

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 $43 + \log_{10}(P_{[Watts]})$, 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.

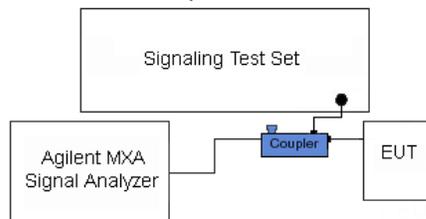


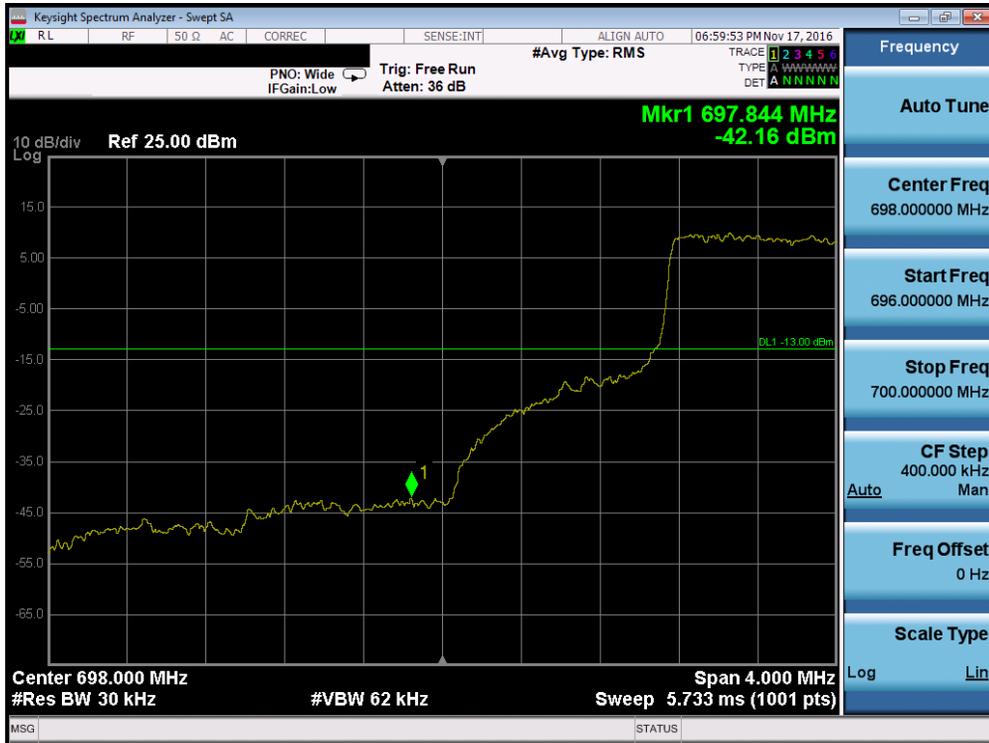
Figure 7-3. Test Instrument & Measurement Setup

Test Notes

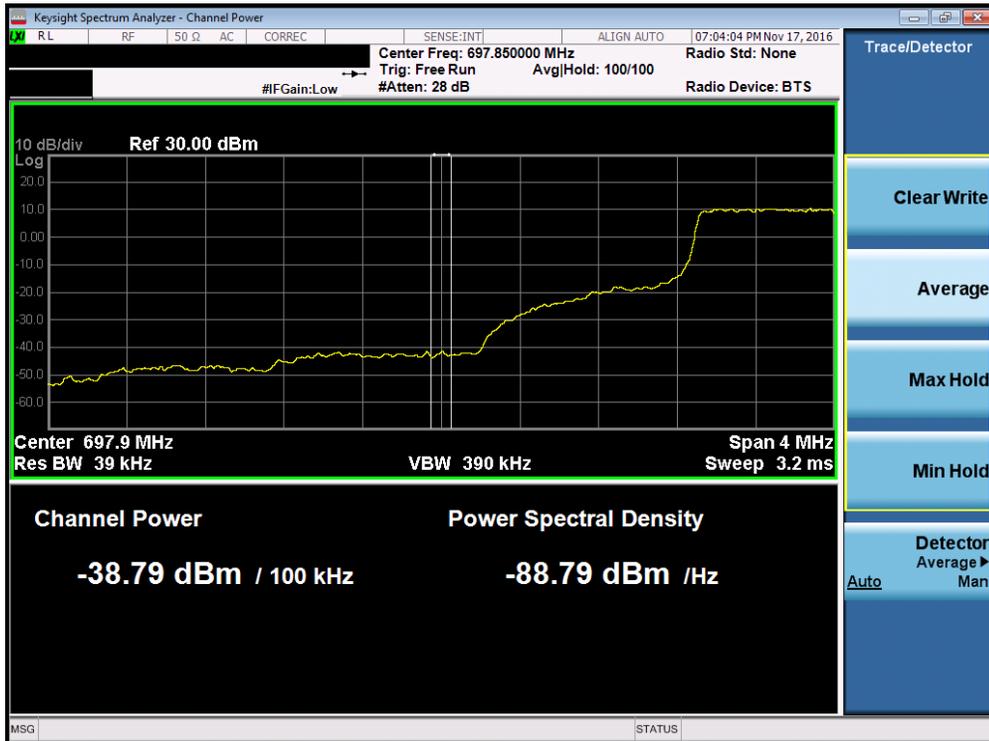
Per 22.917(b) 24.238(a) 27.53(h) in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions 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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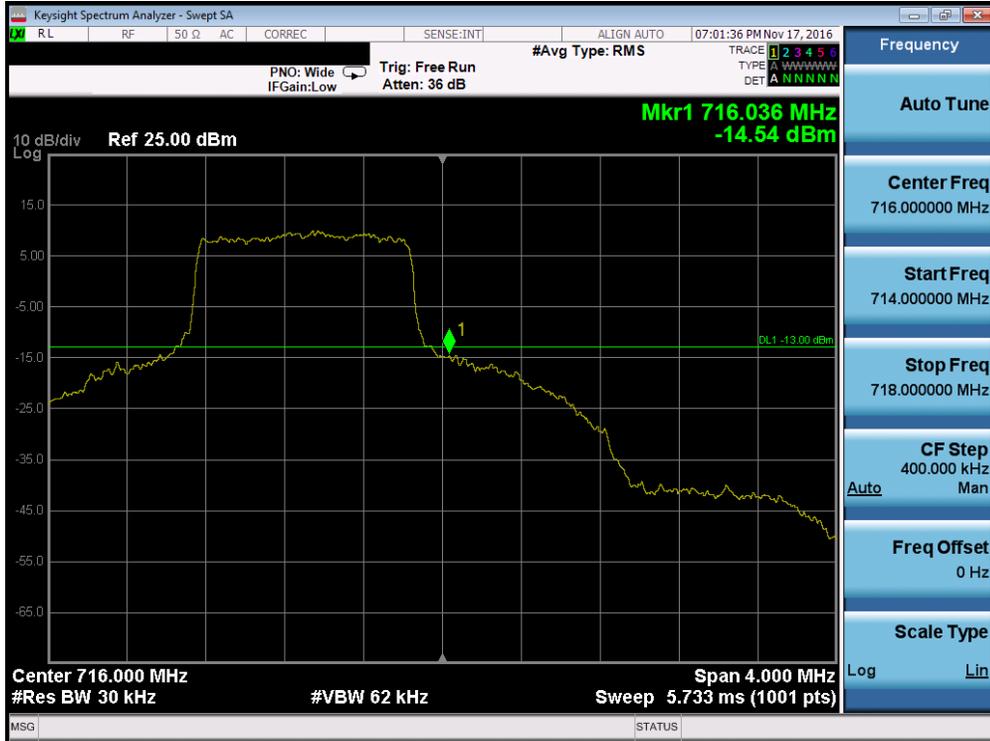


Plot 7-77. Lower Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

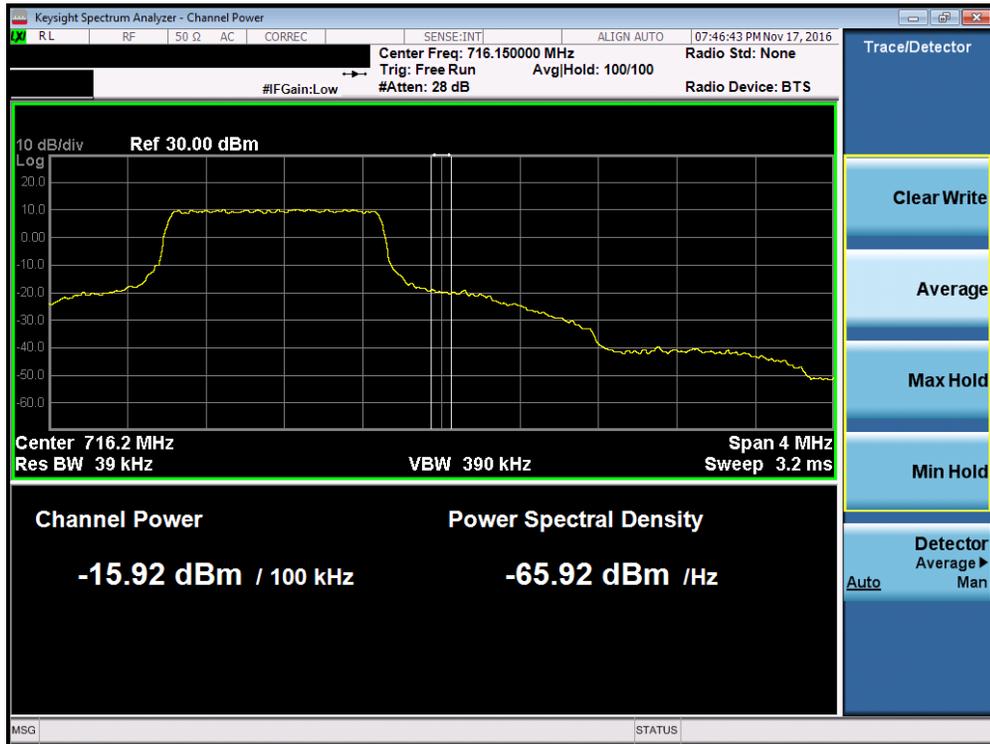


Plot 7-78. Lower Extended Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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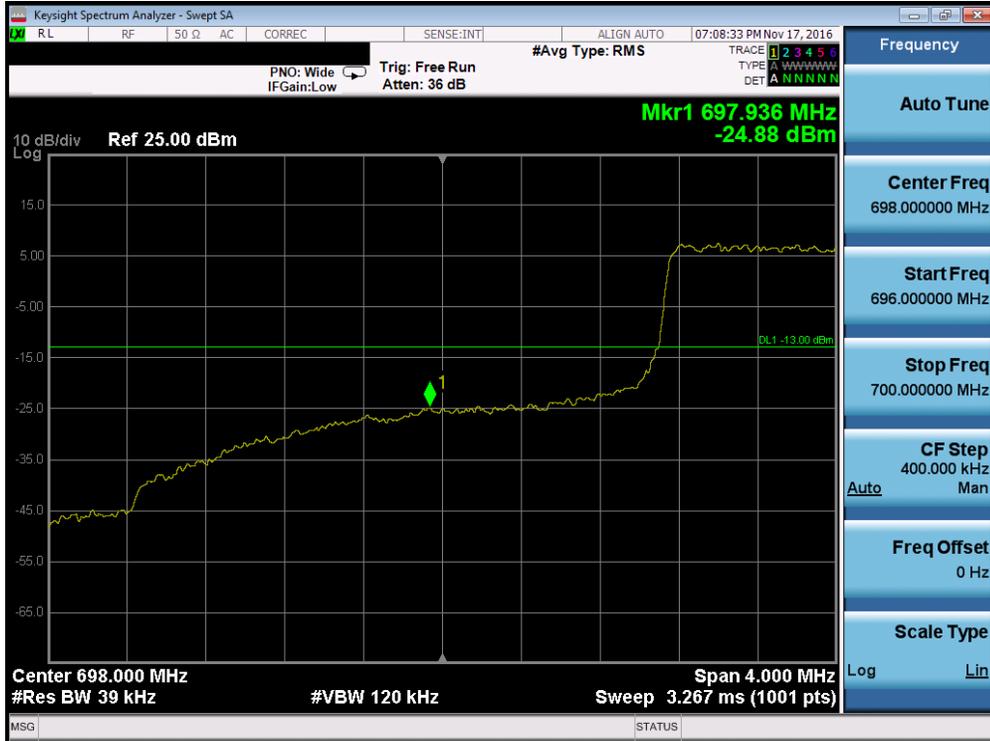


Plot 7-79. Lower Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

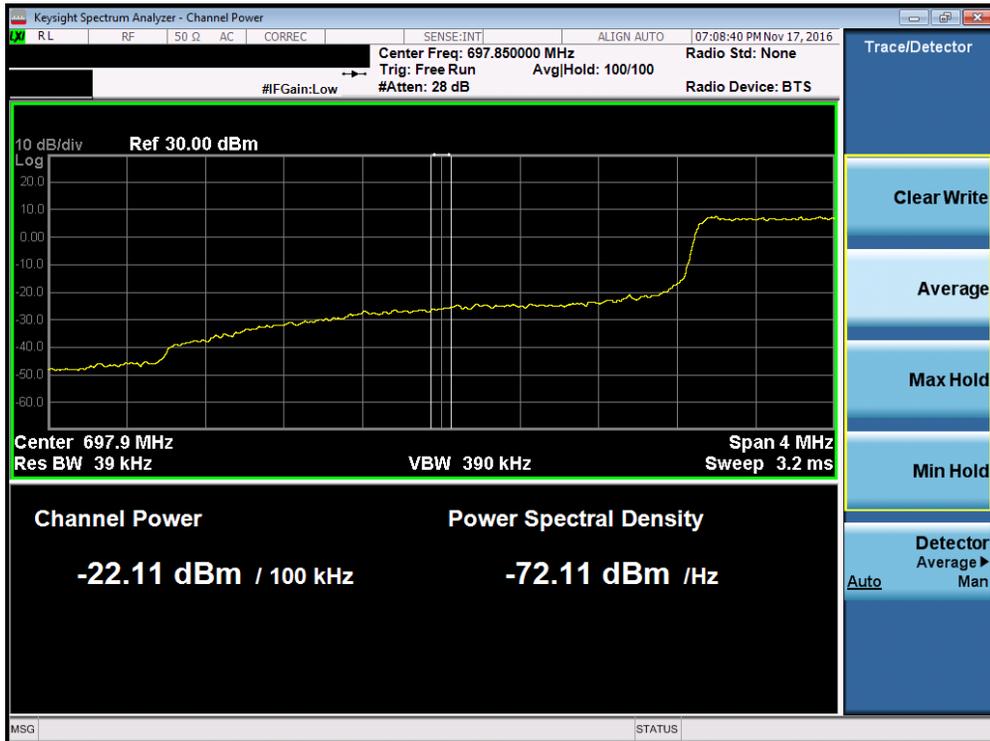


Plot 7-80. Upper Extended Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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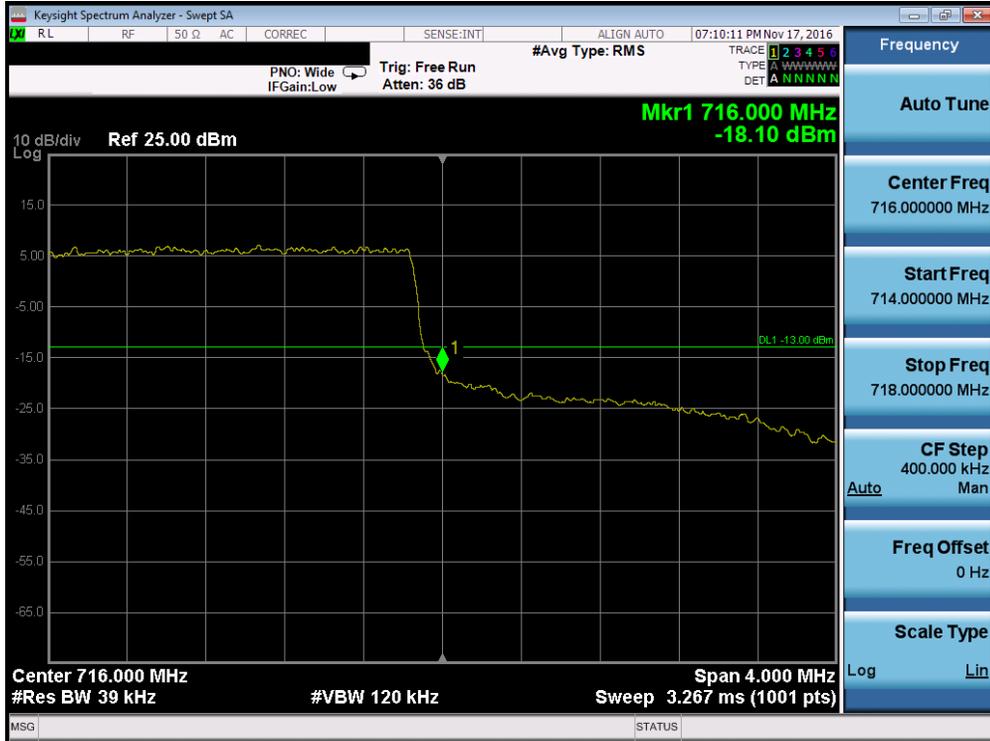


Plot 7-81. Lower Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

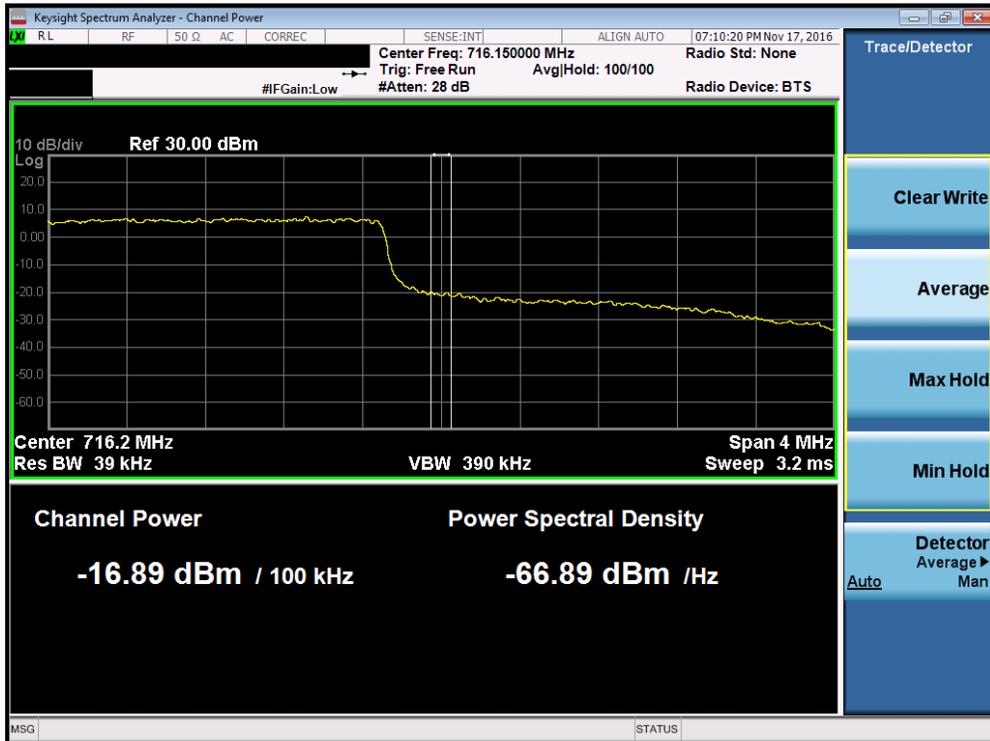


Plot 7-82. Lower Extended Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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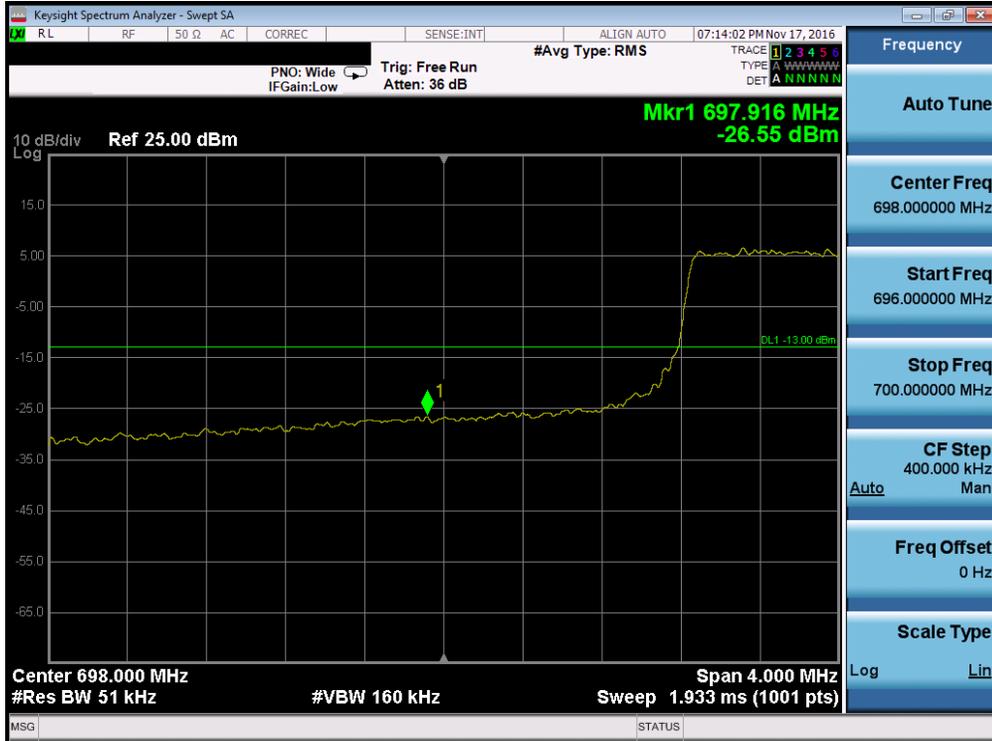


Plot 7-83. Lower Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

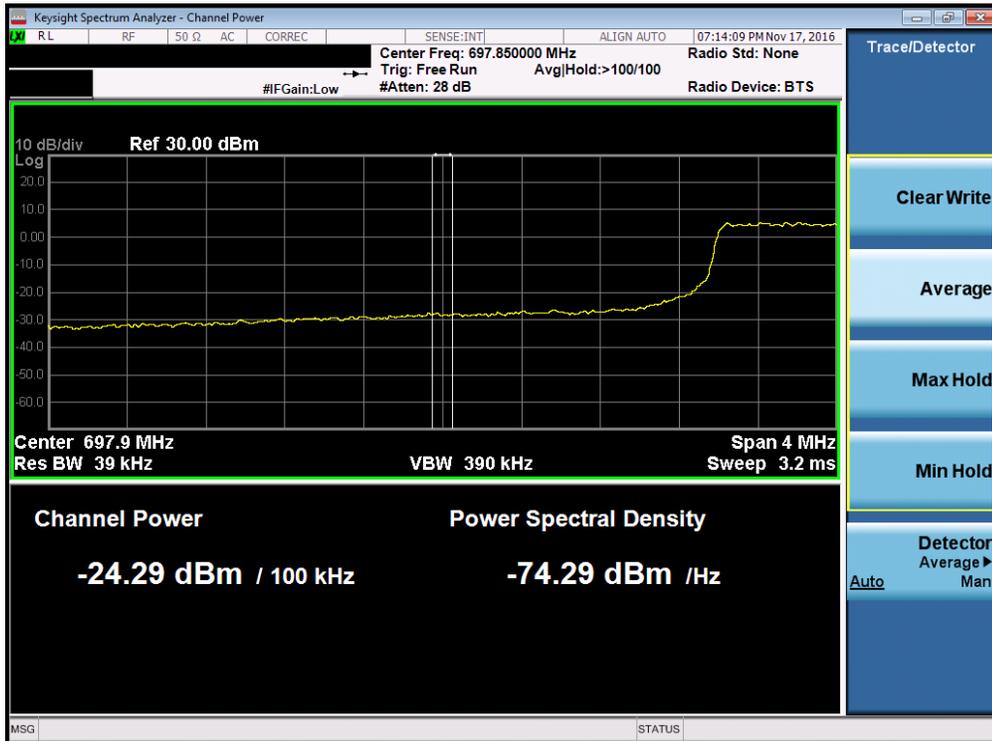


Plot 7-84. Upper Extended Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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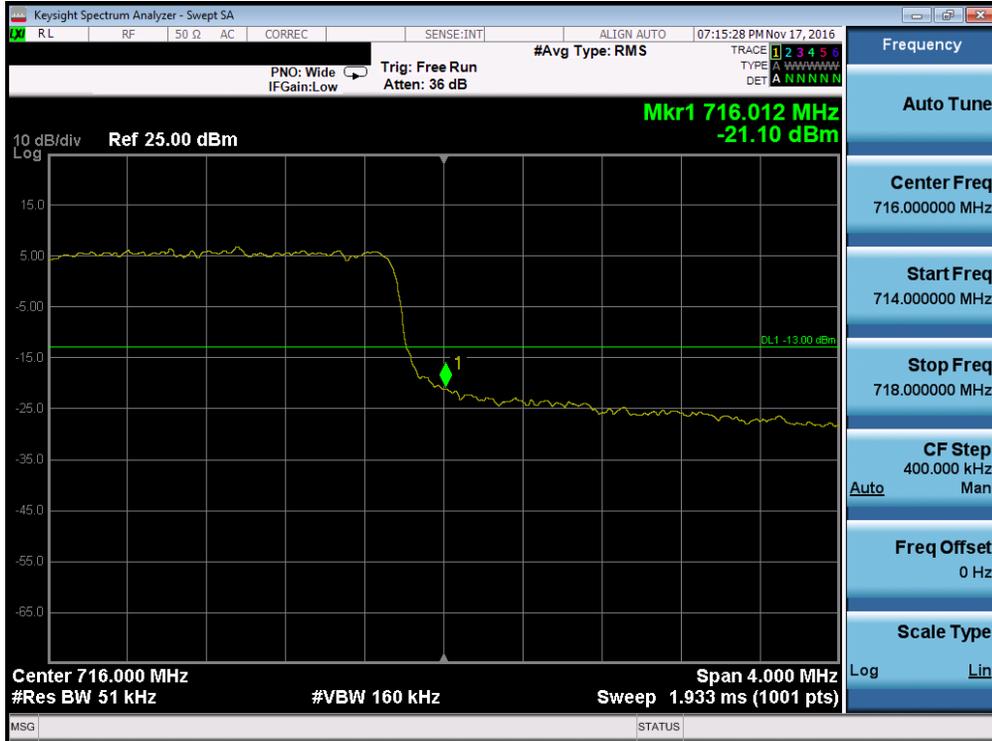


Plot 7-85. Lower Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)

