

## 7.4 Band Edge Emissions at Antenna Terminal

§2.1051 §22.917(a) §24.238(a) §27.53(g) §27.53(h)

### 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  $43 + \log_{10}(P_{\text{Watts}})$ , where  $P$  is the transmitter power in Watts.***

### Test Procedure Used

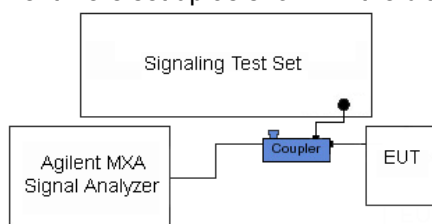
KDB 971168 D01 v02r02 – Section 6.0

### 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
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.





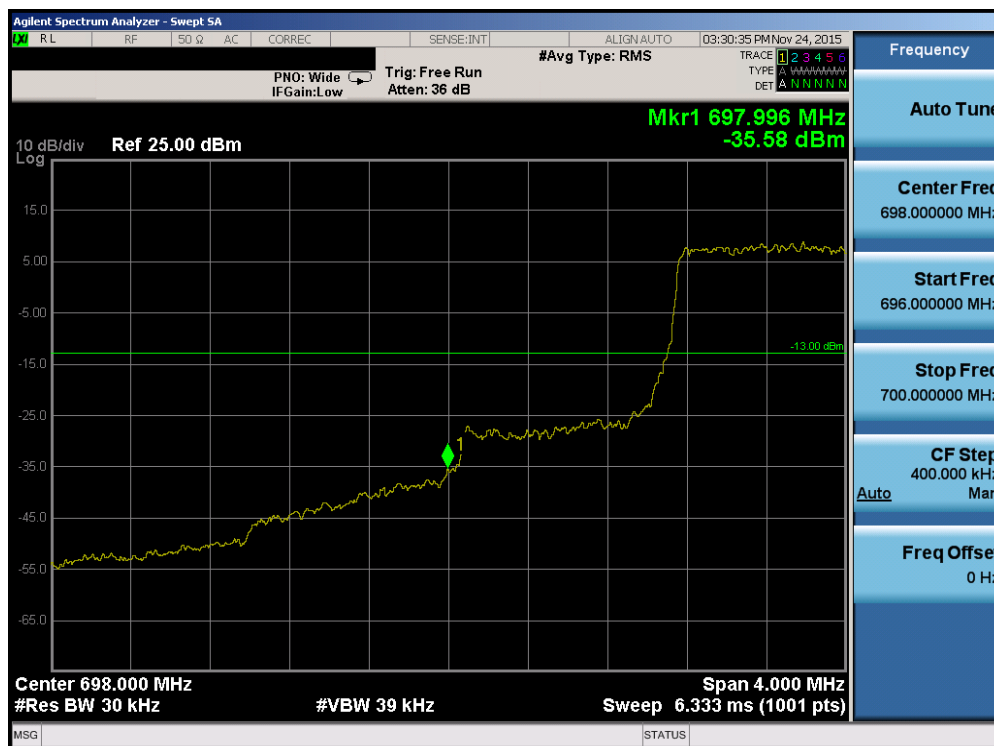
**Figure 7-3. Test Instrument & Measurement Setup**

### 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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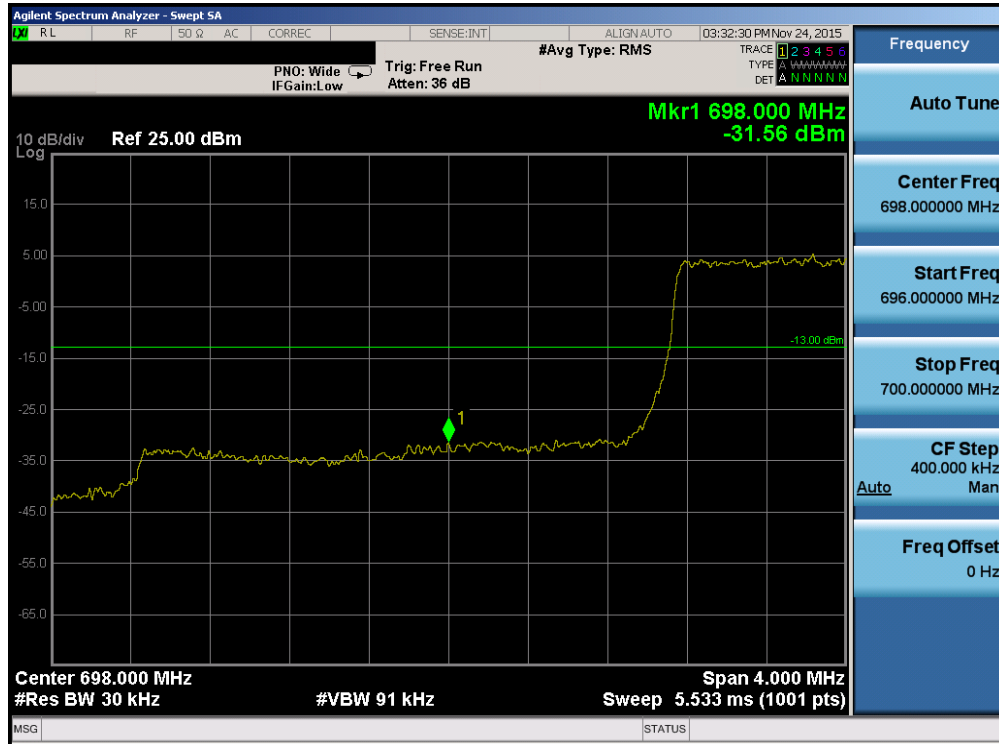
Plot 7-77. Lower Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)



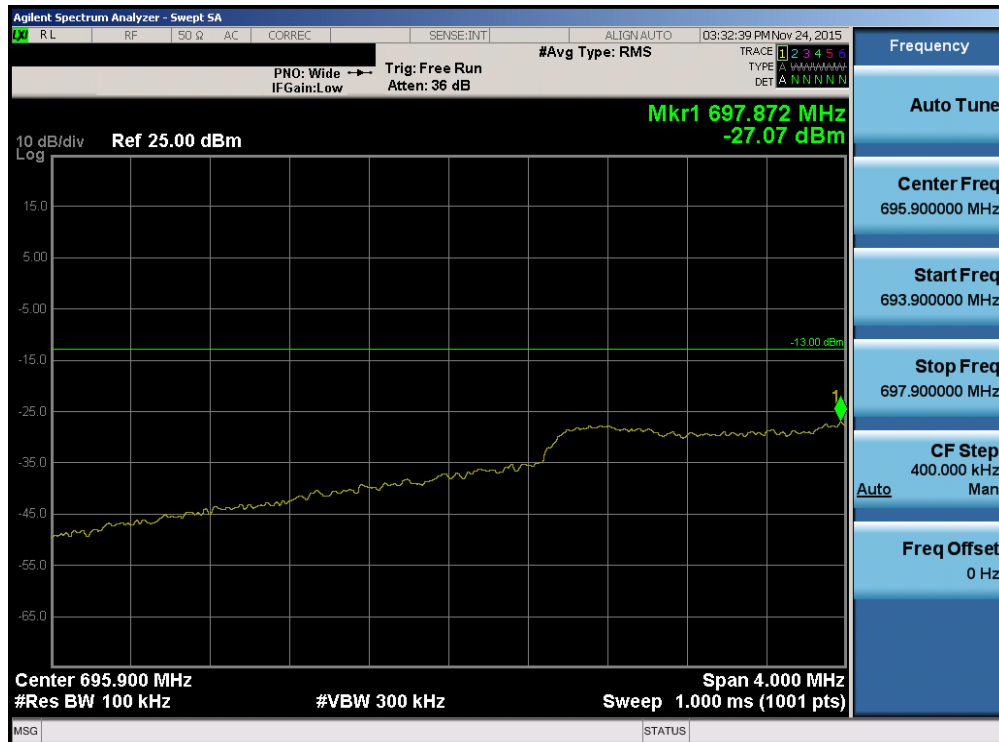
Plot 7-78. Lower Extended Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	<b>LG</b>	Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset		Page 54 of 122



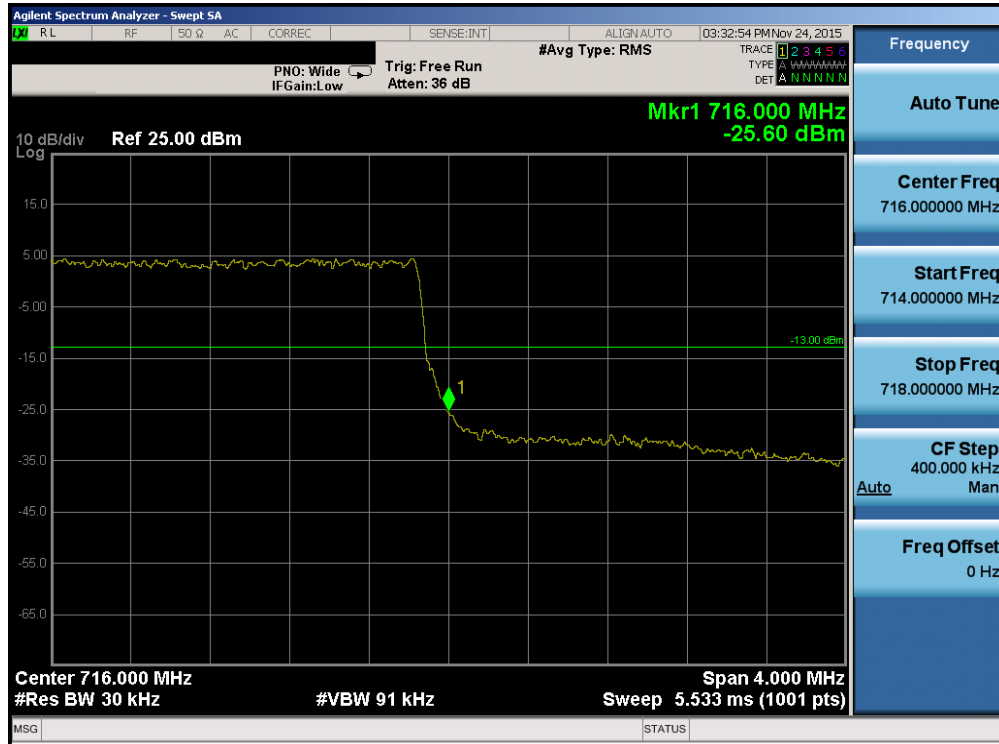


Plot 7-81. Lower Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

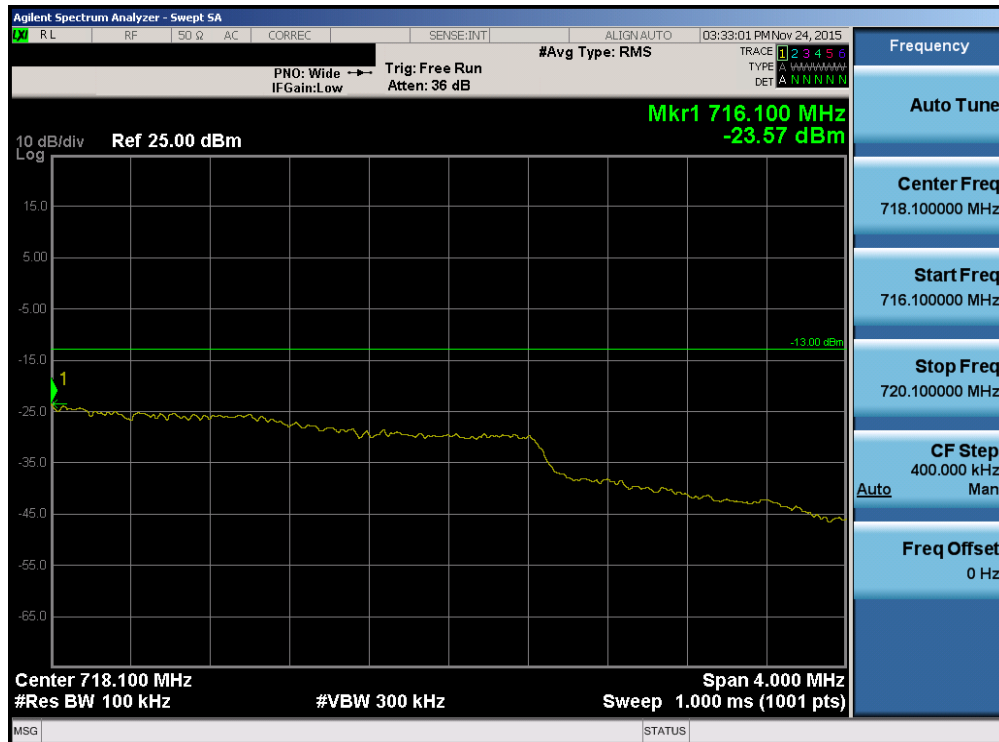


Plot 7-82. Lower Extended Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	<b>LG</b>	Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset		Page 56 of 122

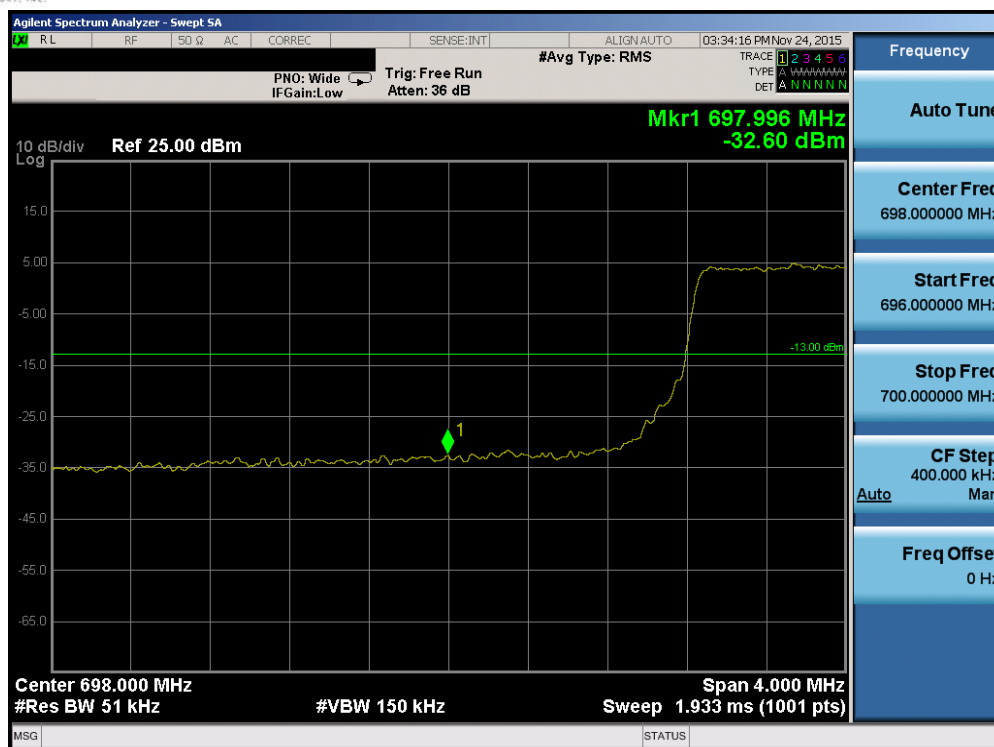


Plot 7-83. Upper Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

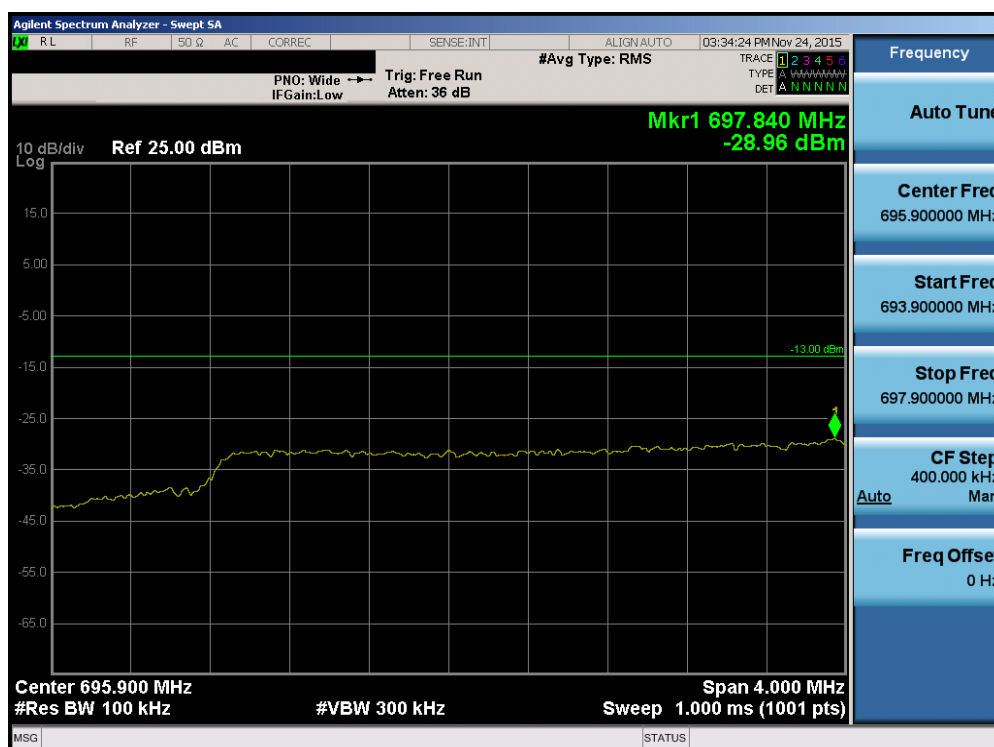


Plot 7-84. Upper Extended Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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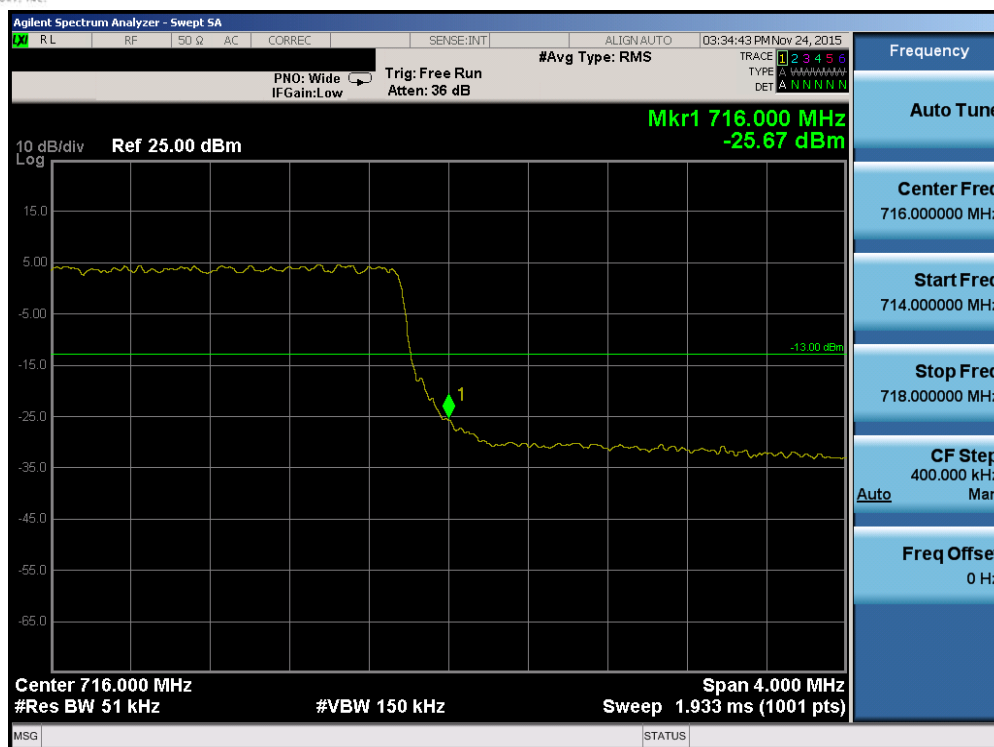


Plot 7-85. Lower Band Edge Plot (Band 12/17 - 5.0MHz QPSK - RB Size 25)

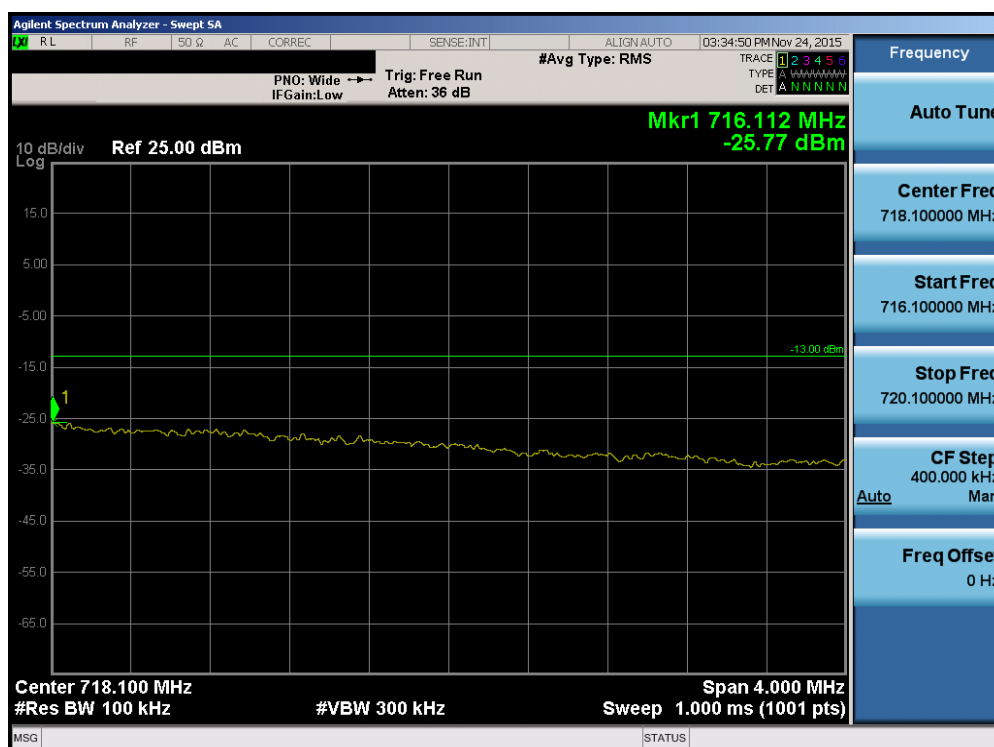


Plot 7-86. Lower Extended Band Edge Plot (Band 12/17 - 5.0MHz QPSK - RB Size 25)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	<b>LG</b>	Reviewed by: Quality Manager
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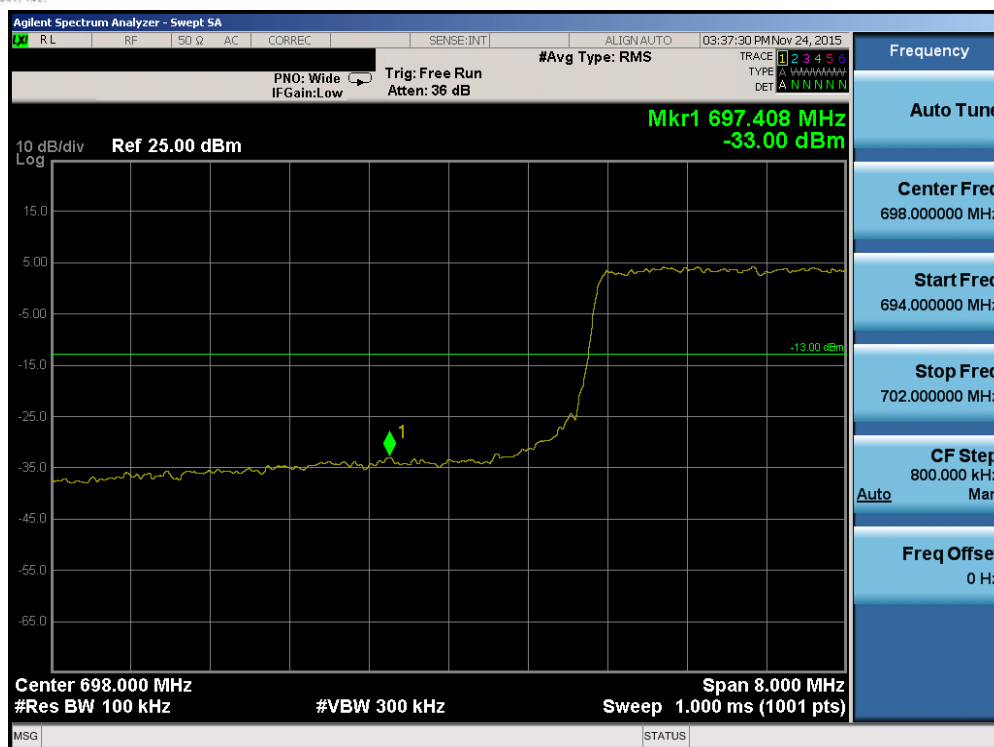
Plot 7-87. Upper Band Edge Plot (Band 12/17 - 5.0MHz QPSK - RB Size 25)



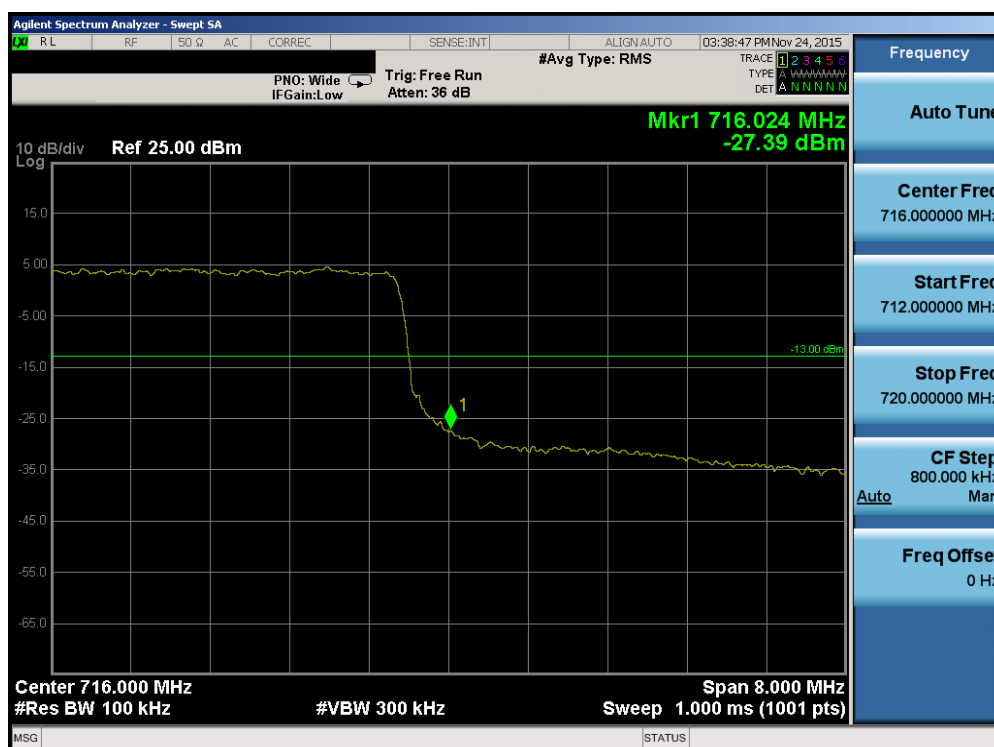
Plot 7-88. Upper Extended Band Edge Plot (Band 12/17 - 5.0MHz QPSK - RB Size 25)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	<b>LG</b>	Reviewed by: Quality Manager
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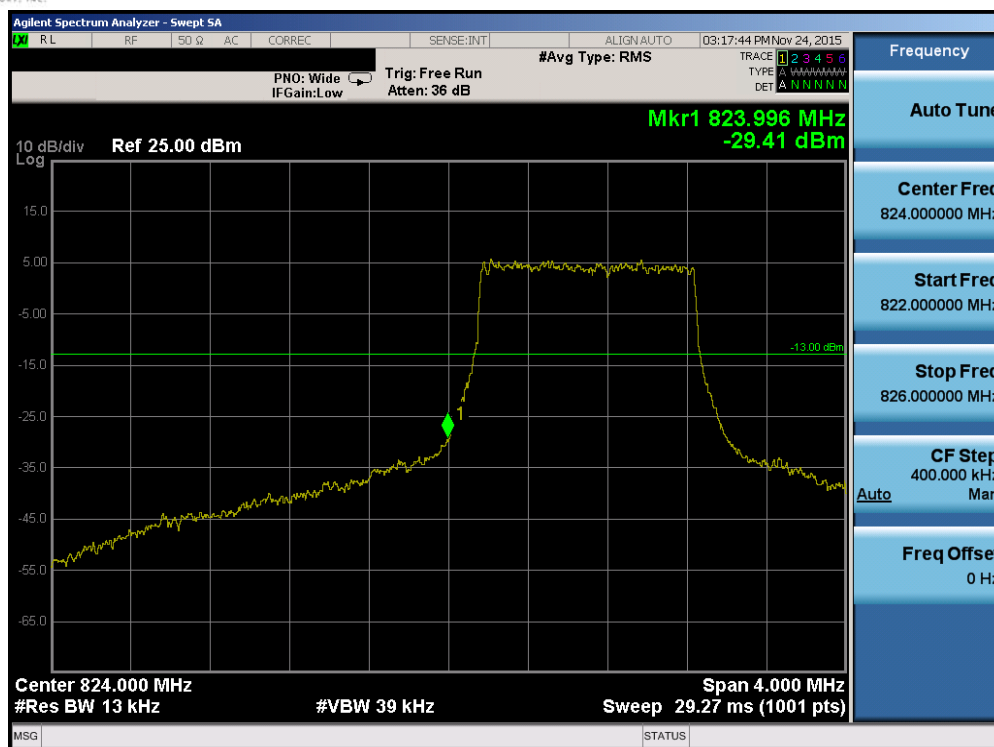
Plot 7-89. Lower Band Edge Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)



