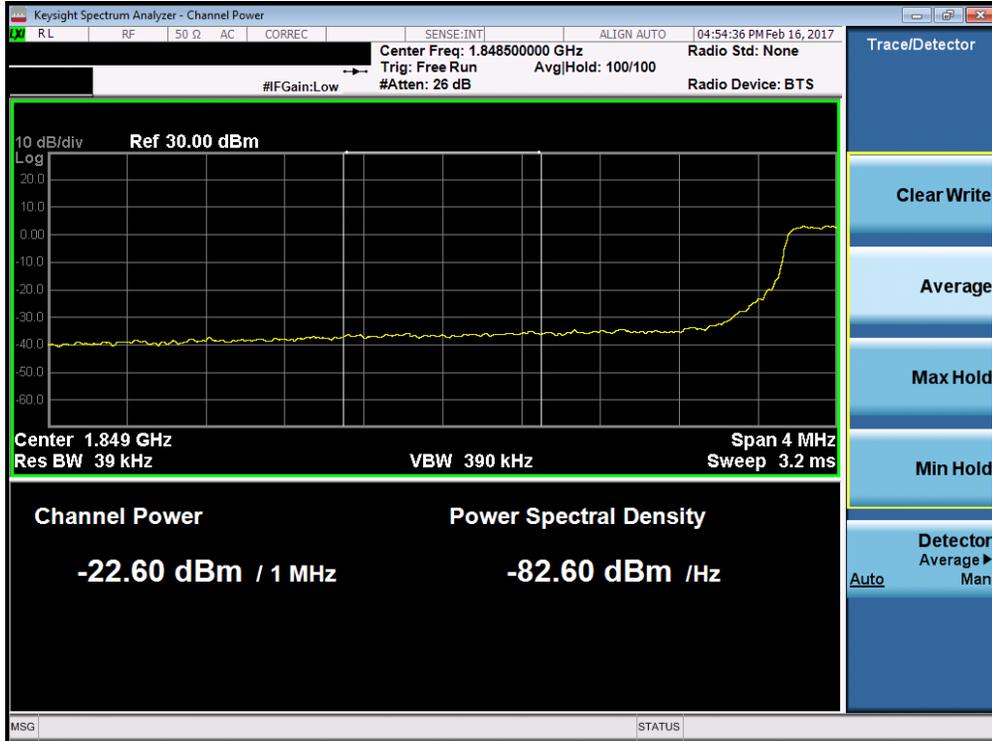


Plot 7-165. Upper Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

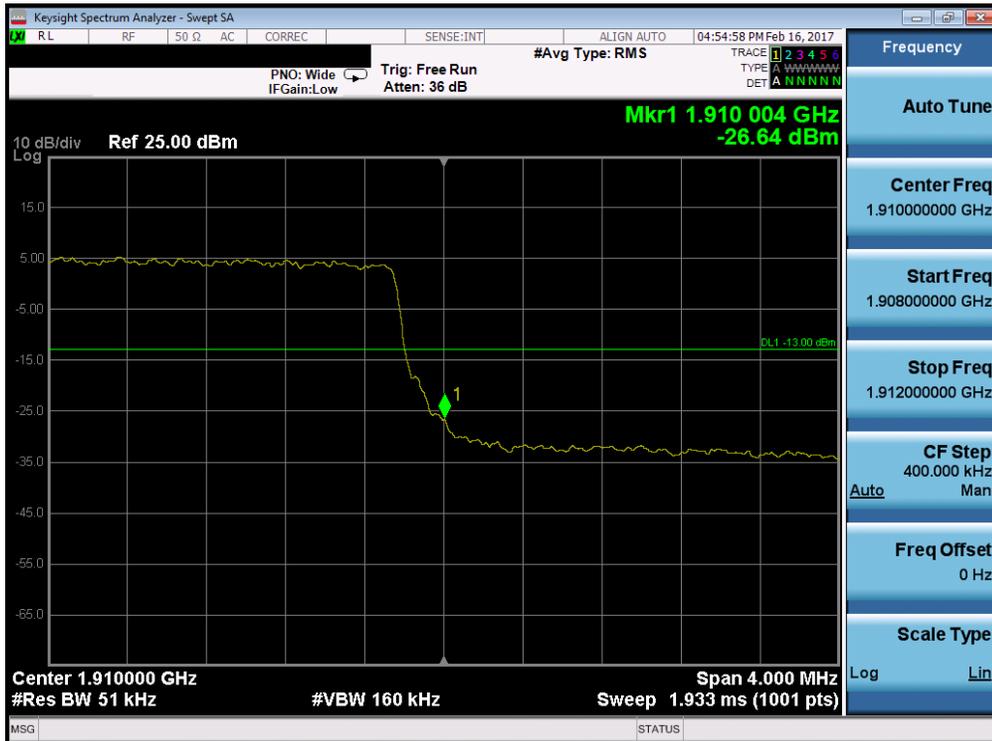


Plot 7-166. Lower Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 102 of 153

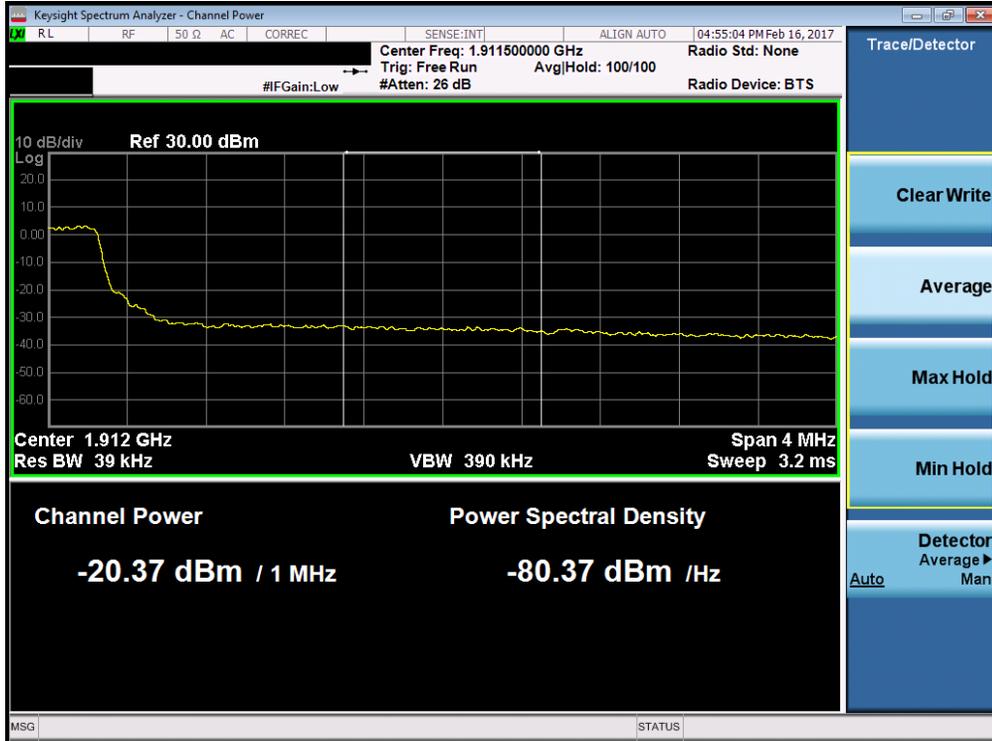


Plot 7-167. Lower Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

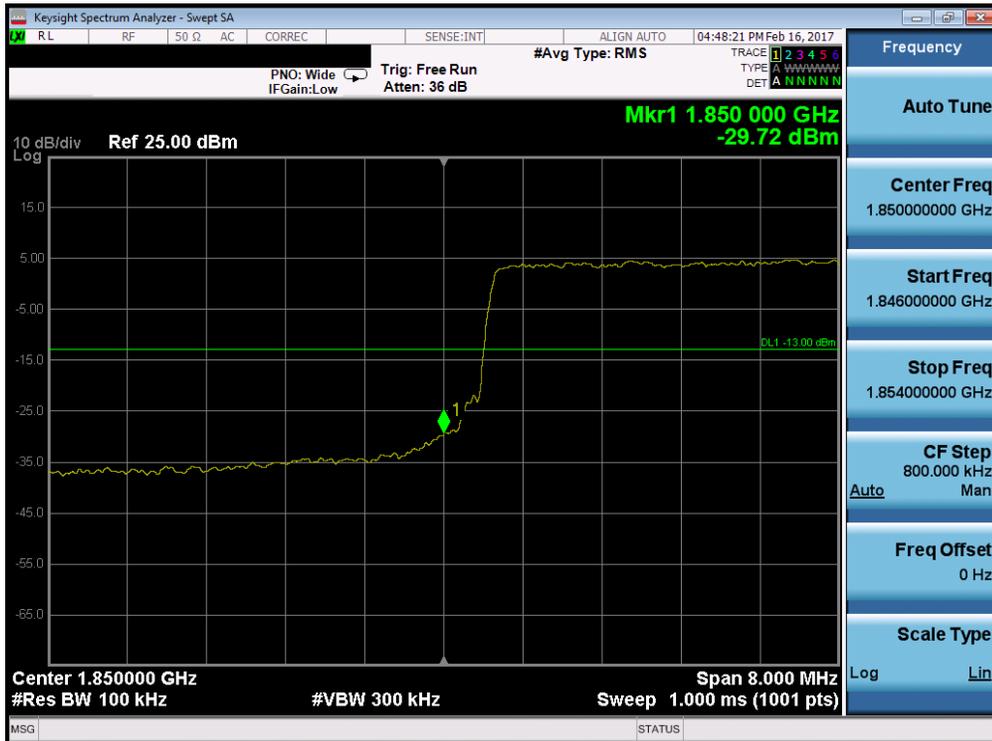


Plot 7-168. Upper Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 103 of 153

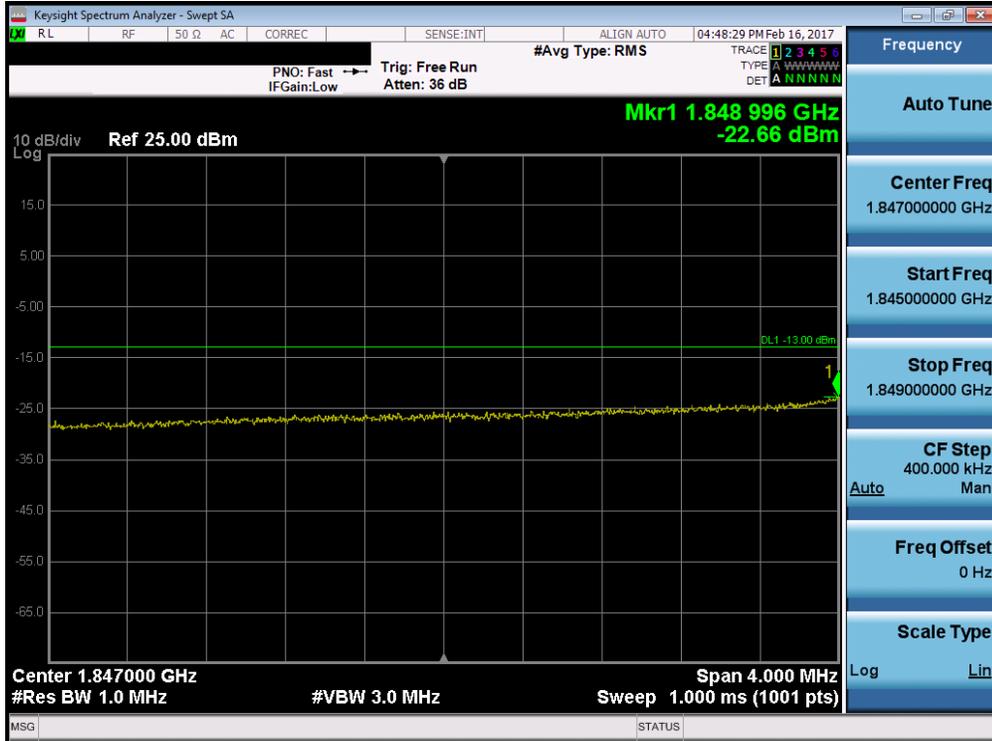


Plot 7-169. Upper Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

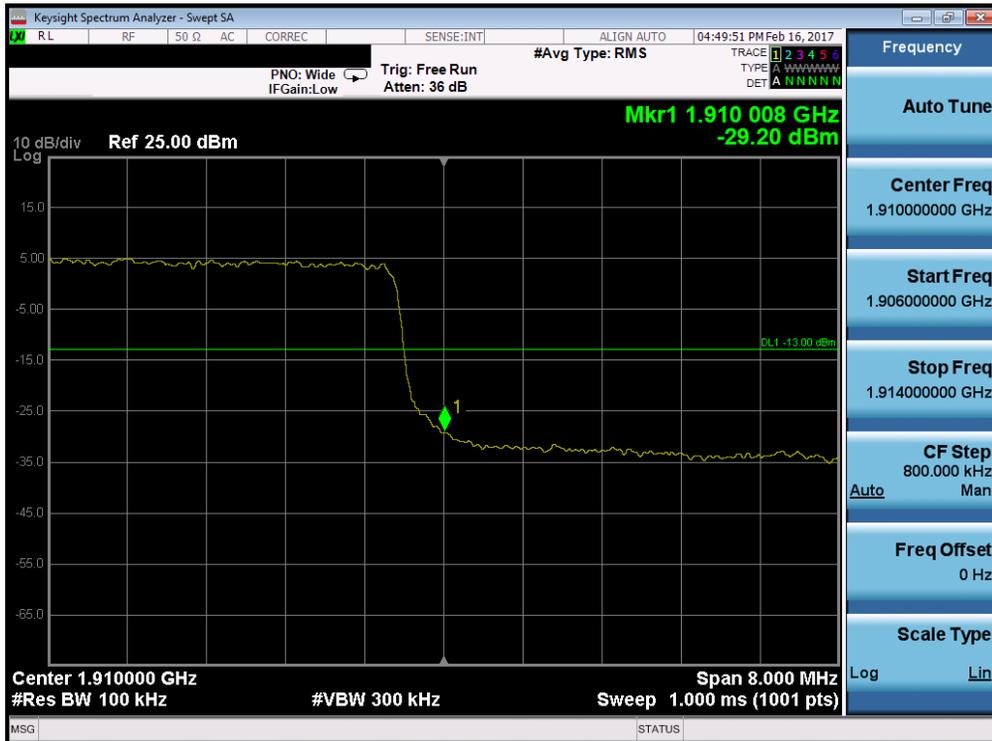


Plot 7-170. Lower Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 104 of 153

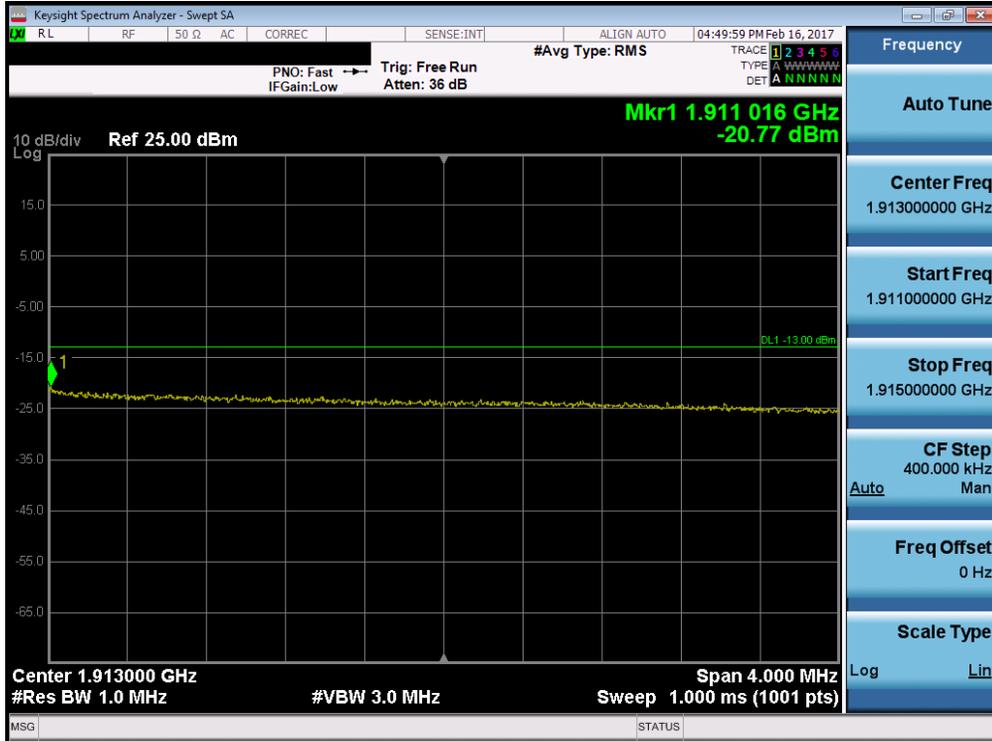


Plot 7-171. Lower Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

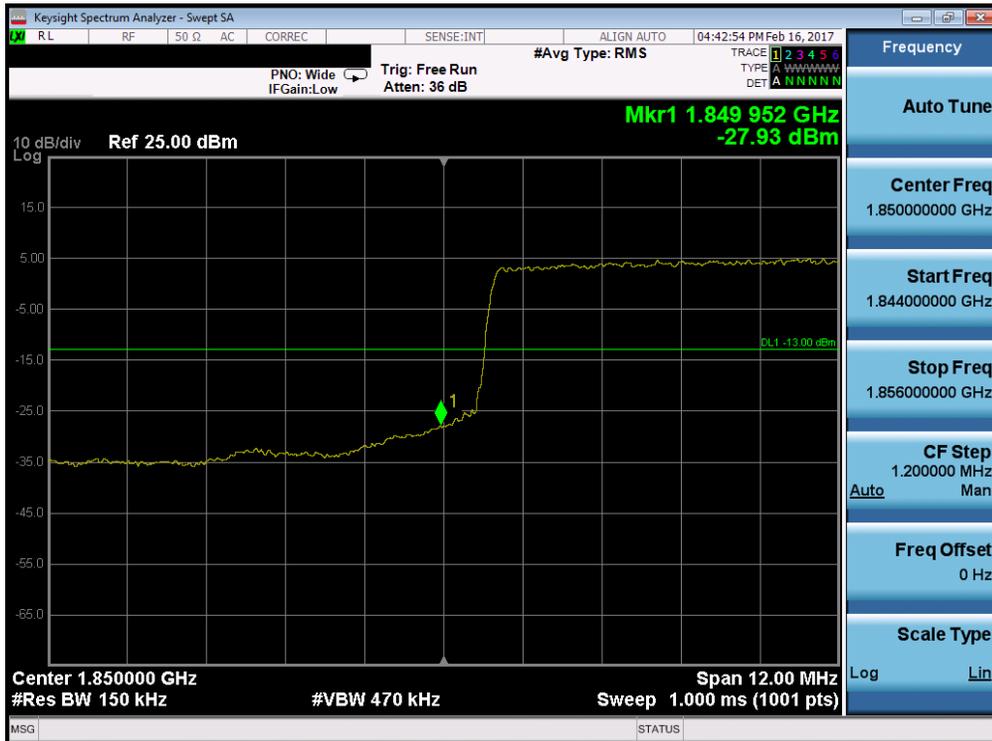


Plot 7-172. Upper Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 105 of 153

