

## 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 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.

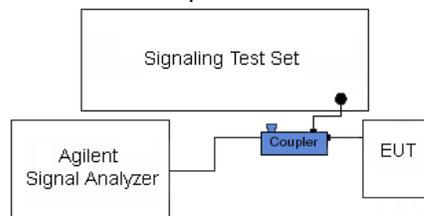


Figure 7-3. Test Instrument & Measurement Setup

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Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset	Page 68 of 150	

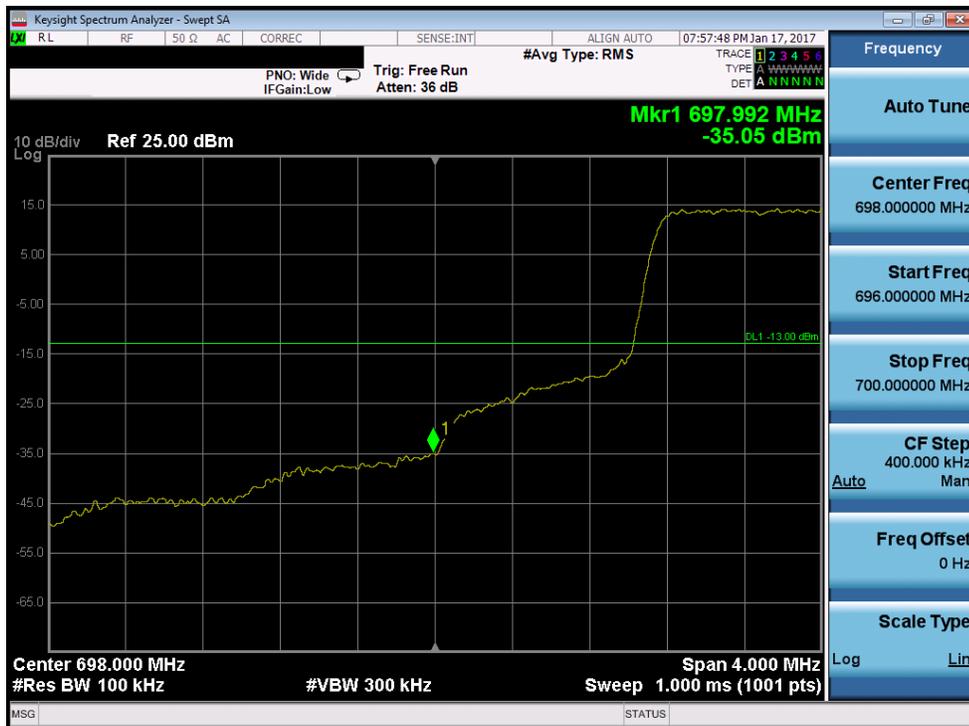
### Test Notes

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.

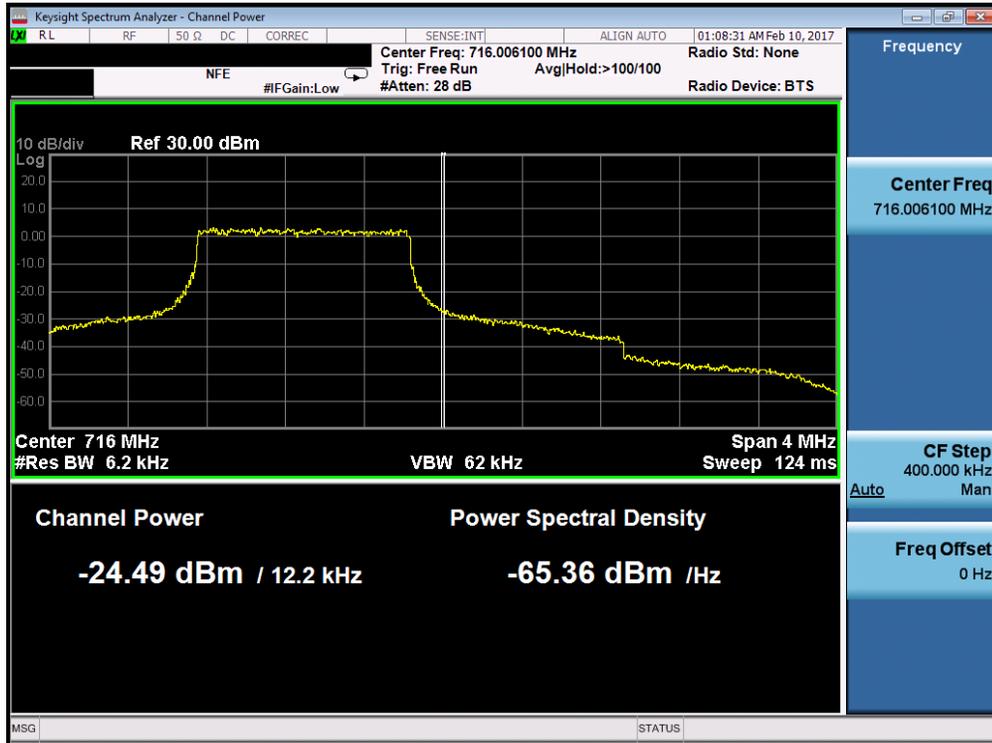
Per 27.53(a)(5) in the 1 MHz bands immediately outside and adjacent to the channel blocks at 2305, 2310, 2315, 2320, 2345, 2350, 2355, and 2360 MHz, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution 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.

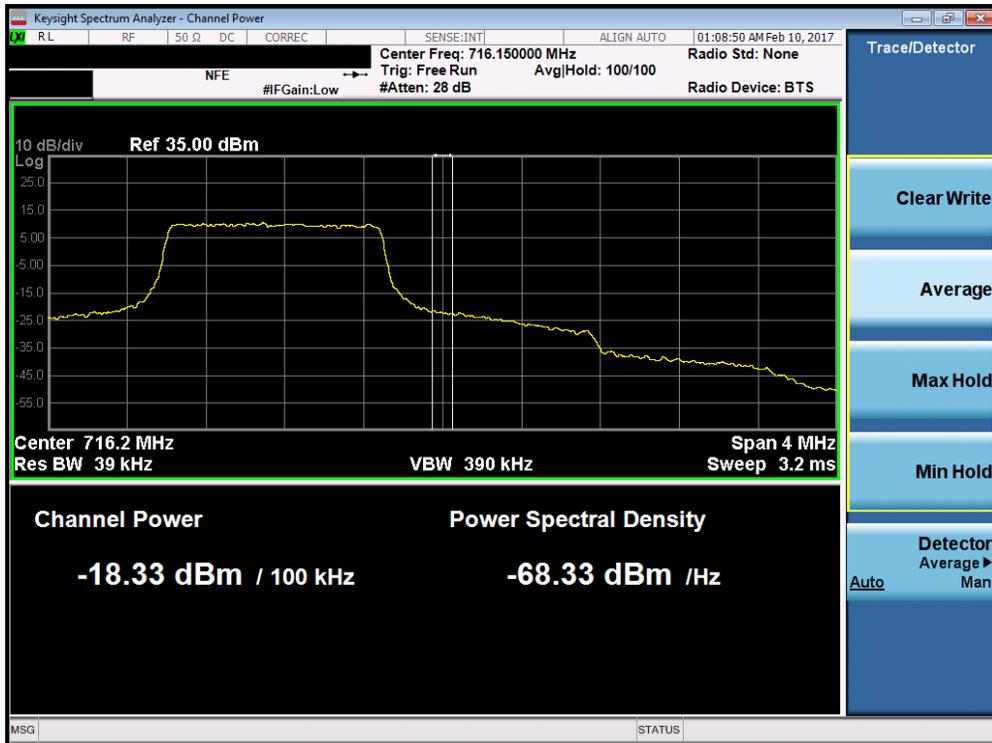


Plot 7-101. Lower Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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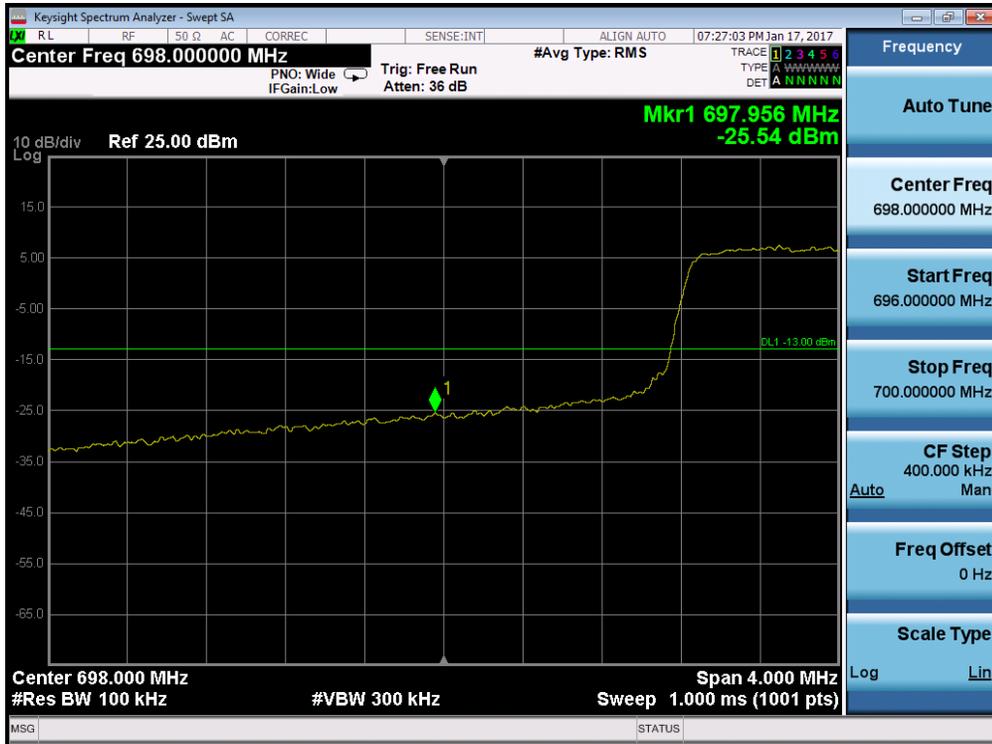
Plot 7-102. Upper Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)



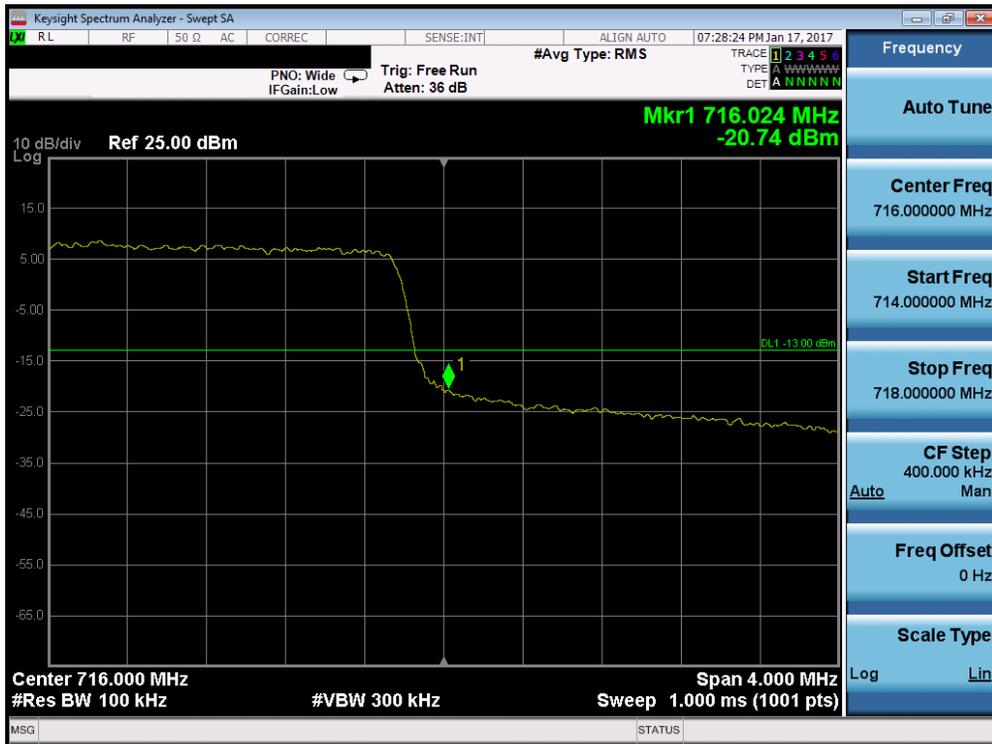
Plot 7-103. Upper Extended Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Plot 7-106. Lower Band Edge Plot (Band 12/17 – 5.0MHz QPSK – RB Size 25)

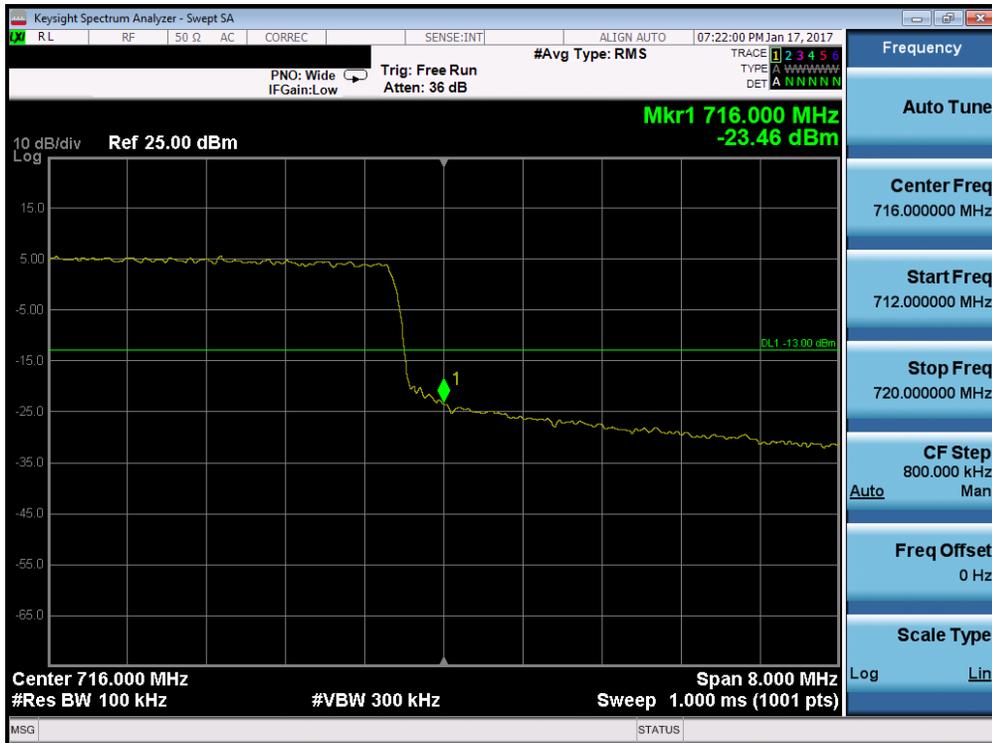


Plot 7-107. Upper Band Edge Plot (Band 12/17 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 72 of 150

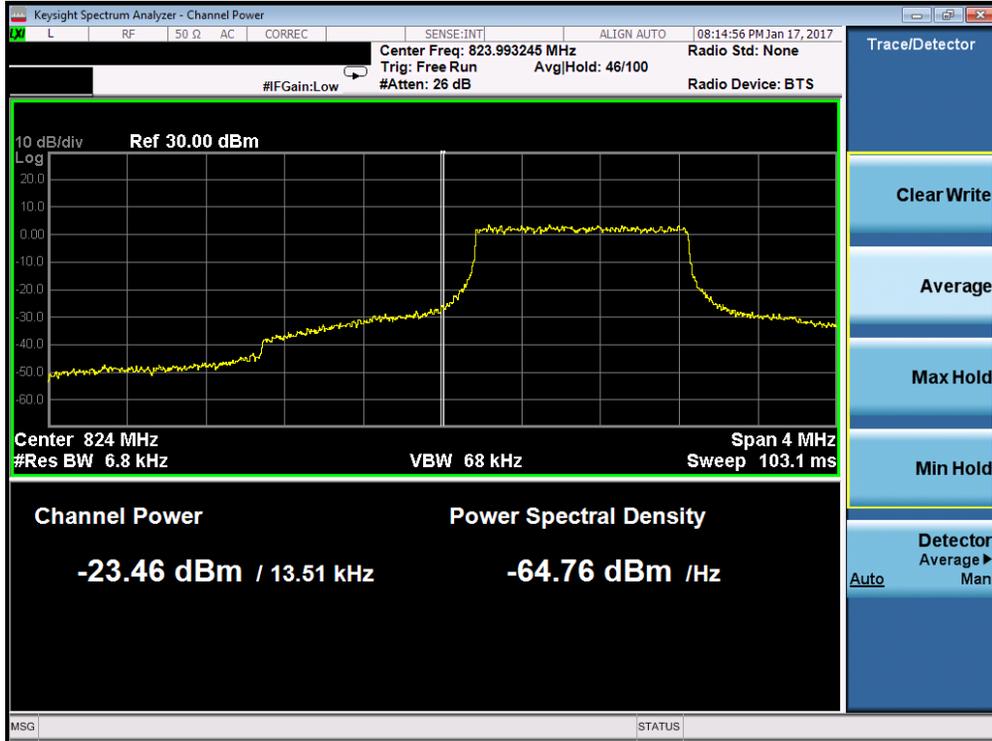


Plot 7-108. Lower Band Edge Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)



Plot 7-109. Upper Band Edge Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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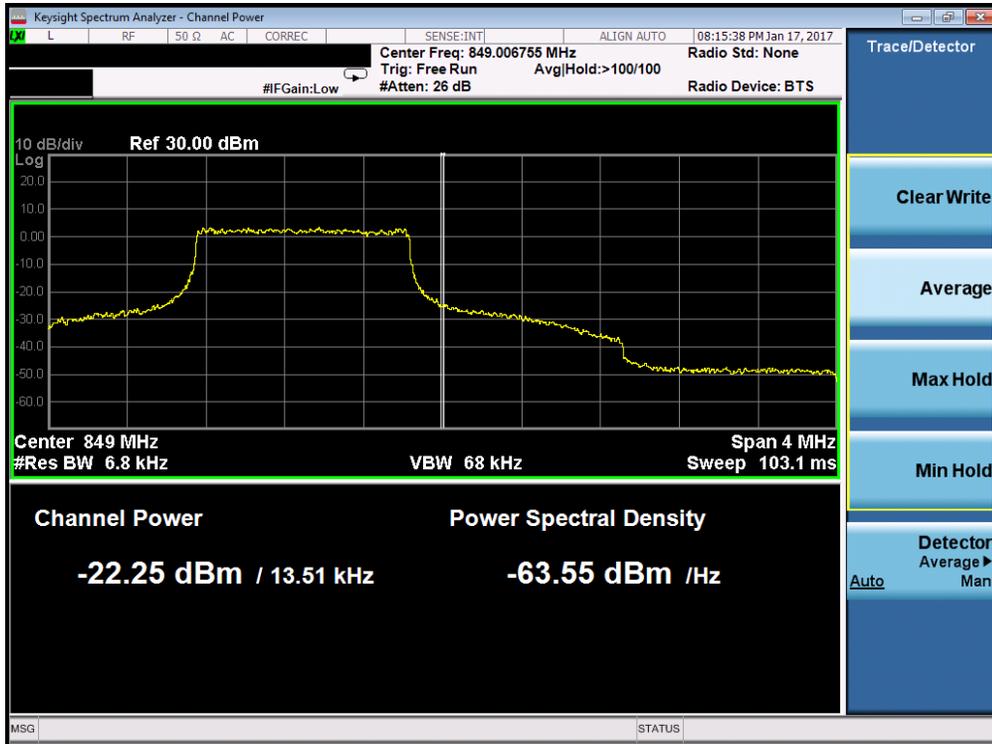


Plot 7-110. Lower Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)



Plot 7-111. Lower Extended Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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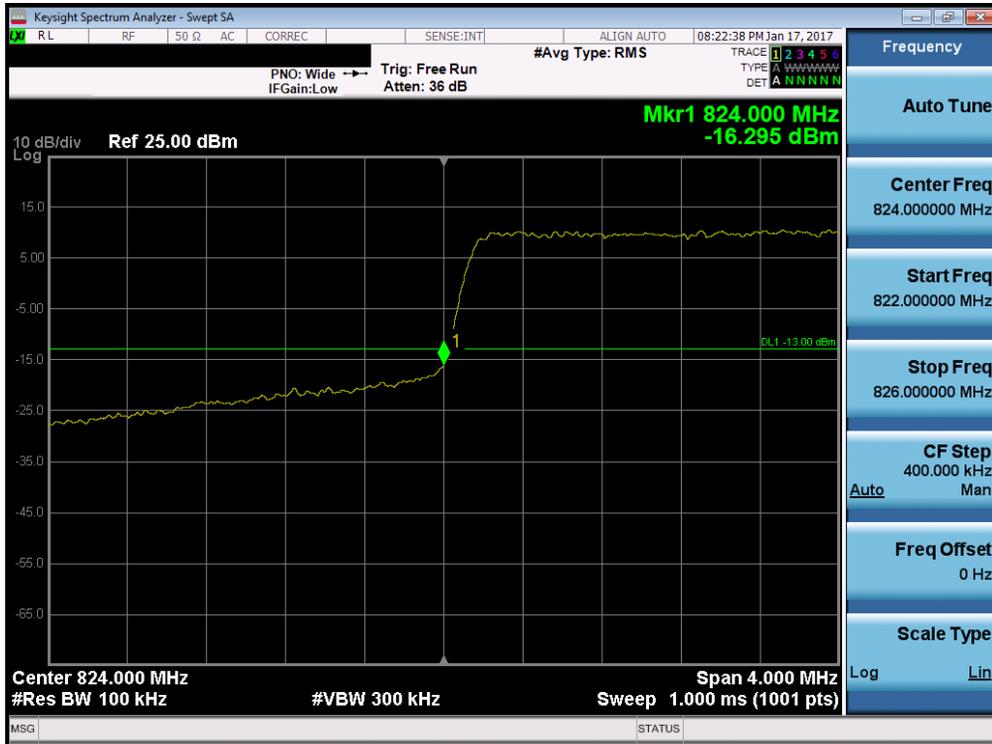


Plot 7-112. Upper Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)



Plot 7-113. Upper Extended Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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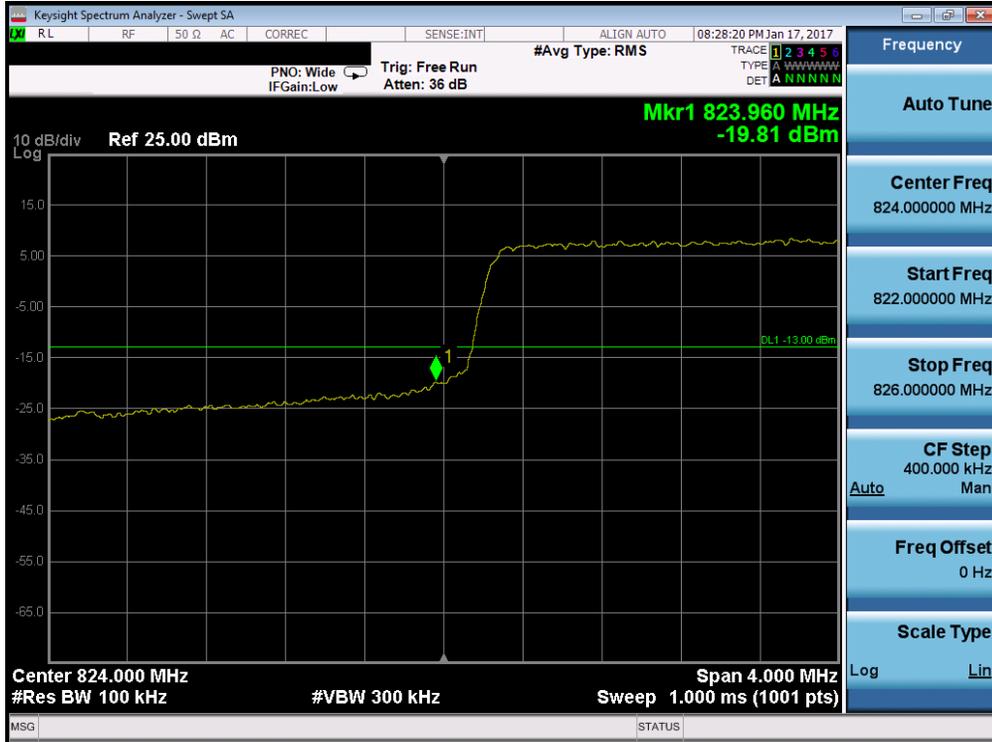


Plot 7-114. Lower Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

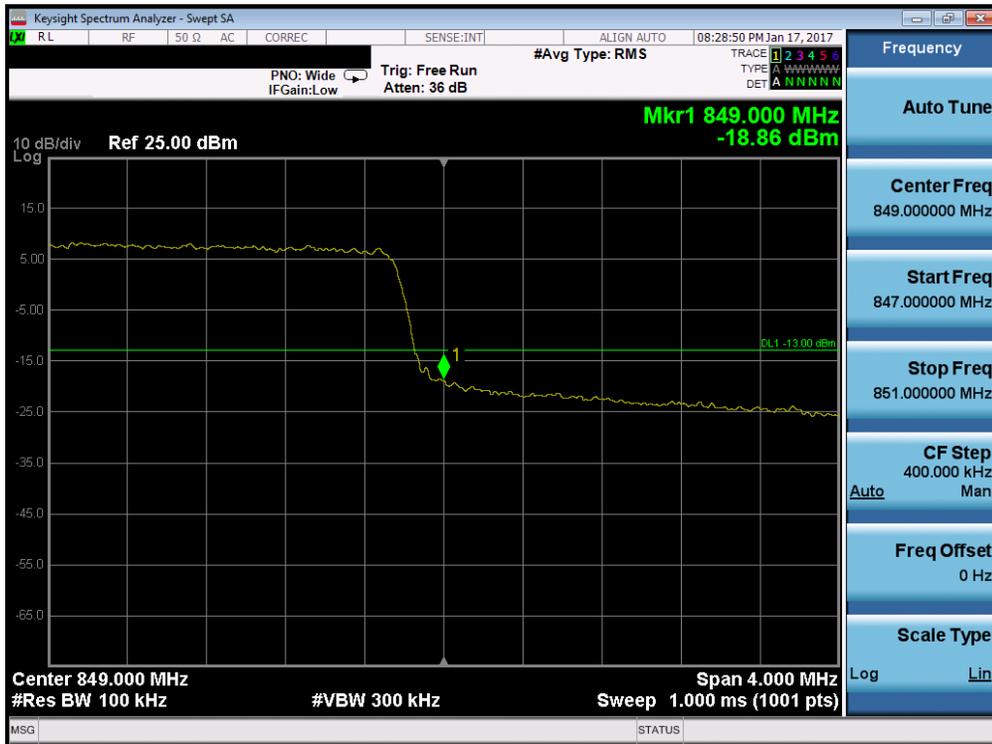


Plot 7-115. Upper Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 76 of 150

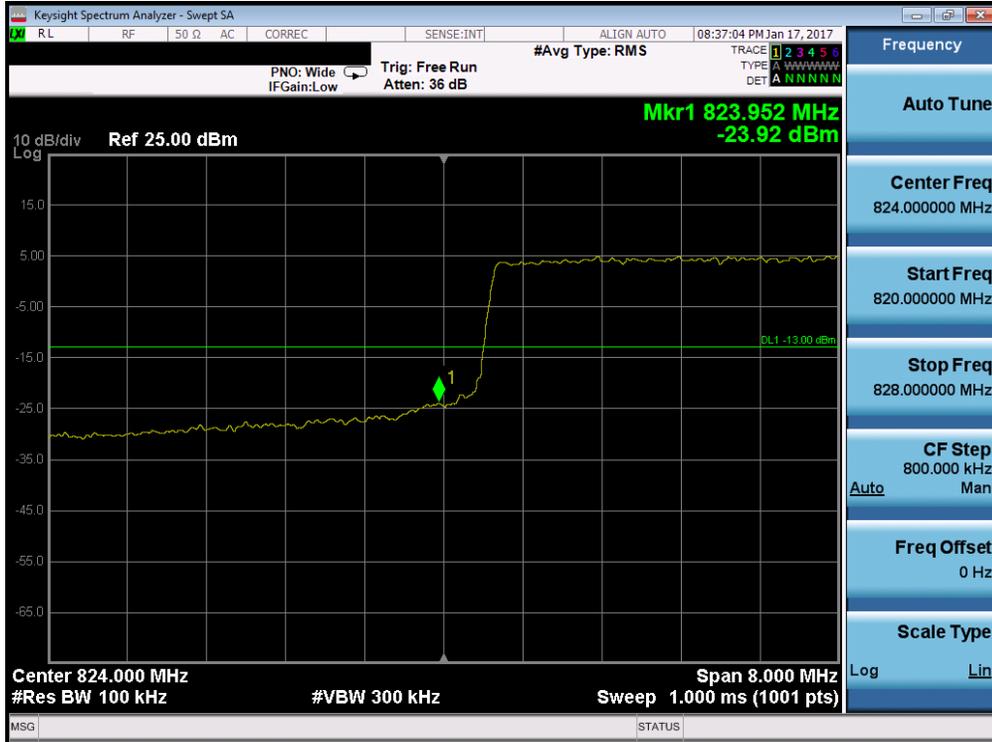


Plot 7-116. Lower Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)



