

## 7.4 Band Edge Emissions at Antenna Terminal

§2.1051 §22.917(a) §24.238(a) §27.53(c) §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 of any spurious emission is  $43 + \log_{10}(P_{[Watts]})$ , where P is the transmitter power in Watts.***

### Test Procedure Used

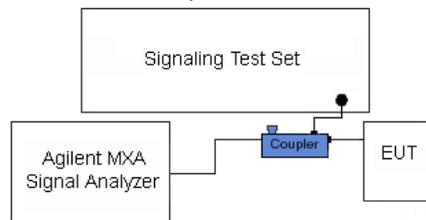
KDB 971168 D01 v02r02 – Section 6.0

### 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.

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.

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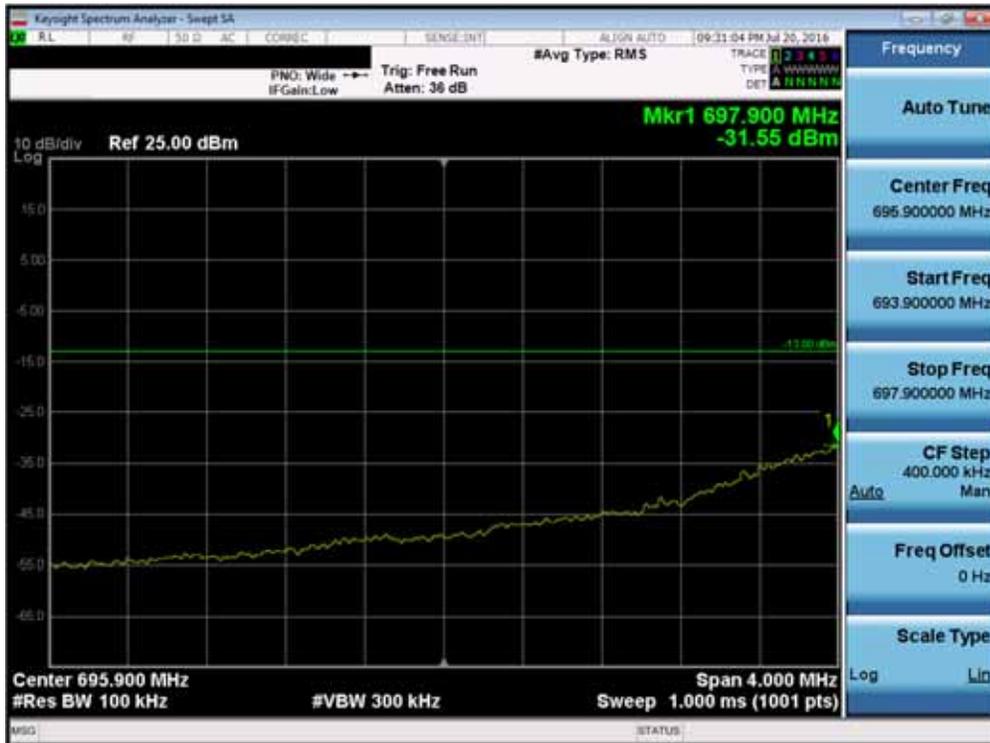
Per 27.53(c.5) for operations in the 776-788 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

For all plots showing emissions in the 763 – 775MHz and 793 – 805MHz band, the FCC limit per 27.53(c.4) is  $65 + 10\log_{10}(P) = -35\text{dBm}$  in a 6.25kHz bandwidth.

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Plot 7-84. Lower Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

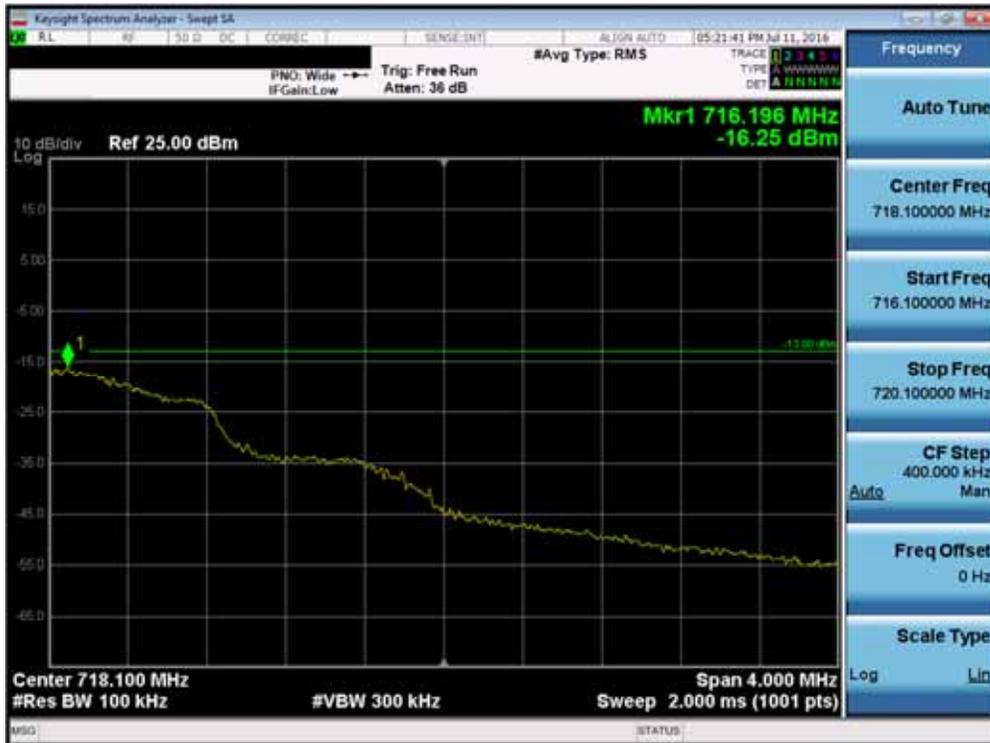


Plot 7-85. Lower Extended Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

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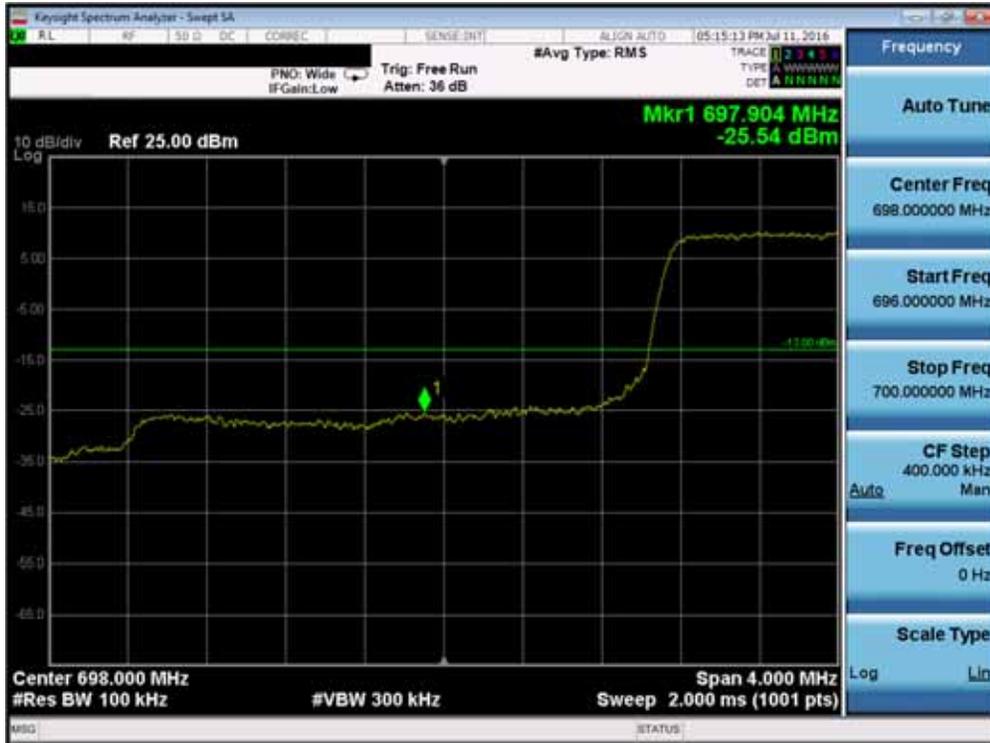


Plot 7-86. Upper Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)



Plot 7-87. Upper Extended Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Plot 7-88. Lower Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)



Plot 7-89. Lower Extended Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFH918	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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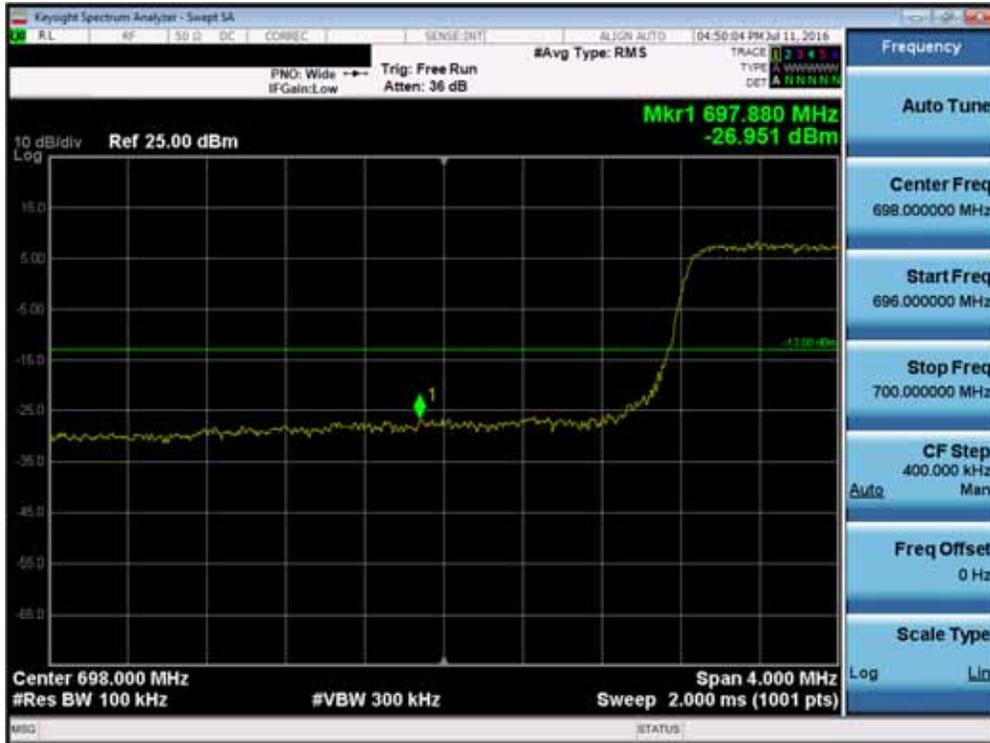


Plot 7-90. Upper Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)



Plot 7-91. Upper Extended Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Plot 7-92. Lower Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)



Plot 7-93. Lower Extended Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFH918	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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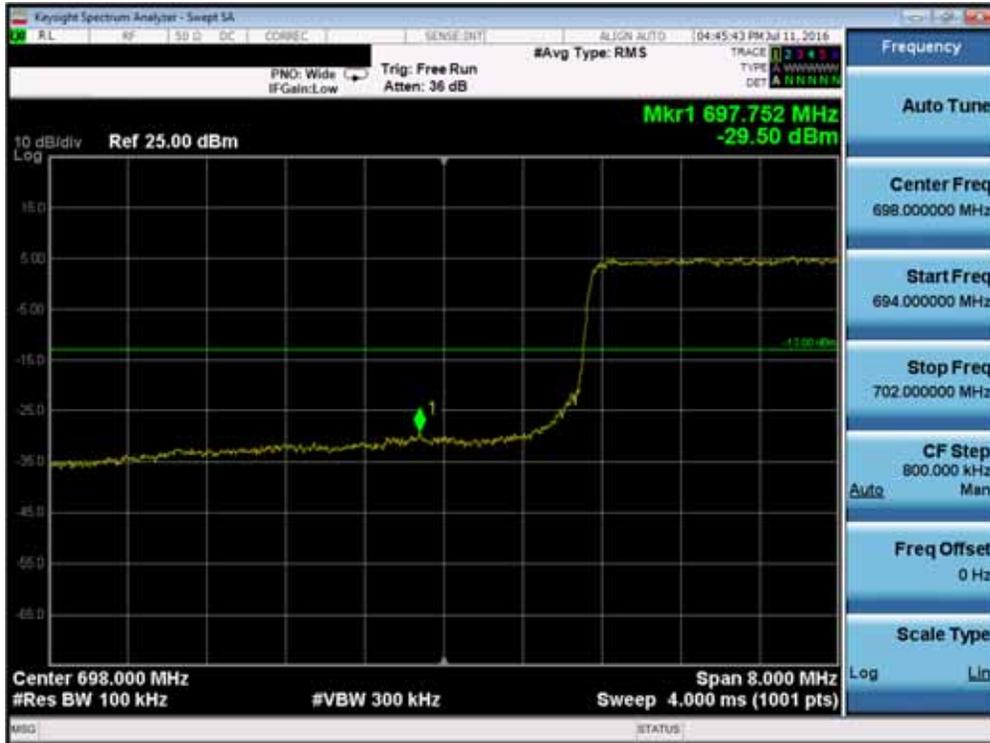


Plot 7-94. Upper Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)

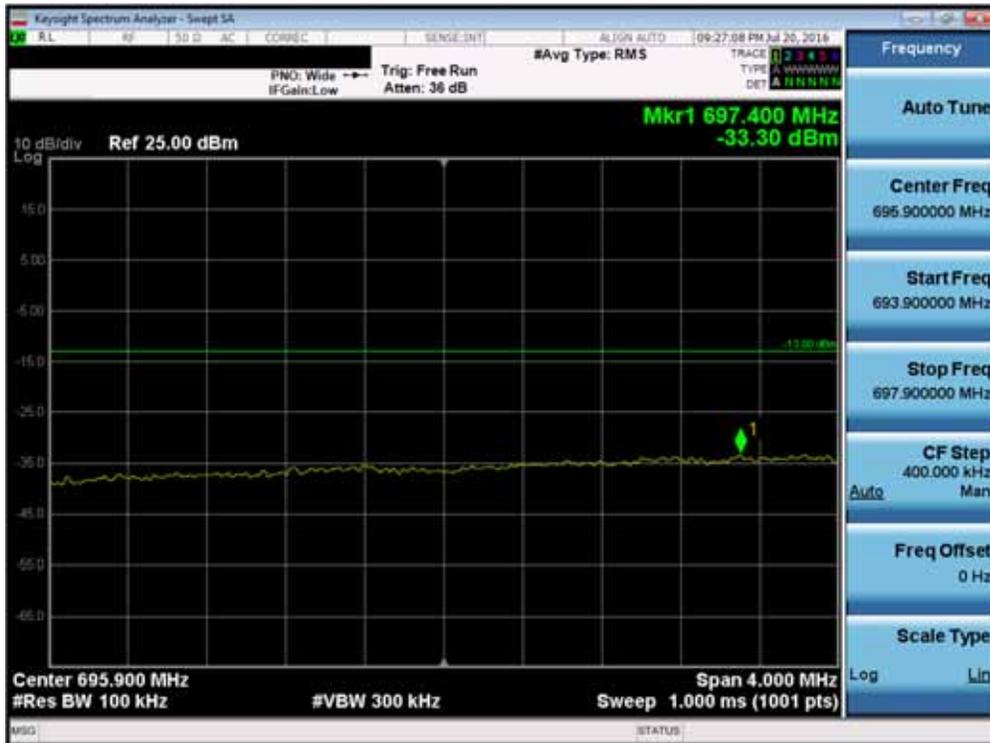


Plot 7-95. Upper Extended Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Plot 7-96. Lower Band Edge Plot (Band 12 – 10.0MHz QPSK – RB Size 50)

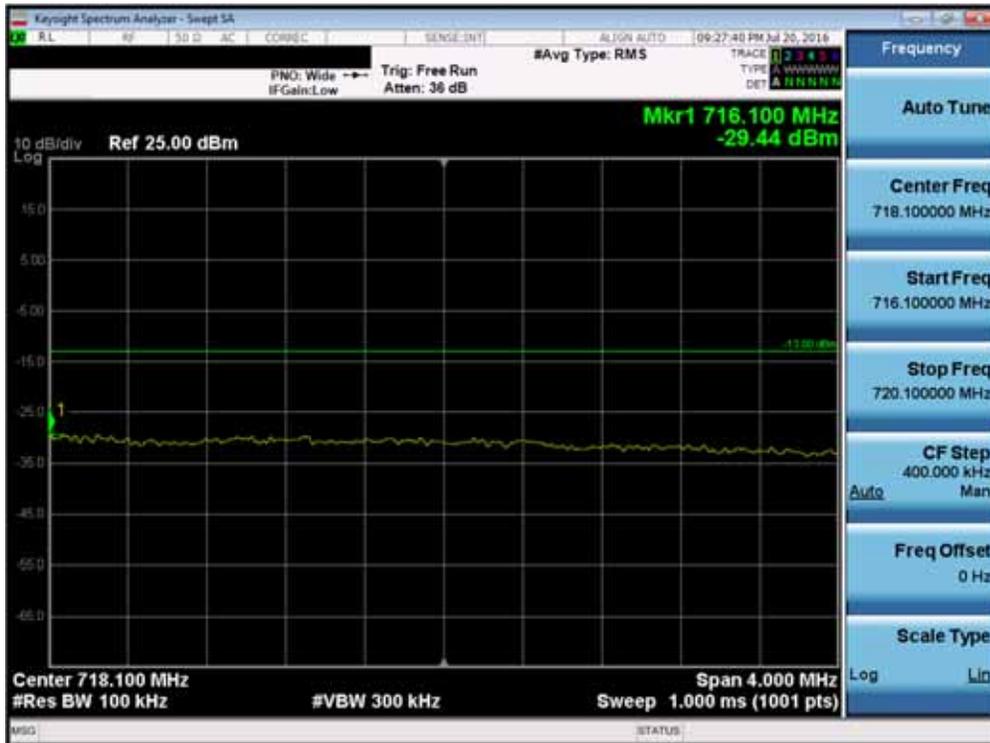


Plot 7-97. Lower Extended Band Edge Plot (Band 12 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFH918	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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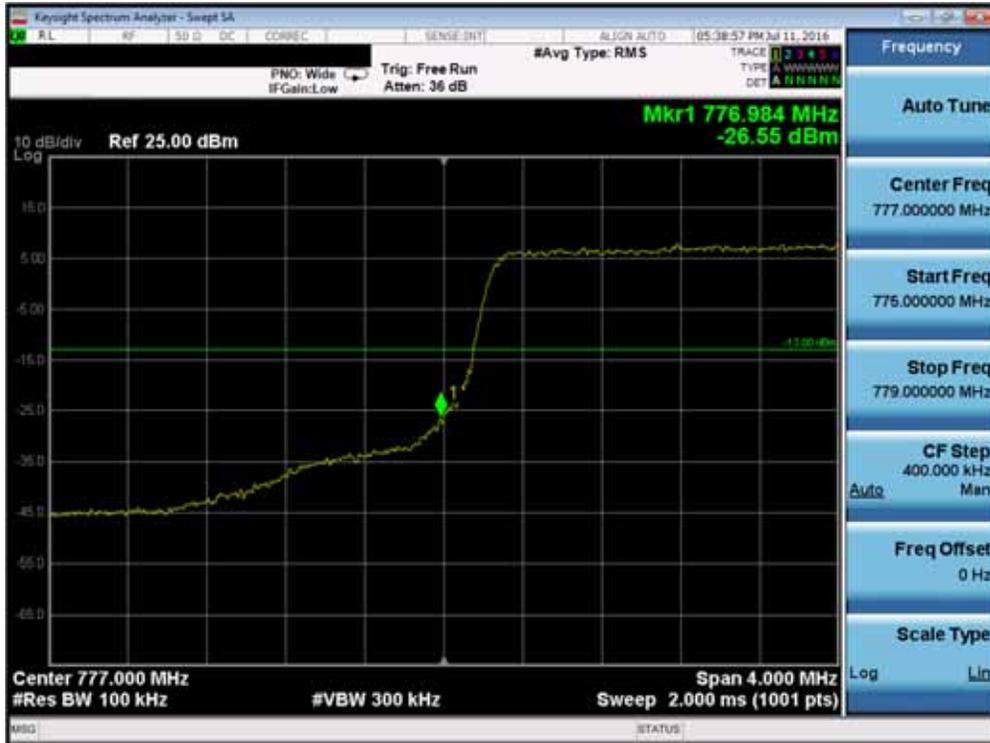


Plot 7-98. Upper Band Edge Plot (Band 12 – 10.0MHz QPSK – RB Size 50)



Plot 7-99. Upper Extended Band Edge Plot (Band 12 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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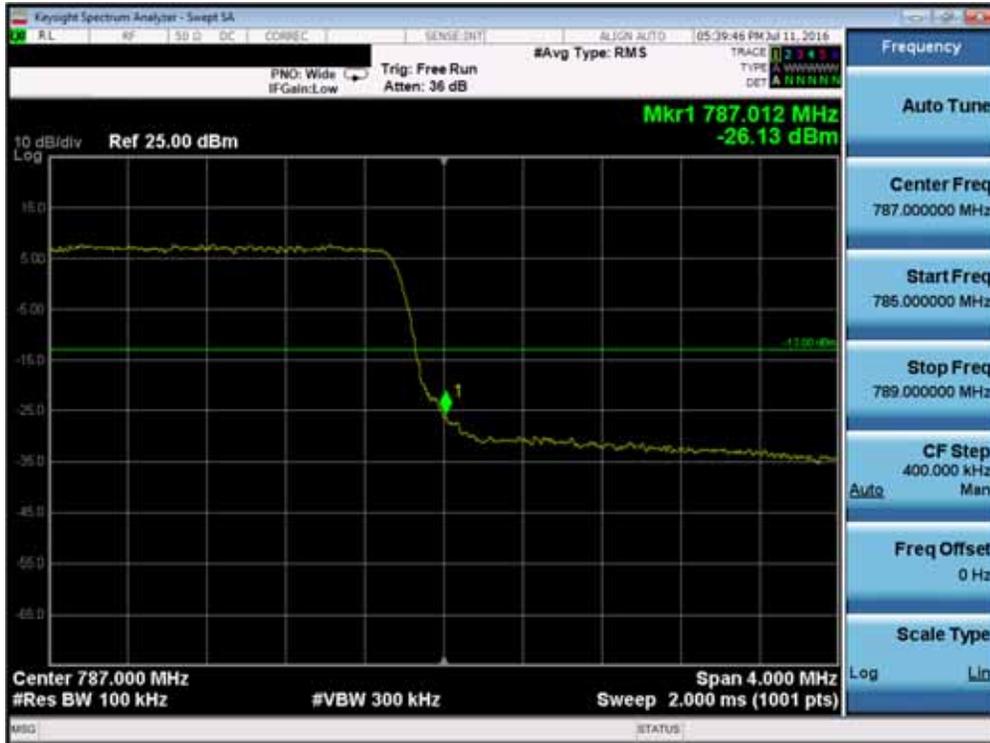


Plot 7-100. Lower Band Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)



Plot 7-101. Lower Emission Mask Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFH918	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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Plot 7-102. Upper Band Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

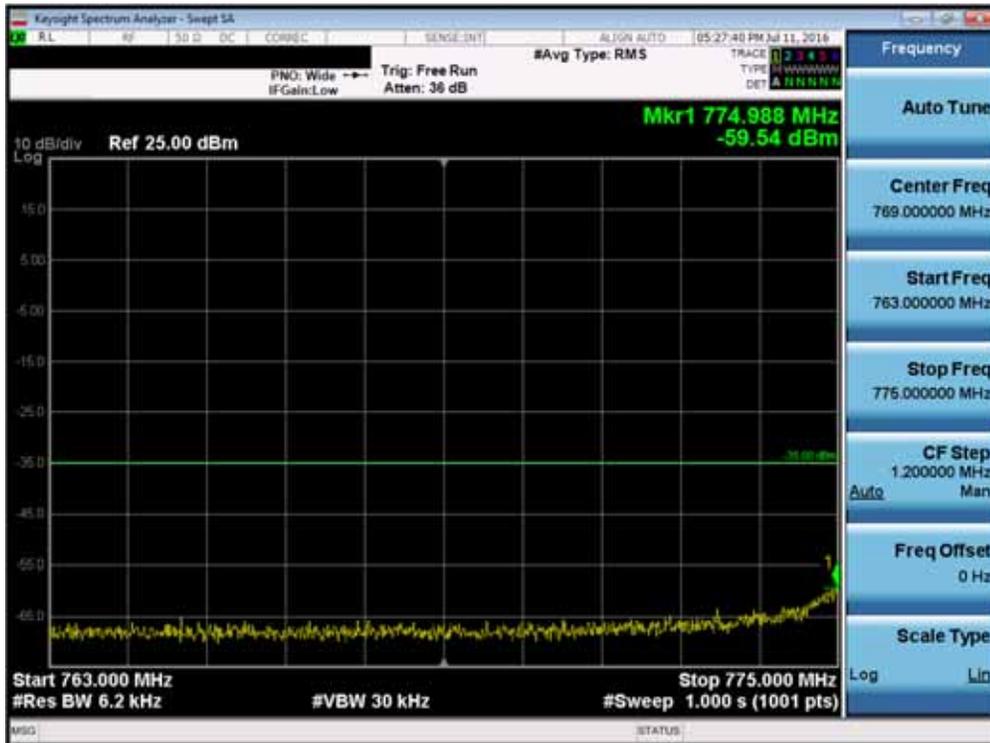


Plot 7-103. Upper Emission Mask Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Plot 7-104. Lower Band Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)



Plot 7-105. Lower Emission Mask Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFH918	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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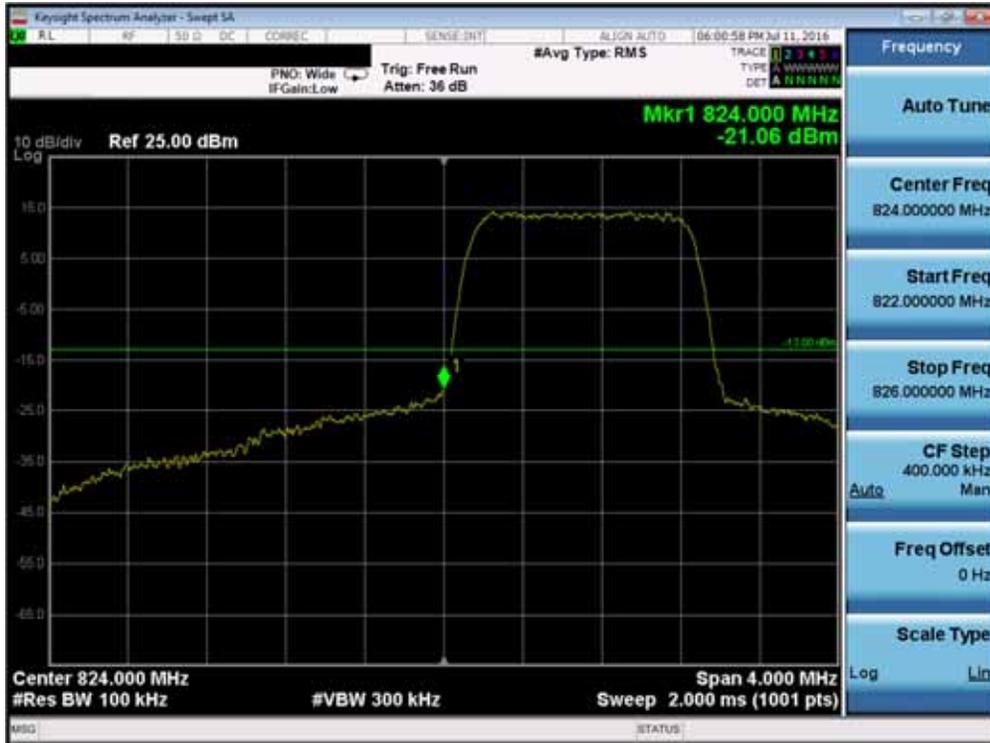