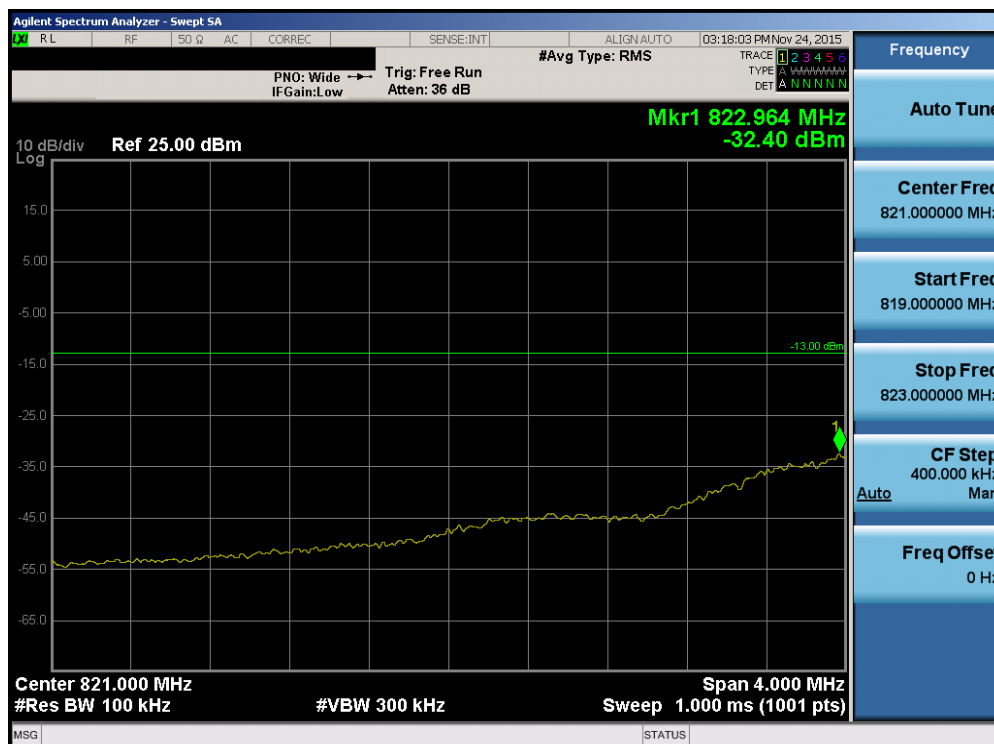
Plot 7-90. Upper Band Edge Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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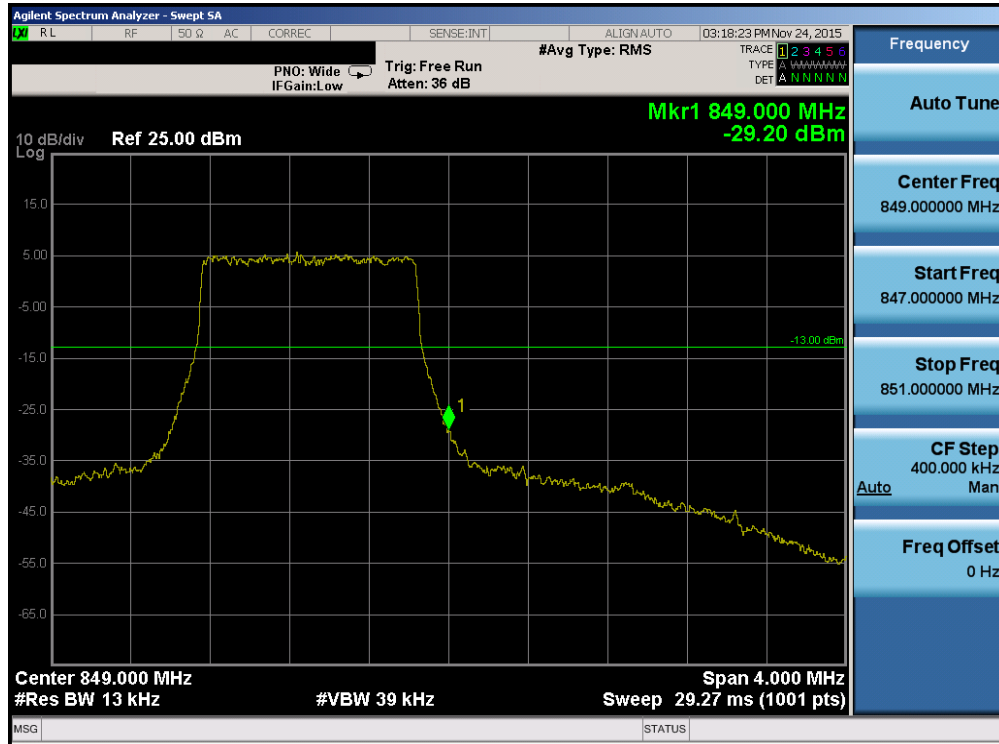


Plot 7-91. Lower Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)



Plot 7-92. Lower Extended Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	<b>LG</b>	Reviewed by: Quality Manager
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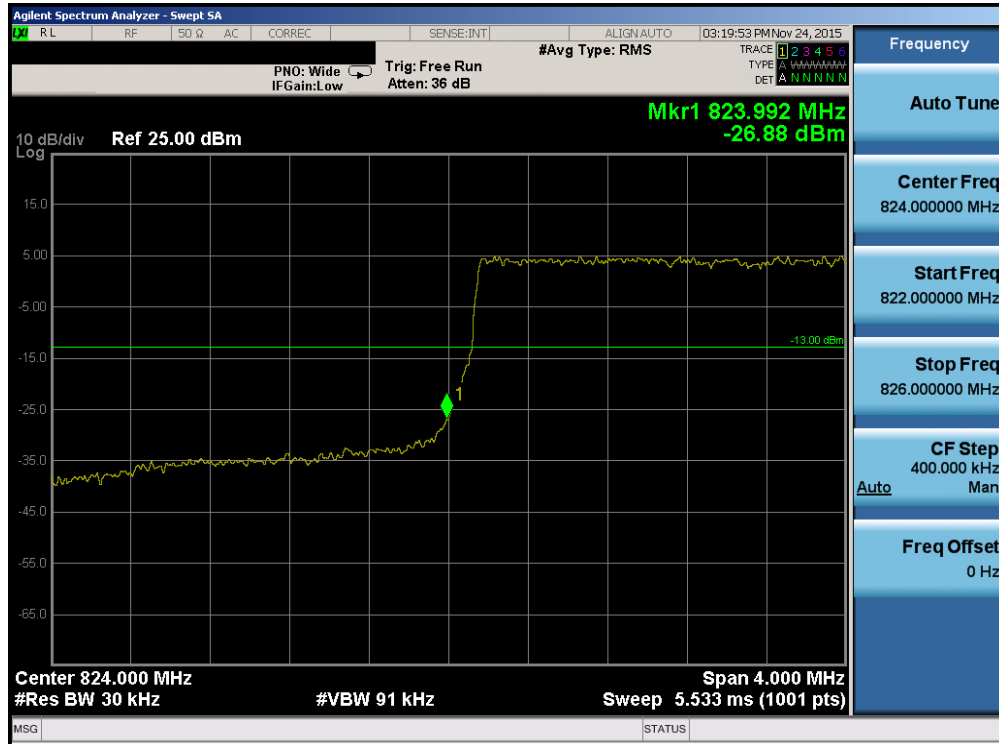


Plot 7-93. Upper Band Edge Plot (Band 5 - 1.4MHz QPSK - RB Size 6)



Plot 7-94. Upper Extended Band Edge Plot (Band 5 - 1.4MHz QPSK - RB Size 6)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	<b>LG</b>	Reviewed by: Quality Manager
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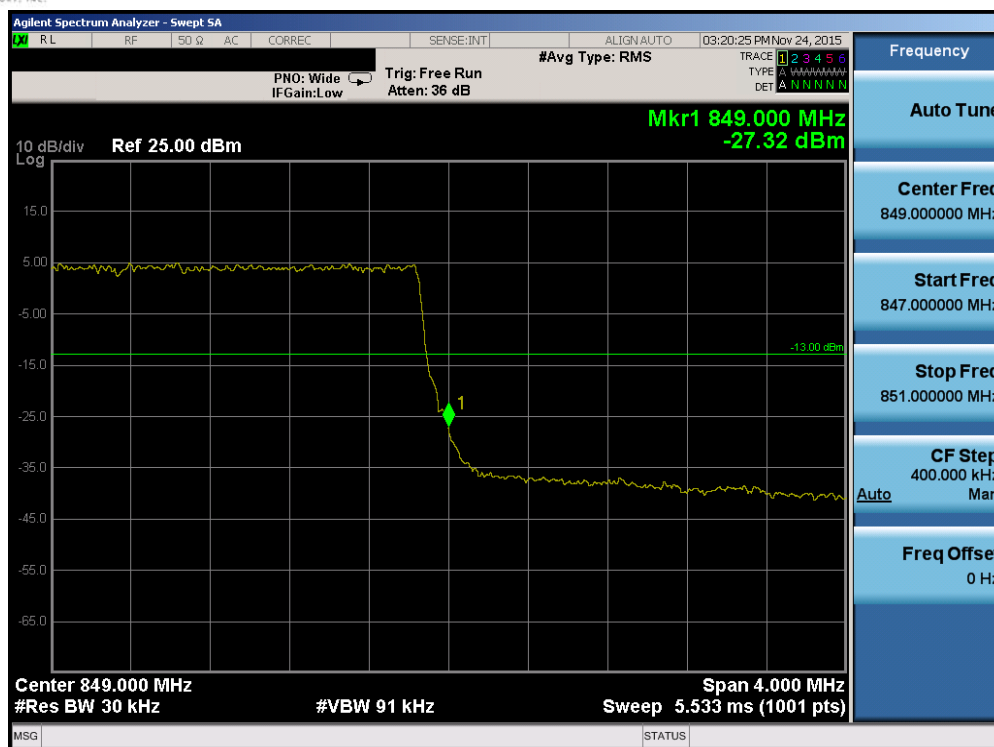


Plot 7-95. Lower Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

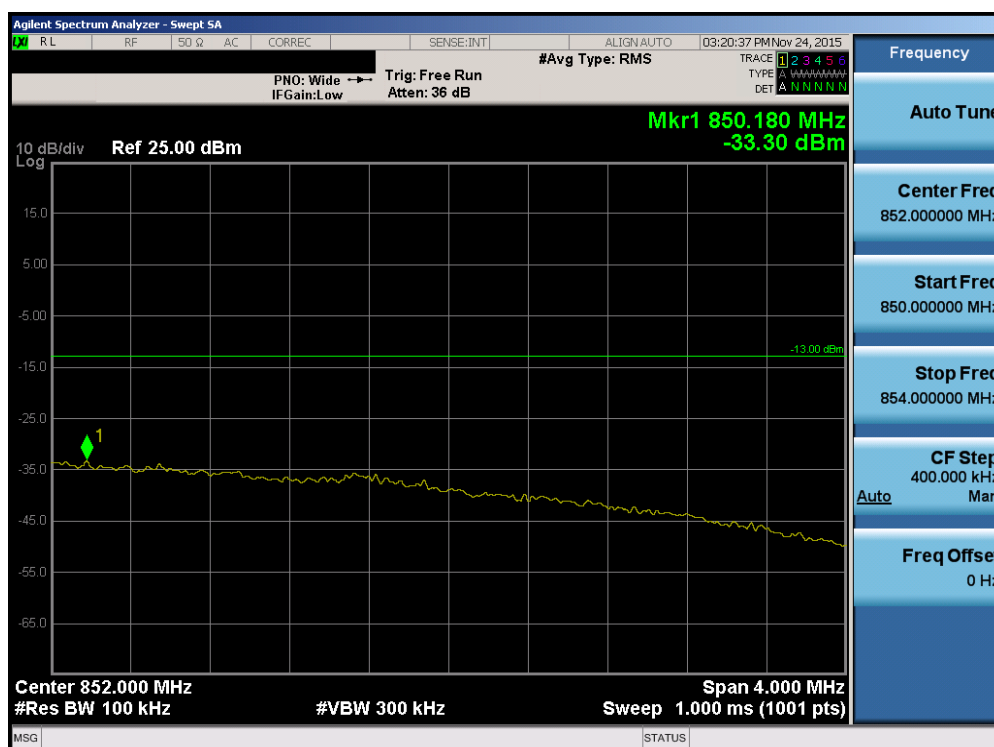


Plot 7-96. Lower Extended Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	<b>LG</b>	Reviewed by: Quality Manager
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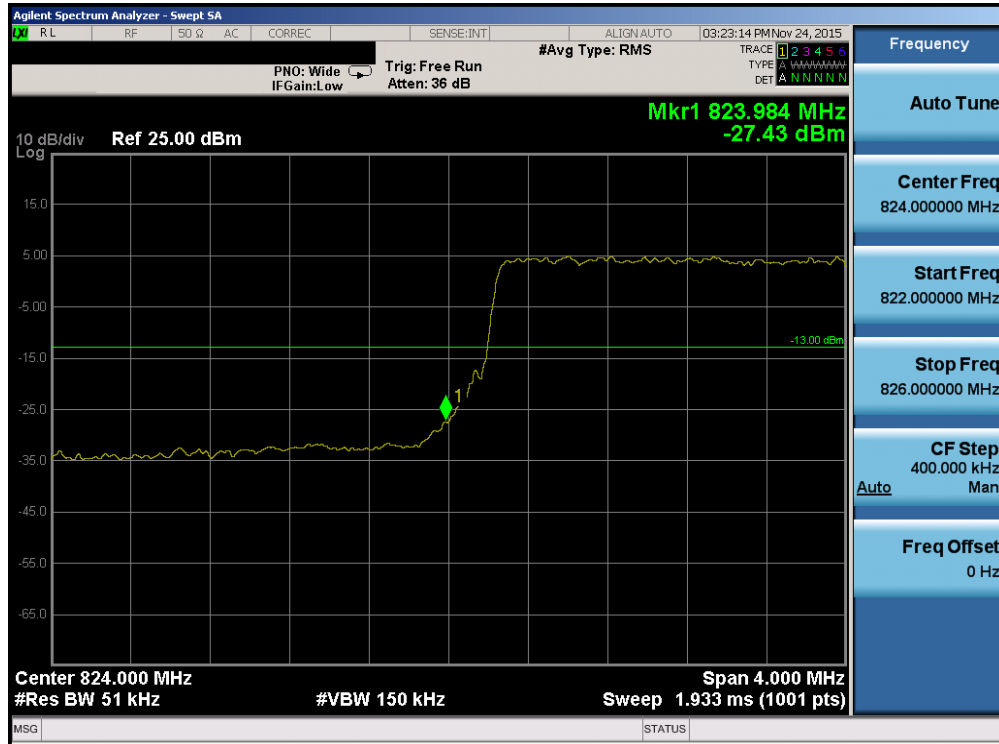


Plot 7-97. Upper Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

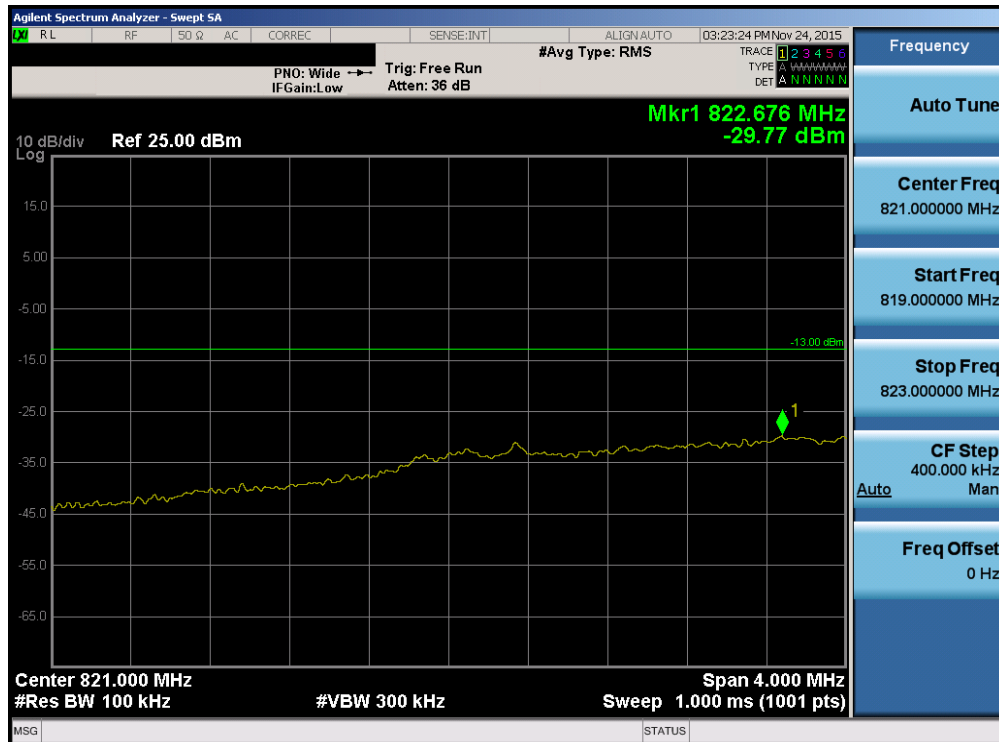


Plot 7-98. Upper Extended Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	<b>LG</b>	Reviewed by: Quality Manager
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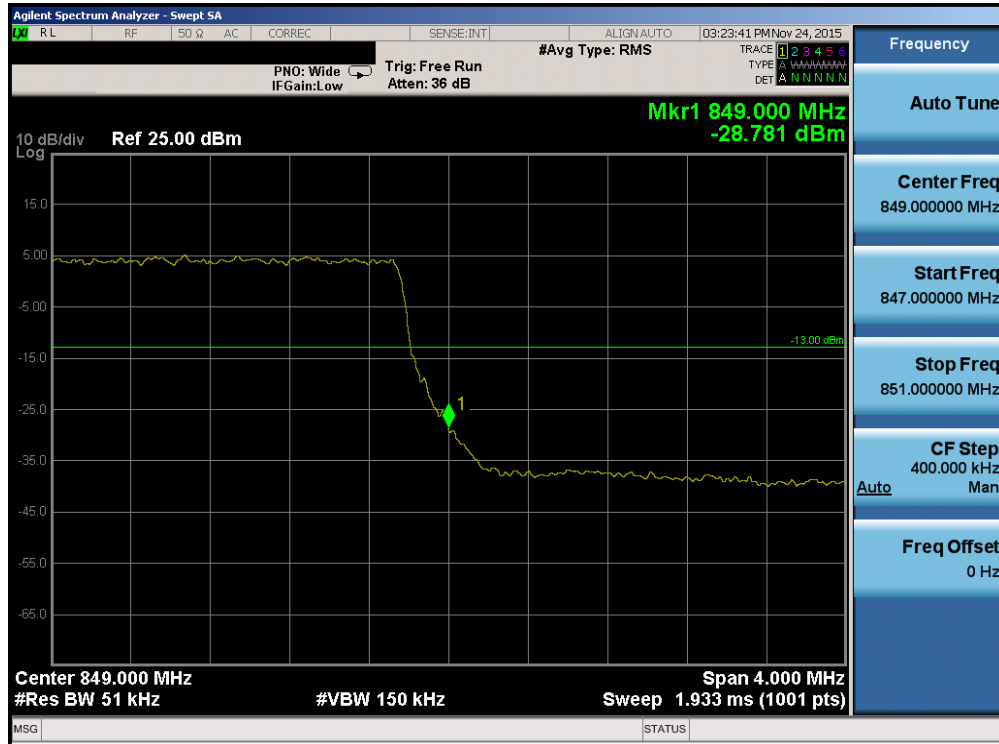


Plot 7-99. Lower Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

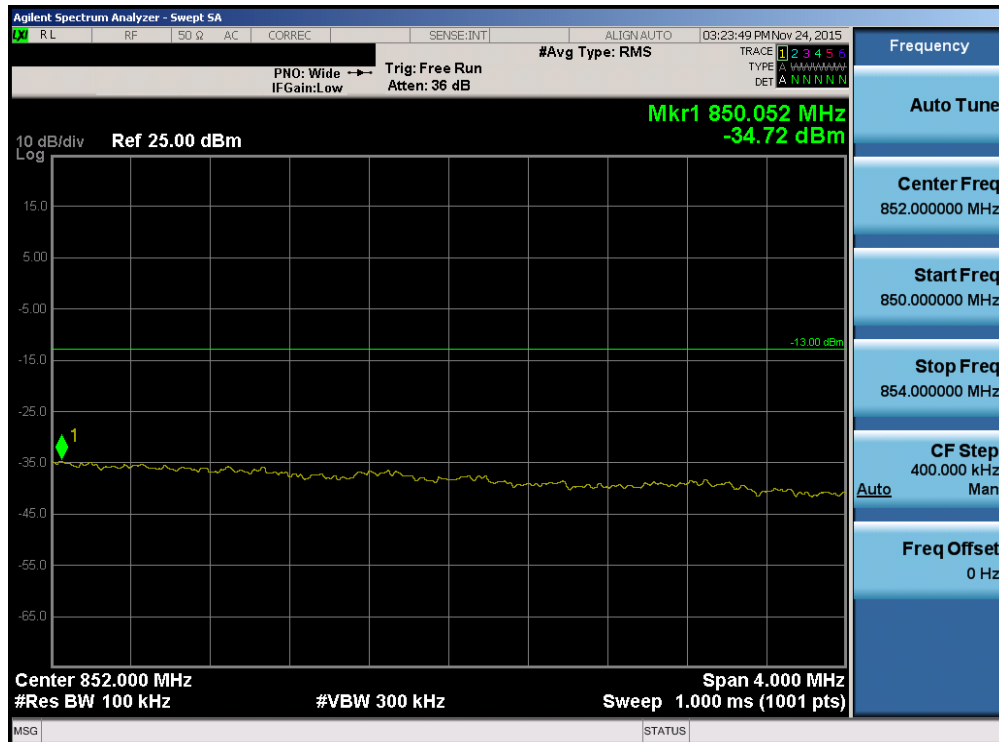


Plot 7-100. Lower Extended Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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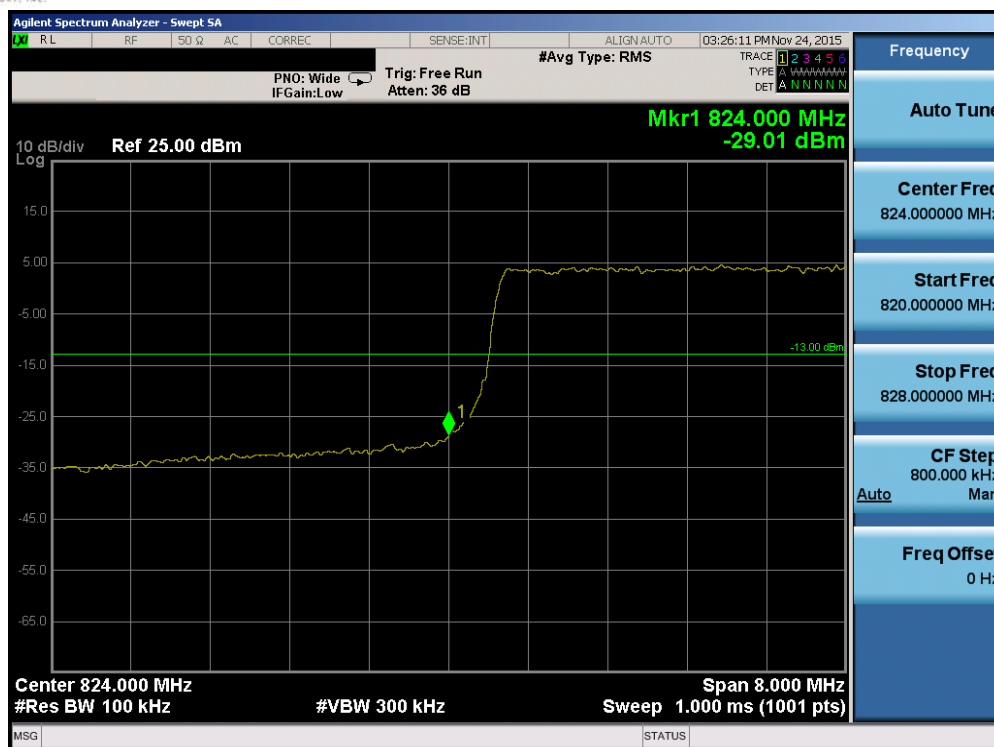


Plot 7-101. Upper Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

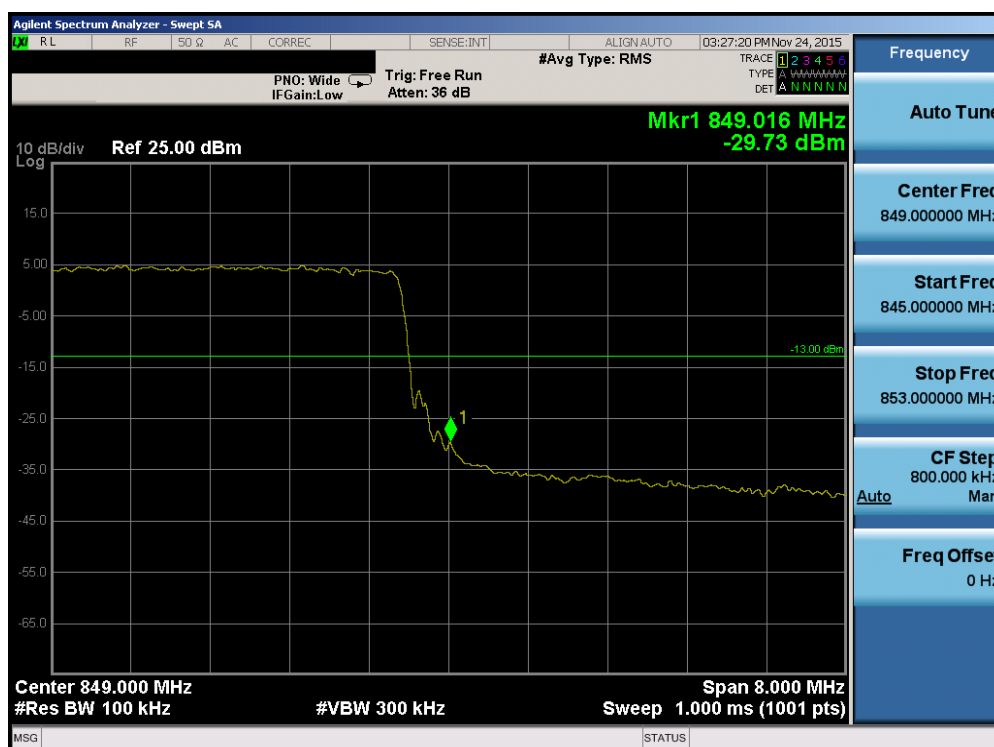


Plot 7-102. Upper Extended Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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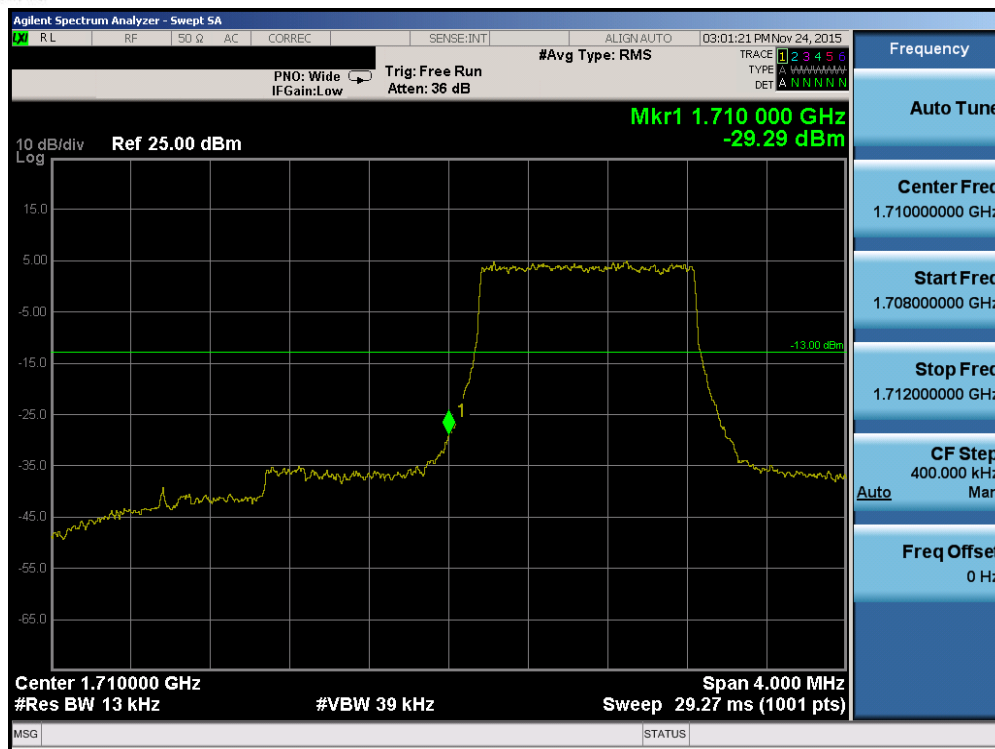
Plot 7-103. Lower Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)



