

7.4 Band Edge Emissions at Antenna Terminal

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

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.

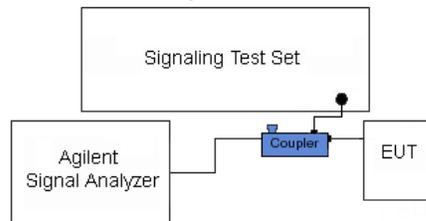


Figure 7-3. Test Instrument & Measurement Setup

Test Notes

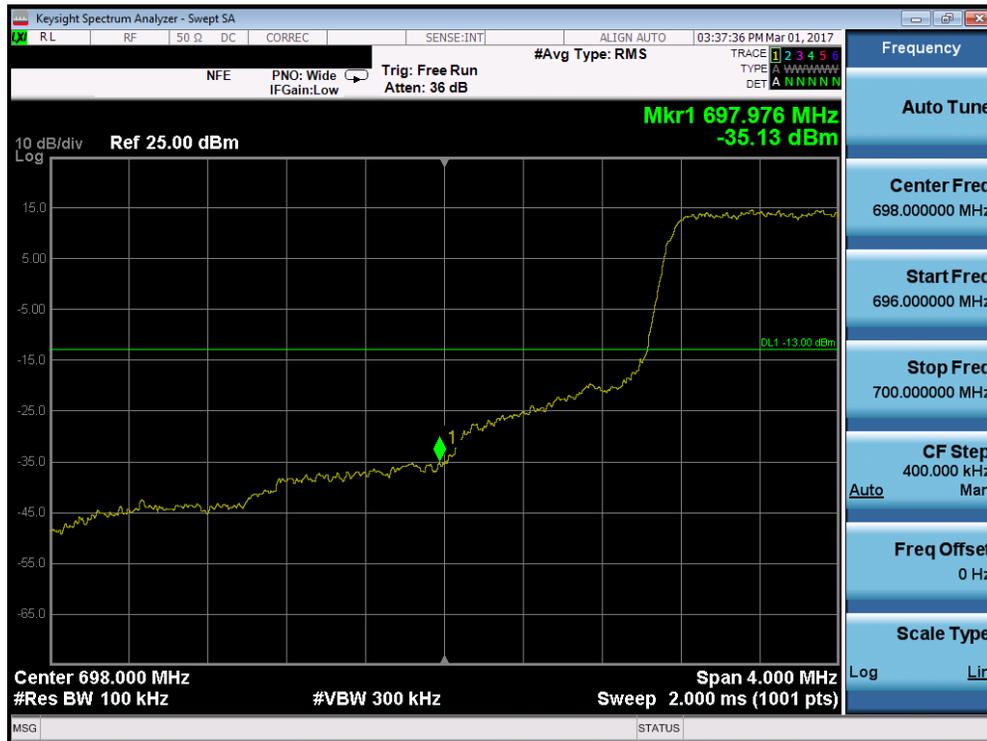
Per 22.917(b), 24.238(a) and 27.53(h) in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions limit. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

Per 27.53(g) for operations in the 698-746 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

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

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



Plot 7-90. Lower Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

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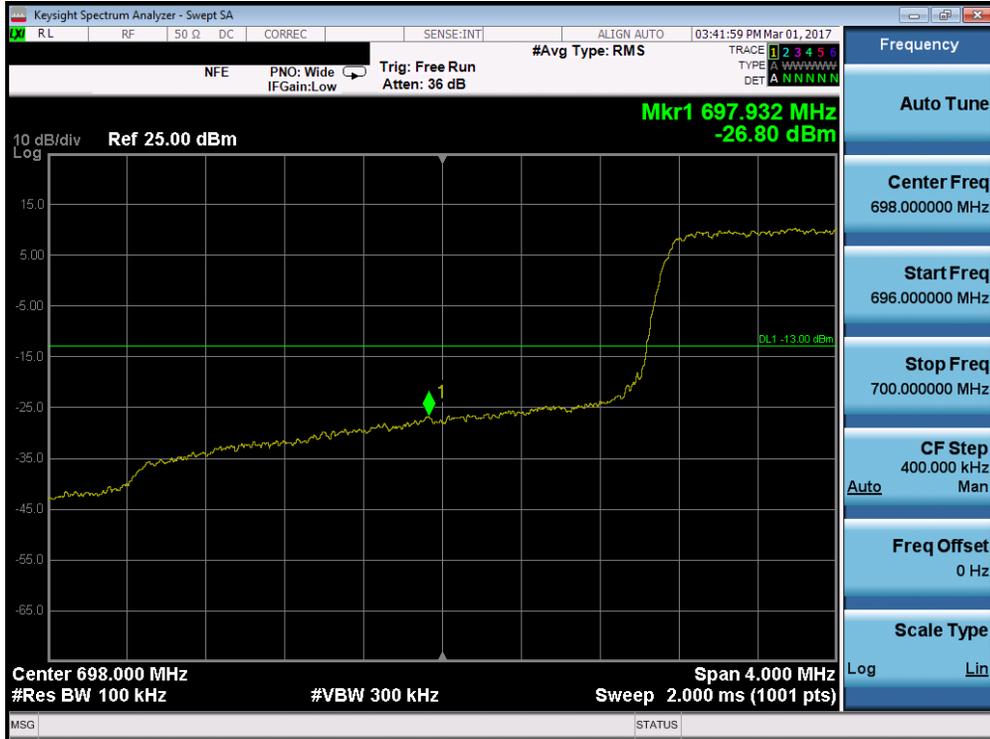


Plot 7-91. Upper Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

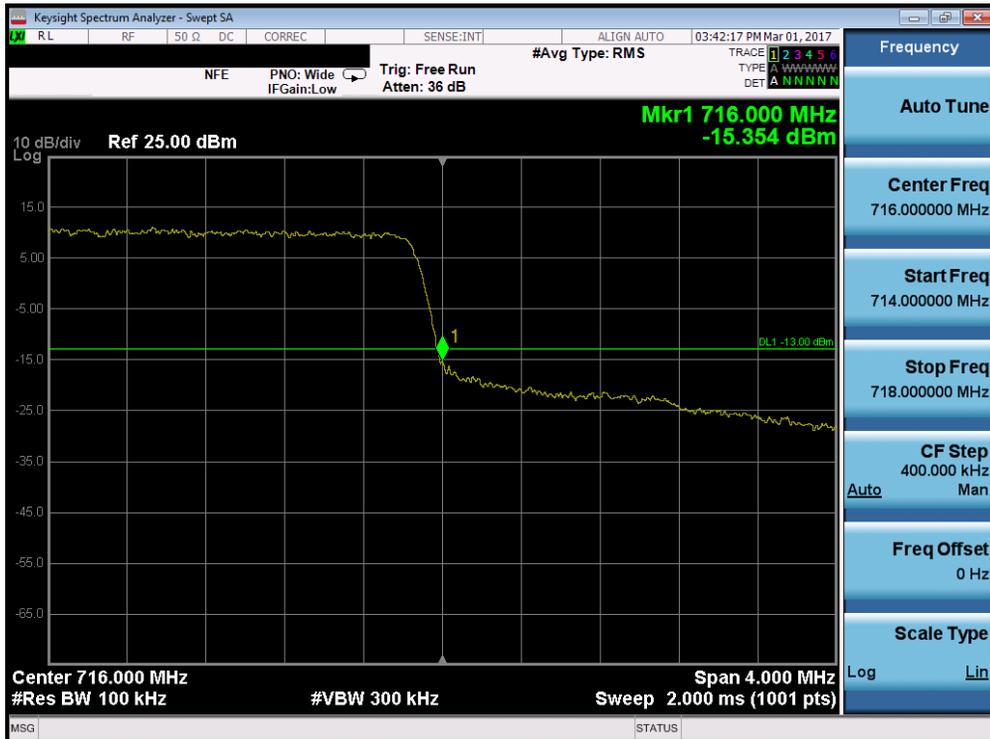


Plot 7-92. Upper Extended Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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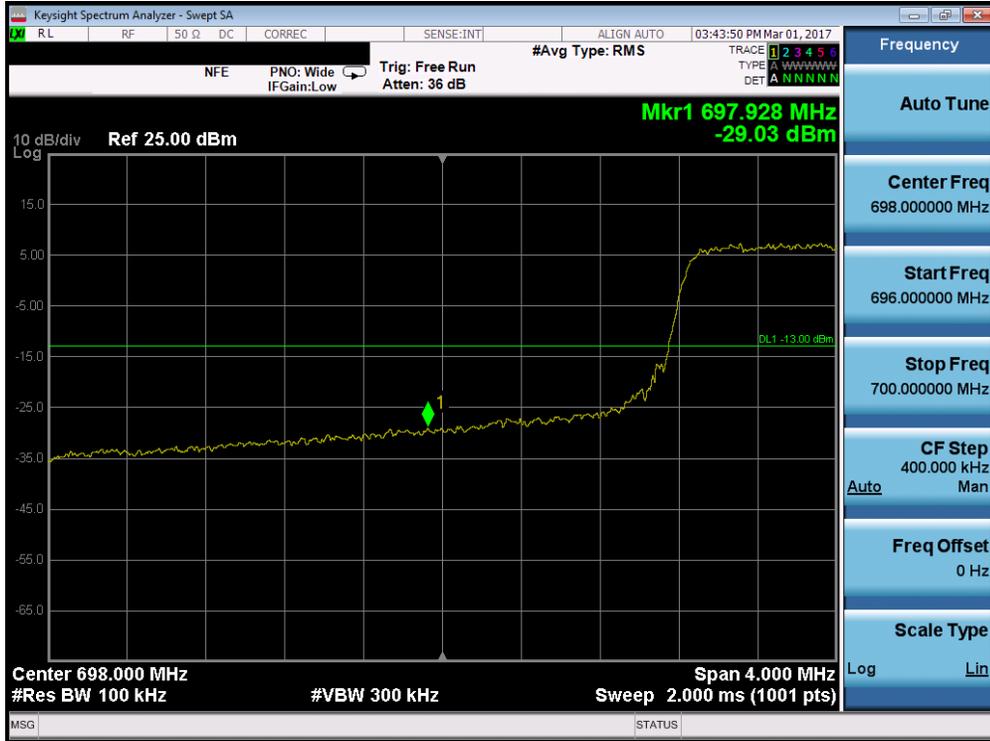


Plot 7-93. Lower Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

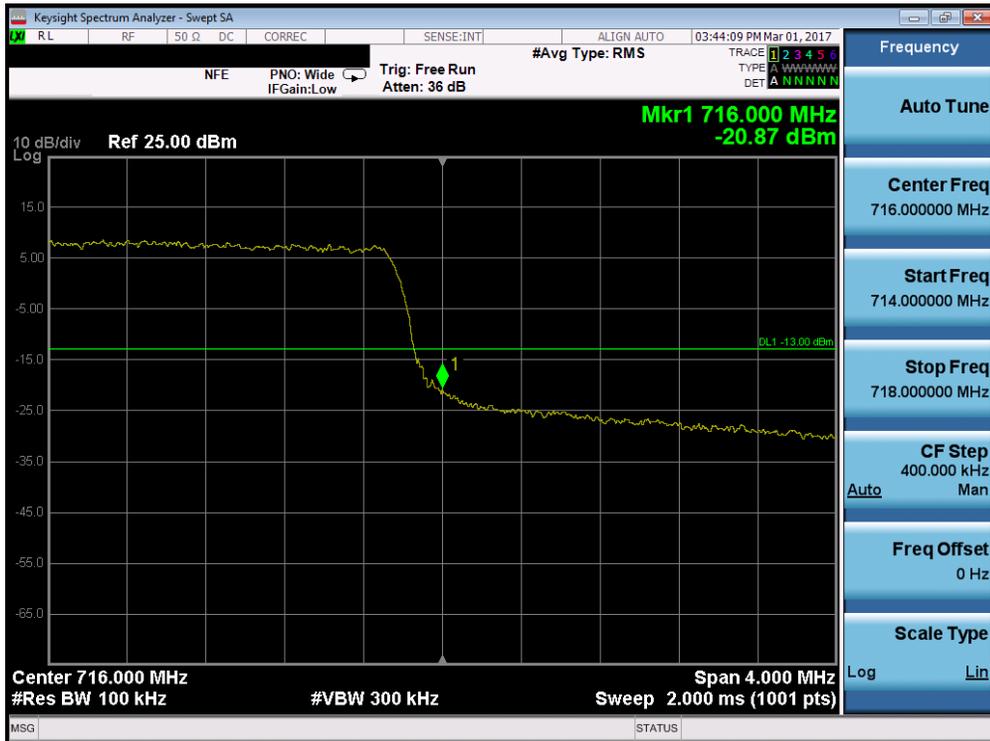


Plot 7-94. Upper Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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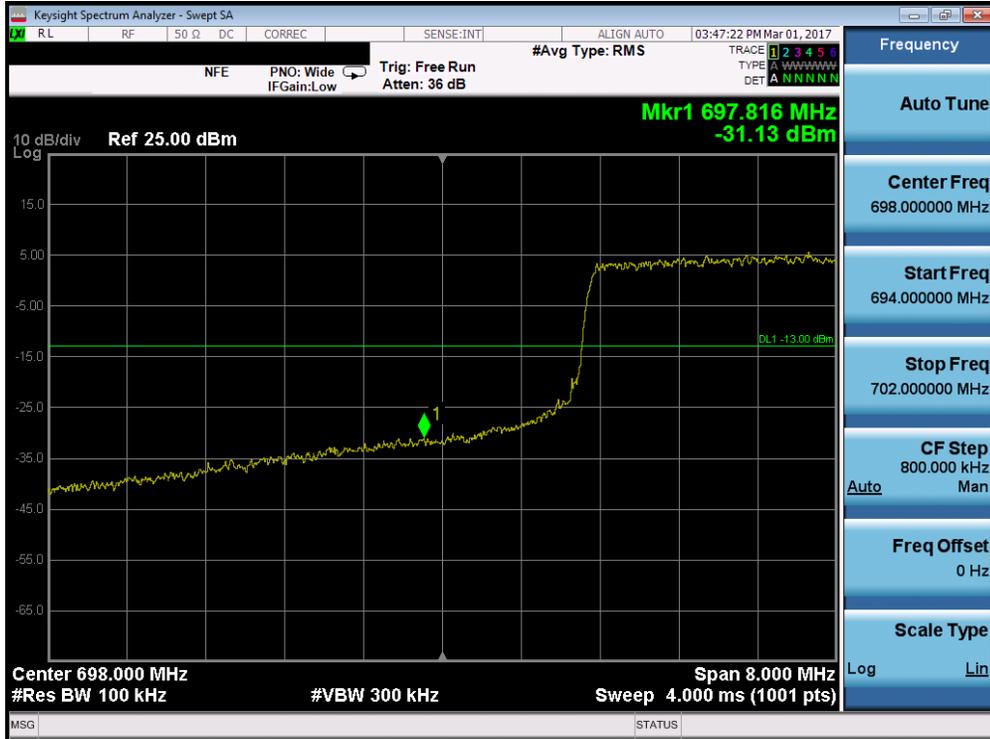


Plot 7-95. Lower Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)

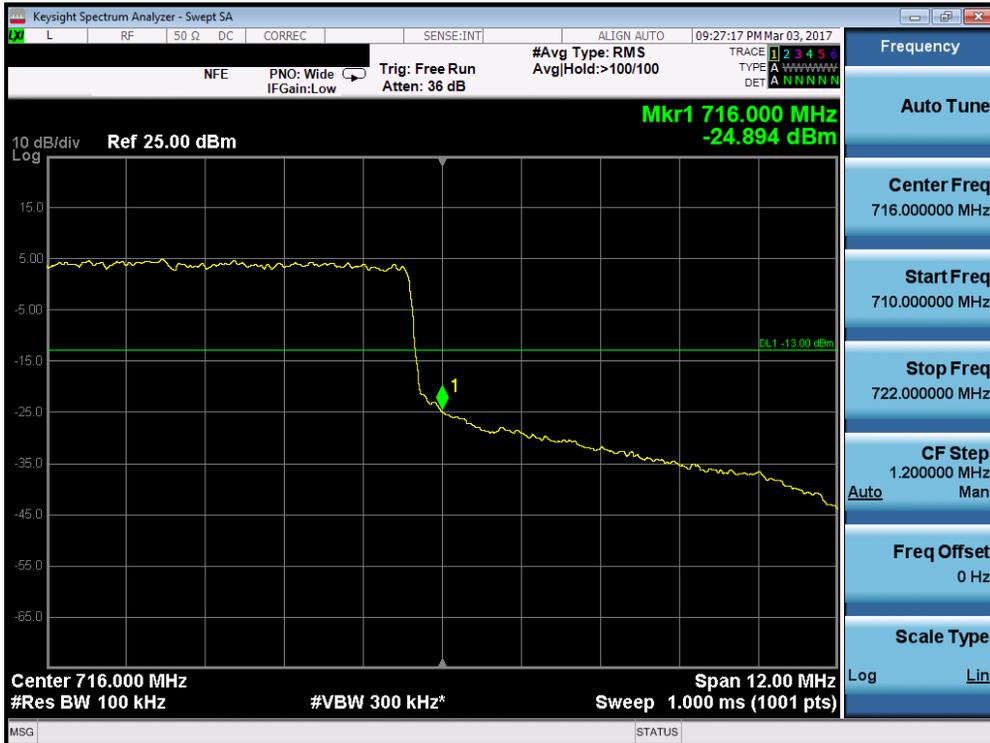


Plot 7-96. Upper Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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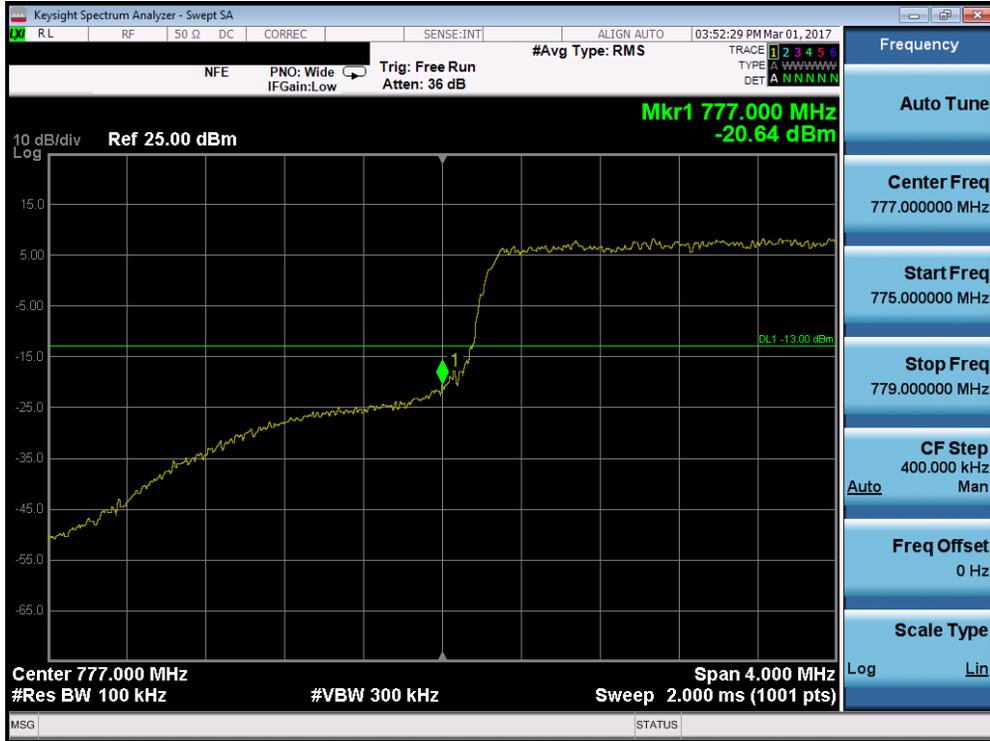


Plot 7-97. Lower Band Edge Plot (Band 12 – 10.0MHz QPSK – RB Size 50)

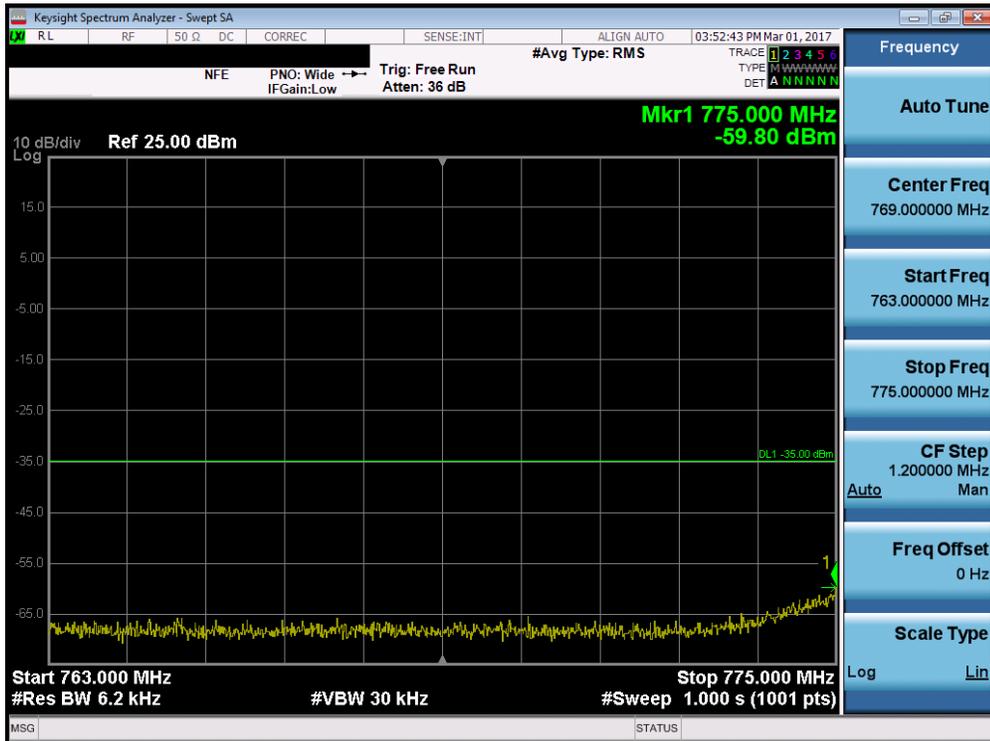


Plot 7-98. Upper Band Edge Plot (Band 12 – 10.0MHz QPSK – RB Size 50)

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Plot 7-99. Lower Band Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

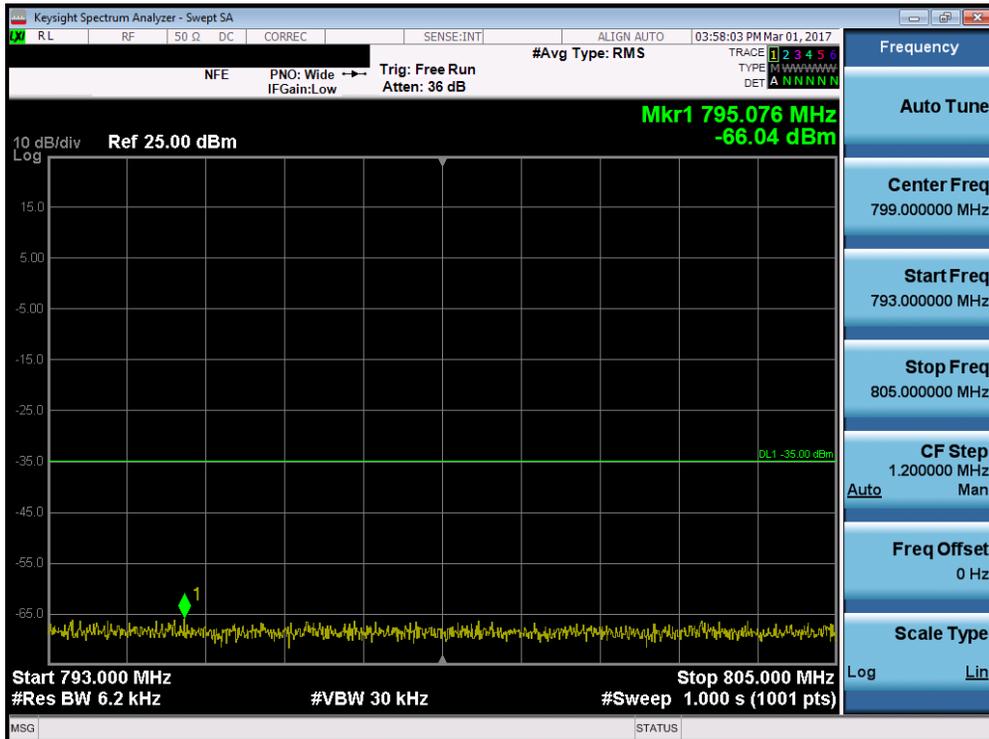


Plot 7-100. Lower Emission Mask Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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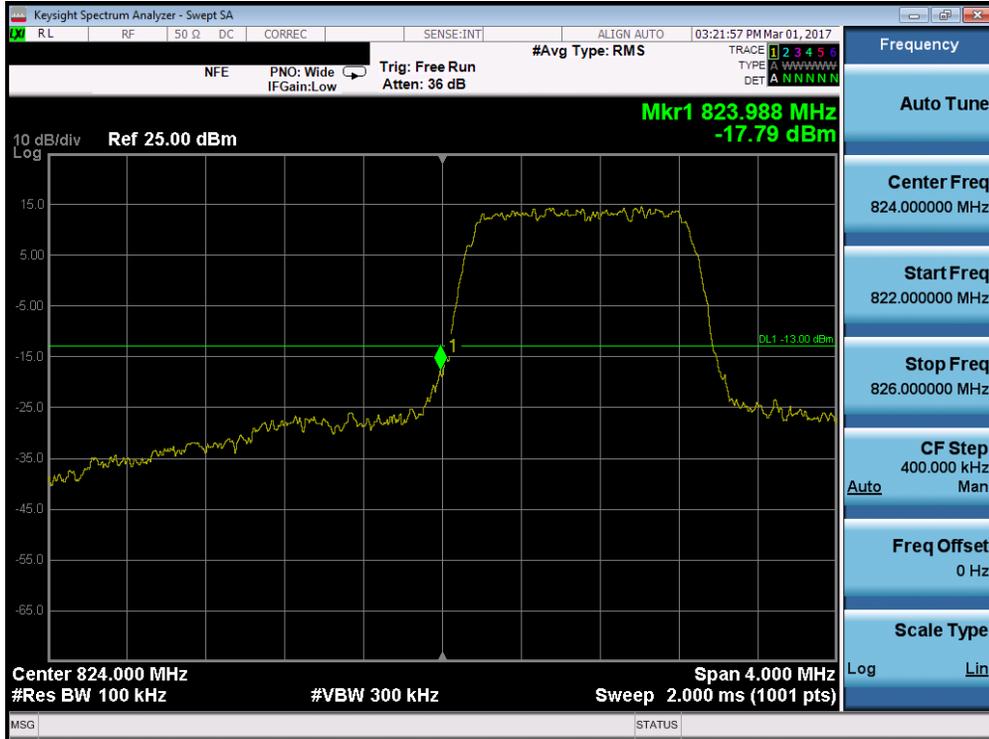


Plot 7-105. Upper Band Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)