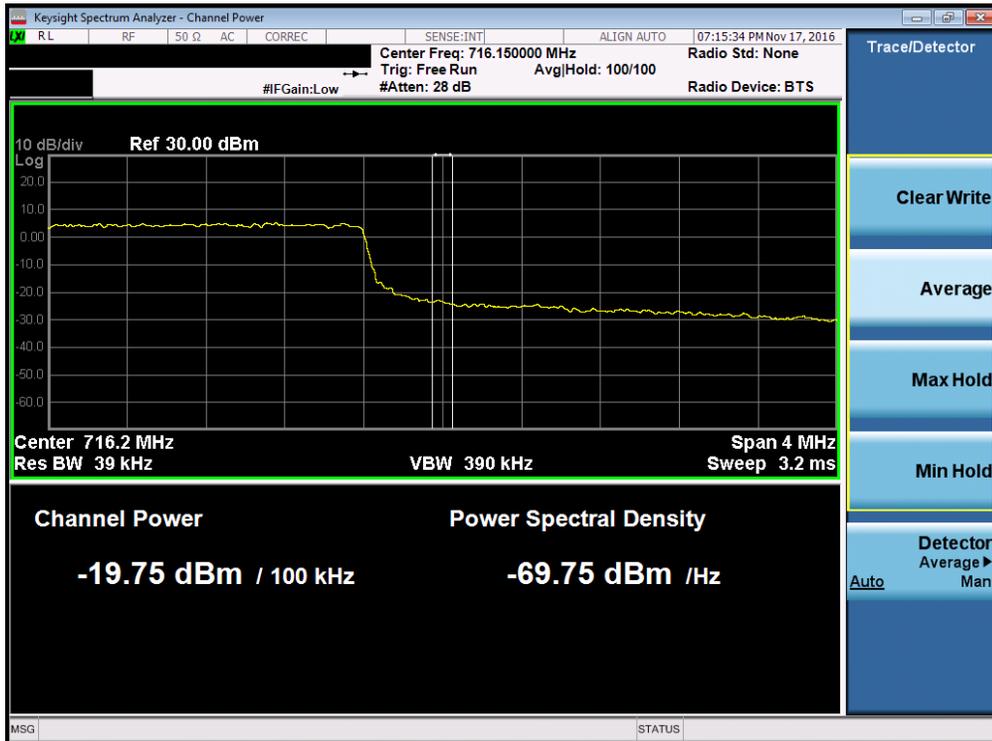


Plot 7-86. Lower Extended Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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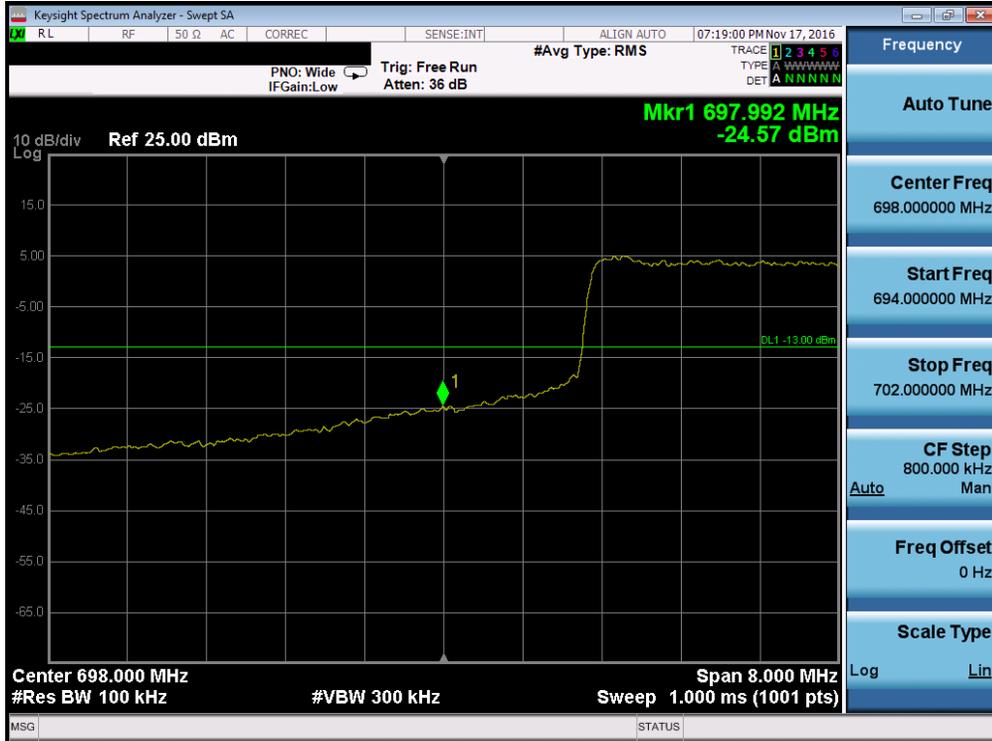


Plot 7-87. Upper Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)



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

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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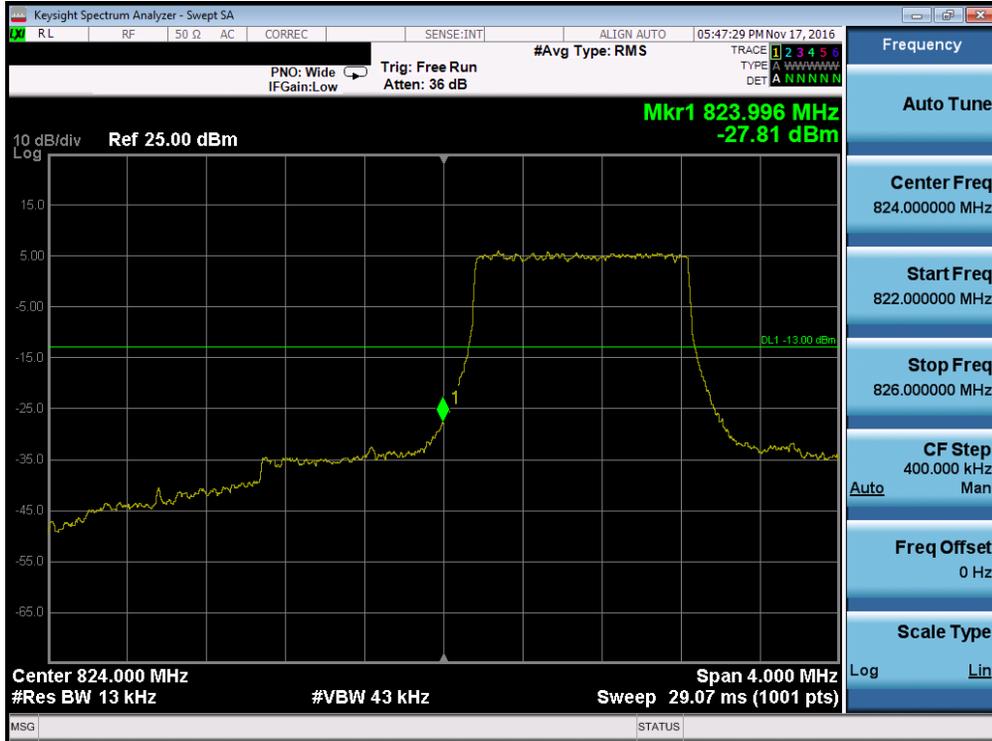


Plot 7-89. Lower Band Edge Plot (Band 12 – 10.0MHz QPSK – RB Size 50)



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

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	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: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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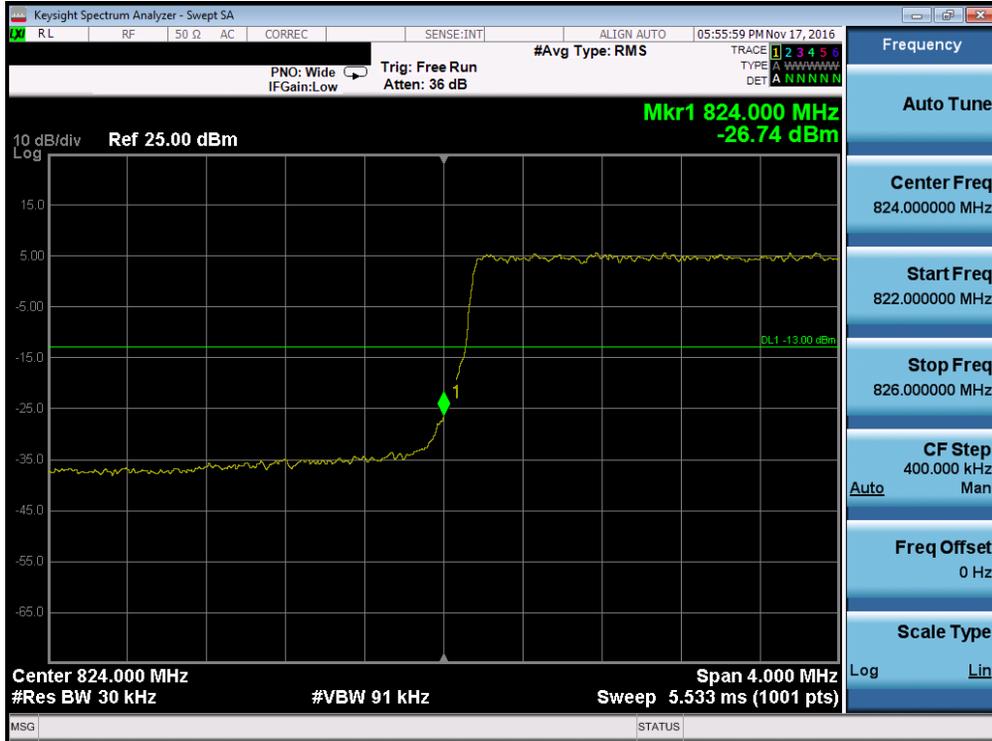


Plot 7-93. Upper Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

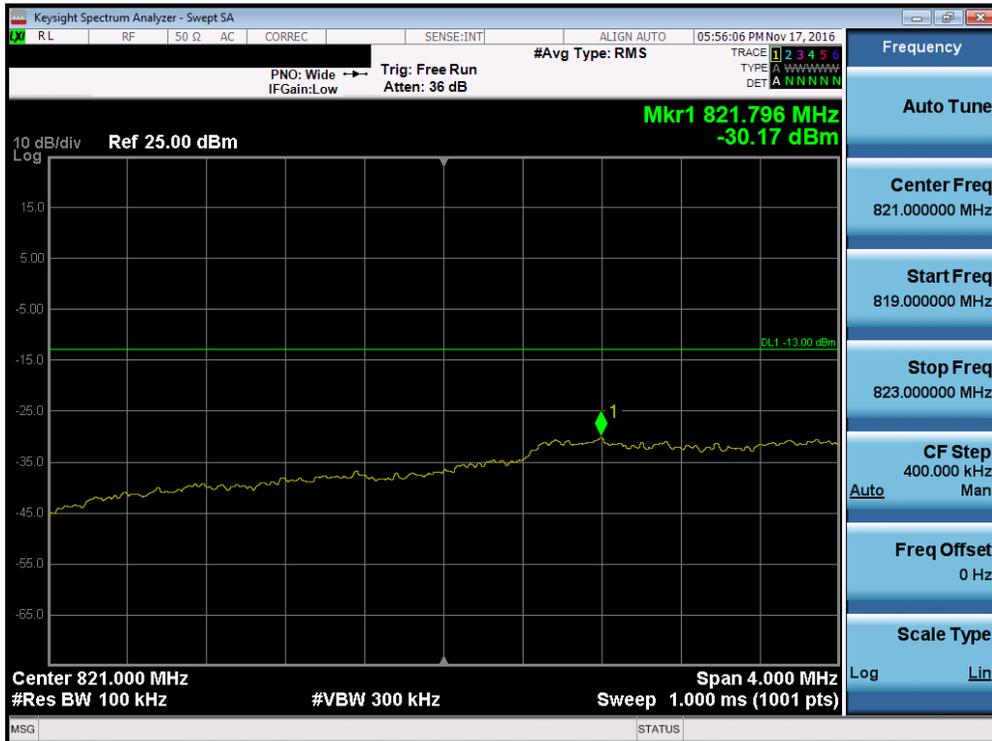


Plot 7-94. Upper Extended Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	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: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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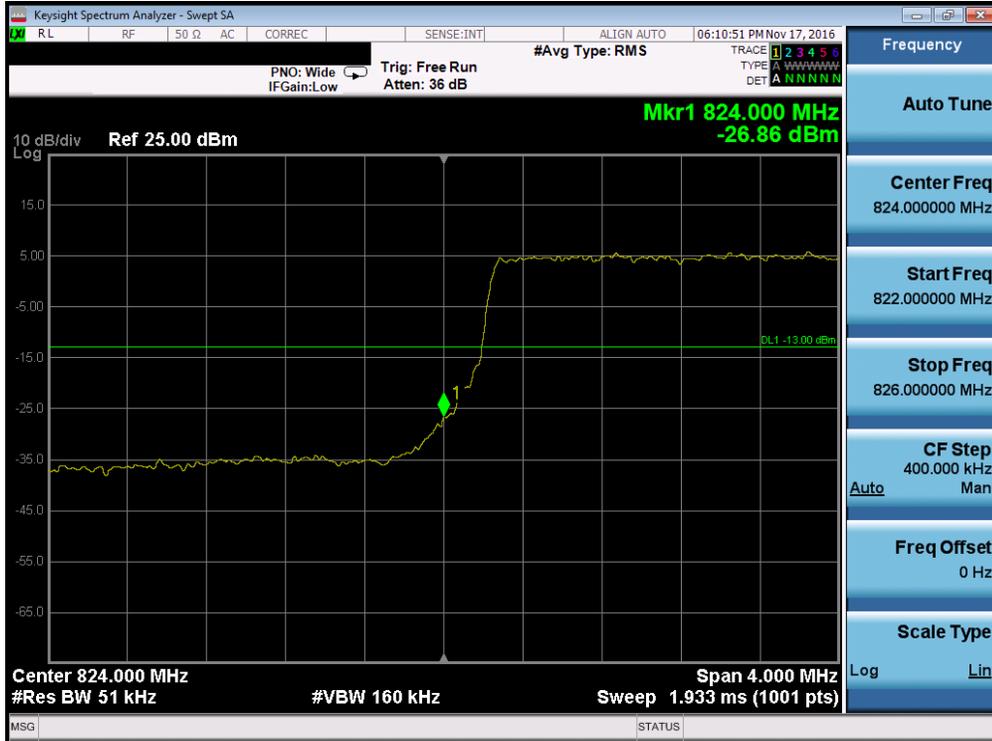


Plot 7-97. Upper Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

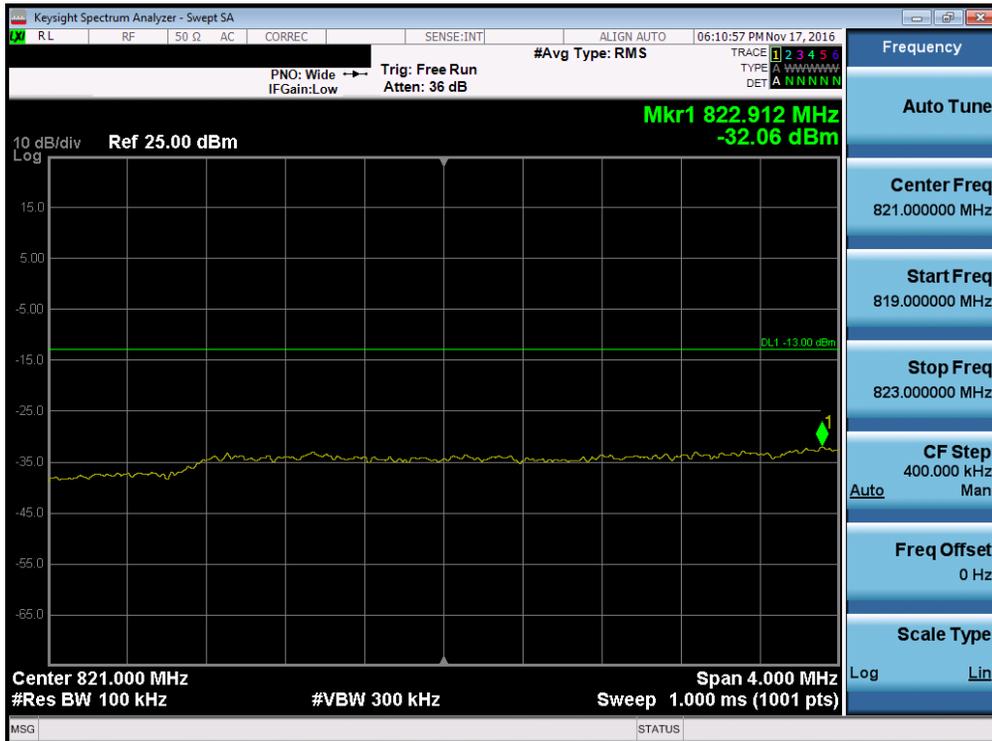


Plot 7-98. Upper Extended Band Edge Plot (Band 5 – Band 5 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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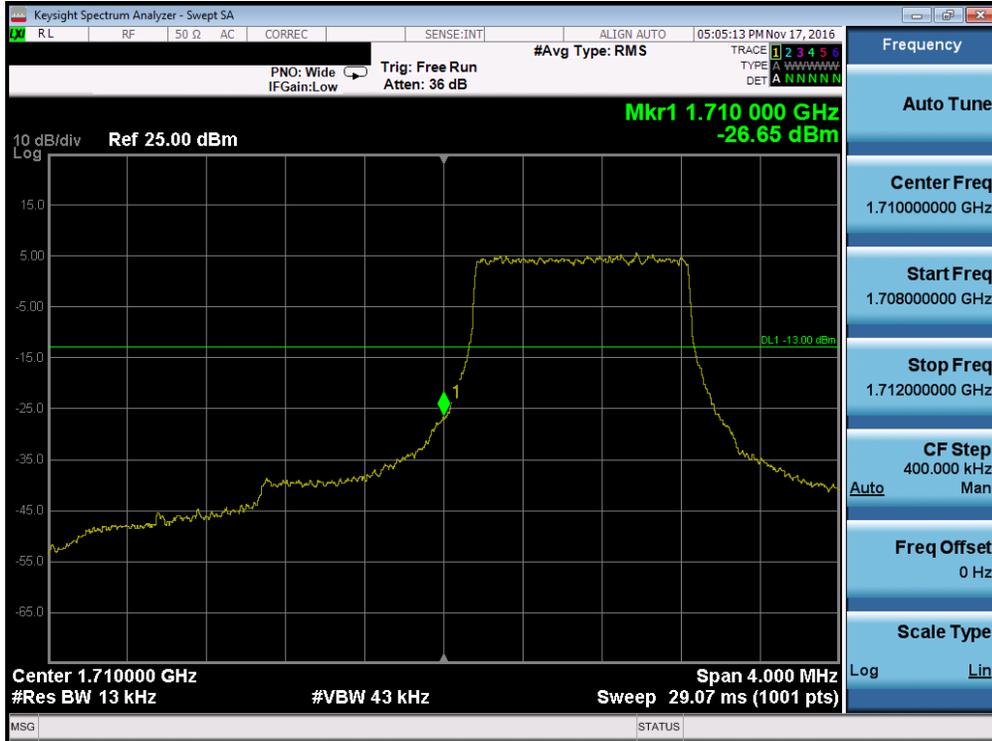


Plot 7-99. Lower Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

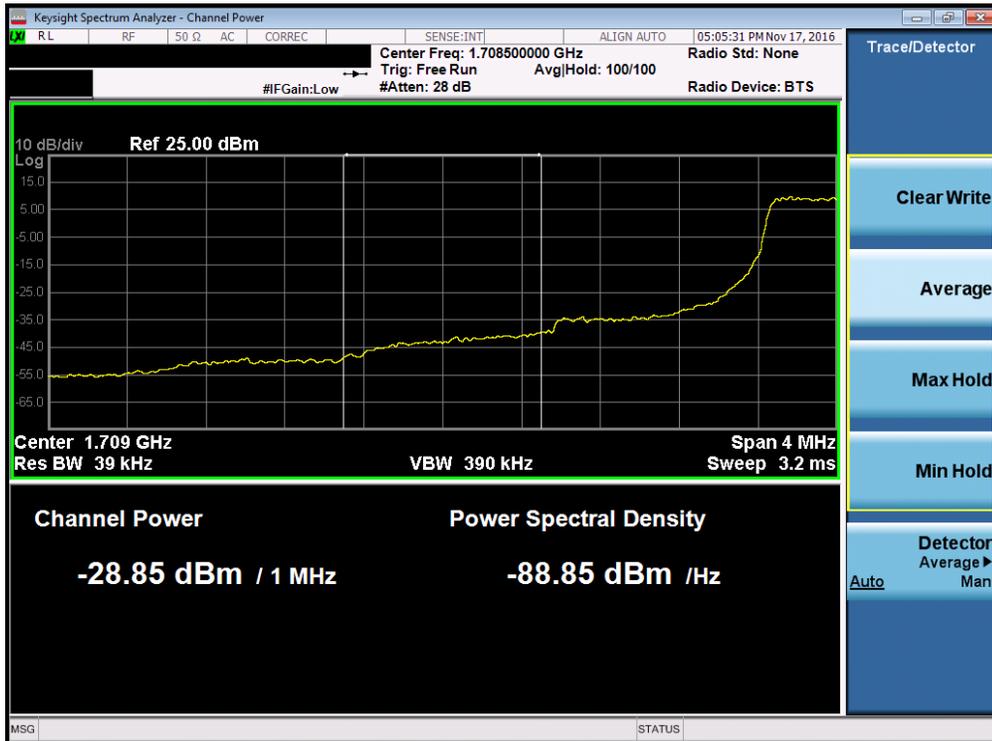


Plot 7-100. Lower Extended Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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Plot 7-105. Lower Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

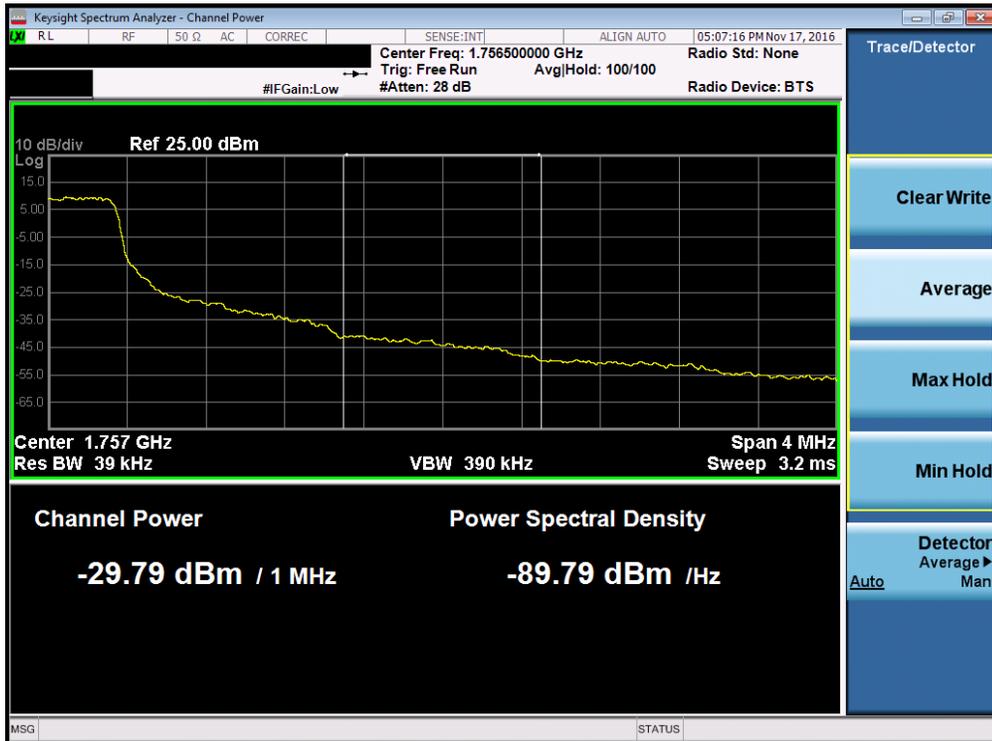


Plot 7-106. Lower Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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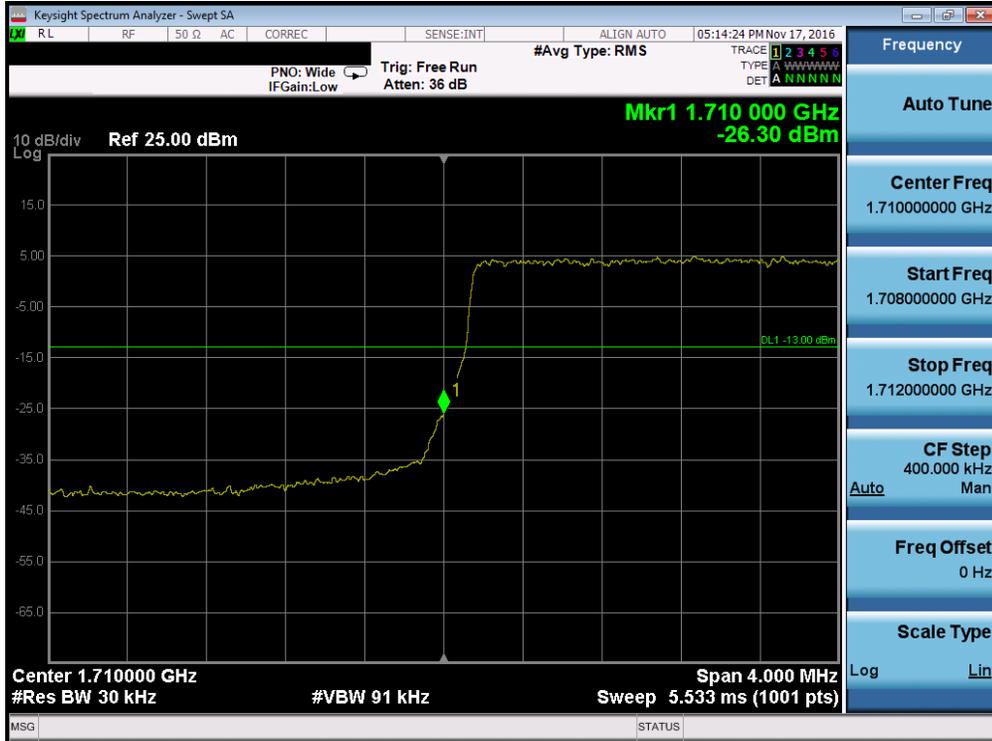