Plot 7-117. Upper Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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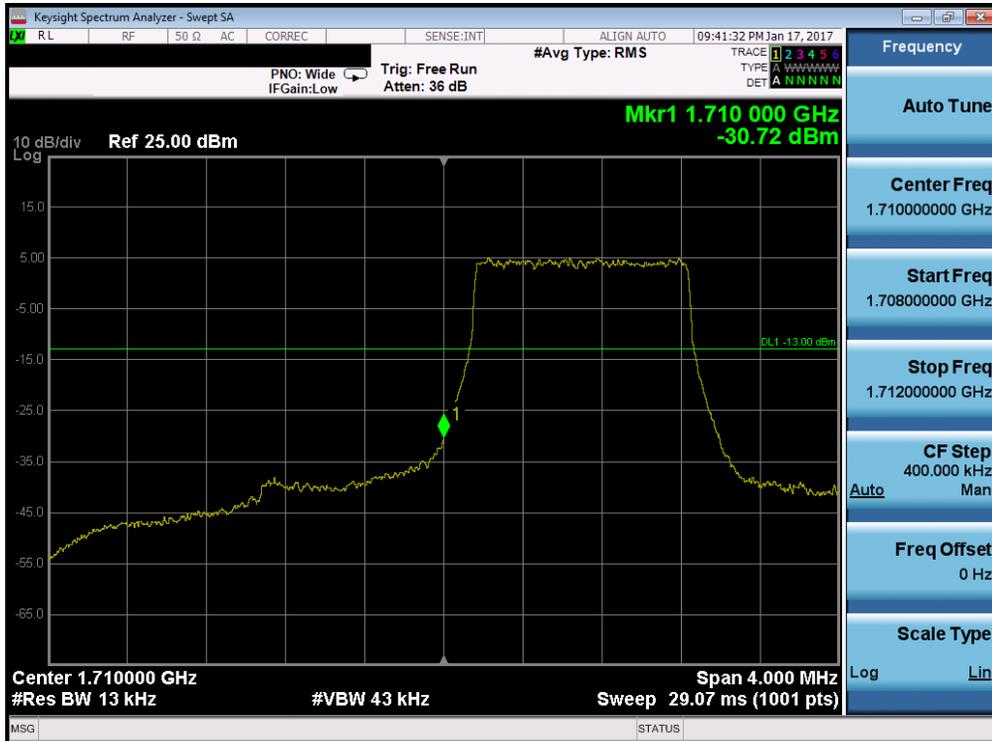


Plot 7-118. Lower Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

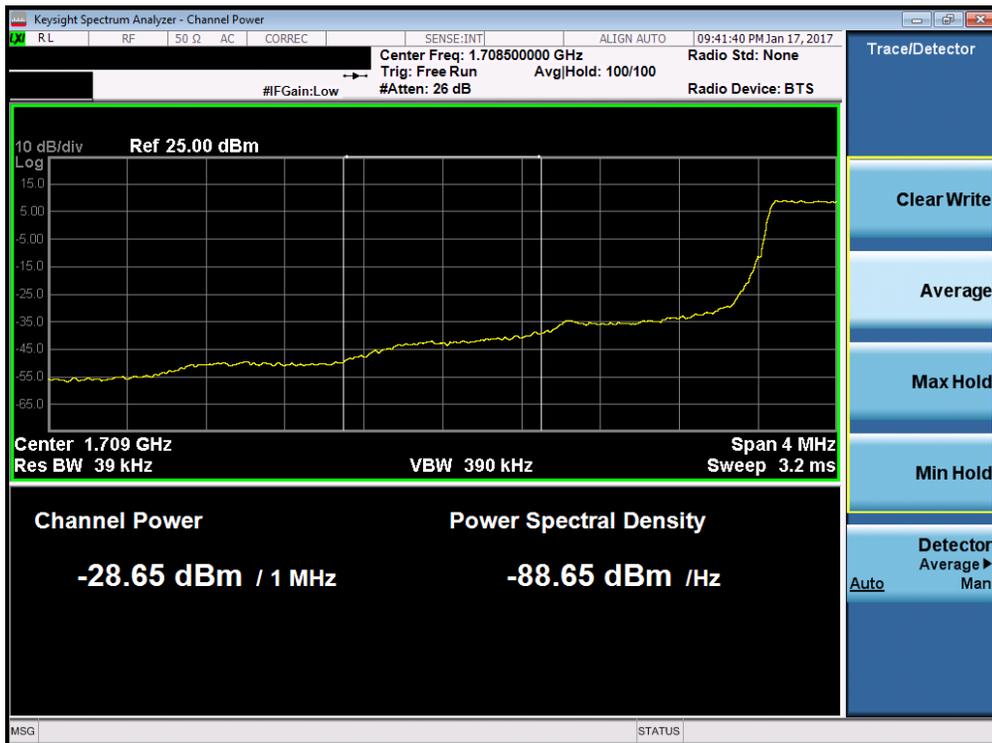


Plot 7-119. Upper Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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Plot 7-120. Lower Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

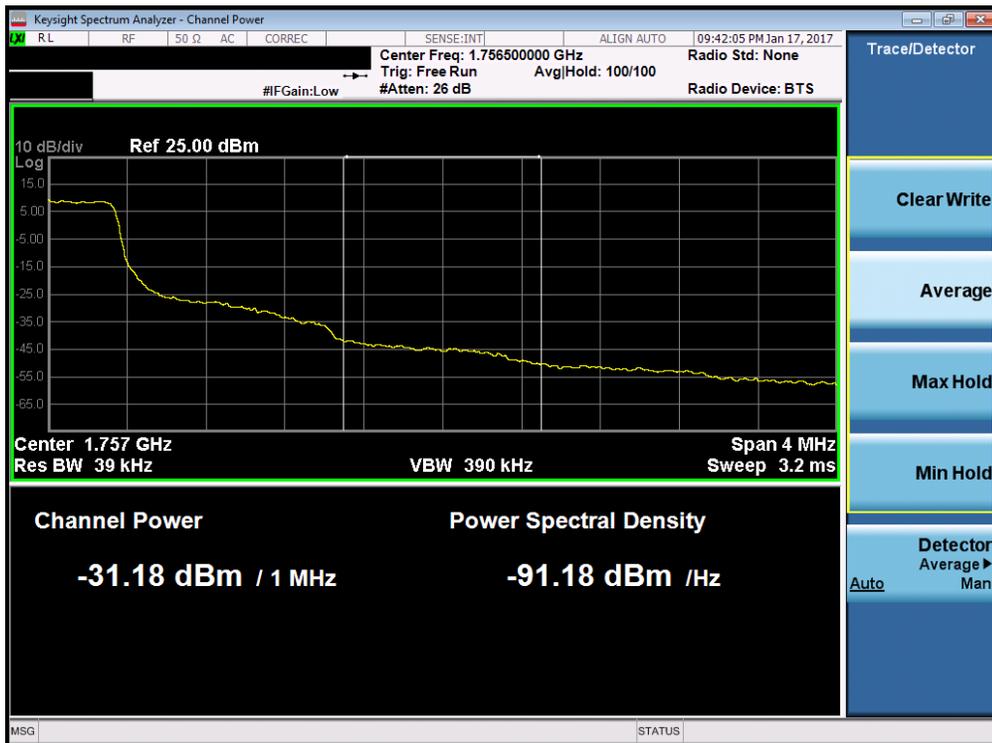


Plot 7-121. Lower Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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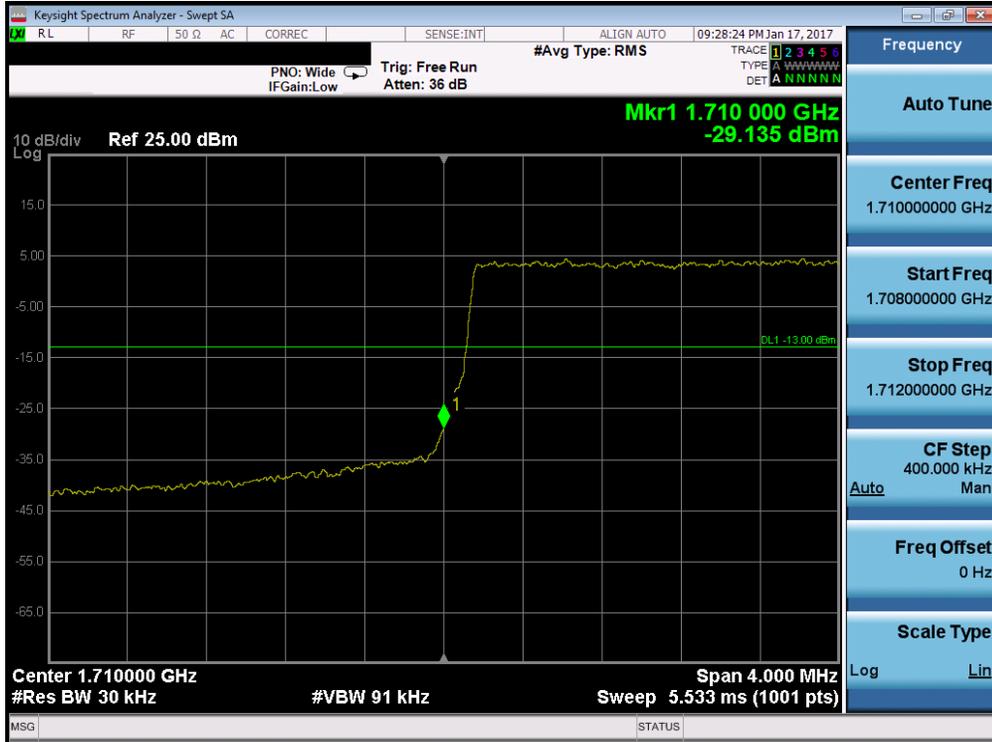


Plot 7-122. Upper Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

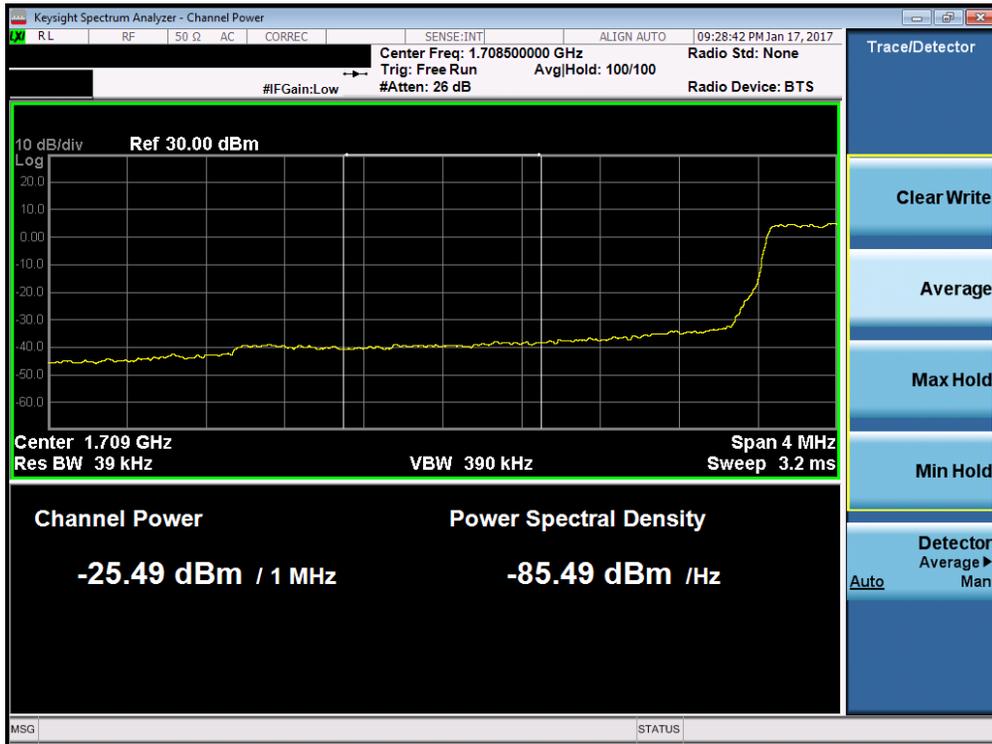


Plot 7-123. Upper Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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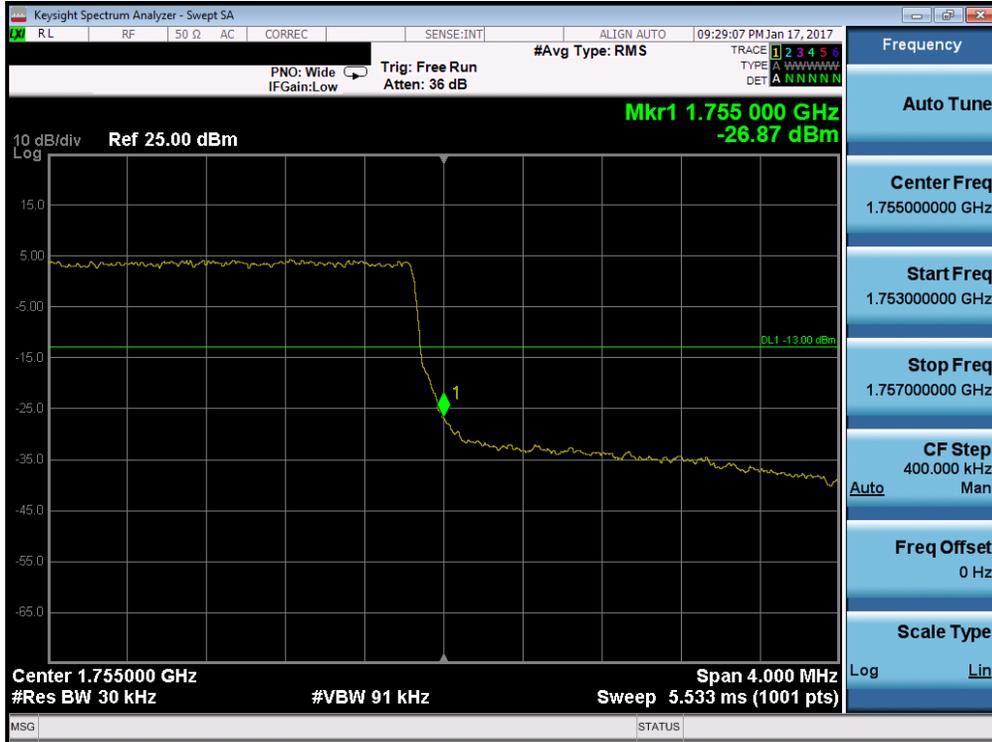


Plot 7-124. Lower Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

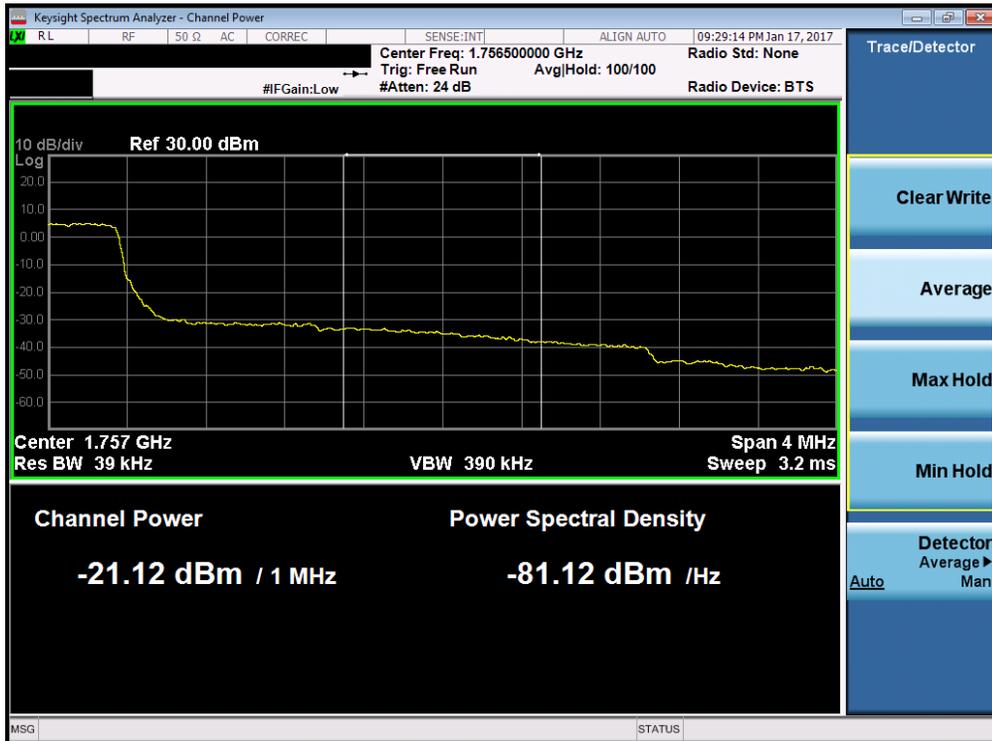


Plot 7-125. Lower Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 81 of 150

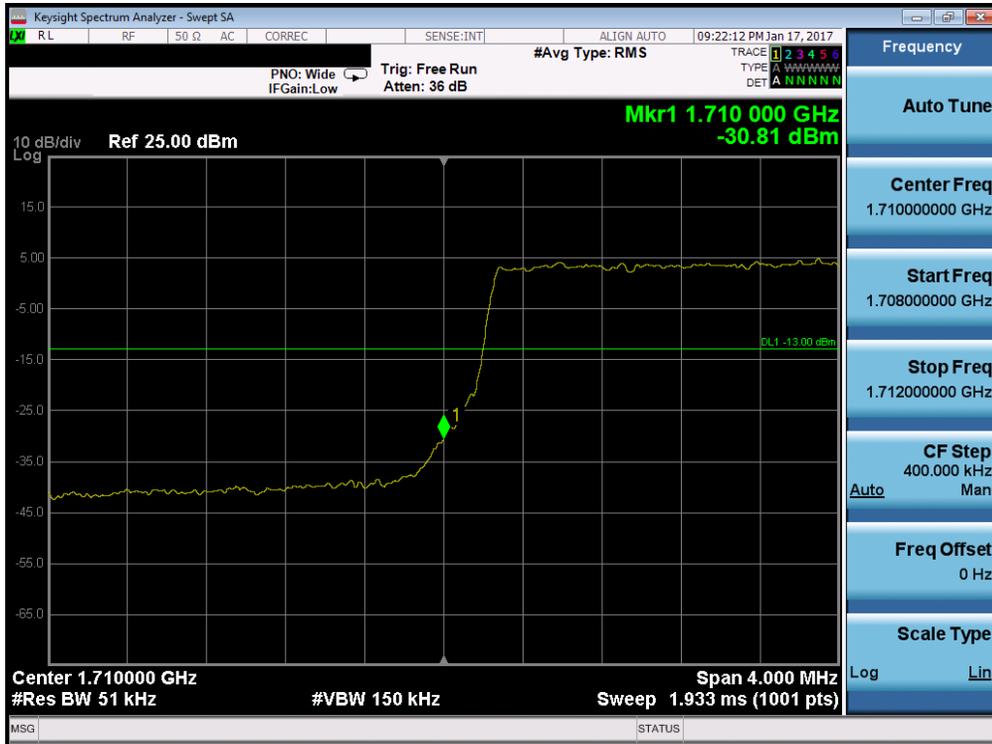


Plot 7-126. Upper Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

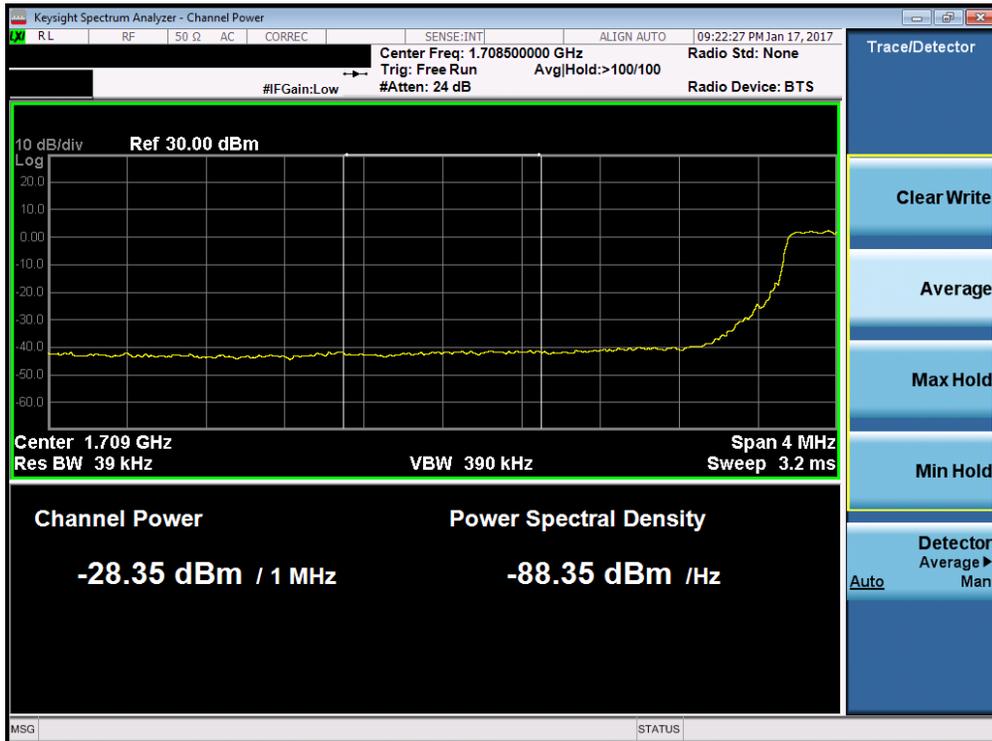


Plot 7-127. Upper Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 82 of 150

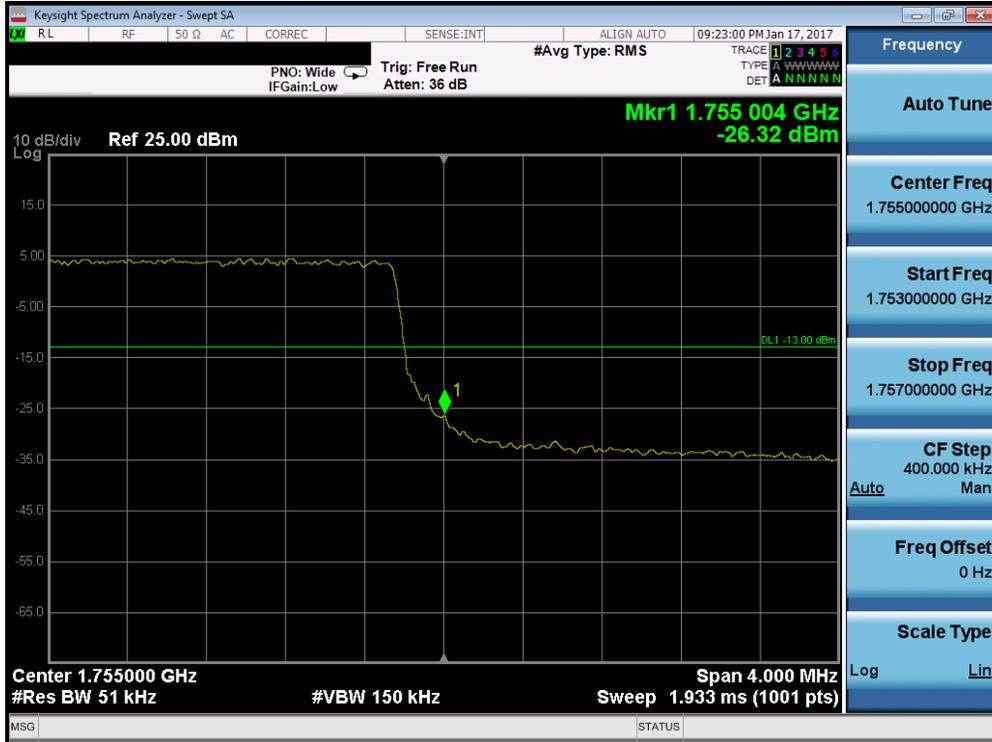


Plot 7-128. Lower Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

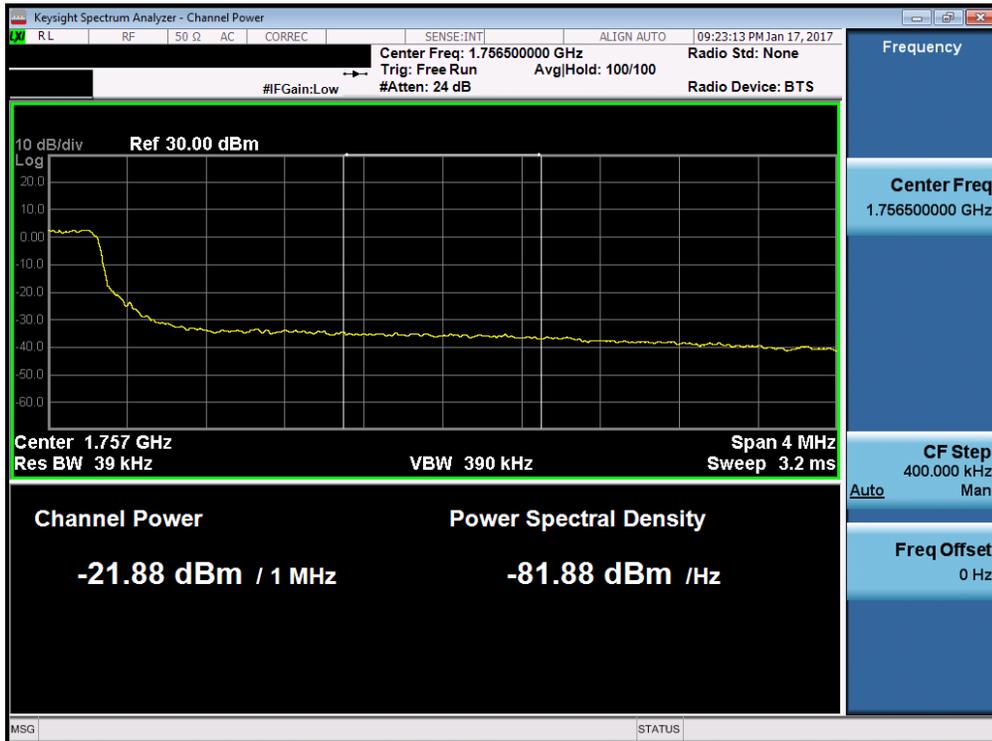


Plot 7-129. Lower Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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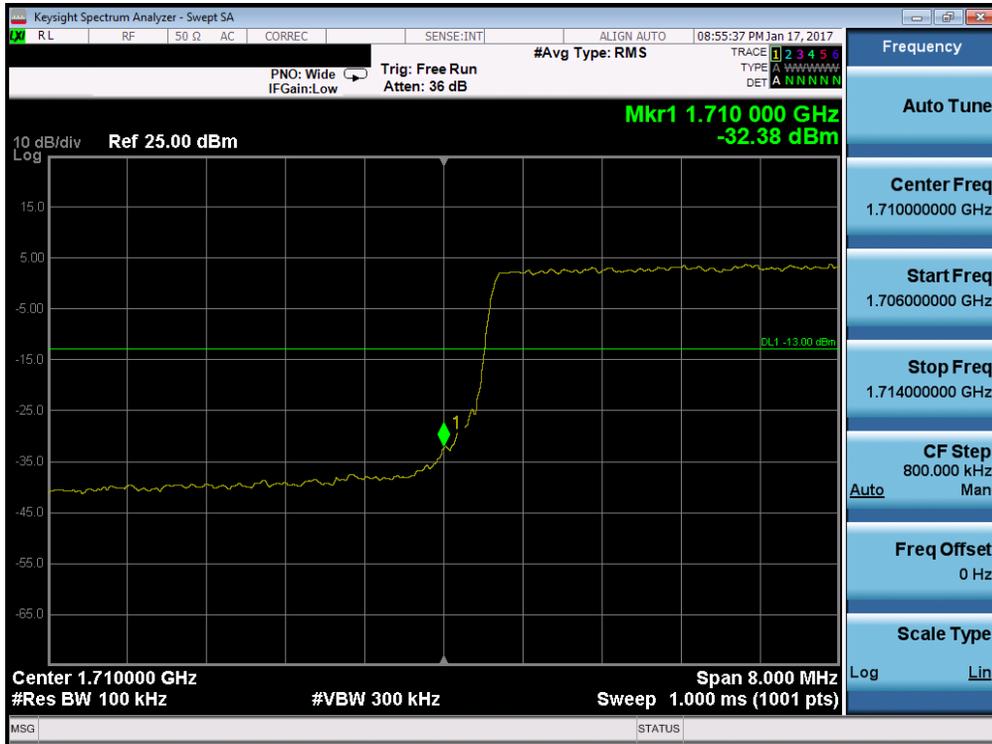