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

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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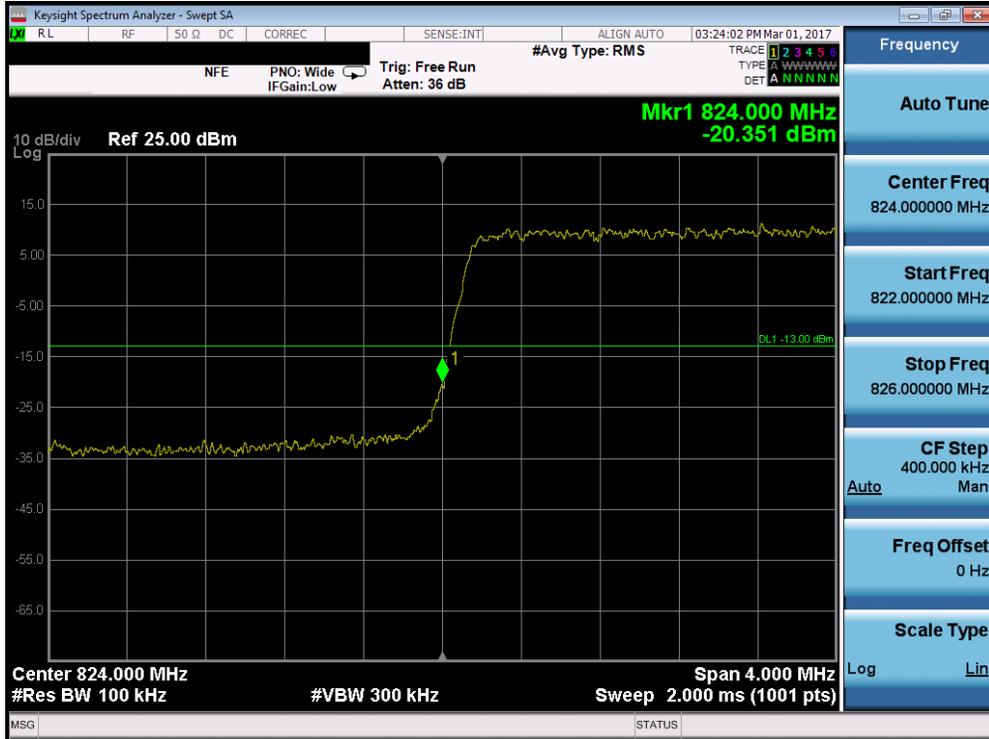


Plot 7-107. Lower Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

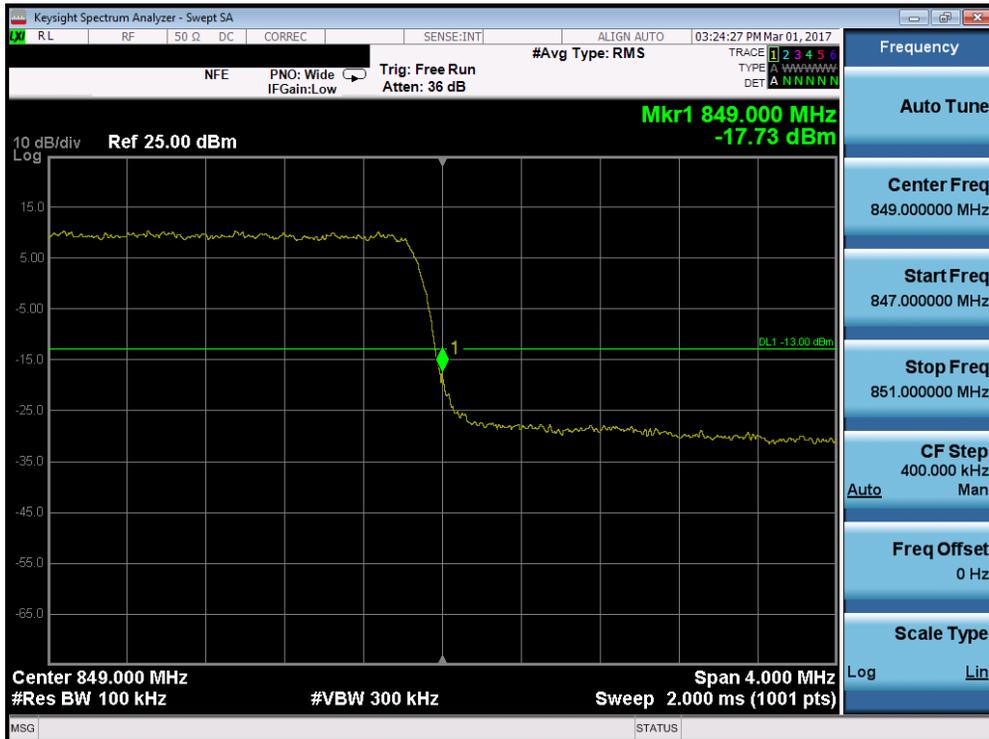


Plot 7-108. Upper Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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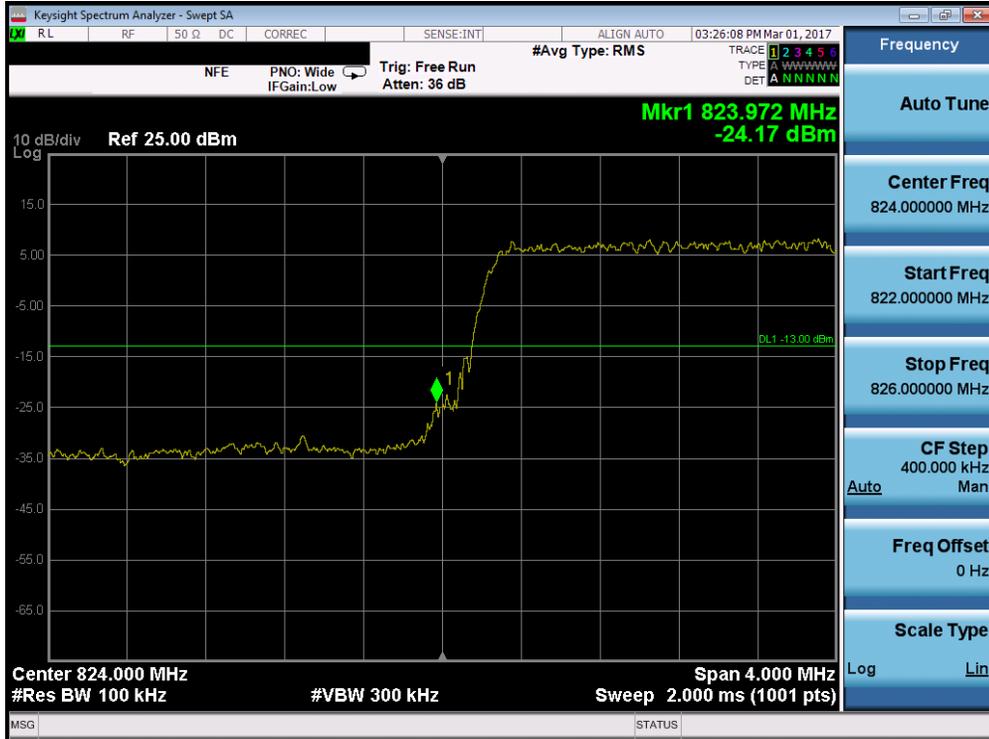


Plot 7-109. Lower Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)



Plot 7-110. Upper Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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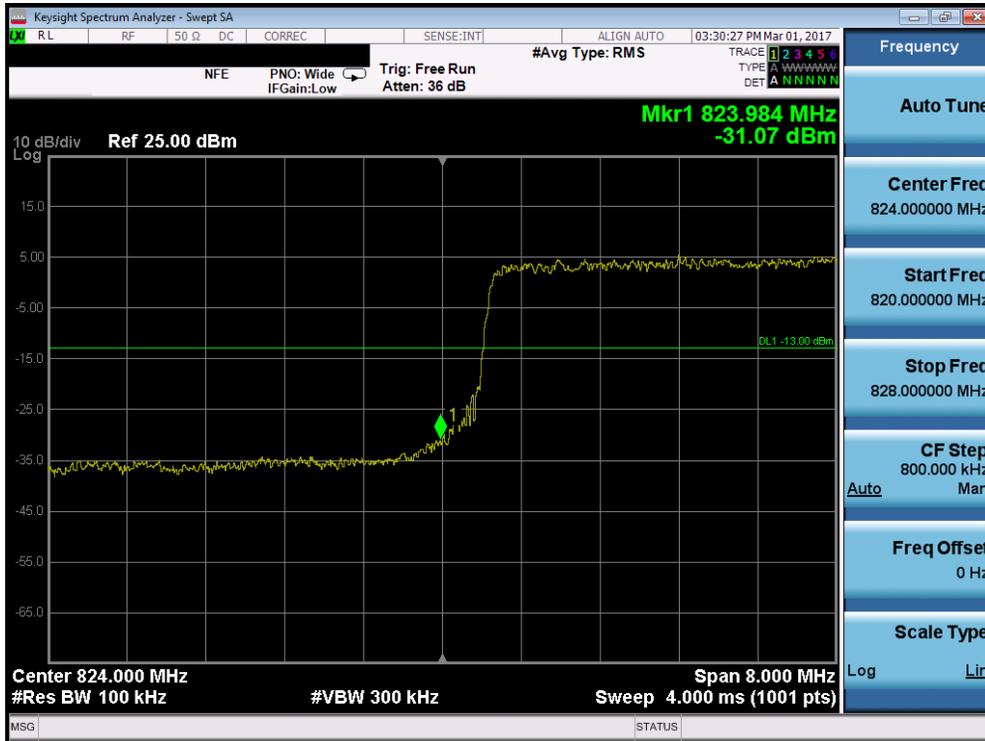


Plot 7-111. Lower Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

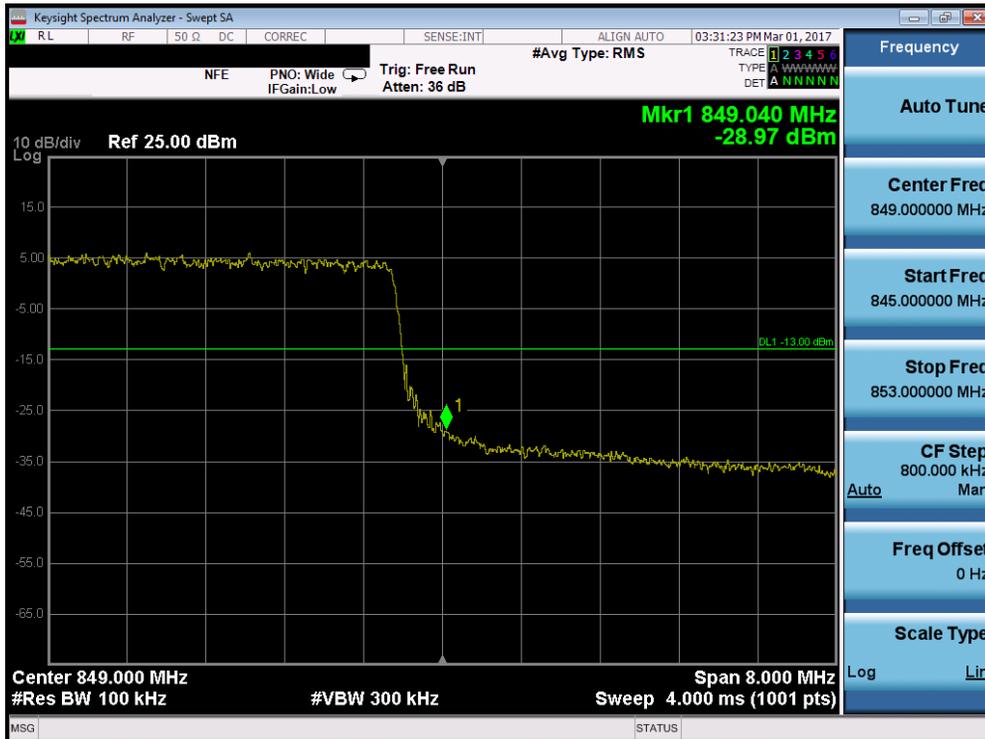


Plot 7-112. Upper Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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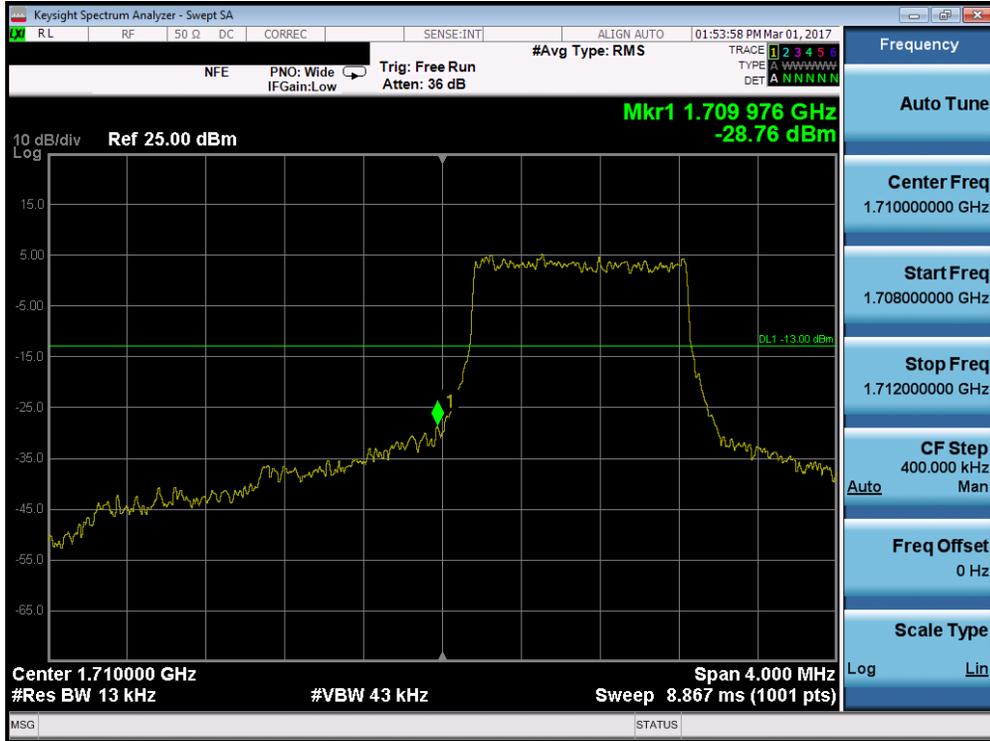


Plot 7-113. Lower Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

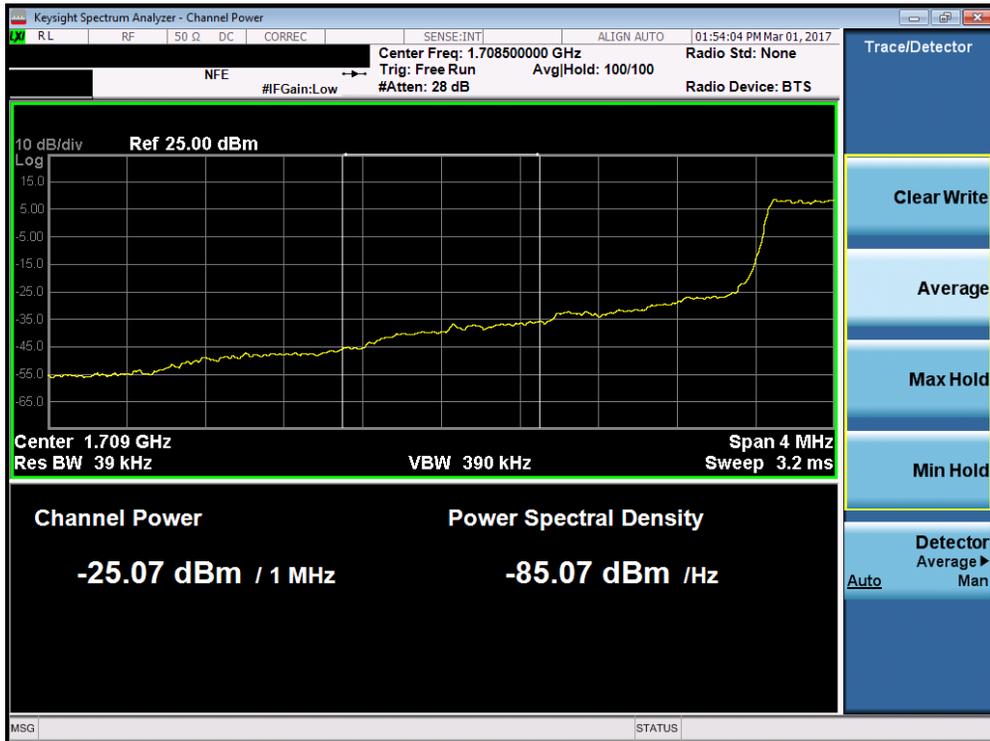


Plot 7-114. Upper Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Plot 7-115. Lower Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

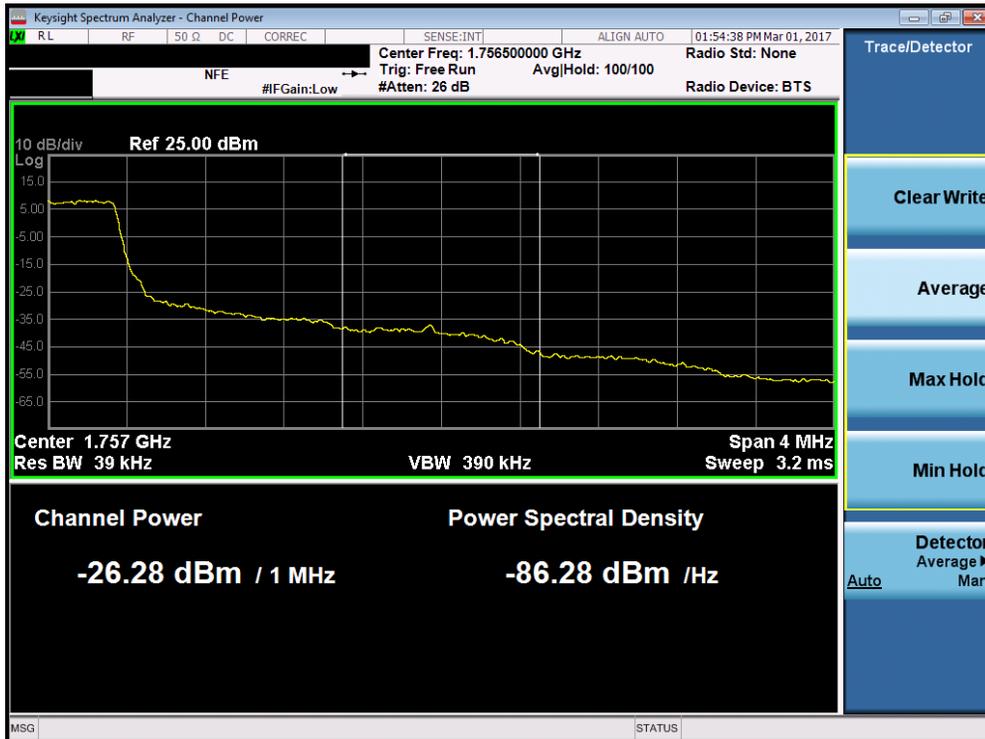


Plot 7-116. Lower Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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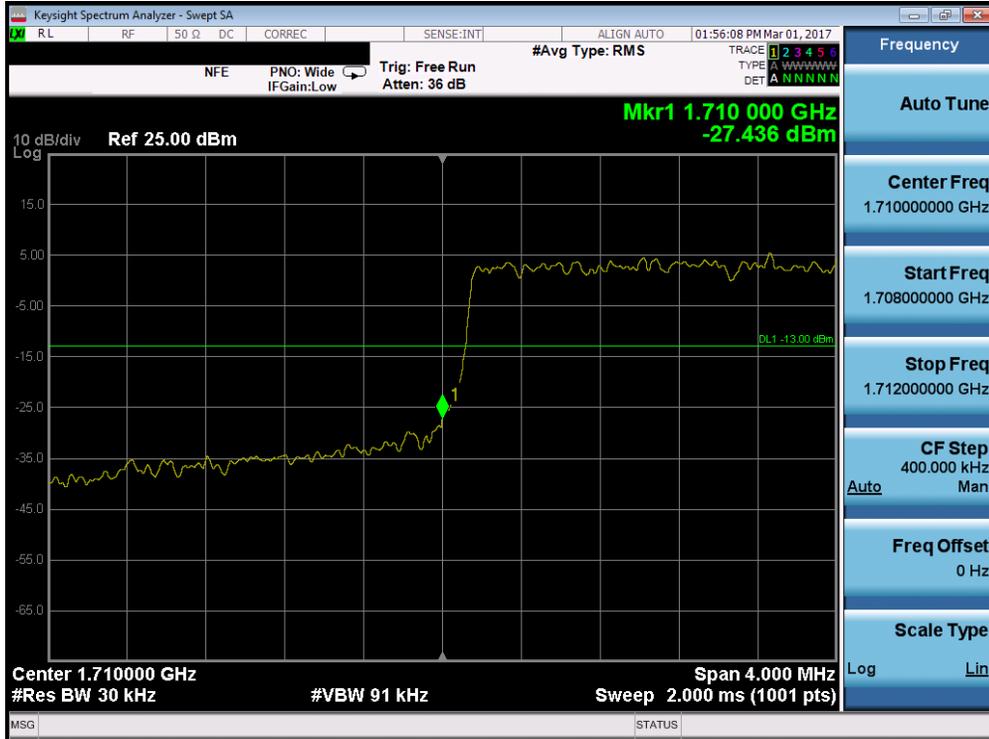


Plot 7-117. Upper Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

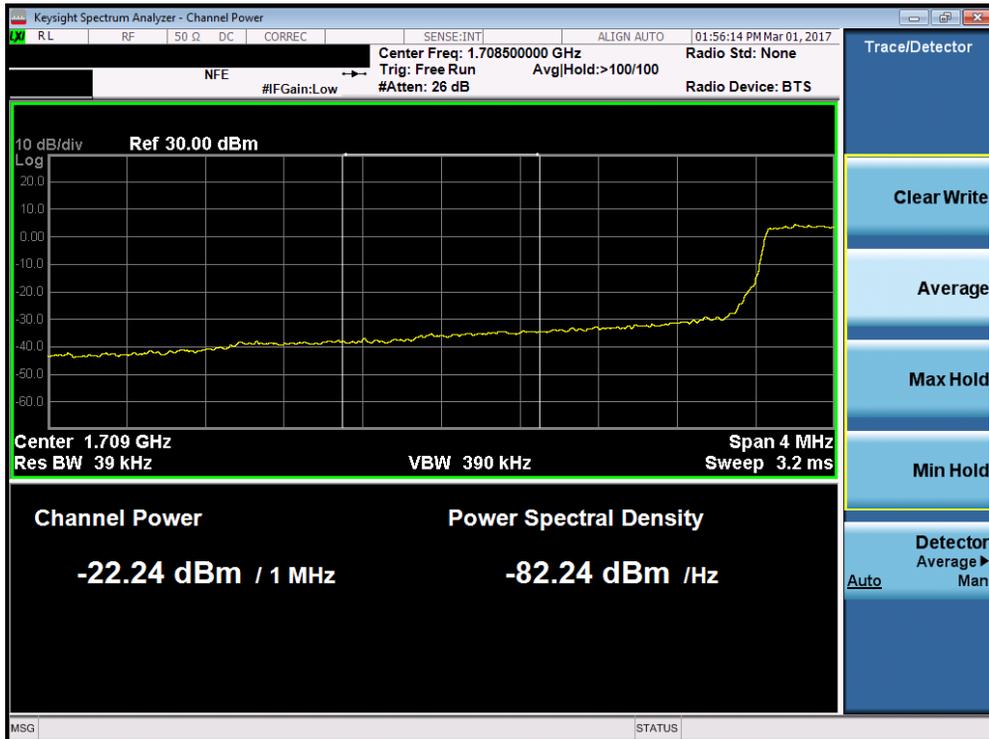


Plot 7-118. Upper Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Plot 7-119. Lower Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

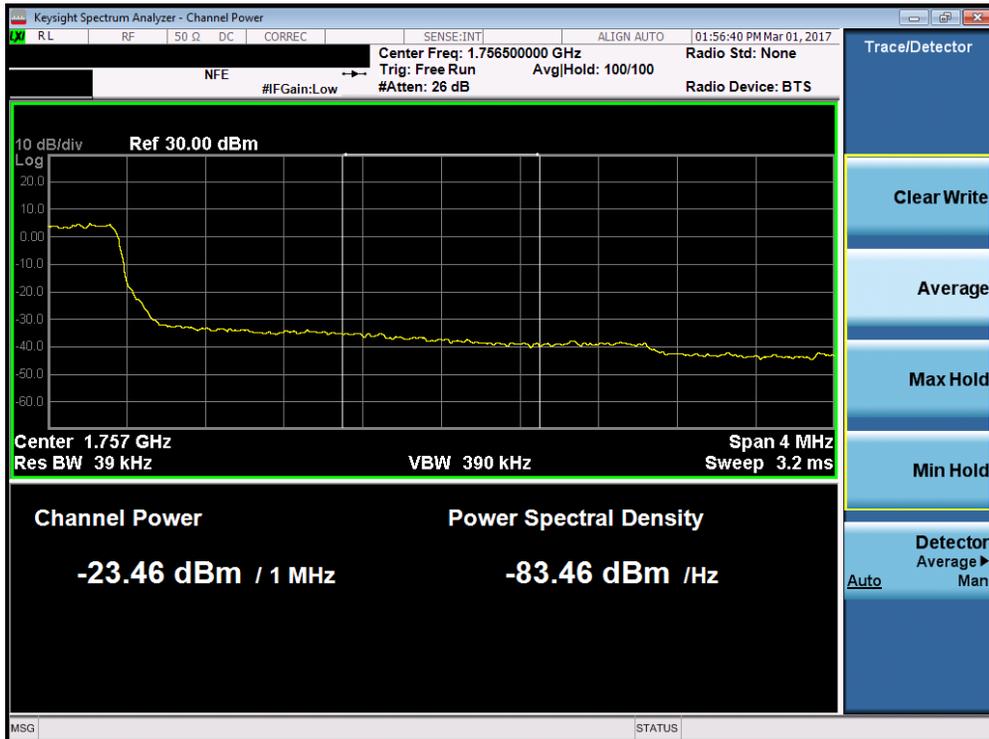


Plot 7-120. Lower Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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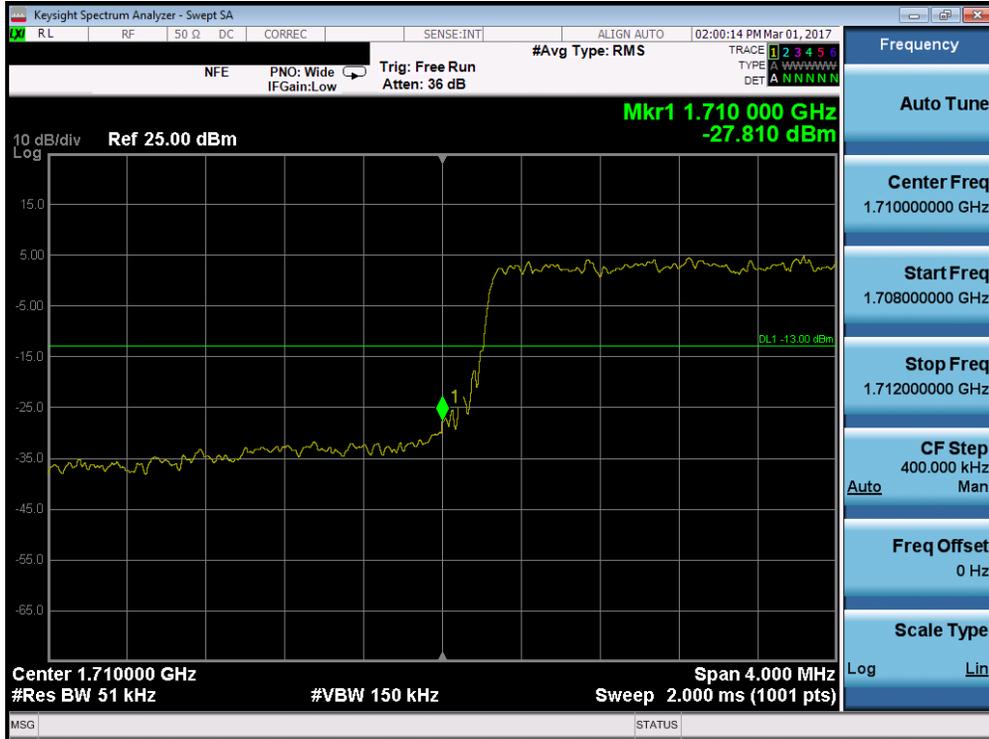