Plot 7-107. Upper Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

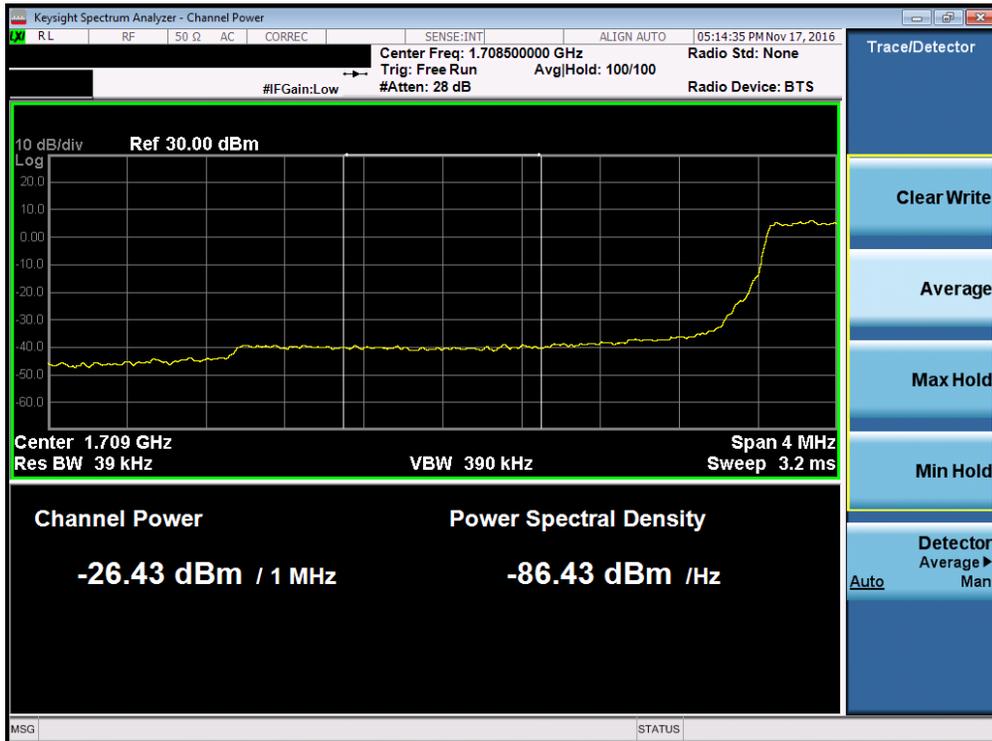


Plot 7-108. Upper Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Plot 7-109. Lower Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

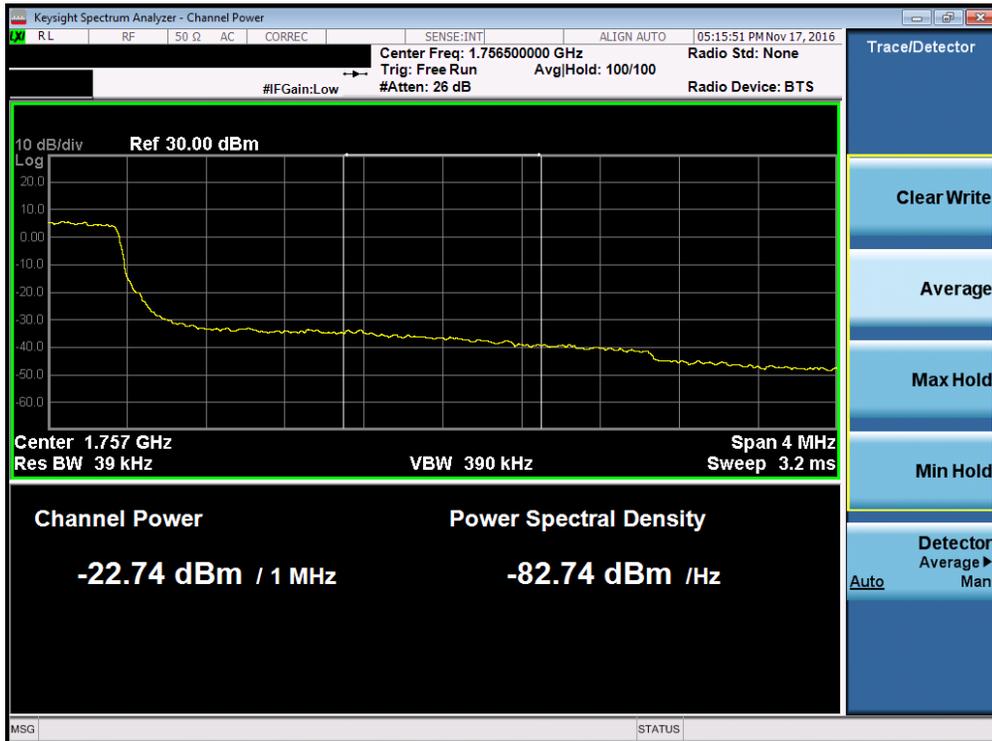


Plot 7-110. Lower Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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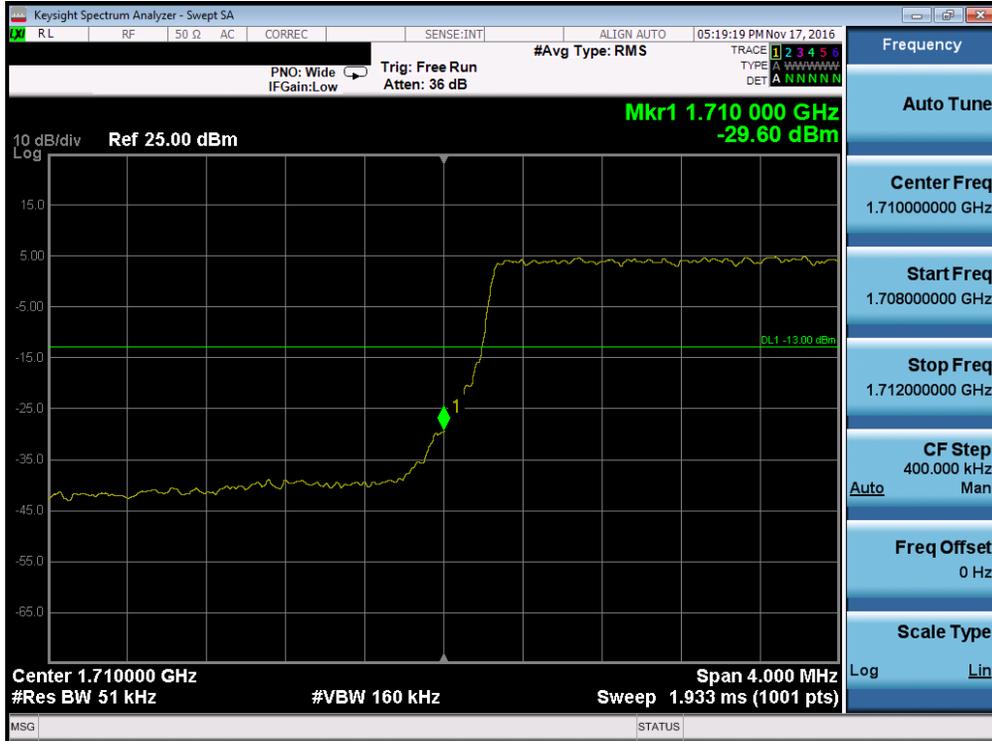


Plot 7-111. Upper Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

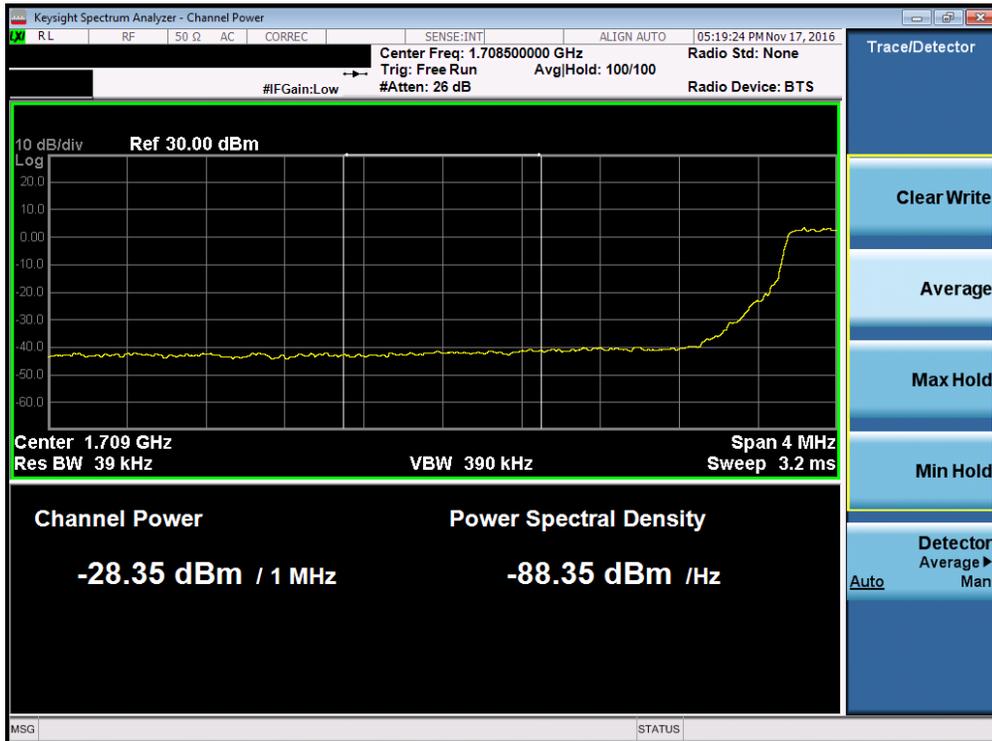


Plot 7-112. Upper Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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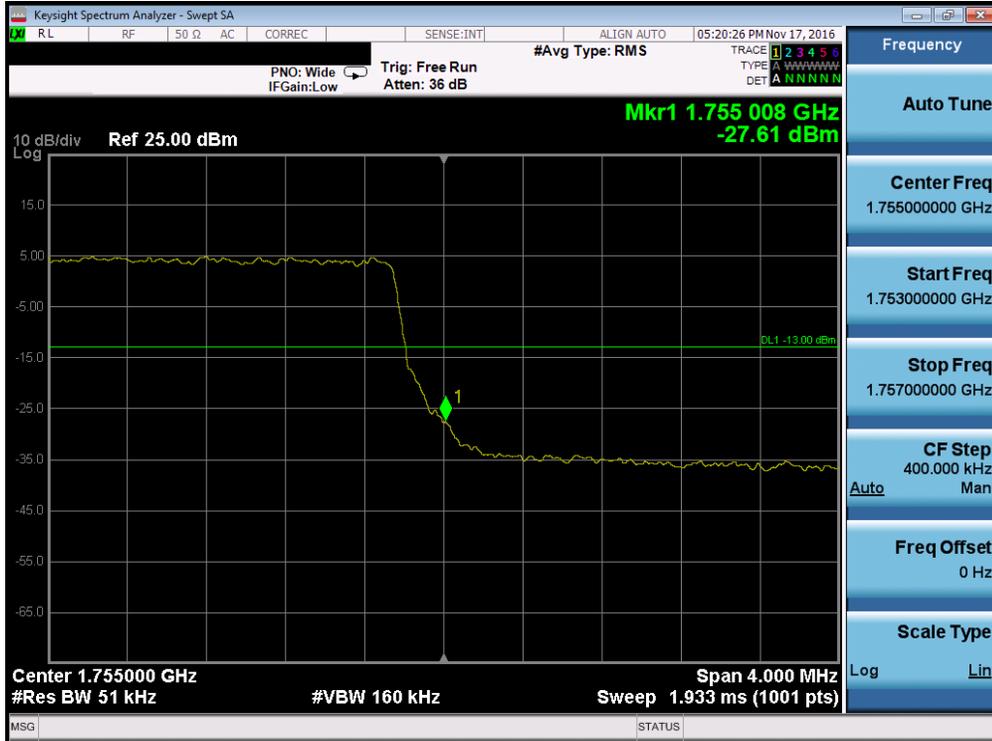


Plot 7-113. Lower Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

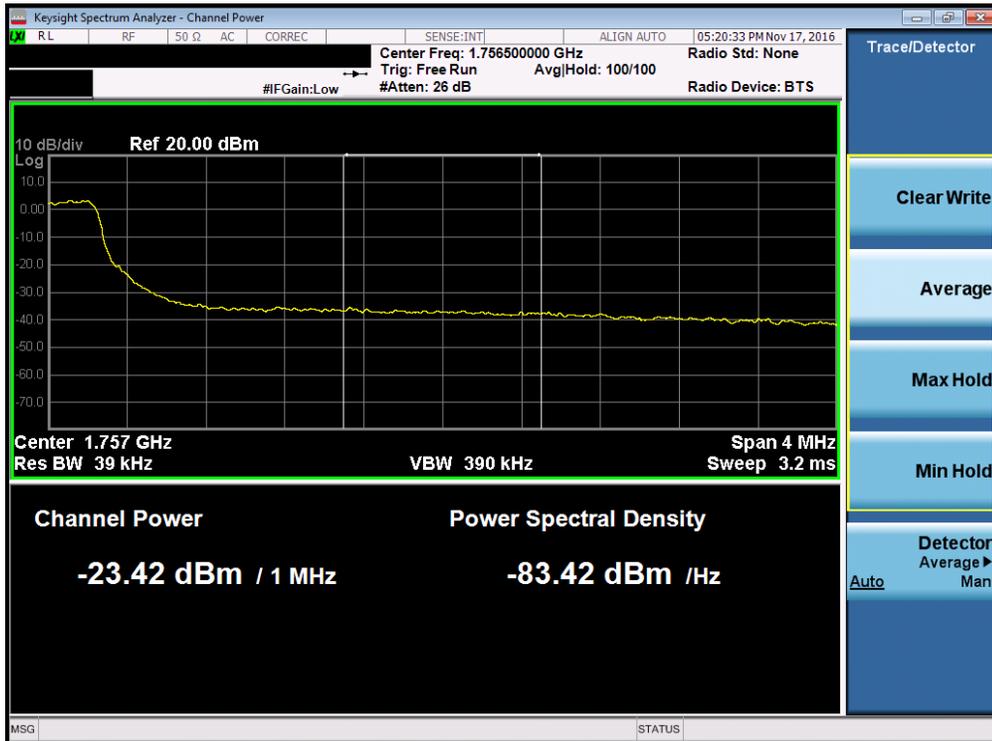


Plot 7-114. Lower Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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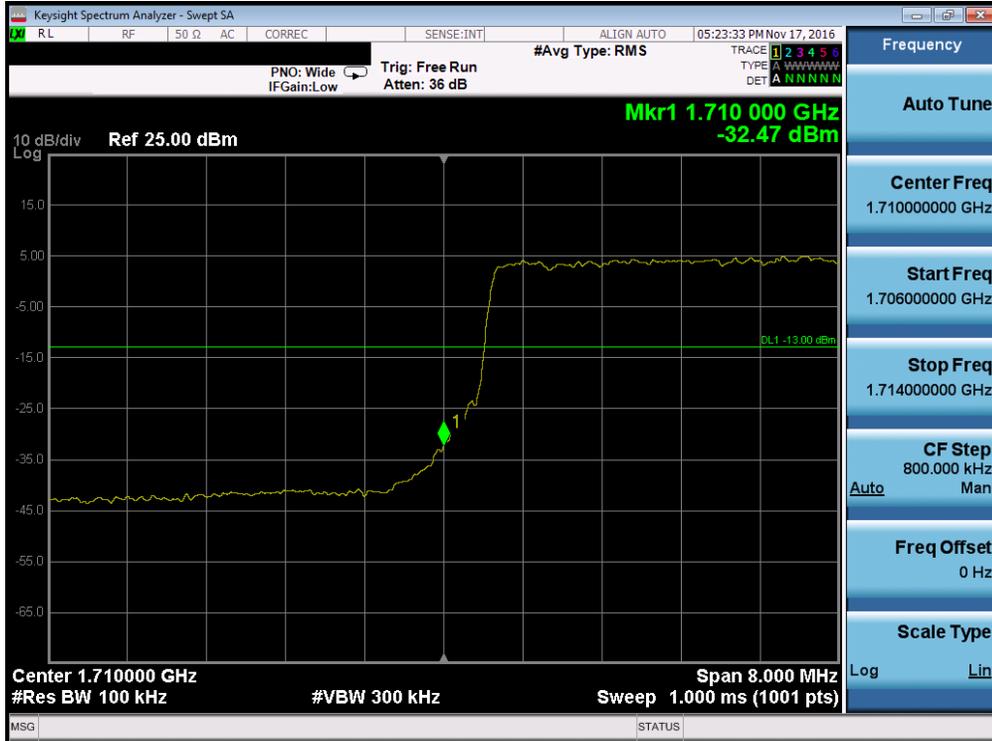


Plot 7-115. Upper Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

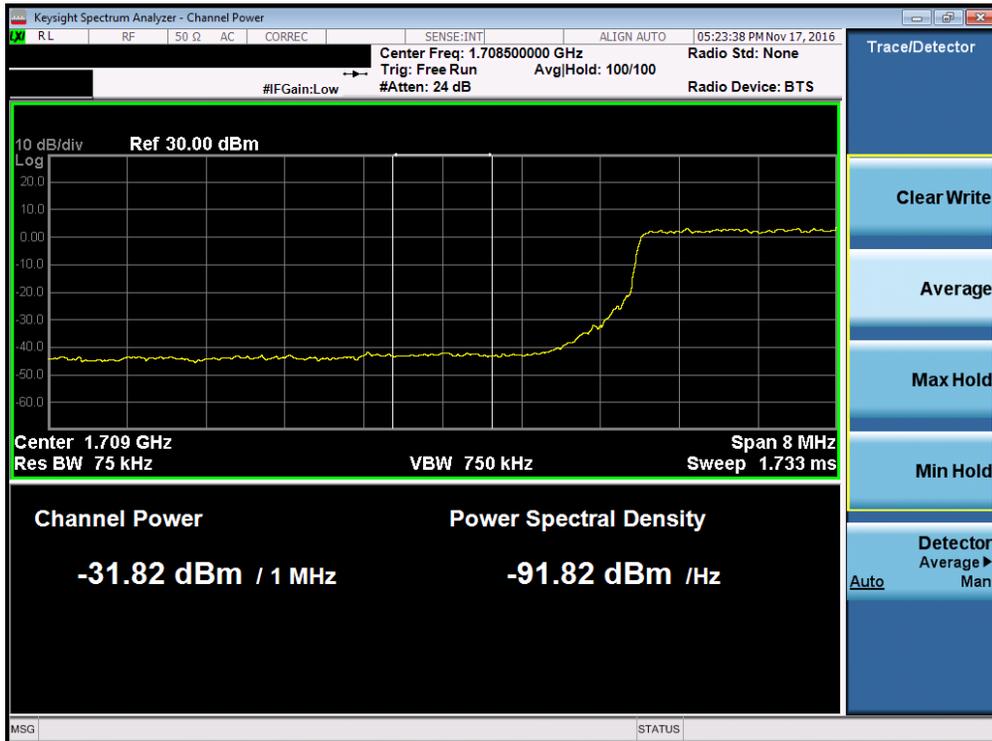


Plot 7-116. Upper Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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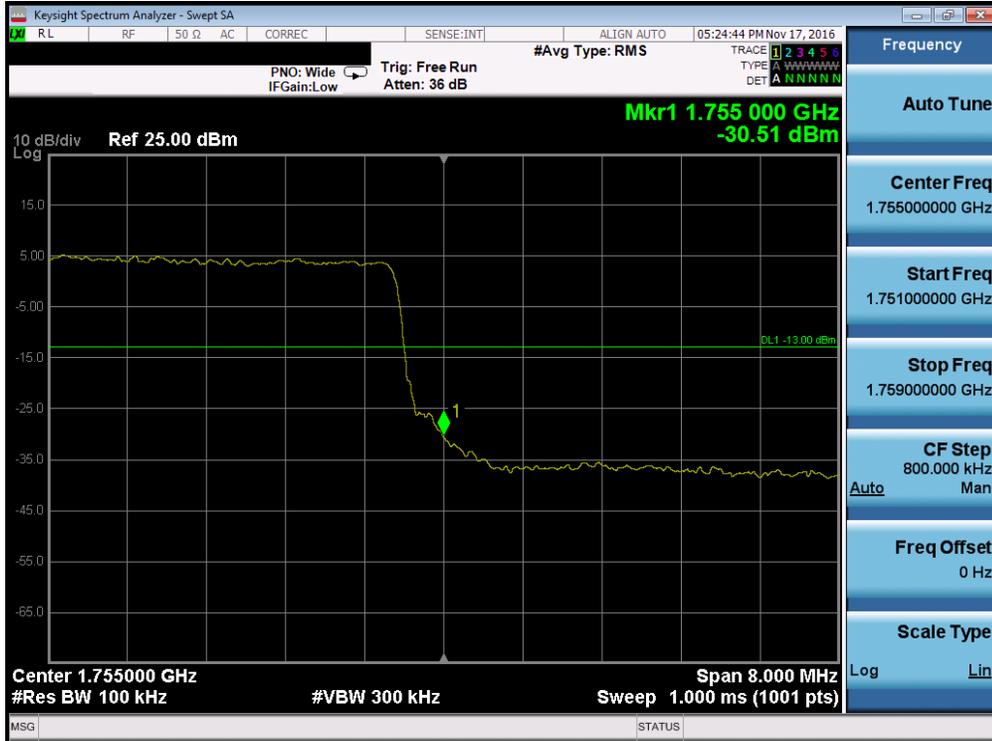


Plot 7-117. Lower Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

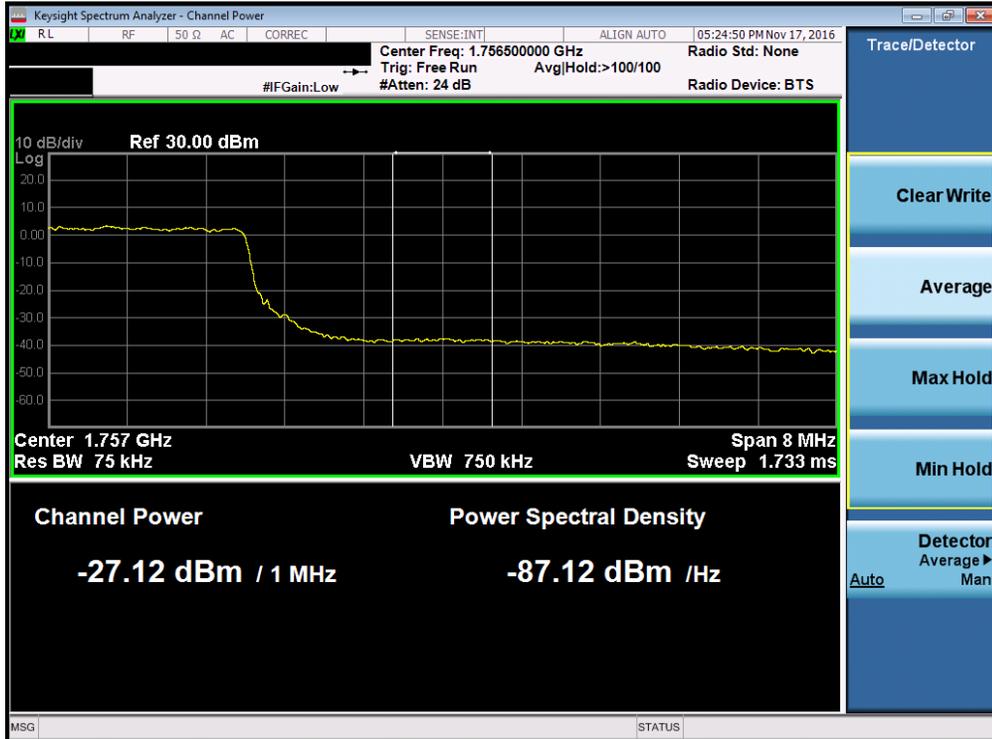


Plot 7-118. Lower Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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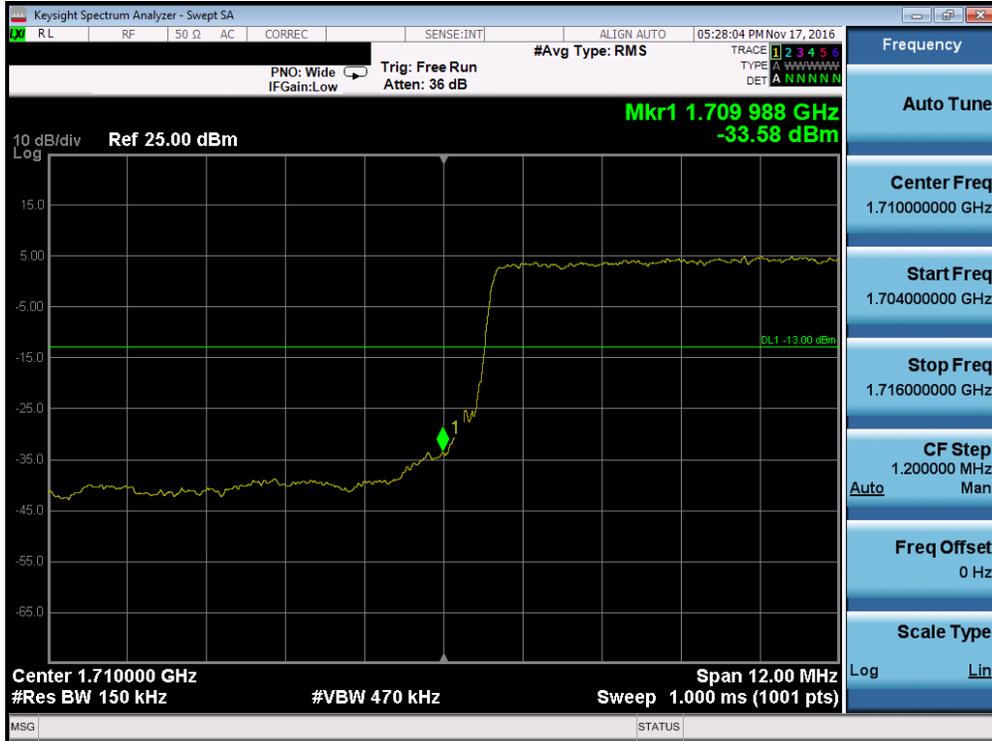


Plot 7-119. Upper Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

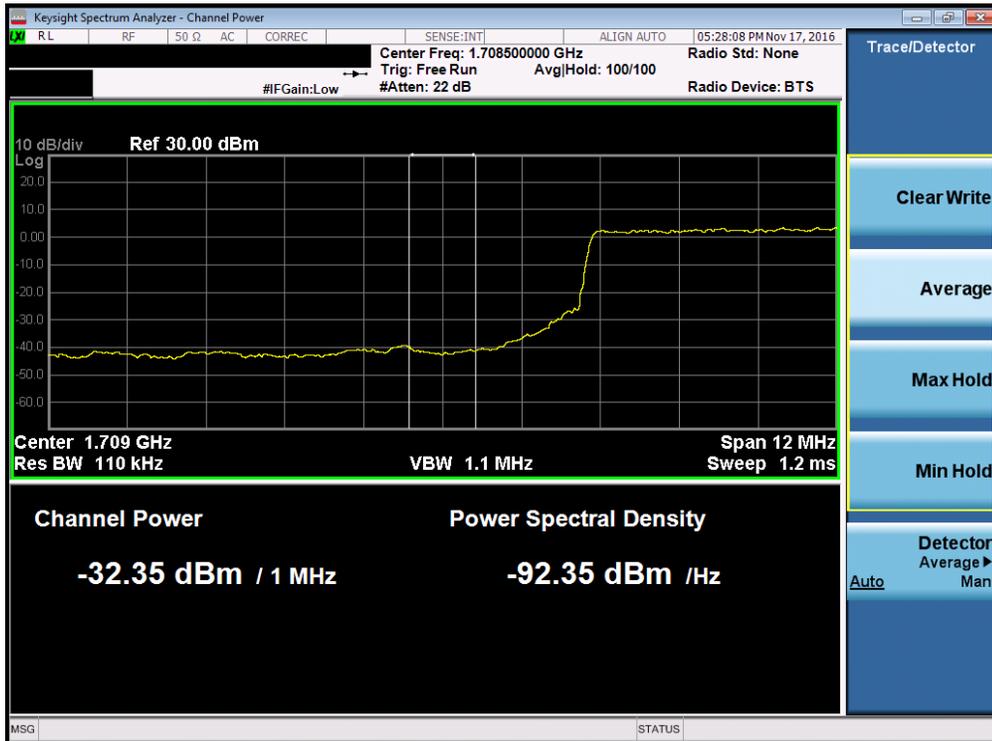


Plot 7-120. Upper Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFL59BL	PCTEST 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)