Plot 7-130. Upper Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

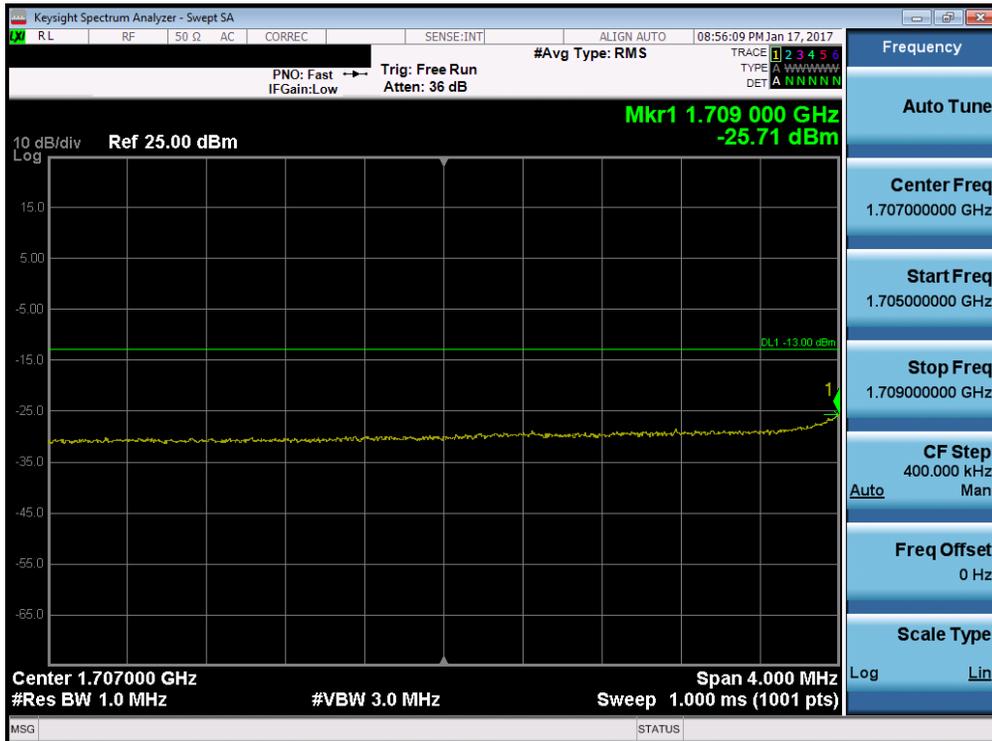


Plot 7-131. Upper Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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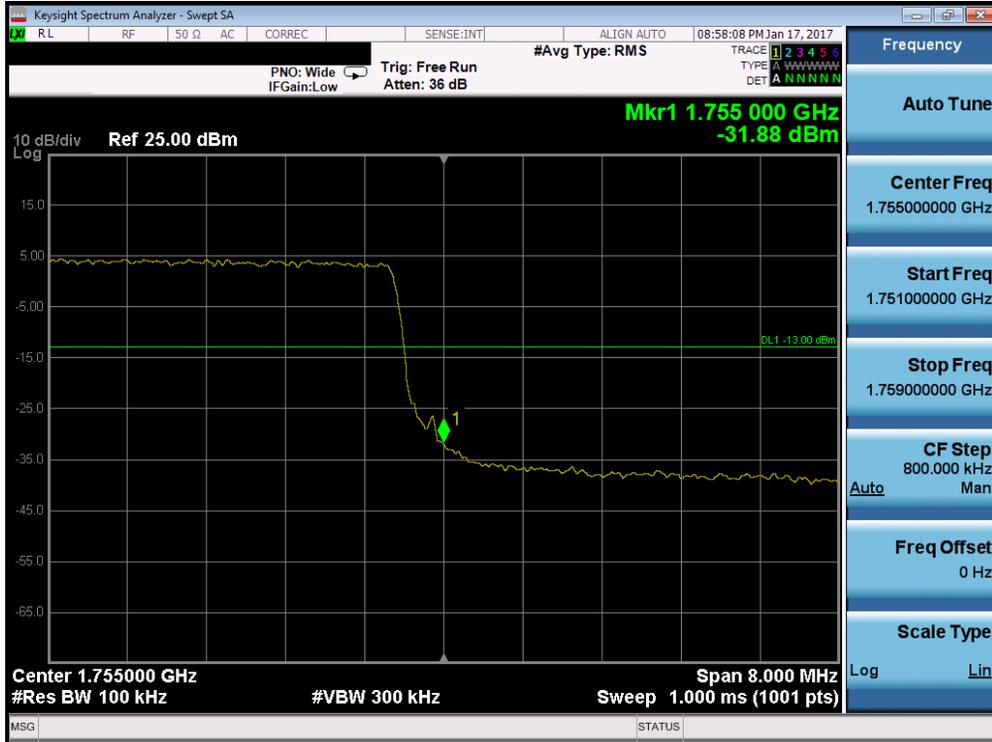


Plot 7-132. Lower Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

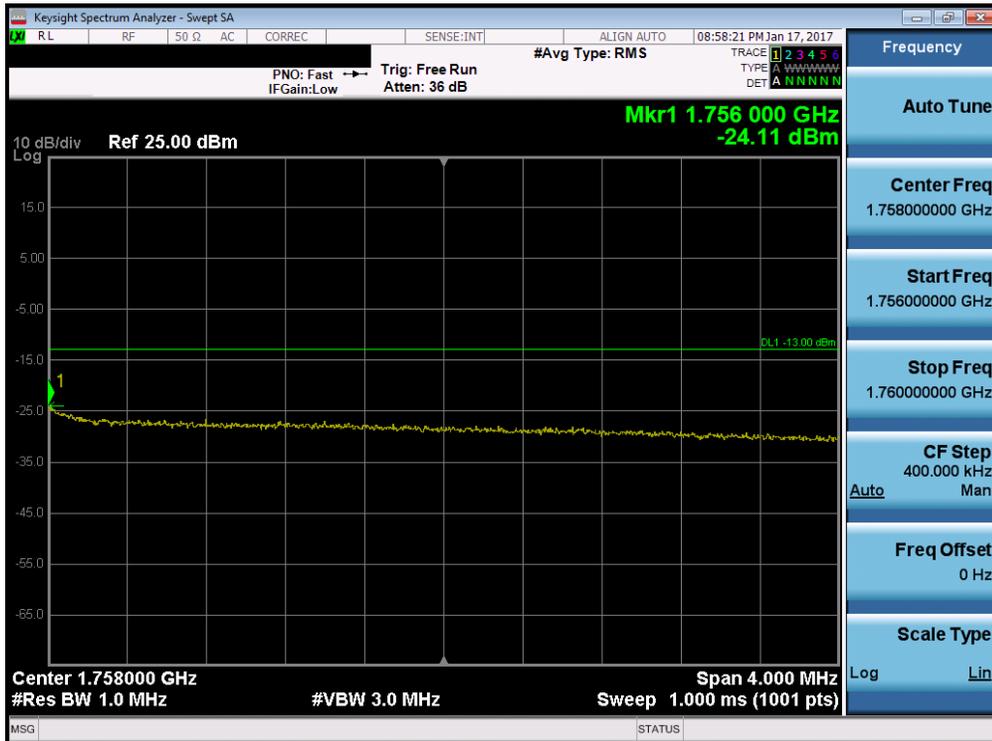


Plot 7-133. Lower Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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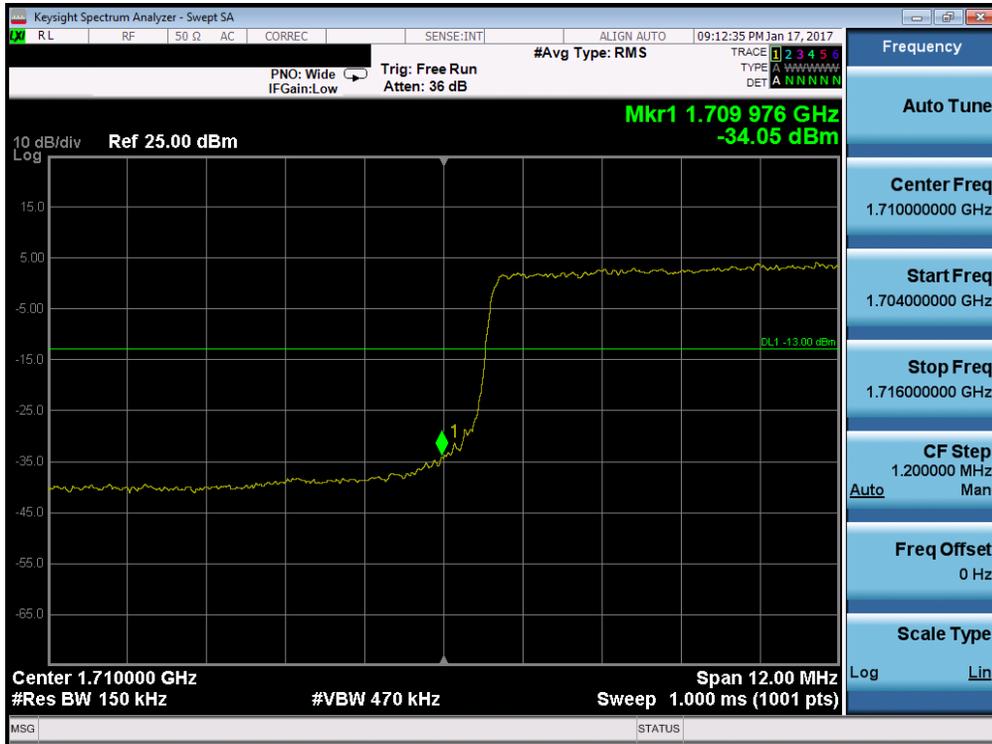


Plot 7-134. Upper Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

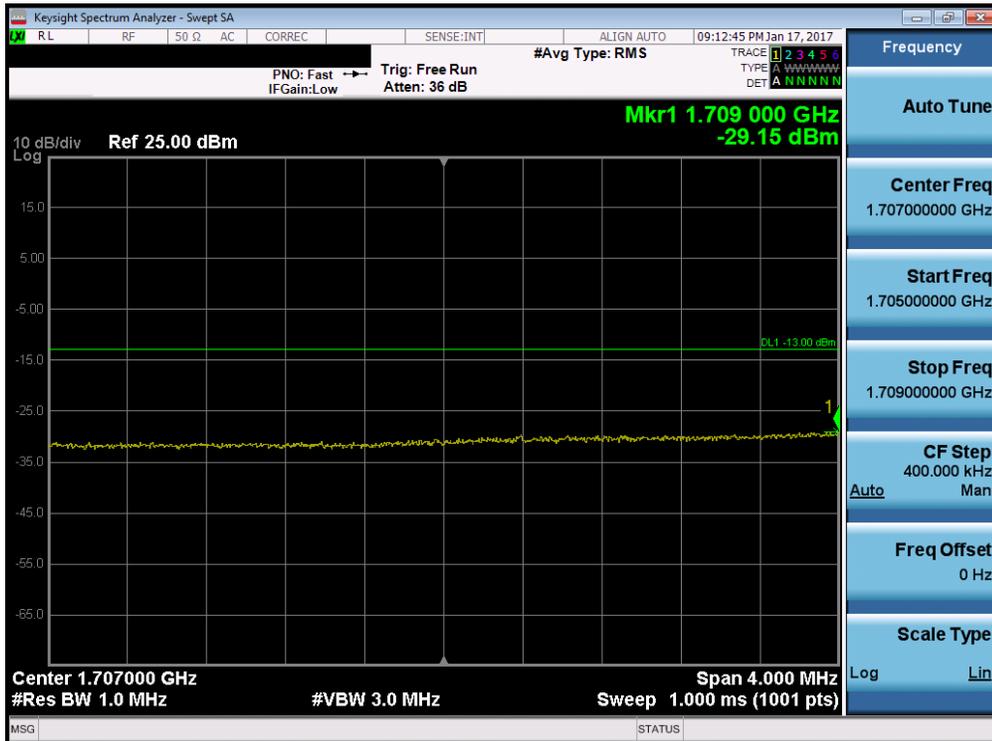


Plot 7-135. Upper Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 86 of 150

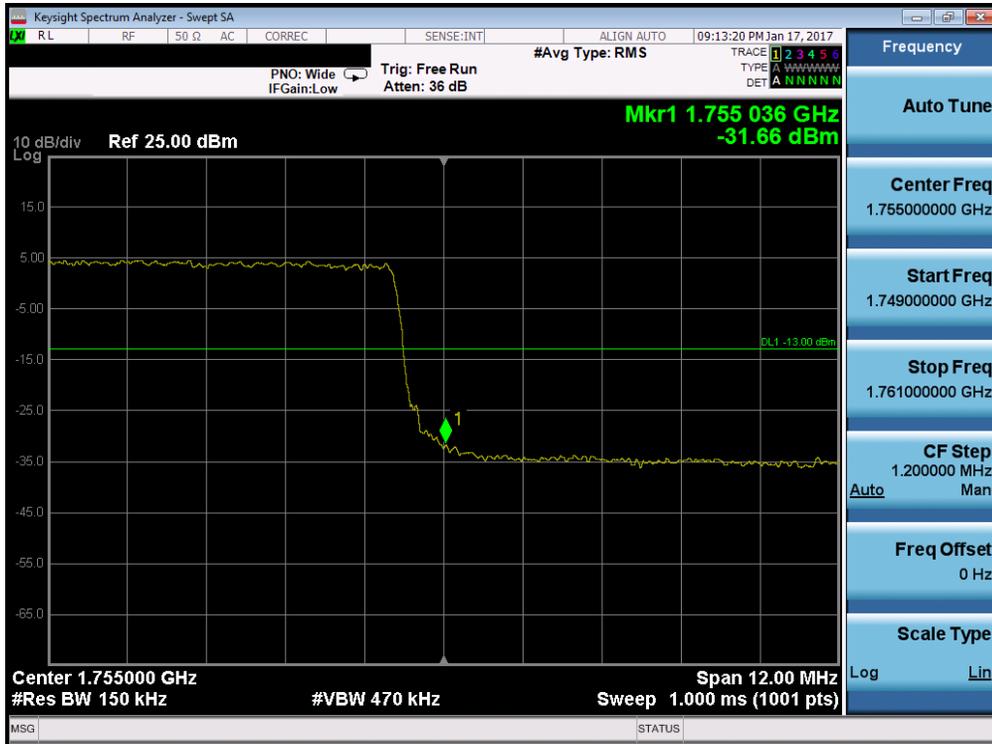


Plot 7-136. Lower Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)



Plot 7-137. Lower Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 87 of 150

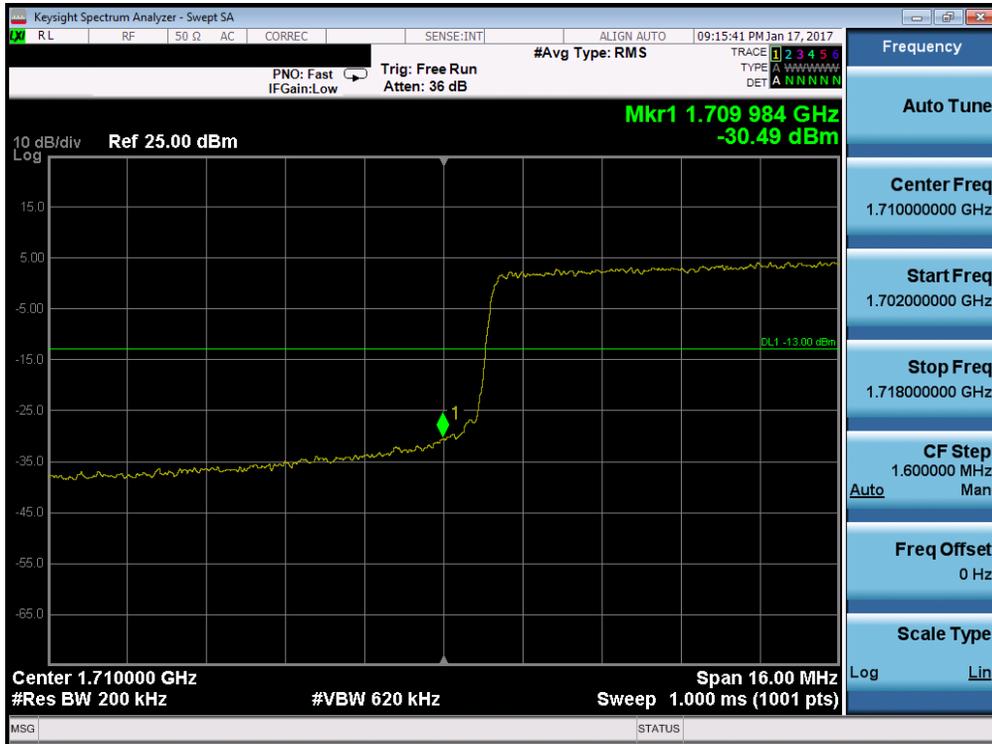


Plot 7-138. Upper Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

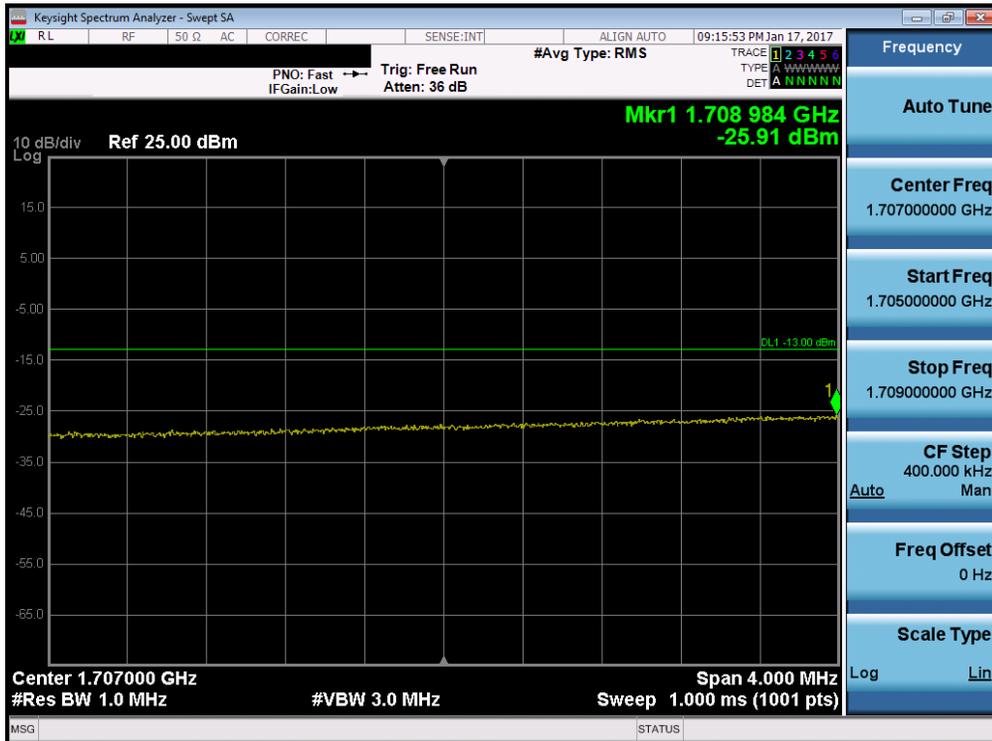


Plot 7-139. Upper Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 88 of 150



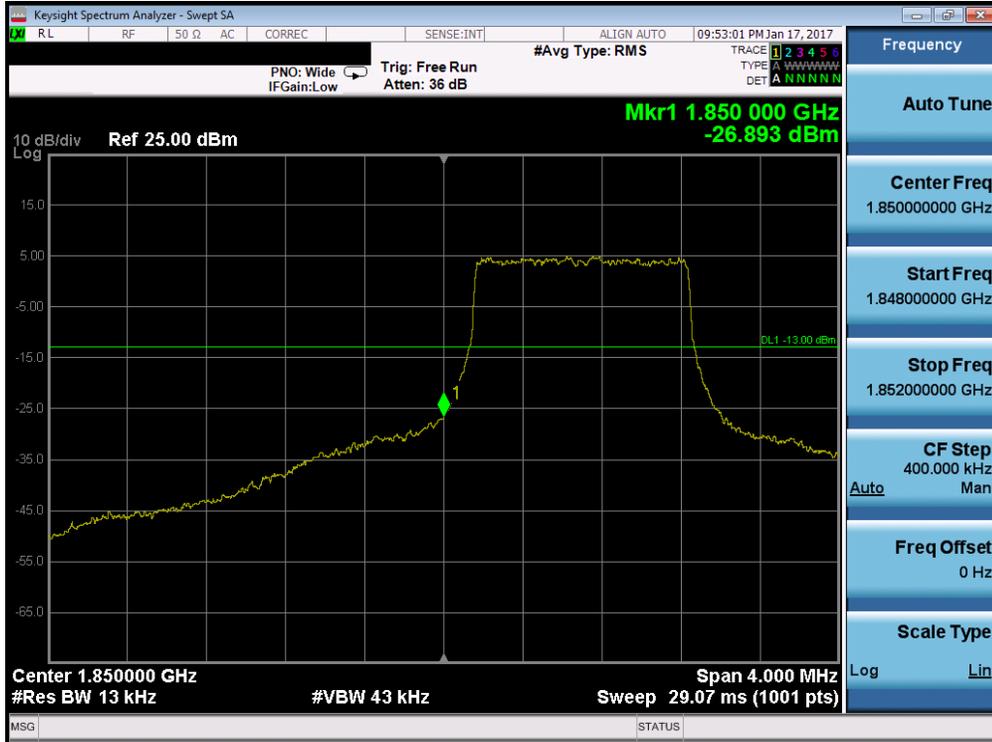
Plot 7-140. Lower Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)



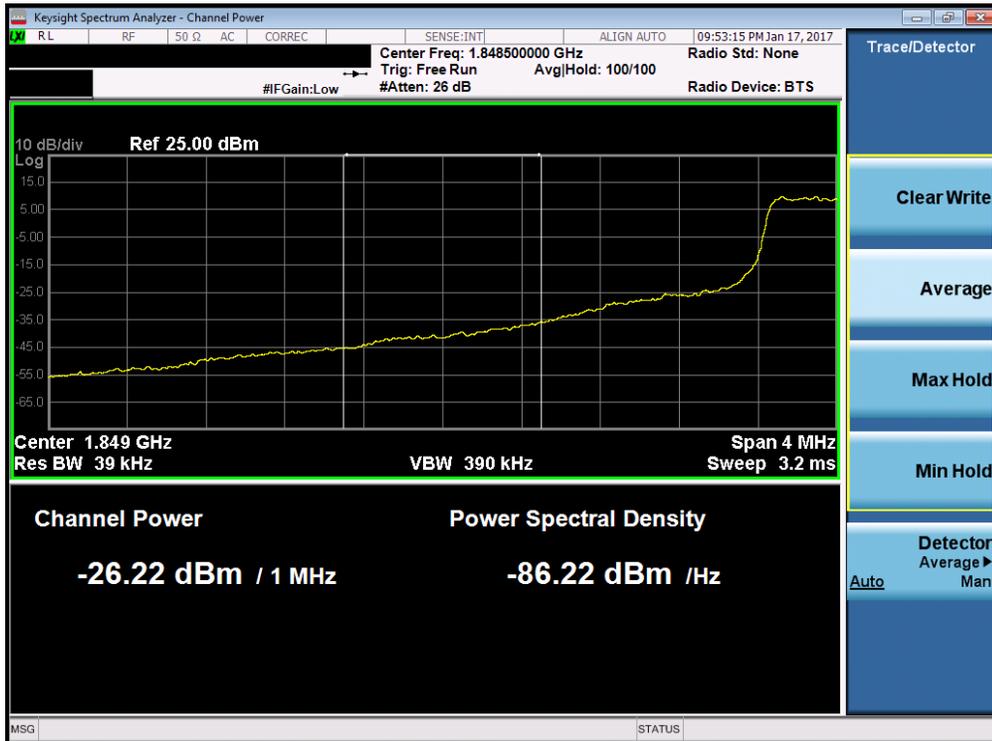
Plot 7-141. Lower Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 89 of 150



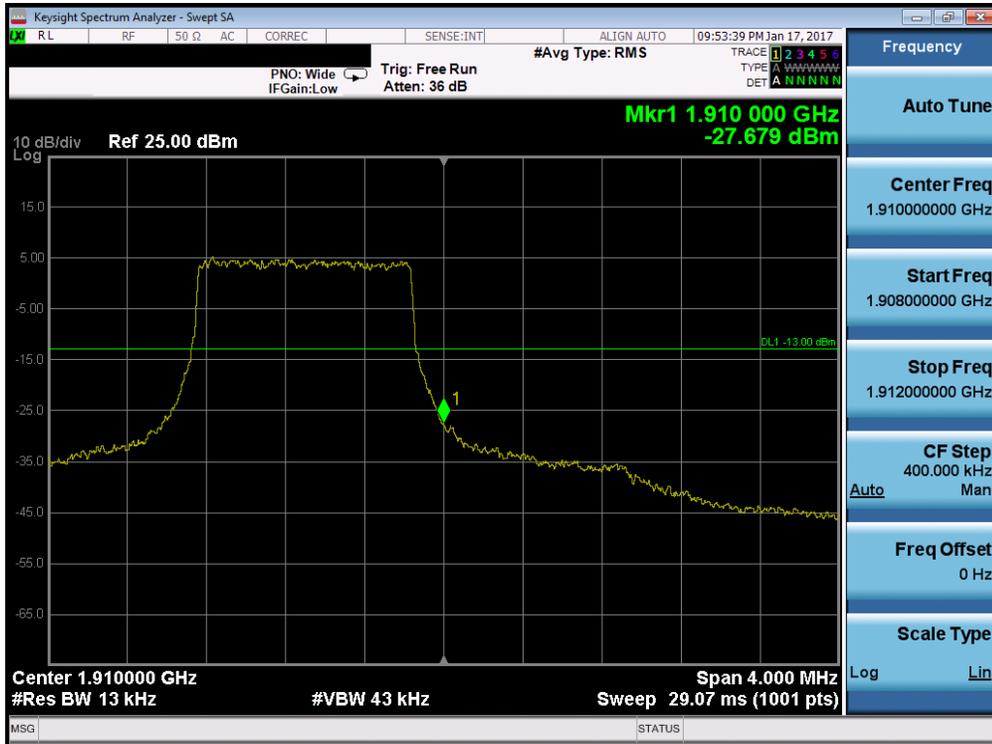


Plot 7-144. Lower Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

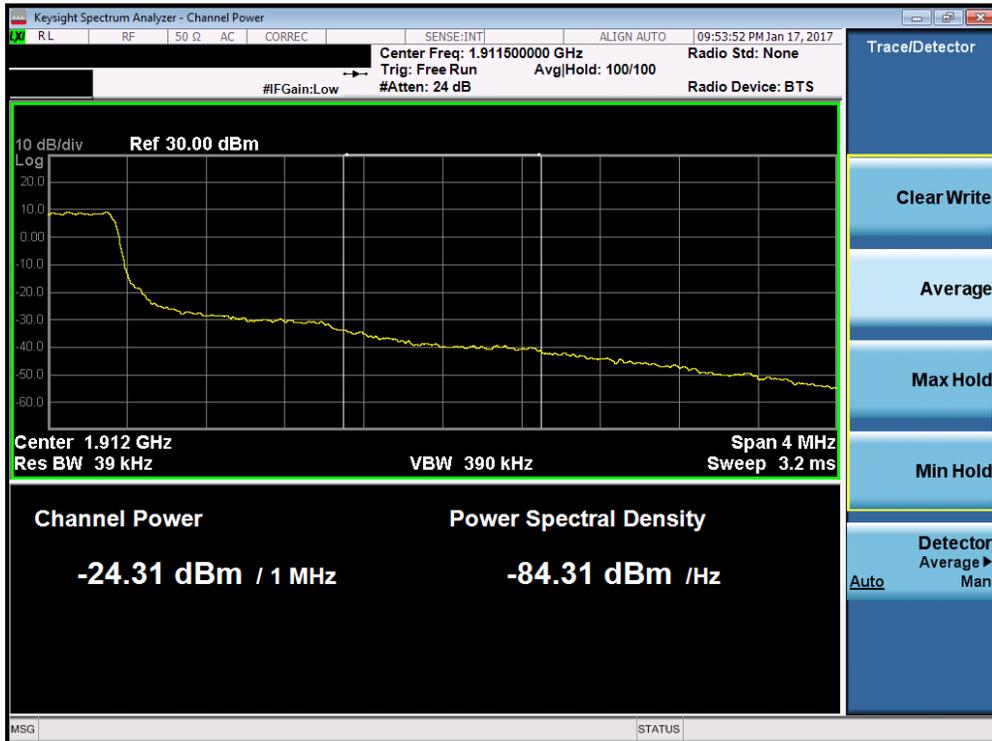


Plot 7-145. Lower Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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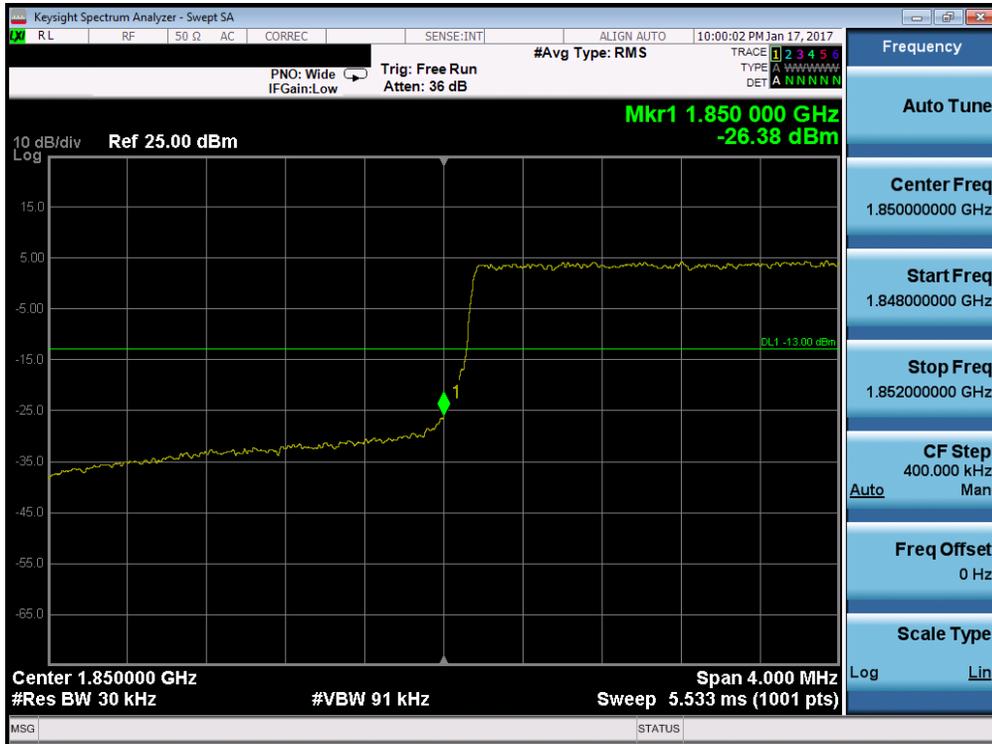