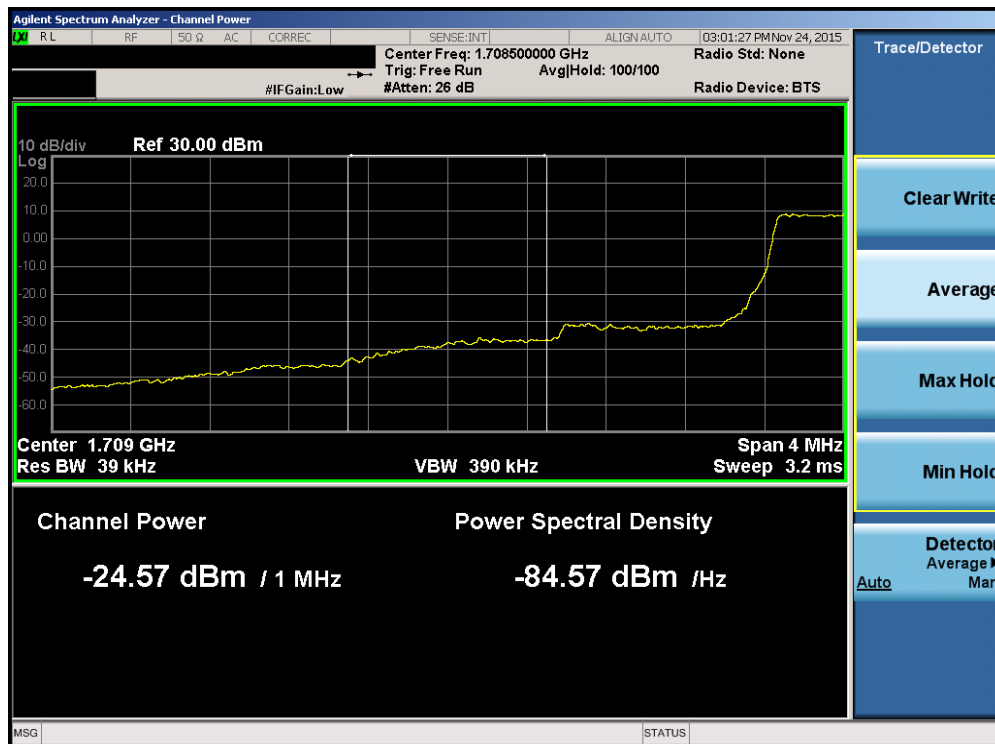
Plot 7-104. Upper Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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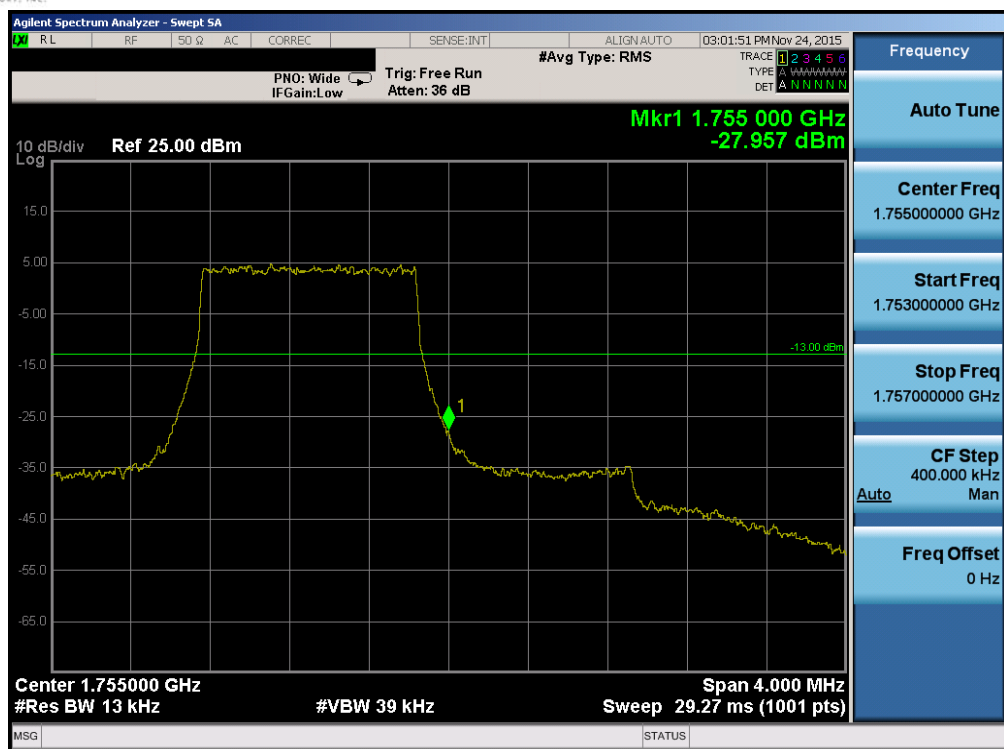


Plot 7-105. Lower Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

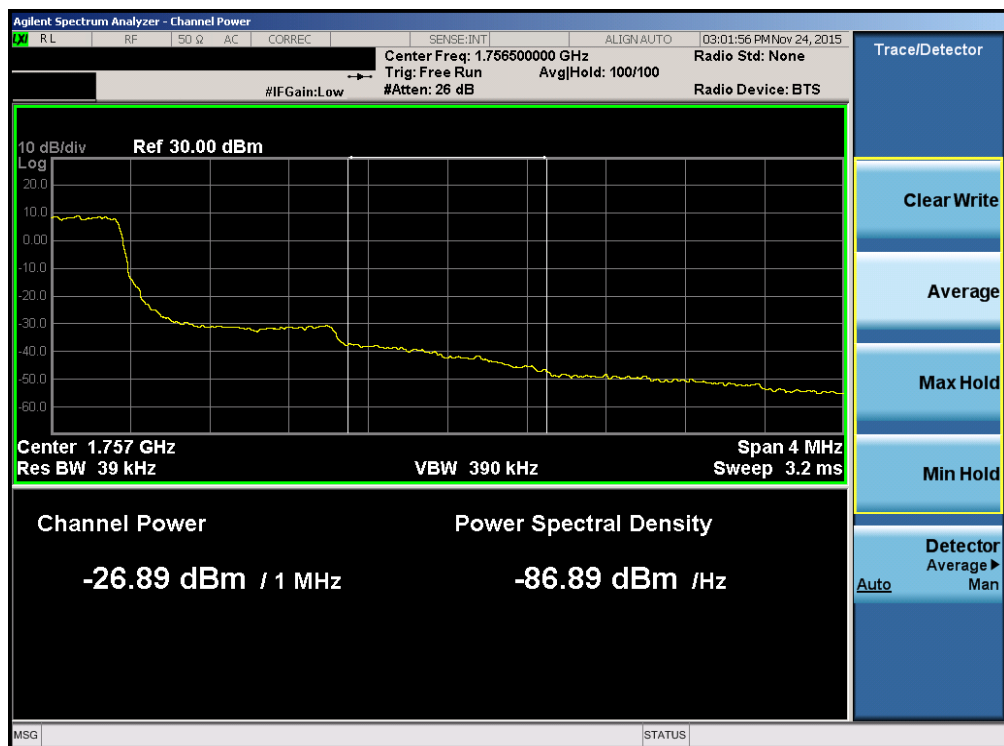


Plot 7-106. Lower Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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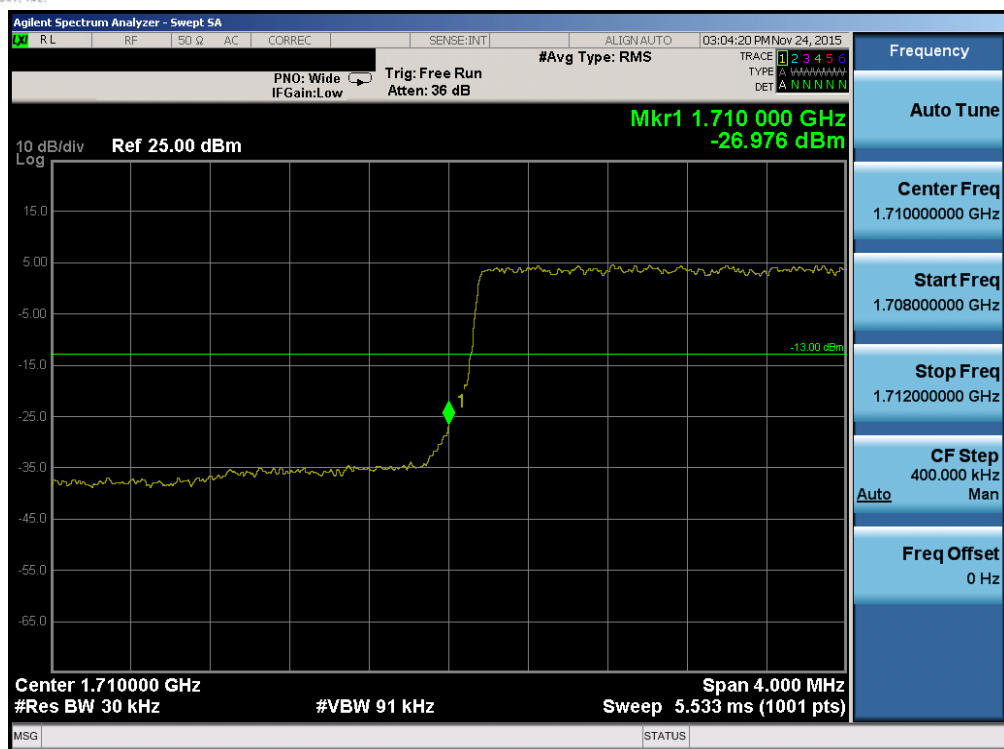


Plot 7-107. Upper Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

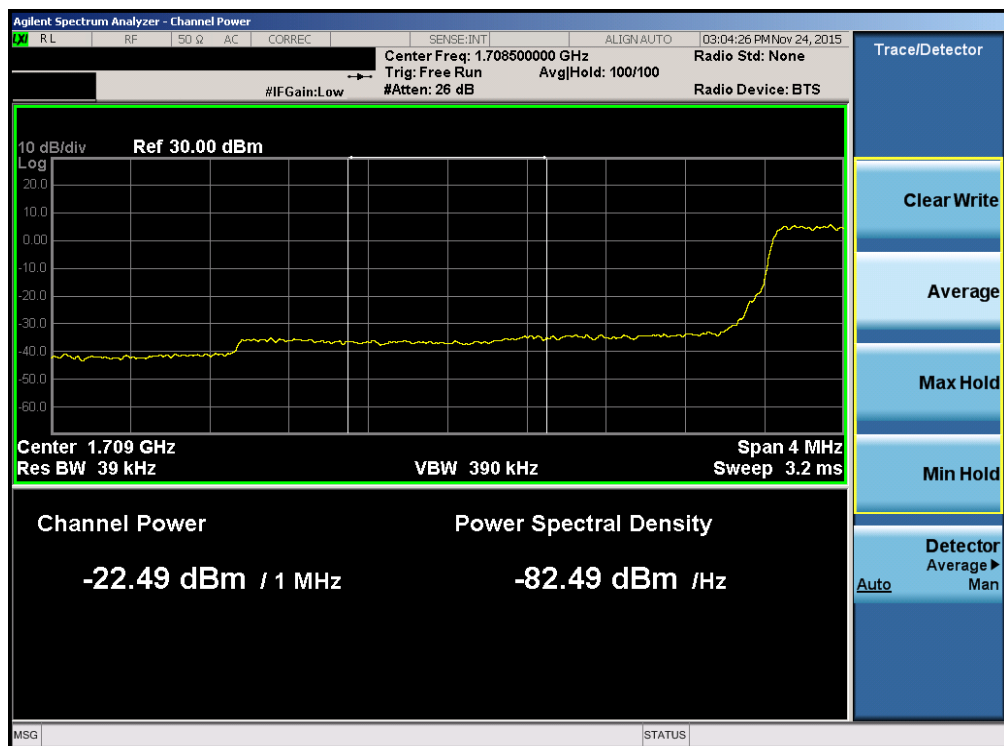


Plot 7-108. Upper Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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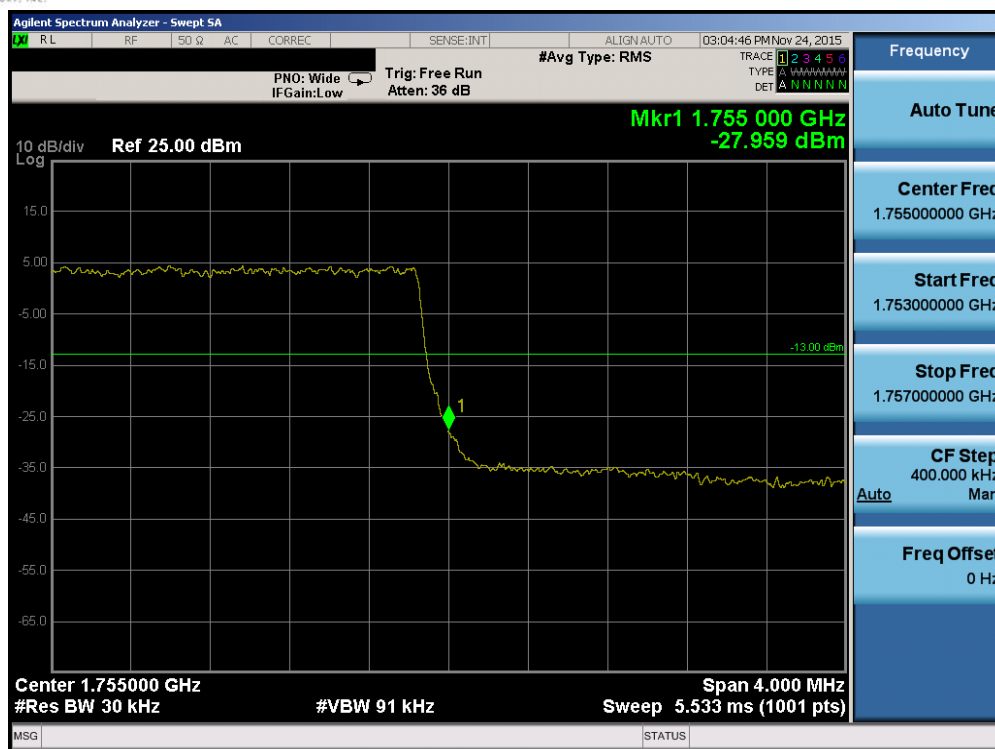


Plot 7-109. Lower Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

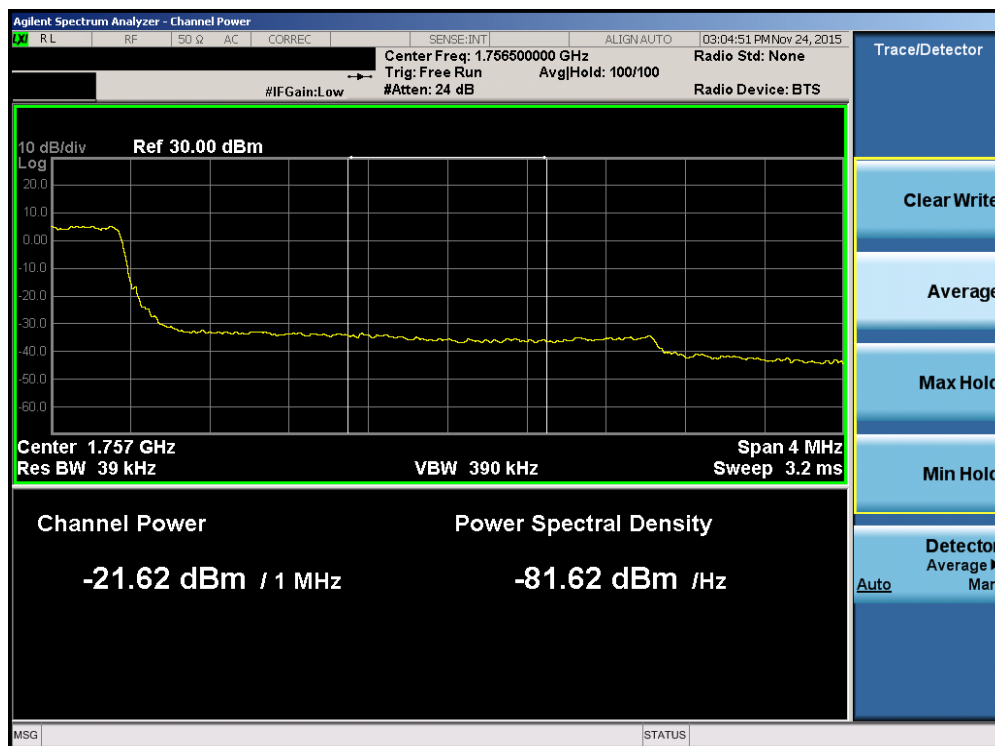


Plot 7-110. Lower Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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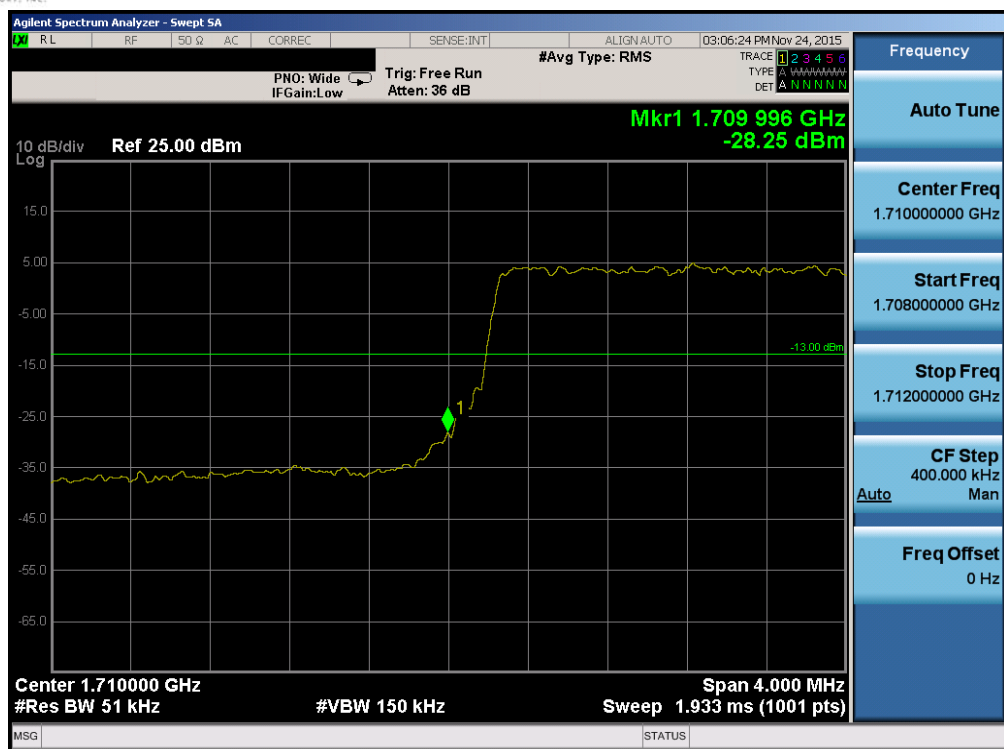


Plot 7-111. Upper Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

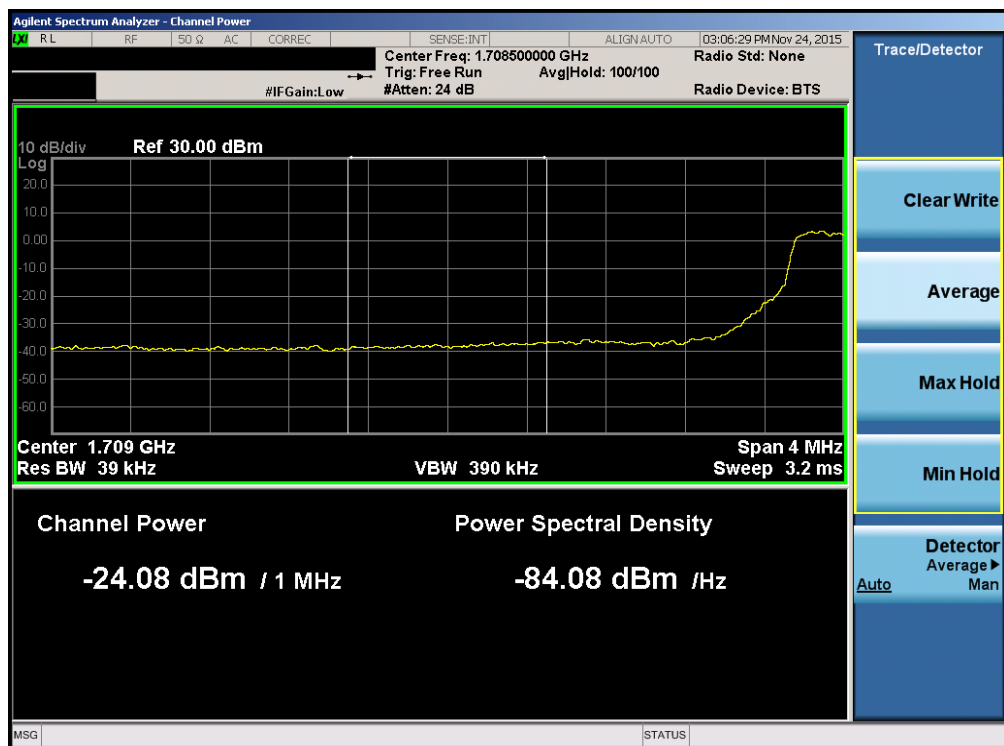


Plot 7-112. Upper Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	<b>LG</b>	Reviewed by: Quality Manager
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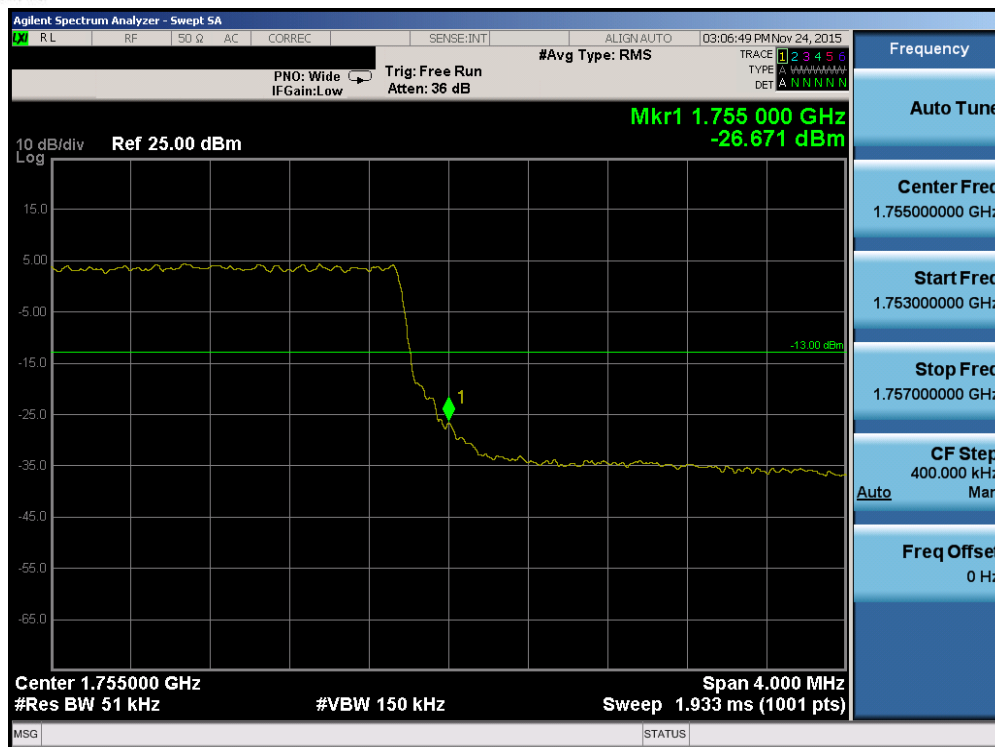


Plot 7-113. Lower Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

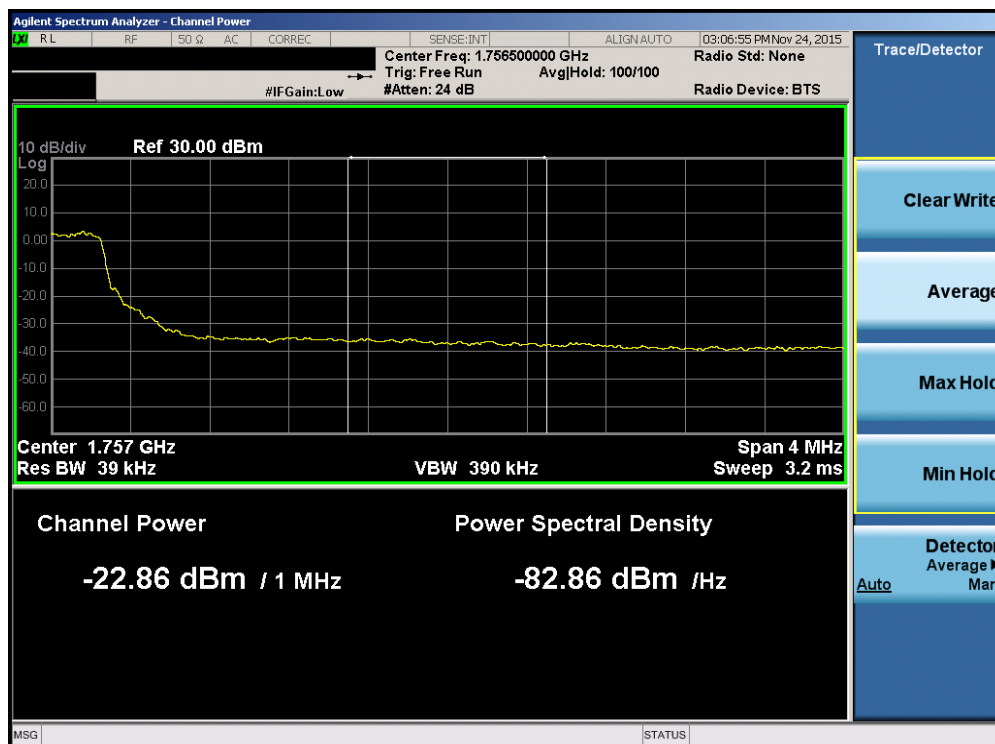


Plot 7-114. Lower Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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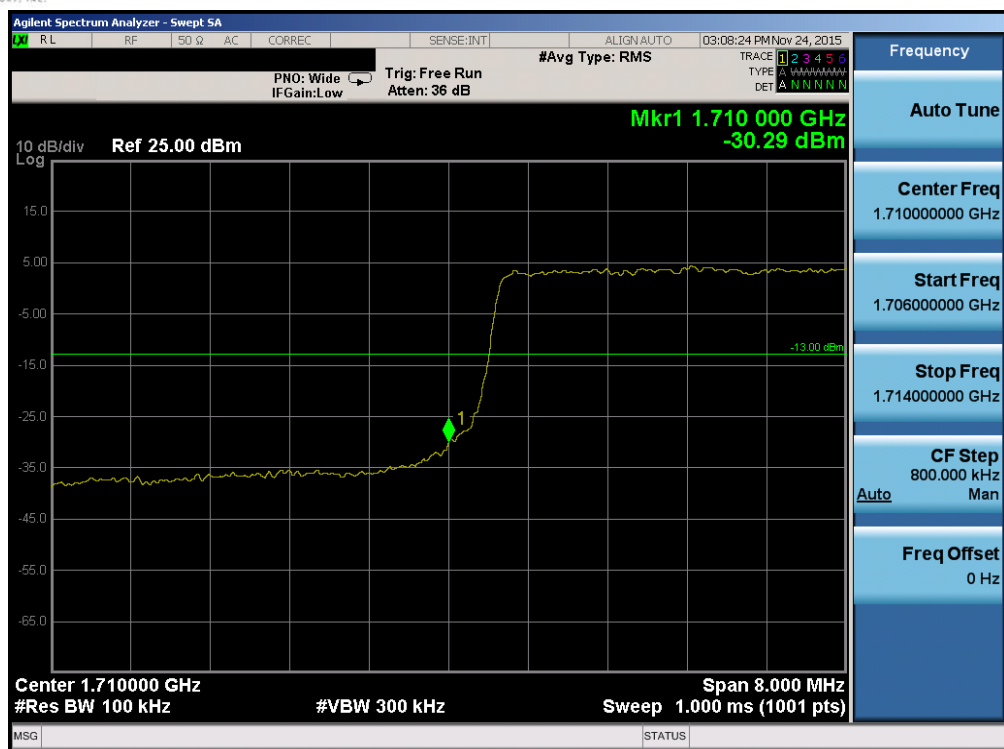