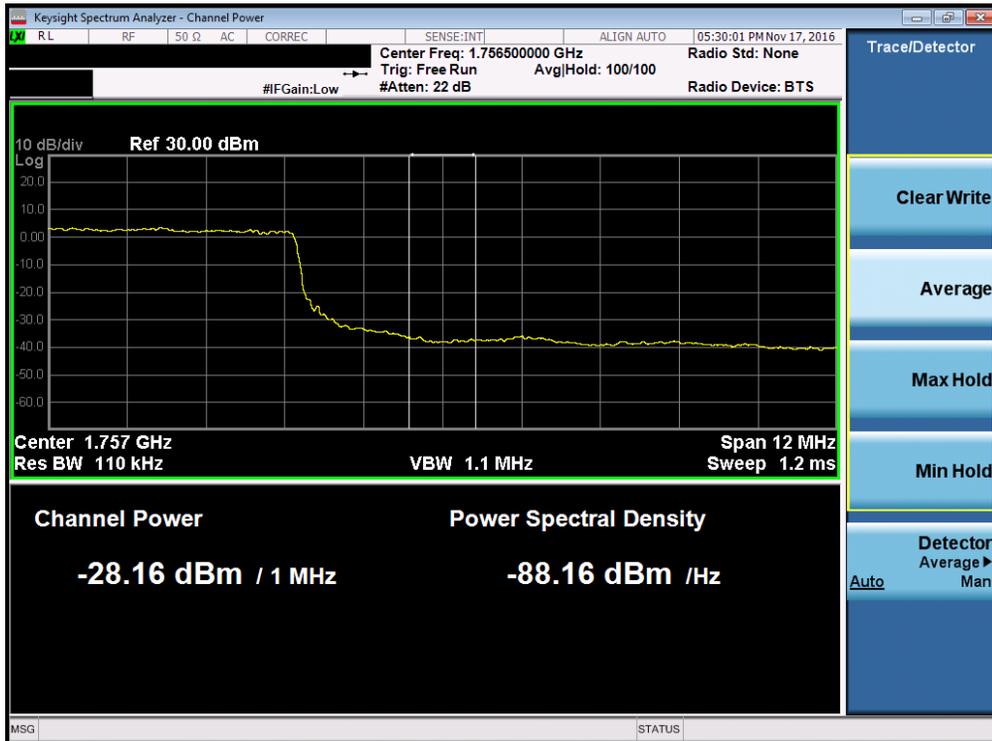


Plot 7-122. Lower Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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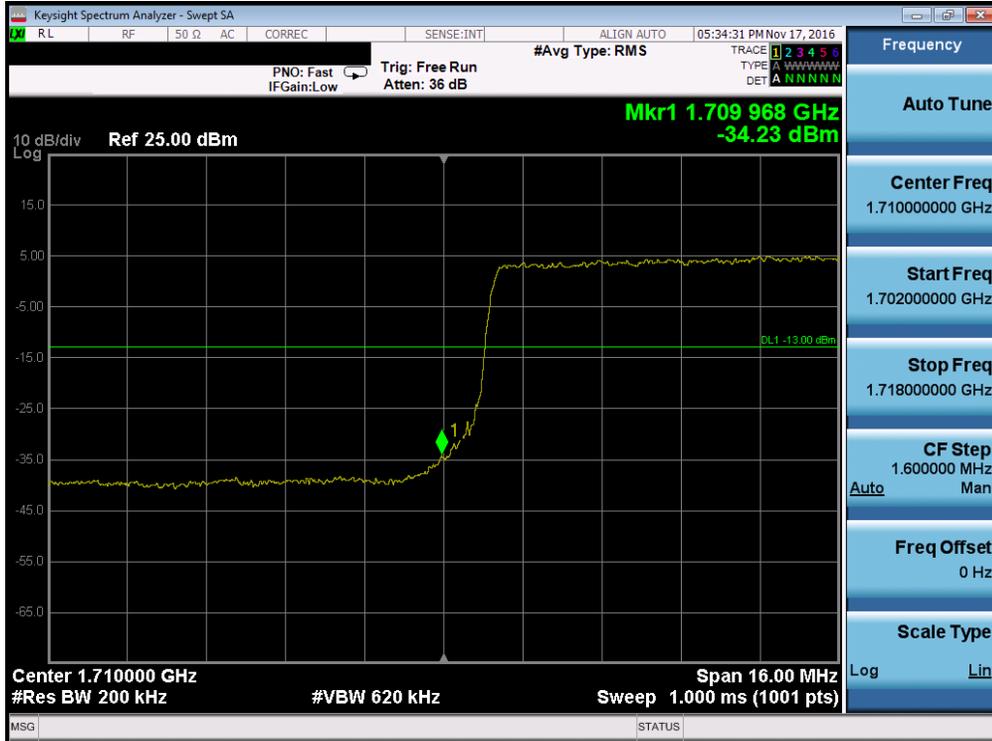


Plot 7-123. Upper Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

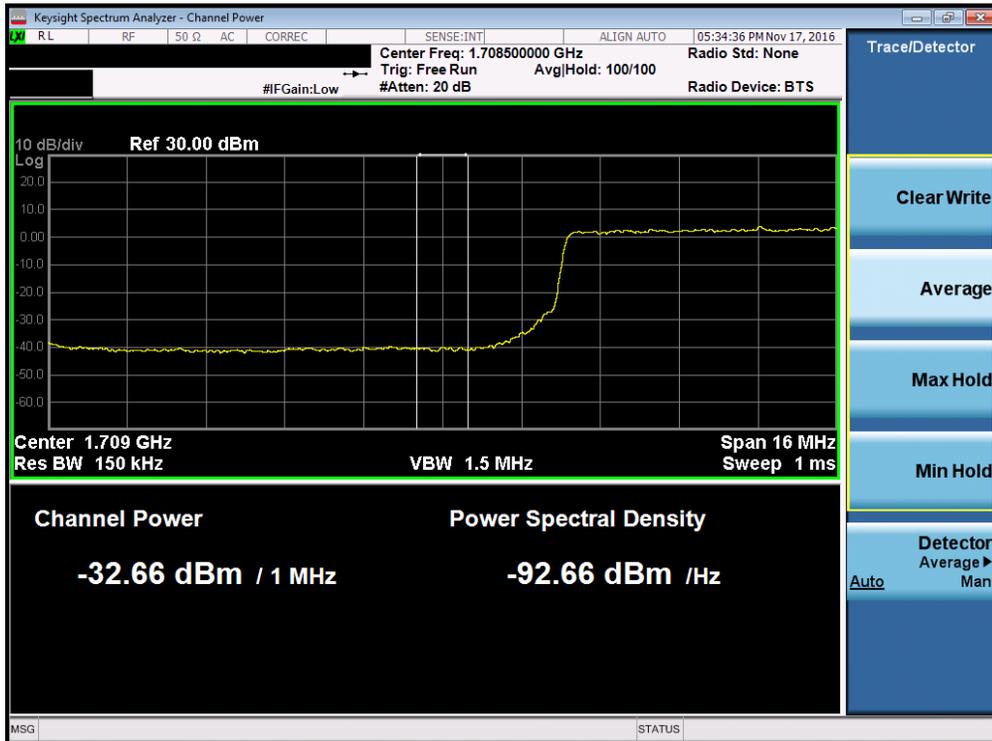


Plot 7-124. Upper Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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Plot 7-125. Lower Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

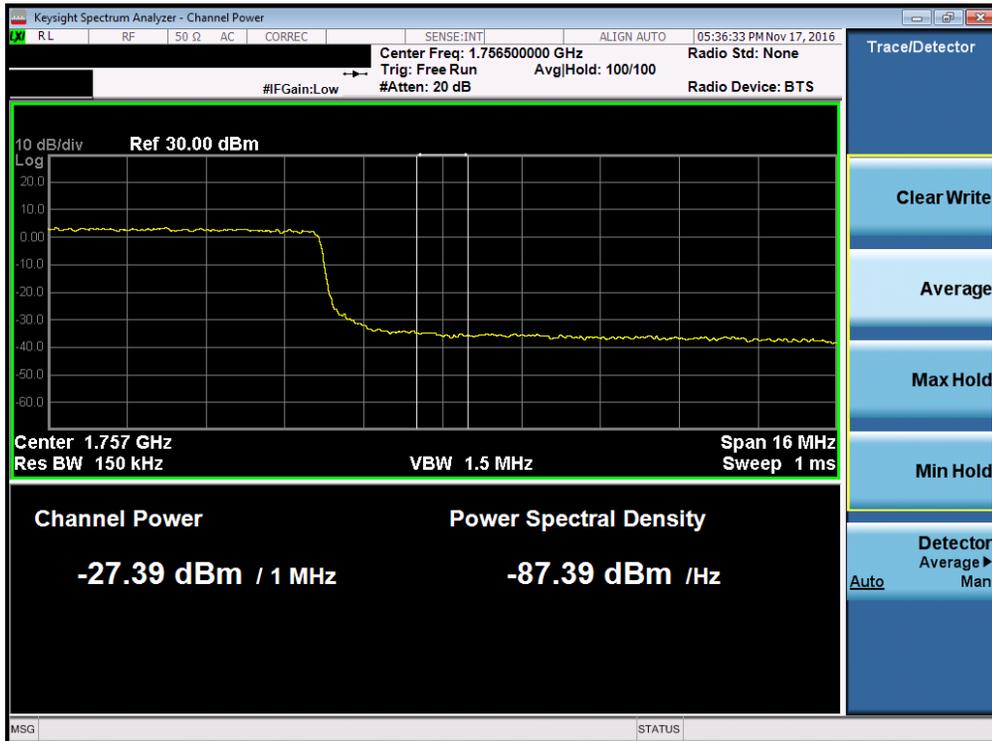


Plot 7-126. Lower Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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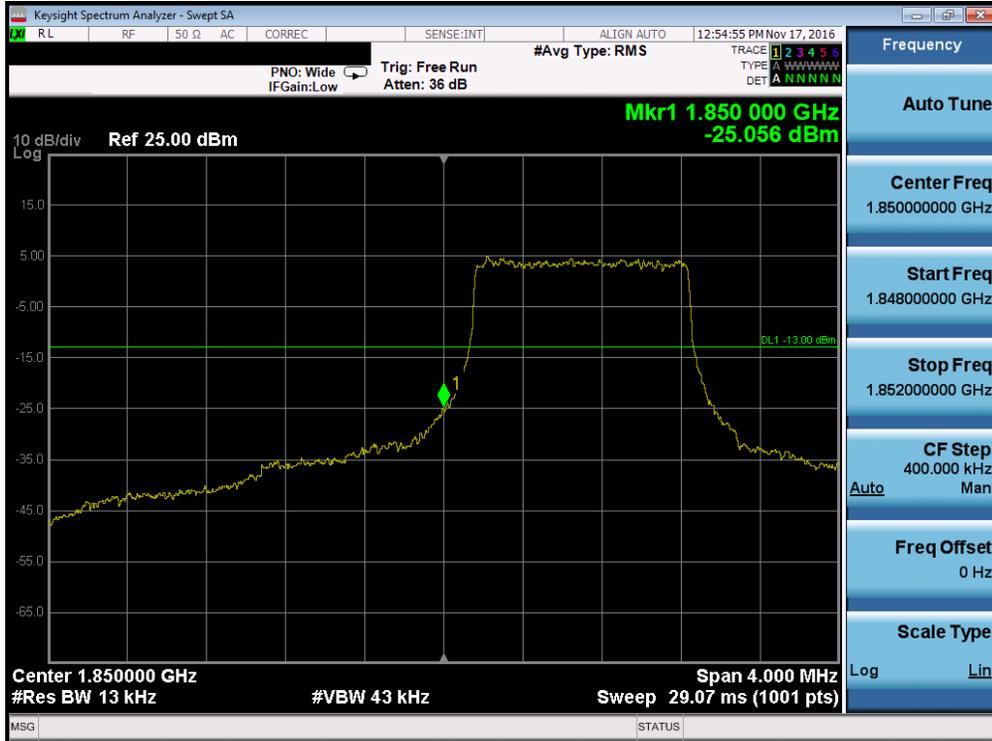


Plot 7-127. Upper Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

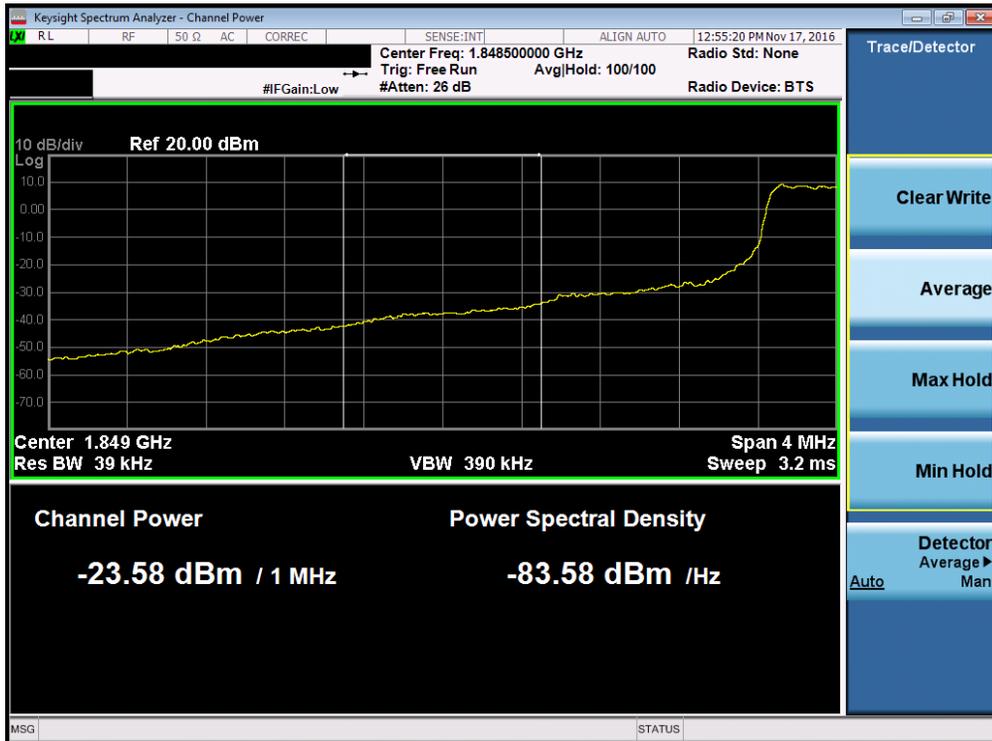


Plot 7-128. Upper Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1611151766-R1.ZNF	Test Dates: 11/14-11/25/2016	EUT Type: Portable Handset		Page 80 of 123

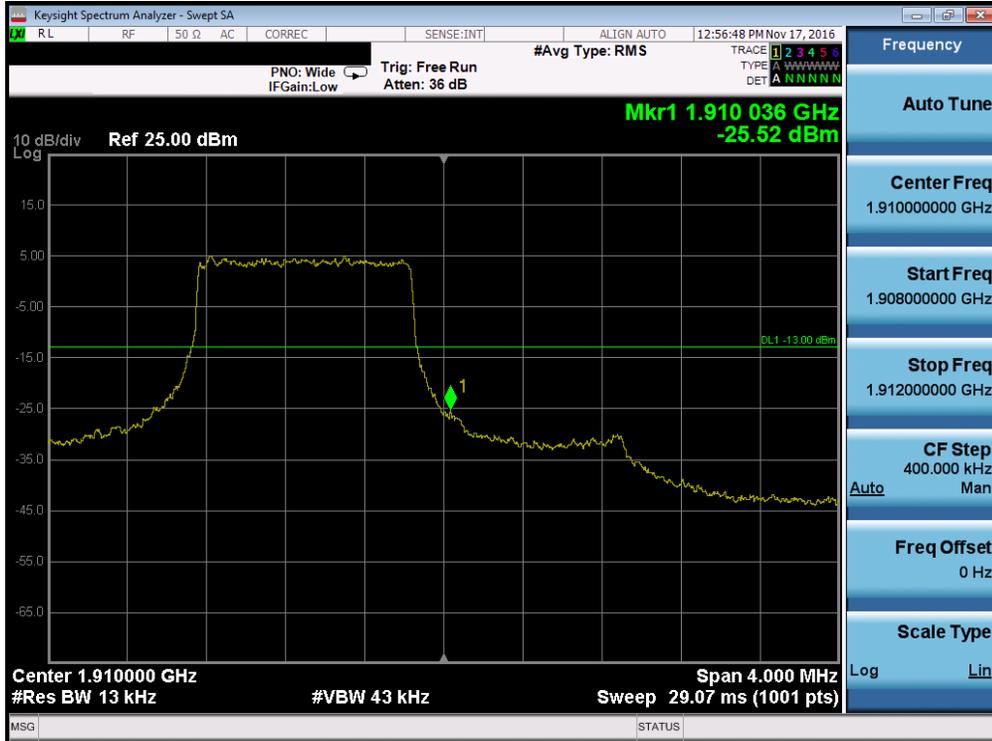


Plot 7-129. Lower Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

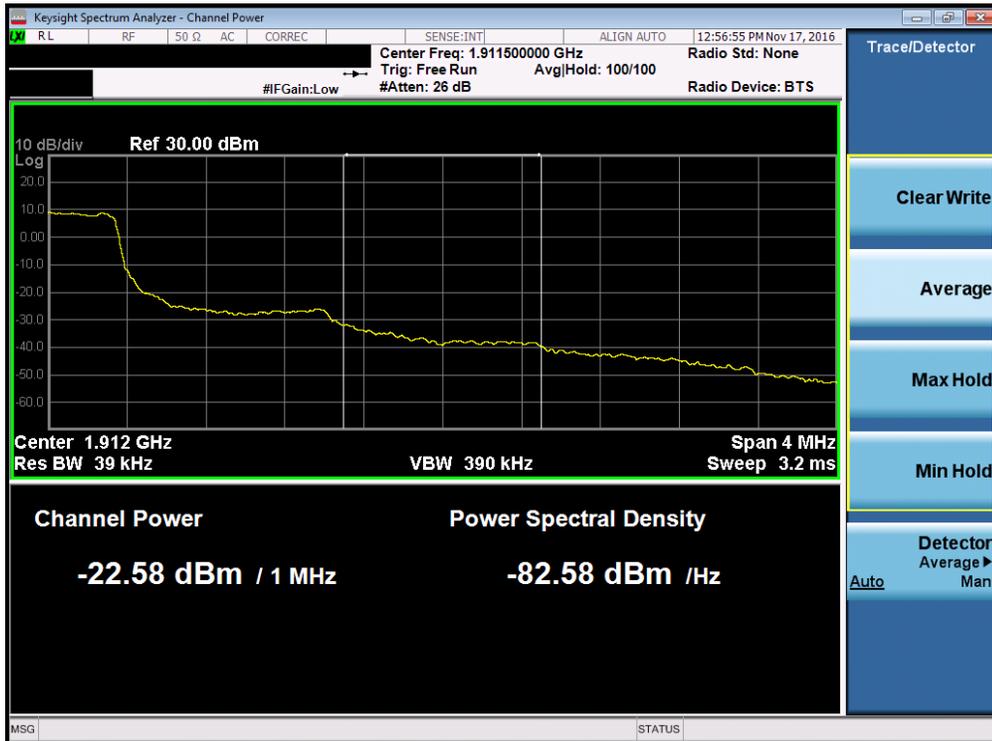


Plot 7-130. Lower Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1611151766-R1.ZNF	Test Dates: 11/14-11/25/2016	EUT Type: Portable Handset		Page 81 of 123

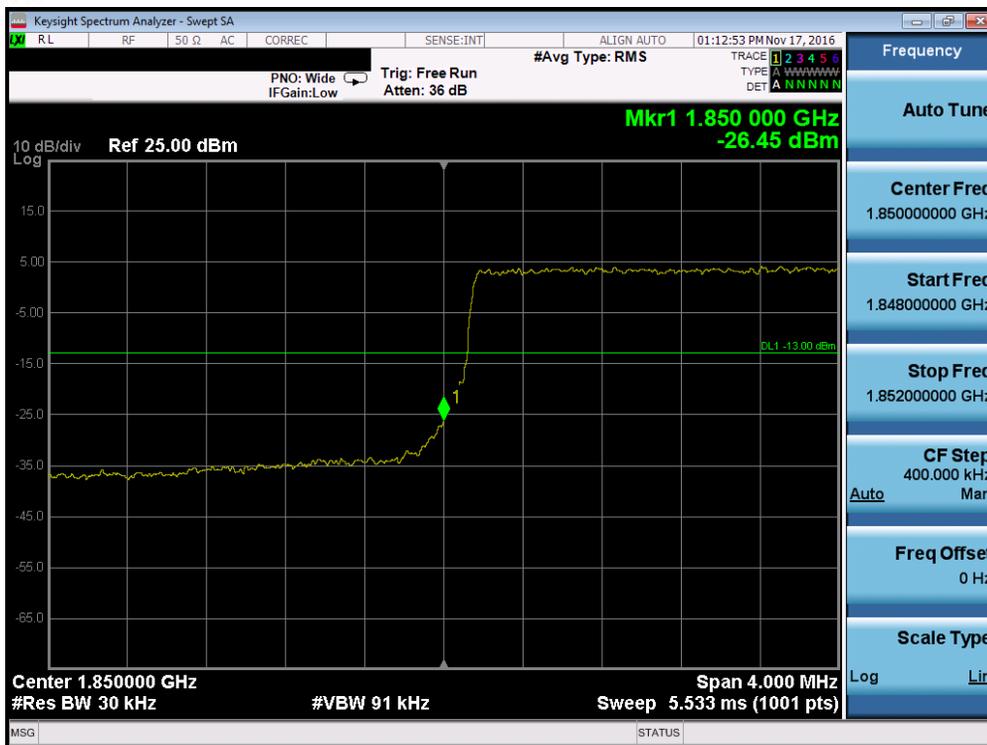


Plot 7-131. Upper Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

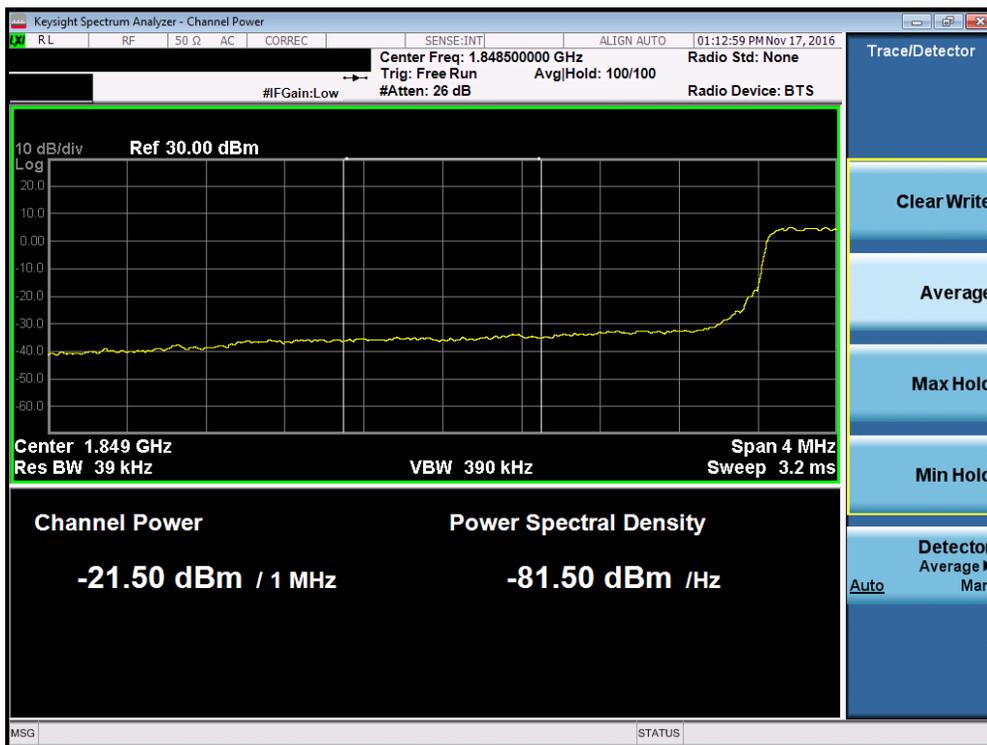


Plot 7-132. Upper Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1611151766-R1.ZNF	Test Dates: 11/14-11/25/2016	EUT Type: Portable Handset		Page 82 of 123



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

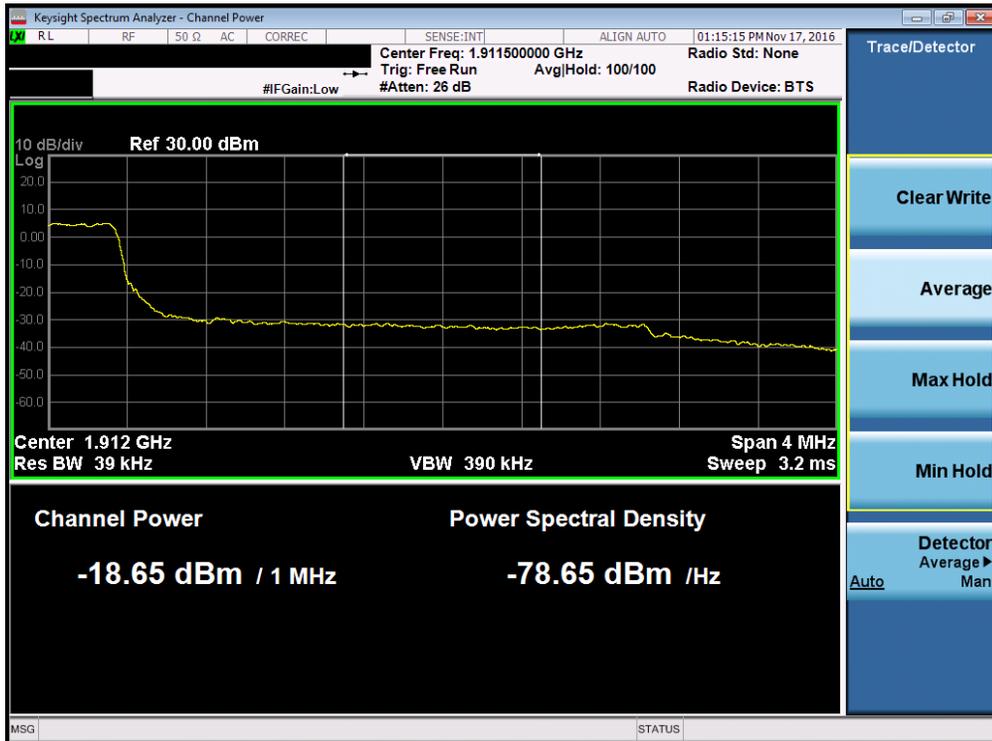


Plot 7-134. Lower Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFL59BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1611151766-R1.ZNF	Test Dates: 11/14-11/25/2016	EUT Type: Portable Handset		Page 83 of 123