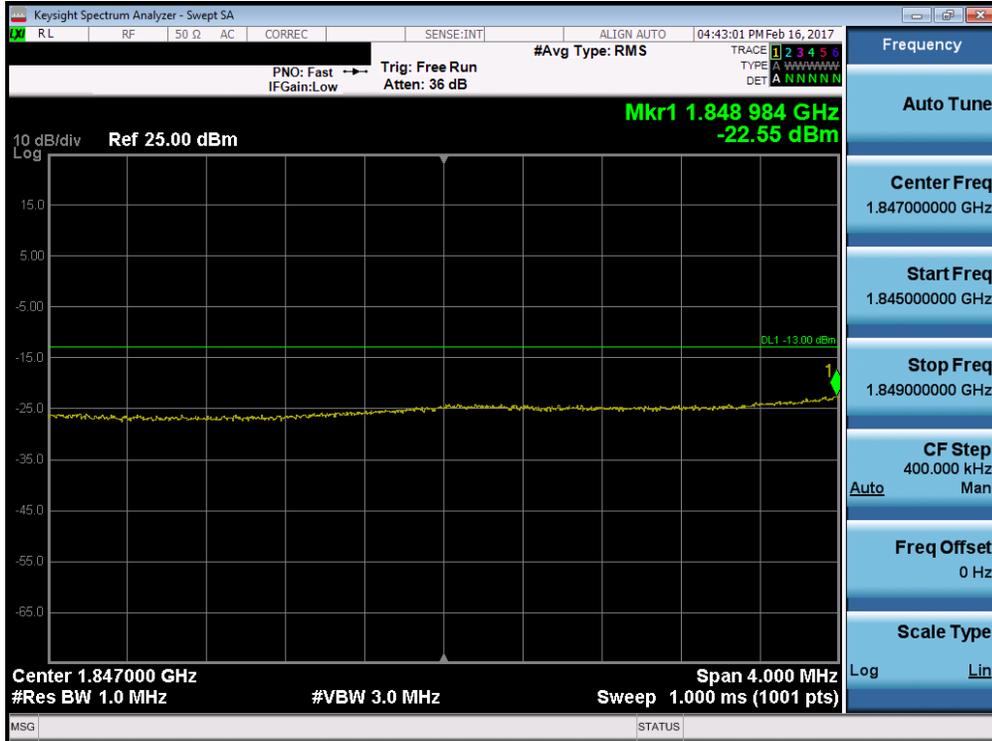


Plot 7-173. Upper Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

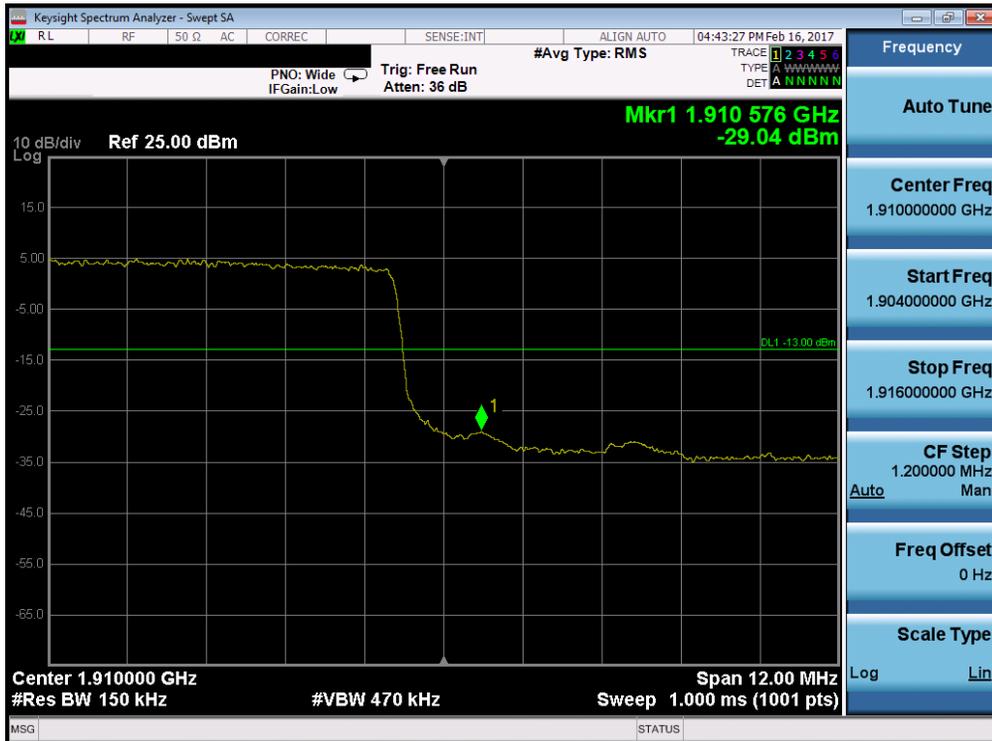


Plot 7-174. Lower Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 106 of 153

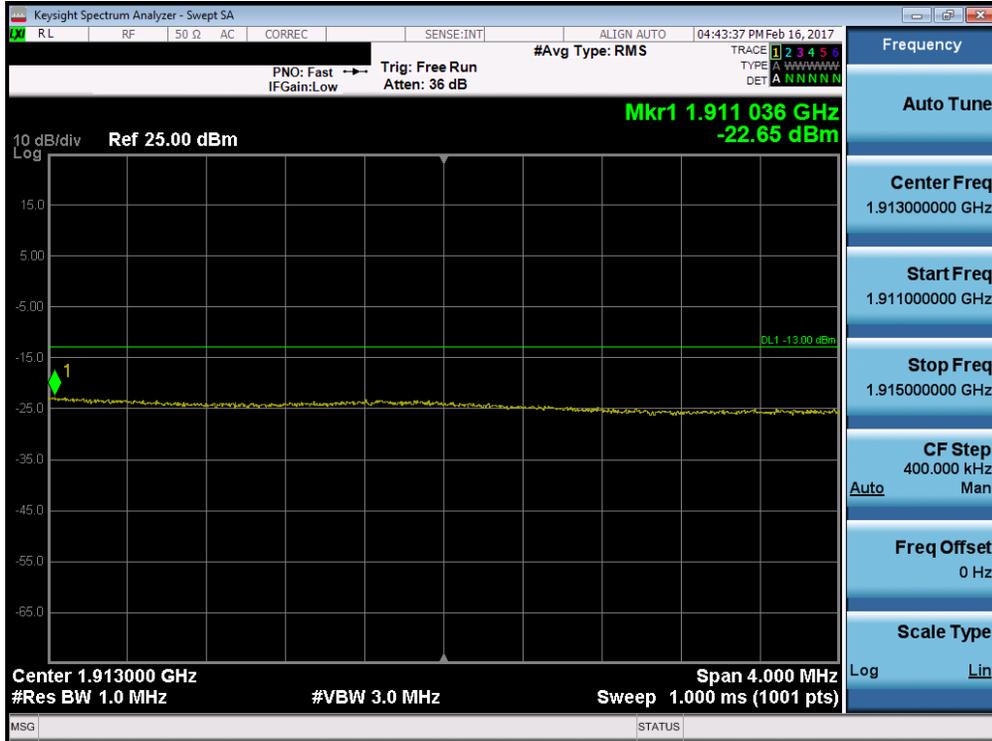


Plot 7-175. Lower Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

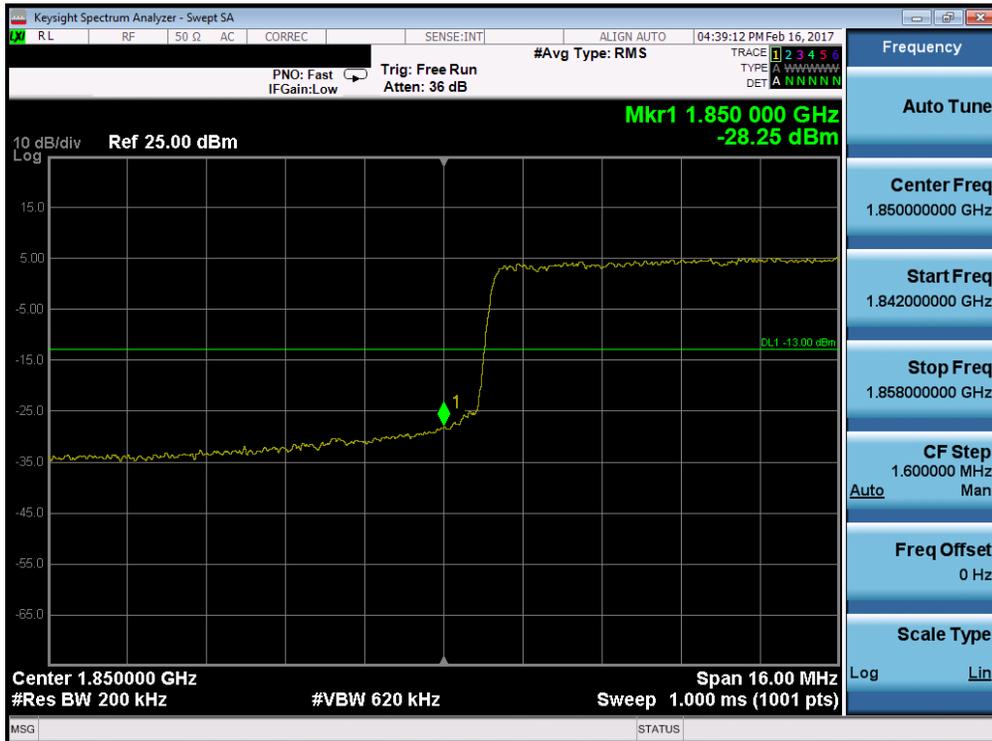


Plot 7-176. Upper Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 107 of 153

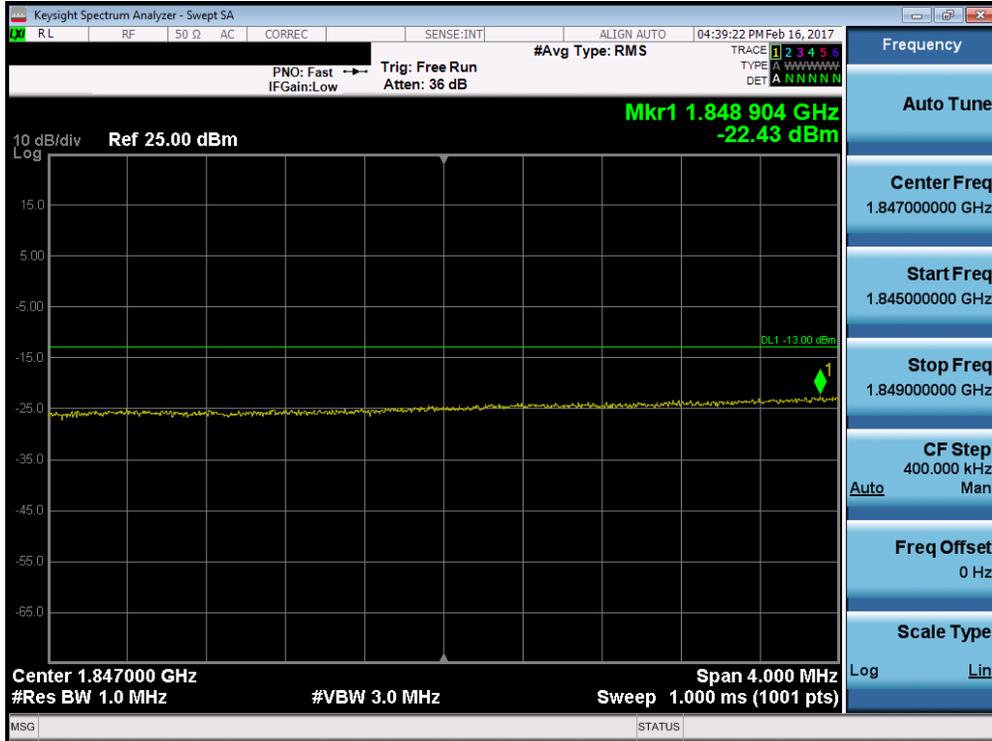


Plot 7-177. Upper Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)



Plot 7-178. Lower Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 108 of 153

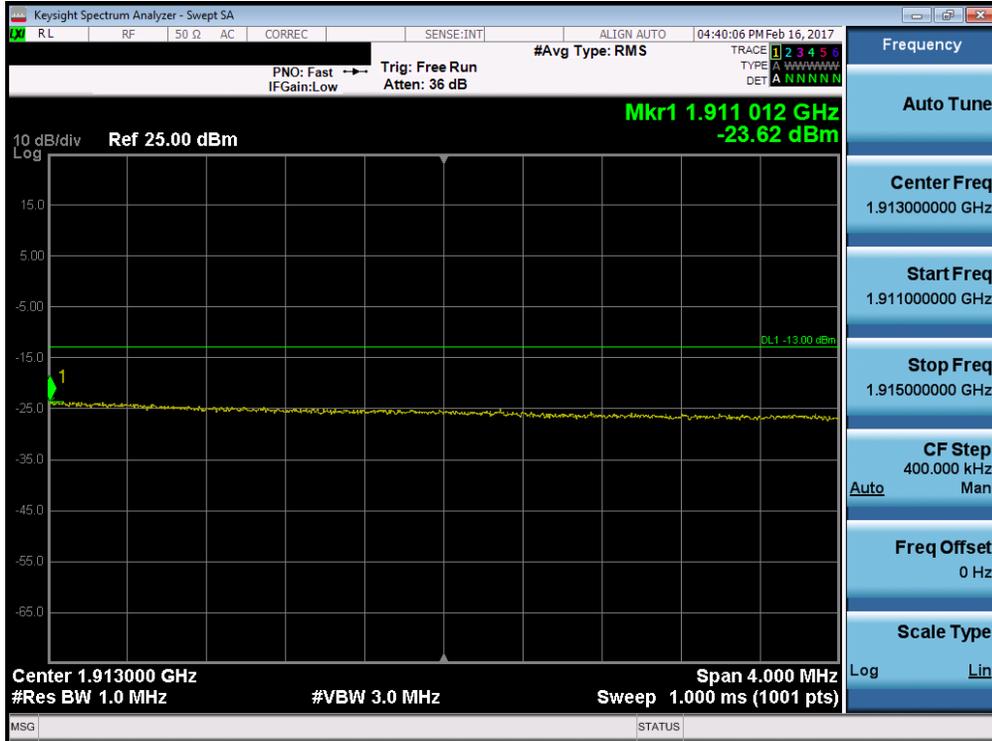


Plot 7-179. Lower Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

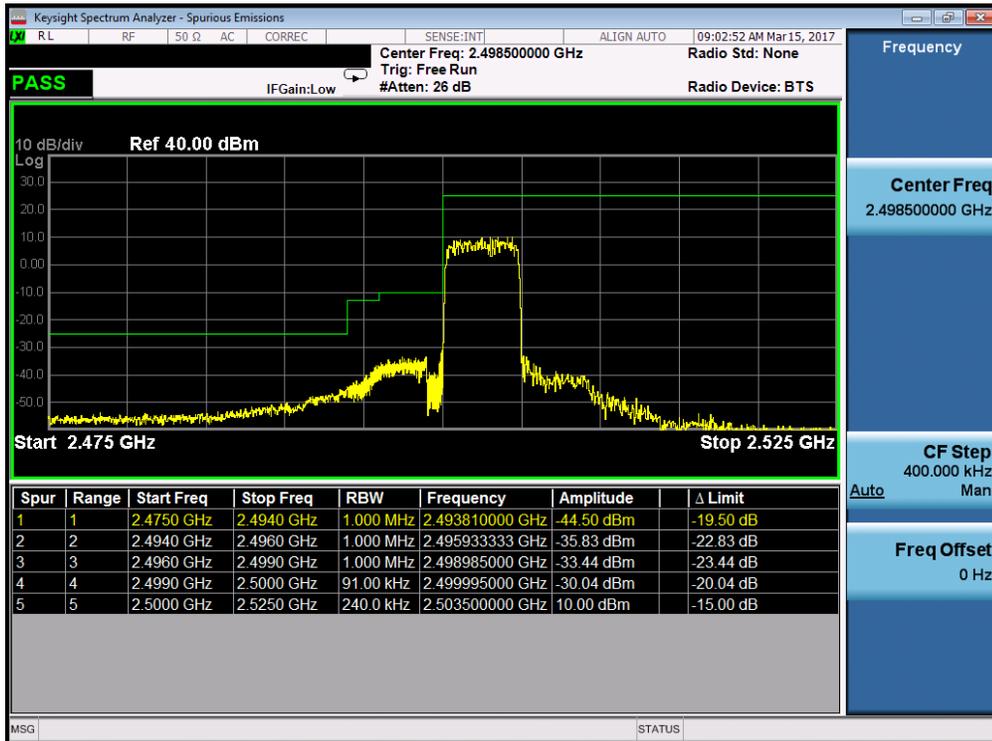


Plot 7-180. Upper Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 109 of 153