Plot 7-146. Upper Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

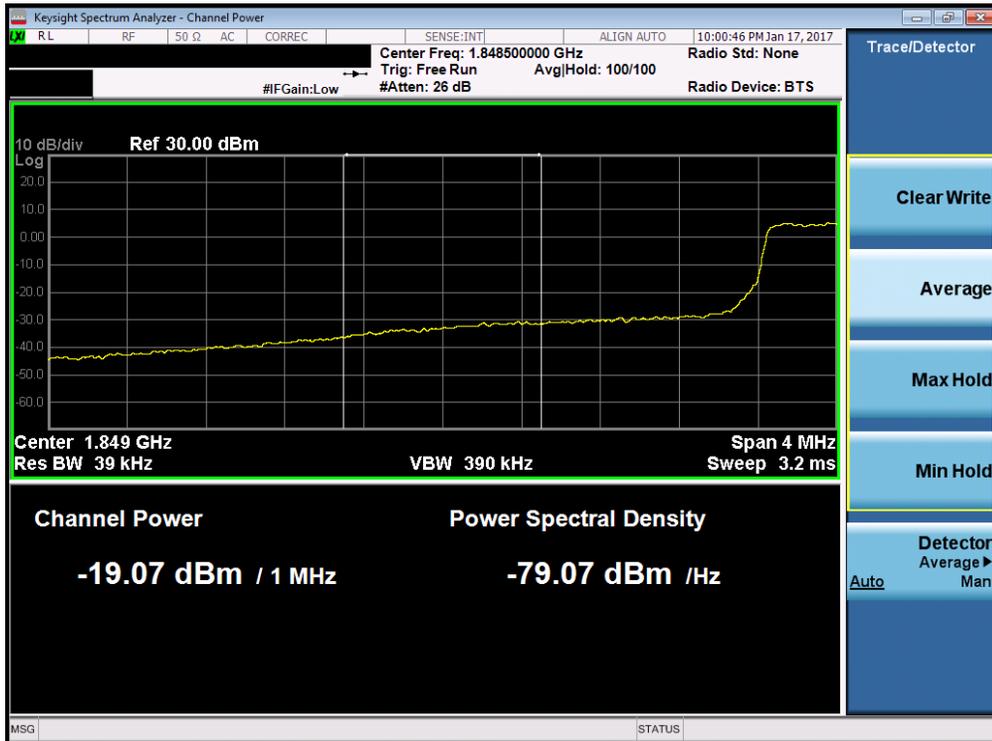


Plot 7-147. Upper Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 92 of 150

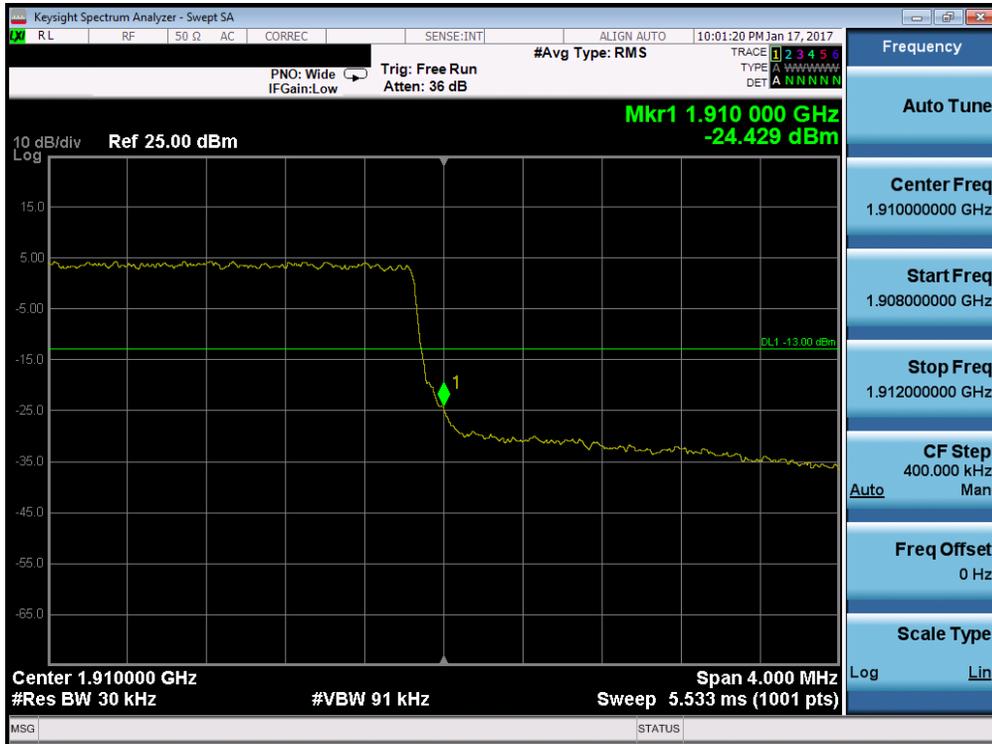


Plot 7-148. Lower Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

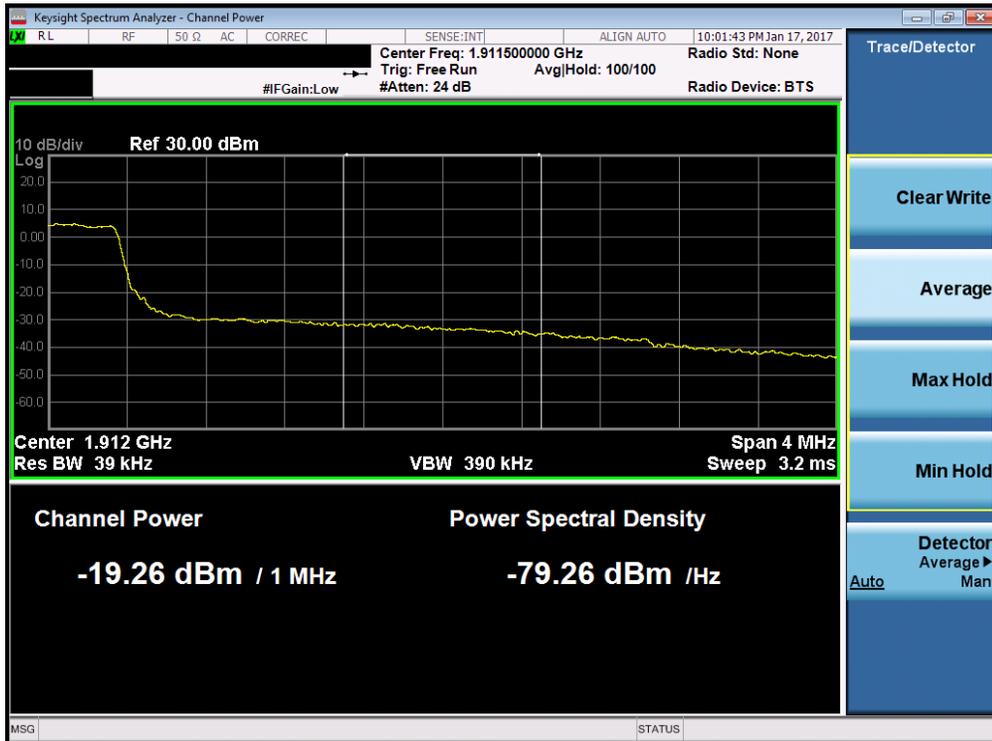


Plot 7-149. Lower Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 93 of 150

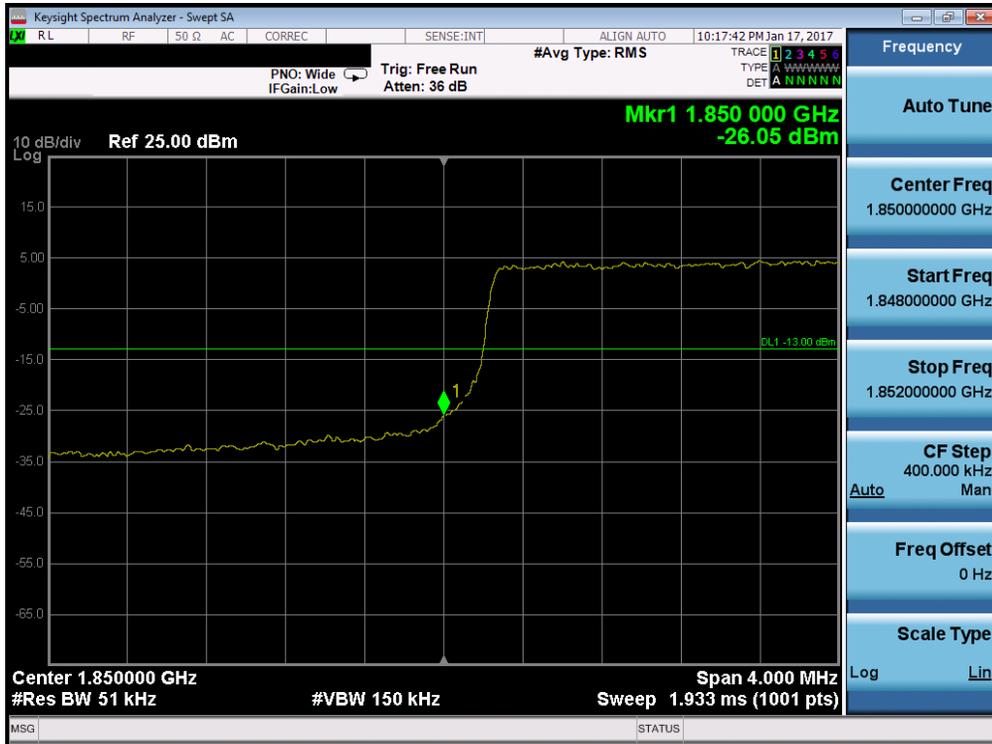


Plot 7-150. Upper Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

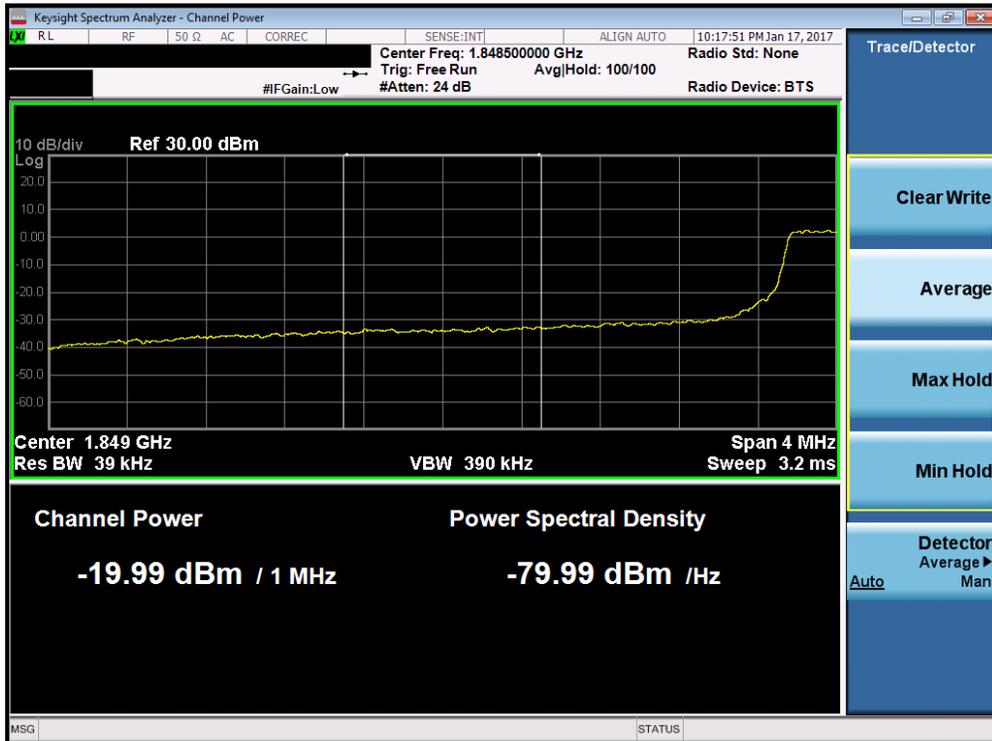


Plot 7-151. Upper Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 94 of 150



Plot 7-152. Lower Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

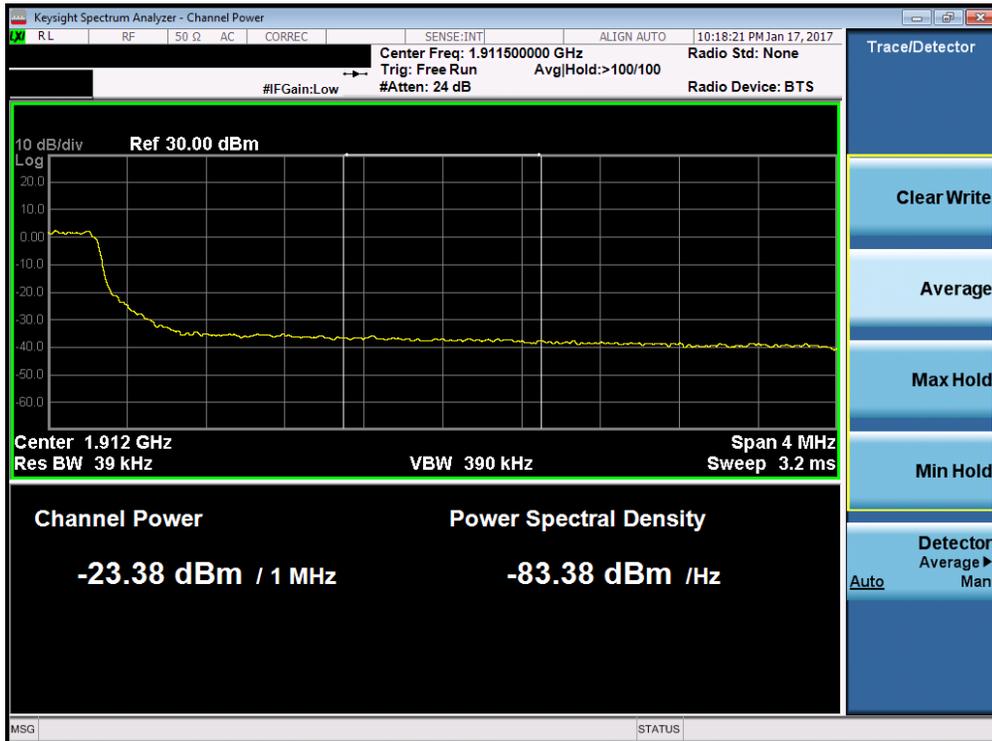


Plot 7-153. Lower Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 95 of 150

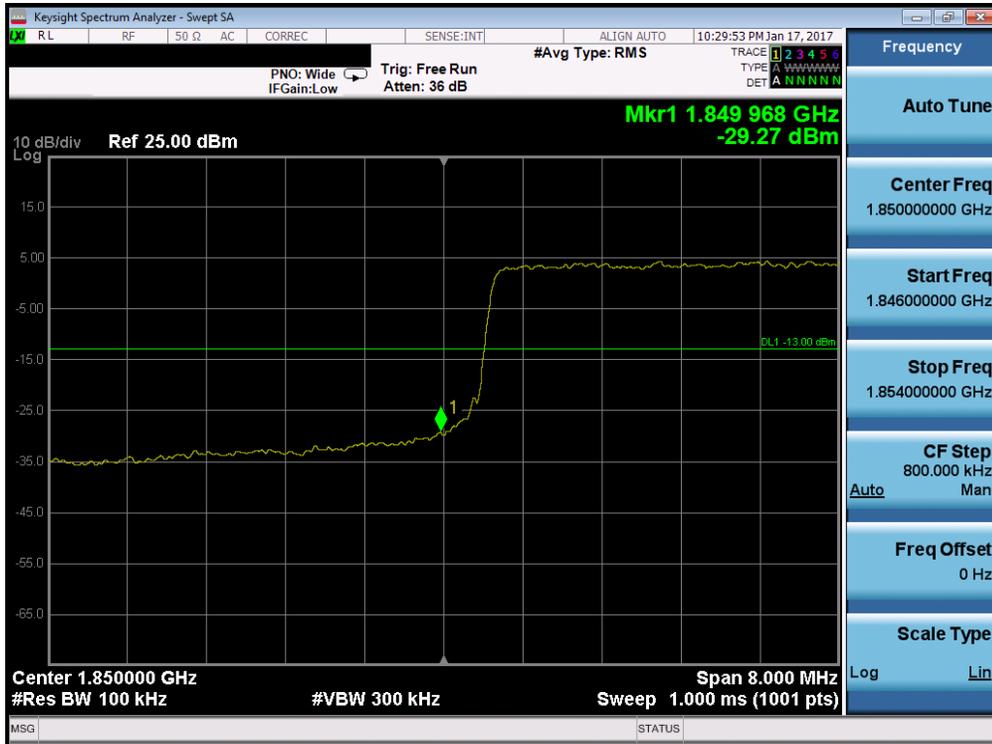


Plot 7-154. Upper Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

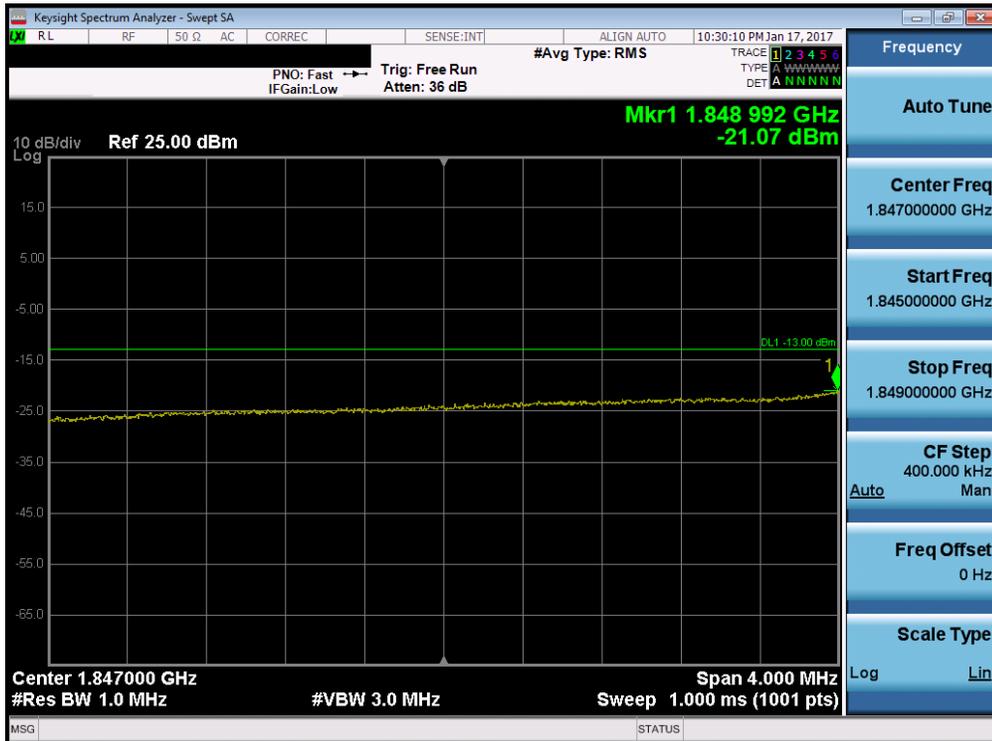


Plot 7-155. Upper Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 96 of 150

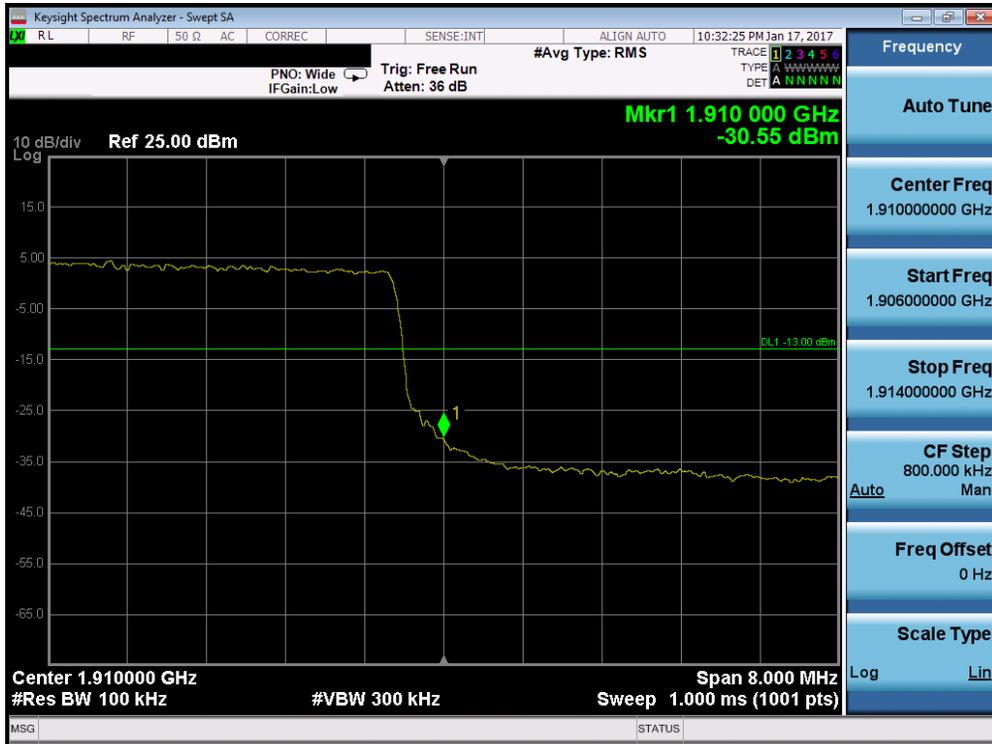


Plot 7-156. Lower Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

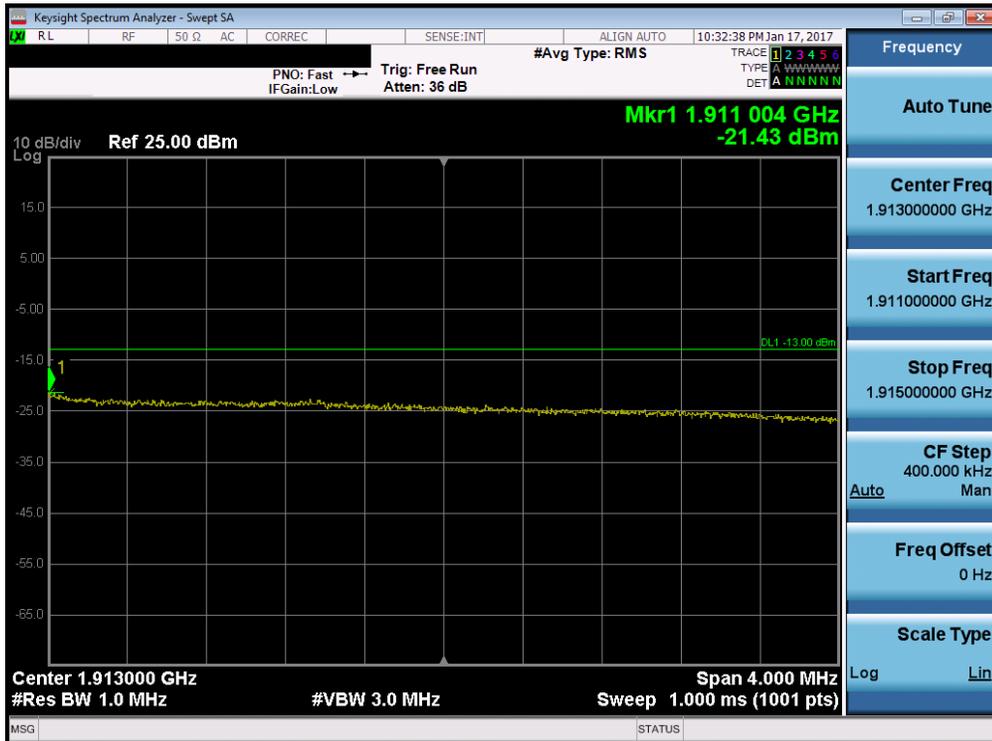


Plot 7-157. Lower Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 97 of 150

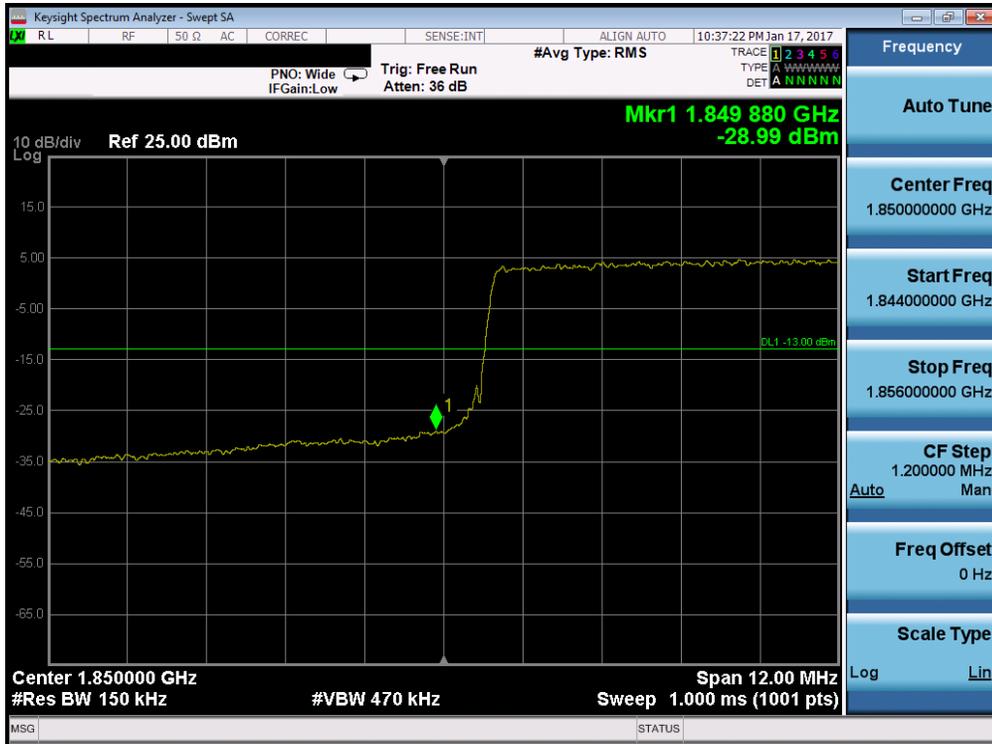


Plot 7-158. Upper Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

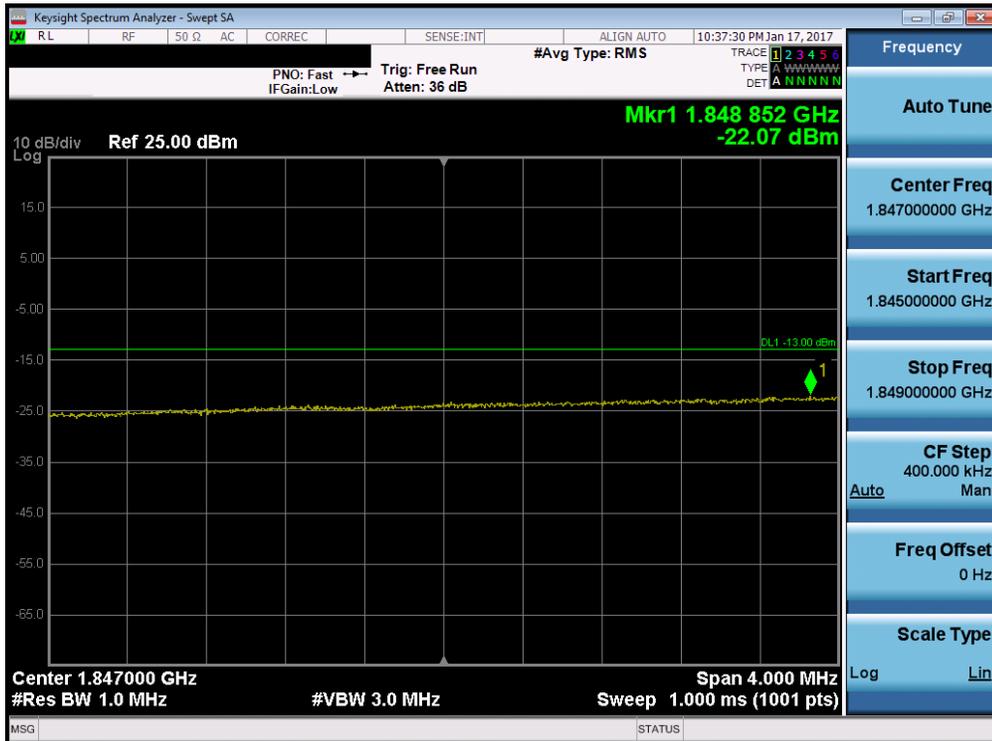


Plot 7-159. Upper Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 98 of 150

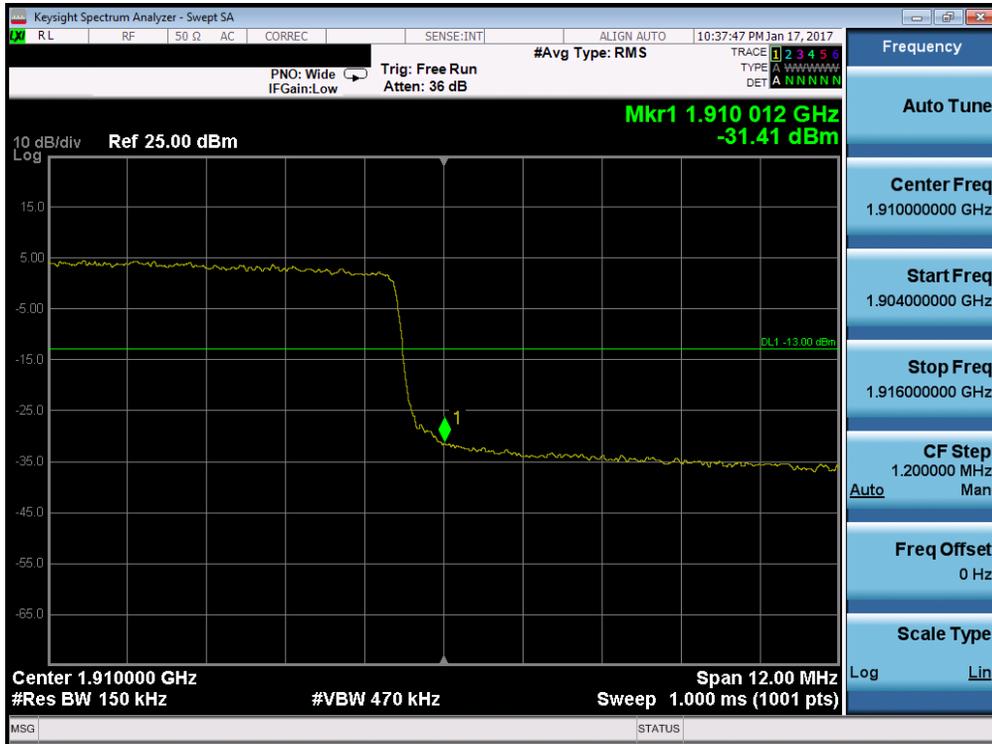


Plot 7-160. Lower Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