Plot 7-106. Upper Band Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)



Plot 7-107. Upper Emission Mask Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Plot 7-108. Lower Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

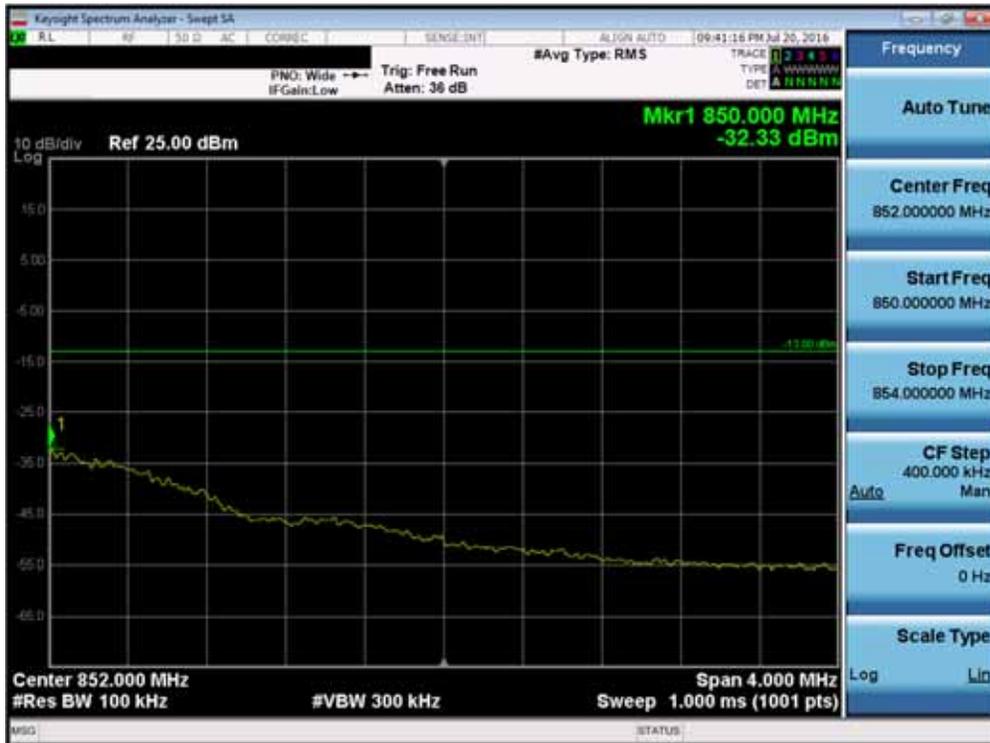


Plot 7-109. Lower Extended Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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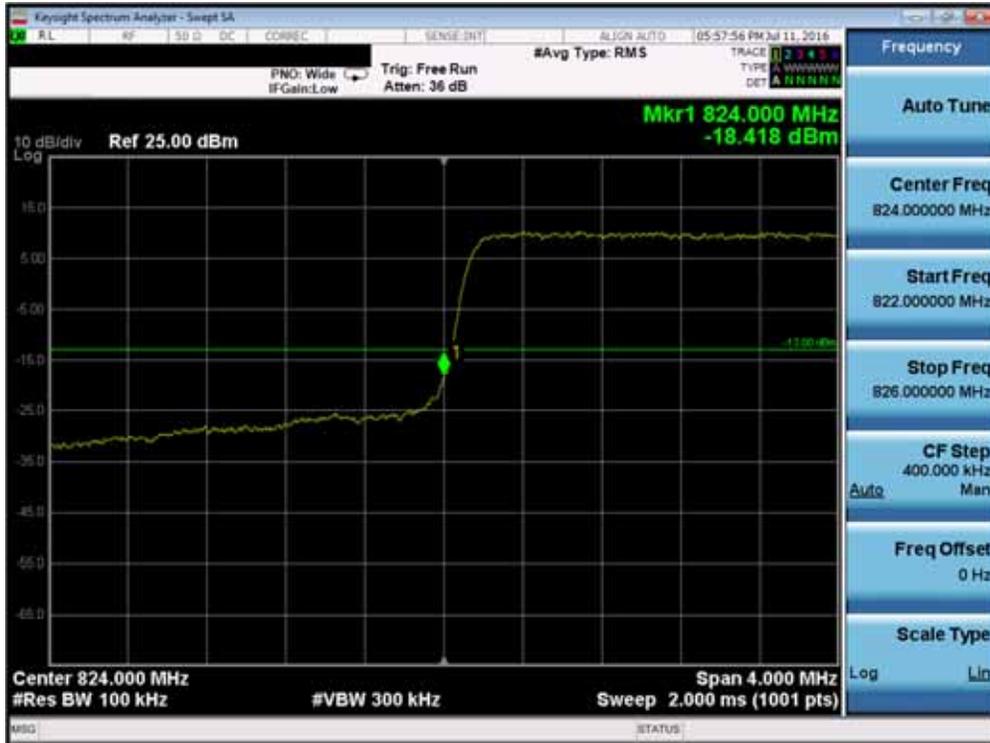


Plot 7-110. Upper Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)



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

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Plot 7-112. Lower Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)



Plot 7-113. Lower Extended Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFH918	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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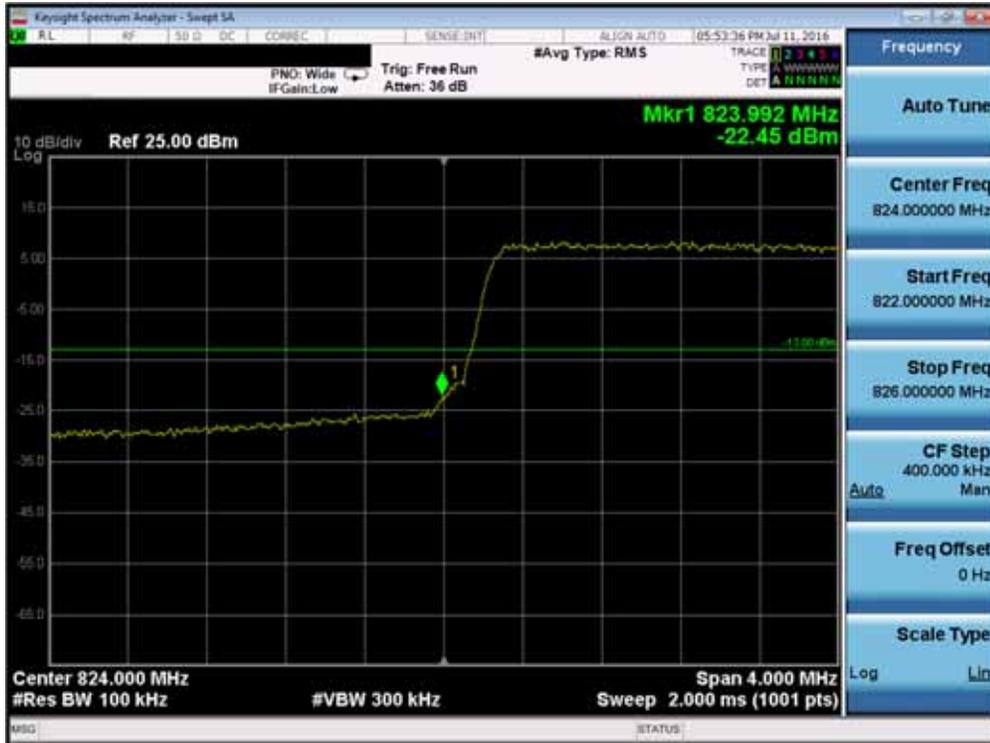


Plot 7-114. Upper Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)



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

FCC ID: ZNFH918	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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Plot 7-116. Lower Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)



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

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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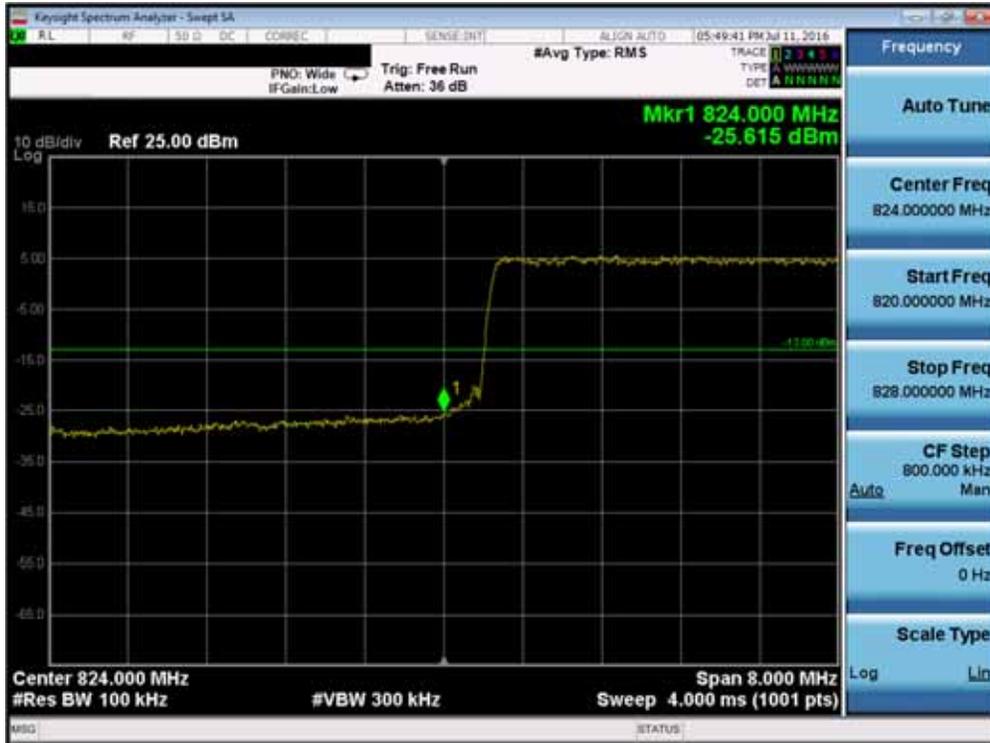


Plot 7-118. Upper Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

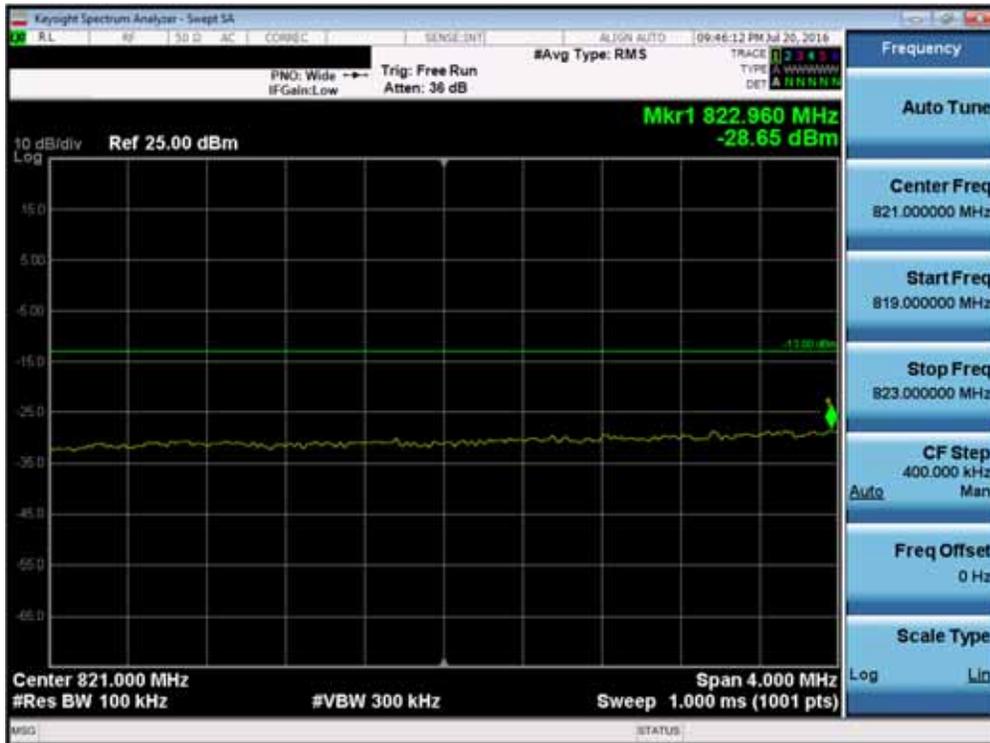


Plot 7-119. Upper Extended Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFH918	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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Plot 7-120. Lower Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

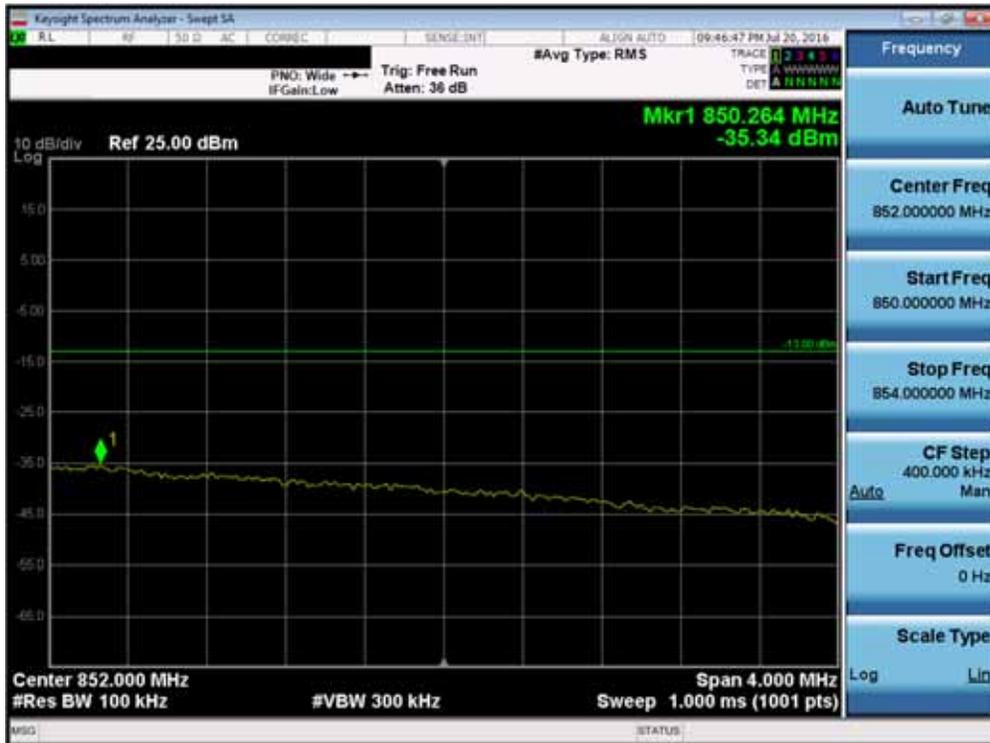


Plot 7-121. Lower Extended Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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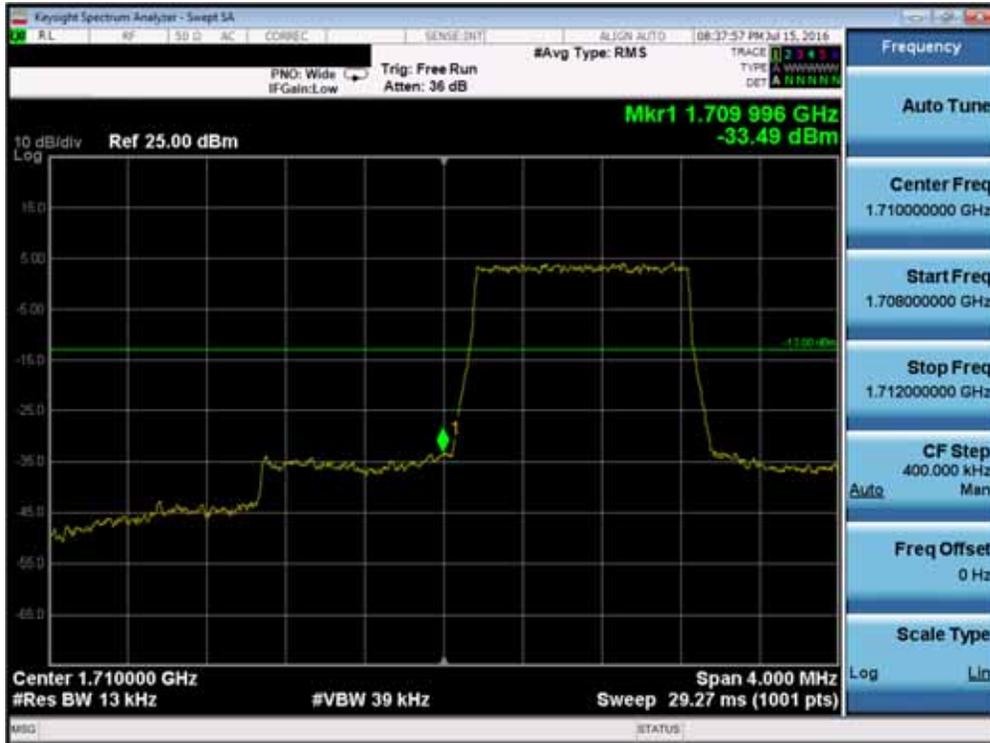


Plot 7-122. Upper Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

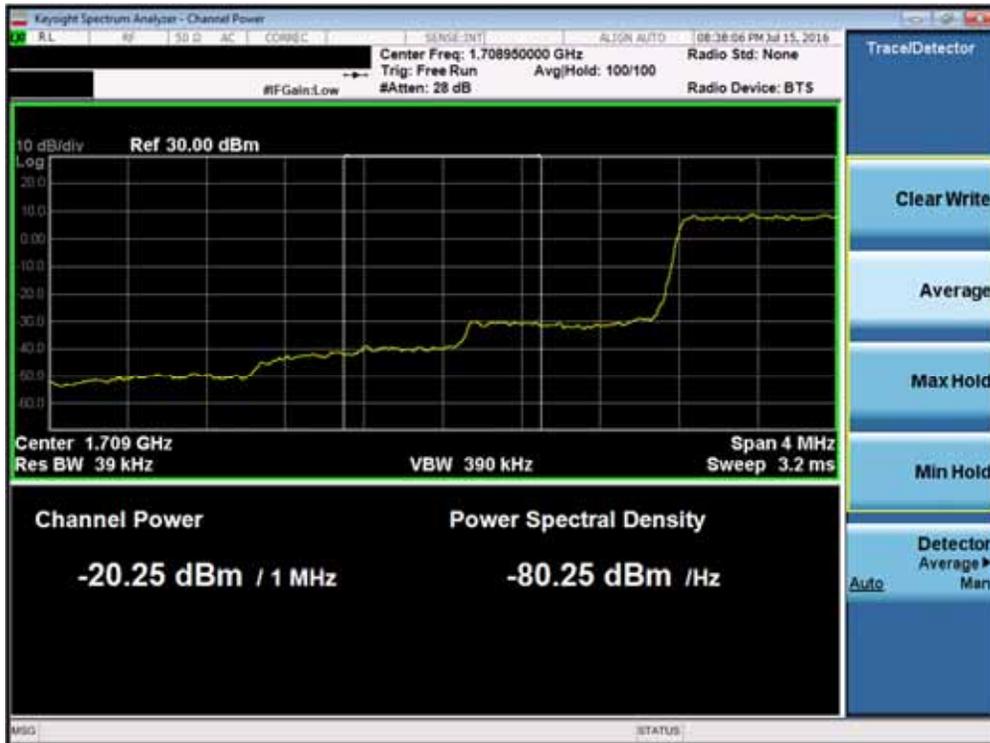


Plot 7-123. Upper Extended Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFH918	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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Plot 7-124. Lower Band Edge Plot (Band 4/66– 1.4MHz QPSK – RB Size 6)

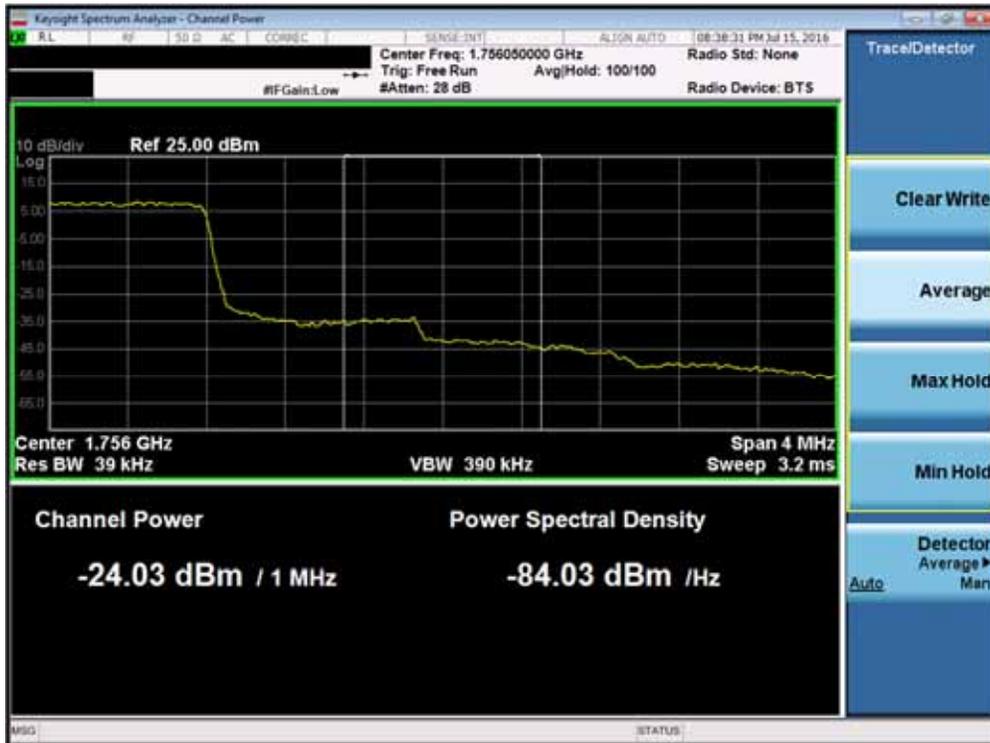


Plot 7-125. Lower Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFH918	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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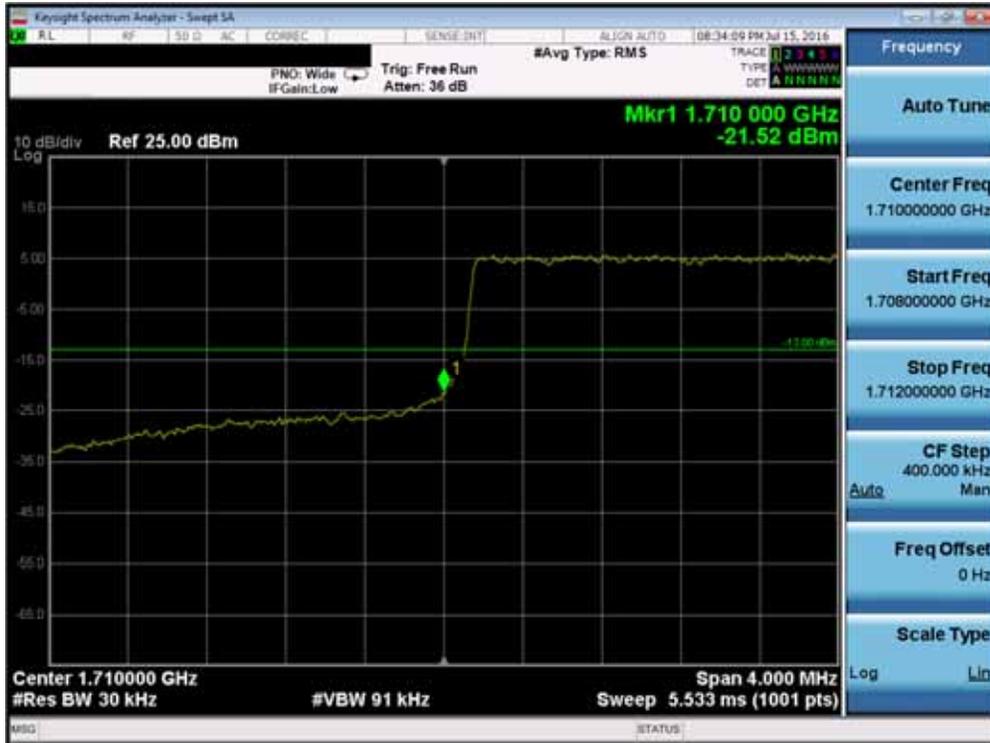


Plot 7-126. Upper Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

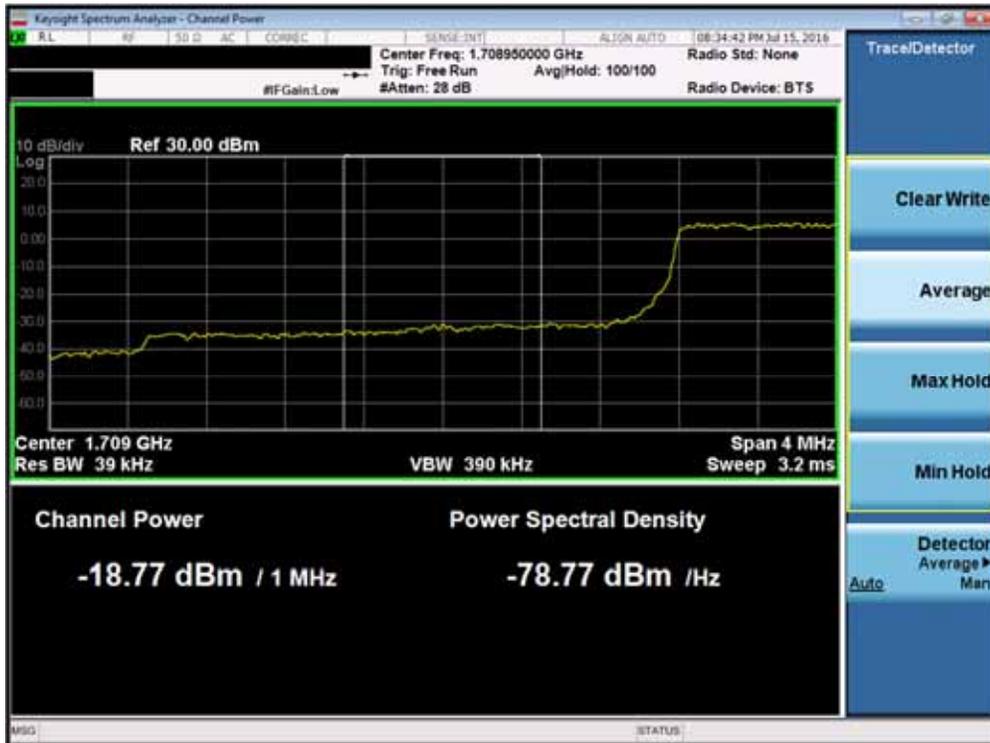


Plot 7-127. Upper Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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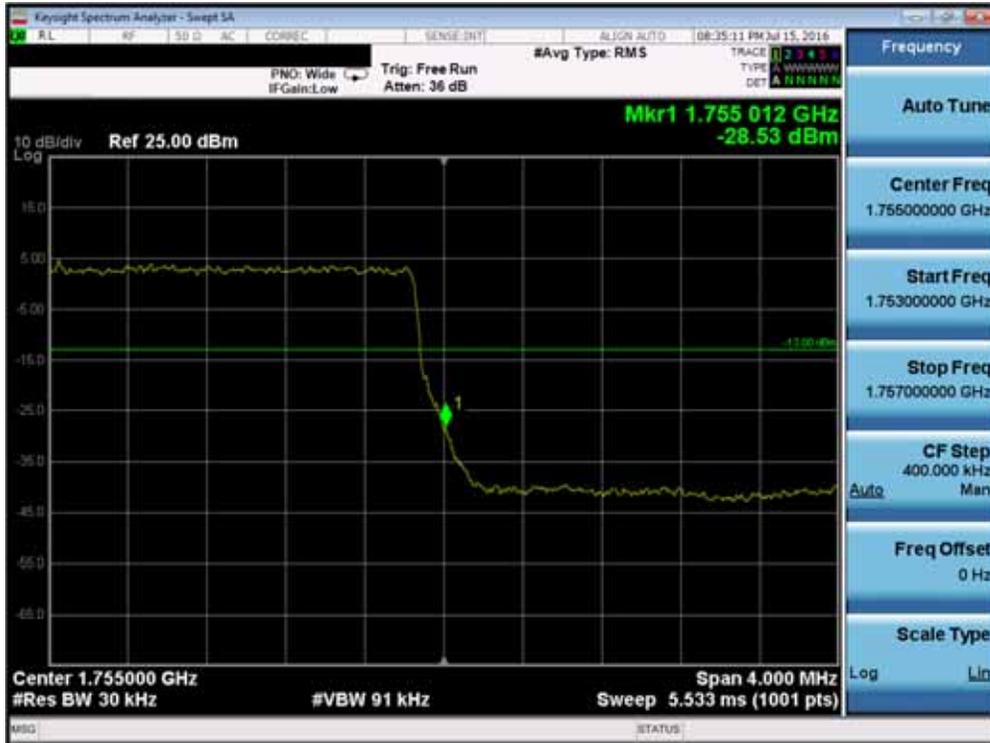