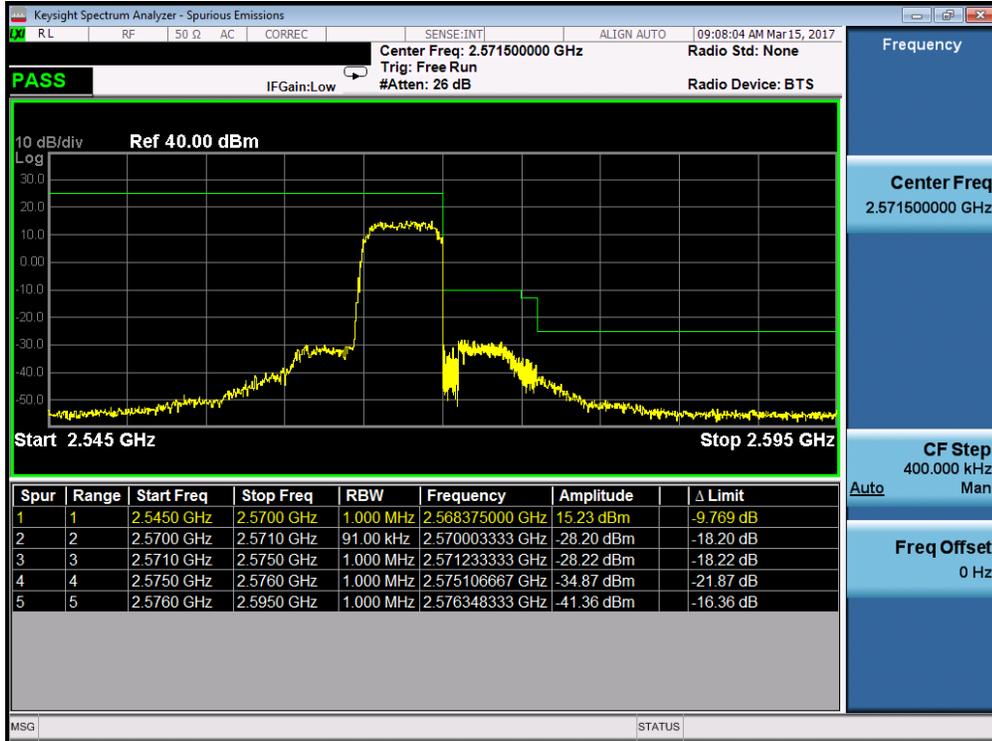


Plot 7-181. Upper Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

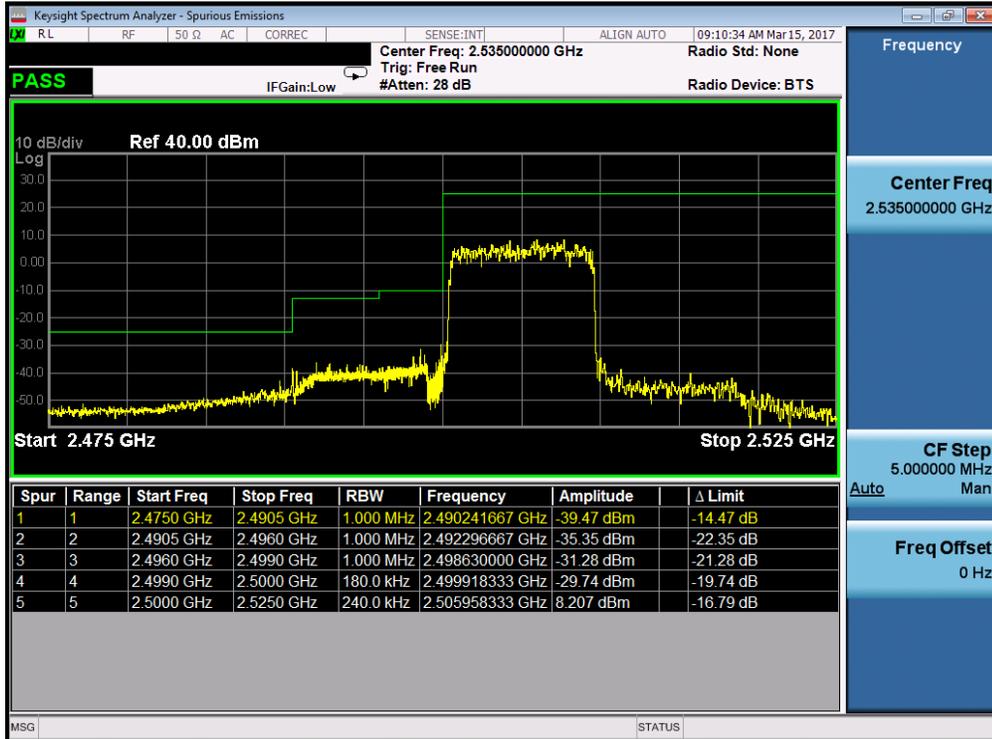


Plot 7-182. Lower ACP Plot (Band 7 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFTP450		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 110 of 153



Plot 7-183. Upper ACP Plot (Band 7 – 5.0MHz QPSK – RB Size 25)

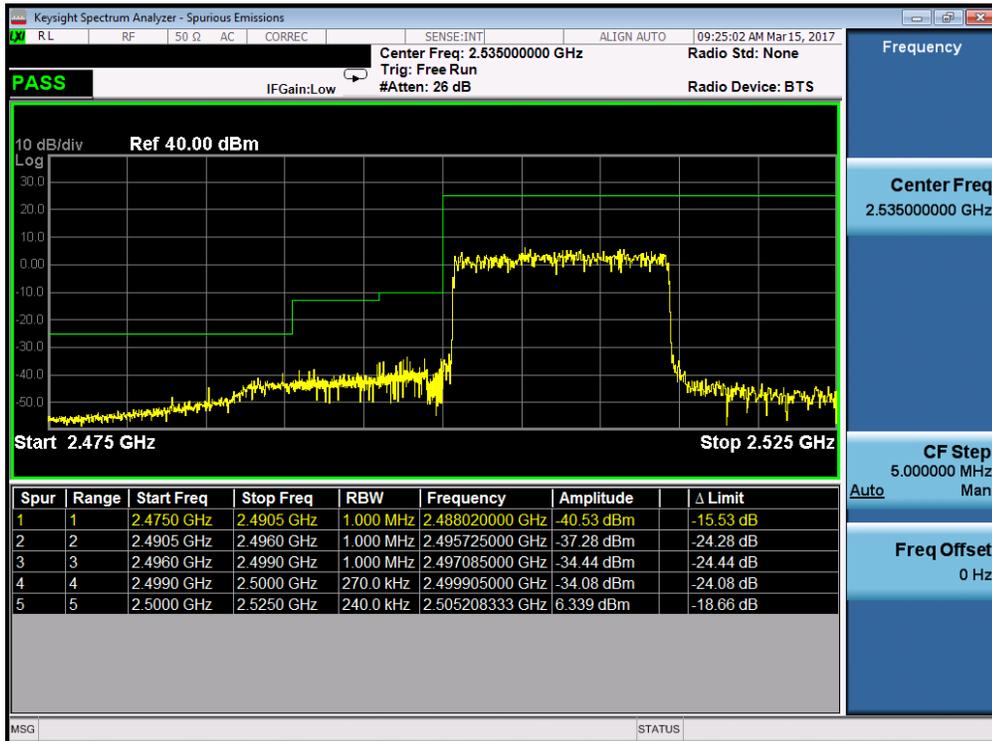


Plot 7-184. Lower ACP Plot (Band 7 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFTP450		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 111 of 153

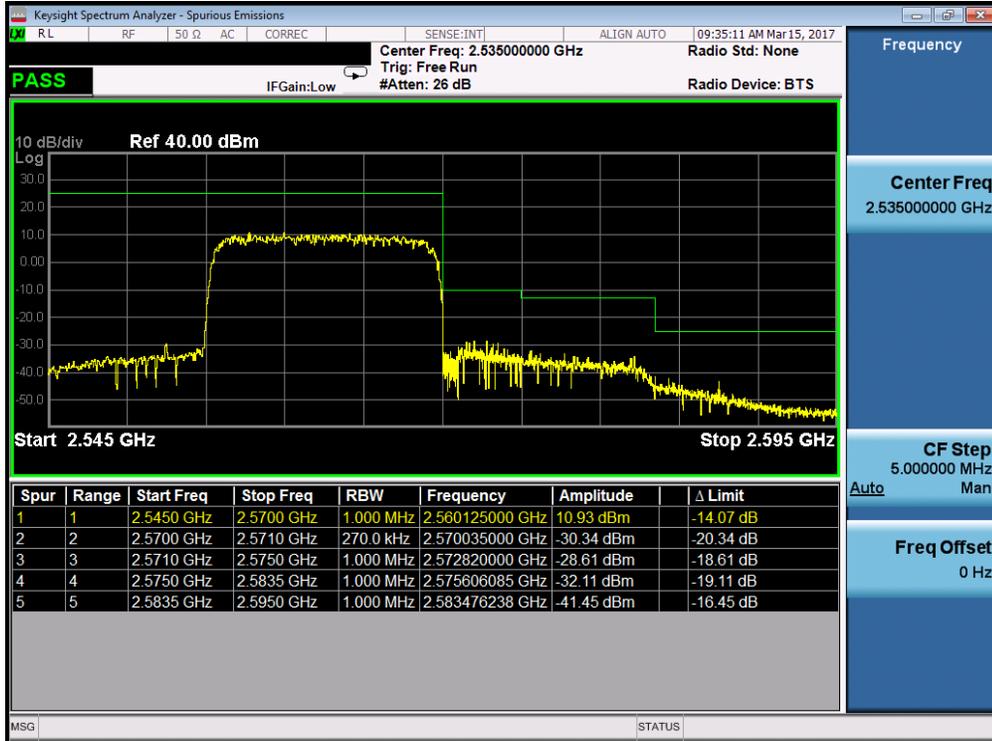


Plot 7-185. Upper ACP Plot (Band 7 – 10.0MHz QPSK – RB Size 50)

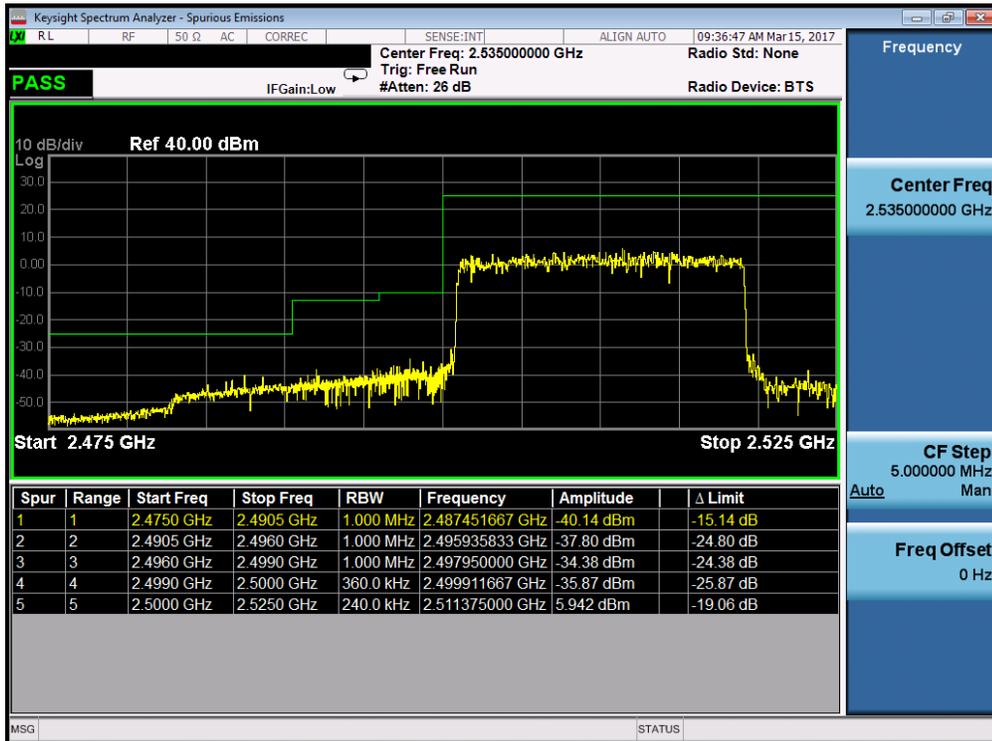


Plot 7-186. Lower ACP Plot (Band 7 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFTP450		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 112 of 153

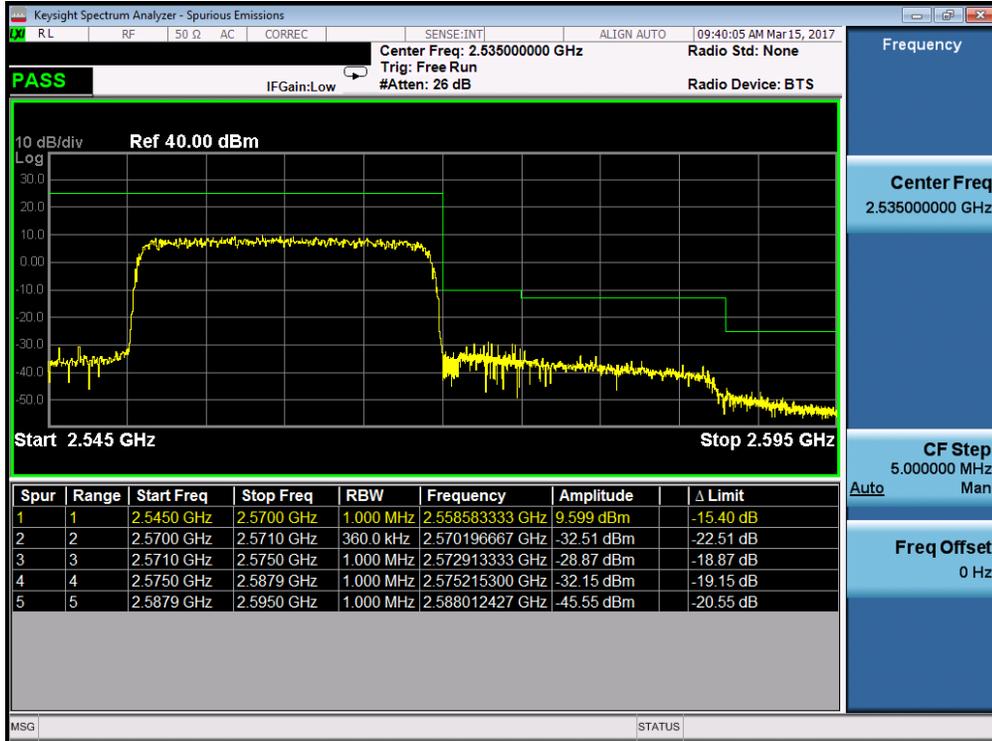


Plot 7-187. Upper ACP Plot (Band 7 – 15.0MHz QPSK – RB Size 75)



Plot 7-188. Lower ACP Plot (Band 7 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFTP450		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 113 of 153



Plot 7-189. Upper ACP Plot (Band 7 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 114 of 153

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 D01 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.