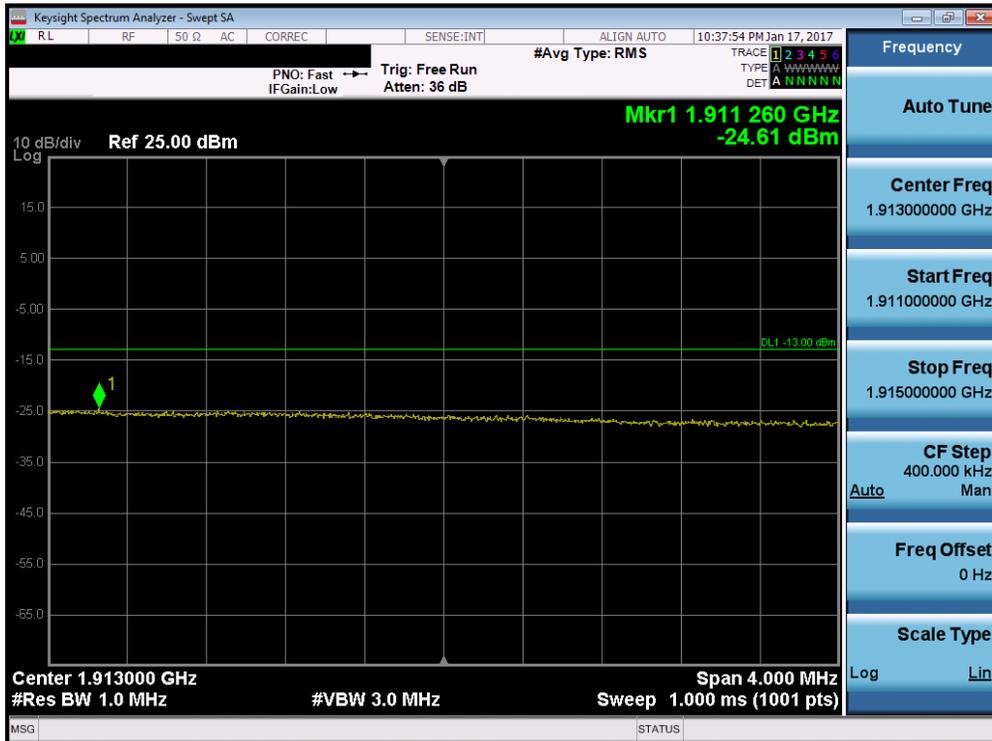


Plot 7-161. Lower Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 99 of 150

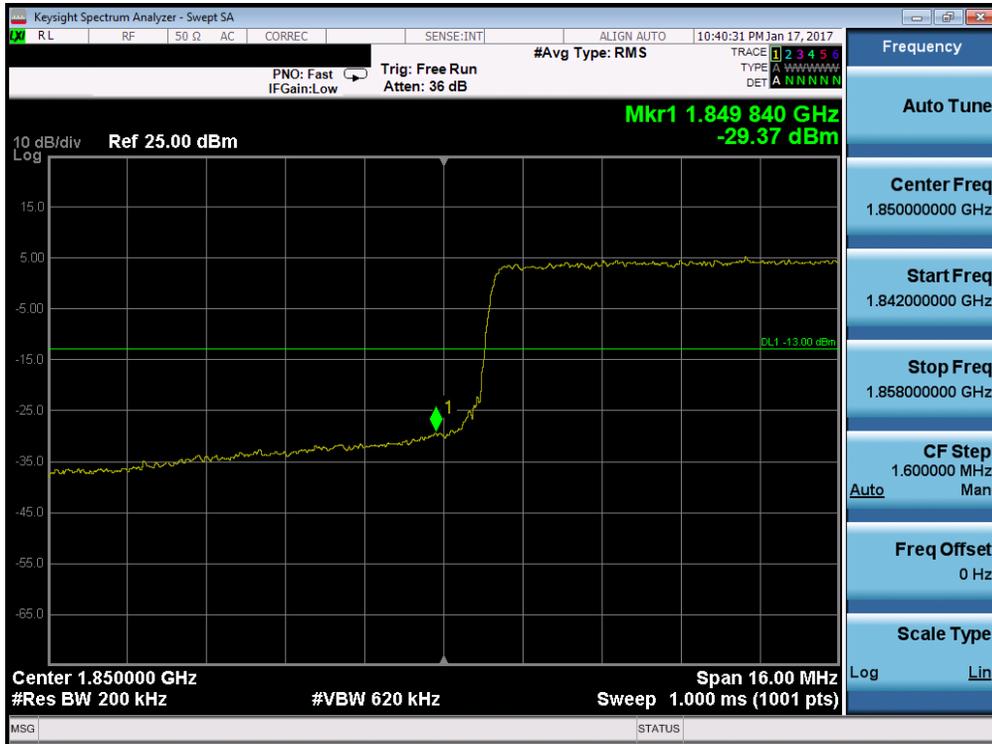


Plot 7-162. Upper Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

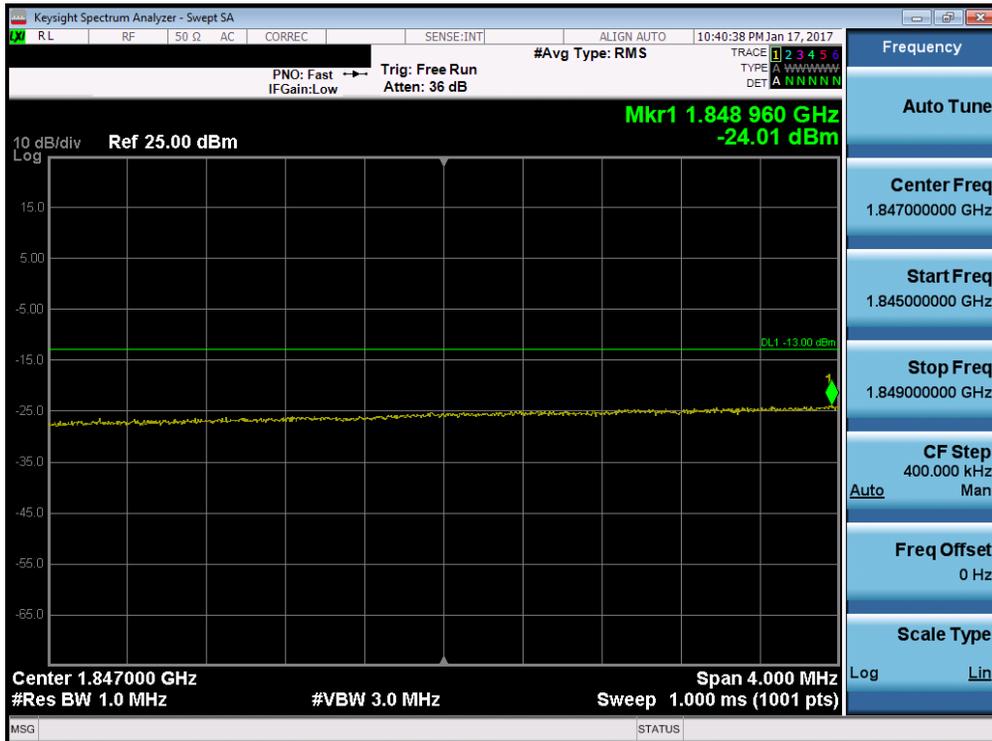


Plot 7-163. Upper Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 100 of 150



Plot 7-164. Lower Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 7-165. Lower Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

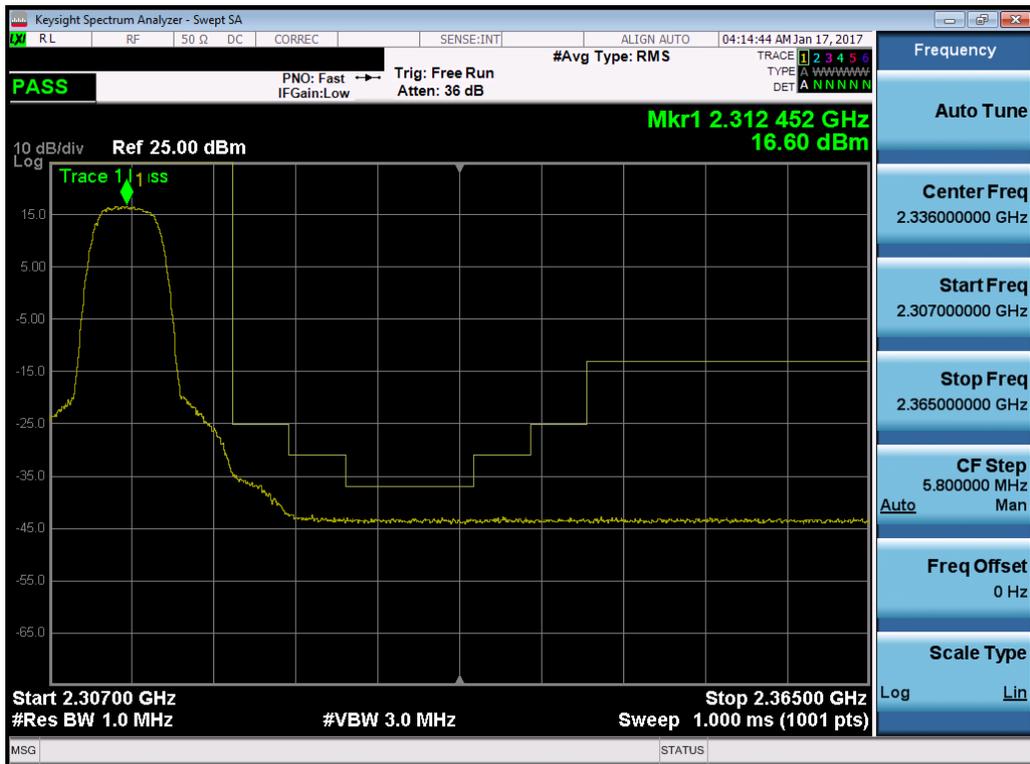
FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 101 of 150







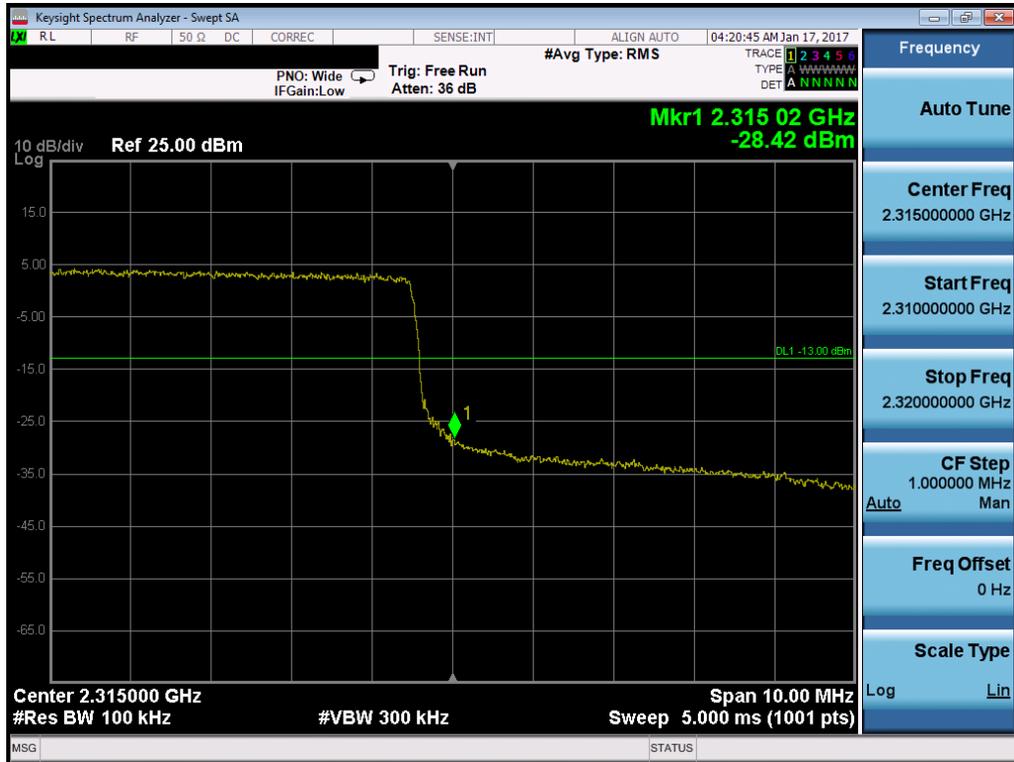
Plot 7-170. Upper Band Edge Plot (Band 30 – 5.0MHz QPSK – RB Size 25)



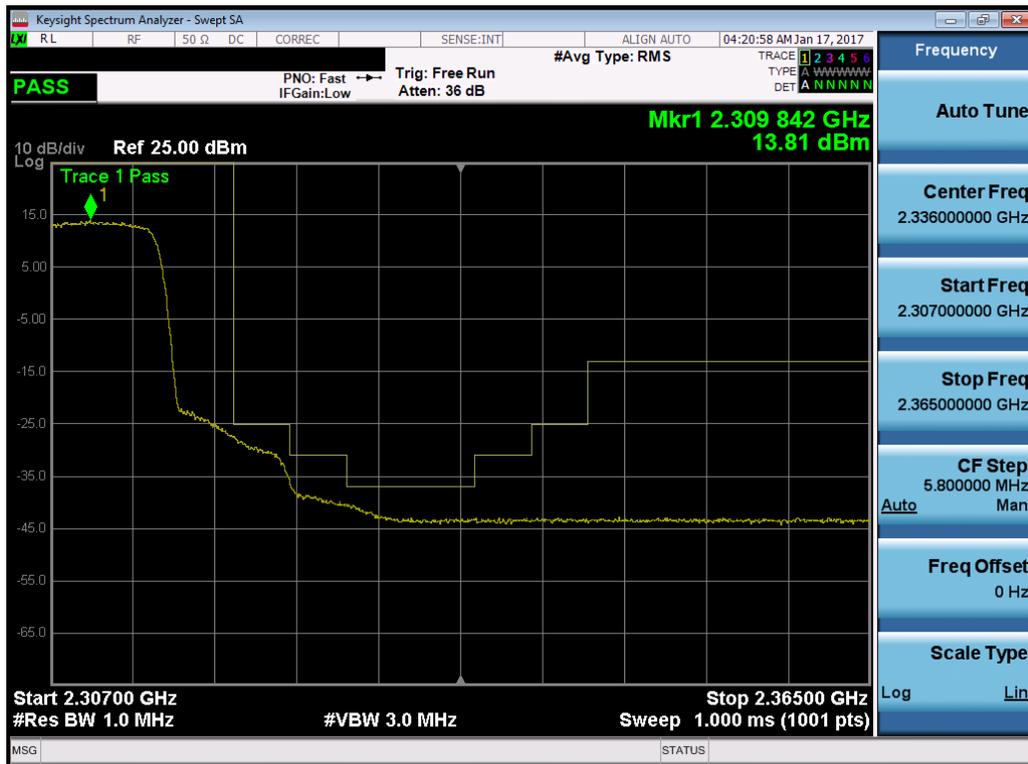
Plot 7-171. Upper Extended Band Edge Plot (Band 30 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 104 of 150



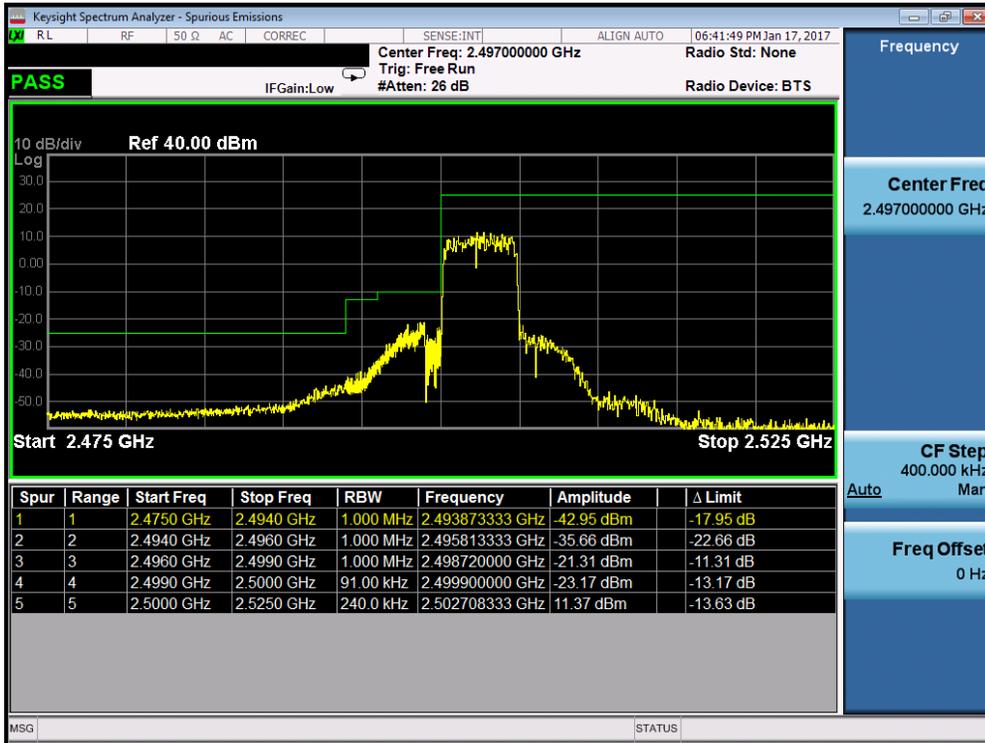


Plot 7-174. Upper Band Edge Plot (Band 30 – 10.0MHz QPSK – RB Size 50)

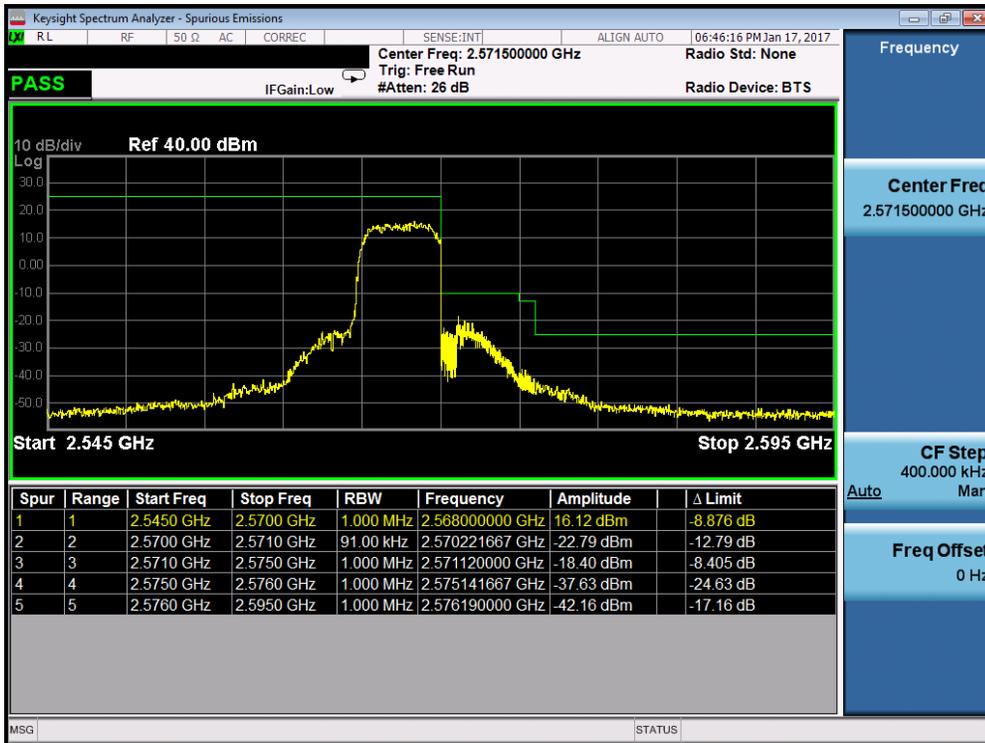


Plot 7-175. Upper Extended Band Edge Plot (Band 30 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 106 of 150

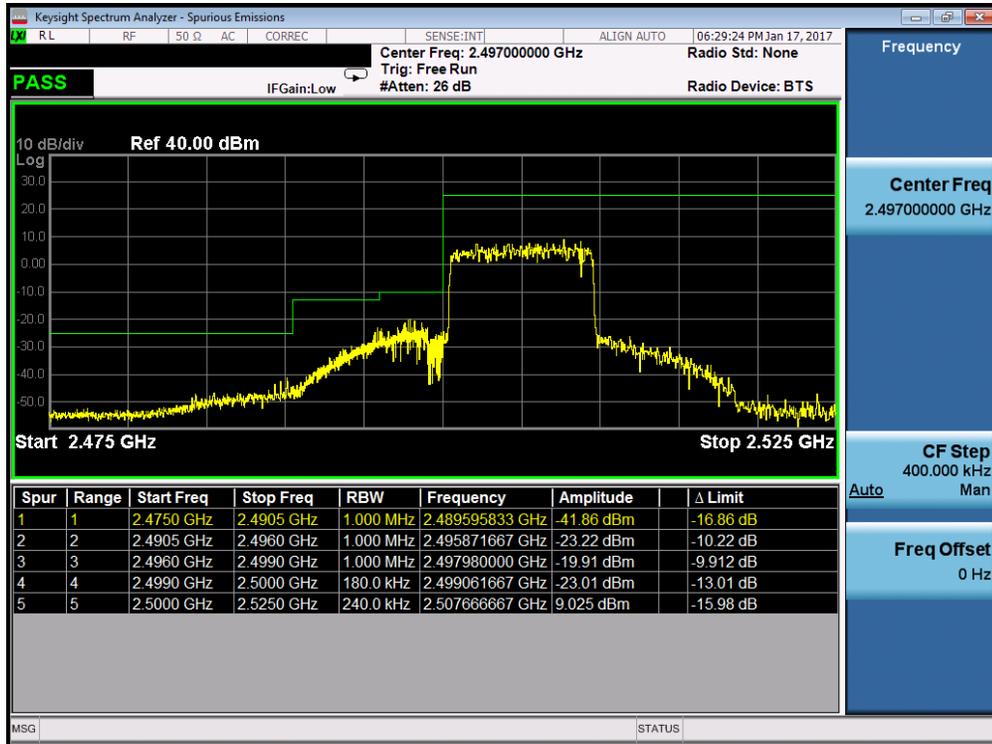


Plot 7-176. Lower ACP Plot (Band 7 – 5.0MHz QPSK – RB Size 25)

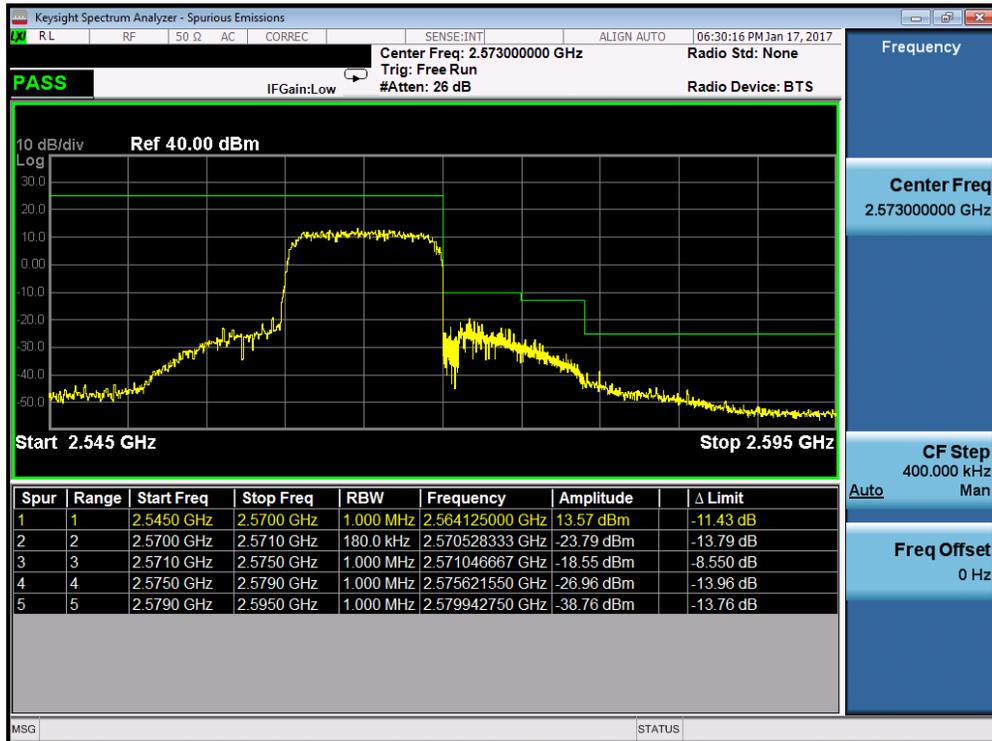


Plot 7-177. Upper ACP Plot (Band 7 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFH700		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 107 of 150

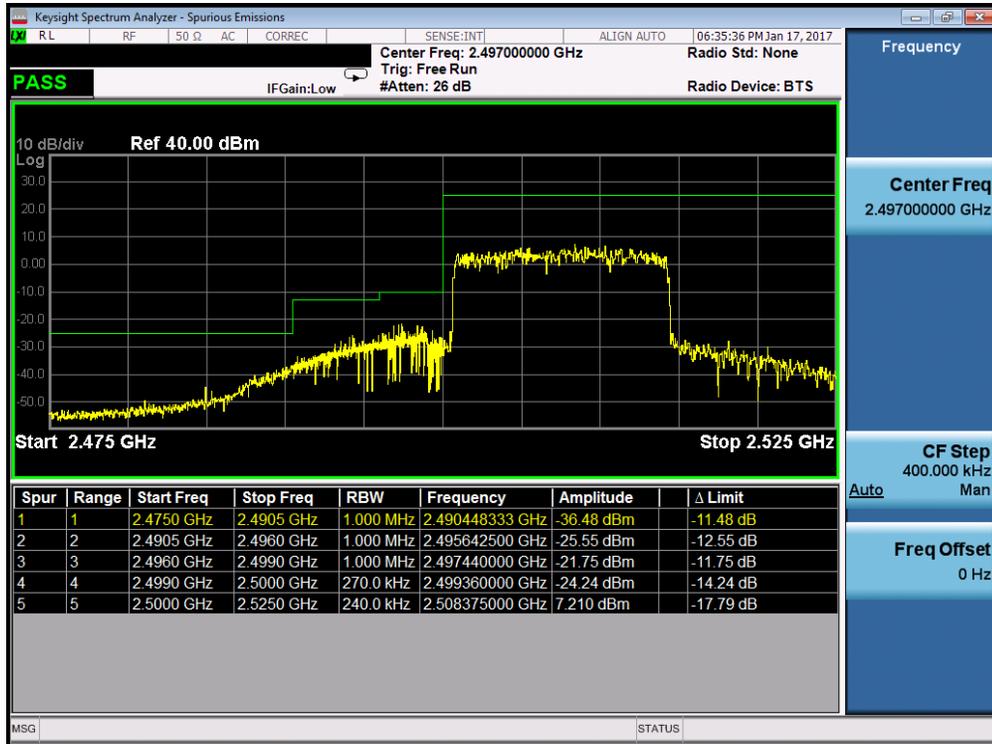


Plot 7-178. Lower ACP Plot (Band 7 – 10.0MHz QPSK – RB Size 50)



Plot 7-179. Upper ACP Plot (Band 7 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 108 of 150