Plot 7-115. Upper Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

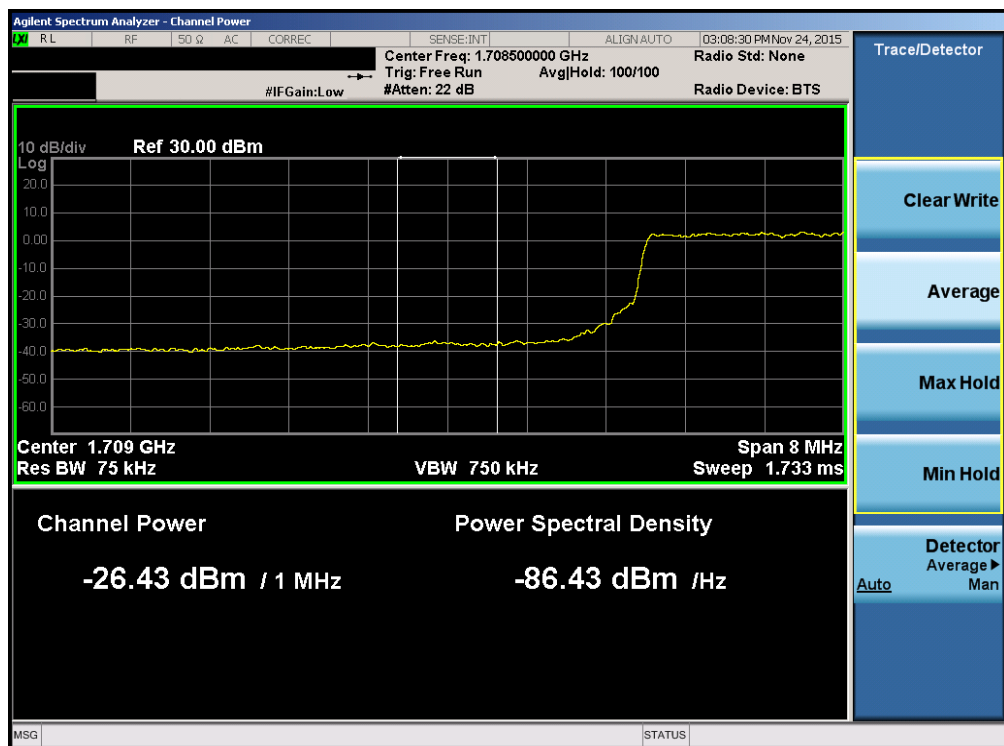


Plot 7-116. Upper Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	<b>LG</b>	Reviewed by: Quality Manager
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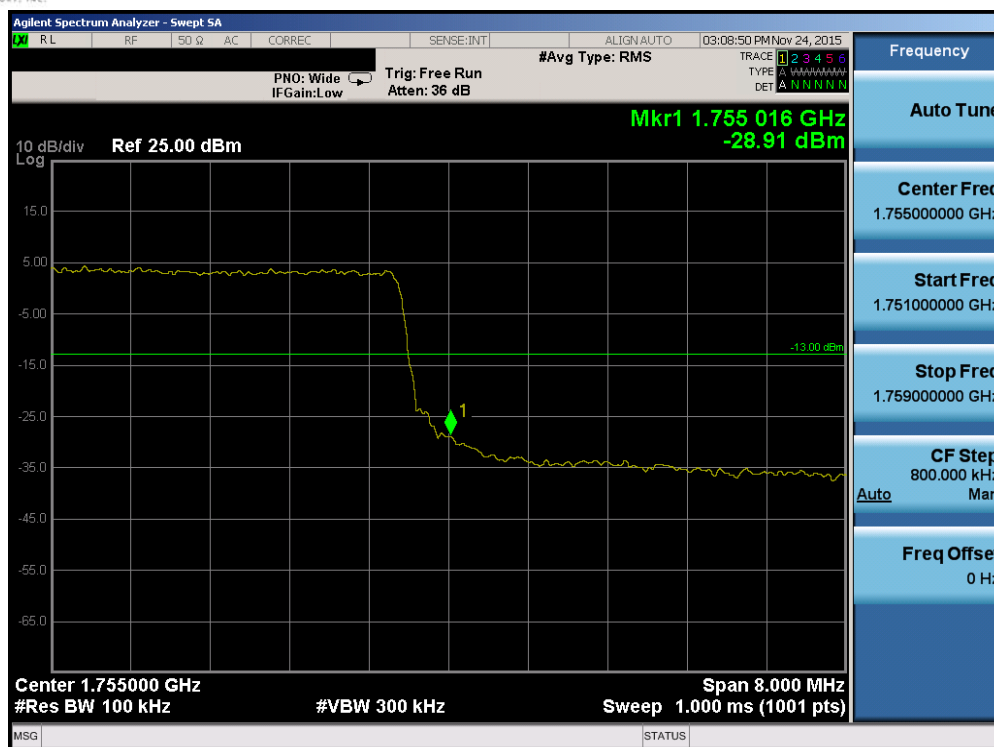
Plot 7-117. Lower Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)



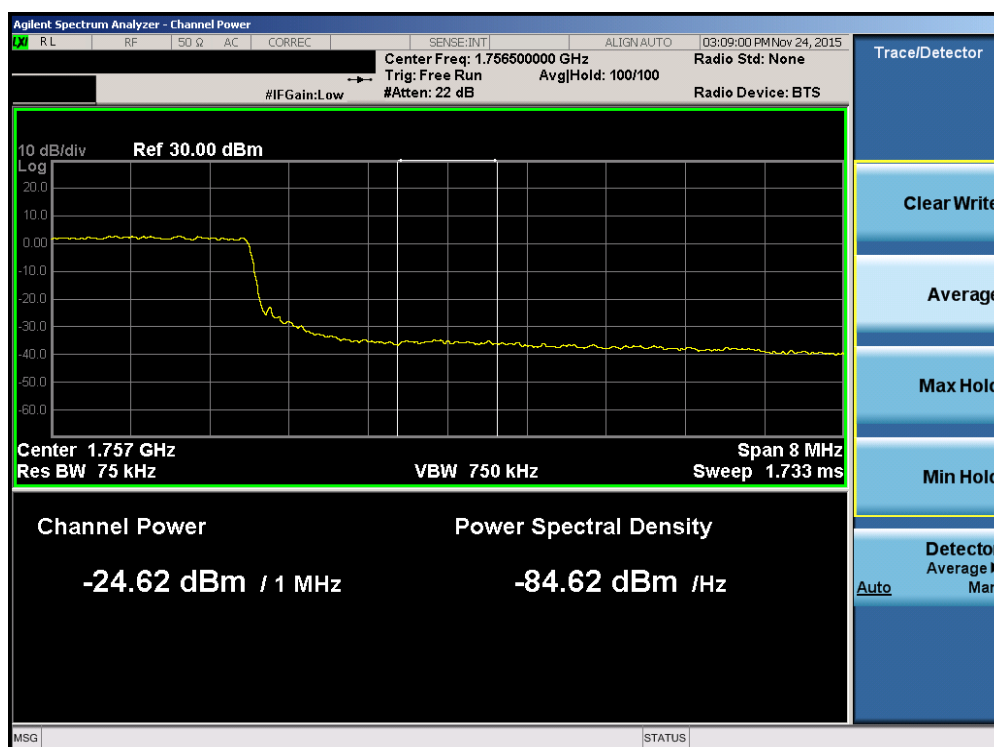
Plot 7-118. Lower Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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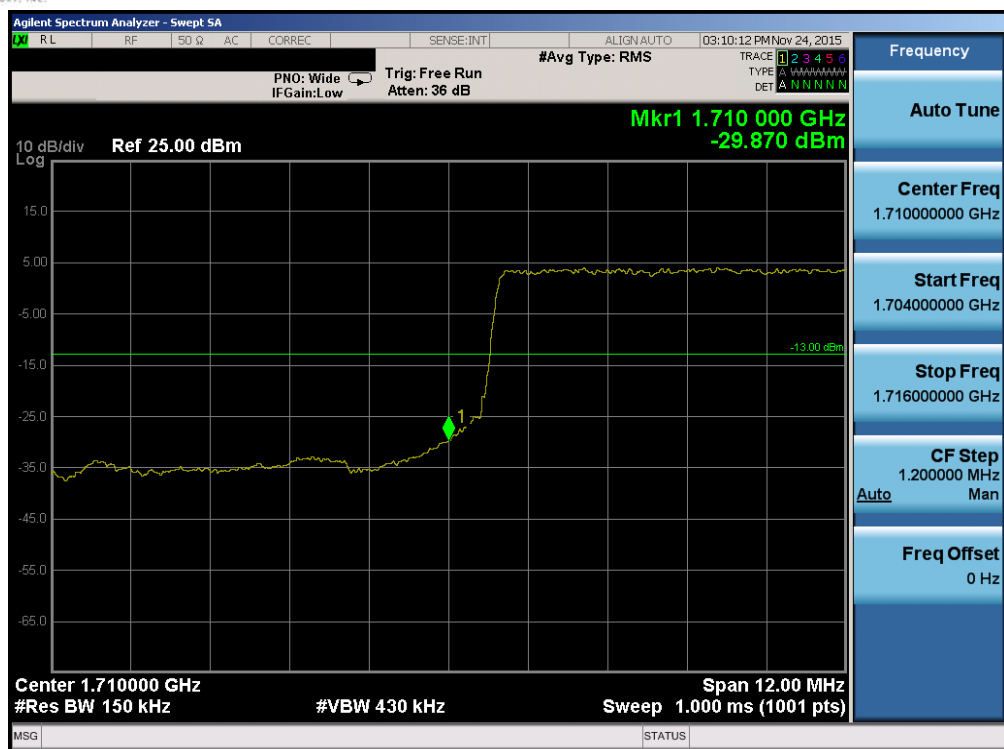


Plot 7-119. Upper Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

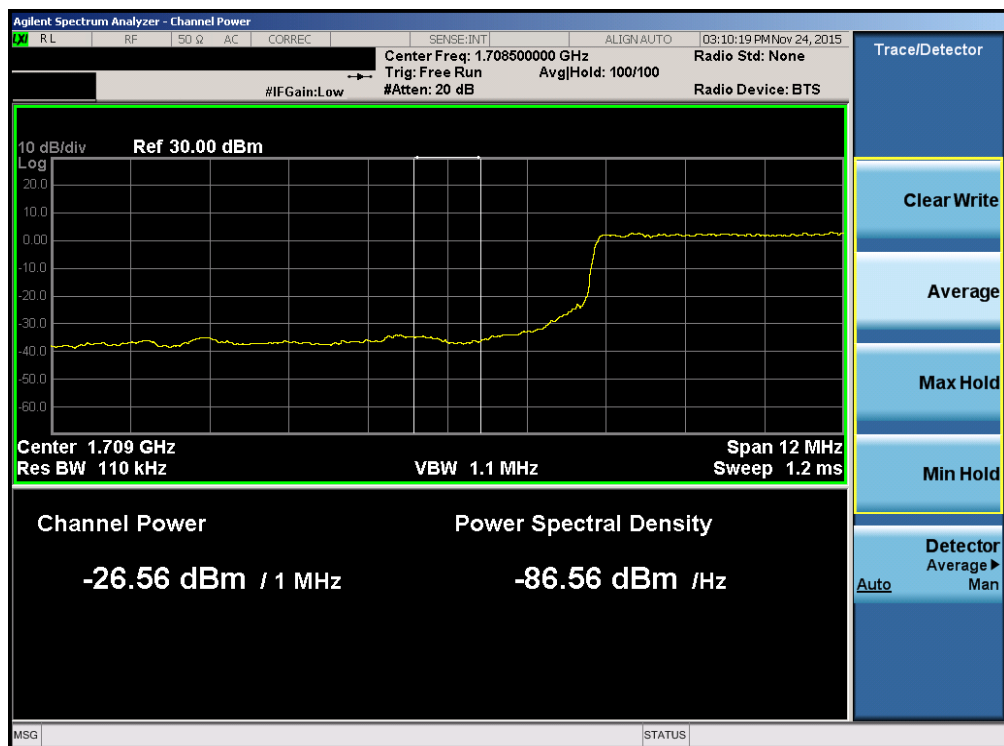


Plot 7-120. Upper Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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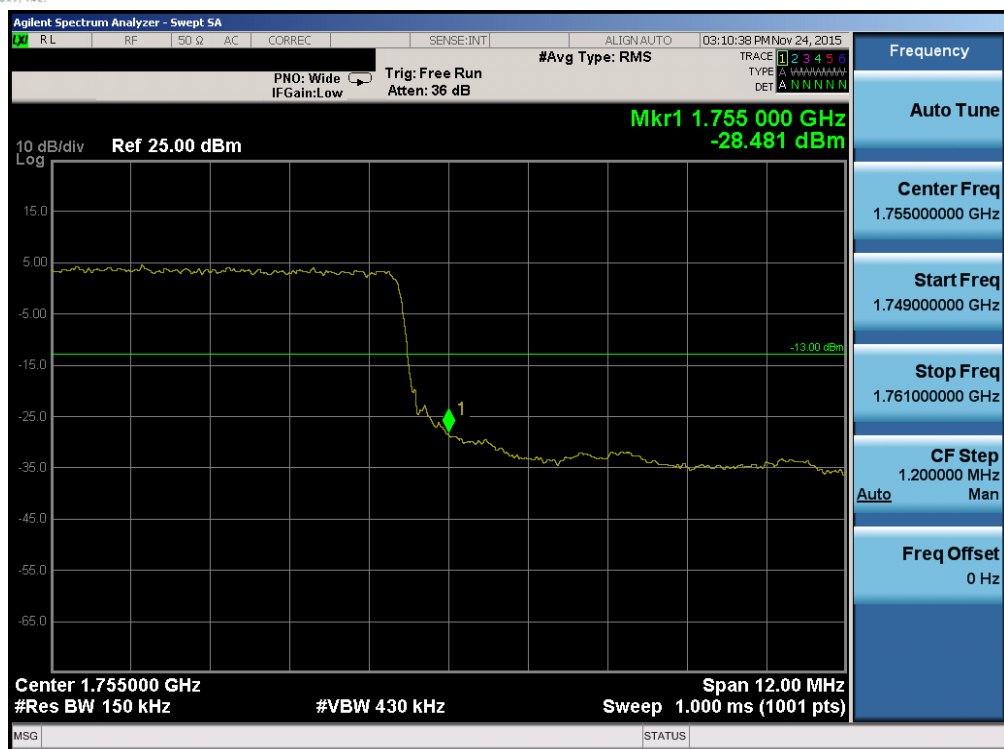


Plot 7-121. Lower Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

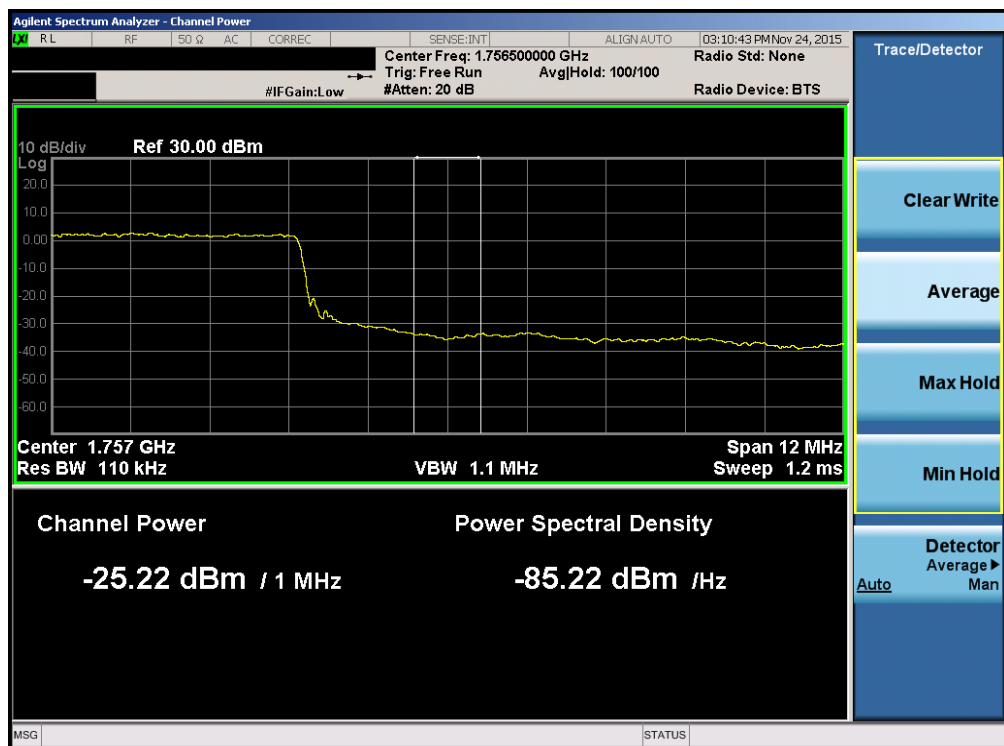


Plot 7-122. Lower Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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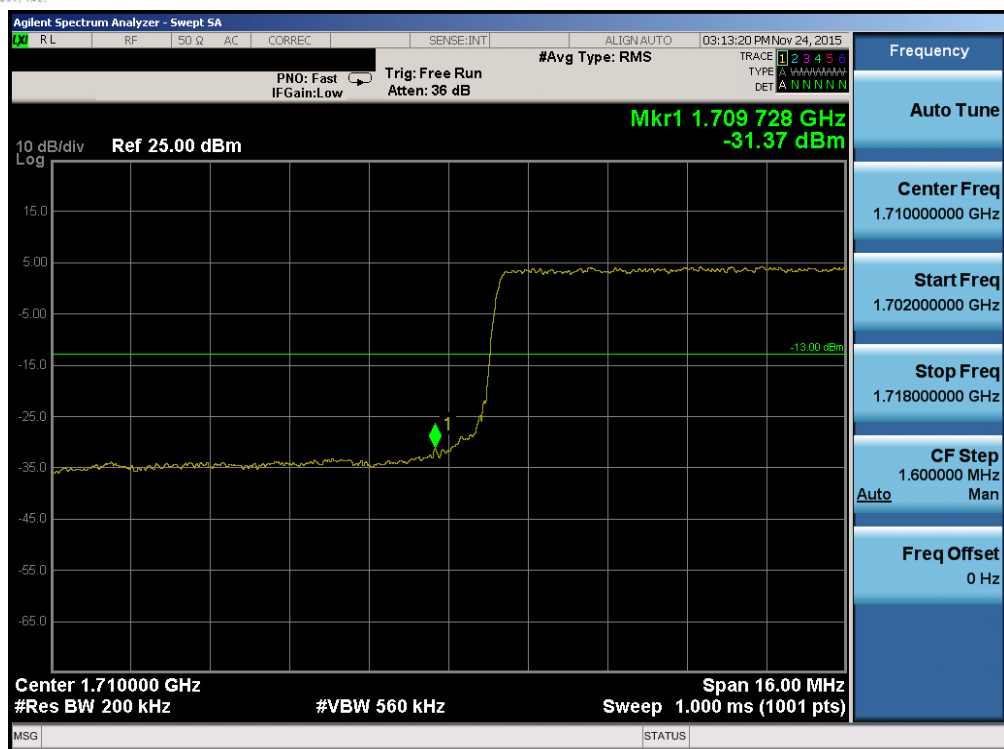


Plot 7-123. Upper Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

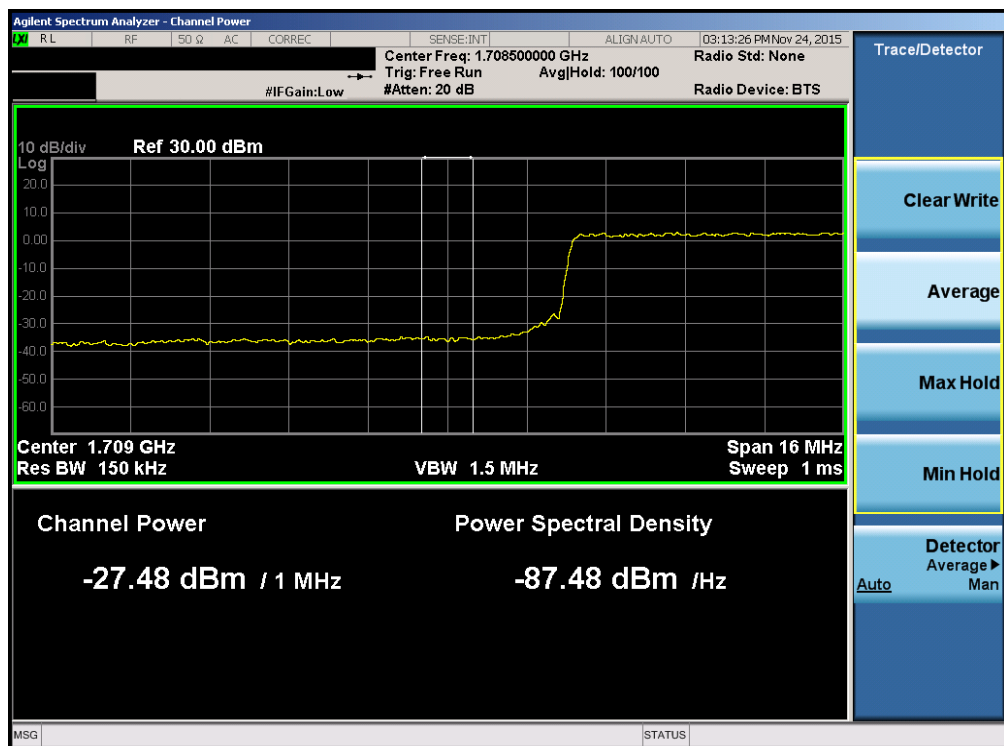


Plot 7-124. Upper Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset		Page 77 of 122

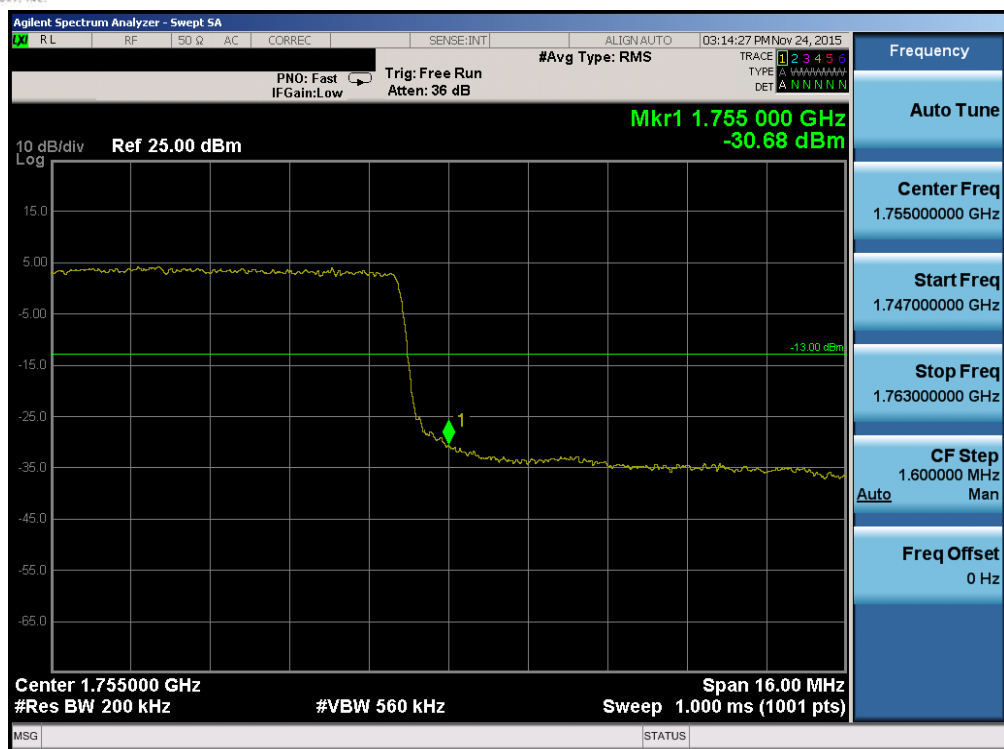


Plot 7-125. Lower Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

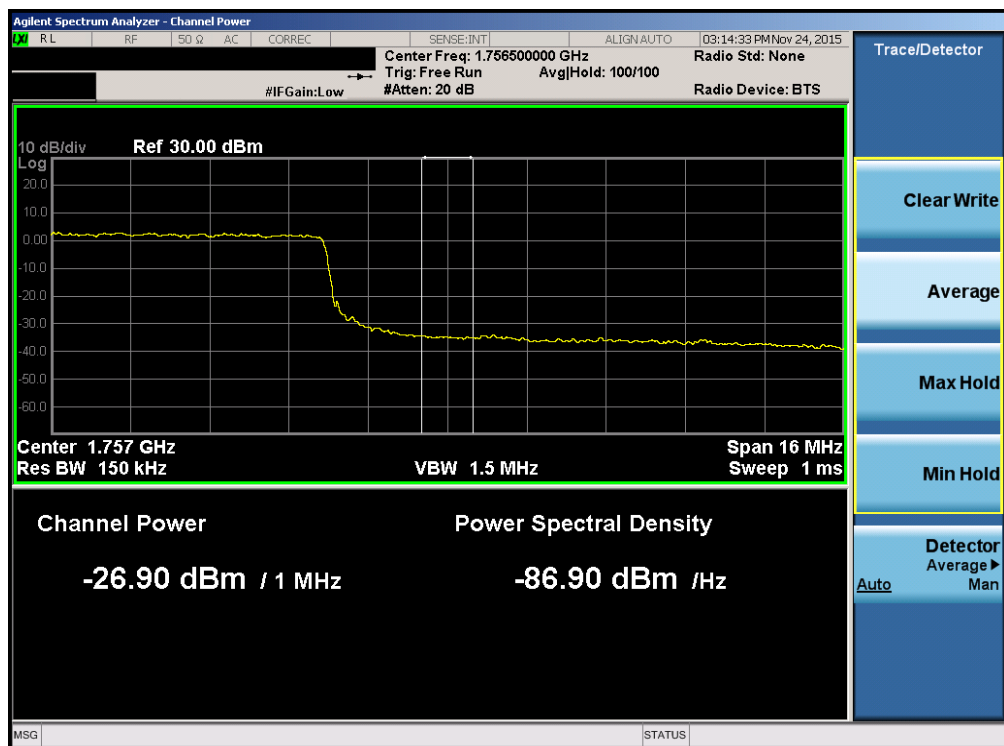


Plot 7-126. Lower Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset		Page 78 of 122

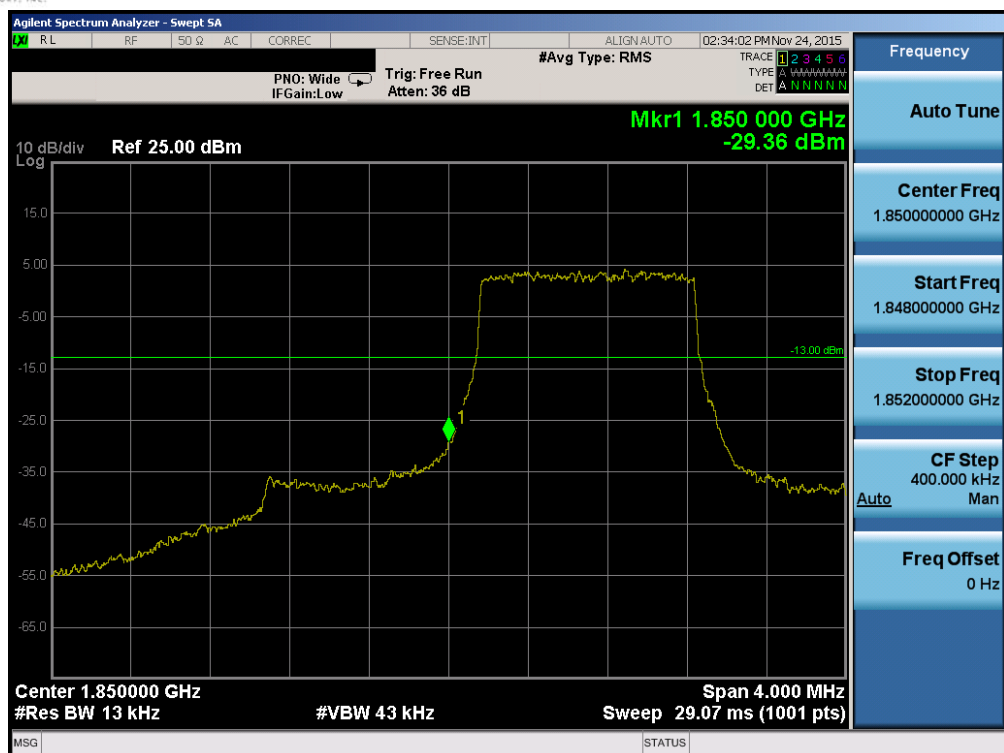


Plot 7-127. Upper Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

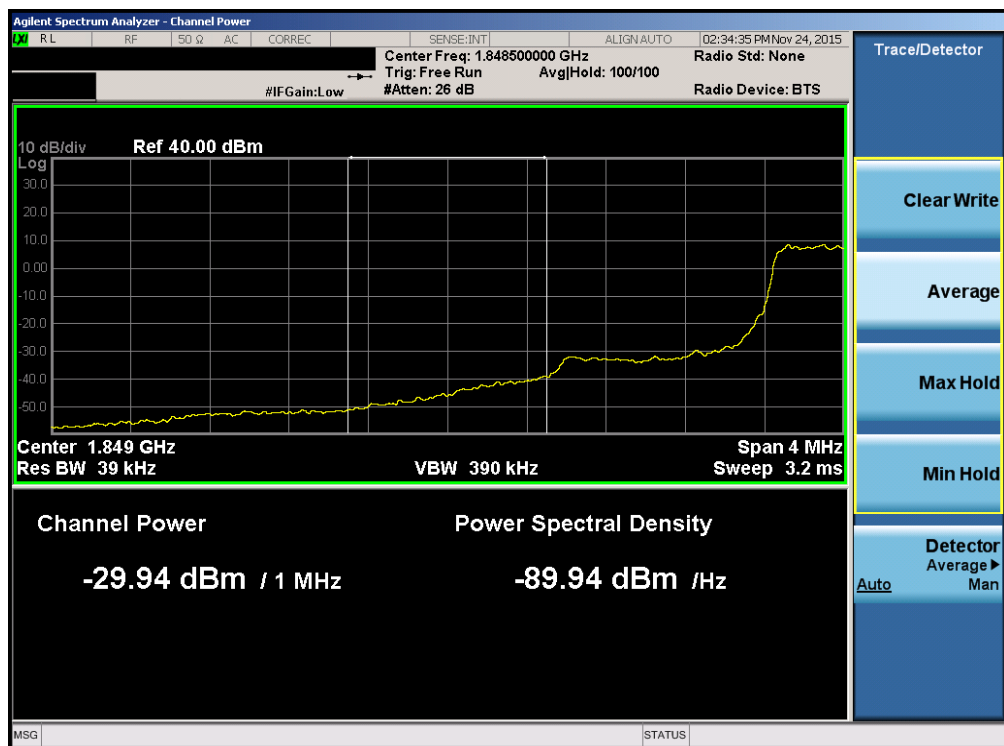


Plot 7-128. Upper Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset		Page 79 of 122