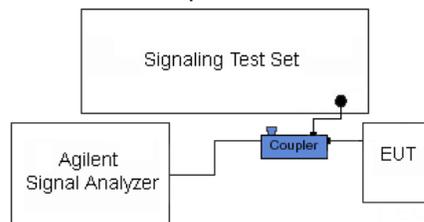
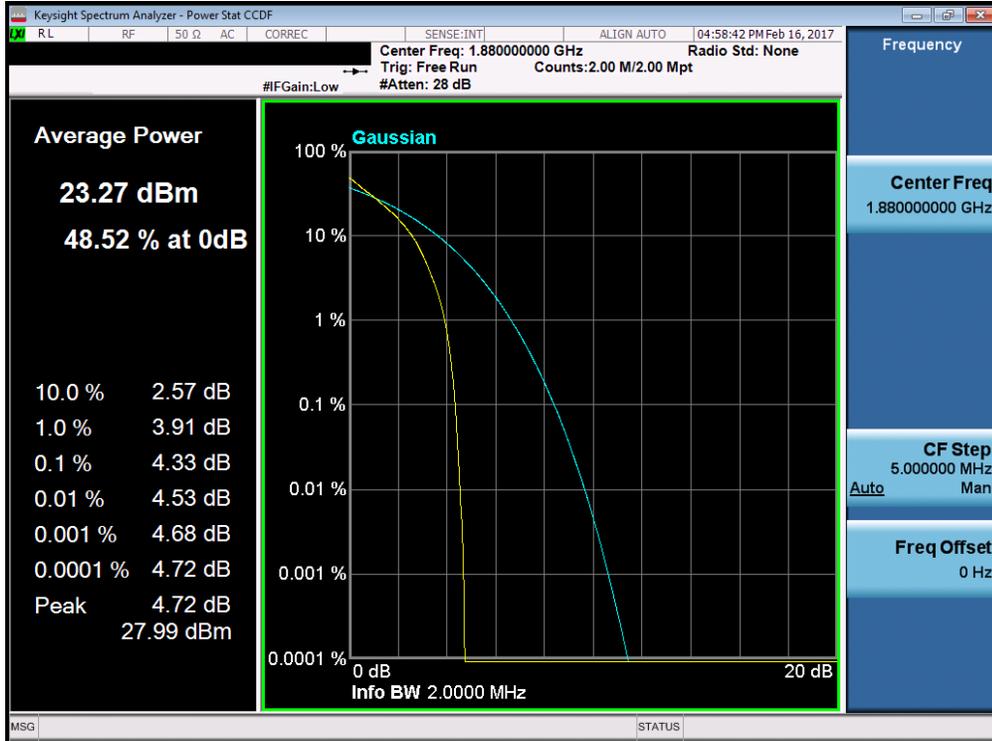


Figure 7-4. Test Instrument & Measurement Setup

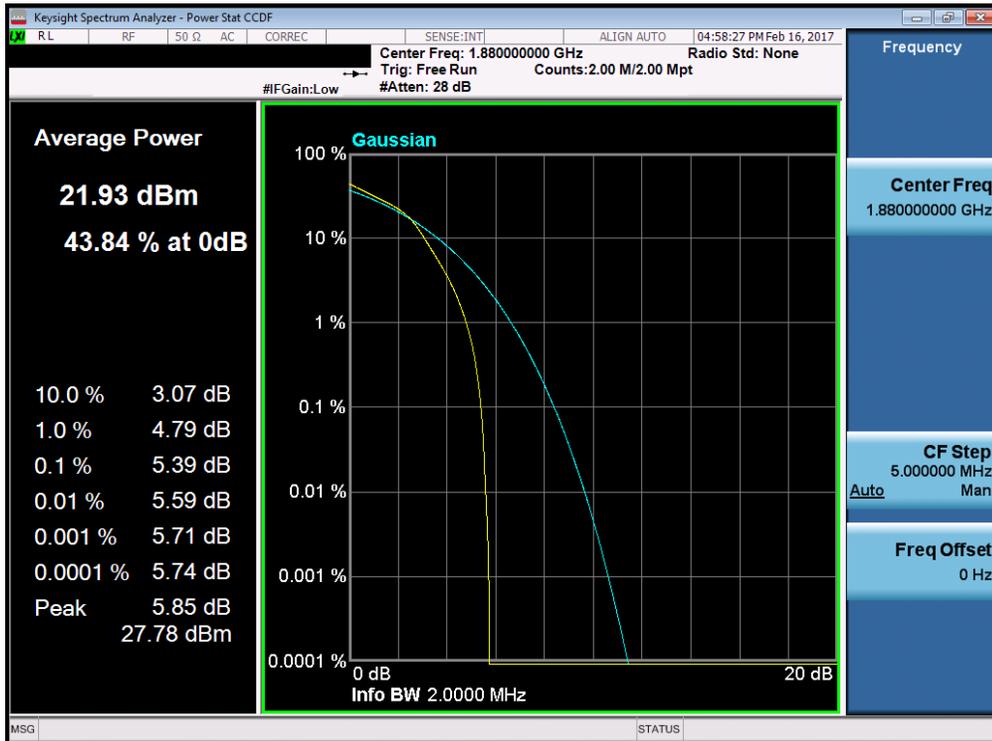
Test Notes

None.

FCC ID: ZNFTP450		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset	Page 115 of 153	

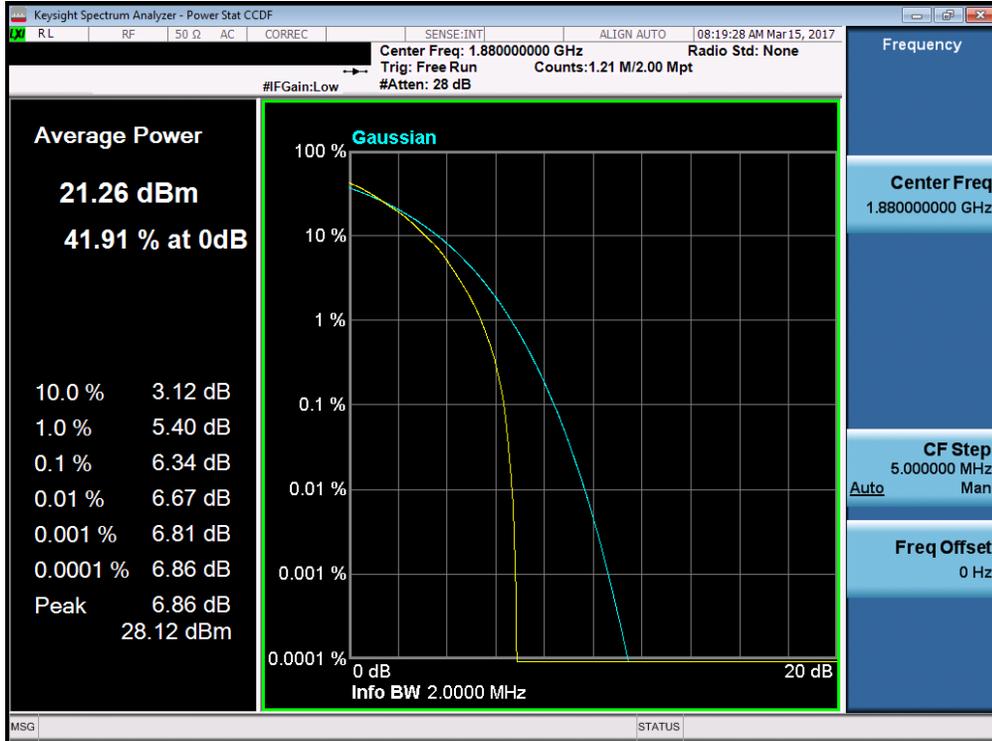


Plot 7-190. PAR Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

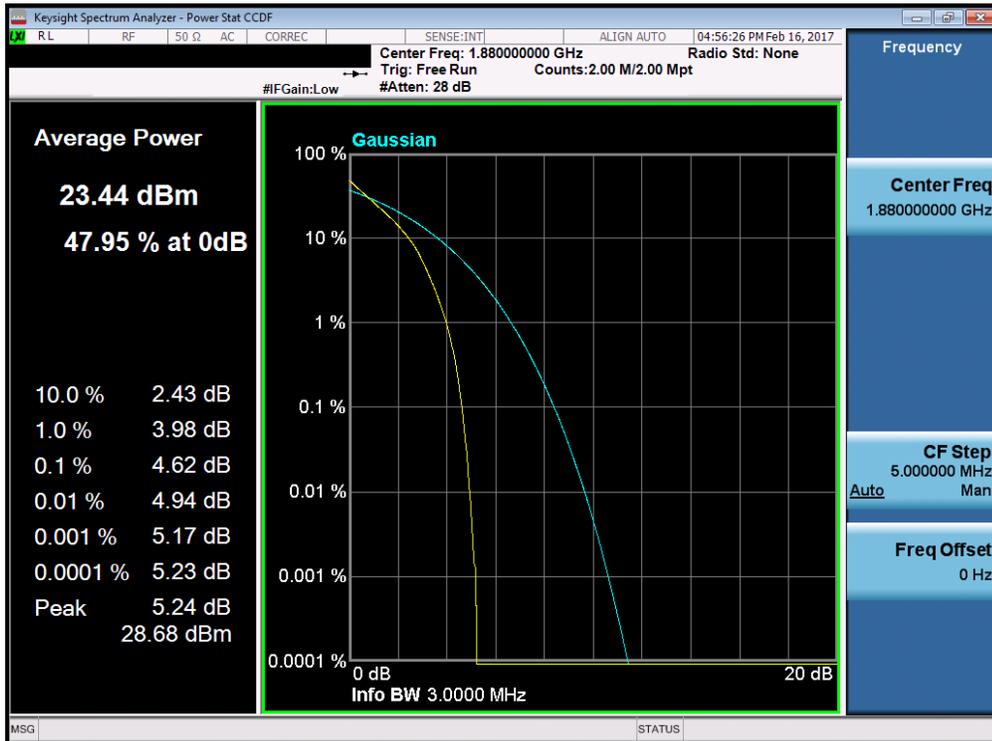


Plot 7-191. PAR Plot (Band 2 – 1.4MHz 16-QAM – RB Size 6)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 116 of 153

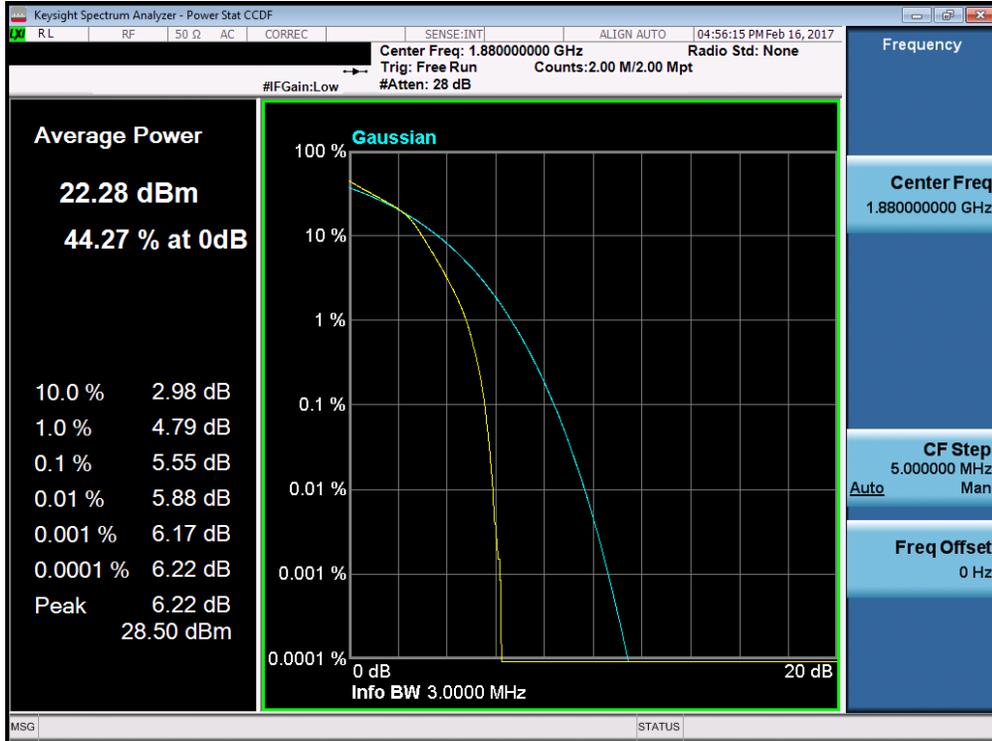


Plot 7-192. PAR Plot (Band 2 – 1.4MHz 64-QAM – RB Size 6)

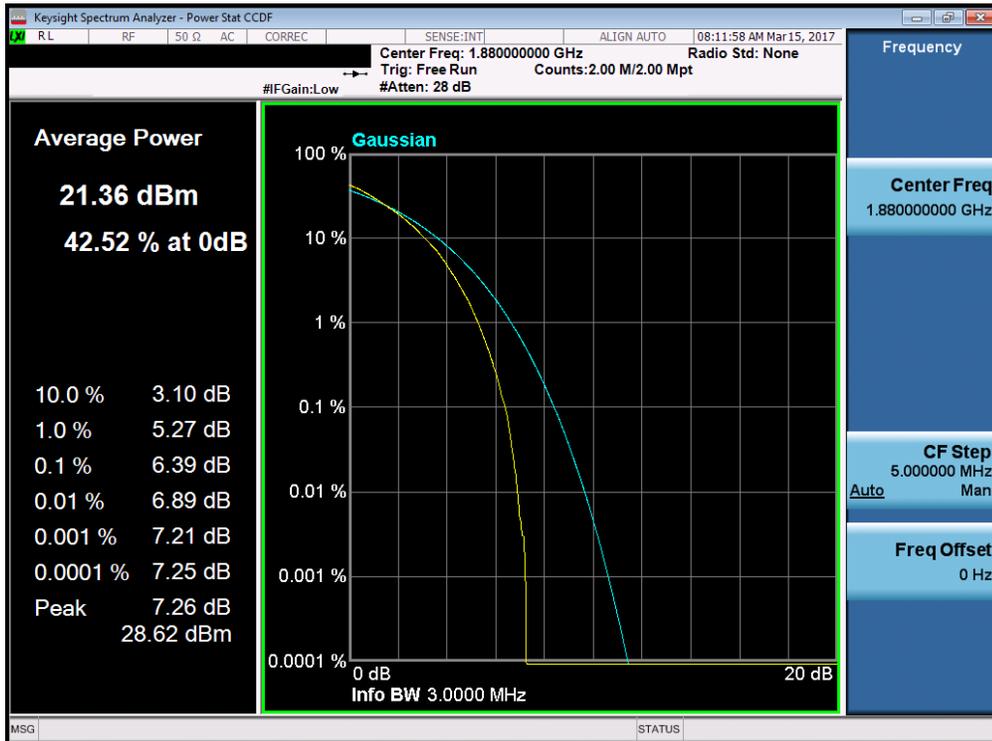


Plot 7-193. PAR Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 117 of 153

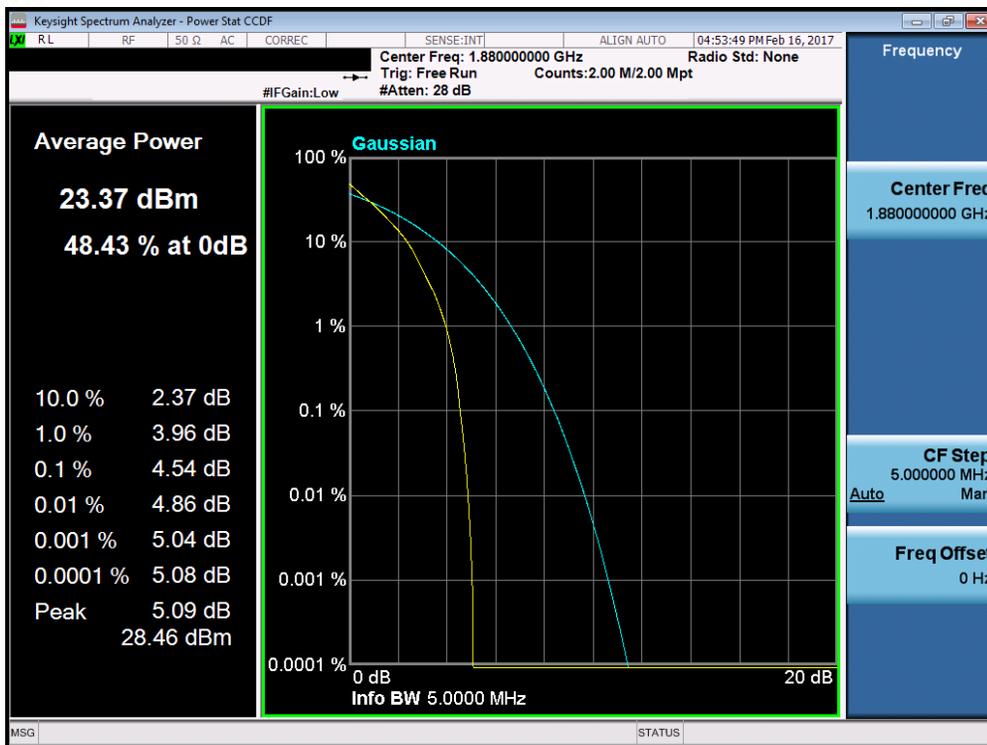


Plot 7-194. PAR Plot (Band 2 – 3.0MHz 16-QAM – RB Size 15)

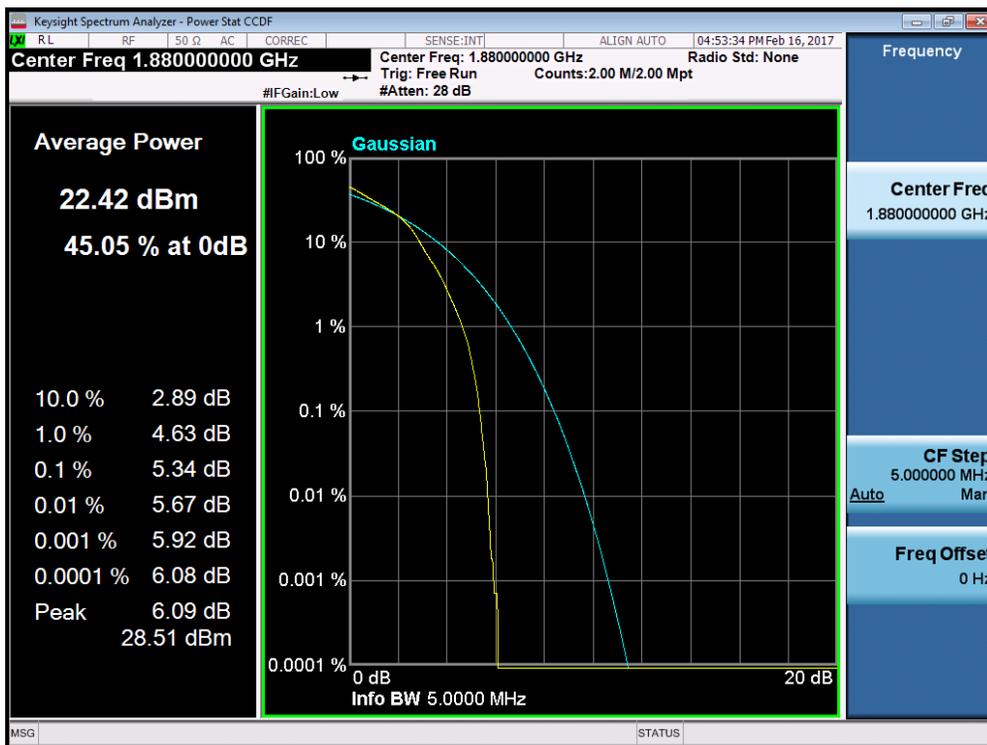


Plot 7-195. PAR Plot (Band 2 – 3.0MHz 64-QAM – RB Size 15)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 118 of 153