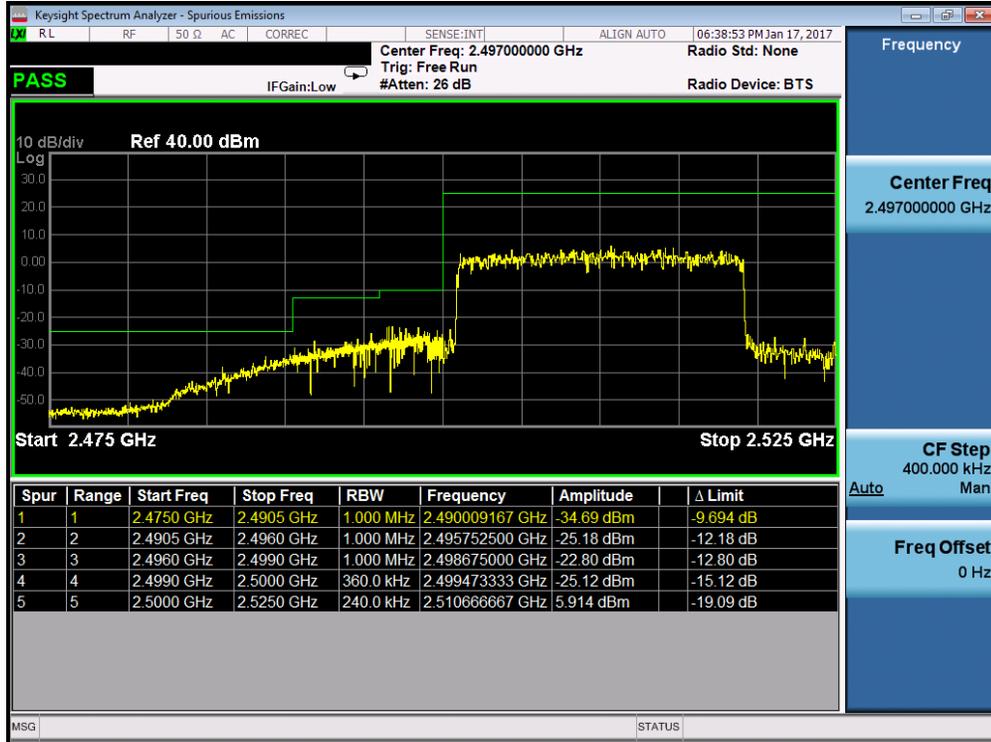


Plot 7-180. Lower ACP Plot (Band 7 – 15.0MHz QPSK – RB Size 75)

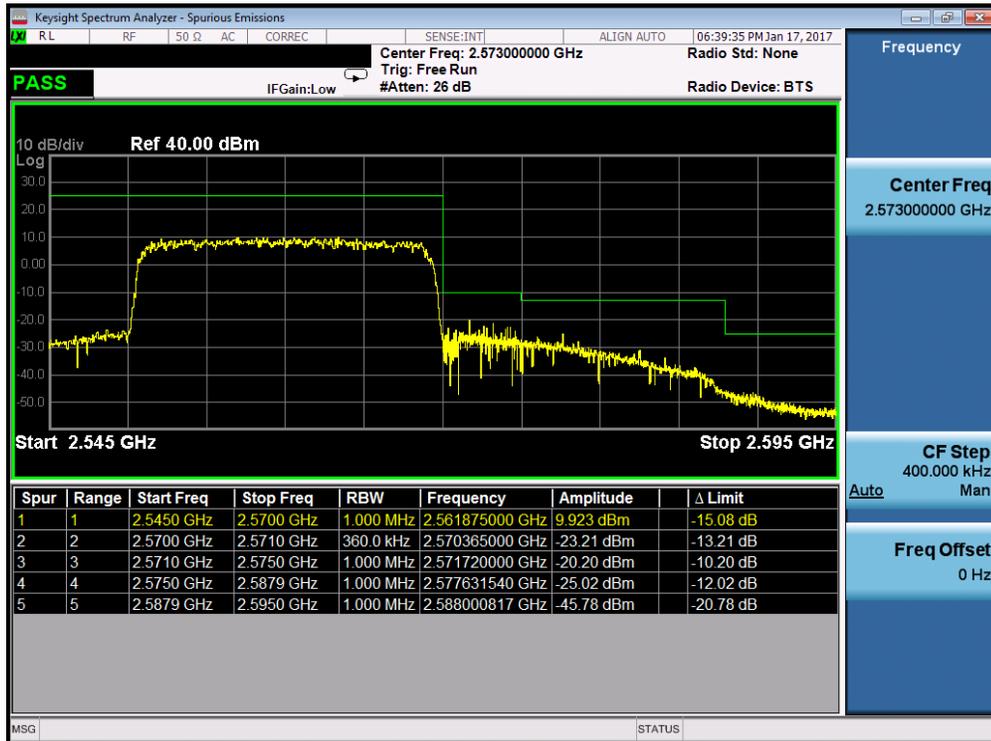


Plot 7-181. Upper ACP Plot (Band 7 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2-ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 109 of 150



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



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

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2-ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 110 of 150

## 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

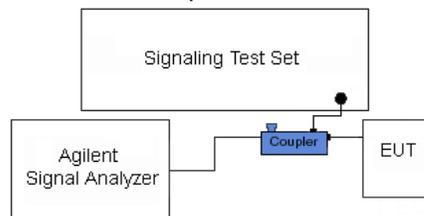
KDB 971168 D01 v02r02 – Section 5.7.1

#### 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.

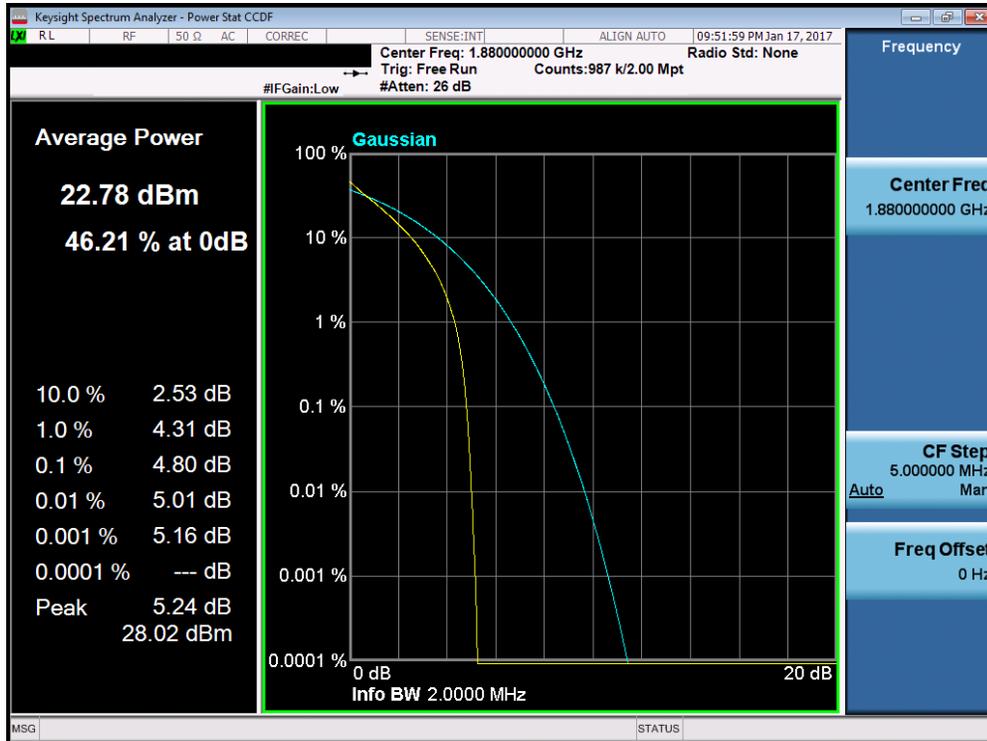


**Figure 7-4. Test Instrument & Measurement Setup**

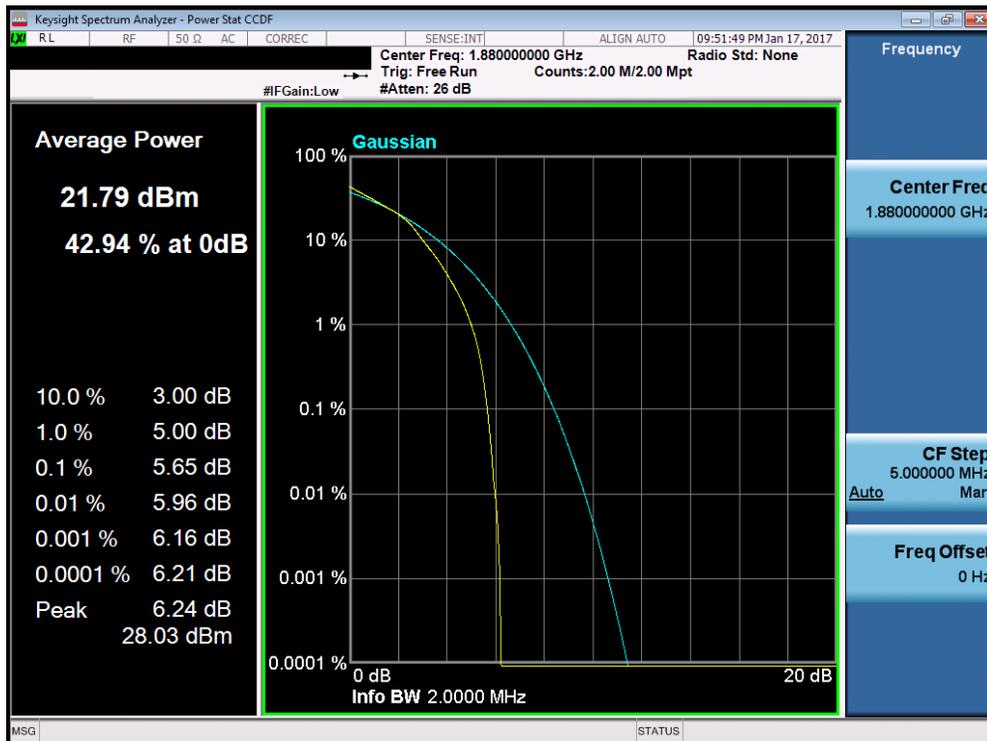
#### Test Notes

None.

FCC ID: ZNFH700	 PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset	Page 111 of 150	

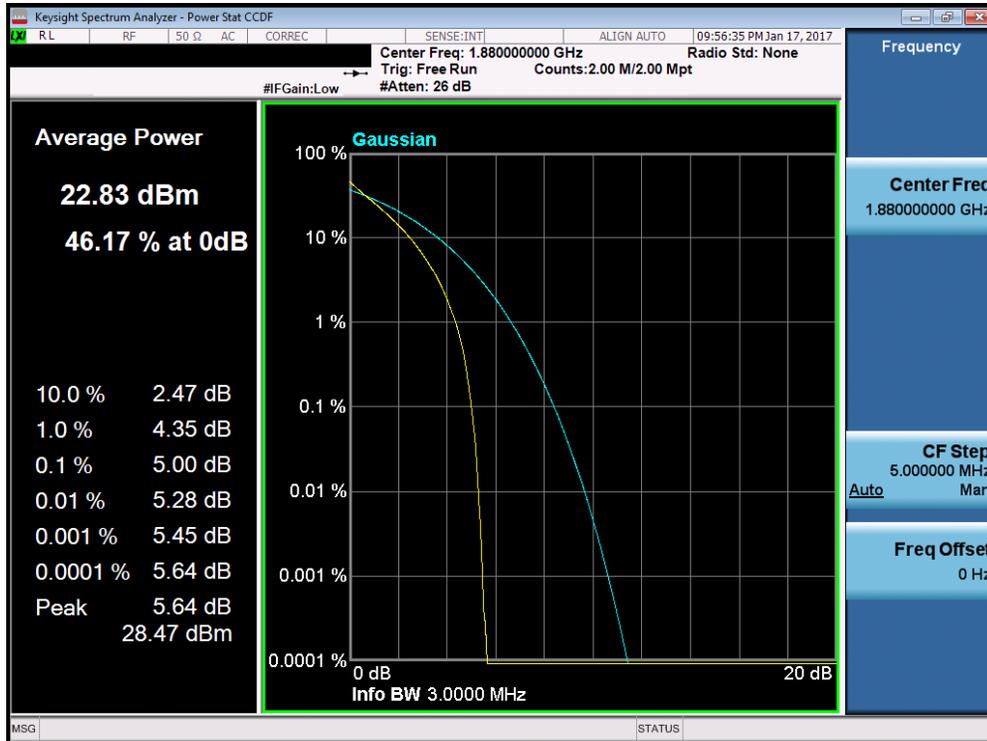


Plot 7-184. PAR Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

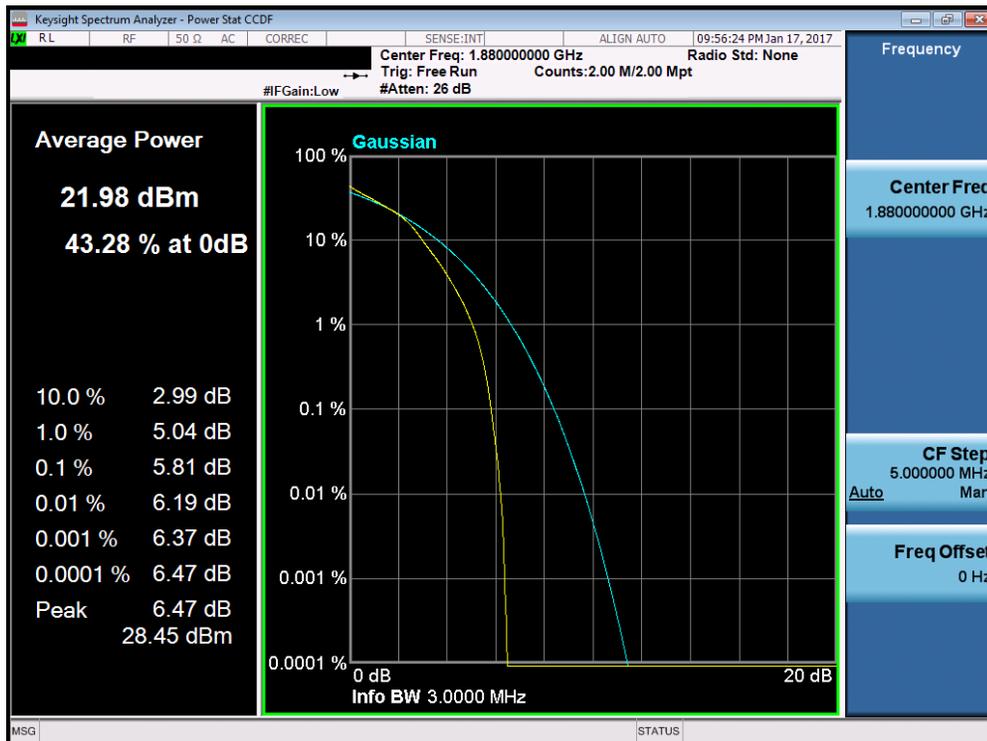


Plot 7-185. PAR Plot (Band 2 – 1.4MHz 16-QAM – RB Size 6)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 112 of 150

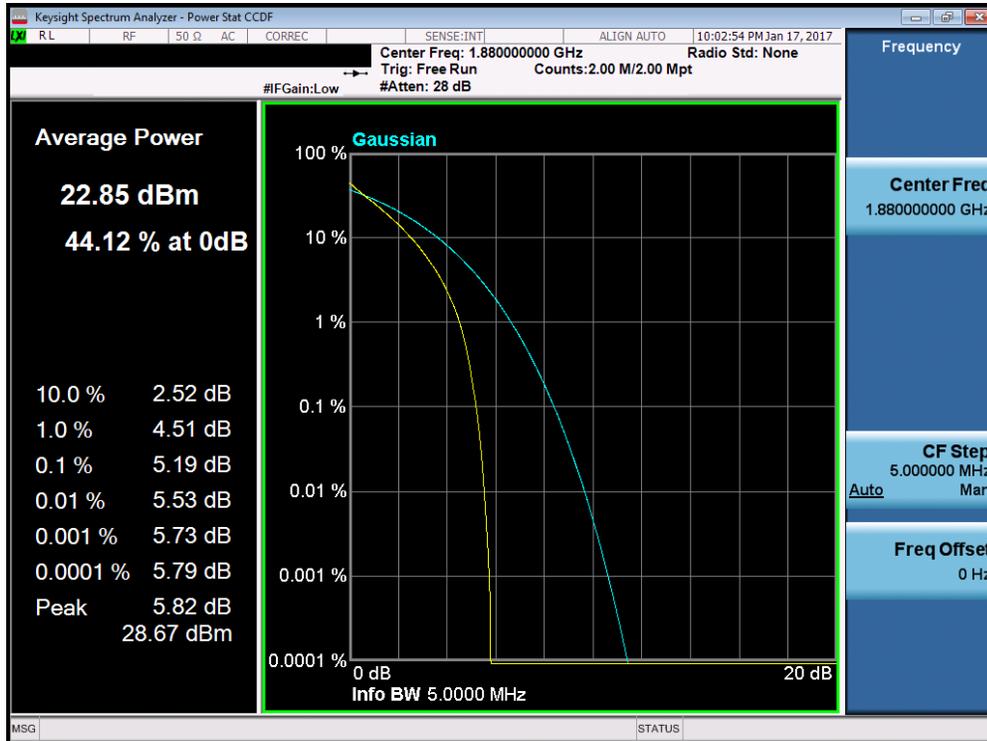


Plot 7-186. PAR Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

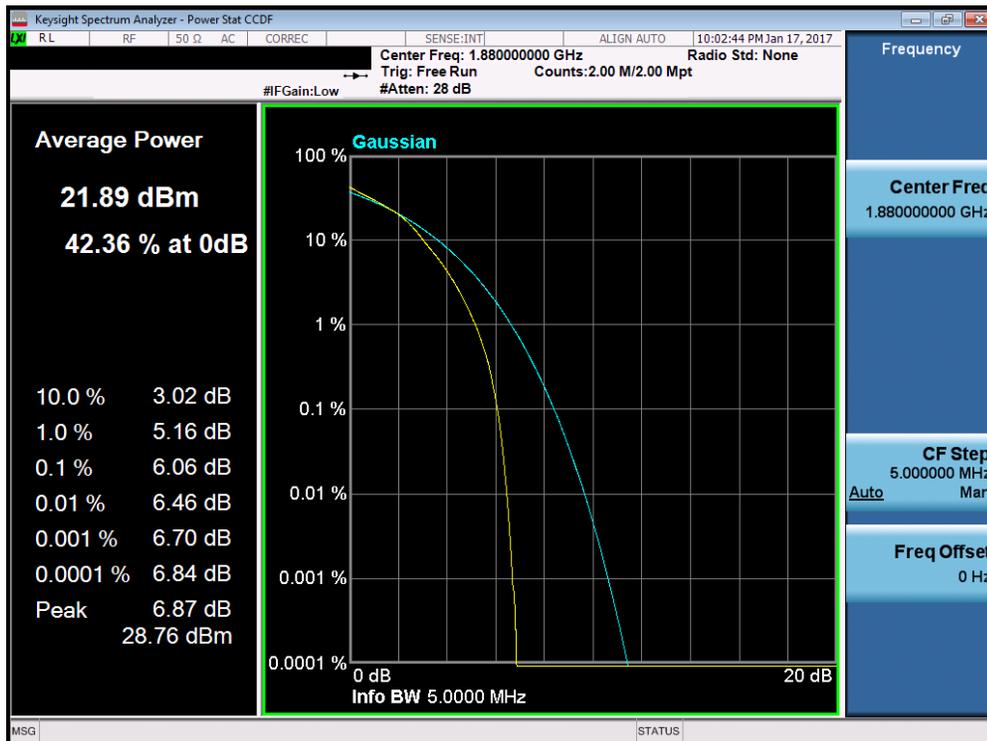


Plot 7-187. PAR Plot (Band 2 – 3.0MHz 16-QAM – RB Size 15)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 113 of 150

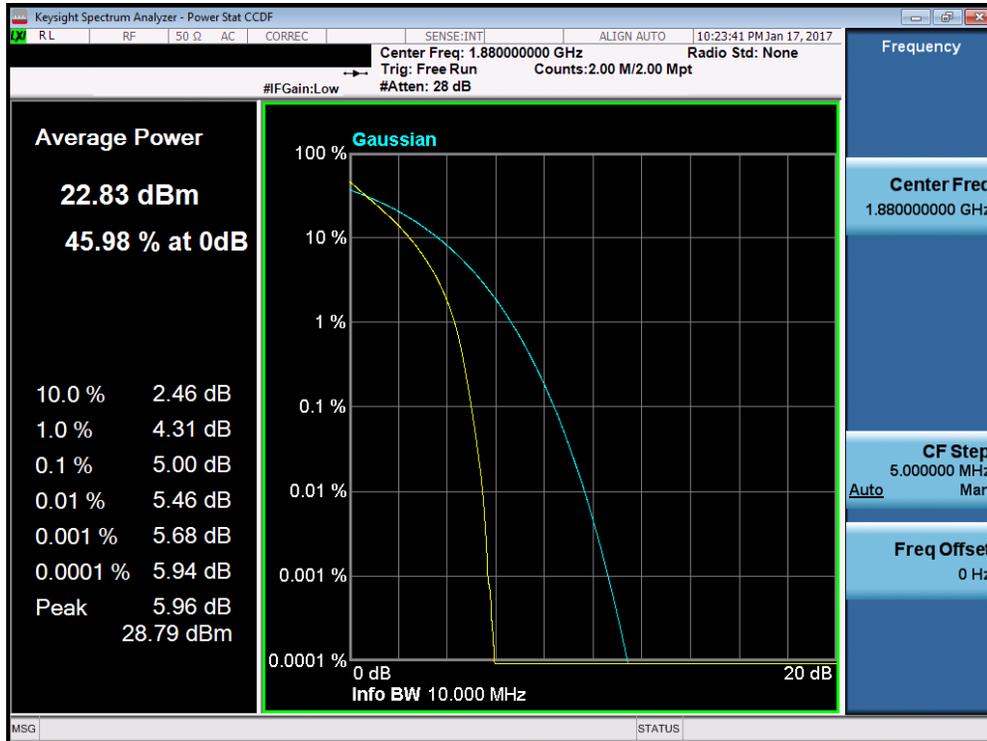


Plot 7-188. PAR Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

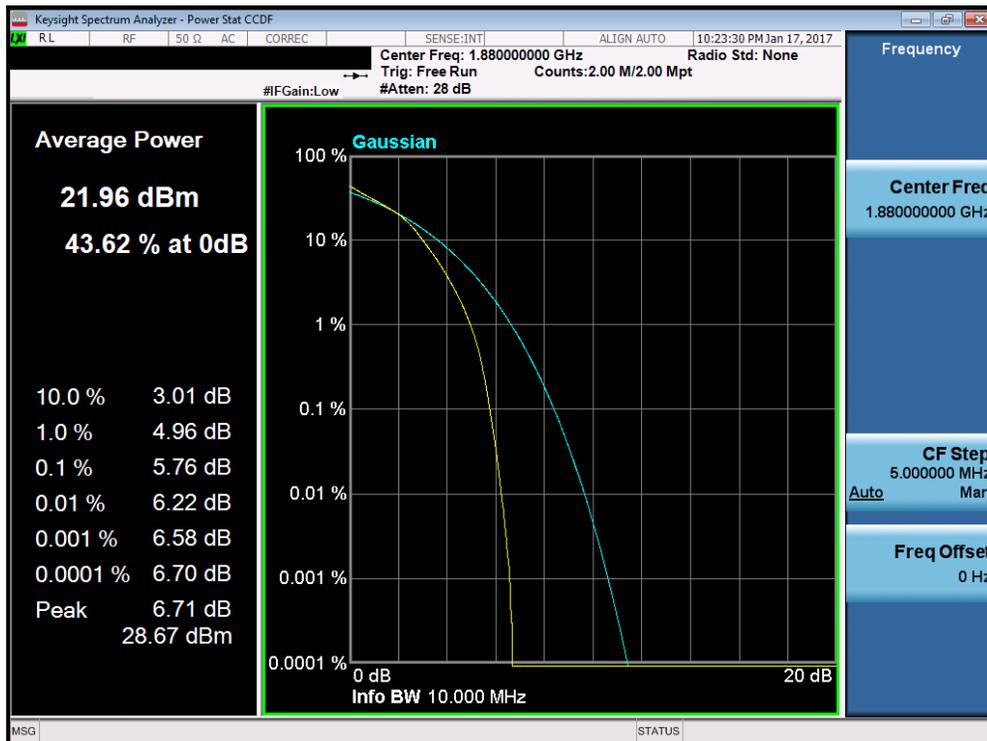


Plot 7-189. PAR Plot (Band 2 – 5.0MHz 16-QAM – RB Size 25)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 114 of 150

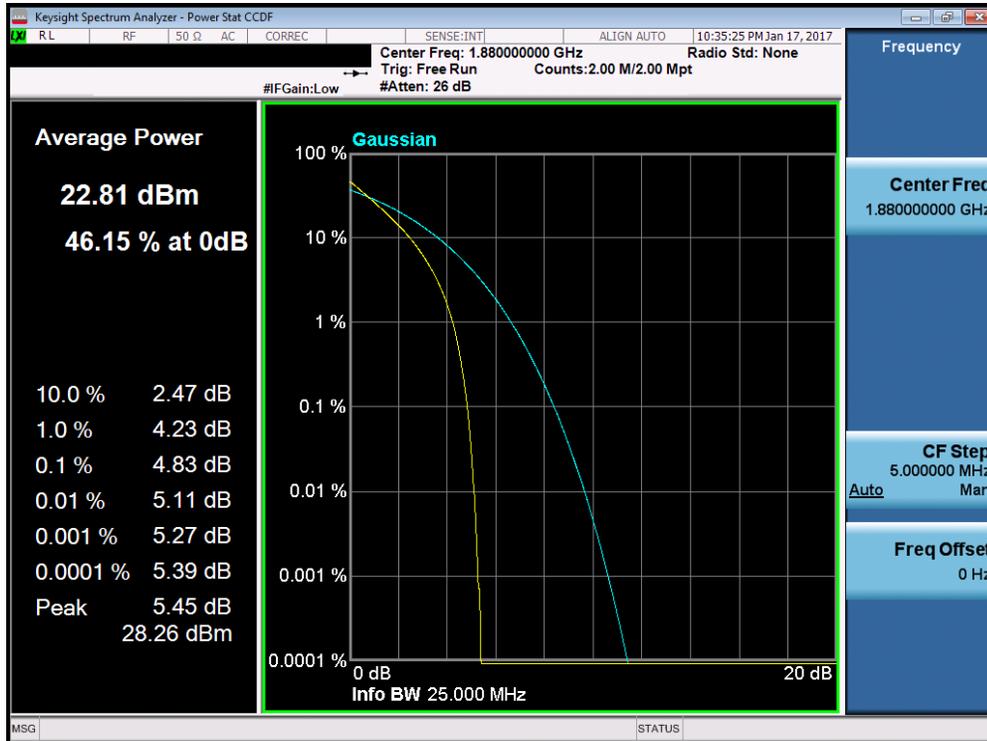


Plot 7-190. PAR Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

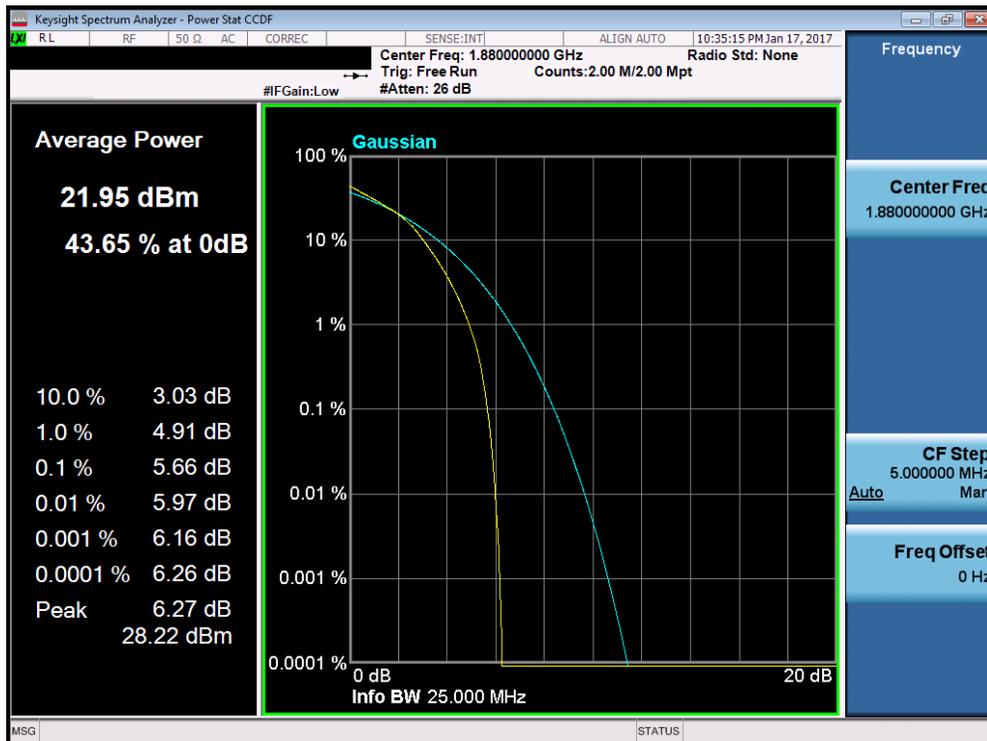


Plot 7-191. PAR Plot (Band 2 – 10.0MHz 16-QAM – RB Size 50)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 115 of 150