Plot 7-128. Lower Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

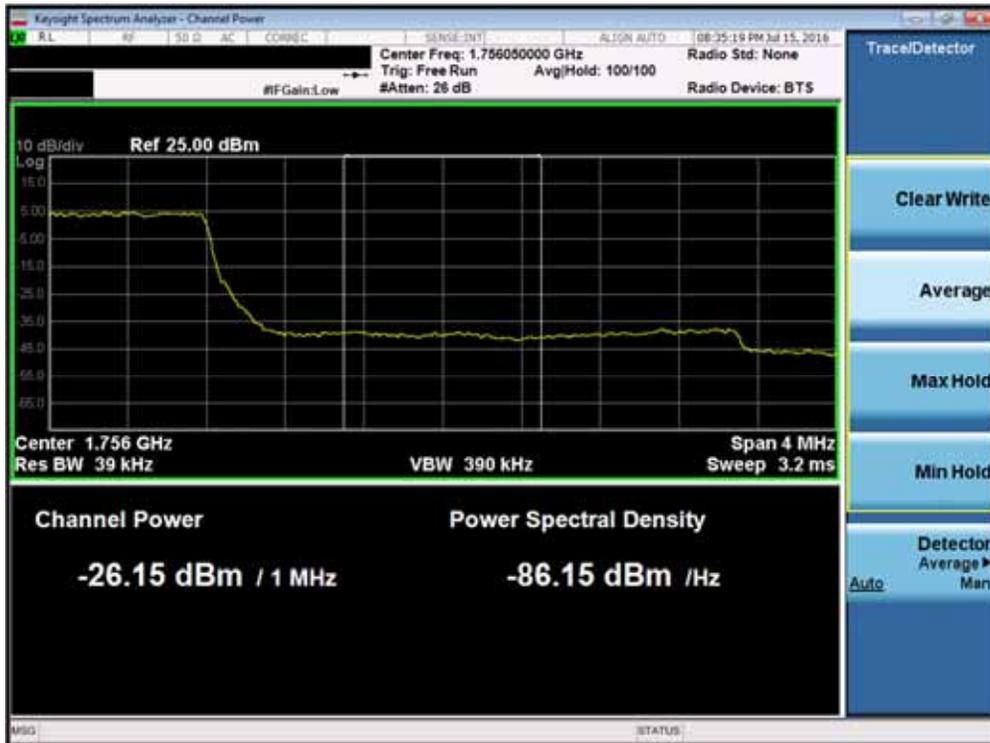


Plot 7-129. Lower Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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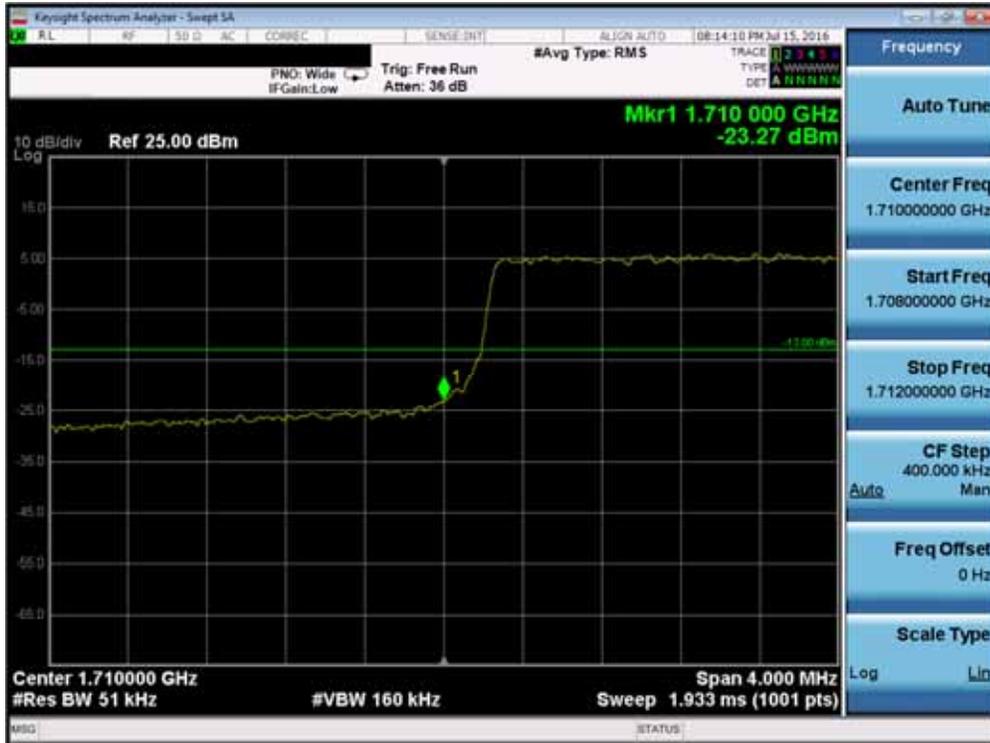


Plot 7-130. Upper Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

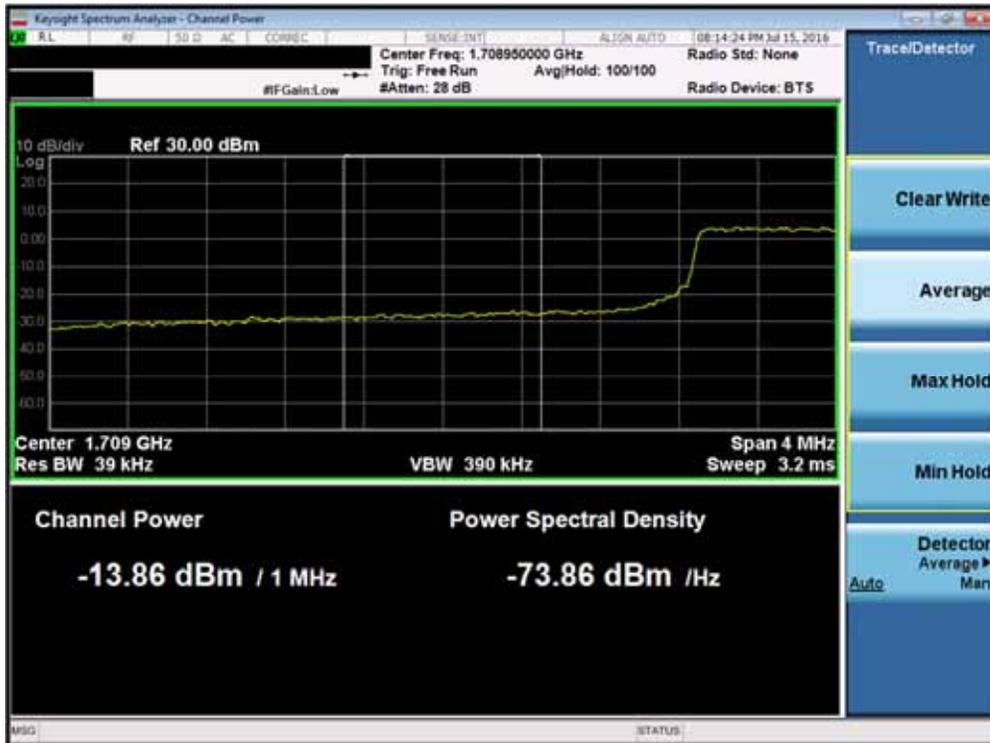


Plot 7-131. Upper Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFH918	PCTEST Engineering Laboratory, Inc.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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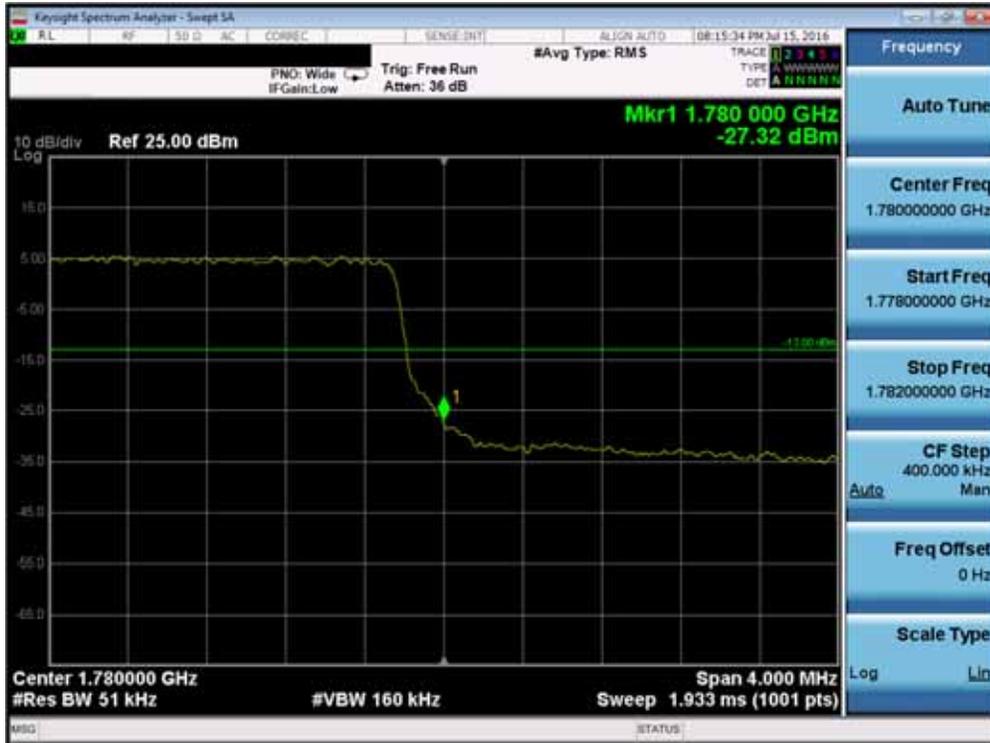


Plot 7-132. Lower Band Edge Plot (Band 4/66– 5.0MHz QPSK – RB Size 25)

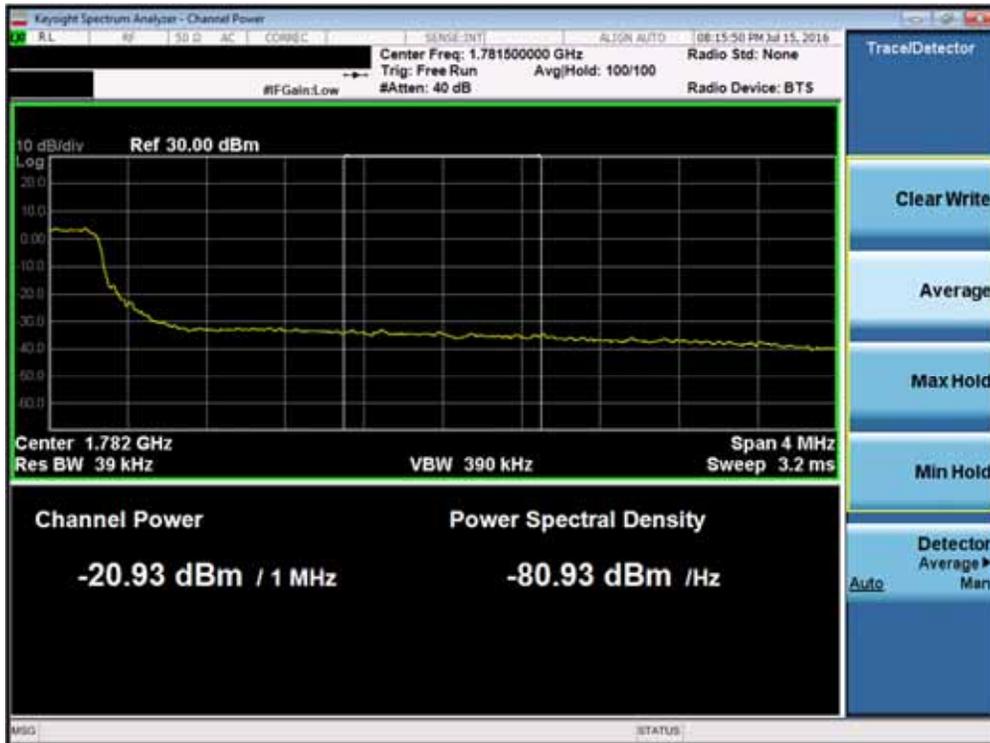


Plot 7-133. Lower Extended Band Edge Plot (Band 4/66– 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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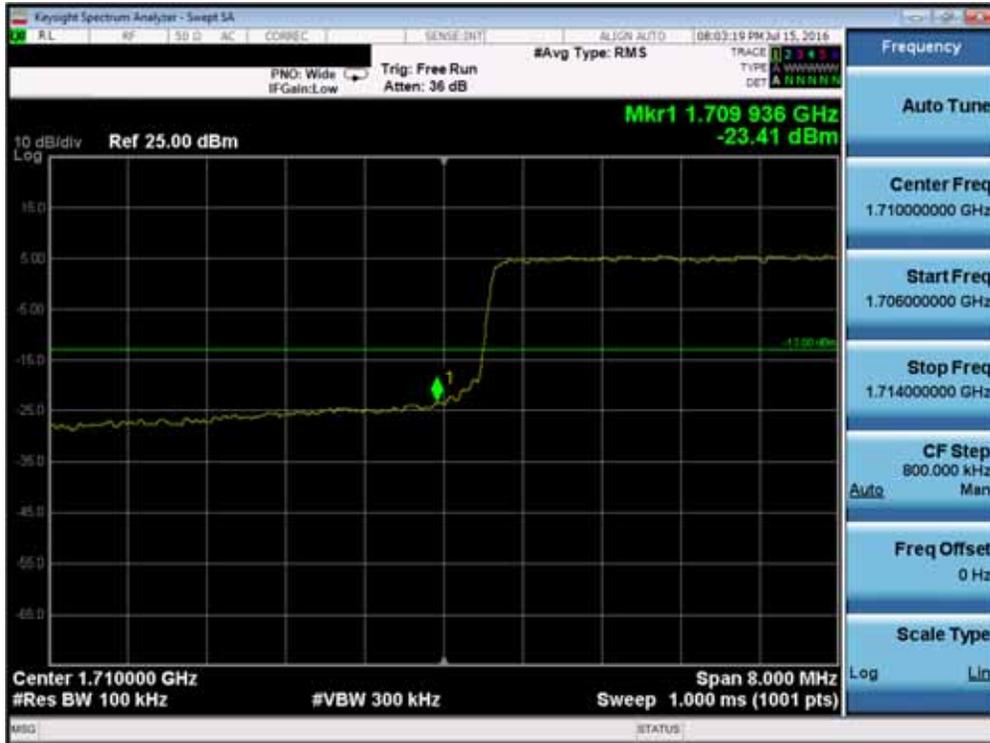


Plot 7-134. Upper Band Edge Plot (Band 4/66– 5.0MHz QPSK – RB Size 25)

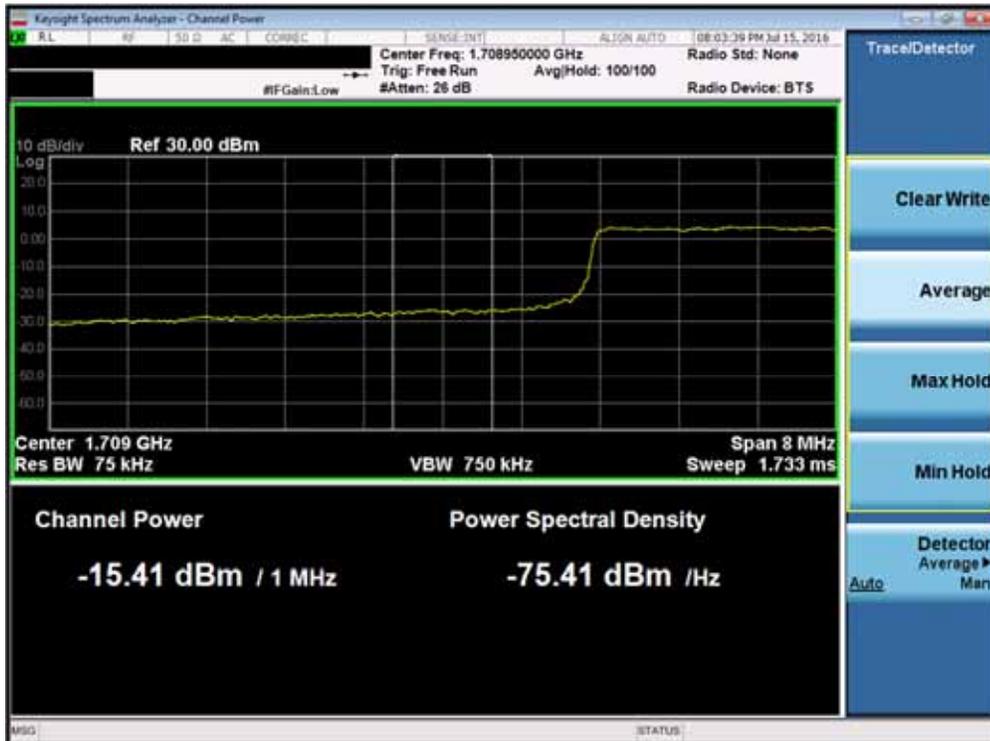


Plot 7-135. Upper Extended Band Edge Plot (Band 4/66– 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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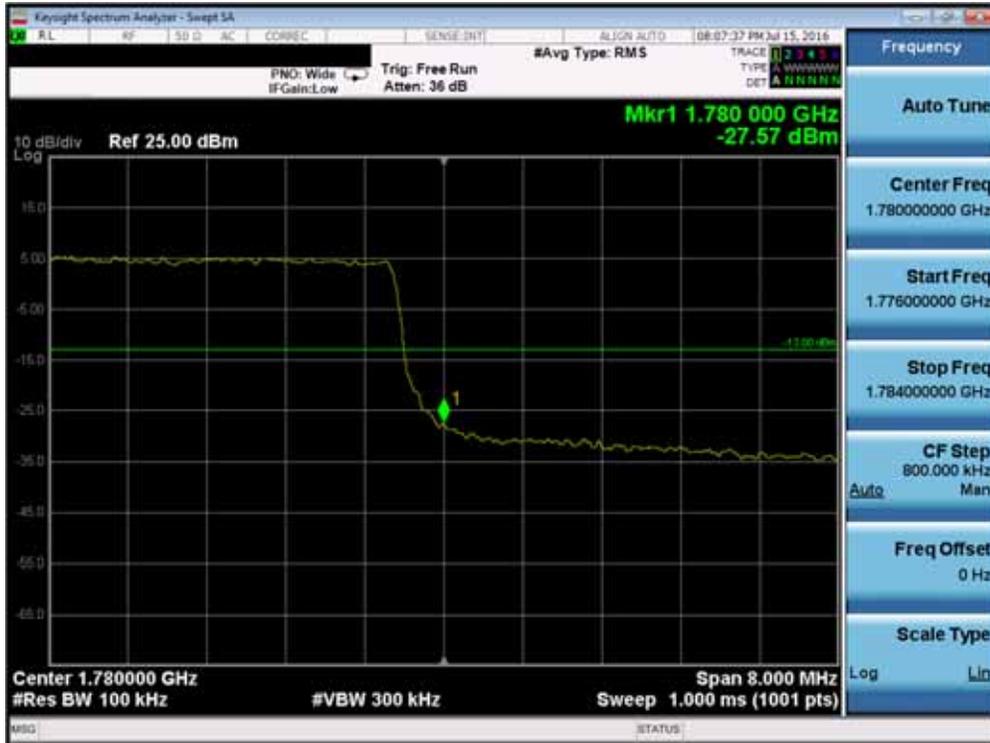


Plot 7-136. Lower Band Edge Plot (Band 4/66– 10.0MHz QPSK – RB Size 50)

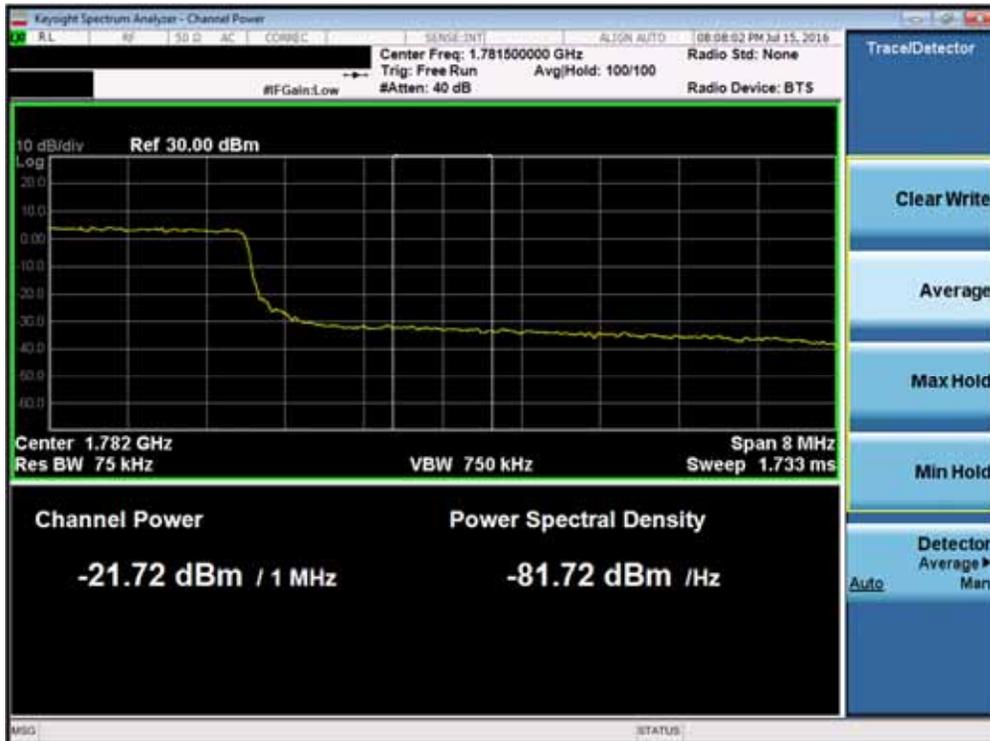


Plot 7-137. Lower Extended Band Edge Plot (Band 4/66– 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFH918	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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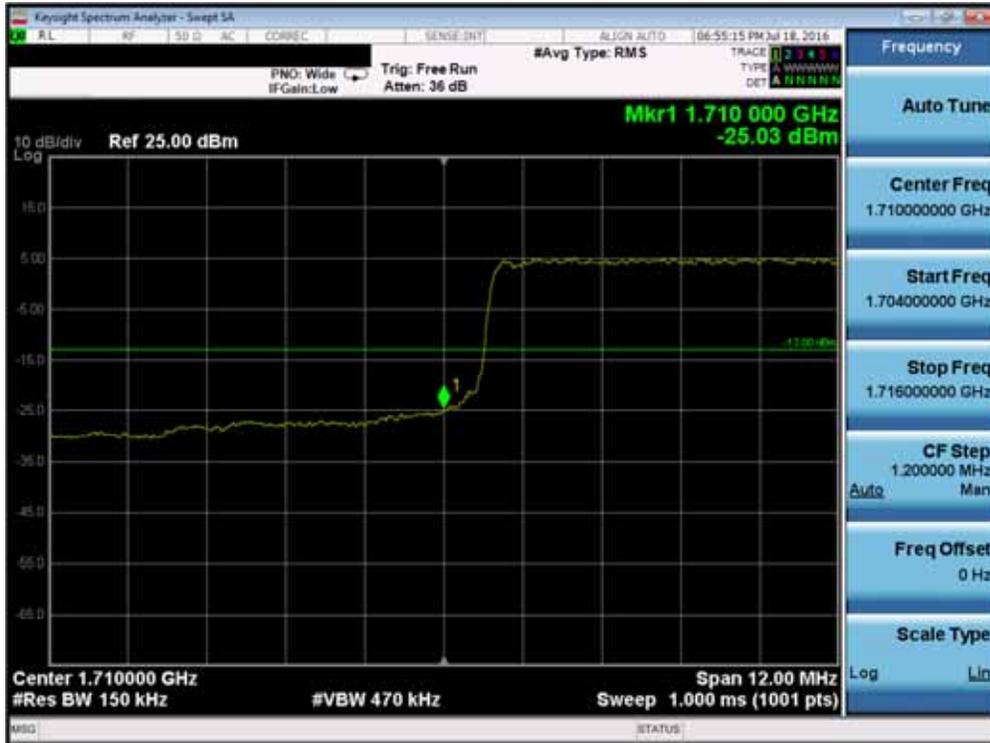


Plot 7-138. Upper Band Edge Plot (Band 4/66– 10.0MHz QPSK – RB Size 50)



Plot 7-139. Upper Extended Band Edge Plot (Band 4/66– 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset		Page 87 of 147