Plot 7-121. Upper Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

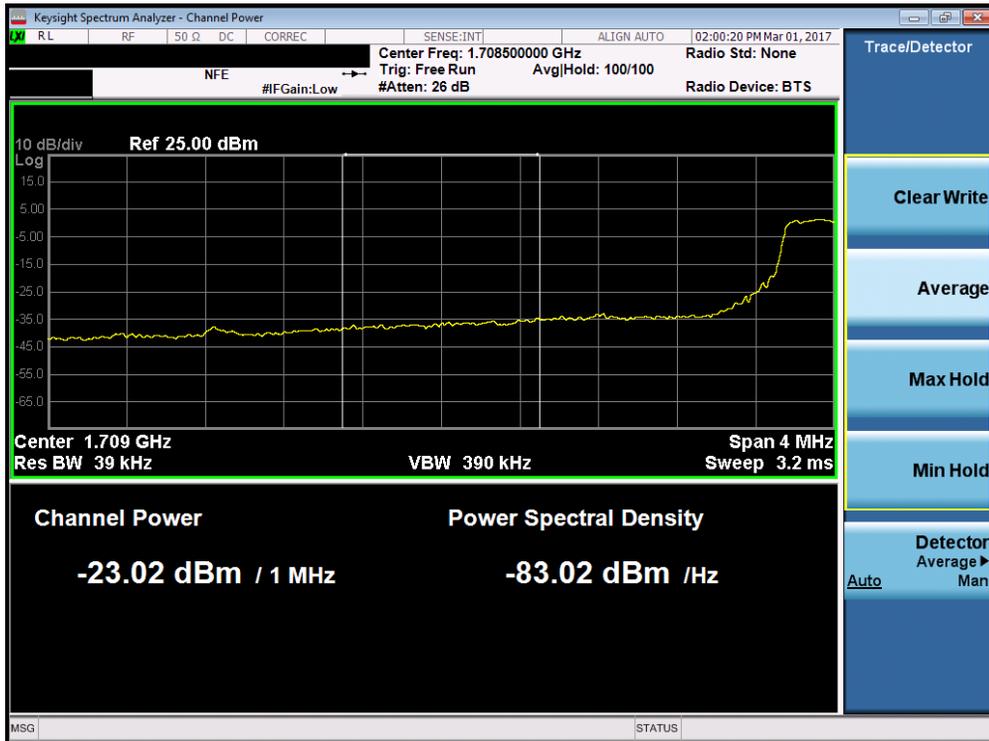


Plot 7-122. Upper Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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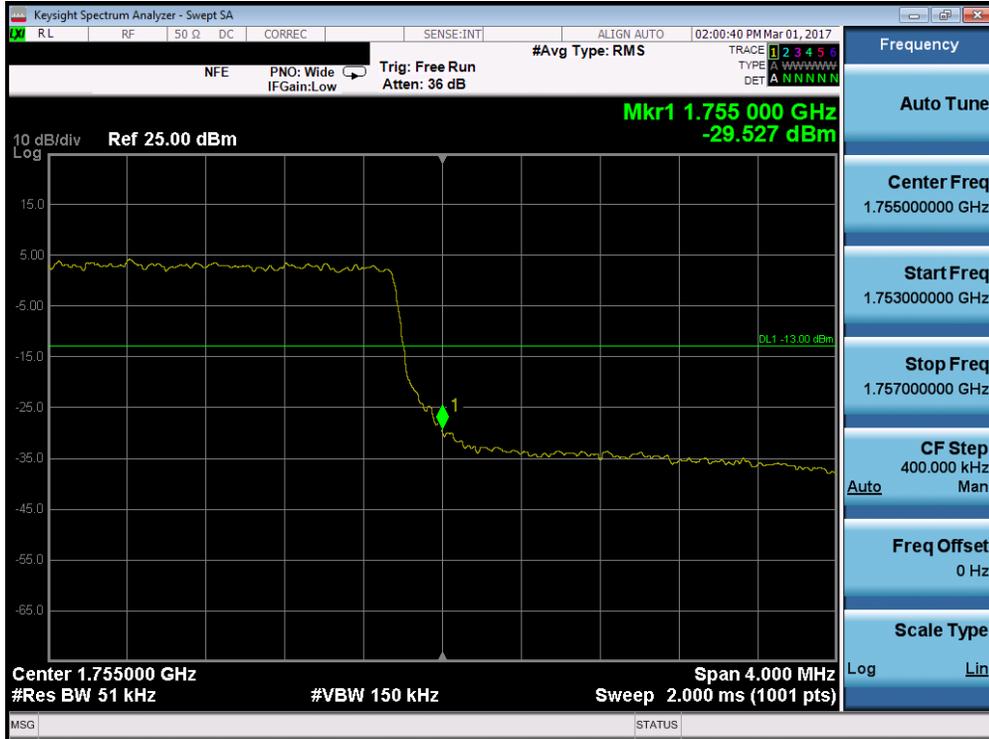


Plot 7-123. Lower Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

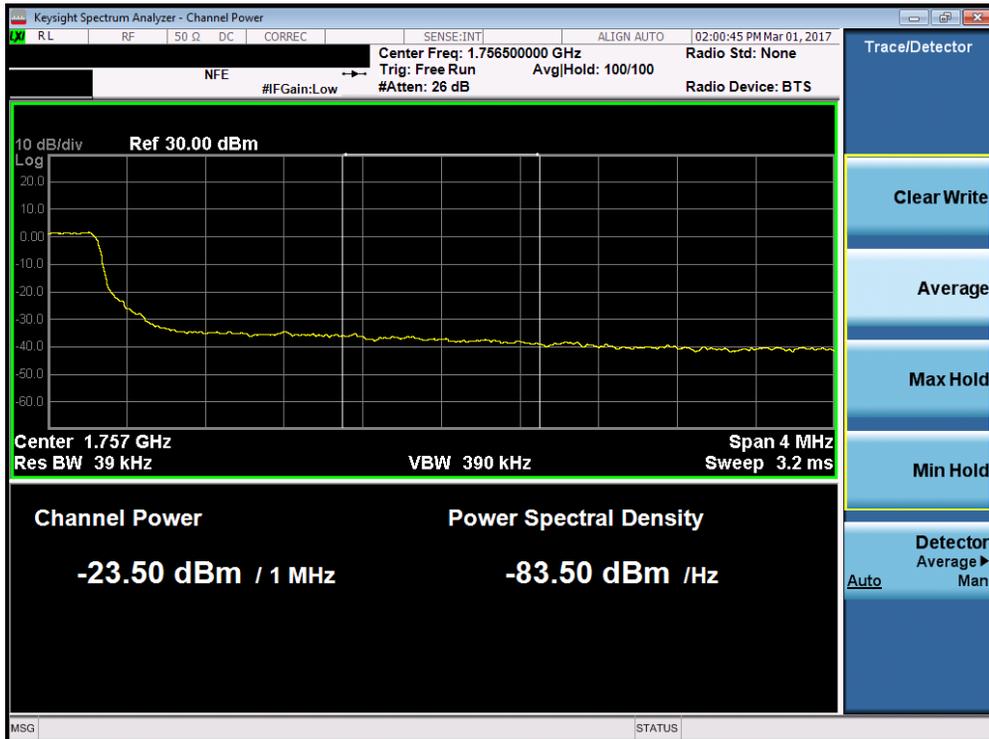


Plot 7-124. Lower Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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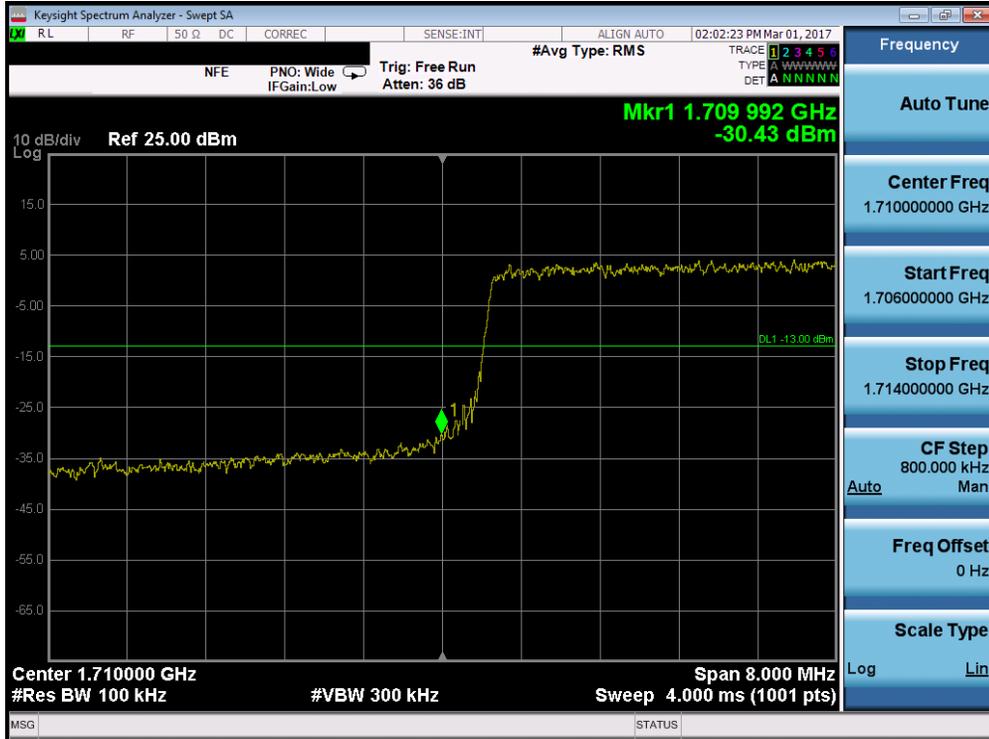


Plot 7-125. Upper Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

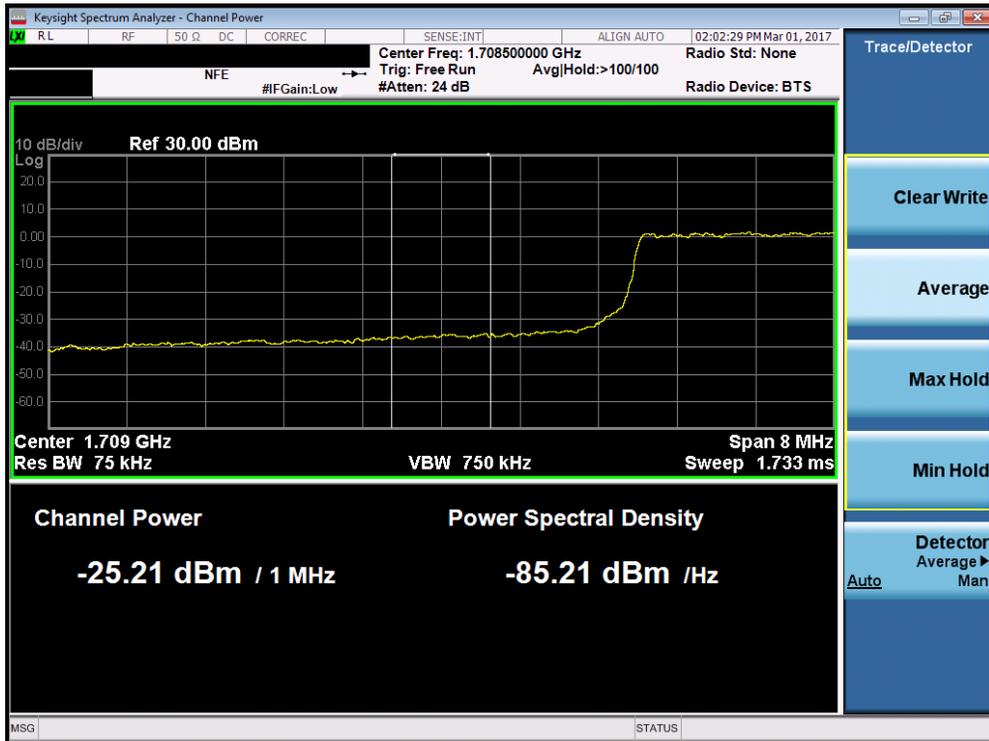


Plot 7-126. Upper Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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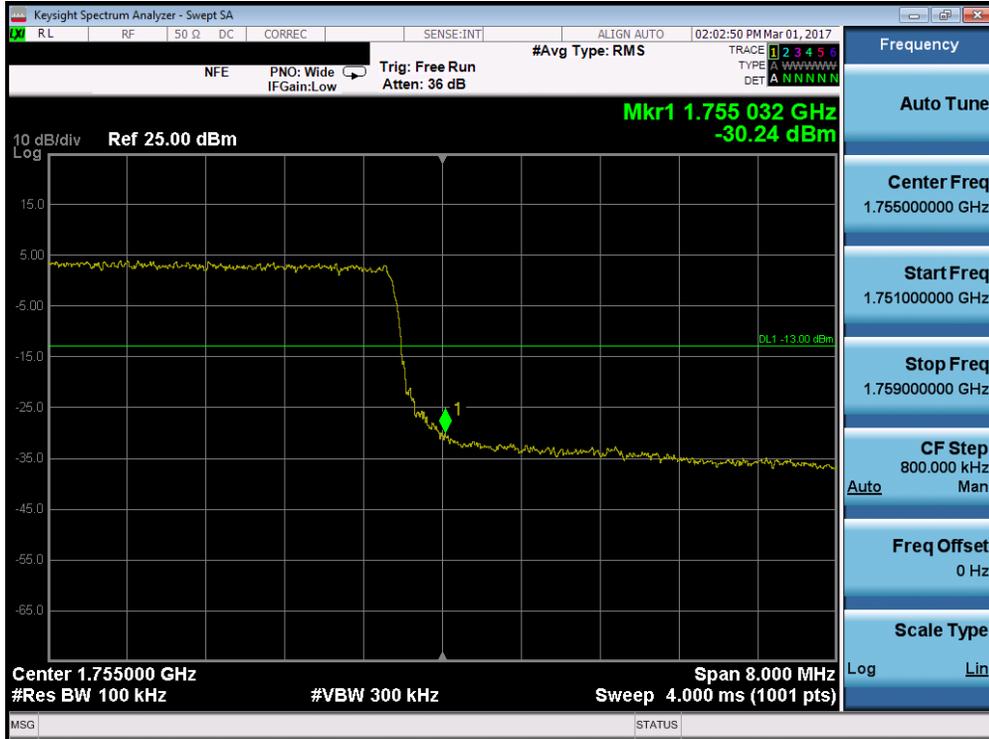


Plot 7-127. Lower Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

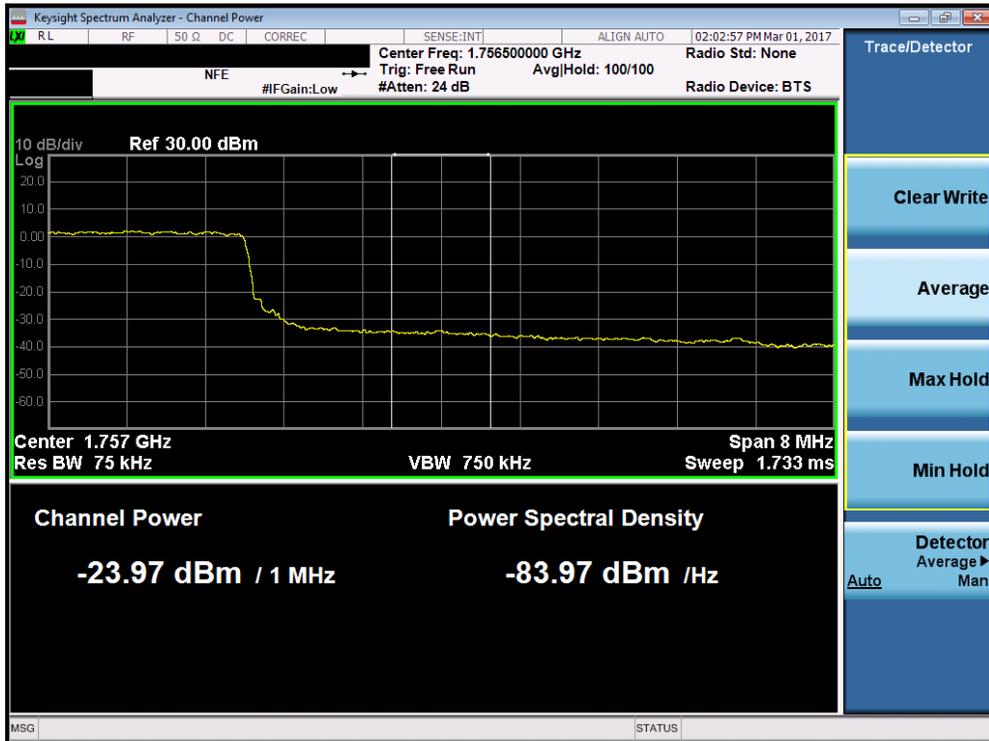


Plot 7-128. Lower Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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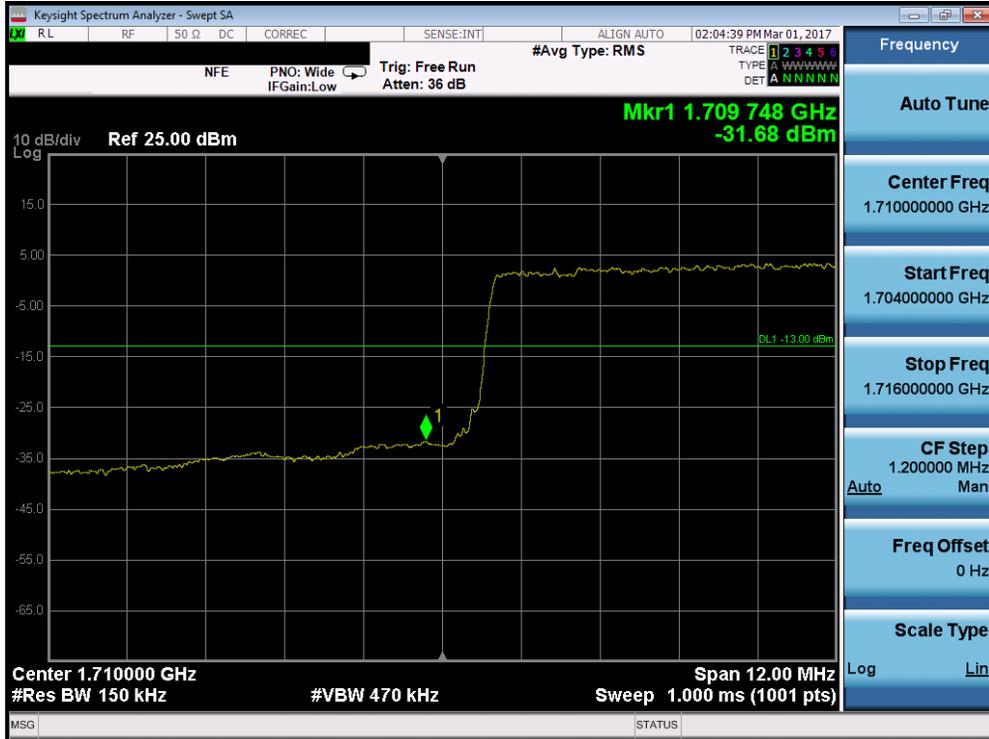


Plot 7-129. Upper Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

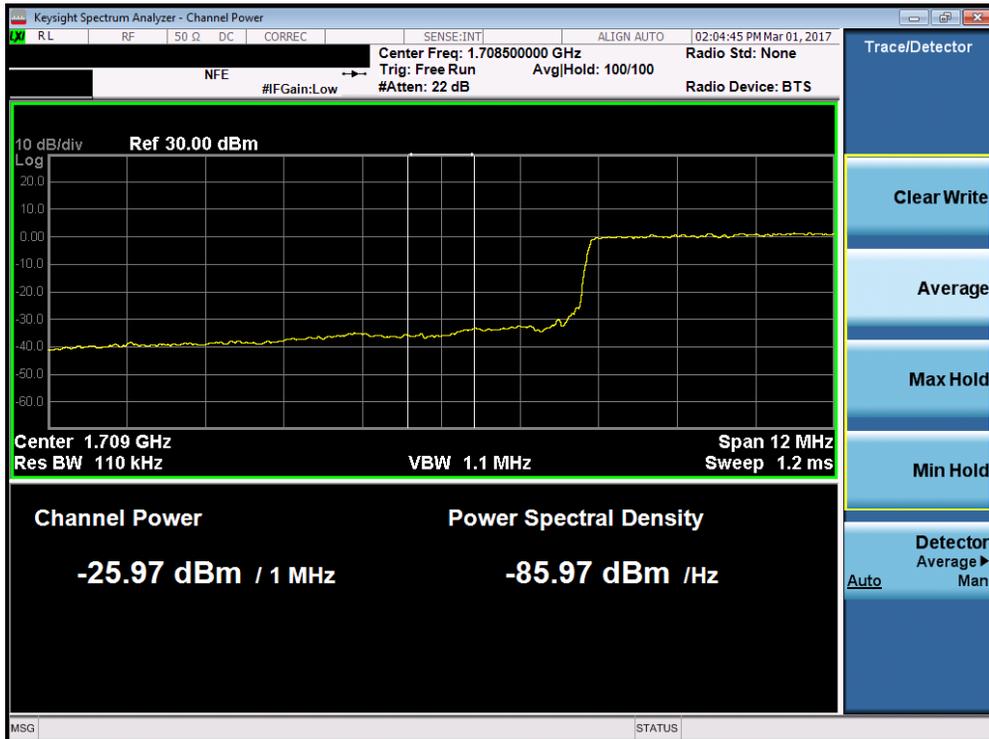


Plot 7-130. Upper Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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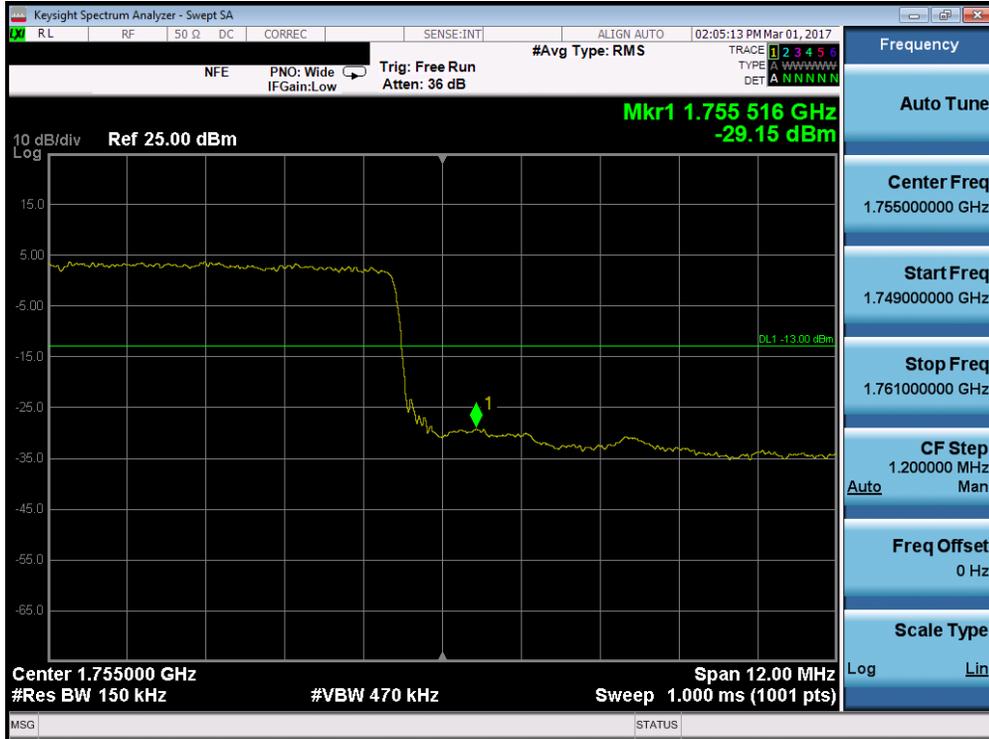