Plot 7-129. Lower Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

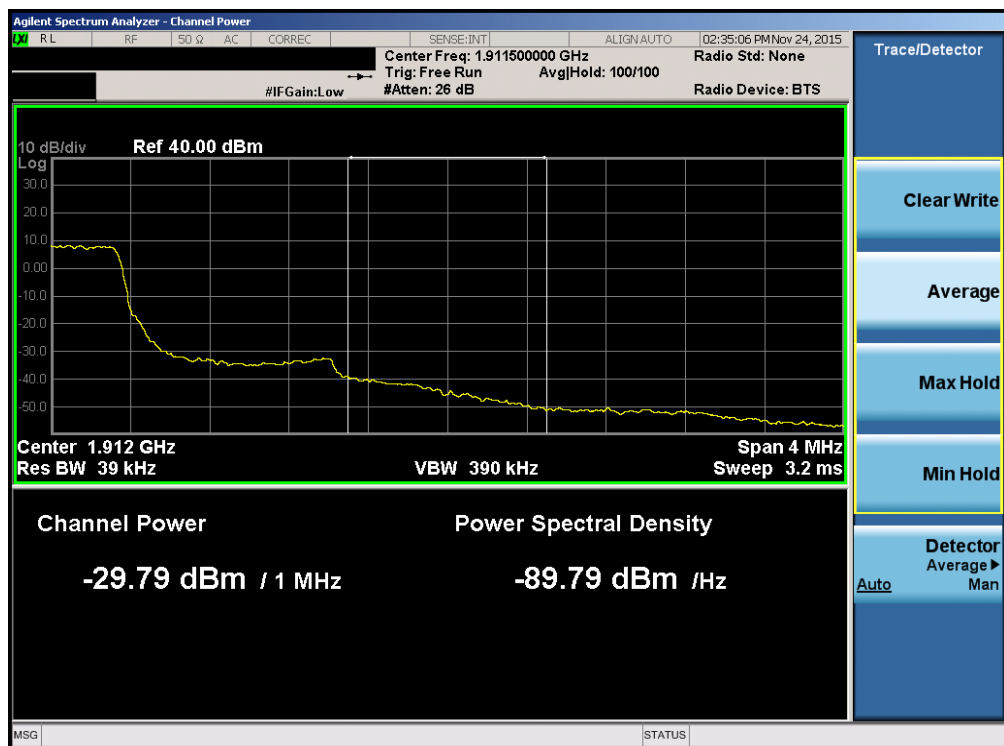


Plot 7-130. Lower Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	<b>LG</b>	Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset		Page 80 of 122



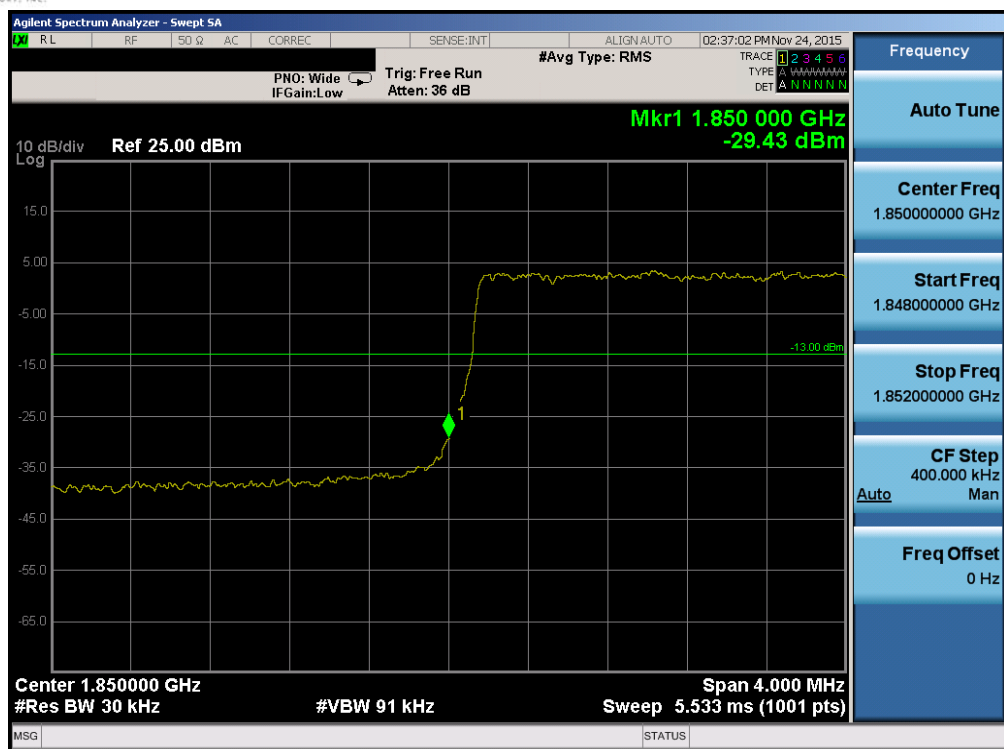
Plot 7-131. Upper Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)



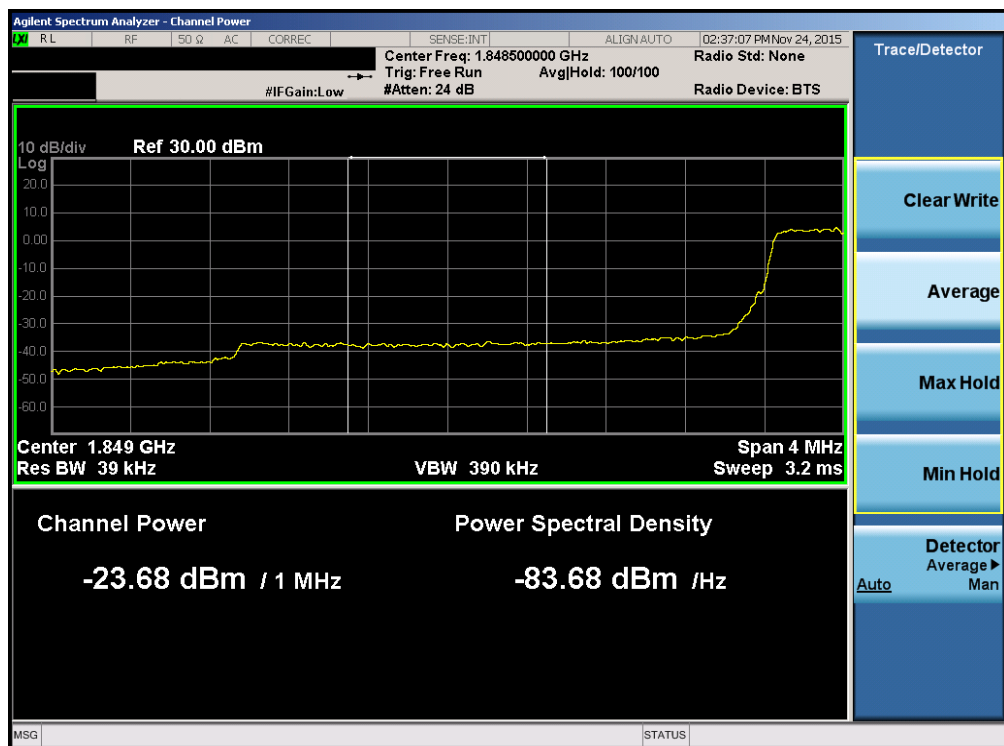
Plot 7-132. Upper Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset		Page 81 of 122



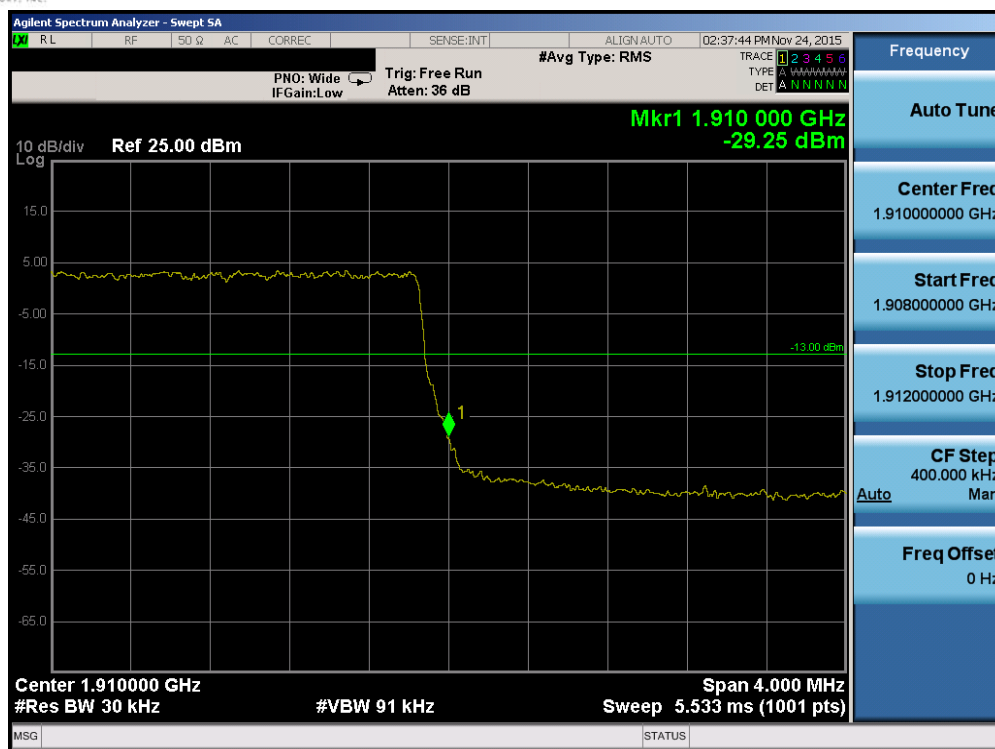


Plot 7-133. Lower Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

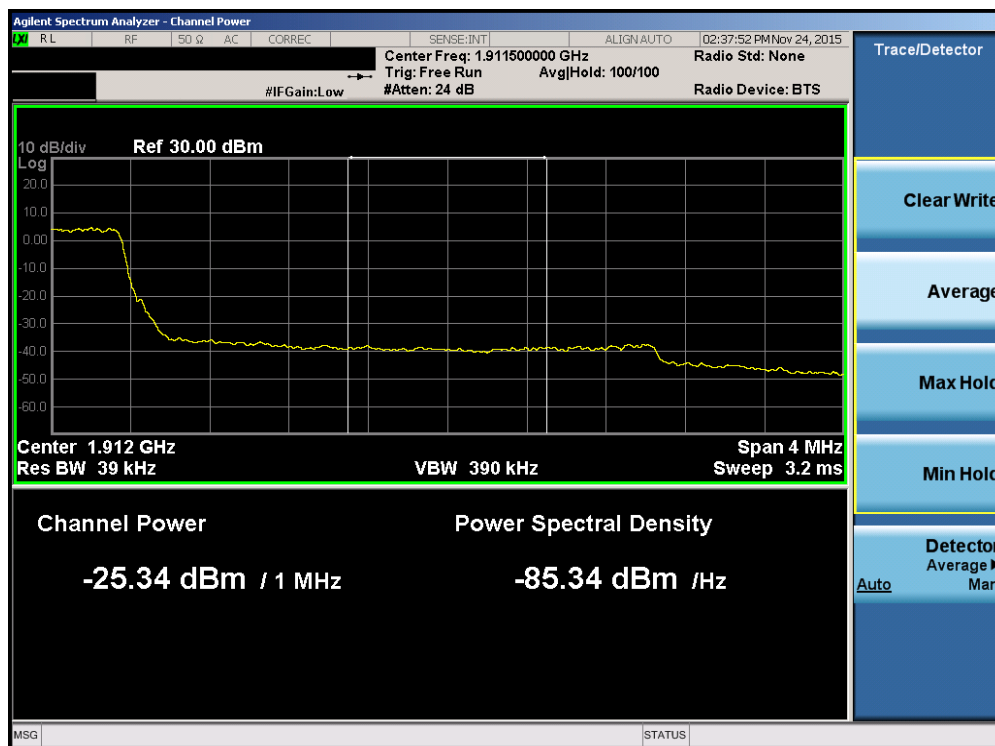


Plot 7-134. Lower Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset		Page 82 of 122

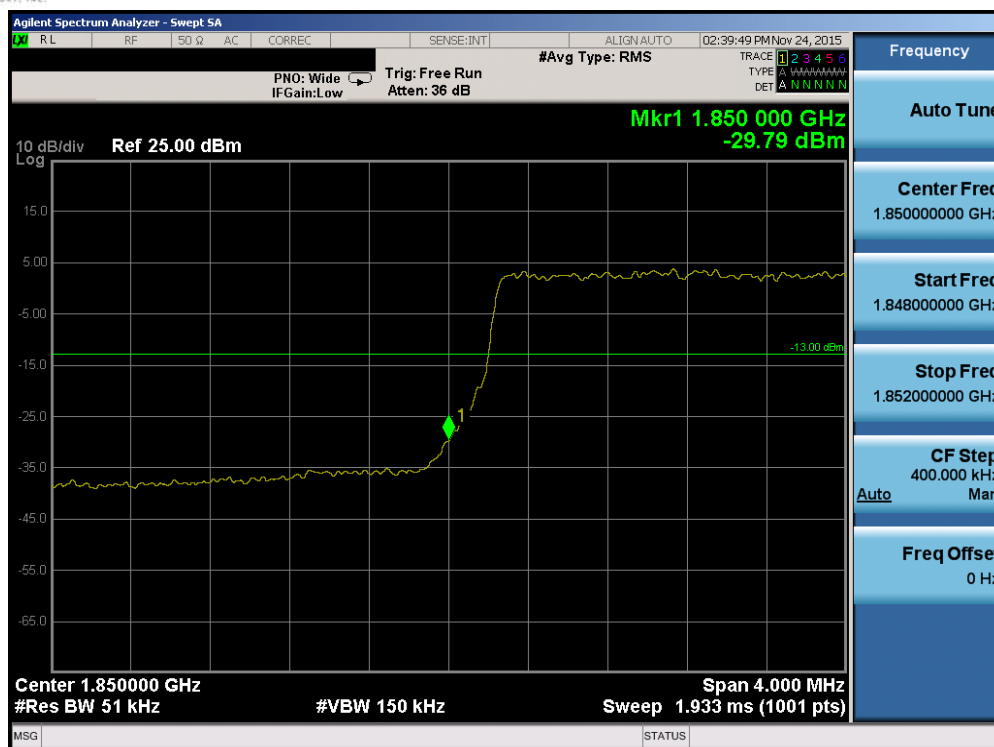


Plot 7-135. Upper Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

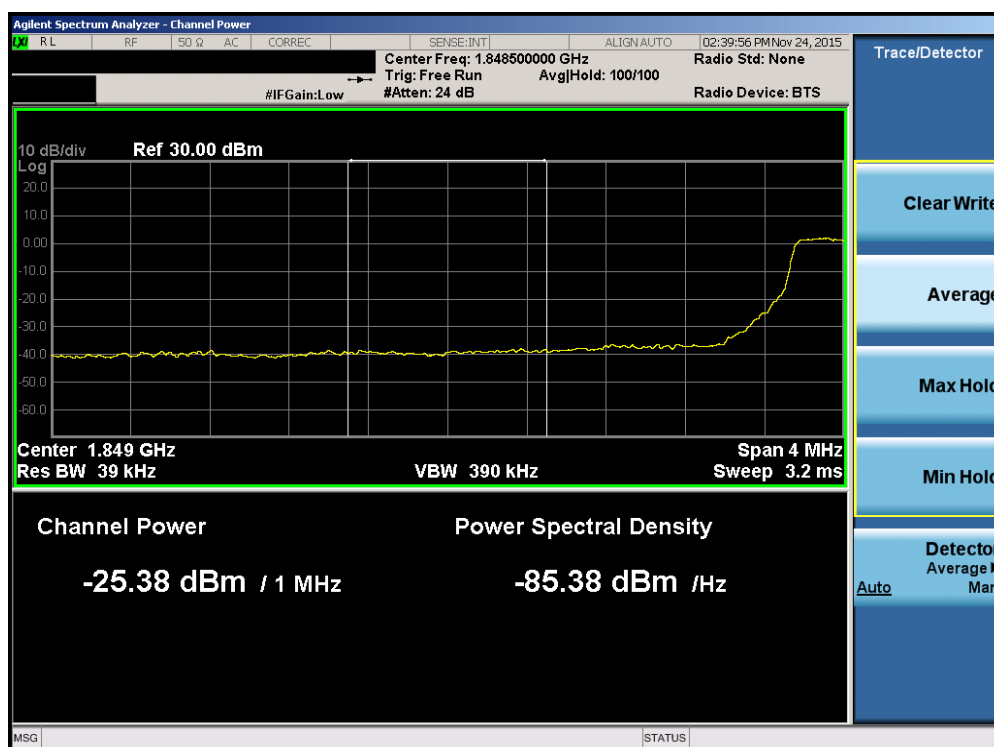


Plot 7-136. Upper Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset		Page 83 of 122

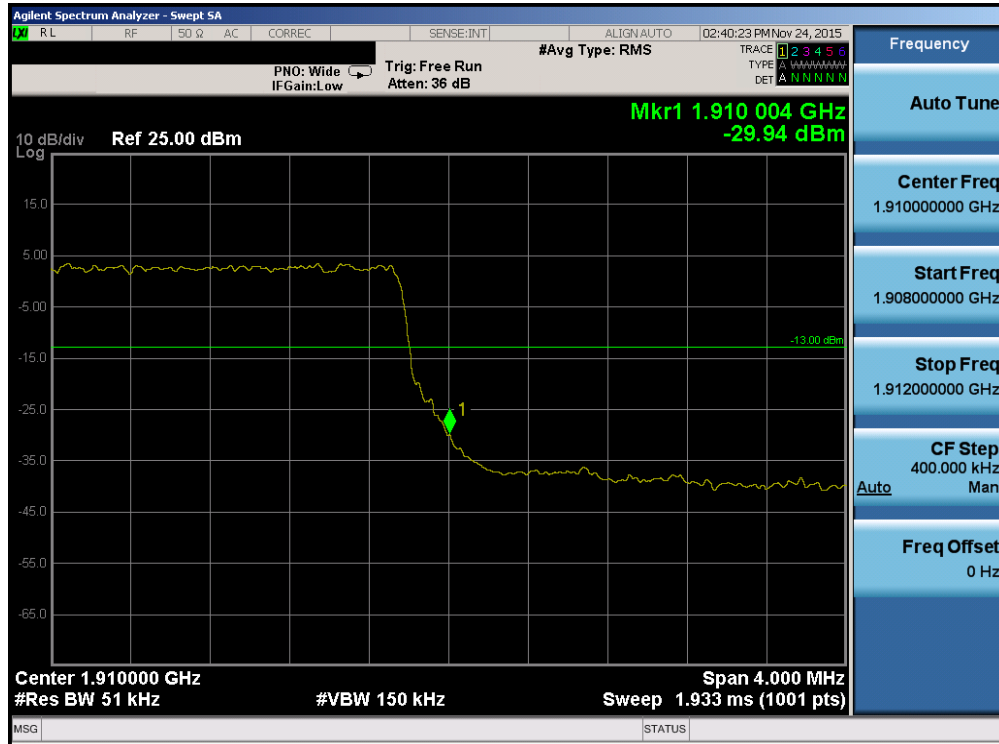


Plot 7-137. Lower Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

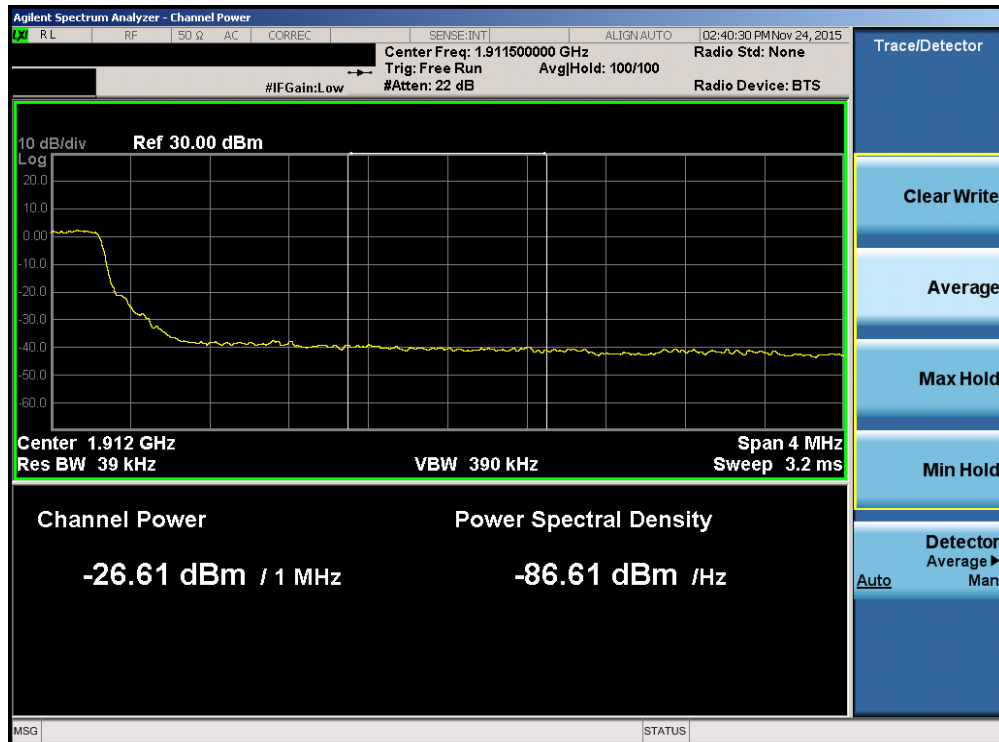


Plot 7-138. Lower Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	<b>LG</b>	Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset		Page 84 of 122

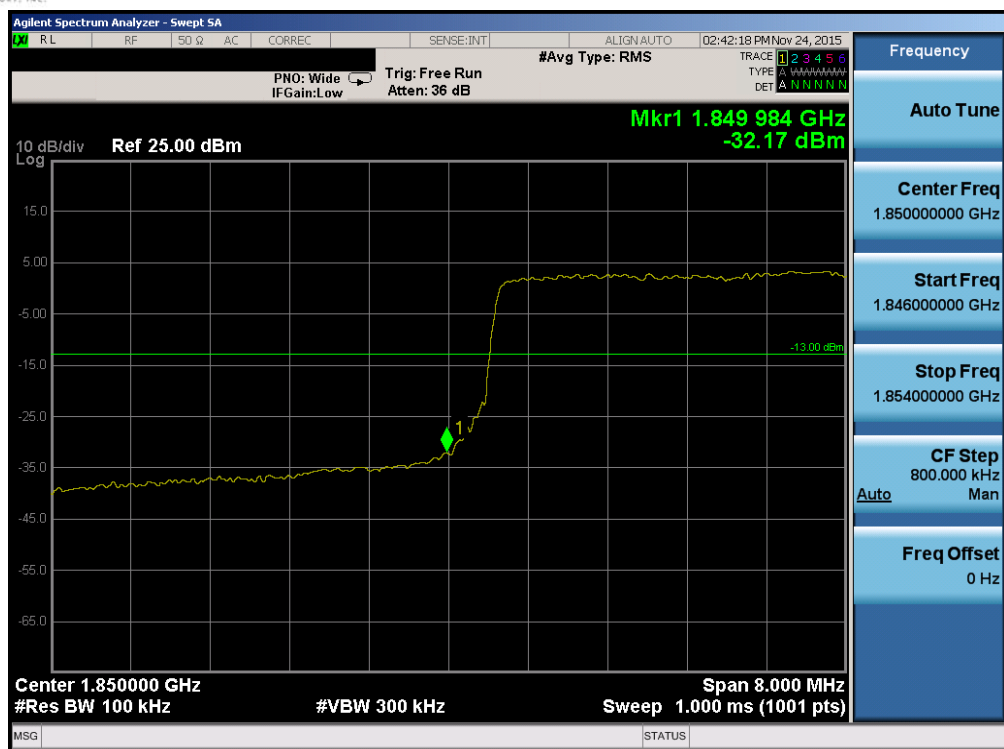


Plot 7-139. Upper Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

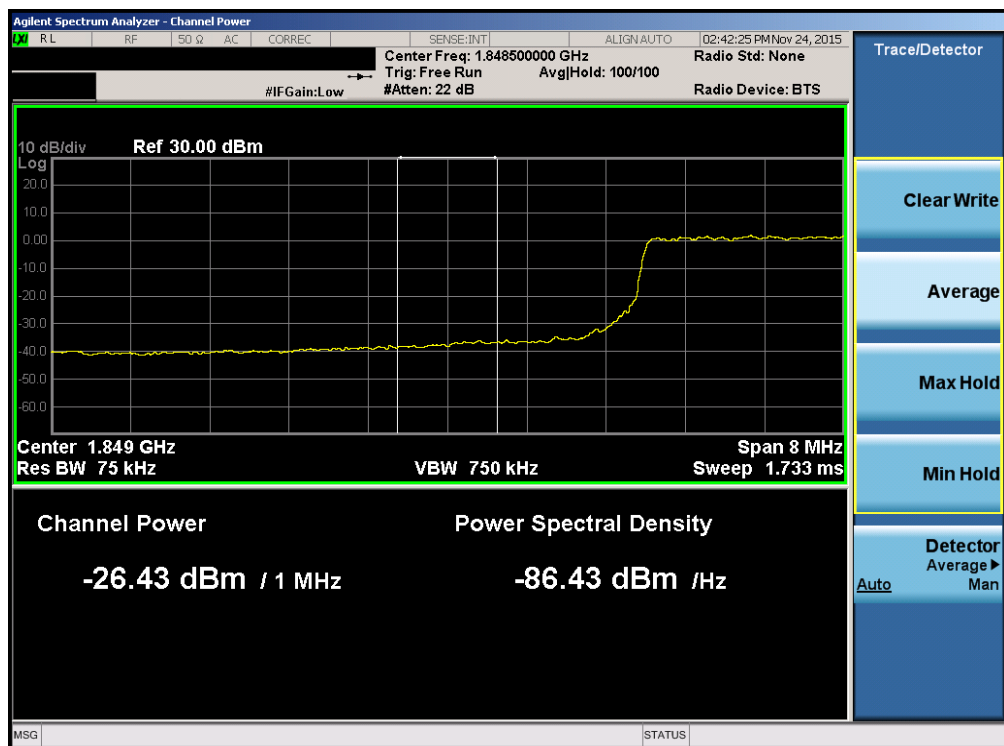


Plot 7-140. Upper Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset		Page 85 of 122



Plot 7-141. Lower Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

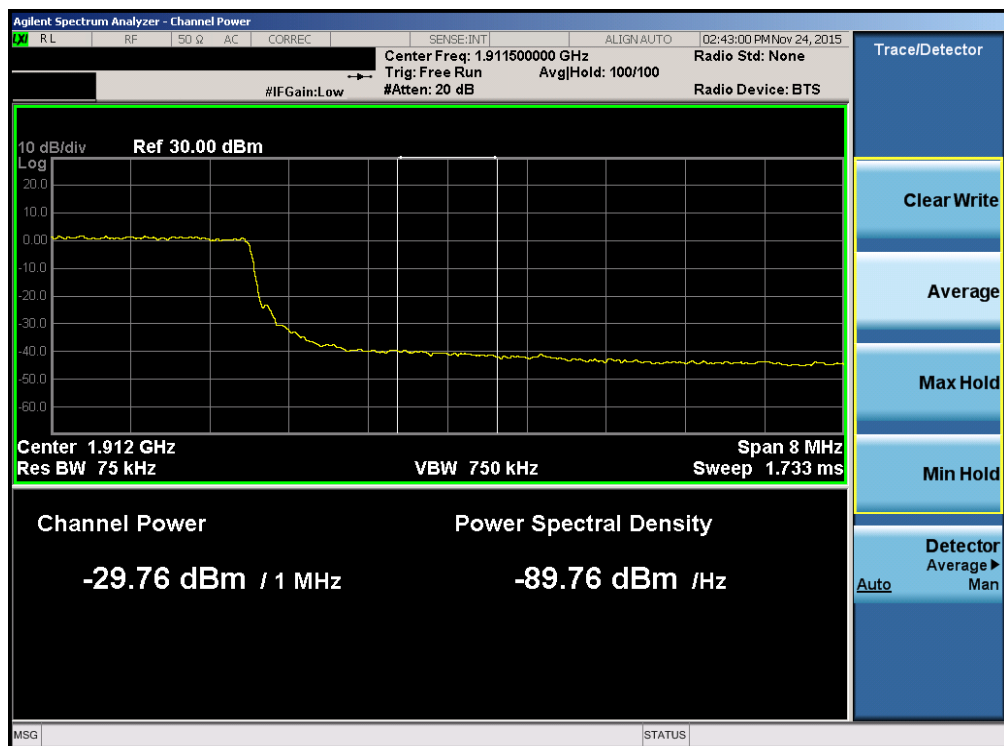


Plot 7-142. Lower Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	<b>LG</b>	Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset		Page 86 of 122