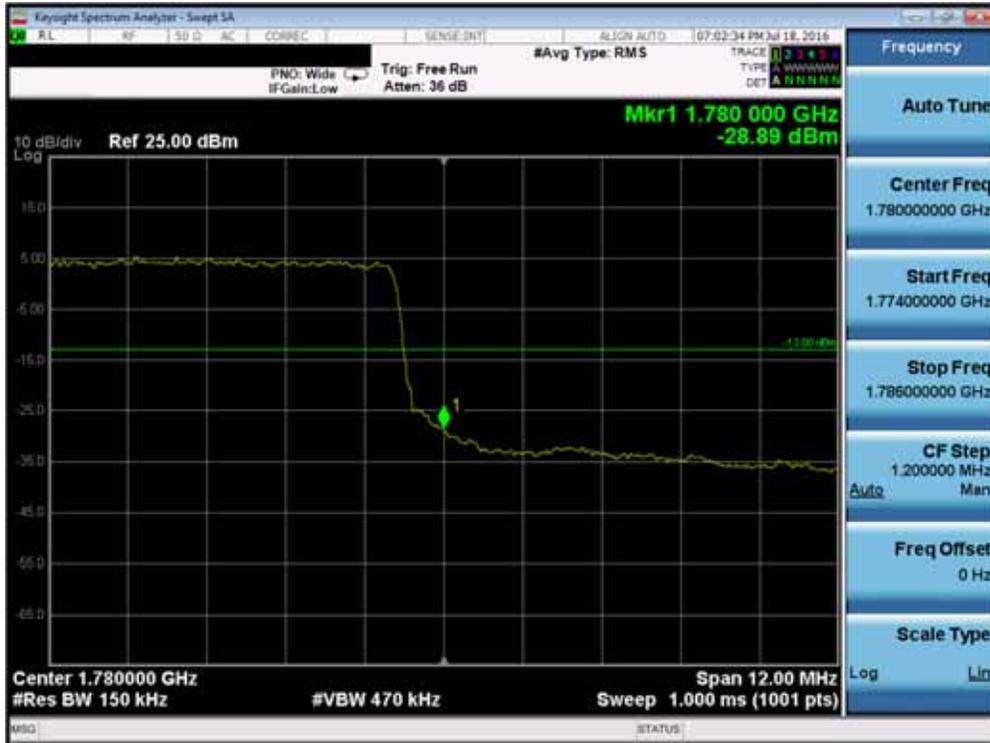


Plot 7-140. Lower Band Edge Plot (Band 4/66 – 15.0MHz QPSK – RB Size 75)

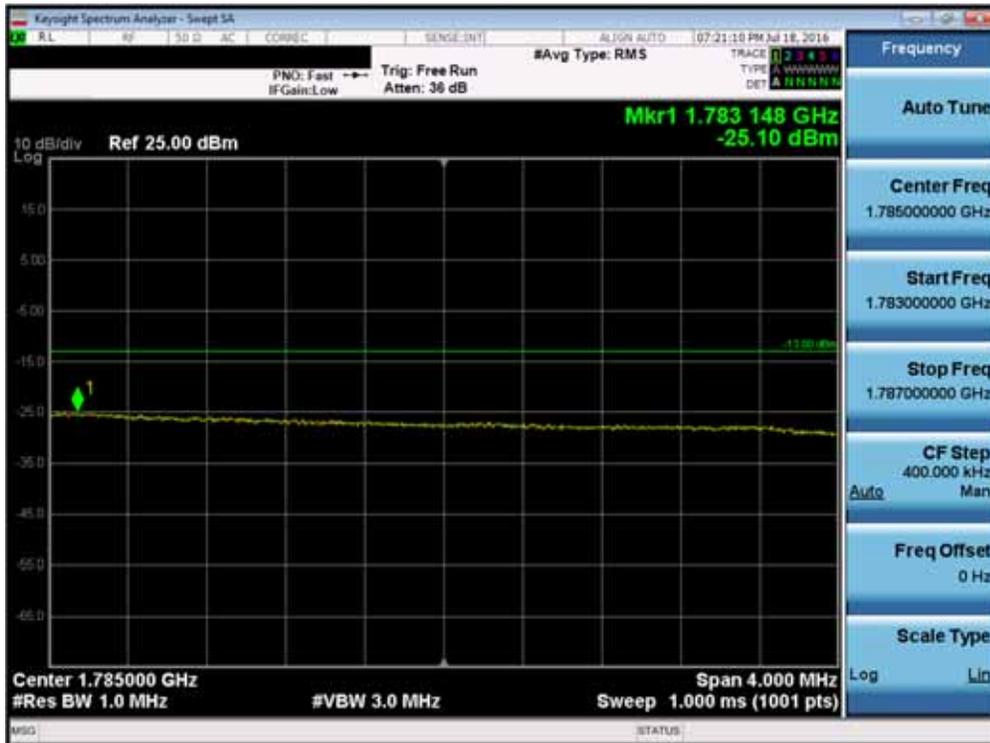


Plot 7-141. Lower Extended Band Edge Plot (Band 4/66 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset		Page 88 of 147



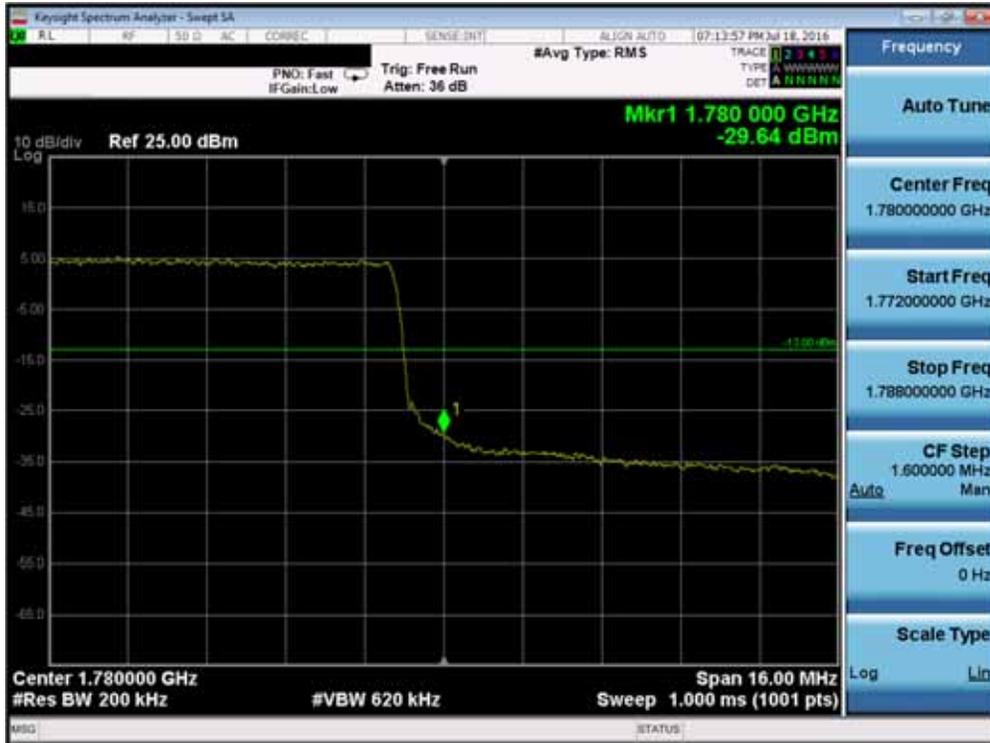
Plot 7-142. Upper Band Edge Plot (Band 4/66 – 15.0MHz QPSK – RB Size 75)



Plot 7-143. Upper Extended Band Edge Plot (Band 4/66 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset		Page 89 of 147





Plot 7-146. Upper Band Edge Plot (Band 4/66 – 20.0MHz QPSK – RB Size 100)

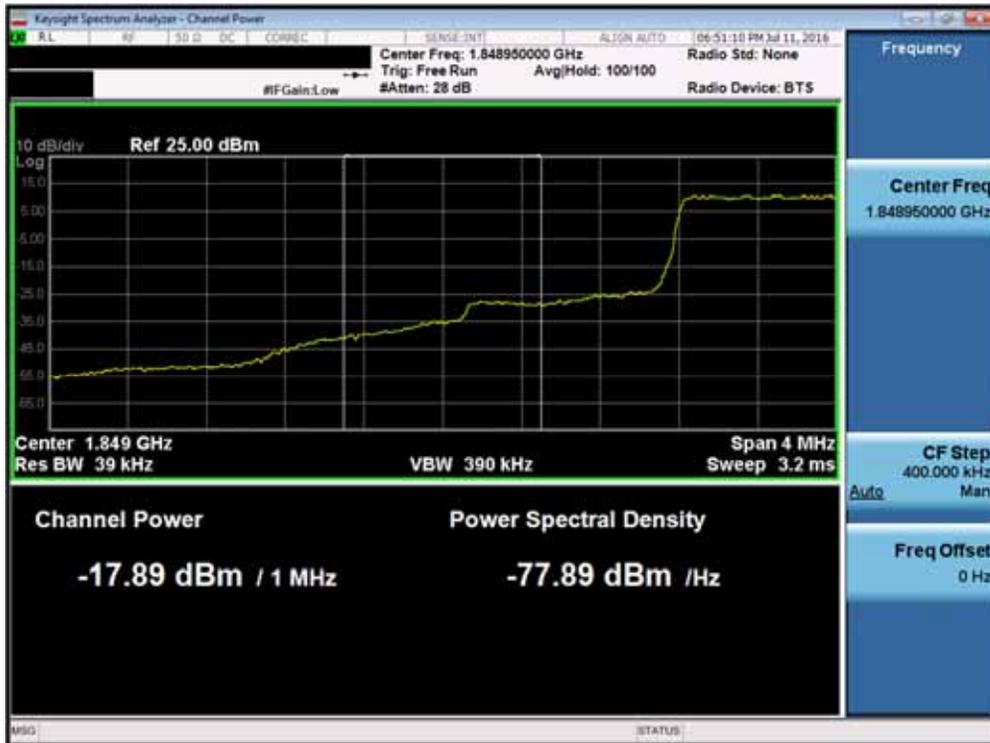


Plot 7-147. Upper Extended Band Edge Plot (Band 4/66 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset		Page 91 of 147

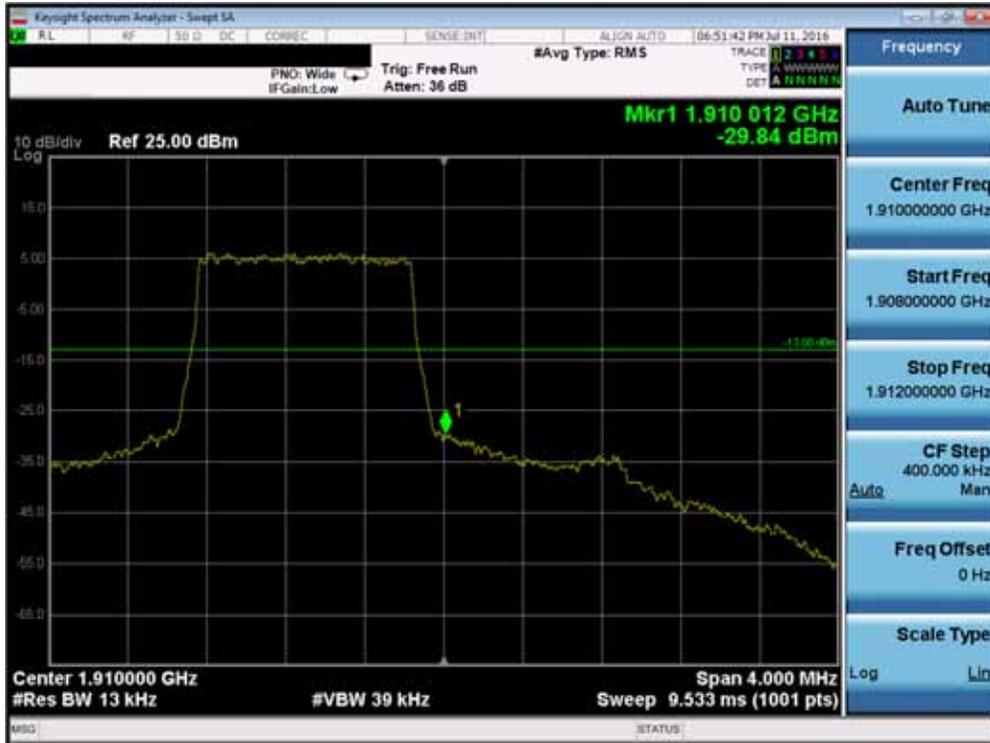


Plot 7-148. Lower Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)



Plot 7-149. Lower Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset		Page 92 of 147

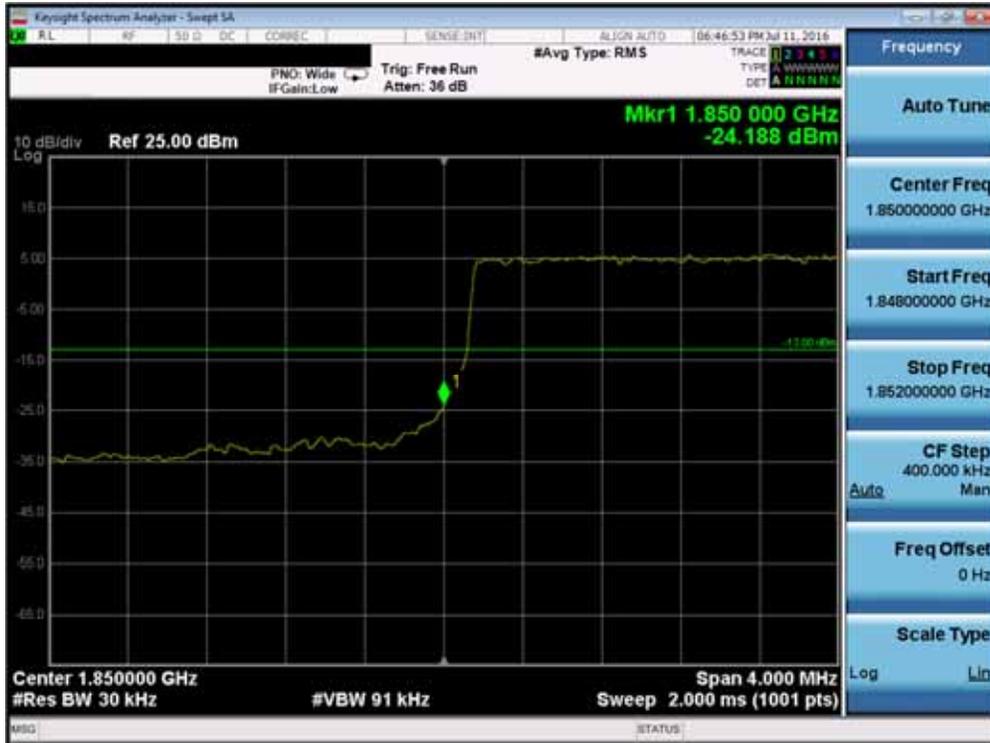


Plot 7-150. Upper Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

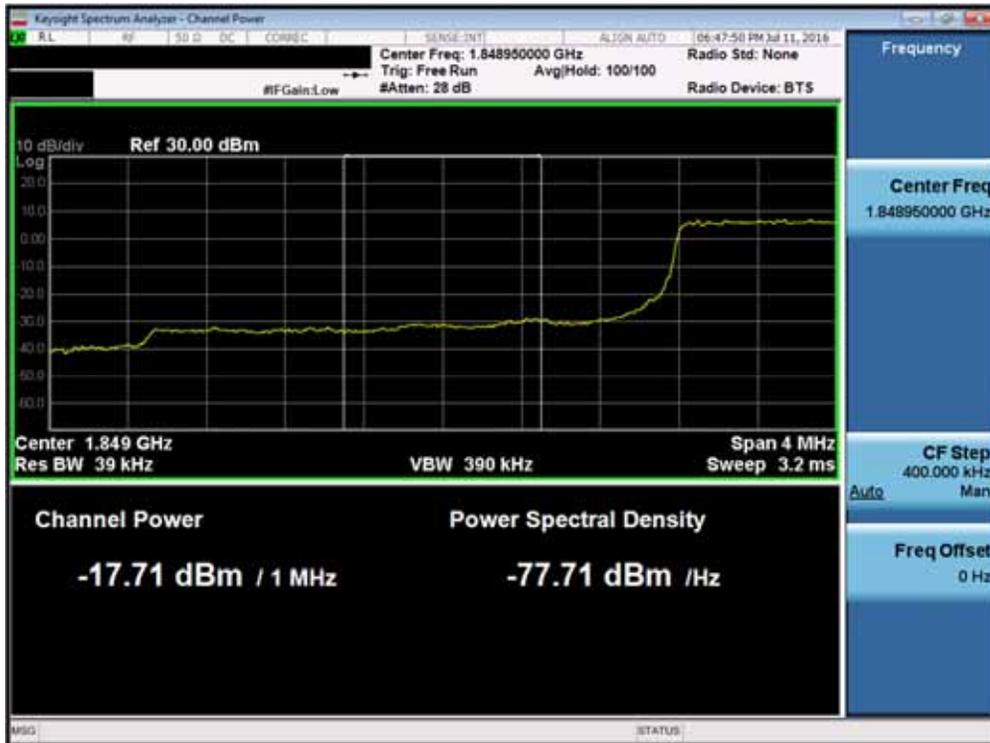


Plot 7-151. Upper Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset		Page 93 of 147

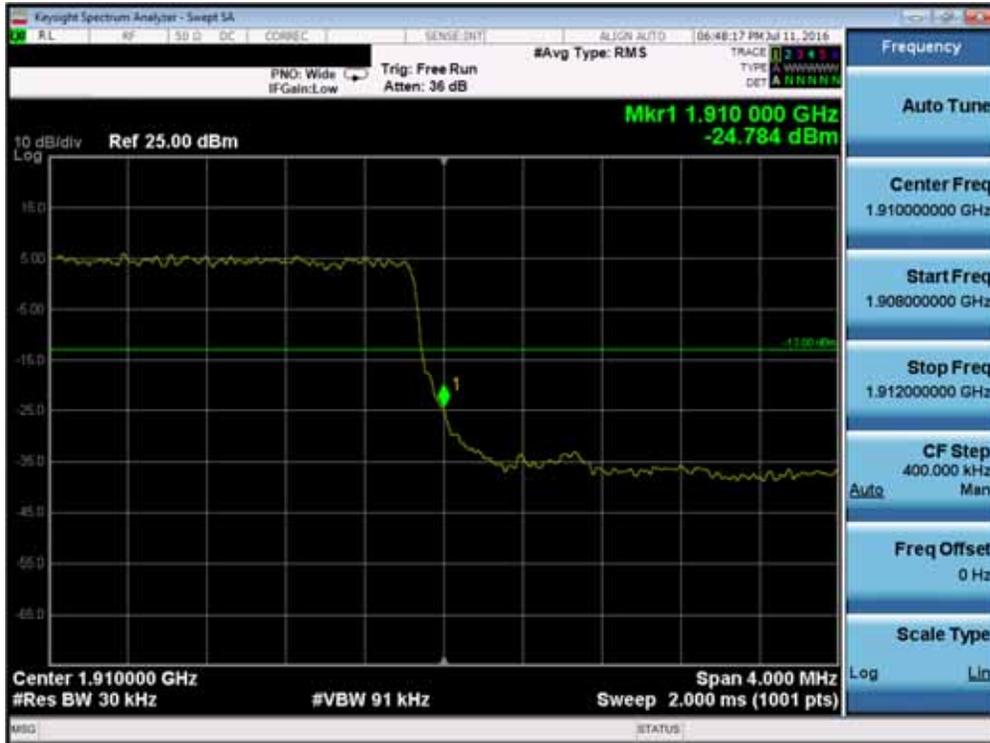


Plot 7-152. Lower Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

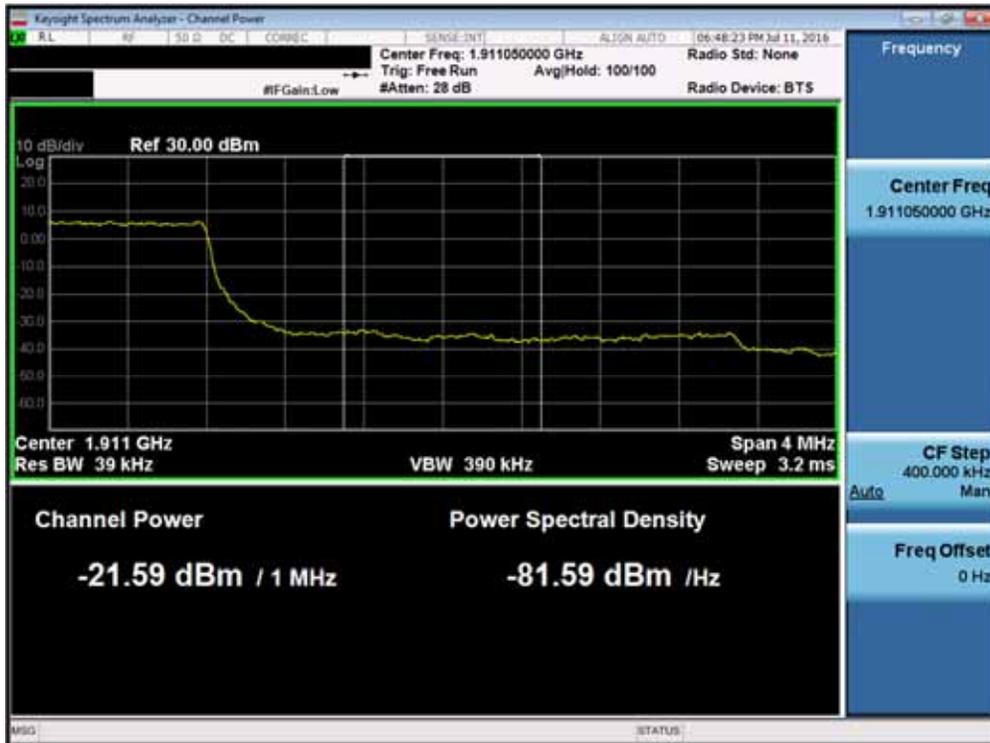


Plot 7-153. Lower Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset		Page 94 of 147

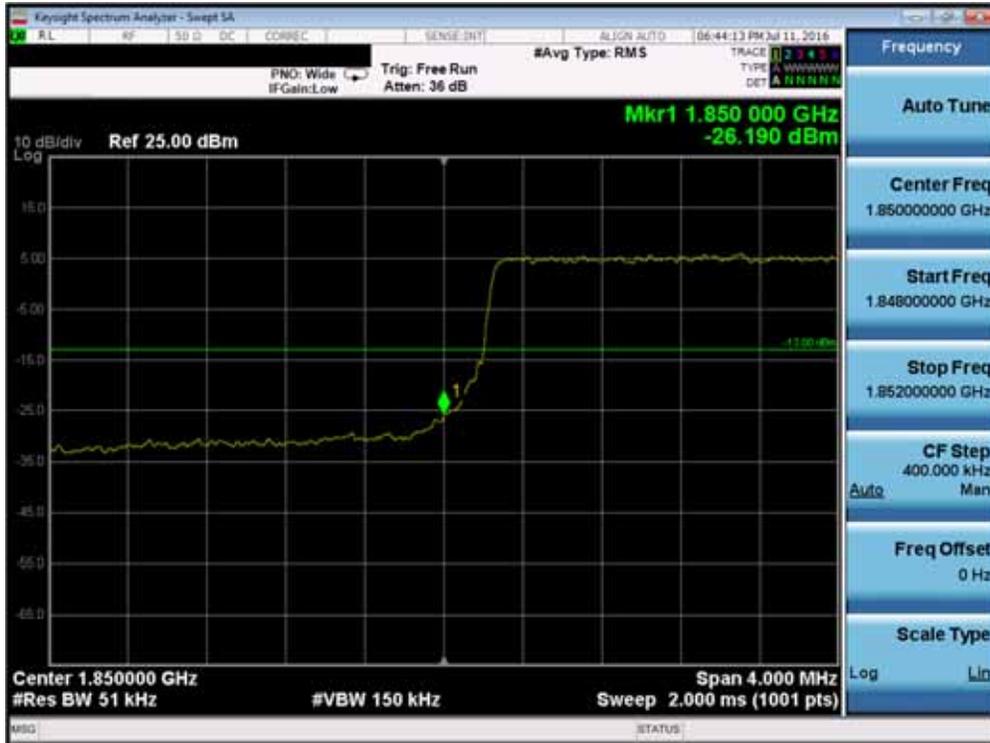


Plot 7-154. Upper Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

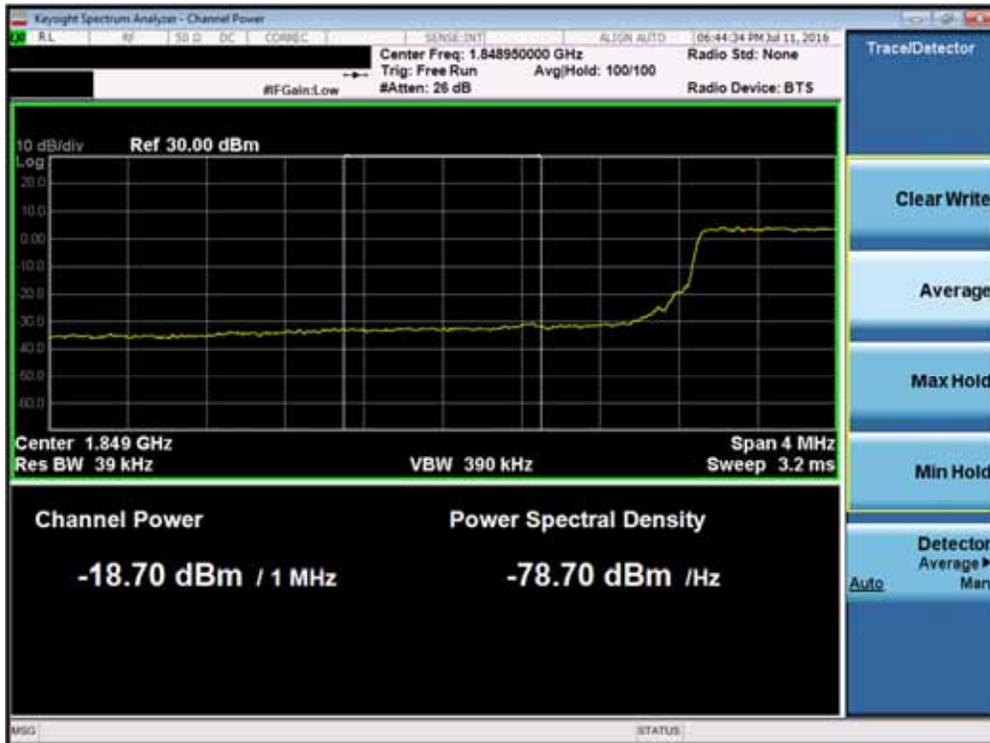


Plot 7-155. Upper Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset		Page 95 of 147