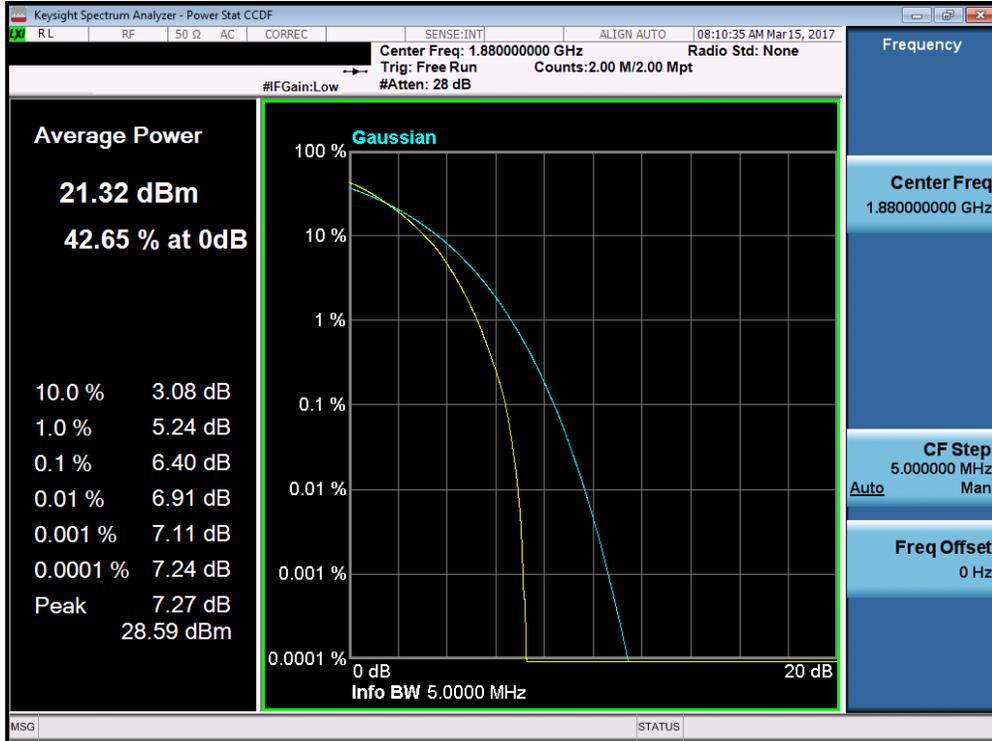


Plot 7-196. PAR Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

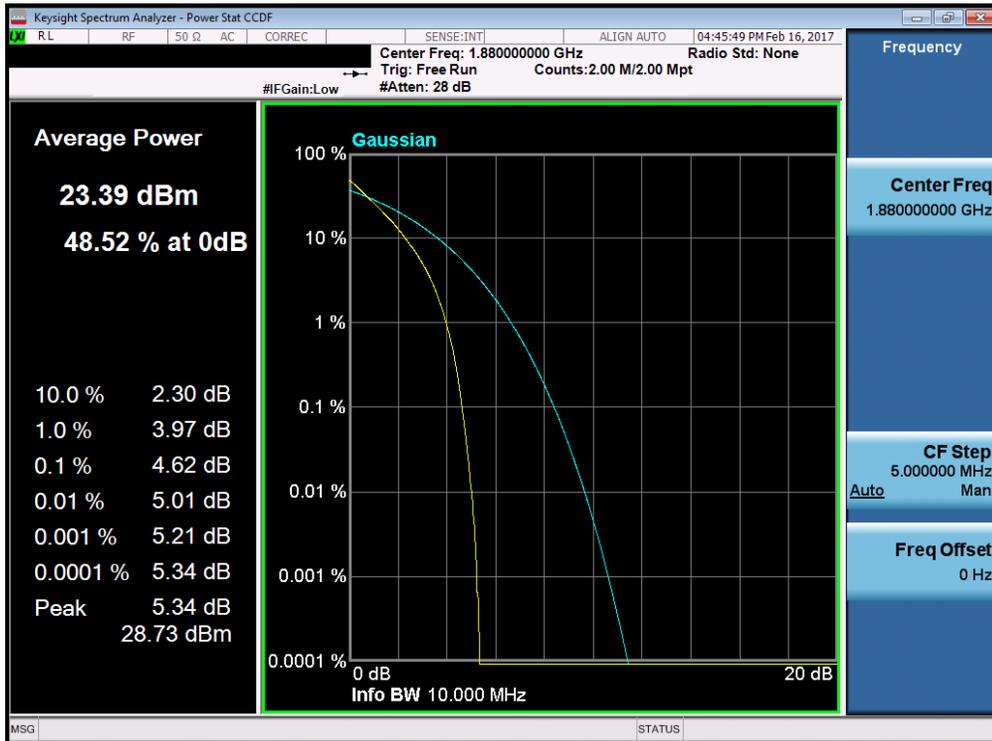


Plot 7-197. PAR Plot (Band 2 – 5.0MHz 16-QAM – RB Size 25)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 119 of 153

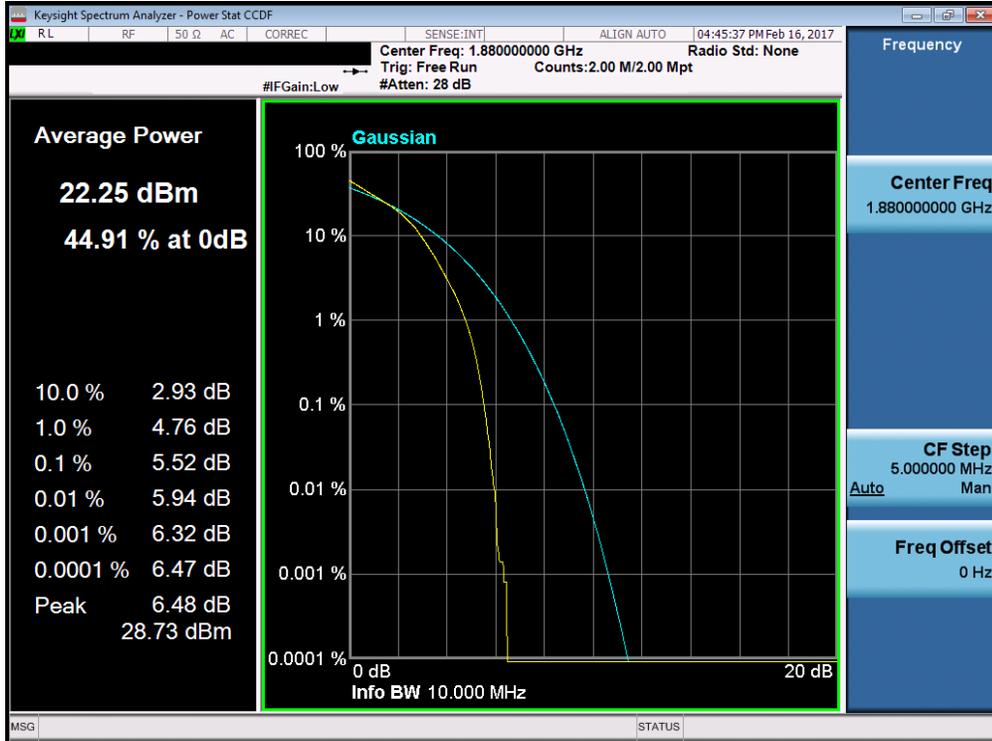


Plot 7-198. PAR Plot (Band 2 – 5.0MHz 64-QAM – RB Size 25)

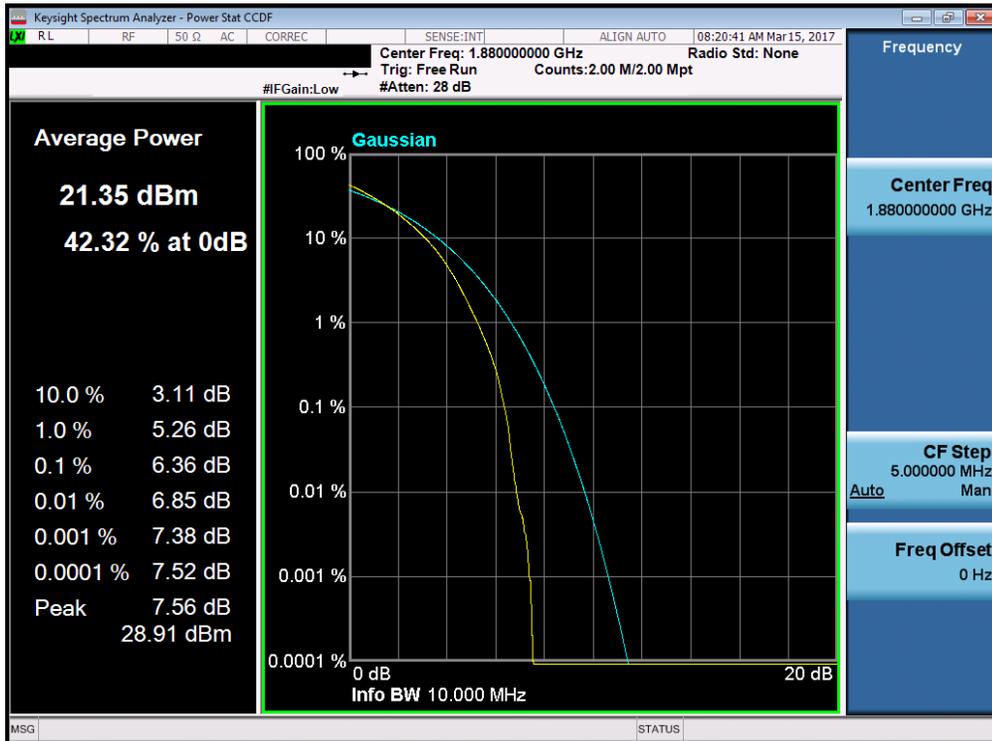


Plot 7-199. PAR Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 120 of 153

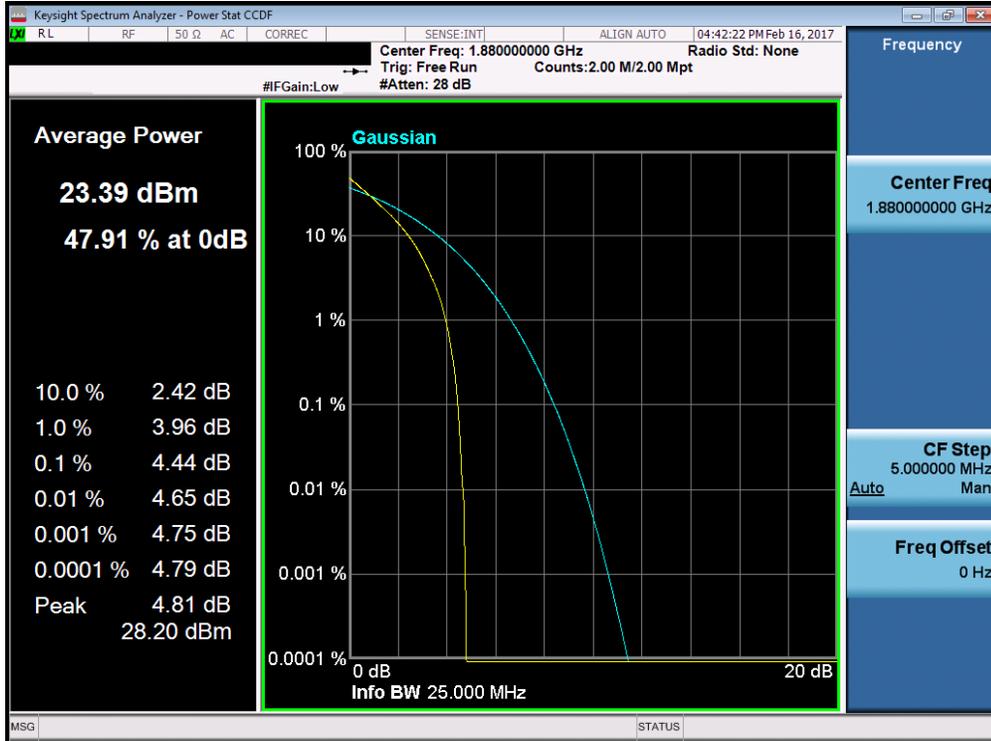


Plot 7-200. PAR Plot (Band 2 – 10.0MHz 16-QAM – RB Size 50)

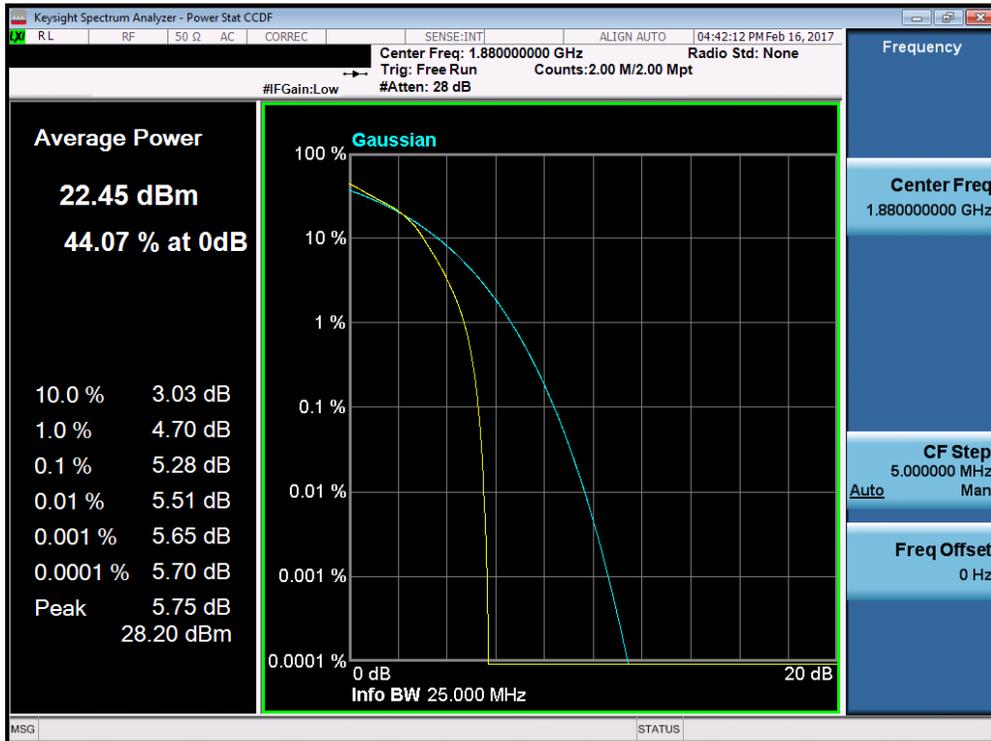


Plot 7-201. PAR Plot (Band 2 – 10.0MHz 64-QAM – RB Size 50)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 121 of 153

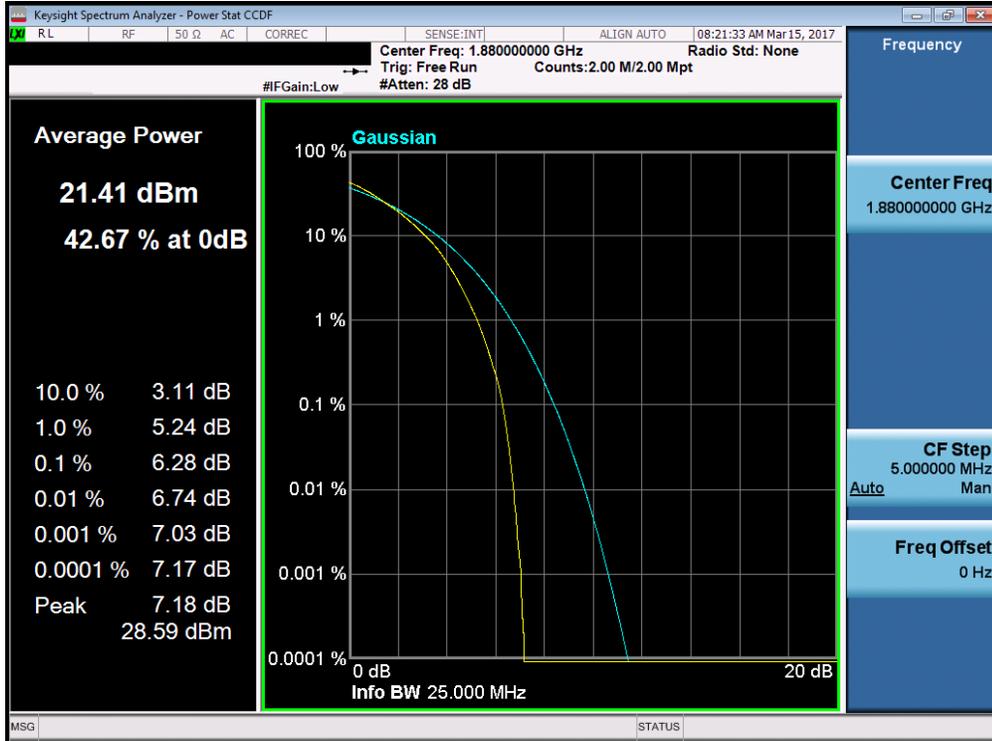


Plot 7-202. PAR Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

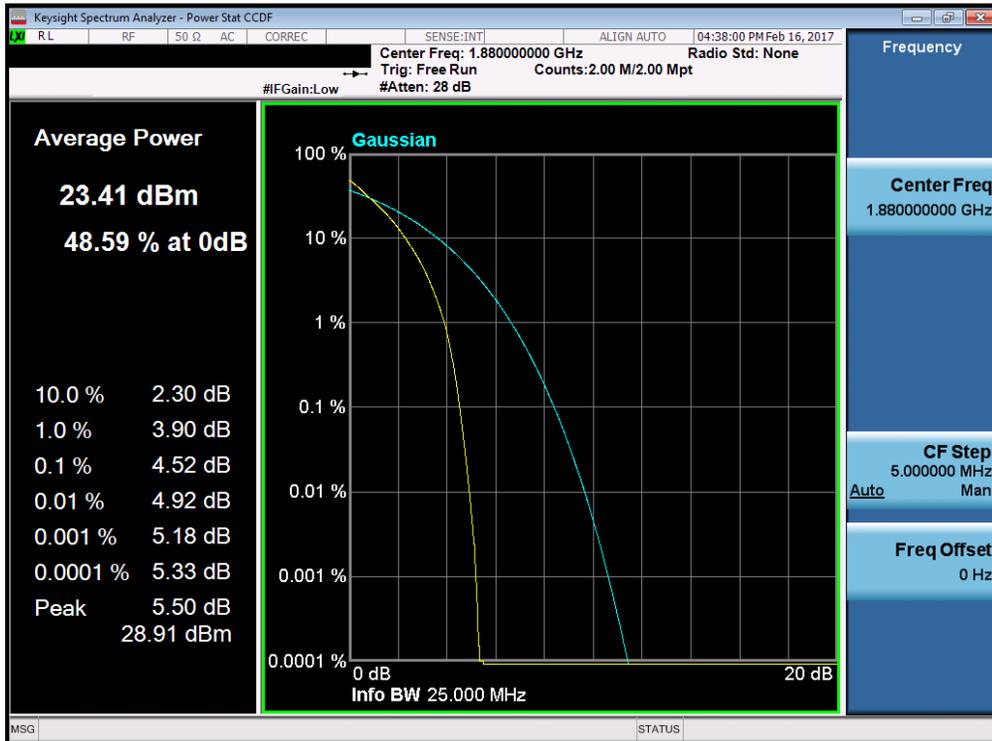


Plot 7-203. PAR Plot (Band 2 – 15.0MHz 16-QAM – RB Size 75)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 122 of 153