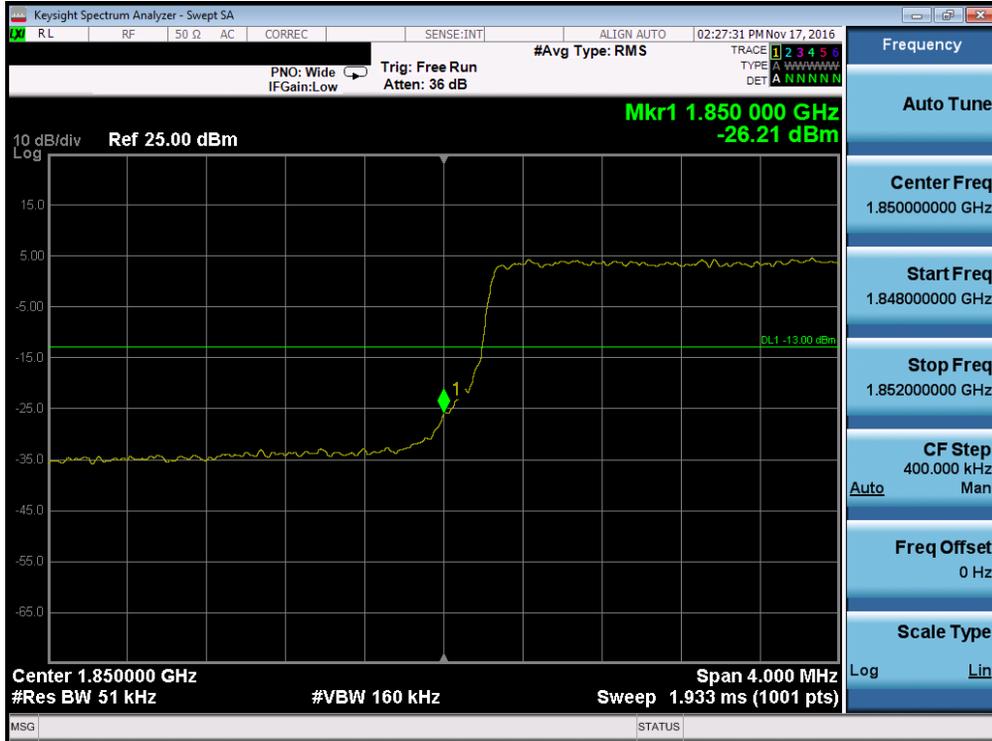


Plot 7-135. Upper Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

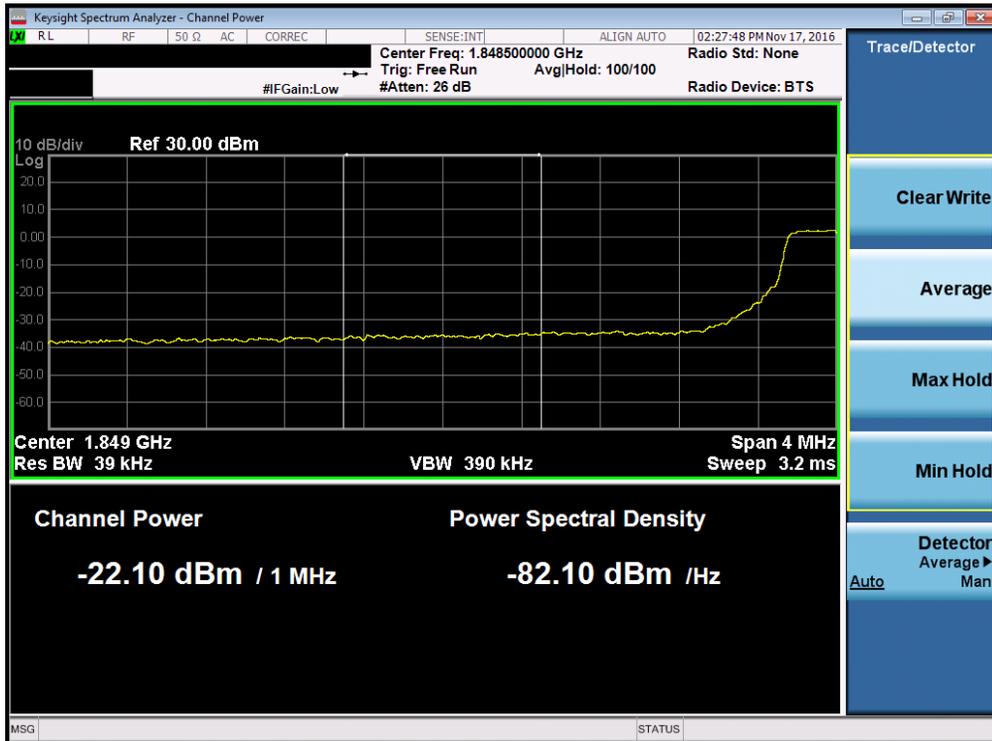


Plot 7-136. Upper Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1611151766-R1.ZNF	Test Dates: 11/14-11/25/2016	EUT Type: Portable Handset		Page 84 of 123

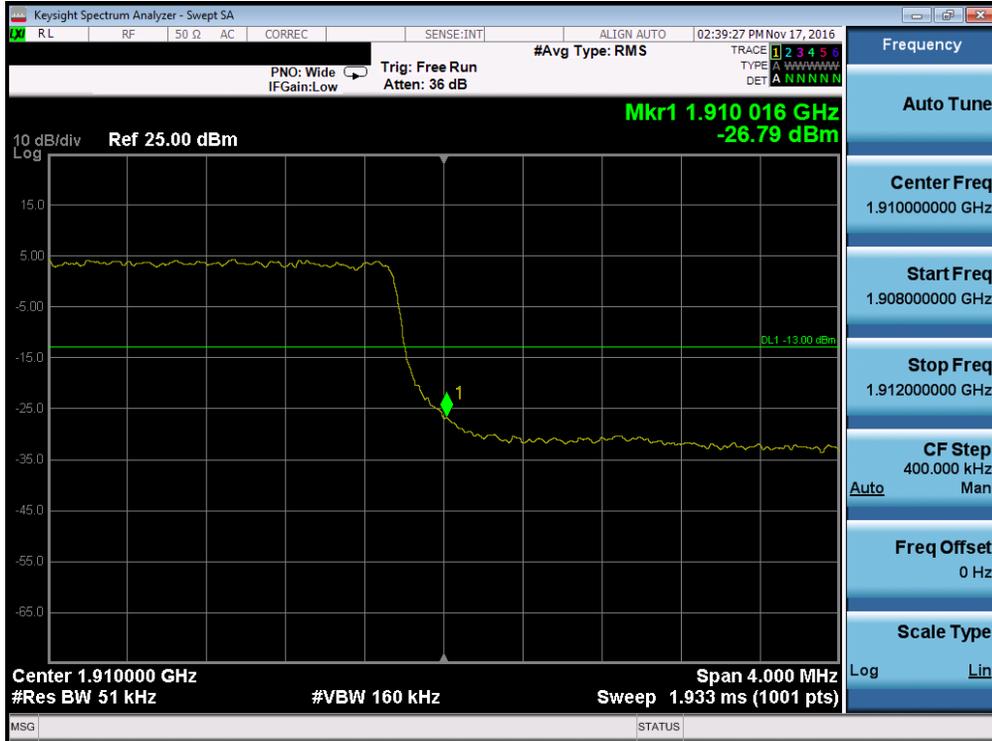


Plot 7-137. Lower Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

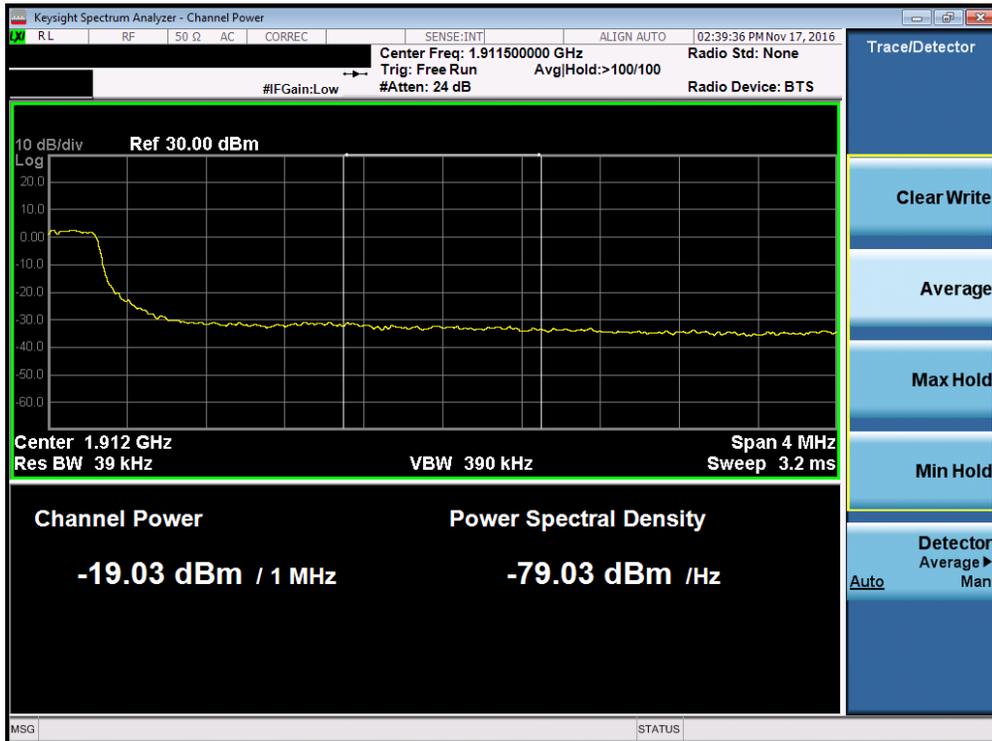


Plot 7-138. Lower Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1611151766-R1.ZNF	Test Dates: 11/14-11/25/2016	EUT Type: Portable Handset		Page 85 of 123

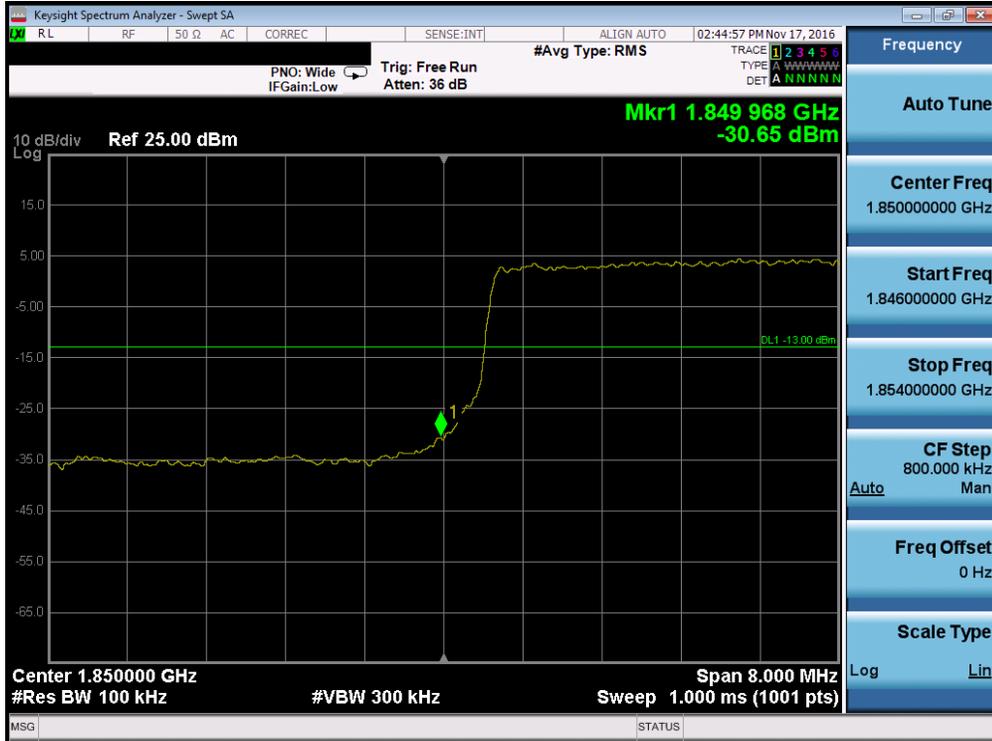


Plot 7-139. Upper Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

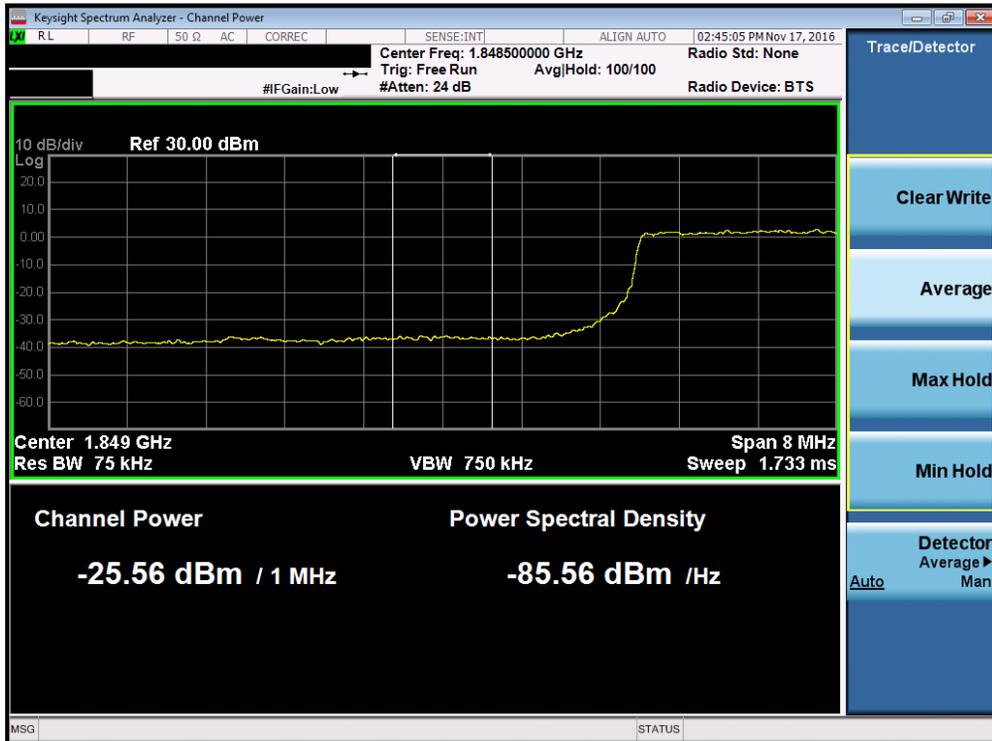


Plot 7-140. Upper Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1611151766-R1.ZNF	Test Dates: 11/14-11/25/2016	EUT Type: Portable Handset		Page 86 of 123

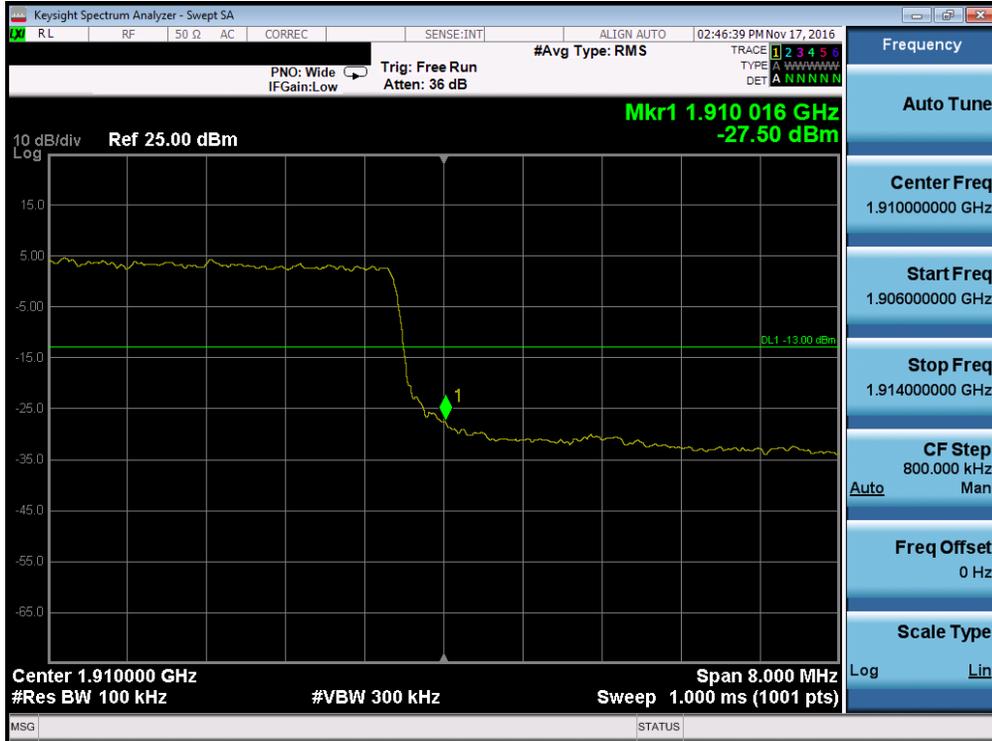


Plot 7-141. Lower Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

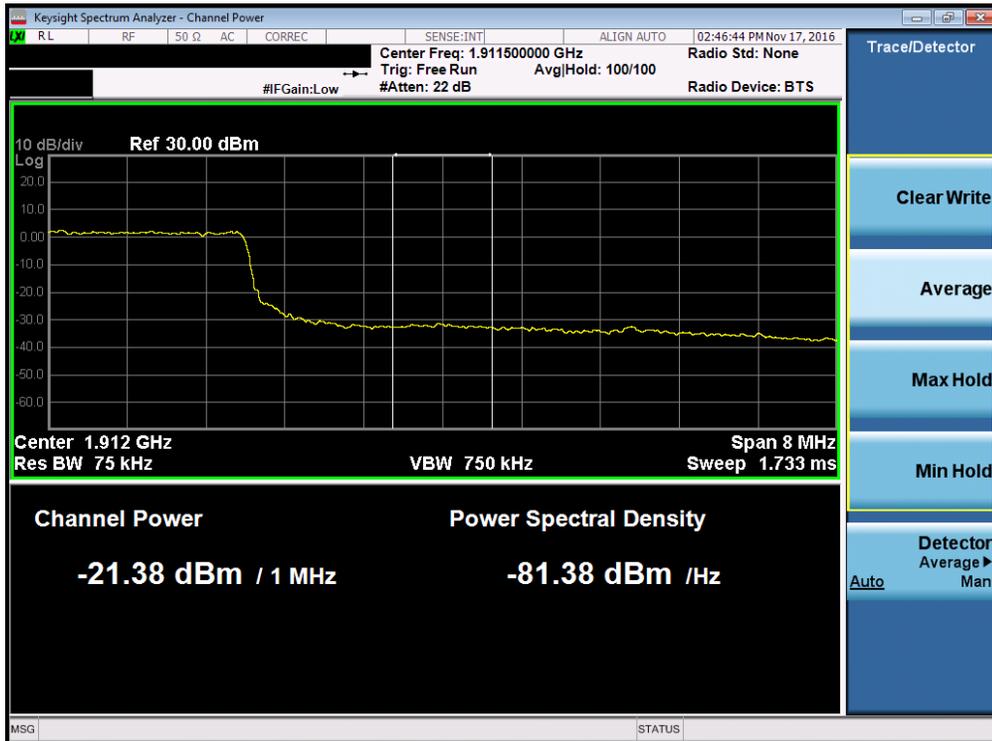


Plot 7-142. Lower Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1611151766-R1.ZNF	Test Dates: 11/14-11/25/2016	EUT Type: Portable Handset		Page 87 of 123

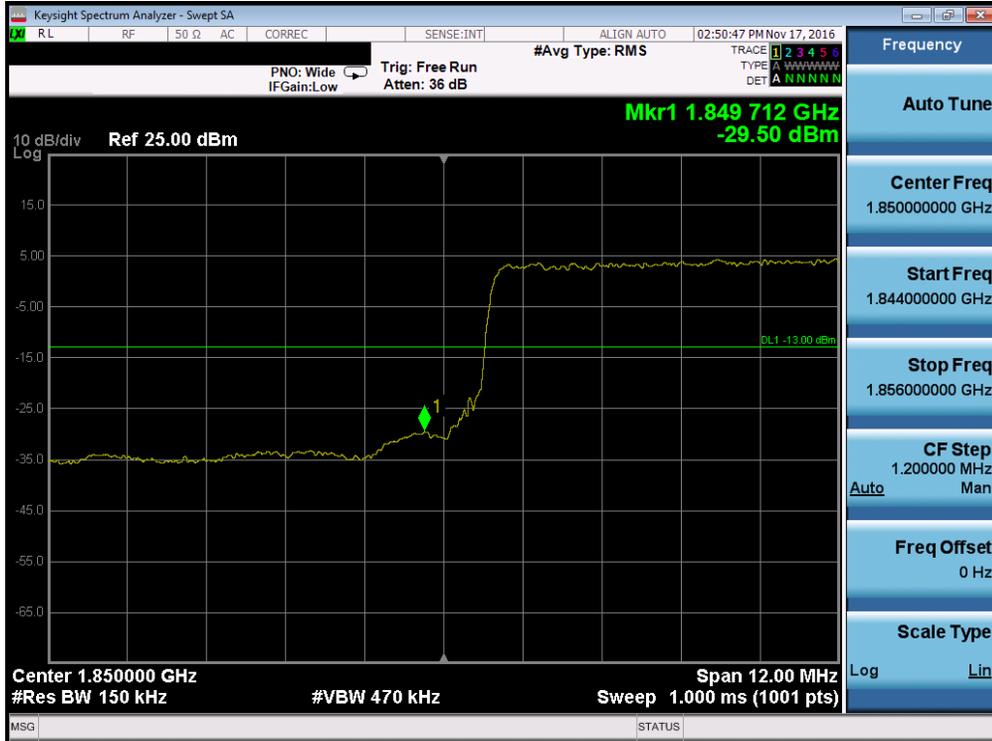


Plot 7-143. Upper Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

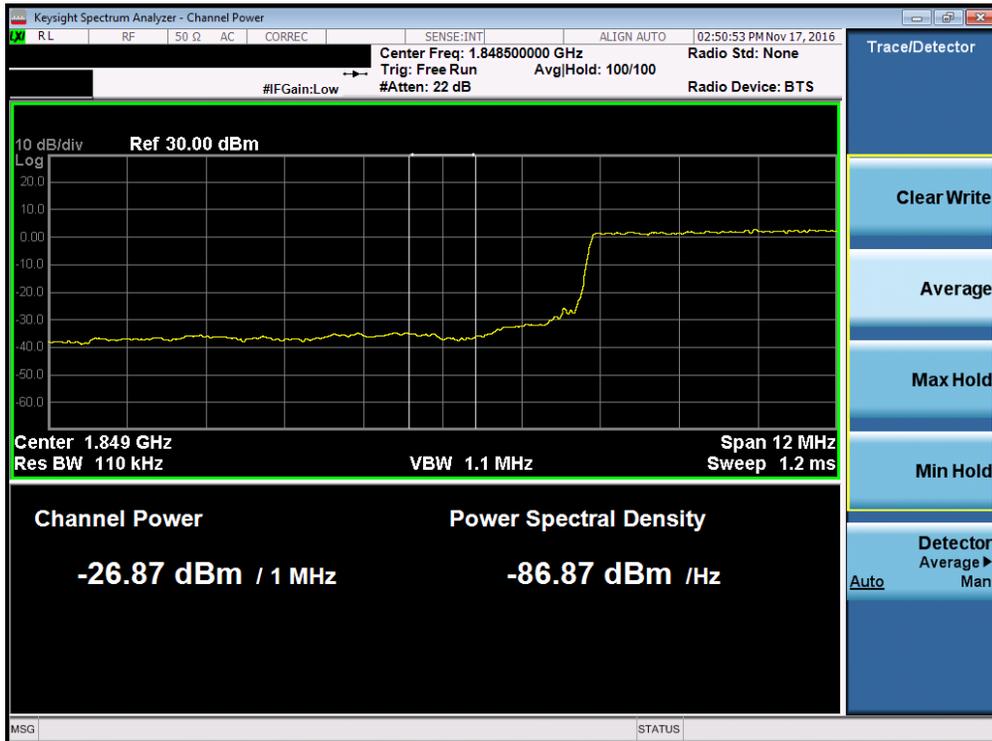


Plot 7-144. Upper Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1611151766-R1.ZNF	Test Dates: 11/14-11/25/2016	EUT Type: Portable Handset		Page 88 of 123