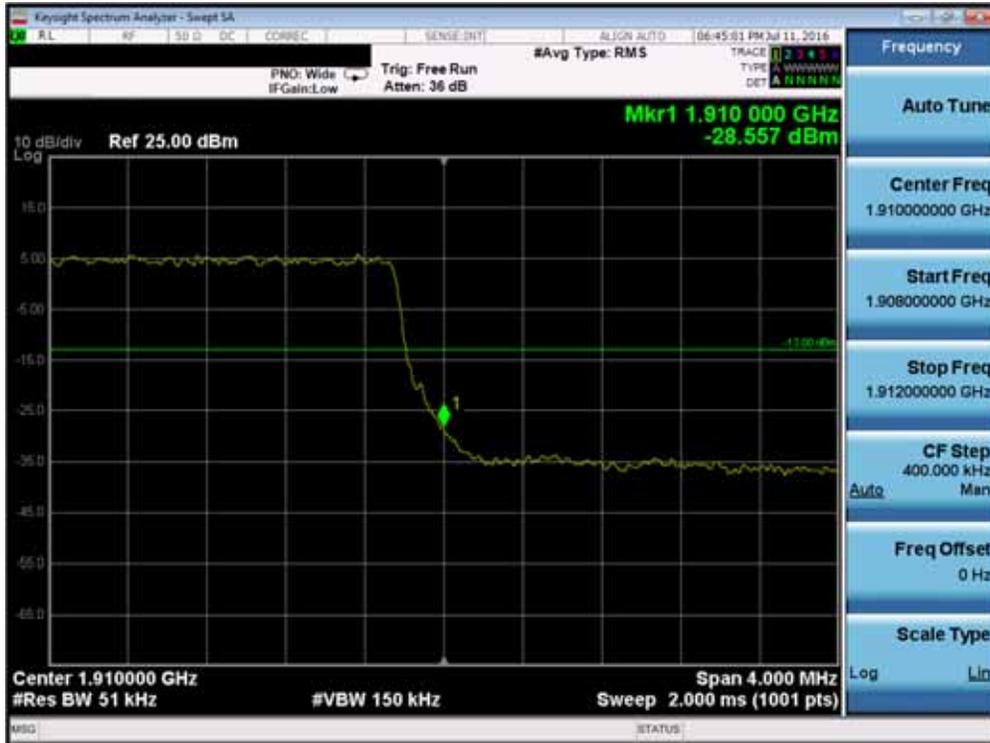


Plot 7-156. Lower Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

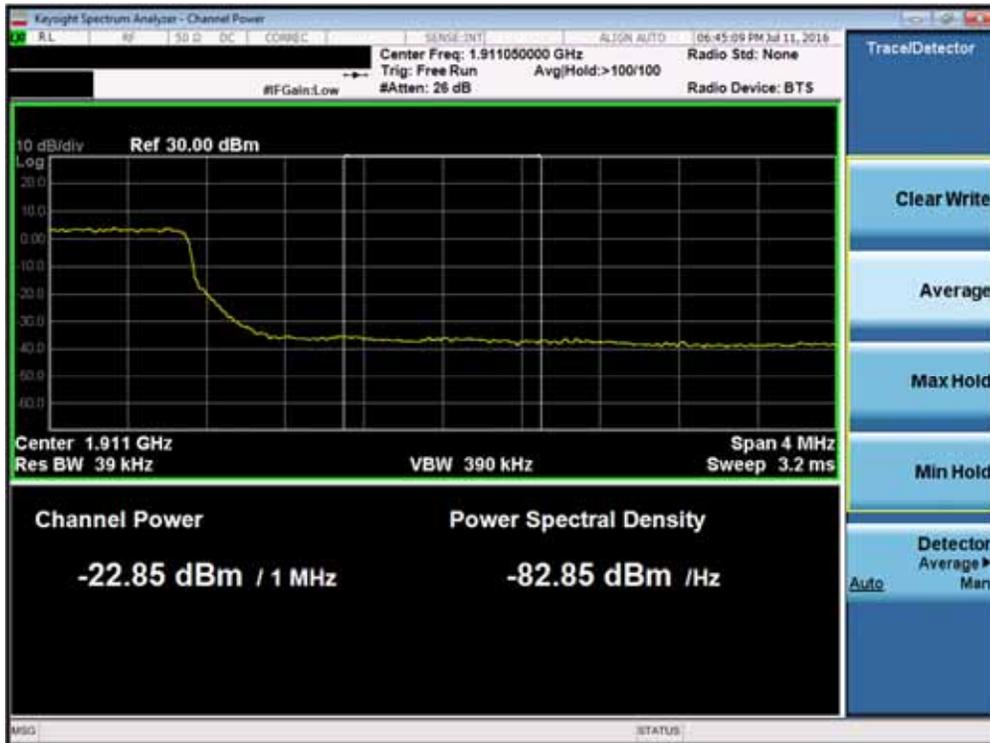


Plot 7-157. Lower Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset		Page 96 of 147

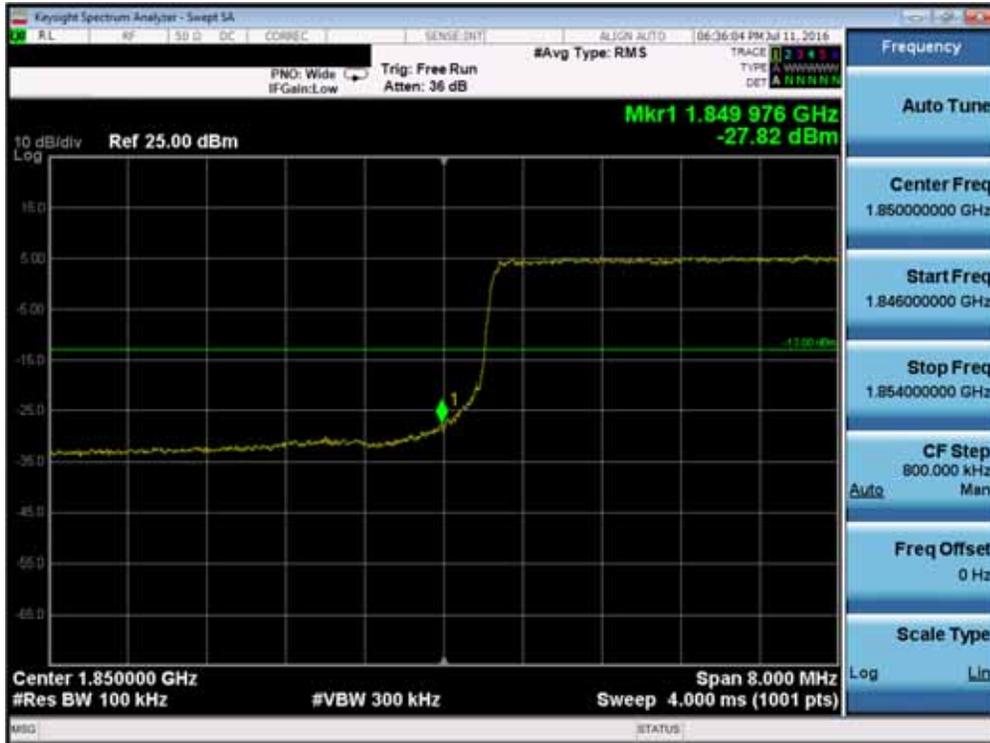


Plot 7-158. Upper Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

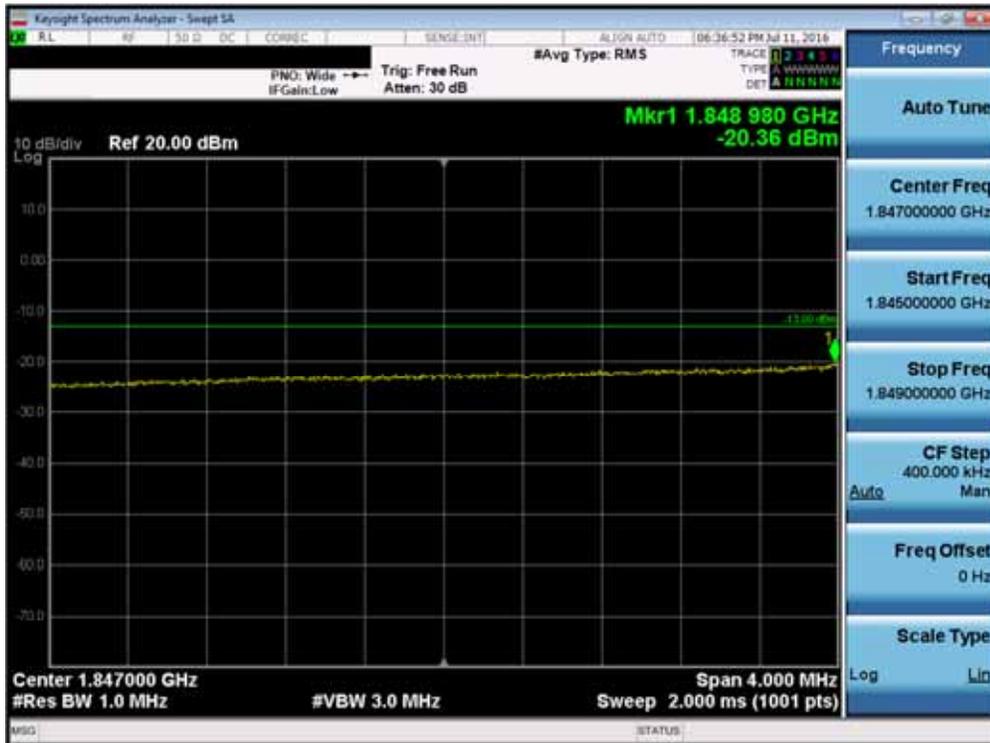


Plot 7-159. Upper Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset		Page 97 of 147



Plot 7-160. Lower Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)



Plot 7-161. Lower Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset	Page 98 of 147	

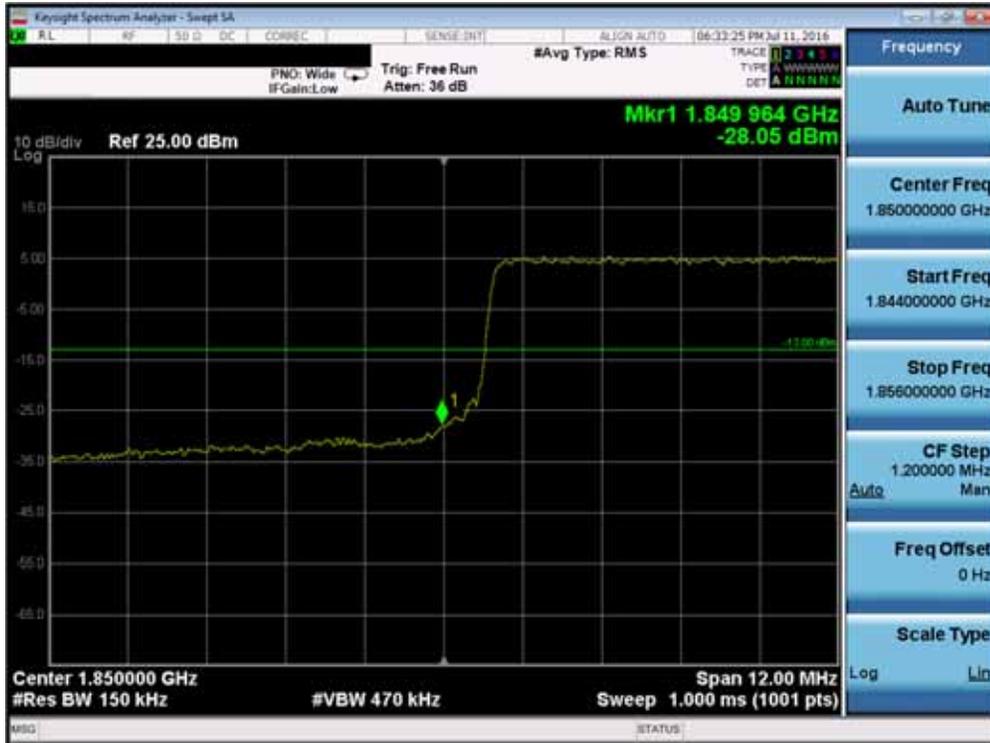


Plot 7-162. Upper Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

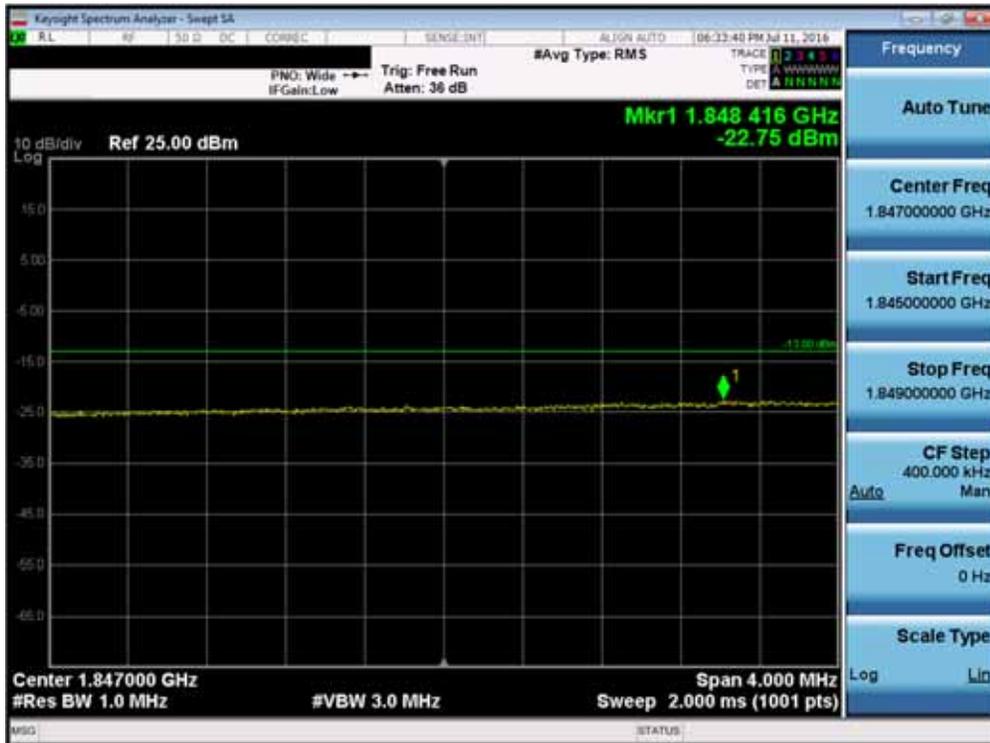


Plot 7-163. Upper Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset		Page 99 of 147

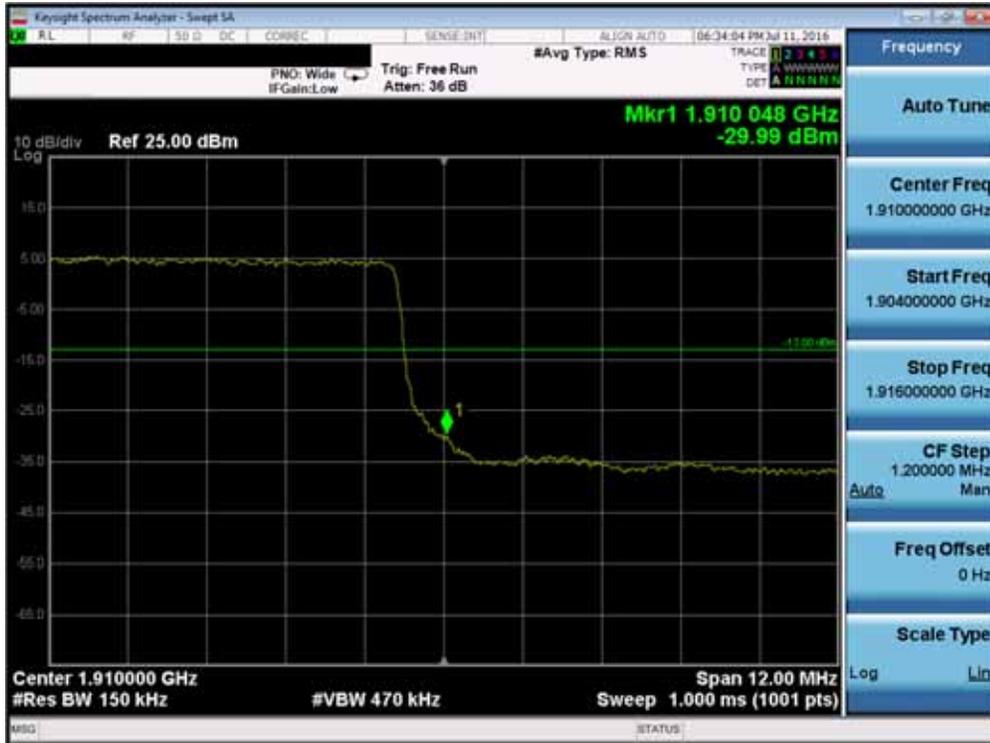


Plot 7-164. Lower Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

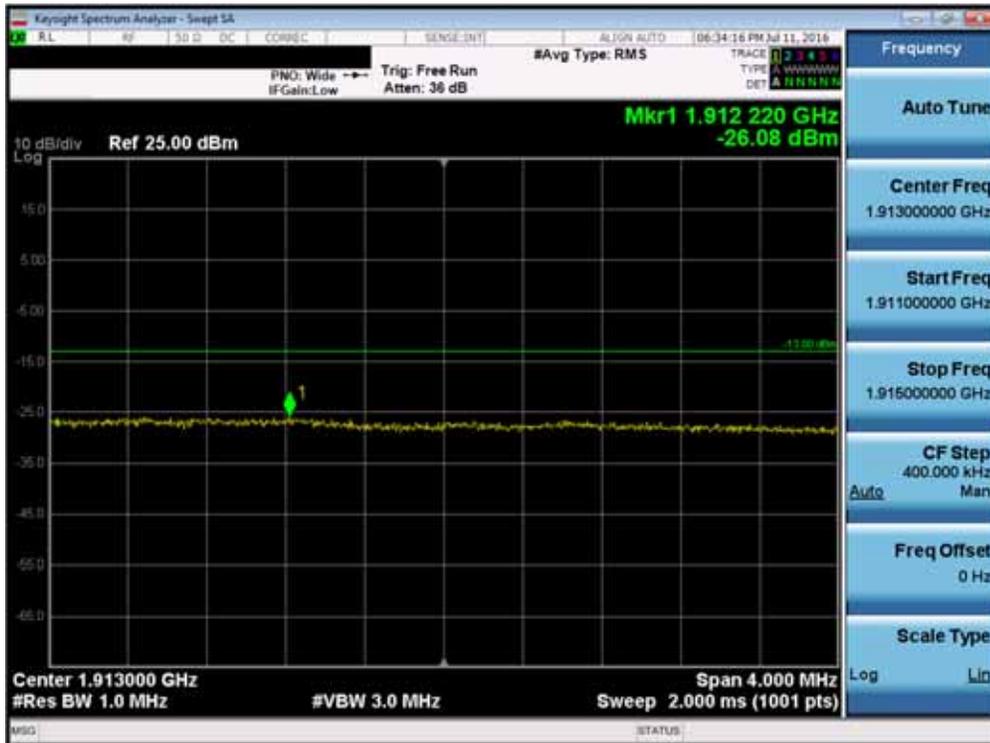


Plot 7-165. Lower Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset	Page 100 of 147	



Plot 7-166. Upper Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)



Plot 7-167. Upper Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset		Page 101 of 147

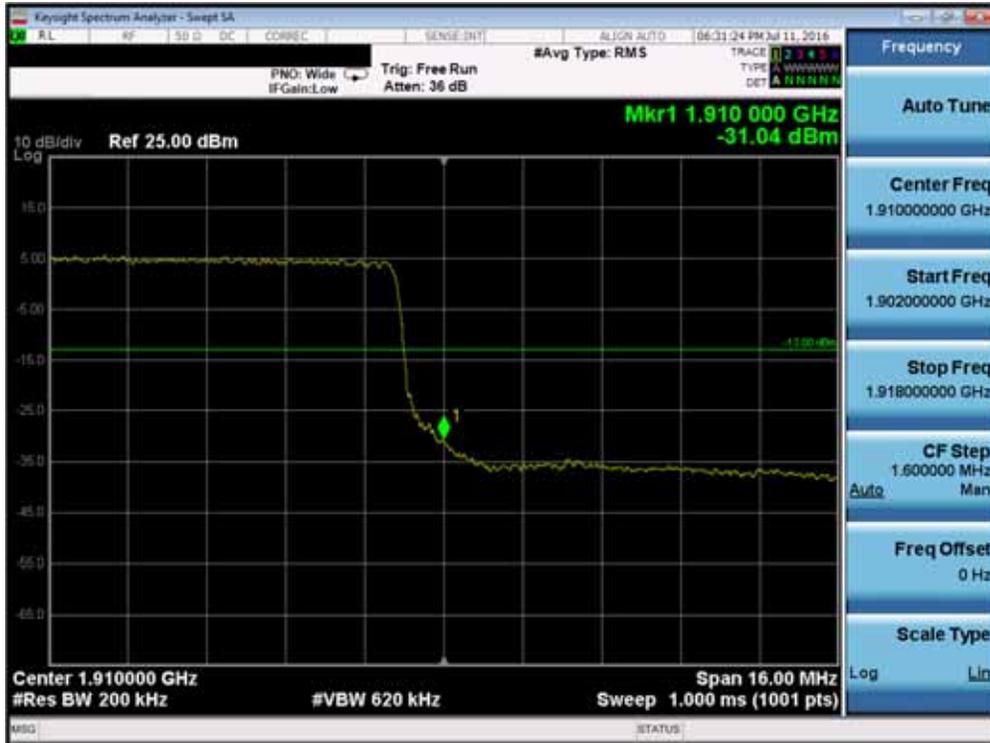


Plot 7-168. Lower Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

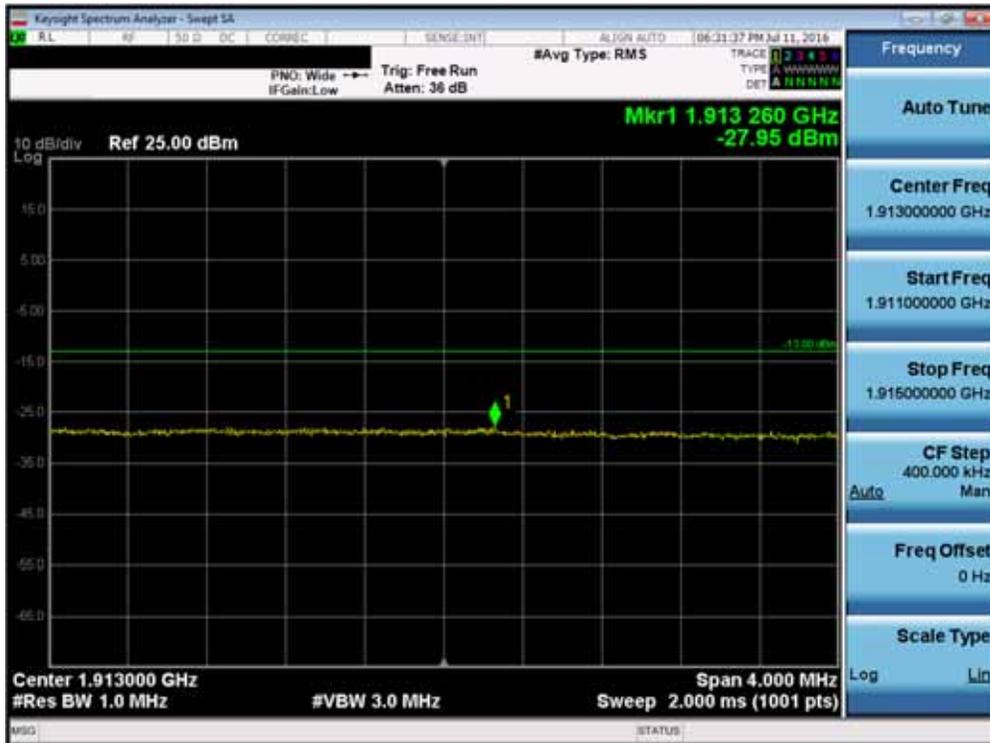


Plot 7-169. Lower Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset	Page 102 of 147	



Plot 7-170. Upper Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 7-171. Upper Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset		Page 103 of 147

## 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

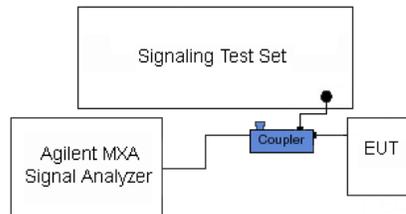
KDB 971168 D01 v02r02 – Section 5.7.1

#### 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.

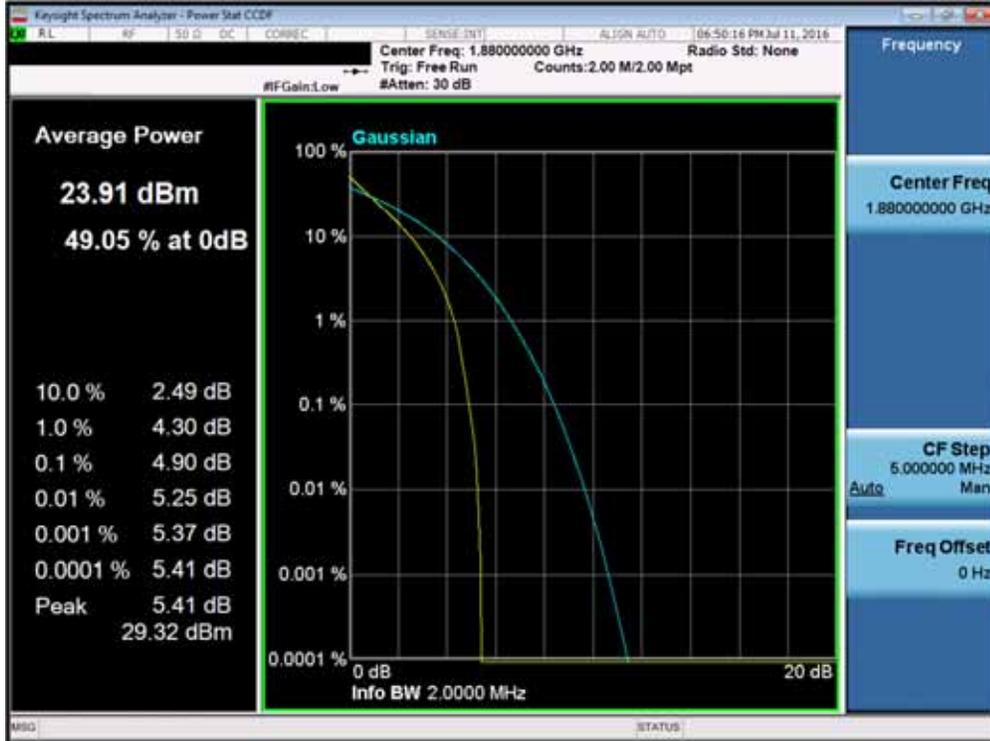


**Figure 7-4. Test Instrument & Measurement Setup**

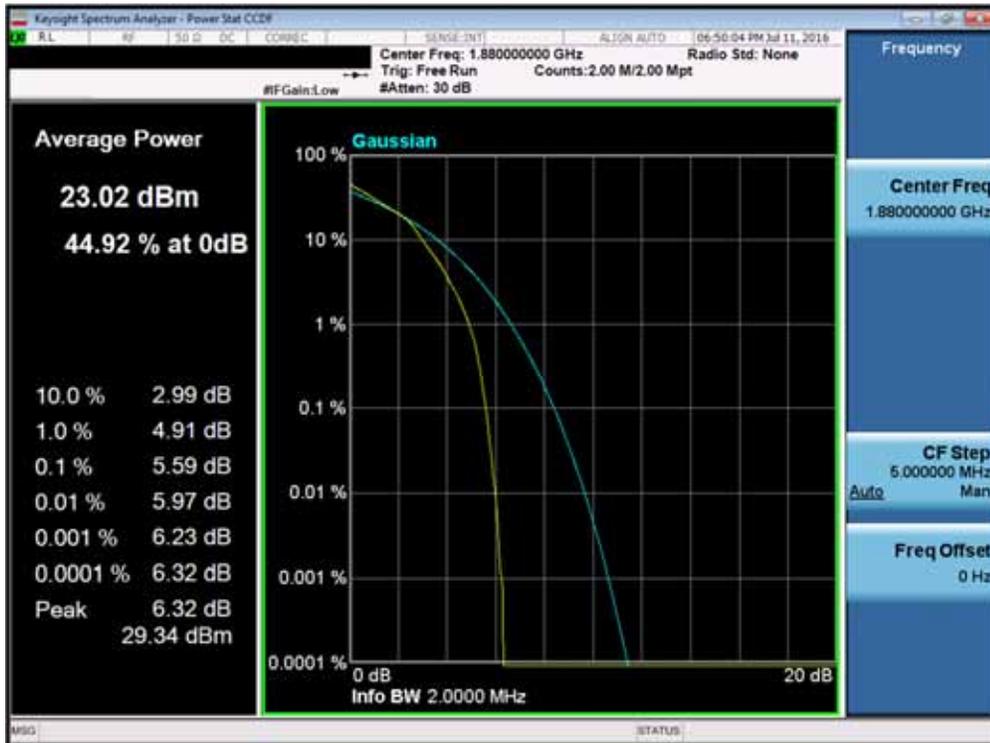
#### Test Notes

None.