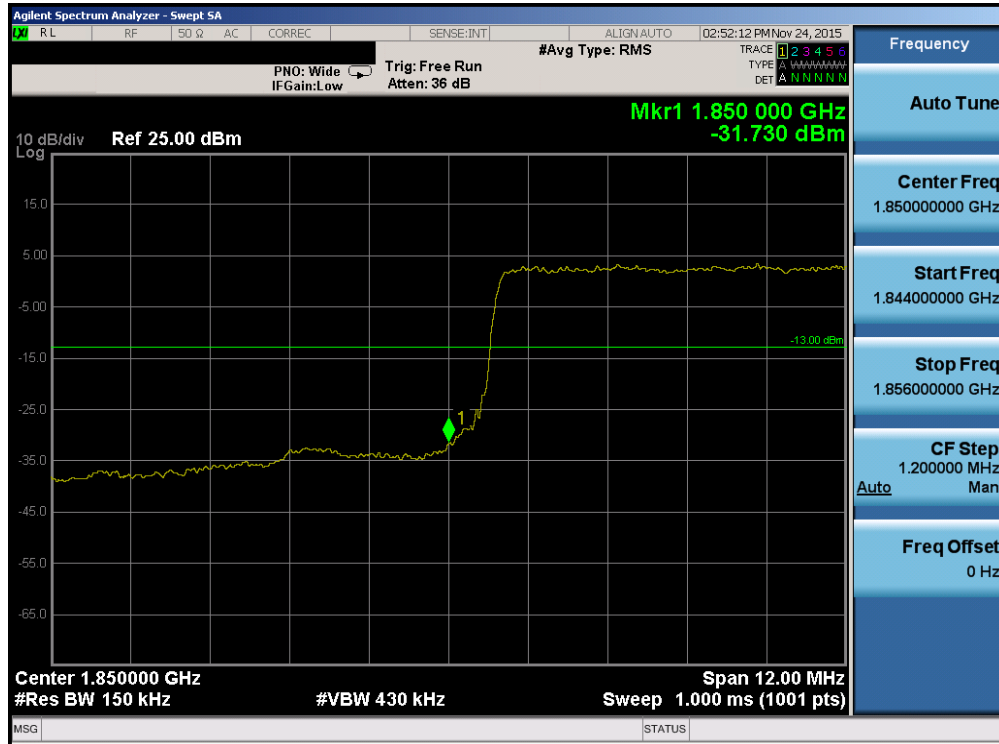


Plot 7-143. Upper Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

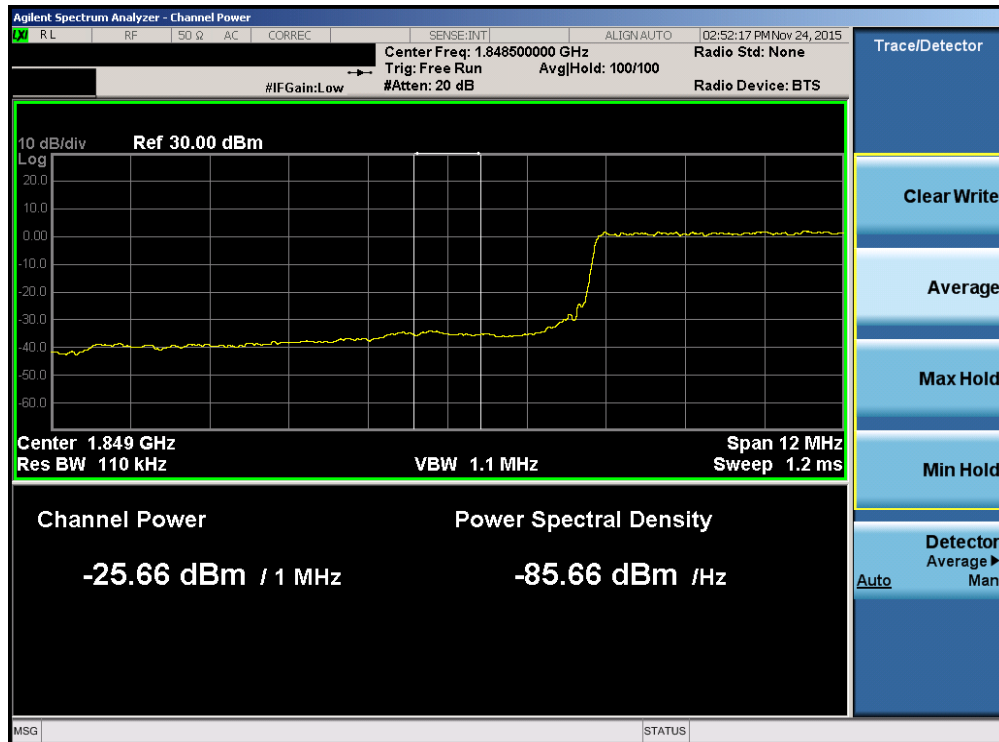


Plot 7-144. Upper Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset		Page 87 of 122



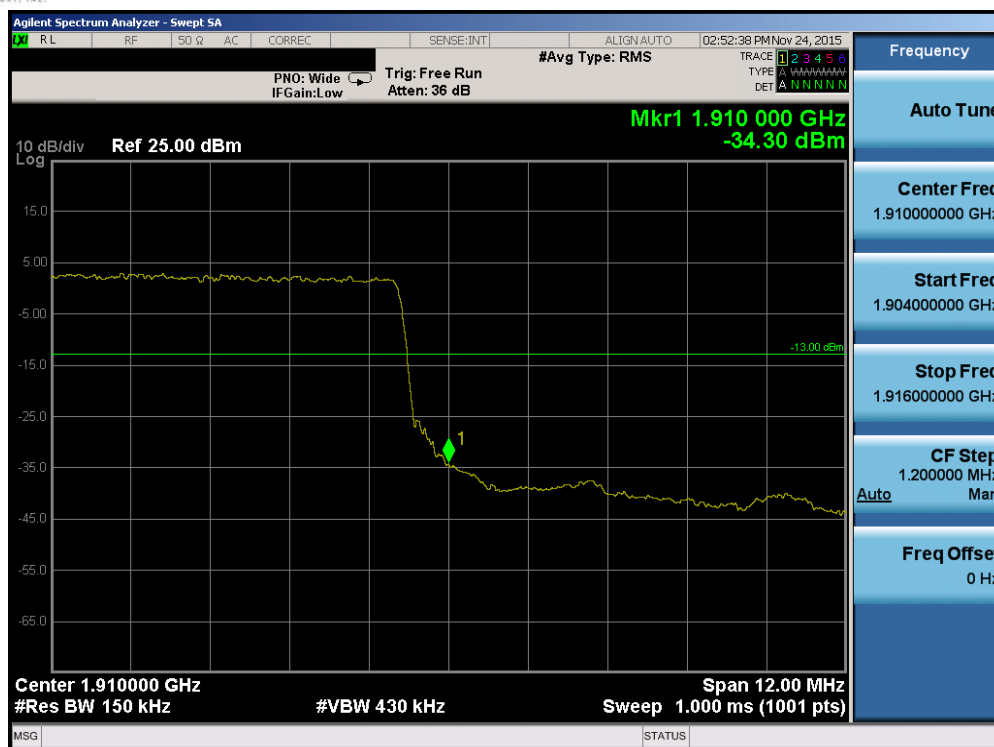
Plot 7-145. Lower Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)



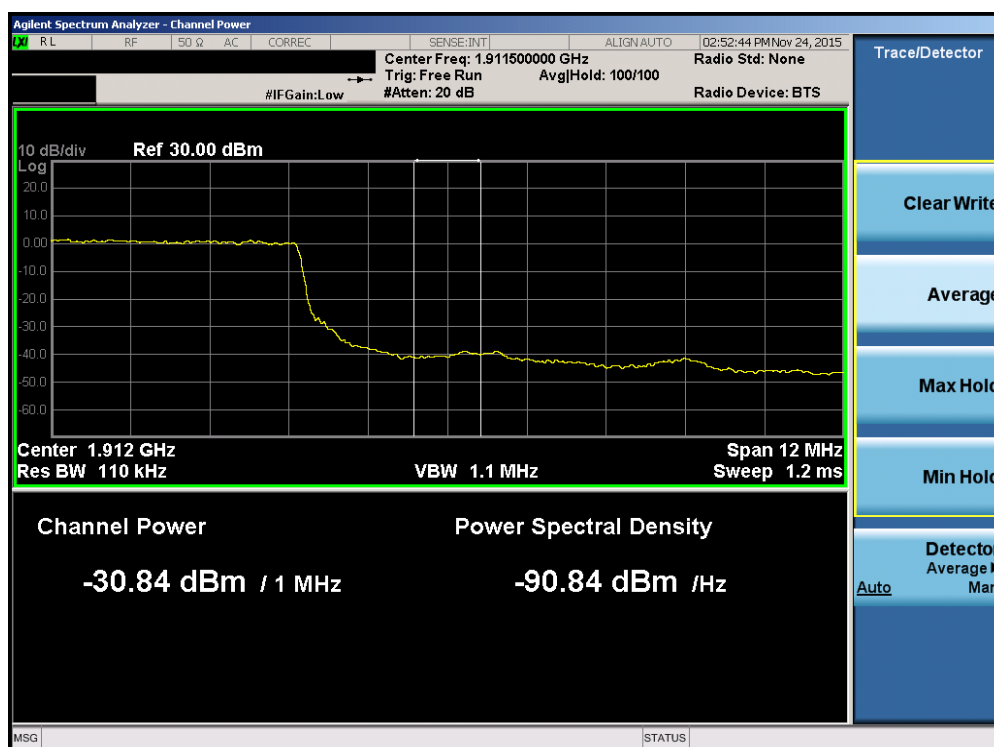
Plot 7-146. Lower Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	<b>LG</b>	Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset		Page 88 of 122



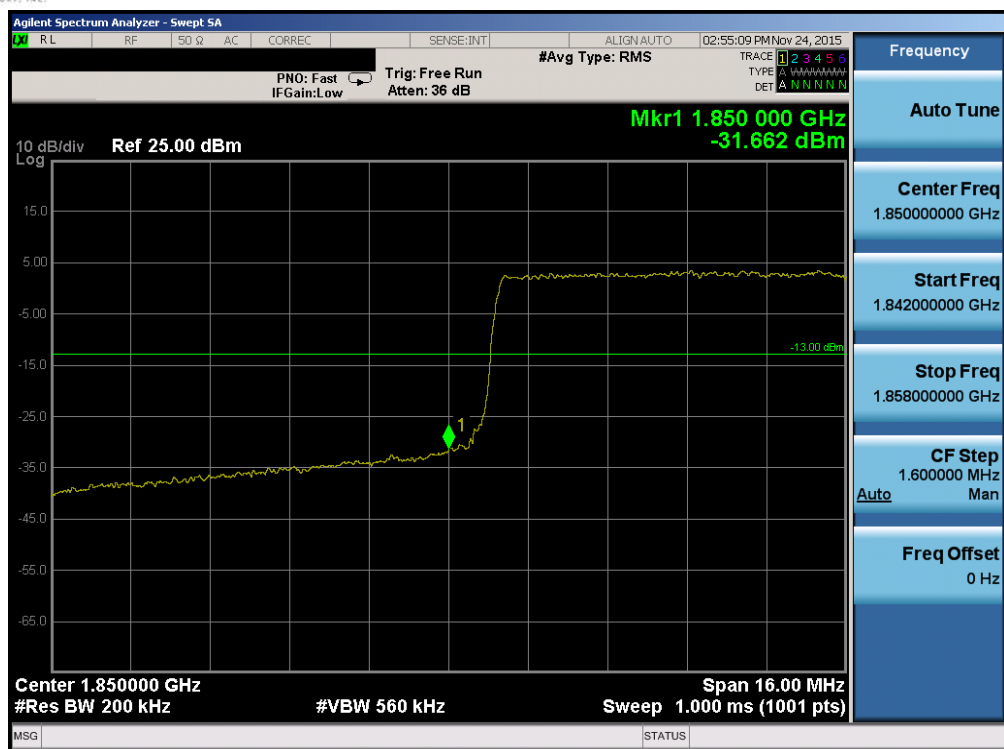


Plot 7-147. Upper Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

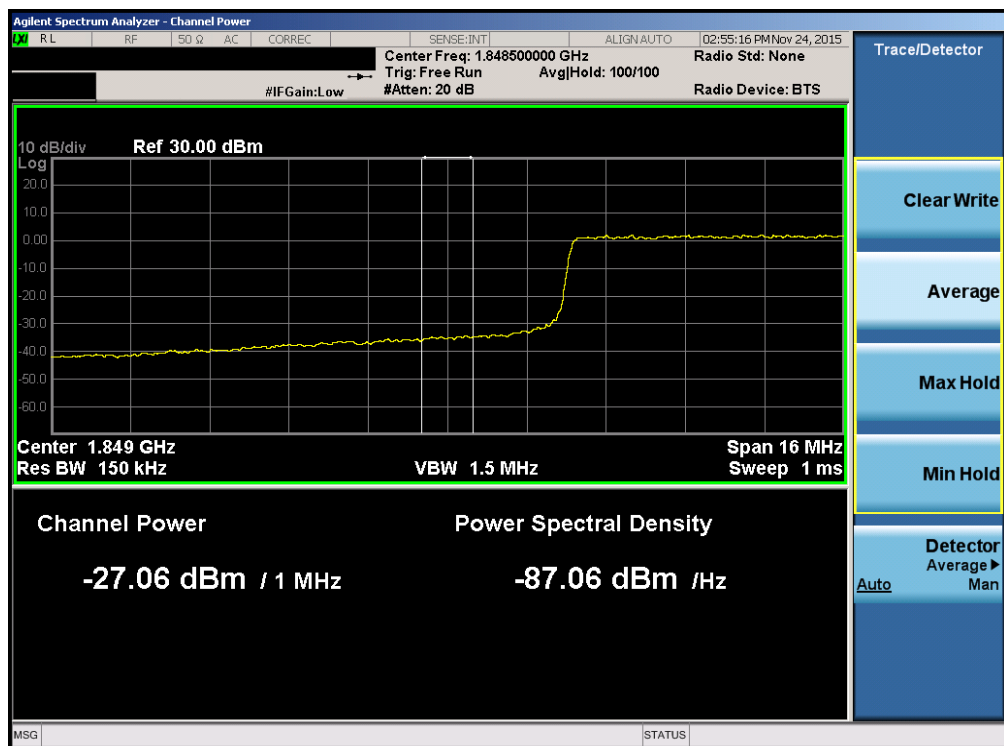


Plot 7-148. Upper Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset		Page 89 of 122



Plot 7-149. Lower Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

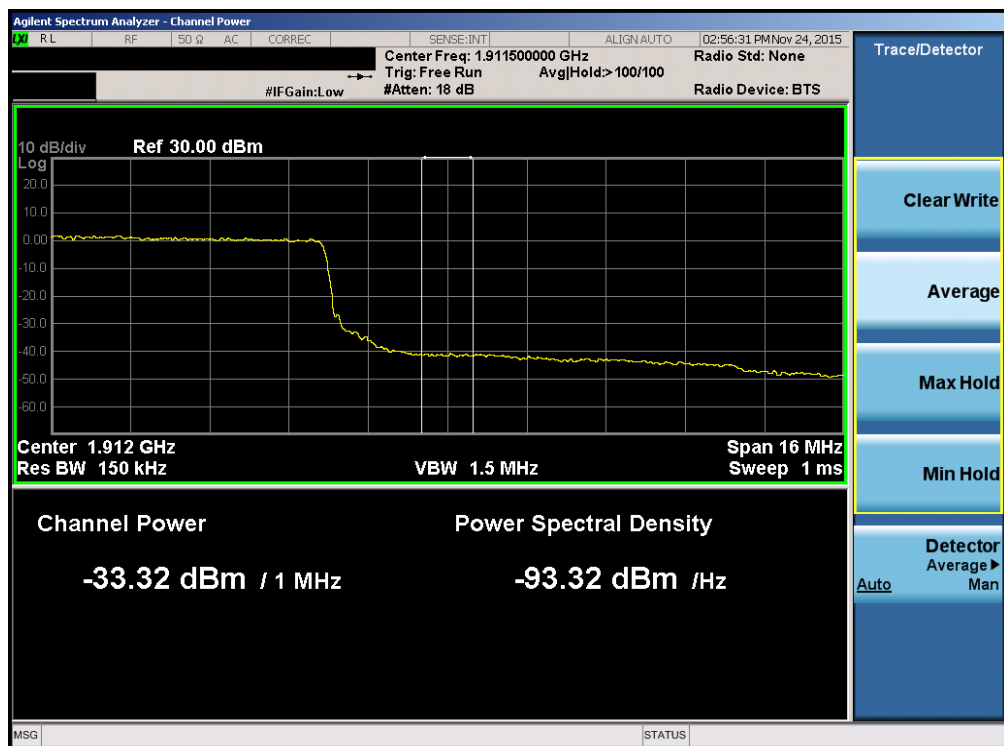


Plot 7-150. Lower Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset		Page 90 of 122



Plot 7-151. Upper Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 7-152. Upper Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset		Page 91 of 122

## 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

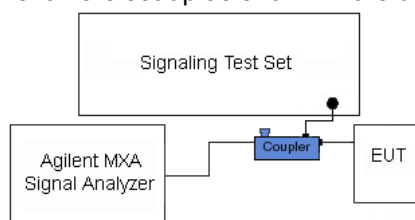
KDB 971168 D01 v02r02 – Section 5.7.1

#### 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.

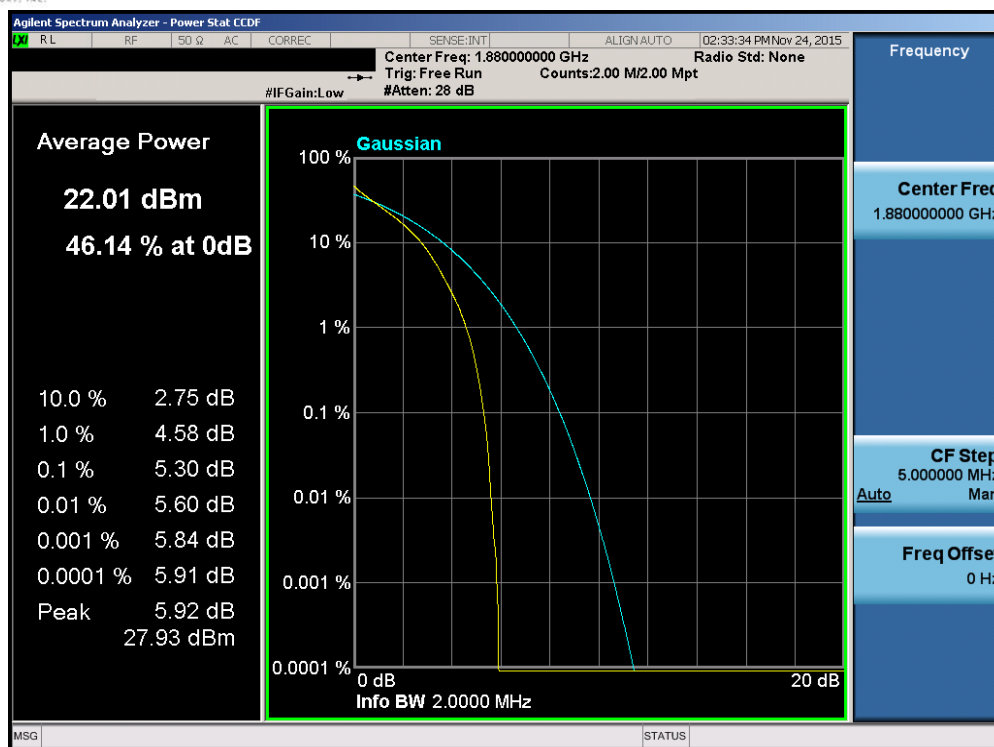


**Figure 7-4. Test Instrument & Measurement Setup**

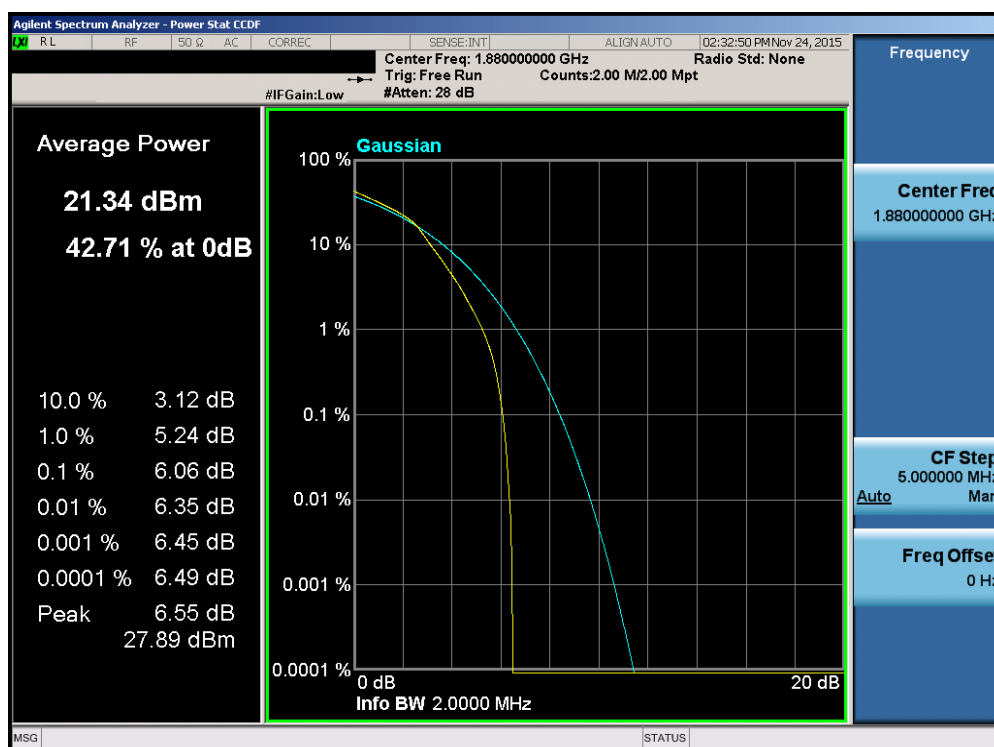
#### Test Notes

None.

FCC ID: ZNFL43AL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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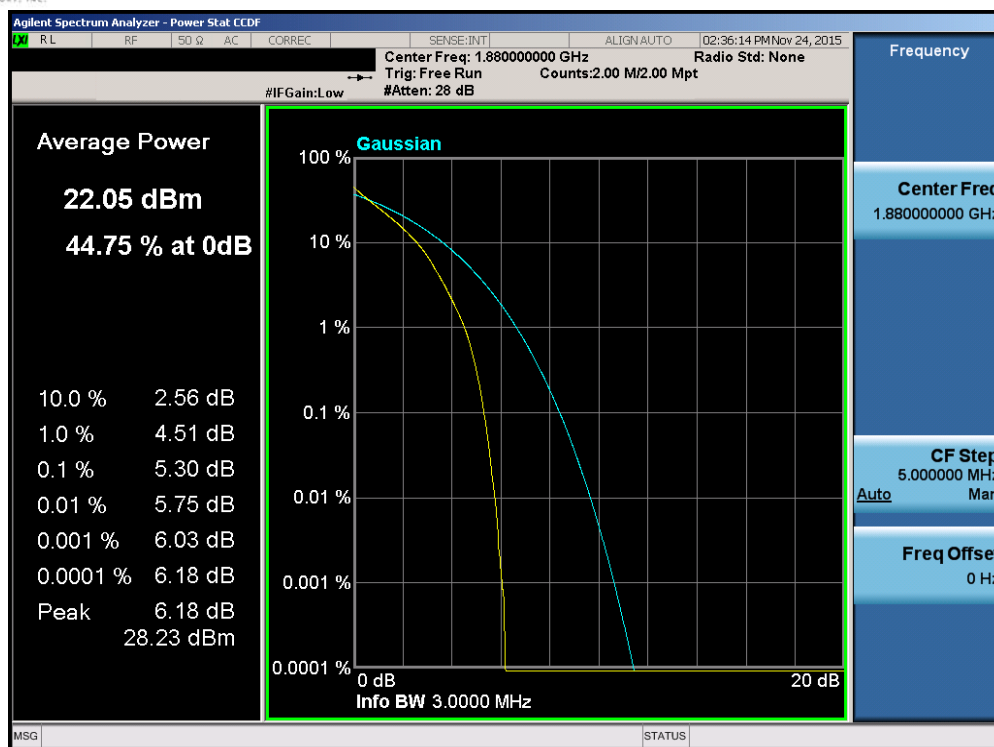


Plot 7-153. PAR Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

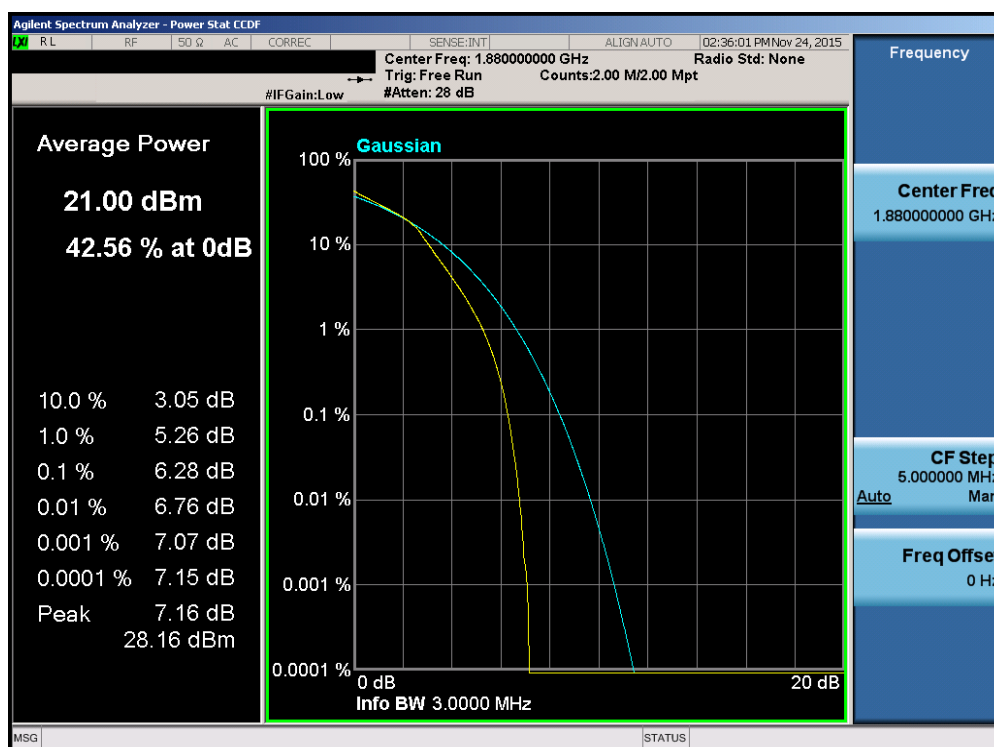


Plot 7-154. PAR Plot (Band 2 – 1.4MHz 16-QAM – RB Size 6)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	<b>LG</b>	Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset		Page 93 of 122

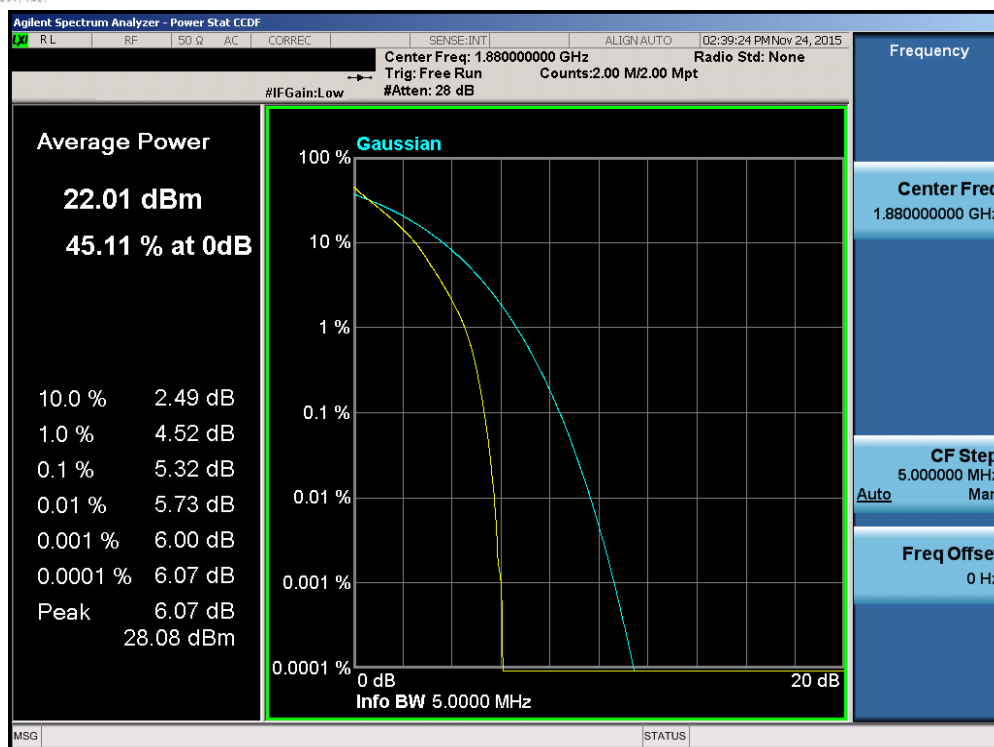


Plot 7-155. PAR Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

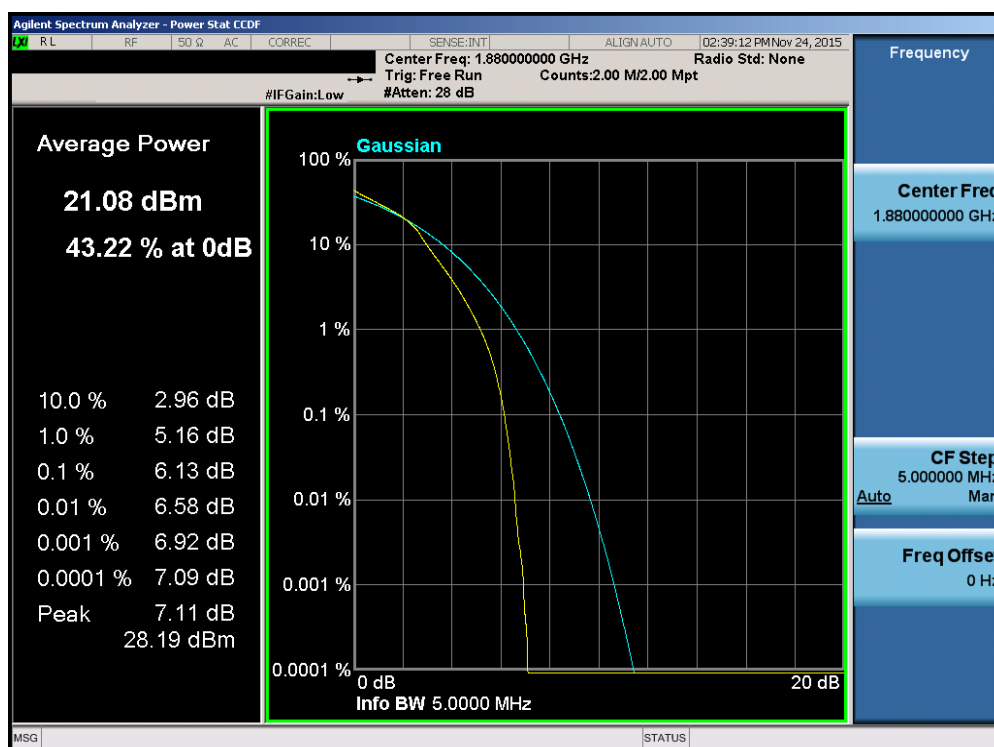


Plot 7-156. PAR Plot (Band 2 – 3.0MHz 16-QAM – RB Size 15)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	<b>LG</b>	Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset		Page 94 of 122