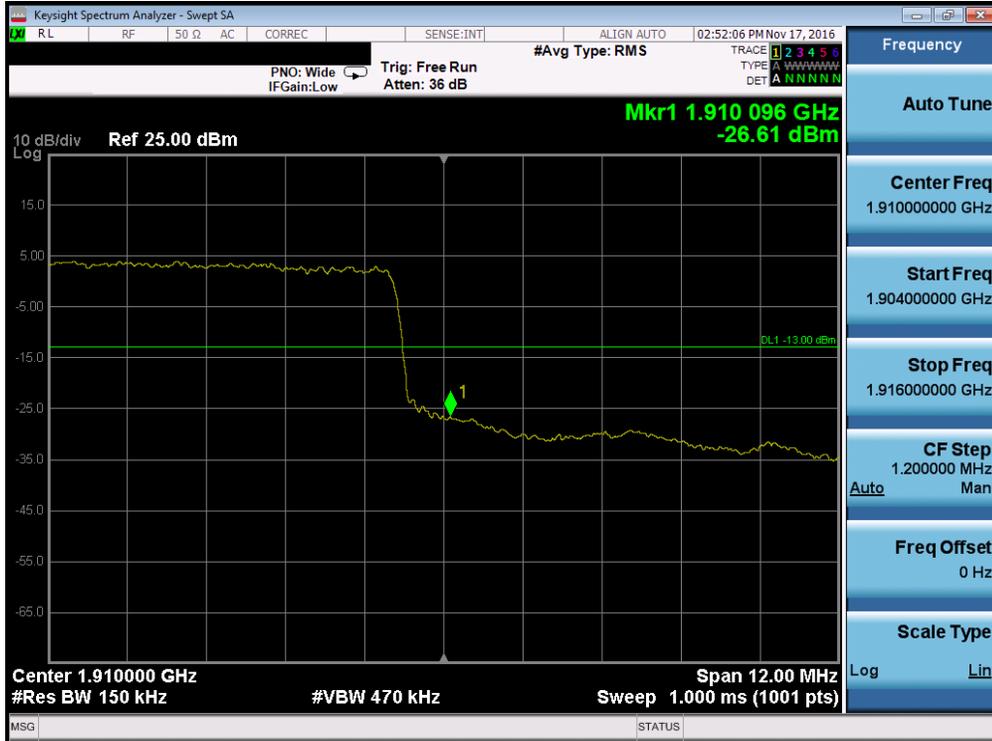


Plot 7-145. Lower Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

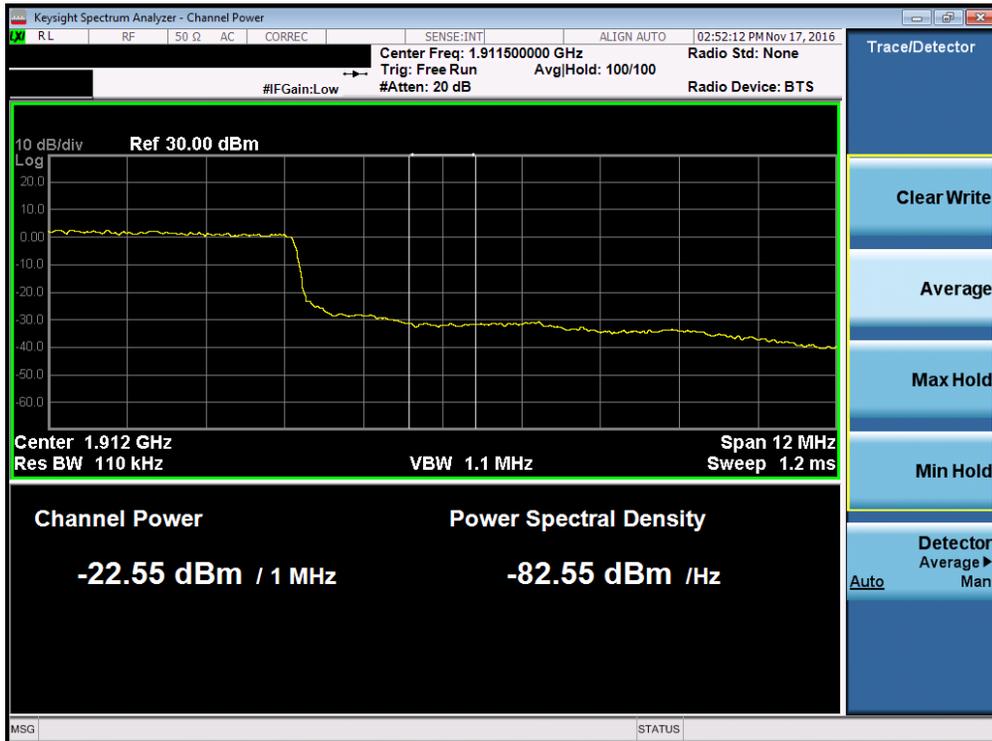


Plot 7-146. Lower Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1611151766-R1.ZNF	Test Dates: 11/14-11/25/2016	EUT Type: Portable Handset		Page 89 of 123

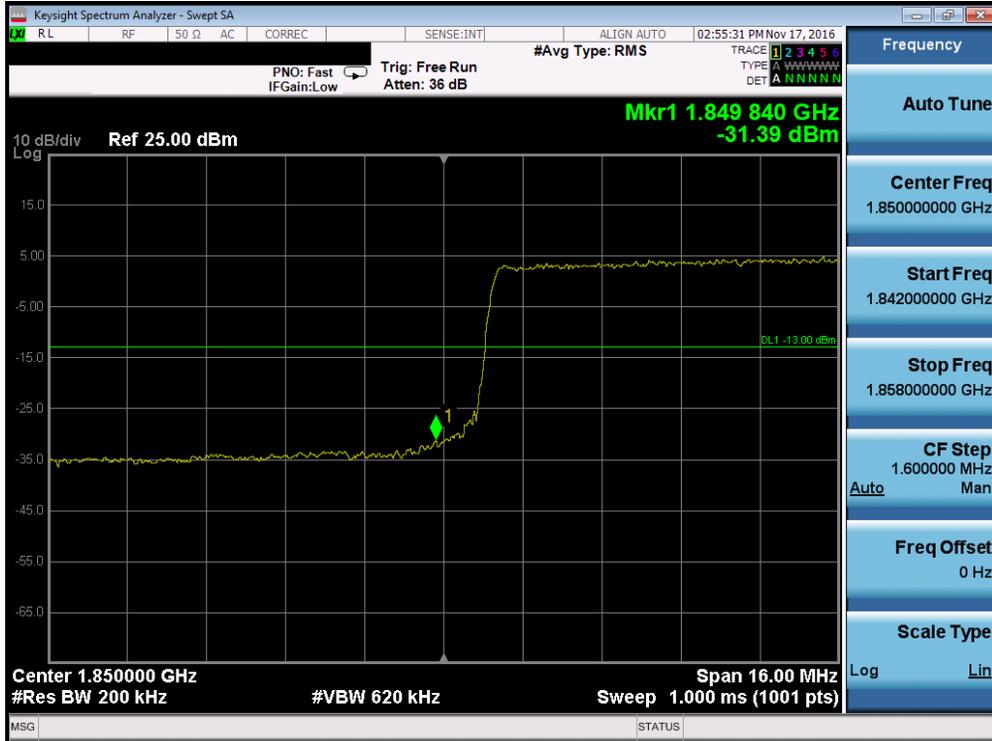


Plot 7-147. Upper Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

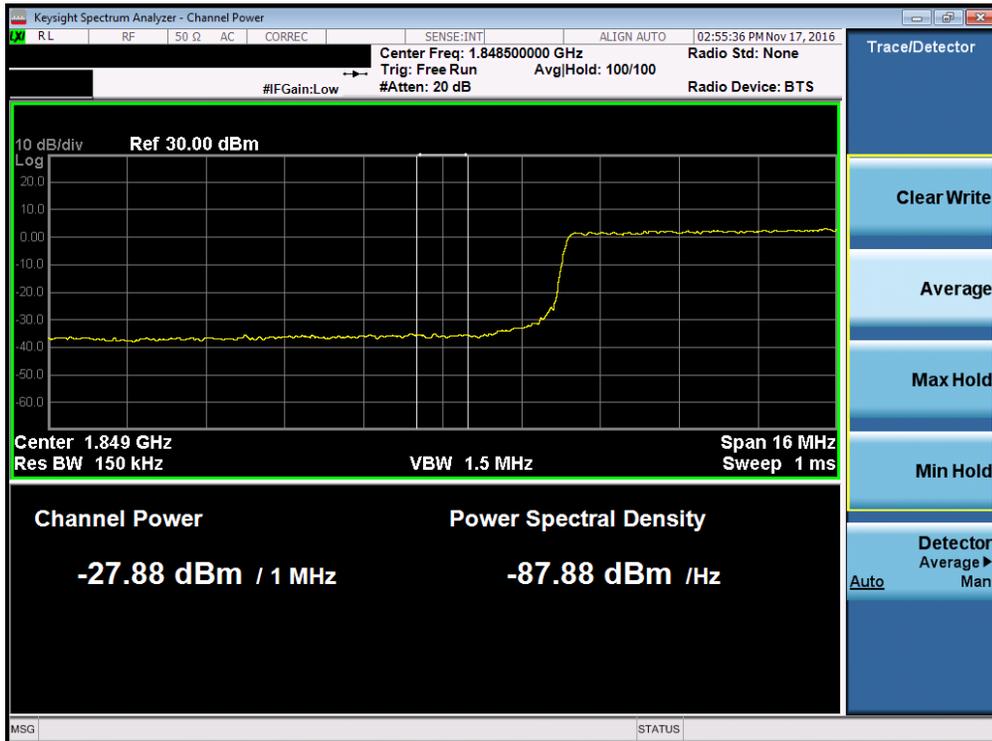


Plot 7-148. Upper Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1611151766-R1.ZNF	Test Dates: 11/14-11/25/2016	EUT Type: Portable Handset		Page 90 of 123



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

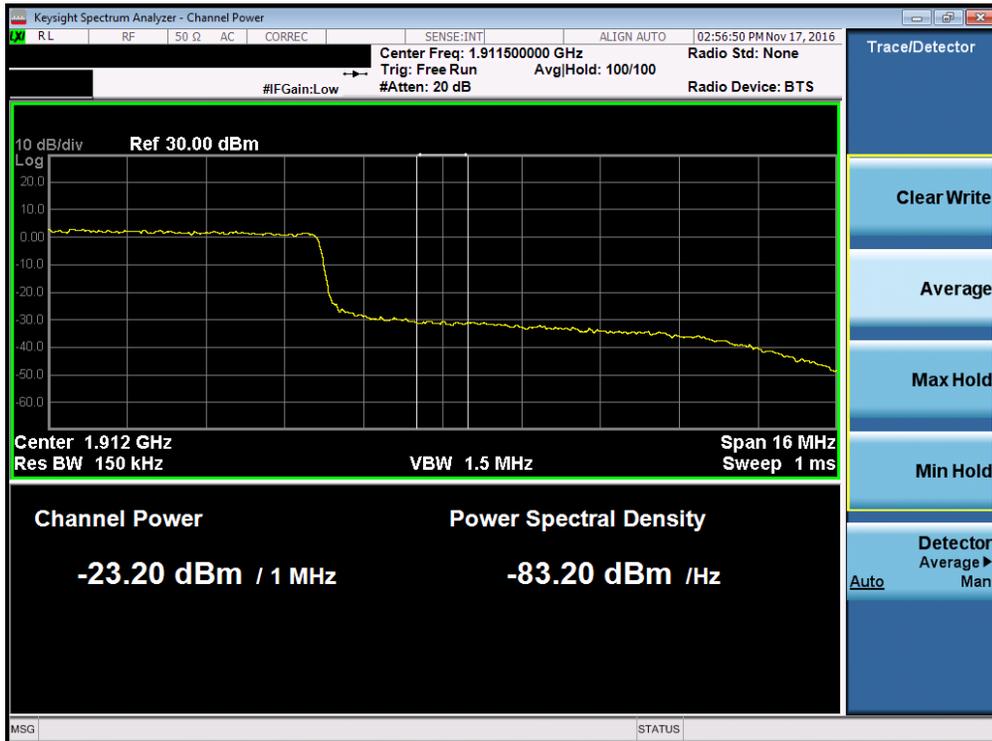


Plot 7-150. Lower Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1611151766-R1.ZNF	Test Dates: 11/14-11/25/2016	EUT Type: Portable Handset		Page 91 of 123



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: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1611151766-R1.ZNF	Test Dates: 11/14-11/25/2016	EUT Type: Portable Handset		Page 92 of 123

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.

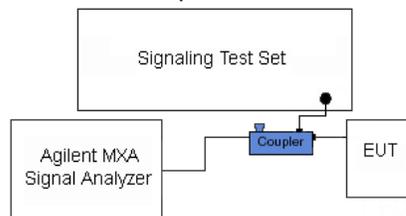
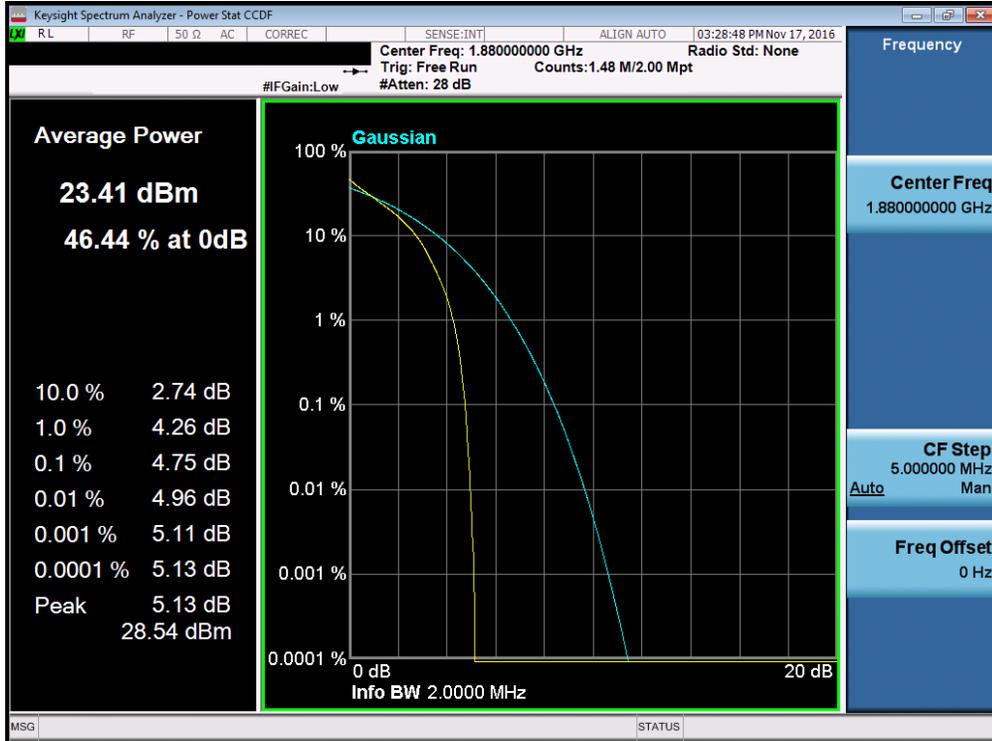


Figure 7-4. Test Instrument & Measurement Setup

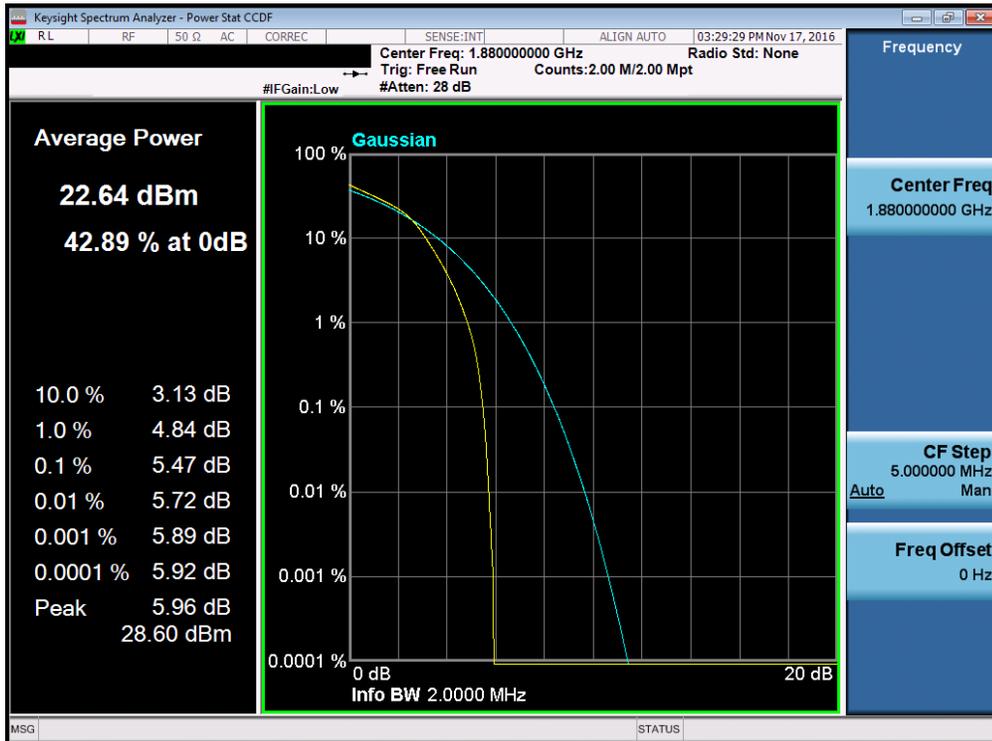
Test Notes

None.

FCC ID: ZNFL59BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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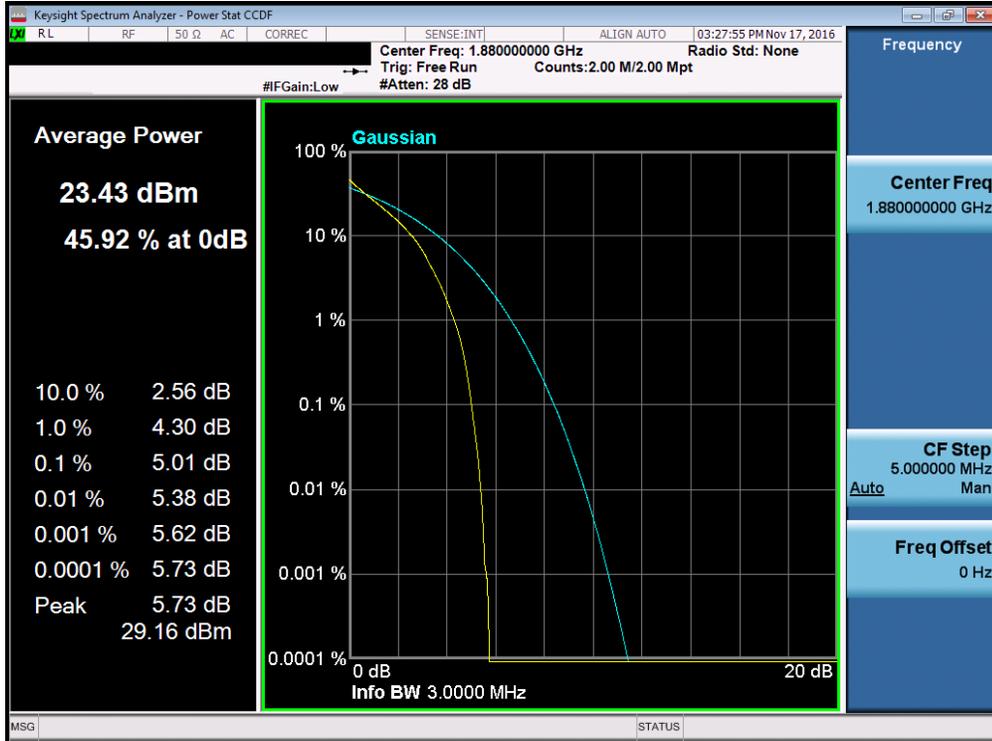


Plot 7-153. PAR Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

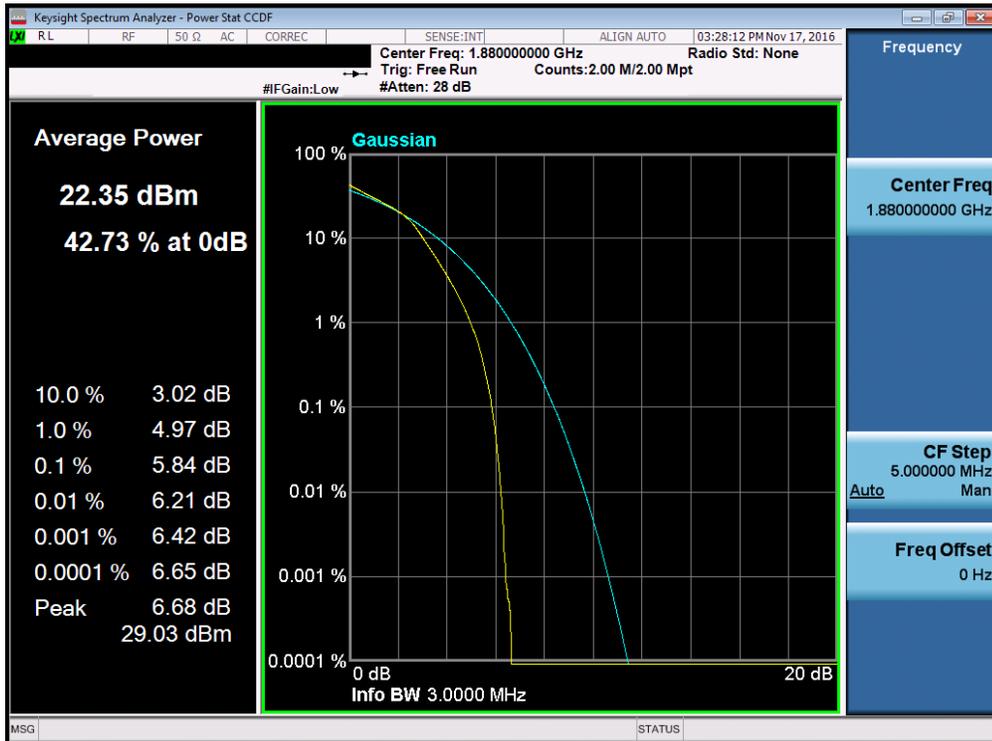


Plot 7-154. PAR Plot (Band 2 – 1.4MHz 16-QAM – RB Size 6)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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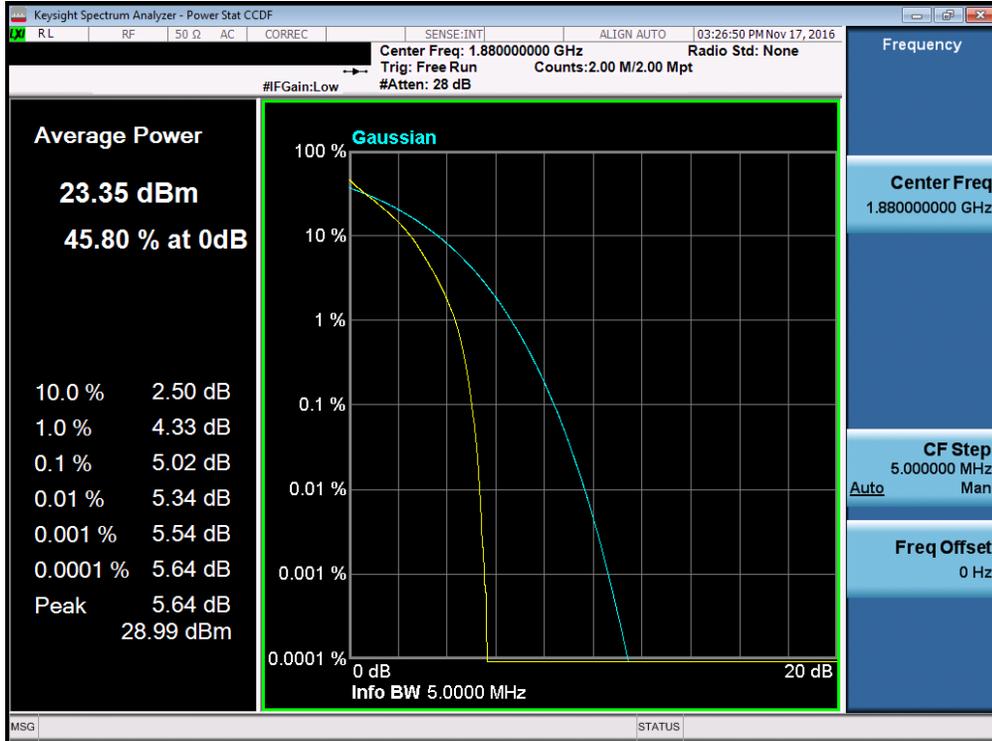


Plot 7-155. PAR Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

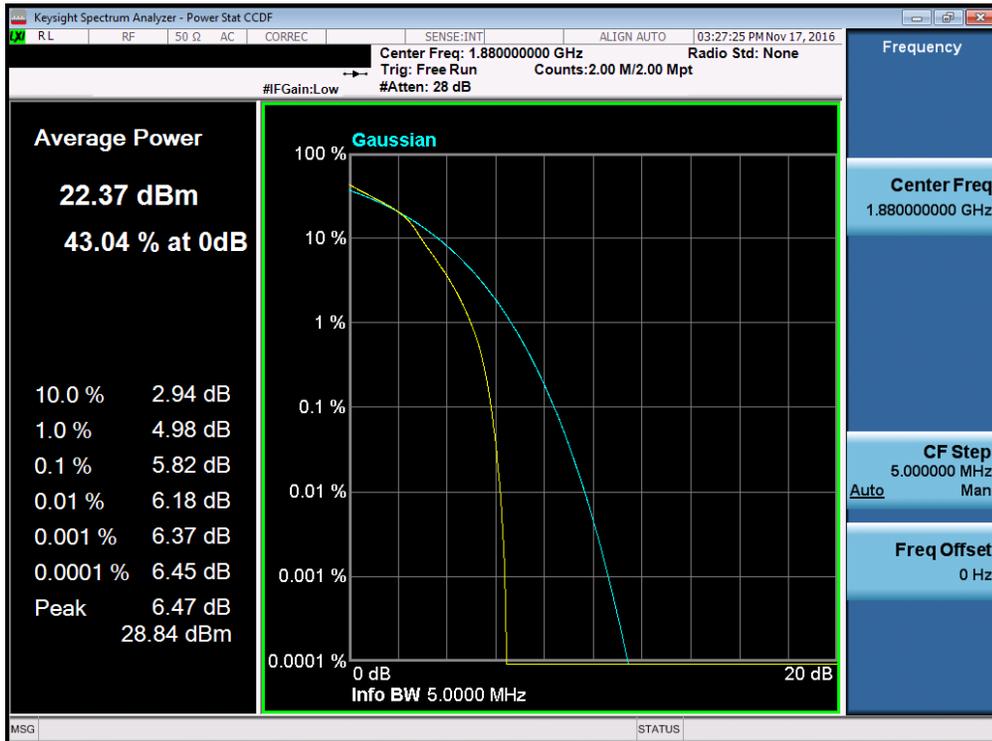


Plot 7-156. PAR Plot (Band 2 – 3.0MHz 16-QAM – RB Size 15)

FCC ID: ZNFL59BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1611151766-R1.ZNF	Test Dates: 11/14-11/25/2016	EUT Type: Portable Handset		Page 95 of 123