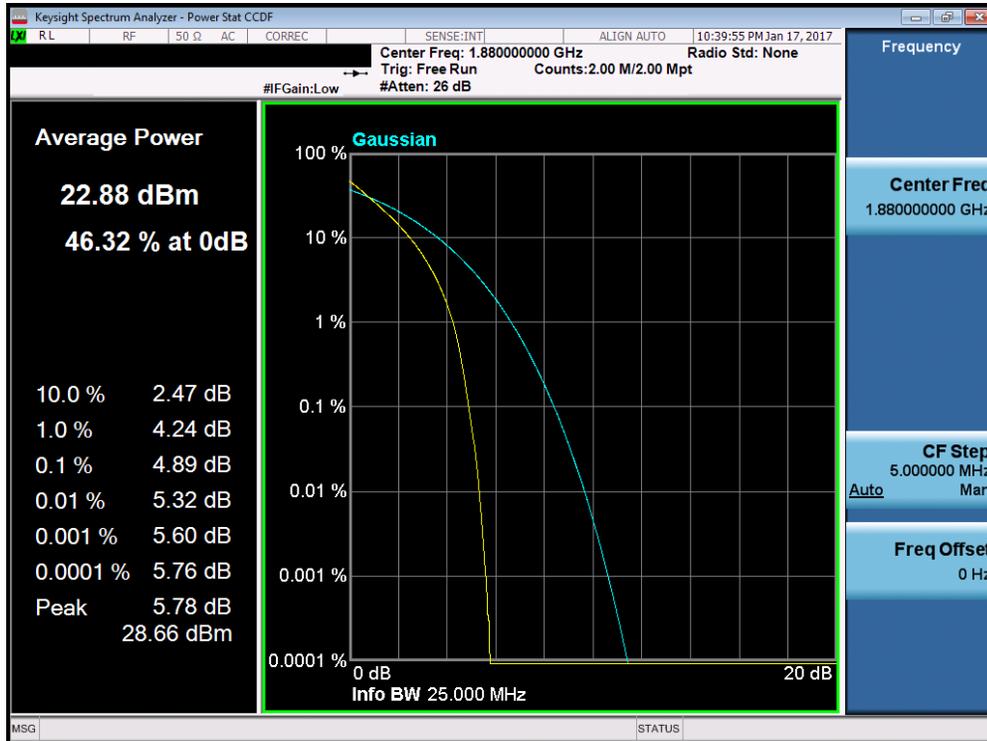


Plot 7-192. PAR Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

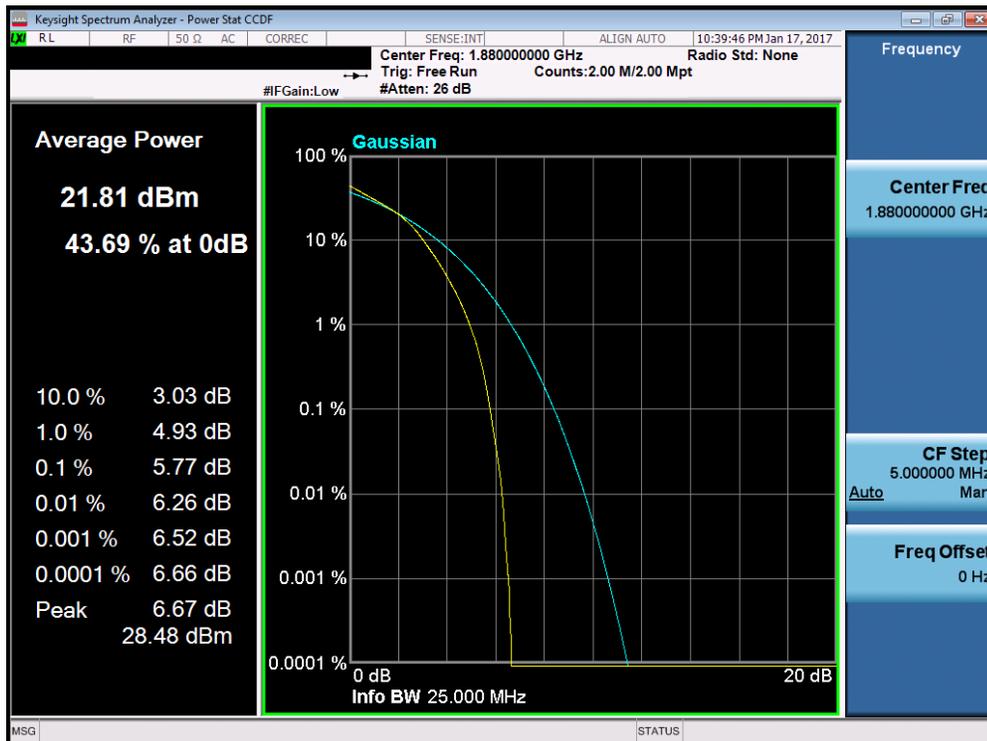


Plot 7-193. PAR Plot (Band 2 – 15.0MHz 16-QAM – RB Size 75)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 116 of 150



Plot 7-194. PAR Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 7-195. PAR Plot (Band 2 – 20.0MHz 16-QAM – RB Size 100)

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 117 of 150

## 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-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

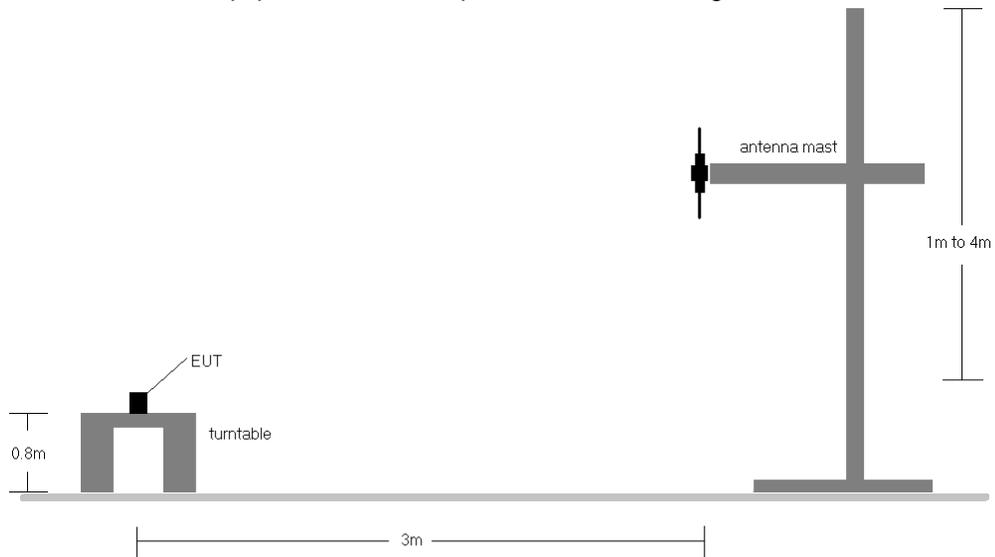
### Test Settings

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

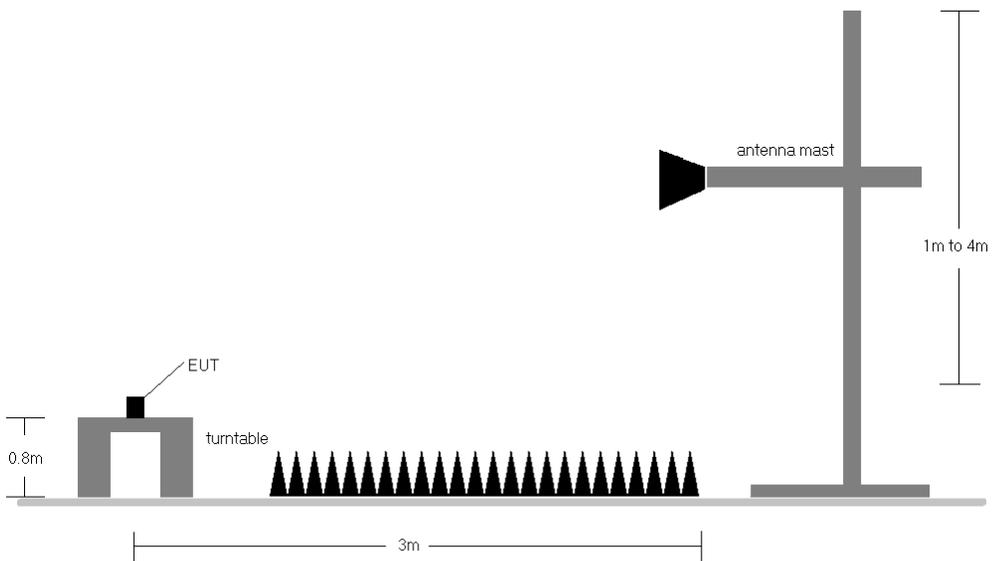
FCC ID: ZNFH700		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset	Page 118 of 150	

### 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.

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
699.70	1.4	QPSK	H	150	91	1 / 5	16.37	-1.05	15.32	34.77	-19.45
707.50	1.4	QPSK	H	150	89	1 / 0	17.37	-1.02	16.35	34.77	-18.42
715.30	1.4	QPSK	H	150	89	1 / 5	17.82	-0.99	16.83	34.77	-17.94
699.70	1.4	16-QAM	H	150	91	1 / 5	15.68	-1.05	14.63	34.77	-20.14
707.50	1.4	16-QAM	H	150	89	1 / 0	16.42	-1.02	15.40	34.77	-19.37
715.30	1.4	16-QAM	H	150	89	1 / 5	16.24	-0.99	15.25	34.77	-19.52
700.50	3	QPSK	H	150	94	1 / 14	17.52	-1.05	16.47	34.77	-18.30
707.50	3	QPSK	H	150	89	1 / 14	18.22	-1.02	17.20	34.77	-17.57
714.50	3	QPSK	H	150	89	1 / 14	18.55	-0.99	17.56	34.77	-17.21
700.50	3	16-QAM	H	150	94	1 / 14	16.15	-1.05	15.10	34.77	-19.67
707.50	3	16-QAM	H	150	89	1 / 14	16.82	-1.02	15.80	34.77	-18.97
714.50	3	16-QAM	H	150	89	1 / 14	17.12	-0.99	16.13	34.77	-18.64
714.50	3	QPSK	V	150	64	1 / 0	18.43	-0.99	17.44	34.77	-17.33

**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	H	150	91	1 / 24	17.77	-1.05	16.72	34.77	-18.05
707.50	5	QPSK	H	150	90	1 / 24	18.16	-1.02	17.14	34.77	-17.63
713.50	5	QPSK	H	150	91	1 / 24	18.41	-0.99	17.42	34.77	-17.35
701.50	5	16-QAM	H	150	91	1 / 24	16.56	-1.05	15.51	34.77	-19.26
707.50	5	16-QAM	H	150	90	1 / 24	16.92	-1.02	15.90	34.77	-18.87
713.50	5	16-QAM	H	150	91	1 / 24	16.92	-0.99	15.93	34.77	-18.84
704.00	10	QPSK	H	150	87	1 / 49	18.18	-1.05	17.13	34.77	-17.64
707.50	10	QPSK	H	150	89	1 / 49	18.42	-1.02	17.40	34.77	-17.37
711.00	10	QPSK	H	150	86	1 / 49	18.03	-0.99	17.04	34.77	-17.73
704.00	10	16-QAM	H	150	87	1 / 49	16.97	-1.05	15.92	34.77	-18.85
707.50	10	16-QAM	H	150	89	1 / 49	16.82	-1.02	15.80	34.77	-18.97
711.00	10	16-QAM	H	150	86	1 / 49	16.92	-0.99	15.93	34.77	-18.84

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

FCC ID: ZNFH700	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b>			<b>Approved by:</b> Quality Manager
<b>Test Report S/N:</b> 1M1702140057-03-R2.ZNF	<b>Test Dates:</b> 1/16 - 3/1/2017	<b>EUT Type:</b> Portable Handset	Page 120 of 150	

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	H	150	92	1 / 5	20.46	-0.65	19.81	38.45	-18.64
836.50	1.4	QPSK	H	150	99	1 / 5	20.51	-0.65	19.86	38.45	-18.59
848.30	1.4	QPSK	H	150	97	1 / 5	20.30	-0.65	19.65	38.45	-18.80
824.70	1.4	16-QAM	H	150	92	1 / 5	19.30	-0.65	18.65	38.45	-19.80
836.50	1.4	16-QAM	H	150	99	1 / 5	19.23	-0.65	18.58	38.45	-19.87
848.30	1.4	16-QAM	H	150	97	1 / 5	18.75	-0.65	18.10	38.45	-20.35
825.50	3	QPSK	H	150	90	1 / 0	20.90	-0.65	20.25	38.45	-18.20
836.50	3	QPSK	H	150	84	1 / 0	21.05	-0.65	20.40	38.45	-18.05
847.50	3	QPSK	H	150	95	1 / 0	20.66	-0.65	20.01	38.45	-18.44
825.50	3	16-QAM	H	150	90	1 / 0	19.30	-0.65	18.65	38.45	-19.80
836.50	3	16-QAM	H	150	84	1 / 0	19.60	-0.65	18.95	38.45	-19.50
847.50	3	16-QAM	H	150	95	1 / 0	19.47	-0.65	18.82	38.45	-19.63
826.50	5	QPSK	H	150	88	1 / 0	21.59	-0.65	20.94	38.45	-17.51
836.50	5	QPSK	H	150	93	1 / 0	21.83	-0.65	21.18	38.45	-17.27
846.50	5	QPSK	H	150	92	1 / 0	21.54	-0.65	20.89	38.45	-17.56
826.50	5	16-QAM	H	150	88	1 / 0	20.05	-0.65	19.40	38.45	-19.05
836.50	5	16-QAM	H	150	93	1 / 0	20.40	-0.65	19.75	38.45	-18.70
846.50	5	16-QAM	H	150	92	1 / 0	19.95	-0.65	19.30	38.45	-19.15
829.00	10	QPSK	H	150	88	1 / 49	21.76	-0.65	21.11	38.45	-17.34
836.50	10	QPSK	H	150	92	1 / 49	21.80	-0.65	21.15	38.45	-17.30
844.00	10	QPSK	H	150	91	1 / 49	21.35	-0.65	20.70	38.45	-17.75
829.00	10	16-QAM	H	150	88	1 / 49	20.13	-0.65	19.48	38.45	-18.97
836.50	10	16-QAM	H	150	92	1 / 49	20.10	-0.65	19.45	38.45	-19.00
844.00	10	16-QAM	H	150	91	1 / 49	19.74	-0.65	19.09	38.45	-19.36
836.50	5	QPSK	V	150	337	1 / 0	18.86	-0.65	18.21	38.45	-20.24

**Table 7-4. ERP Data (Band 5)**

FCC ID: ZNFH700	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b> 		<b>Approved by:</b> Quality Manager
<b>Test Report S/N:</b> 1M1702140057-03-R2.ZNF	<b>Test Dates:</b> 1/16 - 3/1/2017	<b>EUT Type:</b> Portable Handset	Page 121 of 150

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	150	46	1 / 0	17.43	5.56	22.99	30.00	-7.01
1732.50	1.4	QPSK	H	150	43	1 / 0	17.12	5.41	22.53	30.00	-7.47
1754.30	1.4	QPSK	H	150	43	1 / 0	16.77	5.26	22.03	30.00	-7.97
1710.70	1.4	16-QAM	H	150	46	1 / 0	15.88	5.56	21.44	30.00	-8.56
1732.50	1.4	16-QAM	H	150	43	1 / 0	15.75	5.41	21.16	30.00	-8.84
1754.30	1.4	16-QAM	H	150	43	1 / 0	15.52	5.26	20.78	30.00	-9.22
1711.50	3	QPSK	H	150	96	1 / 0	17.47	5.55	23.02	30.00	-6.98
1732.50	3	QPSK	H	150	46	1 / 0	17.73	5.41	23.14	30.00	-6.86
1753.50	3	QPSK	H	150	94	1 / 14	17.15	5.26	22.41	30.00	-7.59
1711.50	3	16-QAM	H	150	96	1 / 0	15.58	5.55	21.13	30.00	-8.87
1732.50	3	16-QAM	H	150	46	1 / 0	16.18	5.41	21.59	30.00	-8.41
1753.50	3	16-QAM	H	150	94	1 / 14	15.80	5.26	21.06	30.00	-8.94
1712.50	5	QPSK	H	150	44	1 / 24	18.36	5.55	23.91	30.00	-6.09
1732.50	5	QPSK	H	150	44	1 / 24	18.45	5.41	23.86	30.00	-6.14
1752.50	5	QPSK	H	150	91	1 / 24	17.80	5.27	23.07	30.00	-6.93
1712.50	5	16-QAM	H	150	44	1 / 24	16.56	5.55	22.11	30.00	-7.89
1732.50	5	16-QAM	H	150	44	1 / 24	16.52	5.41	21.93	30.00	-8.07
1752.50	5	16-QAM	H	150	91	1 / 24	16.28	5.27	21.55	30.00	-8.45
1715.00	10	QPSK	H	150	95	1 / 49	18.08	5.53	23.61	30.00	-6.39
1732.50	10	QPSK	H	150	47	1 / 49	18.76	5.41	24.17	30.00	-5.83
1750.00	10	QPSK	H	150	96	1 / 49	18.40	5.29	23.69	30.00	-6.31
1715.00	10	16-QAM	H	150	95	1 / 49	16.38	5.53	21.91	30.00	-8.09
1732.50	10	16-QAM	H	150	47	1 / 49	16.65	5.41	22.06	30.00	-7.94
1750.00	10	16-QAM	H	150	96	1 / 49	17.08	5.29	22.37	30.00	-7.63
1717.50	15	QPSK	H	150	97	1 / 74	18.14	5.51	23.65	30.00	-6.35
1732.50	15	QPSK	H	150	96	1 / 0	17.96	5.41	23.37	30.00	-6.63
1747.50	15	QPSK	H	150	98	1 / 0	18.11	5.31	23.42	30.00	-6.58
1717.50	15	16-QAM	H	150	97	1 / 74	16.68	5.51	22.19	30.00	-7.81
1732.50	15	16-QAM	H	150	96	1 / 0	16.56	5.41	21.97	30.00	-8.03
1747.50	15	16-QAM	H	150	98	1 / 0	18.20	5.31	23.51	30.00	-6.49
1720.00	20	QPSK	H	150	96	1 / 0	18.07	5.49	23.56	30.00	-6.44
1732.50	20	QPSK	H	150	98	1 / 99	18.10	5.41	23.51	30.00	-6.49
1745.00	20	QPSK	H	150	93	1 / 0	18.07	5.32	23.39	30.00	-6.61
1720.00	20	16-QAM	H	150	96	1 / 99	16.48	5.49	21.97	30.00	-8.03
1732.50	20	16-QAM	H	150	98	1 / 99	16.42	5.41	21.83	30.00	-8.17
1745.00	20	16-QAM	H	150	93	1 / 0	16.64	5.32	21.96	30.00	-8.04
1732.50	10	QPSK	V	150	310	1 / 0	16.26	5.41	21.67	30.00	-8.33

**Table 7-5. EIRP Data (Band 4)**

FCC ID: ZNFH700	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b>			<b>Approved by:</b> Quality Manager
<b>Test Report S/N:</b> 1M1702140057-03-R2.ZNF	<b>Test Dates:</b> 1/16 - 3/1/2017	<b>EUT Type:</b> Portable Handset	Page 122 of 150	

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	150	93	1 / 0	16.68	4.82	21.50	33.01	-11.51
1880.00	1.4	QPSK	H	150	93	1 / 5	16.77	4.74	21.51	33.01	-11.50
1909.30	1.4	QPSK	H	150	97	1 / 5	17.19	4.68	21.87	33.01	-11.14
1850.70	1.4	16-QAM	H	150	93	1 / 0	16.07	4.82	20.89	33.01	-12.12
1880.00	1.4	16-QAM	H	150	93	1 / 5	16.27	4.74	21.01	33.01	-12.00
1909.30	1.4	16-QAM	H	150	97	1 / 5	16.70	4.68	21.38	33.01	-11.63
1851.50	3	QPSK	H	150	93	1 / 14	16.68	4.82	21.50	33.01	-11.51
1880.00	3	QPSK	H	150	95	1 / 0	16.97	4.74	21.71	33.01	-11.30
1908.50	3	QPSK	H	150	50	1 / 14	17.24	4.68	21.92	33.01	-11.09
1851.50	3	16-QAM	H	150	93	1 / 14	16.12	4.82	20.94	33.01	-12.07
1880.00	3	16-QAM	H	150	95	1 / 0	16.22	4.74	20.96	33.01	-12.05
1908.50	3	16-QAM	H	150	50	1 / 14	16.65	4.68	21.33	33.01	-11.68
1852.50	5	QPSK	H	150	95	1 / 0	17.42	4.81	22.23	33.01	-10.78
1880.00	5	QPSK	H	150	94	12 / 6	17.57	4.74	22.31	33.01	-10.70
1907.50	5	QPSK	H	150	98	1 / 24	17.57	4.68	22.25	33.01	-10.76
1852.50	5	16-QAM	H	150	95	1 / 24	16.57	4.81	21.38	33.01	-11.63
1880.00	5	16-QAM	H	150	94	1 / 0	16.87	4.74	21.61	33.01	-11.40
1907.50	5	16-QAM	H	150	98	1 / 24	16.67	4.68	21.35	33.01	-11.66
1855.00	10	QPSK	H	100	308	1 / 0	16.85	4.81	21.66	33.01	-11.35
1880.00	10	QPSK	H	100	340	50 / 0	17.35	4.74	22.09	33.01	-10.92
1905.00	10	QPSK	H	103	343	1 / 0	17.45	4.68	22.13	33.01	-10.88
1855.00	10	16-QAM	H	100	308	1 / 0	16.05	4.81	20.86	33.01	-12.15
1880.00	10	16-QAM	H	100	340	1 / 49	16.75	4.74	21.49	33.01	-11.52
1905.00	10	16-QAM	H	103	343	1 / 0	16.65	4.68	21.33	33.01	-11.68
1857.50	15	QPSK	H	150	91	75 / 0	17.25	4.80	22.05	33.01	-10.96
1880.00	15	QPSK	H	150	95	1 / 74	17.72	4.74	22.46	33.01	-10.55
1902.50	15	QPSK	H	150	93	1 / 0	17.38	4.69	22.07	33.01	-10.94
1857.50	15	16-QAM	H	150	91	75 / 0	16.33	4.80	21.13	33.01	-11.88
1880.00	15	16-QAM	H	150	95	1 / 74	16.91	4.74	21.65	33.01	-11.36
1902.50	15	16-QAM	H	150	93	1 / 0	16.70	4.69	21.39	33.01	-11.62
1860.00	20	QPSK	H	150	93	100 / 0	17.57	4.79	22.36	33.01	-10.65
1880.00	20	QPSK	H	150	93	50 / 25	17.69	4.74	22.43	33.01	-10.58
1900.00	20	QPSK	H	150	93	50 / 25	17.45	4.69	22.14	33.01	-10.87
1860.00	20	16-QAM	H	150	93	100 / 0	16.49	4.79	21.28	33.01	-11.73
1880.00	20	16-QAM	H	150	93	50 / 25	17.70	4.74	22.44	33.01	-10.57
1900.00	20	16-QAM	H	150	93	1 / 0	16.79	4.69	21.48	33.01	-11.53
1880.00	15	QPSK	V	150	41	1 / 0	13.65	4.74	18.39	33.01	-14.62

**Table 7-6. EIRP Data (Band 2)**

FCC ID: ZNFH700	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b>		Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset	Page 123 of 150

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]
2307.50	5	QPSK	H	110	333	1 / 24	13.15	8.72	21.87	23.98	-2.11
2310.00	5	QPSK	H	107	335	1 / 0	13.19	8.73	21.92	23.98	-2.06
2312.50	5	QPSK	H	101	340	1 / 24	12.95	8.74	21.69	23.98	-2.29
2307.50	5	16-QAM	H	110	333	1 / 24	12.55	8.72	21.27	23.98	-2.71
2310.00	5	16-QAM	H	107	335	1 / 0	12.70	8.73	21.43	23.98	-2.55
2312.50	5	16-QAM	H	101	340	1 / 24	12.68	8.74	21.42	23.98	-2.56
2310.00	10	QPSK	H	107	338	25 / 12	13.27	8.73	22.00	23.98	-1.98
2310.00	10	16-QAM	H	107	338	25 / 12	12.31	8.73	21.04	23.98	-2.94
1732.50	10	QPSK	V	124	271	1 / 0	11.88	9.50	21.38	23.98	-2.60

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

FCC ID: ZNFH700	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b>			<b>Approved by:</b> Quality Manager
<b>Test Report S/N:</b> 1M1702140057-03-R2.ZNF	<b>Test Dates:</b> 1/16 - 3/1/2017	<b>EUT Type:</b> Portable Handset	Page 124 of 150	

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	H	150	105	1 / 24	14.77	5.74	20.51	33.01	-12.50
2535.00	5	QPSK	H	150	38	1 / 24	14.72	5.86	20.58	33.01	-12.43
2567.50	5	QPSK	H	150	42	1 / 24	15.36	5.98	21.34	33.01	-11.67
2502.50	5	16-QAM	H	150	105	1 / 24	13.67	5.74	19.41	33.01	-13.60
2535.00	5	16-QAM	H	150	38	1 / 24	13.69	5.86	19.55	33.01	-13.46
2567.50	5	16-QAM	H	150	42	1 / 24	14.47	5.98	20.45	33.01	-12.56
2505.00	10	QPSK	H	150	106	1 / 49	15.72	5.75	21.47	33.01	-11.54
2535.00	10	QPSK	H	150	102	1 / 49	14.85	5.86	20.71	33.01	-12.30
2565.00	10	QPSK	H	150	102	1 / 49	14.78	5.97	20.75	33.01	-12.26
2505.00	10	16-QAM	H	150	106	1 / 49	14.00	5.75	19.75	33.01	-13.26
2535.00	10	16-QAM	H	150	102	1 / 49	13.75	5.86	19.61	33.01	-13.40
2565.00	10	16-QAM	H	150	102	1 / 49	13.75	5.97	19.72	33.01	-13.29
2507.50	15	QPSK	H	150	103	1 / 74	15.65	5.76	21.41	33.01	-11.60
2535.00	15	QPSK	H	150	102	1 / 74	14.70	5.86	20.56	33.01	-12.45
2562.50	15	QPSK	H	150	106	1 / 74	14.02	5.96	19.98	33.01	-13.03
2507.50	15	16-QAM	H	150	103	1 / 74	14.10	5.76	19.86	33.01	-13.15
2535.00	15	16-QAM	H	150	102	1 / 74	13.66	5.86	19.52	33.01	-13.49
2562.50	15	16-QAM	H	150	106	1 / 74	13.12	5.96	19.08	33.01	-13.93
2510.00	20	QPSK	H	150	105	1 / 99	15.39	5.77	21.16	33.01	-11.85
2535.00	20	QPSK	H	150	105	100 / 0	14.62	5.86	20.48	33.01	-12.53
2560.00	20	QPSK	H	150	105	1 / 0	14.87	5.95	20.82	33.01	-12.19
2510.00	20	16-QAM	H	150	105	1 / 99	14.50	5.77	20.27	33.01	-12.74
2535.00	20	16-QAM	H	150	105	100 / 0	13.64	5.86	19.50	33.01	-13.51
2560.00	20	16-QAM	H	150	105	1 / 0	13.67	5.95	19.62	33.01	-13.39
2505.00	10	QPSK	V	150	323	1 / 0	12.79	5.75	18.54	33.01	-14.47

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

FCC ID: ZNFH700	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b>			<b>Approved by:</b> Quality Manager
<b>Test Report S/N:</b> 1M1702140057-03-R2.ZNF	<b>Test Dates:</b> 1/16 - 3/1/2017	<b>EUT Type:</b> Portable Handset	Page 125 of 150	

## 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-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

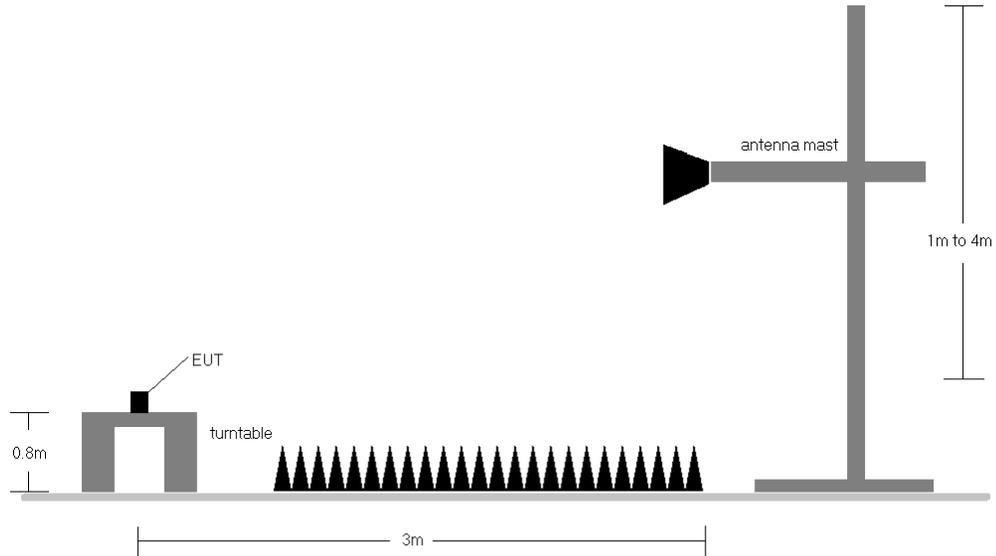
ANSI/TIA-603-D-2010 – Section 2.2.12

### 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: ZNFH700	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b>			<b>Approved by:</b> Quality Manager
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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.