Plot 7-131. Lower Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

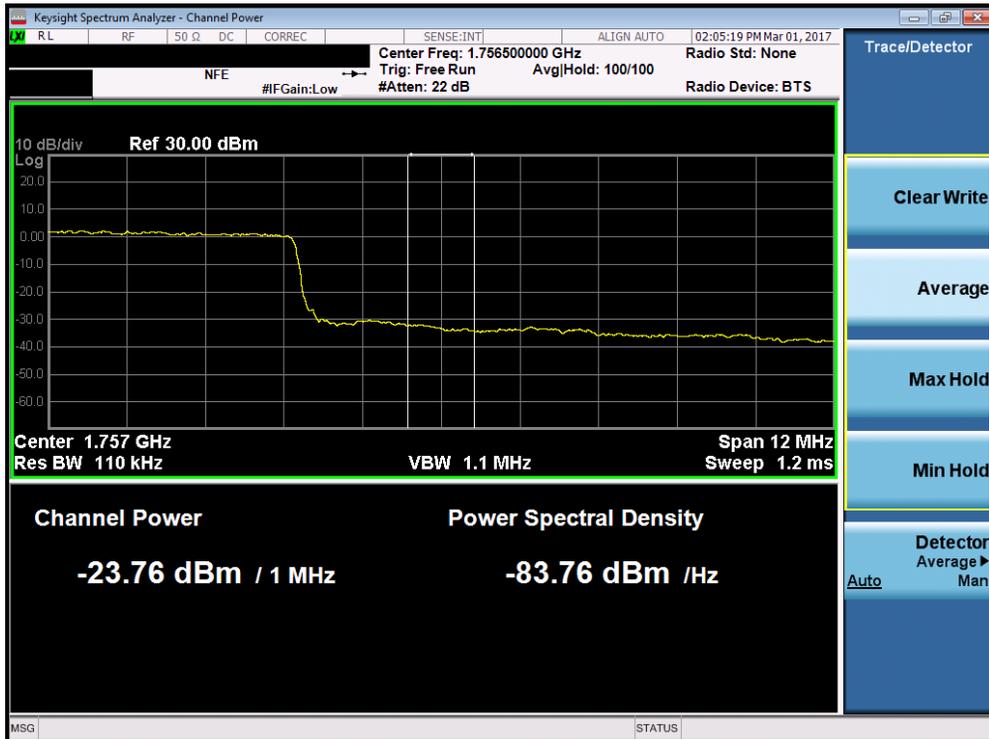


Plot 7-132. Lower Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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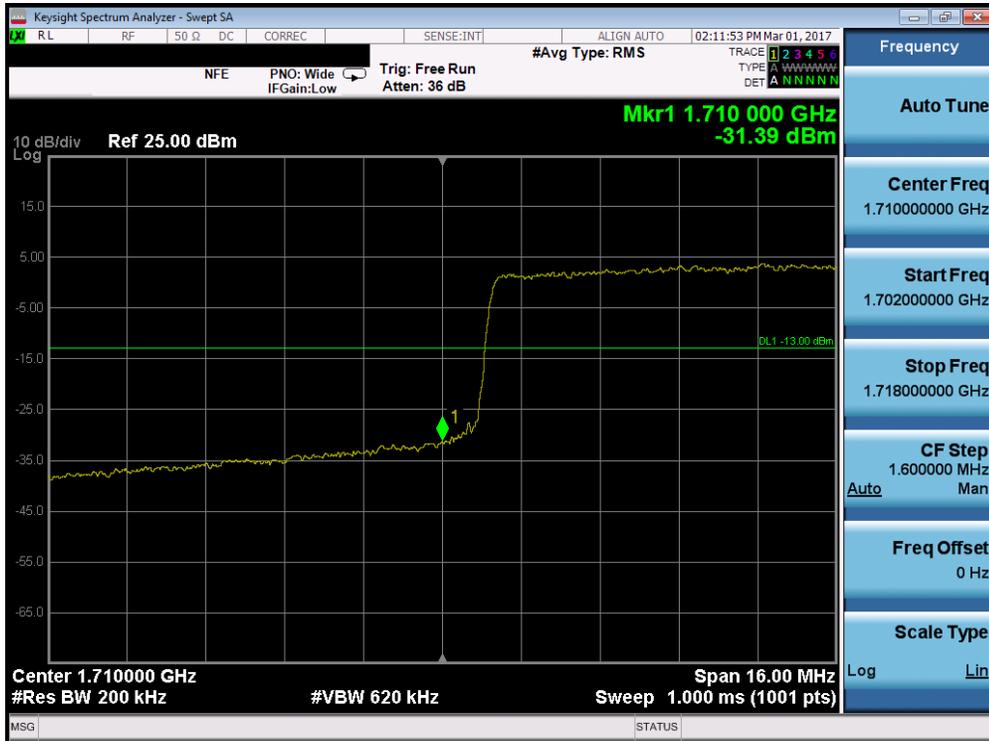


Plot 7-133. Upper Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

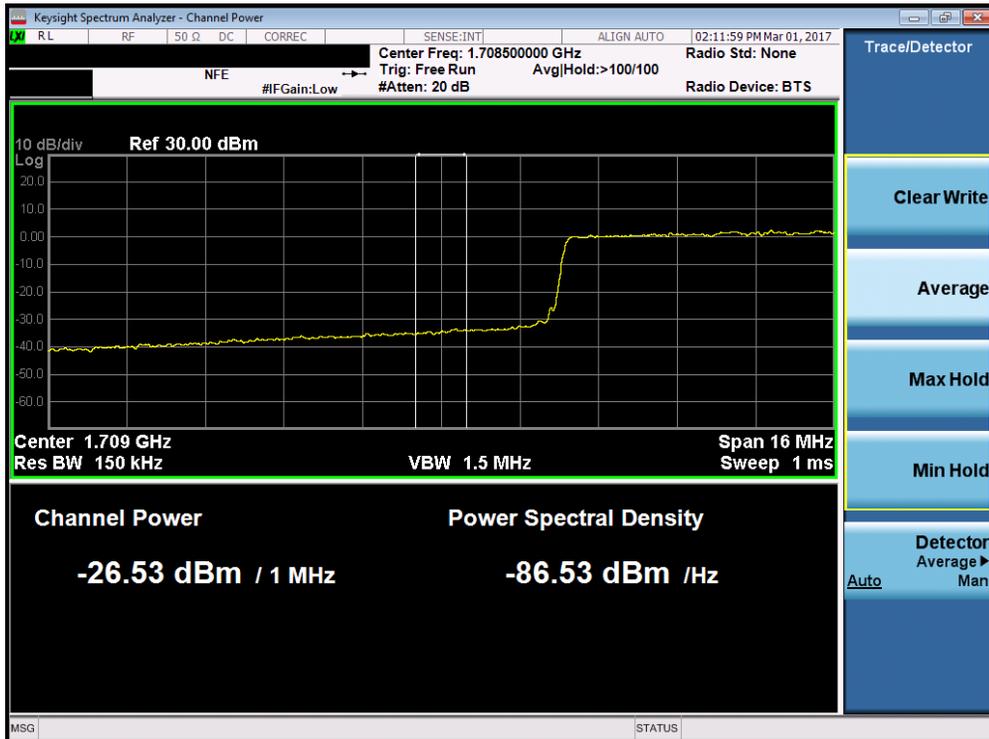


Plot 7-134. Upper Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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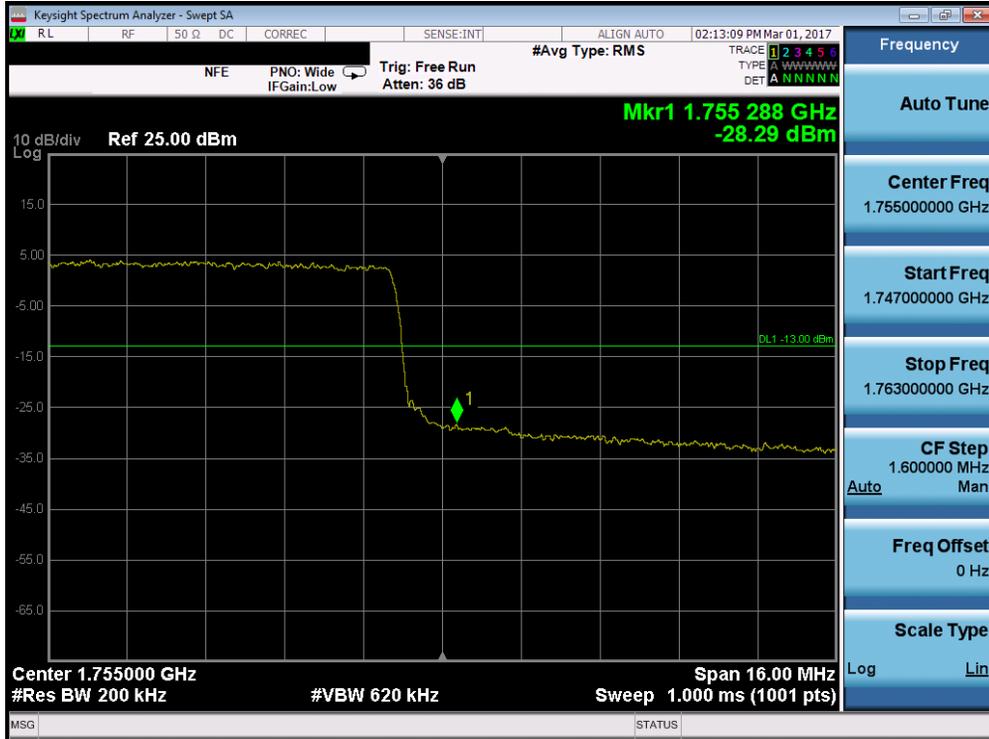


Plot 7-135. Lower Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

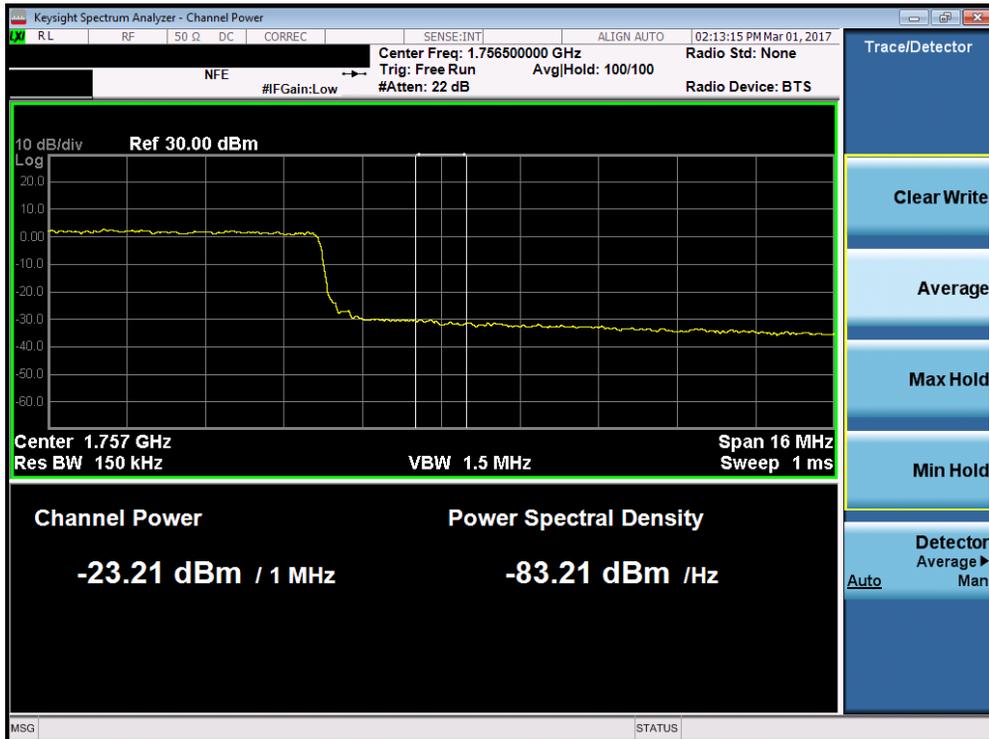


Plot 7-136. Lower Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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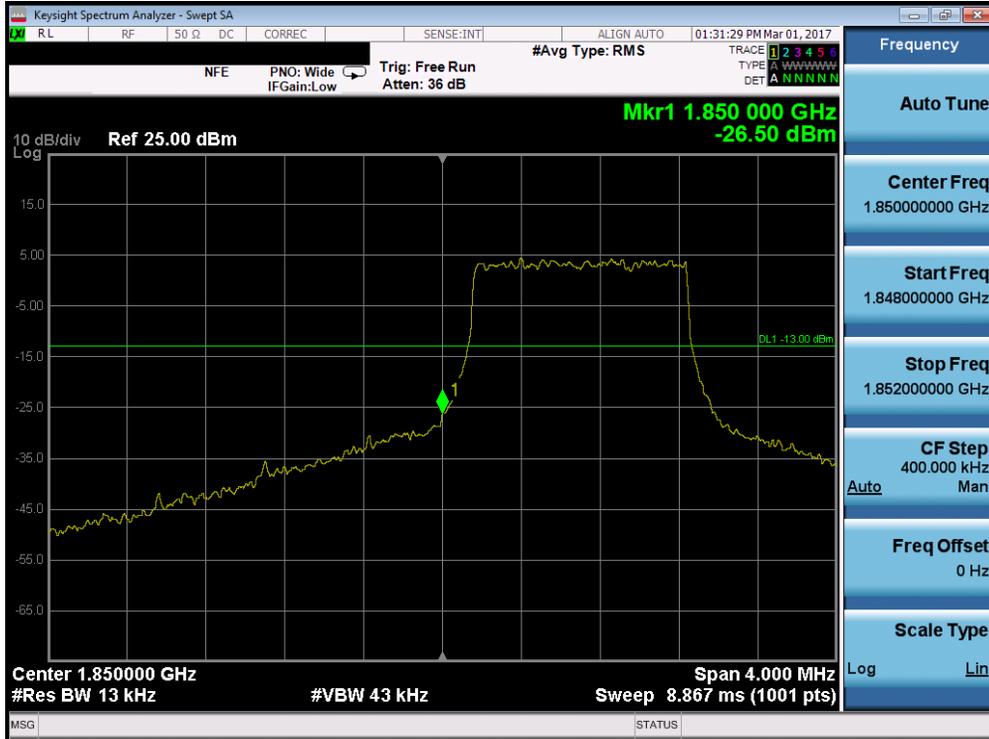


Plot 7-137. Upper Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

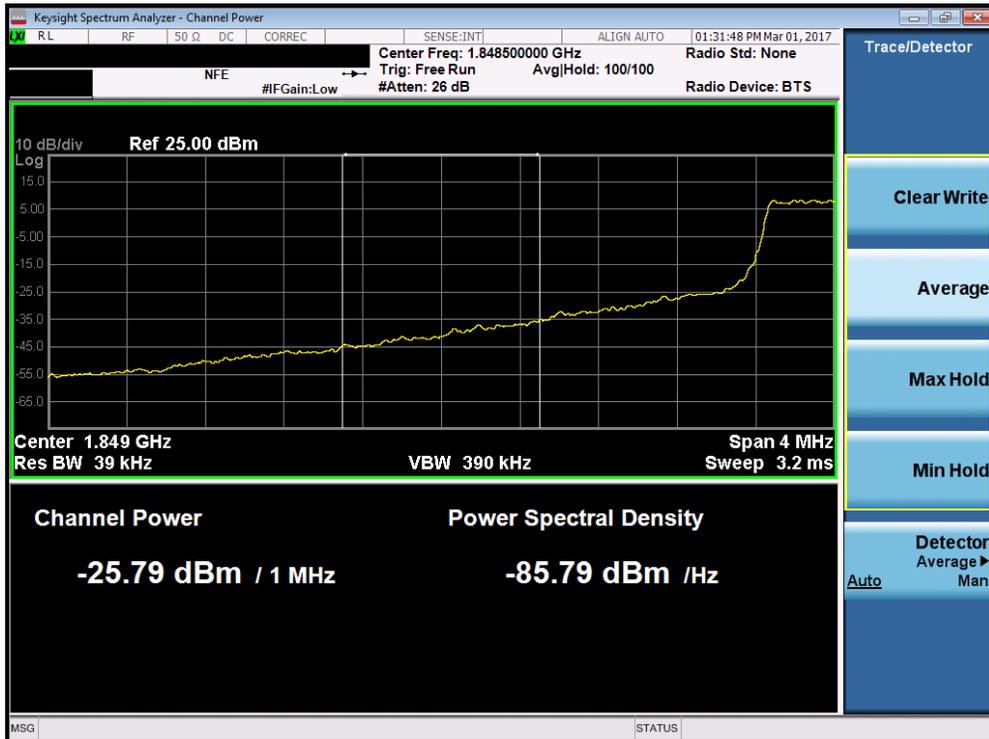


Plot 7-138. Upper Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFUS701		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Plot 7-139. Lower Band Edge Plot (Band 25 – 1.4MHz QPSK – RB Size 6)

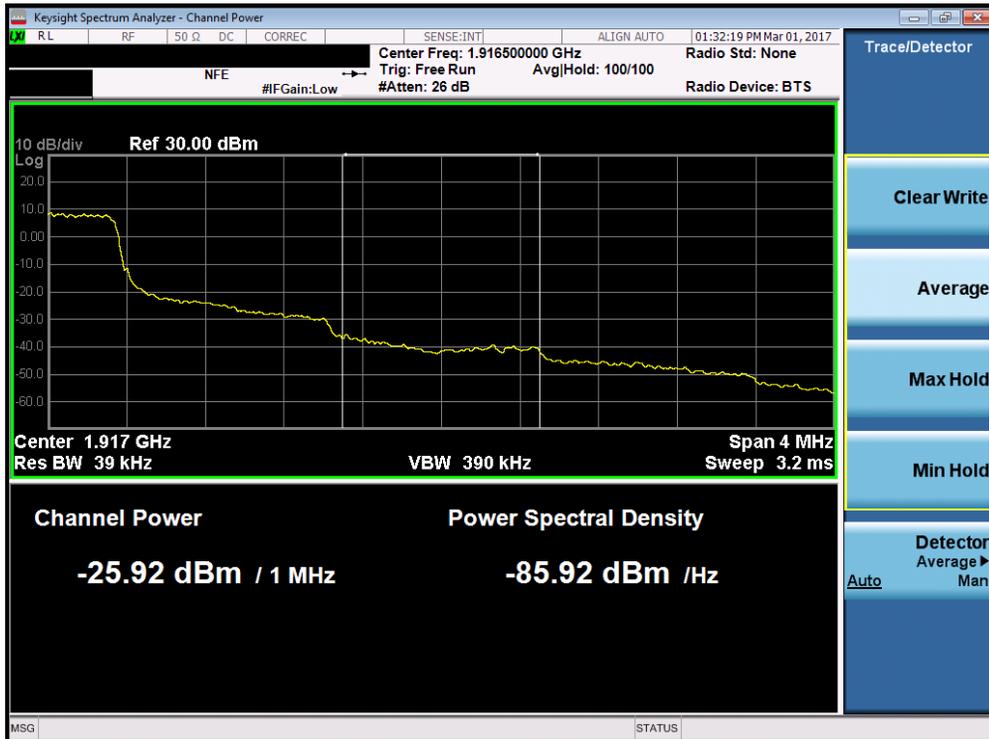


Plot 7-140. Lower Extended Band Edge Plot (Band 25 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140059-03.ZNF	Test Dates: 2/17-3/3/2017	EUT Type: Portable Handset		Page 88 of 134

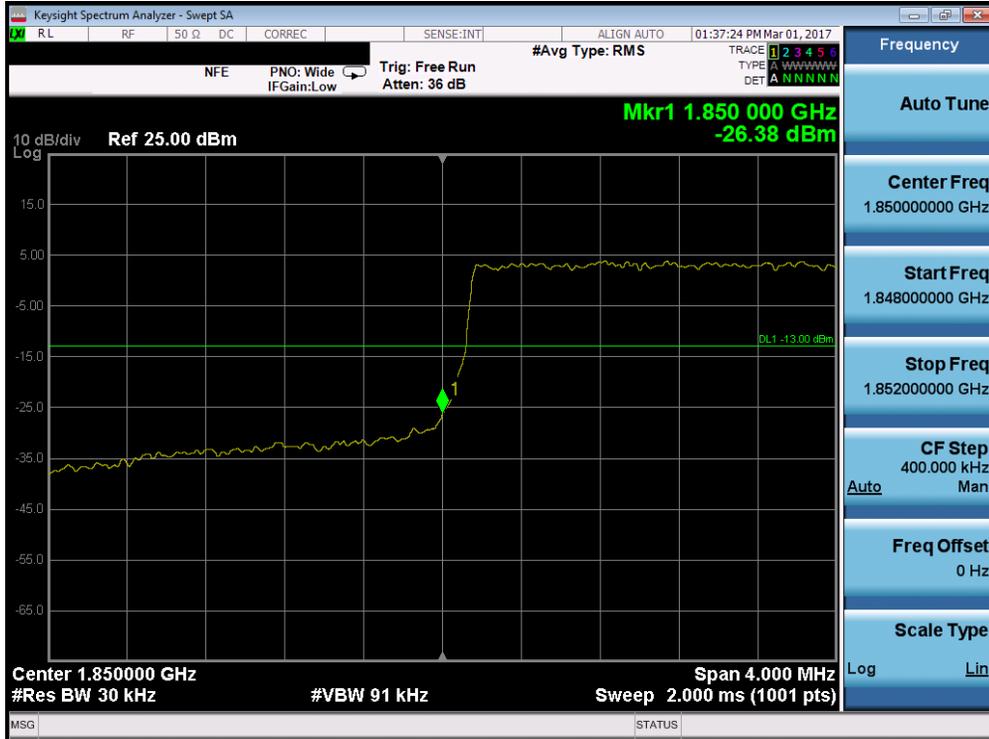


Plot 7-141. Upper Band Edge Plot (Band 25 – 1.4MHz QPSK – RB Size 6)

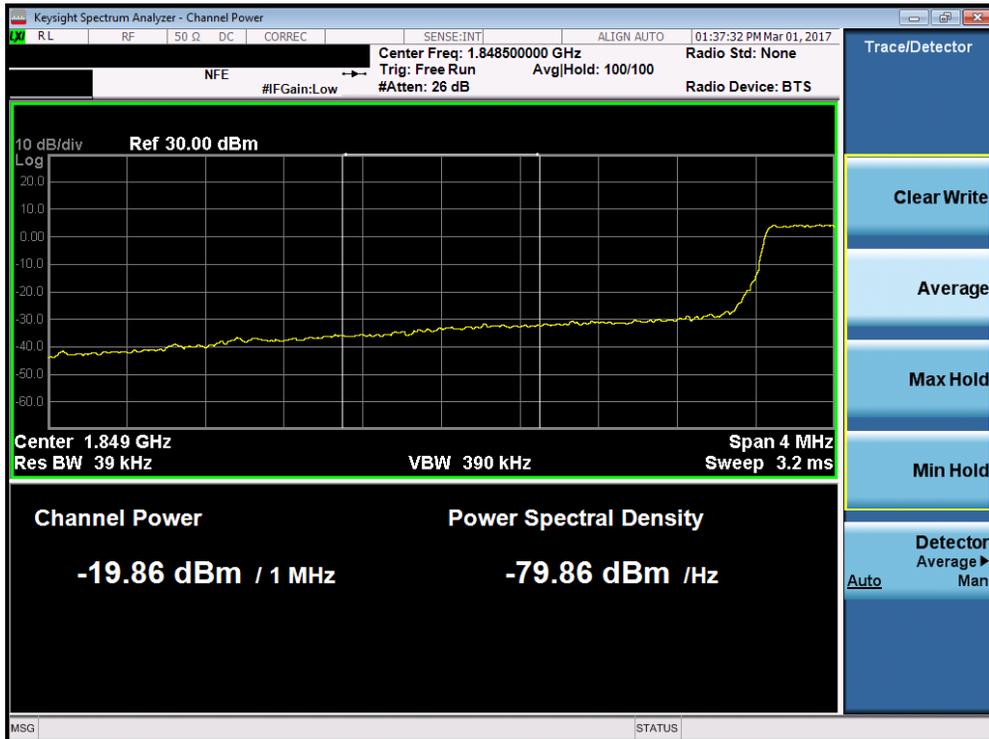


Plot 7-142. Upper Extended Band Edge Plot (Band 25 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140059-03.ZNF	Test Dates: 2/17-3/3/2017	EUT Type: Portable Handset		Page 89 of 134



Plot 7-143. Lower Band Edge Plot (Band 25 – 3.0MHz QPSK – RB Size 15)

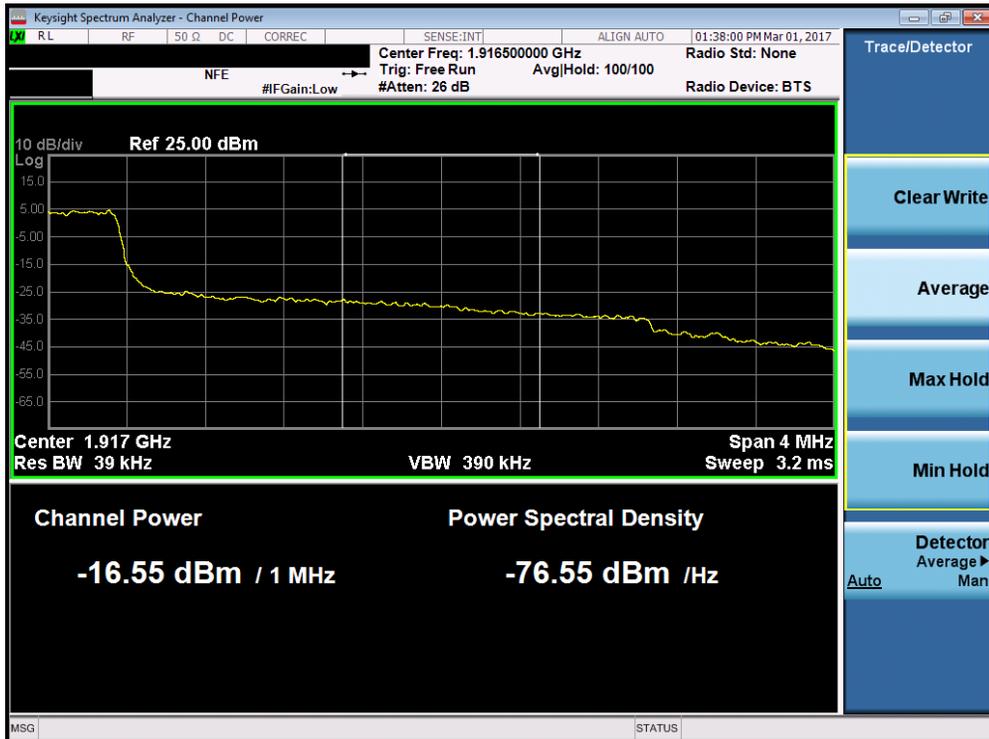


Plot 7-144. Lower Extended Band Edge Plot (Band 25 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140059-03.ZNF	Test Dates: 2/17-3/3/2017	EUT Type: Portable Handset		Page 90 of 134

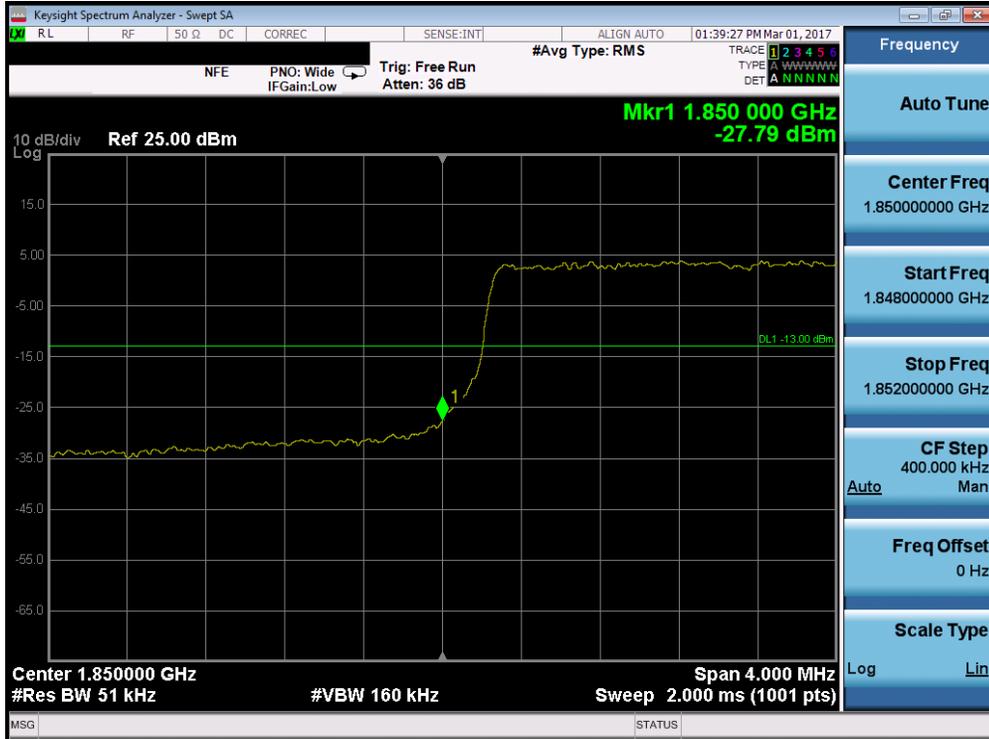


Plot 7-145. Upper Band Edge Plot (Band 25 – 3.0MHz QPSK – RB Size 15)