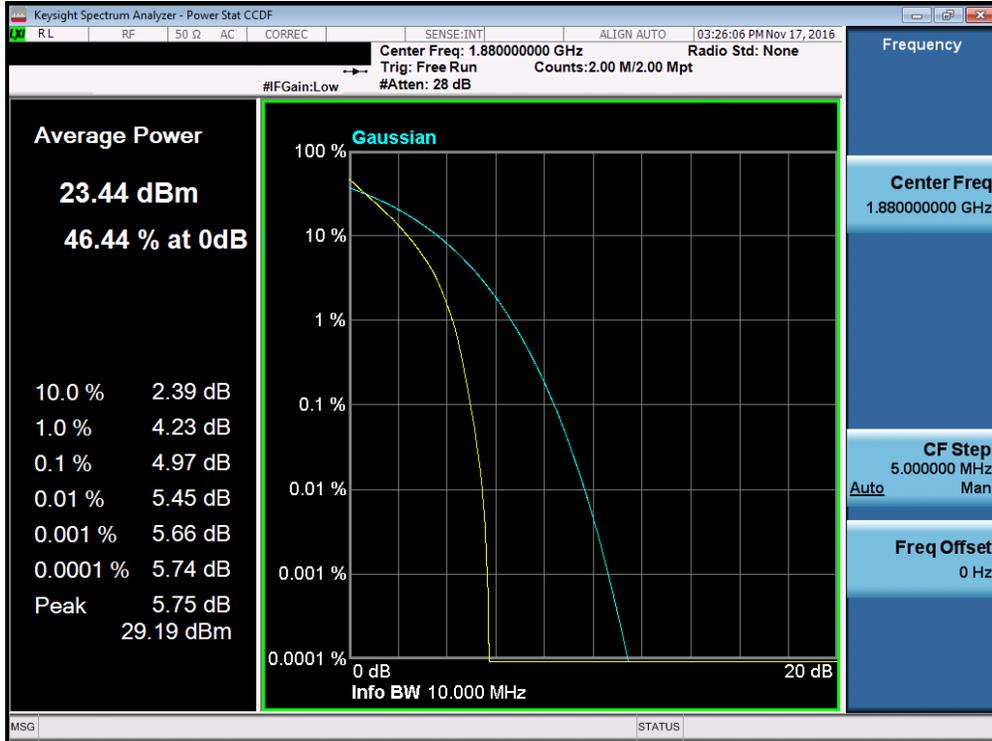


Plot 7-157. PAR Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

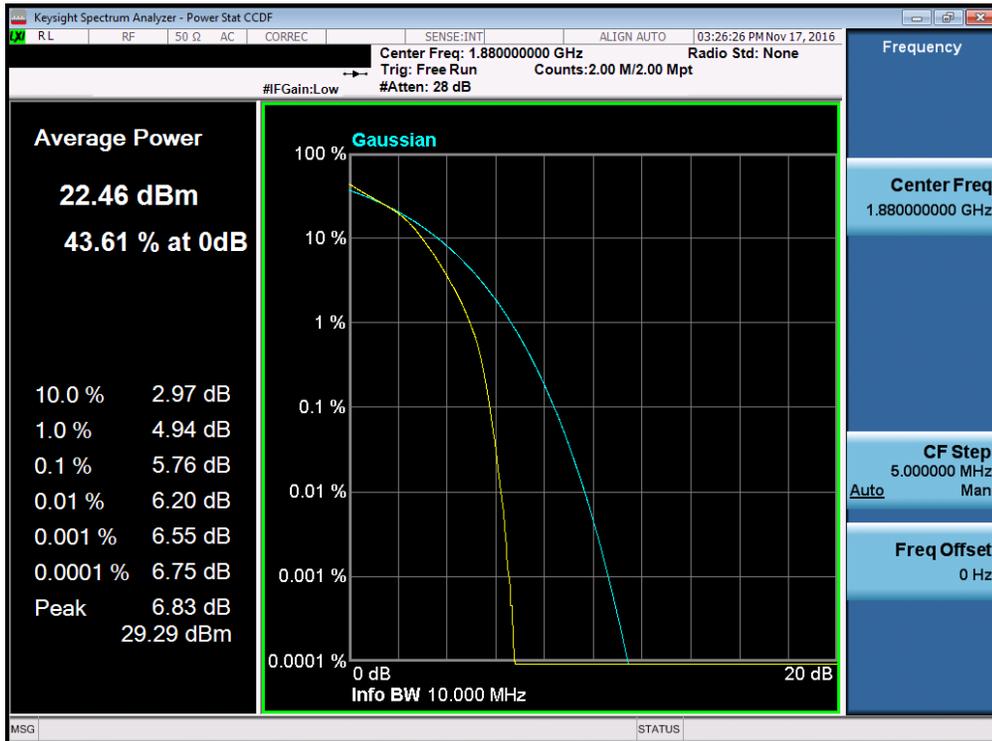


Plot 7-158. PAR Plot (Band 2 – 5.0MHz 16-QAM – RB Size 25)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1611151766-R1.ZNF	Test Dates: 11/14-11/25/2016	EUT Type: Portable Handset		Page 96 of 123

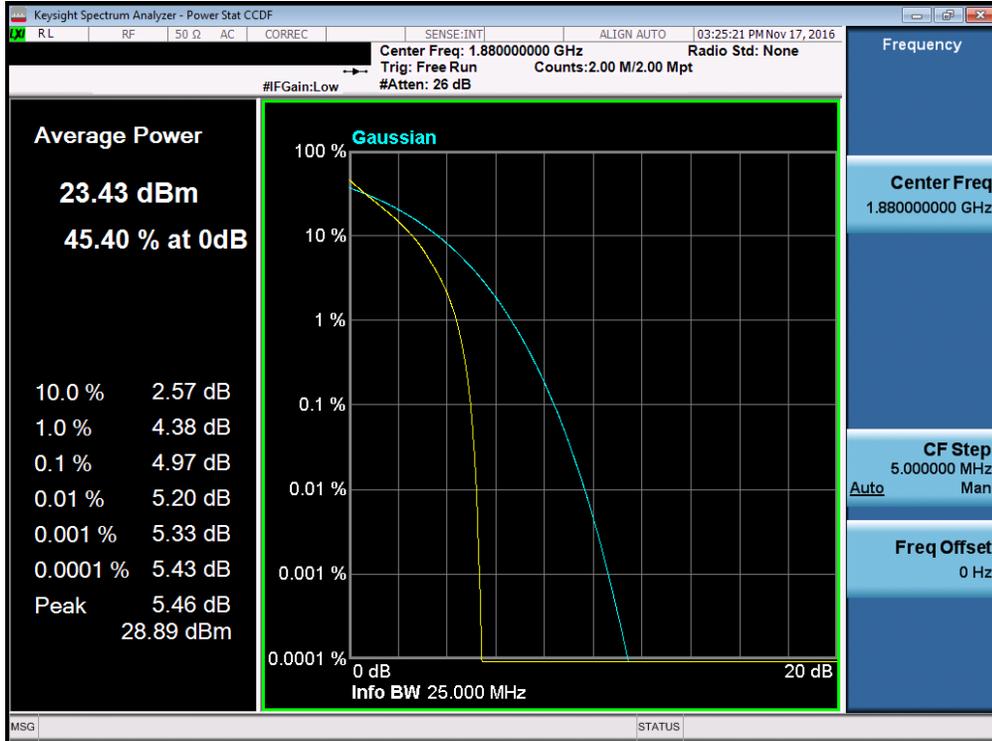


Plot 7-159. PAR Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

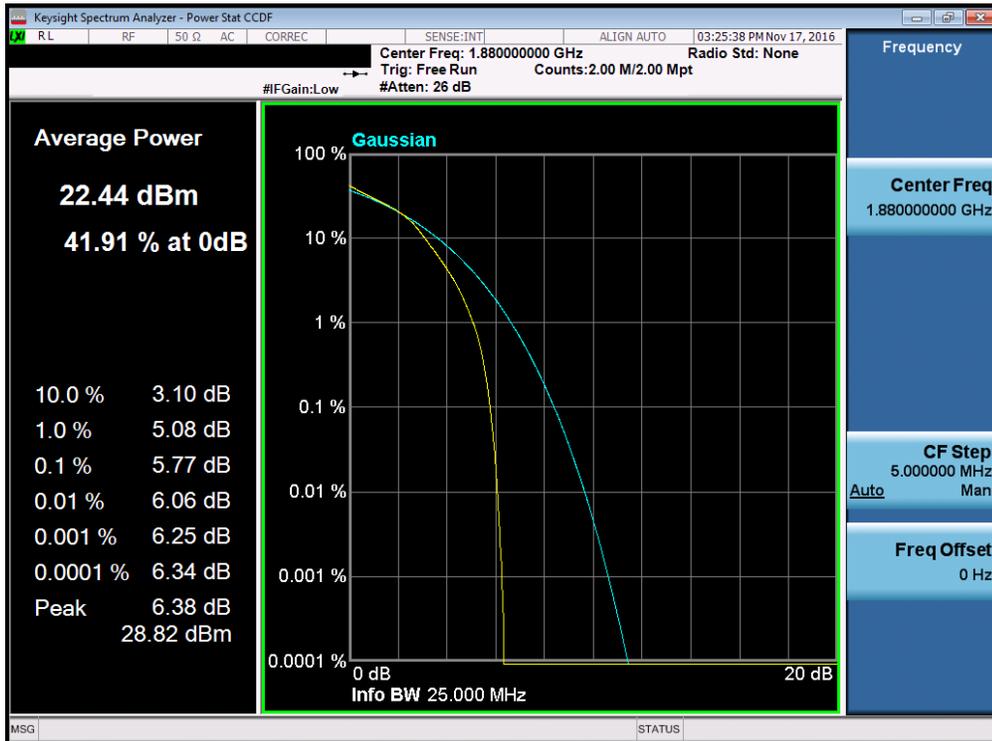


Plot 7-160. PAR Plot (Band 2 – 10.0MHz 16-QAM – RB Size 50)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1611151766-R1.ZNF	Test Dates: 11/14-11/25/2016	EUT Type: Portable Handset		Page 97 of 123

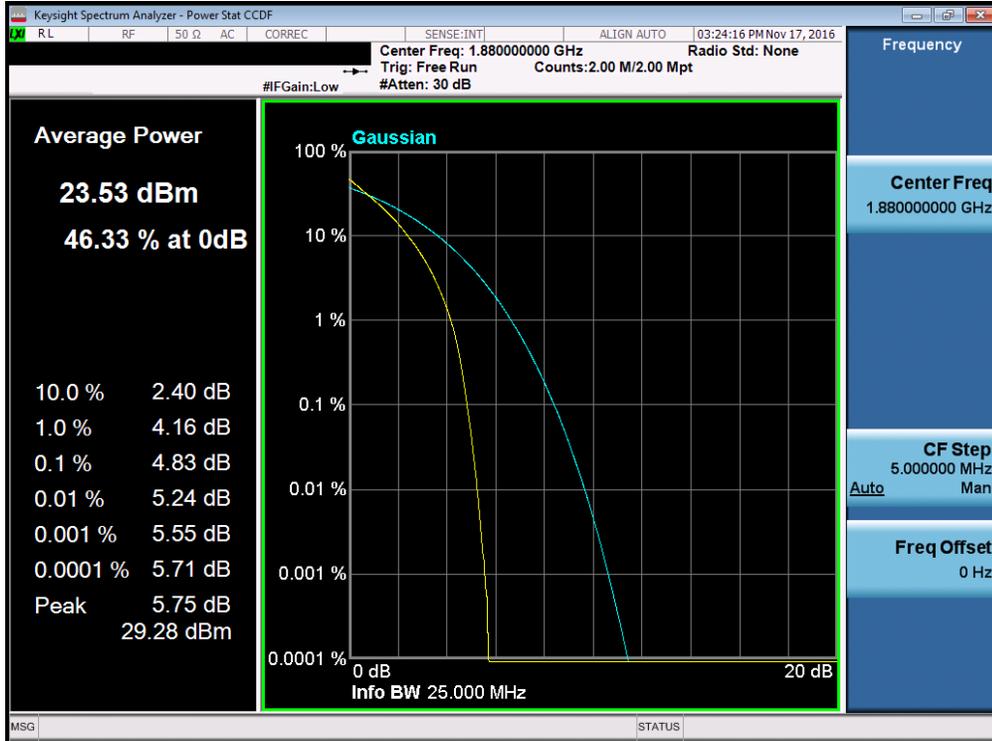


Plot 7-161. PAR Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

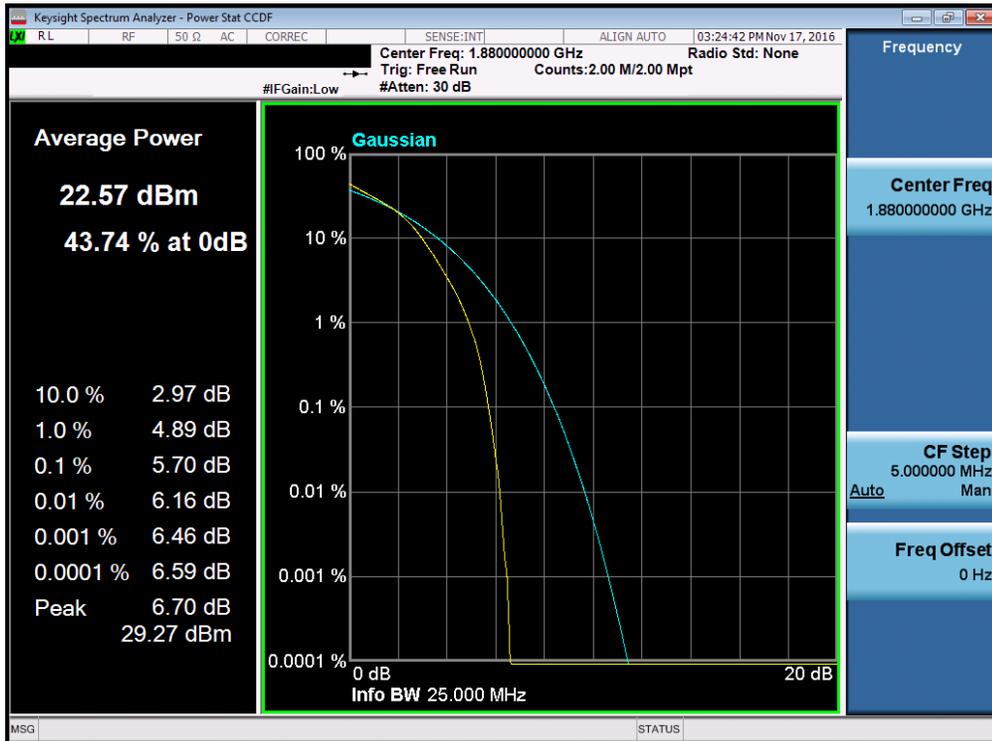


Plot 7-162. PAR Plot (Band 2 – 15.0MHz 16-QAM – RB Size 75)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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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: ZNFL59BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1611151766-R1.ZNF	Test Dates: 11/14-11/25/2016	EUT Type: Portable Handset		Page 99 of 123

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-D-2010 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v02r02 – Section 5.2.1

ANSI/TIA-603-D-2010 – Section 2.2.17

Test Settings

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

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Test Setup

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

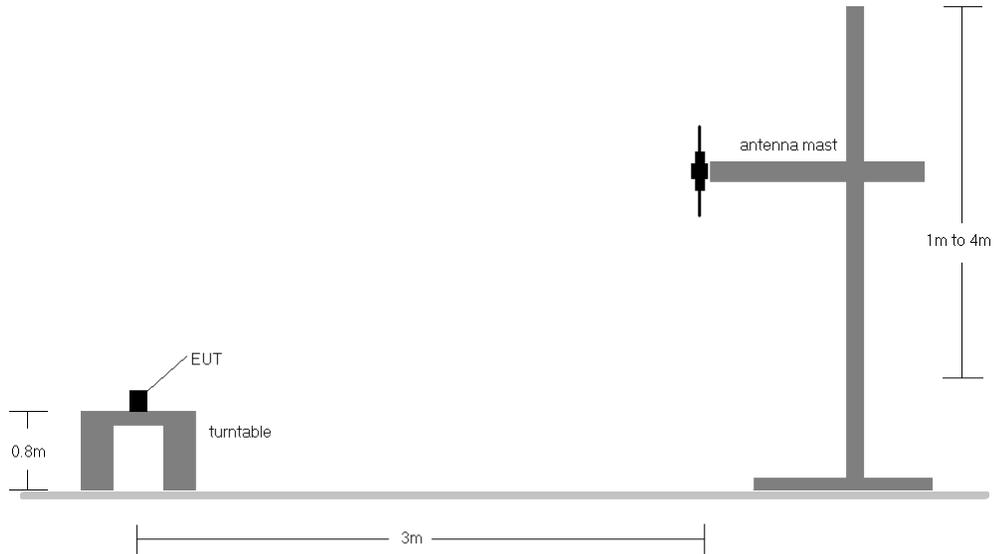


Figure 7-5. Radiated Test Setup <1GHz

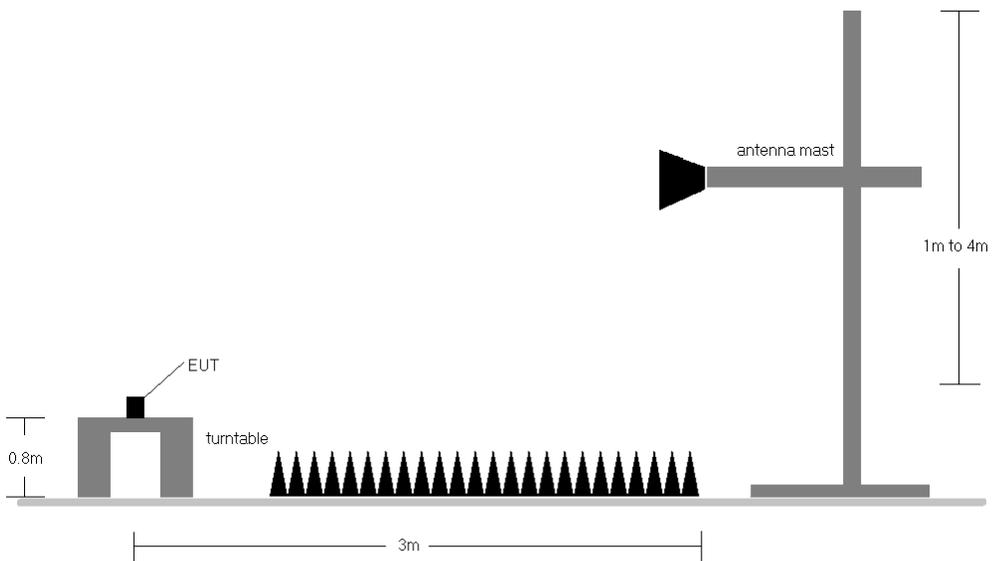


Figure 7-6. Radiated Test Setup >1GHz

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: ZNFL59BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
699.70	1.4	QPSK	H	134	161	1 / 5	17.24	2.10	19.34	34.77	-15.43
707.50	1.4	QPSK	H	134	164	1 / 5	17.49	2.31	19.80	34.77	-14.97
715.30	1.4	QPSK	H	133	157	1 / 5	17.41	2.52	19.93	34.77	-14.84
699.70	1.4	16-QAM	H	134	161	1 / 5	16.51	2.10	18.61	34.77	-16.16
707.50	1.4	16-QAM	H	134	164	1 / 0	16.54	2.31	18.85	34.77	-15.92
715.30	1.4	16-QAM	H	133	157	1 / 5	16.62	2.52	19.14	34.77	-15.63
700.50	3	QPSK	H	136	161	1 / 14	17.62	2.12	19.74	34.77	-15.03
707.50	3	QPSK	H	134	163	1 / 0	17.78	2.31	20.09	34.77	-14.68
714.50	3	QPSK	H	134	159	1 / 14	17.56	2.50	20.06	34.77	-14.71
700.50	3	16-QAM	H	136	161	1 / 14	16.60	2.12	18.72	34.77	-16.05
707.50	3	16-QAM	H	134	163	1 / 14	16.67	2.31	18.98	34.77	-15.79
714.50	3	16-QAM	H	134	159	1 / 14	16.71	2.50	19.21	34.77	-15.56
701.50	5	QPSK	H	133	161	1 / 0	18.49	2.15	20.64	34.77	-14.13
707.50	5	QPSK	H	167	163	1 / 0	18.45	2.31	20.76	34.77	-14.01
713.50	5	QPSK	H	137	156	1 / 0	17.31	2.48	19.79	34.77	-14.99
701.50	5	16-QAM	H	133	161	1 / 0	17.48	2.15	19.63	34.77	-15.14
707.50	5	16-QAM	H	167	163	1 / 0	17.36	2.31	19.67	34.77	-15.10
713.50	5	16-QAM	H	137	156	1 / 0	16.24	2.48	18.72	34.77	-16.06
704.00	10	QPSK	H	136	154	1 / 0	18.40	2.22	20.62	34.77	-14.16
707.50	10	QPSK	H	136	160	1 / 0	18.22	2.31	20.53	34.77	-14.24
711.00	10	QPSK	H	136	160	1 / 0	18.30	2.41	20.71	34.77	-14.06
704.00	10	16-QAM	H	136	154	1 / 0	17.53	2.22	19.75	34.77	-15.03
707.50	10	16-QAM	H	136	160	1 / 0	17.45	2.31	19.76	34.77	-15.01
711.00	10	16-QAM	H	136	160	1 / 0	17.58	2.41	19.99	34.77	-14.78
707.50	5	QPSK	V	202	146	1 / 0	17.55	2.88	20.43	34.77	-14.34

Table 7-2. ERP Data (Band 12)

FCC ID: ZNFL59BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1611151766-R1.ZNF	Test Dates: 11/14-11/25/2016	EUT Type: Portable Handset	Page 102 of 123	

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	233	265	1 / 5	14.54	5.01	19.55	38.45	-18.90
836.50	1.4	QPSK	H	215	266	1 / 5	13.97	5.16	19.13	38.45	-19.32
848.30	1.4	QPSK	H	219	271	1 / 0	14.52	5.30	19.82	38.45	-18.63
824.70	1.4	16-QAM	H	233	265	1 / 0	13.54	5.01	18.55	38.45	-19.90
836.50	1.4	16-QAM	H	215	266	1 / 0	12.91	5.16	18.07	38.45	-20.38
848.30	1.4	16-QAM	H	219	271	1 / 0	13.82	5.30	19.12	38.45	-19.33
825.50	3	QPSK	H	230	257	1 / 0	14.92	5.02	19.94	38.45	-18.51
836.50	3	QPSK	H	211	274	1 / 0	14.38	5.16	19.54	38.45	-18.91
847.50	3	QPSK	H	211	27	1 / 14	14.83	5.29	20.12	38.45	-18.33
825.50	3	16-QAM	H	230	257	1 / 14	13.83	5.02	18.85	38.45	-19.60
836.50	3	16-QAM	H	211	274	1 / 14	13.42	5.16	18.58	38.45	-19.87
847.50	3	16-QAM	H	211	27	1 / 0	13.51	5.29	18.80	38.45	-19.65
826.50	5	QPSK	H	229	271	1 / 0	15.76	5.03	20.79	38.45	-17.66
836.50	5	QPSK	H	211	281	1 / 24	15.23	5.16	20.39	38.45	-18.06
846.50	5	QPSK	H	215	274	1 / 24	15.88	5.28	21.16	38.45	-17.29
826.50	5	16-QAM	H	229	271	1 / 0	14.58	5.03	19.61	38.45	-18.84
836.50	5	16-QAM	H	211	281	1 / 24	14.45	5.16	19.61	38.45	-18.84
846.50	5	16-QAM	H	215	274	1 / 24	14.83	5.28	20.11	38.45	-18.34
829.00	10	QPSK	H	231	262	1 / 0	16.04	5.06	21.10	38.45	-17.35
836.50	10	QPSK	H	214	269	1 / 49	15.89	5.16	21.05	38.45	-17.40
844.00	10	QPSK	H	215	278	1 / 49	16.13	5.25	21.38	38.45	-17.07
829.00	10	16-QAM	H	231	262	1 / 0	14.95	5.06	20.01	38.45	-18.44
836.50	10	16-QAM	H	214	269	1 / 49	14.76	5.16	19.92	38.45	-18.53
844.00	10	16-QAM	H	215	278	1 / 49	15.03	5.25	20.28	38.45	-18.17
844.00	10	QPSK	V	212	358	1 / 74	14.32	5.03	19.35	38.45	-19.10

Table 7-3. ERP Data (Band 5)

FCC ID: ZNFL59BL	 PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	 LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1611151766-R1.ZNF	Test Dates: 11/14-11/25/2016	EUT Type: Portable Handset	Page 103 of 123	

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	165	293	1 / 0	9.87	9.66	19.53	30.00	-10.47
1732.50	1.4	QPSK	H	110	291	1 / 5	10.96	9.61	20.57	30.00	-9.43
1754.30	1.4	QPSK	H	113	293	1 / 5	11.29	9.57	20.86	30.00	-9.14
1710.70	1.4	16-QAM	H	165	293	1 / 0	8.64	9.66	18.30	30.00	-11.70
1732.50	1.4	16-QAM	H	110	291	1 / 5	10.13	9.61	19.74	30.00	-10.26
1754.30	1.4	16-QAM	H	113	293	1 / 5	10.09	9.57	19.66	30.00	-10.34
1711.50	3	QPSK	H	110	293	1 / 14	10.56	9.65	20.21	30.00	-9.79
1732.50	3	QPSK	H	110	292	1 / 14	12.01	9.61	21.62	30.00	-8.38
1753.50	3	QPSK	H	110	290	1 / 0	12.17	9.57	21.74	30.00	-8.26
1711.50	3	16-QAM	H	110	293	1 / 14	9.01	9.65	18.66	30.00	-11.34
1732.50	3	16-QAM	H	110	292	1 / 14	10.72	9.61	20.33	30.00	-9.67
1753.50	3	16-QAM	H	110	290	1 / 0	10.89	9.57	20.46	30.00	-9.54
1712.50	5	QPSK	H	166	289	1 / 0	11.54	9.65	21.19	30.00	-8.81
1732.50	5	QPSK	H	110	291	1 / 24	12.82	9.61	22.43	30.00	-7.57
1752.50	5	QPSK	H	110	294	1 / 0	12.47	9.57	22.04	30.00	-7.96
1712.50	5	16-QAM	H	166	289	1 / 0	9.70	9.65	19.35	30.00	-10.65
1732.50	5	16-QAM	H	110	291	1 / 24	11.84	9.61	21.45	30.00	-8.55
1752.50	5	16-QAM	H	110	294	1 / 0	11.14	9.57	20.71	30.00	-9.29
1715.00	10	QPSK	H	110	297	1 / 49	11.42	9.65	21.07	30.00	-8.93
1732.50	10	QPSK	H	110	291	1 / 49	13.16	9.61	22.77	30.00	-7.23
1750.00	10	QPSK	H	110	293	1 / 49	13.13	9.58	22.71	30.00	-7.29
1715.00	10	16-QAM	H	110	297	1 / 49	10.19	9.65	19.84	30.00	-10.16
1732.50	10	16-QAM	H	110	291	1 / 49	11.22	9.61	20.83	30.00	-9.17
1750.00	10	16-QAM	H	110	293	1 / 49	11.42	9.58	21.00	30.00	-9.00
1717.50	15	QPSK	H	110	290	1 / 74	11.57	9.64	21.21	30.00	-8.79
1732.50	15	QPSK	H	110	292	1 / 74	13.20	9.61	22.81	30.00	-7.19
1747.50	15	QPSK	H	110	291	1 / 0	13.57	9.58	23.15	30.00	-6.85
1717.50	15	16-QAM	H	110	290	1 / 74	10.21	9.64	19.85	30.00	-10.15
1732.50	15	16-QAM	H	110	292	1 / 74	12.16	9.61	21.77	30.00	-8.23
1747.50	15	16-QAM	H	110	291	1 / 0	12.16	9.58	21.74	30.00	-8.26
1720.00	20	QPSK	H	110	288	1 / 99	12.03	9.64	21.67	30.00	-8.33
1732.50	20	QPSK	H	110	292	1 / 99	12.75	9.61	22.36	30.00	-7.64
1745.00	20	QPSK	H	110	297	1 / 0	13.21	9.59	22.80	30.00	-7.20
1720.00	20	16-QAM	H	110	288	1 / 99	10.48	9.64	20.12	30.00	-9.88
1732.50	20	16-QAM	H	110	292	1 / 99	11.47	9.61	21.08	30.00	-8.92
1745.00	20	16-QAM	H	110	297	1 / 0	11.81	9.59	21.40	30.00	-8.60
1747.50	15	QPSK	V	216	45	1 / 99	10.08	9.43	19.51	30.00	-10.49