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OPERATING FREQUENCY: 700.50 MHz  
 CHANNEL: 23025  
 MEASURED OUTPUT POWER: 16.47 dBm = 0.044 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 3.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  29.47 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]
1401.00	H	100	270	-63.96	5.91	-58.05	74.5
2101.50	H	120	189	-68.75	6.79	-61.96	78.4
2802.00	H	-	-	-72.37	8.12	-64.25	80.7

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

OPERATING FREQUENCY: 707.50 MHz  
 CHANNEL: 23095  
 MEASURED OUTPUT POWER: 17.20 dBm = 0.052 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 3.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  30.20 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]
1415.00	H	120	200	-64.16	5.96	-58.19	75.4
2122.50	H	180	150	-70.12	6.84	-63.27	80.5
2830.00	H	-	-	-72.19	8.13	-64.06	81.3

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

FCC ID: ZNFH700	 PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	 LG	Approved by: Quality Manager
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OPERATING FREQUENCY: 714.50 MHz  
 CHANNEL: 23165  
 MEASURED OUTPUT POWER: 17.56 dBm = 0.057 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 3.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  30.56 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]
1429.00	H	112	110	-64.92	6.02	-58.90	76.5
2143.50	H	200	150	-71.21	6.90	-64.32	81.9
2858.00	H	-	-	-72.10	8.15	-63.95	81.5

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

OPERATING FREQUENCY: 826.50 MHz  
 CHANNEL: 20425  
 MEASURED OUTPUT POWER: 20.94 dBm = 0.124 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  33.94 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	122	230	-74.47	6.28	-68.19	89.1
2479.50	H	100	221	-68.38	6.84	-61.53	82.5
3306.00	H	-	-	-68.74	7.14	-61.59	82.5

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

FCC ID: ZNFH700			FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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OPERATING FREQUENCY: 836.50 MHz  
 CHANNEL: 20525  
 MEASURED OUTPUT POWER: 21.18 dBm = 0.131 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  34.18 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	134	69	-73.00	6.21	-66.79	88.0
2509.50	H	100	124	-50.18	6.86	-43.32	64.5
3346.00	H	-	-	-68.80	7.26	-61.53	82.7

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

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	112	150	-73.61	6.14	-67.47	88.4
2539.50	H	200	100	-46.82	6.95	-39.87	60.8
3386.00	H	-	-	-68.96	7.38	-61.58	82.5

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

FCC ID: ZNFH700	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b>			<b>Approved by:</b> Quality Manager
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OPERATING FREQUENCY: 1715.00 MHz  
 CHANNEL: 20000  
 MEASURED OUTPUT POWER: 23.61 dBm = 0.230 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  36.61 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]
3430.00	H	101	171	-67.17	9.67	-57.50	81.1
5145.00	H	108	167	-64.03	10.90	-53.13	76.7

**Table 7-15. Radiated Spurious Data (Band 4 – Low Channel)**

OPERATING FREQUENCY: 1732.50 MHz  
 CHANNEL: 20175  
 MEASURED OUTPUT POWER: 24.17 dBm = 0.261 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  37.17 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	101	340	-66.98	9.77	-57.20	81.4
5197.50	H	-	-	-66.99	10.81	-56.18	80.3

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

FCC ID: ZNFH700	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b>			<b>Approved by:</b> Quality Manager
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OPERATING FREQUENCY: 1750.00 MHz  
 CHANNEL: 20350  
 MEASURED OUTPUT POWER: 23.69 dBm = 0.234 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  36.69 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]
3500.00	H	-	-	-69.04	9.88	-59.16	82.8

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

OPERATING FREQUENCY: 1857.50 MHz  
 CHANNEL: 18675  
 MEASURED OUTPUT POWER: 22.05 dBm = 0.160 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 15.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  35.05 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]
3715.00	H	112	270	-69.56	9.97	-59.59	81.6
5572.50	H	-	-	-67.43	11.23	-56.20	78.2

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

FCC ID: ZNFH700	 PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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OPERATING FREQUENCY: 1880.00 MHz  
 CHANNEL: 18900  
 MEASURED OUTPUT POWER: 22.46 dBm = 0.176 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 15.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  35.46 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]
3760.00	H	110	215	-68.67	9.79	-58.88	81.3
5640.00	H	-	-	-67.56	11.35	-56.21	78.7

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

OPERATING FREQUENCY: 1902.50 MHz  
 CHANNEL: 19125  
 MEASURED OUTPUT POWER: 22.07 dBm = 0.161 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 15.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  35.07 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]
3805.00	H	114	210	-67.42	9.61	-57.82	79.9
5707.50	H	-	-	-67.61	11.43	-56.18	78.2

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

FCC ID: ZNFH700	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b>			<b>Approved by:</b> Quality Manager
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OPERATING FREQUENCY: 2307.50 MHz  
 CHANNEL: 27685  
 MEASURED OUTPUT POWER: 21.87 dBm = 0.154 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $70 + 10 \log_{10}(W) =$  61.87 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]
4615.00	H	-	-	-69.03	11.33	-57.70	79.6
6922.50	H	-	-	-60.13	10.89	-49.25	71.1

**Table 7-21. Radiated Spurious Data (Band 30 – Low Channel)**

OPERATING FREQUENCY: 2310.00 MHz  
 CHANNEL: 27710  
 MEASURED OUTPUT POWER: 21.92 dBm = 0.156 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $70 + 10 \log_{10}(W) =$  61.92 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	-	-	-69.50	11.33	-58.17	80.1
6930.00	H	-	-	-60.61	10.89	-49.73	71.7

**Table 7-22. Radiated Spurious Data (Band 30 – Mid Channel)**

FCC ID: ZNFH700	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b>			<b>Approved by:</b> Quality Manager
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OPERATING FREQUENCY: 2312.50 MHz  
 CHANNEL: 27735  
 MEASURED OUTPUT POWER: 21.69 dBm = 0.148 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $70 + 10 \log_{10}(W) =$  61.69 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]
4625.00	H	-	-	-69.08	11.33	-57.75	79.4
6937.50	H	-	-	-59.82	10.89	-48.94	70.6

Table 7-23. Radiated Spurious Data (Band 30 – High Channel)

OPERATING FREQUENCY: 2505.00 MHz  
 CHANNEL: 20800  
 MEASURED OUTPUT POWER: 21.47 dBm = 0.140 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $55 + 10 \log_{10}(W) =$  46.47 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]
5010.00	H	-	-	-69.27	11.17	-58.10	79.6

Table 7-24. Radiated Spurious Data (Band 7 – Low Channel)

FCC ID: ZNFH700			FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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OPERATING FREQUENCY: 2535.00 MHz  
 CHANNEL: 21100  
 MEASURED OUTPUT POWER: 20.71 dBm = 0.118 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $55 + 10 \log_{10}(W)$  45.71 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	100	127	-65.22	11.04	-54.18	74.9
7605.00	H	-	-	-62.48	11.47	-51.01	71.7

Table 7-25. Radiated Spurious Data (Band 7 – Mid Channel)

OPERATING FREQUENCY: 2565.00 MHz  
 CHANNEL: 21400  
 MEASURED OUTPUT POWER: 20.75 dBm = 0.119 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $55 + 10 \log_{10}(W)$  45.75 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]
5130.00	H	115	200	-65.72	10.92	-54.79	75.5
7695.00	H	-	-	-61.63	11.55	-50.08	70.8

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

FCC ID: ZNFH700			FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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## 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  $\pm 0.00025\%$  ( $\pm 2.5$  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-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

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## Band 12 Frequency Stability Measurements

\$2.1055 \$27.54

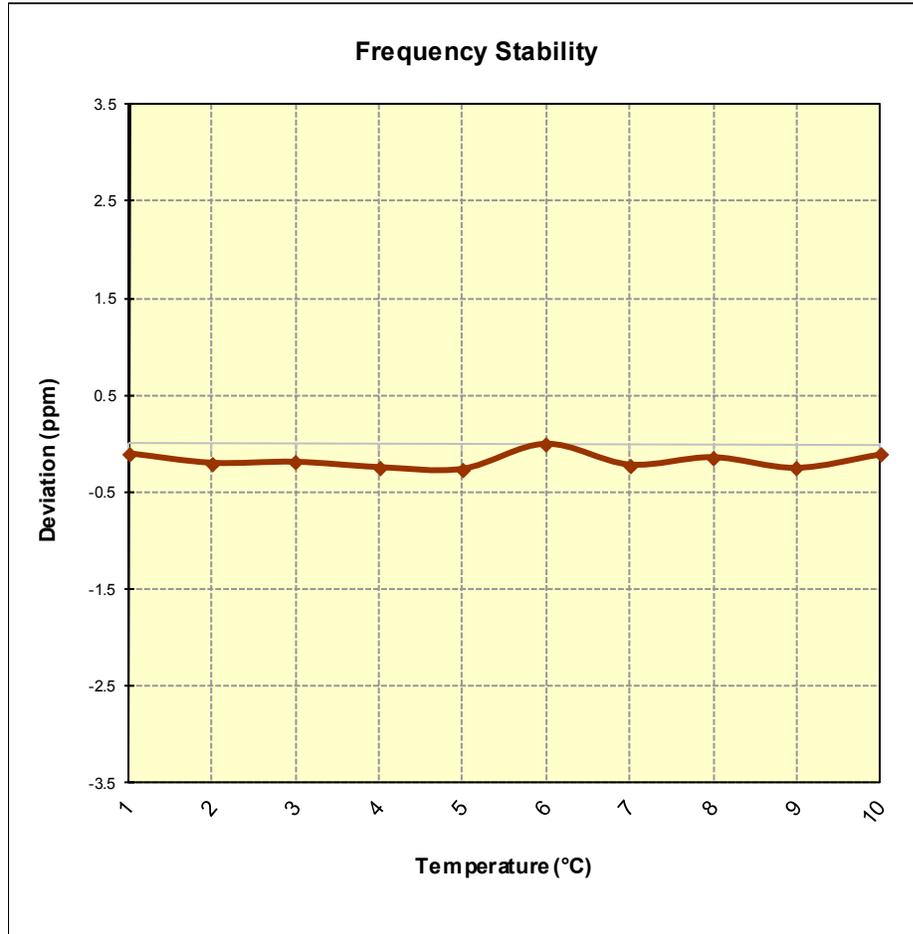
OPERATING FREQUENCY: 707,500,000 Hz  
 CHANNEL: 23790  
 REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	707,499,930	-70	-0.0000099
100 %		- 30	707,499,860	-140	-0.0000198
100 %		- 20	707,499,867	-133	-0.0000188
100 %		- 10	707,499,828	-172	-0.0000242
100 %		0	707,499,815	-185	-0.0000261
100 %		+ 10	707,499,999	-1	-0.0000001
100 %		+ 20	707,499,847	-153	-0.0000217
100 %		+ 30	707,499,901	-99	-0.0000140
100 %		+ 40	707,499,823	-177	-0.0000251
100 %		+ 50	707,499,920	-80	-0.0000113
BATT. ENDPOINT		3.45	+ 20	707,499,829	-171

**Table 7-27. Frequency Stability Data (Band 12)**

FCC ID: ZNFH700		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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**Band 12 Frequency Stability Measurements**  
**\$2.1055 \$27.54**



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

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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## Band 5 Frequency Stability Measurements

§2.1055 §22.355

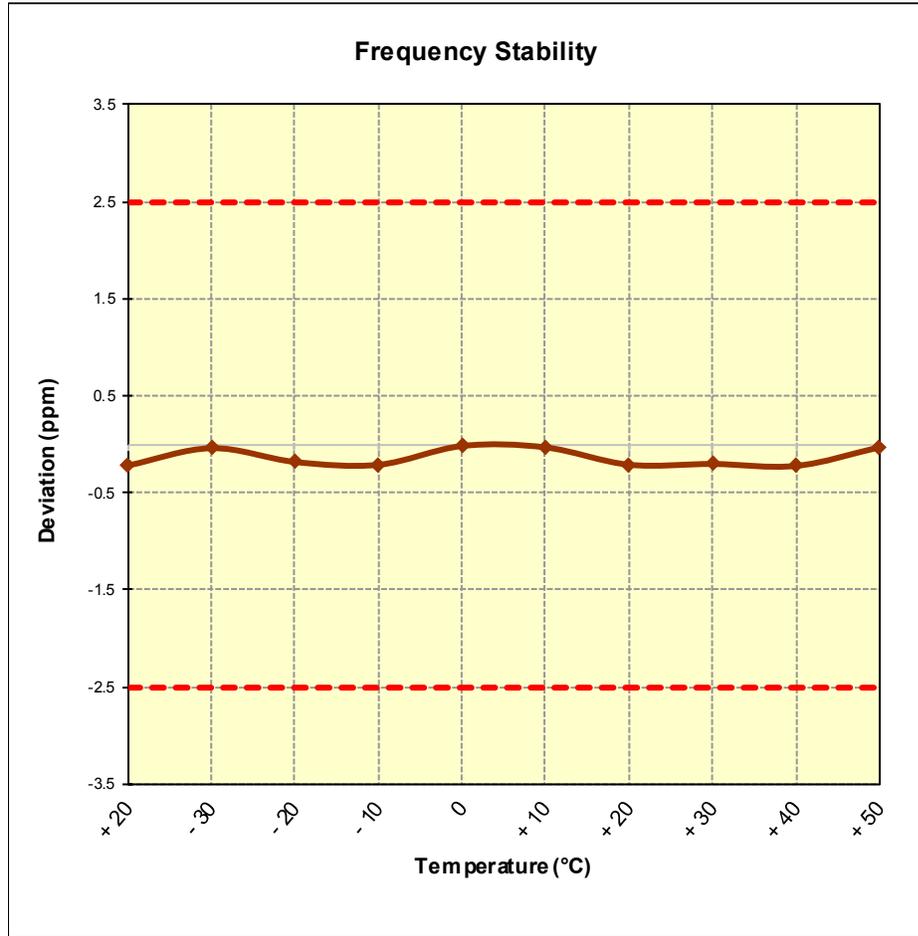
OPERATING FREQUENCY: 836,500,000 Hz  
 CHANNEL: 20525  
 REFERENCE VOLTAGE: 3.85 VDC  
 DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	836,499,815	-185	-0.0000221
100 %		- 30	836,499,964	-36	-0.0000043
100 %		- 20	836,499,844	-156	-0.0000187
100 %		- 10	836,499,820	-180	-0.0000216
100 %		0	836,499,984	-16	-0.0000020
100 %		+ 10	836,499,971	-29	-0.0000035
100 %		+ 20	836,499,820	-180	-0.0000215
100 %		+ 30	836,499,827	-173	-0.0000207
100 %		+ 40	836,499,810	-190	-0.0000227
100 %		+ 50	836,499,972	-28	-0.0000034
BATT. ENDPOINT		3.45	+ 20	836,499,911	-89

**Table 7-28. Frequency Stability Data (Band 5)**

FCC ID: ZNFH700		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset			Page 140 of 150

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



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

FCC ID: ZNFH700	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b>			<b>Approved by:</b> Quality Manager
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## Band 4 Frequency Stability Measurements

\$2.1055 \$27.54

OPERATING FREQUENCY: 1,732,500,000 Hz  
 CHANNEL: 20175  
 REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,732,499,807	-193	-0.0000111
100 %		- 30	1,732,499,939	-61	-0.0000035
100 %		- 20	1,732,499,962	-38	-0.0000022
100 %		- 10	1,732,499,812	-188	-0.0000108
100 %		0	1,732,499,858	-142	-0.0000082
100 %		+ 10	1,732,499,843	-157	-0.0000091
100 %		+ 20	1,732,499,944	-56	-0.0000032
100 %		+ 30	1,732,499,988	-12	-0.0000007
100 %		+ 40	1,732,499,809	-191	-0.0000110
100 %		+ 50	1,732,499,904	-96	-0.0000056
BATT. ENDPOINT		3.45	+ 20	1,732,499,977	-23

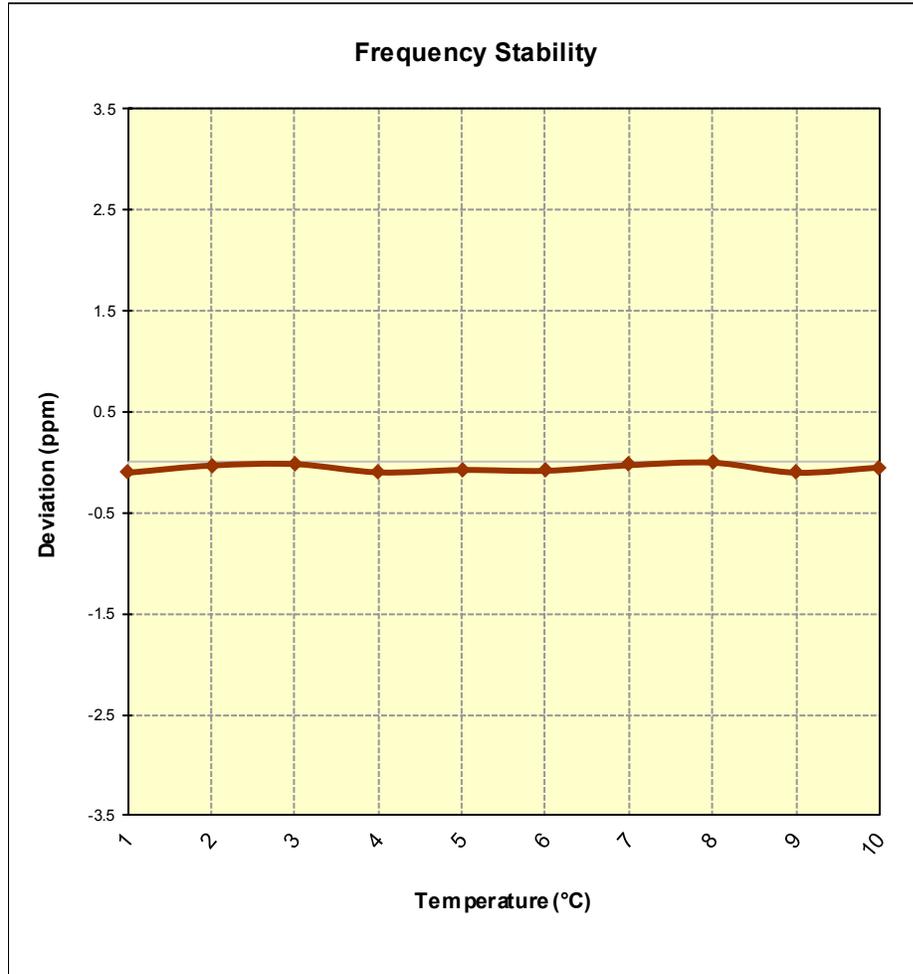
**Table 7-29. Frequency Stability Data (Band 4)**

**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: ZNFH700	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b>			<b>Approved by:</b> Quality Manager
<b>Test Report S/N:</b> 1M1702140057-03-R2.ZNF	<b>Test Dates:</b> 1/16 - 3/1/2017	<b>EUT Type:</b> Portable Handset	Page 142 of 150	

**Band 4 Frequency Stability Measurements**  
**\$2.1055 \$27.54**



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

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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## 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)	1,879,999,890	-110	-0.0000059
100 %		- 30	1,879,999,898	-102	-0.0000054
100 %		- 20	1,879,999,907	-93	-0.0000049
100 %		- 10	1,879,999,970	-30	-0.0000016
100 %		0	1,879,999,871	-129	-0.0000069
100 %		+ 10	1,879,999,872	-128	-0.0000068
100 %		+ 20	1,879,999,810	-190	-0.0000101
100 %		+ 30	1,879,999,978	-22	-0.0000012
100 %		+ 40	1,879,999,830	-170	-0.0000090
100 %		+ 50	1,879,999,877	-123	-0.0000065
BATT. ENDPOINT		3.45	+ 20	1,879,999,879	-121

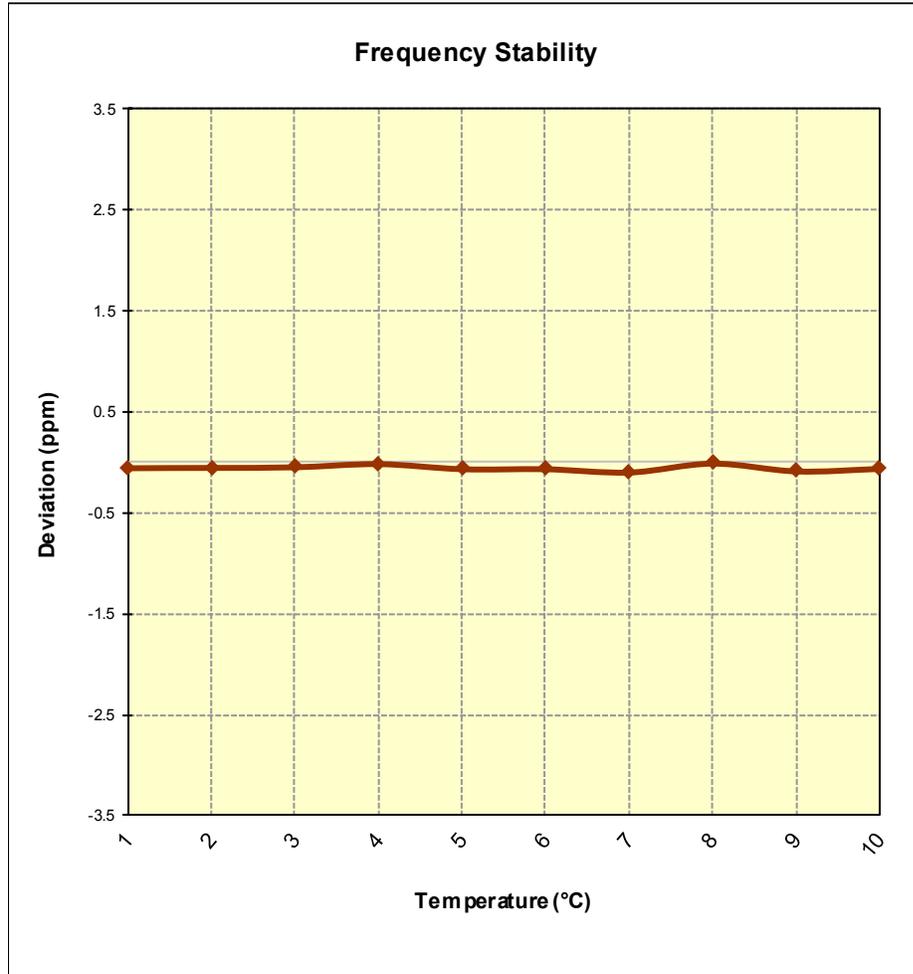
**Table 7-30. Frequency Stability Data (Band 2)**

**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: ZNFH700		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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**Band 2 Frequency Stability Measurements**  
**§2.1055 §24.235**



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

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 145 of 150

## Band 30 Frequency Stability Measurements

\$2.1055 \$24.235

OPERATING FREQUENCY: 2,310,000,000 Hz  
 CHANNEL: 27710  
 REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	2,309,999,976	-24	-0.0000011
100 %		- 30	2,309,999,908	-92	-0.0000040
100 %		- 20	2,309,999,990	-10	-0.0000004
100 %		- 10	2,309,999,861	-139	-0.0000060
100 %		0	2,309,999,999	-1	0.0000000
100 %		+ 10	2,309,999,866	-134	-0.0000058
100 %		+ 20	2,309,999,881	-119	-0.0000052
100 %		+ 30	2,309,999,926	-74	-0.0000032
100 %		+ 40	2,309,999,948	-52	-0.0000023
100 %		+ 50	2,309,999,925	-75	-0.0000032
BATT. ENDPOINT		3.45	+ 20	2,309,999,909	-91

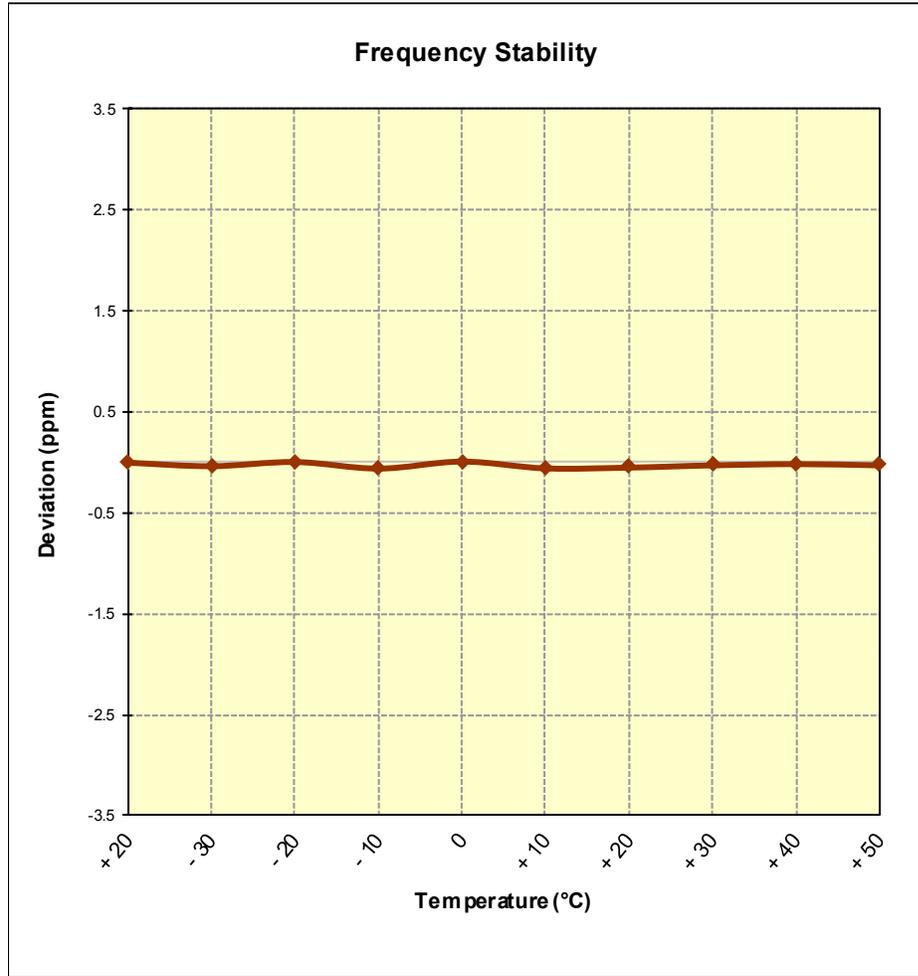
**Table 7-31. Frequency Stability Data (Band 30)**

**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: ZNFH700	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b>			<b>Approved by:</b> Quality Manager
<b>Test Report S/N:</b> 1M1702140057-03-R2.ZNF	<b>Test Dates:</b> 1/16 - 3/1/2017	<b>EUT Type:</b> Portable Handset	Page 146 of 150	

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



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

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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## 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)	2,534,999,883	-117	-0.0000046
100 %		- 30	2,534,999,991	-9	-0.0000004
100 %		- 20	2,534,999,853	-147	-0.0000058
100 %		- 10	2,534,999,932	-68	-0.0000027
100 %		0	2,534,999,839	-161	-0.0000064
100 %		+ 10	2,534,999,841	-159	-0.0000063
100 %		+ 20	2,534,999,988	-12	-0.0000005
100 %		+ 30	2,534,999,808	-192	-0.0000076
100 %		+ 40	2,534,999,914	-86	-0.0000034
100 %		+ 50	2,534,999,901	-99	-0.0000039
BATT. ENDPOINT	3.45	+ 20	2,534,999,803	-197	-0.0000078

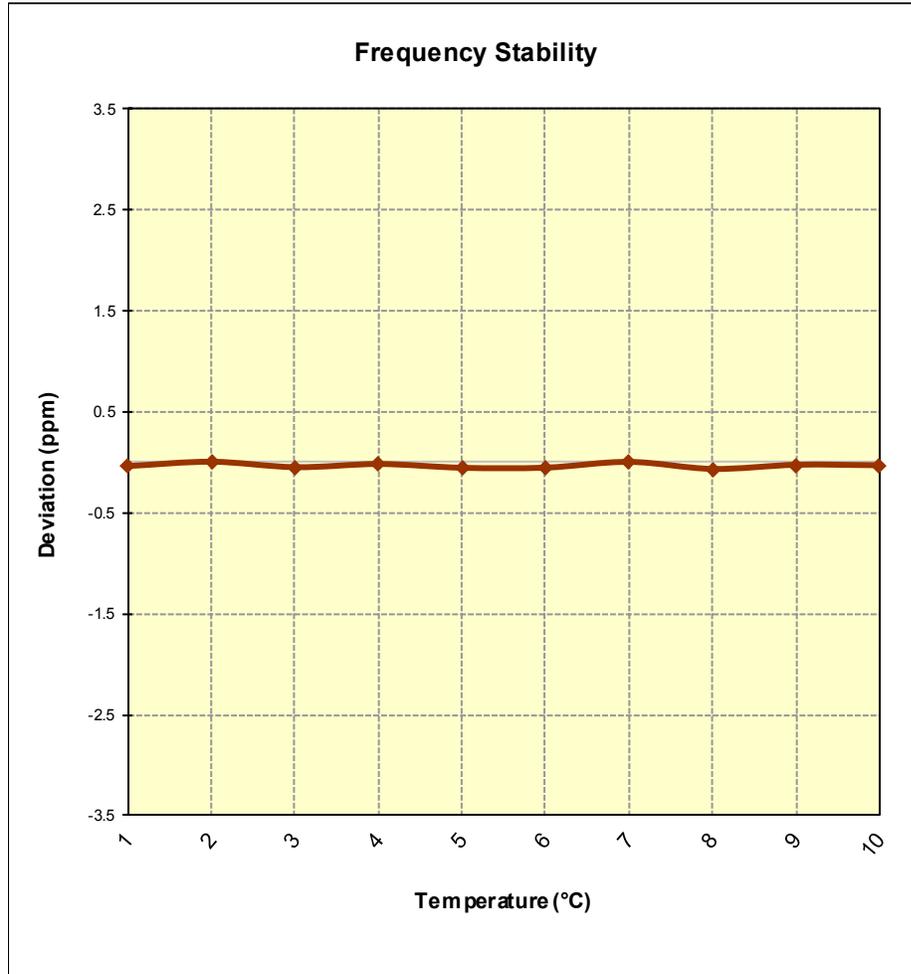
**Table 7-32. Frequency Stability Data (Band 7)**

**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: ZNFH700		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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**Band 7 Frequency Stability Measurements**  
**\$2.1055 \$27.54**



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

FCC ID: ZNFH700	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1702140057-03-R2.ZNF	Test Dates: 1/16 - 3/1/2017	EUT Type: Portable Handset		Page 149 of 150

## 8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LGE Portable Handset FCC ID: ZNFH700** complies with all the requirements of Parts 22, 24, & 27 of the FCC rules for LTE operation only.

FCC ID: ZNFH700	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Approved by:</b> Quality Manager
<b>Test Report S/N:</b> 1M1702140057-03-R2.ZNF	<b>Test Dates:</b> 1/16 - 3/1/2017	<b>EUT Type:</b> Portable Handset	Page 150 of 150