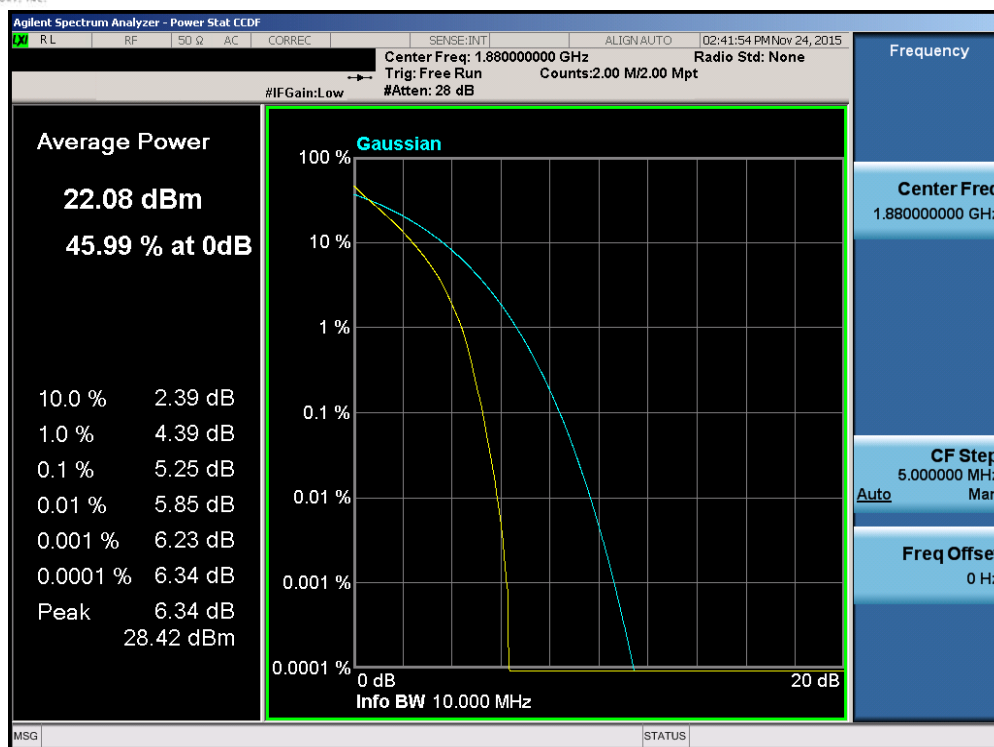
Plot 7-157. PAR Plot (Band 2 – 5.0MHz QPSK – RB Size 25)



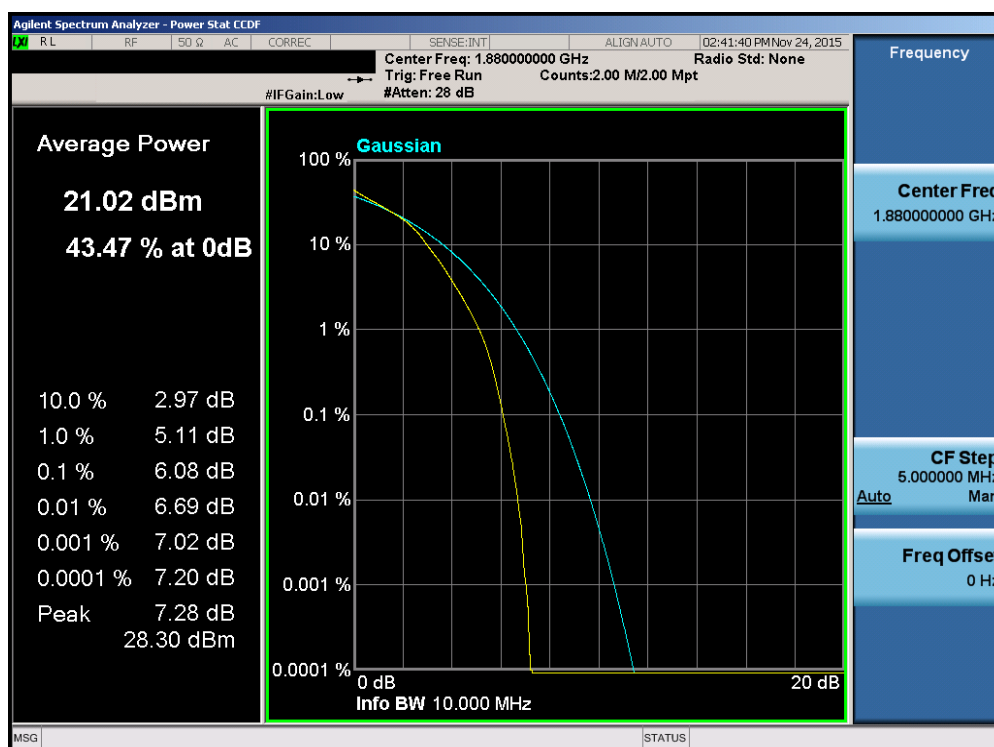
Plot 7-158. PAR Plot (Band 2 – 5.0MHz 16-QAM – RB Size 25)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset		Page 95 of 122



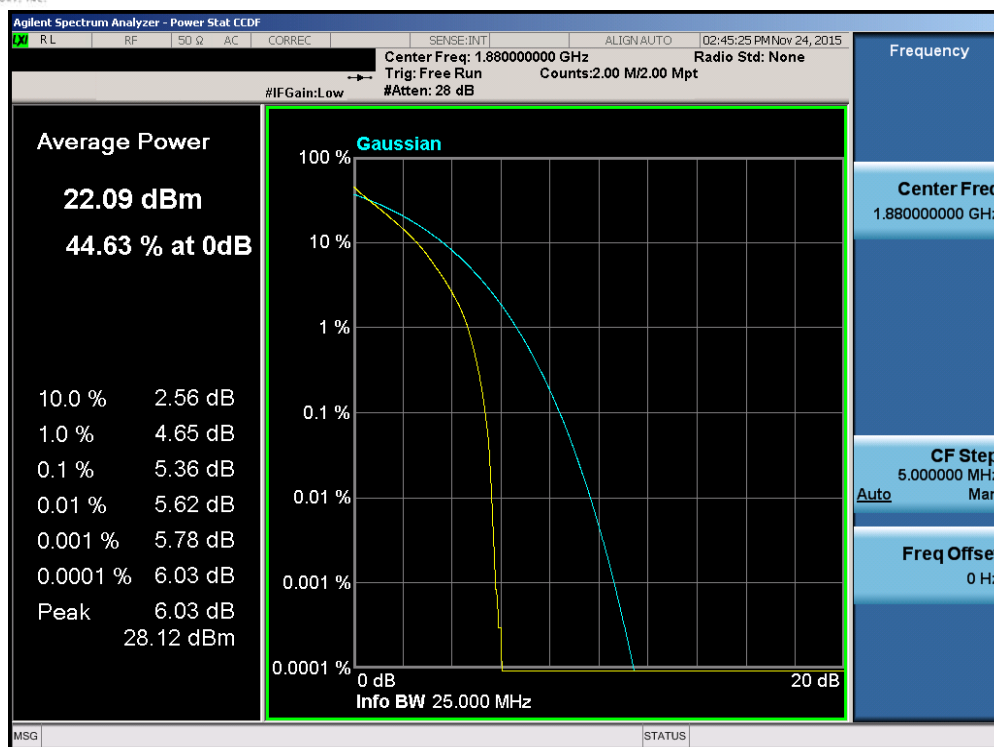


Plot 7-159. PAR Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

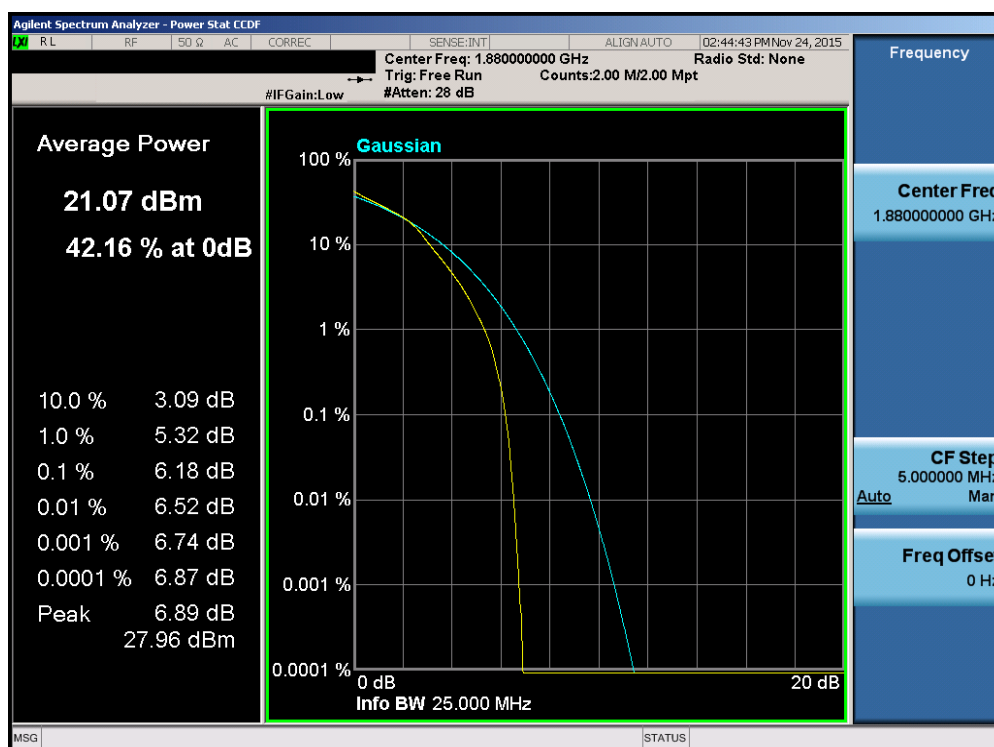


Plot 7-160. PAR Plot (Band 2 – 10.0MHz 16-QAM – RB Size 50)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	<b>LG</b>	Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset		Page 96 of 122

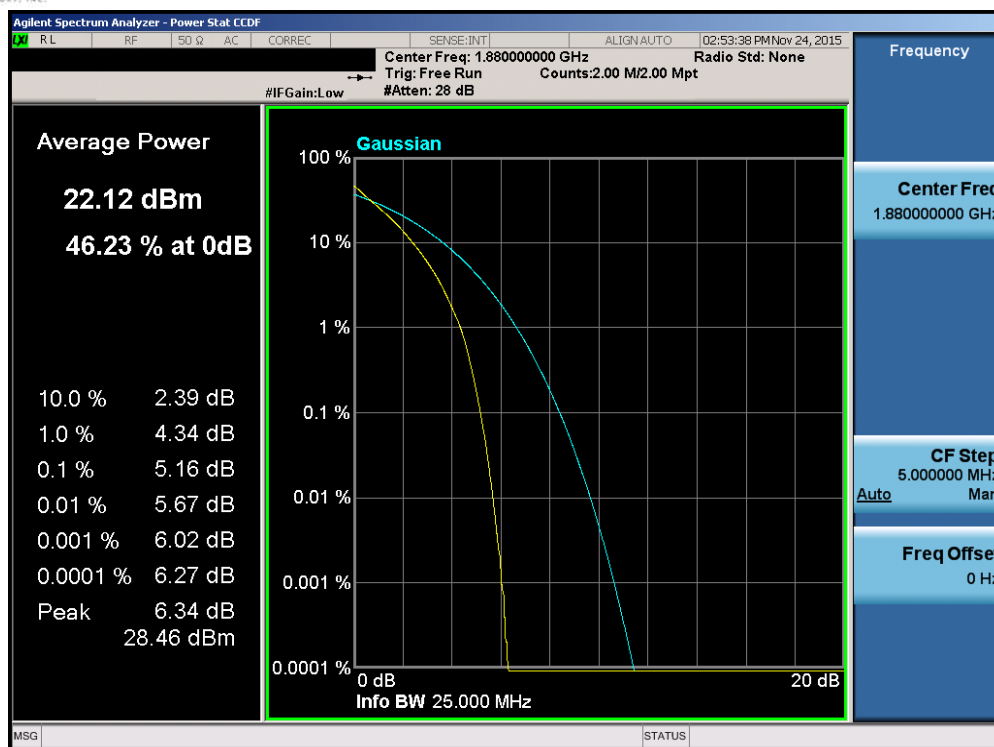


Plot 7-161. PAR Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

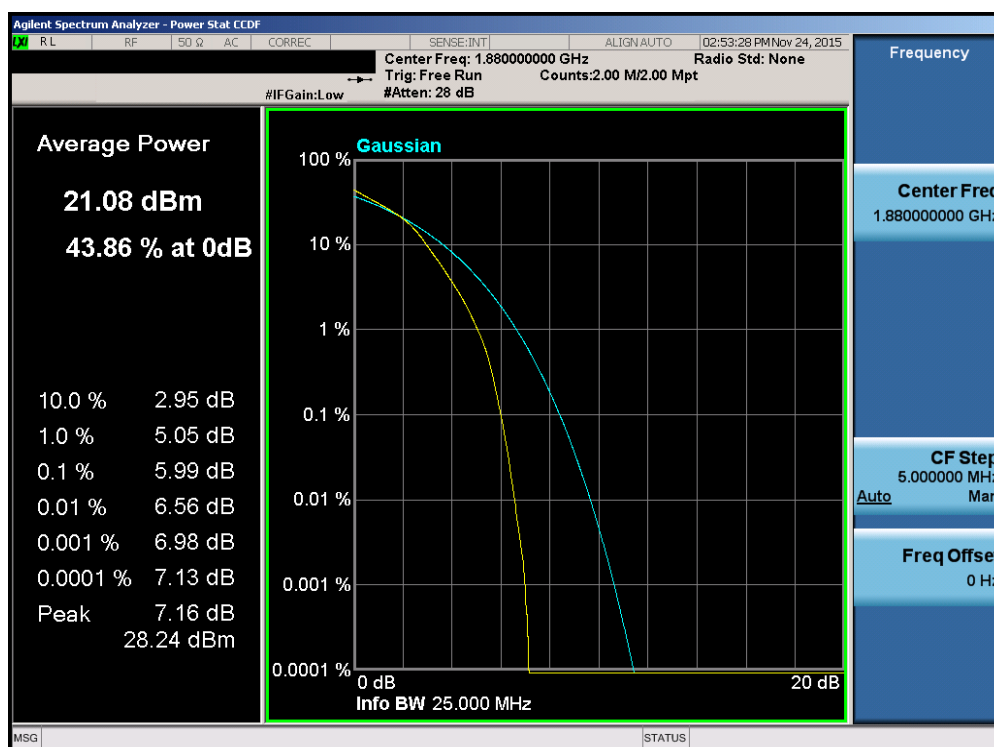


Plot 7-162. PAR Plot (Band 2 – 15.0MHz 16-QAM – RB Size 75)

FCC ID: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	<b>LG</b>	Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset		Page 97 of 122



Plot 7-163. PAR Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 7-164. PAR Plot (Band 2 – 20.0MHz 16-QAM – RB Size 100)

FCC ID: ZNFL43AL	<b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b>			Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset		Page 98 of 122

## 7.6 Radiated Power (ERP/EIRP)

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

### Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-C-2004 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.



### Test Procedures Used

KDB 971168 D01 v02r02 – Section 5.2.1

ANSI/TIA-603-C-2004 – Section 2.2.17

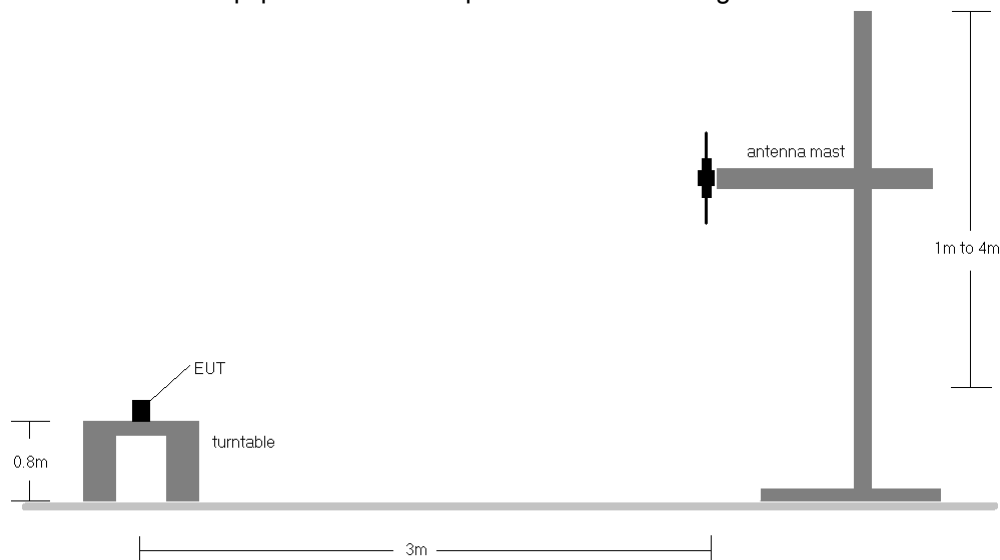
### Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW  $\geq 3 \times$  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

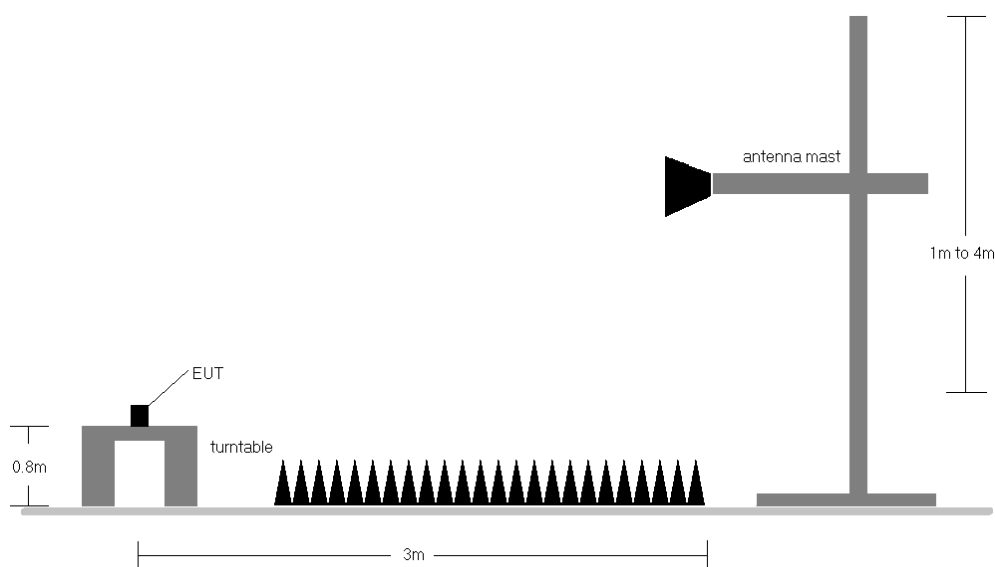
FCC ID: ZNFL43AL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset		Page 99 of 122

## 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: ZNFL43AL	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [m]	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	1	123	1 / 5	14.74	0.92	15.66	34.77	-19.11
707.50	1.4	QPSK	V	1	123	3 / 2	14.56	1.07	15.63	34.77	-19.14
715.30	1.4	QPSK	V	1	123	1 / 0	14.28	1.23	15.51	34.77	-19.27
699.70	1.4	16-QAM	V	1	123	1 / 5	13.98	0.92	14.90	34.77	-19.87
707.50	1.4	16-QAM	V	1	123	1 / 0	13.85	1.07	14.92	34.77	-19.85
715.30	1.4	16-QAM	V	1	123	1 / 0	13.60	1.23	14.83	34.77	-19.95
700.50	3	QPSK	V	1	18	1 / 0	14.98	0.92	15.90	34.77	-18.87
707.50	3	QPSK	V	1	18	1 / 0	14.74	1.07	15.81	34.77	-18.96
714.50	3	QPSK	V	1	18	1 / 0	14.44	1.21	15.65	34.77	-19.12
700.50	3	16-QAM	V	1	18	1 / 0	14.00	0.92	14.92	34.77	-19.85
707.50	3	16-QAM	V	1	18	1 / 0	13.69	1.07	14.76	34.77	-20.01
714.50	3	16-QAM	V	1	18	1 / 0	13.79	1.21	15.00	34.77	-19.77
701.50	5	QPSK	V	1	19	1 / 0	14.85	0.94	15.79	34.77	-18.98
707.50	5	QPSK	V	1	19	1 / 0	15.43	1.07	16.50	34.77	-18.27
713.50	5	QPSK	V	1	19	1 / 0	14.40	1.19	15.59	34.77	-19.18
701.50	5	16-QAM	V	1	19	1 / 24	13.92	0.94	14.86	34.77	-19.91
707.50	5	16-QAM	V	1	19	1 / 0	14.57	1.07	15.64	34.77	-19.13
713.50	5	16-QAM	V	1	19	1 / 0	13.44	1.19	14.63	34.77	-20.14
704.00	10	QPSK	V	1	19	1 / 49	15.39	1.00	16.39	34.77	-18.38
707.50	10	QPSK	V	1	19	1 / 0	14.62	1.07	15.69	34.77	-19.08
711.00	10	QPSK	V	1	19	1 / 0	15.63	1.14	16.77	34.77	-18.00
704.00	10	16-QAM	V	1	19	1 / 49	14.65	1.00	15.65	34.77	-19.12
707.50	10	16-QAM	V	1	19	1 / 0	14.10	1.07	15.17	34.77	-19.60
711.00	10	16-QAM	V	1	19	1 / 0	14.73	1.14	15.87	34.77	-18.90

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

FCC ID: ZNFL43AL	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b> 		Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset	Page 101 of 122

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [m]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
824.70	1.4	QPSK	V	1	246	1 / 0	12.98	2.98	15.96	38.45	-22.49
836.50	1.4	QPSK	V	1	246	1 / 0	12.05	3.04	15.09	38.45	-23.36
848.30	1.4	QPSK	V	1	246	1 / 0	12.44	3.10	15.54	38.45	-22.91
824.70	1.4	16-QAM	V	1	246	1 / 0	12.33	2.98	15.31	38.45	-23.14
836.50	1.4	16-QAM	V	1	246	1 / 0	10.29	3.04	13.33	38.45	-25.12
848.30	1.4	16-QAM	V	1	246	1 / 0	11.56	3.10	14.66	38.45	-23.79
825.50	3	QPSK	V	1	240	1 / 0	13.11	2.98	16.09	38.45	-22.36
836.50	3	QPSK	V	1	240	1 / 0	11.96	3.04	15.00	38.45	-23.45
847.50	3	QPSK	V	1	240	1 / 0	12.60	3.10	15.70	38.45	-22.75
825.50	3	16-QAM	V	1	240	1 / 0	12.39	2.98	15.37	38.45	-23.08
836.50	3	16-QAM	V	1	240	1 / 0	11.14	3.04	14.18	38.45	-24.27
847.50	3	16-QAM	V	1	240	1 / 0	11.74	3.10	14.84	38.45	-23.61
826.50	5	QPSK	V	1	290	1 / 0	12.77	2.99	15.76	38.45	-22.69
836.50	5	QPSK	V	1	290	1 / 24	12.14	3.04	15.18	38.45	-23.27
846.50	5	QPSK	V	1	290	1 / 0	12.59	3.09	15.68	38.45	-22.77
826.50	5	16-QAM	V	1	290	1 / 0	12.27	2.99	15.26	38.45	-23.19
836.50	5	16-QAM	V	1	290	1 / 24	11.36	3.04	14.40	38.45	-24.05
846.50	5	16-QAM	V	1	290	1 / 0	11.38	3.09	14.47	38.45	-23.98
829.00	10	QPSK	V	1	250	1 / 0	13.22	3.00	16.22	38.45	-22.23
836.50	10	QPSK	V	1	250	1 / 49	12.35	3.04	15.39	38.45	-23.06
844.00	10	QPSK	V	1	250	1 / 49	12.48	3.08	15.56	38.45	-22.89
829.00	10	16-QAM	V	1	250	1 / 0	12.19	3.00	15.19	38.45	-23.26
836.50	10	16-QAM	V	1	250	1 / 49	11.63	3.04	14.67	38.45	-23.78
844.00	10	16-QAM	V	1	250	1 / 0	11.89	3.08	14.97	38.45	-23.48



Table 7-3. ERP Data (Band 5)

FCC ID: ZNFL43AL	<div><b>PCTEST</b> ENGINEERING LABORATORY, INC.</div> <div>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</div> <div></div>			Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset		Page 102 of 122





Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [m]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	V	1	316	1 / 5	10.73	9.28	20.01	30.00	-9.99
1732.50	1.4	QPSK	V	1	316	1 / 0	11.03	9.00	20.03	30.00	-9.97
1754.30	1.4	QPSK	V	1	316	1 / 0	10.28	8.72	19.00	30.00	-11.00
1710.70	1.4	16-QAM	V	1	316	1 / 0	10.02	9.28	19.30	30.00	-10.70
1732.50	1.4	16-QAM	V	1	316	1 / 0	10.01	9.00	19.01	30.00	-10.99
1754.30	1.4	16-QAM	V	1	316	1 / 5	9.49	8.72	18.21	30.00	-11.79
1711.50	3	QPSK	V	1	300	1 / 14	10.99	9.27	20.26	30.00	-9.74
1732.50	3	QPSK	V	1	300	1 / 0	10.95	9.00	19.95	30.00	-10.05
1753.50	3	QPSK	V	1	300	1 / 0	10.50	8.73	19.23	30.00	-10.77
1711.50	3	16-QAM	V	1	300	1 / 14	10.13	9.27	19.40	30.00	-10.60
1732.50	3	16-QAM	V	1	300	1 / 0	10.16	9.00	19.16	30.00	-10.84
1753.50	3	16-QAM	V	1	300	1 / 0	9.78	8.73	18.51	30.00	-11.49
1712.50	5	QPSK	V	1	10	1 / 24	11.18	9.26	20.44	30.00	-9.56
1732.50	5	QPSK	V	1	10	1 / 0	11.23	9.00	20.23	30.00	-9.77
1752.50	5	QPSK	V	1	10	1 / 0	10.63	8.74	19.37	30.00	-10.63
1712.50	5	16-QAM	V	1	10	1 / 24	10.41	9.26	19.67	30.00	-10.33
1732.50	5	16-QAM	V	1	10	1 / 0	9.95	9.00	18.95	30.00	-11.05
1752.50	5	16-QAM	V	1	10	1 / 0	9.82	8.74	18.56	30.00	-11.44
1715.00	10	QPSK	V	1	0	1 / 49	11.67	9.22	20.90	30.00	-9.10
1732.50	10	QPSK	V	1	0	1 / 0	11.21	9.00	20.21	30.00	-9.79
1750.00	10	QPSK	V	1	0	1 / 0	10.88	8.77	19.65	30.00	-10.35
1715.00	10	16-QAM	V	1	0	1 / 49	10.95	9.22	20.17	30.00	-9.83
1732.50	10	16-QAM	V	1	0	1 / 0	10.47	9.00	19.47	30.00	-10.53
1750.00	10	16-QAM	V	1	0	1 / 0	10.18	8.77	18.95	30.00	-11.05
1717.50	15	QPSK	V	1	12	1 / 74	11.06	9.19	20.25	30.00	-9.75
1732.50	15	QPSK	V	1	12	1 / 0	11.32	9.00	20.32	30.00	-9.68
1747.50	15	QPSK	V	1	12	1 / 0	10.97	8.80	19.77	30.00	-10.23
1717.50	15	16-QAM	V	1	12	1 / 0	10.23	9.19	19.42	30.00	-10.58
1732.50	15	16-QAM	V	1	12	1 / 0	10.50	9.00	19.50	30.00	-10.50
1747.50	15	16-QAM	V	1	12	1 / 0	10.28	8.80	19.08	30.00	-10.92
1720.00	20	QPSK	V	1	11	1 / 99	11.10	9.16	20.26	30.00	-9.74
1732.50	20	QPSK	V	1	11	1 / 0	11.39	9.00	20.39	30.00	-9.61
1745.00	20	QPSK	V	1	11	1 / 0	10.87	8.83	19.70	30.00	-10.30
1720.00	20	16-QAM	V	1	11	1 / 99	10.37	9.16	19.53	30.00	-10.47
1732.50	20	16-QAM	V	1	11	1 / 0	10.39	9.00	19.39	30.00	-10.61
1745.00	20	16-QAM	V	1	11	1 / 0	9.93	8.83	18.76	30.00	-11.24