Table 7-4. EIRP Data (Band 4)

FCC ID: ZNFL59BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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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 [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1850.70	1.4	QPSK	V	119	63	1 / 0	13.67	9.21	22.88	33.01	-10.13
1880.00	1.4	QPSK	V	110	66	1 / 5	13.71	9.27	22.98	33.01	-10.03
1909.30	1.4	QPSK	V	110	63	1 / 5	13.29	9.36	22.65	33.01	-10.36
1850.70	1.4	16-QAM	V	119	63	1 / 0	12.64	9.21	21.85	33.01	-11.16
1880.00	1.4	16-QAM	V	110	66	1 / 5	12.57	9.27	21.84	33.01	-11.17
1909.30	1.4	16-QAM	V	110	63	1 / 5	12.18	9.36	21.54	33.01	-11.47
1851.50	3	QPSK	V	164	321	1 / 0	12.94	9.21	22.15	33.01	-10.86
1880.00	3	QPSK	V	110	62	1 / 14	14.45	9.27	23.72	33.01	-9.29
1908.50	3	QPSK	V	119	336	1 / 0	14.07	9.36	23.43	33.01	-9.58
1851.50	3	16-QAM	V	164	321	1 / 0	11.96	9.21	21.17	33.01	-11.84
1880.00	3	16-QAM	V	110	62	1 / 14	13.80	9.27	23.07	33.01	-9.94
1908.50	3	16-QAM	V	119	336	1 / 0	12.15	9.36	21.51	33.01	-11.50
1852.50	5	QPSK	V	119	65	1 / 0	16.03	9.22	25.25	33.01	-7.76
1880.00	5	QPSK	V	110	65	1 / 24	15.98	9.27	25.25	33.01	-7.76
1907.50	5	QPSK	V	110	63	1 / 0	16.01	9.35	25.36	33.01	-7.65
1852.50	5	16-QAM	V	119	65	1 / 0	14.19	9.22	23.41	33.01	-9.60
1880.00	5	16-QAM	V	110	65	1 / 24	14.62	9.27	23.89	33.01	-9.12
1907.50	5	16-QAM	V	110	63	1 / 0	14.00	9.35	23.35	33.01	-9.66
1855.00	10	QPSK	V	116	66	1 / 0	16.11	9.22	25.33	33.01	-7.68
1880.00	10	QPSK	V	110	65	1 / 49	16.35	9.27	25.62	33.01	-7.39
1905.00	10	QPSK	V	110	65	1 / 0	16.45	9.34	25.79	33.01	-7.22
1855.00	10	16-QAM	V	116	66	1 / 0	14.52	9.22	23.74	33.01	-9.27
1880.00	10	16-QAM	V	110	65	1 / 49	15.22	9.27	24.49	33.01	-8.52
1905.00	10	16-QAM	V	110	65	1 / 0	15.52	9.34	24.86	33.01	-8.15
1857.50	15	QPSK	V	119	67	1 / 0	15.86	9.23	25.09	33.01	-7.92
1880.00	15	QPSK	V	110	64	1 / 74	16.26	9.27	25.53	33.01	-7.48
1902.50	15	QPSK	V	110	63	1 / 0	15.99	9.33	25.32	33.01	-7.69
1857.50	15	16-QAM	V	119	67	1 / 0	15.09	9.23	24.32	33.01	-8.69
1880.00	15	16-QAM	V	110	64	1 / 74	15.23	9.27	24.50	33.01	-8.51
1902.50	15	16-QAM	V	110	63	1 / 0	15.33	9.33	24.66	33.01	-8.35
1860.00	20	QPSK	V	110	67	1 / 0	15.71	9.23	24.94	33.01	-8.07
1880.00	20	QPSK	V	110	63	1 / 99	15.84	9.27	25.11	33.01	-7.90
1900.00	20	QPSK	V	110	68	1 / 0	15.65	9.31	24.96	33.01	-8.05
1860.00	20	16-QAM	V	110	67	1 / 0	14.28	9.23	23.51	33.01	-9.50
1880.00	20	16-QAM	V	110	63	1 / 99	14.65	9.27	23.92	33.01	-9.09
1900.00	20	16-QAM	V	110	68	1 / 0	13.99	9.31	23.30	33.01	-9.71
1905.00	10	QPSK	H	110	83	1 / 0	16.13	9.24	25.37	33.01	-7.64

Table 7-5. EIRP Data (Band 2)

FCC ID: ZNFL59BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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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-D-2010 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as peak measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v02r02 – Section 5.8

ANSI/TIA-603-D-2010 – Section 2.2.12

Test Settings

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

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Test Setup

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

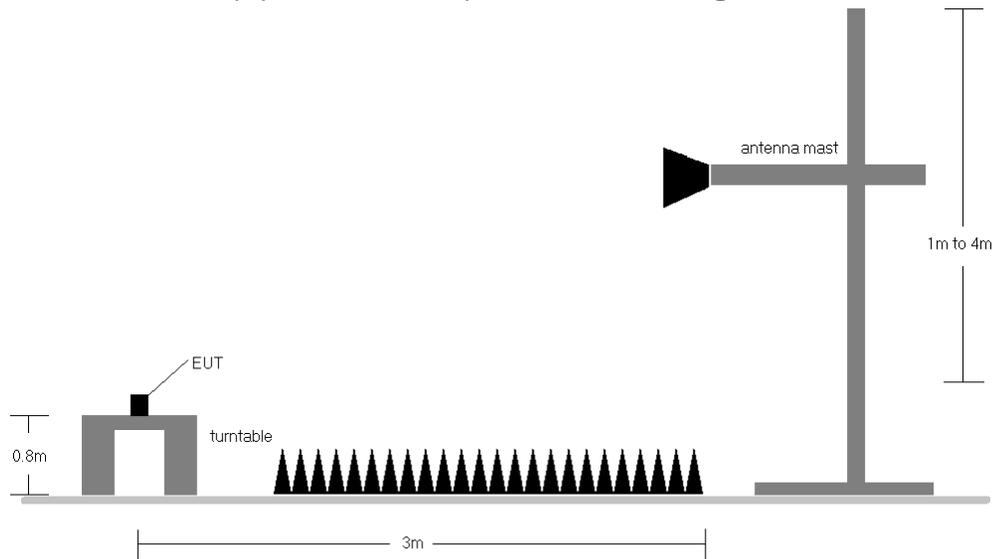


Figure 7-7. Test Instrument & Measurement Setup

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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OPERATING FREQUENCY: 701.50 MHz
 CHANNEL: 23035
 MEASURED OUTPUT POWER: 20.64 dBm = 0.116 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 33.64 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	110	21	-61.63	5.60	-56.03	76.7
2104.50	H	110	318	-67.83	6.67	-61.15	81.8
2806.00	H	-	-	-68.64	7.92	-60.72	81.4
3507.50	H	-	-	-65.43	7.80	-57.63	78.3

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

OPERATING FREQUENCY: 707.50 MHz
 CHANNEL: 23095
 MEASURED OUTPUT POWER: 20.76 dBm = 0.119 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 33.76 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1415.00	H	110	138	-64.19	5.69	-58.49	79.3
2122.50	H	110	145	-66.66	6.75	-59.91	80.7
2830.00	H	-	-	-71.48	7.90	-63.58	84.3
3537.50	H	-	-	-67.73	7.81	-59.92	80.7

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

FCC ID: ZNFL59BL		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: 19.79 dBm = 0.095 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 32.79 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	110	142	-63.96	5.79	-58.17	78.0
2140.50	H	110	319	-69.01	6.82	-62.19	82.0
2854.00	H	-	-	-71.25	7.88	-63.37	83.2
3567.50	H	-	-	-68.21	7.82	-60.40	80.2

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

OPERATING FREQUENCY: 829.00 MHz
 CHANNEL: 20450
 MEASURED OUTPUT POWER: 21.10 dBm = 0.129 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 34.10 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1658.00	H	110	291	-63.63	6.70	-56.93	78.0
2487.00	H	110	110	-60.11	7.58	-52.54	73.6
3316.00	H	-	-	-65.59	7.42	-58.18	79.3
4145.00	H	-	-	-67.60	8.13	-59.47	80.6

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

FCC ID: ZNFL59BL		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: 21.05 dBm = 0.127 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 34.05 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]
1673.00	H	110	285	-66.15	6.70	-59.46	80.5
2509.50	H	110	97	-55.69	7.63	-48.06	69.1
3346.00	H	-	-	-66.18	7.51	-58.67	79.7
4182.50	H	-	-	-67.57	8.23	-59.34	80.4

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

OPERATING FREQUENCY: 844.00 MHz
 CHANNEL: 20600
 MEASURED OUTPUT POWER: 21.38 dBm = 0.137 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 34.38 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]
1688.00	H	110	292	-63.24	6.70	-56.54	77.9
2532.00	H	110	98	-58.28	7.61	-50.67	72.0
3376.00	H	-	-	-65.92	7.61	-58.31	79.7
4220.00	H	-	-	-67.07	8.33	-58.74	80.1

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

FCC ID: ZNFL59BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1611151766-R1.ZNF	Test Dates: 11/14-11/25/2016	EUT Type: Portable Handset	Page 110 of 123	

OPERATING FREQUENCY: 1717.50 MHz
 CHANNEL: 20025
 MEASURED OUTPUT POWER: 21.21 dBm = 0.132 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 15.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 34.21 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	110	167	-63.44	9.88	-53.56	74.8
5152.50	H	-	-	-65.44	10.75	-54.69	75.9
6870.00	H	-	-	-59.68	11.69	-47.99	69.2

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

OPERATING FREQUENCY: 1732.50 MHz
 CHANNEL: 20175
 MEASURED OUTPUT POWER: 22.81 dBm = 0.191 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 15.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 35.81 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3465.00	H	240	179	-61.55	9.91	-51.64	74.5
5197.50	H	-	-	-65.07	10.75	-54.33	77.1
6930.00	H	-	-	-60.68	11.76	-48.92	71.7

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

FCC ID: ZNFL59BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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OPERATING FREQUENCY: 1747.50 MHz
 CHANNEL: 20325
 MEASURED OUTPUT POWER: 23.15 dBm = 0.207 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 15.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 36.15 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]
3495.00	H	110	161	-56.36	9.94	-46.42	69.6
5242.50	H	-	-	-65.87	10.72	-55.15	78.3
6990.00	H	-	-	-60.07	11.83	-48.25	71.4

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

OPERATING FREQUENCY: 1855.00 MHz
 CHANNEL: 18650
 MEASURED OUTPUT POWER: 25.33 dBm = 0.341 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 38.33 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3710.00	V	193	93	-43.79	9.51	-34.29	59.6
5565.00	V	-	-	-65.56	10.96	-54.60	79.9
7420.00	V	-	-	-48.97	10.95	-38.02	63.3

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

FCC ID: ZNFL59BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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OPERATING FREQUENCY: 1880.00 MHz
 CHANNEL: 18900
 MEASURED OUTPUT POWER: 25.62 dBm = 0.365 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 38.62 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3760.00	V	138	98	-52.04	9.38	-42.66	68.3
5640.00	V	-	-	-65.29	11.15	-54.14	79.8
7520.00	V	-	-	-58.03	11.11	-46.92	72.5

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

OPERATING FREQUENCY: 1905.00 MHz
 CHANNEL: 19150
 MEASURED OUTPUT POWER: 25.79 dBm = 0.379 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 38.79 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3810.00	V	167	93	-42.13	9.29	-32.85	58.6
5715.00	V	-	-	-64.86	11.35	-53.51	79.3
7620.00	V	-	-	-58.29	11.31	-46.99	72.8

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

FCC ID: ZNFL59BL		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 $\pm 0.00025\%$ (± 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)	707,499,941	-59	-0.0000083
100 %		- 30	707,499,946	-54	-0.0000076
100 %		- 20	707,500,043	43	0.0000061
100 %		- 10	707,499,900	-100	-0.0000141
100 %		0	707,500,146	146	0.0000206
100 %		+ 10	707,499,907	-93	-0.0000131
100 %		+ 20	707,499,863	-137	-0.0000194
100 %		+ 30	707,500,195	195	0.0000276
100 %		+ 40	707,499,626	-374	-0.0000529
100 %		+ 50	707,500,203	203	0.0000287
BATT. ENDPOINT	3.45	+ 20	707,499,945	-55	-0.0000078

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

FCC ID: ZNFL59BL		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

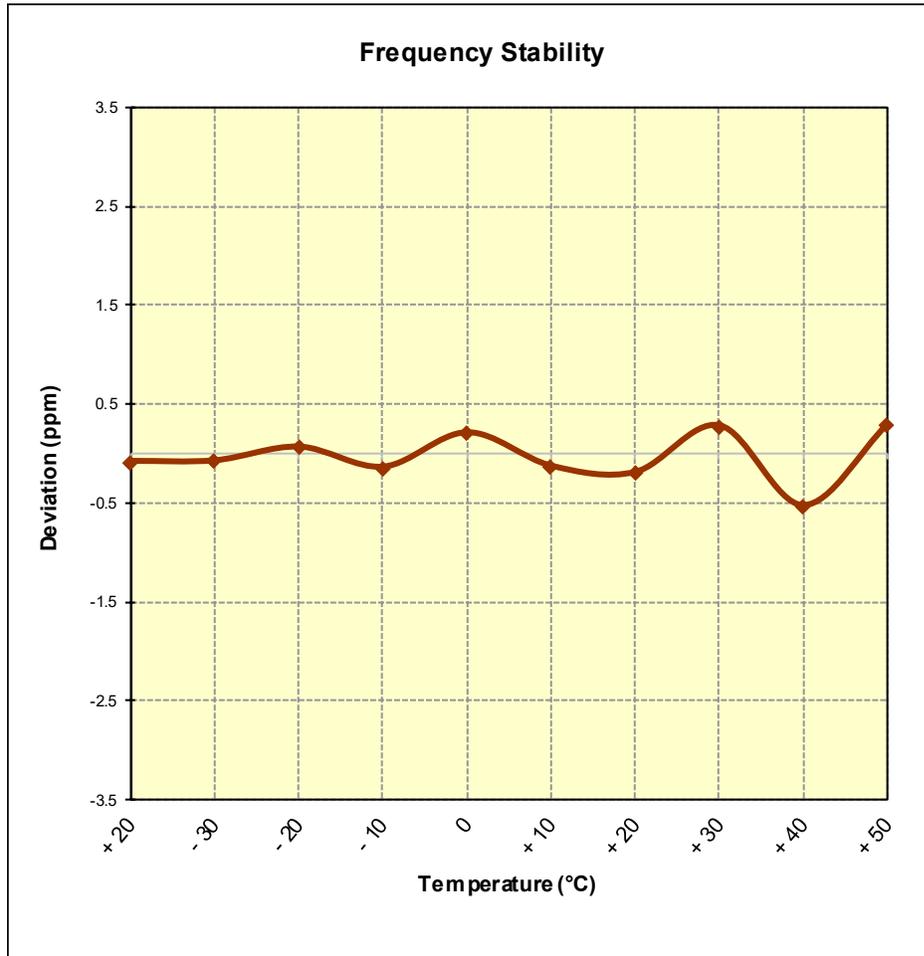


Figure 7-8. Frequency Stability Graph (Band 12)

FCC ID: ZNFL59BL		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

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

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	836,500,235	235	0.0000281
100 %		- 30	836,499,924	-76	-0.0000091
100 %		- 20	836,499,897	-103	-0.0000123
100 %		- 10	836,499,905	-95	-0.0000114
100 %		0	836,499,943	-57	-0.0000068
100 %		+ 10	836,499,897	-103	-0.0000123
100 %		+ 20	836,499,726	-274	-0.0000328
100 %		+ 30	836,499,727	-273	-0.0000326
100 %		+ 40	836,499,904	-96	-0.0000115
100 %		+ 50	836,499,960	-40	-0.0000048
BATT. ENDPOINT	3.45	+ 20	836,499,950	-50	-0.0000060

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

FCC ID: ZNFL59BL		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

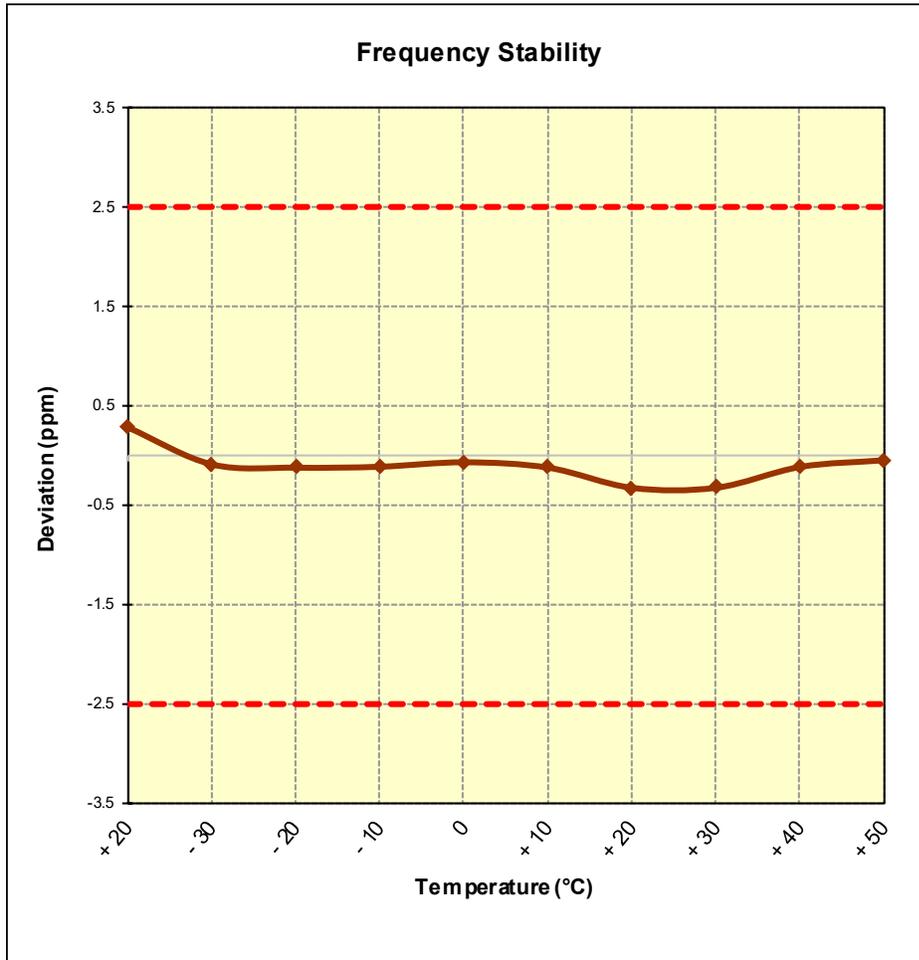


Figure 7-9. Frequency Stability Graph (Band 5)

FCC ID: ZNFL59BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Band 4 Frequency Stability Measurements

§2.1055 §§27.54

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

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,732,499,965	-35	-0.0000020
100 %		- 30	1,732,499,913	-87	-0.0000050
100 %		- 20	1,732,500,069	69	0.0000040
100 %		- 10	1,732,500,100	100	0.0000058
100 %		0	1,732,499,883	-117	-0.0000068
100 %		+ 10	1,732,499,856	-144	-0.0000083
100 %		+ 20	1,732,500,305	305	0.0000176
100 %		+ 30	1,732,500,065	65	0.0000038
100 %		+ 40	1,732,500,075	75	0.0000043
100 %		+ 50	1,732,499,697	-303	-0.0000175
BATT. ENDPOINT	3.45	+ 20	1,732,499,750	-250	-0.0000144

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.

FCC ID: ZNFL59BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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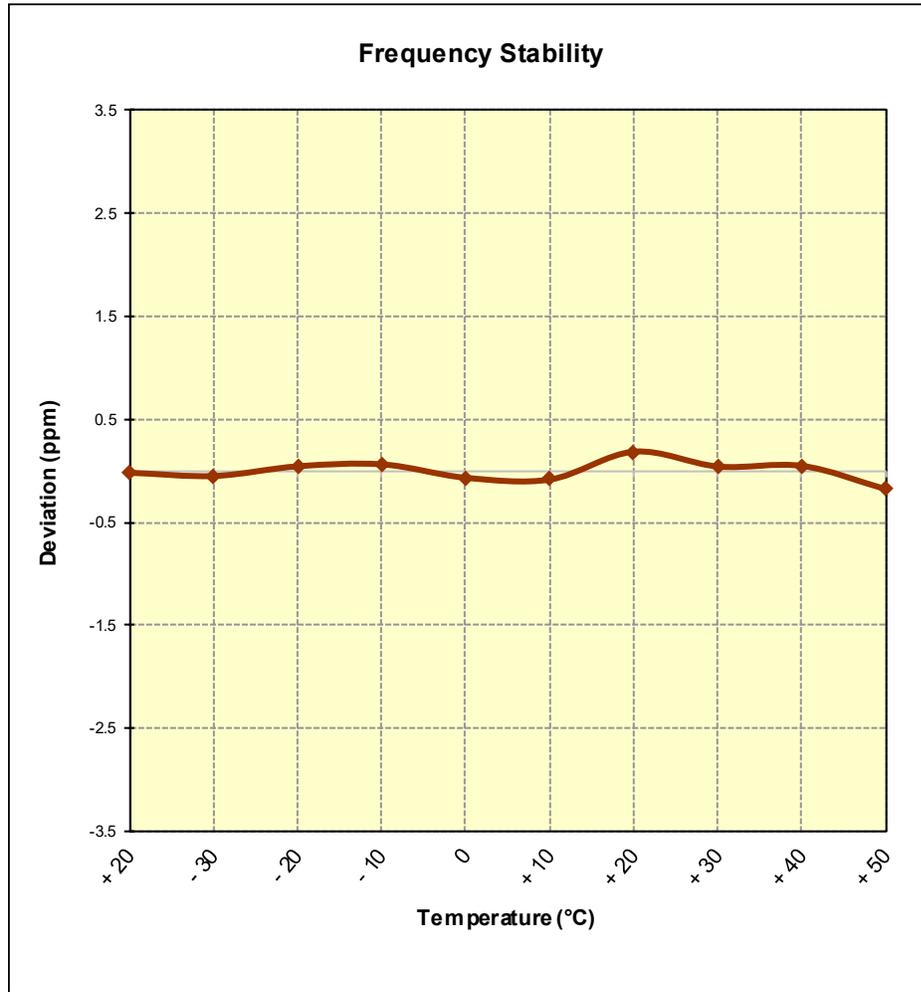


Figure 7-10. Frequency Stability Graph (Band 4)

FCC ID: ZNFL59BL	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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Band 2 Frequency Stability Measurements

§2.1055 §24.235

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

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,879,999,813	-187	-0.0000099
100 %		- 30	1,880,000,400	400	0.0000213
100 %		- 20	1,879,999,812	-188	-0.0000100
100 %		- 10	1,879,999,792	-208	-0.0000111
100 %		0	1,880,000,012	12	0.0000006
100 %		+ 10	1,879,999,945	-55	-0.0000029
100 %		+ 20	1,879,999,942	-58	-0.0000031
100 %		+ 30	1,880,000,008	8	0.0000004
100 %		+ 40	1,880,000,195	195	0.0000104
100 %		+ 50	1,879,999,995	-5	-0.0000003
BATT. ENDPOINT	3.45	+ 20	1,879,999,923	-77	-0.0000041

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: ZNFL59BL		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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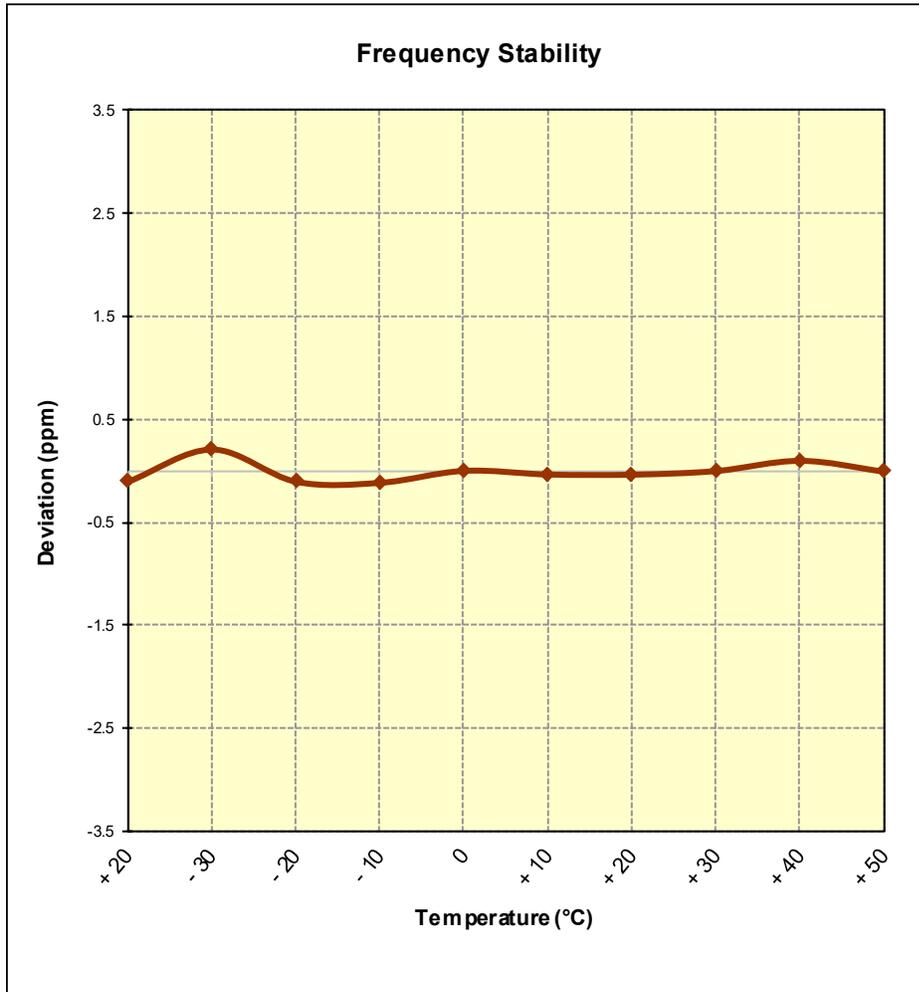


Figure 7-11. Frequency Stability Graph (Band 2)

FCC ID: ZNFL59BL		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: ZNFL59BL** complies with all the requirements of Parts 22, 24, & 27 of the FCC rules for LTE operation only.

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