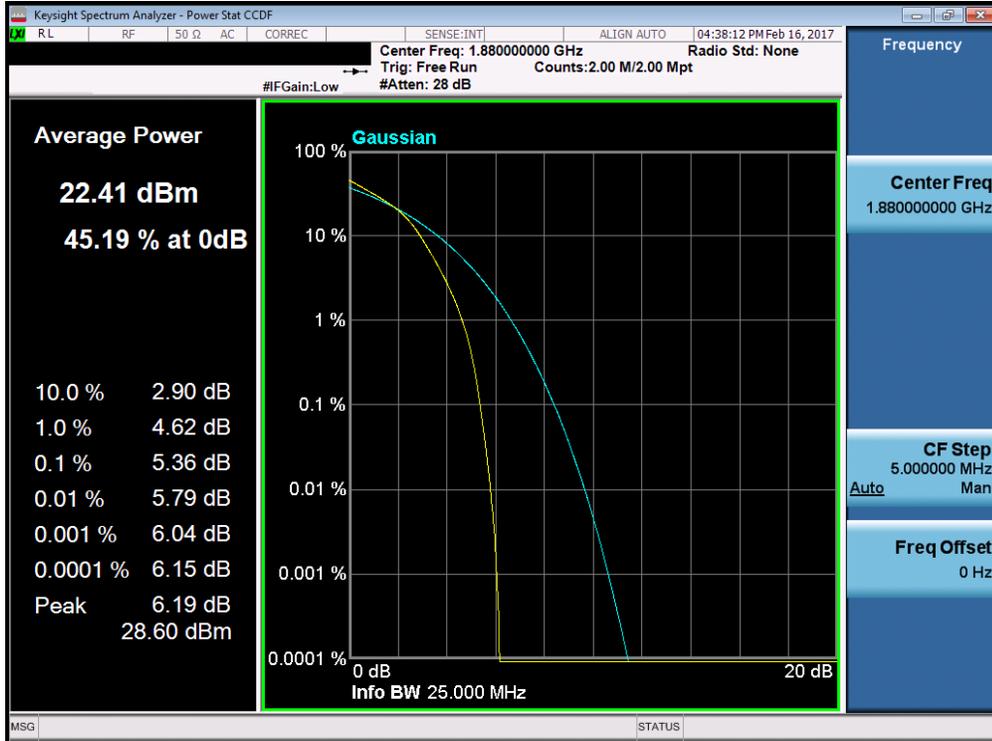


Plot 7-204. PAR Plot (Band 2 – 15.0MHz 64-QAM – RB Size 75)

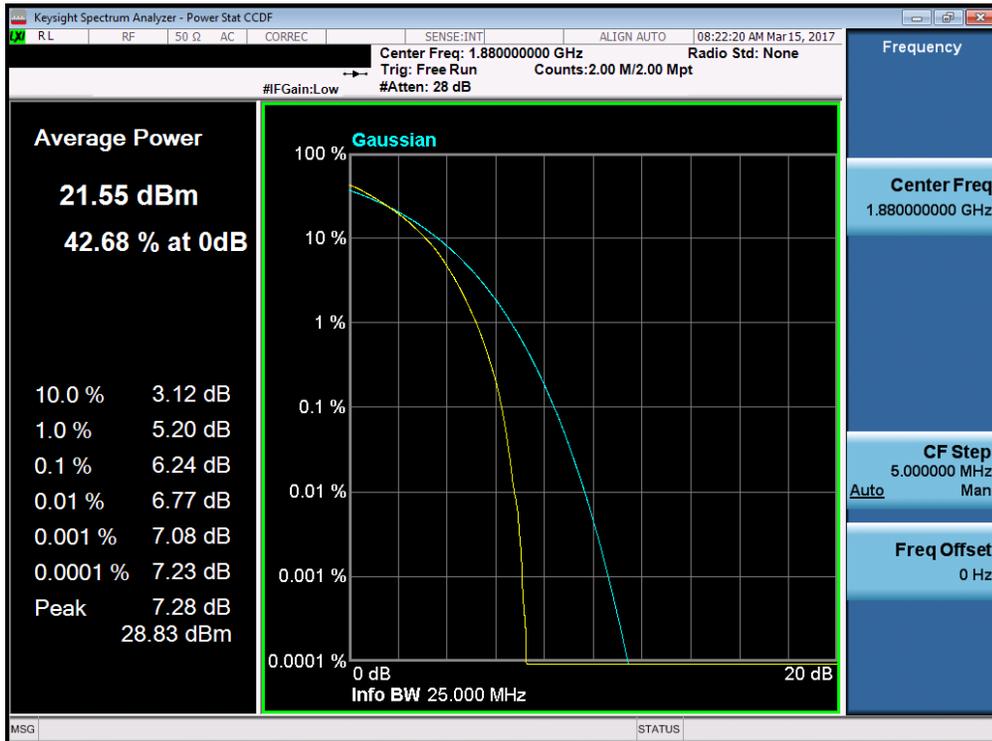


Plot 7-205. PAR Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 123 of 153



Plot 7-206. PAR Plot (Band 2 – 20.0MHz 16-QAM – RB Size 100)



Plot 7-207. PAR Plot (Band 2 – 20.0MHz 64-QAM – RB Size 100)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 124 of 153

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)

Test Overview

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

Test Procedures Used

KDB 971168 D01 v02r02 – Section 5.2.1

ANSI/TIA-603-D-2010 – 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: ZNFTP450		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset	Page 125 of 153	

Test Setup

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

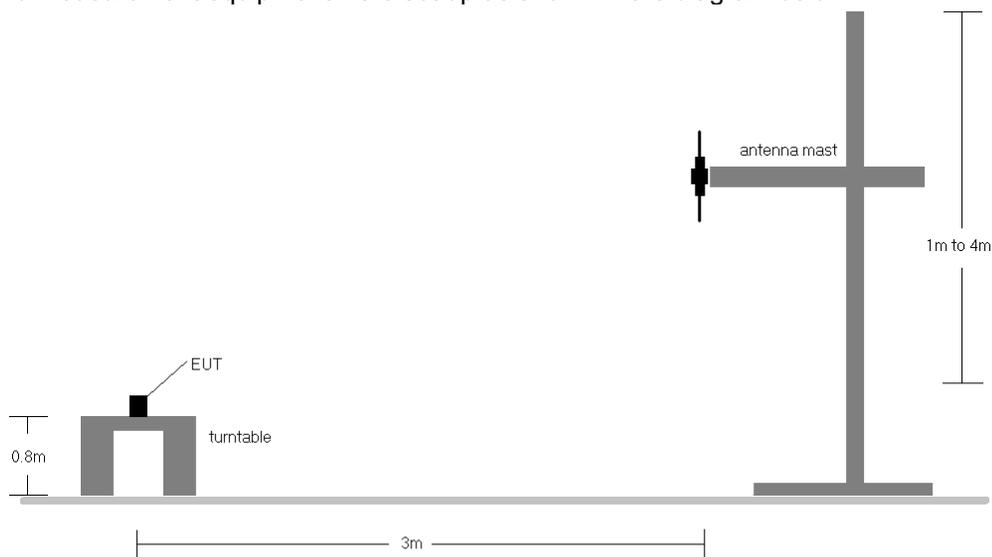


Figure 7-5. Radiated Test Setup <1GHz

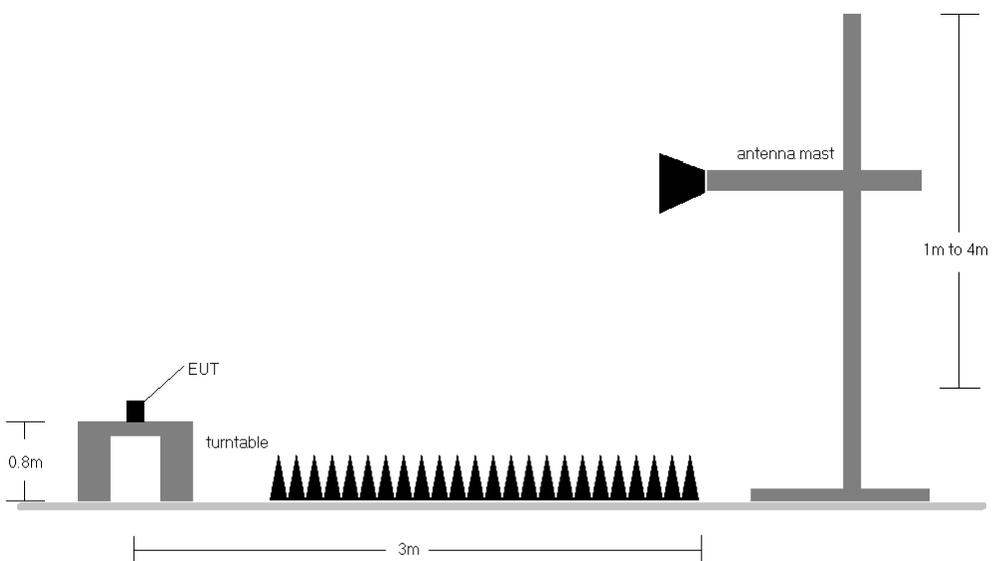


Figure 7-6. Radiated Test Setup >1GHz

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: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 126 of 153

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	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	V	128	23	1 / 0	15.58	2.85	18.43	34.77	-16.34
707.50	1.4	QPSK	V	132	9	1 / 0	16.26	2.99	19.25	34.77	-15.52
715.30	1.4	QPSK	V	136	20	1 / 0	16.93	3.06	19.99	34.77	-14.78
715.30	1.4	16-QAM	V	136	20	1 / 0	15.83	3.06	18.89	34.77	-15.88
715.30	1.4	64-QAM	V	136	20	1 / 0	14.92	3.06	17.98	34.77	-16.79
700.50	3	QPSK	V	100	177	1 / 0	16.13	2.85	18.98	34.77	-15.79
707.50	3	QPSK	V	100	185	1 / 0	17.16	2.99	20.15	34.77	-14.62
714.50	3	QPSK	V	100	175	1 / 0	17.00	3.05	20.05	34.77	-14.72
707.50	3	16-QAM	V	100	185	1 / 0	16.51	2.99	19.50	34.77	-15.27
707.50	3	64-QAM	V	100	185	1 / 0	15.58	2.99	18.57	34.77	-16.20

Table 7-2. ERP Data (Band 12)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
701.50	5	QPSK	V	167	245	1 / 0	15.84	2.88	18.72	34.77	-16.06
707.50	5	QPSK	V	167	250	1 / 0	17.10	2.99	20.09	34.77	-14.68
713.50	5	QPSK	V	168	239	1 / 0	17.18	3.04	20.22	34.77	-14.55
713.50	5	16-QAM	V	168	239	1 / 0	16.55	3.04	19.59	34.77	-15.18
713.50	5	64-QAM	V	168	239	1 / 0	15.63	3.04	18.67	34.77	-16.10
704.00	10	QPSK	V	167	240	1 / 0	15.88	2.94	18.82	34.77	-15.96
707.50	10	QPSK	V	168	239	1 / 49	17.06	2.99	20.05	34.77	-14.72
711.00	10	QPSK	V	168	235	1 / 0	16.03	3.02	19.05	34.77	-15.72
707.50	10	16-QAM	V	168	239	1 / 49	16.34	2.99	19.33	34.77	-15.44
707.50	10	64-QAM	V	168	239	1 / 49	15.42	2.99	18.41	34.77	-16.36
713.50	5.0	QPSK	H	132	9	1 / 0	16.31	2.56	18.87	34.77	-15.90

Table 7-3. ERP Data (Band 12/17)

FCC ID: ZNFTP450	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 127 of 153

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	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	V	129	53	3 / 2	14.47	5.36	19.83	38.45	-18.62
836.50	1.4	QPSK	V	129	53	3 / 2	16.44	5.15	21.59	38.45	-16.86
848.30	1.4	QPSK	V	129	53	1 / 0	14.72	5.16	19.88	38.45	-18.57
836.50	1.4	16-QAM	V	129	53	3 / 2	15.27	5.15	20.42	38.45	-18.03
836.50	1.4	64-QAM	V	129	53	3 / 2	13.82	5.15	18.97	38.45	-19.48
825.50	3	QPSK	V	150	163	1 / 0	15.14	5.35	20.49	38.45	-17.96
836.50	3	QPSK	V	125	176	1 / 14	16.41	5.15	21.56	38.45	-16.89
847.50	3	QPSK	V	141	138	1 / 0	16.68	5.14	21.82	38.45	-16.63
836.50	3	16-QAM	V	125	176	1 / 14	15.78	5.15	20.93	38.45	-17.52
836.50	3	64-QAM	V	125	176	1 / 14	14.22	5.15	19.37	38.45	-19.08
826.50	5	QPSK	V	136	60	1 / 24	15.46	5.34	20.80	38.45	-17.65
836.50	5	QPSK	V	133	119	1 / 24	17.05	5.15	22.20	38.45	-16.25
846.50	5	QPSK	V	136	139	1 / 0	16.53	5.13	21.66	38.45	-16.79
836.50	5	16-QAM	V	133	119	1 / 24	15.78	5.15	20.93	38.45	-17.52
836.50	5	64-QAM	V	133	119	1 / 24	14.37	5.15	19.52	38.45	-18.93
829.00	10	QPSK	V	123	53	1 / 49	15.61	5.30	20.91	38.45	-17.54
836.50	10	QPSK	V	130	139	1 / 49	16.32	5.15	21.47	38.45	-16.98
844.00	10	QPSK	V	129	53	1 / 0	16.22	5.11	21.33	38.45	-17.12
836.50	10	16-QAM	V	130	139	1 / 49	14.92	5.15	20.07	38.45	-18.38
836.50	10	64-QAM	V	130	139	1 / 49	13.74	5.15	18.89	38.45	-19.56
836.50	5	QPSK	H	204	25	1 / 0	15.16	5.14	20.30	38.45	-18.15

Table 7-4. ERP Data (Band 5)

FCC ID: ZNFTP450	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset	Page 128 of 153	

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	H	119	270	1 / 0	15.40	9.62	25.02	30.00	-4.98
1745.00	1.4	QPSK	H	119	270	1 / 0	15.17	9.43	24.60	30.00	-5.40
1779.30	1.4	QPSK	H	119	270	1 / 0	14.78	9.25	24.03	30.00	-5.97
1745.00	1.4	16-QAM	H	119	270	1 / 0	14.39	9.43	23.82	30.00	-6.18
1745.00	1.4	64-QAM	H	119	270	1 / 0	13.37	9.43	22.80	30.00	-7.20
1711.50	3	QPSK	H	115	270	1 / 14	15.57	9.62	25.19	30.00	-4.81
1745.00	3	QPSK	H	115	270	1 / 0	15.71	9.43	25.14	30.00	-4.86
1778.50	3	QPSK	H	115	270	1 / 0	14.69	9.26	23.95	30.00	-6.05
1745.00	3	16-QAM	H	115	270	1 / 0	14.49	9.43	23.92	30.00	-6.08
1745.00	3	64-QAM	H	115	270	1 / 0	13.50	9.43	22.93	30.00	-7.07
1712.50	5	QPSK	H	121	267	1 / 24	15.26	9.61	24.87	30.00	-5.13
1745.00	5	QPSK	H	119	269	1 / 24	15.42	9.43	24.85	30.00	-5.15
1777.50	5	QPSK	H	121	267	1 / 0	14.95	9.26	24.21	30.00	-5.79
1745.00	5	16-QAM	H	119	269	1 / 24	14.06	9.43	23.49	30.00	-6.51
1745.00	5	64-QAM	H	119	269	1 / 24	13.34	9.43	22.77	30.00	-7.23
1715.00	10	QPSK	H	121	268	1 / 49	15.57	9.60	25.17	30.00	-4.83
1745.00	10	QPSK	H	121	268	1 / 0	15.56	9.43	24.99	30.00	-5.01
1775.00	10	QPSK	H	121	268	1 / 0	14.39	9.28	23.67	30.00	-6.33
1745.00	10	16-QAM	H	121	268	1 / 0	14.24	9.43	23.67	30.00	-6.33
1745.00	10	64-QAM	H	121	268	1 / 0	13.31	9.43	22.74	30.00	-7.26
1717.50	15	QPSK	H	119	267	1 / 0	14.80	9.58	24.38	30.00	-5.62
1745.00	15	QPSK	H	119	267	1 / 0	15.43	9.43	24.86	30.00	-5.14
1772.50	15	QPSK	H	119	267	1 / 0	14.96	9.29	24.25	30.00	-5.75
1745.00	15	16-QAM	H	119	267	1 / 0	14.16	9.43	23.59	30.00	-6.41
1745.00	15	64-QAM	H	119	267	1 / 0	13.11	9.43	22.54	30.00	-7.46
1720.00	20	QPSK	H	119	268	1 / 0	15.11	9.57	24.68	30.00	-5.32
1745.00	20	QPSK	H	119	268	1 / 0	15.38	9.43	24.81	30.00	-5.19
1770.00	20	QPSK	H	119	268	1 / 0	14.85	9.30	24.15	30.00	-5.85
1745.00	20	16-QAM	H	119	268	1 / 0	14.29	9.43	23.72	30.00	-6.28
1745.00	20	64-QAM	H	119	268	1 / 0	13.61	9.43	23.04	30.00	-6.96
1711.50	3	QPSK	V	127	321	1 / 99	14.95	8.16	23.11	30.00	-6.89