FCC ID: ZNFH918	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset	Page 104 of 147	

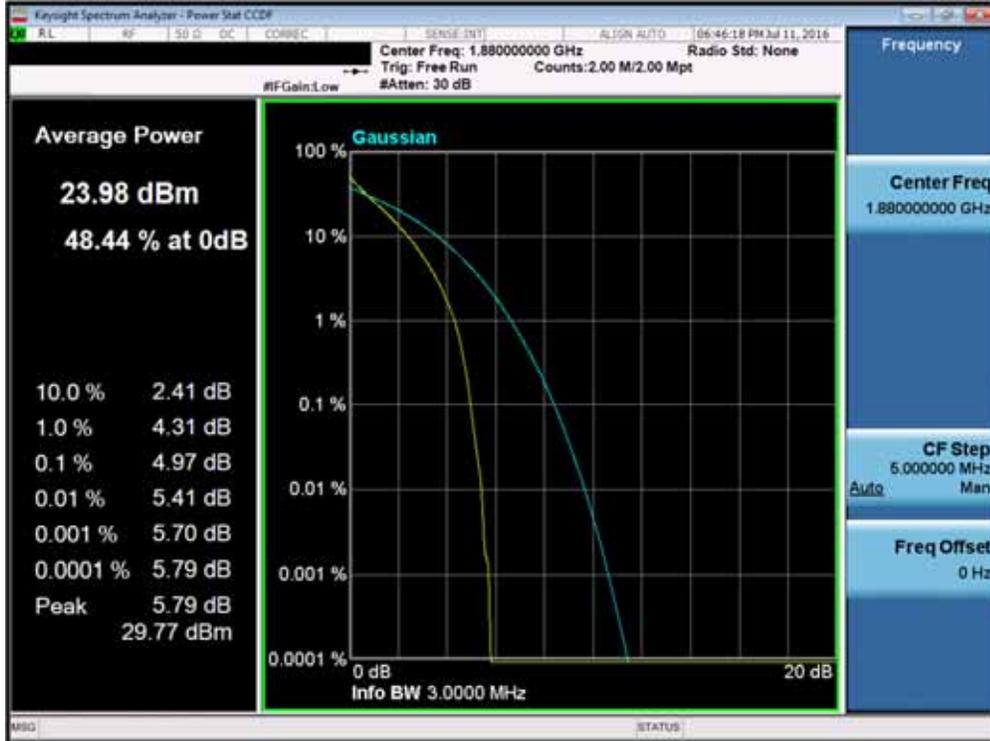


Plot 7-172. PAR Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

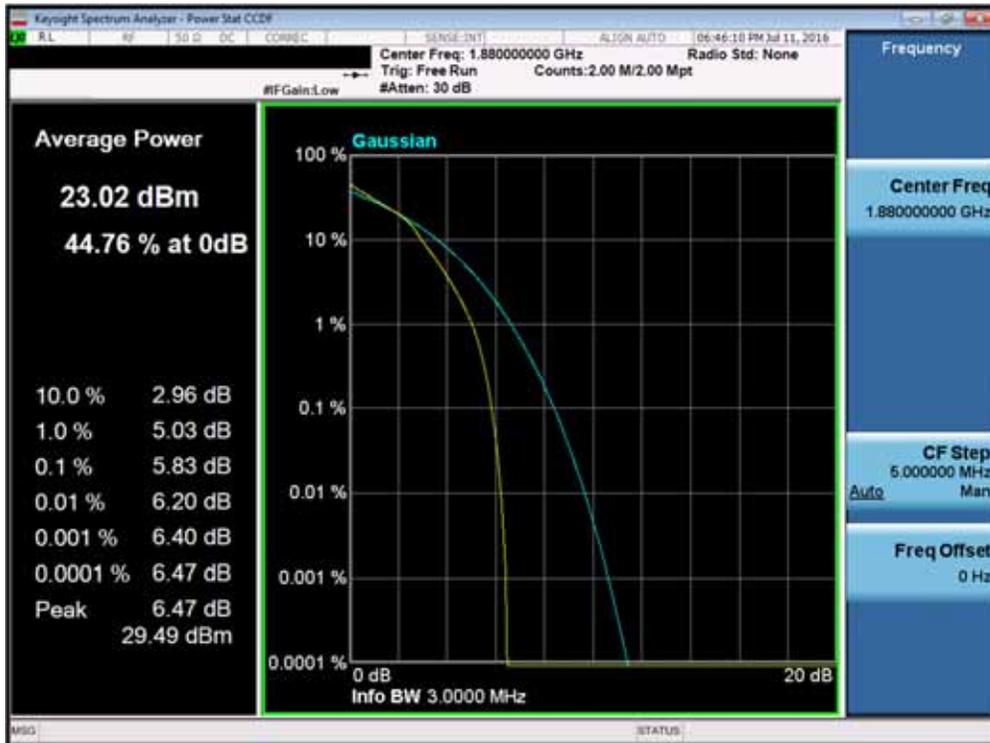


Plot 7-173. PAR Plot (Band 2 – 1.4MHz 16-QAM – RB Size 6)

FCC ID: ZNFH918	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset		Page 105 of 147

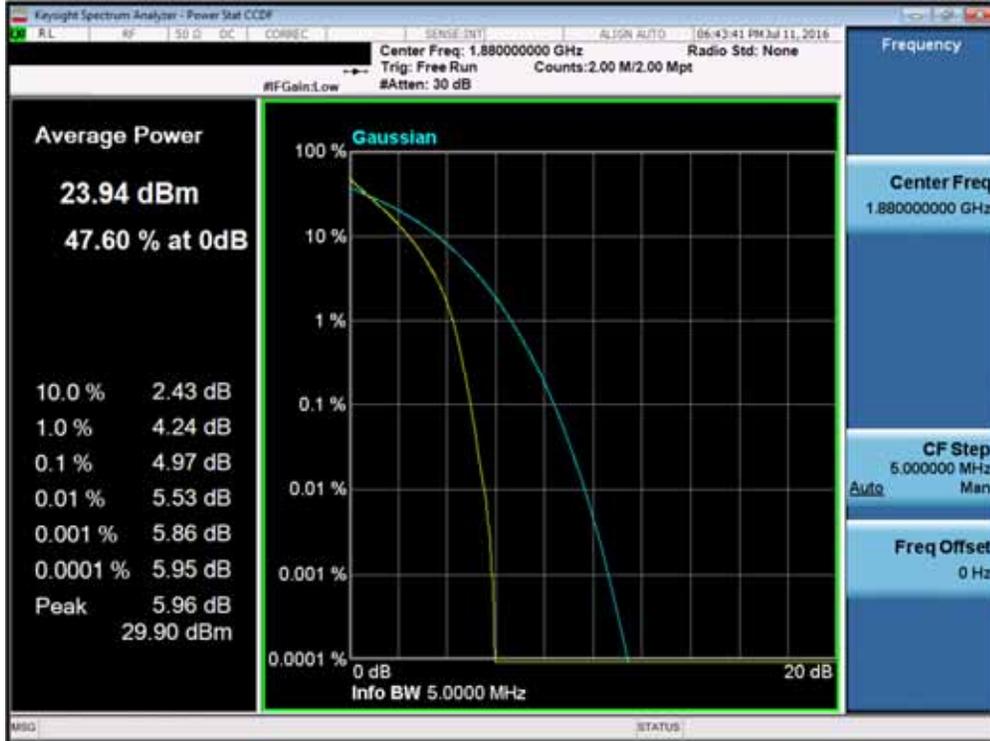


Plot 7-174. PAR Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

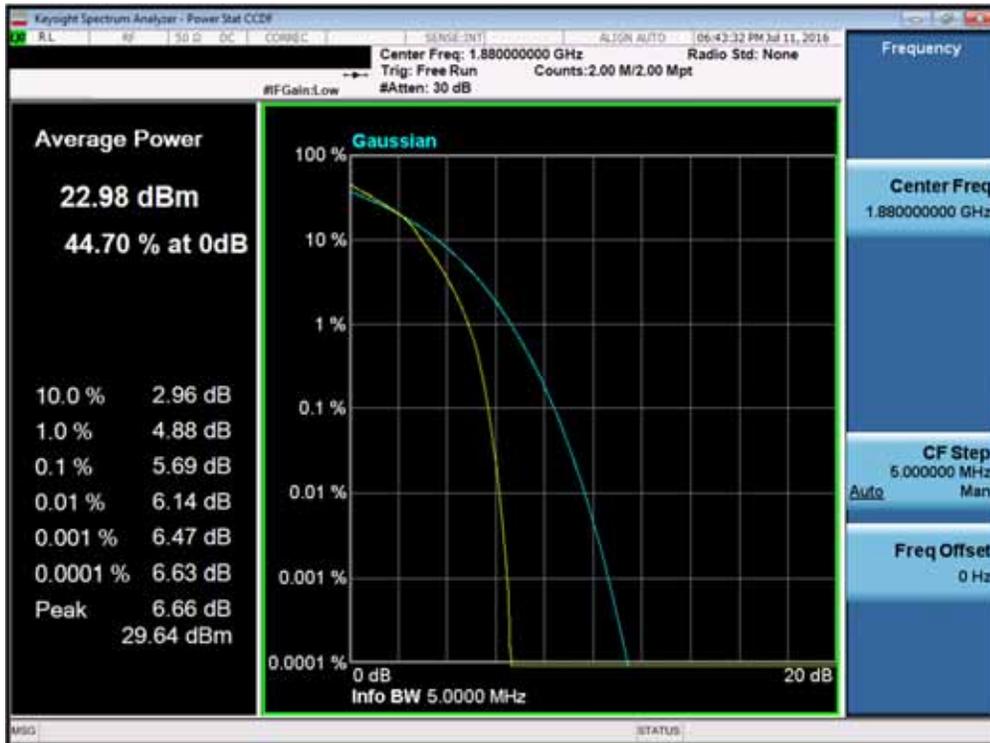


Plot 7-175. PAR Plot (Band 2 – 3.0MHz 16-QAM – RB Size 15)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset		Page 106 of 147

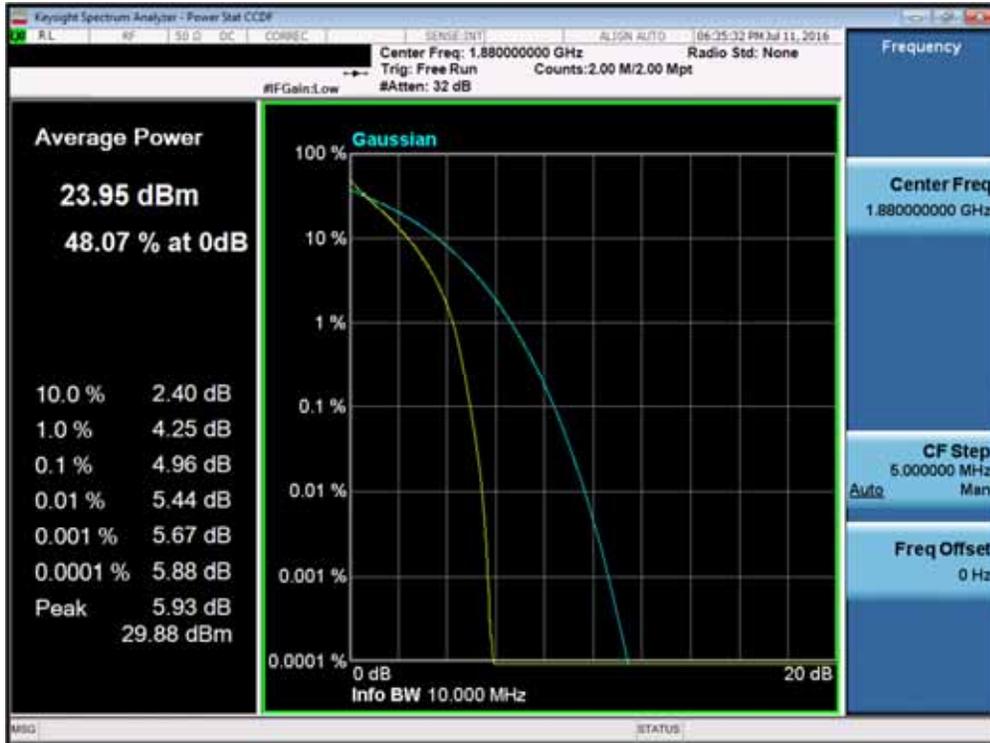


Plot 7-176. PAR Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

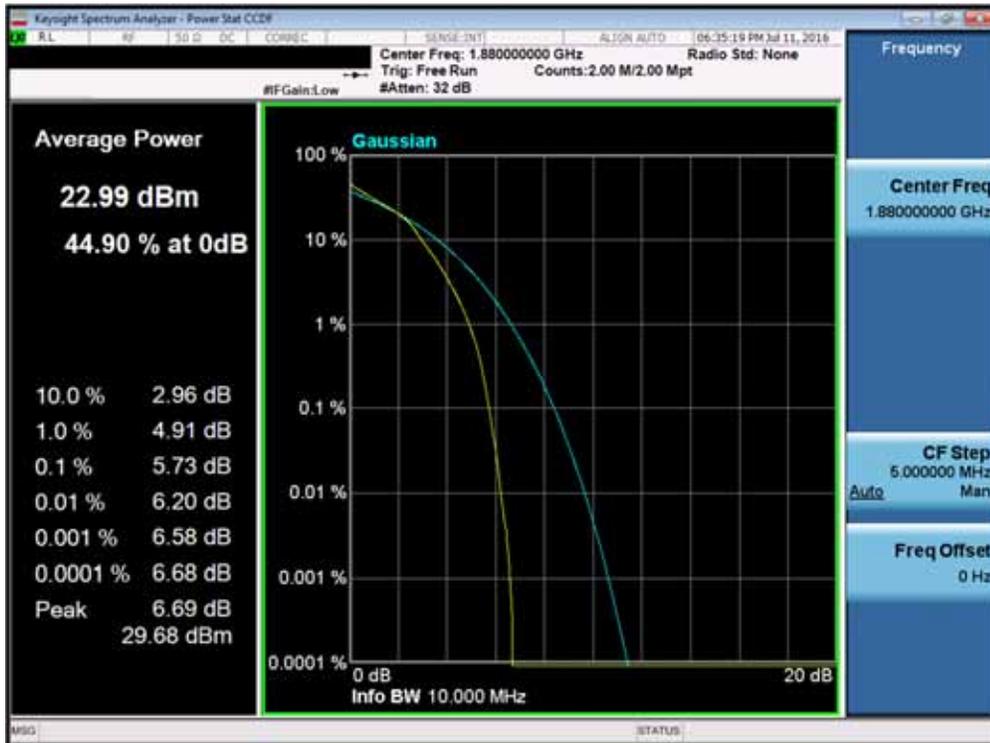


Plot 7-177. PAR Plot (Band 2 – 5.0MHz 16-QAM – RB Size 25)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset		Page 107 of 147

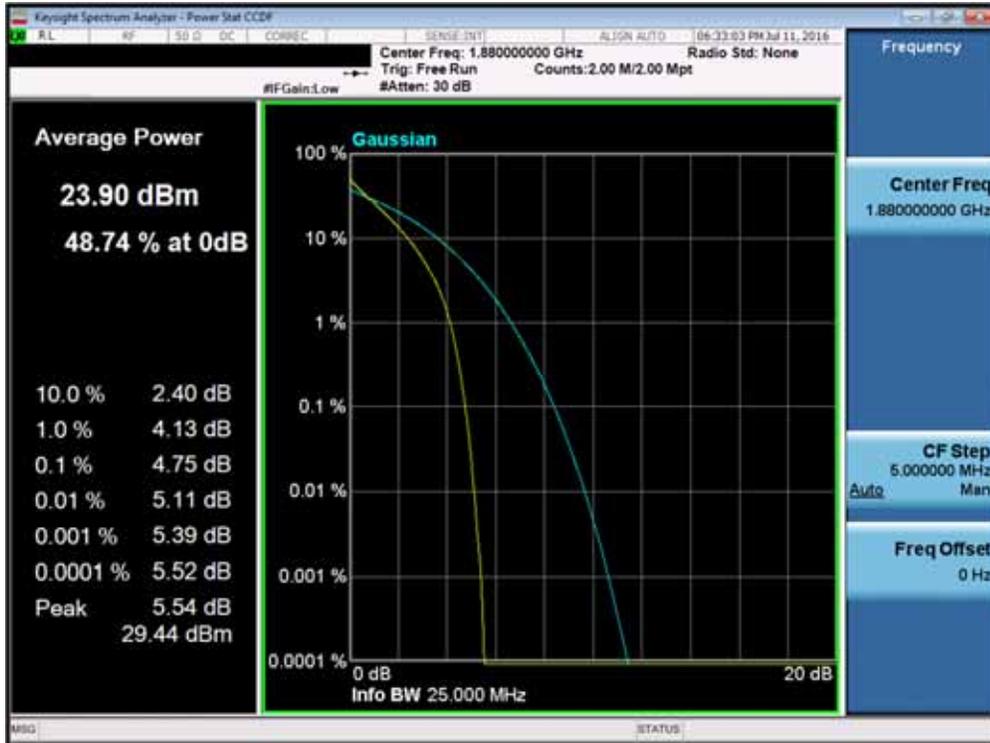


Plot 7-178. PAR Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

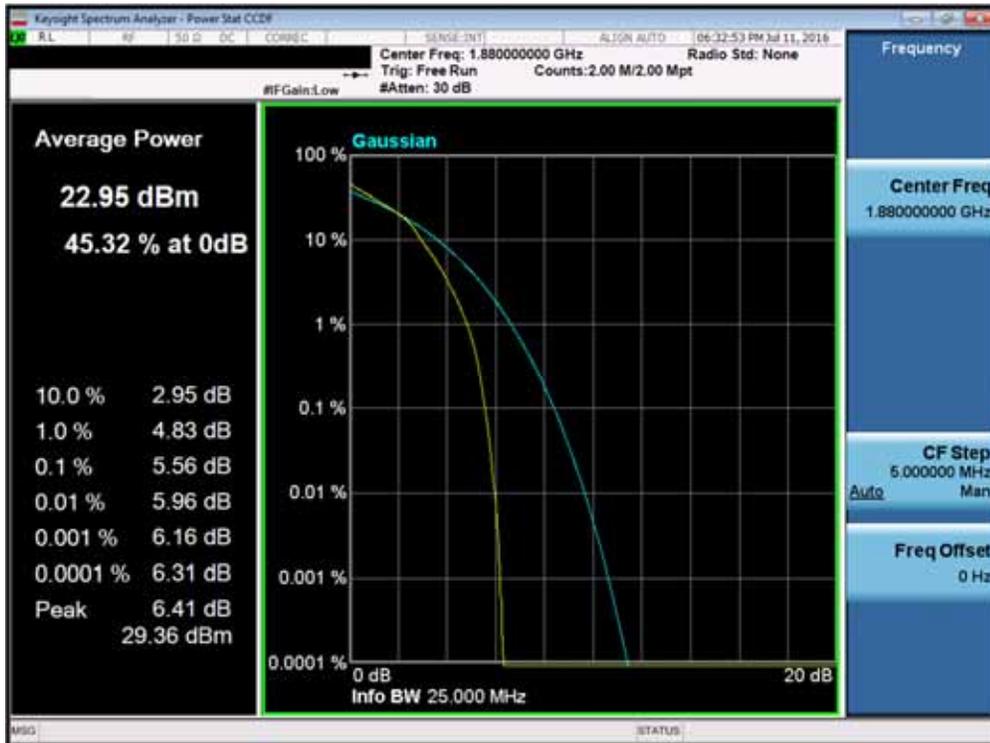


Plot 7-179. PAR Plot (Band 2 – 10.0MHz 16-QAM – RB Size 50)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset		Page 108 of 147

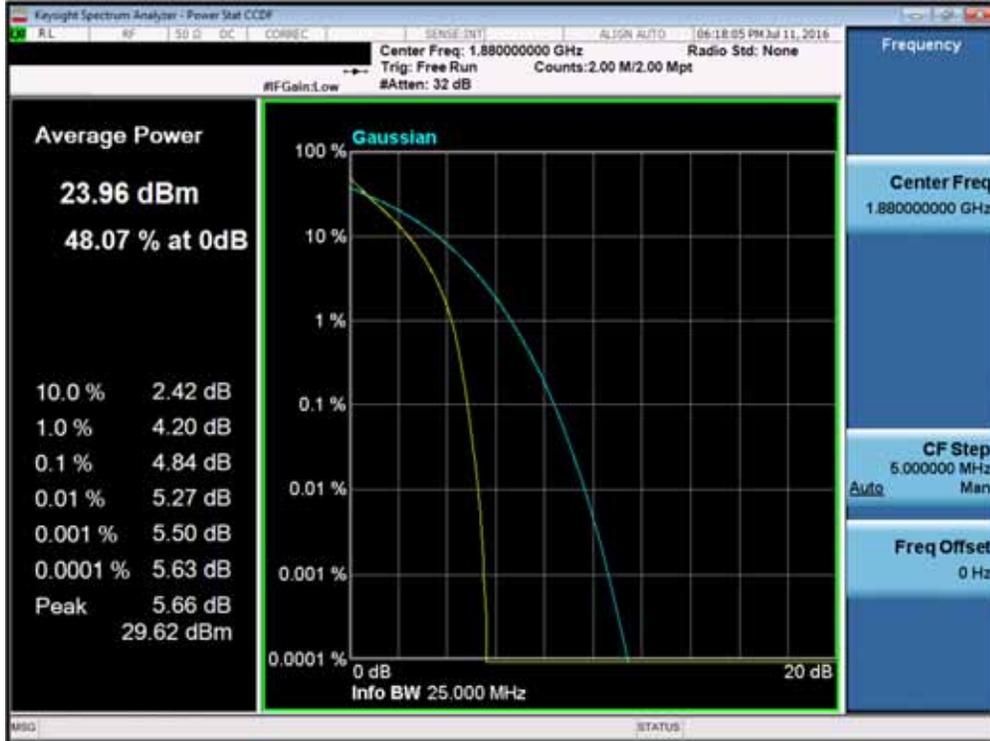


Plot 7-180. PAR Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

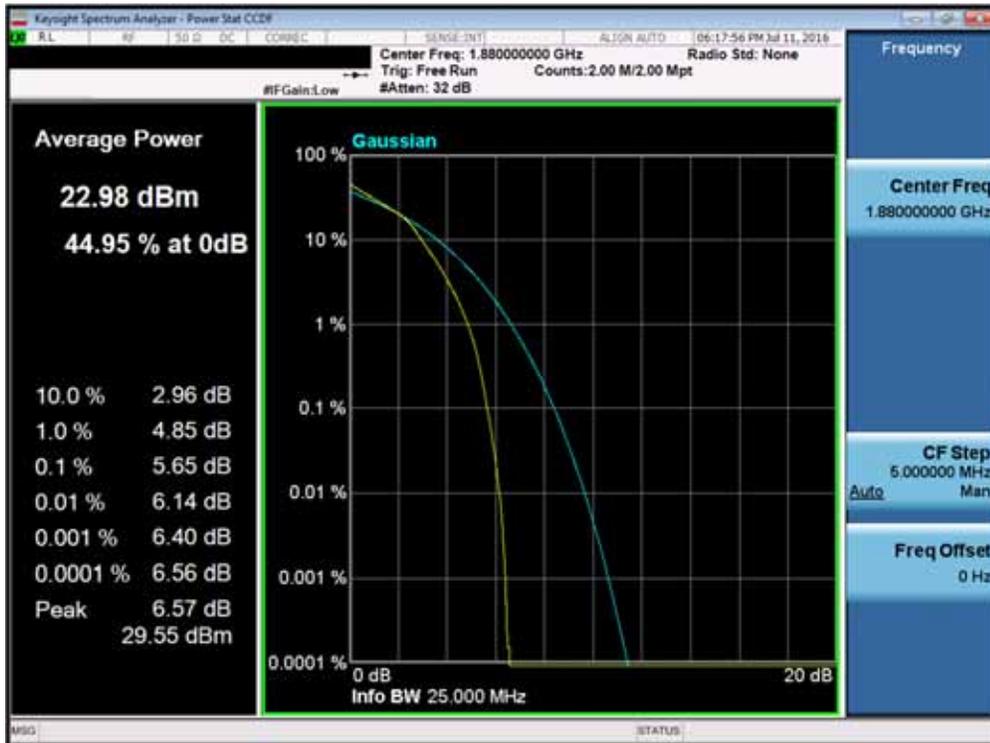


Plot 7-181. PAR Plot (Band 2 – 15.0MHz 16-QAM – RB Size 75)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Plot 7-182. PAR Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 7-183. PAR Plot (Band 2 – 20.0MHz 16-QAM – RB Size 100)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset		Page 110 of 147

## 7.6 Radiated Power (ERP/EIRP)

§22.913(a.2) §24.232(c.2) §27.50(h.2) §27.50(b.10) §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

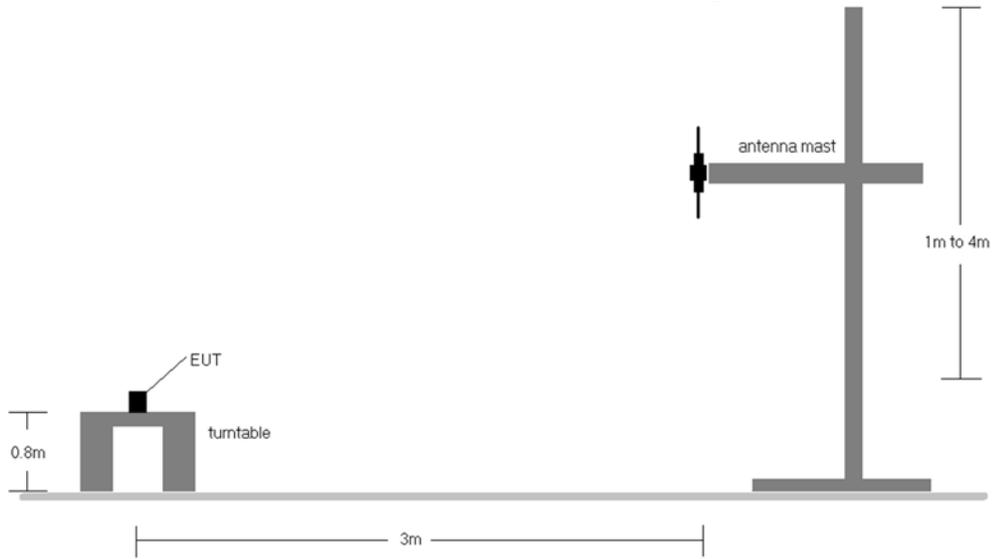
### Test Settings

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  $\geq 3 \times$  RBW
4. Span = 1.5 times the OBW
5. No. of sweep points  $\geq 2 \times$  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