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

FCC ID: ZNLF43AL	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b> 			Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset		Page 103 of 122

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [m]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1850.70	1.4	QPSK	V	1	0	1 / 5	12.30	8.34	20.64	33.01	-12.37
1880.00	1.4	QPSK	V	1	0	3 / 2	13.47	8.46	21.93	33.01	-11.08
1909.30	1.4	QPSK	V	1	0	1 / 5	11.85	8.64	20.49	33.01	-12.52
1850.70	1.4	16-QAM	V	1	0	1 / 5	11.56	8.34	19.90	33.01	-13.11
1880.00	1.4	16-QAM	V	1	0	1 / 5	12.52	8.46	20.98	33.01	-12.03
1909.30	1.4	16-QAM	V	1	0	1 / 0	10.79	8.64	19.43	33.01	-13.58
1851.50	3	QPSK	V	1	10	1 / 0	12.01	8.35	20.36	33.01	-12.65
1880.00	3	QPSK	V	1	10	1 / 14	13.34	8.46	21.80	33.01	-11.21
1908.50	3	QPSK	V	1	10	1 / 14	11.82	8.63	20.45	33.01	-12.56
1851.50	3	16-QAM	V	1	10	1 / 14	10.92	8.35	19.27	33.01	-13.74
1880.00	3	16-QAM	V	1	10	1 / 14	12.47	8.46	20.93	33.01	-12.08
1908.50	3	16-QAM	V	1	10	1 / 14	11.03	8.63	19.66	33.01	-13.35
1852.50	5	QPSK	V	1	360	1 / 24	13.60	8.35	21.95	33.01	-11.06
1880.00	5	QPSK	V	1	360	1 / 24	14.39	8.46	22.85	33.01	-10.16
1907.50	5	QPSK	V	1	360	1 / 0	11.68	8.62	20.30	33.01	-12.71
1852.50	5	16-QAM	V	1	360	1 / 24	12.83	8.35	21.18	33.01	-11.83
1880.00	5	16-QAM	V	1	360	1 / 24	13.40	8.46	21.86	33.01	-11.15
1907.50	5	16-QAM	V	1	360	1 / 24	10.84	8.62	19.46	33.01	-13.55
1855.00	10	QPSK	V	1	360	1 / 49	11.51	8.36	19.87	33.01	-13.14
1880.00	10	QPSK	V	1	360	1 / 49	13.26	8.46	21.72	33.01	-11.29
1905.00	10	QPSK	V	1	360	1 / 0	11.96	8.59	20.55	33.01	-12.46
1855.00	10	16-QAM	V	1	360	1 / 0	10.84	8.36	19.20	33.01	-13.81
1880.00	10	16-QAM	V	1	360	1 / 49	12.24	8.46	20.70	33.01	-12.31
1905.00	10	16-QAM	V	1	360	1 / 0	11.15	8.59	19.74	33.01	-13.27
1857.50	15	QPSK	V	1	10	1 / 74	11.59	8.37	19.96	33.01	-13.05
1880.00	15	QPSK	V	1	10	1 / 74	13.17	8.46	21.63	33.01	-11.38
1902.50	15	QPSK	V	1	10	1 / 0	12.60	8.56	21.16	33.01	-11.85
1857.50	15	16-QAM	V	1	10	1 / 74	10.73	8.37	19.10	33.01	-13.91
1880.00	15	16-QAM	V	1	10	1 / 74	12.14	8.46	20.60	33.01	-12.41
1902.50	15	16-QAM	V	1	10	1 / 0	11.92	8.56	20.48	33.01	-12.53
1860.00	20	QPSK	V	1	0	1 / 0	11.62	8.38	20.00	33.01	-13.01
1880.00	20	QPSK	V	1	0	1 / 99	13.03	8.46	21.49	33.01	-11.52
1900.00	20	QPSK	V	1	0	1 / 0	12.94	8.53	21.47	33.01	-11.54
1860.00	20	16-QAM	V	1	0	1 / 0	10.84	8.38	19.22	33.01	-13.79
1880.00	20	16-QAM	V	1	0	1 / 99	12.12	8.46	20.58	33.01	-12.43
1900.00	20	16-QAM	V	1	0	1 / 0	12.01	8.53	20.54	33.01	-12.47

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

FCC ID: ZNFL43AL	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b> 			Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset		Page 104 of 122

## 7.7 Radiated Spurious Emissions Measurements

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

### Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-C-2004 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as peak measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.



### Test Procedures Used

KDB 971168 D01 v02r02 – Section 5.8

ANSI/TIA-603-C-2004 – Section 2.2.12

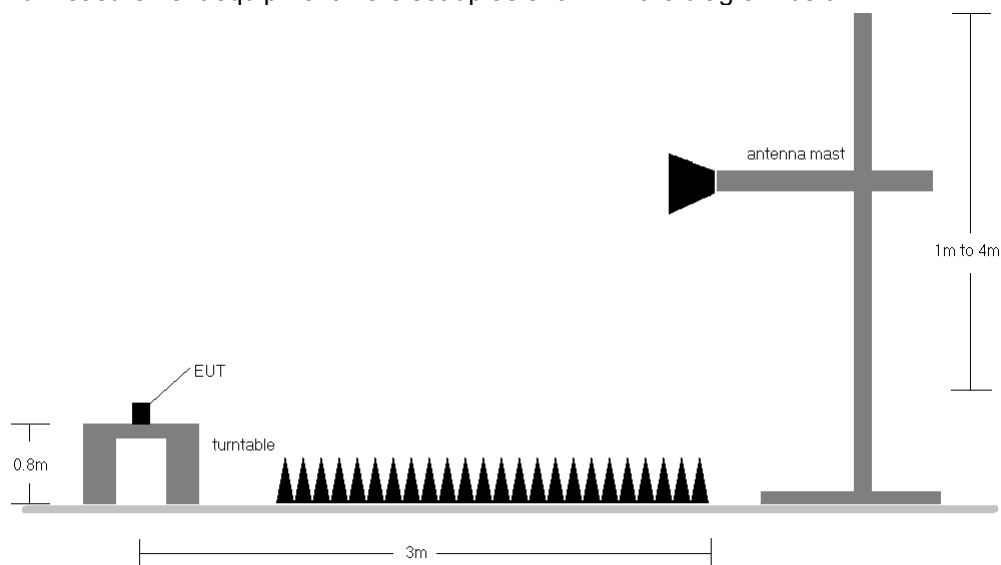
### Test Settings

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

FCC ID: ZNFL43AL	 <b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	 <b>LG</b>	Reviewed by: Quality Manager
Test Report S/N: 0Y1511191990-R3.ZNF	Test Dates: 11/25-12/11/2015	EUT Type: Portable Handset	Page 105 of 122	

## Test Setup



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



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

## Test Notes

- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested with its standard battery.
- 3) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 4) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

FCC ID: ZNFL43AL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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OPERATING FREQUENCY: 704.00 MHz  
 CHANNEL: 23060  
 MEASURED OUTPUT POWER: 16.39 dBm = 0.044 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  29.39 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [m]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1408.00	V	1	360	-57.64	2.50	-55.14	71.5
2112.00	V	1	0	-57.34	2.98	-54.36	70.7

**Table 7-6. Radiated Spurious Data (Band 12/17 – Low Channel)**

OPERATING FREQUENCY: 707.50 MHz  
 CHANNEL: 23095  
 MEASURED OUTPUT POWER: 15.69 dBm = 0.037 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  28.69 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [m]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1415.00	V	1	360	-59.25	2.57	-56.68	72.4
2122.50	V	1	0	-56.07	3.02	-53.05	68.7

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

OPERATING FREQUENCY: 711.00 MHz  
 CHANNEL: 23130  
 MEASURED OUTPUT POWER: 16.77 dBm = 0.048 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  29.77 dBc



Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [m]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1422.00	V	1	0	-60.41	2.65	-57.76	74.5
2133.00	V	1	0	-57.24	3.05	-54.19	71.0

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

OPERATING FREQUENCY: 829.00 MHz  
 CHANNEL: 20450  
 MEASURED OUTPUT POWER: 16.22 dBm = 0.042 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  29.22 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [m]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1658.00	H	1	360	-56.67	3.58	-53.09	69.3
2487.00	H	1	36	-47.87	3.56	-44.31	60.5

**Table 7-9. Radiated Spurious Data (Band 5 – Low Channel)**

FCC ID: ZNFL43AL	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b> 			Reviewed by: Quality Manager
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OPERATING FREQUENCY: 836.50 MHz  
 CHANNEL: 20525  
 MEASURED OUTPUT POWER: 15.39 dBm = 0.035 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  28.39 dBc



Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [m]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1673.00	H	1	330	-58.75	3.53	-55.22	70.6
2509.50	H	3	344	-46.17	3.57	-42.60	58.0

**Table 7-10. Radiated Spurious Data (Band 5 – Mid Channel)**

OPERATING FREQUENCY: 844.00 MHz  
 CHANNEL: 20600  
 MEASURED OUTPUT POWER: 15.56 dBm = 0.036 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  28.56 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [m]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1688.00	H	1	2	-57.28	3.47	-53.81	69.4
2532.00	H	2	360	-45.81	3.62	-42.20	57.8

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

FCC ID: ZNFL43AL	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b> 			Reviewed by: Quality Manager
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OPERATING FREQUENCY: 1715.00 MHz  
 CHANNEL: 20000  
 MEASURED OUTPUT POWER: 20.90 dBm = 0.123 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  33.90 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [m]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3430.00	H	1	12	-54.16	8.17	-45.99	66.9
5145.00	H	1	0	-48.15	10.28	-37.87	58.8
6860.00	H	1	4	-38.59	11.40	-27.19	48.1
8575.00	H	1	35	-40.14	13.02	-27.12	48.0

Table 7-12. Radiated Spurious Data (Band 4 – Low Channel)

OPERATING FREQUENCY: 1732.50 MHz  
 CHANNEL: 20175  
 MEASURED OUTPUT POWER: 20.21 dBm = 0.105 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  33.21 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [m]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3465.00	H	1	0	-53.85	8.29	-45.57	65.8
5197.50	H	1	126	-48.81	10.35	-38.46	58.7
6930.00	H	1	282	-38.26	11.49	-26.78	47.0
8662.50	H	1	30	-40.74	13.02	-27.72	47.9

Table 7-13. Radiated Spurious Data (Band 4 – Mid Channel)

OPERATING FREQUENCY: 1750.00 MHz  
 CHANNEL: 20350  
 MEASURED OUTPUT POWER: 19.65 dBm = 0.092 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  32.65 dBc



Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [m]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3500.00	H	1	0	-54.24	8.40	-45.84	65.5
5250.00	H	1	0	-49.95	10.36	-39.60	59.2
7000.00	H	1	35	-37.36	11.55	-25.81	45.5
8750.00	H	1	24	-42.78	13.02	-29.76	49.4

**Table 7-14. Radiated Spurious Data (Band 4 – High Channel)**

OPERATING FREQUENCY: 1852.50 MHz  
 CHANNEL: 18625  
 MEASURED OUTPUT POWER: 21.95 dBm = 0.157 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  34.95 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [m]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3705.00	H	1	350	-49.51	8.40	-41.12	63.1
5557.50	H	1	316	-44.55	10.57	-33.98	55.9
7410.00	H	1	123	-35.80	12.06	-23.74	45.7

**Table 7-15. Radiated Spurious Data (Band 2 – Low Channel)**

FCC ID: ZNFL43AL	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b> 		Reviewed by: Quality Manager
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OPERATING FREQUENCY: 1880.00 MHz  
 CHANNEL: 18900  
 MEASURED OUTPUT POWER: 22.85 dBm = 0.193 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  35.85 dBc



Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [m]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3760.00	H	1	47	-49.53	8.38	-41.14	64.0
5640.00	H	1	211	-44.24	10.70	-33.54	56.4
7520.00	H	1	277	-41.95	12.10	-29.84	52.7

Table 7-16. Radiated Spurious Data (Band 2 – Mid Channel)

OPERATING FREQUENCY: 1907.50 MHz  
 CHANNEL: 19175  
 MEASURED OUTPUT POWER: 20.30 dBm = 0.107 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  33.30 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [m]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3815.00	H	1	349	-48.73	8.40	-40.34	60.6
5722.50	H	1	14	-43.18	10.76	-32.42	52.7
7630.00	H	1	340	-36.38	12.21	-24.17	44.5

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

FCC ID: ZNFL43AL	 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-C-2004. The frequency stability of the transmitter is measured by:

- a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.
- b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

***For Part 22, the frequency stability of the transmitter shall be maintained within  $\pm 0.00025\%$  ( $\pm 2.5$  ppm) of the center frequency. For Part 24 and Part 27, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.***

### Test Procedure Used

ANSI/TIA-603-C-2004

### Test Settings



1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

### Test Setup

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

### Test Notes

None

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## Band 12/17 Frequency Stability Measurements

§2.1055 §27.54

OPERATING FREQUENCY: 707,500,000 Hz

CHANNEL: 23790



REFERENCE VOLTAGE: 3.80 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	707,500,035	35	0.0000049
100 %		- 30	707,500,069	69	0.0000098
100 %		- 20	707,500,096	96	0.0000136
100 %		- 10	707,499,935	-65	-0.0000092
100 %		0	707,499,877	-123	-0.0000174
100 %		+ 10	707,499,886	-114	-0.0000161
100 %		+ 20	707,499,909	-91	-0.0000129
100 %		+ 30	707,500,037	37	0.0000052
100 %		+ 40	707,499,930	-70	-0.0000099
100 %		+ 50	707,499,897	-103	-0.0000146
BATT. ENDPOINT	3.40	+ 20	707,499,981	-19	-0.0000027

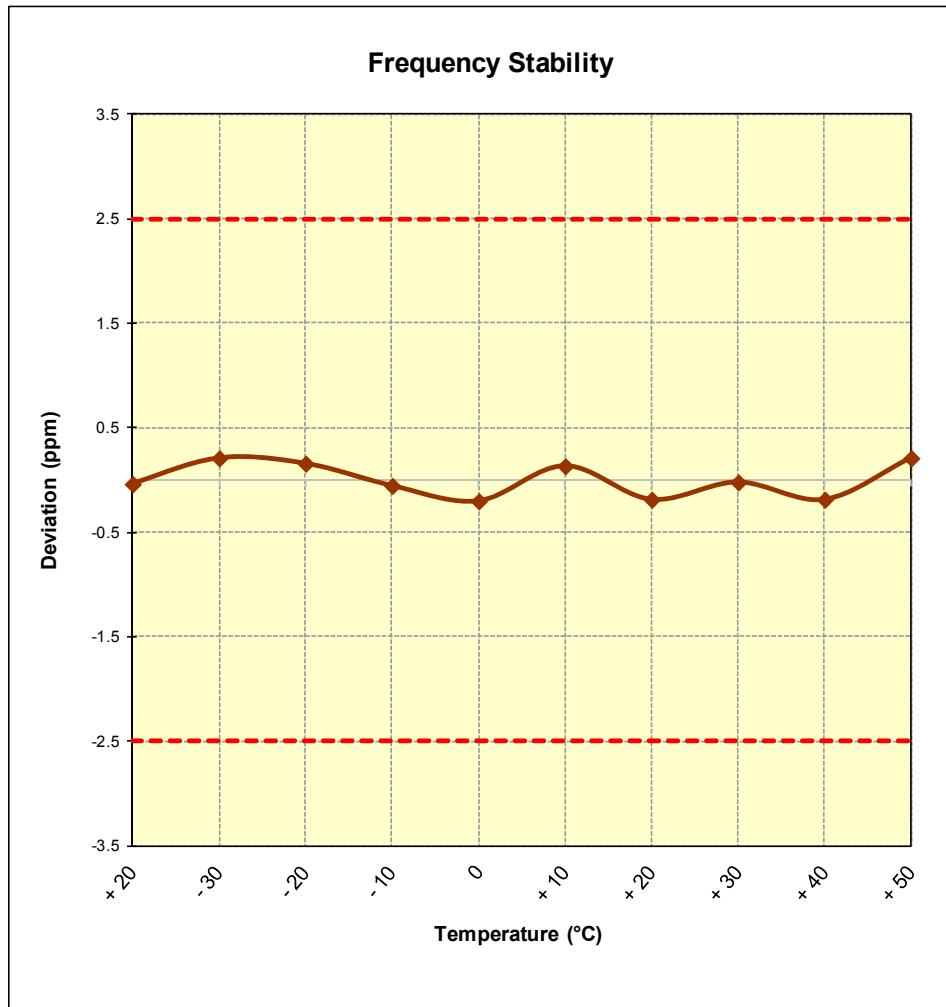
**Table 7-18. Frequency Stability Data (Band 12/17)**

**Note:**



Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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



**Figure 7-8. Frequency Stability Graph (Band 1217)**

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## Band 5 Frequency Stability Measurements

§2.1055 §22.355

OPERATING FREQUENCY: 836,500,000 Hz



CHANNEL: 20525

REFERENCE VOLTAGE: 3.80 VDC

DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	836,500,086	86	0.0000103
100 %		- 30	836,500,004	4	0.0000005
100 %		- 20	836,500,021	21	0.0000025
100 %		- 10	836,499,973	-27	-0.0000032
100 %		0	836,499,901	-99	-0.0000118
100 %		+ 10	836,499,960	-40	-0.0000048
100 %		+ 20	836,500,117	117	0.0000140
100 %		+ 30	836,499,986	-14	-0.0000017
100 %		+ 40	836,499,892	-108	-0.0000129
100 %		+ 50	836,500,042	42	0.0000050
BATT. ENDPOINT	3.40	+ 20	836,499,981	-19	-0.0000023

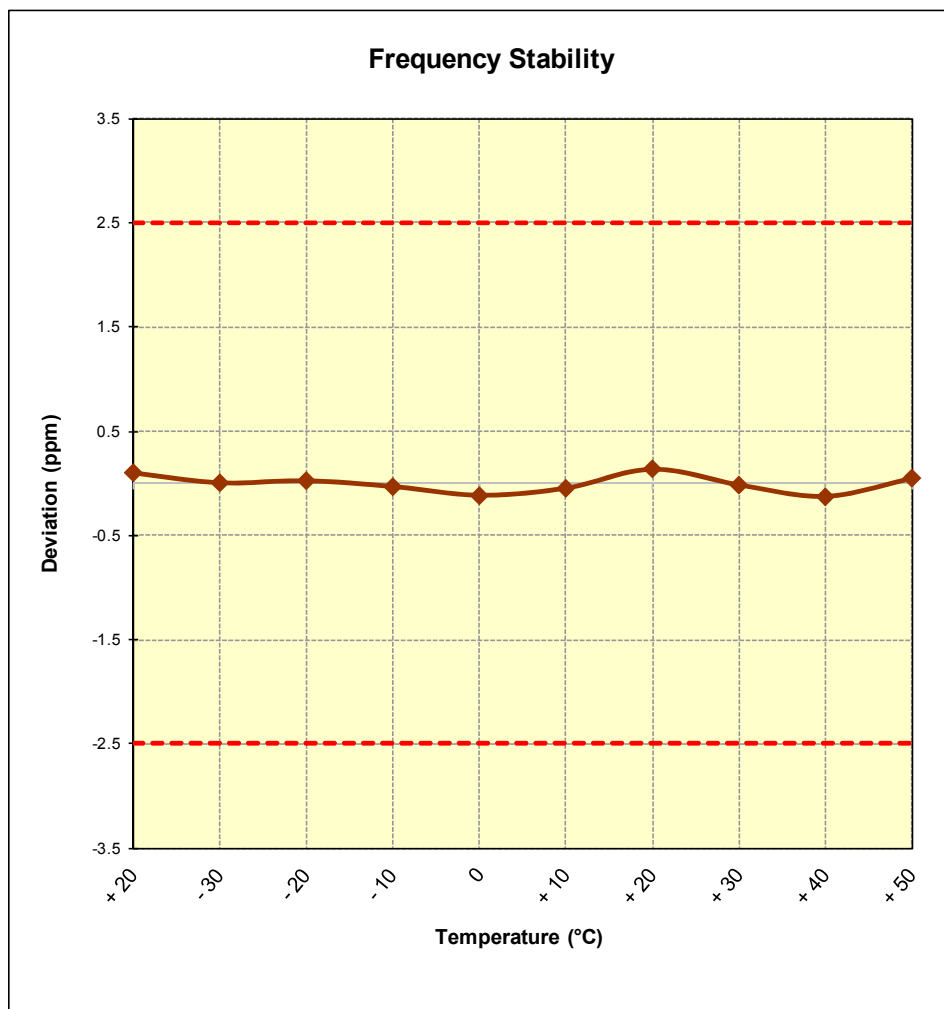
**Table 7-19. Frequency Stability Data (Band 5)**

FCC ID: ZNFL43AL	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b>			Reviewed by: Quality Manager
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## Band 5 Frequency Stability Measurements

§2.1055 §22.355



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

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## Band 4 Frequency Stability Measurements

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

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	1,732,500,001	1	0.0000001
100 %		- 30	1,732,500,114	114	0.0000066
100 %		- 20	1,732,499,970	-30	-0.0000017
100 %		- 10	1,732,500,044	44	0.0000025
100 %		0	1,732,499,969	-31	-0.0000018
100 %		+ 10	1,732,499,873	-127	-0.0000073
100 %		+ 20	1,732,499,934	-66	-0.0000038
100 %		+ 30	1,732,500,039	39	0.0000023
100 %		+ 40	1,732,499,903	-97	-0.0000056
100 %		+ 50	1,732,499,918	-82	-0.0000047
BATT. ENDPOINT	3.40	+ 20	1,732,500,084	84	0.0000048

Table 7-20. Frequency Stability Data (Band 4)

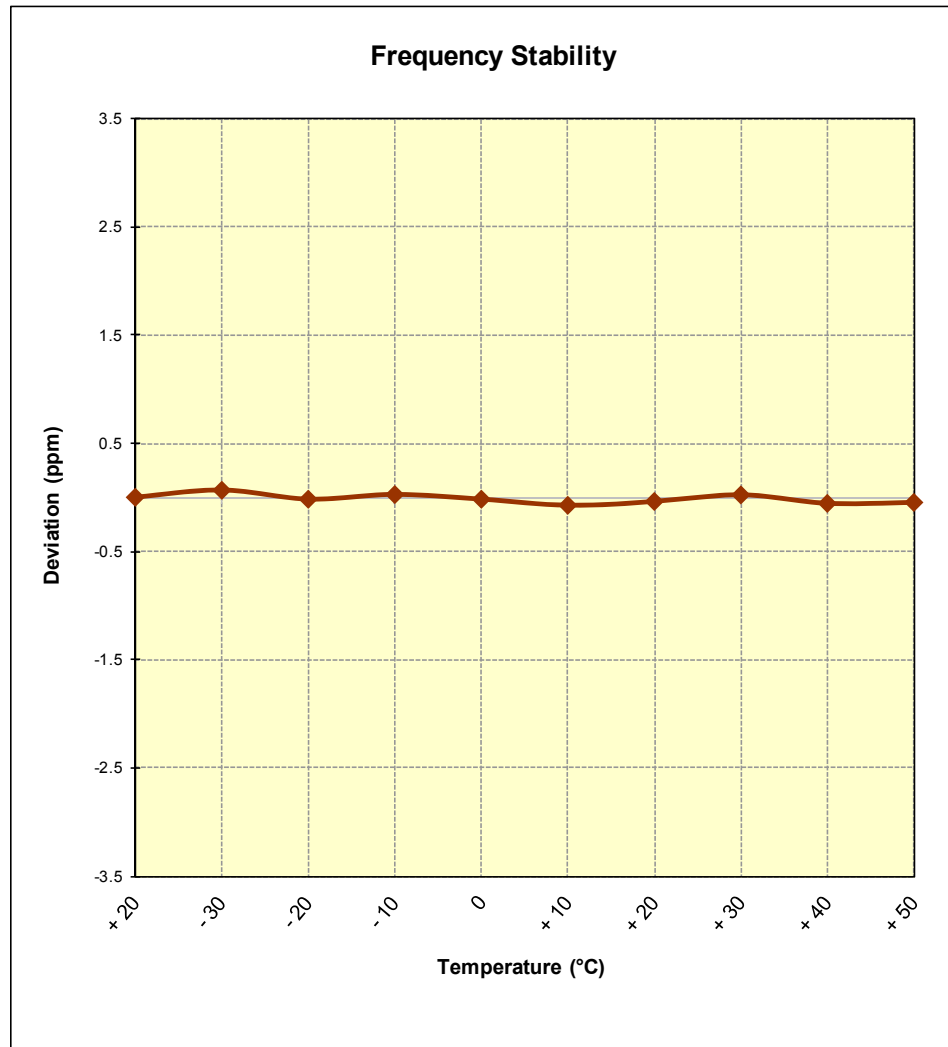
### Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.



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## Band 4 Frequency Stability Measurements

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

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## Band 2 Frequency Stability Measurements

§2.1055 §24.235

OPERATING FREQUENCY: 1,880,000,000 Hz

CHANNEL: 18900



REFERENCE VOLTAGE: 3.80 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	1,880,000,060	60	0.0000032
100 %		- 30	1,880,000,107	107	0.0000057
100 %		- 20	1,879,999,924	-76	-0.0000040
100 %		- 10	1,880,000,127	127	0.0000068
100 %		0	1,880,000,064	64	0.0000034
100 %		+ 10	1,879,999,970	-30	-0.0000016
100 %		+ 20	1,880,000,090	90	0.0000048
100 %		+ 30	1,880,000,114	114	0.0000061
100 %		+ 40	1,879,999,995	-5	-0.0000003
100 %		+ 50	1,880,000,014	14	0.0000007
BATT. ENDPOINT	3.40	+ 20	1,879,999,916	-84	-0.0000045

**Table 7-21. Frequency Stability Data (Band 2)**

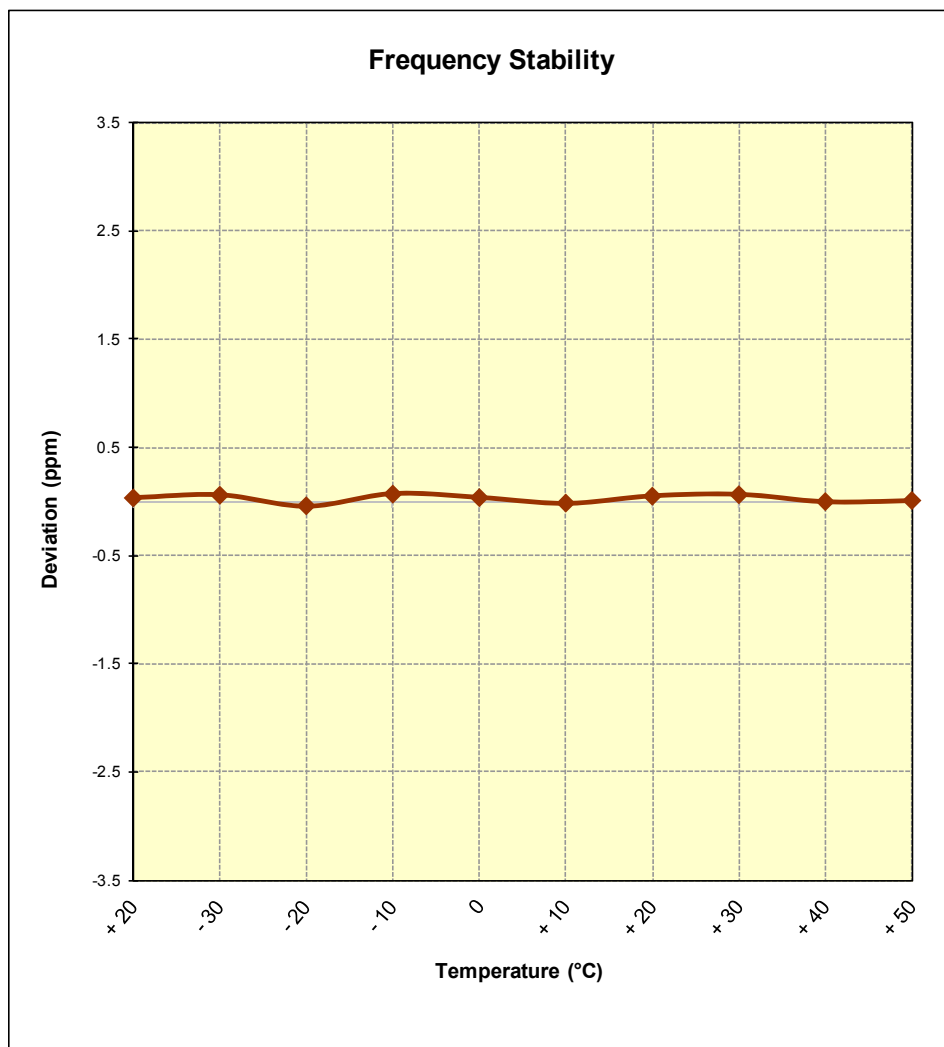
### Note:

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: ZNFL43AL	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b>			Reviewed by: Quality Manager
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## Band 2 Frequency Stability Measurements

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

FCC ID: ZNFL43AL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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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: ZNFL43AL** complies with all the requirements of Parts 22, 24, & 27 of the FCC rules for LTE operation only.

<b>FCC ID:</b> ZNFL43AL		<b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1511191990-R3.ZNF	<b>Test Dates:</b> 11/25-12/11/2015	<b>EUT Type:</b> Portable Handset	Page 122 of 122	