Table 7-5. EIRP Data (Band 4/66)

FCC ID: ZNFTP450	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset	Page 129 of 153	

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1850.70	1.4	QPSK	H	104	266	3 / 2	15.41	9.12	24.53	33.01	-8.48
1880.00	1.4	QPSK	H	105	270	3 / 2	15.45	9.10	24.55	33.01	-8.46
1909.30	1.4	QPSK	H	104	269	3 / 2	15.01	9.16	24.17	33.01	-8.84
1880.00	1.4	16-QAM	H	105	270	3 / 2	14.39	9.10	23.49	33.01	-9.52
1880.00	1.4	64-QAM	H	105	270	3 / 2	13.61	9.10	22.71	33.01	-10.30
1851.50	3	QPSK	H	104	270	1 / 0	15.12	9.12	24.24	33.01	-8.77
1880.00	3	QPSK	H	104	272	1 / 14	15.59	9.10	24.69	33.01	-8.32
1908.50	3	QPSK	H	105	272	1 / 0	14.52	9.15	23.67	33.01	-9.34
1880.00	3	16-QAM	H	104	272	1 / 14	14.21	9.10	23.31	33.01	-9.70
1880.00	3	64-QAM	H	104	272	1 / 14	13.38	9.10	22.48	33.01	-10.53
1852.50	5	QPSK	H	105	197	1 / 24	15.78	9.12	24.90	33.01	-8.11
1880.00	5	QPSK	H	101	200	1 / 24	15.52	9.10	24.62	33.01	-8.39
1907.50	5	QPSK	H	100	200	1 / 24	14.60	9.15	23.75	33.01	-9.26
1852.50	5	16-QAM	H	105	197	1 / 24	14.52	9.12	23.64	33.01	-9.37
1852.50	5	64-QAM	H	105	197	1 / 24	13.42	9.12	22.54	33.01	-10.47
1855.00	10	QPSK	H	109	198	1 / 0	15.22	9.12	24.34	33.01	-8.67
1880.00	10	QPSK	H	100	199	1 / 0	15.49	9.10	24.59	33.01	-8.42
1905.00	10	QPSK	H	109	198	1 / 0	14.02	9.13	23.15	33.01	-9.86
1880.00	10	16-QAM	H	100	199	1 / 0	14.24	9.10	23.34	33.01	-9.67
1880.00	10	64-QAM	H	100	199	1 / 0	13.41	9.10	22.51	33.01	-10.50
1857.50	15	QPSK	H	100	199	1 / 74	14.98	9.11	24.09	33.01	-8.92
1880.00	15	QPSK	H	100	198	1 / 0	15.32	9.10	24.42	33.01	-8.59
1902.50	15	QPSK	H	100	198	1 / 0	14.23	9.11	23.34	33.01	-9.67
1880.00	15	16-QAM	H	100	198	1 / 0	14.13	9.10	23.23	33.01	-9.78
1880.00	15	64-QAM	H	100	198	1 / 0	13.14	9.10	22.24	33.01	-10.77
1860.00	20	QPSK	H	103	200	1 / 0	15.50	9.11	24.61	33.01	-8.40
1880.00	20	QPSK	H	103	200	1 / 0	15.30	9.10	24.40	33.01	-8.61
1900.00	20	QPSK	H	100	199	1 / 0	14.67	9.09	23.76	33.01	-9.25
1860.00	20	16-QAM	H	103	200	1 / 0	14.27	9.11	23.38	33.01	-9.63
1860.00	20	64-QAM	H	103	200	1 / 0	13.36	9.11	22.47	33.01	-10.54
1852.50	5	QPSK	V	101	271	1 / 99	14.98	8.99	23.97	33.01	-9.04

Table 7-6. EIRP Data (Band 2)

FCC ID: ZNFTP450	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset	Page 130 of 153	

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
2502.50	5	QPSK	V	100	36	1 / 0	11.55	8.39	19.94	33.01	-13.07
2535.00	5	QPSK	V	100	37	1 / 0	10.48	8.52	19.00	33.01	-14.01
2567.50	5	QPSK	V	100	41	1 / 0	8.37	8.64	17.01	33.01	-16.00
2502.50	5	16-QAM	V	100	36	1 / 0	10.37	8.39	18.76	33.01	-14.25
2502.50	5	64-QAM	V	100	36	1 / 0	9.43	8.39	17.82	33.01	-15.19
2505.00	10	QPSK	V	100	36	1 / 0	11.24	8.40	19.64	33.01	-13.37
2535.00	10	QPSK	V	102	219	1 / 49	9.99	8.52	18.51	33.01	-14.50
2565.00	10	QPSK	V	100	56	1 / 0	8.33	8.63	16.96	33.01	-16.05
2505.00	10	16-QAM	V	100	36	1 / 0	8.53	8.40	16.93	33.01	-16.08
2505.00	10	64-QAM	V	100	36	1 / 0	7.77	8.40	16.17	33.01	-16.84
2507.50	15	QPSK	V	100	37	1 / 0	9.85	8.41	18.26	33.01	-14.75
2535.00	15	QPSK	V	100	40	1 / 0	8.67	8.52	17.19	33.01	-15.82
2562.50	15	QPSK	V	100	40	1 / 0	7.26	8.62	15.88	33.01	-17.13
2507.50	15	16-QAM	V	100	37	1 / 0	8.29	8.41	16.70	33.01	-16.31
2507.50	15	64-QAM	V	100	37	1 / 0	7.53	8.41	15.94	33.01	-17.07
2510.00	20	QPSK	V	100	38	1 / 99	9.69	8.42	18.11	33.01	-14.90
2535.00	20	QPSK	V	100	38	1 / 0	9.29	8.52	17.81	33.01	-15.20
2560.00	20	QPSK	V	100	39	1 / 0	7.53	8.61	16.14	33.01	-16.87
2510.00	20	16-QAM	V	100	38	1 / 99	8.57	8.42	16.99	33.01	-16.02
2510.00	20	64-QAM	V	100	38	1 / 99	7.32	8.42	15.74	33.01	-17.27
2502.50	5	QPSK	H	106	90	1 / 0	8.17	8.50	16.67	33.01	-16.34

Table 7-7. EIRP Data (Band 7)

FCC ID: ZNFTP450	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 131 of 153

7.7 Radiated Spurious Emissions Measurements

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

Test Overview

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

Test Procedures Used

KDB 971168 D01 v02r02 – Section 5.8

ANSI/TIA-603-D-2010 – Section 2.2.12

Test Settings

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

FCC ID: ZNFTP450	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset	Page 132 of 153	

Test Setup

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

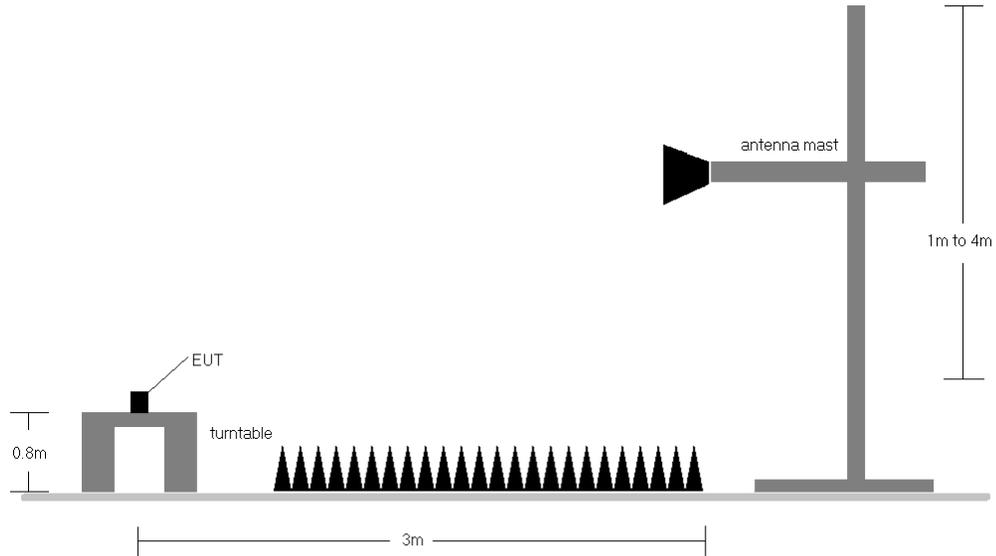


Figure 7-7. Test Instrument & Measurement Setup

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

FCC ID: ZNFTP450	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset	Page 133 of 153	

OPERATING FREQUENCY: 701.50 MHz
 CHANNEL: 23035
 MEASURED OUTPUT POWER: 18.72 dBm = 0.074 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 31.72 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]
1403.00	H	100	75	-68.33	5.92	-62.41	81.1
2104.50	H	100	94	-67.08	6.80	-60.28	79.0
2806.00	H	-	-	-71.56	8.12	-63.44	82.2

Table 7-8. Radiated Spurious Data (Band 12/17 – Low Channel)

OPERATING FREQUENCY: 707.50 MHz
 CHANNEL: 23095
 MEASURED OUTPUT POWER: 20.09 dBm = 0.102 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 33.09 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	100	71	-66.37	5.96	-60.40	80.5
2122.50	H	132	99	-62.89	6.84	-56.04	76.1
2830.00	H	-	-	-71.36	8.13	-63.23	83.3

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

FCC ID: ZNFTP450		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset	Page 134 of 153	

OPERATING FREQUENCY: 713.50 MHz
 CHANNEL: 23155
 MEASURED OUTPUT POWER: 20.22 dBm = 0.105 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 33.22 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]
1427.00	H	149	74	-67.44	6.01	-61.43	81.6
2140.50	H	160	50	-67.10	6.89	-60.21	80.4
2854.00	H	-	-	-71.17	8.15	-63.02	83.2

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

OPERATING FREQUENCY: 826.50 MHz
 CHANNEL: 20425
 MEASURED OUTPUT POWER: 20.80 dBm = 0.120 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 33.80 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]
1653.00	H	111	17	-68.97	6.28	-62.69	83.5
2479.50	H	193	119	-60.10	6.84	-53.25	74.1
3306.00	H	-	-	-67.62	7.14	-60.47	81.3

Table 7-11. Radiated Spurious Data (Band 5 – Low Channel)

FCC ID: ZNFTP450		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 135 of 153

OPERATING FREQUENCY: 836.50 MHz
 CHANNEL: 20525
 MEASURED OUTPUT POWER: 22.20 dBm = 0.166 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 35.20 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	117	23	-66.53	6.21	-60.32	82.5
2509.50	H	110	48	-54.55	6.86	-47.69	69.9
3346.00	H	-	-	-67.82	7.26	-60.55	82.8

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

OPERATING FREQUENCY: 846.50 MHz
 CHANNEL: 20625
 MEASURED OUTPUT POWER: 21.66 dBm = 0.147 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 34.66 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	100	38	-60.97	6.14	-54.83	76.5
2539.50	H	100	46	-54.54	6.95	-47.59	69.2
3386.00	H	-	-	-68.04	7.38	-60.66	82.3

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

FCC ID: ZNFTP450		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset	Page 136 of 153	

OPERATING FREQUENCY: 1711.50 MHz
 CHANNEL: 131987
 MEASURED OUTPUT POWER: 25.19 dBm = 0.330 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 3.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 38.19 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]
3423.00	H	101	347	-61.10	9.65	-51.45	76.6
5134.50	H	165	259	-55.25	10.91	-44.34	69.5
6846.00	H	-	-	-60.41	10.78	-49.63	74.8

Table 7-14. Radiated Spurious Data (Band 4/66 – Low Channel)

OPERATING FREQUENCY: 1745.00 MHz
 CHANNEL: 132322
 MEASURED OUTPUT POWER: 25.14 dBm = 0.327 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 3.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 38.14 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]
3490.00	H	143	69	-64.50	9.85	-54.65	79.8
5235.00	H	165	259	-62.41	10.88	-51.53	76.7
6980.00	H	-	-	-59.83	11.00	-48.83	74.0

Table 7-15. Radiated Spurious Data (Band 4/66 – Mid Channel)

FCC ID: ZNFTP450		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset	Page 137 of 153	

OPERATING FREQUENCY: 1778.50 MHz
 CHANNEL: 132657
 MEASURED OUTPUT POWER: 23.95 dBm = 0.248 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 3.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 36.95 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]
3557.00	H	143	69	-65.31	9.97	-55.34	79.3
5335.50	H	-	-	-66.59	11.05	-55.54	79.5
7114.00	H	-	-	-60.55	11.12	-49.43	73.4

Table 7-16. Radiated Spurious Data (Band 4/66 – High Channel)

OPERATING FREQUENCY: 1852.50 MHz
 CHANNEL: 18625
 MEASURED OUTPUT POWER: 24.90 dBm = 0.309 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 37.90 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]
3705.00	H	100	78	-66.97	10.01	-56.96	81.9
5557.50	H	-	-	-66.91	11.20	-55.72	80.6

Table 7-17. Radiated Spurious Data (Band 2 – Low Channel)

FCC ID: ZNFTP450		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset	Page 138 of 153	

OPERATING FREQUENCY: 1880.00 MHz
 CHANNEL: 18900
 MEASURED OUTPUT POWER: 24.62 dBm = 0.290 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 37.62 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	100	78	-66.82	9.79	-57.03	81.7
5640.00	H	-	-	-66.37	11.35	-55.02	79.6

Table 7-18. Radiated Spurious Data (Band 2 – Mid Channel)

OPERATING FREQUENCY: 1907.50 MHz
 CHANNEL: 19175
 MEASURED OUTPUT POWER: 23.75 dBm = 0.237 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 36.75 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]
3815.00	H	100	78	-66.76	9.57	-57.19	80.9
5722.50	H	-	-	-66.18	11.43	-54.75	78.5

Table 7-19. Radiated Spurious Data (Band 2 – High Channel)

FCC ID: ZNFTP450		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset	Page 139 of 153	

OPERATING FREQUENCY: 2502.50 MHz
 CHANNEL: 20775
 MEASURED OUTPUT POWER: 19.94 dBm = 0.099 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $55 + 10 \log_{10}(W)$ 44.94 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]
5005.00	V	101	8	-65.74	11.20	-54.55	74.5
7507.50	V	-	-	-57.95	11.20	-46.75	66.7

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

OPERATING FREQUENCY: 2535.00 MHz
 CHANNEL: 21100
 MEASURED OUTPUT POWER: 19.00 dBm = 0.079 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $55 + 10 \log_{10}(W)$ 44.00 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	V	104	19	-65.85	11.07	-54.79	73.8
7605.00	V	-	-	-59.90	11.49	-48.41	67.4

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

FCC ID: ZNFTP450		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset	Page 140 of 153	

OPERATING FREQUENCY: 2567.50 MHz
 CHANNEL: 21425
 MEASURED OUTPUT POWER: 17.01 dBm = 0.050 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $55 + 10 \log_{10}(W)$ 42.01 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]
5135.00	V	104	40	-63.89	10.94	-52.95	70.0
7702.50	V	-	-	-59.67	11.55	-48.12	65.1

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

FCC ID: ZNFTP450			FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 141 of 153	

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-D-2010. 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 $\pm 0.00025\%$ (± 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-D-2010

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: ZNFTP450	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset	Page 142 of 153	

Band 12/17 Frequency Stability Measurements
§2.1055 §27.54

OPERATING FREQUENCY: 707,500,000 Hz
 CHANNEL: 23790
 REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	707,500,344	344	0.0000486
100 %		- 30	707,499,728	-272	-0.0000384
100 %		- 20	707,500,090	90	0.0000127
100 %		- 10	707,500,024	24	0.0000034
100 %		0	707,500,455	455	0.0000643
100 %		+ 10	707,499,601	-399	-0.0000564
100 %		+ 20	707,499,608	-392	-0.0000554
100 %		+ 30	707,499,972	-28	-0.0000040
100 %		+ 40	707,500,021	21	0.0000030
100 %		+ 50	707,500,234	234	0.0000331
BATT. ENDPOINT	3.45	+ 20	707,499,738	-262	-0.0000370

Table 7-23. Frequency Stability Data (Band 12/17)

FCC ID: ZNFTP450	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 143 of 153