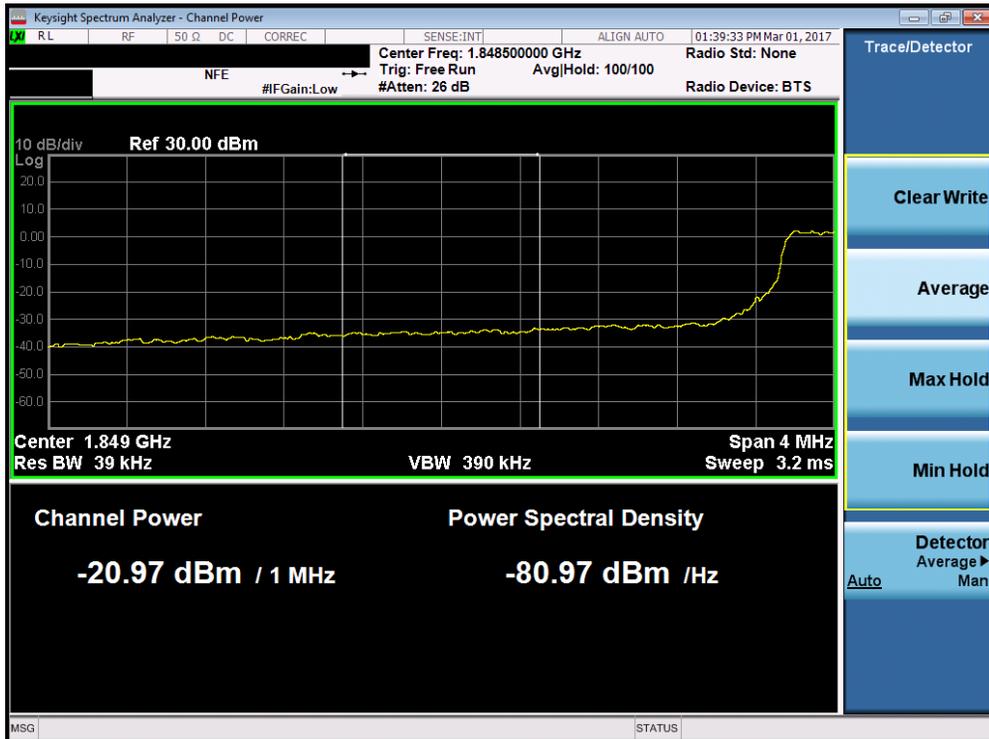


Plot 7-146. Upper Extended Band Edge Plot (Band 25 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFUS701		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140059-03.ZNF	Test Dates: 2/17-3/3/2017	EUT Type: Portable Handset		Page 91 of 134

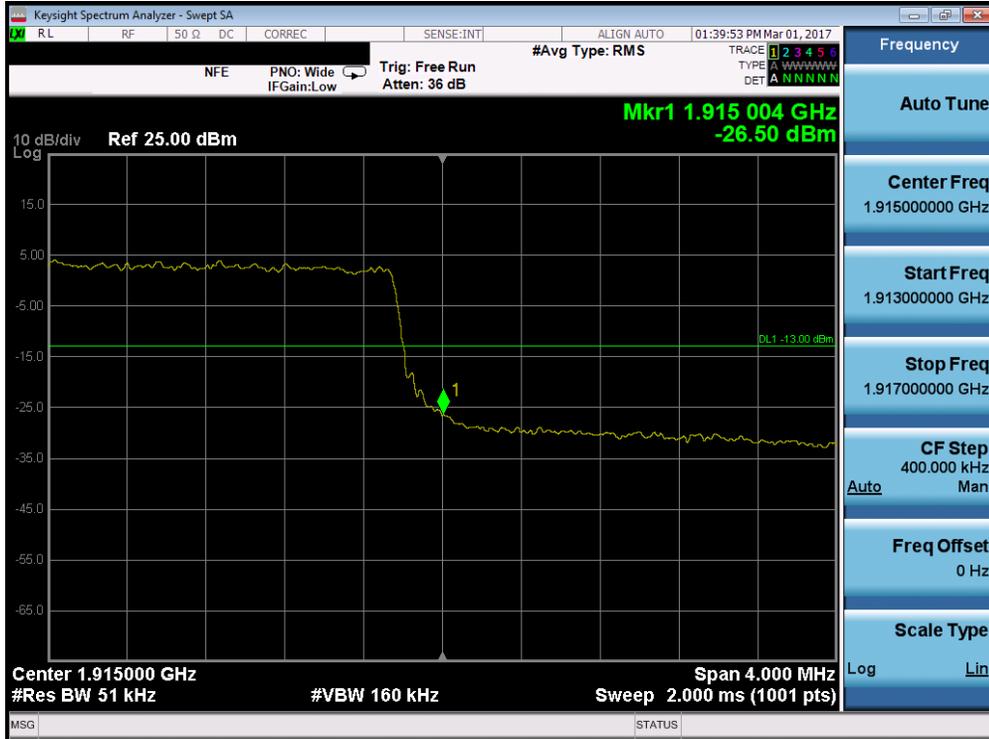


Plot 7-147. Lower Band Edge Plot (Band 25 – 5.0MHz QPSK – RB Size 25)

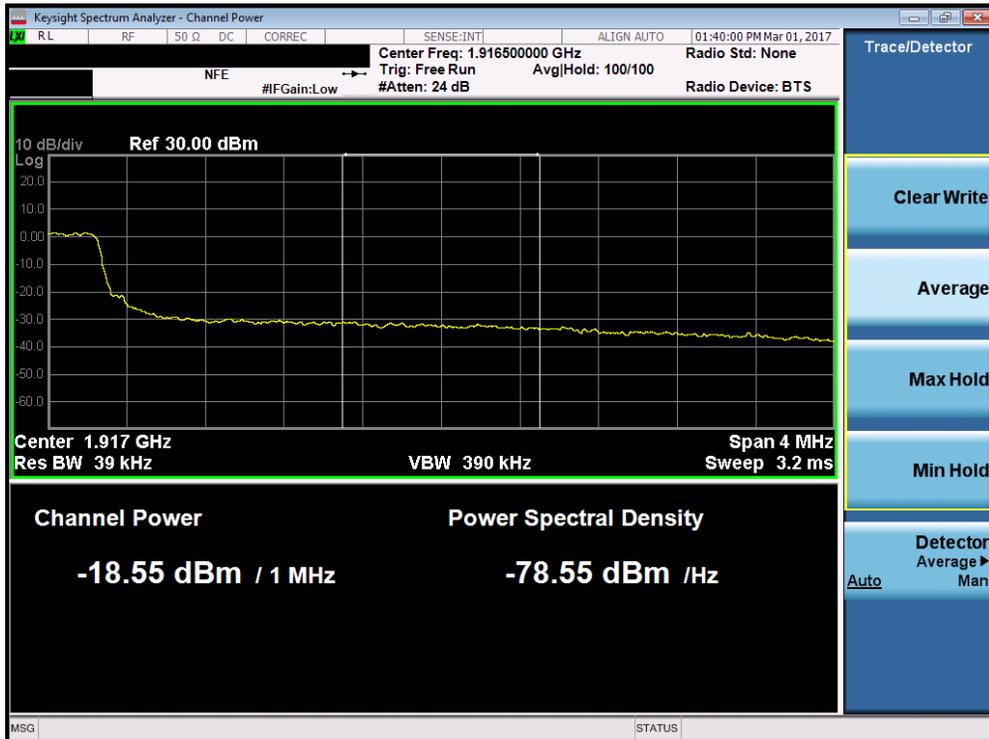


Plot 7-148. Lower Extended Band Edge Plot (Band 25 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140059-03.ZNF	Test Dates: 2/17-3/3/2017	EUT Type: Portable Handset		Page 92 of 134

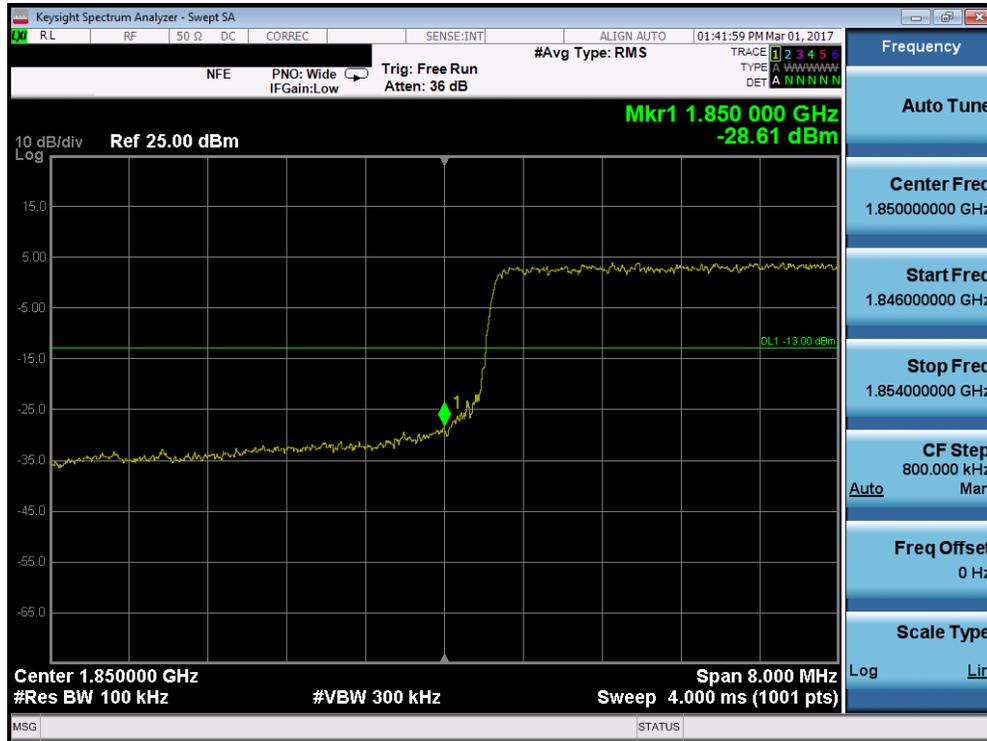


Plot 7-149. Upper Band Edge Plot (Band 25 – 5.0MHz QPSK – RB Size 25)

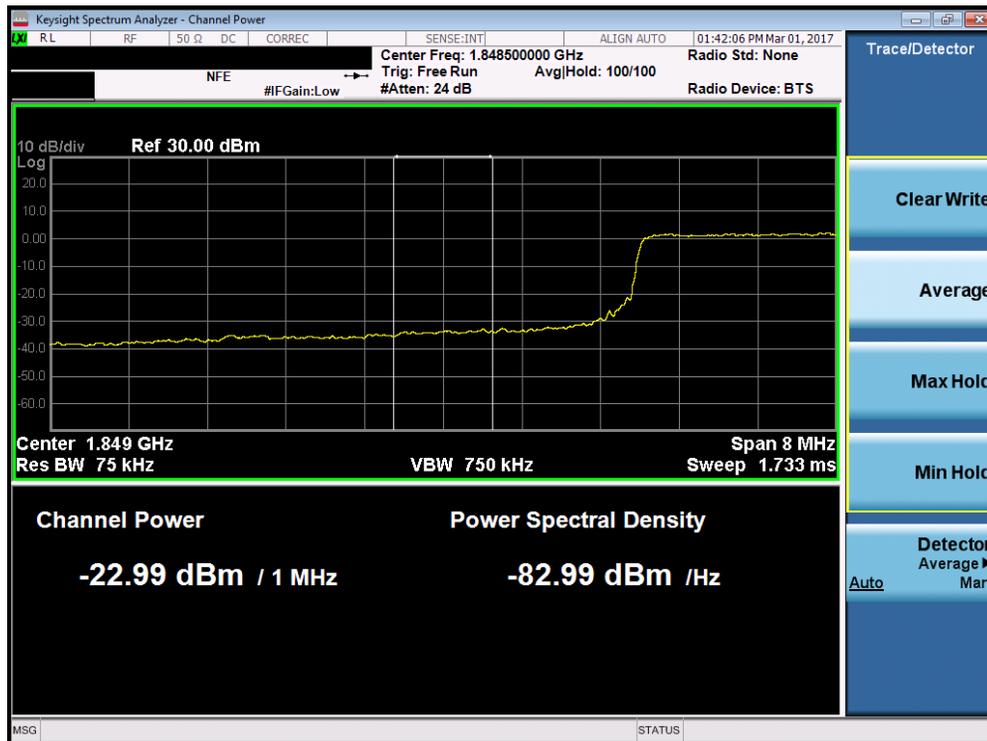


Plot 7-150. Upper Extended Band Edge Plot (Band 25 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFUS701		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140059-03.ZNF	Test Dates: 2/17-3/3/2017	EUT Type: Portable Handset		Page 93 of 134

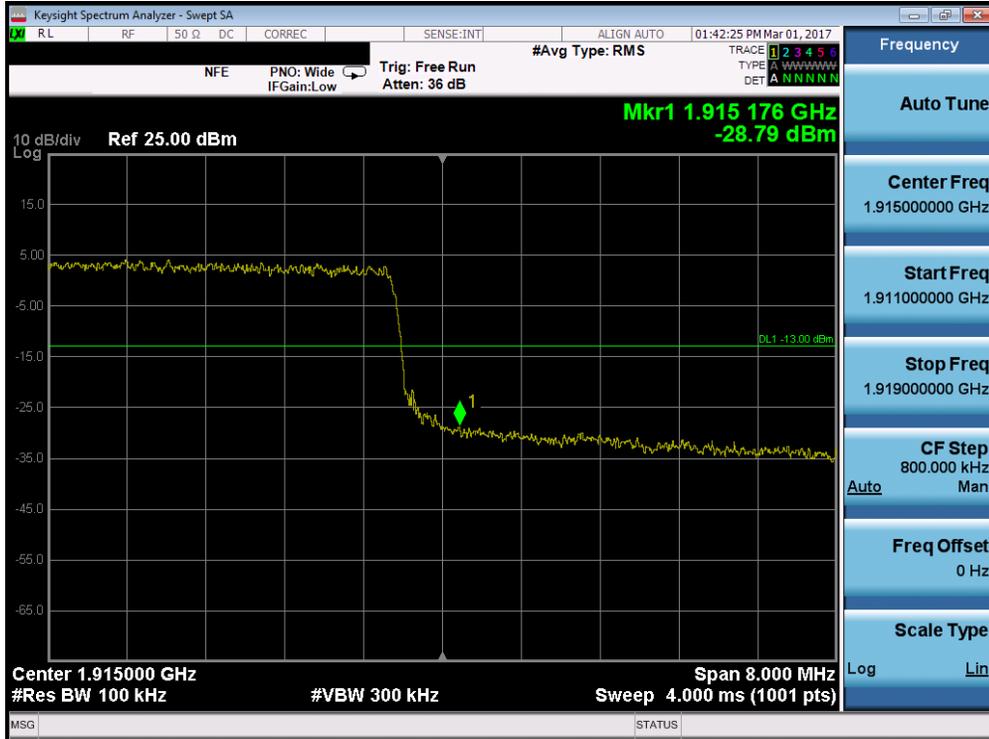


Plot 7-151. Lower Band Edge Plot (Band 25 – 10.0MHz QPSK – RB Size 50)

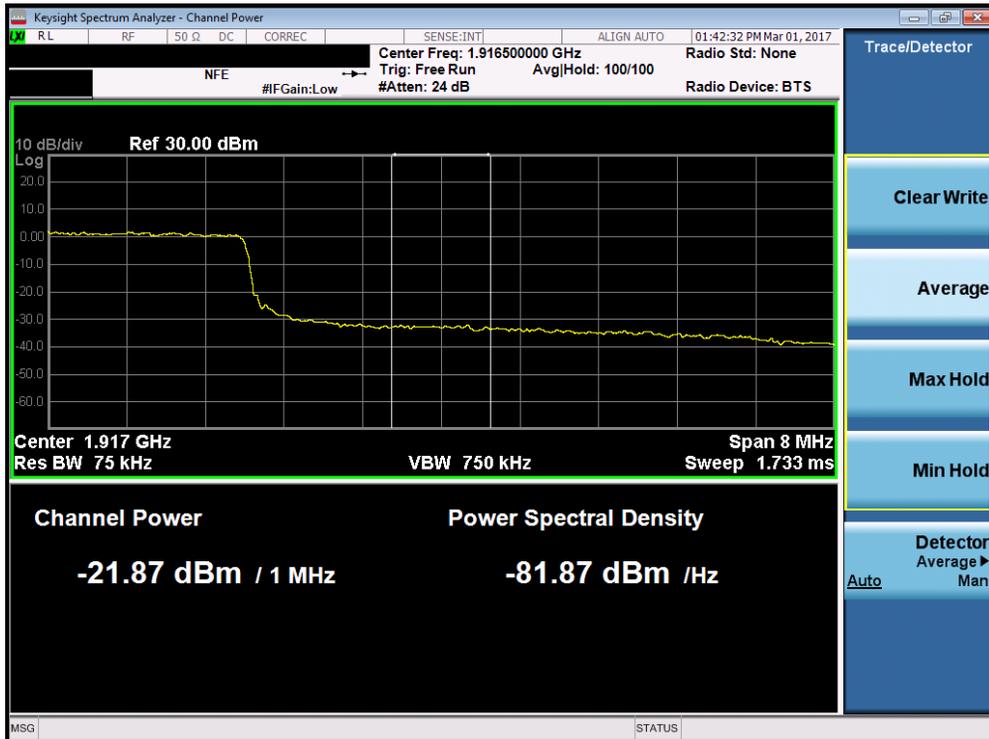


Plot 7-152. Lower Extended Band Edge Plot (Band 25 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140059-03.ZNF	Test Dates: 2/17-3/3/2017	EUT Type: Portable Handset		Page 94 of 134

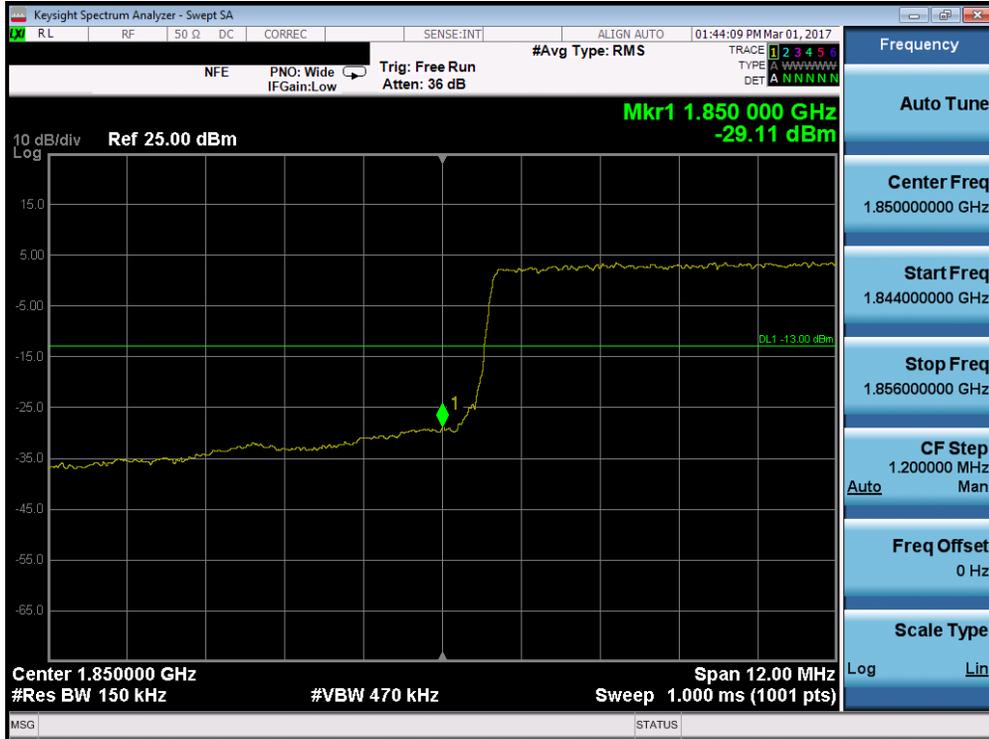


Plot 7-153. Upper Band Edge Plot (Band 25 – 10.0MHz QPSK – RB Size 50)

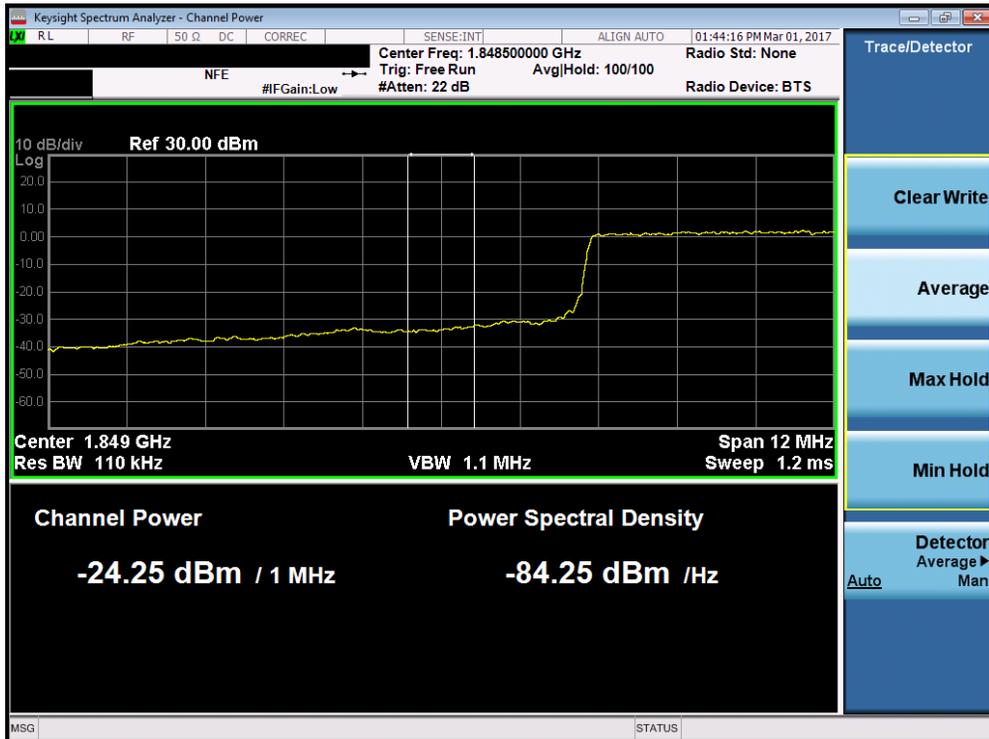


Plot 7-154. Upper Extended Band Edge Plot (Band 25 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140059-03.ZNF	Test Dates: 2/17-3/3/2017	EUT Type: Portable Handset		Page 95 of 134

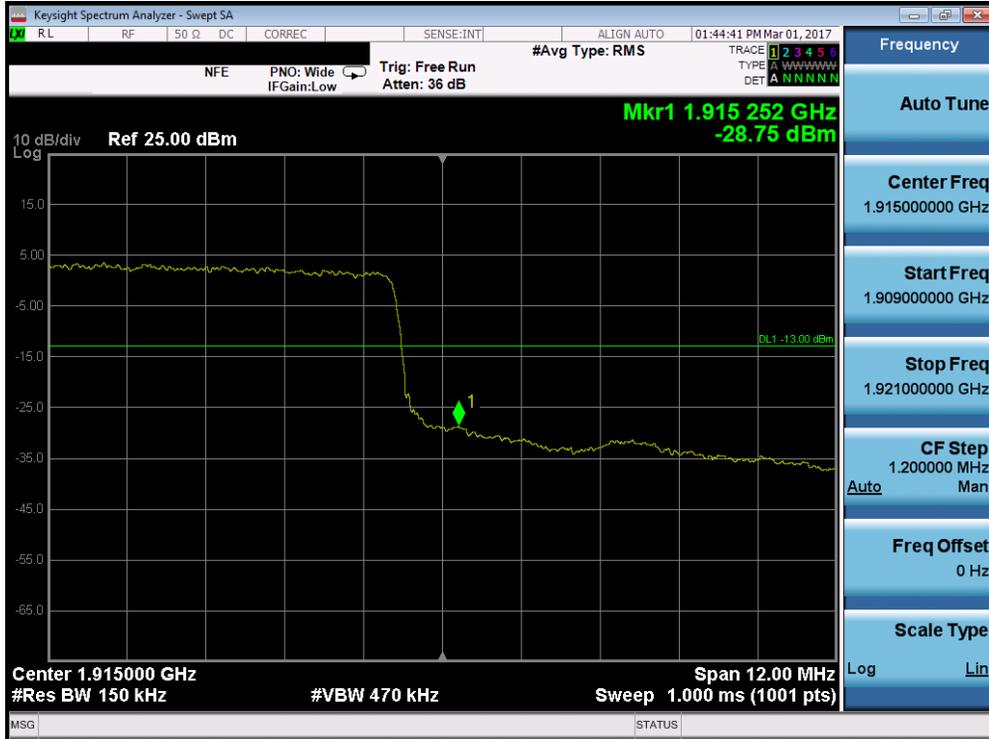


Plot 7-155. Lower Band Edge Plot (Band 25 – 15.0MHz QPSK – RB Size 75)

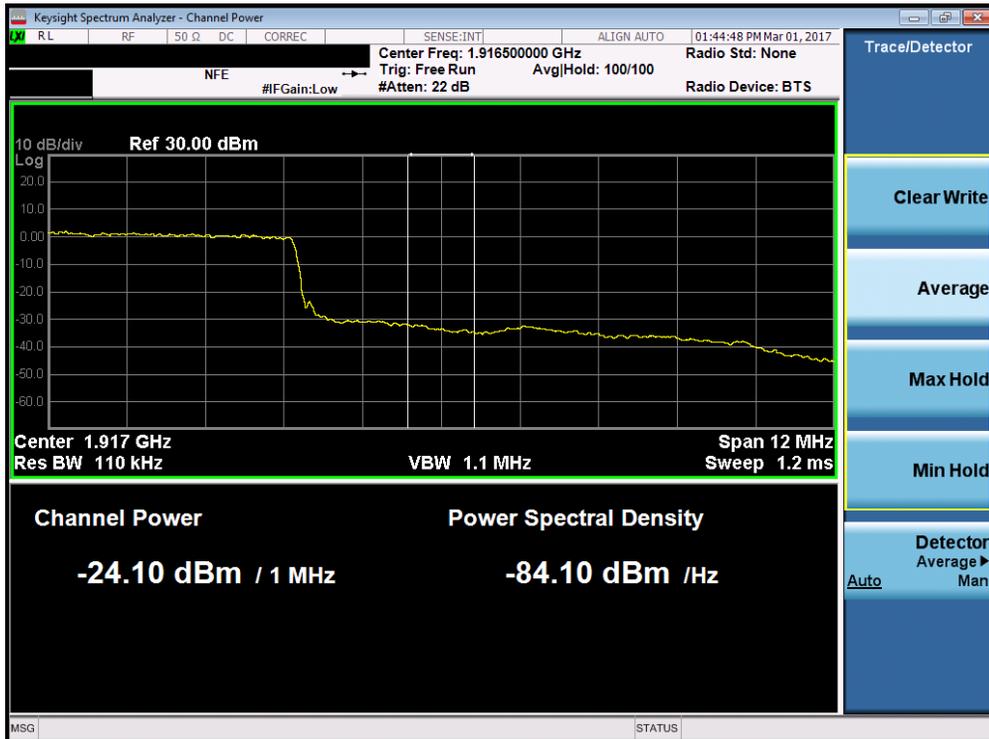


Plot 7-156. Lower Extended Band Edge Plot (Band 25 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140059-03.ZNF	Test Dates: 2/17-3/3/2017	EUT Type: Portable Handset		Page 96 of 134