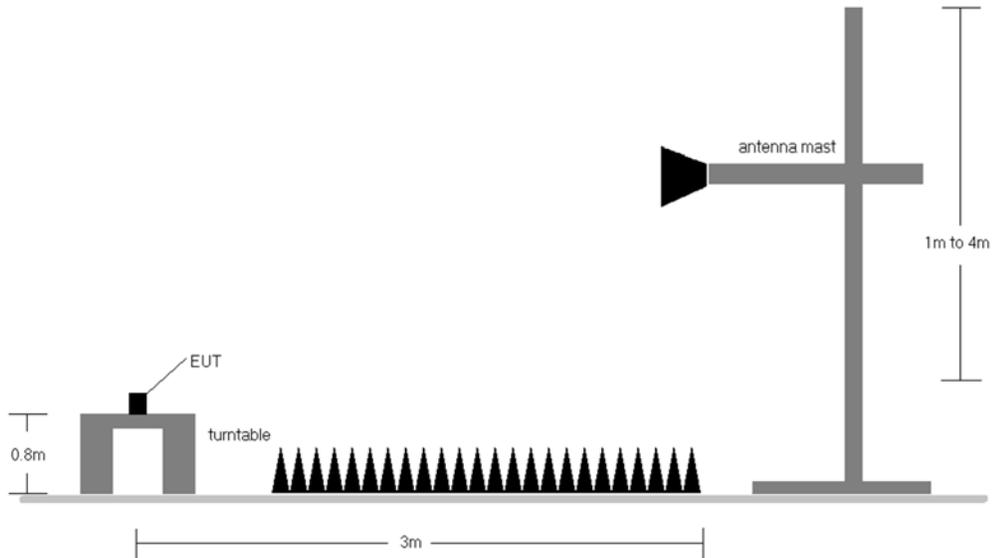
FCC ID: ZNFH918	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b> 		<b>Reviewed by:</b> Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset	Page 111 of 147

## 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: ZNFH918	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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## 7.6.1 Antenna-1 Radiated Power (ERP/EIRP)

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	165	185	1 / 0	15.62	2.88	18.50	34.77	-16.27
707.50	1.4	QPSK	V	171	189	3 / 2	15.90	2.88	18.78	34.77	-15.99
715.30	1.4	QPSK	V	170	193	1 / 5	17.12	3.06	20.18	34.77	-14.59
699.70	1.4	16-QAM	V	165	185	1 / 5	14.60	2.88	17.48	34.77	-17.29
707.50	1.4	16-QAM	V	171	189	1 / 5	14.85	2.88	17.73	34.77	-17.04
715.30	1.4	16-QAM	V	170	193	1 / 5	16.12	3.06	19.18	34.77	-15.59
700.50	3	QPSK	V	144	230	1 / 0	17.40	2.72	20.12	34.77	-14.65
707.50	3	QPSK	V	175	234	1 / 14	17.27	2.88	20.15	34.77	-14.62
714.50	3	QPSK	V	154	200	1 / 14	17.26	3.04	20.30	34.77	-14.47
700.50	3	16-QAM	V	144	230	1 / 0	16.39	2.72	19.11	34.77	-15.66
707.50	3	16-QAM	V	175	234	1 / 14	16.34	2.88	19.22	34.77	-15.55
714.50	3	16-QAM	V	154	200	1 / 0	16.25	3.04	19.29	34.77	-15.48
701.50	5	QPSK	V	170	185	1 / 0	16.92	2.75	19.67	34.77	-15.10
707.50	5	QPSK	V	175	189	1 / 24	17.10	2.88	19.98	34.77	-14.79
713.50	5	QPSK	V	164	179	1 / 24	17.26	3.02	20.28	34.77	-14.49
701.50	5	16-QAM	V	170	185	1 / 24	16.02	2.75	18.77	34.77	-16.00
707.50	5	16-QAM	V	175	189	1 / 24	16.16	2.88	19.04	34.77	-15.73
713.50	5	16-QAM	V	164	179	1 / 0	16.30	3.02	19.32	34.77	-15.45
704.00	10	QPSK	V	180	180	1 / 49	16.71	2.80	19.51	34.77	-15.26
707.50	10	QPSK	V	183	189	1 / 49	16.99	2.88	19.87	34.77	-14.90
711.00	10	QPSK	V	164	134	1 / 49	16.99	2.96	19.95	34.77	-14.82
704.00	10	16-QAM	V	180	180	1 / 49	15.70	2.80	18.50	34.77	-16.27
707.50	10	16-QAM	V	183	189	1 / 49	15.90	2.88	18.78	34.77	-15.99
711.00	10	16-QAM	V	64	134	1 / 49	15.92	2.96	18.88	34.77	-15.89
714.50	3	QPSK	H	293	187	1 / 74	16.77	3.02	19.79	34.77	-14.98

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

FCC ID: ZNFH918	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b>			Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset		Page 113 of 147

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]
779.50	5	QPSK	H	212	0	1 / 24	15.04	4.42	19.46	34.77	-15.31
782.00	5	QPSK	H	245	360	1 / 24	15.19	4.47	19.66	34.77	-15.11
784.50	5	QPSK	H	206	15	1 / 24	15.23	4.52	19.75	34.77	-15.02
779.50	5	16QAM	H	212	0	1 / 24	13.77	4.42	18.19	34.77	-16.58
782.00	5	16QAM	H	245	360	1 / 24	13.96	4.47	18.43	34.77	-16.34
784.50	5	16QAM	H	206	15	1 / 24	13.98	4.52	18.50	34.77	-16.27
782.00	10	QPSK	H	245	13	1 / 49	15.30	4.47	19.77	34.77	-15.00
782.00	10	16QAM	H	245	13	1 / 49	13.88	4.47	18.35	34.77	-16.42
782.00	10	QPSK	V	155	12	1 / 0	13.85	4.47	18.32	34.77	-16.45

**Table 7-3. ERP Data (Band 13)**

<b>FCC ID:</b> ZNFH918		<b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1607051193.ZNF	<b>Test Dates:</b> 7/6 - 7/19/2016	<b>EUT Type:</b> Portable Handset		Page 114 of 147

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	209	153	1 / 5	13.44	4.95	18.39	38.45	-20.07
836.50	1.4	QPSK	H	200	151	1 / 0	13.33	5.00	18.33	38.45	-20.12
848.30	1.4	QPSK	H	200	151	1 / 0	13.46	5.05	18.51	38.45	-19.94
824.70	1.4	16-QAM	H	209	153	1 / 5	12.39	4.95	17.34	38.45	-21.12
836.50	1.4	16-QAM	H	200	151	1 / 0	12.24	5.00	17.24	38.45	-21.21
848.30	1.4	16-QAM	H	200	151	1 / 0	12.45	5.05	17.50	38.45	-20.95
825.50	3	QPSK	H	206	196	1 / 14	12.66	4.95	17.61	38.45	-20.84
836.50	3	QPSK	H	355	338	1 / 0	13.43	5.00	18.43	38.45	-20.02
847.50	3	QPSK	H	100	339	1 / 0	12.40	5.05	17.45	38.45	-21.00
825.50	3	16-QAM	H	206	196	1 / 14	11.57	4.95	16.52	38.45	-21.93
836.50	3	16-QAM	H	355	338	1 / 14	12.34	5.00	17.34	38.45	-21.11
847.50	3	16-QAM	H	100	339	1 / 0	11.36	5.05	16.41	38.45	-22.04
826.50	5	QPSK	H	312	34	1 / 24	13.15	4.95	18.10	38.45	-20.35
836.50	5	QPSK	H	336	341	1 / 24	12.79	5.00	17.79	38.45	-20.66
846.50	5	QPSK	H	100	340	1 / 24	12.62	5.04	17.66	38.45	-20.79
826.50	5	16-QAM	H	312	34	1 / 24	12.10	4.95	17.05	38.45	-21.40
836.50	5	16-QAM	H	336	341	1 / 24	11.92	5.00	16.92	38.45	-21.53
846.50	5	16-QAM	H	100	340	1 / 0	11.76	5.04	16.80	38.45	-21.65
829.00	10	QPSK	H	225	10	1 / 49	12.45	4.96	17.41	38.45	-21.04
836.50	10	QPSK	H	224	0	1 / 0	12.51	5.00	17.51	38.45	-20.94
844.00	10	QPSK	H	221	15	1 / 0	11.80	5.03	16.83	38.45	-21.62
829.00	10	16-QAM	H	100	340	1 / 49	12.61	4.96	17.57	38.45	-20.88
836.50	10	16-QAM	H	224	0	1 / 0	11.46	5.00	16.46	38.45	-21.99
844.00	10	16-QAM	H	221	15	1 / 49	11.45	5.03	16.48	38.45	-21.97
848.30	1.4	QPSK	V	139	323	1 / 74	10.72	5.05	15.77	38.45	-22.68

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

FCC ID: ZNFH918	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b>			Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset		Page 115 of 147

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	131	234	1 / 0	15.29	9.67	24.96	30.00	-5.04
1732.50	1.4	QPSK	H	116	242	1 / 0	14.30	9.53	23.83	30.00	-6.17
1754.30	1.4	QPSK	H	121	239	1 / 0	14.83	9.39	24.22	30.00	-5.78
1710.70	1.4	16-QAM	H	131	234	1 / 0	14.30	9.67	23.97	30.00	-6.03
1732.50	1.4	16-QAM	H	116	242	1 / 0	13.34	9.53	22.87	30.00	-7.13
1754.30	1.4	16-QAM	H	121	239	1 / 5	13.71	9.39	23.10	30.00	-6.90
1711.50	3	QPSK	H	132	238	1 / 0	15.29	9.67	24.96	30.00	-5.04
1732.50	3	QPSK	H	126	238	1 / 0	14.24	9.53	23.77	30.00	-6.23
1753.50	3	QPSK	H	121	239	1 / 14	14.78	9.40	24.18	30.00	-5.82
1711.50	3	16-QAM	H	132	238	1 / 0	14.29	9.67	23.96	30.00	-6.04
1732.50	3	16-QAM	H	126	238	1 / 0	13.18	9.53	22.71	30.00	-7.29
1753.50	3	16-QAM	H	121	239	1 / 14	13.78	9.40	23.18	30.00	-6.82

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

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset	Page 116 of 147	

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]
1712.50	5	QPSK	H	133	236	1 / 0	14.87	9.66	24.53	30.00	-5.47
1745.00	5	QPSK	H	139	258	1 / 0	15.01	9.45	24.46	30.00	-5.54
1777.50	5	QPSK	H	126	235	1 / 24	14.62	9.25	23.87	30.00	-6.13
1712.50	5	16-QAM	H	133	236	1 / 24	14.27	9.66	23.93	30.00	-6.07
1745.00	5	16-QAM	H	139	258	1 / 0	14.83	9.45	24.28	30.00	-5.72
1777.50	5	16-QAM	H	126	235	1 / 24	14.06	9.25	23.31	30.00	-6.69
1715.00	10	QPSK	H	132	233	1 / 0	15.19	9.64	24.83	30.00	-5.17
1745.00	10	QPSK	H	110	242	1 / 0	14.97	9.45	24.42	30.00	-5.58
1775.00	10	QPSK	H	124	234	1 / 49	14.70	9.26	23.96	30.00	-6.04
1715.00	10	16-QAM	H	132	233	1 / 0	14.72	9.64	24.36	30.00	-5.64
1745.00	10	16-QAM	H	110	242	1 / 0	13.97	9.45	23.42	30.00	-6.58
1775.00	10	16-QAM	H	124	234	1 / 49	13.96	9.26	23.22	30.00	-6.78
1717.50	15	QPSK	H	130	235	1 / 0	15.21	9.63	24.84	30.00	-5.16
1745.00	15	QPSK	H	123	240	1 / 0	14.70	9.45	24.15	30.00	-5.85
1772.50	15	QPSK	H	123	234	1 / 74	15.11	9.28	24.39	30.00	-5.61
1717.50	15	16-QAM	H	130	235	1 / 0	14.24	9.63	23.87	30.00	-6.13
1745.00	15	16-QAM	H	123	240	1 / 0	13.68	9.45	23.13	30.00	-6.87
1772.50	15	16-QAM	H	123	234	1 / 74	14.63	9.28	23.91	30.00	-6.09
1720.00	20	QPSK	H	128	239	1 / 0	14.98	9.61	24.59	30.00	-5.41
1745.00	20	QPSK	H	120	239	1 / 0	14.33	9.45	23.78	30.00	-6.22
1770.00	20	QPSK	H	128	235	1 / 0	15.50	9.29	24.79	30.00	-5.21
1720.00	20	16-QAM	H	128	239	1 / 0	13.85	9.61	23.46	30.00	-6.54
1745.00	20	16-QAM	H	120	239	1 / 99	13.51	9.45	22.96	30.00	-7.04
1770.00	20	16-QAM	H	128	235	1 / 99	13.89	9.29	23.18	30.00	-6.82
1717.50	15	QPSK	V	110	200	1 / 0	13.96	9.63	23.59	30.00	-6.41

**Table 7-6. EIRP Data (Band 4/66)**

FCC ID: ZNFH918	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b>			Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset		Page 117 of 147

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	247	265	1 / 5	14.51	9.21	23.72	33.01	-9.29
1880.00	1.4	QPSK	H	257	273	1 / 0	14.88	9.27	24.15	33.01	-8.86
1909.30	1.4	QPSK	H	244	281	1 / 5	14.29	9.36	23.65	33.01	-9.36
1850.70	1.4	16-QAM	H	247	265	1 / 5	13.23	9.21	22.44	33.01	-10.57
1880.00	1.4	16-QAM	H	257	273	1 / 0	13.84	9.27	23.11	33.01	-9.90
1909.30	1.4	16-QAM	H	244	281	1 / 0	12.56	9.36	21.92	33.01	-11.09
1851.50	3	QPSK	H	220	167	1 / 14	14.97	9.21	24.18	33.01	-8.83
1880.00	3	QPSK	H	261	180	1 / 14	15.29	9.27	24.56	33.01	-8.45
1908.50	3	QPSK	H	255	181	1 / 0	14.67	9.36	24.03	33.01	-8.98
1851.50	3	16-QAM	H	220	167	1 / 14	13.90	9.21	23.11	33.01	-9.90
1880.00	3	16-QAM	H	261	180	1 / 14	14.51	9.27	23.78	33.01	-9.23
1908.50	3	16-QAM	H	255	181	1 / 0	13.68	9.36	23.04	33.01	-9.97
1852.50	5	QPSK	H	247	164	1 / 24	14.58	9.22	23.80	33.01	-9.21
1880.00	5	QPSK	H	259	179	1 / 0	15.22	9.27	24.49	33.01	-8.52
1907.50	5	QPSK	H	240	131	1 / 0	13.65	9.35	23.00	33.01	-10.01
1852.50	5	16-QAM	H	247	164	1 / 24	13.59	9.22	22.81	33.01	-10.20
1880.00	5	16-QAM	H	259	179	1 / 0	14.21	9.27	23.48	33.01	-9.53
1907.50	5	16-QAM	H	240	131	1 / 0	12.50	9.35	21.85	33.01	-11.16
1855.00	10	QPSK	H	114	12	1 / 0	12.70	9.34	22.04	33.01	-10.97
1880.00	10	QPSK	H	100	0	1 / 49	12.68	9.27	21.95	33.01	-11.06
1905.00	10	QPSK	H	108	15	1 / 49	13.75	9.24	22.99	33.01	-10.02
1855.00	10	16-QAM	H	114	12	1 / 0	11.60	9.34	20.94	33.01	-12.07
1880.00	10	16-QAM	H	100	0	1 / 49	11.64	9.27	20.91	33.01	-12.10
1905.00	10	16-QAM	H	108	15	1 / 49	12.70	9.24	21.94	33.01	-11.07
1857.50	15	QPSK	H	114	12	1 / 0	15.94	9.33	25.27	33.01	-7.74
1880.00	15	QPSK	H	105	0	1 / 74	15.50	9.27	24.77	33.01	-8.24
1902.50	15	QPSK	H	260	6	1 / 0	15.84	9.23	25.07	33.01	-7.94
1857.50	15	16-QAM	H	114	12	1 / 0	14.71	9.33	24.04	33.01	-8.97
1880.00	15	16-QAM	H	105	0	1 / 74	14.56	9.27	23.83	33.01	-9.18
1902.50	15	16-QAM	H	260	6	1 / 0	14.74	9.23	23.97	33.01	-9.04
1860.00	20	QPSK	H	12	354	1 / 0	14.54	9.32	23.86	33.01	-9.15
1880.00	20	QPSK	H	100	360	1 / 0	15.41	9.27	24.68	33.01	-8.33
1900.00	20	QPSK	H	334	347	1 / 99	14.70	9.22	23.92	33.01	-9.09
1860.00	20	16-QAM	H	12	354	1 / 0	13.63	9.32	22.95	33.01	-10.06
1880.00	20	16-QAM	H	100	360	1 / 0	14.48	9.27	23.75	33.01	-9.26
1900.00	20	16-QAM	H	334	347	1 / 99	13.73	9.22	22.95	33.01	-10.06
1857.50	15	QPSK	V	137	274	1 / 0	12.61	9.23	21.84	33.01	-11.17

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

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset	Page 118 of 147	

## 7.6.2 Antenna-2 Radiated Power (ERP)

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	247	9	1 / 0	12.20	2.88	15.08	34.77	-19.69
707.50	1.4	QPSK	V	246	0	1 / 0	11.47	2.88	14.35	34.77	-20.42
715.30	1.4	QPSK	V	240	7	1 / 0	12.19	3.06	15.25	34.77	-19.52
699.70	1.4	16-QAM	V	247	9	1 / 0	11.24	2.88	14.12	34.77	-20.65
707.50	1.4	16-QAM	V	246	0	1 / 0	10.59	2.88	13.47	34.77	-21.30
715.30	1.4	16-QAM	V	240	7	1 / 0	11.19	3.06	14.25	34.77	-20.52
700.50	3	QPSK	V	244	10	1 / 14	13.33	2.72	16.05	34.77	-18.72
707.50	3	QPSK	V	249	0	1 / 14	13.07	2.88	15.95	34.77	-18.82
714.50	3	QPSK	V	249	4	1 / 0	12.40	3.04	15.44	34.77	-19.33
700.50	3	16-QAM	V	244	10	1 / 14	12.24	2.72	14.96	34.77	-19.81
707.50	3	16-QAM	V	249	0	1 / 14	12.13	2.88	15.01	34.77	-19.76
714.50	3	16-QAM	V	249	4	1 / 0	11.47	3.04	14.51	34.77	-20.26
701.50	5	QPSK	V	238	1	1 / 0	13.30	2.75	16.05	34.77	-18.72
707.50	5	QPSK	V	257	2	1 / 24	13.10	2.88	15.98	34.77	-18.79
713.50	5	QPSK	V	253	9	1 / 0	12.85	3.02	15.87	34.77	-18.90
701.50	5	16-QAM	V	238	1	1 / 0	12.35	2.75	15.10	34.77	-19.67
707.50	5	16-QAM	V	257	2	1 / 24	12.14	2.88	15.02	34.77	-19.75
713.50	5	16-QAM	V	253	9	1 / 0	11.99	3.02	15.01	34.77	-19.76
704.00	10	QPSK	V	259	1	1 / 0	13.11	2.80	15.91	34.77	-18.86
707.50	10	QPSK	V	273	0	1 / 0	12.98	2.88	15.86	34.77	-18.91
711.00	10	QPSK	V	270	5	1 / 0	12.39	2.96	15.35	34.77	-19.42
704.00	10	16-QAM	V	259	1	1 / 0	12.15	2.80	14.95	34.77	-19.82
707.50	10	16-QAM	V	273	0	1 / 0	11.98	2.88	14.86	34.77	-19.91
711.00	10	16-QAM	V	270	5	1 / 0	11.50	2.96	14.46	34.77	-20.31
700.50	3	QPSK	H	150	199	1 / 74	12.04	2.72	14.76	34.77	-20.01

Table 7-8. ERP Data (Band 12)

FCC ID: ZNFH918	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b>			Reviewed by: Quality Manager
Test Report S/N: 0Y1607051193.ZNF	Test Dates: 7/6 - 7/19/2016	EUT Type: Portable Handset	Page 119 of 147	

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]
779.50	5	QPSK	V	126	334	1 / 24	10.38	4.42	14.80	34.77	-19.97
782.00	5	QPSK	V	130	330	1 / 24	10.52	4.47	14.99	34.77	-19.78
784.50	5	QPSK	V	127	327	1 / 0	11.17	4.52	15.69	34.77	-19.08
779.50	5	16QAM	V	126	334	1 / 24	9.27	4.42	13.69	34.77	-21.08
782.00	5	16QAM	V	130	330	1 / 24	9.34	4.47	13.81	34.77	-20.96
784.50	5	16QAM	V	127	327	1 / 0	9.99	4.52	14.51	34.77	-20.26
782.00	10	QPSK	V	135	325	1 / 49	10.64	4.47	15.11	34.77	-19.66
782.00	10	16QAM	V	135	325	1 / 49	9.46	4.47	13.93	34.77	-20.84
784.50	5	QPSK	H	236	208	1 / 0	10.09	4.52	14.61	34.77	-20.16

**Table 7-9. ERP Data (Band 13)**

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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]
824.70	1.4	QPSK	H	220	204	1 / 5	6.57	4.95	11.52	38.45	-26.94
836.50	1.4	QPSK	H	217	210	1 / 0	6.55	5.00	11.55	38.45	-26.90
848.30	1.4	QPSK	H	214	200	1 / 0	5.54	5.05	10.59	38.45	-27.86
824.70	1.4	16-QAM	H	220	204	1 / 0	5.53	4.95	10.48	38.45	-27.98
836.50	1.4	16-QAM	H	217	210	1 / 5	5.47	5.00	10.47	38.45	-27.98
848.30	1.4	16-QAM	H	214	200	1 / 0	4.59	5.05	9.64	38.45	-28.81
825.50	3	QPSK	H	321	180	1 / 14	6.12	4.95	11.07	38.45	-27.38
836.50	3	QPSK	H	365	197	1 / 14	6.60	5.00	11.60	38.45	-26.85
847.50	3	QPSK	H	341	155	1 / 0	6.81	5.05	11.86	38.45	-26.59
825.50	3	16-QAM	H	321	180	1 / 14	4.97	4.95	9.92	38.45	-28.53
836.50	3	16-QAM	H	365	197	1 / 14	5.56	5.00	10.56	38.45	-27.89
847.50	3	16-QAM	H	341	155	1 / 14	5.80	5.05	10.85	38.45	-27.60
826.50	5	QPSK	H	201	142	1 / 24	7.33	4.95	12.28	38.45	-26.17
836.50	5	QPSK	H	207	206	1 / 0	7.16	5.00	12.16	38.45	-26.29
846.50	5	QPSK	H	194	201	1 / 0	6.20	5.04	11.24	38.45	-27.21
826.50	5	16-QAM	H	201	142	1 / 24	6.30	4.95	11.25	38.45	-27.20
836.50	5	16-QAM	H	207	206	1 / 0	6.35	5.00	11.35	38.45	-27.10
846.50	5	16-QAM	H	194	201	1 / 0	5.31	5.04	10.35	38.45	-28.10
829.00	10	QPSK	H	341	194	1 / 49	6.01	4.96	10.97	38.45	-27.48
836.50	10	QPSK	H	365	204	1 / 49	6.53	5.00	11.53	38.45	-26.92
844.00	10	QPSK	H	321	187	1 / 49	6.55	5.03	11.58	38.45	-26.87
829.00	10	16-QAM	H	341	194	1 / 0	5.58	4.96	10.54	38.45	-27.91
836.50	10	16-QAM	H	365	204	1 / 49	5.61	5.00	10.61	38.45	-27.84
844.00	10	16-QAM	H	321	187	1 / 49	5.49	5.03	10.52	38.45	-27.93
826.50	5	QPSK	V	132	292	1 / 0	5.90	4.95	10.85	38.45	-27.60

**Table 7-10. ERP Data (Band 5)**

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## 7.7 Radiated Spurious Emissions Measurements

§2.1053 §22.917(a) §24.238(a) §27.53(c) §27.53(f) §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

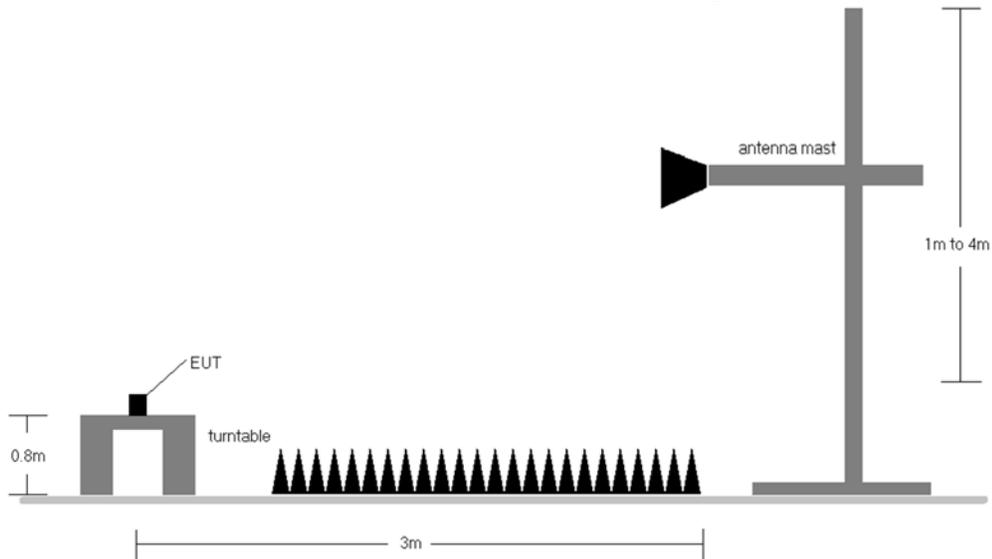
### Test Settings

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

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## 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.