Band 12/17 Frequency Stability Measurements
§2.1055 §27.54

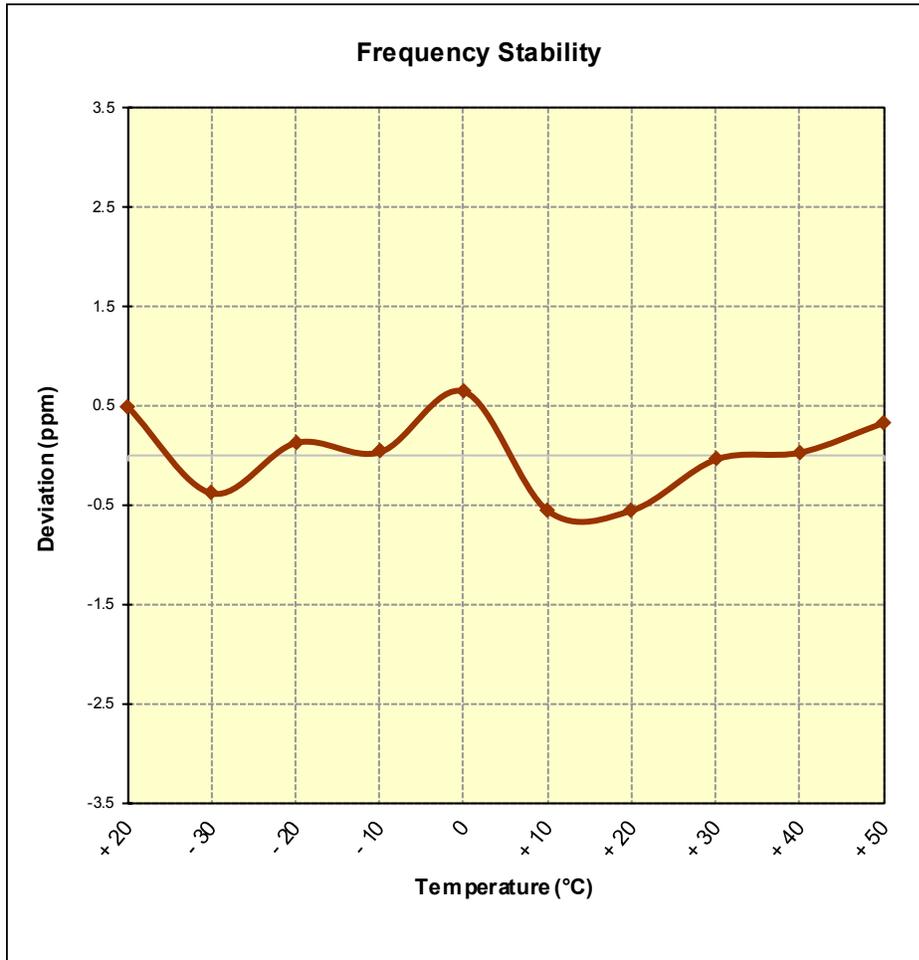


Figure 7-8. Frequency Stability Graph (Band 12/17)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 144 of 153

Band 5 Frequency Stability Measurements

§2.1055 §22.355

OPERATING FREQUENCY: 836,500,000 Hz
 CHANNEL: 20525
 REFERENCE VOLTAGE: 3.85 VDC
 DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	836,500,187	187	0.0000224
100 %		- 30	836,500,103	103	0.0000123
100 %		- 20	836,499,915	-85	-0.0000102
100 %		- 10	836,500,215	215	0.0000257
100 %		0	836,500,174	174	0.0000208
100 %		+ 10	836,499,976	-24	-0.0000029
100 %		+ 20	836,499,565	-435	-0.0000520
100 %		+ 30	836,499,976	-24	-0.0000029
100 %		+ 40	836,499,920	-80	-0.0000096
100 %		+ 50	836,499,920	-80	-0.0000096
BATT. ENDPOINT	3.45	+ 20	836,500,179	179	0.0000214

Table 7-24. Frequency Stability Data (Band 5)

FCC ID: ZNFTP450	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 145 of 153

Band 5 Frequency Stability Measurements
§2.1055 §22.355

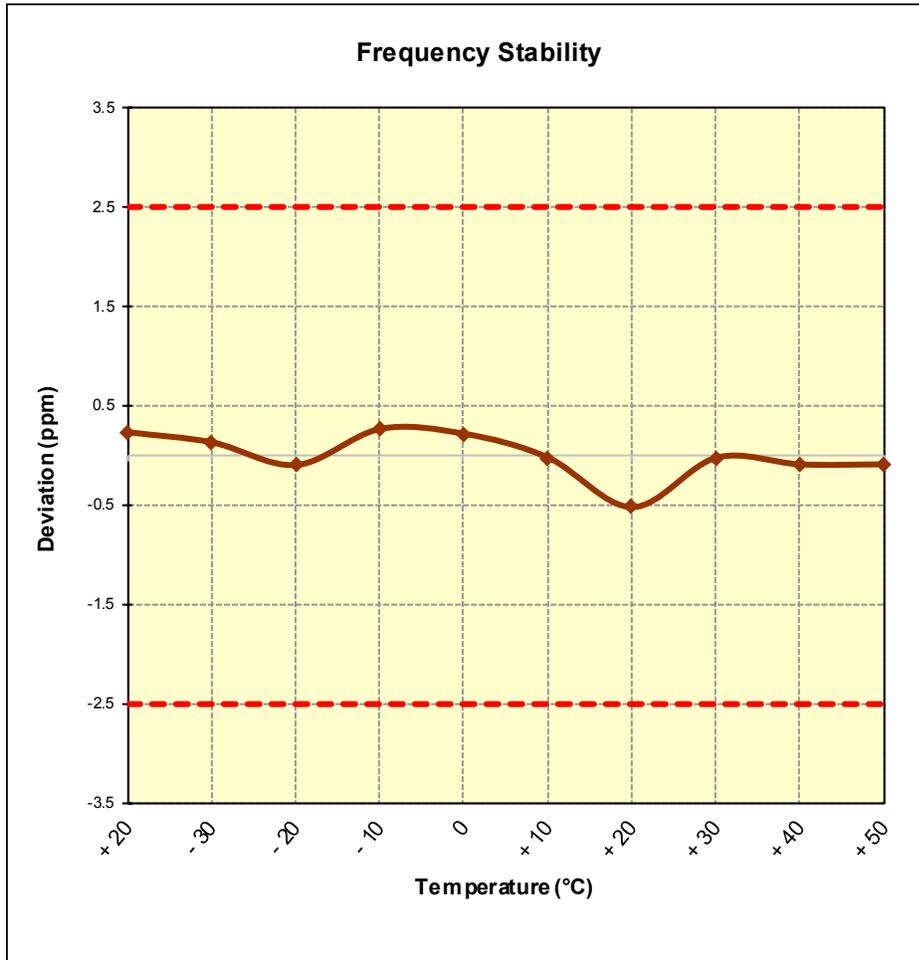


Figure 7-9. Frequency Stability Graph (Band 5)

FCC ID: ZNFTP450		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 146 of 153

Band 4/66 Frequency Stability Measurements
§2.1055 §§27.54

OPERATING FREQUENCY: 1,745,000,000 Hz
 CHANNEL: 132322
 REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,745,000,188	188	0.0000108
100 %		- 30	1,744,999,950	-50	-0.0000029
100 %		- 20	1,744,999,646	-354	-0.0000203
100 %		- 10	1,744,999,938	-62	-0.0000036
100 %		0	1,745,000,230	230	0.0000132
100 %		+ 10	1,744,999,623	-377	-0.0000216
100 %		+ 20	1,744,999,649	-351	-0.0000201
100 %		+ 30	1,745,000,054	54	0.0000031
100 %		+ 40	1,744,999,950	-50	-0.0000029
100 %		+ 50	1,744,999,772	-228	-0.0000131
BATT. ENDPOINT	3.45	+ 20	1,744,999,774	-226	-0.0000130

Table 7-25. Frequency Stability Data (Band 4/66)

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: ZNFTP450	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 147 of 153

Band 4/66 Frequency Stability Measurements
§2.1055 §§27.54

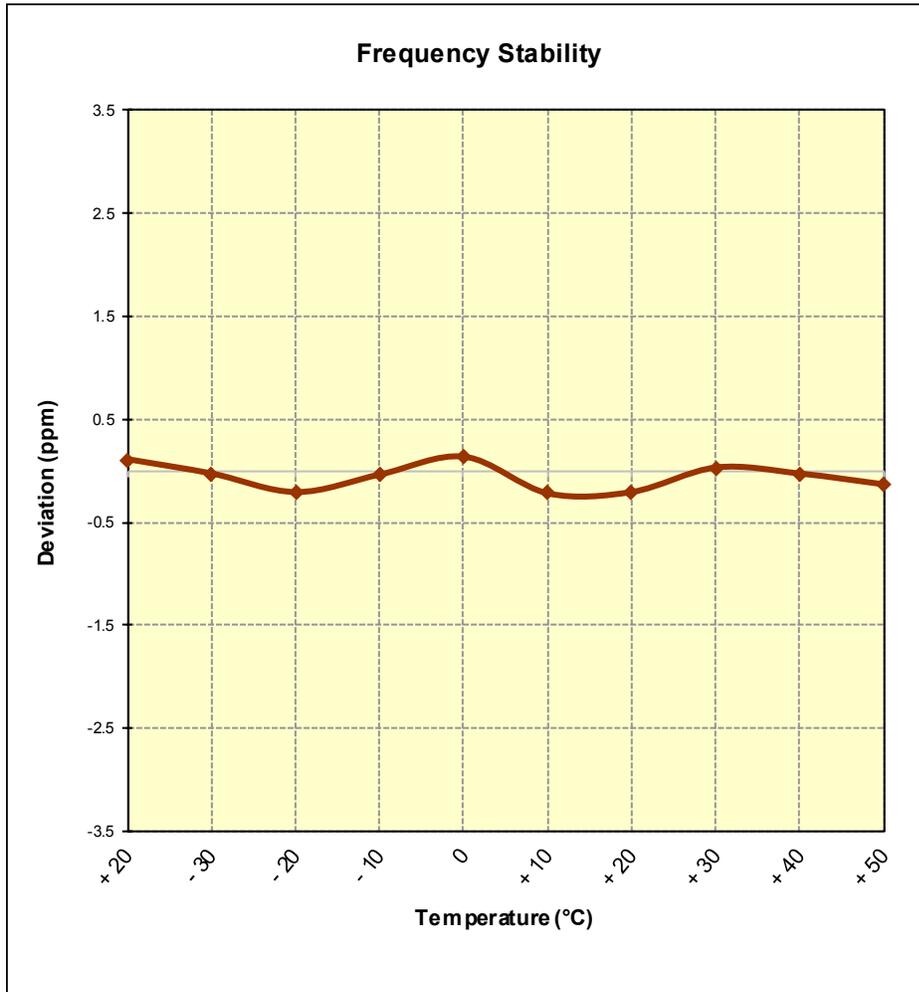


Figure 7-10. Frequency Stability Graph (Band 4/66)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 148 of 153

Band 2 Frequency Stability Measurements

§2.1055 §24.235

OPERATING FREQUENCY: 1,880,000,000 Hz
 CHANNEL: 18900
 REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,879,999,970	-30	-0.0000016
100 %		- 30	1,879,999,918	-82	-0.0000044
100 %		- 20	1,879,999,850	-150	-0.0000080
100 %		- 10	1,880,000,251	251	0.0000134
100 %		0	1,880,000,183	183	0.0000097
100 %		+ 10	1,879,999,781	-219	-0.0000116
100 %		+ 20	1,880,000,358	358	0.0000190
100 %		+ 30	1,879,999,791	-209	-0.0000111
100 %		+ 40	1,880,000,094	94	0.0000050
100 %		+ 50	1,880,000,254	254	0.0000135
BATT. ENDPOINT	3.45	+ 20	1,880,000,115	115	0.0000061

Table 7-26. 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: ZNFTP450	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 149 of 153

Band 2 Frequency Stability Measurements
§2.1055 §24.235

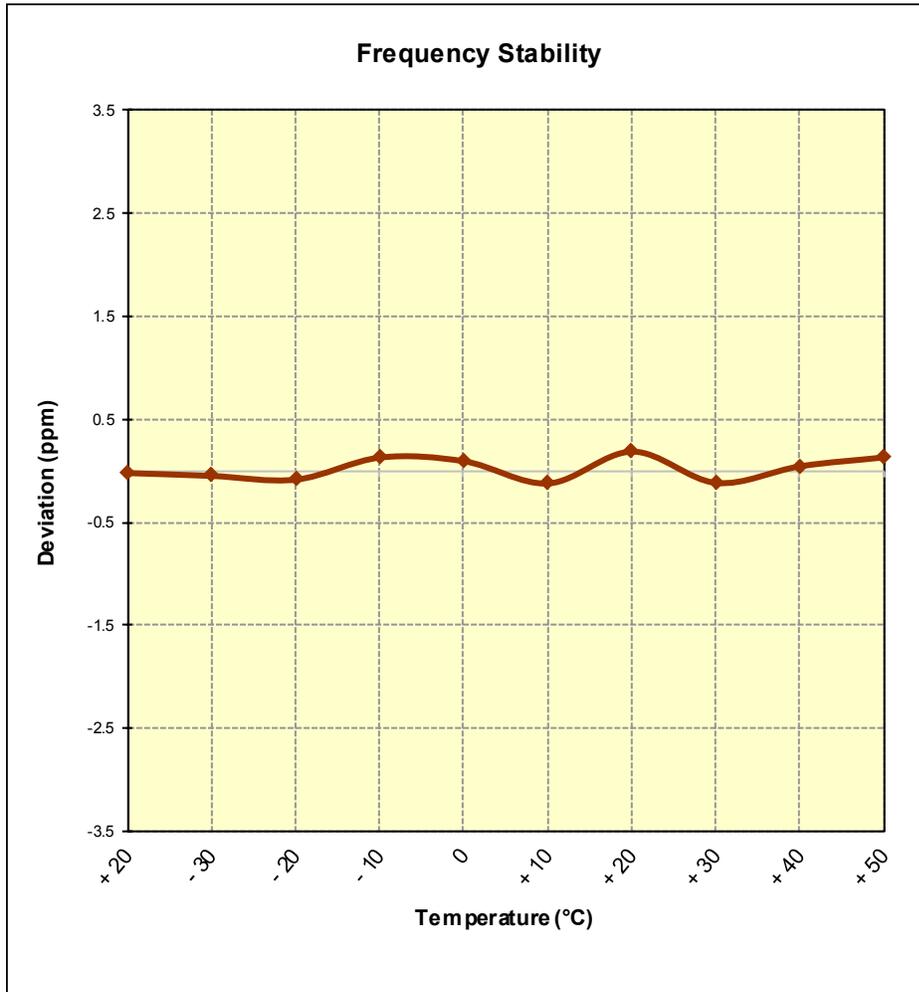


Figure 7-11. Frequency Stability Graph (Band 2)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 150 of 153

Band 7 Frequency Stability Measurements

§2.1055 §27.54

OPERATING FREQUENCY: 2,535,000,000 Hz
 CHANNEL: 21100
 REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	2,535,000,044	44	0.0000017
100 %		- 30	2,535,000,054	54	0.0000021
100 %		- 20	2,534,999,897	-103	-0.0000041
100 %		- 10	2,535,000,224	224	0.0000088
100 %		0	2,535,000,302	302	0.0000119
100 %		+ 10	2,534,999,668	-332	-0.0000131
100 %		+ 20	2,535,000,015	15	0.0000006
100 %		+ 30	2,535,000,049	49	0.0000019
100 %		+ 40	2,535,000,050	50	0.0000020
100 %		+ 50	2,535,000,110	110	0.0000043
BATT. ENDPOINT	3.45	+ 20	2,535,000,191	191	0.0000075

Table 7-27. 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: ZNFTP450	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 151 of 153

Band 7 Frequency Stability Measurements
§2.1055 §27.54

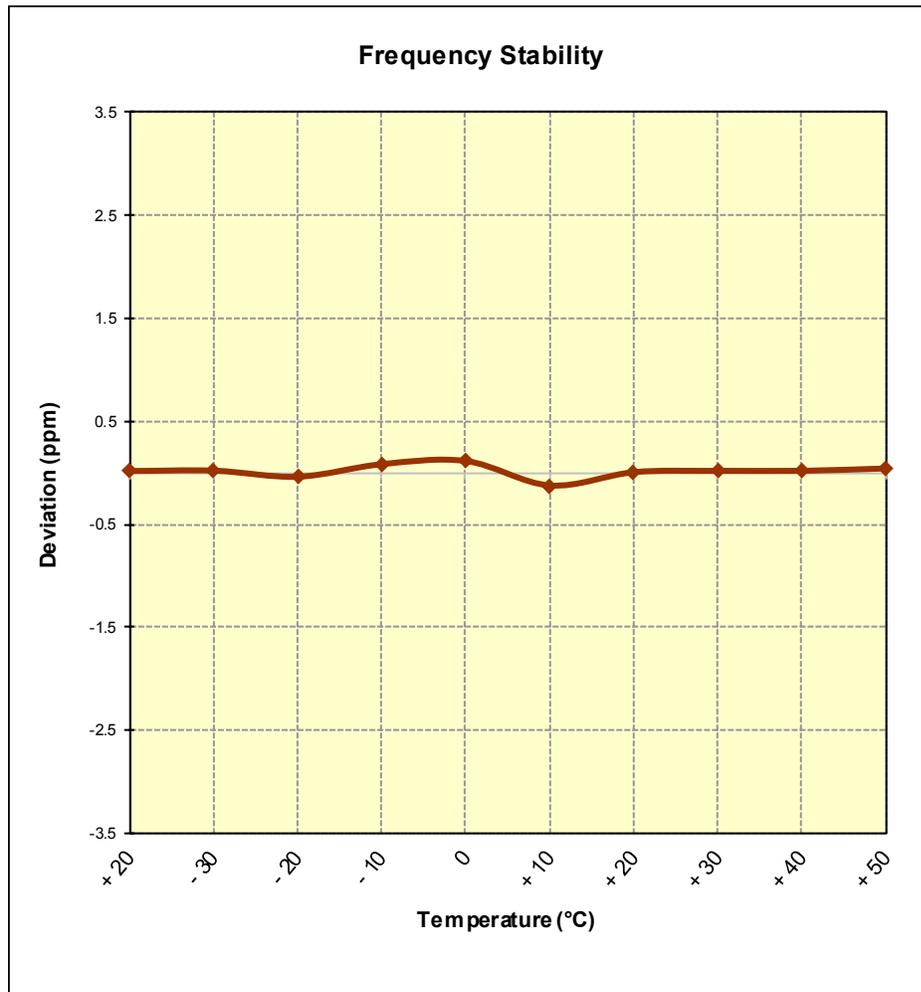


Figure 7-12. Frequency Stability Graph (Band 7)

FCC ID: ZNFTP450	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset		Page 152 of 153

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset** **FCC ID: ZNFTP450** complies with all the requirements of Parts 22, 24, & 27 of the FCC rules for LTE operation only.

FCC ID: ZNFTP450		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1703010081-03.ZNF	Test Dates: 2/6-3/21/2017	EUT Type: Portable Handset	Page 153 of 153	