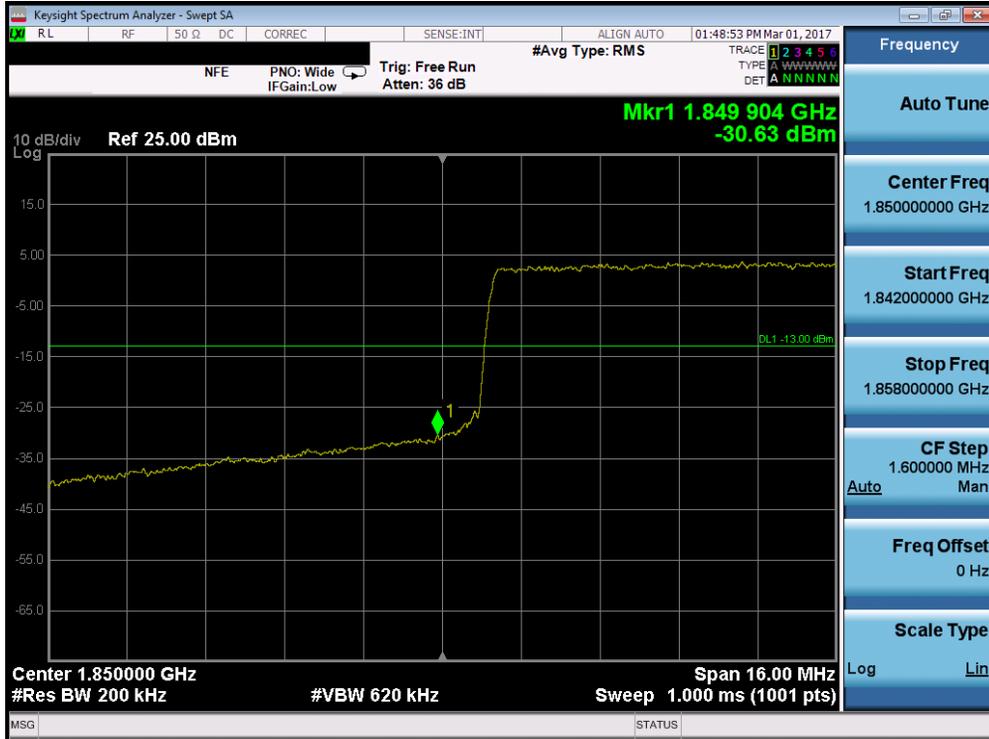


Plot 7-157. Upper Band Edge Plot (Band 25 – 15.0MHz QPSK – RB Size 75)

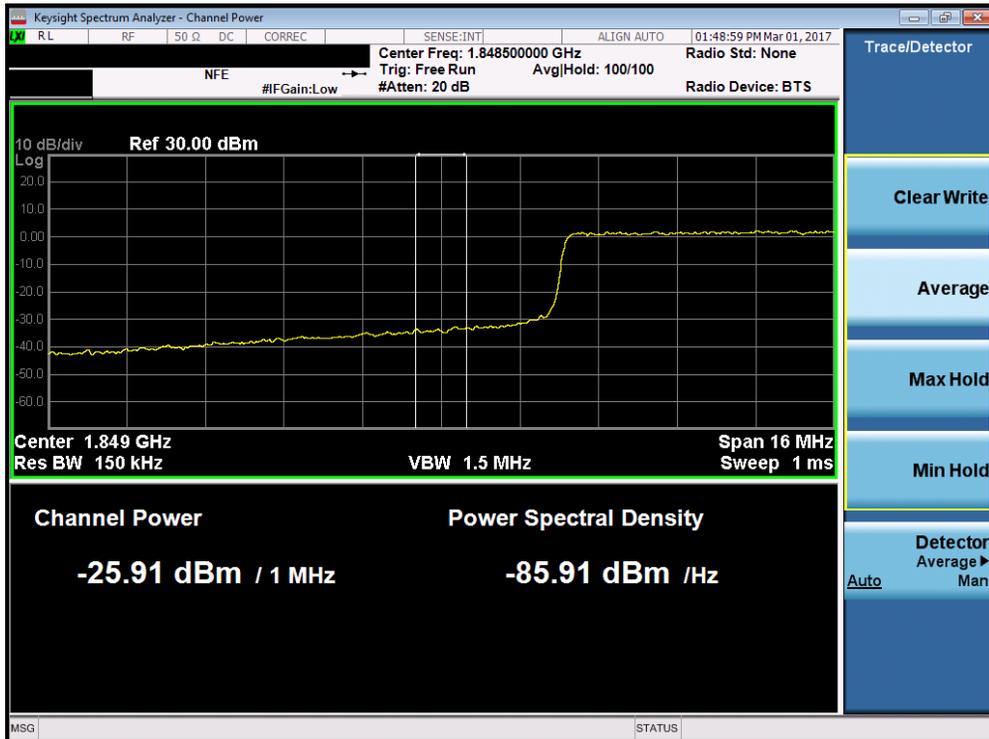


Plot 7-158. Upper Extended Band Edge Plot (Band 25 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140059-03.ZNF	Test Dates: 2/17-3/3/2017	EUT Type: Portable Handset		Page 97 of 134



Plot 7-159. Lower Band Edge Plot (Band 25 – 20.0MHz QPSK – RB Size 100)

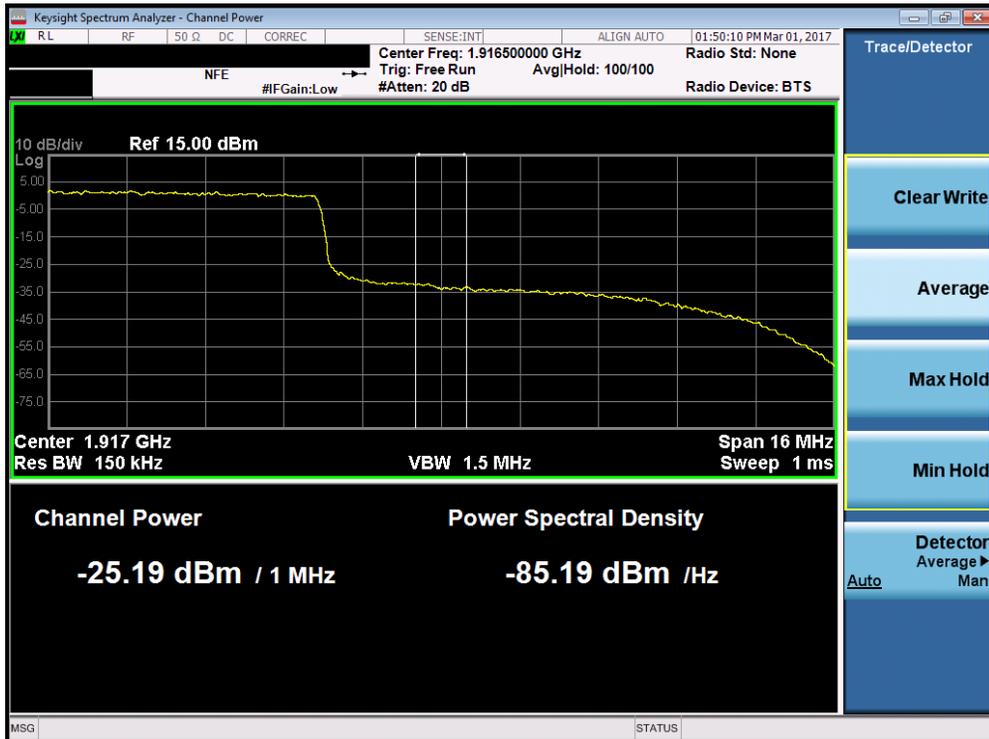


Plot 7-160. Lower Extended Band Edge Plot (Band 25 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFUS701		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Plot 7-161. Upper Band Edge Plot (Band 25 – 20.0MHz QPSK – RB Size 100)



Plot 7-162. Upper Extended Band Edge Plot (Band 25 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140059-03.ZNF	Test Dates: 2/17-3/3/2017	EUT Type: Portable Handset		Page 99 of 134

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.

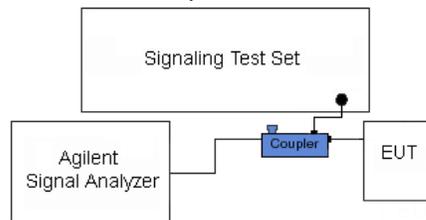
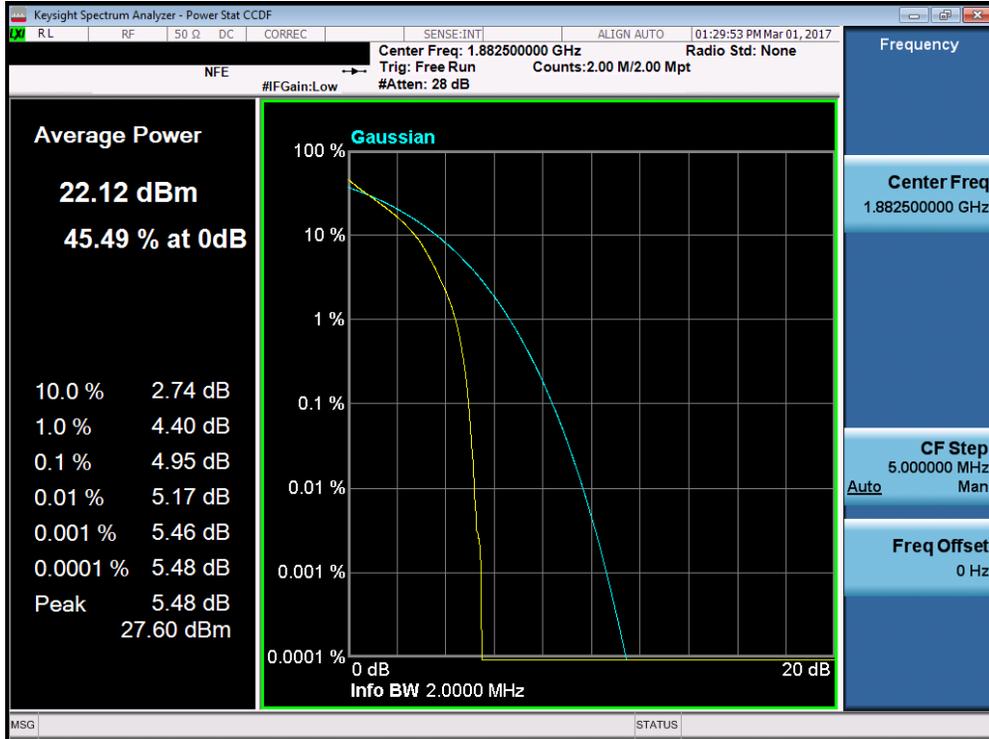


Figure 7-4. Test Instrument & Measurement Setup

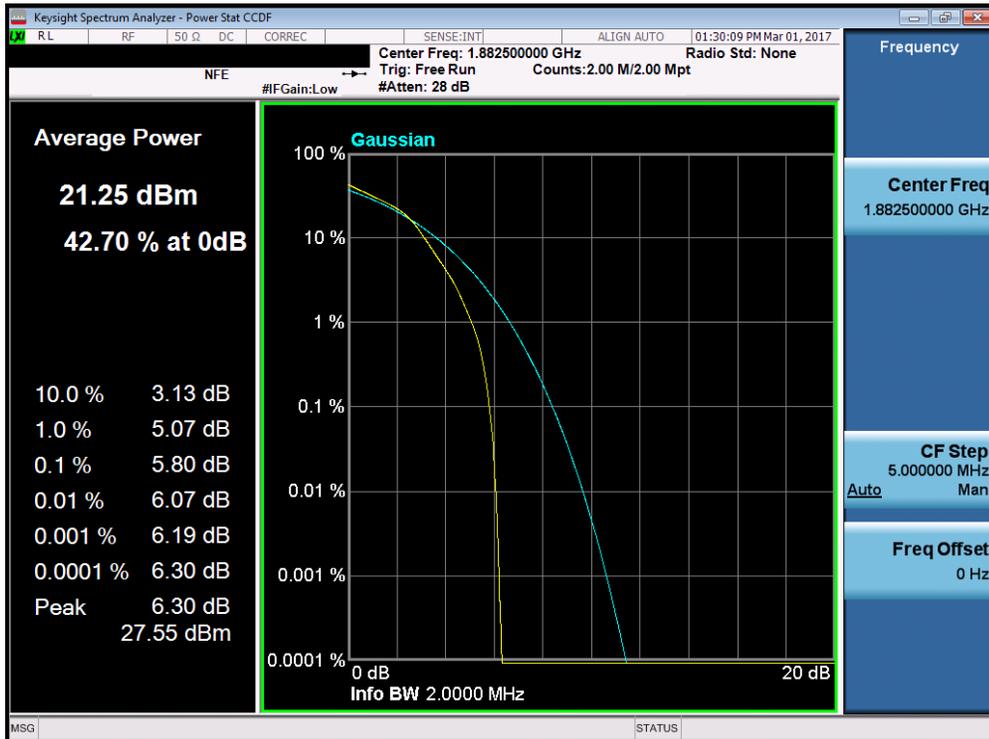
Test Notes

None.

FCC ID: ZNFUS701		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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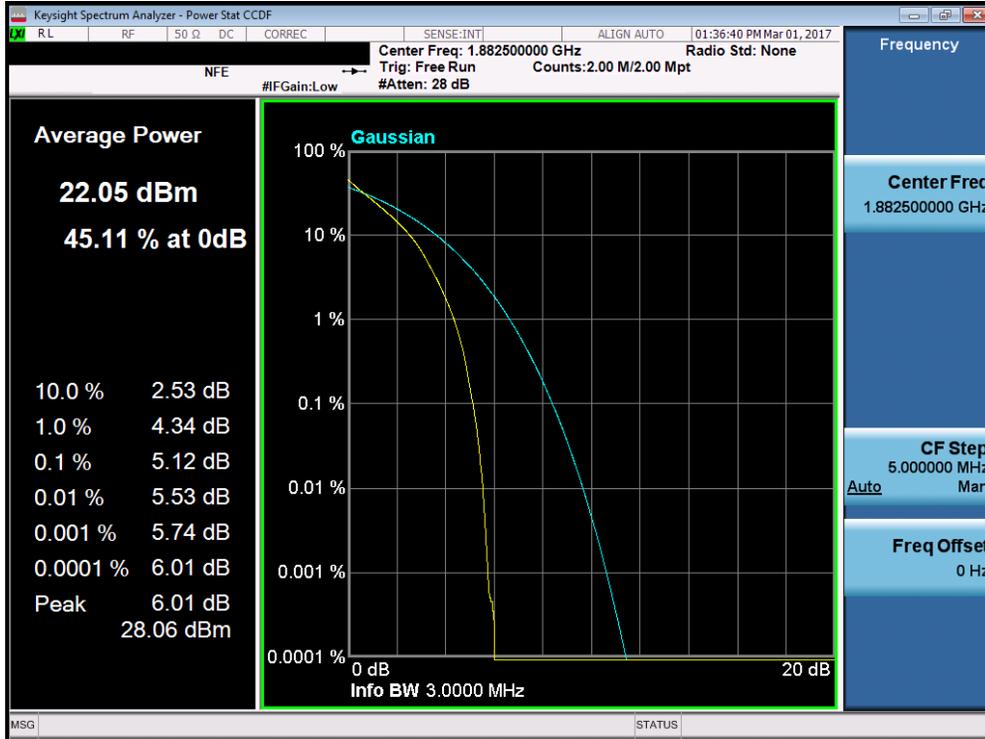


Plot 7-163. PAR Plot (Band 25 – 1.4MHz QPSK – RB Size 6)

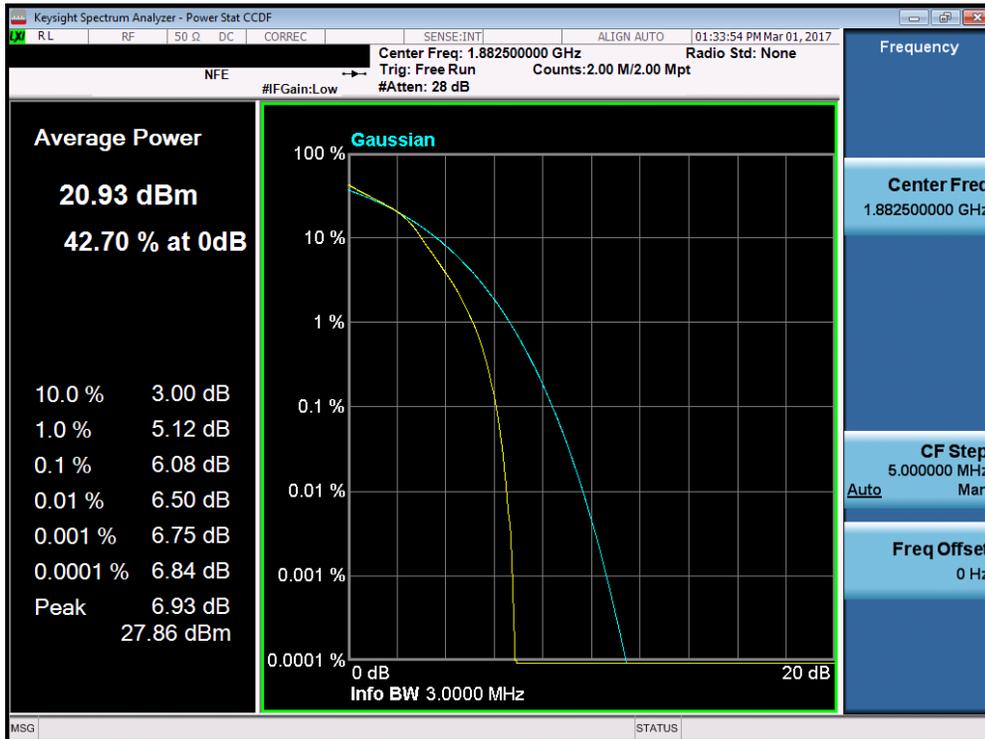


Plot 7-164. PAR Plot (Band 25 – 1.4MHz 16-QAM – RB Size 6)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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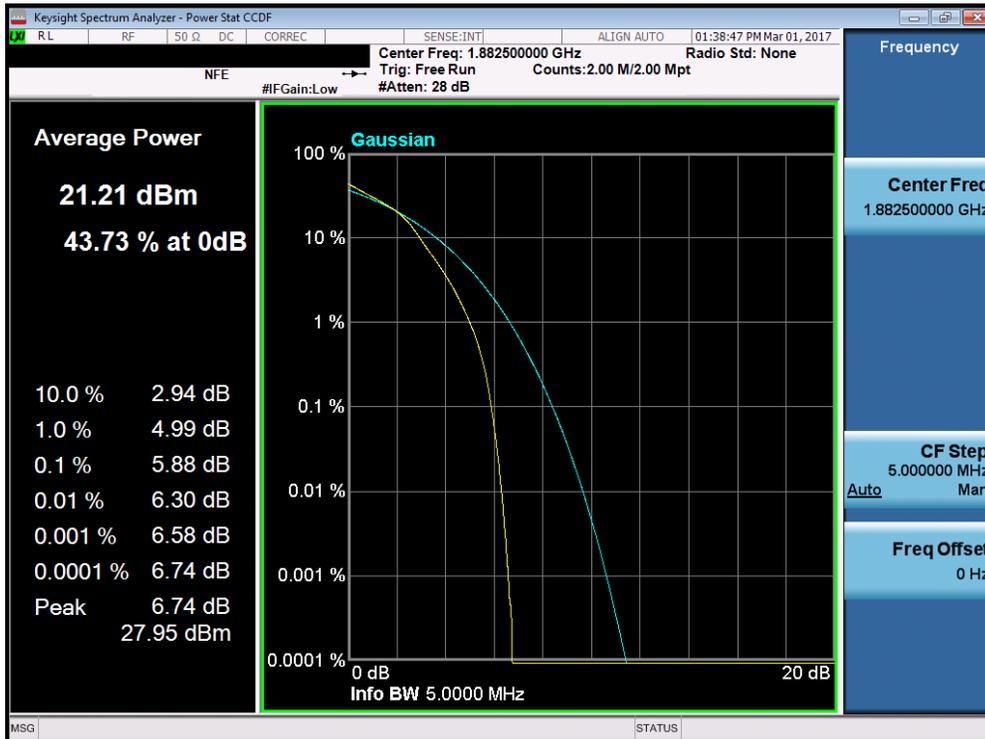
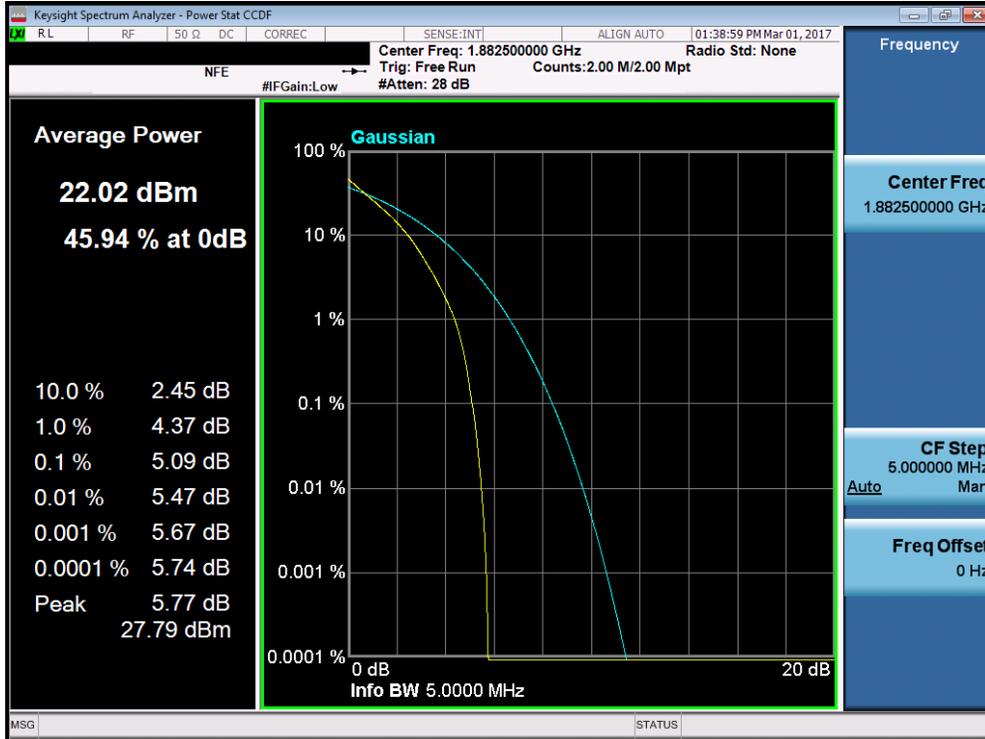


Plot 7-165. PAR Plot (Band 25 – 3.0MHz QPSK – RB Size 15)

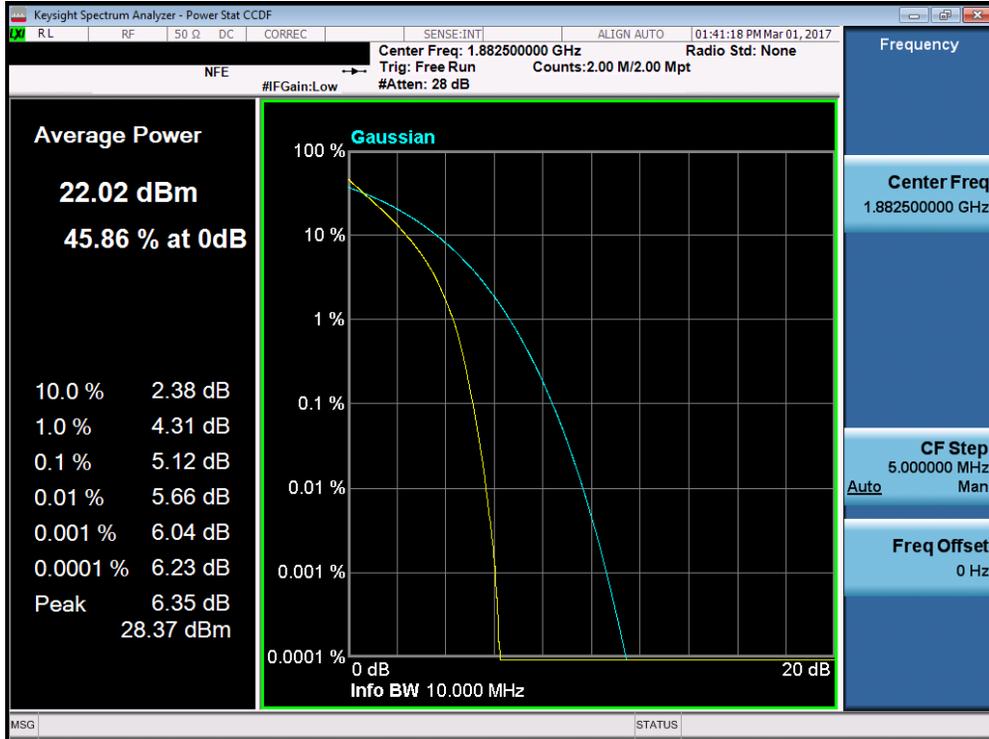


Plot 7-166. PAR Plot (Band 25 – 3.0MHz 16-QAM – RB Size 15)