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### 7.7.1 Antenna-1 Radiated Spurious Emissions Measurements

OPERATING FREQUENCY: 701.50 MHz  
 CHANNEL: 23035  
 MEASURED OUTPUT POWER: 19.67 dBm = 0.093 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  32.67 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	114	153	-55.06	2.39	-52.67	72.3
2104.50	H	-	-	-55.87	3.46	-52.41	72.1
2806.00	H	-	-	-55.35	4.76	-50.59	70.3

**Table 7-11. Radiated Spurious Data (Band 12 – Low Channel)**

OPERATING FREQUENCY: 707.50 MHz  
 CHANNEL: 23095  
 MEASURED OUTPUT POWER: 19.98 dBm = 0.100 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  32.98 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	154	164	-54.49	2.54	-51.94	71.9
2122.50	H	267	151	-53.42	3.42	-50.00	70.0
2830.00	H	-	-	-55.82	4.85	-50.97	71.0

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

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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OPERATING FREQUENCY: 713.50 MHz  
 CHANNEL: 23155  
 MEASURED OUTPUT POWER: 20.28 dBm = 0.107 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  33.28 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	150	171	-55.59	2.70	-52.90	73.2
2140.50	H	114	163	-52.99	3.38	-49.61	69.9
2854.00	H	-	-	-55.66	4.95	-50.72	71.0

**Table 7-13. Radiated Spurious Data (Band 12 – High Channel)**

OPERATING FREQUENCY: 782.00 MHz  
 CHANNEL: 23230  
 MEASURED OUTPUT POWER: 19.77 dBm = 0.095 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  32.77 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]
2346.00	H	-	-	-60.41	7.33	-53.08	72.9
3128.00	H	-	-	-56.78	7.20	-49.58	69.3

**Table 7-14. Radiated Spurious Data (Band 13 – Mid Channel)**

MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.00 MHz  
 DISTANCE: 3 meters  
 NARROWBAND EMISSION LIMIT: -50 dBm  
 WIDEBAND EMISSION LIMIT: -40 dBm/MHz

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]	Margin [dB]
1564.00	H	122	359	-63.21	6.57	-56.64	-16.60

**Table 7-15. Radiated Spurious Data (Band 13 – 1559-1610MHz Band)**

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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OPERATING FREQUENCY: 824.70 MHz  
 CHANNEL: 20407  
 MEASURED OUTPUT POWER: 18.39 dBm = 0.069 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 1.4 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  31.39 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]
1649.40	H	-	-	-62.53	6.70	-55.83	74.2
2474.10	H	-	-	-62.04	7.52	-54.52	72.9

Table 7-16. Radiated Spurious Data (Band 5 – Low Channel)

OPERATING FREQUENCY: 836.50 MHz  
 CHANNEL: 20525  
 MEASURED OUTPUT POWER: 18.33 dBm = 0.068 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 1.4 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  31.33 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	-	-	-63.28	6.70	-56.58	74.9
2509.50	H	-	-	-59.29	7.63	-51.67	70.0

Table 7-17. Radiated Spurious Data (Band 5 – Mid Channel)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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OPERATING FREQUENCY: 848.30 MHz  
 CHANNEL: 20643  
 MEASURED OUTPUT POWER: 18.51 dBm = 0.071 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 1.4 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  31.51 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]
1696.60	H	100	195	-61.28	6.70	-54.58	73.1
2544.90	H	-	-	-59.80	7.60	-52.20	70.7

Table 7-18. Radiated Spurious Data (Band 5 – High Channel)

OPERATING FREQUENCY: 1717.50 MHz  
 CHANNEL: 132047  
 MEASURED OUTPUT POWER: 24.84 dBm = 0.305 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 15.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  37.84 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]
3435.00	H	-	-	-58.54	9.88	-48.67	73.5
5152.50	H	-	-	-57.49	10.75	-46.74	71.6

Table 7-19. Radiated Spurious Data (Band 4/66 – Low Channel)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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OPERATING FREQUENCY: 1745.00 MHz  
 CHANNEL: 132322  
 MEASURED OUTPUT POWER: 24.15 dBm = 0.260 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 15.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  37.15 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	217	10	-55.82	9.94	-45.88	70.0
5235.00	H	-	-	-56.15	10.72	-45.42	69.6

**Table 7-20. Radiated Spurious Data (Band 4/66 – Mid Channel)**

OPERATING FREQUENCY: 1772.50 MHz  
 CHANNEL: 132597  
 MEASURED OUTPUT POWER: 24.39 dBm = 0.275 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 15.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  37.39 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3545.00	H	165	10	-57.09	9.96	-47.13	71.5
5317.50	H	207	253	-53.47	10.70	-42.78	67.2
7090.00	H	-	-	-51.69	11.77	-39.92	64.3

**Table 7-21. Radiated Spurious Data (Band 4/66 – High Channel)**

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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OPERATING FREQUENCY: 1857.50 MHz  
 CHANNEL: 18675  
 MEASURED OUTPUT POWER: 25.27 dBm = 0.337 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 15.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  38.27 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3715.00	H	100	132	-50.27	8.46	-41.81	67.1
5572.50	H	-	-	-51.28	10.54	-40.74	66.0

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

OPERATING FREQUENCY: 1880.00 MHz  
 CHANNEL: 18900  
 MEASURED OUTPUT POWER: 24.77 dBm = 0.300 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 15.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  37.77 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	146	-48.20	8.64	-39.56	64.3
5640.00	H	-	-	-51.44	10.62	-40.83	65.6

Table 7-23. Radiated Spurious Data (Band 2 – Mid Channel)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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OPERATING FREQUENCY: 1902.50 MHz  
 CHANNEL: 19125  
 MEASURED OUTPUT POWER: 25.07 dBm = 0.321 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 15.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  38.07 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	100	131	-51.42	8.79	-42.63	67.7
5707.50	H	-	-	-52.36	10.69	-41.67	66.7

Table 7-24. Radiated Spurious Data (Band 2 – High Channel)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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## 7.7.2 Antenna-2 Radiated Spurious Emissions Measurements

OPERATING FREQUENCY: 701.50 MHz  
 CHANNEL: 23025  
 MEASURED OUTPUT POWER: 16.05 dBm = 0.040 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  29.05 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	-	-	-57.34	2.36	-54.98	71.0
2104.50	H	218	228	-53.95	3.46	-50.49	66.5
2806.00	H	-	-	-54.62	4.75	-49.87	65.9

**Table 7-25. Radiated Spurious Data (Band 12 – Low Channel)**

OPERATING FREQUENCY: 707.50 MHz  
 CHANNEL: 23095  
 MEASURED OUTPUT POWER: 15.98 dBm = 0.040 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  28.98 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	-	-	-56.07	2.54	-53.52	69.5
2122.50	H	275	321	-51.66	3.42	-48.24	64.2
2830.00	H	-	-	-54.53	4.85	-49.68	65.7

**Table 7-26. Radiated Spurious Data (Band 12 – Mid Channel)**

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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OPERATING FREQUENCY: 713.50 MHz  
 CHANNEL: 23165  
 MEASURED OUTPUT POWER: 15.87 dBm = 0.039 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  28.87 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	-	-	-57.01	2.72	-54.29	70.2
2140.50	H	268	303	-53.15	3.37	-49.78	65.6
2854.00	H	-	-	-54.96	4.96	-50.01	65.9

**Table 7-27. Radiated Spurious Data (Band 12 – High Channel)**

OPERATING FREQUENCY: 779.50 MHz  
 CHANNEL: 23205  
 MEASURED OUTPUT POWER: 14.80 dBm = 0.030 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  27.80 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]
2338.50	V	87	171	-64.03	7.35	-56.68	71.5
3118.00	V	110	272	-60.98	7.19	-53.79	68.6
3897.50	V	-	-	-56.71	7.31	-49.40	64.2

**Table 7-28. Radiated Spurious Data (Band 13 – Low Channel)**

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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OPERATING FREQUENCY: 782.00 MHz  
 CHANNEL: 23230  
 MEASURED OUTPUT POWER: 14.99 dBm = 0.032 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  27.99 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]
2346.00	V	100	87	-63.81	7.33	-56.48	71.5
3128.00	V	110	105	-58.74	7.20	-51.54	66.5
3910.00	V	-	-	-55.64	7.34	-48.30	63.3

**Table 7-29. Radiated Spurious Data (Band 13 – Mid Channel)**

OPERATING FREQUENCY: 784.50 MHz  
 CHANNEL: 23255  
 MEASURED OUTPUT POWER: 15.69 dBm = 0.037 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  28.69 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]
2353.50	V	110	292	-61.56	7.30	-54.25	69.9
3138.00	V	100	360	-58.29	7.21	-51.08	66.8
3922.50	V	-	-	-56.26	7.37	-38.59	54.3

**Table 7-30. Radiated Spurious Data (Band 13 – High Channel)**

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.00 MHz  
 DISTANCE: 3 meters  
 NARROWBAND EMISSION LIMIT: -50 dBm  
 WIDEBAND EMISSION LIMIT: -40 dBm/MHz

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]	Margin [dB]
1559.00	H	136	88	-63.41	6.55	-56.86	-16.86
1564.00	H	139	91	-63.50	6.57	-56.93	-16.93
1569.00	H	138	93	-63.70	6.59	-57.12	-17.12

**Table 7-31. Radiated Spurious Data (Band 13 – 1559-1610MHz Band)**

OPERATING FREQUENCY: 826.50 MHz  
 CHANNEL: 20425  
 MEASURED OUTPUT POWER: 12.28 dBm = 0.017 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  25.28 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	-	-	-63.73	6.70	-57.03	69.3
2477.70	H	-	-	-57.30	7.53	-49.77	62.0

**Table 7-32. Radiated Spurious Data (Band 5 – Low Channel)**

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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OPERATING FREQUENCY: 836.50 MHz  
 CHANNEL: 20525  
 MEASURED OUTPUT POWER: 12.16 dBm = 0.016 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  25.16 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	-	-	-61.68	6.70	-54.98	67.1
2509.50	H	-	-	-59.33	7.63	-51.71	63.9

Table 7-33. Radiated Spurious Data (Band 5 – Mid Channel)

OPERATING FREQUENCY: 846.50 MHz  
 CHANNEL: 20625  
 MEASURED OUTPUT POWER: 11.24 dBm = 0.013 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  24.24 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	-	-	-63.09	6.70	-56.39	67.6
2541.30	H	-	-	-59.74	7.60	-52.14	63.4

Table 7-34. Radiated Spurious Data (Band 5 – High Channel)

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed 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

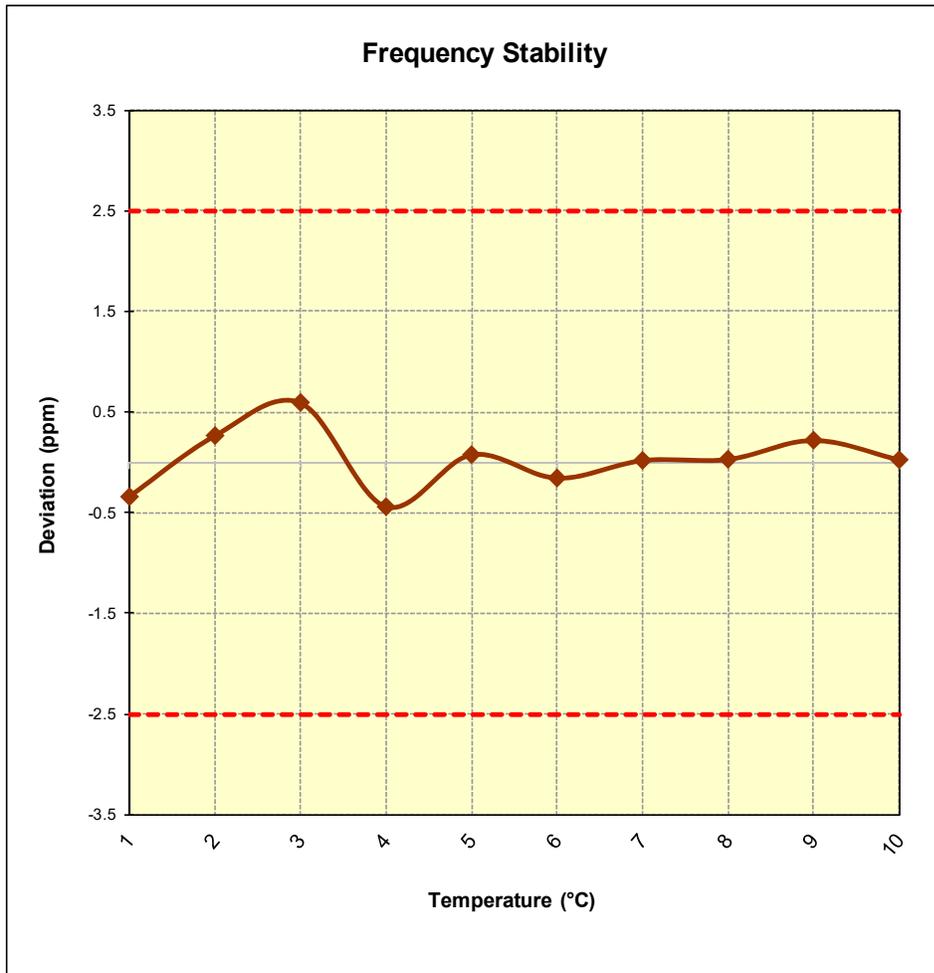
OPERATING FREQUENCY: 707,500,000 Hz  
 CHANNEL: 23790  
 REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	707,499,757	-243	-0.0000343
100 %		- 30	707,500,186	186	0.0000263
100 %		- 20	707,500,419	419	0.0000592
100 %		- 10	707,499,686	-314	-0.0000444
100 %		0	707,500,052	52	0.0000073
100 %		+ 10	707,499,888	-112	-0.0000158
100 %		+ 20	707,500,012	12	0.0000017
100 %		+ 30	707,500,020	20	0.0000028
100 %		+ 40	707,500,154	154	0.0000218
100 %		+ 50	707,500,016	16	0.0000023
BATT. ENDPOINT	3.45	+ 20	707,499,635	-365	-0.0000516

**Table 7-35. Frequency Stability Data (Band 12)**

FCC ID: ZNFH918	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Reviewed by: Quality Manager
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**Band 12 Frequency Stability Measurements**  
§2.1055 §27.54



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

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**Band 13 Frequency Stability Measurements**  
§2.1055 §27.54

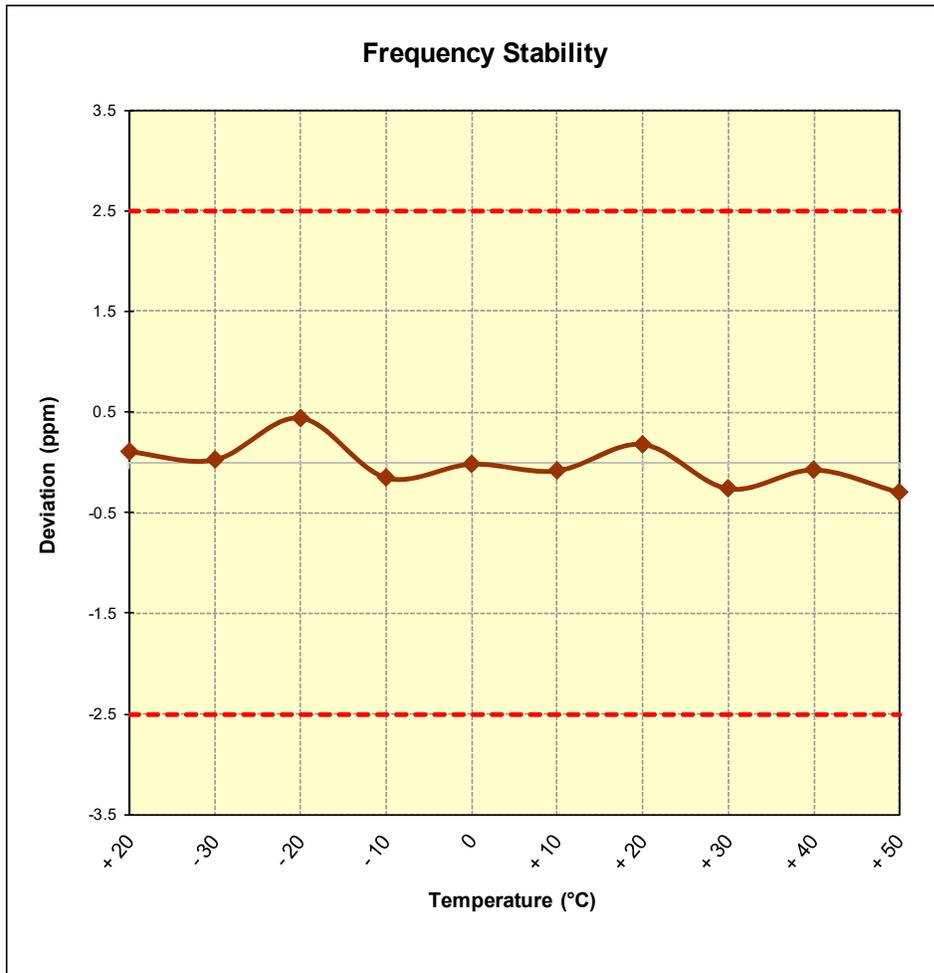
OPERATING FREQUENCY: 782,000,000 Hz  
 CHANNEL: 23230  
 REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	782,000,082	82	0.0000105
100 %		- 30	782,000,020	20	0.0000026
100 %		- 20	782,000,342	342	0.0000437
100 %		- 10	781,999,881	-119	-0.0000152
100 %		0	781,999,986	-14	-0.0000018
100 %		+ 10	781,999,935	-65	-0.0000083
100 %		+ 20	782,000,138	138	0.0000176
100 %		+ 30	781,999,796	-204	-0.0000261
100 %		+ 40	781,999,941	-59	-0.0000075
100 %		+ 50	781,999,767	-233	-0.0000298
BATT. ENDPOINT	3.45	+ 20	782,000,357	357	0.0000457

**Table 7-36. Frequency Stability Data (Band 13)**

FCC ID: ZNFH918		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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**Band 13 Frequency Stability Measurements**  
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**Figure 7-9. Frequency Stability Graph (Band 13)**

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

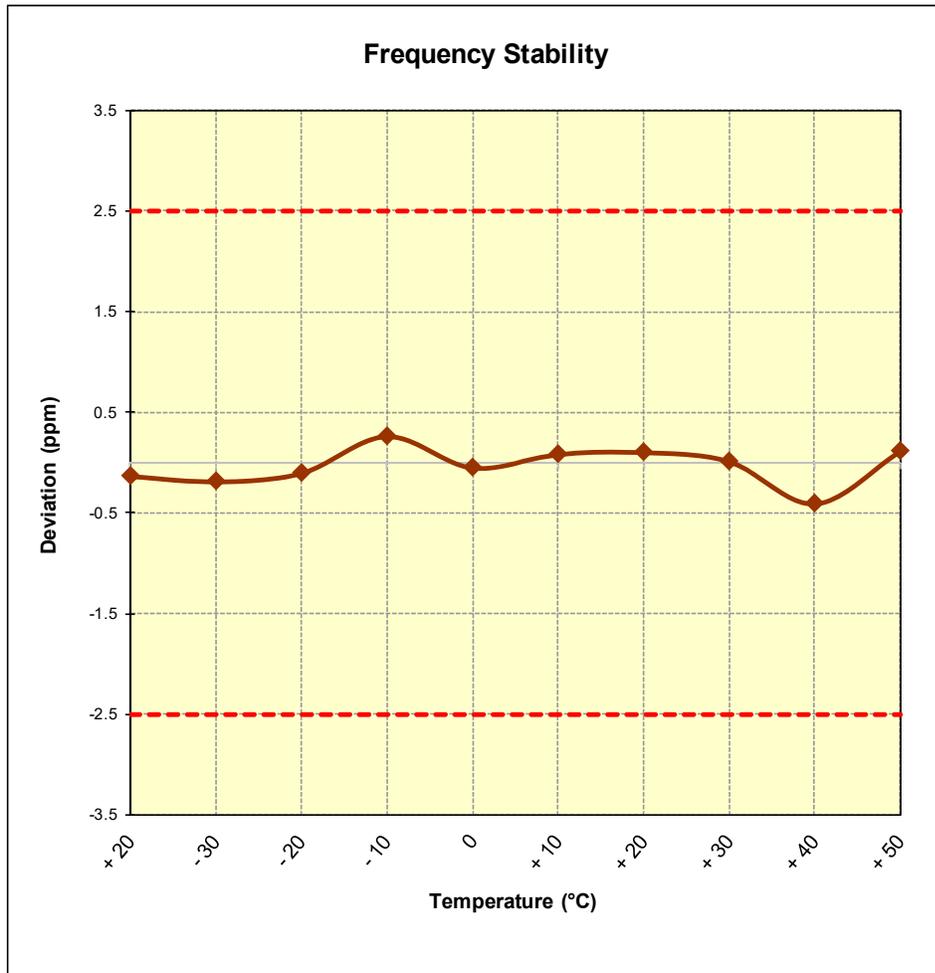
OPERATING FREQUENCY: 836,500,000 Hz  
 CHANNEL: 20525  
 REFERENCE VOLTAGE: 3.85 VDC  
 DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	836,499,888	-112	-0.0000134
100 %		- 30	836,499,844	-156	-0.0000186
100 %		- 20	836,499,913	-87	-0.0000104
100 %		- 10	836,500,218	218	0.0000261
100 %		0	836,499,958	-42	-0.0000050
100 %		+ 10	836,500,069	69	0.0000082
100 %		+ 20	836,500,086	86	0.0000103
100 %		+ 30	836,500,009	9	0.0000011
100 %		+ 40	836,499,660	-340	-0.0000406
100 %		+ 50	836,500,096	96	0.0000115
BATT. ENDPOINT	3.45	+ 20	836,500,069	69	0.0000082

**Table 7-37. Frequency Stability Data (Band 5)**

FCC ID: ZNFH918	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Reviewed by: Quality Manager
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**Band 5 Frequency Stability Measurements**  
§2.1055 §22.355



**Figure 7-10. Frequency Stability Graph (Band 5)**

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## Band 4/66 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)	1,732,499,659	-341	-0.0000197
100 %		- 30	1,732,499,788	-212	-0.0000122
100 %		- 20	1,732,499,671	-329	-0.0000190
100 %		- 10	1,732,499,627	-373	-0.0000215
100 %		0	1,732,499,820	-180	-0.0000104
100 %		+ 10	1,732,499,748	-252	-0.0000145
100 %		+ 20	1,732,500,065	65	0.0000038
100 %		+ 30	1,732,500,043	43	0.0000025
100 %		+ 40	1,732,499,977	-23	-0.0000013
100 %		+ 50	1,732,500,249	249	0.0000144
BATT. ENDPOINT	3.45	+ 20	1,732,499,714	-286	-0.0000165

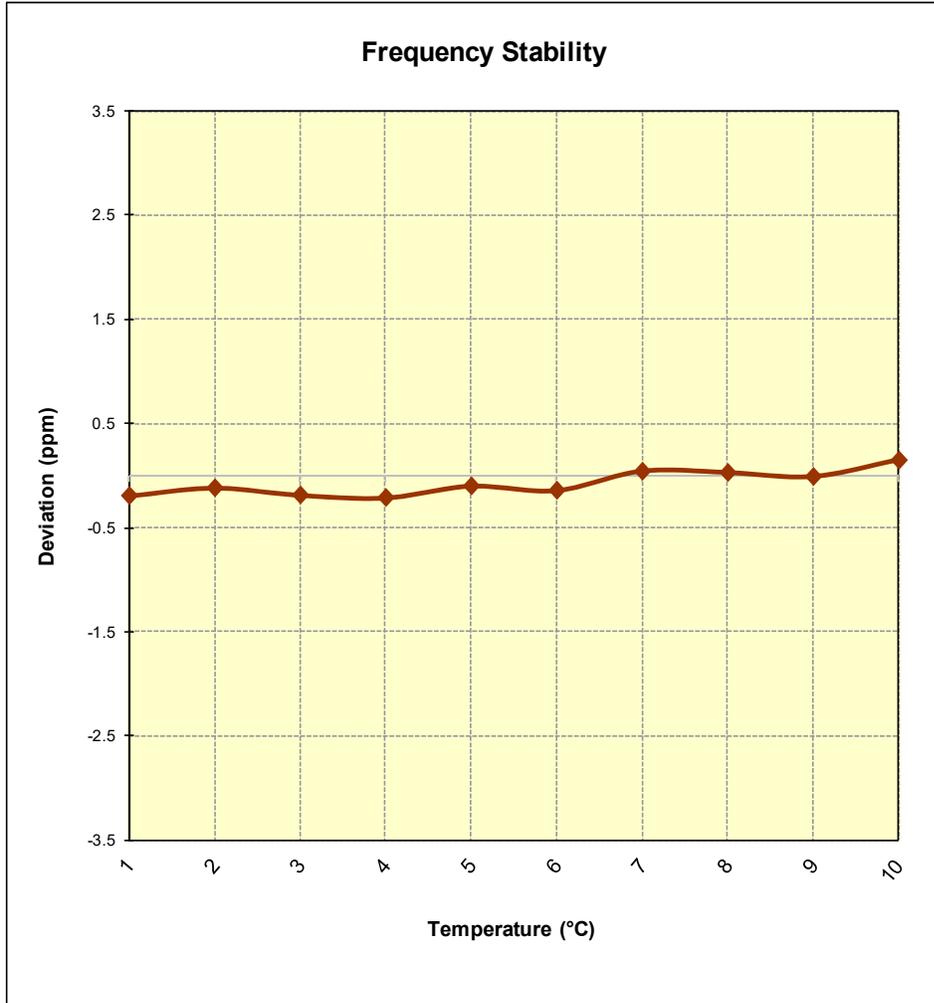
Table 7-38. Frequency Stability Data (Band 4/66)

**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.

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**Band 4/66 Frequency Stability Measurements**  
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**Figure 7-11. Frequency Stability Graph (Band 4/66)**

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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)	1,880,000,087	87	0.0000046
100 %		- 30	1,880,000,027	27	0.0000014
100 %		- 20	1,879,999,880	-120	-0.0000064
100 %		- 10	1,879,999,967	-33	-0.0000018
100 %		0	1,880,000,011	11	0.0000006
100 %		+ 10	1,880,000,009	9	0.0000005
100 %		+ 20	1,879,999,988	-12	-0.0000006
100 %		+ 30	1,879,999,986	-14	-0.0000007
100 %		+ 40	1,880,000,050	50	0.0000027
100 %		+ 50	1,880,000,067	67	0.0000036
BATT. ENDPOINT	3.45	+ 20	1,880,000,216	216	0.0000115

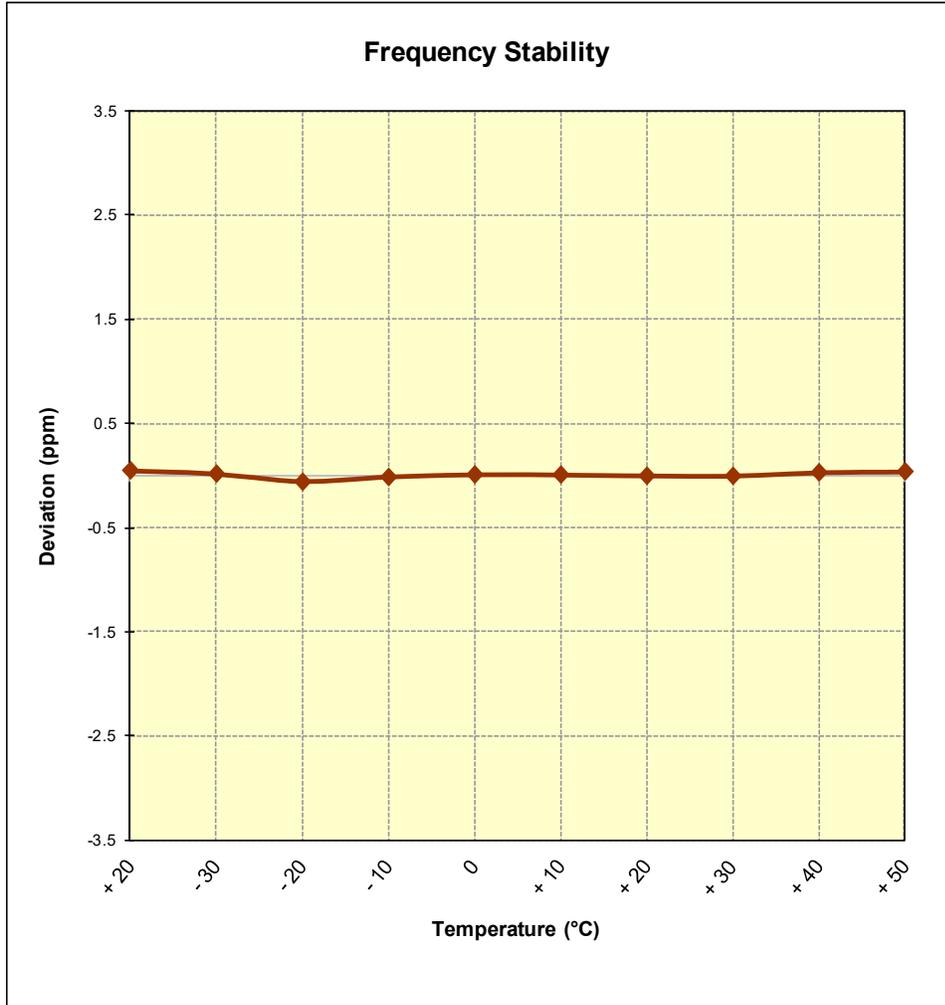
**Table 7-39. Frequency Stability Data (Band 2)**

**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: ZNFH918	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Reviewed by: Quality Manager
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**Band 2 Frequency Stability Measurements**  
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**Figure 7-12. Frequency Stability Graph (Band 2)**

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## 8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFH918** complies with all the requirements of Parts 22, 24, & 27 of the FCC rules for LTE operation only.

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