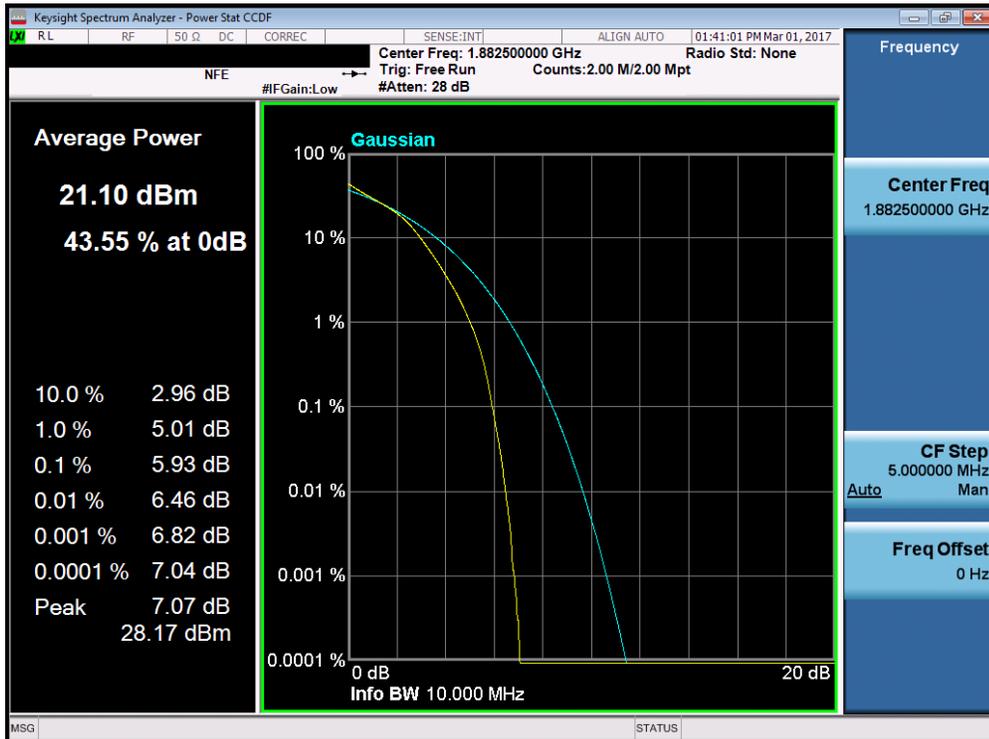
FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702140059-03.ZNF	Test Dates: 2/17-3/3/2017	EUT Type: Portable Handset		Page 102 of 134



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Test Report S/N: 1M1702140059-03.ZNF	Test Dates: 2/17-3/3/2017	EUT Type: Portable Handset		Page 103 of 134

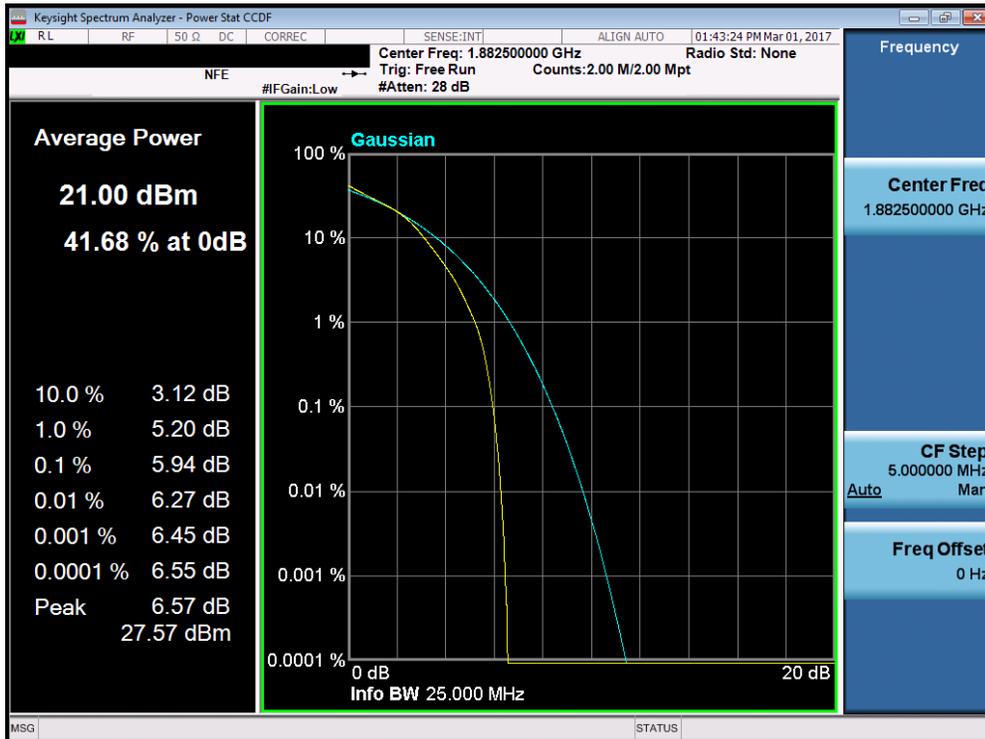
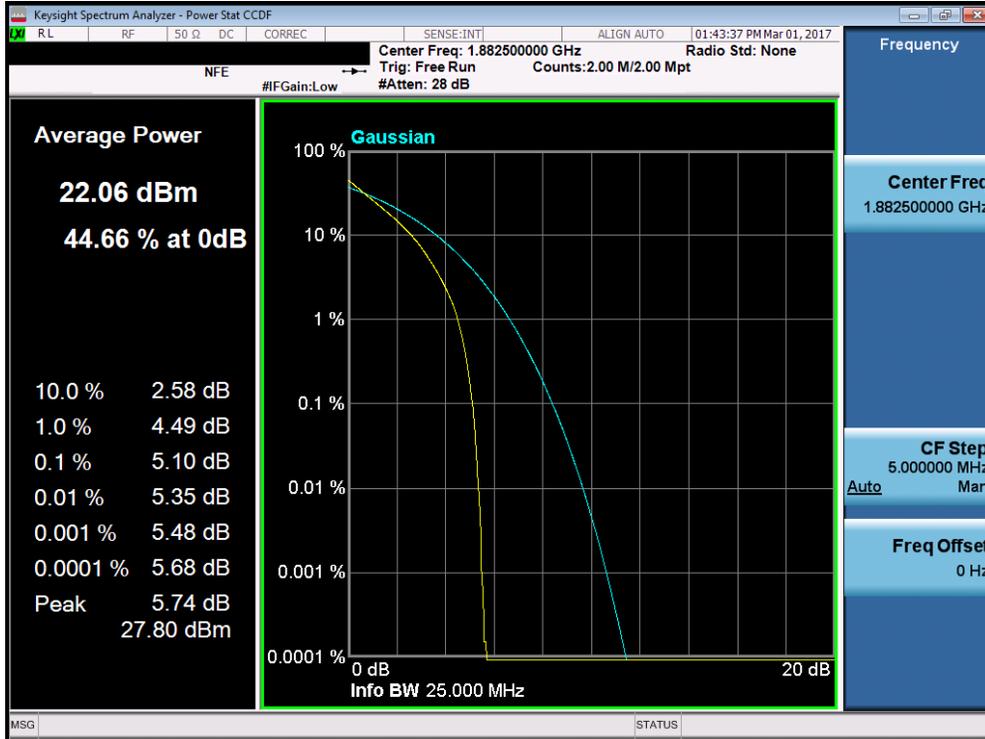


Plot 7-169. PAR Plot (Band 25 – 10.0MHz QPSK – RB Size 50)

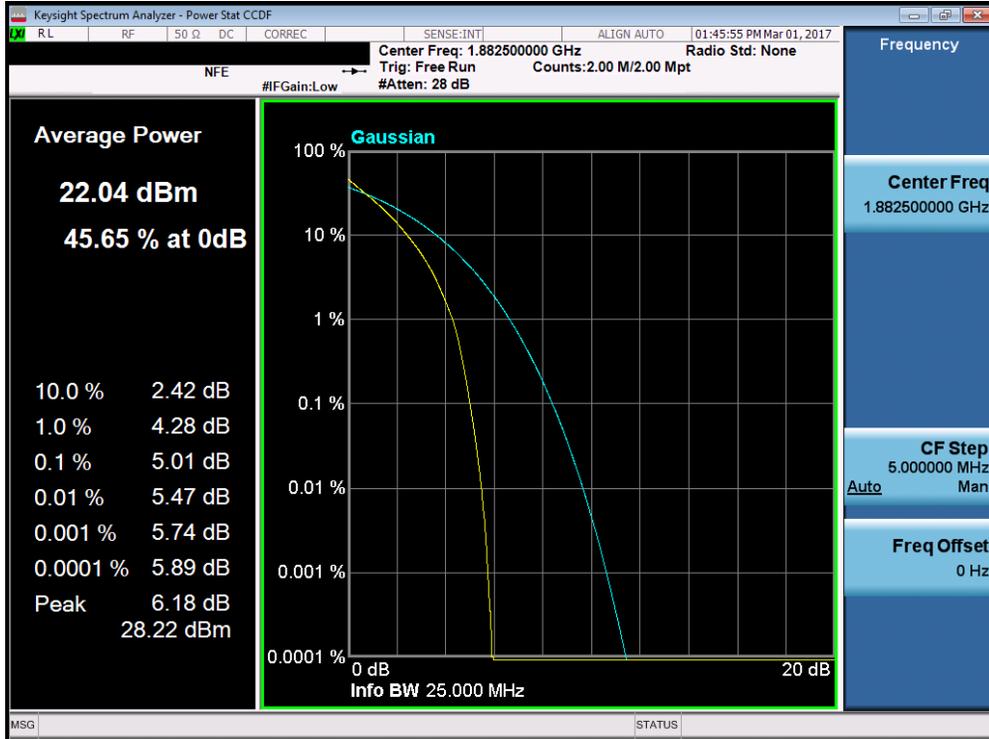


Plot 7-170. PAR Plot (Band 25 – 10.0MHz 16-QAM – RB Size 50)

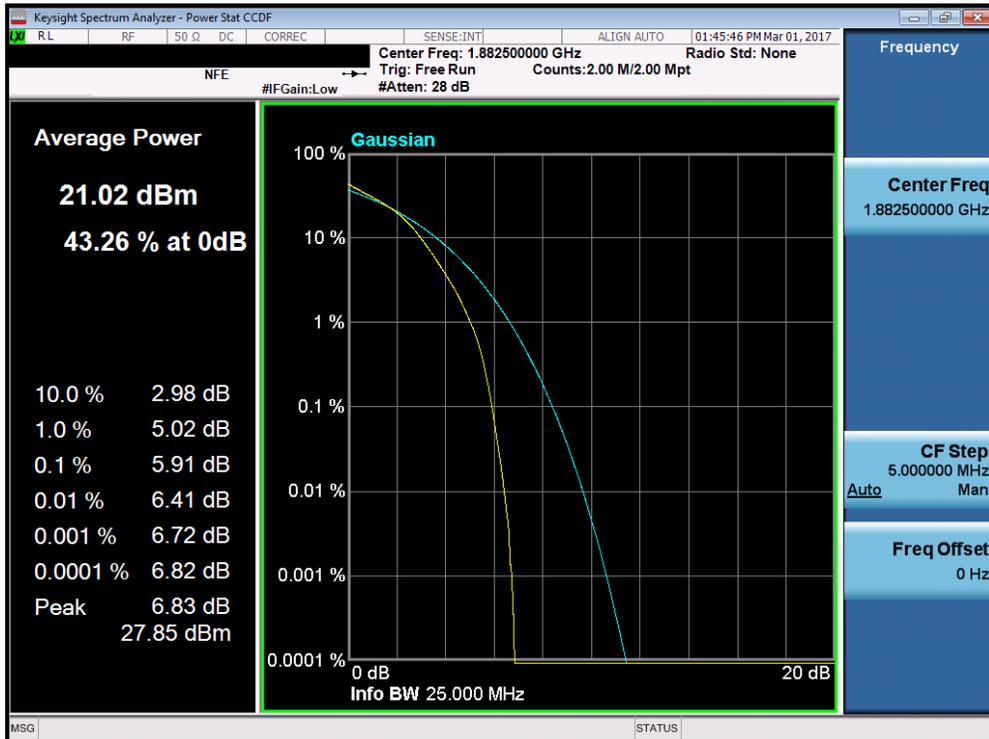
FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1702140059-03.ZNF	Test Dates: 2/17-3/3/2017	EUT Type: Portable Handset		Page 104 of 134



FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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Plot 7-173. PAR Plot (Band 25 – 20.0MHz QPSK – RB Size 100)



Plot 7-174. PAR Plot (Band 25 – 20.0MHz 16-QAM – RB Size 100)

FCC ID: ZNFUS701	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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7.6 Radiated Power (ERP/EIRP)

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

Test Overview

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

Test Procedures Used

KDB 971168 D01 v02r02 – Section 5.2.1

ANSI/TIA-603-D-2010 – Section 2.2.17

Test Settings

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

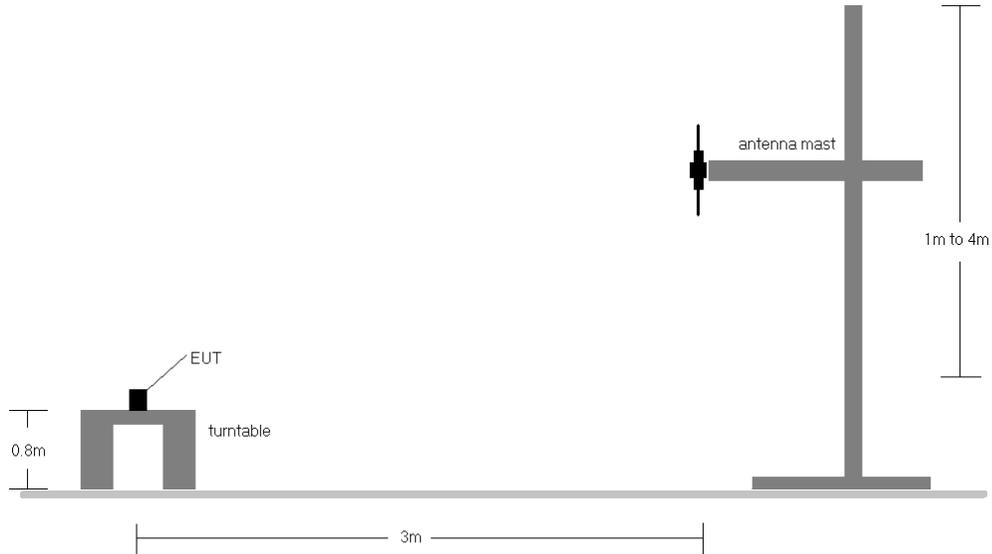


Figure 7-5. Radiated Test Setup <1GHz

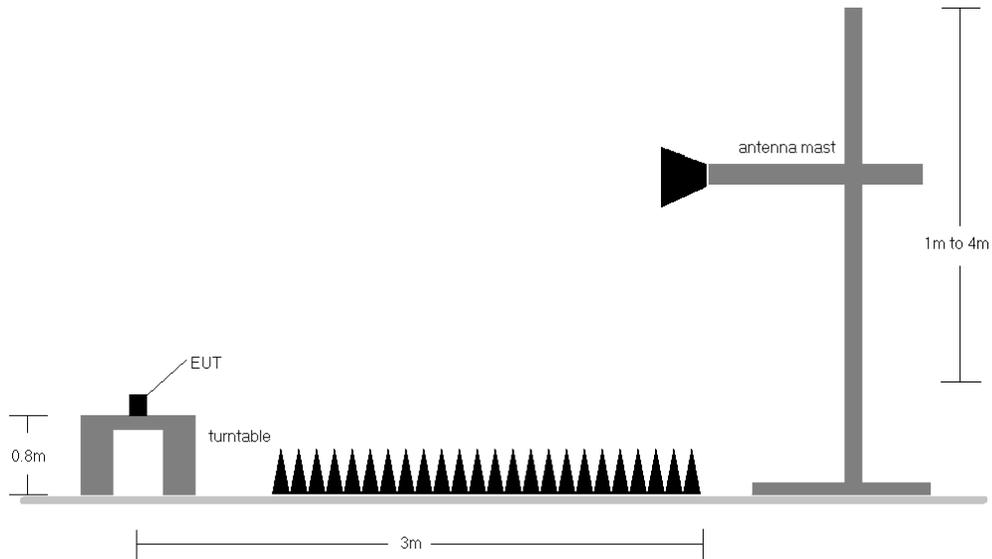


Figure 7-6. Radiated Test Setup >1GHz

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.

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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	236	248	1 / 0	12.22	3.19	15.41	34.77	-19.36
707.50	1.4	QPSK	H	236	248	1 / 5	13.18	3.19	16.37	34.77	-18.40
715.30	1.4	QPSK	H	236	248	1 / 0	13.35	3.31	16.66	34.77	-18.11
715.30	1.4	16-QAM	H	236	248	1 / 0	12.43	3.31	15.74	34.77	-19.03
700.50	3	QPSK	H	253	354	1 / 14	12.50	3.08	15.58	34.77	-19.19
707.50	3	QPSK	H	253	354	1 / 14	13.15	3.19	16.34	34.77	-18.43
714.50	3	QPSK	H	253	354	1 / 0	13.15	3.30	16.45	34.77	-18.32
714.50	3	16-QAM	H	253	354	1 / 14	12.30	3.30	15.60	34.77	-19.17
701.50	5	QPSK	H	235	354	1 / 24	12.60	3.10	15.70	34.77	-19.07
707.50	5	QPSK	H	235	354	1 / 24	12.98	3.19	16.17	34.77	-18.60
713.50	5	QPSK	H	235	354	1 / 24	13.08	3.29	16.37	34.77	-18.41
713.50	5	16-QAM	H	235	354	1 / 0	11.80	3.29	15.09	34.77	-19.69
704.00	10	QPSK	H	234	0	1 / 49	12.87	3.14	16.01	34.77	-18.76
707.50	10	QPSK	H	234	0	1 / 49	12.79	3.19	15.98	34.77	-18.79
711.00	10	QPSK	H	234	0	1 / 49	12.80	3.25	16.05	34.77	-18.72
711.00	10	16-QAM	H	234	0	1 / 0	11.56	3.25	14.81	34.77	-19.96
715.30	1.4	QPSK	V	212	14	1 / 0	13.26	3.06	16.32	34.77	-18.45

Table 7-2. ERP Data (Band 12)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
779.50	5	QPSK	H	230	108	1 / 24	14.11	2.47	16.58	34.77	-18.19
782.00	5	QPSK	H	230	108	1 / 24	14.25	2.54	16.79	34.77	-17.98
784.50	5	QPSK	H	230	108	1 / 0	14.17	2.63	16.80	34.77	-17.97
779.50	5	16-QAM	H	230	108	1 / 24	13.05	2.47	15.52	34.77	-19.25
782.00	5	16-QAM	H	230	108	1 / 24	13.04	2.54	15.58	34.77	-19.19
784.50	5	16-QAM	H	230	108	1 / 0	13.48	2.63	16.11	34.77	-18.66
782.00	10	QPSK	H	226	292	1 / 0	13.14	2.54	15.68	34.77	-19.09
782.00	10	16-QAM	H	226	292	1 / 49	11.99	2.54	14.53	34.77	-20.24
784.50	5	QPSK	V	130	176	1 / 0	12.82	2.63	15.45	34.77	-19.32

Table 7-3. ERP Data (Band 13)

FCC ID: ZNFUS701	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Approved 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]
824.70	1.4	QPSK	V	139	321	1 / 0	13.48	5.51	18.99	38.45	-19.46
836.50	1.4	QPSK	V	139	321	3 / 2	12.70	5.14	17.84	38.45	-20.61
848.30	1.4	QPSK	V	139	321	1 / 5	11.87	4.68	16.55	38.45	-21.90
824.70	1.4	16-QAM	V	139	321	1 / 0	12.13	5.51	17.64	38.45	-20.81
825.50	3	QPSK	V	142	289	1 / 14	13.44	5.52	18.96	38.45	-19.49
836.50	3	QPSK	V	142	289	1 / 14	12.82	5.14	17.96	38.45	-20.49
847.50	3	QPSK	V	142	289	1 / 0	12.47	4.67	17.14	38.45	-21.31
825.50	3	16-QAM	V	142	289	1 / 14	12.46	5.52	17.98	38.45	-20.47
826.50	5	QPSK	V	125	322	1 / 0	13.42	5.51	18.93	38.45	-19.52
836.50	5	QPSK	V	125	322	1 / 0	13.06	5.14	18.20	38.45	-20.25
846.50	5	QPSK	V	125	322	1 / 0	12.74	4.66	17.40	38.45	-21.05
826.50	5	16-QAM	V	125	322	1 / 0	12.22	5.51	17.73	38.45	-20.72
829.00	10	QPSK	V	125	322	1 / 0	13.53	5.49	19.02	38.45	-19.43
836.50	10	QPSK	V	125	322	1 / 0	12.99	5.14	18.13	38.45	-20.32
844.00	10	QPSK	V	125	322	1 / 0	12.75	4.70	17.45	38.45	-21.00
829.00	10	16-QAM	V	125	322	1 / 0	12.29	5.49	17.78	38.45	-20.67
829.00	10	QPSK	H	111	241	1 / 0	11.34	5.49	16.83	38.45	-21.62

Table 7-4. ERP Data (Band 5)

FCC ID: ZNFUS701	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Approved 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]
1710.70	1.4	QPSK	H	111	19	1 / 5	12.61	9.62	22.23	30.00	-7.77
1732.50	1.4	QPSK	H	111	19	3 / 2	14.26	9.50	23.76	30.00	-6.24
1754.30	1.4	QPSK	H	111	19	1 / 0	12.97	9.38	22.35	30.00	-7.65
1732.50	1.4	16-QAM	H	111	19	1 / 0	13.70	9.50	23.20	30.00	-6.80
1711.50	3	QPSK	H	112	25	1 / 14	12.22	9.62	21.84	30.00	-8.16
1732.50	3	QPSK	H	112	25	1 / 0	13.98	9.50	23.48	30.00	-6.52
1753.50	3	QPSK	H	111	24	1 / 0	13.52	9.39	22.91	30.00	-7.09
1732.50	3	16-QAM	H	112	25	1 / 0	12.99	9.50	22.49	30.00	-7.51
1712.50	5	QPSK	H	108	25	1 / 24	12.12	9.61	21.73	30.00	-8.27
1732.50	5	QPSK	H	108	25	1 / 24	13.94	9.50	23.44	30.00	-6.56
1752.50	5	QPSK	H	107	25	1 / 0	13.76	9.39	23.15	30.00	-6.85
1732.50	5	16-QAM	H	108	25	1 / 24	13.39	9.50	22.89	30.00	-7.11
1715.00	10	QPSK	H	108	25	1 / 49	12.73	9.60	22.33	30.00	-7.67
1732.50	10	QPSK	H	108	25	1 / 49	14.10	9.50	23.60	30.00	-6.40
1750.00	10	QPSK	H	108	25	1 / 0	14.05	9.41	23.46	30.00	-6.54
1732.50	10	16-QAM	H	108	25	1 / 49	13.43	9.50	22.93	30.00	-7.07
1717.50	15	QPSK	H	104	29	1 / 0	13.75	9.58	23.33	30.00	-6.67
1732.50	15	QPSK	H	104	29	1 / 74	14.21	9.50	23.71	30.00	-6.29
1747.50	15	QPSK	H	103	28	1 / 0	14.49	9.42	23.91	30.00	-6.09
1747.50	15	16-QAM	H	103	28	1 / 0	13.66	9.42	23.08	30.00	-6.92
1720.00	20	QPSK	H	111	23	1 / 99	13.59	9.57	23.16	30.00	-6.84
1732.50	20	QPSK	H	100	25	1 / 99	14.06	9.50	23.56	30.00	-6.44
1745.00	20	QPSK	H	111	23	1 / 0	14.04	9.43	23.47	30.00	-6.53
1732.50	20	16-QAM	H	100	25	1 / 99	13.81	9.50	23.31	30.00	-6.69
1747.50	15	QPSK	V	112	24	1 / 99	13.63	9.42	23.05	30.00	-6.95

Table 7-5. EIRP Data (Band 4)

FCC ID: ZNFUS701	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Approved 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	H	104	47	1 / 5	12.86	9.12	21.98	33.01	-11.03
1882.50	1.4	QPSK	H	104	47	3 / 2	14.03	9.10	23.13	33.01	-9.88
1914.30	1.4	QPSK	H	104	47	1 / 0	13.61	9.20	22.81	33.01	-10.20
1882.50	1.4	16-QAM	H	104	47	1 / 5	13.67	9.10	22.77	33.01	-10.24
1851.50	3	QPSK	H	103	14	1 / 0	13.09	9.12	22.21	33.01	-10.80
1882.50	3	QPSK	H	103	14	1 / 0	13.97	9.10	23.07	33.01	-9.94
1913.50	3	QPSK	H	103	14	1 / 14	13.47	9.19	22.66	33.01	-10.35
1882.50	3	16-QAM	H	103	14	1 / 0	13.62	9.10	22.72	33.01	-10.29
1852.50	5	QPSK	H	100	25	1 / 24	13.45	9.12	22.57	33.01	-10.44
1882.50	5	QPSK	H	100	52	1 / 0	13.42	9.10	22.52	33.01	-10.49
1912.50	5	QPSK	H	100	54	1 / 24	13.26	9.18	22.44	33.01	-10.57
1852.50	5	16-QAM	H	100	25	1 / 24	13.15	9.12	22.27	33.01	-10.74
1855.00	10	QPSK	H	100	42	1 / 49	13.60	9.12	22.72	33.01	-10.29
1882.50	10	QPSK	H	100	43	1 / 0	13.75	9.10	22.85	33.01	-10.16
1910.00	10	QPSK	H	100	43	1 / 0	13.67	9.16	22.83	33.01	-10.18
1882.50	10	16-QAM	H	100	43	1 / 0	13.56	9.10	22.66	33.01	-10.35
1857.50	15	QPSK	H	100	47	1 / 74	13.38	9.11	22.49	33.01	-10.52
1882.50	15	QPSK	H	100	47	1 / 74	13.70	9.10	22.80	33.01	-10.21
1907.50	15	QPSK	H	100	47	1 / 0	14.50	9.15	23.65	33.01	-9.36
1907.50	15	16-QAM	H	100	47	1 / 0	14.13	9.15	23.28	33.01	-9.73
1860.00	20	QPSK	H	100	46	1 / 99	13.60	9.11	22.71	33.01	-10.30
1882.50	20	QPSK	H	100	46	1 / 0	13.81	9.10	22.91	33.01	-10.10
1905.00	20	QPSK	H	100	46	1 / 0	14.07	9.13	23.20	33.01	-9.81
1905.00	20	16-QAM	H	100	46	1 / 0	13.67	9.13	22.80	33.01	-10.21
1907.50	15	QPSK	V	117	275	1 / 99	13.77	9.15	22.92	33.01	-10.09

Table 7-6. EIRP Data (Band 25)

FCC ID: ZNFUS701	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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7.7 Radiated Spurious Emissions Measurements

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

Test Overview

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

Test Procedures Used

KDB 971168 D01 v02r02 – Section 5.8

ANSI/TIA-603-D-2010 – Section 2.2.12

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW $\geq 3 \times$ RBW
3. Span = 1.5 times the OBW
4. No. of sweep points $\geq 2 \times$ span / RBW
5. Detector = 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.

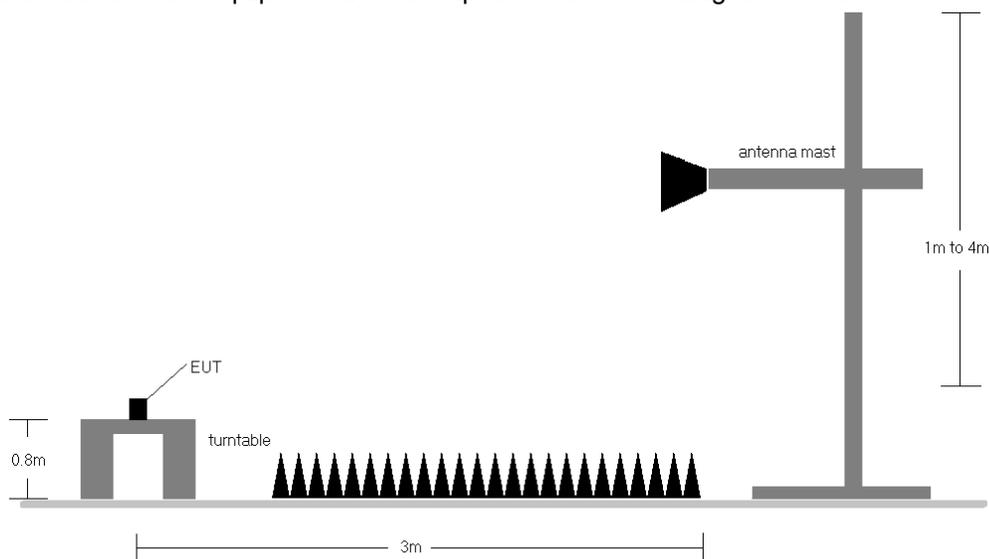


Figure 7-7. Test Instrument & Measurement Setup

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: 699.70 MHz
 CHANNEL: 23017
 MEASURED OUTPUT POWER: 15.41 dBm = 0.035 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 1.4 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 28.41 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]
1399.40	H	110	48	-66.28	5.57	-60.71	76.1
2099.10	H	113	235	-63.22	6.65	-56.57	72.0

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

OPERATING FREQUENCY: 707.50 MHz
 CHANNEL: 23095
 MEASURED OUTPUT POWER: 16.37 dBm = 0.043 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 1.4 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 29.37 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	133	207	-64.55	5.69	-58.86	75.2
2122.50	H	-	-	-65.38	6.75	-58.64	75.0

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

FCC ID: ZNFUS701	 PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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OPERATING FREQUENCY: 715.30 MHz
 CHANNEL: 23173
 MEASURED OUTPUT POWER: 16.66 dBm = 0.046 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 1.4 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 29.66 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1430.60	H	100	24	-68.79	5.82	-62.98	79.6
2145.90	H	110	238	-65.05	6.84	-58.21	74.9

Table 7-9. Radiated Spurious Data (Band 12 – High Channel)

OPERATING FREQUENCY: 779.50 MHz
 CHANNEL: 23205
 MEASURED OUTPUT POWER: 16.58 dBm = 0.046 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 29.58 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
2338.50	H	100	22	-68.69	7.35	-61.34	77.9
3118.00	H	-	-	-67.12	7.19	-59.93	76.5

Table 7-10. Radiated Spurious Data (Band 13 – Low Channel)

FCC ID: ZNFUS701		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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OPERATING FREQUENCY: 782.00 MHz
 CHANNEL: 23230
 MEASURED OUTPUT POWER: 16.79 dBm = 0.048 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 29.79 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]
2346.00	H	113	195	-65.20	7.33	-57.87	74.7
3128.00	H	-	-	-65.53	7.20	-58.33	75.1

Table 7-11. Radiated Spurious Data (Band 13 – Mid Channel)

OPERATING FREQUENCY: 784.50 MHz
 CHANNEL: 23255
 MEASURED OUTPUT POWER: 16.80 dBm = 0.048 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 29.80 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
2353.50	H	100	253	-65.37	7.30	-58.07	74.9
3138.00	H	-	-	-65.67	7.21	-58.45	75.3

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

FCC ID: ZNFUS701			FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.00 MHz
 DISTANCE: 3 meters
 NARROWBAND EMISSION LIMIT: -50 dBm
 WIDEBAND EMISSION LIMIT: -40 dBm/MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Margin [dB]
1559.00	H	-	-	-69.98	6.55	-63.43	-23.4

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

OPERATING FREQUENCY: 829.00 MHz
 CHANNEL: 20450
 MEASURED OUTPUT POWER: 19.02 dBm = 0.080 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 32.02 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	V	-	-	-70.92	6.75	-64.18	83.2
2487.00	V	106	255	-48.67	7.59	-41.09	60.1

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

FCC ID: ZNFUS701		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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OPERATING FREQUENCY: 836.50 MHz
 CHANNEL: 20525
 MEASURED OUTPUT POWER: 18.13 dBm = 0.065 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 31.13 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	V	-	-	-69.53	6.77	-62.76	80.9
2509.50	V	104	278	-48.30	7.65	-40.65	58.8

Table 7-15. Radiated Spurious Data (Band 5 – Mid Channel)

OPERATING FREQUENCY: 844.00 MHz
 CHANNEL: 20600
 MEASURED OUTPUT POWER: 17.45 dBm = 0.056 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 30.45 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	V	100	0	-70.16	6.79	-63.37	80.8
2532.00	V	107	257	-46.59	7.63	-38.96	56.4

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

FCC ID: ZNFUS701		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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OPERATING FREQUENCY: 1717.50 MHz
 CHANNEL: 20025
 MEASURED OUTPUT POWER: 23.33 dBm = 0.215 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 15.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 36.33 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]
3435.00	H	204	258	-65.84	9.88	-55.96	79.3
5152.50	H	-	-	-64.77	10.75	-54.01	77.3

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

OPERATING FREQUENCY: 1732.50 MHz
 CHANNEL: 20175
 MEASURED OUTPUT POWER: 23.71 dBm = 0.235 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 15.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 36.71 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3465.00	H	100	283	-65.80	9.91	-55.89	79.6
5197.50	H	-	-	-64.96	10.75	-54.22	77.9

Table 7-18. Radiated Spurious Data (Band 4 – Mid Channel)

FCC ID: ZNFUS701			FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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OPERATING FREQUENCY: 1747.50 MHz
 CHANNEL: 20325
 MEASURED OUTPUT POWER: 23.91 dBm = 0.246 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 15.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 36.91 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	100	257	-62.82	9.94	-52.88	76.8
5242.50	H	-	-	-64.11	10.72	-53.39	77.3

Table 7-19. Radiated Spurious Data (Band 4 – High Channel)

OPERATING FREQUENCY: 1857.50 MHz
 CHANNEL: 26115
 MEASURED OUTPUT POWER: 22.49 dBm = 0.178 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 15.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 35.49 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3715.00	H	-	-	-65.91	9.49	-56.42	78.9
5572.50	H	-	-	-65.13	11.08	-54.05	76.5

Table 7-20. Radiated Spurious Data (Band 25 – Low Channel)

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OPERATING FREQUENCY: 1882.50 MHz
 CHANNEL: 26365
 MEASURED OUTPUT POWER: 22.80 dBm = 0.191 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 15.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 35.80 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]
3765.00	H	-	-	-64.26	9.37	-54.89	77.7
5647.50	H	-	-	-65.18	11.23	-53.95	76.7

Table 7-21. Radiated Spurious Data (Band 25 – Mid Channel)

OPERATING FREQUENCY: 1907.50 MHz
 CHANNEL: 26615
 MEASURED OUTPUT POWER: 23.65 dBm = 0.232 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 15.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 36.65 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3815.00	H	-	-	-64.67	9.32	-55.35	79.0
5722.50	H	-	-	-64.71	11.35	-53.37	77.0

Table 7-22. Radiated Spurious Data (Band 25 – High Channel)

FCC ID: ZNFUS701		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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7.8 Frequency Stability / Temperature Variation

\$2.1055 \$22.355 \$24.235 \$27.54

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-D-2010. The frequency stability of the transmitter is measured by:

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

For Part 22, the frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ (± 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)	707,499,980	-20	-0.0000028
100 %		- 30	707,499,902	-98	-0.0000139
100 %		- 20	707,500,069	69	0.0000098
100 %		- 10	707,500,054	54	0.0000076
100 %		0	707,499,935	-65	-0.0000092
100 %		+ 10	707,500,082	82	0.0000116
100 %		+ 20	707,499,875	-125	-0.0000177
100 %		+ 30	707,500,138	138	0.0000195
100 %		+ 40	707,500,098	98	0.0000139
100 %		+ 50	707,500,039	39	0.0000055
BATT. ENDPOINT	3.45	+ 20	707,500,064	64	0.0000090

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

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Band 12 Frequency Stability Measurements
§2.1055 §27.54

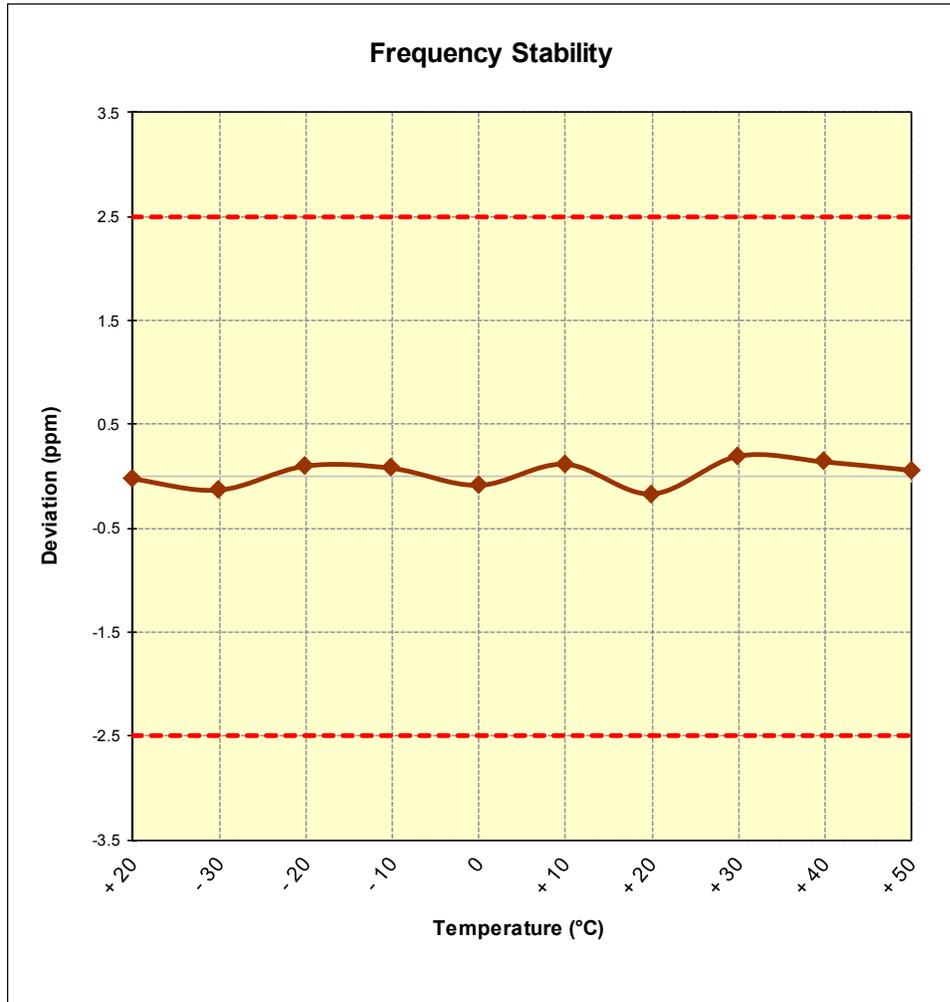


Figure 7-8. Frequency Stability Graph (Band 12)

FCC ID: ZNFUS701		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Band 13 Frequency Stability Measurements

§2.1055 §27.54

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

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	781,999,922	-78	-0.0000100
100 %		- 30	781,999,948	-52	-0.0000066
100 %		- 20	782,000,107	107	0.0000137
100 %		- 10	782,000,126	126	0.0000161
100 %		0	782,000,030	30	0.0000038
100 %		+ 10	781,999,859	-141	-0.0000180
100 %		+ 20	781,999,937	-63	-0.0000081
100 %		+ 30	781,999,883	-117	-0.0000150
100 %		+ 40	782,000,066	66	0.0000084
100 %		+ 50	782,000,030	30	0.0000038
BATT. ENDPOINT		3.45	+ 20	782,000,070	70

Table 7-24. Frequency Stability Data (Band 13)

FCC ID: ZNFUS701	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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Band 13 Frequency Stability Measurements
§2.1055 §27.54

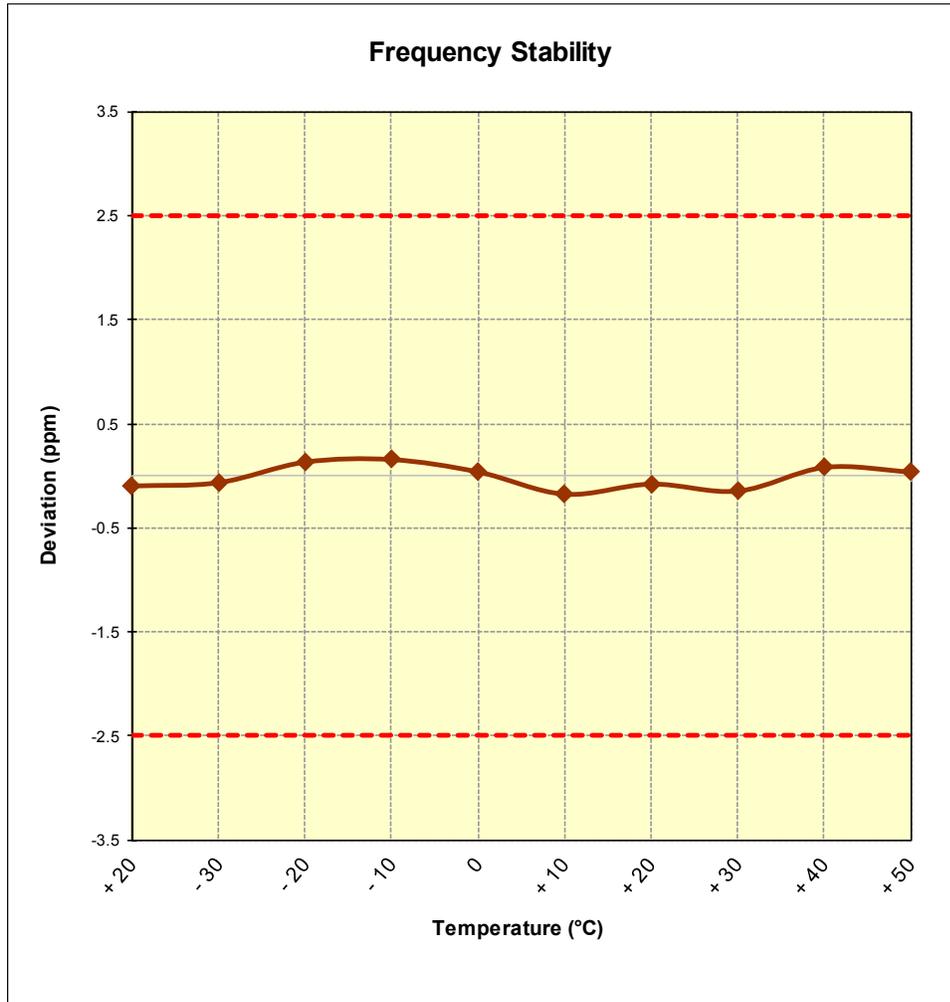


Figure 7-9. Frequency Stability Graph (Band 13)

FCC ID: ZNFUS701		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Band 5 Frequency Stability Measurements

§2.1055 §22.355

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

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	836,500,045	45	0.0000054
100 %		- 30	836,500,017	17	0.0000020
100 %		- 20	836,500,018	18	0.0000022
100 %		- 10	836,500,096	96	0.0000115
100 %		0	836,500,057	57	0.0000068
100 %		+ 10	836,500,107	107	0.0000128
100 %		+ 20	836,499,934	-66	-0.0000079
100 %		+ 30	836,499,927	-73	-0.0000087
100 %		+ 40	836,499,857	-143	-0.0000171
100 %		+ 50	836,499,910	-90	-0.0000108
BATT. ENDPOINT	3.45	+ 20	836,499,932	-68	-0.0000081

Table 7-25. Frequency Stability Data (Band 5)

FCC ID: ZNFUS701		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Band 5 Frequency Stability Measurements
§2.1055 §22.355

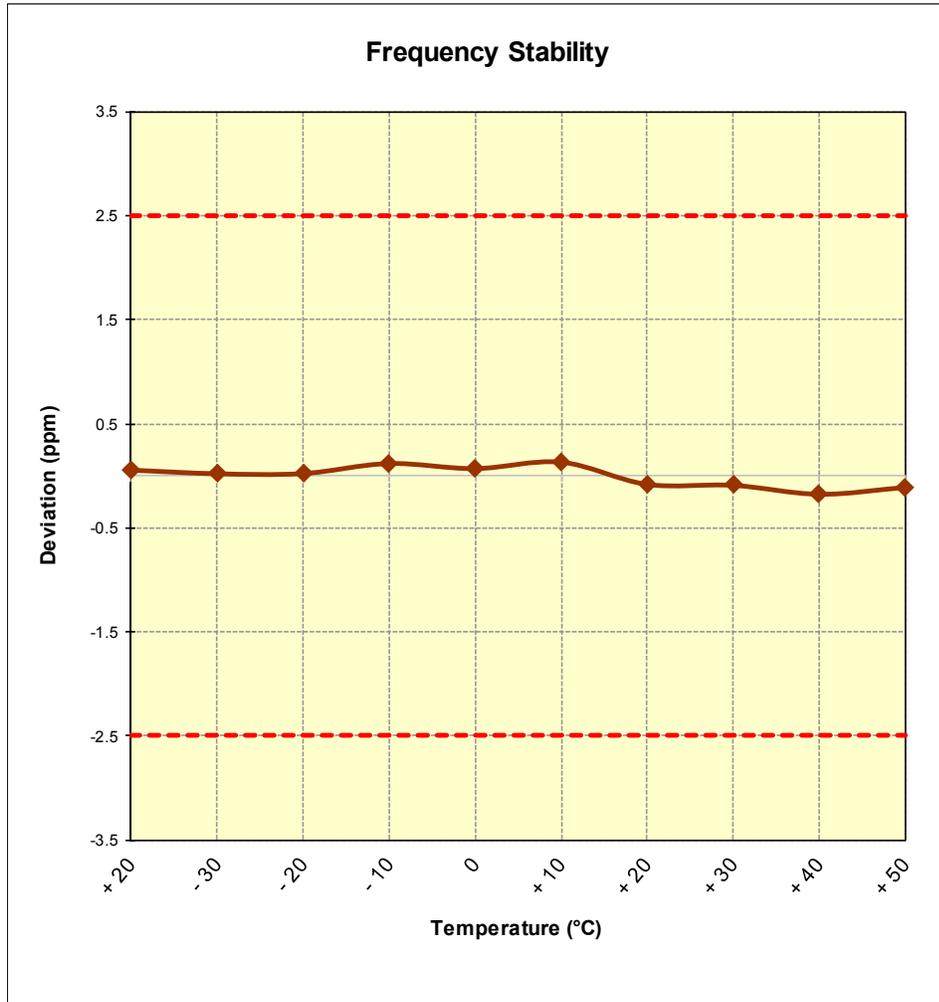


Figure 7-10. Frequency Stability Graph (Band 5)

FCC ID: ZNFUS701		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved 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)	1,732,500,039	39	0.0000023
100 %		- 30	1,732,500,006	6	0.0000003
100 %		- 20	1,732,500,133	133	0.0000077
100 %		- 10	1,732,499,940	-60	-0.0000035
100 %		0	1,732,499,977	-23	-0.0000013
100 %		+ 10	1,732,500,075	75	0.0000043
100 %		+ 20	1,732,500,066	66	0.0000038
100 %		+ 30	1,732,499,927	-73	-0.0000042
100 %		+ 40	1,732,499,899	-101	-0.0000058
100 %		+ 50	1,732,500,048	48	0.0000028
BATT. ENDPOINT	3.45	+ 20	1,732,499,857	-143	-0.0000083

Table 7-26. 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
§2.1055 §§27.54

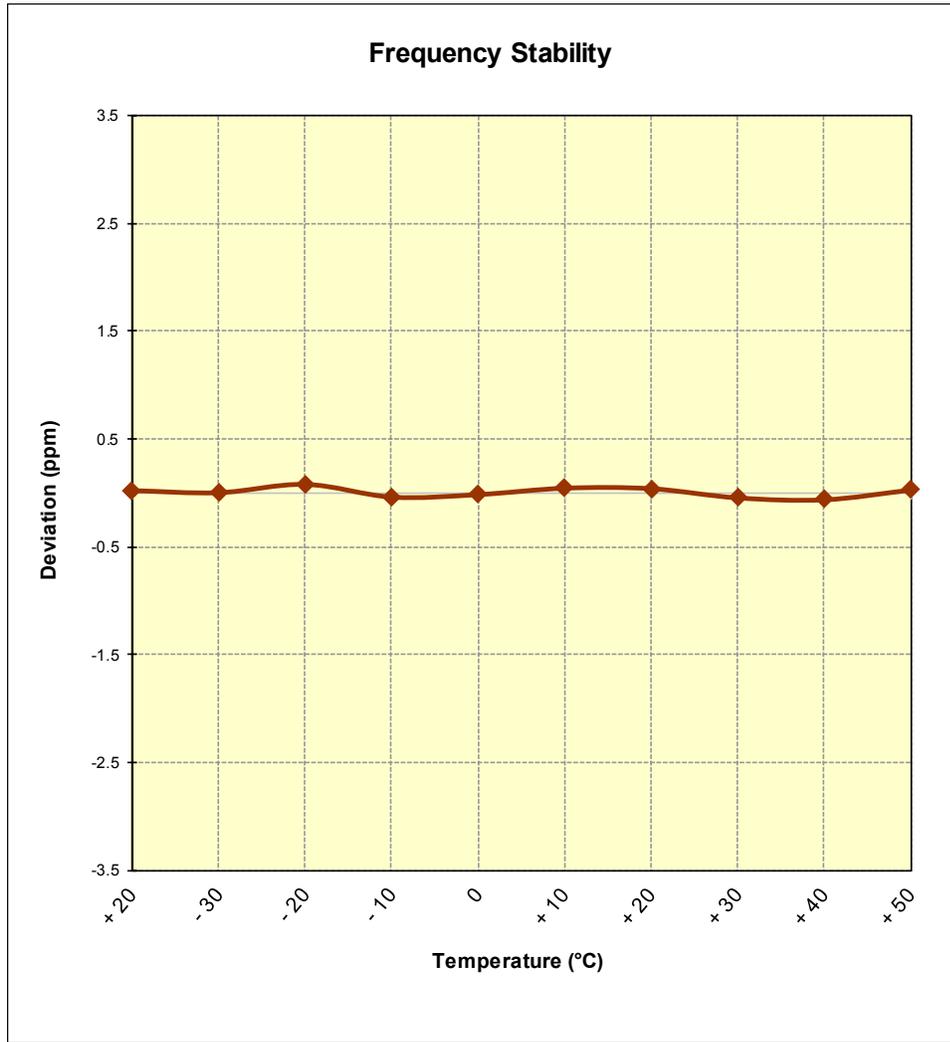


Figure 7-11. Frequency Stability Graph (Band 4)

FCC ID: ZNFUS701		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Band 25 Frequency Stability Measurements

§2.1055 §24.235

OPERATING FREQUENCY: 1,882,500,000 Hz
 CHANNEL: 26365
 REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,882,500,126	126	0.0000067
100 %		- 30	1,882,500,027	27	0.0000014
100 %		- 20	1,882,500,120	120	0.0000064
100 %		- 10	1,882,500,053	53	0.0000028
100 %		0	1,882,500,127	127	0.0000067
100 %		+ 10	1,882,499,977	-23	-0.0000012
100 %		+ 20	1,882,499,980	-20	-0.0000011
100 %		+ 30	1,882,500,144	144	0.0000076
100 %		+ 40	1,882,500,051	51	0.0000027
100 %		+ 50	1,882,500,051	51	0.0000027
BATT. ENDPOINT		3.45	+ 20	1,882,499,860	-140

Table 7-27. Frequency Stability Data (Band 25)

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: ZNFUS701		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Band 25 Frequency Stability Measurements
§2.1055 §24.235

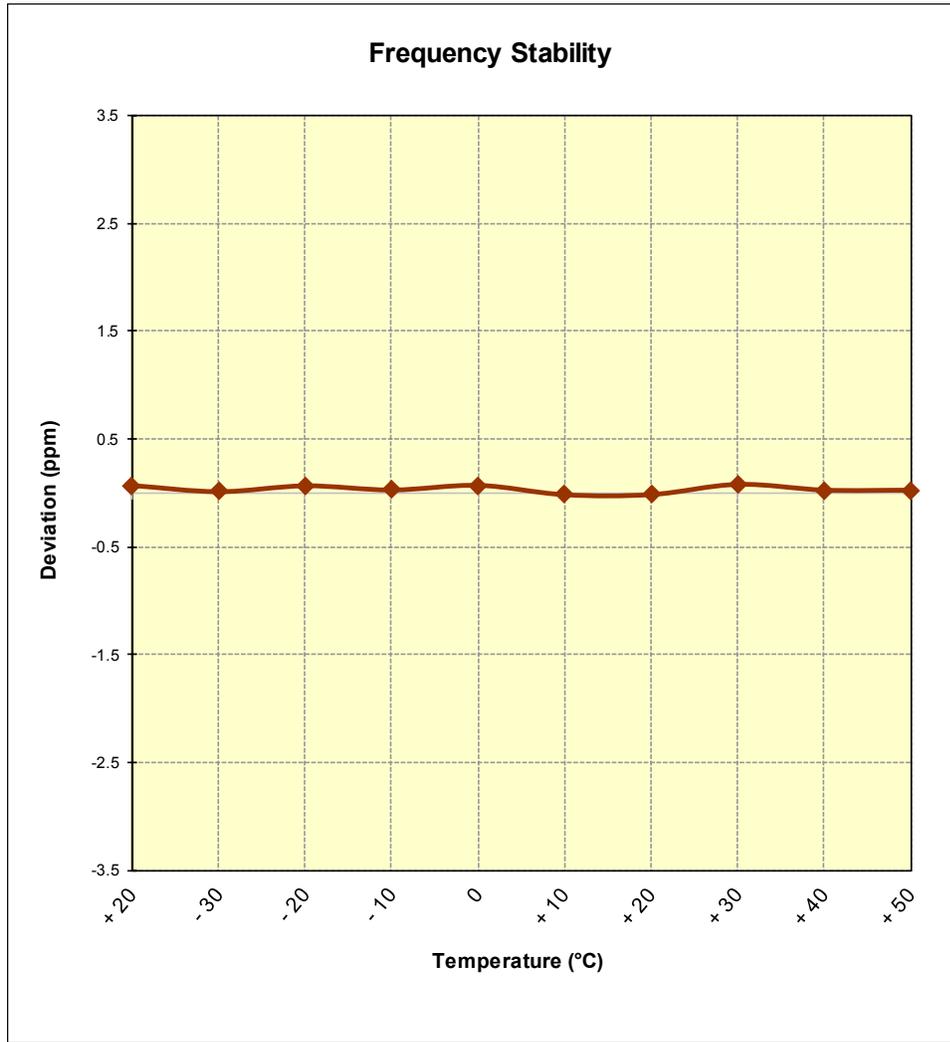


Figure 7-12. Frequency Stability Graph (Band 25)

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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: ZNFUS701** complies with all the requirements of Parts 22, 24, & 27 of the FCC rules for LTE operation only.

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